APPENDIX D: STORMWATER RETROFIT COST ESTIMATE

COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN
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CLIENT	TYLin		
PROJECT	Route 1 Falmouth Commercial District Stormwater Management Plan		
DESIGNED BY	ZLH & AEA	DATE	10/30/2012
COST BY	AEA	DATE	11/8/2012
CHECKED BY	ZLH	DATE	
PROJECT NO.	225740.00	SHEET NO.	1 of 2

Stormwater Retrofits - Opinion of Probable Cost

Assumptions: Unit costs are derived from retrofit estimates developed for theoretical systems managing a unit of impervious area in order to develop an installation cost per unit. Flow through proprietary systems were sized for a given contributing area and time of concentration assumed to be typical for the study area setting. Raw materials including crushed stone, asphalt, gravel, and pavement demolition costs were based on a "bulk rate"--approximately 10 units of each BMP type installed. Costs are for delivered and in place materials unless otherwise noted. The ENR Construction Cost Index for this estimate is 9290 as of April 2012.

Pond Retrofits - Temperature Control	Quantity	Unit	Unit Cost	Price	Total	Notes
The following system was sized for an existing pond						***Pond Area = 27000 sf***
Excavation & Disposal	280	CY	$ 30.00	$ 8,400.00		Excavate to 8' wide berm and for gravel placement
Gravel Trench						
Gravel Trench (3' depth)	100	CY	$ 30.00	$ 3,000.00		Trench area
Geotextile	260	SY	$ 2.25	$ 585.00		Sides and bottom of gravel trench
6" Underdrain	230	LF	$ 25.00	$ 5,750.00		Gravel trench drain line and connection to overflow, including pipe only
Overflow Structure (4' diameter)	1	EA	$ 3,500.00	$ 3,500.00		New structure or modify existing
12" Diameter PVC Pipe	50	LF	$ 85.00	$ 4,250.00		Outlet pipe, including excavation, pipe, bedding, backfill
Loam and Seed (bench and slope)	1770	SY	$ 6.00	$ 10,620.00		Bench and slope areas around gravel
Erosion & Sedimentation Control	1	LS	$ 2,500.00	$ 2,500.00		
				Construction Subtotal:	*$ 38,605.00*	
				Mobilization & Administration (5%):	*$ 1,940.00*	
				Contingency (25%):	*$ 9,660.00*	
				Total Construction:	***$ 50,210.00***	
				Engineering, Permitting, & Survey (20%):	*$ 10,050.00*	(Minimum $10,000, includes survey, evaluation of drainage area, system volume, and water quality requirements)
				Total System Cost:	***$ 60,260.00***	
				Total Cost per Square Foot :	***$ 2.23***	

New Retrofits	Quantity	Unit	Unit Cost	Price	Total	Notes
The following systems were sized for a .5 acre impervious drainage area and 1-inch 24-hour precipitation event						***Water Quality Volume = 1815 cf***
Gravel Wetland Sample (installation in unpaved setting)						*Includes: Pretreatment Basin and 2 Cells*
Excavation & Disposal	400	CY	$ 30.00	$ 12,000.00		*Assume: Design based on UNH Stormwater Center Draft Design Criteria*
Wetland Soil (8")	200	SY	$ 10.00	$ 2,000.00		*Assumed Excavated Area - 2,000 sf*
3/4" Crushed Stone (24")	150	CY	$ 40.00	$ 6,000.00		
Riprap (5")	2	CY	$ 65.00	$ 130.00		
Underdrain (6")	91	LF	$ 25.00	$ 2,275.00		
3' Diameter Perforated Riser	1	EA	$ 650.00	$ 650.00		
6" Diameter Galvanized Riser	1	EA	$ 500.00	$ 500.00		
Loam	150	SY	$ 4.00	$ 600.00		
Seed	150	SY	$ 2.00	$ 300.00		
				Construction Cost per Unit:	***$ 24,455.00***	
				Engineering (15%), Survey (10%) and Construction Bonds, Insurance, etc. (10%):	***$ 8,559.25***	
				Contingency (20%):	***$ 6,602.85***	
				Total Cost per System:	***$ 39,617.10***	
				Total Cost per Cubic Foot :	***$ 21.83***	
				Total Cost (System & Connection) per SF :	***$ 19.81***	
Soil Filter (installation in unpaved setting)						*Assumed Dimension: 1210 SF surface area with 1.5' storage over media*
Excavation & Disposal	180	CY	$ 30.00	$ 5,400.00		*Assumed Excavated Area - 1600 sf*
Riprap Inlet	1	CY	$ 65.00	$ 65.00		*Assumed Dimension: 3' W x 6'L x 1.5' D*
Soil Filter (18")	68	CY	$ 80.00	$ 5,440.00		
Coarse Gravel (12")	45	CY	$ 35.00	$ 1,575.00		
Geotextile Fabric	175	SY	$ 2.25	$ 393.75		
Underdrain (6" Diameter)	150	LF	$ 25.00	$ 3,750.00		
Loam	135	SY	$ 4.00	$ 540.00		
Seed	135	SY	$ 2.00	$ 270.00		
				Construction Cost per Unit:	***$ 17,433.75***	
				Engineering (15%), Survey (10%) and Construction Bonds, Insurance, etc. (10%):	***$ 6,101.81***	
				Contingency (20%):	***$ 4,707.11***	
				Total Cost per System:	***$ 28,242.68***	
				Total Cost per Cubic Foot :	***$ 15.56***	
				Total Cost (System & Connection) per SF :	***$ 17.65***	
Raingarden (installation in unpaved setting)						*Assumed Dimensions: 3' D x 605 SF*
Excavation & Disposal	68	CY	$ 30.00	$ 2,040.00		*Assumed require organic soil amendments.*
Organic Soil Modification	4	CY	$ 65.00	$ 260.00		*Assumed outlet conveyance is existing*
Loam	70	SY	$ 4.00	$ 280.00		*Assumed Excavated Area - 605 sf*
Seed	70	SY	$ 2.00	$ 140.00		
				Construction Cost per Unit:	***$ 2,720.00***	
				Engineering (15%), Survey (10%) and Construction Bonds, Insurance, etc. (10%):	***$ 952.00***	
				Contingency (20%):	***$ 734.40***	
				Total Cost per System:	***$ 4,406.40***	
				Total Cost per Cubic Foot :	***$ 2.43***	
				Total Cost per SF :	***$ 7.28***	

Below Grade Filter (installation in paved setting)							*Assumed Area: Controlled by width - 13.82'(W) x 115.57'(L) (1600 sf)*
							Controlled by length - 10.49'(W) x 158.27'(H) (1660 sf)
Pavement Demolition	70	SY	$	10.00	$ 700.00		*Area can range depending on chamber arrangement: assume 1600 sf - 2000 sf*
Sawcut	60	LF	$	3.00	$ 180.00		*Assumed Excavated Area - 2,500 sf*
Excavation & Disposal	180	CY	$	30.00	$ 5,400.00		
Stormwater Chamber (SC-310)	60	EA	$	160.00	$ 9,600.00		*Assume storage chamber located in impervious surface*
3/4" Angular Stone	137	TON	$	40.00	$ 5,480.00		
Geotextile Fabric	30	SY	$	2.25	$ 67.50		
Hot Mix Asphalt (4")	17	TON	$	100.00	$ 1,700.00		
Aggregate Base (3")	6	CY	$	30.00	$ 180.00		
Aggregate Subbase (18")	35	CY	$	30.00	$ 1,050.00		
Gravel	24	CY	$	35.00	$ 840.00		
Filter Sand	35	CY	$	50.00	$ 1,750.00		
6" Underdrain	100	LF	$	25.00	$ 2,500.00		
Police Detail	2	DAYS	$	300.00	$ 600.00		
					Estimated Cost for Storage Chambers	***$ 30,047.50***	
					Engineering (15%), Survey (10%) and Construction Bonds, Insurance, etc. (10%):	***$ 10,516.63***	
					Contingency (20%):	***$ 8,112.83***	***Notes: Costs are given for delivery and installation of Stormtech Chambers with Isolator Row. Design is based on manufacturer recommendations plus 18" sand filter for bacteria reduction as described in Maine BMP manual.***
					Total Cost per System:	***$ 48,676.95***	
For connection with existing system. Assume one connection per unit.							
Pavement Demolition	25	SY	$	10.00	$ 250.00		
Sawcut	50	LF	$	3.00	$ 150.00		
Excavation & Disposal	45	CY	$	30.00	$ 1,350.00		
Manhole (4')	2	EA	$	3,500.00	$ 7,000.00		
12" Piping	20	LF	$	85.00	$ 1,700.00		
					Estimated Cost for Connection	***$ 10,450.00***	
					Engineering (15%), Survey (10%) and Construction Bonds, Insurance, etc. (10%):	***$ 3,657.50***	
					Contingency (20%):	***$ 2,821.50***	
					Total Cost per Connection to System:	***$ 16,929.00***	
					Total Cost (System & Connection) :	***$ 65,605.95***	
					Total Cost (System & Connection) per Cubic Foot :	***$ 36.15***	
					Total Cost (System & Connection) per SF :	***$ 26.24***	*Design assumes removal and replacement of pavement.*
The following systems are on a per unit basis.							
Catchbasin Insert							*Unit Costs based on HydroInternational Up-Flo Filter*
6 module system	1	EA	$	30,000.00	$ 30,000.00		*Dimensions based on design peak flow, 6 module system treats only 0.27 cfs*
					Construction Cost per Unit:	***$ 30,000.00***	
					Engineering (15%), Survey (10%) and Construction Bonds, Insurance, etc. (10%):	***$ -***	
					Contingency (20%):	***$ 6,000.00***	
					Total Cost per System:	***$ 36,000.00***	
Esplanade Filter Box (installation in unpaved setting)							*Assumed Dimension: 6' x 12' Box*
Sawcut	60	LF	$	3.00	$ 180.00		*Treats up to 0.81 acres for residential where C=0.50 & up to 0.48 acres for commercial*
Pavement Demolition	35	SY	$	10.00	$ 350.00		
Excavation & Disposal	4	CY	$	30.00	$ 120.00		
Bacterra Unit w/ tree grate	1	EA	$	22,300.00	$ 22,300.00		
Crushed Stone (12")	1	CY	$	40.00	$ 40.00		
4" Connection Pipe	50	LF	$	30.00	$ 1,500.00		
Coring	1	EA	$	1,000.00	$ 1,000.00		
Police Detail	2	DAYS	$	300.00	$ 600.00		
					Construction Cost per Unit:	***$ 26,090.00***	
					Engineering (15%), Survey (10%) and Construction Bonds, Insurance, etc. (10%):	***$ 9,131.50***	
					Contingency (20%)	***$ 7,044.30***	
					Total Cost per System:	***$ 42,265.80***	
The following system was sized for an existing swale or drainage ditch.							***Example Swale Area = 3750 sf***
Filtration Swale Sample							
Excavation & Disposal	220	CY	$	30.00	$ 6,600.00		Excavate for filter media and forebay construction
Soil Filter Media:							
Soil Filter (18" depth)	70	CY	$	80.00	$ 5,600.00		Filter area
Coarse Gravel (12" depth)	50	CY	$	35.00	$ 1,750.00		Filter area
6" Underdrain	200	LF	$	25.00	$ 5,000.00		Single run, length of filter, including pipe only
Overflow Structure (4' diameter)	1	EA	$	3,500.00	$ 3,500.00		New structure
12" Diameter PVC Pipe	10	LF	$	85.00	$ 850.00		Tie overflow structure into existing culvert, including excavation, pipe, bedding & backfill
Loam and Seed	900	SY	$	6.00	$ 5,400.00		Filter area, side slopes, and forebay
Landscaping	1	LS	$	2,000.00	$ 2,000.00		Additional landscaping around filter
Erosion & Sedimentation Control	1	LS	$	2,500.00	$ 2,500.00		
					Construction Subtotal:	*$ 33,200.00*	
					Mobilization & Administration (5%):	*$ 1,660.00*	
					Contingency (25%):	*$ 8,300.00*	
					Total Construction:	***$ 43,160.00***	
					Engineering, Permitting, & Survey (20%):	*$ 10,000.00*	(Minimum $10,000, includes survey, evaluation of drainage area, system volume, and water quality requirements)
					Total Cost per SF :	***$ 14.18***	

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PROJECT NO.	225740.00	**SHEET NO.**	2 of 2

Stormwater Retrofits - Opinion of Probable Cost

Assumptions:

Retrofits - Flood Control	Quantity	Unit	Unit Cost	Price	Total	Notes
Excavation & Disposal	84	CY	$ 30.00	$ 2,520.00		Excavate for 4' diameter structure
Overflow Structure (4' diameter)	1	EA	$ 3,500.00	$ 3,500.00		New structure or modify existing
12" Diameter PVC Pipe	50	LF	$ 85.00	$ 4,250.00		Outlet pipe, including excavation, pipe, bedding, backfill
Erosion & Sedimentation Control	1	LS	$ 2,500.00	$ 2,500.00		
				Construction Subtotal:	$ *12,770.00*	
				Mobilization & Administration (5%):	$ *640.00*	
				Contingency (25%):	$ *3,200.00*	
				Total Construction:	***$ 16,610.00***	
				Engineering, Permitting, & Survey (20%):	$ *10,000.00*	(Minimum $10,000, includes survey, evaluation of drainage area, system volume, and water quality requirements)
				Total System Cost:	***$ 26,610.00***	