Final Summary Report

Feasibility Study: Opportunities to Manage Transportation-Related Stormwater Runoff

Hinesburg, Vermont

Prepared for **Chittenden County Regional Planning Commission**
Winooski, Vermont

Town of Hinesburg
Hinesburg, Vermont

Prepared by **VHB**
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June 30, 2015
Project Number: 57732.00

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Executive Summary

With assistance from the Chittenden County Regional Planning Commission ("CCRPC"), the Town of Hinesburg ("Town") and its consultants evaluated opportunities for developing stormwater best management practices ("BMPs") within the Town's Village Growth Area. Of particular interest was the possibility of identifying and providing treatment for untreated impervious areas associated with existing transportation infrastructure.

The Town's consultants evaluated existing impervious areas and drainage patterns in order to identify locations for potential BMPs. These locations and the land area available for potential BMPs were evaluated through an Alternatives Analysis process. Additional feasibility evaluations and land-owner outreach was performed for the three sites with the highest scores in the Alternatives Analysis. Two of these sites were located on private property and one was on land owned by the Town. An outreach and coordination meeting was held with stakeholders, including a representative from the Vermont Department of Environmental Conservation ("DEC") Ecosystem Restoration Program, the Vermont Agency of Transportation ("VTrans"), the CCRPC, Town Planning Department and a representative of the Town Select Board.

Following this coordination meeting, the two privately-owned parcels were removed from further consideration at this time. One of the parcels adjacent to Patrick Brook was removed from further consideration because of concerns over potential flooding at the site that could impact the effectiveness of a stormwater BMP. The second parcel was removed from further consideration because the untreated impervious surface cover within the drainage area was found to be largely privately-owned roads and parking lots that would limit the potential sources of construction funding. The third site, at the Hinesburg Community School, was advanced as the Preferred Alternative.

A conceptual design for the site includes a bioretention area and bio-infiltration swale that treats runoff from portions of paved parking lots, sidewalks, and roof areas of the school. The conceptual design takes advantage of an existing, under-utilized open area adjacent to another recently-constructed stormwater BMP, while also addressing slope erosion and improving landscaping at the school.

This Final Report consolidates the materials prepared under the Data Collection, Alternatives Analysis, and Conceptual Design phases of the Project into a single document.

1.0 Introduction

The Town of Hinesburg ("Town") is seeking to develop additional stormwater best management practices ("BMPs") within the Village Growth Area, in particular for areas of untreated impervious associated with existing transportation infrastructure. This Feasibility Study ("Project" or "Study") has been conducted in order to identify and evaluate potential locations for such BMPs as well as to develop concept-level plans for a stormwater BMP at the selected site. VHB and Milone & MacBroom, Inc. ("MMI") have teamed together to evaluate the feasibility and potential benefits associated with proposed BMP locations.

The Project consisted of four phases: Data Collection, Alternatives Analysis, Conceptual Design, and a Summary Report of Findings and Recommendations. This report documents the Preferred Alternative, provides a preliminary cost estimate for the construction of the BMP, and includes a PowerPoint presentation that describes the Study findings and Project design.

2.0 Data Collection

The Data Collection phase involved field evaluations of nine sites that were previously identified by MMI as potential candidates for the construction of structural stormwater BMPs. The initial site selection was based on a watershed analysis that was previously completed by MMI for the Town (MMI 2012). Information gathered during the Data Collection phase are presented in the "Initial Site Screening Assessment" memorandum dated December 5, 2014 that is included in Appendix 1.

3.0 Alternatives Analysis

The Alternatives Analysis phase involved a more detailed evaluation of the nine sites previously investigated during the Data Collection phase, plus two additional sites were added to this list following discussion with the Town and additional field investigations. A total of 11 sites were included in the Alternatives Analysis. The results of the Alternatives Analysis are presented in the Alternatives Analysis report dated February 5, 2015 that is included in Appendix 2.

4.0 Coordination Meeting / Re-evaluation

On April 24, 2015, the Project team held a coordination meeting with representatives from the Town, Vermont Agency of Transportation ("VTrans"), Vermont Department of Environmental Conservation ("DEC") Ecosystem Restoration Program, and the Chittenden County Regional Planning Commission ("CCRPC"). The feedback from this meeting led to further evaluation of the Alternatives Analysis due to

concerns over the effectiveness of stormwater BMPs located within or in proximity to the 100-year floodplain for Patrick Brook and to the percentage of a watershed that must consist publicly-owned impervious surface area in order to apply for public funding to manage stormwater runoff in that watershed. The minutes from this meeting are included in Appendix 3.

5.0 Concept Design Plans

Following the re-evaluation of the Alternatives Analysis, the Hinesburg Community School Site was selected as the Preferred Alternative. The proposed stormwater BMP would address untreated runoff from a driveway, paved parking lot and other impervious surfaces around the school building. The Town would not need to purchase land or acquire easements on other properties in order to develop this BMP. In addition, the proposed improvements would work in conjunction with the Bioretention Area constructed by the Town in 2014 that treats runoff from adjacent areas of Vermont Route 116 and the Silver Street intersection.

The Concept Design is compatible with the existing site topography and avoids impacts to a sanitary sewer line that runs from the school to Silver Street.

Concept Plans, along with sheets excerpted from the Town of Hinesburg sanitary sewer plans (Dubois and King, 1967) and the Hinesburg Elementary School Additions and Renovations Plans (Civil Engineering Associates, 1998) are included in Appendix 4.

6.0 Cost Opinion

A Cost Opinion for the proposed Concept Plan was developed to aid in the Project understanding. The Cost Opinion is included in Appendix 5. It is expected that this project would cost approximately $96,000 to complete, including all required design and construction. The cost opinion, like the design, is at the conceptual design level and gives a ballpark expected cost of the project that would be refined with more specific details during final design. The cost opinion was based on recent similar projects including the final design and construction of the bioretention area at the corner of Silver Street and Route 116 designed and overseen by MMI in 2014. Excavation and grading costs were estimated based on approximate grades and fine tuning will need to occur during final design following collection of survey. The cost opinion does not include any utility relocations. There are no utility relocations known to the project based on collected information. The concept design avoids all known utilities on the site including the sewer line located between the bioretention area and bio-infiltration swale. The cost opinion does not include property acquisitions or easements. Final design engineering includes project meetings, site survey, stormwater calculations, final design and cost opinion, bid assistance, and part time construction oversight. Incidentals to construction are included

to cover other small items not specifically itemized that would be required for construction. Construction contingency is included in case unforeseen circumstances occur during construction.

7.0 Summary and Recommendations

This feasibility study evaluated eleven potential locations for stormwater BMPs within the Village Growth Area. While several of these opportunities remain viable for the development of stormwater BMPs, some of the alternatives were found to present challenges from a permitting standpoint, as they would involve impacts within jurisdictional wetland, or would involve placing features within the 100-year floodplain. Although wetland restoration projects may also provide valuable ecosystem functions within the watershed, state and federal regulations mandate that untreated stormwater runoff to be managed and treated in upland areas prior to discharge to wetland areas.

Because town ownership of land is generally confined to small areas along public roadways and adjacent to other publicly-owned impervious areas, the degree of private landowner participation will determine the potential for the creation of stand-alone stormwater BMPs that are not associated with new development/redevelopment projects. In general, such opportunities may be limited by the landowners' perceived development potential on their sites. Continued outreach to landowners with large impervious areas in the Town is therefore recommended to identify possible synergies between future development/redevelopment activities and an overall reduction in untreated impervious areas. Opportunities for smaller-scale projects, such as rain gardens and enhanced vegetated swales should not be overlooked within Town-owned rights-of-way and other facilities. Coordination with VTrans District 5 is also recommended to ensure that Town objectives for stormwater management are met within the VTrans right-of-way to the extent practicable, in particular with regard to vegetation management in roadside ditches and swales.

The preferred alternative takes advantage of a highly visible parcel that is owned by the Town and not actively used by other stakeholders. Its location adjacent to an existing bioretention area simplifies the coordination of site maintenance activities and provides additional benefits by making the area into a "demonstration site" for a variety of BMP configurations that may be deployed in the region. No state or federal permits are anticipated to be required to construct the preferred alternative because it would not be located within a wetland or wetland buffer, and is outside of the Special Flood Hazard Area and River Corridor associated with the La Platte River. In addition, the project would not be required to obtain a construction stormwater or operational stormwater permit because it would involve less than one (1) acre of earth disturbance and would not result in the creation of additional impervious area.

References and Resources

Civil Engineering Associates, Inc., 1998. Hinesburg Elementary School 1998 Additions & Renovations. Project 97323, dated November 1997, last revised April 29, 1998.

Dubois and King, Inc., 1967. Town of Hinesburg Sanitary Sewer System Trunk Sewers, Contract #2. June 1967.

Milone & MacBroom, Inc., 2012. Growth Area Existing Conditions Hydrology Study, Hinesburg, Vermont. Prepared for the Town of Hinesburg, Vermont.

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APPENDIX 1

Initial Site Assessment

Memorandum

To: Hinesburg Stormwater Master Planning Project File

Date: December 5, 2014

Project #: 57732.00

From: Robert Wildey, VHB
Jessica Louisos, MMI

Re: Initial Site Screening Assessment

On November 25, 2014, the Project Team visited nine sites that were identified as potential candidates for the construction of structural stormwater best management practices (BMPs) that could address untreated stormwater runoff associated with transportation infrastructure in Hinesburg Village (Table 1). Many of these alternatives were identified during previous stormwater studies completed in the Town including infrastructure mapping and hydrology analysis (MMI 2010a, MMI 2010b, and MMI 2012). This memorandum presents a brief summary of the findings at each site. An updated site screening assessment table is attached. The analysis of these sites will be developed further under Task 2, Alternatives Analysis (Task 2). Site constraints identified in the field will be evaluated and opportunities for providing treatment will be assessed under Task 2 in order to narrow the list of potential sites that will proceed for further analysis and review.

Table 1. Summary of possible stormwater BMP locations (updated from MMI 2010a).

Site	Project Location	Recommendations
1	Cheese Factory Site	Retrofit Existing Pre-treatment Pond / Infiltration
2	Russell Wetlands	Possible Treatment
3	Hinesburg Community School, Parking Area	Bioretention or Infiltration
4	Hinesburg Community School, Play Area	Bioretention
5	Mobil Gas Station / Route 116 at Patrick Brook	Detention on South side
6	Hart & Mead Gas Station / Lyman Meadows	Swale Improvement or Detention
7	Lyman Meadows Northern Section	Swale Improvement or Detention
8	Ballards Corner	Evaluate storage potential at intersection of CVU Road, Shelburne Falls Road, and Route 116
9	Charlotte Road	Swale Improvement, Bioretention, or Infiltration

References

Milone & MacBroom, Inc., 2010a. *LaPlatte River Watershed Stormwater Infrastructure Study, Chittenden County, Vermont.* Prepared for LaPlatte Watershed Partnership.

Milone & MacBroom, Inc., 2010b. *Management Alternatives, Hinesburg Village, Vermont.* Prepared for LaPlatte Watershed Partnership.

Milone & MacBroom, Inc., 2012. *Growth Area Existing Conditions Hydrology Study, Hinesburg, Vermont*. Prepared for the Town of Hinesburg, Vermont.

7056 US Route 7

Post Office Box 120

North Ferrisburgh, VT 05473

Site Number: 1
Location: Cheese Factory
Parcel ID: 20-50-66.000

The Cheese Factory site consists of a large commercial/industrial building and paved parking lot with minimal stormwater treatment or control. Drainage from much of the facility is via overland flow across the parking lot to a vegetated swale along the south side of the parcel and then to a ditched channel that flows westerly toward the LaPlatte River. A portion of the roof runoff drains via overland flow across a vegetated buffer to the Patrick Brook Canal. Three areas of the paved parking lot are captured by short closed drainage systems that discharge directly to the Canal or to one of the swales. Three former sewage treatment lagoons are located near the western edge of the property. One of these lagoons has recently been filled, and the property owner has expressed an interest in filling the other two lagoons. The remaining lagoons represent a possible location for a stormwater BMP, assuming that flow could be directed to this location. The flat topography of the factory site and the elevation difference between the southern swale and the lagoons may be barriers to using the lagoons and will need to be verified with survey to determine what portion of runoff could be collected. The undeveloped parcel adjoining the factory to the west, across the drainage swale, was examined as a potential site. This site has wetland features and high ground water on the west side of Stella Road. A small possible stormwater treatment area exists along the existing swale between the factory site and newly graded gravel parking area. The FEMA-mapped floodplain associated with the LaPlatte River extends across the lagoons and a portion of the parcel west of Stella Road. The lagoons are located in a filled portion of the floodplain with a berm around them.

Site 1. Former wastewater treatment lagoon (northern), view to northwest. Photograph by MMI, November 25, 2014.

Site 1. Former wastewater treatment lagoon (southern), view to west.
Photograph by MMI, November 25, 2014.

Site 1. Filled-in wastewater treatment lagoon, view to north.
Photograph by MMI, November 25, 2014.

Site Number: 2
Location: Russell Farm Wetlands
Parcel ID: 20-50-66.000

This site is an existing wetland and drainage swale located between Kelley's Field Road and Lyman Park on the Russell Farm. The wetland has formed in a relatively flat open area where two drainage swales converge prior to coalescing into a single-thread channel that flows under Route 116 and joins with drainage from the Cheese Factory site before draining to the LaPlatte River. An existing farm road appears to slow the flow of water through this area. The presence of existing wetlands indicates significant hydrology and relatively high groundwater. This area appears to already provide stormwater treatment benefits due to the natural wetland features.

Site 2. Wetland area on Russell Farm adjacent to cart path, view to north. Photograph by MMI, November 25, 2014.

Site Number: 3
Location: Hinesburg Community School, Parking Area
Parcel ID: 08-01-32.000

This site includes the lower paved parking lot of the Hinesburg Community School, bounded by Silver Street to the west and the LaPlatte River to the south. The area is approximately 0.75 acres that drains to a closed drainage system and then to a swale along Silver Street that ultimately drains to the LaPlatte River. The portion of the parking lot closest to the River is within the FEMA-mapped 100-year floodplain. The upper parking area adjacent to the school and a large portion of the school building also drains to this location. The proximity to the River and existing drainage patterns will make it difficult to construct additional stormwater BMPs at this site. A large portion of the open space at the school is used for active recreation, reducing the number and size of areas available for stormwater treatment without impacting recreation. One possibility at this site would be to install a sub-surface hydrodynamic particle separator within the paved parking area to treat sediment washoff from the parking lot. Disconnection of the parking lot and roof drains could reduce the amount of stormwater entering the LaPlatte River.

Site 3. Hinesburg Community School lower parking area, view to north.
Photograph by MMI, December 12, 2012.

Site Number: 4
Location: Hinesburg Community School, Play Area
Parcel ID: 08-01-32.000

This site is part of the open area within the Hinesburg Community School recreation fields. Portions of the open area receive runoff from the paved driveway that runs along the east side of the school. These flows appear to discharge to a vegetated swale located between the tennis courts and the hockey rink. The amount of untreated impervious that could be directed to this site is relatively small (approximately 0.1 acres) and the construction of a stormwater facility would potentially impact the recreational activities at the site. A large portion of the open space at the school is used for active recreation, reducing the number and size of areas available for stormwater treatment without impacting recreation. The southern edge of the site abuts the LaPlatte River and is within the 100-year floodplain. The northern and eastern edges of the grassed area are steeply sloped and would not be practicable locations for the construction of a stormwater BMP.

Site 4. Swale draining access road on east side of school, between tennis courts and hockey rink, view to south. Photograph by MMI, November 25, 2014.

Site Number: 5
Location: Mobil Gas Station / Route 116 at Patrick Brook
Parcel ID: 16-20-68.000

This site consists of an open grassed area between the existing Mobil gas station and Patrick Brook. It is bounded to the west by Route 116 and to the east by additional commercial development. The Route 116 ditchline drains a relatively large area (4.2 acres) of untreated impervious cover, including the Route 116 roadway, a portion of Commerce Street, the gas station, and two commercial parking lots south of the site. A portion of the site is within the 100-year floodplain associated with Patrick Brook.

Site 5. Overview of grassed area between Patrick Brook and gas station, view to west.
Photograph by MMI, November 25, 2014.

Site 5. Ditch line between gas station and Route 116, view to south.
Photograph by MMI, November 25, 2014.

Site 5. Ditch line between gas station and Route 116, view to north.
Photograph by MMI, November 25, 2014.

Site Number: 6
Location: Hart & Mead Gas Station / Lyman Meadows, Southern Section
Parcel ID: 20-50-37.000/ 20-50-73.200

This site consists of portions of two adjoining parcels that have grassy open space which abuts a vegetated swale and drainage ditch along the south side of the Lyman Park Road. Runoff from existing untreated impervious flows to this ditch line from a portion of Route 116, Lyman Meadows Road, Lyman Park Road, and the adjacent commercial and residential parcels. Adjacent development includes the Hart & Mead gas station and auto parts store, Papa Nicks Restaurant, approximately half of the Lyman Meadows condominiums, and a portion of the St. Jude Parish Catholic Church parcel, all of which include significant parking areas. The grassy open space adjacent to the existing swale could possibly be used for stormwater treatment, if acceptable to the landowners.

Site 6. Ditch adjacent to Lyman Park Road, north of Hart and Mead gas station, view to east. Photograph by MMI, November 25, 2014.

Site 6. Erosion caused by overland flow into ditch at intersection of Lyman Meadow Road and Lyman Park Road., view to east. Photograph by MMI, November 25, 2014.

Site 6. Untreated impervious north of Route 116, view to east.
Photograph by MMI, November 25, 2014.

Site Number: 7
Location: Lyman Meadows, Northern Section
Parcel ID: 20-50-81.000/ 20-50-73.200

This site consists of an open grassed area within the Lyman Meadows condominium development, adjacent to the Lyman Park soccer fields. The condominium was constructed in the late 1980s / early 1990's and appears to have minimal stormwater treatment and control measures. The location of the open area is not conducive to receiving stormwater from the paved impervious area, but could potentially collect roof runoff from the buildings.

Site 7. Typical stormwater conveyance trench drain behind Lyman Meadow condominium. Photograph by MMI, November 25, 2014.

Site 7. Existing swale between Lyman Meadow Park and Lyman Park Road condominiums, view to east. Photograph by MMI, November 25, 2014.

Site 7. Existing swale between Lyman Meadow Park and Lyman Park Road condominiums, view to west. Photograph by MMI, November 25, 2014.

Site Number: 8
Location: Ballards Corner
Parcel ID: 16-20-39.000 / 16-20-37.000 / 16-20-33.000

This site consists of three parcels and the public roadway right-of-ways on the northwest corner of the Route 116 and Shelburne Falls Road intersection. Drainage from an unnamed tributary to the LaPlatte River flows westerly, crossing Route 116 just north of the Shelburne Falls Road intersection. The tributary enters a small wetland complex before flowing beneath Ballards Corner Road. The stream channel is entrenched and appears to be downcutting in the reach west of Ballards Corner Road and north the Jiffy Mart gas station. Near the western edge of the gas station parcel, the channel turns to the south, crossing through a small wetland complex before passing beneath Pleasant View Lane and Shelburne Falls Road in culverts. Most runoff from the roadways and commercial buildings is managed in vegetated swales or ditches, with minimal amount of treatment and control. An area of lawn north the Merchants Bank building could potentially be converted to a stormwater treatment facility that would drain to the adjacent wetland. This area is adjacent to disturbance associated with the proposed Route 116 safety improvements that are currently in design. Due to space constraints, there appear to be few opportunities within the gas station and library parcels to construct additional stormwater treatment facilities.

Site 8. Eroding channel behind Jiffy Mart gas station and small existing stormwater BMP adjacent to channel. Photograph by MMI, November 25, 2014.

Site 8. Wetland area north of Merchant's Bank parking lot.
Photograph by MMI, November 25, 2014.

Site 8. Swale along Shelburne Falls Road in front of gas station, view to west.
Photograph by MMI, November 25, 2014.

Site Number: 9
Location: Charlotte Road
Parcel ID: Charlotte Road ROW / 20-50-43.000

This site consists of the public roadway ROW and a portion of a privately-owned parcel near the intersection of Charlotte Road and Route 116. This site was initially identified by MMI during an earlier assessment of potential stormwater improvement projects, and was intended to improve an eroding gully that was present at the time of the earlier investigation. The roadway and shoulder have since been upgraded and although there is limited stormwater infrastructure present, there is currently no evidence of erosion on this site. There is limited room available in the ROW between Route 116 and Green Street. The privately-owned parcel and ROW west of Green Street appears to be wetland and is within the 100-year floodplain.

Site 9. Recently stabilized ROW along Charlotte Road, view to west.
Photograph by MMI, November 25, 2014.

Site 9. Charlotte Road closed drainage discharge location into drainage ditch at Green Street, view to east. Photograph by MMI, November 25, 2014.

Site 9. Charlotte Road drainage ditch west of Green Street, view to west. Area off ROW south of roadway is within the 100-year floodplain Photograph by MMI, November 25, 2014.

Feasibility Study: Opportunities to Manage Transportation-Related Stormwater Runoff
Initial Site Screening Assessment
Last Updated on: 12/5/2014
Last Updated by: VHB

Site Number	Project Location	Recommendations	Property Owner	Parcel ID	Stream Reach ID	Subwatershed Runoff Ranking	Approximate Drainage Area to Outlet (acres)	Approximate Impervious Area to Outlet (acres)	Subwatershed Runoff Depth (inches)	Approx. Runoff Volume (acre-ft)
1	Cheese Factory Site	Retrofit Existing Pre-treatment Pond / Infiltration	Redstone	20-50-66.000	M16, Northern	0.628	86.63	13.36	0.72	5.16
2	Russell Wetlands	Possible Treatment	Russell Family Farm	20-50-66.000	M16, Northern	0.628	60.83	8.33	0.72	3.65
3	Hinesburg Community School, Parking Area	Bioretention or Infiltration	Town of Hinesburg	08-01-32.000	M16, Middle	0.408	5.2	2.33	0.62	0.27
4	Hinesburg Community School, Play Area	Bioretention	Town of Hinesburg	08-01-32.000	M16, Middle	0.408	3.41	0.42	0.62	0.18
5	Jolley Gas Station / Route 116 at Patrick Brook	Detention on South side	Jolley Associates	16-20-68.000	M15S02.1	0.515	16.65	4.19	0.67	0.93
6	Gas Station/Lyman Meadows	Swale Improvement or Detention	Hart & Mead, Inc.; Andrew Burton	20-50-37.000; 20-50-73.200	M16, Northern	0.628	19.78	5.06	0.72	1.18
7	Lyman Meadows Northern Section	Swale Improvement or Detention	Andrew Burton; Town of Hinesburg	20-50-81.000; 20-50-73.200	M16, Northern	0.628	2.77	0.85	0.72	0.17
8	Ballards Corner	Evaluate storage potential at intersection of CVU Road, Shelburne Falls Road, and VT 116	Citgo Gas Station; Merchants Bank; Library	16-20-39.000; 16-20-37.000; 16-20-33.000	M15S02.1	0.418	214	16.45	0.62	11.06
9	Charlotte Road	Swale Improvement, Bioretention, or Infiltration	Public ROW; Green Street LLC.	Road ROW; 20-50-43.000	M16, Middle	0.408	7.43	2.63	0.62	0.39

APPENDIX 2

Alternatives Analysis

Alternatives Analysis

Feasibility Study: Opportunities to Manage Transportation-Related Stormwater Runoff

Hinesburg, Vermont

Prepared for **Chittenden County Regional Planning Commission**
Winooski, Vermont

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February 5, 2015
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Attachment

1.0 Project Overview

The Town of Hinesburg ("Town") is seeking to develop additional stormwater best management practices ("BMPs") within the Village Growth Area, in particular for areas of untreated impervious associated with existing transportation infrastructure. This Feasibility Study ("Project" or "Study") has been conducted in order to identify and evaluate potential locations for such BMPs. VHB and Milone & MacBroom, Inc. ("MMI") have teamed together to evaluate the feasibility and potential benefits associated with proposed BMP locations.

The Project team has reviewed opportunities for innovative stormwater management solutions to reduce peak discharges and improve water quality in tributaries to Patrick Brook and the La Platte River. Previous hydrologic studies of the Village Growth Area, completed for the Town by MMI, have provided a starting point for the investigation. Additional sites have been incorporated into the analysis following consultation with the Town and field reconnaissance.

This Alternatives Analysis has been conducted to evaluate the potential capacity and site constraints of the sites that were selected for review. A matrix of alternatives has been developed that ranks the sites by their potential to improve water quality, evaluating such factors as the percentage of untreated impervious cover and land use practices in the contributing drainage area, the available land area and the size of a resulting BMP, land use constraints, and potential costs. This matrix and a map of the sites is included the Attachment. The outcome of this analysis is the selection of a recommended alternative that is proposed to advance to the conceptual design phase.

2.0 Sites Analyzed

A total of 11 sites were included in the Alternatives Analysis. The initial site selection was based on a watershed analysis that was previously completed by MMI for the Town. Additional sites were added to this list following discussion with the Town and additional field investigations. A map of the sites is included on page 1 of the Attachment. Table 1 presents the sites that were included in the Alternatives Analysis.

Table 1: List of sites included in the Alternatives Analysis

Site Number	Site Location	Site Owner(s)
1	Mobil Gas Station (Route 116 at Patrick Brook)	Jolley Associates
2	Hart & Mead Gas Station (Route 116 at Lyman Meadows Road)	Hart & Mead, Inc.; Andrew Burton
3	Hinesburg Community School, Parking Area	Town of Hinesburg
4	CVU Road near Playing Fields	Public ROW; CVU School
5	Cheese Factory Site (Route 116 at Mechanicsville Road)	Redstone
6	Lyman Meadows Northern Section	Andrew Burton; Town of Hinesburg
7	Route 116 ROW near Riggs Road (Renewable NRG Systems, Inc.)	Public ROW
8	Ballards Corner (Shelburne Falls Road at Route 116)	Citgo Gas Station; Merchants Bank; Library
9	Hinesburg Community School Play Area	Town of Hinesburg
10	Russell Farm Wetlands (behind Lantman's Market)	Russell Family Farm
11	Charlotte Road at Route 116	Public ROW; Green Street LLC.

3.0 Project Setting and Constraints

As part of the Study, the Project team has considered the feasibility of providing stormwater treatment facilities in locations where existing untreated stormwater runoff was being discharged to wetlands or stream channels. Some of the possible BMP sites were determined to be in existing wetlands. Such locations would be attractive sites for stormwater features for several reasons:

- they are already receiving runoff, indicating that a hydraulic connection is already present and would not require significant investment in additional infrastructure to connect the site to the source;
- they tend to be located at a low point within a given watershed, which would allow a facility to provide treatment for as large of an area as possible in the treatment facility; and
- such land typically has little commercial value and cannot generally be developed for other purposes.

Examples of sites that meet these criteria and are in wetlands include portions of the Cheese Factory site located south and west of the main building and paved parking lot (Site 5); portions of the Hinesburg Community School parcel that are adjacent to the La Platte River (Site 9), and portions of the Russell Farm down-gradient from Lyman Meadows Park and east of the barn (Site 10).

While these locations are advantageous from the standpoint of their position in the landscape, state and federal wetlands regulations prohibit the development of stormwater treatment facilities within an existing wetland, even if the wetland is currently being impacted by the stormwater discharges. The reason for this prohibition is that a stormwater treatment facility, even one such as a constructed wetland that may mimic the form and function of a natural wetland, is a developed feature that would be maintained and repeatedly manipulated over time. As sediment is captured within the facility, it would need to be removed to maintain the functionality of the system, or would constitute the placement of "fill" within the wetland. Overflow weirs, pipe networks, and other structural components of the system also require periodic maintenance and replacement that would entail future wetland impacts if the facility were constructed in an existing wetland. For these reasons, stormwater treatment facilities must be located in upland areas.

Two additional considerations that reduce the desirability of establishing BMPs in wetland and floodplain areas are 1) the infiltration capacity of soils in these areas; and 2) the likelihood that the BMP would be impacted by seasonal high groundwater.

1) Infiltration capacity is generally not available in existing wetlands, either due to seasonal high groundwater or the presence of Hydrologic Soil Group ("HSG") D soils (clays and silts). These soils are present throughout the Village Area in all of the locations that were evaluated by the project, with the exception of the Mobil gas station site adjacent to Patrick Brook and Route 116, which has HSG C soils (silt loam). Infiltration (groundwater recharge) is one of the required components of a stormwater treatment facility under the Vermont Stormwater Management Manual ("VSMM"). While the recharge requirement is waived for sites located on HSG D soils, infiltration is an important stormwater practice that provides water quality treatment as well as helping to maintain baseflow during low flow conditions and to moderate peak flows during high frequency storm events.

2) Providing water quality and channel protection volumes per the VSMM may not be feasible where seasonal high groundwater is present, as the lower elevations within such treatment facilities would fill with groundwater and would not have capacity for treating stormwater flows.

For these reasons, sites were assigned lower scores if they were found to have significant wetland or floodplain features in the area that might otherwise appear suitable for locating a BMP.

While the development of stormwater treatment facilities in wetlands is not permissible, other enhancement opportunities may exist for these locations. The wetland features present at many of these sites have been impacted by previous disturbances such as ditching, clearing, or hydrologic

modification. For these reasons, wetland restoration activities would be welcomed by state and federal regulators and could be designed to provide habitat enhancement and some degree of additional water quality improvement, such as by eliminating straightened ditches and restoring more sinuous flow paths through these areas. To the extent practicable, treatment of stormwater runoff from impervious areas should take place upstream from discharge to these areas.

4.0 Alternatives Analysis

The Alternatives were evaluated analytically through a GIS analysis of watershed, subwatershed, and site attributes as well as qualitatively through field observations. The different types of analysis are described below. The results for each site in the analysis and additional information about potential BMPs and constraints at each site are presented on the Alternatives Analysis Summary Table included in the Attachment.

4.1 Subwatershed Analysis

The subwatershed analysis consisted of an analysis for the overall subwatershed in which the site is located. This analysis consisted of an evaluation of the Runoff Ranking and the Channel Protection Volume Runoff Depth. These values evaluate the importance of stormwater mitigation in a particular subwatershed in the context of the entire watershed.

Runoff Ranking

A GIS analysis was performed in a previous project to prioritize subwatersheds for stormwater mitigation based on existing conditions as part of a watershed-wide study to determine the areas where stormwater mitigation should be focused (MMI 2010a). This variable is used in this Study to give an indication of the importance of stormwater mitigation at a site in a watershed context. The ranking was calculated from the percent impervious cover and the runoff volume of the subwatershed. Each of these variables was normalized by the maximum value in the watershed, summed, and divided by two for a combined possible rank of zero to one. A value of one indicates the subwatershed with the highest stormwater threat where stormwater treatment projects should be prioritized. For the subwatersheds included in the analysis, the Runoff Rankings ranged between 0.41 and 0.63.

Channel Protection Runoff Depth

In a previous project, estimation of the channel protection runoff volume (acre-feet) from each subwatershed was calculated using the Natural Resources Conservation Service ("NRCS") runoff curve number method (MMI 2010b). A rainfall of 2.1 inches associated with the 1-year, 24-hour duration storm was used for runoff calculations (VTDEC 2002). LaPlatte River soils, land cover, and impervious cover maps were used to develop area-weighted, composite curve numbers for each subwatershed (SCS 1986). Curve number assignments were fine-tuned based on field observations. Estimated runoff volumes were normalized by subwatershed area, i.e., the volumes were converted to the 1-year runoff

depth, in order to facilitate comparisons between the subwatersheds. For the subwatersheds included in the analysis, the Runoff Depths were found to be 0.6 or 0.7 inches.

4.2 Site Analysis

The site analysis evaluated the specific characteristics of the site that would be treated by a proposed BMP. These analyses evaluated the approximate drainage area to the potential BMP, the approximate impervious area to the outlet, the approximate channel protection runoff volume, the approximate BMP storage volume, the approximate BMP storage as a percentage of the CPV, and the HSG.

Drainage Area, Impervious Cover, and Channel Protection Runoff Volume

A GIS analysis was performed to identify the contributing drainage area that could be routed to a prospective BMP at each site. The percentage of impervious cover within each site-specific subwatershed was assessed using an impervious cover layer that was created as part of the previous watershed-wide study (MMI 2010b). The site channel protection runoff volume was calculated as described above for the overall subwatershed. For the specific sites included in the analysis, the drainage areas ranged from 2.8 to 214 acres. The percentage of impervious cover ranged from 7.7 to 44.8 percent, with higher percentages of imperviousness associated with smaller sites. The channel protection runoff volume ranged from 0.2 acre-feet to 11.1 acre-feet.

Approximate BMP Storage Volume and Percent of Water Quality Volume

The potential storage volume of prospective BMPs was estimated by approximating the surface area and depth available at each site. The percentage of water quality volume was then calculated by comparing this volume to the site's Runoff Depth. The approximate BMP storage volume for the specific sites ranged from 0.0 acre-feet (indicating that no area was found to be available for construction of a BMP) to 2.2 acre-feet.

Hydrologic Soil Group

Hydrologic Soil Groups were determined from the NRCS soil survey for Chittenden County (NRCS 1989). The four hydrologic soil groups (A, B, C, and D) represent a range of runoff characteristics. Soils with lower runoff potential and therefore generally higher infiltration potential are classified as "A" soils (sands and gravels). Soils with high runoff potential and generally lower infiltration potential, are classified as "D" soils (silts and clays). Although pockets of "A" and "B" soils are present in Hinesburg, only one site had HSG "C" soils and the majority of locations investigated are mapped as having HSG "D" soils.

4.3 Objectives

The objective analysis provides a qualitative assessment of the ability of a BMP at a given site to improve water quality, to reduce flood and erosion risk, to capture runoff from impervious surfaces, and to capture runoff from transportation infrastructure. These parameters reflect the results of the field investigation and site-specific conditions that are not easily quantified in analytical terms. Sites were scored as Effective (+), Moderate (o), and Limited (-) for these parameters. Although none of the sites were determined to effectively meet all of the objectives, many of the sites at least moderately address two of the objectives and a few sites would effectively address more than one objective.

4.4 Feasibility

The feasibility analysis provides a qualitative assessment of the constructability/permit-ability of developing a BMP at a given site and the anticipated cost of the BMP based on site constraints such as construction access, land use, utilities, and topography. Sites were scored as High (H), Medium (M), and Low (L) for these parameters. Most sites scored as Moderate in the constructability/permitability analysis and in the relative cost analysis.

5.0 Summary and Recommendations

Based on the results of the Alternatives Analysis, the Mobil Gas Station site adjacent to Patrick Brook is the recommended alternative. It presents a favorable combination of site conditions (including the only area of HSG C soils), contributing drainage area with a relatively large amount of untreated impervious, and the potential storage capacity to provide adequate treatment volumes. This site ranks in the middle of the scoring based on the Runoff Ranking and percent imperviousness, but is tied for second place for the estimated BMP storage volume (1.5 acre-feet) and is estimated to provide the third highest BMP storage volume as a percentage of the channel protection runoff volume (156.5 percent). The site scored highest on its ability to meet the project objectives, with Effective scores in three categories and a Moderate score in the site's ability to reduce flood risk and erosion. Constructability was scored as Medium and construction cost was scored as low. The site would directly benefit surface water quality in Patrick Brook and has tangible connections to transportation infrastructure, as a significant portion of the untreated runoff would come from Route 116 or from the parking lots and driveways of businesses adjacent to the roadway. Lastly, this site is one of the most visible locations for a BMP within the Village and would provide an opportunity to interface with pedestrians once the proposed sidewalk along the Route 116 frontage is constructed.

The Hart and Mead site adjacent to Lyman Meadows Park also scored high in the Alternatives Analysis and may be considered as a backup site in the event that the preferred site is not available or is found to be unsuitable for other reasons. This site scored higher on the Runoff Ranking criteria than the Mobil Gas Station site, has a similar percentage of impervious cover (25.5 percent), and the same approximate BMP storage volume (1.5 acre-feet) as the Mobil Gas site. Soils on the site are mapped as HSG D, indicating that infiltration is not likely to be practical. Construction costs scored higher, due to

the additional grading and drainage system construction that would be required to bring stormwater to a prospective treatment site. The direct linkage to transportation infrastructure and the amount of transportation-related impervious surface that this site could treat is somewhat smaller because portions of Route 116 in this area are already being directed to treatment at the Silver Street bioretention area.

References and Resources

Milone & MacBroom, Inc., 2010a. Management Alternatives, Hinesburg Village, Vermont. Prepared for LaPlatte Watershed Partnership.

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_____, 2012. Growth Area Existing Conditions Hydrology Study, Hinesburg, Vermont. Prepared for the Town of Hinesburg, Vermont.

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Vermont Agency of Natural Resources. 2002. The Vermont Stormwater Management Manual Volume I - Stormwater Treatment Standards. April 2002 – 5th Printing.

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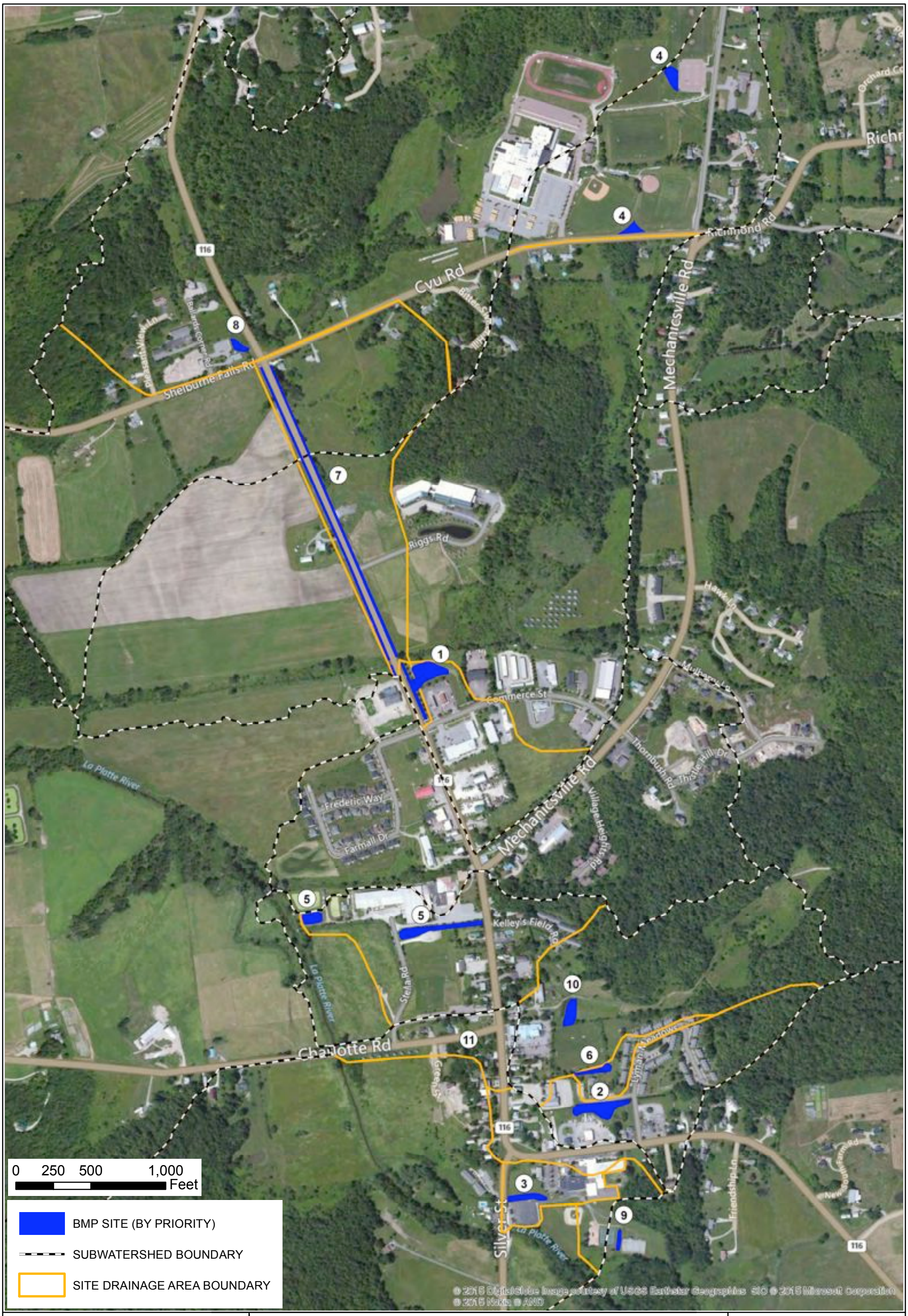
ATTACHMENT



SOURCE(S):

BING MAP
MMI SUBWATERSHED DELINEATION

N

Figure 1: STORMWATER BMP POSSIBLE LOCATIONS

Location: **Hinesburg, Vermont**

FEASIBILITY STUDY: OPPORTUNITIES TO MANAGE TRANSPORTATION-RELATED STORMWATER RUNOFF

Map By: JCL
MMI#: 4438-03
MXD: Y:\4438-03\Maps\FIGURE1-BMP-LOCATIONS.mxd
1st Version: 1/21/2015
Revision: 2/4/2015
Scale: See Scale Bar

MILONE & MACBROOM
vhb

Feasibility Study: Opportunities to Manage Transportation-Related Stormwater Runoff
Alternatives Analysis Summary Table
Last Updated on: 2/4/2015
Last Updated by: MMI

				SUBWATERSHED		SITE						OBJECTIVES				FEASIBILITY		
Site Number (By Priority)	**Project Location**	**Property Owner**	**BMPs**	**Runoff Ranking**	**Channel Protection Volume Depth (inches)**	**Approximate Drainage Area to Outlet (acres)**	**Approximate Impervious Area to Outlet (%)**	**Approx. Channel Protection Volume (acre-ft)**	**Approx. BMP Storage (acre-ft)**	**Approx. BMP Storage (% WQv)**	**HSG (NRCS 2011)**	**Improve Water Quality**	**Reduce Flood and Erosion Risk**	**Capture Runoff from Impervious Surfaces**	**Capture Runoff from Transportation Infrastructure**	**Constructability / Permitability**	**Cost**	**Notes**
1	Mobil Gas Station / Route 116 at Patrick Brook	Jolley Associates	Detention on South side	0.52	0.7	16.7	25.2	0.9	1.2	134.0	C	+	o	+	+	M	L	Connect to ditch along Route 116, collecting flow from roadway and adjacent commercial areas. Avoid mapped wetland along Patrick Brook. Area partially in floodplain and river corridor.
2	Hart & Mead Gas Station/Lyman Meadows	Hart & Mead, Inc.; Andrew Burton	Bioretention along existing swale and lawn behind Hart & Mead; Retrofit storm manhole with pollution control at gas station	0.63	0.7	19.8	25.6	1.2	1.5	130.7	D	+	o	+	o	M	M	Expand existing ditch network to a larger bioretention area. Area crosses multiple private properties. Runoff from portion of Route 116, residential roads and parking, and commercial parking areas.
3	Hinesburg Community School, Parking Area	Town of Hinesburg	Bioretention area north of lower parking lot; Retrofit storm manhole with separator	0.41	0.6	5.2	44.8	0.3	0.5	183.0	D	+	o	+	o	H	M/H	Treat runoff from school roof and parking lots. Good infiltration location. Limited space due to active recreation area and proximity to river.
4	CVU Road near Playing Fields	Public ROW; CVU School	Detention or Bioretention between ball fields and along upper parking lot; Swirl separator at front parking lot possible	0.52	0.7	42.0	19.8	2.3	0.8	35.6	C/D	o	o	+	o	M/H	M	Captures runoff from athletic fields, parking lots, and roads. Integrated into discharge culvert under path. Relatively low storage capacity within available area without subsurface construction.
5	Cheese Factory Site	Redstone	Small detention near gravel parking lot; Ditch improvement; Retrofit existing pre-treatment pond possible	0.63	0.7	86.6	15.4	5.2	2.2	43.3	B/D	o/+	o	+	+	H/M	M/L	Long ditch network for revegetation easy and low cost to implement. Detention area near gravel parking lot would be small compared to watershed size. Lower field is a wetland and a practice in this location may consist of just revegetation. Two lagoons may be used, but getting water into them is not straight forward and could limit treatment volume. Piping may be needed to transport water to the lagoons. Detailed survey will be required.
6	Lyman Meadows Northern Section	Andrew Burton; Town of Hinesburg	Bioretention along existing swale	0.63	0.7	2.8	30.7	0.2	0.3	165.2	D	o	o	+	-	M	L	Limited space due to soccer field and residential lawn.
7	Route 116 ROW near NRG	Public ROW	Linear bioretention along Route 116	0.47	0.6	35.7	9.5	1.9	0.5	27.4	B/D	o	-	o	o	M	M	Slope of existing land complicates treatment other than linear features along road. Potential for linear bioretention areas in proposed 25' Town setback. Could be incorporated into roadway improvements as part of upcoming VTrans project or NRG Master Plan.
8	Ballards Corner	Citgo Gas Station; Merchants Bank; Library	Increase storage potential along channel in existing lawn at bank	0.42	0.6	214.0	7.7	11.1	0.3	3.0	D	-	-	o	+	M	L	Limited space due to existing development along channel. New gas station has some treatment. Possible check dams along channel where eroding.
9	Hinesburg Community School, Play Area	Town of Hinesburg	Bioretention between tennis court and ice rink	0.41	0.6	3.4	12.3	0.2	0.2	95.3	D	o	-	o/-	-	M	L	Limited transportation connection. Limited space due to active recreation and proximity to river and wetland river buffer.
10	Russell Wetlands	Russell Family Farm	Possible Treatment	0.63	0.7	60.8	13.7	3.6	0.4	11.8	D	o	o	o	o	L	M	Current stormwater storage in wetland. Increase of storage in wetlands not allowed per regulations. Also expansion of storage would impact existing farm operations.
11	Charlotte Road	Public ROW; Green Street LLC.	None	0.41	0.6	7.4	35.4	0.4	0.0	0.0	D	-	-	+	+	N/A	N/A	Ditch erosion repaired during previous sidewalk project. No space for additional surface treatment. Lower portion of swale in wetland.

+ Effective
o Moderate
- Limited

H High
M Medium
L Low

APPENDIX 3

VTrans/VT DEC Meeting Minutes

Meeting Notes

Place:	Hinesburg Town Hall Municipal Meeting Room		
Date:	April 2, 2015	Notes Taken by:	Robert Wildey
Project #:	57732.00	Re:	Hinesburg Stormwater Opportunities VTrans / VT DEC Coordination Meeting

ATTENDEES
Alex Weinhagen, Town of Hinesburg
Andrea Morgante, Town of Hinesburg
Roy Schiff, Milone & Macbroom
Jessica Louisos, Milone & Macbroom
Robert Wildey, VHB
Jim Pease, VT DEC Ecosystem Restoration Program
Jonathan Armstrong, VTrans Stormwater Management
Jenn Callahan, VTrans Operations

Not present: Dan Albrecht, CCRPC

Discussion of On-Going or Previously Identified Projects

- Silver Street bioretention facility in year 1 of operation that treats portion of village runoff
- CVU Road / Shelburne Falls Road intersection upgrade and larger new culvert.
    - Series of undersized culverts downstream that have raised local concern
    - Possible inclusion of treatment site #8 for additional impervious cover
- Riggs Road development possible treatment area
- Commerce Street stormwater treatment compliance issues
- Hannaford proposed treatment system
- Town sidewalk project near NRG proposed that crosses Patrick Brook proposed for 2016

Review state permits and possible required upgrades as rules and regulations change.

Discussion of Sites in Alternatives Analysis

Site 1 – Jolley/Mobil Gas Station at intersection of Commerce Street and Route 116.

- Previously identified as the preferred alternative due to apparent available land, potential willing landowner, and untreated stormwater associated with Route 116 and Commerce Street roadway runoff.
- Developer of Commerce Park industrial park needs to transfer stormwater permit (3034-9010) to Commerce Park association; Commerce Street is a Town-accepted roadway within the development but permit needs to be in compliance before Town becomes co-permittee.

40 IDX Drive, Building 100
Suite 200
South Burlington, VT 05403

Meeting Notes

- Existing gas station likely covered by stormwater permit for Commerce Park but does not discharge to stormwater BMP associated with development (located northeast of site).
- Previous development plans showed wetlands in the area proposed for stormwater BMP but US Army Corps-approved delineation by VHB from 2012 does not. Landowner may have other plans for this area if wetlands are not a consideration.
- Additional roadway work likely to occur at intersection if Hannaford is permitted to proceed; Andrea Morgante expressed concern that lane expansion/widening may be required at Patrick Brook culvert, which would potentially change available land or hydraulics in the area.
- Flood Hazard Area/River Corridor permit would be required for project – one more potential hurdle to overcome. This is a new permit effective as of March 1, 2015 and was not explicitly included in the analysis which was completed February.
- Jim Pease expressed significant concern over the portion of the project that would be located within the 100-year floodplain. In particular, the consideration of silting in or other damage during significant flood event. Possible compromise would be to install a subsurface unit at Jolley site so that no damage from flooding would affect the project.
- Route 116 sidewalk project (anticipated construction 2016) – proposed from Riggs Road south to Commerce Street. Lamoreux and Dickinson working on sidewalk project design, will need to account for additional stormwater runoff and treatment associated with this work. This sidewalk would cross the gas station property along an easement located within the frontage area between Route 116 and the gas station paved parking lot.
- Jon Armstrong suggests that the State ROW be expanded to include sidewalk improvement project to improve future permitting and management. Wondered if the easement on Jolley/Mobil property might contribute toward impervious area of the Commerce Park stormwater permit and conflict with 9010 renewal.
- Due to concerns over potential floodplain impacts, potential interference with the Commerce Park 9010 stormwater permit conditions, and potential landowner constraints, the work group has rejected this site as the preferred Alternative.

Site 2 - Ponding area behind Hart & Mead gas station/car wash/auto parts store.

- Alex Weinhagen had initiated outreach to landowner and received some positive feedback. Need to take next steps and provide some conceptual information to them so that they can better understand what is being proposed.
- Landowner related that the culvert installed by the adjacent church (St Jude's the Apostle Parish) as part of their parking lot expansion is causing ponding in this area. Any evaluation of site work in this area will need to incorporate hydraulic modeling of this culvert and the adjacent swale to better understand the drainage pattern at the site. Alex Weinhagen to review Town files and determine what engineering studies or plans (if any) were submitted in conjunction with the church expansion.

Meeting Notes

- Lyman Park Road is a private road but Town has an easement over it to provide access to the parking lot associated with the ball fields.
- Jon Armstrong pointed out that project areas need to consist of 50-percent or greater public ownership for Transportation Alternative funding (FHWA), but lower percentages may be approved under other funding mechanisms.
- Project may ultimately be combination of #2 and #6, plus area in front of condominium units.
- Town parcel of land at corner of soccer field may also be included in this project.

Site 3 – Hinesburg Community School, lower area next to Silver Street bioretention area.

- Good opportunity to capture impervious area on land that the Town owns, but more parking lot than roadway.
- Need to confirm with CCRPC if site meets criteria of a project that can be designed under terms of the existing grant.
- Treatment area is near existing Silver Street bioinfiltration area, yet would be separate linear feature along parking lot and likely include dynamic swirl separator.
- Robert Wildey to follow up with Dan Albrecht.

Site 4 – CVU athletic fields – two sites adjacent to ball fields along CVU Road and Mechanicsville Road

- CVU looking at treatment for proposed artificial turf ball fields. Potential treatment areas that were identified may come into play as part of future ball field redevelopment.
- Some concerns expressed over water quality at artificial turf sites (potential heavy metal contamination) but subsurface storage and infiltration can be very beneficial for quantity control.

Site 5 – Cheese Factory

- Use of existing lagoons is limited by hydraulics between Route 116 frontage and location of lagoons.
- Use of swales adjacent to parking lot and Stella Road will be impacted by high groundwater, hydric soils, and potential wetland impacts.
- General agreement that other opportunities may exist at this site (floodplain or wetland restoration) but challenging from a stormwater perspective unless site redevelopment demands it.
- Wetland restoration project may be a more desirable project from the funding and permitting perspective.

Site 6 - Lyman Meadows stormwater swales, adjacent to ball field

Meeting Notes

- Existing stormwater permit (3281-9010).
- Andrea Morgante notes that there is an erosion issue within the lawn and swale system to east of condo units. She notes that multiple repairs have been applied but a non-lawn fix or check-dam system may be a more permanent solution.
- Requires outreach to condominium association; Alex Weinhagen to make contact.
- Potentially eligible for grant for improvement from VT DEC Ecosystem Restoration, so long as their stormwater permit is up to date.
- Add site as "6B" for additional improvements.

Site 7 – Route 116 ROW near NRG.

- The Route 116 / Riggs Road intersection is eventually proposed for signalized 4-way intersection, with large development proposals on both sides in the future.
- Existing swales / ditches in good condition, potential improvements should be factored into future development plans.
- Route 116 swale could be somewhat widened and vegetation enhancement within context of existing swale to provide additional treatment.
- Need to coordinate with VTrans to keep track of ditching schedule and ensure that any improvements are not inadvertently removed under the guise of "ditch maintenance".

Site 8 - Route 116 / CVU Road intersection

- Proposed VTrans-funded intersection improvement project (including culvert replacement) will require stormwater permit; likely to be addressed using the site balancing approach rather than site-specific stormwater features where additional impervious has been added.
- Three culverts downstream from the Route 116 intersection improvements all need to be upsized (Ballards Corner Road, Pleasant View Road, and Shelburne Falls Road culverts). Can all four culverts be upgraded at the same time to avoid creating additional flooding issues?
- Lot north of the Merchant's Bank has been for sale for a long time and could provide additional area for treatment, but it is likely a development parcel covered under an existing stormwater permit (Ballards Commercial Subdivision - 3496-9010) and is probably not a cost-effective option.
- Town owned parcel north of dentist could be evaluated. Add site as "8B" to consider other options farther north where Town already owns land.

Meeting Notes

Site 9 – Hinesburg Community School Play Area

- Brief discussion of potential areas, most are sloped too steeply for capturing stormwater without significant earthwork, would impact recreational uses of open space, or would be in the floodplain and riparian buffer of the Laplatte River.
- Consider opportunity for an education-scale project at the vegetated swale between the tennis courts and skating rink.

Site 10 – Russell Farm Wetlands

- Conversion of existing wetland area would not be well received by regulating authorities (VT DEC Wetlands, US Army Corps).

Site 11 – Charlotte Road

- Former location of eroding roadway shoulder. Site was repaired following roadway and drainage work, no longer needs improvement.

Discussion of Funding Mechanisms for project construction

- Per Jon Armstrong, the requirement is typically for VTrans-sponsored projects to address at least 50-percent publicly-owned land area, but not all of that area has to be impervious.
- Ecosystem Restoration Program funding goes up to $250K.
- Consider adding any stormwater development projects to the Clean Water SRF priority list?
- Minimum grant size of $200K -$375K projects for Transportation Alternative funding – could be multiple sites? Concerns over constructability/timing of using this funding for multiple sites – if one site gets hung up in permitting or design, all of the sites must wait.
- Consider VTrans planning grant for investigation and design of Mechanicsville Road / canal conversion project.

General Discussion Items

- Andrea Morgante would like to make sure that discussion of these other projects is incorporated so that the Town boards keep them in mind moving forward, even it not appropriate to fund at this time.
- Larger project to be considered is the reconfiguration of the Cheese Factory canal – change water level control structures and develop as a linear rain garden or bioretention-type feature. Significant land-owner uncertainty, but potential opportunity. Would need to ensure that flood flows were directed to the main stem of Patrick Brook rather than being allowed to flow through the Canal. Would capture some stormwater flows from Mechanicsville Road and parts of other off-site areas

Meeting Notes

including Thornbush Road development. Nestech Corporation (Commerce Street) fills a fire pond from the canal but their sprinkler system could be converted to municipal water if required.

- Potential to check through the list of existing sites with older permitted stormwater systems that could be upgraded to accommodate additional area or provide additional treatment for upcoming pollutant concerns (such as phosphorous).
- May want to research the StormTreat system that was installed as part of Mechanicsville Road sidewalk project and understand how well it is functioning before proposing similar units as part of other projects.

Next steps

1. Update decision matrix to reflect the complexities associated with the Jolley / Mobil gas station site
2. Continue coordination with Hart & Mead landowner to evaluate potential issues with this area.
3. Confirm the applicability of the CCRPC grant funding to the Hinesburg Community School lower parking lot site.

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APPENDIX 4

Conceptual Design

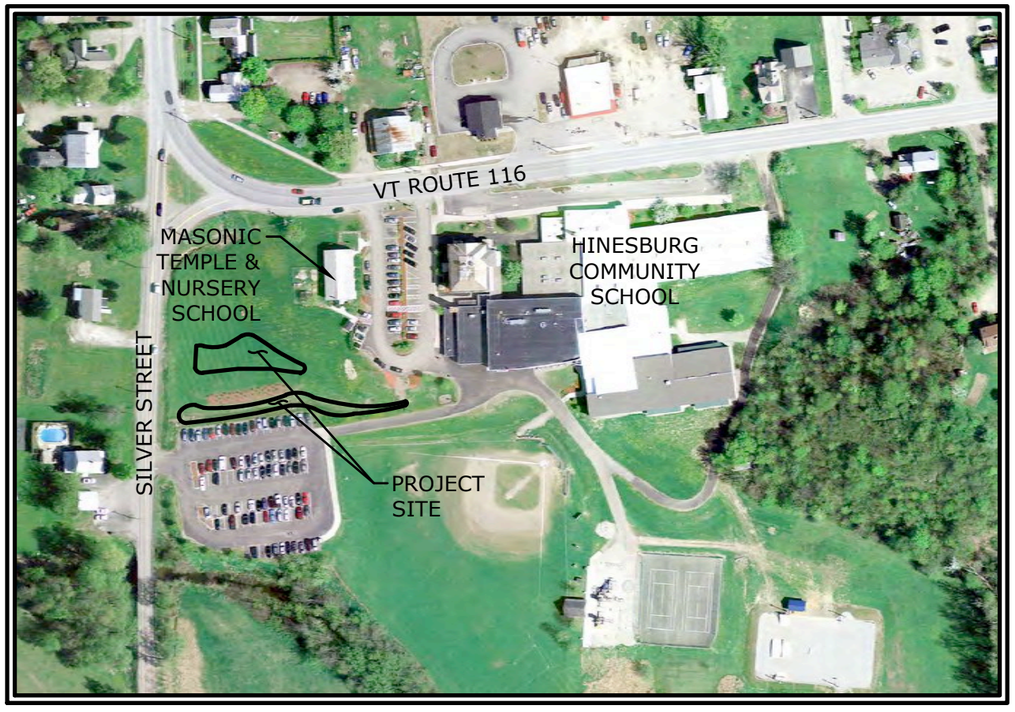
HINESBURG COMMUNITY SCHOOL STORMWATER MANAGEMENT

FEASIBILITY STUDY: OPPORTUNITIES TO MANAGE TRANSPORTATION RELATED STORMWATER RUNOFF

HINESBURG COMMUNITY SCHOOL
HINESBURG, VERMONT

CONCEPT DESIGN
JUNE 17, 2015

SHEET NO.	SHEET TITLE
01	TITLE SHEET & LOCATION MAP
02	SITE PLAN - EXISTING CONDITIONS
03	SITE PLAN - PROPOSED CONDITIONS
04	PROFILES
05	CROSS SECTION & DETAILS



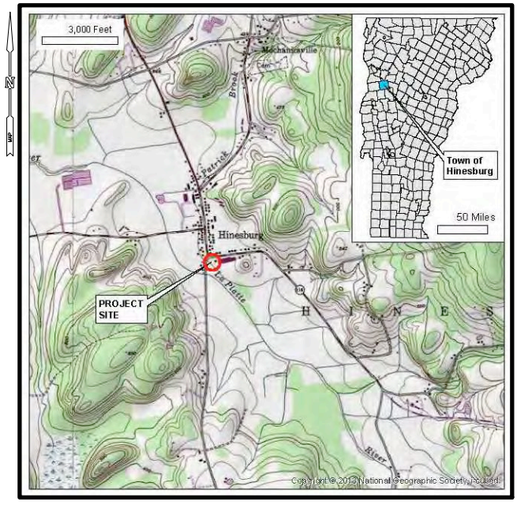
PROJECT SITE VICINITY MAP:

0' 100' 200'
0 1/2" 1"
SCALE 1" = 200'

PREPARED FOR:

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

TOWN OF HINESBURG



LOCATION MAP:
1"=6,000'

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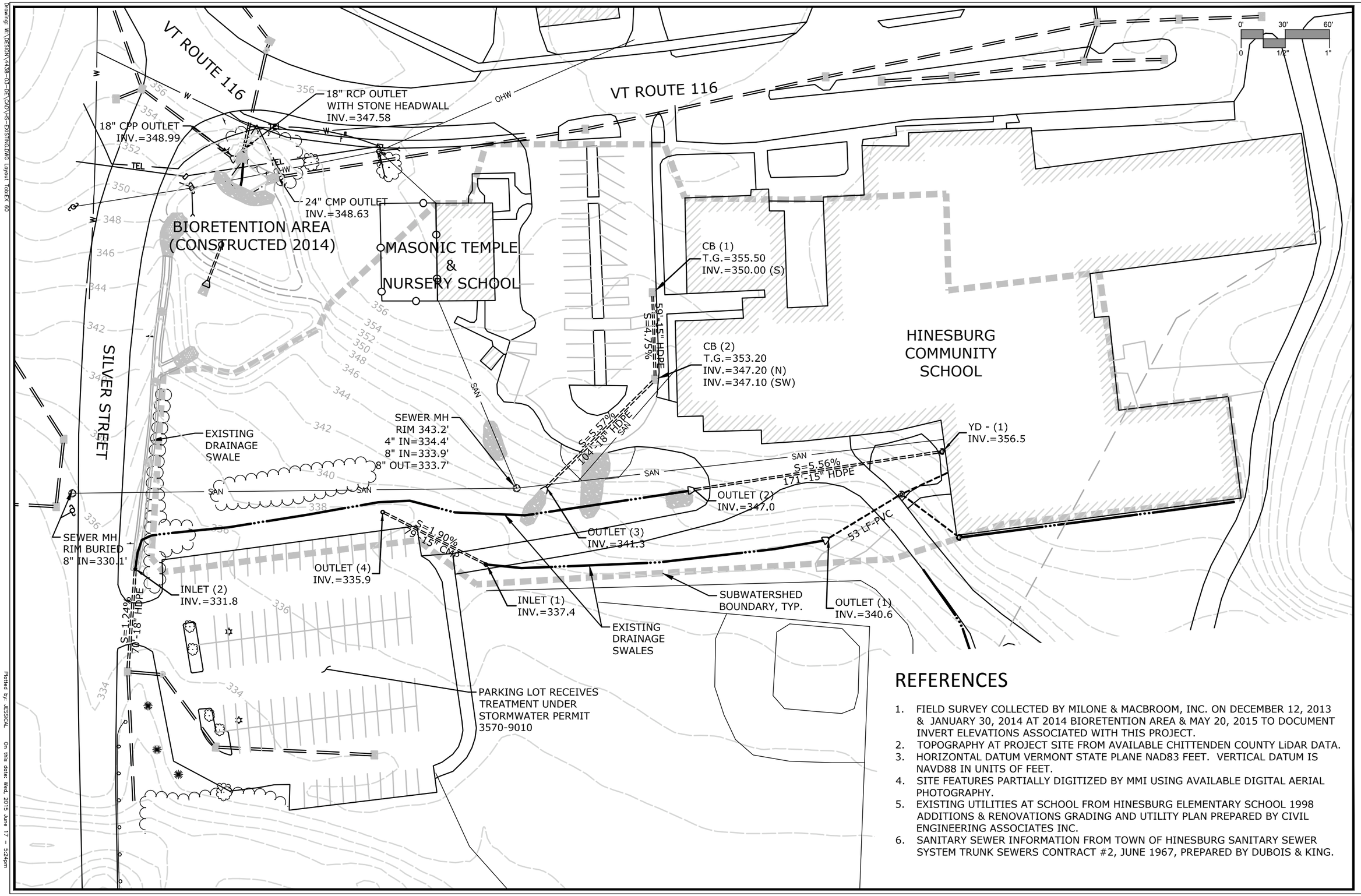

REFERENCES

1. FIELD SURVEY COLLECTED BY MILONE & MACBROOM, INC. ON DECEMBER 12, 2013 & JANUARY 30, 2014 AT 2014 BIORETENTION AREA & MAY 20, 2015 TO DOCUMENT INVERT ELEVATIONS ASSOCIATED WITH THIS PROJECT.
2. TOPOGRAPHY AT PROJECT SITE FROM AVAILABLE CHITTENDEN COUNTY LiDAR DATA.
3. HORIZONTAL DATUM VERMONT STATE PLANE NAD83 FEET. VERTICAL DATUM IS NAVD88 IN UNITS OF FEET.
4. SITE FEATURES PARTIALLY DIGITIZED BY MMI USING AVAILABLE DIGITAL AERIAL PHOTOGRAPHY.
5. EXISTING UTILITIES AT SCHOOL FROM HINESBURG ELEMENTARY SCHOOL 1998 ADDITIONS & RENOVATIONS GRADING AND UTILITY PLAN PREPARED BY CIVIL ENGINEERING ASSOCIATES INC.
6. SANITARY SEWER INFORMATION FROM TOWN OF HINESBURG SANITARY SEWER SYSTEM TRUNK SEWERS CONTRACT #2, JUNE 1967, PREPARED BY DUBOIS & KING.

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REVISIONS

SITE PLAN - EXISTING CONDITIONS

HINESBURG COMMUNITY SCHOOL STORMWATER MANAGEMENT
FEASIBILITY STUDY: TRANSPORTATION-RELATED STORMWATER

HINESBURG COMMUNITY SCHOOL
HINESBURG, VERMONT

CONCEPT DESIGN

JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: 1"=60'

DATE: JUNE 17, 2015

PROJECT NO.: 4438-03

SHEET NO.: 02

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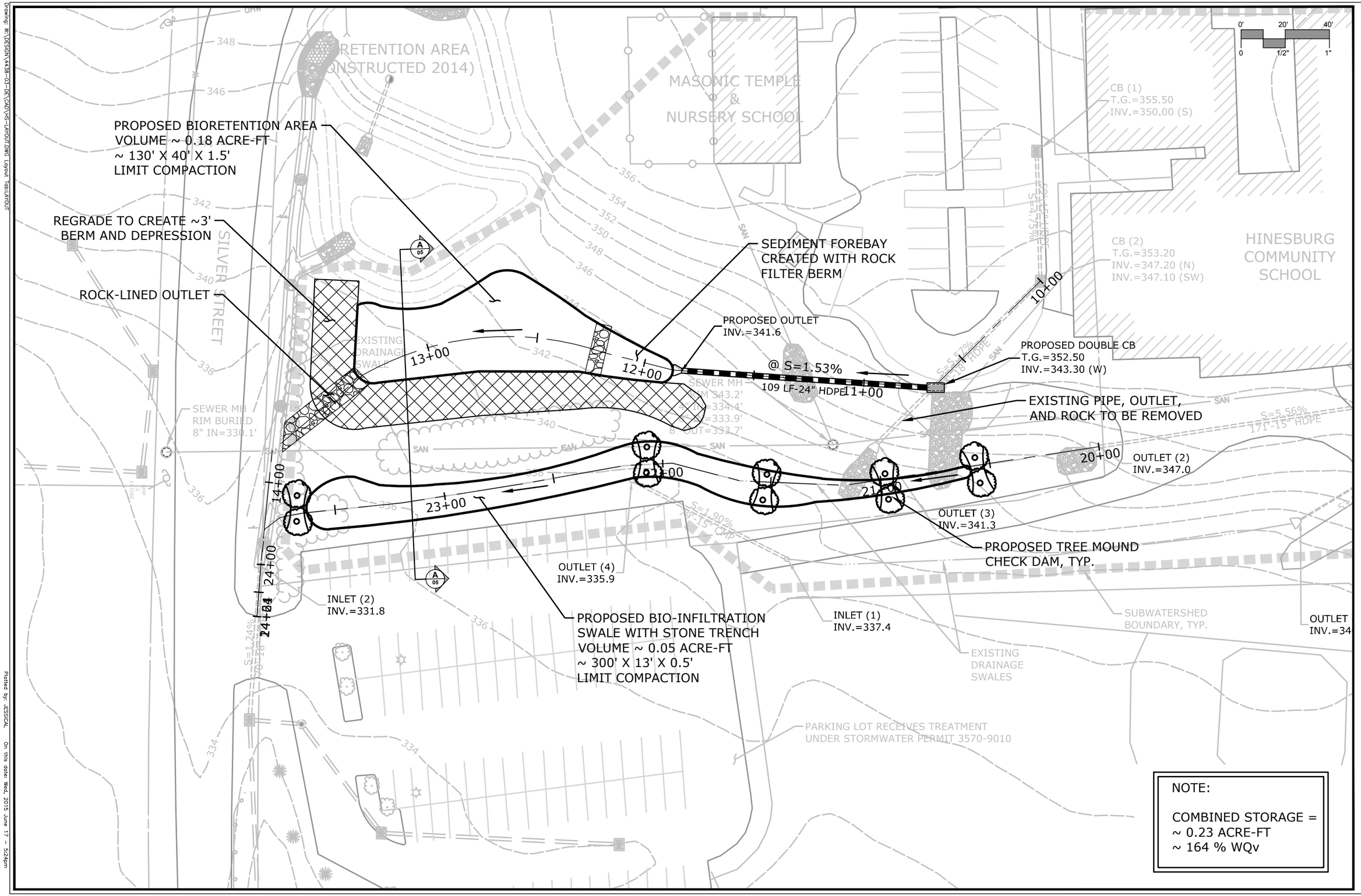

NOTE:

COMBINED STORAGE =
~ 0.23 ACRE-FT
~ 164 % WQv

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REVISIONS

SITE PLAN - PROPOSED CONDITIONS

HINESBURG COMMUNITY SCHOOL STORMWATER MANAGEMENT
FEASIBILITY STUDY: TRANSPORTATION-RELATED STORMWATER

HINESBURG COMMUNITY SCHOOL
HINESBURG, VERMONT

CONCEPT DESIGN

JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: 1"=40'

DATE: JUNE 17, 2015

PROJECT NO.: 4438-03

SHEET NO.: 03

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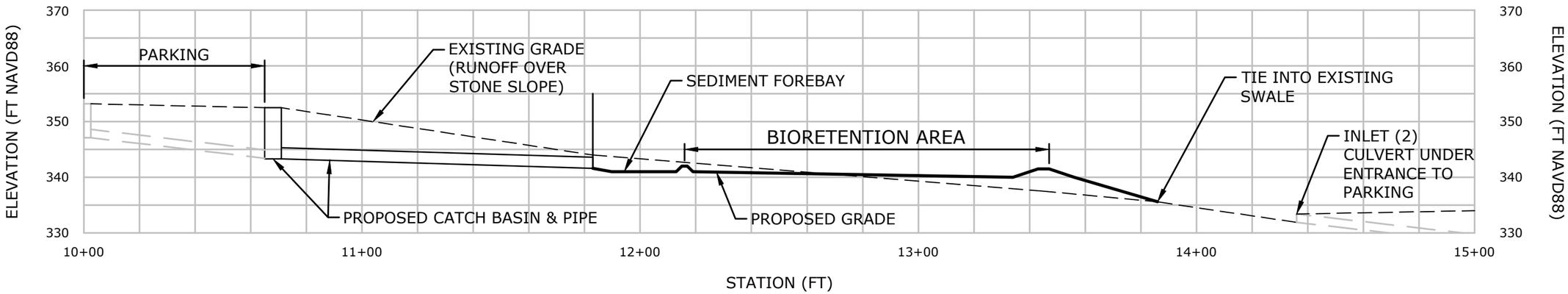
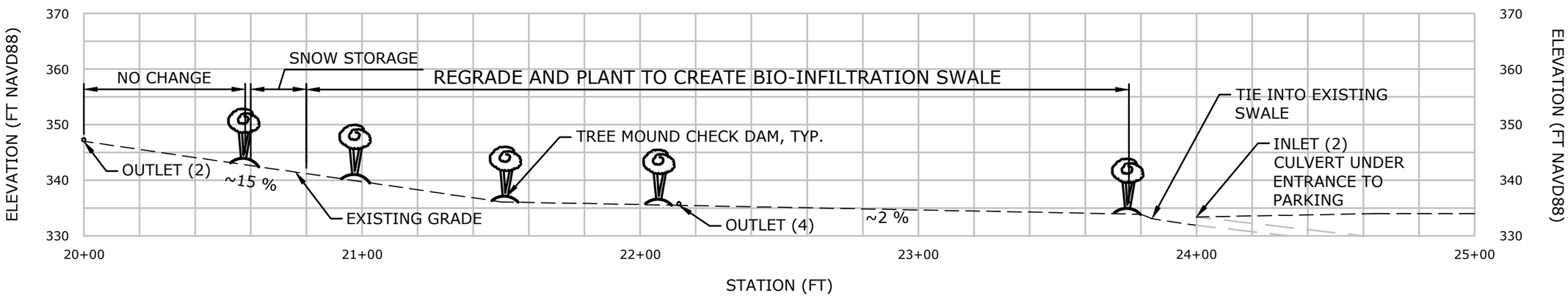


PROFILE: UPPER BIORETENTION AREA

H: 1"=40', V: 1"=20'



PROFILE: LOWER SWALE

H: 1"=40', V: 1"=20'

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REVISIONS

PROFILE

HINESBURG COMMUNITY SCHOOL STORMWATER MANAGEMENT
FEASIBILITY STUDY: TRANSPORTATION-RELATED STORMWATER

HINESBURG COMMUNITY SCHOOL
HINESBURG, VERMONT

CONCEPT DESIGN

JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: H:1"=40', V:1"=20'

DATE: JUNE 17, 2015

PROJECT NO.: 4438-03

SHEET NO.: 04

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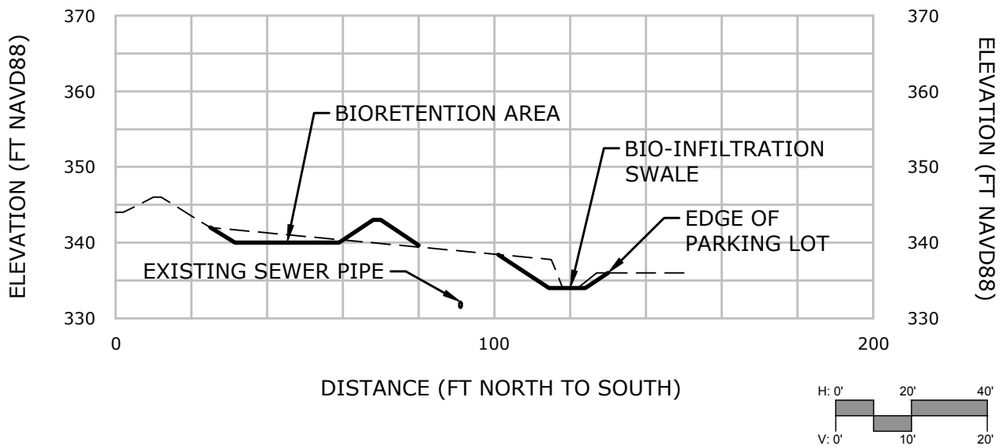
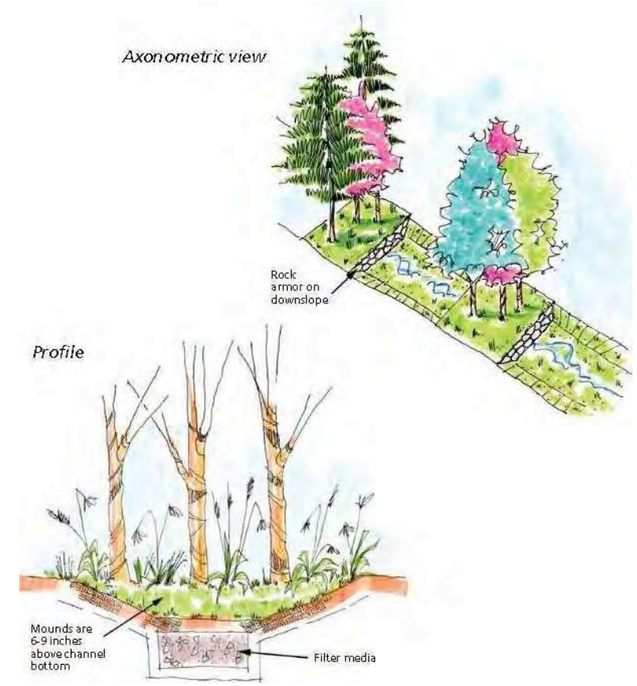


TYPICAL CROSS SECTION A-A

H: 1"=40', V: 1"=20'



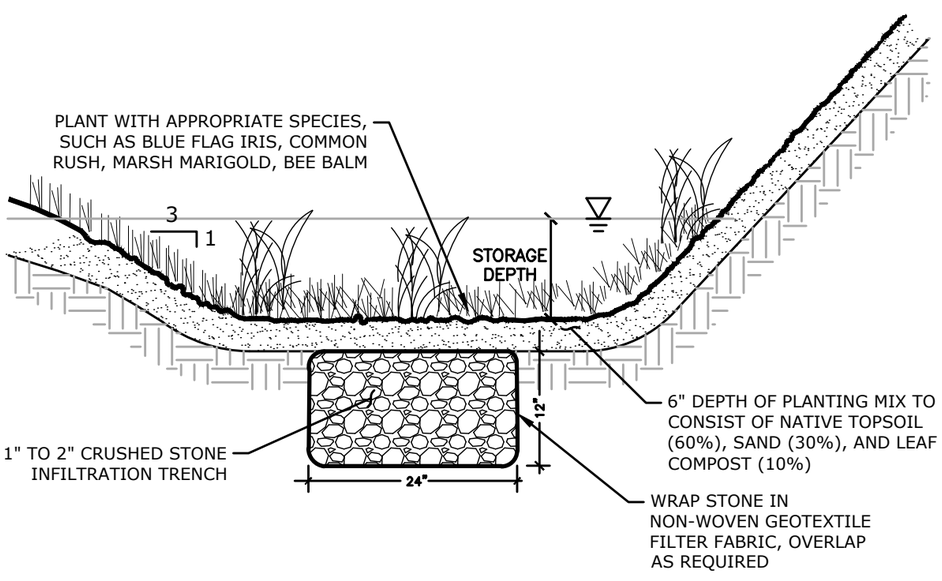
NOTES:

INSTALL TREE MOUND CHECK DAMS ALONG BIO-INFIRLTRATION SWALE AS SHOWN ON PLAN TO REDUCE EFFECTIVE SLOPE OF SWALE AND SLOW WATER.

REFERENCED FROM: URBAN WATERSHED FORESTRY MANUAL, PART 2: CONSERVING AND PLANTING TREES AT DEVELOPMENT SITES. UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE. NA-TP-01-06. MAY 2006.

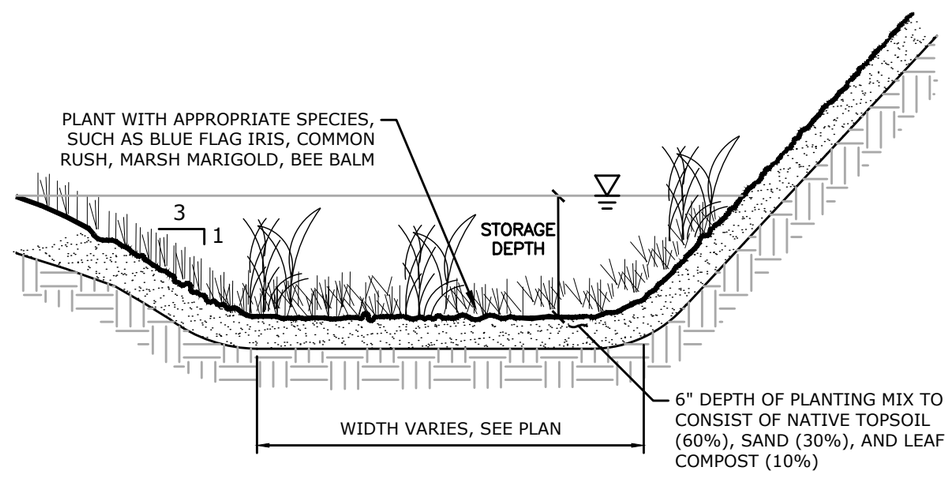
TREE MOUND CHECK DAM

NOT TO SCALE



BIO-INFILTRATION SWALE WITH STONE TRENCH

NOT TO SCALE



BIORETENTION AREA

NOT TO SCALE

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REVISIONS

CROSS SECTION & DETAILS

HINESBURG COMMUNITY SCHOOL STORMWATER MANAGEMENT FEASIBILITY STUDY: TRANSPORTATION-RELATED STORMWATER

HINESBURG COMMUNITY SCHOOL
HINESBURG, VERMONT

CONCEPT DESIGN

JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: VARIES

DATE: JUNE 17, 2015

PROJECT NO.: 4438-03

SHEET NO.: 05

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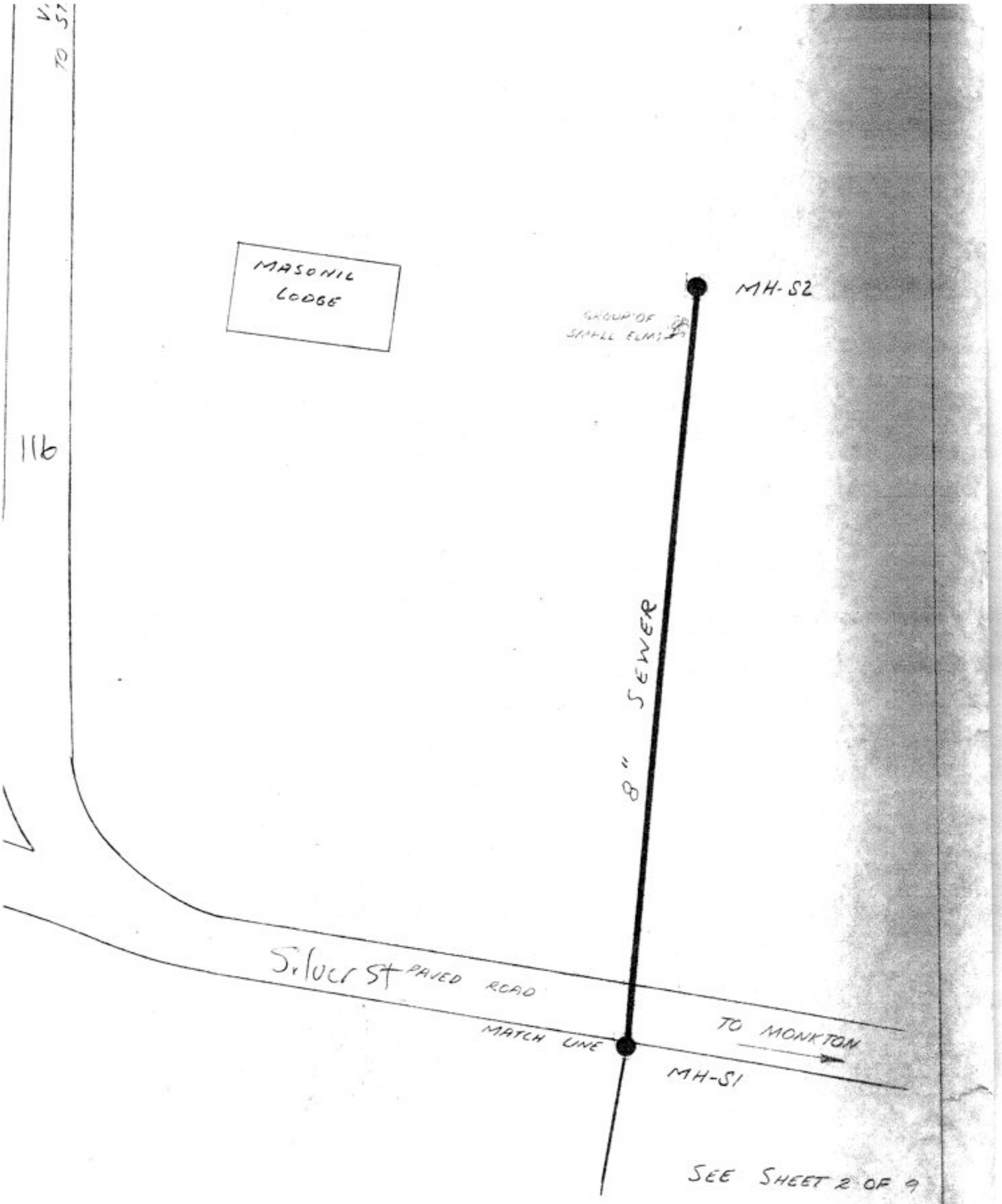
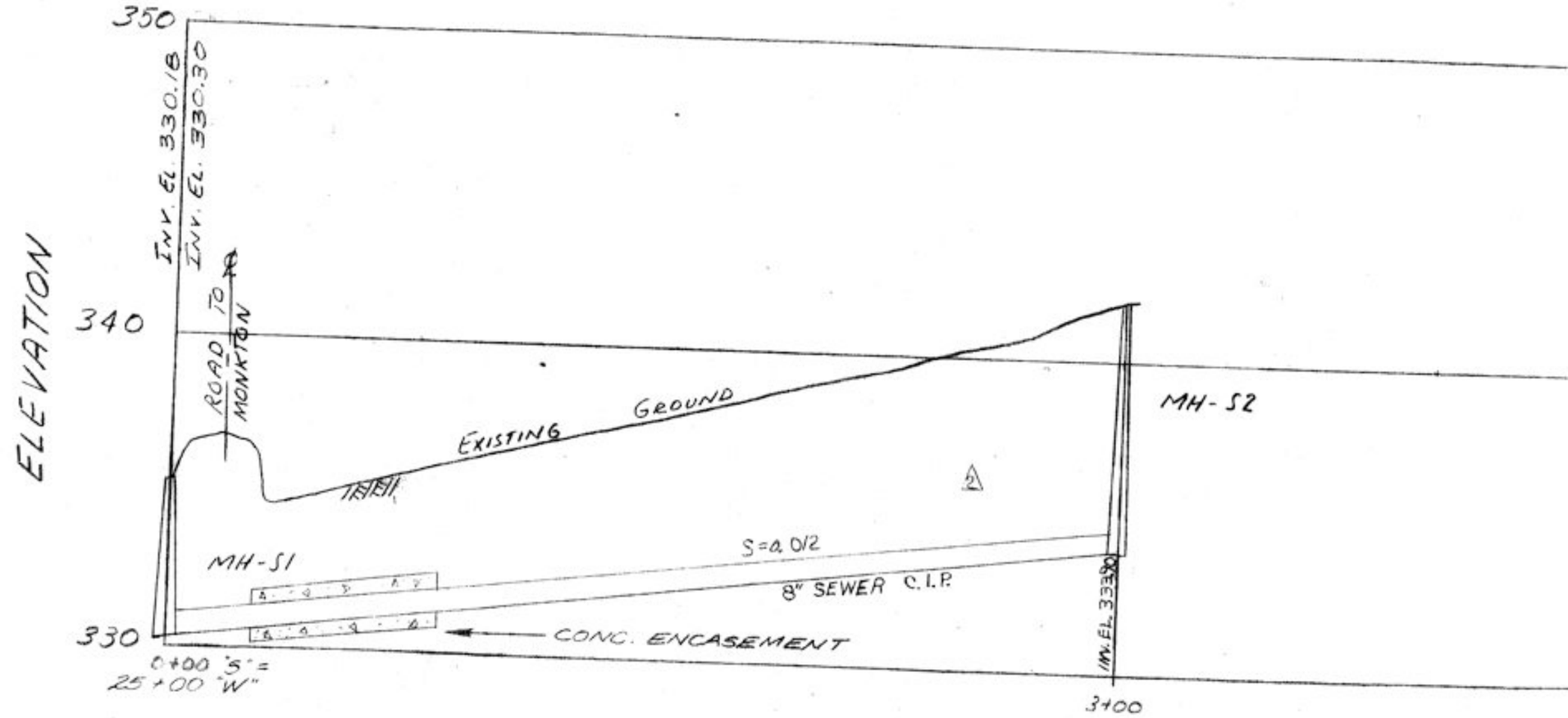


From Dubois & King plans
Town of Hillsborough
Sanitary Sewer System
Trunk Sewers
Contract #2
June 1967

PLAN
SCALE 1" = 40'



NOTE: ALL ELEVATIONS REFER TO U.S.G.S. DATUM.

PROFILE
SCALES HORZ 1" = 40'
VERT. 1" = 4'

HART & MEAD

ROUTE 116

NEW UNDERGROUND FUEL STORAGE TANK & FUEL LINES (SEE MECHANICAL DRAWINGS)

6" TAPPING SLEEVE & TAPPING VALVE TO EXISTING TRANSITE LINE

EXISTING SINGLE WHITE LINE

EXISTING CENTER LINE

EX. CB RIM=99.07

EX. TELEPHONE BOX

EX. 6" WATER MAIN

NEW CB RIM=99.40 INV.=93.7

EX. CB RIM=98.89 INV.=93.5

EX. TELEPHONE BOX

NEW CB RIM=99.2 INV.=94.1

NEW CB RIM=99.3 INV.=94.5

NEW CB RIM=98.9 INV.=95.0

EX. CB RIM=98.52 INV.=94.7

EX. CB RIM=100.23 INV.=95.8

NEW WATER MAIN (BY OTHERS)

NEW CB RIM=98.8 INV.=95.2

NEW CB RIM=98.8 INV.=95.4

HYD.

FIRE LANE

NOTE: REGRADE AREA TO DRAIN TO NEW YARD DRAIN

GRADE TO DRAIN

MASON'S BLDG. & NURSERY SCHOOL

SEE DETAIL "B" THIS SHEET

NEW FUEL OIL LINE

ENTRANCE ELEV. 100.33

ENTRANCE 100.47

ENTRANCE 100.40

ENTRANCE ELEV. 100.45

YARD CB RIM=99.9 INV.=95.9

YARD CB RIM=99.7 INV.=95.7

ELECT. VAULT

EXISTING WATER SERVICE VERIFY IN FIELD

DRAIN POINT OF TERMINATION UNKNOWN

EXISTING FUEL STORAGE TANK REMOVED BY OTHERS UST #2 △2

REMOVE EXISTING FUEL TANK AND INSTALL NEW BIT CONC. △2 UST #1

YARD CB RIM=99.4 INV.=95.5

YARD CB RIM=99.4 INV.=95.7

YARD CB RIM=99.33 INV=95.9

YARD CB RIM=99.3 INV.=96.3

EXISTING SCHOOL BUILDING

DETAIL "A" WALL ELEV'S. PLAN

EX. CB RIM=99.2±

REMOVE EXISTING DRYWELL AND EXTEND NEW STORM DRAIN. TIE IN EXISTING AND PROPOSED ROOF DRAINS INTO NEW DRAIN LINE. (SEE PLUMBING DRAWING)

NOTE: SEE ENLARGED PLAN ON SHT. C 5

SEE DETAIL "A" THIS SHEET TOW ELEVATIONS

REMOVE FUEL FILLER AND EX. FUEL TANK UST #3

NEW CB RIM=93.2 INV.=88.7

NEW FUEL OIL LINE

ROOF DRAIN TIE-IN

TRANSITION CURB

DEMOLITION & NEW CONSTRUCTION

NEW ADDITION

NOTE: △2 CONTRACTOR TO COORDINATE WITH OWNERS POLLUTION ABATEMENT CONTRACTOR. SITE CONTRACTOR IS RESPONSIBLE FOR EXCAVATING & STOCKPILING CONTAMINATED MATERIAL.

NOTE: THESE PLANS DEPICT THE GENERAL LOCATIONS OF THE PROPOSED ELECTRICAL & MECHANICAL SITE UTILITIES. REFERENCE SHALL BE MADE TO THE APPROPRIATE SITE ELECTRICAL & MECHANICAL PLANS PREPARED BY DUBOIS & KING FOR SPECIFIC LOCATIONS, MATERIALS AND INSTALLATION REQUIREMENTS.

EX. SMH ASSUMED BM RIM ELEV. 83.60 INV. IN 74.3 INV. OUT 74.0

STONE LINE DITCH WHERE GRADE IS GREATER THAN 5%

TIE EX. 4" FOUNDATION DRAIN TO NEW DRAINAGE SYSTEM (SEE PLUMBING PLAN)

RELOCATE EX. SEWER LINE

TIE EX. 6" ROOF DRAIN TO NEW DRAINAGE SYSTEM (SEE PLUMBING PLAN)

INSTALL NEW YARD DRAIN INV.=96.5

EXISTING DOWNSPOUT, MAINTAIN CONNECTION INTO STORMWATER COLLECTION SYSTEM △2

EX. CB RIM=98.50 INV.=95.0

RECEIVED MAY 5 1998 PIZZAGALLI CONST. CO.

NOTE: △2 THE BENCHMARK ELEVATTION FOR WORK INSIDE THE BUILDING IS 0.08' HIGHER THAN THE BENCHMARK FOR THE SITE WORK. EXAMPLE SITE WORK GRADE 97.42 = 97.50 BUILDING GRADE.

NEW BIT. CONC. OVERLAY

NEW BIT. CONC. PAVEMENT

HANDICAP ACCESSIBLE RAMP

GRAPHIC SCALE

(IN FEET) 1 inch = 20 ft.

STONE LINED DISPERSION PAD (TYP.)

15" HDPE W/ FLARED END SECTION INV.=83.0

15" HDPE W/84 FLARED END SECTION INV.=87.0

EX. INV. 77.41

DEEPEN EXISTING SWALE

EXTEND EXISTING 15" CMP 40' NEW INV.=75.6

ABANDONED DISPOSAL FIELD

6" PVC DAYLIGHT INV. 80.55

CUT & MATCH EXISTING PAVEMENT (TYP. 5 PLACES)

EX. PAVED DRIVE

EX. GRAVEL DRIVE

BASEBALL DIAMOND

SOCCER NET

BENCH

EX. CONC. WALK

RECESSED CURB

DETAIL "B" STAIR ELEVATIONS

TOP OF STAIR 100.0

TOP OF STAIR 99.5

T.O.W. ELEV. 100

T.O.W. ELEV. 100

Date	Ch'k'd	Revision
4-29-98	DSM	GENERAL REVISIONS
3-13-98	DSM	REVISED PARKING LOT & UTILITIES. REMOVED CANOPIES

Drawn by ACL | Date NOV. 1997

Checked by DSM | Scale 1" = 20'

Approved by ____ | Project No. 97323

HINESBURG ELEMENTARY SCHOOL 1998 ADDITIONS & RENOVATIONS GRADING & UTILITY PLAN

HINESBURG VERMONT

CIVIL ENGINEERING ASSOCIATES, INC. SHELBURNE, VERMONT

SHEET C 3

C:\SDSK\PROJ\97323\97323-C3.dwg Wed Apr 29 11:34:31 1998 AL

APPENDIX 5

Cost Opinion

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COSTS
HINESBURG COMMUNITY SCHOOL STORMWATER MANAGMENT
HINESBURG, VERMONT
JUNE 2015

CONCEPT DESIGN

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	AMOUNT
Mobilization / Demobilization / Construction Layout / Sediment & Erosion Controls / Site Recovery	LS	1	$ 10,000	$ 10,000
Excavation & Grading - Form Bioretention area and Bio-Infiltration Swale	LS	1	$ 6,000	$ 6,000
Earthen Embankment Compaction - Check dams and berm	LS	1	$ 2,000	$ 2,000
Furnish & Install - Catch Basin and Piping	LS	1	$ 10,000	$ 10,000
Furnish & Install - Bioretention Area Outlet and Filter Berm	LS	1	$ 6,000	$ 6,000
Furnish & Install - Swale Filter Media	LS	1	$ 1,000	$ 1,000
Furnish & Install - Erosion Control Matting	LS	1	$ 2,000	$ 2,000
Amended Topsoil	LS	1	$ 5,000	$ 5,000
Plantings - Furnish & Install Plants	LS	1	$ 25,000	$ 25,000

*Cost does not include utility relocations and property acquistions/easements

PROJECT SUBTOTAL =	**$ 67,000**
FINAL DESIGN ENGINEERING =	**$ 19,400**
INCIDENTALS TO CONSTRUCTION (5%) =	**$ 3,350**
CONSTRUCTION CONTINGENCY (10%) =	**$ 6,700**
TOTAL (rounded) =	**$ 96,000**

APPENDIX 6

Presentation Slides

Engineering, Planning, Landscape Architecture and Environmental Science

MILONE & MACBROOM

Town of Hinesburg / Chittenden County Regional Planning Commission

Feasibility Study: Opportunities to Manage Transportation Related Stormwater Runoff

Project Study Overview

- The Town is seeking to develop additional stormwater treatment best practices ("BMPs") within the Village Growth Area, particularly areas of untreated impervious associated with existing transportation infrastructure
- Two key objectives:
  1. Identify treatment opportunities for existing untreated impervious areas associated with primary public roadways and other transportation infrastructure.
  2. Identify and evaluate potential locations for BMPs by reducing peak discharge and improve water quality in tributaries (Patrick Brook and LaPlatte River)

Project Phases

1. Data Collection
2. Alternatives Analysis
3. Stakeholder Outreach & Coordination
4. Concept Design Plans

Phase 1: Data Collection

- Review data from existing studies
- Update land use changes or other relevant alterations that have occurred since the previous studies were completed in order to provide an existing baseline condition
- Evaluate potential sites using desktop analysis and field reconnaissance
- Prioritize sites for future implementation and advance priority sites for further analysis and additional field investigation
- All sites located within the Village Growth Area
- Town facilitated interactions with landowners who may be amenable to locating BMPs on their property
- Produce GIS maps and brief descriptions of the evaluated sites

Initial Site Investigations

Site Number	Site Location	Site Owner(s)
1	Mobil Gas Station (Route 116 at Patrick Brook)	Jolley Associates
2	Hart & Mead Gas Station (Route 116 at Lyman Meadows Road)	Hart & Mead, Inc.; Andrew Burton
3	Hinesburg Community School, Parking Area	Town of Hinesburg
4	CVU Road near Playing Fields	Public ROW; CVU School
5	Cheese Factory Site (Route 116 at Mechanicsville Road)	Redstone
6	Lyman Meadows Northern Section	Andrew Burton; Town of Hinesburg
7	Route 116 ROW near Riggs Road (Renewable NRG Systems, Inc.)	Public ROW
8	Ballards Corner (Shelburne Falls Road at Route 116)	Citgo Gas Station; Merchants Bank; Library
9	Hinesburg Community School Play Area	Town of Hinesburg
10	Russell Farm Wetlands (behind Lantman's Market)	Russell Family Farm
11	Charlotte Road at Route 116	Public ROW; Green Street LLC.

Phase 2: Alternative Analysis

- Alternative Analysis narrowed the list of evaluated sites and documented the opportunities and constraints at the other locations that were evaluated
- Alternative Analysis Report includes:
  - Narrative descriptions
  - GIS maps from Phase 1
  - Matrix ranking the Alternatives
- Top three sites included the following sites within the Village Area and located on or adjacent to Route 116:
  - Mobil Gas Station adjacent to Patrick Brook
  - Hart & Mead Gas Station adjacent to Lyman Meadows
  - Hinesburg Community School

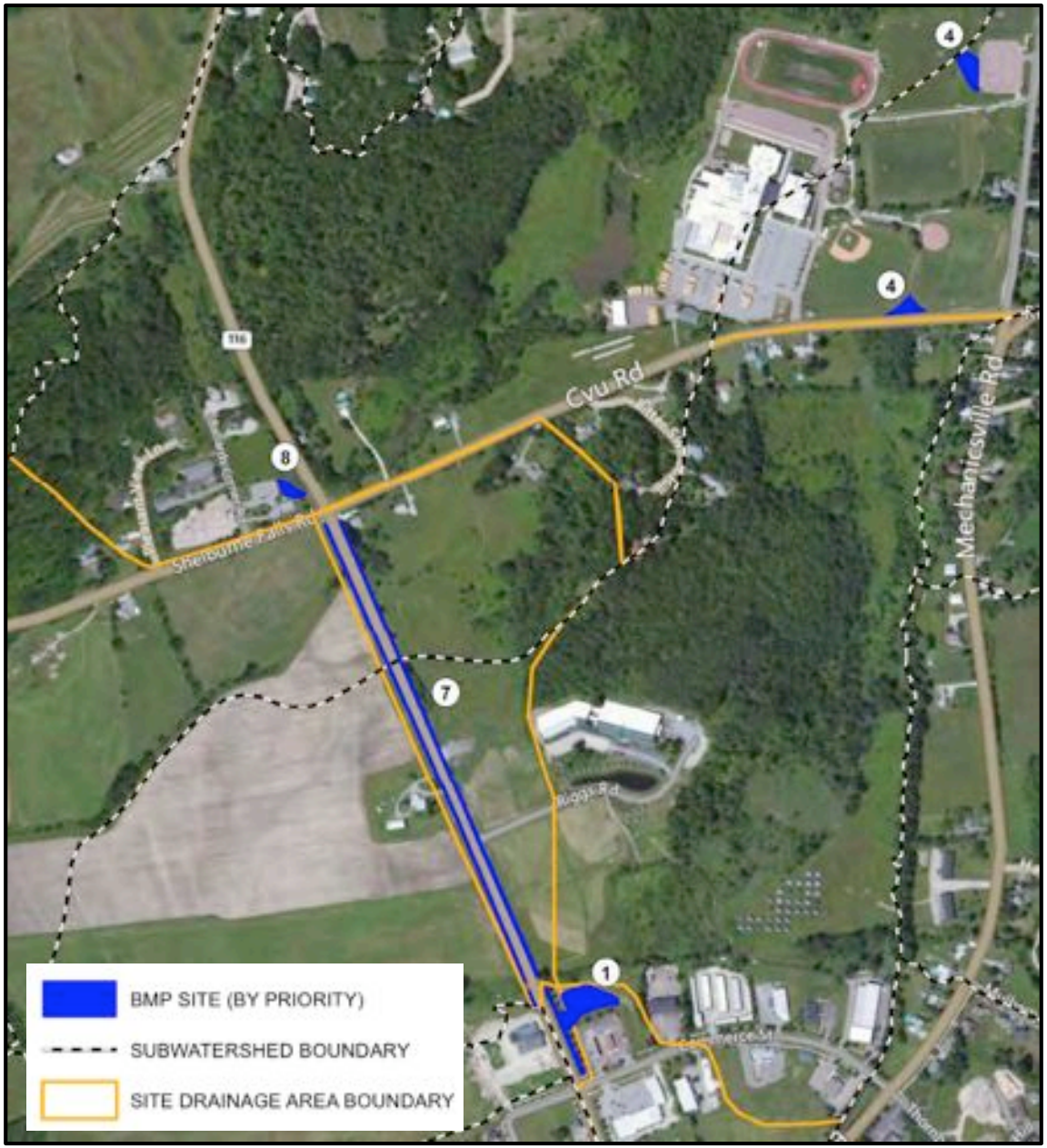
				SUBWATERSHED		SITE						OBJECTIVES				FEASIBILITY		
Site Number (By Priority)	Project Location	Property Owner	BMPs	Runoff Ranking	Channel Protection Volume Depth (inches)	Approximate Drainage Area to Outlet (acres)	Approximate Impervious Area to Outlet (%)	Approx. Channel Protection Volume (acre-ft)	Approx. BMP Storage (acre-ft)	Approx. BMP Storage (% WQv)	HSG (NRCS 2011)	Improve Water Quality	Reduce Flood and Erosion Risk	Capture Runoff from Impervious Surfaces	Capture Runoff from Transportation Infrastructure	Constructability / Permitability	Cost	Notes
1	Mobil Gas Station / Route 116 at Patrick Brook	Jolley Associates	Detention on South side	0.52	0.7	16.7	25.2	0.9	1.2	134.0	C	+	o	+	+	M	L	Connect to ditch along Route 116, collecting flow from roadway and adjacent commercial areas. Avoid mapped wetland along Patrick Brook. Area partially in floodplain and river corridor.
2	Hart & Mead Gas Station/Lyman Meadows	Hart & Mead, Inc.; Andrew Burton	Bioretention along existing swale and been behind Hart & Mead. Retrofit storm manhole with pollution control at gas station	0.63	0.7	19.8	25.6	1.2	1.5	130.7	D	+	o	+	o	M	M	Expand existing ditch network to a larger bioretention area. Area crosses multiple private properties. Runoff from portion of Route 116, residential roads and parking, and commercial parking areas.
3	Hinesburg Community School, Parking Area	Town of Hinesburg	Bioretention area north of lower parking lot. Retrofit storm manhole with separator	0.41	0.6	5.2	44.8	0.3	0.5	183.0	D	+	o	+	o	H	M/H	Treat runoff from school roof and parking lots. Good infiltration location. Limited space due to active recreation area and proximity to river.
4	CVU Road near Playing Fields	Public ROW; CVU School	Detention or Bioretention between ball fields and along upper parking lot. Swirl separator at front parking lot possible	0.52	0.7	42.0	19.8	2.3	0.8	35.6	C/D	o	o	+	o	M/H	M	Captures runoff from athletic fields, parking lots, and roads. Integrated into discharge culvert under path. Relatively low storage capacity within available area without subsurface construction.
5	Cheese Factory Site	Redstone	Small detention near gravel parking lot. Ditch improvement. Retrofit existing pre-treatment pond possible	0.63	0.7	86.6	15.4	5.2	2.2	43.3	B/D	o/+	o	+	+	H/M	M/L	Long ditch network for revegetation easy and low cost to implement. Detention area near gravel parking lot would be small compared to watershed size. Lower field is a wetland and a practice in this location may consist of just revegetation. Two lagoons may be used, but getting water into them is not straight forward and could limit treatment volume. Piping may be needed to transport water to the lagoons. Detailed survey will be required.
6	Lyman Meadows Northern Section	Andrew Burton; Town of Hinesburg	Bioretention along existing swale	0.63	0.7	2.8	30.7	0.2	0.3	165.2	D	o	o	+	-	M	L	Limited space due to soccer field and residential lawn.
7	Route 116 ROW near NRG	Public ROW	Linear bioretention along Route 116	0.47	0.6	35.7	9.5	1.9	0.5	27.4	B/D	o	-	o	o	M	M	Slope of existing land complicates treatment other than linear features along road. Potential for linear bioretention areas in proposed 25' Town setback. Could be incorporated into roadway improvements as part of upcoming VTrans project or NRG Master Plan.
8	Ballards Corner	Crisp Gas Station; Merchants Bank; Library	Increase storage potential along channel in existing lean of bank	0.42	0.6	214.0	7.7	11.1	0.3	3.0	D	-	-	o	+	M	L	Limited space due to existing development along channel. New gas station has some treatment. Possible check dams along channel where eroding.
9	Hinesburg Community School, Play Area	Town of Hinesburg	Bioretention between tennis court and ice rink	0.41	0.6	3.4	12.3	0.2	0.2	95.3	D	o	-	o/-	-	M	L	Limited transportation connection. Limited space due to active recreation and proximity to river and wetland. River buffer.
10	Russell Wetlands	Russell Family Farm	Possible Treatment	0.63	0.7	40.8	13.7	3.6	0.4	11.8	D	o	o	o	o	L	M	Current stormwater storage in wetland. Increase of storage in wetlands not allowed per regulations. Also expansion of storage would impact existing farm operations.
11	Charlotte Road	Public ROW; Green Street LLC	None	0.41	0.6	7.4	31.4	0.4	0.0	0.0	D	-	-	+	+	N/A	N/A	Ditch erosion repaired during previous sidewalk project. No space for additional surface treatment. Lower portion of swale in wetland.

+ Effective
o Moderate
- Limited

H High
M Medium
L Low

Alternative Analysis Site Matrix

Engineering, Planning, Landscape Architecture and Environmental Science
MILONE & MACBROOM

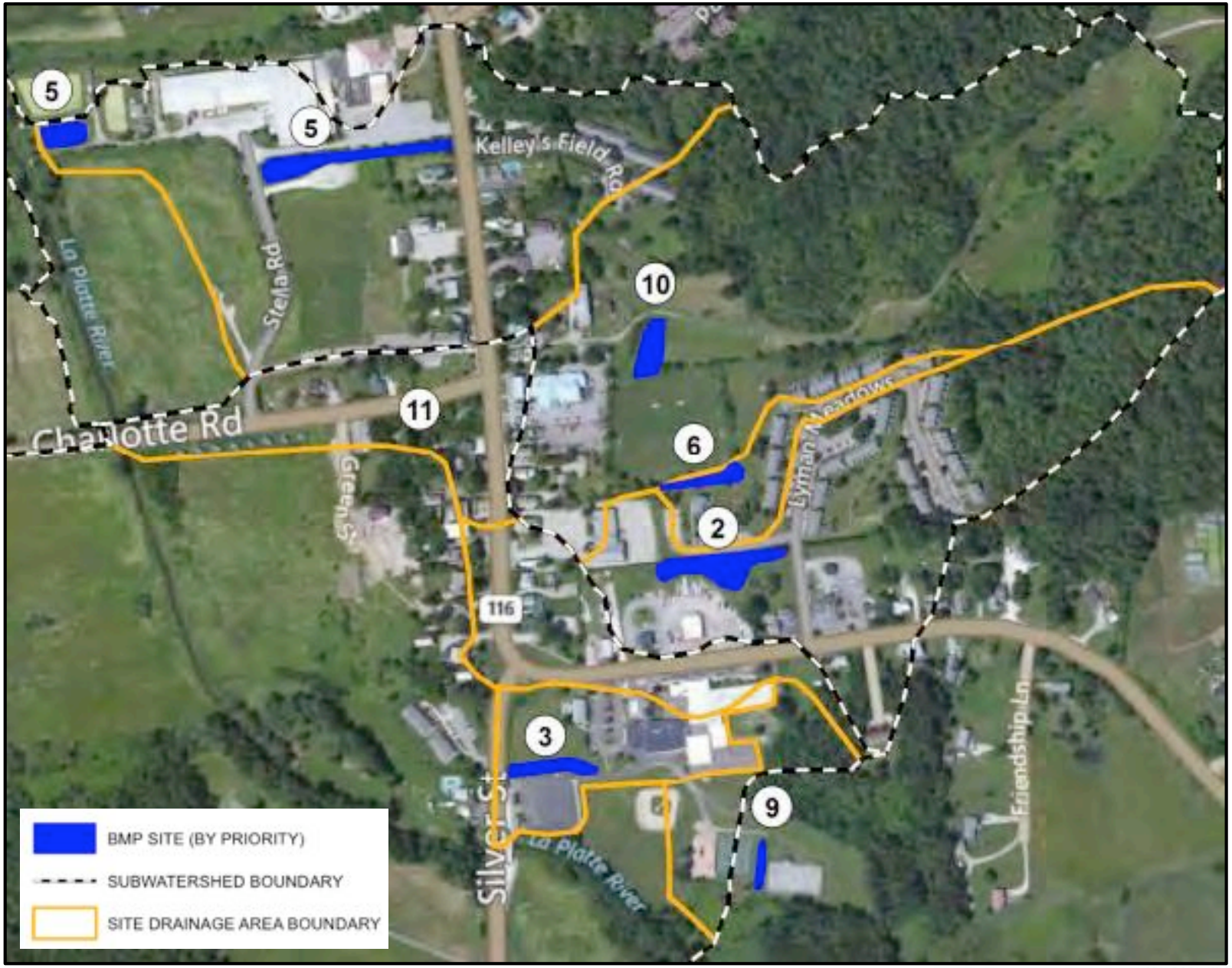


Potential Stormwater BMPs (Northern Area)

vhb

Engineering, Planning, Landscape Architecture and Environmental Science

MILONE & MACBROOM



Potential Stormwater BMPs (Southern Area)

vhb

Engineering, Planning, Landscape Architecture and Environmental Science

MILONE & MACBROOM

Phase 3: Stakeholder Outreach

Coordinate with stakeholders to ensure buy-in from state regulators and understand potential sources of funding.

Attendees included the following:

- Vermont Agency of Transportation (VTrans)
  - Jennifer Callahan, Operations
  - Jonathan Armstrong, Stormwater Management
- Vermont Department of Environmental Conservation
  - Jim Pease, Ecosystem Restoration Program
- Town of Hinesburg
  - Alex Weinhagen, Director of Planning
  - Andrea Morgante, Hinesburg Select Board
- Chittenden County Regional Planning Commission
  - Dan Albrecht, Senior Planner

Phase 3: Stakeholder Outreach

Concerns that were raised were factored into the revised Alternatives Analysis

- VT DEC Ecosystem Restoration Program staff indicated that they were not comfortable with siting proposed stormwater BMPs within the 100-year floodplain. This concern was raised at the Mobil Station adjacent to Patrick Brook, over concerns that the longevity of the BMP would be compromised when flooding would occur.
- VTrans staff indicated that funding for stormwater BMPs would need to have a majority of the impervious area tributary to the facility being publicly-owned. This concern was raised at the Hart & Mead site due to the impervious area associated with Lyman Meadows being private property.
- Town of Hinesburg representatives expressed an interest in evaluating the Hinesburg Canal as a potential stormwater BMP, however, the permitting, management, and ownership issues of this facility are challenging and were not developed further at this time.

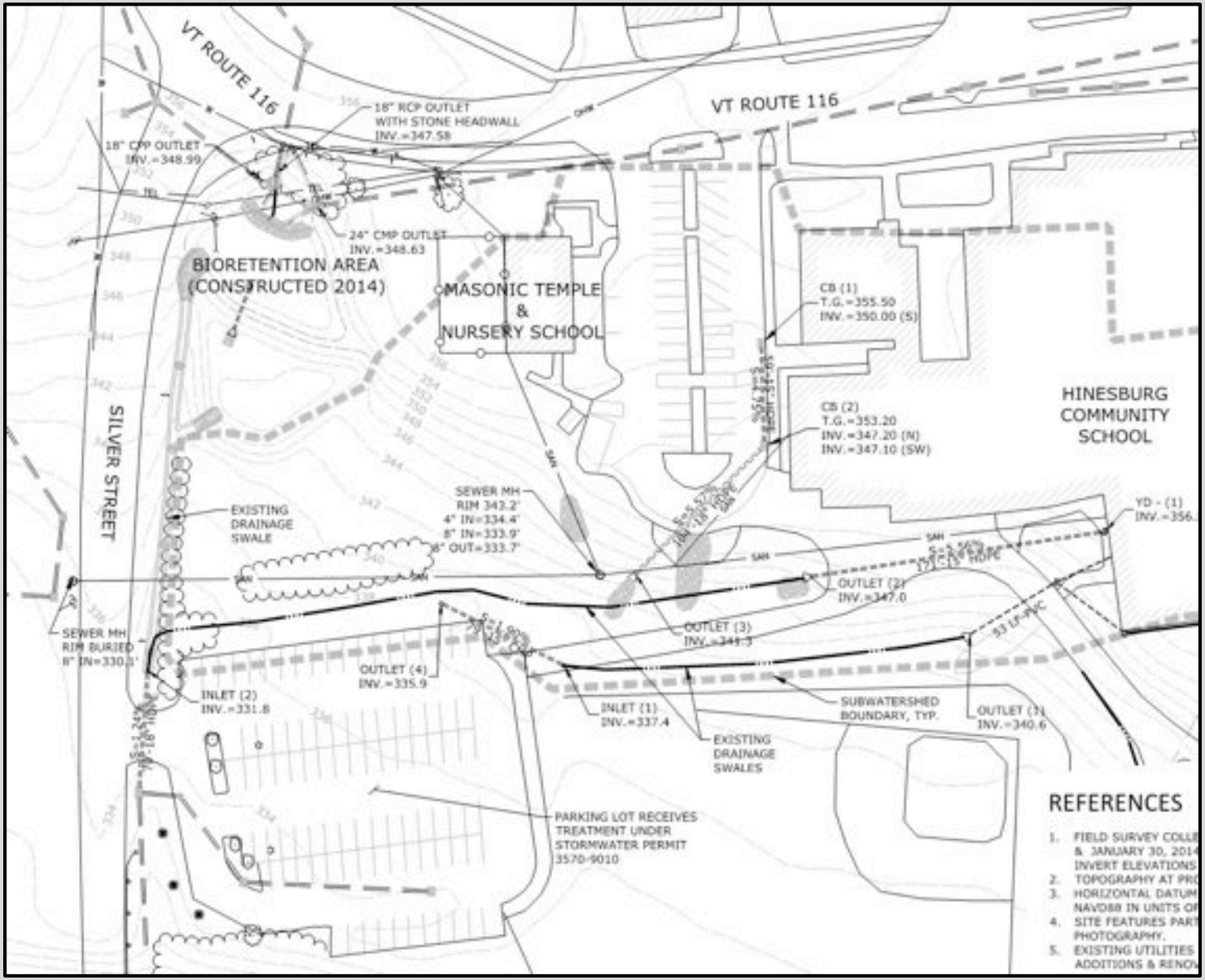
Phase 4: Conceptual Design

- The Project team will address and incorporate comments from round one of Town/CCRPC review of the conceptual design plans
- Concept Design Plan will include…
  - Cover
  - Existing Conditions
  - Proposed Conditions (Footprint and Primary Dimensions)
  - System Profile, and Typical Section and Sample Details
- Hydrologic and Hydraulic Report with calculations demonstrating the capacity of the selective alternative will be produced

Concept Plans – Overall Site Plan

vhb

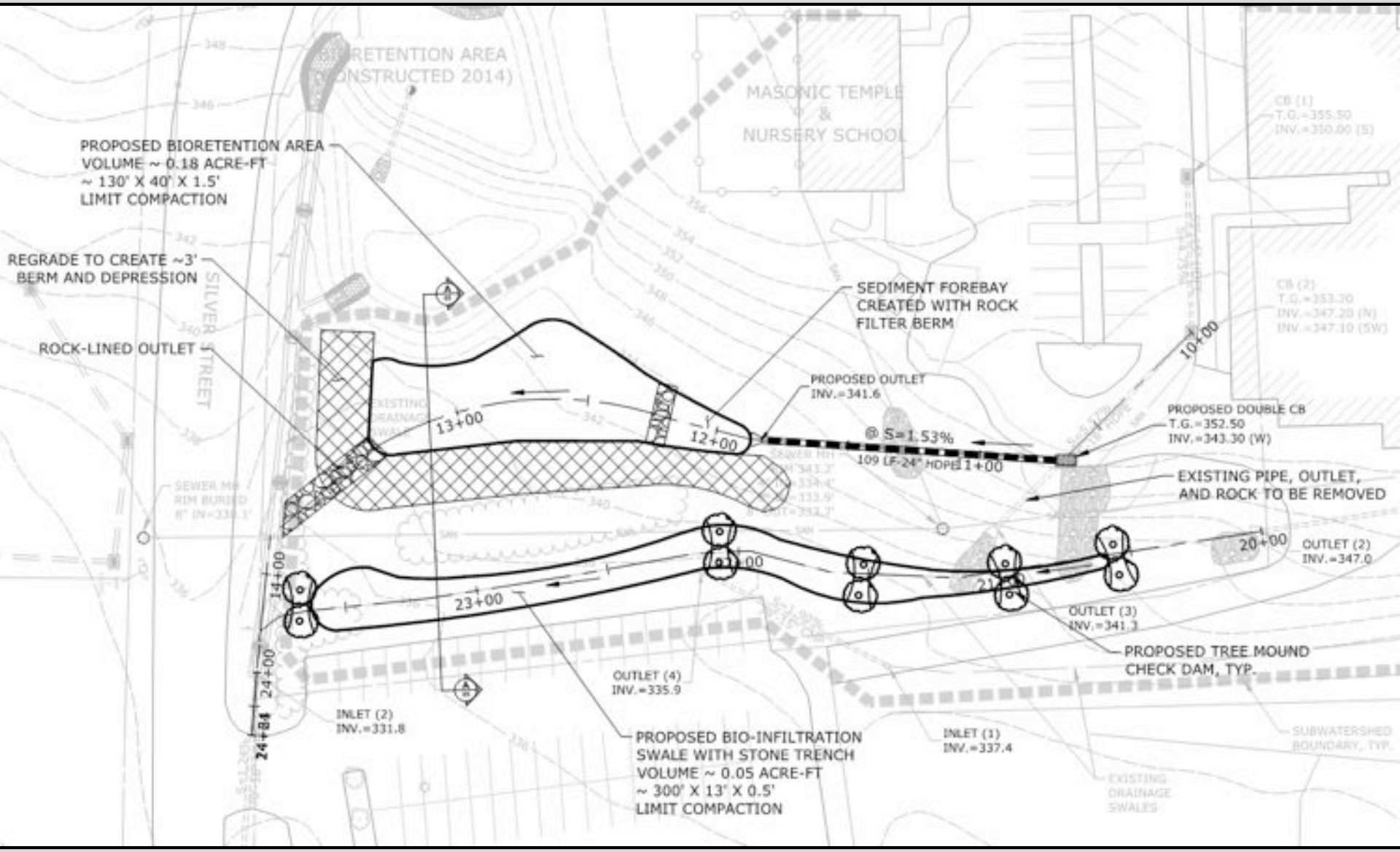
Engineering, Planning, Landscape Architecture and Environmental Science
MILONE & MACBROOM



Concept Plans – Existing Conditions

vhb

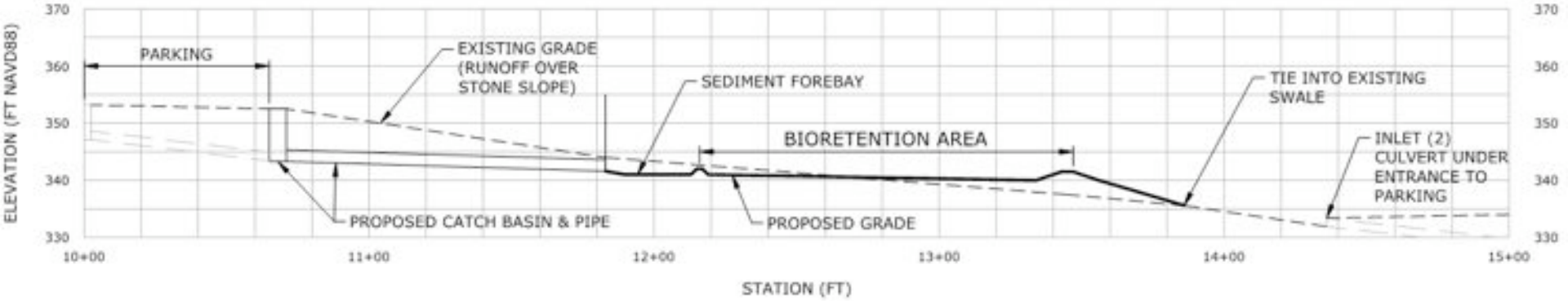
Engineering, Planning, Landscape Architecture and Environmental Science
MILONE & MACBROOM



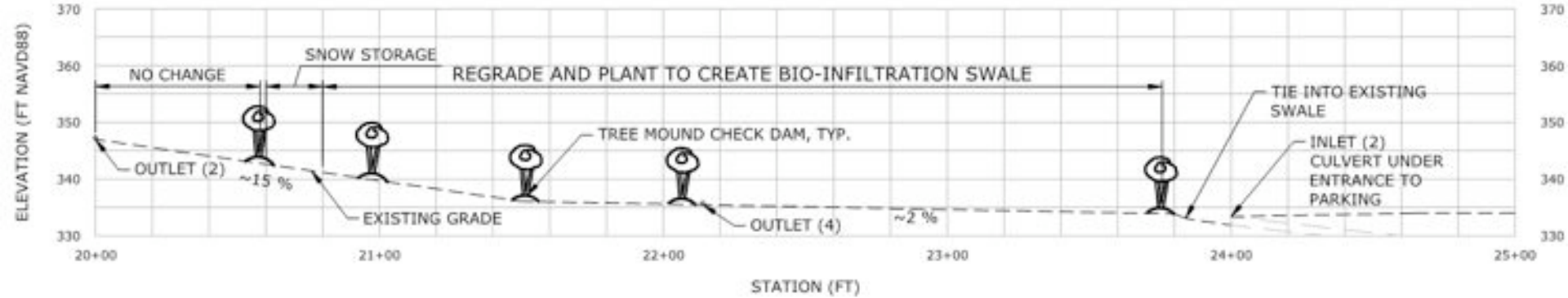
Concept Plans – Proposed Conditions

vhb

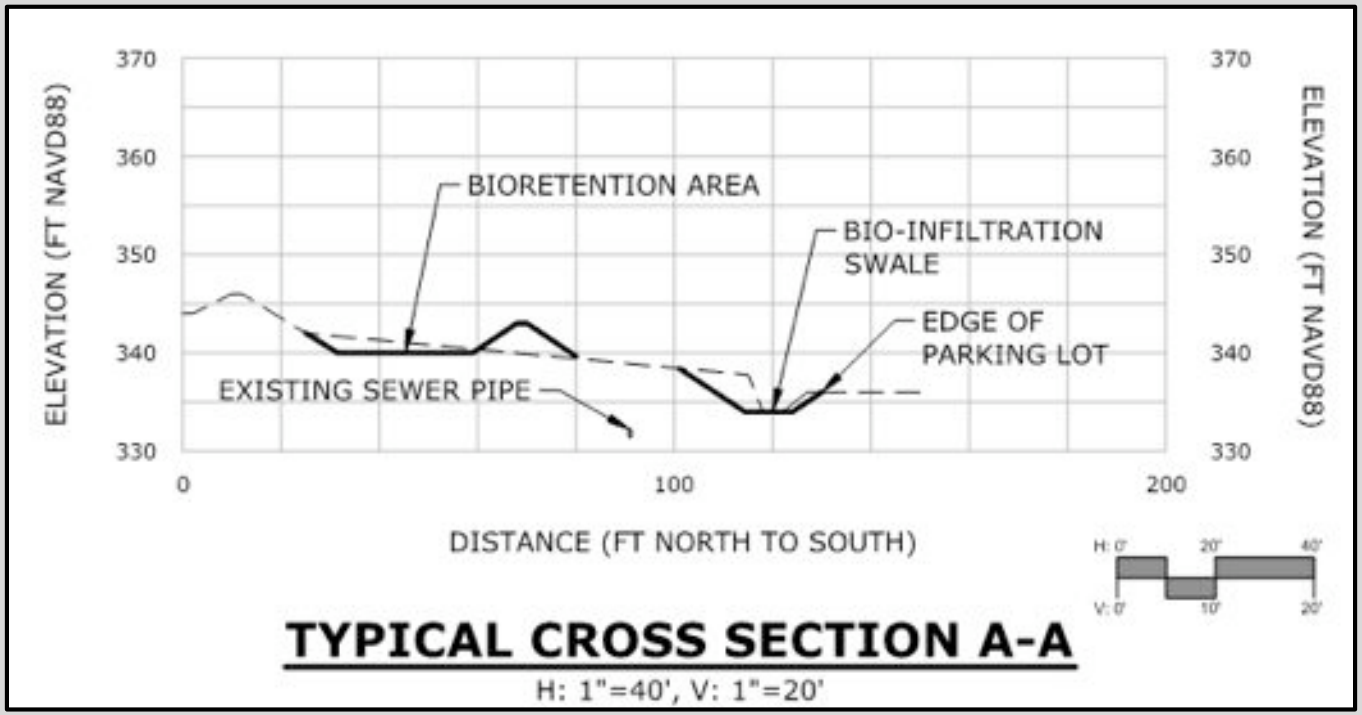
Engineering, Planning, Landscape Architecture and Environmental Science
MILONE & MACBROOM



PROFILE: UPPER BIORETENTION AREA



PROFILE: LOWER SWALE



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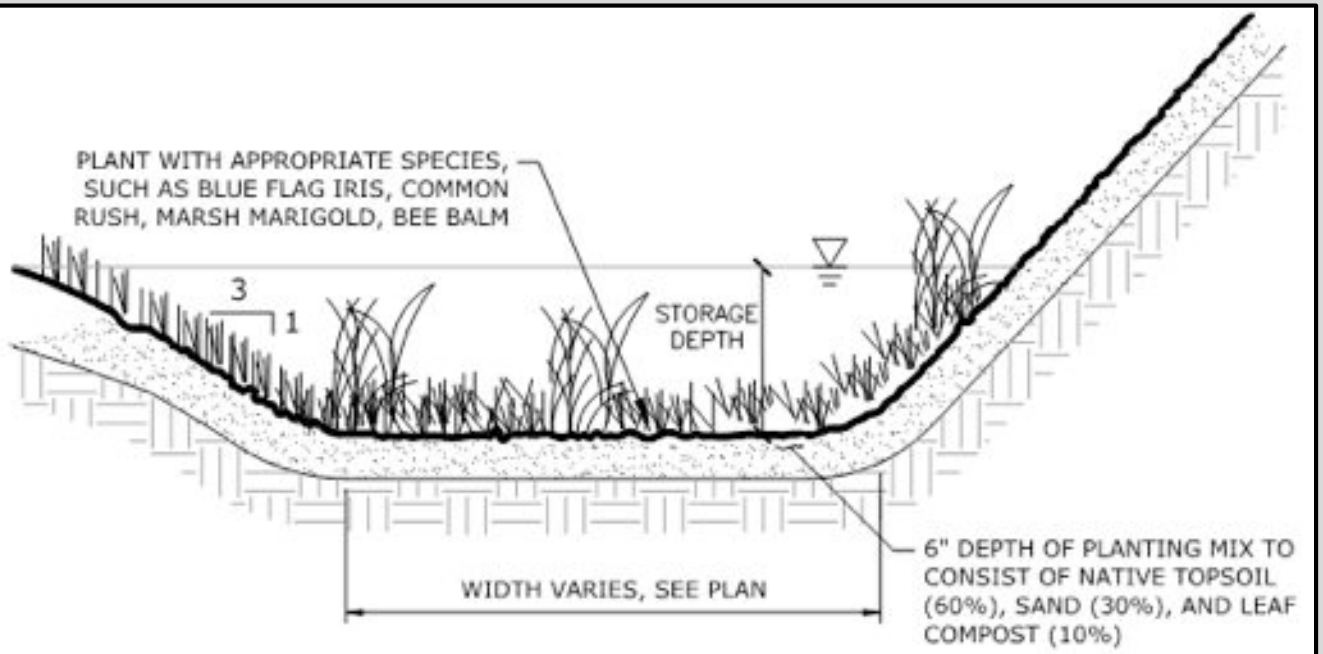
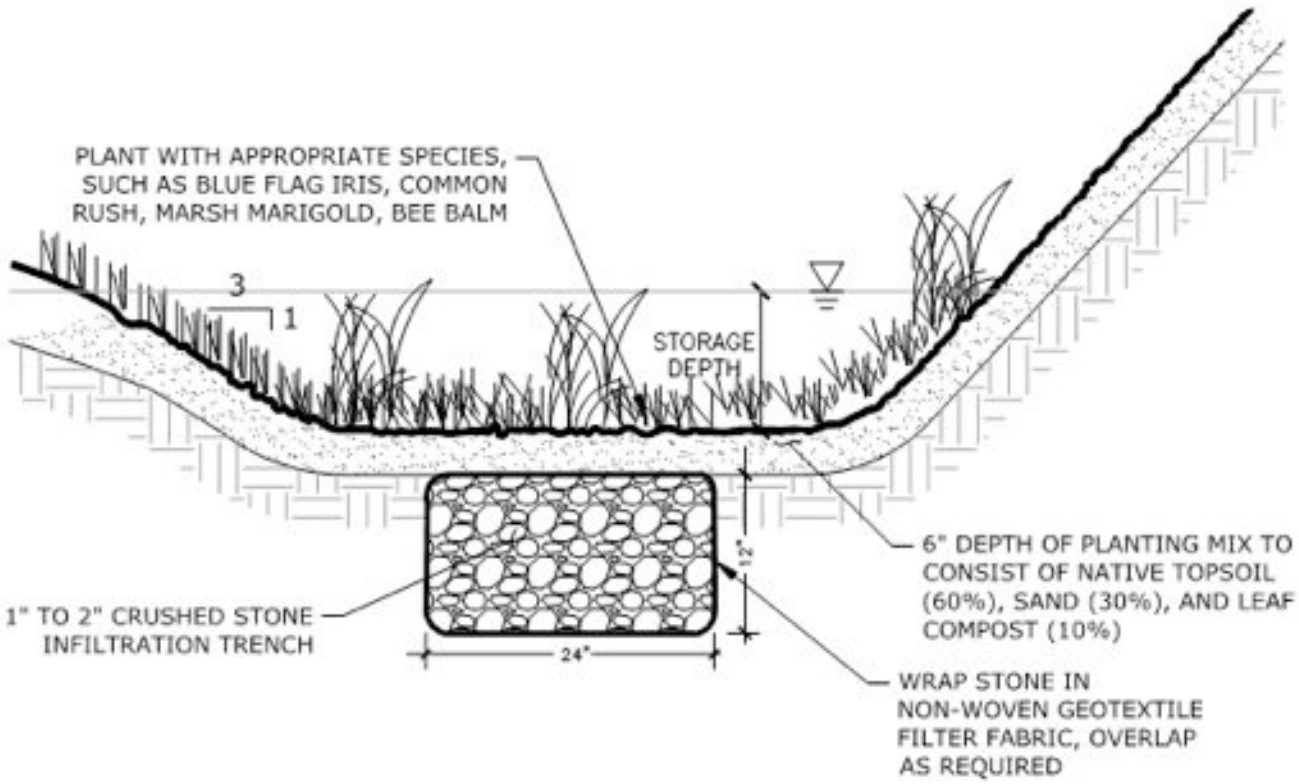


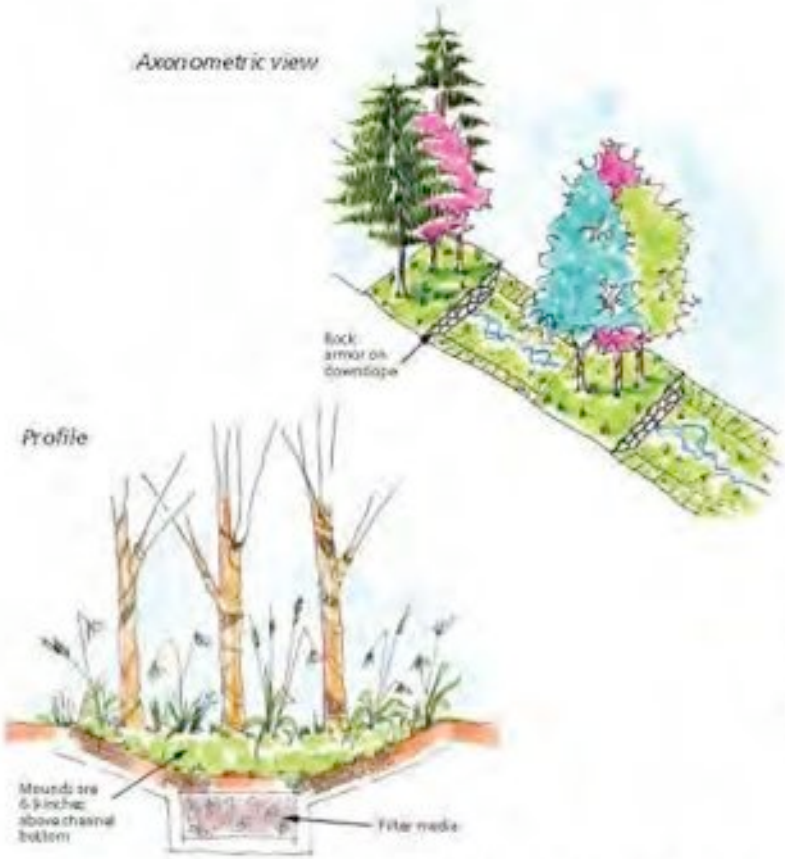
BIORETENTION AREA

NOT TO SCALE



BIO-INFILTRATION SWALE WITH STONE TRENCH

NOT TO SCALE



NOTES:

INSTALL TREE MOUND CHECK DAMS ALONG BIO-INFIRLTRATION SWALE AS SHOWN ON PLAN TO REDUCE EFFECTIVE SLOPE OF SWALE AND SLOW WATER.

REFERENCED FROM: URBAN WATERSHED FORESTRY MANUAL, PART 2: CONSERVING AND PLANTING TREES AT DEVELOPMENT SITES. UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE. NA-TP-01-06. MAY 2006.

TREE MOUND CHECK DAM

NOT TO SCALE

Phase 5: Summary Report of Findings and Recommendations

- Document the findings of Phases 1-3 in a single report
  - Report identifies the preferred alternative(s)
  - Describes the Concept Design
  - Provides a Cost Opinion for the preferred alternative

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