

# **Marina Boat Wash Wastewater Containment and Treatment**

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For Compliance with MDE Discharge Permit 10-MA



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## **I. Introduction**

Maryland Department of General Services contracted Huron Consulting in April 2012 to provide general engineering consulting services to assist marina owners as they attempt to comply with the Maryland Department of the Environment's (MDE) recently issued *General Permit for Discharges from Marinas including Boat Yards and Yacht Basins*, also known as, *Discharge Permit 10-MA* or *NPDES Permit MDG99*. This specific report has been prepared by Huron Consulting for Marinas in Maryland and the Maryland Department of Natural Resources' (DNR) Clean Marina Program to recommend possible solutions for compliance with the new Permit requirements.

The new Permit requirements, in summary, require marinas to collect all pressure washer wastewater generated from boat bottom washing activities and either 1) meet numeric limits for Total Suspended Solids, Oil and Grease, Copper, Zinc, and Lead and discharge the wastewater under a General Permit, or 2) eliminate discharges to surface waters by directing it to one location for treatment using a closed loop recycling system, utilizing off-site disposal, or to connect to a sanitary sewer system with permission of the local sewer authority.

Starting September 1, 2012, a means of collecting all pressure washer wastewater generated from boat bottom washing shall be implemented to begin monitoring the wastewater for Total Suspended Solids (TSS), Oil and Grease (O&G), Copper, Zinc, and Lead. This requires one discharge point where a grab sample can be taken and provided to a Maryland State Certified Laboratory for testing. The results shall be provided to MDE as compliant with the requirements of the Permit. Although not required, marina owners may submit to the State by March 1, 2013, in writing, a plan to cease discharging boat pressure washing wastewater before March 1, 2015. If submitted, and once a receipt has been provided from the State, the permittee will be waived from continuing to monitor Copper, Zinc, and Lead until February 28, 2015. However, TSS and O&G discharges must continue to be monitored as indicated in the Permit.

Beginning on March 1, 2013, wastewater discharges from marinas shall meet the numeric limits for TSS and O&G or the marina must cease the discharge of wastewater.

On March 1, 2015, the numeric limits for TSS, O&G, Copper, Zinc, and Lead must be met in order to discharge to waters of the State under the General Discharge Permit or the marina must eliminate all boat pressure washing wastewater discharges using one of the techniques listed above.

For further information regarding the General Discharge Permit 10-MA, contact the Maryland Department of the Environment, Water Management Administration, at 1-410-537-3000 or toll free at 1-800-633-6101.

## II. Wastewater Collection

### Containment Options

Several options are available to divert pressure washer wastewater to one discharge point.

One option is to construct a temporary collection system. This involves purchasing a waterproof plastic sheet or a 45mil UV resistant ethylene propylene diene monomer (EPDM) pond liner and some 6"x6" pressure treated lumber. Consideration for the largest boat to be washed is required. In most cases, a 15'x40' size may be adequate. If larger boats require pressure washing, a larger size should be utilized. A geotextile underlayment is recommended for prevention of puncturing. This type of temporary collection pad can cost between \$500 and \$1,500. Any pond supply or home improvement store may have these plastic sheets or EPDM liners available. An EPDM liner will typically hold up and last longer than plastic sheets.



Photo courtesy of  
[www.aireindustrial.net](http://www.aireindustrial.net)

Another method of temporary containment is a prefabricated portable containment mat. These may also be referred to as a spill containment pad or containment berm. Many different types of these mats are available for purchase and may allow the operator to collect all wastewater from pressure washing. Several possible sources for this type of containment mat are listed in the table below. This is not a complete list.

Company	Phone Number	Web Address
Absorbents Online	(800) 869-9633	<a href="http://www.absorbentsonline.com">www.absorbentsonline.com</a>
Aire Industrial	(800) 247-3846	<a href="http://www.aireindustrial.net">www.aireindustrial.net</a>
American Canvas Company, LLC	(603) 642-6665	<a href="http://www.americancanvasproducts.com">www.americancanvasproducts.com</a>
Baseline Equipment Company	(877) 844-3101	<a href="http://www.baselineequipment.com">www.baselineequipment.com</a>
Basic Concepts	(888) 810-3979	<a href="http://www.basicconcepts.com">www.basicconcepts.com</a>
Berg Company	(800) 228-8277	<a href="http://www.bergco.com">www.bergco.com</a>
DS Sewing Inc.	(800) 789-8143	<a href="http://www.ds-sewing.com">www.ds-sewing.com</a>
Grainger Industrial Supply	(301) 459-7780	<a href="http://www.grainger.com">www.grainger.com</a>
Interstate Products, Inc.	(800) 238-4259	<a href="http://www.store.interstateproducts.com">www.store.interstateproducts.com</a>
Ultimate Washer Inc.	(866) 858-4982	<a href="http://www.ultimatewasher.com">www.ultimatewasher.com</a>

*It is noted that the vendors listed are for informational purposes only and that the Maryland Department of Natural Resources, as well as, Huron Consulting do not recommend or endorse any product or service.*

There are also many other companies that offer this type of product. The expected price for this type of containment mat ranges between \$1,800 and \$6,500. Depending on the material of temporary mat and the material it is being placed on, an underlayment may be required to help prevent the containment mat from becoming punctured. In most cases, plastic tarps or a geotextile is adequate. Be sure to ask what may be required when obtaining the temporary containment mat.

The last alternative for pressure washer wastewater containment is a permanent pad in the form of asphalt or concrete. This is a much more expensive endeavor and will require an engineered plan with permitting through the local municipality. This may also take an extended period of time to design, permit, and construct. While prices may greatly vary, you can expect to spend between \$15,000 and \$30,000 for a 20'x50' pad. This type of containment may also require sump pits, settling basins, trench drains, and

plumbing to allow for drainage. These items are an additional cost to the pad and will need to be designed dependent on the layout of the pad.

## Dewatering

In addition to collecting the wash wastewater, a method to dewater the containment area is required. A bilge pump or submersible dewatering pump may be adequate for a temporary mat. A pump for this type of application should be capable of dewatering the wash pad to a 1/4" depth and should be able to pump effluent (particles up to 1/2" in diameter). Most local hardware stores supply these and generally range between \$80 and \$300.



Photo courtesy of  
[www.usplastic.com](http://www.usplastic.com)

To help prevent a pump from becoming lodged with particulate matter, a screen to protect the pump should be utilized. This can be accomplished using a stainless steel dipping basket typically used for deep frying food. The size of the basket may depend on the size of the pump used, but generally, a 12" diameter 12" deep basket is sufficient. The perforations in the basket should be no larger than 3/16". Filling the basket with filter cloth and placing the dewatering pump inside this basket may prevent larger matter such as barnacles and paint chips from clogging the pump. Several manufacturers can fabricate the dipping basket. A brief list is provided below, but there are others. This is not a complete list.

Company	Phone Number	Web Address
Cooley Wire Products Inc.	(847) 678-8585	<a href="http://www.cooleywire.com">www.cooleywire.com</a>
Eyster's Machine & Wire Products	(800) 618-4720	<a href="http://www.eysters.com">www.eysters.com</a>
Fluid Filtration Manuf. Corp.	(888) 295-0408	<a href="http://www.fluidfiltr.com">www.fluidfiltr.com</a>
Meadville New Products Inc.	(888) 456-2910	<a href="http://www.meadvillenewproducts.net">www.meadvillenewproducts.net</a>
MetaFin Supply Company	(847) 740-1599	<a href="http://www.electroplating.metafinsupply.com">www.electroplating.metafinsupply.com</a>
Newark Wire Cloth Company	(800) 221-0392	<a href="http://www.newarkwire.com">www.newarkwire.com</a>
Paget Strainer Company	(800) 376-7130	<a href="http://www.pagetstrainer.com">www.pagetstrainer.com</a>
Sterling Filter and Metal Products	(570) 842-7365	<a href="http://www.sterlingfilter.com">www.sterlingfilter.com</a>
Three M Tool	(800) 309-0671	<a href="http://www.threemtool.com">www.threemtool.com</a>
U.S. Plastic Corporation	(800) 809-4217	<a href="http://www.usplastic.com">www.usplastic.com</a>

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Other alternatives to the perforated basket are a 5 gallon bucket with perforations drilled in the sides and bottom or a stainless steel colander. While a perforated bucket may be a sufficient substitute, it may be difficult to provide as many perforations as are fabricated in a stainless steel basket or colander. The arrangement of perforations in a bucket will need to be optimized through trial and error. In addition, the dewatering depth may not be as shallow using a bucket.

In order to further reduce the amount of particulate matter that is pumped, an industrial strength 75 micron nylon filter bag may be installed around the pump prior to placing inside of the basket. Be sure to secure the filter bag in place while pumping and of large enough diameter to allow the pump to be placed in it. A perforated bucket and bag filter will cost approximately \$10-\$20, whereas, a perforated basket and bag filter will cost approximately \$400-\$600

## Testing

By utilizing a containment pad, a pump, and a perforated basket, bucket, or colander with filter cloth and a 75 micron filter bag, this can be enough for the boat bottom pressure washing operation to comply with the September 1, 2012 requirement of capturing and directing wash wastewater to one location for treatment per the Maryland General Discharge Permit No. 10MA. From here, the effluent that is pumped out can be monitored as required by the Permit. A grab sample can be taken from the discharge point and submitted to a laboratory for testing. It is noted that a grab sampling is conducted when all of the test material is collected at one specific time. A grab sample will reflect the performance only at the point in time that the sample was collected. Contact your local laboratory for specific recommendations on how this is to occur. Many labs will provide the container to collect the sample and allow for the sample to be mailed via Fed Ex or UPS. Other labs may choose to obtain the sample themselves.

The following link provides a list of laboratories that MDE maintains that will conduct pollutant testing. [http://www.mde.maryland.gov/programs/water/water\\_supply/documents/wsp-lab-2011may18.pdf](http://www.mde.maryland.gov/programs/water/water_supply/documents/wsp-lab-2011may18.pdf).

Many local wastewater authorities can provide testing as well, for a fee. Several laboratories to consider in the Chesapeake Bay area are listed below. This is not a complete list.

Company	Phone Number	Web Address
Caliber Analytical Services, LLC	(410) 825-1151	<a href="http://www.caslabs.net">www.caslabs.net</a>
Community Environmental Labs	(410) 575-6179	<a href="http://www.watertestinglabs.com">www.watertestinglabs.com</a>
Chesapeake Environmental Lab	(410) 643-0800	<a href="http://www.chesapeakeenvironmentallab.com">www.chesapeakeenvironmentallab.com</a>
Environmental Testing Lab Inc.	(410) 224-4304	
Fountain Valley Analytical Lab	(410) 876-4554	<a href="http://www.fval.com">www.fval.com</a>
Mid-Atlantic Water Services	(410) 573-1020	<a href="http://mawaterservice.com">http://mawaterservice.com</a>
Microbac Laboratory Services	(410) 633-1800	<a href="http://www.microbac.com">www.microbac.com</a>
Phase Separation Science, Inc.	(410) 747-8770	<a href="http://www.phaseonline.com">www.phaseonline.com</a>
TestAmerica, Inc.	(410) 869-0085	<a href="http://www.testamericainc.com">www.testamericainc.com</a>
Water Testing Labs of Maryland	(800) 200-5323	<a href="http://www.wtlmd.com">www.wtlmd.com</a>

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Each time a test is required for TSS, O&G, Copper, Lead and Zinc, each pollutant requires a specific test be conducted. The typical cost for all of these tests combined is between \$150 and \$300. It is noted that testing for TSS and O&G needs to be conducted four (4) times per year, and Copper, Lead, and Zinc will only need to be tested two (2) times during the main haul season. Flow for the discharge of effluent shall be estimated monthly and submitted with the monitoring report twice each calendar year to MDE and can be measured by the rate at which the bilge pump or dewatering pump discharges the wastewater.

After the containment measure is dewatered, all of the residual matter that is left on the mat should be left to dry and discarded with standard solid waste, much as is being done now using a filter cloth while washing. Your local waste company may require a onetime TCLP waste characterization (Toxicity Characteristic Leaching Procedure) before accepting the waste. This typically costs between \$800 and \$1,200.

### **III. Treatment Options**

In order to comply with the General Discharge Permit No. 10MA, two options are available. The first involves treating the pressure wash wastewater to the limits set by the General Permit and to continue to discharge to waters of the State. The second involves collecting all pressure wash wastewater in a closed system and eliminating all discharges to waters of the State. Several methods are available in order to comply with the Permit requirements.

#### **Option 1: Cease Boat Hull Pressure Washing**

This may not be in the best interest of the marina, but is an option. No additional resources would be required. However, if the marina allows boat owners or contractors to conduct pressure washing of painted boat bottoms, Permit requirements and discharge limits remain in effect.

#### **Option 2: Connect to Public Sanitary Sewer**

If your marina does connect to a municipal sewer system, this method seems to be the cheapest and easiest method to comply with the Permit Requirements. However, most local sewer authorities have requirements that may make it cost prohibitive. The wastewater from pressure washing a boat is typically considered as industrial wastewater due to the level of heavy metal content from abrasive paints found in the wastewater. Although paint chips are larger in size and easier to collect and remove, dissolved inorganics (dissolved heavy metals) are very small and do not easily settle out. Most sewer authorities have pre-treatment standards, as required by the Environmental Protection Agency (EPA), that must be met in order to discharge to their sewer system. There are many more pollutants required to meet the pre-treatment standards than what the General Discharge Permit is requiring. A wastewater analysis may need to be performed by the local sewer authority in order to determine if it will accept the wastewater. This can cost between \$400 and \$600. In order to discharge to a municipal sewer, pre-treatment requirements must be met, which will normally involve some form of treatment of the wastewater prior to discharge. In addition, the General Permit, as well as, local sewer authorities do not want rainwater or floodwater to co-mingle with wastewater, which may be problematic in the design of a system to bypass rainwater from pressure washing wastewater. Any design or connection to the public sewer system shall be coordinated with your local municipality.

If this option is considered, a bypass shall be designed to prevent rainwater or floodwater from entering the public sewer system. This may be achieved through the use of a diversion valve or gasketed inlet cover that can be removed when pressure washing operations occur. The inlet would need to be watertight to prevent any rainwater from entering the sewer system. In addition, pressure washing operations could not occur during rain events.

While connecting to the sewer system may be an option after pre-treatment, we feel that it may be difficult to satisfy the local sewer authority without a fail-proof system to bypass all rainwater. This may require that the entire wash area be constructed under a roof, which is a very costly endeavor, and not conducive for sailboats.

#### **Option 3: Discharge to a Tank and have Hauled**

Depending on the amount of wastewater that is generated from your boat pressure washing operations, it will need to be collected, stored, and removed by a licensed septage hauler. As mentioned previously, the wastewater from pressure washing boats is considered industrial wastewater, so an industrial wastewater

disposal company will need to come and pump the storage tank and transfer the wastewater to an industrial wastewater treatment facility. We recommend an above grade 5,000 gallon tank be utilized to collect the wastewater. These are approximately 12' in diameter and cost between \$2,000 and \$4,000. A smaller tank can be utilized, but may need to be pumped more frequently. Treatment of the wastewater is typically between \$0.20 and \$0.30 per gallon, plus the cost per hour to travel to the marina, pump out the tank, and transport to an industrial wastewater treatment facility. Typical rates per hour run between \$100 and \$150. In addition, the treatment facilities typically require an analytical test to be performed on the wastewater to ensure that what they are receiving is treatable at their facility. This test normally costs between \$100 and \$400. The total annual cost to have wastewater hauled is dependent on the amount of wastewater produced by your boat washing operations and your proximity to an industrial wastewater facility. Your local municipality may allow an above ground tank, but this will need to be verified at permitting. A heating source may be required so that the liquid in the tank does not freeze if installed above grade. Tanks should be UV protected and have an anchoring system. Odor and bacterial may be another issue, since the wastewater may be sitting for an extended period of time.

Several sources for a 5,000 gallon tank are listed below. This is not a complete list.

<b>Company</b>	<b>Phone Number</b>	<b>Web Address</b>
Boyd's Equipment	(806) 356-9102	<a href="http://www.boydsequipment.com">www.boydsequipment.com</a>
GoTo Tanks	(877) 468-2657	<a href="http://www.gototanks.com">www.gototanks.com</a>
National Tank Outlet	(888) 686-6265	<a href="http://www.ntotank.com">www.ntotank.com</a>
North American Rain Systems	(864) 316-5200	<a href="http://www.raincollectionsupplies.com">www.raincollectionsupplies.com</a>
Plastic-Mart	(866) 310-2556	<a href="http://www.plastic-mart.com">www.plastic-mart.com</a>
PBM Supply & Manufacturing	(800) 688-1334	<a href="http://www.pbmtanksupply.com">www.pbmtanksupply.com</a>
RainHarvest Systems LLC	(770) 889-2533	<a href="http://www.rainharvest.com">www.rainharvest.com</a>
Tank Depot	(866) 926-5603	<a href="http://www.tank-depot.com">www.tank-depot.com</a>
Tanks for Less	(877) 558-8265	<a href="http://www.tanksforless.com">www.tanksforless.com</a>
U.S. Plastic Corp.	(800) 809-4217	<a href="http://www.usplastic.com">www.usplastic.com</a>

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There are only a few options for industrial wastewater treatment in the area, however, others may be available.

<b>Company</b>	<b>Phone Number</b>	<b>Contact</b>
B & P Environmental	(877) 705-0011	John Davis
Clean Harbors	(339) 788-0778	Kitty Davis
Environmental Recovery Corp.	(717) 393-2627	Eric Merling
Kline's Services	(717) 587-1927	Shawn Perry
Sprit Services	(717) 360-7916	Joe Staton

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This method of treatment may provide the best economical choice for upfront cost, but may require greater annual costs.

#### Option 4: Water Evaporation System

This type of system uses a large steel chamber and burner typically fueled by Natural Gas or LPG. Some electric units are available. This system produces zero discharge, since all liquids are evaporated. There is, however, a waste produced from the pollutants (heavy metals) that does not evaporate out. This waste is considered hazardous and must be removed using a licensed hazardous waste hauler. This can cost between \$200 and \$1,000 per removal depending on the amount that is removed at one time. A settling



Photo courtesy of <http://steamdragon.com>

tank and pre-filter are required to filter out material so that essentially only liquid is entering the system. Typical upfront costs for this type of system are in the \$20,000 to \$30,000 price range. As mentioned, a settling tank and pre-filter with plumbing to connect to the system will be required. This type of system should be enclosed by a building and usually requires a Natural Gas or LPG hookup. These additional items can add another \$2,000 to \$3,500 to the upfront costs. Other costs associated are fuel costs, which vary, and electrical and plumbing installation. Annual costs for this type of system are typically between \$1,000 and \$2,500, but will vary with fuel costs.

These types of systems are mostly proprietary and generally require maintenance by the manufacturer's representative. They generally require high maintenance, and odor may be an issue if water is stored for long periods of time.

If purchasing this type of system, be sure that the vendor identifies how the system deals with corrosion, foaming, V.O.C. emissions, and ease of cleaning the evaporator chambers. In addition, the system should be capable of keeping up with your boat pressure wash operations. A 20 gph system would suffice for your marina. This system requires an area for the settling tank which is typically 8' in diameter, as well as, the water evaporator itself. Although the sizes do vary, most are approximately 4'x10'

Several available vendors are listed below. This is not a complete list.

Company	Phone Number	Web Address
Draygon	(800) 724-3610	<a href="http://steamdragon.com">http://steamdragon.com</a>
Encon	(866) 907-9010	<a href="http://www.evaporator.com">www.evaporator.com</a>
EMC	(888) 833-9000	<a href="http://www.equipmentmanufacturing.com">www.equipmentmanufacturing.com</a>
Industrial Equipment	(800) 287-8306	<a href="http://www.industrial-equipment.biz">www.industrial-equipment.biz</a>
RGF Environmental	(800) 842-7771	<a href="http://www.rgf.com">www.rgf.com</a>
SkimOil Inc.	(314) 579-9755	<a href="http://www.skimoil.com">www.skimoil.com</a>
Wilson Environmental	(800) 469-0799	<a href="http://www.wilsonemi.com">www.wilsonemi.com</a>

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Although this type of system has been used at boat marinas around the country, it is not the typical choice of marinas.

## Option 5: Electrocoagulation System

Electrocoagulation is a type of wastewater treatment that has been in existence for about 100 years. The technology requires wastewater to travel through a series of cells where an electrical current is applied to promote smaller material to coagulate (join together) and settle out. This type of system is very useful in removing heavy metals from wastewater.

Much like some of the aforementioned options, this system does require the system to be placed in an area that is heated to prevent freezing. A building, electric, and plumbing, may be required. All permitting should be obtained through your local municipality and utilize a licensed plumber and electrician.

This type of system may be able to reduce pollutants enough to meet the numeric limits set by MDE and allow for discharge to waters of the State, but be sure to require any vendor to provide a guarantee that the limits can be met. In addition, this system can be used as a closed loop recycling system. This means that there is zero discharge to waters of the state and water can be reused to pressure wash boats. Note that water from pressure washing does evaporate and atomize, so the amount of water that goes into the pressure washer and that is collected and circulated in the treatment system are not the same. Water will need to be added to the system periodically. A sludge waste is produced and may be dried and disposed of as solid waste if allowed by a solid waste company. A TCLP test may be required. If this is identified as hazardous waste, it will need to be removed by a licensed hazardous waste hauler and can cost between \$200 and \$1,000 per removal depending on the amount that is removed at one time. Odors are controlled using ozone or a UV light to kill bacteria.



Photo courtesy of [www.myco-inc.com](http://www.myco-inc.com)

These systems generally cost between \$30,000 and \$40,000. This does not include a wash pad, electric, plumbing, etc. The size of the system is approximately 10'x10' and usually is mounted on a skid for easy relocation. The annual costs associated with an electrocoagulation system are normally between \$1,000 and \$2,000.

Several available vendors are listed below. This is not a complete list.

Company	Phone Number	Web Address
Bay Compliance Solutions	(410) 750-0607	<a href="http://www.baycompliance.com">www.baycompliance.com</a>
Kaselco	(888) 527-3526	<a href="http://www.kaselco.com">www.kaselco.com</a>
Myco Inc.	(410) 381-0500	<a href="http://www.myco-inc.com">www.myco-inc.com</a>
Powell Water Systems	(303) 627-0320	<a href="http://www.powellwater.com">www.powellwater.com</a>
WaterTectonics	(866) 402-2298	<a href="http://www.watertectonics.com">www.watertectonics.com</a>

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Electrocoagulation treatment may allow the water to be treated enough to be disposed of into the municipal sewer system. As stated before, the General Permit, as well as, the local sewer authority, do not want to have rainwater or floodwater co-mingle with wastewater, which may be problematic in the design of a system to bypass rainwater from pressure washing wastewater. Any design or connection to the public sewer system shall be coordinated with your local sewer authority. If an option to dispose of

wastewater into the municipal sewer system after pre-treatment is considered, please refer to Option 2 above.

Electrocoagulation systems work very well for removing dissolved metals from wastewater. However, these types of systems are generally more expensive than the other technologies.

**Option 6: Filtration System**

The technology of these systems utilizes settling basins and/or a series of filters or a membrane to remove pollutants. Many swimming pools utilize this type of system. Filtering systems will reduce the number of pollutants in the wastewater, but may not reduce them enough to comply with MDE requirements and discharge to waters of the State. Therefore, this type of system can only be used in a closed loop recycling application.

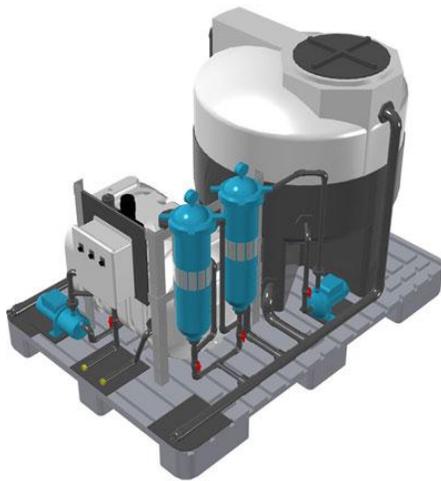


Photo courtesy of <http://empind.net>

These systems can be trailer mounted or skid mounted. Sizes of the skid require an area of 10’x10’ and the trailer will be approximately 6’x12’. Like some of the previous options, this system does require the system to be placed in an area that is heated to prevent freezing. A building, electric, and plumbing, may be required. All permitting should be obtained through your local municipality and utilize a licensed plumber and electrician.

Filtering systems are typically a more economical choice of the treatment systems, as their upfront costs are between \$14,000 and \$25,000. However, there are several systems that are more replacement filters run between \$300 and \$600.

Several available vendors are listed below. This is not a complete list.

Company	Phone Number	Web Address
Atlantic Coast Hotsy	(732) 349-2212	<a href="http://njhotsy.com">http://njhotsy.com</a>
Carbtrol Corp.	(800) 242-1150	<a href="http://www.carbtrol.com">www.carbtrol.com</a>
Catec	(888) 536-7100	<a href="http://www.catec.com">www.catec.com</a>
Elias Environmental Solutions	(610) 490-9734	<a href="http://www.EliasEnvironmental.com">www.EliasEnvironmental.com</a>
Encyclon Filtration	(937) 572-3280	<a href="http://www.cleanmarinapressurewash.com">www.cleanmarinapressurewash.com</a>
Environmental Water Technologies, LLC	(410) 322-6701	<a href="http://www.ewth2o.com">www.ewth2o.com</a>
Hydro Engineering, Inc.	(800) 247-8424	<a href="http://www.hydroblaster.com">www.hydroblaster.com</a>
John Furrh Equipment Company	(609) 876-0906	<a href="http://www.johnwfurhassociates.com">www.johnwfurhassociates.com</a>
RGF Environmental Group, Inc.	(561) 848-1826	<a href="http://www.rgf.com">www.rgf.com</a>
The Next Generation in Waste Water Treatment Technology	(281) 639-7860	<a href="http://www.naturalwatertreatment.com">www.naturalwatertreatment.com</a>

*It is noted that the vendors listed are for informational purposes only and that the Maryland Department of Natural Resources, as well as, Huron Consulting do not recommend or endorse any product or service.*

Odors are managed using ozone, UV lights, or chlorine tablets. These systems will need to be backwashed (purged) on a weekly basis to flush the filters and will need to be circulated to kill any bacteria. The system can be winterized but will require an industrial septage hauler to remove the wastewater. Tanks for these systems vary in size but generally are between 350 and 500 gallons. The cost to have wastewater hauled once annually will be between \$600 and \$1,200.

In order to dispose of the filters, a hazardous waste disposal will be required. Many solid waste companies offer this as an added fee to their annual service. A TCLP test is usually required. A cost of between \$200 and \$500 to dispose of the used filters per year can be expected.

If you decide to purchase a filter system, be sure to ask the vendor if anything on the system is proprietary. Some vendors do have proprietary systems that require you to purchase all filters and replacement parts from them. Most are not proprietary which allows the user the flexibility to purchase filters anywhere, in addition to, replacement parts.

Note that water from pressure washing does evaporate and atomize so the amount of water that goes into the pressure washer and that is collected and circulated in the treatment system are not the same. Water will need to be added to the system periodically.

Filtration treatment may allow the water to be treated enough to be disposed of into the municipal sewer system. As stated before, the General Permit, as well as, the local sewer authority, do not want to have rainwater or floodwater co-mingle with wastewater, which may be problematic in the design of a system to bypass rainwater from pressure washing wastewater. Any design or connection to the public sewer system shall be coordinated with your local sewer authority. If an option to dispose of wastewater into the municipal sewer system after pre-treatment is considered, please refer to Option 2 above.

Filtration systems are the most commonly utilized technology in boat hull pressure washing wastewater treatment.

### **Option 7: Chemical Treatment System**



*Photo courtesy of  
[http://cleanmarine  
solutions.com](http://cleanmarine<br/>solutions.com)*

A chemical treatment system uses chemicals to flocculate (join together) pollutants and settle out. The chemicals typically change the pH of the wastewater to accommodate this. This method of treatment is very effective but can require training and become cost prohibitive. Because results may not meet that required by MDE for treatment and discharge to waters of the State, this system should be a closed loop recycling system.

This technology has been used for decades in the wastewater treatment industry; however, very few vendors have developed this for use related to pressure washing of boats, due to the requirements related to operation. However, there are a few that have developed systems that do not require a wastewater operator to be licensed. Chemical treatment may allow the water to be treated enough to be disposed of into the municipal sewer system, as this type of treatment usually clarifies the water to limits less than that of drinking water.

As stated before, the General Permit, as well as, the local sewer authority, do not want to have rainwater or floodwater co-mingle with wastewater, which may be problematic in the design of a system to bypass rainwater from pressure washing wastewater. Any design or connection to the public sewer system shall

be coordinated with your local sewer authority. If an option to dispose of wastewater into the municipal sewer system after pre-treatment is considered, please refer to Option 2 above.

Upfront costs for this type of system are between \$14,000 and \$35,000. Again, this system needs to be prevented from freezing, so a building, electric, and plumbing, may be required. All permitting should be obtained through your local municipality and utilize a licensed plumber and electrician.

Annual costs associated with this type of system for chemicals are between \$400 and \$600. Some systems combine technologies and have filters as well. These filters are inexpensive, less than \$100 per year, but do require costly disposal through a licensed hazardous waste hauler. In addition, a waste sludge is also produced which can be dried and disposed of through a solid waste company as long as the dried material is not considered hazardous. A TCLP test may be required by your waste company.

Note that water from pressure washing does evaporate and atomize so the amount of water that goes into the pressure washer and that is collected and circulated in the treatment system are not the same. Water will need to be added to the system periodically.

As mentioned above, there are a limited number of vendors that sell an “off the shelf“ chemical treatment units for boat pressure washing purposes. The vendors listed below are only a few options; however, there are many other companies that specialize in custom chemical coagulation treatment systems. A wastewater engineer should be hired to design a small custom system.

<b>Company</b>	<b>Phone Number</b>	<b>Web Address</b>
Clean Marine Solutions	(910) 617-8018	<a href="http://www.cleanmarinesolutions.com">www.cleanmarinesolutions.com</a>
Myco Inc.	(410) 381-0500	<a href="http://www.myco-inc.com">www.myco-inc.com</a>
WaterTectonics	(866) 402-2298	<a href="http://www.watertectonics.com">www.watertectonics.com</a>

*It is noted that the vendor listed is for informational purposes only and that the Maryland Department of Natural Resources, as well as, Huron Consulting do not recommend or endorse any product or service.*

These systems are usually skid mounted and are 10’x10’ in size. Odors are normally handled by a UV light. Systems are typically non-proprietary, but check with the vendor for more information. This will allow you to purchase filters anywhere they are sold and to replace parts as necessary.

While there are only a few vendors indicated, chemical treatment is a very cost effective technology.

#### **IV. Recommendations**

The best option for your marina to comply with the Permit requirements is dependent on the amount of wash wastewater that you produce. This is easily calculated using the number of gallons per minute your pressure washer uses multiplied by the number of boats you wash annually multiplied by the average time it takes for you to pressure wash a boat. This number can then be reduced, since some water from pressure washing does evaporate and atomize. Typically, only 85% of the water that is distributed from your pressure washer will be collected. This can fluctuate depending on the weather.

For a marina that produces less than 5,000 gallons of wash wastewater annually, the best and most affordable option for Permit compliance is to collect the wash wastewater, discharge to a tank, and have an industrial wastewater septage hauler transfer to an industrial wastewater treatment facility. For

marinas that produce more than 5,000 gallons per year, a closed loop recycling system may be the best and most affordable choice for compliance with the Permit requirements.

Since most municipalities have stated that pre-treatment will be required in order to connect to their sewer system, connecting to the sewer may not be possible without some sort of treatment system. A closed loop system will give any marina the opportunity to reuse water when pressure washing and allows them to fully comply with the General Discharge Permit by creating zero discharge. While connecting to the sewer system may still be an option after pre-treatment, we feel that it may be difficult to satisfy the local sewer authority without a fail-proof system to bypass all rainwater. This may require that the entire wash area be constructed under a roof, which is a very costly endeavor, and not conducive for sailboats.

As mentioned previously in this report, a temporary measure to collect the wash wastewater may be sufficient to comply with the Permit for September 1, 2012. After a wash water treatment system has been selected, the marina should consider the installation of a permanent pad, in the future, that will collect wash wastewater and supply it to the closed loop recycle system that is selected. This will require an engineered plan to be signed and sealed and submitted to the local municipality for approval and permit. Depending on the grade where the current wash location is, additional grading may be required. It may also make sense to construct the wash pad directly in front of the boat lift area. The permanent pad shall be designed such that any vehicles that may drive over it (travel lift with maximum boat size) will not damage the pad. The material of the pad shall be concrete or asphalt and shall include a trench drain or inlet to collect the wash wastewater. All areas around the pad shall be graded away from the pad as to not allow runoff to enter. Several conceptual layouts are provided in the appendices of this report.

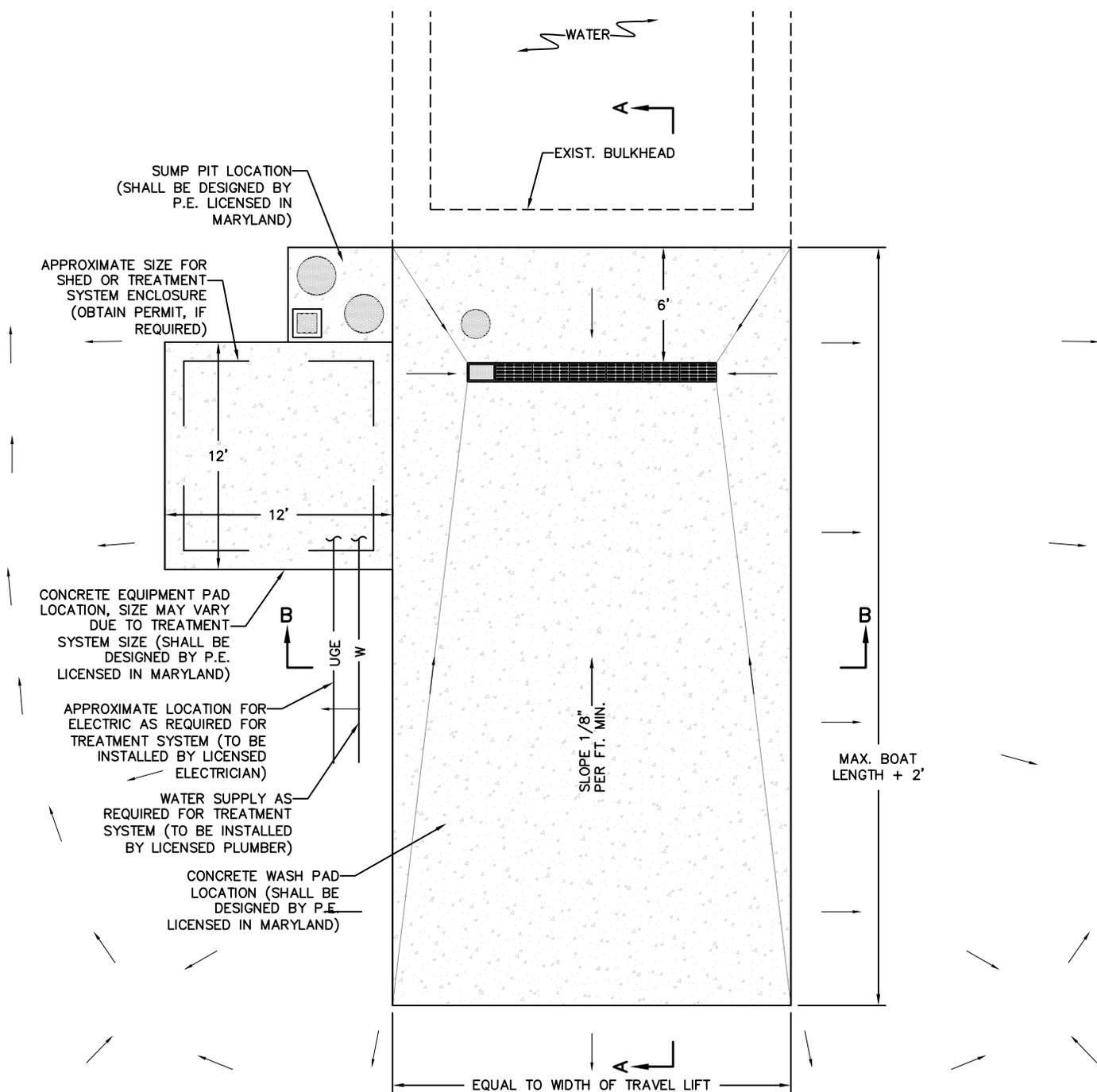
As mentioned previously, systems generally require that they are protected from freezing. In many cases, a shed with insulation or a heat lamp may provide enough heat to protect them. Be aware that any of the systems above require electricity and some may require Natural Gas or LPG, which may not be conducive to your marina. Always inquire to the warranty information for any system mentioned in this report.

We also recommend that your marina prepare a letter stating that you plan to cease discharges to waters of the State by March 1, 2015. This letter should be submitted to MDE by March 1, 2013. Once a receipt is provided from MDE, this will allow your marina to be waived in monitoring Copper, Zinc, and Lead. Bear in mind, that this does not absolve you from ceasing to discharge by March 1, 2015.

It is also recommended that other methods be utilized to minimize the pollutants from boat pressure washing, including: removing zincs or protecting zincs prior to any pressure washing activities, using a high pressure/low volume power washer, using non-toxic or non-biocide coatings in-lieu of biocide based paints, and keeping boats out of the water when not in use. In addition, do not allow bilge water to be added to wash wastewater.

It is noted that any of the treatment systems mentioned previously that will allow for a closed loop recycle system may be sufficient in meeting the MDE requirements for March 1, 2015. Ultimately, the type of treatment and the selected system to be used is up to the marina.

## **V. Appendices**



**NOTES:**

ALL WASH WASTEWATER SHALL BE DIVERTED TO SUMP PIT LOCATION. NO STORMWATER SHALL BE DIRECTED TO THE SUMP PIT.

UNDER NO CIRCUMSTANCES SHALL WASH WASTEWATER DRAIN TO GROUNDWATER OR WATERS OF THE STATE.

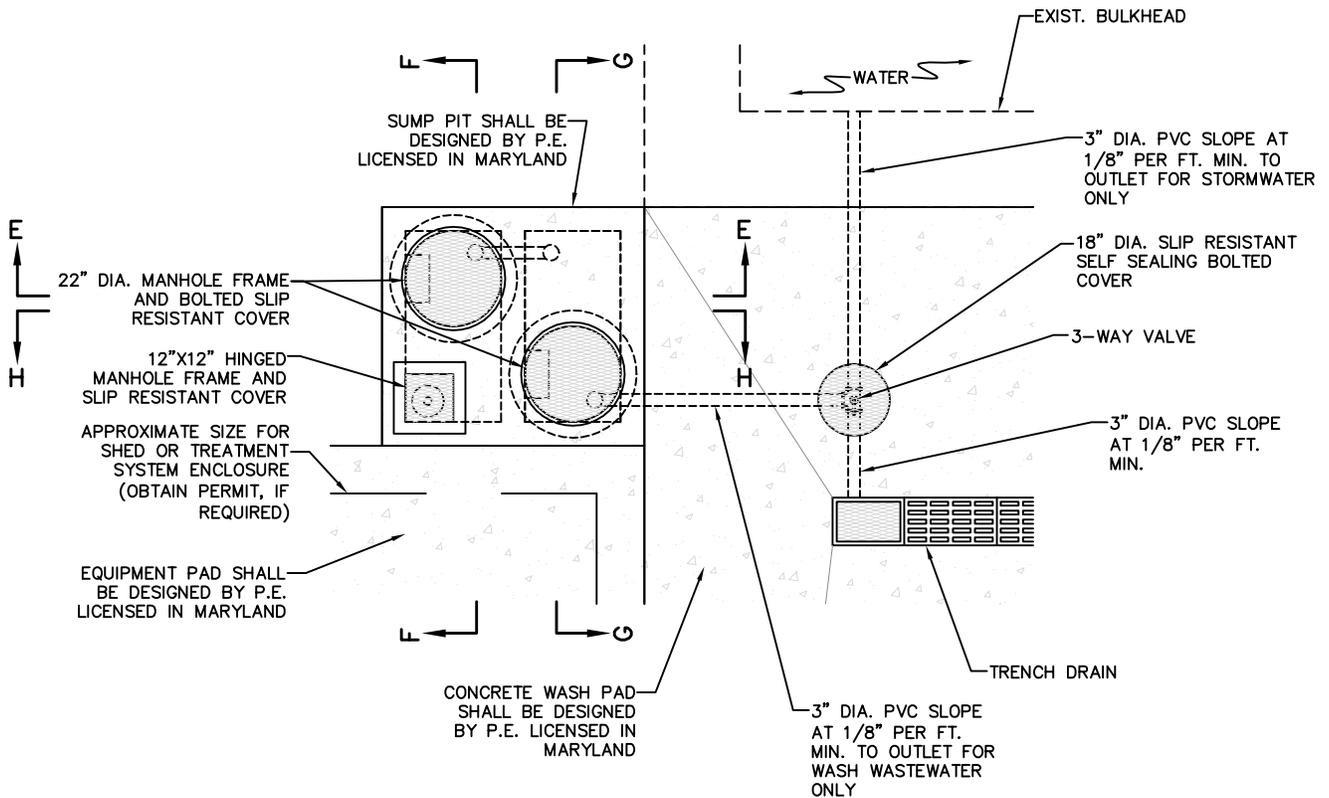
**TYPICAL WASH PAD  
OVERALL LAYOUT  
APPENDIX A**

N.T.S.



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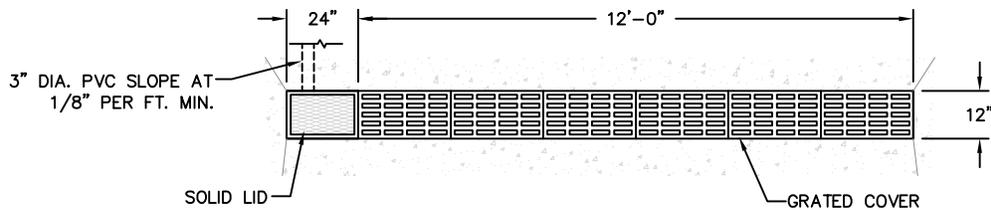
**TYPICAL WASH PAD  
 DETAILED LAYOUT  
 APPENDIX B**

N.T.S.

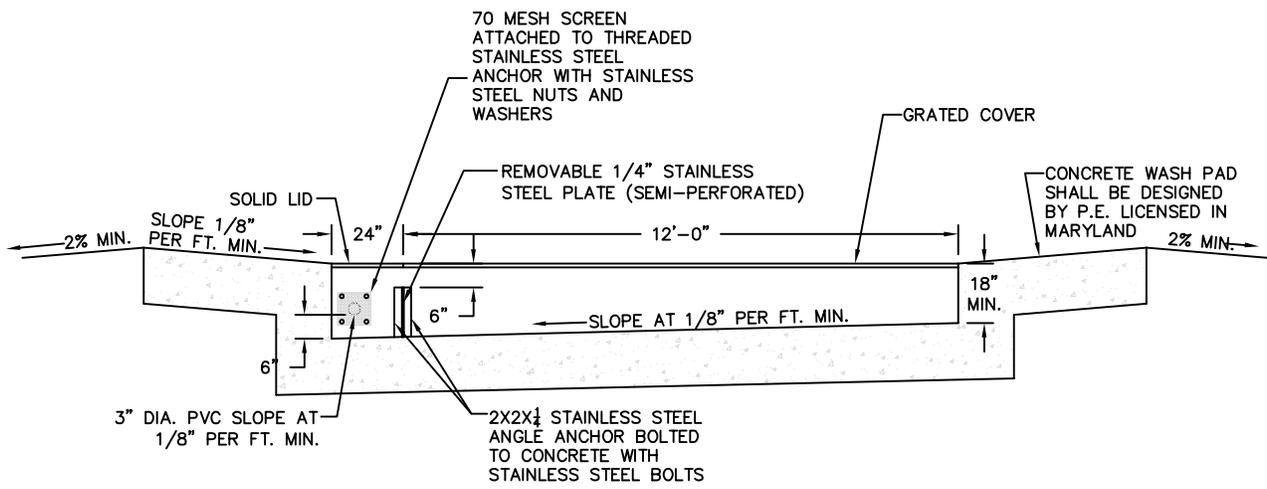


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**PLAN VIEW**



**PROFILE**

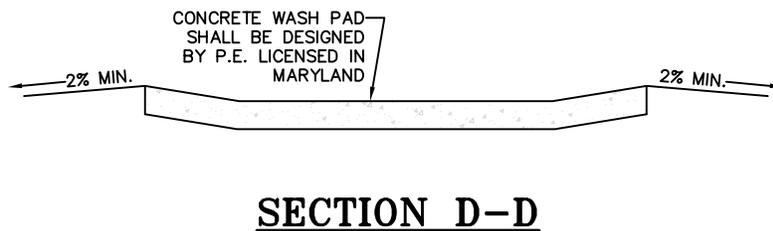
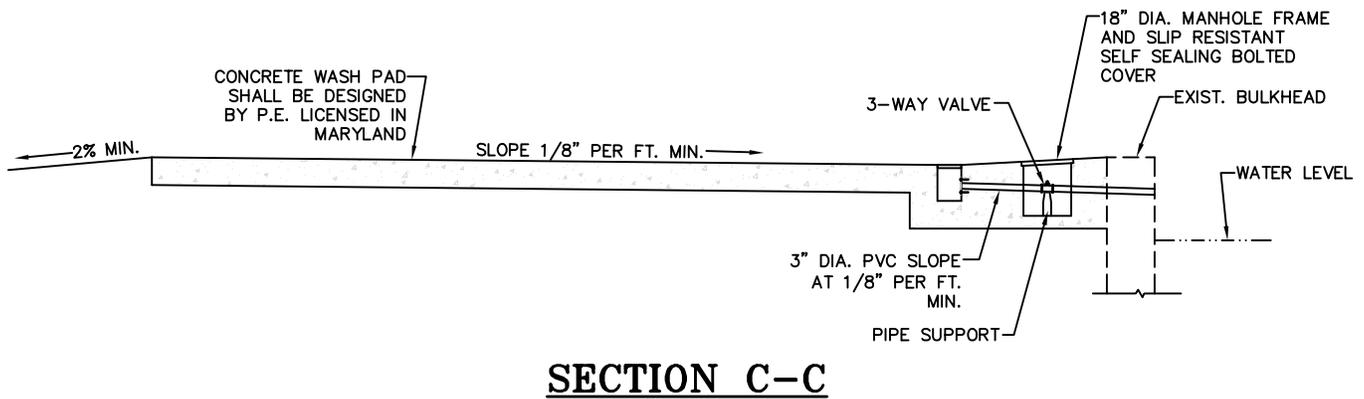
TYPICAL WASH PAD  
TRENCH DRAIN DETAILS  
**APPENDIX C**

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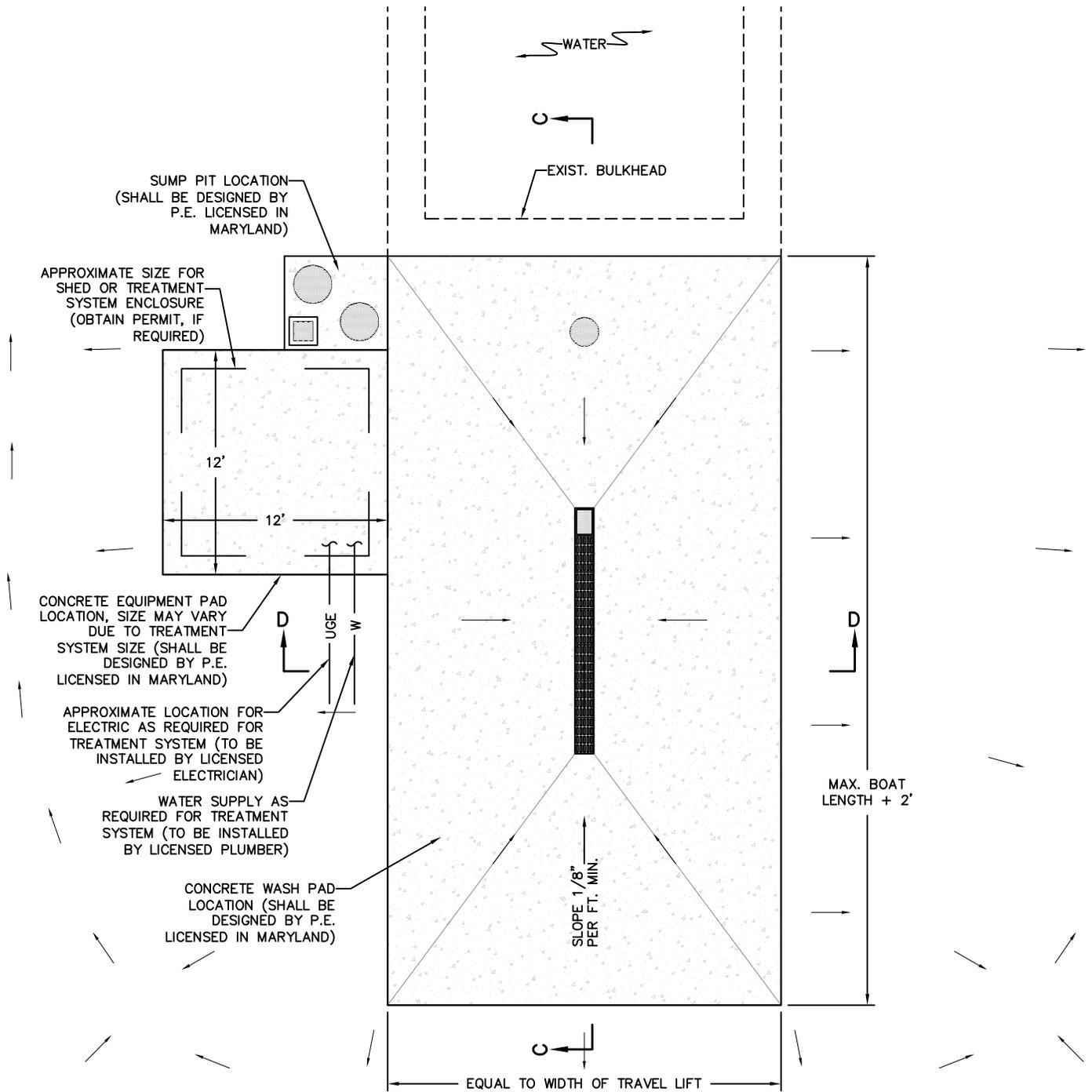
TYPICAL WASH PAD  
CROSS-SECTIONS  
**APPENDIX D**

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NOTES:

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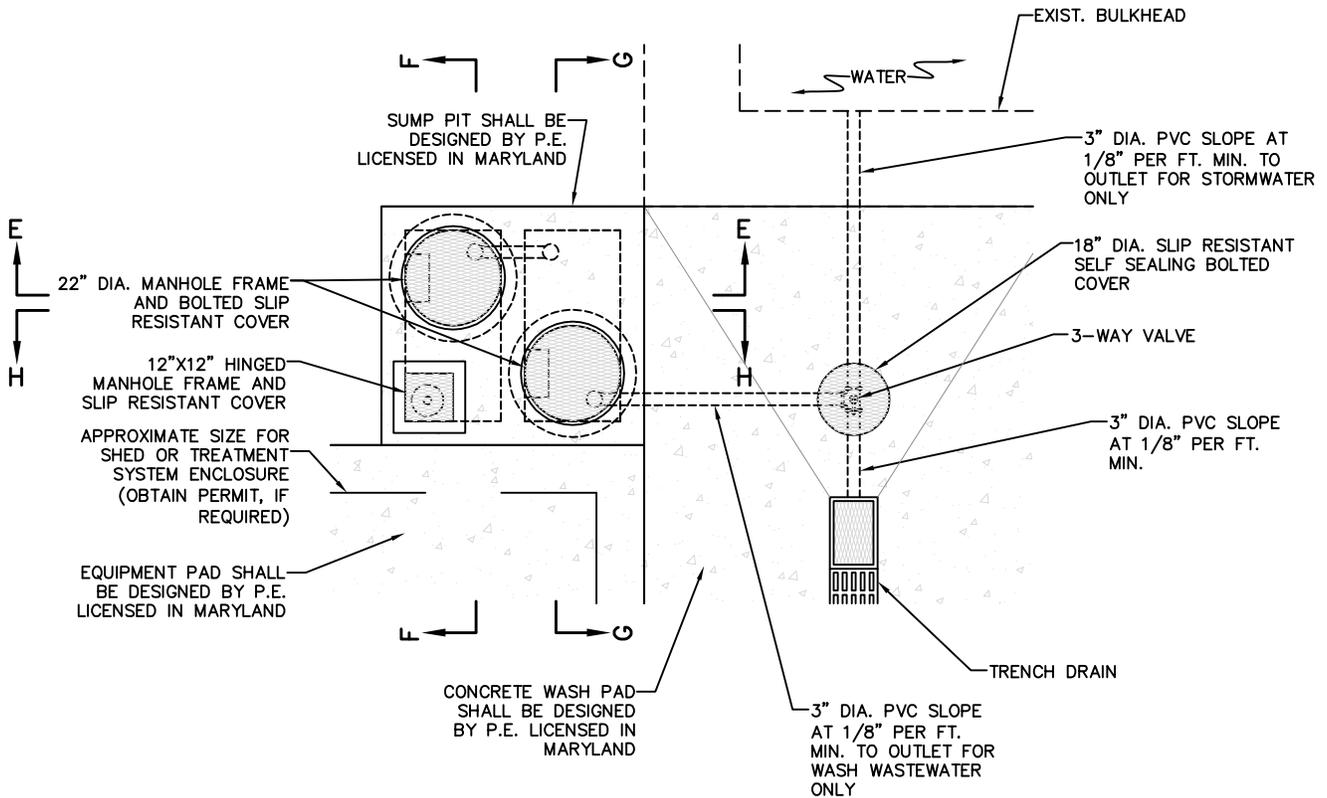
**ALTERNATE WASH PAD  
OVERALL LAYOUT  
APPENDIX E**

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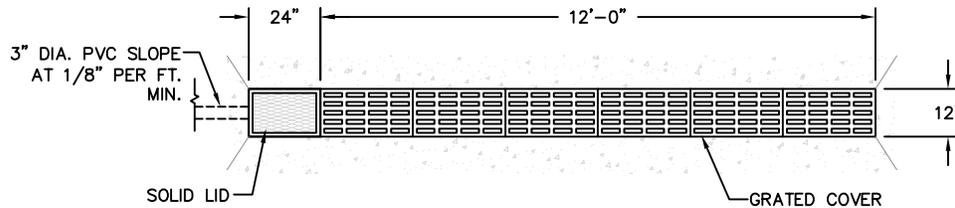
**ALTERNATE WASH PAD  
DETAILED LAYOUT  
APPENDIX F**

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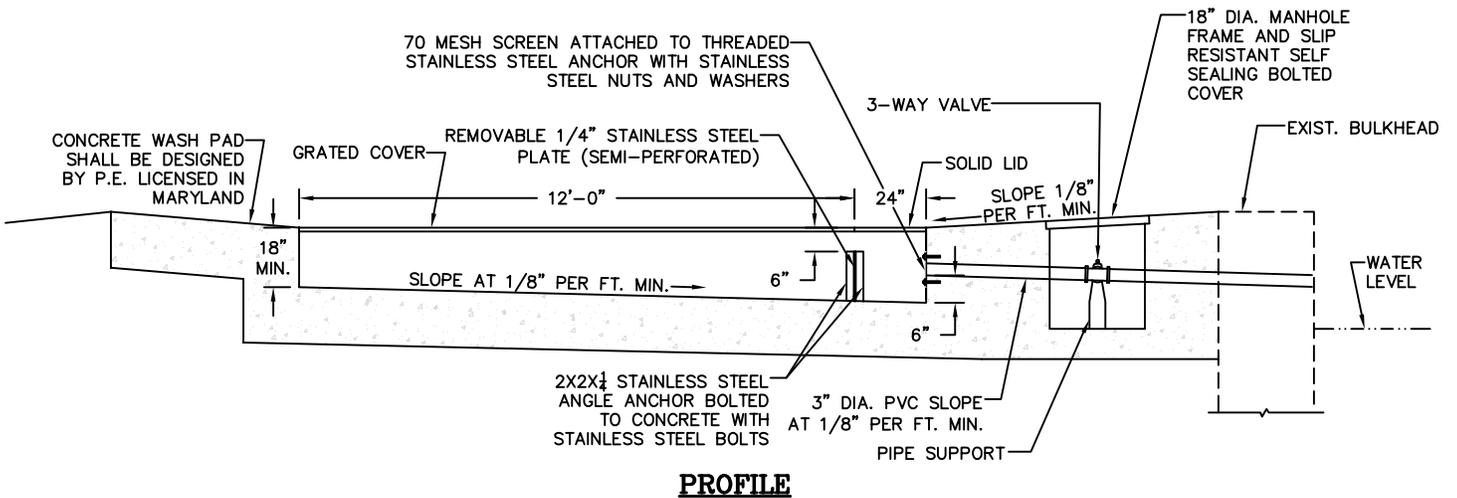


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**PLAN VIEW**



**PROFILE**

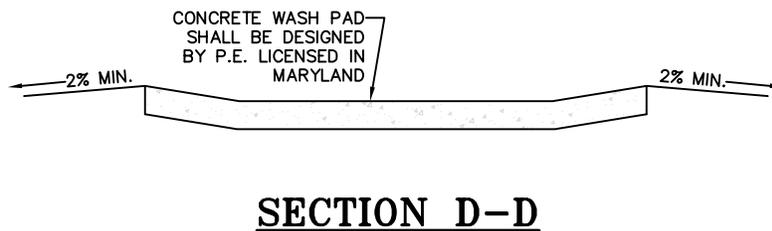
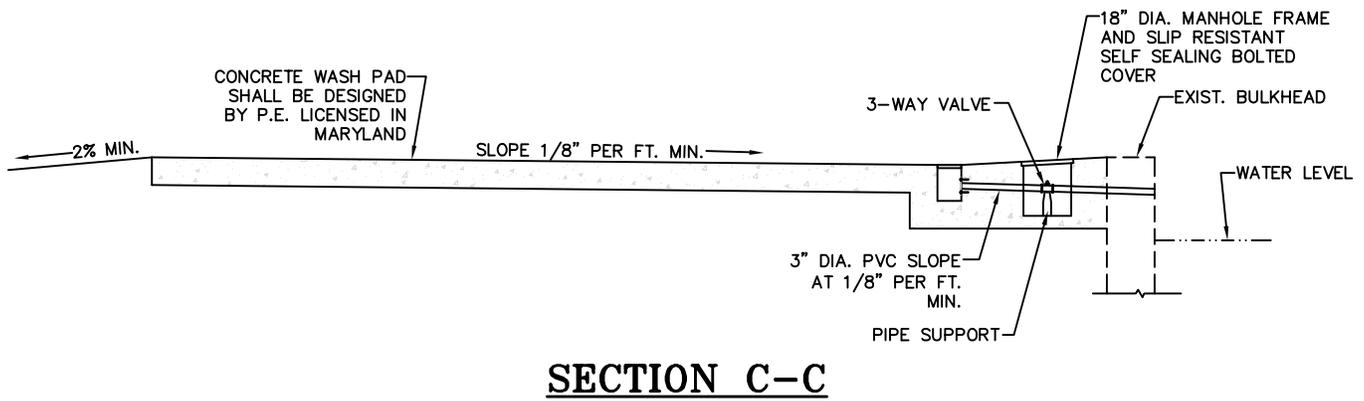
**ALTERNATE WASH PAD  
TRENCH DRAIN DETAILS  
APPENDIX G**

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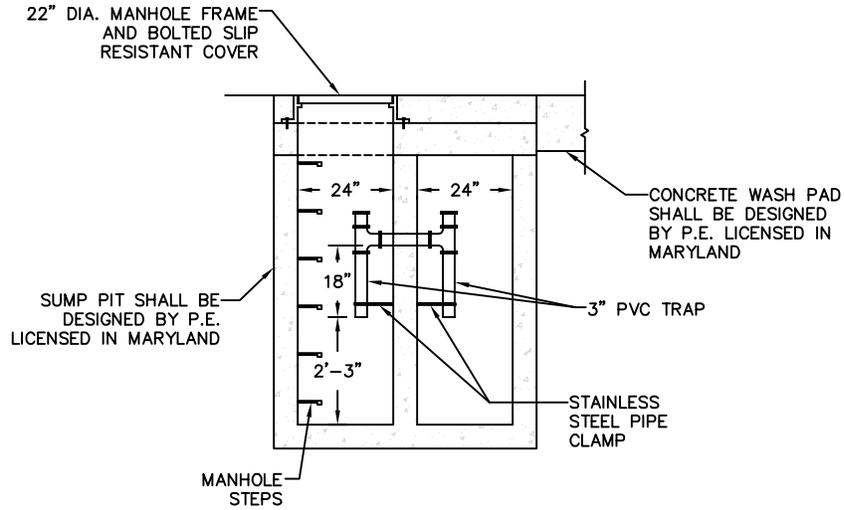
ALTERNATE WASH PAD  
CROSS-SECTIONS  
**APPENDIX H**

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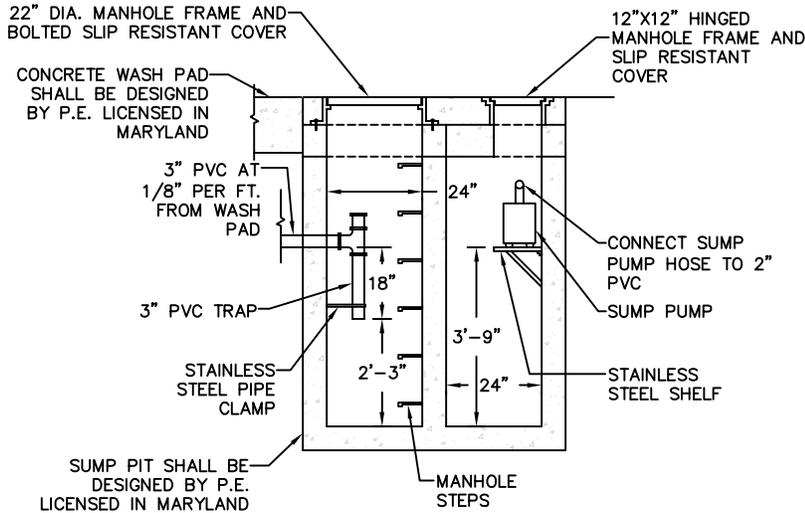


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**SECTION E-E**



**SECTION F-F**

**NOTES:**

THE CONFIGURATION AND SIZE OF THE SUMP PIT MAY BE MODIFIED TO BE MORE CONDUCTIVE TO THE MARINA'S NEEDS. DIMENSIONS SHOWN SHOULD BE CONSIDERED MINIMUM.

SIZE OF SUMP PIT INCLUDING ACCESS AND FUNCTIONALITY ARE SUBJECT TO AGENCY APPROVAL.

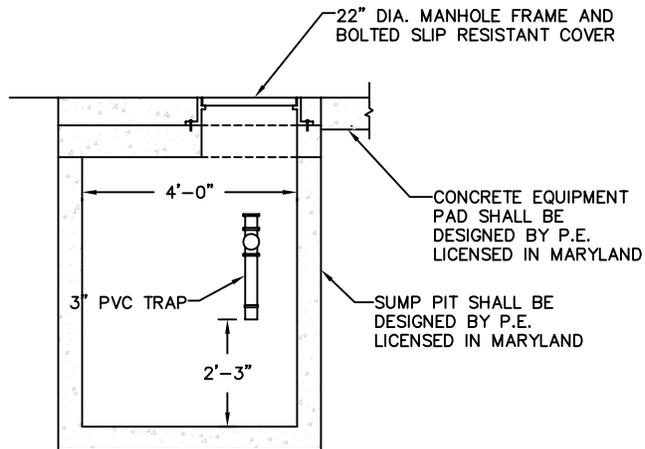
**TYPICAL SUMP PIT  
CROSS-SECTIONS  
APPENDIX I**

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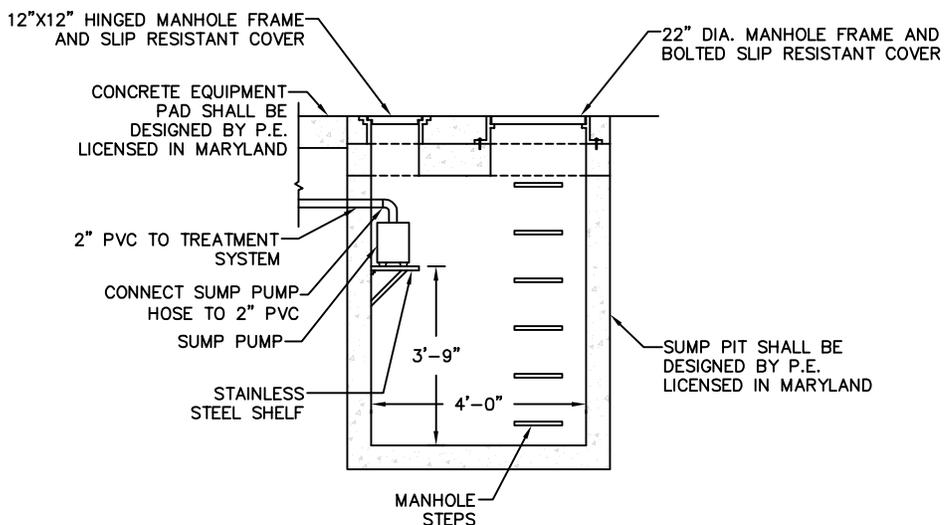


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**SECTION G-G**



**SECTION H-H**

**NOTES:**

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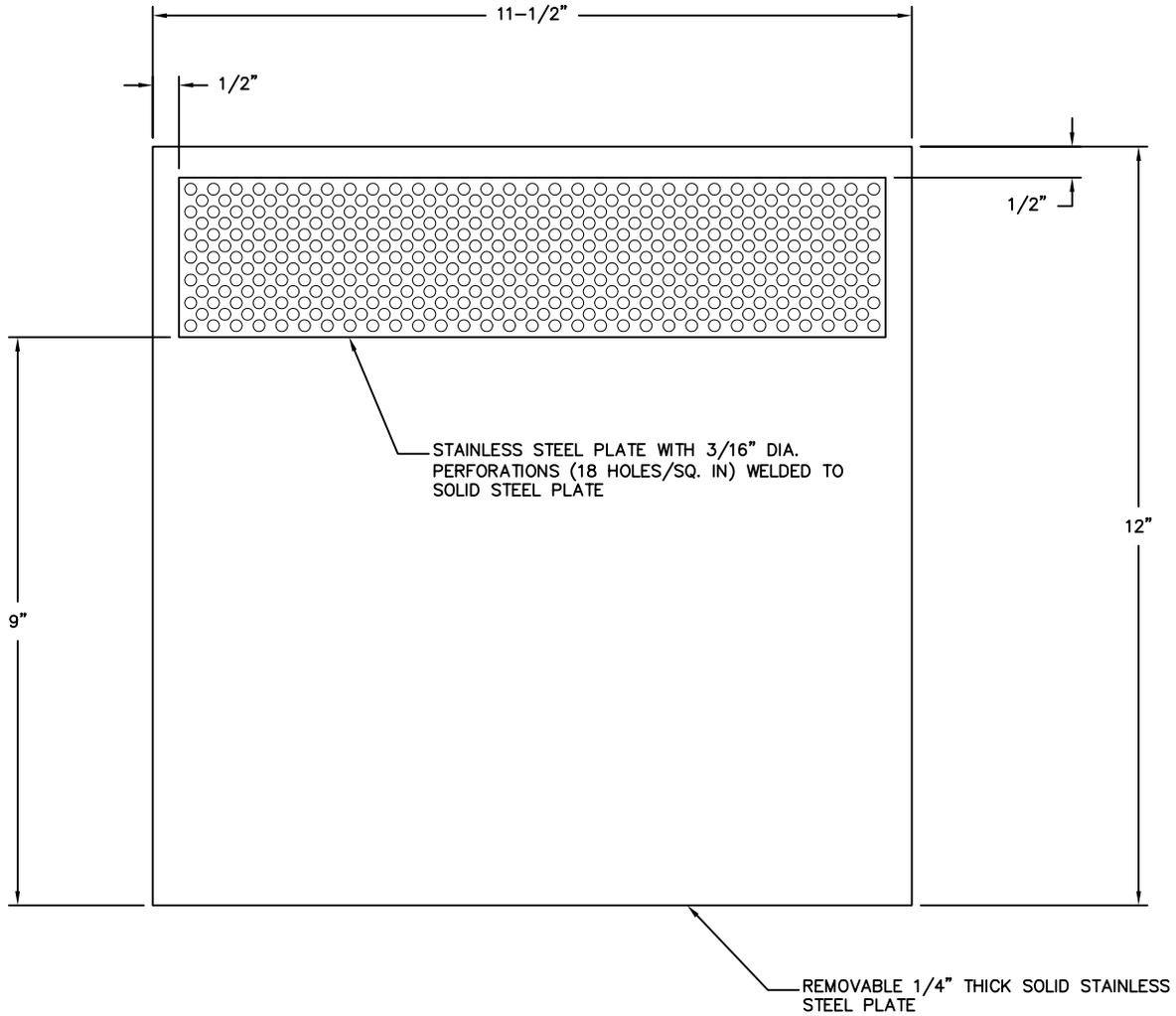
**TYPICAL SUMP PIT  
CROSS-SECTIONS  
APPENDIX J**

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NOTES:

THIS REMOVABLE PLATE MAY BE PREFABRICATED.

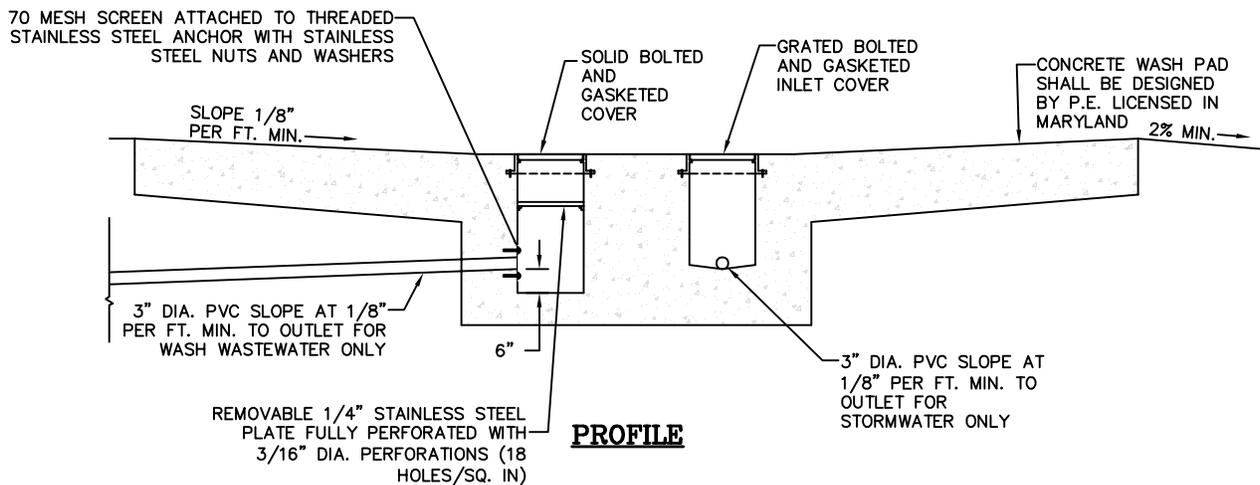
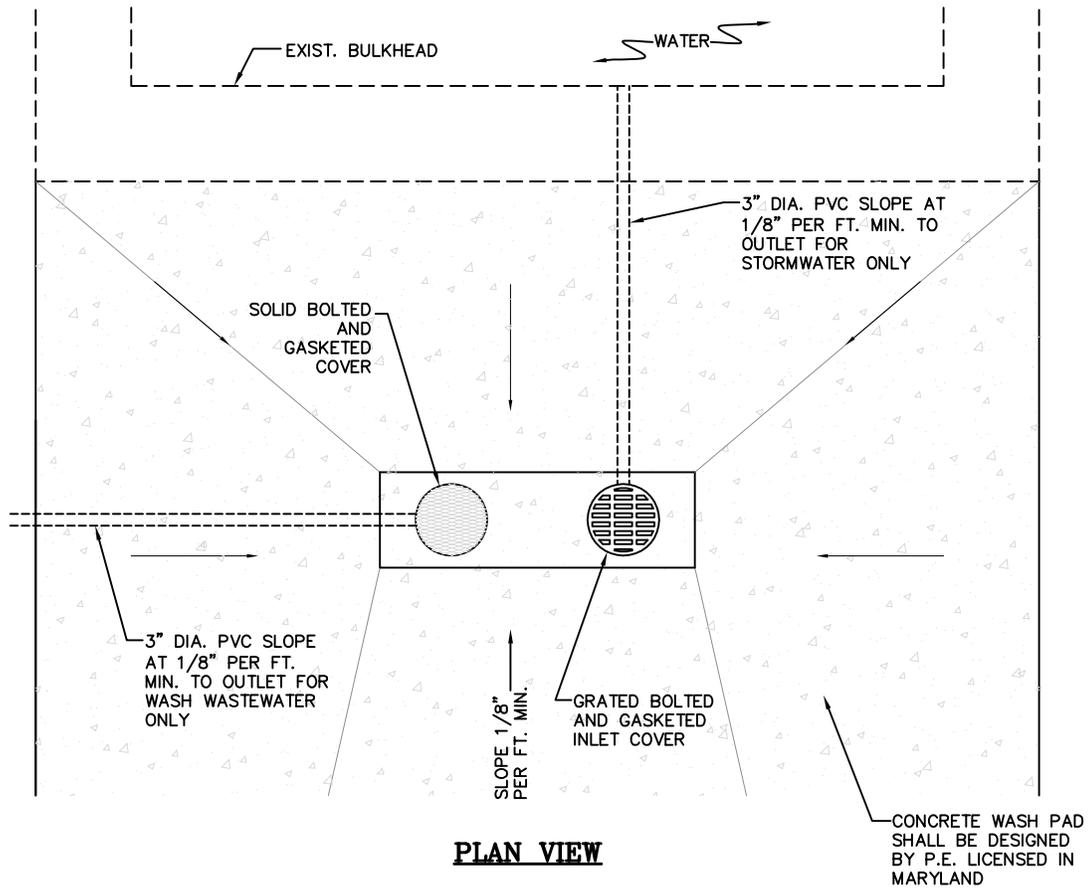
**REMOVABLE  
SEMI-PERFORATED STAINLESS  
STEEL PLATE DETAIL  
APPENDIX K**

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**NOTES:**

INLET AND SOLID COVERS ARE TO BE INTERCHANGED WHEN WASH OPERATIONS ARE OCCURING. NO STORMWATER SHALL BE DIRECTED TO WASTEWATER OUTLET.

UNDER NO CIRCUMSTANCES SHALL WASH WASTEWATER DRAIN TO GROUNDWATER OR WATERS OF THE STATE.

MUST BE COORDINATED WITH SEWER AUTHORITY.

**OPTIONAL WASH PAD  
DETAILED LAYOUT  
APPENDIX L**

N.T.S.



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