September 17, 2018

Mr. Jaime Favila
California State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95812

Re: Application for Trash Treatment Control Devices - Suntree Technologies, Inc®
Nutrient Separating Baffle Box® (NSBB™)

Dear Mr. Favila,

Suntree Technologies, Inc® is pleased to submit this application for our Nutrient Separating Baffle Box® (NSBB™) to be certified as a Full Capture System / Trash Treatment Control Device. Subsequent documentation for this application is submitted in accordance with the California State Water Resources Control Board's Trash Treatment Control Device application requirements. The following submittal documentation includes the minimum requisite sections:

1 Cover Letter
2 Table of Contents
3 Physical Description
4 Installation Information
5 Operation and Maintenance Information
6 Reliability Information
7 Field / Lab Testing Information and Analysis

Please contact me with any questions or should additional information be required.
Thank you for your consideration and review of this application.

Best Regards,

Tom Happel

Tom Happel
President
Suntree Technologies, Inc®

Cover Letter
Section 1

1.A A General Description of the Device

The following Suntree Technologies, Inc® Nutrient Separating Baffle Box® (NSBB™) is an advanced multi stage stormwater runoff treatment system. The patented screen system is designed to capture and store debris in a dry state to minimize nutrient leaching, allowing for easier maintenance. The triple chamber design enables a high level removal of TSS over a range of particle sizes and is effective in capturing both nutrients and hydrocarbons. A patented deflector system ensures no sediment scouring occurs during high flows, allowing for online installation without needing separate diversion structures. NSBB™ systems have the ability to either include or exclude patented Hydro-Variant Technology®. The addition of a SkimBoss® MAX or SkimBoss® Floating Skimmer allows the NSBB™ to bolster pollutant capture potential, detention time and balance conveyance with flow rate.

The SkimBoss® MAX and SkimBoss® Floating Skimmer automatically adjust to the changing hydraulic grade line as necessary. This is accomplished by designing the each skimmer to float and move upward with a rising hydraulic grade line. The SkimBoss® MAX and Floating Skimmer's buoyancy are determined by the hydraulic grade on the upstream side. Floats attached to the front side of each skimmer are mounted in such a way as to enable water to surround them on all sides. Even if there was no hydraulic grade line present on the back side of the MAX or Floating Skimmer, they would still be able to rise based solely on the hydraulic grade line at the front. Upon starting to rise, the gap between the horizontal shelf increases which in turn increases the cross sectional conveyance under each skimmer unit. In most cases, the SkimBoss® MAX of Floating Skimmer will rise high enough to have no impact on headloss while continuing to function to prevent the passage of floating debris. NSBB™ systems which do not include Hydro-Variant Technology® may or may not include an additional static skimmer component.

- Filtering is provided by the screen system basket, suspended above static water level, which has a capacity of several cubic yards depending on the model. The function of the screen basket is to capture gross solids like trash, foliage and debris and can contain pollutants with particles of 5mm or larger in size.

- Sediment particles are separated via three settling chambers, each with a capacity of several cubic yards depending on the NSBB™ model. These chambers are able to collect and contain smaller sediments and particulate metals of 5mm and larger. The inclusion of patented turbulence deflectors within each chamber calm rushing waters, preventing turbidity and captured sediment scouring or resuspension.

- Absorption of emulsified hydrocarbons, oils and grease is facilitated by attaching StormBooms™ to the influent side of a skimmer. StormBooms™ can include a blend of various filtration media types depending on site specific pollutant specifications.

Cover Letter
Section 1

1.B The Applicant's Contact Information and Location

Suntree Technologies, Inc
798 Clearlake Road, Suite 2
Cocoa, Florida 32922
321.637.7552
www.suntreetech.com
info@suntreetech.com

1.C The Devices' Manufacturing Location

Suntree Technologies, Inc
798 Clearlake Road, Suite 2
Cocoa, Florida 32922
321.637.7552
www.suntreetech.com
info@suntreetech.com

1.D A brief summary of any field/lab testing results that demonstrates the Device functions as described within the application

Suntree Technologies, Inc® has conducted appropriate laboratory and field testing to measure pollutant removal rates at varying flow rates and pollutant densities for each of the applicable Nutrient Separating Baffle Box® (NSBB™) models. Suntree Technologies, Inc® conducted empirical testing to adequately determine the strength, durability, conveyance and unique pollutant removal properties of each filtration screen system with and without Hydro-Variant Technology® included, based on varying flow capacity and pollutant characteristics.
Testing results have been included in this application within Appendix D for review by the SWRCB and involved parties.

Cover Letter
Section 1

1.E A brief summary of the Device limitations, and operational, sizing, and maintenance considerations

The Suntree Technologies, Inc® Nutrient Separating Baffle Box® (NSBB™) is a multi faceted, high performance, hydrodynamic filtration system designed to meet water quality treatment requirements in conjunction with site specific engineering plans and specifications as well as Suntree's own recommendations. NSBB™ units are derived from precast concrete vaults which include concrete baffles to form a tri-chamber design to form an installation basis for internal components. Suntree Technologies manufactures each NSBB™ internal component including turbulence deflectors, screen system and skimmers in an array of sizes to specification using stainless steel, aluminum and high tensile marine grade plastic polymer materials. These materials are economical, highly durable and ensure each filter is built to last as a permanent infrastructure fixture. To ensure proper operation, adherence to the installation and service recommendations set forth by Suntree Technologies, Inc® are required. Suntree NSBB™ systems are specifically sized to meet site hydrology requirements and water quality objectives.

1.F A description or list of locations, if any, where the Device has been installed. Include the name and contact information of as many as three municipality(s) purchasing the Device

- **Collins Avenue OCTA Project**
  City of Orange
  Frank Sun, Civil Engineer
  300 E. Chapman Ave., Orange, CA, 92866
  (714)744-5544
  fsun@cityoforange.org

  Orange County Transit Authority (OCTA) Project in Orange County, CA
  NSBB™ 11-24 w/ StormBoom™ and Type 304 Stainless Steel Screen System: 4.76mm aperture size for full pollutant capture and containment of pollutants 5mm in size or larger.

- **Avenida De La Playa Project**
  City of San Diego - Public Works Department
  (619)533-4207
  525 B St. Suite 750 MS# 908A San Diego, CA 92101
  engineering@sandiego.gov

  San Diego Public Works Project in La Jolla, CA
  NSBB™ 11-26 w/ SkimBoss™ floating skimmer, StormBoom™ and Type 304 Stainless Steel Screen System: 4.76mm aperture size for full pollutant capture and containment of pollutants 5mm in size or larger.

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1.F A description or list of locations, if any, where the Device has been installed. Include the name and contact information of as many as three municipality(s) purchasing the Device (Continued)

- **Haven Avenue Project**
  City of Ontario
  303 E. "B" St. Ontario, CA 91764
  (909)395-2012
  purchasing@ontarioca.gov

City of Ontario, Haven Avenue Project in Ontario, CA
NSBB™ 11-16 w/ StormBoom™ and Type 304 Stainless Steel Screen System: 4.76mm aperture size for full pollutant capture and containment of pollutants 5mm in size or larger.

1.G The Certification Below:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons that manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

By: Tom Happel 9/17/2018

Tom Happel, President, Suntree Technologies, Inc® *Date*

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Physical Description
Section 3

3.A Description on how the Device works to trap all particles that are 5 mm or greater in size and how it is sized for varying flow volumes

The Suntree Technologies, Inc® Nutrient Separating Baffle Box® (NSBB™) is an online, high performance hydrodynamic separation system which utilizes screening, hydrodynamic separation, sedimentation and absorption to capture trash, debris, sediment, metals, hydrocarbons and other buoyant pollutants. Pollutant screening is provided by a rectangular basket system which is suspended above the static water level of the sedimentation chambers. This screening filter has a storage capacity of several cubic yards depending on the model and can capture gross solids like trash and nutrient rich debris. Having the screen suspended above static water level allows for dry state storage of captured pollutants between storm events and prevents nutrient leaching or contamination of the static water, which can result in a septic state. As runoff flows through the vault, gross pollutants are captured within the screen system while particulate metals, nutrients and sediment are deposited within on of the three sedimentation chambers on the floor. Theses chambers are facilitated via concrete baffles which equally divide the structure for sediment capture. All sediment and particles 5mm in size or larger are deposited and contained within these chambers with aid of turbulence deflectors along the baffle walls, which prevent sediment resuspension, scouring or turbidity.

In addition, Hydro-Variant Technology® enabled NSBB™ units boost particle sedimentation potential by increasing detention time, slowing runoff flow and blocking passage of any residual buoyant pollutants. StormBoom™ media socks are also utilized along with skimmers to capture any floating emulsified hydrocarbons and grease. The NSBB™ is a versatile device that captures high levels of trash, debris, foliage, etc within the screen and maintains capture via hydraulic flow of incoming runoff. The efficient separation of gross pollutants like trash from particulate sediment, nutrients and metals prevents nutrient leaching, septicity, decomposition odors of organics and allows for easy vacuum truck service to the entire vault without confined space entry requirements. The Nutrient Separating Baffle Box® (NSBB™) is a key component of a stormwater management program. To maintain proper operation, maintenance of these units is essential. The NSBB™ designed and manufactured by Suntree Technologies Inc.® contains patented and patent pending technologies to treat and manage stormwater. The NSBB™ is highly effective in capturing Nitrogen, Phosphorus, Total Suspended Solids, organics, trash, oils and grease. Independent testing has shown the NSBB™ is capable of capturing up to 100% of trash and up to 90% of Total Suspended Solids.

Physical Description
Section 3

3.A Description on how the Device works to trap all particles that are 5 mm or greater in size and how it is sized for varying flow volume (Continued)

The Full Capture Nutrient Separating Baffle Box incorporates the following patented and patent pending features to achieve full capture of particles 5mm in size or larger. These features ensure there is no resuspension of captured pollutants as well as efficient, easy access storage of pollutants for removal.

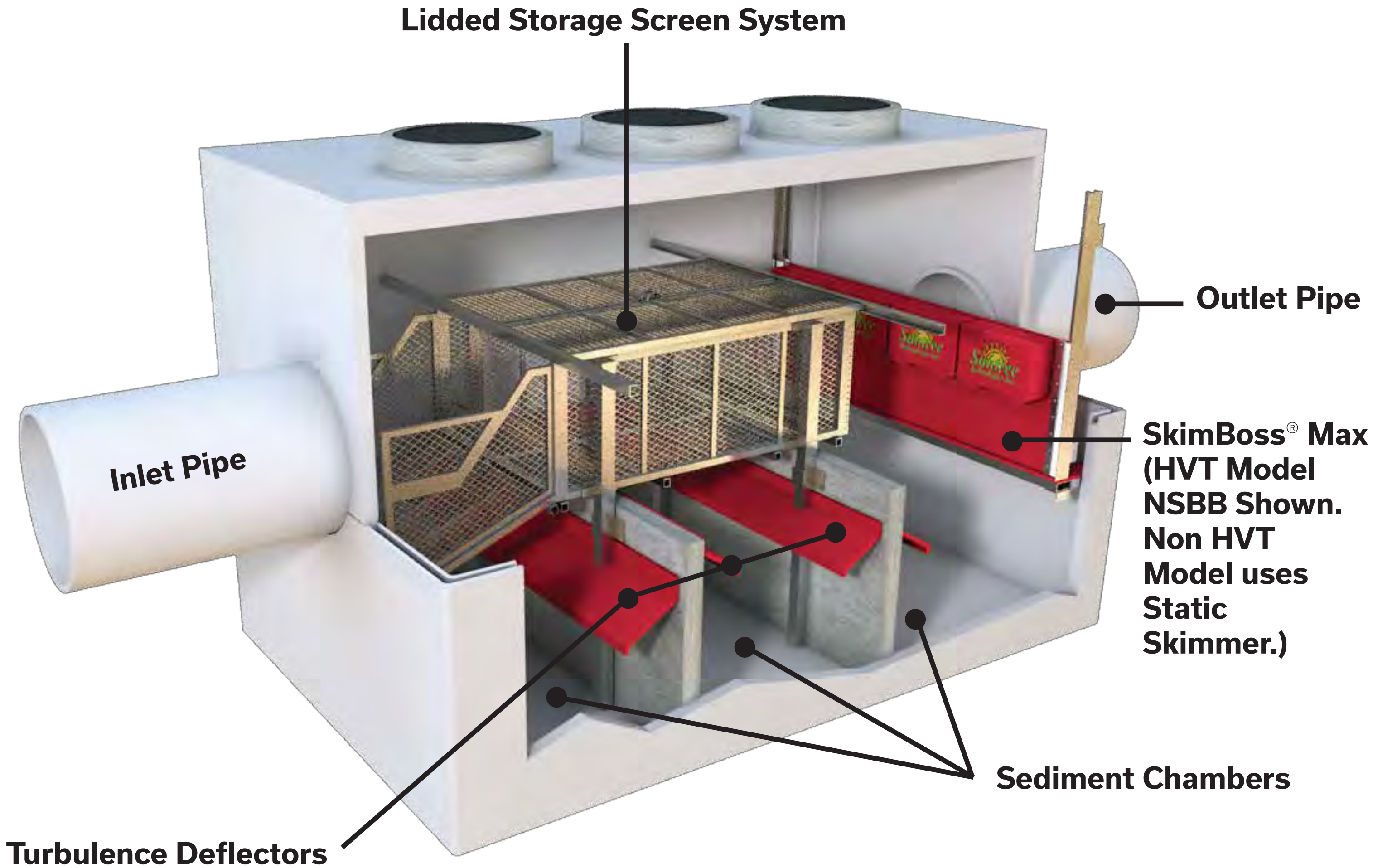
- The screen system is manufactured from a proprietary, non clogging type 5mm stainless steel screen. The openings are angled in a way that pushes water and debris across the screen for capture, minimizing any trash or debris blockages and allowing for proper sedimentation of nutrients, sediment and metals within the baffle chambers. The screen system includes hinged or sliding top and bottom doors to easily facilitate efficient removal of pollutants and maintenance. Screen systems will contain a patented flow spreader which helps to widen the incoming storm flow in order to boost sedimentation and particle removal efficiency in the chambers below.

- Patented turbulence deflectors avert sediment, nutrient, and metal resuspension of particles that have settled into the lower sedimentation chambers. This prevents scouring and resuspension of debris that has previously settled into the lower settling chambers during extra high flow rain events.

- Hydro-Variant Technology® enabled NSBB™ models leverage the power of SkimBoss® Max floating skimmers to move upward with a rising hydraulic grade line. As the SkimBoss® starts to rise, the gap between the horizontal shelf and the bottom edge of the SkimBoss® increases which in turn increases the cross sectional conveyance under each skimmer. Having the SkimBoss® MAX system creates greater detention within the vault during low to medium flows. During high flow rain events the headloss associated with having greater detention within the vault goes away. The hydraulics of the NSBB™ automatically adjusts depending on the elevation of the upstream hydraulic grade line. The SkimBoss® MAX system bolsters sedimentation within the treatment vault, and ensures any floating debris does not pass through the vault by creating a physical skimmer barrier that matches hydraulic grade line.

Physical Description
Section 3

Nutrient Separating Baffle Box® (NSBB™) Features (Isometric View)



Physical Description
Section 3

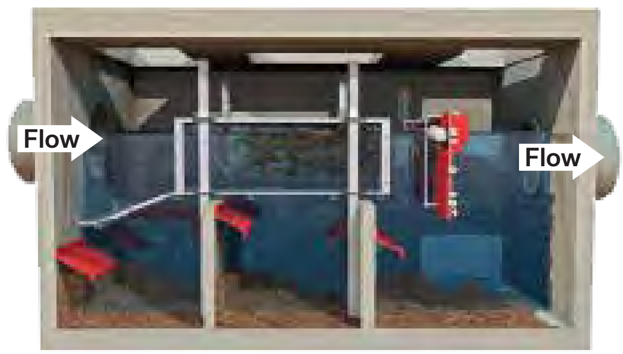
Nutrient Separating Baffle Box® (NSBB™) Operation & Functionality

Low / Medium Flow Storm Event

- Runoff filters through the screen and skimmer leaving behind pollutants.
- Turbulence deflectors prevent captured particles from becoming resuspended.
- Hydrocarbons collect in front of the skimmer and are absorbed by a StormBoom™ containing one of many biosorption media.

High / Extreme Flow Storm Event

- The SkimBoss® Floating skimmer or SkimBoss® MAX adjust to the rising hydraulic grade to stop floatables from passing into the outflow and increase detention times.
- Turbulence deflectors prevent captured particles from becoming resuspended.
- The skimmer rises to an appropriate level to allow water to bypass media filtration and to prevent flooding



After Storm Event

- Nutrient pollutant load is not lost to static water and will not be flushed out during the next storm event.
- Separating organics from static water prevents bacterial growth.

Physical Description
Section 3

3.B Design Drawings for all standards Device sizes including dimensions, and alternative configurations

Design drawings for all applicable filtration device models are included in Appendix A.

3.C If the Device is designed with an internal bypass, explain how the bypass only operates with flows greater than the design storm

The Nutrient Separating Baffle Box is a stormwater filtration device that can be used for either online or offline applications. Hydro-Variant Technology® enabled models not only prevent captured pollutant reintroduction, but also prevent floating trash and debris from passing through the vault via a SkimBoss® Max or SkimBoss® Floating Skimmer unit.

All NSBB™ models are designed to treat the trash capture flow rate as well as peak flows generated by the drainage area. This allows for greater versatility within the storm sewer system, giving the NSBB™ the ability to treat a wide array of flows without concern for flooding or other adverse hydraulic effects. Hydro-Variant Technology® (HVT) enabled NSBB™ units (pictured above) have the ability to treat flows under extreme conditions. All captured debris, trash, and sediment will be retained within the treatment system even if the screen system is topped by water flow. The patented screened lid system prevents floatables from escaping even when the hydraulic grade line is above the screen system.

Physical Description
Section 3

3.D Engineering Plans / Diagrams for a Typical Installation

Engineering diagrams for typical NSBB™ installations are contained within appendix A.

3.E Photographs, if any, of pre- and post-installation examples

Photos of NSBB™ in various stages of installation are included below:

Pre Installation Inspection at Precast Facility

Pre Installation of Turbulence Deflectors

Delivery of Precast Vault to Installation Site

Installation of NSBB™ Base Section

3.E Photographs, if any, of pre- and post-installation examples (Continued)

Photos of NSBB™ in various stages of installation are included below:

NSBB™ Base Section Installed

Installation of Screen System

Application of Butyl Tape Sealant Layer to Base Edge

Installation of NSBB™ Treatment Mid Section

3.E Photographs, if any, of pre- and post-installation examples (Continued)

Photos of NSBB™ in various stages of installation are included below:


NSBB™ Treatment Mid Section Installed


Connection and Grouting of Inflow / Outflow Pipes


Installation of SkimBoss® Floating Skimmer Panel


Installation of NSBB™ Top Finishing Slab

Physical Description
Section 3

3.E Photographs, if any, of pre- and post-installation examples (Continued)

Photos of NSBB™ in various stages of installation are included below:

NSBB™ Pollution Capture Treatment

Finished NSBB™ with Manhole / Hatch Configuration

Finished NSBB™ with Hatch Configuration

Finished NSBB™ with Hatches Open

Physical Description
Section 3

3.E Photographs, if any, of pre- and post-installation examples (Continued)

Photos of NSBB™ in various stages of installation are included below:


NSBB™ Installation Site Preparation


Structure and NSBB™ Internals Set at Install Site


Installation of Pipe Connections


Finished NSBB™ with Sunview™ Observation Lid

3.F The Device maximum trash capture capacity

Table A lists measurements, and treatment flow specifications for trash capture volumes retained by each model. The trash capture volumes listed are maximum values that can be removed without performance reductions and reintroduction under peak flow rate conditions.

3.G The Device hydraulic capacity (flow in cfs) at its maximum trash capture capacity for all standard Device sizes

Unit #	Model	Settling Chamber			Sediment Diameter, um				
		Width, ft.	Length, ft.	Settling Area, ft^2	150	125	100	75	50
					80% Removal Flow Rate, cfs				
1	2-4	2	4	8	0.81	0.67	0.49	0.38	0.19
2	2.5-4	2.5	4	10	1.07	0.89	0.65	0.51	0.25
3	3-6	3	6	18	2.24	1.85	1.35	1.05	0.53
4	3-8	3	8	24	3.21	2.65	1.93	1.51	0.76
5	4-6.5	4	6.5	26	3.55	2.93	2.14	1.67	0.84
6	4-8	4	8	32	4.60	3.80	2.77	2.17	1.08
7	5-10	5	10	50	8.03	6.63	4.84	3.78	1.89
8	5-10.5	5	10.5	52.5	8.54	7.05	5.15	4.02	2.01
9	6-12	6	12	72	12.7	10.47	7.64	5.97	2.99
10	6-13.75	6	13.75	82.5	15.0	12.4	9.05	7.07	3.54
11	7-14	7	14	98	18.6	15.4	11.2	8.77	4.39
12	7-15	7	15	105	20.3	16.8	12.2	9.56	4.79
13	8-12	8	12	96	18.2	15.0	10.9	8.55	4.28
14	8-14	8	14	112	22.0	18.2	13.3	10.4	5.19
15	8-16	8	16	128	26.0	21.5	15.7	12.2	6.13
16	9-18	9	18	162	34.9	28.8	21.0	16.4	8.23
17	10-14	10	14	140	29.1	24.0	17.5	13.7	6.86
18	10-17	10	17	170	37.1	30.6	22.4	17.5	8.75
19	10-20	10	20	200	45.4	37.5	27.4	21.4	10.7
20	11-16	11	16	176	38.7	32.0	23.3	18.2	9.1
21	11-24	11	24	264	64.3	53.1	38.7	30.3	15.2
22	11-26	11	26	286	71.1	58.7	42.8	33.5	16.8
23	11-34	11	34	374	99.4	82.1	59.9	46.8	23.4
24	12-21	12	21	252	60.7	50.1	36.6	28.6	14.3
25	12-24	12	24	288	71.7	59.2	43.2	33.8	16.9

Table A: NSBB™ HVT Maximum Flow Rates

Physical Description
Section 3

3.H Each material and material grade used to construct the Device (e.g., stainless steel, plastic, etc.)

The Nutrient Separating Baffle Box® (NSBB™) is constructed of high strength, durable materials and hardware components to ensure a long service life for each device. The following list details material types and grades for each NSBB™ component.

Material Type & Grade

- Vault Structure: Rectangular precast concrete vault developed with a minimum 28 day compressive strength of 5000psi or greater, with reinforced steel per ASTM A 615, and a load support of H-20 per AASHTO.
- Screen Frame: Rectangular screen framework is manufactured from aluminum channel, angle and type 304 stainless steel.
- Screens: Screen used to manufacture is type 304 stainless steel 5mm screen.
- StormBoom™: Media varies from treated cellulose to polymer particles, application dependent.
- Turbulence Deflectors: Manufactured using marine grade fiberglass and isophthalic polyester resin or thermoformed PVC.

3.I Conditions under which the Device re-introduces previously trapped trash

The Nutrient Separating Baffle Box® (NSBB™) has been designed to remove and perpetually retain all trash and debris 5mm in size or larger. Conditions under which said device may reintroduce previously captured trash are listed below:

- Damage caused to screens, skimmers, turbulence deflectors or mounting frames, hardware, hatches, manholes, etc can cause an adverse effects that could reintroduce trash contaminates into the storm flow stream and storm sewer system.

3.J Estimated Design life of the Device

The estimated design life for the Nutrient Separating Baffle Box® (NSBB™) system ranges between 75 to 100 years. Design life span of devices is dependent on the materials utilized as well as proper care and maintenance of said device.

Installation Information
Section 4

4.A Installation Considerations

Installation requirements, considerations and procedures for the Nutrient Separating Baffle Box® (NSBB™) are detailed in their respective installation documentation within Appendix B of this submittal. The guidelines include requirements and procedures for:

- Ordering Information
- Transport & Delivery
- Unloading
- Inspection Information
- Installation Protocol
- Installation Procedure
- StormBoom™ Installation
- Basket Installation
- Skimmer Installation
- Requirements and Parts

4.B Device Installation Procedures

Installation procedures for the Nutrient Separating Baffle Box® (NSBB™) are detailed in the installation documentation within Appendix B of this submittal. Installation of the NSBB™ is similar to the installation of many municipal precast storm drain structures in that the full capture components of the unit are housed internally. These components including, screen system, skimmers, turbulence deflectors, StormBoom™, etc are either pre installed at the precast concrete facility or installed on site once the vault has been set by qualified Suntree personnel. Post installation inspection of the NSBB™ is advised and a representative from Suntree Technologies, Inc® is available for owner support in conducting said inspection. The inspection will determine the validity of the installation and fidelity of all structural and internal components. Typical installation in association with Full Capture programs for trash TMDLs or the statewide trash amendment are often retrofit installations. Prior inspection and proper considerations should be taken to determine if existing as-built conditions are appropriate for standard installation or if the NSBB™ must be developed into a different configuration per site specific requirements.

4.C Methods for Diagnosing and Correcting Installation Errors

Suntree Technologies, Inc® employs a systematic design and manufacturer process that includes the review of various checklists and inspections to minimize the potential for errors in fabrication and installation. The design process and configuration of the Nutrient Separating Baffle Box® (NSBB™) is accompanied by a formal submittal and review of design and fabrication details as well as site requirements. The owner should also review all details of the proposed NSBB™ device prior to finalization and installation. The processes set forth are meant to provide a means for error reduction during the installation process. In the event that an error is found during the installation process, the error should be well documented and submitted to Suntree Technologies and the installation contractor for proper review and solutions. The NSBB™ can also be inspected after commencing device operation to determine if all components are properly functioning and if not, determine appropriate action to remedy the situation.

Operation & Maintenance Information
Section 5

5.A Device inspection frequency considerations, and inspection procedures

The Nutrient Separating Baffle Box® (NSBB™) operation and maintenance manual is included in this submittal as Appendix C. Included within this manual are detailed requirements and recommendations for the operation and maintenance in order to maintain optimal operation for full capture trash treatment control. A summary of these requirements, recommendations and considerations are listed as follows:

Maintenance Summary

- Empty and clean screen system basket via vacuum truck. Typical service interval occurs every twelve (12) months.
- Empty and clean sediment chambers via vacuum truck. Typical service interval occurs every twelve (12) months.
- Replace any StormBoom™ media booms. Typical service interval occurs annually.
- Maintenance cycles are dependent on site-specific pollutant loading and should be planned to occur prior to start of the location's rainy season and at the termination of said rainy season.

Inspection Procedures

- Following the installation of a Nutrient Separating Baffle Box® (NSBB™), the unit will require routine scheduled maintenance to ensure optimal operation. Suntree Technologies or an approved Suntree Technologies regional distributor can provide training and/or appropriate inspection and maintenance services.
- NSBB™ inspection is simple and does not require entry into the treatment vault. Inspections provide a general assessment of the overall condition and operation of the respective device. Primary focus during an inspection typically involves observing the condition of the device's screen system and sediment chambers for pollutant capacity. The StormBoom™ media boom should also be checked for discoloration and appropriately replaced if needed. The screen system should be in proper working condition, free from obstructions and damage. Accumulated sediment and trash levels should be documented and the unit to be serviced routinely or if at maximum capacity.
- NSBB™ structural and functional components including screen system, sediment chambers, skimmers, access openings, StormBoom™ and overall vault condition should be inspected in quarterly intervals throughout the year.

5.B Maintenance frequency considerations, maintenance procedures, and a description of necessary equipment and materials for maintenance

A full description of the maintenance procedures for the Nutrient Separating Baffle Box® (NSBB™) can be located in the operation and maintenance manual included as Appendix C. A maintenance summary for each components is as follows:

Screen System Maintenance

The Nutrient Separating Baffle Box® Screen Basket is recommended to be inspected every six (6) months and cleaned every twelve (12) months.

1. Remove all manhole covers (or open hatches or grates) to gain access to the screening basket.
2. Remove all trash, litter, debris, organics and sediments captured by the screened basket with the use of a vacuum truck. If desired, the screen basket can be serviced more frequently without servicing the lower settling chambers. The vacuum hose will not damage the screen.
3. Remove vacuum hose and replace manhole covers or hatch doors / grates.
4. Transport all debris, trash, litter, organics and sediments to an approved facility for disposal in accordance with local and state requirements.

Sediment Chambers Maintenance

The Nutrient Separating Baffle Box® sediment chambers are recommended to be inspected every six (6) months and cleaned every twelve (12) months.

1. Remove all manhole covers (or open hatches) to gain access to the sediment chambers.
2. Lower vacuum truck hose into the first sediment chamber through the screening basket closest to the inflow pipe. Pressure washing may be needed to remove compacted sediments. (If not equipped with the HydroSlide® Service System)
3. Remove vacuum hose and replace manhole covers or hatch doors / grates.
4. Transport all debris, trash, litter, organics and sediments to an approved facility for disposal in accordance with local and state requirements.

5.B Maintenance frequency considerations, maintenance procedures, and a description of necessary equipment and materials for maintenance (Continued)

StormBoom™ Installation Procedure

The Nutrient Separating Baffle Box® StormBoom™ is recommended to be inspected every six (6) months and replaced every twelve (12) months

1. Thread one rope end in one of the top panel holes.
2. Each end of the rope will be on opposite ends of the panel and will be brought up to the rear access opening in the top of the box.
3. Attach rope ends to SS Eye Straps which are fastened to the inside of the rear access hole in the concrete.
4. The bottom of the hydrocarbon boom should look slightly "U" shaped and rest 6" from the bottom of the skimmer panel.
5. Double knot the rope ends to eliminate any slack.

StormBoom™ Replacement Procedure

1. Remove manhole cover (or open hatch) closest to the outflow to access the StormBoom™.
2. Inspect the boom in the skimmer system for oil accumulation. Booms should be replaced once discolored or are close to one (1) year of service.
3. The StormBoom™ has ropes attached to each end that are secured to eyelets adjacent to the access cover.
4. Attach a rope on the end of the new boom to a rope on the end of the old boom and pull to remove. As the old boom is removed, the new boom moves into position.
5. Gather enough excess slack to allow the boom to freely float on the surface of the water at the static level.
6. Attach the rope ends of the new boom to the eyelets adjacent to the access cover.

5.B Maintenance frequency considerations, maintenance procedures, and a description of necessary equipment and materials for maintenance (Continued)

Maintenance Procedure Records

- Following service and / or inspection, maintenance personnel should keep an inspection record of activities performed, amount and description of collected pollutants and overall filtration system condition.
- The owner shall retain the inspection record for a minimum of five years from the date of service or inspection. Records shall be made available to the governing municipality for inspection upon request at any time.

Maintenance Equipment and Materials

The following equipment should be utilized when conducting maintenance on the NSBB™:

- Camera
- Recording materials (pen, paper, tablet, etc.)
- Suitable Clothing (hardhat, gloves, appropriate footwear, safety glasses, etc.)
- Traffic control materials (cones, barricades, signage)
- Manhole hook or pry bar
- Flashlight
- Tape measure
- Measuring stick
- Confined space entry equipment (if necessary)
- Vacuum truck
- Pressure washer
- Replacement StormBooms™

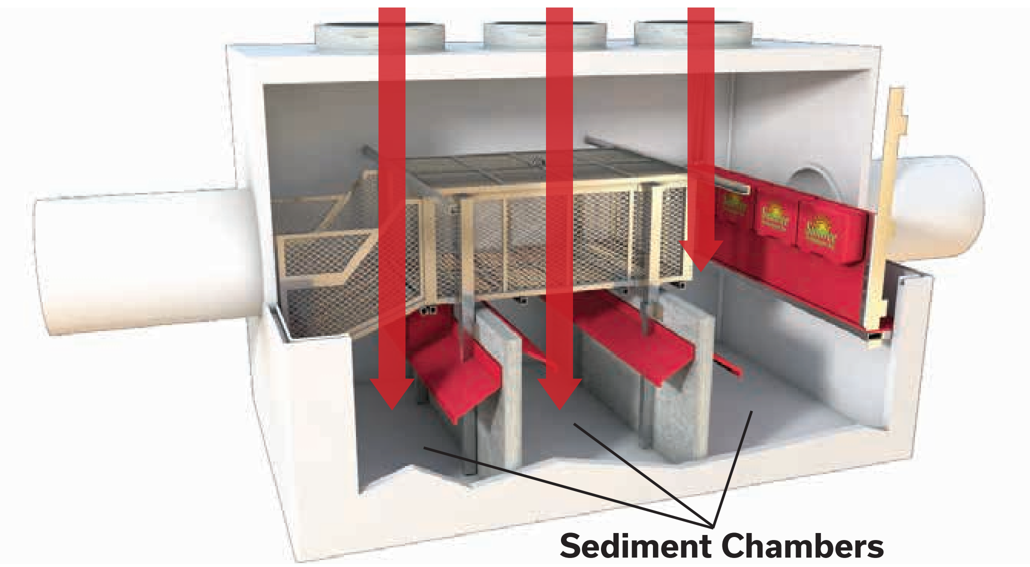
Operation & Maintenance Information
Section 5

5.C Effects of delayed maintenance on Device structural integrity, performance, odors

Standard maintenance frequencies suitable for most sites should be annually. However, frequencies are site specific depending on pollutant loading and could require more or less frequent service. Inspection maintenance records should be reviewed periodically to assess the appropriate impact of the prescribed maintenance frequency. Delayed or deferred maintenance can cause possible internal damage, diminished pollutant removal efficiency and reintroduction of pollutants, resulting in detrimental hydraulic impacts to water quality.

5.D Vector Control Accessibility

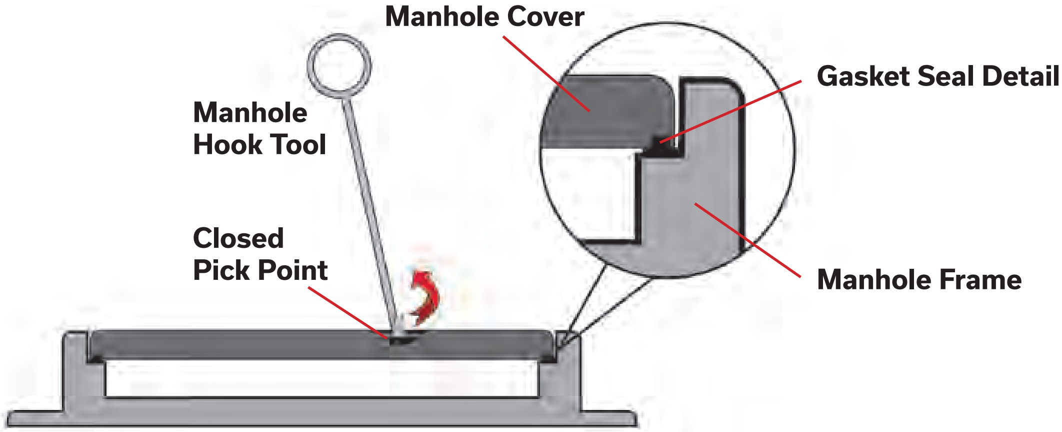
Suntree Technologies designed the Nutrient Separating Baffle Box® (NSBB™) with ease of access in mind. The triple chamber design affords a high efficiency pollutant removal ability but also a means for static water to collect within each chamber for sedimentation and capture. This static water may create the potential for mosquito breeding within the sediment chambers. As a result Suntree Technologies, Inc® has designed each vault to be completely accessible from the finished grade level for maintenance procedures and vector control assessment. The NSBB™ is designed so that the top hatches / manholes are directly in line with each sediment chamber. When the access covers or hatches are opened, there is a direct line of sight provided to each sediment chamber. Liquid or solid vector treatment material can be placed directly into the chambers via open access at the sides and rear of the screen system without obstruction. The screen system also incorporates top and bottom hinged or sliding doors that when opened, allow full access to the center of the sediment chambers below. NSBB™ vaults typically include servicing tools housed at the vault roof level, which allow maintenance or vector control personnel a means to open said doors, if necessary, without vault entry.



5.D Vector Control Accessibility (Continued)

5.D Vector Control Accessibility (Continued)

The NSBB™ also contains design features to prevent mosquito access to the vault via top level manholes / hatches. All Suntree manhole covers and hatches are supplied with gasketed lids that seal the NSBB™ to prevent any physical vector access through covers. Furthermore, each manhole cover / hatch is designed to incorporate closed pick points. Unlike common open hole pick points, NSBB™ pick points are closed hole recessed slots which allow access via a hook tool, all while barring physical mosquito and vector entry.



5.E Repair Procedures for Device Structural Components

In the event that repair is required after conducting routine inspection of the NSBB™ structural and internal components, the issue should be well documented with images and description before being submitted to Suntree Technologies, Inc® for review. Each repair situation is different and is assessed based on the site conditions and individual pollutant frequencies per each site. Upon determination of repair, Suntree personnel will remedy the situation with replacement parts or appropriate concrete repair materials in accordance with the owner, distributor and contractor.

Reliability Information
Section 6

6.A Estimated design life of Device components before major overhaul

The estimated design life for the Nutrient Separating Baffle Box® (NSBB™) components ranges between 75 to 100 years. Design life span before overhaul of internal components is dependent on the materials utilized as well as proper care and maintenance of said device.

6.B Device sensitivity to loadings other than trash (e.g., leaves, sediment, etc.)

The Suntree Technologies, Inc® Nutrient Separating Baffle Box® (NSBB™) is designed to treat an array of pollutants including sediment, heavy metals, nutrients, foliage, debris, hydrocarbons and trash. The advent of pollutant loadings other than trash has no effect on the trash capture ability of said device. Filtration removal mechanisms occur within a single compartment where storage capacity is inclusive of all pollutants captured.

6.C Warranty Information

Suntree Technologies, Inc.® products are engineered and manufactured with the intent of being a permanent part of the infrastructure. Suntree Technologies, Inc.® warranties its products to be free from manufacturing defects for a period of five (5) years from the date of purchase. In the event a warranty claim is made and determined to be valid, Suntree Technologies will replace or repair the product at their own discretion. Warranty claims must be submitted, evaluated and approved by Suntree Technologies for the claim to be determined valid. All warranty work must be authorized by Suntree Technologies prior to work being performed. There are no warranties expressed or implied other than what is specified herein. Abusive treatment, neglect or improper use of the Nutrient Separating Baffle Box® will not be covered by this warranty.

6.D Customer Support Information

Suntree Technologies, Inc® offers full customer support:

Suntree Technologies Inc
Corporate Headquarters
798 Clearlake Road, Suite 2
Cocoa, FL 32922

321.637.7552
www.suntreetech.com
info@suntreetech.com

Field / Lab Testing Information
Section 7

7.A Field / Lab Testing Information and Analysis

Suntree Technologies, Inc® has conducted appropriate laboratory and field testing to measure pollutant removal rates at varying flow rates and pollutant densities for each of the applicable Nutrient Separating Baffle Box® (NSBB™) models. Suntree Technologies, Inc® conducted empirical testing to adequately determine the strength, durability, conveyance and unique pollutant removal properties of each filtration screen system with and without Hydro-Variant Technology® included, based on varying flow capacity and pollutant characteristics.
Testing results have been included in this application within Appendix D for review by the SWRCB and involved parties.

Appendix A

Nutrient Separating Baffle Box®
Design / Installation Diagrams

Suntree Technologies Inc.®

Appendix A

Nutrient Separating Baffle Box®
HVT Models

Suntree Technologies Inc.®

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-2-4

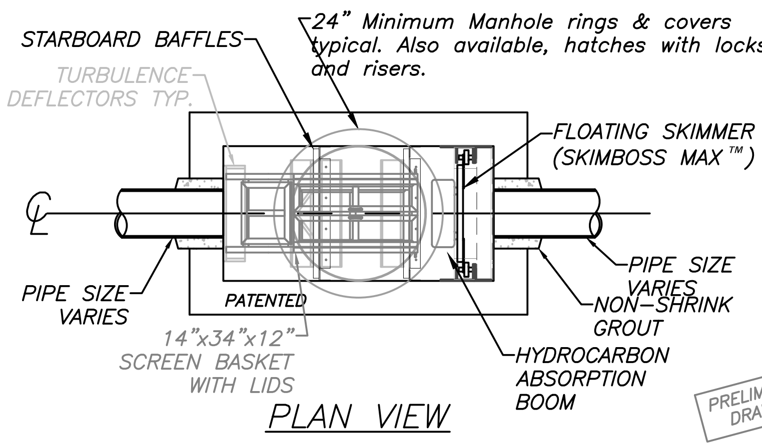
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (8" PVC AS DRAWN) — 0.35 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 2.63 sq.ft.
3. Open orifice area in screen system with 50% blockage — 1.32 sq.ft.
4. Open orifice area in screen system with 75% blockage — 0.66 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 0.80 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 0.76 sq.ft.
7. Screen system storage volume — 2.51 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

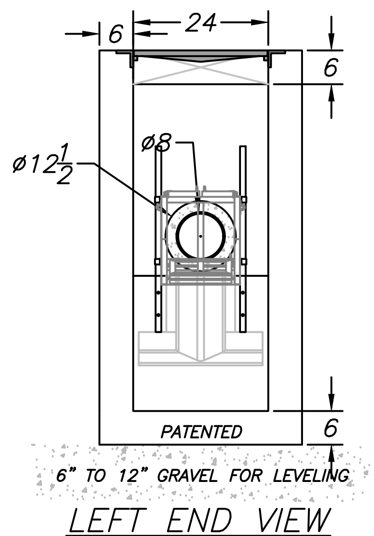
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

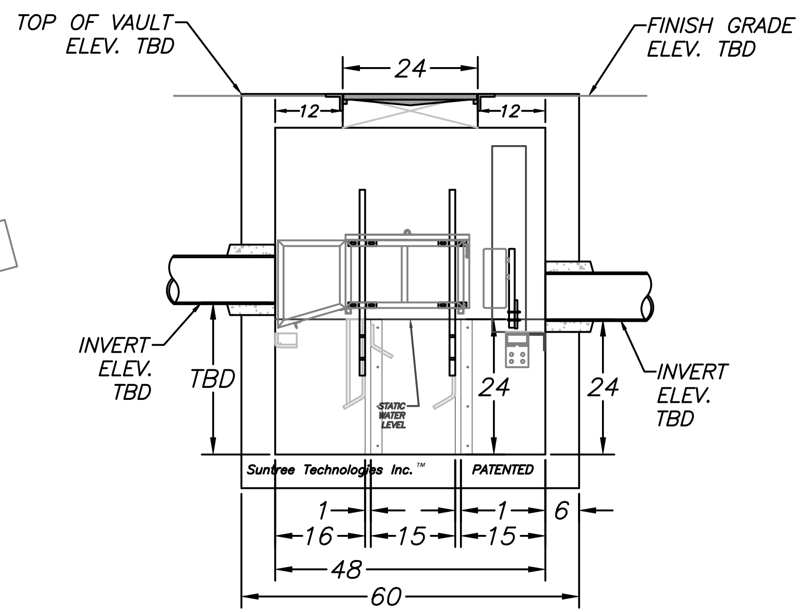
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE ~3" BELOW THE INVERT OF THE OUTFLOW PIPE.

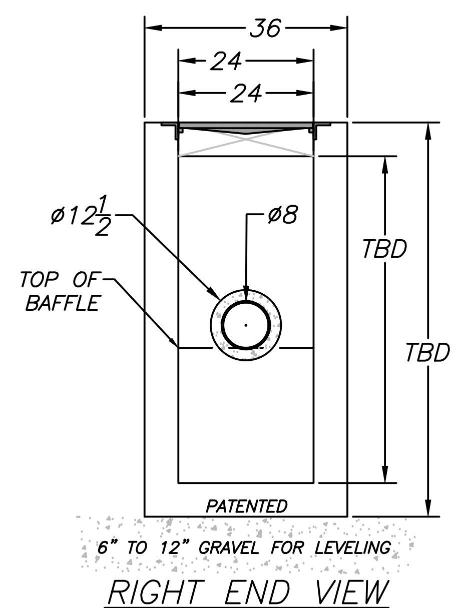
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.

2. JOINT SEALANT: BUTYL RUBBER SS-S-00210

3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.

4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 2 WATER TIGHT CHAMBERS. BAFFLES CAN BE CONCRETE AND/OR STARBOARD.

5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.

6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-2-4		PROJECT NAME: ------ --------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-2.5-4

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

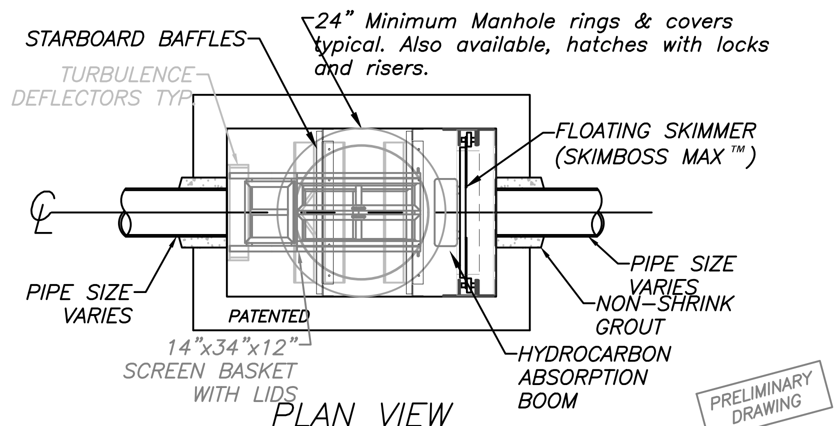
1. Inflow Pipe Area (8" PVC AS DRAWN) ——— 0.35 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 2.63 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 1.32 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 0.66 sq.ft.
5. By-pass through screen system below the ceiling of the pipe ——— 0.80 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 0.76 sq.ft.
7. Screen system storage volume ——— 2.51 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

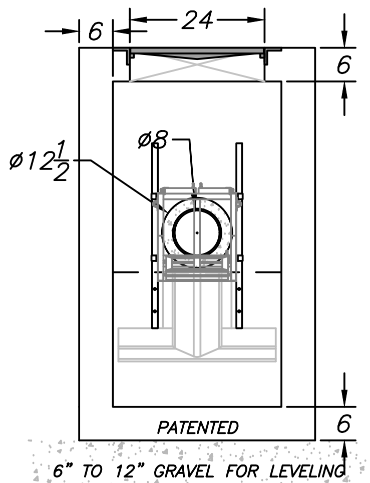
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

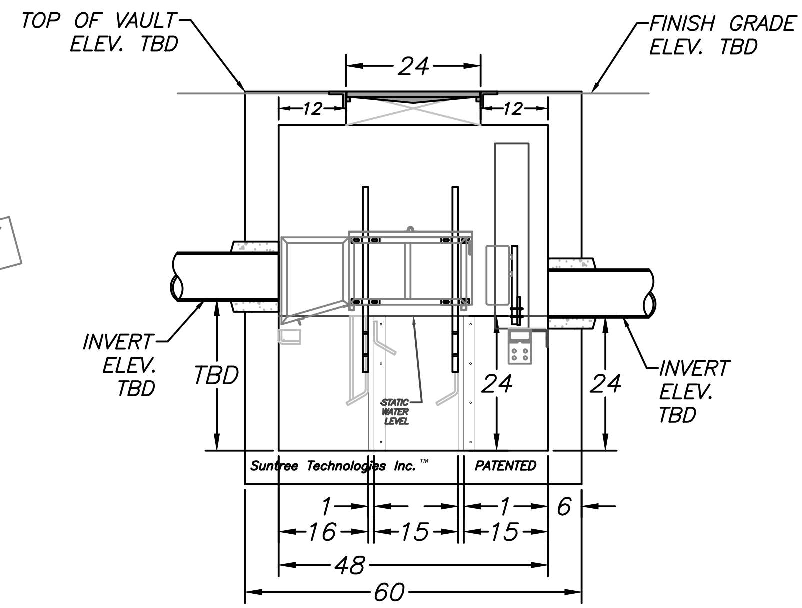
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE ~3" BELOW THE INVERT OF THE OUTFLOW PIPE.

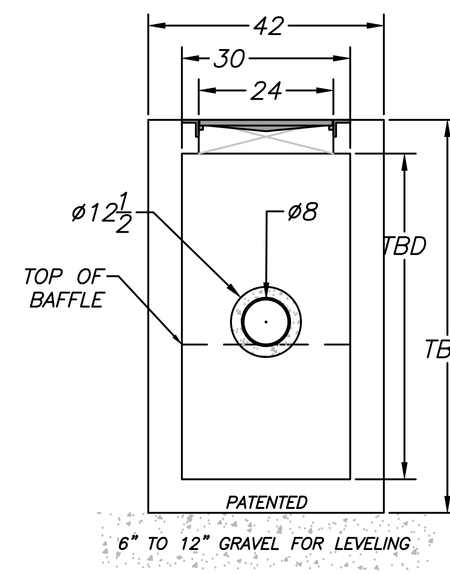
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.

2. JOINT SEALANT: BUTYL RUBBER SS-S-00210

3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.

4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 2 WATER TIGHT CHAMBERS. BAFFLES CAN BE CONCRETE AND/OR STARBOARD.

5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.

6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-2.5-4		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	--------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-3-6

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (15" RCP AS DRAWN) ——— 1.23 sq.ft.

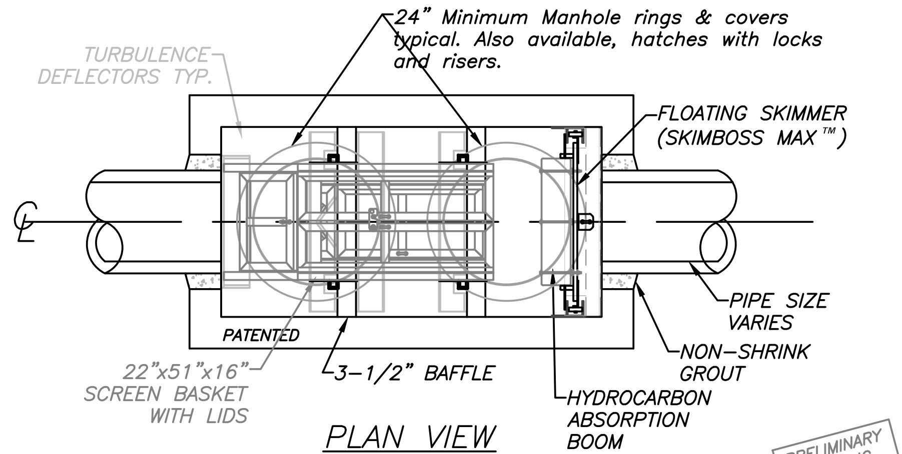
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ——— 4.92 sq.ft.
3. Open orifice area in screen system ——— 2.46 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 1.23 sq.ft. with 75% blockage
5. By-pass through screen system ——— 3.44 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 1.76 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ——— 7.87 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

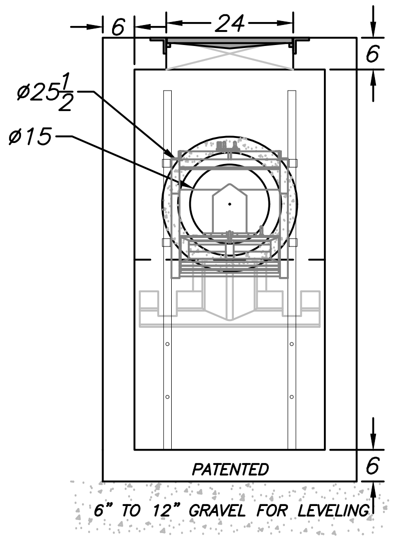
Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



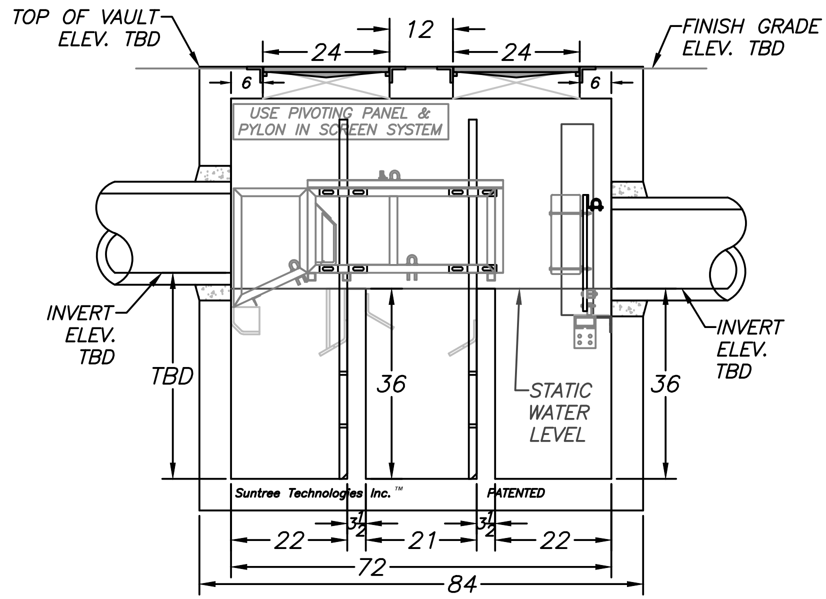
PLAN VIEW

INSTALLATION NOTES:

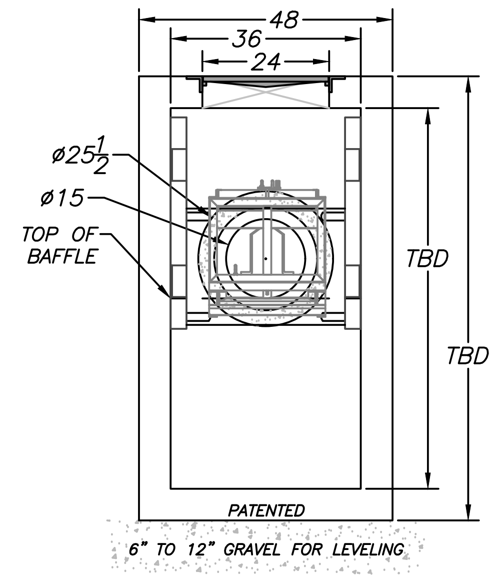
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ----------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-3-6		PROJECT NAME: ------	A.B.1	-------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	----------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-3-8

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (15" RCP AS DRAWN) — 1.23 sq.ft.

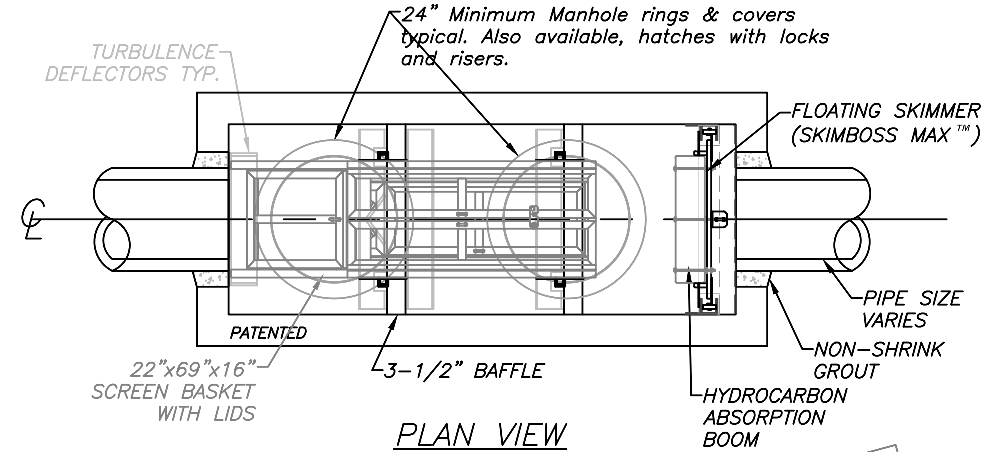
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 7.07 sq.ft.
3. Open orifice area in screen system with 50% blockage — 3.54 sq.ft.
4. Open orifice area in screen system with 75% blockage — 1.77 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 4.73 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 1.76 sq.ft.
7. Screen system storage volume — 9.26 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

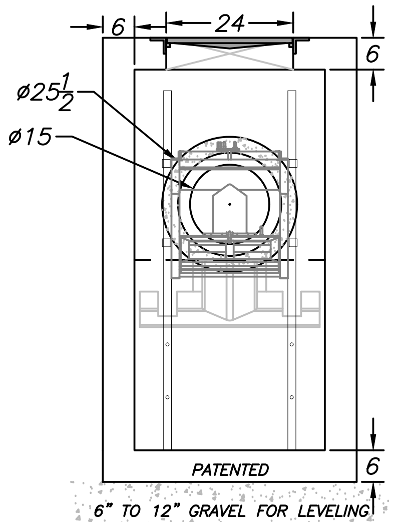


PLAN VIEW

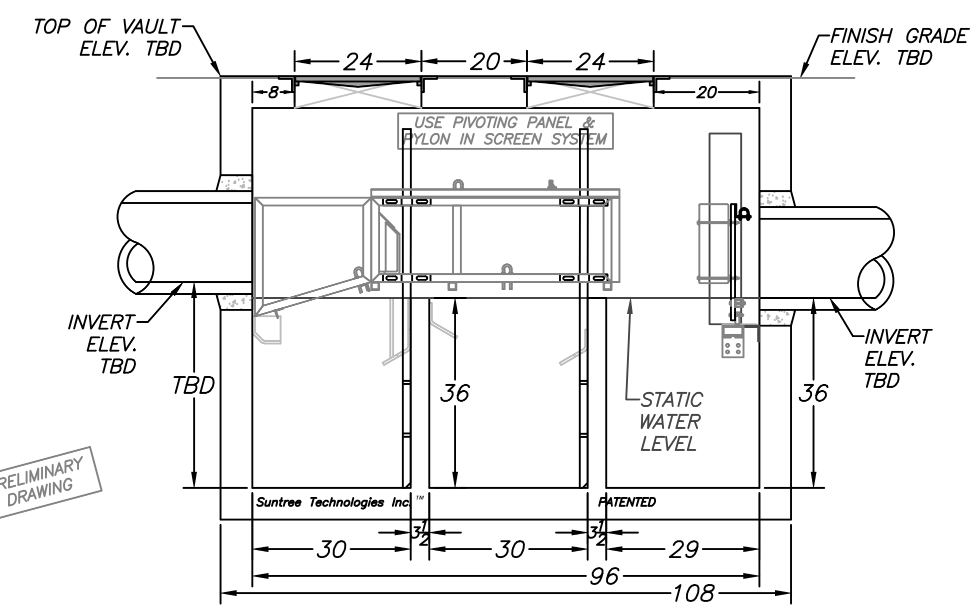
PRELIMINARY DRAWING

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD <u>NOT</u> BE BELOW THE INVERT OF THE OUTFLOW PIPE.

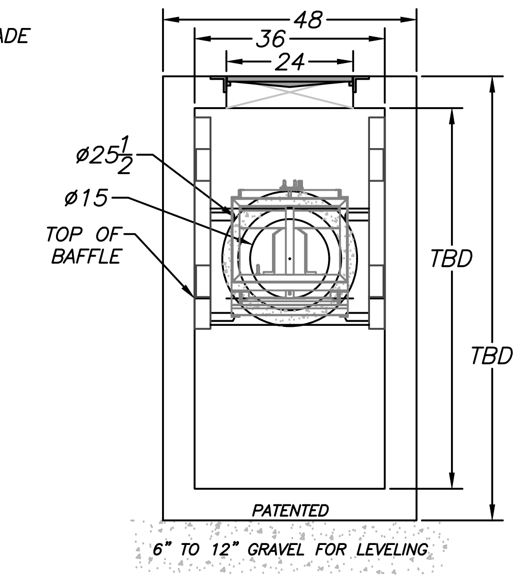


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-3-8		PROJECT NAME: ------ --------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-4-6.5

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

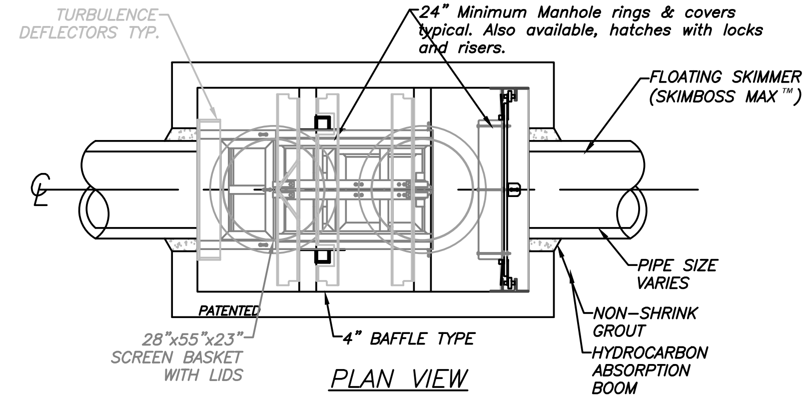
1. Inflow Pipe Area (18" RCP AS DRAWN) — 1.77 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 11.89 sq.ft.
3. Open orifice area in screen system with 50% blockage — 5.94 sq.ft.
4. Open orifice area in screen system with 75% blockage — 2.97 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 4.00 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 2.92 sq.ft.
7. Screen system storage volume — 16.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

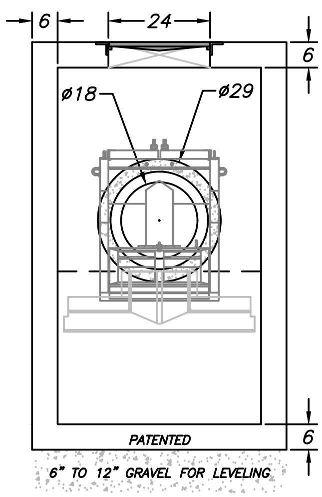
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.

4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

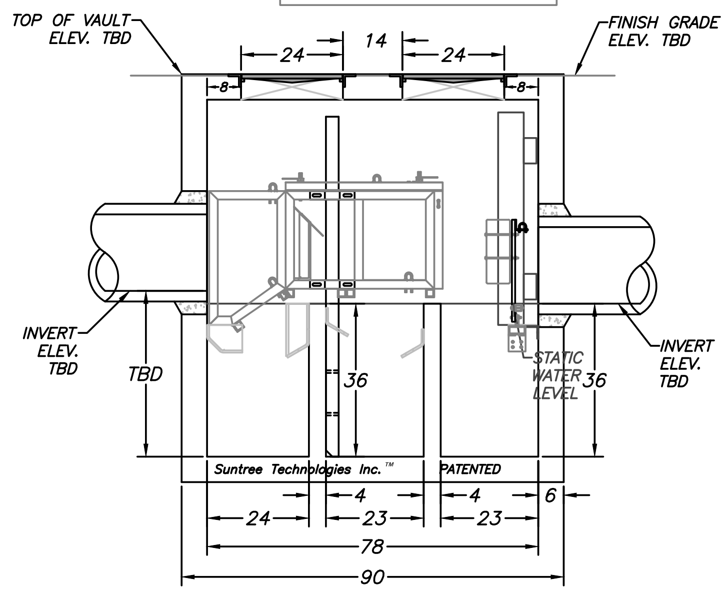
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

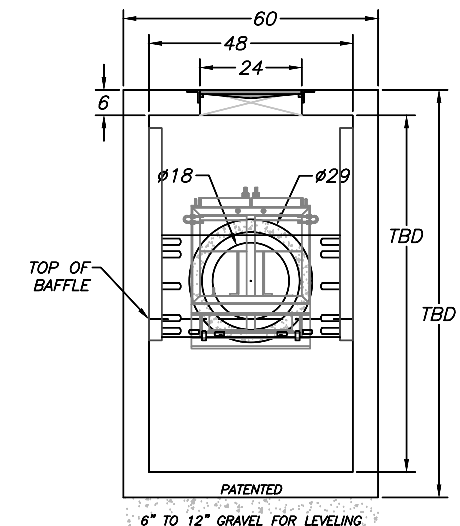


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-4-6.5			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-4-8

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

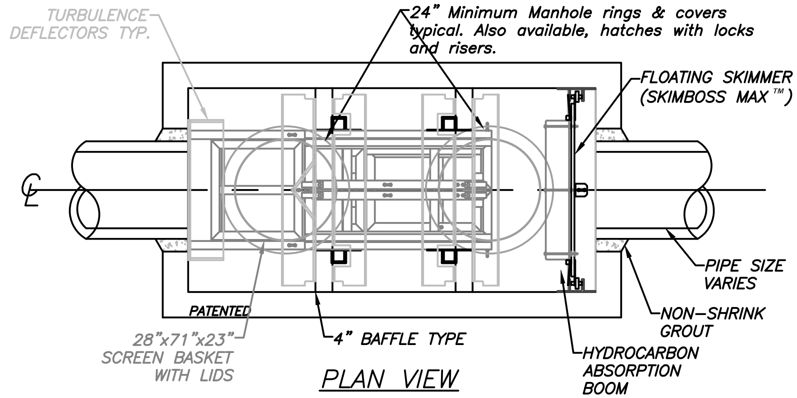
1. Inflow Pipe Area (18" RCP AS DRAWN) — 1.77 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 11.29 sq.ft.
3. Open orifice area in screen system with 50% blockage — 5.65 sq.ft.
4. Open orifice area in screen system with 75% blockage — 2.82 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 1.10 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 2.91 sq.ft.
7. Screen system storage volume — 22.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

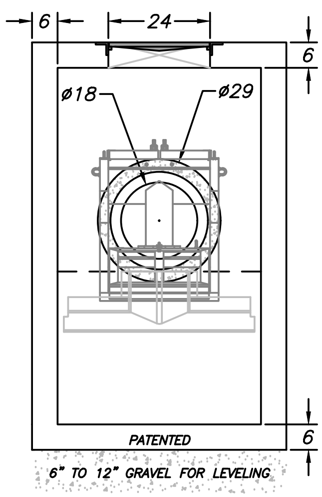
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.

4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

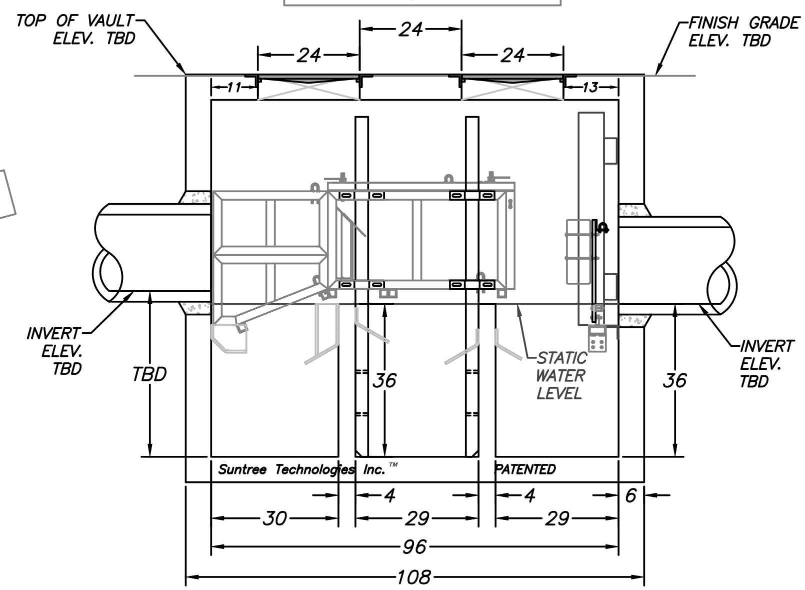
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

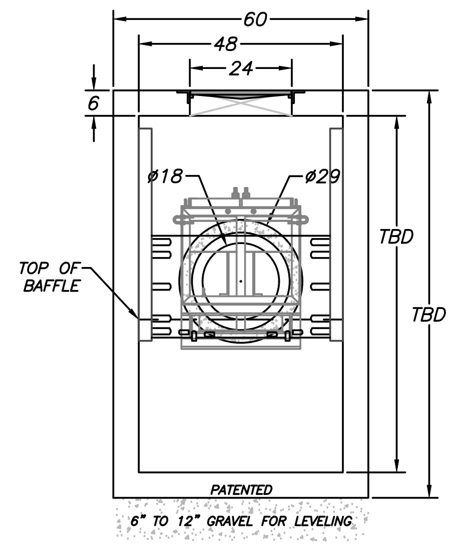


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-4-8			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-5-10.5

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

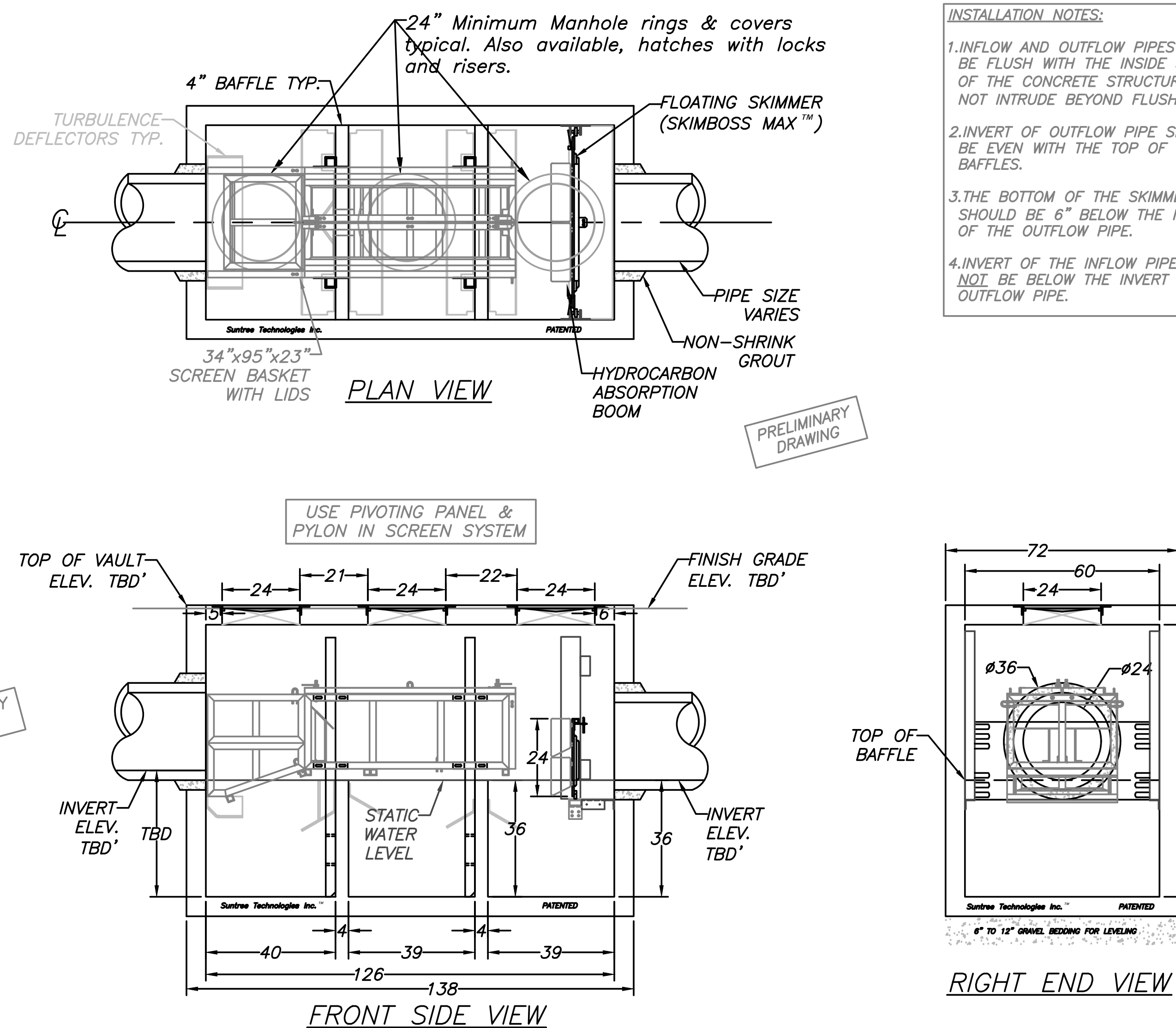
1. Pipe inflow area (Drawn as 24" RCP) — 3.14 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 21.73 sq.ft.
3. Open orifice area in screen system with 50% blockage — 10.86 sq.ft.
4. Open orifice area in screen system with 75% blockage — 5.43 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 9.89 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 4.90 sq.ft.
7. Screen system storage volume — 33.89 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-5-10.5			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-5-10

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

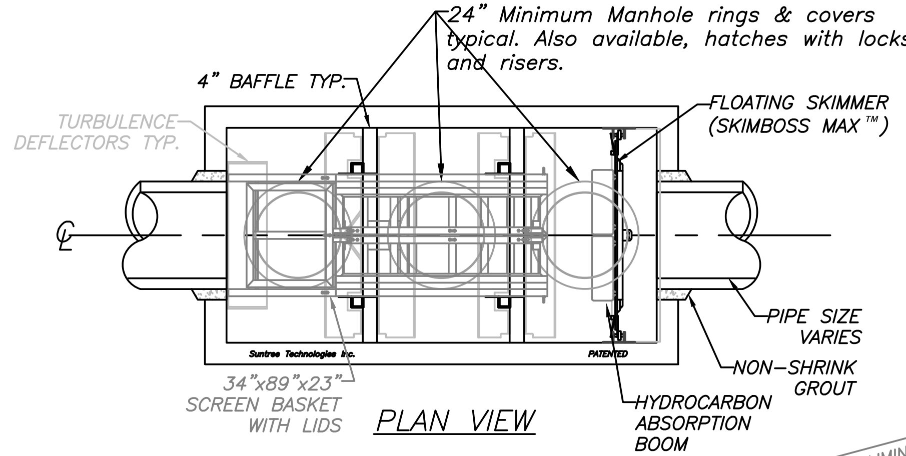
1. Pipe inflow area (Drawn as 24" RCP) — 3.14 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 20.11 sq.ft.
3. Open orifice area in screen system with 50% blockage — 10.05 sq.ft.
4. Open orifice area in screen system with 75% blockage — 5.03 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 9.89 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 4.90 sq.ft.
7. Screen system storage volume — 31.68 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



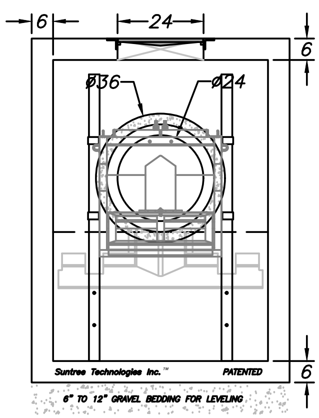
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

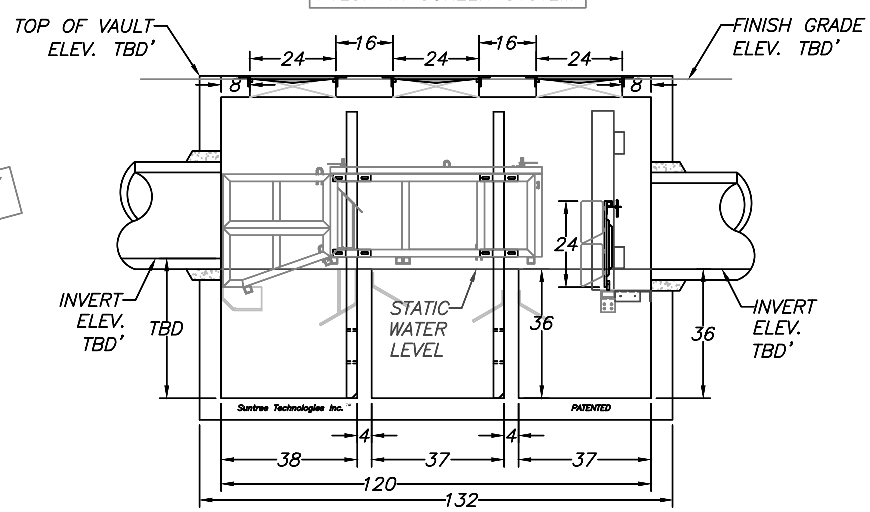
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

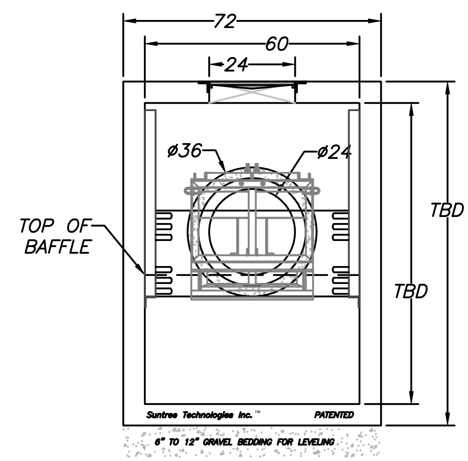


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: -------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-5-10		---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: -------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-6-12

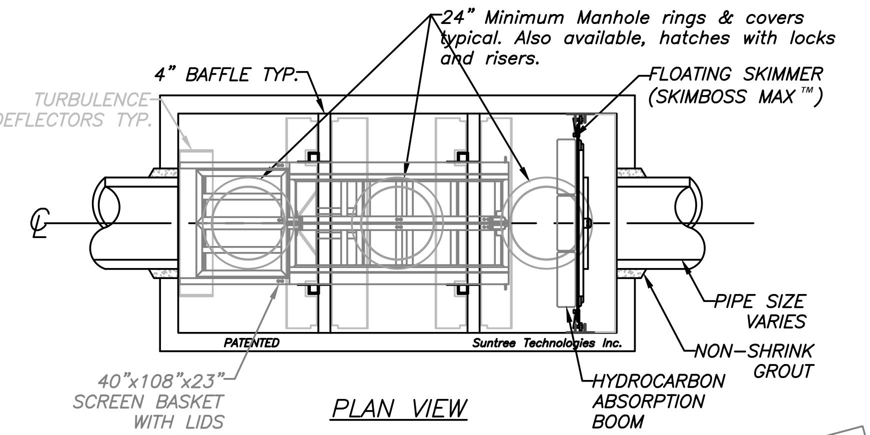
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 24" RCP) — 3.14 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 24.51 sq.ft.
3. Open orifice area in screen system with 50% blockage — 12.25 sq.ft.
4. Open orifice area in screen system with 75% blockage — 6.13 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 4.13 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 5.20 sq.ft.
7. Screen system storage volume — 49.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



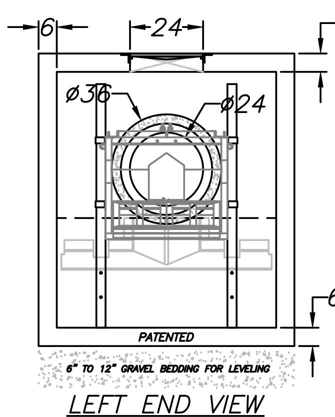
PLAN VIEW

INSTALLATION NOTES:

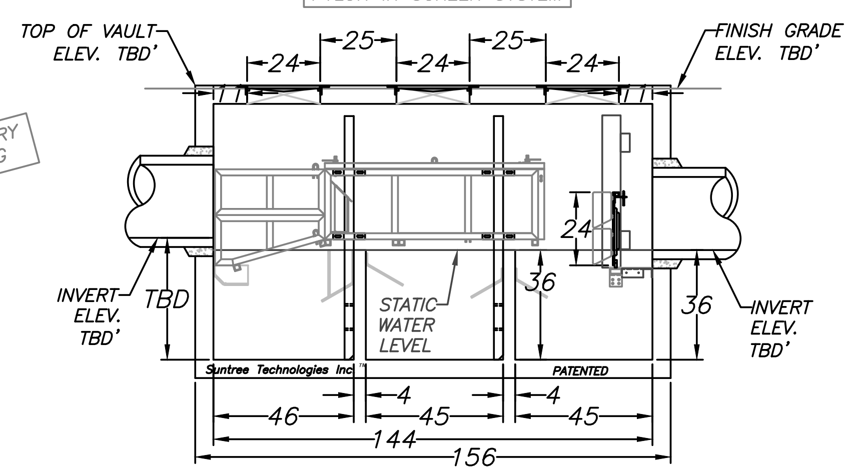
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

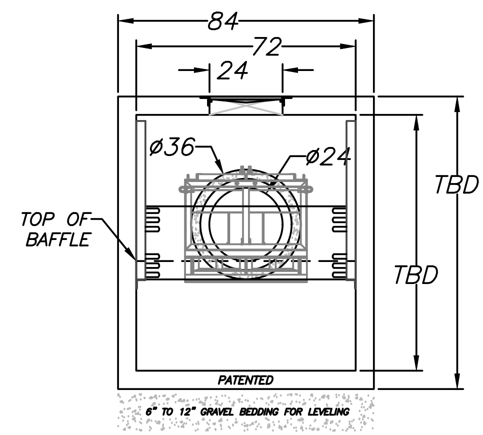
USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBES.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™
798 CLEARLAKE RD. SUITE #2
COCOA, FL. 32922
NUTRIENT SEPARATING BAFFLE BOX
MODEL NO: NSBB-HVT-6-12

START DATE: 00/00/00	SCALE: N/A
DRAFTER: A.B.1.	UNITS: INCHES
CHECKED BY: A.B.1.	PO #: 00000

PROJECT LOC: ------ --------
PROJECT NAME: ------ --------
03-09-21-15-04

CAD	REVISIONS	DATE
A.B.1	------- -------	00/00/00

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-6-13.75

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

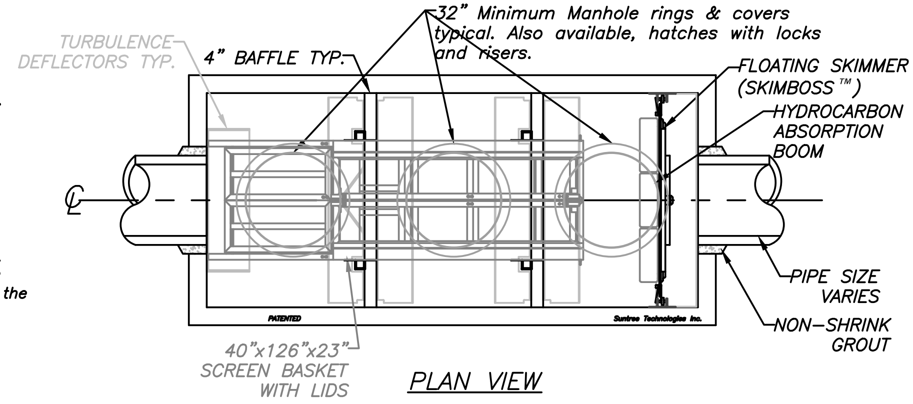
1. Pipe inflow area (Drawn as 24" RCP) — 3.14 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 30.72 sq.ft.
3. Open orifice area in screen system with 50% blockage — 15.36 sq.ft.
4. Open orifice area in screen system with 75% blockage — 7.68 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe — 4.50 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe — 5.20 sq.ft.
7. Screen system storage volume — 60.73 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



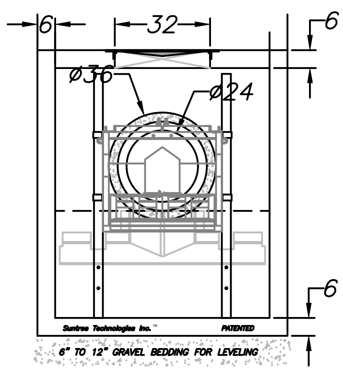
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

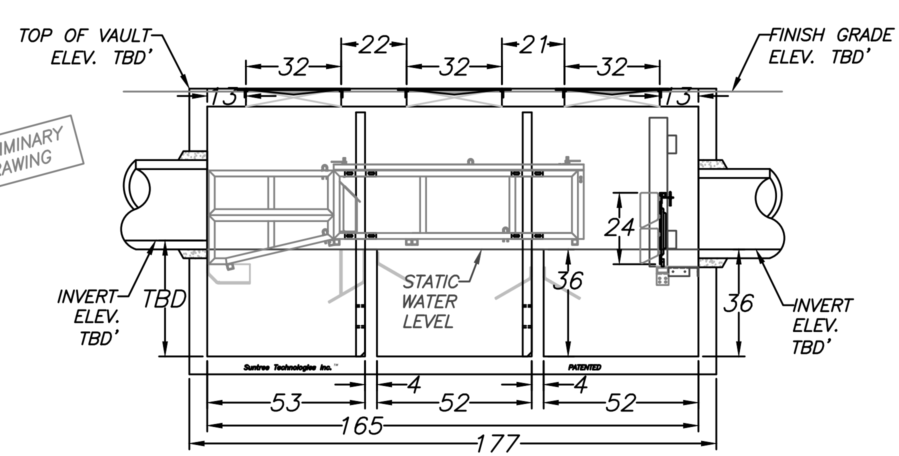
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

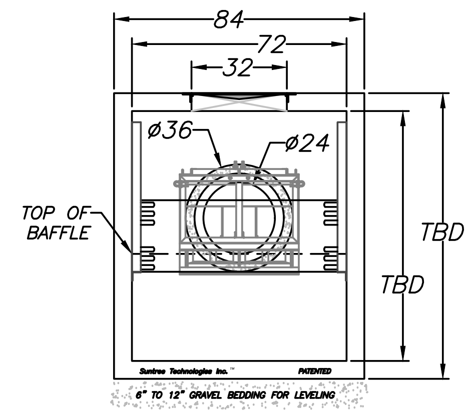


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-6-13.75			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------ --------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-7-14

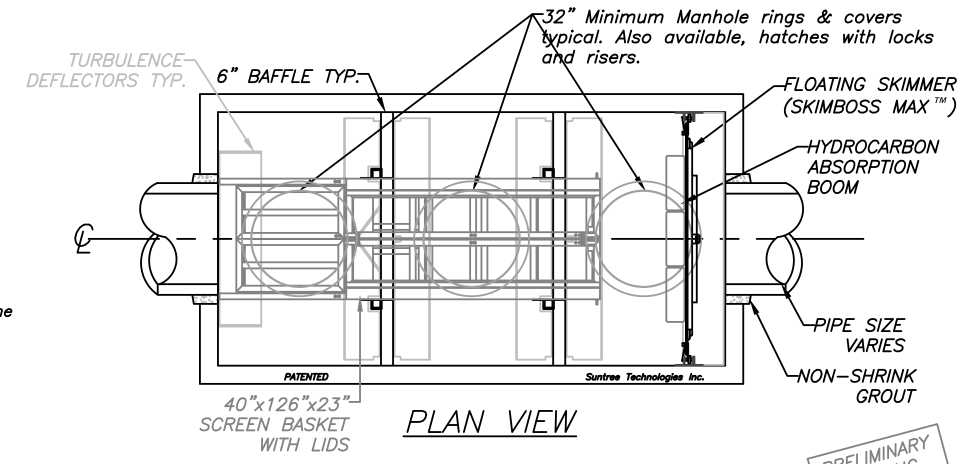
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 30" RCP) —— 4.90 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system —— 26.51 sq.ft.
3. Open orifice area in screen system with 50% blockage —— 13.26 sq.ft.
4. Open orifice area in screen system with 75% blockage —— 6.63 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe —— 16.83 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe —— 6.36 sq.ft.
7. Screen system storage volume —— 56.80 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

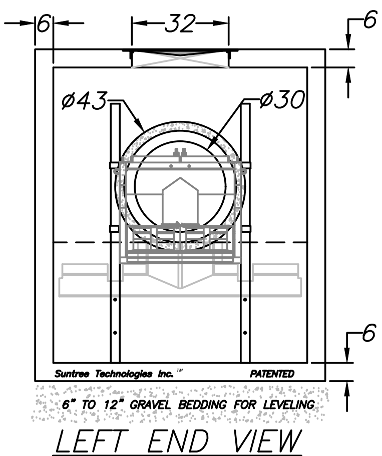


PLAN VIEW

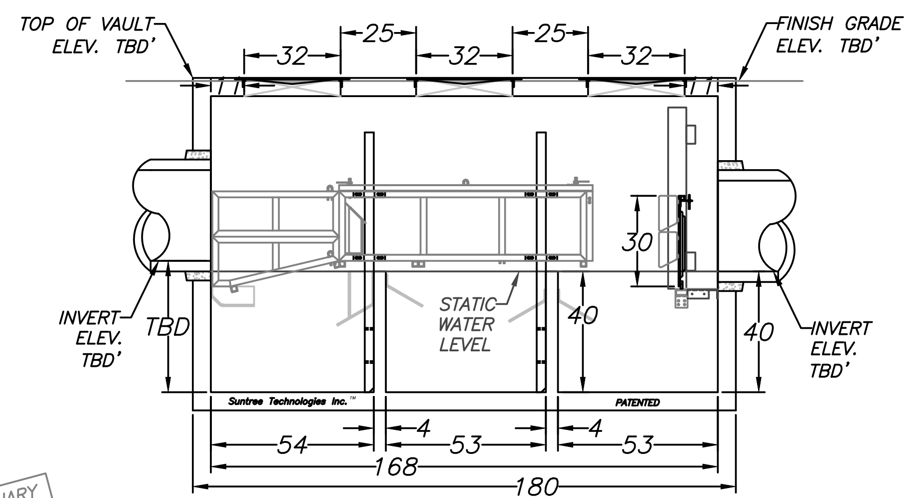
INSTALLATION NOTES:
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD <u>NOT</u> BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

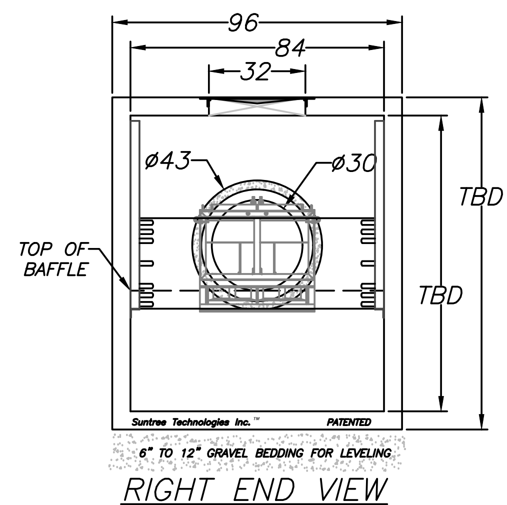
USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:
1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-7-14			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------ --------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-7-15

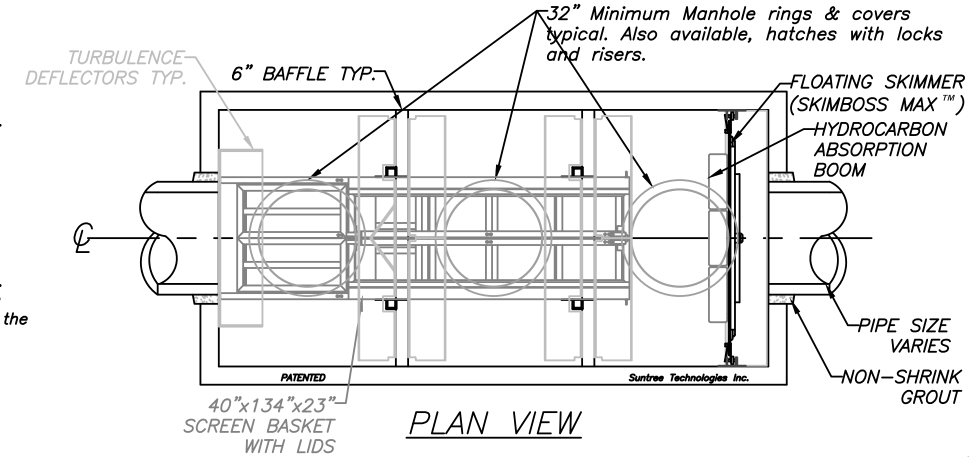
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 30" RCP) ——— 4.90 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 26.51 sq.ft.
3. Open orifice area in screen system ——— 13.26 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 6.63 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 16.83 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 6.36 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ——— 55.39 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



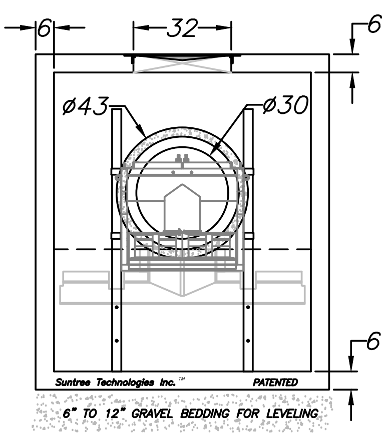
PLAN VIEW

INSTALLATION NOTES:

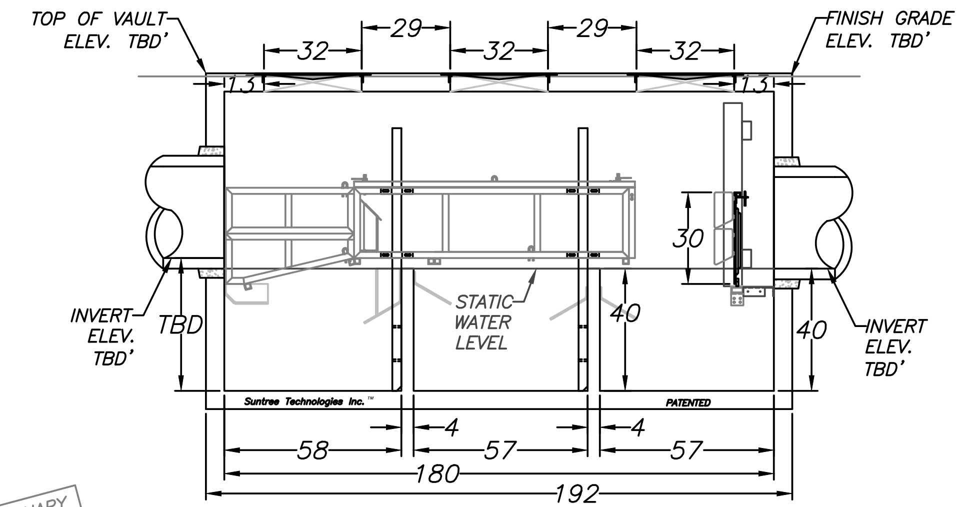
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

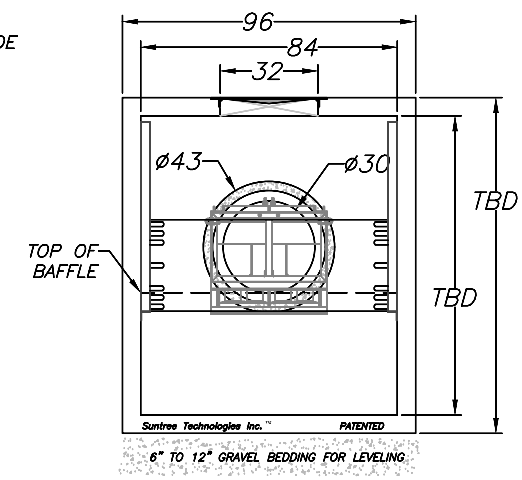
USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-7-15			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: -------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-8-12

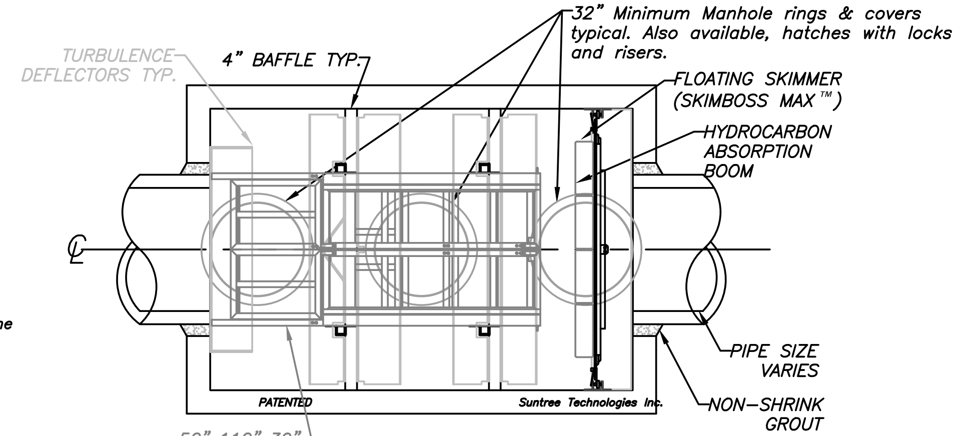
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 42" RCP) ——— 9.61 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 43.03 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 21.51 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 10.76 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe ——— 15.35 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 17.96 sq.ft.
7. Screen system storage volume ——— 84.52 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



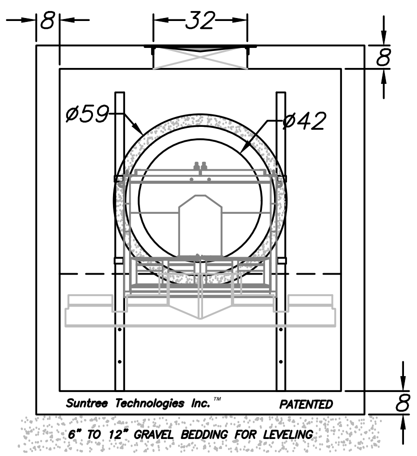
PLAN VIEW

INSTALLATION NOTES:

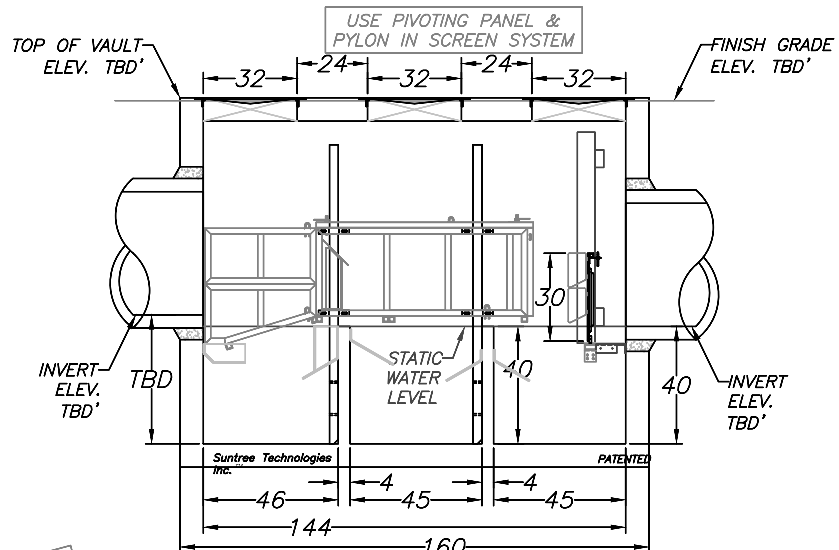
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

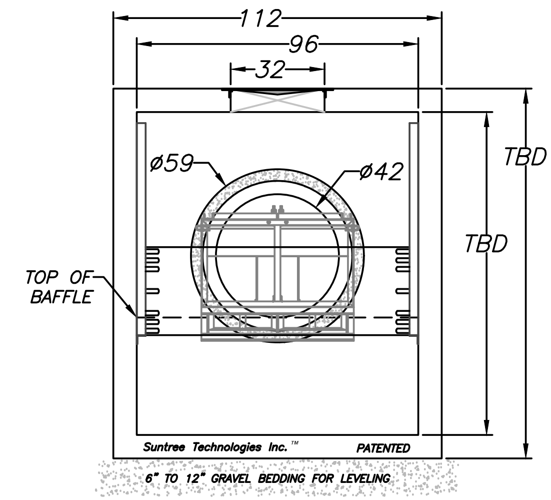
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-8-12			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------- ---------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-8-14

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

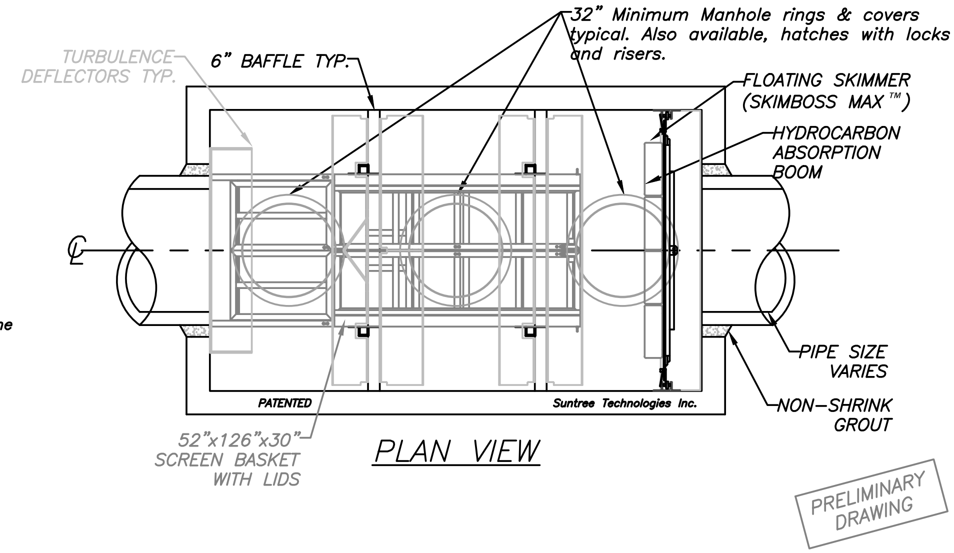
1. Pipe inflow area (Drawn as 42" RCP) ——— 9.61 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ——— 40.77 sq.ft.
3. Open orifice area in screen system ——— 20.38 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 10.19 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 17.40 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 17.66 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ——— 94.88 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

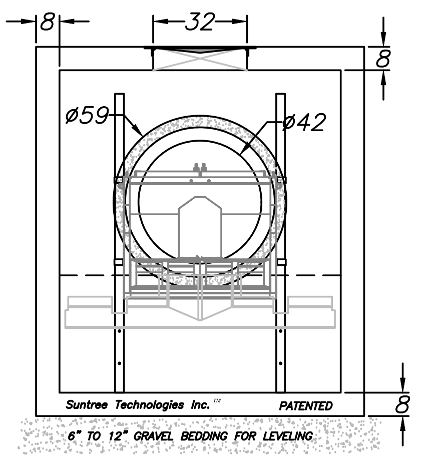


PLAN VIEW

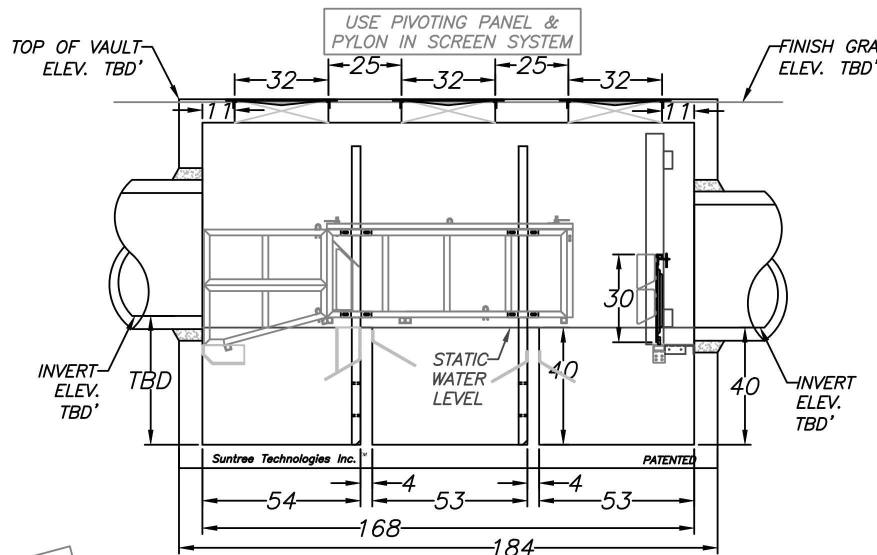
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

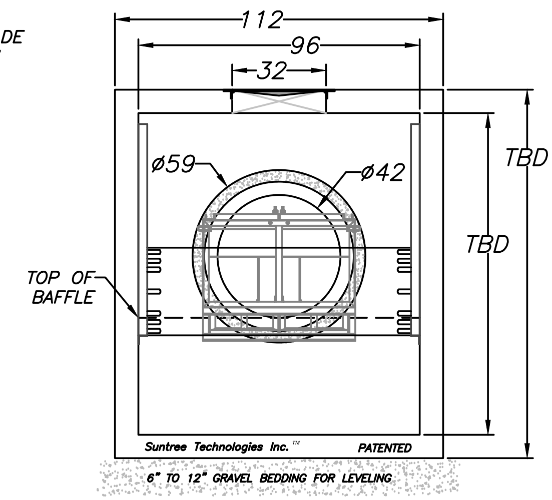
SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-8-14			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-8-16

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 42" RCP) ——— 9.61 sq.ft.

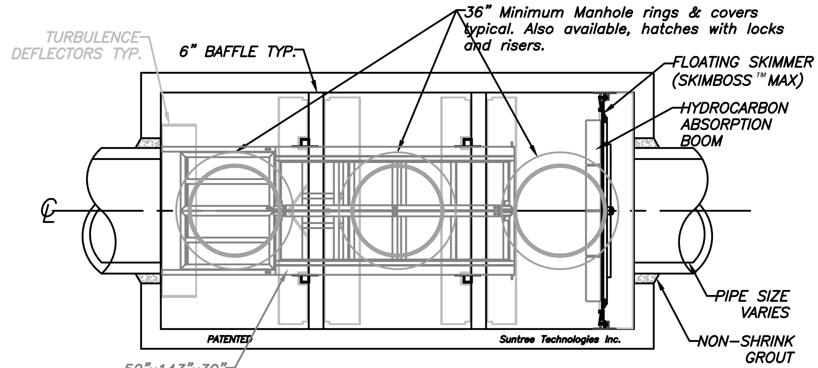
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ——— 47.72 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 23.86 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 11.93 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe ——— 18.60 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe ——— 17.66 sq.ft.
7. Screen system storage volume ——— 108.32 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



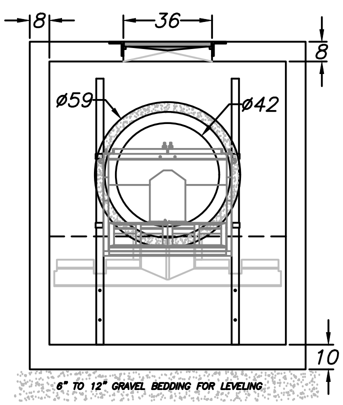
PLAN VIEW

INSTALLATION NOTES:

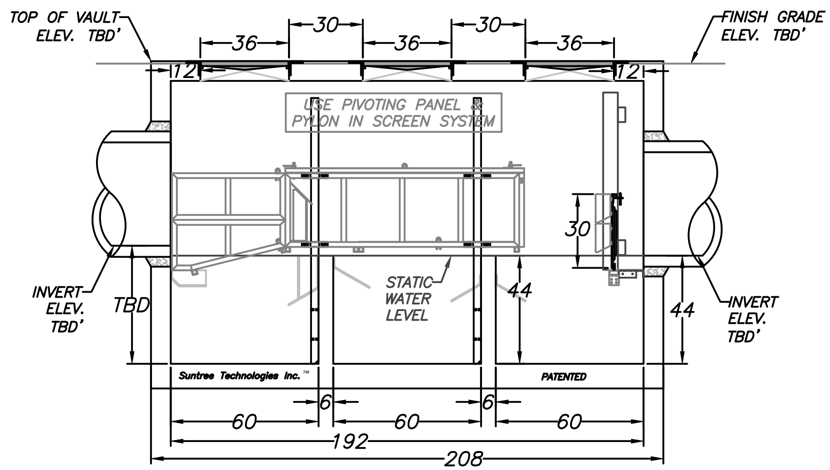
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

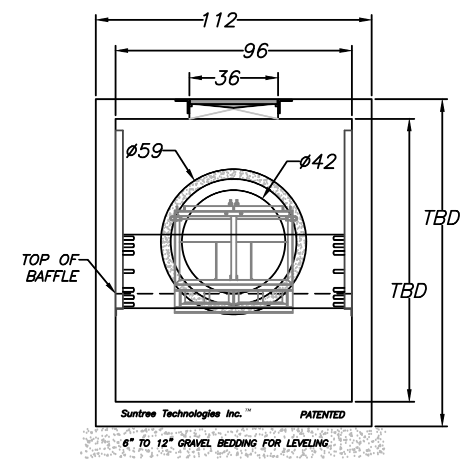
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-8-16		PROJECT NAME: ------ ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-9-18

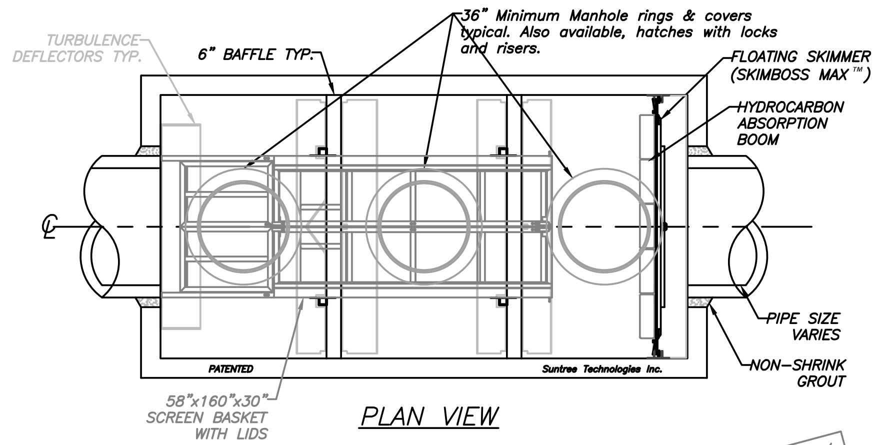
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) ——— 12.56 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 56.69 sq.ft.
3. Open orifice area in screen system ——— 28.35 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 14.17 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 26.57 sq.ft. below the top surface of the pipe
6. Minimum by-pass around screen system ——— 27.11 sq.ft. below the top surface of the pipe
7. Screen system storage volume ——— 135.35 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



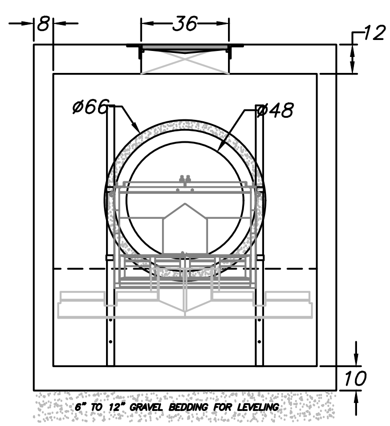
PLAN VIEW

INSTALLATION NOTES:

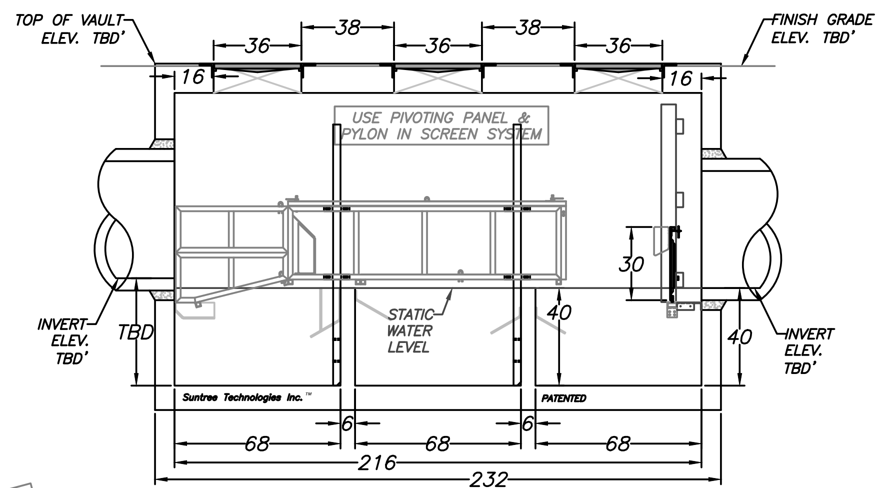
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

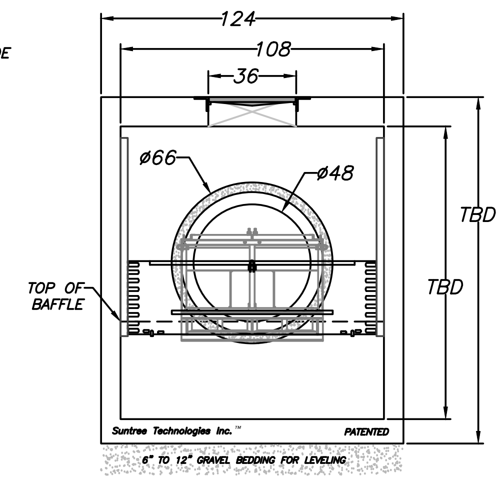
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210.
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-9-18			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-10-14

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) —— 12.56 sq.ft.

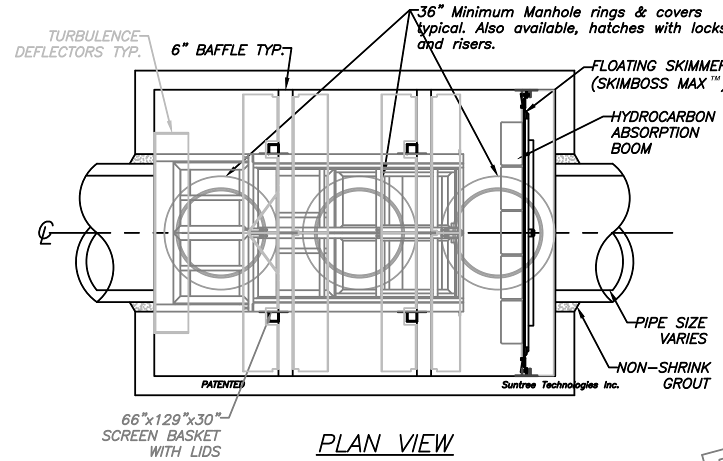
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system —— 56.05 sq.ft.
3. Open orifice area in screen system —— 28.03 sq.ft. with 50% blockage
4. Open orifice area in screen system —— 14.01 sq.ft. with 75% blockage
5. Minimum by-pass through screen system —— 26.17 sq.ft. below the top surface of the pipe
6. Minimum by-pass around screen system —— 27.15 sq.ft. below the top surface of the pipe
7. Screen system storage volume —— 116.15 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



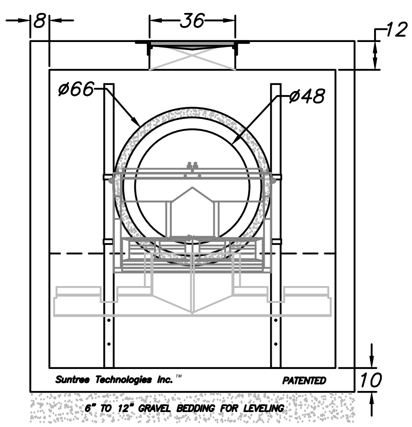
PLAN VIEW

PRELIMINARY DRAWING

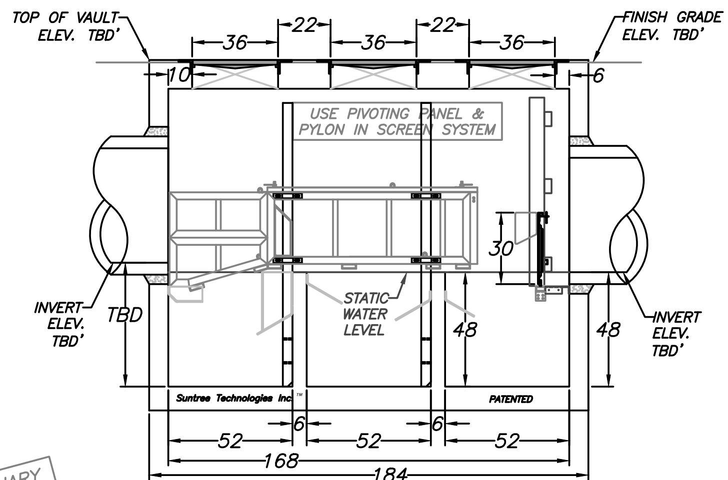
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

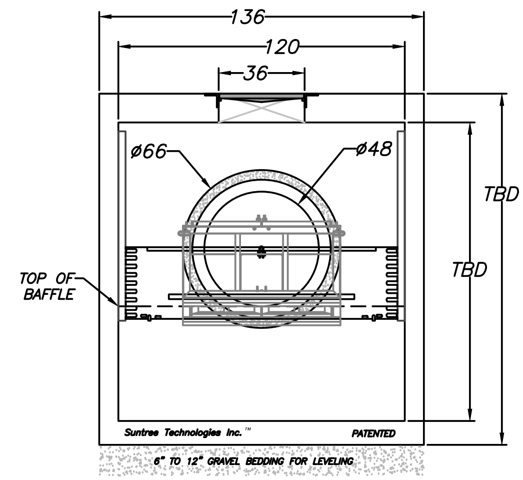


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: —————— —————————	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-10-14		PROJECT NAME: —————— —————————	A.B.1	——————— ———————	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-10-17

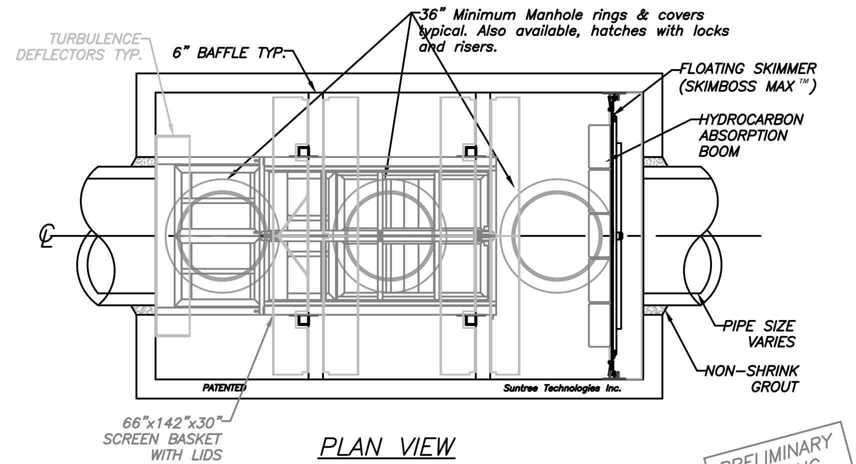
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) ——— 12.56 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 61.76 sq.ft.
3. Open orifice area in screen system ——— 30.88 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 15.44 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 24.11 sq.ft. below the top surface of the pipe
6. Minimum by-pass around screen system ——— 27.15 sq.ft. below the top surface of the pipe
7. Screen system storage volume ——— 127.70 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



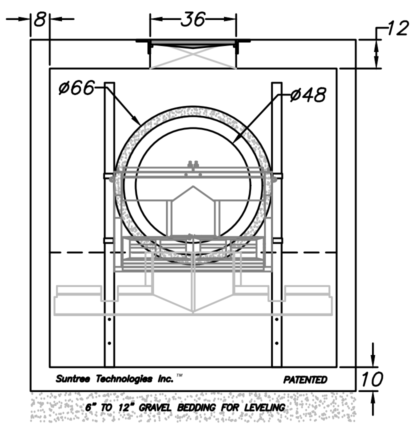
PLAN VIEW

PRELIMINARY DRAWING

INSTALLATION NOTES:

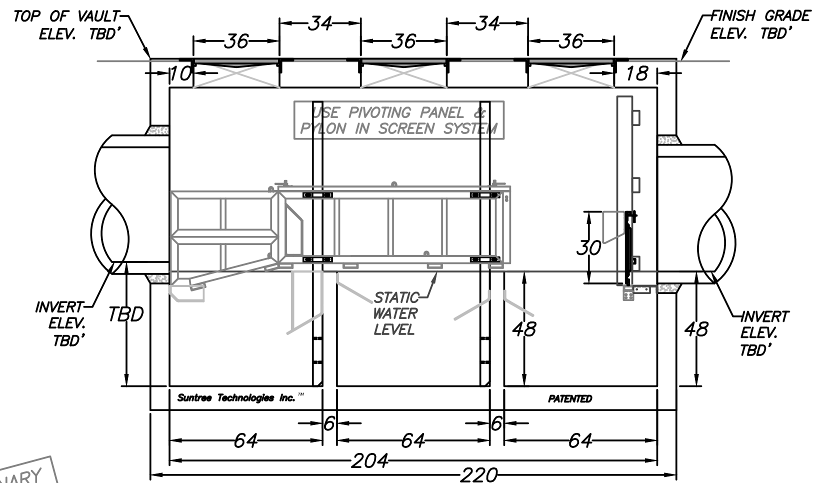
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

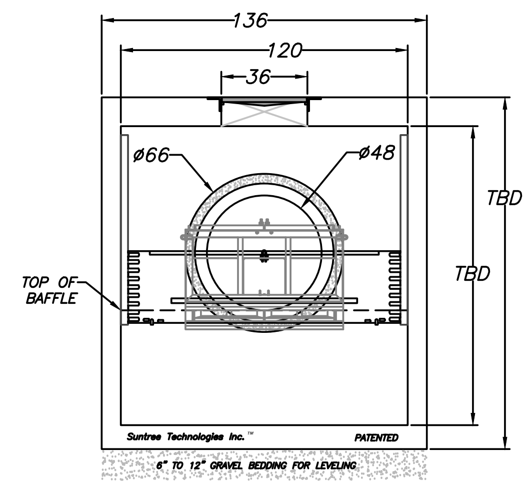


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-10-17			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------ --------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-10-20

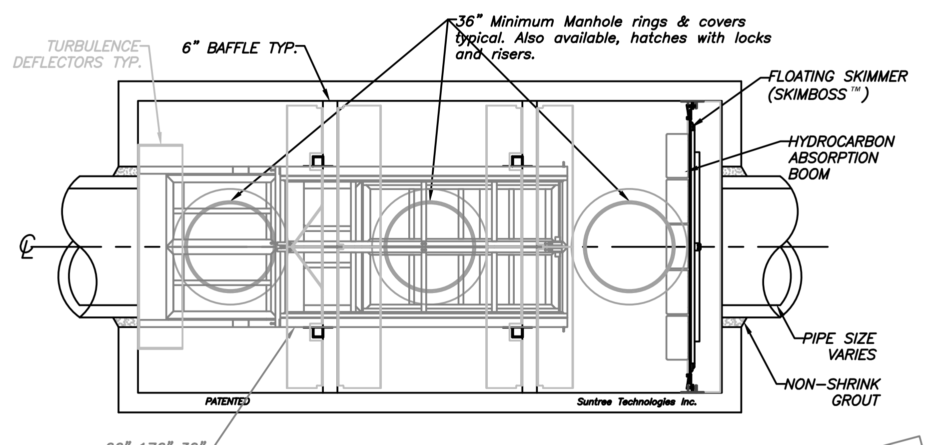
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) ——— 12.57 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 79.63 sq.ft.
3. Open orifice area in screen system ——— 39.82 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 19.91 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 26.97 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 27.15 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ——— 179.10 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



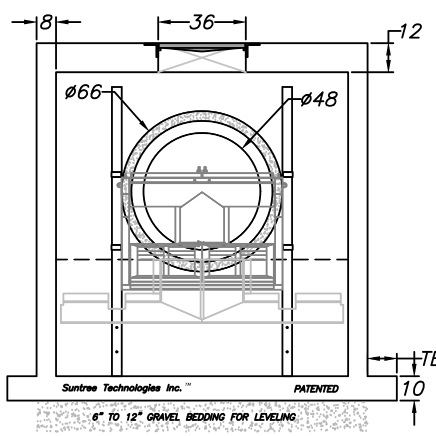
PLAN VIEW

PRELIMINARY DRAWING

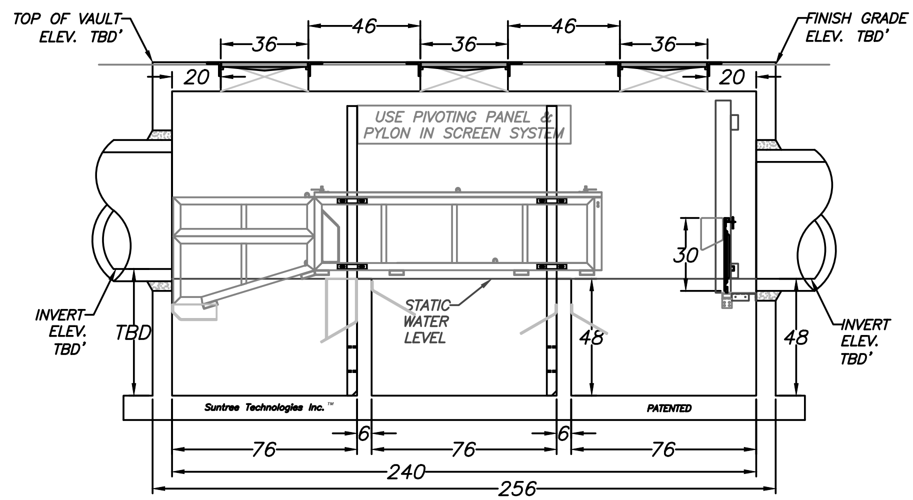
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

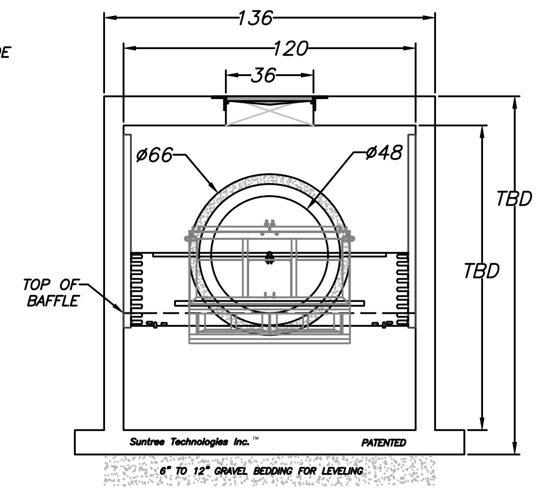
SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:
1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ----------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-10-20		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	----------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-11-16

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

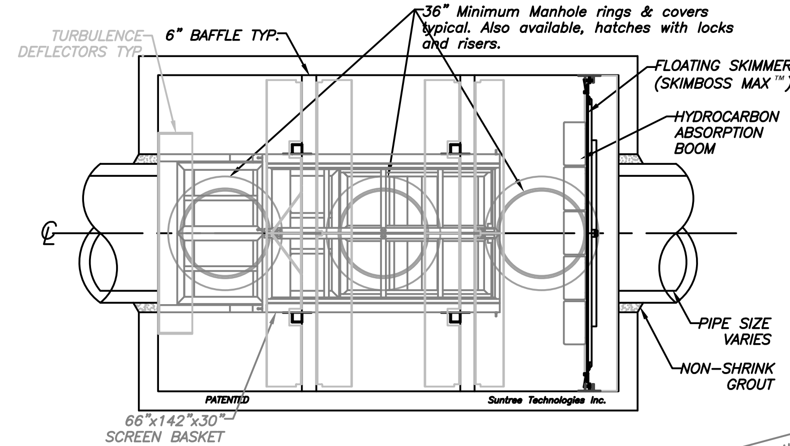
1. Pipe inflow area (Drawn as 48" RCP) ——— 12.56 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 63.93 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 31.97 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 15.98 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe ——— 22.52 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe ——— 31.49 sq.ft.
7. Screen system storage volume ——— 139.00 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



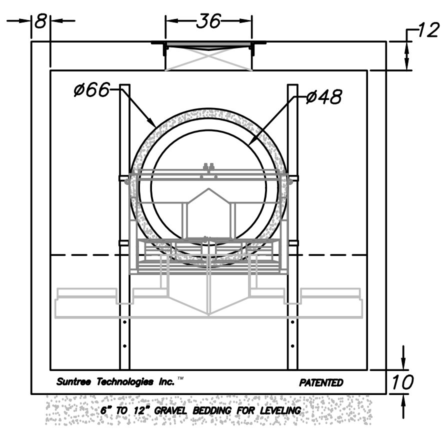
PLAN VIEW

INSTALLATION NOTES:

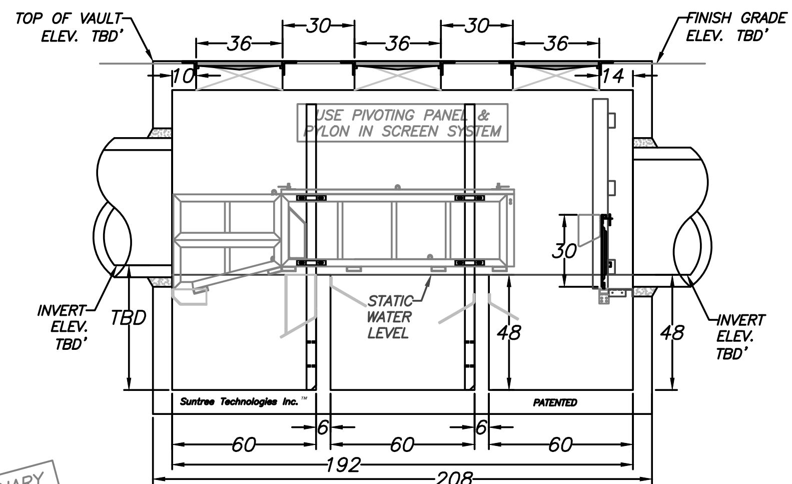
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

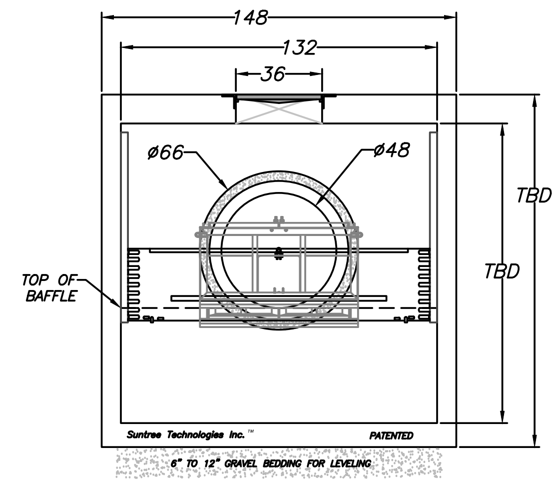
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ----------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-11-16			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------ ----------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-11-24

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

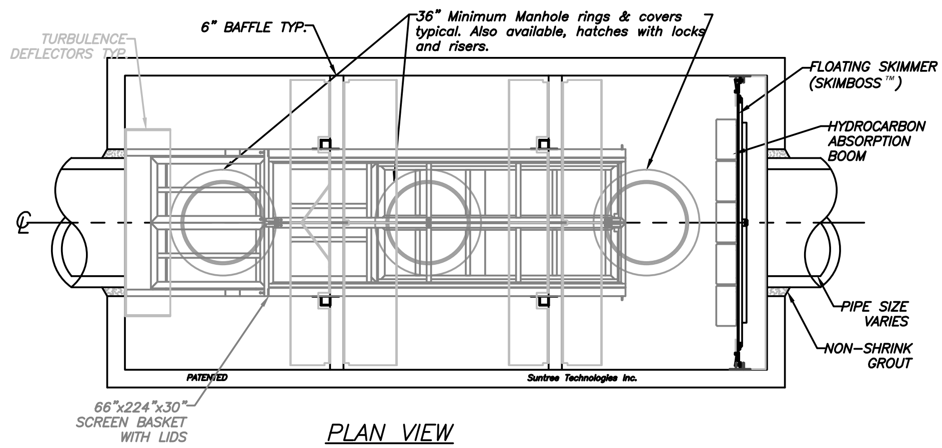
1. Pipe inflow area (Drawn as 48" RCP) —— 12.57 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system —— 103.42 sq.ft.
3. Open orifice area in screen system with 50% blockage —— 51.71 sq.ft.
4. Open orifice area in screen system with 75% blockage —— 25.86 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe —— 28.47 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe —— 31.52 sq.ft.
7. Screen system storage volume —— 225.5 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



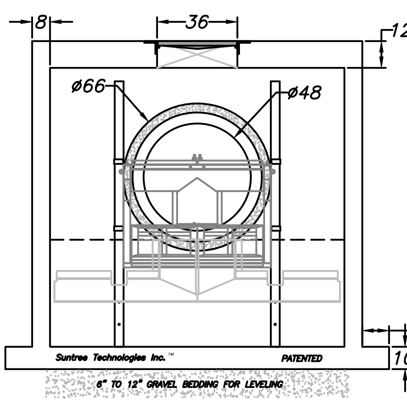
PLAN VIEW

INSTALLATION NOTES:

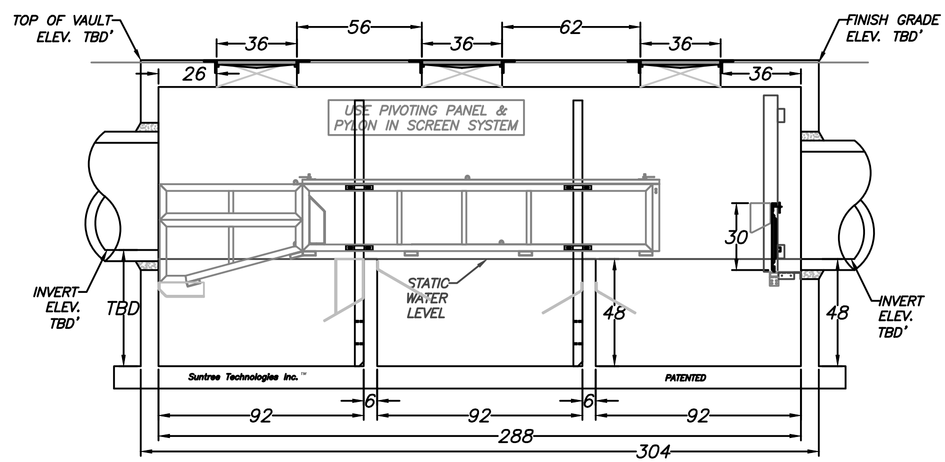
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

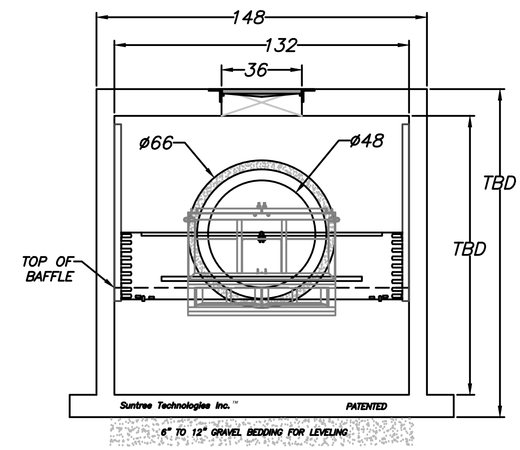
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-11-24			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-11-26

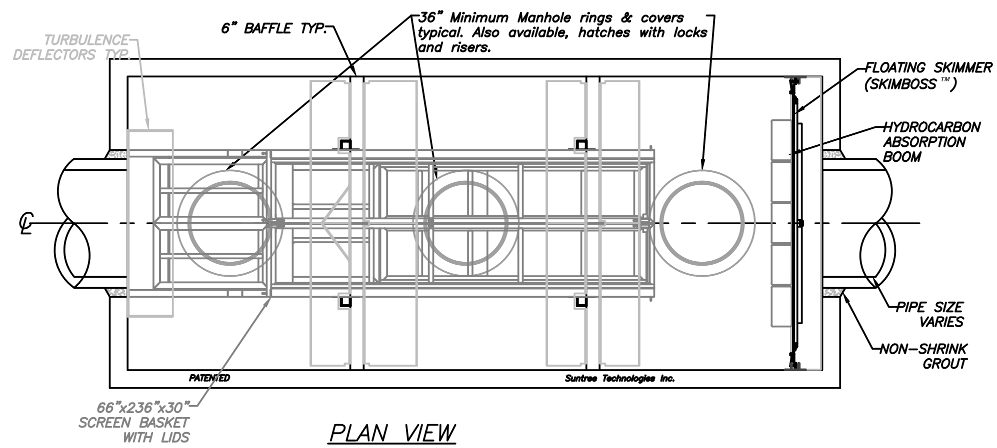
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) — 12.57 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 109.58 sq.ft.
3. Open orifice area in screen system with 50% blockage — 54.79 sq.ft.
4. Open orifice area in screen system with 75% blockage — 27.39 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 28.47 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 46.50 sq.ft.
7. Screen system storage volume — 236.75 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



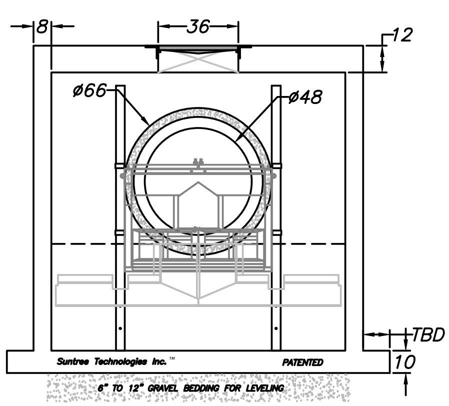
PLAN VIEW

INSTALLATION NOTES:

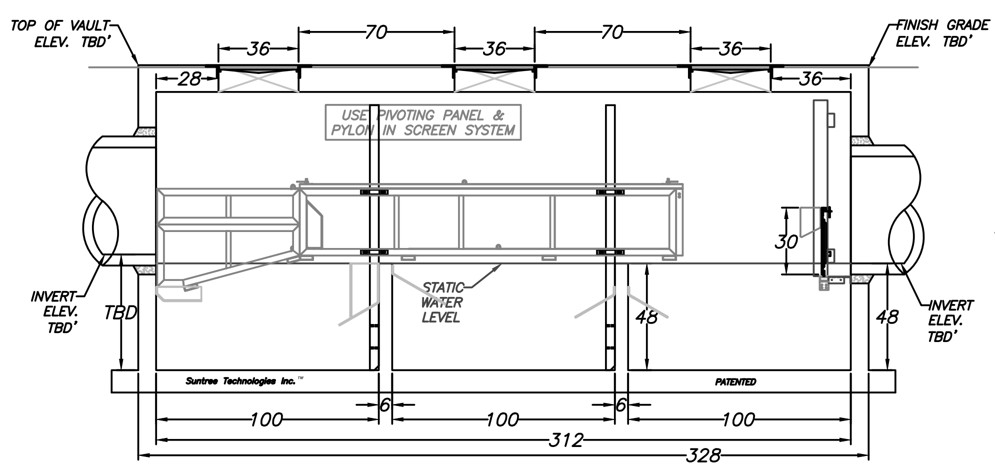
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

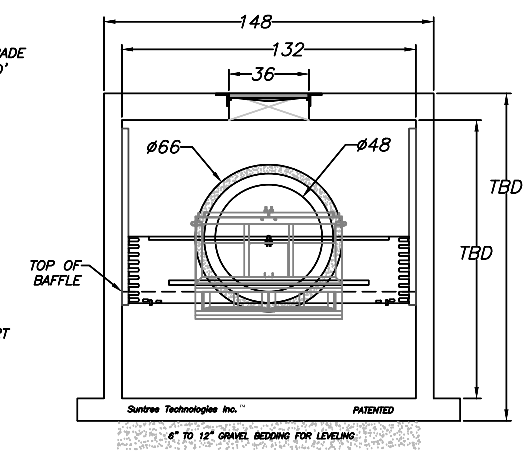
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ----------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-11-26		PROJECT NAME: ------- ----------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-11-34

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

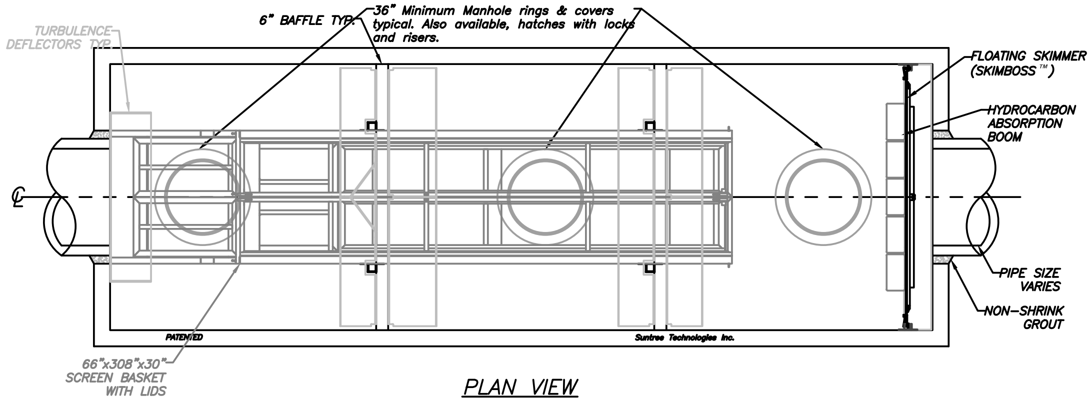
1. Pipe inflow area (Drawn as 48" RCP) — 12.57 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 146.85 sq.ft.
3. Open orifice area in screen system with 50% blockage — 73.43 sq.ft.
4. Open orifice area in screen system with 75% blockage — 36.71 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 28.47 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 31.52 sq.ft.
7. Screen system storage volume — 304.25 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



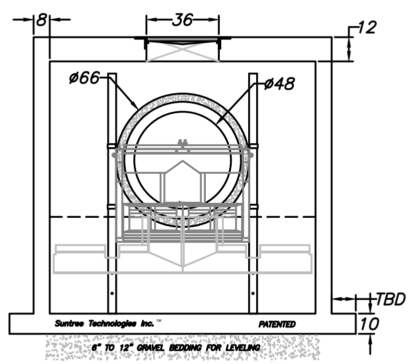
PLAN VIEW

INSTALLATION NOTES:

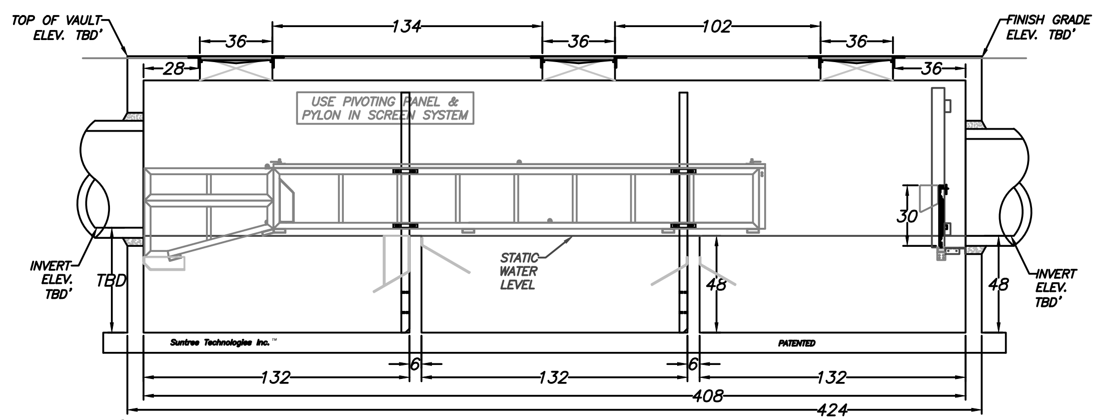
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

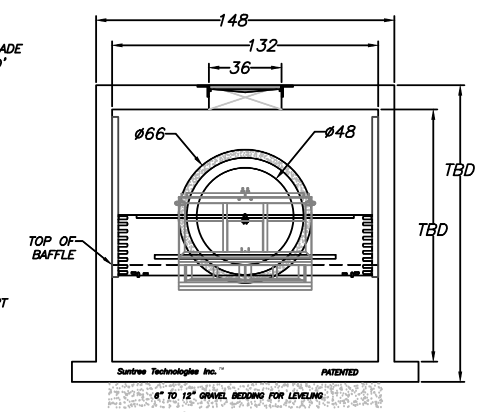
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ----------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-11-34		PROJECT NAME: -------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	----------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-12-21

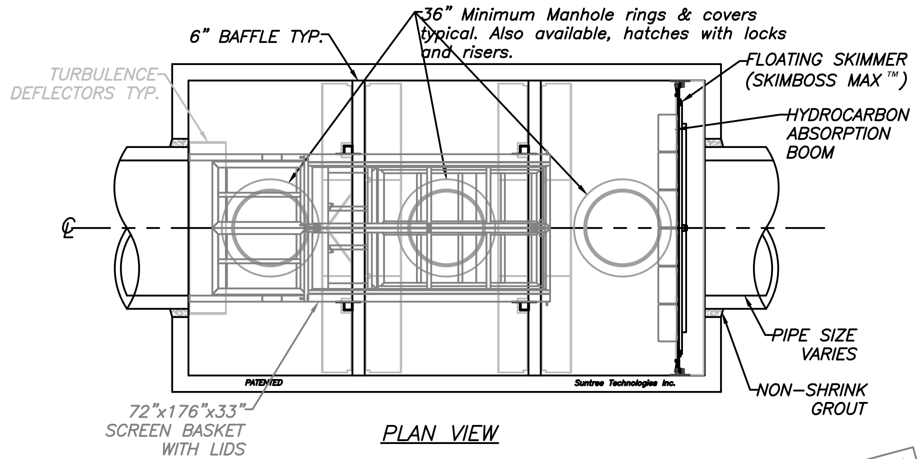
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 66" RCP) — 23.74 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 89.96 sq.ft.
3. Open orifice area in screen system with 50% blockage — 44.98 sq.ft.
4. Open orifice area in screen system with 75% blockage — 22.49 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 43.46 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 49.79 sq.ft.
7. Screen system storage volume — 216.7 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



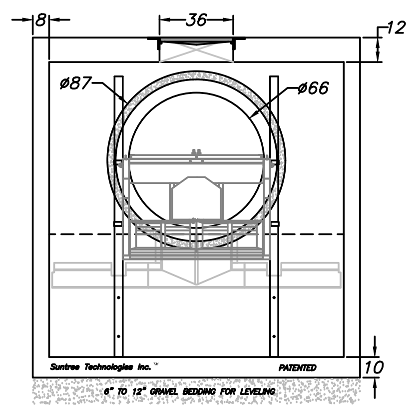
PLAN VIEW

INSTALLATION NOTES:

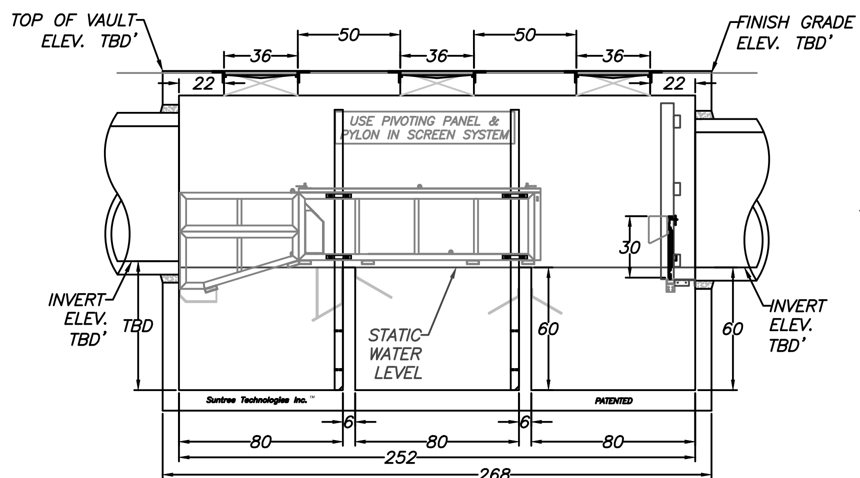
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

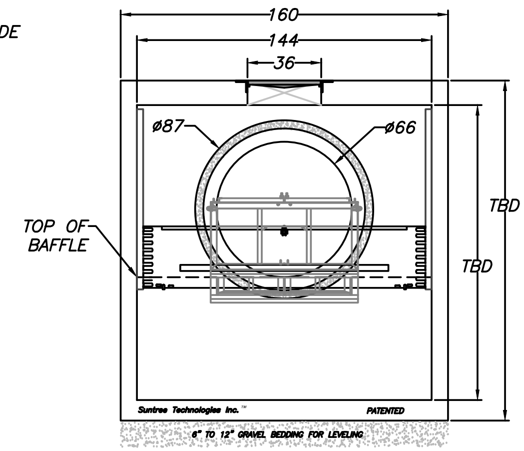
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-12-21			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: -------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-12-24

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM SPECIFICATIONS

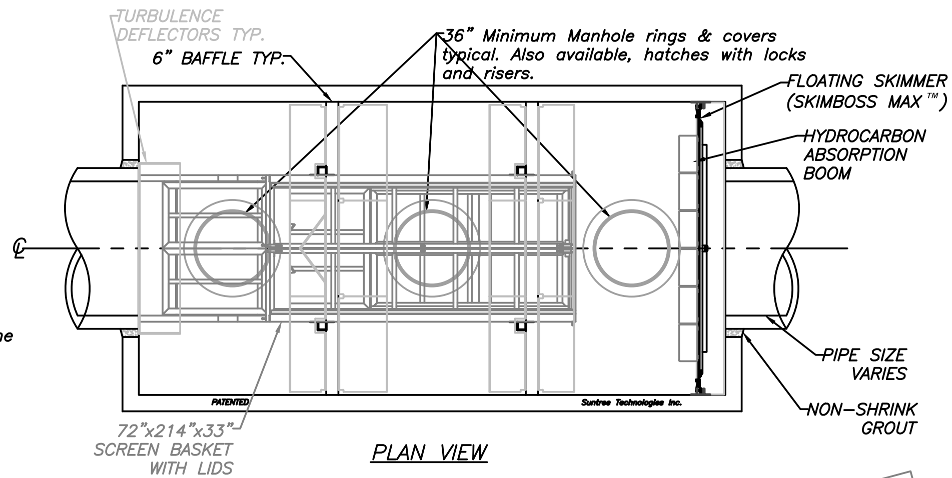
1. Pipe inflow area (Drawn as 66" RCP) — 23.74 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 110.81 sq.ft.
3. Open orifice area in screen system with 50% blockage — 55.41 sq.ft.
4. Open orifice area in screen system with 75% blockage — 27.70 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 55.19 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 53.62 sq.ft.
7. Screen system storage volume — 261.92 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



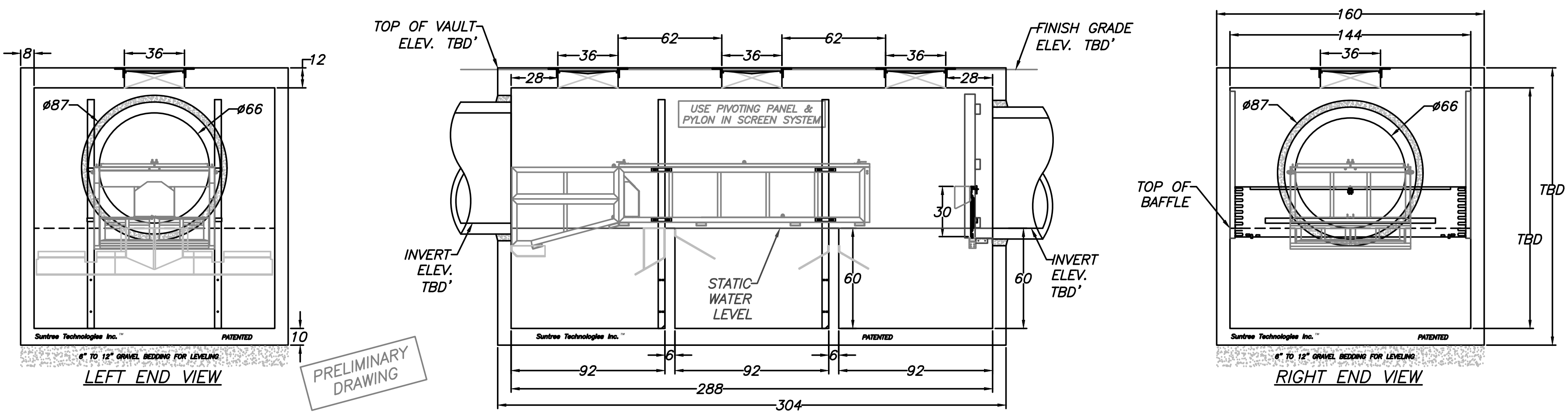
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

PRELIMINARY DRAWING



LEFT END VIEW

PRELIMINARY DRAWING

FRONT SIDE VIEW

RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: -------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-12-24		PROJECT NAME: -------- ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

Appendix A

Nutrient Separating Baffle Box®
HVT-EL Models

Suntree Technologies Inc.®

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-2-4-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (8" PVC AS DRAWN) ——— 3.14 sq.ft.

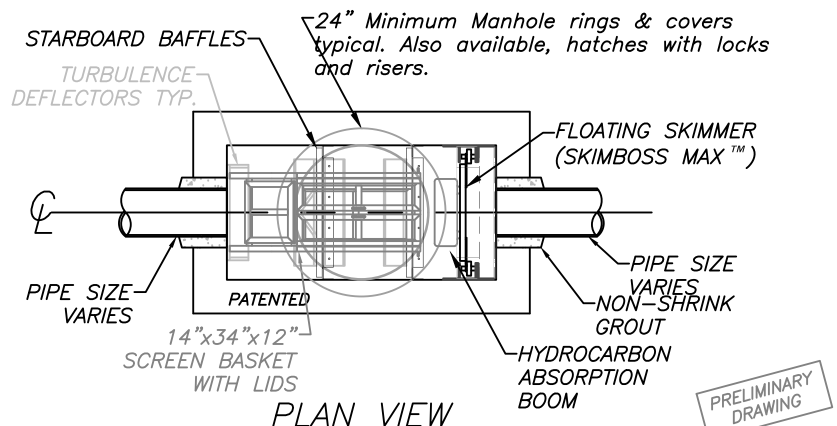
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ——— 1.57 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 0.76 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 0.66 sq.ft.
5. By-pass through screen system below the ceiling of the pipe ——— 0.27 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 0.76 sq.ft.
7. Screen system storage volume ——— 2.51 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

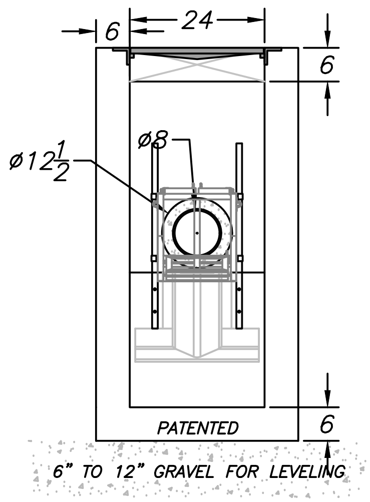
Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



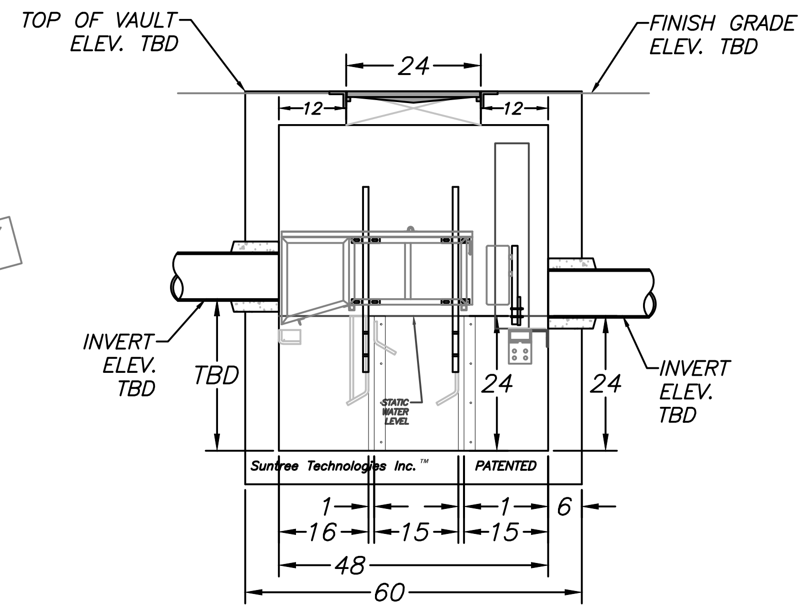
PLAN VIEW

INSTALLATION NOTES:

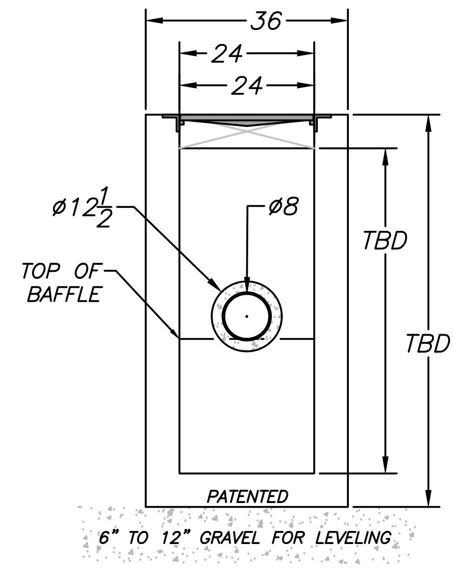
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE ~3" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 2 WATER TIGHT CHAMBERS. BAFFLES CAN BE CONCRETE AND/OR STARBOARD.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-2-4-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-2.5-4-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

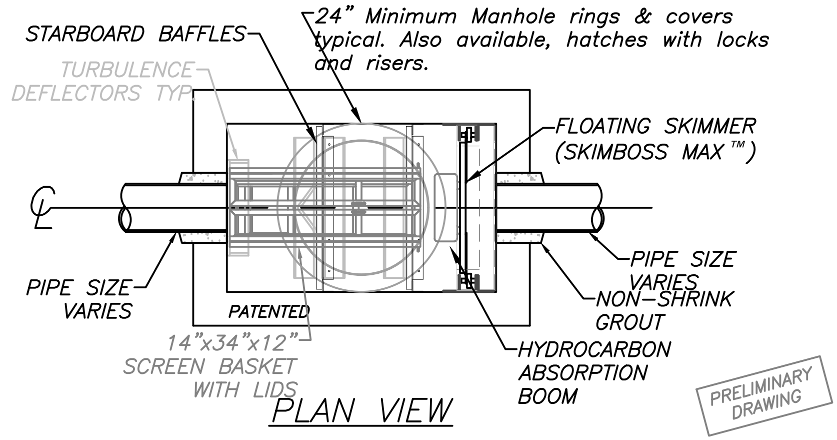
1. Inflow Pipe Area (8" PVC AS DRAWN) ——— 0.35 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 3.14 sq.ft.
3. Open orifice area in screen system ——— 1.57 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 0.785 sq.ft. with 75% blockage
5. By-pass through screen system ——— 0.27 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 0.76 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ——— 2.51 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

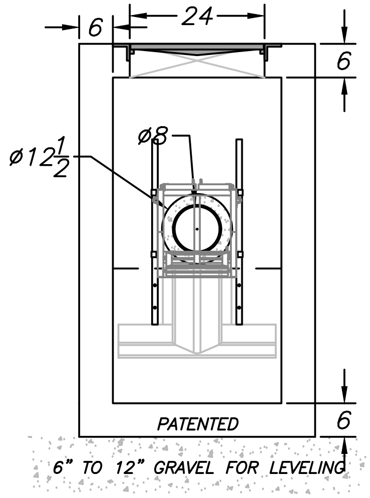
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

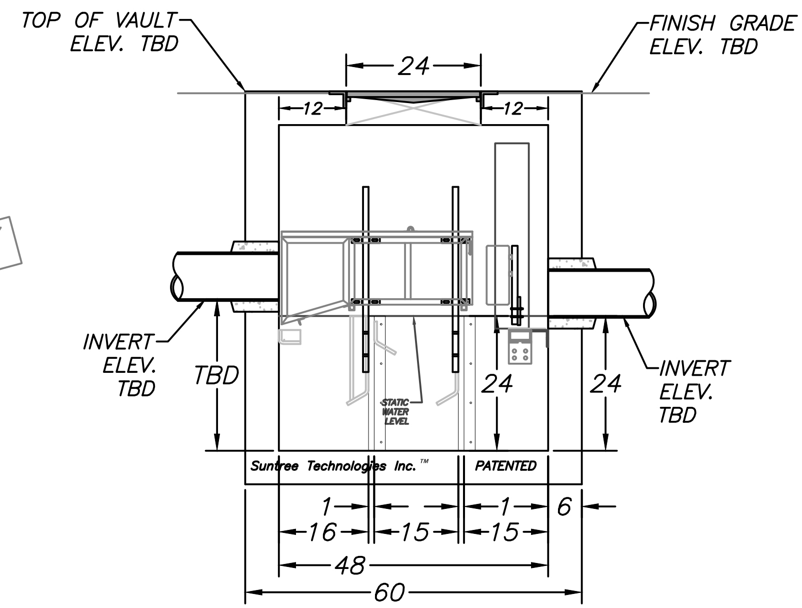
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE ~3" BELOW THE INVERT OF THE OUTFLOW PIPE.

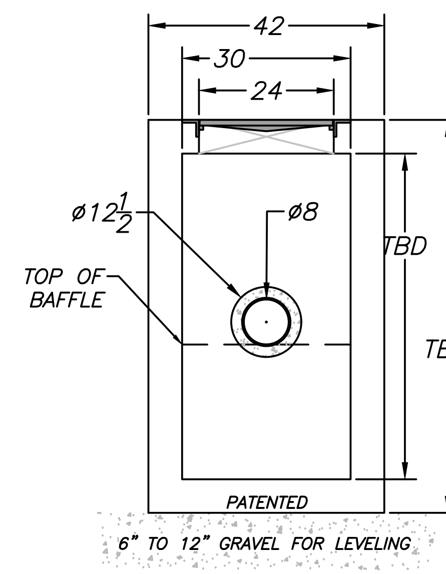
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.

2. JOINT SEALANT: BUTYL RUBBER SS-S-00210

3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.

4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 2 WATER TIGHT CHAMBERS. BAFFLES CAN BE CONCRETE AND/OR STARBOARD.

5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.

6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ----------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-2.5-4-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-3-6-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (15" RCP AS DRAWN) —— 1.23 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system —— 5.86 sq.ft.
3. Open orifice area in screen system with 50% blockage —— 2.93 sq.ft.
4. Open orifice area in screen system with 75% blockage —— 1.47 sq.ft.
5. By-pass through screen system below the ceiling of the pipe —— 0.46 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe —— 1.76 sq.ft.
7. Screen system storage volume —— 7.87 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

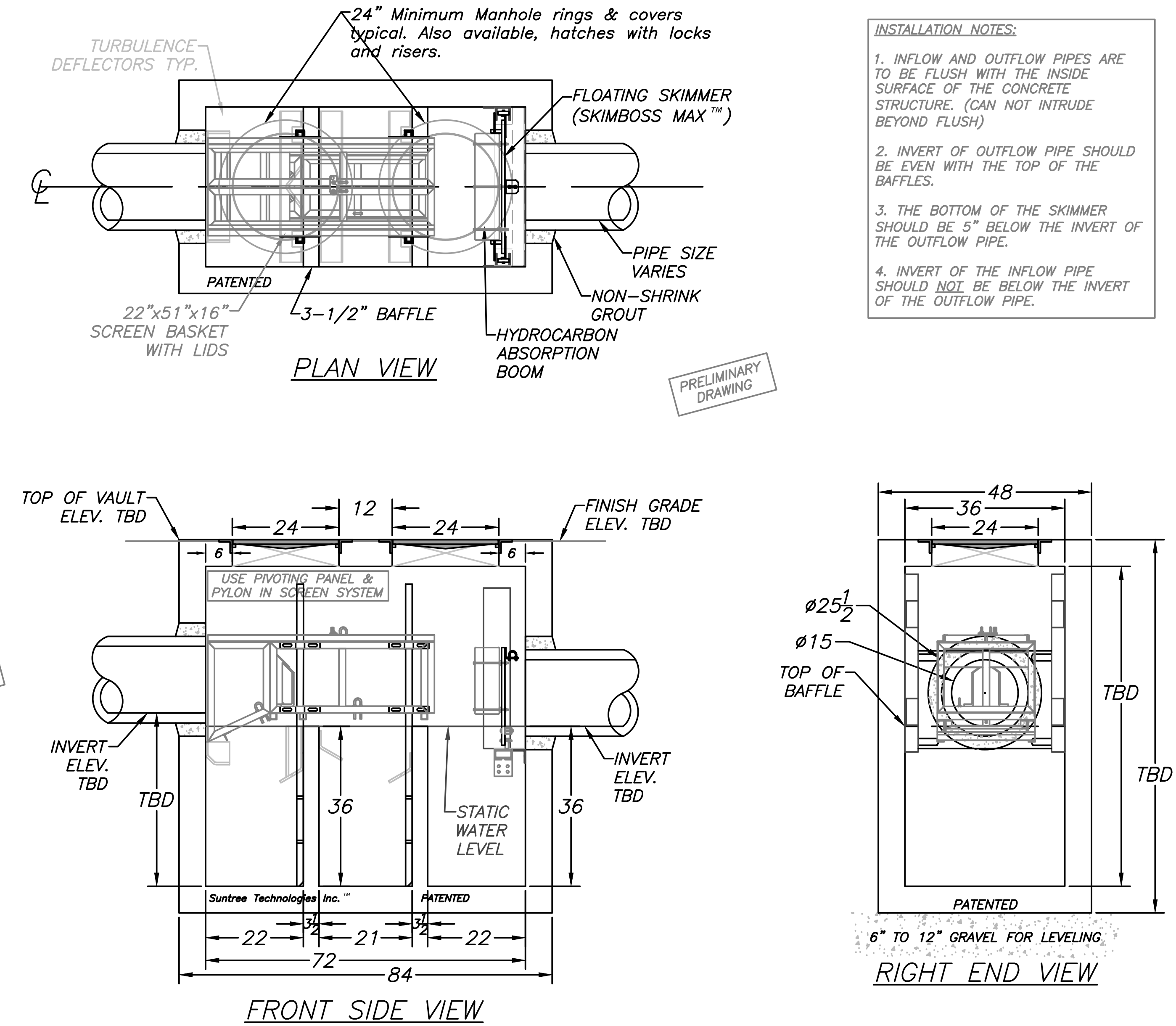
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.

4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.



NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-3-6-EL		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	---------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-3-8-EL

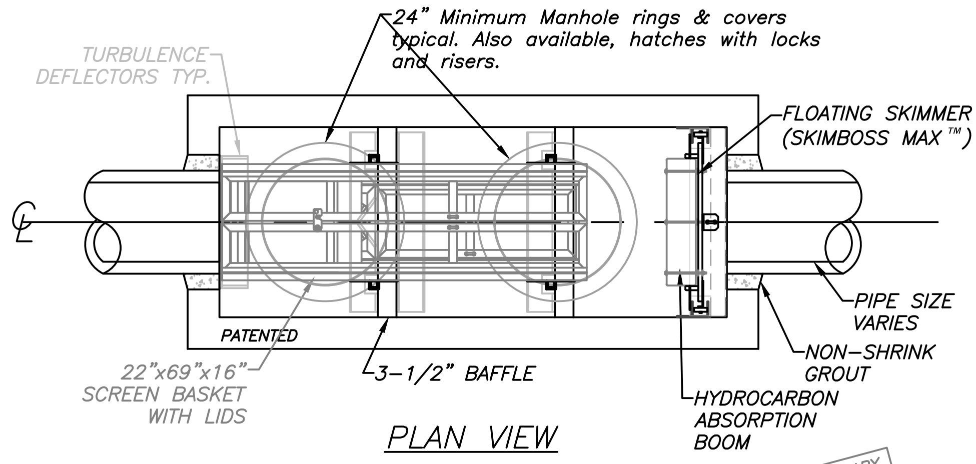
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (15" RCP AS DRAWN) — 1.23 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 8.56 sq.ft.
3. Open orifice area in screen system with 50% blockage — 4.28 sq.ft.
4. Open orifice area in screen system with 75% blockage — 2.14 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 0.46 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 1.76 sq.ft.
7. Screen system storage volume — 9.26 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

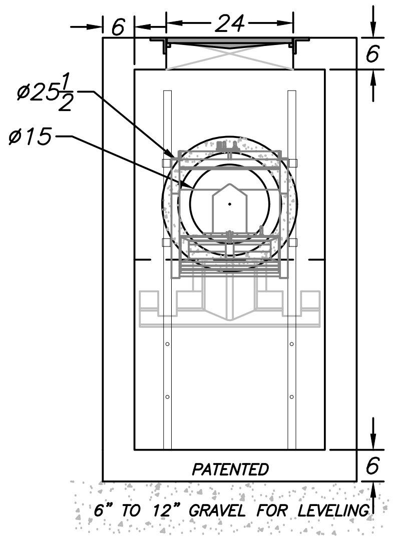
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

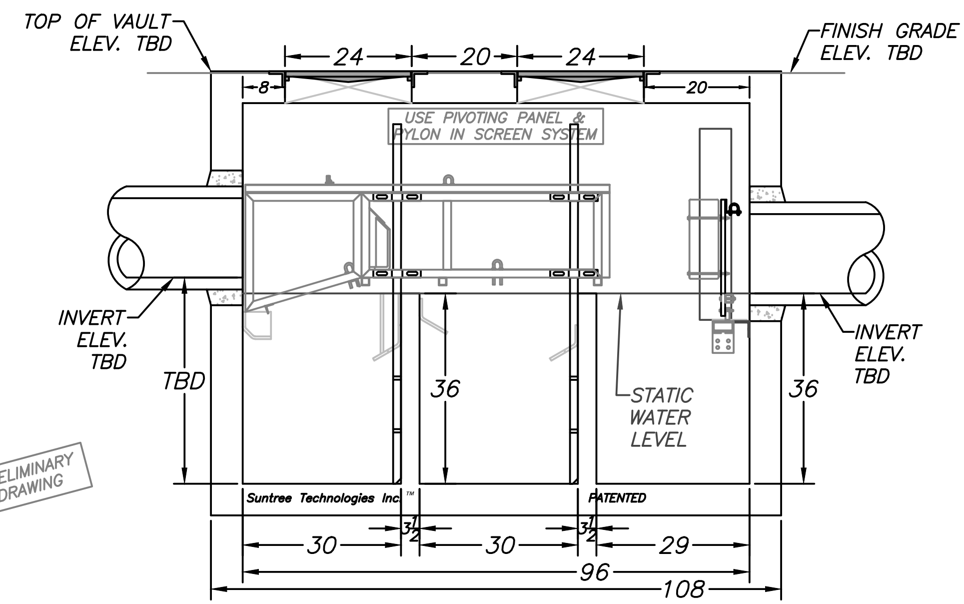
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.

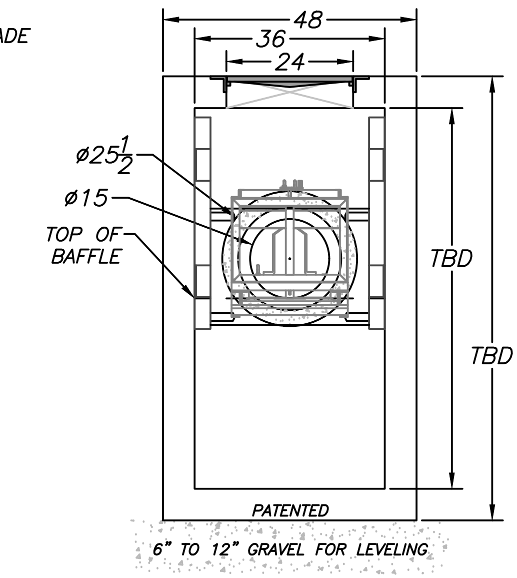
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:
1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ----------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-3-8-EL		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-4-6.5-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (18" RCP AS DRAWN) — 1.77 sq.ft.

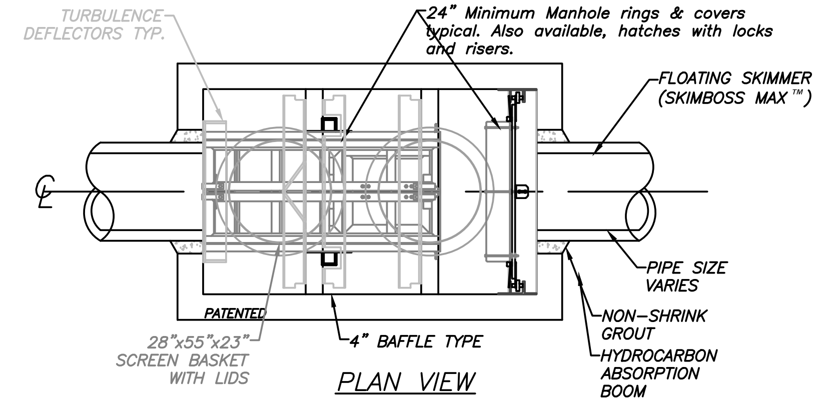
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 13.42 sq.ft.
3. Open orifice area in screen system with 50% blockage — 6.71 sq.ft.
4. Open orifice area in screen system with 75% blockage — 3.36 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 0.83 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 2.92 sq.ft.
7. Screen system storage volume — 16.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

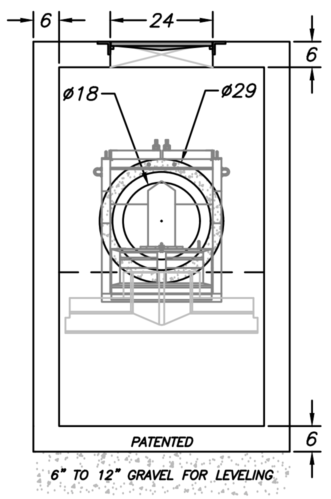


PLAN VIEW

INSTALLATION NOTES:

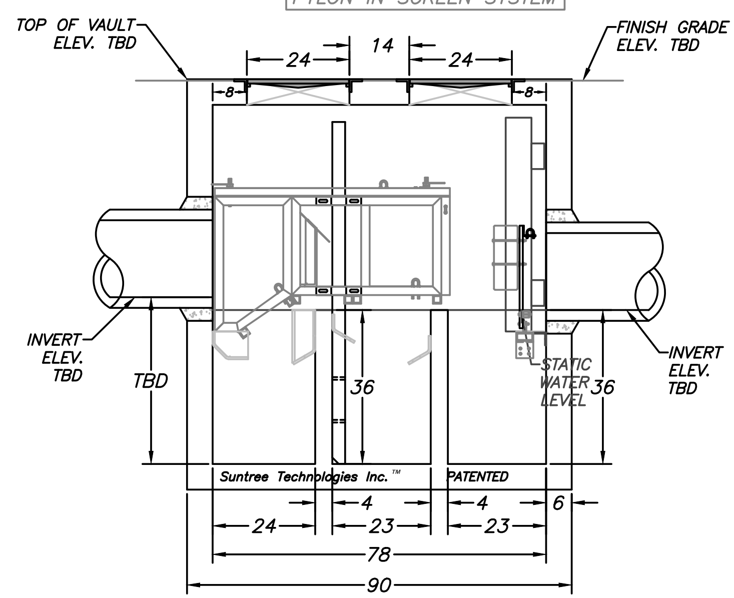
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

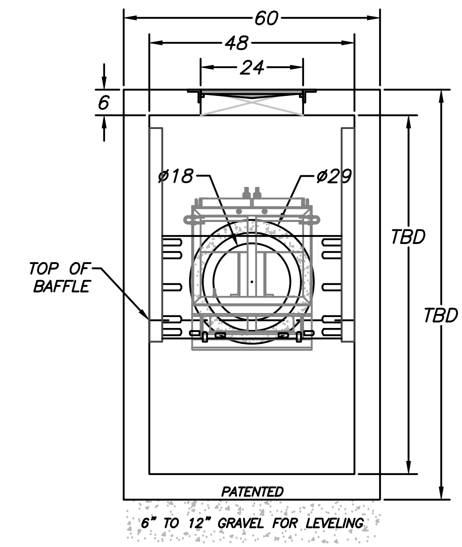


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-4-6.5-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-4-8-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

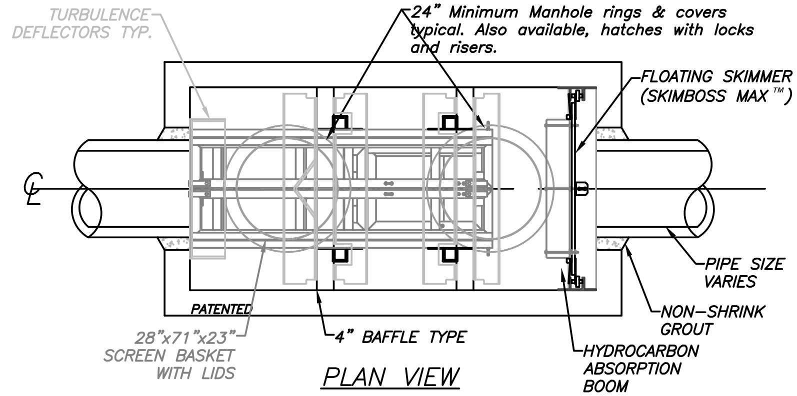
1. Inflow Pipe Area (18" RCP AS DRAWN) — 1.77 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 13.59 sq.ft.
3. Open orifice area in screen system with 50% blockage — 6.79 sq.ft.
4. Open orifice area in screen system with 75% blockage — 3.40 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 0.83 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 2.91 sq.ft.
7. Screen system storage volume — 22.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

INSTALLATION NOTES:

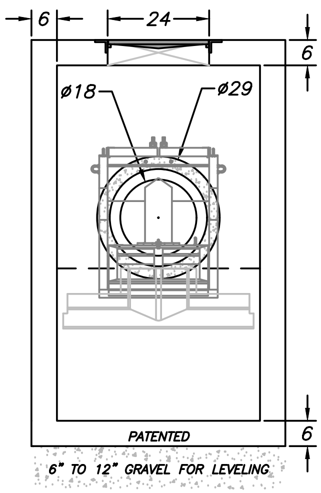
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.

4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

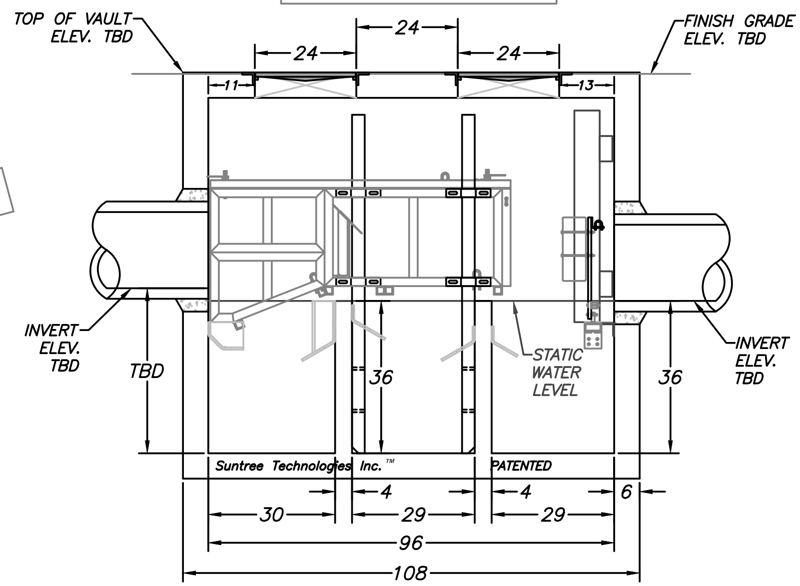
PRELIMINARY DRAWING



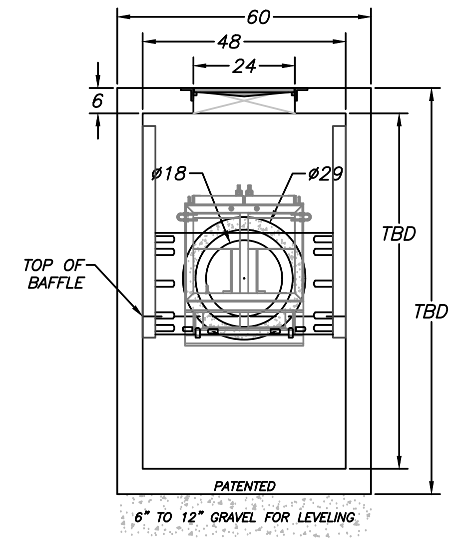
LEFT END VIEW

PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922 NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-4-8-EL		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------ ---------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-5-10-EL

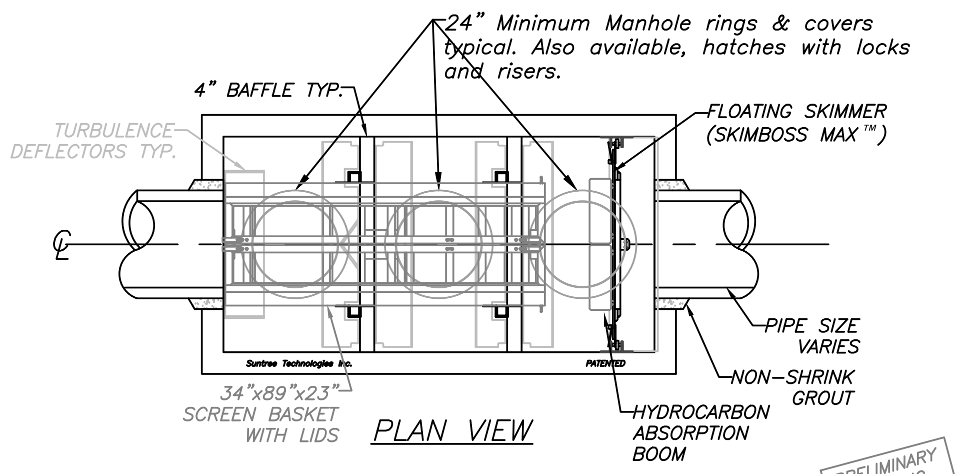
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 24" RCP) — 3.14 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 23.30 sq.ft.
3. Open orifice area in screen system with 50% blockage — 11.65 sq.ft.
4. Open orifice area in screen system with 75% blockage — 5.82 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 1.06 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 4.90 sq.ft.
7. Screen system storage volume — 31.68 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



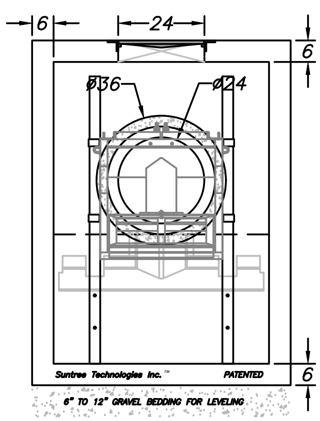
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

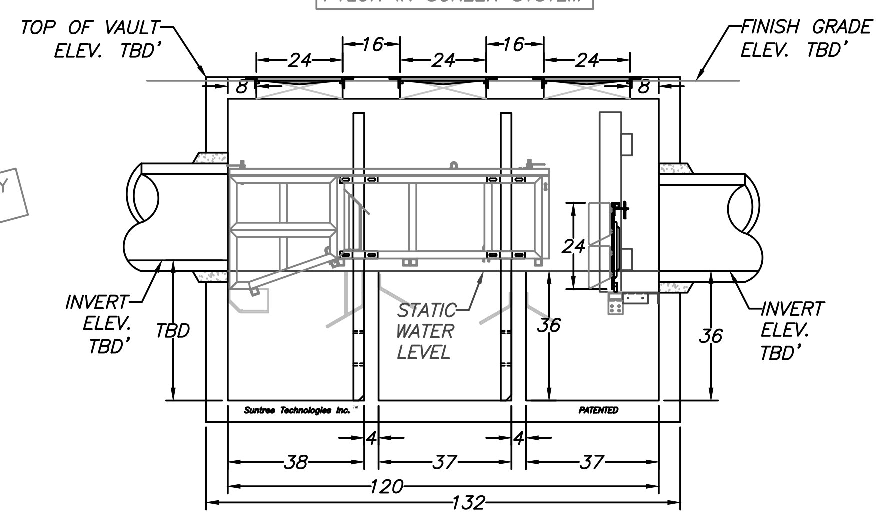
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

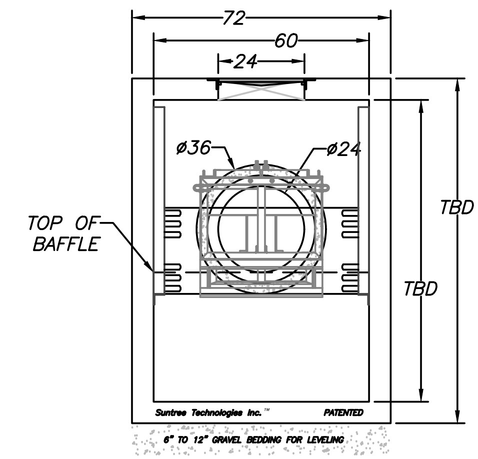


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:
1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-5-10-EL		PROJECT NAME: ------- ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-5-10.5-EL

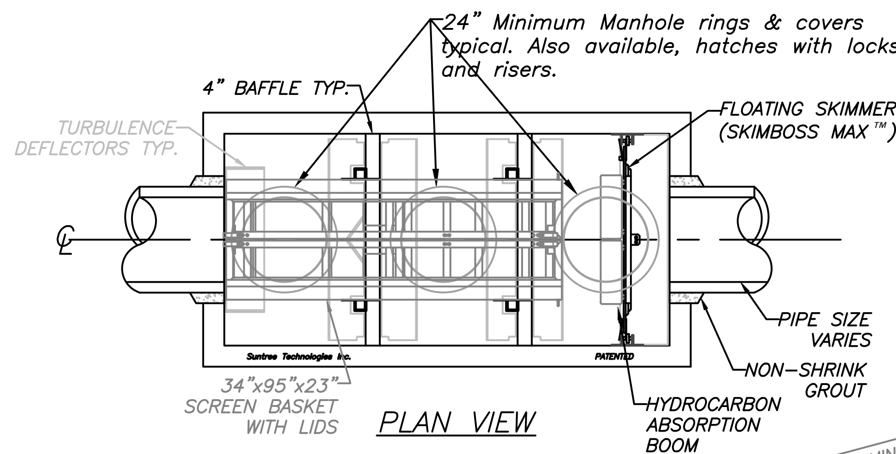
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 24" RCP) — 3.14 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 24.92 sq.ft.
3. Open orifice area in screen system with 50% blockage — 12.46 sq.ft.
4. Open orifice area in screen system with 75% blockage — 6.23 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 1.06 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 4.90 sq.ft.
7. Screen system storage volume — 33.89 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

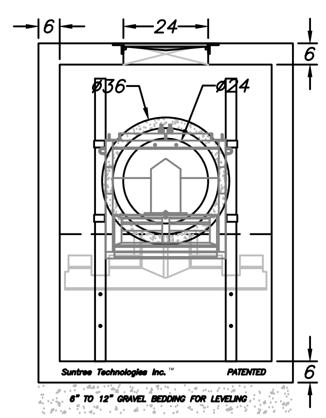


PLAN VIEW

PRELIMINARY DRAWING

INSTALLATION NOTES:

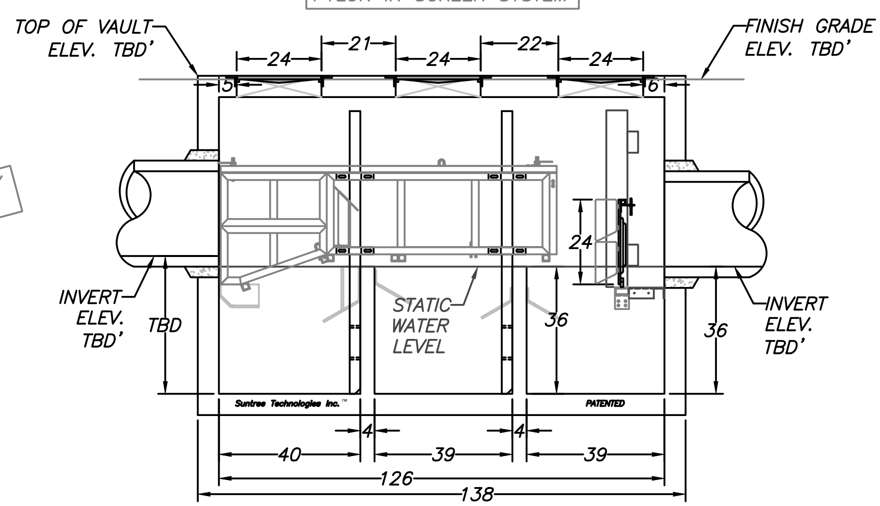
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.



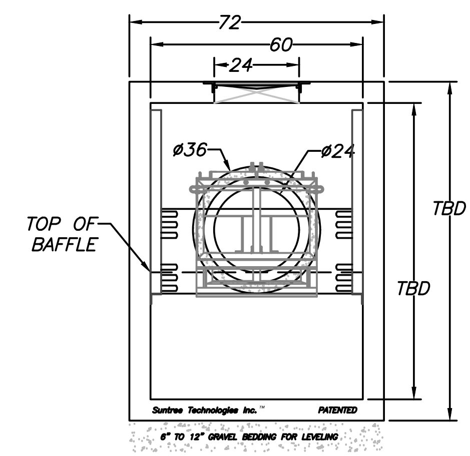
LEFT END VIEW

PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:
1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

			CAD	REVISIONS	DATE
SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	A.B.1	------- -------	00/00/00
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-5-10.5-EL		PROJECT NAME: ------			
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-6-12-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

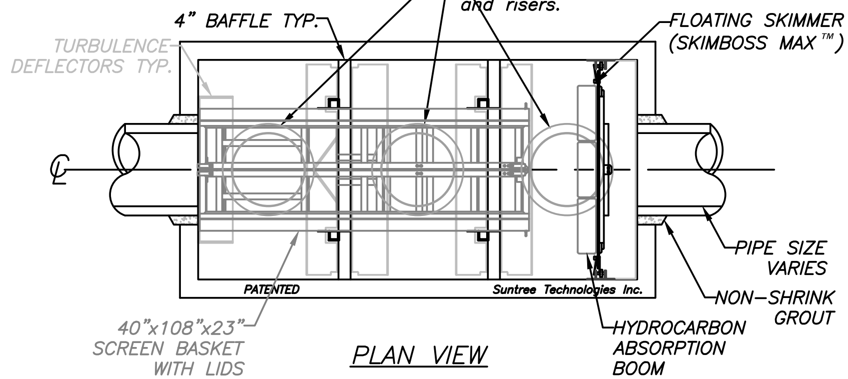
1. Pipe inflow area (Drawn as 24" RCP) ——— 3.14 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ——— 29.10 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 14.55 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 7.28 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe ——— 1.37 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 5.20 sq.ft.
7. Screen system storage volume ——— 49.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



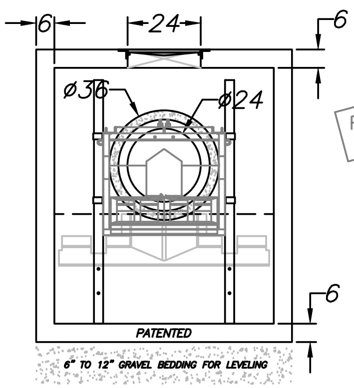
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD <u>NOT</u> BE BELOW THE INVERT OF THE OUTFLOW PIPE.

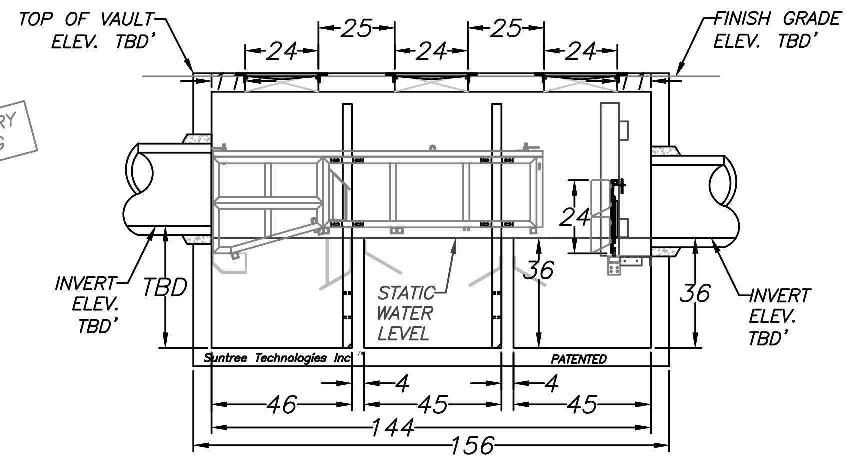
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

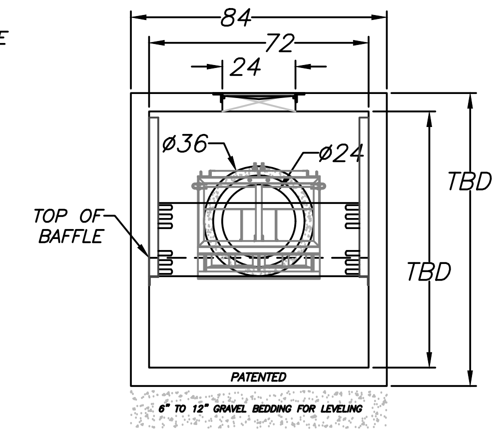


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBES.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-6-12-EL		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-6-13.75-EL

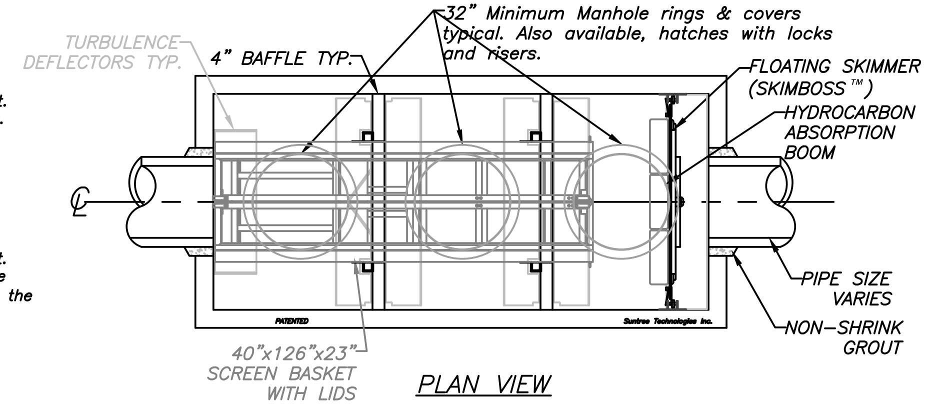
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 24" RCP) ——— 3.14 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 36.08 sq.ft.
3. Open orifice area in screen system ——— 18.04 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 9.02 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 1.39 sq.ft. below the top surface of the pipe
6. Minimum by-pass around screen system ——— 5.20 sq.ft. below the top surface of the pipe
7. Screen system storage volume ——— 60.73 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



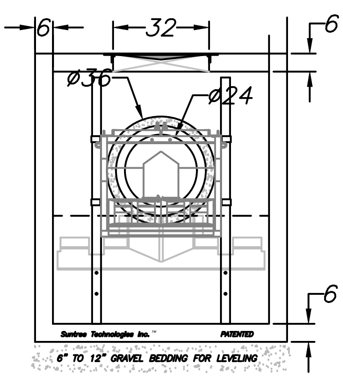
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD <u>NOT</u> BE BELOW THE INVERT OF THE OUTFLOW PIPE.

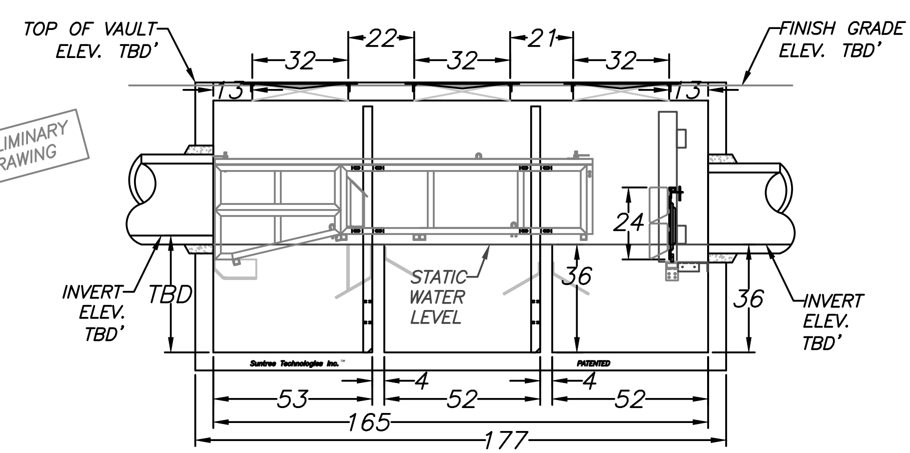
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

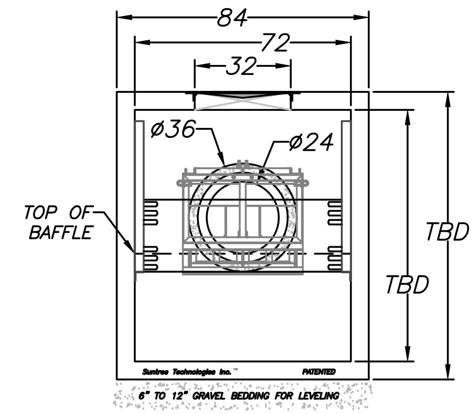


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-6-13.75-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------ --------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-7-14-EL

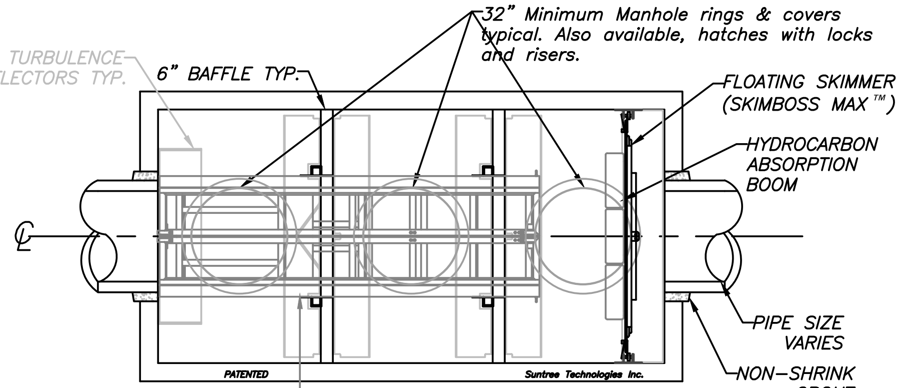
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 30" RCP) ——— 4.90 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 31.86 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 15.93 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 7.96 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe ——— 1.39 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 6.36 sq.ft.
7. Screen system storage volume ——— 56.80 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



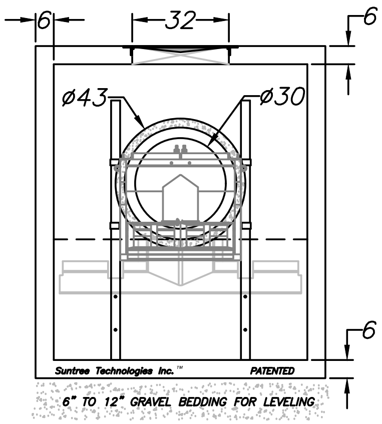
PLAN VIEW

INSTALLATION NOTES:

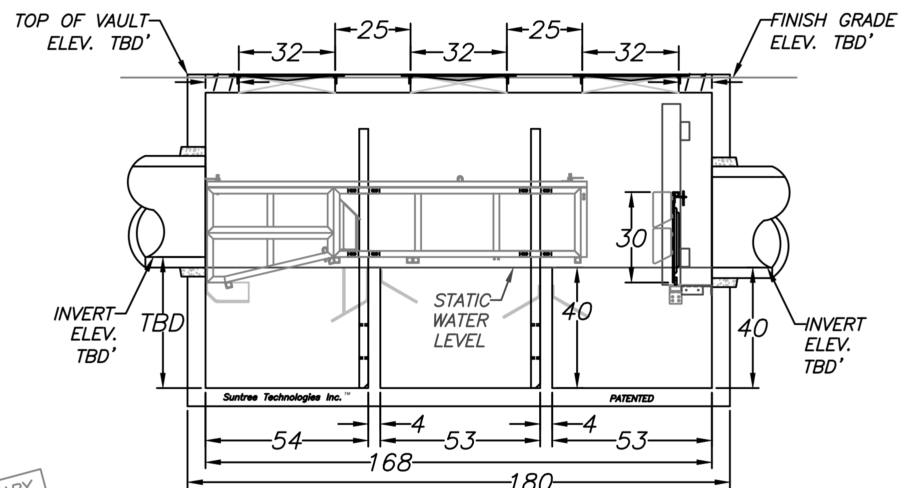
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD <u>NOT</u> BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

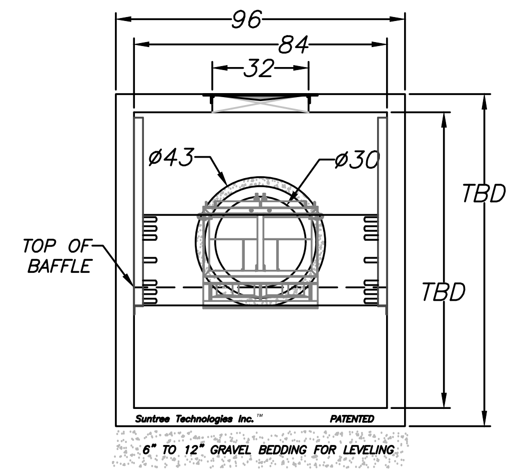


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-7-14-EL			A.B.1	-------- --------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------ --------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-7-15-EL

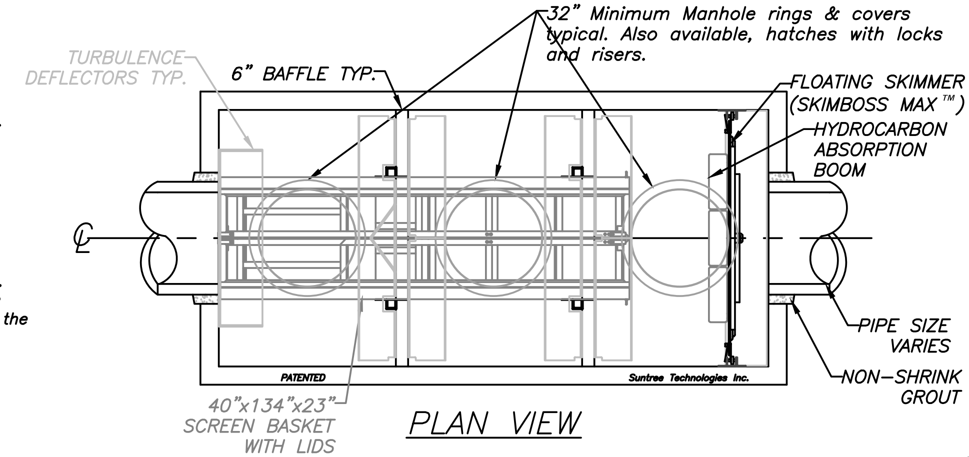
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 30" RCP) — 4.90 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 31.87 sq.ft.
3. Open orifice area in screen system with 50% blockage — 15.93 sq.ft.
4. Open orifice area in screen system with 75% blockage — 7.97 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 1.39 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 6.36 sq.ft.
7. Screen system storage volume — 55.39 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



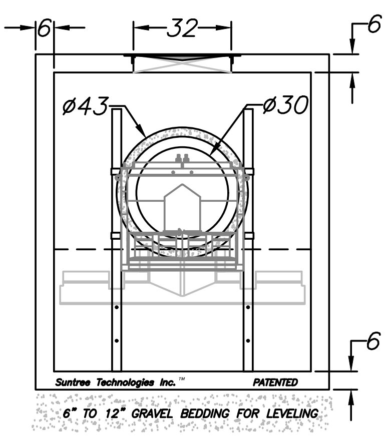
PLAN VIEW

INSTALLATION NOTES:

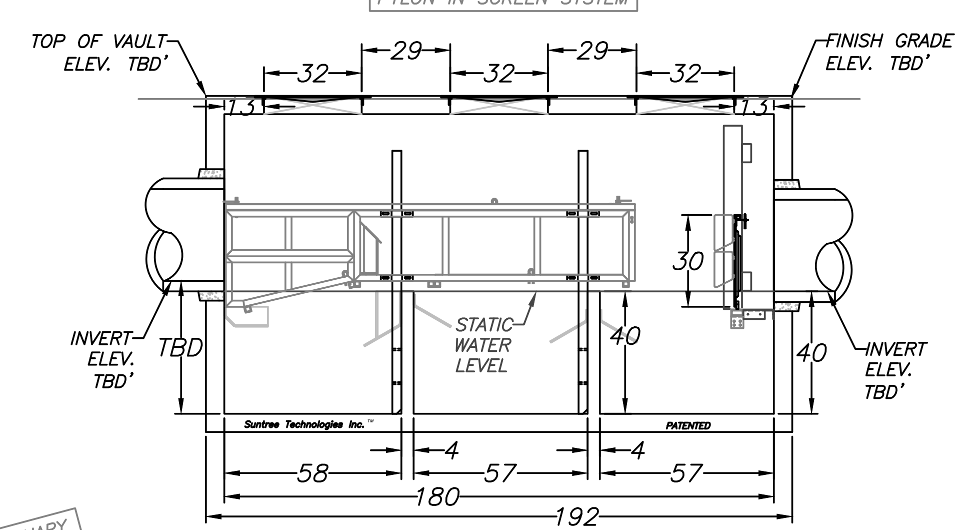
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

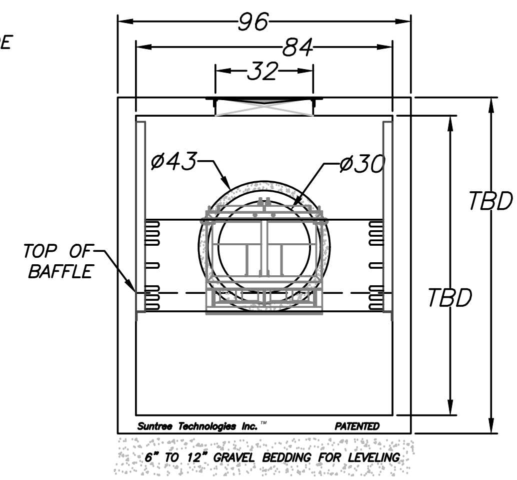
USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-7-15-EL		PROJECT NAME: -------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	--------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-8-12-EL

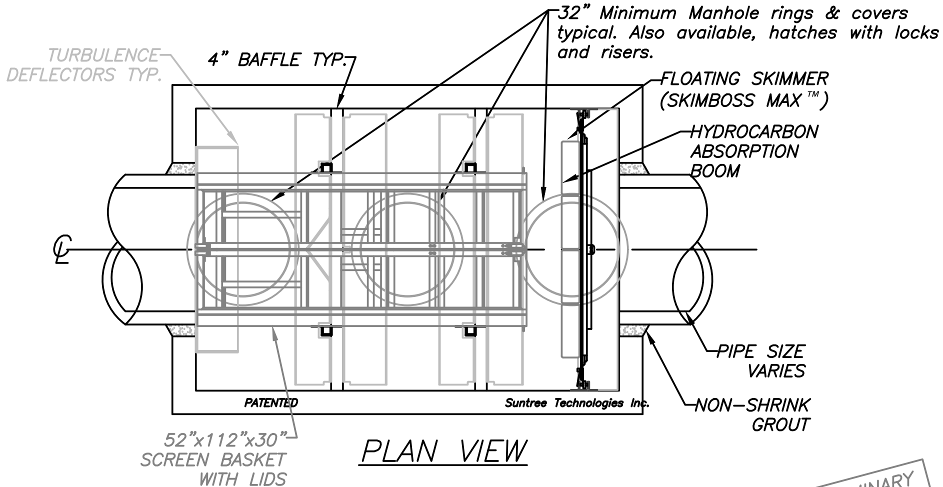
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 42" RCP) — 9.61 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 49.48 sq.ft.
3. Open orifice area in screen system with 50% blockage — 24.74 sq.ft.
4. Open orifice area in screen system with 75% blockage — 12.37 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 2.16 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 17.96 sq.ft.
7. Screen system storage volume — 84.52 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



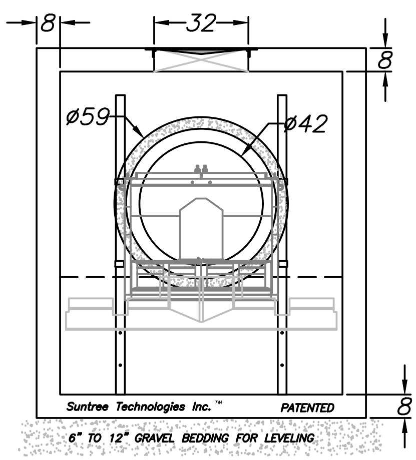
PLAN VIEW

INSTALLATION NOTES:

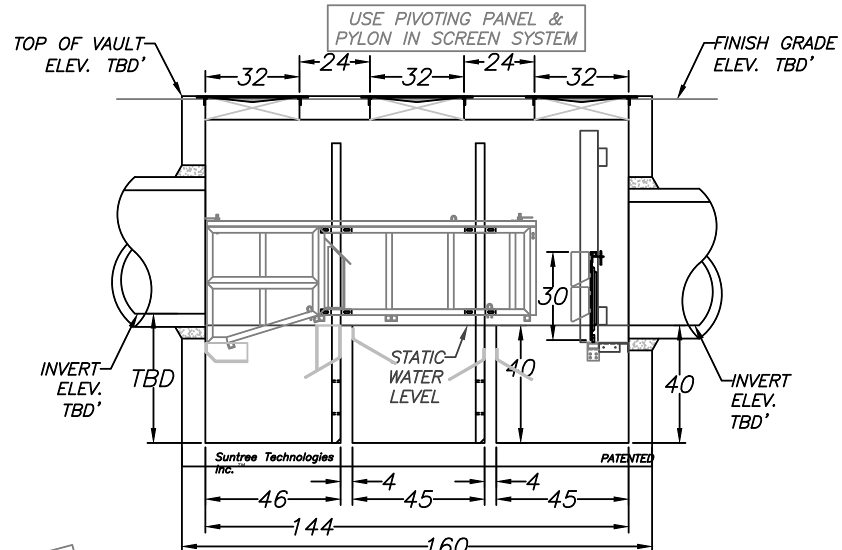
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

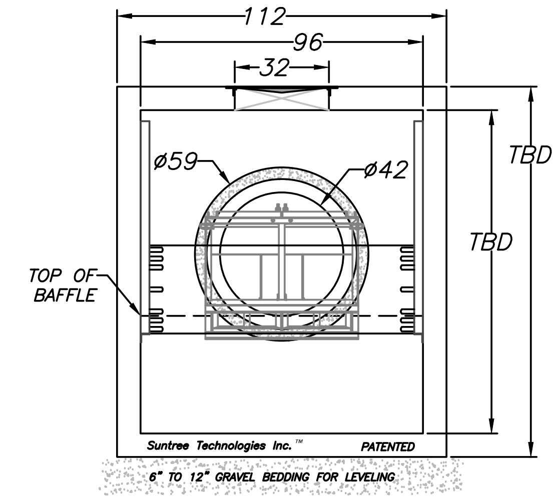
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-8-12-EL		PROJECT NAME: ------ ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-8-14-EL

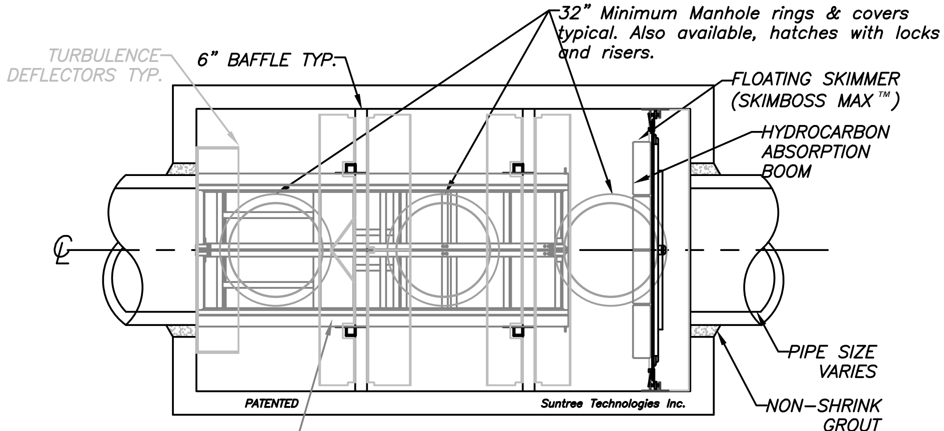
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 42" RCP) ——— 9.61 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 47.91 sq.ft.
3. Open orifice area in screen system ——— 23.96 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 11.98 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 2.16 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 17.66 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ——— 94.88 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

PRELIMINARY DRAWING

INSTALLATION NOTES:

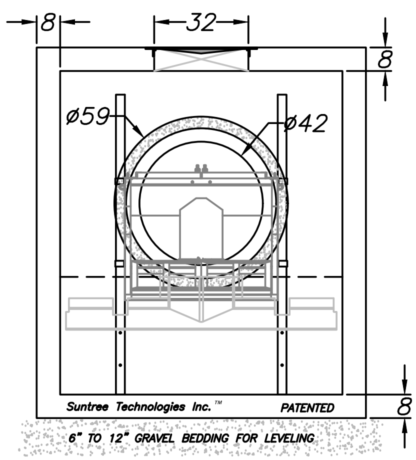
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

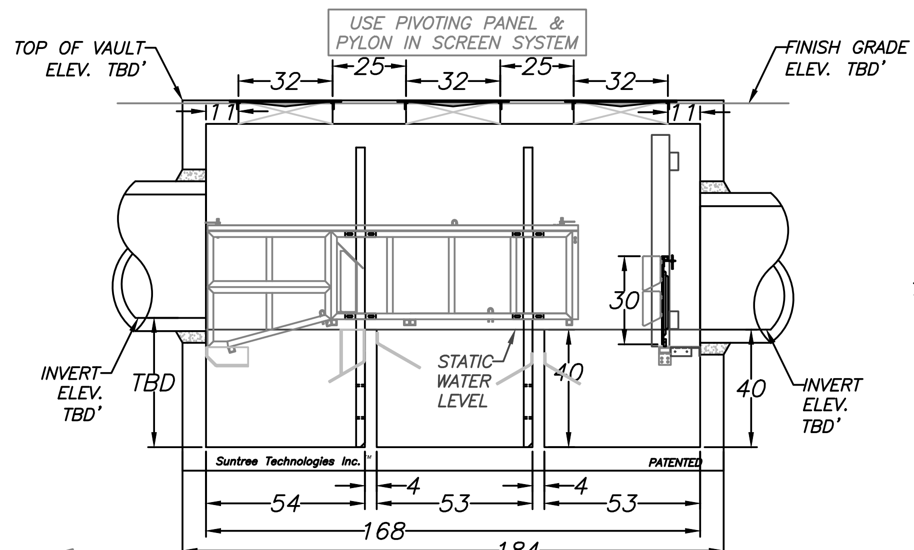
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.

4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

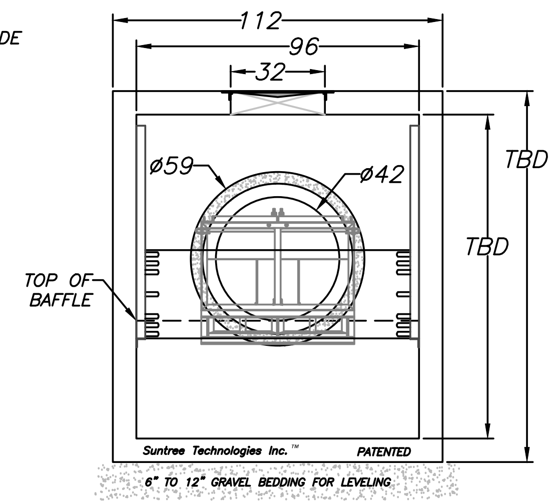
SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-8-14-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-8-16-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 42" RCP) —— 9.61 sq.ft.

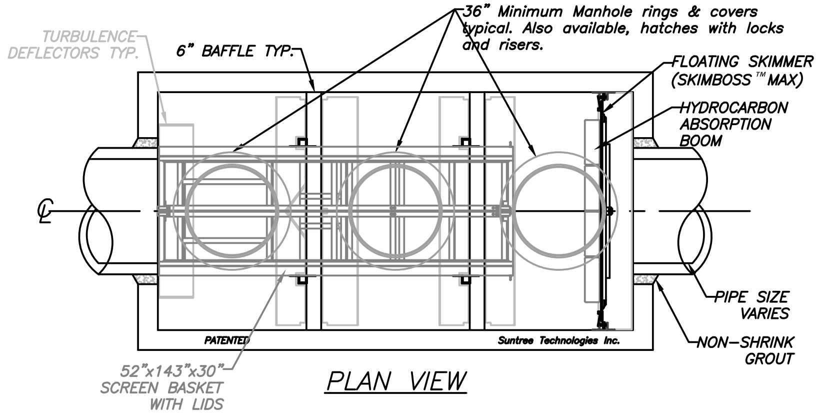
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system —— 55.54 sq.ft.
3. Open orifice area in screen system —— 27.77 sq.ft. with 50% blockage
4. Open orifice area in screen system —— 13.88 sq.ft. with 75% blockage
5. Minimum by-pass through screen system —— 2.51 sq.ft. below the top surface of the pipe
6. Minimum by-pass around screen system —— 17.66 sq.ft. below the top surface of the pipe
7. Screen system storage volume —— 108.32 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



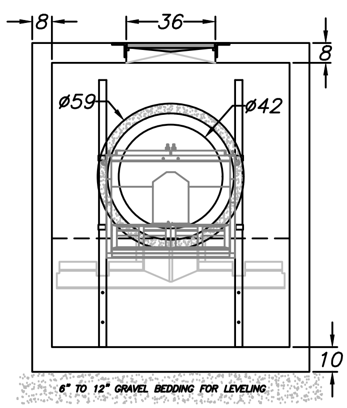
PLAN VIEW

INSTALLATION NOTES:

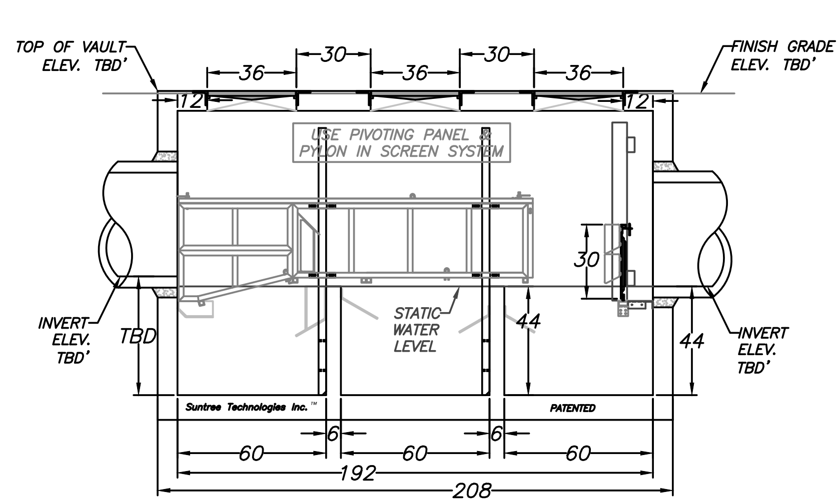
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

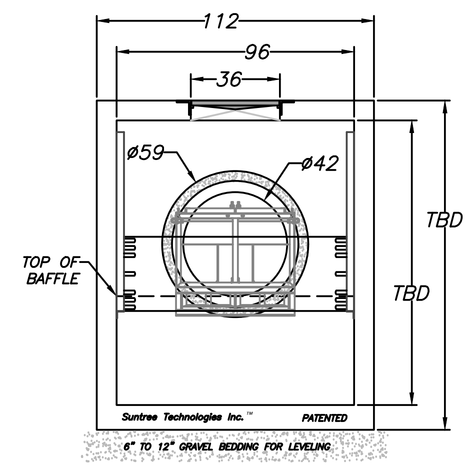
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-8-16-EL		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-9-18-EL

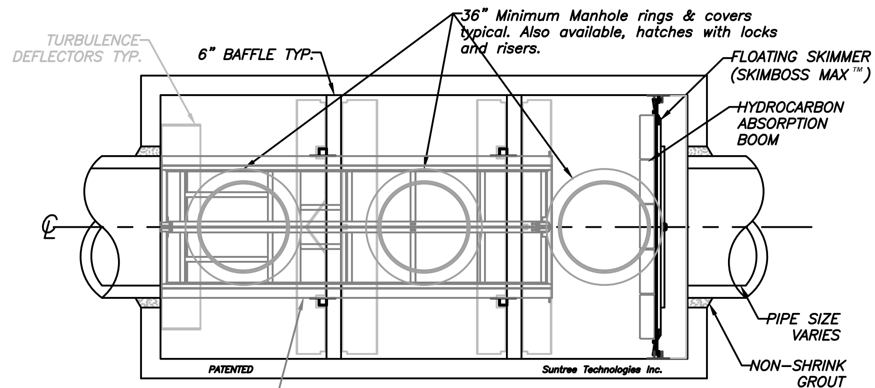
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) — 12.56 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 65.49 sq.ft.
3. Open orifice area in screen system with 50% blockage — 32.74 sq.ft.
4. Open orifice area in screen system with 75% blockage — 16.37 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe — 2.82 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe — 27.11 sq.ft.
7. Screen system storage volume — 135.35 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



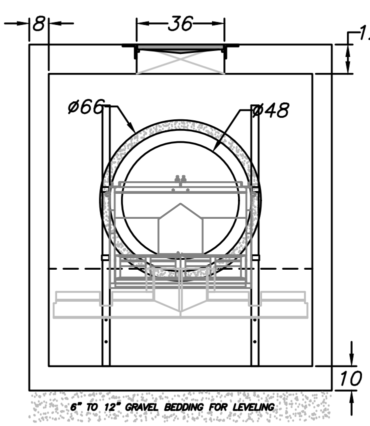
PLAN VIEW

INSTALLATION NOTES:

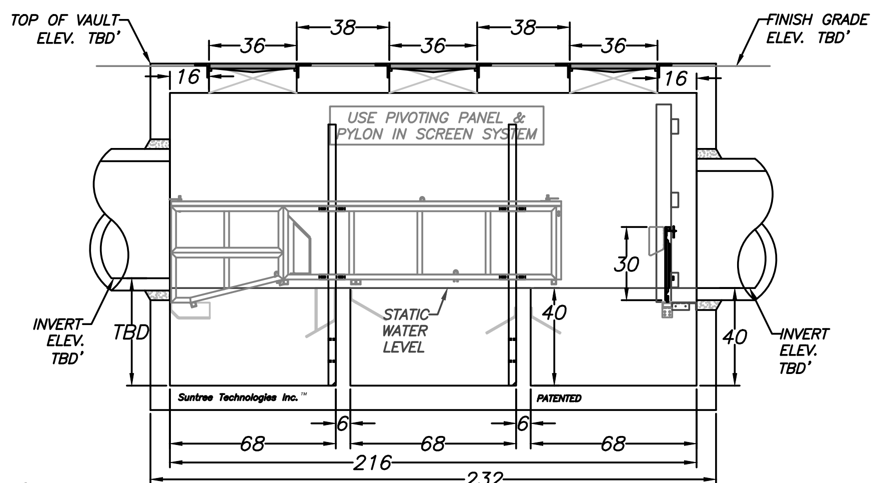
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

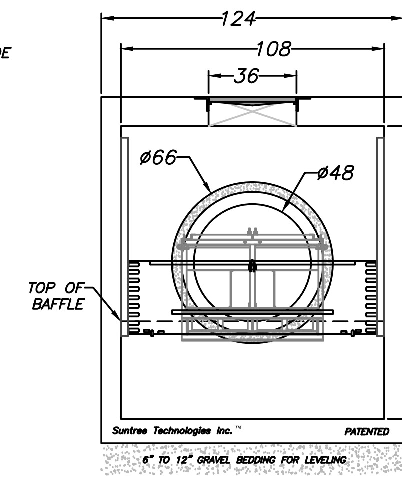
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210.
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-9-18-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-10-14-EL

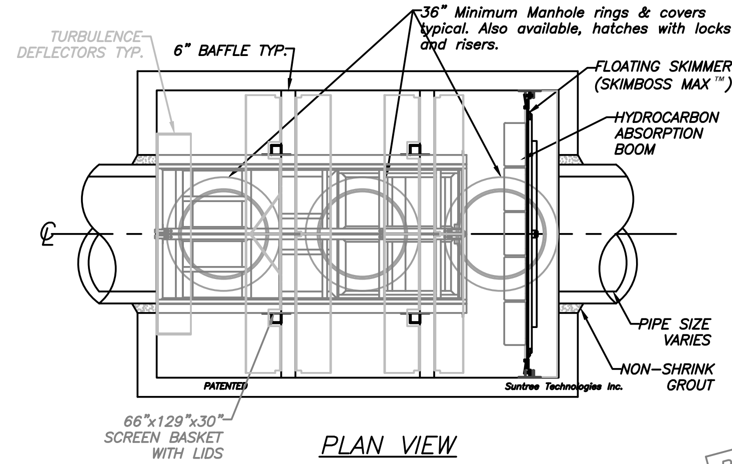
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) ——— 12.56 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 64.74 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 32.37 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 16.18 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe ——— 3.12 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe ——— 27.15 sq.ft.
7. Screen system storage volume ——— 116.15 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



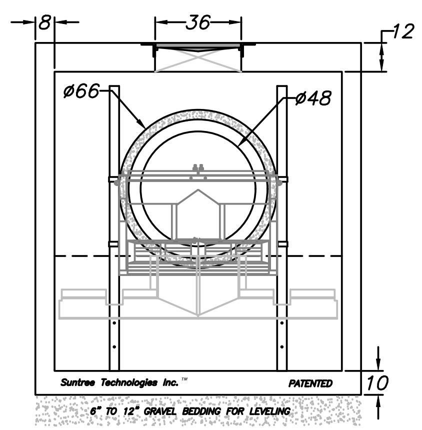
PLAN VIEW

INSTALLATION NOTES:

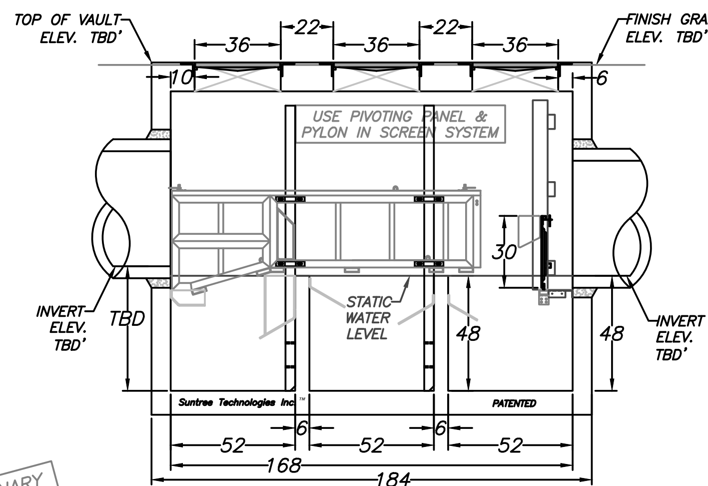
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

PRELIMINARY DRAWING

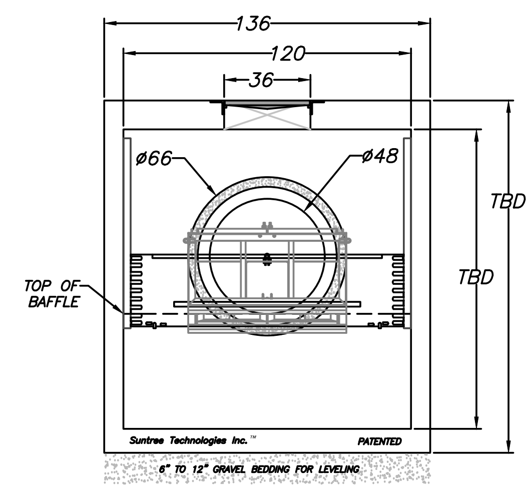


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-10-14-EL		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	---------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-10-17-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) ——— 12.56 sq.ft.

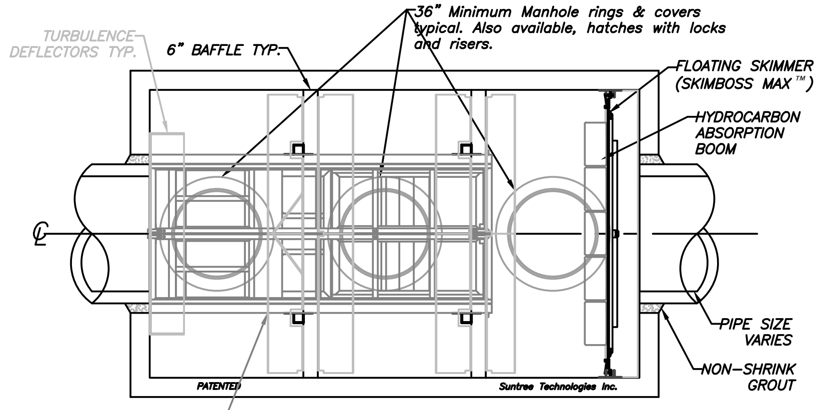
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ——— 71.32 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 35.66 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 17.83 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe ——— 3.12 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe ——— 27.15 sq.ft.
7. Screen system storage volume ——— 127.70 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



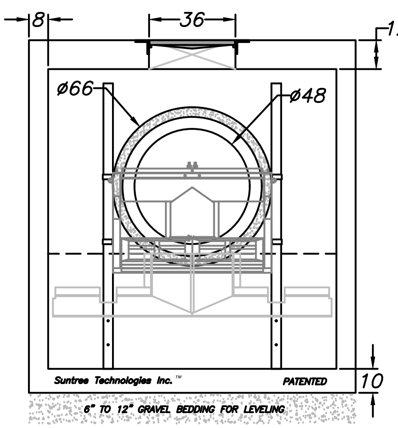
PLAN VIEW

PRELIMINARY DRAWING

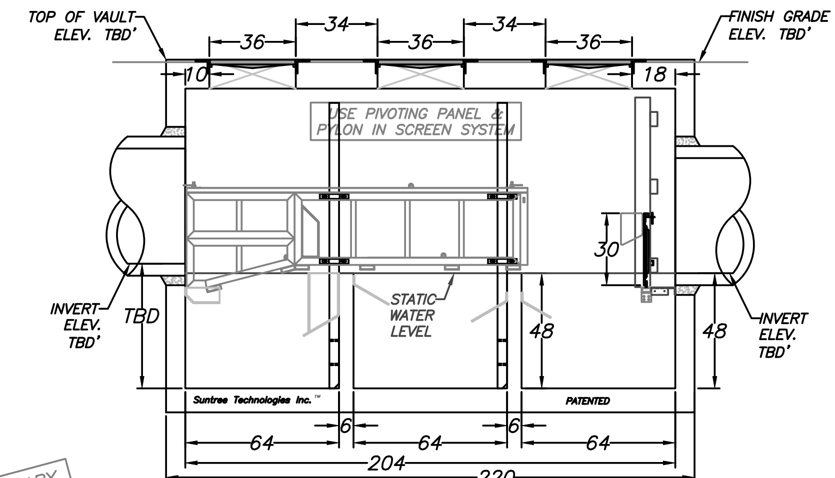
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

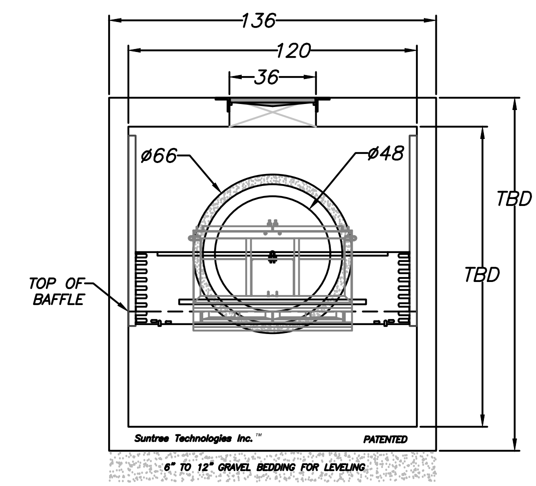


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-10-17-EL		PROJECT NAME: ------ ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-10-20-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) — 12.57 sq.ft.

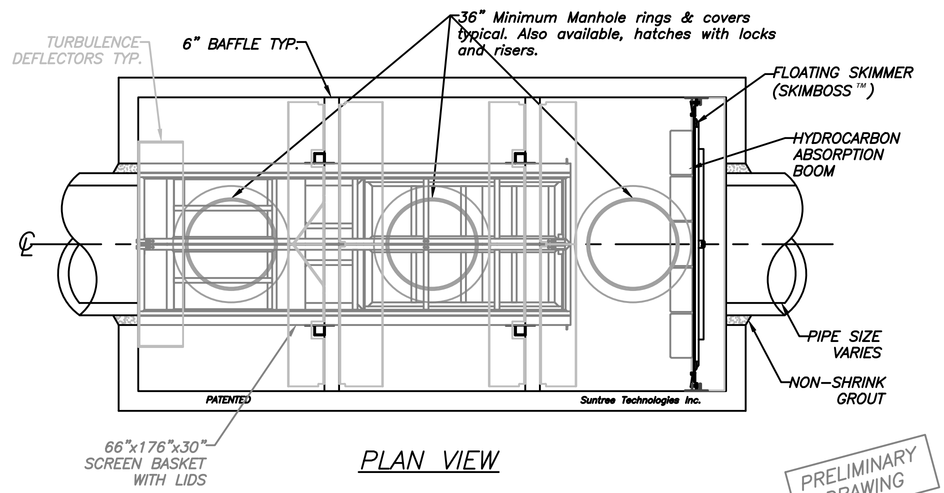
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 91.95 sq.ft.
3. Open orifice area in screen system with 50% blockage — 45.98 sq.ft.
4. Open orifice area in screen system with 75% blockage — 22.99 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 4.63 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 27.15 sq.ft.
7. Screen system storage volume — 179.10 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



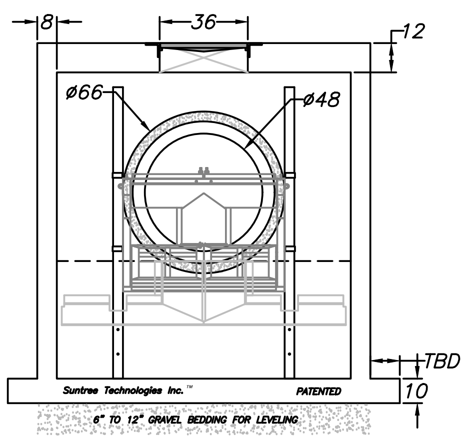
PLAN VIEW

PRELIMINARY DRAWING

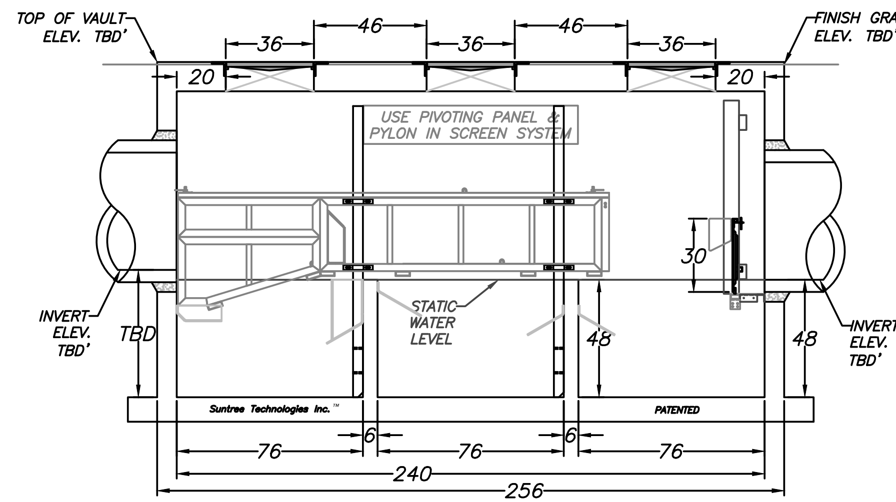
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

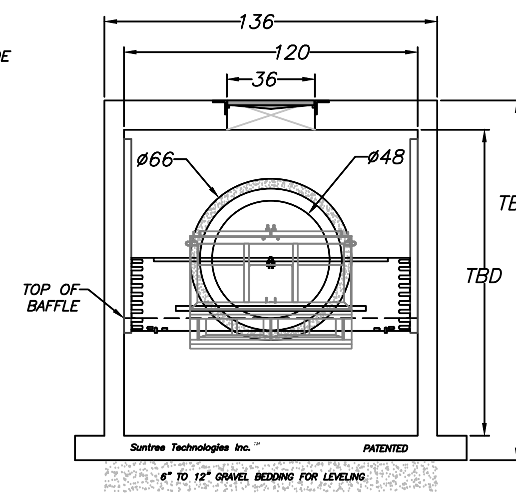


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-10-20-EL		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-11-16-EL

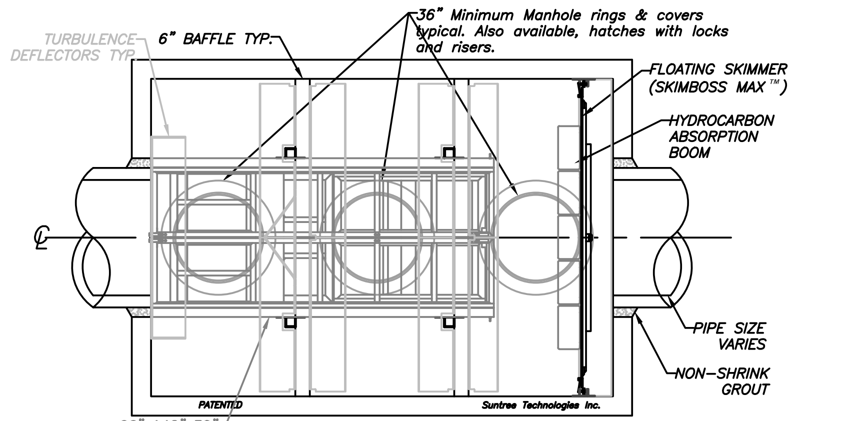
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) ——— 12.56 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 73.36 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 36.68 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 18.34 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe ——— 4.02 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe ——— 31.49 sq.ft.
7. Screen system storage volume ——— 139.00 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



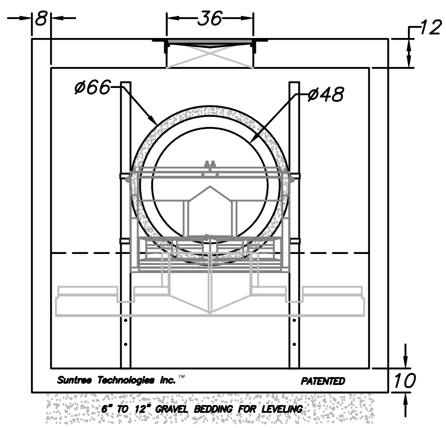
PLAN VIEW

INSTALLATION NOTES:

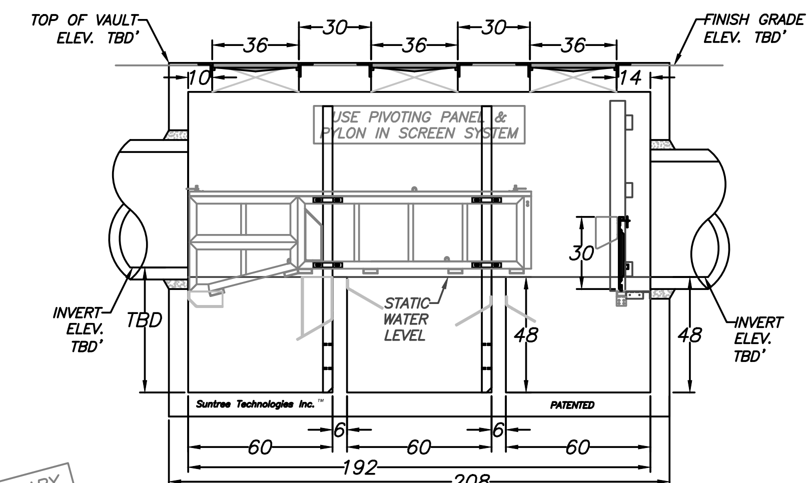
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

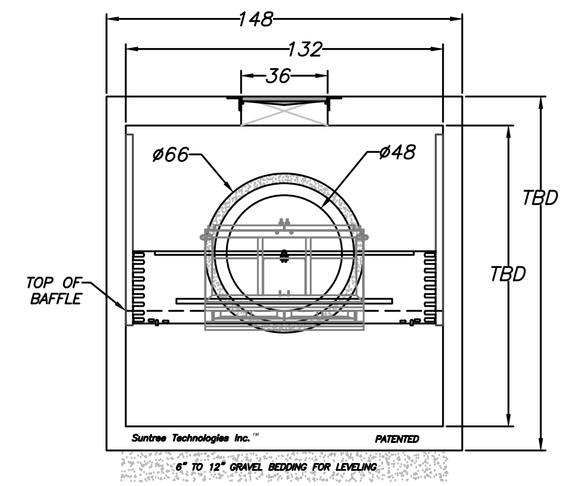
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-11-16-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-11-24-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) —— 12.57 sq.ft.

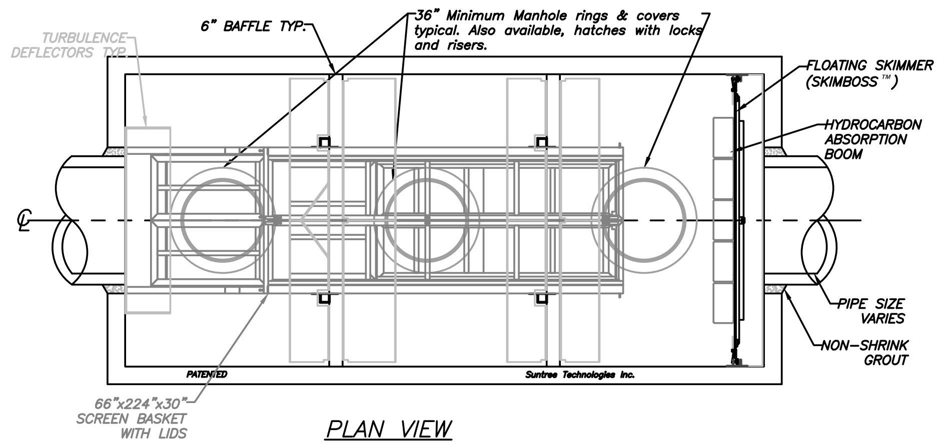
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system —— 117.02 sq.ft.
3. Open orifice area in screen system with 50% blockage —— 58.51 sq.ft.
4. Open orifice area in screen system with 75% blockage —— 29.25 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe —— 4.63 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe —— 31.52 sq.ft.
7. Screen system storage volume —— 225.5 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



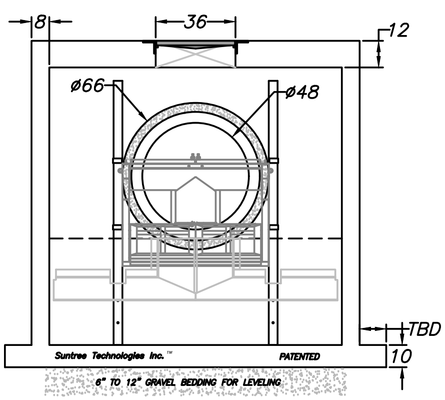
PLAN VIEW

INSTALLATION NOTES:

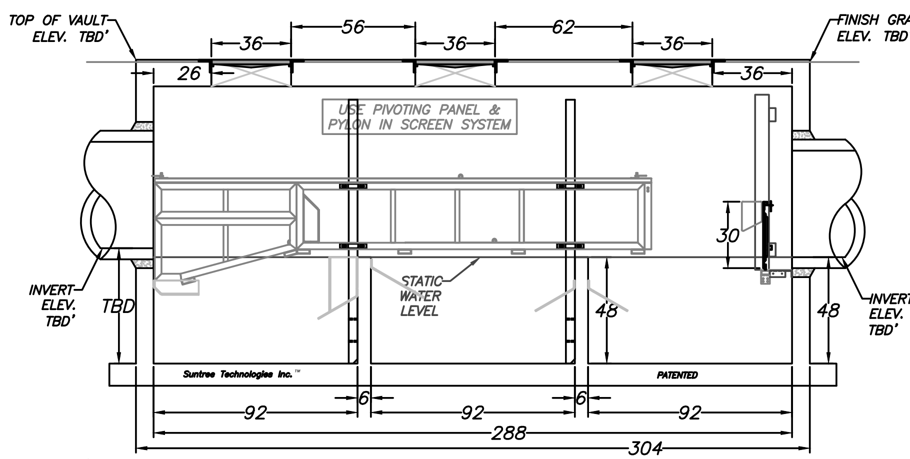
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

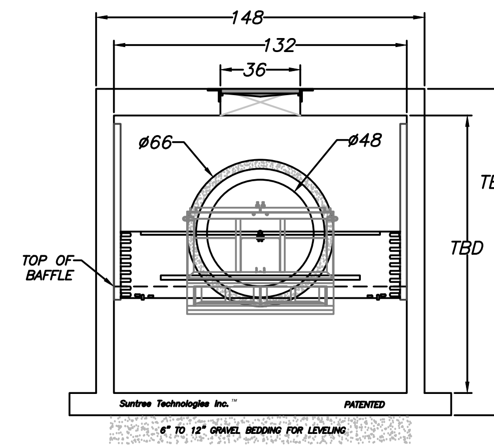
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-11-24-EL		PROJECT NAME: ------- ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-11-26-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) — 12.57 sq.ft.

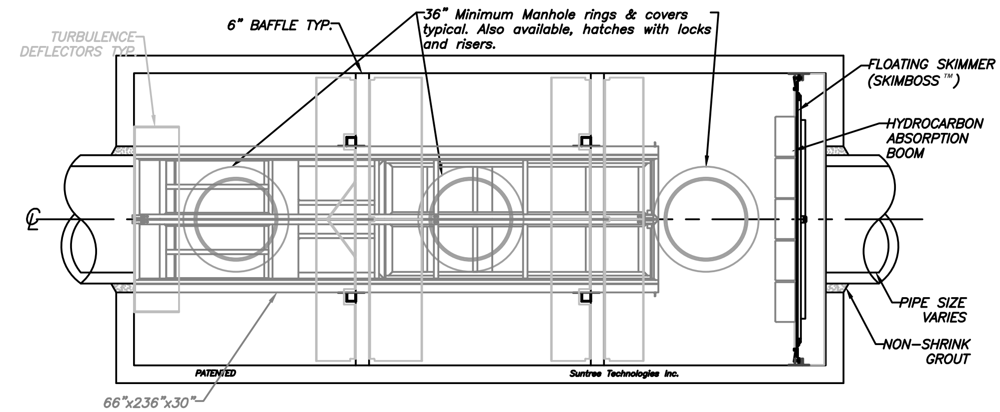
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 123.18 sq.ft.
3. Open orifice area in screen system with 50% blockage — 61.59 sq.ft.
4. Open orifice area in screen system with 75% blockage — 30.79 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 4.63 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 46.50 sq.ft.
7. Screen system storage volume — 236.75 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



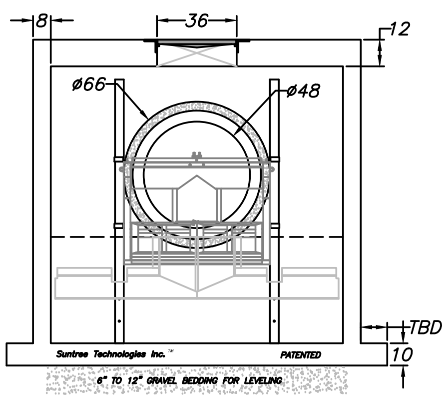
PLAN VIEW

INSTALLATION NOTES:

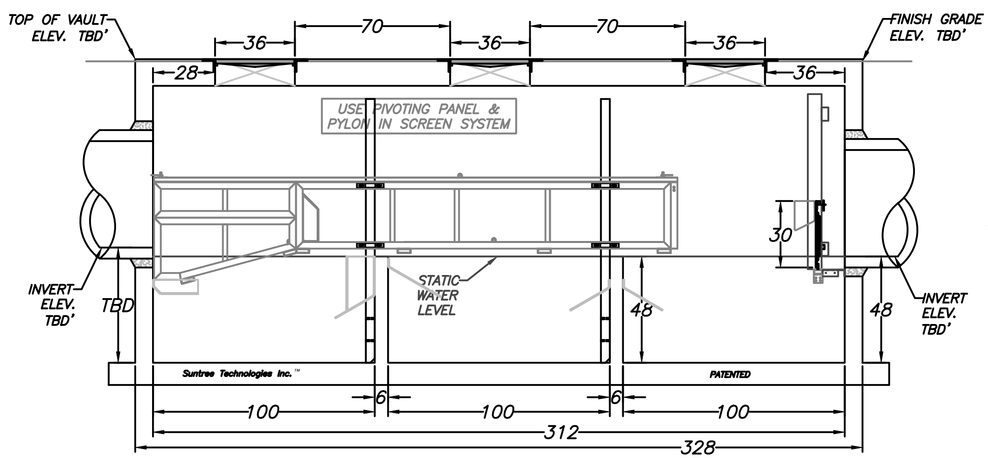
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

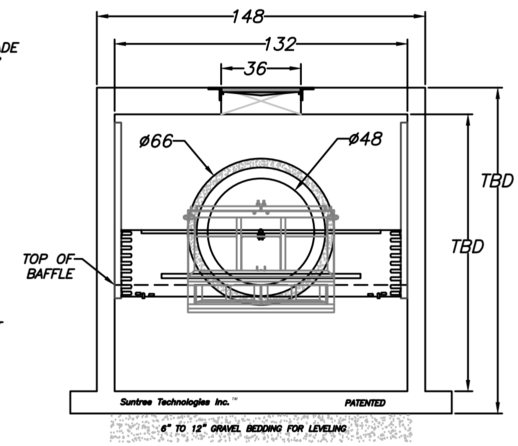
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-11-26-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

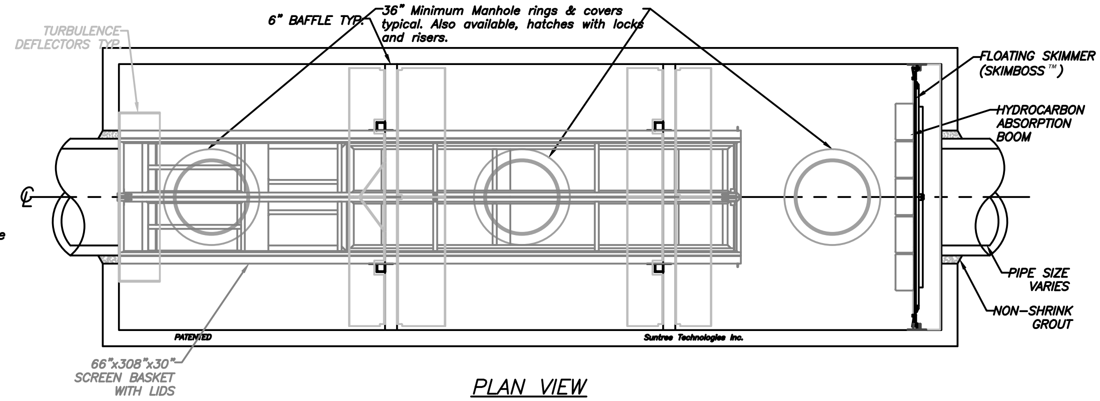
SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-11-34-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) — 12.57 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 160.45 sq.ft.
3. Open orifice area in screen system with 50% blockage — 80.22 sq.ft.
4. Open orifice area in screen system with 75% blockage — 40.11 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 4.63 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 31.52 sq.ft.
7. Screen system storage volume — 304.25 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.
Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



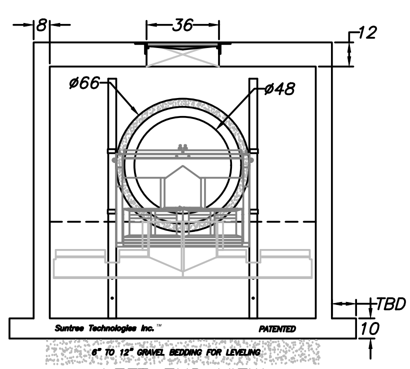
PLAN VIEW

INSTALLATION NOTES:

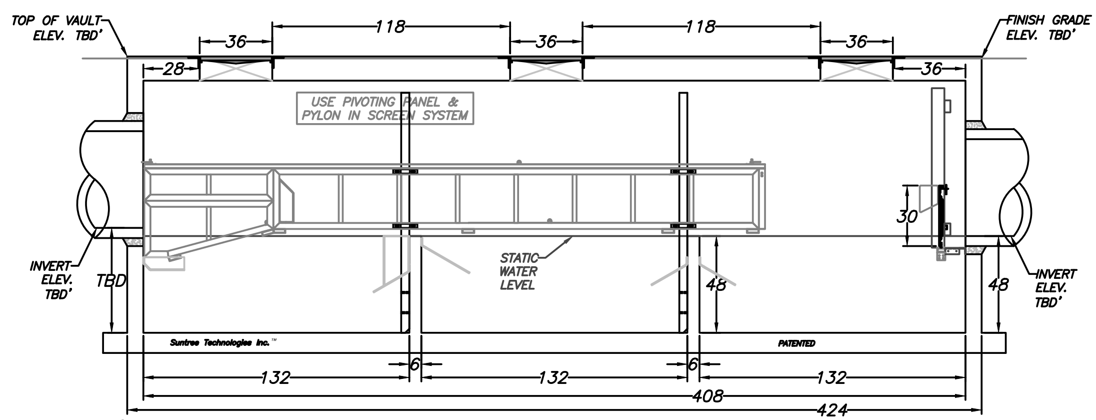
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

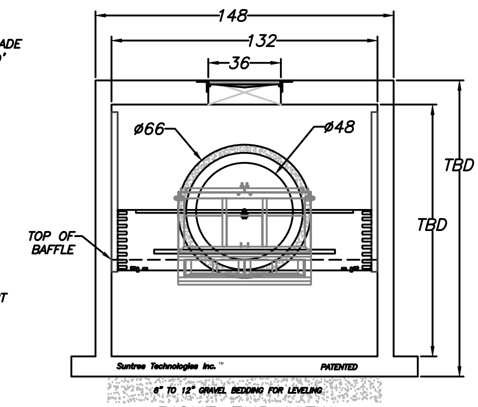
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-11-34-EL		PROJECT NAME: ------- ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-12-21-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

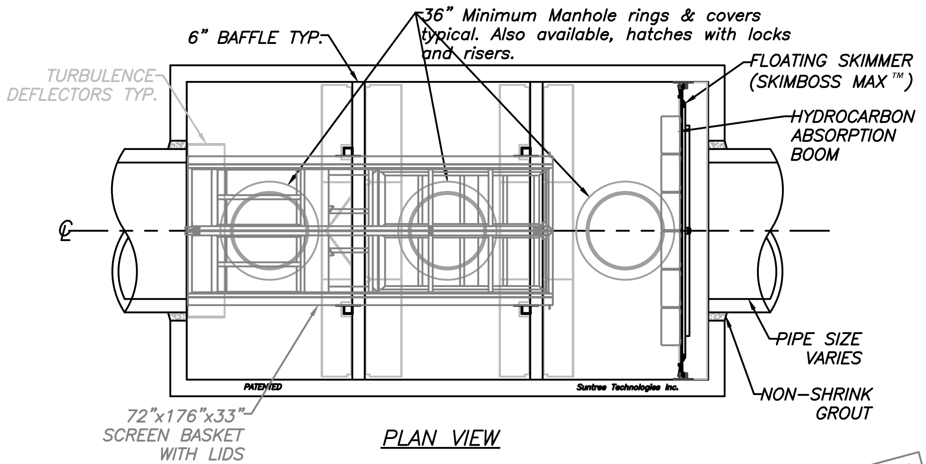
1. Pipe inflow area (Drawn as 66" RCP) —— 23.74 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system —— 103.52 sq.ft.
3. Open orifice area in screen system with 50% blockage —— 51.76 sq.ft.
4. Open orifice area in screen system with 75% blockage —— 25.88 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe —— 5.33 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe —— 49.79 sq.ft.
7. Screen system storage volume —— 216.7 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



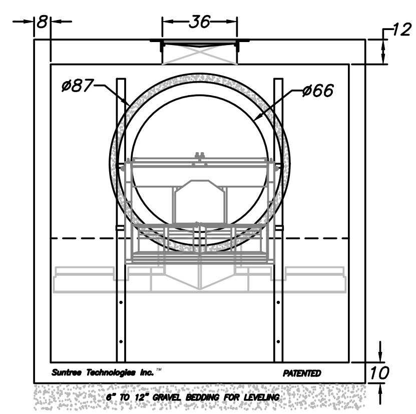
PLAN VIEW

INSTALLATION NOTES:

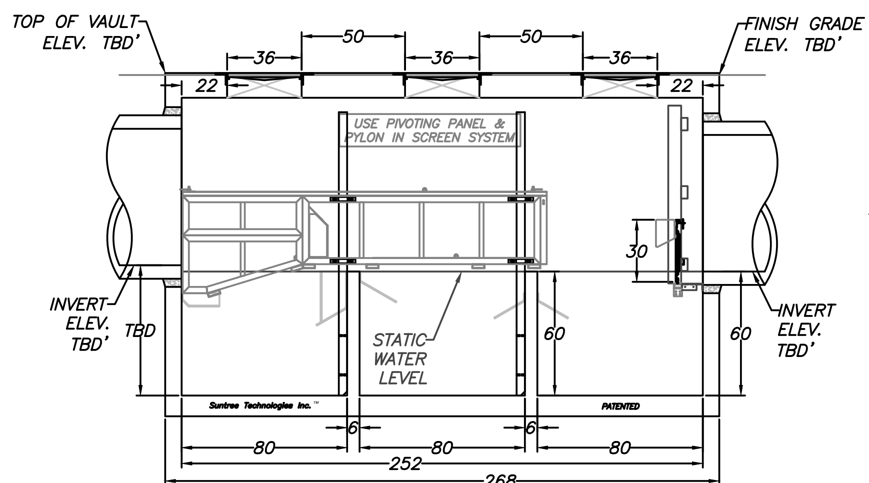
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

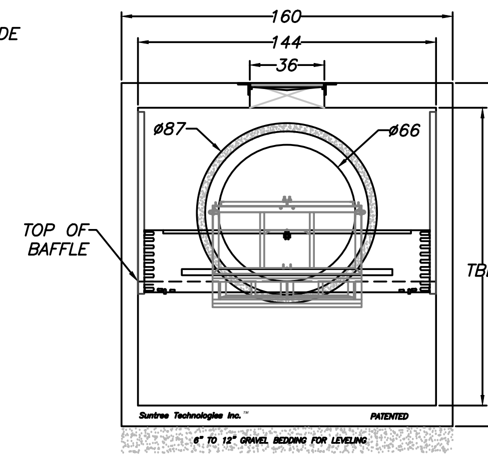
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-12-21-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-HVT-12-24-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM SPECIFICATIONS

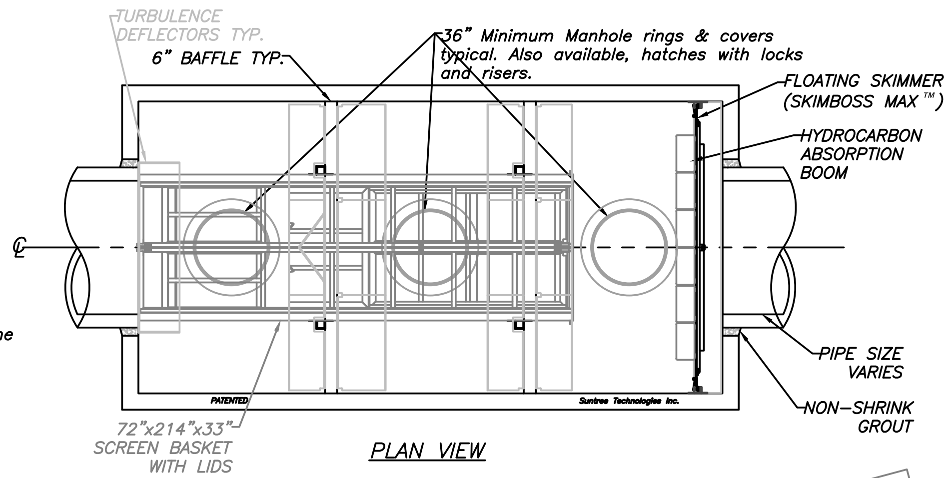
1. Pipe inflow area (Drawn as 66" RCP) — 23.74 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 125.77 sq.ft.
3. Open orifice area in screen system with 50% blockage — 62.88 sq.ft.
4. Open orifice area in screen system with 75% blockage — 31.44 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 5.13 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 53.62 sq.ft.
7. Screen system storage volume — 261.92 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



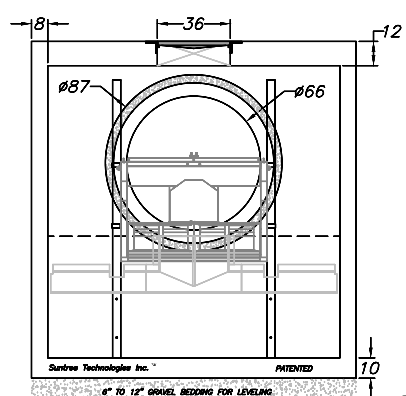
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

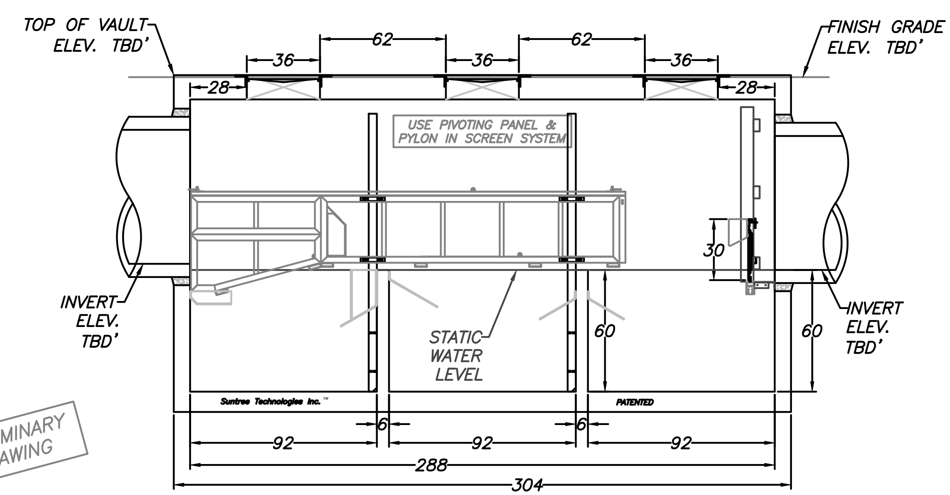
SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

PRELIMINARY DRAWING

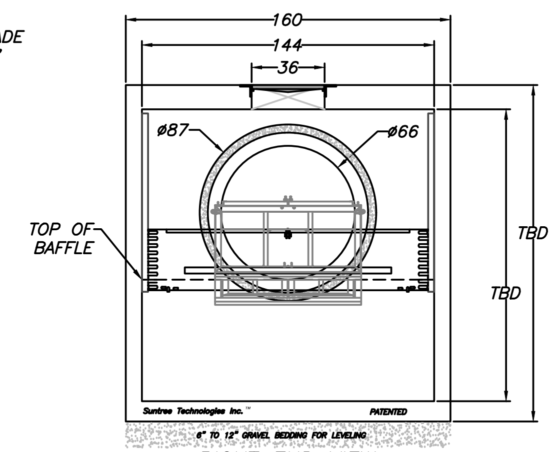


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-HVT-12-24-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

Appendix A

Nutrient Separating Baffle Box®
TC Models

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-2-4

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

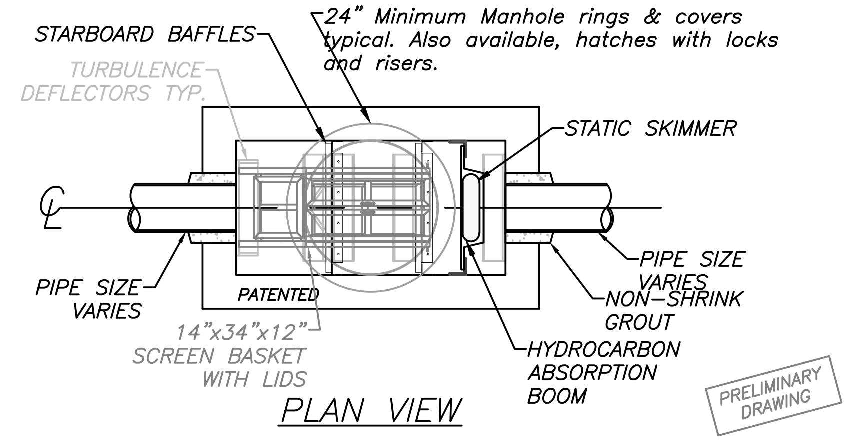
1. Inflow Pipe Area (8" PVC AS DRAWN) ——— 0.35 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 2.63 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 1.31 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 0.66 sq.ft.
5. By-pass through screen system below the ceiling of the pipe ——— 0.80 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 0.76 sq.ft.
7. Screen system storage volume ——— 2.51 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

INSTALLATION NOTES:

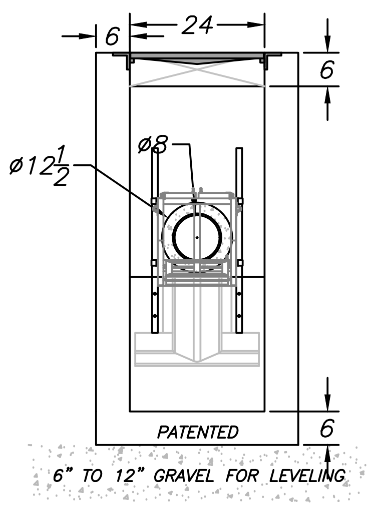
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES..

3. THE BOTTOM OF THE SKIMMER SHOULD BE ~3" BELOW THE INVERT OF THE OUTFLOW PIPE.

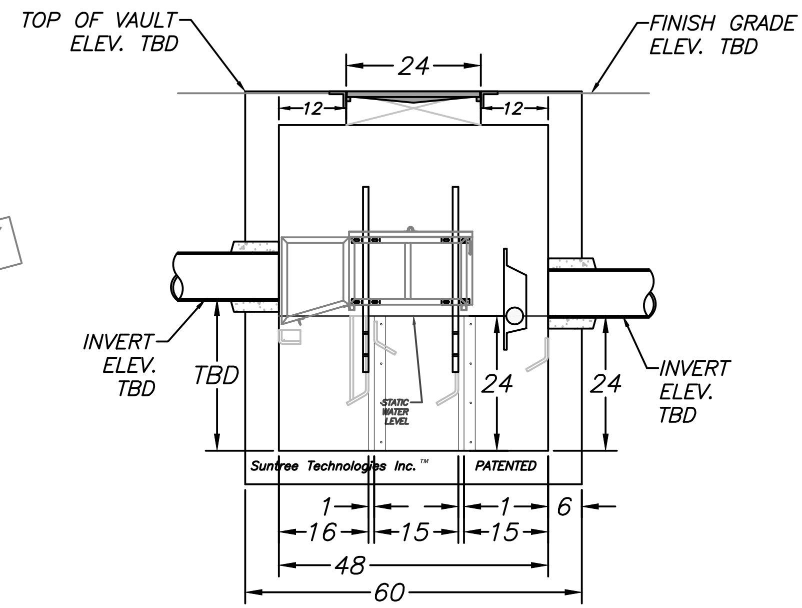
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

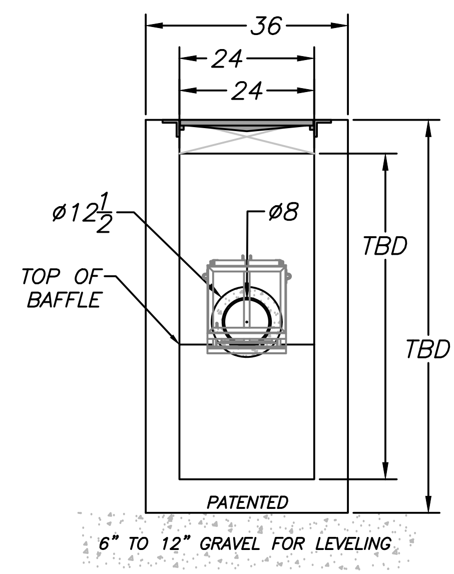


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 2 WATER TIGHT CHAMBERS. BAFFLES CAN BE CONCRETE AND/OR STARBOARD.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-2-4		PROJECT NAME: ------ --------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-3-6

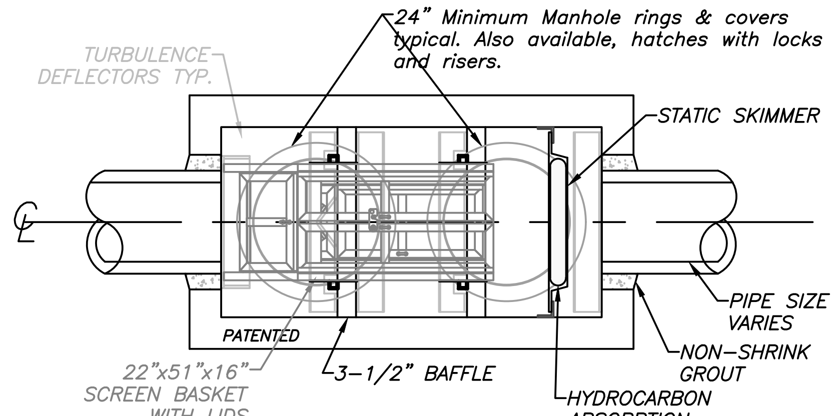
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (15" RCP AS DRAWN) ——— 1.23 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 4.92 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 2.46 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 1.23 sq.ft.
5. By-pass through screen system below the ceiling of the pipe ——— 3.44 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 1.76 sq.ft.
7. Screen system storage volume ——— 7.87 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

PRELIMINARY DRAWING

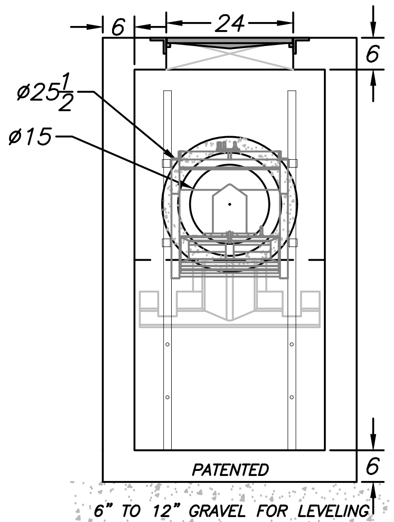
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

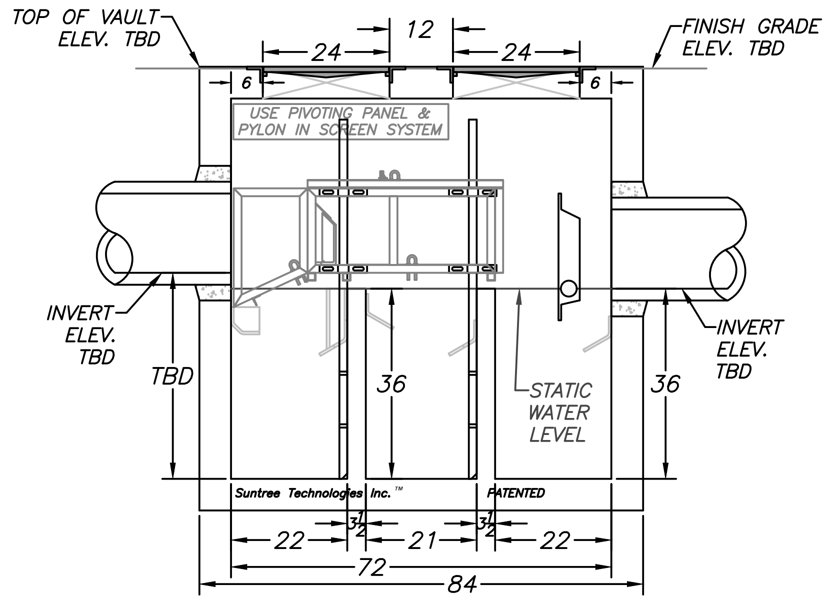
3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.

4. INVERT OF THE INFLOW PIPE SHOULD <u>NOT</u> BE BELOW THE INVERT OF THE OUTFLOW PIPE.

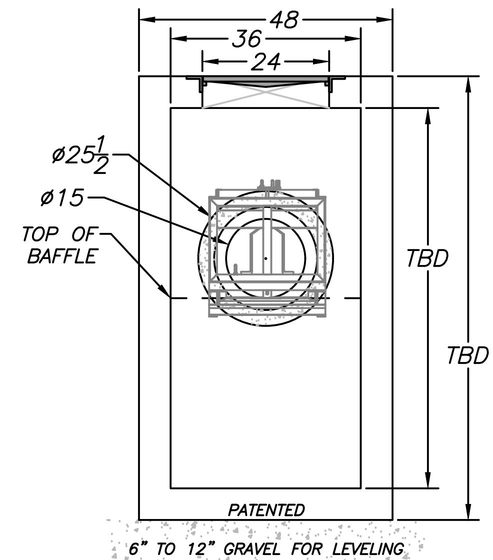


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-3-6		PROJECT NAME: ------ --------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-4-8

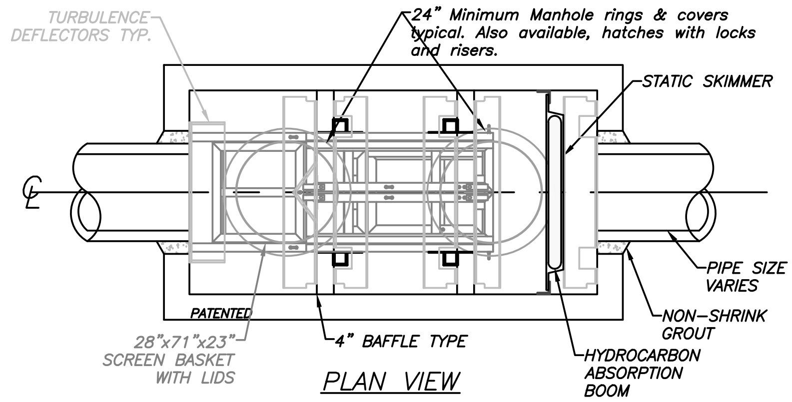
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (18" RCP AS DRAWN) — 1.77 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 11.29 sq.ft.
3. Open orifice area in screen system with 50% blockage — 5.65 sq.ft.
4. Open orifice area in screen system with 75% blockage — 2.82 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 1.10 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 2.91 sq.ft.
7. Screen system storage volume — 22.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

INSTALLATION NOTES:

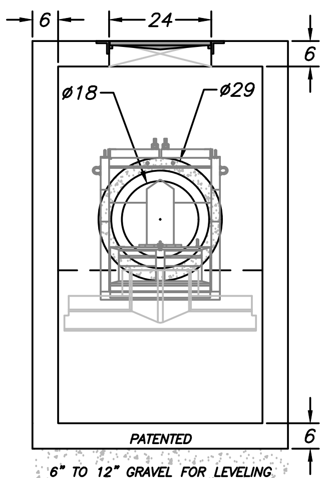
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.

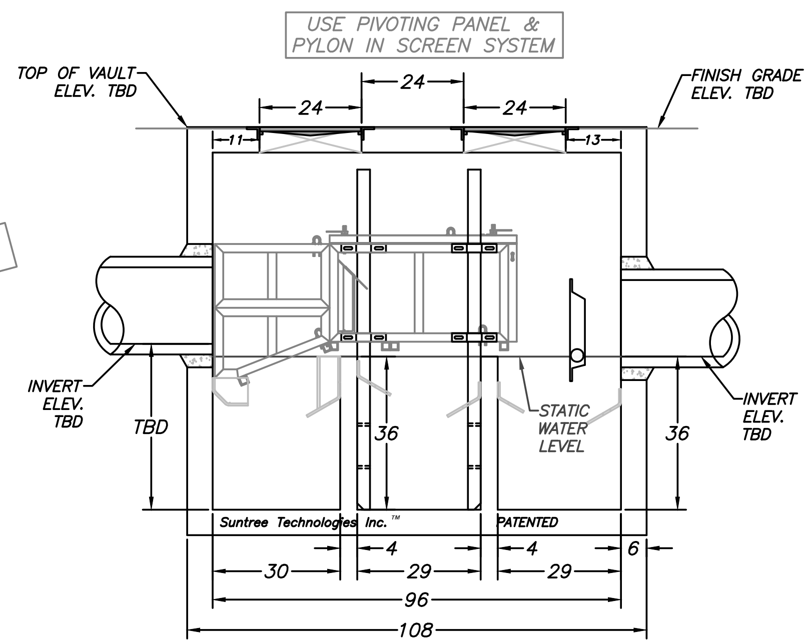
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

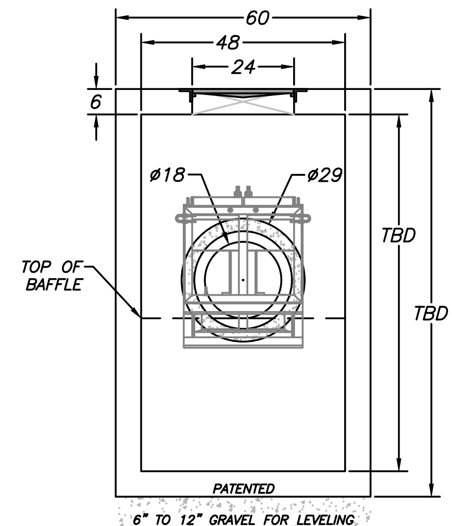


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC:	
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-4-8		PROJECT NAME:	
START DATE: 00/00/00	SCALE: N/A		
DRAFTER: A.B.1.	UNITS: INCHES		
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04	

CAD	REVISIONS	DATE
A.B.1	------- -------	00/00/00

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-5-10

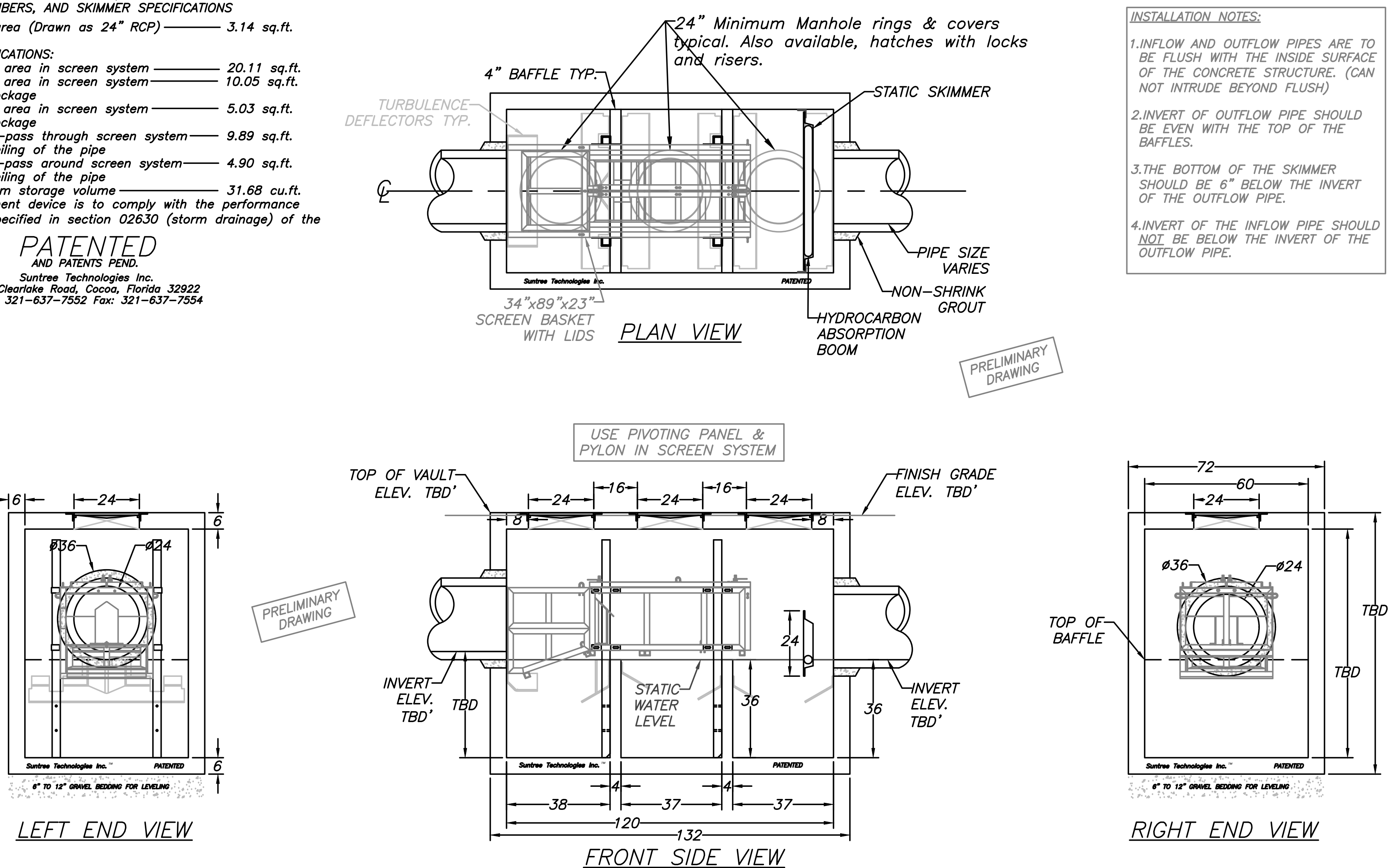
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 24" RCP) — 3.14 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 20.11 sq.ft.
3. Open orifice area in screen system with 50% blockage — 10.05 sq.ft.
4. Open orifice area in screen system with 75% blockage — 5.03 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 9.89 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 4.90 sq.ft.
7. Screen system storage volume — 31.68 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

NOTES:
1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-5-10		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-6-12

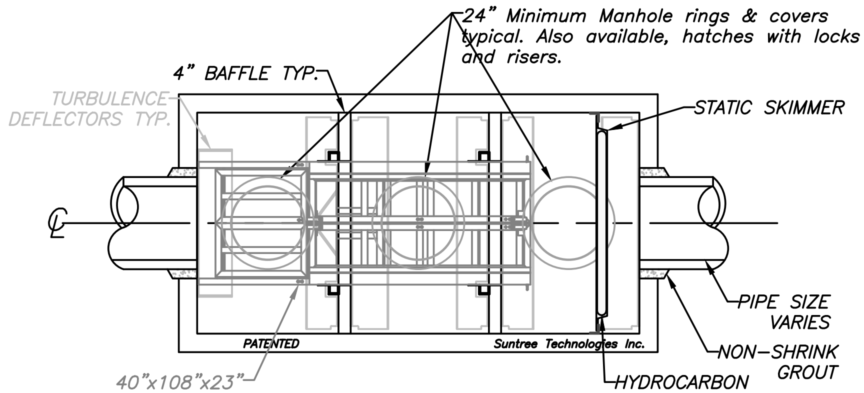
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 24" RCP) ——— 3.14 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 24.51 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 12.25 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 6.13 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe ——— 4.13 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 5.20 sq.ft.
7. Screen system storage volume ——— 49.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



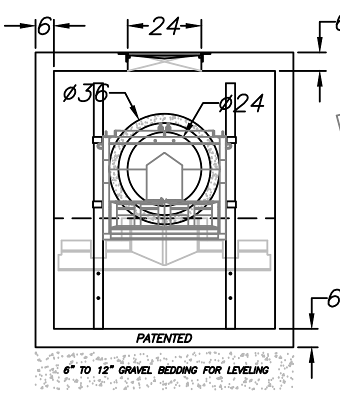
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD <u>NOT</u> BE BELOW THE INVERT OF THE OUTFLOW PIPE.

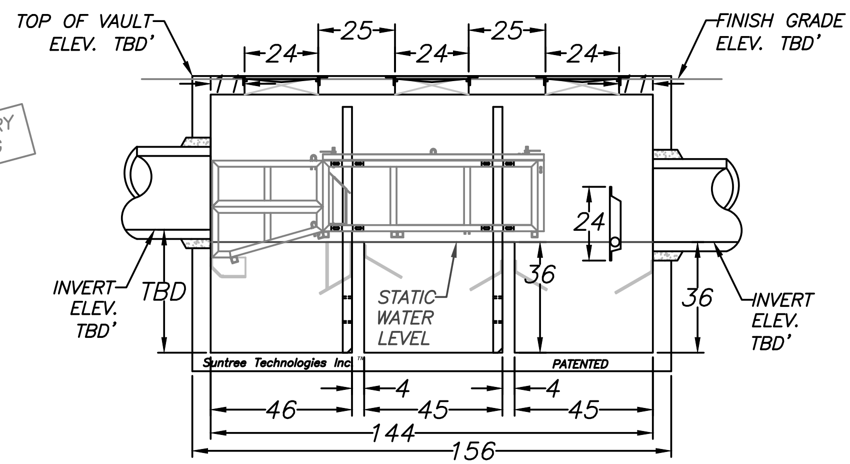
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

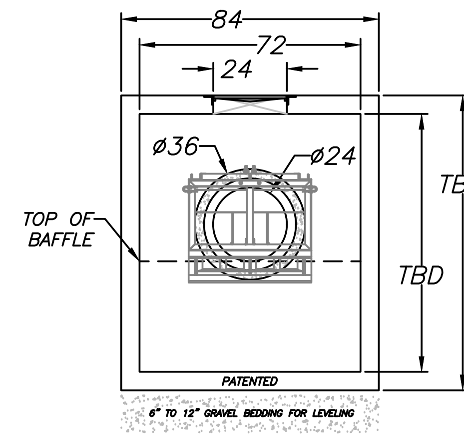


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBES.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-6-12			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------- ---------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-8-12

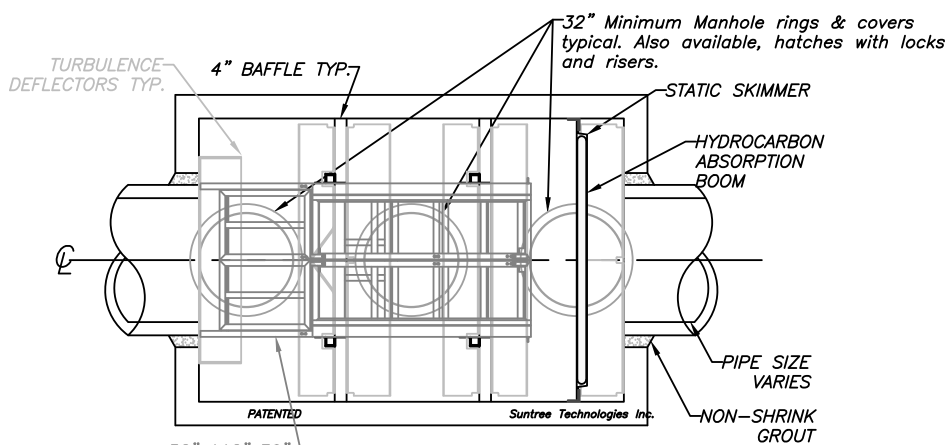
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 42" RCP) — 9.61 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 43.02 sq.ft.
3. Open orifice area in screen system with 50% blockage — 21.51 sq.ft.
4. Open orifice area in screen system with 75% blockage — 10.76 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 15.35 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 17.96 sq.ft.
7. Screen system storage volume — 84.52 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



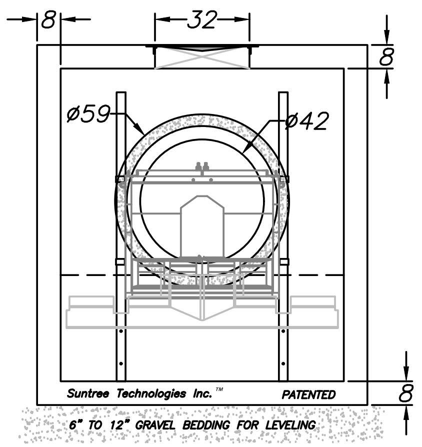
PLAN VIEW

INSTALLATION NOTES:

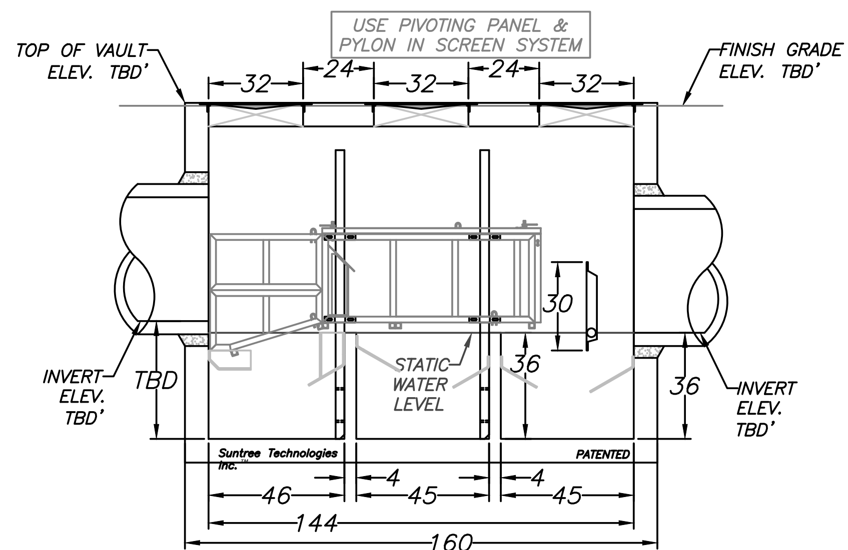
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

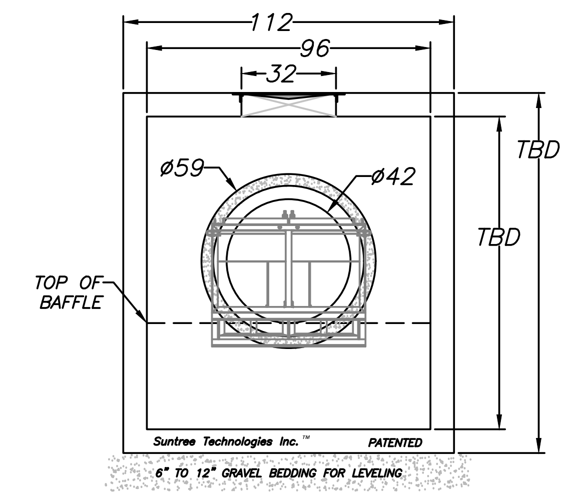
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC:	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-8-12		PROJECT NAME:	A.B.1	-------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-8-14

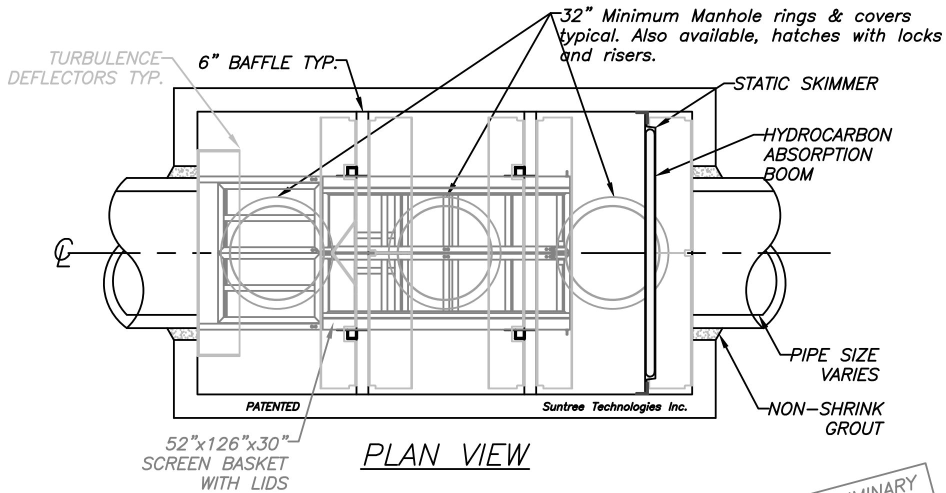
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 42" RCP) ———— 9.61 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ———— 40.77 sq.ft.
3. Open orifice area in screen system ———— 20.38 sq.ft. with 50% blockage
4. Open orifice area in screen system ———— 10.19 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 17.40 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 17.66 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ———— 94.88 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

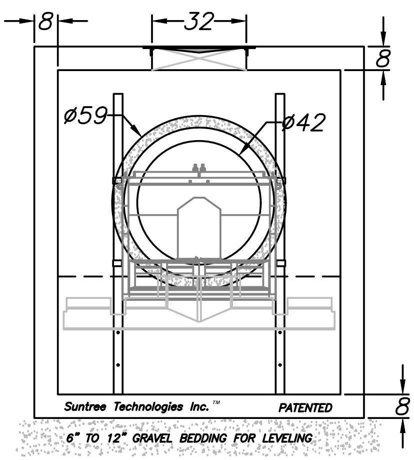
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.

4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

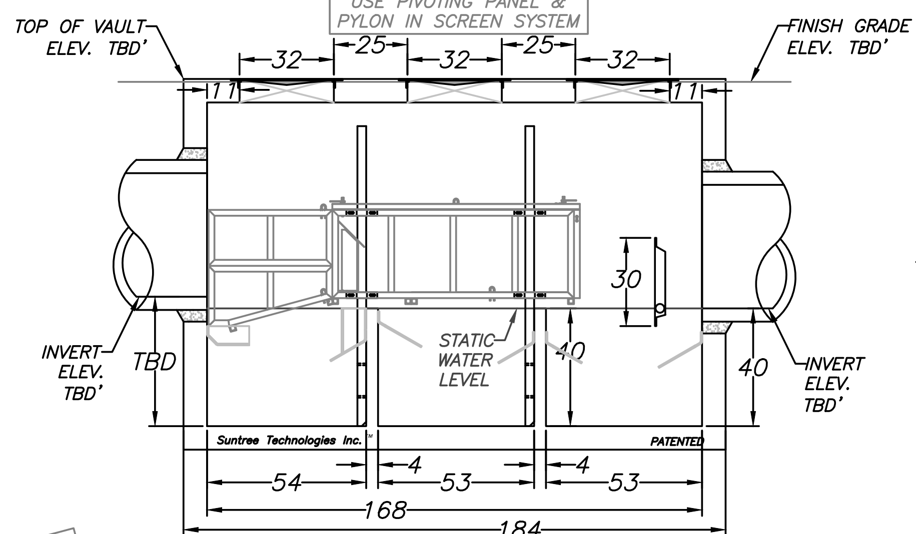
SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

PRELIMINARY DRAWING

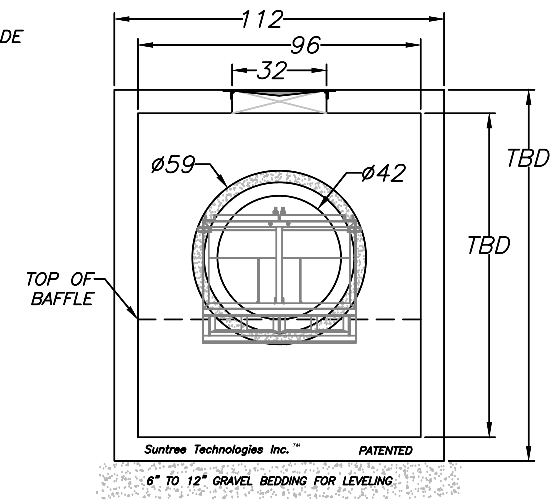


LEFT END VIEW

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-8-14		PROJECT NAME: ------ ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-10-14

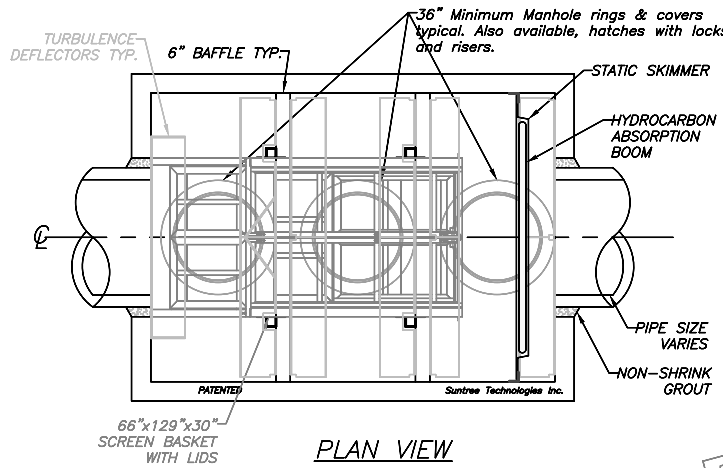
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) ———— 12.56 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ———— 56.05 sq.ft.
3. Open orifice area in screen system with 50% blockage ———— 28.03 sq.ft.
4. Open orifice area in screen system with 75% blockage ———— 14.01 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe ———— 26.17 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe ———— 27.15 sq.ft.
7. Screen system storage volume ———— 116.15 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



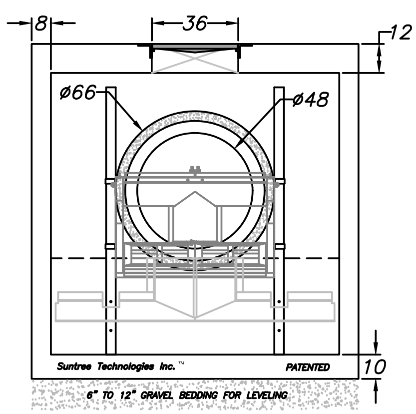
PLAN VIEW

INSTALLATION NOTES:

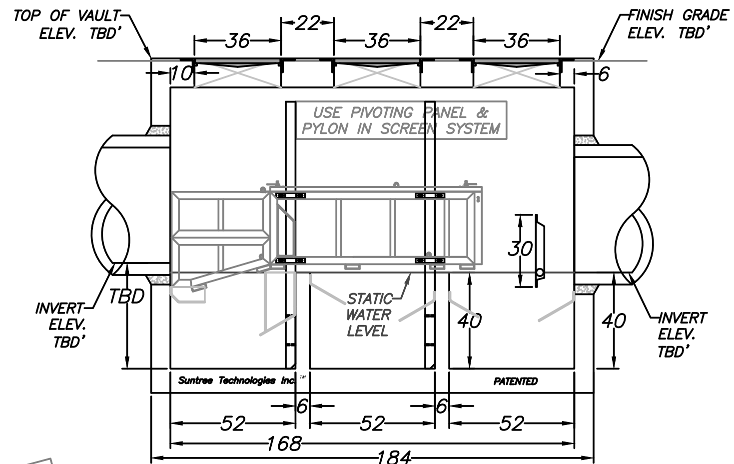
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

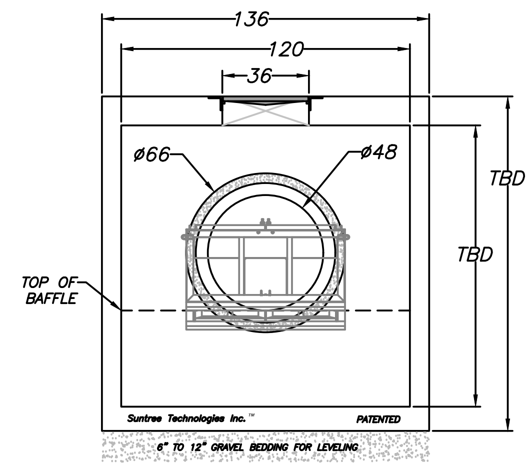
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ----------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-10-14		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	----------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-10-16

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

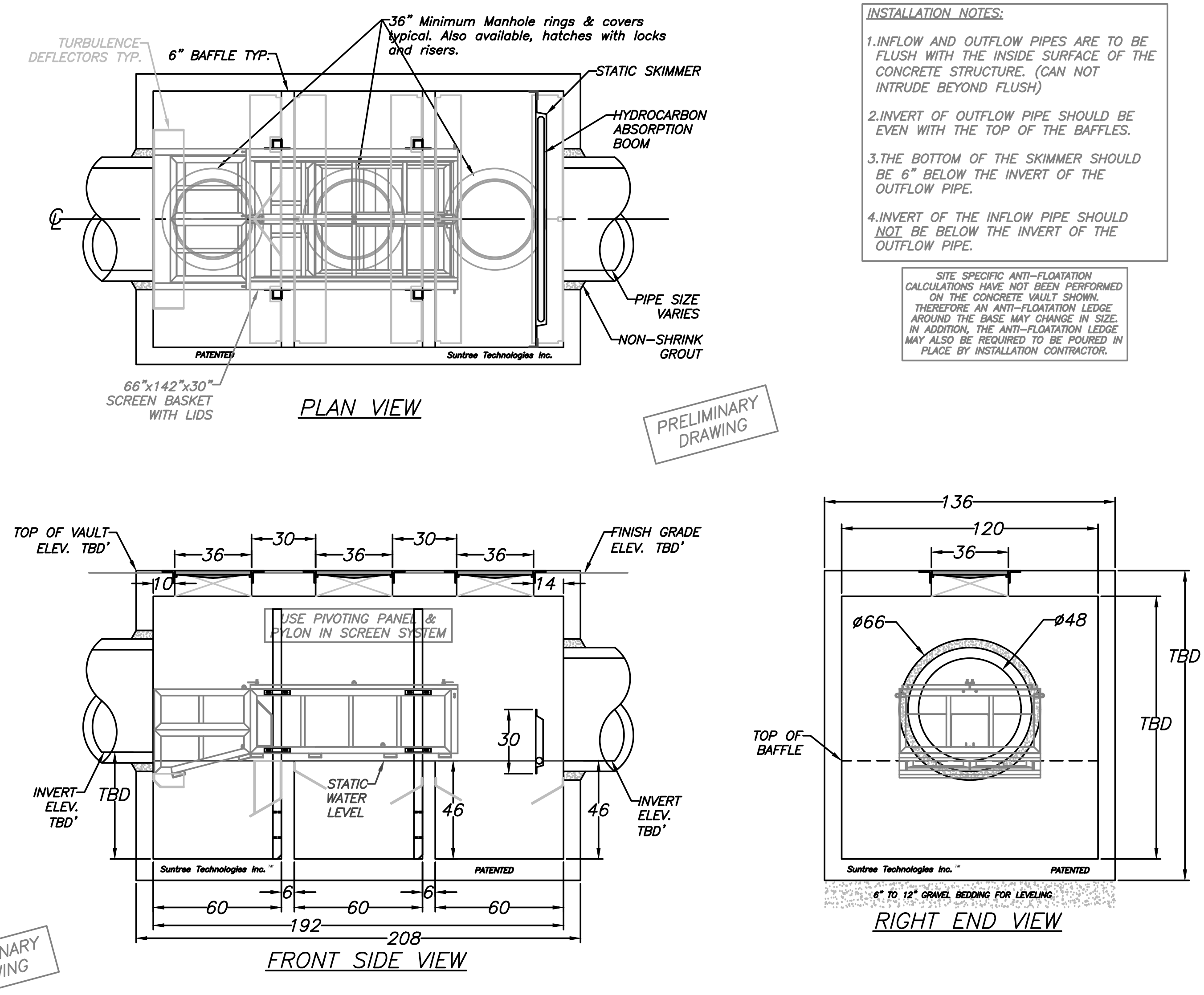
1. Pipe inflow area (Drawn as 48" RCP) — 12.56 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 61.76 sq.ft.
3. Open orifice area in screen system with 50% blockage — 30.88 sq.ft.
4. Open orifice area in screen system with 75% blockage — 15.44 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe — 24.11 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe — 27.15 sq.ft.
7. Screen system storage volume — 127.70 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-10-16			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-10-20

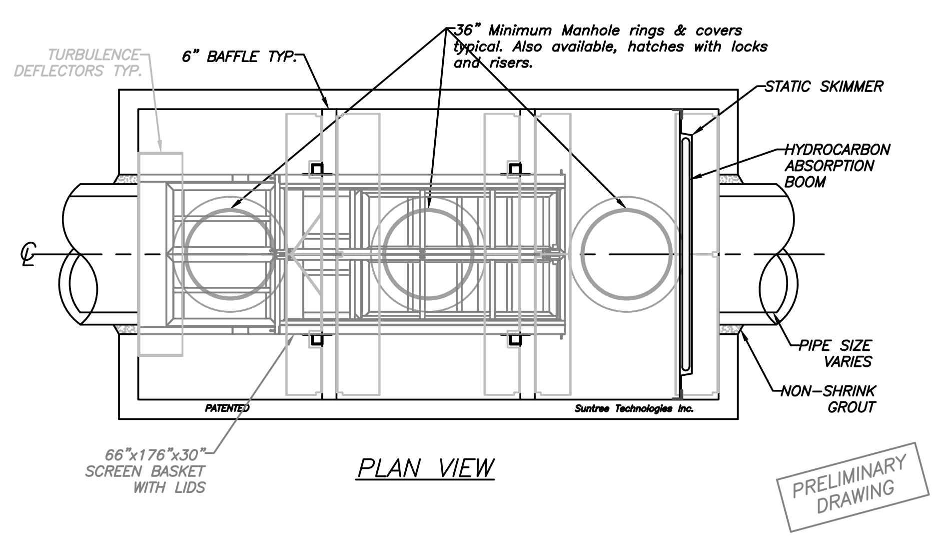
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) —— 12.57 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system —— 79.63 sq.ft.
3. Open orifice area in screen system with 50% blockage —— 39.82 sq.ft.
4. Open orifice area in screen system with 75% blockage —— 19.91 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe —— 26.97 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe —— 27.15 sq.ft.
7. Screen system storage volume —— 179.10 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

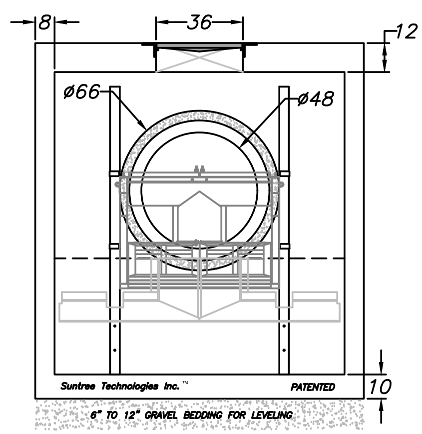


PLAN VIEW

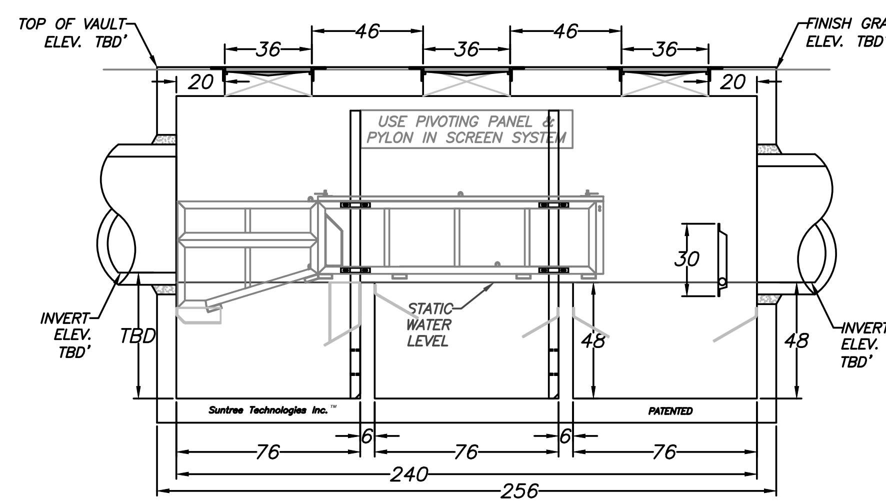
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

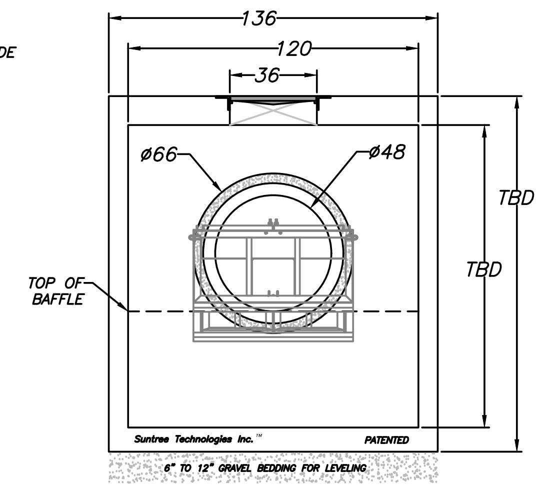


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-10-20		PROJECT NAME: --------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-12-20

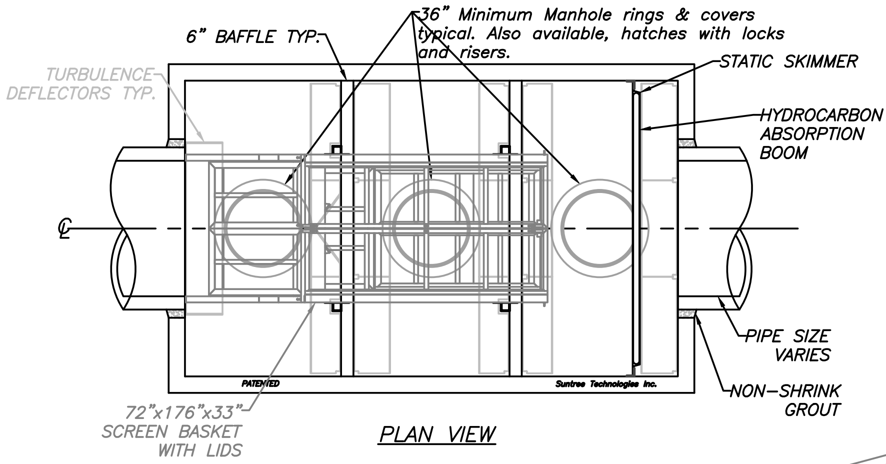
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 66" RCP) — 23.74 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 89.96 sq.ft.
3. Open orifice area in screen system with 50% blockage — 44.98 sq.ft.
4. Open orifice area in screen system with 75% blockage — 22.49 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 43.46 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 49.79 sq.ft.
7. Screen system storage volume — 216.7 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



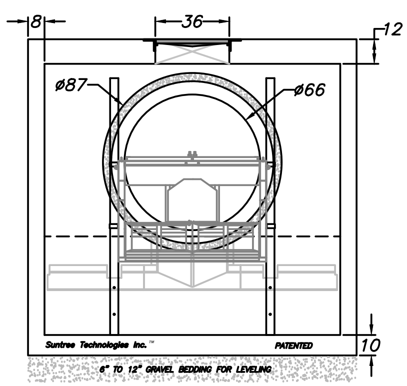
PLAN VIEW

INSTALLATION NOTES:

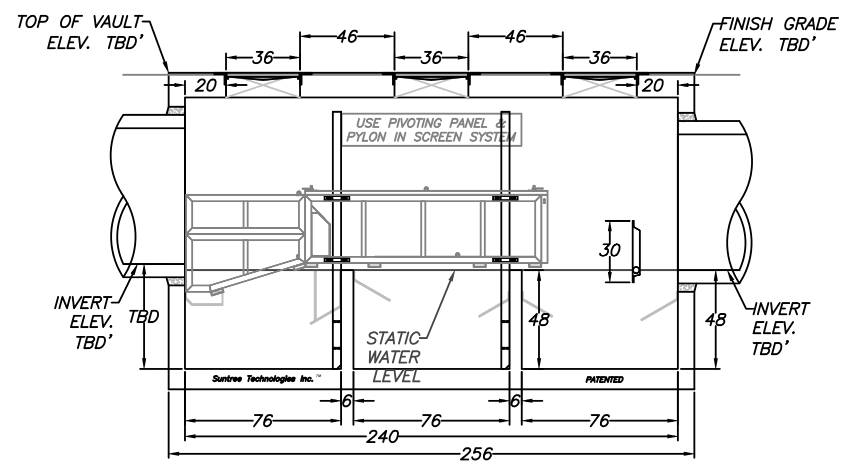
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

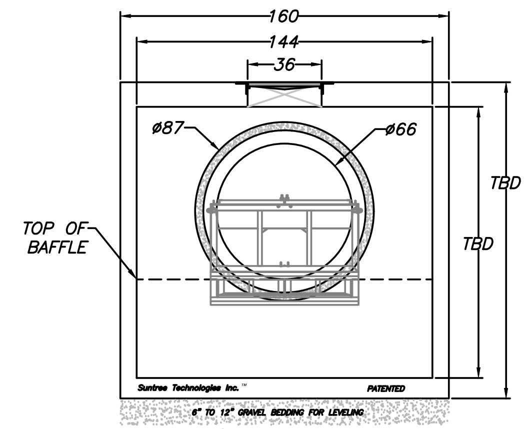
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-12-20		---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-12-24

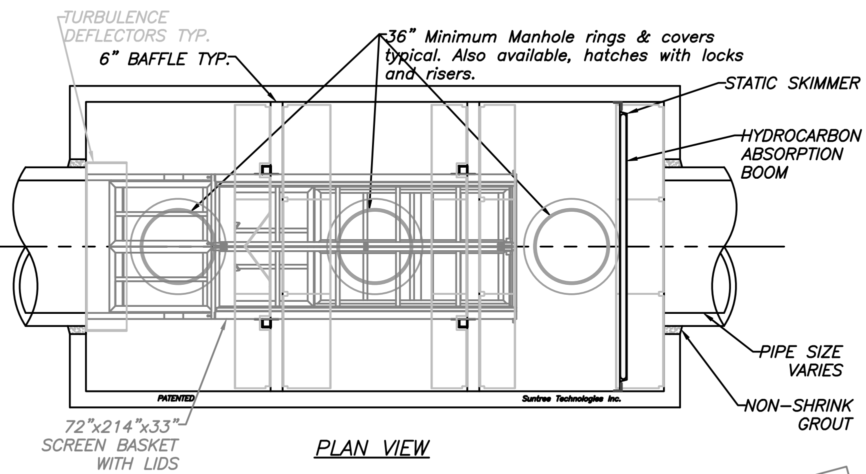
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM SPECIFICATIONS

1. Pipe inflow area (Drawn as 66" RCP) ———— 23.74 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ———— 110.81 sq.ft.
3. Open orifice area in screen system with 50% blockage ———— 55.41 sq.ft.
4. Open orifice area in screen system with 75% blockage ———— 27.70 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe ———— 55.19 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ———— 53.62 sq.ft.
7. Screen system storage volume ———— 261.92 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



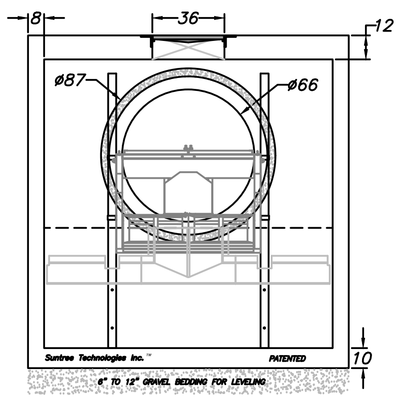
PLAN VIEW

INSTALLATION NOTES:

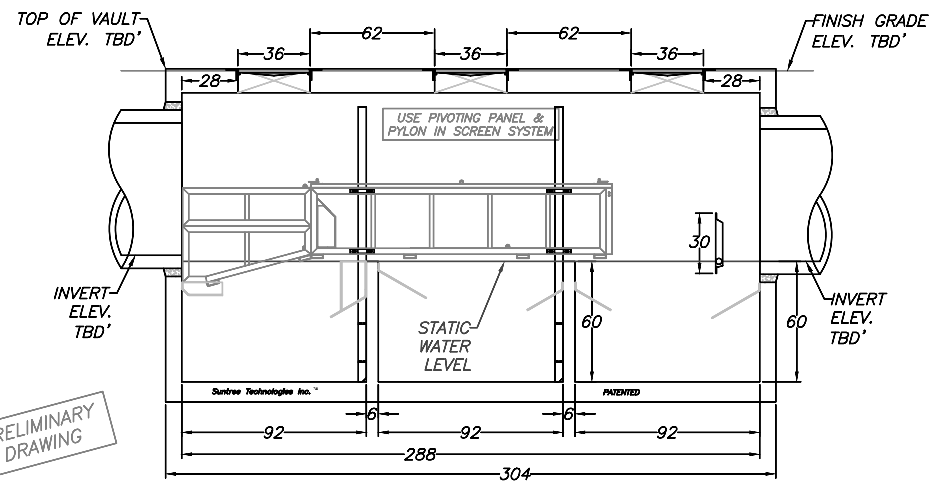
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

PRELIMINARY DRAWING

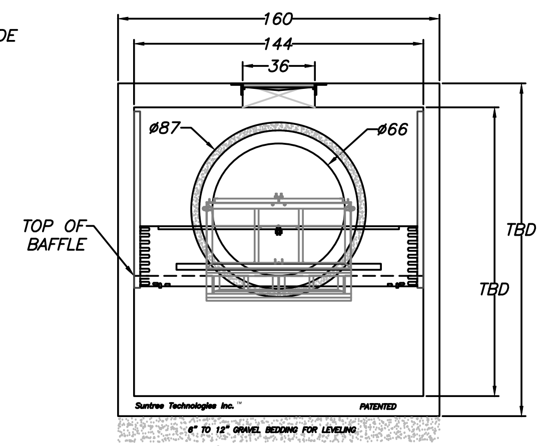


LEFT END VIEW



PRELIMINARY DRAWING

FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: -------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-12-24		---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: -------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

Appendix A

Nutrient Separating Baffle Box®
TC-EL Models

Suntree Technologies Inc.®

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-2-4-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

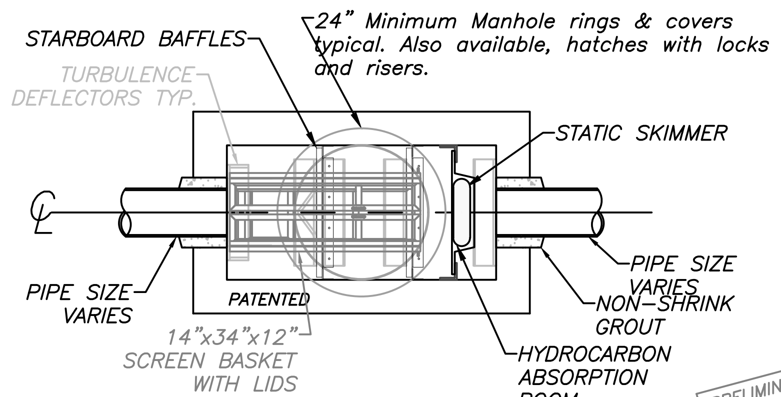
1. Inflow Pipe Area (8" PVC AS DRAWN) ——— 0.35 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 3.14 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 1.57 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 0.79 sq.ft.
5. By-pass through screen system below the ceiling of the pipe ——— 0.27 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ——— 0.76 sq.ft.
7. Screen system storage volume ——— 2.51 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

PRELIMINARY DRAWING

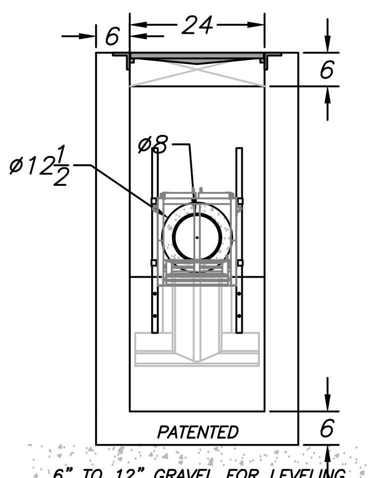
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES..

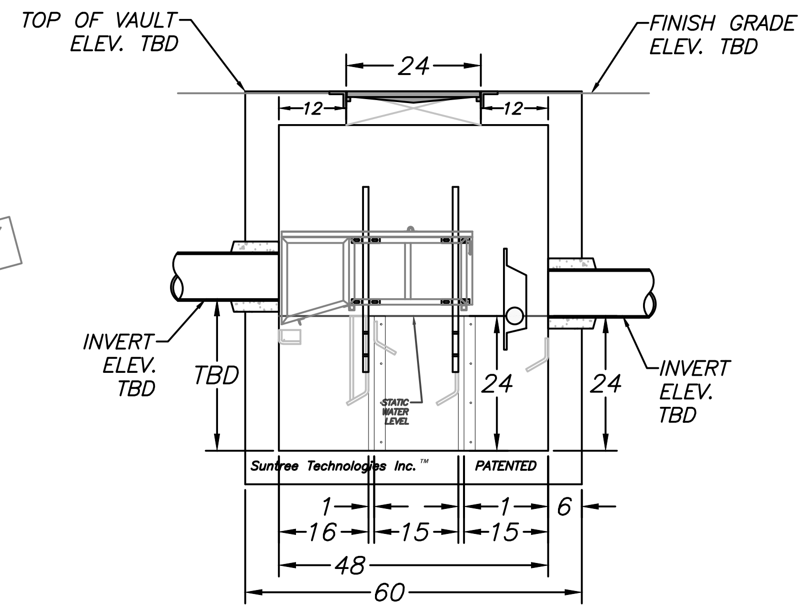
3. THE BOTTOM OF THE SKIMMER SHOULD BE ~3" BELOW THE INVERT OF THE OUTFLOW PIPE.

4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

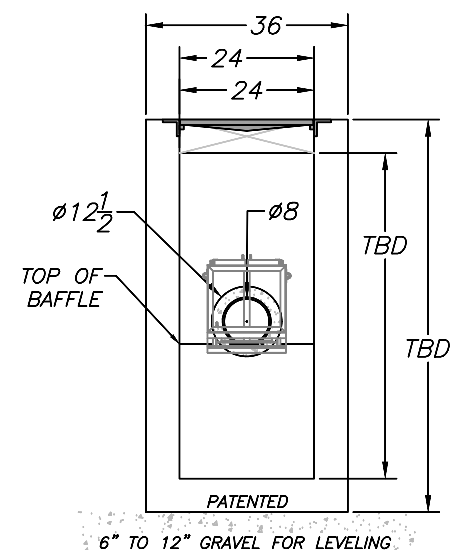


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 2 WATER TIGHT CHAMBERS. BAFFLES CAN BE CONCRETE AND/OR STARBOARD.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-2-4-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: -------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-3-6-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

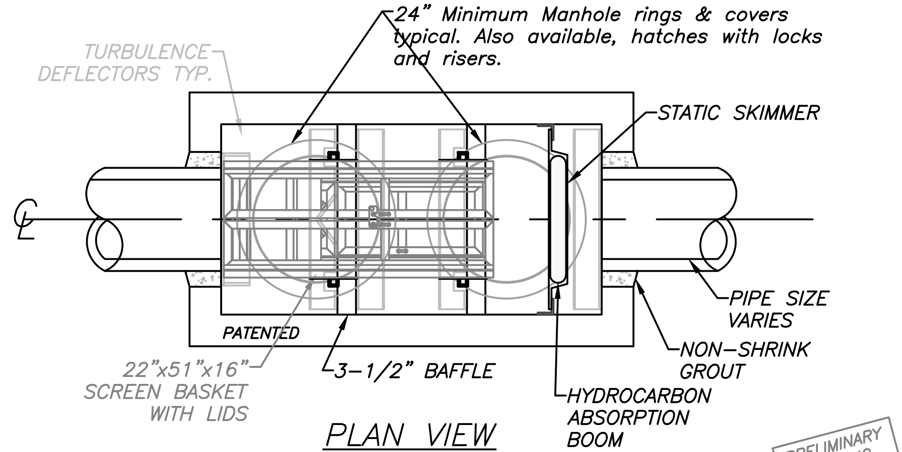
1. Inflow Pipe Area (15" RCP AS DRAWN) — 1.23 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 5.86 sq.ft.
3. Open orifice area in screen system with 50% blockage — 2.93 sq.ft.
4. Open orifice area in screen system with 75% blockage — 1.47 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 0.46 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 1.76 sq.ft.
7. Screen system storage volume — 7.87 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



PLAN VIEW

INSTALLATION NOTES:

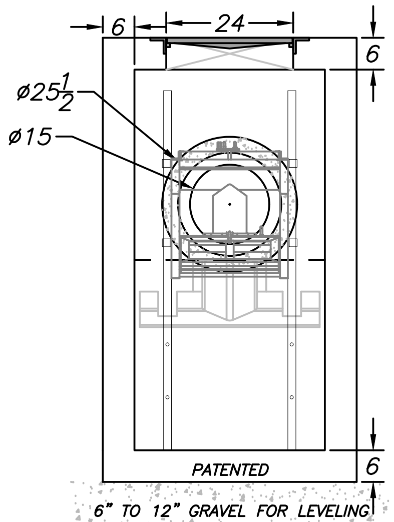
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)

2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.

3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.

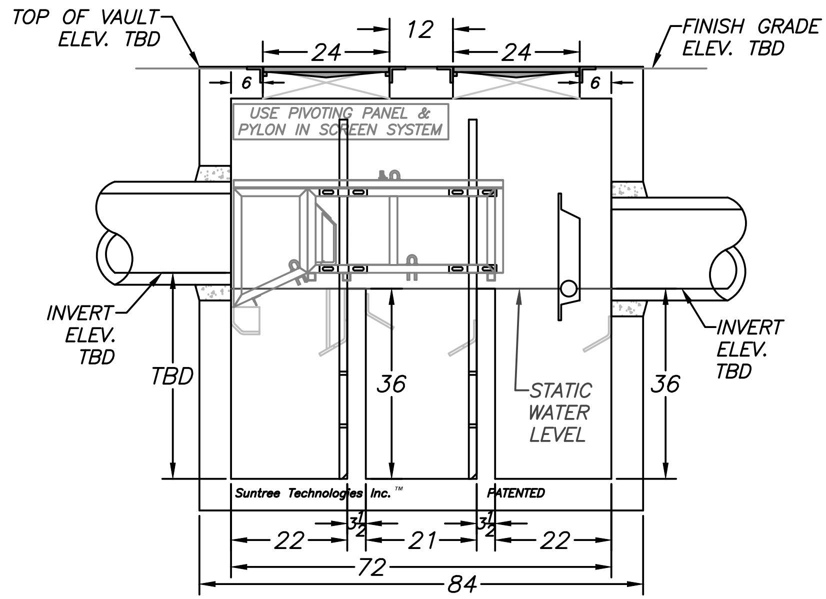
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING

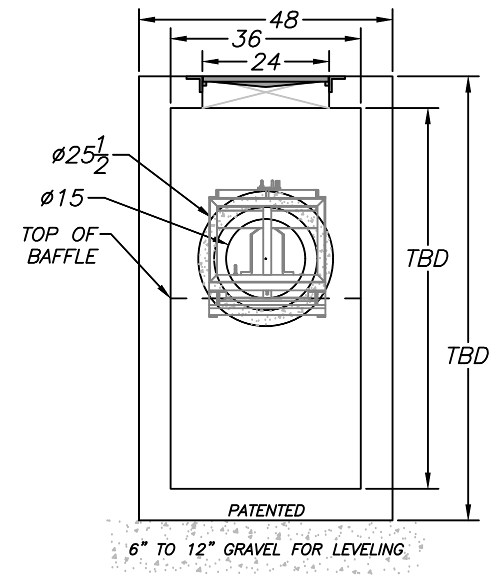


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-3-6-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-4-8-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Inflow Pipe Area (18" RCP AS DRAWN) — 1.77 sq.ft.

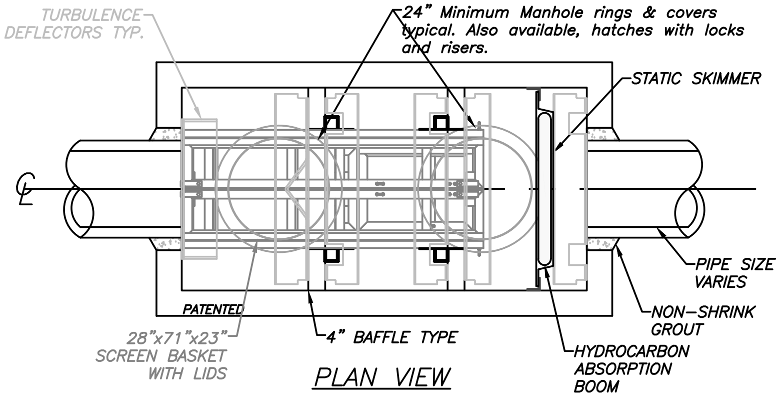
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 13.59 sq.ft.
3. Open orifice area in screen system with 50% blockage — 6.79 sq.ft.
4. Open orifice area in screen system with 75% blockage — 3.40 sq.ft.
5. By-pass through screen system below the ceiling of the pipe — 0.83 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 2.91 sq.ft.
7. Screen system storage volume — 22.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

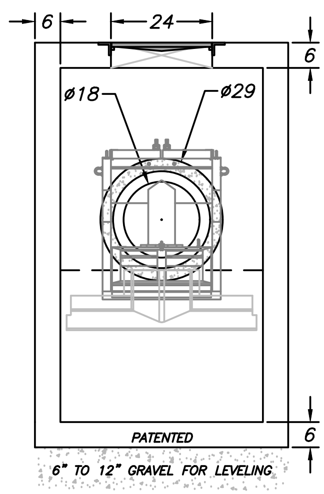


PLAN VIEW

INSTALLATION NOTES:

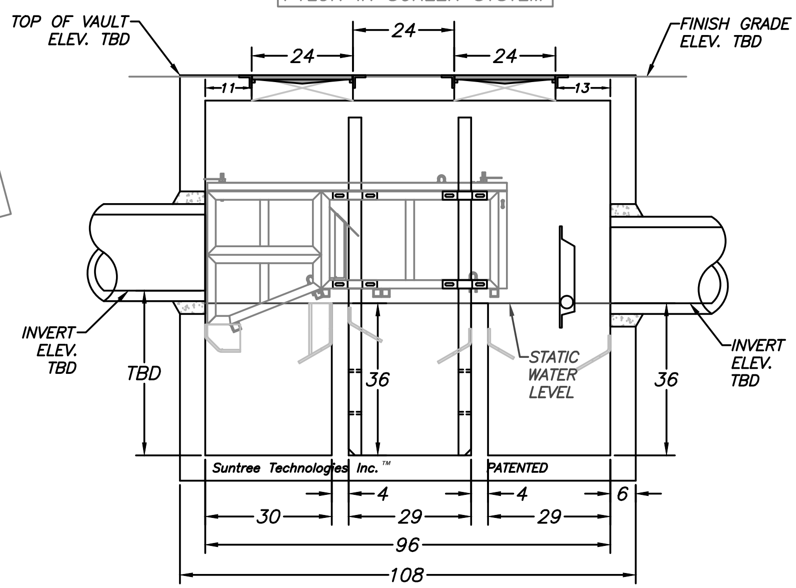
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 5" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD <u>NOT</u> BE BELOW THE INVERT OF THE OUTFLOW PIPE.

PRELIMINARY DRAWING



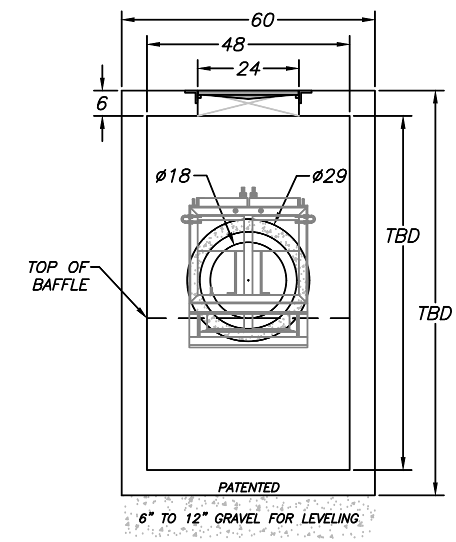
LEFT END VIEW

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: -------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-4-8-EL		---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: -------			
DRAFTER: A.B.1.	UNITS: INCHES	---------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-5-10-EL

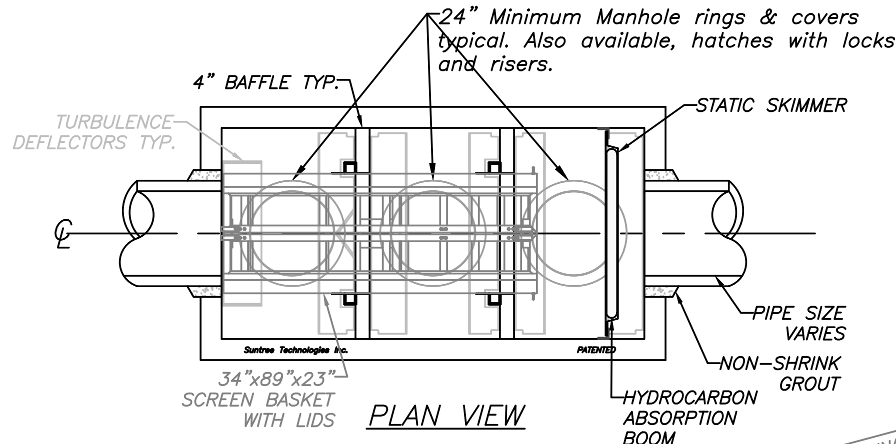
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 24" RCP) — 3.14 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system — 23.30 sq.ft.
3. Open orifice area in screen system with 50% blockage — 11.65 sq.ft.
4. Open orifice area in screen system with 75% blockage — 5.82 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 1.06 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 4.90 sq.ft.
7. Screen system storage volume — 31.68 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



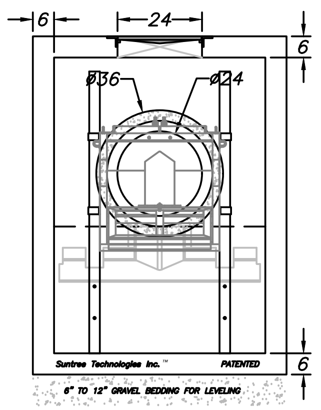
PLAN VIEW

PRELIMINARY DRAWING

INSTALLATION NOTES:

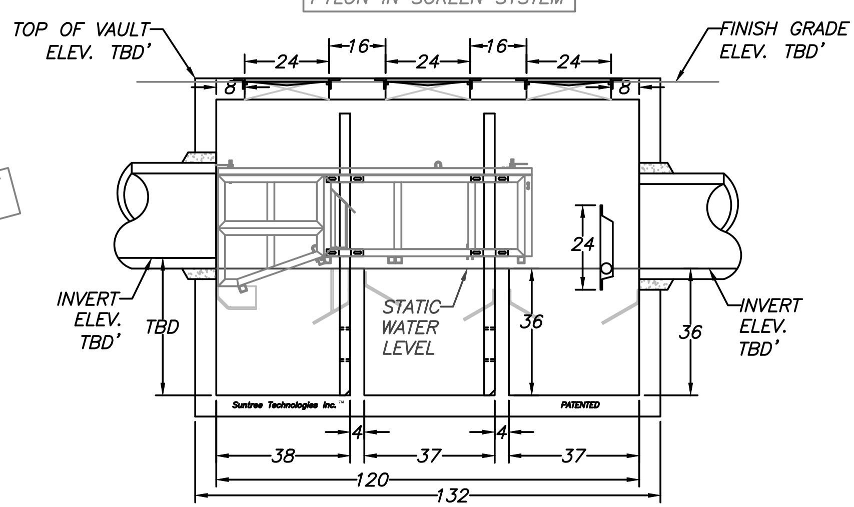
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

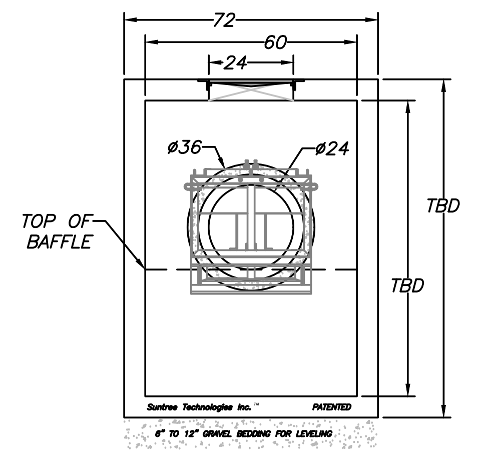


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:
1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-5-10-EL		PROJECT NAME: ------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	---------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-6-12-EL

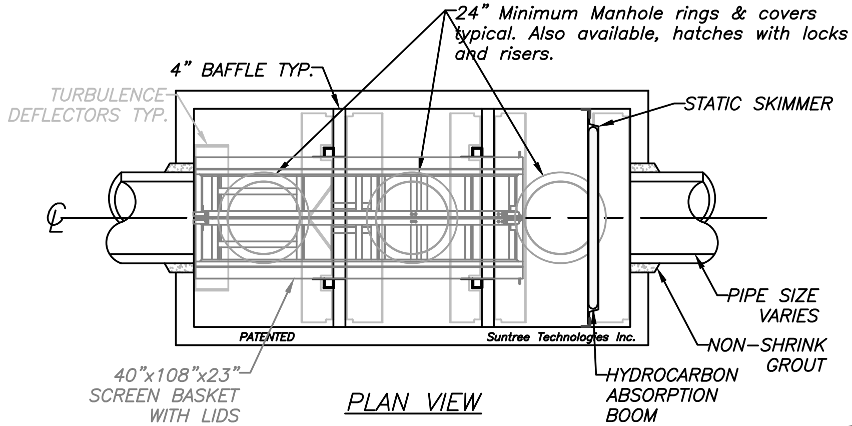
FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 24" RCP) ——— 3.14 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 29.10 sq.ft.
3. Open orifice area in screen system ——— 14.55 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 7.28 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 1.37 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 5.20 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ——— 49.40 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



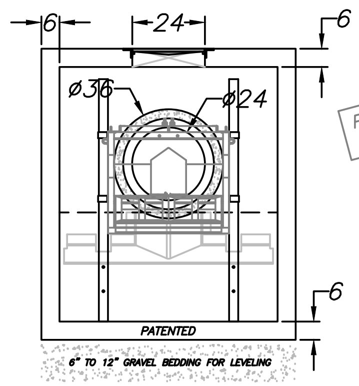
PLAN VIEW

INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

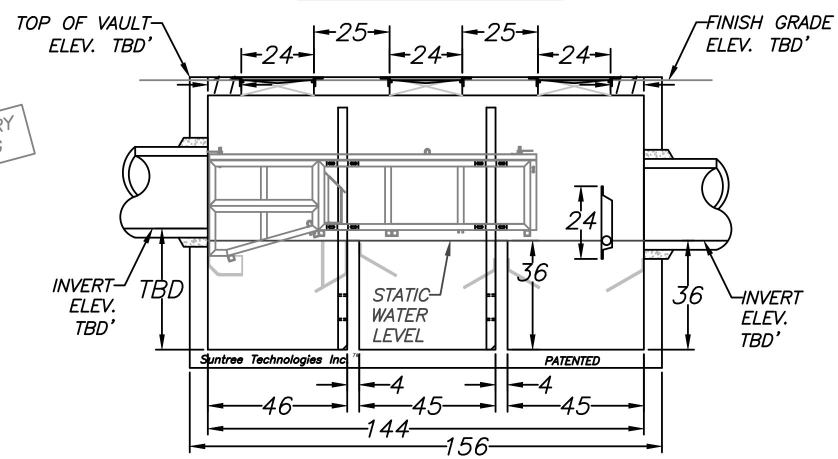
PRELIMINARY DRAWING

USE PIVOTING PANEL & PYLON IN SCREEN SYSTEM

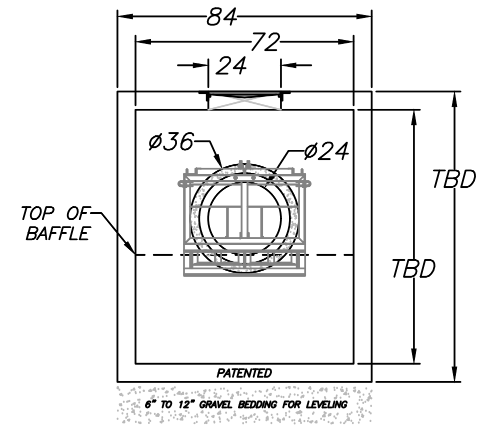


LEFT END VIEW

PRELIMINARY DRAWING



FRONT SIDE VIEW



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBES.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES.
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-6-12-EL		PROJECT NAME: ------- ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-8-12-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

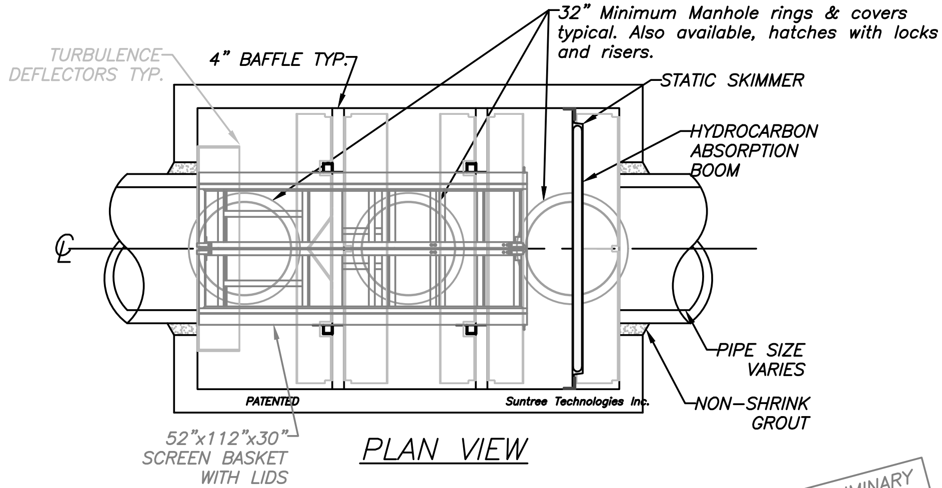
1. Pipe inflow area (Drawn as 42" RCP) — 9.61 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 49.48 sq.ft.
3. Open orifice area in screen system with 50% blockage — 24.74 sq.ft.
4. Open orifice area in screen system with 75% blockage — 12.37 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 2.33 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 17.96 sq.ft.
7. Screen system storage volume — 84.52 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



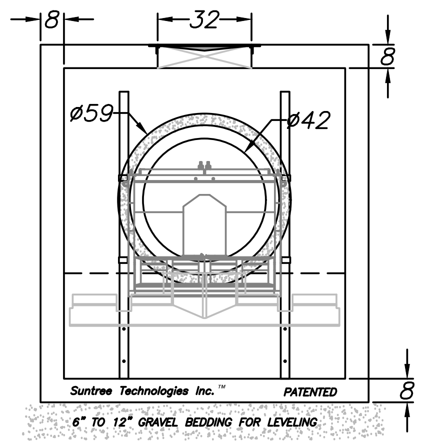
PLAN VIEW

INSTALLATION NOTES:

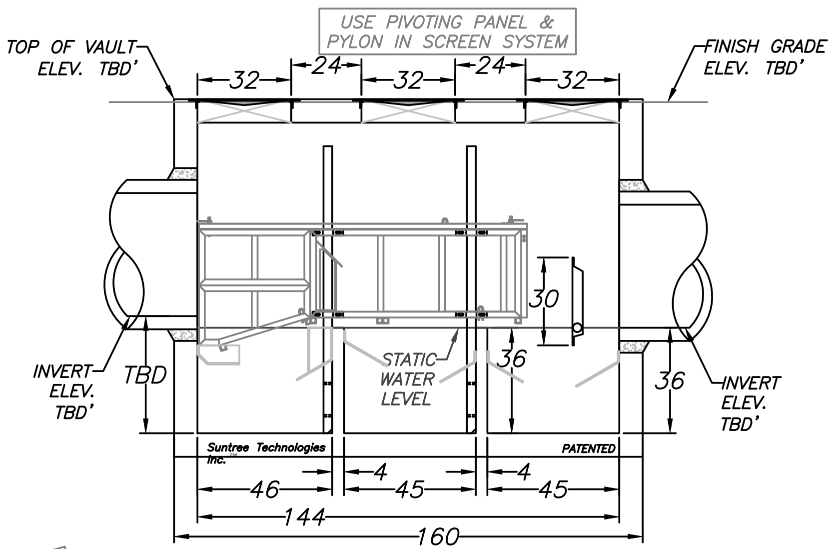
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

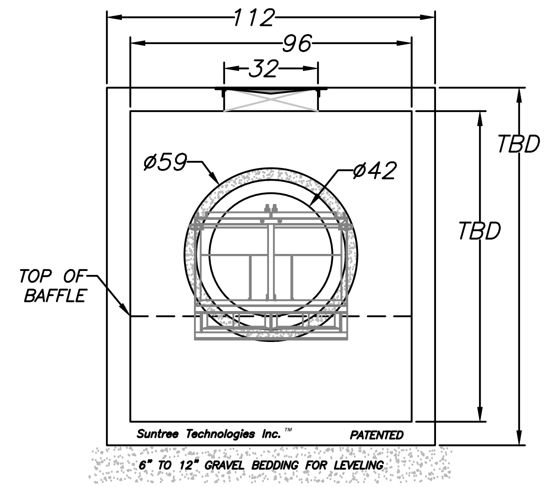
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-8-12-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------- ---------			
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-8-14-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

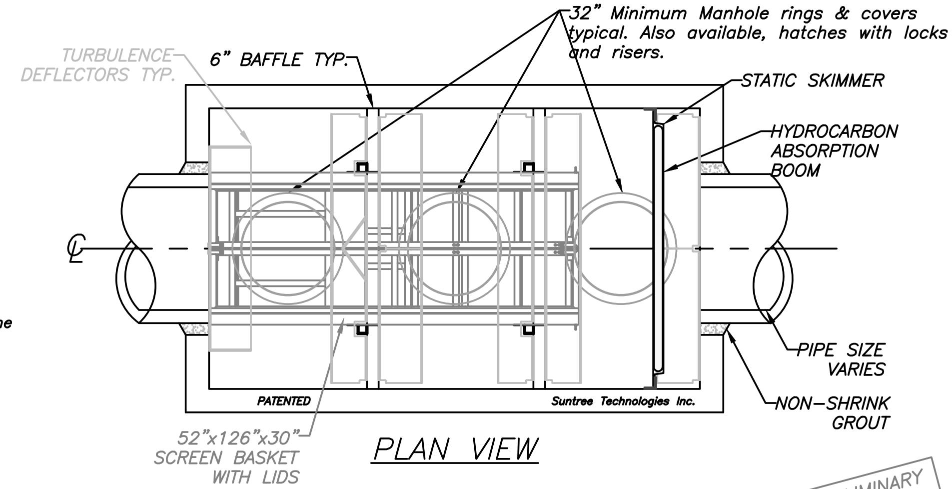
1. Pipe inflow area (Drawn as 42" RCP) ——— 9.61 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ——— 47.91 sq.ft.
3. Open orifice area in screen system ——— 23.96 sq.ft. with 50% blockage
4. Open orifice area in screen system ——— 11.98 sq.ft. with 75% blockage
5. Minimum by-pass through screen system ——— 2.33 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system ——— 17.66 sq.ft. below the ceiling of the pipe
7. Screen system storage volume ——— 94.88 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



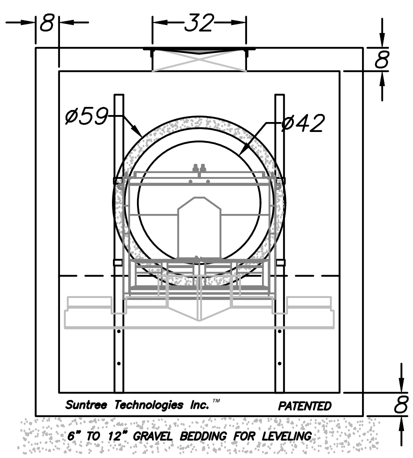
PLAN VIEW

PRELIMINARY DRAWING

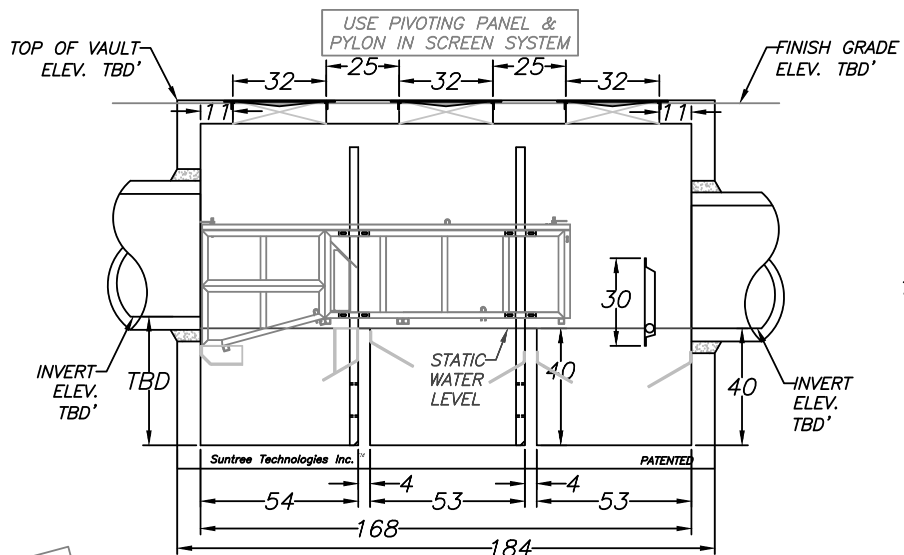
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

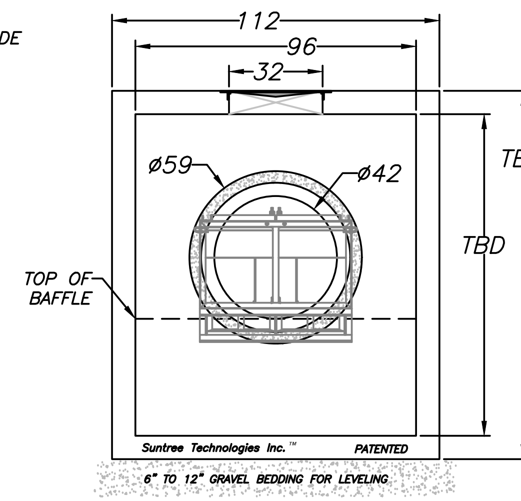
SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE THE ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-8-14-EL		PROJECT NAME: ------- ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-10-14-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 48" RCP) — 12.56 sq.ft.

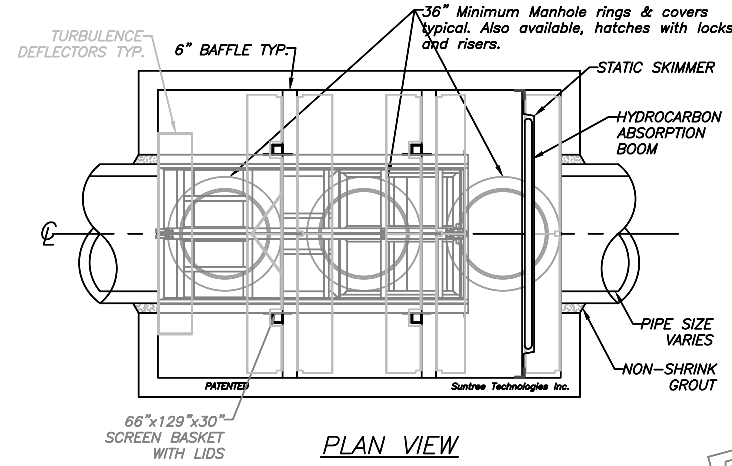
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 64.76 sq.ft.
3. Open orifice area in screen system with 50% blockage — 32.38 sq.ft.
4. Open orifice area in screen system with 75% blockage — 16.19 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe — 3.12 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe — 27.15 sq.ft.
7. Screen system storage volume — 116.15 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



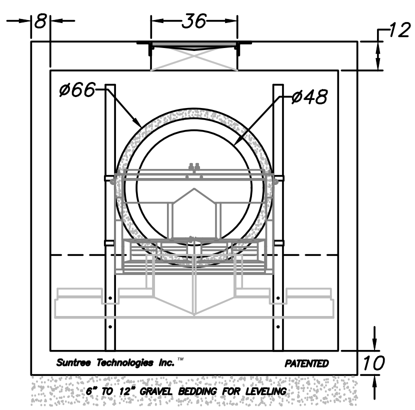
PLAN VIEW

PRELIMINARY DRAWING

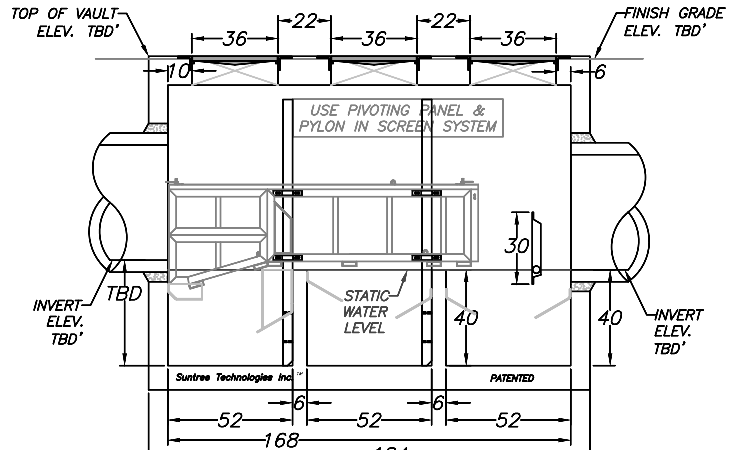
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

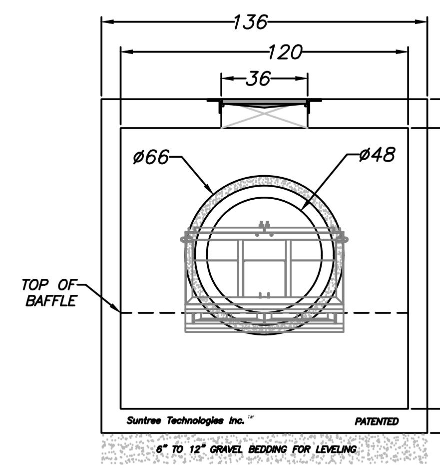


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-10-14-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-10-16-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

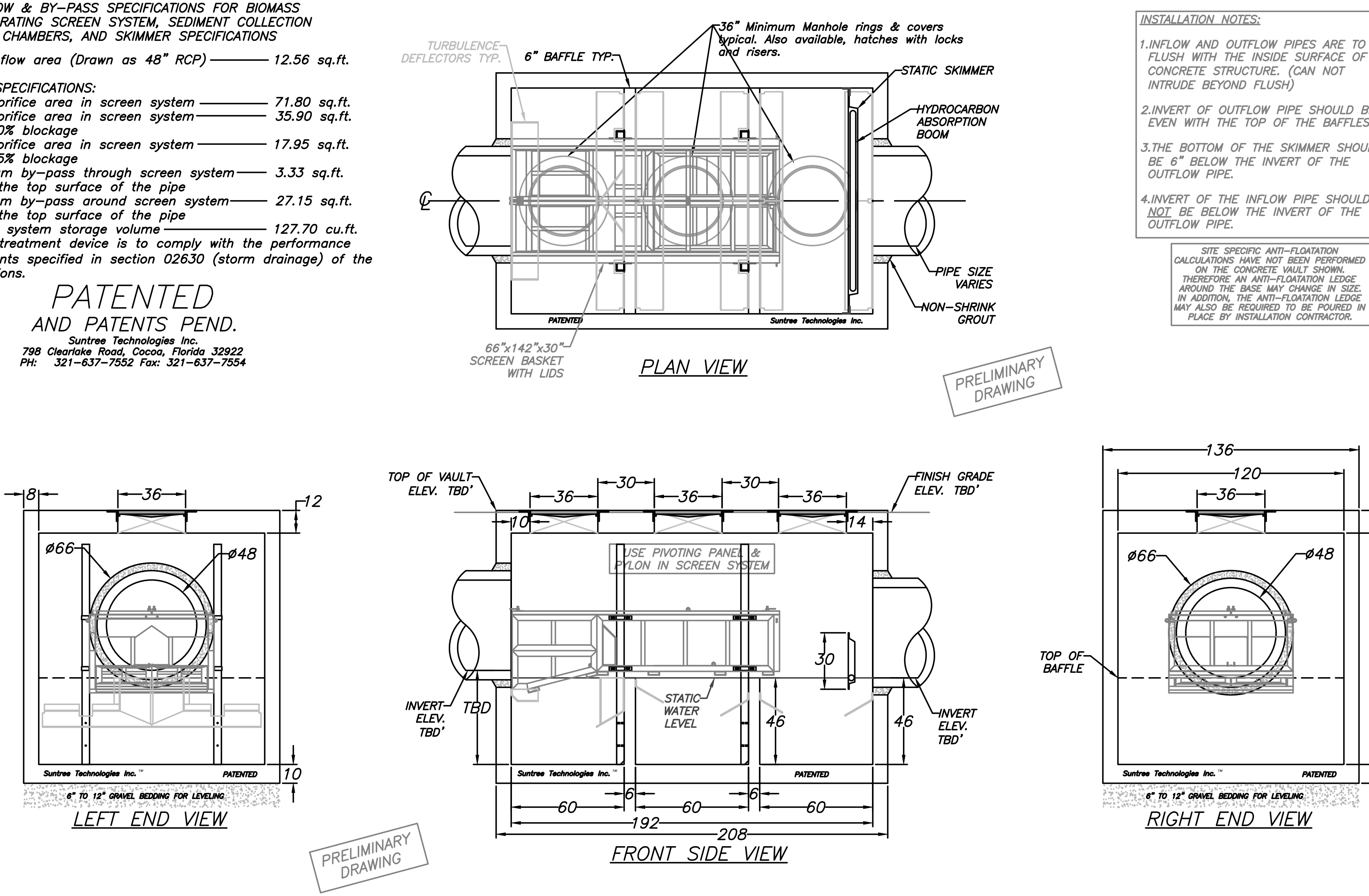
1. Pipe inflow area (Drawn as 48" RCP) ——— 12.56 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ——— 71.80 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 35.90 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 17.95 sq.ft.
5. Minimum by-pass through screen system below the top surface of the pipe ——— 3.33 sq.ft.
6. Minimum by-pass around screen system below the top surface of the pipe ——— 27.15 sq.ft.
7. Screen system storage volume ——— 127.70 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-10-16-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-10-20-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

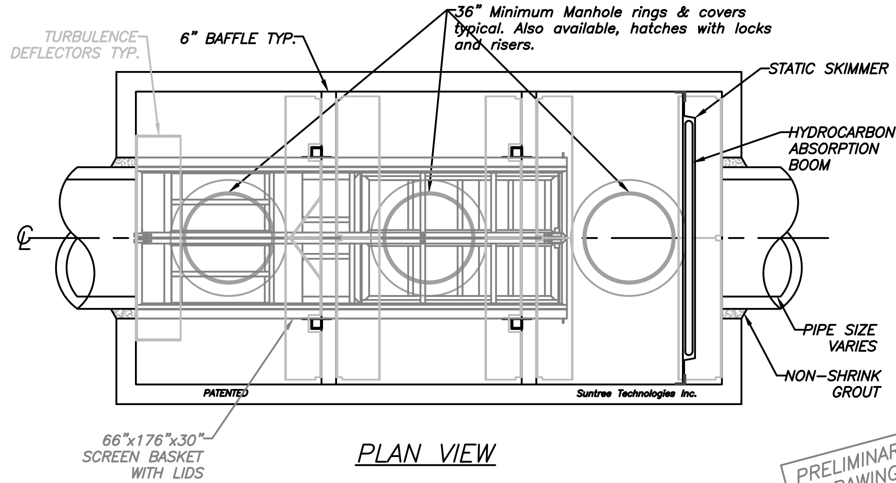
1. Pipe inflow area (Drawn as 48" RCP) —— 12.57 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system —— 91.96 sq.ft.
3. Open orifice area in screen system —— 45.98 sq.ft. with 50% blockage
4. Open orifice area in screen system —— 22.99 sq.ft. with 75% blockage
5. Minimum by-pass through screen system —— 4.84 sq.ft. below the ceiling of the pipe
6. Minimum by-pass around screen system —— 27.15 sq.ft. below the ceiling of the pipe
7. Screen system storage volume —— 179.10 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



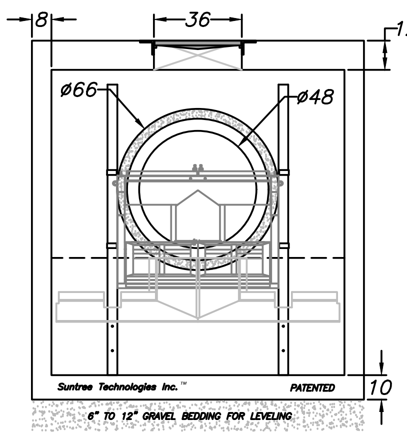
PLAN VIEW

PRELIMINARY DRAWING

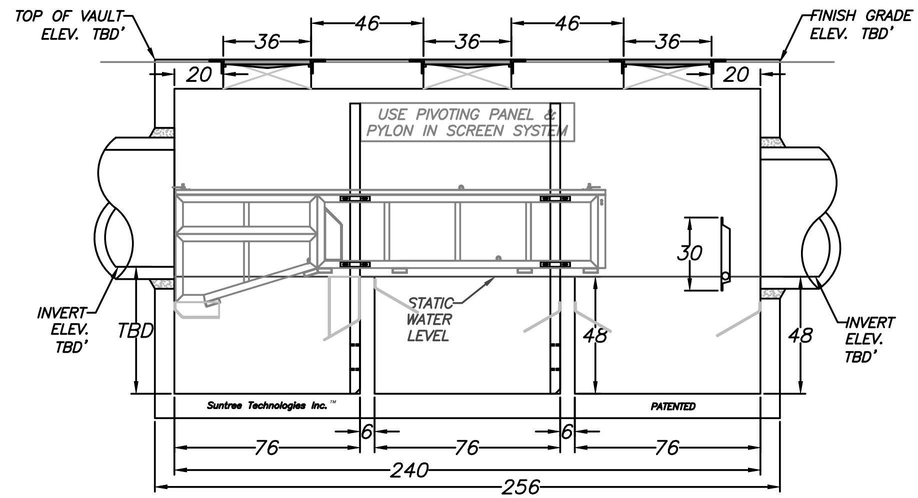
INSTALLATION NOTES:

1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

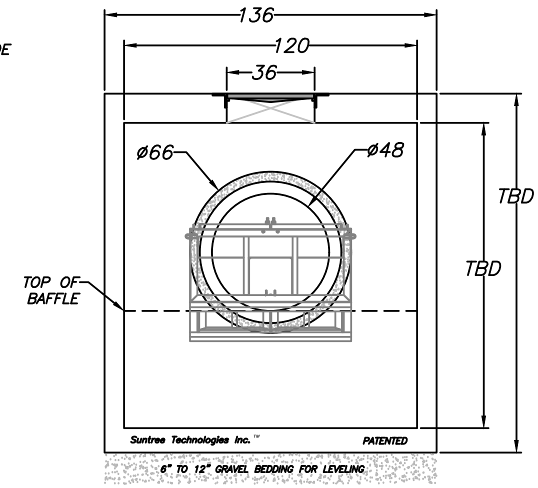
SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------ --------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-10-20-EL			A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A	PROJECT NAME: ------			
DRAFTER: A.B.1.	UNITS: INCHES	--------			
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-12-20-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT COLLECTION CHAMBERS, AND SKIMMER SPECIFICATIONS

1. Pipe inflow area (Drawn as 66" RCP) — 23.74 sq.ft.

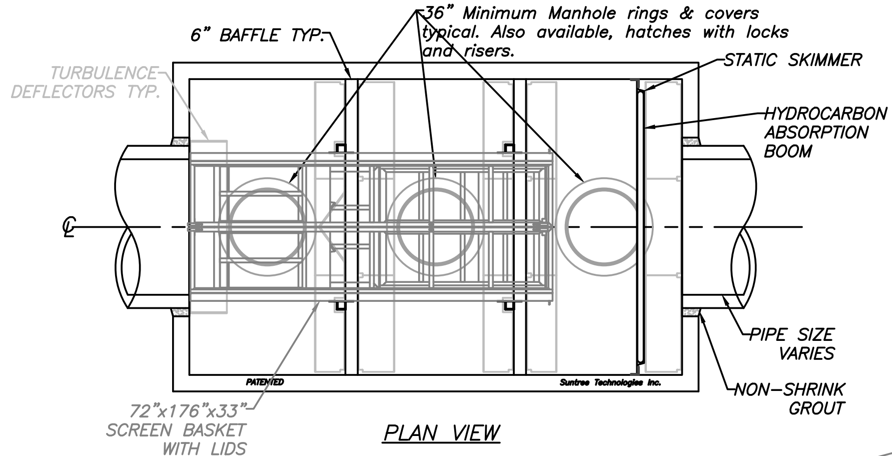
SCREEN SPECIFICATIONS:

2. Open orifice area in screen system — 103.52 sq.ft.
3. Open orifice area in screen system with 50% blockage — 51.76 sq.ft.
4. Open orifice area in screen system with 75% blockage — 25.88 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe — 5.33 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe — 49.79 sq.ft.
7. Screen system storage volume — 216.7 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED

AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



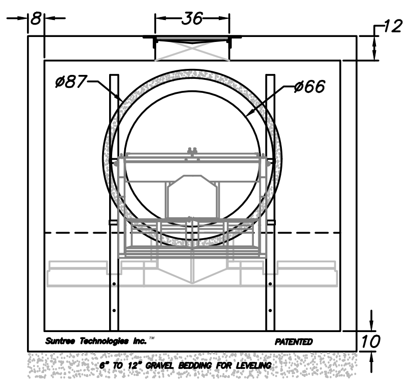
PLAN VIEW

INSTALLATION NOTES:

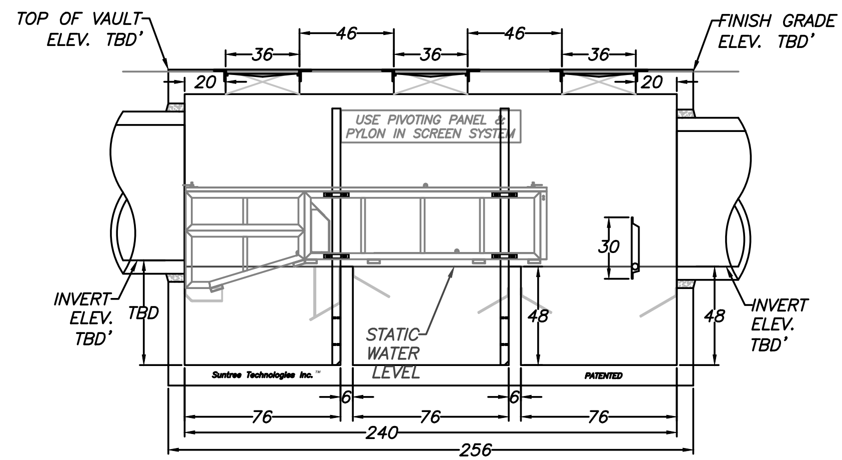
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

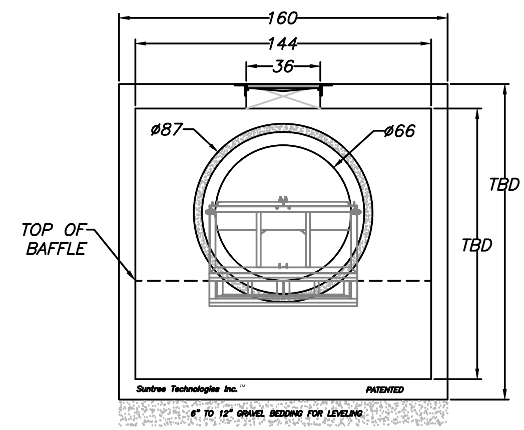
PRELIMINARY DRAWING



LEFT END VIEW



FRONT SIDE VIEW



RIGHT END VIEW

PRELIMINARY DRAWING

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: -------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-12-20-EL		PROJECT NAME: -------	A.B.1	-------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

SUNTREE TECHNOLOGIES INC.™ NUTRIENT SEPARATING BAFFLE BOX™ MODEL NO: NSBB-TC-12-24-EL

FLOW & BY-PASS SPECIFICATIONS FOR BIOMASS SEPARATING SCREEN SYSTEM SPECIFICATIONS

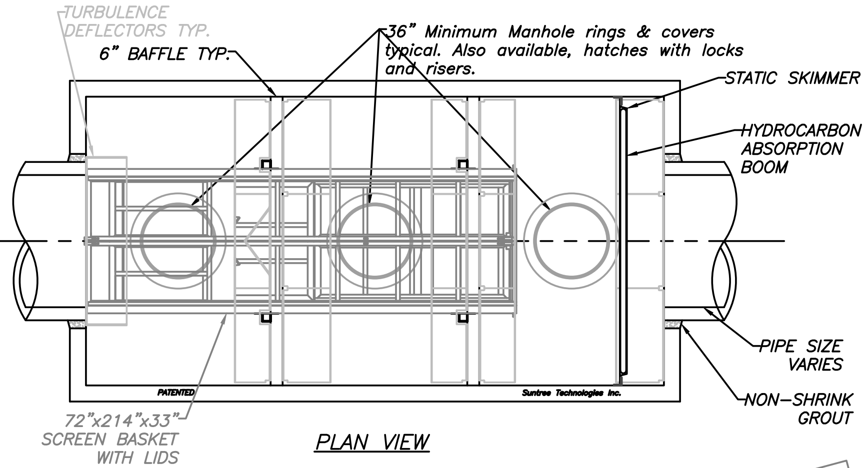
1. Pipe inflow area (Drawn as 66" RCP) ———— 23.74 sq.ft.

SCREEN SPECIFICATIONS:

2. Open orifice area in screen system ———— 125.75 sq.ft.
3. Open orifice area in screen system with 50% blockage ———— 62.87 sq.ft.
4. Open orifice area in screen system with 75% blockage ———— 31.44 sq.ft.
5. Minimum by-pass through screen system below the ceiling of the pipe ———— 5.37 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe ———— 53.62 sq.ft.
7. Screen system storage volume ———— 261.92 cu.ft.
8. The treatment device is to comply with the performance requirements specified in section 02630 (storm drainage) of the specifications.

PATENTED
AND PATENTS PEND.

Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554



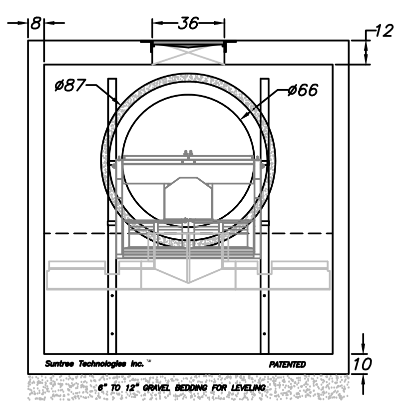
PLAN VIEW

INSTALLATION NOTES:

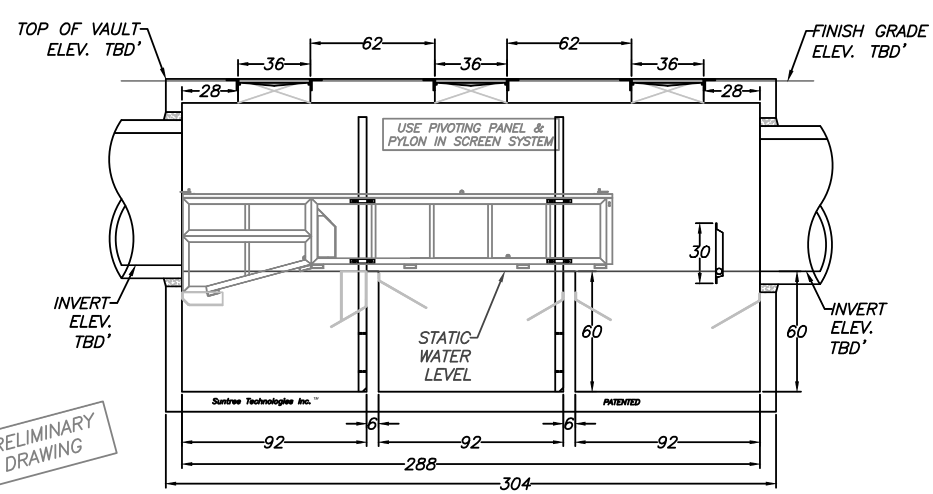
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLES.
3. THE BOTTOM OF THE SKIMMER SHOULD BE 6" BELOW THE INVERT OF THE OUTFLOW PIPE.
4. INVERT OF THE INFLOW PIPE SHOULD NOT BE BELOW THE INVERT OF THE OUTFLOW PIPE.

SITE SPECIFIC ANTI-FLOATATION CALCULATIONS HAVE NOT BEEN PERFORMED ON THE CONCRETE VAULT SHOWN. THEREFORE AN ANTI-FLOATATION LEDGE AROUND THE BASE MAY CHANGE IN SIZE. IN ADDITION, THE ANTI-FLOATATION LEDGE MAY ALSO BE REQUIRED TO BE POURED IN PLACE BY INSTALLATION CONTRACTOR.

PRELIMINARY DRAWING

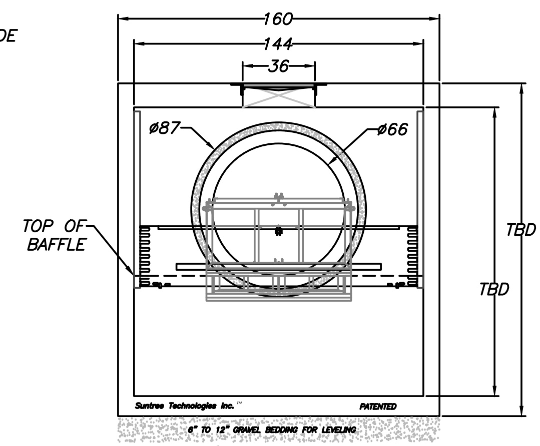


LEFT END VIEW



FRONT SIDE VIEW

PRELIMINARY DRAWING



RIGHT END VIEW

NOTES:

1. SUPPORTS AN H20 LOADING AS INDICATED BY AASHTO.
2. JOINT SEALANT: BUTYL RUBBER SS-S-00210
3. BAFFLE DEPTH SHOWN IS A MINIMUM REQUIREMENT, CAN BE MADE DEEPER FOR MORE STORAGE AS NEEDED.
4. BAFFLES ARE TO BE SEALED WITH GROUT TO FORM 3 WATER TIGHT CHAMBERS.
5. THE SHOWN NSBB IS WITH NO OPTIONS OR CUSTOM FEATURES
6. TREATMENT FLOW RATE -- CFS @ 80% REMOVAL OF -- MICRONS.

SUNTREE TECHNOLOGIES INC.™ 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT LOC: ------- ---------	CAD	REVISIONS	DATE
NUTRIENT SEPARATING BAFFLE BOX MODEL NO: NSBB-TC-12-24-EL		PROJECT NAME: ------- ---------	A.B.1	------- -------	00/00/00
START DATE: 00/00/00	SCALE: N/A				
DRAFTER: A.B.1.	UNITS: INCHES				
CHECKED BY: A.B.1.	PO #: 00000	03-09-21-15-04			

Appendix B

Nutrient Separating Baffle Box®
Installation Manual

Suntree Technologies Inc.®

Nutrient Separating Baffle Box®

Contractor Installation Manual

Version 1.0

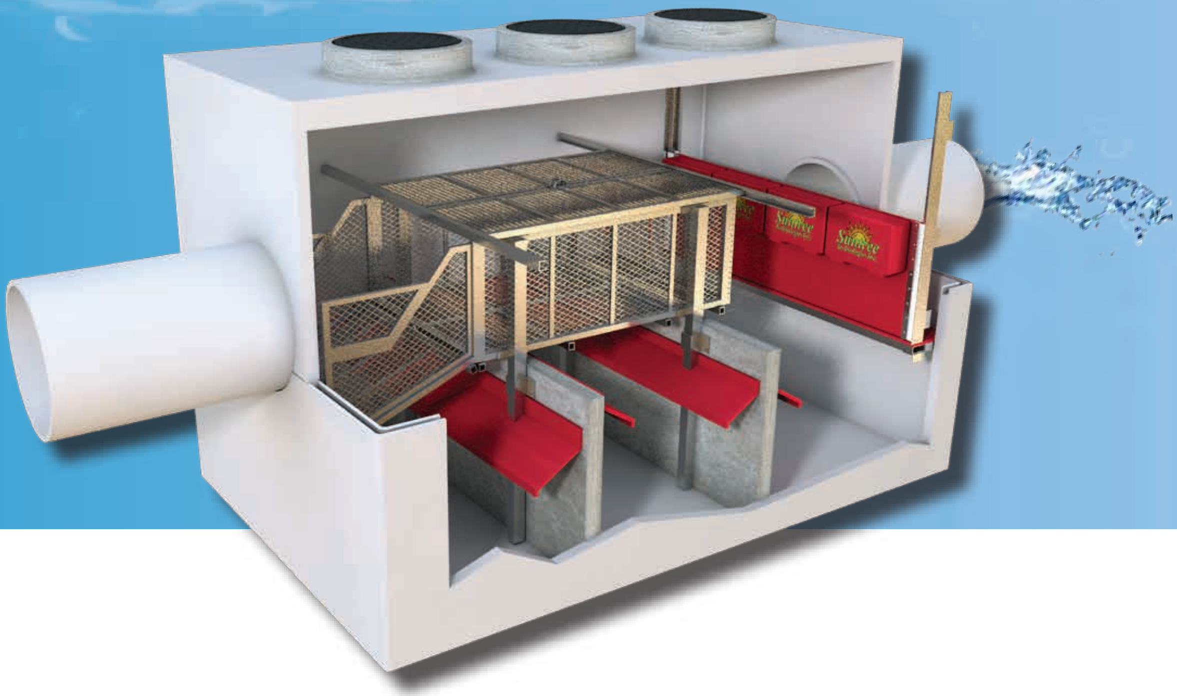


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Table of Contents

Suntree Technologies Inc.®

"Innovative Stormwater Management Solutions"
Since 1993

Warning

Read the Following Information, Instructions and Warnings Before Inspecting or Installing this Stormwater Treatment Device.

This manual is intended to explain the installation specifics and safety procedures for the Suntree Technologies, Inc.® Nutrient Separating Baffle Box® It is the responsibility of all personnel to familiarize themselves with, understand and comply with all applicable local, state and federal laws before attempting to inspect or install this unit.

All precautions and procedures in this manual are current at the time of printing but are subject to change based on the development of new processes and procedures. Suntree Technologies Inc.® assumes no responsibility and is not accountable for any injuries, fines, penalties or losses that occur involving any procedure in this manual or other unaddressable actions taken.

The Nutrient Separating Baffle Box® performance is based on the procedures being followed in this manual. Non-Compliance with the outlined measures will be the responsibility of the owner.

Ordering Information

Order Placement

Suntree Technologies Inc.® will begin NSBB™ fabrication upon receipt of the following customer documentation:

01 Approved drawings, signed by the Project Engineer or another entity having the same authority for approval

02 A signed copy of the Suntree Proposal documentation

03 Deposit of 25% of the order as down payment

04 Notice to Owner information regarding project details

Standard Terms & Conditions

01 All NSBB™ pricing is FOB point of origin with freight allowed to jobsite. Unloading & setting are based on NSBB™ size. Purchaser may cancel order due to project cancellation, but will be liable for the following payment as follows:

- 5% of total order if canceled prior to submittal approval
- up to 25% if order is canceled after submittal approval has been received by Suntree Technologies Inc®
- up to 75% if order has been released to manufacturing

Orders canceled for reasons besides project cancellation may be billed at greater amounts at the sole discretion of Suntree Technologies. Production of the NSBB™ will begin upon receipt of items listed in Order Placement. Suntree products are custom fabricated and are not return eligible. Purchaser agrees to provide suitable access to jobsite for delivery including traffic control and personnel. Allowable unloading time is two (2) hours. Delays caused by Purchaser past the two (2) hour period are subject to billing at the rate of $175.00 per hour minimum. Suntree will not accept back charges without prior written approval and cost validation. Purchaser agrees to provide a safe delivery site and comply with Federal, State, and Local safety requirements. The purchaser further agrees to hold Suntree harmless and to defend any and all actions, claims, suits and proceedings that may subject Suntree Technologies to liability due to Purchaser's failure to provide a safe delivery site.

02 All orders must be shipped within 30 days of manufacturing completion or else a storage charge of 5% per month of the selling price will be charged to the order.

Transport & Delivery

Delivery Lead Times

- Upon order placement, please allow 4–6 weeks for delivery of the NSBB™ depending on fabrication time and work load.
- Delivery of NSBB™ 4-8, 5-10 and some 6-12 models can be accomplished via crane truck. Please allow 5 business days for delivery from the date of request and 10 business days for delivery via crane truck.

Delivery

Suntree Technologies Inc.® will ensure delivery of the NSBB™ vault system to the installation site in accordance with the Installation Contractor / Distributor. Delivery and unloading of the NSBB™ vault is free of charge as long as excessive delay times are not incurred by the carrier.

Delivery of NSBB™ Models 4-8, 5-10 & 6-12

The crane truck will assist in setting the NSBB™ without additional costs unless:

- The unit weight-reach combination is exceeded
- The crane truck operation is obstructed by overhead wires, trees, site restrictions, etc.
- The crane truck has an inadequate soil base to safely support, operate and unload the NSBB™.

Delivery of NSBB™ Models 8-14, 10-16 & 12-20

These models cannot be unloaded or transported via crane truck due to size and weight restrictions. Therefore, the Installation Contractor will require and is responsible for providing the necessary unloading / lifting materials, tools and apparatus at the time of installation.

Secure Unloading / Lifting of the NSBB™ requires:

- Spreader Bar
- 1 set of Lifting Hooks
- 1 set of Shackles
- Several Chains / Cables
- 1 set of Knuckles
- 1 set of Eye Bolts

Important

Some NSBB ™ 6-12 units cannot be delivered on a crane truck due to weight restrictions created by height and / or optional specified equipment.

Unloading

Unloading Responsibilities

If the installation contractor unloads the NSBB™ from the crane truck and decides to set the vault at a later time, then the contractor is responsible for providing a crane of sufficient weight capacity and reach (see fig1) to safely set the vault structure at the time of installation. The contractor must also provide sufficient chains and a spreader bar to unload NSBB™ models: 8-14, 10-16 and 12-20. Suntree Technologies will provide contractors with the appropriate lengths for both spreader bars and chains. Please contact your Suntree Technologies Inc® representative for additional inquires / information.

Note

Please see project specific drawings for weights and lifting details about your site before unloading the NSBB™ vault. If you need additional lifting details or further assistance, contact Suntree Technologies Inc® at **321.637.7552**

Site Preparation

The Installation Contractor is responsible for all installation site preparation and ensuring proper safety procedures and protocols are followed.

- The Installation Contractor is responsible for providing adequate and complete vault protection when the NSBB™ vault is installed prior to final site stabilization (landscaping, grass cover, final paving and street sweeping completed)
- Installation Contractors will adhere to all jurisdictional and / or OSHA safety rules in providing temporary shoring of the excavation zone.
- The Owner or Installation Contractor is responsible for appropriately barricading the Nutrient Separating Baffle Box® from traffic in accordance with local codes.

Inspection Information

Inspection Protocol

The Nutrient Separating Baffle Box® is a key component of your stormwater management program. To ensure proper operation, preliminary inspection of the structural components upon delivery is essential to ensure that no damage occurred during shipping. The NSBB™ designed and manufactured by Suntree Technologies Inc.® contains both patented and patent pending technologies to treat and manage stormwater.

Inspection of the Suntree Technologies Inc® NSBB™ unit and all parts contained in or shipped outside of the vault, are to be inspected at the time of delivery by both the site Engineer / Inspector and the Installation Contractor. Any non-conformance to approved drawings or damage to any part of the system must be documented on the Suntree NSBB™ shipping ticket. Damage to the unit during and after unloading shall be corrected at the expense of the Installation Contractor. Any necessary repairs to the Nutrient Separating Baffle Box® must be brought into compliance with the Engineer / Inspector.

Local and State regulations may require inspections every 90 days. Suntree Technologies, Inc.® recommends inspections be conducted upon delivery, once the site has stabilized and every six (6) months thereafter for optimal operational efficiency.

Installation Protocol

Necessary Materials Supplied by Suntree Technologies

- Concrete base unit with baffles and assembled screen system
- Concrete mid section(s) (if applicable)
- Concrete top section
- Butyl rubber sealing tape strips
- SkimBoss™ Floating Skimmer and StormBoom™ system
- Specified frames and grates, rings and cover or hatches

Installation Contractor Responsibilities

With the exception of finalizing the skimmer and StormBoom™ installation, the contractor is responsible for all work required to properly position and install the NSBB™ unit, sealing materials, pipes (including removal of structural reinforcing left in place by the precaster during shipping), risers, backfilling and installation of covers. The NSBB™ must be set at an elevation that allows the invert of the outflow pipe to be level with the top of the baffles.

The SkimBoss™ skimmer and StormBoom™ system requires minor assembly after the lower, mid and top sections have been installed. This work is completed by Suntree Technologies Inc® personnel during initial box setting operations. Therefore, Suntree Technologies personnel must be on site during each installation. Please allow at least a 3 day lead time for Suntree Technologies installation personnel to be on site. The coordination of this procedure helps to prevent excessive crane or crane truck usage delays.

The standard fabrication of NSBB™ units provide 6 inch+ opening diameters, greater than the outside pipe diameters, enabling simple installation of new and retrofitted systems. Final pipe positions require the pipe ends must be set or cut flush with the interior wall of the vault. All pipes should be sealed within the NSBB™ walls in accordance with local code requirements.

Installation Protocol

Installation Information

01 Each NSBB™ vault is constructed based on the site locations and elevations of the sizes shown on the approved drawings. Any modification to the elevation or location must be the direction of and approved by the Engineer of Record.

02 The vault shall be placed on a level compacted sub-grade with a minimum 6 inch gravel base. Compact undisturbed sub-grade materials are to be in accordance with Geotechnical / Soils report. Unsuitable material below sub-grade must be replaced to the site engineer's approval.

03 Once the base section and risers (if applicable) are set, the installation contractor is responsible for grouting the baffles to form watertight chambers.

04 Pipe connections must be aligned and sealed to meet approved drawings with any necessary modifications to meet site conditions and local regulations. The correct connection (inlet / outlet) will be marked on the NSBB™ vault. The connections are to be flush with the interior walls of the vault and are not to protrude into the vault.

05 Once the vault is set, the NSBB™ system should be protected from construction runoff entering the vault. The Installation Contractor should provide a dry and clean working environment for the manufacturers' installation personnel to complete the installation of the internal components.

06 Once the connections and baffles are grouted in, the manufacturers' installation personnel will install the internal components in accordance with Suntree Technologies Inc.® specifications.

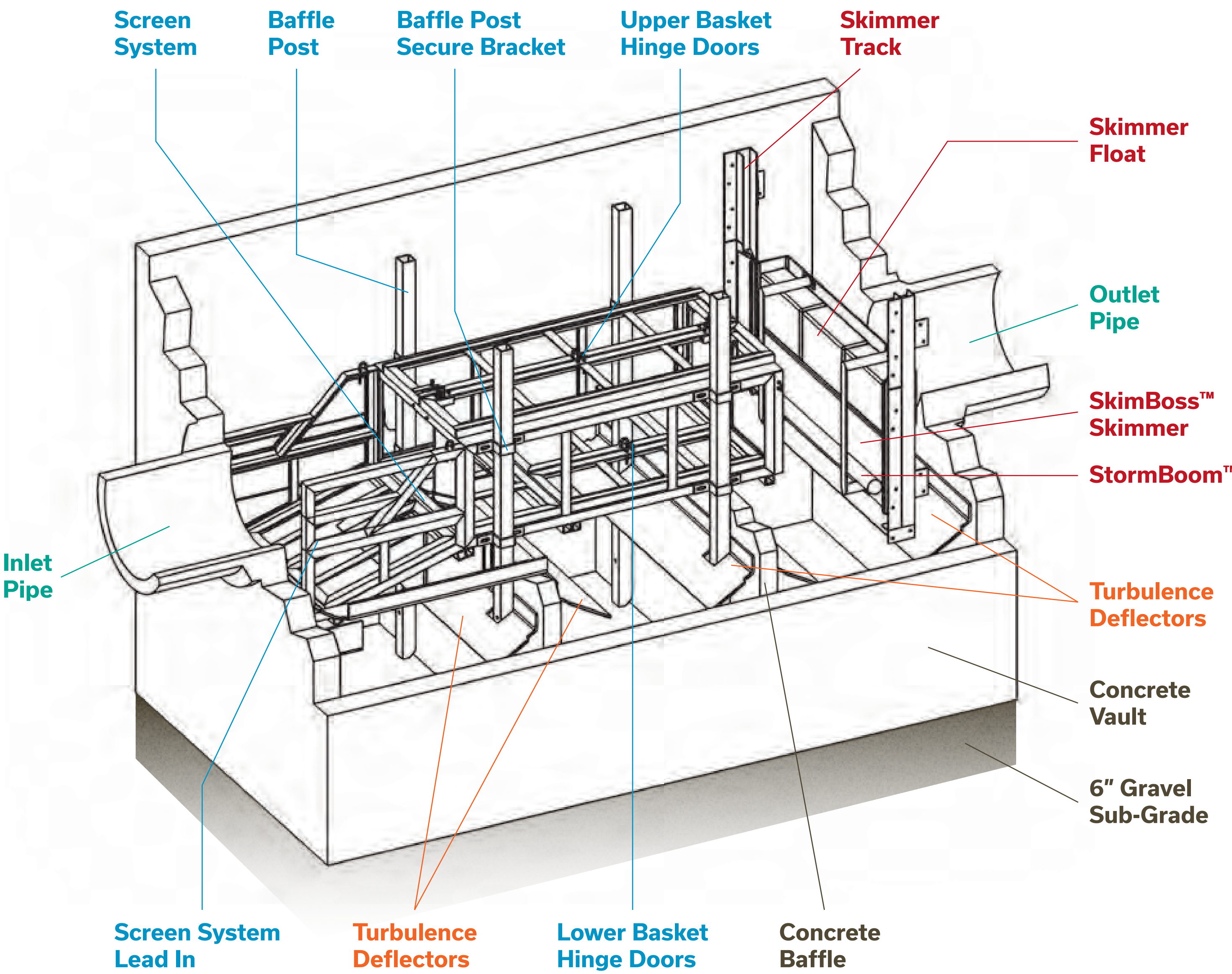
07 Backfilling should be performed carefully. Precast sections must be properly set to result in watertight joints. Installation of the NSBB™ vault must conform to ASTM specification C891 "Standard Practice for Installation of Underground Precast Utility Structures" unless specified otherwise in contract documents or local requirements.

Note

Prior to setting the vault sections, always refer to approved shop drawings to assure that the proper elevation, footprint and other conditions are met.

Reference Diagram

NSBB™ Installation Reference Diagram



Installation Procedure

Protocol Descriptions

The Installation Contractor must provide all rigging and lifting apparatus, such as cables, chains, straps, knuckles, lifting hooks, shackles, eye bolts and spreader bars.

It is the Installation Contractor's responsibility to provide suitable lifting equipment to unload the NSBB™. Nutrient Separating Baffle Boxes® are designed to be unloaded using the contractor's spreader bars.

01 **Unload and Set the Vault**

Off-load the Nutrient Separating Baffle Box® and set into the prepared hole with appropriate compacted sub-grade. (Sub-grade with a 6 inch minimum of gravel base.)

02 **Apply Butyl Tape Seal**

Apply butyl tape seal along the risers and top of the vault section. Butyl tape seal will be provided with every vault.

Installation Procedure

Protocol Descriptions

Prior to setting the top vault section, the manufacturer's installation crew will install the interior components of the Nutrient Separating Baffle Box®. In the event the top section is set without first notifying the manufacturer, a fee of $3,000 per day will be assessed to offset the cost accrued by the manufacturer's installation crew for confined space entry conditions.

03 Set Risers and Vault Top

Set the risers and top on the vault. The Installation Contractor is responsible for grouting the baffles to assure the chamber is watertight as well as grout the inflow and outflow connections flush and smooth with the interior of the vault.

04 Connect Pipes

The correct connection (inflow / outflow) will be indicated on the vault allowing for easy connection of the pipes.

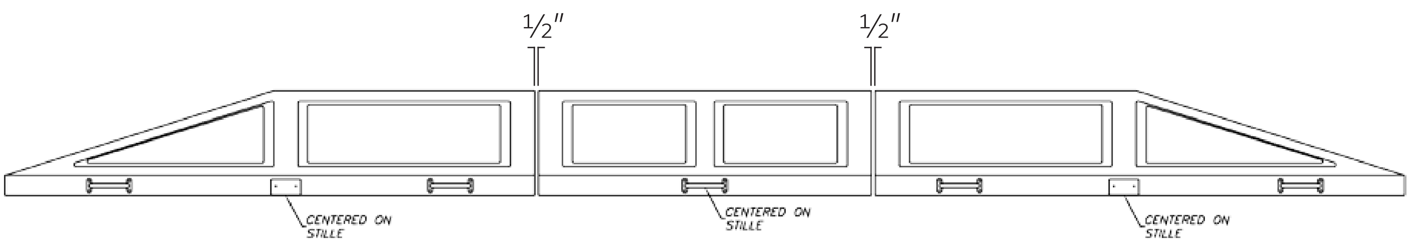
Observation Lid Install

Sunview™ Observation Lid Installation Protocol

01 Verify all parts are on site and that the concrete's dimensions are within appropriate tolerance.

02 Decide which side of the box will be hinged and layout the observation lid's location on the top of the box using chalk.

03 Allow ½″ gap between lid sections.



04 Store some parts in the box on the floor of the screen including the center and end brackets, gas lifters, ½″ expandable bolts, impact wrench with ¾″ socket and sledge hammer.

05 Place the lid sections over the hole, check that they are centered over the hole.

06 Shim the hinged edge of the lids up so that the hinge is flat on the concrete.

07 When the sections are placed over the baffle box, the hole's inside edges are obscured. Consider fastening only one tapcon in each section's end hinges.

08 Visually verify that the lid is centered over the hole and check that the lifter's pins on the outer ends are not obstructed by concrete. If the lids seem out of place they should be corrected at this point.

09 From the inside of the box, find the lid's vertical centerline relative to the lid sections and attach the center bracket slightly less than flush at the top, about ⅛″ to ¼″ down.

09 Attach center bracket

Observation Lid Install

Lifter Installation

10 Attach a gas lifter to the lid on a center pin and position the lifter so that the large reservoir end is up.

11 Have someone on the outside lift the lid so that the lifter does not need to be compressed to line the pin up with the hole on the end of the lifter.

12 Attach the shaft end to the center bracket and carefully lower the lid down.

13 Repeat to attach the center lifter for the other section(s) of the lid.

14 The lifters' end brackets can only be located by measurements or by finding the ideal location while attached to the lid and lifter while the lid is open.

15 Attach the shaft end of the lifter to the correct end bracket.

16 Attach the large reservoir end to the lid's end bracket pin.

17 Have someone lift the lid all the way open to fully extend the lifter already attached to the lid's center brackets.

18 Move the dangling end bracket to a position on the baffle box wall or top edge. Find a location that keeps the ½″ expandable bolts away from the edge of the concrete. Having an expandable bolt too close to the edge of the concrete may cause the concrete to split or fracture when tightened.

19 Mark the location of the hole and attach the end bracket. Repeat for remaining sections.

Cable Installation & Finishing

20 Carefully test the lid's movement then attach one end of the cable to the lid's end bracket.

21 Measuring from where the cable is attached to the lid, pull the lid down about 5″. The cable spring compresses 3″ so lowering the lid slightly more than 3″ assures that the full compression range of the spring will be used to slow the lid.

20 Attach cable to bracket.

Observation Lid Install

Cable Installation & Finishing

22 Mark this mounting position on the box for the bracket at the other end of the cable.

23 Before attaching the bracket, double check the movement and lift of the lid.

- Is the lid supported well by the lifters?
- When the wind blows from the back side of the lids will it knock them down?
- Can the lid be lowered some to achieve a balanced position without collapsing?

24 It is important that the lid be supported well at the fully open position. If there isn't enough lift at the balanced position or fully open position, move the bracket closer to the hinge to allow more for lift.

24 Check & ensure the lid sections are sufficiently supported at the fully open position.

25 It is recommended that the remaining section's cables be positioned before mounting any cable brackets to the box. Repeat the same procedure as the first section.

26 Mount one cable bracket to the concrete box.

27 With the fully attached lid open, position the next section's bracket where it will be mounted.

28 Adjust the position of the other section brackets so that the lids are even when fully open.

29 With the lids lined up, mark and attach the remaining cable brackets to the concrete box.

30 Check the movement of the lids again, close the lids and position and attach the locking brackets to the top of the concrete vault structure.

29 Mark and attach remaining cable brackets and cables.

StormBoom™ Install

StormBoom™ Installation Information

The Hydrocarbon Skimmer Panel is located below the rear access opening in the NSBB™. The skimmer panel is equipped either with front brackets or an expanded metal screen face to contain the StormBoom™.

The StormBoom™ is designed to fit inside the expanded metal screen face of the skimmer panel. There is an oval shaped hole at the top of the skimmer panel for inserting or removing the StormBoom™. Each StormBoom™ is equipped with rope ends to secure the boom in place after it has been installed.

Note

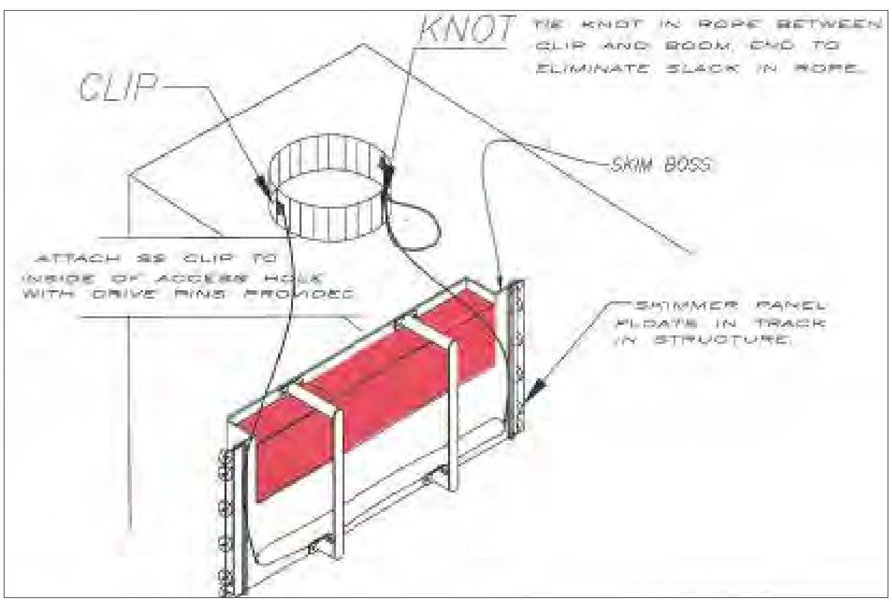
StormBooms™ are single booms for vaults up to 6′ wide and are doubled in length to accommodate wider vault systems.

StormBoom™ Initial Installation Protocol

01 Thread one rope end of the StormBoom™ in one of the top panel holes. Each rope end will be on opposite ends of the panel and will be brought up to the rear access opening.

02 Rope ends need to attach to SS Eye straps anchored to the concrete at the inside rear access opening. The bottom of the StormBoom™ should be slightly "U-Shaped" and rest 6″ from the bottom of the skimmer panel.

03 Double tie the rope ends to eliminate any slack.



SkimBoss™ floating skimmer with hydrocarbon boom attached with rope to SS Eye Strap ready for replacement.

Basket Installation

Installation Information

01 Install turbulence deflectors and baffle posts. Once bolt holes are drilled, clean bolt threads with a brush, apply anti seize compound and bolt deflectors in place.

02 The top of the deflector should be within 1″ of the top of the baffle and centered between the interior walls.

03 Tape 3½″ wooden blocks on the inside of the baffle posts resting on the baffles for basket installation preparation.

04 Attach the flow spreader to the center of the inflow side of the baffle wall using included SS wedge bolts. The top of the flow spreader and baffle wall should be even.

05 Set the basket on top of the baffles with the lead in end flush to the inflow wall and center the basket between the interior side walls.

06 Locate and install two legs for the basket using ½″ x 1¾″ SS bolts and locknuts to attach brackets to the frame.

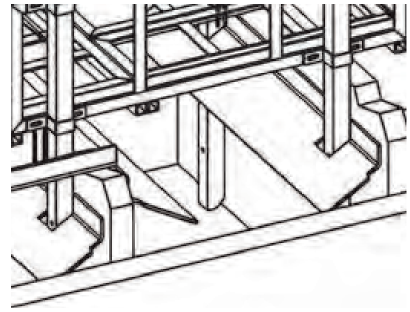
07 Use ½″ x 8″ SS bolts, plain nuts and fender washers to install the legs on the baffle walls.

08 SkimBoss™ Skimmer Panel is complete with mounting angles attached. The back side of the panel should be 11″ from the outflow end of the wall and 30″ from the floor of the vault. The mounting angles may be taken off of the skimmer and temporarily used as a template to mark where holes must be drilled in the vault walls.

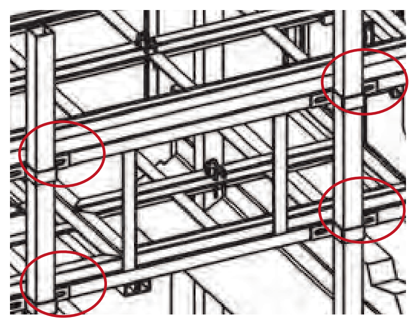
09 SS wedge bolts ½″ x 4¼″ are to be set in the vault walls to mount the panels. Tighten all bolts to complete work.

10 The StormBoom™ is pre installed inside of the skimmer panel. The boom rope ends exit the top of the panel holes and attach to SS Eye straps. The SS Eye straps should be attached to the inside of the rear access opening within the concrete.

11 Check all fasteners for tightness and doors for operation.



01 Install Turbulence Deflectors centered between Baffle Walls & Baffle Posts.



06 Attach post brackets.

Note

Do not drill the ½″ holes deeper than 3¼″ or the bolts may not set properly.

Skimmer Installation

SkimBoss™ Floating Skimmer Installation Protocol

01 The SkimBoss™ Floating Skimmer tracks are installed on the walls of the NSBB™ vault. Each SkimBoss™ Skimmer is complete with tracks of which are broken into two to four pieces per track depending on vault size.

02 The main track has an assembled length of either 1500mm (2 pieces) or 3000mm (3 pieces) depending on the size of the vault width.

03 The bottom of the main track has two holes and a set of double holes above on each side of the assembled track.

04 The two bottom holes require ½″ x 2¾″ wedge anchor bolts (included) to fasten the bottom of the track to the walls.

05 Only one fastener is required in one of each set of holes above the very bottom two. The bottom two holes each receive a bolt. The double holes provide an alternative location for the bolts in case rebar is encountered in the first hole location.

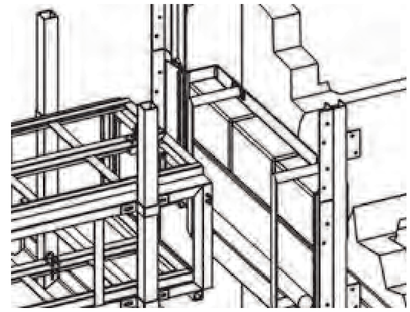
06 In order for each track to be close to parallel to each other, it is important to use exactly the same distance for the bottom of each track and that the tracks are set vertically.

07 Track extensions (if necessary) will be mounted above the main track and are marked to match corresponding locations of the main track.

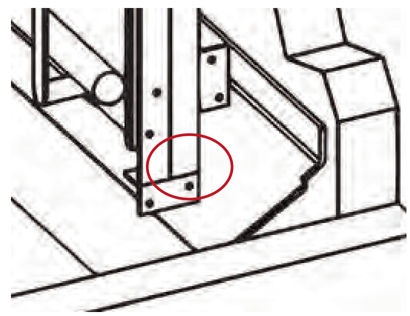
08 The top open edge of the track will face the direction from where the flow is coming from. One mounting bolt is required to be installed in the track at each location above the bottom four bolts.

09 Once the back section of each main track is bolted in place, then the skimmer can be lowered to the bottom of the track.

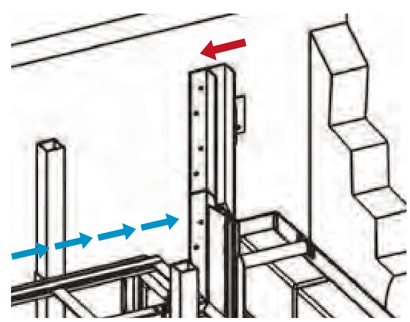
10 After the skimmer is set, bolt in the shorter upper front section of each track with two ½″ x 2¾″ SS wedge anchor bolts each. (Use one bolt per set of two holes) Tighten all bolts to finish work.



01 Install Skimmer Tracks



04 Anchor tracks to vault walls via ½″ x 2¾″ anchor bolts in the bottom holes.



08 The open track edge should face the direction of incoming water flow.

Requirements & Parts

Minimum Equipment Requirements

Installation crews are recommended to check all local, state and federal guidelines for installation and maintenance prior to delivery. The Installation Contractor must provide all unloading and lifting apparatus, such as cables, chains, straps, knuckles, lifting hooks, eye bolts, shackles and spreader bars.

Caution!

Any installation work done in traffic areas must meet all DOT Roadway Work Guidelines and necessary safety procedures.

Structural Components

The structural components of the NSBB™ are designed to have a life span of several decades. Structural inspections of the NSBB™ unit and all parts contained in or shipped outside of the vault are to be conducted at the time of delivery by the site Engineer / Inspector and Installation Contractor.

Warning!

All OSHA confined space requirements must be met for internal installations in the event that the top of the vault is set without first notifying the manufacturer installation crew.

Replacement Parts

All interior components are designed and sized to be assembled and removed from the NSBB™ for installations, servicing or for parts replacement. This can easily be accomplished via the access ports atop the vault structure.

For any replacement parts or further instructions please contact Suntree Technologies, Inc®:

Suntree Technologies Inc.®
798 Clearlake Road, Suite 2
Cocoa, Florida 32922

Phone: **321.637.7552**
Fax: **321.637.7554**
Web: **www.suntreetech.com**
Email: **info@suntreetech.com**

Warranty

Warranty Information

Suntree Technologies, Inc.® products are engineered and manufactured with the intent of being a permanent part of the infrastructure. Suntree Technologies, Inc.® warranties its products to be free from manufacturing defects for a period of five (5) years from the date of purchase.

In the event a warranty claim is made and determined to be valid, Suntree Technologies will replace or repair the product at their own discretion. Warranty claims must be submitted, evaluated and approved by Suntree Technologies for the claim to be determined valid. All warranty work must be authorized by Suntree Technologies prior to work beginning not covered by this warranty. There are no warranties expressed or implied other than what is specified herein. Abusive treatment, neglect or improper use of the Nutrient Separating Baffle Box® will not be covered by this warranty.

Notes

Contact Information

General Inquires

For additional information concerning installation, general usage, maintenance products, warranties or replacement parts please contact:

Suntree Technologies Inc.®
798 Clearlake Road, Suite 2
Cocoa, Florida 32922

Phone:	**321.637.7552**
Fax:	**321.637.7554**
Web:	**www.suntreetech.com**
Email:	**info@suntreetech.com**

Visit our website for in depth information on all of our products!

Appendix C

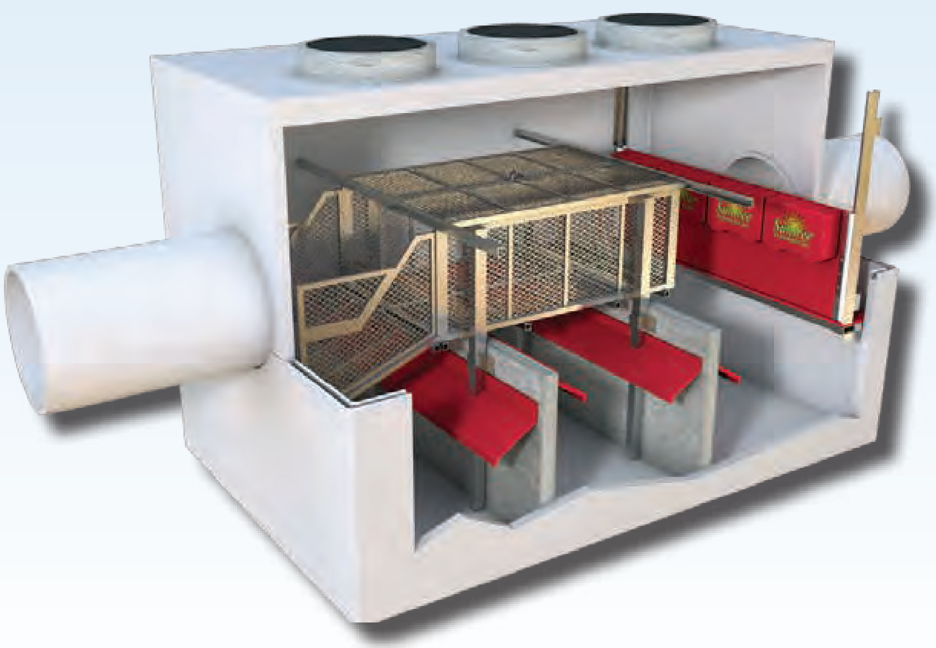
Nutrient Separating Baffle Box® Operation & Maintenance Manual

Suntree Technologies Inc.®

Nutrient Separating Baffle Box®

Operation, Inspection, Cleaning and Maintenance Manual

Version 1.0



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Suntree Technologies Inc.®

"Innovative Stormwater Management Solutions"
Since 1993

Warning

Read the Following Information, Instructions and Warnings Before Inspecting, Cleaning or Performing Maintenance on this Stormwater Treatment Device.

This manual is intended to explain the specifics of the Suntree Technologies, Inc.® Nutrient Separating Baffle Box® and to review the aspects of existing regulations and safety procedures. It is the responsibility of all personnel to familiarize themselves with, understand and comply with all applicable local, state and federal laws before attempting to inspect or service this unit.

All precautions and procedures in this manual are current at the time of printing but are subject to change based on the development of new processes and procedures. Suntree Technologies, Inc.® assumes no responsibility and is not accountable for any injuries, fines, penalties or losses that occur involving any procedure in this manual or other unaddressable actions taken.

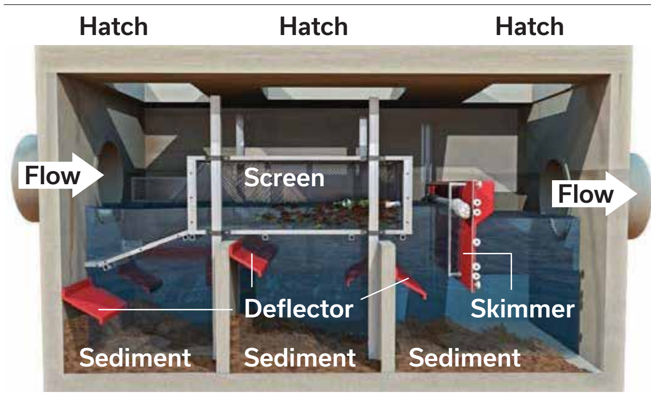
The Nutrient Separating Baffle Box® performance is based on the procedures being followed in this manual. Non-Compliance with the outlined measures will be the responsibility of the owner.

General Information

The Nutrient Separating Baffle Box® (NSBB™) is a key component of your stormwater management program. To maintain proper operation, maintenance of these units is essential. The NSBB™ designed and manufactured by Suntree Technologies Inc.® contains patented and patent pending technologies to treat and manage stormwater.

The NSBB™ is highly effective in capturing Total Nitrogen (TN) Phosphorus (TP), Total Suspended Solids (TSS), organics, trash, oils and grease. Independent testing has shown the NSBB™ is capable of capturing up to 95% of trash, 90% of Total Suspended Solids, 20% of Nitrogen and 19% of phosphorus.

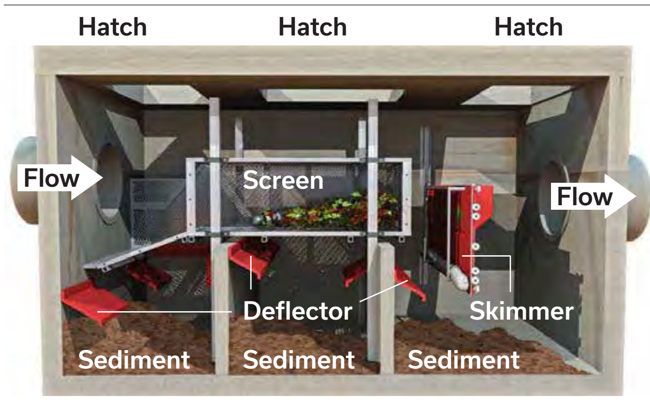
Local and State regulations may require inspections and cleanings every 90 days. Suntree Technologies, Inc.® recommends inspections be conducted every six (6) months and serviced annually for optimal pollutant removal efficiency.



Nutrient rich organics and litter are captured in the screen system.

During Storm Event

- Runoff filters through the screen and skimmer leaving contaminates behind. Left over runoff evaporates over time.
- Turbulence defectors prevent captured sediment from becoming resuspended.
- Hydrocarbons collect in front of the skimmer and are absorbed by the storm boom.



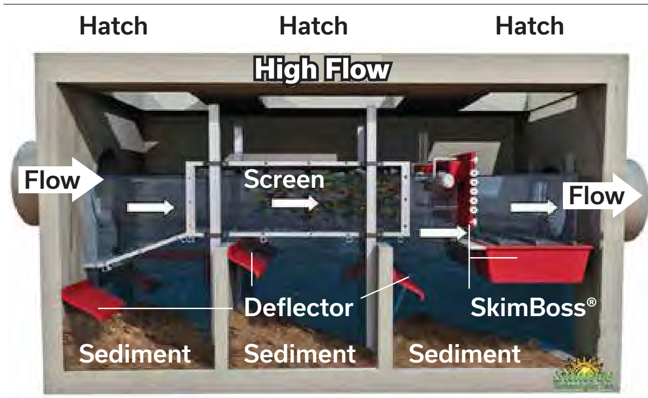
Debris dries out between storm events while pollutants are stored above the static water. As a result, the system does not turn septic.

After Storm Event

- Nutrient pollutant load is not lost to static water and will not be flushed out during the next storm event.
- Separating organic matter from the static water prevents bacterial buildup.

SkimBoss® Filter Information

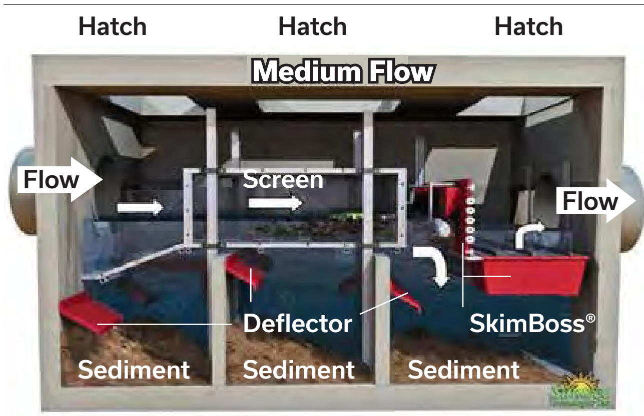
The SkimBoss™ Filtration System removes dissolved phosphorus and nitrogen from stormwater using Bold & Gold® Media. An NSBB™ with SkimBoss™ and Bold & Gold® can capture up to 79% of TP, 67% of TN and 81% of TSS. The use of Hydro-Variant™ Technology lets the SkimBoss™ Filtration System automatically adjusts to hydraulic grade line with a negligible head loss.



Hydro-Variant™ Technology adjusts hydraulic grade line.

High Flow Event

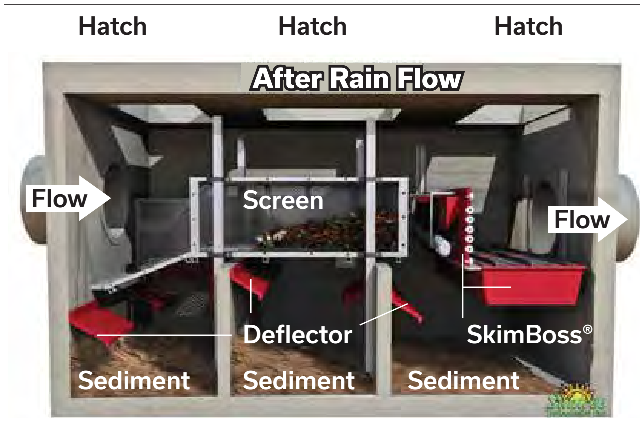
- The SkimBoss™ floating skimmer adjusts the hydraulic grade line via Hydro-Variant™ Technology during high flows.
- The system enters a bypass mode to prevent flooding associated with head loss.
- The SkimBoss™ resumes media filtration upon low flow return.



The SkimBoss™ Filter treats water with Bold and Gold® Media.

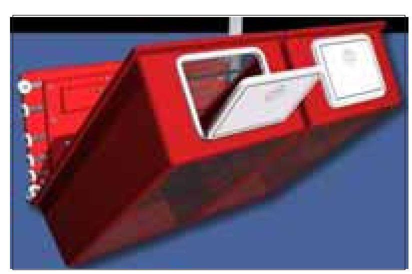
Medium Flow Event

- The SkimBoss™ Filtration System with Bold and Gold® Media treats stormwater by deflecting it under the media vessels via the skimmer and passing through the media.
- Deflected water passes into the Bold and Gold® Media effectively reducing nitrogen and phosphorus levels.



Debris dry out between storms with pollutant stored in the screen.

After Storm Event

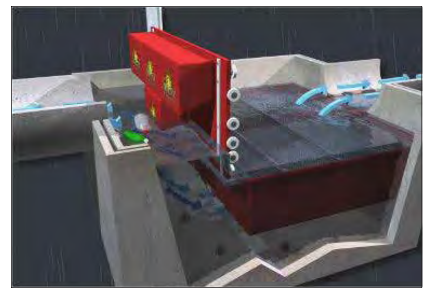


Hinged media vessels allow hatch access for vacuum truck as easy pouring of new filter media.

Bold and Gold® Media Information

Bold and Gold® is a Biosorption Activated Media (BAM) for pollution control to reduce nitrogen and phosphorus in stormwater. When combined with the SkimBoss™ Filtration System, Bold and Gold® combines maximum volume pretreatment without flooding due to head loss. Further benefits of using Bold and Gold® Media include:

- Available in various sizes for particular applications
- Up to 448 gpm flow rate / square foot of surface area
- Economical and lower cost than other media
- Made from recycled materials
- Effectively removes up to 95% Total Phosphorus, 75% Total Nitrogen and 95% Total Suspended Solids
- Sustainable: Eco Friendly
- High Surface Area
- No biological toxic effects
- Physical filtration for the removal of solids
- Sorbent surface bonding for the capture of dissolved pollutants
- Biological activity including nutrient based consumption and denitrification



SkimBoss™ Filtration System with Bold and Gold® media filtering stormwater during a storm event.

Inspection Information

After installation and the site has stabilized, post construction inspections should be conducted after every runoff event. To insure the Nutrient Separating Baffle Box® obtains optimal pollutant removal efficiencies, subsequent sediment accumulation inspections should be conducted a minimum of every six (6) months. In the event the sediment accumulation equals or exceeds 80% of the minimum sediment storage volume (Fig 1), then all accumulated sediment must be removed. All inspections must be documented. (See inspection checklist)

Inspection Procedure

- Inspect the unit from surface.
- Open access points (Manhole/ Hatch) and secure properly.
- Visually inspect screen system to determine debris capacity.
- Inspect sediment chambers under screen system.
- Inspect condition of joints and inflow/outflow pipe grout areas.

(Fig. 1) NSBB™ HVT Maximum Flow Rates 80% Removal

Unit #	Model	Settling Chamber			Sediment Diameter, um				
		Width, ft.	Length, ft.	Settling Area, ft^2	150	125	100	75	50
					80% Removal Flow Rate, cfs				
1	2-4	2	4	8	0.81	0.67	0.49	0.38	0.19
2	2.5-4	2.5	4	10	1.07	0.89	0.65	0.51	0.25
3	3-6	3	6	18	2.24	1.85	1.35	1.05	0.53
4	3-8	3	8	24	3.21	2.65	1.93	1.51	0.76
5	4-6.5	4	6.5	26	3.55	2.93	2.14	1.67	0.84
6	4-8	4	8	32	4.60	3.80	2.77	2.17	1.08
7	5-10	5	10	50	8.03	6.63	4.84	3.78	1.89
8	5-10.5	5	10.5	52.5	8.54	7.05	5.15	4.02	2.01
9	6-12	6	12	72	12.7	10.47	7.64	5.97	2.99
10	6-13.75	6	13.75	82.5	15.0	12.4	9.05	7.07	3.54
11	7-14	7	14	98	18.6	15.4	11.2	8.77	4.39
12	7-15	7	15	105	20.3	16.8	12.2	9.56	4.79
13	8-12	8	12	96	18.2	15.0	10.9	8.55	4.28
14	8-14	8	14	112	22.0	18.2	13.3	10.4	5.19
15	8-16	8	16	128	26.0	21.5	15.7	12.2	6.13
16	9-18	9	18	162	34.9	28.8	21.0	16.4	8.23
17	10-14	10	14	140	29.1	24.0	17.5	13.7	6.86
18	10-17	10	17	170	37.1	30.6	22.4	17.5	8.75
19	10-20	10	20	200	45.4	37.5	27.4	21.4	10.7
20	11-16	11	16	176	38.7	32.0	23.3	18.2	9.1
21	11-24	11	24	264	64.3	53.1	38.7	30.3	15.2
22	11-26	11	26	286	71.1	58.7	42.8	33.5	16.8
23	11-34	11	34	374	99.4	82.1	59.9	46.8	23.4
24	12-21	12	21	252	60.7	50.1	36.6	28.6	14.3
25	12-24	12	24	288	71.7	59.2	43.2	33.8	16.9

NSBB™ Inspection Checklist

Inspection Checklist and Maintenance Guidance: Nutrient Separating Baffle Box®

*** To be Completed at Time of Inspection or Maintenance.**

Owner Name:

Location:

Address:

Phone:

Date & Time:

Site Conditions:

Inspection Items	Recommended Interval	Comments
1 Access Openings	Bi-Annually	
2 Screen System	Bi-Annually	
3 Rear Skimmer	Bi-Annually	
4 Storm Boom	Bi-Annually	
5 Sediment Chambers	Bi-Annually	
6 Vault Condition	Bi-Annually	

1 Inspection items are to determine accessibility into Nutrient Separating Baffle Box®.

2 Inspect screen system for debris volume and broken parts.

3 Inspect sediment chambers for estimated quantity.

4 Inspect general condition of vault for any clogged areas.

Maintenance Items	Volume Collected	Date	Comments
1 Screen System			
2 Sediment Chambers			

1 Inspection items are to determine accessibility into Nutrient Separating Baffle Box®.

2 After cleaning screen system, open bottom doors and vacuum out sediment chambers. (Estimate Volume Collected)

NSBB™ Components

Component Descriptions

The Nutrient Separating Baffle Box® is a multi stage, self contained treatment system. Each subsequent component in the system protects prior stages from clogging. These stages include screening, separation and hydrocarbon absorption.

- Screening is provided by a rectangular basket system which is suspended above the static water level of the sedimentation chambers. The screening filter has a storage capacity of several cubic yards depending on the model. The primary function of the basket is to capture gross solids like trash and nutrient rich debris. The screening system contains debris and provides a dry storage state to prevent nutrient leaching and contamination of static water, causing a septic state.

- Sediment Separation is facilitated by three settling chambers each with a capacity of several cubic yards depending on the model. These chambers work to target smaller sediments and particulate metals.

- Absorption is facilitated by the hydrocarbon boom(s), that are either free floating or attached to the influent side of the skimmer. This device removes free floating and emulsified hydrocarbons from water.

View of Nutrient Separating Baffle Box® and SkimBoss™ with Upflow Filter

Service Requirements and Parts

Minimum Equipment Requirements

The use of a vacuum truck is required for servicing of the Nutrient Separating Baffle Box®. Service crews are recommended to check all local, state and federal guidelines for servicing and disposal of any collected debris and sediments.

Structural Components

The structural components of the NSBB™ are designed to have a life span of several decades. Structural inspections are not required unless stipulated in guidelines set by the local municipality, state or federal agencies.

Replacement Parts

All interior components are designed and sized to be assembled and removed from the NSBB™ for servicing or for parts replacement. This can easily be accomplished via the access ports atop the structure.

For any replacement parts or further instructions please contact Suntree Technologies, Inc®:

Suntree Technologies Inc.®
798 Clearlake Road, Suite 2
Cocoa, Florida 32922

Phone: **321.637.7552**

Fax: **321.637.7554**

Web: **www.suntreetech.com**

Email: **info@suntreetech.com**

Servicing Summary Information

Service Information

Maintenance activities include the removal of captured sediments and debris. Maintenance can be performed from outside the NSBB™ through access points such as manhole covers or hatches installed in the vault surface above the sediment chambers. During maintenance, the screen system may have either SunGlide™ Sliding Doors or Hinged Doors.

These top doors open to gain access to the debris captured by the screen system. This system also has bottom doors that open to give access to the sediment collected in the settling chambers. A vacuum truck is required for debris and sediment removal. Although not every circumstance can be covered in this manual, a situation may arise where the structure needs to be entered. Servicing does not require specialized tools.

Service Procedure Summary

1. Open the access openings (Manhole, Hatch or Grate) on the top of the Baffle Box.
2. Vacuum the debris captured by the screen system to expose the sediment collection chambers.
3. Open the bottom doors to the basket system to expose the sediment collection chambers. These doors have eyebolts to attach the NSBB™ tool in order to open the bottom doors which hinge off to the side.
4. (Attach vacuum truck water hose to service system quick connector and engage if equipped with HydroSlide™.) Vacuum each sediment chamber until they are empty.
5. After cleaning the sediment chambers close the bottom screen doors of the screen system. Lower or Slide the top doors and assure they lock correctly (if equipped with SunGlide™ Lids).
6. When all maintenance work is completed, be sure to close the access covers or hatches.

Caution!

Any Service Work done in Traffic Areas must meet all DOT Roadway Work guidelines and necessary Safety Procedures.

Warning!

All OSHA confined space requirements must be met while cleaning any of the Nutrient Separating Baffle Box® structures.

Note:

All vacuum servicing of NSBB™ components can be done with the use of any vacuum truck designed for catch basin cleaning.

When possible, maintenance should be performed from the surface level.

Screen System Maintenance

Screen Maintenance Procedure

The Nutrient Separating Baffle Box® Screen Basket is recommended to be inspected every six (6) months and cleaned every twelve (12) months.

1 Remove all manhole covers (or open hatches or grates) to gain access to the screening basket.

2 Remove all trash, litter, debris, organics and sediments captured by the screened basket either manually or with the use of a vacuum truck. The vacuum hose will not damage the screen.

3 Remove vacuum hose and replace manhole covers or hatch doors / grates.

4 Transport all debris, trash, litter, organics and sediments to an approved facility for disposal in accordance with local and state requirements.

Nutrient Separating Baffle Box® with trash / debris collected inside the screening system basket.

Note:

The screened basket must be cleaned before vacuuming each separation chamber.

The bottom of the screened basket is designed with three hinged panels that are lifted vertically to access each separation chamber.

SunGate™ Information

SunGate™ Flow Control Gate

The SunGate™ Flow Control Gate is an additional servicing option for your stormwater treatment system. The SunGate™ is adaptable to fit into the NSBB™ at the inflow pipe entrance. This gate isolates your system from water flows when necessary service is required.

- The SunGate™ is available in several varieties and pipe sizes including custom sizes.
- Easy to deploy and remove for maintenance, even under full hydraulic load.
- SunGate™ is highly durable, constructed of marine grade fiberglass and steel.

SunGate™ easily slides in and out of place under full hydraulic load.

Servicing with the SunGate™

1. Slide SunGate™ Flow Control Gate into place at inflow pipe by hand or using included tools.
2. Using wrench or included tool; twist cam bolts to the right to lock in place and create a water tight seal.
3. Service NSBB™ vault, basket and sediment chambers via vacuum truck.
4. When servicing of NSBB™ is complete, open the SunGate™ hatch to equalize water pressure.
5. Using wrench or included tool; twist cam bolts to the left to release water tight seal.
6. Slide out SunGate™ with included tool or pull SunGate™ out if using wheeled version. (Wheeled SunGate™ can be used under full hydraulic load)

Separation Chamber Maintenance

Open lower screen panels to remove sediments via vacuum.

Separation Chamber Maintenance Procedure

The Nutrient Separating Baffle Box® Hydrodynamic Separation Chambers are recommended to be inspected every six (6) months and cleaned every twelve (12) months.

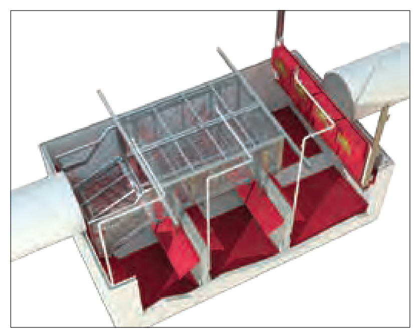
1 Remove all manhole covers (or open hatches or grates) to gain access to the separation chambers.

2 Lower vacuum truck hose into the first separation chamber through the screening basket closest to the inflow pipe. Pressure washing may be needed to remove compacted sediments. (If not equipped with the HydroSlide™ system)

3 Repeat this process in each separation chamber.

4 Remove vacuum hose and lower hinged panels of screening basket back to a horizontal position.

Separation Chamber Service with HydroSlide™



HydroSlide™ system installed into each separation chamber.

1 Remove all manhole covers (or open hatches or grates) to gain access to the separation chambers.

2 Lower vacuum truck hose through the screening basket and into the first separation chamber, closest to the inflow pipe.

3 Attach the vacuum truck water supply hose onto the HydroSlide™ service system quick connector.

4 Start the HydroSlide™ service system using the vacuum truck hose while operating the vacuum line. Debris will be quickly and easily flushed toward the vacuum line and removed. Repeat for each chamber.

5 Remove vacuum line and disconnect truck water supply hose. Repeat steps 3 – 5 for each chamber.

6 Remove vacuum hose and close the bottom screen system doors. Lower / Slide (if equipped with SunGlide™ Lids) and lock top screen doors.

HydroSlide™ quick connector with vacuum truck water supply hose attached for sediment removal.

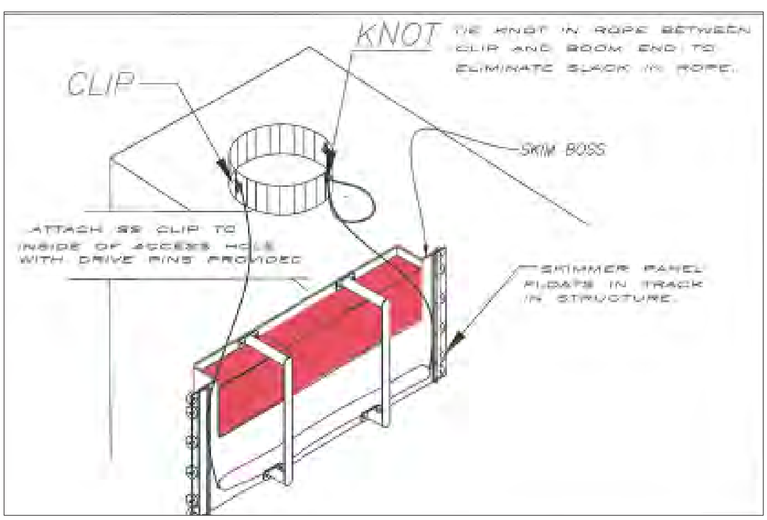
StormBoom™ Information

General Specification Information

StormBooms™ provide sufficient contact time, at rated flows, of passing contaminate water. The material composition will capture and retain all hydrocarbons that are absorbed into the physical structure. The composition material of the boom is made of proprietary polymer based beads that are contained within booms or pouches. Such pouches are made of 100% polyester netted fabric with sieve openings and an open area ratio of about 67%.

The boom and netting material are durable and have an expected life of 5 plus years. StormBooms™ have been proven to absorb up to 180% of its weight within a 300 second contact time. However, the physical increase in size of the boom beads is not more than 50%. Booms capture an array of hydrocarbons including oils, grease, gasoline, diesel and PAHs.

The Hydrocarbon Skimmer Panel is located below the rear top access opening in the Nutrient Separating Baffle Box®. The skimmer panel may be a reinforced fiberglass flat panel, a fiberglass molded panel or a SkimBoss™ floating skimmer. Hydrocarbon booms are designed to fit inside the panel which has an expanded metal screen face. There is an oval hole at the top of the panel for inserting or removing the hydrocarbon boom. Each boom is equipped with rope ends to secure the boom in place after it has been inserted into the skimmer panel.



SkimBoss™ floating skimmer with StormBoom™ attached with rope to SS Eye Strap ready for replacement.

Note:

StormBooms™ are single booms for vaults up to 6′ wide and double in length for vaults 8′ or larger.

StormBoom™ Maintenance

StormBoom™ Installation Procedure

The Nutrient Separating Baffle Box® StormBoom™ is recommended to be inspected every six (6) months and cleaned every twelve (12) months.

1 Thread one rope end in one of the top panel holes.

2 Each end of the rope will be on opposite ends of the panel and will be brought up to the rear access opening in the top of the box.

3 Attach rope ends to SS Eye Straps which are fastened to the inside of the rear access hole in the concrete.

4 The bottom of the hydrocarbon boom should look slightly "U" shaped and rest 6" from the bottom of the skimmer panel.

5 Double knot the rope ends to eliminate any slack.

StormBoom™ Replacement Procedure

1 Remove manhole cover (or open hatch / grate) closest to the outflow to access the StormBoom™.

2 Inspect the boom in the skimmer system for oil accumulation. Booms should be replaced once discolored or are close to one (1) year of service.

3 The StormBoom™ has ropes attached to each end that are secured to eyelets adjacent to the access cover.

4 Attach a rope on the end of the new boom to a rope on the end of the old boom and pull to remove. As the old boom is removed, the new boom moves into position.

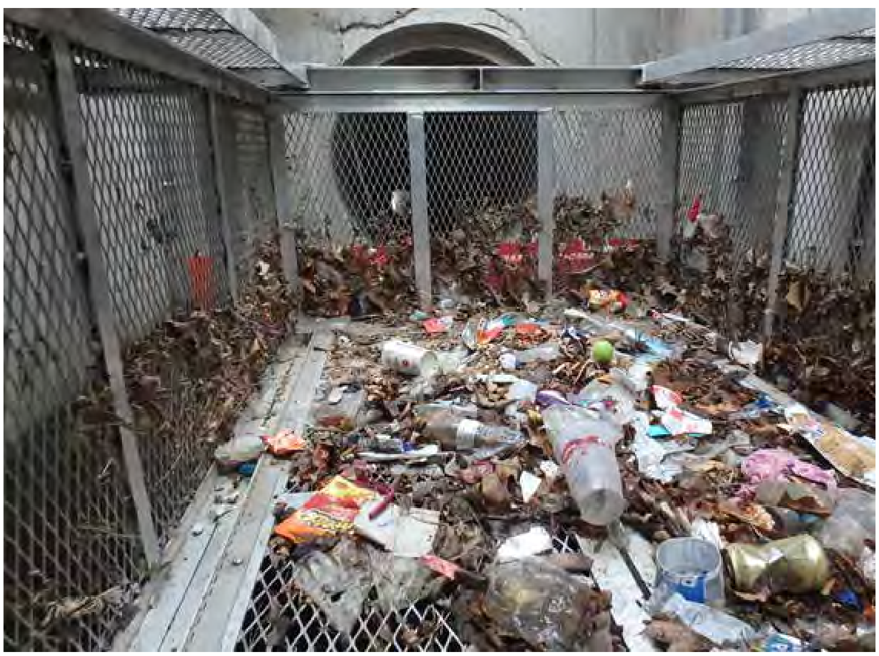
5 Gather enough excess slack to allow the boom to freely float on the surface of the water at the static level.

6 Attach the rope ends of the new boom to the eyelets adjacent to the access cover.

Post Servicing Protocol

After completing inspection or maintenance, the service operator should prepare a record of service. The record should include maintenance activities performed, amount and description of debris collected and system condition.

- The owner will retain the service / inspection record for a minimum of five (5) years from the date of maintenance, or in accordance to specified EPA / DEP requirements.
- All records should be made available to the governing municipalities for inspection upon request at any time.
- Transport all debris, trash, litter, organics and sediments to an approved facility for disposal in accordance with local and state requirements.



Nutrient Separating Baffle Box® with collected trash, organics and debris inside the screened basket system ready for disposal.

Warranty

Warranty Information

Suntree Technologies, Inc.® products are engineered and manufactured with the intent of being a permanent part of the infrastructure. Suntree Technologies, Inc.® warranties its products to be free from manufacturing defects for a period of five (5) years from the date of purchase.

In the event a warranty claim is made and determined to be valid, Suntree Technologies will replace or repair the product at their own discretion. Warranty claims must be submitted, evaluated and approved by Suntree Technologies for the claim to be determined valid. All warranty work must be authorized by Suntree Technologies prior to work beginning not covered by this warranty. There are no warranties expressed or implied other than what is specified herein. Abusive treatment, neglect or improper use of the Nutrient Separating Baffle Box® will not be covered by this warranty.

Notes

Contact

General Inquires

For additional information concerning general usage, maintenance products, warranties or replacement parts please contact:

Suntree Technologies Inc.®
798 Clearlake Road, Suite 2
Cocoa, Florida 32922

Phone: **321.637.7552**

Fax: **321.637.7554**

Web: **www.suntreetech.com**

Email: **info@suntreetech.com**

Visit our website for in depth information on all of our products!

Appendix D

Nutrient Separating Baffle Box®
Testing Reports

Suntree Technologies Inc.®

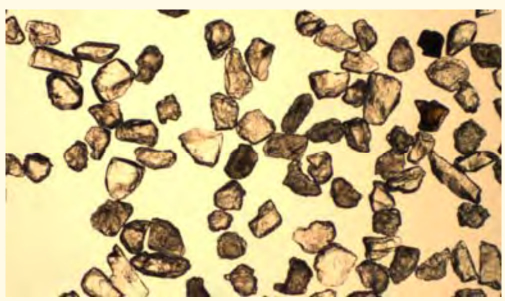
Nutrient Separating Baffle Box®

NJDEP Hydrodynamic Protocol
Evaluation with 100 μm Particles

Daniel P. Smith, Ph.D., P.E., DEE
Applied Environmental Technology
Tampa, FL 33592-2250

May 30, 2013

AET



Nutrient Separating Baffle Box®
NJDEP Hydrodynamic Protocol Evaluation with 100 um Particles
May 30, 2013
Applied Environmental Technology (AET)
Tampa, FL 33592-2250

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EXECUTIVE SUMMARY

The Nutrient Separating Baffle Box® (NSBB) is a manufactured treatment device (MTD) supplied by Sun tree Technologies Inc.® for removing solids from stormwater. Performance of a full-scale NSBB was experimentally evaluated according to the removal efficiency and resuspension protocol recently published by the New Jersey Department of Environmental Protection (NJDEP) and endorsed by the Stormwater Equipment Manufacturer's Association (SWEMA). Experiments were conducted using a relatively narrow particle size distribution (PSD) centered on 100 μm, in lieu of the broader PSD specified by NJDEP. The performance evaluation was conducted using NSBB Model 3-6-73, which has a sedimentation surface area of 18 square feet. A false bottom was installed in each chamber at 6 inch depth, or 50% of the Maximum Sediment Storage Volume (MSSV). Sediment removal efficiency was evaluated by dosing at least 25 lbs. of test sediment to the NSBB, and precisely measuring the mass of sediment dosed and the mass of sediment captured. Influent Suspended Sediment Concentration (SSC) was 200 mg/L in all tests. Removal efficiency experiments were conducted for seven flow rates over a range of 0.25 to 1.75 cubic feet per second (cfs). SSC removal efficiency ranged from 68.1 to 98.2 percent, and progressively increased as flow rate decreased. A Maximum Treatment Flow Rate (MTFR) of 1.30 cfs was derived for 80% SSC removal using the NJDEP weighted removal efficiency procedure. A resuspension experiment was conducted at 2.70 cfs, or 208% of the MTFR, in which no sediment was dosed to the NSBB and bottom chambers were pre-loading with 100 μm test sediment to 6 inch depth, or 50% of MSSV. The sediment used on the NSBB resuspension test was finer than that required by the NJDEP protocol and provided a more rigorous resuspension evaluation. Effluent SSC concentrations in the resuspension test ranged from 3.2 to 6.6 mg/L and did not statistically differ from background influent levels. The SSC in NSBB effluent during the resuspension test were well below the 20 mg/L NJDEP limit that qualifies the NSBB for on-line installation. The results of the Model 3-6-72 tests were used to determine the Maximum Treatment Flow Rates for eleven additional NSBB models in the Suntree product line by applying constant surface overflow rate scaling to the MTFR of Model 3-6-72.

BACKGROUND

The Nutrient Separating Baffle Box® (NSBB) is a structural Stormwater Control Measure (SCM), or Manufactured Treatment Device (MTD), that reduces pollutant loadings by capturing sediments, gross solids, and associated pollutants. The treatment effectiveness of the NSBB can be assessed through definitive experimental evaluations that quantify the suspended sediment removal efficiency under controlled conditions (1). The New Jersey Department of Environmental Protection (NJDEP) recently issued a new revised protocol for the laboratory evaluation of hydrodynamic separation devices to determine suspended sediment removal efficiency and sediment resuspension. The new protocol, titled *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device* (2) is based on a protocol that was recommended by the Stormwater Equipment Manufacturers Association (SWEMA) to perform essentially the same evaluation (3).

The *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device* (2) presents detailed protocols for the laboratory evaluation of hydrodynamic separation devices to determine suspended sediment removal efficiency and sediment resuspension. This document requires that a full scale, commercially available MTD with a specified Effective Sedimentation Area be used in performance testing. The NJDEP protocol includes specifications for the particle size distribution (PSD) of sediment for removal efficiency and resuspension experiments, use of false bottoms in removal efficiency testing, sediment pre-loading in resuspension testing, methods of sampling and analyses, maximum water temperature and maximum background sediment levels. Qualifications of the 3rd party testing laboratory are established.

OBJECTIVE

The objective of this study was to evaluate the performance of a full-scale Nutrient Separating Baffle Box® (NSBB) for 100 μm sediment particles, using protocols for removal efficiency and resuspension established by NJDEP (2). A 100 μm test sediment is congruent with the treatment functionality of the NSBB and provides a more useful comparative basis for hydrodynamic MTD performance than wider PSDs. Many municipalities and stormwater agencies seek MTD performance data based on a 100 μm particle size sediment.

SUNTREE TECHNOLOGIES INC.®

Corporate History The stormwater treatment division of Suntree Technologies was founded by Mr. Henry Happel and Mr. Tom Happel in 1993 in response to local environmental concerns and the need to protect the Indian River Lagoon from stormwater pollutants. Initially incorporated as Suntree Isles and currently doing business as Suntree Technologies Inc.®, the company has been designing and manufacturing stormwater pollution control devices since 1993. The Nutrient Separating Baffle Box® was developed in 1998 by incorporating screen capture devices into in-line sedimentation chambers in order to capture large stormwater materials and hold them out of the water column between storm events. The first NSBB was installed in 1999, and NSBB designs have since continued to evolve and improve. Suntree has also developed an extensive line of other products for the stormwater management industry, including a variety of inlet filter systems, media filtration systems, polymer filtration systems, and advanced skimmer systems. Suntree provides both standardized BMP units and customized designs, and holds thirteen patents for innovative technologies that are related to their NSBB product line.

Organization and Management Suntree Technologies Inc.® is a privately owned Florida corporation with corporate headquarters located at 798 Clearlake Road, Cocoa, FL (PH: 321-637-7552). Suntree Technologies is currently owned and managed by Tom Happel as president and John Happel as Vice President. The product market place of Suntree Technologies has expanded beyond Florida to include all 50 states, with an extensive distributor network.

Operating Experience with Respect to the Proposed Technology To date there are approximately 1,500 installations of the Suntree Nutrient Separating Baffle Box® across the

United States, which vary in size and configuration to treat storm pipes ranging in size from 6" to 84" in diameter. In addition to 14 different standard sizes, custom NSBB configurations are manufactured to accommodate various unique treatment and site specific requirements.

The Nutrient Separating Baffle Box® (NSBB) is also referred to as the 2nd Generation Baffle Box and is a significant design improvement over previous old style baffle boxes. Key innovations have been the incorporation of a raised screen basket in line with the stormwater inlet pipe to keep organic material and debris separate from the static water between rain events, and the addition of turbulence deflectors to improve the settling of fine sediments while minimizing re-suspension. While Suntree initially developed the Nutrient Separating Baffle Box® as a gross pollutant removal device prior to stormwater outfalls, NSBB application has since been expanded to a pretreatment option prior to underground detention, exfiltration fields, filtration systems, and injection wells, as well as its general use as a component of a treatment train. A variety of media treatment systems are also available as options for the NSBB. The unique design of the Nutrient Separating Baffle Box® results in minimal head loss through the treatment structure. As a result, the NSBB can be installed in either an on-line or off-line configuration, making for an easy retrofit within existing water sheds.

Patents The proprietary technology behind the Nutrient Separating Baffle Box® and its many unique and specialized features are protected by patents issued by the U.S. Patent office, and patents pending. The trade name, Nutrient Separating Baffle Box®, is a federally registered trademark of Suntree Technologies, Inc.® Below is a list of issued utility patents for the NSBB and its features:

6,428,692	6,979,148	7,294,256	8,034,236
7,270,747	8,231,780	7,981,283	8,034,234
7,153,417	7,846,327	8,083,937	8,142,666
8,366,923			

Technical Resources, Staff and Capital Equipment Suntree Technologies Inc.® employs 30 employees which includes 2 staff engineers. In addition to in-house design work, additional engineering is often outsourced to several different firms. Specialized product testing and evaluations are performed in house and by third party testing laboratories.

Suntree Technologies Inc.® representatives oversee the assembly and installation of every Nutrient Separating Baffle Box® to ensure that installation is always perfect, and that the treatment system is quality controlled to ensure optimum treatment of the water flow. Suntree Technologies Inc.® warranties all of its products to be free from manufacturer's defects for a period of at least five (5) years from the date of purchase. Suntree Technologies Inc.® also warranties that the materials used to manufacture its products are able to withstand and remain durable to typical environmental conditions for a period of at least five (5) years from the date of purchase.

The vault that makes up the Nutrient Separating Baffle Box® is typically made of either concrete or fiberglass. Typically, the concrete is cast by an independent casting company that is located relatively local to the installation site. The interior components are manufactured in Cocoa

Florida and shipped to the casting company where the components are then installed. If a project requires a fiberglass vault, the vault with all the interior components pre-installed is shipped from Cocoa, Florida. In almost all cases, all the unique interior components are installed prior to delivery of the vault. This makes for a quick and easy install, in which the excavation, setting Nutrient Separating Baffle Box®, and restoration of the excavation often takes less than a day.

The products of Suntree Technologies Inc.® are available either directly from Suntree Technologies or through a national sales network of authorized distributors. There are no other manufacturers authorized to sell or market the Nutrient Separating Baffle Box®.

NUTRIENT SEPARATING BAFFLE BOX®

The NSBB is a subsurface rectangular vault MTD that is placed on-line in the stormwater collection system. The NSBB vault is subdivided into a series of chambers by engineered vertical baffles which influence hydrodynamics and capture suspended particles by sedimentation (Figure 1). The NSBB additionally contains a basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during non-flow periods. Details of the NSBB can be found on the Suntree Technologies Inc.® website (4). The NJDEP performance evaluation of will be conducted using the commercially available NSBB Model 3-6-72. Details of NSBB 3-6-72 are summarized in Table 1.

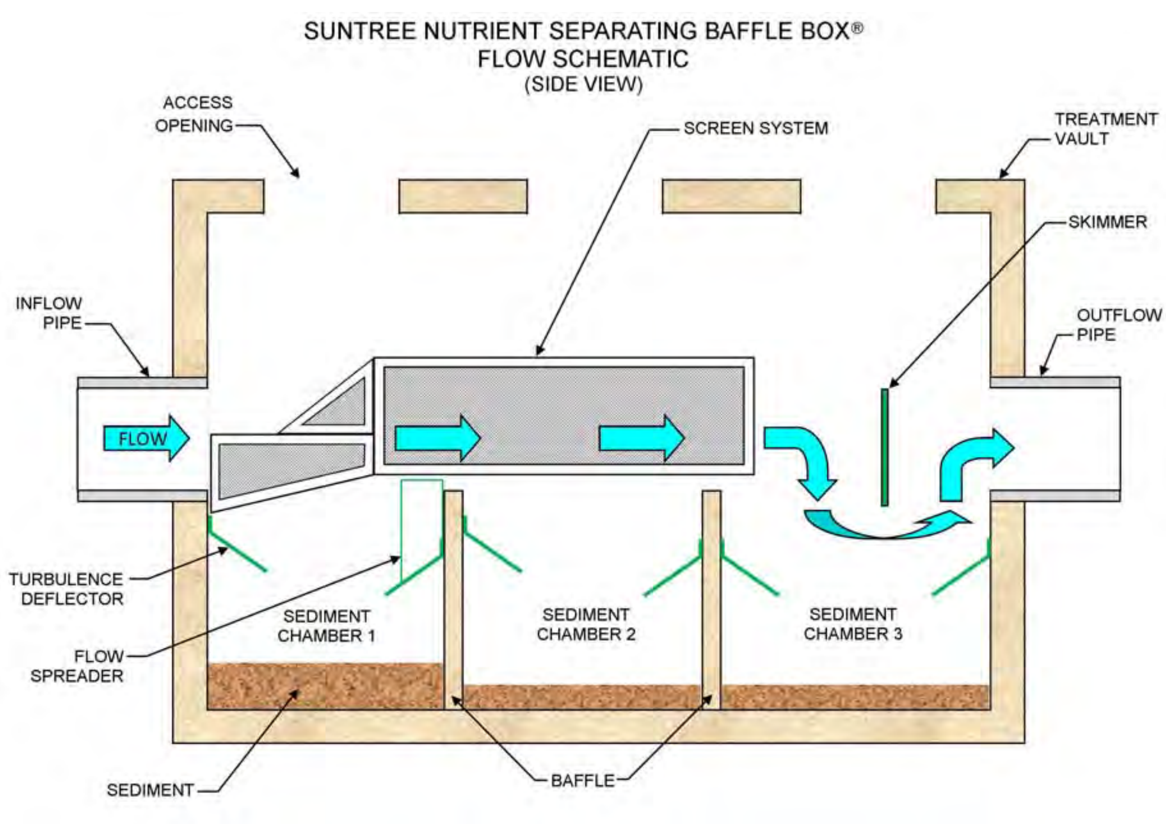


Figure 1 Nutrient Separating Baffle Box®

Table 1 NSBB 3-6-72 Specifications

Internal length, inch	72
Internal width, inch	36
Number of bottom chambers	3
Baffle height, inch	36
Effective sedimentation area, ft^2	18
Chamber empty bed volume, gallon	404
Maintenance Sediment Storage Volume, ft^3	18.0
Screen box length, inch	51
Screen box width, inch	21

Drawings of the NSBB 3-6-72 are included in Appendix A. The Maintenance Sediment Storage Volume (MSSV) of the NSBB 3-6-72 has been established as 18 ft^3, which represents an average sediment depth of 12 in. over the plan area of each of the three bottom chambers. The NJDEP protocol (2) requires a sediment pre-loading of 50% of the MSSV, which for the NSBB 3-6-72 is a uniform sediment depth of 6 inch over the bottom surface of all three chambers (9 ft^3 volume). In practice, sediment accumulation in the NSBB is typically not uniform, with the greatest accumulation of sediment in the first chamber and the least accumulation in the last. For removal efficiency testing, false bottoms were placed across the entire bottom of each chamber at 6 in. depth, i.e. at the 50% MSSV sediment depth. For the resuspension experiment, test sediment was placed to a uniform depth of 6 in. in each chamber; false bottoms were not used.

PARTICLE SIZE DISTRIBUTION

The NSBB evaluation was conducted using sediment with a relatively narrow particle size distribution (PSD) centered on 100 μm. The test sediment was a processed Best Sand 110 (Best Sand Corporation, Chardon, OH). Best Sand 110 is a high quality sub-angular grain silica sand with a purity of greater than 99% SiO_2 and a median particle size (d_{50}) in the 100 μm range. A series of sieving and decanting procedures were developed to produce a sediment with a d_{50} in the 100 μm particle size. Production steps were: remove coarser particles by dry sieving through US No. 125 sieve; remove finer particles by wet elutriation with continuous washing in a 12 in. x 18 in. slurry channel basin with water flow rate of ca. 4.4 gallon per minute; decant water; collect sand and dry at 170F, and store in sealed 5 gallon buckets until ready for use.

PSD analyses were conducted by a certified laboratory (BTL Engineering Services, Tampa, FL 33614) according to ASTM D 422 (9). A PSD of test sediment is shown in Figure 2. Results of PSD conducted on eight test sediment samples are listed in Table 2. Mean d_{50} was 97.5 μm, with a standard deviation of 3.7 μm and coefficient of variation of 0.037. The 100 μm PSD contrasts with the broader PSD specified in the NJDEP protocol (2). Results of all test sediment PSD analyses are included in Appendix E.

The 100 μm PSD contrasts with the broader PSD specified in the NJDEP protocol (2). Sediment removal in hydrodynamic devices is highly dependent on particle size and settling velocity (5,6,7). Use of sediment with a relatively narrow PSD centered on 100 μm is congruent with the treatment functionality of the NSBB and provides a more useful comparative performance basis than wider PSDs. Other than the use of a narrow PSD test sediment centered on 100 μm particles, the NSBB testing for removal efficiency and resuspension were in accordance with the NJDEP protocol for hydrodynamic separator devices (2). The sediment used in the NSBB resuspension tests was much finer than that specified in the NJDEP resuspension protocol (i.e. d_{50} of 98 versus 216 μm). According to theory, propensity for resuspension is proportional to the inverse of the particle diameter. Therefore, the NSBB experiment provided a more rigorous resuspension test than required by the NJDEP protocol.

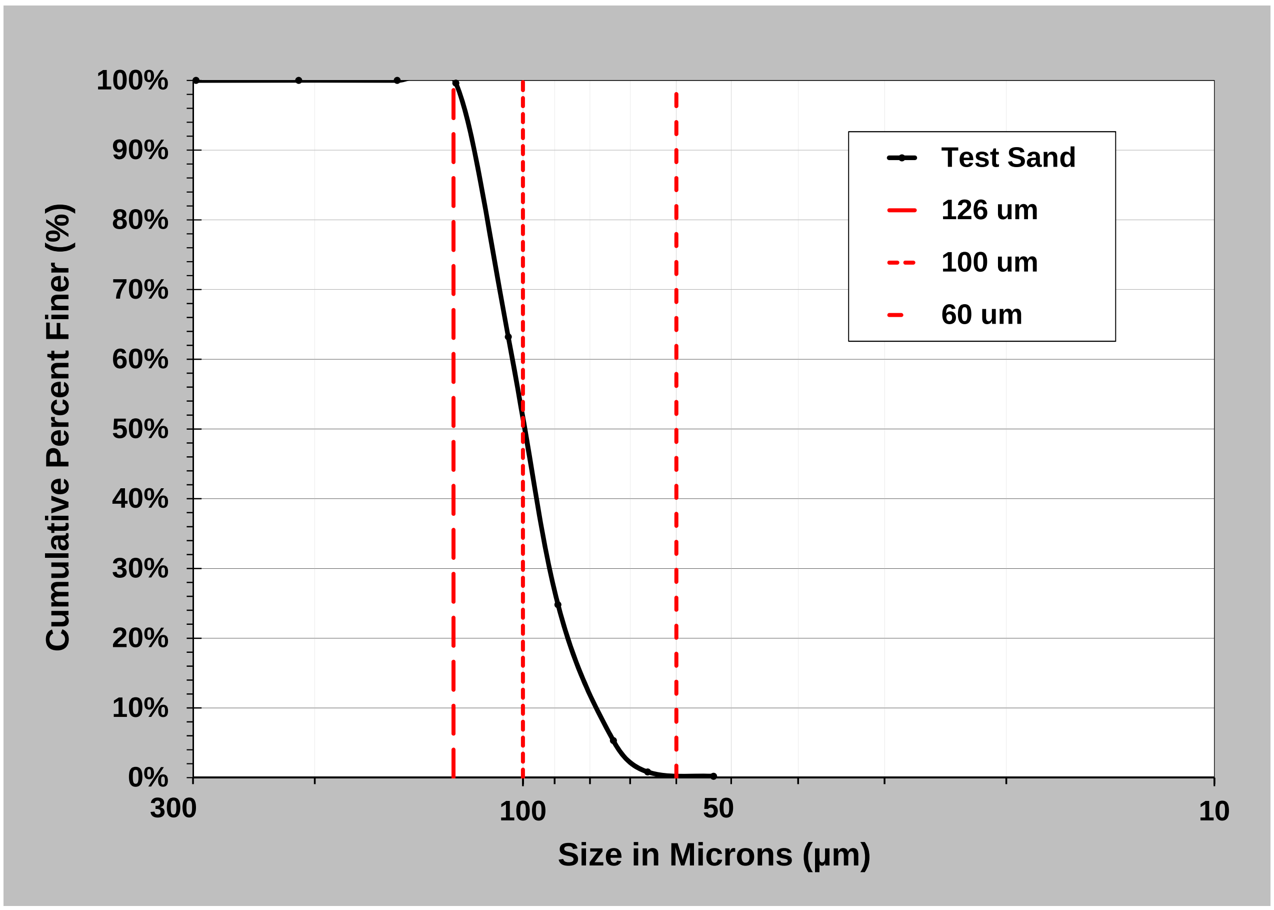


Figure 2 Particle Size Distribution of Test Sediment

Table 2 Test Sediment Particle Size Analysis

Sand Source	Date	d_{90}, um	d_{50}, um	d_{10}, um
Hopper	11/12/12	117.9	100.8	80.3
Hopper	11/16/12	118.5	101.2	78.6
Hopper	11/20/12	118.1	100.9	80.0
Hopper	11/26/12	106.5	92.5	76.3
Hopper	11/28/12	106.2	92.0	76.6
Chamber 1 Pre-Load	01/08/13	116.4	98.0	78.6
Chamber 2 Pre-Load	01/08/13	114.4	96.4	79.2
Chamber 3 Pre-Load	01/08/13	114.0	98.2	82.1
	Mean	114.0	97.5	79.0
	Standard Deviation	5.0	3.7	1.9
	Median	115.4	98.1	78.9
	Coefficient of Variation	0.044	0.037	0.024

NSBB PERFORMANCE EVALUATION WITH NJDEP PROTOCOL

The NJDEP protocol entails the following:

- Establish a Maintenance Sediment Storage Volume (MSSV), the maximum amount of sediment that can accumulate in the MTD based on a six month interval.
- Evaluate suspended sediment removal efficiency of the treatment device across a range of flow rates that encompass 25, 50, 75, 100 and 125% of the Maximum Treatment Flow Rate (MTFR). Each experiment is conducted with an influent suspended sediment concentration of 200 mg/l and with a false bottom placed at a level of 50% of the MSSV.
- Establish a Maximum Treatment Flow Rate (MTFR) for which a performance claim (i.e. percent removal efficiency) will be made for the treatment device. The performance claim is stated as a flow weighted removal efficiency of suspended solids (TSS/SSC). MTFR is derived from a continuous curve of weighted removal efficiency based on individual experiments that bracket the MTFR-scaled flow rates at 25 and 125%.
- Evaluate sediment resuspension at a flow rate of 200% of the Maximum Treatment Flow Rate (MTFR) for on-line installation, without sediment dosing into the NSBB influent, and with sediment pre-loading of 50% of the Maintenance Sediment Storage Volume (MSSV).
- Compare effluent TSS/SSC from the resuspension experiment with NJDEP on-line MTD criteria of 20 mg/L.

For the NSBB, the Maintenance Sediment Storage Volume (MSSV) is a uniform depth of 12 in. in each of the three chambers. A target SSC removal efficiency of 80% was established as the basis for the performance claim. The conducted removal efficiency experiments are listed in Table 3.

Table 3 Summary of Removal Efficiency Experiments

Flow Rate, cfs	% of MTFR[1]	Sediment Mass Flow, gram/min	Hydraulic Retention Time, min[2]	Surface Overflow Rate, gal/ft^2-min
0.25	19.2	85	3.60	6.2
0.50	38.5	170	1.80	12.5
0.75	57.7	255	1.20	18.7
1.00	76.9	340	0.90	24.9
1.25	96.2	425	0.72	31.2
1.50	115	510	0.60	37.4
1.75	135	595	0.51	43.6

[1] Maximum Treatment Flow Rate, determined in subsequent section of report
[2] Based on chamber volumes

EXPERIMENTAL SYSTEM

Configuration Experiments were conducted at the Applied Environmental Technology Test Facility (AET-TF) in Hillsborough County, Florida (8). A schematic of the system used to conduct the experiments is shown in Figure 2. The system consisted of a Screening Chamber, a Dosing Hopper System, the Nutrient Separating Baffle Box (NSBB), a Water Recycle Reservoir, influent pump, influent flow control valve, influent flow meter, and associated piping and appurtenances. Access locations were provided for background influent and effluent sampling. Through a process of adaptive development, the apparatus depicted in Figure 1 was iteratively assembled into a complete experimental system, fully capable of meeting the testing requirements of the NJDEP Protocol. The Influent Pump was the only power requiring component of the experimental system; all other flow was by gravity. Sediment was dosed from an open hopper directly into the conveyance pipe through a slot in the crown of the pipe. Test water was AET-TF groundwater supplied by pump to the Water Recycle Reservoir. The groundwater supply had circumneutral pH, was virtually free of suspended sediment, and had limited dissolved oxygen levels. Water pumped to the Water Supply Reservoir was aerated and filtered several days prior to performance of tests. All experiments were conducted at water temperatures of less than 80F.

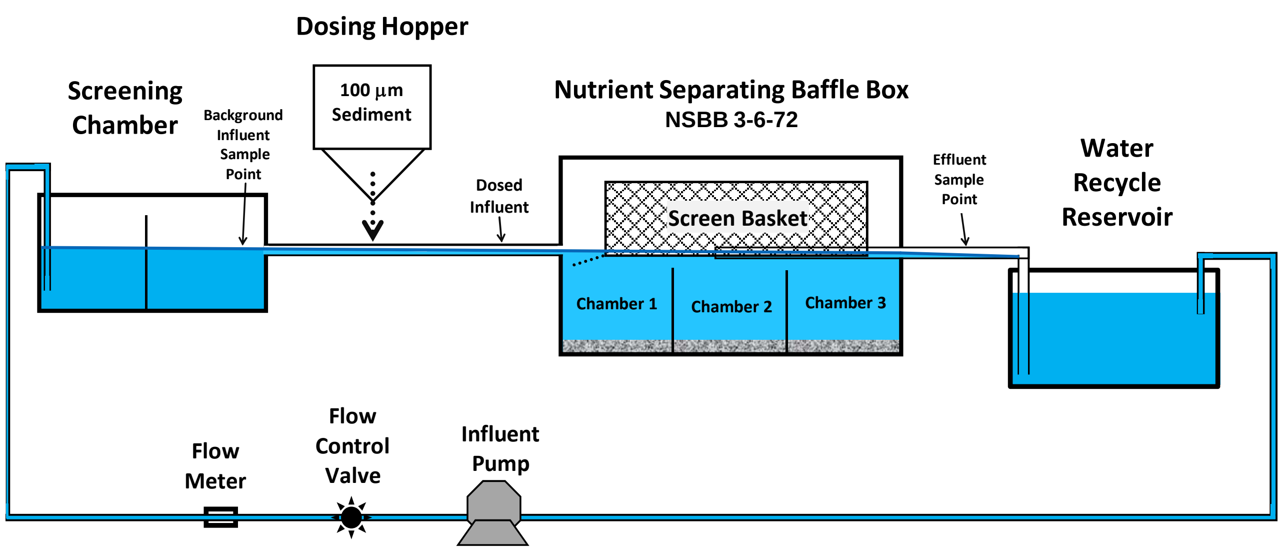


Figure 3 Schematic of Experimental System

Pump Flow to the experimental system was provided by a John Deere diesel powered vacuum well point pump (Model 6VW-DJDST-45D-M, Thompson Pump Co., Sarasota, FL). The pump was connected by 6 inch tubing to a PVC withdrawal pipe in the Water Recycle Reservoir that extended eight inches below the water surface. The pump had variable speed control to adjust the flow rate and was capable of maximum flow rates exceeding three cubic feet per second.

Flow Rate Control Valve A 6 inch knife gate valve (Thompson Pump Co., Sarasota, FL) was used for fine flow rate adjustment at test initiation and throughout the experiments as needed.

Flow Meter Flow rate was measured with a PT-500 Ultrasonic Flow Meter, Serial Number 7629 (Greyline Instruments Inc., Massena, New York). The PT-500 is a Transit Time ultrasonic flow meter that employs two sensors mounted on the outside of the pipe wall and has a manufacturer stated accuracy of ±2% (http://www.greyline.com/pt500.htm). The instrument was calibrated by Micronics Ltd. and a copy of the Certificate of Calibration is included in Appendix E. The flowmeter was positioned in close proximity to the flow valve to enable expeditious adjustment of the flow rate by a single operator.

Screening Chamber The screening chamber (3 ft. by 6 ft.) contained a coarse screen to remove any larger suspended material which inadvertently entered the experimental system. Water was pumped from the Water Supply Reservoir to the upstream end of the Screening Chamber, and all flow passed through the screen on its way to the 14 in. pipe that connected the Screening Chamber to the baffle box. An access cover was placed in the top of the Screening Chamber at the location of the outlet to enable samples to be taken for background influent Suspended Solids Concentrations.

Sediment Dosing System Sediment was dosed using a dry feed system placed directly over the crown of the 18 inch pipe that connected the Screening Chamber to the NSBB. The location of sediment dosing was 6 ft. (72 in.) from the entrance to the NSBB. Sediment dosed from the hopper passed through a slot in the crown in the pipe. The hopper had an inverted square pyramid geometry of 23.5 in. inner diameter with rounded corners, and sides at 42^{o} from horizontal. Sediment mass flow was controlled by aluminum plates placed at the bottom of the hopper. The aluminum plates contained one or two circular orifices which were calibrated to deliver target mass flow rates. Seven plates were fabricated, one for each of the seven removal efficiency experiments. Plate calibration was conducted in situ by measuring the mass of sediment collected for 60 seconds using dried and prepared test sand.

NSBB 3-6-72 The NSBB 3-6-72 was placed on-line for all testing and treated 100% of the applied flow. For removal efficiency testing, false bottoms were placed across the entire bottom of each chamber at 6 in. depth, i.e. at the 50% MSSV sediment depth. For the resuspension experiment, test sediment was placed to a uniform depth of 6 in. in each chamber; false bottoms were not used. The NSBB was connected to the Water Recycle Reservoir by 18 inch piping. Piping proceeded horizontally from the NSBB to a location just inside the wall of the Water Recycle Reservoir, where a right angle in the piping directed flow in a vertically downward direction to the bottom of the Water Recycle Reservoir.

Water Recycle Reservoir The Water Recycle Reservoir had a circular plan area of 22 ft. and mean working depth of ca. 46 in., with water capacity of ca. 10,800 gallons. Flow from the NSBB entered the reservoir at the bottom; it was directed parallel to the reservoir wall to create a circumferential flow field. Water withdrawal occurred from a location ca. 8 in. below the water surface, ca. 40 in. from the inflow pipe, but in the opposite direction from which influent flow was directed. The inflow and withdrawal locations and their orientations created a circumferential path of water flow path in the Water Recycle Reservoir.

CONDUCT OF REMOVAL EFFICIENCY EXPERIMENTS

All removal efficiency experiments followed a testing protocol that was iteratively developed to implement the NJDEP testing requirements.

System Cleaning The NSBB, Screening Chamber, and piping were covered between experiments and were completely cleaned prior to testing to remove sediment.

Sediment Preparation Several hours before each experiment, ca. 33 lbs. of sediment was removed from sealed containers, dried for 2 hours at 180^{o}F, cooled, and sieved though a U.S. No. 80 (180 μm) screen. The sediment was loaded into the dosing hopper shortly before the experiment was initiated. Appendix D included Quality Assurance results for Constant Weight in Sediment Preparation, Constant Weight Pre-Testing.

Water Temperature Water temperature was verified to be less than 80F just before the initiation of each experiment using a NIST traceable thermometer (Traceable Calibration Control Company 281-482-1714).

Field Data Sheets Field data sheets were prepared for preparation of test sediment, temperature monitoring, flow rate target and monitoring, sediment dosing rate monitoring, total sediment dosing time, background suspended sediment concentration sample collection times, Suspended Sediment Concentration (SSC) laboratory analysis, and laboratory blank and laboratory control samples for SSC analysis. Data sheets specified and recorded time of sediment dosing initiation, time of sediment dosing termination, time of all sample events, and time of other observations.

Sample Containers Samples containers were prepared for at least eight background influent SSC samples and six sediment dosing samples. All containers has sealable tops. SSC containers were one half gallon PETE canisters with round 4 in. diameter open mouths. SSC containers and tops were rinsed at least three times with tap water and drained. SSC containers were numbered and deployed in order of increasing number with experimental time. Sediment containers were 4.5 x 6 in. open containers of 2.75 in. depth, cleaned by repeated wipings with clean paper towels. Sediment containers were lettered A though F and deployed progressively with experimental time.

Flow Initiation and Control When all experimental preparations were completed, the pump was started at an initial speed estimated to produce the target flow rate. The flow meter was then powered on and allowed to electronically stablilize. When flow readings could be discerned, the pump speed was adjusted if necessary. Further adjustment was made with the flow control valve until stable flow was achieved that was centered around the target flow rate. The pump was run for several minutes of stable flow at the target flow rate before sediment dosing was initiated. Flow rate adjustments were made as needed through out the experiments using the flow rate control valve. Flow rate was recorded on data sheets at 1 minute intervals throughout the experiments.

Sediment Dosing Initiation Sediment dosing was initiated after several minutes of stable flow had been attained which was centered at the target flow rate. Dosing was initiated by sliding the calibrated dosing plate into the dosing plate slot at the bottom of the dosing hopper, displacing the blank plate (i.e. zero dosing). The time of initiation of sediment dosing was the start of the sediment dosing period and was carefully recorded. The sediment dosing time ended when sediment dosing was terminated. The start of the sediment dosing time was the zero time point of the experiment and the basis of the time stamp for all sampling and all measurements.

Background Influent Sampling Eight backgound influent samples were collected at intervals spaced through the sediment dosing time. The sample location was in the sediment screening chamber, just in front of the entrance to the discharge pipe. Sampling was conducted by opening the cover in the top of the Screening Chamber; loosening but not removing the threaded cap on the cannister; immersing the container with the opening facing directly into the direction of water flow with the centerline of the opening ca. 6 in. below the surface of the water; removing the cap for a short time to allow water ingress; placing the cap over the opening; quickly removing the cannister from the water while simultaneously turning the cannister so the the opening was facing upward; and screwing the top closed.

Sediment Dose Sampling Six sediment dose samples were collected at intervals spaced through the sediment dosing time. Sediment dose sampling was conducted by placing a sediment collection container under the hopper dosing point for 60 seconds to collect all sediment leaving the hopper.

Sediment Dosing Termination Sediment dosing was terminated by sliding the the blank plate (i.e. zero dosing) into the dosing plate slot at the bottom of the dosing hopper, displacing the dosing plate. The time of termination of sediment dosing was the end of the sediment dosing time and was carefully recorded. The sediment dosing time was usd to calculated the total sediment dosed from the hopper. The sediment dosing time was used to calculate the total sediment dosed from the hopper. The sediment dosing time correected for the time of six hopper dose samples was used to calculate the total sediment dosed to the NSBB.

Retained Sediment Collection and Analysis The mass of sediment accumulated in the NSBB was quantified using a previously developed methodology that had been demonstrated to produce sediment mass recoveries of 99.9% (Appendix B). Following the termination of sediment dosing, the pump was turned off and water in the NSBB chambers was allowed to settle for 30 minutes. The clear water in each chamber was decanted to approximately eight inches above the surface of the accumulated sediment. The sediment slurry was then removed with a suction pipe and directed to an external sediment filtration system. The filtration system consisted of a bank of pre-tared paper filters contained in filter support screens. The filter paper was a food grade preparation paper (Bunn 20124) with a purported pore size range of 5 to 15 μm. Paper filters were dried and tare weighed to a precision of 0.01 grams before filtration. Filters and sediment were dried to constant weight (12 hours at 180^{o}C) and sediment mass was determined by subtracting the tare weight.

Analytical and Quality Assurance Procedures Analysis of Suspended Sediment Concentration (SSC) analysis was conducted according to the AET SSC protocol contained in Appendix C. SSC Quality Assurance results are included in Appendix E. A 2 hour drying time for filtered samples was verified to be sufficient by weight changes of 0.05 mg and less for 250 mg/L equivalent SSC concentrations (Table D-1, App. E; Table E-2, App. E). For all removal efficiency experiment analyses events, Method Blanks were less than the established Reporting Limit of 2.07 mg/L (Table E-3, App. E). For all removal efficiency experiment analyses events, Lab Control Sample recoveries were within the established tolerance of 15% (Table E-6, App. E). Initial Demonstration of Capability samples in the low SSC range of ca. 10 mg/L were all within the 30%

Recovery Criteria (Table E-5, App. E). Demonstration of Capability samples in the high SSC range of ca. 100 mg/L were all within 15% Recovery Criteria (Table E-5, App. E).

Data Management Data sheets were assembled and a complete file maintained at AET for each experiment. All data was placed in electronic format by entering into Excel spreadsheets which are maintained at several locations.

REMOVAL EFFICIENCY EXPERIMENT RESULTS

This section summarizes measured temperature, flow rate, sediment dosing rate and background sediment concentrations, presents the removal efficiency results of seven flow rate experiments, and derives weighted removal efficiencies using the NJDEP weighing factors. Full results of the removal efficiency experiments are presented in Appendix F.

Water Temperature The water temperatures was verified to be less 80F just prior to the start of each of the seven removal efficiency experiments and remained less than 80F during testing.

Flow Rate Measured and target flow rates are shown in Figure 4 and summarized in Table 4. Mean flow rates were all within 1% of target flow rates, which was well within the ±10% criteria in the NJDEP protocol (2). Monitored flow rates for the 1.00 cfs experiment is shown in Figure 5, which illustrates that flow rates was well within the the NJDEP-permitted tolerance.

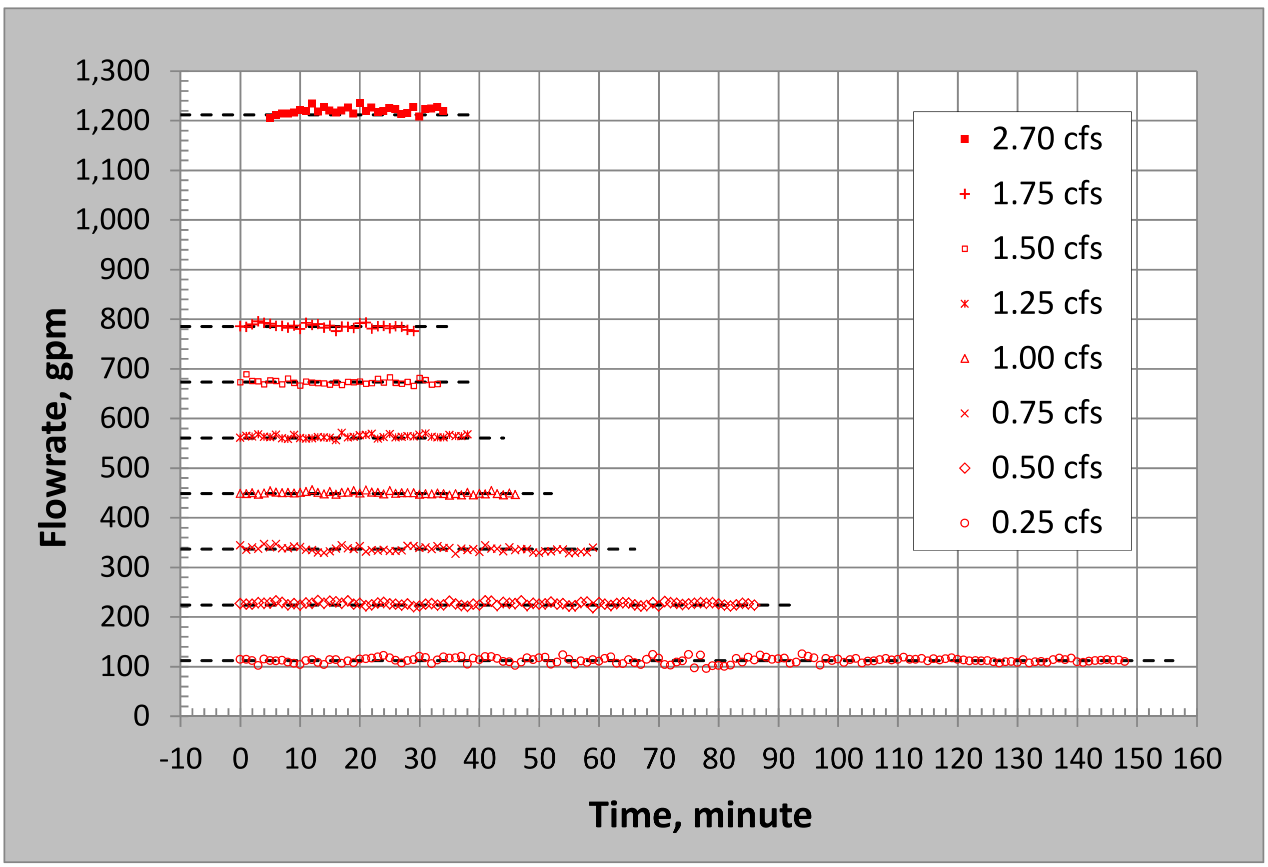


Figure 4 Monitored Flow Rates in Removal Efficiency Experiments

Table 4 Measured Flow Rates in Removal Efficiency Experiments

Target Flow Rate		Measured Flow Rate				
cfs	gpm	Mean, gpm	SD, gpm[1]	CV[2]	% RE[3]	Median, gpm
0.25	112.2	112.3	5.54	0.049	0.06	112.9
0.50	224.4	226.6	3.03	0.013	0.98	226.7
0.75	336.6	336.4	4.82	0.014	-0.05	336.4
1.00	448.8	449.9	2.65	0.006	0.25	449.7
1.25	561.0	563.6	3.40	0.006	0.47	563.1
1.50	673.2	673.3	5.11	0.008	0.02	672.5
1.75	785.4	785.7	4.89	0.006	0.04	785.8

[1] Standard Deviation
[2] Coefficient of Variation = Standard Deviation / Mean x 100
[3] % Relative Error = (Measured Mean - Target) / Target x 100

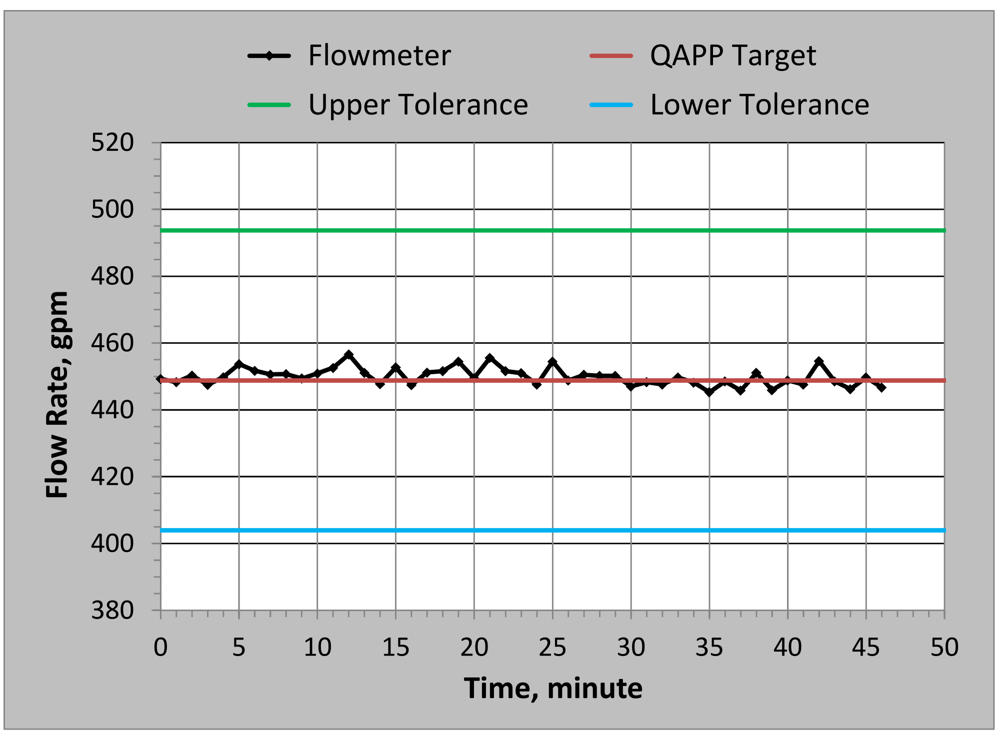


Figure 5 Monitored Flow Rate in 1.00 cfs Experiment

Sediment Dosing Measured and target sediment dosing rates are shown in Figure 6 and summarized in Table 5. Mean dosing rates were all within 5% of target flow rates, which was well within the ±10% criteria in the NJDEP protocol. Monitored sediment dosing rates for the 1.00 cfs experiment is shown in Figure 7, which illustrates that dosing rates were well within the NJDEP-permitted tolerance. Mean influent SSC to the NSBB were estimated by dividing the mean sediment dosing rate by the mean flow rate. Mean influent SSC are compared to the target influent SSC of 200 mg/L in Figure 8. Estimated mean influent SSC were well within the ±10% NJDEP-permitted tolerance (i.e. 180 to 220 mg/L).

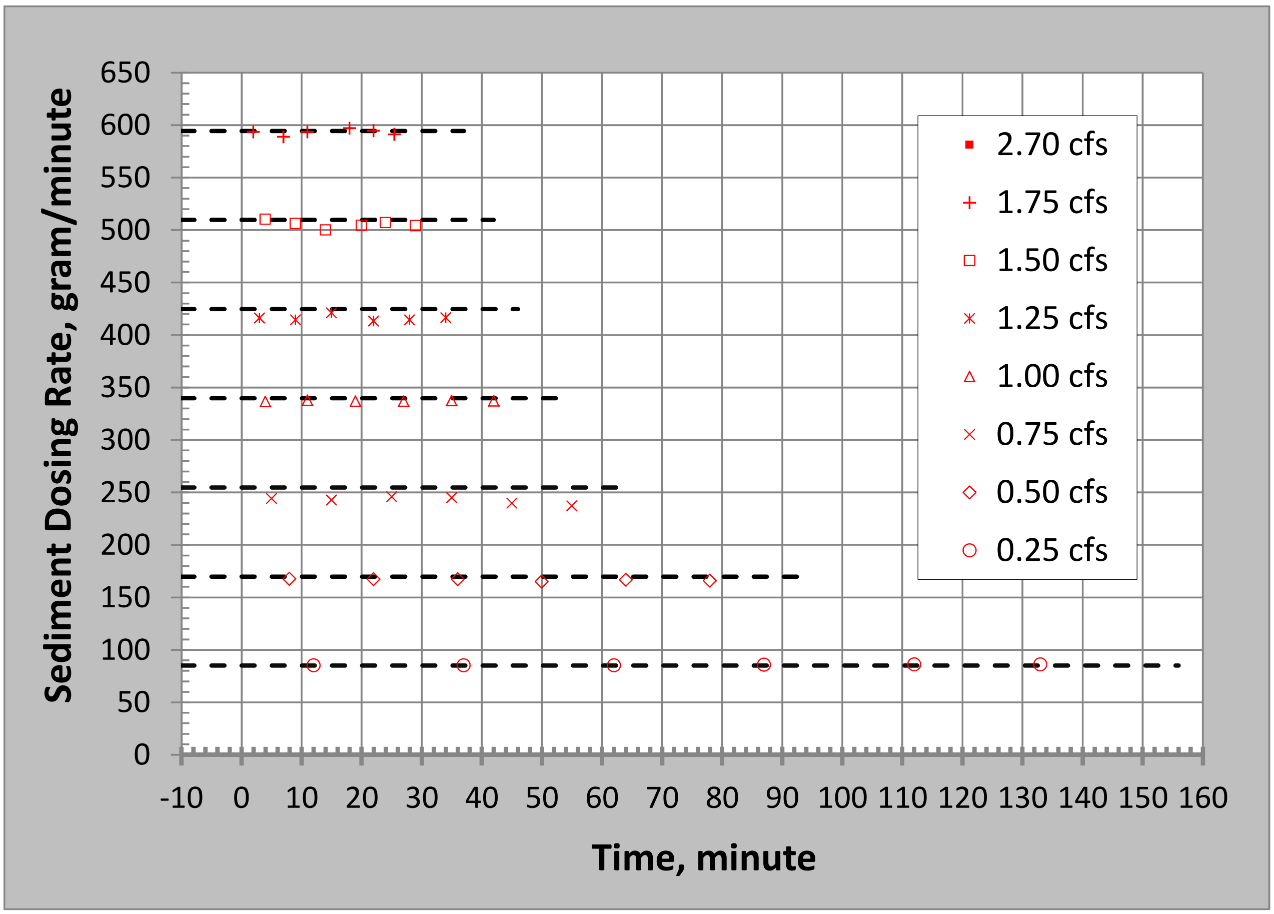


Figure 6 Sediment Dosing Rates in Removal Efficiency Experiments

Table 5 Measured Sediment Dosing Rates

Target Flow Rate	Target Dosing Rate	Measured Dosing Rate				
cfs	gram/min	Mean, gram/min.	SD, gram/min.[1]	CV[2]	% RE[3]	Median, gram/min.
0.25	84.9	85.6	0.4	0.004	0.76	85.6
0.50	169.9	166.9	1.0	0.006	-1.8	167.2
0.75	254.8	242.4	3.4	0.014	-4.9	243.4
1.00	339.7	337.2	0.5	0.001	-0.74	337.1
1.25	424.7	415.9	2.8	0.007	-2.1	415.2
1.50	509.6	505.2	3.4	0.007	-0.86	505.2
1.75	594.5	593.3	2.8	0.005	-0.20	593.8

[1] Standard Deviation

[2] Coefficient of Variation = Standard Deviation / Mean x 100

[3] % Relative Error = (Measured Mean - Target) / Target x 100

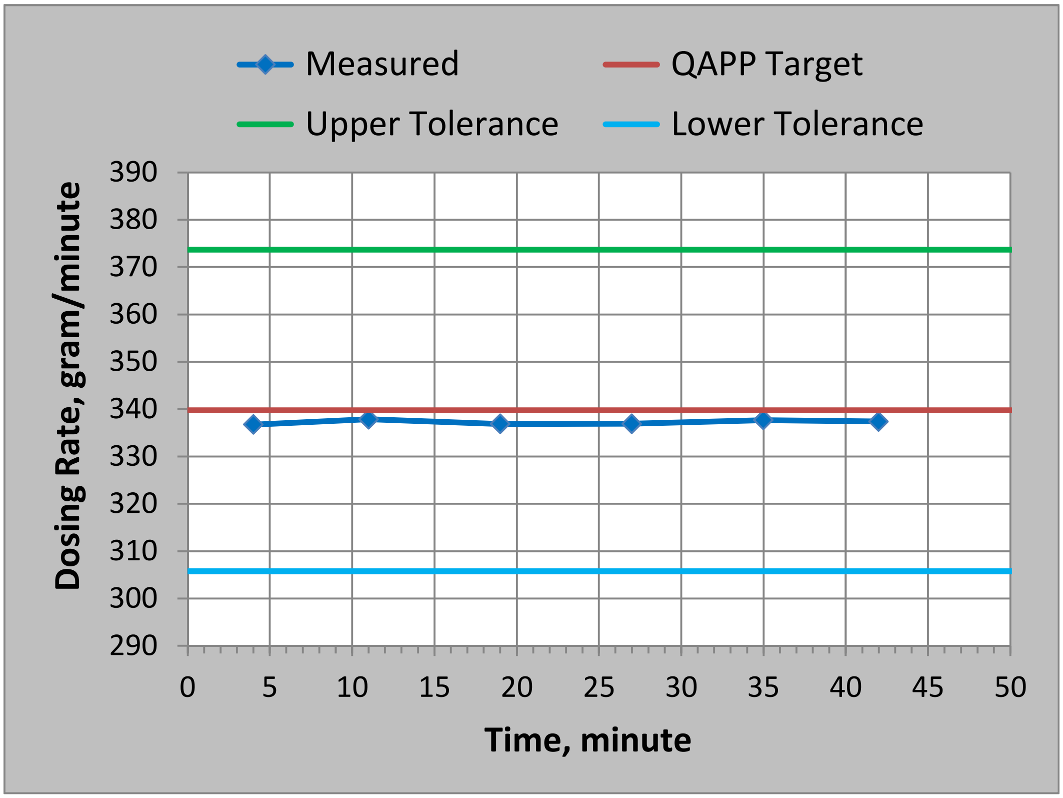


Figure 7 Sediment Dosing Rate in 1.00 cfs Experiment

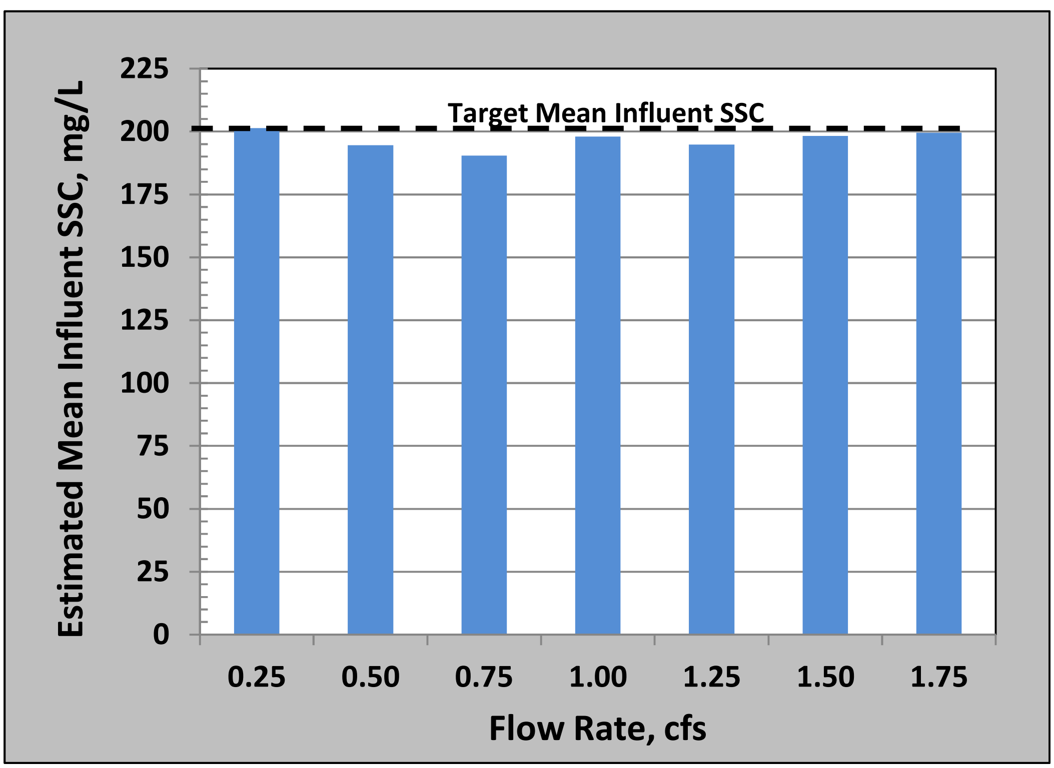


Figure 8 Estimated Mean Influent SSC in Removal Efficiency Experiments

Background Sediment Concentration Background SSC in the removal efficiency tests are summarized in a box plot in Figure 9 and in Table 6. Mean background SSC ranged from 2.2 to 13.4 mg/L (n=8). Figure 9 shows that all background SSC distributions were well within the 20 mg/L criteria in the NJDEP protocol (Figure 9). Background SSC generally increased with increasing flow rate, with the exception of the 1.25 cfs experiment. All measured background SSC were less than 20 mg/L except for one level of 24.4 mg/L the 1.25 cfs experiment.

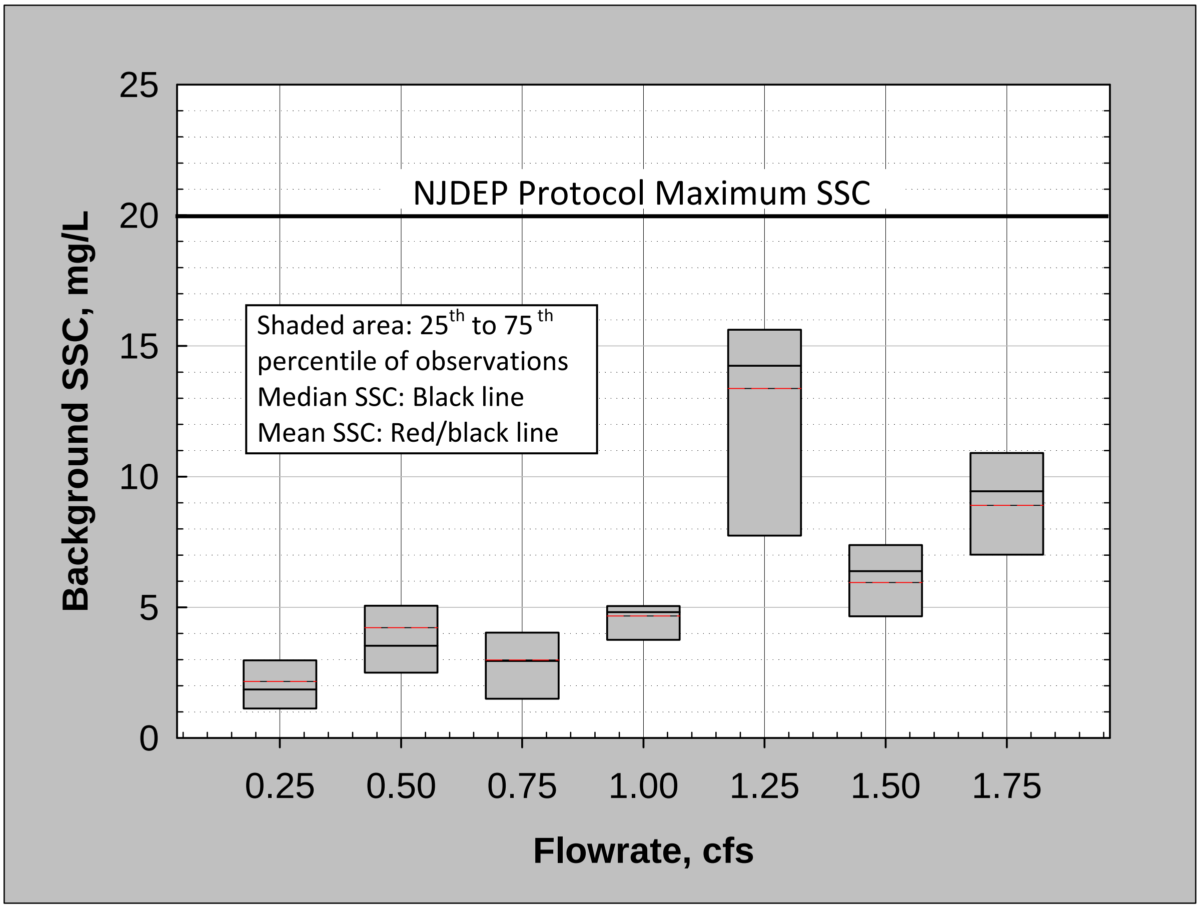


Figure 9 Background Sediment Concentration in Removal Efficiency Experiments

Table 6 Measured Background Suspended Sediment Concentrations

Target Flow Rate	Measured Background Suspended Sediment Concentration			
cfs	Mean, mg/L	SD, mg/L[1]	CV[2]	Median, mg/L
0.25	2.16	1.4	0.659	1.86
0.50	4.22	2.4	0.574	3.53
0.75	2.98	1.5	0.500	2.94
1.00	4.67	1.2	0.260	4.81
1.25	13.4	6.3	0.471	14.2
1.50	5.95	2.0	0.332	6.38
1.75	8.89	2.7	0.302	9.44

[1] Standard Deviation

[2] Coefficient of Variation = Standard Deviation / Mean x 100

[3] % Relative Error = (Measured Mean - Target) / Target x 100

Sediment Mass Removal Efficiency The masses of sediment dosed to NSBB 3-6-72 and captured in bottom chambers are listed in Table 7 for the seven removal efficient experiments. The dosed mass ranged from 26.8 to 30 lbs., and satisfied the 25 lb. minimum dosing mass in the NJDEP protocol. Sediment removal efficiencies ranged from 98.2% at 0.25 cfs to 68.1% at 1.75 cfs, and progressively increased as flow rate decreased (Figure 10). A third order polynomial equation was fit to the removal efficiency data (n=7) and provided an acceptable fit to experimental data ($R^2 > 0.99$) as shown in Figure 10.

Table 7 Sediment Mass Removal Efficiency

Target Flow Rate, cfs	Sediment Mass Dosed, lbs.	Sediment Mass Captured, lbs.	Removal Efficiency, %
0.25	26.81	26.32	98.20
0.50	29.38	26.61	90.60
0.75	28.28	21.04	74.40
1.00	29.69	21.49	72.40
1.25	29.29	20.80	71.00
1.50	30.03	20.70	68.90
1.75	30.04	20.47	68.10

[1] Standard Deviation
[2] Coefficient of Variation = Standard Deviation / Mean x 100
[3] % Relative Error = (Measured Mean - Target) / Target x 100

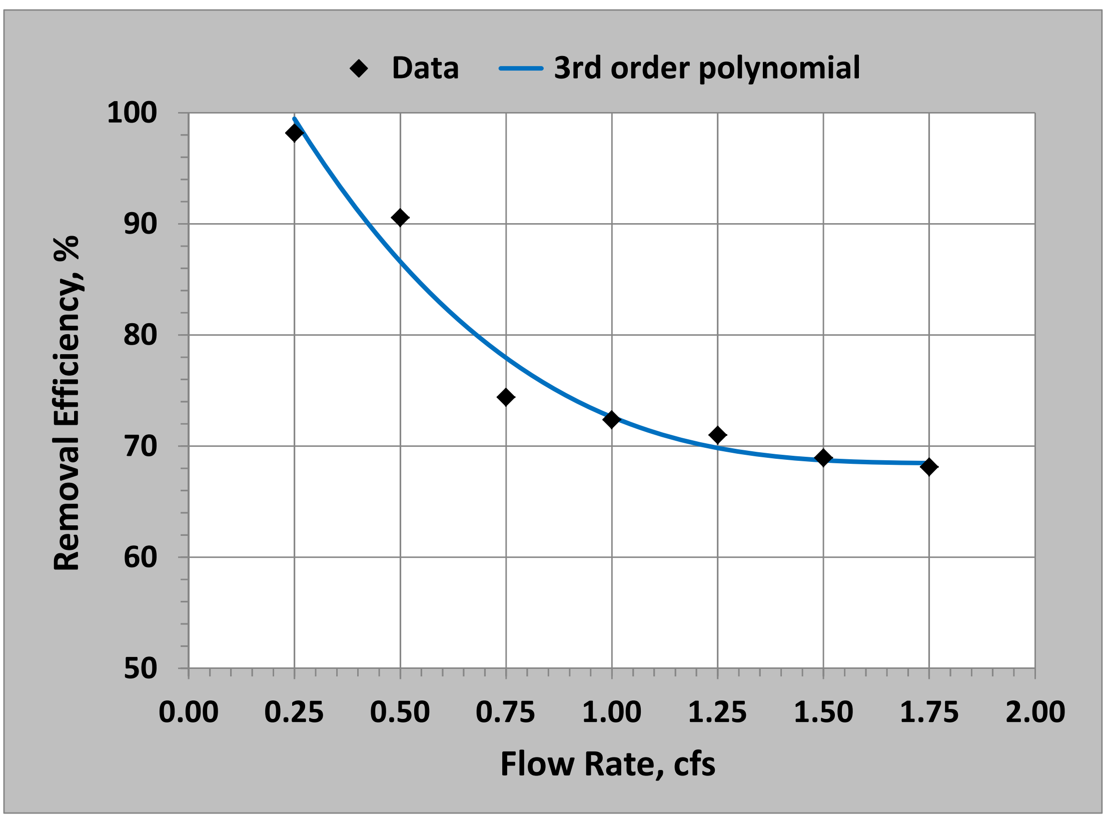


Figure 10 Removal Efficiency versus Flow Rate

Flow-Weighted Removal Efficiency The NJDEP protocol establishes the Maximum Treatment Flow Rate (MTFR) as a flow weighted removal efficiency, with weighing factors 0.25, 0.30, 0.20, 0.15 and 0.10 for flow rates of 25, 50, 75, 100 and 125% of MTFR, respectively. To derive MTFR for the NSBB 3-6-72, a continuous function was developed of the weighted removal efficiency versus flow rate. The weighted removal efficiency function was based on the third order polynomial describing removal efficiency as a function of single flow rate presented in Figure 10. For any flow rate, the removal efficiencies at the 25, 50, 75, 100 and 125% flow rates were calculated and the NJDEP weighing factors were applied. Weighted removal efficiencies are shown in Figure 11. With increasing flow rate (Figure 11, X axis), the flow weighted removal efficiency decreases (Figure 11, Y axis). The permissible flow range of the weighted removal efficiency calculation is 1.00 to 1.40 cfs and is constrained by the range of flow rates used in the removal efficiency experiments (Figure 11). Calculations of the flow weighted removal efficiency for 1.00 and 1.30 cfs are shown in Table 8.

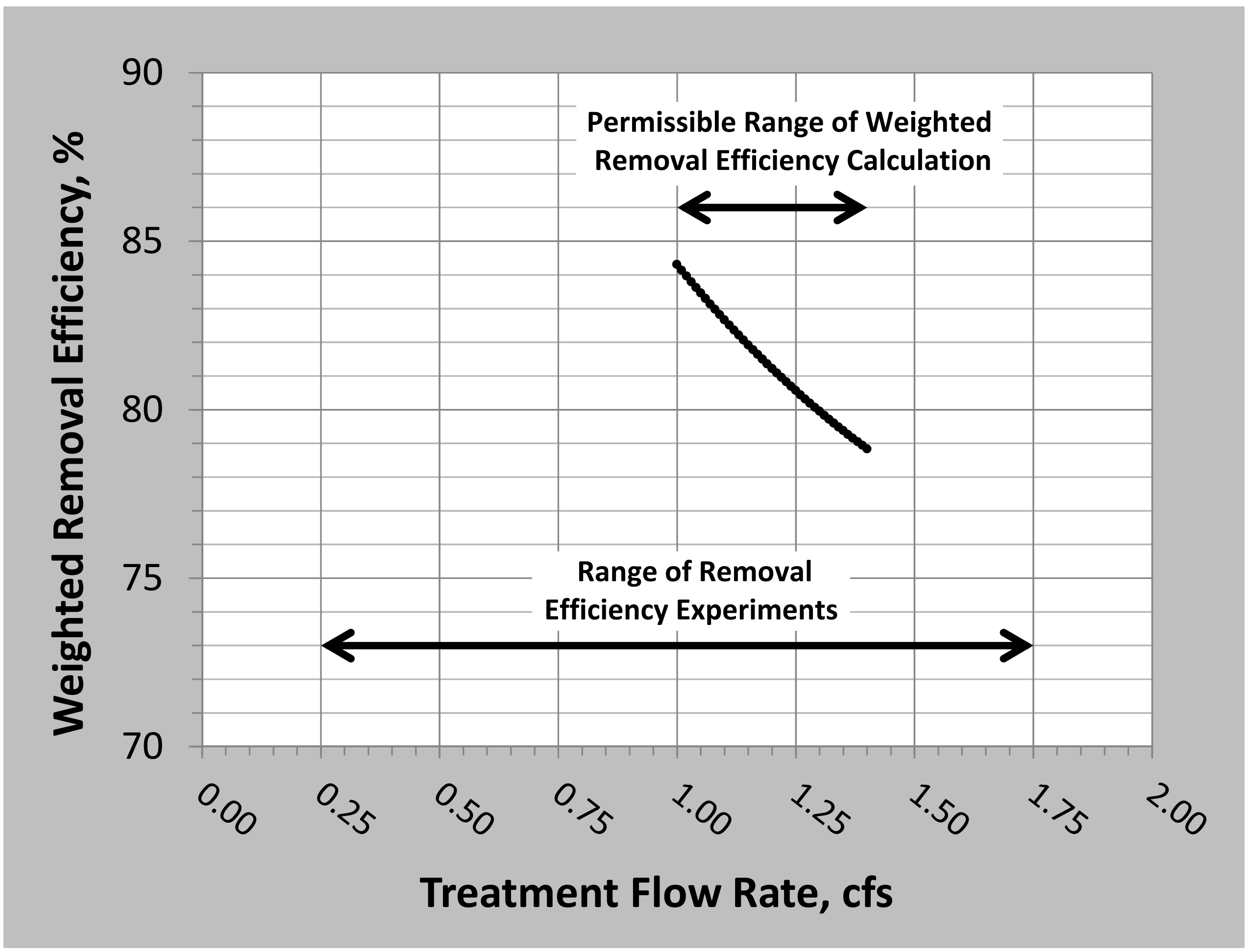


Figure 11 Flow Weighted Removal Efficiencies

Table 8 Flow Weighted Removal Efficiency Calculations

Maximum Treatment Flow Rate, cfs		% of Maximum Treatment Flow Rate					Flow Weighted Removal Efficiency, %
		25%	50%	75%	100%	125%	
1.00	Flow Rate, cfs	0.250	0.500	0.750	1.000	1.250	84.3
	Removal Efficiency, %	99.4	86.6	77.9	72.6	69.8	
1.30	Flow Rate, cfs	0.325	0.650	0.975	1.300	1.625	80.0
	Removal Efficiency, %	95.1	81.0	73.0	69.5	68.6	

Maximum Treatment Flow Rate (MTFR) A target weighted removal efficiency of 80% was established as the basis of the performance claim for NSBB 3-6-72. For 80% SSC removal of 100 μm sediment by NSBB 3-6-72, a Maximum Treatment Flow Rate of 1.30 cfs was derived as illustrated in Figure 12.

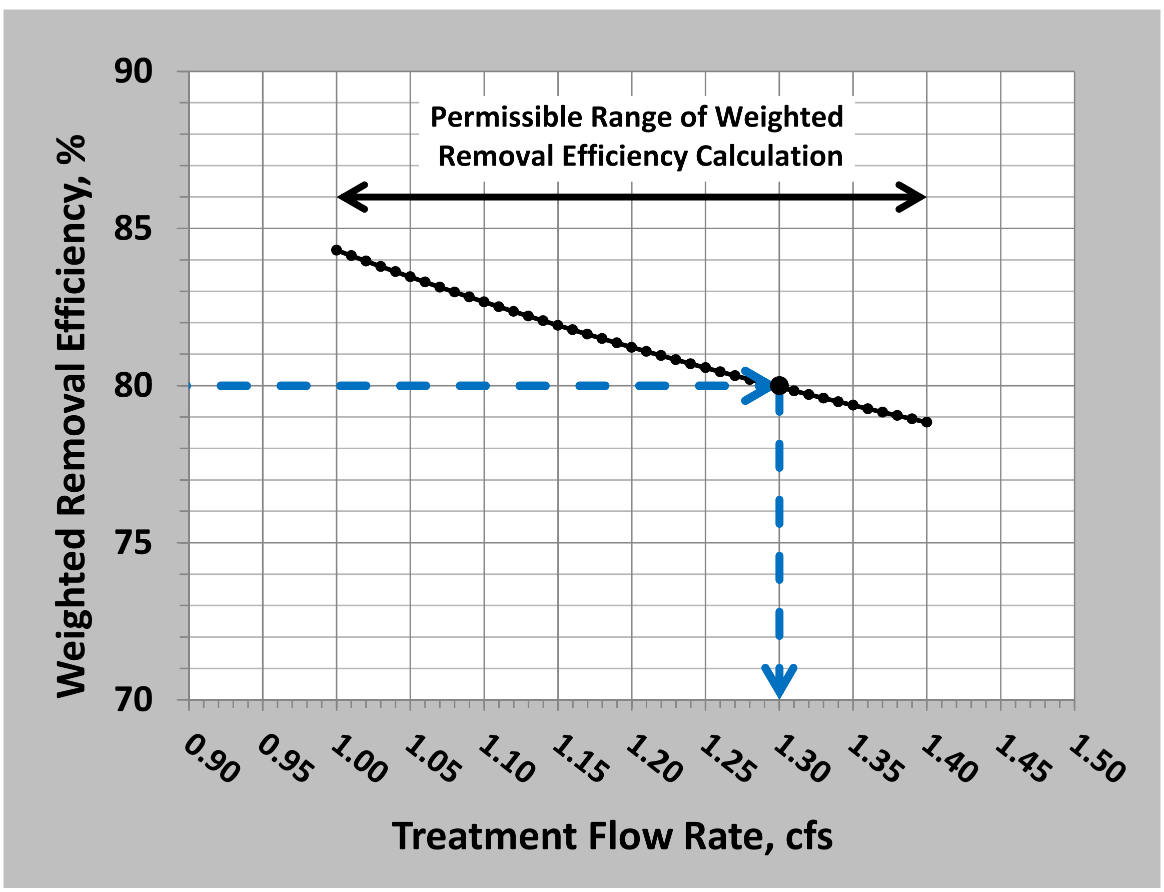


Figure 12 Maximum Treatment Flow Rate Determination

CONDUCT OF RESUSPENSION EXPERIMENT

The resuspension experiment followed a testing protocol that was iteratively developed to implement the NJDEP testing requirements.

Comparison of NSBB and NJDEP Resuspension PSDs The NSBB resuspension experiment was conducted using the same sediment that was employed in the removal efficiency tests. The NSBB resuspension sediment had a relatively narrow PSD centered on 100 μm and was finer than the NJDEP protocol resuspension sediment. The PSDs of the NSBB resuspension test and NJDEP resuspension protocol are compared in Figure 14. The NSBB resuspension test provided a more rigourous resuspension evaluation than if the NJDEP protocol sediment had been used.

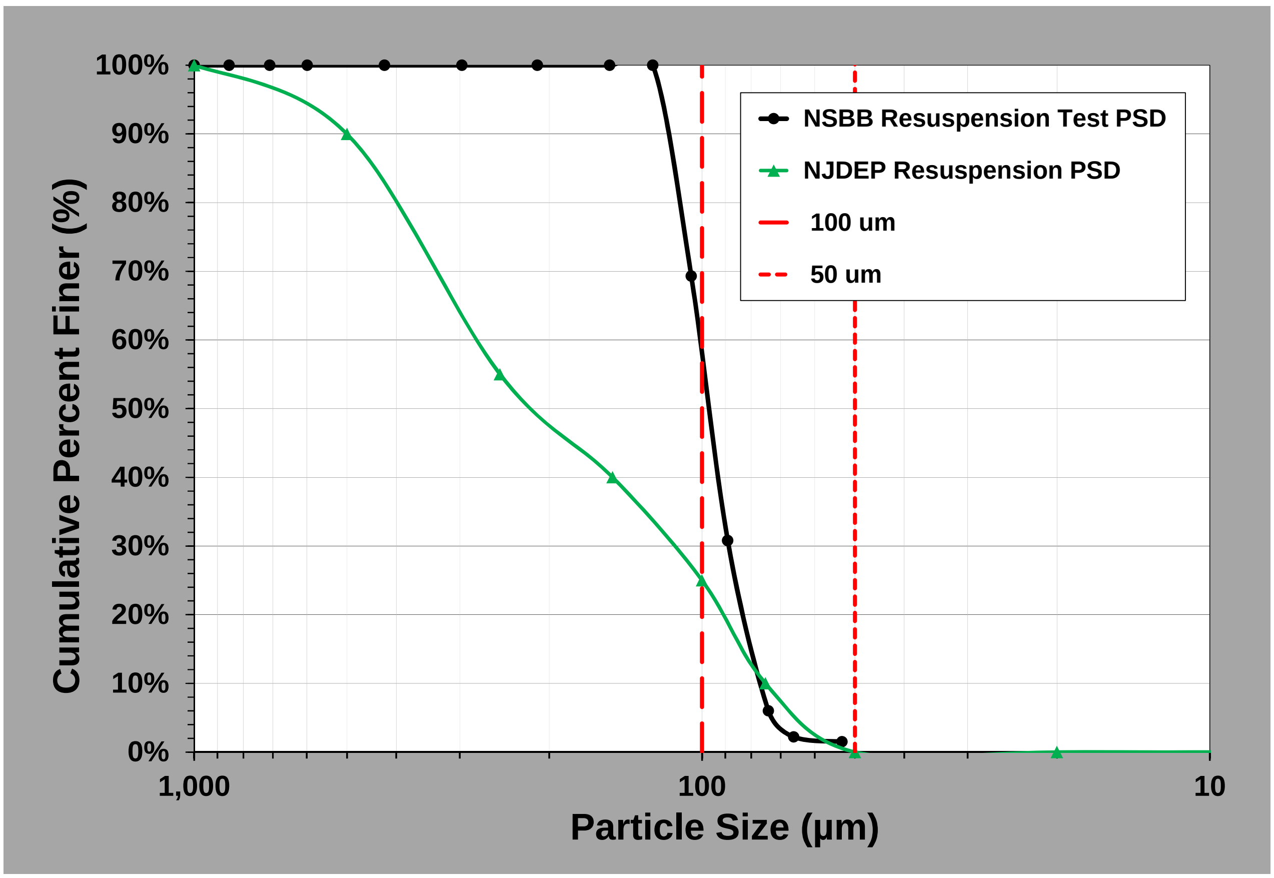


Figure 13 Comparison of PSD used in Resuspension Experiment with NJDEP PSD

Sediment Pre-Loading Test sediment was preloaded into each NSBB chamber to a uniform six inch depth on 1 4 2013. Sediment was added from sealed containers and water added to a level just above the sediment surface. Stirring and releveling of sand was conducted to insure absence of air from the system. The resuspenison test was conducted in 1 8 2013. Water was pumped slowly to fill the NSBB to the top of the baffles.

Water Temperature Water temperature was verified to be less than 80F just before the initiation of the experiment using a NIST traceable thermometer (Traceable Calibration Control Company 281-482-1714).

Field Data Sheets Field data sheets were prepared for temperature monitoring, flow rate target and monitoring, , total experimental time at target flow rate, background suspended sediment concentration sample collection times, effluent suspended sediment concentration sample collection times, Suspended Sediment Concentration (SSC) laboratory analysis, and laboratory blank and laboratory control samples for SSC analysis. Data sheets specified and recorded the times of all sample events of other observations.

Sample Containers Samples containers were prepared for at least eight background influent SSC samples and fifteen effluent SSC samples. All containers has sealable tops. SSC containers with one half gallon PETE canisters with round 4 in. diameter open mouths. SSC containers and tops were rinsed at least three times with tap water and drained. SSC containers were numbered and deployed in increasing number with experimental time.

Flow Initiation and Control The pump and flow control valve were pre-set to achieve the target resuspension flow rate of 2.70 cfs (i.e. 208% of MTFR). When all experimental preparations were completed, the pump was started at the pre-settings. The flow meter was then powered on and allowed to electronically stablilize. When flow readings could be discerned, a the zero time was stamped, and checking of flow rate and adjustment of flow rate with the flow control valve were initiated. Flow rate adjustments were made as needed through out the experiments using the flow rate control valve. Flow rate was recorded on data sheets at 1 minute intervals throughout the experiment. The target 2.70 cfs flow rate was reached within 4 minutes of pump startup and maintained at that flow rate for the remaining 30 minutes of the test. Background influent and NSBB effluent samples were collected though the 30 minute constant flow rate period.

Background Influent Sampling Backgound influent samples were collected at intervals spaced through the 30 min. resuspension test time. The sample location was in the sediment screening chamber, just in front of the entrance to the discharge pipe. Backgound influent sampling was conducted by opening the cover in the top of the Screening Chamber; loosening but not removing the threaded cap on the cannister; immersing the container with the opening facing directly into the direction of water flow with the centerline of the opening ca. 6 in. below the surface of the water; removing the cap for a short time to allow water ingress; placing the cap over the opening,; quickly removing the cannister from the water while simultaneously turning the cannister so the the opening was facing upward; and screwing the top closed.

Effluent Sampling Effluent samples were collected at intervals spaced through the 30 min. resuspension test time. Samples were collected though a slot in the top of the pipe connecting the NSBB to the Water Supply Reservoir at ca. 4 ft. downstream of the NSBB exit. Sampling was conducted by loosening but not removing the threaded cap on the cannister; immersing the container with the opening facing directly into the direction of water flow with the centerline of the opening ca. 4 in. below the surface of the water; removing the cap for a short time to allow water ingress; placing the cap over the opening,; quickly removing the cannister from the water while simultaneously turning the cannister so the the opening was facing upward; and screwing the top closed.

Analytical and Quality Assurance Procedures The Method Blank for the resuspension test analysis event was within the established Reporting Limit of 2.07 mg/L (Table E-3, App. E). Recovery of the Lab Control Sample for the resuspension test analysis event was 103.3%, and was within the established tolerance of 15% (Table E-6, App. E).

Data Management Data sheets were assembled and a complete file maintained at AET for each experiment. All data was placed in electronic format by entering into Excel spreadsheets which are maintained at several locations.

RESUSPENSION EXPERIMENT RESULTS

This section summarizes measured temperature, flow rate, background and effluent sediment concentrations in the resuspension experiment, and compares the data sets for background and effluent SSC to each other and to the NJDEP criteria for on-line installation of 20 mg/L SSC. Full results of the removal efficiency experiments are presented in Appendix F.

Water Temperature The water temperature just prior to the start of the resuspension experiment was less than 80F and remained less than 80F during testing.

Flow Rate Measured and target flow rates are plotted in Figure 14 and summarized in Table 9. Mean flow rate was within 1% of target flow rate, which was well within the ±10% the NJDEP-permitted tolerance (Figure 14), with a coefficient of variation of less than 0.01.

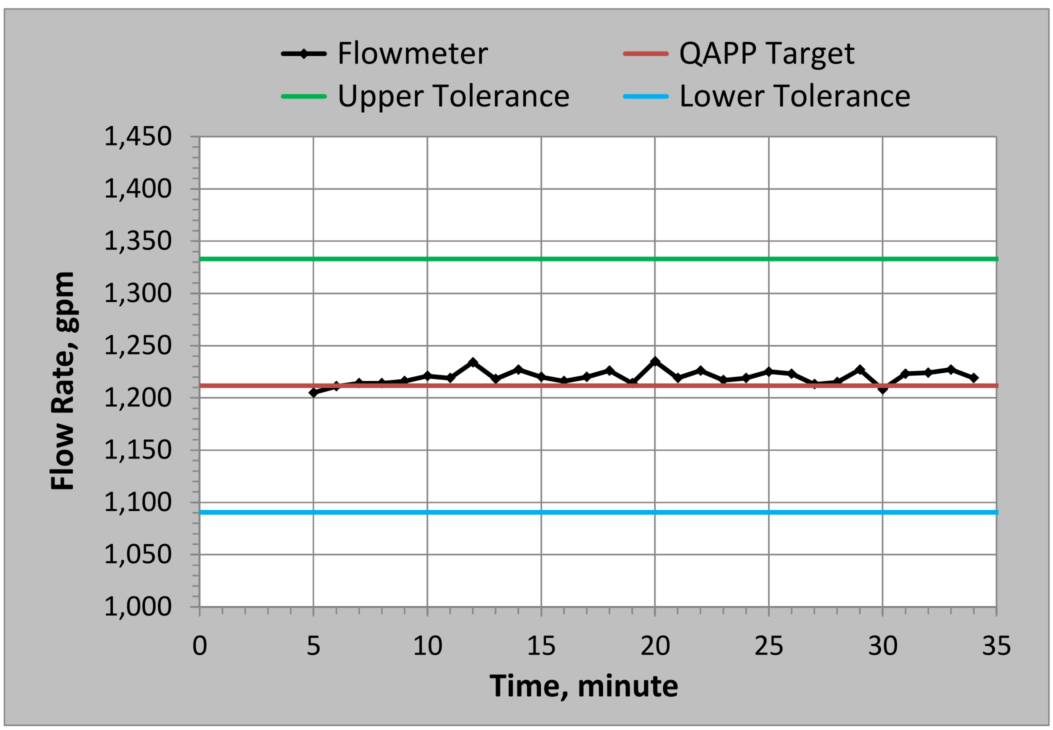


Figure 14 Flow Rate in Resuspension Experiment

Table 9 Measured Flow Rates in Resuspension Experiment

Target Flow Rate		Measured Flow Rate				
cfs	gpm	Mean, gpm	SD, gpm[1]	CV[2]	% RE[3]	Median, gpm
2.70	1,211.8	1,219.8	6.90	0.006	0.67	1,219.0

[1] Standard Deviation

[2] Coefficient of Variation = Standard Deviation / Mean x 100

[3] % Relative Error = (Measured Mean - Target) / Target x 100

Background and Effluent Suspended Sediment Concentrations The SSC concentrations in the resusopension experiment are plotted in Figure 15 and listed in Table 10.

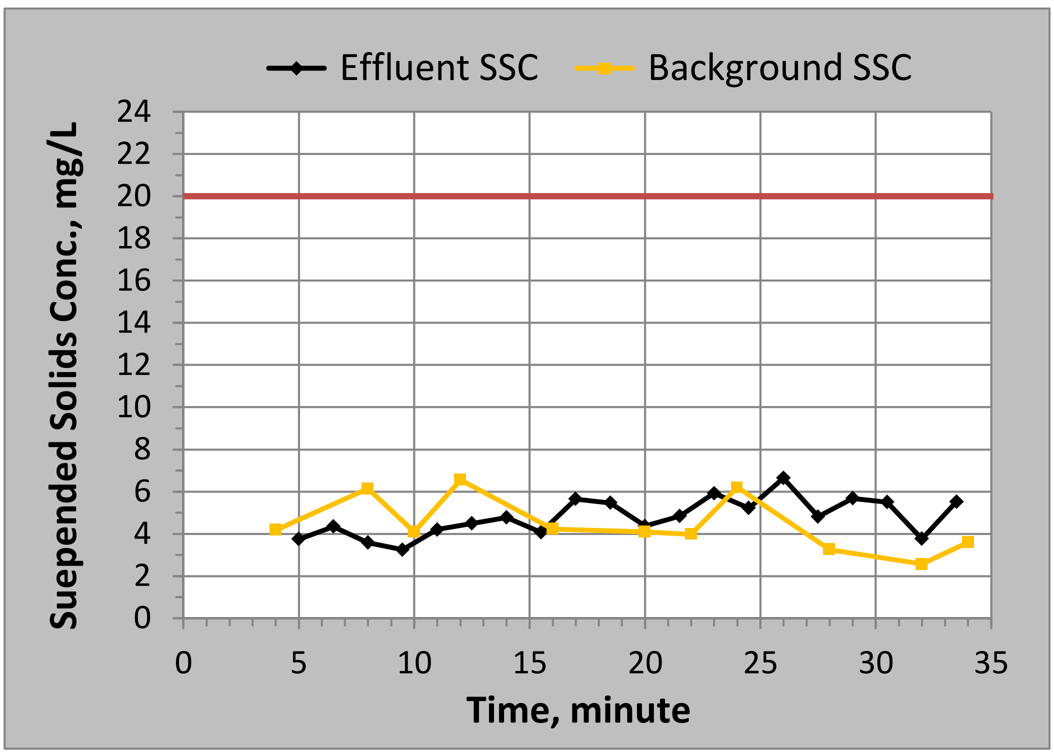


Figure 15 Suspended Sediment Concentrations in Resuspension Test

Table 10 Suspended Sediment Concentrations in Resuspension Experiment

Sample	Measured Suspended Sediment Concentration/ mg/L				
	Mean	SD[1]	CV[2]	Median	Maximum
Background (Influent)	4.44	1.3	0.290	4.10	6.56
Effluent	4.79	0.9	0.187	4.79	6.64

[1] Standard Deviation
[2] Coefficient of Variation = Standard Deviation / Mean x 100

Mean SSC in NSBB effluent was 4.79 mg/L and ranged from 3.2 to 6.6 mg/L. Mean background SSC in NSBB influent was 4.44 mg/L and ranged from 2.6 to 6.6 mg/L. Statistical analysis indicated that the effluent SSC data set (n = 20) and the influent SSC data set (n = 11) were both normally distributed (Shapiro-Wilk test) and passed an equal variance test (Figure 16). A t-test (95% confidence level for difference of means) indicated that the difference in the mean values of influent and effluent data was not great enough to reject the possibility that the difference was due to random sampling variability. There was not a statistically significant difference between the influent and effluent SSC data sets. All SSC values in NSBB effluent were well below 20 mg/L. The NSBB 3-6-72 fully met the NJDEP resuspension criteria for on-line installation at 1.30 cfs Maximum Treatment Flow Rate. The sediment used in the NSBB resuspension tests was much finer than that specified in the NJDEP resuspension protocol (i.e. d_{50} of 98 versus 216 μm) and provided a more rigorous resuspension test than the NJDEP protocol. Therefore, the results of the NSBB resuspension test confirm that the NSBB meets the NJDEP protocol criteria for on-line installation. The NJDEP protocol includes a procedure to correct effluent SSC for

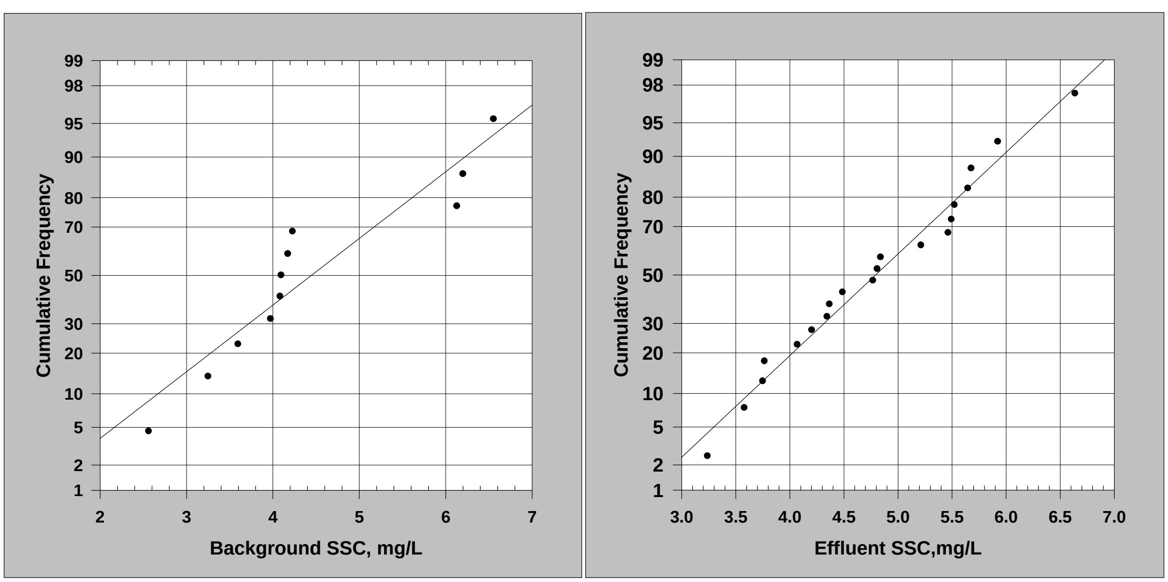


Figure 16 Resuspension SSC Normal Probability Plots

background levels by creating a curve of the background SSC and subtracting each effluent SSC for background at the time of sampling. Application of this technique resulted in a high percentage of negative values for background-corrected effluent SSC and was considered to be not appropriate.

SURFACE OVERFLOW RATE SCALING

The Nutrient Separating Baffle Box® (NSBB) is supplied in a range of models and sizes. The Maximum Treatment Flow Rate (MTFR) of NSBB models were derived by constant surface overflow rate scaling. Surface overflow rate is widely used for comparative performance assessment of hydrodynamic stormwater treatment devices, and equals the applied flow rate per surface area available for sedimentation. The basis for scaling was the 1.30 cfs MTFR of the NSBB 3-6-72 that was developed in this report. Dimensions of NSBB models and their scaled MTFR are listed in Table 11.

Table 11 Maximum Treatment Flow Rate of NSBB® Models*

NSBB Model #	Inside Width, ft.	Inside Length, ft.	Baffle Height, in.	Sedimentation Area, ft^2	Maximum Treatment Flow Rate, cfs
2-4-60	2	4	24	8.0	0.58
3-6-72	3	6	36	18.0	1.30
4-8-84	4	8	36	32.0	2.31
5-10-84	5	10	36	50.0	3.61
6-12-84	6	12	36	72.0	5.20
8-12-84	8	12	36	96.0	6.93
8-14-100	8	14	40	112	8.09
10-14-100	10	14	40	140	10.1
10-16-125	10	16	46	160	11.6
10-20-125	10	20	48	200	14.4
12-20-132	12	20	48	240	17.3
12-24-132	12	24	60	288	20.8

*80% SSC Removal Efficiency

SUMMARY

A full-scale Nutrient Separation Baffle Box® Model 3-6-72 was experimentally evaluated using removal efficiency and resuspension protocols published by the New Jersey Department of Environmental Protection (NJDEP) and endorsed by the Stormwater Equipment Manufacturer's Association (SWEMA). Experiments employed a relatively narrow particle size distribution (PSD) centered on 100 μm, in lieu of the broader NJDEP PSD. Seven removal efficiency experiments were conducted at flow rates ranging from 0.25 to 1.75 cubic feet per second (cfs), each at influent Suspended Sediment Concentration (SSC) of 200 mg/L. SSC removal efficiencies ranged from 68.1 to 98.2 percent and progressively increased as flow rate decreased. A Maximum Treatment Flow Rate (MTFR) of 1.30 cfs was derived for 80% SSC removal by the NSBB 3-6-72, based on the NJDEP weighted removal efficiency procedure. In a resuspension experiment conducted at 208% of MTFR (2.70 cfs), sediment resuspension was not significant; the mean SSC in NSBB discharge was only 0.35 mg/L greater than the mean influent SSC. The maximum SSC in NSBB discharge (6.6 mg/L) was well below the limit of 20 mg/L that is allowed by NJDEP for on-line installation. The Maximum Treatment Flow Rates of fourteen NSBB models were determined by applying constant surface overflow rate scaling to the Maximum Treatment Flow Rate of Model 3-6-72 that was determined in this study.

REFERENCES

1 Smith, D. (2009) A New Approach to Evaluating Pollutant Removal by Storm Water Treatment Devices, Journal of Environmental Engineering, Volume 136, 4, 371-380.

2 New Jersey Department of Environmental Protection (2013) New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device, January 25, 2013.

3 Stormwater Equipment Manufacturer's Association (2012). Protocol for Manufactured Treatment Devices that Utilize Sedimentation for Total Suspended Solids Removal. Submitted to New Jersey Department of Environmental Protection and New Jersey Corporation for Advanced Technology, February 7, 2012.

4 Suntree Technologies Inc.® (2012) *http://www.suntreetech.com/Products/Nutrient+Separating+Baffle+Box/default.aspx*

5 Wilson, M., Mohseni, O. , Gulliver, J., Hozalski, R. and Stefan, H. (2009) Assessment of Hydrodynamic Separators for Storm-Water Treatment. J. Hydraulic Engineering, 135, 5, 383.

6 Prandit and Gopalakrishnan (1996) Physical Modeling of a Stormwater Sediment Removal Box Final Report submitted to Brevard County, Florida and the National Estuary Program, Civil Engineering Program, Florida Institute of Technology, Melbourne, FL, June 1996.

7 Fluid Mechanics With Engineering Applications 9th Edition, Franzini and Finnemore, WCB/McGraw Hill, New York.

8 Smith, D. (2012) Nutrient Separating Baffle Box: SWEMA Hydrodynamic Protocol Evaluation with 100 μm Sediment Particles Quality Assurance Project Plan, July 11, 2012.

9 American Society for Testing and Materials (2007) Standard Test Method for Particle Size Analysis of Soils. ASTM D 422-63 (Reapproved 2007). ASTM, Philadelphia, PA.

10 American Society for Testing and Materials (2007) Standard Test Methods for Determining Sediment Concentrations in Water Samples. D3977-97 (Reapproved 2007), ASTM, Philadelphia, PA.

APPENDIX A

Nutrient Separating Baffle Box® No. 3-6-72

SUNTREE TECHNOLOGIES INC.® NUTRIENT SEPARATING BAFFLE BOX®
MODEL NO: NSBB-3-6-72

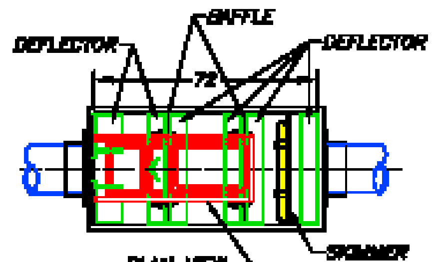
FLOW & BY-PASS SPECIFICATIONS FOR THE BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT STORAGE, AND SKIMMER SPECIFICATIONS.

1. Inflow Pipe Area (18" PVC AS SHOWN) —— 1.23 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system —— 3.10 sq.ft.
3. Open orifice area in screen system with 50% blockage —— 4.5 sq.ft.
4. Open orifice area in screen system with 75% blockage —— 2.30 sq.ft.
5. By-pass through screen system below the ceiling of the pipe. —— 1.33 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe. —— 1.88 sq.ft.
7. Screen system storage volume —— 8.5 cu.ft.

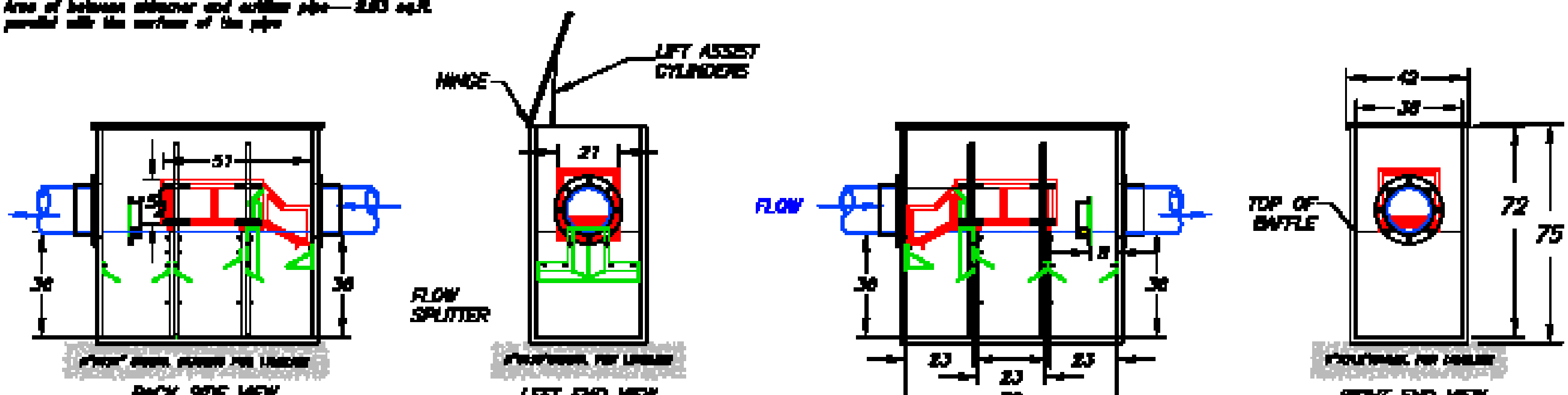
SEDIMENT STORAGE:
8. Volume of first chamber —— 18.00 cu.ft.
9. Volume of second chamber —— 18.50 cu.ft.
10. Volume of third chamber —— 16.00 cu.ft.
11. Volume of total sediment storage —— 52.50 cu.ft.

SKIMMER SPECIFICATIONS:
12. Flow area under skimmer —— 2.25 sq.ft.
13. Area of pipe in line with skimmer —— 1.85 sq.ft.
14. Area of between skimmer and outflow pipe parallel with the surface of the pipe —— 2.83 sq.ft.



PATENTED
AND PATENTS PENDING

INSTALLATION NOTES:
1. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH)
2. INVERT OF OUTFLOW PIPE SHOULD BE EVEN WITH THE TOP OF THE BAFFLE.
4. THE BOTTOM OF THE SKIMMER SHOULD BE 4" BELOW THE INVERT OF THE OUTFLOW PIPE.
5. INVERT OF THE INFLOW PIPE SHOULD [illegible] BELOW THE INVERT OF THE OUTFLOW PIPE.



FRONT VIEW

NOTES:

1. VAULT SUPPORTS PEDESTRIAN LOADING.
2. ALL WALLS, TOP, AND BOTTOM ARE LAMINATED FIBERGLASS WITH PVC STRUCTURAL FOAM CORE.
3. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE VAULT. PIPES CAN NOT INTRUDE INTO THE VAULT.
4. TOP OF VAULT TO BE HINGED WITH STAINLESS STEEL PIANO HINGE ALONG ONE LONG SIDE OF THE VAULT.
5. LIFT SUPPORT CYLINDER TO INCORPORATED TO HELP WITH HOLDING UP THE TOP COVER OF THE VAULT.
6. PYLON AND PIVOTING PANEL TO BE INCORPORATED AS SHOWN INTO THE BODY OF THE SCREEN SYSTEM.
7. TURBULENCE DEFLECTORS TO BE INCORPORATED AS SHOW TO REDUCE TURBULENCE INSIDE SETTLING CHAMBERS.
8. RECOMMENDED PIPE SIZE TO RANGE FROM 12" TO 18".

SUNTREE TECHNOLOGIES, INC. 798 CLEARLAKE RD., SUITE #2 COCOA, FL 32922		2-01-31-13-01
NUTRIENT SEPARATING BAFFLE BOX® MODEL NO: NSBB-3-6-72		NSBB-3-6-72
DATE: 05/25/05	SCALE: = 27.6	
DRAFTER: T.H.H.	UNITS = INCHES	

APPENDIX B

PARTICLE SIZE DISTRIBUTION ANALYSIS

Particle Size Distribution Analyses
ASTM D 422-63

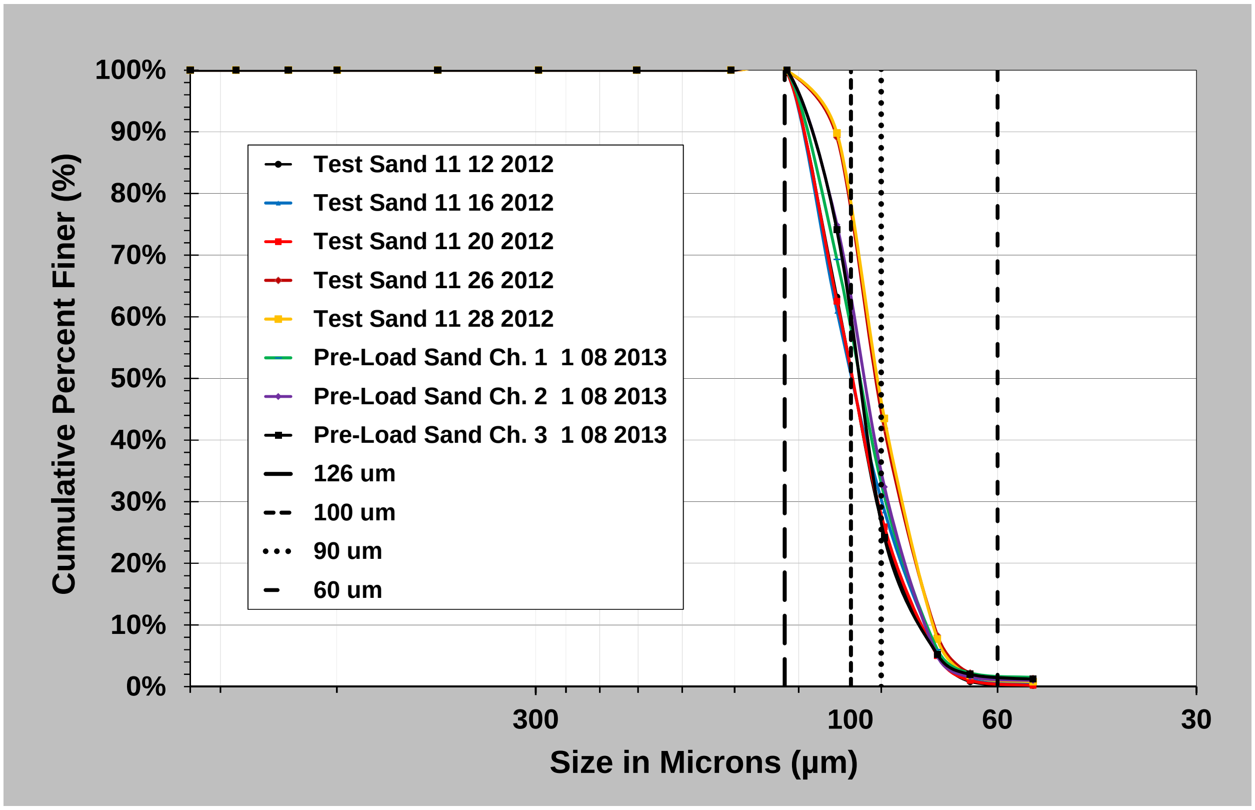
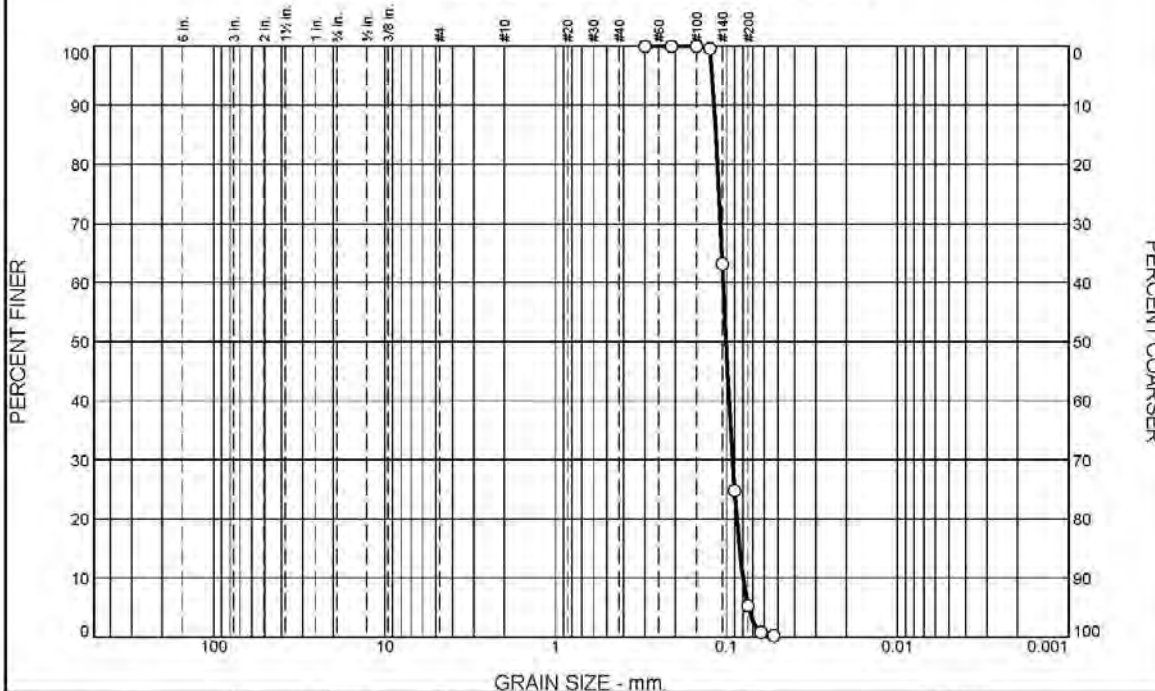


Figure B-1 Particle Size Distributions of Eight Test Sediment Samples

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	94.7	5.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#50	100.0		
#70	100.0		
#100	100.0		
#120	99.6		
#140	63.2		
#170	24.8		
#200	5.3		
#230	0.8		
#270	0.2		

* (no specification provided)

Soil Description

Very Pale Brown Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1179 D_{85}= 0.1153 D_{60}= 0.1048
D_{50}= 0.1008 D_{30}= 0.0925 D_{15}= 0.0843
D_{10}= 0.0803 C_u= 1.30 C_c= 1.02

Classification

USCS= AASHTO=

Remarks

Location: Baffle Box

Date: 11/20/2012

BTL Engineering, Inc.

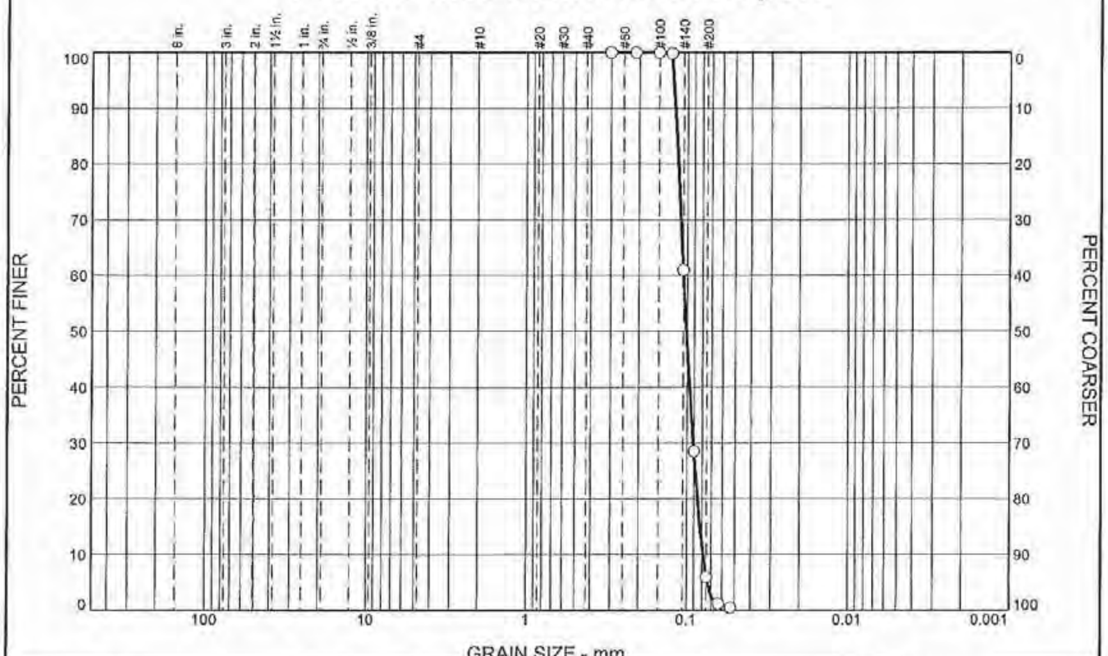
Tampa, FL

Client: Applied Enviromental Technologies
Project: Nutrients Separating Baffle Box
Project No: 5241-12-1062 **Figure**

Tested By: T. Hannum **Checked By:** S. West

Figure B-2 11/12/2012 Test Sediment PSD

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	94.1	5.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#50	100.0		
#70	100.0		
#100	100.0		
#120	99.9		
#140	60.9		
#170	28.5		
#200	5.9		
#230	1.2		
#270	0.4		

* (no specification provided)

Soil Description

Very Pale Brown Very Fine Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1185 D_{85}= 0.1161 D_{60}= 0.1056
D_{50}= 0.1012 D_{30}= 0.0908 D_{15}= 0.0820
D_{10}= 0.0786 C_u= 1.34 C_c= 0.99

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Location: PSD2
Sample Number: 1085
Date: 11/26/2012

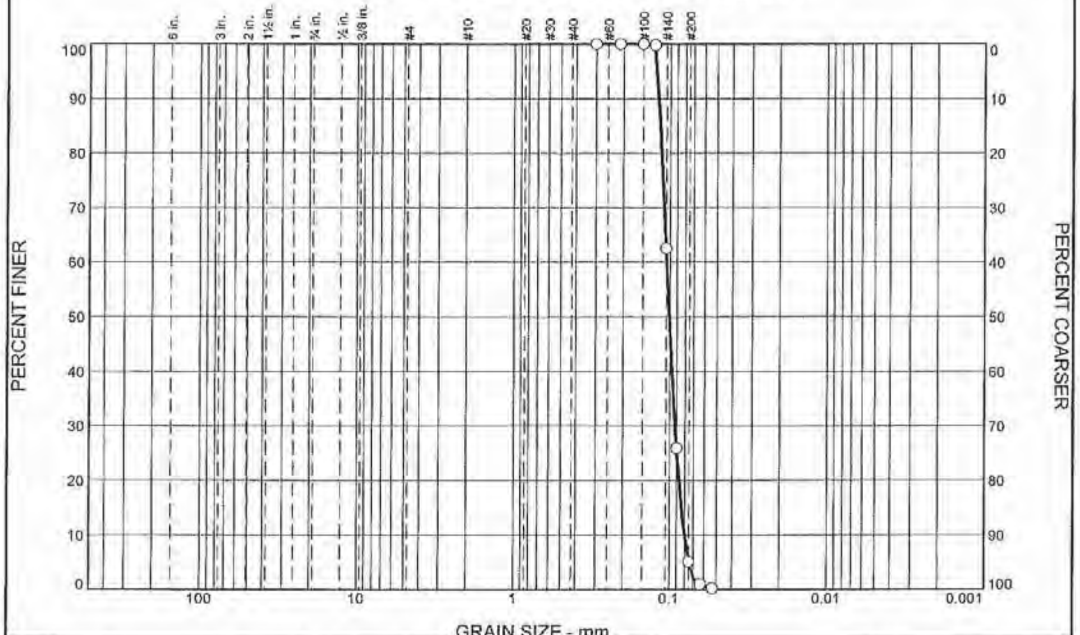
BTL Engineering, Inc.
Tampa, FL

Client: Applied Environmental Technologies
Project: Nutrients Separating Baffle Box
Project No: 5241-12 **Figure**

Tested By: T. Hannum **Checked By:** S. West

Figure B-3 11/16/2012 Test Sediment PSD

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	95.0	5.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#50	100.0		
#70	100.0		
#100	100.0		
#120	99.8		
#140	62.5		
#170	25.9		
#200	5.0		
#230	1.0		
#270	0.2		

* (no specification provided)

Soil Description

Very Pale Brown Fine Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1181 D_{85}= 0.1155 D_{60}= 0.1050
D_{50}= 0.1009 D_{30}= 0.0920 D_{15}= 0.0837
D_{10}= 0.0800 C_u= 1.31 C_c= 1.01

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Location: PSD3
Sample Number: 1084

Date: 11/26/2012

BTL Engineering, Inc.

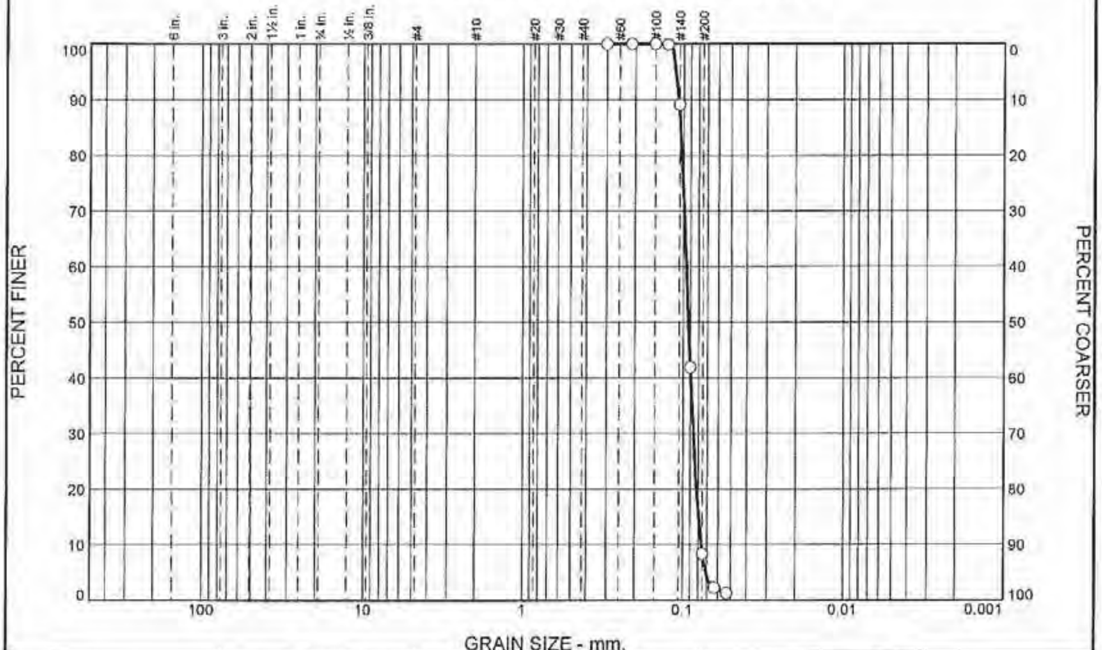
Tampa, FL

Client: Applied Enviromental Technologies
Project: Nutrients Separating Baffle Box
Project No: 5241-12 **Figure**

Tested By: T. Hannum **Checked By:** S. West

Figure B-4 11/20/2012 Test Sediment PSD

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	91.7	8.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#50	100.0		
#70	100.0		
#100	100.0		
#120	99.9		
#140	89.1		
#170	41.9		
#200	8.3		
#230	2.2		
#270	1.3		

* (no specification provided)

Soil Description

Very Pale Brown Fine Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1065 D_{85}= 0.1040 D_{60}= 0.0954
D_{50}= 0.0925 D_{30}= 0.0860 D_{15}= 0.0794
D_{10}= 0.0763 C_u= 1.25 C_c= 1.01

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Location: PSD-5
Sample Number: 1112-1

Date: 12/04/2012

BTL Engineering, Inc.

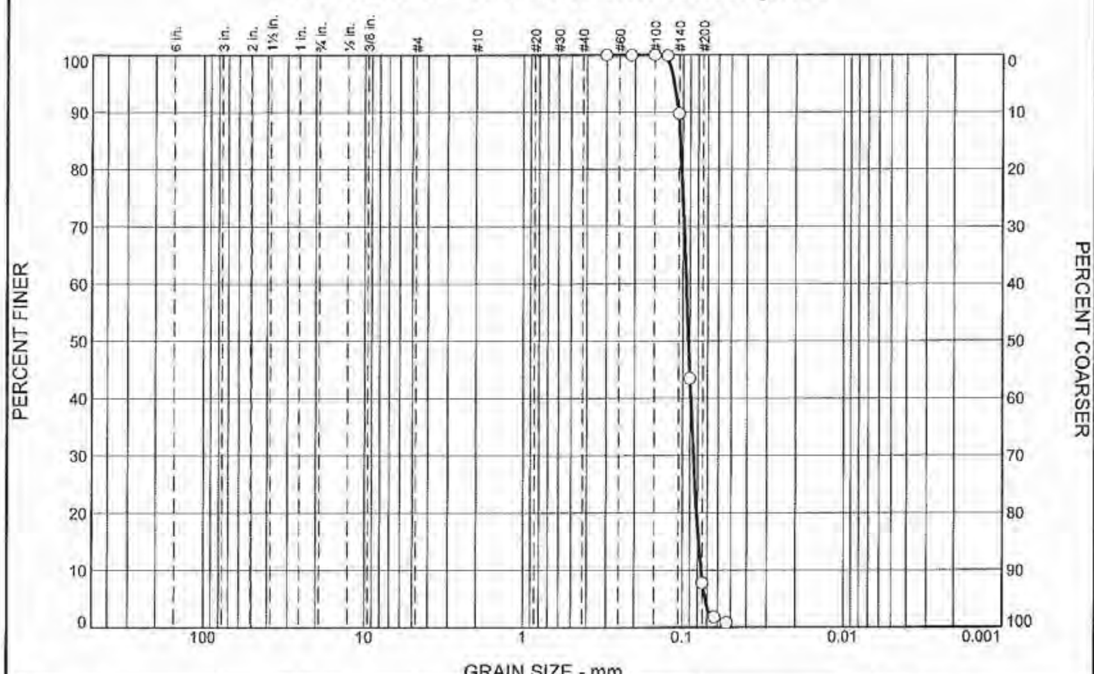
Tampa, FL

Client: Applied Environmental Technologies
Project: Nutrients Separating Baffle Box
Project No: 5241-12 **Figure**

Tested By: T. Hannum **Checked By:** S. West

Figure B-5 11/26/2012 Test Sediment PSD

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	92.3	7.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#50	100.0		
#70	100.0		
#100	100.0		
#120	99.9		
#140	89.8		
#170	43.5		
#200	7.7		
#230	1.8		
#270	0.8		

* (no specification provided)

Soil Description

Very Pale Brown Fine Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1062 D_{85}= 0.1036 D_{60}= 0.0950
D_{50}= 0.0920 D_{30}= 0.0855 D_{15}= 0.0793
D_{10}= 0.0766 C_u= 1.24 C_c= 1.01

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Location: PSD-7
Sample Number: 1112-3
Date: 12-4-2012

BTL Engineering, Inc.

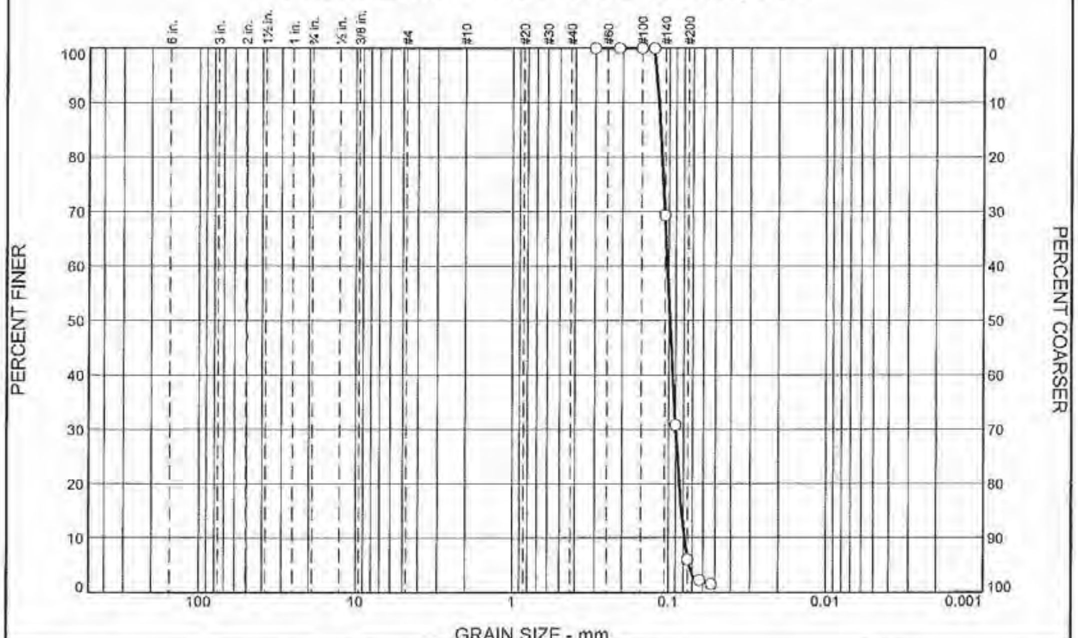
Tampa, FL

Client: Applied Enviromental Technologies
Project: Nutrients Separating Baffle Box
Project No: 5241-12 **Figure**

Tested By: T. Hannum **Checked By:** S. West

Figure B-6 11/28/2012 Test Sediment PSD

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	94.0	6.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#50	100.0		
#70	100.0		
#100	100.0		
#120	100.0		
#140	69.3		
#170	30.8		
#200	6.0		
#230	2.2		
#270	1.5		

* (no specification provided)

Soil Description

Very Pale Brown Fine Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1164 D_{85}= 0.1135 D_{60}= 0.1020
D_{50}= 0.0980 D_{30}= 0.0896 D_{15}= 0.0820
D_{10}= 0.0786 C_u= 1.30 C_c= 1.00

Classification

USCS= SP-SM AASHTO= A-3

Remarks

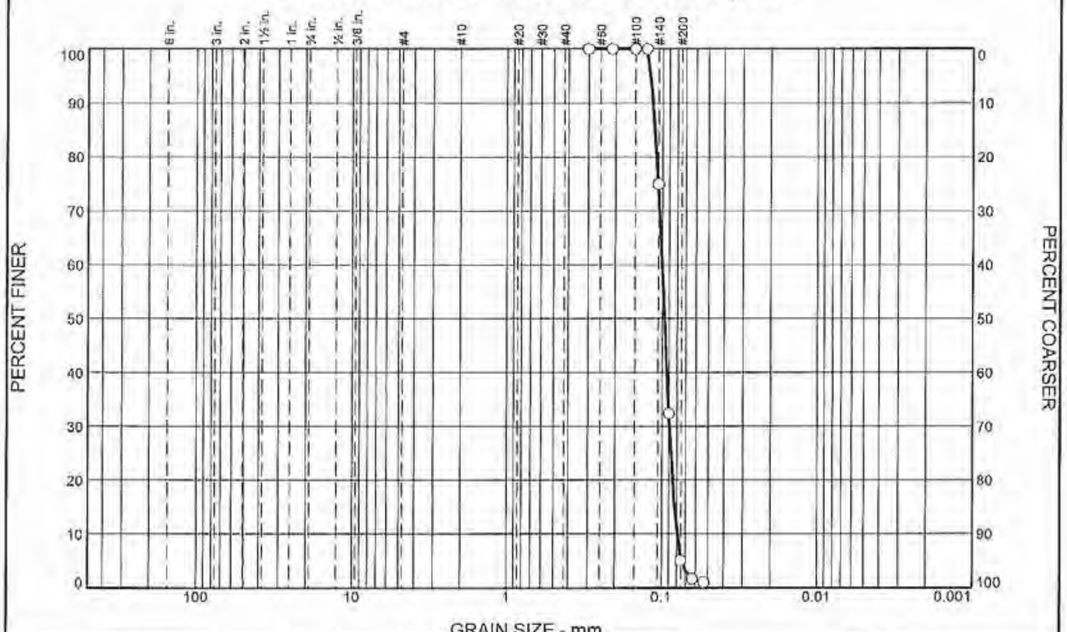
Location: A
Sample Number: 0014-1 **Date:** 1/09/2013

BTL Engineering, Inc. Tampa, FL	**Client:** Applied Enviromental Technologies **Project:** Baffle Box **Project No:** 5241-13 **Figure**

Tested By: T. Hannum **Checked By:** S. West

Figure B-7 1/8/2013 Pre-Load Sediment PSD: Chamber 1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	95.0	5.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#50	100.0		
#70	100.0		
#100	100.0		
#120	100.0		
#140	74.9		
#170	32.4		
#200	5.0		
#230	1.6		
#270	1.0		

* (no specification provided)

Soil Description

Very Pale Brown Fine Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1144 D_{85}= 0.1111 D_{60}= 0.1000
D_{50}= 0.0964 D_{30}= 0.0891 D_{15}= 0.0822
D_{10}= 0.0792 C_u= 1.26 C_c= 1.00

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Location: B
Sample Number: 0014-2

Date: 1/09/2013

BTL Engineering, Inc.

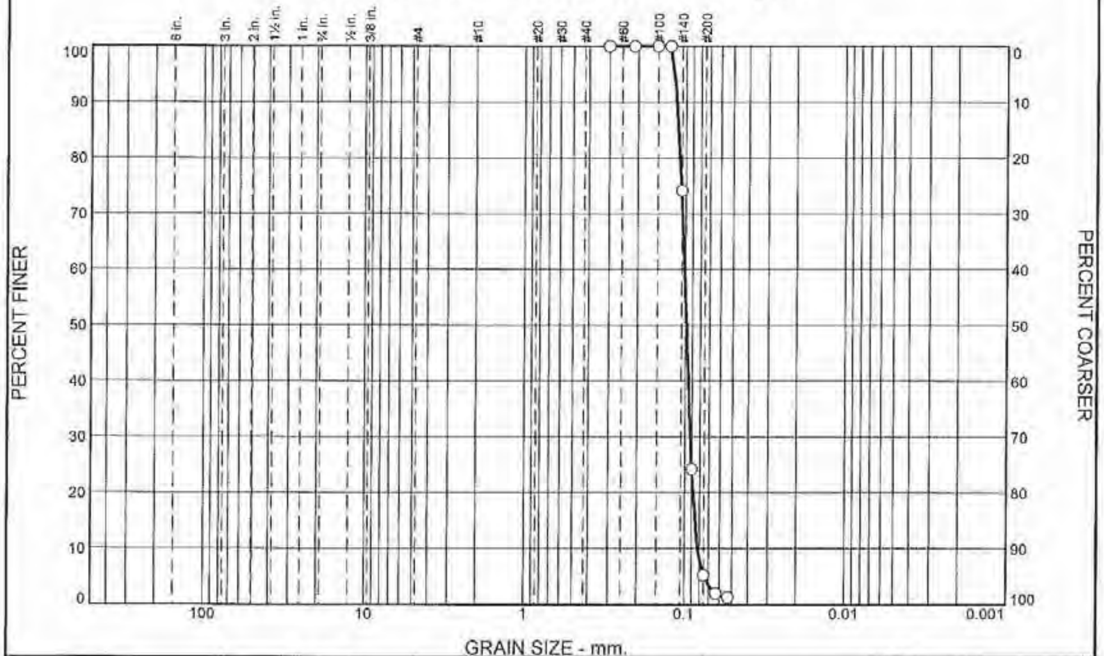
Tampa, FL

Client: Applied Enviromental Technologies
Project: Baffle Box
Project No: 5241-13 **Figure**

Tested By: T. Hannum **Checked By:** S. West

Figure B-8 1/8/2013 Pre-Load Sediment PSD: Chamber 2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	94.8	5.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#50	100.0		
#70	100.0		
#100	100.0		
#120	100.0		
#140	74.1		
#170	24.2		
#200	5.2		
#230	2.0		
#270	1.3		

* (no specification provided)

Soil Description

Very Pale Brown Fine Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1140 D_{85}= 0.1110 D_{60}= 0.1012
D_{50}= 0.0982 D_{30}= 0.0921 D_{15}= 0.0857
D_{10}= 0.0821 C_u= 1.23 C_c= 1.02

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Location: C
Sample Number: 0014-3

Date: 1/09/2013

BTL Engineering, Inc. Tampa, FL	**Client:** Applied Enviromental Technologies **Project:** Baffle Box **Project No:** 5241-13 **Figure**

Tested By: T. Hannum **Checked By:** S. West

Figure B-9 1/8/2013 Pre-Load Sediment PSD: Chamber 3

APPENDIX C

SEDIMENT RECOVERY EVALUATION

Sediment Recovery Evaluation
Nutrient Separating Baffle Box

9/28/12 to 9/30/12

Procedure

Baffle box model (NSBB 12x24X12 in.) with elevated false bottom 1st and 2nd chambers
NSBB was completely cleaned and free of sediment
Test sand was baked until there was no moisture and perfectly dry
Baffle box chambers were filled with water to top of baffles
1000 grams of test sand was wieghed and added to each chamber
Tare weights were measured for tray + filter
Sand was siphoned from the chambers individually and filtered and deposited in tray
Trays + filter were baked until the sand had no moisture and was perfectly dry
Weight of sand + tray + filter was measured
Sand removed from each chamber was calculated as mass of sand + tray + filter minus tare weight

Sediment Recovery Evaluation
Nutrient Separating Baffle Box

9/28/12 to 9/30/12

Results

Test **1**
Date **9/28/2011**

Baffle chamber	Mass tray + filter	Mass sand + tray + filter	Mass sand	Percent Recovery	Average Percent Recovery	Average Percent Loss
1	500.48	1,499.57	999.09	99.9090		
2	501.21	1,497.79	996.58	99.6580		
3	502.06	1,501.51	999.45	99.9450	99.8373	0.1627

Test **2**
Date **9/29/2011**

Baffle chamber	Mass tray + filter	Mass sand + tray + filter	Mass sand	Percent Recovery	Average Percent Recovery	Average Percent Loss
1	500.48	1,499.79	999.31	99.9310		
2	501.06	1,500.03	998.97	99.8970		
3	502.04	1,501.93	999.89	99.9890	99.9390	0.0610

Test **3**
Date **9/30/2011**

Baffle chamber	Mass tray + filter	Mass sand + tray + filter	Mass sand	Percent Recovery	Average Percent Recovery	Average Percent Loss
1	500.44	1,500.09	999.65	99.9650		
2	500.85	1,500.52	999.67	99.9670		
3	501.9	1,501.60	999.70	99.9700	99.9673	0.0327

Average Percent Recovery (3 tests)	Average Percent Loss (3 tests)
99.9	0.09

APPENDIX D

SUSPENDED SEDIMENT CONCENTRATION ANALYSIS PROTOCOL

Standard Operating Procedure

Analysis for Determining Suspended Sediment Concentration (SSC) in Water Samples

Purpose This Standard Operating Procedure (SOP) describes the procedures used to determine Suspended Sediment Concentration (SSC) as described in ASTM method D3977-97 B

Scope and Application

- This method is applicable to water samples collected from a Nutrient Separating Baffle Box (NSBB) for SWEMA/NJCAT evaluation
- The minimum reporting limit (RL) is 2.07 mg/L
- Water samples to be tested will have SSC generally in the range of 10 to 250 mg/L
- This SOP was prepared for method-compliant use by AET

Summary of Method:
A glass fiber filter is placed into an aluminum pan and dried to constant weight at 104^{o} C. A well-mixed sample of known volume is passed through the filter. The filter/pan and residue retained on the filter are dried to constant weight at 104^{o} C. The difference in weight (mass) is divided by the volume of the filtered sample to determine SSC.

Interferences

- Critical to this analyses are well mixing of the sample, preparation of the filter and filtration apparatus, rinsing of the sample container and filtration apparatus to capture all residual sediment, and drying time and temperature
- Only well characterized sand in a well characterized matrix will be present in test samples leading to relatively limited interferences

Safety

- It is mandatory to wear personal safety equipment while working with samples, glassware, and apparatus
- Sound judgment and good laboratory procedures are always recommended

Equipment and Supplies

- Glass fiber filter discs, 15.0 cm, without organic binder, Whatman type 934-AH
- Buchner funnel
- Filtration flask, 2000 mL
- Vacuum pump
- Drying oven, 103-105^{o}C
- Desiccator
- Analytical balance capable of weighing to 0.1 mg
- Graduated cylinders
- Aluminum pans
- Indelible marker, Sharpie or equivalent

Sample Collection, Preservation, and Handling

- Samples are collected in plastic containers and preserved and stored at >0 to 6^{o} C (32 to 43 ^{o} F). There is no specific holding time defined for this analysis.

Reagents and Standards

- Suspended Solid Standards, 40 to 250 mg/L, prepared by adding known mass of test sediment to a known volume of distilled water

Calibration and Standardization

- The analytical balance is calibrated annually to NIST Traceable standards
- Calibration verification: calibration verifications are performed with NIST traceable standards and documented

Procedure

Preparation of glass fiber filters/aluminum pans

- Assemble filter and aluminum pans for projected number of samples for SSC analyses
- Including at two additional filter/pans for Lab Control Sample and Method Blank
- In each filter/pan, include a small piece of additional filter material (wipe filter) for post filtration cleaning of the interior surfaces of the Buchner funnel to remove any remaining sediment
- Number all filter pans sequentially with an indelible marker
- Place first filter in the Buchner funnel apparatus with the wrinkled side up
- Apply vacuum to the funnel
- While vacuum is applied, wash the disc with approximately 50 mL distilled water
- Continue vacuum to remove as much water as possible
- Discontinue vacuum
- Remove filter from apparatus and place in aluminum pan along with wipe filter
- Place pan in drying oven at 103-105^{o}C and dry for two hours
- Remove filter/pan/wipe filter assemblage from oven and place in a desiccator for two hours
- Place filter/pan/wipe filter assemblage onto analytical balance and weigh (tare weight)
- Record tare weight = A (gram)

Filtration

- Prepare the Lab Control Sample (LCS) by adding a known mass of test sediment to a known volume of distilled water in a standard sample container, where the volume of distilled water volume is within the range of volume of samples being analyzed and the added sediment mass provides SSC of 40 to 200 mg/L
- A Method Blank (MB) is prepared by adding a known volume of distilled water to a standard sample container, where added distilled water volume is within the range of volume of samples being analyzed
- Mark the level of water sample on the side of the sample container
- Place filter into Buchner funnel

- Shake the unknown sample vigorously, pour initial sample volume into Buchner funnel, quickly start the vacuum pump
- Continue to pour remainder of sample into Buchner funnel as sample water is filtered
- Rinse the filter with copious amounts of distilled water and continue vacuum to remove as much water as possible, trying to bring the sand to the middle of the filter
- Remove the filter from apparatus and place it in the aluminum pan
- Wipe the inside of the Buchner funnel with the wipe filter to remove any remaining sediment
- Maintain the filter order for all filters to provide more orderly analyses process
- Fill the sample container to the marked level
- Measure it water volume in the container using a graduated cylinder
- Record sample volume = C (ml)

Drying

- Place the filter/pan/wipe filter assemblage into the drying oven at 103-105°C for at least 2 hours
- Remove the filter/pan/wipe filter assemblage from the oven and place immediately in desiccator

Final Weighing

- Place filter/pan/wipe filter assemblage onto analytical balance and weigh (filtered weight)
- Record filtered weight = B (gram)

Data Analysis and Reporting

- Calculate SSC in mg/L as SSC = (B – A) / C x 1,000,000, where:
  - A = Weight of filter assemblage before filtration, gram
  - B = Weight of filter assemblage after filtration, gram
  - C = Volume of sample filtered, mL

Method Performance

- Demonstration of Capability (DOC) DOC for this method is based on the analyst experience with Total Suspended Solids, SM 2540 D and the SSC method itself
- An Initial Demonstration of Capabilities (IDOC) Study will be performed prior to evaluation of SWEMA/NJCAT verification test samples
- The IDOC will entail analysis of at least 4 consecutive prepped LCSs. The recovery of the LCSs must be 70%-130% in the low SSC range (ca. 10 mg/L) and 85%-115% in the high SSC range (ca. 100 mg/L) to pass

Quality Control

- A Lab Control Sample (LCS) is prepared by adding a known mass of test sediment to a known volume of distilled water in a standard sample container, where the volume of distilled water is within the range of volume of samples being analyzed and the added sediment mass provides SSC of 10 to 50 mg/L

- A Method Blank (MB) is prepared by adding a known volume of distilled water to a standard sample container, where added distilled water volume is within the range of volume of samples being analyzed
- SSC procedure uses entire sample volume and duplicate analyses cannot be performed
- Any deviations from the norm encountered while conducting this analysis must be noted in the bench sheet and corrected
- An analysis event is performance of SSC analyses on multiple samples in one analytical campaign, such as analyses of samples resulting from one or more flow rate tests
- Quality Control (QC) specifications are:

QC Check	Minimum	Frequency	Acceptance Criteria	Corrective Action
Constant weight	None	Once at initiation of SWEMA/ NJCAT	Weight change of less than 0.5 mg for a sample with SSC > 250 mg/L	Longer duration drying time
Method Blank (MB)	1	Per analyses event	< Reporting Limit	Repeat analyses; identify problems
Lab Control Sample (LCS)	1	Per analyses event	85 - 115% recovery	Repeat analyses; flag data
Demonstration of Capability	4	Once for each analyst	High Range recovery: 85 - 115% (ca. 100 mg/L) Low Range recovery: 70 - 130% (ca. 10 mg/L)	Identify problem(s), repeat analyses

References

- American Society for Testing and Materials, Standard Test Methods for Determining Sediment Concentration in Water Samples, Method D3977 – 97 part B., 1997
- Standard Methods for the Examination of Water and Wastewater, Method 2540D

APPENDIX E

QUALITY ASSURANCE DOCUMENTATION

SWEMA/NJCAT-100 μm Protocol
Quality Assurance Documentation

Constant Weight in Suspended Solids Concentration (SSC) Tests

The SSC procedure requires verification that the sample drying time is long enough to achieve a constant sample weight. Verification tests were performed on 11/27/2012 and 11/28/2012 using SSC background influent samples collected in NSBB pre-testing runs. On each date, the complete SSC test procedure was performed on eight background influent samples. At the completion of the SSC tests, samples were dried for an additional 2 hours and re-weighed. Using the analytical SSC, the difference in mass of tare + solids was scaled to a 250 mg/L SSC concentration. Results are shown in Tables A-1 and A-2. The weight change of all samples was well below 0.5 mg for all samples, satisfying the constant weight criteria.

Table E-1 SSC Constant Weight Demonstration (11/27/2012)

Dry 12 hours					Dry additional 2 hours		
Tare, g	Tare + solids, g	Volume, ml	Solids, g	SSC, mg/L	Tare + solids, g	Difference in mass of (tare + solids), g	Absolute value of difference in (tare + solids), normalized to 250 mg/L SSC, mg
9.6016	9.6034	1,453	0.0018	1.24	9.6031	0.0003	0.0015
9.5767	9.5794	1,467	0.0027	1.84	9.5799	-0.0005	0.0037
14.5078	14.5132	1,785	0.0054	3.03	14.5127	0.0005	0.0061
14.3000	14.3041	1,429	0.0041	2.87	14.3041	0.0000	0.0000
9.4165	9.4210	1,591	0.0045	2.83	9.4205	0.0005	0.0057
14.5313	14.5358	1,612	0.0045	2.79	14.5355	0.0003	0.0033
9.6842	9.6885	1,590	0.0043	2.70	9.6875	0.0010	0.0108
9.5537	9.5593	1,498	0.0056	3.74	9.5593	0.0000	0.0000

Table E-2 SSC Constant Weight Demonstration (11/28/2012)

Sample Time, minute	Dry 12 hours					Dry additional 2 hours		
	Tare, g	Tare + solids, g	Volume, ml	Solids, g	SSC, mg/L	Tare + solids, g	Difference in mass of (tare + solids), g	Absolute value of difference in (tare + solids), normalized to 250 mg/L SSC, mg
2	9.6874	9.6908	1,598	0.0034	2.13	9.6906	0.0002	0.0017
10	9.5927	9.5960	1,660	0.0033	1.99	9.5962	-0.0002	0.0016
17	14.5347	14.5389	1,662	0.0042	2.53	14.5339	0.0050	0.0503
23	14.5105	14.5154	1,375	0.0049	3.56	14.5152	0.0002	0.0029
33	9.6349	9.6368	1,392	0.0019	1.36	9.6368	0.0000	0.0000
41	9.6063	9.6092	1,207	0.0029	2.40	9.6086	0.0006	0.0058
49	9.5734	9.5774	1,843	0.0040	2.17	9.5772	0.0002	0.0017
57	9.6546	9.6596	1,595	0.0050	3.13	9.6594	0.0002	0.0025

Suspended Solids Concentration Method Detection Limit (MDL)

The Method Detection Limit (MDL) is the lowest quantity of suspended sediment that can be distinguished from that absence of suspended sediment in the sample. The MDL for SSC was established by performing SSC analyses on a series of laboratory blanks and performing statistical analyses. Ten laboratory blanks were prepared by adding a known volume of distilled water to clean sample containers (zero suspended sediment). The complete SSC analyses procedure was performed on each laboratory blank. The results are listed in Table A-3 and plotted in Figure A-1. A statistical summary of the laboratory blank SSC data set is shown in Table A-4. Mean and standard deviation were -0.139 and 0.977 mg/L, respectively. The data set passed the Shapiro-Wilk test for normal distribution (P=0.05). A cumulative probability plot of SSC data is shown in Figure A-2.

The MDL for SSC was established by applying one-sided t-distribution for nine degrees of freedom at a 97.5% confidence level ($\nu = 9$, $\alpha = .025$), for which the critical value is 2.262. The MDL was established as:

$MDL = Mean_{SSC} + 2.262 * Standard\ Deviation_{SSC}$
$MDL = -0.139 + 2.262 * 0.977$
$MDL = 2.07$ mg/L

For an analytical SSC result greater than 2.07 mg/L, there is 97.5% confidence that suspended sediment is actually present in the sample.

Table E-3 Laboratory Blank SSC Determination

Date	Tare, g	Tare + solids, g	Volume, ml	Solids, g	SSC, mg/L
11/27/12	9.6629	9.6621	1,010	-0.0008	-0.79
12/06/12	9.3926	9.3927	1,000	0.0001	0.10
12/07/12	14.3451	14.3441	1,010	-0.0010	-0.99
12/10/12	9.5629	9.5659	1,984	0.0030	1.51
12/11/12	14.4411	14.4415	1,000	0.0004	0.40
12/12/12	14.2313	14.2322	1,000	0.0009	0.90
12/18/12	13.1760	13.1757	1,025	-0.0003	-0.29
12/19/12	9.5476	9.5456	1,035	-0.0020	-1.93
12/20/12	9.3645	9.3642	1,017	-0.0003	-0.29
01/08/13	9.5710	9.5710	1,000	0.0000	0.00

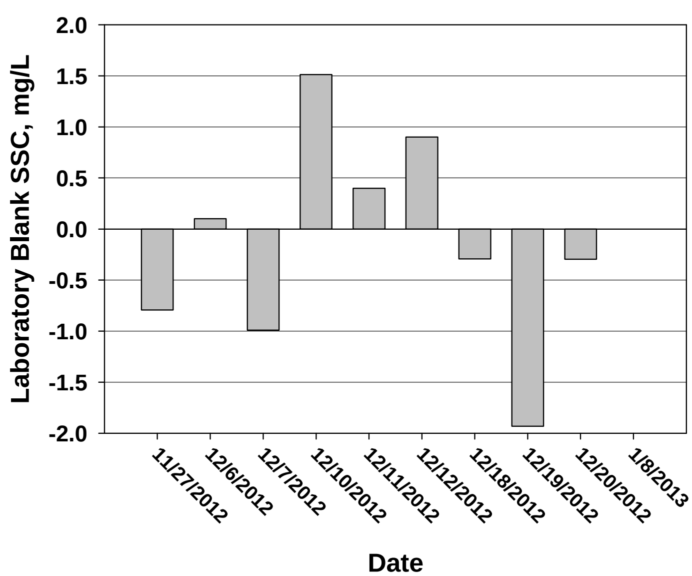


Figure D-1 SSC of Laboratory Blanks (n=10)

Table E-4 Statistical Parameters for Data Set of Laboratory Blank SSC

Count	10
Mean	-0.139
Median	-0.146
Minimum	-1.93
Maximum	1.51
Range	3.44
Standard Deviation	0.977
Variance	0.954
Kurtosis	0.392
Skewness	-0.130

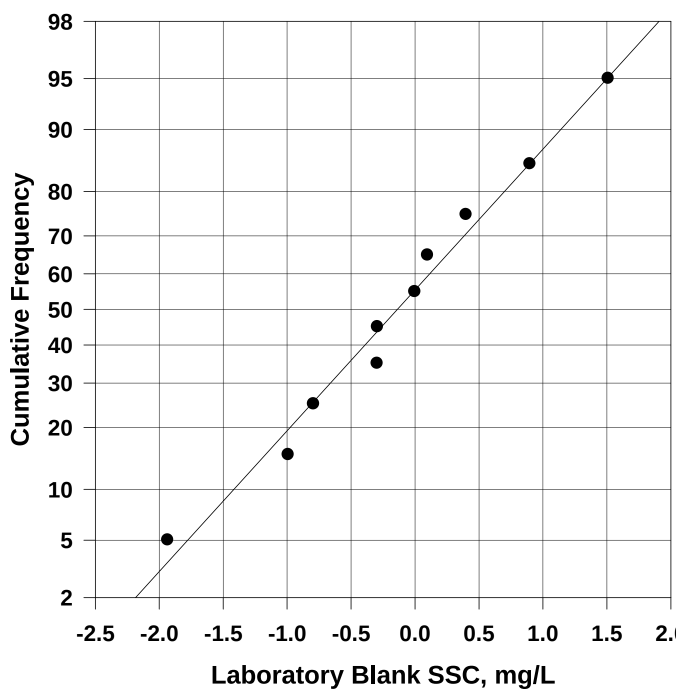


Figure E-2 Cumulative Frequency of Laboratory Blank SSC

Suspended Solids Concentration Reporting Limit (RL)

In NSBB verification testing, SSC analyses are used to:

- Verify that background SSC in NSBB influent do not exceed 20 mg/L in either sediment removal efficiency testing and resuspension testing
- In resuspension testing, verify that SSC in NSBB discharge do not increase by more than 20 mg/L over the influent background SSC.

The main purpose of SSC analyses is therefore to verify that SSC levels remain below 20 mg/L, rather than to precisely quantify the SSC levels that obtain during testing. Therefore, the SSC Reporting Limit was established as the MDL (2.07 mg/L). Furthermore, all SSC analytical results were included in the verification report, even if the SSC values are less than the Reporting Limit. In reviewing the verification report, it should be kept in mind that SSC values less than the MDL of 2.07 mg/L cannot be distinguished from background.

Suspended Solids Concentration Method Demonstration of Capability

The initial Demonstration of Capability for the Suspended Solids Concentration Method was performed on 11/28-30/2010 using three SSC standards in the low range (ca. 10 mg/L) and three SSC standards in the high range (ca. 100 mg/L). Results are shown in Table A-5. Mean recovery of low and high range samples were 100.7 and 95.4%, respectively. All low range samples met the 40% recovery criteria and all high range samples met the 15% recovery criteria. The maximum absolute errors were 2.8 and 10.0 mg/L in low and high SSC ranges, respectively.

The low and high range data sets for SSC recovery both passed the Shapiro-Wilk test for normality. Confidence intervals were established for SSC recovery using t-distribution analysis of Demonstration of Capability data sets. For the low SSC range, a one way analysis was applied

Table E-5 Demonstration of Capability

<table>
<tr><th rowspan="2">SSC Range</th><th colspan="3">SSC, mg/L</th><th colspan="8">% Recovery</th></tr>
<tr><th>Standard Solution</th><th>Standard Solution Mean</th><th>Analytical Result</th><th>%</th><th>Mean</th><th>Standard Deviation</th><th>Minimum</th><th>Maximum</th><th>Coefficient of Variation</th><th>Within 40% Criteria?</th><th>Within 15% Criteria?</th></tr>
<tr><td rowspan="3">Low</td><td>11.7</td><td rowspan="3">10.7</td><td>10.0</td><td>85.5</td><td rowspan="3">100.7</td><td rowspan="3">22.5</td><td rowspan="3">85.5</td><td rowspan="3">126.6</td><td rowspan="3">0.22</td><td>Yes</td><td>-</td></tr>
<tr><td>10.7</td><td>13.5</td><td>126.6</td><td>Yes</td><td>-</td></tr>
<tr><td>9.8</td><td>8.8</td><td>90.0</td><td>Yes</td><td>-</td></tr>
<tr><td rowspan="3">High</td><td>103.3</td><td rowspan="3">101.9</td><td>96.4</td><td>93.3</td><td rowspan="3">95.4</td><td rowspan="3">1.9</td><td rowspan="3">93.3</td><td rowspan="3">97.0</td><td rowspan="3">0.020</td><td>-</td><td>Yes</td></tr>
<tr><td>101.1</td><td>96.9</td><td>95.8</td><td>-</td><td>Yes</td></tr>
<tr><td>101.2</td><td>98.1</td><td>97.0</td><td>-</td><td>Yes</td></tr>
</table>

based on the primary need of SSC in the verification testing which is to demonstrate that SSC levels are less than 20 mg/L. For the low SSC range, one sided t-distribution analysis (ν = 2, α = .2, critical value = 1.886) provides a lower recovery limit of 100.7 - 1.886*22.5, or 58.1%. Using the limited low SSC range dataset (n=3), it is predicted that there is a 90% probability that actual SSC is less than 20 mg/L for any analytical SSC result of 11.6 mg/L or less. For the high SSC range, two sided t-distribution analysis (ν = 2, α = .1, critical value = 2.920) provides lower and upper recovery limits (90% confidence) of 89.9 and 100.8%. The analysis of SSC recoveries based on the Demonstration of Capability results is limited due to the small number of samples in each SSC range (n=3). Additional insight into SSC recoveries is provided in Laboratory Control Samples section that follows.

Laboratory Control Samples (LCS)

A summary of Laboratory Control Sample (LCS) analyses is presented in Table A-6 and Figure A-3. Mean LCS recovery was 95.64%, with a standard deviation of 7.65, minimum of 86.2, and maximum of 107.3%. Shapiro-Wilk test indicated that the LC SSC recovery data set was normally distributed (Figure A-4). Lower and upper recovery limits were derived using a two sided t-distribution analysis at 90% confidence (ν = 7, α = .1, critical value = 1.895). Lower and upper recovery limits of LC SSC recoveries were 81.1 and 110.1%, respectively.

Table E-6 Laboratory Control Sample SSC Determination

Date	Test Flow	SSC Standard Solution, mg/L (Lab Control)	SSC Analytical Result, mg/L	% Recovery	Recovery Within ±10%?	Recovery Within ±15%?
12/06/12	0.75	28.9	28.4	98.3	Yes	Yes
12/10/12	1.25	17.8	17.7	99.2	Yes	Yes
12/11/12	0.50	20.3	17.5	86.2	No	Yes
12/12/12	0.25	20.6	22.1	107.3	Yes	Yes
12/18/12	1.00	20.8	19.1	91.9	Yes	Yes
12/19/12	1.50	23.0	19.9	86.5	No	Yes
12/20/12	1.75	31.3	28.9	92.4	Yes	Yes
01/08/13	2.70	18.3	18.9	103.3	Yes	Yes

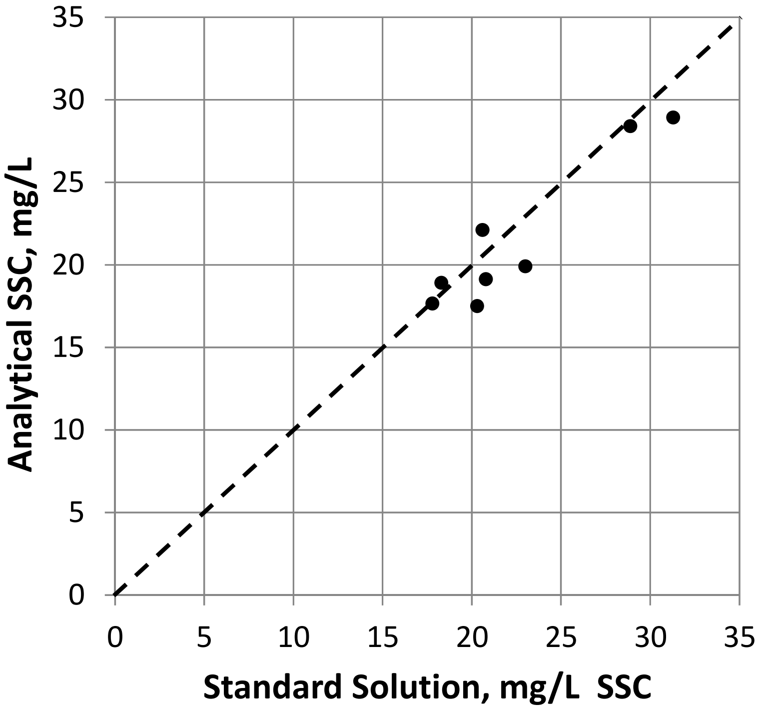


Figure E-3 Laboratory Control Sample SSC

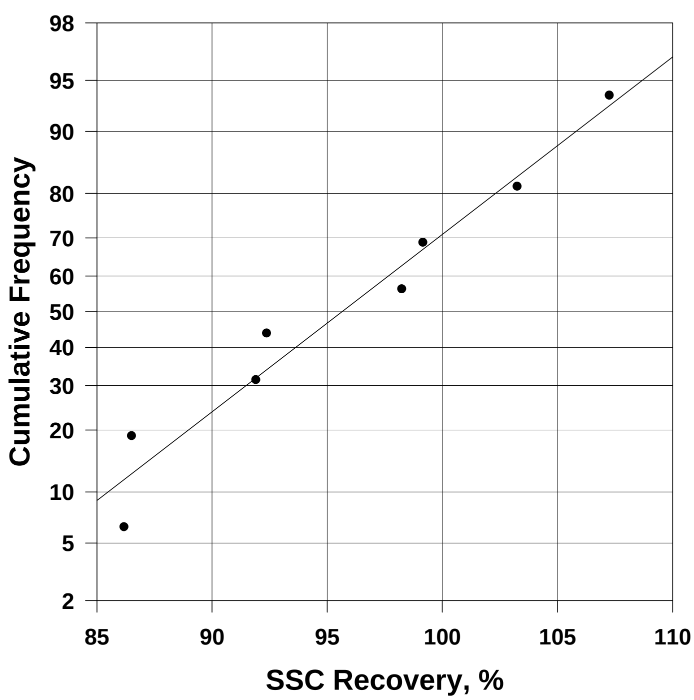


Figure E-4 Cumulative Frequency of Laboratory Control Sample SSC Recovery

Constant Weight in Sediment Preparation Constant Weight Pre-Testing

Each sediment removal efficiency test required preparation of sediment. The starting sediment had been previously dried and stored in sealed containers. Approximately 35 lbs. of sediment was sieved through a US No. 80 sieve, placed in aluminum pans, heated for 2 hours at 170F, cooled, and placed in the dosing hopper just prior to performance of the test. A test was performed on 11/28/2012 to verify that the procedure resulted in sediment of constant dryness. A subsample of cooled sediment was weighed, dried at 103C for 2 hours, cooled, and reweighed. The results are shown in Table A-7. The relative difference in mass was negligible after the second drying step (2 hour at 103C), indicating that acceptable dryness was achieved by the drying procedure.

Table E-7 Sediment Preparation Constant Weight Demonstration

	gram
Tare Weight	29.77
Weight Sediment + Tare	
After 2 hours at 170F	112.18
After 2 hours at 103C	112.16
Weight Sediment	
After 2 hours at 170F	82.41
After 2 hours at 103C	82.39
Fractional change	-2.43E-04

Certificate of Calibration

Flow rate was measured with a PT-500 Ultrasonic Flow Meter, Serial Number 7629 (Greyline Instruments Inc., Massena, New York). The PT-500 is a Transit Time ultrasonic flow meter that employs two sensors mounted on the outside of the pipe wall and has a manufacturer stated accuracy of ±2% (http://www.greyline.com/pt500.htm). The instrument was calibrated by Micronics Ltd. and a copy of the Certificate of Calibration is included on Page E-9.

micronics

Certificate of Calibration

Micronics Ltd certifies that, at the time of manufacture the instrument detailed below was calibrated and verified using an Electromagnetic Flow Meter of known accuracy, which is traceable to National and International Standards in accordance with Micronics Ltd calibration procedures (Doc 780-1001-007-TP). These procedures are in compliance with the relevant clauses of ISO 9001.

Description of Instrument Calibrated

These are ultrasonic 'clamp-on' flowmeters designed for measuring flow in 'clean' liquids

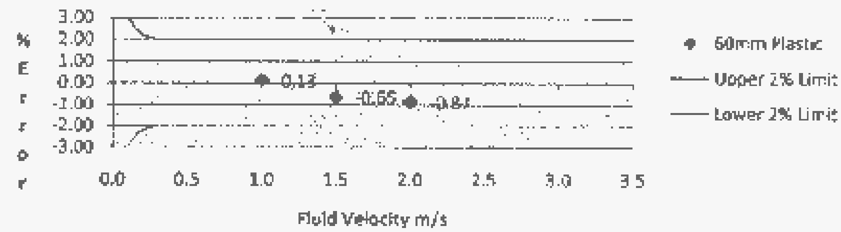
Uncertainty in Reference Measurement Equipment

Flowmeter ±0.2%; DMM ±0.005%; Pulse Counter ±0.005%

Unit Under Test	
Model:	PT500
Serial No:	7629
Condition:	New
Software Version:	02.07.002

Environmental Conditions	
Ambient Temperature (°C)	23 1
Fluid Temperature (°C)	27 3
Relative Humidity %RH	52

Calibration Chart 1 - A-ST Sensors
Serial Numbers: 20585 - 20593



Calibration Chart 2 - B-ST Sensors
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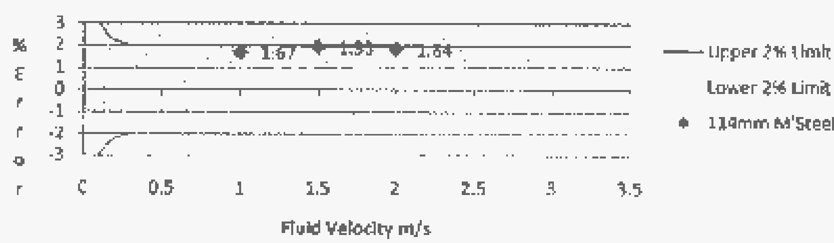

4-20mA Current Output Calibration

[illegible] (c)	[illegible] (mA)	DAC Value	Measured (mA)	Deviation (%)
620	4.000	8144	4 0045	0 1125
520	20.000	40896	20 0045	0 0225

Tested by:-

Pulse Output Check

Vol/Pulse (litres)	Measured Vol (litres)	Expected No Pulses	Measured No Pulses	Deviation (%)
10.00	1075.7	108	107	-0.53

Date Tested:- 22.07.10

Registered Office: Micronics Limited, Knaves Beech Business Centre, Davies Way, Loudwater, Buckinghamshire HP10 9QR
Web site: www.micronicsltd.co.uk Tel: +44 (1628) 810456 Fax: +44 (1628) 531540
Directors: E.J. Farmer, M.S. Farmer

APPENDIX F

EXPERIMENTAL DATA AND RESULTS

Experimental Data and Results

Table F-1 List of Experiments

Experiment	Test Date	Flowrate, cfs
Removal Efficiency	12/12/12	0.25
	12/11/12	0.50
	12/06/12	0.75
	12/18/12	1.00
	12/10/12	1.25
	12/19/12	1.50
	12/20/12	1.75
Resuspension	01/08/13	2.70

Table F-2 Summary of Results for 0.25 cfs Flow Rate Experiment

	Target	Experiment				Relative Error, %
		Mean	C.V.	Minimum	Maximum	
Flowrate, gpm	112.2	112.3	0.0494	96.1	125.4	0.06
NSBB Sediment Dosing Time, min	142.33					
Sediment Dosing Rate, gram/min	84.9	85.6	0.004	85.2	86.0	0.76
Mean Influent SSC, mg/L	201.4					
Background SSC, mg/L	20 mg/L max.	2.2	0.66	0.5	5.0	

	gram	lbs.	% in chamber	% Removal Efficiency
Total Sediment Dosed to NSBB	12,182	26.81		
Sediment Captured				
Chamber 1	10,723	23.60	89.7	88.0
Chamber 2	819	1.80	6.9	56.2
Chamber 3	415	0.91	3.5	64.9
Total	11,957	26.32	100.0	98.2

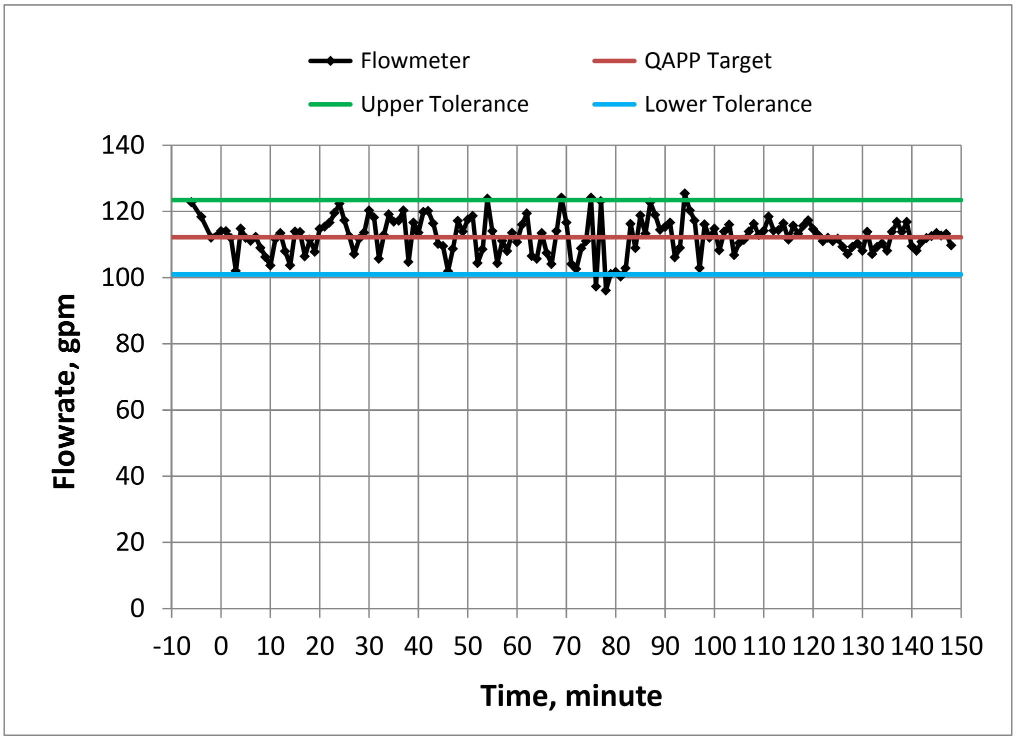

Figure F-1 Monitored Flow Rate for 0.25 cfs Experiment

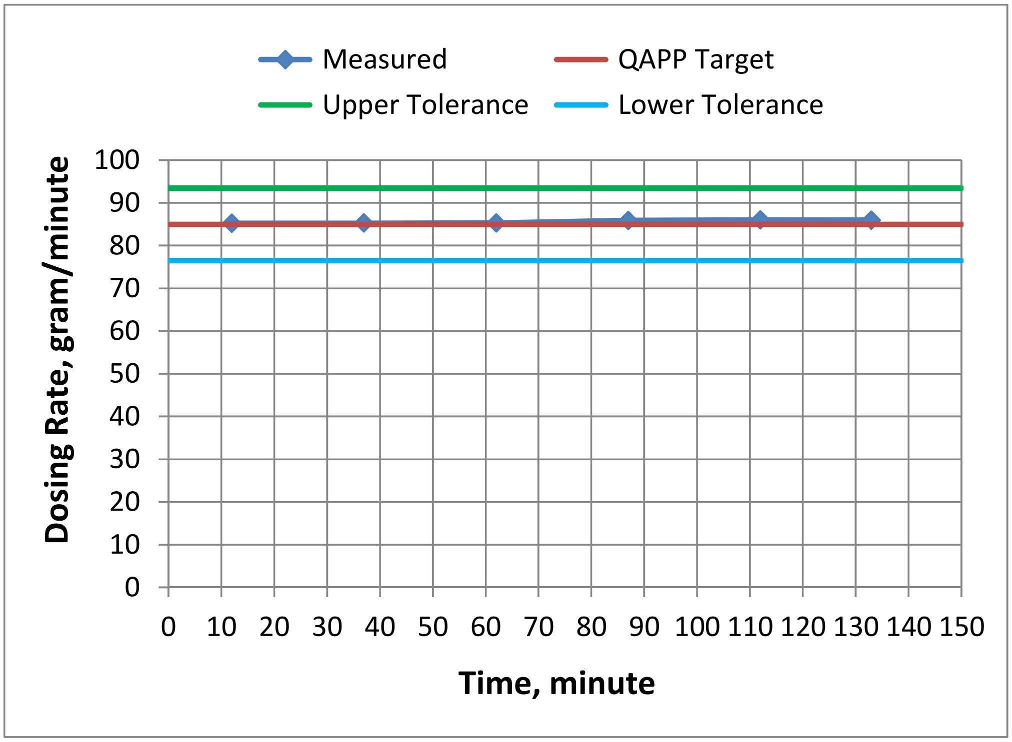

Figure F-2 Monitored Sediment Dosing Rate for 0.25 cfs Experiment

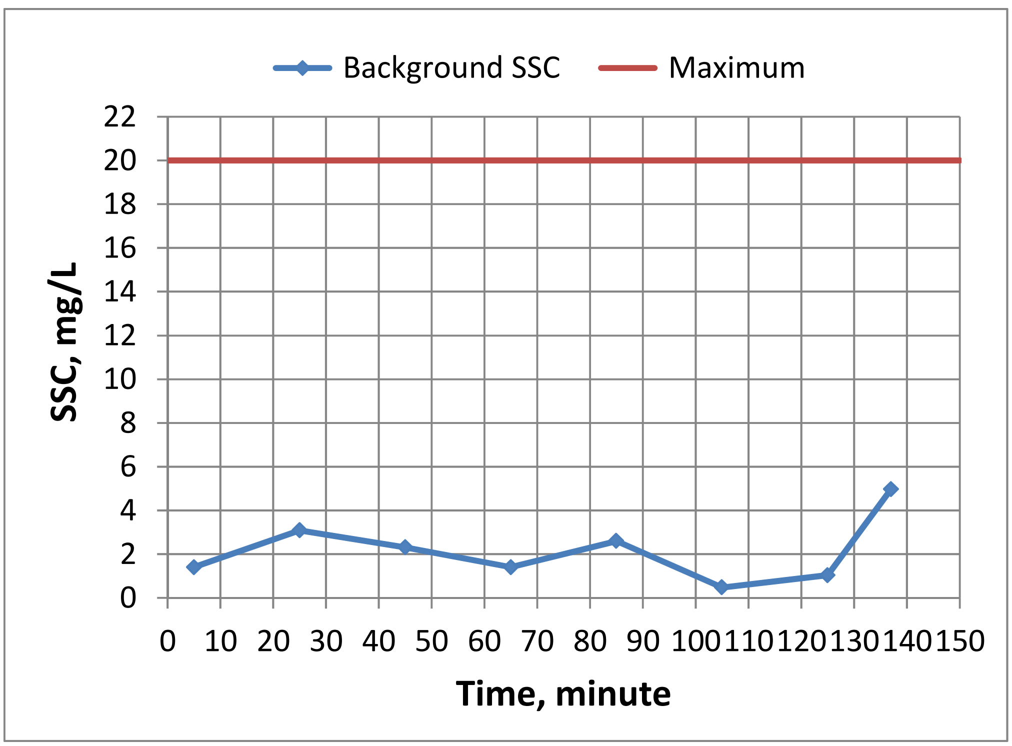

Figure F-3 Monitored Background SSC for 0.25 cfs Experiment

Table F-3 Summary of Results for 0.50 cfs Flow Rate Experiment

	Target	Experiment				Relative Error, %
		Mean	C.V.	Minimum	Maximum	
Flowrate, gpm	224.4	226.6	0.0134	218.8	232.9	0.98
NSBB Sediment Dosing Time, min	80.0					
Sediment Dosing Rate, gram/min	169.9	166.9	0.006	165.2	167.8	-1.77
Mean Influent SSC, mg/L	194.6					
Background SSC, mg/L	20 mg/L max.	4.2	0.57	2.0	9.6	

	gram	lbs.	% in chamber	% Removal Efficiency
Total Sediment Dosed	13,349	29.38		
Sediment Captured				
Chamber 1	10,650	23.44	88.1	79.8
Chamber 2	842	1.85	7.0	31.2
Chamber 3	596	1.31	4.9	32.1
Total	12,088	26.61	100.0	90.6

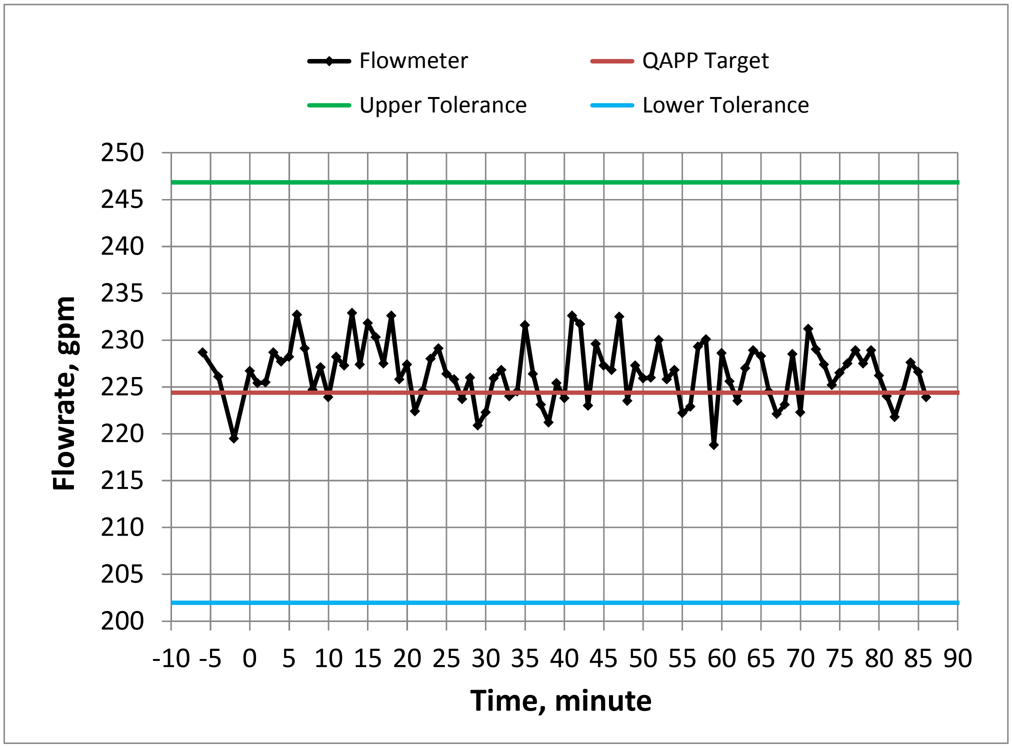

Figure F-4 Monitored Flow Rate for 0.50 cfs Experiment

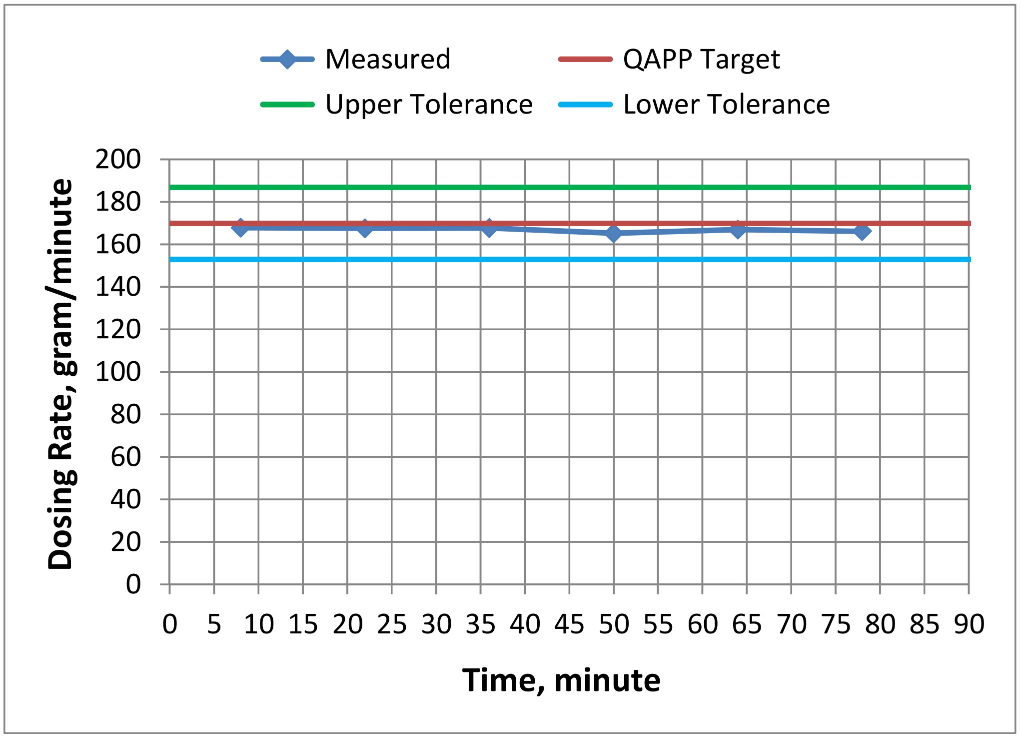

Figure F-5 Monitored Sediment Dosing Rate for 0.50 cfs Experiment

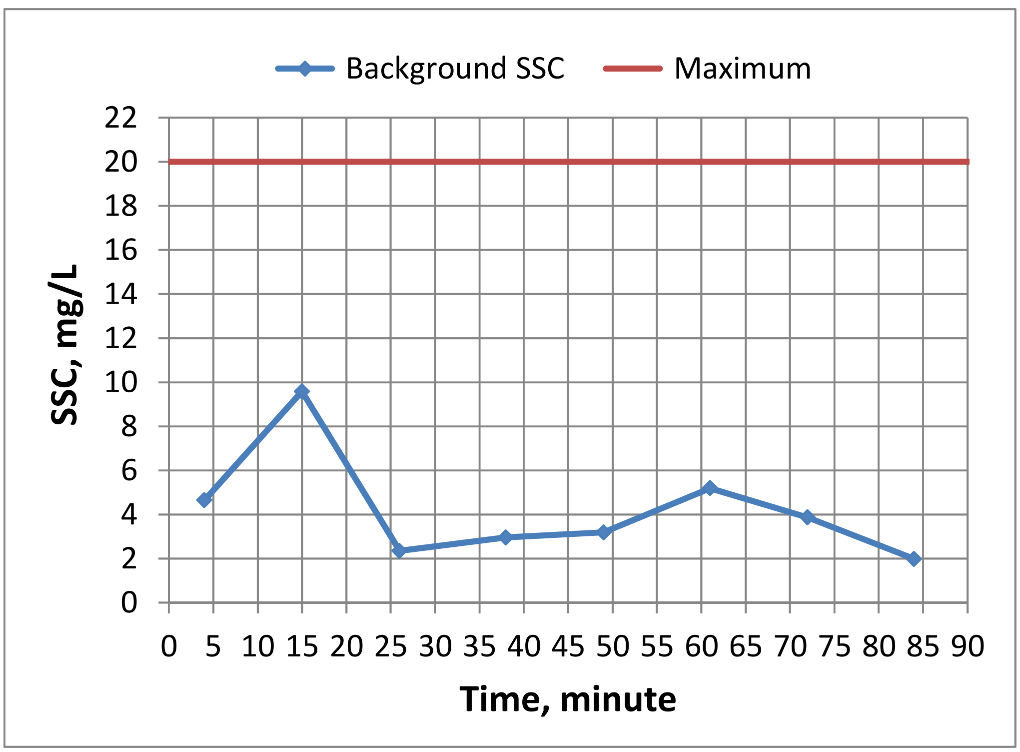

Figure F-6 Monitored Background SSC for 0.50 cfs Experiment

Table F-4 Summary of Results for 0.75 cfs Flow Rate Experiment

	Target	Experiment				Relative Error, %
		Mean	C.V.	Minimum	Maximum	
Flowrate, gpm	336.6	336.4	0.0143	327.5	346.8	-0.05
NSBB Sediment Dosing Time, min	53.0					
Sediment Dosing Rate, gram/min	254.8	242.4	0.014	237.1	245.9	-4.87
Mean Influent SSC, mg/L	190.4					
Background SSC, mg/L	20 mg/L max.	3.0	0.50	0.9	5.3	

	gram	lbs.	% in chamber	% Removal Efficiency
Total Sediment Dosed	12,847	28.28		
Sediment Captured				
Chamber 1	8,192	18.03	85.7	63.8
Chamber 2	849	1.87	8.9	18.2
Chamber 3	517	1.14	5.4	13.6
Total	9,559	21.04	100.0	74.4

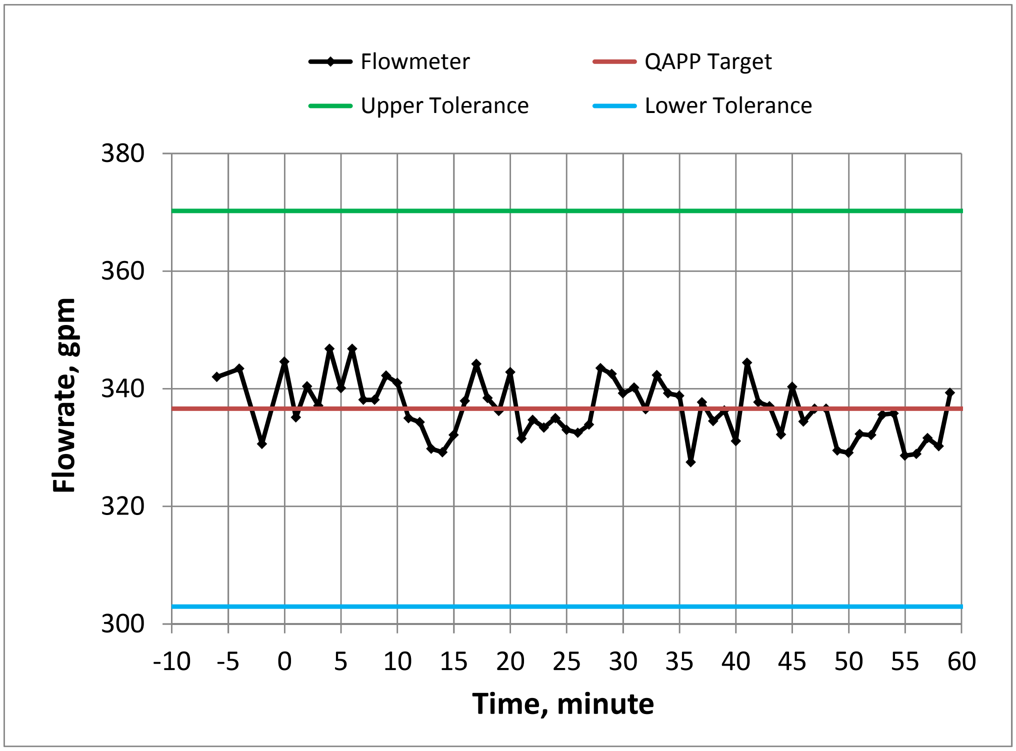

Figure F-7 Monitored Flow Rate for 0.75 cfs Experiment

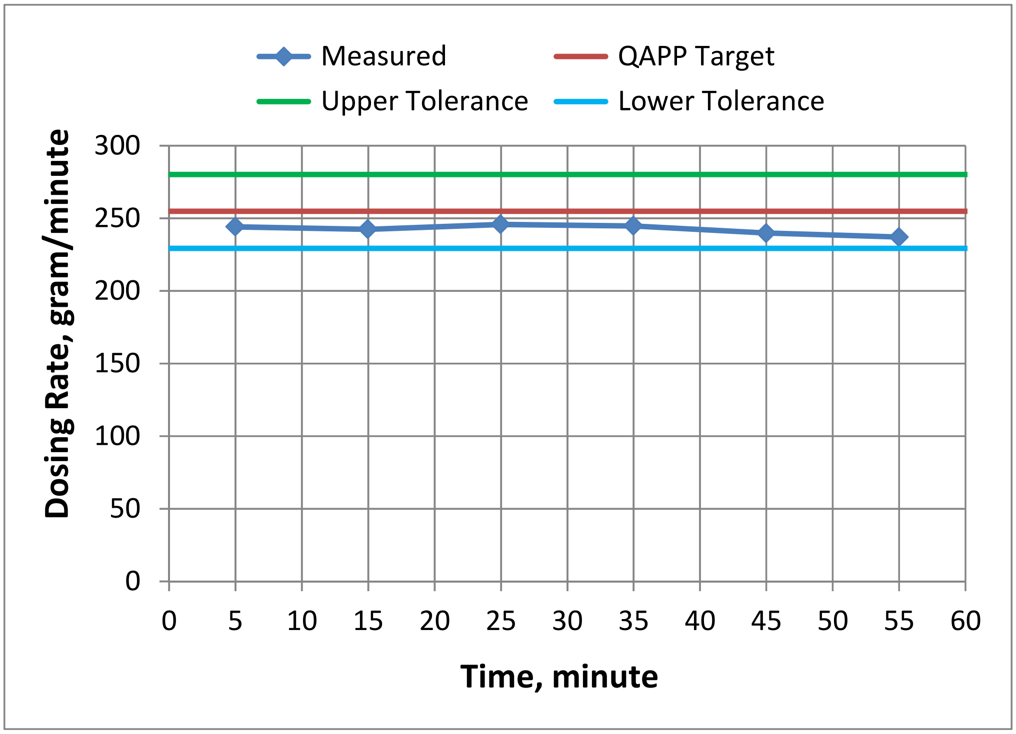

Figure F-8 Monitored Sediment Dosing Rate for 0.75 cfs Experiment

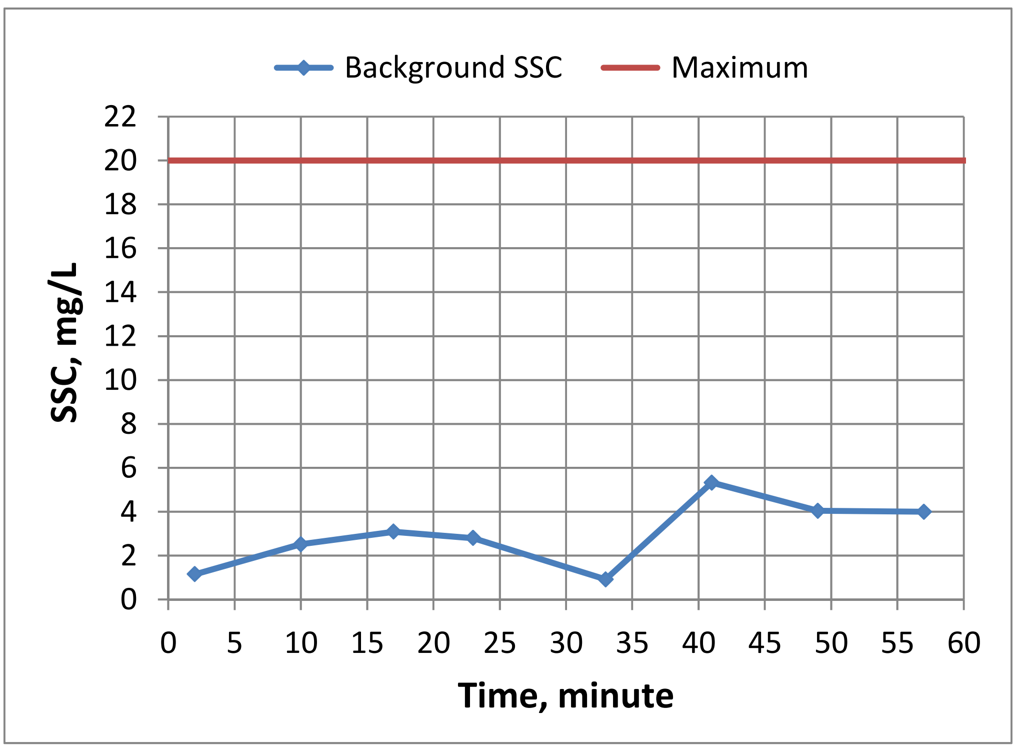

Figure F-9 Monitored Background SSC for 0.75 cfs Experiment

Table F-5 Summary of Results for 1.00 cfs Flow Rate Experiment

	Target	Experiment				Relative Error, %
		Mean	C.V.	Minimum	Maximum	
Flowrate, gpm	448.8	449.9	0.0059	445.3	456.6	0.25
NSBB Sediment Dosing Time, min	40.0					
Sediment Dosing Rate, gram/min	339.7	337.2	0.001	336.7	337.9	-0.74
Mean Influent SSC, mg/L	198.0					
Background SSC, mg/L	20 mg/L max.	4.7	0.26	3.0	7.0	

	gram	lbs.	% in chamber	% Removal Efficiency
Total Sediment Dosed	13,489	29.69		
Sediment Captured				
Chamber 1	7,943	17.49	81.4	58.9
Chamber 2	1,404	3.09	14.4	25.3
Chamber 3	416	0.91	4.3	10.0
Total	9,763	21.49	100.0	72.4

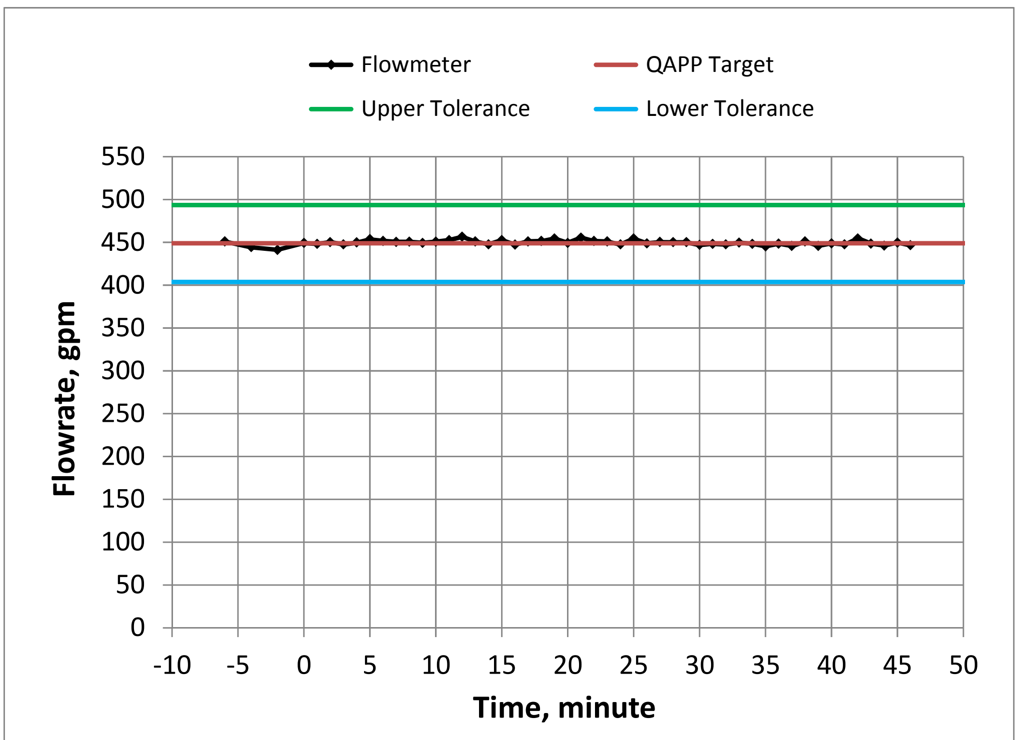

Figure F-10 Monitored Flow Rate for 1.00 cfs Experiment

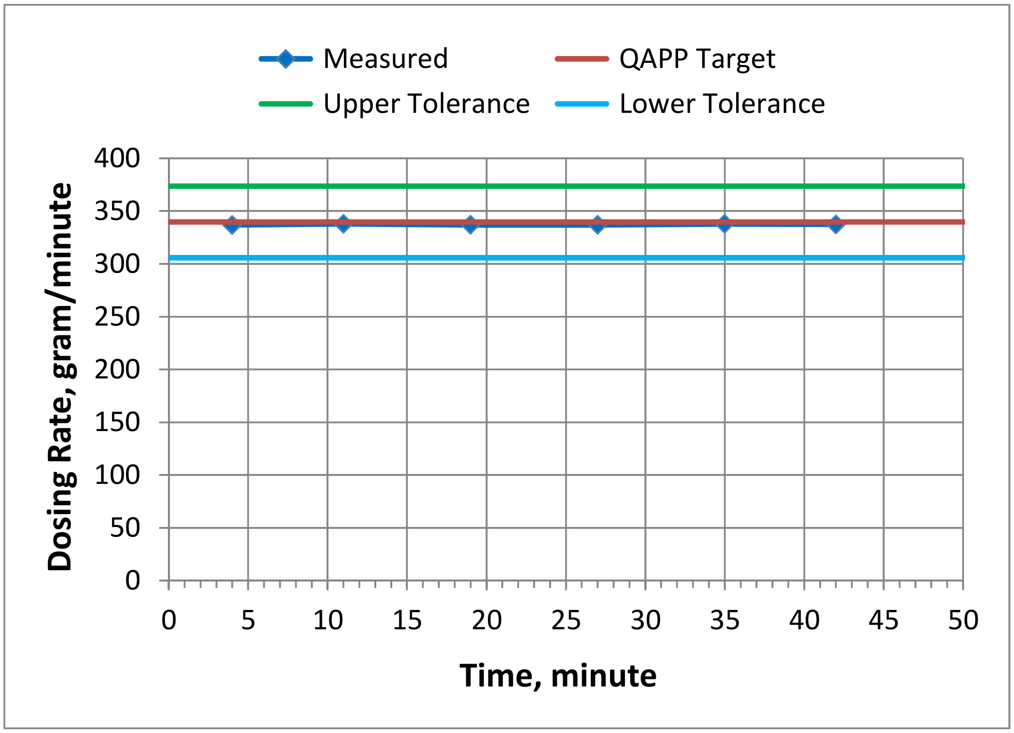

Figure F-11 Monitored Sediment Dosing Rate for 1.00 cfs Experiment

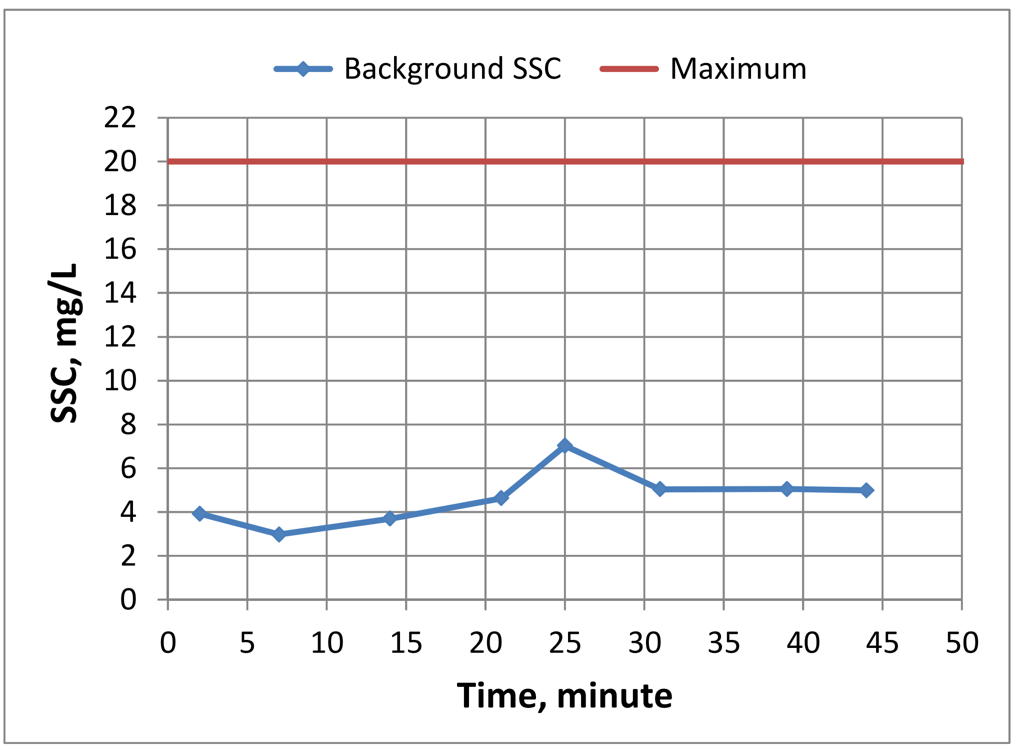

Figure F-12 Monitored Background SSC for 1.00 cfs Experiment

Table F-6 Summary of Results for 1.25 cfs Flow Rate Experiment

	Target	Experiment				Relative Error, %
		Mean	C.V.	Minimum	Maximum	
Flowrate, gpm	561	563.6	0.0060	556.4	570.8	0.47
NSBB Sediment Dosing Time, min	32.0					
Sediment Dosing Rate, gram/min	424.7	415.9	0.007	413.2	421.0	-2.07
Mean Influent SSC, mg/L	194.9					
Background SSC, mg/L	20 mg/L max.	13.4	0.47	4.0	24.4	

	gram	lbs.	% in chamber	% Removal Efficiency
Total Sediment Dosed	13,308	29.29		
Sediment Captured				
Chamber 1	7,277	16.02	77.0	54.7
Chamber 2	1,716	3.78	18.2	28.5
Chamber 3	456	1.00	4.8	10.6
Total	9,449	20.80	100.0	71.0

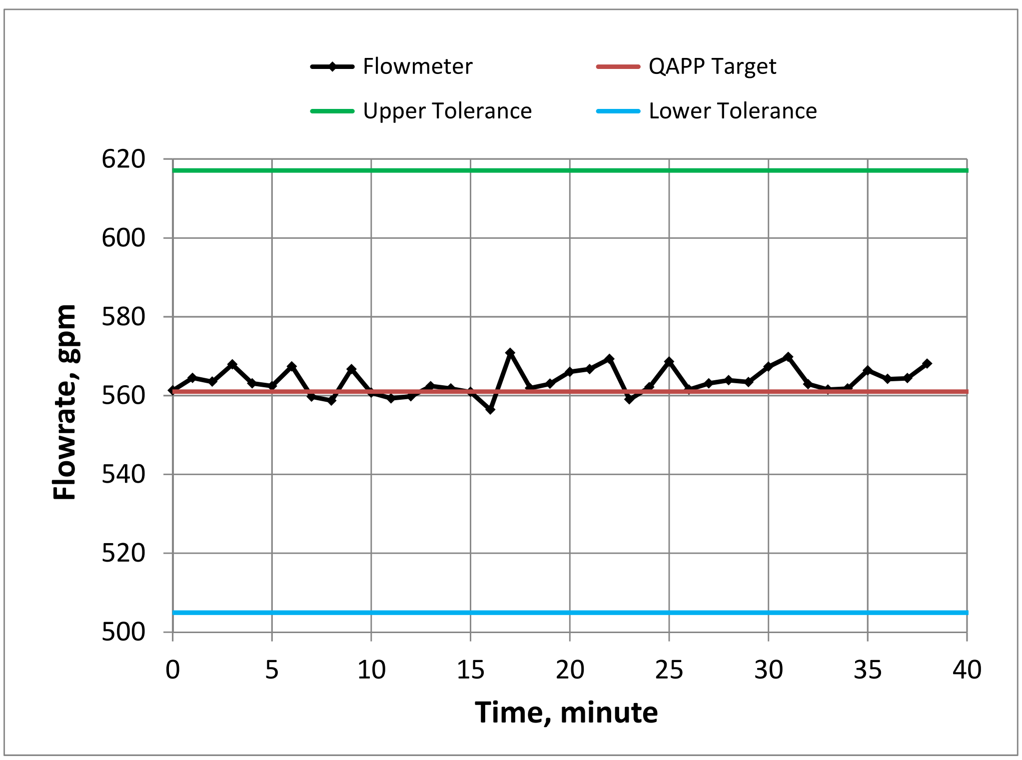

Figure F-13 Monitored Flow Rate for 1.25 cfs Experiment

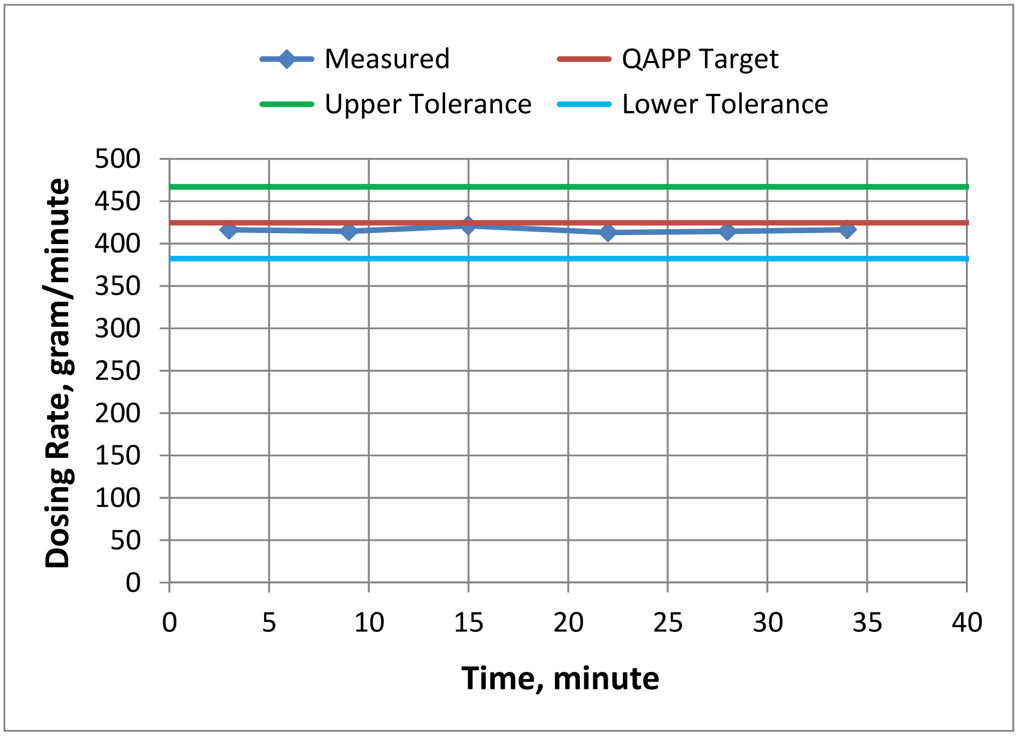

Figure F-14 Monitored Sediment Dosing Rate for 1.25 cfs Experiment

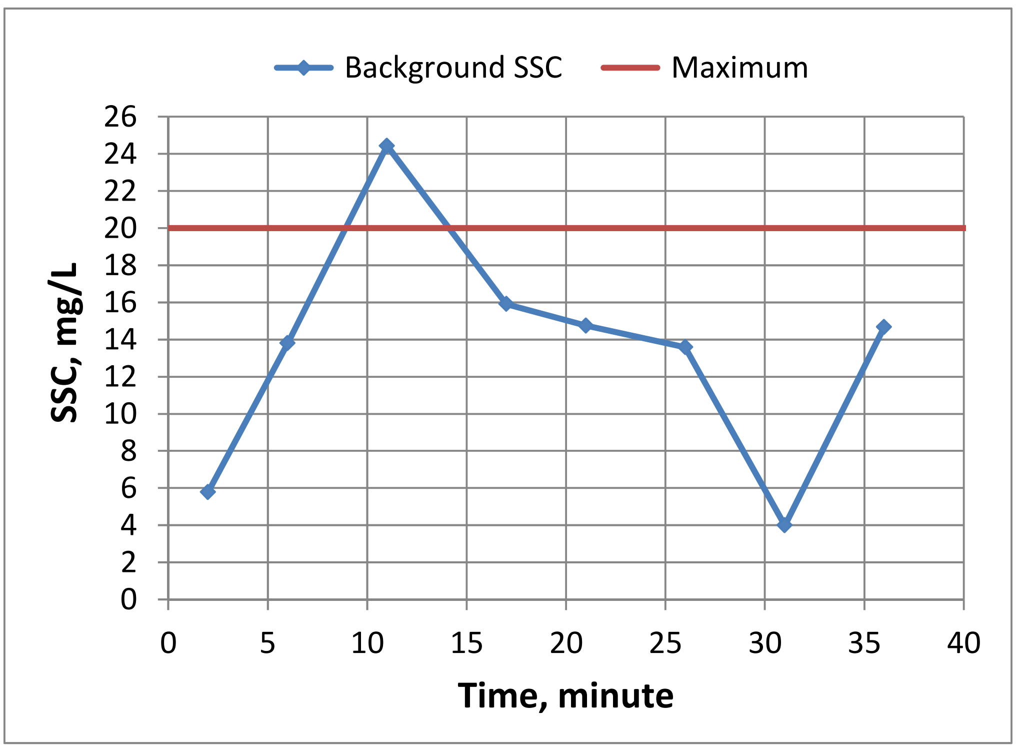

Figure F-15 Monitored Background SSC for 1.25 cfs Experiment

Table F-7 Summary of Results for 1.50 cfs Flow Rate Experiment

	Target	Experiment				Relative Error, %
		Mean	C.V.	Minimum	Maximum	
Flowrate, gpm	673.2	673.3	0.0076	665.7	689.3	0.02
NSBB Sediment Dosing Time, min	27.0					
Sediment Dosing Rate, gram/min	509.6	505.2	0.007	500.1	510.1	-0.86
Mean Influent SSC, mg/L	198.2					
Background SSC, mg/L	20 mg/L max.	5.9	0.33	2.1	8.2	

	gram	lbs.	% in chamber	% Removal Efficiency
Total Sediment Dosed	13,641	30.03		
Sediment Captured				
Chamber 1	7,206	15.86	76.6	52.8217613
Chamber 2	1,823	4.01	19.4	28.3261936
Chamber 3	376	0.83	4.0	8.15320012
Total	9,405	20.70	100.0	68.9

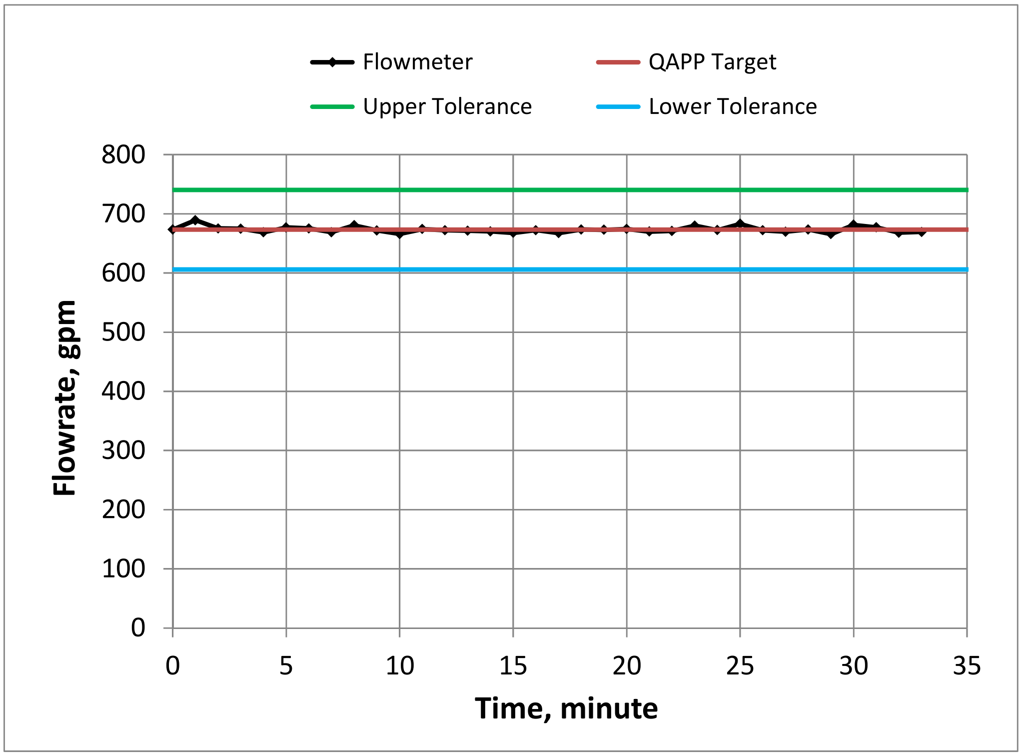

Figure F-16 Monitored Flow Rate for 1.50 cfs Experiment

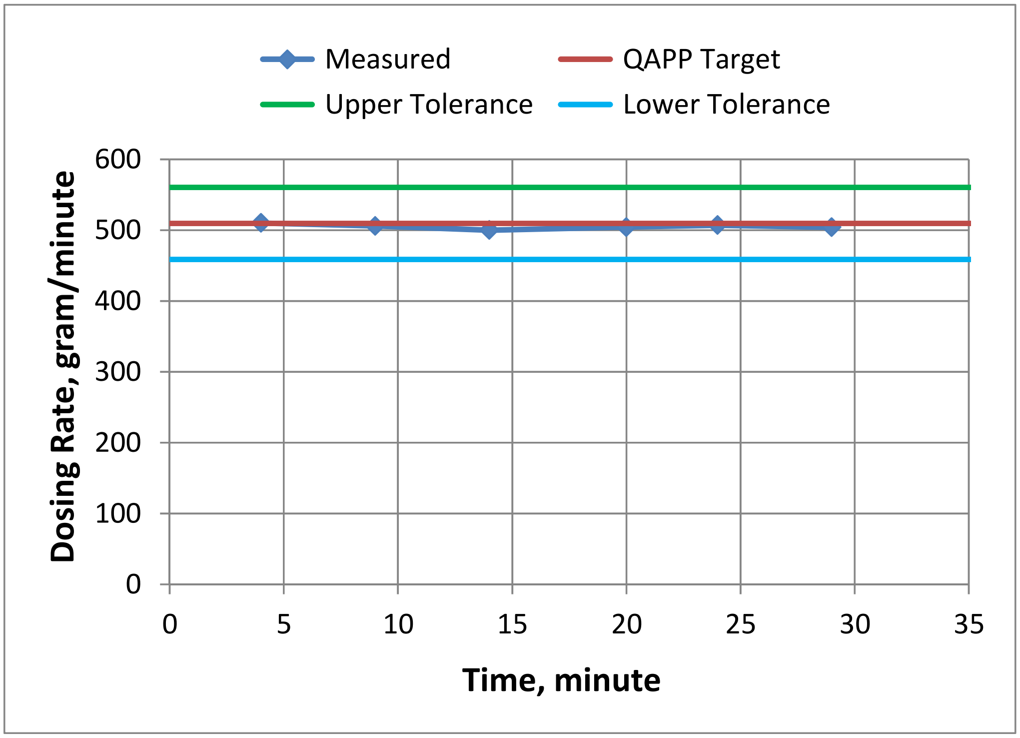

Figure F-17 Monitored Sediment Dosing Rate for 1.50 cfs Experiment

Figure F-18 Monitored Background SSC for 1.50 cfs Experiment

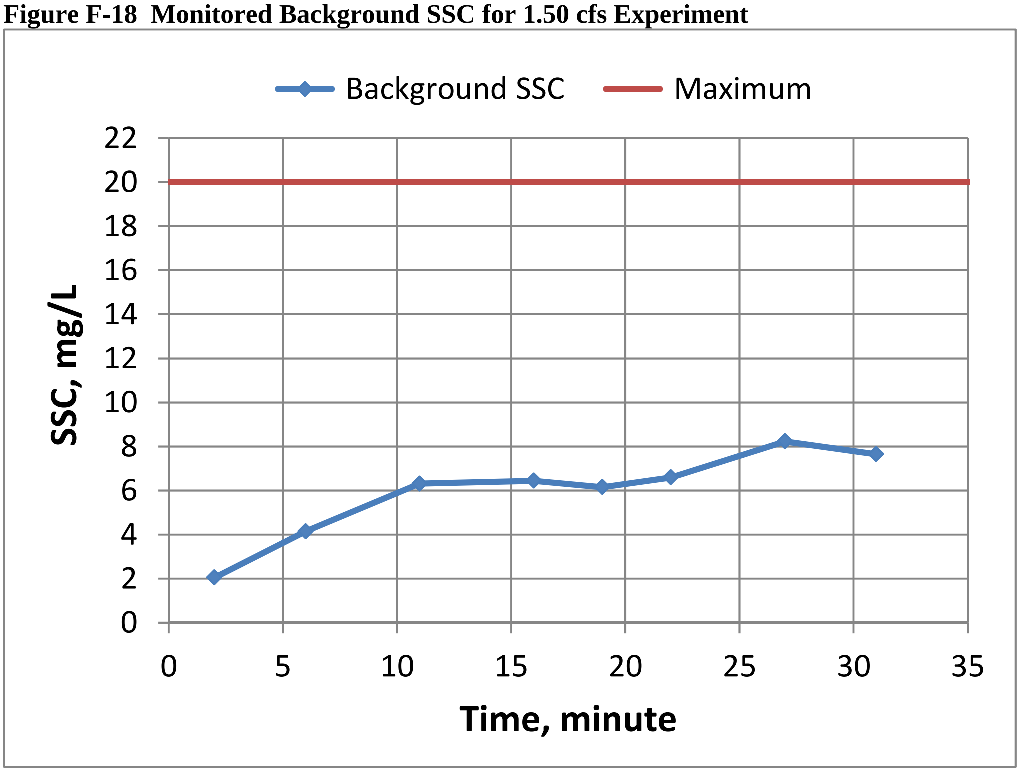

Table F-8 Summary of Results for 1.75 cfs Flow Rate Experiment

	Target	Experiment				Relative Error, %
		Mean	C.V.	Minimum	Maximum	
Flowrate, gpm	785.4	785.7	0.0062	775.9	795.4	0.04
NSBB Sediment Dosing Time, min	23.0					
Sediment Dosing Rate, gram/min	594.5	593.3	0.005	589.1	597.2	-0.20
Mean Influent SSC, mg/L	199.5					
Background SSC, mg/L	20 mg/L max.	8.9	0.30	3.7	12.0	

	gram	lbs.	% in chamber	% Removal Efficiency
Total Sediment Dosed to NSBB	13,647	30.04		
Sediment Captured				
Chamber 1	7,045	15.51	75.8	51.6
Chamber 2	1,883	4.14	20.2	28.5
Chamber 3	371	0.82	4.0	7.9
Total	9,299	20.47	100.0	68.1

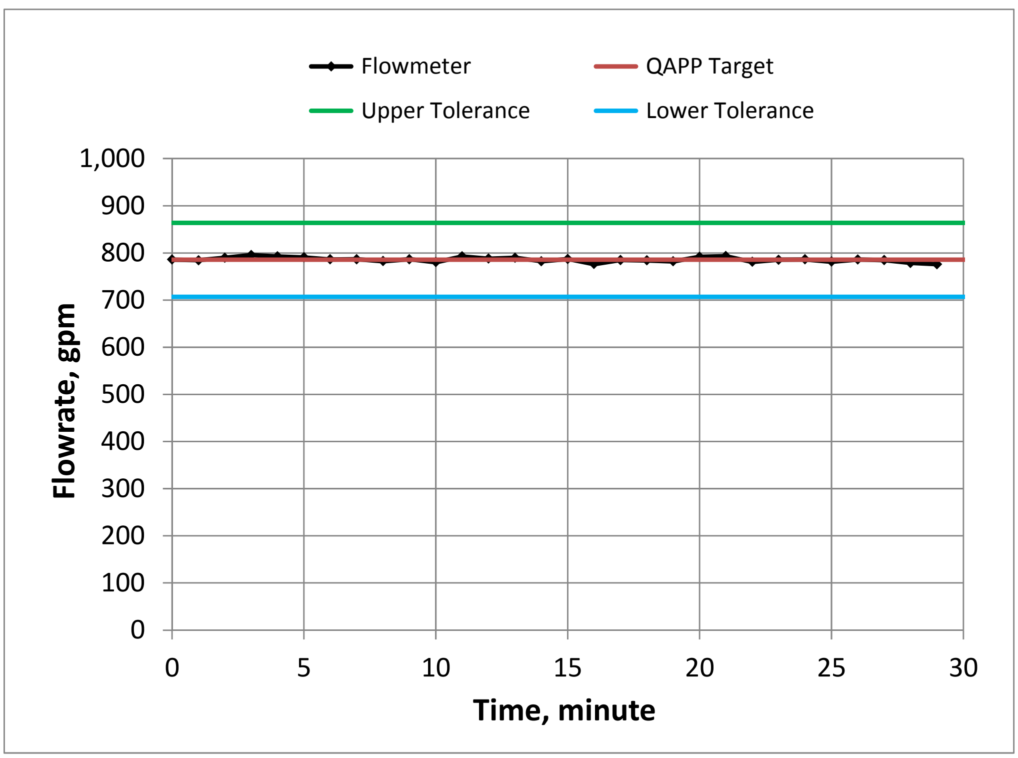

Figure F-19 Monitored Flow Rate for 1.75 cfs Experiment

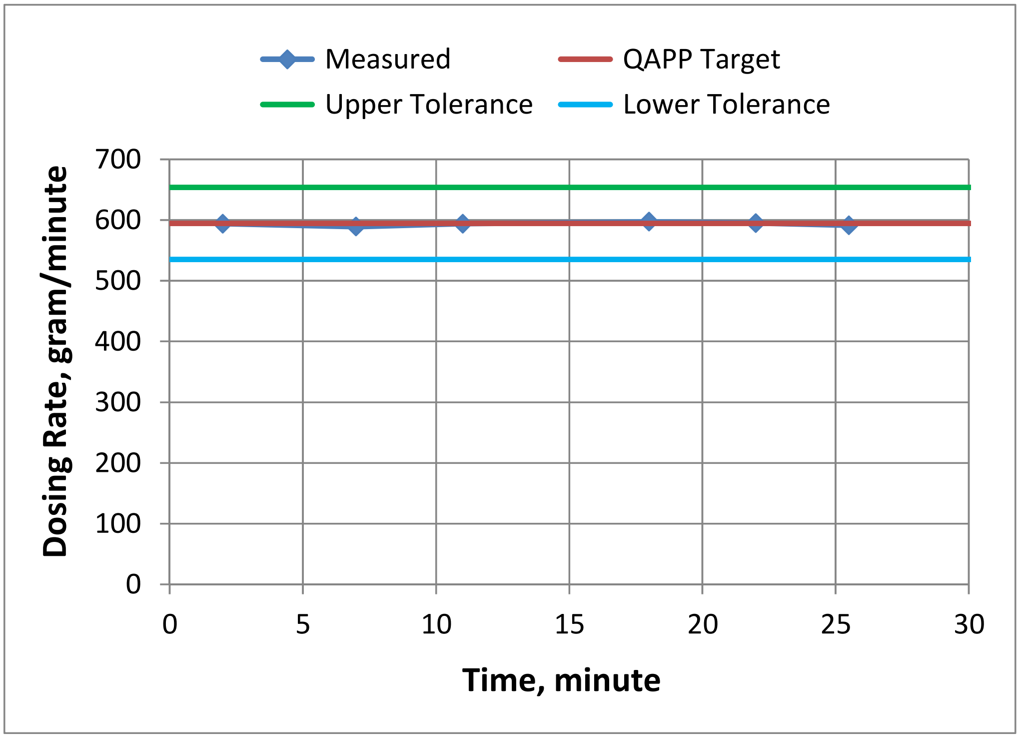

Figure F-20 Monitored Sediment Dosing Rate for 1.75 cfs Experiment

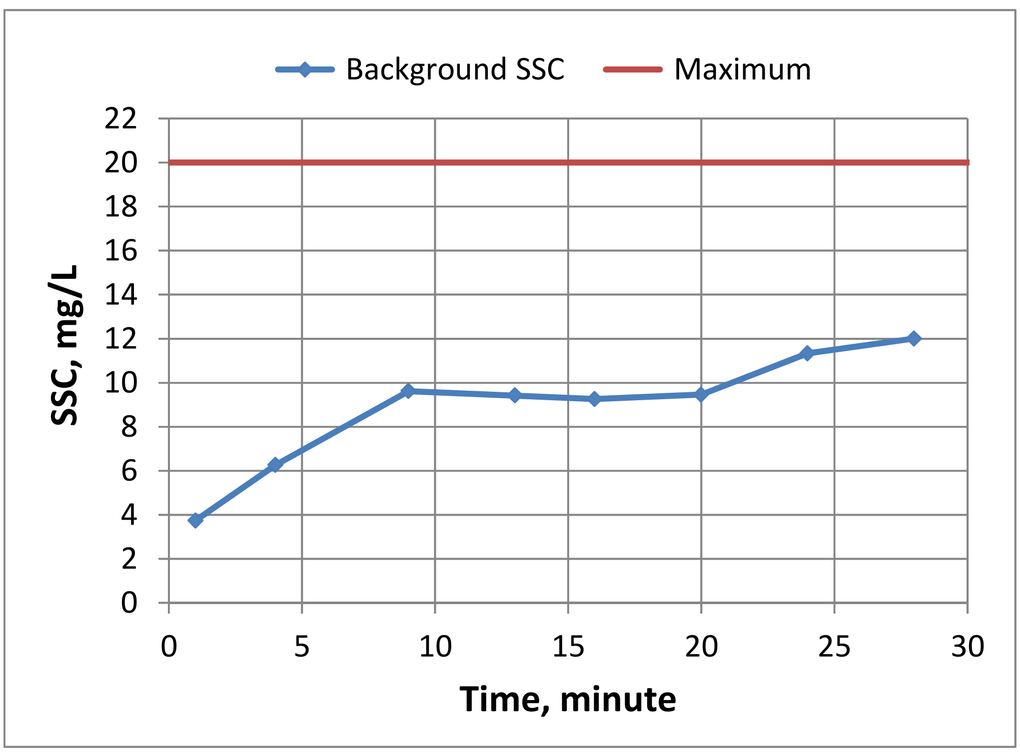

Figure F-21 Monitored Background SSC for 1.75 cfs Experiment

Table F-9 Summary of Results for 2.70 cfs Flow Rate Experiment

	Target	Experiment				Relative Error, %
		Mean	C.V.	Minimum	Maximum	
Flowrate, gpm	1211.8	1219.8	0.0057	1205.0	1235.0	0.67
Sediment Dosing Rate, gram/min	0.0					
Effluent SSC, mg/L	20 mg/L max.	4.8	0.19	3.2	6.6	
Background SSC, mg/L	-	4.4	0.29	2.6	6.6	

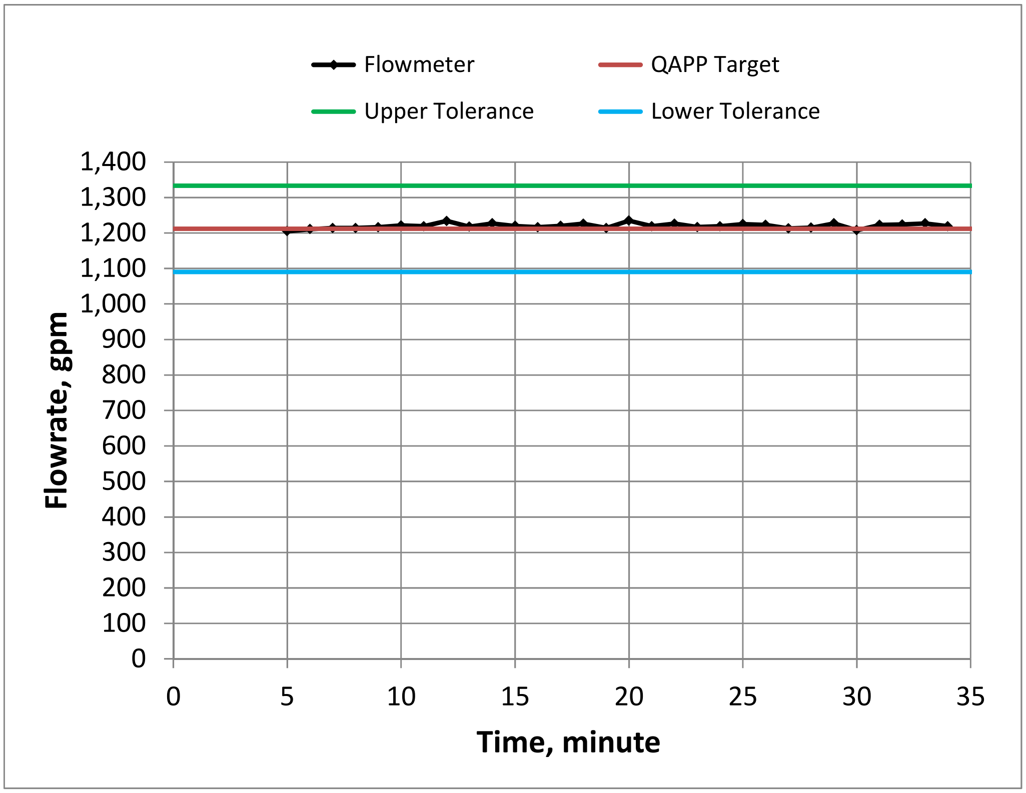

Figure F-22 Monitored Flow Rate for 2.70 cfs Experiment

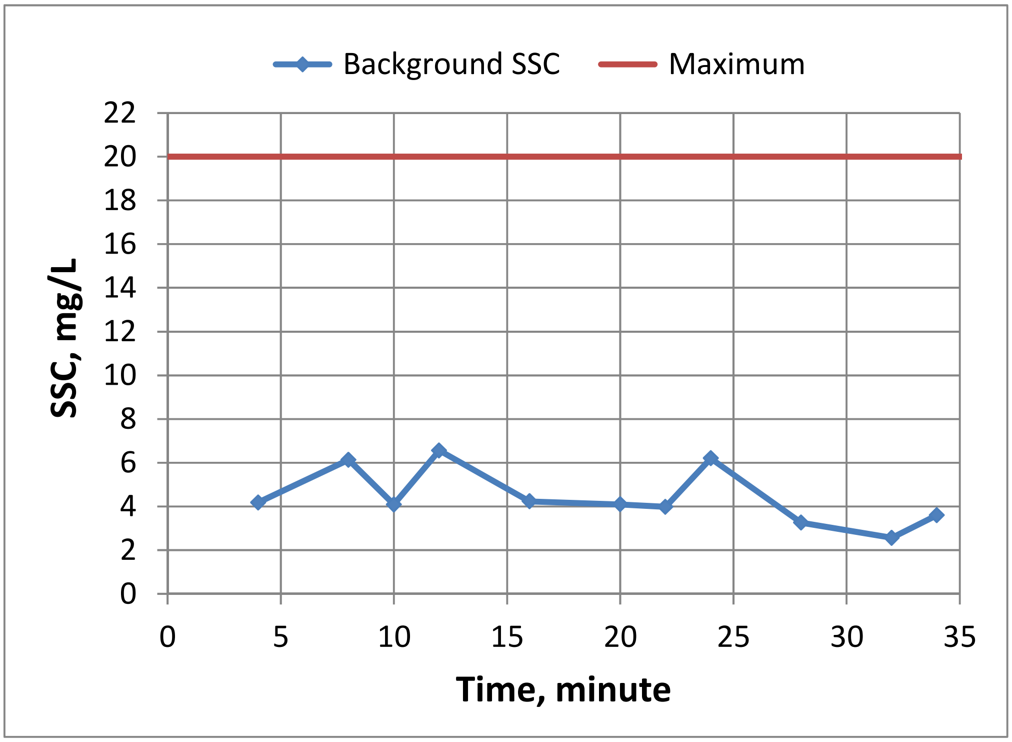

Figure F-23 Monitored Background SSC for 2.70 cfs Experiment

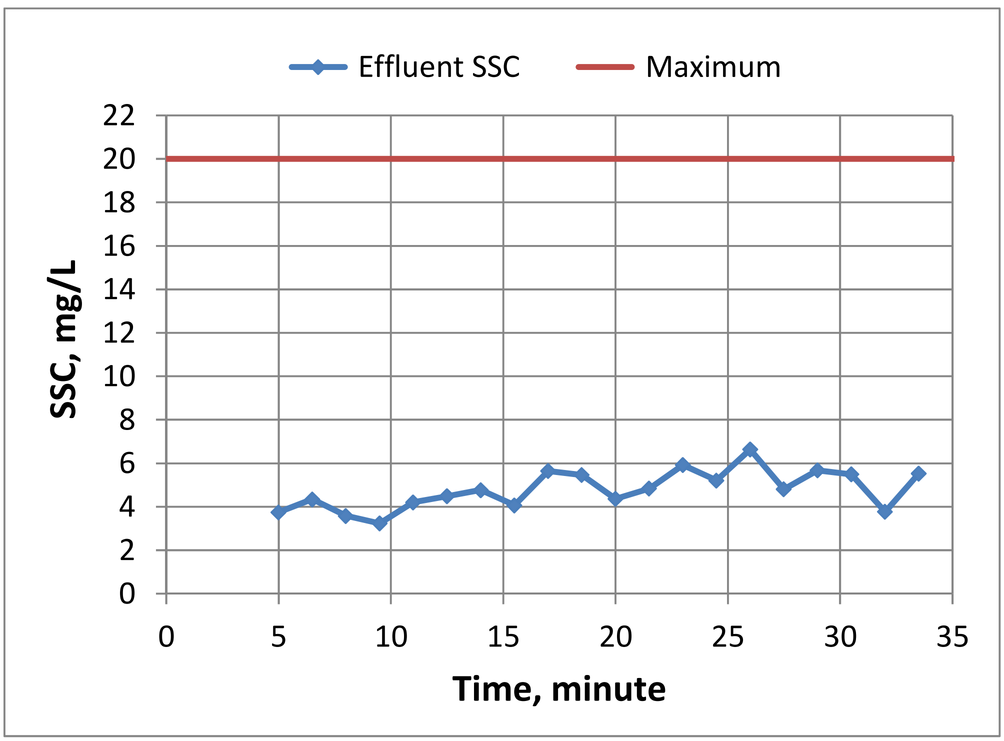

Figure F-24 Monitored Effluent SSC for 2.70 cfs Experiment

NJCAT TECHNOLOGY VERIFICATION

Nutrient Separating Baffle Box with Hydro-Variant Technology

Suntree Technologies Inc.

May, 2016

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1. Description of Technology

The Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT) is a subsurface rectangular vault MTD that is placed on-line in the stormwater collection system (**Figure 1**). The NSBB-HVT is engineered to be able to remove solids from stormwater flowing through stormwater pipes and other types of stormwater conveyances. NSBB-HVT treatment removes suspended sediment as well as larger floatable solids including foliage, detritus, and liter.

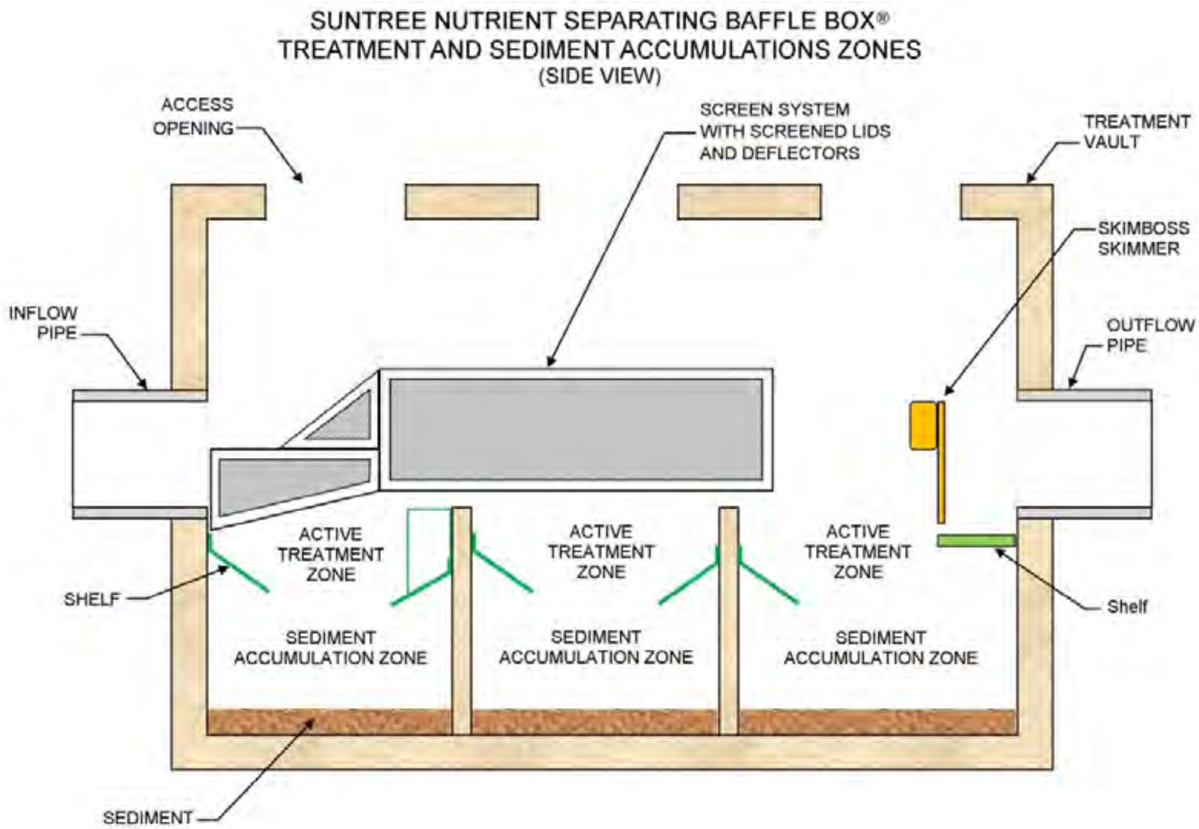


Figure 1 Nutrient Separating Baffle Box Schematic

The NSBB-HVT vault is subdivided into a series of chambers by vertical partitions that extend at an equal distance from the bottom of the vault, supplemented with engineering baffling to influence hydrodynamics and capture suspended particles by sedimentation (**Figure 1**). The water column in each chamber is divided into an upper and a lower zone by shelves that extend from the fore and aft walls. The upper zone of each chamber is the *active treatment zone*, while the *sediment accumulation zone* lies beneath the shelves (**Figure 1**). As water enters the NSBB-HVT the width of flow increases and the linear velocity decreases, making conditions more favorable for particle sedimentation.

Multiple internal components are contained within the NSBB-HVT vault, with a primary objective of calming the water and enabling finer solids to settle out of the flow and accumulate in the sediment accumulation zone of the chambers. The shelves in the NSBB-HVT chambers are strategically arranged and uniquely designed to capture finer particles within the settling chambers, while preventing their resuspension from the underlying sediment accumulation zone during high flow storm events. The shelves create a horizontal vortex at the top of the first and second settling chambers, located above the shelves and below the bottom of the screen system (**Figure 2**). This hydrodynamic characteristic assists in the ability of gravity to act on particles, enhancing their retention within the settling chambers. In addition, the shelves isolate the sediments captured in the underlying sediment accumulation zone from turbulence that could otherwise result in re-suspension. Scaling of the NSBB-HVT is based on the depth of the active treatment zone, as measured by the vertical elevation from the top of the chamber partition to the bottom of the lowest shelf component.

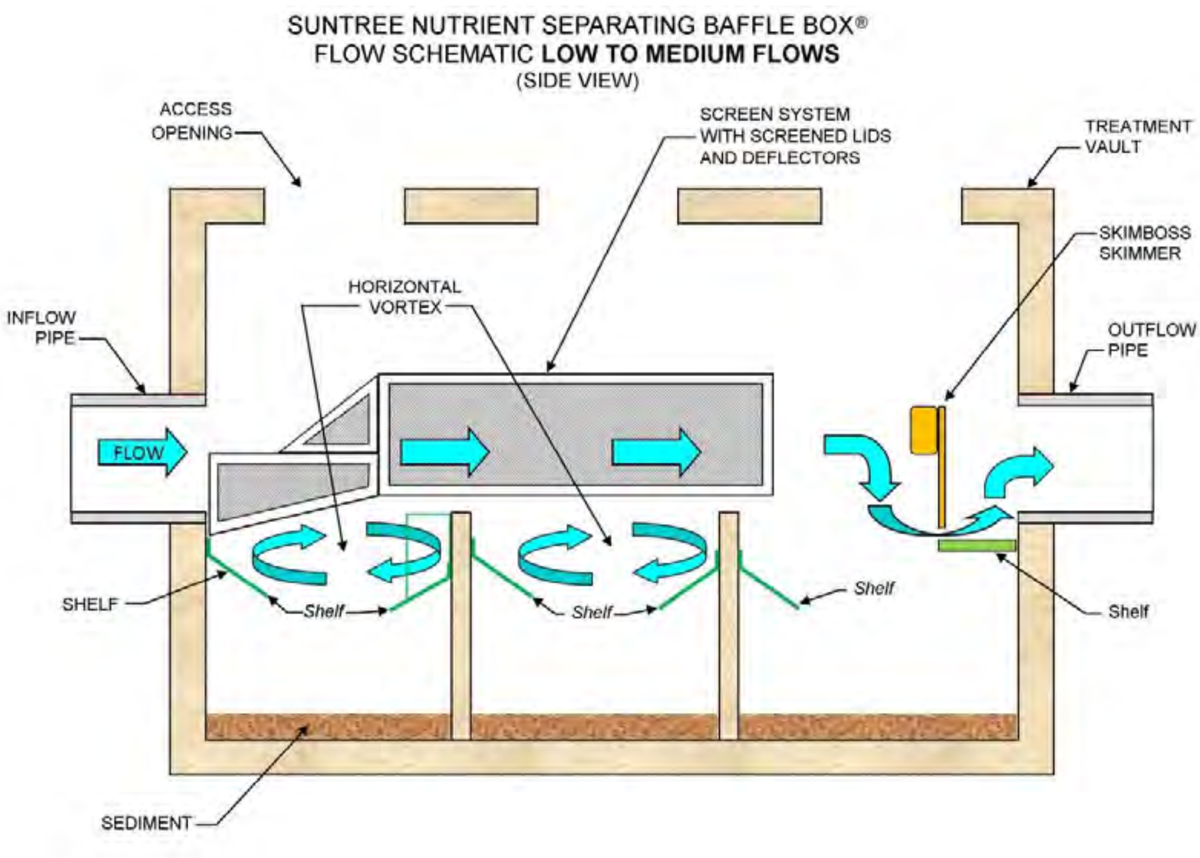


Figure 2 NSBB-HVT Operation at Low to Medium Flows

The NSBB-HVT also incorporates an internal basket screen that is located above the top of the chamber partitions (**Figure 1**). The objective of the screen is to collect and retain floatables including foliage, liter and detritus. As flow rate declines at the tail end of a storm event, the water level in the NSBB-HVT decreases to its static level (i.e. at the top of the partitions). The materials captured in the screen system remain above and out of the water column during non-flow periods, reducing leaching.

The unique hydraulic design of the NSBB-HVT provides *upper level conveyance* of flow in the region that lies above the chamber partitions. The horizontal cross sectional area available for flow conveyance around the outside of the screen system is always sized to be equal to or greater than the conveyance area of the inflow and the outflow pipes. It is not necessary for upper layer stormwater flow to pass through the screen system; it can flow around the screen in order to pass through the NSBB-HVT vault. During high flows, when the water level may be higher than the top of the screen system, screened lids across the top of the screen system prevent large floatables captured by the screen system from escaping through overtopping and washout. These unique hydraulic features enable the NSBB-HVT to be easily retrofitted to existing storm pipes with only minimal headloss impact and without compromising the hydrology of the water shed.

The NSBB-HVT is an evolution of the fixed-skimmer NSBB that contains a performance-enhancing feature trade named SkimBoss® MAX (**Figures 2 and 3**).

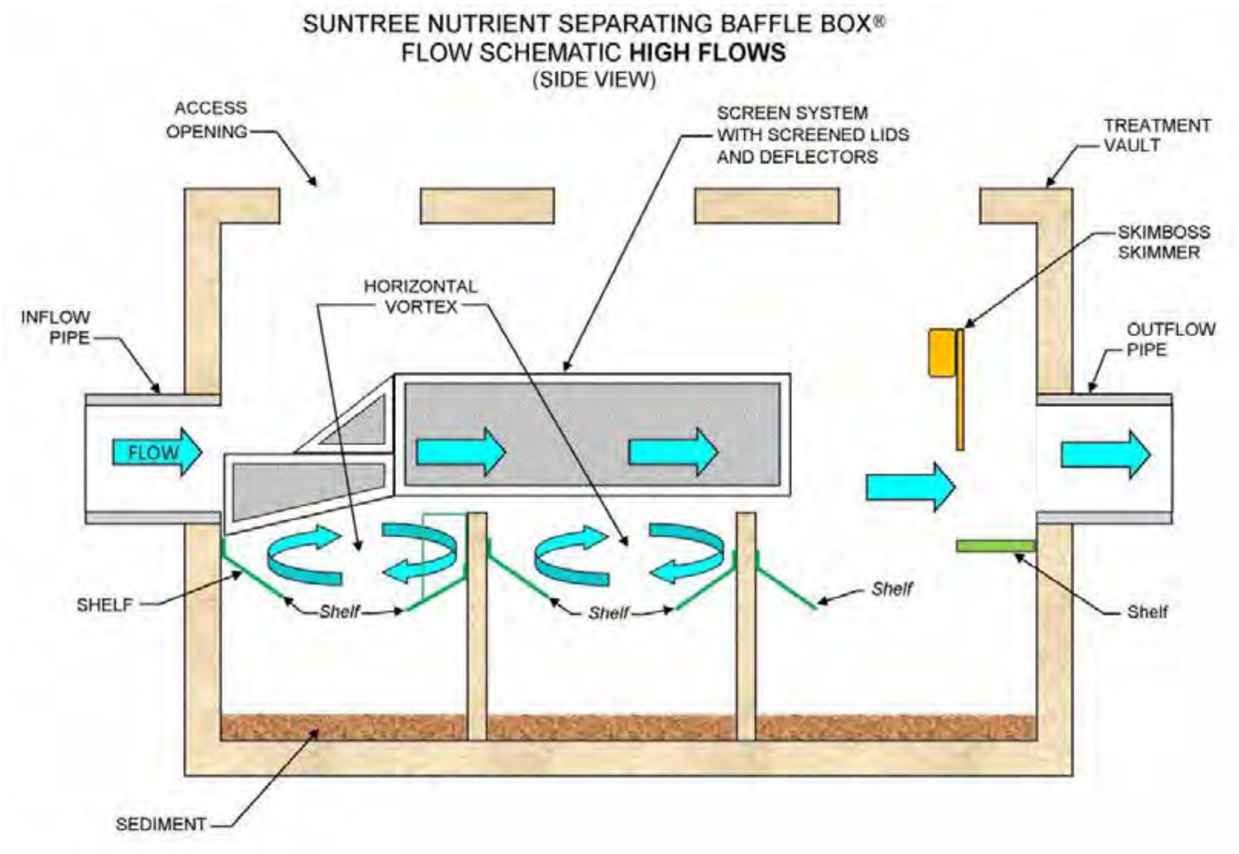


Figure 3 NSBB-HVT Operation at High Flows

SkimBoss® MAX is *a hydro-variant* skimmer that is located adjacent to the vault outflow. The SkimBoss® MAX system automatically adjusts its level in response to stormwater flow and water level, providing a variant level hydraulic conveyance feature. During low to medium flows, the SkimBoss® Max is at its lower level, which optimizes water detention time and reduces turbulence in order to maximize the removal efficiency of finer particles (**Figure 2**). During high flows, when flooding may be a concern, SkimBoss® MAX rises vertically to provide the higher flow conveyance that is needed while limiting the increase in headloss through the treatment system (**Figure 3**). The SkimBoss® MAX adjusts its height automatically with flow rate and water level; operator attention is not required.

2. Laboratory Testing

This testing was conducted to independently verify NSBB-HVT performance such that it could be certified by the New Jersey Department of Environmental Protection (NJDEP) as a 50% Total Suspended Solids removal device.

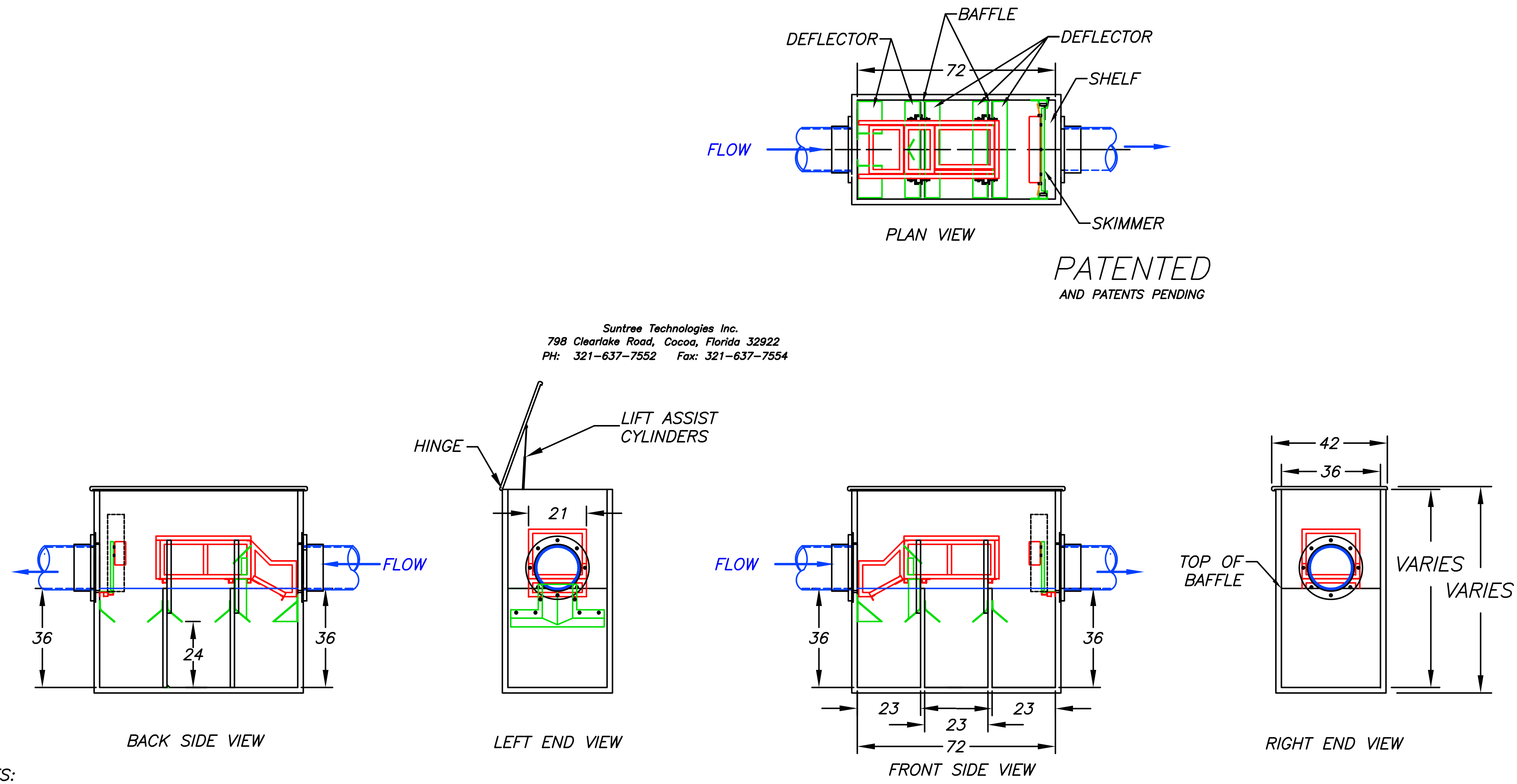
The NSBB-HVT was tested to the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" (NJDEP 2013b). The testing was conducted at the Applied Environmental Technology Test Facility (AET-TF) in Hillsborough County, Florida. AET-TF is located on a 4-acre site that is dedicated to the evaluation of water treatment technologies, with electric power, water supply, shop and pilot support facilities, and an analytical laboratory. Dr Daniel Smith, President of AET, an environmental and water resources engineer with over thirty years' experience in water quality, treatment and modelling conducted the NSBB-HVT performance testing.

The particle size distribution of the removal efficiency test sediment samples and the scour testing test sediment samples were analyzed by the independent analytical laboratory BTL Engineering, Inc., Tampa, FL. All water quality samples for both the removal efficiency testing and the washout testing were collected and analyzed by AET.

2.1 Test Unit

The test unit was a full-scale commercially available 3 ft wide x 6 ft long Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT 3-6). A drawing of the NSBB-HVT 3-6 is shown in **Figure 4**. There are three (3) bottom chambers. The depths of the active treatment zone and the sediment accumulation zone are 12 and 24 inch, respectively. The depth of the maintenance sediment storage volume (MSSV) in the NSBB-HVT 3-6 was established as 50% of the chamber depth underlying the active treatment zone, or 12 inch.

SUNTREE TECHNOLOGIES INC. NUTRIENT SEPARATING BAFFLE BOX®
MODEL NO: NSBB-HVT-3-6



Suntree Technologies Inc.
798 Clearlake Road, Cocoa, Florida 32922
PH: 321-637-7552 Fax: 321-637-7554

NOTES:

1. VAULT SUPPORTS PEDESTRIAN LOADING.
2. ALL WALLS, TOP, AND BOTTOM ARE LAMINATED FIBERGLASS
3. INFLOW AND OUTFLOW PIPES CAN NOT INTRUDE INTO THE VAULT.
4. TOP OF VAULT TO BE HINGED WITH STAINLESS STEEL PIANO HINGE ALONG ONE LONG SIDE OF THE VAULT.
5. LIFT SUPPORT CYLINDER TO INCORPORATED TO HELP WITH HOLDING UP THE TOP COVER OF THE VAULT.
6. PYLON AND PIVOTING PANEL TO BE INCORPORATED AS SHOWN INTO THE BODY OF THE SCREEN SYSTEM.
7. TURBULENCE DEFLECTORS TO BE INCOPORATED AS SHOW TO REDUCE TURBULENCE INSIDE SETTLING CHAMBERS.
8. RECOMMENDED PIPE SIZE TO RANGE FROM 12" TO 18".
9. THE TRADE NAME FOR HVT IS SKIMBOSS MAX

SUNTREE TECHNOLOGIES, INC. 798 CLEARLAKE RD. SUITE #2 COCOA, FL. 32922		PROJECT: GENERIC DRAWING	
		DRAWING #: 2-01-03-30-16	
NUTRIENT SEPARATING BAFFLE BOX® MODEL NO: NSBB-HVT-3-6		FILE NAME: NSBB-3-6-72	
DATE: 03/30/16	SCALE: = 57.6	REVISIONS:	DATE:
DRAFTER: T.H.H.	UNITS =INCHES	REVISIONS:	DATE:

2.2 Test Setup

The configuration of the experimental system is shown in **Figure 5**. The test system consisted of a NSBB-HVT 3-6 and Water Supply Recycle Reservoir (WSRR), connected by an influent pump (IP) that recycled water from the WSSR to the NSBB-HVT (**Figure 5**). The WSRR was pre-charged with AET-TF groundwater which is of circumneutral pH and virtually completely free of suspended sediment. Water was aerated and equilibrated prior to testing. A valve for fine flow rate control was located downstream of the influent pump and inline flow meter. This arrangement enabled a single operator to iteratively adjust flow rate in order to maintain flows close to target values. Water pumped from the WSRR was treated in a pre-filter chamber to reduce background SSC prior to background SSC sampling and sediment dosing. Effluent from the pre-filter chamber entered the feed channel to the NSBB-HVT 3-6. The feed channel was an 18 in. diameter pipe with upper openings for background sampling, sediment dosing, discharge sampling, and visual observation.

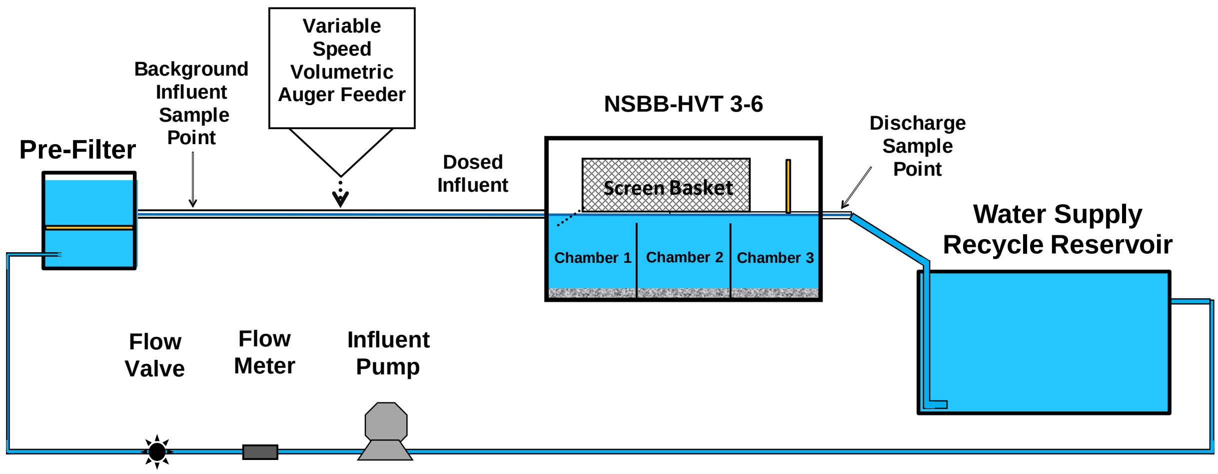


Figure 5 Schematic of Experimental System

The WSRR had a working volume of at ca. 13,500 gallon and served to settle and remove suspended solids prior to recycling. Solids removal was aided by bottom horizontal entry of discharge from the NSBB-HVT 3-6 and tangential withdrawal, which created a circular flow regime, augmented by upper level withdrawal from a baffled WSRR sub-chamber. Flow to the experimental system was provided by John Deere diesel powered vacuum well point pumps (Thompson Pump Co., Sarasota, FL). Pumps were connected by 6 or 8 inch pipes to a PVC withdrawal manifold in the Water Recycle Reservoir that extended ca. 8 in. below the water surface. Pumps had a variable speed control to adjust the flow rate. Removal efficiency testing employed one pump, while two pumps in parallel were employed for the high flow rate resuspension testing. For tests that used a single pump, pump flow was routed through a 6 inch pipe and adjusted with a 6-inch knife gate valve (Thompson Pump Co., Sarasota, FL). Where two pumps were used, pump flows were combined and routed through an 8 inch pipe and adjusted with an 8-inch knife gate valve (Thompson Pump Co., Sarasota, FL). Flow rate was measured with a Portaflow PTFM 1.0 Inline Portable Transit Time Flow Meter, which uses clamp-on ultrasonic sensors and has measurement accuracy within 1% (Greyline Instruments Inc., Massena, N.Y.). Flow rate was recorded at a frequency of one minute during removal efficiency and resuspension testing. The Pre-Filter Chamber (4 ft. by 8 ft. inner plan dimensions) contained a coarse screen followed by filter media to remove suspended sediment not captured in the WSRR or which inadvertently entered the experimental system. Water was pumped from the WSRR to the upstream end of the Pre-Filter Chamber, with all flow passing through screens prior to entering the channel leading to the NSBB-HVT. Background influent SSC samples were collected directly from the influent pipe prior to the point of sediment dosing and discharge SSC samples were collected directly from the discharge pipe (**Figure 5**).

Total Suspended Solids Removal Efficiency Laboratory Test Setup

For the removal efficiency test runs, test sediment was dosed into the feed channel using a variable speed volumetric feed that dispensed dry materials from a hopper at a selected feed rate (Model VF-2, IPM Systems, Lee's Summit, MO). The VF-2 employs a direct drive auger delivery system to provide feed rates that are accurate to within 2%. The point of sediment dosing was 68 inches upstream from the entrance wall of the NSBB-HVT 3-6.

For removal efficiency testing, a false floor was installed at the 50% MSSV depth (6 in. from chamber bottom). In line with the protocol requirements, it was fitted with a false bottom positioned 6 inches from the true sump bottom to simulate a 50% full condition.

Scour Test Laboratory Setup

To simulate the 50% full condition for the scour test, the false bottom was set 2 inches above the sump floor over all three chambers and 4 inches of the scour test sediment blend was pre-loaded on top of the false bottom, bringing the level of sump contents to 6 inches from the sump bottom.

2.3 Test Sediment

Test Sediment Feed for Suspended Solids Removal Efficiency Testing

Removal efficiency tests employed high purity silica (99.8%) that conformed to the NJDEP PSD specification. Test sediment was a mixture of high purity silica components. The sediment mixture was prepared by placing a known mass of each sediment component in a five gallon container, sealing the container, and blending by container rotation for five minutes. Fifteen containers of the sediment mixture were prepared, each with the same ratio of sediment component masses. The PSD of test sediment was determined as follows. The sediment containers were numbered 1 through 15. A composite sediment was prepared by collecting an equal mass subsample from five randomly selected sediment containers and thoroughly blending (Composite 1). Two other composites samples were prepared using five randomly and independently selected sediment containers (Composites 2 and 3). PSD analyses of each sediment composite were conducted by BTL Engineering, Inc., Tampa, Florida according to ASTM D422-63 (reapproved 2007). The PSD of test sediment was calculated as the mean of the PSD of the three composites.

Scour Test Sediment

The resuspension test sediment consisted of a mixture of multiple high pursity silica (99.8%) sand components. The sediment mixture was prepared by placing a known mass of each component in a five gallon container, sealing the container, and blending container contents by rotation for five minutes. Fifteen containers of the sediment mixture were prepared, each with the same ratio of sediment component masses. The PSD of scour test sediments were determined as follows. Sediment containers were numbered 1 through 15. A composite sediment was prepared by collecting an equal mass subsample from five randomly and independently selected sediment containers and thoroughly blending (Composite 1). Two other composites samples were similarly prepared (Composites 2 and 3). PSD analyses of Composites 1, 2 and 3 were conducted by BTL Engineering, Inc., Tampa, Florida according to ASTM D422-63 (reapproved 2007). PSDs of test sediments were calculated as the mean of the PSD of Composites 1, 2 and 3.

2.4 Removal Efficiency Testing Procedure

Removal efficiency testing was conducted in accordance with Section 5 of the NJDEP Laboratory Protocol for HDS MTDs. A total of five flow rates were tested: the 25%, 50%, 75%, 100% and 125% Maximum Treatment Flow Rate (MTFR). The NSBB-HVT, Screening Chamber, and piping were completely cleaned prior to testing to remove sediment. Captured sediment was removed from the NSBB-HVT chambers between each flow rate trial. Cleaning of the Water Supply Recycle Reservoir was determined by experimental needs.

The test sediment mass was fed into the flow stream at a known rate using the variable speed volumetric feed that dispensed dry materials from the hopper. Sediment was introduced at a rate within 10% of the targeted value of 200 mg/L influent concentration throughout the duration of the testing.

Six calibration samples were taken from the injection point. The calibration samples were timed at evenly spaced intervals over the total duration of the test for each tested flow rate. Each calibration sample was collected over 60 seconds timed to the nearest second. These samples were weighed to the nearest hundredth gram. The average influent TSS concentration was calculated using the total mass of the test sediment added during dosing divided by the volume of water that flowed through the MTD during dosing (**Equation 1**). The mass extracted for calibration samples was subtracted from the total mass introduced to the system when removal efficiency was subsequently calculated. The volume of water that flows through the MTD was calculated by multiplying the average flow rate by the time of sediment injection only.

$$\textbf{Average Influent Concentration} = \frac{\text{Total mass added}}{\text{Total volume of water flowing through the MTD during addition of test sediment}}$$

Equation 1 Calculation for Average Influent Concentration

Field data sheets were prepared for preparation of test sediment, temperature monitoring, flow rate target and monitoring, sediment dosing rate monitoring, total sediment dosing time, background and discharge suspended sediment concentration sample collection times, Suspended Sediment Concentration (SSC) laboratory analysis, and laboratory blank and laboratory control samples for SSC analysis. Data sheets specified and recorded time of sediment dosing initiation, time of sediment dosing termination, time of all sample events, and time of other observations.

The flow meter was powered on and allowed to electronically stablilize. The pump was started and brought to initial speed estimated to produce the target flow rate. When flow readings could be discerned, the pump speed was adjusted if necessary and the flow rate adjusted with the flow control valve until stable flow was achieved that was centered around the target flow rate. The pump was run for several minutes of stable flow at the target flow rate before sediment dosing was initiated. Flow rate adjustments were made as needed through out the experiments using the flow rate control valve. Flow rate was recorded on data sheets at 1 minute intervals throughout the experiments.

Shortly after the pump was started the dosing auger was started with the sediment from the auger collected in a container. After several minutes of stable flow at the target flow rate, sediment dosing was initiated by removing the container. The time of initiation of sediment dosing was the start of the sediment dosing period and was carefully recorded. The sediment dosing time ended when sediment dosing was terminated. The time of the start of the sediment dosing was the zero time point of the experiment and the basis of the time stamp for all sampling and all measurements. Sediment dosing was terminated by depowering the auger after the last samples were collected.

Samples containers were prepared for at least eight background influent SSC samples, fifteen discharge SSC samples, and six sediment dosing samples. All containers had sealable tops. Containers and tops were rinsed at least three times with tap water and drained. SSC containers were one half gallon PETE canisters with round 4 in. diameter open mouths. SSC containers were numbered and deployed in order of increasing number with experimental time. Influent background and discharge sampling were conducted by loosening but not removing the threaded cap on the sample container, immersing the container into the water with the opening facing directly into the direction of water flow at pipe centerline, removing the cap for a short time to allow water ingress, placing the cap over the opening, quickly removing the cannister from the water, and screwing the top closed. Sediment dose containers were 6 x 6 in. open top containers of 2.75 in. depth, cleaned by repeated wipings with clean paper towels. They were lettered A though F and deployed progressively with experimental time.

Eight background influent samples were collected at evenly spaced intervals through the sediment dosing time. The sample location was in the pipe leading to the NSBB-HVT, before the sediment dosing point (**Figure 5**). Fifteen effluent samples were collected at evenly spaced intervals throughout the sediment dosing time. The effluent sample location was at the NSBB-HVT discharge (**Figure 5**). Following sediment dose samples collection, effluent sampling was not conducted until after at least three hydraulic residence times of flow had passed though the NSBB-HVT.

The background data were plotted on a curve for use in adjusting the effluent samples for background concentration. The NSBB-HVT 3-6 removal efficiency for each tested flow rate was calculated as per **Equation 2**.

$$\textbf{Removal Efficiency (\%)} = \frac{\left(\begin{array}{c}\text{Average Influent}\\\text{Concentration}\end{array} - \begin{array}{c}\text{Adjusted}\\\text{Average Effluent*}\\\text{Concentration}\end{array}\right)}{\text{Average Influent Concentration}} \times 100$$

* Adjusted for background concentration

Equation 2 Equation for Calculating Removal Efficiency

Water temperature was verified to between 79 and 80F during the tests using a NIST traceable thermometer (Traceable Calibration Control Company 281-482-1714).

Analysis of Suspended Sediment Concentration (SSC) was conducted according to the AET SSC protocol. A 2 hour drying time was verified to produce constant weight for rinsed filters and filtered samples. Method Blanks were less than the established Reporting Limit of 2.07 mg/L for all analyses events. For all analyses events, Lab Control Sample recoveries were within the established tolerances of 15% for high range samples (100 mg/L) and 30% for low range samples (20 mg/L). Initial Demonstration of Capability samples in the high and low SSC range were all within the 15% and 30% Recovery Criteria, respectively.

Data sheets were assembled and a complete file maintained at AET for each experiment. All data was placed in electronic format by entering into Excel spreadsheets.

2.5 Scour Testing Procedure

To simulate a 50% full sump condition, the NSBB-HVT sump false bottom was set to a height of 2 inches and then topped with 4 inches of scour test sediment. The sediment was leveled, then the NSBB-HVT was filled with clear water at a slow rate as to not disturb the sediment prior to the beginning of testing. The scour testing was begun within 24 hours of sediment placement, less than the 96 hours allowed by the protocol. The scour test was conducted at a water temperature of 79 to 80 F.

The test was initiated by starting the water pump. Full scour flow rate was reached within 5 minutes of test initiation and maintained at constant flow rate through duration of the test. Flow rate was recorded at one minute intervals from initiation to the end of test. The first discharge and the first background sample were each collected at the 1 minute point after the steady test flow rate was reached. Thereafter, discharge samples were collected at 2 minute intervals (3, 5, 7…) for a total of fifteen samples. After the first background sample, background samples were collected at 4 minute intervals (5, 9, 11…) for a total of eight samples. Background and discharge sampling was conducted by the same procedures employed in the removal efficiency tests. Sample collection, SSC analyses, analytical, quality control and data management methods were the same as those used in the removal efficiency tests.

3. Performance Claims

In line with the NJDEP verification procedure (NJDEP 2013a), NSBB-HVT performance claims are outlined below.

Total Suspended Solids Removal Rate

The TSS removal rate of the NBSS-HVT is dependent upon flow rate, particle density and particle size. For the particle size distribution and weighted calculation method required by the NJDEP HDS MTD protocol, the NSBB-HVT 3-6 at a MTFR of 1.40 cfs will demonstrate at least 50% TSS removal efficiency.

Maximum Treatment Flow Rate

The MTFR for the NSBB-HVT 3-6 was demonstrated to be 628 gpm (1.40 cfs), which corresponds to a surface loading rate of 34.9 gpm/sf.

Sediment Storage Depth and Volume

The maximum sediment storage depth of the NSBB-HVT 3-6 is 12 inches. The available sediment storage volume of the NSBB-HVT 3-6 is 0.65 cubic yards. Available sediment storage volume varies with each NSBB-HVT model, as NSBB-HVT model dimensions increase in plan area and depth.

Effective Treatment Area and Effective Sedimentation Area

The effective treatment and sedimentation area of the NSBB-HVT varies with model size, and equals the plan surface area of the NSBB-HVT model. The tested NSBB-HVT 3-6 has a treatment surface area of 18.0 square feet.

Detention Time and Volume

The detention time of the NSBB-HVT depends on flow rate and model size. The nominal detention time is calculated by dividing the treatment zone volume by the flow rate. The volume of the treatment zone is defined as the volume between the top of partition and the top of the underlying sediment accumulation zone. For the tested NSBB-HVT 3-6 model at the MTFR of 1.40 cfs, the nominal detention time was 12.9 seconds.

Online or Offline Installation

Based on the results of the Scour Testing documented in Section 4.4, the NSBB-HVT qualifies for online installation.

4. Supporting Documentation

The NJDEP Procedure (NJDEP 2013a) for obtaining verification of a stormwater manufactured treatment device (MTD) from the New Jersey Corporation for Advanced Technology (NJCAT) requires that "copies of the laboratory test reports, including all collected and measured data; all data from performance evaluation test runs; spreadsheets containing original data from all performance test runs; all pertinent calculations; etc." be included in this section. This was discussed with NJDEP and it was agreed that as long as such documentation could be made available by NJCAT upon request that it would not be prudent or necessary to include all this information in this verification report.

4.1 Test Sediment PSD Analysis – Removal Efficiency Testing

The test sediment for the removal efficiency testing was prepared and blended as described in **Section 2.3**. PSD analysis on three blends was conducted by BTL Engineering, Inc., Tampa, Florida according to ASTM D422-63 (reapproved 2007). The test sediment was found to be slightly finer than the protocol specified sediment blend. The results and the comparison to the protocol specification are shown in **Table 1** and **Figure 6.**

Table 1 - Particle Size Distribution Results of Test Sediment Samples

Particle Size	% Finer					Difference from Protocol %
μm	Protocol	Sample 1	Sample 2	Sample 3	Test Sediment Average	
1000	100	100.0	100.0	100.0	100.0	0.0
500	95	99.9	99.9	99.9	99.9	-4.9
250	90	96.6	96.8	96.8	96.7	-6.7
150	75	77.1	77.7	77.6	77.5	-2.5
100	60	61.4	61.1	61.3	61.3	-1.3
75	50	58.9	58.1	58.4	58.5	-8.5
50	45	50.4	49.8	51.3	49.3	-4.3
20	35	34.9	35.4	35.4	35.2	-0.2
8	20	20.9	20.3	20.8	20.7	-0.7
5	10	14.4	15.1	15.0	14.8	-4.8
2	5	9.0	8.5	9.0	8.8	-3.8

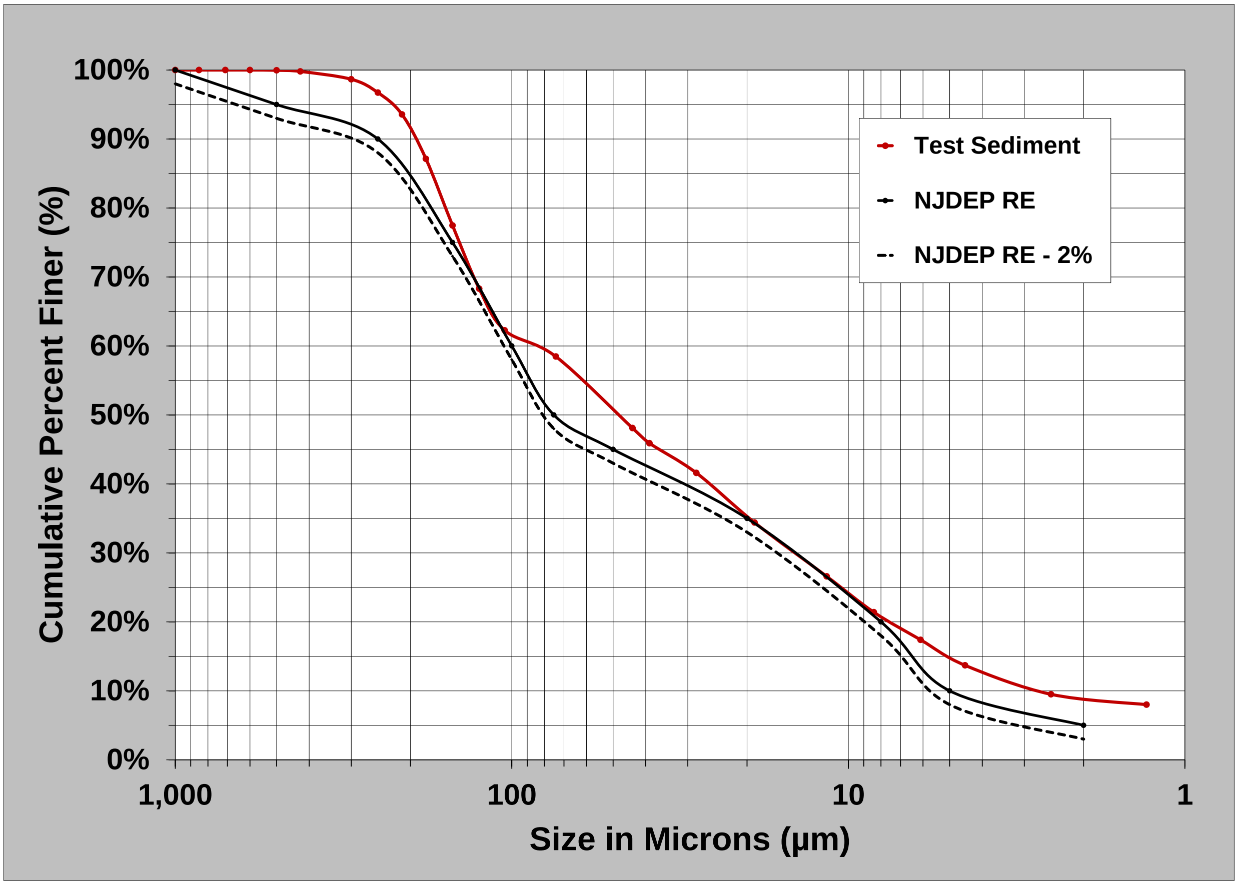


Figure 6 Average Test Sediment PSD vs Protocol Specification

4.2 Removal Efficiency Testing

In accordance with the NJDEP HDS Protocol, removal efficiency testing was executed on the NSBB-HVT 3-6 unit in order to establish the ability of the NSBB-HVT to remove the specified test sediment at 25%, 50%, 75%, 100% and 125% of the target MTFR. The target MTFR was 628 gpm (1.40 cfs). This target was chosen based on the ultimate goal of demonstrating greater than 50% annualized weighted solids removal as defined in the Protocol.

All results reported in this section were derived from test runs that fully complied with the terms of the protocol. None of the collection intervals of the calibration samples exceeded one minute in duration for any of the reported tests. The inlet feed concentration coefficient of variance (COV) did not exceed 0.10 for any flow rate trials.

The mean influent concentration was calculated using Equation 1 from *Section 2.4 Removal Efficiency Test Procedure*. The mean effluent concentration was adjusted by subtracting the measured background concentrations. No background TSS concentrations exceeded the 20 mg/L maximum allowed by the protocol. At no point did the water temperature exceed 80 F.

25% MTFR Results

The NSBB-HVT 3-6 25% MTFR test was conducted in accordance with the NJDEP HDS Protocol at a target flow rate of 0.35 cfs (157 gpm). A summary of test readings, measurements and calculations are shown in **Table 2**. Feed calibration results are shown in **Table 3**. Background and effluent sampling measurements are shown in **Table 4**.

The NSBB-HVT removed 67.9% of the test sediment at a flow rate of 0.35 cfs. **Table 5** shows that the QA/QC results for flow rate, feed rate and influent and effluent background concentrations were within the allowable parameters specified by the protocol.

Table 2 - Summary of NSBB-HVT 3-6 25% MTFR Test

Trial Date	Target Flow (cfs)/(gpm)	Detention Time (sec)	Target Sediment Concentration (mg/L)	Target Feed Rate (mg/min)	Test Duration (Min)
1/07/2016	0.35 /157.1	51	200	118,930	82
Measured Values					
Mean Flow Rate (cfs)/(gpm)	**Mean Influent Concentration[1] (mg/L)**	**Max. Water Temperature °C / °F**	**Mean Adjusted Effluent Concentration (mg/L)**	**Average Removal Efficiency**	**QA/QC Compliance**
0.35 /158.1	192.6	26.7 / 80	61.8	67.9%	YES

[1] The mean influent concentration reported is calculated by dividing the entire mass of test sediment injected into the flow stream over the duration of the test divided by the total flow during the injection of test sediment.

Table 3 – NSBB-HVT 3-6 25% MTFR Test Calibration Results

Target Concentration	200 mg/L	Target Feed Rate		118,930 mg/min	
Sample ID	**Sample Time (min)**	**Sample Mass (g)**	**Sample Duration (sec)**	**Feed Rate (mg/min)**	**Calculated Influent Concentration (mg/L)**
Feed Rate 1	1	113.26	60	113,260	189
Feed Rate 2	17	113.03	60	113,030	189
Feed Rate 3	33	115.83	60	115,830	194
Feed Rate 4	49	115.12	60	115,120	192
Feed Rate 5	65	116.48	60	116,480	195
Feed Rate 6	81	117.78	60	117,780	197
			Mean	115,250	**193**

Table 4 – NSBB-HVT 3-6 25% MTFR Background and Effluent Measurements

Sample ID	Time (min)	Concentration (mg/L)		
Background 1	10	MDL		
Background 2	16	<MDL		
Background 3	29	<MDL		
Background 4	42	<MDL		
Background 5	48	<MDL		
Background 6	61	<MDL		
Background 7	74	<MDL		
Background 8	80	<MDL		
Sample ID	**Time (min)**	**Concentration (mg/L)**	**Associated Background Concentration (mg/L)**	**Adjusted Concentration (mg/L)**
Effluent 1	10	59.4	1	58.4
Effluent 2	13	60.2	1	59.2
Effluent 3	16	61.8	1	60.8
Effluent 4	26	53.3	1	52.3
Effluent 5	29	59.9	1	58.9
Effluent 6	32	60.9	1	59.9
Effluent 7	42	61.7	1	60.7
Effluent 8	45	63.2	1	62.2
Effluent 9	48	64.7	1	63.7
Effluent 10	58	65.1	1	64.1
Effluent 11	61	65.6	1	64.6
Effluent 12	64	67.4	1	66.4
Effluent 13	74	64.3	1	63.3
Effluent 14	77	66.2	1	65.2
Effluent 15	80	68.1	1	67.1
	Mean	**62.8**	**1.0**	**61.8**

MDL – 2.1 mg/L

Table 5 – NSBB-HVT 3-6 25% MTFR Trial QA/QC Results

Flow Rate			
Target (cfs / gpm)	Mean (cfs / gpm)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
0.35 / 157.1	0.35 / 158.1	0.022	<0.03
Feed Rate			
Target (mg/min)	Mean (mg/min)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
118,930	115,250	0.016	<0.1
Influent Concentration			
Target (mg/L)	Mean (mg/L)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
200	192.6	0.016	<0.1
Background Concentration			
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)
<MDL	MDL	1.0 (1/2 MDL)	<20

50% MTFR Results

The NSBB-HVT 3-6 50% MTFR test was conducted in accordance with the NJDEP HDS Protocol at a target flow rate of 0.70 cfs (314 gpm). A summary of test readings, measurements and calculations are shown in **Table 6**. Feed calibration results are shown in **Table 7**. Background and effluent sampling results are shown in **Table 8**.

The NBSS-HVT 3-6 removed 65.8% of the test sediment at a flow rate of 0.70 cfs. **Table 9** shows that the QA/QC results for flow rate, feed rate and influent and effluent background concentrations were within the allowable parameters specified by the protocol.

Table 6 – Summary of NSBB-HVT 3-6 50% MTFR Test

Trial Date	Target Flow (cfs) / (gpm)	Detention Time (sec)	Target Sediment Concentration (mg/L)	Target Feed Rate (mg/min)	Test Duration (Min)
1/07/2016	0.70 / 314.2	26	200	237,860	62
Measured Values					
Mean Flow Rate (cfs) / (gpm)	**Mean Influent Concentration[1] (mg/L)**	**Max. Water Temperature °C / °F**	**Mean Adjusted Effluent Concentration (mg/L)**	**Average Removal Efficiency**	**QA/QC Compliance**
0.70 / 312.5	196.1	26.7 / 80	67.0	65.8%	YES

[1] The mean influent concentration reported is calculated by dividing the entire mass of test sediment injected into the flow stream over the duration of the test divided by the total flow during the injection of test sediment.

Table 7 – NSBB-HVT 3-6 50% MTFR Test Calibration Results

Target Concentration	200 mg/L	Target Feed Rate		237,860 mg/min	
Sample ID	**Sample Time (min)**	**Sample Mass (g)**	**Sample Duration (sec)**	**Feed Rate (mg/min)**	**Calculated Influent Concentration (mg/L)**
Feed Rate 1	1	224.62	60	224,620	190
Feed Rate 2	13	226.53	60	226,530	192
Feed Rate 3	25	234.25	60	234,250	198
Feed Rate 4	37	233.62	60	233,620	198
Feed Rate 5	49	232.71	60	232,710	197
Feed Rate 6	61	239.70	60	239,700	203
			Mean	**231,905**	**196**

Table 8 – NSBB-HVT 3-6 50% MTFR Background and Effluent Measurements

Sample ID	Time (min)	Concentration (mg/L)		
Background 1	6	<MDL		
Background 2	12	<MDL		
Background 3	21	<MDL		
Background 4	30	<MDL		
Background 5	36	<MDL		
Background 6	45	2.5		
Background 7	54	<MDL		
Background 8	60	2.3		
Sample ID	**Time (min)**	**Concentration (mg/L)**	**Associated Background Concentration (mg/L)**	**Adjusted Concentration (mg/L)**
Effluent 1	6	66.6	1	65.6
Effluent 2	9	68.2	1	67.2
Effluent 3	12	69.8	1	68.8
Effluent 4	18	68.4	1	67.4
Effluent 5	21	71.1	1	70.1
Effluent 6	24	72.8	1	71.8
Effluent 7	30	72.9	1	71.9
Effluent 8	33	68.4	1	67.4
Effluent 9	36	69.2	1	68.2
Effluent 10	42	71.5	1	70.5
Effluent 11	45	70.3	2	68.3
Effluent 12	48	61.4	2	59.4
Effluent 13	54	51.6	2	49.6
Effluent 14	57	73.2	2	71.2
Effluent 15	60	69.3	2	67.3
	Mean	**68.3**	**1.3**	**67.0**

MDL – 2.1 mg/L

Table 9 – 4-ft FDHC 50% MTFR Trial QA/QC Results

Flow Rate			
Target (cfs / gpm)	Mean (cfs / gpm)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
0.70 / 314.2	0.70 / 312.5	0.013	<0.03
Feed Rate			
Target (mg/min)	Mean (mg/min)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
237,860	231,905	0.024	<0.1
Influent Concentration			
Target (mg/L)	Mean (mg/L)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
200	196.1	0.024	<0.1
Background Concentration			
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)
<MDL	2.5	1.4	<20

75% MTFR Results

The NSBB-HVT 3-6 75% MTFR test was conducted in accordance with the NJDEP HDS Protocol at a target flow rate of 1.05 cfs (471 gpm). A summary of test readings, measurements and calculations are shown in **Table 10**. Feed calibration results are shown in **Table 11**. Background and effluent sampling results are shown in **Table 12**.

The NBSS-HVT 3-6 removed 63.1% of the test sediment at a flow rate of 1.05 cfs. **Table 13** shows that the QA/QC results for flow rate, feed rate and influent and effluent background concentrations were within the allowable parameters specified by the protocol.

Table 10 – Summary of NSBB-HVT 3-6 75% MTFR Test

Trial Date	Target Flow (cfs) / (gpm)	Detention Time (sec)	Target Sediment Concentration (mg/L)	Target Feed Rate (mg/min)	Test Duration (Min)
1/06/2016	1.05 / 471.3	17	200	356,790	57
Measured Values					
Mean Flow Rate (cfs / gpm)	**Mean Influent Concentration[1] (mg/L)**	**Max. Water Temperature °C / °F**	**Mean Adjusted Effluent Concentration (mg/L)**	**Average Removal Efficiency**	**QA/QC Compliance**
1.05 / 471.9	199.1	26.7 / 80	73.4	63.1%	YES

[1] The mean influent concentration reported is calculated by dividing the entire mass of test sediment injected into the flow stream over the duration of the test divided by the total flow during the injection of test sediment.

Table 11 – NSBB-HVT 3-6 75% MTFR Test Calibration Results

Target Concentration	200 mg/L	Target Feed Rate		356,790 mg/min	
Sample ID	**Sample Time (min)**	**Sample Mass (g)**	**Sample Duration (sec)**	**Feed Rate (mg/min)**	**Calculated Influent Concentration (mg/L)**
Feed Rate 1	1	352.26	60	352,260	197
Feed Rate 2	12	355.89	60	355,890	199
Feed Rate 3	23	358.64	60	358,640	201
Feed Rate 4	34	354.16	60	354,160	198
Feed Rate 5	45	361.42	60	361,420	202
Feed Rate 6	56	351.82	60	351,820	197
			Mean	**355,698**	**199**

Table 12 – NSBB-HVT 3-6 75% MTFR Background and Effluent Measurements

Sample ID	Time (min)	Concentration (mg/L)		
Background 1	5	3.2		
Background 2	11	3.6		
Background 3	19	3.2		
Background 4	27	<MDL		
Background 5	33	5.5		
Background 6	41	4.4		
Background 7	49	7.1		
Background 8	55	8.9		
Sample ID	**Time (min)**	**Concentration (mg/L)**	**Associated Background Concentration (mg/L)**	**Adjusted Concentration (mg/L)**
Effluent 1	5	72.7	3.2	69.5
Effluent 2	7	79.0	3.4	75.6
Effluent 3	11	80.0	3.6	76.4
Effluent 4	16	76.3	3.4	72.9
Effluent 5	19	69.3	3.2	66.1
Effluent 6	22	85.1	2.1	83.0
Effluent 7	27	129.0	1.0	128.0
Effluent 8	30	86.3	3.3	83.0
Effluent 9	33	84.0	5.5	78.5
Effluent 10	38	80.0	5.0	75.0
Effluent 11	41	83.2	4.4	78.8
Effluent 12	44	49.4	5.8	43.6
Effluent 13	49	70.1	7.1	63.0
Effluent 14	52	59.3	8.0	51.3
Effluent 15	55	65.5	8.9	56.6
	Mean	**77.9**	**4.5**	**73.4**

MDL – 2.1 mg/L

Table 13 – NSBB-HVT 3-6 75% MTFR Trial QA/QC Results

Flow Rate			
Target (cfs / gpm)	Mean (cfs / gpm)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
1.05 / 471.3	1.05 / 471.9	0.011	<0.03
Feed Rate			
Target (mg/min)	Mean (mg/min)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
356,790	355,698	0.011	<0.1
Influent Concentration			
Target (mg/L)	Mean (mg/L)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
200	199.1	0.011	<0.1
Background Concentration			
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)
<MDL	8.9	4.6	<20

100% MTFR Results

The NSBB-HVT 3-6 100% MTFR test was conducted in accordance with the NJDEP HDS Protocol at a target flow rate of 1.40 cfs (628 gpm). A summary of test readings, measurements and calculations are shown in **Table 14**. Feed calibration results are shown in **Table 15**. Background and effluent sampling results are shown in **Table 16**.

The NBSS-HVT 3-6 removed 56.4% of the test sediment at a flow rate of 1.40 cfs. **Table 17** shows that the QA/QC results for flow rate, feed rate and influent and effluent background concentrations were within the allowable parameters specified by the protocol.

Table 14 – Summary of NSBB-HVT 3-6 100% MTFR Test

Trial Date	Target Flow (cfs) / (gpm)	Detention Time (sec)	Target Sediment Concentration (mg/L)	Target Feed Rate (mg/min)	Test Duration (Min)
1/08/2015	1.40 / 628.4	12.9	200	475,720	42
Measured Values					
Mean Flow Rate (cfs / gpm)	**Mean Influent Concentration (mg/L)[1]**	**Max. Water Temperature °C / °F**	**Mean Adjusted Effluent Concentration (mg/L)**	**Average Removal Efficiency**	**QA/QC Compliance**
1.40 / 629.3	198.3	26.7 / 80	86.5	56.4%	YES

[1] The mean influent concentration reported is calculated by dividing the entire mass of test sediment injected into the flow stream over the duration of the test divided by the total flow during the injection of test sediment.

Table 15 – NSBB-HVT 3-6 100% MTFR Test Calibration Results

Target Concentration	200 mg/L	Target Feed Rate		475,720 mg/min	
Sample ID	**Sample Time (min)**	**Sample Mass (g)**	**Sample Duration (sec)**	**Feed Rate (mg/min)**	**Calculated Influent Concentration (mg/L)**
Feed Rate 1	1	462.66	60	462,660	194
Feed Rate 2	9	470.75	60	470,750	198
Feed Rate 3	17	467.25	60	467,250	196
Feed Rate 4	25	474.72	60	474,720	199
Feed Rate 5	33	480.77	60	480,770	202
Feed Rate 6	41	477.39	60	477,390	200
			Mean	**472,257**	**198**

Table 16 – NSBB-HVT 3-6 100% MTFR Background and Effluent Measurements

Sample ID	Time (min)	Concentration (mg/L)		
Background 1	4	<MDL		
Background 2	8	<MDL		
Background 3	14	<MDL		
Background 4	20	3.7		
Background 5	24	3.2		
Background 6	30	5.1		
Background 7	36	6.7		
Background 8	40	10.9		
Sample ID	**Time (min)**	**Concentration (mg/L)**	**Associated Background Concentration (mg/L)**	**Adjusted Concentration (mg/L)**
Effluent 1	4	77.4	1.0	76.4
Effluent 2	6	88.9	1.0	87.9
Effluent 3	8	70.4	1.0	69.4
Effluent 4	12	99.5	1.0	98.5
Effluent 5	14	101.3	1.0	100.3
Effluent 6	16	83.7	2.4	81.3
Effluent 7	20	98.0	3.7	94.3
Effluent 8	22	100.6	3.5	97.1
Effluent 9	24	96.2	3.2	93.0
Effluent 10	28	62.5	4.2	58.3
Effluent 11	30	88.4	5.1	83.3
Effluent 12	32	101.7	5.9	95.8
Effluent 13	36	91.2	6.7	84.5
Effluent 14	38	96.9	8.8	88.1
Effluent 15	40	100.7	10.9	89.8
	Mean	**90.5**	**4.0**	**86.5**

MDL – 2.1 mg/L

Table 17 – NSBB-HVT 3-6 100% MTFR Trial QA/QC Results

Flow Rate			
Target (cfs / gpm)	Mean (cfs / gpm)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
1.40 / 628.4	1.40 / 629.3	0.009	<0.03
Feed Rate			
Target (mg/min)	Mean (mg/min)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
475,720	472,257	0.014	<0.1
Influent Concentration			
Target (mg/L)	Mean (mg/L)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
200	198.3	0.014	<0.1
Background Concentration			
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)
<MDL	10.9	4.1	<20

125% MTFR Results

The NSBB-HVT 3-6 125% MTFR test was conducted in accordance with the NJDEP HDS Protocol at a target flow rate of 1.75 cfs (785 gpm). A summary of test readings, measurements and calculations are shown in **Table 18**. Feed calibration results are shown in **Table 19**. Background and effluent sampling results are shown in **Table 20**.

The NBSS-HVT 3-6 removed 50.6% of the test sediment at a flow rate of 1.75 cfs. **Table 21** shows that the QA/QC results for flow rate, feed rate and influent and effluent background concentrations were within the allowable parameters specified by the protocol.

Table 18 – Summary of NSBB-HVT 3-6 125% MTFR Test

Trial Date	Target Flow (cfs / gpm)	Detention Time (sec)	Target Sediment Concentration (mg/L)	Target Feed Rate (mg/min)	Test Duration (Min)
1/13/2016	1.75 / 785.5	10	200	594,650	32
Measured Values					
Mean Flow Rate (cfs / gpm)	**Mean Influent Concentration[1] (mg/L)**	**Max. Water Temperature °C / °F**	**Mean Adjusted Effluent Concentration (mg/L)**	**Average Removal Efficiency**	**QA/QC Compliance**
1.75 / 785.8	201.9	26.7 / 80	99.7	50.6%	YES

[1] The mean influent concentration reported is calculated by dividing the entire mass of test sediment injected into the flow stream over the duration of the test divided by the total flow during the injection of test sediment.

Table 19 – NSBB-HVT 3-6 125% MTFR Test Calibration Results

Target Concentration	200 mg/L	Target Feed Rate		594,650 mg/min	
Sample ID	**Sample Time (min)**	**Sample Mass (g)**	**Sample Duration (sec)**	**Feed Rate (mg/min)**	**Calculated Influent Concentration (mg/L)**
Feed Rate 1	1	587.90	60	587,900	198
Feed Rate 2	7	599.93	60	599,930	202
Feed Rate 3	13	600.58	60	600,580	202
Feed Rate 4	19	600.27	60	600,270	202
Feed Rate 5	25	606.54	60	606,540	204
Feed Rate 6	31	606.94	60	606,940	204
			Mean	**600,360**	**202**

Table 20 – NSBB-HVT 3-6 125% MTFR Background and Effluent Measurements

Sample ID	Time (min)	Concentration (mg/L)		
Background 1	4	<MDL		
Background 2	6	<MDL		
Background 3	11	<MDL		
Background 4	16	<MDL		
Background 5	18	<MDL		
Background 6	23	<MDL		
Background 7	28	2.1		
Background 8	30	3.2		
Sample ID	**Time (min)**	**Concentration (mg/L)**	**Associated Background Concentration (mg/L)**	**Adjusted Concentration (mg/L)**
Effluent 1	4	98.7	1.0	97.7
Effluent 2	5	92.7	1.0	92.7
Effluent 3	6	104.4	1.0	103.4
Effluent 4	10	82.2	1.0	81.2
Effluent 5	11	112.7	1.0	111.7
Effluent 6	12	130.3	1.0	129.3
Effluent 7	16	105.2	1.0	104.2
Effluent 8	17	111.2	1.0	110.2
Effluent 9	18	98.8	1.0	97.8
Effluent 10	22	96.9	1.0	95.9
Effluent 11	23	107.6	1.0	106.6
Effluent 12	24	110.1	1.0	109.1
Effluent 13	28	92.1	2.1	91.1
Effluent 14	29	79.7	2.6	78.7
Effluent 15	30	93.1	3.2	92.1
	Mean	**101**	**1.3**	**99.7**

MDL – 2.1 mg/L

Table 21 – NSBB-HVT 3-6 125% MTFR Trial QA/QC Results

Flow Rate			
Target (cfs / gpm)	Mean (cfs / gpm)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
1.75 / 785.5	1.75 / 785.8	0.009	<0.03
Feed Rate			
Target (mg/min)	Mean (mg/min)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
594,650	600,360	0.011	<0.1
Influent Concentration			
Target (mg/L)	Mean (mg/L)	Coef. Of Variance	Acceptable Parameters Coef. Of Variance
200	201.9	0.011	<0.1
Background Concentration			
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)
<MDL	3.2	1.4	<20

Excluded Data/Results

Section 5.D, *Verification Report Requirements: Supporting Documentation* of the NJDEP Process document requires that all data from performance evaluation test runs excluded from the computation of the removal rate or verification analysis be disclosed. Results from one removal efficiency test run conducted at 1.75 cfs on January 9, 2016 were not reported since it was determined that background SSC exceeded 20 mg/L.

Annualized Weighted TSS Removal Efficiency

The NJDEP-specified annual weighted TSS removal efficiency calculation is shown in **Table 22** using the results from the removal efficiency testing.

Testing in accordance with the provisions detailed in the NJDEP HDS Protocol demonstrate that the NSBB-HVT 3-6 achieved a 62.86% annualized weighted TSS removal at an MTFR of 1.40 cfs (34.9 gpm/sf). This testing demonstrates that the NSBB-HVT 3-6 exceeds the NJDEP requirement that HDS devices demonstrate at least 50% weighted annualized TSS removal efficiency at the MTFR.

Table 22 – Annualized Weighted TSS Removal of the NSBB-HVT 3-6

% MTFR	Mean Flow Rate Tested (cfs)	Actual % MTFR	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
25	0.35	25.2	67.9%	0.25	16.98%
50	0.70	49.7	65.8%	0.3	19.74%
75	1.05	75.1	63.1%	0.2	12.62%
100	1.40	100.2	56.4%	0.15	8.46%
125	1.75	125.1	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency					**62.86%**

4.3 Test Sediment PSD Analysis - Scour Testing

The scour test sediment, as described in Section 2.3 *Test Sediment*, was a mixture of multiple high pursity silica (99.8%), blended as described in Section 2.3. Three composite samples were prepared as described in Section 2.3 and analyzed by BTL Engineering Inc., Tampa, Florida.

The results showed that the average test sediment significantly exceeded the particle size distribution specified by the protocol (**Table 23**). A comparison of the PSD specified by the protocol, the average PSD of the scour sediment, and the removal efficiency PSD are shown in **Figure 7**.

Table 23 – Scour Test Sediment Particle Size Distribution Comparison

Particle Size (µm)	% Finer					% Difference from Spec
	NJDEP Spec	Sample 1	Sample 2	Sample 3	Average	
1000	100	100.0	100.0	100.0	100.0	0.0
500	90	99.9	99.0	99.9	99.9	-9.9
250	55	97.1	96.9	96.7	96.9	-41.9
150	40	78.5	78.1	76.8	77.8	-37.8
100	25	60.2	59.8	58.9	59.6	-34.6
75	10	53.8	53.5	52.0	53.1	-43.1
50	0	48.9	48.0	47.5	48.1	-48.1

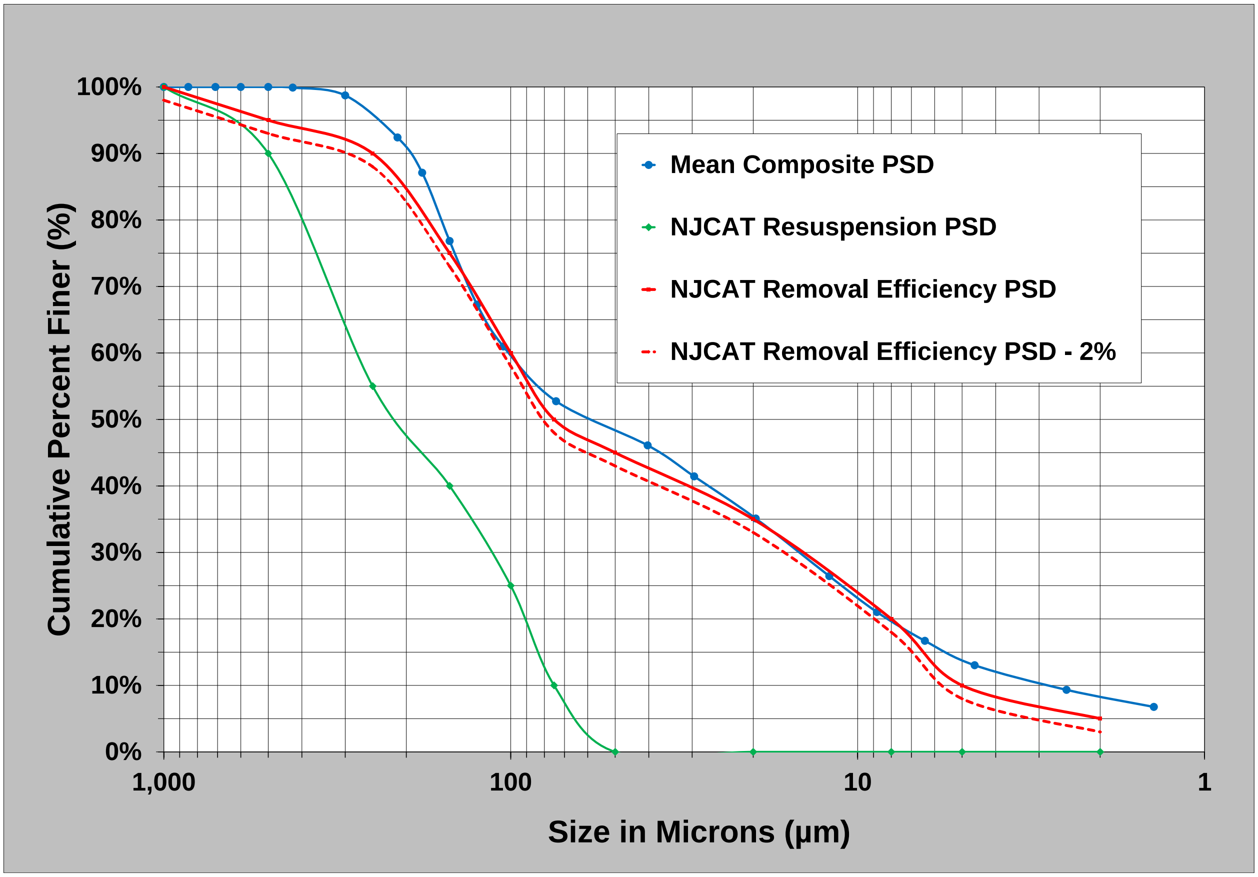


Figure 7 Scour Test Sediment PSD vs Protocol Specification

4.4 Scour Testing for Online Installation

The NSBB-HVT 3-6 underwent scour testing in line with Section 4 of the NJDEP HDS protocol at a flow rate greater than 200% of its MTFR in order to verify its suitability for online use. For the NSBB-HVT 3-6 with an MTFR of 1.40 cfs (628 gpm) the average scour test flow rate had to be at least 2.8 cfs (1,256 gpm). The average flow rate for the scour test was 5.84 cfs (2,621 gpm), which represents 417% of the MTFR. The target flow rate was reached within 4 minutes and the first samples taken one minute later. The maximum water temperature during testing was 79.4°F. The flow rate COV was 0.015. Background concentrations measured 2.5 mg/L – 8.6 mg/L, which complies with the 20 mg/L maximum background concentration specified by the test protocol. Flow and background concentration measurements are shown in **Table 24**. The unadjusted and adjusted effluent concentrations are shown in **Table 25**.

Table 24 – Flow and Background Concentrations for NSBB-HVT 3-6 Scour Testing

Trial Date		2/25/2016	Average Flow Rate =	5.84 cfs
Mean Temperature		26.3 C / 79.4 F	Flow Rate COV	0.015
Sample ID	**Time (min)**	**Concentration (mg/L)**		
Background 1	1	2.5		
Background 2	5	8.0		
Background 3	9	5.5		
Background 4	13	8.6		
Background 5	17	6.3		
Background 6	21	5.8		
Background 7	25	6.1		
Background 8	29	3.8		

Table 25 – Effluent Concentrations for NSBB-HVT 3-6 Scour Test at 417% MTFR

Sample ID	Time (min)	Effluent Concentration with Background Concentrations (mg/L)	Background Concentration (mg/L)	Adjusted Effluent Concentration (mg/L)
Effluent 1	1	6.3	2.5	3.8
Effluent 2	3	8.3	5.2	3.1
Effluent 3	5	9.0	8.0	1.0
Effluent 4	7	8.1	6.8	2.3
Effluent 5	9	9.6	5.5	4.1
Effluent 6	11	6.5	7.0	-0.5
Effluent 7	13	7.1	8.6	-1.5
Effluent 8	15	6.9	7.5	-0.6
Effluent 9	17	7.1	6.3	0.8
Effluent 10	19	6.0	6.0	0.0
Effluent 11	21	6.0	5.8	0.2
Effluent 12	23	5.9	6.0	-0.1
Effluent 13	25	5.4	6.1	-0.7
Effluent 14	27	6.3	5.0	1.3
Effluent 15	29	6.7	3.8	2.9
	Mean	**7.0**	**6.0**	**1.1**

Excluded Data/Results

The protocol requires the disclosure and discussion of any data collected as a part of the testing process that is excluded from the reported results. Several scour tests were conducted at lower flow rates to assess scour performance. These were superseded by subsequent resuspension testing at the final scour test run (5.84 cfs).

5. Design Limitations

The NSBB-HVT is an engineered system for which Suntree Technologies Inc. engineers work with site designers to generate a detailed engineering submittal package for each installation. Design limitations are identified and managed during the design process. Design limitations are discussed in general terms below.

Required Soil Characteristics

The NSBB-HVT is a flow-through system contained within a water tight enclosure. The NSBB-HVT can be installed and function as intended in all soil types.

Slope of Drainage Pipe

Suntree Technologies Inc. recommends contacting our design engineers when the NSBB-HVT is going to be installed on a drainage line with a slope greater than 15%.

Maximum Flow Rate

The maximum treatment flow rate (MTFR) of the NSBB-HVT is dependent upon model size. The recommended maximum peak flow rate is dependent on NSBB-HVT model size and other design and performance specifications. Suntree Technologies Inc. recommends contacting their engineering staff with questions about managing high peak flow rates at specific locations.

Maintenance Requirements

The NSBB-HVT should be inspected and maintained with guidelines set forth in the *Operation, Maintenance, Inspection and Cleaning Manual Nutrient Separating Baffle Box, and at Recommended Service at* http://www.suntreetech.com/files/Documents/Products/Nutrient-Separating-Baffle-Box/NSBB%20Service%20Procedures%20Nov%20%202007.pdf.

The sediment accumulation rate within the NSBB-HVT is dependent on site-specific characteristics such as land use in the contributing drainage and topography, and it is recommended to develop a site specific maintenance interval for each unit.

Driving Head

Testing shows that the headloss across the NSBB-HVT is a function of flow rate and pipe velocities. Generally, the NSBB-HVT headloss is estimated using the energy equation:

$$\Delta H = \left(H_U - \frac{V_U^2}{2g}\right) - \left(H_D - \frac{V_D^2}{2g}\right)$$

where ΔH is the headloss across the NSBB-HVT, H_U is the inlet water elevation, V_U is the average flow velocity at the inlet, H_D is the outlet water elevation, V_D is the average flow velocity at the outlet, and g is the gravitational constant (32.2 ft./sec^2).

Installation Limitations

Pick weights and installation procedures vary slightly with model size. Suntree Technologies Inc. provides contractors with project-specific unit pick weights and installation instructions prior to delivery.

Configurations

The NSBB-HVT is designed for online applications in which the inlet and outlet are tied directly into the main drainage line. In some cases multiple inlet lines can be accommodated. Contact Suntree Technologies Inc. engineering staff when multiple inlet pipes must be accommodated.

Load Limitations

Standard NSBB-HVT units may be designed for HS-20 loading. Contact Suntree Technologies Inc. engineering staff for load ratings analysis.

Pretreatment Requirements

The NSBB-HVT has no pre-treatment requirements.

Limitations on Tail Water

The NSBB-HVT does not have tail water limitations.

Depth to Seasonal High Water Table

Although the functionality of the NSBB-HVT is not impacted by high groundwater levels, Suntree Technologies Inc. recommends consulting their engineering staff to determine whether the addition of anti-flotation collars to the base of the NSBB-HVT chamber is necessary to counterbalance buoyant forces.

Pipe Sizes

Inlet and pipe sizes are evaluated by Suntree Technologies Inc. engineering team for each installation.

6. Maintenance Plans

To maintain proper NSBB-HVT operation, maintenance of these units is important. Suntree Technologies has prepared an *Operations, Maintenance, Inspection and Cleaning Manual* that provides typical inspection and maintenance procedures that should be followed to ensure that

the NSBB-HVT maintains optimal pollutant removal performance. The Manual can be accessed at:
http://www.suntreetech.com/files/Product%20Brochure/Nutrient%20Separating%20Baffle%20Box/O%20&%20M%20Manual%202016%2003%2007.pdf

Inspection

Suntree Technologies recommends the following inspection guidelines:

- After installation and the site has stabilized, inspections should be conducted after every runoff event for the first thirty (30) days.
- Subsequent inspections of sediment accumulation should be conducted a minimum of four (4) times per year.
- When sediment accumulation equals or exceeds 50% of the Minimum Sediment Storage Volume then all accumulated sediment must be removed.
- All inspections must be document. The Manual provides typical inspection procedures, for example, visually inspect for broken or missing parts, and an Inspection Checklist form.

Maintenance

Maintenance activities include the removal of captured sediment and debris. Maintenance can be performed from outside the NSBB-HVT through access points such as manhole covers or hatches installed in the vault surface above the sediment chambers. The screen system may have either SunGlide® Sliding Top Doors or SunGlide® Hinged Doors. These top doors open to give access to the debris captured by the screen system. The screen system also has bottom doors that open to give access to the sediment collected in the settling chambers. A vacuum truck is required for debris and sediment removal. Typical service procedures are listed in the O&M Manual.

7. Statements

The following signed statements from the manufacturer (Suntree Technologies), the independent testing laboratory (Applied Environmental Technology) and NJCAT are required to complete the NJCAT verification process.

In addition, it should be noted that this report has been subjected to public review (e.g. stormwater industry) and all comments and concerns have been satisfactorily addressed.

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April 12, 2016

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New Jersey Corporation for Advanced Technology
Center for Environmental Systems
Stevens Institute of Technology
One Castle Point
Hoboken, NJ 07030

Re: Nutrient Separating Baffle Box® with Hydro-Variant Technology

Dear Dr. Magee,

The Suntree Technologies Nutrient Separating Baffle Box® with Hydro-Variant Technology, which is a hydro dynamic separator for applications of stormwater treatment, recently underwent verification testing according to the NJDEP HDS laboratory testing protocol. The model number NSBB-HVT-3-6, a full size commercially available treatment system, was tested for removal efficiency and scour by the qualified third party entity Applied Environmental Technologies under the direct supervision of Dr. Daniel Smith, Ph.D., P.E., DEE. Testing was conducted according to New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device, dated January 25, 2013. Testing was performed at the testing facility of Applied Environmental Technology located in Tampa, FL. As required by the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation of Advanced Technology", this letter serves as Suntree's statement that all procedures and requirements identified in the aforementioned test protocol and process document were met or exceeded.

Sincerely,

Tom Happel
President

Applied Environmental Technology
10809 Cedar Cove Drive Thonotosassa Florida 33592-2250 813 716 2262

March 25, 2016

Dr. Richard Magee
New Jersey Corporation for Advanced Technology (NJCAT)

RE: Hydrodynamic Protocol Evaluation
Nutrient Separating Baffle Box with Hydrovariant Technology
Suntree Technologies Inc.

Dr. Magee:

Verification testing has been conducted for the Nutrient Separating Baffle Box with Hydrovariant Technology according to the *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device,* January 25, 2013.

Manufacturer

Suntree Technologies, Inc.
798 Clear Lake Road
Cocoa, Florida 32922
Phone: 321-637-7552

Mr. Tom Happel, President
Phone: 321-537-9069

Laboratory Testing Location

Applied Environmental Technology Test Facility
10809 Cedar Cove Drive
Thonotosassa, Florida 33592-2250

Dr. Daniel P. Smith, P.E., DEE, President
Applied Environmental Technology
10809 Cedar Cove Drive
Thonotosassa, Florida 33592-2250
Phone: 813-716-2262

Dr. Daniel P. Smith provided the test facility, conducted all testing and acted as third party observer for all testing. Dr. Smith observed or directly supervised all activities over the full duration including:

- test sediment preparation and sampling
- sediment submittal to laboratories for PSD analyses
- design of removal efficiency and resuspension tests including pump operation, sediment dosing, and background and discharge sampling schedules
- all temperature measurements
- all flow rate measurements
- collection methods for sediment dosing rate
- collection method for background and discharge SSC sampling
- all laboratory SSC analyses including QA/QC
- all data and records management
- all data assessment calculations
- reporting

The laboratory testing fully met or exceeded the requirements of *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device,* January 25, 2013.

Dr. Daniel Smith (AET) has no financial conflict of interest regarding the test results. Dr. Smith has provided services for Suntree Technologies Inc. for two previous NJCAT verification tests and for other technical evaluations, reviews and assessments. Dr. Smith (AET) has no direct financial interest in Suntree Technologies, Inc. Dr. Smith (AET) has no previous or current personal relationships Suntree Technologies, Inc.

Maintenance that was conducted on the experimental system during the testing program consisted of between-test cleanings of the NSBB-HVT chambers, pre-filter chamber, water supply recycle reservoir, and piping; replacing media in the pre-filter, and pump maintenance.

Please contact me if you require additional information.

Sincerely,

Daniel P. Smith

Daniel P. Smith, Ph.D., P.E., BCEES

Florida PE #58388 ▪ New Jersey PE #24GE03765900

Center for Environmental Systems
Stevens Institute of Technology
One Castle Point
Hoboken, NJ 07030-0000

April 18, 2016

Titus Magnanao
NJDEP
Division of Water Quality
Bureau of Non-Point Pollution Control
401-02B
PO Box 420
Trenton, NJ 08625-0420

Dear Mr. Magnanao,

Based on my review, evaluation and assessment of the testing conducted on Suntree Technologies Inc.'s Nutrient Separating Baffle Box with Hydro-Variant Technology by Applied Environmental Technology (AET), the test protocol requirements contained in the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" (NJDEP HDS Protocol) were met or exceeded. Specifically:

Test Sediment Feed

The mean PSD of the AET test sediments comply with the PSD criteria established by the NJDEP HDS protocol. The AET removal efficiency test sediment PSD analysis was plotted against the NJDEP removal efficiency test PSD specification. The test sediment was shown to be slightly finer than the sediment blend specified by the protocol. The AET scour test sediment PSD analysis was plotted against the NJDEP removal efficiency test PSD specification and shown to be significantly finer than specified by the protocol.

Removal Efficiency Testing

In accordance with the NJDEP HDS Protocol, removal efficiency testing was executed on the NSBB-HVT 3-6 in order to establish the ability of the NSBB-HVT to remove the specified test sediment at 25%, 50%, 75%, 100% and 125% of the target MTFR. A target MTFR of 628 gpm (1.40 cfs) was chosen based on the ultimate goal of demonstrating greater than 50% annualized weighted solids removal as defined in the NJDEP HDS Protocol. The flow rates, feed rates and influent concentration all met the NJDEP HDS test protocol’s coefficient of variance requirements and the background concentration for all five test runs never exceeded 20 mg/L.

Scour Testing

In order to demonstrate the ability of the NBSS-HVT 3-6 to be used as an online treatment device scour testing was conducted at greater than 200% of MTFR in accordance with the NJDEP HDS Protocol. The average flow rate during the online scour test was 5.84 cfs, which represents 417% of the MTFR (MTFR = 1.40 cfs). Background concentrations were less than 8.6 mg/L throughout the scour testing, which complies with the 20 mg/L maximum background concentration specified by the test protocol. Unadjusted effluent concentrations ranged from 5.4 mg/L to 9.0 mg/L with a mean of 7.0 mg/L. When adjusted for background concentrations, the effluent concentrations range from -1.5 to 4.1 mg/L with a mean of 1.1 mg/L. These results confirm that the NBSS-HVT 3-6 did not scour at 417% MTFR and meets the criteria for online use.

Maintenance Frequency

The predicted maintenance frequency for all models is >30 months.

Sincerely,

Richard S Magee

Richard S. Magee, Sc.D., P.E., BCEE

8. References

ASTM D422-63 (Reapproved 2007). *Standard Test Method for Particle-Size Analysis of Soils.* ASTM, Philadelphia, PA.

ASTM D3977-97 (Reapproved 2007). *Standard Test Methods for Determining Concentrations in Water Samples*. ASTM, Philadelphia, PA.

NJDEP 2013a. *New Jersey Department of Environmental Protection Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology*. Trenton, NJ. January 25, 2013.

NJDEP 2013b. *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device.* Trenton, NJ. January 25, 2013.

Smith, D. (2016). *Nutrient Separating Baffle Box with Hydro-Variant Technology*. Submitted to New Jersey Corporation for Advanced Technology, Hoboken, New Jersey. March, 2016.

VERIFICATION APPENDIX

Introduction

- Manufacturer – Suntree Technologies Inc., 798 Clearlake Road, Suite 2, Cocoa, FL 32922. *General Phone: (321)637-7552. Website:* www.suntreetech.com

- MTD – Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT) verified models are shown in **Table A-1.**

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- TSS Removal Rate – 50%

- Online installation

Detailed Specification

- NJDEP sizing tables and physical dimensions for the NSBB-HVT verified models are attached (**Table A-1** and **Table A-2**).

- New Jersey requires that the peak flow rate of the NJWQ Design Storm event of 1.25 inch in 2 hours shall be used to determine the appropriate size for the MTD in New Jersey.

- Pick weights and installation procedures vary slightly with model size. Suntree Technologies provides contractors with project-specific unit pick weights and installation instructions prior to delivery.

- Maximum recommended sediment depth prior to cleanout is 4-13 inches (50% of the maximum sediment storage depth) for various model sizes (**Table A-1)**.

- For a reference maintenance plan, download the NSBB-HVT O&M Manual at: http://www.suntreetech.com/files/Product%20Brochure/Nutrient%20Separating%20Baffle%20Box/O%20&%20M%20Manual%202016%2003%2007.pdf

- Under N.J.A.C. 7:8-5.5, NJDEP stormwater design requirements do not allow a hydrodynamic separator such as the NSBB-HVT to be used in series with another hydrodynamic separator to achieve an enhanced total suspended solids (TSS) removal rate.

Table A-1 NSBB-HVT Model MTFRs and Required Sediment Removal Intervals

NSBB-HVT Model No.	Inside Width (ft)	Inside Length (ft)	Treatment Area (ft^2)	MTFR* (cfs)	Partition Height (ft)	Partition Thickness (in.)	Floor Area (ft^2)	Maximum Sediment Storage Depth (in.)	50% Max Sediment Storage Volume (ft^3)	Required Sediment Removal Interval** (months)
2-4	2.00	4.00	8	0.62	2.00	0.75	7.75	8.00	2.58	30
3-6	3.00	6.00	18	1.40	3.00	1.00	17.5	12.00	8.75	45
3-8	3.00	8.00	24	1.87	3.17	1.00	23.5	13.00	12.7	49
4-8	4.00	8.00	32	2.49	3.25	3.00	30.0	13.00	16.3	47
5-10	5.00	10.00	50	3.89	3.50	3.00	47.5	14.00	27.7	51
6-12	6.00	12.00	72	5.60	3.80	3.00	69.0	15.00	43.1	55
6-13.75	6.00	13.75	82.5	6.42	4.20	3.00	79.5	17.00	56.3	63
7-14	7,00	14.00	98	7.62	4.20	4.00	93.3	17.00	66.1	62
7-15	7.00	15.00	105	8.17	4.20	4.00	100.3	17.00	71.0	62
8-14	8.00	14.00	112	8.71	4.50	4.00	106.7	18.00	80.0	66
8-16	8.00	16.00	128	9.96	4.50	4.00	122.7	18.00	92.0	66
9-18	9.00	18.00	162	12.60	4.75	5.00	154.5	19.00	122.5	69
10-17	10.00	17.00	170	13.22	6.00	5.00	161.7	24.00	161.7	87
10-20	10.00	20.00	200	15.56	6.00	5.00	191.7	24.00	191.7	88
12-21	12.00	21.00	252	19.60	6.50	6.00	240.0	26.00	260	95
12-24	12.00	24.00	288	22.40	6.50	6.00	276.0	26.00	299	95

*MTFR scaling based on 1.40/18 = 0.07778 cfs/ft^2

**Sediment Removal Interval (months) = (50% HDS MTD Max Sediment Storage Volume * 3.57) / (MTFR * TSS Removal Efficiency)

Table A-2 NSBB-HVT Model Scaling Ratios

NSBB-HVT Model No.	Inside Length, ft	Inside Width, ft	Treatment Zone Depth (TZD), ft	Length / Width (L/W)	L/W within 15% of Tested Unit?	TZD / Length (TZD/L)	TZD/L within 15% of Tested Unit?	TZD / Width (TZD/W)	TZD/W within 15% of Tested Unit?
2-4	4.00	2.00	0.60	2.00	Yes	0.15	Yes	0.30	Yes
3-6	6.00	3.00	1.00	2.00	Yes	0.17	Yes	0.33	Yes
3-8	8.00	3.00	1.14	2.67	No	0.14	Yes	0.38	Yes
4-8	8.00	4.00	1.25	2.00	Yes	0.16	Yes	0.31	Yes
5-10	10.00	5.00	1.50	2.00	Yes	0.15	Yes	0.30	Yes
6-12	12.00	6.00	1.80	2.00	Yes	0.15	Yes	0.30	Yes
6-13.75	13.75	6.00	2.20	2.29	Yes	0.16	Yes	0.37	Yes
7-14	14.00	7.00	2.00	2.00	Yes	0.14	Yes	0.29	Yes
7-15	15.00	7.00	2.20	2.14	Yes	0.15	Yes	0.31	Yes
8-14	14.00	8.00	2.30	1.75	Yes	0.16	Yes	0.29	Yes
8-16	16.00	8.00	2.30	2.00	Yes	0.14	Yes	0.29	Yes
9-18	18.00	9.00	2.60	2.00	Yes	0.14	Yes	0.29	Yes
10-17	17.00	10.00	2.90	1.70	Yes	0.17	Yes	0.29	Yes
10-20	20.00	10.00	2.90	2.00	Yes	0.15	Yes	0.29	Yes
12-21	21.00	12.00	3.50	1.75	Yes	0.17	Yes	0.29	Yes
12-24	24.00	12.00	3.50	2.00	Yes	0.15	Yes	0.29	Yes

Note: NSBB-HVT Model 3-8 MTFR is within 250% of the tested NSBB-HVT 3-6 and therefore is not required to meet geometric scaling requirement.

AET Tech

Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT)®

Treatment Capacity Verification

City of Indianapolis/Marion County Stormwater Management District

September 5, 2017

Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT)®
Treatment Capacity Verification
City of Indianapolis/Marion County Stormwater Management District
September 5, 2017
AET Tech, Tampa, FL 33592-2250

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SUMMARY

The Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT) is a manufactured stormwater quality unit (SQU) supplied by Suntree Technologies Inc.[1]. The NSBB-HVT reduces stormwater pollutant loadings by capturing sediments, gross solids, and associated pollutants. The treatment effectiveness of the NSBB-HVT was assessed through a definitive evaluation that quantified the suspended sediment removal efficiency under controlled conditions. The evaluation of NSBB-HVT followed a Quality Assurance Project Plan that was developed for this testing[7]. The testing was conducted according to the City of Indianapolis/Marion County evaluation criteria to verify the suspended sediment removal effectiveness of SQUs[2]. The criteria include verification of the maximum flowrate (MFR_{80}) at which the SQU can remove 80% of suspended sediment with a specified intrinsic density and particle size distribution.

Testing was conducted using a full-scale NSBB-HVT 3-6 with sedimentation area of 18 ft^2. Test sediment exceeded the testing requirement of Indianapolis/Marion County, with a finer particle size distribution than required (90.7 µm d_{50}; largest particle size of 125 µm). Suspended solids removal efficiency was quantified based on the effective concentration of suspended sediment dosed to the influent and the measured discharge SSC corrected for influent background SSC. The NSBB-HVT achieved 80.5% SSC removal efficiency at a flow rate of 1.35 cfs (606 gpm), equivalent to a Surface Loading Rate of 33.7 gallon/ft^2-min (0.075 ft^3/ft^3-sec). The removal efficiency test results established an MFR_{80} of 1.35 cfs for NSBB-HVT 3-6. The SSC removal efficiency ranged ranging from 80 to 88.2% for flow rates of 10 to 100% of MFR_{80}. MFR_{80} for the NSBB-HVT product line were calculated using scaling criteria of the City of Indianapolis/Marion County and water elevations above NSBB-HVT invert were developed for flow rates of 20 to 100% of MFR_{80}. At the conclusion of the removal efficiency test, sediments captured by the NSBB-HVT were removed, dried and weighed. Sediment mass recovery was 96.8%, which is highly acceptable considering the nature and scale of testing. To our knowledge, this NSBB-HVT removal efficiency test is the first submitted to Indianapolis/Marion County that provides a true mass balance confirmation of removal efficiency results. This NSBB-HVT test demonstrates that it is practically achievable to provide mass balance confirmation of SQU removal efficiency and mass balance should be mandatory for all SQU technology vendors.

Third party testing and verification was conducted at the AET Tech Test Facility, 10809 Cedar Cove Drive, Thonotosassa, Florida 33592-2250 under the direction of Dr. Daniel P. Smith, P.E., BCEE, President, AET Tech (Phone: 813-716-2262). Dr. Smith is a licensed Professional Engineer in Florida (PE #58388) and New Jersey (PE #24GE03765900). The need for *third-party testing* of stormwater treatment devices by qualified verification entities was cited by the STEPP working group of the Water Environment Federation[4]. The experimental testing conducted to verify MFR_{80} for the NSBB-HVT fully met the standards for true *Third Party Testing*. This contrasts with an in-house testing model in which the experiments and measurements are conducted by the manufacturer and where the observer may have limited experience and qualifications.

NUTRIENT SEPARATING BAFFLE BOX WITH HYDRO-VARIANT TECHNOLOGY (NSBB-HVT)

The Nutrient Separating Baffle Box-HVT is a subsurface rectangular vault MTD that is placed on-line in the stormwater collection system (Figure 1). The NSBB-HVT is

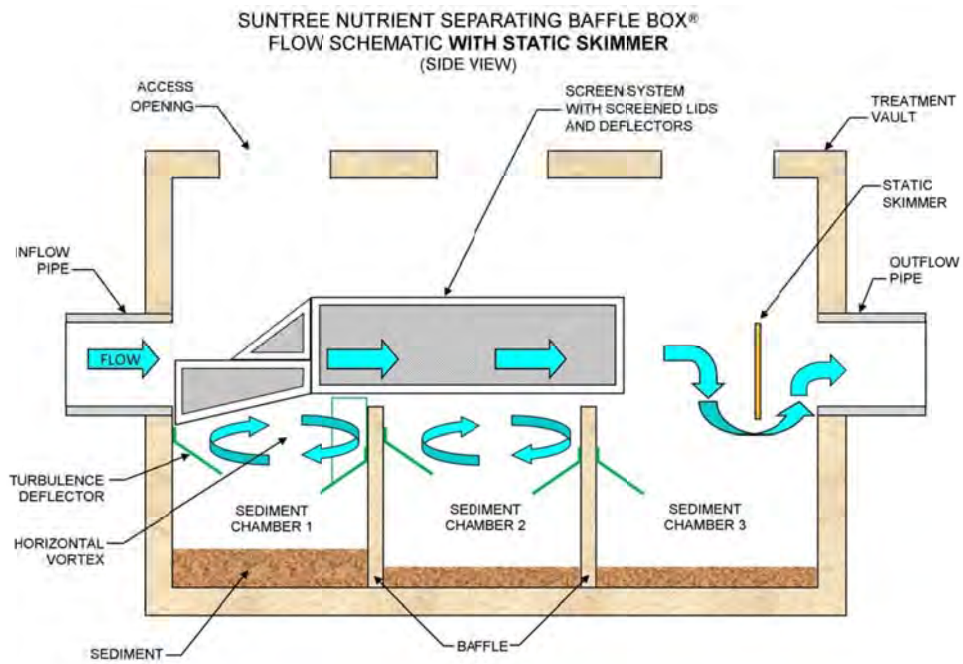


Figure 1 Nutrient Separating Baffle Box® Schematic

engineered to be able to remove solids from stormwater flowing through stormwater pipes and other types of water conveyances. NSBB-HVT treatment removes suspended sediment as well as larger floatable solids including foliage, detritus, and liter. Details of the NSBB-HVT can be found on the Suntree Technologies Inc. website (4). The NSBB-HVT is available in a range of commercial sizes, depending on watershed size, anticipated flowrates and other site factors. A list of commercial NSBB-HVT models is presented in Table 1. A drawing of a commercial NSBB-HVT model (NSBB-HVT 3-6) is included in Appendix A.

The NSBB-HVT vault is subdivided into a series of chambers by vertical baffles that extend from the bottom of the chamber to a common height (Figure 1). As water enters the NSBB-HVT the width of flow increases and the linear velocity decreases, making conditions more favorable for particle sedimentation. Multiple internal components are contained within the NSBB-HVT vault, with a primary objective of calming the water and enabling finer solids to settle out of the flow in the lower settling chambers. Deflectors in the NSBB-HVT settling chambers are strategically arranged and uniquely designed and sized to capture finer particles in the settling chambers, while preventing their resuspension during high flowing storm events. The deflectors create a horizontal vortex at the top of the first and second settling chambers, which is located above the deflectors and below the bottom of the screen system (Figure 1). This hydrodynamic characteristic enhances the ability of gravity to act on particles, enhancing their retention in the settling chambers. In addition, the deflector system isolates the sediments captured in the settling chambers from turbulence and limits the potential for re-suspension.

The NSBB-HVT also incorporates a basket screen that is located above the top of the chamber baffles (Figure 1). A primary objective of the internal screen is to collect and retain floatables such as foliage, liter and detritus. As flowrate declines, the water level in the NSBB-HVT decreases to its static level and the materials captured in the screen system are separated from the underlying water level . Screen-captured materials remain above and out of the water column during non-flow periods. The screen also retains finer sediment that is attached to the larger screen-captured solids, which can collect sediments through straining and filtration.

The unique hydraulic design of the NSBB-HVT provides *upper level conveyance* of flow in the region that lies above the chamber baffles. Upper layer stormwater flow does not have to pass through the screen system but can pass through the NSBB-HVT® vault by flowing around the screen. The horizontal cross sectional area of conveyance around the screen system is always sized to be equal to or greater than the conveyance area of the inflow and the outflow pipes. During high flows, when the water level may be higher than the top of the screen system, screened lids across the top of the screen system prevent floatables from escaping through overtopping and washout. In addition, specialized deflectors within the screen system prevent floatables from being lost through the screen's bypass, which is adjacent to the inflow. These unique hydraulic features enable the NSBB-HVT to be easily retrofitted to existing storm pipes with only a minimal headloss impact and without compromising the hydrology of the water shed.

The Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT) is an evolution of the fixed-skimmer NSBB that contains a performance-enhancing feature called SkimBoss MAX (Figures 2,3). SkimBoss MAX is *a hydro-variant* skimmer that is located adjacent to the vault outflow. The SkimBoss MAX system automatically adjusts its level in response to stormwater flow and water level, providing a variant level hydraulic conveyance feature. During low to medium flows, the lower level of the SkimBoss Max system optimizes detention time and reduces turbulence in the vault to maximize the removal efficiency of finer particles (Figure 2). During high flows, when flooding may be a concern, SkimBoss MAX rises vertically to reduce the headloss of the treatment system and provide the higher conveyance that is needed (Figure 3). The SkimBoss MAX adjusts its height automatically with flowrate and water level; operator attention is not required.

Table 1 Nutrient Separating Baffle Box-HVT® Commercial Models

NSBB Model #	Inside Width, ft.	Inside Length, ft.	Baffle Height, in.	Sedimentation Area, ft^2
2-4-60	2	4	24	8.0
3-6-72	3	6	36	18.0
3-8-84	3	8	36	24.0
4-8-84	4	8	36	32.0
5-10-84	5	10	36	50.0
6-12-84	6	12	36	72.0
8-12-84	8	12	36	96.0
8-12-100	8	12	40	96.0
7-14-100	7	14	40	98
8-14-100	8	14	40	112
8-16-100	8	16	44	128
9-18-100	9	18	40	162
10-14-100	10	14	40	140
10-16-125	10	16	46	160
10-20-125	10	20	48	200
12-20-132	12	20	48	240
12-24-132	12	24	60	288

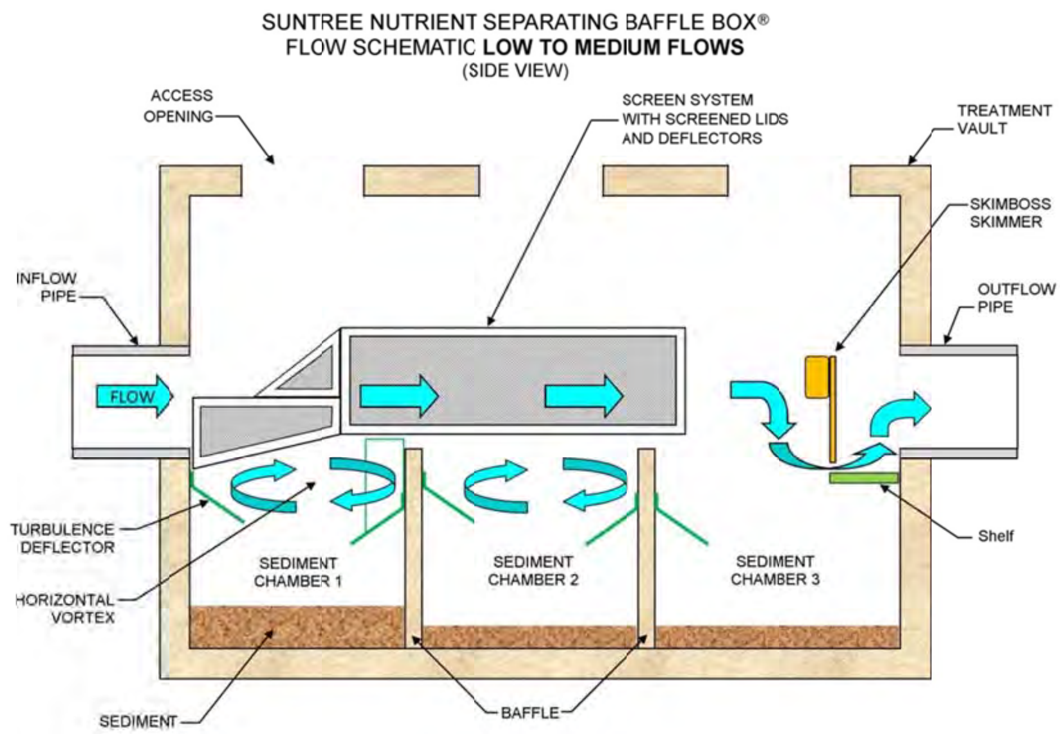


Figure 2 NSBB-HVT Operation at Low to Medium Flows

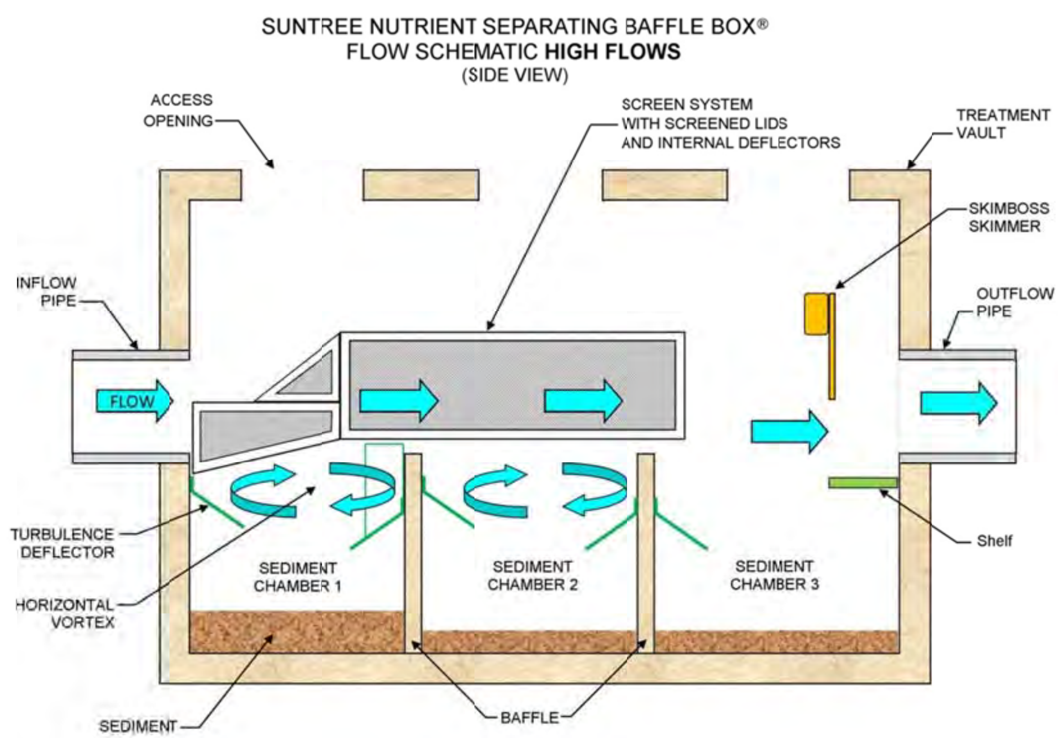


Figure 3 NSBB-HVT Operation at High Flows

SUNTREE TECHNOLOGIES INC.

Corporate History The stormwater treatment division of Suntree Technologies was founded by Mr. Henry Happel and Mr. Tom Happel in 1993 in response to local environmental concerns and the need to protect the Indian River Lagoon from stormwater pollutants. Initially incorporated as Suntree Isles and currently doing business as Suntree Technologies Inc., the company has been designing and manufacturing stormwater pollution control devices since 1993. The Nutrient Separating Baffle Box was developed in 1998 by incorporating screen capture devices into in-line sedimentation chambers in order to capture large stormwater materials and hold them out of the water column between storm events. The first NSBB-HVT was installed in 1999, and NSBB-HVT® designs have since continued to evolve and improve. Suntree has also developed an extensive line of other products for the stormwater management industry, including a variety of inlet filter systems, media filtration systems, polymer filtration systems, and advanced skimmer systems. Suntree provides both standardized BMP units and customized designs, and holds eleven patents for innovative technologies that are related to their NSBB-HVT® product line.

Organization and Management Suntree Technologies Inc. is a privately owned Florida corporation with corporate headquarters located at 798 Clearlake Road, Cocoa, FL (PH: 321-637-7552). Suntree Technologies is currently owned and managed by Tom Happel as president and John Happel as Vice President. Suntree's product market place has expanded beyond Florida to include all 50 states, with an extensive distributor network.

Operating Experience with Respect to the Proposed Technology To date there are approximately 2,000 installations of the Suntree Nutrient Separating Baffle Box across the United States, which vary in size and configuration to treat storm pipes ranging in size from 6" to 84" in diameter. In addition to 12 different standard sizes, custom NSBB-HVT configurations are manufactured to accommodate various unique treatment and site-specific requirements.

The Nutrient Separating Baffle Box (NSBB) is also referred to as the 2nd Generation Baffle Box and is a significant design improvement over previous old style baffle boxes. Key innovations have been the incorporation of a raised screen basket in line with the stormwater inlet pipe to keep organic material and debris separate from the static water between rain events, and the addition of turbulence deflectors to improve the settling of fine sediments while minimizing re-suspension. While Suntree initially developed the NSBB as a gross pollutant removal device prior to stormwater outfalls, application has since been expanded to a pretreatment option prior to underground detention, exfiltration fields, filtration systems, wetlands, and injection wells, as well as its general use as a component of a treatment train. A variety of media treatment systems are also available as options for the NSBB-HVT®. The unique design of the Nutrient Separating Baffle Box-HVT results in minimal head loss through the treatment structure. As a result, the NSBB-HVT® can be installed in either an inline or offline configuration, making for an easy retrofit within existing water sheds. The Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT) is an evolution of the NSBB that incorporates design features to enhance sediment removal performance.

Patents The proprietary technology behind the Nutrient Separating Baffle Box is protected by 1 or more patents issued by the U.S. Patent office with patents pending. The trade name, Nutrient Separating Baffle Box, is a federally registered trademark of Suntree Technologies, Inc. Below is a list of issued utility patents:

6,428,692	6,979,148	7,294,256	8,034,236
7,270,747	6,270,663	7,981,283	8,034,234
6,797,162	7,153,417	7,846,327	9,534,368

Technical Resources, Staff and Capital Equipment Suntree Technologies employs 30 employees which includes 2 staff engineers. In addition to in-house design work, engineering is often outsourced to several different firms. Specialized product testing and evaluations are performed in house and by third party testing laboratories.

NSBB-HVT vaults and specialized internal components are constructed of concrete, marine grade aluminum, stainless steel, and fiberglass. Structural components are designed to have a life span of many decades. The NSBB-HVT will typically last as long as the drainage system in which it is installed and is expected to perform as intended for at least 75 years without major overhall.

The vault that makes up the Nutrient Separating Baffle Box and the Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT) is typically made of either concrete or fiberglass. Typically, the concrete is cast by an independent casting company that is located relatively local to the installation site. The interior components are manufactured in Cocoa Florida and shipped to the casting company where the components are then installed. If a project requires a fiberglass vault, the vault with all the interior components pre-installed is shipped from Cocoa, Florida. In almost all cases, all the unique interior components are installed prior to delivery of the vault. This makes for a quick and easy install, in which the excavation, setting Nutrient Separating Baffle Box and the Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT), and restoration of the excavation often takes less than a day.

The products of Suntree Technologies Inc. are available either directly from Suntree Technologies or through a national sales network of authorized distributors. There are no other manufacturers authorized to sell or market the Nutrient Separating Baffle Box or the Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT).

EXPERIMENTAL SYSTEM

Test Facility Verification testing was conducted at the AET Tech Research Facility (AET-TF) in Hillsborough County, Florida. AET-TF is located on a 4-acre site that is dedicated to the evaluation of water treatment technologies, with electric power, water supply, shop and pilot support facilities, and an analytical laboratory.

The physical address is:

AET Tech LLC
10809 Cedar Cove Drive
Thonotosassa, Florida 33592-2250

The AET Tech contact is:

Dr. Daniel P. Smith, P.E., DEE, President
AET Tech LLC
10809 Cedar Cove Drive
Thonotosassa, Florida 33592-2250
Phone: 813-716-2262
Email: DPSmith_AET@verizon.net

Dr. Daniel Smith is President of AET Tech and an environmental and water resources engineer with over thirty years' experience in water quality, treatment and modeling. Dr. Smith received a Ph.D. in Environmental Engineering and Science from Stanford University and has taught at three universities. He is a registered Professional Engineer (P.E.) in Florida (#58388) and New Jersey (#24GE03765900) and a Diplomat and Board Certified Environmental Engineer (BCEE) of the American Academy of Environmental Engineers and Scientists (AAEES). Dr. Smith has previously conducted three NJCAT criteria verification studies at AET-TF, each of which has received NJCAT verification:

Smith, D. (2008) Nutrient Separating Baffle Box NJCAT Evaluation Full Scale Laboratory Testing for Interim Certification. Submitted to New Jersey Corporation for Advanced Technology, Newark, New Jersey, June 25, 2008.

Smith, D. (2013) Nutrient Separating Baffle Box: SWEMA Hydrodynamic Criteria Evaluation with 100 µm Sediment Particles. Submitted to New Jersey Corporation for Advanced Technology, Newark, New Jersey, May 30, 2013.

Smith, D. (2016) Nutrient Separating Baffle Box with Hydro-Variant Technology, NJDEP Hydrodynamic Criteria Evaluation, Submitted to New Jersey Corporation for Advanced Technology, Newark, New Jersey, March 28, 2016.

NSBB-HVT 3-6 Testing was conducted using the full-scale commercially available NSBB-HVT 3-6. Physical specifications of the NSBB-HVT 3-6 are summarized in Table 2. A drawing of the NSBB-HVT 3-6 is included in Appendix A.

Table 2 NSBB-HVT 3-6 Specifications

Internal length, inch	72
Internal width, inch	36
Number of bottom chambers	3
Baffle height, inch	36
Effective sedimentation area, ft^2	18
Chamber empty bed volume, gallon	404
Depth from bottom at 100% capture capacity, inch	12
Maintenance Sediment Storage Volume, ft^3	18.0
Depth from bottom at 50% capture capacity, inch	6
Screen box length, inch	51
Screen box width, inch	21

The Maintenance Sediment Storage Volume (MSSV) of the NSBB-HVT 3-6 has been established as 18 ft^3, which represents an average sediment depth of 12 in. over the plan area of each of the three bottom chambers. For removal efficiency testing, a false floor was placed at 6 in. depth above the bottom of the chambers as an alternative to pre-loading of test sediment to the 6 in. depth.

System Configuration and Components The configuration of the experimental system is shown in Figure 4. The general configuration of the test system and individual components have been successfully used in previous NJCAT verification testing. The test system consisted of a NSBB-HVT 3-6 and Water Supply Recycle Reservoir (WSRR), connected by an influent pump (IP) that recycles water from the WSSR to the NSBB-HVT (Figure 4). The WSRR was pre-charged with AET-TF groundwater which was of circumneutral pH and virtually free of suspended sediment. Water was aerated and cleaned prior to testing. A valve for fine flowrate control was located downstream of the influent pump and was adjacent to an inline flow meter. This arrangement enabled a single operator to iteratively adjust flowrate to achieve and maintain target values. Water pumped from the WSRR was directed to a pre-chamber to reduce

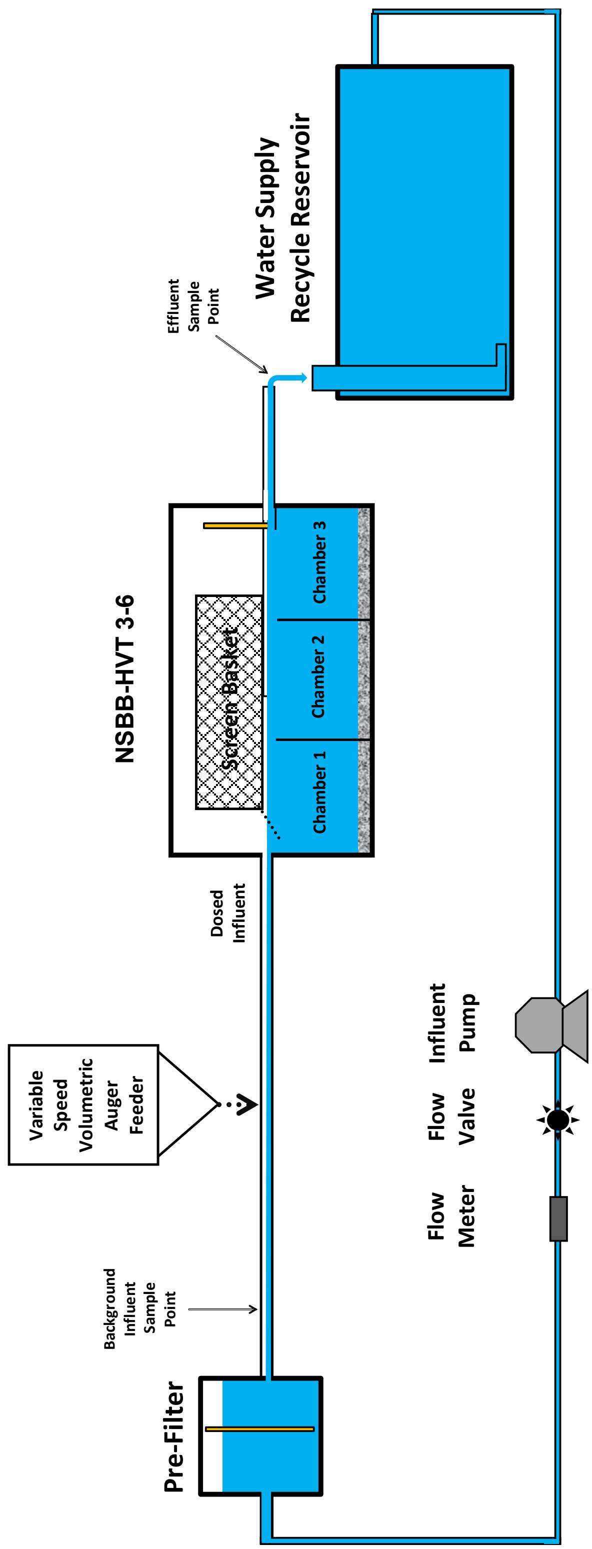


Figure 4 Schematic of Experimental System

Background SSC through media filtration. Background SSC was maintained below 20 mg/L through the duration of the entire test. Water exited the pre-chamber chamber and proceeded into and through the feed pipe that leads to the NSBB-HVT 3-6. Discharge from the pre-chamber chamber proceeded by gravity through the remainder of the test system. The feed channel was an 18 in. diameter pipe with an upper slot in the crown for background SSC sampling, sediment dosing, and visual observation. Test sediment was dosed into the feed pipe using a variable speed volumetric feeder that dispenses dry materials from a hopper at a selected mass rate (Model VF-2, IPM Systems, Lee's Summit, MO). The VF-2 employs a direct drive auger delivery system which is stated by the manufacture to provide feed rates that are accurate to within 2% (Appendix B; www.ipm-sys.com). The point of sediment dosing was 234.5 inch (> 10 pipe diameters) upstream from the NSBB-HVT entrance. NSBB-HVT 3-6 discharge entered a discharge channel and then proceed through a free pipe outfall into the WSRR. The discharge channel contained an open slot along the crown for visual observation. NSBB-HVT discharge samples were collected from the free pipe outfall by upward vertical sweep sampling along the horizontal centerline of flow. Sampling containers had a circular opening of 4 in. diameter and 0.5 gallon volume. Background SSC samples were collected from the 18 in. pipe downstream of the pre-filter and before sediment dosing using the same sampling containers that were used in discharge sampling. Background sampling was conducted by inserting a sample container into the pipe with opening facing upstream, with closed opening, rapidly opening and closing the container to a partially full volume, removing the container from the pipe flow, and screwing the threaded opening tightly. The vertical placement of background sample bottles placed the center of the opening at ca. two thirds of the depth of water depth in pipe. For all background and discharge samples, the determination of SSC used the entire collected sample volume (no sub-sampling).

The WSRR had a working volume of ca. 13,000 gallon and served to settle and remove suspended solids prior to recycling. Solids removal was aided by bottom horizontal entry the NSBB-HVT 3-6 of discharge and tangential withdrawal, which created a circular flow regime. These features was augmented by upper level withdrawal from a baffled WSRR sub-chamber. The reservoir temperature during the test was 79-80F.

Flow to the experimental system was provided by a John Deere diesel powered vacuum well point pump (Model 6VW-DJDST-45D-M or equivalent, Thompson Pump Co., Sarasota, FL), which has been employed previously. The pump was connected by 6 inch tubing to a PVC withdrawal pipe in the Water Recycle Reservoir that extended below the water surface. The pump has a variable speed control to adjust the flow rate. A 6-inch knife gate valve (Thompson Pump Co., Sarasota, FL) was used for fine flow rate adjustment at test initiation and throughout the experiments as needed. Flowrate was measured with a Porta flow PTFM 1.0 Inline Portable Transit Time Flow Meter, which uses clamp-on ultrasonic sensors and has measurement accuracy within 1% (Germline Instruments Inc., Massena, N.Y.). Flow was recorded continuously during removal efficiency and resuspension testing at a frequency of one minute or less. The NSBB-HVT testing employed a new flowmeter and included calibration certificate.

The experimental system components were pre-tested individually and in combination prior to initiation of testing. Pre-testing included pump operability and capacity, flow controllability and measurement, sediment dosing, and the effectiveness of sediment removal by the WSRR and Pre-Filter.

REMOVAL EFFICIENCY EVALUATION

Test Sediment The test sediment was processed Fairmount Best Sand 110 (Appendix C), referred to as "100 μm sediment". Best Sand 110 is high quality sub-angular grain silica sand with a purity of greater than 99% SiO_2 and a median particle size (d_{50}) in the 100 μm range. A series of sieving and decanting procedures were implemented to narrow the PSD. Production steps were: remove coarser particles by dry sieving through US No. 125 sieve; remove finer particles by wet elutriation with continuous washing in a 12 in. x 18 in. slurry channel basin with water flow rate of ca. 4.4 gallon per minute; decant water; collect sand and dry at 170F, and store in sealed 5 gallon buckets until ready for use.

Three composite samples of 100 μm sediment were assembled by collecting an equal mass of sediment from five randomly selected 5 gallon buckets, placing the sediment samples in a sealed dry container, and mixing. The three composite samples were transported to the laboratory for PSD analysis. PSD analyses were conducted by a certified laboratory (BTL Engineering Services, 5802 North Occidental Street, Tampa, FL 33614) according to ASTM D 422[5]. The PSDs of the three 100 μm sediment composite samples were in close agreement as shown in Figure 5. The d_{50} of three 100 μm composites were 87.2, 92.5 and 92.4 μm, with a mean d_{50} of 90.7 μm. The BTL laboratory reports are included in Appendix C.

The mean PSD of 100 μm sediment is plotted in Figure 6. Also shown in Figure 6 is the PSD of OK-110, which is based on the OK-110 data sheet contained in Appendix C. OK-110 is specified in the testing criteria of the City of Indianapolis/Marion County[2]. As seen in Figure 6, 100 μm sediment has a finer PSD than that of OK-110. Use of the 100μm sediment would therefore provide a more rigorous removal efficieny test that using OK-110 (which is no longer available).

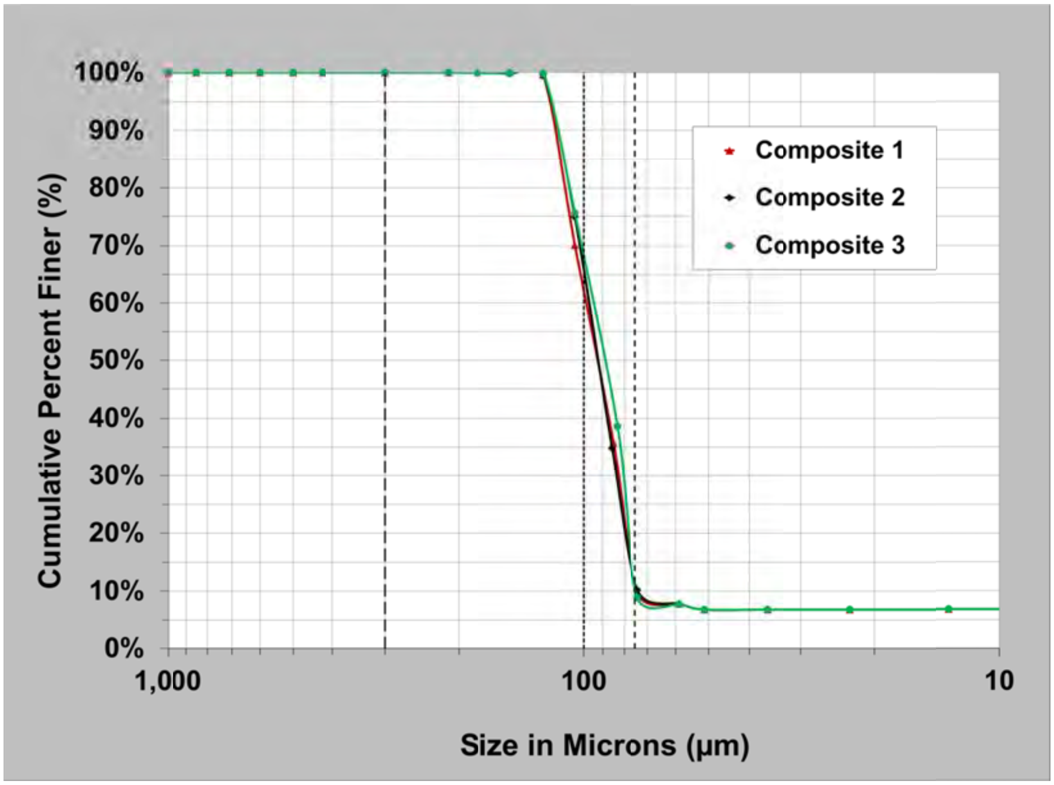


Figure 5 Particle Size Distribution of 100 μm Sediment Samples

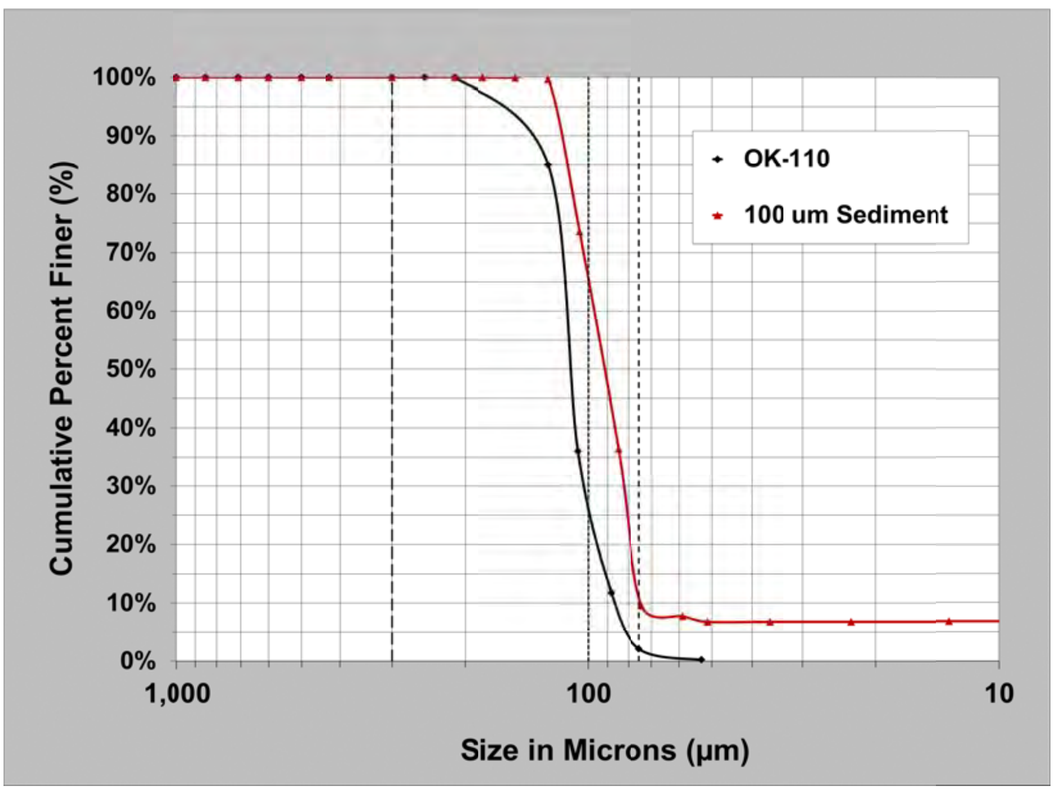


Figure 6 Comparison of 100 μm Sediment and OK-110 PSDs

Test Duration and Sampling Sequence Removal efficiency test characteristics at an example test flow rate of 1.35 cfs are listed in Table 3. The test duration was 44 minutes at target flow rate of 606 gallon per minute and sediment dosing rate of 449 gram per minute. A test template with sample times is shown in Table 4. Effluent sampling was conducted only after a minimum of three hydraulic residence times elapsed after the end of each sediment dose sampling event of one minute duration.

Table 3 Characteristics of Removal Efficiency Test at 1.35 cfs MTFR

Flow Rate, cfs	1.35
Flow Rate, gallon/minute	606
Surface Overflow rate, cfs/ft^2	0.0750
Surface Overflow rate, gallon/ft^2-min.	33.7
Hydraulic Residence Time, min	0.67
Sediment Dose Rate, g/min	459
Duration, min	44

Table 4 Template for Removal Efficiency Test at 1.35 cfs

AET Tech Research Facility (AET-RF)
NSBB-HVT 3-6

08/16/17

Event	Test Time, minute	Sediment Dose	Background SSC	Discharge SSC
Pump On	-6			
	-4			
	-2			
Initiate Sediment Dosing	0			
	1	1		
	2			
	3			
	4		1	1
	5			
	6			2
	7			
	8		2	3
	9	2		
	10			
	11			
	12			4
	13			
	14		3	5
	15			
	16			6
	17	3		
	18			
	19			
	20		4	7
	21			
	22			8
	23			
	24		5	9
	25	4		
	26			
	27			
	28			10
	29			
	30		6	11
	31			
	32			12
	33	5		
	34			
	35			
	36		7	13
	37			
	38			14
	39			
	40		8	15
	41	6		
	42			
Pump Off	43			

Experimental Sequence The experimental sequence was:

- Prepare SSC filters on by rinsing, drying, cooling, and measuring tares
- Prepare and label all sample containers
- Tare sediment dose containers
- Clean NSBB-HVT 3-6 and conveyance channel
- Add sediment to top off sediment feeder
- Measure water temperature in WSRR
- Place all sample bottles with closed lids into appropriate positions
- Start influent pump and adjust and stabilize flow rate
- Initiate sediment dosing and record start time
- Initiate experimental timing for synoptic sampling
- Operate at steady flow and sediment dosing test duration
- Record flowrate at least once per minute over duration of test
- Perform six sediment dosing measurements, spaced evenly over test duration
- Collect fifteen discharge samples evenly spaced over test duration
- Collect eight background influent samples at the same time as every other discharge sample
- Turn off sediment feeder
- Turn off water pump
- Clean and close up all system components
- Weight sediment dose samples
- Perform SSC analyses on samples
- Quantify mass of captured sediment

Summary of Removal Efficiency Test at 1.35 cfs Salient metrics of the removal efficiency test and results are summarized in Table 5.

Flow Rate The flow rate was continuously logged and manually monitored once per minute. Flow rate is plotted in Figure 7. The mean flow rate of 604.7 gallon per minute was within 0.2% of the target flow rate, with a Coefficient of Variation (COV = standard deviation/mean) of 0.009.

Table 5 Removal Efficiency Test Summary

AET Tech Research Facility (AET-RF)
Indianapolis/Marion County

Test Results 8/16/2017

Flow Rate, cfs	1.35			
Flow Rate, gpm	606			
Sediment Dose Rate, g/min	459			
	Target	Mean	C.V.	% Relative Error
Flowrate, gpm	605.9	604.7	0.009	-0.20
Sediment Dosing Rate, gram/min	458.7	473.2	0.006	3.18
Effective SSC Dose, mg/L	200.0	206.8		3.39
	Mean	Maximum		
Background SSC, mg/L	0.88	2.0		
	Mean			
Discharge SSC, mg/L	41.2			
Corrected Discharge SSC, mg/L	40.4			
	%			
SSC Removal Efficiency	80.5			
	minute			
Total Time of Sediment Dosing Period	42.8			
Total Time of Sediment Sampling	6.0			
Time of Sediment Dosing to NSBB-HVT	36.8			
	gallon			
Total dosed volume	22,252			
Sediment Mass Balance				
	gram	lbs.		
Total Sediment Dosed	20,255	44.58		
Sediment Sampled	2,839	6.25		
Net Sediment Dose to NSBB-HVT	17,415	38.33		
Sediment Captured in NSBB-HVT	13,460	29.63		
Sediment in Discharge	3,399	7.48		
Sediment Captured + Discharged	16,859	37.11		
% Mass Recovery	96.8			

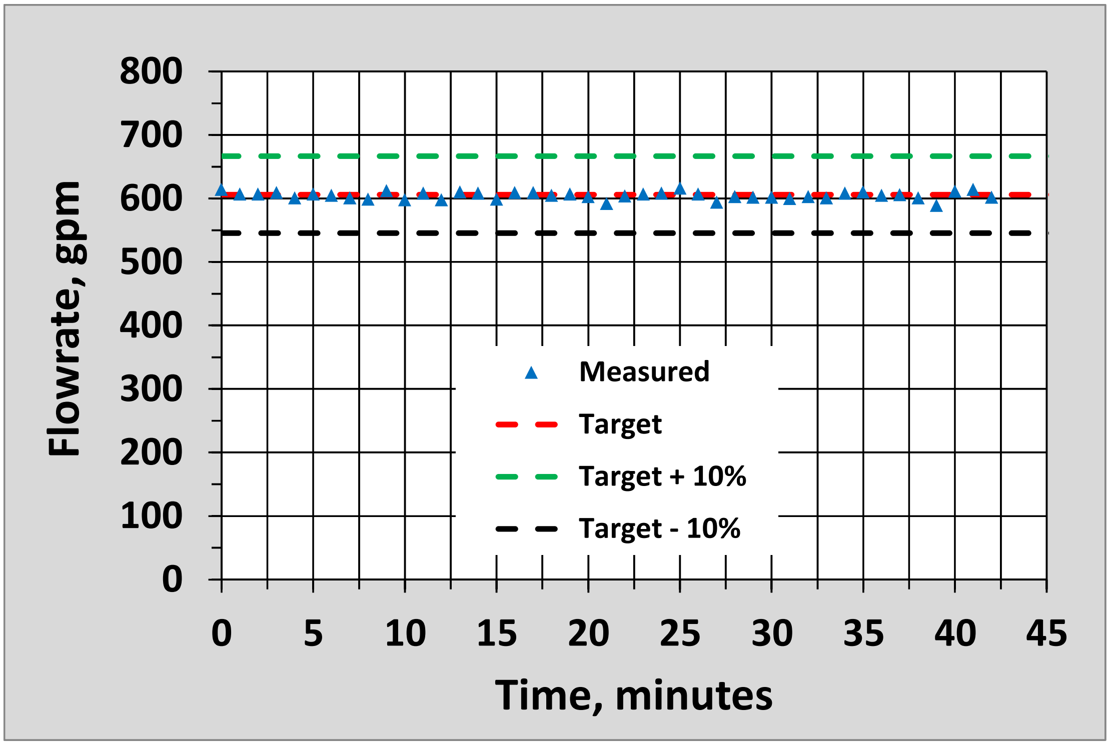


Figure 7 Flow Rate in Removal Efficiency Test at 1.35 cfs

Sediment Dosing and Effective Dosed SSC The sediment dosing rate was measured six times over the period of sediment dosing. The measurement of sediment mass addition rate was conducted by placing a clean, dry and tared sediment collection container in the outlet channel of the volumetric feeder and collecting 100% of dosed solids for exactly 60 seconds. Sediment mass addition rates were calculated using Equation 1. Sediment dosing rate is plotted in Figure 8. The mean sediment dosing

$$\text{Sediment mass added/time} \quad = \quad \text{Mass collected} \quad \div \quad \text{Collection time} \qquad \text{Eq. 1}$$

rate was 473.2 gram/minute, with a COV of 0.006. The effective dosed SSC was 206.8 mg/L as calculated using Equation 2. The low COV of both measured flow rate and measured sediment dosing rate indicate that the experimental procedures that were employed provided the conditions for a valid SSC removal efficiency test.

$$\text{Effective Dosed SSC} \quad = \quad \frac{\text{Sediment mass added/time}}{\text{Volume of water/time}} \qquad \text{Eq. 2}$$

Background Influent and NSBB-HVT Discharge SSC The SSC concentrations in background and NSBB-HVT discharge are plotted in Figure 9. The mean and maximum background SSC were 0.88 and 2.0 mg/L respectively. Background SSC was well below the level of 20 mg/L that is a considered a maximum level for a valid removal efficiency test. Background SSC was very consistent and enabled time-interpolation of background SSCs values between samples. NSBB-HVT discharge SSC had a mean value of 41.2 mg/L and ranged from 22.9 to 53.8 mg/L (Figure 9).

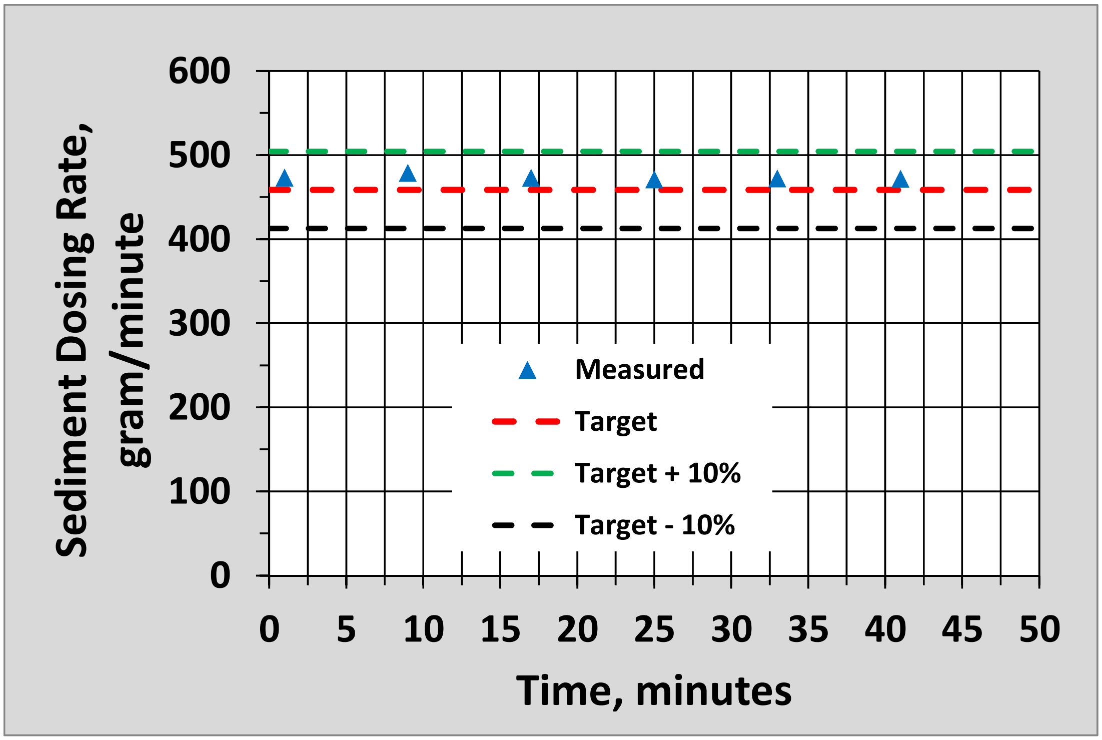


Figure 8 Sediment Dosing Rate in Removal Efficiency Test at 1.35 cfs

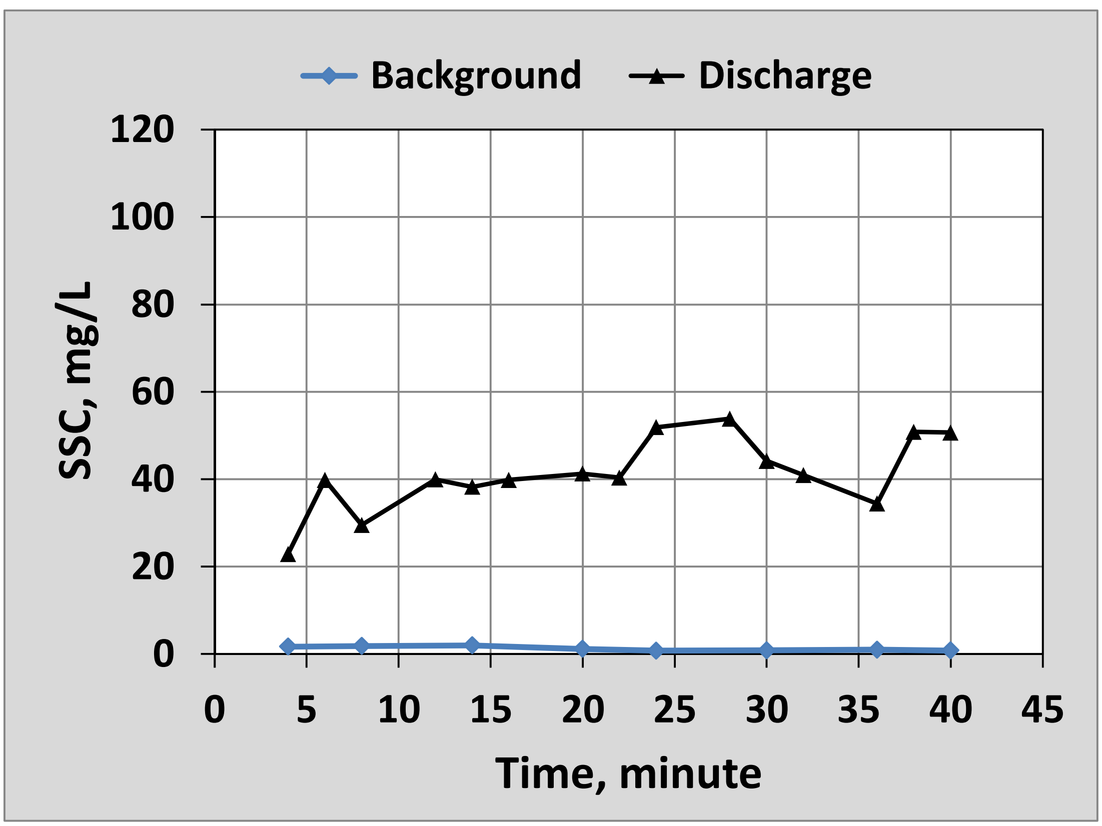


Figure 9 Discharge and Background SSC in Removal Efficiency Test at 1.35 cfs

SSC Removal Efficiency Adjusted discharge SSC was calculated by subtracting background SSC from the measured discharge SSC, where background SSC was the measured SSC at the same time as the discharge SSC sample or a background SSC calculated by linear time-interpolation at the discharge sample time. Adjusted NSBB-HVT discharge SSC had a mean value of 40.4 mg/L and ranged from 21.2 to 53.4 mg/L (Figure 10). Adjusted discharge SSC closely followed the measured discharge SSC due to the low background SSC concentrations measured throughout the test. SSC removal efficiency (RE) was calculated by Equation 3:

$$\mathrm{RE}\ (\%) = \frac{\text{Effective Dosed Influent SSC} - \text{Mean Discharge SSC}}{\text{Effective Dosed Influent SSC}}\ \mathrm{x}\ 100 \qquad \text{Eq. 3}$$

The SSC removal efficiency of NSBB-HVT 3-6 was 80.5% at a flow rate of 1.35 cfs.

MFR_{80} and Required Pollutant Capture The Indianapolis/ Marion County *BMP Testing Criteria* requires determination of maximum flow rate that achieves an 80% removal efficiency of 110 µm d_{50} sediment. The MFR_{80} of NSBB-HVT 3-6 is 1.35 cfs, at which flow rate NSBB-HVT 3-6 achieved 80% removal of 110 um d_{50} sediment. The removal efficiency for 110 µm d_{50} sediment was estimated for flow rates of 10 to 100% of MFR_{80} using a previously developed correlation (7). Removal efficiencies range from 80 to 88.2% and decrease monotonically with increasing flow rate (Figure 11).

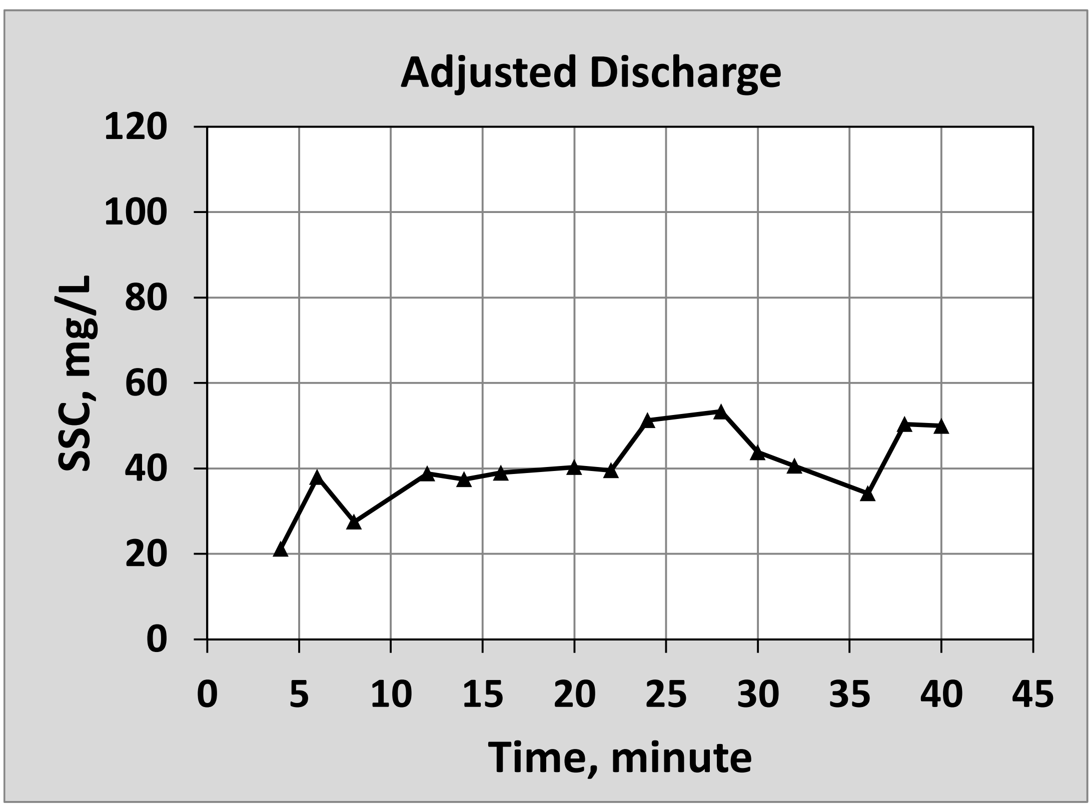


Figure 10 Adjusted Discharge SSC in Removal Efficiency Test at 1.35 cfs

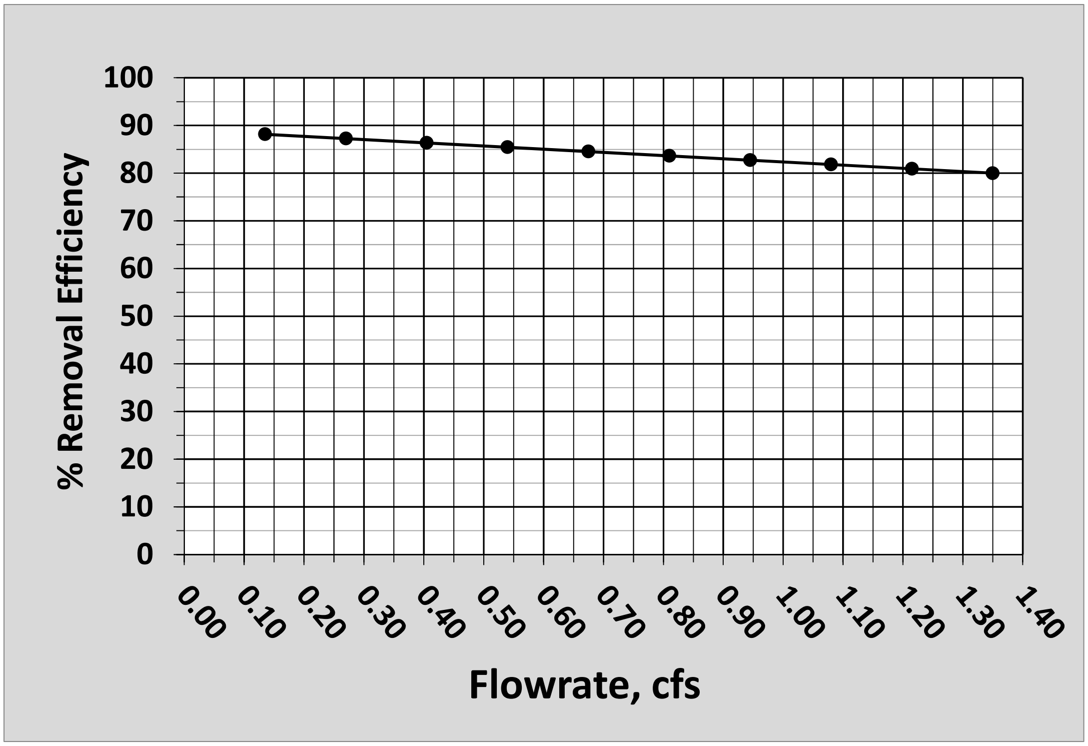


Figure 11 NSBB-HVT Removal Efficiency from 10 to 100% MFR_{80}

Surface Loading Rate At the 80% SSC removal efficiency flow rate (MFR_{80}), the surface loading rate (flow rate per sedimentation area) to the NSBB-HVT 3-6 is 1.35 cfs/18 ft^2, or 0.0750 cfs/ft^2 (33.7 gal./ft^2-min).

Sediment Recovery The mass of sediment captured by the NSBB-HVT was quantified at the end of the removal efficiency test. The NSBB-HVT chambers were partially drained and sediments that had accumulated in the influent pipe were flushed into NSBB-HVT Chamber 1. All sediment was removed from the chambers and passed through tared filters which were then dried to determine the total dry mass of captured sediment. The mass of sediment captured by NSBB-HVT 3-6 was 13,460 grams (Table 5). A mass balance calculation was performed using Equation 4.

$$\text{Net Dosed Mass} = \text{Volume x Discharge SSC} + \text{Mass Captured} \qquad \text{Eq. 4}$$

The net dosed mass of sediment was determined as the total sediment mass dosed over the 42.8 minute dosing period corrected for the sediment mass collected during the six one minute dosing rate samplings. The discharge sediment mass was calculated as the product of the treated volume and mean adjusted discharge SSC, where treated volume was corected for the six one minute sediment dose samplng periods (Table 5). The mass balance calculation for the removal efficiency test yielded a sediment mass recovery of 96.9%, which is considered highly satisfactory considering the size and magnitude of the testing.

FLOW RATE SCALING OF NSBB-HVT PRODUCT LINE

Dimensions of the NSBB-HVT product line are listed in Table 1. The *BMP Testing Criteria*[2] Appendix II applied the sedimentation surface area of NSBB-HVT as the basis of flow rate scaling. Flow rate scaling is presented in Table 6. NSBB-HVT models were scaled from the maximum treatment flow rate of 1.35 cfs to NSBB-HVT 3-6 for 80% removal of 110 µm d_{50} sediment (MFR_{80}). Scaling used the following equation from *BMP Testing Criteria*[2] Appendix II:

$$Flow\ Rate_{Model} = Flow\ Rate_{Prototype}\ x\ \frac{Model\ Diameter}{Prototype\ Diameter}^{2.5} \qquad \text{Eq. 5}$$

To apply Eq. 5, its circular-based SQU geometry was adapted to the rectangular geometry of NSBB-HVT using surface area. For circular SQU, the surface area is proportional to the square of the diameter:

$$Surface\ Area_{Circ.\ Model} = Surface\ Area_{Circ.\ Prototype}\ x\ \left[\frac{Model\ Diameter}{Prototype\ Diameter}\right]^{2.0} \qquad \text{Eq. 6}$$

Combining Eqs. 5 and 6 give equivalent scaling for the rectangular NSBB-HVT:

$$Flow\ Rate_{Model} = Flow\ Rate_{Prototype}\ x\ \left[\frac{Surface\ Area_{Model}}{Surface\ Area_{Prototype}}\right]^{1.25} \qquad \text{Eq. 7}$$

The MFR_{80} for each NSBB-HVT model, scaled with Eq. 7, are listed in Table 6. MFR_{80} of NSBB-HVT models increase with increasing surface area. Geometric scaling of NSBB-HVT models has been previously presented[7].

Table 6 MFR_{80} of NSBB-HVT Models

NSBB-HVT Model No.	Inside Length (L), ft	Inside Width (W), ft	Treatment Zone Depth (D), ft	Settling Area, ft^2	MFR_{80}, cfs
3-6	**6.0**	**3.0**	**1.00**	**18**	**1.35**
2-4	4.0	2.0	0.60	8	0.49
3-8	8.0	3.0	1.14	24	1.93
4-8	8.0	4.0	1.25	32	2.77
5-10	10.0	5.0	1.50	50	4.84
6-12	12.0	6.0	1.80	72	7.64
6-13.75	13.8	6.0	2.20	83	9.1
7-14	14.0	7.0	2.00	98	11.2
7-15	15.0	7.0	2.20	105	12.2
8-14	14.0	8.0	2.30	112	13.3
8-16	16.0	8.0	2.30	128	15.7
9-18	18.0	9.0	2.60	162	21.0
10-17	17.0	10.0	2.90	170	22.4
10-20	20.0	10.0	2.90	200	27.4
12-21	21.0	12.0	3.50	252	36.6
12-24	24.0	12.0	3.50	288	43.2

WATER ELEVATIONS ABOVE INVERT

A predictive discharge equation for NSBB-HVT 3-6 based on the measured water elevation difference between the upstream water surface and horizontal shelf, the area of the flow constriction, and a discharge coefficient[7]:

$$Q = C_d \; A \; (2 \; g \; (h_{upstream} - D_{shelf})^{0.50} \qquad \text{Eq. 8}$$

where Q = NSBB-HVT discharge, C_d = discharge coefficient, A = area of flow constriction, g = gravitational constant, $h_{upstream}$ = NSBB-HVT water elevation upstream of SkimBossMax, and D_{shelf} = elevation of horizontal shelf underlying SkimBossMax. Measured water elevations were used for $h_{upstream}$ and D_{shelf} equals the elevation of the horizontal shelf (1.625 in below inlet invert in NSBB-HVT 3-6). The constriction area equals the constriction width multiplied by the constriction height. Constriction width equaled the internal width of the NSBB-HVT 3-6 minus the track displacements on each side of SkimBossMax. Constriction height equaled the difference between the SkimBossMax bottom elevation and the top of the horizontal shelf, with a flow convergence correction factor applied for height less than 1 in. Eq. 8 was used to calculate discharge/water elevation relationships for the entire NSBB-HVT product line. For each NSBB-HVT model, water elevations ($h_{upstream}$) were derived for flow rates of 20, 40, 60, 80, and 100% of MFR_{80}. D_{shelf} was 1.625 in. below inlet invert for all models and C_d of 0.46 was used in all simulations. Water elevation/discharge relationships for the NSBB-HVT product line are summarized in Table 7.

Table 7 Water Elevations Above Invert for NSBB-HVT Models

NSBB-HVT Model No.	Flow Rate % of MFR_{80}				
	20	40	60	80	100
2-4	9.92	10.41	10.80	11.14	11.46
3-6	13.22	13.86	14.36	14.81	15.23
3-8	13.54	14.16	14.80	15.38	15.92
4-8	15.11	15.78	16.37	16.93	17.46
5-10	18.46	19.21	19.98	20.67	21.31
6-12	18.67	19.51	20.42	21.23	22.00
6-13.75	18.68	19.77	20.79	21.72	22.58
7-14	18.68	19.84	20.88	21.84	22.73
7-15	18.68	19.99	21.10	22.12	23.07
8-14	23.51	24.62	25.66	26.61	27.49
8-16	23.51	24.90	26.08	27.14	28.14
9-18	23.66	25.23	26.55	27.75	28.88
10-17	23.60	25.11	26.38	27.54	28.62
10-20	28.56	30.29	31.74	33.06	34.29
12-21	28.68	30.51	32.06	33.47	34.78
12-24	28.91	30.96	32.71	34.30	35.79

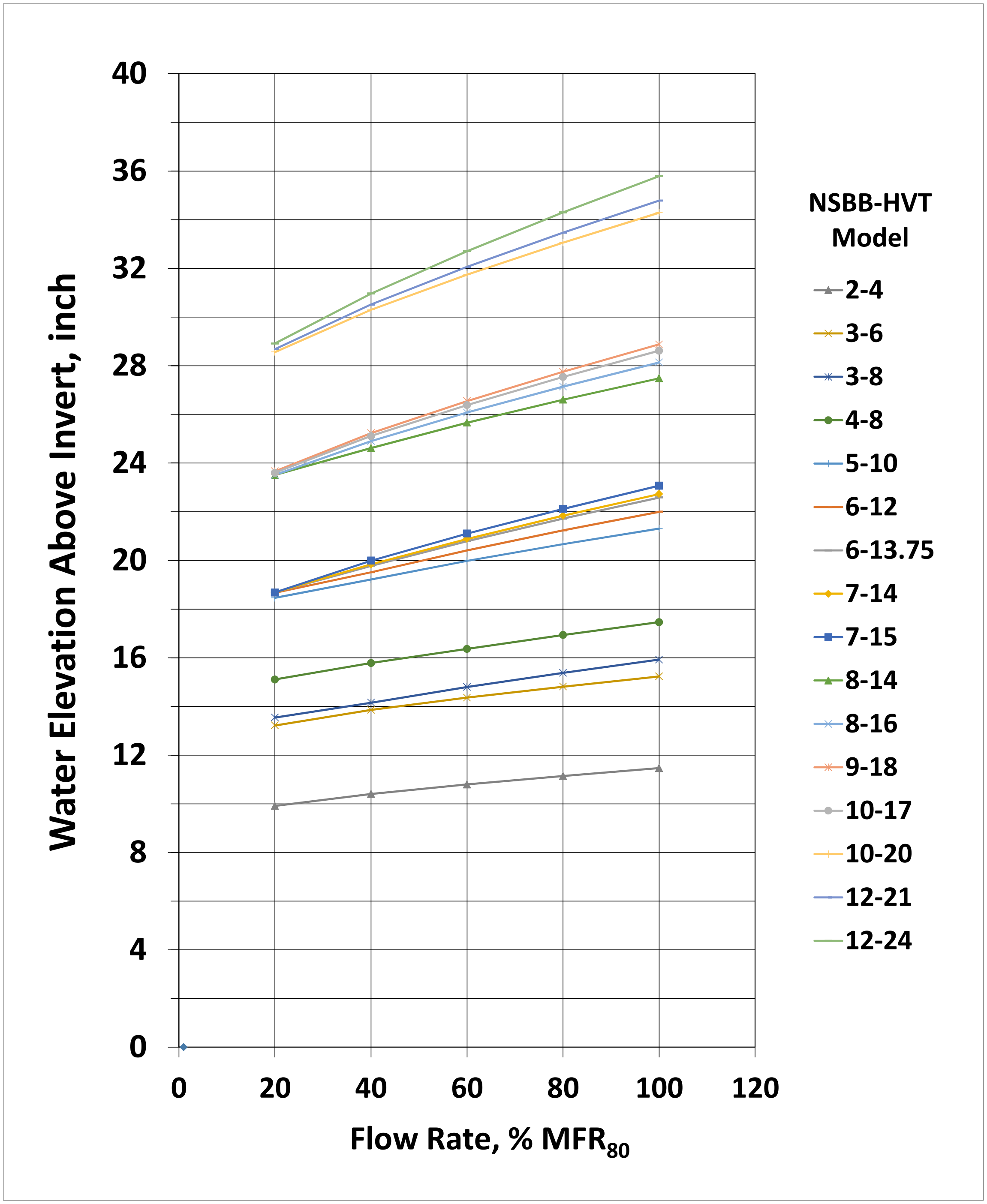


Figure 12 NSBB-HVT Water Elevations Above Invert

CERTIFICATION

AET Tech LLC

10809 Cedar Cove Drive Thonotosassa Florida 33592-2250 813 716 2262

September 5, 2017

TO: City of Indianapolis/Marion County Stormwater Management District
New Products Committee

RE: Certification Statement by Professional Engineer
Nutrient Separating Baffle Box with Hydro-Variant Technology
Suntree Technologies Inc.

CC: Tom Happel, President, Suntree Technologies Inc., Cocoa, Florida
Gary Moody, WISE Hydrology, Hendersonville, TN

AET Tech LLC conducted third-party testing of the Nutrient Separating Baffle Box with Hydro-Variant Technology , a Stormwater Quality Unit (SQU) manufactured by Suntree Technologies, Inc., 798 Clear Lake Road, Cocoa, Florida 32922. Third-party testing was conducted by Dr. Daniel P. Smith of AET Tech LLC. The testing determined the maximum treatment flow rate for 80% removal efficiency of 110 μm d_{50} sediment. Testing was conducted at the AET Tech Test Facility, 10809 Cedar Cove Drive, Thonotosassa, Florida 33592-2250. Dr. Daniel P. Smith conducted and acted as third party observer for all aspects of removal efficiency testing. Dr. Smith conducted, directly supervised, or observed all activities over the full duration of all testing, including design of removal efficiency and resuspension tests (pump operation, flow rate monitoring, sediment preparation and dosing, and background and discharge sampling schedules, sediment submittal to laboratories for PSD analyses, temperature measurement, collection methods for sediment dosing rate, background and discharge SSC sampling, collection and quantification of accumulated solids in NSBB/NSBB-HVT chambers, all laboratory SSC analyses and QA/QC activities, all data and records management, all data assessment calculations, and reporting.

I certify that the information provided to the City of Indianapolis/Marion County Stormwater Management District NPR Consultant, NPR Program Manager or their designated representative(s) pertaining to the Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT) stormwater quality treatment system is accurate and correct and was obtained as required by the testing protocol specified by the City of Indianapolis. AET Tech has no financial relationship, including an ownership interest or investment interest, with the manufacturer involved in this test or any affiliate of the manufacturer. I further certify that I have been compensated only for my time and effort related to this testing certification and I will receive no other compensation for the actions related to this certification.

Daniel P. Smith

Daniel P. Smith, Ph.D., P.E., BCEES
President, AET Tech LLC
Florida PE #58388 • New Jersey PE #24GE03765900

Daniel P. Smith September 5, 2017

REFERENCES

1. Suntree Technologies Inc. (2015) *http://www.suntreetech.com/Products/Nutrient+Separating+Baffle+Box/default.aspx*
2. City of Indianapolis/Marion County (2017) *Manufactured Stormwater Quality Evaluation Criteria* under *BMP Testing Criteria* at http://www.indy.gov/eGov/City/DPW/Business/Specs/Documents/BMP_Testing_Criteria_R3%202016%2010%2011.pdf.
3. AET Tech (2017) Suntree Technologies Inc. Nutrient Separating Baffle Box with Hydro-Variant Technology, New Product Review Program, City of Indianapolis/Marion County Stormwater Management District, April 4, 2017.
4. Water Environment Federation (2014) Investigation into the Feasibility of a National Testing and Evaluation Program for Stormwater Products and Practices A White Paper by the National Stormwater Testing and Evaluation of Products and Practices (STEPP) Workgroup Steering Committee February 6, 2014 STEPP Workgroup.
5. American Society for Testing and Materials (2007) Standard Test Method for Particle Size Analysis of Soils. ASTM D 422-63 (Reapproved 2007). ASTM, Philadelphia, PA.
6. American Society for Testing and Materials (2007) Standard Test Methods for Determining Sediment Concentrations in Water Samples. D3977-97 (Reapproved 2007), ASTM, Philadelphia, PA.
7. AET Tech (2017) Nutrient Separating Baffle Box with Hydro-Variant Technology (NSBB-HVT)®, Laboratory Treatment Capacity Verification Quality Assurance Project Plan, City of Indianapolis/Marion County Stormwater Management District, July 18, 2017.

APPENDIX A

NUTRIENT SEPARATING BAFFLE BOX-HVT® NO. 3-6

SUNTREE TECHNOLOGIES INC.® NUTRIENT SEPARATING BAFFLE BOX®
MODEL NO: NSBB-3-6-72

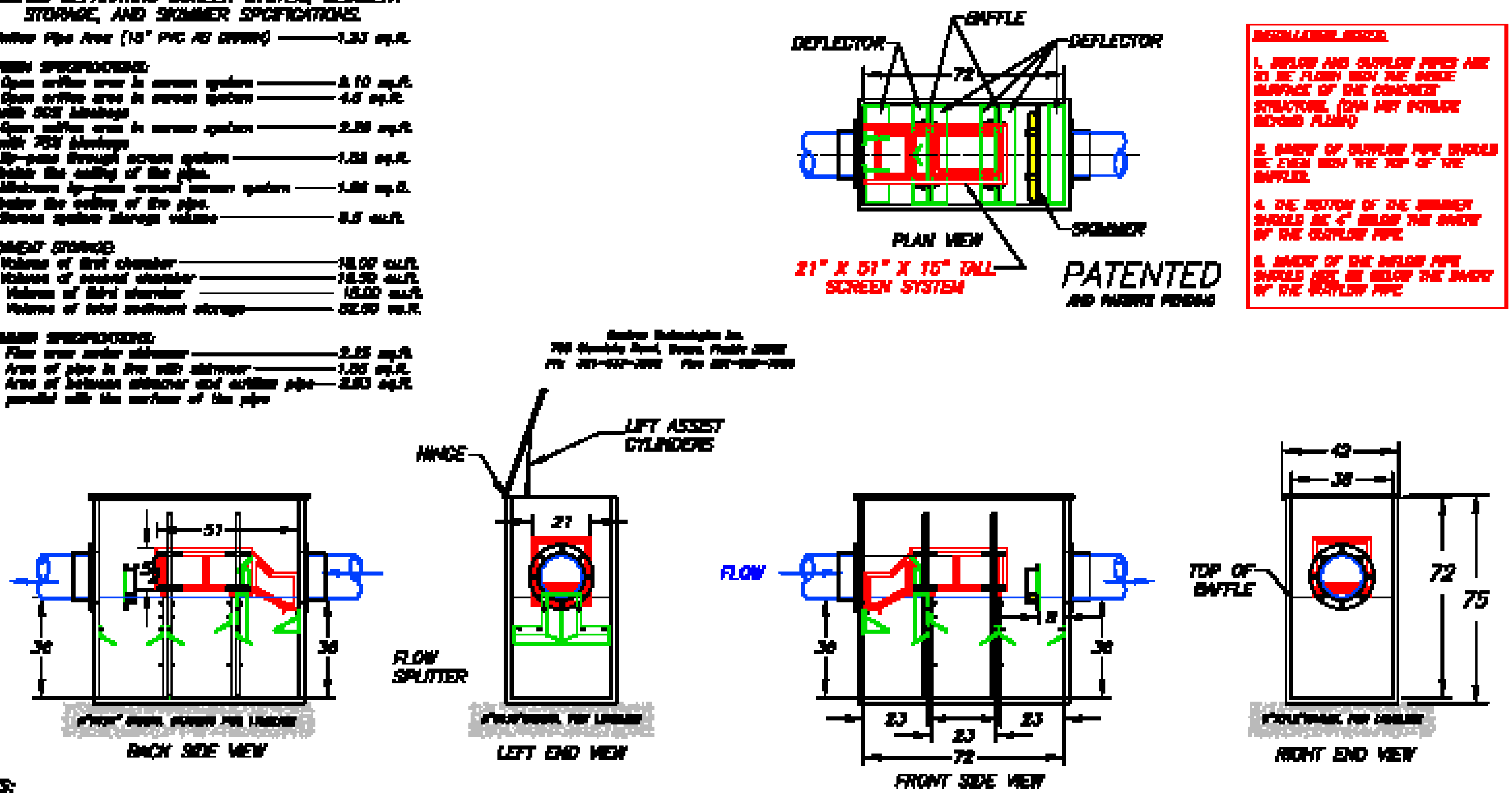
FLOW & BY-PASS SPECIFICATIONS FOR THE BIOMASS SEPARATING SCREEN SYSTEM, SEDIMENT STORAGE, AND SKIMMER SPECIFICATIONS.

1. Inflow Pipe Area (18" PVC AS SHOWN) ——— 1.33 sq.ft.

SCREEN SPECIFICATIONS:
2. Open orifice area in screen system ——— 8.10 sq.ft.
3. Open orifice area in screen system with 50% blockage ——— 4.5 sq.ft.
4. Open orifice area in screen system with 75% blockage ——— 2.50 sq.ft.
5. By-pass through screen system below the ceiling of the pipe. ——— 1.53 sq.ft.
6. Minimum by-pass around screen system below the ceiling of the pipe. ——— 1.88 sq.ft.
7. Screen system storage volume ——— 8.5 cu.ft.

SEDIMENT STORAGE:
8. Volume of first chamber ——— 18.00 cu.ft.
9. Volume of second chamber ——— 18.50 cu.ft.
10. Volume of third chamber ——— 18.00 cu.ft.
11. Volume of total sediment storage ——— 52.50 cu.ft.

SKIMMER SPECIFICATIONS:
12. Flow area under skimmer ——— 2.85 sq.ft.
13. Area of pipe in line with skimmer ——— 1.88 sq.ft.
14. Area of between skimmer and outflow pipe parallel with the surface of the pipe ——— 2.83 sq.ft.



NOTES:

1. VAULT SUPPORTS PEDESTRIAN LOADING.
2. ALL WALLS, TOP, AND BOTTOM ARE LAMINATED FIBERGLASS WITH PVC STRUCTURAL FOAM CORE.
3. INFLOW AND OUTFLOW PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE VAULT. PIPES CAN NOT INTRUDE INTO THE VAULT.
4. TOP OF VAULT TO BE HINGED WITH STAINLESS STEEL PIANO HINGE ALONG ONE LONG SIDE OF THE VAULT.
5. LIFT SUPPORT CYLINDER TO INCORPORATED TO HELP WITH HOLDING UP THE TOP COVER OF THE VAULT.
6. PYLON AND PIVOTING PANEL TO BE INCORPORATED AS SHOWN INTO THE BODY OF THE SCREEN SYSTEM.
7. TURBULENCE DEFLECTORS TO BE INCORPORATED AS SHOW TO REDUCE TURBULENCE INSIDE SETTLING CHAMBERS.
8. RECOMMENDED PIPE SIZE TO RANGE FROM 12" TO 18".

FRONT VIEW

SUNTREE TECHNOLOGIES, INC. 798 CLEARLAKE RD. SUITE #2 COCOA, FL 32922	2-01-31-13-01
NUTRIENT SEPARATING BAFFLE BOX® MODEL NO: NSBB-3-6-72	NSBB-3-6-72
DATE: 05/25/05 SCALE: = 27.6	
DRAFTER: T.H.H. UNITS =INCHES	

APPENDIX B

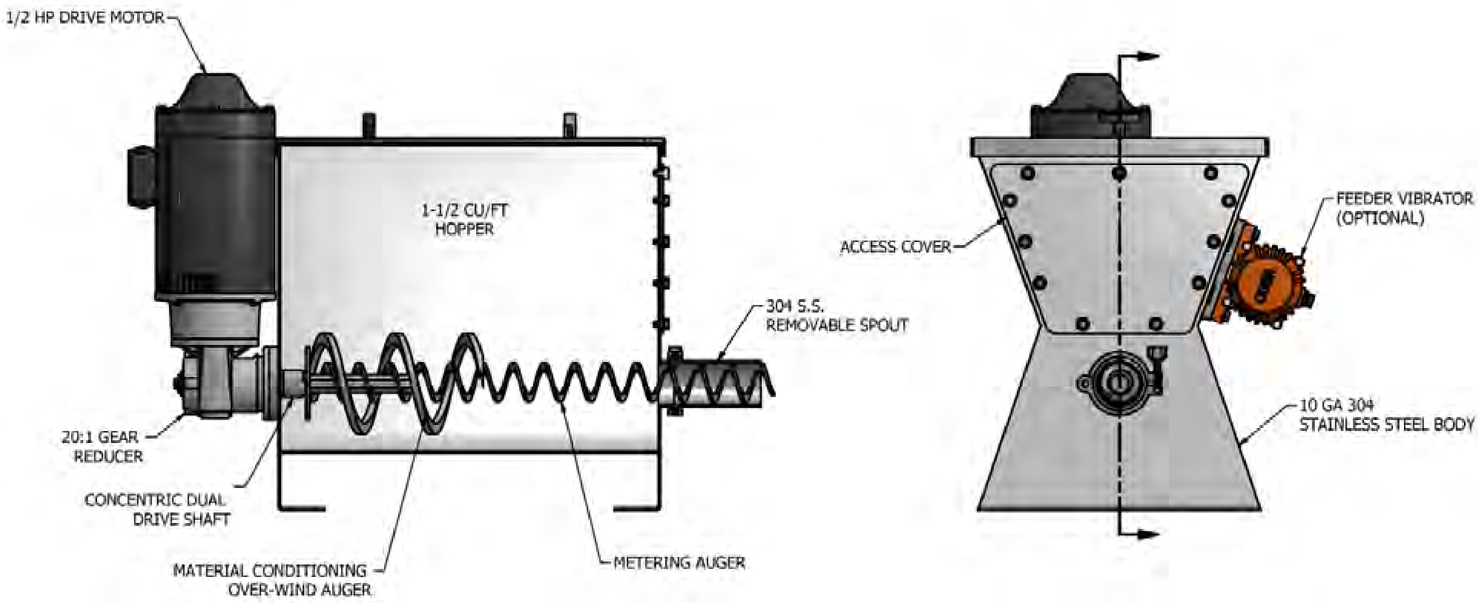
VOLUMETRIC AUGER FEEDER

Model VF-2

Dry Material Metering

- Used to dispense powders, pellets, chips, and flakes.
- Constructed of 304 Stainless Steel (316 S.S. Available)
- Designed with a direct drive
- Small footprint
- Engineered for reliability with the use of many products
- 1-2% accuracy within desired feed rate
- Easily change out auger and discharge

Contact us for more information:
Phone: 855.328.9200
Email: sales@ipm-sys.com



Standard Instrument Features:

- 304 Stainless Steel Construction
- Lid if needed
- Motor
- Gear Box
- Auger and Spout
- 1 ½ cubic foot hopper

Design Specifications:

- Floor Dimensions: 20-3/4 x 15-1/4 inches
- Height: 20 inches
- Hopper Opening: 15-3/16 x 12-3/8 inches
- Feed Rates: 0.02-11.5 Cu. Ft. per hour
- Auger Tooling: 3/8” to 2” Diameter
- Feeder Motor: ½ HP
- Electrical Requirements: 120/240 VAC
- Shipping Weight: 250 lbs

Accessories:

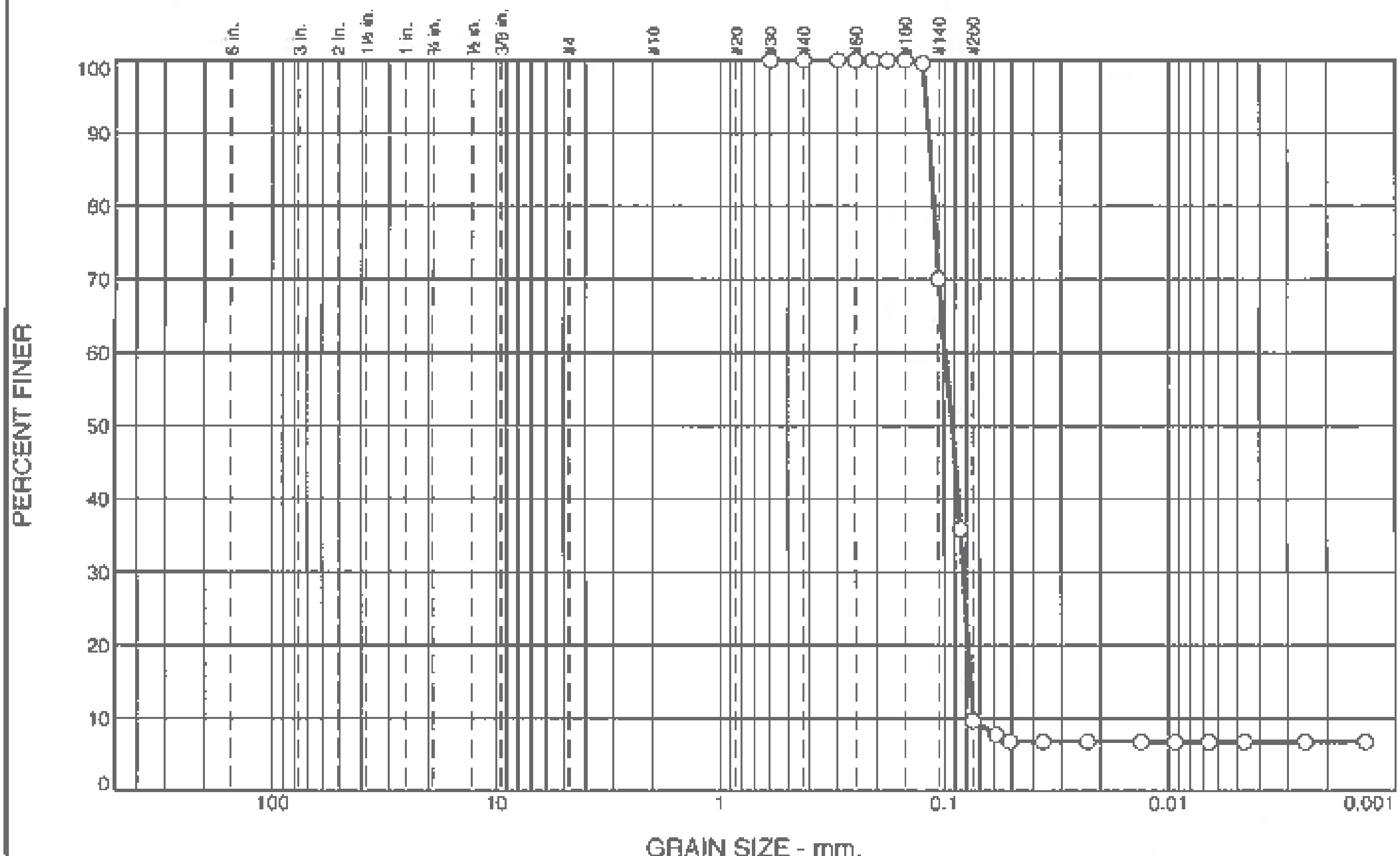
- Solution Tanks (15,35,50 Gallon Sizes)
- Liquid Level Control (on tanks)
- Mixer (on tanks)
- Bag Unloader (304 S.S.)
- Bulk Bag Frame
- Feeder Stand (304 S.S.)
- Drum Inverter
- Dust Collector
- Explosion Proof Motors
- Knife Gate

IPM SYSTEMS

APPENDIX C

TEST SEDIMENT PSD

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	90.3	2.9	6.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#30	100.0		
#40	100.0		
#50	100.0		
#60	100.0		
#70	100.0		
#80	100.0		
#100	100.0		
#120	99.6		
#140	70.1		
#200	9.7		

* (no specification provided)

Material Description

Pale Brown F/S

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1172 D_{85}= 0.1143 D_{60}= 0.0994
D_{50}= 0.0924 D_{30}= 0.0827 D_{15}= 0.0773
D_{10}= 0.0752 C_u= 1.32 C_c= 0.92

Classification

USCS= AASHTO=

Remarks

Location: #7

Date: 1/27/16

BTL Engineering, Inc.

Tampa, FL

Client: Suntree Technologies Inc.
Project: NJ Cat Testing
Project No: 5241-15 **Figure**

Tested By: T.H. **Checked By:** Chris Haley

GRAIN SIZE DISTRIBUTION TEST DATA

1/27/2016

Client: Suntree Technologies Inc.
Project: NJ Cat Testing
Project Number: 5241-15
Location: #7
Material Description: Pale Brown F/S
Date: 1/27/16
Tested by: T.H. **Checked by:** Chris Haley

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 100.00
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
100.00	0.00	#30	0.00	0.00	100.0
		#40	0.00	0.00	100.0
		#50	0.00	0.00	100.0
		#60	0.00	0.00	100.0
		#70	0.00	0.00	100.0
		#80	0.00	0.00	100.0
		#100	0.00	0.00	100.0
		#120	0.40	0.00	99.6
		#140	29.50	0.00	70.1
		#200	60.40	0.00	9.7

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 100.0
Weight of hydrometer sample =100
Hygroscopic moisture correction:
Moist weight and tare = 32.74
Dry weight and tare = 32.73
Tare weight = 6.62
Hygroscopic moisture = 0.0%
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 - 0.164 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
0.25	23.5	35.0	35.8	0.0131	35.0	10.6	0.0850	35.8
0.75	23.5	7.0	7.8	0.0131	7.0	15.1	0.0588	7.8
1.00	23.5	6.0	6.8	0.0131	6.0	15.3	0.0512	6.8
2.00	23.5	6.0	6.8	0.0131	6.0	15.3	0.0362	6.8
5.00	23.5	6.0	6.8	0.0131	6.0	15.3	0.0229	6.8
15.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0132	6.8
30.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0094	6.8
60.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0066	6.8
120.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0047	6.8
420.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0025	6.8
1440.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0013	6.8

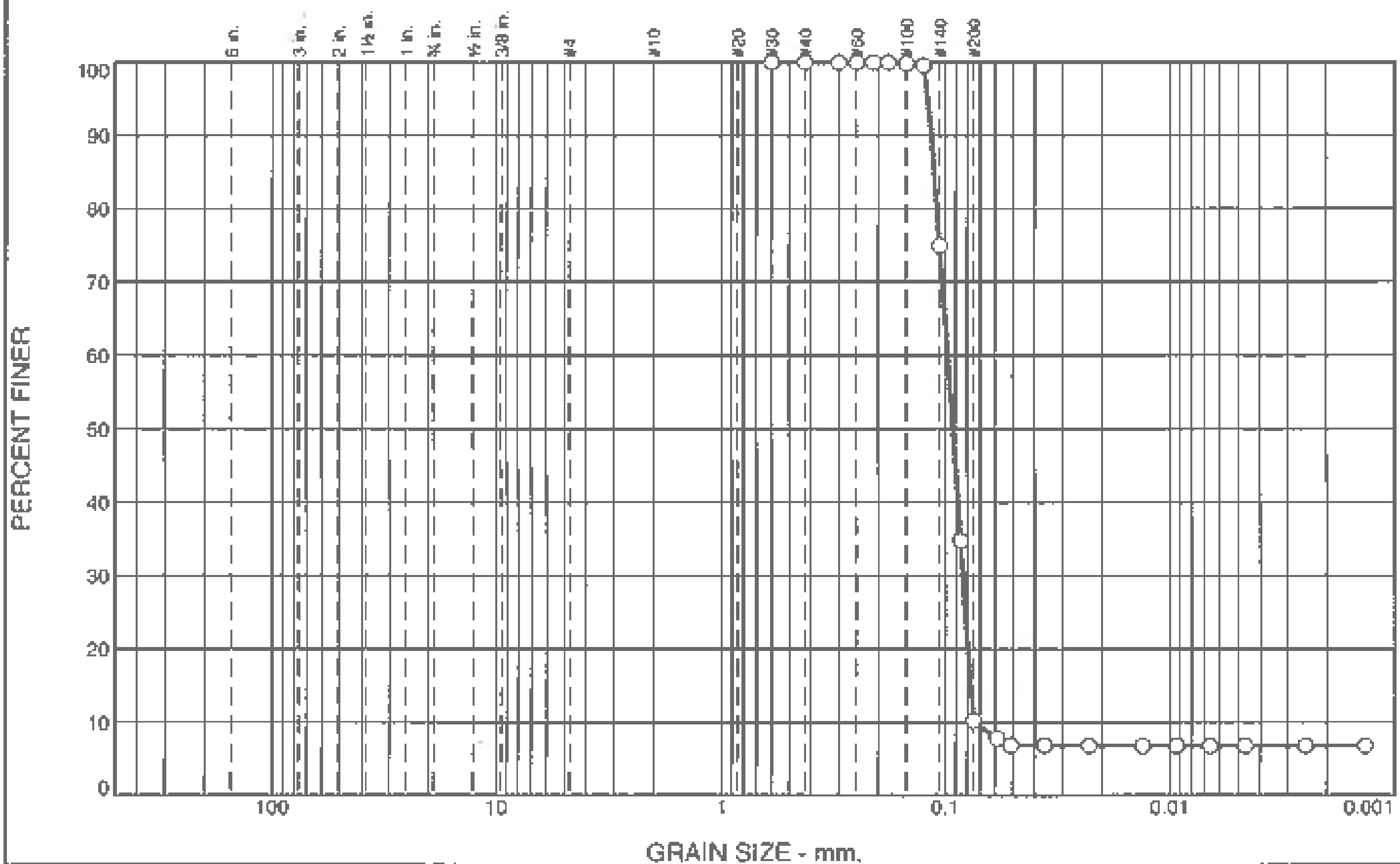
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.0	90.3	90.3	2.9	6.8	9.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0752	0.0773	0.0792	0.0827	0.0868	0.0924	0.0994	0.1115	0.1143	0.1172	0.1207

Fineness Modulus	C_u	C_c
0.00	1.32	0.92

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	89.8	3.4	6.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#30	100.0		
#40	100.0		
#50	100.0		
#60	100.0		
#70	100.0		
#80	100.0		
#100	99.8		
#120	99.5		
#140	74.9		
#200	10.2		

* (no specification provided)

Material Description

Pale Brown F/S

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1155 D_{85}= 0.1121 D_{60}= 0.0976
D_{50}= 0.0925 D_{30}= 0.0837 D_{15}= 0.0775
D_{10}= 0.0738 C_u= 1.32 C_c= 0.97

Classification

USCS= AASHTO=

Remarks

Location: #8

Date: 1/27/16

BTL Engineering, Inc.

Tampa, FL

Client: Suntree Technologies Inc.
Project: NJ Cat Testing

Project No: 5241-15 **Figure**

Tested By: T.H. **Checked By:** Chris Haley

GRAIN SIZE DISTRIBUTION TEST DATA

1/27/2016

Client: Suntree Technologies Inc.
Project: NJ Cat Testing
Project Number: 5241-15
Location: #8
Material Description: Pale Brown F/S
Date: 1/27/16
Tested by: T.H. **Checked by:** Chris Haley

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 100.10
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
100.10	0.00	#30	0.00	0.00	100.0
		#40	0.00	0.00	100.0
		#50	0.00	0.00	100.0
		#60	0.00	0.00	100.0
		#70	0.00	0.00	100.0
		#80	0.00	0.00	100.0
		#100	0.20	0.00	99.8
		#120	0.30	0.00	99.5
		#140	24.60	0.00	74.9
		#200	64.80	0.00	10.2

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 100.0
Weight of hydrometer sample =100.1
Hygroscopic moisture correction:
Moist weight and tare = 53.97
Dry weight and tare = 53.96
Tare weight = 6.60
Hygroscopic moisture = 0.0%
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 - 0.164 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
0.25	23.5	34.0	34.8	0.0131	34.0	10.7	0.0856	34.8
0.75	23.5	7.0	7.8	0.0131	7.0	15.1	0.0588	7.8
1.00	23.5	6.0	6.8	0.0131	6.0	15.3	0.0512	6.8
2.00	23.5	6.0	6.8	0.0131	6.0	15.3	0.0362	6.8
5.00	23.5	6.0	6.8	0.0131	6.0	15.3	0.0229	6.8
15.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0132	6.8
30.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0094	6.8
60.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0066	6.8
120.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0047	6.8
420.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0025	6.8
1440.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0013	6.8

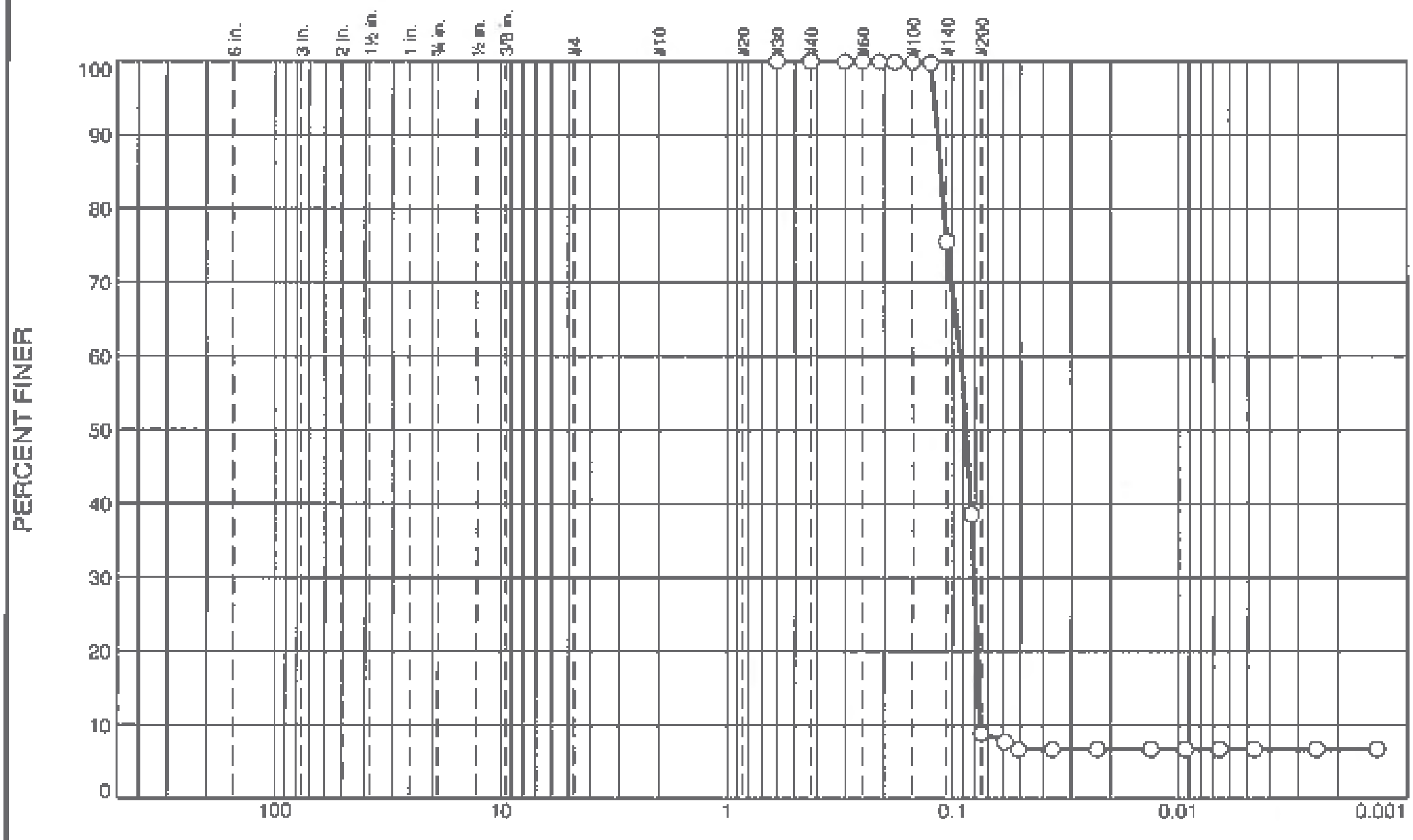
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.0	89.8	89.8	3.4	6.8	10.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0738	0.0775	0.0797	0.0837	0.0878	0.0925	0.0976	0.1090	0.1121	0.1155	0.1196

Fineness Modulus	C_u	C_c
0.00	1.32	0.97

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	91.1	2.1	6.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#30	100.0		
#40	100.0		
#50	100.0		
#60	100.0		
#70	100.0		
#80	99.9		
#100	99.9		
#120	99.8		
#140	75.6		
#200	8.9		

* (no specification provided)

Material Description

Pale Brown F/S

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1159 D_{85}= 0.1124 D_{60}= 0.0929
D_{50}= 0.0872 D_{30}= 0.0807 D_{15}= 0.0769
D_{10}= 0.0754 C_u= 1.23 C_c= 0.93

Classification

USCS= AASHTO=

Remarks

Location: #9

Date: 1/27/16

BTL Engineering, Inc.

Tampa, FL

Client: Suntree Technologies Inc.
Project: NJ Cat Testing
Project No: 5241-15 **Figure**

Tested By: T.H. **Checked By:** Chris Haley

GRAIN SIZE DISTRIBUTION TEST DATA

1/27/2016

Client: Suntree Technologies Inc.
Project: NJ Cat Testing
Project Number: 5241-15
Location: #9
Material Description: Pale Brown F/S
Date: 1/27/16
Tested by: T.H. **Checked by:** Chris Haley

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 100.40
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
100.40	0.00	#30	0.00	0.00	100.0
		#40	0.00	0.00	100.0
		#50	0.00	0.00	100.0
		#60	0.00	0.00	100.0
		#70	0.00	0.00	100.0
		#80	0.10	0.00	99.9
		#100	0.00	0.00	99.9
		#120	0.10	0.00	99.8
		#140	24.30	0.00	75.6
		#200	67.00	0.00	8.9

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 100.0
Weight of hydrometer sample =100.4
Hygroscopic moisture correction:
Moist weight and tare = 40.00
Dry weight and tare = 39.98
Tare weight = 6.58
Hygroscopic moisture = 0.1%
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 - 0.164 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
0.25	23.4	38.0	38.8	0.0131	38.0	10.1	0.0831	38.6
0.75	23.4	7.0	7.8	0.0131	7.0	15.1	0.0588	7.7
1.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0512	6.8
2.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0362	6.8
5.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0229	6.8
15.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0132	6.8
30.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0094	6.8
60.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0066	6.8
120.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0047	6.8
420.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0025	6.8
1440.00	23.4	6.0	6.8	0.0131	6.0	15.3	0.0013	6.8

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.0	91.1	91.1	2.1	6.8	8.9

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0754	0.0769	0.0782	0.0807	0.0835	0.0872	0.0929	0.1091	0.1124	0.1159	0.1198

Fineness Modulus	C_u	C_c
0.00	1.23	0.93