

CITY OF MADISON
ENGINEERING DIVISION

MONONA TERRACE CONVENTION CENTER STORM WATER MANAGEMENT PLAN

ONE JOHN NOLEN DRIVE

November 30, 1994

Background.

On November 16, 1993, the Common Council of the City of Madison adopted Substitute Resolution 50,515 "declaring that the construction of the Monona Terrace Community and Convention Center will have no significant adverse environmental impact on Lake Monona". The resolution required that thirteen mitigation measures be undertaken as a part of the design, construction and maintenance of the project among which was:

- "1. The plans and specifications for the Convention Center Project and the Project's Maintenance Plan shall be developed with the following stormwater management goals for the completed project:
 - a) Reduce the sediment and metals in the stormwater runoff to 20% of the estimated present load; and,
 - b) Reduce oil and petroleum in the stormwater runoff to 20% of the estimated present load; and,
 - c) Reduce phosphorous in the stormwater runoff to 50% of estimated present load.
 - d) Due to the unique nature of these goals, staff shall investigate the eligibility of grants for installation and monitoring of these facilities."
- "6. The Convention Center Project shall conform to Chapter 37, Madison General Ordinances, regarding erosion and runoff control."

On November 1, 1994, Chapter NR216 of the Wisconsin Administration Code went into effect. This code provides that the Wisconsin Department of Natural Resources (WDNR) has certain responsibilities for storm water management and erosion control on sites greater than 5 acres. (The Monona Terrace Convention Center site is approximately 11 acres.) An erosion control plan has been prepared and a "Notice of Intent" has been submitted to the WDNR by the Construction Manager, on behalf of the city and the State of Wisconsin, in accordance with NR216. NR216 also requires that the owners prepare a Storm Water Management Plan for the site for implementation after construction has been concluded and in compliance with that regulation, this plan has been prepared.

Best Management Practices Considered.

Two best management practices were initially reviewed:

- the construction of two wet detention ponds east and west of the Convention Center building within the parking lot area; and,
- the use of mechanical street sweepers to clean the parking areas and John Nolen Drive.

A review of the frequencies of cleaning the parking areas and John Nolen Drive, indicated that there was a significant decrease in the amount of residue removed for a frequency of cleaning at intervals less than weekly.

The two detention ponds were proposed to be excavated at the site with a permanent pond below the level of Lake Monona. These ponds, although they were relatively small, would trap sediment which would have to be removed periodically. These ponds had the added advantage of complying with the city's runoff control regulations, which addresses the quantity of runoff - not the quality of that runoff. Given the site is on the shoreline of Lake Monona, the reduction of the peak rate of runoff is not a factor of concern. Rather the emphasis is the quality of runoff from the site.

The SLAMM computer model was employed to estimate the amount of annual sediment that could be removed from storm water to pursue the goals established by Council Resolution 50,515. Using various combinations of street sweeping and storm sewer wet ponds that would retain the first 0.5 inches of storm water, a reduction of nearly 73% percent of the amount of sediment could be achieved from the amount of sediment that would drain to Lake Monona without the management practices (15,800 lbs/yr to 6,500 lbs/yr). While that is a substantial decrease, it is nevertheless short of the goal of reducing the sediment load to the lake to that which is 20% of the estimated 4,600 lbs/yr of present conditions at Law Park plus an improved John Nolen Drive.

At a review meeting with the WDNR it was determined that the excavation of wet ponds was not compatible with the goal of minimizing the impact of the construction on the existing filled area at Law Park and reducing the percolation of surface water through the fill and that the Department could not support the concept.

Very recently, new storm water management practices to reduce the flow of sediments to the receiving waters have been and are currently being developed. The following patented devices were investigated for applicability at the Monona Terrace Convention Center site:

- Trapping sediment, oil, and debris in the storm sewer inlets within the parking structure. A product, called "Gully Washers", is an inlet insert (see attached picture) which collects both suspended solids, by being constructed of a #40 sieve equivalent opening plastic coated wire mesh, and absorb up to a maximum of 60% of all petroleum products passing through the absorbent sock which is incorporated into the inlet insert. These inlets shall require maintenance every 6-8 weeks. This will include removal of trapped sediments and periodic replacement of the absorbent sock. The cost of this product is approximately \$450 per unit, and 56 units would

be installed in the parking facility of the site. The cost of replacement of the absorbent sock is approximately \$30 each.

- Installation of two sediment traps on the storm sewer drainage system at the east and west side of the site. Patented devices called "Vortechincs Grease and Grit Traps" would replace the storm water detention ponds. The vortechincs boxes remove oil and suspended solids from the storm water flow by the use of a swirl concentrator and flow regulating devices. The traps must be periodically cleaned to remove the sediment. Each "Vortechincs Grease and Grit Trap" is estimated to cost \$20,000.

It is emphasized that these devices are experimental with minimal documentation on their sediment removal efficiency. However, storm water management practices that are applicable to developed urban areas are very limited and experimentation is required if we are to advance in this area.

Recommended Storm Water Management Plan.

The Storm Water Management Plan for the Monona Terrace Convention Center Site shall be:

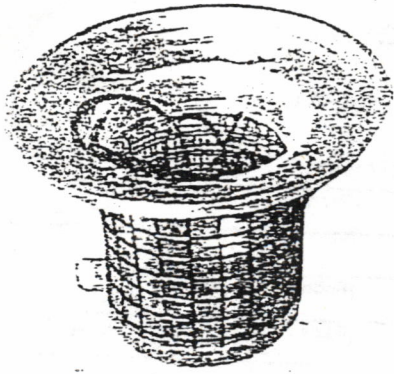
- John Nolen Drive, the parking ramps auto storage areas and drives, and the surface parking areas shall be mechanically swept once per week, during the spring, summer, and fall.
- Storm water inlets within the parking structure shall be fitted with inserts to retain sediment and petroleum products. The inserts shall be maintained monthly and the amount of debris removed and the cost of maintenance shall be documented for 2 years following occupancy of the ramp in order to determine the inserts effectiveness and applicability to other sites.
- Stormwater sediment traps (Vortechincs) shall be installed on two storm sewer mains within the site. The traps shall be maintained monthly during the spring, summer, and fall by the Engineering Division and the amount of debris removed and the cost of maintenance shall be documented for 2 years following construction in order to determine the effectiveness and applicability to other sites.

Prepared by: _____
Greg Fries

Approved by: _____
Larry D. Nelson, P.E.
City Engineer

cc. Fred Wegener, WDOA
George Austin, Director of Planning and Development

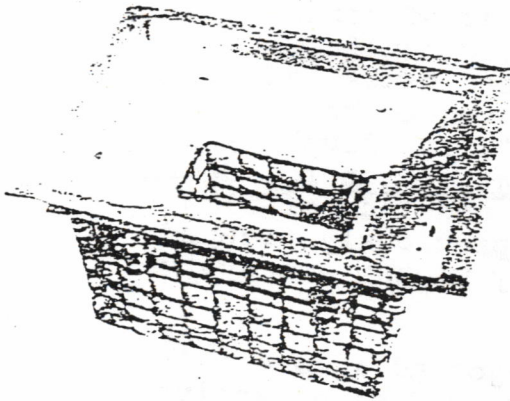
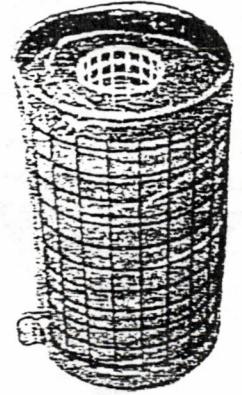
Attachments: (1) "Gullywasher Technical Literature
(2) Vortechincs Technical Literature
(3) Drawings 218 and 219, Monona Terrace Convention Center Site



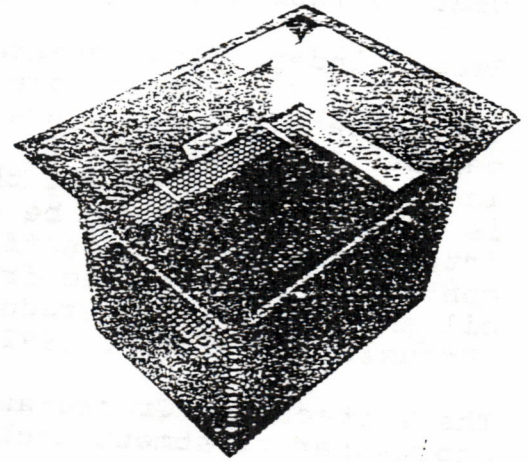
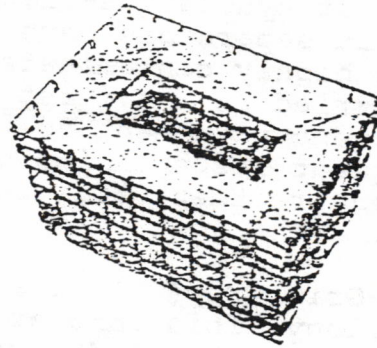
25" Gullywashette - 30 mesh stainless steel wire cloth between 2x2 and 1x1 wire sides. Removable aluminum support frame, fixed aluminum bottom pan, brass handle. Part # 12001



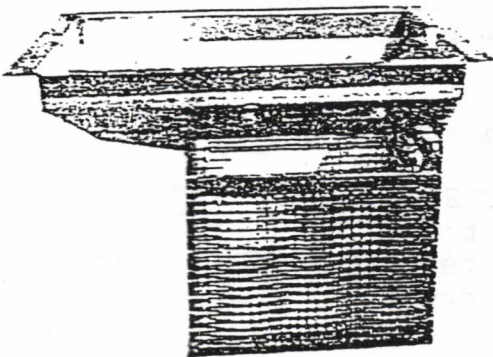
25" Gullywashette - 2x2 wire sides, wire spacer for absorbent sock, removable aluminum support frame, fixed aluminum bottom pan, brass handle. Part # 12003



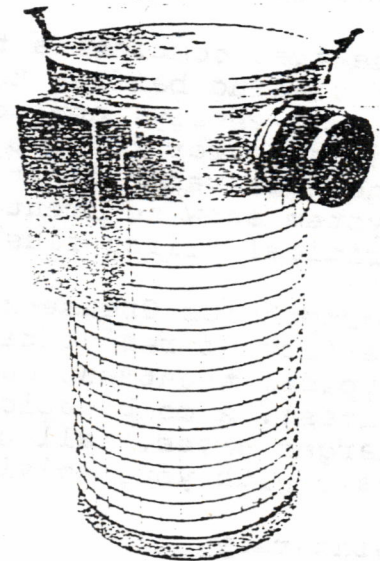
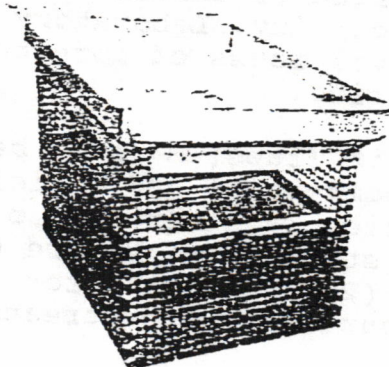
18"x24" Gullywasher - 2x2 wire basket, wire spacer for absorbent sock, removable stainless steel support frame, solid plastic bottom. Part # 10003



18"x24" Gullywasher - 1/2x1/2 wire basket, built in relief, 30 mesh stainless steel wire cloth liner. Part # 10001



18"x24" Gullywasher to fit around 90 degree downturn (left). Part # 10004. 18"x24" Gullywasher to fit curb and gutter style inlet (middle). Part # 10005



24"x44" StormLOKTY - fits inside 48"x48"x48" type I catch basin. Features 90 downturn, outlet connection for flex pipe, removable top, removable wire spacer for absorbent sock with adjustable inner tray for specialty media pack. Part # 12004

TO HUS

FRITZ : FTI

RE : MONONA TERRACE

Dsp

829-127

STORMWATER QUALITY

DAVE KAUL

3-15-94

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To	DOUG STIBSON	From	DON PAULSON
Co.	GCS	Co.	A&O INC
Dept.	STORM SEWER	Phone #	271-9651
Fax #	829-1272	Fax #	271-7284

For Your INFORMATION

RE: A SOLUTION TO URBAN AND INDUSTRIAL SURFACE RUNOFF PROBLEMS

Dear Pollution Engineering Reader

Recent independent research indicates that a number of urban landscape "hot spots" are responsible for producing runoff with significantly higher levels of hydrocarbon-laden sediments and trace metals. Conventional oil grit separators have proved to be ineffective in treating the highly contaminated "first flush" which is widely believed to be carried in the first inch of runoff. Poor internal geometry, insufficient treatment volume and lack of flow controls contribute to frequent resuspension of previously trapped oil and sediment and reduced treatment efficiency with these systems (Schueler and Shepp, 1992).

The Vortechtechnics Grease-and-Grit Trap(TM) is a major advancement in stormwater treatment technology. This innovative product effectively removes and retains sand, hydrocarbon-laden sediment, toxic metals, petroleum-based liquids and other floating pollutants from stormwater runoff. The patented process keeps the captured oil and sediment in the trap by abating forces which encourage resuspension of the contaminated material.

The trap combines a tangential inlet swirl-concentrator with flow regulating baffles to provide high levels of treatment without moving parts, energy input or costly maintenance. Each trap is specifically designed for the project site to ensure optimum performance during the full range of storm activity. Laboratory bench scale tests of the system show sediment removal rates of more than 90% during the critical "first flush" period.

Vortechtechnics Grease-and-Grit Traps(TM) have been designed for a variety of residential, commercial and municipal applications - typical treatment capacities range from 3 to 18 CFS (2 to 10 acre sites). A combination of standard sizes are used to accommodate the larger sites. Call us on (207) 761-1577 for free technical advice and help with your solving your stormwater treatment needs.

Sincerely,

Francis Tighe

Francis Tighe
Technical Sales Manager

Variable Rate
Variable Level

Grease-and-Grit Trap™

A Single-Tank Grit and Oil Management System (GaG Trap™)
That Won't Wash Out - Even In the Heaviest Storms.

EQUIPMENT & LAYOUT

Grit Chamber

The swirling motion created by the tangential inlet directs settleable solids toward the center. In correctly-sized units the sediment mound that accumulates is stable, even under peak flow surges.

Oil Chamber

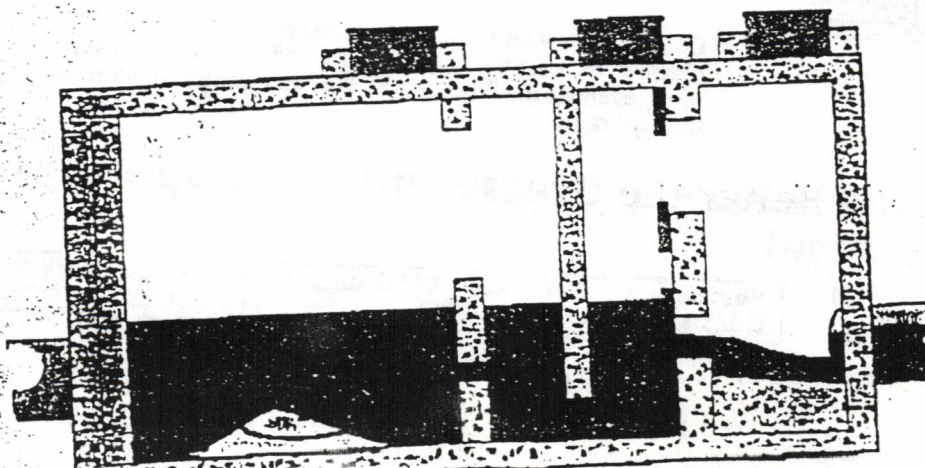
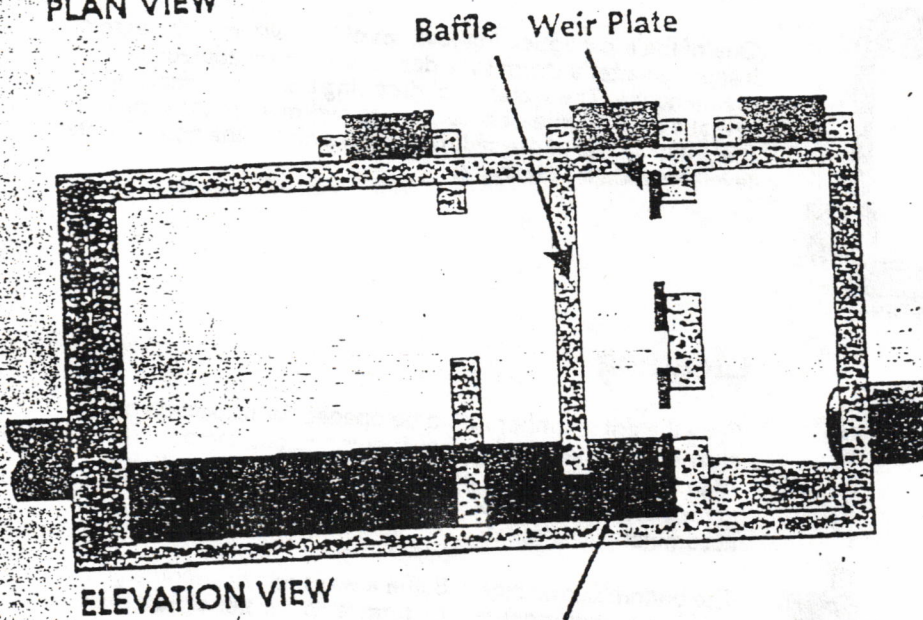
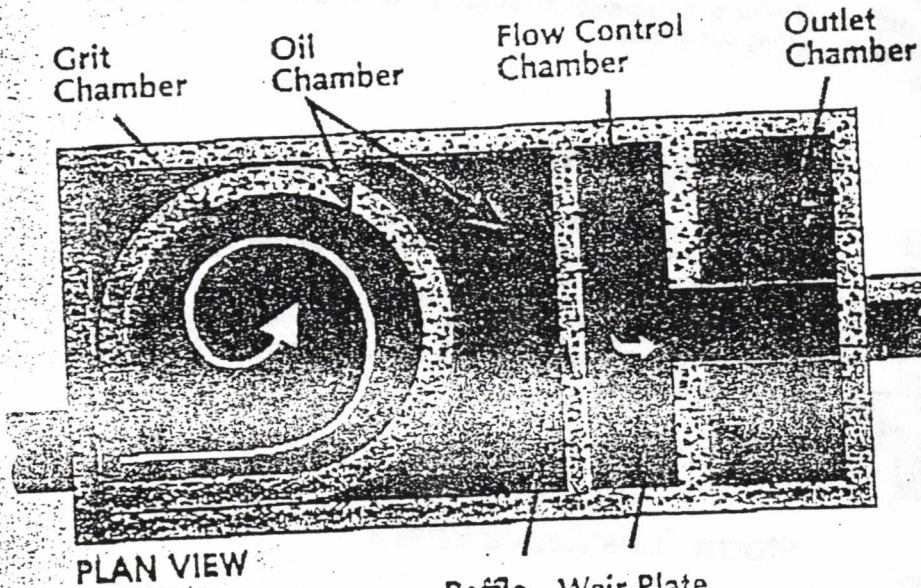
The center baffle traps floatables in the oil chamber. Unlike conventional oil traps that lack flow controls and extra tank capacity, this design is highly resistant to flow surges.

Flow Control Chamber

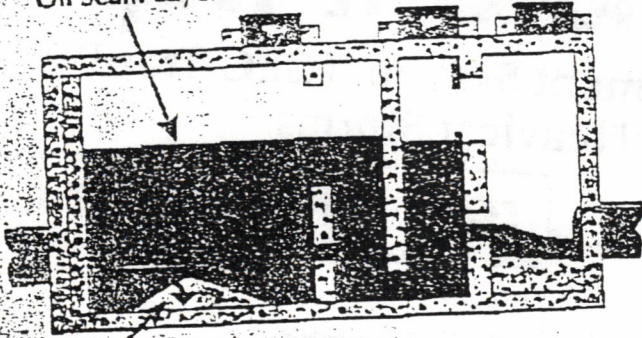
The low-level, low-flow outlet is sized for a routine (2-month storm) runoff rate. Heavier rains will cause trapped oils to begin floating up, away from any high-velocity flows through the tank.

We refer to this stage as the **INITIAL WET WEATHER PHASE**, which is shown in the bottom illustration. Subsequent phases are shown on the back page.

For many storms the Initial Wet Weather Phase will be the only stage of operation. Treatment effectiveness is very high.



Oil Scum Layer



Sediment

Transition Phase

As the inflow rate increases above the controlled outflow rate, the tank fills and the oily scum layer accumulated from past storms floats up. When the inlet is submerged the scum layer is well above it, where it cannot be "turbulated" by high-velocity inflows.

On-line or Off-line detention basins can be designed to fill during this phase.

Full Capacity Phase

Full-capacity operation begins when the high-level high-flow outlet begins to discharge. Design capacity for each facility should match a predetermined storm (a "5-year storm," for example). Although treatment efficiencies will drop off somewhat during this phase, the critical first-flush particulates, sediments and floatables have already been captured, and will remain undisturbed.

Storm Subsidence Phase

One of the most appealing features of this system is the ease of inspection after a storm subsides, or during scheduled maintenance. The water level dropping back to normal will reveal a conical pile of accumulated sediment in the center of the grit chamber. If the sediment shows above the normal water level- it's time for cleaning.

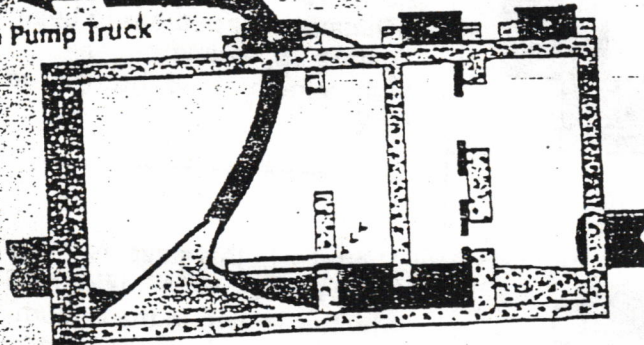
Cleaning

Only the grit chamber has to be opened for inspection or cleaning. As the grit chamber is pumped out, the oil chamber automatically drains back into it, so that oil scum, particulates and floatables are removed along with the accumulated sediment.


The bottom of the central baffle always remains submerged, forming a permanent seal that prevents transfer of floatables to the outlet during cleaning, or during the next storm.

Compare this with the conventional oil/grit trap which, when cleaned, exposes the bottom of the baffle so that the messy residue left on the floor will be flushed through with the onset of the next rain.

To Pump Truck



The Harder it Rains, the Better the Grease-and-Grit Trap Works -
To Protect the Environment

 VortechTM

VortechTM Suite 420 477 Congress St. Portland ME 04101
Hdqtrs/Sales: (207)761-1577 Tech Support: (207)774-2228

Manufactured locally by:

GREASE-AND-GRIT TRAP™



Swirl Concentrator (sediment extraction)

Oil/Floatables Baffle

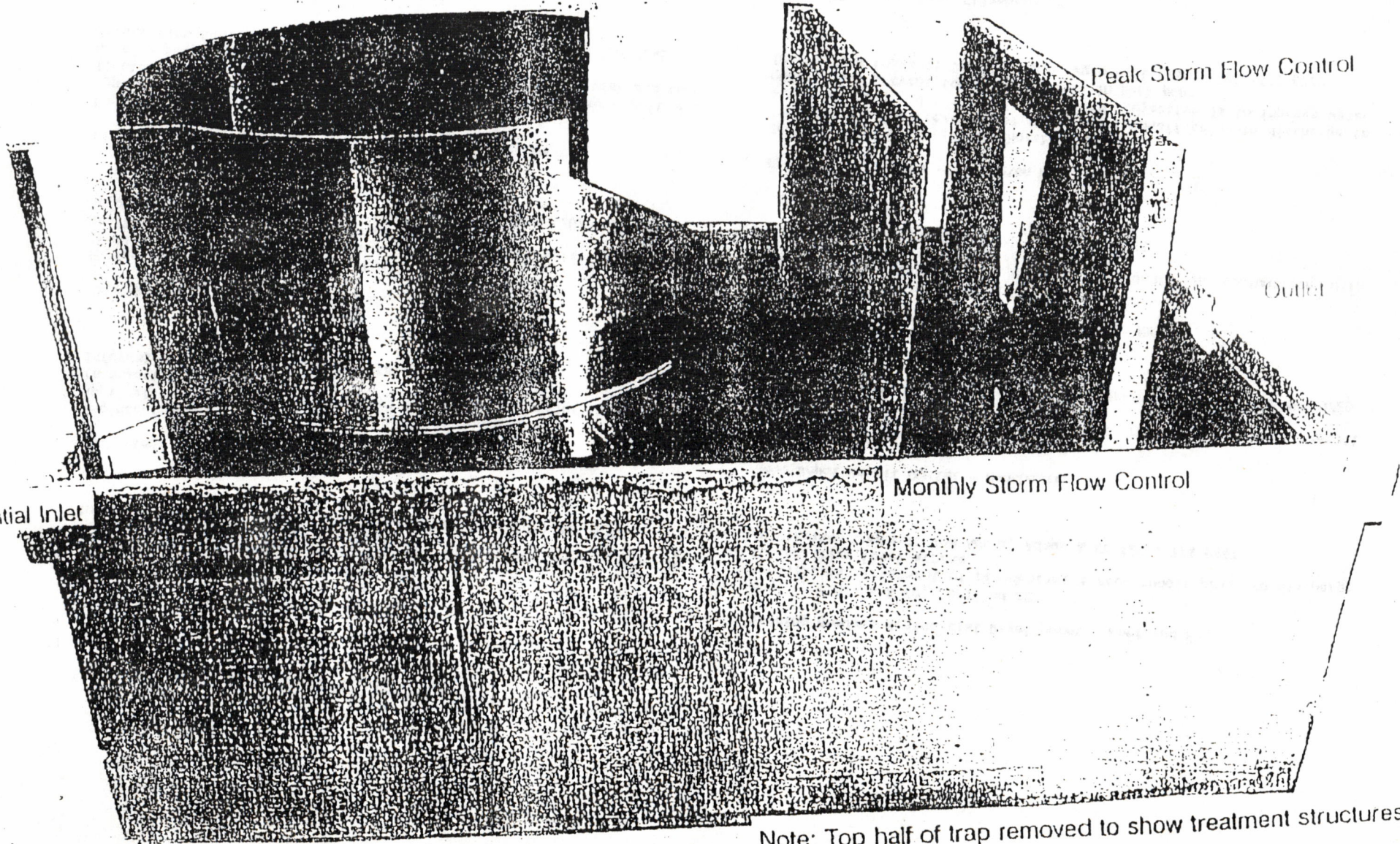
Peak Storm Flow Control

Outlet

Monthly Storm Flow Control

ingential Inlet

Note: Top half of trap removed to show treatment structures



EXAMPLES OF GREASE-AND-GRIT TRAPTM APPLICATIONS

L.L. Bean Office Facility - Freeport ME

Engineer: Sebago Technics, Westbrook ME
Application: Pre-treatment of parking lot runoff prior to discharge to "polishing pond" (detention structure)
Information Contact: Shawn Frank, Sebago Technics (207) 856 0277

Cumberland County Jail - Portland ME

Engineer: Stevens, Morton, Rose & Thompson, Portland ME
Application: Treatment of parking lot and site runoff prior to discharge to adjacent wetland
Information Contact: Dana Morton, SMRT (207) 772 3846

Cole Haan Office Facility - Yarmouth ME

Engineer: Land Use Consultants, Portland ME
Application: Site runoff treatment to improve both water quality and aesthetics prior to discharge to wet pond
Information Contact: Rick Licht, Land Use Consultants (207) 772 8392

Lincoln Street Combined Sewer Overflow - South Portland ME

Engineer: City of South Portland Engineering Department
Application: Pre-treatment of municipal stormwater to remove grit and floatables (primary objective is removal of grit to reduce wear and tear on city pump station)
Information Contact: Dave Pineo, Chief City Engineer (207) 767 7645

US Post Office Distribution Depot - Hampden ME

Engineer: Harriman Associates, Auburn ME
Application: Treatment of parking lot runoff (heavy and frequent vehicle usage)
Information Contact: Frank Crabtree, Harriman Associates (207) 784 5100

Deering Meadows Residential Development - Portland ME

Engineer: Adams & Co, Portland ME
Application: Treatment of residential street runoff prior to discharge to sensitive local stream
Information Contact: Tom Adams, Adams & Co (207) 774 0447

Home Depot Retail Outlet - Manchester NH

Engineer: Klball Chase, Portsmouth NH
Application: Treatment of parking lot runoff from large retail development
Information Contact: Mark Gross, MHF Design Consultants (603) 893 0720

Manchester Run Shopping Center - Manchester NH

Engineer: T F Moran, Bedford NH
Application: Treatment of parking lot runoff in conjunction with stormwater infiltration system
Information Contact: T F Moran (603) 472 4488

Menotomy Rocks Park - Arlington MA

Engineer: Fugro-McClelland, Northborough MA
Application: Pre-treatment of residential runoff prior to discharge to detention pond and ultimately park pond. Objective is to improve water quality and prevent sediment build-up in park pond.
Information Contact: David Hyman, Fugro-McClelland (408) 393 6779

Inn by the Sea - Cape Elizabeth ME

Landscape Architect: Mohr & Seredin, Portland ME
Application: Treatment of restaurant parking lot runoff to protect a sensitive salt marsh adjacent to site
Information Contact: Steve Mohr, Mohr & Seredin (207) 871 0003