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Technical Memorandum

To/Attention	Michael Bobinsky, City of Portland	**Date**	August 22, 2014
From	Tegin Teich, IBI Group	**Project No**	34144
cc	Jeremiah Bartlett, Darryl Belz, Carl Eppich, Markos Miller, PAC	**Steno**	zm
Subject	Franklin Street Alternatives Analysis - Task 7		

1 INTRODUCTION

Franklin Street Feasibility Study Phase II, under an agreement between the City of Portland, Maine Department of Transportation (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 includes the development of a Preliminary Design Report (PDR), based on the final recommendations, for a section of Franklin Street between the Marginal Way intersection and 825 feet southeast of the Fox/Somerset Street intersection.

The study process, illustrated below, consists of ten tasks. In the tasks preceding this memorandum, the goals and objectives for the study were developed, and the existing conditions and future projections along Franklin Street were studied. Alternatives originally developed in the Phase I study were refined and further elaborated on for the purposes of preparing them for the evaluation of the alternatives leading to final recommendations. Four Public Advisory Committee (PAC) meetings and one public meeting were held to gather opinion on the priorities of people living, working and traveling near Franklin Street. Additional meetings were held with other stakeholders, including the Portland Bicycle and Pedestrian Advisory Committee (PBPAC), and operations personnel from police, METRO (the transit agency), and others.

This technical memorandum presents the results of Task 7, the analysis of the alternatives. In this task, the refined alternatives[2] were evaluated using metrics based on the project goals and stakeholder priorities[3]. This memorandum includes a brief summary of the alternatives being evaluated, a description of the evaluation process including the tool and metrics used, the results of the evaluation itself, a discussion of the evaluation results, and a summary of the next steps.

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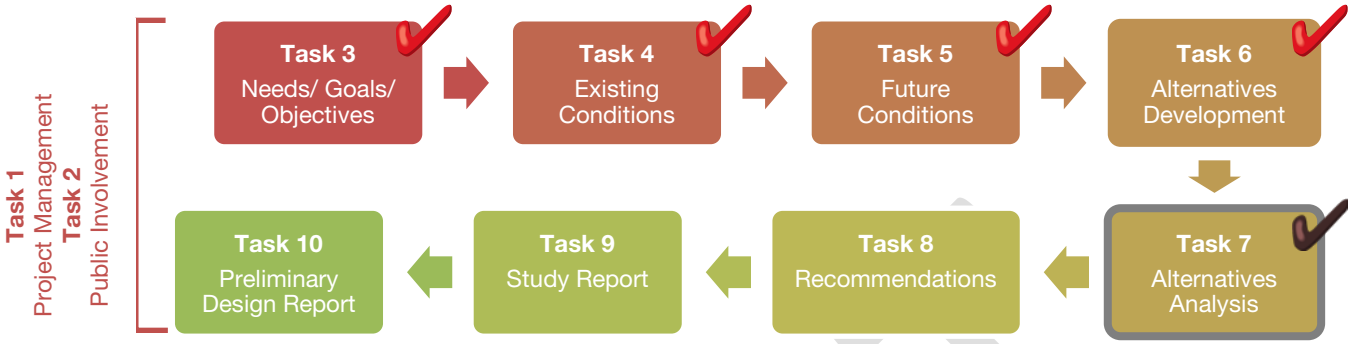
[1] Source: *RFP 313: Franklin Street Feasibility Study Phase II*, September 25, 2012, page 7.
[2] For more information on the refined alternatives for the study, see the Task 6 Memorandum, *Alternatives for Franklin Street,* submitted August 20, 2014.
[3] For more information on the goals and objectives of the study, see the Task 3 Memorandum, *Study Purpose and Need, Goals and Objectives, Evaluation Criteria, and Measures of Effectiveness,* submitted September 19, 2013.



1.1 Recap of Alternatives

This section provides a brief summary of the three alternatives that are described in greater detail in the Task 6 memorandum, *Alternatives for Franklin Street.* All three alternatives involved narrowing the right of way (ROW) for Franklin Street along most of the corridor, in particular reducing the number of lanes in the southern portion to accommodate the lower traffic volumes appropriately. Following a brief description of each alternative, an example cross section image is provided for each of them at the same location, illustrating the differences between them. The table summarizing various elements of the alternatives is included again here as Appendix A.

1.1.1 Alternative 1 – Urban Street Option 1

Envisioned as the most pedestrian oriented of the three alternatives, Urban Street Option 1 provides 22' wide sidewalks and on-street buffered bike lanes/cycle tracks. It incorporates maximum street reconnections for all modes. This alternative maximizes the development opportunities created by narrowing and realigning the ROW, allowing for large parcel sizes that can attract active mixed-use development. This alternative proposes to retain the current size of Lincoln Park, and utilizes the land across the street for active mixed use development.

1.1.2 Alternative 2 – Urban Street Option 2

The Urban Street Option 2 alternative balances transportation priorities with local neighborhood needs and development opportunities. It proposes the narrowest ROW width, which is achieved by providing a bi-directional off-street cycle track along the western sidewalk instead of on-street facilities. Sidewalks are limited to an adequate 10' that is usually wider than existing conditions. Only some streets are proposed to be reconnected for all modes. The rest are proposed as only pedestrian and bike connections. This alternative allows for smaller-scaled development opportunities due to smaller parcel sizes made available by the proposed ROW alignment. There remains high potential, however, for new development to better integrate the surrounding urban fabric. Lincoln Park is proposed to be partially expanded, while the land across the street is used for small-scaled development with an active edge.

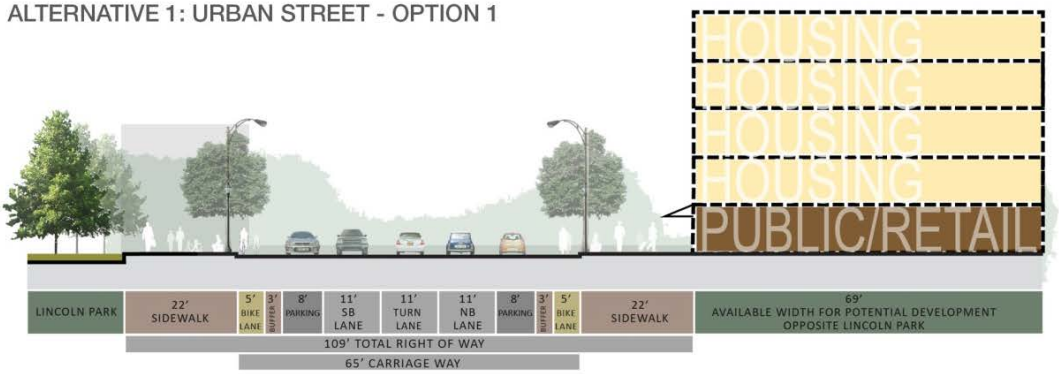
1.1.3 Alternative 3 – Urban Parkway

Prioritizing both transportation and open space needs, the Urban Parkway alternative focuses on maintaining higher mobility for automobile and transit users, while providing improvement for pedestrian and bicycle facilities. It proposes to retain the central median and use it as a median bi-directional bike path in the near-term, reserving it for potential future fixed guideway transit. Street reconnections are largely proposed for pedestrians and bicyclists only. In terms of development, the emphasis is more on open spaces. Lincoln Park is proposed to be

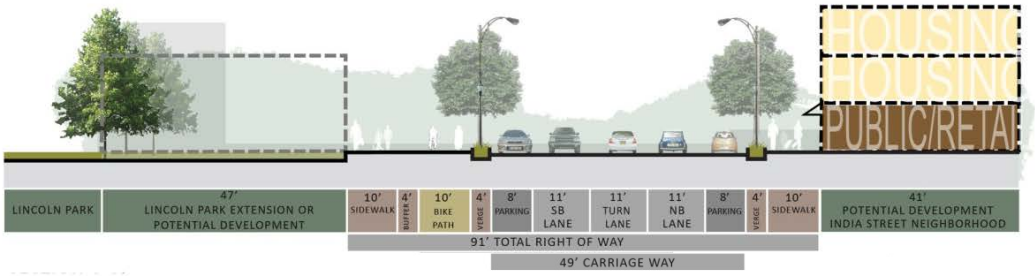
expanded as much as possible within geometric constraints. A form based code is proposed to enhance the quality of the street edge and improve the interaction between the street and surrounding neighborhoods.

SECTION CC' Franklin Street near Lincoln Park facing north

ALTERNATIVE 1: URBAN STREET - OPTION 1



ALTERNATIVE 2: URBAN STREET - OPTION 2



ALTERNATIVE 3: URBAN PARKWAY

KEY MAP - FRANKLIN STREET

2 EVALUATION PROCESS

2.1 Objectives of the Evaluation

This evaluation is intended to assess the ability of the three alternatives and the no-build baseline to meet the study's goals and objectives. Each of the five overarching goals has a number of objectives associated with it. The goals and objectives were developed based on collaboration between the City, MaineDOT, PACTS, the PAC, and the consultant team and were summarized in the Task 3 memorandum, *Study Purpose and Need, Goals and Objectives, Evaluation Criteria, and Measures of Effectiveness.* The ability to meet the broader goals and objectives is assessed in this evaluation through the use of qualitative and quantitative measures of effectiveness (MOEs) assigned to each objective. These MOEs were vetted with MaineDOT, the City of Portland, PACTS, and the PAC in advance and have been modified and honed as the study has progressed to be the best measures based on available data. The goals, objectives, and MOEs that were used for evaluation are all listed below and elaborated on further through the evaluation tool.

Goal	Obj#	Objective	MOE#	Measures of Effectiveness
GOAL 1: ACCESSIBILITY To improve the local and regional accessibility of people and the movement of goods	1A	To improve accessibility for all users of the corridor between the Franklin corridor and points within the city as well as regional destinations	1A.1	*Average speed for all trips to & from the study area*
			1A.2	*Number of east-west street connections between Franklin and adjacent north-south streets*
			1A.3	*Number of east-west public bike and pedestrian connections between Franklin and adjacent north-south streets*
			1A.4	*Number of sanctioned crossings across Franklin Street*
	1B	To improve local street network connectivity	1B.1	*Study area vehicle turning movements per vehicle-mile*
			1B.2	*Number of east-west street connections between Franklin and adjacent north-south streets*
			1B.3	*Average block length along Franklin Street*
			1B.4	*Number of sanctioned crossings across Franklin Street*
	1C	To encourage multimodal transportation	1C.1	*Auto LOS from Multimodal LOS tool*
			1C.2	*Transit LOS from Multimodal LOS tool*
			1C.3	*Bicycle LOS from Multimodal LOS tool*
			1C.4	*Pedestrian LOS from Multimodal LOS tool*
			1C.5	*Fraction of trips to/from the study area by car*
	1D	To improve current and future transit operations and access	1D.1	*Average transit operating speed in the study area*
			1D.2	*Transit vehicle-miles operated in the study area in the AM and PM peaks*
			1D.3	*Fraction of trips to/from the study area by transit*
			1D.4	*Does not preclude accommodating a range of future transit options (in terms of ROW)*

Goal	Obj#	Objective	MOE#	Measures of Effectiveness
	1E	To expand quality and quantity of pedestrian and bicycle facilities	1E.1	*New sidewalk length within the study area*
			1E.2	*New marked/dedicated bike facilities length*
			1E.3	*New non-sidewalk walkway length in the study area*
			1E.4	*New separated bikeway or bike path length in study area*
	1F	To not worsen the capacity and LOS compared to the future capacity and LOS of the current configuration of the corridor	1F.1	*Average speed of vehicular traffic in the study area (AM and PM peaks)*
			1F.2	*Number of intersections on Franklin Street at or below LOS 'E' in the AM or PM peak hour*
			1F.3	*MMLOS along Franklin: number of modes worse than Baseline*
GOAL 2: URBANISM AND LAND USE To enrich the urban fabric of the city through respectful, compact, and sustainable development	2A	To provide a memorable urban gateway or entry to Downtown Portland	2A.1	*Qualitative rating of the urban gateway or entry (lowest ranking for no gateway)*
			2A.2	*Presence of identifiable placemaking elements such as street furniture and art installations*
	2B	To respect and enhance the built heritage	2B.1	*Number of enhanced historical/heritage/cultural sites*
			2B.2	*Number of historical/heritage/cultural sites adversely impacted*
	2C	To promote mixed-use development	2C.1	*Extent to which zoning strategy amenable to mix-use development*
			2C.2	*Area of land made newly available that is suitable (i.e. adjacent to appropriate properties, of appropriate dimensions) for residential or mixed use development*
	2D	To foster a compact, pedestrian-scaled environment	2D.1	*Sidewalk area as fraction of total paved area (percent)*
			2D.2	*Maximum building heights (stories) along Franklin Street*
			2D.3	*Portion of the total street frontage that is potentially active*
			2D.4	*Typical ROW widths (ROW width N to S)*
	2E	To promote easy-to-understand wayfinding or navigation along the corridor and between major destinations	2E.1	*Number of east-west bike and public pedestrian connections between Franklin and adjacent north-south streets*
	2F	To provide high-quality, aesthetically attractive, contextually appropriate urban design	2F.1	*Qualitative evaluation of landscaping, storm water drainage system, street lighting, and public amenities*
			2F.2	*Extent of identifiable placemaking elements such as street furniture and art installations*
	2G	To promote seamless integration between the streetscape and adjacent land uses	2G.1	*Extent to which adjacent land uses have the potential to add architectural character (historic or other) to the streetscape*
			2G.2	*Extent to which adjacent land uses have the potential to allow spillover of pedestrian-scaled activities onto Franklin Street*
	2H	To provide a balance between the different uses on the corridor	2H.1	*Opportunity to improve land use mix based on new development potential*

Goal	Obj#	Objective	MOE#	Measures of Effectiveness
GOAL 3: ENVIRONMENT AND ENERGY To conserve and efficiently use nonrenewable energy resources, protect the environment, and improve the urban quality of life	3A	To reduce the negative effect of through traffic using neighborhood streets	3A.1	*Fraction of study area vehicle-miles on streets designated as 'neighborhood streets' and in the PACTS network*
			3A.2	*Turning movements between Franklin Street and designated 'neighborhood streets'*
	3B	To reduce the number of trips by single-occupancy vehicles	3B.1	*Fraction of trips to/from the study area by car*
	3C	To improve the efficiency of transportation on the corridor and reduce overall energy consumption related to transportation activities	3C.1	*Average speed of vehicular traffic in the study area (AM and PM peaks)*
			3C.2	*Person-miles traveled per vehicle-mile along Franklin Street*
	3D	To enhance the corridor's green space	3D.1	*Percentage of green space that is usable in the study area*
			3D.2	*Acres of green space in the study area*
			3D.3	*Number of access points to green space within study area*
	3E	To design a roadway that anticipates storm surge and sea level rise	3E.1	*Impact of storm surge will not be worse given proposed corridor alignment*
			3E.2	*Impact of sea level rise will not be worse given proposed corridor alignment*
			3E.3	*Sewer and storm drainage facilities ability to accommodate storm surge and sea level rise*
	3F	To activate Lincoln Park for a broad set of users	3F.1	*Extent to which streetscape and land use recommendations are conducive to active use of Lincoln Park*
			3F.2	*Square feet of additional usable space added to Lincoln Park*
			3F.3	*Number of access points to Lincoln Park*
GOAL 4: HEALTH AND SAFETY To provide a healthy and safe urban environment in which to live and work	4A	To promote physical activity	4A.1	*New sidewalk length within the study area*
			4A.2	*New marked/dedicated bike facilities length*
			4A.3	*Number of access points to existing trail network*
	4B	To enhance safety for all modes	4B.1	*Total pedestrian/auto exposure index (EI) along Franklin*
			4B.2	*New separated bicycle facilities length*
	4C	To reduce vehicular speeds	4C.1	*Average speed of vehicular traffic in the study area (AM and PM peaks)*
			4C.2	*Average speed of vehicular traffic along Franklin Street (AM and PM peak)*

Goal	Obj#	Objective	MOE#	Measures of Effectiveness
GOAL 5: COMMUNITY AND ECONOMIC DEVELOPMENT To foster community improvement and enhance social prosperity of the local economy in an equitable way	5A	To enhance the livability and vitality of the corridor and surrounding neighborhoods	5A.1	*Qualitative assessment of increase in pedestrian use of the street due to transportation and land use changes*
			5A.2	*Portion of the total street frontage that is attractive to active pedestrian oriented development*
			5A.3	*Extent to which zoning strategy amenable to mix-use development*
			5A.4	*Number of east-west public pedestrian connections between Franklin and adjacent north-south streets*
	5B	To improve connectivity of transit to the Casco Bay Terminal	5B.1	*Average walk and wait time for transit service from Casco Bay Terminal in the AM and PM peaks*
	5C	To preserve and strengthen the unique character of neighborhoods	5C.1	*Qualitative assessment of enhancement of existing neighborhood characteristics through proposed land use and transportation recommendations*
	5D	To improve access to employment, community, and institutional centers of activity	5D.1	*Number of designated 'activity centers' that lose access*
			5D.2	*Number of 'activity centers' that gain access*
			5D.3	*Average speed for all trips to & from the study area*
	5E	To protect neighborhoods through community-sensitive infrastructure	5E.1	*Qualitative assessment of appropriateness of scale of streets*
			5E.2	*Qualitative assessment of appropriateness of scale of development*
			5E.3	*Qualitative assessment of portion of low income community impacted by changes*

2.3 The Evaluation Tool

A tool was developed using Excel to allow for the calculation and comparison of all MOEs. This tool and the results are shown in Section 3. The full evaluation tool is provided in Appendix B. Each MOE required either quantitative input, the value of which is shown in the INPUT columns, or a qualitative evaluation based on a scale of 0-4 (zero being completely unsatisfactory and 4 being excellent).

- The **quantitative inputs,** shown in the full matrix in Appendix B, are translated into relative scores on a scale of 0 to 100 to allow for comparison between the alternatives without setting absolute benchmarks. Sometimes this relative scoring exaggerates what might be a small difference in the inputs. If this is so, it will be marked as an "A" in the notes section or commented on in a narrative format.
- The **qualitative inputs**, shown in the full matrix in Appendix B, are translated as 0=0, 1=25, 2=50, 3=75, or 4=100 to put them on the same 0 to 100 scale as the quantitative measures.

Depending on the way an MOE is worded, sometimes the maximum value among the alternatives receives the highest score, and sometimes the minimum value. The "best" score in each category has been highlighted in the tables.

Each objective has been weighted, based on prioritization that PAC members expressed through an online Google Groups discussion. PAC members commented on the order of importance of each objective within a goal. Votes were tallied and a weighted average was used to come up with a relative weight for each objective.

Overall scores can be traced all the way back to the MOE. First, scores were determined for each MOE. Then, the weighted objective score was based on the average of all of the individual MOE scores for that objective times the weight for the objective. The total score for the goal was based on a sum of each objective's weighted score. Finally, the overall score was based on the average of all of the goal scores, assuming each goal was weighted equally. A goal-level weight also could have been applied if desired.

This tool was designed to be adaptable. Any MOE can be removed and the results will still be available for those that remain. That weighting can be easily changed if priorities shift. Cost is considered separately at the bottom of the table, outside of the weighted average for all of the goals. These costs are based on high level cost estimates developed by Gorrill-Palmer Consulting Engineers, and are included in Appendix C.

2.4 Quantitative Measures

Several analyses were critical for supplying data for the quantitative measures. Of the quantitative MOEs, about 40 were based on transportation measures, including level of service (LOS), speed, number of connections, turning movements, number of trips, facility type lengths, vehicle-miles, person-miles, mode choice, a project-specific exposure index, average travel times, and right of way widths. Some measures were repeated for more than one objective. In some cases, measures were used in different ways; for example, in the case of safety-related objectives, lower traffic speeds were considered desirable, but in the case of accessibility-related objectives, higher traffic speeds were considered desirable. This use of these measures allowed the team to assess the trade-offs between specific objectives.

The analysis of projected traffic volumes was an important component of the project, as well as a source of some contention. The project team was tasked with developing recommendations that served the goals of the project but would not result in the LOS as defined by the *Highway Capacity Manual* (HCM) being worse for any of the alternatives than in the future baseline (no-build) case. It was necessary to carry out traffic modeling to ensure this criterion was met. In addition, it was important to understand the multimodal (not just the vehicular) level of service. There are a variety of ways in which the team examined conditions for pedestrians, cyclists,

transit users, and automobile drivers, including a Multimodal Level of Service (MMLOS) measure, as well as various other indicators such as availability of dedicated facilities (sidewalks, bike lanes, etc.) and a modified "exposure index" to provide an assessment of safety on the corridor. They are described in the following sections.

2.4.1 Transportation Modeling and Level of Service Analysis

The project team worked with Kevin Hooper and Associates to update the PACTS regional travel demand model to the 2035 design year for the study. The PACTS model follows a traditional four-step process: trip generation, trip distribution, mode split, and traffic assignment. This model was used to develop traffic forecasts, which could then be used as inputs into a micro-simulation model.

The traffic simulation model was developed and updated by Gorrill-Palmer Consulting Engineers for the purposes of estimating vehicular LOS for this project (see Appendix D for Design Hour Volumes used for the analysis). In addition, IBI Group used the *CompleteStreets* software released by Dowling Associates, Inc., to estimate the MMLOS (see Appendix E for results). The 2035 baseline (no-build) forecasts served as the baseline against which to compare the alternatives, which were also based on a 2035 design year.

The methodology for the MMLOS analysis follows the guidelines presented in *National Cooperative Highway Research Program Report 616 Multimodal Level of Service Analysis for Urban Streets*. While they are measured differently, both the HCM and National Cooperative Highway Research Program (NCHRP) methods provide the results for the vehicular and MMLOS in terms of letter grades "A" through "F", with "A" representing the best quality of service, and "F" the worst. The MMLOS provided grades for each mode, including pedestrians, transit users, and cyclists, but did not provide an overall weighted score across modes of travel.

An important note is that LOS results should always be considered in the context of goals and objectives for a study area. In some cases, particularly in an urban context, LOS results indicative of increased vehicular delay are often considered acceptable. In the case of the Franklin Street Feasibility Study Phase II, the contract between MaineDOT, the City of Portland, and PACTS only stated that the LOS should not be worse than the future baseline (no-build) condition. If an LOS was "F" in the no-build case, it would not necessarily need to be targeted for improvement in the alternatives.

2.4.2 Exposure Index

The study team recognized a need for a specific safety metric. For the purposes of this study, IBI Group developed an "exposure index" to consider both pedestrian and vehicular safety. It was adapted and simplified from the Federal Highway Administration's (FHWA) Highway Safety Model.[4] The exposure index took into consideration available data sources, and included:

- Highway traffic volumes along Franklin;
- Highway traffic volumes on streets crossing Franklin;
- Pedestrian volumes at intersections along Franklin;
- Pedestrian volumes at mid-block crossings of Franklin; and
- Number of curb access points along Franklin.

[4] AASHTO. *Highway Safety Manual*, 1st Edition. American Association of State Highway Transportation Officials, Washington, D.D., 2010

The index provided a sense of a relative increase or decrease in safety for pedestrians and vehicles when compared to the future baseline (no-build) case, based primarily on projected volumes. The Exposure Index analysis methodology is included in Appendix F.

2.4.3 Development Opportunities

The three ROW alternatives were analyzed on the basis of new development opportunities and possible land use patterns created as the result of realignment. The change in the land utilization due to ROW realignment was mapped for each of the alternatives, and assigned to the three following categories, which are described in more detail in the following subsections:

1. New development opportunities: land freed up as a result of narrowing and shifting of the ROW
2. Area taken by ROW alignment: previously free/occupied land taken by the new ROW alignment and street reconnections
3. Infill opportunities: presently underutilized land

2.4.3.1 New development opportunities

The new development opportunities formed as a result of re-alignment of ROW were organized in three broad categories:

- *New developable land without consolidation*: This category includes new parcels having the smaller dimension (depth) greater than 40 feet. These parcels were identified as ready for development without any additional consolidation with existing parcels. They are suitable for larger mixed use developments.
- *New developable land after consolidation*: This category includes new parcels having the smaller dimension (depth) less than 40 feet but more than 10 feet. These parcels are contiguous with existing infill opportunities and can be developed after consolidation with the existing parcels. On their own, only some of them are suitable for mid- and small-scale infill developments along Franklin Street.
- *Parcels unusable for development*: This category includes new parcels having the smaller dimension (depth) less than 10 feet. These are not suitable for any kind of built development. They can, however, be consolidated with the existing ROW or existing parcels to form smaller urban plazas and open spaces along the Franklin street.

2.4.3.2 Area taken by ROW alignment

In all three alternatives some amount of land has been taken from existing parcels to achieve the new alignment and street reconnections. The Urban Street options look at reconnecting the east-west street network as well as few north-south streets parallel to the Franklin street, like Wilmont and Pearl Street, and therefore have a greater amount of land area taken by ROW alignment. The Urban Parkway alternative looks at providing only pedestrian and bicycling reconnections, requiring smaller footprints to be taken from existing parcels.

2.4.3.3 Infill opportunities

Infill opportunities were identified within a depth of two blocks to the east and west of Franklin Street. These parcels are organized in two broad categories.

- *Stand-alone infill opportunities*: This category includes infill parcels with smallest dimension (depth) greater than 40 feet. These parcels are large enough for independent

mixed use infill opportunities. Most of these parcels comprise the under-utilized surface parking lots and open lands around the existing development.

- *Infill development opportunities after consolidation*: This category includes smaller infill parcels having a depth less than 40 feet. These mainly comprise unusually large setbacks left by the existing development. These parcels have the potential to be consolidated with the new parcels mentioned above resulting in mid to large sized development opportunities.

2.4.3.4 Summary of Development Opportunities

A summary of the development opportunities analysis for the three alternatives is presented in the table below.

		Alternatives		
		Urban Street 1	**Urban Street 2**	**Urban Parkway**
	Parcel Formation			
1	Total Infill Parcels (SFT)	685,000	660,000	564,000
2	Total New Parcels (SFT)	168,000	190,000	145,000
3	Total Area to be taken by ROW alignment (SFT)	155,000	130,000	86,000
	Development Opportunities			
A	Total New Developable Land Made Available without Consolidation (SFT)	42,000	79,300	70,500
B	Potential Developable Land Made Available After Consolidation (SFT)	300,000	289,700	167,000
C	Parcels created that are unsuitable for development(SFT)	20,000	19,500	35,500
D	Total stand-alone infill opportunities	491,000	461,500	436,000
	Total Development Opportunity (A+B+D) (SFT)	**833,000**	**830,500**	**673,500**

2.4.4 Public Realm Improvement Opportunities

Public realm improvement opportunities were identified through quantitative and qualitative measures. The sizes of sidewalks, number of public plazas, available building frontage are all quantities that were used to compare the no-build and the three alternatives in terms of their influence on the public realm. Improvements in connectivity to the neighboring activity centers and neighborhood streets through an enhanced public realm were measured and included. Any effect of historic places and public places was also measured through a count of the number of such places affected.

2.5 Qualitative Measures

The urban design vision of each alternative was refined to a level that would allow qualitative comparison between the alternatives. In particular, this included the following elements:

The urban gateway – the scale of development combined with the ROW widths were used to determine the potential of each alternative for creating the feeling of entering an urban setting.

Placemaking elements – the space and opportunities available to install street furniture and art installations in each alternative were used to determine the potential for placemaking.

Quality of landscaping – the extent and type of landscaping possible, combined with storm water drainage systems, street lighting, and other public amenities were used to determine the quality of proposed landscape.

Active uses – the size of new development parcels and building scale were used to identify the potential of each alternative to attract active uses.

Community enhancement – the type of land use and transportation changes possible in each alternative were used to determine how much Franklin Street could contribute for enhancement of neighborhood characteristics. The appropriateness of the scale of the streets and development was determined through comparison with the characteristics of the surrounding neighborhood.

3 ALTERNATIVES ANALYSIS

This section provides the evaluation scores for each objective under each goal. The detailed evaluation tool, showing all Measures of Effectiveness (MOEs) under each objective for each goal, is provided in Appendix B. The tables below show the weight for each of those objectives and the resulting numerical score for each alternative and the no-build option. Where applicable, superscripts have been provided for the objectives, to indicate specific assumptions or considerations that influence the interpretation of the scores for that objective. The scores are summed to show the overall scores for the goal. In each table for each goal, the highest scores for each objective and total are in bold text and highlighted in green. In addition, some preliminary observations and recommendations are offered on the evaluation results to provide some sense of how these results will guide the final recommendations. These preliminary recommendations will be discussed with the PAC and public, along with additional unresolved issues, before developing final recommendations in the next task.

3.1 Evaluation Results

GOAL 1: ACCESSIBILITY

To improve the local and regional accessibility of people and the movement of goods

Objectives	1A Access to City and Regional destinations	1B Local street network connectivity	1C[a] Multi modal transportation	1D Current and future transit operations	1E Pedestrian and Bicycle facilities	1F Capacity and LOS	Total
Weight	*27%*	*20%*	*14%*	*11%*	*15%*	*13%*	*100%*
No build	7	2	3	2	0	4	**18**
Urban Street 1	**21**	**20**	7	6	**12**	7	**72**
Urban Street 2	14	9	**8**	8	10	7	**56**
Urban Parkway	7	3	2	**9**	8	9	**38**

a. The LOS F for Option 1 does not represent the potential benefit of the shuttle bus operation on Pearl Street.

Preliminary Recommendations: Urban St Option 1 ranks best for accessibility, largely because it allows for the greatest reconnection of the street network. However, after further modeling, it may be found that not all reconnections are feasible given the requirement to not worsen LOS compared to the future no-build option.

Modeling results were inconclusive because of significant traffic issues at Marginal Way and Franklin Street where traffic queues extended beyond the network used in the model. Once a solution is found for Marginal Way, it can be combined with other recommendations related to reconnections and assessed for new LOS measures.

In addition, the addition of a shuttle along or parallel to Franklin Street is recommended based on the goals but needs to be discussed further in terms of tradeoffs considering cost and potential additional conflicts/challenges for bicycles and automobiles.

In terms of bicycle and pedestrian facilities, PBPAC feedback as well as the evaluation indicates that buffered on-street bicycle facilities are preferred. Sidewalks are preferred to be 10’ to 12' on the corridor, with some wider sections where plaza space is warranted south of Congress Street.

GOAL 2: URBANISM AND LAND USE

To enrich the urban fabric of the city through respectful, compact, and sustainable development

Objectives	2A Provide Urban Gateway	2B Enhance Built Heritage	2C Promote Mixed Use Development	2D Pedestrian Scale	2E Wayfinding and Navigation	2F Appropriate Urban Design	2G Integrated Street scape and land use	2H Balance between different uses	Total
Weight	*10%*	*16%*	*11%*	*12%*	*9%*	*11%*	*16%*	*15%*	*100%*
No build	0	8	0	0	0	4	0	0	**12**
Urban Street 1	**7**	14	**11**	**11**	**9**	**8**	**16**	13	**89**
Urban Street 2	**7**	15	**11**	8	**9**	**8**	14	**15**	**87**
Urban Parkway	2	**16**	7	5	**9**	6	7	9	**60**

Preliminary Recommendations: The Urban Street alternatives provide the most opportunity to enhance urbanism and improve land uses, contextualizing the urban realm more to the existing fabric surrounding it. These alternatives include a narrower ROW, balancing the expansion of Lincoln Park with development needs, mixed use zoning strategies, and high quality plaza space. These are, therefore, all likely recommendations. The three-to-four story building heights are generally considered most appropriate.

GOAL 3: ENVIRONMENT AND ENERGY

To conserve and efficiently use non-renewable energy resources, protect the environment, and improve the urban quality of life

Objectives	3A Reduce impact of through traffic	3B Reduce SOV trips	3C Improve transportation efficiency	3D Enhance green space	3E[b] Roadway handling Storm surge and sea level rise	3F Activate Lincoln Park	Total
Weight	*17%*	*14%*	*32%*	*11%*	*11%*	*15%*	*100%*
No build	**17**	**14**	16	4	0	0	**50**
Urban Street 1	0	0	0	6	**8**	11	**25**
Urban Street 2	3	0	**17**	6	**8**	**13**	**47**
Urban Parkway	11	0	6	**9**	**8**	11	**44**

b. Measures were based on assumption and/or could not be assessed at current level of design.

Preliminary Recommendations: In the case of environment and energy, the measures favor the no-build/baseline primarily because all of the alternatives actually result in an increase in vehicle trips, due to the changes in development and the road network, and some of which disperse

onto the neighborhood streets. These outcomes are not considered as desirable when using typical environmental and energy related measures. No-build also includes the largest amount of green space due to the existing median, but more thoughtful assessment would acknowledge that the current median is not likely the best use of space. Because PAC discussion about the retention of the median has indicated preference towards development and accessibility goals, recommendations will still likely include a reconnected Urban Street solution over the future baseline (no-build) solution. These results do indicate that the final design should include careful consideration of stormwater management and other environmental concerns and at a minimum. These results also suggest that Lincoln Park should be at the very least enhanced if not expanded.

GOAL 4: HEALTH AND SAFETY

To provide a healthy and safe urban environment in which to live and work

Objectives	4A Promote Physical Activity	4B Enhance Safety for all modes	4C Reduce vehicle speed	Total
Weight	*24%*	*51%*	*25%*	*100%*
No build	0	25	0	**25**
Urban Street 1	**24**	36	**25**	**85**
Urban Street 2	21	**42**	24	87
Urban Parkway	13	16	15	**45**

Preliminary Recommendations: In terms of health and safety, the Urban Street alternatives provide the preferred bicycle and pedestrian facilities, with details already discussed in the Goal 1: Accessibility results. Note that the exposure index measure indicates the signalized reconnection as well as bicycle and pedestrian reconnections at intersections are preferred over unsignalized intersections or midblock reconnections.

GOAL 5: COMMUNITY AND ECONOMIC DEVELOPMENT

To foster community improvement and enhance social prosperity of the local economy in an equitable way

Objectives	5A Enhance Livability and Vitality	5B Improve transit to Casco Bay Terminal	5C Enhance neighborhood character	5D Access to employment, community and activity centers	5E Community sensitive infrastructure	Total
Weight	*33%*	*12%*	*13%*	*24%*	*18%*	*100%*
No build	0	0	0	**16**	0	**16**
Urban Street 1	**33**	**12**	**13**	**16**	10	**84**
Urban Street 2	32	**12**	**13**	14	**15**	**86**
Urban Parkway	19	0	3	12	6	**40**

Preliminary Recommendations: Urban Street Option 1 and Option 2 focus on creating a more integrated and connected network, as well as more development opportunity, and therefore rank best in terms of community and economic development. Urban Street Option 2 seeks to continue the surrounding scale of development in the Franklin Street study area, and hides Franklin Towers, creating a more harmonious urban fabric. This goal should be pursued in the final recommendations.

3.2 Overall Summary of Scores

Goals	No build	Urban Street 1	Urban Street 2	Urban Parkway
1: Accessibility	18	72	56	38
2: Urbanism and Land Use	12	89	87	60
3: Environment and Energy	50	25	47	44
4: Health and Safety	25	85	87	45
5: Community and Economic Devp	16	84	86	40
TOTAL	**24**	**71**	**73**	**46**

As indicated in the discussion for each goal, overall, the Urban Street approaches rank better than the no-build or Urban Parkway. Because of this, recommendations will likely lean more toward greater reconnection, enhanced bicycle and pedestrian facilities, and preference for development opportunity with enhanced if not greatly expanded green spaces. Although Urban Street Option 2 ranks highest overall, the final recommendations will likely take into account the best features from the various alternatives to come up with a design that best meets all of the goals of the study.

4 DISCUSSION

There are shortcomings to basing an assessment on the numerical scores summarized in the previous section. For example, the exaggeration of small differences in relative scorings mentioned might indicate a stronger preference for a solution than there really should be as indicated by stakeholder input. Because of these shortcomings, recommendations should not be based on the numerical values alone. The narrative included in each “Preliminary Recommendations” section acknowledges some conflicts between the objectives as well as incorporates additional feedback received from stakeholders outside of these measures. In addition, the evaluation did not resolve all questions and issues. Some remaining points for discussion that have not yet been resolved either by stakeholder input or the numerical rankings are discussed further below.

These became topics for the the next PAC and Public meetings scheduled on September 23 and October 1, 2014 and the feedback from those meetings will be incorporated into the final recommendations.

4.1 Traffic

There is remaining analysis to be done to obtain a working traffic solution that is compatible with other goals and objectives. None of the traffic models for the alternatives were operating at an acceptable level, primarily given to challenges at Marginal Way. Once a solution is developed for Marginal Way, other recommendations may be affected.

4.2 Accessibility and safety

There is a key tradeoff between accessibility objectives and those related to safety and traffic flow because of the way that they are measured in this tool. None of the modeled reconnections across Franklin Street (Lancaster, Oxford, Newbury, and Federal) would meet the requirements for signal warrants. Therefore, any reconnections of side streets for accessibility purposes, whether full vehicular or pedestrian/bicycle only, would initially be proposed to be unsignalized and therefore would be expected to introduce additional conflicts and disruption to traffic flow. Traffic diversion is another concern. This is a notable tradeoff that warrants further discussion; however, as long as the LOS does not worsen in the alternatives compared to the future baseline (no-build), it is recognized that the goals and PAC feedback tend to favor providing reconnections where feasible.

4.3 Transit

The decision to provide a transit shuttle on Franklin Street or a parallel street, while recommended to achieve certain goals, will likely be a policy decision as well a decision based on cost and requires further discussion with the City and METRO. The predicted benefit in terms of immediate ridership is small. It should also be further discussed whether it is preferred to operate a shuttle on Franklin Street or a parallel route based on potential conflict with other vehicles and bicycles.

4.4 Bicycle and Pedestrian Facilities

The PBPAC provided detailed recommendations on both pedestrian and bicycle facilities, including the preference for buffered on-street bicycle lanes that merge into traffic lanes at intersections over off-street paths. These recommendations are taken into account in the Preliminary Recommendations narratives and lead us to recommending on-street bicycle facilities and relatively consistent 10’ to 12’ sidewalks, which may not be the same conclusion reached by looking at the MOEs alone.

4.5 New Development Calculations

Many of these measures, including the estimates of new developable land and costs, are based on conceptual plans at a very rough level of detail. The numerical inputs provide us with an ability to compare the alternatives to the no-build scenario, but should not be taken as final absolute numbers.

4.6 Alignment

The roadway alignment remains to be finalized, independent of traffic considerations and lane configurations. There was quite a bit of consensus on this in the PAC’s Google Groups discussion, but a final recommendation on the Lincoln Park expansion is needed before finalizing the alignment. In the evaluation tool, some objectives lead to an assessment that development is preferred over the expansion of the park and vice versa.

5 NEXT STEPS

A PAC and Public Meeting will be held in September and October. After these meetings, all feedback will be incorporated in the next task, which is to develop the final recommendations.

The next deliverable, the Final Recommendations report, will be the final deliverable before moving onto the PDR for the portion of the corridor between the Marginal Way intersection and 825 feet southeast of the Fox/Somerset Street intersection.

APPENDIX A: ALTERNATIVES ELEMENTS TABLE

Elements	Alternatives		
	Urban Street Option 1	**Urban Street Option 2**	**Urban Parkway**
Vehicle Right of Way	2 through lanes (22') each direction from I-295 to Congress Street, 1 through lane each direction from Congress to Commercial Street with turn lane/refuge. Tighten turning radii where possible. Roadway shifted to W where possible. Typical cross section width of roadway ranges from 65'-71' including buffered bike path/cycle track and turn lanes.	Similar to option 1, except roadway moved to NE near Cathedral and more centrally at Lincoln Park opening up for development on SW and SE (or possible park expansion on SW and development SE). Tighten turning radii where possible. Roadway shifted to E Oxford-Congress, more centrally Congress-Newbury. Typical cross section width of roadway ranges from 50'-65' including turn lanes but not including side path.	2 through lanes (24') each direction from I-295 to Congress Street, 1 through lane each direction from Congress to Commercial Street. Roadway shifted to E starting from Oxford. Typical cross section width of roadway ranges from 63'-97'+ (depending on median) including turn lanes.
Median	Eliminate median.	Narrow island/refuge retained where no turning lane	Retain at minimum width (32') needed for future light rail from Marginal to Congress, and 22' south of Congress. Bike path in median
Pedestrian Infrastructure	Typical 22' sidewalk width with additional shared/multi-use area. Sidewalks become narrower at intersections to accommodate cycle tracks but refuge islands are provided and crossing distances further shortened.	Narrower sidewalks in northern portion (10' + 4' verge) but NB side also has a 10' side path + additional 4' verge buffering from traffic. Sidewalk and mixed use zone in southern portion is ~27'.	10' sidewalk Congress to Middle and 14' Middle to Congress, 12'+ elsewhere, with 4' verges.
Bicycle Infrastructure	Protected bicycle lanes/cycle tracks on the curb side of parking where parking exists Congress to Commercial. 5' bicycle lane and 3' striped buffer from traffic or parking. Bicycle lanes where possible on side streets. Bike boxes or improved crossings on signalized side street approaches that are identified as part of the planned bike network.	10' side path with 4' buffer each side. Bicycles prioritized on Oxford and bike/ped only connections on Wilmot. Shared lane markings on perpendicular streets. Bike boxes or improved crossings on signalized side street approaches that are identified as part of the planned bike network.	Bidirectional median path (12' + minimum 5' verge/buffer each side). 4' shoulder also provides reasonable space for bicycles on roadway. Shared lane markings on perpendicular streets that are identified as part of the planned bike network.

Elements	Alternatives		
	Urban Street Option 1	**Urban Street Option 2**	**Urban Parkway**
Transit	Improve bus stops at Congress Street and Franklin Street, moving EB stop to Lincoln Park side. Implement Franklin Shuttle on parallel route connecting Park and Ride to Casco Bay Lines Ferry Terminal.	Improve bus stops at Congress Street and Franklin Street, moving EB stop to Lincoln Park side. 11' outer lanes + 4' shoulder leaves 16' in outer lane for possible future enhanced transit (adequate for future fixed guideway transit like streetcar).	Allow curbside stops in near-term. Reserve median for future fixed guideway. 11' outer lanes + 4' shoulder also leaves 16' in outer lane for possible future enhanced transit (adequate for future fixed guideway transit like streetcar).
Vehicular Turning Movements / Intersections	Turning lanes at all except Federal (left turns prohibited from Franklin onto Federal). Signal warrants do not require signalization at Oxford, Newbury, Federal, Wilmot/Marginal, and Pearl/Marginal, so no signals are shown at this time	Unsignalized turns at Newbury and Federal. At Marginal Way, restrict left turn movements from eastbound Marginal Way to Franklin/I-295.	Turning lanes retained where currently existing. Roundabout at Commercial End. At Marginal Way, restrict left turn movements from eastbound Marginal Way to Franklin/I-295 AND restrict left turn movements northbound Franklin Street onto Marginal Way westbound. Roundabout at Commercial Street. Left turns restricted Franklin NB onto Fore and Middle.
Target Speed	25 mph	25 mph	30 mph
Perpendicular Street Reconnections	Lancaster (all modes unsignalized)	Lancaster (bike + ped only signalized/flashing beacon) – right turn only but remove slip lane. W side still 1-way with contraflow bike lane.	Lancaster (bike + ped only signalized/flashing beacon with median refuge) - right turn only but remove slip lane.
	Oxford (all modes unsignalized)	Oxford (bike + ped only signalized/flashing beacon), bike boulevard	Oxford (bike + ped only signalized/flashing beacon with median refuge)
	Newbury (all modes unsignalized), convert to 2-way	Newbury (all modes unsignalized), retain 1-way	Newbury (bike + ped only unsignalized with median refuge)
	Federal (all modes unsignalized, no lefts), convert to 2-way	Federal (all modes unsignalized), retain 1-way	Federal (bike + ped only unsignalized with median refuge)
Parallel Street Connections	Wilmot: Somerset-Marginal (right turn in and out only), Oxford-Lancaster, and Congress-Cumberland (right turn in and out only at Congress)	Wilmot: Somerset-Marginal (ped/bike only, unsignalized or RFFB), Congress-Cumberland (right turn in and out only at Congress)	Wilmot: Congress to Cumberland (right turn in and out only at Congress)
	Boyd: to Marginal (bike + ped only) with new crossing N of Boyd at Marginal	Boyd: to Marginal (bike + ped only) with new crossing N of Boyd at Marginal	Boyd: to Marginal (bike + ped only) with new crossing N of Boyd at Marginal
	Pearl: Somerset to Marginal	Pearl: Somerset to Marginal	Pearl: Somerset to Marginal

Elements	Alternatives		
	Urban Street Option 1	**Urban Street Option 2**	**Urban Parkway**
Development	3 – 4 story buildings generally, with development nodes with up to 5-story buildings	3 – 4 story buildings generally, with development nodes with up to 5-story buildings	Green space and Parks generally. New development intended to be at a similar height as surrounding development
Zoning and Land Use	Mixed Use Zoning Overlay, promoting smaller block sizes and active frontages.	Mixed Use Zoning Overlay, promoting smaller block sizes and active frontages.	Emphasis on open spaces with form-based code for activating park edges.
Green Space / Plazas	Lincoln Park: Maintain size and form, development on SE side	Lincoln Park: Maintain size and form and develop on both sides OR expand on W side and develop on E side	Maximum expansion given road footprint, with no development. Development possible at Congress and Franklin.
	Boyd St. Community Gardens: Vehicular connection across Oxford may limit expansion/enhancement. Maximize redevelop-able land near Oxford.	Boyd St. Community Gardens: Bike + ped-only reconnection at Oxford allows for development, however, Franklin Street is shifted E at Franklin Towers	Boyd St. Community Gardens: Bike + ped-only reconnection at Oxford allows for enhancement, however, Franklin is shifted E at Franklin Towers
	Federal Street: Vehicular connection may limit additional green space at Federal but plazas could be created on E side	Federal Street: Vehicular connection may limit additional green space at Federal but plazas could be created on W side	Federal Street: Maximize plaza/green space
	Franklin Towers: Maximize developable land across from Franklin Towers	Franklin Towers: Maximize plaza / green space in front of Franklin Towers to buffer from Franklin Street	Franklin Towers: Maximize plaza / green space in front of Franklin Towers to buffer from Franklin Street
Trail Connections	Back Cove Trail: Connection on W side via protected crossing	Back Cove Trail: Connection to side path on W side	Back Cove Trail: Protected crossing on W and S side of intersection to connect to median path
	Bayside Trail: No realignment but protected crossing at intersection in all direction. Added midblock crossings at Wilmot and Pearl.	Bayside Trail: No realignment, midblock crossing at Pearl	Bayside Trail: No realignment but protected crossing on W and S side of intersection to connect to median path
	Eastern Prom Trail: Protected crossing at intersection leading directly into protected bicycle lane.	Eastern Prom Trail: Connection to side path on W side	Eastern Prom Trail: Connects protected bicycle path to trail on E side of roundabout

APPENDIX B: EVALUATION TOOL

The following tool contains all of the goals, objectives, and measures of effectiveness, as well as the weights for each objective, and the resulting scores. The interpretation of the numerical scores is provided in the Preliminary Recommendations columns, which also takes into account additional stakeholder input that may not always agree with the numerical outcomes. The recommendations and comments in these columns are not the final recommendations, which will be developed after additional stakeholder feedback in the next task for the project. They are meant to be discussed at PAC and Public Meetings. The narrative acknowledges conflicts between the objectives and calls out remaining points for discussion that have not yet been resolved either by stakeholder input or the numerical rankings.

The Notes column contains references to notes that are provided at the end of the tool.

Goal	Objective	PAC Weight	MOE#	Measures of Effectiveness	2035 No-Build input	Urban St OPTION 1 input	Urban St OPTION 2 input	Urban Pkwy (OPT 3) input	2035 No-Build rating	Urban St OPTION 1 rating	Urban St OPTION 2 rating	Urban Pkwy (OPT 3) rating	Notes	Preliminary Interpretation/Recommendations for Objectives	Preliminary Recommendations for Goals
ACCESSIBILITY. To improve the local and regional accessibility of people and the movement of goods	To improve accessibility for all users of the corridor between the Franklin corridor and points within the city as well as regional destinations	27%	1A.1	*Average speed for all trips to & from the study area*	20.40	20.01	20.01	20.03	100	0	0	5	A	Provide as many reconnections as feasible given the traffic implications (needed turn pocket lengths to maintain LOS, queues, etc.).	
			1A.2	*Number of east-west street connections between Franklin and adjacent north-south streets*	7	11	9	7	0	100	50	0			
			1A.3	*Number of east-west public bike and pedestrian connections between Franklin and adjacent north-south streets*	7	11	11	11	0	100	100	100			
			1A.4	*Number of sanctioned crossings across Franklin Street*	12	22	17	12	0	100	50	0			
	Weighted Average Score for Objective 1A								7	21	14	7			
	To improve local street network connectivity	20%	1B.1	*Study area vehicle turning movements per vehicle-mile*	2.83	2.68	2.92	2.89	38	100	0	12		Provide as many reconnections as feasible given the traffic implications.	
			1B.2	*Number of east-west street connections between Franklin and adjacent north-south streets*	7	11	9	7	0	100	50	0			
			1B.3	*Average block length along Franklin Street*	385	285	300	330	0	100	85	55			
			1B.4	*Number of sanctioned crossings across Franklin Street*	12	22	17	12	0	100	50	0			
	Weighted Average Score for Objective 1B								2	20	9	3			
	To encourage multimodal transportation	14%	1C.1	*Auto LOS from Multimodal LOS tool*	E	C	C	D	0	N/A	N/A	N/A	B	Note that the auto LOS is not reliable, as summarized in Note B (indicated in the Notes column and written at the end of this table). Urban St Option #2 ranks higher for this objective because of its better transit service, although the transit rating for Option #1 does not account for the parallel service. Bike and ped also rank best in Option #1. DISCUSS: If the on-street bicycle facilities are preferred, consider following the Option 1 model of transit on a parallel route resulting in less conflict with bikes on Franklin.	
			1C.2	*Transit LOS from Multimodal LOS tool*	F	F	C	F	0	2	100	1	C		
			1C.3	*Bicycle LOS from Multimodal LOS tool*	D	B	C	D	7	100	77	0			
			1C.4	*Pedestrian LOS from Multimodal LOS tool*	C	B	C	C	0	100	68	40			
			1C.5	*Fraction of trips to/from the study area by car*	93.40%	93.50%	93.50%	93.50%	100	0	0	0	A		
	Weighted Average Score for Objective 1C								3	7	8	1			
	To improve current and future transit operations and access	11%	1D.1	*Average transit operating speed in the study area*	9.67	9.50	9.50	9.81	55	0	0	100	A	Although Option #3 ranks highly, retaining the median is not recommended due to many PAC members' preference for additional developable space. In addition, 1D.1 doesn't differentiate enough to be helpful. DISCUSS: Option #2 strategy with off-street cycle tracks (rather than the bidirectional one-sided path), or Option 1 with transit on a parallel route and on-street bike facilities.	
			1D.2	*Transit vehicle-miles operated in the study area in the AM and PM peaks*	18.2	26.9	26.9	18.2	0	100	100	0			
			1D.3	*Fraction of trips to/from the study area by transit*	1.89%	1.96%	1.96%	1.96%	0	100	100	100			
			1D.4	*Does not preclude accommodating a range of future transit options (in terms of ROW)*	N/A	N/A	N/A	N/A	0	25	75	100			
	Weighted Average Score for Objective 1D								2	6	8	9			

Goal	Objective	PAC Weight	MOE#	Measures of Effectiveness	2035 No-Build	Urban St OPTION 1	Urban St OPTION 2	Urban Pkwy (OPT 3)	2035 No-Build	Urban St OPTION 1	Urban St OPTION 2	Urban Pkwy (OPT 3)	Notes	Preliminary Interpretation/Recommendations for Objectives	Preliminary Recommendations for Goals
					input	input	input	input	rating	rating	rating	rating			
	To expand quality and quantity of pedestrian and bicycle facilities	15%	1E.1	*New sidewalk length within the study area*	8847	15251	11817	8491	5	100	49	0		Based on PAC and PBPAC input, provide sidewalks as in Urban St Option 1 but not at the widths suggested near Marginal. 10-12' is adequate there. The on-street facilities in Urban St Option #1 rank highest because the separate directions are counted as additional miles of facilities. Based on recommendations from the PBPAC, the on-street facilities are recommended.	***Urban St Option #1 ranks best although not all reconnections might be feasible given the LOS requirements. Once a solution is found for Marginal Way, it can be included with the other recommendations related to Urban Street Option #1 and the maximum number of possible reconnections given turn lane queue lengths, etc. and assessed for new LOS metrics. In addition, transit is recommended, though a parallel route would improve service without introducing additional conflicts/challenges for bicycles and autos. Buffered on-street bicycle facilities are preferred. Sidewalks are preferred to be 10-12' on the corridor, with some wider sections where plaza space is warranted south of Congress St.***
			1E.2	*New marked/dedicated bike facilities length*	0	13360	11500	8660	0	100	86	65			
			1E.3	*New non-sidewalk walkway length in the study area*	0	1571	3818	6390	0	25	60	100			
			1E.4	*New separated bikeway or bike path length in study area*	0	13360	11500	8660	0	100	86	65			
	Weighted Average Score for Objective 1E								0	12	10	8			
	To not worsen the capacity and LOS compared to the future capacity and LOS of the current configuration of the corridor	13%	1F.1	*Average speed of vehicular traffic in the study area (AM and PM peaks)*	25.8	24.0	24.2	24.8	100	0	7	40		CONFLICT: Option 3 Urban Parkway ranks highest based on the higher auto speeds, but this directly conflicts with other objectives related to reducing vehicular speed. Recommendation: Overall, the Urban Parkway (Option 3) approach ranks worst, and so implement the Urban Street characteristics with careful attention to not worsening the auto LOS as a result.	
			1F.2	*Number of intersections on Franklin Street at or below LOS 'E' in the AM or PM peak hour*	4	2	2	3	0	N/A	N/A	N/A	B		
			1F.3	*MMLOS along Franklin: number of modes worse than Baseline*	0	0	0	0	0	100	100	100			
	Weighted Average Score for Objective 1F								4	7	7	9			
Total Weighted Score for Goal 1									18	72	56	38			
URBANISM & LAND USE. To enrich the urban fabric of the city through respectful aesthetically attractive, compact, and sustainable development	To provide a memorable urban gateway or entry to Downtown Portland	10%	2A.1	*Qualitative rating of the urban gateway or entry (lowest ranking for no gateway)*	N/A	N/A	N/A	N/A	0	50	50	25		Placemaking requires addition of people-oriented elements, enabling people to use the street as a destination by itself and not just a pass-through corridor. The Urban Street alternatives provide the best opportunities for such people-oriented design strategies.	
			2A.2	*Presence of identifiable placemaking elements such as street furniture and art installations*	N/A	N/A	N/A	N/A	0	100	100	25			
	Weighted Average Score for Objective 2A								0	7	7	2			
	To respect and enhance the built heritage	16%	2B.1	*Number of enhanced historical/heritage/cultural sites*	0	2	2.5	3	0	67	83	100		Urban Parkway (Option #3) expands Lincoln Park as close to its historic size as possible. However, to bring vitality to the Park, present conditions must be considered in a detailed study, which can identify strategies to bring the Park its former glory. DISCUSS: Enlargement of the park could be achieved with any alternative and it must be decided whether this is a priority over additional developable space.	
			2B.2	*Number of historical/heritage/cultural sites adversely impacted*	0	0	0	0	100	100	100	100			
	Weighted Average Score for Objective 2B								8	14	15	16			
	To promote mixed-use development	11%	2C.1	*Extent to which zoning strategy amenable to mix-use development*	25%	75%	75%	50%	0	100	100	50		The Urban Street Options #1 and #2 provide more potential for development-led revitalization of the area, providing more space for catalyst projects. Therefore the Mixed Use Zoning Overlap is a recommended zoning strategy. The India Street neighborhood is considering application of Form-Based Code, which would also be a reasonable approach.	
			2C.2	*Area of land made newly available that is suitable (i.e. adjacent to appropriate properties, of appropriate dimensions) for residential or mixed use development*	0	148000	170500	109500	0	87	100	64			
	Weighted Average Score for Objective 2C								0	11	11	7			

Goal	Objective	PAC Weight	MOE#	Measures of Effectiveness	2035 No-Build	Urban St OPTION 1	Urban St OPTION 2	Urban Pkwy (OPT 3)	2035 No-Build	Urban St OPTION 1	Urban St OPTION 2	Urban Pkwy (OPT 3)	Notes	Preliminary Interpretation/Recommendations for Objectives	Preliminary Recommendations for Goals
					input	input	input	input	rating	rating	rating	rating			
	To foster a compact, pedestrian-scaled environment	12%	2D.1	*Sidewalk area as fraction of total paved area (percent)*	#N/A	38%	25%	22%	N/A	100	19	0		Urban Street Option 1 ranks best because of the wide sidewalk widths and higher maximum building heights, but PAC and PBPAC feedback has indicated that 10-12' sidewalks are adequate and 3-4 story building heights are preferred. Therefore recommendations should focus more on Urban St Option #2 elements for building heights.	
			2D.2	*Maximum building heights (stories) along Franklin Street*	1	5	4	2	0	100	75	25			
			2D.3	*Portion of the total street frontage that is potentially active*	3.90%	51.69%	49.35%	34.64%	0	100	95	64			
			2D.4	*Typical ROW widths (ROW width N to S)*	176	115	105	129	0	86	100	66			
	Weighted Average Score for Objective 2D								0	11	8	5			
	To promote easy-to-understand wayfinding or navigation along the corridor and between major destinations	9%	2E.1	*Number of east-west bike and public pedestrian connections between Franklin and adjacent north-south streets*	7	11	11	11	0	100	100	100		N/A - all rank similarly, no differentiation.	
	Weighted Average Score for Objective 2E								0	9	9	9			
	To provide high-quality, aesthetically attractive, contextually appropriate urban design	11%	2F.1	*Qualitative evaluation of landscaping, storm water drainage system, street lighting, and public amenities*	N/A	N/A	N/A	N/A	75	50	50	75		Opportunities exist in all options; however, the plaza and other space near development created in Options #1 and #2 cause those to rank better for 2F.2 The median would have provided additional benefits in terms of stormwater management, but preference has been shown towards the plaza and development inherent in Options 1 and 2.	
			2F.2	*Extent of identifiable placemaking elements such as street furniture and art installations*	N/A	N/A	N/A	N/A	0	100	100	25			
	Weighted Average Score for Objective 2F								4	8	8	6			
	To promote seamless integration between the streetscape and adjacent land uses	16%	2G.1	*Extent to which adjacent land uses - have the potential to add architectural character (historic or other) to the streetscape*	22890	145340	110640	47310	0	100	72	20		These measures are biased toward the opportunity as in available space, rather than actual improvements. If a building is higher it is considered to have more potential to add character, but this does not mean that higher building heights are considered preferable. In general, however, Urban St Option #1 allows for significant additional development as well as additional sidewalk/plaza space, and therefore ranks highest. Recommendations still include providing 10-12' maximum sidewalks north of Congress, and maintaining building heights closer to 3-4 stories maximum.	***The Urban Street alternatives provide the most opportunity to reshape the urban realm, and contextualize it more to the existing fabric surrounding it. These alternatives include focus on a narrower ROW, balancing the expansion of Lincoln Park with development needs, mixed use zoning strategies, and providing high quality plaza space. The 3-4 story building heights are generally considered appropriate.***
			2G.2	*Extent to which adjacent land uses have the potential to allow spillover of pedestrian-scaled activities onto Franklin Street*	3.90%	51.69%	49.35%	34.64%	0	100	95	64			
	Weighted Average Score for Objective 2G								0	16	14	7			
	To provide a balance between the different uses on the corridor	15%	2H.1	*Opportunity to improve land use mix based on new development potential*	0	148000	170500	109500	0	87	100	64		The narrow ROW alignment provides the maximum opportunity for new development, which can be programmed to fit the area's needs. A narrower ROW is recommended, with consideration of the preferred on-street bicycle facilities.	
	Weighted Average Score for Objective 2H								0	13	15	9			
Total Weighted Score for Goal 2									12	89	87	60			

Goal	Objective	PAC Weight	MOE#	Measures of Effectiveness	2035 No-Build input	Urban St OPTION 1 input	Urban St OPTION 2 input	Urban Pkwy (OPT 3) input	2035 No-Build rating	Urban St OPTION 1 rating	Urban St OPTION 2 rating	Urban Pkwy (OPT 3) rating	Notes	Preliminary Interpretation/Recommendations for Objectives	Preliminary Recommendations for Goals
ENVIRONMENT & ENERGY. To conserve and efficiently use nonrenewable energy resources, protect the environment, and improve the urban quality of life	To reduce the negative effect of through traffic using neighborhood streets	17%	3A.1	*Fraction of study area vehicle-miles on streets designated as 'neighborhood streets' and in the PACTS network*	0.0305	0.049	0.0488	0.0436	100	0	1	29		CONFLICT: This objective, weighted as reasonably important, conflicts with the goals related to reconnection. It is understood that reconnection and accessibility are considered key concerns for the project, and so reconnection is still recommended where feasible.	***In the case of Environment and Energy, the metrics favor the baseline because of the concentration of traffic on Franklin St versus other roads, the lower vehicle trips compared to the other alternatives, higher vehicle speeds, and largest acreage of green space due to the existing median. Because PAC discussion about the retention of the median has indicated preference towards development and accessibility goals, recommendations still include a reconnected Urban Street solution over the future baseline solution. Final design should include careful consideration of stormwater management and other environmental concerns and at a minimum, Lincoln Park should be enhanced if not expanded.***
			3A.2	*Turning movements between Franklin Street and designated 'neighborhood streets'*	56	957	639	56	100	0	35	100			
	Weighted Average Score for Objective 3A								17	0	3	11			
	To reduce the number of trips by single-occupancy vehicles	14%	3B.1	*Fraction of trips to/from the study area by car*	93.40%	93.50%	93.50%	93.50%	100	0	0	0	A	N/A - all rank similarly, no differentiation.	
	Weighted Average Score for Objective 3B								14	0	0	0			
	To improve the efficiency of transportation on the corridor and reduce overall energy consumption related to transportation activities	32%	3C.1	*Average speed of vehicular traffic in the study area (AM and PM peaks)*	25.8	24.0	24.2	24.8	100	0	7	40		Urban Street Option #2 ranks highest because of slightly higher person miles traveled per vehicle, despite the fact vehicle speeds are lower than Urban Parkway. This is primarily due to the increased transit service, which is recommended on a trial basis. CONFLICT: The MOE favoring higher vehicle speeds here conflicts with other objectives to lower vehicle speeds. Higher vehicle speeds are not recommended.	
			3C.2	*Person-miles traveled per vehicle-mile along Franklin Street*	1.20	1.20	1.22	1.20	0	0	100	0			
	Weighted Average Score for Objective 3C								16	0	17	6			
	To enhance the corridor's green space	11%	3D.1	*Percentage of green space that is usable in the study area*	17.20%	54.30%	55.70%	40%	0	96	100	59		While Option #3, Urban Parkway, ranks highest for this objective, preferences have been shown toward more developable area and plaza space over retaining the median. DISCUSSION: The proposed final alignment of the roadway is still undecided from Congress St to Federal St. Options #1 and #2 require less ROW space because of the lack of the median and so offer other opportunities for plaza space.	
			3D.2	*Acres of green space in the study area*	10.7	3.7	3.88	8.9	100	0	3	74			
			3D.3	*Number of access points to green space within study area*	8	11	11	13	0	60	60	100			
	Weighted Average Score for Objective 3D								4	6	6	9			
	To design a roadway that anticipates storm surge and sea level rise	11%	3E.1	*Impact of storm surge will not be worse given proposed corridor alignment*	N/A	N/A	N/A	N/A	0	100	100	100	D	N/A - further design detail is needed before fully evaluating these metrics. However, it is not anticipated that any individual option would cause greater issues than the others.	
			3E.2	*Impact of sea level rise will not be worse given proposed corridor alignment*	N/A	N/A	N/A	N/A	0	100	100	100	D		
			3E.3	*Sewer and storm drainage facilities ability to accommodate storm surge and sea level rise*	N/A	N/A	N/A	N/A	0	0	0	0	E		
	Weighted Average Score for Objective 3E								0	8	8	8			
	To activate Lincoln Park for a broad set of users	15%	3F.1	*Extent to which streetscape and land use recommendations are conducive to active use of Lincoln Park*	N/A	N/A	N/A	N/A	0	100	100	25		Urban Street Option #2 provides for both partial expansion as well as enhancement of Lincoln Park, and so ranks best for this objective. However, a final decision must be made on the park expansion.	
			3F.2	*Square feet of additional usable space added to Lincoln Park*	0	6550	14150	22760	0	29	62	100			
			3F.3	*Number of access points to Lincoln Park*	6	8	8	8	0	100	100	100			
	Weighted Average Score for Objective 3F								0	11	13	11			
Total Weighted Score for Goal 3									50	25	47	44			

Goal	Objective	PAC Weight	MOE#	Measures of Effectiveness	2035 No-Build input	Urban St OPTION 1 input	Urban St OPTION 2 input	Urban Pkwy (OPT 3) input	2035 No-Build rating	Urban St OPTION 1 rating	Urban St OPTION 2 rating	Urban Pkwy (OPT 3) rating	Notes	Preliminary Interpretation/Recommendations for Objectives	Preliminary Recommendations for Goals
HEALTH & SAFETY. To provide a healthy and safe urban environment in which to live and work	To promote physical activity	24%	4A.1	*New sidewalk length within the study area*	0	15251	11817	8491	0	100	77	56		Urban Street Option #1 includes the most enhanced pedestrian facilities and on-street bicycle facilities.	***The Urban Street alternatives provide the preferred bicycle and pedestrian facilities, with details already discussed in the Accessibility recommendations. Note that the EI measure indicates the signalized reconnection as well as bicycle and pedestrian reconnections at intersections (rather than midblock) are preferred.***
			4A.2	*New marked/dedicated bike facilities length*	0	13360	11500	8660	0	100	86	65			
			4A.3	*Number of access points to existing trail network*	3	7	7	5	0	100	100	50			
	Weighted Average Score for Objective 4A								0	24	21	13			
	To enhance safety for all modes	51%	4B.1	*Total pedestrian/auto exposure index (EI) along Franklin*	100	116	106	127	100	41	79	0		All options rank worse than baseline for the EI due to increased unsignalized connectivity. This does not take into account the current unsanctioned crossings that occur. Option 2 ranks best with only partial reconnection but still with most bicycle and pedestrian crossings occurring at intersections rather than mid-block. Buffered/protected on-street bicycle facilities or two-way cycle tracks have been expressed as a preference (as in Option #1)	
			4B.2	*New separated bicycle facilities length*	0	13360	11500	8660	0	100	86	65			
	Weighted Average Score for Objective 4B								25	36	42	16			
	To reduce vehicular speeds	25%	4C.1	*Average speed of vehicular traffic in the study area (AM and PM peaks)*	25.8	24.0	24.2	24.8	0	100	93	60		CONFLICT: The outcome of the metrics related to this objective conflict with MOE 1F.1 , which values higher vehicular speeds.	
			4C.2	*Average speed of vehicular traffic along Franklin Street (AM and PM peak)*	10.4	12.7	12.0	12.0	N/A	N/A	N/A	N/A	B		
	Weighted Average Score for Objective 4C								0	25	24	15			
Total Weighted Score for Goal 4									25	85	87	45			
COMMUNITY & ECONOMIC DEVELOPMENT. To foster community improvement and enhance social prosperity of the local economy in an equitable way	To enhance the livability and vitality of the corridor and surrounding neighborhoods	33%	5A.1	*Qualitative assessment of increase in pedestrian use of the street due to transportation and land use changes*	N/A	N/A	N/A	N/A	0	100	100	25		Urban Street Option #1 and Option #2 focus on creating more development opportunity by removing the median and narrowing the ROW, and therefore are recommended for this objective.	
			5A.2	*Portion of the total street frontage that is attractive to active pedestrian oriented development*	3.90%	51.69%	49.35%	34.64%	0	100	95	64			
			5A.3	*Extent to which zoning strategy amenable to mix-use development*	25%	75%	75%	50%	0	100	100	50			
			5A.4	*Number of east-west public pedestrian connections between Franklin and adjacent north-south streets*	7	11	11	11	0	100	100	100			
	Weighted Average Score for Objective 5A								0	33	32	19			
	To improve connectivity of transit to the Casco Bay Terminal	12%	5B.1	*Average walk and wait time for transit service from Casco Bay Terminal in the AM and PM peaks*	8.4	5.4	5.4	8.4	0	100	100	0		Include new transit shuttle service as in Options #1 and #2, though it would be acceptable to operate it on a parallel street like Pearl so that there are less vehicular and bicycle conflicts on Franklin Street.	
	Weighted Average Score for Objective 5B								0	12	12	0			
	To preserve and strengthen the unique character of neighborhoods	13%	5C.1	*Qualitative assessment of enhancement of existing neighborhood characteristics through proposed land use and transportation recommendations*	N/A	N/A	N/A	N/A	0	100	100	25		Urban Street Option #1 and #2 create more development opportunity, particularly that which is Franklin-facing, and therefore are recommended for this objective. Better bicycle and pedestrian facilities also contribute to enhancing neighborhood characteristics, and so favor Options #1 and #2.	
	Weighted Average Score for Objective 5C								0	13	13	3			

Goal	Objective	PAC Weight	MOE#	Measures of Effectiveness	2035 No-Build	Urban St OPTION 1	Urban St OPTION 2	Urban Pkwy (OPT 3)	2035 No-Build	Urban St OPTION 1	Urban St OPTION 2	Urban Pkwy (OPT 3)	Notes	Preliminary Interpretation/Recommendations for Objectives	Preliminary Recommendations for Goals
					input	input	input	input	rating	rating	rating	rating			
	To improve access to employment, community, and institutional centers of activity	24%	5D.1	*Number of designated 'activity centers' that lose access*	0	0	0	0	100	100	100	100		Urban Street Option #1 and Option #2 focus on creating a more integrated and connected network, and therefore are recommended for this objective.	***Urban Street Option #1 and Option #2 focus on creating a more integrated and connected network, as well as more development opportunity, and therefore are recommended for this objective. Option #2 seeks to continue the surrounding scale of development into the Franklin Street corridor, and hide Franklin Towers, creating a harmonious urban fabric. This goal should be pursued in the final recommendations.***
			5D.2	*Number of 'activity centers' that gain access*	0	11	8	4	0	100	73	36			
			5D.3	*Average speed for all trips to & from the study area*	20.40	20.01	20.01	20.03	100	0	0	5	A		
	Weighted Average Score for Objective 5D								16	16	14	12			
	To protect neighborhoods through community-sensitive infrastructure	18%	5E.1	*Qualitative assessment of appropriateness of scale of streets*	N/A	N/A	N/A	N/A	0	50	100	50		Urban St Option #2 is the most sensitive to the neighborhoods around, providing a balance of development opportunities with space for small-scale residential and large scale catalyst projects. Land uses and scale of development will both help in building bridges between the fractured neighborhoods. In particular, Option #2 provides the most opportunity for balancing the scale of Franklin Towers, and so higher development is recommended for notes, noting that the 3 to 4-story development is preferred.	
			5E.2	*Qualitative assessment of appropriateness of scale of development*	N/A	N/A	N/A	N/A	0	75	100	25			
			5E.3	*Qualitative assessment of portion of low income community impacted by changes*	N/A	N/A	N/A	N/A	0	50	50	25			
	Weighted Average Score for Objective 5E								0	10	15	6			
Total Weighted Score for Goal 5									16	84	86	40			
Average Score for all Goals									24	71	73	46			
RELATIVE COST					N/A	24,862,100	21,232,960	18,840,270	N/A	0	60	100			

Notes

A	Differential is so small that the measure is not very helpful.
B	In the traffic analysis for all three alternatives, the Marginal Way intersection did not allow all traffic onto the network. The LOS measures are based on the traffic that was on the network, and therefore do not provide a reliable assessment of LOS. The final recommendation will involve a solution for Marginal that does allow all traffic onto the network.
C	The LOS F for Option 1 does not represent the potential benefit of the shuttle bus operation on Pearl Street.
D	Based on preliminary assessment assuming vertical profile of roadway will not get lower.
E	Not able to be assessed at current level of design. Will be affected by proposed storage conduit project.

APPENDIX C: HIGH LEVEL COST ESTIMATES FOR ALTERNATIVES

Gorrill-Palmer Consulting Engineers Inc.
Preliminary Opinion of Probable Construction Cost

Job Number: **2735**
Project Location: **Portland, Maine**
Project Name: **Franklin St**
Date: 7/1/2014
Transit Items (999) and ROW costs added by IBI Group 6/11/2014 and 6/30/2014

Calculated By: Brandon Havu
Checked By: Lauren Meek

Notes:
1. Opinion of cost does not include Environmental Impacts or Utility Relocations.
2. Opinion of cost is based on Conceptual Plans dated April 23, 2014.
3. ROW costs are estimated using $5 per sq ft for residual land and $30 per sq ft for primary land acquisition for new ROW needed for re-connections.

URBAN STREET 1 ESTIMATE

Item	Item Description	Unit	Unit Price	Quantity	Amount
203.20	COMMON EXCAVATION	CY	$ 20.00	71500	$ 1,430,000.00
304.10	AGGREGATE SUBBASE COURSE - GRAVEL	CY	$ 30.00	55300	$ 1,659,000.00
403	HOT MIX ASPHALT	T	$ 100.00	26500	$ 2,650,000.00
604.071	CATCH BASIN TYPE A1-P	EA	$ 3,800.00	95	$ 361,000.00
605.11	12" UNDERDRAIN TYPE C	LF	$ 50.00	28500	$ 1,425,000.00
608.09	BRICK SIDEWALK	SY	$ 80.00	26700	$ 2,136,000.00
609.11	VERTICAL CURB TYPE 1	LF	$ 35.00	22300	$ 780,500.00
609.34	CURB TYPE 5	LF	$ 30.00	6200	$ 186,000.00
615.07	LOAM	CY	$ 50.00	0	$ -
621.XX	LANDSCAPING	LS	$ 100,000.00	1	$ 100,000.00
634.XX	HIGHWAY LIGHTING	LS	$ 1,000,000.00	1	$ 1,000,000.00
643.XX	TRAFFIC SIGNALS	EA	$ 150,000.00	8	$ 1,200,000.00
999.X1	TYPE 'A' BUS STOP (CONGRESS ST.)	EA	$ 37,500.00	2	$ 75,000.00
999.X2	TYPE 'B' BUS STOP (FRANKLIN SHUTTLE)	EA	$ 22,500.00	10	$ 225,000.00
999.X3	PARK & RIDE LOT BUS STOP	EA	$ 62,500.00	1	$ 62,500.00

CONSTRUCTION COSTS	$ 13,290,000.00
MOBILIZATION (10%)	$ 1,329,000.00
MAINTENANCE OF TRAFFIC (10	$ 1,329,000.00
CONTINGENCY (25%)	$ 3,322,500.00
TOTAL CONSTRUCTION COSTS	$ 19,270,500.00
PRELIMINARY ENGINEERING (10%)	$ 1,927,050.00
CONSTRUCTION ENGINEERING (10%	$ 1,927,050.00
30-FOOT TRANSIT BUS	$ 325,000.00
RIGHT OF WAY COSTS	$ 1,412,500.00
TOTAL PROJECT COST	**$ 24,862,100**

URBAN STREET 2 ESTIMATE

Item	Item Description	Unit	Unit Price	Quantity	Amount
203.20	COMMON EXCAVATION	CY	$ 20.00	61200	$ 1,224,000.00
304.10	AGGREGATE SUBBASE COURSE - GRAVEL	CY	$ 30.00	48300	$ 1,449,000.00
403	HOT MIX ASPHALT	T	$ 100.00	22500	$ 2,250,000.00
604.071	CATCH BASIN TYPE A1-P	EA	$ 3,800.00	75	$ 285,000.00
605.11	12" UNDERDRAIN TYPE C	LF	$ 50.00	22100	$ 1,105,000.00
608.09	BRICK SIDEWALK	SY	$ 80.00	20000	$ 1,600,000.00
609.11	VERTICAL CURB TYPE 1	LF	$ 35.00	20400	$ 714,000.00
609.34	CURB TYPE 5	LF	$ 30.00	1750	$ 52,500.00
615.07	LOAM	CY	$ 50.00	550	$ 27,500.00
621.XX	LANDSCAPING	LS	$ 100,000.00	1	$ 100,000.00
634.XX	HIGHWAY LIGHTING	LS	$ 1,000,000.00	1	$ 1,000,000.00
643.XX	TRAFFIC SIGNALS	EA	$ 150,000.00	8	$ 1,200,000.00
999.X1	TYPE 'A' BUS STOP (CONGRESS ST.)	EA	$ 37,500.00	2	$ 75,000.00
999.X2	TYPE 'B' BUS STOP (FRANKLIN SHUTTLE)	EA	$ 22,500.00	10	$ 225,000.00
999.X3	PARK & RIDE LOT BUS STOP	EA	$ 62,500.00	1	$ 62,500.00

CONSTRUCTION COSTS	$ 11,369,500.00
MOBILIZATION (10%)	$ 1,136,950.00
MAINTENANCE OF TRAFFIC (10	$ 1,136,950.00
CONTINGENCY (25%)	$ 2,842,375.00
TOTAL CONSTRUCTION COSTS	$ 16,485,800.00
PRELIMINARY ENGINEERING (10%)	$ 1,648,580.00
CONSTRUCTION ENGINEERING (10%	$ 1,648,580.00
30-FOOT TRANSIT BUS	$ 325,000.00
RIGHT OF WAY COSTS	$ 1,125,000.00
TOTAL PROJECT COST	**$ 21,232,960**

Gorrill-Palmer Consulting Engineers Inc.
Preliminary Opinion of Probable Construction Cost

URBAN PARKWAY ESTIMATE

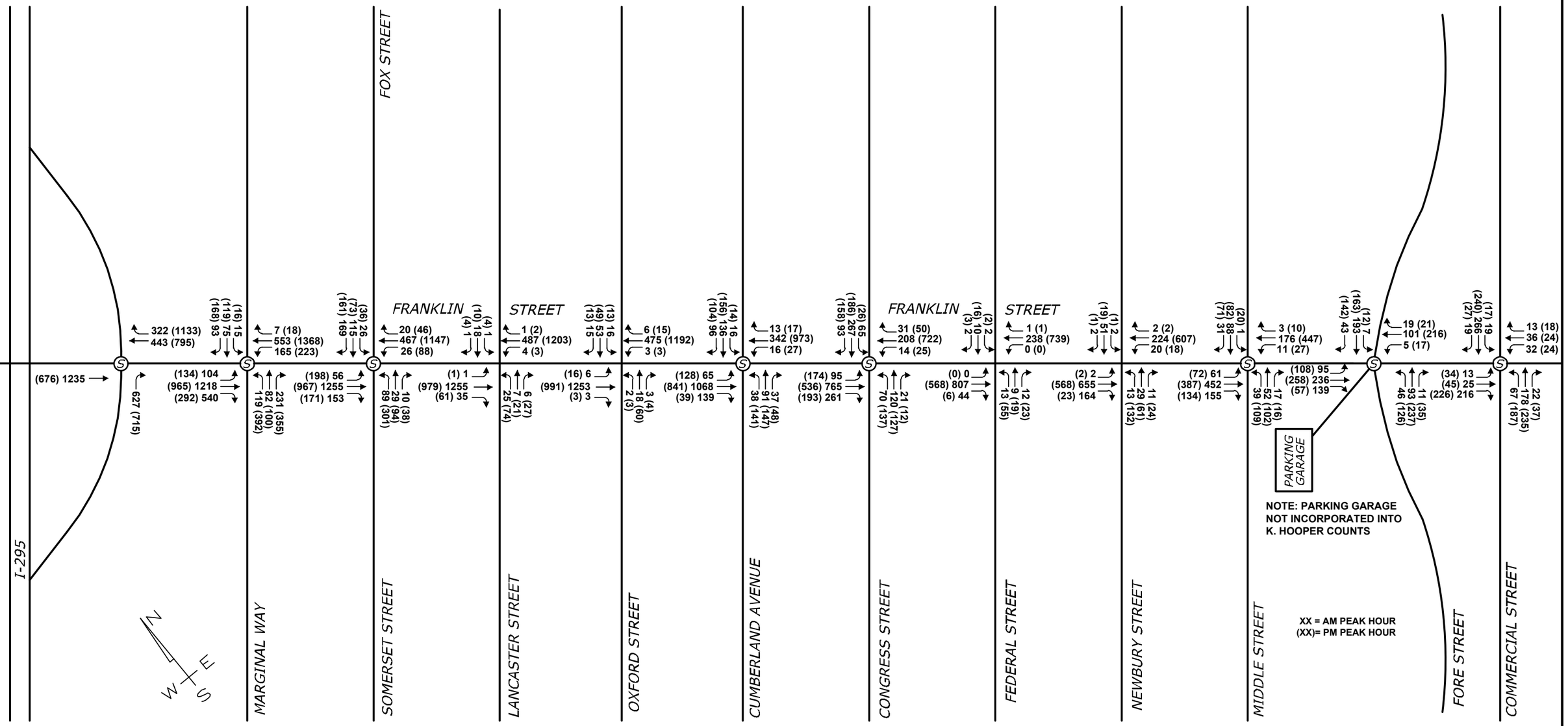
Item	Item Description	Unit	Unit Price	Quantity	Amount
203.20	COMMON EXCAVATION	CY	$ 20.00	53000	$ 1,060,000.00
304.10	AGGREGATE SUBBASE COURSE - GRAVEL	CY	$ 30.00	42800	$ 1,284,000.00
403	HOT MIX ASPHALT	T	$ 100.00	19900	$ 1,990,000.00
604.071	CATCH BASIN TYPE A1-P	EA	$ 3,800.00	87	$ 330,600.00
605.11	12" UNDERDRAIN TYPE C	LF	$ 50.00	26000	$ 1,300,000.00
608.09	BRICK SIDEWALK	SY	$ 80.00	17600	$ 1,408,000.00
609.11	VERTICAL CURB TYPE 1	LF	$ 35.00	17800	$ 623,000.00
609.34	CURB TYPE 5	LF	$ 30.00	8200	$ 246,000.00
615.07	LOAM	CY	$ 50.00	1800	$ 90,000.00
621.XX	LANDSCAPING	LS	$ 100,000.00	1	$ 100,000.00
634.XX	HIGHWAY LIGHTING	LS	$ 1,000,000.00	1	$ 1,000,000.00
643.XX	TRAFFIC SIGNALS	EA	$ 150,000.00	7	$ 1,050,000.00
999.X1	TYPE 'A' BUS STOP (CONGRESS ST.)	EA	$ 37,500.00	2	$ 75,000.00

CONSTRUCTION COSTS	$ 10,556,600.00
MOBILIZATION (10%)	$ 1,055,660.00
MAINTENANCE OF TRAFFIC (10	$ 1,055,660.00
CONTINGENCY (25%)	$ 2,639,150.00
TOTAL CONSTRUCTION COSTS	$ 15,307,100.00
PRELIMINARY ENGINEERING (10%)	$ 1,530,710.00
CONSTRUCTION ENGINEERING (10%	$ 1,530,710.00
RIGHT OF WAY COSTS	$ 471,750.00
TOTAL PROJECT COST	**$ 18,840,270**

APPENDIX D: DESIGN HOUR VOLUMES FOR SYNCHRO MODEL ALTERNATIVES

Urban Street #1 - 2035 Design Hour Volumes

Figure No. 8A



FRANKLIN STREET, PORTLAND, MAINE

Design: RED
Draft: LAN
Checked: TLG
Scale: NONE
Date: APR 2014
File Name: 2735 -Traff UrbanSt #1.dwg

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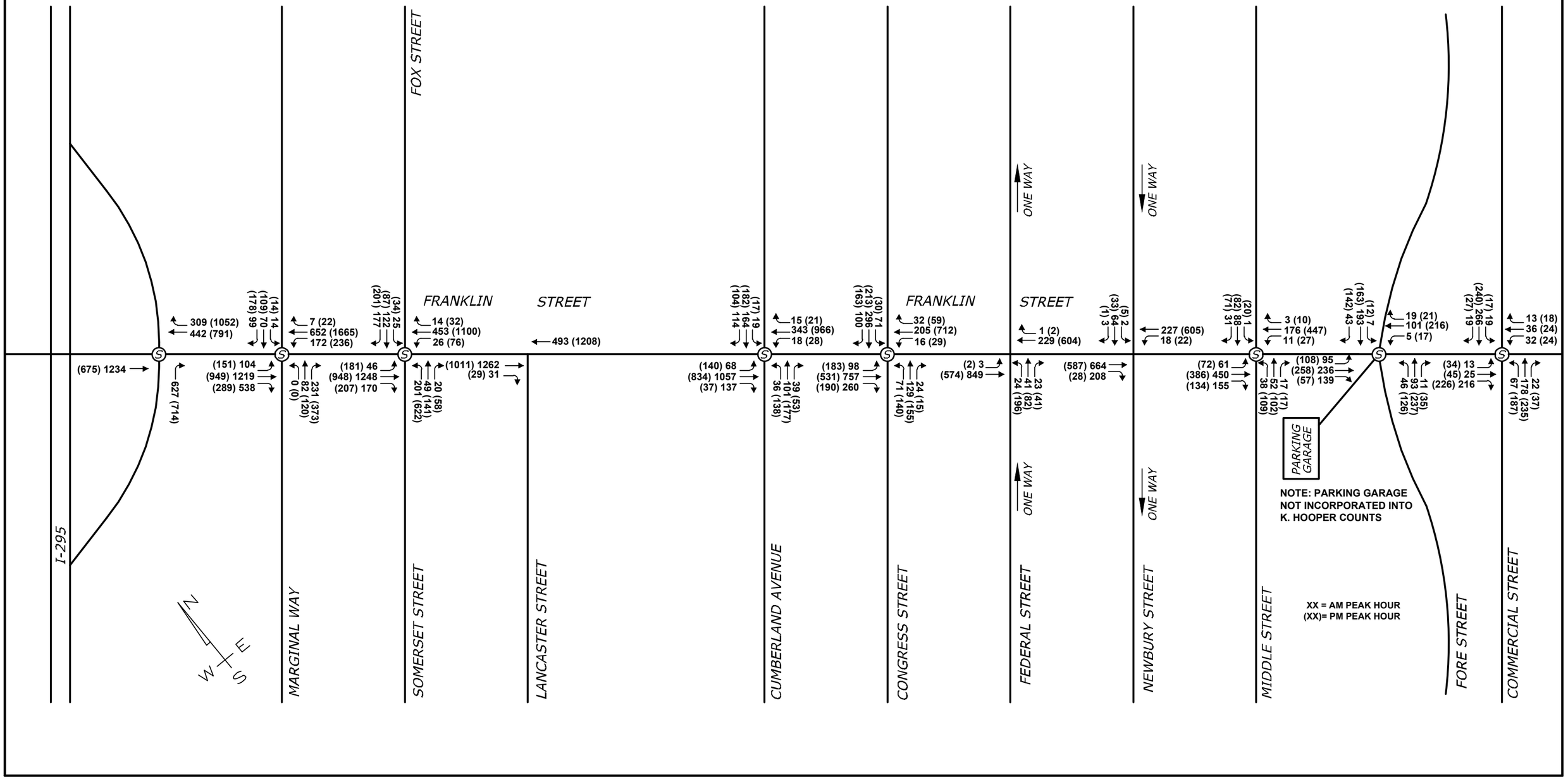
Urban Street #2 - 2035 Design Hour Volumes

Figure No. 9A



FRANKLIN STREET, PORTLAND, MAINE

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Draft: LAN
Checked: TLG
Scale: NONE
Date: APR 2014
File Name: 2735 -Traff UrbanSt #2.dwg

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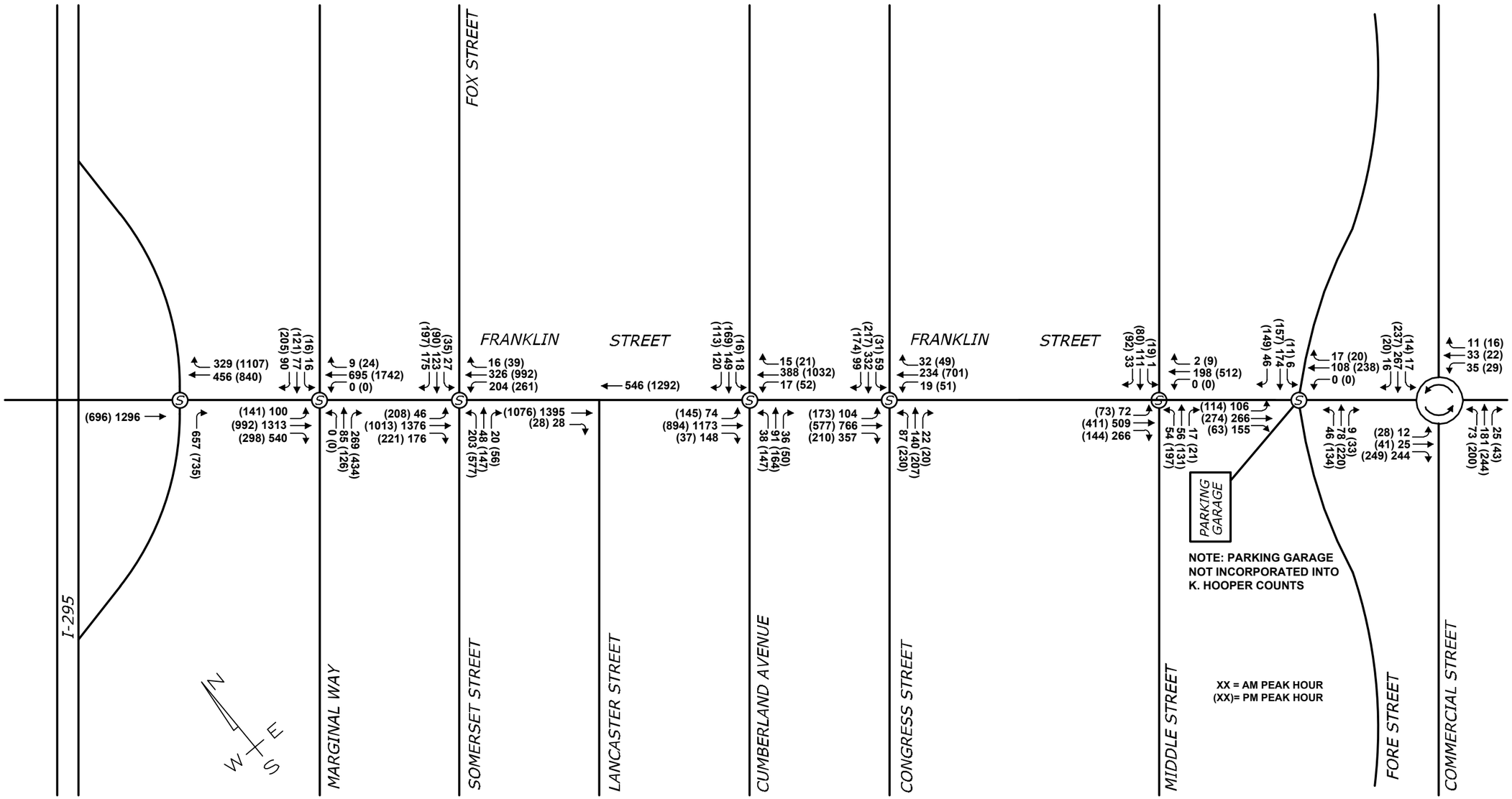
Urban Parkway - 2035 Design Hour Volumes

Figure No. 10A



FRANKLIN STREET, PORTLAND, MAINE

Design: RED
Draft: LAN
Checked: TLG
Scale: NONE
Date: APR 2014
File Name: 2735 -Traff UrbanParkway.dwg

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APPENDIX E: MMLOS RESULTS

1. INTRODUCTION

This memo summarizes the MMLOS analysis conducted for Franklin Street between Commercial Street and Fox Street/Somerset Street. The analysis uses the CompleteStreets software and includes an analysis of the following scenarios:

- Existing Year 2013 – No Project
- Future Year 2035 – No Project
- Future Year 2035 – Enhanced Urban Street: Option 1 (WP1)
- Future Year 2035 – Enhanced Urban Street: Option 2 (WP2)
- Future Year 2035 – Enhanced Urban Parkway (WP3)

2. 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 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 must be evaluated in the context of other planning and design considerations. Level of service "F", by itself, does NOT mean that there is a problem that the agency must fix. Similarly, level of service "A", by itself, does NOT mean that there are no problems. Table 1 illustrates the thresholds for each letter grade set forth by the multimodal methodology for pedestrian, transit, and bicycle modes. Table 2 illustrates the threshold for each letter grade for auto level of service.

Table 1 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:

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 2 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 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 HCM approach described above, 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 should be split into their own segments for the purpose of transit LOS analysis. The transit LOS should be set at “F” for these segments. The rest of the transit LOS analysis proceeds normally, with the overall transit LOS being 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, and 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.

5.1 Data Collection

The data collection effort consisted of field observations, traffic counts, and information obtained from the City of Portland, MaineDOT, and the consultant team.

Field observations were conducted in May 2013 to observe existing conditions and verify information obtained from online sources. Other sources include the same traffic counts used for the motorized vehicular operational analysis in this study and transit information summarized in the relevant section of this report. Gorrill-Palmer Consulting Engineers, Inc. provided an updated Synchro model for the study area. Note that previous MMLOS results released for existing conditions and future conditions included all intersections, including Marginal Way and Franklin Street. When assessing the alternatives, it was found that traffic was not all able to enter the Synchro network near Marginal Way because of changes made to the network. Therefore, results at this intersection or at segments including this intersection were not considered of value. The results below show the analysis only for the other intersections and segments in the network.

Key data inputs include the following:

Layout and Cross Section: Information related to layout and cross sections was obtained from the field observations. This information included:

- Crosswalk Widths
- Segment Lengths
- Number of Lanes
- Speed Limits
- Number of Bus Stops on Each Segment
- Presence of Right Turn Islands
- Median Type
- Number of Large Barrier Objects
- Cross Sectional Widths
- Number of left/right access points along the segment
- Bus Stop Amenities
- Pavement Conditions
- Presence of Left Turn Pockets
- On-Street Parking
- Number of Trees

Traffic and Signal Information: The traffic counts and signal timing information were used to determine the following factors:

- g/C Ratio - the ratio of green time to total cycle length for each through movement
- Walk Phase Timing
- Peak Hour Factor (PHF)
- “K” Factor – the ratio of peak hour volume to total daily volume
- Traffic Signal Cycle Length
- Signal System Coordination (yes or no)
- Peak Hour 2-Way Volumes
- Directional Volume Distribution

Transit: Transit information was gathered from the Internet and the City of Portland, PACTS, and METRO.

Other Information: Additional information required for the multimodal LOS analysis was obtained using standard defaults provided by the NCHRP Report 616 *Multimodal Level of Service Analysis for Urban Streets* and engineering judgment, including signal timing information and Average Daily Traffic (ADT) volumes for certain segments.

3. EXISTING YEAR (2013) ANALYSIS

Table 3 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the northbound direction. Note that in this and all results, the intersection with Marginal Way has been eliminated from the analysis to allow for direct comparison. In earlier released results for existing and future no project conditions, Marginal Way was still included. Table 4 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the southbound direction.

Table 3 Year (2013) Peak Hour Level of Service Results – Northbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Commercial Street to Fore Street	Auto	31.7%	E	27.0%	F
	Transit	6.38	F	6.38	F
	Bicycle	2.94	C	2.97	C
	Pedestrian	2.52	B	2.53	B
Fore Street to Middle Street	Auto	24.9%	F	19.4%	F
	Transit	6.40	F	6.40	F
	Bicycle	3.49	C	3.46	C
	Pedestrian	2.66	B	2.66	B
Middle Street to Congress Street	Auto	57.6%	C	54.9%	C
	Transit	6.49	F	6.50	F
	Bicycle	3.48	C	3.61	D
	Pedestrian	3.26	C	3.36	C
Congress Street to Cumberland Avenue	Auto	50.4%	C	42.9%	D
	Transit	6.45	F	6.45	F
	Bicycle	3.76	D	3.68	D
	Pedestrian	3.00	C	3.01	C
Cumberland Avenue to Lancaster Street	Auto	50.0%	C	50.3%	C
	Transit	6.49	F	6.48	F
	Bicycle	3.70	D	3.65	D
	Pedestrian	3.27	C	3.23	C
Lancaster Street to Fox Street/Somerset Street	Auto	33.9%	E	28.3%	F
	Transit	6.48	F	6.50	F
	Bicycle	3.56	D	3.63	D
	Pedestrian	3.20	C	3.36	C

Table 4 (Year 2013) Peak Hour Level of Service Results – Southbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Fox Street/Somerset Street to Lancaster Street	Auto	33.3%	E	33.7%	E
	Transit	6.40	F	6.40	F
	Bicycle	3.59	D	3.59	D
	Pedestrian	2.66	B	2.66	B
Lancaster Street to Cumberland Avenue	Auto	64.4%	C	56.0%	C
	Transit	6.46	F	6.47	F
	Bicycle	3.62	D	3.61	D
	Pedestrian	3.06	C	3.10	C
Cumberland Avenue to Congress Street	Auto	43.4%	D	39.7%	E
	Transit	6.43	F	6.44	F
	Bicycle	3.29	C	3.28	C
	Pedestrian	2.89	C	2.95	C
Congress Street to Middle Street	Auto	61.9%	C	36.4%	E
	Transit	6.49	F	6.49	F
	Bicycle	3.69	D	3.66	D
	Pedestrian	3.26	C	3.28	C
Middle Street to Fore Street	Auto	22.9%	F	17.4%	F
	Transit	6.41	F	6.42	F
	Bicycle	3.68	D	3.65	D
	Pedestrian	2.73	B	2.77	C
Fore Street to Commercial Street	Auto	23.1%	F	21.9%	F
	Transit	6.42	F	6.42	F
	Bicycle	3.67	D	3.66	D
	Pedestrian	2.77	C	2.82	C

A summary of the overall corridor Multimodal LOS results for Franklin Street is provided in Table 5.

Table 5 Year (2013) Peak Overall Facility Score

Franklin Street – Overall Corridor					
	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Northbound	Auto	0.38	E	0.35	E
	Transit	6.47	F	6.48	F
	Bicycle	3.59	D	3.58	D
	Pedestrian	3.13	C	3.18	C
Southbound	Auto	0.41	D	0.34	E
	Transit	6.45	F	6.45	F
	Bicycle	3.65	D	3.63	D
	Pedestrian	2.97	C	3.00	C

5.1.1.1.1 Summary of MMLOS Analysis – Year (2013)

The results of the Multimodal LOS for Franklin Street are generally consistent in both the northbound and southbound direction and both peak periods.

5.1.1.2 Auto LOS

Auto LOS is a function of the average travel speed over the length of the street and the average number of stops per mile. The overall corridor Auto LOS is "E" during both peak periods in the northbound direction and the PM peak period in the southbound direction. The overall corridor Auto LOS during the AM peak period in the southbound direction is LOS "D." Again, this is a different way of measuring automobile LOS than the HCM method.

5.1.1.3 Transit LOS

There are currently no transit stops along Franklin Street, resulting in a Transit LOS of "F." The transit level of service is based on a combination of the access experience, the waiting experience, and the rider experience, as well as the pedestrian LOS score.

5.1.1.4 Bicycle LOS

The overall corridor Bicycle LOS for Franklin Street is LOS "D" all scenarios. Bicycle LOS is based on a combination of user experience at intersections, the presence of striped bicycle lanes, and the number of signalized intersections per mile that the bicyclists must cross. The resulting LOS is due to the lack of striped bicycle lanes along Franklin Street. However, due to limited driveways and intersections along the corridor, combined with the volume and speed of auto traffic in the direction of travel, bicyclists can still travel along the corridor.

5.1.1.5 Pedestrian LOS

The overall corridor Pedestrian LOS for Franklin Street is LOS "C" for all scenarios. Pedestrian LOS is a combination of pedestrian density and widths of bicycle lanes, parking lanes, buffers, and sidewalk. The most significant factor affecting Pedestrian LOS is usually the volume of auto traffic and traffic speed.

4. FUTURE YEAR (2035) NO PROJECT ANALYSIS

A Multimodal LOS analysis for the Future Year (2035) No Project (NP) condition was conducted for Franklin Corridor. Future Year (2035) roadway conditions and geometry are anticipated to remain consistent with existing conditions. The only changes associated with the Future Year (2035) analysis include signal timing changes and traffic volume growth.

Table 6 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the northbound direction. Table 7 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the southbound direction.

Table 6 Year (2035) NP Peak Hour Level of Service Results – Northbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Commercial Street to Fore Street	Auto	36.20%	E	33.40%	E
	Transit	6.38	F	6.38	F
	Bicycle	2.98	C	2.97	C
	Pedestrian	2.55	B	2.55	B
Fore Street to Middle Street	Auto	25.40%	F	23.60%	F
	Transit	6.41	F	6.41	F
	Bicycle	3.53	D	3.51	D
	Pedestrian	2.7	B	2.7	B
Middle Street to Congress Street	Auto	57.60%	C	47.90%	D
	Transit	6.5	F	6.5	F
	Bicycle	3.51	D	3.5	C
	Pedestrian	3.32	C	3.31	C
Congress Street to Cumberland Avenue	Auto	59.30%	C	35.60%	E
	Transit	6.46	F	6.46	F
	Bicycle	3.81	D	3.77	D
	Pedestrian	3.06	C	3.04	C
Cumberland Avenue to Lancaster Street	Auto	38.50%	E	52.30%	C
	Transit	6.5	F	6.5	F
	Bicycle	3.72	D	3.74	D
	Pedestrian	3.33	C	3.33	C
Lancaster Street to Fox Street/Somerset Street	Auto	35.30%	E	24.80%	F
	Transit	6.49	F	6.49	F
	Bicycle	3.59	D	3.56	D
	Pedestrian	3.24	C	3.24	C

Table 7 Year (2035) NP Peak Hour Level of Service Results – Southbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Fox Street/Somerset Street to Lancaster Street	Auto	37.90%	E	25.40%	F
	Transit	6.41	F	6.4	F
	Bicycle	3.64	D	3.6	D
	Pedestrian	2.71	B	2.7	B
Lancaster Street to Cumberland Avenue	Auto	56.60%	C	35.70%	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	43.70%	D	31.90%	E
	Transit	6.44	F	6.45	F
	Bicycle	3.29	C	3.28	C
	Pedestrian	2.95	C	3	C
Congress Street to Middle Street	Auto	65.50%	C	43.00%	D
	Transit	6.5	F	6.5	F
	Bicycle	3.74	D	3.72	D
	Pedestrian	3.32	C	3.35	C
Middle Street to Fore Street	Auto	32.50%	E	21.50%	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	24.90%	F	26.80%	F
	Transit	6.42	F	6.43	F
	Bicycle	3.72	D	3.73	D
	Pedestrian	2.8	C	2.85	C

A summary of the overall corridor Multimodal LOS results for Franklin Street is provided in Table 8.

Table 8 Year (2035) NP Peak Overall Facility Score

Franklin Street – Overall Corridor					
	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Northbound	Auto	0.40	E	0.35	E
	Transit	6.47	F	6.47	F
	Bicycle	3.55	D	3.54	D
	Pedestrian	3.12	C	3.11	C
Southbound	Auto	0.43	D	0.32	E
	Transit	6.45	F	6.46	F
	Bicycle	3.64	D	3.61	D
	Pedestrian	3.02	C	3.05	C

5.1.1.5.1 Summary of MMLOS Analysis – Year (2035)

5.1.1.6 Auto LOS

The overall corridor Auto LOS is "E" during both peak periods in the northbound direction and the PM peak period in the southbound direction. The overall corridor Auto LOS during the AM peak period in the southbound direction is LOS "D."

5.1.1.7 Transit LOS

There are currently no transit stops along Franklin Street, resulting in a Transit LOS of "F." The transit level of service is based on a combination of the access experience, the waiting experience, and the rider experience, as well as the pedestrian LOS score.

5.1.1.8 Bicycle LOS

The overall corridor Bicycle LOS for Franklin Street is LOS "D" during both peak periods and directions.

5.1.1.9 Pedestrian LOS

The overall corridor Pedestrian LOS for Franklin Street is LOS "C" for all scenarios. Pedestrian LOS is a combination of pedestrian density and widths of bicycle lanes, parking lanes, buffers, and sidewalk. The most significant factor affecting Pedestrian LOS is usually the volume of auto traffic and traffic speed.

5. FUTURE YEAR (2035) ANALYSIS – ENHANCED URBAN STREET: OPTION 1

A Multimodal LOS analysis for the Future Year (2035) Enhanced Urban Street: Option 1 condition was conducted for Franklin Corridor. This option includes the addition of bike lanes, wider pedestrian sidewalks, and a shuttle service running parallel to the south of Franklin Street.

Table 9 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the northbound direction. Table 10 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the southbound direction.

Table 9 Year (2035) WP 1 Peak Hour Level of Service Results – Northbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Commercial Street to Fore Street	Auto	57.80%	C	30.80%	E
	Transit[1]	6.36	F	6.37	F
	Bicycle[2]	2.79	C	3.12	C
	Pedestrian	2.37	B	2.47	B
Fore Street to Middle Street	Auto	50.50%	C	21.90%	F
	Transit[1]	6.37	F	6.4	F
	Bicycle[2]	2.95	C	2.99	C
	Pedestrian	2.43	B	2.65	B
Middle Street to Congress Street	Auto	71.10%	B	48.30%	D
	Transit[1]	6.39	F	6.46	F
	Bicycle[2]	2.98	C	3.07	C
	Pedestrian	2.62	B	3.04	C
Congress Street to Cumberland Avenue	Auto	58.60%	C	31.00%	E
	Transit[1]	6.37	F	6.41	F
	Bicycle	2.39	B	2.46	B
	Pedestrian	2.49	B	2.75	C
Cumberland Avenue to Lancaster Street	Auto	66.00%	C	33.40%	E
	Transit[1]	6.36	F	6.41	F
	Bicycle	2.42	B	2.48	B
	Pedestrian	2.43	B	2.71	B
Lancaster Street to Fox Street/Somerset Street	Auto	42.30%	D	1.80%	F
	Transit[1]	6.38	F	6.42	F
	Bicycle	2.4	B	2.49	B
	Pedestrian	2.52	B	2.82	C

Notes: (1) This option includes a shuttle service that runs parallel to Franklin Street. The proposed shuttle service would run along Pearl Street, which is within walking distance (0.10 of a mile) from Franklin Street.
(2)This option includes protected bike lanes/cycle tracks between Commercial Street and Congress Street. The MMLOS model does not include features to model this scenario. It is assumed that protected bike lanes/cycle tracks operate in their own right of way and would be perceived as LOS A.

Table 10 Year (2035) WP 1 Peak Hour Level of Service Results – Southbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Fox Street/Somerset Street to Lancaster Street	Auto	54.10%	C	31.30%	E
	Transit[1]	6.41	F	6.4	F
	Bicycle[2]	2.48	B	2.46	B
	Pedestrian	2.75	C	2.65	B
Lancaster Street to Cumberland Avenue	Auto	64.90%	C	44.70%	D
	Transit[1]	6.43	F	6.41	F
	Bicycle[2]	2.53	B	2.46	B
	Pedestrian	2.85	C	2.74	B
Cumberland Avenue to Congress Street	Auto	34.80%	E	45.00%	D
	Transit[1]	6.48	F	6.45	F
	Bicycle[2]	2.56	B	2.52	B
	Pedestrian	3.19	C	3.02	C
Congress Street to Middle Street	Auto	80.80%	B	49.00%	D
	Transit[1]	6.42	F	6.41	F
	Bicycle	3.1	C	3.01	C
	Pedestrian	2.82	C	2.77	C
Middle Street to Fore Street	Auto	39.90%	E	20.80%	F
	Transit[1]	6.41	F	6.4	F
	Bicycle	2.99	C	2.98	C
	Pedestrian	2.7	B	2.7	B
Fore Street to Commercial Street	Auto	58.80%	C	41.10%	D
	Transit[1]	6.38	F	6.39	F
	Bicycle	2.96	C	2.95	C
	Pedestrian	2.56	B	2.61	B

Notes: (1) This option includes a shuttle service that runs parallel to Franklin Street. The proposed shuttle service would run along Pearl Street, which is within walking distance (0.10 of a mile) from Franklin Street.
(2)This option includes protected bike lanes/cycle tracks between Commercial Street and Congress Street. The MMLOS model does not include features to model this scenario. It is assumed that protected bike lanes/cycle tracks operate in their own right of way and would be perceived as LOS A.

A summary of the overall corridor Multimodal LOS results for the Future Year 2035 WP1 scenario is provided in Table 11.

Table 11 Year (2035) WP1 Peak Overall Facility Score

Franklin Street – Overall Corridor					
	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Northbound	Auto	0.76	B	0.2	F
	Transit	6.37	F	6.42	F
	Bicycle	2.65	B	2.76	C
	Pedestrian	2.49	B	2.77	C
Southbound	Auto	0.71	B	0.44	D
	Transit	6.42	F	6.41	F
	Bicycle	2.77	C	2.73	B
	Pedestrian	2.83	C	2.75	C

5.1.1.9.1 Summary of MMLOS Analysis – Year (2035) WP1

The multimodal level of service improves significantly in the 2035 WP1 scenario across all modes, with the exception of the Auto LOS during the PM peak period in the northbound direction.

5.1.1.10 Auto LOS

The overall corridor Auto LOS improves during both peak periods in the southbound direction and during the AM peak period in the northbound direction. The overall corridor Auto LOS during the PM peak period in the northbound direction worsens due to signal timing changes at the intersection of Franklin Street and Somerset/Fox Street.

5.1.1.11 Transit LOS

There are no proposed stops or service along Franklin Street, resulting in a Transit LOS of "F." However, this option includes a proposed shuttle service parallel to Franklin Street. The proposed shuttle service is within walking distance (0.10 of a mile) from Franklin Street, providing improved access to transit services over the no project condition.

5.1.1.12 Bicycle LOS

With the implementation of bike lanes along the corridor, the overall corridor Bicycle LOS improves in both peak periods and directions.

5.1.1.13 Pedestrian LOS

With the implementation of wider pedestrian sidewalks and lower target speed for vehicles, the overall corridor Pedestrian score improves in both peak periods and direction.

A comparison of the 2035 NP and 2035 WP1 MMLOS results is provided in Table 12.

Table 12 Comparison of Peak Overall Facility Score

	Mode	AM Peak					PM Peak				
		2035 NP		2035 WP1		Change in Score	2035 NP		2035 WP1		Change in Score
		Score	LOS	Score	LOS		Score	LOS	Score	LOS	
Northbound	Auto*	0.40	E	0.76	B	0.36	0.35	E	0.20	F	-0.15
	Transit	6.47	F	6.37	F	-0.10	6.47	F	6.42	F	-0.05
	Bicycle	3.55	D	2.65	B	-0.90	3.54	D	2.76	C	-0.78
	Pedestrian	3.12	C	2.49	B	-0.63	3.11	C	2.77	C	-0.34
Southbound	Auto*	0.43	D	0.71	B	0.28	0.32	E	0.44	D	0.12
	Transit	6.45	F	6.42	F	-0.03	6.46	F	6.41	F	-0.05
	Bicycle	3.64	D	2.77	C	-0.87	3.61	D	2.73	B	-0.88
	Pedestrian	3.02	C	2.83	C	-0.19	3.05	C	2.75	C	-0.30

Note: Auto Mode is scored differently from Transit, Bicycle, and Pedestrian, as discussed in the methodology section and shown in Tables 1 and 2.

6. FUTURE YEAR (2035) ANALYSIS – ENHANCED URBAN STREET: OPTION 2

A Multimodal LOS analysis for the Future Year (2035) Enhanced Urban Street: Option 2 condition was conducted for Franklin Corridor. This option is similar to the Enhanced Urban Street: Option 1, with slight variations in vehicle, bicycle, and pedestrian right-of-way widths and the inclusion of a shuttle service along Franklin Street.

Table 13 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the northbound direction. Table 14 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the southbound direction.

Table 13 Year (2035) WP 2 Peak Hour Level of Service Results – Northbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Commercial Street to Fore Street	Auto	59.20%	C	46.80%	D
	Transit	3.20	C	3.22	C
	Bicycle	2.79	C	3.12	C
	Pedestrian	2.37	B	2.49	B
Fore Street to Middle Street	Auto	50.00%	C	31.80%	E
	Transit	3.21	C	3.25	C
	Bicycle	2.95	C	2.99	C
	Pedestrian	2.44	B	2.66	B
Middle Street to Congress Street	Auto	66.70%	C	41.90%	D
	Transit	3.32	C	3.32	C
	Bicycle	2.97	C	3.07	C
	Pedestrian	2.76	C	3.17	C
Congress Street to Cumberland Avenue	Auto	45.00%	D	30.20%	E
	Transit	3.26	C	3.3	C
	Bicycle	3.52	D	3.73	D
	Pedestrian	2.75	B	3.02	C
Cumberland Avenue to Lancaster Street	Auto	61.50%	C	29.20%	F
	Transit	3.25	C	3.29	C
	Bicycle	3.54	D	3.75	D
	Pedestrian	2.69	B	2.97	C
Lancaster Street to Fox Street/Somerset Street	Auto	33.30%	E	1.80%	F
	Transit	3.26	C	3.29	C
	Bicycle	3.56	D	2.49	B
	Pedestrian	2.78	C	2.94	C

Table 14 Year (2035) WP 2 Peak Hour Level of Service Results – Southbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Fox Street/Somerset Street to Lancaster Street	Auto	48.70%	D	40.60%	D
	Transit	3.28	C	3.27	C
	Bicycle	2.36	B	2.35	B
	Pedestrian	2.86	C	2.82	C
Lancaster Street to Cumberland Avenue	Auto	61.50%	C	55.30%	C
	Transit	3.29	C	3.28	C
	Bicycle	2.37	B	2.34	B
	Pedestrian	2.95	C	2.89	C
Cumberland Avenue to Congress Street	Auto	27.30%	F	31.50%	E
	Transit	3.34	C	3.31	C
	Bicycle	2.43	B	2.38	B
	Pedestrian	3.30	C	3.11	C
Congress Street to Middle Street	Auto	80.80%	B	64.10%	C
	Transit	3.29	C	3.27	C
	Bicycle	3.10	C	3.01	C
	Pedestrian	2.96	C	2.81	C
Middle Street to Fore Street	Auto	41.10%	D	33.80%	E
	Transit	3.25	C	3.23	C
	Bicycle	2.99	C	2.92	C
	Pedestrian	2.70	B	2.54	B
Fore Street to Commercial Street	Auto	45.50%	D	41.80%	D
	Transit	3.23	C	3.20	C
	Bicycle	2.93	C	2.13	B
	Pedestrian	2.54	B	2.37	B

A summary of the overall corridor Multimodal LOS results for Franklin Street is provided in Table 15.

Table 15 Year (2035) WP 2 Peak Overall Facility Score

Franklin Street – Overall Corridor					
	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Northbound	Auto	0.68	B	0.20	F
	Transit	3.26	C	3.29	C
	Bicycle	3.24	C	3.27	C
	Pedestrian	2.66	B	2.93	C
Southbound	Auto	0.63	C	0.58	C
	Transit	3.28	C	3.27	C
	Bicycle	2.69	B	2.54	B
	Pedestrian	2.92	C	2.79	C

5.1.1.13.1 Summary of MMLOS Analysis – Year (2035) WP2

The multimodal level of service improves significantly in the 2035 WP2 scenario across all modes, with the exception of the Auto LOS during the PM peak period in the northbound direction.

5.1.1.14 Auto LOS

The overall corridor Auto LOS improves during both peak periods in the southbound direction and during the AM peak period in the northbound direction. The overall corridor Auto LOS during the PM peak period in the northbound direction worsens due to signal timing changes at the intersection of Franklin Street and Somerset/Fox Street.

5.1.1.15 Transit LOS

The proposed Franklin Shuttle service results in an improvement of Transit LOS from the 2035 No Project condition. The inclusion of transit in this option results in this corridor providing options for all modes of travel.

5.1.1.16 Bicycle LOS

With the implementation of bike lanes along the corridor in the southbound direction, the overall corridor Bicycle LOS improves in both peak periods and the southbound direction. Bicycle LOS remains similar in the northbound direction, and improves slightly in during the PM peak period.

5.1.1.17 Pedestrian LOS

With the implementation of wider pedestrian sidewalks and lower target speed for vehicles, the overall corridor Pedestrian score improves in both peak periods and direction.

A comparison of the 2035 NP and 2035 WP2 MMLOS results is provided in Table 16.

Table 16 Comparison of Peak Overall Facility Score

	Mode	AM Peak					PM Peak				
		2035 NP		2035 WP 2		Change in Score	2035 NP		2035 WP 2		Change in Score
		Score	LOS	Score	LOS		Score	LOS	Score	LOS	
Northbound	Auto*	0.40	E	0.68	B	0.28	0.35	E	0.20	F	-0.15
	Transit	6.47	F	3.26	C	-3.21	6.47	F	3.29	C	-3.18
	Bicycle	3.55	D	3.24	C	-0.31	3.54	D	3.27	C	-0.27
	Pedestrian	3.12	C	2.66	B	-0.46	3.11	C	2.93	C	-0.18
Southbound	Auto*	0.43	D	0.63	C	0.20	0.32	E	0.58	C	0.26
	Transit	6.45	F	3.28	C	-3.17	6.46	F	3.27	C	-3.19
	Bicycle	3.64	D	2.69	B	-0.95	3.61	D	2.54	B	-1.07
	Pedestrian	3.02	C	2.92	C	-0.10	3.05	C	2.79	C	-0.26

Note: Auto Mode is scored differently from Transit, Bicycle, and Pedestrian, as discussed in the methodology section and shown in Tables 1 and 2.

7. FUTURE YEAR (2035) ANALYSIS – ENHANCED URBAN PARKWAY

A Multimodal LOS analysis for the Future Year (2035) Enhanced Urban Parkway condition was conducted for Franklin Corridor. This option includes a Class I bike path along the center median of Franklin Street, as well as wider pedestrian sidewalks.

Table 17 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the northbound direction. Table 18 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the southbound direction.

Table 17 Year (2035) WP 3 Peak Hour Level of Service Results – Northbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Commercial Street to Fore Street	Auto	46.70%	D	33.70%	E
	Transit	6.37	F	6.39	F
	Bicycle	1.21	A	2.01	B
	Pedestrian	2.49	B	2.61	B
Fore Street to Middle Street	Auto	37.10%	E	20.90%	F
	Transit	6.39	F	6.42	F
	Bicycle[1]	3.52	D	3.68	D
	Pedestrian	2.58	B	2.83	C
Middle Street to Congress Street	Auto	62.10%	C	40.30%	D
	Transit	6.44	F	6.49	F
	Bicycle[1]	3.65	D	3.94	D
	Pedestrian	2.91	C	3.29	C
Congress Street to Cumberland Avenue	Auto	45.80%	D	31.70%	E
	Transit	6.41	F	6.45	F
	Bicycle[1]	3.57	D	3.76	D
	Pedestrian	2.74	B	3.02	C
Cumberland Avenue to Lancaster Street	Auto	62.30%	C	17.80%	F
	Transit	6.37	F	6.41	F
	Bicycle[1]	3.57	D	3.69	D
	Pedestrian	2.46	B	2.74	B
Lancaster Street to Fox Street/Somerset Street	Auto	32.80%	E	17.20%	F
	Transit	6.41	F	6.46	F
	Bicycle[1]	3.57	D	3.84	D
	Pedestrian	2.76	C	3.08	C

Note: (1) This option includes a Class I bike path along the center median of Franklin Street. The MMLOS model does not include features to model this scenario. It is assumed that a Class I bike path operates in its own right of way and would be perceived as LOS A.

Table 18 Year (2035) WP 3 Peak Hour Level of Service Results – Southbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Fox Street/Somerset Street to Lancaster Street	Auto	52.00%	C	45.10%	D
	Transit	6.44	F	6.42	F
	Bicycle[1]	3.78	D	3.67	D
	Pedestrian	2.96	C	2.83	C
Lancaster Street to Cumberland Avenue	Auto	61.10%	C	53.90%	C
	Transit	6.47	F	6.45	F
	Bicycle[1]	3.96	D	3.81	D
	Pedestrian	3.12	C	3.01	C
Cumberland Avenue to Congress Street	Auto	19.80%	F	36.70%	E
	Transit	6.52	F	6.5	F
	Bicycle[1]	4.53	E	4.12	D
	Pedestrian	3.5	C	3.32	C
Congress Street to Middle Street	Auto	75.70%	B	50.20%	C
	Transit	6.48	F	6.46	F
	Bicycle[1]	4	D	3.79	D
	Pedestrian	3.21	C	3.07	C
Middle Street to Fore Street	Auto	40.50%	D	32.20%	E
	Transit	6.43	F	6.43	F
	Bicycle[1]	3.78	D	3.68	D
	Pedestrian	2.89	C	2.87	C
Fore Street to Commercial Street	Auto	60.50%	C	37.90%	E
	Transit	6.4	F	6.42	F
	Bicycle	3.62	D	3.56	D
	Pedestrian	2.69	B	2.79	C

Note: (1) This option includes a Class I bike path along the center median of Franklin Street. The MMLOS model does not include features to model this scenario. It is assumed that a Class I bike path operates in its own right of way and would be perceived as LOS A.

A summary of the overall corridor Multimodal LOS results for Franklin Street is provided in Table 19.

Table 19 Year (2035) WP 3 Peak Overall Facility Score

Franklin Street – Overall Corridor					
	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Northbound	Auto	0.54	C	0.28	F
	Transit	6.40	F	6.44	F
	Bicycle	3.27	C	3.56	D
	Pedestrian	2.67	B	2.95	C
Southbound	Auto	0.51	C	0.49	D
	Transit	6.47	F	6.45	F
	Bicycle	3.97	D	3.79	D
	Pedestrian	3.10	C	3.00	C

5.1.1.17.1 Summary of MMLOS Analysis – Year (2035) WP2

The multimodal level of service generally improves in the 2035 WP3 scenario across all modes, with the exception of the Auto LOS during the PM peak period in the northbound direction.

5.1.1.18 Auto LOS

The overall corridor Auto LOS improves during both peak periods in the southbound direction and during the AM peak period in the northbound direction. The overall corridor Auto LOS during the PM peak period in the northbound direction worsens due to signal timing changes at the intersection of Franklin Street and Somerset/Fox Street.

5.1.1.19 Transit LOS

There are no proposed transit stops or services along Franklin Street, resulting in a Transit LOS of "F."

5.1.1.20 Bicycle LOS

The results show a slight decrease in Bicycle LOS in the southbound direction and only a minor improvement in the northbound direction. These results do not reflect the Class I bikeway along the center median of Franklin Street as this methodology aims to compare the interaction between various modes. A Class I bikeway functions in its own right of way and is assumed to have LOS A.

5.1.1.21 Pedestrian LOS

With the implementation of wider pedestrian sidewalks and buffers, the overall corridor Pedestrian score improves in both peak periods and direction.

A comparison of the 2035 NP and 2035 WP3 MMLOS results is provided in Table 20.

Table 30 Comparison of Peak Overall Facility Score

	Mode	AM Peak					PM Peak				
		2035 NP		2035 WP 3		Change in Score	2035 NP		2035 WP 3		Change in Score
		Score	LOS	Score	LOS		Score	LOS	Score	LOS	
Northbound	Auto*	0.40	E	0.54	C	0.14	0.35	E	0.28	F	-0.07
	Transit	6.47	F	6.40	F	-0.07	6.47	F	6.44	F	-0.03
	Bicycle	3.55	D	3.27	C	-0.28	3.54	D	3.56	D	0.02
	Pedestrian	3.12	C	2.67	B	-0.45	3.11	C	2.95	C	-0.16
Southbound	Auto*	0.43	D	0.51	C	0.08	0.32	E	0.49	D	0.17
	Transit	6.45	F	6.47	F	0.02	6.46	F	6.45	F	-0.01
	Bicycle	3.64	D	3.97	D	0.33	3.61	D	3.79	D	0.18
	Pedestrian	3.02	C	3.10	C	0.08	3.05	C	3.00	C	-0.05

Note: Auto Mode is scored differently from Transit, Bicycle, and Pedestrian, as discussed in the methodology section and shown in Tables 1 and 2.

APPENDIX F: EXPOSURE INDEX

Exposure Index Methodology for Franklin Evaluation

Introduction to Exposure Indices

Many models or methods have been advanced over time to estimate the safety performance of intersections or crossing points between various types of traffic, including motor vehicles, rail vehicles, bicycles, and pedestrians. These methods often include an accident exposure index (EI). Research suggests that the safety risk posed by the intersection of volumes V_i and V_j of modes i and j at a point is best estimated by a 'power factor' expression of the type:

Estimated safety risk = $k_{ij} F_{adj} V_i^a V_j^b$

where

k_{ij} is a constant particular to the intersecting modes (i and j);

F_{adj} is an intersection-specific adjustment factor based on intersection characteristics, including geometry and the presence of protective measures such as traffic signals;

V_i and V_j are the intersecting volumes for modes i and j respectively; and

a and b are calibrated exponents.

The term $V_i^a V_j^b$ is sometimes called an 'exposure index' (EI).

For both highway intersections and rail-highway crossings, 'best fit' values of a have generally been found to lie in the range 0.2-0.7. This non-linear behavior is expressed in some alternative models with a more complex structure of intersection types or different values for volume ranges. The effectiveness of the 'power factor' expression in EI is likely linked to two significant causal factors:

- Humans' ability to recognize safety-sensitive situations increases with the number of visual cues provided. As volumes increase, the average vehicle operator is likely to be presented with more such visual cues in the form of other vehicles; and

- At higher volumes, the travelway infrastructure is likely to be equipped with more treatments that enhance safety, and often to have a more consistent geometric treatment and/or fewer wayside distractions.

Application of Exposure Index to Franklin Street

For this study, the term EI will be used for the summary corridor-wide total accident risk exposure, normalized to 100 for the future base conditions. An alternative with an index of 110, for example, might be expected to have 10 percent more accident experience over a time period long enough for statistical fluctuation to average out. The Franklin corridor does not include any intersections with rail vehicles, so the methodology does not include them. The observed bicycle volumes were so small that including a separate component for bicycle-related risk would not have a meaningful effect on the outcome, so the methodology presented here includes only terms related to highway and pedestrian traffic in the corridor. The safety considerations for bicycles are treated in the assessment of the quality of the bicycle connections in the corridor.

The methodology presented here is intended to make the best use of available information from the travel demand model and the data collected for the study at a level appropriate to the nature and accuracy of that information. As a general rule, the introduction of an increasing number of variables and complexity

to a model exhibits diminishing marginal returns in terms of accuracy for significant increases in data collection and analysis effort. The EI used as the Franklin MOE for safety uses the following as inputs:

- Highway traffic volumes along Franklin;
- Highway traffic volumes on streets crossing Franklin;
- Pedestrian volumes at intersections along Franklin;
- Pedestrian volumes at mid-block crossings of Franklin; and
- Number of curb access points along Franklin.

The EI for the Franklin corridor has been composed based on consideration of a number of information sources, and has been adjusted so as to be generally in alignment with the Federal Highway Administration's (FHWA) Highway Safety Model. It includes two terms representing two types of intersecting traffic flows:

- Highway-highway at intersections; and
- Highway-pedestrian at signalized intersections and mid-block crossings.

These account for a large fraction of total accidents, and also have the best body of research in support of them. The next largest accident source is highway accidents along roadways between intersections. There is enough research to support including a third term for estimating this. The number of bicycle trips observed in the corridor was so low that adding a term for them would not measurably affect the overall risk evaluation and would have a high level of uncertainty.
The alternatives will be evaluated on the safety criterion by comparing the total EI relative to the baseline 2035 case. No prediction of an absolute accident number should be inferred from this comparison.

Highway EI Component at Signalized Intersections

The component of the EI for intersections is based on signalized intersections with four approaches, as occur along Franklin. In the event of a major change in an intersection configuration, the FHWA Highway Safety Model can be applied as a consistent basis for evaluating such a change.

EI component for a signalized intersection = $0.000067 \ K_{hh} \ V_{major}^{0.90} \ V_{minor}^{0.235}$

where

K_{hh} is 1.0 for left turn lanes off Franklin with protected signal phases
1.2 for left turn lanes off Franklin without protected signal phases
1.4 without left turn lanes off Franklin

V_{major} is the traffic volume entering the intersection on the major roadway (Franklin Street)

V_{minor} is the traffic volume entering the intersection on the minor or cross street

Highway EI Component at Unsignalized Intersections

A separate expression is used for unsignalized intersections . The exponents were derived from a 2008 study by British Columbia's Ministry of Transportation & Infrastructure.

EI component for an unsignalized intersection = $0.000084 \ V_{major}^{0.54} \ V_{minor}^{0.64}$

Highway-pedestrian EI Component at Crossings

Pedestrian crossing EI component = $0.000026 \ K_{ped} \ (V_{minor} + V_{major})^{0.66} \ V_{ped}^{0.20}$

where

K_{ped} is 1.00 for crossings at signalized intersection locations
1.30 at unsignalized crossings (at midblock locations, where $V_{minor} = 0$), either informal (unmarked) or with only passive protection (*e.g.* pavement markings and fixed signage)
0.95 at midblock crossings with some form of active protection (e.g. pedestrian-actuated overhead signs, pedestrian beacons, or half-signals)

V_{ped} is the pedestrian volume at the crossing

Highway EI Component between Intersections

Highway segment EI component $= 0.000033\ K_{div}\ (1.0 + 0.07\ EAPPM)\ L\ V_{major}^{1.25}$

where

K_{div} is 0.70 for a divided segment of Franklin and 1.00 otherwise;
L is the segment length in miles; and
EAPPM is the number of effective access points per mile, computed as the following divided by L:

- 1 for each 'minor' driveway or access point (or curb cut) onto Franklin, *e.g*. small businesses, strip malls, residences;
- 3 for each 'major' driveway or access point, *e.g.* large surface parking lots, access to/from underground parking or shopping centers; and
- 10 for each mile of on-street curb parking (averaged over both directions)

In this case, the EI component grows linearly with both highway volume and the number of effective access points. This is not inconsistent with the power factor basis of the other two terms of the overall corridor risk because this term is not formulated as such.

Total Exposure Index (EI)

The total EI is be based on the sum of the three terms described above, evaluated at all segments and intersections included in the corridor. It is indexed so that the baseline future (2035) condition for the corridor has a value of 100.