

**STORMWATER QUALITY STORMWATER TREATMENT UNIT
SPECIFICATIONS**

GENERAL SWTU SPECS

1.1 Scope

The Contractor shall install a precast storm water treatment unit(s) (SWTUs) in accordance with the notes and details shown on the drawings and in conformance with these Specifications. The precast SWTU(s) shall be a (XX.XX)-cubic foot per second (-cfs [-ft³/s]) treatment flow rate capacity Jensen Deflective Separator (JDS), model JDSXXX-XXXXXX as manufactured by Jensen Precast. This type of SWTU(s) is typically categorized as a Hydrodynamic Separation (HDS) unit.

The Contractor shall furnish all labor, equipment and materials necessary to install the SWTU(s) along with any required appurtenances. The SWTU(s) shall be a precast underground structure capable of achieving the treatment and hydraulic performance and materials requirements of these SWTU(s), Stormwater Quality Specifications.

The SWTU(s) shall be non-mechanical and gravity driven. The SWTU(s) shall come equipped with a stainless steel expanded metal screen cylinder configured in the separation chamber. This expanded screen shall have openings of (4,700)-micron, (4.7-millimeters), (0.185 inches), (2,400)-micron (2.4-millimeters) (0.0925 inches). The treatment flow through the separation screen cylinder assembly shall be self-cleaning and non-blocking for all flows diverted to it, even when flows within the storm drain pipeline exceed the SWTU's treatment flow capacity listed above.

SWTU(s) must have approval prior to implementation.

The following specifications sections also apply to the installation of this SWTU

Excavation & Backfill	Specification Section ()
Shoring	Specification Section ()
Dewatering	Specification Section ()

SWTU(s) TREATMENT, HYDRAULIC AND MATERIALS SPECS

2.1 PERFORMANCE

A. Solids Removal Efficiencies (RE%)

1. The SWTU(s) shall be capable of achieving an 80 percent (%) average annual reduction in the total suspended solids (TSS).

2. The SWTU(s) shall be capable of capturing and retaining 100% of pollutants greater than or equal to (\geq) 4.7 (2.4)-millimeters (mm) regardless of the specific gravity of the pollutant, whether the pollutant is a floatable or neutrally buoyant for flows up to the SWTU's water quality design treatment flow rate capacity.
3. There shall be no flow path through the SWTU(s)' listed treatment flow capacity in Table 1., that allows the passage of a 4.7-mm (2.4-mm) or larger neutrally buoyant object. The SWTU(s) must have positive, non-blocking screening process.
4. The SWTU(s) shall be designed to retain all previously captured pollutants even during bypass flow conditions. The unit shall not "Burp" or allow the scouring out of previously captured pollutants.
5. Solids RE% shall be supported by independent third-party research utilizing Particle Size Distributions consistent with the New Jersey Department of Environmental Protection's.
6. The SWTU(s) device shall be capable of achieving greater than 65% removal efficiency (RE%) of particles typically found in roadside sediments.
7. The SWTU(s) device shall be Full Capture certified by the California Department of Water Resources (DWR). This Certification shall be supported by the completion and submission to the DWR of a full Scale Test validating 100% Full Capture of the 5-mm and larger particles, verified by an Independent 3rd Party.
8. The full scale testing of the SWTU for Full Capture shall demonstrate 100% retention of the 5-mm and larger particles for all bypass flows. The SWTU may not "Burp" previously captured trash and debris during any bypass flow event.
9. The SWTU(s) shall be certified for Vector (Mosquito) Control Accessibility Verification by the Mosquito and Vector Control Association of California (MVCAC).
10. The SWTU(s) shall be capable of capturing and retaining Total Petroleum Hydrocarbons (TPH), also known as oils and greases (O&G). The SWTU(s) shall be capable of achieving the following RE%_{TPH}:
 - RE%_{TPH} = 92% when hydraulically loaded at 25% percent of its rated-treatment capacity.
 - RE%_{TPH} = 78% when hydraulically loaded at 50% percent of its rated-treatment capacity.

These RE%_{TPH} shall be based on independent third-party research for influent oil concentrations representative of storm water runoff of 20-mg/L, \pm 5-mg/L.

8. The SWTU(s) shall be greater than 99% effective in controlling oil spills during dry weather.

9. The SWTU(s) shall be capable of utilizing sorbent media to enhance removal and retention of petroleum based pollutants. See “Oil Sorbent” in the Materials section of these specs.
- B. Treatment Sizing Criteria: The treatment sizing methodology and design criteria for this SWTU(s) shall conform to the following:
1. The specified SWTU(s), is a swirl concentrating non-blocking screening HDS designed in accordance with the governing tenants of the continuous deflective separation treatment process for the treatment of the water quality runoff rate at its critical flow depth in the inlet, to achieve a RE% = 80% for TSS. This 80% TSS RE% shall be based on an average particles size of $D_{50}=63\text{-microns}$ (μm).
 2. This HDS, vortex-type separation system has been designed so that the surface hydraulic loading rate in the plan view of the separation chamber does not exceed 24-gpm/ft^2 at any time of operation up to the SWTU’s treatment flow rate listed above.
- C. Alternative SWTUs: Alternative SWTU(s) may be considered and must be approved before implementation. At a minimum, an alternative SWTU(s) system shall have treatment sizing methodology and design criteria that conform with these entire specifications to include the following:
1. Alternative-Gravity-based, sedimentation separation systems based on “Stokes Law” for gravity settling of particles shall not have a surface hydraulic loading rate in their primary sedimentation chamber that exceeds 6-gpm/ft^2 , plan view, at the peak of the treatment flow rate. Solids RE% claims of 80% TSS removal based on an average particles size of $D_{50}=63\text{-}\mu\text{m}$ when the unit has a surface hydraulic loading rate, in the plan view, more than 6-gpm/ft^2 will not be accepted.

These gravity units shall not exceed laminar flow condition parameters in their primary treatment chamber. Additionally, they will be design to include a bypass system to prevent turbulence from occurring in their primary treatment sedimentation chamber.
 2. The performance of alternative treatment processes shall have been evaluated by a third party and verified in a program that allows a reasonable comparison to other technologies on an essentially equal Particle Size Distribution (PSD) basis such as the New Jersey Corporation for Advanced Technology (NJCAT) or equivalent verification program.
 3. Solids RE% performance should be third party verified, and removal efficiencies across the spectrum of particle sizes reported, at a range of hydraulic loading rates varying over a range of at least 25% to 125% of the manufacturer’s advertised ‘water treatment’ loading rate.
 4. Solids RE% shall be verified by the New Jersey Corporation for Advanced Technology (NJCAT), and certified by the New Jersey Department of Environmental Protection (NJDEP), which is the only acceptable Solids RE% program. It is supported by independent third-party validation using known

Particle Size for tests ensuring a direct solids RE% comparison between SWTUs.

5. The SWTU(s) device shall be Full Capture certified by the California Department of Water Resources (DWR). This Certification shall be supported by the completion and submission to the DWR of a full Scale Test validating 100% Full Capture of the 5-mm and larger particles, verified by an Independent 3rd Party.
6. The full scale testing of the SWTU for Full Capture shall demonstrate 100% retention of the 5-mm and larger particles for all bypass flows. The SWTU may not “Burp” previously captured trash and debris during any bypass flow event.
7. The SWTU(s) shall be certified for Vector (Mosquito) Control Accessibility Verification by the Mosquito and Vector Control Association of California (MVCAC).
8. The manufacturer of an alternative SWTU shall be vetted to confirm their suitability to provide an acceptable SWTU. At a minimum, alternative manufacturer shall have been regularly engaged in the engineering design and production of stormwater treatment systems deployed for at least five (5) years with a proven record of providing quality SWTUs as well as a history of successful production and delivery.

A. Hydraulic Treatment and Bypass Capacity

1. The SWTU shall have a treatment flow rate capacity in cubic feet per second (cfs, ft³/s), in accordance with the SWTU model listed in Table 1., before bypass flow is allowed.
2. The SWTU shall maintain the peak conveyance capacity of the drainage network as defined by the Engineer.

B. Solids and Oil Storage Capacity

1. The SWTU shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber shall be measured in cubic yards (yd³), and equal to the value of the model SWTU listed in Table 1.

The sump chamber shall be hydraulically and physically separate from the treatment process flow path of the SWTU(s) to minimize re-suspension potential of fine particles. Access ways shall be no smaller in diameter than 24-inches.

2. The SWTU shall have an oil storage capacity of the gallons for retention of oil and fuel spills during dry-weather per the volume listed in Table 1 below.

Table 1. JENSEN DEFLECTIVE SEPARATOR (JDS)
Stormwater Treatment Units (SWTUs), Hydrodynamic Separator (HDS),
Full Capture (FC), Non-Blocking Screening, Swirl Concentrating Units

Model Designation	Treatment Flow Rate (Nominal)	Sump Capacity		Oil Storage Capacity
	(ft ³ /s)	(ft ³)	(yd ³)	(gal)
JDS36-1813	0.3	14	0.5	29.5
JDS36-1818	0.6	14	0.5	35.4
JDS36-1827	1.0	14	0.5	46.0
JDS48-2418(G) ¹	0.7	28	1.0	66.1
JDS48-2418	0.7	28	1.0	66.1
JDS48-2424	1.1	28	1.0	79.4
JDS48-2430	1.6	28	1.0	92.6
JDS60-2418	0.7	44	1.6	90.4
JDS60-2424	1.1	44	1.6	108.5
JDS60-2430	1.6	44	1.6	126.5
JDS72-3624	2.0	64	2.4	158.6
JDS72-3630	2.4	64	2.4	185.0
JDS72-3636	3.0	64	2.4	211.4
JDS72-3642	3.8	64	2.4	237.9
JDS84-4230	2.8	106	3.9	285.3
JDS84-4236	3.7	106	3.9	320.9
JDS84-4242	4.6	106	3.9	356.6
JDS84-4248	5.6	106	3.9	392.2
JDS96-4836	4.5	126	4.7	434.2
JDS96-4848	6.5	126	4.7	530.7
JDS96-4854	7.5	126	4.7	579.0
JDS96-4860	8.5	126	4.7	579.0
JDS120-6748	9.0	157	5.8	770.7
JDS120-6758	11.0	157	5.8	887.5
JDS120-6764	14.0	157	5.8	957.6
JDS120-6770	15.2	157	5.8	1027.7
JDS120-6782	19.0	157	5.8	1167.8
JDS144-8484	25.2	283	10.5	1894.8
JDS144-9480	26.0	283	10.5	1828.7
JDS144-9490	31.0	283	10.5	2015.3
JDS144-94102	38.0	283	10.5	2239.2
JDS192-12096	44.0	603	22.3	2251.1
JDS192-120108	53.0	603	22.3	2488.1
JDS192-120120	62.0	603	22.3	2725.0
JDS192-120132	72.0	603	22.3	2962.0
JDS192-120144	81.0	603	22.3	3198.9

1. "G" suffix on small JDS models designed to treat flows entering from drop or grated inlets as well as lateral pipes.

4.2 MATERIALS

- A. Precast Concrete Components: Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:
1. Concrete shall achieve a minimum 28-day compressive strength of 3,000 pounds per square-inch (psi);
 2. Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
 3. Cement shall conform to ASTM C 150;
 4. Aggregates shall conform to ASTM C 33;
 5. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 706, A 185 or A 497; and
 6. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.
- B. Internal Components and Appurtenances: Internal Components and Appurtenances shall conform to the following:
1. Screen and support structure shall be manufactured of Type 316 and 316L stainless steel;
 2. Connection hardware shall be manufactured of Type 316 stainless steel;
 3. Inlet Weir Cylinder shall be manufactured from high density polypropylene (HDPE), marine grade aluminum or stainless steel 304 or 316; and
 4. Access system(s) shall conform to the following:
 - a. Manhole cast iron frames and covers shall withstand AASHTO H-20 loadings and cast-iron material shall conform to ASTM A 48 Class 30.
 - b. Hatch systems shall be designed to withstand the site loading conditions, and shall be manufactured from either steel or aluminum and must be approved before implementation.
- C. Oil Sorbents: The addition of the oil sorbents can ensure the permanent removal of 80% to 90% of the free oil and grease from the storm water runoff.

USE OF SORBENTS – It needs to be emphasized that the addition of sorbents is not a requirement for *JDS* units to effectively control oil and grease from storm water. The complete discharge piping configuration in the *JDS* unit has been designed to function as a conventional oil baffle. This baffling configuration assures satisfactory oil and grease removal. However, the addition of sorbents is a unique enhancement capability special to *JDS* units, enabling increased oil and

grease capture efficiencies beyond that obtainable by conventional oil baffle systems.

Under normal operations, *JDS* units will provide effluent concentrations of oil and grease that are less than 15 parts per million (ppm) for all dry weather spills where the volume is less than or equal to the spill capture volume of the *JDS* unit. During wet weather flows, the oil baffle system can be expected to remove between 78% and 92% of the free oil and grease from the storm water runoff.

Jensen Stormwater Systems only recommends the addition of sorbents to the separation chamber if there are specific land use activities in the catchment watershed that could produce exceptionally large concentrations of oil and grease in the runoff - concentration levels well above typical amounts. If site evaluations merit an increased control of free oil and grease, then oil sorbents can be added to the *JDS* unit to thoroughly address these particular pollutants of concern.

Recommended Oil Sorbents

ClearTec™ Rubberizer® products sorb and transform oil and grease into a rubber-like material many petroleum products including: The ClearTec Rubberizer Mats is the recommend means of deploying the ClearTec Rubberizer in the separation chamber. The Rubberizer Mats provide a large surface area to interact with the oil and grease in stormwater. They are designed to absorb and solidify up to 3/4 gallon of hydrocarbons per square foot. They are constructed from high-strength fiberglass mesh screen and contain ClearTec Rubberizer® Filter Media as a filler. They are available in a variety of sizes and can be customized to fit different diameter *JDS* units. They exhibit characteristics that include:

- **Single Waste Stream:** ClearTec Rubberizer® Pillows contain, absorb and solidify which allows for easy disposal.
- **Permanently Buoyant:** ClearTec Rubberizer® Pillows remain buoyant even once hydrocarbons are fully sorbed and solidified.
- **Leach Resistant:** ClearTec Rubberizer® Pillows are retrievable without loss of their contents caused by handling and consequent dripping.
- **Versatile:** ClearTec Rubberizer® Pillows are equally effective on land or water borne spills.
- **Single Waste Stream:** ClearTec Rubberizer® Mats contain, absorb and solidify which allows for easy disposal.
- **Permanently Buoyant:** ClearTec Rubberizer® Mats remain buoyant even once hydrocarbons are fully sorbed and solidified.
- **Versatile:** ClearTec Rubberizer® Mats have ribbon loops so multiple mats can be tethered together to cover virtually any spill area.

- **Leach Resistant:** ClearTec Rubberizer® Mats are retrievable without loss of their contents caused by handling and consequent dripping.

The amount of sorbent to be added to the **JDS** separation chamber can be determined if sufficient information is known about the concentration of oil and grease in the runoff. Frequently, the actual concentrations of oil and grease are too variable. Therefore, the amount of sorbent to be added as well as the frequency of cleaning will be determined by periodic observation of the sorbent. As an initial application, Jensen Stormwater recommends that two 12”x12” mats be added to the 2-ft diameter separation chamber and add an additional mat for each foot of increase in the diameter of the **JDS** unit. Sorbent usage can also be estimated on a per acre of parking lot or road surface per year basis.

The oil and grease loading of the sorbent material should be observed after major storm events. Oil sorbent material may also be furnished in pillow or boom configurations.

The sorbent material should be replaced when it is fully discolored by skimming the sorbent from the surface. The sorbent may require disposal as a special or hazardous waste depending on local and state regulatory requirements.

4.3 MANUFACTURER

In accordance with these Specifications and the Drawings, the SWTU(s) shall be a **Jensen Deflective Separator (JDS)** SWTU manufactured by:

Jensen Stormwater Systems
521 Dunn Circle
Sparks, NV 89431
(877) 649-0095

INSTALLATION SPECS

- 3.1 HANDLING AND STORAGE:** The contractor shall handle and store the SWTU and any of its components with care upon receipt and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be the responsibility of the contractor.

3.2 INSTALLATION

- A. The SWTU shall be installed in accordance with the manufacturer’s recommendations, these specifications, and per the drawings. The manufacturer shall provide the contractor installation instructions and offer guidance during critical stages of the installation. Reasonable notice shall be provided to the manufacturer prior to installation to coordinate onsite guidance.
- B. The contractor shall grout fill all voids in the precast concrete that are associated with lifting connection pockets in the concrete sections. Use non-shrink grout to fill pockets and strike flush with adjacent finished surfaces. The contractor shall trim all protruding

lifting provisions flush with the adjacent concrete surface, leaving no sharp points or edges.

- C. Inspection: All components shall be subject to inspection by the Engineer at the place of manufacture and/or installation. All components are subject to be rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair. Final acceptance of the component is at the discretion of the Engineer.

3.3 SUBMITTALS

- A. Shop Drawings & Catalog Cut Sheets Details: The contractor shall submit shop drawings for approval by the Engineer. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials, and design assumptions for structural analysis. The shop drawings shall detail horizontal and vertical dimensioning, reinforcement, and pipe type and locations. Supporting Catalog Cut Sheets of associated components and appurtenances shall also be included in the submittal packet substantiating materials and dimensions.
- B. Warranty: The manufacturer shall guarantee the SWTU(s) components against all manufacturer-originated defects in materials or workmanship for a period of twelve (12) months from the date of installation. The manufacturer shall be notified of repair/replacement issues in writing within the referenced warranty period. The manufacturer shall, upon its determination: repair, correct or replace any manufacturer-originated defects identified by the written notice within the referenced warranty period. The use of SWTU components shall be limited to the application for which it was specifically designed.
- C. Manufacturer's Performance Certificate: The SWTU manufacturer shall submit a "Manufacturer's Performance Certification" certifying that each SWTU can achieve the specified removal efficiencies as listed in these specifications. The certification shall be supported by previous independent third-party research of the continuous deflective treatment process.

JENSEN DEFLECTIVE SEPARATOR (JDS)
 Stormwater Treatment Units (SWTUs), Hydrodynamic Separator (HDS),
 Full Capture (FC), Non-Blocking Screening, Swirl Concentrating Units

<i>Jensen Deflective Separator (JDS)</i>			Treatment Flow Rate (nominal)	Typical Sump Capacity		Oil & Grease Storage Capacity
Casting	Configuration	Model Designation	cfs	(ft ³)	(yd ³)	(gal)
Precast*	Inline and Offline	JDS48-2418G ²	0.7	25	0.9	65
		JDS48-2418	0.7	25	0.9	65
		JDS60-2418	0.7	39	1.5	88
		JDS60-2424	1.1	39	1.5	106
		JDS60-2430	1.6	39	1.5	124
		JDS72-3624	2.0	57	2.1	183
		JDS72-3630	2.4	57	2.1	209
		JDS72-3636	3.0	57	2.1	235
		JDS72-3642	3.8	57	2.1	235
		JDS96-4836	4.5	151	5.6	435
		JDS96-4848	6.0	151	5.6	532
		JDS96-4854	7.5	151	5.6	580
		JDS120-6748	9.0	314	11.6	765
		JDS120-6758	11	314	11.6	881
		JDS120-6764	14	314	11.6	951
		JDS120-6770	15	314	11.6	1,020
		JDS120-6782	19	314	11.6	1,159
		JDS120-6794	25	314	11.6	1,299
		JDS144-8484	25	565	20.9	1,893
		JDS144-9480	26	565	20.9	1,819
		JDS144-9490	31	565	20.9	2,004
		JDS144-94102	38	565	20.9	2,227
		JDS144-94114	44	565	20.9	2,450
		Cast In Place	Offline Only	JDS192-12696	42	1005
JDS192-12072	31			1005	37.2	3,588
JDS192-12096	50			1005	37.2	4,484
JDS192-120120	64			1005	37.2	5,381
JDS192-126120	67			1005	37.2	5,381
JDS192-126138	73			1005	37.2	6,054
Cast In Place	Offline	JDS264-180161	131	2281	84.5	TBD
		JDS312-240197	237	3717	137.6	TBD
		JDS384-288192	273	5630	208.5	TBD

1. This depth below pipe invert may vary varies in accordance with regional precast capacities. Sump base and separation slab thickness vary by few inches across regional Jensen Precast Facilities: AZ, CA, HI & NV. Custom height sumps readily available.
2. "G" Suffix on the model number means that unit is configured to receive flow from a grated drop or curb inlet.
3. This is an approximate storage volume. Final Storage volume varies as a function of the outlet pipe diameter