

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

Prepared for:

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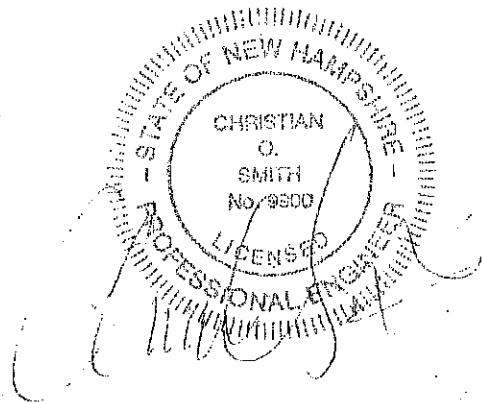
Project Number:

NH-1073

Calef Highway

Barrington, New Hampshire

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DESIGN METHOD OBJECTIVES

Vermont Stone Sculpturing, Inc. is proposing a stone fabrication and monument facility on approximately 5.0-acres of land located on Calef Highway in Barrington, NH. The existing property is located on a parcel (Tax Map 220, Lot 57-19) consisting of a grassed area, woods, and wetlands. The development will include: on-site overhead electric, telephone & cable; onsite septic systems & well; and Low Impact Development/BMP storm water management and treatment. Proper erosion controls will be proposed where construction could result in sediment transport for the development. A drainage analysis of the proposed development was conducted for the purpose of estimating the peak rate of stormwater run-off and to subsequently design adequate drainage structures. Two models were compiled, one for the area in its existing (pre-construction) condition, and a second for its proposed (post-construction) condition. The analysis was conducted using data for the 2Yr, 10Yr, 25Yr and 50 Yr- 24 Hr storm events using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment. The purpose of this analysis is to estimate the peak rates of run-off from the site for swale adequacy purposes, and to compare the peak rate of run-off between the existing and proposed conditions. The proposed sediment forebay and infiltration pond provide for reducing potential pollutants in stormwater by: 86% of total suspended solids; 95+% of total zinc; 54% of Dissolved inorganic Nitrogen, and 50% of total phosphorous per the UNH Storm Center Testing.

ANALYSIS COMPONENT PEAK RATE of DISCHARGE (CFS)

2 YR		10 YR		25 YR		50 YR	
Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1.41	1.38	5.70	5.12	9.99	8.89	14.37	12.71

The existing property is located on a parcel consisting of a grassed area, forest and wetlands. The existing topography is such that the site analysis is divided into a single subcatchment and analysis point reach. The reach flows offsite and into a large wetland complex.

The proposed development utilizes an existing curb cut with a proposed gravel driveway off the existing public roadway. The proposed layout will divide the parcel into 2 different subcatchments. The peak rate of run-off from the proposed development is decreased from that of the existing conditions. In addition, the volume of runoff from the development is not increased under the 2 through the 50 year storm event exceeding NHDES AoT requirements as cited in Env-Wg 1507.05(b)(1)a. The addition of a formal infiltration basin direct the cleaned run-off back into the GW table in all storm events. The sediment forebay and infiltration pond (prior to discharge) provide retainage and treatment of the improved areas. The use of Best Management Practices per the NH Stormwater Manual have been applied to the design of these structures and will be observed during all stages of construction. All land disturbed during construction will be permanently stabilized within 45 days of groundbreaking; and existing wetlands and abutters will suffer no adversity resulting from this development.

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Appendix I - Existing Conditions Analysis

Summary 2 YR - 24 HR rainfall = 3.05"
Complete 10 YR - 24 HR rainfall = 4.58"
Summary 25 YR - 24 HR rainfall = 5.79"
Summary 50 YR - 24 HR rainfall = 6.91"
Sheet W-1 Existing Conditions Watershed Plan

Appendix II - Proposed Conditions Analysis

Summary 2 YR - 24 HR rainfall = 3.05"
Complete 10 YR - 24 HR rainfall = 4.58"
Summary 25 YR - 24 HR rainfall = 5.79"
Summary 50 YR - 24 HR rainfall = 6.91"
Sheet W-2 Proposed Conditions Watershed Plan

Note: rainfall events based on information from Extreme Precipitation Tables.

Appendix III - Charts, Graphs, and Calculations

1.0 RAINFALL CHARACTERISTICS

This drainage report includes an existing conditions analysis of the area involved in the proposed development, as well as proposed conditions, or post-construction analysis of the same location. These analyses were accomplished using the USDA SCS TR-20 Method within the HydroCAD Stormwater Modeling System. The curve numbers were developed using the SCS TR-55 Runoff Curve numbers for Urban Areas. A Type III SCS 24-hour rainfall distribution was utilized in analyzing the data for the 2, 10, 25 & 50 Yr – 24 Hr storm events using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment.

<u>ANALYSIS</u>		<u>COMPONENT PEAK RATE of DISCHARGE (CFS)</u>							
2 YR		10 YR		25 YR		50 YR			
Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1.41	1.38	5.70	5.12	9.99	8.89	14.37	12.71		

2.0 EXISTING CONDITIONS

Reference: Sheet W-1, Existing Conditions Watershed Plan (Enclosed)
Existing Conditions Plan

The existing property is located on a parcel consisting of a grassed area, forest and wetlands. The existing topography is such that the site analysis is divided into a single subcatchment and analysis point reach. The reach flows offsite and into a large wetland complex. The wetlands ultimately drain to Green Hill Brook.

Classified by NRCS Mapping, the land within the drainage analysis is composed of slopes ranging from 3% to 25%+, and soils categorized into the Hydrologic Soil Groups (HSG) B, C & D (the prime wetland area).

3.0 PROPOSED CONDITIONS

Reference: Proposed Conditions Watershed Plan (Enclosed)

The addition of the impervious area from the gravel driveway and parking areas, and the 3,840 s.f. metal roof building cause an increase in the curve number (Cn) and a decrease in the time of concentration (Tc), the net result being a potential increase in peak rates of run-off from the site. The proposed facility divides the site into 2 different post-construction subcatchments. The run-off is directed to the wetlands through HydroCAD "reaches" and "ponds". These consist of swales, ponds, etc.. The proposed development utilizes a g gravel drive off the existing public roadway. The peak rate of run-off from the proposed development is slightly decreased from that of the existing conditions. The addition of the infiltration direct the cleaned run off to infiltrate back into the groundwater matrix after treatment.

During construction, appropriate BMP's will be applied so as to negate the potential for sediment-laden run-off to discharge into wetlands prior to the final stabilization of the proposed

grading. The structures outlined in this proposal provide for adequate treatment of stormwater run-off for sediment control.

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

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 NH Stormwater Manual. Any area disturbed by construction will be permanently re-stabilized within 60 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.

4.1 Silt Fence / Construction Fence

The plan set demonstrates the location of silt fence for sediment control. In areas where the limits of construction need to be emphasized to operators, construction fence for added visibility will be installed. Erosion and Sediment Control Details have the specifications for installation and maintenance of the silt fence. Orange construction fence will be VISI Perimeter Fence by Conwed Plastic Fencing, or equal. The four-foot fencing to be installed using six-foot posts at least two feet in the ground with spacing of six to eight feet.

4.2 Drainage Swales / Stormwater Conveyance Channels

Drainage swales will be stabilized with vegetation for long term cover as outlined below 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.

4.3 Vegetated Stabilization

All areas that are disturbed during construction will be stabilized with vegetated material within 45 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 as follows:

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Tall Fescue	20	0.45
Creeping Red Fescue	28	0.65
Total	48	1.10

4.4 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'-75' for the full width of the access road. The aggregate should be placed at least six inches thick.

4.5 Level Spreaders

Level spreaders enable any run-off directed towards them to be spread evenly into sheet flow prior to discharge into wetlands or treatment by a filter strip, thus allowing for better filter strip efficiency and a lesser potential for erosion.

4.6 Filter Strips

Filter strips are areas of land with natural or planted vegetation designed to receive sheet run-off from upgradient development. These natural areas, preferably wooded, are effective in removing sediment and sediment-laden pollutants from such run-off, although their effectiveness is severely diminished when forced to deal with concentrated flow and must therefore be equipped with a level-spreading device. Filter strips should not have a slope exceeding fifteen percent and have a minimum length of seventy-five feet.

4.7 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.

4.8 Construction Sequence

1. Construct and/or install temporary and permanent sediment erosion and detention control facilities (silt fence, 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.
2. Clear, cut, grub, and dispose of debris in approved facilities.
3. Excavate and stockpile topsoil / loam. All disturbed areas shall be stabilized immediately after grading.

4. Construct the roadway and its associated drainage structures.
5. Begin permanent and temporary seeding and mulching. All cut and fill slopes and disturbed areas shall be seeded and mulched as required, or directed.
6. 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.
7. Inspect and maintain all erosion and sediment control measures during construction every two weeks and after every storm event with 0.25" or more rain.
9. Complete permanent seeding and landscaping.
9. Remove temporary erosion control measures after seeding areas have established themselves and site improvements are complete. Smooth and re-vegetate all disturbed areas.
10. All swales and drainage structures will be constructed and stabilized prior to having run-off being directed to them.
11. Finish graveling all roadways/parking.

4.9 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 revegetated.

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.

4.11 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

This proposed development on Calef Highway in Barrington, NH will have no adverse effect on the abutting property owners nor the environment by way of storm water run-off or siltation. The post-construction peak rate of run-off for the site has been decreased from that of the existing conditions and impervious run-off will receive treatment by either constructed or natural methods. Appropriate steps will be taken to eliminate erosion and sedimentation; these will be accomplished through the construction of a drainage system consisting of an infiltration pond, and sediment forebay. The Best Management Practices developed by the State of New Hampshire have been utilized in the design of this system and these applications will be enforced throughout the construction process.

A Site Specific, Terrain Alteration Permit (RSA 485: A-17) is not required for this project due to the area of disturbance being less than 100,000 square feet.

Respectfully Submitted,

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