



# Below Grade Concrete Systems - Model COS Oil Water Separators

Pan America Environmental COS Series, concrete oil/water separators are a gravity/coalescing design for removal of free and finely dispersed oil droplets from various wastestreams. The use of our proprietary Flopak, cross-corrugated, oleophilic, coalescing media provides predictable oil removal through impingement coalescence while allowing solids settling without plugging. Performance: 10mg/L 30 micron free, dispersed and non-emulsified oil droplets. The COS concrete design is provided for new-build or retro-fit projects to provide increased performance in a smaller footprint.

Full, turnkey systems can be provided with many types of options and custom configurations can be provided tailored to the particular project requirements or wastestream needs. Many sizes and designs are offered for flow rates up to 250,000 GPM or greater.

## Options (partial)

- Influent/effluent/oil/sludge pumping systems
- Retpak secondary coalescer
- Hi-temp upgrade
- Stainless components
- Covers
- Walkways
- Sludge auger

## Applications

- Oil refineries
- Mobile separation system
- Compressor condensate
- Power plant water treatment
- Refueling depot runoff
- Aircraft wash racks
- Machining coolant oil removal
- Tank farm tank bottoms
- Vehicle washwater treatment
- R.O. Filter pre-treatment
- Oil spill recovery
- Trench water treatment
- Bilge/ballast water treatment
- DAF/clarifier pre-treatment
- Stormwater runoff
- Hydraulic fluid tank dewatering

Flow Range to 250,000 GPM



Features  
Concrete construction  
Adjustable water weir  
Integral oil reservoir  
Influent diffuser  
Effluent chamber  
Installation/design drawings  
Epoxy coated components  
Flopak coalescing media  
Solids Y-hopper or flat bottom  
Tank engineering

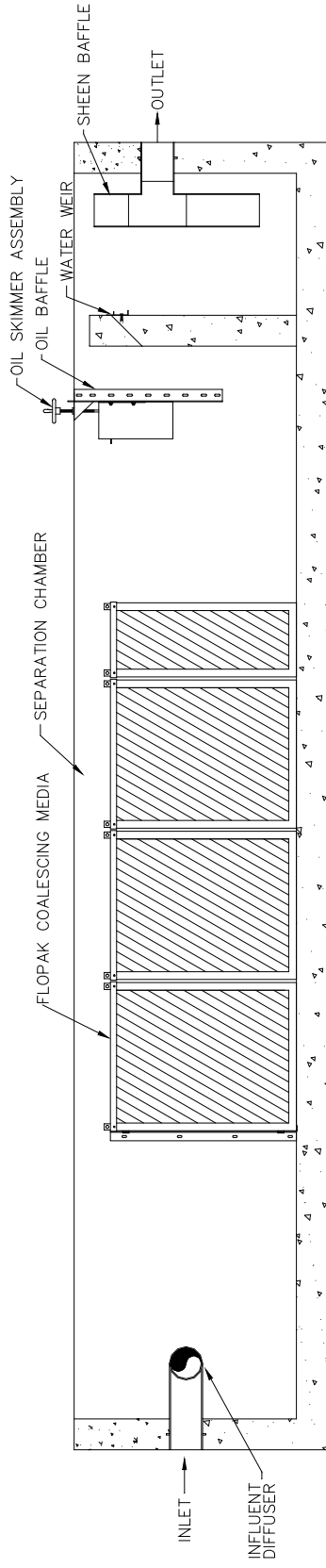
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Environmental**  
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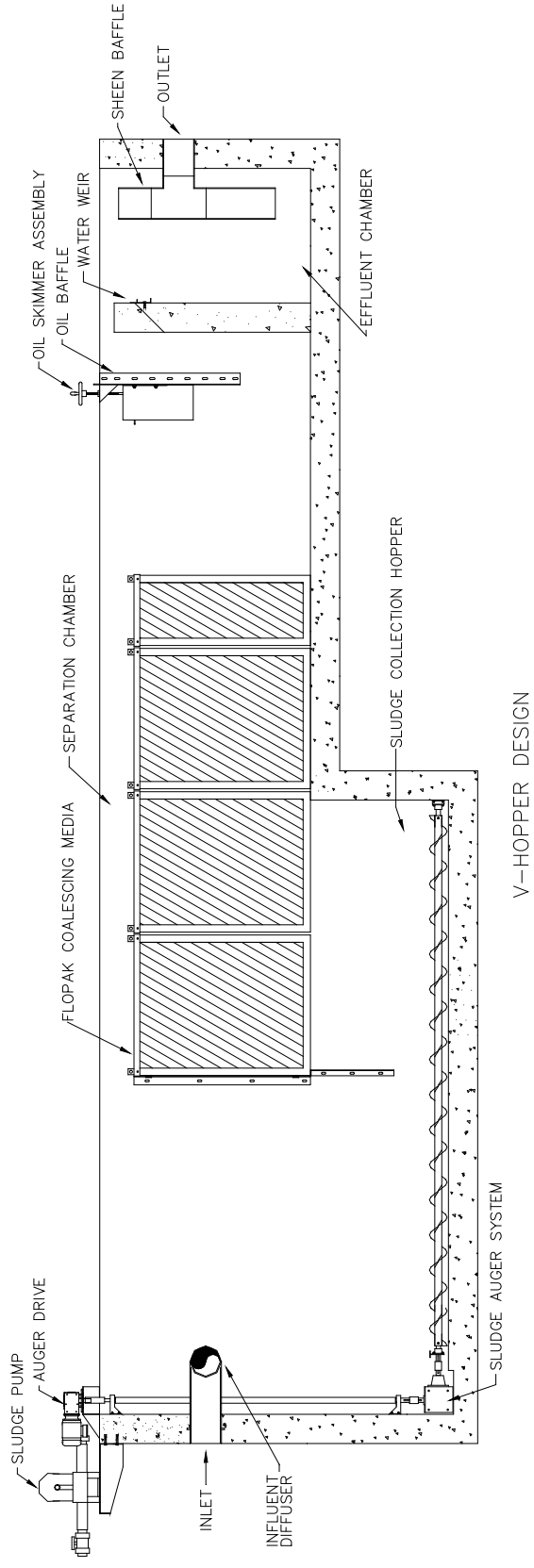
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# COS Series Concrete Oil/Water Separator Product Detail

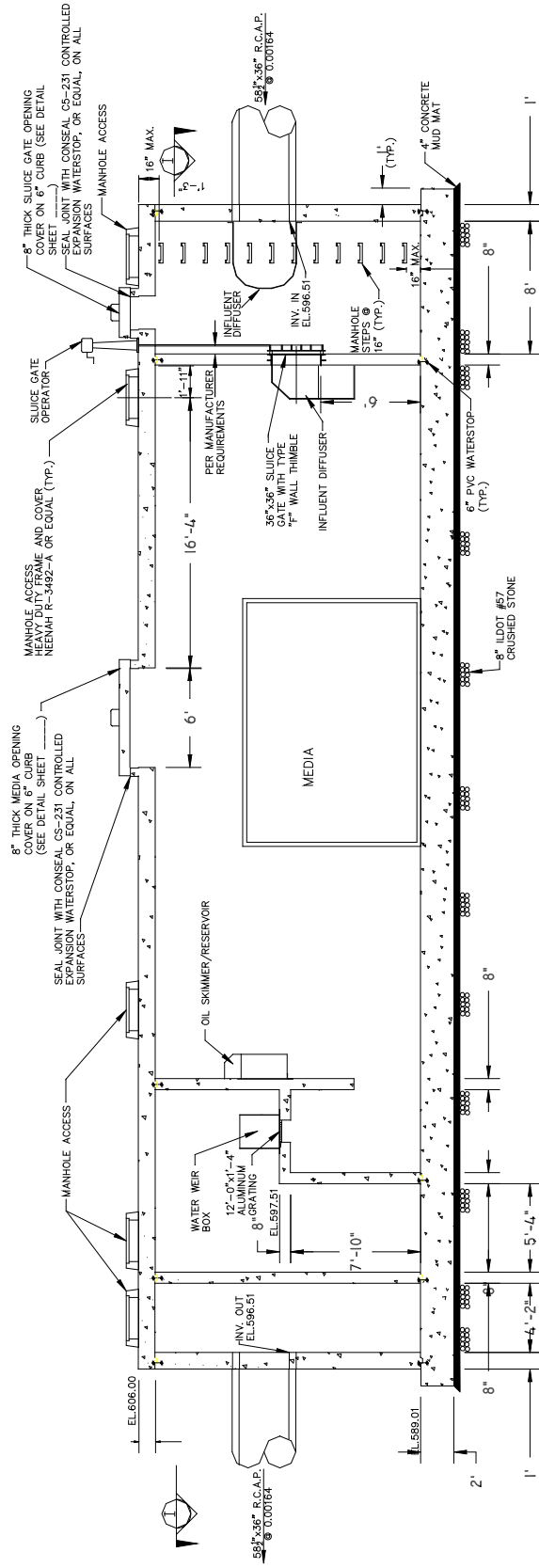


FLAT BOTTOM DESIGN

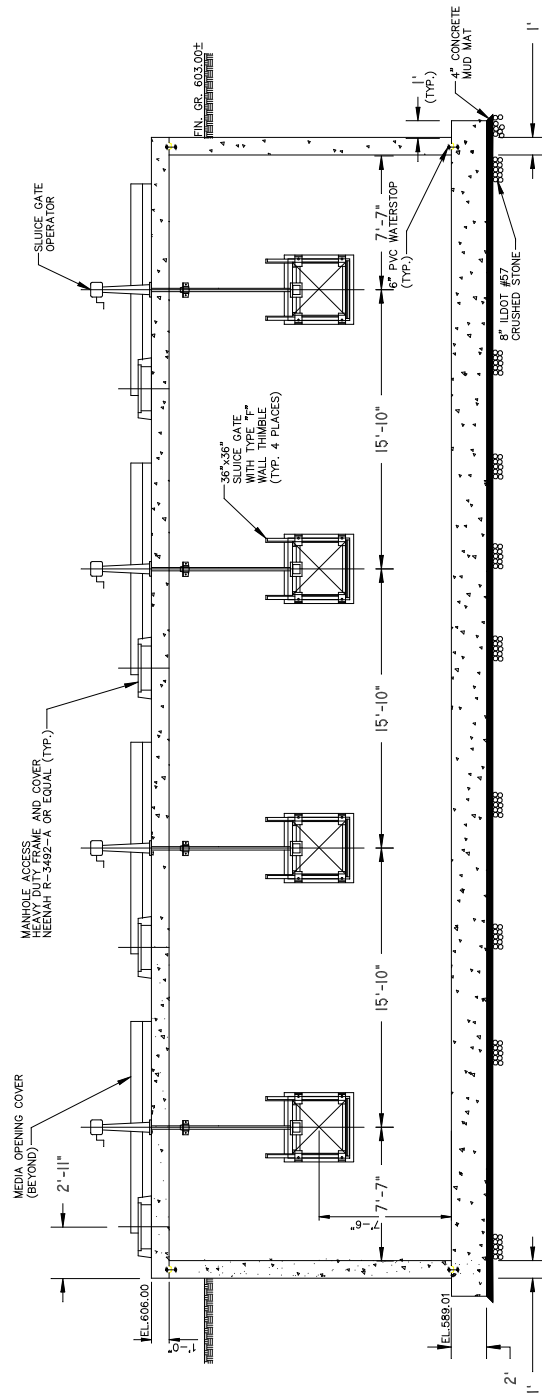


V-HOPPER DESIGN

# COS Series Concrete Oil/Water Separator Product Detail



SECTION A-A



SECTION B-B



# Below Grade Concrete Systems-Model COS Oil/Water Separators

## COS Series Concrete Oil/Water Separator Engineering Specification COS-2 through COS-35,000

### SECTION 1.0 OIL/WATER SEPARATOR

#### Performance

The Pan America Environmental COS Series Oil/Water Separators are designed to produce an effluent concentration of 10 mg/l or less of oil droplets 30 micron and larger of non-emulsified, free and dispersed oils. By virtue of our Flopak coalescing media and tank designs readily settleable solids are also removed.

#### 1.01 Design and Engineering

The oil/water separator will be designed and fabricated per the following specifications. Rectangular tankage with features as described designed per API #421 Design & Operation of Oil/Water Separators Manual and Stokes law. The design will incorporate flexible flow rating capability based on application parameters.

1.01.1 Pan America Environmental (PAE) will provide general tank design, internal tank dimensioning, design and internal component location/installation drawings for use in customer tank construction and assembly. Component installation hardware shall be specified. Concrete type and pcf rating, wall thickness and soil loading calculations will be provided by customer or customer's engineers for use by the contractor in tank construction.

1.01.2 If prefabricated, concrete vault, PAE will provide separator drawings with internal component installation drawings based on tank design. Where provided or required, prefabricated vault manufacturers shall provide appropriate design calculations, certifications or authority acceptance of design for over the road transport strength and soil loading capability. See prefabricated tank specification for tailored specification.

#### 1.02 Influent Chamber

Influent flow enters the clog proof influent diffuser pipe and is immediately spreadout across the depth and width of the chamber. Any readily settleable solids drop to the bottom of the separation chamber. Optional solids chamber: if provided, a V-shaped solids accumulation chamber or inverted pyramid type hopper(s) can be located directly under the Flopak coalescing media pack. The optional screw auger sludge conveyor and sludge pumpout systems are recommended for solids removal.

#### 1.03 Oil/Water Separation Chamber

The separation chamber is to be packed with Flopak, cross-fluted coalescing media. The media pack will be designed to create a quiescent zone, a laminar flow pattern to facilitate the impingement of oil on the media, and will provide numerous oil droplet impact sites and changes of flow direction. The media shall have a 60-degree cross-flute angle.

#### 1.04 Cylindrical Oil Skimmer (optional)

The separator shall be provided with an adjustable cylindrical oil skimmer. The skimmer pipe will be designed to rotate for adjustment. The oil skimmer is to be located at the effluent end of the separation chamber. Skimmer pipe is to be constructed of carbon steel with a coal tar epoxy coating. The skimmer pipe will be directly connected to an oil reservoir for temporary storage of skimmed product. The opposite end of the skimmer shall be supported via an adjustable steel suspension bracket to maintain skim pipe in level horizontal position. The skimmer shall have a hand operated adjusting handle to rotate the skimmer for adjustment.

#### 1.05 Solids Accumulation Chamber (when provided)

The separator shall have a V-shaped or inverted pyramid type solids accumulation chamber located under the Flopak coalescing media. This chamber will provide temporary solids storage. The chamber walls are to be pitched at 45 degrees to assure simple and thorough solids removal.

#### 1.06 Solids Screw Auger System (when provided)

When the V hopper, solids accumulation chamber is provided, an auger can be provided to convey the settled solids to the sludge pumpout suction pipe. The auger system shall consist of a direct drive, drive shaft system with a reduction gear motor, steel drive shaft, bevel gear, screw type auger, support bearings all required shaft couplings and drive overload protection device.

1.06.1 Gear Motor: A reduction gear motor shall be provided. The gear motor shall be sized and designed to provide sufficient drive torque within an acceptable RPM range. The gear motor will include a TEFC motor and vertically adjustable, steel mount base to allow ease of attachment to drive shaft. Base will include a shaft safety guard for above water contact safety. Base will be epoxy or enamel coated (6-dft min.) for unprotected weather duty.

1.06.2 Drive Shaft: A carbon steel, hollow pipe, heavy walled drive-shaft with keyed, 304 stainless steel end shafts will be provided. The shaft and end shafts will be designed to accommodate an rpm equal to 2 times the maximum speed of the auger system and 1.5 times the maximum torque attained by gear motor. The shaft shall be straight, true and coal tar epoxy coated following SSPC-SP10 surface preparation.

1.06.3 Bevel Gear: Submergence rated, dual seal, 90-degree input/output, 1 to 1 ratio bevel gear. The heavy-duty bevel gear shall have stainless steel input/output shafts, adjustable mounting bracket(s), cast iron housing and coal tar epoxy external coating

1.06.3a The bevel gear will have an adjustable gear lube reservoir for location above grade to provide positive pressure on the bevel gear housing to resist water infiltration through the shaft seals and allow convenient gear box lubrication. Connection tubing and reservoir mount hardware will be provided. Customer to attach tubing to tank wall, attaching hardware by customer.

1.06.4 Screw Auger: The screw auger shall be sized and construction compatibility matched for the application. Required bearings shall be non-lube, HDPE with stainless steel mount brackets, hanger bearings and hardware. Bearing brackets can be steel with coal tar coat or protective electro-deposition plating where accepted.

1.06.4a Screw auger will consist of a 304 stainless steel keyed drive-shaft and unkeyed end shaft. Shaft to auger attaching hardware shall be stainless steel.

1.06.5 Overload Coupling Device A torque overload device shall be provided between the gear motor output shaft and drive shaft. The device shall be rated and designed to protect the drive system from instantaneous and extended auger stoppage or solids overloading.

1.06.5a All the shaft to shaft female couplings are to be designed to accommodate the system torque and will be keyed. Materials of construction are to be corrosion resistant.



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### COS Series Concrete Oil/Water Separator Engineering Specification COS-2 through COS-35,000

#### 1.06.6 Torque Loading

The gear motor, drive shaft, bearings, bevel gear and screw auger shall be sized, designed and fabricated in accordance with torque loadings required to convey a 100% specific solids loading on the screw auger. Loading calculations as provided by auger manufacturer shall be provided indicating auger size, horsepower and torque requirements based on solids type and volume being conveyed.

#### 1.07 Oil Retention Baffle

A steel oil retention baffle shall be provided to retain all separated oils within the separation chamber. The baffle shall stretch from one sidewall to the opposite wall and shall be provided with sufficient height to stop any bypass of water or oils over the top and around sides during normal operation. The baffle shall be constructed of concrete. The baffle shall be designed to support its own weight and the weight of any peripheral assemblies/equipment attached to it.

#### 1.08 Effluent Weir

The effluent end of the tank is to be provided with an adjustable, stainless steel water weir plate for installation on the concrete water baffle.

#### 1.09 Clean Water Effluent Chamber

The cleansed water will flow under the oil retention baffle, over the water weir and into the effluent chamber. This chamber shall be provided with an exit pipe sized for the maximum anticipated flow. A sheen baffle can be provided if required to trap sheens within this chamber. Discuss sheens and sheen baffle with Pan America prior to establishing a final specification.

#### 1.10 Separator Cover (optional)

The separator is to have a cover that provides complete closure of the tank. The separator cover will be mounted to the tank to provide a vapor seal and/or coverage for people or vehicular traffic. One or more access ways shall be provided to allow Flopak media to be removed and reinstalled and will allow access to all parts of the tank for inspection and maintenance. Cover can be concrete, steel or Geo-textile type of cover. Discuss with Pan America prior to final specification.

#### 1.11 Handrailings (when provided)

When tank is at grade, uncovered or can be a safety concern handrailings will be supplied around the entire perimeter of the tank.

1.11.1 Railings will be designed per OSHA guidelines. Construction shall be 1 1/2" carbon steel pipe with safety yellow, industrial epoxy coating and mount feet located at bottom of vertical pipe for bolted attachment to concrete.

#### 1.11.2 Signage

Signs shall be included to indicate warning of rotating equipment and water danger where required or desired.

#### 1.12 Fittings

All fittings 3" and smaller are to be FNPT coupling. Fittings 4" and larger are to be 150# FF ANSI flange.

## Section 2.0 Materials of Construction

### 2.01 Concrete Construction

Tank shell, integral baffles and external structural members shall be

constructed of concrete typically used for below grade tank applications. Prefabricated concrete vaulting is allowed where possible or accepted and as it fits into the design, sizing and performance requirements of the project.

### 2.02 Steel Component Surface Preparation and Coating

Interior (wetted) component surfaces shall be prepared to an SSPC-SP10 near white metal blast. Exterior (non-wetted) surfaces shall be prepared to an SSPC-SP6 commercial blast. All wetted surfaces of steel components, coating shall be self-priming, coal tar epoxy (14 dft). Where desired 304 stainless steel can be provided in place of coated steel (optional).

### 2.03 Piping (when provided)

Internal/external piping shall be ASTM, A-53 steel, iron, polyethylene or PVC where allowed and practical. Plastic piping shall be compatibility matched to product being separated and must withstand rigors of application.

#### 2.03.1 Pipe Seals

Tank wall penetrations shall provide double seals between tank pipe and concrete. Seal material will be matched to application contaminants (Buna-N to be minimum required if seals can contact oils/fuels).

### 2.04 Flopak Coalescing Media

Cross-fluted, oleophilic, PVC construction Flopak coalescing media shall be provided as manufactured by Pan America Environmental. The media material of construction shall be compatibility matched to product being separated. The Flopak media shall be encased in 304 stainless steel frames with lifting lugs and removable lids to allow ease of moving media packs and disassembly/assembly. The influent end media frame(s) shall have permanently attached guide clips to attach frame(s) to wall mounted bypass prevention brackets. Each frame will be attached to its closest neighboring frame on both ends and/or sides of the frame via stainless steel attaching plates and stainless hardware. This arrangement will stop any movement or shifting of media frames once installed. The influent end media frame(s) shall be provided with a stainless steel, vertical bypass prevention plate located on top of frame on the influent end of the frame to prevent flow bypass above the frame if water flow should exceed top of media frames.

Two influent bypass prevention brackets will be supplied to attach media frames to tank and prevent bypass of the flow between the side of the media frames and tank wall. These brackets must extend from the bottom of the media frames to above the water line. If the tank has a v-hopper or inverted pyramid type hoppers for solids collection, a media bottom support/flow bypass prevention baffle shall be provided extending from the bottom of the influent media frame to near the bottom of the v-hopper without interfering with the auger and solids movement. This baffle shall be attached and sealed to the v-hopper walls.

### 2.05 Manufacturer

The manufacturer of preference shall be:

Pan America Environmental 950 N. Rand Rd. Ste 120  
Wauconda, IL 60084 - 847/487.9166 - Fax: 847/487.9218

### 2.06 Warranty

Pan America Environmental warrants its products to be free of defect in materials and workmanship for a period of one year from the date of shipment.





## Below Grade Concrete Systems-Model COS Oil/Water Separators

### COS Concrete Series Oil/Water Separator Product Options

Option	Description
Influent Feed System	Air operated, diaphragm pump with air controls, sump level switches & Nema 4 control panel, base mounted, 115V/1ph/60Hz power req'd. Electric diaphragm pumps available. 1 - 150 GPM. Any influent feed pumps to be used must be reviewed for potential emulsifying capability.
Sludge Pumpout System	Air operated, diaphragm pump with air controls & Nema 4 control panel, auto on/off timer, base mounted, 115V/1ph/60Hz power req'd. Electric pumps available. 1 - 100 GPM. Electrically driven diaphragm pumps or other pump types area also available.
Oil Pumpout System	Air operated, diaphragm pump with air controls, level switches & Nema 4 control panel, base mounted, 115V/1ph/60Hz power req'd. Electric gear pump system available. 1 - 125 GPM
Freeze Protection	Two (or more) immersion heaters mounted in tank. Heaters are thermostat controlled, 0-100 deg. F thermostat and Nema 4 housing. 230/460V/3ph/60Hz power req'd.
Retpak Secondary Coalescer	High surface area, reticulated, secondary coalescing media for polishing flow after standard Flopak media.
Elevated Design	Tank designed to be built and used above grade.
High Temperature Design	Flopak coalescing media is constructed of CPVC or other materials for temperature resistance 180 deg. F and greater
Alternate Media Construction	Standard Flopak media is PVC. CPVC, polypropylene, stainless & galvanized media is available. Contact PAE to determine proper media type for your application. Media plate spacing is available in 1/2", 3/4" & 1.2".
External Storage/Feed Tanks	A wide variety of tank volumes can be supplied for your water, product and sludge holding needs. Flat bottom and cone bottom designs constructed in polyethylene, fiberglass, steel & stainless steel can be provided and designed to fit your application and facility.
Effluent Filter Systems	Solids filter systems can be provided to remove filterable solids from the COS effluent. Contact Pan America to determine proper filtration needs for your application.
AQAM Filter Systems	AQAM (Alkyl Quaternary Ammonium Montmorillonite) filter systems can be provided to remove trace hydrocarbons, sheens, DNAPLs, slightly soluble chlorinated hydrocarbons and high molecular weight organics from the COS effluent. Contact Pan America to determine proper filtration needs for your application.
Emulsion Cracking Systems	Emulsion cracking systems can be provided to remove oil-in-water emulsions prior to the separator. Contact Pan America to determine proper system needs for your application.
pH Adjustment Systems	pH adjustment systems can be provided to maintain pH levels prior to or after the COS separator. Contact Pan America to determine proper system needs for your application.
Carbon Filtration Systems	GAC carbon filters can be provided to remove contaminants after the COS separator. Contact Pan America to determine proper system needs for your application.



## Below Grade COS Concrete Systems-Model COS Oil/Water Separators

### COS Concrete Series Oil/Water Separator Applications

Application	Uses and Products Removed
Heat Treating	Heat treating facility oily wash solution can be continuously treated to reduce contamination.
Industrial Process Water	Hydraulic fluids, machining coolant/cutting fluid tramp oil removal, compressor condensate, machined parts rinse water.
Military Wash Racks	Field equipment, jet wash, tracked equipment wash uses for typical fuels, oils, solids & BTEX removal. Complete treatment systems are offered.
Petro-Chemical	Refineries, chemical compounding companies, hydrocarbon based chemical bases such as cumene and other materials.
Power Generation	Generator lube oils, hydraulic oils, fuels. Stationary & mobile systems offered.
Shipping	Ballast & bilge water treatment. Off-loading of water to shore based treatment system, bunker & diesel fuels removal.
Steel Mills	Rolling mill hydraulic oil/water extraction, compressor condensate, stormwater runoff, drain water.
Stormwater Treatment	Parking lot runoff, railroad re-fueling depot runoff, gas station runoff, bridge runoff.
Tank Farms	Fuel, oil storage tank farms for removal of water from tank bottoms. Stationary and mobile systems are offered.
Truck Docks	Truck docks, oily/fuel rainwater runoff.
Vehicle Wash Racks	Removal of gasoline, diesel fuel, motor oils, transmission fluids, hydraulic fluids, jet fuels, aircraft fuels and lubricants when washing jets, cars, trucks, heavy equipment, railroad locomotives and equipment.



# Above Grade Oil/Water Separators Below Grade

## Oil/Water Separator Data Sheet

**Please provide the following information for equipment sizing & recommendations:**

Company name and location:

Describe type of facility where wastestream is located:

Origin of wastestream:

Wastestream flow rate: GPM Min:\_\_\_\_\_ GPM Norm:\_\_\_\_\_ GPM Max:\_\_\_\_\_

Hours per day this wastestream flows:\_\_\_\_\_ Days per week:\_\_\_\_\_

Type(s) of oils in the flow:

State of oils: (please circle one)

- Free: droplets 150 micron diameter & greater
- Dispersed: droplets from 20 to 150 micron diameter
- Mechanically emulsified: droplets less than 20 micron diameter
- Chemically emulsified: droplets less than 20 micron diameter combined with water (& other) molecules via chemical bond
- Dissolved oil: solubilized oil or emulsion in a stable state

Concentration of oils in mg/l or % of total flow:\_\_\_\_\_ Specific gravity of oils:\_\_\_\_\_

Viscosity of oils:\_\_\_\_\_poise at\_\_\_\_\_deg.F pH of wastestream:\_\_\_\_\_

Water operating temperature: High\_\_\_\_\_deg.F Norm\_\_\_\_\_deg.F Low\_\_\_\_\_deg.F

List types of contaminants in wastestream:

### Solids

Define the type(s) of solids present:

Describe solids characteristics: ie: hard, soft, slimy:

Do the solids: stay in suspension? \_\_\_\_\_  
sink? \_\_\_\_\_  
float? \_\_\_\_\_

Specific gravity of solids:\_\_\_\_\_

Solids concentration in mg/l or % of flow:\_\_\_\_\_

Have any discharge requirements been established? (if so please list)

If an existing system is being used please provide a sketch of the process flow and components.