



# Stormwater Management in Arlington, Massachusetts

Presented by  
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GALA SIMON ASSOCIATES, INC.  
LEXINGTON, MA

Gala Simon Associates

**GSA**

# Overview

- Arlington Bylaw
- Environmental Permitting
- Hydrologic Analysis
- Design Considerations
- Best Management Practices (BMP)
- Example Projects

# Town Bylaw Title V; Article 15



# Definitions

## Stormwater:

Water which results from precipitation events and snowmelt.

## Impervious Surface:

A surface that does not readily absorb or retain water, which prevents the infiltration of stormwater runoff.

## Runoff:

Rainfall, snowmelt, or irrigation water flowing over the ground surface or directed through a pipe or culvert.

## Runoff Rate:

The speed and volume of stormwater which flows over the surface.

# Applicability

Previously undeveloped vacant lots:

- Proposed structure's building footprint + other impervious surfaces exceeds 500 square feet

Developed properties:

- Proposed alteration results in an increase to the impervious area of the lot by 350 square feet

Does not apply to private ways, owned in common with abutting lot owners, or that serve purposes similar to public ways

# Requirements & Regulations

No project subject to this bylaw may increase the surface water runoff rate relative to the pre-development runoff rate.

**Pre-development  
runoff rate**



**Post-development  
runoff rate**



Conservation

# Local





# Conservation Commission

## Arlington, Massachusetts

### When you must file:

- Work within 100 feet of wetland or pond
- Work within 200 feet of a river or stream
- Work in any area that may cause additional runoff into a wetland, river or stream

### What you must file:

- Request for Determination of Applicability (RDA)  
or
- Notice of Intent (NOI)

# Conservation Commission

## **When to file an RDA vs. NOI**

Request for Determination of Applicability vs. Notice of Intent.

The Commission will require the filing of a Notice of Intent (instead of a Request for Determination of Applicability) when the Commission has jurisdiction and the proposed activity:

- (a) is within 50 feet of a lake, stream, brook, pond, river, or wetland;
- (b) is in an area with a moderate or steep slope;
- (c) involves excavation, grading, or use of heavy equipment;
- (d) involves stockpiling of materials or soils;
- (e) extensive (more than 50%) removal of vegetation); or
- (f) when a cumulative adverse impact occurs.

- Arlington Regulations for Wetlands Protection, Jan. 20, 2011, Section 8B (4).

# Federal



# Environmental Protection Agency (EPA)

More than 1 acre is disturbed

Must apply for **National Pollutant Discharge Elimination System (NPDES)** permit

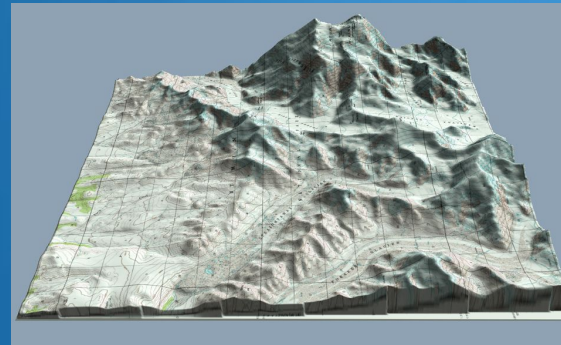
Submit an eNOI @ <https://cdx.epa.gov/>

More info @ <http://water.epa.gov/polwaste/npdes/basics/eNOI.cfm>

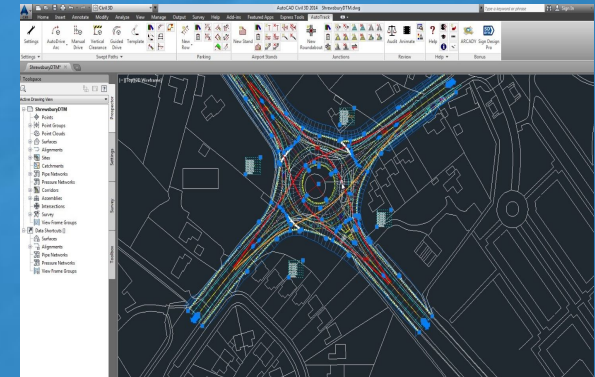
# Hydrologic Analysis 101



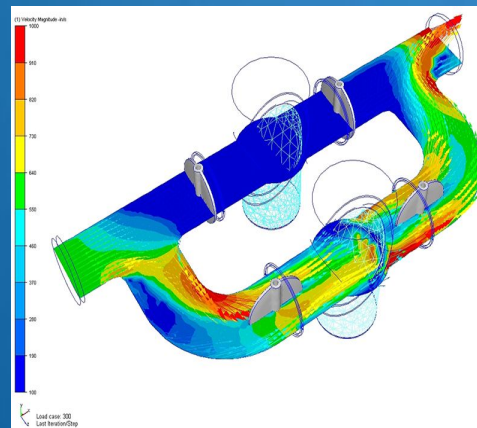
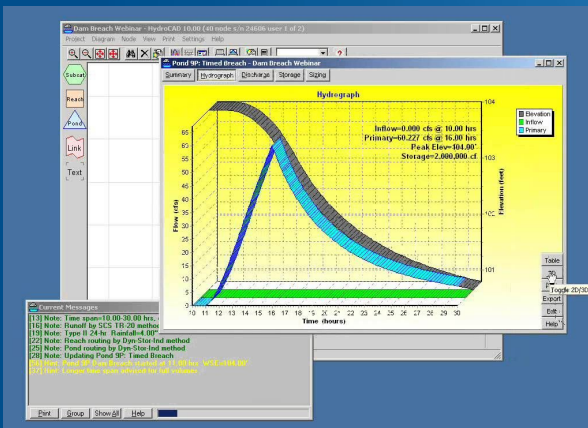
Soil/Percolation test



Topography

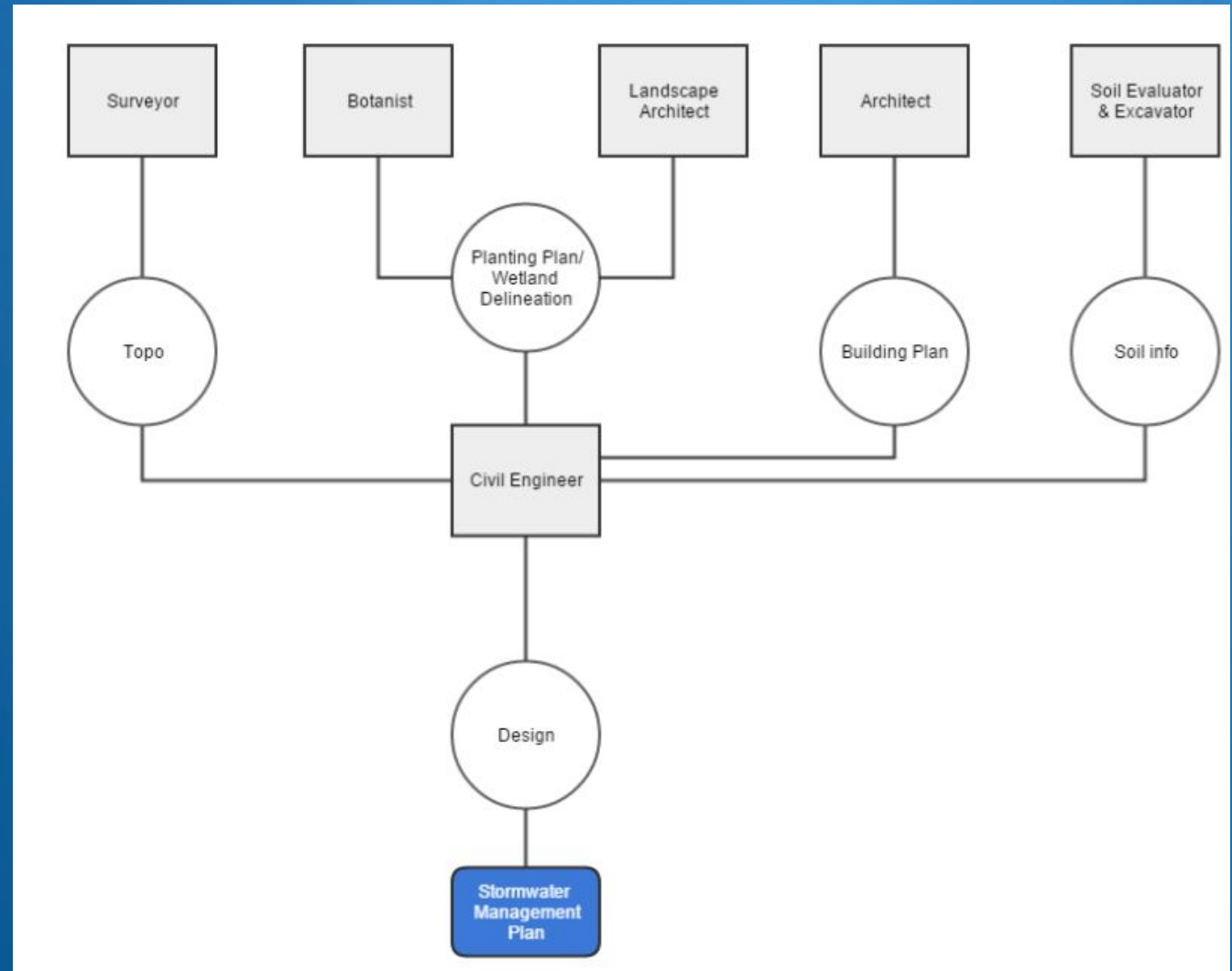


Drafting



Modelling, Simulation & Analysis

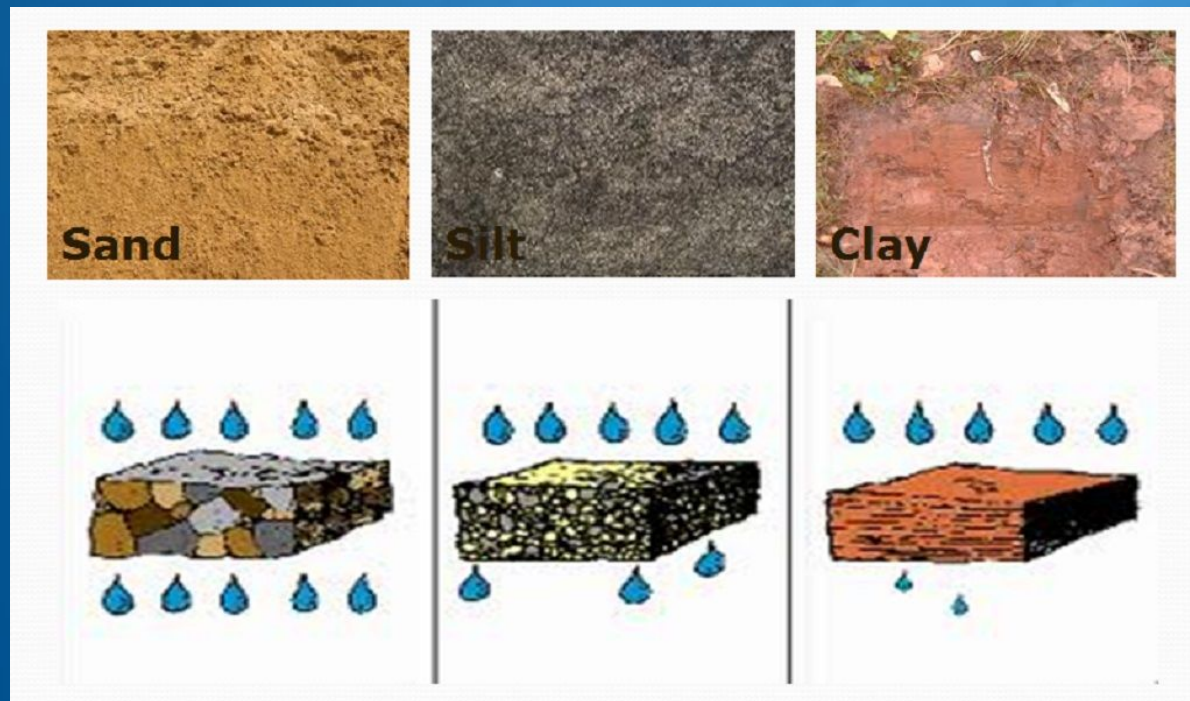
# Process





# Soil Testing

## Infiltration





# Soil Testing

## Groundwater level determination

Evaluator looks for signs of water, for example, soil mottling. Water itself may even be found.



Testing can be done at any time of the year



# Soil Testing

## National Resources Conservation Services (NRCS) Soil Survey

<http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

The screenshot shows the homepage of the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey. The header features the USDA logo, the text "United States Department of Agriculture Natural Resources Conservation Service", and a large "Web Soil Survey" title. Below the header is a navigation menu with links for "Home", "About Soils", "Help", and "Contact Us". The main content area includes a search bar, a "START WSS" button, and a "Welcome to Web Soil Survey (WSS)" section. The "Welcome" section contains a photograph of people in a field and text describing the service. To the right, there are two sidebars: "I Want To..." with a list of links and "Announcements/Events" with a link to view new features and fixes.

**USDA** United States Department of Agriculture  
Natural Resources Conservation Service

## Web Soil Survey

Home About Soils Help Contact Us

You are here: Web Soil Survey Home

**Search**  
Enter Keywords    
All NRCS Sites

**Browse by Subject**

- Soils Home
- National Cooperative Soil Survey (NCSS)
- Archived Soil Surveys
- Status Maps
- Official Soil Series Descriptions (OSD)
- Soil Series Extent Mapping Tool
- Geospatial Data Gateway
- eFOTG
- National Soil Characterization Data
- Soil Quality
- Soil Geography

The simple yet powerful way to access and use soil data.

**START WSS**

**Welcome to Web Soil Survey (WSS)**

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Soil surveys can be used for general farm, local, and wider area planning. Onsite investigation is needed in some cases, such as soil quality assessments and certain conservation and engineering applications. For more detailed information, contact your local [USDA Service Center](#) or your [NRCS State Soil Scientist](#).

**I Want To...**

- Start Web Soil Survey (WSS)
- Know the requirements for running Web Soil Survey – will Web Soil Survey work in my web browser?
- Know the Web Soil Survey hours of operation
- Find what areas of the U.S. have soil data
- Find information by topic
- Know how to hyperlink from other documents to Web Soil Survey
- Know the SSURGO data structure

**Announcements/Events**

- Web Soil Survey 3.1 has been released! [View description of new features and fixes.](#)
- Web Soil Survey Release History
- Sign up for e-mail updates via GovDelivery

# Soil Testing

## National Resources Conservation Services (NRCS) Soil Survey

<http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

**1** Define.

**Area of Interest (AOI)** Use the Area of Interest tab to define your area of interest.



**2** View.

**Soil Map** Click the Soil Map tab to view or print a soil map, and detailed descriptions of the soils in your Area of Interest.




**3** Explore.

**Soil Data Explorer** Click the Soil Data Explorer tab to access soil data for your area and determine the suitability of the soils for a particular use. The items you want saved in a report can be added to your shopping cart.

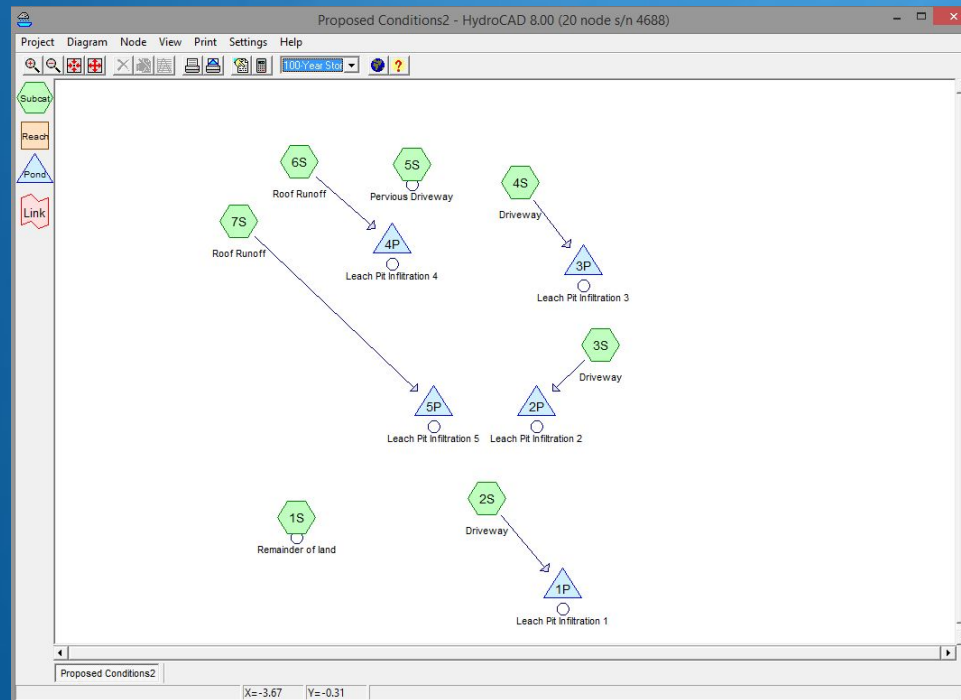


**4** Check Out.

**Shopping Cart (Free)** Use the Shopping Cart tab to get your custom printable report immediately, or download it later.



# Numerical Analysis



A unique computer model is created for each individual site.

# Numerical Analysis

**Extreme Precipitation in New York & New England**  
*An Interactive Web Tool for Extreme Precipitation Analysis*

About this Project | Data & Products | Daily Monitoring | Documentation

**Select Product ?**

- Extreme Precipitation Tables - HTML ?
- Extreme Precipitation Tables - Text/CSV ?
- Partial Duration Series - by Point ?
- Partial Duration Series - by Station ?
- Distribution Curves - Graphical ?
- Distribution Curves - Text/TBL ?
- Intensity Frequency Duration Graphs ?
- Precipitation Frequency Duration Graphs ?
- GIS Data Files ?
- Regional/State Maps ?

**Select Location ?** Double-click the map to place a marker, or enter address or latitude/longitude.

Locate by Address ? 730 Massachusetts Ave  
Locate by Lat/Lon ? N W  
Locate by State/County ?

**Select Options ?**

Smoothing ? Yes  
Delivery ? Popup

**Submit** ?

Version 1.12 Copyright 2010-2015.  
This project is a joint collaboration between:  
Northeast Regional Climate Center (NRCC) | Natural Resources Conservation Service (NRCS)  
Cornell University | USDA NRCS  
Contact: [precip@cornell.edu](mailto:precip@cornell.edu)

<http://precip.eas.cornell.edu/>

The model is then put through a simulation of multiple storm events.  
Intensity of the events depends upon location.

# Numerical Analysis

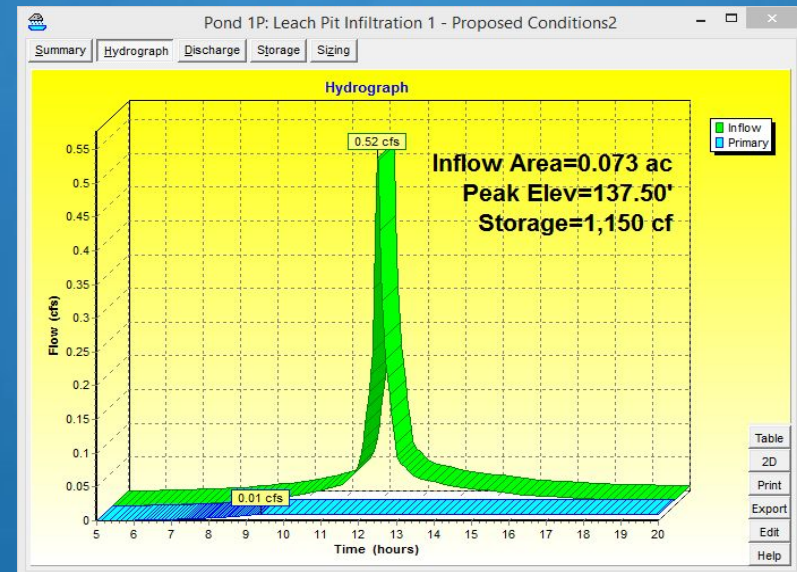
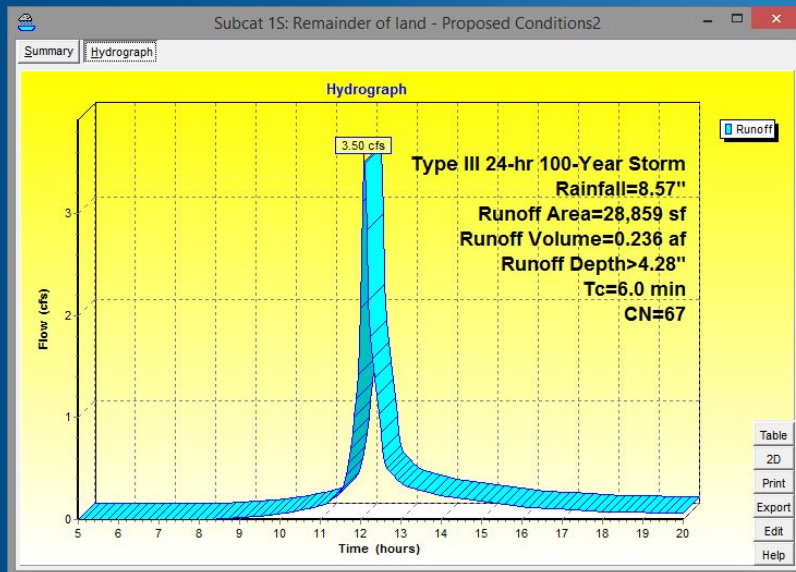
730 Massachusetts Ave  
Arlington, MA 02476

## Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr
1yr	0.28	0.43	0.53	0.70	0.87	1.10	1yr	0.75	1.04	1.28	1.63	2.09	2.68	2.93
2yr	0.35	0.54	0.67	0.88	1.11	1.40	2yr	0.96	1.28	1.62	2.04	2.56	3.23	3.58
5yr	0.42	0.65	0.81	1.09	1.39	1.77	5yr	1.20	1.61	2.06	2.59	3.26	4.09	4.55
10yr	0.47	0.74	0.93	1.26	1.64	2.11	10yr	1.42	1.91	2.47	3.11	3.91	4.89	5.46
25yr	0.56	0.89	1.13	1.55	2.06	2.67	25yr	1.78	2.40	3.12	3.96	4.97	6.20	6.95
50yr	0.63	1.01	1.29	1.81	2.45	3.20	50yr	2.11	2.85	3.76	4.77	5.98	7.42	8.35
100yr	0.72	1.16	1.50	2.13	2.91	3.83	100yr	2.51	3.40	4.52	5.73	7.17	8.89	10.04
200yr	0.83	1.35	1.75	2.51	3.46	4.58	200yr	2.98	4.04	5.41	6.88	8.61	10.65	12.07
500yr	1.00	1.65	2.15	3.11	4.35	5.81	500yr	3.76	5.09	6.88	8.76	10.96	13.54	15.41

# Numerical Analysis

The simulation accounts for runoff volume and velocity at varying points in the storm. The results show whether or not the system can contain the runoff even at the maximum point of the storm and whether or not runoff has been reduced or held the same as in pre-development.





# Design Considerations

## Pre & Post-development





# Pre-Development

- Wetlands
- Floodplain
- Erosion control
- Groundwater table
- Basement floor elevation



# Post-Development

- Inspection
- Operation & Maintenance
- As-Built Plan



# Best Management Practices (BMP)

## Options:

- Drywells
- Chambers
- Trenches
- Swales
- Rain gardens
- Permeable pavers

# Drywells



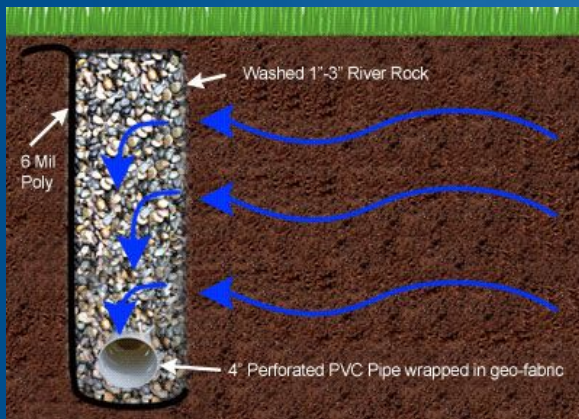
# Chambers

## Cultec



# Trenches

## French Drain



## Trench Grate



# Swales



# Rip-Rap

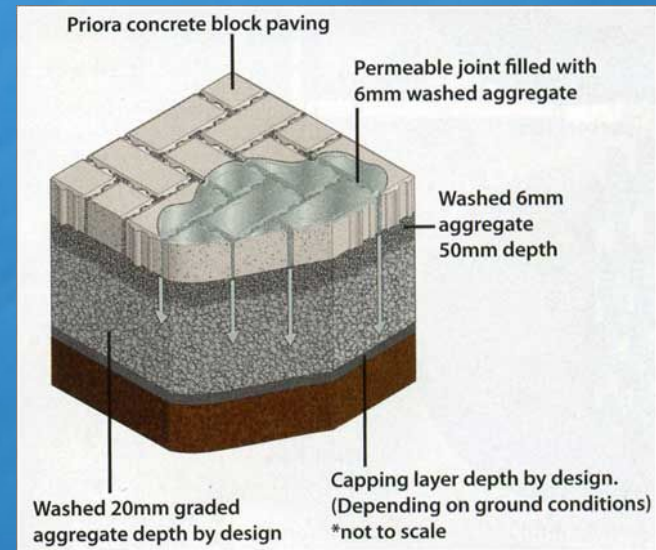




# Rain Gardens



# Permeable Pavers



# Example Projects



Public

# Spy Pond Field

## Arlington



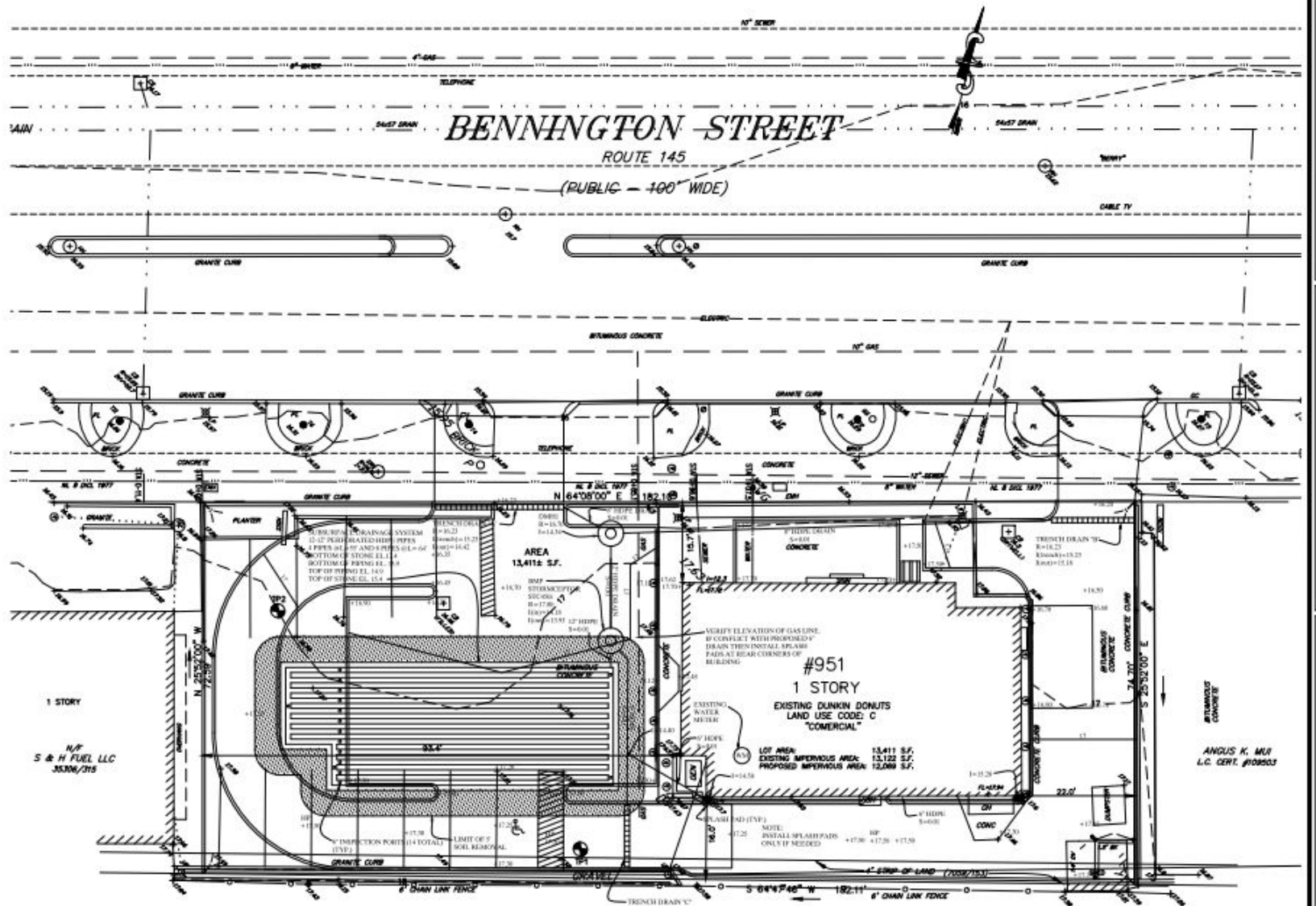


# Commercial

# 951 Bennington Street East Boston







N/F  
S & H FUEL LLC  
35306/315

ANGUS K. MUR  
L.C. CERT. #108503

N/F  
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

**SITE PLAN**  
SCALE: 1" = 10'

**SOIL TESTING**

SEWAGE FLOWS:  
EXISTING RESTAURANT W/ 20 SEATS @ 20 GPD/SEAT = 400 GPD  
PROPOSED RESTAURANT W/ 21 SEATS @ 20 GPD/SEAT = 420 GPD

ACCOUNT# 121980000

\*FLOWS ACCORDING TO 310CMR 15.205

DATE:

# Residential



Questions?

