

**DRAINAGE ANALYSIS
&
SEDIMENT AND EROSION
CONTROL PLAN**

Prepared for:
**ST. MICHAELS CHURCH
PINE STREET
ROCHESTER, NH**

Prepared by:

**Berry Surveying & Engineering
335 Second Crown Point Road
Rochester, NH 03867**

Project Number:
DB 2011-078

August 3, 2011

Table of Contents

Design Method Objectives	Page 2
1.0 Existing Conditions Analysis	Page 3
2.0 Proposed Conditions Analysis	Page 3
4.0 Sediment & Erosion Control, BMP's	Page 5
5.0 Conclusion	Page 10

Appendix I Proposed Hydrograph Analysis

2 Yr- 24 Hr Complete
10 Yr – 24 Hr. Complete
25 Yr – 24 Hr Complete
50 Yr – 24 Hr Complete

DESIGN METHOD OBJECTIVES

St. Michaels Church is proposing a small four thousand square foot gravel parking area for the revised use of the existing building on Pine Street. The purpose of this report and analysis is to provide sizing criteria for the infiltration system designed on site.

1.0 Existing Analysis:

Reference: Existing Conditions Plan.

The property is located in a sandy area and is made up of the Windsor Soil Group. This was proven by an onsite test pit in the location of the proposed swale and infiltration system. The test pit results yielded sandy soils down and below 6' deep with no seasonal high water table being observed. We have determined through the use of the NRCS "Websoil Survey" that the existing infiltration rates in this area are 20 In/Hr.

Currently the site collects water in the center lawn areas where it migrates to the municipal collection system in Pine Street. There is a mix of impervious surface and lawn area which attributes to the run off.

2.0 Proposed Analysis:

Reference: Proposed Grading Plan.

We have determined that by placing the parking lot in the proposed location we will be blocking the existing flow pattern for the on-site storm water. An alternatives analysis was done which yielded two possible mitigation plans.

1. The first was to collect the storm water in a collection swale and then convey the storm water to the existing catch basin in the street, through the use of a culvert device.
2. The second was to collect the storm water in a collection swale and utilize Low Impact Development design, and infiltrate the storm water into the known sandy soil.

The second option was chosen so as to reduce peak rates into the municipal storm water collection system, and reduce any downstream volume control problems. Additionally, the infiltration design reduces all water quality concerns with urbanized development.

The basic design is to grade the proposed parking lot towards a conveyance swale. The swale will act to reduce floatables in the storm water, and allow for a small amount of treatment. During larger rain events the storage volume in the swale is utilized for flood control. The swale and the remainder of the site is directed at a standard catch basins which is equipped with an open bottom. This basin is placed on 1' of stone to allow for better infiltration. Half inch holes are installed in the structure walls to facilitate more infiltration from the device.

There is approximately 14,000 Sq.Ft., of area draining to this device and we have estimated that 6,000 Sq.Ft., of that area is impervious with the remainder being lawn. We have estimated the gravel parking area in the 6,000 Sq.Ft., of impervious surface.

The provided analysis shows that the infiltration device can handle storm flows up to the 50 Year event, reaching a peak elevation of 100.82'. The device stays consistent at this elevation for only 2 hours or less and is completely dry by the 20th hour.

3.0 SEDIMENT & EROSION CONTROL PLANS BEST MANAGEMENT PRACTICES (BMP's)

Reference: Sheet W2 - Proposed Conditions Plan
Proposed Site Plans
Erosion & Sediment Control Details

The proposed site development is protected from erosion and the roadways and abutting properties are protected from sediment by the use of Best Management Practices as outlined in the New Hampshire Stormwater Manual, Volume 2, Post-Construction Best Management Practices Selection & Design (December 2008, NHDES & US EPA). Any area disturbed by construction will be re-stabilized within 30 days and abutting properties and wetlands will not be adversely affected by this development. All swales and drainage structures will be constructed and stabilized prior to having run-off directed to them. Reference is also made to the Stormwater System Operation and Maintenance Plan / Inspection & Maintenance Manual which has been written specifically for this project and available to the owner.

Silt Fence

The plan set demonstrates the location of silt fence for sediment control. The Erosion and Sediment Control Details, has the specifications for installation and maintenance of the silt fence.

Drainage Swales / Stormwater Conveyance Channels

Drainage swales will be stabilized with vegetation for long term cover as outlined below, and on Sheet E-102 using seed mixture C. As a general rule, velocities in the swale should not exceed 3.0 feet per second for a vegetated swale although velocities as high as 4.5 FPS are allowed under certain soil conditions.

Vegetated Stabilization

All areas that are disturbed during construction will be stabilized with vegetated material within 30 days of breaking ground. Construction will be managed in such a manner that erosion is prevented and that no abutter's property will be subjected to any siltation, unless otherwise permitted. All areas to be planted with grass for long-term cover will follow the specification and on Sheet E-102 using seeding mixture C, as follows:

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Tall Fescue	24	0.55
Creeping Red Fescue	24	0.55
Total	48	1.10

Stabilized Construction Entrance

A temporary gravel construction entrance provides an area where mud can be dislodged from tires before the vehicle leaves the construction site to reduce the amount of mud and sediment transported onto paved municipal and state roads. The stone size for the pad should be between 1 and 2-inch coarse aggregate, and the pad itself constructed to a minimum length of 50' for the full width of the access road. The aggregate should be placed at least six inches thick. A plan view and profile are shown on Sheet E-102- Sediment and Erosion Control Detail Plan.

Environmental Dust Control

Dust will be controlled on the site by the use of multiple Best Management Practices. Mulching and temporary seeding will be the first line of protection to be utilized where problems occur. If dust problems are not solved by these applications, the use of water and calcium chloride can be applied. Calcium chloride will be applied at a rate that will keep the surface moist but not cause pollution.

Drainage Swales / Stormwater Conveyance Channels

Drainage swales will be stabilized with vegetation for long term cover as outlined below, and on Sheet E-102 using seed mixture C. As a general rule, velocities in the swale should not exceed 3.0 feet per second for a vegetated swale although velocities as high as 4.5 FPS are allowed under certain soil conditions.

Construction Sequence

1. Cut and remove trees in construction areas as directed or required.
2. Install Silt Fence and construct and/or install temporary and permanent sediment erosion and detention control facilities (Vegetated swales, level spreaders, and constructed filter strips), as required. Erosion, sediment and facilities shall be installed and stabilized prior to any earth moving operation, and prior to directing run-off to them.
3. Clear, grub, and dispose of debris in approved facilities.
4. Excavate and stockpile topsoil / loam. All disturbed areas shall be stabilized immediately after grading.
5. Construct the roadway and its associated drainage structures.
6. Begin permanent and temporary seeding and mulching. All cut and fill slopes and disturbed areas shall be seeded and mulched as required, or directed.
7. Daily, or as required, construct temporary berms, drainage ditches, sediment traps, etc. to prevent erosion on the site and prevent any siltation of abutting waters or property.
8. Inspect and maintain all erosion and sediment control measures during construction.
9. Complete permanent seeding and landscaping.
10. Remove temporary erosion control measures after seeding areas have established themselves and site improvements are complete. Smooth and re-vegetate all disturbed areas.
11. All swales and drainage structures will be constructed and stabilized prior to having run-off being directed to them.
12. Finish graveling all roadways/parking.

Temporary Erosion Control Measures

1. The smallest practical area of land shall be exposed at any one time.
2. Erosion, sediment control measures shall be installed as shown on the plans and at locations as required, or directed by the engineer.
3. All disturbed areas shall be returned to original grades and elevations. Disturbed areas shall be loamed with a minimum of 4" of loam and seeded with not less than 1.10 pound of seed per 1,000 square feet (48 pounds per acre) of area.

4. Silt fences and other barriers shall be inspected periodically and after every rainstorm during the life of the project. All damaged areas shall be repaired, sediment deposits shall periodically be removed and properly disposed of.
5. After all disturbed areas have been stabilized, the temporary erosion control measures are to be removed and the area disturbed by the removal smoothed and re-vegetated.
6. Areas must be seeded and mulched within 5 days of final grading, permanently stabilized within 15 days of final grading, or temporarily stabilized within 30 days of initial disturbance of soil.

Inspection and Maintenance Schedule

Fencing will be inspected during and after storm events to ensure that the fence still has integrity and is not allowing sediment to pass. Sediment build-up in swales and level spreaders will be removed if it is deeper than six inches.

5.0 CONCLUSION

It is our conclusion that we have designed a mitigation plan which will aid in reducing storm flow and volume into the municipal system, will readily handle the small amount of additional impervious surface created by this proposal and creates no further discharge points on to abutting lands owners.

A Site Specific, Terrain Alteration Permit (RSA 485: A-17) is not required for this site plan due to the area of disturbance being under 100,000 Sq.Ft.,

Respectfully Submitted,

Christopher R. Berry
Berry Surveying & Engineering
SIT 567
Engineering Tech.
Project Manager