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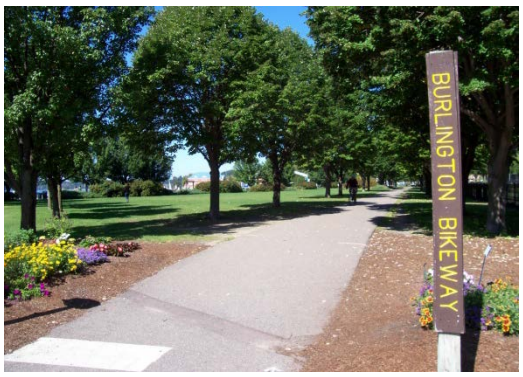

Executive Summary

Burlington Bike Path Improvement Feasibility Study

Burlington, VT

February 17, 2012

DATA ■ ANALYSIS ■ SOLUTIONS

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Introduction

A 2010 City Council resolution created the 12-member Burlington Bike Path Task Force, charged with recommending future improvements to the Bike Path and updating its capital plan, reviewing funding options, and soliciting public input. The path, which is part of the regional Island Line that traverses Burlington, is valuable to the local community and the region as a recreation, health, transportation, tourism, and economic resource. Furthermore, sections of the bike path were constructed in the mid-1980s and it is past due for a comprehensive rehabilitation. The City Council resolution refers to the Waterfront Bike Path as "a crown jewel of the Queen City." In 2010, the University of Vermont's Transportation Research Center estimated only part of the economic impact - the one-day tourism revenue associated with visitors on the day of bike path use- to be $4.5M per summer. This does not include local users or expenditures on additional days of the tourist visit.

The overall goal of this report is to identify upgrades to the Bike Path that satisfy current standards and improve safety, enhance user amenities, and raise its standing to that of a world class regional trail. This study has been guided by a working group consisting of staff from the City Parks and Recreation Department, Chittenden County Regional Planning Commission (CCRPC), Local Motion, and members of the Bike Path Task Force. This plan updates the 2002 Burlington Bike Path Improvement Feasibility Study by the City of Burlington Department of Public Works (DPW) and considers the 2005 Island Line Sign and Amenities Plan (by the CCRPC with assistance from LandWorks) a companion piece. **Together, these plans set forth three alternatives (described in Section 5.3 of the final report) for the future of the Burlington Bike Path to attract further economic vitality to the region:**

1) **Rehabilitation:** Actions which would have to be undertaken whether or not improvements are made, simply to repair the path to proper functionality. These costs would have to be expended regardless of whether this plan is approved or implemented.
2) **Functional:** Actions and recommendations that improve safety and bring the path up to minimum design guidelines.
3) **Enhancement:** Recommendations that enhance the path and add amenities to upgrade it to a world class facility.

The report establishes the purpose and need for the bike path improvements; notes the economic impact of the bike path to the City and the region; reviews relevant plans and studies; summarizes public input, existing conditions, environmental and cultural resources, and relevant design standards; and recommends improvements to repair and upgrade the facility to current standards.

Public Outreach and Existing Conditions

In December 2010, the Burlington Bike Path Task Force held a public forum and conducted an online survey to solicit input on the bike path. These results guided the development of the feasibility study in identifying community needs; existing conditions, problem areas, and issues; and the overall direction of the bike path improvements.

The public provided input as to the overall condition and feel of the path, as well as location specific comments for more detailed issues. Some of the generic responses pertaining to the entirety of the path were that there are not sufficient shoulders for running/walking, there are few regional trail connections, and that the path may not be wide enough and needs to be resurfaced. Other open comments made by users were that the etiquette on the path should be made clear, there should more frequent or updated signage, and the path should be maintained to a higher degree. Safety concerns included intersections where cross flows of vehicles, bicyclists and pedestrians occurs, and dark, confined segments of the path. The most common improvements recommended for these issues were the installation of lighting throughout the path, and increasing signage and safety awareness at hazardous intersections.

To supplement public input on the bike path, existing conditions (Section 4.3 of the report) were assessed based on available data. The assessment includes connectivity and access points; alignment; cross-section; safety and conflict points; utilities, drainage and erosion; signage; and amenities.

Recommendations

Recommendations were developed by applying the appropriate design standards in response to the public comments and observations noted during the existing conditions assessment. Feasibility relative to constraints has been considered to the extent allowed by available data.

Cross-Section

- Design guidelines recommend an 11' paved width as the minimum for the path because 1) it will accommodate maintenance and emergency vehicles; and 2) it is the minimum needed for two bicyclists traveling in opposite directions to pass one another and a pedestrian.
- A 4" wide yellow centerline stripe (broken where it is safe to pass and solid in no passing zones, such as around curves) and "Keep Right" pavement markings are recommended.
- Defined, unpaved shoulders (2' wide) are recommended on either side of the path to provide a soft surface alternative for pedestrians. Including drainage considerations in the design of the shoulders is imperative to reduce maintenance needs.
- Implementing this cross-section may be challenging in some areas due to right-of-way encroachment by private property owners and side grading conditions. Cost estimates include an assumption for addressing side slope constraints. Initial investigation of GIS parcel data suggests that right-of-way widths are adequate to accommodate the cross-section. Preliminary review of environmental and cultural resources do not indicate significant conflicts either, although more detailed design and grading plans will be necessary as projects are developed.

Path-Road Intersections

Intersection treatments are based largely on the guidelines and standards cited in the MUTCD and 2010 AASHTO Draft. Although each intersection differs and will need to be considered on a case-by-case basis, general elements that should be consistent for all intersections and crosswalks along the path are as follows:

- Right-of-way is to be assigned to vehicles on the road and intersection control is therefore to be applied to the path.
- 4-way stops (stop-signs on both path and road approaches) are NOT recommended.
- Traffic calming should be applied on the road to reduce vehicle speeds: speed table/raised crosswalk; neck downs to 11' travel lanes (as identified the Burlington Transportation Plan); and splitter islands.
- Intersection control is dictated by sight distances. The least intersection control that is effective should be used (that is, 'yield' is preferable to 'stop'). Evaluate each intersection's sight distances to determine the most appropriate intersection control. Improve sight distances as much as possible by trimming vegetation, removing obstacles, etc..
- Upgrade signs and pavement markings as described in MUTCD Part 9 (Figure 9B-7). Include cross-street signs on path for wayfinding.
- Widen path approaches and install splitter islands per VTrans Design Standards and *VTrans Pedestrian and Bicycle Facility Planning and Design Manual.*

Connections

To improve the path's regional connectivity, the recommendations of the *CCRPC Regional Bicycle-Pedestrian Plan and Metropolitan Transportation Plan* should be pursued. Long-term, opportunities for an east-west

connection between the path and Pine Street need to be identified to address the gap between Perkins Pier/Maple Street and Lakeside Avenue. Improvements are needed to connect the southern end of the Burlington Bike Path at Austin Drive to other networks (such as the I-189 trail, Red Rocks Park, etc.). This mainly entails wayfinding and signage, as does improving the connection through Oakledge and Leddy Parks.

At a local level, the improving connectivity involves two separate issues: 1) improving existing connections where gateways should be developed to raise the level of amenities; and 2) defining connections that are currently informal. The Task Force (or the Department of Parks & Recreation) needs to determine how to address existing neighborhood connections (such as at Kilarney Drive) and whether to formalize such connections (which then requires maintenance) or to redirect users to nearby connections that are already established.

Amenities

The 2005 Island Line Sign and Amenity Plan includes designs and placement recommendations for directional and regulatory signs; interpretive markers; entry/gateway kiosks with interpretive and safety information; "Pause Places;" restrooms; benches; and bike racks. Additional items that would enhance the Island Line are drinking fountains, "You are here" maps, trash receptacles, dog waste bag dispensers, signs to existing restrooms, and mile markers.

Constraints

Section 5.2 of the report estimates areas along the path that will require additional design and construction work due to slope constraints. These areas may require retaining walls, gabion baskets, sheet piling, or other designs to address the slopes.

The section adjacent to the Barge Canal will require significant engineering and design work to widen. Options to be considered are cantilevering a metal grated surface off the existing cement wall; developing a boardwalk supported by piles located in the lake; or paving to the edge of the existing concrete block wall to gain additional width. Additional scoping will be needed to compare alternatives and evaluate additional ones.

Implementation Plan and Prioritization

The implementation plan is presented in presented in Section 5.5 and identifies project timeframe, estimated capital cost, potential funding sources, potential partners, potential constraints, and next steps for each recommendation. The Department of Parks & Recreation is assumed to be the lead agency for each project. Flexibility is needed to effectively and efficiently implement the recommendations. As funding is pursued for implementation, some projects will best be approached from a corridor-wide viewpoint and others from a segment-by-segment perspective. As noted above, recommendations are organized into three categories to assist in prioritization: **rehabilitation, functional, and enhancement.**

Cost Estimates

The estimate for the path rehabilitation assumes full reconstruction of the bike path for its entire 7.5 mile length. Nine road-path intersections and six gateway treatments are assumed. The cost estimates have been broken down on a per segment basis by alternative scenario and are presented in Table 1. The three alternative scenarios are based on the Task Force's prioritization process: those recommendations graded "A" comprise the Rehabilitation scenario, which is the minimum required to repair the path. The Functional scenario is all the minimum required repairs, plus the recommendations graded "B". The Enhanced scenario includes all these recommendations plus those graded "C" or "D" to improve the path's character and

aesthetics. (For comparison, the New York State Department of Transportation suggests a typical cost of $1M to $5M per lane mile for road reconstruction or rehabilitation.[1])

Table 1: Segment cost estimates by alternative scenario

Segment	Rehabilitation (Minimum required repairs)	Functional (Improved scenario)	Enhancement (Ideal scenario)
1. Oakledge Park to Harrison Avenue	$880,000	$930,500	$1,065,500
2. Harrison Avenue to Blodgett Building	$380,000	$500,000	$540,000
3. Blodgett Building to Barge Canal Beach	$210,000	$210,000	$210,000
4. Barge Canal Beach to Wastewater Treatment Plant	$1,710,000	$1,710,000	$1,740,000
5. Wastewater Treatment Plant to Perkins Pier	$325,000	$325,000	$325,000
6. Perkins Pier to King Street	$95,000	$145,000	$145,000
7. King Street to College Street	$200,000	$700,000	$710,000
8. College Street to Lake Street	$295,000	$320,000	$330,000
9. Lake Street to Urban Reserve	$715,000	$815,000	$1,385,000
10. Urban Reserve to North Beach	$475,000	$875,000	$1,875,000
11. North Beach to Little Eagle Bay	$70,000	$270,000	$1,370,000
12. Little Eagle Bay to Shore Road	$570,000	$780,000	$850,500
13. Shore Road to Staniford Road	$295,000	$305,000	$305,000
14. Staniford Road to Starr Farm Road	$475,000	$485,000	$485,000
15. Starr Farm Road to North Avenue Extension	$2,950,000	$2,960,000	$2,982,000
16. North Avenue Extension to Winooski River	$0	$545,000	$555,000
Slope constraints	$2,000,000	$2,000,000	$2,000,000
Total Bike Path Cost	$11,645,000	$13,875,500	$16,873,000

Table 2 provides the difference in cost for various cross sections with 2' shoulders on either side and 11', 10', or 9' paved widths.

Table 2: Price variations according to path width

Assumptions (per mile)	2-11-2 Cross Section	2-10-2 Cross Section	2-9-2 Cross Section
Paved width*:	$460,000.00	$440,000.00	$410,000.00
sub-base: 12" gravel			
base: 6" sand or earth			
surface: 2" asphalt			
2' wide limestone shoulders on each side**	$40,000.00	$40,000.00	$40,000.00
Centerline stripe***	$10,000.00	$10,000.00	$10,000.00
Construction Subtotal	*$510,000.00*	*$490,000.00*	*$460,000.00*
5% Drainage	$30,000.00	$30,000.00	$30,000.00
25% Contingency	$130,000.00	$120,000.00	$120,000.00
20% Engineering	$100,000.00	$100,000.00	$90,000.00
15% Municpal Project Management	$80,000.00	$80,000.00	$70,000.00
25% Inspection	$130,000.00	$120,000.00	$120,000.00
Total per mile cost	$980,000.00	$940,000.00	$890,000.00

*Based on VTrans 2010 "Report on Shared-Use Path and Sidewalk Unit Costs."

**Based on 2008 Burt Township Trail Feasibility Study.

***Based on VTrans 5 year Averaged Price List 2004-2009 Item #646.410.

**Note: This executive summary serves as an abbreviated version of the full-length feasibility study with appendices. Please contact the Burlington Department of Parks and Recreation for additional information.*

[1] NYSDOT *Typical Construction Costs by Project Type* (2008-2012).