STANDARD SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for constructing underground stormwater treatment chambers to construct the complete Oil Grit Separator (OGS) device. Work includes supply and installation of concrete bases, precast sections, and the appropriate precast section with all internal components completely and correctly installed within the OGS device, water tight seals prior to arrival to the project site.

1.2 REFERENCE STANDARDS

1.2.1 For Canadian projects only, the following reference standards apply:

Canadian Standards Association
CAN/CSA-A257.3-M92: Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets
CAN/CSA-A257.4-M92: Precast Reinforced Circular Concrete Manhole Sections, Catch Basins, and Fittings
CAN/CSA-S6-00: Canadian Highway Bridge Design Code

1.2.2 For ALL projects, the following reference standards apply:

ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D2563: Standard Practice for Classification of Visual Defects in Reinforced Plastics
ASTM D2584: Test Method for Ignition Loss of Cured Reinforced Plastics

1.3 SHOP DRAWINGS

Shop drawings shall be submitted upon request with each order to the contractor then forwarded to the consulting engineer for review and acceptance. Shop drawings shall detail the precast concrete components and the precast concrete component detailing all OGS internal components pre-installed and watertight sealed at the precast facility prior to shipment, including the sequence for installation.

1.4 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

1.4.1 Internal OGS device materials supplied by the Manufacturer for connection to the precast concrete shall be pre-fabricated and bolted to the precast and watertight sealed to the precast surface prior to delivery to the project site to ensure Manufacturer's internal assembly process and quality control processes are fully adhered to, and to prevent damage to the materials on site. No exceptions will be accepted.

1.4.2 Follow all instructions labeled on precast concrete components during installation.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The separator shall be circular and constructed from the pre-cast concrete circular riser and slab components.

2.1.2 The concrete separator shall include a fiberglass insert bolted and sealed, watertight inside the concrete precast chamber, prior to delivery to the project site. The fiberglass insert must provide a lining for oil storage and retention as a secondary containment system within the OGS.

2.1.3 The separator shall be allowed to be specified as a bend or junction structure in the stormwater drainage system.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications.

2.3 GASKETS

For Canadian projects only: Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.4 JOINTS

The concrete joints shall be water-tight and meet the design criteria according to ASTM C-443. Mastic sealants or butyl tape are not an acceptable alternative.

2.5 FRAME AND COVER

Frame and covers shall be manufactured in accordance with local regulatory specifications and shall be clearly embossed with manufacturer's product name.

2.6 CONCRETE

All concrete components shall conform to the appropriate CSA or ASTM specifications.

2.7 FIBERGLASS

The fiberglass portion of the water treatment device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.8 LADDERS

Ladder rungs to be provided upon request.

2.9 SAFETY GRATE

A safety grate shall be installed within the chamber of the unit.

2.10 INSPECTION

All precast concrete sections shall be inspected to ensure dimensions, appearance, integrity of internal components, and quality of the product meets local municipal specifications and associated standards.

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS device shall remove oil and sediment from stormwater during frequent wet weather events, and retain these pollutants within the device for later removal.

3.2 RUNOFF VOLUME

The OGS device shall be engineered, designed and sized to treat a minimum of 90 percent of the annual runoff volume using a widely accepted continuous simulation runoff model which uses rainfall data records which includes antecedent conditions as well as rainfall periods. Rainfall records should be comprised of 15-years of rainfall data or a longer continuous period if available for a given location, but in all cases at least a minimum of 5-years continuous rainfall.

3.3 TOTAL SUSPENDED SOLIDS (TSS)

The OGS device shall be capable of removing the Engineer-specified total suspended solids (TSS) load, without scouring previously captured pollutants.

3.4 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to treat a minimum of 90 percent of the annual runoff volume using a widely accepted continuous simulation runoff model which uses rainfall data records which includes antecedent conditions as well as rainfall periods. Rainfall records should be comprised of 15-years of rainfall data or a longer continuous period if available for a given location, but in all cases at least a minimum of 5-years continuous rainfall. The Peclet Number is not an approved method or model for calculating TSS removal, sizing, or scaling OGS devices.

3.5 PARTICLE SIZE DISTRIBUTION (PSD) FOR SIZING

The OGS device shall be sized to remove the Engineer-specified total suspended sediment (TSS) load using the particle size distribution (PSD) in Table 3.5, in addition to adhering to sections 3.2 & 3.4 of this specification. No alternative PSDs or deviations from Table 3.5 shall be accepted.

Table 3.5 – Particle Size Distribution

Particle Size Distribution to be used to size OGS

Particle Diameter (Micron)	% by Mass of All Particles	Specific Gravity
1000	5%	2.65
500	5%	2.65
250	15%	2.65
150	15%	2.65
100	10%	2.65
75	5%	2.65
50	10%	2.65
20	15%	2.65
8	10%	2.65
5	5%	2.65
2	5%	2.65

3.6 VERIFIED SCOUR TESTING

3.6.1 The OGS device shall have New Jersey Corporation for Advanced Technology (NJCAT) verification that the device is acceptable for on-line installation based on full-scale third-party scour testing performed with the device pre-loaded with the particle size distribution (PSD) illustrated in **TABLE 1 - Scour Test Particle Size Distribution**. Alternatively, the OGS device shall have Toronto and Region Conservation Authority (TRCA) verification of third-party scour testing performed in accordance with the Canadian ETV "Procedure for Laboratory Testing of Oil-Grit Separators."

3.6.1.1 Scour testing data from laboratory scour testing performed with the OGS device pre-loaded with a coarser PSD than the PSD shown in TABLE 1 (i.e. the coarser PSD has no particles in the 1 – 50 micron size range) shall not be acceptable for the determination of the device's suitability for on-line installation.

TABLE 1 - Scour Test Particle Size Distribution[1]

Particle Size (Microns)	Percent by Mass of All Particles
500 – 1000	5%
250 – 500	5%
100 – 250	30%
50 – 100	15%
8 – 50	25%
2 – 8	15%
1 – 2	5%

1. The Materials shall be hard, firm and inorganic with a specific gravity of 2.65. The various particle sizes shall be uniformly distributed throughout the material prior to use.

3.7 DESIGN ACCOUNTING FOR BYPASS

3.7.1 The OGS system design shall be specified to achieve the TSS removal performance and water quality objectives without washout of previously captured pollutants. To ensure that this is achieved, there are two design options with associated requirements:

3.7.1.1 The OGS device shall be placed **off-line** with an upstream external water quality bypass diversion structure (typically in an upstream manhole) that only allows the water quality volume to be diverted to the OGS device, and excessive flows diverted downstream around the OGS device to prevent high flow washout of pollutants previously captured. This design typically incorporates a triangular configuration layout including an upstream bypass manhole with an appropriately engineered weir wall, the OGS device, and a downstream junction manhole, which is connected to both the OGS device and bypass structure. In this case with an external bypass required, the OGS device manufacturer must provide calculations and designs for all structures, piping and any other required material applicable to the proper functioning of the system, stamped by a Professional Engineer.

3.7.1.2 Alternatively, OGS devices in compliance with Section 3.6.1 shall be acceptable for an on-line design configuration, thereby eliminating the requirement for an upstream bypass manhole and downstream junction manhole.

3.8 SEDIMENT STORAGE CAPACITY

Manufacturer's sediment storage capacity guidelines for the OGS device shall be confirmed by the Engineer to be adequate for the anticipated sediment loadings. Sediment loadings shall be determined by land-use and defined as a minimum of 450 kg (992 lb) of sediment (TSS) per impervious hectare of drainage area per year or greater as noted in the "Typical Urban Areas and Pollutant Yields (Sediment)" table below. The OGS device shall be specified as to not require maintenance (sediment removal) more frequently than once per year.

Typical Urban Areas and Pollutant Yields (Sediment) (Burton and Pitt, 2002)

Pollutant	Pollutant Load by Land Use (Kg/ha/year)							
	Commercial	Parking Lot	Residential Density			Highways	Industrial	Shopping Centers
			High	Med.	Low			
TSS	1000	400	400	250	10	880	500	440

Source: U.S. EPA Stormwater Best Management Practice Design Guide, Volume 1, Appendix D, Table D-1
NOTE: to determine volume of adequate sediment storage capacity a bulk density of 1602 kg/m^3 (100 lbs/ft^3) shall be applied.

3.9 PETROLEUM HYDROCARBON CAPTURE AND STORAGE

3.9.1 Petroleum hydrocarbon storage capacity in the OGS device shall be a minimum 35 gallons (132 Liters), or more as specified.

3.9.2 The OGS device internal hydrocarbon storage area shall include a minimum of 12 inches (305 mm) of double wall containment for the full circumference of the device to provide safe oil and other hydrocarbon material storage and ground water protection.

3.10 SURFACE LOADING RATE SCALING OF DIFFERENT MODEL SIZES

The reference device for scaling shall be an OGS device that has been third-party laboratory tested and verified by NJCAT or TRCA. Other model sizes of the tested device shall be scaled such that the claimed TSS removal efficiency of the scaled device shall be no greater than the TSS removal efficiency of the tested device at identical **surface loading rate** (flow rate divided by settling surface area). Alternative scaling methodologies shall not be accepted without providing a minimum of three (3) full-scale third-party laboratory performance and scour testing of differing OGS model sizes. The Peclet Number is not an approved method for scaling OGS devices.

PART 4 – INSPECTION & MAINTENENACE

The OGS manufacturer shall provide an Owner's Manual upon request.

4.1 A Quality Assurance Plan that covers inspection and maintenance for up to 5 years shall be included with the OGS, and written into the COA.

4.2 Inspection of the OGS device, which includes determination of sediment depth and presence of petroleum hydrocarbons, shall be easily conducted from finished grade.

4.3 Sediment removal from the OGS shall be conducted using a standard maintenance truck and vacuum apparatus.

4.4 No confined space for sediment removal or inspection of screens or other internal components shall be required for normal annual inspection or maintenance activity.

PART 5 – EXECUTION

5.1 CONCRETE INSTALLATION

The installation of the concrete OGS device should conform to state highway, provincial, or local specifications for the construction of manholes. Selected sections of a general specification that are applicable are summarized below.

5.2 EXCAVATION

5.2.1 Excavation for the installation of the stormwater quality treatment device should conform to state highway, municipal or local specifications. Topsoil that is removed during the excavation for the stormwater quality treatment device should be stockpiled in designated areas and should not be mixed with subsoil or other materials. Topsoil stockpiles and the general site preparation for the installation of the water quality device should conform to state highway, provincial or local specifications.

5.2.2 The OGS device should not be installed on frozen ground. Excavation should extend a minimum of 12 inch (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

5.2.3 In areas with a high water table, continuous dewatering should be provided to ensure that the excavation is stable and free of water.

5.3 BACKFILLING

Backfill material should conform to state highway, municipal or local specifications. Backfill material should be placed in uniform layers not exceeding 12 inches (300 mm) in depth and compacted to state highway, provincial or local specifications.

5.4 WATER QUALITY DEVICE (OGS) CONSTRUCTION SEQUENCE

5.4.1 The concrete water quality device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber section(s); shall include the internals bolted/secured to the precast walls and water tight sealed prior to arrival to the project site to ensure quality control
- transition slab (if required)
- bypass section
- connect inlet and outlet pipes
- riser section and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

5.4.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

5.4.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary. Once the stormwater quality treatment (OGS) device has been constructed, any lift holes must be plugged with mortar.

5.5 DROP PIPE, RISER PIPE, AND OIL PORT

Once the upper chamber has been attached to the lower chamber, the inlet drop tee, and riser pipe must be attached. If an oil port is included, this must be attached as well. Pipe installation instructions and required materials shall be provided with the insert.

5.6 INLET AND OUTLET PIPES

Inlet and outlet pipes should be securely set into the upper chamber using grout or approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight. Non-secure inlets and outlets will result in improper performance.

5.7 FRAME AND COVER OR FRAME AND GRATE INSTALLATION

Precast concrete adjustment units should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.