William M. Varrell III, PE, LEED AP
45 Asheville Road
Chestnut Hill, MA 02467
617-842-3096

August 26, 2013

Anthony Fracasso, Senior Vice President
MassDevelopment
99 High Street, 11th floor
Boston, MA 02110

Dear Mr. Fracasso:

I am writing to ask you to reject the proposal to build a 271 unit development on the site of Chestnut Hill Reality's Hancock Village apartment complex in South Brookline. My residence, on the the corner of Asheville and Russet Road, directly abuts the property. My family and I have resided at this address for more than five years.

The current proposal calls for the complete eradication of the green belt area that serves as an important buffer between the current complex and my South Brookline neighborhood. This green space is the only area for the residents of Hancock Village's numerous young residents to safely play outdoors. The complex also allows pets and this area is used by many of the residents for daily exercise of their dogs.

Another key environmental aspect of the project that is extremely troubling to me is the destruction of the Roxbury Puddingstone outcropping that is within sight of my property. As you may know, Roxbury Puddingstone is the official rock of Massachusetts. Also, as a registered Structural Engineer, I am aware that this pudding stone formation most likely is extremely deep and runs not only under the Hancock Village property, but also under most of my neighborhood. This is a critical issue, as I, like most of my neighbors, have severe water table issues on my property. During rain events, my sump pump is constantly working to remove water from my basement. Unfortunately, several times over the years the pump has not been able to keep up and my basement has flooded. If the remaining green space is eliminated and replaced with impermeable surfaces such as roofs and pavement, the flooding is sure to become more frequent and intense. In addition to the trouble of constant flooding, the rerouting of substantial amounts of water can lead to severe soil erosion and foundation instability. This seems like an unfair burden to put on me and my neighbors.

Another major concern is the traffic that will be generated. The one constant refrain for visitors to my home is the observation of the heavy traffic in front of my house. Currently there is a nearly nonstop procession of cars running by my house in and out of Hancock Village. These cars are usually traveling at a high rate of speed down a narrow, steep "driveway." Although classified as a driveway, the entrance to Hancock Village is as busy as the adjacent VFW Parkway. However, this driveway has no shoulders, pavement markings and very poor sight distance. Over the years I have noticed several near misses between cars and even pedestrians. There are no sidewalks along the driveway and little room for people to walk off of the curbs. We do not allow our kids to ride bicycles on our street due to the heavy traffic.

I also feel that the proposed structures do not fit in well with the existing townhouse style of Hancock Village and the existing single family houses in the adjacent neighborhood. These towers and multifamily residences will be totally out of place. The plan to build a multiunit complex steps from our property line will mean my property will be in permanent shade and the yard and landscaping I have spent the last several years establishing will be destroyed.

Finally, as a LEED AP, I feel strongly that this project is in conflict with the current direction of sustainable development that is so prevalent in today's culture. This project eliminates green space and is not located near practical public transportation or shopping districts. These services are vital to successful projects such as the one being proposed.

For the above reasons, I urge you to reject the proposal. It will permanently spoil the South Brookline community if this project is allowed to proceed.

If you have any questions, please feel free to contact me. I work at 100 High Street and would be happy to meet with you to discuss this issue. Thank you for attention to this matter.

Sincerely,

William M. Varrell III, PE, LEED AP

Hancock Village Stormwater Report Analysis

1. Page 5 of the report says "efforts will be made to protect existing trees during the construction period …". This is misleading as 98% of the wooded area on the site will be removed according to the calculations.
2. Page 7 states that "The project does not have direct discharge of stormwater to waters or wetlands." This is not a true statement. The analysis assumes there are no new direct discharge points to wetlands. Discharge point DP-1 is clearly labeled on the existing conditions map as "DISCHARGE POINT AT WETLANDS NORTH". I also feel that proposed drainage areas P-1A & P-1C could also directly discharge into the wetlands at the Hoar Sanctuary. This will depend on the profile of the ledge under the soil. This needs to be evaluated to be sure Stormwater Standard No. 1 is met.
3. Compliance with Standard 2: Peak Rate Attenuation relies heavily on the premise that the porous pavement and Stormceptor basins will be working at optimum conditions. Porous pavement is not a reliable stormwater mitigation alternative for this site for the following reasons:
    a. It can be easily clogged and compromised with sanding and salting. Hancock village aggressively applies sand to all paved areas in the winter and it will be extremely difficult to monitor this practice and assure that sand is not used in these newly developed areas.
    b. It is recommended that there is a minimum of 41" of vertical room available to install the pavement and necessary subgrade. In addition, there should be several feet of well draining material below the subgrade. The site has multiple ledge outcropping that indicate there is not the required room to install this system.
    c. Porous pavement should not be used within 10 feet of a building foundation that is above proposed pavement location or 100 feet from a building foundation that is below the proposed pavement location. The proposed site plan violates this rule.
    d. Porous pavement should not be used within close proximity of sources of contaminants e.g. gas stations. There is a gas station located across the VFW Parkway and number of cars expected to be parked could also lead to contamination.
    e. On slopes that exceed five percent. Many of the proposed slopes will be much greater than 5%.
4. The stormwater analysis also does not take into account the extreme number of trees that will be removed from the site.
    a. In one day, one large tree can lift up to 100 gallons of water out of the ground and discharge it into the air.
    b. For every five percent of tree cover added to a community, stormwater runoff is reduced by approximately two percent.
    c. Dozens of trees will need to be removed from the site in order to build as shown in the post developed plans.
5. The stormwater requirements indicate that "peak discharges" will be less in the post developed state than the existing condition. This ignores the fact that for the homeowners on Russet and

Beverly Road there is already a flooding issue and this supposed decrease in the discharge rate will only mean the additional runoff from the project will get to their yards and basements in at a slightly slower rate. The report confirms that impervious areas, and runoff, will increase.

6. The report states that 76 borings were drilled to determine the ledge profile. Only a few are included in the report. I believe these were “cherry picked” to support the design. I believe, in general, ledge is much higher than the report assumes.
7. I did some analysis of the Pre and Post development areas and found some interesting facts that may go unnoticed:
    a. The percent impervious area goes from 16.14% to 49.51%, almost a three- fold increase.
    b. The percent of woodland goes from 22.76% to 0.52%, a 96% decrease in wooded area.
    c. If you multiply the Curve Number for each area by the area and determine a composite CN for the Pre and Post conditions the number goes from 883.6 to 1075.6. This is a 21.7% increase in composite CN number which closely corresponds to the increase in runoff. While the water may come off of the site at a slower “peak rate” there will be 22% more water to deal with for homeowners on Beverly and Russet.
8. The Groundwater Elevations shown on Table 2.3 were assumed to be the “Estimated Seasonal High Groundwater”. These values were measured on January 22, 2013. A simple search for rainfall data during the time period of Jan 1, 2013 to Jan 22, 2013 shows we only had about 0.56 inches of rain. For the period of March 1, 2013 to March 22, 2013 we had about 3.85 inches of rain, or nearly seven times as much. The seasonal rainfall data should be based on the average high measured over the 21 rainiest days of the calendar year. If this data were obtained I feel the Season High Groundwater would be several feet higher. This is a critical elevation as all stormwater mitigation systems should be 3-5 feet above this level.
9. Compliance with Standard 3: Recharge requires that all “Infiltration structures must be able to drain fully within 72 hours”. The stormceptor tanks hold about 450 gallons of runoff. Most of this remains in the tank in a five foot deep holding section. This water will remain until it evaporates. Evaporation rates for open water are less than 0.25 inches per day in the summer. These tanks will take several weeks to fully drain (if they do at all).
10. Standing water inside these tanks could be breeding grounds for disease carrying insects and could contribute to increased cases of West Nile Virus and EEE.
11. Requirement 3 states that “There is greater than a two-foot separation between the bottom of the subsurface basin (infiltration structure) and the seasonal high groundwater. The Stormceptor basins are a minimum of 10 feet from cover to bottom according to the details that I found for the product. There is no way that there is two feet between the bottom of these structures and the seasonal high groundwater.
12. Compliance with Standard 4: Water Quality states the porous pavement will be cleaned after major storms and vacuum swept quarterly. This will be very difficult to enforce and most likely will not be done.
13. The design calls for severe regrading of the site and will require a significant amount of retaining wall construction. Typically retaining walls are designed to have equal hydraulic pressures on either side of the wall. This is accomplished by adding weep holes to the bottom of the walls to allow the water to drain. This will counteract the storage assumptions made in the report. These

weep holes will discharge onto the property on the low side of the wall, including the properties along Beverly and Russet roads. The discharge from these weep holes should be considered in the pre and post condition analysis.

14. The Checklist for Stromwater Report was not signed or sealed by a PE.

Additional Concerns about Porous Pavement based on the EPA Storm Water Technology Fact Sheet prepared for Porous Pavement

1. The report recommends that porous pavement should only be considered when "…grades, subsoils, drainage characteristics, and groundwater conditions are suitable. Slopes should be flat or very gentle." This is not the proposed condition at Hancock Village.
2. The report goes on to say "The use of porous pavement may be restricted in cold regions." and "The use of porous pavement is highly constrained, requiring deep permeable soils…". The site at Hancock Village does not have deep permeable soils.
3. The report included many drawbacks to porous pavement including:
    a. Many pavement engineers and contractors lack experience with this technology.
    b. Porous pavement has a tendency to become clogged if improperly installed or maintained.
    c. Porous pavement has a high rate of failure.
    d. There is some risk of contaminating groundwater, depending on soil conditions and aquifer susceptibility.
    e. Fuel leaks from vehicles and toxic chemicals may leach from asphalt and/or binder surface. Porous pavement systems are not designed to treat these pollutants.
    f. Anaerobic conditions may develop in underlying soils if the soils are unable to dry out between storm events. This may impede microbiological decomposition.
4. The report goes on to warn "…the use of porous pavement does create risk of groundwater contamination. Pollutants that are not easily trapped, absorbed, or reduced, such as nitrates and chlorides, may continue to move through the soil profile and into the groundwater, possibly contaminating drinking water supplies."
5. The report went on to point out there are several unknowns about porous pavement including:
    a. "Whether porous pavement can maintain its porosity over a long period of time, particularly with resurfacing needs and snow removal."
    b. "Whether porous pavement remains capable of removing pollutants after subfreezing weather and snow removal."
6. One of the most alarming concerns of the report is when it talks about the long term performance of porous pavement. The report states that porous pavement has "demonstrated a short life span." And "Traditionally, porous pavement sites have had a high failure rate – <u>approximately 75 percent.</u>"
7. There is a long list of design criteria that the report proposes that the project is ignoring:
    a. Not recommended on slopes greater than 5 percent and best with slopes as flat as possible.
    b. Minimum depth to bedrock and seasonally high water table: 1.2 meters (4 feet).

c. Minimum setback from building foundations: 3 meters (10 feet) downgradient, 30 meters (100 feet) upgradient.
d. Avoid moderate to high traffic areas and significant truck traffic.
e. Pretreatment recommended to treat runoff from off-site areas…”

United States Environmental Protection Agency | Office of Water Washington, D.C. | EPA 832-F-99-023 September 1999

Storm Water Technology Fact Sheet
Porous Pavement

DESCRIPTION

Porous pavement is a special type of pavement that allows rain and snowmelt to pass through it, thereby reducing the runoff from a site and surrounding areas. In addition, porous pavement filters some pollutants from the runoff if maintained.

There are two types of porous pavement: porous asphalt and pervious concrete. Porous asphalt pavement consists of an open-graded coarse aggregate, bonded together by asphalt cement, with sufficient interconnected voids to make it highly permeable to water. Pervious concrete consists of specially formulated mixtures of Portland cement, uniform, open-graded coarse aggregate, and water. Pervious concrete has enough void space to allow rapid percolation of liquids through the pavement.

The porous pavement surface is typically placed over a highly permeable layer of open-graded gravel and crushed stone. The void spaces in the aggregate layers act as a storage reservoir for runoff. A filter fabric is placed beneath the gravel and stone layers to screen out fine soil particles. Figure 1 illustrates a common porous asphalt pavement installation.

Two common modifications made in designing porous pavement systems are (1) varying the amount of storage in the stone reservoir beneath the pavement and (2) adding perforated pipes near the top of the reservoir to discharge excess storm water after the reservoir has been filled.

Some municipalities have also added storm water reservoirs (in addition to stone reservoirs) beneath the pavement. These reservoirs should be designed to accommodate runoff from a design storm and should provide for infiltration through the underlying subsoil.

APPLICABILITY

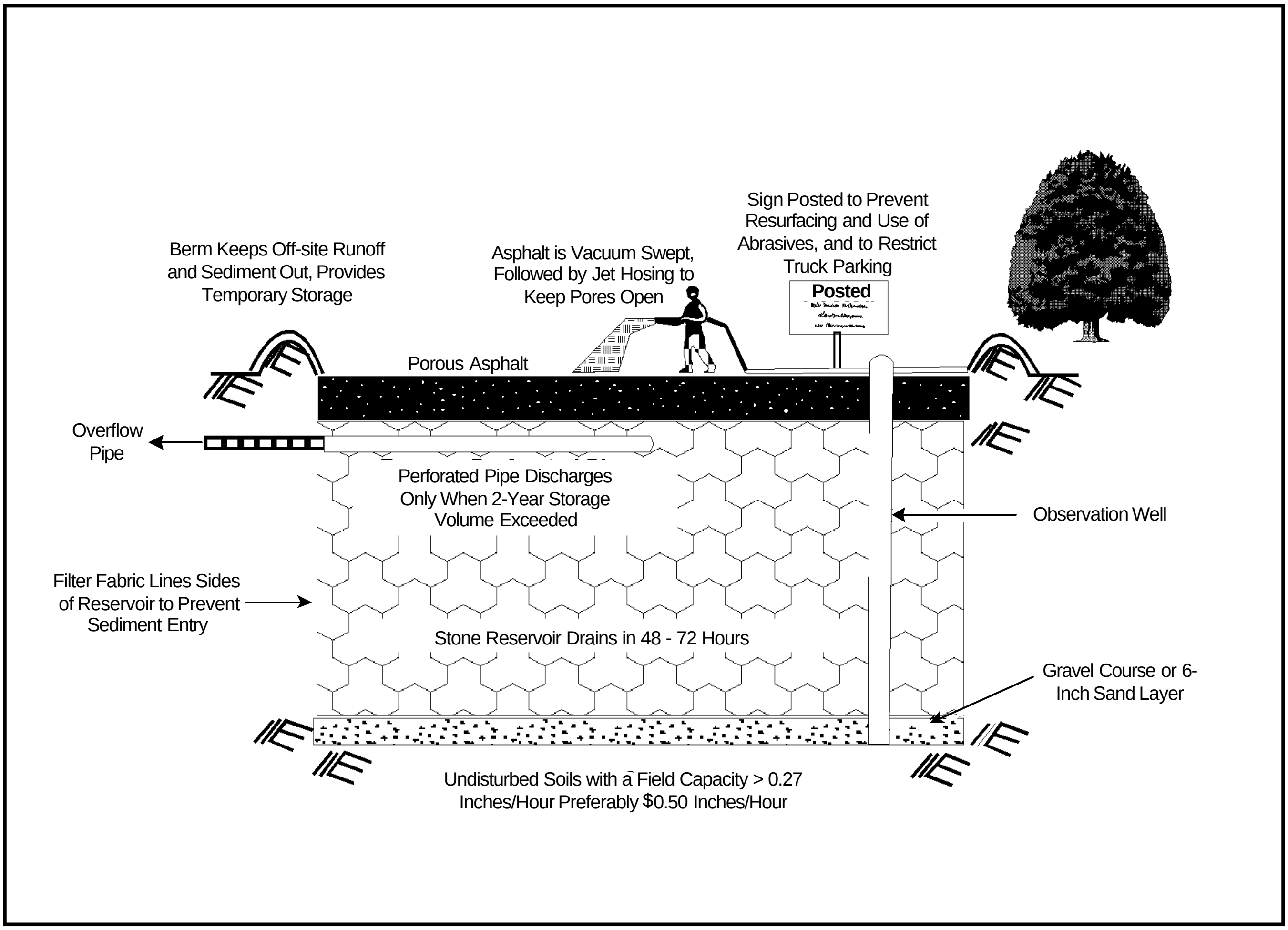
Porous pavement may substitute for conventional pavement on parking areas, areas with light traffic, and the shoulders of airport taxiways a runways, provided that the grades, subsoils, drainage characteristics, and groundwater conditions are suitable. Slopes should be flat or very gentle. Soils should have field-verified permeability rates of greater than 1.3 centimeters (0.5 inches) per hour, and there should be a 1.2 meter (4-foot) minimum clearance from the bottom of the system to bedrock or the water table.

ADVANTAGES AND DISADVANTAGES

The advantages of using porous pavement include:

- Water treatment by pollutant removal.
- Less need for curbing and storm sewers.
- Improved road safety because of better skid resistance.
- Recharge to local aquifers.

The use of porous pavement may be restricted in cold regions, arid regions or regions with high wind erosion rates, and areas of sole-source aquifers. The use of porous pavement is highly constrained, requiring deep permeable soils, restricted traffic, and adjacent land



Source: Modified from MWCOG, 1987.

FIGURE 1 TYPICAL POROUS PAVEMENT INSTALLATION

uses. Some specific disadvantages of porous pavement include the following:

- Many pavement engineers and contractors lack expertise with this technology.
- Porous pavement has a tendency to become clogged if improperly installed or maintained.
- Porous pavement has a high rate of failure.
- There is some risk of contaminating groundwater, depending on soil conditions and aquifer susceptibility.
- Fuel may leak from vehicles and toxic chemicals may leach from asphalt and/or binder surface. Porous pavement systems are not designed to treat these pollutants.
- Some building codes may not allow for its installation.
- Anaerobic conditions may develop in underlying soils if the soils are unable to dry out between storm events. This may impede microbiological decomposition.

As noted above, the use of porous pavement does create risk of groundwater contamination. Pollutants that are not easily trapped, adsorbed, or reduced, such as nitrates and chlorides, may continue to move through the soil profile and into the groundwater, possibly contaminating drinking water supplies. Therefore, until more scientific data is available, it is not advisable to construct porous pavement near groundwater drinking supplies.

In addition to these documented pros and cons of porous pavements, several questions remain 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 the performance and reduce the risk of failure of porous pavements (and other infiltration technologies) include:

- Site conditions;

- Construction materials; and

- Installation methods.

These factors are discussed further in Table 1.

PERFORMANCE

Porous pavement pollutant removal mechanisms include absorption, straining, and microbiological decomposition in the soil. An estimate of porous pavement pollutant removal efficiency is provided by two long-term monitoring studies conducted in Rockville, MD, and Prince William, VA. These studies indicate removal efficiencies of between 82 and 95 percent for sediment, 65 percent for total phosphorus, and between 80 and 85 percent of total nitrogen. The Rockville, MD, site also indicated high removal rates for zinc, lead, and chemical oxygen demand. Some key factors to increase pollutant removal include:

- 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:

- Vacuum sweeping and high-pressure washing.

- Use in low-intensity parking areas.

- Restrictions on use by heavy vehicles.

- Limited use of de-icing chemicals and sand.

- Resurfacing.

- Inspection and enforcement of specifications during construction.

- Pretreatment of runoff from offsite.

- Implementation of a stringent sediment control plan.

OPERATION AND MAINTENANCE

Porous pavements need to be maintained. Maintenance should include vacuum sweeping at least four times a year (with proper disposal of

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.
Drainage Time for Design Storm	• Minimum: 12 hours.
	• Maximum: 72 hours.
	• Recommended: 24 hours.
Construction	• Excavate and grade with light equipment with tracks or oversized tires to prevent soil compaction.
	• As needed, divert storm water runoff away from planned pavement area before and during construction.
	• A typical porous pavement cross-section consists of the following layers: 1) porous asphalt course, 5-10 centimeters (2-4 inches) thick; 2) filter aggregate course; 3) reservoir course of 4-8 centimeters (1.5-3-inch) diameter stone; and 4) filter fabric.
Porous Pavement Placement	• Paving temperature: 240° - 260° F.
	• Minimum air temperature: 50° F.
	• Compact with one or two passes of a 10,000-kilogram (10-ton) roller.
	• Prevent any vehicular traffic on pavement for at least two days.
Pretreatment	• Pretreatment recommended to treat runoff from off-site areas. For example, place a 7.6-meter (25-foot) wide vegetative filter strip around the perimeter of the porous pavement where drainage flows onto the pavement surface.

removed material), followed by high-pressure hosing to free pores in the top layer from clogging. Potholes and cracks can be filled with patching mixes unless more than 10 percent of the surface area needs repair. Spot-clogging may be fixed by drilling 1.3 centimeter (half-inch) holes through the porous pavement layer every few feet.

The pavement should be inspected several times during the first few months following installation and annually thereafter. Annual inspections should take place after large storms, when puddles will make any clogging obvious. The condition of adjacent pretreatment devices should also be inspected.

COSTS

The costs associated with developing a porous pavement system are illustrated in Table 2.

Estimated costs for an average annual maintenance program of a porous pavement parking lot are approximately $4,942 per hectare per year ($200 per acre per year). This cost assumes four inspections each year with appropriate jet hosing and vacuum sweeping treatments.

REFERENCES

1. Field, R., et al., 1982. "An Overview of Porous Pavement Research." *Water Resources Bulletin*, Volume 18, No. 2, pp. 265-267.

2. Metropolitan Washington Council of Governments, 1987. *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs*.

3. Metropolitan Washington Council of Governments, 1992. *A Current Assessment of Best Management Practices: Techniques for Reducing Nonpoint Source Pollution in a Coastal Zone*.

4. Southeastern Wisconsin Regional Planning Commission, 1991. *Costs of Urban Nonpoint Source Water Pollution Control Measures*, Technical Report No. 31.

5. U.S. EPA, 1981. *Best Management Practices Implementation Manual*.

TABLE 2 ESTIMATED COSTS FOR A POROUS PAVEMENT SYSTEM

Component	Unit Cost	Total
Excavation Costs	740 cy X $5.00/cy	$3,700
Filter Aggregate/Stone Fill	740 cy X $20.00/cy	$14,800
Filter Fabric	760 sy X $3.00/cy	$2,280
Porous Pavement	556 sy X $13.00/sy	$7,228
Overflow Pipes	200 ft X $12.00/ft	$2,400
Observation Well	1 at $200 each	$200
Grass Buffer	822 sy X $1.50/sy	$1,250
Erosion Control	$1000	$1,000
Subtotal		$32,858
Contingencies (Engineering, Administration, etc.)	25%	$8,215
Total		$41,073

6. U.S. EPA, 1992. *Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices*. EPA 833-R-92-006.

7. Washington State Department of Ecology, 1992. *Stormwater Management Manual for the Puget Sound Basin*.

ADDITIONAL INFORMATION

Andropogon Associates, Ltd.
Yaki Miodovnik
374 Shurs Lane
Philadelphia, PA 19128

Cahill Associates
Thomas H. Cahill
104 S. High Street
West Chester, PA 19382

Center for Watershed Protection
Tom Schueler
8391 Main Street
Ellicott City, MD 21043

Fairland Park, Maryland
Ken Pensyl
Nonpoint Source Program
Water Management Administration
Maryland Department of the Environment
2500 Broening Highway
Baltimore, MD 21224

Fort Necessity National Battlefield
National Park Service
1 Washington Parkway
Farmington, PA 15437

Massachusetts Highway Department
Clem Fung
Research and Materials Group
400 D Street
Boston, MA 02210

Morris Arboretum
Robert Anderson
9414 Meadowbrook Avenue
Philadelphia, PA 19118

Washington Department of Ecology
Linda Matlock
Stormwater Unit
P.O. Box 47696
Olympia, WA 98504-7696

For more information contact:

Municipal Technology Branch
U.S. EPA
Mail Code 4204
401 M St., S.W.
Washington, DC, 20460

OWM MTB
Excellence in compliance through optimal technical solutions
MUNICIPAL TECHNOLOGY BRANCH