

# AHEAD OF THE STORM

Site: Charlotte Congregational Church

Location: Church Hill Road, Charlotte, Vermont



## Primary Problem

Surface water runoff from the Charlotte Congregational Church property contributes to either McCabes Brook to the northeast or Thorp Brook to the southwest. Runoff generated from buildings, driveways, and parking areas on the eastern portion of property concentrate in a series of swales that drain to a wetland area before crossing under Church Hill Road. On the western portion of the property, runoff generally sheet flows overland before collecting in a roadside swale along Church Hill Road. Runoff flowing over gravel surfaces generates sediment laden water and causes surface erosion and rill formation. *(See existing conditions site summary and plan.)*

One primary Optimal Conservation Practices (OCPs) is recommended to treat runoff from a portion of the existing impervious cover to improve water quality and increase flood resiliency by retaining runoff on-site. This project will begin to reverse the cumulative impacts from incremental development within the McCabes and Thorp Brook watersheds where past water quality sampling found high turbidity, nitrogen, and phosphorus levels in the stream.

## Final Treatment Recommendations

1. Create a series of bio-retention area downstream of existing impervious surfaces to slow runoff and retain water on-site. Stone filter berms, level spreaders, or riser structures will serve as the outlets designed to increase retention time and store runoff prior to discharging from the site. Swale enhancement and grading modifications are proposed to direct as much runoff from impervious surfaces to the bio-retention areas as possible maximizing use of proposed water quality treatment volumes.

## Site Constraints and Design Basis

The areas selected for bio-retention are in highly visible, unused portions of the property near parking areas and driveways to allow the proposed improvements to function as educational tools, while taking advantage of existing swales and drainage patterns to maximize collection of impervious surfaces to the extent practicable. The property contains an area that has historically been mapped as an inland wetland. Additional wetland delineation would be required to refine proposed design and minimize potential adverse impacts to wetlands. Soils on site can generally described as stony loam or silty clay with low infiltration capabilities making underground treatment practices less effective. Runoff calculations indicate that the bio-retention areas proposed will treat the 1-inch rain storm (i.e., the Water Quality Volume – WQv), with the exception of Bio-Retention 3. Three of the proposed bio-retention areas will provide adequate storage volume to treat the 2.1-inch rain storm (i.e., the Channel Protection Volume – CPv) (Table 1). The design minimizes long-term maintenance procedures and costs. *(See attached concept design plans, including operation and maintenance notes.)*

Table 1: Summary of Hydrology Calculations

WS ID	Description	Total Drainage Area (Acres)	Drainage Area on the Site (Acres)	Impervious Area on the Site (%)	WQv Generated on the Site (Cubic Feet)	Channel Protection Volume, CPv (Cubic Feet)	10-yr Volume (Cubic Feet)	Treatment Volume (Cubic Feet)	Treatment Volume (%)
1B	Bio-retention 1B	4.10	0.30	24	292	5,140	14,288	1,000	343%
1A	Bio-retention 1A	0.83	0.53	26	545	1,437	3,441	1,500	275%
2	Bio-Retention 2	0.63	0.63	48	1,095	2,091	4,095	5,000	457%
3	Bio-Retention 3	2.27	0.47	86	1,394	3,964	9,757	450	32%
4	Bio-Retention 4	0.64	0.55	21	475	1,263	2,919	1,200	252%

## Cost

Final engineering design and construction is estimated to cost \$83,800 assuming that labor and materials are purchased at the market rate through a competitive bid process.

# Ahead of the Storm

## Existing Conditions Site Summary

### Charlotte Congregational Church

#### Site Description

The Charlotte Congregational Church is taking a proactive approach to stormwater management on their property on Church Hill Road. Stormwater runoff from the upper hillside and cemetery, church buildings, parsonage, outbuildings, parking, and driveway currently flow through and off the property with no formal treatment (Figure 1). This project's goals are decreasing the amount of runoff leaving the site, improving water quality, and increasing resiliency.

#### Drainage Patterns

The site is roughly split along the middle of the church meeting building by a watershed divide, with the eastern portion of the property draining to the headwater reach of McCabes Brook (T1.08) ultimately flowing to Shelburne Bay, and the western portion of the property draining to Pringle Brook.

The hillside above the church consists of a cemetery and forest. Runoff generated from the hillside travels through the site.

At the west side of the site drainage from the church roof, cemetery, and gravel parking lot are concentrated causing erosion of the gravel parking area surface. This water travels across the church front lawn and off of the property. Eroded gravel is collecting under the trees at the edge of the parking area.

At the north side of the site, drainage from the back parking areas, hillside, and cemetery collect in a grass swale and is carried into the wetland.

At the east side of the church a portion of the church building, parking and driveway are collected and directed to a former stormwater pond. The pond berm has breached and no longer impounds water.

At the parsonage water flows down the hill from the buildings and lawn and collects near the road.

#### Site Constraints

Soils at the site include a mix of silt loam, stony loam, silty clay, and Vergennes clay. The Hydrologic Soil Group (HSG) on the site is either C or D, indicating that runoff potential is moderate to high and that infiltration potential is limited.

The site has numerous underground utility conflicts including onsite septic systems, sanitary force mains, water mains, and electrical conduit from a newly installed solar array.

There are no mapped wetlands on the State inventory, but a wetland was delineated in 2015 generally in the area between the church and parsonage.

#### Possible Treatment Options Identified

1. Create bioretention areas at strategic locations where stormwater collects and the slope is low enough. Areas identified are to the west of the church between the garden and parking area, to the northeast of the church near the gravel parking lot and shed, and near Church Hill Road in front of the parsonage.
2. Improve the swale along the north side of the parking area to increase detention and slow runoff.
3. Disconnect roof drainage (or continue to where disconnection exists) and possibly collect rainwater in rainbarrels for use in the garden or landscaping.
4. Modify existing stormwater pond to impound water.
5. Explore options to increase detention in neighbor's pond across the street.

Ahead of the Storm  
Existing Conditions Photo Documentation Summary  
Charlotte Congregational Church



*Figure 1: Runoff from the cemetery and hillside behind the church flows through the church property.*



*Figure 3: A parking lot to the west of the church has experienced erosion of the gravel surface during rain events.*



*Figure 2: The church sits on a hill, with runoff flowing south towards Church Hill Road.*



*Figure 4: A bioretention area could be installed in the lawn adjacent to the gravel parking lot.*



Ahead of the Storm  
Existing Conditions Photo Documentation Summary  
Charlotte Congregational Church



*Figure 5: The drainage at the property is split in the middle of the parking area behind the church.*



*Figure 7: A swale carries water from the parking area and cemetery to the east and into the wetland.*



*Figure 6: A swale carries water from the parking area and cemetery to the east and into the wetland.*



*Figure 8: A possible bioretention area has been identified between the driveway and the shed and gravel parking area.*



Ahead of the Storm  
Existing Conditions Photo  
Documentation Summary  
Charlotte Congregational Church



*Figure 9: A portion of the church building and gravel drive and parking drain to a former small pond.*



*Figure 11: A portion of the parsonage property drains to the roadside swale and eventually flows through a culvert under Church Hill Road.*



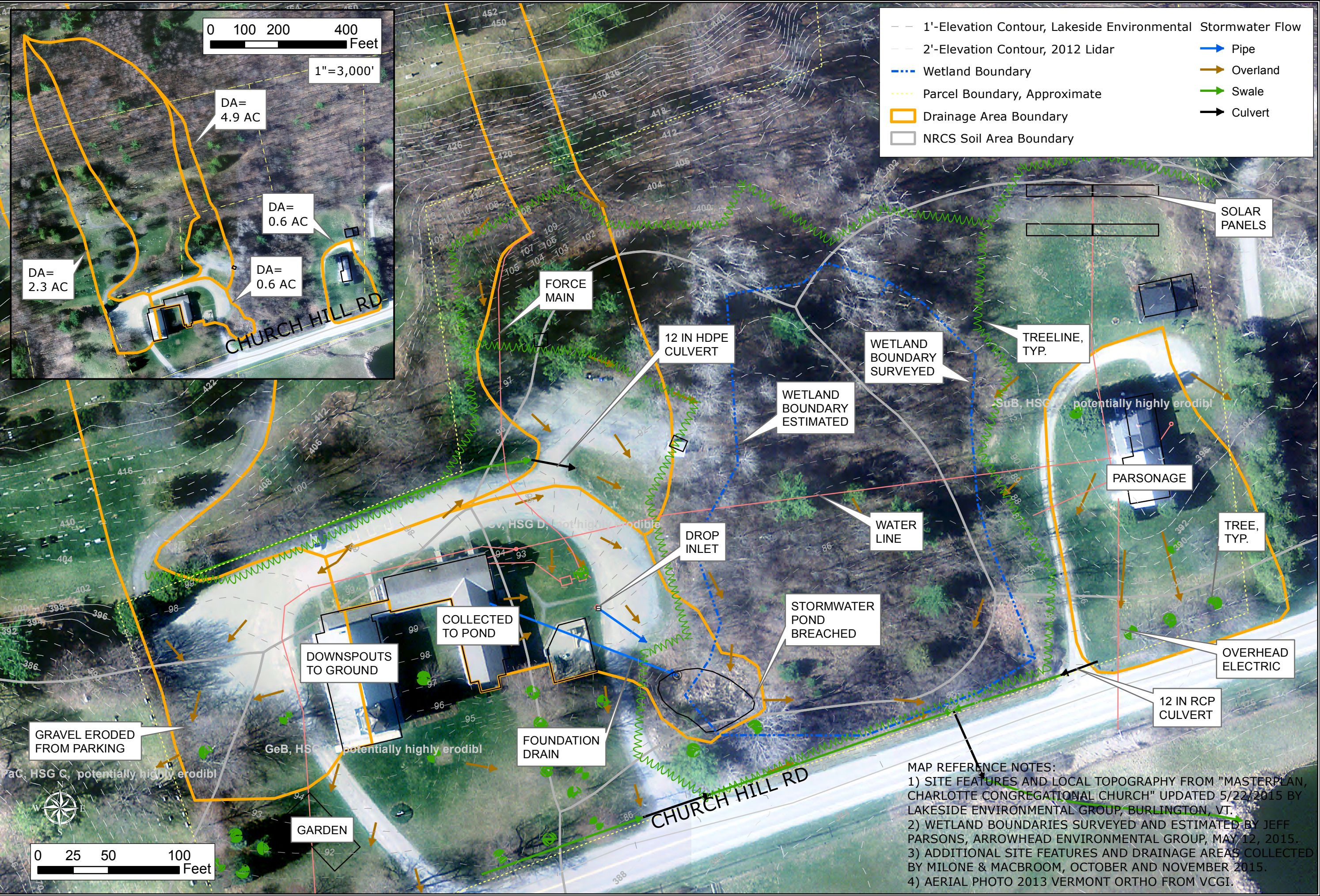
*Figure 10: A former small pond exists in the vegetation to the east of the driveway.*



*Figure 12: Possible bioretention area could be installed on the parsonage property in the swale adjacent to Church Hill Road.*



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**SOURCE(S):**  
 SEE LEGEND AND  
 MAP REFERENCE NOTES

**EXISTING CONDITIONS**  
**AHEAD OF THE STORM**  
**CONGREGATIONAL CHURCH**  
 403 CHURCH HILL ROAD  
 CHARLOTTE, VERMONT

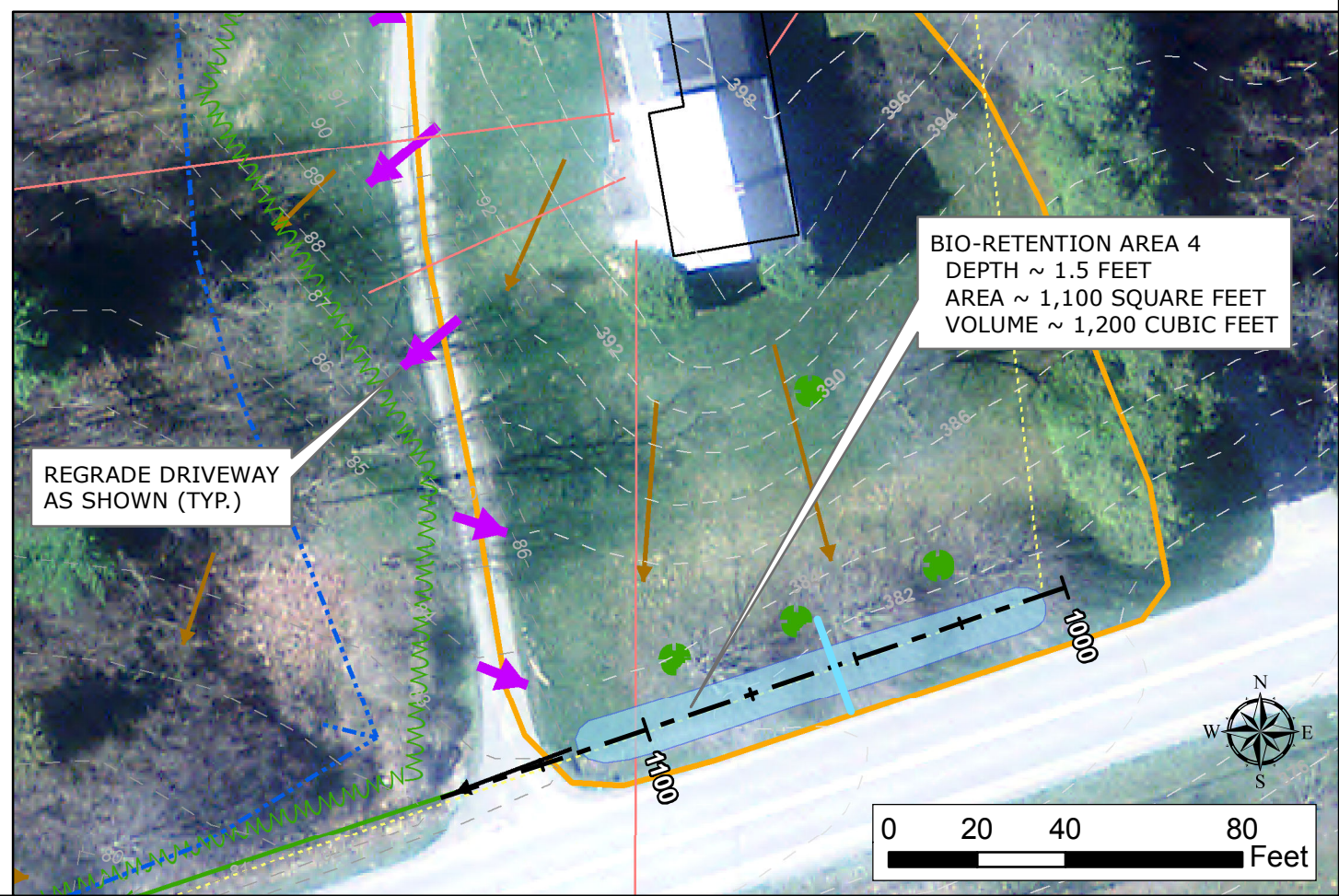
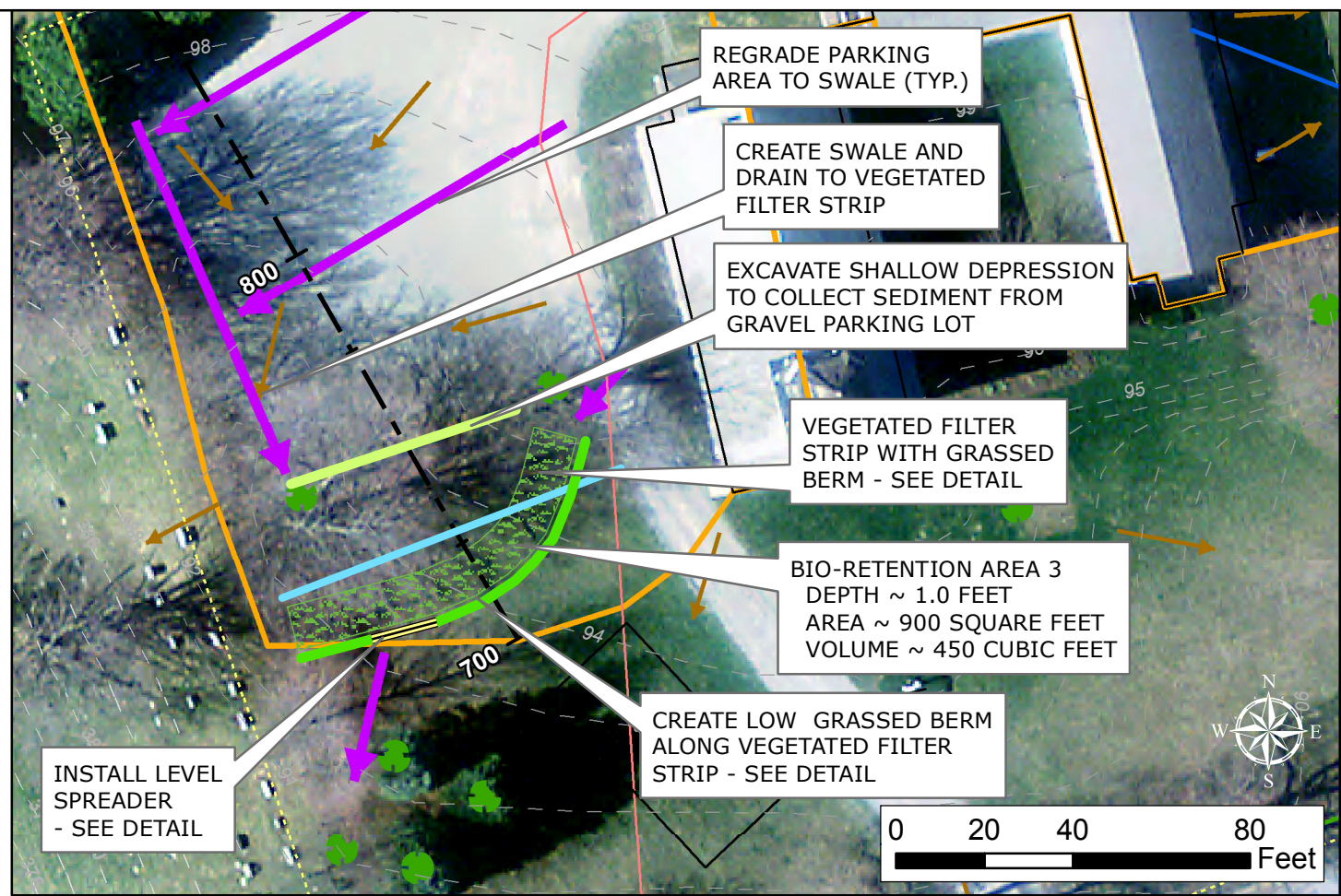
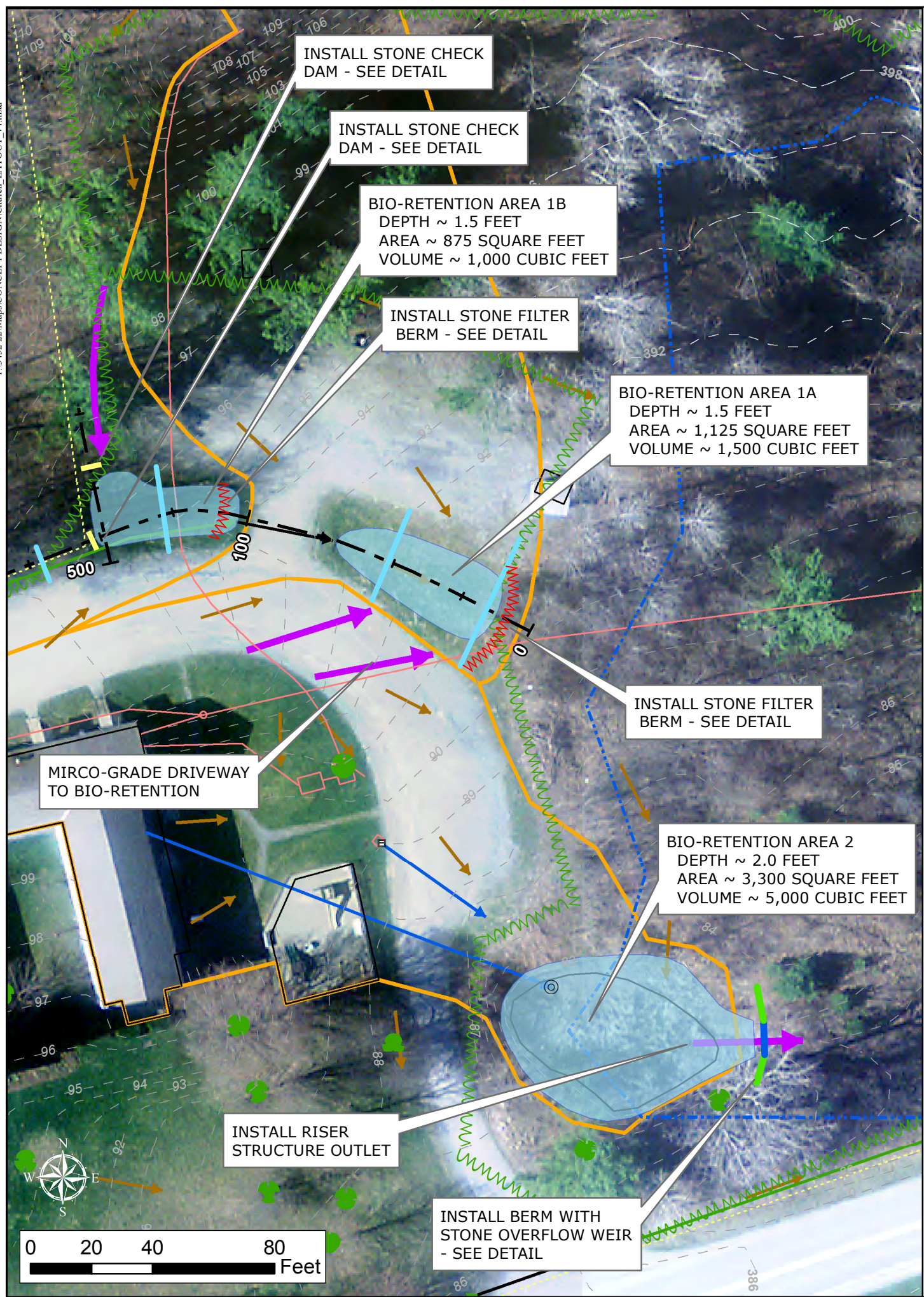
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 Revision: 9/6/2016  
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**MAP REFERENCE NOTES:**  
 1) SITE FEATURES AND LOCAL TOPOGRAPHY FROM "MASTERPLAN, CHARLOTTE CONGREGATIONAL CHURCH" UPDATED 5/22/2015 BY LAKESIDE ENVIRONMENTAL GROUP, BURLINGTON, VT.  
 2) WETLAND BOUNDARIES SURVEYED AND ESTIMATED BY JEFF PARSONS, ARROWHEADS ENVIRONMENTAL GROUP, MAY 12, 2015.  
 3) ADDITIONAL SITE FEATURES AND DRAINAGE AREAS COLLECTED BY MILONE & MACBROOM, OCTOBER AND NOVEMBER 2015.  
 4) AERIAL PHOTO 2013 VERMONT ORTHO FROM VCGI.



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**SOURCE(S):**  
 SEE LEGEND AND MAP  
 REFERENCE NOTES ON  
 EXISTING CONDITIONS PLAN

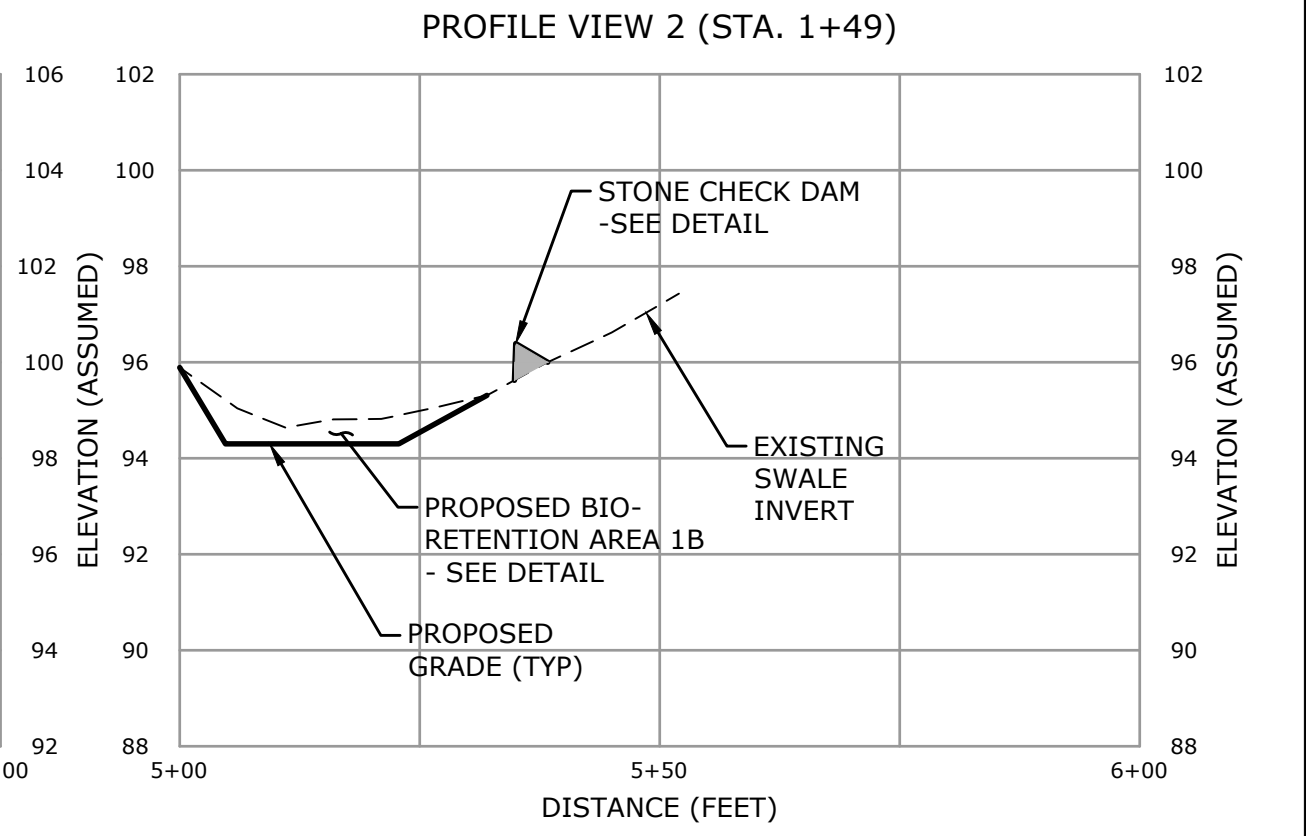
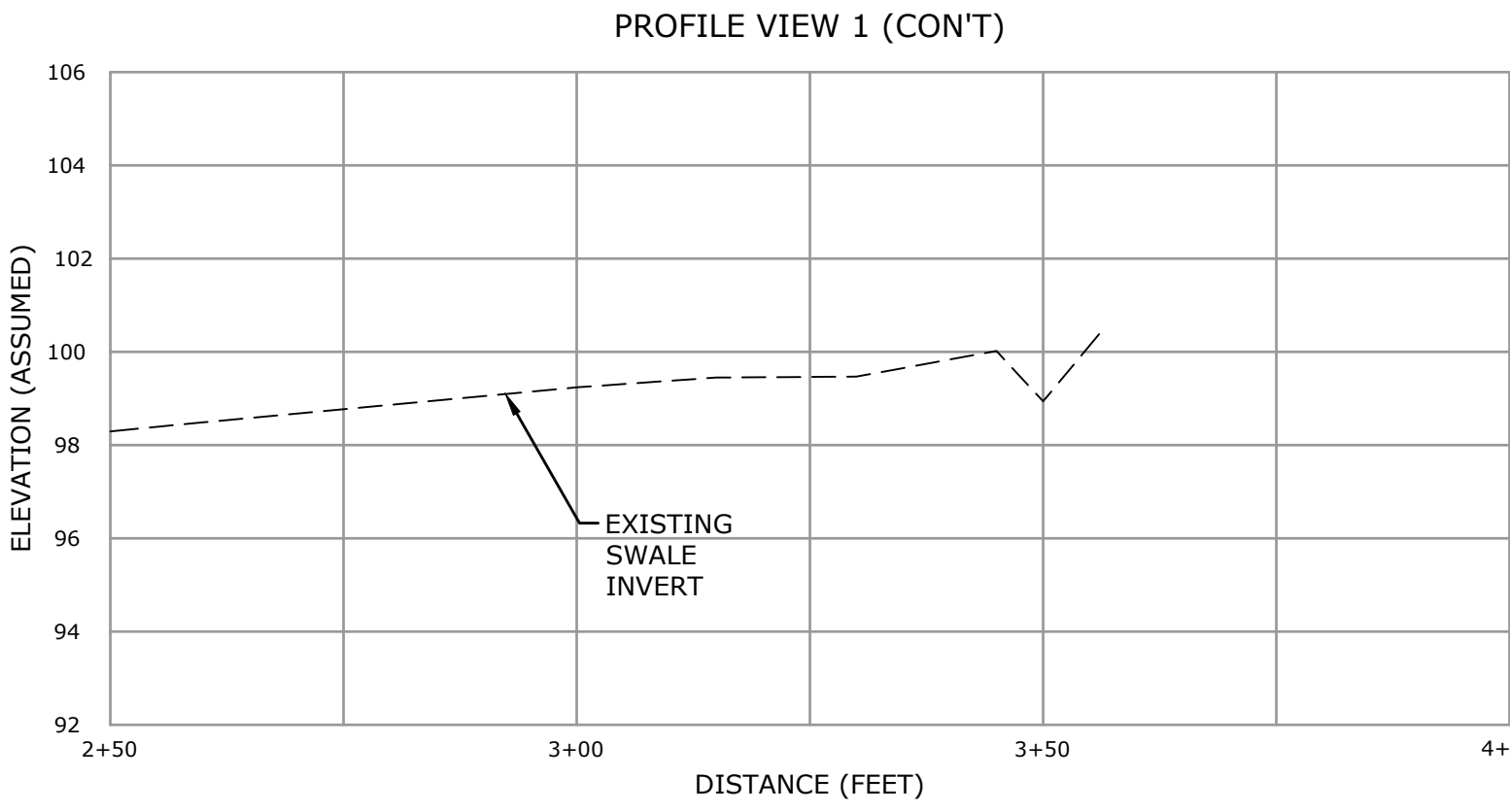
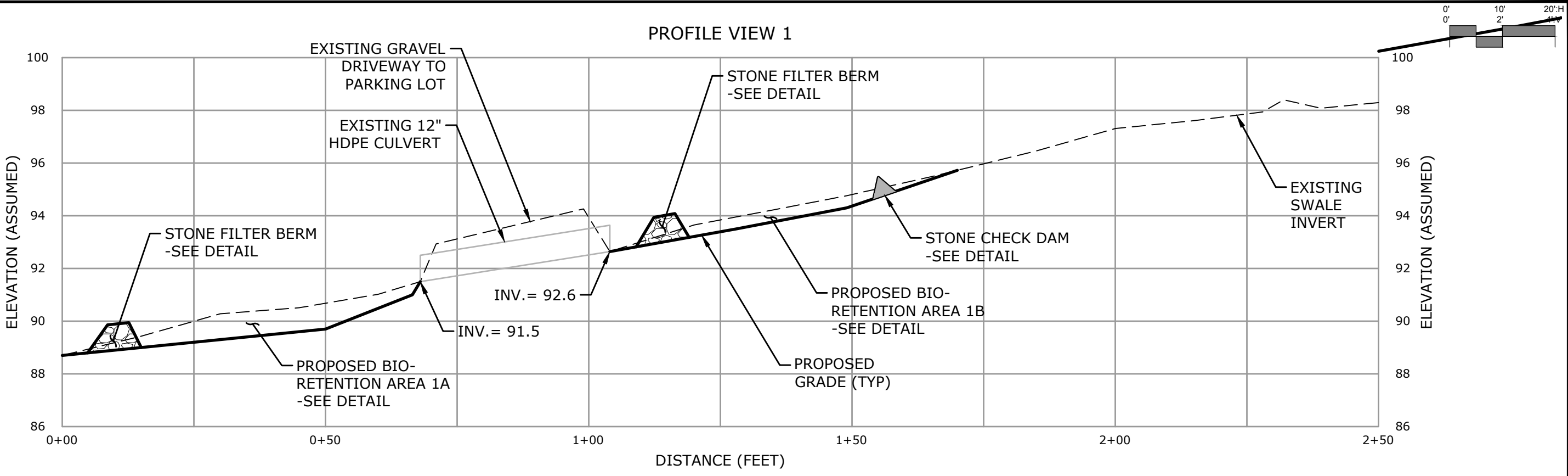
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**LAYOUT**  
**AHEAD OF THE STORM**  
**CONGREGATIONAL CHURCH**  
 403 CHURCH HILL ROAD  
 CHARLOTTE, VERMONT

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**CONCEPT DESIGN**

**DETAILS - PROFILE VIEWS**

**AHEAD OF THE STORM CONGREGATIONAL CHURCH**  
 403 CHURCH HILL ROAD  
 CHARLOTTE, VERMONT

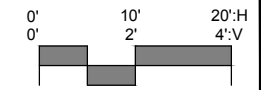
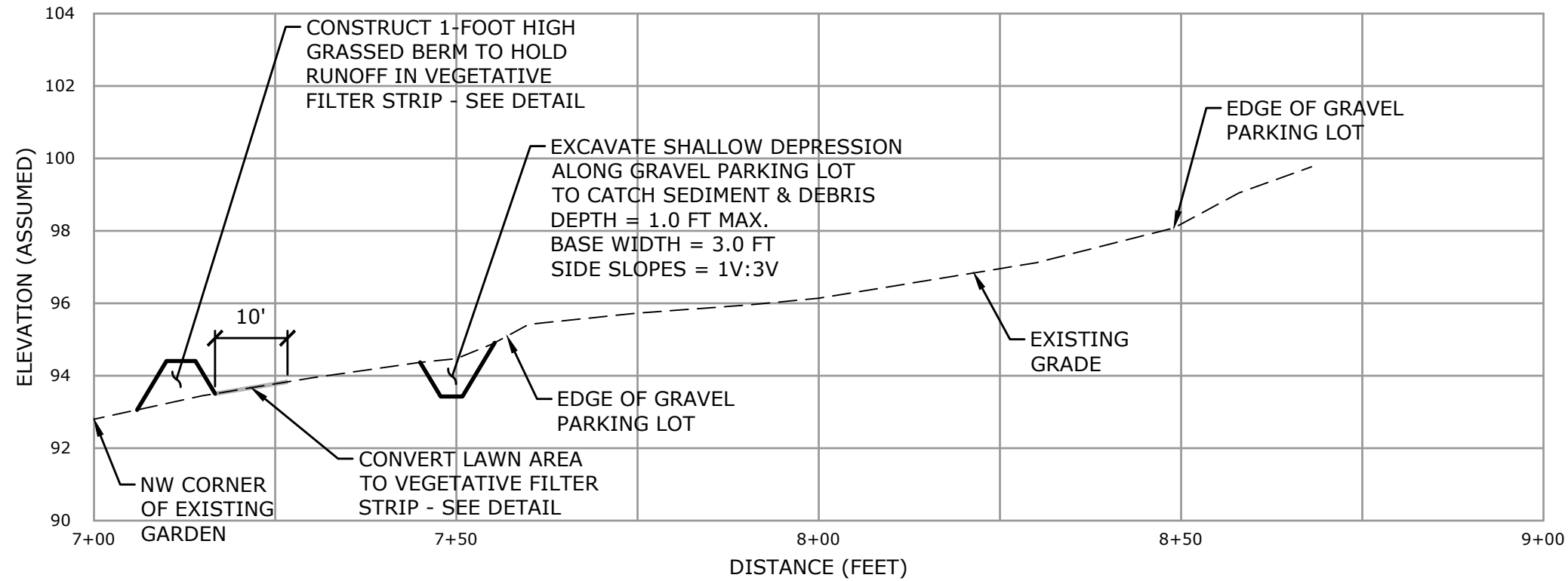
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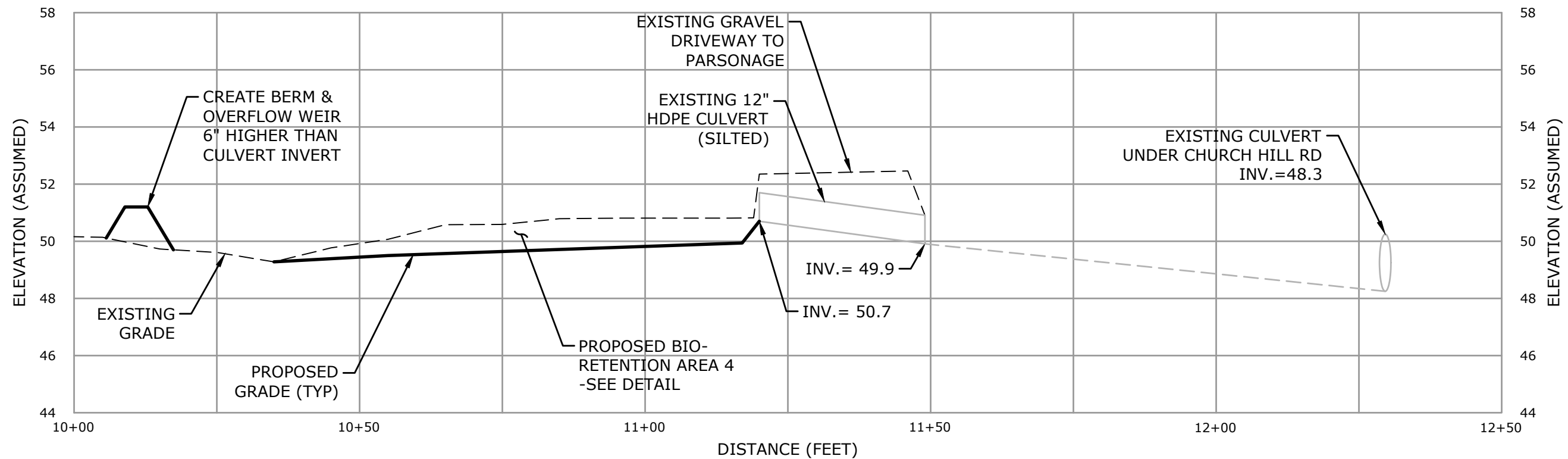


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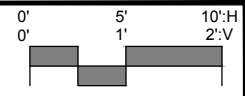


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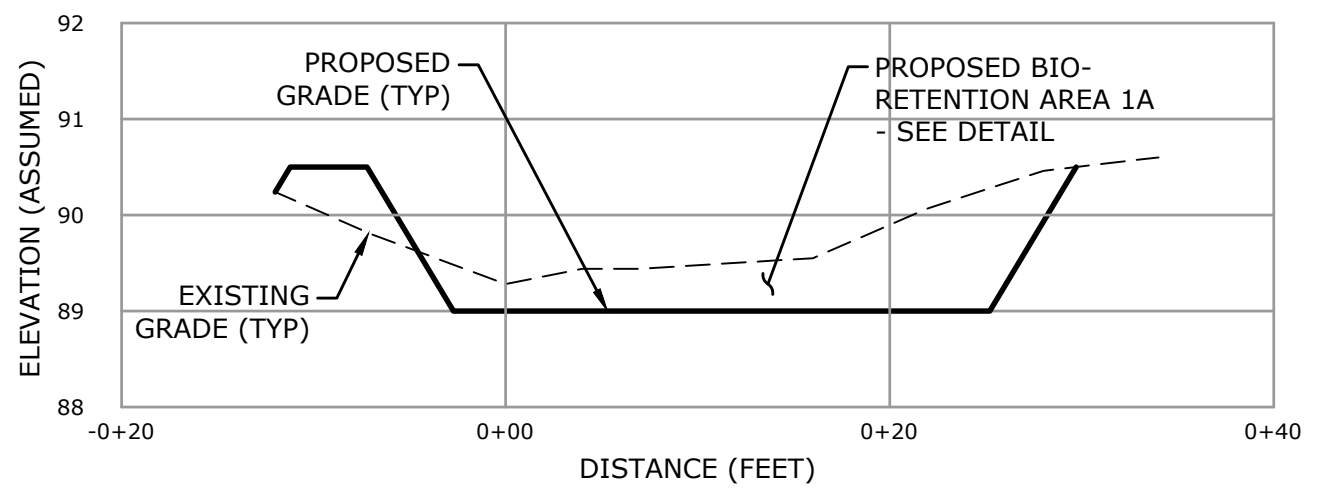


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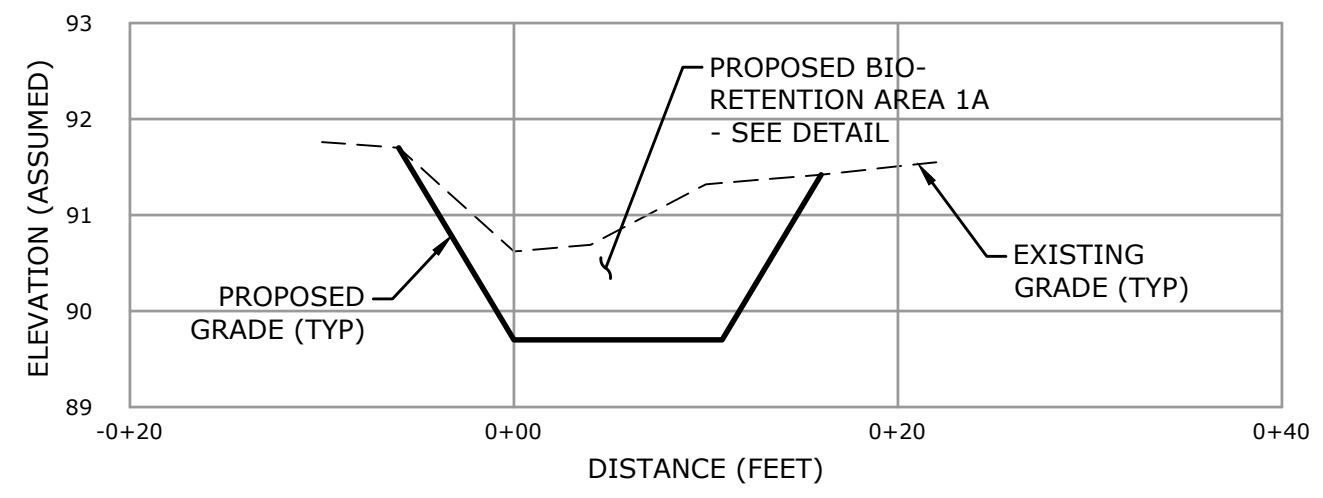
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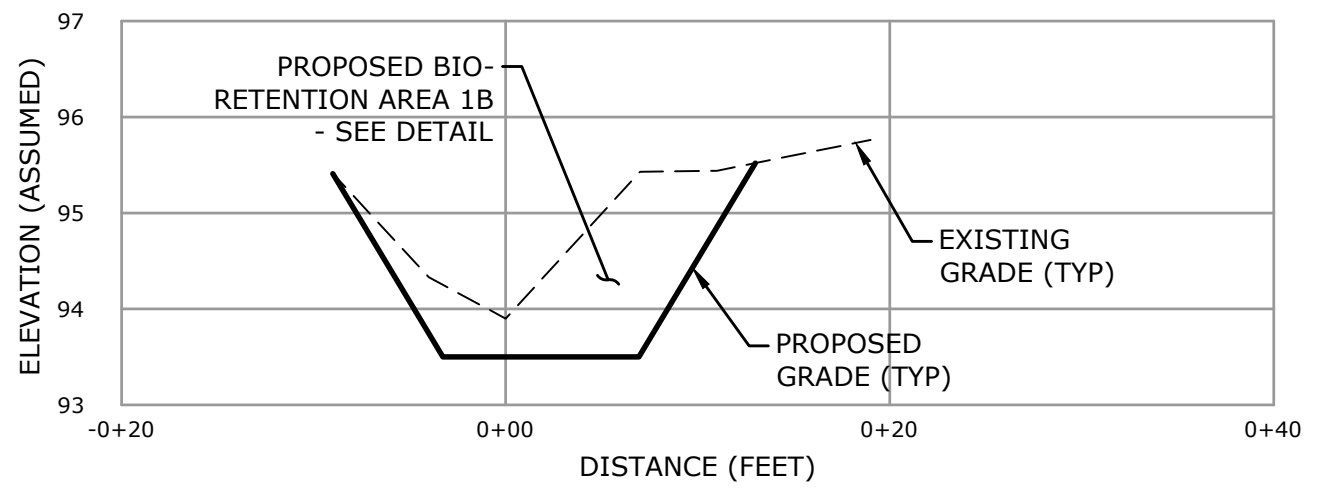
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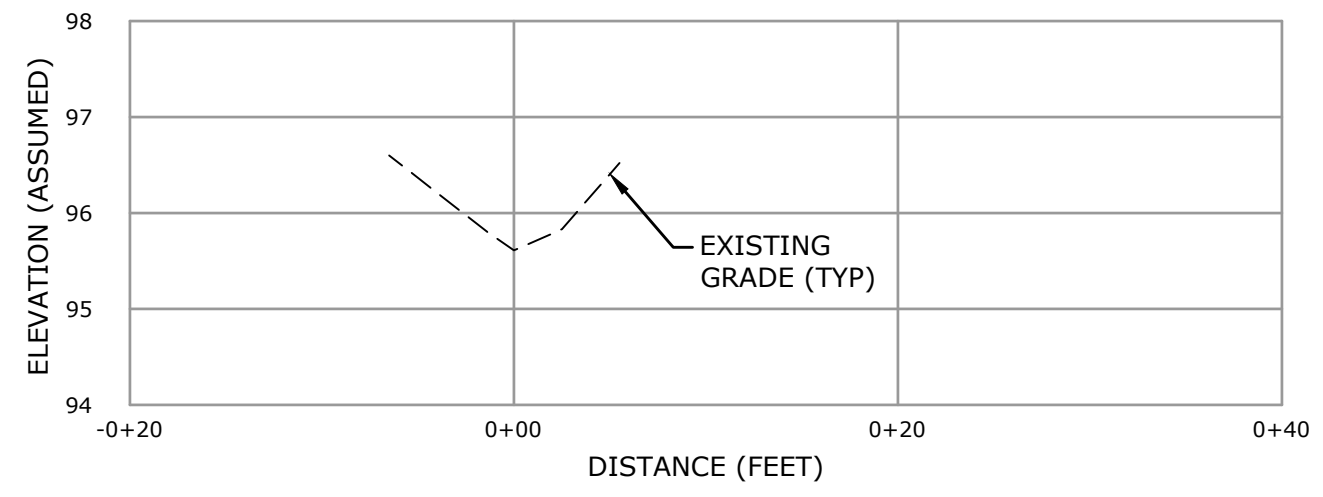
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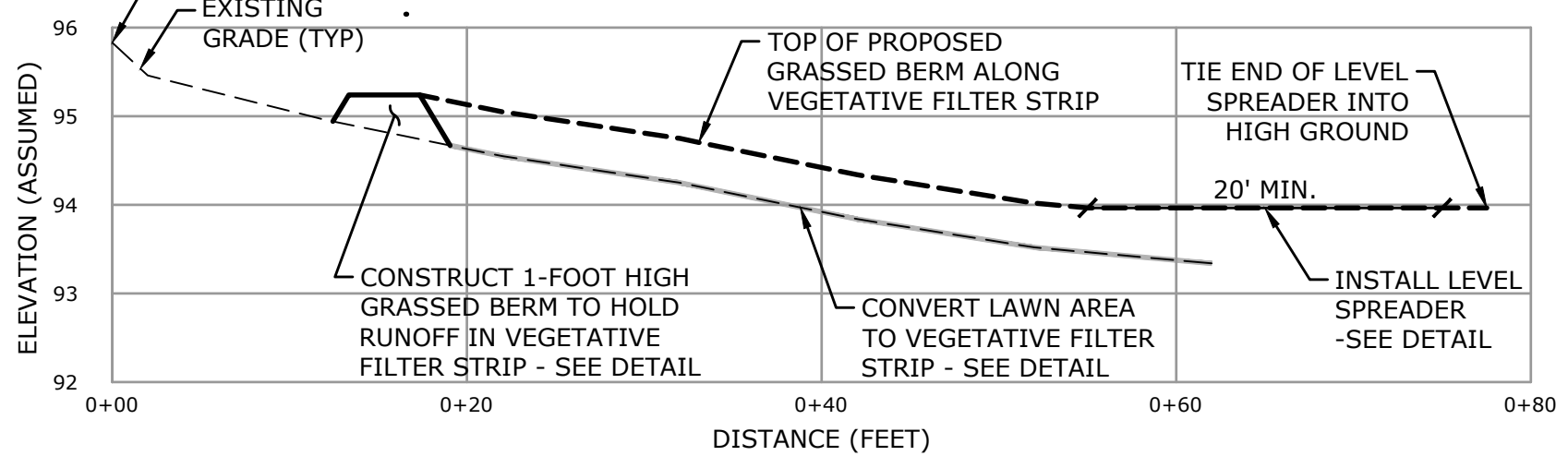
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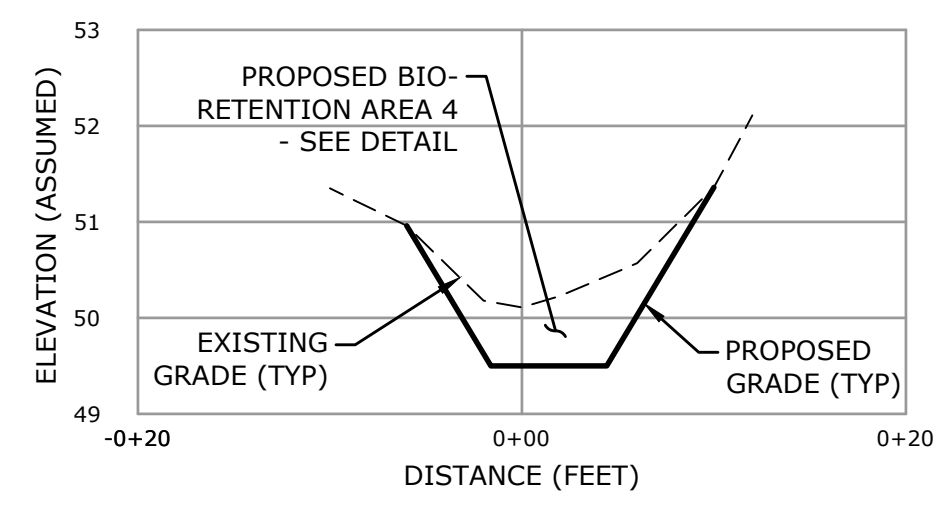
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CROSS SECTION VIEW - XS 7+28



CROSS SECTION VIEW - XS 10+55



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09/30/2016

CONCEPT DESIGN

**DETAILS - CROSS SECTIONS**  
 AHEAD OF THE STORM  
 CONGREGATIONAL CHURCH  
 403 CHURCH HILL ROAD  
 CHARLOTTE, VERMONT

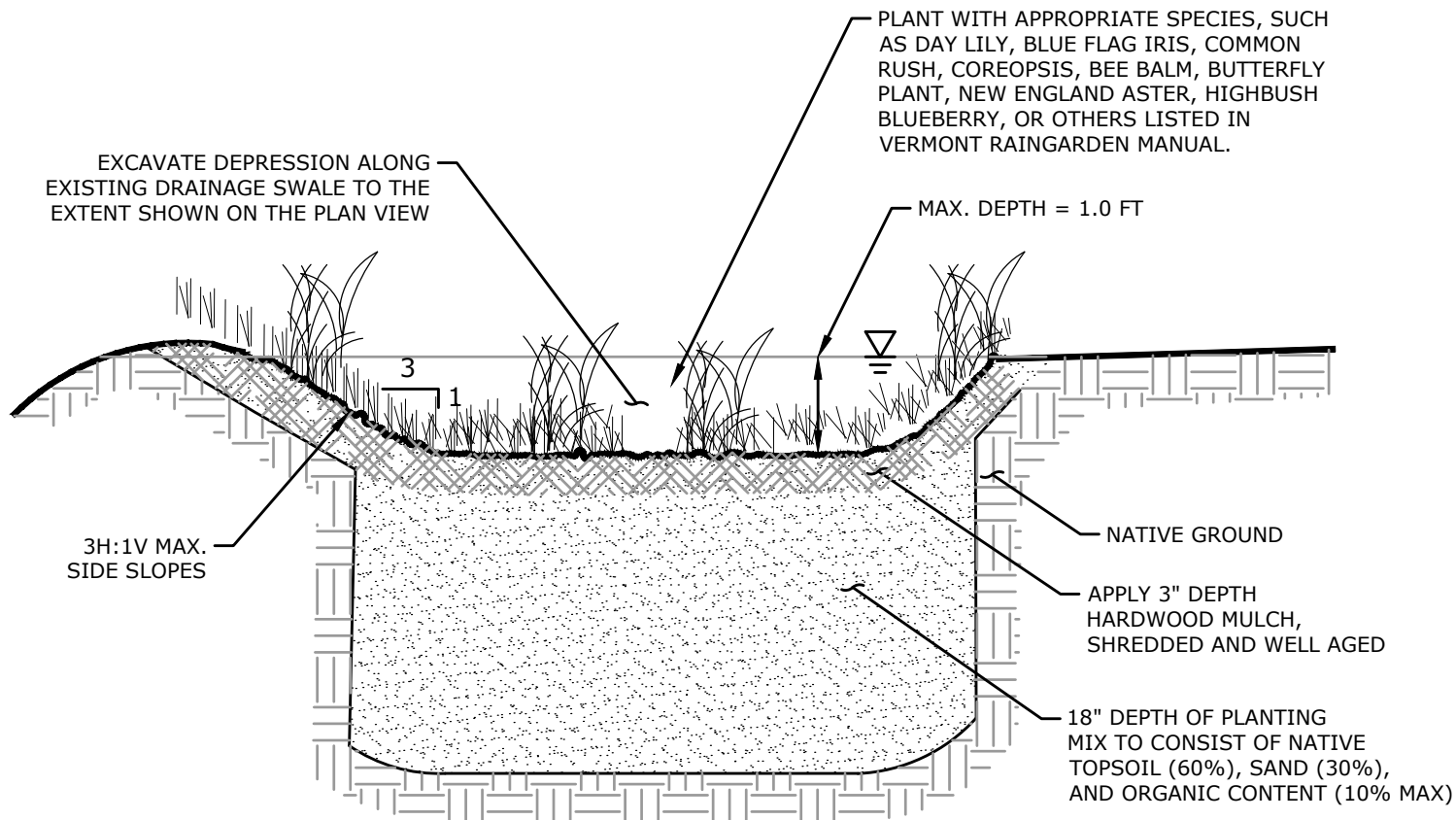
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PROJECT NO. 3452-22		

SHEET NO. **05**

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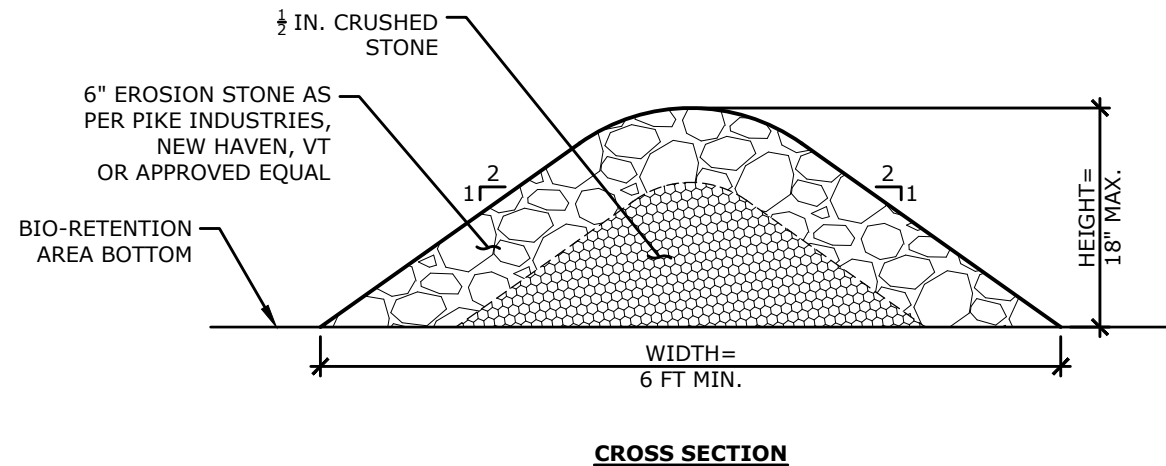
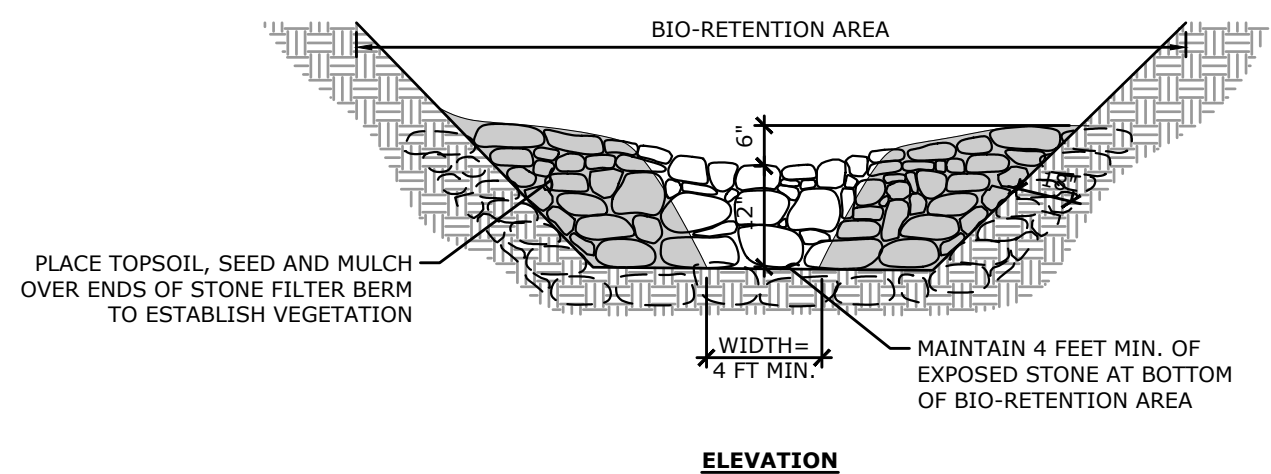
**BIO-RETENTION AREA**  
NOT TO SCALE

**INSTALLATION NOTES:**

1. THE VERMONT RAINGARDEN MANUAL IS A GOOD EDUCATIONAL RESOURCE TO ACCOMPANY THIS PROJECT. ALTERNATIVES TO THE DETAILS PRESCRIBED ARE AVAILABLE IN THAT MANUAL INCLUDING ADDITIONAL APPROPRIATE PLANT SPECIES.
2. PLANTING DENSITIES ARE RECOMMENDED TO BE ONE PERENNIAL EVERY 2.5 FEET ON CENTER OR ONE SHRUB EVERY 5 FEET ON CENTER.

**OPERATION AND MAINTENANCE NOTES:**

1. MAINTENANCE OF THE BIO-RETENTION AREA IS VERY SIMILAR TO PLANTED LANDSCAPED BEDS. REPLACEMENT OF SOME MULCH MAY BE REQUIRED IN THE SPRING. OCCASIONAL WEEDING WILL BE REQUIRED TO MAINTAIN THE SELECTED PLANTS AESTHETICALLY PLEASING.
2. DURING THE FIRST YEAR OF OPERATION, WATERING, WEEDING, AND REPLACEMENT OF DEAD PLANTS IS IMPORTANT FOR PROPER ESTABLISHMENT.
3. ANNUALLY INSPECT MAKE SURE NO INVASIVE SPECIES ARE PRESENT.
4. PERIODICALLY, INCLUDING AFTER LARGE STORMS AND REGULARLY DURING THE FALL, REMOVE LEAVES AND DEBRIS ACCUMULATED AT THE FILTER BERM OVERFLOW.
5. THE ACCUMULATION OF SEDIMENT WITHIN THE BIO-RETENTION AREA SHOULD BE MONITORED AND INSPECTED A MINIMUM OF ONCE ANNUALLY. REMOVE SEDIMENT AFTER APPROXIMATELY THREE (3) TO SIX (6) INCHES OF SEDIMENT HAS ACCUMULATED.
6. BIO-RETENTION AREA DISTURBED AFTER REMOVAL OF ACCUMULATED SEDIMENT SHOULD BE REPLANTED WITH SPECIFIED SEED MIX OR PLANTINGS AS NEEDED TO RE-ESTABLISH VEGETATION.
7. MAINTENANCE OF THE BIO-RETENTION AREA SHOULD ONLY OCCUR DURING LOW FLOW AND IN THE GROWING SEASON AFTER SPRING RUNOFF.
8. THE BIO-RETENTION AREA AND SWALES CAN BE MOWED OR BRUSH-HOGGED AT THE END OF EACH GROWING SEASON.



**STONE FILTER BERM**  
NOT TO SCALE

**INSTALLATION NOTES:**

1. EXTEND THE STONE A MINIMUM OF 18 INCHES INTO BANKS AND BOTTOM TO PREVENT CUTTING AROUND THE ENDS OR UNDER THE FILTER BERM.
2. ENDS OF FILTER BERM MAY BE COVERED WITH TOPSOIL AND PLANTED IF DESIRED. MAINTAIN A MINIMUM OF 4 FEET OF EXPOSED STONE AT THE BASE OF THE FILTER BERM TO ALLOW WATER TO FILTER THROUGH THE STONE.
3. USE 6" EROSION STONE AS PER PIKE INDUSTRIES, NEW HAVEN, VT OR APPROVED EQUAL.

**OPERATION AND MAINTENANCE NOTES:**

1. PERIODICALLY, INCLUDING AFTER LARGE STORMS AND REGULARLY DURING THE FALL, INSPECT THE STONE FILTER BERM.
2. MONITOR STONE FILTER BERM FOR EXCESSIVE EROSION, DISPLACED STONES, OR SETTLEMENT, AND REPAIR AS NEEDED. REMOVED LEAVES AND DEBRIS ACCUMULATED UPSTREAM OF THE FILTER BERM TO MAINTAIN DESIGN WIDTH AND DEPTH.

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REVISIONS	DATE	DESCRIPTION
09/30/2016		

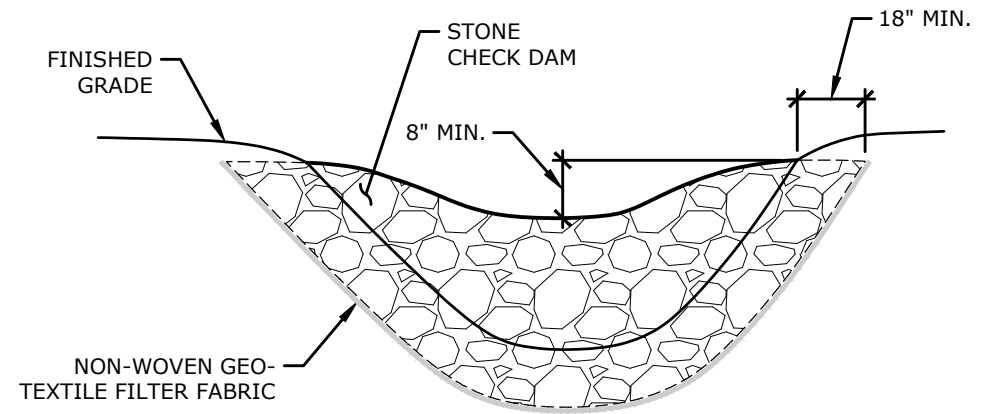
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**DETAILS**

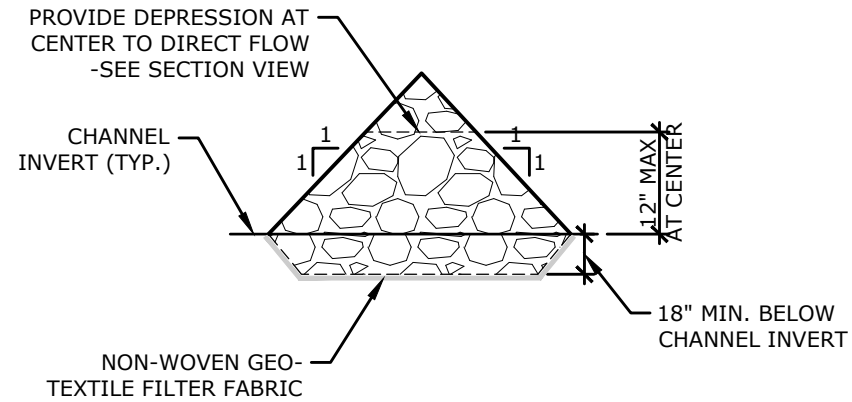
**AHEAD OF THE STORM CONGREGATIONAL CHURCH**  
403 CHURCH HILL ROAD  
CHARLOTTE, VERMONT

DESIGNED	DRAWN	CHECKED
SCALE: <b>AS SHOWN</b>		
DATE: <b>AUG. 29, 2016</b>		
PROJECT NO: <b>3452-22</b>		
SHEET NO: <b>06</b>		

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**SECTION VIEW**



**ELEVATION VIEW**

**STONE CHECK DAM**

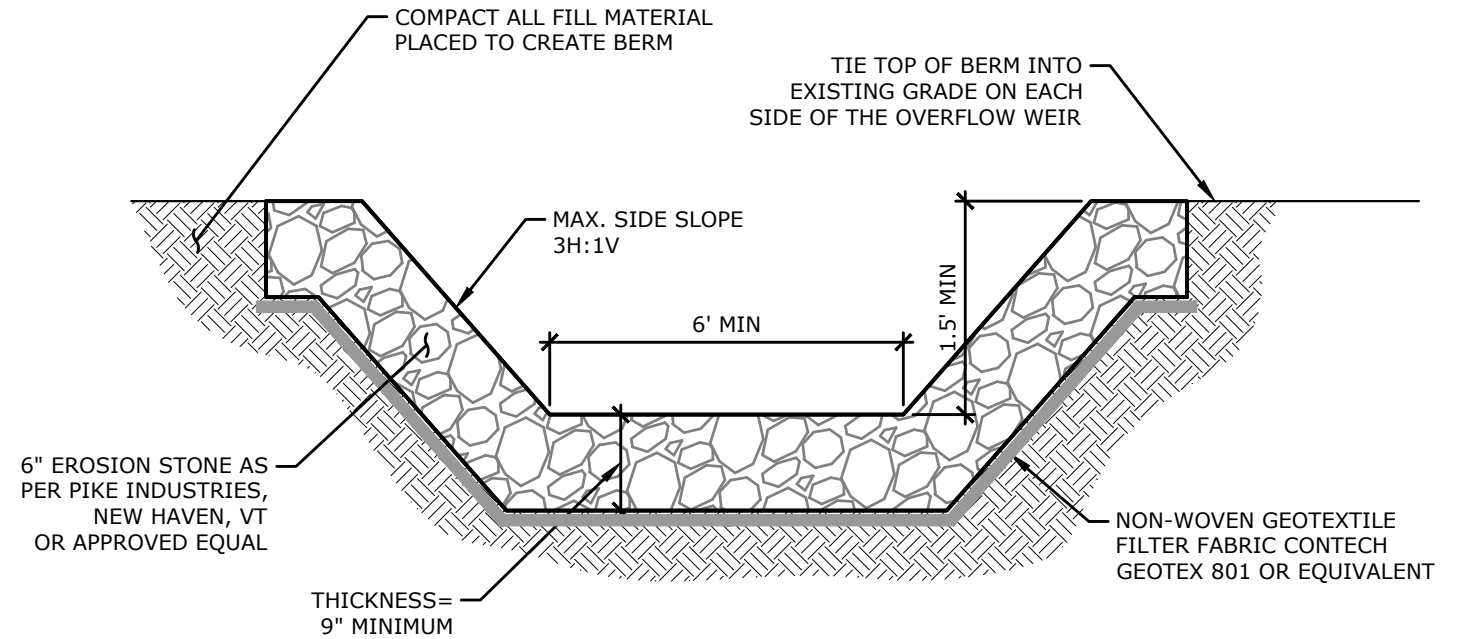
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**INSTALLATION NOTES:**

1. EXTEND THE STONE A MINIMUM OF 18 INCHES BEYOND THE BANKS AND CHANNEL INVERT OF THE SWALE TO PREVENT CUTTING AROUND THE ENDS OF OR UNDERNEATH THE CHECK DAM.
2. USE 6" EROSION STONE AS PER PIKE INDUSTRIES, NEW HAVEN, VT OR APPROVED EQUAL.
3. USE CONTECH GEOTEX 801 NON-WOVEN GEOTEXTILE FILTER FABRIC OR APPROVED EQUAL ALONG THE BOTTOM OF THE CUTOFF TRENCH AS A FILTER.
4. FINAL LOCATION OF CHECK DAMS TO BE DETERMINED BY ENGINEER IN FIELD.

**OPERATION AND MAINTENANCE NOTES:**

1. PERIODICALLY, INCLUDING AFTER LARGE STORMS AND REGULARLY DURING THE FALL, INSPECT STONE CHECK DAM.
2. MONITOR STONE CHECK DAM FOR EXCESSIVE EROSION, DISPLACED STONES, OR SETTLEMENT, AND REPAIR AS NEEDED. REMOVED LEAVES AND DEBRIS ACCUMULATED UPSTREAM OF THE STONE CHECK DAM.
3. THE ACCUMULATION OF SEDIMENT UPSTREAM OF THE STONE CHECK DAM SHOULD BE MONITORED AND INSPECTED A MINIMUM OF ONCE ANNUALLY. REMOVE SEDIMENT AFTER APPROXIMATELY THREE (3) TO SIX (6) INCHES OF SEDIMENT HAS ACCUMULATED.
4. AREAS DISTURBED DURING THE REMOVAL OF ACCUMULATED SEDIMENT SHOULD BE RESTORED WITH SEED AND MULCH AS NEEDED TO RE-ESTABLISH VEGETATION.
5. MAINTENANCE OF THE STONE CHECK DAM SHOULD ONLY OCCUR DURING LOW FLOW AND IN THE GROWING SEASON AFTER SPRING RUNOFF.



**BERM & OVERFLOW WEIR**

NOT TO SCALE

**INSTALLATION NOTES:**

1. USE 6" EROSION STONE AS PER PIKE INDUSTRIES, NEW HAVEN, VT OR APPROVED EQUAL.
2. USE CONTECH GEOTEX 801 NON-WOVEN GEOTEXTILE FILTER FABRIC OR APPROVED EQUAL ALONG THE BOTTOM OF THE CUTOFF TRENCH AS A FILTER.

**OPERATION AND MAINTENANCE NOTES:**

1. PERIODICALLY, INCLUDING AFTER LARGE STORMS AND REGULARLY DURING THE FALL, INSPECT BERM AND STONE OVERFLOW WEIR.
2. MONITOR BERM AND STONE OVERFLOW WEIR FOR EXCESSIVE EROSION, DISPLACED STONES, OR SETTLEMENT, AND REPAIR AS NEEDED. REMOVED LEAVES AND DEBRIS ACCUMULATED WITHIN THE OVERFLOW WEIR TO MAINTAIN DESIGN WIDTH AND DEPTH.

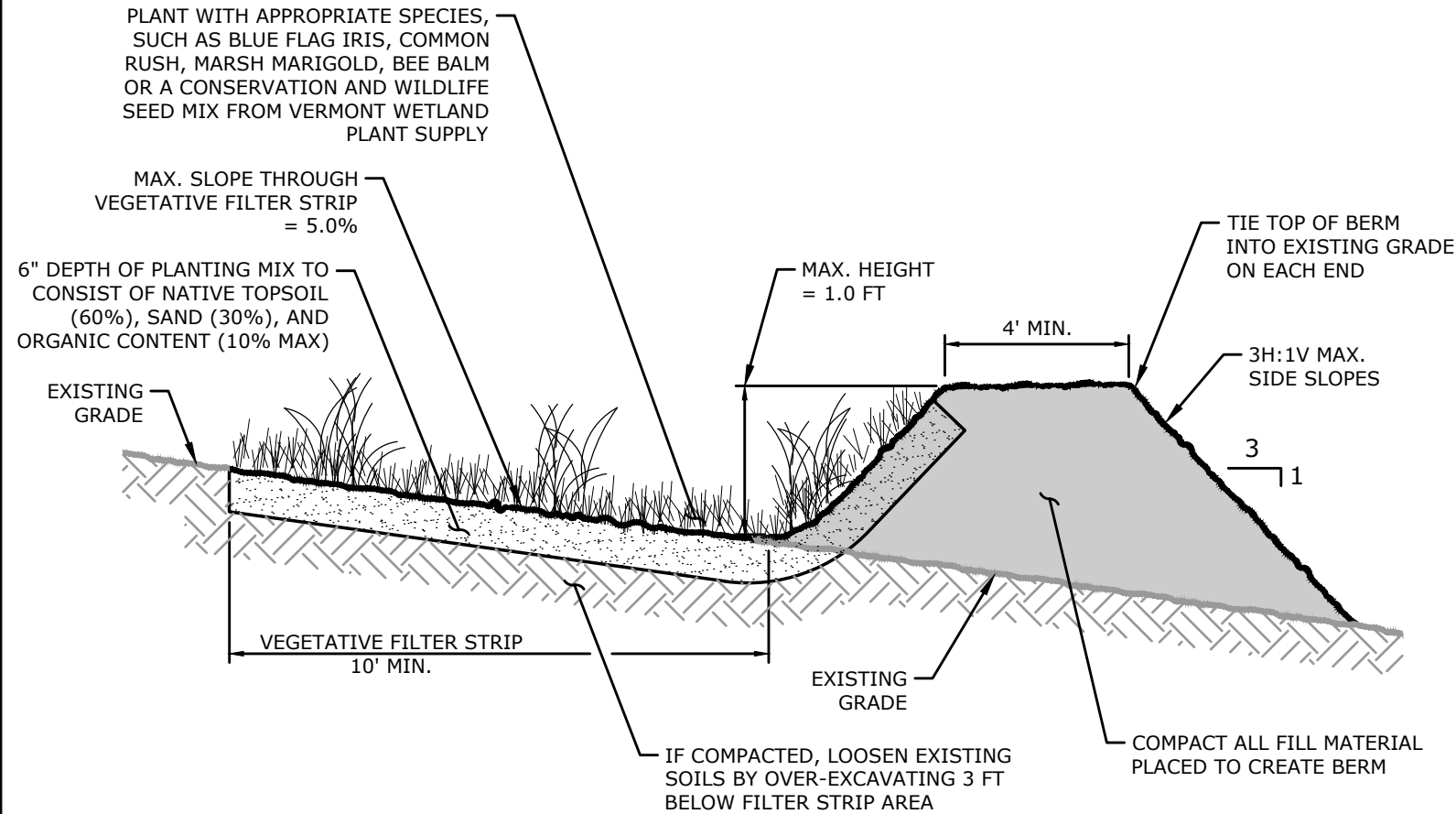
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CONCEPT DESIGN

**DETAILS**  
 AHEAD OF THE STORM  
 CONGREGATIONAL CHURCH  
 403 CHURCH HILL ROAD  
 CHARLOTTE, VERMONT

DESIGNED \_\_\_\_\_ DRAWN \_\_\_\_\_ CHECKED \_\_\_\_\_  
 SCALE AS SHOWN  
 DATE AUG. 29, 2016  
 PROJECT NO. 3452-22

07



## VEGETATIVE FILTER STRIP & BERM

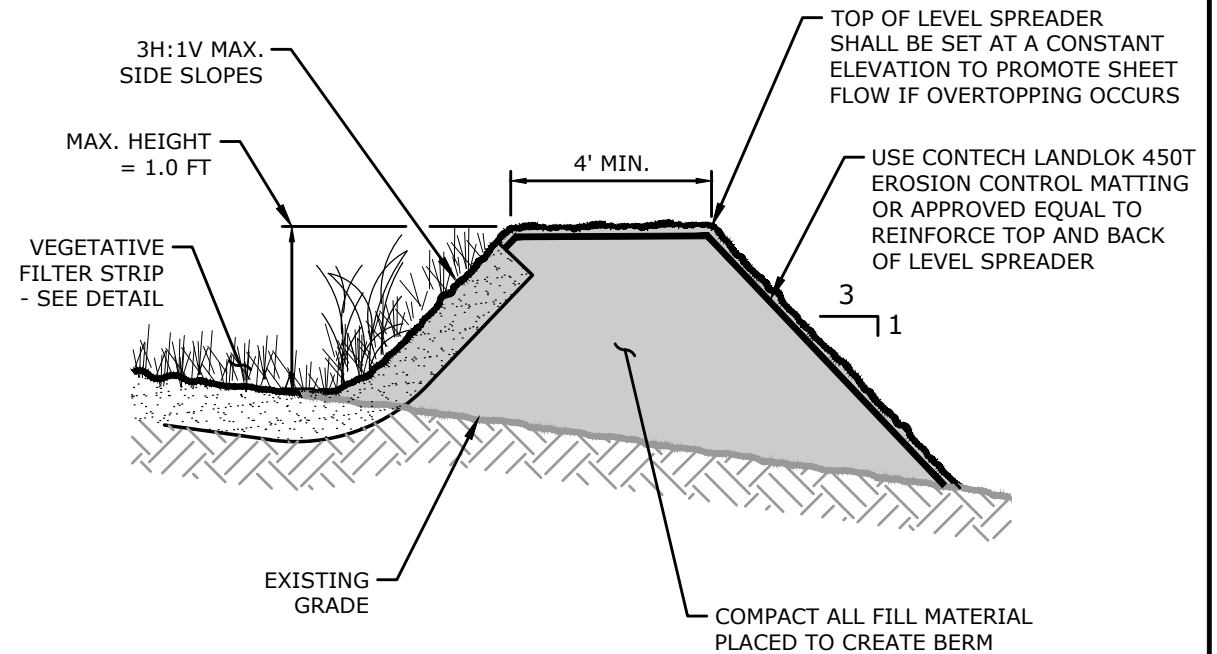
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### INSTALLATION NOTES:

1. THE VERMONT RAINGARDEN MANUAL IS A GOOD EDUCATIONAL RESOURCE TO ACCOMPANY THIS PROJECT. ALTERNATIVES TO THE DETAILS PRESCRIBED ARE AVAILABLE IN THAT MANUAL INCLUDING ADDITIONAL APPROPRIATE PLANT SPECIES.
2. PLANTING DENSITIES ARE RECOMMENDED TO BE ONE PERENNIAL EVERY 2.5 FEET ON CENTER OR ONE SHRUB EVERY 5 FEET ON CENTER.
3. A MINIMUM OF 4" OF TOPSOIL SHALL BE PLACED ON LOW BERM ALONG THE VEGETATIVE FILTER STRIP. THE BERM CAN BE VEGETATED BY SPREADING LAWN SEED AND MULCH.

### OPERATION AND MAINTENANCE NOTES:

1. MAINTENANCE OF THE VEGETATIVE FILTER STRIP IS VERY SIMILAR TO PLANTED LANDSCAPED BEDS. REPLACEMENT OF SOME MULCH MAY BE REQUIRED IN THE SPRING. OCCASIONAL WEEDING WILL BE REQUIRED TO MAINTAIN THE SELECTED PLANTS AESTHETICALLY PLEASING.
2. DURING THE FIRST YEAR OF OPERATION, WATERING, WEEDING, AND REPLACEMENT OF DEAD PLANTS IS IMPORTANT FOR PROPER ESTABLISHMENT.
3. ANNUALLY INSPECT MAKE SURE NO INVASIVE SPECIES ARE PRESENT.
4. PERIODICALLY, INCLUDING AFTER LARGE STORMS AND REGULARLY DURING THE FALL, REMOVE LEAVES AND DEBRIS ACCUMULATED WITHIN THE VEGETATIVE FILTER STRIP.
5. ACCUMULATION OF SEDIMENT WITHIN THE FILTER STRIP SHOULD BE MONITORED AND INSPECTED A MINIMUM OF ONCE ANNUALLY. REMOVE SEDIMENT AFTER APPROXIMATELY THREE (3) TO SIX (6) INCHES OF SEDIMENT HAS ACCUMULATED.
6. AREAS DISTURBED AFTER REMOVAL OF ACCUMULATED SEDIMENT SHOULD BE RESTORED WITH SPECIFIED SEED MIX OR PLANTINGS AS NEEDED TO RE-ESTABLISH VEGETATION.
7. MAINTENANCE OF THE FILTER STRIP SHOULD ONLY OCCUR DURING LOW FLOW AND IN THE GROWING SEASON AFTER SPRING RUNOFF.
8. THE VEGETATIVE FILTER STRIP CAN BE MOWED OR BRUSH-HOGGED AT THE END OF EACH GROWING SEASON. THE BERM CAN BE MAINTAINED AS LAWN AND MOWED REGULARLY.



## LEVEL SPREADER OUTLET

NOT TO SCALE

### INSTALLATION NOTES:

1. USE CONTECH LANDLOK 450T NON-BIODEGRADABLE EROSION CONTROL MATTING OR APPROVED EQUAL TO REINFORCE THE TOP AND BACK OF THE LEVEL SPREADER TO PROTECT AGAINST EROSION.
2. AS AN ALTERNATIVE TO TURF REINFORCEMENT MATTING, USE 6" EROSION STONE AS PER PIKE INDUSTRIES, NEW HAVEN, VT OR APPROVED EQUAL APPLIED WITH A MIN. LAYER THICKNESS OF 9".
3. TOP OF THE LEVEL SPREADER SHALL BE AT CONSTANT ELEVATION TO PREVENT FLOW CONCENTRATION AT LOW POINTS OR UNDULATIONS.
4. PROVIDE A MINIMUM LEVEL SPREADER WIDTH OF 15 FEET, SEE PLAN VIEW FOR LOCATION.

### OPERATION AND MAINTENANCE NOTES:

1. PERIODICALLY, INCLUDING AFTER LARGE STORMS AND REGULARLY DURING THE FALL, INSPECT THE LEVEL SPREADER OUTLET.
2. MONITOR LEVEL SPREADER FOR EXCESSIVE EROSION OR SETTLEMENT, AND REPAIR AS NEEDED. REMOVED LEAVES AND DEBRIS ACCUMULATED ON TOP OF THE LEVEL SPREADER.
3. AREAS DISTURBED DURING MAINTENANCE SHOULD BE RESTORED WITH SEED AND MULCH AS NEEDED TO RE-ESTABLISH VEGETATION.
4. MAINTENANCE OF THE LEVEL SPREADER OUTLET SHOULD ONLY OCCUR DURING LOW FLOW AND IN THE GROWING SEASON AFTER SPRING RUNOFF.



**BALLPARK OPINION OF PROBABLE CONSTRUCTION COSTS - BASED ON CONCEPT DESIGN**

**CHARLOTTE CONGREGATIONAL CHURCH**

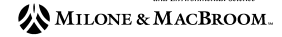
**AHEAD OF THE STORM**

**Charlotte, Vermont**

MMI #3452-22

October 20, 2016

Engineering,  
Landscape Architecture  
and Environmental Science



Item	ITEM/DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST	LANDOWNER MATCH	GRANT REQUEST
<b>PROJECT SITE 1: EAST PARKING LOT BIO-RETENTION AREAS 1A &amp; 1B</b>							
1	Mobilization & Demobilization	LS	1	\$1,000	\$1,000		\$1,000
2	Labor to Install Filter Berms & Check Dams	HR	8	\$35	\$280		\$280
3	Labor to Install Plants	HR	16	\$35	\$560	\$560	
4	Labor to Restore Site	HR	8	\$35	\$280		\$280
5	Excavator Rental / Operator	HR	24	\$110	\$2,640		\$2,640
6	Haul Materials On or Off Site	LOAD	15	\$100	\$1,500		\$1,500
7	Ammended Soil for Bio-Retention Areas	CY	80	\$45	\$3,600		\$3,600
8	Stone for Filter Berms & Check Dams	TN	52	\$10	\$520		\$520
9	Mulch for Bio-Retention Areas	CY	18	\$45	\$810		\$810
10	Plants for Bio-Retention Areas	LS	1	\$3,500	\$3,500	\$3,500	
11	Regrade Portion of Driveway	LS	1	\$1,500	\$1,500		\$1,500
12	Erosion Matting, Seed, & Minor Items to Restore Site	LS	1	\$1,000	\$1,000		\$1,000
	<b>PROJECT SITE 1 SUBTOTAL</b>				<b>\$17,190</b>	<b>\$4,060</b>	<b>\$13,130</b>
<b>PROJECT SITE 2: BIO-RETENTION AREA 2 AT HISTORIC POND</b>							
13	Mobilization & Demobilization	LS	1	\$1,000	\$1,000		\$1,000
14	Labor to Prep Site	HR	4	\$35	\$140		\$140
15	Labor to Install Berm and Stone Overflow Weir	HR	8	\$35	\$280		\$280
16	Labor to Install Riser Outlet Structure	HR	4	\$35	\$140		\$140
17	Labor to Restore Site	HR	4	\$35	\$140		\$140
18	Excavator Rental / Operator	HR	16	\$110	\$1,760		\$1,760
19	Haul Materials On or Off Site	LOAD	3	\$100	\$300		\$300
20	Earthen Fill for Berm Reconstruction	CY	18	\$15	\$270		\$270
21	Stone for Overflow Weir	CY	10	\$18	\$180		\$180
22	Riser Outlet Structure	LS	1	\$1,500	\$1,500		\$1,500
23	Erosion Matting, Seed, & Minor Items to Restore Site	LS	1	\$1,000	\$1,000		\$1,000
	<b>PROJECT SITE 2 SUBTOTAL</b>				<b>\$6,710</b>	<b>\$0</b>	<b>\$6,710</b>
<b>PROJECT SITE 3: WEST PARKING LOT BIO-RETENTION AREA 3</b>							
24	Mobilization & Demobilization	LS	1	\$1,000	\$1,000		\$1,000
25	Labor for Filter Strip and Berm Construction	HR	8	\$35	\$280		\$280
26	Labor to Install Plants	HR	12	\$35	\$420	\$420	
27	Labor to Restore Site	HR	8	\$35	\$280		\$280
28	Excavator Rental / Operator	HR	16	\$110	\$1,760		\$1,760
29	Haul Materials On or Off Site	LOAD	5	\$100	\$500		\$500
30	Earthen Fill for Berm Construction	CY	12	\$15	\$180		\$180
31	Ammended Soil for Vegetated Filter Strip	CY	22	\$45	\$990		\$990
32	Plants for Vegetated Filter Strip	LS	1	\$2,000	\$2,000	\$2,000	
33	Regrade Portion of Driveway / Parking Lot	LS	1	\$1,500	\$1,500		\$1,500
34	Erosion Matting, Seed, & Minor Items to Restore Site	LS	1	\$1,500	\$1,500		\$1,500
	<b>PROJECT SITE 3 SUBTOTAL</b>				<b>\$10,410</b>	<b>\$2,420</b>	<b>\$7,990</b>
<b>PROJECT SITE 4: PARSONAGE BIO-RETENTION AREA 4</b>							
35	Mobilization & Demobilization	LS	1	\$1,000	\$1,000		\$1,000
36	Labor to Install Plants	HR	12	\$35	\$420	\$420	
37	Labor to Restore Site	HR	4	\$35	\$140		\$140
38	Excavator Rental / Operator	HR	16	\$110	\$1,760		\$1,760
39	Haul Materials On or Off Site	LOAD	7	\$100	\$700		\$700
40	Ammended Soil for Bio-Retention Area	CY	55	\$45	\$2,475		\$2,475
41	Mulch for Bio-Retention Area	CY	10	\$45	\$450		\$450
42	Plants for Bio-Retention Area	LS	1	\$1,900	\$1,900	\$1,900	
43	Erosion Matting, Seed, & Minor Items to Restore Site	LS	1	\$1,000	\$1,000		\$1,000
	<b>PROJECT SITE 4 SUBTOTAL</b>				<b>\$9,845</b>	<b>\$2,320</b>	<b>\$7,525</b>

BALLPARK OPINION OF PROBABLE CONSTRUCTION COSTS - BASED ON CONCEPT DESIGN

CHARLOTTE CONGREGATIONAL CHURCH

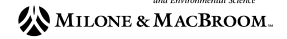
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Engineering,  
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Item	ITEM/DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST	LANDOWNER MATCH	GRANT REQUEST
	ENGINEERING SERVICES						
44	Data Collection				\$5,800		\$5,800
45	Design				\$10,000		\$10,000
46	Permitting and Construction Plans				\$5,700		\$5,700
47	Bid Services				\$4,300		\$4,300
48	Construction Services				\$7,200		\$7,200
	<i>ENGINEERING SERVICES SUBTOTAL</i>				<i>\$33,000</i>	<i>\$0</i>	<i>\$33,000</i>
	<b>CONSTRUCTION BUDGET SUMMARY</b>						
	PROJECT SITE 1 SUBTOTAL				\$17,190	\$4,060	\$13,130
	PROJECT SITE 2 SUBTOTAL				\$6,710	\$0	\$6,710
	PROJECT SITE 3 SUBTOTAL				\$10,410	\$2,420	\$7,990
	PROJECT SITE 4 SUBTOTAL				\$9,845	\$2,320	\$7,525
	<b>CONSTRUCTION SUBTOTAL</b>				<b>\$44,155</b>	<b>\$8,800</b>	<b>\$35,355</b>
	<b>CONSTRUCTION CONTINGENCY (15%)</b>				<b>\$6,623</b>	<b>\$1,320</b>	<b>\$5,303</b>
	<b>ENGINEERING SERVICES SUBTOTAL</b>				<b>\$33,000</b>	<b>\$0</b>	<b>\$33,000</b>
	<b>TOTAL (ROUNDED)</b>				<b>\$83,800</b>	<b>\$10,200</b>	<b>\$73,700</b>
	<b>TOTAL (%)</b>				<b>100%</b>	<b>12%</b>	<b>88%</b>