Hancock Village Traffic & Drainage Review

A Dangerous Situation Made Worse?

- Hynes Field and playground are on the VFW Parkway directly across from the proposed development.
- There are no safe crossings from Hancock Village to the park.
- Parents are compelled to run across 4 lanes of fast-moving traffic with small children.
- With the elimination of the green space, Hynes Field will be the only option for children to play.

Hancock Village Traffic & Drainage Review

Poor Parking Layout Leads to Dangerous Double Parking?

- Expecting people to walk long distances between their cars and homes is not reasonable.
- The car in the picture is double-parked, so the owner can carry groceries to his home.
- The potential for accidents is high due to wet conditions, steeply sloping roadway and horizontal curve.

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The existing Hancock Village has much more space for emergency vehicles to operate than in the proposed development.

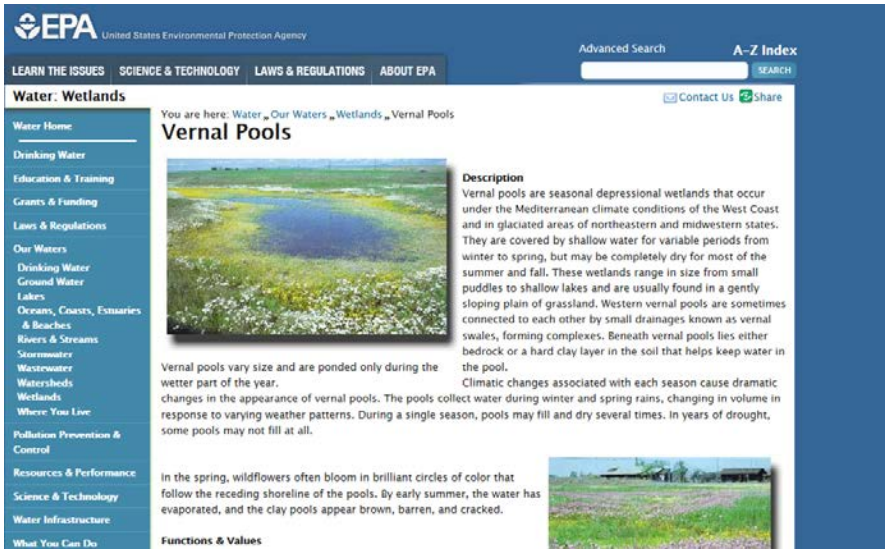
- These photos were taken near the Baker School tennis courts during an emergency at Hancock Village.
- The car next to the fire truck (top photo) is illegally parked in a handicap space limiting access to the incident.
- There were dozens of children darting in and out of this area during the incident.
- The ability of the emergency vehicles to operate in the proposed site should be evaluated with similar circumstances (including moving vehicles, illegally parked cars, pedestrians, etc.).

Hancock Village Traffic & Drainage Review

- Traffic Study Conclusions/Concerns

- The following issues have not been completely or adequately addressed by the Designer or Applicant
  - Safety to pedestrians
  - Traffic and parking issues
  - Conditions when Beverly Road is one-way in winter months
  - Ability of the roads surrounding the site to accommodate additional traffic (surrounding roads are narrow leading to alternating one-way traffic)

Hancock Village Traffic & Drainage Review



EPA United States Environmental Protection Agency

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Vernal Pools

Description

Vernal pools are seasonal depressional wetlands that occur under the Mediterranean climate conditions of the West Coast and in glaciated areas of northeastern and midwestern states. They are covered by shallow water for variable periods from winter to spring, but may be completely dry for most of the summer and fall. These wetlands range in size from small puddles to shallow lakes and are usually found in a gently sloping plain of grassland. Western vernal pools are sometimes connected to each other by small drainages known as vernal swales, forming complexes. Beneath vernal pools lies either bedrock or a hard clay layer in the soil that helps keep water in the pool.

Vernal pools vary size and are ponded only during the wetter part of the year.

Climatic changes associated with each season cause dramatic changes in the appearance of vernal pools. The pools collect water during winter and spring rains, changing in volume in response to varying weather patterns. During a single season, pools may fill and dry several times. In years of drought, some pools may not fill at all.

In the spring, wildflowers often bloom in brilliant circles of color that follow the receding shoreline of the pools. By early summer, the water has evaporated, and the clay pools appear brown, barren, and cracked.

Functions & Values

Potential Vernal Pool on the site behind Beverly Road?

- EPA describes a Vernal Pool as:

  Vernal pools are seasonal depressional wetlands that occur under the Mediterranean climate conditions of the West Coast and in **glaciated areas of northeastern and midwestern states**. They are covered by shallow water for variable periods from winter to spring, but **may be completely dry for most of the summer and fall**. These **wetlands range in size from small puddles to shallow lakes** and are usually found in a gently sloping plain of grassland. Western vernal pools are sometimes connected to each other by small drainages known as vernal swales, forming complexes. Beneath vernal pools lies either bedrock or a hard clay layer in the soil that helps keep water in the pool.

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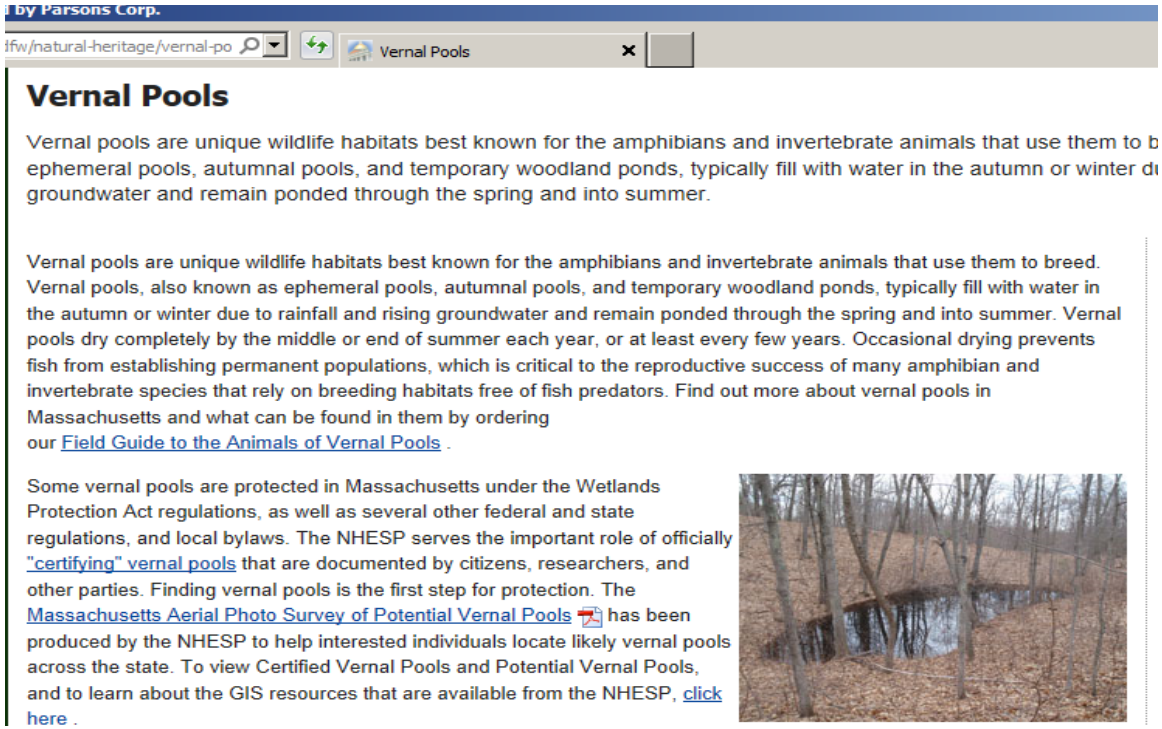


by Parsons Corp.

dfw/natural-heritage/vernal-po Vernal Pools

Vernal Pools

Vernal pools are unique wildlife habitats best known for the amphibians and invertebrate animals that use them to b
ephemeral pools, autumnal pools, and temporary woodland ponds, typically fill with water in the autumn or winter d
groundwater and remain ponded through the spring and into summer.

Vernal pools are unique wildlife habitats best known for the amphibians and invertebrate animals that use them to breed. Vernal pools, also known as ephemeral pools, autumnal pools, and temporary woodland ponds, typically fill with water in the autumn or winter due to rainfall and rising groundwater and remain ponded through the spring and into summer. Vernal pools dry completely by the middle or end of summer each year, or at least every few years. Occasional drying prevents fish from establishing permanent populations, which is critical to the reproductive success of many amphibian and invertebrate species that rely on breeding habitats free of fish predators. Find out more about vernal pools in Massachusetts and what can be found in them by ordering our Field Guide to the Animals of Vernal Pools .

Some vernal pools are protected in Massachusetts under the Wetlands Protection Act regulations, as well as several other federal and state regulations, and local bylaws. The NHESP serves the important role of officially "certifying" vernal pools that are documented by citizens, researchers, and other parties. Finding vernal pools is the first step for protection. The Massachusetts Aerial Photo Survey of Potential Vernal Pools has been produced by the NHESP to help interested individuals locate likely vernal pools across the state. To view Certified Vernal Pools and Potential Vernal Pools, and to learn about the GIS resources that are available from the NHESP, click here .

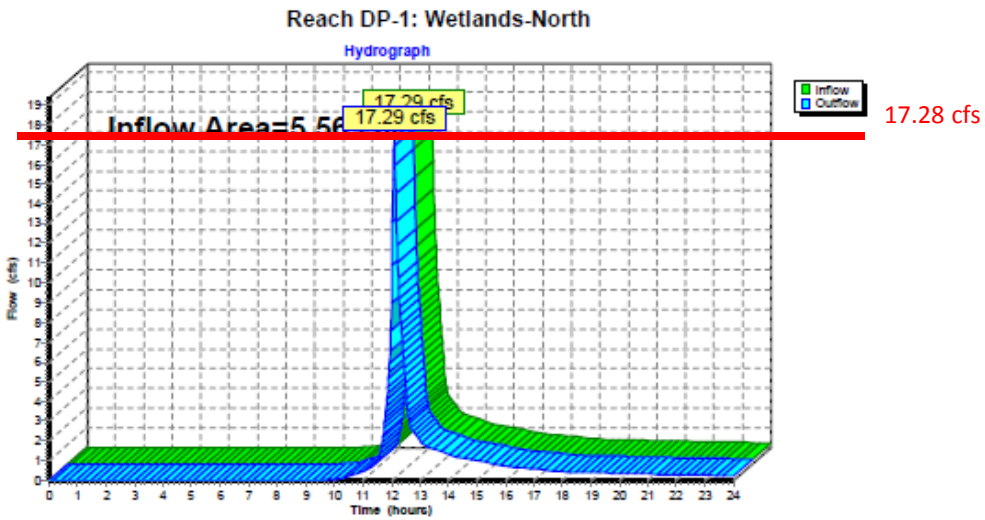
The photograph of the pooling water on Beverly Road looks substantially similar to the above picture of a vernal pool on the Energy and Environmental Affairs website.

- According to Mass Office of Energy and Environmental Affairs:

  Some vernal pools are protected in Massachusetts under the Wetlands Protection Act regulations.

- Has CHR asked the EEA to see if the pools on their site are candidates for protection? Should the Town of Brookline ask?

Hancock Village Traffic & Drainage Review



- CHR's design is based on the peak flow of a 24 hour event, which usually occurs over a brief (a few minute) period.
- Technically, as long as the Post development peak is less than the Pre development peak, the design is acceptable.
- If you were to design a system that delivered 17.28 cfs constantly over 24 hours you could claim to have a compliant system.
- This compliant system would result in additional runoff from the site of more than 11,167,500 gallons of water.

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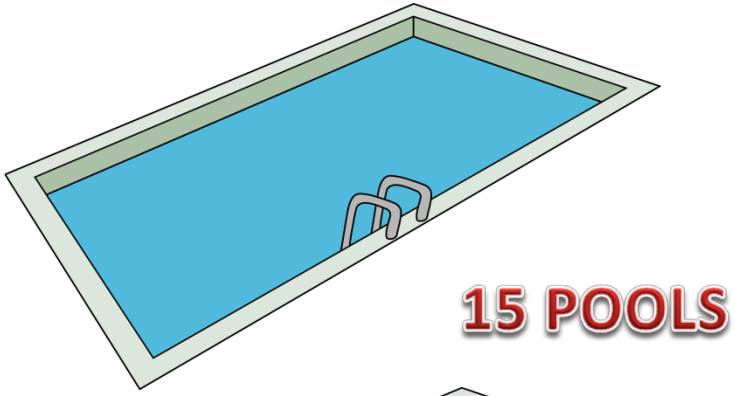
HOW MUCH ADDITIONAL WATER IS BEING GENERATED?

For a 10-year storm the existing run-off from the site is 0.717 Acre-Feet

For a 10-year storm the proposed run-off from the site is 1.45 Acre-Feet

The net effect is 0.733 Acre-Feet, which is twice the original amount

This translates into an additional 241,781 gallons

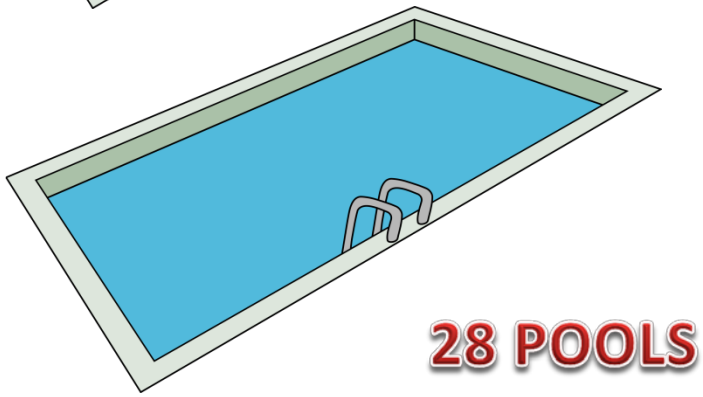


For a 100-year storm the exsiting run-off from the site is 3.292 Acre-Feet

For a 100-year storm the proposed run-off from the site is 4.672 Acre-Feet

The net effect is 1.38 Acre-Feet

This translates into an additional 449,675 gallons



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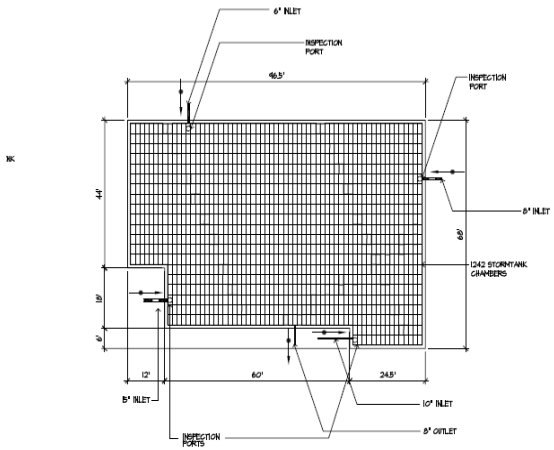
Stantec installed eight (8) monitoring wells on site on January 15, 2013 and January 16, 2013. Soil samples were collected and classified in accordance with the USDA classification procedures. Sieve analyses were performed on selected soil samples. Water levels in the monitoring wells were measured by Stantec on January 22, 2013 and April 29, 2014, and those measurements were used as the basis for estimating seasonal high groundwater elevations.

Is the Drainage Design based on flawed data gathering?

- The Seasonal High Water Table was estimated based on two readings (a very small sample set).
- The ten-day period before each of the readings was extremely dry (0.4” total leading up to Jan. 22, 2013 and 0.59” leading up to April 29, 2014)
- Total rainfall for 2011 (41.66”) and 2012 (40.66”) was about 30% less than the previous two years (55.85” & 58.67”).
- There are many comprehensive methods for determining Seasonal Ground Water Elevations. Why did the designer not do a more detailed analysis?

Hancock Village Traffic & Drainage Review

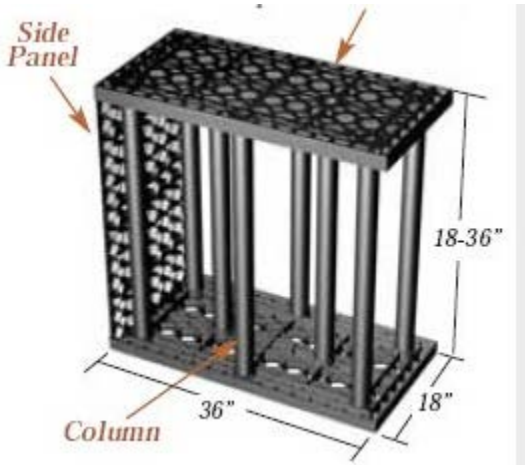
- This is not a proven technology. StormTank systems come with a 12 month limited warranty.
- This system is equivalent to building an underground storage tank out of thousands of milk crates.
- The Geotech has not provided the Bearing Capacity of the soils, soil composition, limiting zones, etc. that the manufacturer requires.
- Lateral loads from adjacent structures could compromise the system. These systems are located near adjacent structures that need to be analyzed.
- Drainage ports shown do not comply with manufacturers'recommendations showing the designer has little experience with these systems.



5 P-4C STORMTANK CHAMBERS
SCALE: NTS

Foundation

The foundation (subgrade) of the sub-surface storage structure is the most important part of the installation. This is the location where the system applies the load generated at the surface. If the subgrade lacks the adequate support or encounters potential settlement, the entire system will be affected. A geotechnical investigation is important when implementing an underground storage solution. The bearing capacity, soil composition, limiting zones, etc. of a potential site should be evaluated before deciding on the type of system and configuration.



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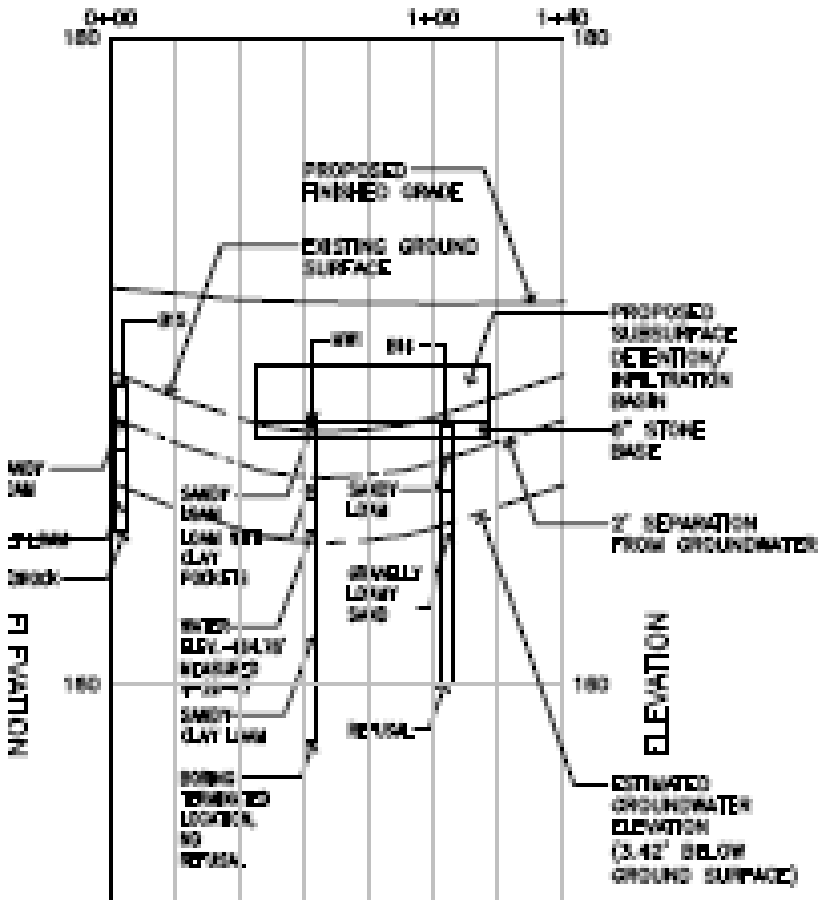


The Architectural Reviewer recommended keeping the natural grades of the existing site. Why is the site built up in places?

- The ground water elevation at Basin 1A is extremely high.
- They must build up over the existing grade to fit in their stormwater holding tank.
- If the Seasonal Ground Water elevations are higher than assumed, the system could fail!

Hancock Village Traffic & Drainage Review

regarding their use. These include:

- Whether porous pavement can maintain its porosity over a long period of time, particularly with resurfacing needs and snow removal.
- Whether porous pavement remains capable of removing pollutants after subfreezing weather and snow removal.
- The cost of maintenance and rehabilitation options for restoration of porosity.

DESIGN CRITERIA

Porous pavement - along with other infiltration technologies like infiltration basins and trenches - have demonstrated a short life span. Failures generally have been attributed to poor design, poor construction techniques, subsoils with low permeability, and lack of adequate preventive maintenance. Key design factors that can increase

- Routine vacuum sweeping and high pressure washing (with proper disposal of removed material).
- Drainage time of at least 24 hours.
- Highly permeable soils.
- Pretreatment of runoff from site.
- Organic matter in subsoils.
- Clean-washed aggregate.

Traditionally, porous pavement sites have had a high failure rate - approximately 75 percent. Failure has been attributed to poor design, inadequate construction techniques, soils with low permeability, heavy vehicular traffic, and resurfacing with nonporous pavement materials. Factors enhancing longevity include:

TABLE 1 DESIGN CRITERIA FOR POROUS PAVEMENTS

Design Criterion	Guidelines
Site Evaluation	• Take soil boring to a depth of at least 1.2 meters (4 feet) below bottom of stone reservoir to check for soil permeability, porosity, depth of seasonally high water table, and depth to bedrock.
	• Not recommended on slopes greater than 5 percent and best with slopes as flat as possible.
	• Minimum infiltration rate 0.9 meters (3 feet) below bottom of stone reservoir: 1.3 centimeters (0.5 inches) per hour.
	• Minimum depth to bedrock and seasonally high water table: 1.2 meters (4 feet).
	• Minimum setback from water supply wells: 30 meters (100 feet).
	• Minimum setback from building foundations: 3 meters (10 feet) downgradient, 30 meters (100 feet) upgradient.
	• Not recommended in areas where wind erosion supplies significant amounts of windblown sediment.
	• Drainage area should be less than 6.1 hectares (15 acres).
Traffic conditions	• Use for low-volume automobile parking areas and lightly used access roads.
	• Avoid moderate to high traffic areas and significant truck traffic.
	• Avoid snow removal operations; post with signs to restrict the use of sand, salt, and other deicing chemicals typically associated with snow cleaning activities.
Design Storm Storage Volume	• Highly variable; depends upon regulatory requirements. Typically design for storm water runoff volume produced in the tributary watershed by the 6-month, 24-hour duration storm event.

- 75% Failure Rate
- Minimum Infiltration rate 3 feet BELOW stone reservoir should be 0.5 inches/hr. Bedrock will have ZERO inches per hour.
- Minimum depth to bedrock is 4 feet.
- Minimum set back from upgradient foundations is 100 feet. Existing buildings and homes are closer.

EPA <u>Fact</u> Sheet on Porous Pavement

Hancock Village Traffic & Drainage Review

Porous Asphalt Pavement

A surface parking and driveway constructed with porous asphalt pavement is proposed. The porous asphalt pavement will allow stormwater to travel vertically through a stone base before infiltrating into the subsoil. The stone storage bed has been designed to hold ½ inch of water quality volume and will drain within 72 hours therefore achieving 80% TSS removal based on compliance with the structural BMP specifications of the MassDEP stormwater handbook.

- The drainage study states that water held in the porous pavement will infiltrate into the subsoil. However, there is mostly ledge under the porous pavement.

Hancock Village Traffic & Drainage Review

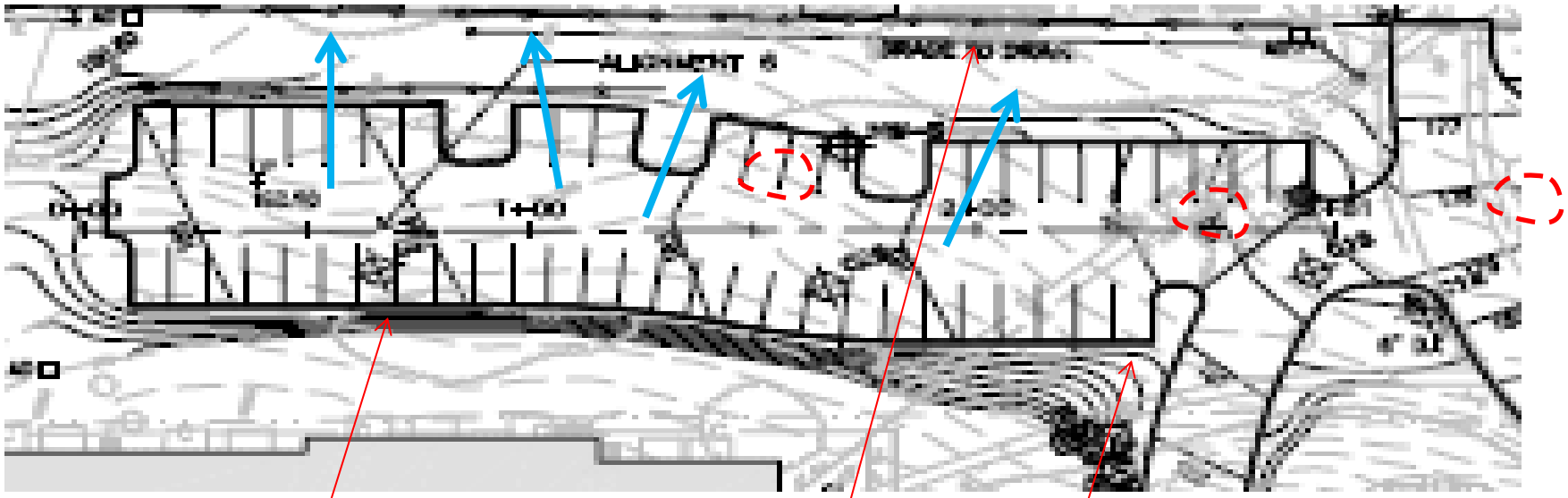
Infiltration rates for each stormwater component summarized below:

Proposed Stormwater BMP	Bottom Elevation of Basin	USDA Soil Classification at Depth	Boring/Monitoring Well	Assumed Rawl's Rate at Depth (in/hr)
Subsurface Detention/Infiltration Basin (P-1A)	167.60	Sandy Clay Loam	MW-1	0.17
Bioretention Basin (P-1C)	161.50	Silt Loam	MW-2	0.27
Subsurface Detention/Infiltration Basin (P-1F)	158.00	Sandy Clay Loam	MW-3	0.17
Subsurface Detention/Infiltration Basin (P-4C)	153.50	Sandy Clay Loam	MW-7	0.17

Infiltration Rates provided to the designer are half to one-third of the 0.5 in/hr recommended by the EPA!

- These soils have poor infiltration rates.

Hancock Village Traffic & Drainage Review



Steep Rock Excavation

5’ cut in rock

How are the Area Drains installed without removing vegetation that is supposed to remain?

The plans call to “Grade to Drain”. There is no proposed grading shown and these trees are supposed to be saved.

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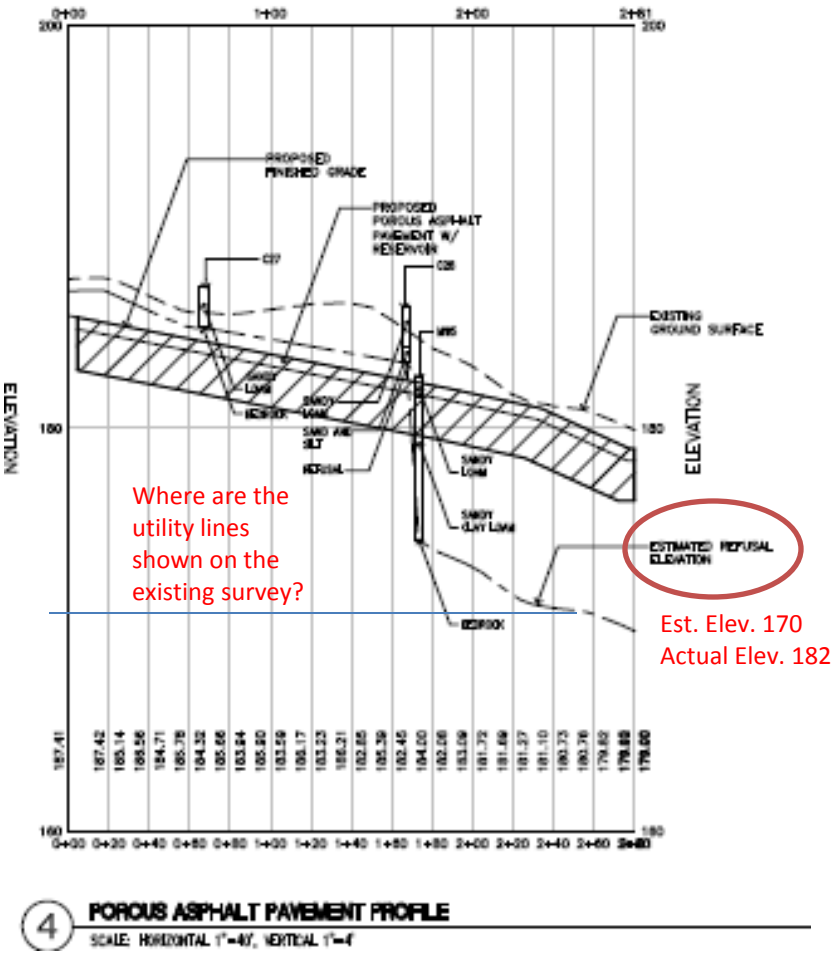
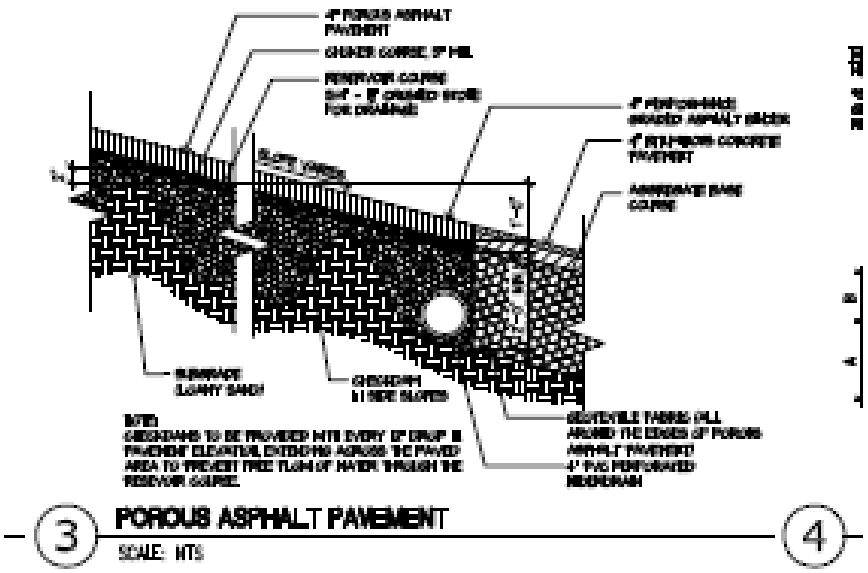


Existing Rock Outcropping at Station 2+50 (clearly shown on survey but not on the profile)

Hancock Village Traffic & Drainage Review



Proposed Porous Pavement Detail.

- The detail provided says the subgrade will be “loamy sand.” The cross section shows the subgrade material will be solid rock.
- The detail calls for checkdams. Will these be carved into the rock? These dams will direct water towards Russet Road.
- The minimum section is approximately 3’ deep. In some cases, the proposed elevation is 5’ below existing grade. There could be rock excavation of over 8’!
- The proposed parking lot will create a bath tub out of rock with the primary exit towards the residences on Russet and Asheville Road.
- The 4” underdrain is only located at the west end of the parking lot. The majority of the water will be heading towards the Russet Road residences instead of flowing to the drain.

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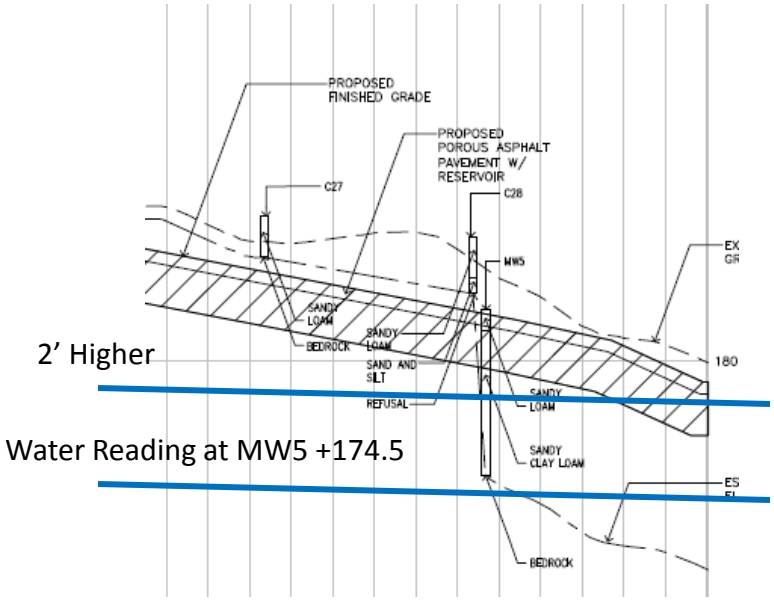
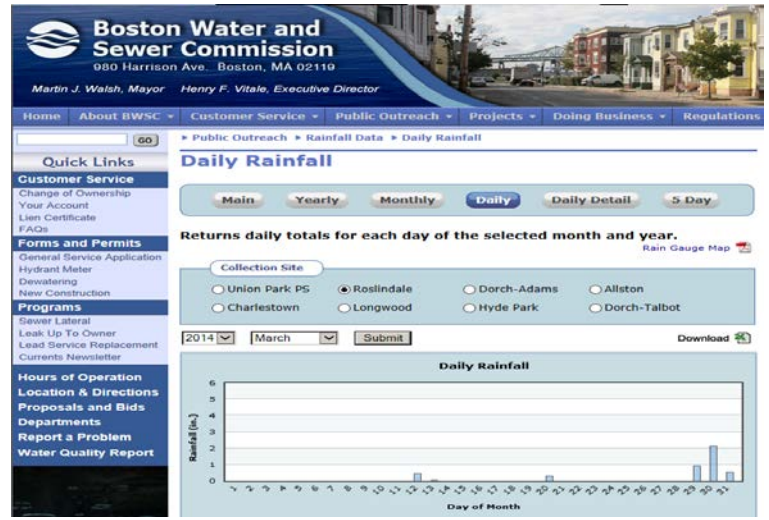


There is not proper separation between the water table and storage

- Well MW 5 had a water reading of 174.5
- Two feet above that is 176.5
- The low point of the pervious pavement parking lot is 179.0
- The pervious pavement is 3' deep.
- 179'-3' = 176' which only allow 1.5' separation.

Hancock Village Traffic & Drainage Review

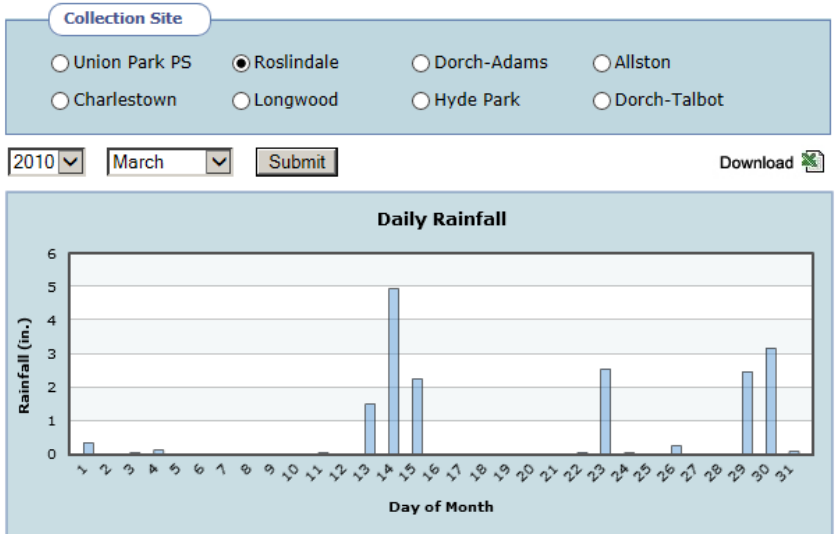
Rain Event on March 30, 2014



- Photos were taken on March 30, 2014 in the morning. At the time of the photos approximately 1”-1 1/2” of rain had fallen.
- The site is completely saturated with ZERO capacity to store water.
- Previous to this event it had been a extremely dry month.
- All the water shown in the picture is flowing towards Asheville Road.

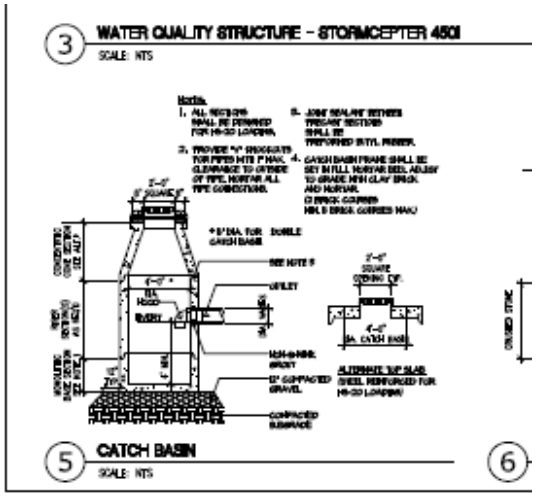
Hancock Village Traffic & Drainage Review

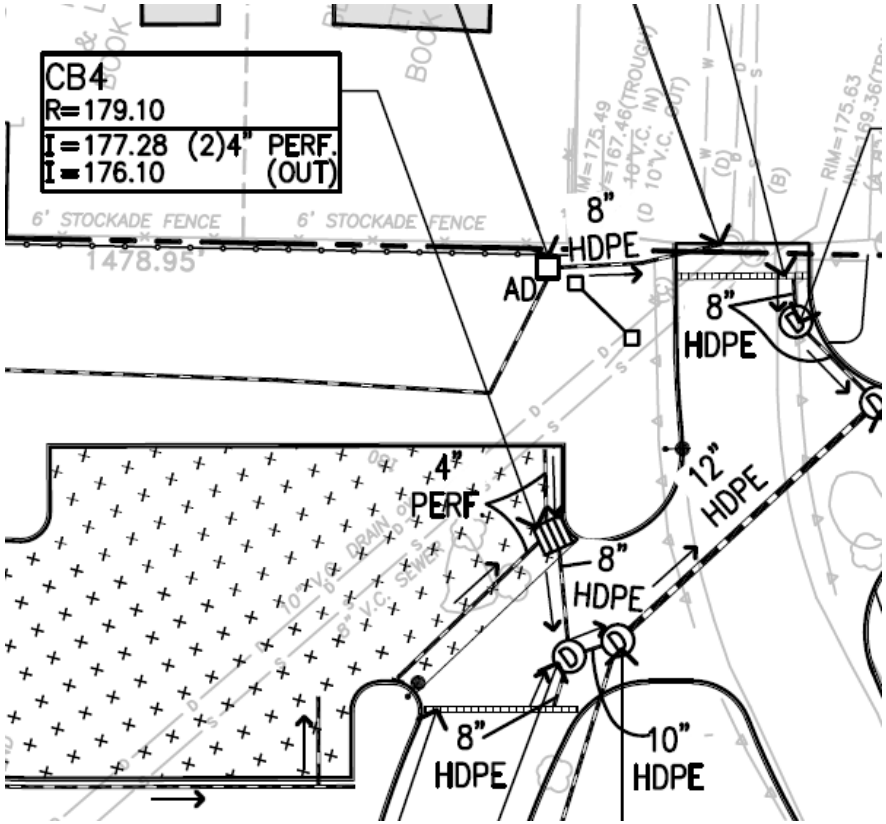
Start of basement flooding due to March 30, 2014 event



- In March 2010, there was a three day event that produced 7+ inches of rain.
- Despite running two pumps 24 hours a day, my basement was completely flooded with approximately 1 foot of water.
- My neighbor across Asheville Road, Mrs. Green, also had her basement flooded.
- This was not a “one in 100” year event. I have actually had this happen twice since moving in, and my sump pump runs during every storm event and the basement gets some level of water every spring.

Hancock Village Traffic & Drainage Review





- Catch Basin CB4's rim is proposed to be at El. 179.10, about 1' below existing rock.
- The bottom will be at El. 170.6 about 10 feet below existing rock.
- All the proposed drain lines shown left will have to have deep cuts blasted into the rock in order to install them.

Hancock Village Traffic & Drainage Review

- Drainage Study Conclusions

- The existing site has not been adequately studied to determine:
  - Potential Wetlands
  - Limits of Ledge
  - Locations of Underground Utilities
  - Soil Capacities
  - Seasonal High Ground Water
- The proposed mitigation methods are not typical
  - Grading is used to build-up land to provide separation between structures and ground water.
  - EPA recommendations are not being followed
  - There is no “history” of success with the proposed storage systems
  - It will take an extreme amount of maintenance to keep system operational
  - Failure of maintaining systems will definitely result in impacts to adjacent sites.
- The designer has made clear mistakes
  - The reasons behind errors on plans and calculations needs to be investigated.
  - Are these errors due to lack of investigation or lack of understanding on the systems being used?