DRAINAGE SOLUTIONS, INC

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Introduction to Design and Maintenance Considerations for SNOUT® Stormwater Quality Systems

Background:

The SNOUT system from Best Management Products, Inc. (BMP, Inc.) is based on a vented hood that can reduce floatable trash and debris, free oils, and other solids from stormwater discharges. In its most basic application, a SNOUT hood is installed over the outlet pipe of a catch basin or other stormwater quality structure which incorporates a deep sump (see Installation Drawing). The SNOUT forms a baffle in the structure which collects floatable debris and free oils on the surface of the captured stormwater, while permitting heavier solids to sink to the bottom of the sump. The clarified intermediate layer is forced out of the structure through the open bottom of the SNOUT by displacement from incoming flow. The resultant discharge contains considerably less unsightly trash and other gross pollutants, and can also offer reductions of free-oils and finer solids.

As with any structural stormwater quality BMP (Best Management Practice), design and maintenance considerations will have a dramatic impact on SNOUT system performance over the life of the facility. The most important factor to consider when designing structures which will incorporate a SNOUT is the depth of the sump (the sump is defined as the depth from beneath the invert of the outlet pipe to the bottom of the structure). Simply put, the deeper the sump, the more effective the unit will be both in terms of pollutant removals and reducing frequency of maintenance. More volume in a structure means more quiescence, thus allowing the pollutant constituents a better chance to separate out. Secondly, more volume means fewer cycles between maintenance operations, because the structure has a greater capacity. Of equal importance to good performance is putting SNOUTs in every inlet whenever possible. The closer one captures pollution to where it enters the infrastructure (e.g. at the inlet), the less mixing of runoff there is, and the easier it will be to separate out pollutants. Putting SNOUTs and deep sumps in every inlet develops a powerful structural treatment train with a great deal of effective storage volume where even finer particles may have chance to settle out.

Design Notes:

- The SNOUT size is ALWAYS greater than the nominal pipe size. The SNOUT should cover the pipe OD plus the grouted area around the pipe (e.g. for a 12” pipe, an 18” SNOUT is the correct choice).

- As a rule of thumb, BMP, Inc. recommends *minimum* sump depths based on outlet pipe inside diameters of 2.5 to 3 times the outlet pipe size.
- Special Note for Smaller Pipes: A minimum sump depth of 36 inches for all pipe sizes 12 inches ID or less, and 48 inches for pipe 15-18 inches ID is required if collection of finer solids is desired.
- The plan dimension of the structure should be up to 6 to 7 times the flow area of the outlet pipe.
- To optimize pollutant removals establish a "treatment train" with SNOUTs placed in every inlet where it is feasible to do so (this protocol applies to most commercial, institutional or municipal applications and any application with direct discharge to surface waters).
- At a minimum, SNOUTs should be used in every third structure for less critical applications (less critical areas might include flow over grassy surfaces, very low traffic areas in private, non-commercial or non-institutional settings, single family residential sites).
- Bio-Skirts™ (for hydrocarbons and/or bacteria reduction in any structure) and flow deflectors (for settleable solids in a final polishing structure) can increase pollutant removals. Bio-Skirts are highly recommended for gas or vehicle service stations, convenience stores, restaurants, loading docks, marinas, beaches, schools or high traffic applications.
- The "R" series SNOUTs (12R, 18R, 24R, 30R, 52R/72and 72R/96) are available for round manhole type structures of up to 72" ID; the "F" series SNOUTs (12F, 18F, 24F, 30F, 36F, 48F, 72F and 96F) are available for flat walled box type structures; the "NP" series SNOUTs (NP1218R, NP1524R, NP1830R, and NP2430R) are available for PVC Nyloplast® type structures up to 30" ID.

Example Structure Sizing Calculation:

A SNOUT equipped structure with a 15 inch ID outlet pipe (1.23 sqft. flow area) will offer best performance with a minimum plan area of 7.4 sqft. and 48 inch sump. Thus, a readily available 48 inch diameter manhole-type structure, or a rectangular structure of 2 feet x 4 feet will offer sufficient size when combined with a sump depth of 48 inches or greater.

Maintenance Recommendations:

- Monthly monitoring for the first year of a new installation after the site has been stabilized.
- Measurements should be taken after each rain event of .5 inches or more, or monthly, as determined by local weather conditions.
- Checking sediment depth and noting the surface pollutants in the structure will be helpful in planning maintenance.
- The pollutants collected in SNOUT equipped structures will consist of floatable debris and oils on the surface of the captured water, and grit and sediment on the bottom of the structure.

- It is best to schedule maintenance based on the solids collected in the sump.
- Optimally, the structure should be cleaned when the sump is half full (e.g. when 2 feet of material collects in a 4 foot sump, clean it out).
- Structures should also be cleaned if a spill or other incident causes a larger than normal accumulation of pollutants in a structure.
- Maintenance is best done with a vacuum truck.
- If Bio-Skirts™ are being used in the structure to enhance hydrocarbon capture and/or bacteria removals, they should be checked on a monthly basis, and serviced or replaced when more than 2/3 of the boom is submerged, indicating a nearly saturated state. Assuming a typical pollutant-loading environment exists, Bio-Skirts should be serviced* or replaced annually.
- In the case of an oil spill, the structure should be serviced and Bio-Skirts replaced (if any) immediately
- All collected wastes must be handled and disposed of according to local environmental requirements.
- To maintain the SNOUT hoods themselves, an annual inspection of the anti-siphon vent and access hatch are recommended. A simple flushing of the vent, or a gentle rodding with a flexible wire are all that's typically needed to maintain the anti-siphon properties. Opening and closing the access hatch once a year ensures a lifetime of trouble-free service.

Further structural design guidelines including CAD drawings, hydraulic spreadsheets, and site inspection and maintenance field reports and installation inspection sheets are available from BMP, Inc.

*To extend the service life of a Bio-Skirt, the unit may be "wrung out" to remove accumulated oils and washed in an industrial washing machine in warm water. The Bio-Skirt may then be re-deployed as long the material maintains it's structural integrity.

Fitment Guide: Based on SNOUT inlet area vs. pipe inlet area.

% OF SNOUT INLET AREA vs. PIPE INSIDE DIAMETER

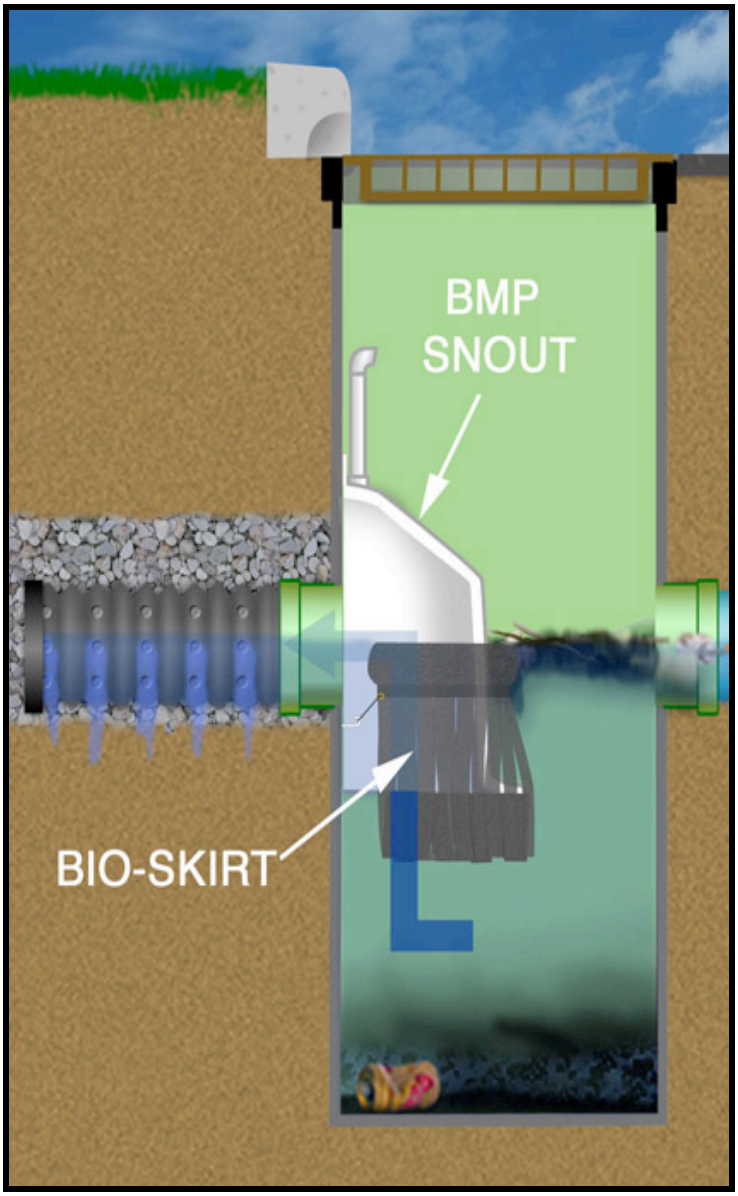
MODEL	12F	12R	18F	18R	24F	24R	30F	30R	36F	48F	52R	72F	96F
(SQFT.)	*0.393*	*0.455*	*1.091*	*1.264*	*1.843*	*2.118*	*2.793*	*3.210*	*3.534*	*6.278*	*9.045*	*14.13702*	*25.132*
PIPE I.D.													
4	450.3%	521.4%	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*
6	200.2%	231.7%	555.6%	643.8%	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*
8	112.6%	130.3%	312.6%	362.1%	528.1%	606.8%	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*
10	72.1%	83.4%	200.0%	231.8%	338.0%	388.3%	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*	*N/O*
12	*N/A*	*N/A*	138.9%	160.9%	234.7%	269.7%	355.6%	409%	450%	*N/O*	*N/O*	*N/O*	*N/O*
15	*N/A*	*N/A*	88.9%	103.0%	150.2%	172.6%	227.6%	262%	288%	*N/O*	*N/O*	*N/O*	*N/O*
18	*N/A*	*N/A*	61.7%	71.5%	104.3%	119.9%	158.1%	182%	200%	355%		*N/O*	*N/O*
21	*N/A*	*N/A*	*N/A*	*N/A*	76.6%	88.1%	116.1%	133%	147%	261%	376%	*N/O*	*N/O*
24	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	88.9%	102%	112%	200%	288%	*N/O*	*N/O*
27	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	70.2%	81%	89%	158%	227%	*N/O*	*N/O*
30	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	56.9%	65%	72%	128%	184%	288%	*N/O*
36	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	50%	89%	128%	200%	355.5%
42	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	65%	94%	147%	261.2%
48	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	50%	72%	113%	200.0%
54	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	57%	89%	158.0%
60	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	72%	128.0%
66	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	60%	105.8%
72	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	50%	88.9%
78	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	75.7%
84	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	65.3%
90	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	56.9%

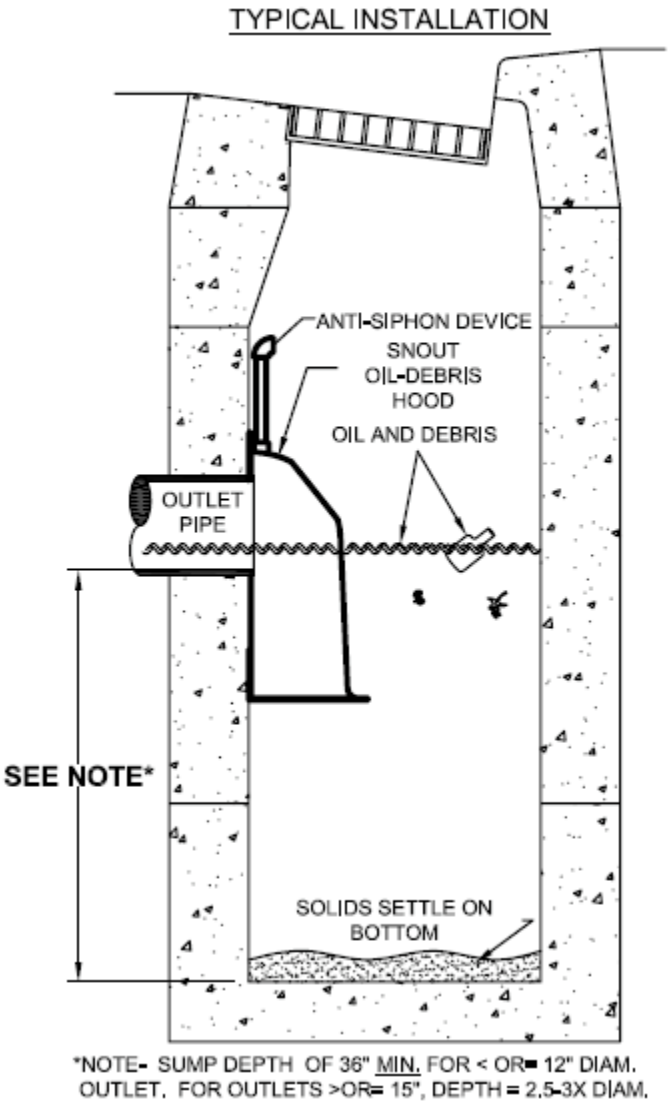
Use "F" for flat back SNOUT in rectangular structure
Use "R" for round back SNOUT in cylindrical structure

VALUE%	=> Marginal Sizing
N/A	=> Not Applicable
N/O	=> Not Optimal

Design Note: The SNOUT size will always be bigger than the pipe size as the SNOUT must cover the pipe O.D. (i.e. Use an 18" SNOUT for 12" pipe.)

Installation Drawings:





Contact Information:

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