3.4 Post Construction Stormwater Control Fact Sheets (PTP)

Post Construction Stormwater Control Practices	PTP-09 Oil and Grease/Water Separator

Symbol

O/W

TSS Reduction: 40%

Description

REASONS FOR LIMITED USE

- Cannot alone achieve the 80% TSS removal target
- Intended for hotspot, space-limited or pretreatment applications
- Limited performance data

KEY CONSIDERATIONS

- Intended for the removal of settleable solids (grit and sediment) and floatable matter, including oil and grease
- Dissolved pollutants are not effectively removed
- Frequent maintenance required
- Performance dependent on design and frequency of inspection and cleanout of unit.
- Must have adequate capacity to accommodate spills

Applications

Gravity separators (also known as oil/water separators) are hydrodynamic separation devices that are designed to remove grit and heavy sediments, oil and grease, debris and floatable matter from stormwater runoff through gravitational settling and trapping. Gravity separator units contain a permanent pool of water and typically consist of an inlet chamber, separation/storage chamber, a bypass chamber, and an access port for maintenance purposes. Runoff enters the inlet chamber where heavy sediments and solids drop out.

Applications

The flow moves into the main gravity separation chamber, where further settling of suspended solids takes place. Oil and grease are skimmed and stored in a waste oil storage compartment for future removal. After moving into the outlet chamber, the clarified runoff is then discharged. The performance of these systems is based primarily on the relatively low solubility of petroleum products in water and the difference between the Gravity separators are *not* designed to separate other products such as solvents, detergents, or dissolved pollutants. The typical gravity separator unit may be enhanced with a pretreatment swirl concentrator chamber, oil draw-off devices that continuously remove the accumulated light liquids, and flow control valves regulating the flow rate into the unit.

Gravity separators are best used in commercial, industrial and transportation land uses and are intended primarily as a pretreatment measure for high-density or ultra urban sites, or for use in hydrocarbon hotspots, such as gas stations and areas with high vehicular traffic. However, gravity separators cannot be used for the removal of dissolved or emulsified oils and pollutants such as coolants, soluble lubricants, glycols and alcohols. Since resuspension of accumulated sediments is possible during heavy storm events, gravity separator units should be installed off-line. Gravity separators are available as prefabricated proprietary systems from a number of different commercial vendors.

Design

Section 2.7 outlines the criteria and approval process for proprietary or manufactured BMPs within the City limits. Where the water quality unit is not rated for full treatment (80% TSS reduction), additional permanent treatment practices are required. Water quality units are not typically designed for stormwater quantity control as well, so a detention structure such as a detention pond will be required.

For water quality units designed based upon a flow rate, the following equation must be used to simulate treatment of the WQv:

$$Qp = C * I * A$$

Where:
Qp = the peak flow through the proprietary BMP in cfs
C = runoff coefficient
I = rainfall intensity, 2.45 in/hr
A = the contributing drainage area for the BMP, in acres

The use of gravity (oil/water) separators should be limited to the following applications:

- Pretreatment for other structural stormwater controls
- High-density, ultra urban or other space-limited development sites
- Hotspot landuse areas where the control of grit, floatables, and/or oil and grease are required

Gravity separators are typically used for areas less than 5 acres. It is recommended that the contributing area to any individual gravity separator be limited to 1 acre or less of impervious cover.

Design

Gravity separator systems can be installed in almost any soil or terrain. Since these devices are underground, appearance is not an issue and public safety risks are low.

Gravity separators are rate-based devices. This contrasts with most other stormwater structural controls, which are sized based on capturing and treating a specific water quality volume.

Gravity separator units are typically designed to bypass runoff flows in excess of the design flow rate. Some designs have built-in high flow bypass mechanisms. Other designs require a diversion structure or flow splitter ahead of the device in the drainage system. An adequate outfall must be provided.

The separation chamber should provide for three separate storage volumes:

1. A volume for separated oil storage at the top of the chamber
2. A volume for settleable solids accumulation at the bottom of the chamber
3. A volume required to give adequate flow-through detention time for separation of oil and sediment from the stormwater flow

- The total wet storage of the gravity separator unit should be at least 400 cubic feet per contributing impervious acre.
- Horizontal velocity through the separation chamber should be 1 to 3 $^{ft}/_{min}$ or less. No velocities in the device should exceed the entrance velocity.
- The minimum depth of the permanent pools should be 4 feet.
- A trash rack should be included in the design to capture floating debris, preferably near the inlet chamber to prevent debris from becoming oil impregnated.
- Ideally, a gravity separator design will provide an oil draw-off mechanism to a separate chamber or storage area.
- Adequate maintenance access to each chamber must be provided for inspection and cleanout of a gravity separator unit.
- Gravity separator units should be watertight to prevent possible groundwater contamination.
- The design criteria and specifications of a proprietary gravity separator unit should be obtained from the manufacturer.

Maintenance

A maintenance and operation plan must be provided for each water quality unit. This information can be provided by the manufacturer and must address the following items:

- Expected clean out frequency
- Unit life expectancy
- Procedures addressing dewatering of the unit, should it get clogged
- A cross sectional view of the unit with all overflow structures, weirs, pipe connections clearly identified
- The bypassing mechanism and any maintenance requirements for that component

Additional maintenance requirements for a proprietary system should be obtained from the manufacturer.

Failure to provide adequate inspection and maintenance can result in the resuspension of accumulated solids. Frequency of inspection and maintenance is dependent on land use, climatological conditions, and the design of gravity separator.

Proper disposal of oil, solids and floatables removed from the gravity separator must be ensured.