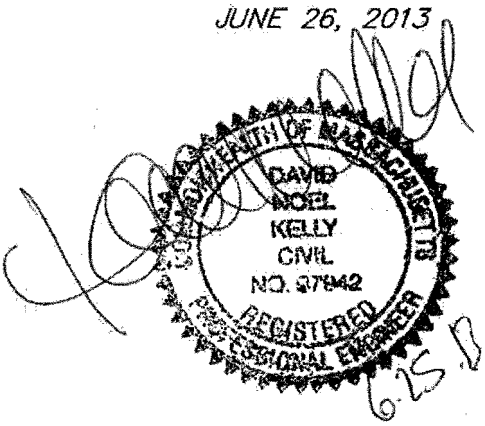
# STORMWATER MANAGEMENT REPORT

## 170 NEEDHAM STREET
## NEWTON, MA 02464

*JUNE 26, 2013*






*PREPARED FOR:*

**NEEDHAM CHESTNUT REALTY, LLC**
**310 WASHINGTON STREET, SUITE 202**
**WELLESLEY HILLS, MA 02481**

*PREPARED BY:*

KELLY ENGINEERING GROUP, INC.
CIVIL ENGINEERING CONSULTANTS
0 CAMPANELLI DRIVE BRAINTREE MA 02184
PHONE: 781 843 4333 FAX: 781 843 0028

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## INTRODUCTION

The site is located at 170 Needham Street in Newton, MA. It is a 27,178 ± s.f. lot to the east of Needham Street. The proposed work is completely contained in the lot. For the purposes of this report we will analyze the drainage characteristics of the existing developed lot to the redeveloped conditions on the site.

A stormwater management system was designed which includes a double catch basin, a proprietary water quality device ("WQD"), an internal roof drain system, 20 Cultec 150HD subsurface recharge chambers, and an operations and maintenance program for the runoff generated from the proposed site. As a result of the proposed stormwater management system, the runoff characteristics of the site will be improved.

## EXISTING SITE

The existing lot is a completely fully developed site with an approximately 11,550 s.f. building with associated parking, drainage and utilities. The stormwater for the parking lot in the rear of the building is collected by a double catch basin that is untreated and drains directly to South Meadow Brook. The roof area is collected by a roof drain system that discharges to the South Meadow Brook.

There is a drainage system in Jaconnet Street that collects stormwater runoff from various areas along the street. The stormwater is conveyed through a 15" RCP that runs beneath the existing building on the site and discharges to South Meadow Brook. A portion of the existing site along Jaconnet Street discharges to this system.

Another small portion of the site along Needham Street is collected by the drainage system in Needham Street.

There is no treatment prior to entering this system. See Existing Conditions Drainage Exhibit in **Attachment A.**

## PROPOSED SITE

The proposed project will entail the demolition of the entire existing site and the construction of a 7,100 ± retail and restaurant building with associated parking, utilities, and a stormwater management system for the site. The proposed project will result in a reduction of approximately 1,000 s.f. of impervious area.

A stormwater management system has been designed to comply with redevelopment standards for Massachusetts Department of Environmental Protection Standards for stormwater management.

The stormwater management system will incorporate several Best Management Practices (BMPs) which will include 20 subsurface recharge chambers, a double catch basin, an internal roof drain system, and a water quality device called a Contech VortSentry HS36, and an operations and maintenance plan for the entire site will be adhered to.

Runoff from the parking lot will be captured by the double catch basin which will be directed to the existing line that discharges to the South Meadow Brook. That line will also discharge the roof runoff captured by the internal roof drain system and then routed through the 20 Cultec 100HD recharge chambers.

A reduced area consisting of sidewalk and landscaped area will contribute runoff to the storm drain system on Jaconnet Street. The pipe that connects the system to South Meadow Brook will be relocated so it will no longer run beneath the foundation of the proposed building for easier maintenance. The section of pipe that overlaps the footprint of the building will be relocated

with a series of drain manholes and drain lines to the existing entrance at the culvert.

An area of sidewalk and landscaped area in front of the building along Needham Street will flow directly down the slope and will be collected by the catch basins and drain system in the street. See Proposed Conditions Drainage Exhibit in **Attachment B**.

## STORMWATER QUALITY

Stormwater runoff from the site will be enhanced by means of a number of Best Management Practices (BMP's), which have been designed to comply with the DEP Stormwater Management Guidelines. In order to achieve a Total Suspended Solids (TSS) removal rate of 80%, the following BMP's will be incorporated:

- A pavement sweeping and maintenance program will be adhered to.
- A Contech VortSentry HS36 water quality unit will be utilized for the paved area.
- An internal roof drain will capture the roof runoff and direct it to a subsurface recharge system.

The total TSS removal is expected to be greater than 80%. See TSS Removal in **Attachment D**.

## STORMWATER RECHARGE

Because there is a reduction of impervious area from existing to proposed conditions no recharge is owed according to DEP guidelines for recharge. However, a system will be provided to recharge the roof runoff. There will be 20 Cultec 100HD subsurface recharge chambers that will provide 660 cu.ft. of stormwater

storage. The roof area is approximately 7,100 s.f. so the depth of recharge provided over the roof is:

660 cu.ft. / 7,120 s.f. x 12"/1' = 1.1" recharge

See **Attachment C** for recharge calculations.

## EROSION AND SEDIMENTATION CONTROL

During construction, erosion and sedimentation control measures will be employed on the site. A haybale line will be constructed on the perimeter of the site along the property line adjacent to South Meadow Brook. In addition, silt sacks will be installed in the proposed drainage inlets so sediment will not enter the drainage system.

At the end of construction, it is proposed to clean the entire storm drain line system of silt so that it continues to operate effectively.

## CONCLUSION

A stormwater management system has been designed for the site. This Stormwater management system has been designed to fully comply with current (DEP) guidelines for recharge and water quality and will incorporate a number of Best Management Practices ("BMP's") that will ensure that the runoff will be treated prior to leaving the site.

The construction of the stormwater management system will ensure that storm drainage runoff from this site will be of high quality.

As can be seen from this report the drainage characteristics will be improved by developing this site

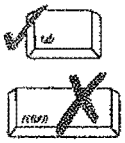
as designed. The construction of the stormwater management system will not increase runoff peaks because of the reduction of impervious area.

**Massachusetts Department of Environmental Protection**
Bureau of Resource Protection - Wetlands Program

# Checklist for Stormwater Report

## A. Introduction

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

**Massachusetts Department of Environmental Protection**
Bureau of Resource Protection - Wetlands Program

# Checklist for Stormwater Report

## B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

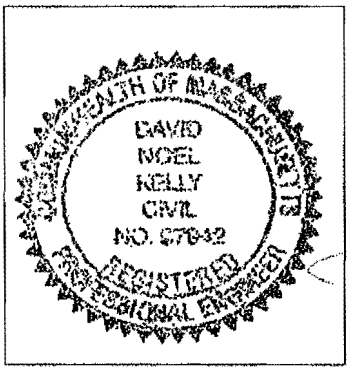
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

## Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature




Signature and Date 6.26.13

## Checklist

**Project Type:** Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

# Checklist for Stormwater Report

## Checklist (continued)

**LID Measures:** Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☒ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

**Standard 1: No New Untreated Discharges**

- ☒ No new untreated discharges
- ☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

# Checklist for Stormwater Report

## Checklist (continued)

### Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

### Standard 3: Recharge

- ☐ Soil Analysis provided.
- ☐ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - ☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
  - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
  - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 3: Recharge** (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

**Standard 4: Water Quality**

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 4: Water Quality** (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

**Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)**

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

**Standard 6: Critical Areas**

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable**

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

**Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control**

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control** (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

**Standard 9: Operation and Maintenance Plan**

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

**Standard 10: Prohibition of Illicit Discharges**

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

## ILLICIT DISCHARGE STATEMENT

This statement has been prepared to comply with Stormwater Management Standard #10 as referenced in the Massachusetts Stormwater Handbook, Volume One, Chapter One, Page 25. This handbook has been issued by the Massachusetts Department of Environmental Protection for compliance with revised Regulations for Wetlands 310 CMR 10.00.

As detailed in the Site Development Plans accompanying this application this project will not involve any illicit discharge to the stormwater management system. Furthermore, to the best of my knowledge there are no illicit discharges to the stormwater management system of the existing site.

Owner and Responsible Party for Operating and Managing the site:

Sanford Custom Builders Inc.
310 Washington Street, Suite 202
Wellesley Hills, MA 02481
781-416-7007

Hilde Karpawich 6/20/13

Hilde Karpawich for
Sanford Custom Builders Inc.

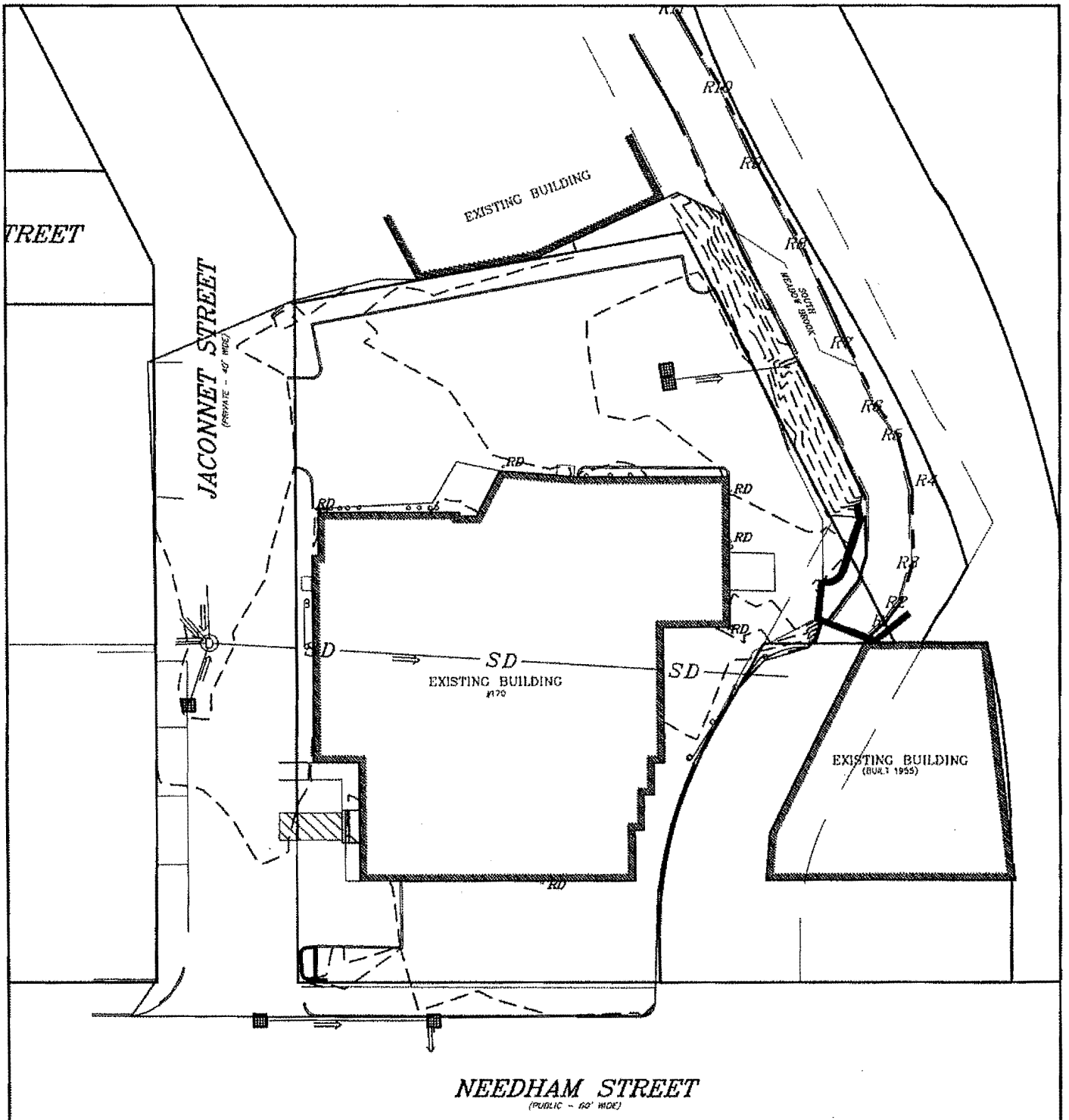
Date

# Area Summary

| | Existing | Proposed |
|---|---|---|
| **Total Area** | **27,178 s.f.** | **27,178 s.f.** |
| **Total Impervious Area** | **22,732 s.f.** | **21,731 s.f.** |
| Roof Area | 11,549 s.f. | 7,137 s.f. |
| Other Impervious Area | 11,183 s.f. | 14,594 s.f. |
| Landscaped Area | 4,446 s.f. | 5,447 s.f. |

**KELLY ENGINEERING GROUP, INC.**
Zero Campanelli Drive-Braintree-MA 02184 Phone 781 843 4333

# Attachment A
# Existing and Proposed Conditions




DATE: 06/26/13

SCALE: 1"= 40'

# 170 NEEDHAM ST. NEWTON, MA

# EXISTING CONDITIONS EXHIBIT

KELLY ENGINEERING GROUP, INC.
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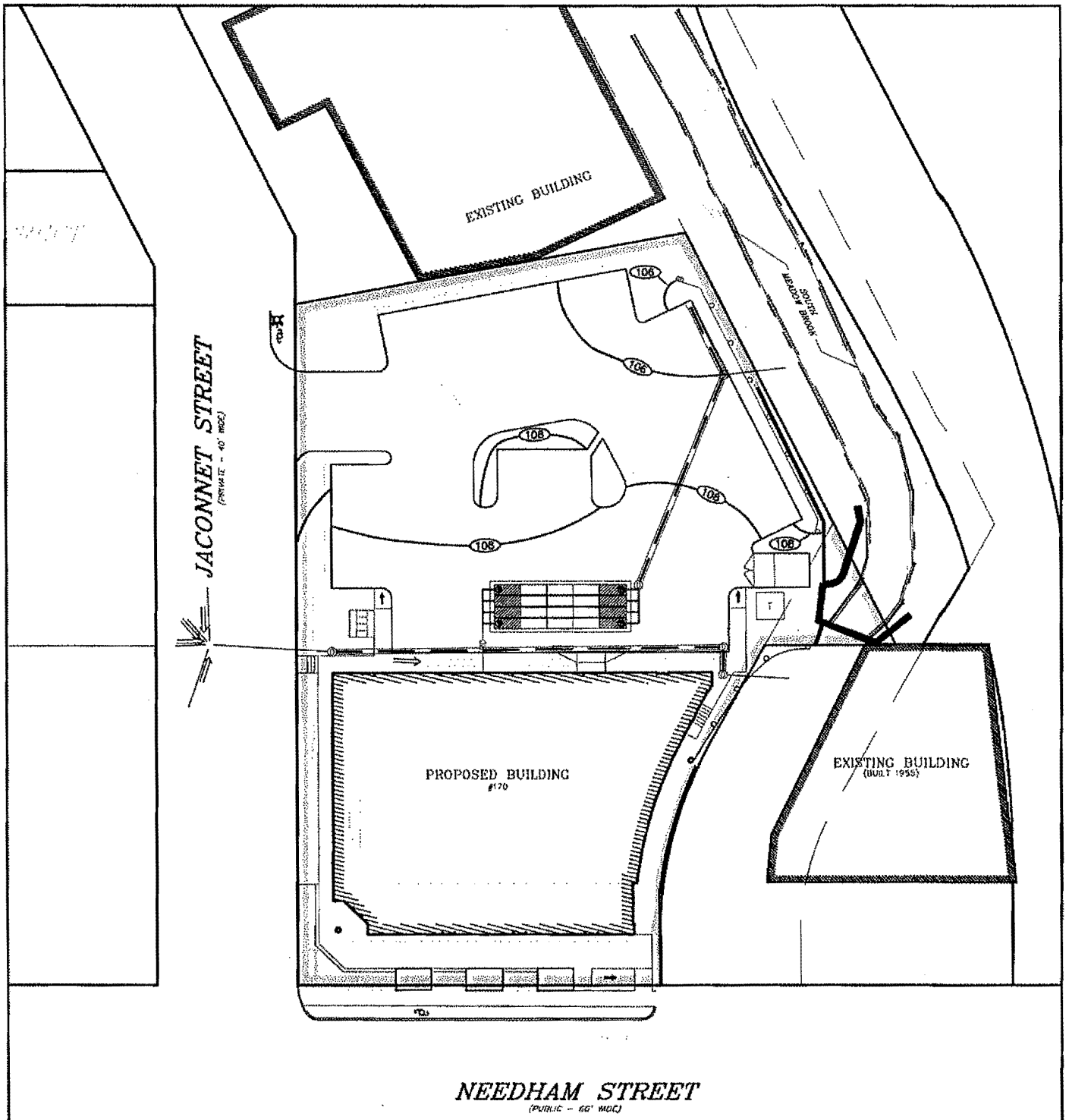
PHONE: 781 843 4333 FAX: 781 843 0028

2013-028-EXDR00




DATE: 06/24/13

SCALE: 1"= 40'

170 NEEDHAM ST.
NEWTON, MA

# PROPOSED CONDITIONS EXHIBIT

KELLY ENGINEERING GROUP, INC.
CIVIL ENGINEERING CONSULTANTS
0 CAMPANELLI DRIVE · BRAINTREE · MA 02184
PHONE: 781 843 4333 FAX: 781 843 0028

2013-028-PRDR00

**KELLY ENGINEERING GROUP, INC.**
Zero Campanelli Drive-Braintree-MA 02184 Phone 781 843 4333

# Attachment B
# Recharge Chambers

CULTEC

*Subsurface Stormwater Solutions Since 1986*

**PREPARED FOR:**

Kelly Engineering Group, Inc.
0 Campanelli Drive
Braintree, MA 02184
781-843-4333
781-843-0028

**PROJECT INFORMATION:**
170 Needham St.
Newton, MA

**INPUT**
*Please fill in your parameters*

**DATE:**

**CALCULATED BY:**
Hilde Karpawich
Kelly Engineering Group

| | | |
|---|---|---|
| Workable / Effective Depth | 6 | feet |
| Required Storage Volume | 595 | cubic feet |
| Desired Bed Width | 16 | feet |
| Stone Porosity (Industry Standard = 40%) | 40% | |
| Stone Foundation Depth | 6 | inches |
| Type of System | Retention | |

| Model Name | Approx. Unit Count | Number of Rows Wide (pieces) | Number of Chambers Long (pieces) | Number of Chambers Required (pieces) | Storage Provided (cubic feet) | Bed Area Required (square feet) | Bed Width (feet) | Bed Length (feet) | Minimum Bed Depth (feet) | Stone Required (tons) | Storage Volume Provided per Installed Chamber (cubic feet) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Recharger® 330XLHD Heavy Duty | 7 | 3 | 2 | 6 | 604.77 | 280.00 | 16.00 | 17.50 | 4.38 | 33 | 79.26 |
| Recharger® 280HD Heavy Duty | 9 | 3 | 3 | 9 | 687.33 | 348.00 | 14.50 | 24.00 | 3.88 | 37 | 64.46 |
| Recharger® 180HD Heavy Duty | 16 | 4 | 4 | 16 | 670.14 | 417.72 | 14.75 | 28.32 | 3.38 | 40 | 35.37 |
| Recharger® 150HD Heavy Duty | 16 | 4 | 4 | 16 | 683.65 | 478.50 | 14.50 | 33.00 | 3.21 | 46 | 36.71 |
| Contactor® 100HD Heavy Duty | 20 | 4 | 5 | 20 | 660.18 | 600.00 | 15.00 | 40.00 | 2.71 | 49 | 28.81 |

*This calculator program does not calculate for our Recharger V8 series. To calculate for the Recharger V8, use CULTEC Stormwater Calculator for V8 v.2006-1.xls*

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804

Phone: 203-775-4416
Fax: 203-775-1462
www.cultec.com

**KELLY ENGINEERING GROUP, INC.**
Zero Campanelli Drive-Braintree-MA 02184 Phone 781 843 4333

# Attachment C
# TSS Removal

## VortSentry® HS Estimated Net Annual TSS Reduction

CONTECH ENGINEERED SOLUTIONS

**170 NEEDHAM STREET**
**NEWTON UPPER FALLS, MA**
**Model VSHS36**
**System WQD**

**Design Ratio[1] =** $\frac{0.45 \text{ acres} \times 0.79}{27 \text{ ft3}}$ **= 0.013**

| Rainfall Intensity "/hr | Flow Rate cfs | Operating Rate[2] cfs/ft$^3$ | % Total Rainfall Depth[3] | Rmvl. Effcy[4] (%) | Rel. Effcy (%) |
|---|---|---|---|---|---|
| 0.02 | 0.01 | 0.00027 | 10.2% | 98.0% | 10.0% |
| 0.04 | 0.01 | 0.00053 | 9.6% | 98.0% | 9.5% |
| 0.06 | 0.02 | 0.00080 | 9.4% | 98.0% | 9.3% |
| 0.08 | 0.03 | 0.00107 | 7.7% | 98.0% | 7.6% |
| 0.10 | 0.04 | 0.00133 | 8.6% | 98.0% | 8.4% |
| 0.12 | 0.04 | 0.00160 | 6.3% | 98.0% | 6.2% |
| 0.14 | 0.05 | 0.00187 | 4.7% | 98.0% | 4.6% |
| 0.16 | 0.06 | 0.00213 | 4.6% | 98.0% | 4.5% |
| 0.18 | 0.06 | 0.00240 | 3.5% | 98.0% | 3.5% |
| 0.20 | 0.07 | 0.00267 | 4.3% | 98.0% | 4.3% |
| 0.25 | 0.09 | 0.00334 | 8.0% | 98.0% | 7.8% |
| 0.30 | 0.11 | 0.00400 | 5.6% | 98.0% | 5.5% |
| 0.35 | 0.12 | 0.00467 | 4.4% | 98.0% | 4.3% |
| 0.40 | 0.14 | 0.00534 | 2.5% | 98.0% | 2.5% |
| 0.45 | 0.16 | 0.00600 | 2.5% | 98.0% | 2.5% |
| 0.50 | 0.18 | 0.00667 | 1.4% | 98.0% | 1.4% |
| 0.75 | 0.27 | 0.01001 | 5.0% | 95.7% | 4.8% |
| 1.00 | 0.35 | 0.01334 | 1.0% | 89.6% | 0.9% |
| 1.50 | 0.53 | 0.02002 | 0.0% | 82.1% | 0.0% |
| 2.00 | 0.71 | 0.02669 | 0.0% | 66.9% | 0.0% |
| 3.00 | 1.06 | 0.04003 | 0.5% | 25.3% | 0.1% |
| | | | | | 97.4% |
| | | | | **% rain falling at >0"/hr =** | 0.0% |
| | | | | **Removal Efficiency Adjustment[4] =** | 6.5% |
| | | | | **Predicted Net Annual Load Removal Efficiency =** | **90.9%** |

1 - Design Ratio = (Total Drainage Area x Runoff Coefficient) / VortSentry HS Treatment Volume
= The Total Drainage Area and Runoff Coefficient are specified by the site engineer.

2 - Operating Rate (cfs/ft$^3$) = Rainfall Intensity ("/hr) x Design Ratio

3 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

4 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

| Calculated by: JAG | Date: 06/25/13 | Checked by: | Date: |
|---|---|---|---|

**Project:** 170 Needham St
**Location:** *Newton, MA*
**Prepared For:** Hilde Karpawich (Kelly Engineering Group)

**Purpose:** To calculate the first flush runoff flow rate (WQF) over a given site area. In this situation the WQV to be analyzed is the runoff produced by the first 1.0" or 0.5" of rainfall.

**Reference:**

United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

**Given:**

| Structure Name | A (acres) | A ($miles^2$) | Runoff Coefficient | Percent Imp. (%)* | $t_c$ (min) | $t_c$ (hr) |
|---|---|---|---|---|---|---|
| WQD | 0.45 | 0.00070 | 0.786 | 81.00 | 5 | 0.083 |

* Assumes runoff coefficient of 0.3 for pervious areas and 0.9 for impervious areas.

**Procedure:** The Water Quality Flow (WQF) is calculated using the Water Quality Volume (WQV). This WQV, converted to watershed inches, is substituted for the runoff depth (Q) in the Natural Resources Conservation Service (formerly Soil Conservation Service), TR-55 Graphical Peak Discharge Method.

1. Compute WQV in watershed inches using the following equation:

$$WQV = P * R$$

where: WQV = water quality volume (watershed inches)
P = design precipitation (inches) = (1.0" or 0.5" for water quality storm)
R = volumetric runoff coefficient = 0.05 + 0.009(I)
I = percent impervious cover

| Structure Name | Percent Imp. (%) | R | P (in) | WQV (in) | WQV (ac-ft) |
|---|---|---|---|---|---|
| WQD | 81.00 | 0.779 | 1.0 | 0.779 | 0.0292 |

2. Compute the NRCS Runoff Curve Number (CN) using the following equation, or graphically using Figure 2-1 from TR-55 (USDA, 1986):

$$CN = 1000 / [10+5P+10Q-10(Q^2+1.25QP)^{1/2}]$$

where: CN = Runoff Curve Number
P = design precipitation (inches) = (1.0" or 0.5" for water quality storm)
Q = runoff depth (watershed inches)

| Structure Name | Q (in) | CN |
|---|---|---|
| WQD | 0.779 | 97.87 |

3. Using computed CN, read initial abstraction ($I_a$) from Table 4-1 in Chapter 4 of TR-55; compute $I_a/P$, interpolating when appropriate.

| Structure Name | $I_a$ (in) | $I_a/P$ |
|---|---|---|
| WQD | 0.041 | 0.041 |

4. Compute the time of concentration ($t_c$) in hours and the drainage area in square miles. A minimum $t_c$ of 0.167 hours (10 minutes) should be used.

| Structure Name | $t_c$ (hr) | A (miles$^2$) |
|---|---|---|
| WQD | 0.167 | 0.00070 |

5. Read the unit peak discharge ($q_u$) from Exhibit 4-III in Chapter 4 of TR-55 for appropriate $t_c$ for Type III rainfall distribution.

| Structure Name | $t_c$ (hr) | $I_a/P$ | $q_u$ (csm/in) |
|---|---|---|---|
| WQD | 0.167 | 0.041 | 635 |

6. Substituting WQV (watershed inches) for runoff depth (Q), compute the water quality flow (WQF) from the following equation:

$$WQF = (q_u)*(A)*(Q)$$

where: WQF = water quality flow (cfs)
$q_u$ = unit peak discharge (cfs/mi$^2$/inch)
A = drainage area (mi$^2$)
Q = runoff depth (watershed inches)

| Structure Name | $q_u$ (csm/in) | A (miles$^2$) | Q (in) | WQF (cfs) |
|---|---|---|---|---|
| WQD | 635 | 0.00070 | 0.779 | 0.35 |

# NEEDHAM CHESTNUT REALTY, LLC
# STORMWATER MANAGEMENT SYSTEM
# OPERATION AND MAINTENANCE PLAN
# &
# LONG-TERM POLLUTION PREVENTION PLAN

06/26/13


***Prepared by:***

**KELLY ENGINEERING GROUP, INC.**
Zero Campanelli Drive
Braintree, Massachusetts 02184


OWNER AND RESPONSIBLE PARTY:
Needham Chestnut Realty, LLC
310 Washington Street, Suite 202
Wellesley, MA 02481

Note: If ownership of this property changes then the new owner becomes the responsible party. The Owner may assign responsibility to a tenant on the property.

**Introduction**

Considerable time, effort and cost has been spent in the design and construction of the stormwater management system for this development. The stormwater management system consists of a number of Best Management Practices (BMP's). These BMP's combine to ensure that storm runoff from the site will not damage the sensitive environmental resources surrounding the site. In order to ensure that these BMP's operate as designed it is very important that the procedures in this operation and maintenance plan be followed. Most of these operation procedures require observation and measurement; however, at certain times more extensive maintenance measures may be needed. The following is an itemization of each of these BMP's and their maintenance needs.

The party responsible for maintenance should contract with a maintenance organization capable of performing the more extensive measures such as pumping of catch basin sumps, etc.

***BMP No. 1 – Paved Road Surface/Parking Lot Area:***

- Regularly pick up and remove litter from the parking lot area, landscaped islands and perimeter landscaped areas and water quality areas.

- The paved area is to be swept a minimum of four times per year, at least once during April and again during September with a high efficiency vacuum sweeper or a regenerative air sweeper. If a mechanical sweeper is used, the paved area is to be swept a minimum of once a month.

***BMP No. 2 - Deep Sump Catch Basins:***

- Basins are to be inspected monthly.

  1. Verify that tees are secure and free-flowing.
  2. Measure depth of sediment below water line.

- Basins are to be cleaned whenever sediment and hydrocarbons are observed. Basins are to be cleaned a minimum of twice per year. One of these cleanings shall occur before April 15$^{th}$ of each year and one shall occur before September 15$^{th}$ of each year. Basins may be cleaned either using a clamshell or a vacuum pump.

- All liquid shall be pumped from the sump of each basin at least once per year.

- All sediments and hydrocarbons should be properly handled and disposed of, in accordance with local, state and federal guidelines and regulations.

***Note: See catch basin detail for explanation of terms.***

***BMP No. 3 –Contech Water Quality Units:***

- Once per month inspect the Contech Units to ensure that it is operating correctly using the dipstick tube provided by Contech to measure the sediment depth. Also measure the oil depth.

- Whenever the oil is observed, the entire liquid volume shall be pumped from the Contech Units. Oil is pumped through the 6" inspection/clean-out pipe.

- When the sediment depth is 8" or more the sediment shall be completely pumped from the Contech Units. Sediment is pumped through the 24" opening.

- Sediment shall be pumped through the 24" opening when sediment depth indicates required maintenance. See Contech Technical Manual for sediment depth requiring servicing.

If any problems are encountered with the Contech Units, contact the manufacturer.

***BMP No. 4 - Subsurface Recharge:***

- The inlet pipe and observation basin shall be inspected on a monthly basis. Any accumulated debris shall be removed.
- Inspect recharge facilities following a rainfall event greater than 2.5 inches in a 24 hour period.
- If standing water is observed for more than 48 hours following a storm event, immediately retain a qualified professional to assess whether infiltration function has been lost and develop recommended corrective actions.

***Snow Removal:***

- Road salts and de-icing materials shall be stored on impervious pads and covered to protect from wind and precipitation.
- No de-icing materials shall be stored nor used within all resource areas and any area subject to the jurisdiction of local and state regulations without the prior written permission from state or local approving authority.

***Storage and Use of Chemicals:***

- No pesticides, herbicides, nor insecticides shall be stored nor used within all resource areas and any area subject to the jurisdiction of local and state regulations without the prior written permission from state or local approving authority.
- Chemical storage on site shall be limited. Any chemicals that must be stored shall be stored in a secure area in accordance with Local and State regulations.

***Hazardous Waste:***

- Containment – In the event of a discharge or spill of oil or another hazardous material, outlets to stormwater management ponds shall be plugged so that hazardous material do not enter resource areas.
- Reporting - In the event of a discharge or spill of oil or another hazardous material, responsible facility personnel, oil spill and/or hazardous material removal organizations, federal, state, and local regulatory agencies, the Town of Hanover Department of Public Works, and the EPA National Response Center 1-800-424-8802 shall be rapidly notified.
- Hazardous Waste – All hazardous waste materials will be disposed of in the manner specified by local, state and/or federal regulations and by the manufacturer of such products.
- There shall be no illicit discharges to the stormwater management system.

***Material and Waste Storage, Handling and Management:***

- All waste materials will be collected and stored in a securely lidded metal dumpster from a solid waste management company licensed to do business by the state and the town. The dumpster will comply with all local and state solid waste management regulations.

***Training for Long Term Pollution Prevention Plan:***

- All staff or personnel involved and responsible for implementing the Stormwater Management System Operations and Maintenance Plan and the Long-Term Pollution Prevention Plan shall be properly trained as required under the DEP Stormwater Management Regulations. Training shall be documented with records kept with other stormwater maintenance records.

***Vehicle Washing:***

- There shall be no vehicle washing on the site.

***Pet Waste Management:***

- Pooper-scooper laws for pets shall be followed.
- Never dump pet waste into storm drains, catch basins, or the drainage system.
- Pet waste shall be scooped up and disposed of properly in the garbage.

***Lawn and Garden activities:***

- There shall be no exterior storage of fertilizers, pesticides, herbicides, or insecticides. No pesticides, herbicides, nor insecticides shall be stored nor used within any resource areas its buffers, and any area subject to the jurisdiction of local and state regulations without the prior written permission from state or local approving authority.
- Fertilizers and pesticides shall be applied properly, sparingly, and outside any resource areas and its buffers.

To reduce the impact of fertilizers, consider the following tips;

- Don't fertilize before a rain storm.
- Consider using organic fertilizers. They release nutrients more slowly.
- Test soils before applying fertilizers. Some soils may not need fertilizers. A standard soil test costs $9.00. (Call the UMass Extension Soil Testing Lab at 413-545-2311 or download a soil test order form at http://www.umass.edu/plsoils/soiltest/.)

**Needham Chestnut Realty, LLC**

**PROJECT LOCATION: 170 Needham Street, Newton, MA**

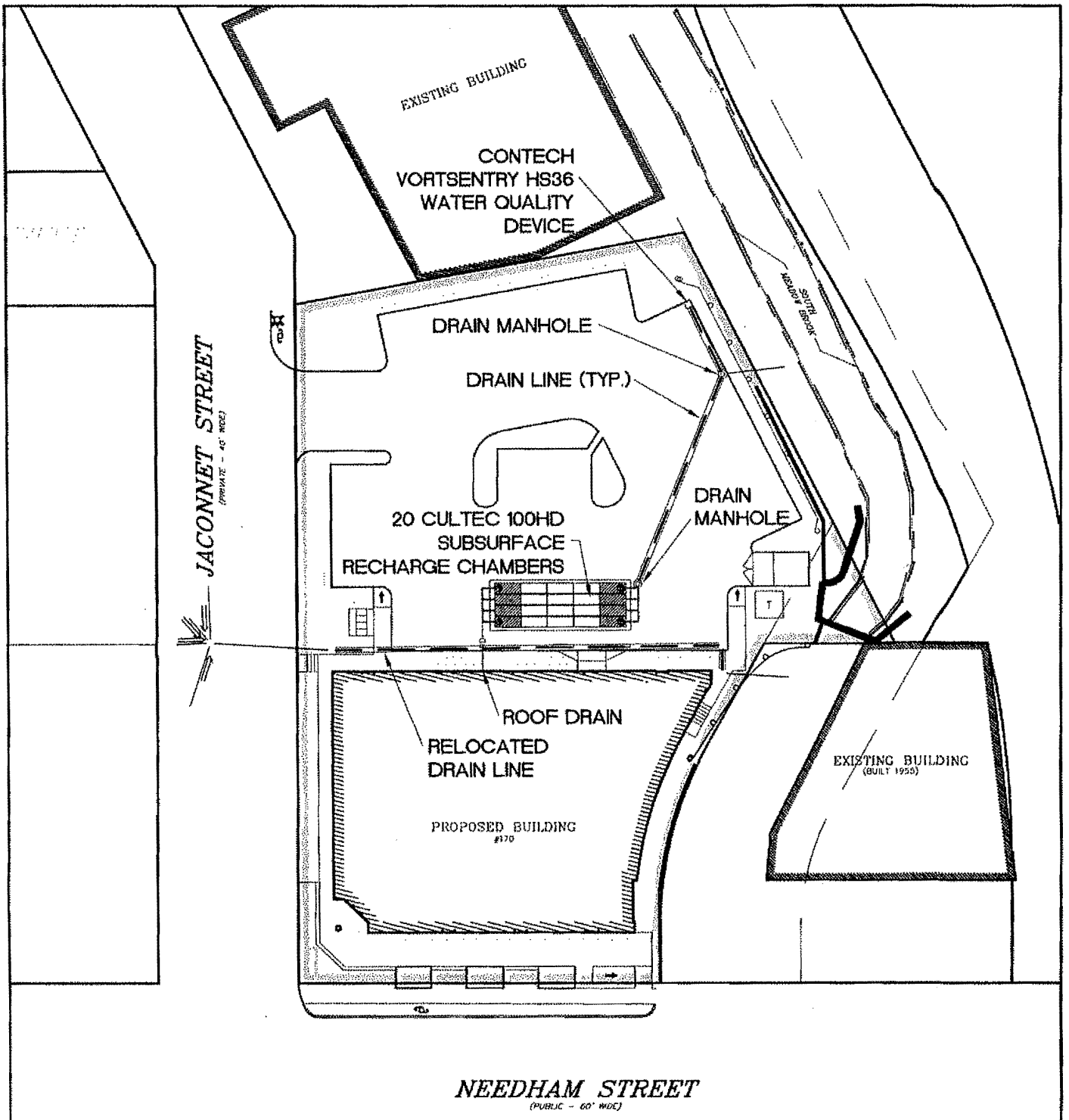
**STORMWATER ANAGEMENT BEST MANAGEMENT PRACTICES - INSPECTION SCHEDULE AND EVALUATION CHECKLIST**

| Best Management Practice | Inspection Frequency (1) | Date I | Inspector | Minimum Maintenance and Key Items to Check (1) | Cleaning/Repair Needed yes__ no__ (list items) | Date of Cleaning /Repair | Perform ed By |
|---|---|---|---|---|---|---|---|
| Street Sweeping | 4x per year | | | Vacuum sweeper | | | |
| Deep Sump and Hooded Catch Basins | 4x per year | | | Remove sediment 1x per year or if >6" | | | |
| CDS water Quality device | 4x per year | | | Per manufacturer Requirements | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**(1) Refer to the Operation and Maintenance Plan for recommendations regarding frequency of inspections and maintenance of specific BMP's.**

**recommendations regarding frequency for inspection and maintenance of specific BMPs.**

**Stormwater Control Manager/Environmental Monitor:** **Stamp/Signature**




DATE: 06/26/13

SCALE: 1"= 40'

170 NEEDHAM ST.
NEWTON, MA

# BMP LOCATION MAP

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2013-028-BMP00

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# Attachment D
# Miscellaneous


SCALE; 1"= 2083'±

DATE: 06/26/13

170 NEEDHAM ST.
NEWTON, MA

LOCATION PLAN

SOURCE: USGS

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