SOP Technologies
Our Mission is to Stop Ocean Pollution
www.soptechint.com
251 Valencia Ave, #143501 Coral Gables, FL 33114
305-792-8778 info@soptechint.com

June 2, 2025

Mr. Nicholas Wong
California State Water Resources Control Board
Division of Water Quality
PO Box 100
Sacramento, CA 95812-0100

Re: Trash Treatment Control Device Application for SOP Technologies Stormwater Catch Basin Treatment System

Dear Mr. Wong,

The mission of SOP Technologies is to Stop Ocean Pollution, and with this aim in mind, we are pleased to submit this application for the SOP Technologies Stormwater Catch Basin Treatment System for use as a Trash Treatment Control Device throughout the state of California. This application organizes information and provides details in accordance with the California SWRCB document titled, *Application Requirements for Trash Full Capture System Certification* (Updated September 2024). In accordance with the requirements, our application includes the following sections:

1. Cover Letter
2. Table of Contents
3. Physical Description
4. Installation Guidance
5. Operation and Maintenance Information
6. Vector Control Accessibility
7. Reliability Information
8. Field and Laboratory Testing Information and Analysis

Thank you for considering this application, and please feel free to contact us as needed.

Sincerely,
Emilio Lopez, CEO
SOP Technologies

1. Cover Letter

1.A. The System name and general description.

The SOP Technologies Stormwater Catch Basin Treatment System is an engineered, custom manufactured treatment device to capture trash and debris that has entered stormwater catch basins. The system uses the SOP Technologies patented upward flow screens inside a catch basin for an initial water filtration process for larger items of debris, followed by a second set of screens to trap particles of 5.0 mm or more before water exits the device.

1.B. The name of the applicant and contact information.

The SOP Technologies primary contact is:

Emilio Lopez
Chief Executive Officer
251 Valencia Ave, #143501
Coral Gables, FL 33114
305-792-8778
emilio@soptechint.com

1.C. The applicant's webpage address.

The SOP Technologies webpage address is https://soptechint.com

1.D. The location of the System's manufacturing site(s).

SOP Technologies stormwater filters are designed and manufactured at our facility in Miami Beach, FL. For raw materials and components obtained from third parties, we work with suppliers based in the United States.

SOP Technologies
1661 Pennsylvania Avenue
Ground Level
Miami Beach, FL 33139

1.E. A brief summary of any field or laboratory testing results that demonstrates the System functions as described within the application.

SOP Technologies patented upward flow stormwater filters have been tested in various configurations in the field in Florida, Maryland and Tennessee. More comprehensive field tests to quantify the sizes and types of debris captured were performed in Florida. These demonstrated the screen's ability to capture items as small as cigarette butts, straws, and leaves. Laboratory analysis includes an open channel flume empirical analysis to quantify the gallons per minute (also translated to cubic feet per second - CFS) the SOP Technologies screens allow for water flow.

Since pollution-reduction and TMDL requirements in the state of California require screening / filtration to ensure capture of particulate matter 5.0 mm and larger, the SOP Technologies Stormwater Catch Basin Treatment System also includes a second set of screens made with perforated sheet metal with round holes that are 3/16" in diameter (4.8 mm). The type of perforated sheet metal is commonly used with other screens approved by the California State Water Resources Control Board, and this application includes specifications for such screens.

Appendix E provides a detailed summary of field analysis conducted in the Village of Key Biscayne, FL of SOP Technologies stormwater filters with upward flow, Appendix B is a waterflow analysis to calculate the gallons per minute (and cubic feet per second) for SOP Technologies filters, and Appendix C is a field analysis conducted in the City of Aventura, FL to quantify and classify debris captured by SOP Technologies patented stormwater filters.

1.F. A description or list of locations, if any, where the system has been installed.

SOP Technologies patented stormwater filters are actively being used at several municipalities by Public Works departments for the purposes of trapping trash. The most common implementations of the screens are as curb filters and under-grate basket filters / catch basin inserts, and as a catch basin filtration system. The configuration in this application for the SOP Technologies Stormwater Catch Basin Treatment System for use in California includes the addition of a second set of screens that use 4.8 mm round holes commonly used with screens approved by the California State Water Resources Control Board.

Contacts for Municipalities using SOP Technologies Patented Stormwater Filters:

City of Aventura, FL
Public Works and Transportation Department
Anthony Mihalko, Stormwater Coordinator
Phone: 305-466-8970
https://cityofaventura.com

City of Laurel, MD
Public Works Department
Thomas Helms, Assistant Public Works Director
Phone: 301-725-0088, ext. 3201
https://www.cityoflaurel.org

City of Hallandale Beach, FL
Public Works Department
Charles Casimir, Assistant Director of Public Works / Operations
Phone: 954-457-1669
https://hallandalebeachfl.gov

1.G. Certification Statement.

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.

Emilio Lopez, Chief Executive Officer (CEO)

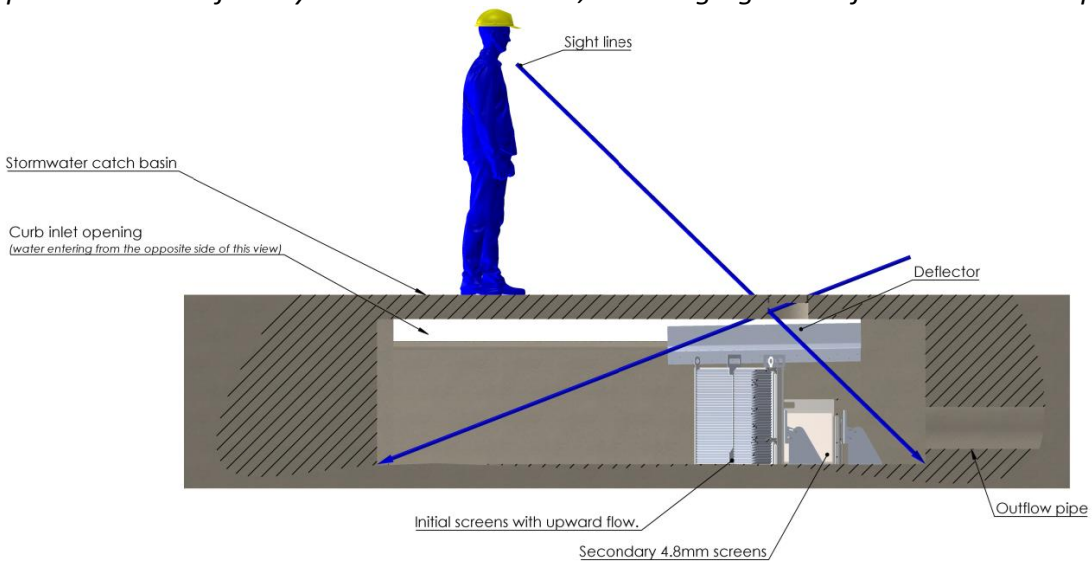
June 2, 2025

2. Table of Contents

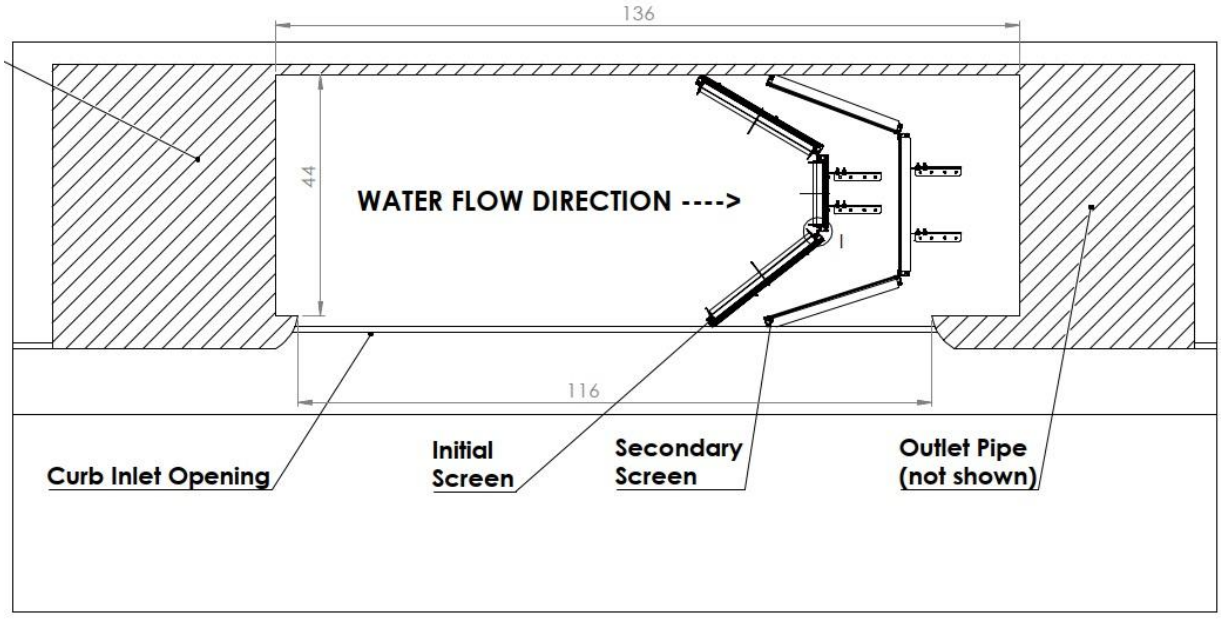
3. Physical Description

The SOP Technologies Stormwater Catch Basin Treatment System is a multi-phase filtration system with filtration screens located within the stormwater catch basin, to capture trash. The illustration below shows the System and the two sets of screens. The Initial Screens use the SOP Technologies patented upward flow stormwater filtration system (8.38 mm openings), and the Secondary Screens use perforated sheet metal with staggered holes measuring 3/16" (4.8 mm) in diameter. Appendix A includes shop drawings with additional details and views of the System.

Sample Illustration of the System in a catch basin, including sight lines for vector control personnel



Top view sample illustration looking into a stormwater catch basin



3.A. Trash Capture

The System ensures that all trash particles greater than or equal to 5mm are captured by constructing a set of Secondary Screens that use a filter / screen made of uniformly spaced round holes measuring 4.8mm. This ensures that no trash particles larger than 4.8mm can pass through the filter. Below, and in Appendix A, water flow calculations are provided for several models of SOP Technologies Secondary Screens.

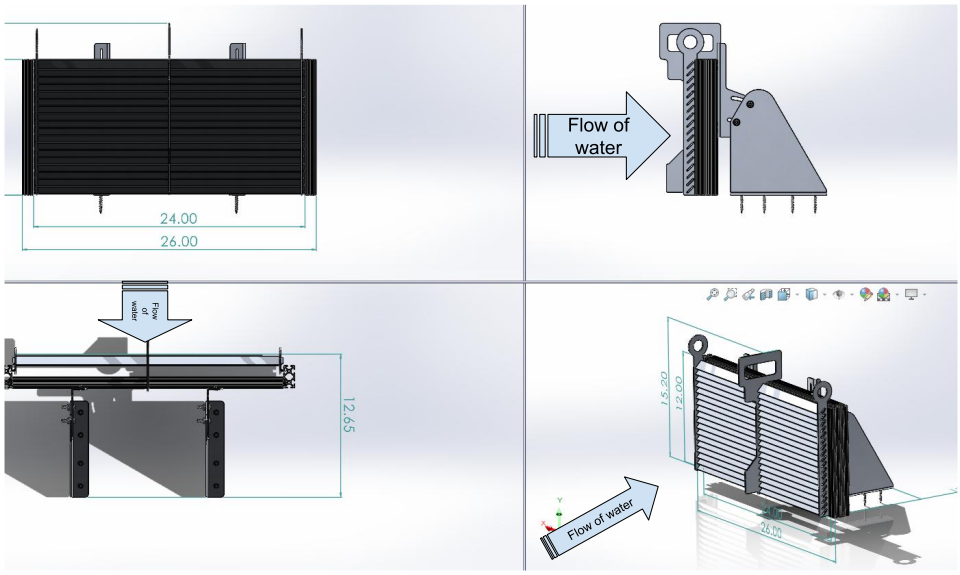
3.B. Peak Flows/Trash Capture Volumes

Flow rates and trash capture volumes are determined by the dimension of the stormwater catch basin and the filtration area that is available and used within the catch basin structure. Appendix A shows calculations for determining the flow of water through the Initial Screens with upward flow and Secondary Screens with 4.8 mm holes (table also shown in the Hydraulic Capacity section below). Also, below and in Appendix A, are examples of three sample catch basin sizes and the sizes of screens used.

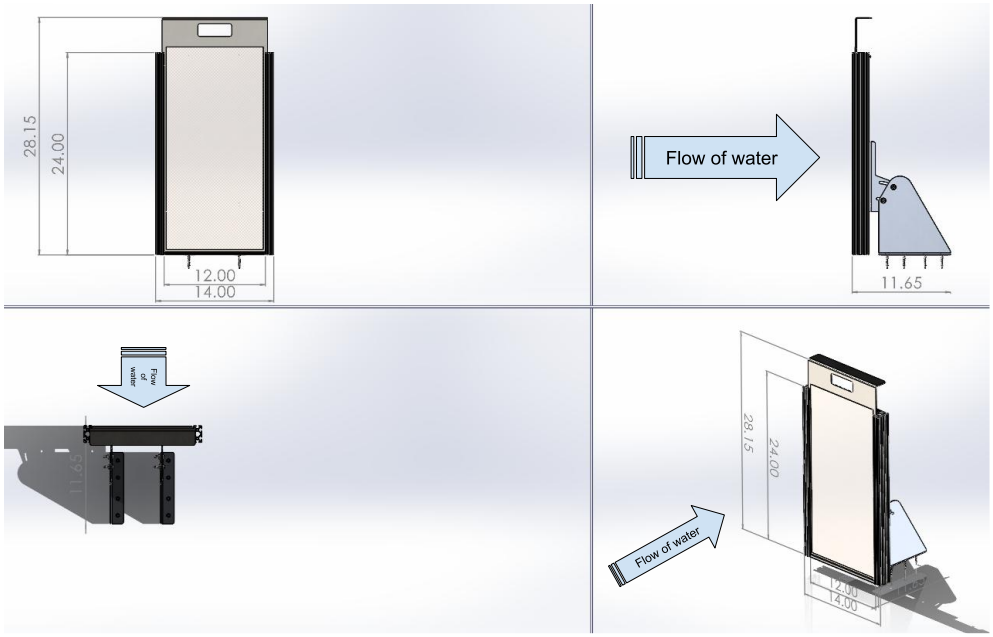
3.C. Hydraulic Capacity

Hydraulic capacity for the Initial Screen with the SOP Technologies patented upward flow (8.38 mm openings) are shown in Appendix A. For the Secondary Screen with 4.8 mm openings, formulas, example calculations, and a table with water flow rates are included below for various areas of screening. Appendix A also includes similar details.

Sample illustrations of an Initial (8.38mm) screen within the screen frame

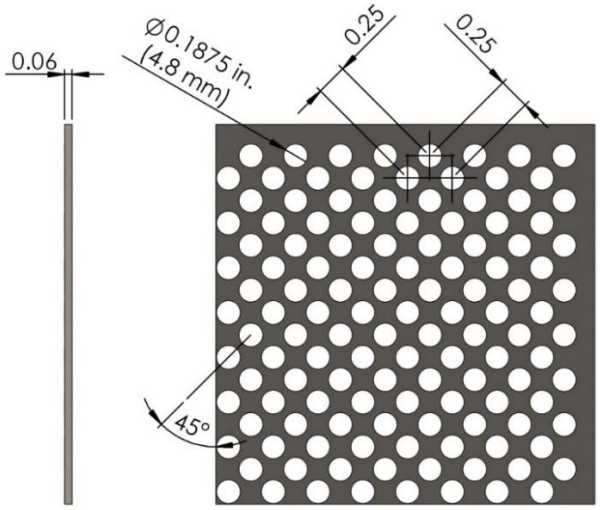


Sample illustrations of a Secondary (4.8mm) screen within the screen frame



Details for the Secondary Screen with 4.8mm Holes

- Dimensions are in inches, and the hole diameter callout is also shown in millimeters.
- The center-to-center distance between holes is 0.25" (staggered at 45-degree angles).
- Material is 304 Stainless Steel but may be made of Aluminum if needed.
- There are 72 holes in a 2"x2" sample of the Secondary screen (4 square inches). This equals 18 holes per square inch of screening area.



Water Flow Calculations for the Secondary Screen with 4.8 mm Openings

To determine the flow through a 4.8mm opening we first determine the pressure difference of water before and after it flows through the orifice. It is assumed that once the water exits the perforated opening it has a pressure equal to sea level (101.325 kPa). Before exiting the orifice, it is assumed the water has a pressure equal to a 6-inch height water level (an assumed water level in front of the screen within a catch basin as water enters the basin (102.82 kPa). Using the formula shown below, we can convert that pressure difference into a flow rate.

Equation(s)

$$p_1 - p_2 < FL^2 \cdot (p_1 - FF \cdot P) \rightarrow$$
$$Q_w = 0.0865 \cdot C \cdot (\frac{d_o}{4.654})^2 \cdot \sqrt{\frac{p_1 - p_2}{SG}}$$
$$p_1 - p_2 \geq FL^2 \cdot (p_1 - FF \cdot P) \rightarrow$$
$$Q_w = 0.0865 \cdot C \cdot (\frac{d_o}{4.654})^2 \cdot FL \cdot \sqrt{\frac{p_1 - FF \cdot P}{SG}}$$

p1 : Primary Pressure (kPa abs)
p2 : Secondary Pressure (kPa abs)
do : Diameter of Orifice (mm)
C : Discharge Coefficient
Qw : Water Flow Rate (m³/h)
FL : Pressure recovery factor (=0.9)
FF : Critical pressure ratio factor
P : Absolute vapor pressure of the water at inlet temperature (kPa abs)
SG : Specific Gravity

Formula Inputs
- p1 Primary Pressure: 102.82 kPa abs
- p2 Secondary Pressure: 101.325 kPa abs
- do Diameter of Orifice: 4.8 mm
- C Discharge Coefficient: 0.61
- P Water Temperature: 0 C (absolute vapor pressure of 0.6113 kPa)
- SG Specific Gravity: 1

Plugging these values into the formula yields a water flow rate of 0.3021566 GPM or 0.00067321 CFS per hole.

Calculations using the Formula Inputs above:

$$Qw = 0.0865 \times C \times \left(\frac{d0}{4.654}\right)^2 \times \sqrt{\frac{(p1 - p2)}{SG}}$$

$$Qw = 0.0865 \times 0.61 \times \left(\frac{4.8}{4.654}\right)^2 \times \sqrt{\frac{(102.82 - 101.325)}{1}}$$

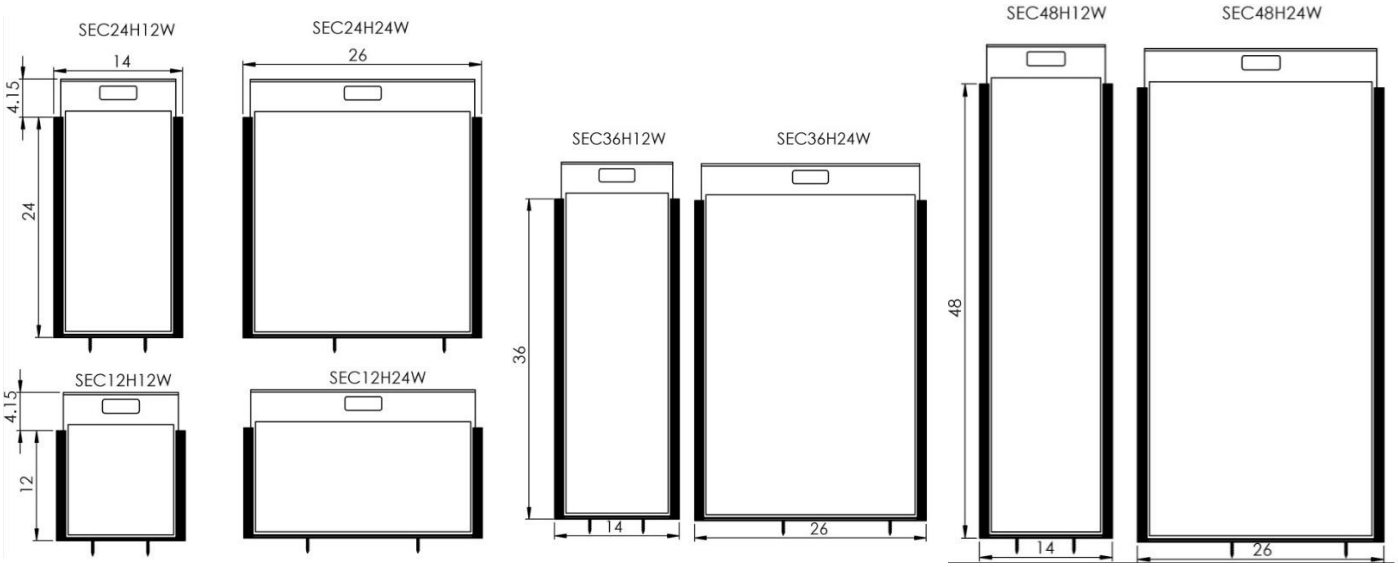
$$Qw = 0.0686272\ m^3/h\ \ (converting\ to\ GPM\ multiplying\ by\ 4.40287\ = 0.3021566\ GPM\ per\ hole)$$

Convert GPM to CFS by dividing 0.3021566 GPM by 448.831 = 0.00067321 CFS per hole

Table 1: Water Flow Rates Table for the Secondary (4.8mm) Screen

Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC12H12W	Secondary: 4.8mm Openings	11.5	10.5	120.75	1.464	0.732
SEC12H24W	Secondary: 4.8mm Openings	11.5	22.5	258.75	3.136	1.568
SEC24H12W	Secondary: 4.8mm Openings	23.5	10.5	246.75	2.990	1.495
SEC24H24W	Secondary: 4.8mm Openings	23.5	22.5	528.75	6.408	3.204
SEC36H12W	Secondary: 4.8mm Openings	35.5	10.5	372.75	4.517	2.259
SEC36H24W	Secondary: 4.8mm Openings	35.5	22.5	798.75	9.679	4.840
SEC48H12W	Secondary: 4.8mm Openings	47.5	10.5	498.75	6.044	3.022
SEC48H24W	Secondary: 4.8mm Openings	47.5	22.5	1,068.75	12.951	6.476

Overall Dimensions for the 4.8mm Screen Models Listed Above *(images not to scale)*



3.D. Comparison Table

The table below includes hydraulic capacity calculations for various configurations of Initial Screens (larger 8.38mm openings) and Secondary Screens (4.8 mm openings). Since capture volumes are based on the sizes of the catch basins and field conditions, provided are examples of some catch basins and calculations for reference purposes.

Comparison table of water flows for Initial and Secondary screens

Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI12H12W	Initial: SOP Tech Upward Flow	11.84	11.28	133.56	1.570	0.785
INI12H24W	Initial: SOP Tech Upward Flow	11.84	23.28	275.64	3.240	1.620
INI24H12W	Initial: SOP Tech Upward Flow	23.84	11.28	268.92	3.160	1.580
INI24H24W	Initial: SOP Tech Upward Flow	23.84	23.28	555	6.520	3.260
INI36H12W	Initial: SOP Tech Upward Flow	35.84	11.28	404.28	4.750	2.375
INI36H24W	Initial: SOP Tech Upward Flow	35.84	23.28	834.36	9.810	4.905
INI48H12W	Initial: SOP Tech Upward Flow	47.84	11.28	539.64	6.340	3.170
INI48H24W	Initial: SOP Tech Upward Flow	47.84	23.28	1113.72	13.090	6.545
SEC12H12W	Secondary: 4.8mm Openings	11.5	10.5	120.75	1.464	0.732
SEC12H24W	Secondary: 4.8mm Openings	11.5	22.5	258.75	3.136	1.568
SEC24H12W	Secondary: 4.8mm Openings	23.5	10.5	246.75	2.990	1.495
SEC24H24W	Secondary: 4.8mm Openings	23.5	22.5	528.75	6.408	3.204
SEC36H12W	Secondary: 4.8mm Openings	35.5	10.5	372.75	4.517	2.259
SEC36H24W	Secondary: 4.8mm Openings	35.5	22.5	798.75	9.679	4.840
SEC48H12W	Secondary: 4.8mm Openings	47.5	10.5	498.75	6.044	3.022
SEC48H24W	Secondary: 4.8mm Openings	47.5	22.5	1,068.75	12.951	6.476

Sample System Implementations for three sizes of Catch Basins

Summary:

- The three sample System implementations below differ mainly in the width and height of the catch basin structure.
- The Narrow Catch Basin example with a 32" wide section for screening uses screens with less width (12" wide screen models).
- The Medium Catch Basin example uses a combination of screens that are 12" wide and 24" wide and also screens varying heights.
- The Large Catch Basin example uses 24" wide screens that are taller.
- Trash capture capacity calculations are included with each example.
- If a catch basin is too small to allow for 2 sets of screens (i.e. Initial screens and Secondary screens), the Initial Upward Flow screens with 8.38 mm openings can be omitted. Secondary screens with 4.8mm openings must always be used with this System. Since capture capacity calculations are based on the 4.8mm screens, the capture capacity formulas are the same if the 8.38mm screens are omitted.

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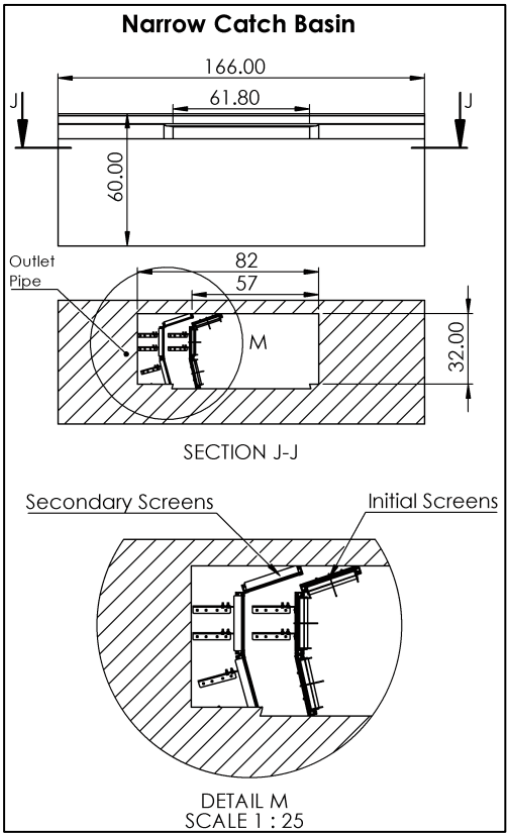
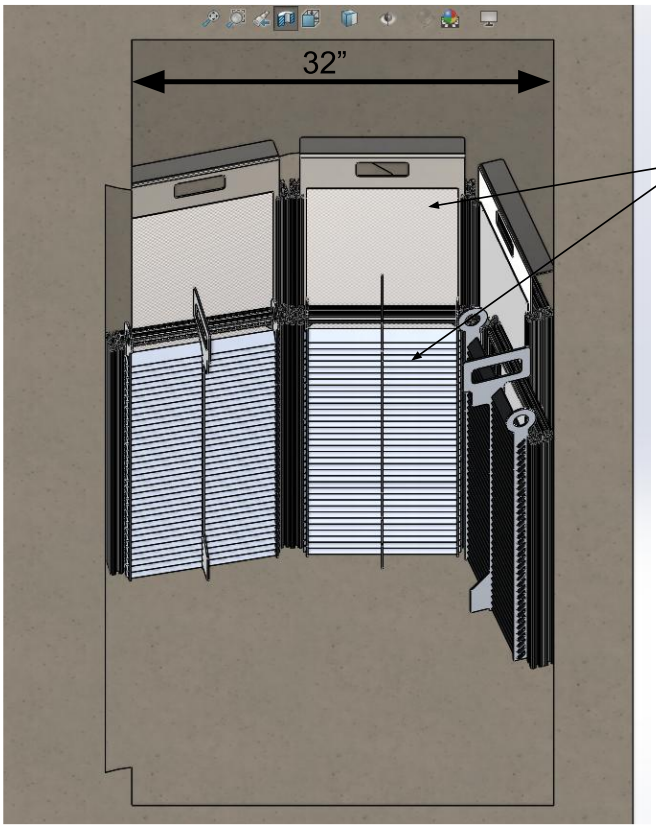
Narrow Catch Basin Sample Implementation





Since the catch basin is narrow with a width of 32”, the screens used here are of a 12” width.

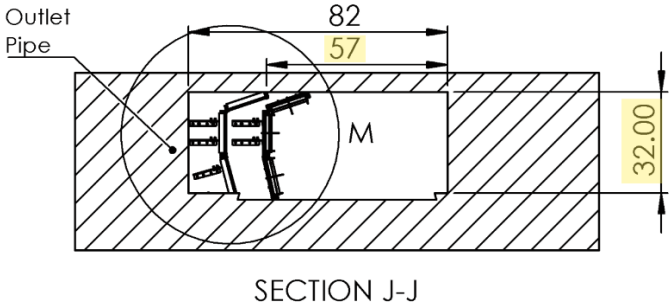
Examples shown here are the following screen models:
- INI24H12W (3 units)
- SEC24H12W (3 units)

Flow Rates for this Sample Implementation

Screen Model Number (SKU)	Type of Screen	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)	Quantity of Screens of this Model	Ext. Flow Rates Without Obstruction (CFS)	Ext. Flow Rate when 50% Blocked (CFS)
INI24H12W	Initial: SOP Tech Upward Flow	3.160	1.580	3	9.48	4.74
				Initial Screens Total Flow Rate	**9.48**	**4.74**
SEC24H12W	Secondary: 4.8mm Openings	2.990	1.495	3	8.97	4.49
				Secondary Screens Total Flow Rate	**8.97**	**4.49**

Trash Capture Capacity Calculation for this Sample Implementation

Formula: Secondary Screen Height x Basin Width x Distance from the 4.8mm screens to the wall opposite the Outlet Pipe



*Note: Screens SEC**24H**12W are 24” in Height*

Formula implementation:

$24" \times 32" \times 57" = 43{,}776 in^3$

$43{,}776\ in^3 \div 1{,}728 =$

$\mathbf{25.3\ ft^3\ trash\ capture\ capacity}$

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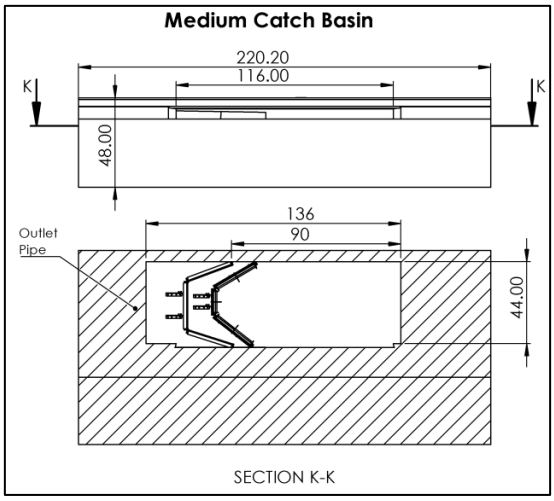
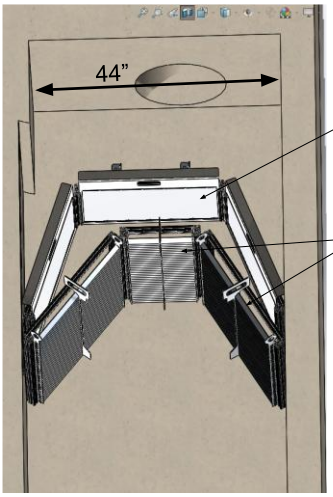
Medium Catch Basin Sample Implementation

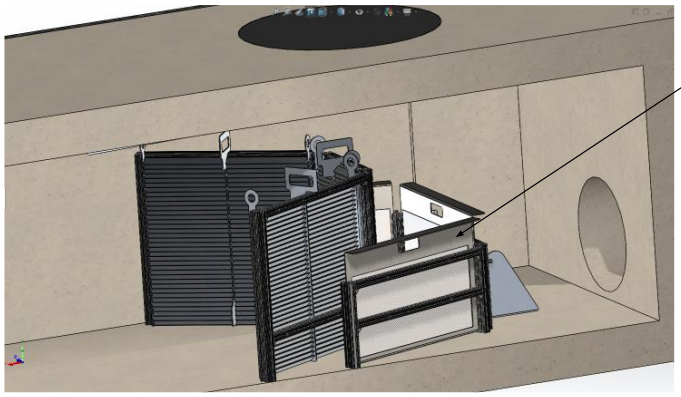




The 44” width allows for wider screens to be used.

Secondary (4.8mm) screens: All 3 screens are 24” wide.

Initial (SOP Tech upward flow) screens:
2 screens are 24” wide and the middle screen is 12” wide.



This example uses lower height secondary (4.8mm) screens to allow easier viewing and access to the outlet pipe.

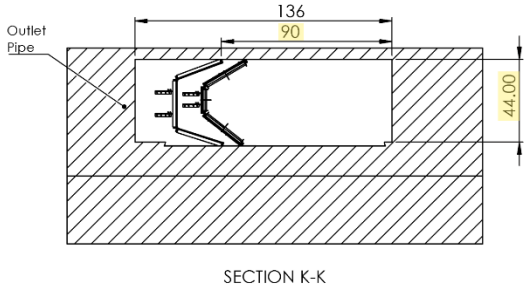
Another option is to use the mechanism allowing screens to be moved down (described in section 3.F. Optional Components).

Flow Rates for this Sample Implementation

Screen Model Number (SKU)	Type of Screen	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)	Quantity of Screens of this Model	Ext. Flow Rates Without Obstruction (CFS)	Ext. Flow Rate when 50% Blocked (CFS)
INI24H12W	Initial: SOP Tech Upward Flow	3.160	1.580	1	3.16	1.58
INI24H24W	Initial: SOP Tech Upward Flow	6.520	3.260	2	13.04	6.52
				Initial Screens Total Flow Rate	**16.20**	**8.10**
SEC12H24W	Secondary: 4.8mm Openings	3.136	1.568	3	9.41	4.70
				Secondary Screens Total Flow Rate	**9.41**	**4.70**

Trash Capture Capacity Calculation for this Sample Implementation

Formula: Secondary Screen Height x Basin Width x Distance from the 4.8mm screens to the wall opposite the Outlet Pipe



*Note: Screens SEC**12H**24W are 12” in Height*

Formula implementation:

$$12\text{" x } 44\text{" x } 90\text{"} = 47{,}520 in^3$$

$$47{,}520\ in^3 \div 1{,}728 =$$

$$\mathbf{27.5\ ft^3\ trash\ capture\ capacity}$$

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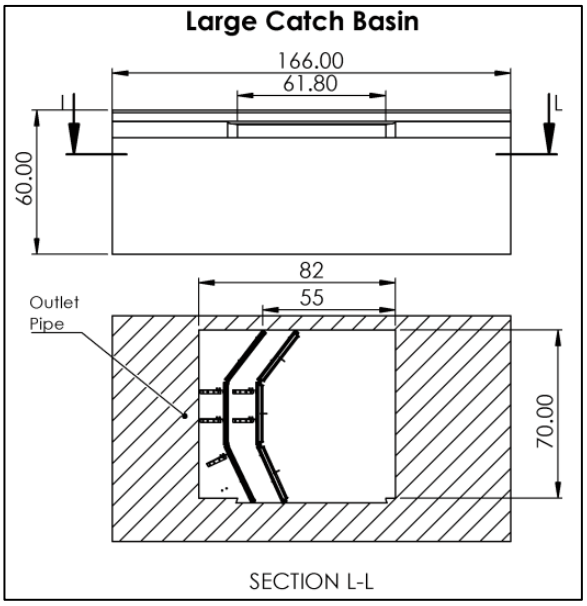
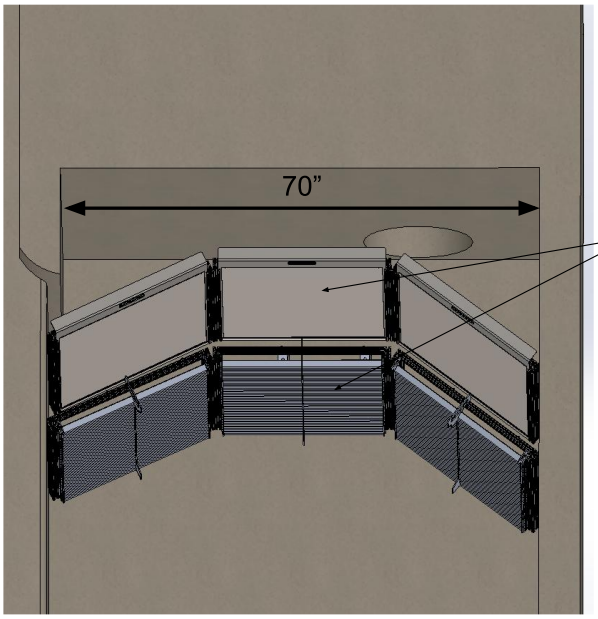
Large Catch Basin Sample Implementation



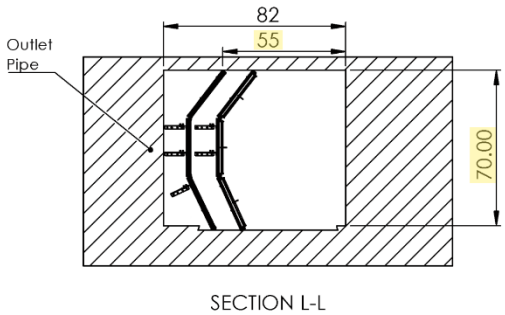


Flow Rates for this Sample Implementation

Screen Model Number (SKU)	Type of Screen	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)	Quantity of Screens of this Model	Ext. Flow Rates Without Obstruction (CFS)	Ext. Flow Rate when 50% Blocked (CFS)
INI36H24W	Initial: SOP Tech Upward Flow	9.810	4.905	3	29.43	14.72
				Initial Screens Total Flow Rate	**29.43**	**14.72**
SEC36H24W	Secondary: 4.8mm Openings	9.679	4.840	3	29.04	14.52
				Secondary Screens Total Flow Rate	**29.04**	**14.52**

Trash Capture Capacity Calculation for this Sample Implementation

Formula: Secondary Screen Height x Basin Width x Distance from the 4.8mm screens to the wall opposite the outflow pipe



*Note: Screens SEC**36H**24W are 36” in Height*

Formula implementation:

$36" \times 70" \times 55" = 138{,}600 in^3$

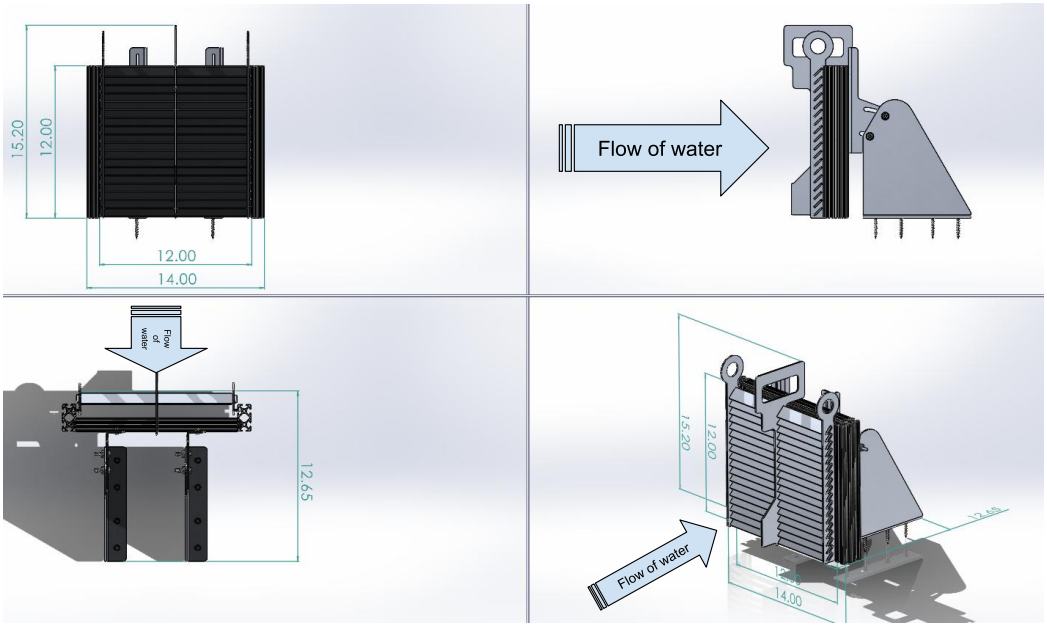
$138{,}600\ in^3 \div 1{,}728 =$

$\mathbf{80.2\ ft^3\ trash\ capture\ capacity}$

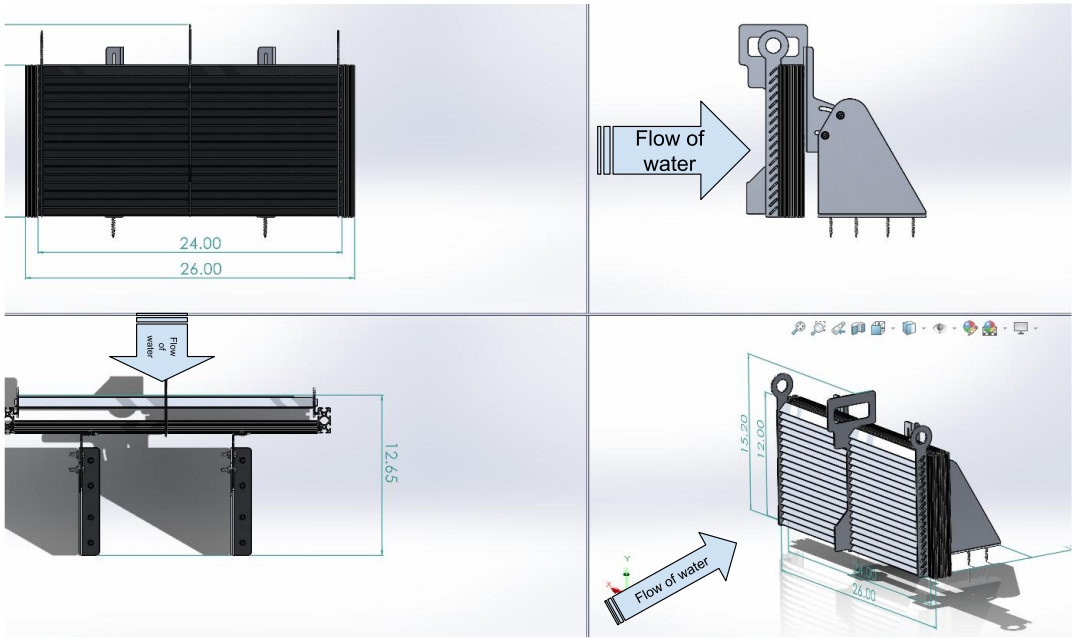
3.E. Design Drawings

The pages that follow show design drawings for all 16 standard sizes and configurations of screens. Since sizing of the screens is based on field conditions, the examples provided do not limit the application of this System.

Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI12H12W	Initial: SOP Tech Upward Flow	11.84	11.28	133.56	1.570	0.785



Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI12H24W	Initial: SOP Tech Upward Flow	11.84	23.28	275.64	3.240	1.620



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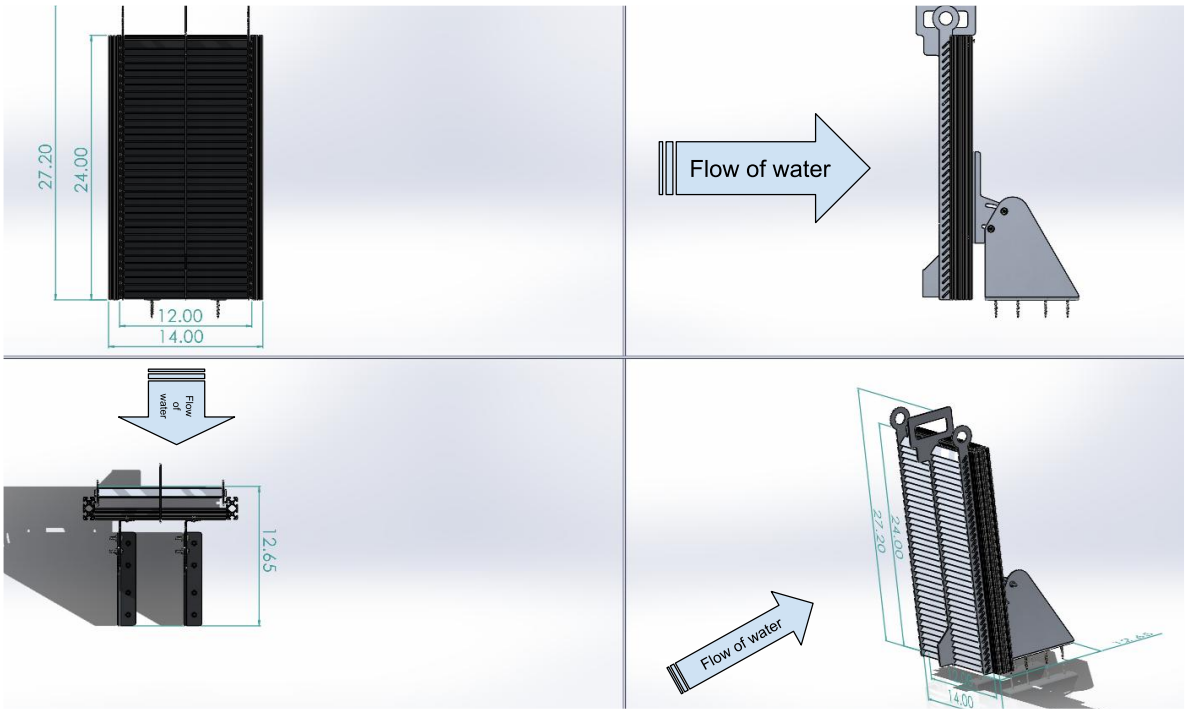
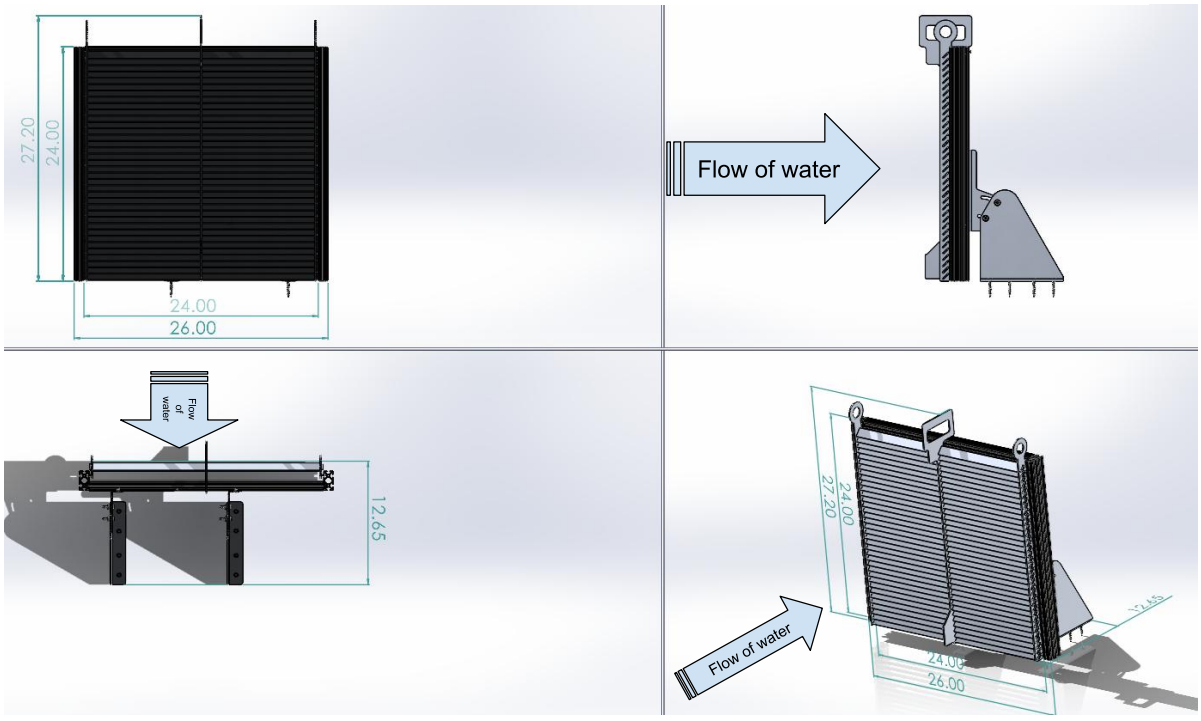
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI24H12W	Initial: SOP Tech Upward Flow	23.84	11.28	268.92	3.160	1.580



Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI24H24W	Initial: SOP Tech Upward Flow	23.84	23.28	555	6.520	3.260



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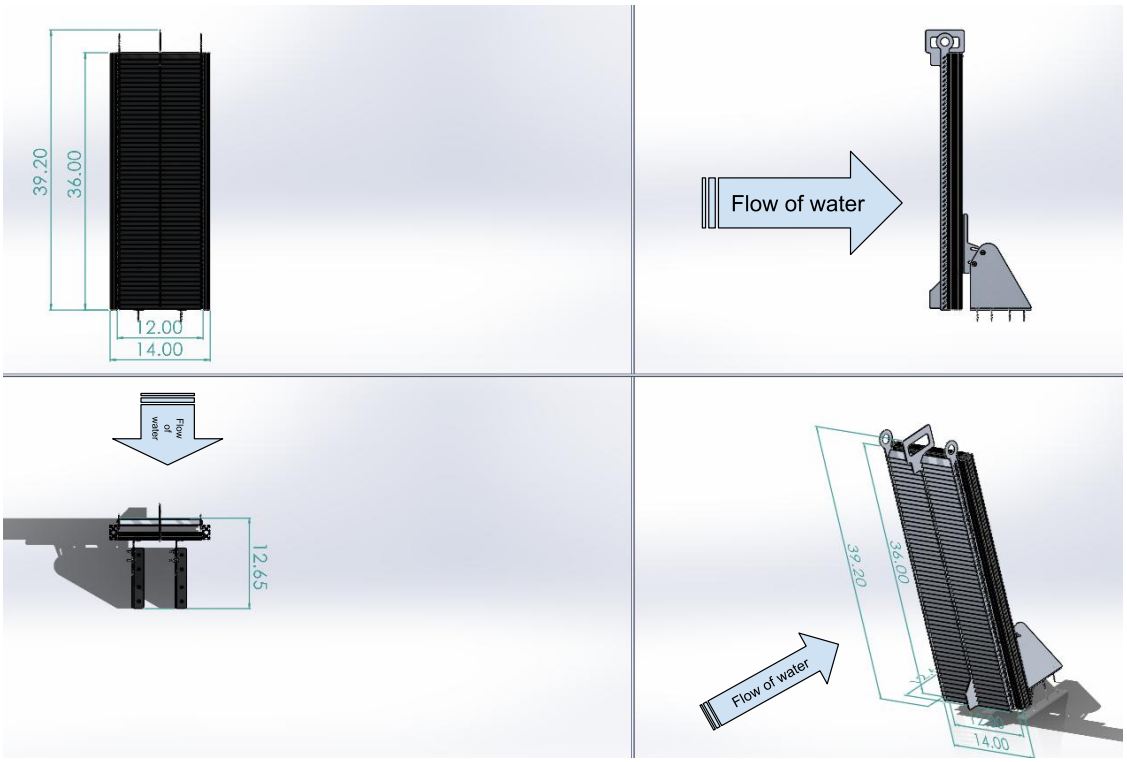
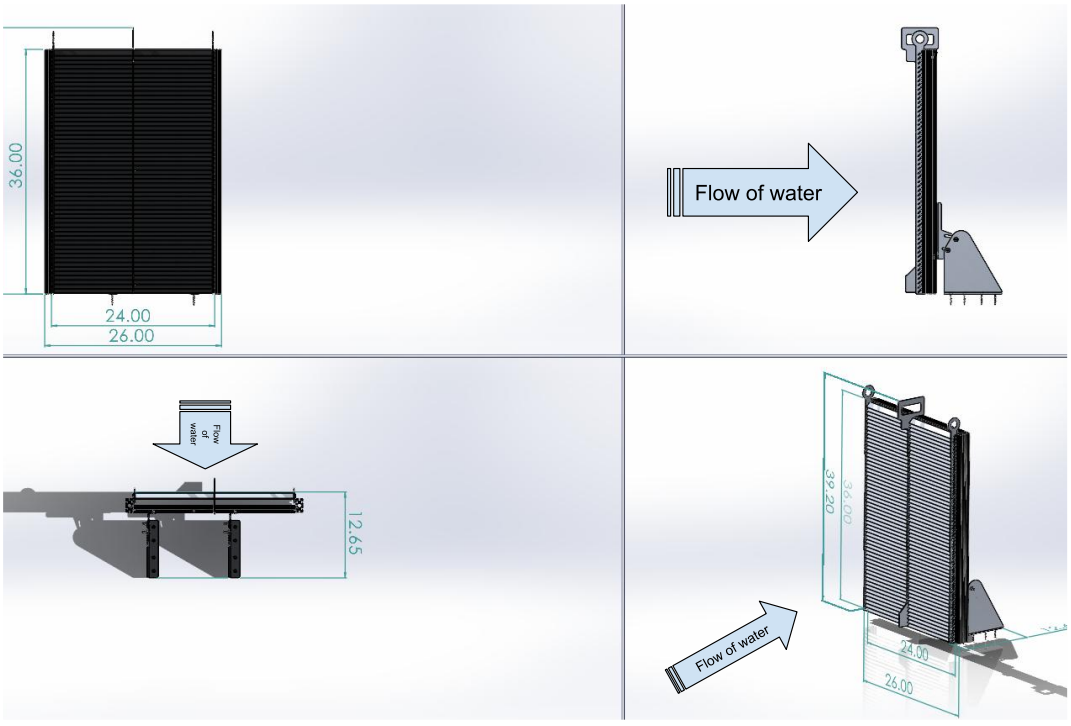
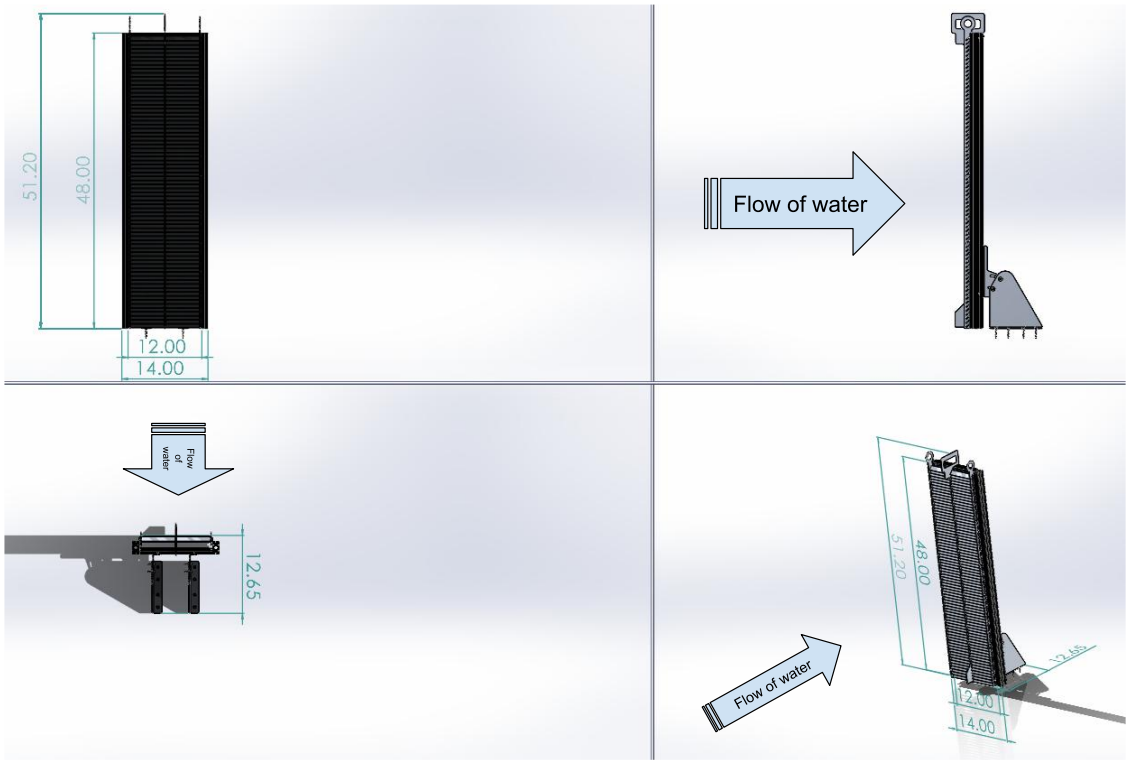
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI36H12W	Initial: SOP Tech Upward Flow	35.84	11.28	404.28	4.750	2.375



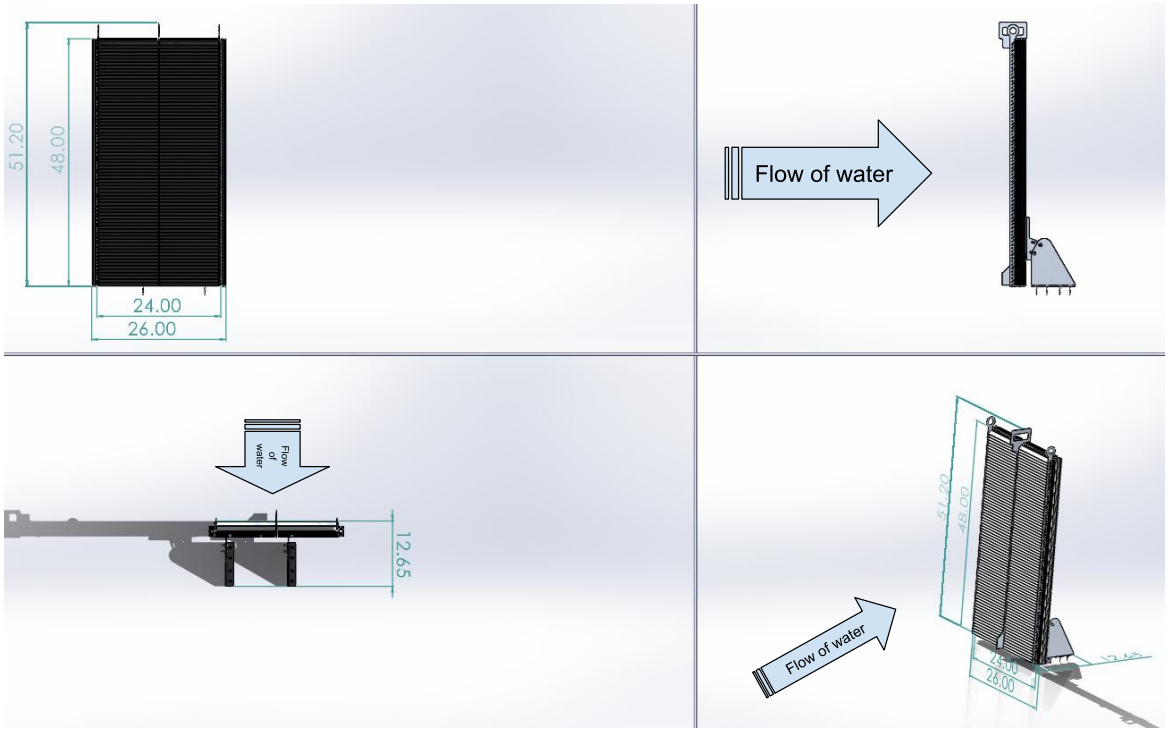
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI36H24W	Initial: SOP Tech Upward Flow	35.84	23.28	834.36	9.810	4.905



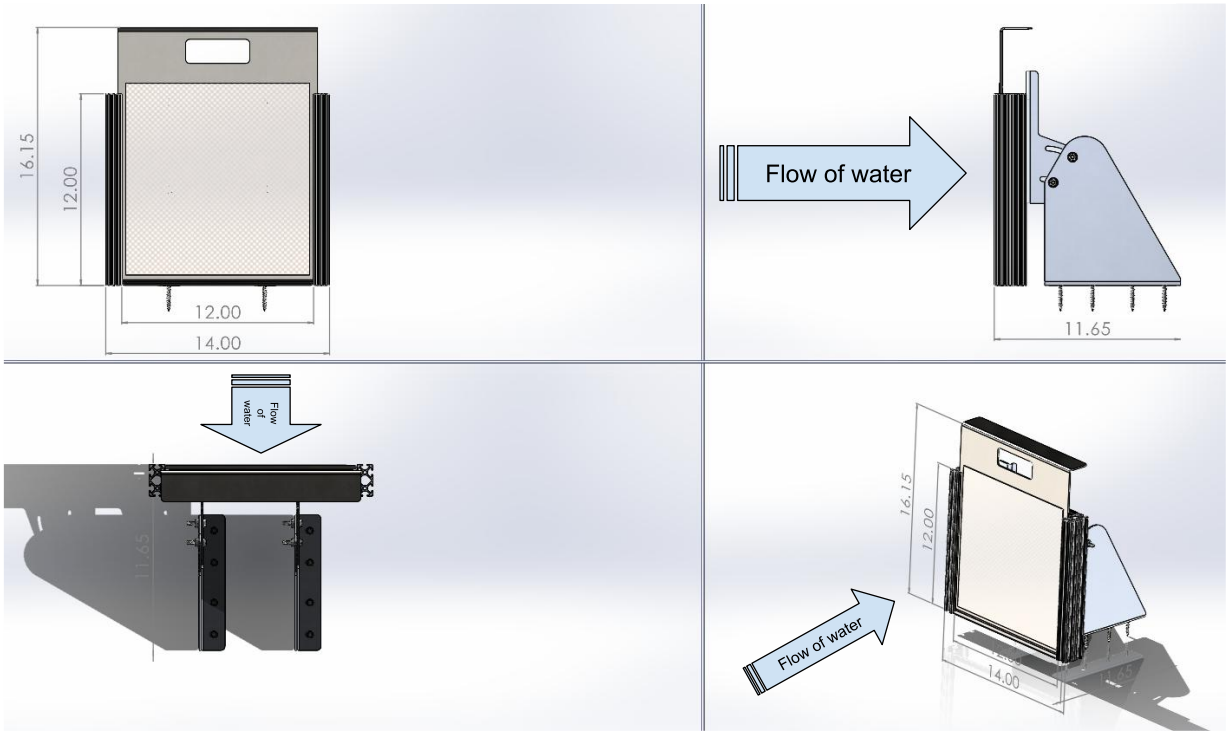
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI48H12W	Initial: SOP Tech Upward Flow	47.84	11.28	539.64	6.340	3.170



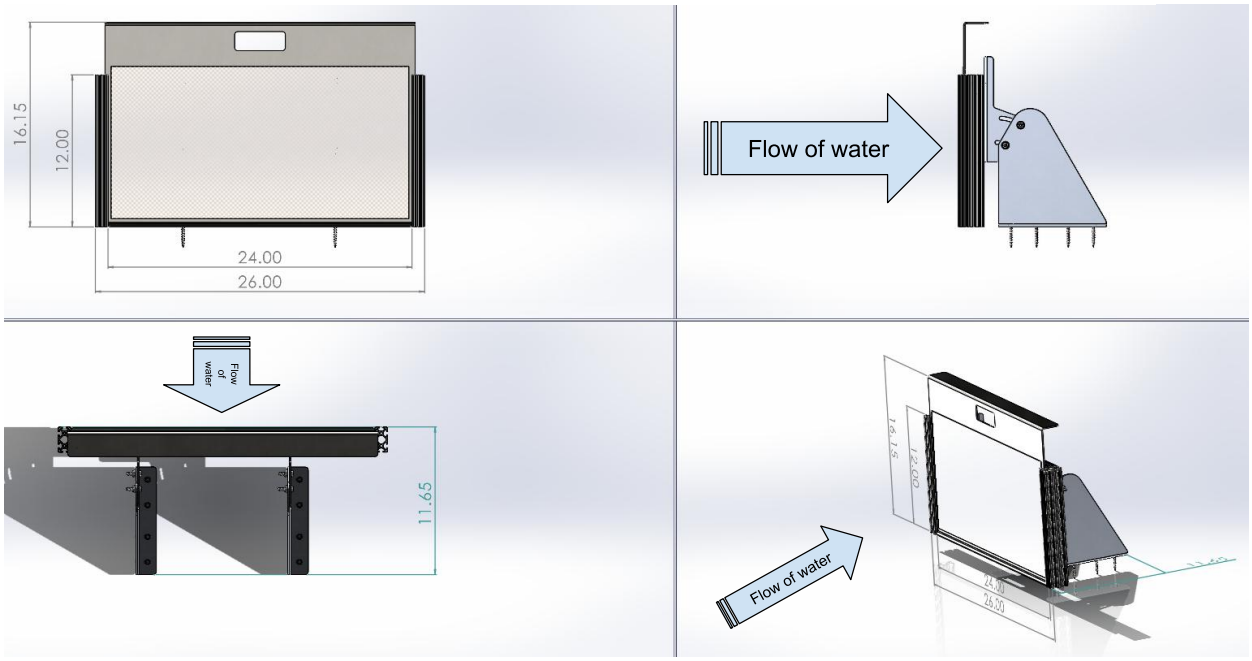
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
INI48H24W	Initial: SOP Tech Upward Flow	47.84	23.28	1113.72	13.090	6.545



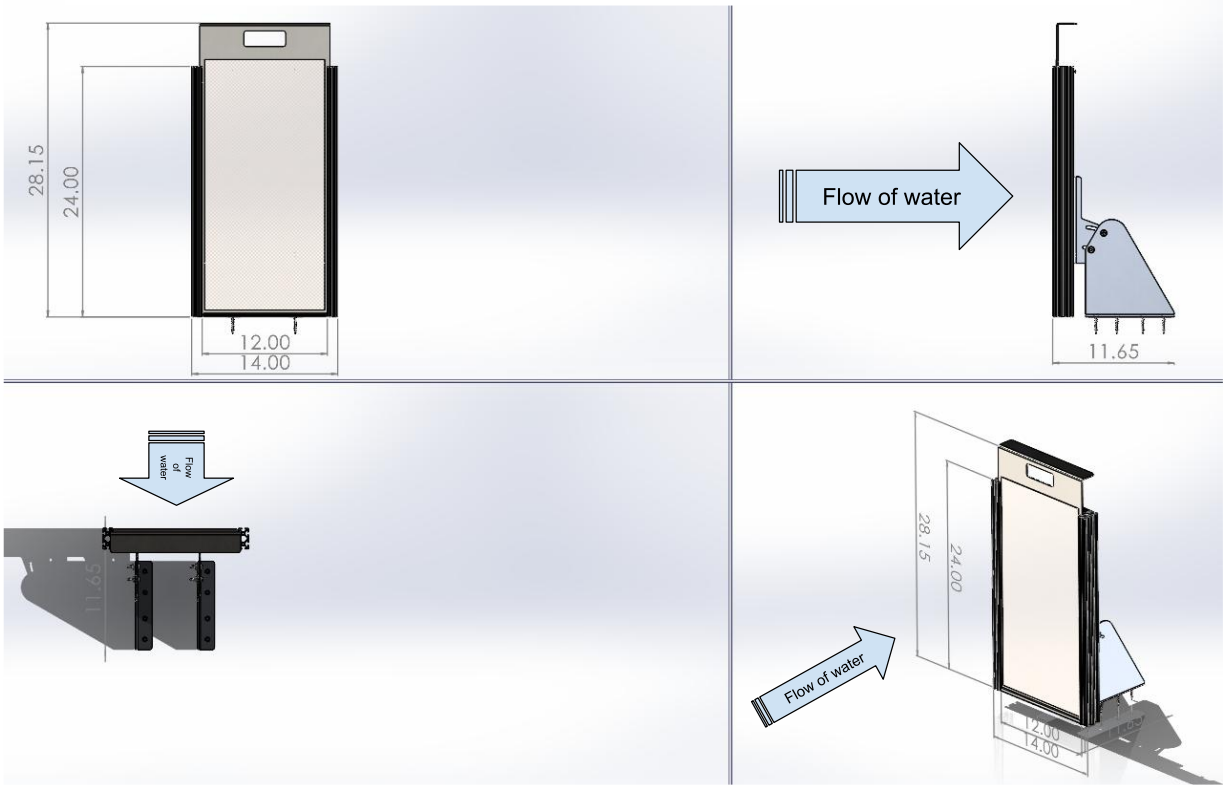
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC12H12W	Secondary: 4.8mm Openings	11.5	10.5	120.75	1.464	0.732



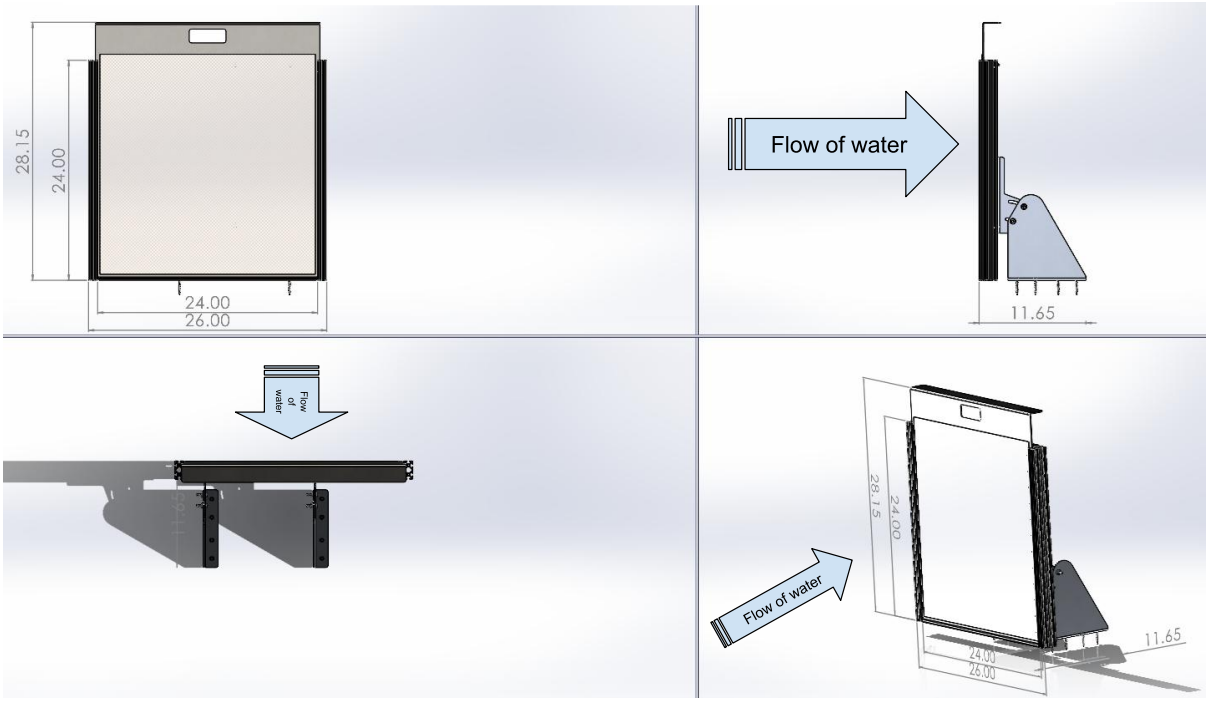
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC12H24W	Secondary: 4.8mm Openings	11.5	22.5	258.75	3.136	1.568



Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC24H12W	Secondary: 4.8mm Openings	23.5	10.5	246.75	2.990	1.495



Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC24H24W	Secondary: 4.8mm Openings	23.5	22.5	528.75	6.408	3.204



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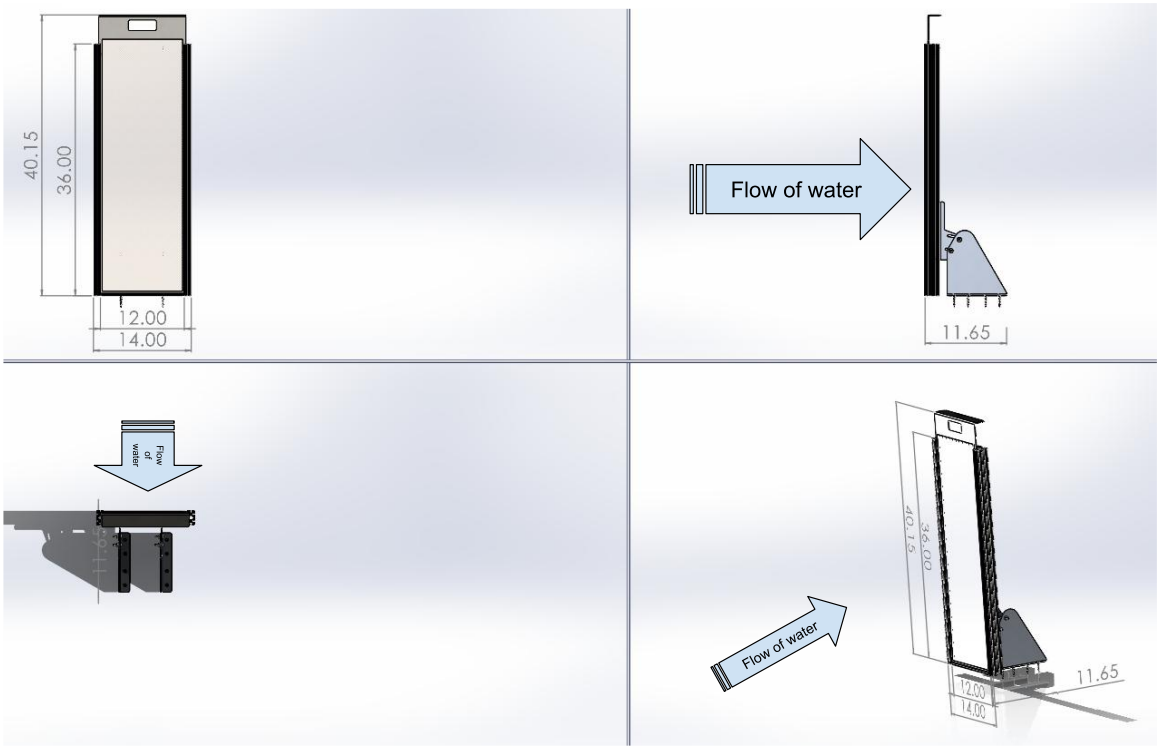
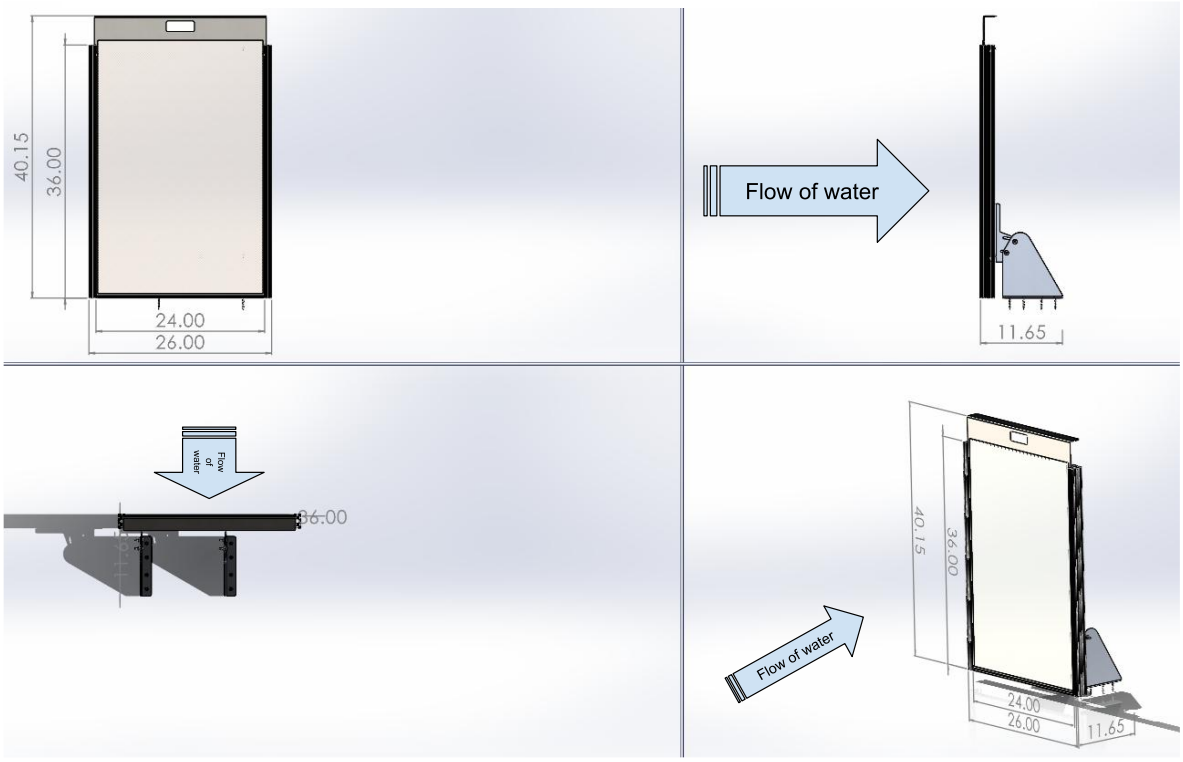
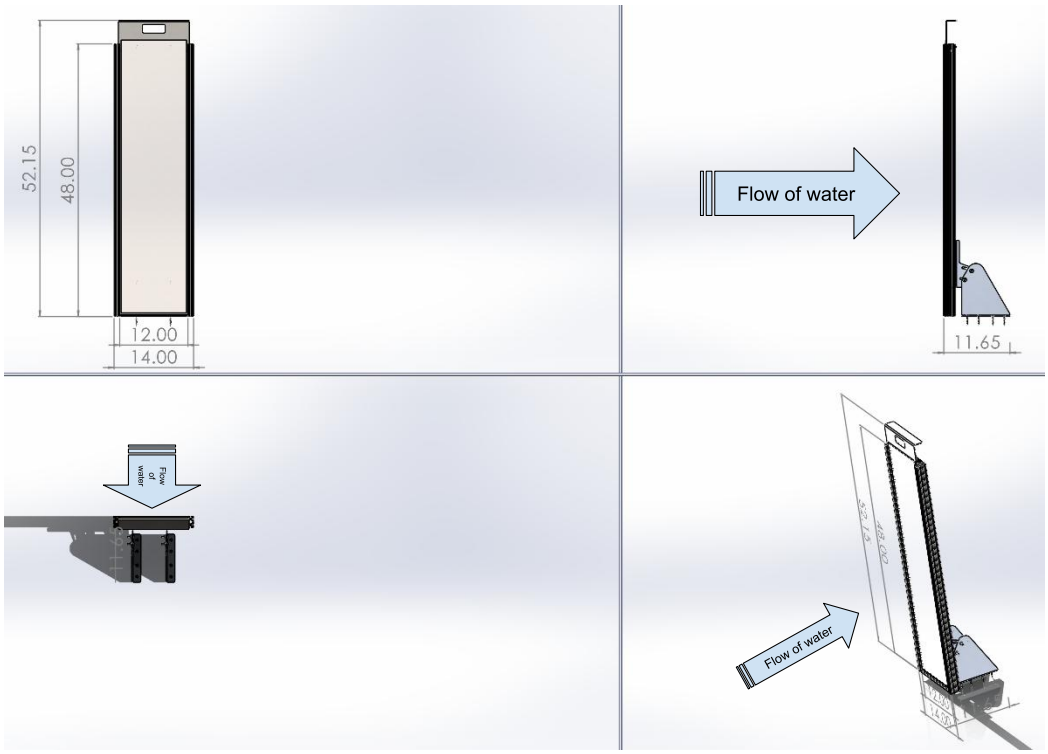
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC36H12W	Secondary: 4.8mm Openings	35.5	10.5	372.75	4.517	2.259



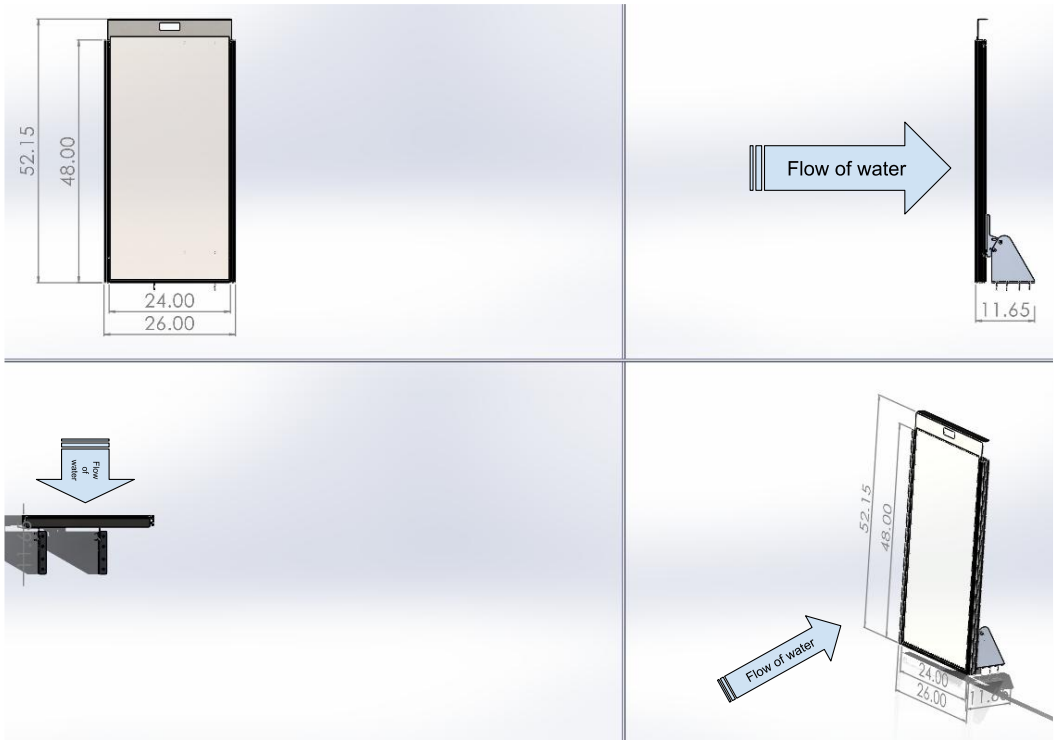
Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC36H24W	Secondary: 4.8mm Openings	35.5	22.5	798.75	9.679	4.840



Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC48H12W	Secondary: 4.8mm Openings	47.5	10.5	498.75	6.044	3.022



Screen Model Number (SKU)	Type of Screen	Screening Zone Height (in)	Screening Zone Width (in)	Screening Area (square inches)	Flow Rate Without Obstruction (CFS)	Flow Rate when 50% Blocked (CFS)
SEC48H24W	Secondary: 4.8mm Openings	47.5	22.5	1,068.75	12.951	6.476



3.F. Optional Components

Swivel mechanism: If screens cannot reach the desired height to capture sufficient trash and debris while also maintaining an unobstructed line of sight of the bottom corners of the catch basin, and if approved by vector control personnel, the screens can be designed higher and with a mechanism so they are easily moved or rotated to allow for an unobstructed view of the bottom of the catch basin. This optional customization would be considered on a case-by-case basis as an exception.

Sample illustration of the Swivel mechanism

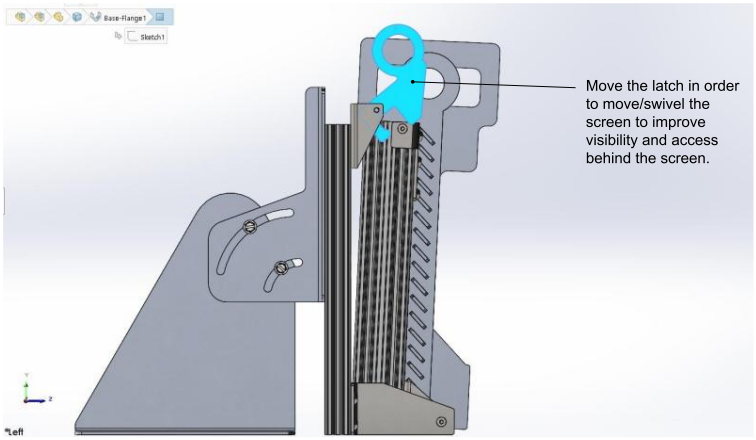
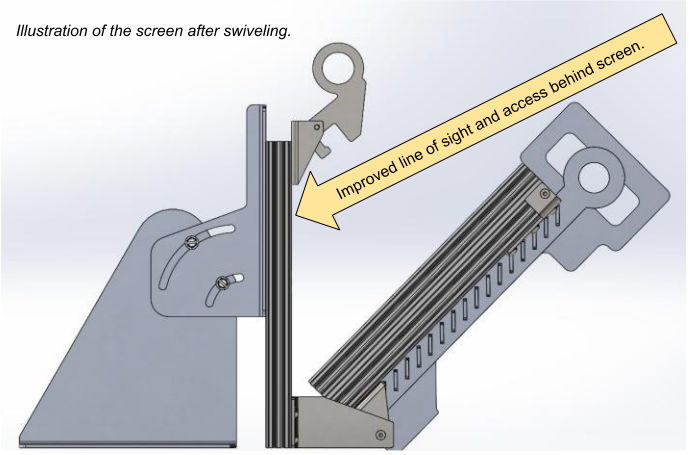
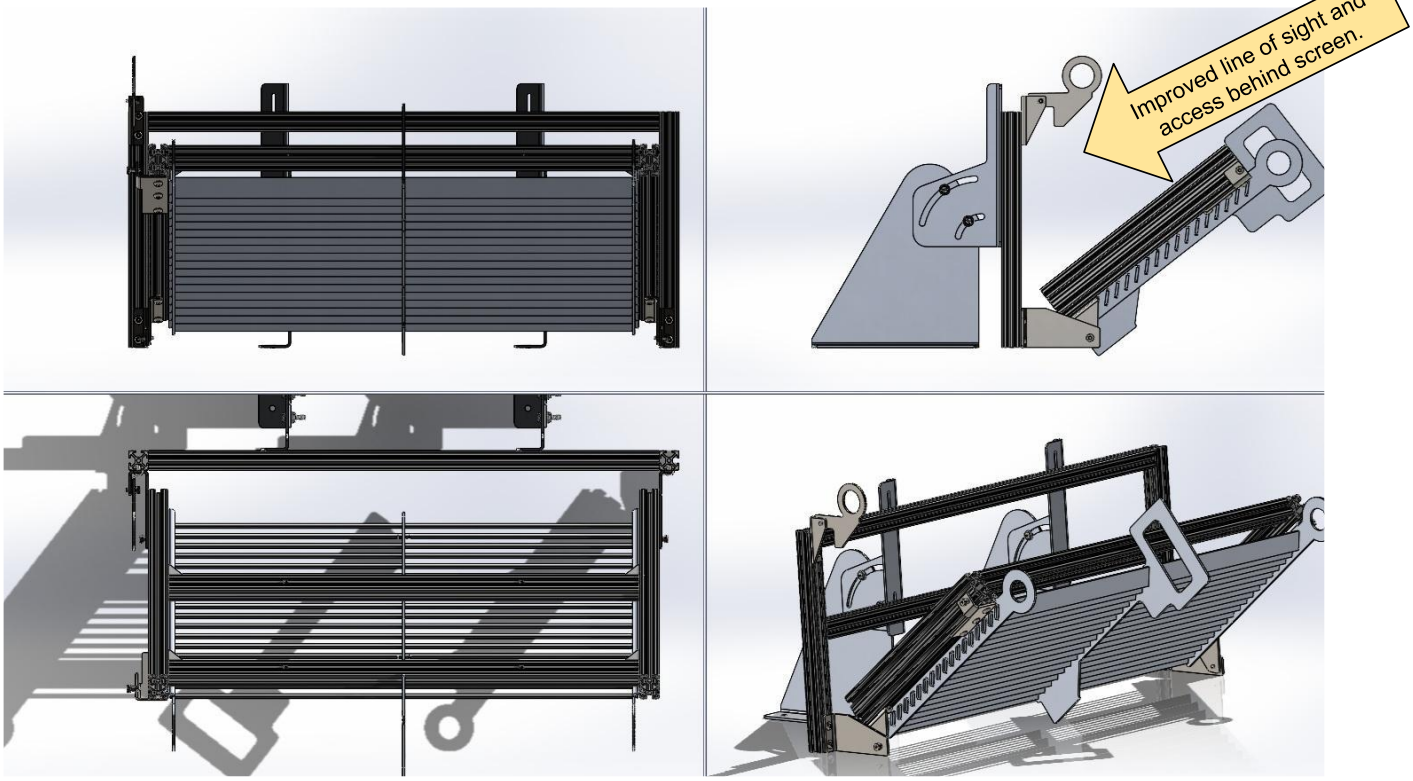


Illustration of the screen after swiveling.





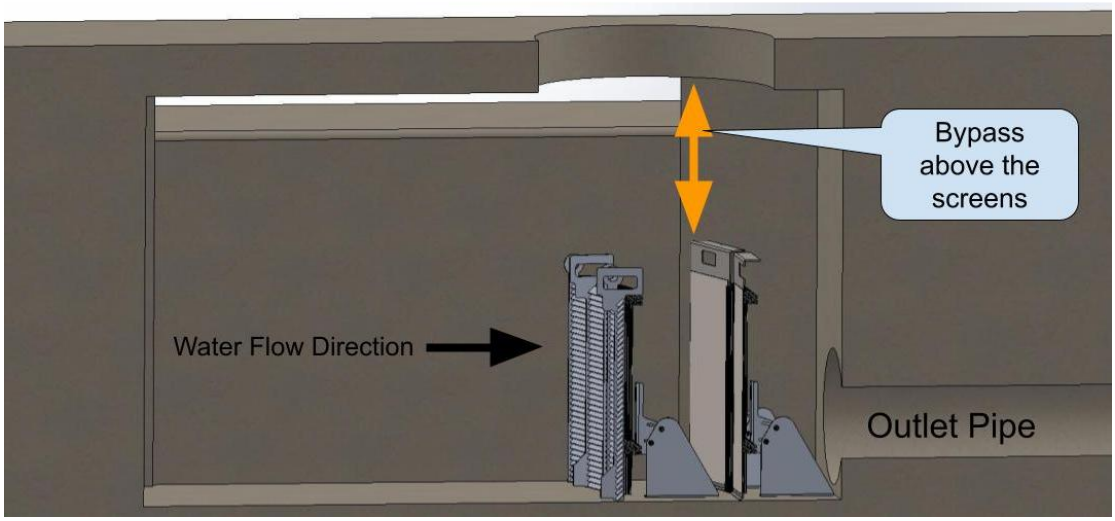
3.G. Bypass

At least 12 inches should be left above the screens to allow for a bypass should the flows exceed the design peak flow rate of the System (also to allow for vector control access). The maximum flow rate for the System depends on the dimensions of the catch basin structure and dimensions of the installed screens.
The allowable flow for the bypass area above the screens is also dependent on the size of the catch basins and the installed System. When a catch basin is rectangular as shown in the image below, bypass flow rate can be calculated as an open channel flow (rectangular channel) using the Manning equation:

Q = (1.49/n) * A * R^(2/3) * S^(1/2)

Where:

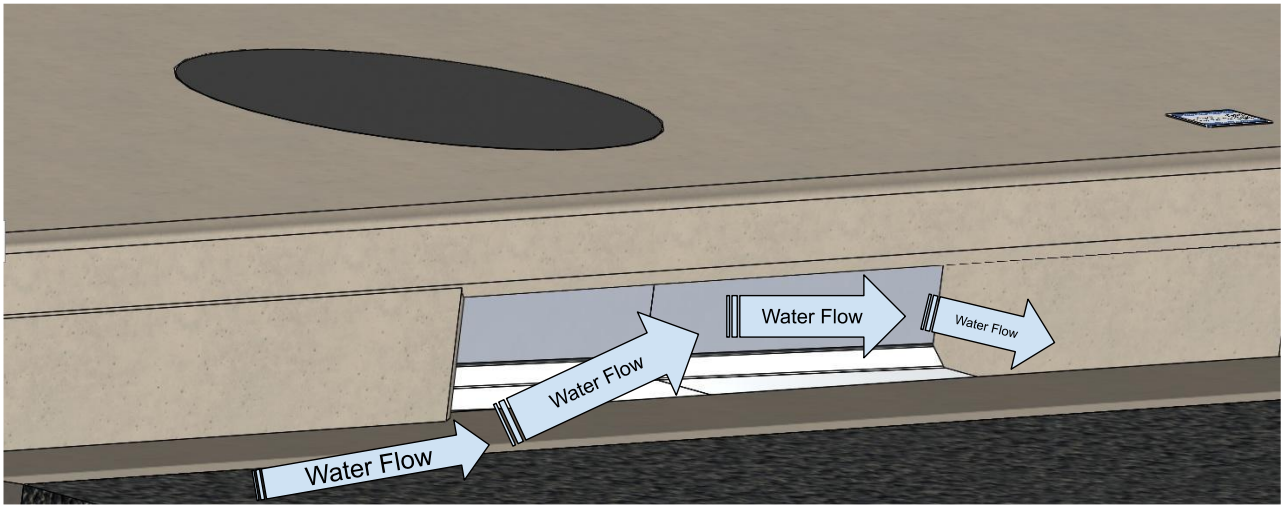
- Q: Flow rate (cubic feet per second)
- n: Manning's roughness coefficient (e.g. 0.011 for neat cement finish)
- A: Cross-sectional area of flow
- R: Hydraulic radius (A / P, where P is the wetted perimeter)
- S: Channel slope (drop in elevation per unit length)



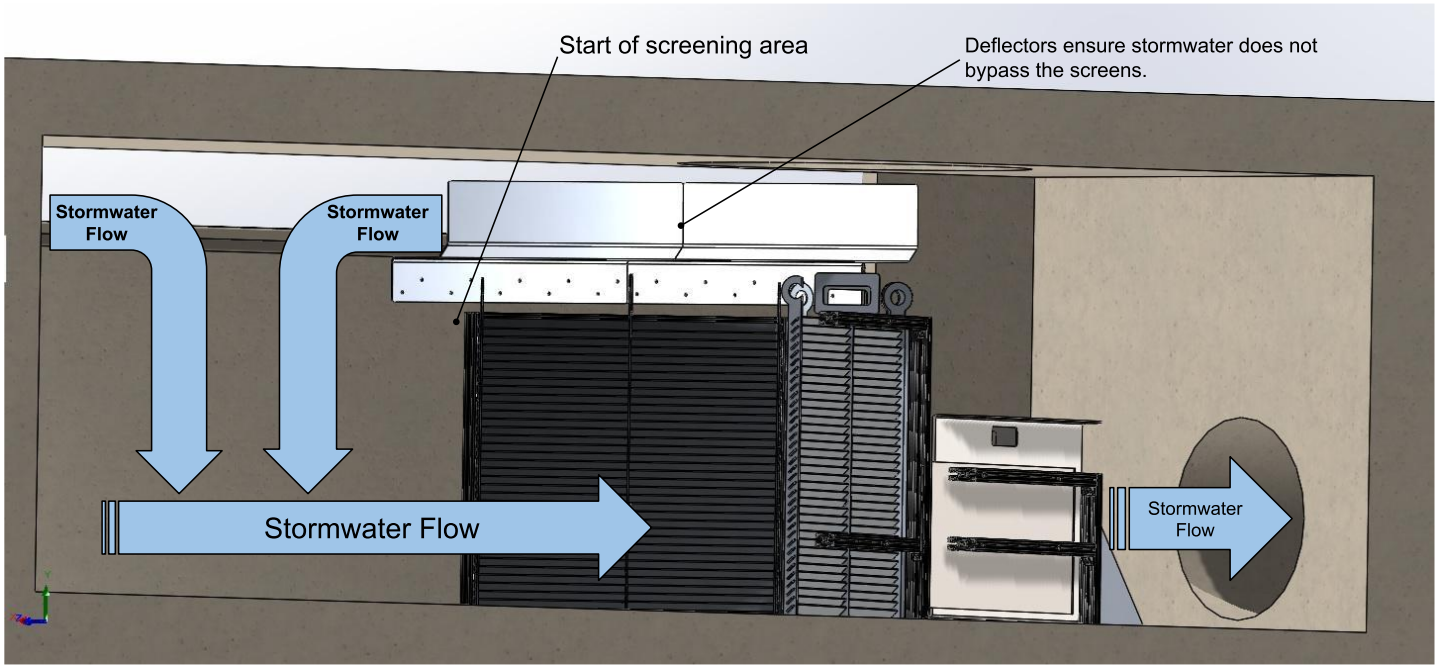
3.H. Feeder Troughs

If water entering a catch basin needs redirection so it can be treated by the filtration system, a feeder trough/deflector is necessary to prevent stormwater and trash from bypassing the device. If the water entering the catch basin can be filtered without the need for redirection, the feeder trough/Deflector is optional. Below are illustrations of the device, and Appendix A includes design specifications. The length of the Feeder Trough/Deflector can be customized to meet field requirements, but the height of the Deflector wall cannot change.

Front view of the Feeder Trough/Deflectors diverting water that enters a curb inlet.



View of the Feeder Trough/Deflectors and screens from inside the catch basin.



3.I. Calibration Feature

This System does not include a Calibration Feature.

3.J. Previously Trapped Trash

If the System receives water beyond its designed peak flow or debris accumulation exceeds the top of the screens, previously trapped trash may be re-introduced by escaping above the screens through the bypass area. To minimize the possibility of this occurring, the Initial and Secondary screens should be sized and positioned to maximize the debris capture. The maintenance/debris collection frequency should be conducted based on observed historical and predicted debris accumulation amounts.

Another scenario in which trash previously trapped may be re-introduced would be if there is a backflow in the stormwater system and debris and floatable trash are suspended above the level of the overflow bypasses.

3.K. Photos

Photos of this device are not currently available.

3.L. Material Type

The SOP Technologies Stormwater Catch Basin Treatment System frames are constructed of 6000 series aluminum and use stainless steel fasteners. The same types of frames are used for both the Initial Screen with Upward Flow and the Secondary Screen with 4.8mm openings.

Materials for the Initial Screen with SOP Technologies Patented Upward Flow: The screen is made of 5052-H32 aluminum that is 0.125” thick. The height spacing between the slats of the primary screen are approximately 0.33” and vary in width openings depending on the configuration of the screen implemented.

Materials for the Secondary screen with 4.8mm openings: The screen is made of perforated sheet metal that is 304 stainless steel of 0.06” thickness. The rectangular opening the screen is fastened to is made of 304 stainless steel that is 0.12” thick. If desired by a municipality for reduced weight (e.g. if the screens are planned to be lifted regularly), the screens can be manufactured of 6061 aluminum using the same hole dimensions and pattern and of 0.063” thickness. If the screen is made of aluminum, the rectangular opening for the screen can also be manufactured using 5052-H32 aluminum.

Fasteners: Fasteners used for the frames that hold the screens in place and fasteners used

to bolt the frames to the catch basin are made of stainless steel (e.g. 18-8 stainless steel, 304 stainless steel, and 316 stainless steel).

3.M. Design Life

The estimated design life for the SOP Technologies Stormwater Catch Basin Treatment System is 20+ years when used in stormwater applications exposed to moderate levels of salt and other naturally occurring roadway contaminants. Maintenance frequency, exposure to corrosive elements, and the amount of impact and abrasion the screens and frames undergo can impact the lifespan of the System. Since the system uses different materials and is modular, components that become damaged with time can be replaced independently of other components, thereby reducing replacement costs because the entire system does not need to be replaced.

4. Installation Guidance

4.A. Standard System installation procedures, any non-standard System installation procedures, and any applicable calibration procedures.

Appendix A provides examples of installation procedures for various sizes of stormwater catch basins and position of manhole covers. If as-built drawings of catch basins are not available, take field measurements to determine the dimensions of catch basins, curb and grate inlet openings and positions, and manhole cover openings and positions.

Measurements should allow the designer to determine the maximum height of the Initial and Secondary screens as well as their placement within the catch basin structure. Placement of the screens should allow for the following:

- Maintenance teams should be able to vacuum out debris collected in front of the Initial screen and Secondary screen.
- Vector control personnel should have an unobstructed view of all four bottom corners of the catch basin to see if there is an accumulation of water and/or to apply mosquito control measures.
- Adequate overflow bypass should be allowed above the screens to address situations where the water flow exceeds the allowable flow through the screens.

Systems are installed inside catch basins. Frames for the screens are lowered into the catch basin through the manhole opening or other access points and installed to the bottom and sides of the catch basin using stainless steel screws and anchors as needed. Tools such as rotary hammer drills are used to make holes into the concrete, and drills fasten screws and bolts. After the frames are secured in place, the screens slide into the frames.

4.B. Description of System installation limitations.

The height of the Initial and Secondary screens will be limited by the following:

- The available height within the catch basin structure: If the screens cannot slide into and out of their respective frames once the frames are installed, the screens need to be made of a lower overall height. If needed, the screens can be designed to slide with less distance above the screens.
- The ability to view the four corners of the bottom of the catch basin structure: Screens are limited in height to allow a clear view of the four bottom corners of the basin.
- Space for vacuum truck hoses: Positioning of the screens should allow Public Works and Maintenance personnel to vacuum debris captured/trapped by the screens. This means that the Initial screen and Secondary screen should be placed at least 12" apart so a vacuum truck hose can go in between the screens.

4.C. Methods for diagnosing and correcting installation errors.

SOP Technologies provides detailed installation instructions and System frames for screens are designed to be modular and adaptable to varying field conditions that may have not been recognized during the initial process of taking measurements.

If the System is installed improperly, it can be repositioned and reinserted as needed. System components intended to be inserted in a certain direction will have physical and/or visual design elements to prevent incorrect assembly or usage. If there is an error in installation, it will become apparent during the installation process itself or soon thereafter during maintenance and operation activities. Issues that arise would likely be due to positioning of screens or fastening of screens to the basin structure. Both issues are easy to resolve by repositioning the frames of screens.

An example of an installation error can be the placement of screens in such a way to impede the unobstructed view of the bottom corners of the catch basin structure. Should this happen, the screen frames can be easily removed and repositioned as intended.

Detailed installation instructions are provided with the System so that installation crews have a thorough understanding of the installation processes.

5. Operation and Maintenance Information

5.A. Inspection procedures.

To see how much debris has accumulated in front of the Initial screen and Secondary screen, remove the manhole cover of the catch basin structure and look inside the basin. If there is more than 50% accumulation from the bottom of the structure to the top of the screens, it is recommended to use a vacuum truck or industrial vacuum to remove the trash and debris that has collected in front of the filters.

If there is thickly layered or "caked-on" trash and debris on a screen or at the bottom of the catch basin, also remove it with the vacuum and/or use a hose to loosen the debris so it can then be vacuumed. If needed, use a pressure washer to further loosen thickly layered

debris from the screens.

When inspecting and cleaning the System, use the provided SOP Technologies QR Code Storm Drain Marker (details in Appendix A) to log the activities. This can include photos before and after maintenance operations, quantitative measurements of debris captured, and qualitative assessments by maintenance personnel. These data points and images help to inform future inspection and maintenance activities.

5.B. Recommended minimum maintenance frequency necessary to maintain the System's hydraulic capacity.

Inspections of the SOP Technologies Stormwater Catch Basin Treatment System should occur four times per year (every three months) for the first year of implementation. Using the SOP Technologies QR Code Markers and web applications (details in Appendix A), logging the inspections with photos, debris accumulation numbers, debris capture numbers, and qualitative observations will allow maintenance personnel to determine adjustments in inspection and maintenance frequencies going forward. It is likely that different systems will have different maintenance frequencies because of the amount of debris accumulated or collected per site.

To quantify the amount of debris accumulated in front of the screens, take at least three measurements to capture the height of debris accumulation in front of the Initial screen and three measurements to capture the height of debris in front of the Secondary screen. Log the data using the form made available via the SOP Technologies web application asset management system or other forms.

Since the goal of the Initial screen is to capture part of the debris before the water reaches the Secondary screen, it is expected that the Initial screen will have more debris accumulation. If the debris accumulation in front of the Initial or Secondary (4.8mm) screen has reached 50% or more of the height of the screen, collect/remove the debris from both screens. At a minimum, trash and debris should be removed from the catch basins and the screens once per year, even if the level has not reached the 50% threshold.

After the first year of implementing the System, inspection frequencies can be adjusted based on the maintenance that was required during the first year of implementation. If the second year or a subsequent year of System usage experiences significant changes in rainfall or debris accumulation when compared to the first year of implementation, adjust inspection and maintenance frequencies as needed.

This section specifies minimum maintenance frequencies for the System; however, municipalities should review and comply with the minimum maintenance frequency for these types of systems as required by their applicable municipal stormwater permit.

5.C. Maintenance procedures to remove trash, clean the trash capture screen, and maintain the integrity and performance of the System.

Typically, a vacuum truck or industrial vacuum is the only equipment needed to collect/remove debris that has accumulated within the catch basin and in front of the filters. If needed, a pressure washer or hose can be used to wash out and loosen accumulated debris that has formed a thick layer at the bottom of the catch basin or the screens (and then a vacuum used to collect the debris).

If thick layers of "caked-on" debris are allowed to remain on the surface of the screens, their effectiveness will be diminished and water flow may be impeded. The overflow bypass area is intended as a last resort when there is substantial water flow that exceeds the System's treatment capacity, and adequate maintenance can help decrease the likelihood that water will need to go above the Secondary screen as an overflow.

5.D. Essential equipment and materials needed for maintenance.

Standard equipment used to collect debris from stormwater catch basins are sufficient to keep the System operating in optimal conditions. These include the following:

- Vacuum truck or industrial vacuum.
- Hose with sufficient water pressure to loosen thickly layered debris.
- Hook to lift manhole covers and grates that allow access to the catch basin.
- For inspections and to log debris accumulation, use a yardstick to measure the height of accumulated debris.
- Smartphone or internet-enabled tablet to scan the provided SOP Technologies QR Code Storm Drain Marker and upload inspection and maintenance photos, measurements and qualitative observations.

5.E. Description of the effects of deferred maintenance on System structural integrity and performance.

Delayed or inadequate maintenance of this System, as is the case with all stormwater BMPs, can cause an overaccumulation of debris and impedance of waterflow. The delayed maintenance could result in diminished performance of the System in terms of flow conveyance or effluent water quality if the trash and/or sediment retention capacity is exceeded.

If the screens are allowed to become fully blocked with debris, trash and debris can bypass above the screens and move further downstream into stormwater pipes and potentially discharge to local waterways.

Allowing stormwater pipes to receive the debris can lead to blockages of the pipes and street flooding, and cleaning those pipes will increase maintenance costs because it is more labor intensive and time consuming to remove debris from a pipe when compared to collecting it from a catch basin. Debris and trash that has already reached waterways are

harmful to aquatic life, is more expensive and impractical to collect when compared to performing catch basin maintenance and can have subsequent harmful impacts that far outweigh the cost of regular maintenance of the System.

5.F. Repair procedures for the System's structural and screening components.

Since the System is modular, damage to structural components or screening components would likely be limited to only a portion of the System.

Minor bends or deformations of the structural components or screens can often be fixed by applying pressure to bend screens back as they originally were. If there is a small crack that is irreparable with conventional tools available to Public Works personnel, this can likely be repaired by a local sheet metal shop, or it may cost less to obtain a replacement component from SOP Technologies. If the Secondary (4.8mm) screen is damaged, one solution can be to un-fasten the screen from its frame and refasten a replacement screen for a low cost of the replacement perforated sheet metal.

Repairing a structural element from the frame involves unscrewing the bolts that hold the frame segment in place and taking that segment out of the catch basin to perform repairs. Repairing screens involves sliding out the screens from their frame so they can be repaired outside of the catch basin.

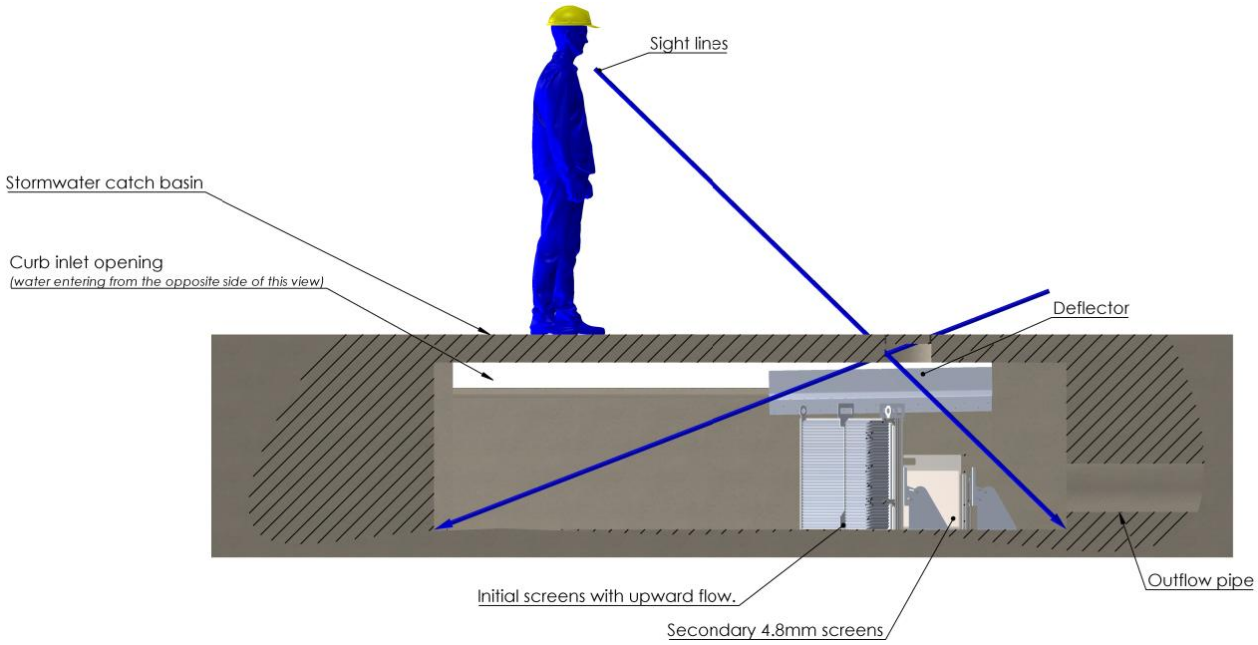
Since the System is modular and several components are used in multiple locations, a municipality can purchase extra components when placing a large order and thereby have replacement components readily available so filtration benefits are maintained even as repairs occur to some components.

6. Vector Control Accessibility

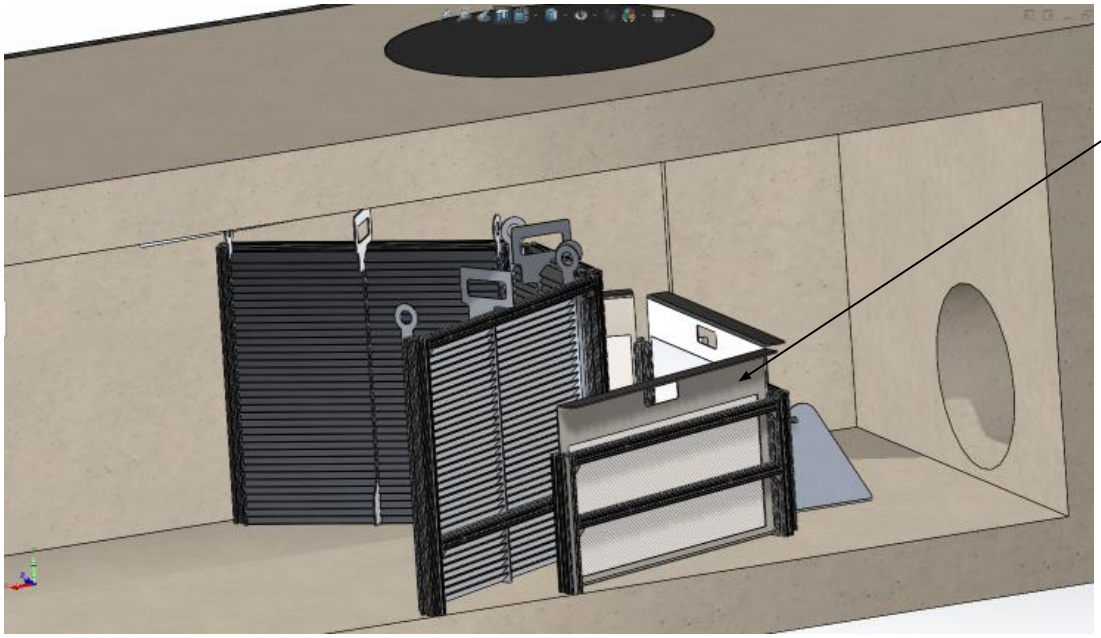
6.A. The description of how mosquito vector control personnel can readily access the bottom of the storm water vault and/or System for visual observation and mosquito treatment.

During the initial design phase of the System, measurements are taken and/or 3D models are used to determine the sizing and positioning of screens inside catch basins. An important design consideration is to ensure that there is an unobstructed view of every corner of the bottom of the catch basin structure when looking inside the structure from above through the manhole or basin opening(s).

The illustration below shows how the line of sight is maintained while the System is in place.



View of the Stormwater Catch Basin Treatment System inside a catch basin

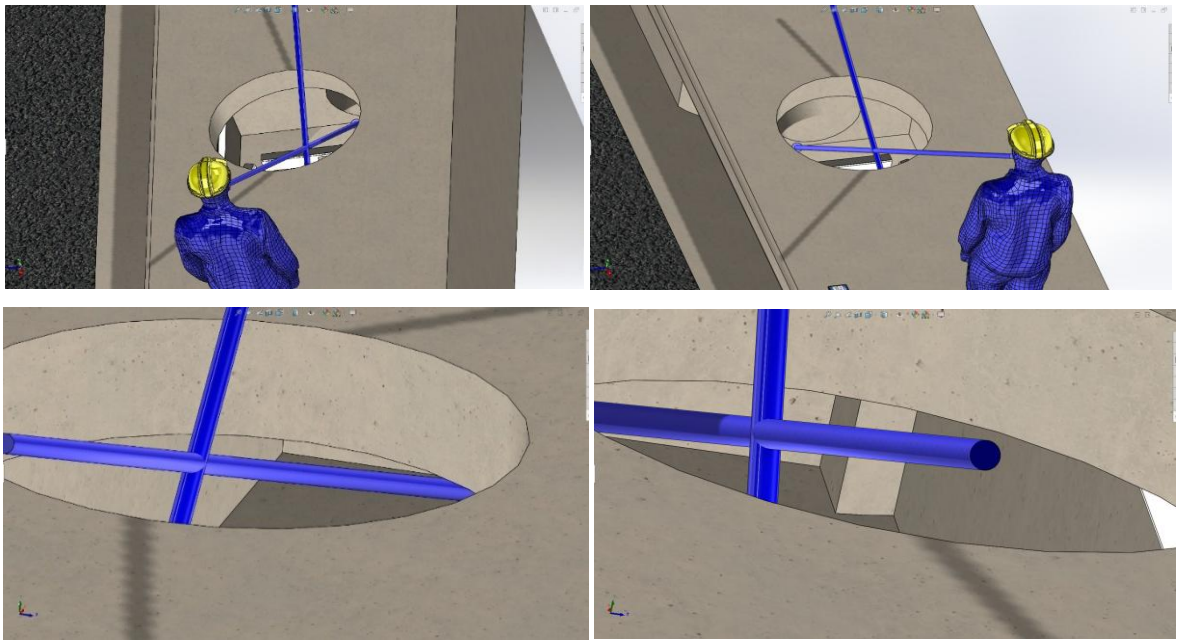


This example uses lower height secondary (4.8mm) screens to allow easier viewing and access to the outlet pipe.

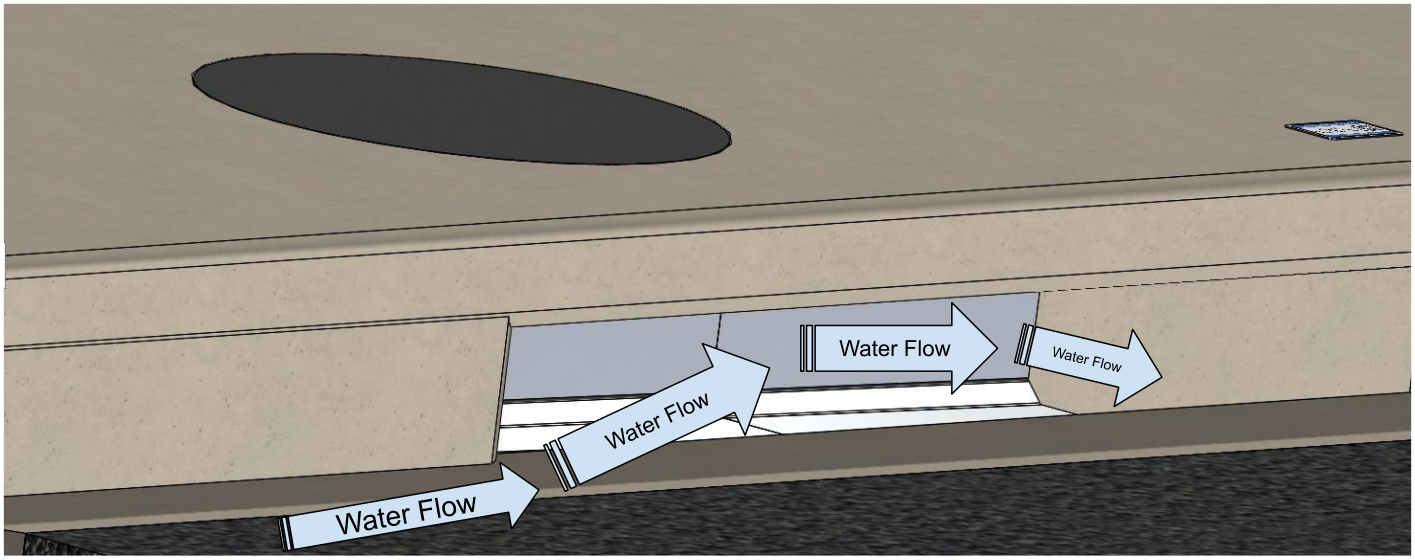
Another option is to use the mechanism allowing screens to be moved down (described in section 3.F. Optional Components).

6.B. System drawings that depict the vector control accessibility including sight lines.

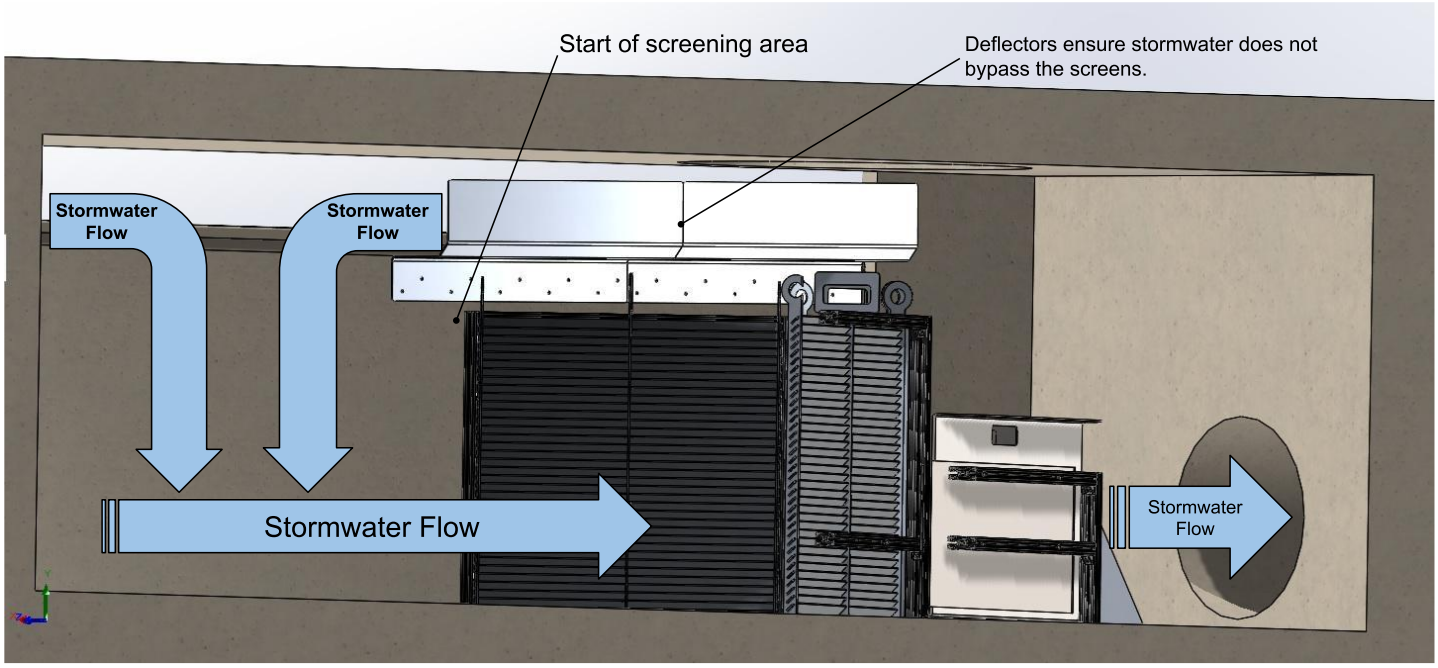
The perspective views below show drawings with sight lines showing that vector control personnel should have an unobstructed view of all corners of the catch basin once the System is installed.



Street view of a curb opening using a Feeder Trough/Deflectors to divert water that enters a curb inlet.

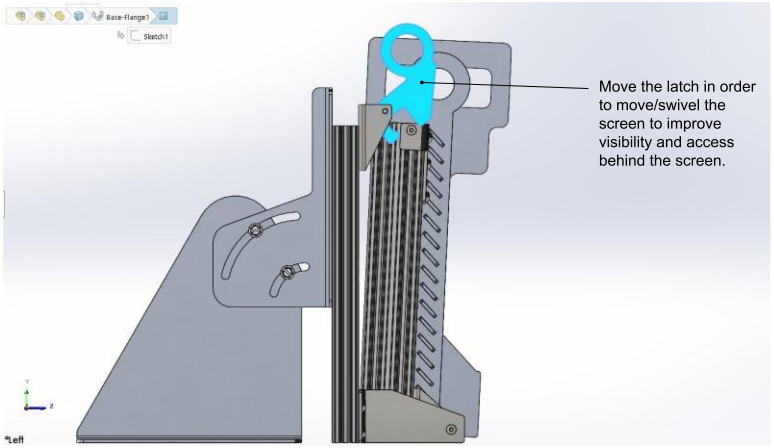


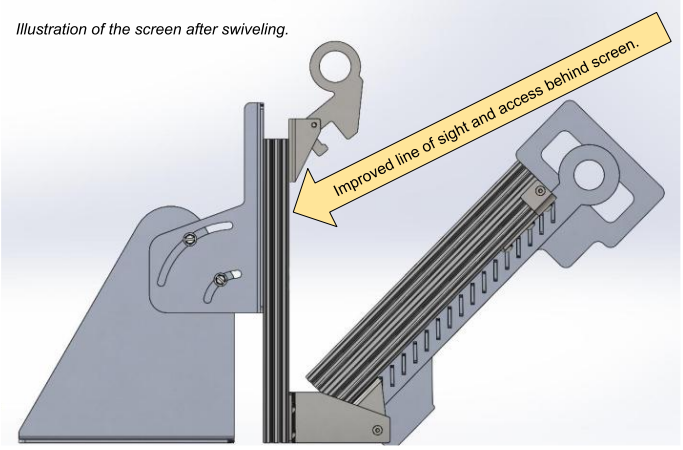
View of the Feeder Trough/Deflectors and the System from inside the catch basin.



If needed for improved viewing of the catch basin structure by vector control personnel, the system can include a Swivel mechanism that allows vector control personnel to easily move screens for improved access to the basin.

Sample illustrations of the Swivel mechanism





6.C. The date the System application was submitted for vector control accessibility design verification.

This application was submitted for vector control accessibility design verification on:
May 9, 2025

6.D. Once received, the date of the Mosquito Vector Control Association of California Letter of Verification.

The Mosquito Vector Control Association of California Letter of Verification is dated
May 30, 2025

7. Reliability Information

7.A. Estimated design life of the System and screens.

The estimated design life of the System and screens is over 20 years when used under normal conditions typically experienced in stormwater catch basins.

7.B. Warranty information.

The Stormwater Catch Basin Treatment System is warranted for a period of 5 years from the delivery date, in accordance with the SOP Technologies warranty included in Appendix D.

7.C. Customer support information.

SOP Technologies strives to provide customer support in a timely and efficient manner. Our team is available to provide assistance remotely or in person as needed for projects.

Support Contacts:
SOP Technologies website: https://soptechint.com

info@soptechint.com

Emilio Lopez, CEO
305-792-8778
emilio@soptechint.com

8. Field and Laboratory Testing Information and Analysis

8.A. For Systems that include 5-millimeter screening, field or laboratory testing is optional.

The SOP Technologies Stormwater Catch Basin Treatment System Secondary screen is made of perforated stainless steel sheet metal with staggered 4.8mm diameter holes (details included in Appendix A). These screens have been shown to perform effectively at achieving the California SWRCB objective of capturing trash 5.0mm or greater in size.

8.B. If the System does not include a 5-millimeter screen, field or laboratory testing is mandatory.

The Stormwater Catch Basin Treatment System uses a Secondary Screen with 4.8 mm openings, and Appendix A provides flow calculations for those screens. For the Initial Screen with 8.32 mm openings (used before water flows to the Secondary Screens), laboratory tests to calculate water flow were conducted at Florida International University (FIU) and a copy of the analysis is included in Appendix B. A field analysis of this type of screen was conducted in 2019 in the City of Aventura, FL, and a copy of that analysis is included in Appendix C. Another field analysis was conducted in the Village of Key Biscayne, FL using SOP Technologies stormwater filters, and that report is included in Appendix E.

8.C. If the System includes feeder troughs, laboratory testing should be included to demonstrate over-top prevention.

This system does not include a feeder trough; however, the design of the Deflector detailed in Appendix A includes best practices in design to minimize clogging and over-topping of stormwater and floatable trash that is redirected by the Deflector.

MVCAC
Mosquito and Vector Control Association of California
One Capitol Mall, Suite 320 • Sacramento, CA 95814 • p: (916) 440-0826 • f: (916) 444-7462 • e: mvcac@mvcac.org

Mr. Emilio Lopez
SOP Technologies
251 Valencia Ave. #143501
Coral Gables, FL 33114

May 30, 2025

Dear Mr. Lopez,

Thank you for the submission of the SOP Technologies Stormwater Catch Basin Treatment System full trash capture device for review by the Mosquito and Vector Control Association of California pursuant to the SWRCB Trash Treatment Control Device Application Requirements. The Association has reviewed the conceptual drawings for the Stormwater Catch Basin Treatment System and verifies that provisions have been included in the design that allow for full visual access to all areas for presence of standing water, and when necessary, allows for treatments of mosquitoes.

While this verification letter confirms that inspection and treatment for the purpose of minimizing mosquito production should be possible with the SOP Technologies Stormwater Catch Basin Treatment System as presented, it does not affect the local mosquito control agency's rights and remedies under the State Mosquito Abatement and Vector Control District Law. For example, if the installed device or the associated stormwater system infrastructure becomes a mosquito breeding source, it may be determined by a local mosquito control agency to be a public nuisance in accordance with California Health and Safety Code sections 2060-2067.

"Public nuisance" means any of the following:

1. Any property, excluding water, that has been artificially altered from its natural condition so that it now supports the development, attraction, or harborage of vectors. The presence of vectors in their developmental stages on a property is prima facie evidence that the property is a public nuisance.
2. Any water that is a breeding place for vectors. The presence of vectors in their developmental stages in the water is prima facie evidence that the water is a public nuisance.
3. Any activity that supports the development, attraction, or harborage of vectors, or that facilitates the introduction or spread of vectors. (Heal. & Saf. Code § 2002 (j).)

Declaration of a facility or property as a public nuisance may result in penalties as provided under the Health and Safety Code. Municipalities and the vendors they work with are encouraged to discuss the design, installation, and maintenance of stormwater trash capture devices with their local mosquito control agency to reduce the potential for disease transmission and public nuisance associated with mosquito production.

Sincerely,

Megan MacNee
MVCAC Executive Director