TOWN OF FAIRHAVEN, MASSACHUSETTS

CONSERVATION COMMISSION

Town Hall · 40 Center Street · Fairhaven, MA 02719

Memorandum

Date: October 3, 2019

To: Steven D. Gioiosa, P.E.

From: Whitney McClees, Conservation Agent

RE: Field Change Request, DEP File #SE 023-1246, Bridge Street

At their September 30, 2019 meeting, the Conservation Commission voted unanimously to approve the field change request as presented in your Memorandum dated September 19, 2019 as long as the Planning Board also approves the change.

Consider this memorandum confirmation that you may use First Defense, Model FD-3HC units as a substitute for Stormceptor 450i model units as long as the Planning Board also approves.

SITEC
Civil and Environmental Engineering
Land Use Planning

SITEC, Inc.
449 Faunce Corner Road
Dartmouth, MA 02747
Tel. (508) 998-2125 FAX (508) 998-7554

Unit C
769 Plain Street
Marshfield, MA 02050
Tel. (781) 319-0100 FAX (781) 834-4783

MEMORANDUM

TO: WHITNEY McCLEES
CONSERVATION AGENT

FROM: STEVEN D. GIOIOSA, P.E.

DATE: SEPTEMBER 19, 2019

REFERENCE: STORMWATER TREATMENT UNITS
CONVENIENCE STORE/GAS STATION
ROUTE 240/BRIDGE STREET
DEP FILE #SE23-1246

As we discussed yesterday, the site contractor has requested that we evaluate a proposed alternate stormwater unit for use on the above referenced project. Catch Basins #1 and #2 were approved with Stormceptor 450i model units. The contractor is having difficulty obtaining a reasonable delivery date for this product and they are proposing to use First Defense, Model FD-3HC units as a substitute.

Attached you will find the technical specifications for the First Defense unit as well as a Total Suspended Solids (TSS) treatment and flow comparison with the Stormceptor 450i unit. I have reviewed this data and I agree that this product is comparable to the Stormceptor 450i unit and is acceptable to SITEC for use on this project. I also note in reviewing the attached information that this product has been installed throughout Massachusetts including the Town of Fairhaven.

At this time we request your approval to make this field change. Please let me know if you require any additional information.

attachment: Hydro International Data

cc: Carri Corp. Industries

Hydro International
stormwater

FIRST DEFENSE® TECHNICAL SUBMITTAL

The enclosed information provides a technical comparison between the 3-foot diameter First Defense and the Stormceptor 450i. The FD-3HC unit is sized to provide treatment and cleanout capacities that equal or exceed that of the Stormceptor 450i. The treatment and cleanout capacities of both devices are summarized in Table 1.

Table 1. Treatment Unit Capacities

Model	Treatment Flow (cfs)	Cleanout Capacity* (ft^3 / cy)
First Defense FD-3HC	1.06	11 / 0.4
Stormceptor 450i	0.4	9 / 0.33

In addition to the information outlined above, the following information is enclosed.

First Defense Detail Drawing

- Please note, the enclosed detail drawing is for general reference only. Shop drawings with site specific elevations and pipe configuration will be submitted separately as needed.

Frame & Grate Details

First Defense Materials and Design

First Defense Product Literature

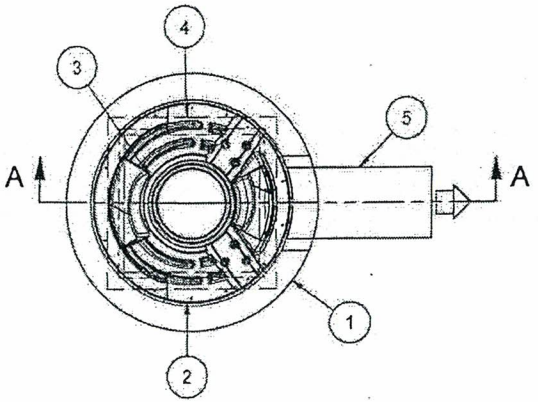
First Defense Technical Abstract

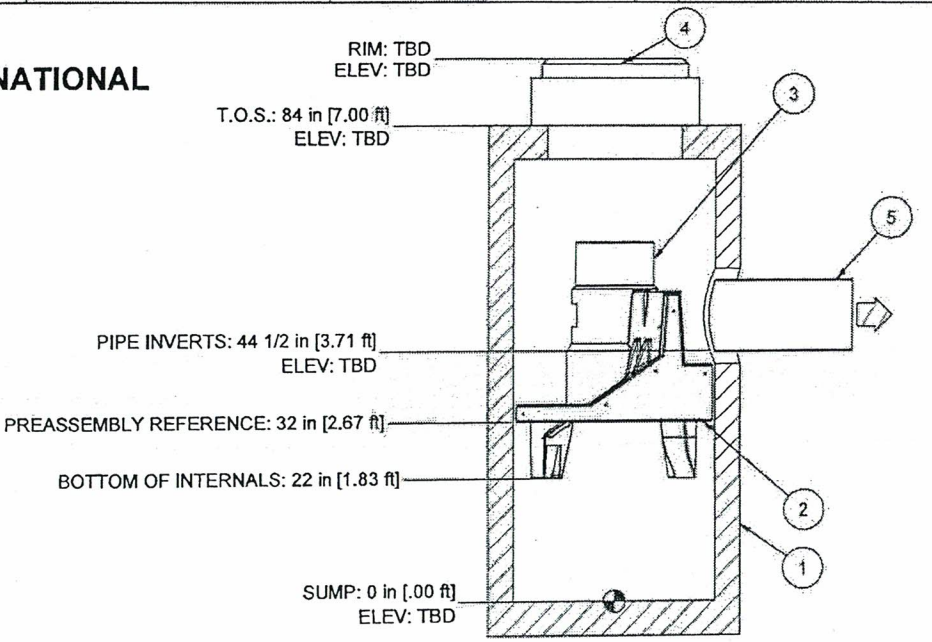
Stormceptor Information for comparison

If additional information is required, feel free to contact me.

David Mongeau
Regional Sales Manager
Direct: (207) 450-5964
dmongeau@hydro-int.com

NOT FOR CONSTRUCTION
- PLEASE CONTACT HYDRO INTERNATIONAL FOR A SITE SPECIFIC DETAIL





SECTION A-A

CAPACITIES:

1. PEAK HYDRAULIC FLOW: 15.0 cfs (424 l/s)
2. TREATMENT FLOW: 0.84 cfs (23.78 l/s)
3. SEDIMENT STORAGE CAPACITY: 0.4 cu. yd. (0.3 cu. m.)
4. OIL STORAGE CAPACITY: 125 gal. (473 liters)
5. MAXIMUM INLET/OUTLET PIPE DIAMETERS: 18 in. (450 mm)

PRODUCT SPECIFICATIONS:

A. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
B. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
C. The treatment system shall convey the Peak On-line Flow Rates of up to 15 cfs without causing upstream surcharge conditions. Full-scale independent laboratory scour testing shall demonstrate effluent control of less than or equal to 5 mg/L for all flows up to 200% of MTFR-106.
D. The treatment system shall be capable of capturing and retaining fine silt and sand size particles. Analysis of captured sediment from full-scale field installations shall demonstrate particle sizes predominately in the 20-micron range

PARTS LIST

ITEM	QTY	SIZE (in)	DESCRIPTION	TYPE
1	1	36	I.D. PRECAST MANHOLE	
2	1		LEDGER SUPPORT	
3	1		SEPARATION MODULE	
4	1	24	FRAME AND GRATE (SQUARE)	
5	1	12	OUTLET PIPE (BY OTHERS)	PVC

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERENCES ARE:

FRACTIONS ± 1/16
DECIMALS ± .06
ANGLES ± 1°

PROJECTION

COMMENTS:
1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

REVISION HISTORY			
REV	BY	DESCRIPTION	DATE
-		FIRST RELEASE	

DATE: 1/23/2017
SCALE: NTS
DRAWN BY: BL
CHECKED BY:
APPROVED BY

TITLE:
3-ft DIAMETER
FIRST DEFENSE HIGH CAPACITY

GENERAL ARRANGEMENT

NOT FOR CONSTRUCTION

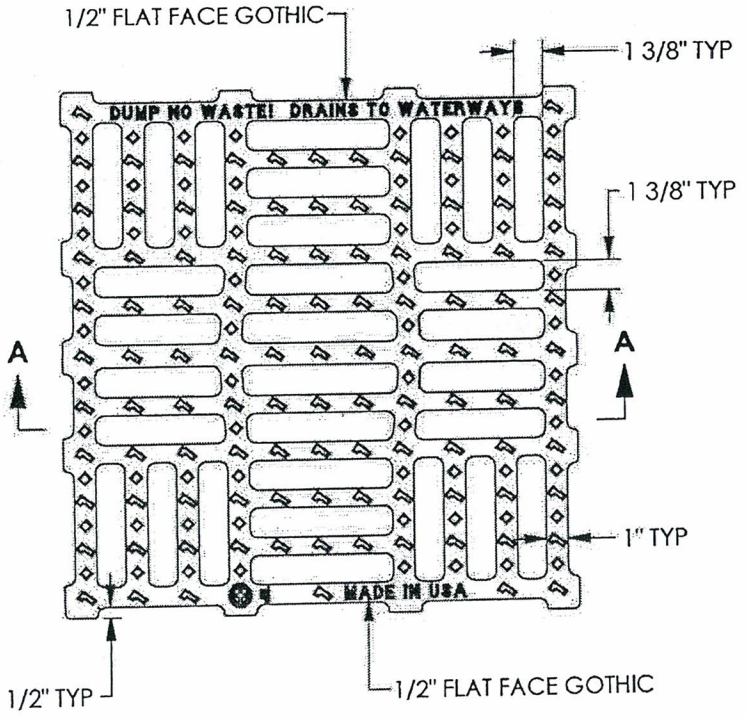
GENERAL ARRANGEMENT

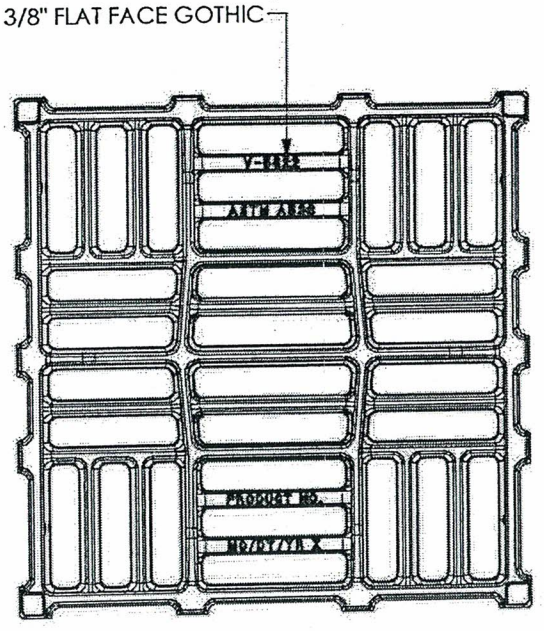
Hydro International

94 Hutchins Drive
Portland, ME 04102
Tel: +1 (207) 756-6200
Fax: +1 (207) 756-6212
hydro-int.com

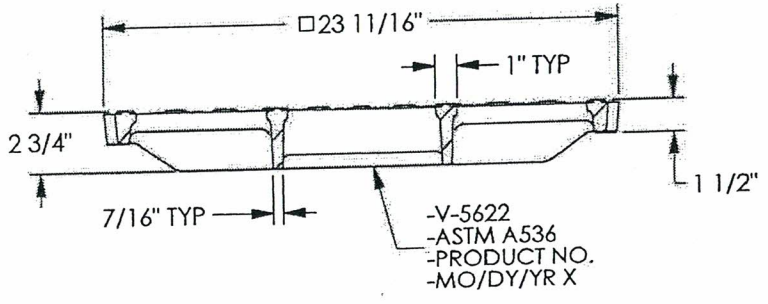
APPROX WEIGHT: N/A
MATERIAL:
NEXT ASSEMBLY: 17_12_0000-NEXT ASSY
DRAWING NO.: 17_12_0000-FDHC GA
SHEET SIZE: B
SHEET: 1 OF 1
REV: -

V5622 Grate





BOTTOM VIEW



SECTION A-A

Product Number
45622050

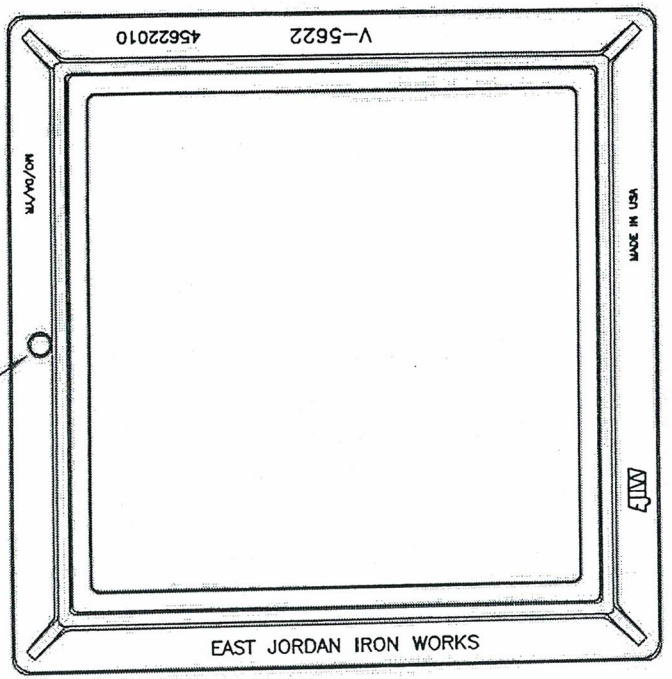
Design Features
-Materials
Ductile Iron (70-50-05)
-Design Load
Heavy Duty
-Open Area
274 sq. in.
-Coating
Undipped
-√ Designates Machined Surface

Certification
-ASTM A536
-AASHTO M306
-
-Country of Origin: USA

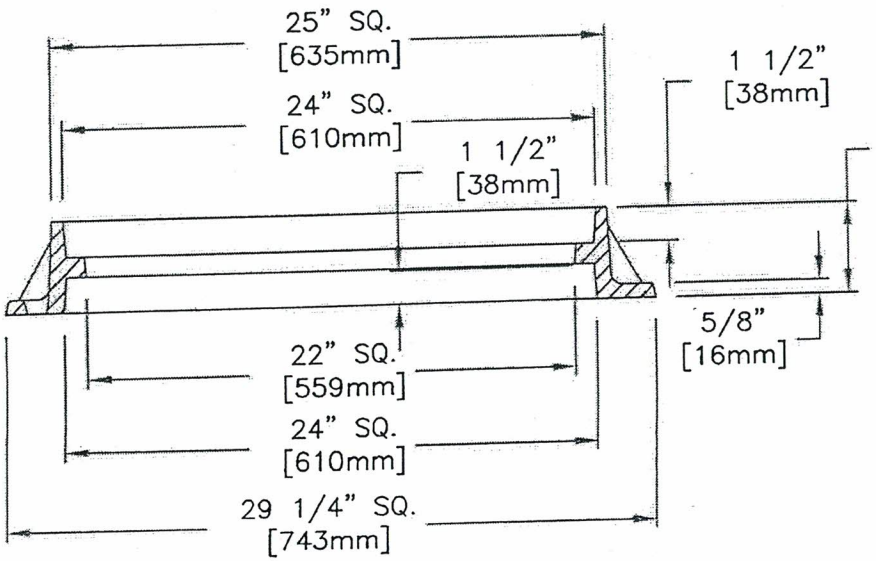
Drawing Revision
01/21/2016 Designer: KK
04/19/2017 Revised By: KK

Disclaimer
Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact
800 626 4653
ejco.com



7/8" (22mm) DIA
LIFT HOLE



FRAME SECTION

NOTE:
FRAME IS REVERSIBLE
BOTTOM FLANGE V-5622
TOP FLANGE V-5822

EAST JORDAN
IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN	DATE
PFB	08/09/00
APPROVED	DATE

CATCH BASIN
FRAME

PRODUCT NO.
45622010
UNDIPPED

CATALOG NO.
V-5622

REF. PRODUCT DRAWING
45622010

EST. WT.
FRAME: 120 LBS 54kg

OPEN AREA
N/A

MAT'L SPEC.
FRAME - GRAY IRON
ASTM A48 CL35

LOAD RATING
HEAVY DUTY

Hydro International®

Turning Water Around...®

First Defense® Materials and Design

A. Structures for precast stormwater treatment systems shall conform to ASTM C478, C857 and C858 and meet the following additional requirements:

1. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 loading requirements as determined by a licensed professional engineer.

2. Sections shall have tongue and groove or ship-lap joints with butyl mastic sealant conforming to ASTM C 990.

3. Cement shall be Type II or Type III Portland cement conforming to ASTM C150.

4. Aggregates shall conform to ASTM C33

5. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi and shall have a 28 day compressive strength of 5000 psi.

6. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with hydraulic cement conforming to ASTM C595M.

B. Internal stainless steel components shall be grade 304 stainless steel in accordance with ASTM A314.

C. 4' & 6' diameter internal plastic components shall be rotationally molded from linear low density polyethylene.

D. Casting for manhole frames and covers shall be in accordance with ASTM A48, CL. 35B and AASHTO M306. Castings shall be placed on top of the structure per the requirements of the project engineer.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

inspired by HX

First Defense® High Capacity

A Simple Solution for your Trickiest Sites

Verified by NJCAT and NJDEP

Product Profile

The First Defense® High Capacity is an enhanced vortex separator that combines an effective stormwater treatment chamber with an integral peak flow bypass. It efficiently removes sediment total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® High Capacity is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (**Table 1**, next page).

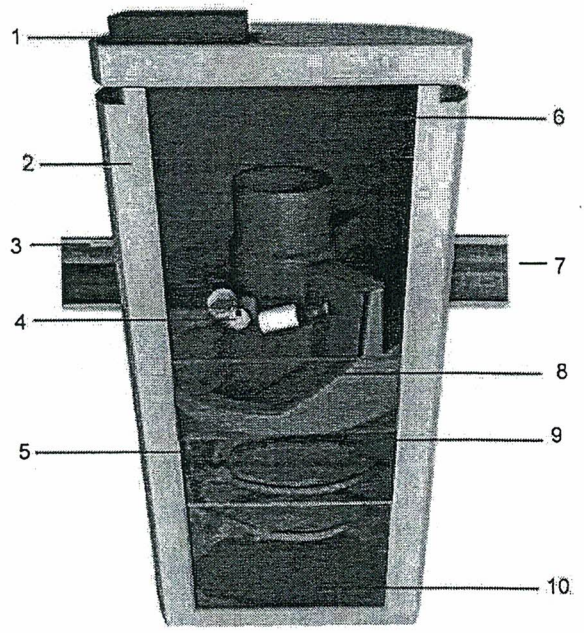
Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 450% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

Fig.1 The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at peak flows.



Components

1. Inlet Grate (optional)
2. Precast chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet pipe
8. Oil and Floatables Storage
9. Outlet chute
10. Sediment Storage Sump

How it Works

The First Defense® High Capacity has internal components designed to remove and retain gross debris, total suspended solids (TSS) and hydrocarbons (**Fig.1**).

Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

First Defense® High Capacity

Sizing & Design

This adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now, contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense® High Capacity allows engineers to maximize available site space without compromising treatment level.

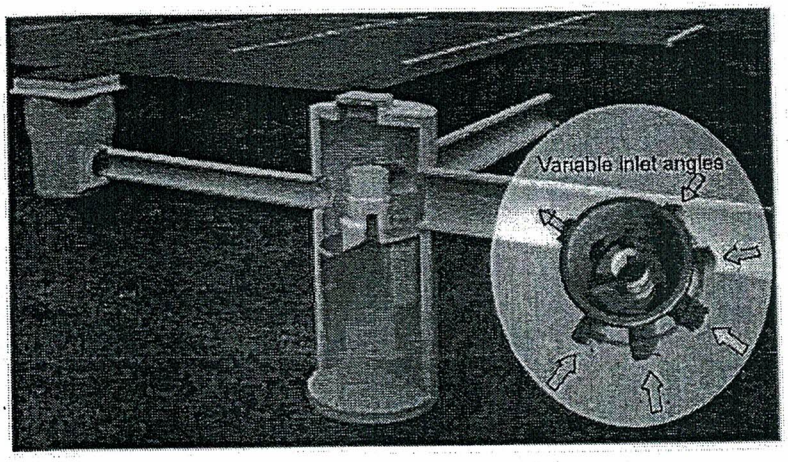


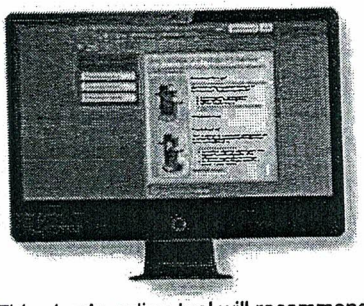
Fig 2. Works with multiple inlet pipes and grates

Inspection and Maintenance

Nobody maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients.

Call 1 (800) 848-2706 to schedule an inspection and cleanout or learn more at hydro-int.com/service

Sizing Calculator for Engineers



This simple online tool will recommend the best separatror, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizing to access the tool.

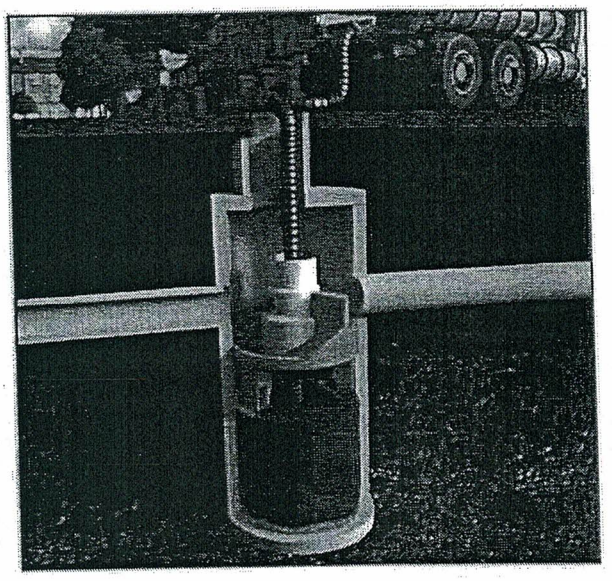


Fig 3. Maintenance is done with a vactor truck

Table 1. First Defense® High Capacity Design Criteria.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	110µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	1.06 / 30.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 53.2	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.34 / 66.2	2.94 / 83.2	20 / 566	24 / 600	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.23 / 119.8	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

Technical Abstract

First Defense® - High Capacity

NJCAT Verified Performance Testing – OK110 (D_{50} = 108 µm) Particle Sizes Range

Introduction

Hydro International has a state-of-the-art hydraulics and test facility that is used both to develop products and to evaluate performance. Through controlled testing using industry standard test protocols, Hydro's treatment products are evaluated under varying hydraulic and sediment load conditions. With a known drainage area or water quality flow rate, these test results are used to benchmark treatment objectives and to select the correct model size.

A common stormwater treatment goal for manufactured treatment devices is to reduce the Total Suspended Solids (TSS) concentration by at least 80%. To comply with this goal, a silica-based test sand with known particle size gradation (PSD) and density is injected into the treatment system at different flow rates. With known TSS concentrations and particle sizes before and after treatment, efficiency curves are plotted and used to predict TSS reductions for a range of particle sizes.

U.S. Silica OK110 is a common test sand that has been used by the industry but is no longer available. However, its PSD can be replicated from a blend of silica sands having a wide range of particle sizes. This abstract summarizes test results based on a particle size range similar to OK110 for the First Defense® High Capacity (FDHC). All test protocols and results have been independently verified by the New Jersey Corporation for Advanced Technology (NJCAT).

First Defense High Capacity (FDHC)

The FDHC (Figure 1) has patented flow modifying internal components that create a gentle swirling flow path within the Vortex Chamber. The rotating flow creates low energy vortex forces that supplement gravitational settling forces to enhance separation of pollutants.

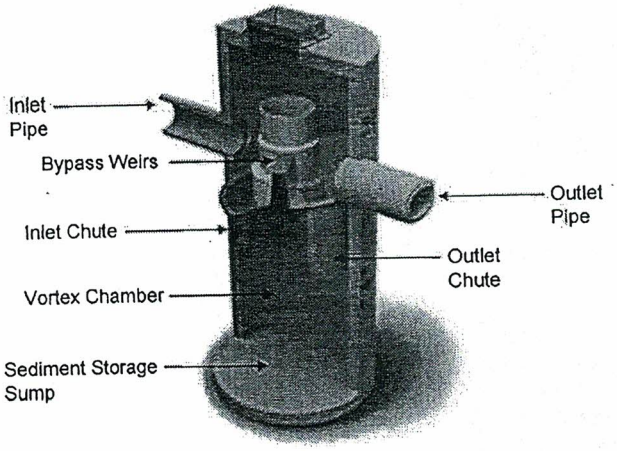


Figure 1 - First Defense High Capacity

The internal components are designed to fit into standard precast manholes and are installed to collect runoff as part of typical drainage network system. During a rain event, flow enters either from a surface inlet grate or inlet pipe. As flow enters the manhole, components divert flow and pollutants into a Vortex Chamber beneath a separation module, that includes both Inlet\Outlet Chutes and Bypass Weirs. The internal Bypass Weirs divert peak flows over the separation module and away from the Vortex Chamber where pollutants are collecting. This prevents high velocities from re-suspending captured pollutants during infrequent but large storm events.

Capable of providing high pollutant removals for a wide range of flow rates and pipe sizes, the FDHC can be installed ether online or offline depending on pipes and peak flows. Its efficiency and simplicity make it economical to install and maintain.

Laboratory Testing Arrangement

The laboratory setup (Figure 2) consisted of a recirculating closed loop system with an 8-inch (200 mm) submersible Flygt pump that conveyed water from a 23,000 gal (87,064 L) reservoir through a PVC pipe network to the 4-ft (1.2m) FDHC. The flow rate of the pump was controlled by a GE Fuji Electric AF-300 P11 Adjustable Frequency Drive and measured by an EMCO Flow Systems 4411e Electromagnetic Flow Transmitter. Test sand was injected into the incoming flow stream using a volumetric screw feeder situated 10-ft prior to entering the test unit.

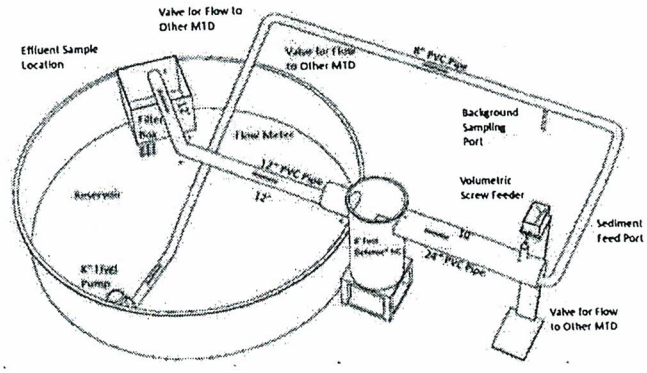


Figure 2 - Set-up of the Portland, Maine hydraulic testing facility

Test Sediment

The feed sediment injected into the inlet during removal efficiency testing was a blend of commercially available silica sands ranging from 2 µm to 1,000 µm. The PSD of the test sediment was analyzed by an independent laboratory in accordance with ASTM D 422-63. To evaluate the performance of the tested FDHC model for a particle size band similar to OK110, results were analyzed from the

First Defense® - High Capacity

particle sizes range of 50 µm to 150 µm (D_{50}=108µm). A comparison of the two gradations is shown in Figure 3, which shows the test sand gradation to be slightly finer than OK110 between 50µm and 100µm. For example, the test sand had 15% finer than 75 microns compared to the OK110 PSD that had only 3% less than 75 microns. Given finer particles are more difficult to settle, performance results based on the "OK110" particle size band of the test sand is considered conservative.

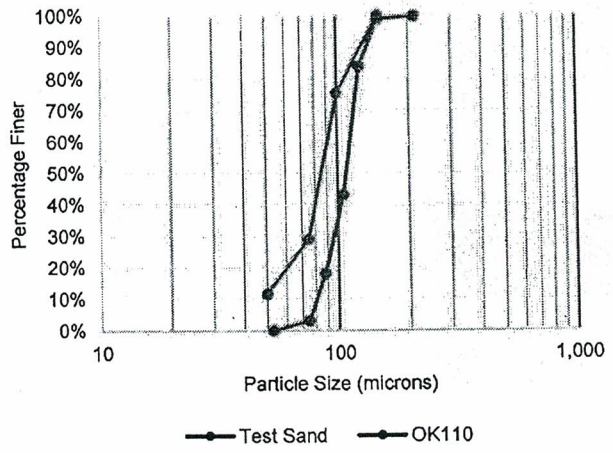


Figure 3 - Particle Size Distribution Comparison

Removal Efficiency Testing

Removal efficiency testing with the feed sediment was conducted in accordance with Section 5 of the NJDEP Laboratory Protocol for Manufactured Treatment Devices. Five flow rates ranging from 25% to 125% of the design treatment flow rate were evaluated.

The test sediment was fed into the flow stream at a rate that was equivalent to 200 mg/L. The average influent TSS concentration was calculated using the total sediment mass and volume of water added during dosing. The influent concentration for each particle size band was calculated using the percentage of particles in each particle size band and known average inlet concentration. Three time-spaced effluent grab samples were composited and analyzed using laser diffraction (ISO 13320) to evaluate the effluent particle sizes.

Table 1 – OK110 Particle Size Range Test Results

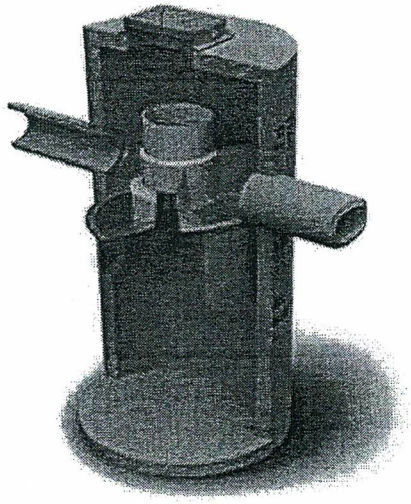
Flow cfs (L/s)	Inlet Conc mg/L	Outlet Conc mg/L	Removal %
0.38 (10.8)	84	4.44	95
0.75 (21.2)	83	5.50	93
1.13 (32.0)	78	4.00	95
1.5 (42.5)	83	6.57	92
1.88 (53.2)	79	8.81	89

The average effluent sediment concentration of the three composited samples was also measured for each flow rate in accordance with ASTM D3977-97. The effluent concentration for each particle size band was then calculated using the average effluent composite concentration and percentage of particles in each particle size band.

Percent removed at each of the five tested flow rates is shown in Table 1. Inlet concentrations of the OK110 particle size range varied from 79-84 mg/L compared to 4-8.5 mg/L at the outlet. As expected, the highest concentration measured at the outlet was at the highest tested flow rate of 1.88 cfs (53.2 L/s). In general, the 4-ft FDHC removed greater than 80% of the OK110 particle size range for all tested flow rates. Table 2 provides "Treatment Flow Rates" for the available models.

Table 2 – FDHC Treatment Flow Rate for > 80% TSS

Model:	FD-3HC	FD-4HC	FD-5HC	FD-6HC	FD-8HC
Size:	3 ft (900 mm)	4 ft (1.2 m)	5 ft (1.5 m)	6 ft (1.8 m)	8 ft (2.4m)
cfs:	1.06	1.88	2.94	4.23	7.52
L/s:	29.9	53.2	83.2	119.8	212.9



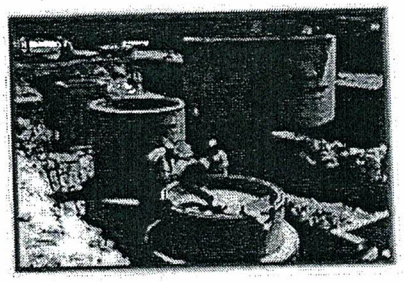
For design purposes the selected model's Treatment Flow Rate must be equal or greater to the site's required Water Quality Flow Rate. The peak flow rate and maximum pipe size must be considered to determine whether an online or offline configuration is appropriate. Full removal curves are available on request.

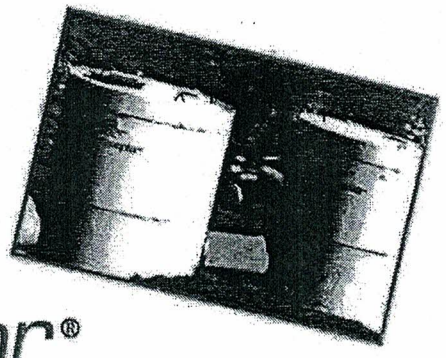
Refer First Defense product information brochure or visit www.hydro-int.com/us for more information

Hydro International. 94 Hutchins Drive. Portland. ME 04102
Tel: 207.756.6200 Fax: 207.756.6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

Stormwater Solutions

For Comparison Purposes





Stormceptor® STC

Stormceptor® is an underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention. With thousands of systems operating worldwide, Stormceptor delivers protection every day in every storm.

With patented technology, optimal treatment occurs by allowing free oil to rise and sediment to settle. The Stormceptor design prohibits scour and release of previously captured pollutants, ensuring superior treatment and protection during even the most extreme storm events.

Stormceptor is very easy to design and provides flexibility under varying site constraints such as tight right-of-ways, zero lot lines and retrofit projects. Design flexibility allows for a cost-effective approach to stormwater treatment. Stormceptor has proven performance backed by the longest record of lab and field verification in the industry.

Tested Performance

- Fine particle capture
- Prevents scour or release
- 95%+ Oil removal

Stormceptor STC Model	Inside Diameter	Typical Depth Below Inlet Pipe Invert [1]	Water Quality Flow Rate Q [2]	Peak Conveyance Flow Rate [3]	Hydrocarbon Capacity [4]	Maximum Sediment Capacity [4]
	(ft)	(in)	(cfs)	(cfs)	(Gallons)	(ft^3)
→ STC 450I	4	68	0.40	5.5	86	46
STC 900	6	63	0.89	22	251	89
STC 2400	8	104	1.58	22	840	205
STC 4800	10	140	2.47	22	909	543
STC 7200	12	148	3.56	22	1,059	839
STC 11000	2 x 10	142	4.94	48	2,792	1,086
STC 16000	2 x 12	148	7.12	48	3,055	1,677

[1] Depth Below Pipe Inlet Invert to the Bottom of Base Slab, and Maximum Sediment Capacity can vary to accommodate specific site designs and pollutant loads. Depths can vary to accommodate special designs or site conditions. Contact your local representative for assistance.
[2] Water Quality Flow Rate (Q) is based on 80% annual average TSS removal of the OK110 particle size distribution.
[3] Peak Conveyance Flow Rate is based upon ideal velocity of 3 feet per second and outlet pipe diameters of 18-inch, 36-inch, and 54-inch diameters.
[4] Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.

Rinker MATERIALS™

www.rinkerstormceptor.com
Manufacturing Plant: Westfield, MA
Phone: (413) 562-3647
11-22-13-R13-802 MDEP

Stormceptor®
www.stormceptor.com

2.4 Technical Specifications

The Stormceptor dimensions vary with the size of unit that is specified. Dimensions of the concrete Stormceptor units are provided in Table 5.

Table 5. Stormceptor Dimensions *

Model	Treatment Chamber Diameter	Pipe Invert to Bottom of Base Slab
450*i*	4'	68"
900	6'	63"
1200	6'	79"
1800	6'	113"
2400	8'	104"
3600	8'	144"
4800	10'	140"
6000	10'	162"
7200	12'	148"
11000*s***	10'	140"
13000*s***	10'	162"
16000*s***	12'	148"

* Depths are approximate
** Two vertical structures

Storage capacities for Stormceptor are provided in Table 6. The STCs series consists of two vertical structures, storage capacities represent the total storage for both chambers.

Table 6. Stormceptor Capacities

Model	Down Pipe Orifice	*Sediment Capacity (ft^3)	Oil Capacity (US Gal.)	Total (US Gal.)
→ 450*i*	6	9	86	470
900	6	19	251	952
1200	6	25	251	1234
1800	6	37	251	1833
2400	8	49	840	2462
3600	8	75	840	3715
4800	10	101	909	5059
6000	10	123	909	6136
7200	12	149	1059	7420
11000*s*	10	224**	2797**	11194**
13000*s*	10	268**	2797**	13348**
16000*s*	12	319**	3055**	15918**

* Capacity prior to recommended maintenance
** Total both structures combined

Hydrocarbon Spills

In the event of any hazardous material spill, Rinker Materials recommends maintenance be performed immediately. Maintenance should be performed by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required.

4.1 Recommended Maintenance Procedure

Oil is removed through the 6" inspection/oil port and sediment is removed through the 24" diameter outlet riser pipe. Alternatively, oil could be removed from the 24" opening if water is removed from the treatment chamber, lowering the oil level below the drop pipes.

The depth of sediment can be measured from the surface of the Stormceptor with a dipstick tube equipped with a ball valve (Sludge Judge®). Rinker Materials recommends maintenance be performed once the sediment depth exceeds the guideline values provided in Table 8.

Table 8. Sediment Depths Indicating Required Maintenance*

Model	Sediment Depth
→ 450*i*	8" (200 mm)
900	8" (200 mm)
1200	10" (250 mm)
1800	15" (375 mm)
2400	12" (300 mm)
3600	17" (425 mm)
4800	15" (375 mm)
6000	18" (450 mm)
7200	15" (375 mm)
11000*s*	17" (425 mm)**
13000*s*	20" (500 mm)**
16000*s*	17" (425 mm)**

* *Depths are approximate*

** *Depths in each structure*

No entry into the unit is required for routine maintenance of the Inlet Stormceptor or the smaller disc insert models of the In-Line Stormceptor. Entry to the level of the by-pass may be required for servicing the larger in-line models. Any potential obstructions at the inlet can be observed from the surface. The by-pass chamber has been designed as a platform for authorized maintenance personnel, in the event that an obstruction needs to be removed, drain flushing needs to be performed, or camera surveys are required.

Typically, maintenance is performed by the Vacuum Service Industry, a well established sector of the service industry that cleans underground tanks, sewers, and catch-basins. Costs to clean a Stormceptor will vary based on the size of the unit and transportation distances. If you need assistance for cleaning a Stormceptor unit, contact your local Rinker Materials representative, or the Rinker Materials Stormceptor Information Line at (800) 909-7763.

Stormwater Solutions

Hydro International

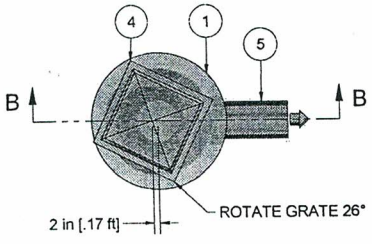
Turning Water Around...®

Massachusetts Installation List

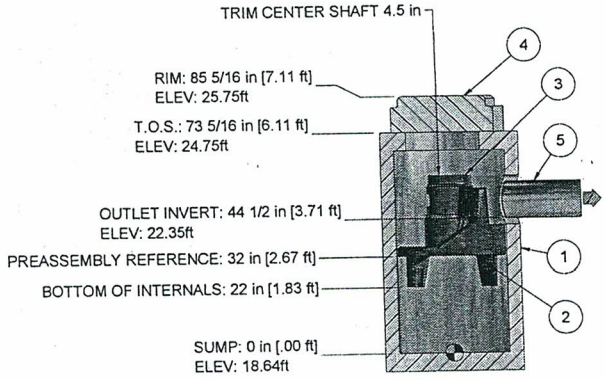
Abington
Acton
Acushnet
Amesbury
Amherst
Andover
Ashburnham
Ashland
Attleboro
Avon
Bedford
Belchertown
Bellingham
Berlin
Beverly
Billerica
Boston
Bourne
Braintree
Bridgewater
Brockton
Brookline
Burlington
Cambridge
Canton
Carver
Centerville
Charlton
Chatham
Chelmsford
Chelsea
Chicopee
Clinton
Cohasset
Concord
Conway
Danvers
Dartmouth
Dedham
Deerfield
Dennis
Devens
Dighton
Dover
Dracut
Duxbury
East Longmeadow
East Bridgewater
Easton
Edgartown
Erving
Everett
Fairhaven
Fall River
Falmouth
Fitchburg
Foxborough
Framingham
Franklin
Freetown
Gardner
Georgetown
Gill
Grafton
Granby
Groveland
Hadley
Hanover
Harwich
Hingham
Holbrook
Holden
Hopedale
Hopkinton
Hudson
Hull
Ipswich
Kingston
Lakeville
Lancaster
Lawrence
Leicester
Leominster
Lexington
Lowell
Lunenburg
Lynn
Lynnfield
Mansfield
Marblehead
Marion
Marlborough
Marshfield
Medfield
Medford
Medway
Melrose
Methuen
Middleborough
Middleton
Milford
Millbury
Millis
Milton
Nantucket
Natick
Needham
New Bedford
Newbury
Newton
Norfolk
North Adams
North Andover
North Attleborough
North Reading
Northampton
Northborough
Norwell
Norwood
Norton
Oak Bluffs
Orleans
Oxford
Peabody
Pembroke
Pittsfield
Plainville
Plymouth
Plympton
Provincetown
Quincy
Randolph
Raynham
Rehoboth
Revere
Rochester
Rockland
Rutland
Salem
Salisbury
Saugus
Scituate
Seekonk
Sharon
Shrewsbury
Somerville
South Hadley
South Yarmouth
Southbridge
Spencer
Springfield
Sterling
Stoneham
Stoughton
Sturbridge
Sudbury
Sutton
Swampscott
Taunton
Tewksbury
Topsfield
Tyngsboro
Uxbridge
Wakefield
Walpole
Waltham
Wareham
Warren
Watertown
Webster
Wellesley
West Boylston
West Bridgewater
Westborough
Westfield
Westford
Westminster
Weston
Westwood
Weymouth
Whitinsville
Whitman
Williamstown
Wilmington
Winthrop
Woburn
Worcester
Wrentham

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

inspired by HX



SECTION A-A
SCALE 1:30



SECTION B-B
SCALE 1:30

CAPACITIES:

1. PEAK HYDRAULIC FLOW: 15.0 cfs (424 l/s)
2. SEDIMENT STORAGE CAPACITY: 0.4 cu. yd. (0.3 cu. m.)
3. OIL STORAGE CAPACITY: 125 gal. (473 liters)
4. MAXIMUM INLET/OUTLET PIPE DIAMETERS: 18 in. (450 mm)

PRODUCT SPECIFICATIONS:

A. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
B. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
C. The treatment system shall convey the Peak On-line Flow Rates of up to 15 cfs without causing upstream surcharge conditions.
D. The treatment system shall be capable of capturing and retaining fine silt and sand size particles.

PARTS LIST

ITEM	QTY	SIZE (in)	DESCRIPTION	TYPE
1	1	36	I.D. PRECAST MANHOLE	
2	1		LEDGER SUPPORT	
3	1		SEPARATION MODULE	
4	1	24	FRAME AND GRATE (SQUARE)	
5	1	12	OUTLET PIPE (BY OTHERS)	HDPE

PROJECTION

IF IN DOUBT ASK

COMMENTS:
1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

REVISION HISTORY

REV	BY	DESCRIPTION	DATE
-	KM	FIRST RELEASE	9/24/2019

DATE: 9/24/2019
SCALE: 1:30
DRAWN BY: KM
CHECKED BY:
APPROVED BY

Title: FIRST DEFENSE HIGH CAPACITY 3-ft DIAMETER

CB-1
BRIDGE STREET COMMERCIAL DEVELOPMENT
FAIRHAVEN, MA

Patent: www.hydro-int.com/patents

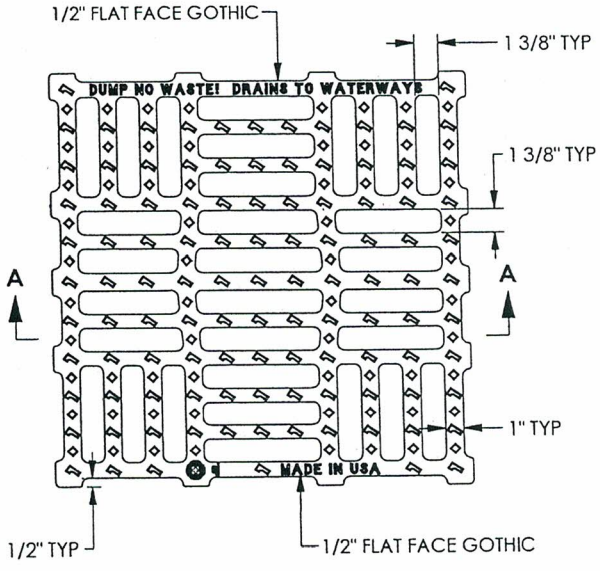
Hydro International
hydro-int.com
HYDRO INTERNATIONAL

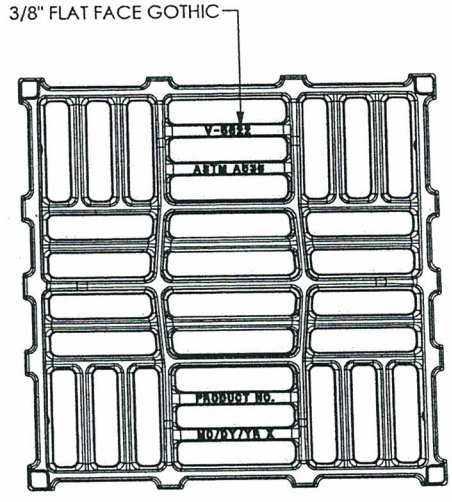
DO NOT SCALE DRAWING
STEEL FABRICATION TOLERANCES UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

LINEAR	ANGULAR
000 - 012in = ±0.04in	000 - 120in = ±1°
012 - 024in = ±0.06in	120 - 240in = ±0.5°
024 - 048in = ±0.09in	240in >>>> = ±0.25°
048 - 120in = ±0.12in	
120in >>>> = ±0.20in	

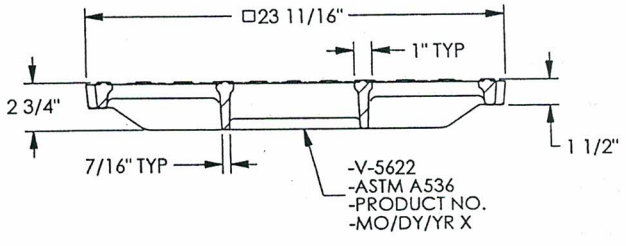
WEIGHT: N/A
MATERIAL:
STOCK NUMBER: 1
DRAWING NO.: 19_12_2677-3ftFDHC-1
SHEET SIZE: B
SHEET: 1 OF 1
Rev: -

V5622 Grate





BOTTOM VIEW



SECTION A-A

Product Number
45622050

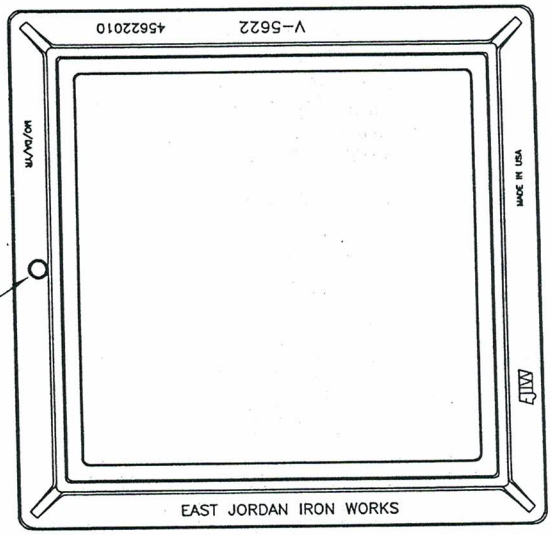
Design Features
-Materials
Ductile Iron (70-50-05)
-Design Load
Heavy Duty
-Open Area
274 sq. in.
-Coating
Undipped
-√ Designates Machined Surface

Certification
-ASTM A536
-AASHTO M306
-
-Country of Origin: USA

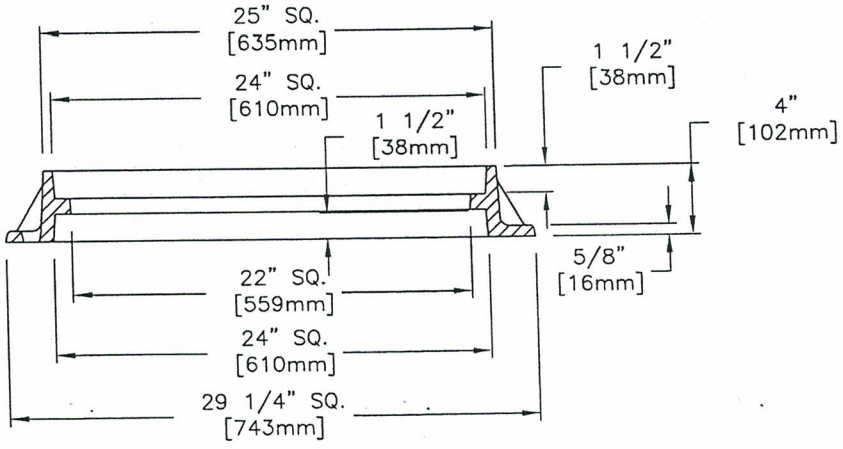
Drawing Revision
01/21/2016 Designer: KK
04/19/2017 Revised By: KK

Disclaimer
Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact
800 626 4653
ejco.com



7/8" (22mm) DIA
LIFT HOLE



FRAME SECTION

NOTE:
FRAME IS REVERSIBLE
BOTTOM FLANGE V-5622
TOP FLANGE V-5822

EAST JORDAN
IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN	DATE
PFB	08/09/00
APPROVED	DATE

CATCH BASIN
FRAME

PRODUCT NO.
45622010
UNDIPPED

CATALOG NO.
V-5622

REF. PRODUCT DRAWING
45622010

EST. WT.
FRAME: 120 LBS 54kg

OPEN AREA
N/A

MAT'L SPEC.
FRAME - GRAY IRON
ASTM A48 CL35

LOAD RATING
HEAVY DUTY

Hydro International®

Turning Water Around...®

First Defense® Materials and Design

A. Structures for precast stormwater treatment systems shall conform to ASTM C478, C857 and C858 and meet the following additional requirements:

1. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 loading requirements as determined by a licensed professional engineer.

2. Sections shall have tongue and groove or ship-lap joints with butyl mastic sealant conforming to ASTM C 990.

3. Cement shall be Type II or Type III Portland cement conforming to ASTM C150.

4. Aggregates shall conform to ASTM C33

5. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi and shall have a 28 day compressive strength of 5000 psi.

6. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with hydraulic cement conforming to ASTM C595M.

B. Internal stainless steel components shall be grade 304 stainless steel in accordance with ASTM A314.

C. 4' & 6' diameter internal plastic components shall be rotationally molded from high density polyethylene.

D. Casting for manhole frames and covers shall be in accordance with ASTM A48, CL. 35B and AASHTO M306. Castings shall be placed on top of the structure per the requirements of the project engineer.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

inspired by

Articles

A Comprehensive Approach to Verification of Stormwater Treatment Systems

Although innovative environmental and energy technologies often consume fewer natural resources than traditional methods, they encounter numerous technical, financial and regulatory impediments. Over the years, NJCAT has broken down many of the barriers, but there are still daunting challenges facing innovative technologies. Stormwater Management Technologies in particular are difficult to evaluate. Pollutant removal performance depends upon many factors, e.g., influent particulate size distribution, influent pollutant concentration (loading), stormwater flow rate, sump design and capacity, and maintenance. NJCAT's extensive involvement and activities over the past three years in identifying and evaluating a number of pre-manufactured stormwater treatment devices has created the knowledge and experience base necessary to effectively and confidently assess anticipated field removal performance.

The Energy and Environmental Technology Verification (EETV) Act at N.J.S.A. 13:1D-134 et seq., establishes the guidelines for a verification and certification process to approve the use of innovative energy and environmental technologies that benefit the environment and economy of New Jersey. The New Jersey Legislature found that, in establishing the technology verification and certification program, it is in the public's interest to encourage the commercial development and use of new technology-based environmental and energy related products, services and systems that abate and prevent environmental pollution and promote energy conservation in the most cost-effective and environmentally efficient manner in the State.

The New Jersey Stormwater rules clearly establish in 35 N.J.R. 154 that manufactured stormwater treatment devices may be used to meet the requirements of the subchapter provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the NJDEP.

The overall goal of the EETV Act is to encourage the development and implementation of innovative energy and environmental technologies. The EETV Act identifies the NJCAT as the third-party verification entity to evaluate innovative energy and environmental technologies. The stormwater rules in a more focused way underscore that NJCAT verification of an innovative technology must attest to the claims made to satisfy the regulatory requirements of the respective NJDEP programs. In addition, the development and evaluation of the technologies must be verified to satisfy acceptable scientific/engineering principles and protocols, and offer an overall net beneficial effect to human health and the environment.

After a verification of an innovative energy or environmental technology it is submitted to the NJDEP certification review process. However, the certification will only be given after the department determines that all regulatory requirements that apply to the technology have been satisfied, and the technology has been shown qualitatively and quantitatively to provide a net beneficial effect to human health and the environment. Upon certifying the verification of an innovative energy and environmental technology, the NJDEP is required to ensure the following:

- The regulatory programs issuing permits can rely on the verification process to establish contract provisions, protocols, policies, principles and/or technical guidance to develop expedited or more efficient timeframes for review and decision-making of permits or approvals associated with the verified innovative energy or environmental technology.

- In conjunction with partnership entities, develop and implement a series of outreach and education seminars that enable the deployment and expedited commercial use of the innovative energy or environmental technology.

- The State Treasurer to includes the innovative energy or environmental technology in appropriate State bid specifications.

NJCAT works closely with TARP, The Technology Acceptance and Reciprocity Partnership, which was formed by the states of California, Illinois, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, and Virginia. Through the development of common protocols, TARP provides uniform guidance protocols to collect and evaluate data on technology performance. These common protocols allow interstate sharing of scientifically credible, reliable data that enhances the ability of states to make scientifically sound defensible decisions. This program is designed to promote consistent standard and permit decisions while allows states' to take advantage of partnering state's technology evaluation, leading to faster and less resource intensive permit decisions.

Stormwater pollution, especially in developed urban areas is a leading cause of water quality degradation in U.S. rivers, lakes, streams, and other surface waters. Water quality problems associated with nonpoint sources of pollution, particularly stormwater, are being addressed by federal mandates that affect all states. Expansion of the National Pollutant Discharge Elimination System (NPDES) Phase II, Storm Water Regulations, requires stormwater plans from thousands of municipalities nationwide, and a renewed focus

on the total maximum daily load (TMDL) provisions in the Clean Water Act brings unprecedented attention and increased resources to stormwater control issues. These programs also are predicted to have a significant influence on the rate at which new technologies enter the marketplace.

To support responsible use of stormwater technologies, the Technology Acceptance Reciprocity Partnership (TARP) Protocol (Tier II) for Stormwater Best Management Practice Demonstrations has been endorsed by California, Massachusetts, Maryland, New Jersey, Pennsylvania, and Virginia. All technologies accepted through the NJCAT verification model and certified by NJDEP will be required to participate in a TARP Tier II stormwater demonstration.

The TARP Demonstration Protocol is designed to be flexible and inclusive of both structural and nonstructural best management practices (BMPs). The Protocol primarily deals with the demonstration of BMPs that are designed for one or more of the following: 1) directing and distributing flows; 2) reducing erosive velocities; and 3) removing contaminants such as suspended or dissolved pollutants from collected stormwater through physical and chemical processes such as settling, media-filtering, ion-exchange, carbon adsorption, and precipitation. Current BMPs used in industrial, municipal, and construction stormwater pollution control applications, include vegetated swales, detention basins, infiltration basins, wet ponds, constructed wetlands, media filtration, bioretention, and sedimentation units (e.g., hydrodynamic structures, oil/sediment separators, and screen separators).

The TARP Demonstration Tier II Protocol involves extensive data gathering in the field over a minimum 12-month period to assess the annual pollution removal (e.g.,TSS) efficiency. As mentioned earlier NJCAT's performance verification based on laboratory and/or field data is required for the NJDEP to grant interim certification allowing a technology provider to install a pre-manufactured stormwater treatment unit in New Jersey. NJCAT has been asked by NJDEP to review vendor Quality Assurance Project Plans to ensure conformance with the TARP Protocol.

Technology has a clear role to play in the states innovative approach to stormwater management. Verified and certified stormwater technologies are now being incorporated in planning and design strategies to reduce site development impacts and meet targeted watershed objectives. Improved methods will lead to better stormwater quality control strategies, increased effectiveness of BMPs and other facilities, and better protection of receiving water quality.

Contact Rhea Weinberg Brekke, Executive Director, NJCAT, for more information.