

G1.1 INTRODUCTION

The State of California requires that all new development and redevelopment projects include certified Trash Full-Capture Devices for storm drains within the project area to comply with the California Trash Amendments (State Water Resources Control Board [State Board], 2015). This appendix contains guidance and an inventory of Trash Full-Capture Devices, in accordance with the California Trash Amendments last authorized on April 30, 2018. The definition of a "full capture system" is defined as follows: "A full capture system is any single device, or series of devices, that traps all particles retained by a 5-mm mesh screen and has a design treatment capacity of no less than the peak flow rate resulting from a one-year, one-hour storm in the subdrainage area" (State Board, 2015).

The devices approved and certified by the State Board can be placed in three categories: catch basin inserts, high-flow capture devices, and multi-benefit treatment systems: **Section G1.2**, **Section G1.3**, and **Section G1.4**, respectively.

G1.2 CATCH BASIN INSERTS

Catch basin inserts are designed to be installed in standard catch basins. They are effective for removing trash and large sediment by filtration through insert basket filters and may be designed to include sorbent media to remove floating oils and grease. Trapped sediment and debris must be removed periodically manually or by vacuum truck. Long-term costs are typically higher for devices that require manual cleaning because frequent cleanings and maintenance are more labor-intensive. The advantages and disadvantages of catch basin inserts are summarized in **Table G-1**.

Table G-1. Catch Basin Inserts Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Located underground; limited lot size is not a deterrent • Compatible with subsurface storm drain systems • Can be used for retrofitting small urban lots when larger SCMs are not feasible • Provide pretreatment of runoff before it is delivered to other SCMs • Easily accessed for maintenance • Long life-span, if properly maintained 	<ul style="list-style-type: none"> • Limited pollutant removal • Expensive to install and maintain, resulting in high cost per unit area treated • No ability to control volume of stormwater runoff • Frequent maintenance is essential • Requires proper disposal of trapped sediment and oil and grease • Entrapment hazard for amphibians and other small animals

Catch basin inserts are often used in combination with catch basin inlet screens. Catch basin inlet screens provide a first line of defense against trash but must be installed in-line with catch basin inserts to be considered compliant as a Trash Full-Capture Device.

Catch Basin Insert Full-Capture Trash Device certified by the State Board (as of April 30, 2018) are listed in **Table G-2**. An updated list of State approved Trash Full Capture Systems may be found at the following link:

https://www.waterboards.ca.gov/water_issues/programs/stormwater/trash_implementation.html

Table G-2. State Board Certified Full-Capture Catch Basin Inserts




Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Debris Dam Connector Pipe Screen</p>  <p>American Stormwater</p>	<ul style="list-style-type: none"> High floatables reduction 	<ul style="list-style-type: none"> Easy to clean and maintain. A 12"x12" maintenance hatch is attached to the lower portion of the Debris Dam to allow cleaning and maintenance crews to access the storm drain outlet. Low capital cost. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. Warranty is limited compared to other systems (1 year workmanship/3 years parts and material). 	<p>CA Water Boards Fact Sheet - PG 30</p>
<p>Square Grate Inlet Skimmer Box</p>  <p>Bio Clean Environmental</p>	<ul style="list-style-type: none"> Fine Total Suspended Solids (TSS) 85% Dissolved Phosphorus 69% Copper 95% Lead 87% Zinc 95% Fecal Coliform 68% Oils & Grease 95% 	<ul style="list-style-type: none"> Time to clean is approximated at 10-15 minutes. Comes with 5-year warranty. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. System needs to be inspected every 6 months. Maintenance can be provided only by supplier or a supplier approved contractor. Disposal of exposed filter must be in accordance with local, state and federal agency requirements. High capital cost. 	<p>Los Angeles Approval Brochure</p> <p>Operations & Maintenance Specifications</p> <p>Drawing Details</p> <p>CA Water Boards Fact Sheet - PG 42</p>
<p>Round Curb Inlet Basket</p>  <p>Bio Clean Environmental</p>	<ul style="list-style-type: none"> Fine TSS 85% Dissolved Phosphorus 69% Copper 95% Lead 87% Zinc 95% Oils & Grease 95% Fecal Coliform 68% 	<ul style="list-style-type: none"> Filters can be cleaned and vacuumed from the manhole-opening. Catch basin entry not required. Cleaning can be completed with a vacuum truck - approximately 15-minute service time. Cleaning can be done manually by lifting the basket from the shelf and dumping out collected debris. Comes with 5-year warranty. Evaluated as the easiest system to clean by the City and County of Honolulu. 	<ul style="list-style-type: none"> Disposal of exposed filter must be in accordance with local, state, and federal agency requirements. High capital cost. 	<p>Brochure</p> <p>Maintenance Specifications</p> <p>Drawing Details</p> <p>CA Water Boards Fact Sheet - PG 39</p> <p>Approved for trash capture by San Francisco Estuary and County of San Diego</p>

Table G-2. State Board Certified Full-Capture Catch Basin Inserts



Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Modular Connector Pipe Screen (MCPS)</p>  <p>Bio Clean Environmental</p>	<ul style="list-style-type: none"> Captures 100% of trash and debris. 	<ul style="list-style-type: none"> Modular design allows it to be adapted to any pipe size and quickly assembled inside the catch basin. Maintenance of the catch basin can be performed using a standard vacuum truck or manually. The center piece can be easily removed to allow for access to the outlet pipe for jetting and other activities. Low capital cost. Comes with 5-year warranty. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. 	<p>Brochure CA Water Boards Fact Sheet - PG 36</p>
<p>Catch Basin Connector Pipe Screen (Trash Guard)</p>  <p>Bio Clean Environmental</p>	<ul style="list-style-type: none"> Captures 100% of trash and debris. 	<ul style="list-style-type: none"> Modular design allows it to be adapted to any pipe size and quickly assembled inside the catch basin. Maintenance of the catch basin can be performed using a standard vacuum truck or removed by hand. The center piece can be easily removed to allow for access to the outlet pipe for jetting and other activities. Low capital cost. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. Warranty is limited compared to other systems (1 year). 	<p>CA Water Boards Fact Sheet - PG 33</p>

Table G-2. State Board Certified Full-Capture Catch Basin Inserts




Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Curb Inlet and Grate Inlet Filters</p>  <p>Bio Clean Environmental</p>	<ul style="list-style-type: none"> 100% capture of all particles 5 mm in size or larger. 	<ul style="list-style-type: none"> Easy installation. No confined space entry required for cleaning. Estimated design life is 25 to 50 years Made with high strength, durable materials 	<ul style="list-style-type: none"> Limited trash storage capacity. Requires frequent maintenance to prevent trapped trash from being introduced into effluent. 	<p>CA Water Boards Fact Sheet APPLICATION 4</p>
<p>Collector Pipe Screen - Drop-in</p>  <p>G2 Construction</p>	<ul style="list-style-type: none"> Captures 100% of trash and debris 5 mm or larger. 	<ul style="list-style-type: none"> Filter can be cleaned and vacuumed from the manhole-opening. Low capital cost. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. Warranty is limited compared to other systems (1 year workmanship/3 years parts and material). 	<p>Drop-In CPS Screen</p> <p>CA Water Boards Fact Sheet - PG 27</p>
<p>Collector Pipe Screen – Mod Series</p>  <p>G2 Construction</p>	<ul style="list-style-type: none"> Captures 100% of trash and debris 5 mm or larger. 	<ul style="list-style-type: none"> Filter can be cleaned manually and/or vacuumed. Estimated cleaning time is 5-10 minutes. Low capital cost. Fits all catch basins. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. Warranty is limited compared to other systems (1 year workmanship/3 years parts and material). 	<p>CPS-Mod 3S</p> <p>CA Water Boards Fact Sheet – PG 27</p>

Table G-2. State Board Certified Full-Capture Catch Basin Inserts

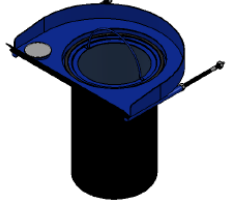

Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>CleanWay Curb Inlet Filtration System</p>  <p>Cleanway USA</p>	<ul style="list-style-type: none"> Captures 100% of trash and debris 5 mm or larger. 	<ul style="list-style-type: none"> Easy installation. No special tools required. Modular support pan and sliding basket conform to the existing vault specifications. 	<ul style="list-style-type: none"> Limited to a minimum depth of 12" and a manhole size of 16". Monthly inspection and maintenance recommended Curb inlets products have a 10-year design life. 	<p>CA Water Boards Fact Sheet APPLICATION 7</p>
<p>CleanWay Drop Inlet Filtration Insert</p>  <p>Cleanway USA</p>	<ul style="list-style-type: none"> Captures 100% of trash and debris 5 mm or larger. 	<ul style="list-style-type: none"> Easy installation and easy maintenance of StormClean® components. Modular support pan conforms to the existing vault specifications and support the strainer. Optional filter fabric available for water quality treatment. 	<ul style="list-style-type: none"> Monthly inspection and maintenance recommended Drop Inlet Filtration products have design lives varying from 1 month to 10 years. 	<p>CA Water Boards Fact Sheet APPLICATION 8</p>

Table G-2. State Board Certified Full-Capture Catch Basin Inserts




Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>COANDA Curb Inlet Filter with Trash Screen and Debris Fence</p>  <p>Coanda</p>	<ul style="list-style-type: none"> Captures debris, nutrients, heavy metals, and organic matter. Removes everything larger than fine sand. 	<ul style="list-style-type: none"> No moving parts and rarely needs servicing. Debris is easily accessible for cleaning whenever necessary. Due to the design enabling debris to remain dry, vector control is not an issue, and bacterial growth is impeded. Self-cleaning stainless steel screen. Handles fast moving water without clogging. Captured debris dries quickly, enabling easy removal. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. Warranty is limited compared to other systems (1 year). Fact sheet and costs not provided by State Water Board. 	<p>Brochure</p> <p>Drawing Details</p> <p>Approved by for trash capture by Los Angeles River Total Maximum Daily Load (TMDL) and also meets Caltrans definition of Gross Solid Removal Device (GSRD).</p>
<p>FloGard Catch Basin Insert – Combination Inlet Style</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> TSS 86% Oils & Grease 80% Gross solids 100% 	<ul style="list-style-type: none"> Filters can be cleaned and vacuumed from the grate opening. Catch basin entry not required. Low capital cost. Comes with 5-year warranty. 	<ul style="list-style-type: none"> It is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. Disposal of exposed filter must be in accordance with local, state, and federal agency requirements. 	<p>Product Overview</p> <p>Maintenance</p> <p>Drawing Details</p> <p>CA Water Boards Fact Sheet – PG 18</p>
<p>FloGard Catch Basin Insert – Flat Grated Inlet Style</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> TSS 86% Oils & Grease 80% Gross solids 100% 	<ul style="list-style-type: none"> Filters can be cleaned and vacuumed from the grate opening. Catch basin entry not required. Low capital cost. Comes with 5-year warranty. 	<ul style="list-style-type: none"> It is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. Disposal of exposed filter must be in accordance with local, state and federal agency requirements. 	<p>Product Overview</p> <p>Maintenance</p> <p>Drawing Details</p> <p>CA Water Boards Fact Sheet – PG 13</p>

Table G-2. State Board Certified Full-Capture Catch Basin Inserts




Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>FloGard Catch Basin Outlet Insert – Connector Pipe Screen</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> Captures 100% of trash and debris. 	<ul style="list-style-type: none"> Maintenance of the catch basin can be performed using a standard vacuum truck or manually. The center piece can be easily removed to allow for access to the outlet pipe for jetting and other activities. Comes with 5-year warranty. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. 	<p>CA Water Boards Fact Sheet – PG 9</p>
<p>United Storm Water Connector Pipe Screen</p>  <p>United Stormwater</p>	<ul style="list-style-type: none"> 100% removal of debris greater than 5 mm in diameter. 	<ul style="list-style-type: none"> Filter can be cleaned manually and/or vacuumed. Provides overflow bypass for larger storm events. Low capital cost. Comes with 3-year warranty. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. 	<p>CPS – Brochure Drawing Details CA Water Boards Fact Sheet – PG 4</p>
<p>Drop-in Grate Inlet</p>  <p>United Stormwater</p>	<ul style="list-style-type: none"> Filters heavy metals, petroleum hydrocarbons, sediments, trash and debris. 	<ul style="list-style-type: none"> Self-supported on the lip of the catch basin under traffic grate. Filters can be cleaned and vacuumed from the grate opening. Catch basin entry not required. Filtration devices are installed in a manner that does not interfere with lateral line water flow. Low capital cost. Comes with 3-year warranty. 	<ul style="list-style-type: none"> Maintenance before and after the rainy season. System need to be inspected every 6 months. Disposal of exposed filter must be in accordance with local, state and federal agency requirements. 	<p>Drawing Details CA Water Boards Fact Sheet – PG 5</p>

Table G-2. State Board Certified Full-Capture Catch Basin Inserts






Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Flexstorm Connector Pipe Screen</p>  <p>Inlet Filters</p>	<ul style="list-style-type: none"> Connector Pipe Screens retain large volumes of trash and sediment inside the catch basin instead of the debris being conveyed through the stormwater system. 	<ul style="list-style-type: none"> Quick and easy install. No assembly required. Optional Quick Release Brackets allow device to be removed for easy line or jet cleaning. Good for retrofits or new applications. Low capital cost. Comes with 3-year warranty. 	<ul style="list-style-type: none"> High maintenance frequency (every 3-6 months depending on loading). 	<p>Product Overview CA Water Boards Fact Sheet – PG 83</p>
<p>Flexstorm Full Trash Capture (FTC) Inserts</p>  <p>Inlet Filters</p>	<ul style="list-style-type: none"> The steel basket is uniformly punched with 3/16" diameter holes (4.8 mm) in such a pattern that the basket has 50% open area and retains any particles 5 mm or larger. 	<ul style="list-style-type: none"> Easy to install, with lift handles and adjustable flanges. Dual cleaning options. Cleaning can be performed using vacuum truck or by lifting basket out of inlet. Low capital cost. 	<ul style="list-style-type: none"> Three inspections recommended per year (minimum). 	<p>CA Water Boards Fact Sheet APPLICATION 2</p>
<p>ST3 & ST3G – Catch Basin Connector Pipe</p>  <p>Stormtek</p>	<ul style="list-style-type: none"> Connector Pipe Screens retain large volumes of trash and sediment inside the catch basin instead of the debris being conveyed through the stormwater system. 	<ul style="list-style-type: none"> The StormTek connector pipe screen maximizes use of up to 90% of the available storage capacity. Prevents flooding of the catch basin during large rain events by providing overflow. Can be completely removed from the catch basin/storm drain wall in seconds. 	<ul style="list-style-type: none"> High maintenance frequency (every 3-6 months depending on loading). Warranty is limited compared to other systems (2 years) High capital cost. 	<p>CA Water Boards Fact Sheet – PG 45</p>

Table G-2. State Board Certified Full-Capture Catch Basin Inserts

Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Water Decontaminator</p>  <p>Inventive Resources</p>	<ul style="list-style-type: none"> • Trash capture screen captures particles 5mm and larger. • Oil and contaminants captured in a disposable cartridge. 	<ul style="list-style-type: none"> • Can be used for new and existing catch basins of various sizes. • Easy cleaning. • Has provisions for vector control accessibility. 	<ul style="list-style-type: none"> • High maintenance frequency to ensure optimal performance. • Inspections recommended twice annually. • Housing should be cleaned out once a year. • Filter cartridge needs replacement when slow flow is observed. 	<p>CA Water Boards Fact Sheet APPLICATION 3</p>
<p>Triton Bioflex Inlet Trash Guard</p>  <p>Revel Environmental</p>	<ul style="list-style-type: none"> • Treats liquefied petroleum hydrocarbons and variety of TSS. 	<ul style="list-style-type: none"> • Reduced occlusion and increased flow over a range of rainfall intensities. • Stainless steel media cartridge cam-locks in place onto the filter basin floor allowing quick and easy removal for maintenance. • Low capital cost. 	<ul style="list-style-type: none"> • It is recommended that each installation be serviced a minimum of 3 times per year, with a change of filter medium once per year. • Disposal of exposed filter must be in accordance with local, state and federal agency requirements. • Warranty is limited compared to other systems (1 year, or 6 years if REM contracts to do maintenance). 	<p>CA Water Boards Fact Sheet - PG 6</p>

G1.3 HIGH-FLOW DEVICES

High-Flow Trash Capture Devices are typically designed to decrease the velocity of stormwater runoff, therefore allowing trash and sediment to settle into internal storage zones. The four main categories of High-Flow Trash Capture Devices are described in **Table G-3** and their respective advantages and disadvantages are presented in successive tables.

Table G-3. High-Flow Trash Full-Capture Devices

High-Flow Trash Capture Device	Description
Hydrodynamic Separator (Table G-4)	These devices can remove trash, debris, and coarse sediment from incoming flows using screening, gravity settling, and centrifugal forces generated by forcing the influent into a circular motion. As water moves through the system circularly, rather than in a straight line, it is possible to obtain significant removal of coarse sediments and attached pollutants with less space compared with other traditional gravity settling devices.
Nutrient Separating Baffle Box (Table G-5)	These structures contain a series of sediment settling chambers. Nutrients, vegetation, and litter are captured in a filtration screen system and sediments settle to the bottom.
Netting Trash Trap (Table G-6)	These devices can be installed in-line and in end-of-the-line pipe. They use the natural energy of the stormwater flow to capture trash.
Media Filtration System (Table G-7)	These devices are designed to capture sediment, metals, nutrients, and petroleum hydrocarbons, as well as gross solids and trash, to significantly reduce the total pollutant discharge load in stormwater runoff.

Source: Port of Long Beach, 2018.

Table G-4. Hydrodynamic Separator System Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Can be easily installed as retrofits • Smaller footprint required • Ideal for redevelopment 	<ul style="list-style-type: none"> • Significant maintenance requirements • Prone to sediment resuspension during high-flow storm events • Performance must be verified by third party

Table G-5. Nutrient Separating Baffle Box Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Can be easily installed as retrofits • Good for densely populated urban areas or parking lots • Relatively small footprint 	<ul style="list-style-type: none"> • Significant maintenance requirements • Can re-suspend settled sediment in subsequent storms • Not effective in removing finer sediment

Table G-6. Netting Trash Trap Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Quick installation • Simple and inexpensive • No confined space entry required 	<ul style="list-style-type: none"> • Significant maintenance requirements • Can detach easily if not well installed • Not effective for removing finer sediment and oils/grease

Table G-7. Media Filtration Systems Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Flexible configurations • Can treat for high flow rates • High TSS and phosphorus removal rates 	<ul style="list-style-type: none"> • Significant maintenance requirements • Some systems require confined space entry • Mosquito breeding if not regularly cleaned and maintained

High Flow Devices Full-Capture Trash Devices certified by the State Board (as of April 30, 2018) are listed in **Table G-8**.

An updated list of State certified Trash Full Capture Devices can be found at the following link:

https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/trash_implementation/a1_certified_fcsdevicelist_05aug19.pdf

Table G-8. State Board Certified Full-Capture High Flow Devices

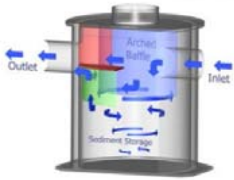
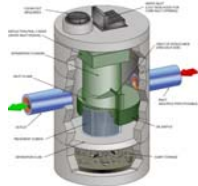
Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Aqua-Swirl Stormwater Treatment System</p>  <p>Aqua Shield, Inc.</p>	<ul style="list-style-type: none"> 85% sediment (net annual) 80% TSS (net annual), gaining one LEED 2009 Credit for Sustainable Sites (SS) 6.2, Stormwater Design - Quality Control Captures sediment, oil, and debris 5 mm or greater 	<ul style="list-style-type: none"> Utilizes lightweight and durable construction materials. Inspection and maintenance activities can be performed from the surface without confined space entry or specialized equipment. Requires minimal routine maintenance. Damage to the system is unlikely as there are no fragile internal parts. 	<ul style="list-style-type: none"> System inspections recommended every 3 months during the first year after installation. Cleaning must be performed with a vacuum truck. Organic matter may decompose and release nitrogen (nitrogen gas or nitrate) to the downstream environment. Sensitivity to heavy loads of sediment. Design incorporates standing water, which may lead to mosquito breeding in the system. 	<p>Brochure</p> <p>Specifications</p> <p>Inspection and Maintenance</p> <p>Field Testing Report</p> <p>NJCAT Technology Verification</p> <p>CA Water Boards Full Capture System Application - PG 84</p>
<p>Continuous Deflective Separator (CDS)</p>  <p>Contech Engineered Solutions</p>	<ul style="list-style-type: none"> Captures and retains 100% of floatables and neutrally buoyant debris 2.4 mm or larger. 	<ul style="list-style-type: none"> Easy to inspect, clean and maintain through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen Self-cleaning screen. Isolated storage sump eliminates scour potential. Internal bypass. 	<ul style="list-style-type: none"> Inspections and maintenance at least twice per year. Warranty is limited compared to other systems (2 years). Multiple pipe inlets and 90-180° angles. 	<p>Brochure</p> <p>CA Water Boards Fact Sheet - PG 77</p>

Table G-8. State Board Certified Full-Capture High Flow Devices (continued)

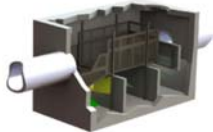

Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Nutrient Separating Baffle Box</p>  <p>Bio Clean Environmental</p>	<ul style="list-style-type: none"> TSS 87% Turbidity 71% Oils & Grease 99% Copper 40% Bacteria 47% 	<ul style="list-style-type: none"> No Confined Space Entry is required for servicing. Device can be accessed for maintenance through manhole or hatch above ground with vacuum truck. Separating pollutants minimizes costs – screen system allows gross solids to be removed without vacuuming out water or sediment chambers. Comes with 5-year warranty. 	<ul style="list-style-type: none"> High frequency of service; checking and cleaning of the baffle boxes every 2 to 3 months during dry season and every month during wet season recommended. Baffle Boxes are more effective at removing larger particles and less effective at removing smaller particles. 	<p>Brochure</p> <p>Specifications</p> <p>Maintenance</p> <p>Water Boards Approval</p> <p>MASTEP Approval</p> <p>CA Water Boards Fact Sheet - PG 80</p>
<p>End of Pipe Netting Trash Trap</p>  <p>Storm Trap</p>	<ul style="list-style-type: none"> 97% removal efficiencies recorded by United States Environmental Protection Agency (U.S. EPA) sponsored projects. 	<ul style="list-style-type: none"> Easily accessible for inspection and maintenance. No confined space entry is required, as net change-out is done at the surface. Scales can be attached to lifting equipment for easy measurement of debris to meet environmental permit requirements. Remote monitoring available through Telnet. 	<ul style="list-style-type: none"> High frequency of net replacement (when net appears 1/2-2/3 full). Failure to replace nets and/or remove floatables from bypass screening (if applicable) will lead to hydraulic relief, drain down deficiencies, and decrease the long-term functionality of the system. Warranty is limited compared to other systems (2 years). High capital cost. 	<p>Brochure</p> <p>CA Water Boards Fact Sheet - PG 71</p> <p>Approved for trash capture by Los Angeles Regional Water Quality Control Board</p>

Table G-8. State Board Certified Full-Capture High Flow Devices (continued)



Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Inline Netting Trash Trap</p>  <p>Storm Trap</p>	<ul style="list-style-type: none"> U.S. EPA-sponsored netting projects recorded 97% removal efficiencies. Performance has been verified by the New Jersey Corporation for Advanced Technology (NJCAT), and is approved by the New Jersey Department of Environmental Protection (NJDEP). 	<ul style="list-style-type: none"> Three-dimensional netting technology removes floatables, trash, and debris while providing a larger surface area than traditional two-dimensional screens. Easily accessible for inspection and maintenance. No confined space entry is required, as net change-out is done at the surface. Long service life, with cost-effective maintenance. Scales can be attached to lifting equipment for easy debris measurements required for environmental permits. Remote monitoring available through Telnet. 	<ul style="list-style-type: none"> High frequency of net replacement (when net appears 1/2 - 2/3 full). Recommended inspections every 6 months to determine the rate of pollutant accumulation. Failure to replace nets and/or remove floatables from bypass screening (if applicable) will lead to hydraulic relief, drain down deficiencies, and decrease the long-term functionality of the system. Warranty is limited compared to other systems (2 years). High capital cost. 	<p>Brochure</p> <p>Maintenance</p> <p>CA Water Boards Fact Sheet - PG 74</p> <p>Approved for trash capture by Los Angeles Regional Water Quality Control Board and NJCAT Verified / NJDEP Certified</p>
<p>Jensen Deflective Separator (JDS)</p>  <p>Jensen Precast</p>	<ul style="list-style-type: none"> Captures 100% of particles greater than or equal to 5 mm. 98% solids removal efficiency for small scale models. 	<ul style="list-style-type: none"> Physical separation of previously captured solids from bypass flows. 50-year design life Variety of access options (frame and covers, hatch access, etc.) HDPE insert for mosquito access control. 	<ul style="list-style-type: none"> Larger units subjected to frequent low flows that are a very low percentage of their peak treatment capacity may not develop the balanced hydraulic conditions for a non-blocking screen. Limited warranty (12 months). 	<p>CA Water Boards Fact Sheet APPLICATION 5</p>

Table G-8. State Board Certified Full-Capture High Flow Devices (continued)


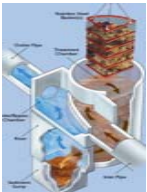
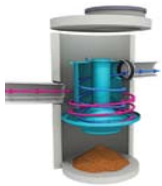
Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Site Saver</p>  <p>Storm Trap</p>	<ul style="list-style-type: none"> Full capture of all particles greater than or equal to 5 mm U.S. EPA-sponsored netting projects recorded 97% removal efficiencies. 	<ul style="list-style-type: none"> Quick installation. Low capital and installation costs. Accessible for inspection and maintenance. Remote monitoring available through Telnet. 5-year warranty. 	<ul style="list-style-type: none"> Quarterly inspections within the first year of installation are recommended. Influent pipe velocities should not exceed 7 ft/s. 	<p>CA Water Boards Fact Sheet APPLICATION 9</p>
<p>CleansAll - Gross Pollutant Trap</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> High sediment removal. CleansAll® GPT is capable of removing in excess of 98% of gross pollutants (>2 mm) and oils, as well as approximately 70% of sediment (75 µm – 2.36 mm) at design flows. 	<ul style="list-style-type: none"> Stormwater enters the inlet chamber, where it is diverted by a by-pass weir into the treatment chamber. Long service life. Low head loss. Effective overflow system for larger flows. Comes with 5-year warranty. 	<ul style="list-style-type: none"> Requires inspection on a regular basis and maintenance as necessary to ensure performance. Crane Truck is needed to remove and empty trash baskets. Disposal of collected debris must be conducted in accordance with relevant regulations. 	<p>CA Water Boards Fact Sheet - PG 68</p>
<p>Downstream Defender</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> Tests conducted under simulated oil spill conditions showed that Downstream Defender® maintains greater than 80% removal efficiency for a range of loading rates. Field testing on an urban mixed-use site showed effective control of oil and grease, limiting the average effluent concentration to 16 mg/L (manufacturer reference). 	<ul style="list-style-type: none"> Offers long maintenance intervals and consolidates pollutant removal to a single point in the drainage system. Comes with 5-year warranty. 	<ul style="list-style-type: none"> The frequency of the sump vacuum procedure is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. 	<p>Brochure</p> <p>CA Water Boards Fact Sheet - PG 65</p>

Table G-8. State Board Certified Full-Capture High Flow Devices (continued)


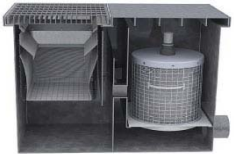
Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Dual Vortex Separator (DVS)</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> Removes solids, trash, debris, and petroleum hydrocarbons. Performance has been verified by the NJCAT, and is approved by the NJDEP. 	<ul style="list-style-type: none"> Dual access to sediment storage areas. Easy access to floatable collection areas. Modular construction of components. Large interior work areas. Low capital cost. Comes with 5-year warranty. 	<ul style="list-style-type: none"> Confined space required for maintenance. Recommended inspection twice per year. All material removed from the DVS during maintenance must be disposed of in accordance with local regulations. 	<p>Product Overview</p> <p>Maintenance</p> <p>CA Water Boards Fact Sheet - PG 62</p>
<p>FloGard Perk Filter</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> TSS >80% Total Phosphorus >60% High TSS and phosphorus removal rates 	<ul style="list-style-type: none"> Offers a wide variety of media filters to address the specific pollutants of concern. Pretreatment chamber prolongs media lifespan by removing gross pollutants. Integrated bypass system reduces construction costs by eliminating the need for a separate bypass structure. Retrofit options in vaults, manholes, and catch basins with variable inlet/outlet locations. Low capital cost. Comes with 5-year warranty. 	<ul style="list-style-type: none"> System requires inspection on a regular basis and maintenance as necessary to ensure performance. Confined space required for maintenance. 	<p>Product Overview</p> <p>Maintenance</p> <p>Drawing Details</p> <p>CA Water Boards Fact Sheet - PG 59</p> <p>Approved for trash capture by the San Francisco Bay Regional Water Quality Control Board.</p>

Table G-8. State Board Certified Full-Capture High Flow Devices (continued)




Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Nettech Gross Pollutant Trap - In Line</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> Captures and retains more than 99% of pollutants larger than 2 mm. 	<ul style="list-style-type: none"> Nets are light and malleable for easy inspection and installation. Lack of human contact with interceptor pollutants. Custom sizes available for retrofit applications. Low capital cost. Can be fitted to conduits of almost any size and shape. Low capital cost. Comes with 5-year warranty. 	<ul style="list-style-type: none"> Maintenance depends on the amount of runoff, pollutant loading, and interference from debris. 	<p>CA Water Boards Fact Sheet - PG 53</p>
<p>Nettech Gross Pollutant Trap - End of the Line</p>  <p>Oldcastle Precast</p>	<ul style="list-style-type: none"> Captures sediment and debris 5 mm or greater. 	<ul style="list-style-type: none"> Ease of installation and maintenance. Lack of human contact with interceptor pollutants. Water drains completely from the device, so there is no likelihood of odor, infection, or mosquito breeding. Debris cannot be reactivated, as overtopping is not possible. Litter is stored dry, preventing anaerobic decomposition. Custom sizes available for retrofit applications. Low capital cost. 25-year warranty for stainless steel, 10-year warranty for netting. 	<ul style="list-style-type: none"> It is recommended that installed Net Tech be systematically and periodically checked to make sure the net has not become full and detached itself. Susceptible to tearing and detaches easily depending on weight and types of debris. 	<p>Product Overview</p> <p>Drawing Details</p> <p>CA Water Boards Fact Sheet - PG 50</p>

Table G-8. State Board Certified Full-Capture High Flow Devices (continued)

Devices	Pollutant Removal and Performance	Product and Maintenance		Specification Links/Brochures
		PROS	CONS	
<p>Storm Flo Trash Screen</p>  <p>Roscoe Moss</p>	<ul style="list-style-type: none"> Captures sediment and debris 5 mm or greater. 	<ul style="list-style-type: none"> System removes solids from stormwater and is manufactured in diameters and lengths to treat a wide range of hydraulic conditions and debris loads. The captured debris is accessed through large hatchways that are located on top of the screen. There is no maintenance required on the device itself other than cleaning of the interior. Low capital cost. 	<ul style="list-style-type: none"> It is recommended that the device be cleaned when half full. Cleaning the interior is best accomplished with a vacuum truck. Warranty is limited compared to other systems (2 years). 	<p>CA Water Boards Fact Sheet - PG 47</p>

G1.4 MULTI-BENEFIT TREATMENT SYSTEMS

Multi-Benefit Treatment Systems include many of the Stormwater Control Measures (SCMs) that are discussed in the Stormwater Development Standards. To qualify as a Trash Full-Capture Device, the design and plan must be approved with the following requirements:

- Prohibits the discharge of particles sized at 5 mm or larger to surface waters offsite;
- Contains a capacity greater than the volume collected during the region specific one-year, one-hour storm event from the applicable drainage area, or a capacity to carry at least the same flows as the corresponding storm drain;
- Incorporates an operation and maintenance plan sufficient to ensure that the captured trash does not migrate from the site; and
- Has stamped and signed design plans by a registered California-licensed professional civil engineer (see Business and Professional Code Section 6700, et seq.).

Table G-9 provides a brief description of how these devices function, and successive tables provide information on the advantages and disadvantages of each treatment system.

Please see the [State Board Guidance](#) for each Multi-Benefit Treatment System described.

Table G-9. Multi-Benefit Treatment System Trash Full-Capture Summary

Multi-Benefit Treatment System	Description
Rainwater Harvesting (Table G-10)	Rainwater harvesting cisterns and rain barrels store rooftop runoff and reuse it for landscaping and other nonpotable uses.
Infiltration Basins (Table G-11)	Infiltration basins are stormwater impoundments over permeable soils with vegetated bottoms and side slopes. Infiltration basins are designed to reduce stormwater volumes through exfiltration and groundwater recharge.
Biofiltration (Table G-12)	Biofiltration SCMs use soils, plants, and microbes to treat stormwater before it is infiltrated and/or discharged. Biofiltration areas are shallow depressions filled with sandy soil topped with a thick layer of mulch and planted with dense native vegetation.
Detention Basins (Table G-13)	Detention basins are excavated basins for the short-term retention of stormwater runoff that allows a controlled release from the structure at downstream, predevelopment flow rates. These basins are not designed to provide extended dewatering times, wet pools, or groundwater recharge.
Media Filters (Table G-14)	Media filters use a bed of sand, peat, zeolite, anionic, and/or cationic media, granite, or other fine-grained materials or fabrics to physically separate sediment and sediment-bound pollutants and/or electrochemically remove dissolved constituents from stormwater.

Source: Port of Long Beach, 2018.

Table G-10. Rainwater Harvesting Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Reduced water demand • Can decrease water utility costs • Reduced stormwater runoff 	<ul style="list-style-type: none"> • Mosquito breeding if not regularly maintained • May need to disconnect and drain in winter

Table G-11. Infiltration Basin Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Groundwater recharge • Volume reduction • Peak flow attenuation 	<ul style="list-style-type: none"> • Requires pretreatment • Large pervious area required • Clogging potential is high

Table G-12. Biofiltration Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Can contribute to groundwater recharge • Can be used on small lots with space constrains • Little or no hazard for amphibians or other small animals • Suitable for stormwater retrofit projects 	<ul style="list-style-type: none"> • Requires careful landscaping and maintenance • Not suitable for large landscape areas.

Table G-13. Detention Basin Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Controls peak runoff flows • Low cost 	<ul style="list-style-type: none"> • Large land area • Susceptible to resuspension of settled materials by subsequent storms • Negligible removal of total suspended solids

Table G-14. Media Filters Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Good sediment removal • Suitable for industrial sites for specific target pollutants. • Peak flow attenuation 	<ul style="list-style-type: none"> • Filter maintenance regularly • Severe clogging potential • Performance varies upon media

Trash Full-Capture SCMs are also useful as pretreatment devices for other volume control measures. Rainwater Harvesting SCMs benefit from trash-capture to screen for particles before more robust treatment. Infiltration SCMs also require trash capture to prevent clogging and increase their overall efficiency.