Transforming Forest Avenue

By IBI Group Inc. with Gorrill-Palmer Consulting Engineers, Inc. and Barton & Gingold

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Adopted by Portland City Council June 4, 2012

PACTS

Portland Area Comprehensive Transportation System

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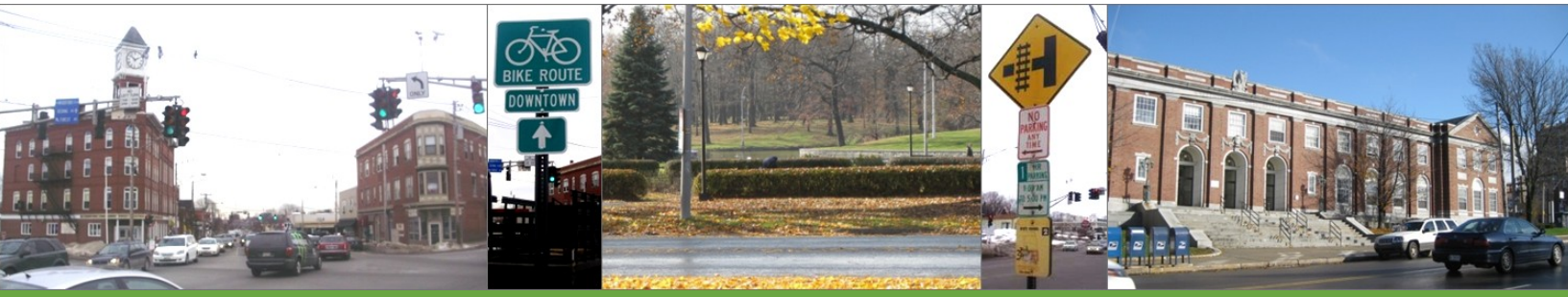

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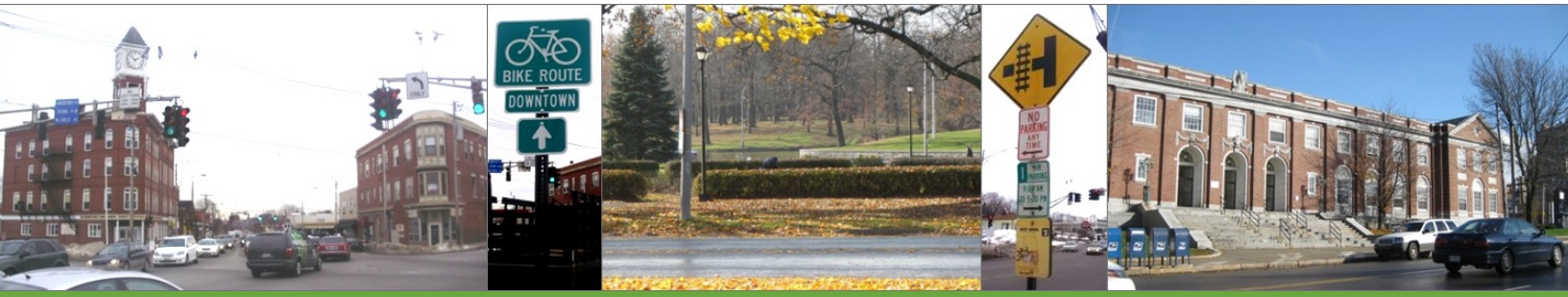

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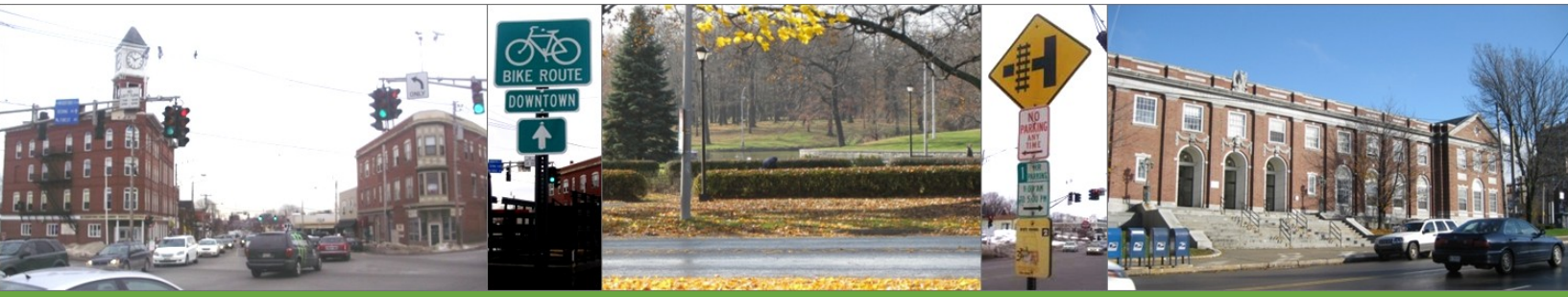
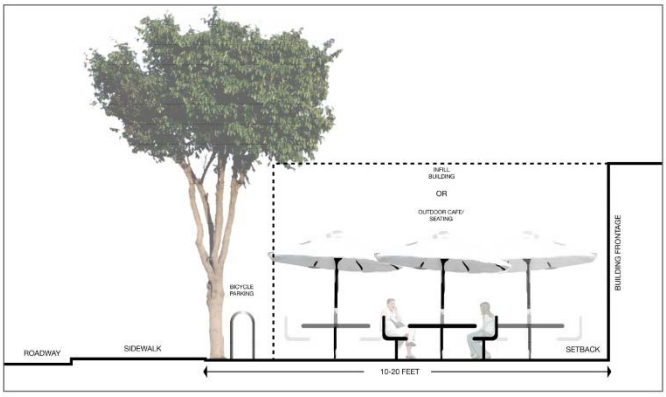


Executive Summary

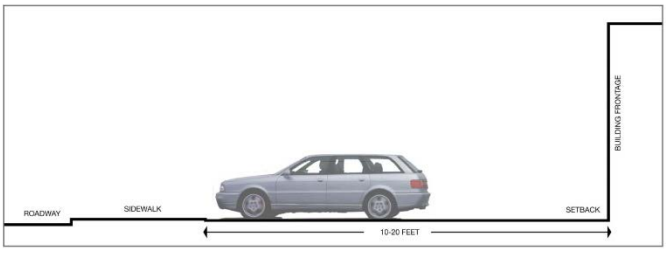
Executive Summary

Forest Avenue serves as one of the Portland region's most critical transportation corridors, linking the highly urbanized peninsula to Interstate 295 and suburban communities to the northwest. Along its course, Forest Avenue passes established residential neighborhoods, historically dense commercial districts, large employers, post-WWII shopping plazas, and school and community centers. The City of Portland recognizes that Forest Avenue has many assets – its existing commercial activity, its access to USM, its historic neighborhood nodes with capacity for mixed-use development, its frequent transit service, and its infill opportunities. It is also widely recognized that years of auto-oriented development have created challenges for Forest Avenue. In this light, the City of Portland, in conjunction with the Portland Area Comprehensive Transportation Study (PACTS), initiated *Transforming Forest Avenue*, an integrated transportation and land use plan for the Forest Avenue corridor.

Transforming Forest Avenue included an intensive five-month examination of the portion of Forest Avenue from Park Avenue north through Woodfords Corner. The study developed land use, transportation, and streetscape alternatives based on public involvement and best practices, analyzed these against transit-supportive development and complete streets principles, and culminated in a concept plan for the corridor as a whole. The process involved two Public Advisory Committee meetings and two public meetings, as well as a study website.



Possible Infill Strategies



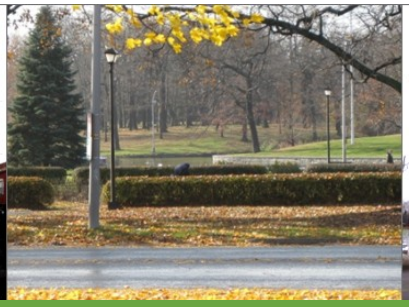
Existing Front Yard Configurations

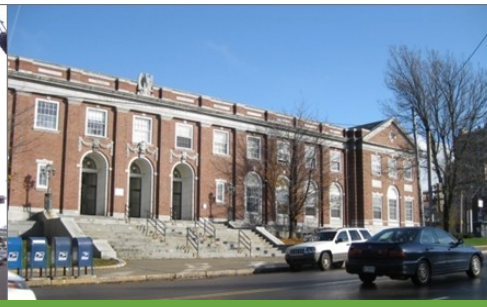
Ultimately, *Transforming Forest Avenue* resulted a wide range of land use, streetscape, and transportation-related recommendations, all designed to encourage transit-supportive development and the evolution of Forest Avenue as a complete street. The plan suggests:

- Installing high-quality and consistent street furniture, lighting, and landscaping to brand Forest Avenue as a place;
- Upgrading sidewalks, ramps, and crosswalks to provide universal access and using techniques such as asphalt stamping to create a more pedestrian-oriented atmosphere;
- Designating shared bicycle lanes and providing additional bike parking;
- Introducing off-peak shuttle service and providing bus stop amenities, including benches and shelters, at key locations;

- Creating a gateway to downtown by:
    - Widening and landscaping the median at the southerly end of the corridor;
    - Reducing the number of travel lanes between High Street and Park Avenue to allow more space for bicycle facilities; and
    - Installing bulb-outs at Park Avenue/Portland Street;
- Enhancing bicycle and pedestrian safety and character from Marginal Way through the I-295 underpass by:
    - Installing bollard lighting under the bridge;
    - Establishing an off-street multi-use path on both sides of Forest Avenue;
    - Creating shared bicycle lanes for more experienced riders; and
    - Coordinating with MaineDOT to provide bicycle and pedestrian safety enhancements at the ramp crossings;
- Encouraging access to businesses in the central portion of the corridor by completing the pedestrian crossing at Preble Street and calming traffic on side streets;
- Enhancing the existing node at Woodfords Corner by:
    - Improving traffic flow with parking and turning restrictions;
    - Installing a bulb-outs where warranted;
    - Adding planters, asphalt stamping, and street furniture;
    - Enhancing crosswalks; and
    - Improving lane markings and directional signage; and
- Pursuing further study of existing land use policy, wayfinding, bus stop placement, parking policy, and stormwater management on the corridor

The City of Portland recognizes that Forest Avenue will not change overnight, and that it will take a concerted effort on the part of residents, business-owners, the city, and the region to make these plans a reality. However, by taking the steps outlined here and building on the street's existing assets, eventually Forest Avenue can be a more complete street, one that works for businesses and homes, bicyclists and pedestrians, transit-riders and drivers. The final outcome? A truly transformed Forest Avenue, an attractive and walkable neighborhood destination.

Chapter I. Transforming Forest Avenue Concept Plan

1. Introduction

IBI Group Incorporated, Gorrill-Palmer Consulting Engineers Incorporated, and Barton and Gingold Communications Management were retained by the Portland Area Comprehensive Transportation Committee (PACTS) and the City of Portland to "develop an integrated transportation and land use plan that will leverage transportation and other public investments to stimulate private redevelopment and infill of underutilized properties."[1] The Transforming Forest Avenue Concept Plan evolved from a process of assessing existing conditions and evaluating alternatives based on feedback in the public process. This Concept Plan is a combination of land use and zoning, as well as transportation and streetscape plans. Together they are meant to represent a possible vision for the corridor's future development.

The Land Use and Zoning component of the Concept Plan is described generally for the entire corridor. The Transportation and Streetscape component of the Concept Plan is presented as a set of improvements for the whole corridor, and an application of the Plan in each of the three segments (A, B, and C) of the study corridor shown in **Error! Reference source not found.**.

The Land Use and Zoning component is described at a higher level, in a more goal-oriented perspective. The Transportation and Streetscape component is illustrated through a variety of transportation and streetscape improvements that have been proposed and vetted for basic feasibility based on the existing conditions analysis, and the future traffic analysis carried out for this report. This set of possible improvements has been further narrowed down based on public feedback. Future studies should determine the full extent to which many of these improvements can be carried out.

2. Process

The Transforming Forest Avenue Concept Plan is based on the five-month Transforming Forest Avenue Study. The goal of the study was to determine a land use and transportation plan for a portion of Forest Avenue from Park Avenue/Portland Street to the railroad crossing north of Woodfords Corner. The Concept is based on a context sensitive approach and was developed in accordance with Complete Streets, and Transit-Supportive Development (TSD) principles. The following tasks were carried out in the Transforming Forest Avenue study:

- The development of TSD and Complete Streets principles
- The assessment of existing conditions for both land use and transportation with separate deliverables
- The analysis of existing traffic conditions, including Level of Service assessment
- The analysis of the corridor's streetscape, including the creation of three street sections of existing conditions
- The development of three land use and zoning alternatives
- The development of three transportation and streetscape alternatives
- The analysis of future traffic conditions for the year 2035
- The development and application of evaluation tables for the land use and zoning alternatives and the transportation and streetscape alternatives

[1] From *The Portland Area Comprehensive Transportation System (PACTS) Request for Proposals for a Portland -Forest Avenue Integrated Transportation and Land Use Plan*, November 2, 2010.

- The development of draft alternative for the Concept Plan from feedback on alternatives
- The development of a concept plan
- The Enhanced Project Scoping (EPS) for two locations on the corridor (I-295 and Woodfords Corner)

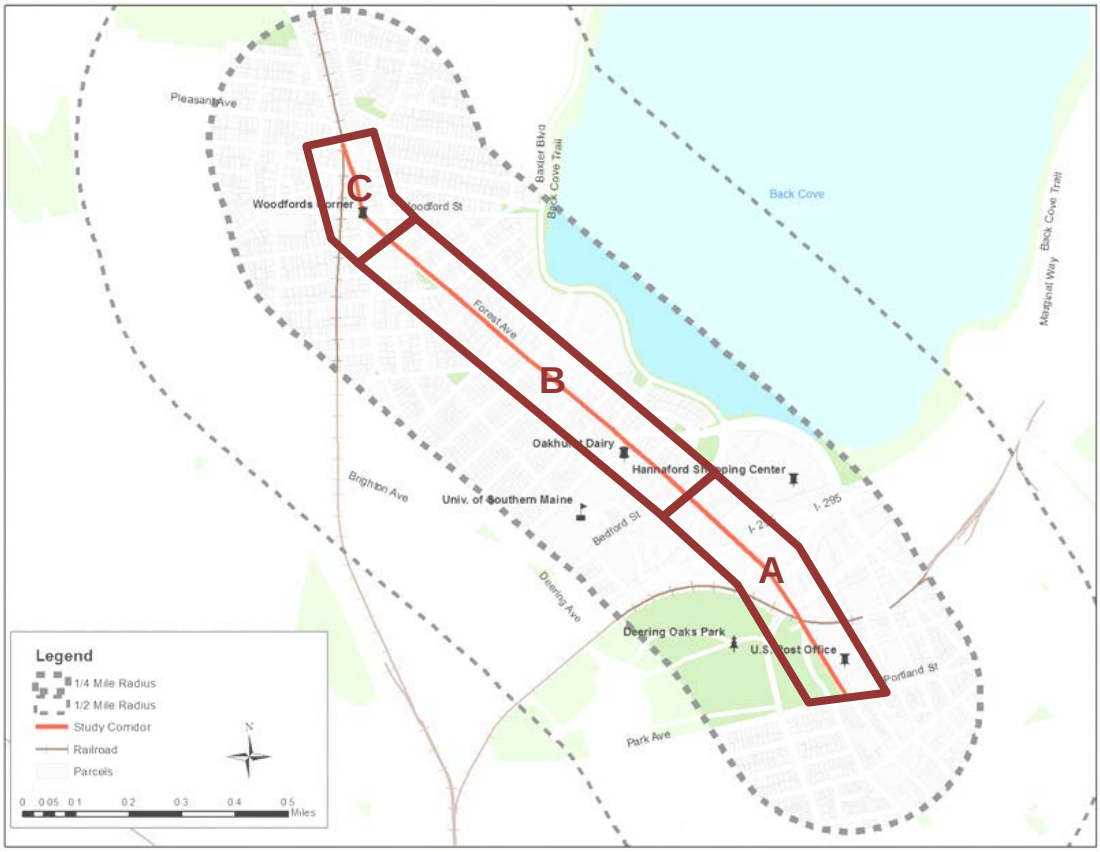


Figure 1: Study Area Segments for Transportation Forest Avenue

This process included the submission of five memoranda summarizing the results of various stages of this process. Other deliverables throughout this process included the Transit Supportive Development and Complete Streets principles, evaluation tables, and other items. Finally, maps, street sections, diagrams, and renderings of the final concept plan are included in Chapter III of this report.

The Concept Plan and the vision of Forest Avenue contained within were developed based on input by the City of Portland, and Portland Area Comprehensive Transportation System (PACTS), and reflect the input of stakeholders, including residents and business owners along the corridor. Stakeholder and public input was given in two Public Advisory Committee meetings held on May 4, 2011 and June 15, 2011, as well as two Public Meetings held on May 12, 2011 and June 22, 2011. The project timeline was compressed significantly, so the public process was also compressed; however, feedback was still obtained on major deliverables in the study. The first Public Advisory Committee meeting and Public Meeting included discussion of existing conditions, TSD and Complete Streets principles, as well as key challenges and opportunities on

the corridor. The draft alternatives for land use and zoning, as well as transportation and streetscape were presented to the Public Advisory Committee at the second meeting. A draft set of improvements for the Concept Plan was presented to the public at the second Public Meeting for feedback. Comments have also been received through individual meetings and other forms of feedback, such as email.

3. Land Use and Zoning Concept Plan

3.1 Alternatives

Three conceptual alternatives that embodied different land use and zoning strategies were defined and evaluated in order to explore possibilities for the future of land development around Forest Avenue. The alternatives included modification of the current zoning framework, and an exploration of alternative zoning paradigms, such as form-based codes, which a handful of cities and towns across the country are beginning to implement. The project's Transit-Supportive Development (TSD) principles (see Chapter II), developed with input from the City of Portland, PACTS, Project Advisory Committee, and the public, served as the guidance for selecting improvements to explore and evaluate.

3.1.1 Summary of Alternatives

The following alternatives were developed and presented to the Public Advisory Committee for feedback.

Use-Based Zoning

Euclidean zoning, based on land uses, is the most well known and widely used form of zoning code. In this approach, land uses, such as commercial, residential, industrial, institutional, and so on, are defined and grouped in zoning districts. Development along the study corridor is currently governed by an Euclidean code (Figure 2). The zoning for Forest Avenue could be considered typical for a commercial corridor, with mixed-use commercial along Forest Avenue, surrounded by residential areas. There is an overlay zone around the University of Southern Maine (USM), making this area subject to different guidelines than the rest of the residential zone around it.

The first conceptual alternative (Use-Based Zoning) envisioned a strategy based on adapting the current zoning to the principles of TSD. Some possible enhancements to the existing code were explored, as well as some improvements and incentives for the existing City of Portland design guidelines.

Form-Based Zoning

The second conceptual alternative involved the application of a Form-Based Code (FBC), which is a contemporary form of zoning which regulates development based on the desired urban form rather than uses. FBCs address the scale and type of blocks and streets, relationships between buildings, and relationship between buildings and the public realm by incorporating three primary elements: vertical form, site design, and land use. Land use is still addressed in FBC, though it is generally considered secondarily to form. A regulating plan is used to designate an area by the appropriate form of development (i.e. designate a character), rather than by land use.

Form-Based Codes typically aim towards some of the following goals:

- Achieving quality aesthetics in neighborhoods and village centers

- Improving walkability
- Increasing the amount of neighborhood parks and open space
- Providing safer neighborhoods and village centers day and night
- Conserving city resources (infrastructure and others)
- Creating a stronger sense of place and identity for neighborhoods and village centers
- Creating economic growth opportunities
- Providing more housing options for citizens
- Conserving agriculture lands by providing village centers and reducing sprawl

Some examples of developments that resulted from implementing design guidelines and FBCs are shown in Chapter II. Many of the abovementioned goals are already identified in adopted City of Portland policy documents such as the Comprehensive Plan.

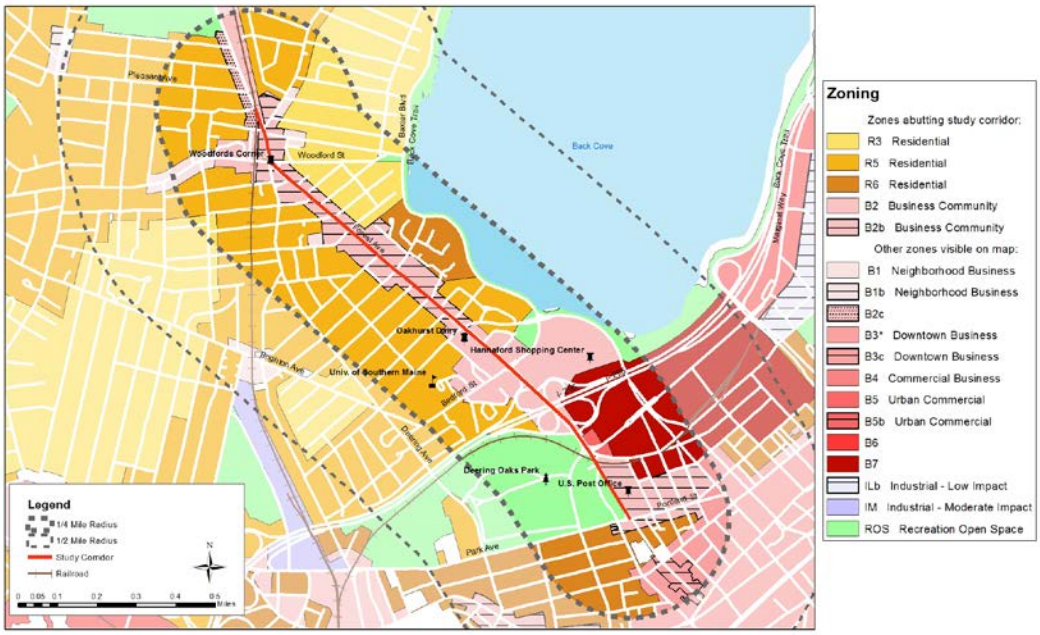


Figure 2: Existing Zoning on Forest Avenue

Hybrid Zoning

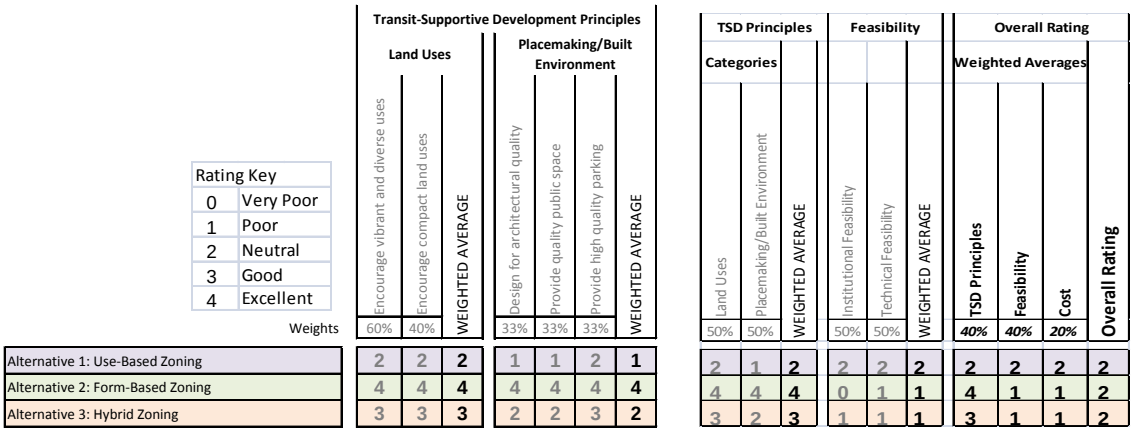
The third conceptual alternative (Hybrid Zoning) retained the existing Euclidean zoning code with some enhancements to achieve TSD outcomes, while incentivizing the use of FBCs or providing FBC overlays at certain locations. Overlays would be used to achieve certain goals in certain locations, such as providing a housing and activity center for USM students or providing an intensive residential feeder for the commercial activity on the corridor.

3.1.2 Evaluation of Alternatives

Alternatives were evaluated qualitatively according to the TSD principles and a preliminary assessment of institutional feasibility, technical feasibility, and cost was conducted. Figure 3 shows a summary of that evaluation. Each category for which alternatives were evaluated has a

weight assigned to it that reflects the priorities and goals of the project. For example, in this visioning exercise, cost is weighted less than the realization of the principles or the feasibility. Weighted averages were taken in several stages. First, all of the principles were evaluated and the weighted average taken for each category. Then, an overall weighted average for the principles was calculated. This weighted average was considered with weighted averages for feasibility and cost to determine an overall rating.

Overall, the alternatives received the same rating. Alternatives achieved different things that averaged the same rating. For example, FBCs may optimally achieve TSD principles, but they may be less politically attractive and more costly to prepare. Use-Based Zoning might not be able to address as many of the TSD principles, but is a widely accepted zoning method, and enhancements to current zoning would be less costly than developing a new strategy.



Rating Key	
0	Very Poor
1	Poor
2	Neutral
3	Good
4	Excellent

	Transit-Supportive Development Principles							TSD Principles			Feasibility			Overall Rating			
	Land Uses			Placemaking/Built Environment				Categories						Weighted Averages			
	Encourage vibrant and diverse uses	Encourage compact land uses	WEIGHTED AVERAGE	Design for architectural quality	Provide quality public space	Provide high quality parking	WEIGHTED AVERAGE	Land Uses	Placemaking/Built Environment	WEIGHTED AVERAGE	Institutional Feasibility	Technical Feasibility	WEIGHTED AVERAGE	TSD Principles	Feasibility	Cost	Overall Rating
Weights	60%	40%		33%	33%	33%		50%	50%		50%	50%		*40%*	*40%*	*20%*	
Alternative 1: Use-Based Zoning	2	2	**2**	1	1	2	**1**	2	1	**2**	2	2	**2**	2	2	2	2
Alternative 2: Form-Based Zoning	4	4	**4**	4	4	4	**4**	4	4	**4**	0	1	**1**	4	1	1	2
Alternative 3: Hybrid Zoning	3	3	**3**	2	2	3	**2**	3	2	**3**	1	1	**1**	3	1	1	2

Figure 3: Evaluation of Land Use and Zoning Alternatives

3.2 Concept Plan

Feedback during the public process for *Transforming Forest Avenue* indicated that there is general satisfaction with the current zoning code. The evaluation indicates that although it may not be the ideal approach to achieving TSD principles, it is more feasible and less costly than other approaches. Therefore, it is likely that for the time being, the approach to zoning will not change. Enhancements, adjustments, or incentives can still be made to the existing zoning to promote TSD principles. The following subsections describe the way in which Transit Supportive goals could be realized given the existing zoning approach.

3.2.1 Vibrant and Diverse Land Uses

The existence of vibrant and diverse land uses should stimulate a variety of activity at all times of day in order to increase the economic vitality and perceived safety along the corridor. Varied land use would also provide a variety of options to residents and visitors for living, working, and engaging in recreational activities. Providing a mixture of uses also provides multiple reasons to visit the same location, making transit a more feasible or reasonable way to travel and reach destinations.

Mixed use is typically achieved by having a variety of uses located in close proximity, either within the same building or in adjacent structures. A typical example is to have commercial on the bottom floor of a building and residential above. The current zoning code allows for mixed use,

particularly in the B-2 and B-2b zoned areas. Some examples can already been seen in multi-story buildings in which the first floor is commercial and upper residential. Conditional uses also permit a greater variety than the zoning code normally allows, though in practice these uses rarely occur along the corridor.

Changing the composition of land uses can be a slow process focusing primarily on new development. A shift in composition can be accomplished either by changing current zoning, or by encouraging greater realization of current mixed-use regulations. For example, in the first approach, some areas could be rezoned to a type that allows more mixed use development, like B-2b. In the second approach, the City could provide incentives for certain uses that are allowed in the existing zoning but are currently lacking on the corridor. Incentives could include relaxing certain requirements, expediting approval processes, or eliminating fees.

Successfully mixing uses requires attention to the transition between the varied uses. For example, residents along the corridor near commercial activity may wish to retain a residential character within the area. Improvements can be made to accomplish a residential character without restricting mixed-uses. For example, residences can be buffered from busier parts of the corridor with landscaping. Building equipment can be attractively screened from view of residences. The transition between uses should not be abrupt and should include good connections between uses to encourage pedestrian activity.

The following image shows the existing transition between the Forest Avenue shopping plaza and the housing immediately behind. The buffer and access to the plaza could be improved to provide a more pleasant residential environment and better access to the retail opportunities. This could include better landscaping, improved pedestrian pathways, and rear entrances to shops to activate the area.

3.2.2 Compact Uses

Compact uses also provide support for transit. Increasing convenience by concentrating development and activities along transit routes increases the likelihood of transit use. Compactness should not create an adverse environment for pedestrians by allowing development at a scale that would be intimidating or out of place. Rather, it should provide for vibrant loci of activity at a pedestrian scale.

Compact uses can be encouraged in a variety of ways, though the general approaches focus on either new development or infill of existing structures. Particularly in the commercial areas, incentives can be used to encourage new development to more fully realize the desired density within the current zoning code. Incentives for infill of existing development can also be used to increase density, and to enhance the pedestrian environment.

Figure 4: Existing Transition between Retail and Residential on Forest Avenue

Figure 5 is a representation of parking lot infill with buildings and street furniture (in this case, seating and bicycle parking). Encouraging compact development through such approaches could be limited by constraints in the zoning code, such as a requirement to provide adequate parking. Easing parking requirements could be allowed under the condition it does not create a drastic deficit in parking supply. While a deficit in parking is not desired, improvements to alternative transit options through TSD principles may result in a reduced need for parking. A strategic approach to managing parking is described in Sub-section 3.2.5 (High Quality Parking).

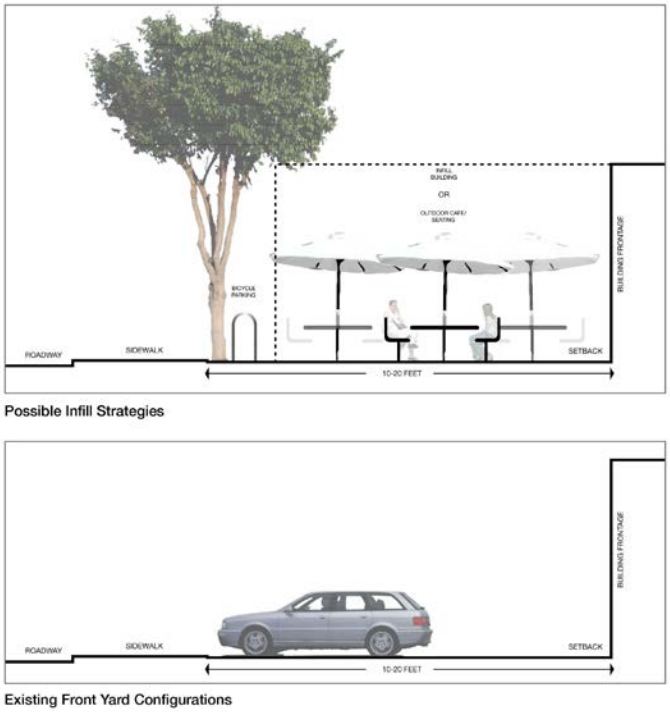


Figure 5: Example of Infill

3.2.3 Architectural Quality

In addition to building form, architectural quality pertains to building scale, orientation, and access. Good architectural quality can compel visitors to remain in the area. Architectural quality can be directly addressed through design guidelines. The City of Portland's *Design Manual*, adopted in May of 2010, establishes general standards for particular zones accompanied by a set of more specific design guidelines to help achieve standards in the zones. Improvements to the design guidelines could include additional graphics used to explain guidelines and form-based elements. By incorporating detailed design options, developers will be guided to achieve a coherent character along the corridor.

Typical ways to address form through design guidelines include the following:

- Defining building envelope within which a building on a typical lot may be designed.
- Providing a reference library of approved façade treatments and materials.
- Providing a reference library of approved front yard landscape treatments.
- Recommending store window dimensions, awning types, colors, and materials, consistent with the corridor branding.

3.2.4 Public Spaces

The Forest Avenue corridor benefits from of two near-by major public resources: Back Cove and Deering Oaks Park. Back Cove is an estuary basin with a widely-used recreation loop tracing its shore. Deering Oaks Park is a 55 acre public park with recreation courts and fields, and a pond. Connections and compatible nearby land uses would optimize use of these existing resources. The public spaces could also be improved along the corridor. Well-used and active public spaces can help draw activity to an area and increase the perception of safety by providing added activity.

Improvements to the streetscape or the installation of attractive street furniture would improve the public environment. Figure 6 shows a simple approach to improving building frontages with street furniture. Enhancements to the design guidelines would also improve the immediate public environment along the corridor. In addition, public spaces should be located next to other activities, have good pedestrian connections, should be activated through activity programming (i.e. activities in the space), and high quality installations (such as street furniture/seating).

Shown in Figure 7 is an underutilized space with potential for a public plaza. This space is apart of the USM Glickman Library. The library's entrance facing Forest Avenue is currently closed, leaving this plaza underutilized. Opening this entrance and installing street furniture and other amenities, might encourage more use of this space.

Existing Conditions Possible Improvements to Create 'Public' Space

Figure 6: Example of Improvement to Public Space in Building Frontages

Figure 7: Example of Underutilized Public Space on Forest Avenue

3.2.5 High Quality Parking

There are two main considerations regarding parking: appearance and strategy. Both appearance and the development of a comprehensive parking strategy are vital components use to achieve high quality in parking areas.

Front parking lots are inharmonious with TSD principles. Approaches to improving parking along the corridor include visually screening parking using landscaping, or to incentivize side or rear location of parking. Requiring or incentivizing pervious paving in parking lots, such as seen in Figure 8, could increase the attractiveness of parking lots as well as lessen their environmental impact.

Figure 8: Example of Pervious Parking Lot[2]

In addition to improving the appearance of parking, a parking strategy could be implemented to reduce the amount of space used for parking and optimize the location of parking lots. A one-time survey performed as part of this study was conducted to estimate utilization of off-street parking spaces along the corridor. Results were that less than half (around 40%) of parking spaces were occupied between 1:00 and 3:00pm on a weekday. 85% is typically viewed as an optimal parking occupancy as it meets the demand and allows for turn-over without searching for parking. Although further study is required to examine different times of day and to consider different types of demand, the preliminary survey indicates that the use of space for parking may not be optimal. Instead, some space currently dedicated to parking might be appropriate for other uses such as plazas, public space, or infill opportunities. However, the parking requirements in the zoning code currently restrict the ability to do so. Modifications to the parking requirements may be considered after a full parking study to accomplish more efficient provision of parking. Centralized parking structures could also provide a concentration of parking, allowing for better realization of economic potential in the area. Centralized parking, when combined with other TSD principles, can help create a park-once-and-walk environment.

Another way to achieve more efficient use of parking is for businesses share parking. This approach may be particularly desirable when businesses experience parking demand at different times of day. For example, a church typically experiences the most demand for parking on the weekend, while an office must provide parking for its employees during the day on the weekdays. The same case pertains to a bagel or coffee shop only open from early morning until early afternoon, while a restaurant or bar may only be open in the evenings. By sharing parking, businesses can meet demand with fewer spaces and less land devoted to parking. There are various ways in which collaboration could be structured, four of which include informal collaboratives, semi-independent organizations, independent organizations, and an authority structure:

- *An Informal collaborative* is when stakeholders decide to coordinate activities, an informal collaborative can be established involving no clear legal or financial relationships.
- *Semi-independent organizations* are, in some cases, more formalized organizations in which it may be necessary to allow for financial participation in joint activities. These can occur within an existing framework such as a Chamber of Commerce.

[2] Source: http://www.lrc.usace.army.mil/co-r/best_management_practices.htm, accessed June 28, 2011.

- *Independent organizations* are those in which organizations can be independent (non-profit) with dedicated staff. This type of organization would also likely require the election of a board.
- *An authority structure* is a formal government body to manage parking.

The following are a few examples of the types of organizations that have been established to foster coordination between business owners to manage parking:

- *Parking Management Collaborative:* This type of organization is typically a voluntary collaboration between public and private participants. The level of formalization can depend on the desired purview of the collaborative. A collaborative can be used to provide a coordinated approach to parking through provision, marketing, and wayfinding. They can also involve coordination of technology such as common parking validation.
- *Transportation Management Association (TMA):* TMAs are more formal structures, which typically focus on reducing congestion and increasing air quality by implementing transportation demand management strategies. This can include parking, but efforts typically include marketing, the development of complimentary programs, and advocacy.
- *Parking and Business Improvement Area (PBIA):* These types of organizations build on the concept of a business improvement area (BIA) or district (BID) in which member businesses fund improvements in a certain area meant to contribute to the economic vitality of the area. Member businesses would participate in the decision of how to use funds, and could be required to develop a parking management strategy.

Establishing a volunteer parking collaborative with minimal formalization would be an immediate-term approach to begin coordination. A collaborative would require the least upfront investments out of the above options, including some staff time and monetary resources. At first, there would be no financial commitment, though this could be considered in the future to fund studies and implementation of the parking management strategy.

One way to initiate a collaborative is to invite business owners to a series of workshops to raise interest about the possibility of sharing parking and educate participants regarding the benefits that might be realized. In these workshops, business owners could be engaged in the tasks of examining the existing supply and identifying needs, exploring solutions, and developing their own parking management program.

These efforts would all benefit from a comprehensive parking study, which would explore demand and analyze parking access with consideration of curb-cut consolidation and funding sources for parking management strategies.

4. Transportation and Streetscape Concept Plan

4.1 Alternatives

As part of the Transforming Forest Avenue study, three transportation alternatives were developed to represent three different visions for Forest Avenue and to achieve study goals. They represent different interpretations of how to apply Complete Streets principles (Chapter II) developed as a part of this study with feedback from the City, PACTS, Project Advisory Committee, and the public. Complete Streets aim to accommodate all users, but may prioritize users to different degrees based on the intended primary function of the road. In each alternative,

Forest Avenue was envisioned as a different type of street. Although all three alternatives included a common set of streetscape improvements, intersection treatments, narrowing of travel lanes, and additional transit service, they were intended to differ thematically to elicit conversation regarding desirable features and possible trade-offs to achieve certain goals. These alternatives are summarized below.

4.1.1 Summary of Alternatives

The following alternatives were developed and presented to the Public Advisory Committee for feedback.

Alternative 1: Connecting Destinations

In this alternative, Forest Avenue is envisioned as a vibrant main street. The most vulnerable users of the road (pedestrians and cyclists) were prioritized through a variety of improvements intended to enhance the corridor's role as both a destination and a connector. The main features of this alternative included improvements to pedestrian and bicycle facilities, such as upgraded and increased crossings, shared lane markings for bicycles, and a bicycle lane of sufficient width in Segment A. On-street parking was retained as an important buffer for pedestrians. Automobile and transit travel was not envisioned to change significantly.

Alternative 2: Greening Forest Avenue

Forest Avenue is envisioned as an enhanced avenue, in this alternative, with a boulevard and landscaped median (where road width allows). This alternative provides relatively equal consideration to all users while creating a greener, more attractive corridor. New plantings and a landscaped median contributed to a consistent green character throughout the corridor. It also included the elimination of on-street parking to allow for a bicycle lane in both directions along the entire corridor. Bus stops were envisioned as pull-out locations wherever possible.

Alternative 3: Creating a Transit Corridor

This alternative seeks to retain Forest Avenue's existing role as an arterial, but to focus on improving transit as a way to draw riders from single occupancy vehicle trips. The most significant improvement would be achieved through the elimination of on-street parking to allow for a bus only lane in the southbound direction. This lane would allow buses to bypass the worst congestion in the PM peak hours. This alternative also included the provision of additional express transit service from a park-and-ride location at the northern terminus of Route 2.

4.1.2 Evaluation of Alternatives

The alternatives were evaluated qualitatively according to the Complete Streets Principles, a preliminary assessment of institutional and technical feasibility, and high-level costs. Figure 3 shows a summary of that evaluation. The top table shows the more detailed evaluation of each Complete Streets principle. The lower table shows the summary of the weighted averages of categories of Complete Streets Principles and the evaluation of feasibility and cost, producing an overall ranking. As in the evaluation for the land use and zoning alternatives, each category is weighted according to the priorities and goals of the study.

The alternatives received similar overall ratings. Despite having similar ratings, each alternative achieves different objectives. While Greening Forest Avenue was rated to achieve the most benefit in terms of the Complete Streets principles categories, the Complete Streets Principles

weighted average was the same for each alternative. A shift in priorities, and therefore in the weights for each category, could cause the alternatives to rank differently. Alternatives 2 and 3 ranked lower for feasibility and cost because, for example, the removal of parking might be politically undesirable and the costs associated with roadway reconfiguration were higher. This evaluation contributed to the development of a Transportation and Streetscape Concept Plan that focuses largely on the improvements suggested in the first alternative, with significant improvements to the streetscape as described in the second alternative.

The alternatives were evaluated separately for their ability to attract transit riders, using a high-level sketch model that included the major transit improvements. A summary of the assessment in terms of changes relative to existing conditions (the baseline) is shown in Figure 10. None of the proposed changes to transit service were radical enough to induce a significant number of additional transit trips. However, creating a more attractive destination, improving alternatives to automobile travel, and improving land use and zoning conditions, should all contribute to creating a more transit-supportive environment for the future. This analysis suggests that there is no one-way to increase transit travel. Longer-term processes of land use and transportation planning would gradually produce a more transit-supportive community.

Rating Key	
0	Very Poor
1	Poor
2	Neutral
3	Good
4	Excellent

	Complete Streets Principles														
	Health and Safety				Accommodate All Modes						Connectivity/ Accessibility			Environment		
	Promote Physical Activity	Enhance safety of vulnerable users	Manage vehicle speeds	WEIGHTED AVERAGE	Encourage multi-modality	Improve transit operations, facilities, and access	Mitigate traffic diversion	Manage parking	Increase comfort	WEIGHTED AVERAGE	Connect the street network	Provide wayfinding	WEIGHTED AVERAGE	Increase permeability	Reduce greenhouse gas (GHG) emissions	WEIGHTED AVERAGE
Weights	15%	50%	35%		25%	20%	25%	15%	15%		50%	50%		50%	50%	
Alternative 1: Connecting Destinations	3	3	2	**3**	3	2	2	2	3	**2**	2	2	**2**	2	3	**2**
Alternative 2: Greening Forest Avenue	3	3	2	**3**	3	2	2	2	3	**2**	2	2	**2**	3	3	**3**
Alternative 3: Creating a Transit Corridor	2	2	2	**2**	3	3	2	2	2	**2**	2	2	**2**	2	3	**2**

	Complete Streets Principles					Feasibility			Cost			Overall Rating			
	Categories											Weighted Averages			
	Health and Safety	Accommodate all Modes	Connectivity/Accessibility	Environment	WEIGHTED AVERAGE	Institutional Feasibility	Technical Feasibility	WEIGHTED AVERAGE	Capital Cost	Maintenance Cost	WEIGHTED AVERAGE	Complete Streets Principles	Feasibility	Cost	Overall Rating
Weights	25%	30%	25%	20%		50%	50%		50%	50%		*40%*	*40%*	*20%*	
Alternative 1: Connecting Destinations	3	2	2	2	**2**	2	1	**2**	2	1	**2**	2. 4	1. 5	1. 5	**1. 9**
Alternative 2: Greening Forest Avenue	3	2	2	3	**2**	1	1	**1**	1	1	**1**	2. 5	1. 2	1. 2	**1. 7**
Alternative 3: Creating a Transit Corridor	2	2	2	2	**2**	1	1	**1**	1	2	**1**	2. 2	1	1. 4	**1. 6**

Figure 9: Evaluation of Transportation and Streetscape Alternatives

	PM Peak Hour Person-Trips, Change from Baseline		
	Alternative 1	**Alternative 2**	**Alternative 3**
Downtown Attraction:			
Transit	13	12	16
Walk/Bike	-2	4	0
Drive Alone/Shared Ride	-11	-16	-16
Downtown Production:			
Transit	19	17	23
Walk/Bike	-1	8	0
Drive Alone/Shared Ride	-18	-25	-23

Figure 10: Evaluation of Alternatives: Mode Shift to Transit

4.2 Concept Plan

The transportation and streetscape component of the Concept Plan includes the desirable, feasible, and/or compatible aspects derived from feedback from the Public Advisory Committee and the general public. Some improvements contained in the alternatives were clearly undesirable to the public, such as the removal of on-street parking, and so were not included in this Concept Plan.

Improvements to the Concept Plan take into account future traffic operations for the year 2035 as projected by the regional traffic demand forecasting model. On average over the length of the study corridor, these projected traffic levels are 20 percent higher than existing (2011) conditions. A similar analysis was attempted for the year 2035 peak hour volumes, but this did not yield a directly comparable result because all of the projected traffic could not enter the corridor network with only the existing street configuration in place. Forest Avenue is already approaching capacity, and will not be able to accommodate future traffic projected by regional models. These results suggest that within not too many years, extensive queuing and stop-and-go operation, and/or diversion to other streets, will prevail throughout the corridor during peak hours. Thereafter, peak hours of congestion will grow and perhaps to take up most of the business day by 2035. In effect, traffic volume will be both greater in the single peak hour and extend the duration of high volume periods over the course of the day.

The improvements included in the Concept Plan would not eliminate low levels of service on the corridor, but some would achieve modest localized improvement in traffic operations relative to not making the changes. The improvements also aim to make non-motorized forms of transportation more attractive. This Concept Plan includes as many feasible improvements as possible to adhere to Complete Streets Principles within the constraints indicated in the future traffic analysis. This is an attempt to avoid a reduction in capacity that would negatively affect traffic operations. The challenge remains that without dedicated facilities, bus operations will experience additional delays related to the congestion on the corridor, and their ability to compete as a travel choice will be limited without regional-scale changes in transportation policy.

Two studies being carried out at the same time as Transforming Forest Avenue are particularly relevant to the potential outcomes of the Concept Plan: the MaineDOT study of the I-295 interchange configuration and a signal timing study on Forest Avenue. The preliminary results from the signal timing study were used in the assessment of future traffic. The impact of the I-295 interchange study is discussed further in Sub-section 4.2.2. (Segment A: Deering Oaks Park).

The following subsections describe the Concept Plan both in terms of corridor wide improvements, and segment-specific improvements. Chapter III contains visual representations of the improvements. The following descriptions of corridor improvements begin with those described in the Concept Plan which were supported by the results of the existing conditions and future transportation analysis performed as a part of this study.

4.2.1 Corridor-Wide Improvements

The following improvements would be applied along the entire corridor. The corridor-wide improvements for the Concept Plan are organized under the categories of modal improvements (pedestrian and bicycle, traffic and transit), streetscape and design improvements, and environmental improvements. Within the modal improvements, pedestrians and cyclists are grouped because many improvements affect both types of users, and they are presented first because they are considered the most vulnerable users in terms of safety. Traffic and transit improvements are grouped because many traffic improvements affect travel lanes and other factors that relate to transit operations.

Pedestrians and Bicycle Improvements

All of the general bicycle and pedestrian improvements discussed during the study process are included in a refined format in this Concept Plan.

Upgrade sidewalks and intersections to increase accessibility for people with disabilities. Upgrades include the widening and improving of sidewalks, introducing textured ramps, and adding countdown pedestrian signal heads. Space for sidewalks within the existing right of way can be gained by narrowing traffic lanes, as discussed further under traffic and transit improvements.

Redo pavement striping and/or use more attractive materials or techniques. Much of the pavement striping, including pedestrian crosswalks and shared lane markings for bicycles, are faded and almost invisible on Forest Avenue and need to be redone. Using asphalt stamping or different materials like brick at certain locations would help to add character to particular areas. Selection of an appropriate treatment should consider life cycle cost under the prevailing climatic and traffic conditions.

***Provide shared lane markings (sharrows) for cyclists*.** Shared lane markings, which would be used throughout the study corridor, guide cyclists to a safe position in the roadway and validate a cyclist's place in a travel lane. AASHTO recommends a lane width of 14' for shared lane markings to allow automobiles to pass cyclists without veering into adjacent lanes (Figure 11). However, this lane width is undesirable in the corridor. Shared lane markings can still be used in narrower lanes to provide the above benefits when there is not enough space for a separate bicycle lane.

Provide additional bicycle parking. Bicycle parking is a relatively inexpensive way to make cycling a more feasible and attractive method of travel. Bicycle parking would be concentrated at major destinations and at transit stops. A variety of parking, such as shorter-term racks and longer-term shelters would provide a range of options. Bicycle parking can also be artistic and add to the character of the corridor.

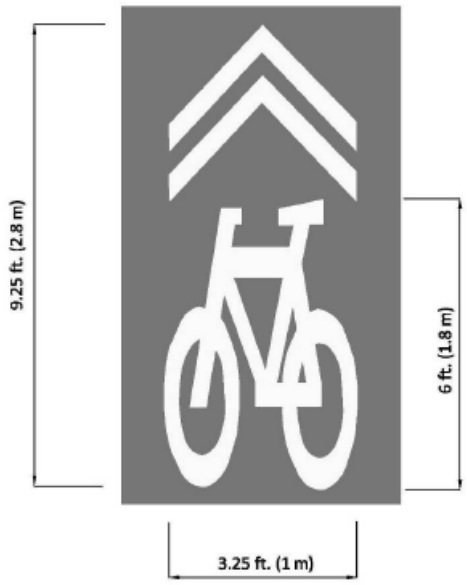


Figure 11: Shared Lane Marking for Bicycles (Sharrow) [3]

Traffic and Transit Improvements

It is assumed that the traffic level of service will be somewhat improved by the separate signal timing study. Additional improvements contained in the Concept Plan include the following:

Reduce travel lanes widths. Travel lanes throughout the corridor would be narrowed to 12' on the outside and 10' on the inside. AASHTO recommends 10' to 12' lanes on arterials, with narrower widths within that range being acceptable and even advantageous in interrupted (with signals) arterials of this speed (30 miles per hour).[4] The outer lane is widest to facilitate bus travel.

Introduce 2S shuttle service. To stimulate economic development and increase the use of Forest Avenue as a commercial destination, an off-peak shuttle service (called "2S" here) would be established to serve more non-work trips. This shuttle service would operate from the terminus of Route 2 downtown to a turnaround point just north of Woodfords Corner. Examples of users of this service could include daytime shoppers who wish to park once and then visit other parts of the corridor without walking far, USM students wishing to access other nearby destinations, and people who work downtown but eat lunch or run daytime errands at locations along the corridor.

Improve amenities as bus stops. Overall, amenities would be improved at all bus stop locations to improve the perception of the quality of service. Currently there are only a few locations with a bench. At a minimum, benches would be added at all bus stop locations unless it conflicts with accessibility for people with disabilities. In addition, all stops would include additional information, such as, the schedule and route map on signage. At key locations, including near the US post

[3] American Association of State Highway and Transportation Officials. (2010). *Draft AASHTO Guide for the Planning, Design, and Operation of Bicycle Facilities.* Page 60.
[4] American Association of State Highway and Transportation Officials. (2004). *A Policy on Geometric Design of Highways and Streets (Green Book)*, 5th Edition.

office, USM, Forest Avenue Plaza, and Woodfords Corner, bus shelters would be constructed. These efforts would improve rider experiences without affecting operations.

Streetscape and Design Improvements

Streetscape and design improvements would primarily be targeted at making the corridor a more pleasant place to be, rather than a place to pass through. These improvements should be made wherever possible, with attention to maintenance requirements.

Install consistent landscaping along the corridor. Consistent plantings, verges, and greenery would be incorporated wherever possible on the corridor, particularly on medians or where sidewalk space would be gained from the narrowing of travel lanes. The goal would be to re-embrace the name of Forest Avenue by increasing vegetation on the corridor.

Install street furniture. Where space is available, street furniture would be installed for both functionality and comfort. There are many types of street furniture, some of which (benches, bicycle parking, and bus shelters) have already been mentioned. However, street furniture could also include trash bins, newsstands, decorative lamp posts, and many other items on the streetscape. Consistently branded street furniture would give Forest Avenue a cohesive identity, and in certain locations, can be used to indicate a special character. Street furniture could also be artistic installations.

Environmental Improvements

The following are a few more directly streetscape-related environmental improvements along the corridor. Incentives discussed in Section 3 for land use and zoning improvements could be used to encourage more sustainable development along the corridor.

Use recycled materials. Recycled materials would be used when possible along the corridor for construction (with consideration of cost and maintenance trade-offs) and/or for more decorative elements such as street furniture.

Use pervious materials and surfaces. Pervious paving has already been addressed in Section 3 in terms of parking lots. Use of pervious paving would be expanded where possible in alleys and sidewalks. In addition, curb extensions, street planters, and rain gardens would be used to capture and filter stormwater runoff.

Items for Further Consideration

The following improvements could be included in the Concept Plan, and are considered important enough to warrant further consideration for inclusion. However, additional analysis or study is required to determine whether these would, in fact, be improvements, and to determine the most appropriate way to implement them.

Introduce additional pedestrian crossings. Additional crosswalks would be added, when possible, in the case of four-way intersections without crosswalks in each direction. A few locations are suggested improvements in the segment specific sections, however, other locations or the possibility of midblock crossings should be assessed more carefully in terms of traffic impact. Any new crossings at signalized intersections should be considered in the ongoing signal timing study.

Upgrade pavement striping. The Concept Plan includes the renewal of pavement striping at all crossings and pavement markings like sharrows. Further research should be done to select the best material given available resources to better withstand adverse weather conditions. For

example, thermoplastic is commonly used in more adverse weather conditions, but it is also more expensive than paint to install and maintain. The particular maintenance requirements in Portland should be considered in the selection of the appropriate material.

Consolidate curb-cuts. This Concept Plan would include the consolidation of curb-cuts as a product of more centralized or shared use parking and as an effort to reduce the potential conflict between pedestrians, cyclists, and traffic. Reducing the number of locations at which local access turns are made could also serve to improve traffic flow if the increased turning movements at consolidated locations do not have a negative impact. However, specific locations should be considered based on further parking management efforts as well as potential impact to traffic flow. Therefore, further analysis should be done if curb-cut consolidation is to be pursued.

Determine appropriate location and spacing of bus stops. The location and spacing of bus stops can have a significant impact on average bus speeds. Further analysis would be required to determine the optimal location and spacing. A study should be undertaken with Metro to determine the best location for bus stops within the study corridor considering both bus operations and customer access. Such a study could focus on optimizing the entire Route 2, including an examination of ridership, schedule, and routing.

Strategic stormwater management. Simply increasing the pervious pavement and plantings on Forest Avenue may not be enough to effectively manage stormwater runoff. In addition, there could be trade-offs to aggressive stormwater management approaches, such as the loss of usable sidewalk space. Stormwater management should be addressed strategically at a more regional scale to determine the level of improvement that is ideal for this corridor given the constraints on right-of-way.

Develop a comprehensive wayfinding strategy. Wayfinding allows people to more effectively use the transportation options available to them. Wayfinding systems can be branded to provide a character to the corridor that contributes to a sense of place. The City of Portland already employs some wayfinding strategies, such as signage for designated bicycle routes. A new wayfinding system has recently been approved, and all efforts to install wayfinding strategies should coincide with the most recent system adopted by the City of Portland. A more comprehensive wayfinding strategy could be employed for multiple modes to improve the ability of people on the corridor to determine direction, distance, and travel time to other destinations by walking, cycling, and transit. In addition, wayfinding strategies could be employed to assist with locating parking, particularly if a more centralized or coordinated parking approach is pursued.

4.2.2 Segment A: Deering Oaks Park

The Concept Plan for Segment A, spans from Bedford Street to Park Avenue. The most dramatic improvements for cyclists and pedestrians beyond the general streetscape improvements on the corridor are included. The goal for this segment would be to create a unique identity as a gateway to downtown, complete with branded signage and iconic installations when possible. The improvements below are intended to create a progression from a more boulevard-style street near I-295 to a calmer, more pedestrian-scaled street towards downtown. Chapter III contains a street section drawing just north of Marginal Way illustrating a possible application of this Concept Plan at one point in the segment. The following improvements are included in this segment of the Concept Plan.

Widen and landscape center median. This segment of Forest Avenue would be developed as a boulevard with beautification and landscaping of the center median from Bedford Street/Baxter Boulevard to Marginal Way. The existing right-of-way is adequate to allow for some widening of the existing median. Landscaping should include attractive plantings that do not negatively impact line of sight.

Reduce travel lanes between High Street and Park Avenue. The level of service analysis suggests that there is excess capacity on Forest Avenue between High Street and Park Avenue/Portland Street. In the Concept Plan, the travel lanes in this part of the segment would be reduced to one in each direction. This improvement would provide space for bicycle facilities and would not impact on-street parking.

Install bulb-outs at Park Avenue/Portland Street. At Forest Avenue's intersection with Park Avenue/Portland Street road width would be narrowed using bulb-outs to decrease the turning radii for automobiles, slowing them, and to reduce crossing distances for pedestrians. This would also eliminate the right-turn 'slip-lane' onto Park Avenue.

Expand and improve amenities on sidewalks. Sidewalks would be significantly improved and widened, and would have more street furniture and art that is compatible with both the adjacent institutional structures as well as the lushness of the park. Bus shelters would be installed near USM and the post office.

Provide consistent cycle tracks. This is the only segment in the Concept Plan that would have exclusive bicycle facilities. Cycle tracks are bicycle facilities that are distinct from both the roadway and pedestrian facilities. In this case, the distinction would be achieved by a slight grade separation as well as protection, such as bollards, from travel lanes. Care should be taken that bollards are not a hazard for cyclists or motorists, and are used more for delineation than access prevention. See Figure 12 for an example in Washington DC. The cycle tracks would continue from Bedford Street/Baxter Boulevard (connecting with the bicycle facilities on those streets), through the interchange, and end at the Park Avenue/Portland Street intersection.

Figure 12: Example of Bollards to Buffer Bicycle Lanes[5]

Provide bicycle boxes where left turns are desirable. Bicycle boxes provide the benefit of more comfortable queuing at lights and added space for maneuvering to make a left turn. The public provided feedback that bicycle boxes may not be necessary along the entire corridor. However, they are typically applied where there are high volumes of vehicles and significant turning movements and may be useful in this small section for less experienced cyclists. Therefore, the cycle tracks would be integrated with bicycle boxes where cyclists would take left-turns onto Portland Street, Marginal Way, and Bedford Street.

[5] Source: Sebastian, Jim (DDOT). From National Association of City Transportation Officials (NACTO), http://nacto.org/cities-for-cycling/projects/truncated-cycle-track-at-the-intersection-of-o-st-and-15th-st-washington-d-c/, accessed June 30, 2011.

Exit 6 Interchange

The Exit 6 interchange of I-295 is an important and problematic part of this segment that merits more detailed discussion. Improvements for this area, shown in Chapter III, are targeted primarily at improving pedestrian and bicycle safety, and are the subject of Enhanced Project Scoping (EPS). These improvements could be implemented whether or not the ramps are reconfigured as a result of the MaineDOT study, but are based on the premise that the previously recommended changes to the ramp configuration would be implemented. These changes include tighter turning radii at the off-ramps and building out of delta islands to provide off-ramp traffic with its own merging lane onto Forest Avenue. Listed below are a variety of improvements included in the Concept Plan to improve safety for pedestrians and cyclists. Implemented improvements should be approved or deemed acceptable by the MaineDOT and the Federal Highway Administration (FHWA).

Improve ramp crossings for cyclists and pedestrians. Rumble strips, zigzag striping (Figure 13), signage, warning beacons (Figure 14), and other warnings would be used to alert drivers on the exit ramps to slow down and yield for both pedestrian and bicycles. Chapter III contains a visualization of the bicycle facilities and crossing at an off-ramp ramp on a proposed built-out delta as in the preliminary I-295 plans.

Figure 13: Example of Zigzag Striping to Alert Motorists to Reduce Speed[6]

Figure 14: Warning Beacon for Pedestrian Crosswalks[7]

[6] Source: LIVINGINLOCO, http://www.livinginloco.com/2010/03/survey-says-zig-zags-on-belmont-ridge/, accessed June 28, 2011

[7] Source: Spot Devices, http://www.spotdevices.com/system-rrfb.html, accessed June 30, 2011.

Provide colored treatments at possible bicycle/automobile conflict areas. Colored bicycle lane treatments provide warning to both cyclists and motorists when they are approaching an area where cars may wish to cross a bicycle lane. The treatment at ramps for cyclists would look something like that seen in Figure 15. Another option within the existing configuration that is not being recommended at this point is installing unprotected bicycle lanes to the left of merge lanes rather than protected cycle tracks at the curb. This alternative would encourage more 'vehicular' cyclist behavior, keeping cyclists with the flow of traffic instead of requiring them to cross at the ramps, almost as pedestrians. In either solution, any conflict areas should be clearly colored and marked, such as the treatment shown in Figure 15.

Figure 15: Example of Colored Bicycle Lanes and Signage in Conflict Areas[8]

Provide lighting under the interchange. The interchange is currently a dark and unattractive place for pedestrians to walk. Landscaping and other improvements will help improve this atmosphere, but the perception of safety as well as the aesthetics would be further improved by creative or artistic lighting. At the very least, simple lighting would be provided. Figure 16 shows an example of more artistic lighting.

Figure 16: Examples of Artistic Lighting of Underpasses[9]

[8] Source: National Association of City Transportation Officials (NACTO), http://nacto.org/cities-for-cycling/design-guide/bikeway-signing-marking/colored-bike-lanes/#design, accessed June 28, 2011.
[9] Source: FitzGibbons, Bill. From San Antonio Current, http://www2.sacurrent.com/printStory.asp?id=69955, accessed June 29, 2011.

Items for Further Consideration

The following include additional improvements that could be considered in the Concept Plan after further study, and discussions of the relevance of possible long-term realignments of the corridor raised during the *Transforming Forest Avenue* study.

Complete crosswalks at Marginal Way. An additional pedestrian crosswalk could be introduced at Marginal Way to complete the pedestrian crossings at the intersection. However, the current signal timing would likely not provide a crossing phase long enough to be ideal for typical pedestrian crossing speeds. The Forest Avenue signal timing study could correct this problem and provide an adequate pedestrian crossing phase.

Consider implications of relocation of Kennebec Street. There has also been discussion of a future reconfiguration of the Marginal Way intersection including the relocation of Kennebec Street to intersect with Forest Avenue at State Street and the termination of the Bayside Trail at the Marginal Way intersection. If this reconfiguration were ever to occur, both intersections should include pedestrian crossings at all sides if possible, along with all of the previously discussed pedestrian crossing improvements.

Consider a pedestrian and cyclist bridge connection to Bayside Trail. A pedestrian and bicycle bridge could be considered over Forest Avenue to create a direct and safe connection between Deering Oaks Park and the future exit of the Bayside Trail. This improvement is not included in the Concept Plan because it would be expensive, may not be desirable compared to improving bicycle and pedestrian facilities at the street level, and would depend on the final configuration of the Bayside Trail and the Marginal Way intersection. However, it may prove to be more desirable as these concepts progress.

Consider implications of closure of State Street. There is another major reconfiguration in this segment that has been discussed but its potential impacts are not fully understood. The closure of State Street from Forest Avenue to Park Avenue would provide some benefits in terms of reducing conflicts for pedestrians and cyclists and reconnecting parts of Deering Oaks Park. However, it would also have significant traffic impacts that should be explored in much greater detail.

Coordinate improvements with the final configuration of the I-295 interchange. Determining the configuration of the interchange is not within the scope of this study. The final implementation of improvements to the I-295 interchange area would ideally be coordinated with the final interchange alignment established by the MaineDOT study. All improvements that would affect any of the interchange area under the purview of state and federal authorities should be addressed with those authorities to ensure that they are considered acceptable.

Consider further improvements to Bedford Street near Forest Avenue. Some alternatives at this intersection were examined as part of the *Transforming Forest Avenue* study, but results show that this intersection has already been optimized through modifications made over the last several years. One alternative that was not modeled but could be considered is to dead-end Bedford Street near the USM parking garage to allow vehicles to enter and exit the garage from each end without allowing through movements. This could potentially improve the intersection by decreasing turning movements onto Bedford Street. However, it could also have significant impacts to the surrounding streets as through traffic would be diverted. A detailed study would be required to further understand these impacts and the potential benefits.

4.2.3 Segment B: Central Forest Avenue

In this Concept Plan, the segment from Bedford Street to Coyle Street would serve as the heart of commercial, civic, and other activity along the corridor. Access to businesses would be the most important goal, so a priority would be to encourage easy travel between the many destinations by maximizing pedestrian, bicycle, and transit improvements. Improvements to this segment would not involve any major reconfiguration of the roadway, as shown in the street section representing the application of the Concept Plan (Chapter III). Segment specific improvements are listed below.

Complete pedestrian crossing at Preble Street. The pedestrian crossing would be completed at Preble Street to allow pedestrians to cross in all directions.

Calm traffic on side streets. The diversion of traffic onto neighborhood streets is an ongoing concern for the study corridor. The existing congestion and low level of service already cause diversion, and careful consideration was given to all improvements in this Concept Plan to avoid or reduce the chances of additional diversion. One direct approach to discouraging traffic diversion would be to calm or slow traffic down on the more residential side streets. Specifically, this would include the streets between (but not including) Preble Street and Revere Street.

Traffic calming on these streets could be accomplished through a variety of established methods that aim to directly control speeds or create an environment that makes motorists naturally drive slower. For example, a few ways in which speed control can be achieved include speed tables (Figure 17) and chicaning (Figure 18). Chicaning forces repeated back and forth turns in the road, which is often achieved through placement of parking or construction of islands. There are many more possible approaches. Such interventions can be made attractive through techniques already described like asphalt stamping and landscaping.

Figure 17: Speed Table with Stamped Asphalt and Pedestrian Crossing

Figure 18: Chicaning Created by Placement of Parking

4.2.4 Segment C: Woodfords Corner

Improvements to Segment C, extending from Coyle Street to Pleasant Avenue, would involve significant changes to the road right-of-way to address congestion. In addition, significant streetscape improvements would create a more pedestrian-friendly environment at Woodfords Corner. Similar to the I-295 interchange, this segment has been an important focus of the study. Chapter III contains a street section representing this Concept Plan at a point north of Woodfords Corner, and a diagram of the more detailed improvements to this area that are a part of this segment's Concept Plan.

A Synchro traffic analysis was completed for the three northernmost signalized intersections in the corridor for projected year 2035 volumes. The results of the baseline scenario (using the current configuration) indicated that the intersections would be able to accommodate the 2035 demand at a very low level of service ('F' at the intersections with Ocean Avenue and Woodford Street) in the PM peak. A Synchro analysis with the same volumes over the new configuration included in this Concept Plan suggested about a 70 percent reduction in delay from the baseline, resulting in level of service 'D' at these intersections.

Restrict on-street parking in the PM peak. Public feedback for this area strongly focused on the congestion on Forest Avenue in the northbound direction approaching Woodfords Corner. A variety of approaches were explored to address the congestion throughout Woodfords Corner. Based on the evaluation, the Concept Plan would restrict on-street parking between Woodford Street and Ocean Avenue in the PM peak hours to allow for a second travel lane. Because there is currently no on-street parking directly north of Ocean Avenue, the width is insufficient to accommodate two northbound through lanes. Therefore, in order to accommodate two northbound through lanes to the north of the Ocean Avenue intersection, roadway widening would be necessary. This configuration is included in the Enhanced Project Scoping. This recommendation is subject to further traffic engineering analysis to confirm its feasibility.

Prohibit left turns in the PM peak. In addition to the extra travel lane in the PM peak hours, northbound left turns off of Forest Avenue onto Saunders Street would be prohibited, and the

peak hour ban on southbound left turns from Forest Avenue onto Vannah Avenue would be enforced.

Southbound lane treatment at Woodfords Corner. In the southbound direction, only one lane of traffic is permitted to continue through Woodfords Corner on Forest Avenue. If this rule were enforced, the level of service assessment indicated that it would be possible to reduce the receiving lane south of Woodfords corner to one lane for a short distance. This reduction would allow for the installation of a bulb-out to make crossing Woodfords Corner more pedestrian friendly, and for the addition of a plaza area. This concept is visualized in Chapter III. After a short 20', the road would expand back to two travel lanes to accommodate the queuing at the signalized intersection with Revere Street and to minimally reduce on-street parking. For this improvement to be successful, it will be important to ensure that motorists are in the appropriate southbound lane. If an error is made, motorists still have the option to continue onto Deering Avenue and then access Forest Avenue from Revere Street. The goal, however, would be to minimize these types of diversions onto Deering Avenue.

The Public Advisory Committee and the Portland City Council discussed this recommendation at length. There are ongoing concerns that the removal of a receiving lane at this location would increase traffic diversion into residential neighborhoods along Deering Avenue. This recommended alternative is pending confirmation of the engineering feasibility of two southbound travel lanes at this location. Final design of this feature should incorporate bulb-outs or median refuge islands as appropriate and feasible to accommodate pedestrian crossings.

Install bulb-out on Deering Avenue. Another bulb-out would be installed on Deering Avenue near the existing bus stop by Dunkin' Donuts. Landscaping and other improvements could create another plaza area. This improvement would also create a slower traffic environment for vehicles continuing onto Deering Avenue.

Complete crosswalk at Vannah Avenue. Improved landscaping and the addition of bulb-outs would already provide a significant improvement for pedestrians. Another pedestrian improvement would include adding a crosswalk across Forest Avenue at Vannah Avenue to complete the crossings at this intersection.

Provide signage to direct motorists to appropriate lanes. Signage would inform drivers and cyclists of lane distinctions that change throughout the day, and insure correct lane selections. For example, overhead signage for motorists approaching Woodfords Corner in the northbound direction would clearly indicate each lane and whether or not the outside lane is open or being used as parking. There could also be signage in the southbound direction regarding which lane continues onto Forest or Deering Avenues. As already mentioned, signage is already cluttered on Forest Avenue, so a consolidation would help achieve clarity.

Use appropriate streetscape improvements. As with the rest of the corridor, streetscape improvements would be made throughout the area. However, planters would be more common than planted trees at this location, due to maintenance challenges. Asphalt stamping and branded street furniture in any plaza space created from improvements would improve appearance with fewer plantings.

Items for Further Consideration

Determine appropriate shared lane markings where parking is restricted. The treatment for cyclists north of Woodfords Corner should accommodate the fact that sometimes the right-most lane is a parking lane, and sometimes it is a travel lane. One approach is to simply provide shared lane markings in the outside parking/travel lane that would be covered while cars are parked. Another is to add shared lane markings both to the right and left of the parking/travel lane

so that the outside marking is visible while cars are parked. However, the parking/travel lane will not be wide enough to allow for safe travel of cyclists when cars are parked (if cars park using 8', only 3' will be left to cyclists, leaving them in the 'dooring zone'). Figure 19 provides an example of this dilemma in Baltimore. Care should be taken to determine a safe design based on the final implementation and striping of the parking/travel lane.

Figure 19: Shared Lane Marking Placement while Off-Peak Parking Allowed[10]

Determine configuration for cyclist-railroad track crossing. Cyclists should be encouraged to cross railroad tracks north of Woodfords Corner at closer to 90 degrees, but the exact alignment of bicycle crossings will depend on the expansion of the road right-of-way in this area and will involve cooperation with the railroad. One way to accomplish this could be to install a brief section of bicycle lane or an angled shared lane marking (Figure 20) that directs cyclists in the safest direction (closer to 90 degrees) across the railroad track within the existing lane. This approach requires a cyclist to take up more of the travel lane to accomplish maneuvers. Another would be to expand the street (in a bulge or jug handle) at the railroad tracks (see an example in Cohasset, MA in Figure 20 and Figure 21: Angled Shared Lane Marking). If the jug handle approach were employed on Forest Avenue, attention should be paid to the safe re-integration of the cyclist into the travel lane without a bicycle lane.

[10] Source: Elly Blue, Western Bike Works, http://bikeportland.org/2009/01/27/baltimores-bike-improvements-13783, accessed June 29, 2011.

Figure 20: Angled Shared Lane Marking[11]; Figure 21: Bulge for Cyclists at Railroad Crossing[12]

5. Further Analysis and Future Studies

There are elements of the *Transforming Forest Avenue* Concept Plan that require further study before being considered feasible or desirable. These have been discussed throughout the Concept Plans, but they are summarized in this section as a set of recommended future studies.

Comprehensive parking study. A comprehensive parking study should examine parking demand at different times of day and attempt to differentiate between types of demand. In addition, work should include meeting with stakeholders to discuss needs and explore challenges to coordination. Based on this understanding, a comprehensive parking strategy should be developed. Funding sources should be identified for any projects identified. The assessment of the existing supply and demand should provide business owners with enough information to begin to consider joint parking lots. Results of the parking study could be combined with further traffic analysis to determine appropriate locations for curb-cut consolidation.

Snow-removal strategy. In its snow removal strategy, the City should aim to achieve better year-round access for pedestrians, transit riders, and cyclists. The current approach to snow removal can leave sidewalks almost impassable in the winter as snow is piled on sidewalks, melts, and refreezes. Access to buses from the curb at bus stops is not maintained. A snow removal strategy should take into account available resources or seek to identify additional resources in order to improve snow removal.

Bus stop optimization study. A bus stop optimization study should aim to minimize overall passenger travel and access times by considering alternative locations for stops along Route 2 in the corridor. Changes might include shifts from one side of an intersection to another to reduce traffic signal or operational delays, or even consolidation of existing stops, reducing the number slightly to improve overall average speed. This analysis should include a detailed assessment of passenger boardings and lightings by stop, and the origins and destinations of these passengers.

[11] Source: NACTO, http://nacto.org/cities-for-cycling/design-guide/bikeway-signing-marking/shared-lane-marking/#design, accessed June 28, 2011.
[12] Source: White, Nancy. Wicked Local Cohasset, http://www.wickedlocal.com/cohasset/news/x1070363127/North-Main-rail-crossing-concerns-addressed#axzz1Qbs8BlqF, accessed June 28, 2011

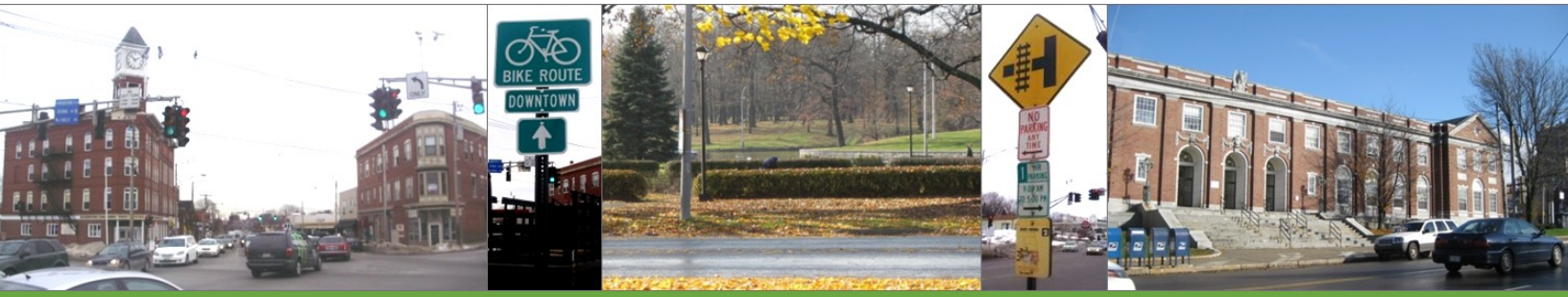
It should also include an operational simulation that takes both traffic signal operation and actual traffic volumes into account.

Stormwater management strategy. The City should consider a more regional stormwater management strategy that takes into account groundwater recharge, retention, and drainage. Consideration of drainage strategies would include a hydrology analysis to ascertain where storm water will be emptied and the natural direction of flow. It should also consider filtration mechanisms to ensure pollutants are not carried off with stormwater. Within this context, the City could consider stormwater strategies that should be employed on Forest Avenue along with the trade-off with further development or infill.

Comprehensive wayfinding strategy. The City should determine a consistent strategic approach expanding on the wayfinding currently available. The strategy should consider multiple modes, including automobiles (those passing through and those searching for parking), non-motorized transportation, and transit. Currently, there are many signs along Forest Avenue which clutter the streetscape. Simply adding wayfinding signs, therefore, may not necessarily improve navigation along the corridor. This study could include determining how signs can be consolidated.

Continuation of I-295 Interchange study. It is expected that MaineDOT will complete this study to determine an appropriate alignment for the I-295 interchange. However, the final configuration would ideally consider and incorporate the various pedestrian and bicycle improvements included in this Concept Plan. If appropriate, modifications could be suggested. Also, the MaineDOT study could consider the narrowing of the roadway through and south of the interchange to allow for better bicycle and pedestrian facilities. This option would require further study.

Relocation of State and Kennebec Streets. Relocation or realignment of these streets would require a major traffic study. Any future studies related to these reconfigurations could also include consideration of a pedestrian/bicycle overpass over Forest Avenue to accommodate a Bayside Trail-Deering Oaks connection.



Chapter II. Principles, Codes and Guidelines

Transit-Supportive Development Principles

Overall Approach: Develop principles for land use characteristics that support current and promote future transit demand. These principles should promote transit use as well as support the pedestrians and cyclists that will be using transit to access the land uses on the corridor, without excluding consideration of current or desired future automobile use.

Principle	Strategy	Description
Land Uses		
Encourage vibrant and diverse uses	Promote a mixture of land uses	Mixed land uses provide more desired destinations in a smaller area and can stimulate activity at various times of day, supporting all-day and nighttime transit service.
	Promote a variety of housing types	Residential development should contain mixed housing types and sizes, such as townhouses and apartments appropriate for singles and families at a variety of price points.
	Provide active streets	Commercial streets should have active streetfronts with a variety of retail, food, office and entertainment opportunities in proximity to the transit stops. Encouraging outdoor seating or other visible activity can further increase the vibrancy of a corridor and the appeal of arriving by transit.
	Provide civic uses and neighborhood amenities	Incorporating civic uses and amenities in development engages the community, provides benefits to residents, and provides additional destinations on the corridor to draw
Encourage compact land uses	Promote compact development	Promoting higher density within the land uses on the corridor provides a greater concentration of potential demand for transit.
	Focus the most compact development near transit	Development should be most compact along the corridor closest to transit stops, and gradually less compact away from the corridor.
Placemaking/Built Environment		
Design for architectural quality	Scale buildings to human use	Buildings should be oriented to the street to be pedestrian-friendly, help define the streetscape, and be easily accessible.
	Keep building scales consistent and transition gradually	Avoiding abrupt changes in building scales ensures a reasonable transition to adjacent sites and respects the character of existing neighborhoods.
	Promote public safety and security	Following City of Portland Crime Prevention Through Environmental Design (CPTED) guidelines during development helps to maintain or improve natural surveillance, increasing perception of safety of arriving by transit, foot, or bicycle.
	Promote architectural quality	Employ high quality, durable building materials that are consistent with the overall composition of area.
	Orient buildings to allow easy pedestrian access	Orienting buildings and entrances towards the street and pedestrian walkways decreases the walking distance to transit and provides an environment that is more functional and pleasant.

Principle	Strategy	Description
Provide quality public space	Provide public meeting and gathering spaces	Centrally located or visible parks and plazas provide public meeting places, which can increase vitality on a corridor and support transit demand.
	Provide high quality landscaping	Landscaping and design features such as shade trees, median plantings, appropriate lighting, and street furniture can improve comfort and security for pedestrians, as well as provide an attractive, human-scaled corridor.
Provide high quality parking	Conceal parking areas	Parking areas should be concealed with landscaping or wrapped with development while not creating barriers for pedestrian or bicycle access to land uses. Options for more pedestrian-friendly parking lot design include placing parking in the rear or side of the property rather than in the front, using pedestrian pathways, and clearly marked pedestrian crossings.
	Prioritize on-street over other forms of parking	On-street parking provides convenient short-term parking, reducing area needed for parking lots and allowing other more compact development.

Design Guidelines Regulated Building Form Contributing to Street Vitality in Vancouver, BC.

Photo: Steve Ruark for The New York Times

Mixed-Use Development at Market Commons, a Retail and Entertainment Hub in Clarendon, VA

Photo: Google Street View

Aesthetically Designed Mixed-Use Parking Structure outside the University of Pennsylvania Campus, Philadelphia, PA

Residential Development of Uniform Character Enhancing Edge Conditions at Stapleton, Denver, CO

Form-Based Code Application at Rosemary Beach, FL

Form-Based Code Application at Kentlands, MD

Form-Based Code Application at Kentlands, MD

Complete Streets Principles

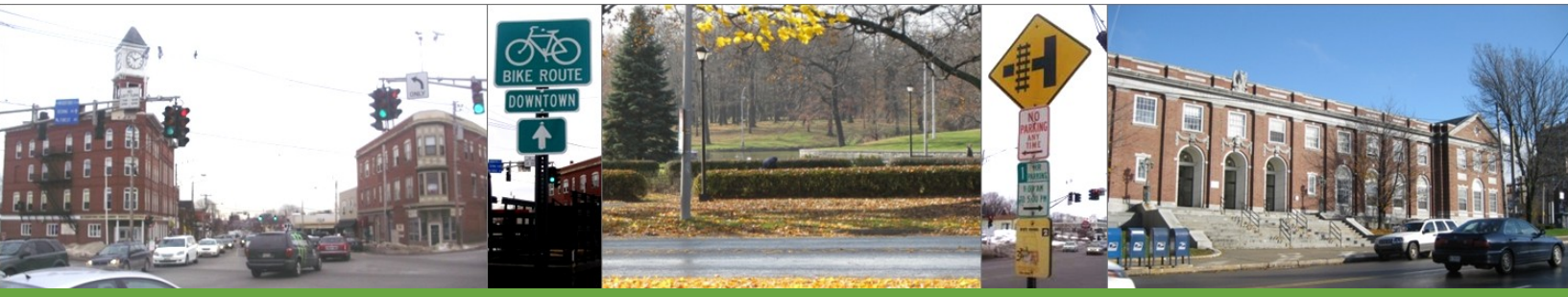
Overall Approach: "Complete Streets" are designed, operated and maintained to enable safe access for all users. Pedestrians, cyclists, transit riders and motorists of all ages and abilities must be able to safely move along and across a complete street.

These Complete Streets principles are intended to be applied using a Context Sensitive Solutions approach; the design of a complete street and the level of accommodation of each mode varies depending on the context and needs of a community. Forest Avenue is an arterial (which would have some focus on providing longer through travel between major trip generators) but has also been targeted for better serving transit, bicyclists and pedestrians. These principles acknowledge the importance of transit, commercial, and automobile traffic on this corridor while retaining a focus on better serving pedestrians and cyclists.

Principle	Strategy	Description
Health and Safety		
Promote physical activity	Promote active forms of transportation as well as other physical activities	The health benefits of active transportation have been widely acknowledged. Designing streets to promote physical activity helps to connect to a wider network of amenities to keep residents fit.
	Design streets to acknowledge their role as public spaces that define a vibrant community	Streets include not just lanes for traffic, but the entire right of way, which can include bicycle lanes, parking, plantings, and sidewalks. Designs should account for streets' potential as public spaces.
Enhance safety of vulnerable users	Manage conflicts and increase safety of vulnerable users	Intersections are important focal areas for safety for all users. Attention should be paid to these potential conflict areas to accommodate the most vulnerable users. This includes the physical design of the intersection as well as signals.
	Promote safe walking and cycling for children	Follow street design principles and promote activities and policies that make streets safer for children. Link to Safe Routes to Schools efforts.
	Ensure access for persons with disabilities	Ensure that all streets are accessible to persons with disabilities so that they can move along and across those streets
Manage vehicle speeds	Implement traffic calming measures when appropriate to make streets safer for all users	Lowering speeds reduces fatalities associated with accidents and makes a street more comfortable for all users.
Accommodate all Modes		
Encourage multi-modality	Design streets to accommodate all modes to the degree feasible given desired functionality	Streets should accommodate all modes, ensuring that no mode is disproportionately disadvantaged by improvements for another mode. The level and type of accommodations varies by context and desired functionality.
	Design streets to be an appropriate size	Road diets, reducing the width or number of travel lanes, can improve conditions for all users. Careful considerations should be made for accommodating larger vehicles (such as buses) and bicycle lanes, however, studies have shown that design standards are often wider than necessary.

Principle	Strategy	Description
Improve transit operations, facilities, and access	Increase transit flow in roadway	Special infrastructure or technology for transit, such as queue jumping lanes or transit signal priority, as well as enforcing policies such as bus right-of-way at pull-outs, can decrease travel times by transit.
	Design streets to allow for efficient transit operations without negatively impacting pedestrians and cyclists	Increased operational efficiency makes transit more desirable. Traditional improvements for transit operational efficiency, such as wider lanes or larger turning radii, may not be ideal for pedestrians and cyclists. Such approaches should be avoided or mitigated as feasible given a street's desired functionality.
	Improve bus stop amenities, including shelters and benches	Improving amenities for waiting passengers makes transit more attractive. Shelters and other amenities can be designed to brand transit service.
	Provide high quality sidewalks around bus shelters	Improving sidewalk quality around and near bus stops improves pedestrian accessibility.
	Improve pedestrian crossings near bus stops	When possible and without disproportionally negatively impacting bus operations, locating stops near crossings or providing mid-block crossings can provide pedestrians with safe and easy access to transit.
	Locate bus stops conveniently relative to desired destinations	Locating bus stops near desirable locations decreases walking times and increases attractiveness of transit.
Mitigate traffic diversion	Design arterial and residential streets to reduce the effects of diversion of arterial traffic into neighborhoods	Arterial traffic can bring with it congestion, noise, pollution, and other qualities that would be undesirable to divert to neighborhood streets. Well-designed streets that incorporate pedestrians, cyclists, and transit users should not cause significant amounts of arterial through traffic to seek alternative routes
Manage parking	Manage parking demand	Appropriately pricing parking can help manage demand and space required to accommodate automobiles as well as incentivize other modes of transportation.
	Design parking to mitigate potential conflict	On-street parking buffers pedestrians from traffic, but care should be taken to address or mitigate potential conflict with bicycle facilities. Entrances to parking lots can also be sources of conflict with other users.
	Provide bicycle parking	Increasing bicycle access to the corridor includes providing parking at or near transit stops and destinations.
Increase comfort	Design streets to include characteristics that increase comfort for pedestrians and cyclists	Utilize design features such as building and landscaping enclosures, street furniture, buffers between pedestrians/cyclists and traffic to increase pedestrian and cyclist comfort.

Principle	Strategy	Description
Connectivity/Accessibility		
Connect the street network	Enhance interconnectivity of street network	Interconnected street patterns, such as a grid network that avoids dead ends and cul-de- sacs, improve mobility of pedestrians and cyclists, assists in efficient transit routing, and helps to distribute traffic among streets. Street redesign should retain or enhance existing connectivity. In an established street pattern, additional connections for pedestrians and cyclists may be created on existing blocks.
Provide wayfinding	Provide legible signage and landmarks	Highly visible and legible signage and clear landmarks ensure that all travelers can easily find destinations.
	Provide signs to direct towards major destinations	Additional wayfinding, such as signage indicating direction and distance to other desirable destinations, can improve wayfinding as well perceptions of pedestrian, cycling, and transit accessibility.
Environment		
Increase permeability	Limit impervious footprint of streets	Limiting street footprints includes reducing width and using pervious paving where possible.
	Limit the concentration of water	Using pervious materials and infiltration basins help limit pressure on potable groundwater supplies.
	Capture stormwater	Consider stormwater curb extensions, street planters, and rain gardens to capture and filter stormwater runoff and allow it to infiltrate into the ground.
Reduce greenhouse gas (GHG) emissions	Reduce congestion	Employ strategies that decrease congestion, thereby decreasing GHG emissions. Strategies can both focus on reducing the stop-and-go emissions in congested conditions and reducing SOV travel.
	Increase attractiveness of non-motorized and transit modes	When possible, prioritize transit and active transportation over SOV travel to encourage a mode shift to less polluting per capita forms of transportation.

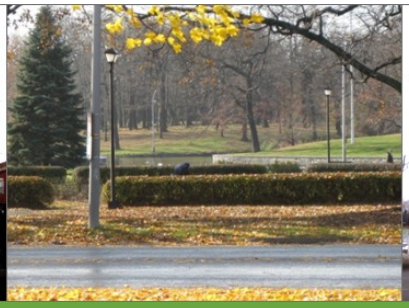


Chapter III. Final Concept Plan Visualizations

1. Segment A - Deering Oaks Park
   i. Transportation and Streetscape Concept Plan
   ii. Transportation and Streetscape Concept Plan: Street Section
   iii. Lane Configuration Concept: I-295
   iv. Visualization of Improvements at I-295

2. Segment B - Central Forest Avenue
   i. Transportation and Streetscape Concept Plan
   ii. Transportation and Streetscape Concept Plan: Street Section

3. Segment C - Woodfords Corner
   i. Transportation and Streetscape Concept Plan
   ii. Transportation and Streetscape Concept Plan: Street Section
   iii. Lane Configuration Concept: Woodfords Corner
   iv. Visualization of Improvements at Woodfords Corner


Chapter III.

Segment A - Deering Oaks Park

i. Transportation and Streetscape Concept Plan

ii. Transportation and Streetscape Concept Plan: Street Section

iii. Lane Configuration Concept: I-295

iv. Visualization of Improvements at I-295


Improved Pedestrian Lighting


Textured Ramps for Improved Accessibility


Bus Shelters with all Amenities


Pervious Paving


Innovative Stormwater Drainage solutions


Prominent Bicycle Lane Markings

CORRIDOR WIDE IMPROVEMENTS

Improved access for people with disabilities	Improved treatment (e.g. asphalt stamping) of pedestrian and cyclist crossings	Improved paving treatment and pedestrian lighting	Distinctly visible shared lane markings for cyclists	Additional bicycle parking	Narrow travel lanes	Route '2S' shuttle service	Improved amenities at bus stops	Consistent landscaping	Branded and consistent street furniture	Use of recycled materials	Use of pervious materials and surfaces

BAXTER BOULEVARD INTERSECTION

'University of Southern Maine' branding

Bus shelters with all amenities

Bicycle boxes on NB Forest Ave and side streets

BAXTER BOULEVARD - I-295

Landscaped medians

Expanded sidewalks

Cycle tracks

Conflict area markings

Rumble strips/zigzag striping on interstate exits

I-295 UNDERPASS

Landscaped medians

Expanded sidewalks with improved paving treatment and pedestrian lighting for pedestrian safety

Cycle tracks

I-295 - MARGINAL WAY

Landscaped medians

Expanded sidewalks

Cycle tracks

Conflict area markings

Rumble strips/zigzag striping on interstate exits

MARGINAL WAY INTERSECTION

'Gateway to Portland' branding

Additional pedestrian crossing

Bicycle boxes

HIGH STREET INTERSECTION

Improved ped crossing configuration

Pedestrian bulb-outs

HIGH STREET - PARK AVENUE

Removal of one travel lane in each direction

Expanded sidewalks

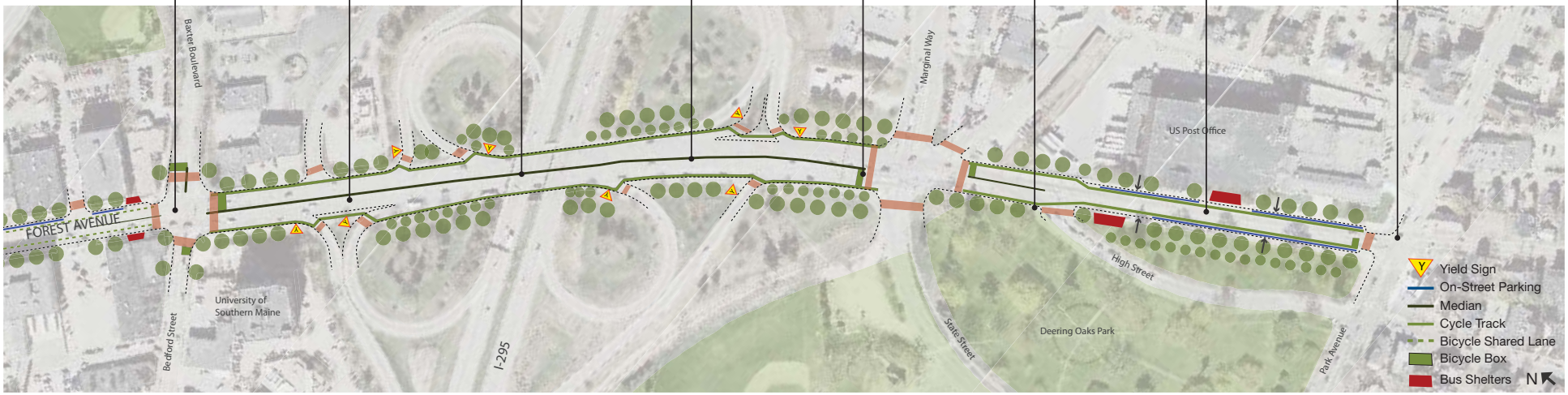
Cycle tracks

Bus shelter with all amenities

PARK AVENUE INTERSECTION

Pedestrian bulb-outs

Bicycle boxes



Transportation and Streetscape Concept Plan

Corridor Segment A - Deering Oaks Park

PACTS

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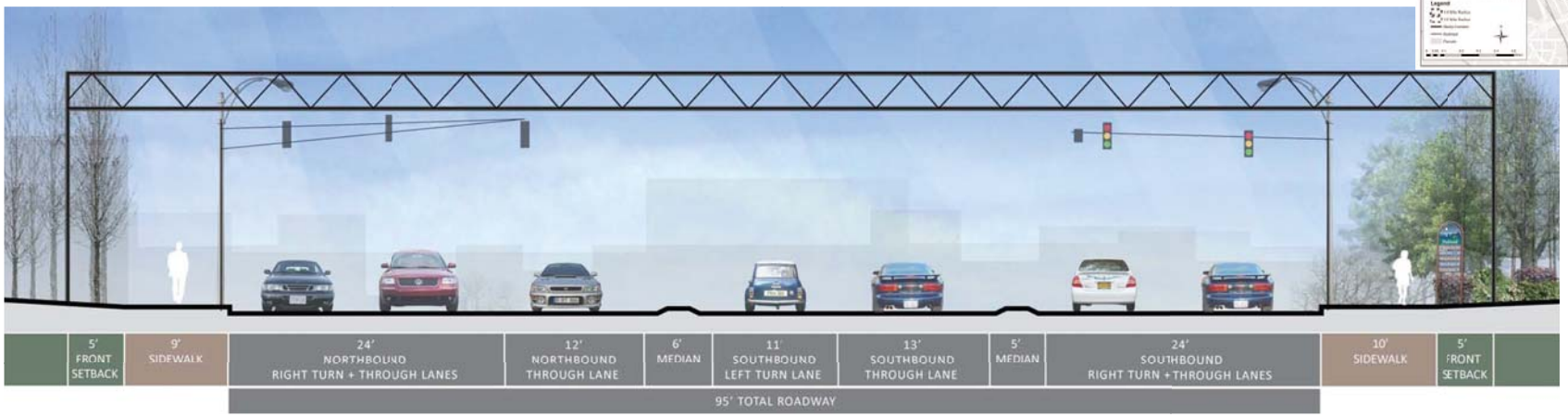
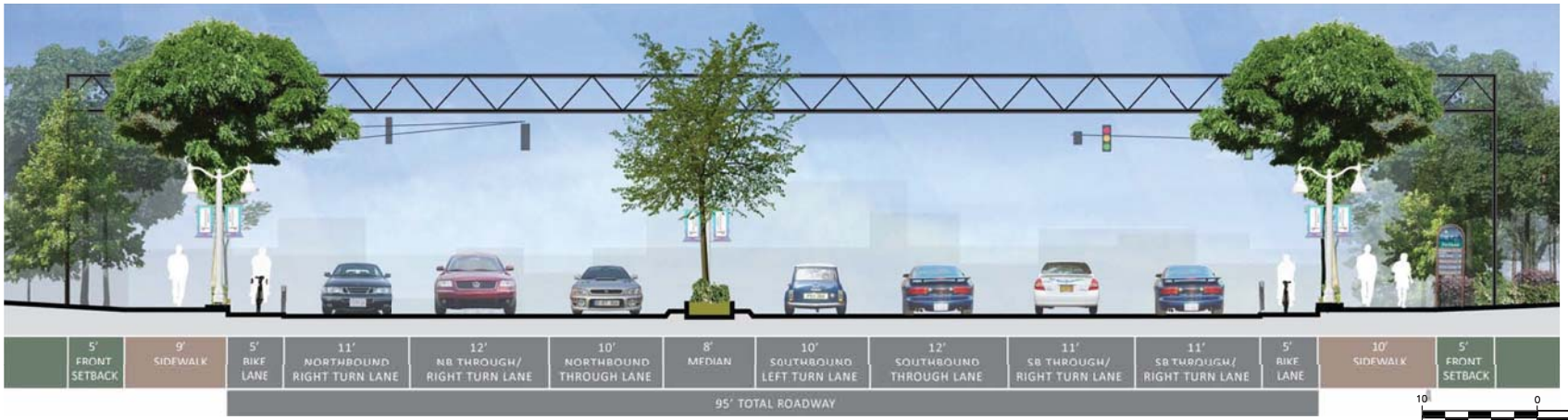
BARTON & GINGOLD

Key Map



Existing Street Section A



Proposed Street Section A

10 0 5 10 20
1 inch = 10 feet

PACTS

Transportation and Streetscape Concept Plan

Street Section for Segment A - Deering Oaks Park

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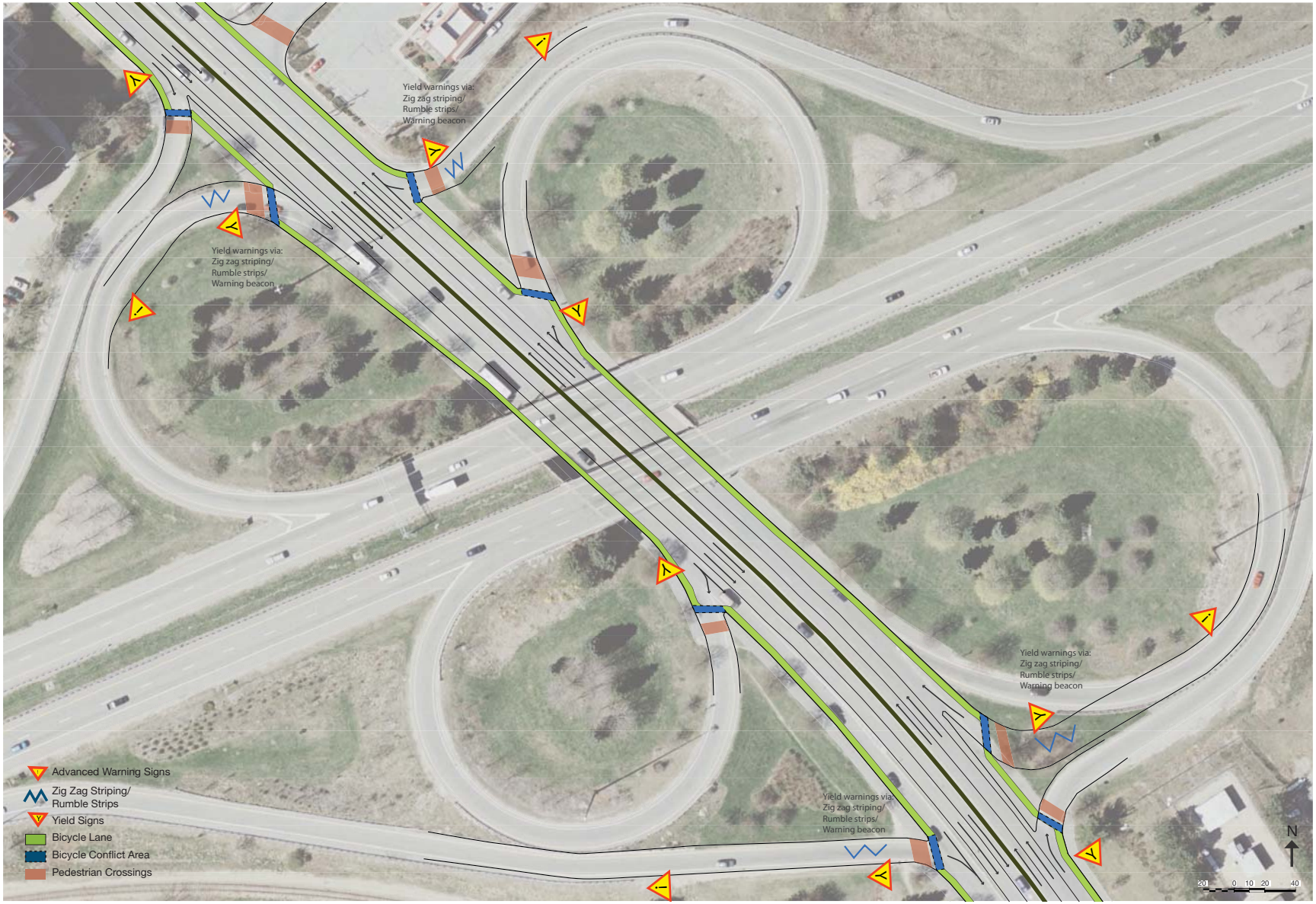
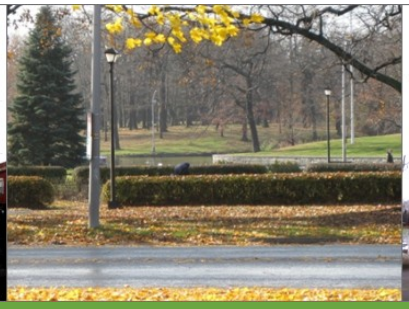


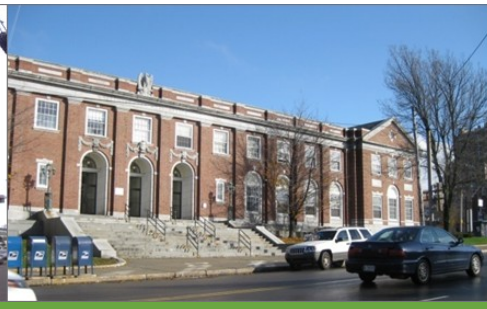
Lane Configuration Concept

I-295

Existing View from North of I-295 Intersection facing South

View of I-295 Intersection facing South with Proposed Improvements

Chapter III.

Segment B - Central Forest Avenue

i. **Transportation and Streetscape Concept Plan**

ii. **Transportation and Streetscape Concept Plan: Street Section**

Bicycle Shared Lane Marking

Bicycle Wayfinding Signage

Bicycle Parking

Improved Paving, Pedestrian Lighting and Trees

Pedestrian and Bicyclist Amenities

Improved Street Planting

CORRIDOR WIDE IMPROVEMENTS

Improved access for people with disabilities	Improved treatment (e.g. asphalt stamping) of pedestrian and cyclist crossings	Improved paving treatment and pedestrian lighting	Distinctly visible shared lane markings for cyclists	Additional bicycle parking	Narrow travel lanes	Route '2S' shuttle service	Improved amenities at bus stops	Consistent landscaping	Branded and consistent street furniture	Use of recycled materials	Use of pervious materials and surfaces

COYLE ST INTERSECTION

Traffic calm side streets

ASHMONT STREET INTERSECTION

Pedestrian bulb-outs

Traffic calm side streets

NOYES STREET INTERSECTION

Traffic calm side streets

DARTMOUTH ST INTERSECTION

Pedestrian bulb-outs

Bus shelter (NB direction) with all amenities

Traffic calm side streets

WILLIAM STREET INTERSECTION

Traffic calm side streets

Bus shelter (SB direction) with all amenities

Increased use of pervious paving for parking lots

PITT STREET INTERSECTION

Traffic calm side streets

COYLE STREET - BEDFORD STREET

Improved amenities at bus stops

PREBLE STREET INTERSECTION

4-way pedestrian crossings

Pedestrian bulb-outs

PACTS

Transportation and Streetscape Concept Plan

Corridor Segment B - Central Forest Avenue

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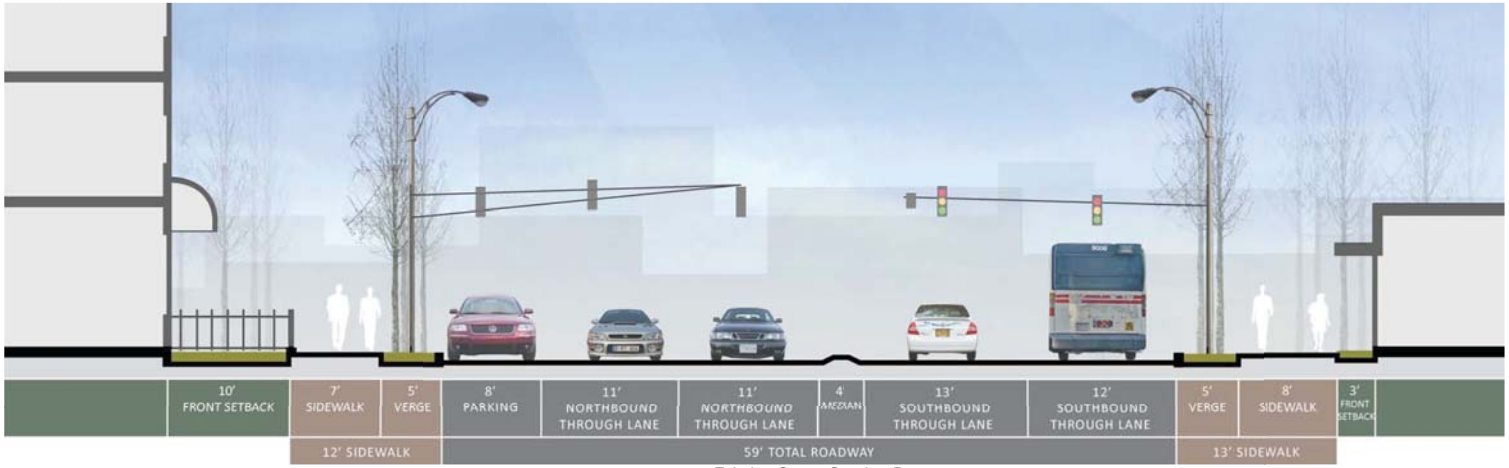
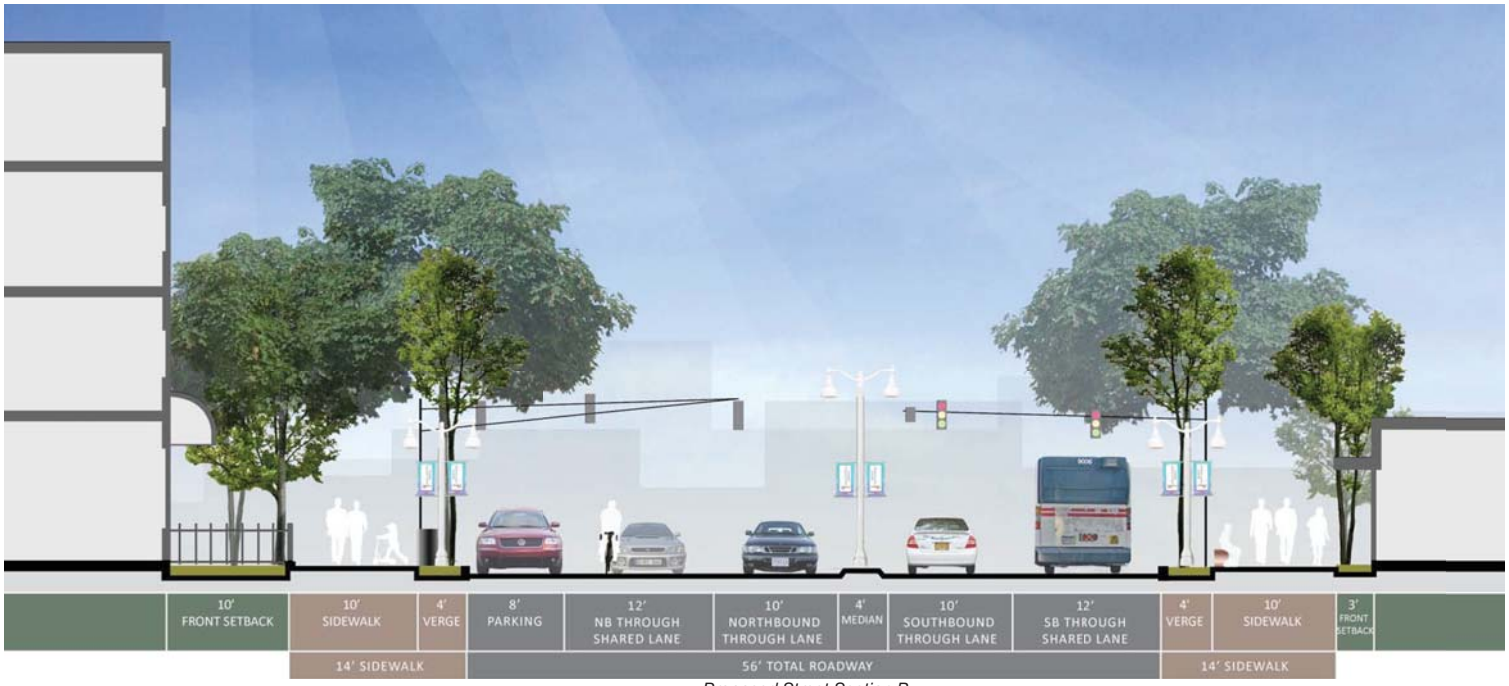
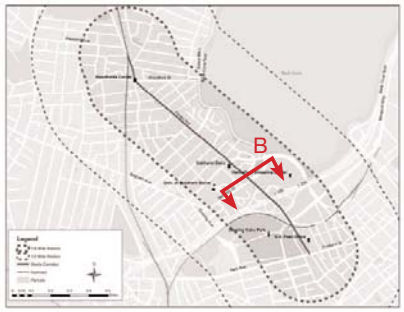


Existing Street Section B



Proposed Street Section B



Key Map

10 0 5 10 20

1 inch = 10 feet

Transportation and Streetscape Concept Plan

Street Section for Segment B - Central Forest Avenue

PACTS

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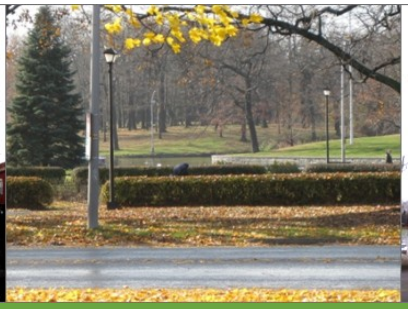



Chapter III.

Segment C - Woodfords Corner

i. Transportation and Streetscape Concept Plan

ii. Transportation and Streetscape Concept Plan: Street Section

iii. Lane Configuration Concept: Woodfords Corner

iv. Visualization of Improvements at Woodfords Corner


Improved Paving with Street Furniture and Bicycle Parking


Improved Street Planting and Stormwater Drainage

Landmark/ Directional Signs for Pedestrians


Place Branding


Bicycle Box


Improved Sidewalk Paving and Street Furniture

CORRIDOR WIDE IMPROVEMENTS

Improved access for people with disabilities	Improved treatment (e.g. asphalt stamping) of pedestrian and cyclist crossings	Improved paving treatment and pedestrian lighting	Distinctly visible shared lane markings for cyclists	Additional bicycle parking	Narrow travel lanes	Route '2S' shuttle service	Improved amenities at bus stops	Consistent landscaping	Branded and consistent street furniture	Use of recycled materials	Use of pervious materials and surfaces

OCEAN AVE - PLEASANT AVE

Expand ROW to 2 continuous NB lanes north of Ocean Ave intersection

Bulge/jug or lane marking to allow cyclists to cross tracks at 90 degrees

OCEAN AVE/VANNAH AVE INTERSECTION

Complete pedestrian crossings

Prohibit and enforce PM peak left turns onto Saunders & Vannah Ave

REVERE ST INTERSECTION

Pedestrian bulb-outs

WOODFORD STREET - OCEAN AVE

Prohibition of peak hour parking in NB direction to accomodate additional NB travel lane

WOODFORDS CORNER

'Woodfords Corner' placemaking and branding

Pedestrian bulb-outs on Deering Ave

Bus shelter on Deering Ave

Redesigned pedestrian friendly traffic island

WOODFORD - REVERE STREETS

One SB travel lane up to 20' south from Woodfords Corner

Prohibition of peak hour parking in NB direction to accomodate additional NB approach lane

Expanded sidewalks

Bus shelter

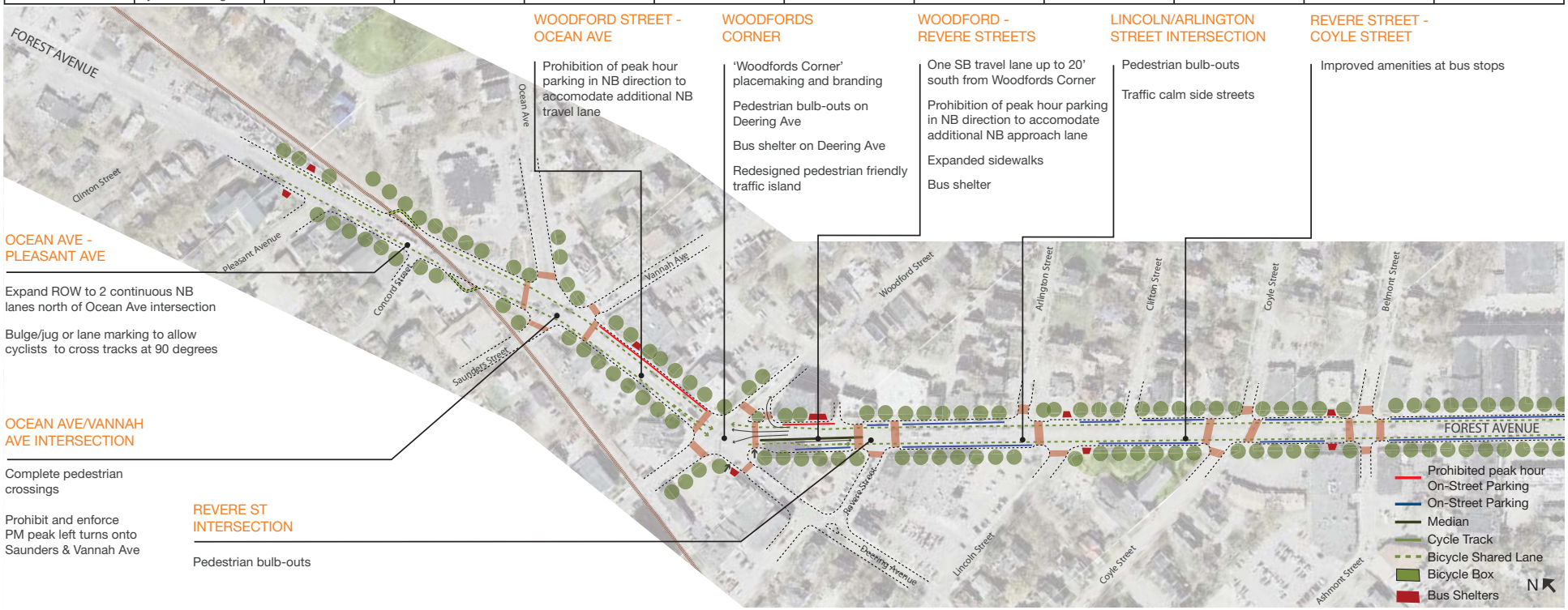
LINCOLN/ARLINGTON STREET INTERSECTION

Pedestrian bulb-outs

Traffic calm side streets

REVERE STREET - COYLE STREET

Improved amenities at bus stops



Transportation and Streetscape Concept Plan

Corridor Segment C - Woodfords Corner

PACTS

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GP Gorrill-Palmer Consulting Engineers, Inc.

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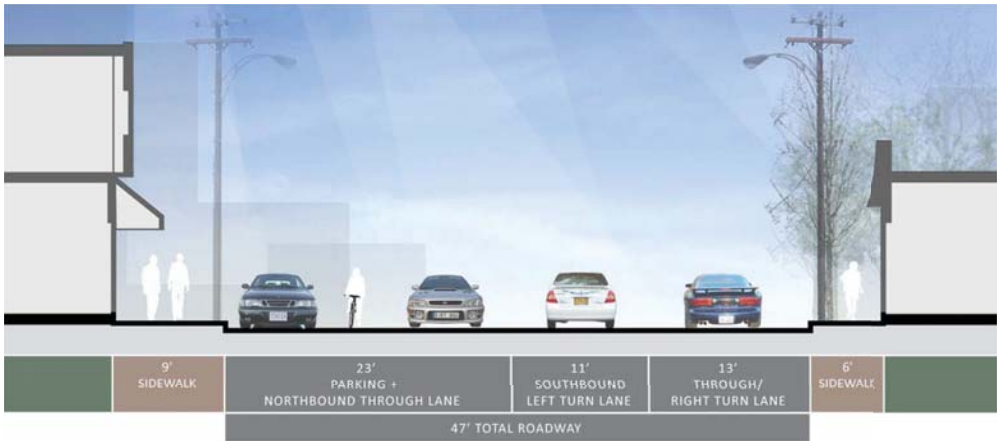


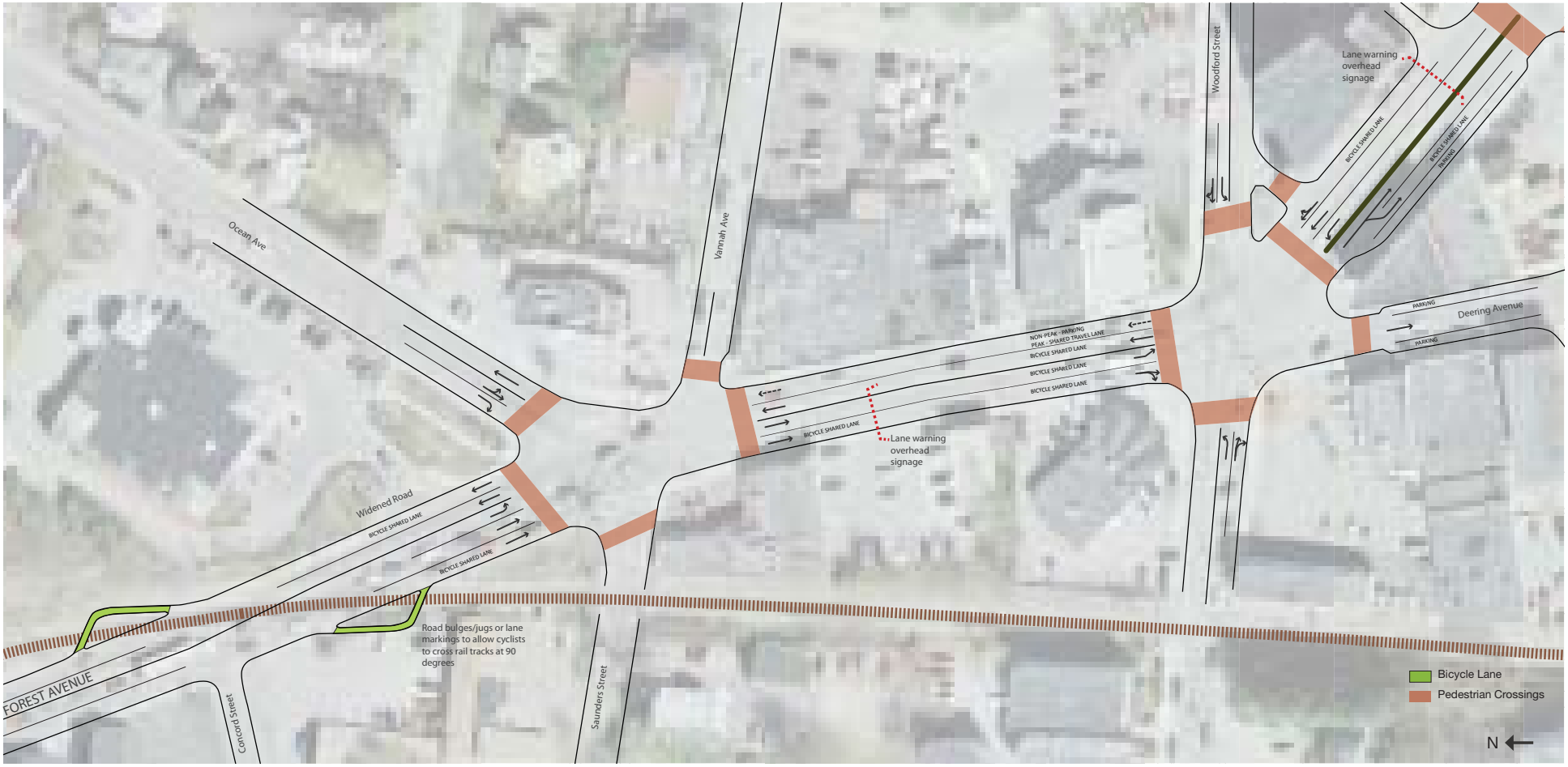
Existing Street Section C

Proposed Street Section C

Key Map

10 0 5 10 20

1 inch = 10 feet



Lane Configuration Concept

Woodfords Corner

PACTS
Portland Area Comprehensive Transportation System

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Existing View from North of Woodfords Corner facing South

View of Woodfords Corner facing South with Proposed Improvements