

Memorandum



To: Shawn White, Friends of the Winooski River
From: Dana Allen, Watershed Consulting Associates, LLC
Date: November 30, 2018
Re: ***Hubbard Park – Stormwater Master Plan – Task 9 – Final Design Plans Summary Memo***

ATTACHMENTS:

9.1 – Final Design Plans

1.0 Introduction

On behalf of the Friends of the Winooski River, Watershed Consulting Associates, LLC (Watershed) has completed final design plans for four stormwater management retrofits at Montpelier’s Hubbard Park. These improvements are:

- A sediment forebay for the ‘Frog Pond’ at the Park’s entrance
- An improved grate for the existing outlet riser of the Frog Pond
- A sediment basin below the sledding hill parking area
- A sediment basin at the intersection of Parkway Avenue and the pavilion driveway
- A sediment basin at the intersection of Parkway Avenue and Corse Street

Combined, these retrofits are projected to cost ~\$40,000 and will remove a total of 2.4 lbs. total phosphorus per year. Over a ten-year period, the average annual cost per pound of phosphorus removed is ~\$1,700. The cost for these retrofits also includes improvements to the entirety of the road surface of Parkway Avenue and associated ditch improvements which will reduce erosion and better manage runoff.

2.0 Materials and Costs

Costs were estimated using VTrans materials and cost estimates where applicable and appropriate. VTrans costs are for materials as-placed (meaning the costs include trucking and machine/person hours to place the materials once on the site). Where necessary, manufacturer-specific costs were used. In the absence of a VTrans cost item, a cost projection was developed based on past project experience and professional judgment. A 5% contingency was added to the overall cost projection to account for cost overruns or minor additional items.

VTrans Code	Description	Unit	Quantity	Unit Price	Amount
Mobilization and Erosion Control					
	Mobilization	LS	1	\$ 500.00	\$ 500.00
653.55	Project Demarcation Fencing	LF	400	\$ 1.17	\$ 468.00
<i>Subtotal:</i>					\$ 968.00
Forebay					
203.15	Common Excavation	CY	135	\$ 9.86	\$ 1,331.10
629.54	3/4" to 1 1/2" Crushed Stone (Crushed Stone Bedding)	TON	10	\$ 34.04	\$ 340.40
613.13	Type IV Stone (granite block dam)	CY	110	\$ 43.32	\$ 4,765.20
613.11	Type II Stone (channel armoring)	CY	15	\$ 42.29	\$ 634.35
649.31	Geotextile Under Stone Fill (for granite block dam)	SY	500	\$ 2.51	\$ 1,255.00
N/A	StormRax Round RS-24	LS	1	\$ 1,200.00	\$ 1,200.00
N/A	Wooden Footbridge	LS	1	\$ 3,500.00	\$ 3,500.00
653.20	Temporary Erosion Matting	SY	300	\$ 2.20	\$ 660.00
<i>Subtotal:</i>					\$ 13,686.05
Sediment Basin 1 - Below sledding hill (& associated ditch/culvert work)					
203.15	Common Excavation	CY	75	\$ 9.86	\$ 739.50
613.10	Type I Stone (culvert inlet/outlet)	CY	14	\$ 43.91	\$ 614.74
651.15	Seed (grass)	LBS	25	\$ 7.66	\$ 191.50
301.15	Subbase of Gravel (parking area re-surfacing)	CY	40	\$ 25.11	\$ 1,004.40
613.13	Type IV Stone (stone bollards for parking edge)	CY	14	\$ 43.32	\$ 606.48
653.20	Temporary Erosion Matting (ditch fabric)	SY	500	\$ 2.20	\$ 1,100.00
<i>Subtotal:</i>					\$ 4,256.62
Sediment Basin 2 - intersection of Parkway Avenue and pavillion driveway (& associated ditch/culvert work)					
203.15	Common Excavation	CY	75	\$ 9.86	\$ 739.50
613.10	Type I Stone (culvert inlet/outlet)	CY	28	\$ 43.91	\$ 1,229.48
651.15	Seed (grass)	LBS	25	\$ 7.66	\$ 191.50
653.20	Temporary Erosion Matting	SY	300	\$ 2.20	\$ 660.00
601.0910	15" CPEP (culvert)	LF	40	\$ 34.05	\$ 1,362.00
N/A	Tree Removal	LS	1	\$ 3,000.00	\$ 3,000.00
613.10	Type I Stone (stone lined ditching)	CY	85	\$ 43.91	\$ 3,732.35
613.10	Type I Stone (plunge pool)	CY	5	\$ 43.91	\$ 219.55
<i>Subtotal:</i>					\$ 11,134.38
Sediment Basin 3 - intersection of Parkway Avenue and Corse Street (& associated ditch/culvert work)					
203.15	Common Excavation	CY	45	\$ 9.86	\$ 443.70
613.10	Type I Stone (culvert inlet/outlet)	CY	14	\$ 43.91	\$ 614.74
651.15	Seed (grass)	LBS	25	\$ 7.66	\$ 191.50
653.20	Temporary Erosion Matting (basin side slopes)	SY	80	\$ 2.20	\$ 176.00
601.0910	15" CPEP (culvert)	LF	30	\$ 34.05	\$ 1,021.50
601.0915	18" CPEP (outlet riser and culvert)	LF	50	\$ 34.05	\$ 1,702.50
613.10	Type I Stone (plunge pool)	CY	5	\$ 43.91	\$ 219.55
653.20	Temporary Erosion Matting (ditch fabric)	SY	300	\$ 2.20	\$ 660.00
N/A	Tree Removal	LS	1	\$ 2,000.00	\$ 2,000.00
<i>Subtotal:</i>					\$ 7,029.49
Road Surface Improvements					
301.15	Subbase of Gravel (road re-surfacing)	CY	35	\$ 25.11	\$ 878.85
<i>Subtotal:</i>					\$ 878.85
Subtotal:					\$ 37,953.39
	Incidentals to Construction - 5%**				\$ 1,897.67
Total (Rounded)					\$ 40,000.00

3.0 Holistic Recommendations for Road and Frog Pond Improvements

Roadways

Parkway Avenue, which is the primary route through Hubbard Park, is an unpaved road with an average gradient of 4.5%, though numerous sections are steeper, approaching 10% for certain segments. The ditches in this area are unstabilized and many of the culverts lack headers or outlet erosion control practices. Our final plan set includes details and instructions, drawn from the Vermont Better Roads Manual, that will address these issues. Generally, our recommendations include:

- Re-shaping the road such that it is crowned (or super-elevated where noted)
- Stabilizing the ditches with erosion control fabric and grass or stone (where appropriate)
- Stabilizing culvert inlets/outlets to prevent erosion
- Installing more durable material on the roads and parking areas composed of staymat, an aggregate mix including rock dust which will compact into a more erosion resistant wearing surface.
- As part of typical maintenance, inspect and remove grader berms that exist along many areas of the roadway. These grader berms prevent runoff from escaping the roadway and lead to erosion of the road surface and shoulder where water flow “breaks out” of the roadway. See the Vermont Better Roads Manual – Road Surface section, sub-section Surface Profile and Grading on page 4 of the manual for description of profiling and grading techniques to use.

Frog Pond

The Frog Pond is a highly used area of the Park which has been significantly impacted by humans and animals. There are relatively low-cost improvements that could help to improve water quality and the user experience including the following:

- Re-shaping the Pond side slopes, in particular adjacent to the parking lot where they are vertical and are exposed earth. Regrading of the pond edge to slope the grade back and revegetate would help mitigate the erosion to the Pond.
- Create a defined hardened access point to the Pond to encourage human and animal access to the Pond at one or two defined locations.
- Planting of vegetation around the Pond to provide shading and mitigate heating of the water during the summer months.

4.0 Operation and Maintenance Summary

Operation and maintenance for each of the practices is as follows:

Forebay at the Frog Pond:

Spring:

Remove accumulated sediment from forebay using a vactor truck or excavator. De-water the sediment in an upland location to a flat vegetated surface (i.e. in a location where de-watering fluid won't run into the Frog Pond or another drainage structure) or filter de-watering fluid through a filter bag. Dispose of accumulated sediment in an upland location where it won't run into surface waters or into drainage structures that are connected to surface waters. This include wetlands and vernal pools.

Fall:

Inspect the forebay for sediment accumulation. If accumulation on the forebay pool bottom is more than 1', remove sediment following the same procedure as for the spring. Inspect the overflow weir to ensure that no debris obstructions are present.

Sediment Basins (all):

Spring:

Inspect sediment basins for sediment accumulation and remove when sediment accumulated to a depth of 6" or more. Dispose of sediment in a non-hydrologically connected area where sediment can't run into surface waters or to drainage infrastructure that's connected to surface waters. Inspect culvert inlets and outlets for clogging. Clean out when material begins to accumulate. Inspect overflow weirs (or pipe riser outlets) for any issues. Issues with overflow weirs can include erosion or the development of solution channels through the berm or weir that prevent water from ponding to the desired depth. If erosion is present, fill in the area, place erosion control fabric over it, and spread grass seed to repair. If solution channels are developing, fill the channels with suitable materials and compact them to create an impervious surface. If necessary, cover with erosion control fabric and grass seed.

Fall:

Inspect each basin for sediment accumulation, culvert clogging, or erosion (or riser pipe clogging) as per spring inspection. If sediment requires removal or other repairs are needed, proceed as for spring maintenance.

Road Surface and Ditch Stabilization Measures:

Spring:

Inspect road surface following spring thaw. If road requires re-grading, perform work as soon as conditions allow to ensure that the road surface maintains its shape and doesn't become rutted with passing vehicle traffic or erosion from runoff occurring in wheel ruts. Re-grading instruction can be found on pages 4-8 of the Vermont Better Roads Manual.

Inspect ditches for erosion. If any type of significant erosion is occurring, immediately fill in the eroded area with suitable replacement material and compact so that erosion won't continue occurring. If needed, cover the area with erosion control fabric and additional grass seed to stabilize (or stone in the case of

stone lined ditches). If sediment is accumulating in ditches, remove using hand tools or a small excavator. Dispose of the removed material as per sediment removal for each sediment basin.

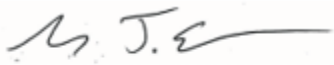
Inspect culverts (inlets and outlets) for erosion, particularly erosion occurring at the outlets. If erosion is occurring, add additional stone material underneath the culvert outlet, making sure to add smaller stone material or gravel underneath the larger stone material in order to prevent erosion underneath the larger stone. If culvert inlets are eroding, consider placing additional stones as per the Stone Header detail from the Vermont Better Roads Manual. If culverts are clogging, remove accumulated material using hand tools or using a water jetter (taking care not to cause erosion through the use of the high-pressure water jetter).

Fall:

Inspect all features as per spring maintenance instructions. If repairs are needed, perform as per spring instructions.

Please feel free to give us a call at (802) 497-2367 to discuss the contents of this memo or email at dana@watershedca.com with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. J. E.', is positioned above the typed name.

Dana Allen
Water Quality Project Manager