

45 Asheville Road  
Chestnut Hill, MA  
(617) 942-2548

October 14, 2014

Ms. Allison Steinfeld  
Planning Director  
Town of Brookline  
333 Washington Street  
Brookline, MA 02445

**Re: Proposed Residence of South Brookline 40B Development/Comments Regarding the Drainage Study for Hancock Village**

Dear Ms. Steinfeld:

Since presenting findings from my review of the Drainage Calculations for the Proposed Residence of South Brookline 40B Development last month, I have found several additional significant errors in the design. In order to address these errors there will have to be significant modifications to the presently designed system, but given the natural features of the site, a drainage solution for a project of this size may not exist. I realize that my observations may be seen as less than altruistic due to the direct impact the development will have on my property and as such, I strongly recommend that a new consultant be brought on to review my concerns. The key issues include the following:

**1. The use of Stormceptors**

I'm a professional engineer working in Massachusetts and on my current project with the Massachusetts Department of Transportation (MassDOT), we have been discussing a drainage problem on a specific site. At two recent meetings the use of Stormceptors was presented as an alternative by the Contractor. In both instances, the possibility was rejected by MassDOT due to the poor performance of these systems. At one meeting, Stormceptors were referred to as "a waste of taxpayer's money" and would not be considered, even if the only alternative for treatment was to do nothing at all. The aversion to these systems displayed by MassDOT is a strong reason to prohibit them from this project.

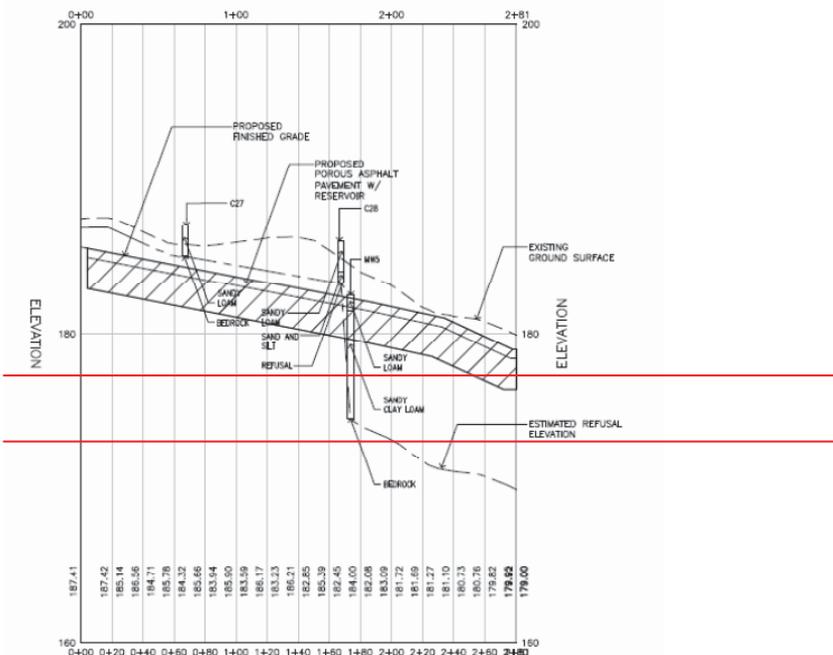
## 2. The Porous Pavement Storage Capacity is not correct

The Stormwater Report claims the porous pavement parking area will store a tremendous amount of water (7,821 cubic feet) between elevations 176.4 and 178.4. See the attached printout from the Stormwater Report.

PR cond  
 Prepared by Stantec Consulting Ltd. Type III 24-hr 100 YEAR Rainfall=6.70"  
 HydroCAD® 10.00 s/n 02809 © 2012 HydroCAD Software Solutions LLC Printed 8/22/2014  
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**Stage-Area-Storage for Pond P-4D: porous asphalt pavement**

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
176.40	0	177.46	4,145
176.42	78	177.48	4,223
176.44	156	177.50	4,302
176.46	235	177.52	4,380
176.48	313	177.54	4,458
176.50	391	177.56	4,536
176.52	469	177.58	4,614
176.54	547	177.60	4,693
176.56	626	177.62	4,771
176.58	704	177.64	4,849
176.60	782	177.66	4,927
176.62	860	177.68	5,005
176.64	939	177.70	5,084
176.66	1,017	177.72	5,162
176.68	1,095	177.74	5,240
176.70	1,173	177.76	5,318
176.72	1,251	177.78	5,396
176.74	1,330	177.80	5,475
176.76	1,408	177.82	5,553
176.78	1,486	177.84	5,631
176.80	1,564	177.86	5,709
176.82	1,642	177.88	5,788
176.84	1,721	177.90	5,866
176.86	1,799	177.92	5,944
176.88	1,877	177.94	6,022
176.90	1,955	177.96	6,100
176.92	2,033	177.98	6,179
176.94	2,112	178.00	6,257
176.96	2,190	178.02	6,335
176.98	2,268	178.04	6,413
177.00	2,346	178.06	6,491
177.02	2,425	178.08	6,570
177.04	2,503	178.10	6,648
177.06	2,581	178.12	6,726
177.08	2,659	178.14	6,804
177.10	2,737	178.16	6,882
177.12	2,816	178.18	6,961
177.14	2,894	178.20	7,039
177.16	2,972	178.22	7,117
177.18	3,050	178.24	7,195
177.20	3,128	178.26	7,274
177.22	3,207	178.28	7,352
177.24	3,285	178.30	7,430
177.26	3,363	178.32	7,508
177.28	3,441	178.34	7,586
177.30	3,519	178.36	7,665
177.32	3,598	178.38	7,743
177.34	3,676	178.40	7,821
177.36	3,754		
177.38	3,832		
177.40	3,911		
177.42	3,989		
177.44	4,067		



The Hatched Area to the left is the storage area depicted in the Design Plans. The red lines indicated the area from the design.

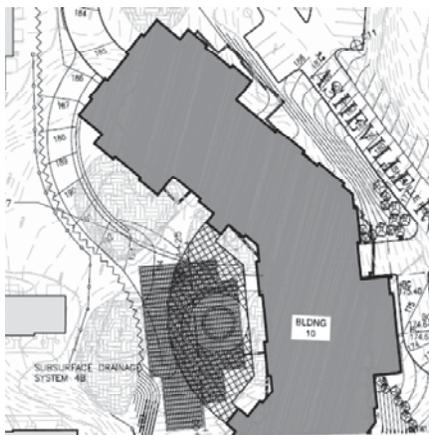
178.4

176.4

However, the Design Plans illustrate that the developer only plans to remove the ledge to two feet below grade. In order to get to the elevations depicted in the design report, he would have to remove over eleven feet of ledge in some areas. This would drastically increase the proposed ledge removal for the project. As the Porous Asphalt Pavement Profile (above) clearly illustrates, the developer has no intention of building a basin to the dimensions described in the Stormwater Report. There will be almost no storage between the elevations used in the report.

### 3. Substorage Basin No. 4B will not work

Substation Basin No. 4B is proposed to be constructed in the ledge adjacent to the residential tower.

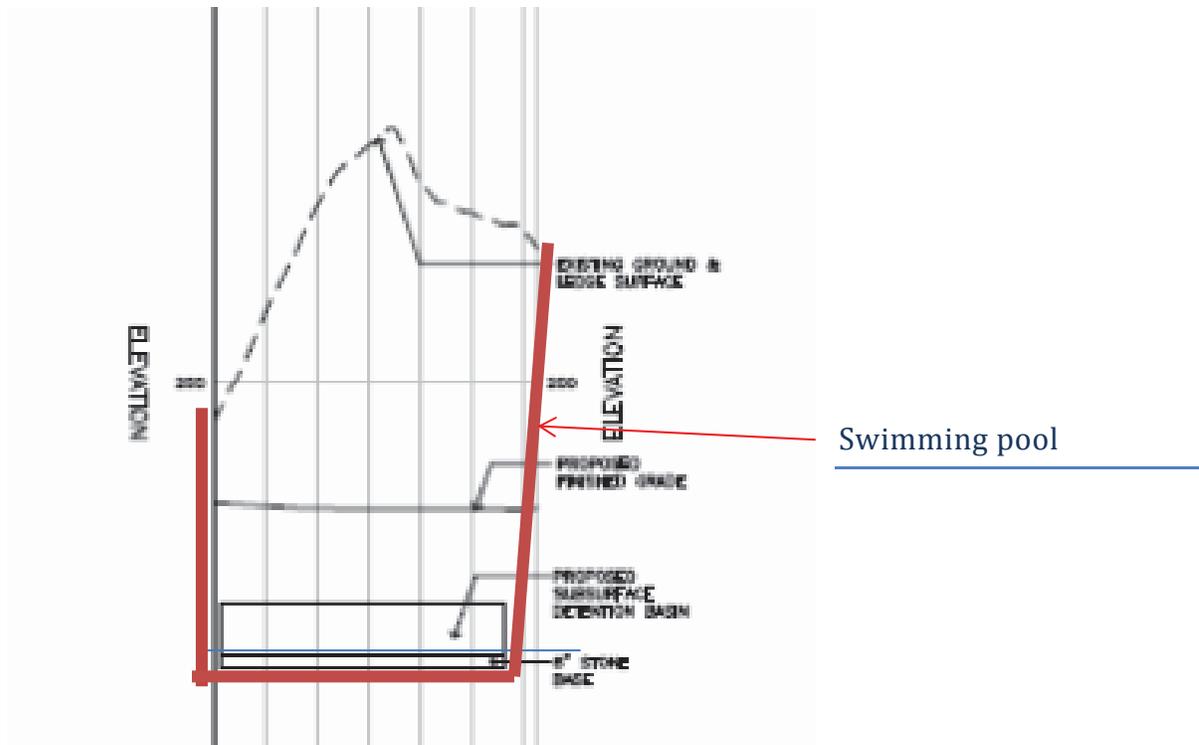


This basin will be built by carving a tremendous area out of the puddingstone ledge. When complete, there will essentially be a deep “swimming pool” cut into the rock which will have plastic crates installed as a run-off storage system. The only way for water that is collected with the storage system to exit the storage system is through a small 6” pipe. This design has several fatal flaws:

- a. The model was run assuming the system was dry, so it had the maximum storage capacity available. However, once this system fills with water there will be no way for the water below the elevation of the outlet to drain. These systems were intended to be placed over soil, not rock as the design shows. The design should be run considering what would happen if two storm events would happen a few days apart. If this were done, the runoff calculations would show very different results.
- b. The six inch outlet pipe is dangerously small. Again, for MassDOT projects, the minimum pipe diameters allowed for drainage projects is twelve inches. This is to prevent clogging and system failures. Stantec said the pipe they are proposing was selected because “that’s what was needed.” I believe this answer is misleading. It

implies that a six inch pipe is what the system needed to operate properly and to provide a larger pipe would be wasteful. However, in actuality the six inch pipe is needed to choke the system to prevent water from leaving the storm tanks too soon. If a larger pipe were provided, it would allow too much water to enter the downstream system and not show the runoff being reduced. This is not an appropriate way to design a drainage system.

- c. The inability of the storage tanks to fully drain could result in water being trapped in the system and freezing. As such, the pressures developed by freezing water could destroy the flimsy plastic storm tank modules.



#### 4. The Vernal Pool investigation was incomplete

The letter from Lenore White reviewing the possibility of the Vernal Pool on the site was less than conclusive. The only thing Ms. White could state was that at the time she was unable to find evidence of a Vernal Pool. She clearly stated that evidence of a Vernal Pool could be present in the past and future. Due to the less than average rainfall over the last two years it is inappropriate to evaluate the site based on observation at this time only. It is reasonable to require more investigation.

Furthermore, Ms. White claims that she visited the site on April 10. Looking at rainfall data for the area, that date is over 48 hours after the most recent storm. In the stormwater report Stantec claims that this area (referred to as P-1C) will fully drain in 13.19 hours after a major storm.

**Table 3.3 – Summary of Drawdown Time**

<b>Subsurface Basin</b>	<b>Maximum Drawdown Time (hours)</b>	<b>Drawdown Time Provided (hours)</b>
P-1A	72	9.55
P-1C	72	13.19
P-1F	72	19.18
P-4C	72	34.79

Obviously if there was standing water more than 48 hours after the latest minor storm, there has to be wrong assumptions in the report.

**5. The Estimated Seasonal High Groundwater used by Stantec is wrong**

One of the biggest issues with the Stantec design is the method by which they determined the Estimated Seasonal High Groundwater (ESHG). I pointed out the concerns I had with the minimum well readings used to determine this value. Since giving my presentation, I have spoken to additional experts in determining these values and discussed this project. From what I have learned, estimating groundwater is a complex issue, especially in areas over ledge. The ESHG elevation is a critical value that could mean the difference between a successful project and a disastrous one. A comprehensive analysis using procedures developed by Michael Frimpter should be required for this project. Mr. Frimpter was one of the authors of “Estimation of High Ground-Water Levels for Construction and Land Use Planning—Cape Cod MA in 2006” which is available online. In its Introduction he gives a dire warning of the consequences of underestimating these values:

**INTRODUCTION**

High ground-water levels are a major cause of septic-system failures, wet basements, and other problems for suburban and rural residents. For example, unexpectedly high ground-water levels can floor septic systems, causing sewage to back up into the home, and (or) reach the land surface, threatening public health, creating obnoxious odors, and devaluing property (Figure 1.) Persons who come in contact with untreated sewage can be exposed to bacterial and viral diseases, such as hepatitis, dysentery, cholera, and typhoid fever. Conditions leading to these problems can be anticipated during design phases of construction.

The significant issues I have raised along with the numerous other observations I have made over the course of the review of the Engineering and Plans for the proposed development warrant an additional comprehensive review of the proposed development. The proposed development fails to adequately protect abutters from harm to their property.

Sincerely,

William M. Varrell, III, P.E., LEED AP

A handwritten signature in blue ink that reads "William M. Varrell III". The signature is written in a cursive style with a distinct "III" at the end.

cc: Jesse Geller, Esq., Chairman, Brookline Zoning Board of Appeals  
William Pu, Preserve Brookline (via e-mail)