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Trash Full Capture Device Operation and Maintenance Verification Program

Template & Guidance

Prepared by:

<Permittee Name, Logo and Address>

<If desired, add images and other formatting to make specific to your municipality>

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APPENDIX E - INSPECTION AND CLEANING ACTIVITIES FIELD FORMS

Please Note: This document and associated guidance was prepared to assist North Bay Phase II Permittees (permittees) subject to requirements in the trash amendments of the statewide general permit (Phase II MS4 Permit) pursuant to section 402(p) of the Federal Clean Water Act. It is intended to provide Permittees with a format for documenting their Trash Full Capture Device Operation and Maintenance Program. The use of this document and associated guidance are done so at the discretion of each Permittee.

INTRODUCTION

The amendments to the Statewide Inland Surface Waters and Ocean Water Quality Control Plans and the Statewide General Permit for stormwater discharges from small municipalities contain requirements to reduce trash from municipal separate storm sewer systems (MS4s). The City/Town/County of ***[insert municipality name]*** can comply with the requirements by either installing, operating and maintaining trash full capture systems; or implementing equivalent trash controls. A trash full-capture system is a single device or series of devices that can trap all particles retained by a 5mm mesh screen, and has a treatment capacity that exceeds the peak flow rate resulting from a one-year, one-hour storm in the sub-drainage area or designed to carry at least the same flow as the storm drain connected to the inlet. Systems certified by the State Water Resources Control Board (State Water Board) are deemed trash full capture systems.

Adequate inspection and maintenance of trash full capture devices is required to maintain the full capture designation. The Trash Full Capture Device Operation and Maintenance (O&M) Verification Program described in this document ensures that devices are operated at a level necessary to maintain their full capture designation. It includes standard operating procedures (SOPs) for inspection and cleaning and an O&M Verification Program Plan that documents maintenance responsibilities and frequencies. This Program serves as documentation and provides the rationale for O&M activities, including the inspection and cleaning of trash full capture systems installed to meet trash reduction goals.

O&M Verification Program Components

A trash full capture device O&M Verification Program begins with maintaining an inventory of installed full capture devices. The inventory should, at a minimum, include the device manufacturer, device type and location where it is installed. Some basic design parameters of the device may also be helpful for inspections and determining if cleaning or maintenance is required. Routine cleanings are scheduled at a frequency to maintain the full capture designation. Inspections are scheduled at a frequency to verify if additional cleaning or maintenance is required. Documentation of inspection and maintenance activities, including cleanings, demonstrates that the O&M Verification Program is active. It also provides support for any program revisions (e.g., changes in inspection frequency).

Trash Full-Capture Devices

Trash full capture devices are divided into two types: small full capture devices and large full capture devices. Small full capture devices include screens installed inside a storm drain inlet, in front of the entrance to a connector pipe (outlet), or filter inserts. Large full capture devices include large underground vault-based devices installed in-line with storm drain pipelines or screens/netting installed end-of-pipe or within pump stations. Small full capture devices have lower initial capital costs but require more maintenance than large full capture devices.

The following types and number of full capture devices are installed within our jurisdiction. This includes devices planned for installation within the next year.

Table 1. Trash Full Capture Devices

Small Full Capture Devices		
Manufacturer	**Device Type**	**# Installed**
West Coast Storm, Inc.	Connector Pipe Screen	
United Stormwater, Inc.	Connector Pipe Screen	
Oldstar Stormwater Solutions (formerly Kristar Enterprises, Inc.)	Flo Gard Plus CB Filter Insert	
Bio Clean Environmental Services, Inc.	Trash Guard	
Stormtek	Stormtek ST3	
Add others here		
Large Full-Capture Devices		
Manufacturer	**Device Type**	**# Installed**
Contech Engineered Solutions	Continuous Deflective Separator (CDS)	
Roscoe Moss Company	Storm Flo Screen (GSRD)	
Fresh Creek Technologies	End-of-Pipe Netting Trash Trap	
Add others here		

A complete list of the trash full capture devices and their locations are included in **Appendix A**. The list will serve as the ***[insert municipality name]*** inventory of full capture devices that will be routinely inspected and cleaned. This list will also be reviewed and updated at least once a year, as appropriate to reflect the current inventory of full capture devices.

A trash full capture device map is included in **Appendix B**. Device location may play a large role in scheduling maintenance activities, for example:

- Timing (e.g., dense commercial areas may need to be maintained before business hours)
- Grouping (e.g., devices may have different maintenance frequencies, however, it may be more efficient to have them all on the same frequency)
- Site conditions (e.g., devices located in high leaf drop areas may need additional maintenance)

Guidance: Delete Guidance after completing this Section.
Complete the table in this section by deleting the rows that are not applicable and providing the number of devices installed. Include a list of full capture treatment devices with locations in Appendix A. Update list and replace as needed.

Include a copy of your most recent Trash Full Capture Device Map in Appendix B. Update map and replace as needed.

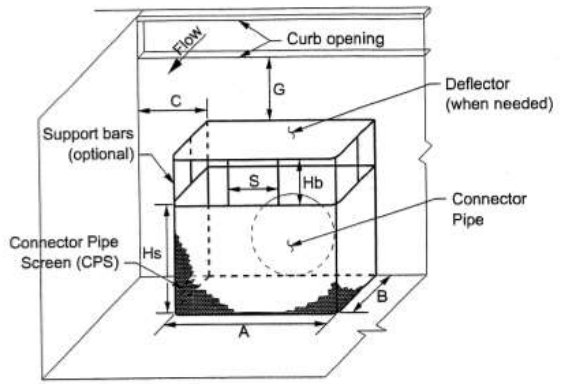
Small Trash Full Capture Devices

Guidance: Delete Guidance after completing this Section.
Delete all or any part of this section that does not apply to device types installed within your jurisdiction.

Connector Pipe Screens

The majority of the small full capture devices (small devices) certified to-date are some type of connector pipe screen (CPS). The CPS is a stainless-steel or plastic screen assembly installed inside a storm drain inlet, in front of the entrance to a connector pipe (outlet), to prevent debris and trash from entering the pipe. Debris and trash is stored within the storm drain inlet until removed by municipal staff. An overflow is provided near the top of the CPS to allow stormwater to bypass if the storm drain inlet is filled with debris and/or trash or if it is plugged or blinded.

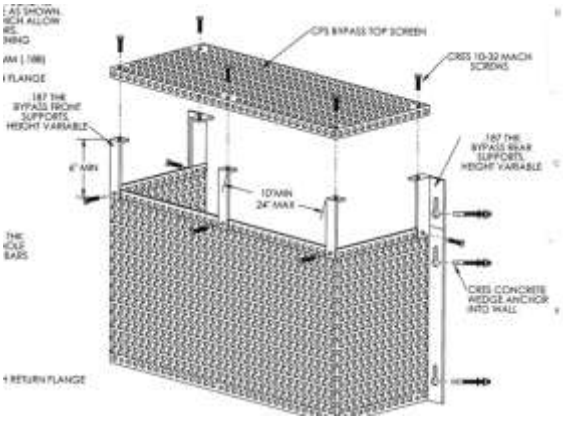
Connector pipe screens are manufactured by several different vendors, each with their own design. Examples of the devices installed in ***[insert municipality name]*** are below.



Connector Pipe Screen (United Stormwater, Inc.)

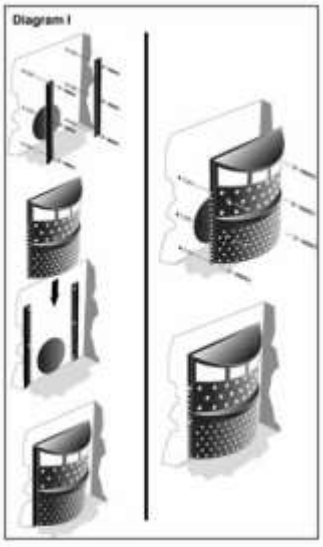

Connector Pipe Screen (United Stormwater, Inc.)


Stormtek ST3 CPS, removable (Stormtek)



Connector Pipe Screen (West Coast Storm, Inc.)

Connector Pipe Screen (West Coast Storm, Inc.)



Trash Guard (Bio Clean Environmental Services, Inc.)

(Photos from SFEP Bay Area-wide Trash Capture Demonstration Project Information Sheets)

Insert Filters

An insert filter is a stainless-steel basket assembly with a filter fabric lining. It is placed inside a storm drain inlet to prevent debris and/or trash from entering the storm drain. Debris and trash is stored within the insert filter until removed by municipal staff. An overflow is provided near the top of the device to allow stormwater to bypass if the filter's storage capacity has been reached or if the filter fabric is obstructed.

Insert filters are manufactured by several different vendors, each with their own design. An example of this device type installed in ***[insert municipality name]*** is below.

Flo Gard Plus Catch Basin Insert Filter (Oldcastle Stormwater Solutions)

Large Trash Full Capture Device Operation

Guidance: Delete Guidance after completing this Section*. Delete all or any part of this section that does not apply to the types of devices you have installed.*

Hydrodynamic Separators

A hydrodynamic separator (HDS), also known as a vortex separator or swirl concentrator (Figure 1) is a non-mechanical, self-operating system that uses the physics of flowing water to remove pollutants from stormwater. These systems are manufactured by several different vendors, each with their own design. All HDS systems contain large cylindrical separation chambers where stormwater enters creating a swirling vortex to separate floatables (e.g., trash, vegetation, and oil) and settleable particles (e.g., sediment) from stormwater. The velocity is highest at the outer edge of the vortex, keeping the floatables from clogging the holes and allowing the stormwater to leave the cylinder. HDS systems are not effective for removing very fine solids or dissolved pollutants (USEPA 1999). A common HDS system installed by municipalities is the Continuous Deflective Separation (CDS) unit manufactured by Contech Engineered Solutions. An example of a HDS unit installed in [***insert municipality name***] is below.

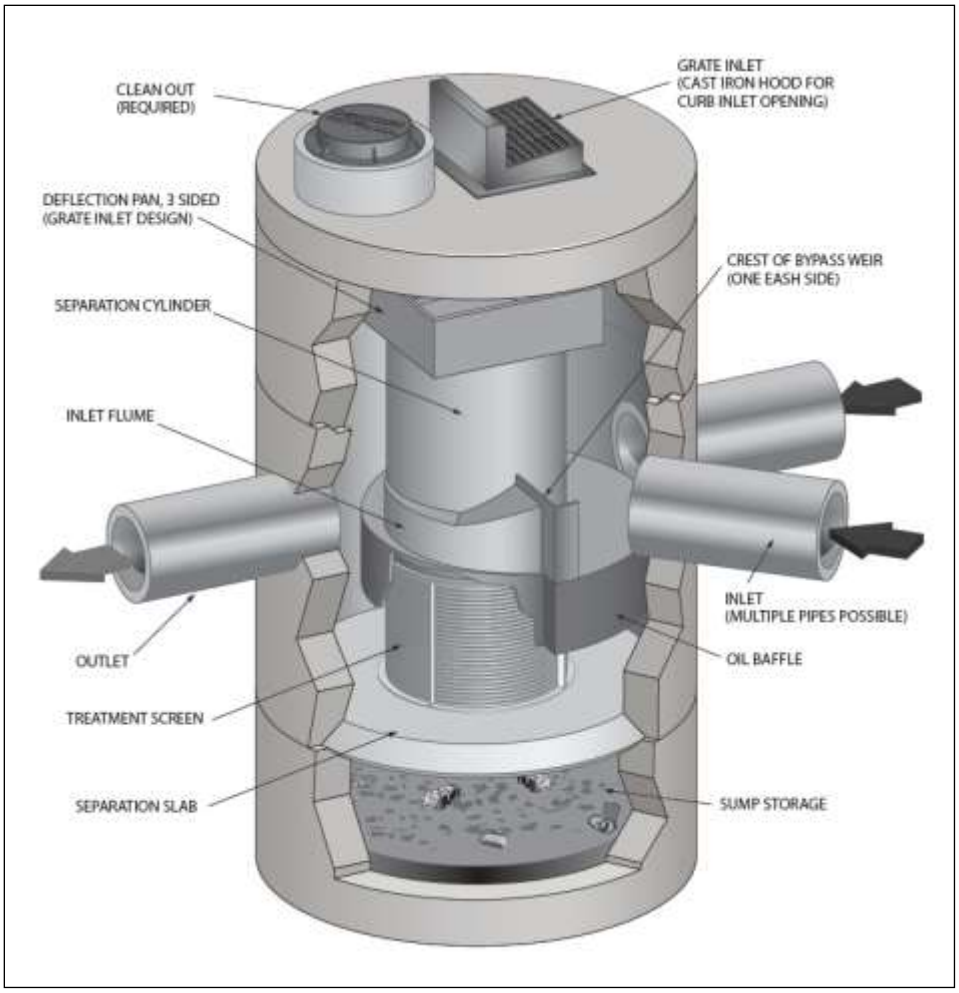


Figure 1. Internal components of Contech CDS® hydrodynamic separator
(Source: http://www.conteches.com/products/stormwater-management/treatment)

Gross Solids Removal Devices

This is a large-scale screen device installed "end of pipe" (i.e., at a storm drain outlet to the receiving water or pump station) or in-line with storm drain pipelines. The pipe length and pipe outlet are screened. An overflow is provided as a bypass, with wider openings, located on top of the first pipe segment of the device or as a weir at the pipe inlet. Water flows through the screened pipe. Debris and trash larger than 5 millimeters is deposited within the pipe.

The non-proprietary Gross Solids Removal Device (GSRD) designs were originally developed by the California Department of Transportation (Caltrans) in early 2000s to comply with new regulations for controlling trash discharges to Southern California receiving waters. GSRDs may have different configurations depending on where the device is installed. An example of a GSRD installed in [***insert municipality name***] is below.

Storm Flo Screen (Roscoe Moss Company)

City of Milpitas Storm Flo Screen (photo courtesy of Roscoe Moss Company)

Netting Systems

This is a large net installed "end of pipe", typically a storm drain outlet to the receiving water or pump station. Water flows through the net while debris and trash is captured within the net. An example of a netting system installed in ***[insert municipality name]*** is below.

End of Pipe Netting Trash Trap (Fresh Creek Technologies)

RESPONSIBILITY FOR OPERATION & MAINTENANCE

Trash full capture devices must be maintained to be effective. There is the potential for inadequate maintenance due to a variety of factors such as limited resources (e.g., money, personnel and/or equipment) and poor management of program performance. A key step in developing a successful O&M Verification Program is to designate an individual(s) responsible for each O&M program component. The ***[insert municipality name]*** has designated the following individual(s) to be responsible for the following O&M components:

- Tracking (type, location, number) installed trash full capture devices – ***[insert name and/or job title]***
- Designating inspection and cleaning frequency of devices – ***[insert name and/or job title]***
- Inspections – ***[insert name and/or job title]***
- Cleaning – ***[insert name and/or job title]***
- Data management – ***[insert name and/or job title]***
- Program documentation (e.g., Annual Report information, updating O&M Verification Program Plan as needed) – ***[insert name and/or job title]***

Guidance: Delete Guidance after completing this Section.

When designating an individual to each O&M component, it is not necessary for the individual to actually participate in the O& M task. However, it is highly recommended that the designated individual have a working knowledge of the task based upon personal experience and a position of responsibility within the organization. The ideal individual to designate for each task should have a significant degree of direct, personal involvement with the overall maintenance program and have the authority to effectively manage the program and command the attention of upper management.

A staff training element is needed to ensure that inspection and cleaning activities are conducted in a way to maintain the full capture designation. A failure to provide adequate training could result in time-consuming maintenance and possible device failure. Inspection and cleaning of all full capture devices will be performed in accordance with procedures described in this document and:

- *Small Full-Capture Device Operation and Maintenance: Standard Operating Procedures*; **and/or**
- *Hydrodynamic Separator Operation and Maintenance: Standard Operating Procedures*

The ***[insert municipality name]*** has the following training materials and methods available:

- Program training materials (i.e., Powerpoint presentation) used in-house

- Attendance at Program-sponsored workshops or meetings
- Tailgate safety meetings where key O&M concepts are reviewed
- Documented self-training activities by staff, including reviewing O&M Verification Program Plan and/or Standard Operating Procedures

The ***[insert municipality name]*** will train new and experienced staff in accordance with the following schedule:

- New staff – ***[Insert training schedule. Provide initial training and refresher training schedule]***
- Experienced Staff – ***[Insert refresher training schedule]***

New staff may assist experienced staff but will not inspect or clean full capture devices without supervision until trained.

Guidance: Delete Guidance after completing this Section.

It is recommended that new staff be trained in O&M protocols within two weeks of starting their O&M responsibilities. Provide refresher training schedule for new and experienced staff. It is recommended that new and experienced staff be provided a refresher training in O&M protocols at least once/year.

In addition to training staff on proper inspection and cleaning procedures to maintain the full capture standard, it is necessary to train staff on safety procedures. Safety training is necessary to prevent injury and possible death. At a minimum, the ***[insert municipality name]*** will train staff in the following areas:

- Proper operation of all equipment used during the inspection, cleaning, and solids drying and disposal process.
- Safety measures relating to the use of arrow boards or channelizing devices (e.g., drums, cones, tabular markers, vertical panels, etc.) and highly visible safety apparel. Guidance provided in the *Manual on Uniform Traffic Control Devices* is the standard.
- OSHA Confined Space Entry training if a HDS system must be entered for cleaning.
- ***[Insert all other relevant training necessary to prevent injury or death]***

Safety training for municipal staff is part of the routine course of business for all maintenance activities, not just those related to the O&M Verification Program. The ***[insert municipality name]*** ensures all staff will be trained in safety procedures prior to performing any task relating to the inspection, cleaning, solids drying and disposal process. ***[Add additional information on municipal maintenance staff safety training program in your agency if appropriate]***

OPERATION & MAINTENANCE ACTIVITES

Trash full capture devices must be cleaned to maintain their full-capture designation. Cleaning can be performed at regularly scheduled (e.g., routine) times and/or on an as-needed basis when identified during inspections. Advantages to regularly scheduled cleanings include:

- Maintenance staff workloads can be better managed when device cleanings are scheduled.
- The frequency of inspections can be reduced, resulting in a more efficient use of time and resources.
- Vector problems in accumulated trash are reduced.
- Compaction of accumulated debris, which make cleaning more difficult and time consuming is reduced.

Inspections may be performed during or in-between routine scheduled cleanings to verify that devices are operating at a level necessary to maintain their full capture designation. Cleaning will be conducted if inspection reveals that the defined cleaning triggers have been exceeded.

The ***[insert municipality name]*** will perform inspection and cleaning of full capture devices using the procedures described in this document and the following documents:

- *Small Full-Capture Device Operation and Maintenance: Standard Operating Procedures*; **and/or**
- *Hydrodynamic Separator Operation and Maintenance: Standard Operating Procedures*

Each type of full capture device has its own unique inspection and cleaning requirements and priorities. Inspection and cleaning frequencies for full capture devices installed within the ***[insert municipality name]*** are discussed below.

Guidance: Delete Guidance after completing this Section.

Delete all or any part of the following sections that does not apply to the types of devices you have installed.

Small Full Capture Devices

Cleaning Frequencies and Procedures

Cleaning frequency of small full capture devices (small devices) is directly related to the amount of solids (i.e., debris and trash) within storm drains and how these solids impact the operation of the device. When cleaning is needed, it will be conducted during dry weather conditions when no flows are entering the storm drain.

As-needed cleaning will be done based on inspection findings. The ***[insert municipality name]*** will clean small devices when the following conditions have been observed during inspection.

Guidance: Delete Guidance after completing this Section.

Minimum cleaning triggers are provided below. Add additional cleaning triggers if your program exceeds the minimum triggers.

Connector pipe screens or insert filters will be cleaned when the following conditions have been observed during inspections:

- Storm drain floods during storm events; **OR**
- Small device screen is plugged or blinded with leaves, plastic bags or other debris which likely causes overflow or bypass; **OR**
- Small device screen is greater than 50 percent "full" of debris and/or trash (i.e., 50 percent of the screen's capacity below the overflow is covered with debris and/or trash); **OR**
- Flows have been determined (observed or evidence) to have bypassed the small device.

Guidance: Delete Guidance after completing this Section.

It is recommended that Permittees also implement a routine cleaning frequency. Suggested routine frequencies are provided below. Edit the text if you are not cleaning or planning to clean small devices at the end of the wet season and/or twice/year in high leaf drop areas. Edit to reflect another preferred cleaning schedule. Additional site conditions influence cleaning. Using the general factors listed below; provide your justification for your routine cleaning frequency.

In addition to the observed conditions listed above, the ***[insert municipality name]*** will clean small devices on a routine schedule. At a minimum, each device will be scheduled for routine cleaning at the end of the wet season. This is so accumulated solids, including organic material, do not sit in the storm drain over the dry season. During the dry season, large amounts of debris and trash, particularly vegetation is not likely to be transported to storm drains. Therefore, it is likely that cleaning would not be needed during this time. Devices that are placed in locations with a large number and/or high density of well-established deciduous street trees will also be scheduled for routine cleaning at the end of leaf drop season. Factors that may influence scheduled cleaning frequency include:

- Trash generation levels;
- Number and density of well-established deciduous street trees;
- Storm drain capture capacity;
- Storm drain location (e.g., intersections);
- Adjacent land uses;
- Storm drain flooding history; and
- Inspection findings.

Cleanings may also be triggered by an event other than an inspection. For example, an extreme storm event may trigger staff to clean devices. These cleanings, while not specifically scheduled in advance for a specific date are still considered scheduled since they are not triggered by an inspection event.

The ***[insert municipality name]*** conducts cleaning in accordance with the routine schedule in **Appendix D**. The ***[insert municipality name]*** may change the routine cleaning frequency of small devices based on storm drain conditions observed through inspection and cleaning over time. Any changes to routine cleaning frequency will be reported in updates of **Appendix D**.

At a minimum, the frequency of maintenance events should be increased if any device is plugged or blinded with leaves, plastic bags or other debris which likely causes overflow or bypass **OR** is greater than 50 percent "full" of debris and/or trash (i.e., 50 percent of the screen's capacity below the overflow is covered with debris and/or trash). These increases are also incorporated into **Appendix D**.

Connector pipe screens will be cleaned according to the procedures in **Appendix C**, *Small Full Capture Device Operation and Maintenance: Standard Operating Procedures.* Cleaning can be conducted with a vacuum truck and pressure washer or hand tools (e.g., shovel, clam shell, etc.). Debris and trash is removed from the storm drain and the screen is cleaned.

Insert filters are typically cleaned using hand tools. They can be cleaned in place with a shovel or lifted out of the storm drain and emptied. Debris and trash are managed and disposed in accordance with common practices and all applicable regulations. Common practice is to dispose removed solids in the same manner as sediments removed from street sweeping operations, storm drain cleanings and deep sump manhole cleanouts unless they are contaminated with hazardous materials or hazardous waste.

Inspection Activities and Procedures

Guidance: Delete Guidance after completing this Section.

Minimum inspection frequencies are provided below. Add additional inspections if your program exceeds the minimum triggers.

Inspections may be scheduled according to a time frame (e.g. every two months) or based on an event (e.g. after a large storm event). There are several variables that influence the accumulation of debris and trash in storm drains with small devices including rainfall frequency, storm events with runoff, intensity of storm events, cleaning frequency and trash generation rates. These factors may change over time or vary from year to year. Another factor that may influence scheduled inspection frequencies are findings from previous inspections.

Minimum inspection frequency:

- Inspect two times per year, with the inspections spaced at least three months or more apart, all devices in high or very high trash generation areas.
- Inspect all devices at least once per year.
- If the frequency of inspection is found excessive after two inspections, the inspection frequency can be reduced to once per year.
- The maintenance frequency shall be increased if the small device screen is plugged or blinded with leaves, plastic bags or other debris which likely causes overflow or bypass; **OR** if it is greater than 50 percent "full" of debris and/or trash (i.e., 50 percent of the screen's capacity below the overflow is covered with debris and/or trash).

The ***[insert municipality name]*** has implemented the inspection frequency provided in **Appendix D** and may modify it due to storm drain conditions observed through inspection over time. Any changes to inspection frequency will be reported in updates of **Appendix D**.

Connector pipe screens will be inspected according to the procedures in **Appendix C**, *Small Full-Capture Device Operation and Maintenance: Standard Operating Procedures.* Inspections are done by removing the storm drain inlet grate and looking to see if the screen is plugged or blinded with leaves, plastic bags or other debris which likely causes overflow or bypass; **OR** if the screen is greater than 50 percent "full" of debris and/or trash. If either one of these conditions are observed, it is necessary to clean the storm drain and small device. Some Permittees have decided to clean the storm drain and small device if debris and trash is present.

Insert filters are also inspected for flooding issues. The storm drain inlet grate is removed to inspect the amount of debris and trash present in the insert filter, and to determine if the filter fabric is clogged. A determination of bypass will also be made.

Small devices in need of cleaning will be maintained within ***XX*** business days, if possible. If the device is observed to be damaged, vandalized, or not working properly, follow-up maintenance will be scheduled.

Hydrodynamic Separators

Cleaning Activities and Procedures

Cleaning frequency will depend on how fast solids (i.e., debris and trash) accumulate within various components of the HDS system. When cleaning is needed, it will be conducted during dry weather when no flows are entering the system.

Cleaning will be done based on inspection findings. The ***[insert municipality name]*** will clean HDS systems when the following conditions have been observed during inspection.

Guidance: Delete Guidance after completing this Section.

Minimum cleaning triggers are provided below. Additional triggers are based on best practices to ensure optimal HDS operation. Add additional cleaning triggers if your program exceeds the minimum triggers.

- Floatables exceed two inches within the diversion box; **OR**
- Solids are obstructing inlet pipe(s), outlet pipe and separation screen; **OR**
- Solids are present outside the separation screen; **OR**
- Significant amounts of floatables are present in the separation chamber; **OR**
- Accumulated solids exceed 50 percent of the storage sump capacity.

Guidance: Delete Guidance after completing this Section.

It is recommended that Permittees also implement a routine cleaning frequency. The suggested routine frequency is at the end of the wet season. Edit the text if you are not cleaning or planning to clean your HDS system at the end of the wet season. Edit to reflect another preferred cleaning schedule. Additional site conditions influence cleaning. Using the general factors listed below; provide your justification for your routine cleaning frequency.

In addition to the observed conditions listed above, the ***[insert municipality name]*** will clean HDS systems on a routine schedule. At a minimum, each system will be scheduled for routine cleaning at the end of the wet season. This is so accumulated solids, including organic material, does not sit in the storage sump over the dry season. During the dry season, large amounts of debris and trash, particularly vegetation is not likely to be transported to storm drains. A routine cleaning will also prevent the compaction of accumulated solids over a long period of time, making solids removal more difficult and time consuming. Factors that may influence a routine cleaning frequency include:

- Trash generation rates;
- Number and density of well-established deciduous street trees;
- Storm drain capture capacity;
- Storm drain location (e.g., intersections);
- Adjacent land uses; and
- Inspection findings

Cleanings may also be triggered by an event, other than an inspection. For example, an extreme storm event may trigger staff to clean the HDS system. These cleanings, while not specifically scheduled in advance for a specific date are still considered scheduled since they are not triggered by an inspection event.

The ***[insert municipality name]*** conducts cleaning in accordance with the routine schedule in **Appendix D**. The ***[insert municipality name]*** may modify it due to conditions observed through inspection and cleaning over time. Any changes to routine cleaning frequency will be reported in updates of **Appendix D**.

The frequency of maintenance events should be increased if any device is plugged or blinded with leaves, plastic bags or other debris which likely causes overflow or bypass **OR** is greater than 50 percent "full" of debris and/or trash. These increases are also incorporated into **Appendix D**.

HDS systems will be cleaned according to the procedures in **Appendix C**, *Hydrodynamic Separator Operation and Maintenance: Standard Operating Procedures.* Cleaning is conducted with a vacuum truck and pressure washer. Floatable trash is removed from the separation chamber and accumulated solids are removed from the sump storage. Removed solids are dried and managed according to the SOP.

Inspection Activities and Procedures

Guidance: Delete Guidance after completing this Section.

Minimum inspection frequencies are provided below. Add additional inspections if your program exceeds the minimum triggers.

Inspections may be scheduled in accordance with a time frame (e.g., every two months) or based on an event (e.g. after a large storm event). There are several variables that influence the accumulation of debris and trash in HDS systems. They include rainfall frequency, storm events with runoff, intensity of storm events, cleaning frequency and trash generation rates. These factors may change over time or vary from year to year. Another factor that may influence routine inspection frequencies are findings from previous inspections.

Minimum inspection frequency:

- Inspect two times per year, with the inspections spaced at least three months or more apart, all devices in high or very high trash generation areas
- Inspect all devices at least once per year.
- If the frequency of inspection is found excessive after two inspections, the inspection frequency can be reduced to once per year.
- The maintenance frequency shall be increased if the HDS system's screen is plugged or blinded with leaves, plastic bags or other debris which likely causes overflow or bypass; **OR** if it is greater than 50 percent "full" (i.e., accumulated solids exceed 50 percent of the HDS storage sump capacity).

The ***[insert municipality name]*** has implemented the inspection frequency provided in **Appendix D** and may modify it due to HDS system conditions observed through inspection over time. Any changes to inspection frequency will be reported in updates of **Appendix D**.

HDS systems will be inspected according to the procedures in **Appendix C**, *Hydrodynamic Separator Operation and Maintenance: Standard Operating Procedures.* As part of the inspection process, the ***[insert municipality name]*** will measure the percent of accumulated solids within the storage sump. To determine the

percent of accumulated solids, the following two values will be determined before conducting the inspection: 1) the storage sump depth and 2) distance to bottom of HDS from rim (excluding vault thickness). The values will be determined from the as-built drawings prepared for the HDS system. The process of calculating both values is described in the document entitled *Hydrodynamic Separator Operation and Maintenance: Standard Operating Procedures*. Municipal staff will be provided with both values prior to conducting inspections. Additionally, a measuring instrument known as a "sludge judge" may be used to determine the amount of accumulated solids within the storage sump. A description on how to use a "sludge judge" is provided in the document entitled *Hydrodynamic Separator Operation and Maintenance: Standard Operating Procedures*.

HDS systems in need of cleaning will be maintained within ***XX*** business days, if possible. Any observation of malfunctioning or defective HDS components will be noted with follow-up maintenance scheduled.

Gross Solids Removal Device (GSRD)

Cleaning Activities and Procedures

Cleaning frequency will depend on how fast solids (i.e., debris and trash) accumulate within screened pipes. When cleaning is needed, it will be conducted during dry weather when no or low flows are entering the system.

As needed cleaning will be done based on inspection findings. The ***[insert municipality name]*** will clean GSRDs when the following conditions have been observed during inspection.

Guidance: Delete Guidance after completing this Section.

Minimum cleaning triggers are provided below. Additional triggers are based on best practices to ensure optimal GSRD operation. Add additional cleaning triggers if your program exceeds the minimum triggers.

- Accumulated solids exceed 50% of screened pipe capacity; **OR**
- Solids are obstructing inlet pipe(s), outlet pipe or overflow;

Guidance: Delete Guidance after completing this Section.

It is recommended that Permittees also implement a routine cleaning frequency. The manufacturer suggests that the routine cleaning frequency be twice/year (i.e., at the start of the dry season and before the start of the wet season). Edit the text if you are not cleaning or planning to clean your GSRD at the start of the dry season and before the start of the wet season. Edit to reflect another cleaning schedule. Additional site conditions influence cleaning. Using the general factors listed below; provide your justification for your routine cleaning frequency.

In addition to observed conditions listed above, the ***[insert municipality name]*** will clean GSRDs on a routine schedule. At a minimum, each GSRD will be scheduled for routine cleaning at the start of the dry season and before the start of the wet season. This is so accumulated solids, including organic material, does not sit in the screened pipes during the dry season and that the screened pipes are empty prior to the first flush. A routine cleaning will also prevent the compaction of accumulated solids over a long period of time, making solids removal more difficult and time consuming. Factors that may influence a routine cleaning frequency include:

- Trash generation rates;
- Amount and density of vegetation within drainage area;
- Sediment loading;
- Historical flows; and
- Inspection findings.

The ***[insert municipality name]*** conducts cleaning in accordance with the routine schedule in **Appendix D**. The ***[insert municipality name]*** may modify it due to conditions observed through inspection and cleaning over time. Any changes to routine cleaning frequency will be reported in updates of **Appendix D**.

At a minimum, the frequency of maintenance events should be increased if any device is found to have a plugged screen, blinded screen or is greater than 50% full of debris and/or trash. These increases are also incorporated into Appendix D.

GSRDs will be cleaned according to ***[insert municipality name]'s*** procedures provided in **Appendix C**. Cleaning is done with a vacuum truck and pressure washer. All solids (i.e., debris and trash) are removed from the screened pipe. Removed solids are dried and managed in accordance with common practices and applicable regulations. Common practice is to dispose removed solids in the same manner as sediments removed from street sweeping operations, storm drain cleanings and deep sump manhole cleanouts unless they are contaminated with hazardous materials or hazardous waste.

(Pictures of cleaning activities courtesy of Roscoe Moss Company)

Inspection Activities and Procedures

Guidance: Delete Guidance after completing this Section.

Minimum inspection frequencies are provided below. Add additional inspections if your program exceeds the minimum triggers.

Inspections may be scheduled in accordance with a time frame (e.g., every two months) or based on an event (e.g. after a large storm event). There are several variables that influence the accumulation of debris and trash in GSRDs. They include rainfall frequency, storm events with runoff, intensity of storm events, cleaning frequency, sediment loading and trash generation rates. These factors may change over time or vary from year to year. Another factor that may influence routine inspection frequencies are findings from previous inspections.

Minimum inspection frequency:

- Inspect two times per year, with the inspections spaced at least three months or more apart, all devices in high or very high trash generation areas
- Inspect all devices at least once per year.
- If the frequency of inspection is found excessive after two inspections, the inspection frequency can be reduced to once per year.
- The maintenance frequency shall be increased if the GSRD's screen is plugged or blinded with leaves, plastic bags or other debris which likely causes overflow or bypass; **OR** if it is greater than 50 percent "full" (i.e., accumulated solids exceed 50 percent of the GSRD storage capacity).

The ***[insert municipality name]*** has implemented the inspection frequency provided in **Appendix D** and may modify it due to GSRD conditions observed through inspection over time. Any changes to inspection frequency will be reported in updates of **Appendix D**.

GSRDs will be inspected in accordance with the procedures provided in **Appendix C**. Inspectors will ensure that the GSRD is not clogged through a visual inspection by line of site into the screen and that all entry points are closed. As part of the inspection process, the ***[insert municipality name]*** will estimate the percent of accumulated solids within the GSRD.

GSRDs in need of cleaning will be maintained within ***XX*** business days, if possible. If the GSRD is observed to be damaged, vandalized, or not working properly, follow-up maintenance will be scheduled.

Netting Systems <delete if not applicable>

Cleaning Activities and Procedures

Cleaning frequency will depend on how fast solids (i.e., debris and trash) accumulate within the netting system. When cleaning is needed, it will be conducted during dry weather when no or low flows are entering the system.

As needed, cleaning will be done based on inspection findings. The ***[insert municipality name]*** will clean end-of-pipe netting systems when the following conditions have been observed during inspection.

Guidance: Delete Guidance after completing this Section.

Minimum cleaning triggers are provided below. Edit cleaning triggers if your program differs from the recommended minimum triggers.

- Nets are > 50 percent full

Guidance: Delete Guidance after completing this Section.

It is recommended that Permittees also implement a routine cleaning frequency. It is suggested that the routine cleaning frequency be twice/year (i.e., at the start of the dry season and before the start of the wet season). Edit the text if you are not cleaning or planning to clean your netting system at the start of the dry season and before the start of the wet season. Edit to reflect another cleaning schedule. Additional site conditions influence cleaning. Using the general factors listed below; provide your justification for your routine cleaning frequency.

In addition to observed conditions listed above, the ***[insert municipality name]*** will clean netting systems on a routine schedule. At a minimum, each netting system will be scheduled for routine cleaning at the start of the dry season and before the start of the wet season. This is so accumulated solids, including organic material, does not sit in the netting system during the dry season and that the netting system has maximum storage capacity prior to the first flush. Factors that may influence a routine cleaning frequency include:

- Trash generation rates;
- Amount and density of vegetation within drainage area;
- Historical flows; and
- Inspection findings.

The ***[insert municipality name]*** conducts cleaning in accordance with the routine schedule in **Appendix D**. The ***[insert municipality name]*** may modify it due to conditions observed through inspection and cleaning over time. Any changes to routine cleaning frequency will be reported in updates of **Appendix D**.

End-of-pipe netting systems are cleaned according to the procedures provided in **Appendix C**. A crane truck with hoist is used to lift the netting frame from the outlet. The netting is placed on land and trash is removed. It is inspected and replaced if needed. The frame and netting are lifted back onto the outlet. Removed solids are dried and managed in accordance with common practices and applicable regulations. Common practice is to dispose removed solids in the same manner as sediments removed from street sweeping operations, storm drain cleanings and deep sump manhole cleanouts unless they are contaminated with hazardous materials or hazardous waste.


(Cleaning operations at the City of Santa Clara pump station)

Inspection Activities and Procedures

Guidance: Delete Guidance after completing this Section.

Minimum inspection frequencies are provided below. Add additional inspections if your program exceeds the minimum triggers.

Inspections may be scheduled in accordance with a time frame (e.g., before the start of the wet season) or based on an event (e.g. after a large storm event). There are several variables that influence the accumulation of debris and trash in netting systems. They include rainfall frequency, storm events with runoff, intensity of storm events, cleaning frequency and trash generation rates. These factors may change over time or vary from year to year. Another factor that may influence routine inspection frequencies are findings from previous inspections.

Minimum inspection frequency:

- Inspect two times per year, with the inspections spaced at least three months or more apart, all devices in high or very high trash generation areas.
- Inspect all devices at least once per year.
- If the frequency of inspection is found excessive after two inspections, the inspection frequency can be reduced to once per year.

- The maintenance frequency shall be increased if any device is greater than 50% 'full" (i.e., accumulated solids exceed 50 percent of the netting system storage capacity).

The ***[insert municipality name]*** will inspect netting systems at the start of the dry season, before the start of the wet season and after major rain events (e.g., greater than 0.25 inches). Netting systems will be inspected at these times to ensure that there is always maximum storage capacity. This inspection frequency may be modified due to observed inspection results. The ***[insert municipality name]*** has implemented the inspection frequency provided in **Appendix D**. Any changes to inspection frequency will be reported in updates of **Appendix D**.

Netting systems will be inspected at the start of the dry season, before the start of the wet season and after major rain events (e.g., greater than 0.25 inches). Inspectors will ensure that the frame is not damaged and netting is in good condition. Inspections may be conducted at the same time as the visual inspection of the retention basin. As part of the inspection process, the ***[insert municipality name]*** will estimate the percent of accumulated solids within the netting system.

Netting systems in need of cleaning will be maintained within ***XX*** business days, if possible. Any observation of damaged components (e.g., frame or netting) will be noted with follow-up maintenance scheduled.

DATA COLLECTION

A data management approach was developed to track inspection and maintenance results for all trash full capture devices. Data is used to show on-going inspection and maintenance of trash full capture devices, and to demonstrate continued achievement of the full capture standard. The ***[insert municipality name]*** will retain device specific maintenance records, including, at a minimum:

- Date(s) of maintenance,
- Capacity condition of the device at the time of maintenance (full and overflowing or with storage capacity remaining), and
- Any special problems such as flooding, screen blinding or plugging from leaves, plastic bags, or other debris causing overflow, damage reducing function, or other negative conditions.

The ***[insert municipality name]*** uses the inspection and cleaning activity field form provided in **Appendix E**. It has been developed to collect the following information:

- Conditions that indicate device is not operating as full capture:
  - Plugging of screen leading to overflow and bypass
  - Flooding
  - Full trash reservoir causing bypass
- Conditions that indicate maintenance frequency must be increased
  - Plugged screen,
  - blinded screen or
  - greater than 50 percent 'full" of debris and/or trash
- For each device:
  - date of maintenance or inspection,
  - capacity condition (full and overflowing or with storage capacity remaining)
  - special problems such as flooding, screen blinding or plugging from leaves, plastic bags, or other debris causing overflow
  - damage reducing function
  - other negative conditions
  - corrective actions

If cleaning is conducted on a more frequent basis (i.e., devices are cleaned before the cleaning triggers are reached and interim inspections are not conducted), the "% full" of the device should be noted as part of the cleaning event.

Additional inspection and maintenance data is collected as needed for internal operation metrics.

REFERENCES

City of Portland. 2008. Operation and Maintenance Guidelines: CDS Stormwater Treatment Unit. Available at http://www.portlandoregon.gov/Bes/article/314446.

Contech Engineered Solutions. 2013. CDS Guide: Operation, Design, Performance and Maintenance. Available at http://www.conteches.com/products/stormwater-management/treatment/cds.aspx#1822141-technical-info

San Francisco Estuary Partnership. May 8, 2014. Bay Area-wide Trash Capture Demonstration Project Appendix III Trash Capture Devices Offered Through the Project. Available at http://www.sfestuary.org/wp-content/uploads/2014/05/demo_proj_report_final.pdf.

Town of Bethlehem. 2009. Continuous Deflective Separation (CDS) Unit Maintenance Inspection Report Form. Available at http://www.townofbethlehem.org/DocumentCenter/Home/View/3032. April 2009.

U.S. Environmental Protection Agency (USEPA). 1999. Storm Water Technology Fact Sheet: Hydrodynamic Separators. EPA 832-F-99-017. September 1999.

Appendix A

List of Full Capture Devices with Locations

Guidance: Delete Guidance after completing this Section.

Attach a list of full trash capture devices with locations installed in your jurisdiction. If available, provide the type and vendor for each device.

Appendix B

Trash Full Capture Device Map

Guidance: Delete Guidance after completing this Section.

Attach your most recent Trash Full Capture Device Map.

Appendix C

Standard Operating Procedures (SOPs) for Inspection and Cleaning of Trash Full Capture Devices

Small Full Capture Device Operation and Maintenance: Standard Operating Procedures
Hydrodynamic Separator Operation and Maintenance: Standard Operating Procedures

Guidance: Delete Guidance after completing this Section.

Attach your standard operating procedures (SOPs) for inspection and cleaning of trash full capture devices.

Appendix D

Inspection and Cleaning Schedule for Trash Full Capture Devices

Guidance: Delete Guidance after completing this Section.

Complete the tables below with your scheduled cleaning frequency and your scheduled inspection frequency. Delete the example entries in the tables.

Scheduled <u>Cleaning Frequencies</u> of Trash Full Capture Devices

Device Type	Location	Minimum Frequency	Timing	Comments
Example Entry:	Inlet #12345	(i.e. 1/yr, 2/yr, etc.)	(e.g., end of wet season, after leap drop, once during wet season, after extreme storm, etc.)	(e.g. rationale for change in frequency)
Storm Flo Screen (GSRD)		2x/year	Start of dry season; Before start of wet season	
Netting System		2x/year	Start of the dry season; Before start of the wet season	
HDS		1x/year	End of wet season	
Connector Pipe Screen		2x/year	End of wet season; after leaf drop	In area with high density of trees
Connector Pipe Screen		1x/year	End of wet season	Not in area with high density of trees
Filter Insert		2x/year	End of wet season; after leaf drop	

Last Updated: *<MONTH DAY, YEAR>*

<Permittee Name Here>

Scheduled Inspection Frequencies of Trash Full Capture Devices

Device Type	Location	Frequency	Timing	Comments
Example Entry:	Inlet #12345	(i.e. 4/yr, 2/yr, etc.)	(e.g., before start of wet season, after each major storm event, etc.)	(e.g. rationale for change in frequency)
Storm Flo Screen (GSRD)		2x/year	Start of dry season; Before start of wet season	Location and inspection results dictate inspection frequency. Minimum required. Manufacturer recommends 2x/year.
Netting System		6-8x/year	Start of dry season; Before start of wet season; and after major rain events	Frequency > baseline minimum due to findings of previous inspections. Major rain event is defined as greater than 0.25 inches in 24hrs
HDS		1-2x/year	3 months apart or more	Location and inspection results dictate inspection frequency. Minimum required.
Connector Pipe Screen		1-2x/year	3 months apart or more	Location and inspection results dictate inspection frequency. Minimum required.
Insert Filter		1-2x/year	3 months apart or more	Location and inspection results dictate inspection frequency. Minimum required.

Last Updated: *<MONTH DAY, YEAR>*

Appendix E

Inspection and Cleaning Activities Field Forms

Guidance: Delete Guidance after completing this Section.

Agencies should attach their specific field forms to this document and to any Standard Operating Procedures (SOPs) that will be used. Example field logs are attached. Inspection forms must contain the minimum data required by the Trash Amendments or NDPES Permit for recordkeeping and reporting.