TECHNICAL BULLETIN

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IN LANDSCAPE &
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Case Study:
Reebok Corporate Headquarters, Massachusetts
alternative stormwater management systems

I. Introduction

Recently implemented and evolving stormwater initiatives and regulations in the US have placed new demands on stormwater managers, engineers and developers. The use of conventional stormwater management techniques is increasingly considered detrimental to the environment. Rob Lemire of Stormtech (designers and installers of alternative stormwater systems) states: "No one will fix something that is not broken. Well, our water broke; it is contaminated, polluted and, by not recharging the ground water, essentially vanishing. Non-point source pollution and other nontraditional sources, such as storm water runoff and combined sewer overflows, are a major factor contributing to the increasing pollution in our oceans, rivers and streams." In response to new stormwater regulations, like Massachusetts' zero-net runoff, companies such as Stormtech are exploring new markets with the goal of defining, and implementing environmentally sound best management practices.

STORMWATER SYSTEM

II. Project Description

Type of System Constructed
PREFORMED PVC INFILTRATION TRENCHES

Year
1998

Area serviced
41.4 ACRES

Level of Stormwater Management
O-NET RUNOFF

This technical bulletin provides a brief project overview, offers a project evaluation, and discusses system and maintenance costs of the infiltration stormwater system implemented for the Reebok Hedquarters development in Canton, Massachusetts.

In Massachusetts, it is required that on-site infiltration measures be used to handle stormwater where suitable soils exist. A comprehensive site plan for Reebok, identified the need for source control of potential contaminants, as well as the implementation of structural and non-structural treatment methods. Proper maintenance regimes have been established to protect surface water, drinking water supplies, ground water, and wetlands. Stormwater Best Management Practices (BMPs) are used to maintain water quality and infiltration rates during construction and post- development. The overall development is being carried out in phases. Each phase is constructed in conformance with an approved stormwater program, which complies with Massachusetts' 'zero-net runoff' regulation for new developments.(Massachusetts' zero-net runoff regulation requires post-development volume of water discharged

PROJECT

Development Type
OFFICE PARK

Storm water System
6 MANAGEMENT AREAS

System Length
1143 METERS

per year, peak flow and amount recharged replicate pre-development conditions.) The Reebok Project is a combination of six separate stormwater management areas. Two areas collect roof runoff in the chambers and recharge it directly into the ground. Three other chamber systems clean and infiltrate parking lot surface water. The final stormwater management area recharges water runoff from a grassy slope. The soils, water table elevation, and surface drainage patterns were reviewed before selecting the Infiltrator system to handle roof runoff and parking lot water recharge.

High Capacity Infiltration Chambers are made up of chamber units capable of providing 16.3 cubic feet (122 gallons) of stormwater storage. The trench for these chambers does not require stone backfill and can be used for either retention and detention applications. The runoff may recharge into the ground, or be routed to an outfall, depending on the particular design goals and site conditions. Figure 3-1 and 3-2 show the details of High Capacity Infiltration Chambers.

III. Site Condition

The Reebok site is located in an environmentally sensitive, natural resource zone that includes Fowl Meadow, Ponkapoag Bog Area of Critical Environmental Concern (ACEC), and the Zone II Aquifer Protection District for five wells within the Dedham/ Westwood Water District jurisdiction. This overall zone has been designated a National Environmental Study Area by the National Park Service. The objectives of the stormwater management program are: (1) to protect the regional water resources around the site; and (2) to maximize the amount of stormwater runoff that could be infiltrated on this site. Prior to development, the Reebok site was open field with some cultivated lawn, and the soils were considered appropriate for an infiltration stormwater system.

IV. Evaluation

Figure 3-1 - The High Capacity Chamber units are 34" wide, 75" long, and 16" tall and designed to fit into a three-foot wide trench as a direct replacement for stone and pipe.(See figure 2) The system can be installed by just two people, one on a backhoe and the other installing the polytuff (TM) units.

To date, the Reebok stormwater system has successfully achieved 'zero net run-off,' and complies with the Massachusetts Stormwater Performance Standards and Guidelines issued by the Department of Environmental Protection in March of 1997. A post-construction monitoring program will verify impacts to the Fowl Meadow ACEC and adjacent resources. The constructed detention/water quality basins and recharge systems are expected to minimize runoff to the existing discharge locations. Natural drainage patterns were retained in the design and protected during construction, and remain as natural stormwater management strategies on the site. These controls, as well as hooded catch basins, a parking lot and catch basin cleaning program, and the minimization of sanding and salting practices, will provide for long-term protection of the areas natural resources.

COST

The total system cost for the Reebok project was $65,000 US dollars; a breakdown of the system costs (cost per acre, hectare, meter and linear foot) is provided in Table 3-1.

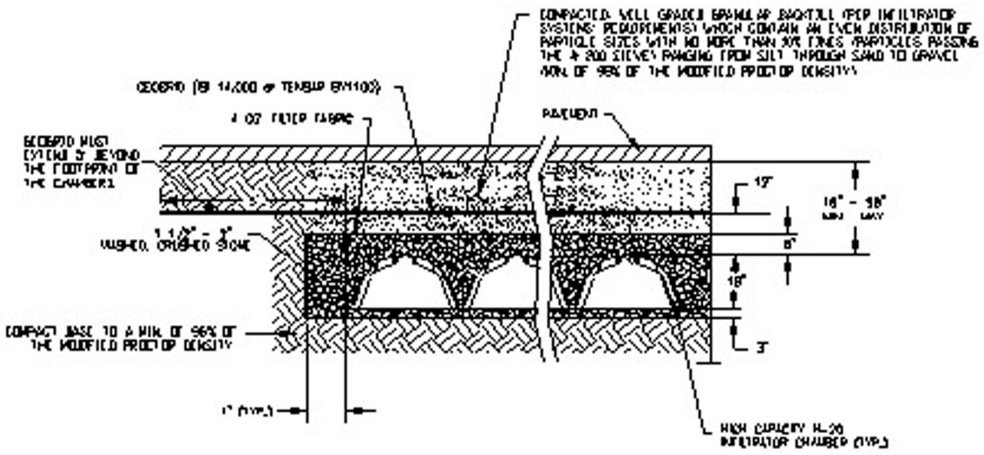

Figure 3-2 - Typical Cross Section

MAINTENANCE

Long-term maintenance figures are not yet available. A catch basin cleaning program requires a vacuum truck to clean each basin 4 times a year (end of spring, summer and twice in the fall) with an estimated cost of $80 per catch basin (estimate based on gallon capacity).

V. Summary

This system provides an effective, easy to install (as shown in Figure 3-1), and economically feasible choice for infiltrating stormwater on site. Runoff may recharge into the ground, or may be routed to an outfall, depending on the particular design goals and site conditions. The High Capacity Infiltrator Chamber provides 16.3 cubic feet (122 gallons) of stormwater storage exclusive of stone backfill and is equally effective for retention and detention applications.

Table 3-1 - System Costs

Project Description	Reebok
DEVELOPMENT	
Location	Massachassetts
Development Type	office park
No. of Units	n/a
Developer	VHB Inc
Size	41.4 Acres
Date of Construction	1998
ROAD	
Street Pattern	n/a
Typical ROW width	n/a
UTILITIES	
Pattern	n/a
STORMWATER	
Type of System Constructed	infiltration/ **exfiltration**/ storage
Area serviced	41.4 Acres
Level of SWM	0-net runoff
Large Storm situation	n/a
System Length	1,143 m
Culverts	n/a
Site Condition	
BIOPHYSICAL	
Settlement Patterns	wetlands
Post Development Conditions	office park
HYDROLOGICAL	
Average Rain Event	n/a
GEOTECHNICAL	
Soils Profile - surface	n/a
sub soils	n/a
Site Grades	undulating
Water Table Elevation	high
Soil Infiltration Capacity	n/a
HABITAT	
Urban Forest Coverages	n/a
Evaluation	
PROJECT COSTS	1998
Stormwater Installation Costs	$65,000
cost per ha	$3,881
cost per acre	$1,570
cost per linear metre	$57
cost per linear foot	$17
MAINTENANCE COSTS	
Yearly Expenses	($80x4)per catchbasin
SWS Expected Lifespan	indefinite

* approximate unit price for High Capacity Chamber Unit (H20., This is a high capacity model with storage up to 122 gal and offers a high load bearing rate. Other products are available to suit design specifications and intentions.

Stormwater Installation Cost

Cost per meter: $56.87 US

Resources

American Public Works Association. 1981. Urban Stormwater Management, Special Report No. 49.

Internet articles, 2000. http://www. infiltratorsystems.com

1. Project Profile: Reebok Corporate Headquarters Site Incorporates Advanced Stormwater and Drainage Management to Protect Sensitive Environment
2. High Capacity Infiltrator Chamber System Specification Sheet

Iosca, Robert. 1994. "Developing Successful Runoff Control Programs for Urbanized Areas." Nonpoint Source Control Branch. Office of Water, US Environmental Protection Agency. Washington DC.

Lemire, Rob. Stormtech. 2000 Telephone and other correspondence. Phone 888-892-2694

Murray, James. 1989. "Nonpoint Pollution: First Step in Control" Design of Urban Runoff Quality Controls, Roesner et.al, eds. American Society of Civil Engineers. pp. 378.

Schueler. 1987. *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs*. Washington Metropolitan Water Resources Planning Board.

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Internet Articles

http://www.epa.gov/owm/sw/links/index.htm#assist Stormwater links

http://www2.ncsu.edu/ncsu/wrri/reports/storm.html WRRI technical reports related to stormwater

http://www.epa.gov/owm/sw/phase2/ Phase II of the NPDES Storm Water

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