



PLANNING AND SUSTAINABILITY • CITY OF NORTHAMPTON

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Wayne Feiden, FAICP, Director of Planning and Sustainability • wfeiden@northamptonma.gov • 413-587-1265

MassCentral Rail Trail extension in Leeds Outline

MassCentral access ramp at Look Park northerly service road (intersection Florence/Haydenville Road)

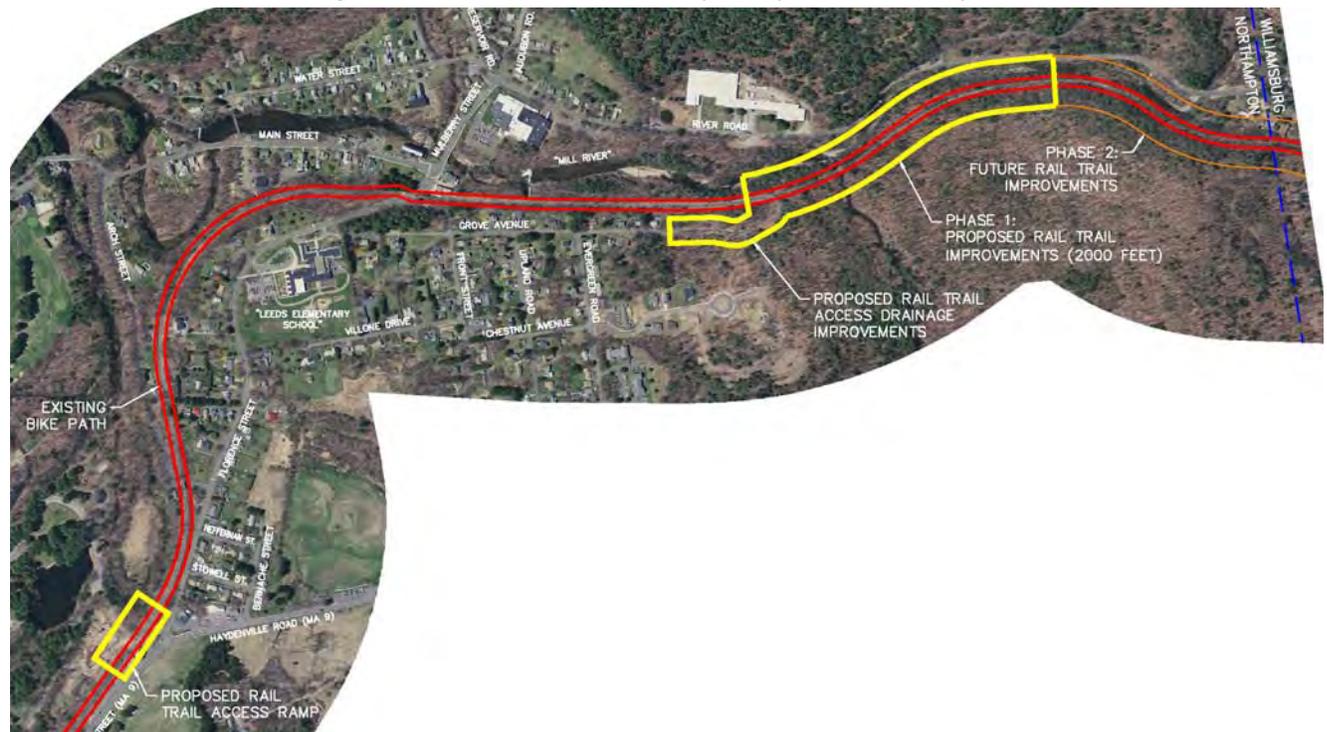
We have funding to design an access ramp, although at this time there is no funding to construct it. Once the design better quantifies costs we can examine the options for how construction can be funded.

MassCentral Extension north of Grove Avenue (0.35 miles)

The trail surface will be 8-wide asphalt. We have directed our engineer to minimize the number of trees that need to be cut to retain the pristine nature of this area to the extent possible.

There has been extensive community debate about what the surface of the trail should be. We have heard overwhelmingly (although not unanimously) from the rail trail community that we should design this as an asphalt trail, preferably ten feet wide to match other trails and accommodate all users. We have also heard overwhelmingly from many in the immediate neighborhood (although again not unanimously) that the trail, if it is to be improved at all, should be with a soil stabilized trap rock gravel.

The eight-foot wide asphalt trail accommodates the greatest number of users, provides the least maintenance costs and obligations, and eliminates the very costly need for new permits.



MassCentral Rail Trail Leeds Extension: Surface Options

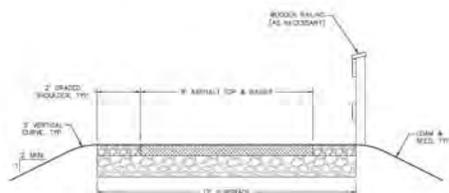
<p>Selected option</p> <p>8' wide asphalt</p>	<ul style="list-style-type: none"> • Unanimous recommendation city's Bicycle and Pedestrian Committee • Recommended by Planning and Sustainability, DPW, and rail trail users • Standard for state's Norwottuck Rail Trail until it was widened in 2014 • Allows widest range of users and accommodates expected use patterns • Minimal amount of tree cutting and impacts • Tree cutting can focus on those with shallow roots • Does not require any new permitting • Lowest maintenance needs and costs • Least likely surface to cause tripping and easiest for accessibility • Capital costs covered by grants and funds already on hand
<p>Considered by not selected: ProTerra Design, the project engineer, assessed the costs. All construction options can be covered by existing grants but maintenance issues are critical.</p>	
<p>10' asphalt</p>	<ul style="list-style-type: none"> • Bicycle users prefer, City standard, MassDOT standard • Too many trees would be cut, changing the nature of the experience
<p>6' asphalt plus 3' permeable pavers</p>	<ul style="list-style-type: none"> • Compromise for all users and separates uses, but no user group endorsed • Most expensive and would require new permits
<p>6' asphalt plus 3' soil stabilized trap rock gravel</p>	<ul style="list-style-type: none"> • Compromise for all users, but no user group endorsed • Higher maintenance costs • Would require new permits
<p>8' or 10' soil stabilized trap rock gravel</p>	<ul style="list-style-type: none"> • Recommended at neighborhood public meeting by majority of attendees and by Leeds Mill River Greenway group • Most natural appearance • Least number of user types accommodated • Higher maintenance costs, needs and challenges



10' WIDE ASPHALT



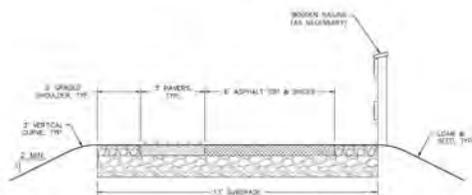
6' WIDE ASPHALT WITH 3' WIDE TRAP ROCK GRAVEL



8' WIDE ASPHALT



10' WIDE TRAP ROCK GRAVEL



6' WIDE ASPHALT WITH 3' WIDE PAVERS

November 3, 2014

Wayne Feiden
Director of Planning and Sustainability
City of Northampton
210 Main Street, Room 11
Northampton, MA 01060

**RE: Present Day Surface Cost Analysis
MassCentral Rail Trail Extension
Leeds, MA**

Mr. Feiden:

ProTerra Design Group, LLC (ProTerra) has completed a comparative cost estimate for various surfaces considered for the proposed MassCentral Rail Trail bike path in Leeds located on land owned in fee by the City of Northampton (City.) The following surfaces were considered:

- 8' wide asphalt
- 6' wide asphalt with 3' wide trap rock gravel (TRG)
- 8' wide trap rock gravel
- 10' wide trap rock gravel

Construction items were developed using the *Standard Specification for Highways and Bridges (English Edition)* prepared by Massachusetts Department of Transportation (MassDOT) Highway Division dated 1988 with Supplemental Specifications dated June 15, 2012. Cost estimates were computed using weighted mean bid prices for the October 2013 to 2014 time period as provided on the MassDOT website. Prices for Division 2 were used when available.

Maintenance and reconstruction intervals noted herein are estimates and may increase or decrease depending on environmental conditions and volume of use. These estimates were made based upon observed maintenance intervals and service lives of similar facilities, most notably the Norwottuck Rail Trail. The intent of the estimates was to allow the City to compare the relative costs of the surfaces. Additional costs common to each option such as mobilization/demobilization, drainage structures, traffic control devices, permitting, guardrails, bridge work, etc are not included. These additional costs are non-trivial and may greatly increase the final costs of the project but lie outside the scope of this document.

The construction capital costs of the surfaces included trimming of surrounding foliage, final grading, placement of aggregate base, placement of loam shoulder, placement of path surface(s), and seeding of exposed soil. The cost noted is a lump-sum present-day cost per 100 linear feet of trail.

The greater bike path structure was assumed to have an infinite life cycle provided the wearing surface is maintained and replaced regularly. Maintenance operations are intended to extend the service life of the surface and ensure the trail can be safely utilized by the users. Each surface option was assumed to require maintenance every second year. Asphalt surfaces may require patching, crack filling, and sweeping. TRG surfaces will require fine grading and supplementary TRG to fill ruts and maintain positive drainage. Costs were calculated per 100 linear feet of trail and divided by the maintenance interval of two years to obtain a yearly equivalent cost in present-day dollars.

Both asphalt and TRG surfaces were assumed to require reconstruction after a service life of twelve years. Reconstruction of the asphalt surfaces includes milling and replacement of the wear course. Reconstruction of the TRG surfaces includes removal and replacement of the stone surface with compacted gravel. Costs were calculated per 100 linear feet of trail and divided by the reconstruction interval of twelve years to obtain a yearly equivalent cost in present-day dollars.

A detailed and itemized listing of work items and costs for construction, maintenance, and reconstruction activities is attached. The following table summarizes the costs calculated thereon:

	8' Asphalt	6' Asphalt & 3' TRG	8' TRG	10' TRG
Construction Estimate Present-day per 100 LF of trail	\$5,152	\$5,176	\$4,110	\$4,679
Maintenance Estimate Yearly present-day equivalent per 100 LF of trail	\$94	\$123	\$161	\$201
Reconstruction Estimate Yearly present-day equivalent per 100 LF of trail	\$274	\$233	\$73	\$91

As is depicted in the preceding table, TRG options have lower construction costs compared to asphalt allowing for a wider path for an equal budget over an equal length. TRG surfaces require more expensive maintenance operations but also comparatively lower reconstruction costs.

In addition to the monetary advantages and drawbacks stated above, each surface has serviceability advantages and drawbacks which cannot be easily enumerated with a dollar value. The surface chosen will influence the type of user utilizing the trail. A smooth, uniform surface like asphalt may attract a wider range of users including high-performance road bicycles, inline skaters, families with young children, the elderly, and the disabled which may not be able to use a TRG surface. A TRG surface may be more attractive to walkers and hikers who prefer a softer surface and the increased peace-of-mind which comes with slower wheeled-vehicle speeds. Local residents may prefer TRG surfaces which required slower wheeled-vehicle speeds.

Both surfaces may be used equally in the winter months by cross-country skiers and snowshoers or plowed to allow for year-round walkers and wheeled vehicles although plowing of asphalt surfaces may be quicker, cheaper, and less destructive to the surface than TRG. A mixed-use trail incorporating asphalt and TRG surfaces may be utilized by all users stated previously but would suffer from a transition between hard and soft surfaces. In winter months, the asphalt surface of a mixed-use trail may be plowed allowing for utilization by winter and year-round users.

Asphalt surfaces may be safer in dry conditions due to increased slip resistance compared to TRG. In colder months, asphalt may become relatively less safe due to icing of the smooth surface. As with roadways, asphalt trail surfaces may be made safer by sanding or salting.

TRG surfaces may be less disruptive to the surrounding environment. TRG may aesthetically blend with the wooded alignment of the trail compared to asphalt.

The existing permits were issued for a ten foot wide asphalt surface. A change in surface may require revised permitting. Identification of vernal pools, protected wildlife habitats, and stricter environmental regulations may complicate paving in the future if this option is not chosen.

ProTerra is available to conduct further cost estimates and answer any engineering-related questions the City may have while deciding on a surface option.

Sincerely,
ProTerra Design Group, LLC

A handwritten signature in black ink, appearing to read 'Jesse Moreno', is written over the printed name and title.

Jesse Moreno, PE
Managing Partner

Enclosure

Item Description	MassDOT Item #	Mean Bid	Units	8' Wide Asphalt	6' Wide Asphalt with 3' Wide Trap Rock Gravel	8' Wide Trap Rock Gravel	10' Wide Trap Rock Gravel
Clearing and Grubbing (3' outside trail)	101	\$18,688.36	Acres	0.04	0.04	0.04	0.05
Fine Grading and Compacting	170	\$2.39	Sq. Yards	133.33	144.44	133.33	155.56
Gravel Borrow (Sub-base)	151	\$31.92	Cu. Yards	50.00	54.17	50.00	58.33
Hot Mix Asphalt (Base Course)	460	\$85.00	Ton	10.00	7.50		
Hot Mix Asphalt (Wear Course)	460	\$85.00	Ton	10.00	7.50		
Crushed Stone (Surface)	156	\$39.47	Ton		6.25	16.67	20.83
Loam Borrow (Shoulder)	751	\$46.20	Cu. Yards	5.93	5.93	5.93	5.93
Seeding	765	\$1.30	Sq. Yards	377.78	377.78	377.78	377.78
CONSTRUCTION TOTALS (Per 100 LF of Trail)				\$5,152	\$5,176	\$4,110	\$4,679

Hot Applied Rubberized Asphaltic Crack Filler (2 Years)	482.17	\$125.00	Gallon	0.75	0.50		
Fine Grading and Compacting (2 Years)	170	\$2.39	Sq. Yards		16.67	44.44	55.56
1" Crushed Stone (2 Years)	156	\$39.47	Ton		0.52	1.39	1.74
MAINTENANCE TOTALS (Yearly Present-Day Equivalent Per 100 LF of Trail)				\$94	\$123	\$161	\$201

Bit. Conc. Excavation by Cold Planer (12 years)	129	\$18.32	Sq. Yards	11.11	8.33		
Hot Mix Asphalt (12 years)	460	\$85.00	Ton	0.83	0.63		
Fine Grading and Compacting (12 Years)	170	\$2.39	Sq. Yards		2.78	7.41	9.26
6" Crushed Stone (12 Years)	156	\$39.47	Ton		0.52	1.39	1.74
RECONSTRUCTION TOTALS (Yearly Present-Day Equivalent Per 100 LF of Trail)				\$274	\$233	\$73	\$91

Surface:	8' Asphalt	6' Asphalt & 3' TRG	8' TRG	10' TRG
Source:	<ul style="list-style-type: none"> Bike/Ped Comm. Initial compromise Former state trail 	<ul style="list-style-type: none"> Compromise for all users Precedents elsewhere 	<ul style="list-style-type: none"> Narrower version of Leeds Greenway group initial suggestion 	<ul style="list-style-type: none"> Leeds Greenway group initial suggestion
Benefits:	<ul style="list-style-type: none"> Allows moderate to high use Current permits cover Increased dry slip resistance Hard surface for road bikes, inline skates, young children, elderly, disabled 	<ul style="list-style-type: none"> Separation of users Soft surface for walkers Hard surface for road bikes, inline skates, young children, elderly, disabled 	<ul style="list-style-type: none"> Less expensive than 10' TRG option Keeps speeds down Soft surface for walkers & hikers 	<ul style="list-style-type: none"> Most natural appearance Keeps speeds down Soft surface for walkers & hikers
Drawbacks:	<ul style="list-style-type: none"> Least natural appearance 	<ul style="list-style-type: none"> Requires revised permitting Transition between surfaces tricky 	<ul style="list-style-type: none"> May not be usable by high-performance road bikes, inline skates, young children, elderly, disabled Requires revised permitting Increased cross pitch 	<ul style="list-style-type: none"> May not be usable by high-perf. road bikes, inline skates, young children, elderly, disabled Greatest disturbed area Required revised permitting Increased cross pitch
Winter Use:	<ul style="list-style-type: none"> Plowable May require sanding 	<ul style="list-style-type: none"> Asphalt portion is plowable Asphalt portion may require sanding Plowing TRG portion may increase maintenance costs 	<ul style="list-style-type: none"> Plowing may increase maintenance costs or may be impracticable 	<ul style="list-style-type: none"> Plowing may increase maintenance costs or may be impracticable
Construction: (Yearly Present-Day Equivalent Per 100 LF of Trail)	\$5,152 <ul style="list-style-type: none"> Greater capital cost 	\$5,176 <ul style="list-style-type: none"> Two surfaces requires more complex construction 	\$4,110 <ul style="list-style-type: none"> Least capital cost 	\$4,679 <ul style="list-style-type: none"> Less capital cost compared to asphalt
Maintenance: (Yearly Present-Day Equivalent Per 100 LF of Trail)	\$94 <ul style="list-style-type: none"> Least maint. cost 	\$123 <ul style="list-style-type: none"> Two surfaces requires more complex maint. procedures 	\$161 <ul style="list-style-type: none"> Greater maint. costs compared to asphalt 	\$201 <ul style="list-style-type: none"> Greatest maint. cost
Reconstruction: (Yearly Present-Day Equivalent Per 100 LF of Trail)	\$274 <ul style="list-style-type: none"> Greater resurfacing cost Highest service life 	\$233 <ul style="list-style-type: none"> Mixed service lives of different surfaces 	\$73 <ul style="list-style-type: none"> Least resurfacing cost 	\$91 <ul style="list-style-type: none"> Less resurfacing cost compared to asphalt