

Section [_____] Storm Water Treatment Device

PART 1 – GENERAL

01.01.00 Purpose

The purpose of this specification is to establish generally acceptable criteria for Storm Water Treatment Devices for treating storm water runoff including dry weather flows and other contaminated water sources. It is intended to serve as a guide to promote understanding regarding materials, manufacture and installation, and to identify devices complying with this specification.

01.02.00 Description

Storm Water Treatment Devices (SWTD) are used for filtration of stormwater runoff including dry weather flows. The SWTD is an inline pre-engineered hydrodynamic separation system composed an inlet flow splitter assembly creating two vortex motions, one clockwise and one counter clockwise on the influent side of the oil/floatables baffle, the vertically extending oil/floatables baffle, and an outlet weir assembly to reduce inlet velocities, maximize flow path and create laminar flow conditions.

01.03.00 Manufacturer

The manufacturer of the SWTD shall be one that is regularly engaged in the engineering design and production of systems developed for the treatment of stormwater runoff for at least (10) years, and which have a history of successful production, acceptable to the engineer of work. In accordance with the drawings, the SWTD(s) shall be a device manufactured by Bio Clean Environmental Services, Inc., or assigned distributors or licensees. Bio Clean Environmental Services, Inc. can be reached at:

Corporate Headquarters:
398 Via El Centro
Oceanside, CA 92058
Phone: (760) 433-7640
Fax: (760) 433-3176
www.biocleanenvironmental.net

01.04.00 Submittals

- 01.04.01 Submittal drawings are to be provided with each order to the contractor and consulting engineer.
- 01.04.02 Submittal drawings are to detail the SWTD and all components required and the sequence for installation, including:
- System configuration with primary dimensions
 - Interior components
 - Any accessory equipment called out on submittal drawings
- 01.04.03 Inspection and maintenance documentation submitted upon request.

01.05.00 Work Included

- 01.05.01 Specification requirements for installation of SWTD.
- 01.05.02 Manufacturer to supply components of the SWTD(s):
- Concrete structure
 - Internal components
 - Risers, hatches, and manholes optional

01.06.00 Reference Standards

ASTM A 615	Standard Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A 706	Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
ASTM D422-63	Standard Test Method for Particle-Size Analysis of Soils
ASTM D3977-97	Standard Test Methods for Determining Sediment Concentrations in Water Samples

PART 2 – COMPONENTS

The Storm Water Treatment Device (SWTD) and all of its components shall be self-contained within a concrete structure constructed with a minimum 28 day compressive strength of 5,000 psi, with reinforcing per ASTM A 615 and ASTM A 706, Grade 60, and supports a minimum H-20 loading as indicated by AASHTO. All seams and connection points shall be sealed water tight with non-shrink grout in accordance with manufactures recommendations and project specifications.

02.01.00 Flow Splitter

02.01.01 Flow Splitter - shall be constructed of high density polyethylene conforming to a tensile strength of 3,600 psi (ASTM D-638), and Izod impact value of 3.0 (ASTM D-256), water absorption of 0.01% (ASTM D-570), a density of 0.959 (ASTM D-792), a flexural modulus of 200,000 (ASTM D-792), a heat distortion temperature of 176 °F (ASTM D-648), and a Rockwell Hardness of 69 (ASTM D-785). Thickness of Flow Splitter will be ¼” or greater. Joints must be welded using acceptable methods for HDPE (high density polyethylene). Flow Splitter shall be mounted across the inlet pipe such that all inflowing water flows into it. The flow splitter must split the incoming flows in two directions along the perimeter of the structure toward the oil/floatables skimmer. The horizontal deck of the flow splitter shall be positioned below the inlet pipe invert.

02.02.00 Oil/Floatables Skimmer

02.02.01 Oil/Floatables Skimmer - shall be constructed of high density polyethylene conforming to a tensile strength of 3,600 psi (ASTM D-638), and Izod impact value of 3.0 (ASTM D-256), water absorption of 0.01% (ASTM D-570), a density of 0.959 (ASTM D-792), a flexural modulus of 200,000 (ASTM D-792), a heat distortion temperature of 176 °F (ASTM D-648), and a Rockwell Hardness of 69 (ASTM D-785). Thickness of Oil/Floatables Skimmer will be ¼” or greater. Joints must be welded using acceptable methods for HDPE (high density polyethylene). Oil/Floatables Skimmer shall be mounted across concrete structure at its widest point and extend vertically downward 12” below the outlet pipe invert and upward several feet above the outlet pipe invert.

02.03.00 Outlet Weir

02.03.01 Outlet Weir - shall be constructed of high density polyethylene conforming to a tensile strength of 3,600 psi (ASTM D-638), and Izod impact value of 3.0 (ASTM D-256), water absorption of 0.01% (ASTM D-570), a density of 0.959 (ASTM D-792), a flexural modulus of 200,000 (ASTM D-792), a heat distortion

temperature of 176 °F (ASTM D-648), and a Rockwell Hardness of 69 (ASTM D-785). Thickness of Outlet Weir will be ¼” or greater. Joints must be welded using acceptable methods for HDPE (high density polyethylene). Outlet Weir shall be mounted across the outlet pipe such that all outflowing water flows over it. The outlet weir must be level as to create laminar flow over its top to minimize entrance velocity out of the system and into the outlet pipe. The top of the outlet weir must be above the outlet pipe invert. The horizontal deck of the outlet weir shall be positioned below the outlet pipe invert.

02.04.00 Mounting Hardware

- 02.04.01 Wedge Anchors - internal components shall be fastened to the concrete structure using stainless steel hardware Grade 304 or 316. Stainless steel wedge anchors shall be 3/8” in diameter and at least 3” long. Fender washers (2” diameter) are to be used with wedge anchors where the internal baffles are fastened to the concrete walls to disperse the anchor pressure over the baffle surface area.

02.05.00 Sealant

- 02.05.01 Silicone - internal components fastened to the concrete structure shall of any gaps filled with sealant to ensure no leakage. All surfaces in which the HDPE internal components make contact with a concrete surface must be fully filled with sealant and made completely watertight. Sealant must be Sil-Fix (RTV 7500) and have a movement capability of 50% (ASTM C-719), a low Modulus rating (ASTM D-412), an extrusion rate of 500 g/min (ASTM C-1183), Skin over time of 12 minutes (MNA method), track over time of 25 minutes (ASTM C-679), a tensile strength of 190 psi (ASTM D-412) and a elongation percentage of 650 (ASTM D-412).

PART 3 – PERFORMANCE

03.01.00 General

- 03.01.01 Function - The SWTD is a pre-engineered inline hydrodynamic separation system composed of a flow splitter, oils/floatables baffle, outlet weir and sump chamber designed to capture sediments, floatables, particulate bound nutrients and metals, oils and other debris.
- 03.01.02 Removal Efficiencies - The SWTD shall be capable of achieving at least 80% Annualized weighted TSS removal efficiency (of the size fractions typical for urban runoff) up to 100% of its manufacture treatment flow rate (MTFR). The SWTD shall be capable of capturing and retaining 98% of oils and grease up to 100% of its manufacture treatment flow rate (MTFR). All removal efficiencies shall be tested in accordance with section 03.02.00.
- 03.01.03 Hydraulic Capacity - The SWTD shall provide a rated hydraulic capacity, which is consistent with governing water treatment regulations. The hydraulic capacity must be supported by independent third-party testing per section 03.02.01.
- 03.01.04 Storage Capacity - The volume of the sump chamber will be called out on the submittal drawings. The SWTD must have an oil/floatable skimmer to capture floatable pollutants.

03.02.00 Test Performance

At a minimum, the SWTD must meet all of these testing performance standards and have a Manufactures Performance Certification per Section 05.02.00:

- 03.02.01 Independent Third Party Testing:
The SWTD must be tested by a fully independent third party laboratory using the latest New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device dated January 25, 2013. Testing done under the old protocol is not acceptable. Testing done in-house by a manufacturer with a third party independent observer is also not acceptable;
- Must use a particle size distribution (PSD) with an average mean of between 110 and 120 microns on average.
 - Annualized weighted TSS removal efficiency must be greater than 80% based on a range of flow rates from 25% to 125% the MTRF as specified in the New Jersey protocol.
 - Removal efficiencies based on using a pecclet number and extrapolating from testing under the old New Jersey protocol are not acceptable.
- 03.02.03 Oil and Grease Removal - The SWTD must be tested by a independent third party laboratory using an acceptable testing method such as Canadian ETV. Testing must be done up to 125% the systems MTRF.

PART 4 - EXECUTION

04.01.00 General

The installation of the SWTD shall conform to all applicable national, state, state highway, municipal and local specifications.

04.02.00 Installation

The Contractor shall furnish all labor, equipment, materials and incidentals required to install the (SWTD) device(s) and appurtenances in accordance with the drawings and these specifications.

- 04.02.01 Grading and Excavation site shall be properly surveyed by a registered professional surveyor, and clearly marked with excavation limits and elevations. After site is marked it is the responsibility of the contractor to contact local utility companies and/or DigAlert to check for underground utilities. All grading permits shall be approved by governing agencies before commencement of grading and excavation. Soil conditions shall be tested in accordance with the governing agencies requirements. All earth removed shall be transported, disposed, stored, and handled per governing agencies standards. It is the responsibility of the contractor to install and maintain proper erosion control measures during grading and excavation operations.
- 04.02.02 Compaction – All soil shall be compacted per registered professional soils engineer's recommendations and per governing agencies standards, prior to installation of SWTD.
- 04.02.03 Backfill shall be placed according to a registered professional soils engineer's recommendations and per governing agencies standards, and with a minimum of 6" of gravel under all concrete structures.
- 04.02.04 Concrete Structures – After backfill has been inspected by the governing agency and approved the concrete structures shall be lifted and placed in proper position per plans.

04.03.00 Shipping, Storage and Handling

- 04.03.01 Shipping – SWTD shall be shipped to the contractor’s address or job site, and is the responsibility of the contractor to offload the unit(s) and place in the exact site of installation.
- 04.03.02 Storage and Handling– The contractor shall exercise care in the storage and handling of the SWTD and all components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be born by the contractor. The SWTD(s) and all components shall always be stored indoors and transported inside the original shipping container until the unit(s) are ready to be installed. The SWTD shall always be handled with care and lifted according to OSHA and NIOSA lifting recommendations and/or contractor’s workplace safety professional recommendations.

04.04.00 Maintenance and Inspection

- 04.04.01 Inspection – After installation, the contractor shall demonstrate that the SWTD has been properly installed at the correct location(s), elevations, and with appropriate components. All components associated with the SWTD and its installation shall be subject to inspection by the engineer at the place of installation. In addition, the contractor shall demonstrate that the SWTD has been installed per the manufacturer’s specifications and recommendations. All components shall be inspected by a qualified person once a year and results of inspection shall be kept in an inspection log.
- 04.04.02 Maintenance – The manufacturer recommends cleaning and debris removal and replacement of the storm booms as needed. The maintenance shall be preformed by someone qualified. A Maintenance Manual is available upon request from the manufacturer. The manual has detailed information regarding the maintenance of the SWTD. A Maintenance/Inspection record shall be kept by the maintenance operator. The record shall include any maintenance activities preformed, amount and description of debris collected, and the condition of the storm booms.
- 04.04.03 Material Disposal - All debris, trash, organics, and sediments captured by the SWTD shall be transported and disposed of at an approved facility for disposal in accordance with local and state requirements. Please refer to state and local regulations for the proper disposal of toxic and non-toxic material.

PART 5 – QUALITY ASSURANCE

05.01.00 Warranty

The Manufacturer shall guarantee the SWTD against all manufacturing defects in materials and workmanship for a period of (1) year from the date of delivery to the customer. The manufacturer shall be notified of repair or replacement issues in writing within the warranty period. The SWTD is limited to recommended application for which it was designed.

05.02.00 Performance Certification

The SWTD manufacturer shall submit to the Engineer of Record a “Signed Third Party Performance Report” certifying the SWTD is capable of achieving the specified removal efficiency for suspended solids as typically found in storm water runoff.

END OF SECTION

Metric Specifications

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Corporate Headquarters:
5796 Armada Drive, Suite 250
Carlsbad, CA 92008
Phone: (760) 433-7640
Fax: (760) 433-3176
www.biocleanenvironmental.net

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02.03.00 Outlet Weir

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02.04.00 Mounting Hardware

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PART 3 – PERFORMANCE

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- 03.01.03 Hydraulic Capacity - The SWTD shall provide a rated hydraulic capacity, which is consistent with governing water treatment regulations. The hydraulic capacity must be supported by independent third-party testing per section 03.02.01.
- 03.01.04 Storage Capacity - The volume of the sump chamber will be called out on the submittal drawings. The SWTD must have an oil/floatable skimmer to capture floatable pollutants.

03.02.00 Test Performance

At a minimum, the SWTD must meet all of these testing performance standards and have a Manufacturer's Performance Certification per Section 05.02.00:

- 03.02.01 Independent Third Party Testing:
The SWTD must be tested by a fully independent third-party laboratory using the latest Canadian Environmental Technology Verification Program to assess total suspended solids removal by a hydrodynamic sedimentation manufactured treatment device dated February 15, 2019. Testing done under the old protocol is not acceptable. Testing done in-house by a manufacturer with a third-party independent observer is also not acceptable;
- 03.02.03 Oil and Grease Removal - The SWTD must be tested by an independent Third-party laboratory using an acceptable testing method such as Canadian ETV. Testing must be done up to 125% the systems MTR.

PART 4 - EXECUTION

04.01.00 General

The installation of the SWTD shall conform to all applicable national, provincial, highway, municipal and local specifications.

04.02.00 Installation

The Contractor shall furnish all labor, equipment, materials and incidentals required to install the (SWTD) device(s) and appurtenances in accordance with the drawings and these specifications.

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- 04.02.02 Compaction – All soil shall be compacted per registered professional soils engineer's recommendations and per governing agencies standards, prior to installation of SWTD.
- 04.02.03 Backfill shall be placed according to a registered professional soils engineer's recommendations and per governing agencies standards, and with a minimum of 150 mm of gravel under all concrete structures.
- 04.02.04 Concrete Structures – After backfill has been inspected by the governing agency and approved the concrete structures shall be lifted and placed in proper position per plans.

04.03.00 Shipping, Storage and Handling

- 04.03.01 Shipping – SWTD shall be shipped to the contractor's address or job site, and is the responsibility of the contractor to offload the unit(s) and place in the exact site of installation.

- 04.03.02 Storage and Handling– The contractor shall exercise care in the storage and handling of the SWTD and all components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be born by the contractor. The SWTD(s) and all components shall always be stored indoors and transported inside the original shipping container until the unit(s) are ready to be installed. The SWTD shall always be handled with care and lifted according to OSHA and NIOSA lifting recommendations and/or contractor’s workplace safety professional recommendations.

04.04.00 Maintenance and Inspection

- 04.04.01 Inspection – After installation, the contractor shall demonstrate that the SWTD has been properly installed at the correct location(s), elevations, and with appropriate components. All components associated with the SWTD and its installation shall be subject to inspection by the engineer at the place of installation. In addition, the contractor shall demonstrate that the SWTD has been installed per the manufacturer’s specifications and recommendations. All components shall be inspected by a qualified person once a year and results of inspection shall be kept in an inspection log.
- 04.04.02 Maintenance – The manufacturer recommends cleaning and debris removal and replacement of the storm booms as needed. The maintenance shall be preformed by someone qualified. A Maintenance Manual is available upon request from the manufacturer. The manual has detailed information regarding the maintenance of the SWTD. A Maintenance/Inspection record shall be kept by the maintenance operator. The record shall include any maintenance activities preformed, amount and description of debris collected, and the condition of the storm booms.
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PART 5 – QUALITY ASSURANCE

05.01.00 Warranty

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05.02.00 Performance Certification

The SWTD manufacturer shall submit to the Engineer of Record a “Signed Third Party Performance Report” certifying the SWTD is capable of achieving the specified removal efficiency for suspended solids as typically found in storm water runoff.

END OF SECTION