AHEAD OF THE STORM

Site: Shelburne Stormwater Mitigation BMP Design and Implementation

Location: Brook Lane, Shelburne, Vermont

POST-CONSTRUCTION SUMMARY

Construction Summary

An eroding swale along the west side of Brook Lane in Shelburne, Vermont was improved to improve water quality and flood resilience. Island Excavating of Grand Island, Vermont completed construction for the project. Planting and year 1 maintenance was completed by Andrea Morgante Landscaping Services of Hinesburg, Vermont. The Town of Shelburne Highway Superintendent and highway crew assisted with construction oversight. Additional construction oversight and documentation was completed by Milone & MacBroom on a part-time basis. Construction was completed in approximately 1 week, with final planting completed on August 11, 2016. The project was funded by a Lake Champlain Basin Program Grant received by the Lewis Creek Association.

This project site was identified in conjunction with the Town of Shelburne and designed as part of a larger project to map and screen swales for possible upgrades including stormwater treatment BMPs, "Shelburne Stormwater Mitigation Best Management Practice (BMP) Design and Implementation Project" funded by VTANR Ecosystem Restoration Grant. This project originated in response to community concerns for changing existing grass-lined swales to stormwater pipes. The original design project provided a framework for evaluating the appropriateness of a swale versus a pipe based on site characteristics. Practices were identified that would preserve some of the water quality benefits of swales in areas where a closed pipe system was appropriate. At the project site the swale screening tool indicated that the swale could appropriately be changed to a pipe and a demonstration project was developed. This project is within the Town right-of-way, yet was developed with input from the adjacent landowner.

Installed Treatment Elements

Two Optimal Conservation Practices (OCPs) were installed to mitigate stormwater runoff at the site.

1. A raingarden to slow water, reduce erosion, and filter sediment and nutrients to pre-treat runoff entering the existing downstream stormwater treatment system.
2. Swale improvements and a pipe inlet including installation of an infiltration trench with a large perforated pipe and stone filter medium.

Project Benefits

This project will improve water quality by reducing sediment produced by erosion, increasing infiltration, and providing underground storage. The primary goals are to improve water quality protection and flood resiliency by slowing runoff, reducing erosion, and enhancing vegetation. This project provides treatment of 12.7 acres of runoff from Brook Lane and Woodbine Road to remove sediment prior to water flowing to the downstream stormwater treatment system at Hullcrest Park. The raingarden and void space in the infiltration trench stores 1,140 cubic feet of water that will be infiltrated, a volume larger than the 958 cubic feet produced in the 0.9-inch rain storm (i.e., the Water Quality Volume – WQv).

Additional Documentation Attached

Pre- and Post-Construction Photo Log
Post-Construction Conditions Record Drawings dated November 2016
Planting and Maintenance Plan dated November 7, 2016
Construction Observation Reports
Design Plans dated January 2013
Cost Opinion

MILONE & MACBROOM

LEWIS CREEK ASSOCIATION

AHEAD OF THE STORM

Site: Shelburne Stormwater Mitigation BMP Design and Implementation

Location: Brook Lane, Shelburne, Vermont

PRE- AND POST-CONSTRUCTION PHOTO LOG

Pre-Construction, November 16, 2012: Erosion at pipe inlet upstream of catch basin.

Post-Construction, September 21, 2016: Infiltration trench installed under shallow grass swale.

Pre-Construction, November 16, 2012: Erosion at pipe inlet.

Post-Construction, September 21, 2016: Raingarden created with new flow controlling inlet into downstream infiltration trench.

Pre-Construction, November 16, 2012: Erosion and at pipe inlet.

Post-Construction, September 21, 2016: Raingarden created and planted.

Pre-Construction, November 16, 2012: Erosion along deep narrow swale.

Post-Construction, September 21, 2016: Raingarden created.

Pre-Construction, November 16, 2012: Erosion along deep narrow swale.

Post-Construction, September 21, 2016: Infiltration trench with perforated pipe installed with shallow grass swale for local surface runoff.

Pre-Construction, July 25, 2016: Steep eroded side slopes of swale do not allow vegetation to grow and create a safety hazard for pedestrians.

Post-Construction, September 21, 2016: Raingarden created.

BROOK LANE DEMONSTRATION
SHELBURNE STORMWATER MITIGATION BMP DESIGN AND IMPLEMENTATION PROJECT

SHELBURNE, VERMONT
RECORD DRAWING
NOV. 2016

POST-CONSTRUCTION CONDITIONS
DENOTED IN RED

- **LIST OF DRAWINGS:**

  01 – TITLE SHEET AND LOCATION MAP
  02 – PROPOSED LAYOUT
  03 – RAINGARDEN LAYOUT AND DETAIL
  04 – PROFILE
  05 – CROSS SECTIONS
  06 – CROSS SECTIONS

- **PROJECT PARTNERS**

  Town of Shelburne
  5420 Shelburne Road
  Shelburne, VT 05482

  Ecosystem Restoration Program
  Vermont Department of Environmental Conservation
  1 National Life Drive
  Montpelier, Vermont 05620

  Lewis Creek Association &
  LaPlatte Watershed Partnership
  442 Lewis Creek Road
  Charlotte, VT 05445

- **PREPARED BY:**

  Milone & MacBroom, Inc.
  1 South Main Street, 2nd Floor
  Waterbury, Vermont 05676

CONSTRUCTION COMPLETED BY:
ISLAND EXCAVATING, INC.

CONSTRUCTION OVERSIGHT BY:
MILONE & MACBROOM AND
TOWN OF SHELBURNE

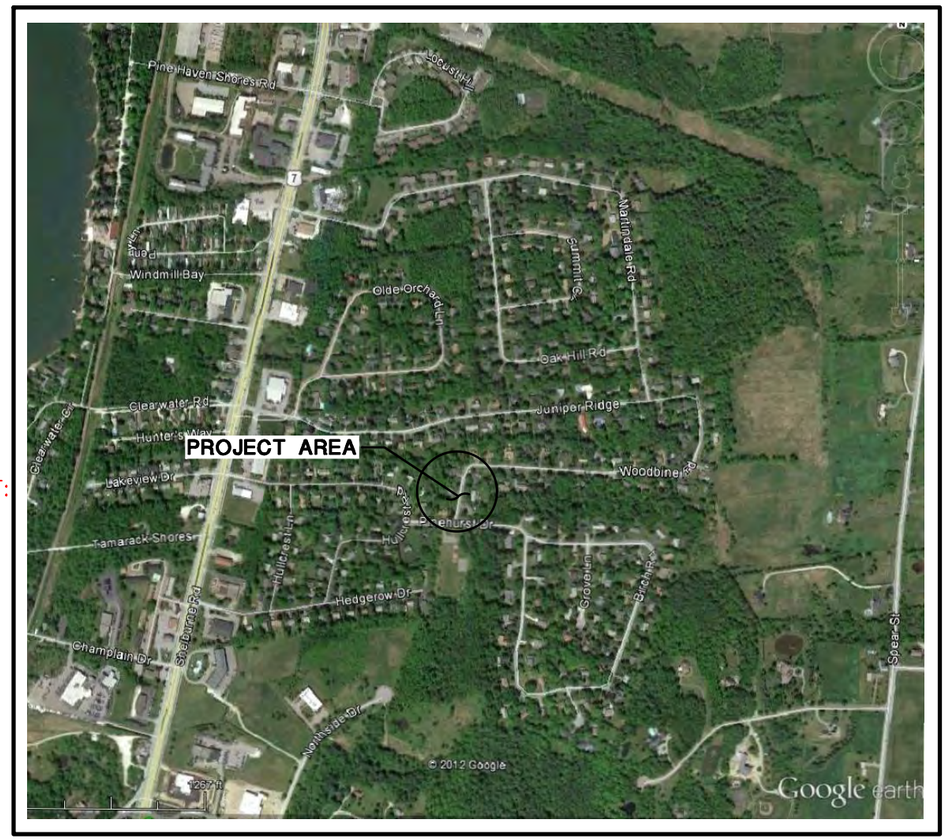
CONSTRUCTION PROJECT MANAGEMENT:
LEWIS CREEK ASSOCIATION

PROJECT IMPLEMENTATION FUNDING:
LAKE CHAMPLAIN BASIN PROGRAM

LEWIS CREEK ASSOCIATION

Lake Champlain Basin Program

MILONE & MACBROOM®



PROJECT SITE VICINITY MAP:
1"=1,000'

REFERENCES

1. BACKGROUND AERIAL PHOTOGRAPH IS FROM GOOGLE EARTH, OBTAINED NOVEMBER 2012.
2. PROPERTY BOUNDARIES ARE APPROXIMATE AND RECEIVED FROM THE CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION. NO BOUNDARY SURVEY WAS PERFORMED AS PART OF THIS PROJECT.
3. SITE CONDITIONS AND FEATURES, INCLUDING CROSS SECTIONS, WERE MEASURED IN THE FIELD.
4. ADDITIONAL SITE FEATURES WERE DIGITIZED FROM THE AERIAL PHOTOGRAPH, REFERENCE 1.
5. TOPOGRAPHIC CONTOUR LINES ARE FROM LIDAR DATA FLOWN IN 2009 AND AVAILABLE THROUGH VCGI.

POST-CONSTRUCTION CONDITIONS DENOTED IN RED

1+65.42

PERFORATED PIPE DAYLIGHTED AND ROCK STABILIZATION INSTALLED

PROPERTY LINE IS EXTENT OF INFILTRATION TRENCH AND PIPE

EXISTING UTILITY POLE

EXISTING STUMP

INSTALL INFILTRATION TRENCH AND PIPE, SEE CROSS SECTION AND PROFILE FOR DETAILS

EXISTING FLOWERBED WITH SHRUBS AND DAYLILIES

1+00

60'

70'

BROOK LANE

RAINGARDEN LOCATION SHIFTED 10 FEET TO THE NORTH

30'

INSTALL RAINGARDEN, SEE FOLLOWING SHEETS FOR DETAILS

INSTALL INLET TO STORMWATER PIPE

AHEAD OF THE STORM EDUCATIONAL SIGN INSTALLED

40'

EXISTING 18" HDPE STORM PIPE

0+00

EXISTING PIPE REMOVED AND INFILTRATION TRENCH INSTALLED AND CONNECTED INTO DOWNSTREAM CATCHBASIN

PINEHURST DRIVE

0' 10' 20'
0 1/2" 1"

N
W E
S

MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

RECORD DRAWING

PROPOSED LAYOUT

SHELBURNE STORMWATER MITIGATION BMP
DESIGN AND IMPLEMENTATION PROJECT

BROOK LANE
SHELBURNE, VERMONT

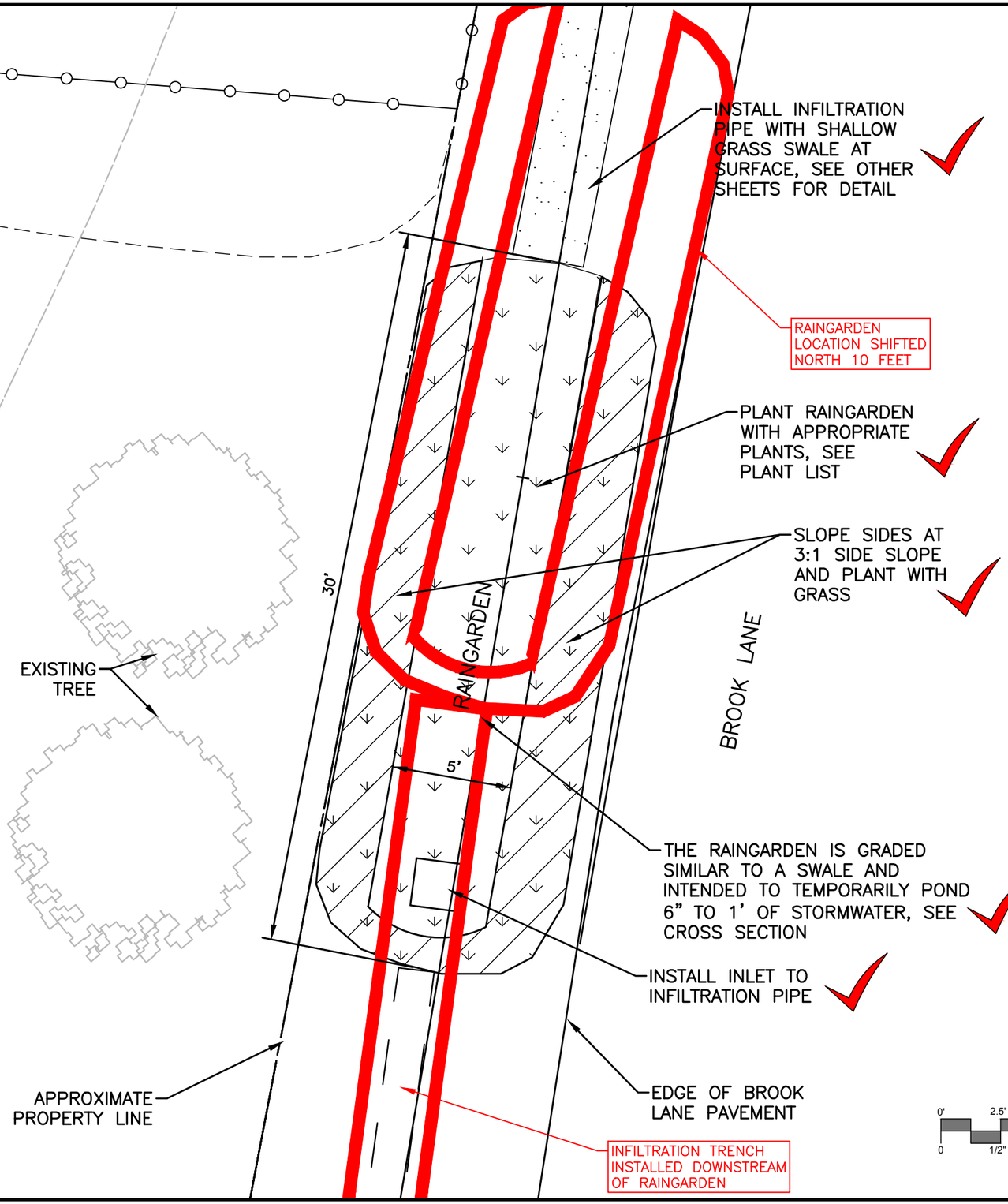
JCL DESIGNED	JCL DRAWN	RKS CHECKED

SCALE: 1"=20'

DATE: NOV. 2016

PROJECT NO.: 3452-14

SHEET NO.: 02



POST-CONSTRUCTION CONDITIONS DENOTED IN RED

RAINGARDEN PLANT INFORMATION

1. THE RAINGARDEN AREA SHOULD BE VEGETATED. THE RECOMMENDED VEGETATION IS A VARIETY OF PERENNIAL PLANTS THAT IS MAINTAINED SIMILAR TO A PERENNIAL FLOWER BED. IF THE LEVEL OF CARE IS NOT AVAILABLE, IT IS POSSIBLE TO MAINTAIN THIS AREA AS A GRASS SWALE AND CARE FOR THE AREA SIMILAR TO A LAWN.
2. A LIST OF POSSIBLE PERENNIAL PLANTS HAS BEEN PROVIDED. FINAL SELECTION OF THE PLANTS SHOULD BE COORDINATED BETWEEN THE ADJACENT LANDOWNER AND THE TOWN.
3. PLANTS LISTED WERE CHOSEN BECAUSE THEY ARE NATIVE TO VERMONT AND MOST ARE ALSO SALT RESISTANT.
4. ADDITIONAL PLANT INFORMATION CAN BE FOUND IN THE VERMONT RAIN GARDEN MANUAL, PUBLISHED BY THE WINOOSKI NATURAL RESOURCE CONSERVATION DISTRICT.

Perrenials		**Fern:**	
Anemone canadensis	Windflower	*Athyrium filix-femina*	Lady Fern
Aquilegia cacadensis	Colombine	*Osmunda cinnamomea*	Cinnamon Fern
Aster novae-angliae	New England Aster		
Aster umbellatus	Flat-topped Aster	**Grasses:**	
Baptisia australis	Blue False Indigo	*Carex Grayi*	Gray Sedge
Iris versicolor	Blue Flag Iris	*Panicum virgatum*	Switch Grass
Lobelia cardinalis	Cardinal Flower	*Schizachyrium scoparium*	Little Bluestem
Lobelia spicata	Spiked Lobelia		
Rudbeckia hirta	Black-Eyed Susan		
Caltha palustris	Marsh Marigold		
Echinacea purpurea spp.	Coneflower		
Hemerocallis	Daylilies		

RAINGARDEN MAINTENANCE

1. RAINGARDEN REQUIRES LANSCAPING CARE SIMILAR TO OTHER PLANTED FLOWER BEDS INCLUDING REGULAR WEEDING TO SELECT WHICH PLANTS CONTINUE TO GROW SUCCESSFULLY.
2. SELECTED SPECIES CAN BE MOWED OR BRUSH-HOGGED AT THE END OF THE GROWING SEASON IF DESIRED.
3. PERIODICALLY, INCLUDING AFTER LARGE STORMS AND REGULARLY DURING THE FALL, REMOVE LEAVES AND DEBRIS ACCUMULATED AT THE STORMWATER INLET.
4. OPTIONALLY ADD MULCH TO ASSIST IN WEED CONTROL.

SEE NOVEMBER 7, 2016 PLANTING AND MAINTENANCE PLAN FOR FINAL PLANT LIST AND YEAR 1 AND ANNUAL MAINTENANCE PROCEDURES

MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

RECORD DRAWING

RAINGARDEN LAYOUT AND DETAIL

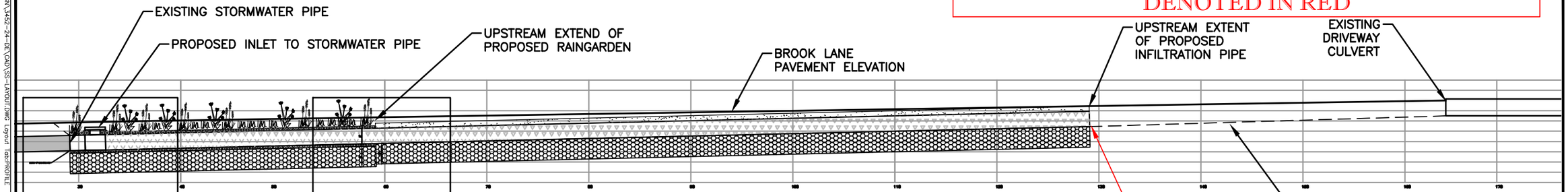
SHELBURNE STORMWATER MITIGATION BMP
DESIGN AND IMPLEMENTATION PROJECT

BROOK LANE
SHELBURNE, VERMONT

JCL DESIGNED	JCL DRAWN	RKS CHECKED

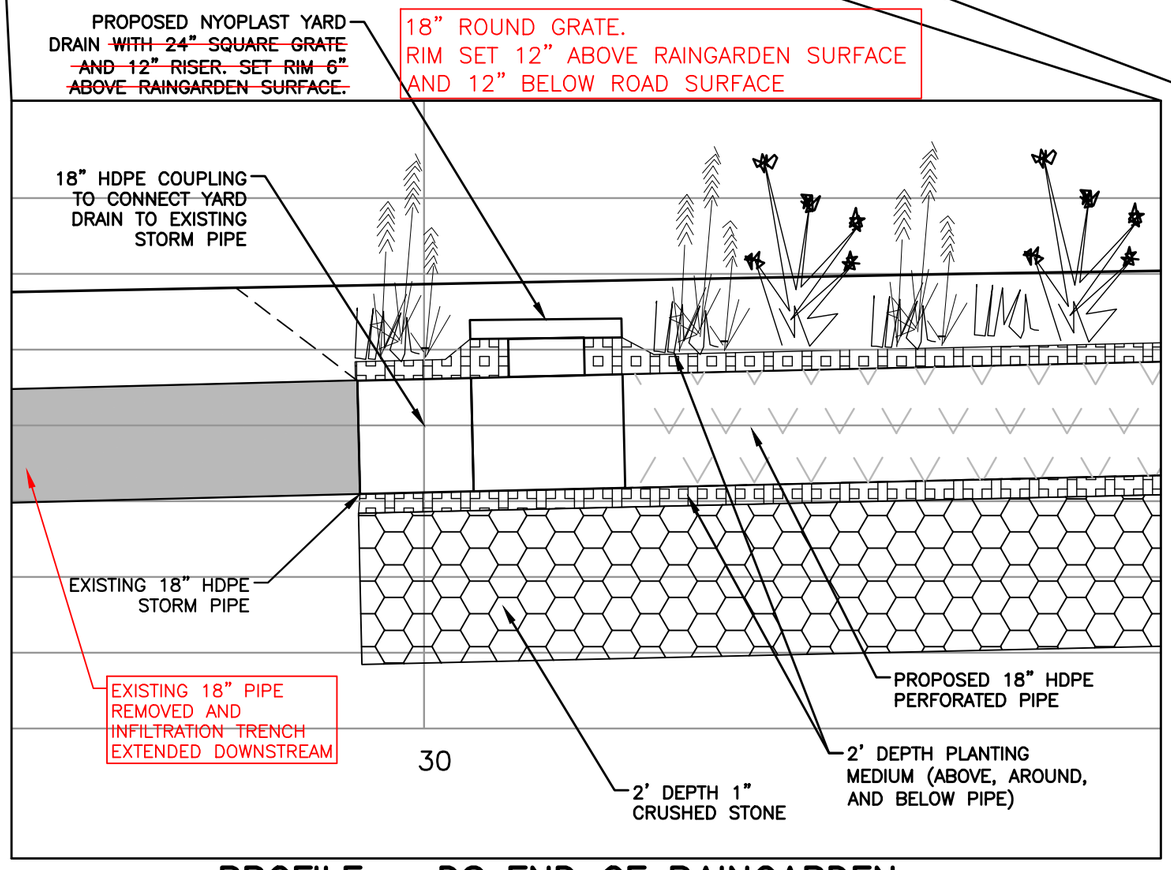
SCALE: 1"=5'
DATE: NOV. 2016
PROJECT NO.: 3452-14
SHEET NO.: 03

POST-CONSTRUCTION CONDITIONS
DENOTED IN RED



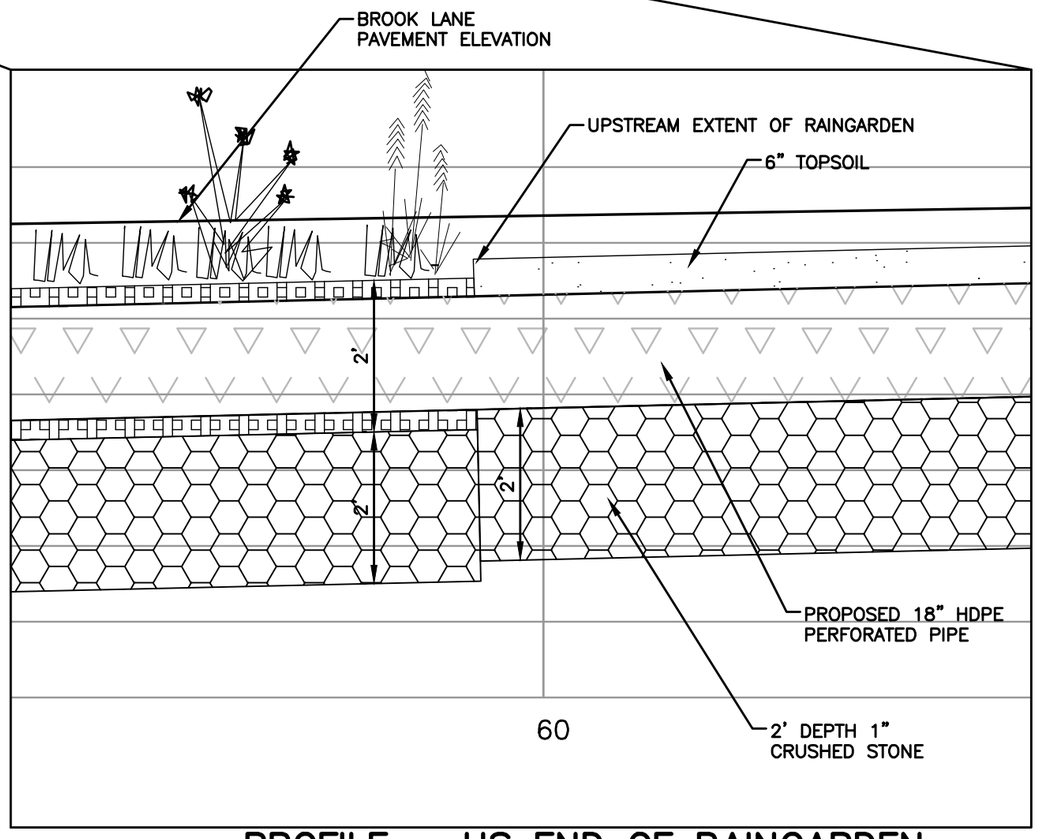
FULL PROFILE

SCALE: 1"=20'



PROFILE – DS END OF RAINGARDEN

SCALE: 1"=2'



PROFILE – US END OF RAINGARDEN

SCALE: 1"=2'

MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

RECORD DRAWING

PROFILE

SHELBURNE STORMWATER MITIGATION BMP
DESIGN AND IMPLEMENTATION PROJECT

BROOK LANE
SHELBURNE, VERMONT

JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: VARIES

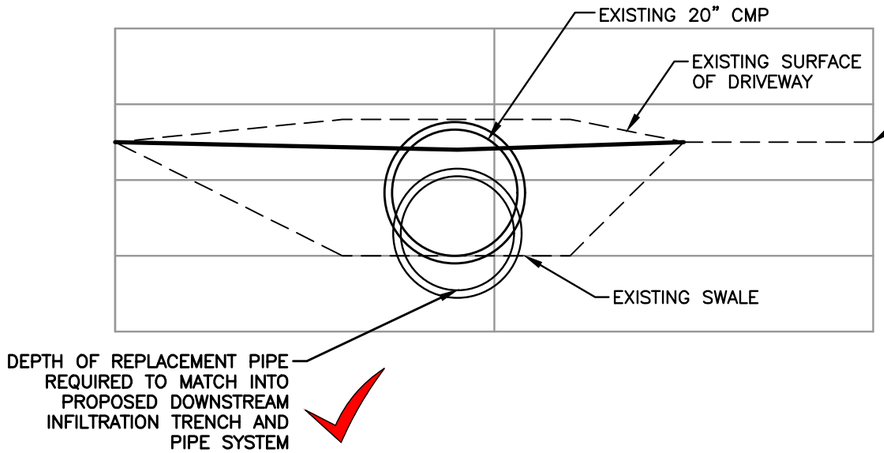
DATE: NOV. 2016

PROJECT NO.: 3452-14

SHEET NO.: 04

POST-CONSTRUCTION CONDITIONS
DENOTED IN RED

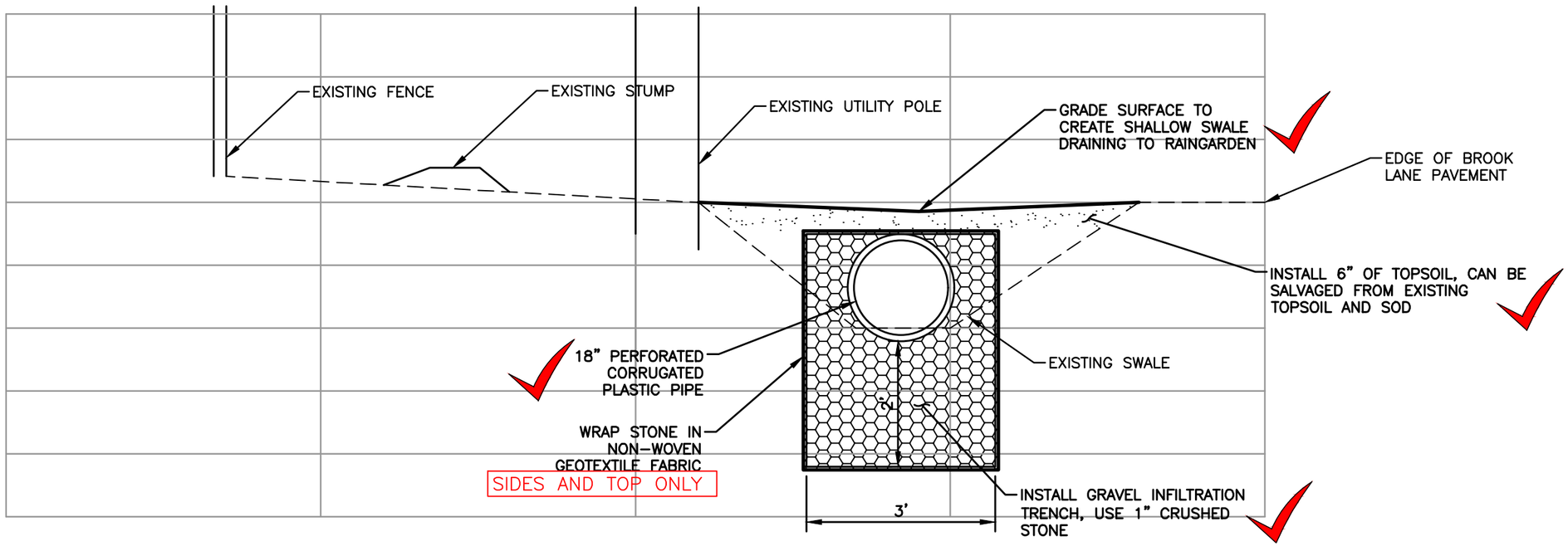
1+64
AT DRIVEWAY CULVERT



WOULD REQUIRE REPLACEMENT AND LOWERING OF DRIVEWAY CULVERT TO EXTEND TREATMENT TO THIS LOCATION

TREATMENT NOT EXTENDED THIS FAR NORTH. THE UPSTREAM END OF INFILTRATION PIPE WAS SET DEEP ENOUGH TO ACCOMMODATE 12" COVER OVER DRIVEWAY CULVERT IF PROJECT EXTENDED UPSTREAM IN THE FUTURE.

1+22
AT UTILITY POLE



0' 1' 2'
0 1/2" 1"

MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

RECORD DRAWING

CROSS SECTIONS

SHELBURNE STORMWATER MITIGATION BMP
DESIGN AND IMPLEMENTATION PROJECT

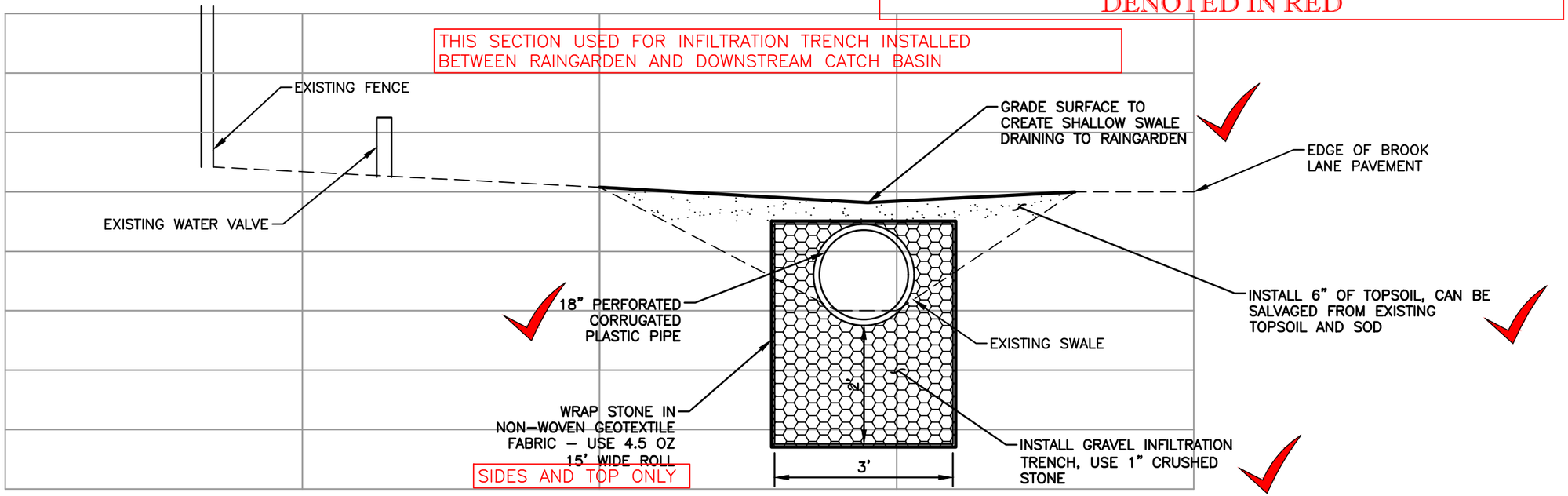
BROOK LANE
SHELBURNE, VERMONT

JCL DESIGNED	JCL DRAWN	RKS CHECKED
SCALE	1"=2'	
DATE	NOV. 2016	
PROJECT NO.	3452-14	
SHEET NO.	05	

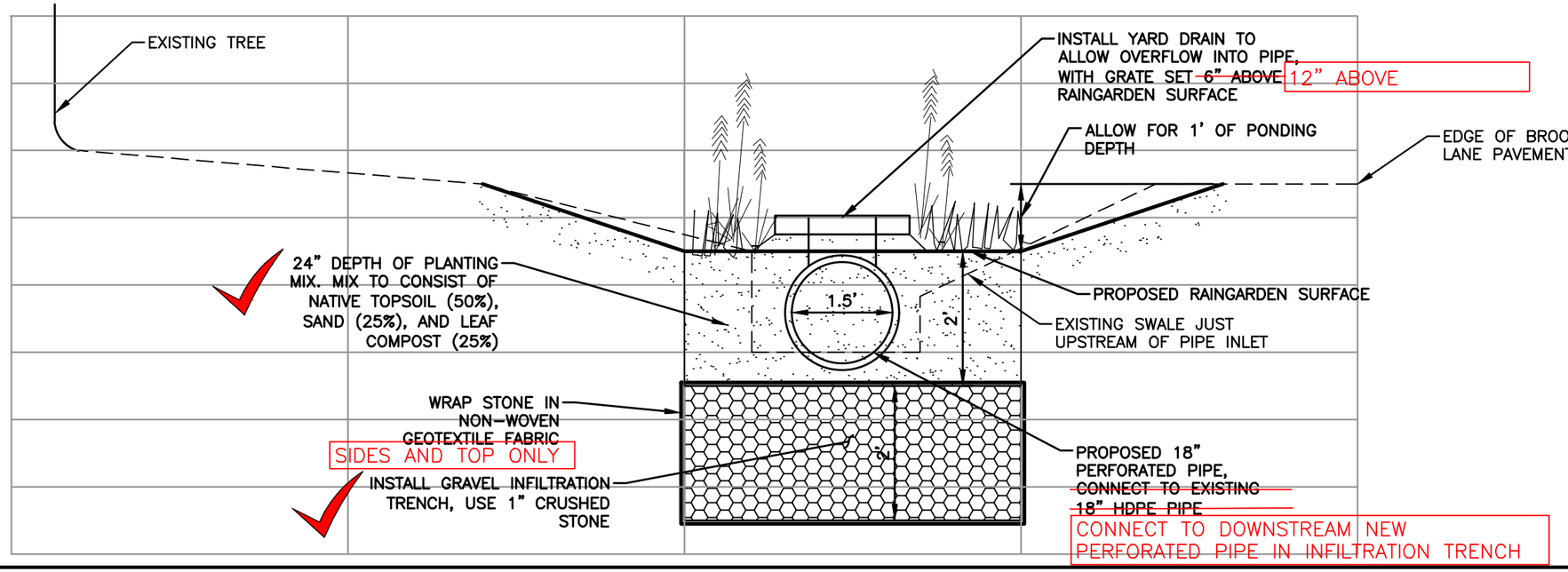
1+00
AT FLOWER BED

POST-CONSTRUCTION CONDITIONS DENOTED IN RED

THIS SECTION USED FOR INFILTRATION TRENCH INSTALLED BETWEEN RAINGARDEN AND DOWNSTREAM CATCH BASIN



0+32
RAINGARDEN CROSS SECTION



MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

RECORD DRAWING

CROSS SECTIONS

SHELBURNE STORMWATER MITIGATION BMP DESIGN AND IMPLEMENTATION PROJECT

BROOK LANE
SHELBURNE, VERMONT

JCL DESIGNED	JCL DRAWN	RKS CHECKED

SCALE: 1"=2'

DATE: NOV. 2016

PROJECT NO.: 3452-14

SHEET NO.: 06

Memorandum

TO: **Joe Colangelo and Paul Goodrich, Town of Shelburne**

FROM: **Jessica Louisos, MS, PE, Milone & MacBroom**

DATE: **11/15/2016**

RE: Planting and Maintenance Plans
Brook Lane Demonstration
Shelburne Stormwater Mitigation BMP Design and Implementation Project
MMI #3452-24

Planting Plan (Completed August 11, 2016)

Swale and Disturbed Areas:

- The swale and all disturbed areas will be planted with conservation grass seed mix applied at 20 pounds/ acre.
- Lightly rake seed mix into the first one inch of topsoil.
- Lightly tamp seed and soil.
- Apply a weed free straw mulch over entire seeded area.

Raingarden:

- The Raingarden will be planted with a mix of perennial vegetation. A list of possible native and salt-tolerant vegetation has been selected (Table 1). Additional plant information can be found in the Vermont Rain Garden Manual, published by the Winooski Natural Resource Conservation District.
- Plant one perennial every 2.5 feet on center (~50 plants).
- Plant in groupings of same species by hand.
- Apply a weed free straw or wood chip mulch around plants.

Table 1: List of Species Planted in the Raingarden

Scientific Name	Common Name	Number Planted
Aquilegia cacadensis	Colombine	5
Aster laevis	Smooth Aster	5
Baptisia australis	Blue False Indigo	5
Iris versicolor	Blue Flag Iris	5
Lobelia cardinalis	Cardinal Flower	5
Lobelia silphicata	Great Blue Lobelia	5
Rudbeckia hirta	Black-Eyed Susan	10
Caltha palustris	Marsh Marigold	5
Echinacea purpurea spp.	Coneflower	12
Hemerocallis	Daylilies, Happy Returns	15
Eupatorium dubium "Baby Joe"	Dwarf red joe pyweed	1
Chelon glabra	Turtlehead	1
Lysimachia	Yellow Loostrife	3
Iris siberica	Siberian Iris	5

Maintenance Plan

Year 1 (Completed by LCA Fall 2016): Successful establishment of raingarden vegetation requires that the following tasks be undertaken in the first year immediately following installation:

- The construction site should be inspected following the first two precipitation events of at least 0.5 to 1.0 inch to ensure that the system is functioning properly. Thereafter, inspections shall be conducted on an annual basis.
- Spot Reseeding. Bare or eroding areas in the swale or around the bioretention area shall be immediately stabilized with grass cover.
- Watering. Depending on rainfall, watering may be necessary once a week during the first growing season (April-October). Vegetation shall receive ½ inch to 1 inch of water per week, whether through rainfall or watering.
- Weeding and invasive species control. Inspect for, and remove, any undesired plant growth, whether weeds or invasive plant species.
- Removal and replacement of dead plants in Raingarden. Construction contracts shall include a care and replacement warranty to ensure that vegetation is properly established and survives during the first growing season following construction. The typical thresholds below which replacements are required within the first year after planting are 85% survival of plant material, including shrubs, and 100% survival of trees.
- Swale and disturbed areas can be maintained as lawn and mowed following establishment.

Annual (Ongoing to be completed by Town of Shelburne): Long-term performance of the project requires annual maintenance that can be completed annually:

- In the fall, brushhog or mow raingarden and rake and remove dead plant material.
- Sediment shall be cleaned out of the raingarden when it accumulates to a depth of more than 4 inches.
- When water ponds on the surface of the raingarden for more than 48 hours, the top 1-3 inches of discolored material shall be removed and shall be replaced with fresh material. The removed sediments shall be disposed in an acceptable manner.
- Trash and debris shall be removed as necessary.
- Look for any bare soil or sediment sources in the contributing drainage area, and stabilize them immediately.
- Check for the presence of accumulated sand, sediment and trash at pipe inlets and remove it and properly dispose.
- Inspect bioretention side slopes and grass filter strips for evidence of any rill or gully erosion, and repair as needed.
- Check to see if 75% to 90% cover (mulch plus vegetative cover) has been achieved in the bed.
- Check for dead or diseased vegetation, and replace vegetation as needed.
- Check for and remove weeds and invasive plant species.
- Check the bioretention bed for evidence of mulch flotation, excessive ponding, or concentrated flows, and take appropriate remedial action.
- Check for clogged or slow-draining soil media, a crust formed on the top layer, inappropriate soil media, or other causes of insufficient filtering time, and restore proper filtration characteristics.
- Optionally add mulch between plant groupings.

Site Inspection

DATE: July 25, 2016
MMI #: 3452-24
PROJECT: Brook Lane Demonstration, Shelburne Stormwater Mitigation BMP Design and Implementation Project

Weather: Sunny, 70's, Rain over weekend
Onsite: 8:30 am
Offsite: 10:45 am

PRE-CONSTRUCTION MEETING ATTENDEES:

Dustin Parizo, Contractor, Island Excavating

Paul Goodrich, Highway Superintendent, Shelburne

Ann Janda, Town Managers Office, Shelburne

Susan Moegenburg, Project Manager, Lewis Creek Association

Jessica Louisos, Engineer, Milone & MacBroom

Pre-Construction Meeting:

Distributed and reviewed plans dated January 2013.

Island Excavating has been hired by Town to install the infiltration trench and pipe. Planting of raingarden will be done by others following work by Island Excavating.

Contractor will install 120 feet of pipe, connecting into the existing catch basin at the corner of Brook Lane and Pinehurst and extending to the phone pole, approximately at the property line of the first home on Brook Lane. This is a positive change from the plans that show the new pipe beginning at the end of the 18" existing stormpipe.

The raingarden will be shifted to be 40 feet from the existing catchbasin, at the natural end of a pipe section. The raingarden will continue to have the same dimensions shown on the plan.

The geotextile fabric will only be placed on the top and sides of the infiltration trench. The bottom of the rock will be left open to transfer water into the below native soil. Within the 30 foot raingarden section, the pipe runs through the planting medium, and will be wrapped in geotextile fabric to keep soil from entering the pipe.

The contractor will shoot grades. They will generally follow the slope of the road, keeping the final swale below both the road and the adjacent lawn. The raingarden will be deep enough to allow for 1 foot of ponding without flooding adjacent areas. The grade between the raingarden and the existing catch basin will be sloped back to the raingarden. The uphill end of the pipe will be deep enough to be able to extend the project further up the road and be able to keep 12" cover over the driveway culvert on the adjacent property.

The contractor will fine grade the finished surface and seed and mulch all of the swale and disturbed areas. They will not plant or seed the raingarden area.

The contractor will provide and install the planting medium for the raingarden and leave it at final grade. Paul and Jessica inspected the available topsoil and it appears to have the correct amount of sand and organic matter to be used for the raingarden.

Reviewed July 22 Memo with Planting and Maintenance Plans (see attached). These plans were drafted based on the project team meeting in February and subsequence meeting with the adjacent landowner. No changes identified.

Cost estimates for materials and island excavating should allow a planting budget that can include plants, mulch, installation, and first year care. This will be confirmed in the next few days when the miscellaneous additional materials have been purchased.

The project engineer and Lewis Creek Association will coordinate the raingarden planting. Discussion included possibly hiring a local landscape company to do this work, Horsfords? Andrea Morgante? To be finalized when available budget is confirmed.

Adjacent Landowner Meeting:

Jessica, Ann, and Paul met with adjacent landowner Sally Thomas following the pre-construction meeting.

We shared the project schedule, project elements, and discussed in detail the planting plan.

Sally is supportive of the project, agrees with the planting plan, and the maintenance plan with the Town weed-wacking and raking once per year. She is not interested in more weeding.

Sally can provide water and a hose to use during first-year establishment of the raingarden plants.

Schedule:

Tuesday July 26 – Begin Construction

Wednesday July 27 – Thursday July 28 – Complete Construction

Following Island Excavation – Project Engineer and Lewis Creek Association to coordinate planting of raingarden.

Project Engineer Contact Information:

Jessica Louisos or Roy Schiff, Milone & MacBroom, jlouisos@mminc.com or rschiff@mminc.com, Office: (802) 882-8335, Cell: (802) 578-2016

Memorandum

TO: **Paul Goodrich, Town of Shelburne**

FROM: **Jessica Louisos, MS, PE, Milone & MacBroom**

DATE: **7/22/2016**

RE: Planting and Maintenance Plans
Brook Lane Demonstration
Shelburne Stormwater Mitigation BMP Design and Implementation Project
MMI #3452-24

Planting Plan

Swale and Disturbed Areas:

- The swale and all disturbed areas will be planted with conservation grass seed mix applied at 20 pounds/ acre.
- Lightly rake seed mix into the first one inch of topsoil.
- Lightly tamp seed and soil.
- Apply a weed free straw mulch over entire seeded area.

Raingarden:

- The Raingarden will be planted with a mix of perennial vegetation. A list of possible native and salt-tolerant vegetation has been selected (Table 1). Additional plant information can be found in the Vermont Rain Garden Manual, published by the Winooski Natural Resource Conservation District.
- Plant one perennial every 2.5 feet on center (~50 plants).
- Plant in groupings of same species by hand.
- Apply a weed free straw or wood chip mulch around plants.

Table 1: Native and Salt Tolerant Vegetation

Perrenials			**Fern:**	
Anemone canadensis	Windflower		*Athyrium filix-femina*	Lady Fern
Aquilegia cacadensis	Colombine		*Osmunda cinnamomea*	Cinnamon Fern
Aster novae-angliae	New England Aster			
Aster umbellatus	Flat-topped Aster		**Grasses:**	
Baptisia australis	Blue False Indigo		*Carex Grayi*	Gray Sedge
Iris versicolor	Blue Flag Iris		*Panicum virgatum*	Switch Grass
Lobelia cardinalis	Cardinal Flower		*Schizachyrium scoparium*	Little Bluestem
Lobelia spicata	Spiked Lobelia			
Rudbeckia hirta	Black-Eyed Susan			
Caltha palustris	Marsh Marigold			
Echinacea purpurea spp.	Coneflower			
Hemerocallis	Daylilies			

Maintanance Plan

Year 1: Successful establishment of raingarden vegetation requires that the following tasks be undertaken in the first year immediately following installation:

- The construction site should be inspected following the first two precipitation events of at least 0.5 to 1.0 inch to ensure that the system is functioning properly. Thereafter, inspections shall be conducted on an annual basis.
- Spot Reseeding. Bare or eroding areas in the swale or around the bioretention area shall be immediately stabilized with grass cover.
- Watering. Depending on rainfall, watering may be necessary once a week during the first growing season (April-October). Vegetation shall receive ½ inch to 1 inch of water per week, whether through rainfall or watering.
- Weeding and invasive species control. Inspect for, and remove, any undesired plant growth, whether weeds or invasive plant species.
- Removal and replacement of dead plants in Raingarden. Construction contracts shall include a care and replacement warranty to ensure that vegetation is properly established and survives during the first growing season following construction. The typical thresholds below which replacements are required within the first year after planting are 85% survival of plant material, including shrubs, and 100% survival of trees.
- Swale and disturbed areas can be maintained as lawn and mowed following establishment.

Annual: Long-term performance of the project requires annual maintenance that can be completed annually:

- In the fall, brushhog or mow raingarden and rake dead plant material.
- Sediment shall be cleaned out of the raingarden when it accumulates to a depth of more than 4 inches.
- When water ponds on the surface of the raingarden for more than 48 hours, the top 1-3 inches of discolored material shall be removed and shall be replaced with fresh material. The removed sediments shall be disposed in an acceptable manner.
- Trash and debris shall be removed as necessary
- Look for any bare soil or sediment sources in the contributing drainage area, and stabilize them immediately.
- Check for presence of accumulated sand, sediment and trash at pipe inlets and remove it and properly dispose.
- Inspect bioretention side slopes and grass filter strips for evidence of any rill or gully erosion, and repair as needed.
- Check to see if 75% to 90% cover (mulch plus vegetative cover) has been achieved in the bed.
- Check for dead or diseased vegetation, and replace this vegetation as needed.
- Check for and remove weeds and invasive plant species.
- Check the bioretention bed for evidence of mulch flotation, excessive ponding, or concentrated flows, and take appropriate remedial action.
- Check for clogged or slow-draining soil media, a crust formed on the top layer, inappropriate soil media, or other causes of insufficient filtering time, and restore proper filtration characteristics.
- Optionally add mulch between plant groupings.

Site Inspection

DATE: July 26, 2016
MMI #: 3452-24
PROJECT: Brook Lane Demonstration
Shelburne Stormwater Mitigation BMP Design and Implementation Project

Weather: Sunny, 70's, Dry
Onsite: 11:00 am – 12:40 pm & 3:00 pm – 3:40 pm

Visit By: Jessica Louisos, Milone & MacBroom

Equipment Onsite:

Volvo EC160CL Excavator, Island Excavating

Case CX55B Excavator, Island Excavating

2 Trucks – Hauling Fill, Town of Shelburne

1 Truck – Hauling Stone, Island Excavating

1 Truck – Hauling Topsoil, Island Excavating

Construction Activity:

Island Excavating crew is onsite, led by Dustin Parizo. They are checking grades with laser as they work.

Paul Goodrich is onsite providing oversight and representing the Town.

Perforated 18" pipe, 18" T at raingarden inlet, and fabric provided by Town.

Contractor installed 100 feet of pipe today. The downstream end was connected into the existing catch basin at the corner of Brook Lane and Pinehurst. The invert of the pipe was lowered 6" lower than the removed pipe previously connected.

Infiltration trench with the 18" pipe over 2 feet of stone, 3 foot wide, with fabric on sides and top was installed for the first 40 feet from the catch basin.

The raingarden begins 40 feet from the existing catchbasin, at the natural end of a pipe section. A T connection was installed with a standpipe for the raingarden overflow. The top of the standpipe was set 6" below the road grade. Within the 30 foot raingarden section the trench is 6 feet wide with 2 feet of rock wrapped on sides and top with filter fabric. The perforated pipe is wrapped in fabric in a 2 foot topsoil planting medium.

The infiltration trench, as described above, was continued for another 30 feet upstream of the raingarden. An additional 20 feet remain to be completed tomorrow, along with the finish grading and site recovery.

The contractor is keeping a tidy site. The road was swept prior to leaving the site today.

Adjacent Landowner Meeting:

Jessica and Paul talked with adjacent landowner Sally Thomas during construction. She would like to alter the planting list to remove any very tall plants that would be much higher than 3 feet. This would remove the switch grass. She would also like us to remove Marsh Marigold and check for dry tolerant ferns.

Schedule:

Wednesday July 27 – Expect to complete construction mid-day

Following Island Excavation – Project Engineer and Lewis Creek Association to coordinate planting of raingarden.

Project Engineer Contact Information:

Jessica Louisos or Roy Schiff, Milone & MacBroom, jlouisos@mminc.com or rschiff@mminc.com, Office: (802) 882-8335, Cell: (802) 578-2016

Site Photos:

Gravel and geotextile fabric under raingarden section in progress.

70 feet of infiltration trench and 30 feet of raingarden have been installed. Fine grading and topsoil application still remain over these sections.

Site Inspection

DATE: July 27, 2016
MMI #: 3452-24
PROJECT: Brook Lane Demonstration
Shelburne Stormwater Mitigation BMP Design and Implementation Project

Weather: Sunny, 70's, Dry
Onsite: 9:30 am – 11:50 pm

Visit By: Jessica Louisos, Milone & MacBroom

Equipment Onsite:

Volvo EC160CL Excavator, Island Excavating (loading out at noon)

Case CX55B Excavator, Island Excavating

1 Truck – Hauling Fill to New Village Farm and Town Garage, Town of Shelburne

1 Truck – Hauling Erosion Stone, Town of Shelburne

2 Trucks – Hauling Topsoil, Island Excavating

Construction Activity:

Island Excavating crew is onsite, led by Dustin Parizo. They are checking grades with laser as they work.

Paul Goodrich is onsite providing oversight and representing the Town.

Shelburne News was onsite this morning.

Contractor installed 30 feet of infiltration trench and pipe today for a total installed length of 130 feet. Paul extended the project 10 feet upstream to get past a utility pole adjacent to the swale. The contractor hand dug when near the water line that they crossed, with no conflicts.

The upstream end of the project where the pipe daylights was stabilized with 5 inch erosion stone and graded to match the upstream swale.

Topsoil was applied over the entire excavated area and fine graded to form a slight swale over the infiltration trench and raingarden basin with shallow side slopes.

The contractor is keeping a tidy site and keeping the road swept.

Swale and disturbed areas are seeded and mulched.

The contractor was loading out equipment prior to lunch breach with very minor tasks to carry over into the afternoon. The contractor has an additional 10 feet of swale at the upstream end over which to apply topsoil, fine grade, and apply seed and mulch. Paul will approve this application and site recovery this afternoon.

Adjacent Landowner Meeting:

Jessica and Paul talked with adjacent landowner Sally Thomas during construction. She offered that some of her plants could be transplanted into the raingarden to supplement plants we will provide. She specifically listed *Liatris spicata* 'Kobalt' and both purple and white Echinacea. She mentioned again that we can use the water from the hose in the front of the house, but need to make sure it is turned off all the way after use.

Schedule:

Wednesday July 27 afternoon– Paul to approve final site cleanup.

Following Island Excavation – Project Engineer and Lewis Creek Association to coordinate planting of raingarden.

Project Engineer Contact Information:

Jessica Louisos or Roy Schiff, Milone & MacBroom, jlouisos@mminc.com or rschiff@mminc.com, Office: (802) 882-8335, Cell: (802) 578-2016

Site Photos:

Infiltration trench and pipe installation complete and topsoil application and fine grading are underway.

Raingarden area has had topsoil application and fine grading. Waiting on plantings.

Final grading done over all but last 10 feet, seed applied, mulch application beginning, and equipment loading out.

Site Inspection

DATE: July 28, 2016
MMI #: 3452-24
PROJECT: Brook Lane Demonstration
Shelburne Stormwater Mitigation BMP Design and Implementation Project

Weather: Sunny, 70's, Dry
Onsite: 9:00 am – 9:20 am

Visit By: Jessica Louisos, Milone & MacBroom

Equipment Onsite:

No equipment or personnel onsite

Construction Activity:

Site work is complete including installation of 130 feet of infiltration trench and pipe and the raingarden section has been graded to final elevation.

Swale and disturbed areas are seeded and mulched.

Site recovery is complete.

The site is ready for planting of the raingarden portion of the project.

Schedule:

Paul to collect final bills and forward to Jessica and Susan.

Project Engineer and Lewis Creek Association to coordinate planting of raingarden.

Project Engineer Contact Information:

Jessica Louisos or Roy Schiff, Milone & MacBroom, jlouisos@mminc.com or rschiff@mminc.com, Office: (802) 882-8335, Cell: (802) 578-2016

Site Photos:

Site view at raingarden area, ready for planting.

Site viewed from adjacent neighbor driveway.

Site viewed from edge of park across Pinehurst Drive.

Site Inspection

DATE: August 9, 2016
MMI #: 3452-24
PROJECT: Brook Lane Demonstration, Shelburne Stormwater Mitigation BMP Design and Implementation Project

Weather: Sunny, 80's, Dry
Onsite: 11:45 am
Offsite: 1:10 pm

PRE-PLANTING MEETING ATTENDEES:

Andrea Morgante, Contractor, Andrea Morgante Landscape Service

Paul Goodrich, Highway Superintendent, Shelburne

Ann Janda, Town Managers Office, Shelburne

Joe Colangelo, Town Manager, Shelburne

Marty Illick, Lewis Creek Association

Susan Moegenburg, Project Manager, Lewis Creek Association

Jessica Louisos, Engineer, Milone & MacBroom

Pre-Planting Meeting:

The group reviewed and all toured the work previously completed on project including a description of the underground features.

Andrea Morgante of Andrea Morgante Landscape Service has been selected by the Lewis Creek Association to complete the planting of the raingarden area and provide maintenance for the first year.

Reviewed July 22 Memo with Planting and Maintenance Plans (see attached). Jessica will create an updated version that lists the plants that are actually being installed.

Changes to the plant list: Plants that have been removed from the list include: Windflower, Flat-topped Aster, Ferns, Grasses. New England Aster has been changed to *Aster laevis* Smooth Aster and Spiked Lobelia is changed to *Lobelia siphilitica* Great Blue Lobelia. *Eupatorium duium* Dwarf Joe Pyeweed (red) has been added. Others may be added during the transplanting.

Plants will be installed in the bottom of the raingarden and approximately halfway up the slopes. A mower-width of lawn grass will be established around it. Andrea will spread more grass seed and mulch on the slopes after the raingarden plants have been installed and mulched. Plant spacing will vary by variety and plant size and is expected to be closer than the 2.5 foot on center minimum distance listed in the plans.

Many plants have been graciously donated by Frances and Bill Hoadley, Marty Illick, and Sally Thomas. Supplemental plants are being purchased from Horsford Gardens & Nursery.

Andrea will install a micromulch from Green Mountain Compost that is amended with compost. She will also use some organic fertilizer to help the plants establish.

Andrea will provide first year maintenance as described in the Planting and Maintenance Plan, except for the watering which will be provided by Sally Thomas of 41 Pinehurst.

After August 2017, Shelburne will take on the Annual maintenance.

This project will be featured as one of the 14 Ahead of the Storm demonstration projects. A sign will be available to designate the site. A summary report with treatment levels will be created by Jessica to serve in public outreach.

Adjacent Landowner Meeting:

Andrea, Susan, Marty, and Jessica met with adjacent landowner Sally Thomas following the meeting.

We shared the project schedule and discussed in detail the planting plan.

Sally will water the plants during the first-year establishment of the raingarden plants.

Sally agreed to hosting an Ahead of the Strom sign and said it could be located on her fence or on a post at the raingarden grate inlet.

She worked with Andrea on identifying plants that can be used in the raingarden.

Schedule:

Wednesday August 10 – Andrea, with help from Krista Hoffsis and Susan Moegenburg, will work on planting the garden and transplanting plants.

Thursday August 11 at 8:30 am – Chris Robinson and Paul Goodrich from the Town of Shelburne, Susan Moegenburg of Lewis Creek Association, and Jessica Lousios of Milone & MacBroom will inspect progress on the planting and scope possible future sites for similar improvements.

Project Engineer Contact Information:

Jessica Louisos or Roy Schiff, Milone & MacBroom, jlouisos@mminc.com or rschiff@mminc.com, Office: (802) 882-8335, Cell: (802) 578-2016

Photos:

Raingarden area is ready for planting.

Most of the project team.

Site Inspection

DATE: August 11, 2016
MMI #: 3452-24
PROJECT: Brook Lane Demonstration, Shelburne Stormwater Mitigation BMP Design and Implementation Project

Weather: Sunny, 80's, Dry
Onsite: 8:20 am
Offsite: 10:30 am

INSPECTION MEETING ATTENDEES:

Andrea Morgante, Contractor, Andrea Morgante Landscape Service

Paul Goodrich, Highway Superintendent, Shelburne

Ann Janda, Town Managers Office, Shelburne

Joe Colangelo, Town Manager, Shelburne

Chris Robinson, Water Quality Superintendent, Shelburne

Susan Moegenburg, Project Manager, Lewis Creek Association

Sally Thomas, Adjacent Landowner

Jessica Louisos, Engineer, Milone & MacBroom

Inspection Meeting:

The group reviewed and all toured the work completed on project. All work is now completed, except for the ongoing maintenance.

Andrea Morgante installed final plants into the raingarden area. Micromulch from Green Mountain Compost was spread between plants.

Additions to the plant list: Happy Returns Day Lily (shorter), Loostrife (yellow), Siberian Iris, Turtlehead (pink)

Sally Thomas is overseeing watering using a sprinkler borrowed from LCA.

All agreed that the project has gone very well. There are no outstanding construction items.

Future Site Scoping Meeting:

Paul, Chris, Joe, Susan, and Jessica met. We reviewed the work products from the *Shelburne Stormwater Mitigation Best Management Practice (BMP) Design and Implementation Project* including the report, decision matrix, BMP list, and large scale map of swale screen results. All of these were given to Chris for future use.

They see being able to use this information when working with landowners on possible changes to the swale network.

The Town is most concerned right now with the very large requirements of the Munroe Brook Flow Restoration Plan. They would like to work on projects that would contribute to the implementation of that plan.

The group then brainstormed other issues in the swale network and visited sites. Three sites have surfaced as top priorities for potential swale improvements and one potential stormwater improvement area. These will be documented in greater detail as a deliverable. Sites identified include:

- Brook Lane – continue project to corner of Woodbine Road.
- Maeck Farm Road – Swale along west side of entrance area, leading to Bishop Road.
- Harbor Road at the Arbors – Swale along the south side between the Arbors entrances
- Detain water upstream of the Harbor Road swale, possible on the south side of Depot Road to alleviate the amount of runoff flowing to the downstream swale network.

Schedule:

Next few months:

Andrea to continue to the annual maintenance with watering help from Sally.

Jessica to complete work products including list of future sites and AOTS summary sheet and contributions to reporting.

Susan to lead reporting.

Project Engineer Contact Information:

Jessica Louisos or Roy Schiff, Milone & MacBroom, jlouisos@mminc.com or rschiff@mminc.com, Office: (802) 882-8335, Cell: (802) 578-2016

Photos:

Raingarden area, planting almost complete.

Project construction and planting complete.

Site Inspection

DATE: September 21, 2016
MMI #: 3452-24
PROJECT: Brook Lane Demonstration
Shelburne Stormwater Mitigation BMP Design and Implementation Project

Weather: Sunny, 60's, Dry
Onsite: 10:30 am – 11:00 am

Visit By: Jessica Louisos, Milone & MacBroom

Project Update:

Photo-documentation of the final work product was completed.

An *Ahead of the Storm* sign has been installed at the stormwater inlet in the raingarden. This sign will help people locate the project and serve as part of the ongoing, watershed wide education project spearheaded by the Lewis Creek Association in partnership with others.

The plants and grass are growing well and are clearly being taken care of according to the Year 1 maintenance plan. Some of the plants are blooming.

There are no signs of erosion.

Andrea Morgante has been continuing the Year 1 maintenance as outlined in the Planting and Maintenance Plan and agreed on by the project team.

Sally Thomas is overseeing watering using a sprinkler borrowed from LCA. Mowing of the area around the raingarden has also been completed by Sally Thomas and will continue to be her responsibility.

Project Engineer Contact Information:

Jessica Louisos or Roy Schiff, Milone & MacBroom, jlouisos@mminc.com or rschiff@mminc.com, Office: (802) 882-8335, Cell: (802) 578-2016

Site Photos:

The final raingarden, viewed looking north along Brook Lane.

The final raingarden, viewed looking south along Brook Lane. The planting medium, infiltration trench, and perforated pipe are located below ground.

The final grass swale, upstream of the raingarden, viewed looking north along Brook Lane. The infiltration trench and pipe are located below ground.

The final grass swale, upstream of the raingarden, viewed looking south along Brook Lane. The infiltration trench and pipe are located below ground. The end of the perforated pipe is visible.

The final raingarden viewed looking southwest from Brook Lane.

A close view of the plants in the final raingarden, viewed looking south along Brook Lane.

A close view of the plants in the final raingarden, viewed looking south along Brook Lane.

A close view of the plants, *Ahead of the Storm* signage, and stormwater inlet at the downstream end of the final raingarden, viewed looking west from Brook Lane.

BROOK LANE DEMONSTRATION
SHELBURNE STORMWATER MITIGATION BMP DESIGN AND IMPLEMENTATION PROJECT

SHELBURNE, VERMONT
PRELIMINARY DESIGN
JAN. 2013

- **LIST OF DRAWINGS:**

  01 - TITLE SHEET AND LOCATION MAP
  02 - PROPOSED LAYOUT
  03 - RAINGARDEN LAYOUT AND DETAIL
  04 - PROFILE
  05 - CROSS SECTIONS
  06 - CROSS SECTIONS

- **PROJECT PARTNERS**

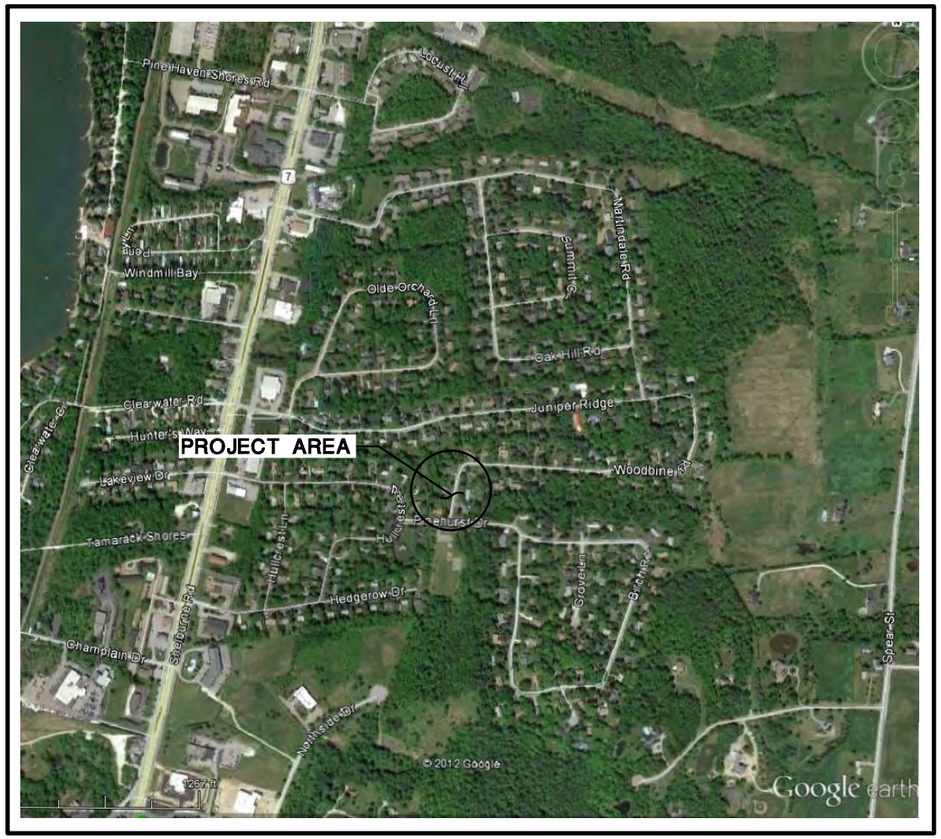
  Town of Shelburne
  5420 Shelburne Road
  Shelburne, VT 05482

  Ecosystem Restoration Program
  Vermont Department of Environmental Conservation
  1 National Life Drive
  Montpelier, Vermont 05620

  Lewis Creek Association &
  LaPlatte Watershed Partnership
  442 Lewis Creek Road
  Charlotte, VT 05445

- **PREPARED BY:**

  Milone & MacBroom, Inc.
  1 South Main Street, 2nd Floor
  Waterbury, Vermont 05676



MAP

PROJECT SITE VICINITY MAP:

1"=1,000'

REFERENCES

1. BACKGROUND AERIAL PHOTOGRAPH IS FROM GOOGLE EARTH, OBTAINED NOVEMBER 2012.
2. PROPERTY BOUNDARIES ARE APPROXIMATE AND RECEIVED FROM THE CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION. NO BOUNDARY SURVEY WAS PERFORMED AS PART OF THIS PROJECT.
3. SITE CONDITIONS AND FEATURES, INCLUDING CROSS SECTIONS, WERE MEASURED IN THE FIELD.
4. ADDITIONAL SITE FEATURES WERE DIGITIZED FROM THE AERIAL PHOTOGRAPH, REFERENCE 1.
5. TOPOGRAPHIC CONTOUR LINES ARE FROM LIDAR DATA FLOWN IN 2009 AND AVAILABLE THROUGH VCGI.

1+65.42

EXISTING UTILITY POLE

EXISTING STUMP

PROPERTY LINE IS EXTENT OF INFILTRATION TRENCH AND PIPE

INSTALL INFILTRATION TRENCH AND PIPE, SEE CROSS SECTION AND PROFILE FOR DETAILS

EXISTING FLOWERBED WITH SHRUBS AND DAYLILIES

1+00

70'

BROOK LANE

INSTALL RAINGARDEN, SEE FOLLOWING SHEETS FOR DETAILS

30'

INSTALL INLET TO STORMWATER PIPE

EXISTING 18" HDPE STORM PIPE

0+00

PINEHURST DRIVE

0' 10' 20'
0 1/2" 1"

N
W E
S

MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

PRELIMINARY DESIGN

PROPOSED LAYOUT

SHELBURNE STORMWATER MITIGATION BMP DESIGN AND IMPLEMENTATION PROJECT

BROOK LANE
SHELBURNE, VERMONT

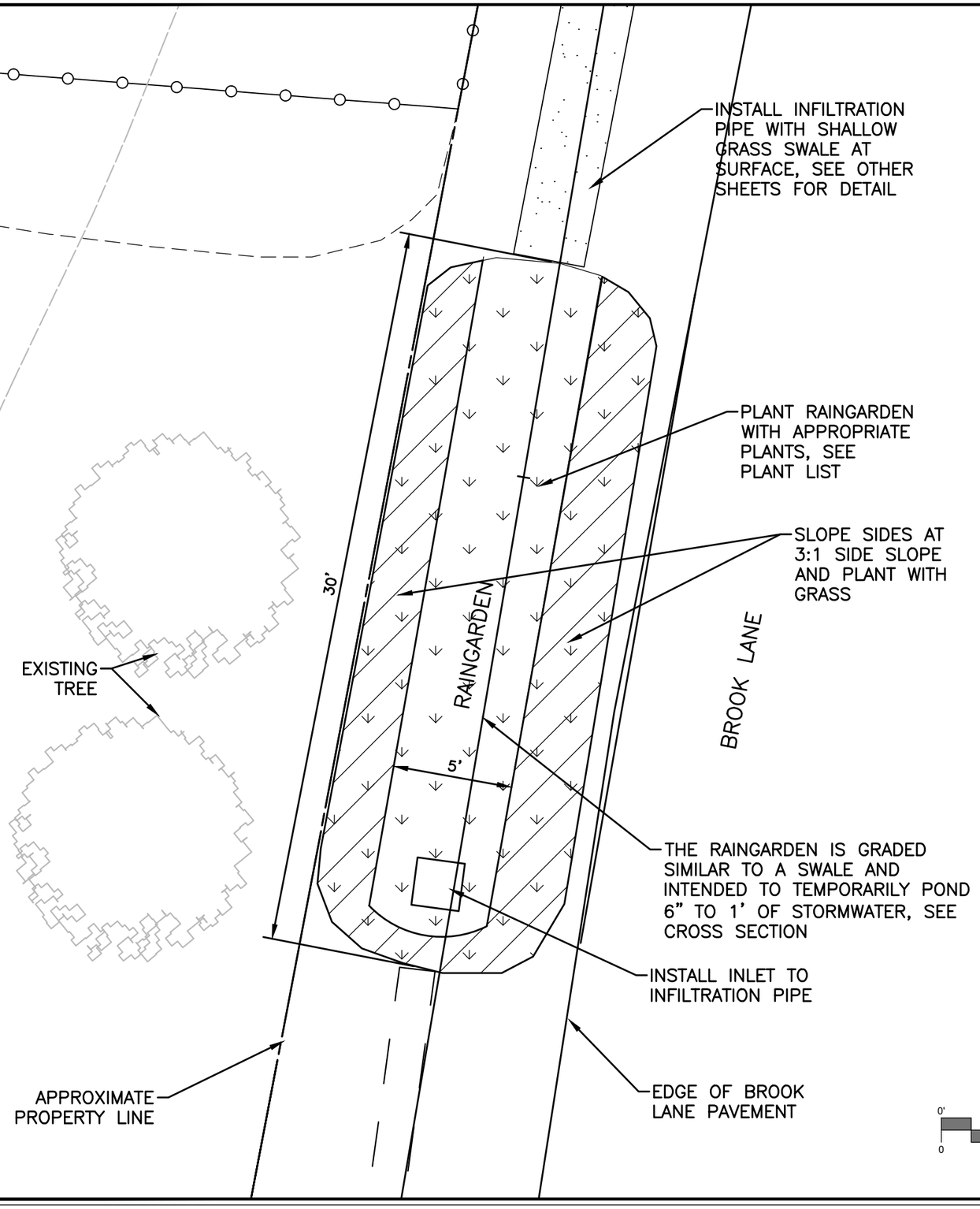
JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: 1"=20'

DATE: JAN. 2013

PROJECT NO.: 3452-14

SHEET NO.: 02



RAINGARDEN PLANT INFORMATION

1. THE RAINGARDEN AREA SHOULD BE VEGETATED. THE RECOMMENDED VEGETATION IS A VARIETY OF PERENNIAL PLANTS THAT IS MAINTAINED SIMILAR TO A PERENNIAL FLOWER BED. IF THE LEVEL OF CARE IS NOT AVAILABLE, IT IS POSSIBLE TO MAINTAIN THIS AREA AS A GRASS SWALE AND CARE FOR THE AREA SIMILAR TO A LAWN.
2. A LIST OF POSSIBLE PERENNIAL PLANTS HAS BEEN PROVIDED. FINAL SELECTION OF THE PLANTS SHOULD BE COORDINATED BETWEEN THE ADJACENT LANDOWNER AND THE TOWN.
3. PLANTS LISTED WERE CHOSEN BECAUSE THEY ARE NATIVE TO VERMONT AND MOST ARE ALSO SALT RESISTANT.
4. ADDITIONAL PLANT INFORMATION CAN BE FOUND IN THE VERMONT RAIN GARDEN MANUAL, PUBLISHED BY THE WINOOSKI NATURAL RESOURCE CONSERVATION DISTRICT.

Perrenials

Anemone canadensis	Windflower
Aquilegia cacadensis	Colombine
Aster novae-angliae	New England Aster
Aster umbellatus	Flat-topped Aster
Baptisia australis	Blue False Indigo
Iris versicolor	Blue Flag Iris
Lobelia cardinalis	Cardinal Flower
Lobelia spicata	Spiked Lobelia
Rudbeckia hirta	Black-Eyed Susan
Caltha palustris	Marsh Marigold
Echinacea purpurea spp.	Coneflower
Hemerocallis	Daylilies

Fern:

Athyrium filix-femina	Lady Fern
Osmunda cinnamomea	Cinnamon Fern

Grasses:

Carex Grayi	Gray Sedge
Panicum virgatum	Switch Grass
Schizachyrium scoparium	Little Bluestem

RAINGARDEN MAINTENANCE

1. RAINGARDEN REQUIRES LANSCAPING CARE SIMILAR TO OTHER PLANTED FLOWER BEDS INCLUDING REGULAR WEEDING TO SELECT WHICH PLANTS CONTINUE TO GROW SUCCESSFULLY.
2. SELECTED SPECIES CAN BE MOWED OR BRUSH-HOGGED AT THE END OF THE GROWING SEASON IF DESIRED.
3. PERIODICALLY, INCLUDING AFTER LARGE STORMS AND REGULARLY DURING THE FALL, REMOVE LEAVES AND DEBRIS ACCUMULATED AT THE STORMWATER INLET.
4. OPTIONALLY ADD MULCH TO ASSIST IN WEED CONTROL.

MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

PRELIMINARY DESIGN

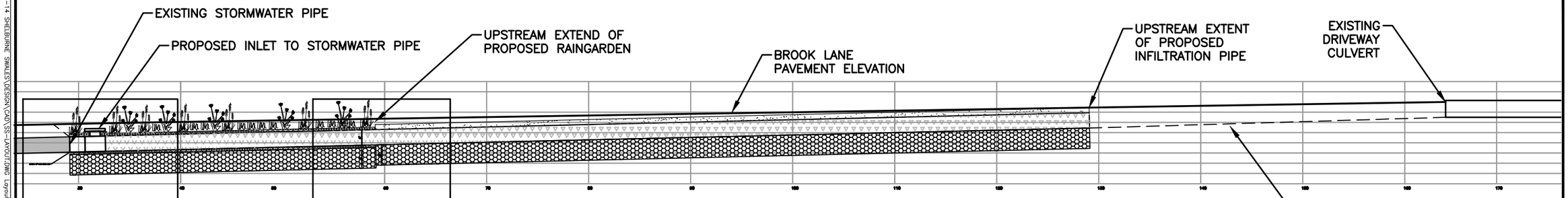
RAINGARDEN LAYOUT AND DETAIL

SHELBURNE STORMWATER MITIGATION BMP
DESIGN AND IMPLEMENTATION PROJECT
BROOK LANE
SHELBURNE, VERMONT

JCL DESIGNED	JCL DRAWN	RKS CHECKED

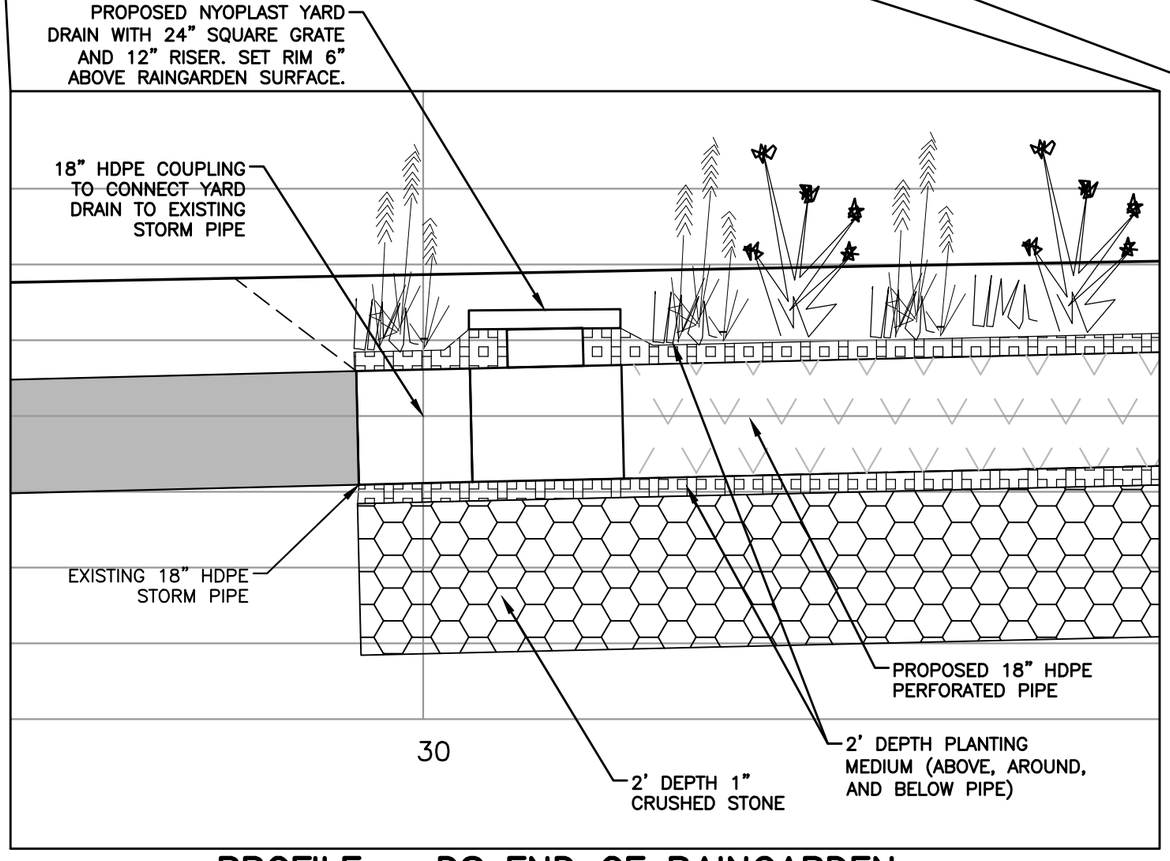
SCALE: 1"=5'
DATE: JAN. 2013
PROJECT NO.: 3452-14
SHEET NO.: 03

Drawing: P:\3452-14 SHELBURNE SWALES\DESIGN\CAD\SS-LAYOUT.DWG Layout Tab: RAINGARDEN
Plotted by: JESSICAC On: this date: Mon, 2013 January 7 – 1:30pm



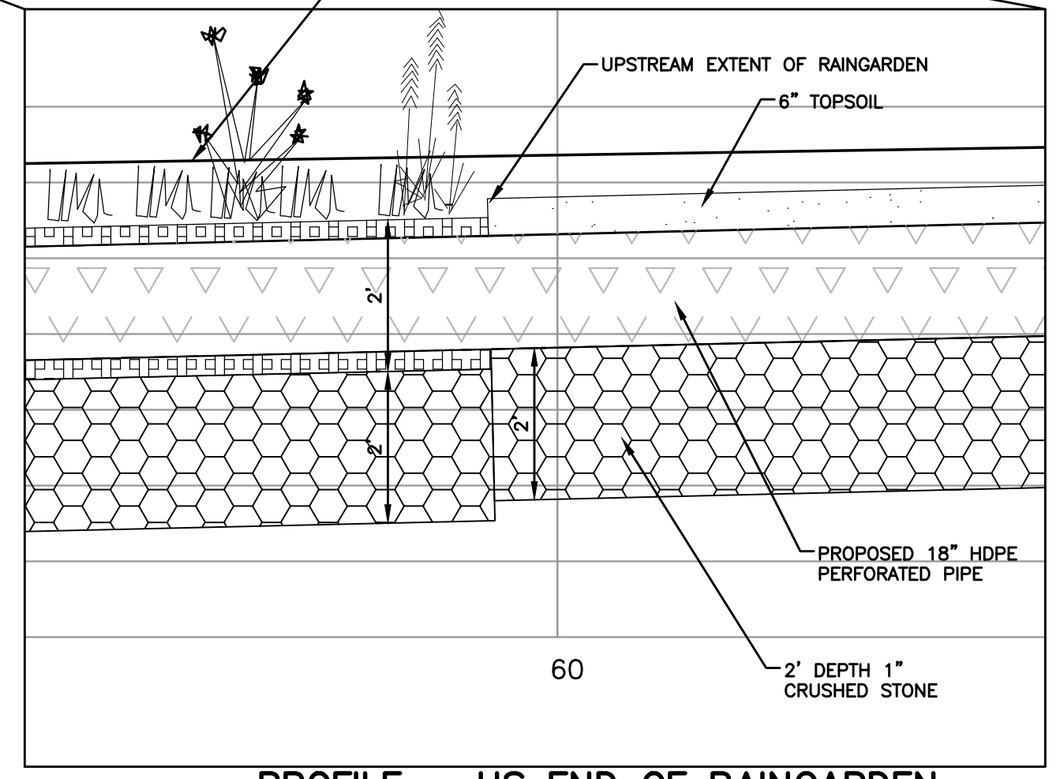
FULL PROFILE

SCALE: 1"=20'



PROFILE – DS END OF RAINGARDEN

SCALE: 1"=2'



PROFILE – US END OF RAINGARDEN

SCALE: 1"=2'

MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

PRELIMINARY DESIGN

PROFILE

SHELBURNE STORMWATER MITIGATION BMP
DESIGN AND IMPLEMENTATION PROJECT

BROOK LANE
SHELBURNE, VERMONT

JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

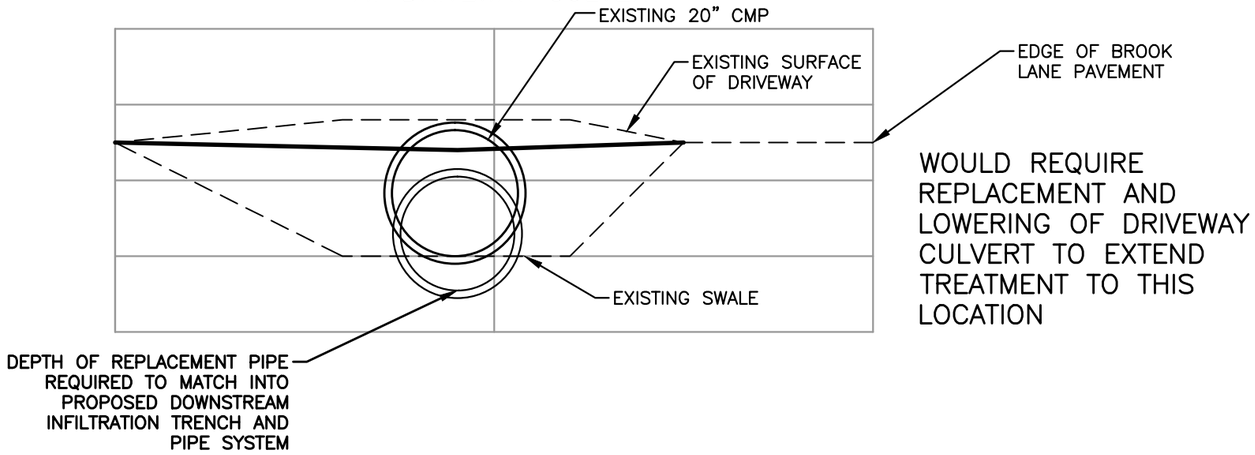
SCALE: VARIES

DATE: JAN. 2013

PROJECT NO.: 3452-14

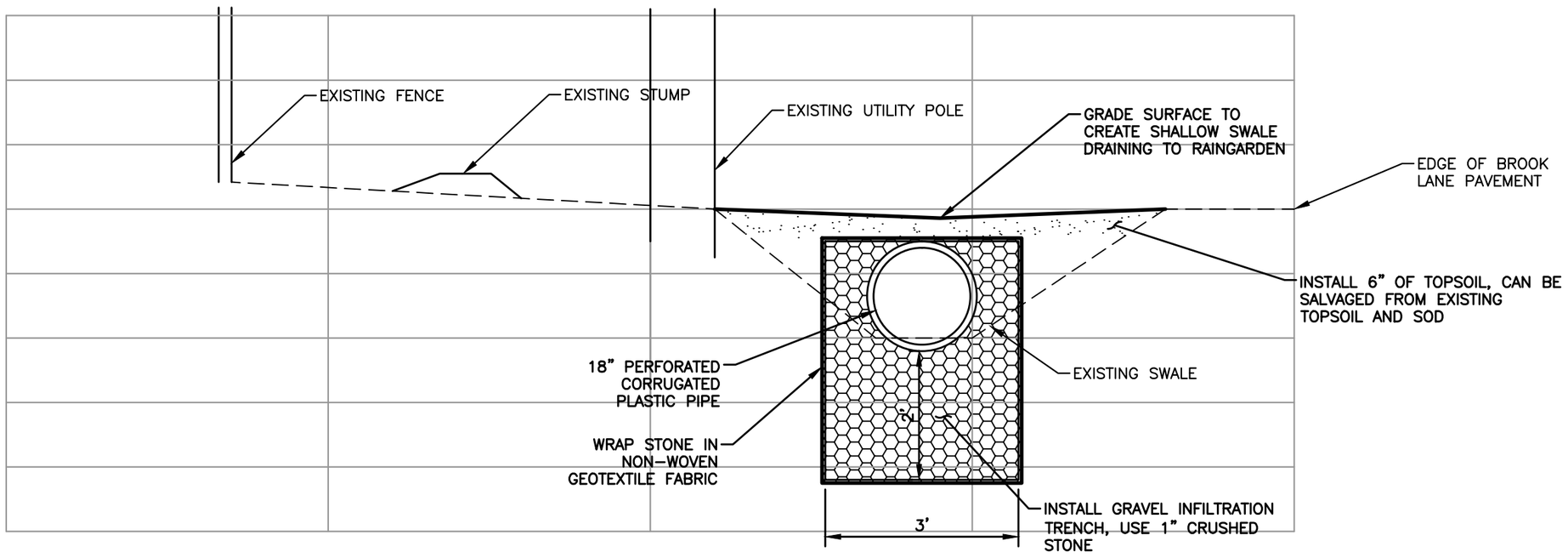
SHEET NO.: 04

1+64
AT DRIVEWAY CULVERT



WOULD REQUIRE REPLACEMENT AND LOWERING OF DRIVEWAY CULVERT TO EXTEND TREATMENT TO THIS LOCATION

1+22
AT UTILITY POLE



0' 1' 2'
0 1/2" 1"

MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

PRELIMINARY DESIGN

CROSS SECTIONS

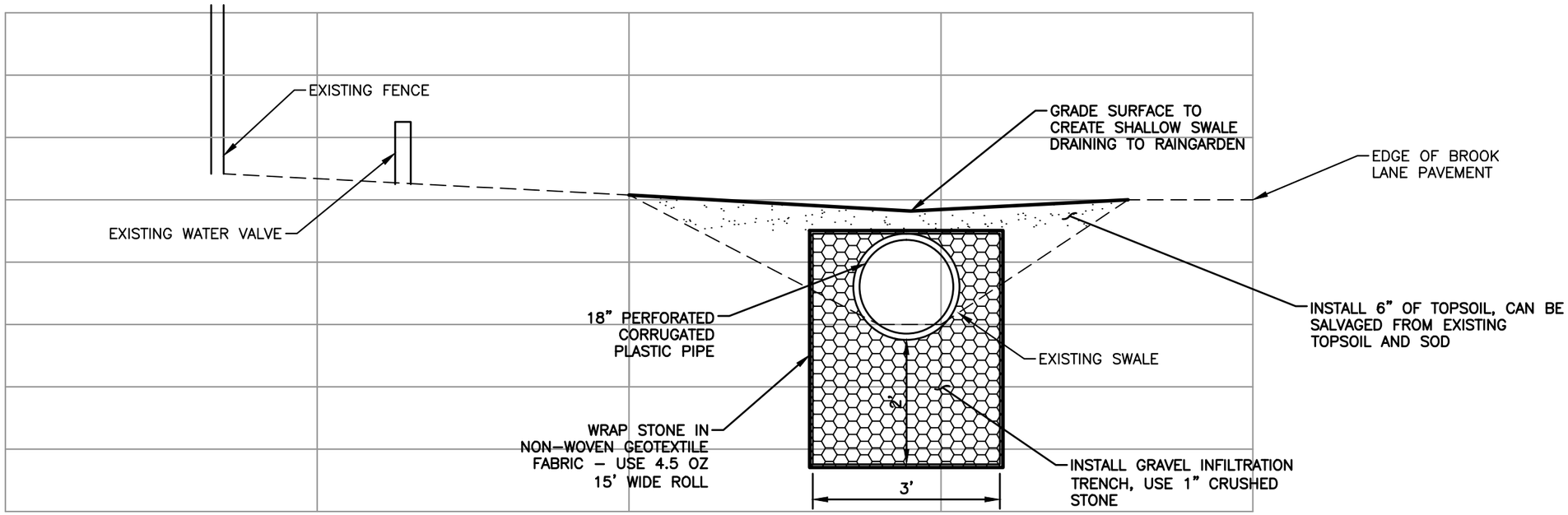
SHELBURNE STORMWATER MITIGATION BMP
DESIGN AND IMPLEMENTATION PROJECT

BROOK LANE
SHELBURNE, VERMONT

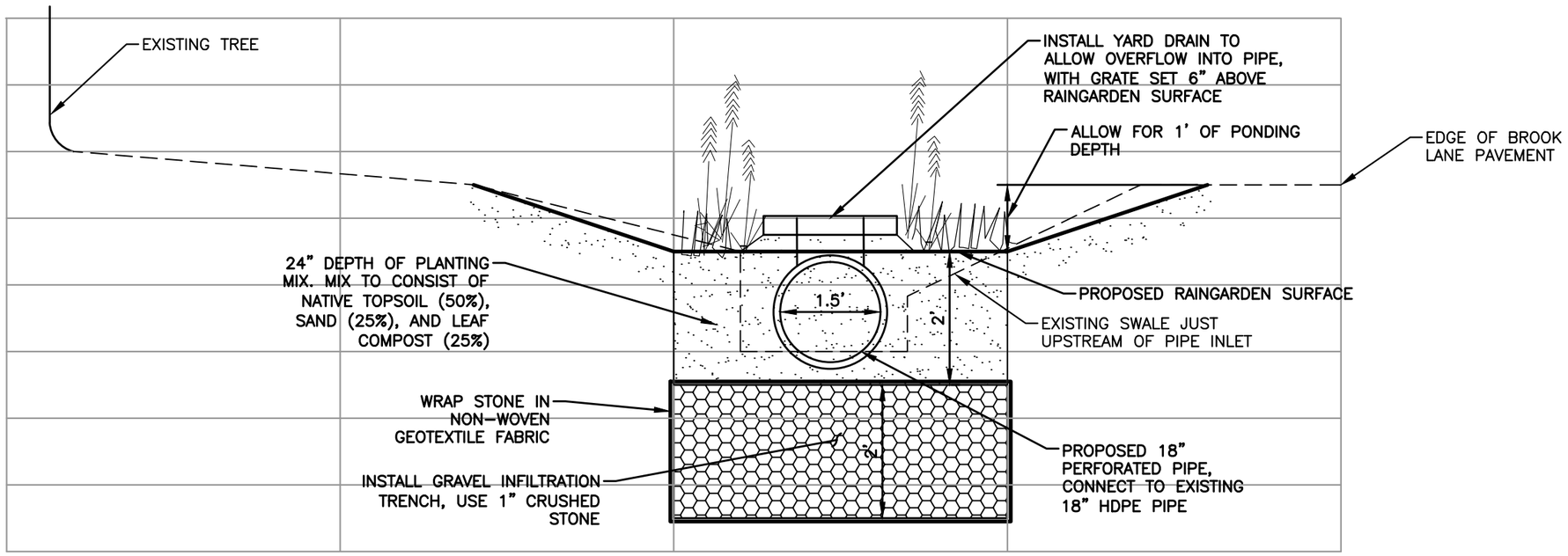
JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: 1"=2'
DATE: JAN. 2013
PROJECT NO.: 3452-14
SHEET NO.: 05

1+00
AT FLOWER BED



0+32
RAINGARDEN CROSS SECTION



MILONE & MACBROOM®
1 South Main Street, 2nd Floor
Waterbury, Vermont 05676
(802) 882-8335 Fax (802) 882-8346
www.miloneandmacbroom.com

REVISIONS

PRELIMINARY DESIGN

CROSS SECTIONS

SHELBURNE STORMWATER MITIGATION BMP
DESIGN AND IMPLEMENTATION PROJECT

BROOK LANE
SHELBURNE, VERMONT

JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: 1"=2'

DATE: JAN. 2013

PROJECT NO.: 3452-14

SHEET NO.: 06

Brook Lane Demonstration
Shelburne Stormwater Mitigation BMP Design and Implementation Project
11/30/2012

	Unit Price	Units	Quantity	Price	Price Quote Source	Phone Number
Infiltration Pipe and Trench						
1" crushed stone + delivery	varies with delivery	cubic yard	32	$ 755	Hinesburg Sand and Gravel	482-2342
Geotextile Fabric	$ 384.00	roll	1	$ 384	E.J. Prescott	865-3958
18" HDPE Perforated Pipe	$ 17.49	linear feet	100	$ 1,749	E.J. Prescott	
Nyoplast 24" Yard Drain, 12" Vertical Riser	$ 875.00	each	1	$ 875	E.J. Prescott	
Yard Drain T connection	$ 216.24	each	1	$ 216	E.J. Prescott	
Coupling for Yard Drain	$ 29.31	total	2	$ 59	E.J. Prescott	
Lawn Grass Seed	$ 15.00	pound	0.5	$ 8		
Erosion Fabric - optional	$ 3.00	square yard	75	$ 225		
Raingarden Treatment Area						
Planting Medium - Fine Washed Sand + delivery	varies with delivery	cubic yard	2	$ -	* Priced with Topsoil because same delivery	
Planting Medium - Topsoil + delivery	varies with delivery	cubic yard	4	$ 270	Hinesburg Sand and Gravel	
Planting Medium - Compost + delivery	varies with delivery	cubic yard	2	$ 136	Green Mountain Compost	660-4949
Raingarden Plants	$ 14.00	each	30	$ 420	Horsford Nursery	425-2811
Grass Seed and Mulch	$ 30.00	pound	1	$ 30	Vermont Wetland Plant Supply	948-2553
Erosion Fabric - optional	$ 3.00	square yard	35	$ 105		
Total				**$ 5,096**		