

**SERVICING & STORMWATER MANAGEMENT REPORT**

**FOR**

**PROPOSED RESIDENTIAL DEVELOPMENT**

**AT 63 ALBANY STREET,**

**OSHAWA, ONTARIO**

**October 23, 2024**

Prepared by:



**Jain Infrastructure Consultants Ltd.**

7405 East Danbro Crescent, 2<sup>nd</sup> Floor

Mississauga, Ontario

L5N 6P8 , Canada

Tel: (905) 285-9900

Fax: (905) 567-5246

**1.0 BACKGROUND OF THE PROJECT**

The purpose of this report is to present the connections for sanitary sewage disposal, water distribution, storm drainage and appropriate measures to mitigate the impact of runoff with the proposed redevelopment. Adequacy of the pipe sizes to convey 1-year storm flows from the development is analysed for existing system and proposed network.

The subject site is located at south of Albany Street between Front Street and Albert Street as shown in Figure 1.

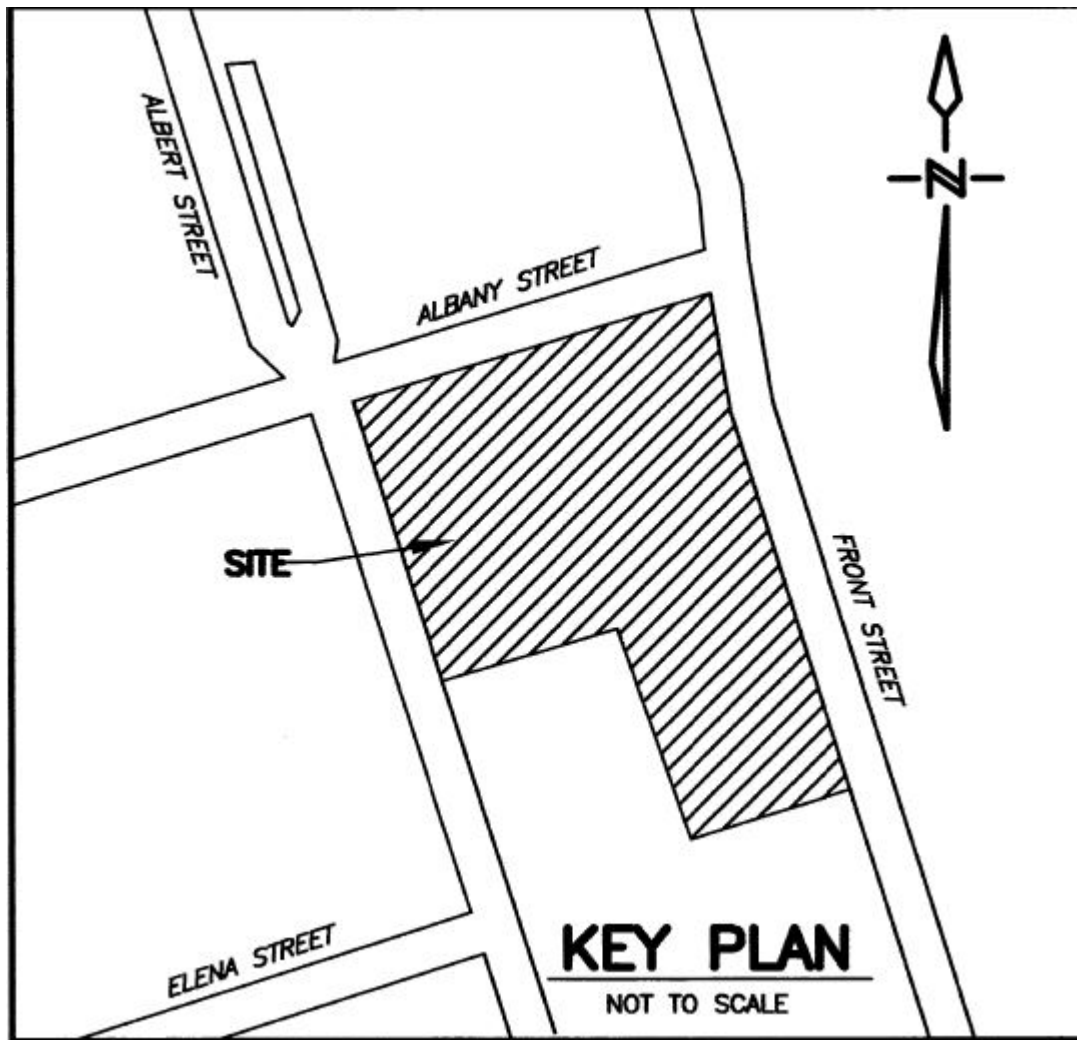


Figure 1 - Site Location Plan

## 2.0 INTRODUCTION:

A legal and topographic survey has been prepared by ertl surveyors (Ontario Land Surveyors) dated March 17, 2010 which identifies the site as part of Block A registered plan 279, City of Oshawa, Regional Municipality of Durham.

The site has approximately 0.64 ha area, with asphalt parking area in addition to vacant land covered with grass and trees. It is proposed to redevelop the site for construction of a podium with multi-story tower and 2 blocks of 3 story townhouses.

New building and townhouse ground floor level are shown on drawing C102. The existing grades around the site are proposed to be matched at the boundary limits. Proposed site servicing, grading and storm drainage plans are submitted separately as full-size drawings with this report.

Potential stormwater management (SWM) strategies to mitigate any potential impacts as per City of Oshawa design guidelines and *CLOCA SWM submission guidelines, 2020* are presented in the report. New site servicing requirements for sanitary and water supply will also be discussed in the following sections.

## 3.0 STORMWATER MANAGEMENT CRITERIA AND METHODOLOGY

The proposed development shall follow the respective criteria/guidelines of the City of Oshawa. The criteria for small new developments are summarized below (*Engineering Design Criteria City of Oshawa, August 2002*) and *CLOCA SWM submission guidelines, 2020*.

- **Water Quantity Control** – According to City of Oshawa’s criteria no quantity control will be required for the site;
- **Water Quality Control** - long-term average removal of 80% of total suspended solids (TSS) on an annual loading basis from a minimum 90% of the runoff volume runoff leaving the site;
- **Erosion & Sediment Control** – Mitigation measures to control construction related sediment and silt control;

### 3.1 Storm Drainage Runoff Coefficients

The existing land use of this site includes grass area, walkway and parking. Pre-development runoff coefficients are calculated based on existing land use of the site, as shown in Figure DR01 (Appendix A). Calculations for pre and post-development imperviousness are given in Appendix B and are summarized below. As per city criteria for receiving storm sewers, the site does not require quantity control.

**Table 1 – Runoff Coefficients**

Drainage Area (Hectare)	Runoff coefficient ‘C’ (Pre-development)	Runoff coefficient ‘C’ (Post-development)
0.64	0.66	0.70

Runoff coefficients are increased as per MTO design chart 1.07 for large storm event (i.e. For return period of more than 10 years, increase above values as 25- year – add 10%, 50-year - add 20%, 100-year - add 25%)

**3.2 Water Quantity Control:**

As per City, there is no requirement for onsite stormwater quantity control. The external areas on the west side of property are identified as single-family houses as shown on drainage area plan drawings DR1 & DR2 attached in Appendix A. The drainage from external areas flows along the property line to the west and does not enter into site due to the proposed retaining wall that is at higher elevation than the adjacent property. The flow directional arrows are shown on site grading plan C102 and cross-section at property limit added on site servicing plan C101 ensure that the external area does not drain into the proposed site.

**3.3 Water Quality Control:**

A Jellyfish is proposed to achieve quality control criteria for the site. The sizing calculations are based on the rainfall data for Toronto Central station and the fine particle distribution.

Table 2 summarizes the predicted treatment efficiencies for the selected model. Details are presented in Appendix E.

**Table 2 – Jellyfish Sizing Summary**

Jellyfish Model	Area Covered (ha.)	Annual Runoff Treated (%)
JF6-3-1	0.64	>90%

The location and details of Jellyfish are shown on Drawing C101.

**4.0 MINOR SYSTEM DRAINAGE**

Proposed site storm sewer network will convey the site drainage to an existing 525mm dia. storm sewer on Front Street. Storm sewer design sheet is attached in Appendix D.

Area Drains are proposed for site runoff collection. Drawing C101 shows location, existing storm sewers and proposed site storm sewers network.

**4.1 Inlet capture Capacity Analysis with 50% blockage**

As per city comments, the inlet capture capacity to be checked for 50% blockage on Inlet grates. The site area excluding building towers and townhouse is 3000 m<sup>2</sup>. Three double area drains (total 8) are provided for drainage. The area served by each double area drain is calculated as  $3000/8 = 375 \text{ m}^2$ .

Zurn Z537 is selected for this purpose. The drain specs are attached in Appendix C which shows that the Open Grate Area per drain is 510 cm<sup>2</sup>. 50% blockage is assumed which reduces the open grate area to 255 cm<sup>2</sup>.

The 100 yr flow for the site area is calculated as follows,

From Town's IDF formula: (Table B1, Appendix B)

$$I = 203.31 \text{ mm/hr @ } t_c = 10.0 \text{ min. (Refer Table B2, Appendix B)}$$

Therefore,  $Q_{\text{Post development (Site Area Excluding Buildings)}} = 2.78 \times A \times I \times R$

$$\begin{aligned} &= 2.78 \times 0.0375 \times 203.31 \times 0.90 \\ &= 19.07 \text{ L/Sec} \\ &= \mathbf{0.019 \text{ m}^3/\text{sec}} \end{aligned}$$

Based upon a specified flow rate and head, the grate open area of the required drain can be calculated using the following equation:

$$Q = C_d A \sqrt{2gh}$$

where  $Q$  = Flow Rate ( $\text{m}^3/\text{sec}$ )

$C_d$  = Discharge Coefficient (Typically 0.67)

$A$  = Open Area of Grate ( $\text{m}^2$ )

$g$  = Acceleration ( $9.81 \text{ m}/\text{sec}^2$ )

$h$  = Head Above the Floor (m)

$$\begin{aligned} Q &= 0.67 \times .0255 \times \sqrt{2 \times 9.81 \times 0.10} \\ &= .0239 = 23.93 \text{ l/sec} \end{aligned}$$

Therefore 0.10 m head above the grate will provide the required 100 yr flow of 23.93 l/sec assuming 50% blockage. This means that top elevation of 102.80 at inlet AD1 with 0.10m head will allow a 0.40m clearance from the building FFE of 103.3. Refer FFE and grades shown on Drawing C102.

## 5.0 MAJOR SYSTEM DRAINAGE

The overland flow will not impact the building since the grading of the site ensures storm flows will be able to flow overland through the site without any impact to proposed buildings and adjacent site.

External Drainage from existing single family residential units on the west side are allowed to flow along the property line in a landscape strip as shown on Drawing C102 up to the Street.

## 6.0 SERVICE CONNECTIONS

### 6.1 Sanitary:

The details of the existing sanitary network available on surrounding streets is as follows:

- 200 mm Sanitary sewer on Albert Street
- 200 mm Sanitary sewer on Albany Street
- 375 mm Sanitary sewer on Front Street

A new sanitary sewer is proposed from the existing 375 mm sanitary sewer on Front Street as shown on drawing C101. The new 200mm sanitary sewer is proposed for the building.

Sanitary design peak flow is calculated as 10 l/sec based on the unit count, equivalent population and infiltration. Refer design sheet attached in Appendix D.

### 6.2 Domestic / Fire Water:

The details of the existing water main available on surrounding streets is as follows:

- 300 mm Watermain on Albert Street
- 300 mm Watermain on Albany Street
- 150 mm & 450 mm Watermain on Front Street

A new 100mm diameter domestic connection is proposed from the existing 300mm diameter water main on Albany Street. A tap in sleeve and valve along with a curb stop is proposed as shown in drawing C101.

Existing 150mm dia. connection is proposed to use as a fire connection. (Refer: Drawing C101)

The water meter and backflow preventer are provided as per Region Standard 240-041.

### Population:

The Project population is calculated as follows;

<b>Table 6.1 Population</b>			
Apartments	No. Units	Persons/Unit	Population
<b><i>Tower</i></b>			
Studio	4	1.5	<b>6</b>
1 Bedroom	185	1.5	<b>278</b>
2 Bedroom	102	2.5	<b>255</b>
3 Bedroom	6	3.5	<b>21</b>
<b>Town House</b>			
3 Bedroom	18	3.0	<b>54</b>
Total	315	-	614

**Water Demand:**

The water demand is calculated as follows;

<b>Table 6.2 Water Demand</b>	
<b>Parameter</b>	<b>Value</b>
Population	614
Water Demand per bed	364 L/Cap/day
Average Daily Demand	6.80 L/s
Maximum Daily Demand Factor	2
Maximum Daily Demand (MDD)	13.6 L/sec

**Fire Flow**

Fire flow demands have also been calculated for the proposed building as per guidelines of Fire Underwriter Survey based on the type of construction, largest floor area and other fire suppression related information. Fire flow demands have been calculated as 11,000 L/min (183 l/sec). Refer to Table D1, Appendix D for detailed analysis.

**Design Demand**

The proposed design demand is calculated as follows;  
 Max day + Fire = 13.6+183 = 196.6 l/sec (3117 USGPM)

**7.0 EROSION, DUST AND SEDIMENT CONTROL DURING CONSTRUCTION**

An erosion and sediment control strategy will be implemented during the construction to mitigate the transportation of silt from the site. Drawing C103 shows the silt fence and sediment control measures. The silt fence and other erosion control measures will reflect the construction phasing as shown in Drawing C103.

The following measures should be implemented with regular inspection and maintenance,

- Temporary silt fencing around the perimeter of the grading activities;
- Designated construction vehicle access should be laid with 50mm size rip rap as a vibration pad for mud tracking control;
- Dust Control measures should be followed during the construction;
- Erosion control measures to be removed only after the site is substantially stabilized with sod, and at the direction of the consultant or city staff.

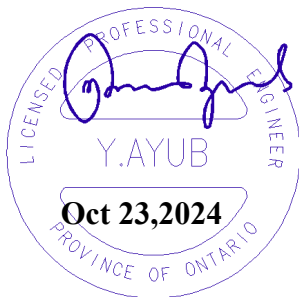
**8.0 CONCLUSIONS AND RECOMMENDATIONS**

- The proposed development will be provided with new water connections and sanitary and storm services will be connected to existing connections.
- According to City of Oshawa's criteria no quantity control will be required for the site.
- Quality control will be achieved through soft landscaped areas and oil/grit separator.
- Minor storm sewer network has been designed to connect to existing sewers in accordance with City of Oshawa storm sewer design criteria.
- Overland flow route through the site ensures that major overland flows are safely carried through the site.
- Erosion control such as installation of temporary silt fence, mud matt & rock check dams are recommended to minimize off-site sediment transport.

We trust you will find this submission complete and in order. Should you have any questions, please contact the undersigned.

Respectfully Submitted,

Jain Infrastructure Consultants Ltd.




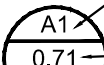
**Yasar Ayub, P. Eng.**  
**Project Manager**

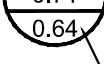


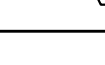
Appendix A  
**Figures**

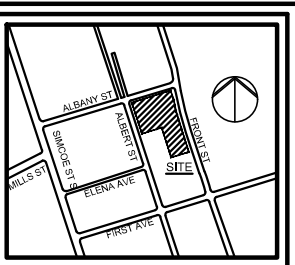
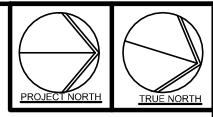
**LEGEND:**

 CATCHMENT AREA BOUNDARY

 CATCHMENT AREA No.

 CATCHMENT AREA IN HECTARES.

 WEIGHTED RUN-OFF COEFFICIENT



KEY PLAN  
(N.T.S)

TOPOGRAPHIC DATA  
PLAN OF PART OF BLOCK A  
REGISTERED PLAN 279  
CITY OF OSHTAWA  
REGION MUNICIPALITY OF DURHAM

INFORMATION TAKEN FROM ERTL SURVEYORS  
ONTARIO LAND SURVEYORS  
1234 REID STREET, UNIT 10, RICHMOND HILL L4B 1C1  
TELEPHONE (905) 731-7834 FAX (905) 731-7852  
DRAWING: 21675-18-2022-JAN-21.DWG

**BEARING NOTE**  
BEARINGS ARE ASTROMONIC AND ARE REFERRED TO THE WESTERLY LIMIT OF FRONT STREET, HAVING A BEARING OF N17°05'50"W AS SHOWN ON PLAN 40R-1255.

**BENCHMARK**  
ELEVATIONS ARE GEODETIC AND REFERRED TO CITY OF OSHTAWA B.M. NO. 98, ELEVATION = 100.084M



REVISION		
No.	DESCRIPTION	DATE
4	ISSUED FOR APPROVAL	AUG 23/24
3	ISSUED FOR APPROVAL	JUL 29/24
2	ISSUED FOR APPROVAL	JUL 15/24
1	ISSUED FOR APPROVAL	MAR23/22

**JAIN**

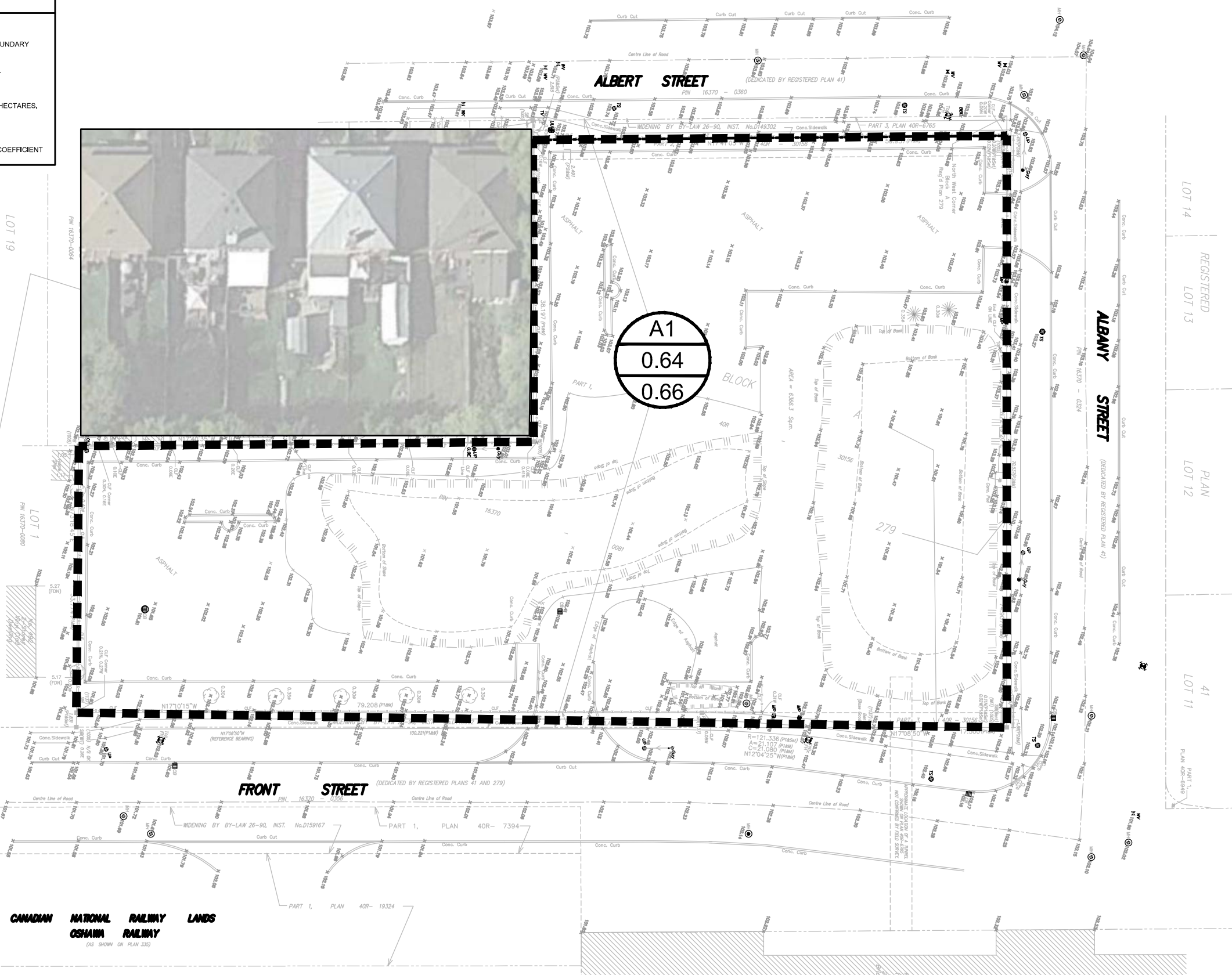
Jain Infrastructure Consultants Ltd.  
7405 EAST DANBRO CRESCENT  
MISSISSAUGA, ON L5N 6P8  
TEL: (905) 285-9900, FAX: (905) 567-5246  
Email: yayub@jainconsultants.com

PROJECT  
**RESIDENTIAL**  
63 ALBANY STREET,  
OSHTAWA, ONTARIO

DRAWING TITLE  
**PRE DEVELOPMENT  
DRAINAGE AREAS**

SCALE: (ARCH 36"x24") 1:250  
DATE: Aug. 23, 24  
DRAWN BY: CC  
CHECKED BY: YA

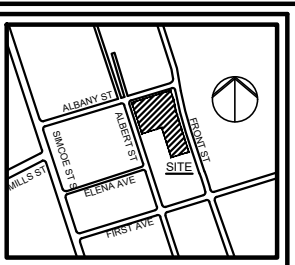
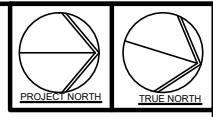
DWG No.  
**DR01**



**CANADIAN NATIONAL RAILWAY LANDS**  
**OSHTAWA RAILWAY**  
(AS SHOWN ON PLAN 330)

**LEGEND:**

- CATCHMENT AREA BOUNDARY
- CATCHMENT AREA No.
- CATCHMENT AREA IN HECTARES
- WEIGHTED RUN-OFF COEFFICIENT



KEY PLAN (N.T.S.)

TOPOGRAPHIC DATA  
 PLAN OF PART OF BLOCK A  
 REGISTERED PLAN 279  
 CITY OF OSHTAWA  
 REGION MUNICIPALITY OF DURHAM

INFORMATION TAKEN FROM ERTL SURVEYORS  
 ONTARIO LAND SURVEYORS  
 1234 REID STREET, UNIT 10, RICHMOND HILL L4B 1C1  
 TELEPHONE: (905) 731-7834 FAX: (905) 731-7852  
 DRAWING: 21675-15-2022-JAN-21.DWG

**BEARING NOTE**  
 BEARINGS ARE ASTROMONIC AND ARE REFERRED TO THE WESTERLY LIMIT OF FRONT STREET, HAVING A BEARING OF N17°08'50"W AS SHOWN ON PLAN 40R-1295.

**BENCHMARK**  
 ELEVATIONS ARE GEODETIC AND REFERRED TO CITY OF OSHTAWA B.M. NO. 98, ELEVATION = 100.084M



REVISION		
No.	DESCRIPTION	DATE
5	ISSUED FOR APPROVAL	OCT 23/24
4	ISSUED FOR APPROVAL	AUG 23/24
3	ISSUED FOR APPROVAL	JUL 29/24
2	ISSUED FOR APPROVAL	JUL 15/24
1	ISSUED FOR APPROVAL	MAR 23/22

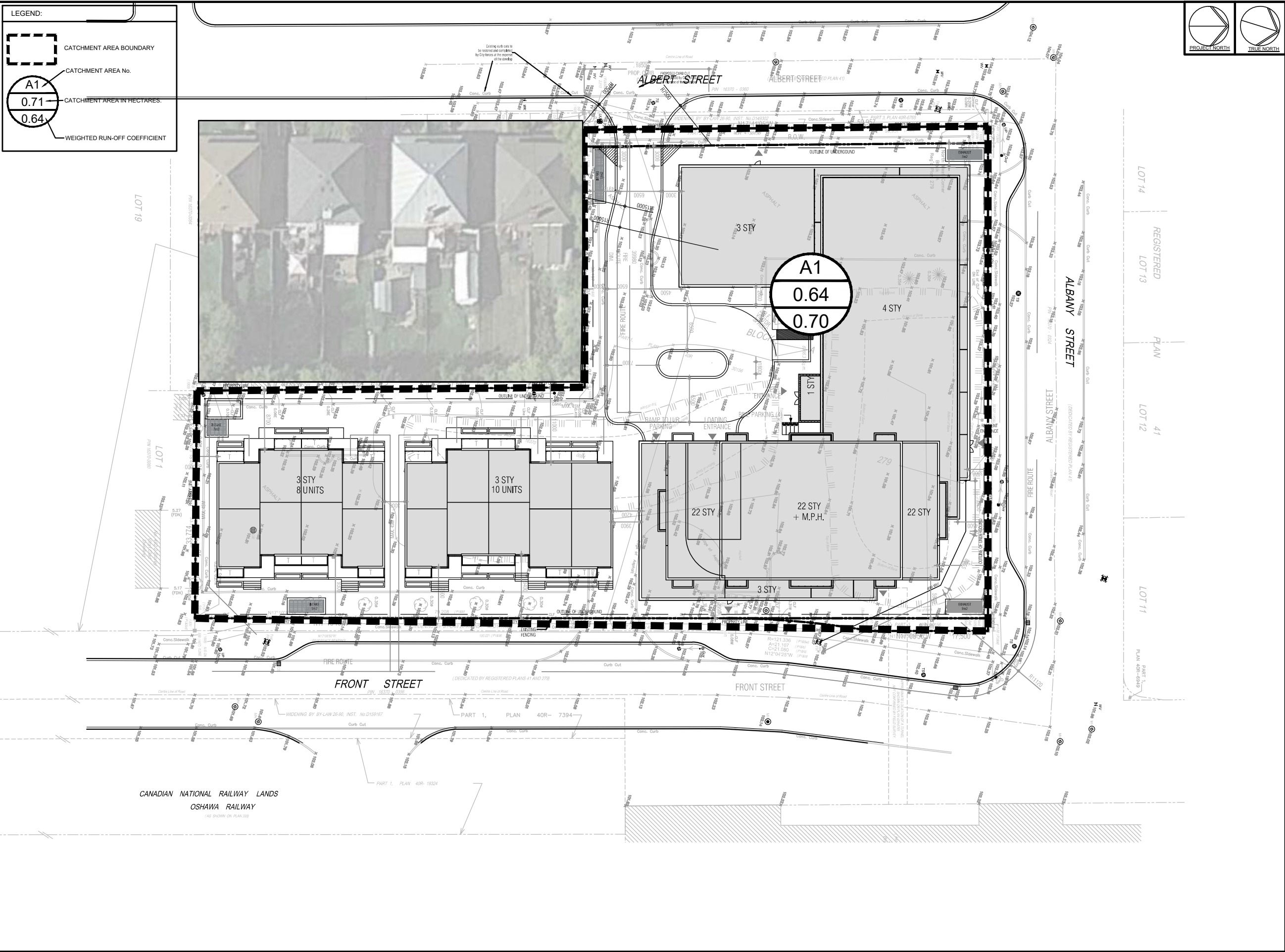
**JAIN**  
 Jain Infrastructure Consultants Ltd.  
 7405 EAST DANBRO CRESCENT  
 MISSISSAUGA, ON L5N 6P8  
 TEL: (905) 285-9900, FAX: (905) 567-5246  
 Email: yayub@jainconsultants.com

PROJECT  
**RESIDENTIAL**  
 63 ALBANY STREET,  
 OSHTAWA, ONTARIO

DRAWING TITLE  
**POST DEVELOPMENT  
 DRAINAGE AREAS**

SCALE: (ARCH 36"x24") 1:250  
 DATE: Oct 23, 24  
 DRAWN BY: CC  
 CHECKED BY: YA

DWG No.  
**DR02**



Appendix B

# Pre and Post Flow Calculations

## Calculation Sheet B-1

<b>Project:</b>	<b>63 Albany Street , Oshawa, Ontario</b>
<b>Project No.</b>	<b>2022-516</b>
<b>Date:</b>	<b>2024-08-22</b>

**PRE DEVELOPMENT RUNOFF COFFICIENT**

AREA TYPE	AREA (M <sup>2</sup> )	RUNOFF COEFFICIENT "R"	AREA x R
PAVED AREA	4,061.2	0.90	3655.08
LANDSCAPED AREA	2,382.1	0.25	595.53
ΣAREA X R			4250.61
WEIGHTED AVERAGE "R"			<b>0.66</b>
AREA "A" (Hectares)			0.64

Rainfall intensity calculated in accordance City of Oshawa:  $i = a/(t+b)^c$  (cm/hr)

Where:

t = Time of concentration(min)                      10.00

**Q=2.78 x (A x i x R) (liters/sec)**

Where:

Q= Runoff quantity (liters/second)

R = Runoff coefficient

A = Drainage Area (hectares)

i = Average rainfall intensity (millimeters/hour)

Ca = Antecedent Precipitation Index

Return Period (Years)	1 -Years	2 -Years	5 -Years	10 -Years	25 -Years	50 -Years	100 -Years
a	51.95	64.77	92.96	102.10	110.00	144.80	177.00
b	3.8	4.00	4.00	3.00	2.00	3.00	4.00
c	0.7755	0.7840	0.7860	0.7780	0.7780	0.8050	0.8200
T (mins)	10	10	10	10	10	10	10
Ca	1.00	1.00	1.00	1.00	1.10	1.20	1.25
R	0.66	0.66	0.66	0.66	0.73	0.79	0.82
I (cm/hr)	6.79	8.18	11.68	13.88	15.91	18.37	20.33
I (mm/hr)	67.86	81.81	116.80	138.80	159.14	183.67	203.31
<b>Q (l/sec)</b>	<b>80.19</b>	<b>96.67</b>	<b>138.02</b>	<b>164.01</b>	<b>206.86</b>	<b>260.45</b>	<b>300.30</b>

## Calculation Sheet B-2

<b>Project:</b>	<b>63 Albany Street , Oshawa, Ontario</b>
<b>Project No.</b>	<b>2022-516</b>
<b>Date:</b>	<b>2024-08-22</b>

### POST DEVELOPMENT RUNOFF COEFFICIENT

AREA TYPE	AREA (M <sup>2</sup> )	RUNOFF COEFFICIENT "R"	AREA x R
ASPHALT/ CONCRETE	1025.0	0.90	922.48
BUILDING	3463.3	0.90	3116.94
LANDSCAPED AREA	1942.7	0.25	485.68
	6143.5	ΣAREA X R	4525.11
		WEIGHTED AVERAGE "R"	<b>0.70</b>
		AREA "A" (Hectares)	0.64

Rainfall intensity calculated in accordance City of Oshawa:  $i = a/(t+b)^c$  (cm/hr)

Where:

t = Time of concentration(min)                      10.00

**Q=2.78 x (A x i x R) (liters/sec)**

Where:

Q= Runoff quantity (liters/second)

R = Runoff coefficient

A = Draingae Area (hectares)

i = Average rainfall intensity (milimeters/hour)

Ca = Antecedent Precipitation Index

Return Period (Years)	1 -Years	2 -Years	5 -Years	10 -Years	25 -Years	50 -Years	100 -Years
a	51.95	64.77	92.96	102.10	110.00	144.80	177.00
b	3.8	4.00	4.00	3.00	2.00	3.00	4.00
c	0.7755	0.7840	0.7980	0.7780	0.7780	0.8050	0.8200
T (mins)	10	10	10	10	10	10	10
Ca	1.00	1.00	1.00	1.00	1.10	1.20	1.25
R	0.70	0.70	0.70	0.70	0.70	0.70	0.70
I (cm/hr)	6.79	8.18	11.32	13.88	15.91	18.37	20.33
I (mm/hr)	67.86	81.81	113.16	138.80	159.14	183.67	203.31
<b>Q (l/sec)</b>	<b>85.37</b>	<b>102.92</b>	<b>142.35</b>	<b>174.60</b>	<b>220.22</b>	<b>277.27</b>	<b>319.69</b>

Appendix C  
Storm Drainage Design Sheet  
Area Drains Specifications

**City of Oshawa**  
**Engineering Department**  
**STORM SEWER DESIGN SHEET**  
**63 ALBANY STREET , OSHAWA, ONTARIO**

Jain Infrastructure Consultants Ltd.	
PREPARED BY:	UA
FILE No.:	2022-516
DATE PREPARED	22-Aug-24

DESIGN STORM:	1 YEAR RETURN
R (1-YEAR):	$51.95 / (T_c + 3.8)^{0.7755}$ , T <sub>c</sub> in minutes
T <sub>c</sub> (start):	T <sub>c</sub> 10.00 minutes

LOCATION	MANHOLES		A area (ha)	I runoff coeff.	A x I	ACC. A x I	T <sub>c</sub> (min)	R1 (cm/hr)	q (1-YR) (l/s)	STORM SEWER DESIGN INFORMATION					TIME OF FLOW SECT. (min)	%Load	REMARKS
	FROM MH #	TO MH#								size (mm)	slope (%)	length (m)	CAP (l/s)	Velocity (m/s)			
Building	BLDG	STM MH1	0.640	0.70	0.45	0.45	10.00	6.79	84	300	1.00	1.00	97	1.37	0.01	87.34	
Building	STM MH1	STM MH2	0.000	0.70	0.00	0.45	10.01	6.78	84	300	1.00	1.00	97	1.37	0.01	87.28	
Front St	STM MH2	EX MH 102	0.00	0.00	0.00	0.45	10.02	6.78	84	300	1.00	15.00	97	1.37	0.18	87.22	

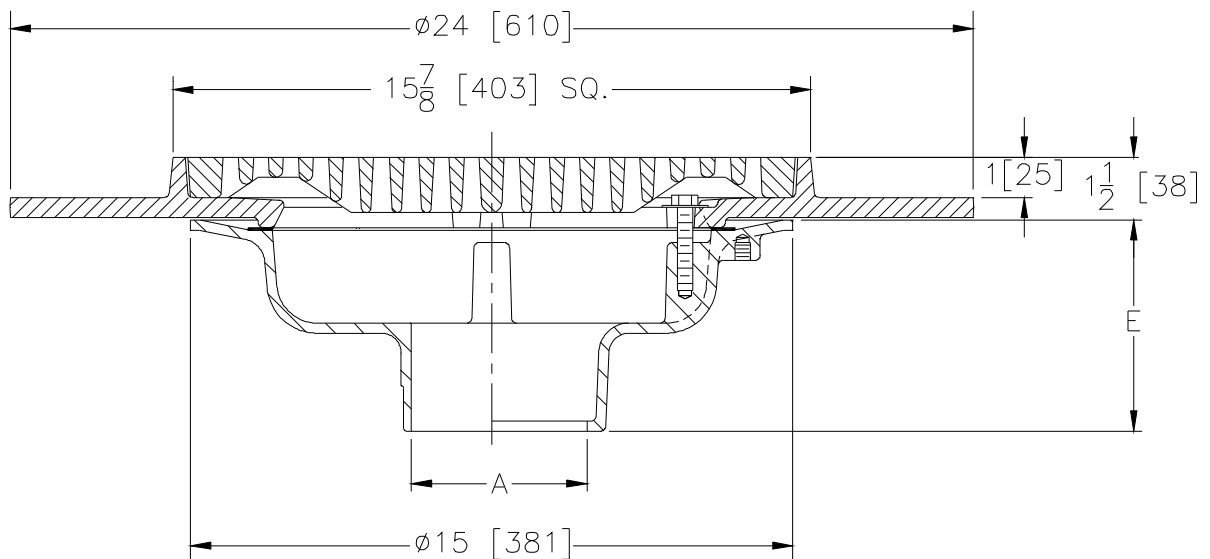


**Z537****15-7/8 [403] SQUARE TOP HEAVY-DUTY PARKING DECK DRAIN W/ SUPPORT FLANGE**

SPECIFICATION SHEET

TAG \_\_\_\_\_

Dimensional Data (inches and [ mm ]) are Subject to Manufacturing Tolerances and Change Without Notice



A Pipe Size In [mm]	Approx. Wt. Lbs. [kg]	Grate Open Area Sq. In. [cm <sup>2</sup> ]
2,3,4,6 [51,76,102,152]	122 [55]	79 [510]
8 [203]	124 [56]	

**ENGINEERING SPECIFICATION: ZURN Z537**

15-7/8" [403mm] Square top parking deck drain, Dura-Coated cast iron body with bottom outlet, heavy-duty gasketed drain support flange, with heavy-duty slotted ductile iron grate.

**OPTIONS** (Check/specify appropriate options)**PIPE SIZE**

3,4,6,8 [76,102,152,203]

3,4,6,8 [76,102,152,203]

2,3,4 [51,76,102]

**(Specify size/type) OUTLET**

\_\_\_ IP Threaded

\_\_\_ NH No-Hub

\_\_\_ NL Neo-Loc

**'E' BODY HT. DIM.**

3-3/4 [95]

5-1/4 [133]

4-5/8 [117]

**PREFIXES**

\_\_\_ Z D.C.C.I. Body and Top\*

\_\_\_ ZN D.C.C.I. Body with Polished Nickel Bronze Top (Add 3/16 [5] to 1-1/2 [38] Dim.)

**SUFFIXES**

\_\_\_ -C Underdeck Clamp

\_\_\_ -G Galvanized Cast Iron

\_\_\_ -VP Vandal-Proof Secured Top

\_\_\_ -Y Sediment Bucket

\* Regularly furnished unless otherwise specified.

**Zurn Industries, LLC | Specification Drainage Operation**  
 1801 Pittsburgh Avenue, Erie, PA U.S.A. 16502 · Ph. 855-663-9876, Fax 814-454-7929  
 In Canada | **Zurn Industries Limited**  
 3544 Nashua Drive, Mississauga, Ontario L4V 1L2 · Ph. 905-405-8272, Fax 905-405-1292  
[www.zurn.com](http://www.zurn.com)

Rev. G  
 Date: 09/27/2017  
 C.N. No. 137904  
 Prod. | Dwg. No. Z537



## TABLE OF CONTENTS

---

Introduction . . . . .	1
Application Index . . . . .	2
Product Compliance . . . . .	3
Top Loading – Classification . . . . .	3
General Information . . . . .	3
Floor Drain Sizing and Location . . . . .	4
How To Choose A Floor Drain . . . . .	4
Zurn Outlet Pipe Connections . . . . .	5
Neo-Loc Drain Gasket with Integral Test Cap . . . . .	6-7
Options and Variations . . . . .	8-9
Pictorial Index . . . . .	10-15
Replacement Grates (Round) . . . . .	16-18
Replacement Grates (Square) . . . . .	19-22
Replacement Buckets . . . . .	23-26
Typical Installations . . . . .	27-30
Materials and Finishes . . . . .	31
Product Descriptions . . . . .	33-110

## INTRODUCTION

---

### Floor Drains

Floor drains are standard fixtures throughout every commercial and institutional building. Floor drains serve the purpose of removing wastewater from floor areas discharging the water directly into the sewer and wastewater systems.

Floor drains come in all shapes and sizes. What separates floor drains apart from one another is its application. The Zurn Plumbing Products Group Specification Drainage Operation has been manufacturing drainage products for over 100 years. We have standard floor drains to meet the more common installation, as well as specialize in manufacturing drains for the not-so-common application.

By application, we are referring to where the drain is to be installed. For example, a floor drain in a typical corridor will not be exposed to as much water drainage compared to a floor drain located in a locker room. One of the key pieces of information needed for determining which floor drain best suits your application is knowing the maximum amount of water the floor drain may be exposed to. Even though the drain may not be continuously exposed to water, consideration should be given for times when abnormal conditions may exist.

Here is a simple check list of questions that may help you determine what product you need in most situations:

- What is the size of your pipe connection?
- Do you need a round or square top?
- Is the drain going to be in a finished area that requires a polished nickel or brass finish to match the decor?
- Does the drain require a special finish for added protection? (i.e., a galvanized finish if the drain may be exposed to severe water conditions; an acid resistant epoxy finish if the drain is repeatedly coming in contact with chemicals or highly concentrated cleaning materials.)
- What type of traffic is the drain going to be exposed to? Will it require a ductile iron grate suitable for heavier loads or vehicular applications?
- What other conditions might exist requiring you to consider other options?

Don't hesitate to call upon our engineers to help you find a drain that meets your specific application.

## APPLICATION INDEX

The Zurn Floor Drains below are recommended for the applications listed. Most Zurn Floor Drains can be readily adapted for use in finished areas by using Bronze or Nickel Bronze Grates and Strainers. (Use Prefix "ZB" or "ZN" preceding the product number in place of the usual "Z" Prefix.)

APPLICATION	RECOMMENDED PRODUCT
Automobile Parking Area	Z533, Z534, Z535, Z536, Z537, Z541, Z543, Z662, Z761, Z784, Z792, Z793, Z794
Basement and Subterranean Areas	Z560, Z566, Z568, Z730, Z753
Boiler House and Maintenance Areas	Z541-90, Z645, Z761
Clinical, Surgical, Detention Areas	Z300, Z310, Z315, Z319
Entrances and Concourses	Z340, Z587, Z664, Z665, Z667, Z780, Z784, Z792, Z793, Z794
Equipment Rooms, Computer Rooms, Laboratories	Z624, Z625, Z626, Z627
Finished Area/Gutter	Z572, Z573, Z574, Z575, Z576, Z585
Finished Interior Floor Areas Adjustable	ZN415, ZS415, ZN450, ZN453, ZN455, ZN456, ZS415, ZN529
Food Preparation Areas	Z320, ZN610-SS (Also See Sani-Flor Receptors – Z1900 Series)
Garage, Hangar and Service Areas	Z664, Z665, Z667, Z673, Z675, Z676, Z784, Z792, Z793, Z794
Volatile Liquid Interceptors	Z690, Z691
Indirect Waste Area (Condensate and Drip)	Z325, Z326, Z328, Z329, Z566, Z568, Z586
Industrial Areas – Vertical Adjustment	Z520, Z521, Z525, Z526, Z556
Extra Heavy Duty	Z503, Z516, Z541, Z610, Z645, Z662, Z664, Z668, Z673, Z675, Z676, Z679
Heavy Duty	Z504, Z505, Z508, Z509, Z511, Z512, Z513, Z517, Z520, Z521, Z526, Z532, Z539, Z541, Z543, Z545, Z548, Z575, Z609
Medium Duty	Z507, Z525, Z530, Z550, Z551, Z576, Z585, Z587, Z609, Z611, Z667, Z730, Z753
Traps and Backwater Valves	Z548, Z730, Z761
Pit Drains	Z629
Planting Area	Z348, Z349, Z350, Z352
Prison Cell (Multi-Purpose)	Z355, Z356
Roadways	Z610, Z668, Z673
Sur-Set Drains	Z538, Z540, Z554
Waste Disposal Areas	Z670 (See Sani-Flor Receptors – Z1982)

## PRODUCT COMPLIANCE

Zurn Floor Drains are constructed of high quality materials and, in general, are designed to meet the requirements of ASME Specification A112.6.3 (revision and redesignation of ANSI A112.21.1M). For an explanation of materials used, see Page 31.

## TOP LOADING – CLASSIFICATION\*

Selection of a Zurn Floor drain should be based on the load factor and the anticipated traffic. Many of Zurn's cast iron grates may be furnished in duresist iron when increased working load requirements are necessary. Specify duresist grate (-DG) when required or contact your Zurn representative when special applications are necessary. For a description of duresist iron, see Page 31.

Zurn drains are rated as follows: (Reference ASME Standard A112.6.3M)

### 6.1 Loading Classifications

Grates and top rims shall be designed to meet the following loading classifications.

**6.1.1 – Light Duty** All grates having safe live load (as calculated in para. 6.2.5) under 2000 lb. [900 kg].

**6.1.2 – Medium Duty** All grates having safe live load (as calculated in para. 6.2.5) between 2000 lb. [900 kg] and 4999 lb. [2250 kg].

**6.1.3 – Heavy Duty** All grates having safe live load (as calculated in para. 6.2.5) between 5000 lb. [2250 kg] and 7499 lb. [3375 kg].

**6.1.4 – Extra Heavy Duty** All grates having safe live load (as calculated in para. 6.2.5) between 7500 lb. [3375 kg] and 10,000 lb. [4500 kg].

**6.1.5 – Special Duty** Grates having safe live load (as calculated in para. 6.2.5) over 10,000 lb. [4500 kg] shall be considered special and treated accordingly.

### 6.2 Test Procedure for Grate Loading

Live Load – Requirements listed in 6.1 through 6.1.5 shall be determined as follows:

**6.2.1 – Load Classifications** Load classifications as stated in 6.1 shall be determined by laboratory tests.

**6.2.2 – Platen Size** A 3.5 in. [89 mm] diameter platen shall be applied to the center of the grate specimen.

**6.2.3 – Loading** Loading shall be applied slowly so that point of failure can be observed.

### 6.2.4 Point of Failure

(a) Brittle Materials (Cast Iron). The load (in pounds or kilograms) at which the first fracture on any part of the specimen appears.

(b) Ductile Material. The load which the permanent set (at the point of loading) is greater than 2% of the longest transverse dimension of the specimen.

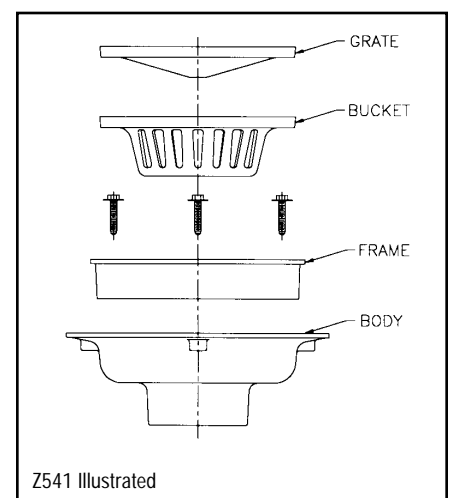
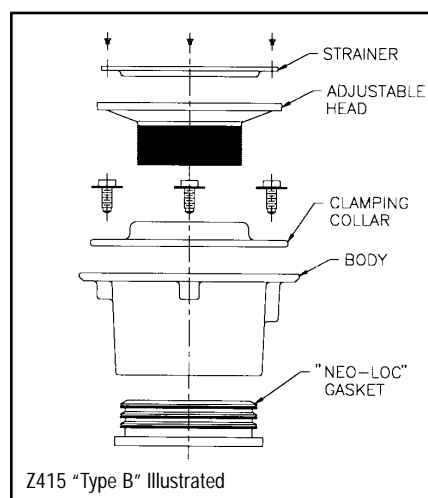
**6.2.5 – Grate Classification** The maximum safe live load is computed by dividing the load at failure by two.

\*Safe live load rating of grates is for general classification purposes only. For the actual load of any given grate, contact your Zurn representative. ZB and ZN 400 Series drain head assemblies are rated for light-duty applications only.

## GENERAL INFORMATION

Zurn floor drains are generally made up of a body, combination frame/clamp collar and top grate. The assemblies shown at right illustrate the more common components utilized in floor drains.

Zurn floor drains are available in 2" through 10" outlet sizes with Inside Caulk, Threaded, No-Hub, and Neo-Loc connections. For an explanation of these outlets, see Page 5.



## FLOOR DRAIN SIZING and LOCATION

The location, number, and size of floor drains are all important factors in the design of a drainage system. Proximity of the drain to the source of water is important, as well as the grade, so that water on any floor area naturally flows to the drain. The number of drains must be considered based on anticipated volume and proximity. In any case, local and national codes should be followed for drain sizing and placement.

The size of floor drains is important as it affects the number of drains required and the amount of water which can be efficiently drained. As a general reference, floor drains should be sized to handle an overflow condition of water that may be discharged onto the floor. The chart below illustrates water outlets and the demand (GPM) requirements.

Type of Water Outlet	Demand (GPM)	Type of Water Outlet	Demand (GPM)
Aspirator (Operating Room or Laboratory)	2.5	Ordinary Lavatory Faucet	2.0
Ball Cock in Water Closet Flush Tank	3.0	Self-Closing Lavatory Faucet	2.5
Bath Faucet, 1/2"	5.0	Shower Head, 1/2"	5.0
Dishwashing Machine (Domestic)	4.0	Sink Faucet, 3/8" or 1/2"	4.5
Drinking Fountain Jet	0.75	Sink Faucet, 3/4"	6.0
Hose Bib or Sill Cock, 1/2"	5.0	3/4" Flush Valve (15 PSI Flow Pressure)	15.0
Laundry Faucet, 1/2"	5.0	1" Flush Valve (15 PSI Flow Pressure)	27.0
Laundry Machine (8 lbs. or 16 lbs.)	4.0	1" Flush Valve (25 PSI Flow Pressure)	35.0

## HOW TO CHOOSE A FLOOR DRAIN

Given a piping system with a designed flow rate, an appropriate floor drain can be readily selected. Factors such as flow rate, length of horizontal pipe, and pipe size are some of the predominate factors upon which the selection of a floor drain depends. These factors are the first to be considered because together with a floor drain, they fulfill the purpose of a drainage system, which is to carry all water efficiently from the floor. Also to be considered is the maximum head and buildup of water on the floor. This value can range typically up to 2" depending on pipe size or any other design consideration of the particular application.

### Pipe Size and Open Area

Pipe size and open area of grate should be one of the first specifications decided on in the selection of a floor drain because they are most important in fulfilling the requirements of the specified flow rate and drainage system. However, additional criteria exists in selecting the most appropriate drain. The type of connection, either Inside Caulk (IC), Threaded (IP), No-Hub (NH), Neo-Loc (NL) or Spigot (SP), needs to be chosen. Backwater valves are useful to reduce drainage backup. Sediment buckets can filter out of the water flow such items as leaves, jewelry, hair, paper, and dirt, which can cause the drainage system to clog.

### Flow Rate Calculation

Based upon a specified flow rate and head, the grate open area of the required drain can be calculated using the following equation:

$$Q = 448.2 \text{ Cd } A \sqrt{2gh} \quad \text{where} \quad \begin{array}{l} Q = \text{Flow Rate (Gallons per Minute)} \\ \text{Cd} = \text{Discharge Coefficient (Typically 0.6)} \\ A = \text{Open Area of Grate (ft}^2\text{)} \\ g = \text{Acceleration (32.2 ft/s}^2\text{)} \\ h = \text{Head Above the Floor (ft)} \end{array}$$

### Open Area Calculation

The equation can be easily arranged to solve for 'A':

$$A = \frac{Q}{448.2 \text{ Cd } \sqrt{2gh}}$$

Example: For a maximum 0.25" (0.021 ft.) head (h), flow rate of 10 gallons per minute (Q), and an average discharge coefficient (Cd) of 0.6 yields a grate with an open area (A) of 0.032 sq. ft., multiplying by 144 in<sup>2</sup>/ft<sup>2</sup> yields an open area of 4.62 sq. in.

### Grate Loading

Depending on the purpose and location, an extra heavy, heavy, medium, or light duty drain may be selected. Extra-heavy and heavy-duty drains are useful in places where heavy and medium size trucks are being operated. Medium duty drains can be used where there is lighter vehicle traffic. For pedestrian traffic and bicycles, light duty drains may be used. The type of material chosen is important for corrosion characteristics, as well as for blending into the surroundings. The top shape (round, square, rectangular, etc.) and finish should be selected in accordance with the surrounding environment.

### Heel-Proof Grates

In areas where pedestrian traffic is the norm, floor drains with heel-proof grates should be used. Heel-proof grates are designed to provide a relatively secure surface in which the maximum grate hole size in least dimension shall be 5/16 inch. The heel-proof feature, if available, is contained in the Engineering Specification of that product.

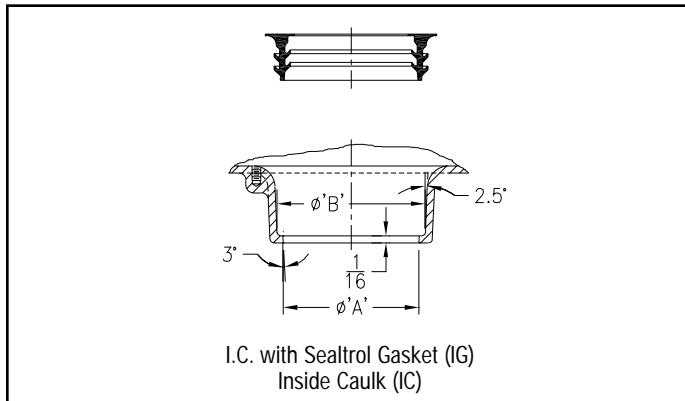
## ZURN OUTLET PIPE CONNECTIONS

### INSIDE CAULK (IC)

Often specified where drain body is positioned on pipe, bottom of outlet is sealed with oakum and connection is then completed according to local plumbing codes.

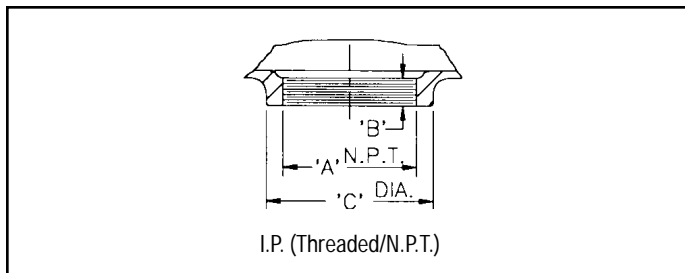
### INSIDE GASKET (IG)

The IG connections utilize an inside caulk drain body and a Zurn "Sealtrol" gasket. **This connection is only recommended for basement or ground floor applications.**



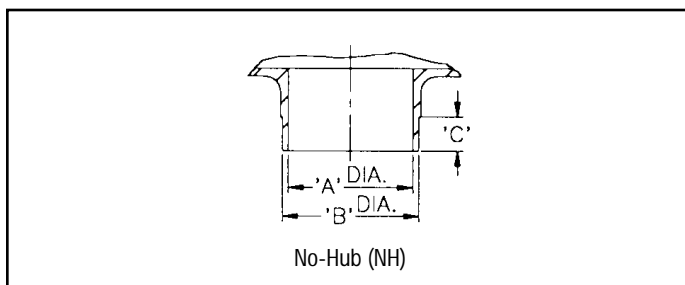
### IRON PIPE (IP)

Zurn Iron Pipe Threaded connection is an old industry standard. The female (NPT) threaded outlet is often specified on industrial and institutional applications.



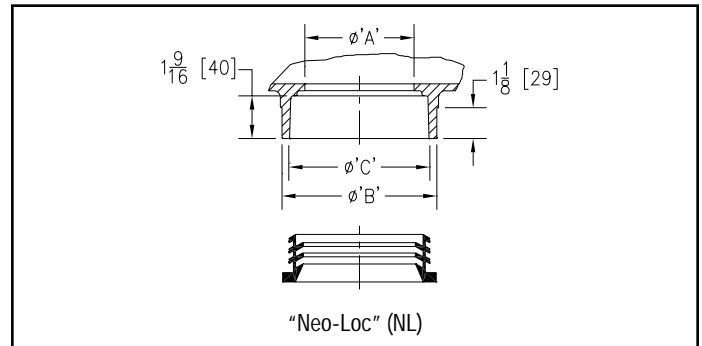
### NO-HUB (NH)

The most widely used connection. A No-Hub connection is achieved by butting No-Hub soil pipe or plastic pipe to the bottom of drain and securing it with a NH joint clamp. (Clamp furnished by others.)



### NEO-LOC (NL)

Zurn Neo-Loc is a unique labor saving compression gasketed connection designed to simply push on the stub end of the pipe. The Neo-Loc drain body and gasket can be utilized with plastic, steel, No-Hub and service weight soil pipe. A unique pipe stop cast in each Zurn Neo-Loc drain body ensures a proper fit.



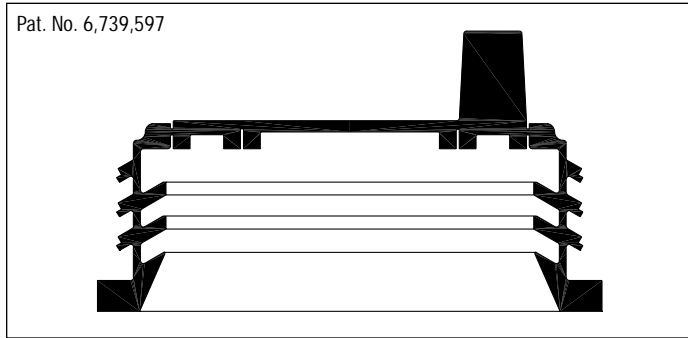
**Special Note:** Zurn "Neo-Loc" and "Sealtrol" gaskets are designed for use exclusively with Zurn drainage products. They are not sold separately and all warranties either expressed or implied would be forfeited if used in other than a Zurn drainage product.

OUTLETS	Dimensions in Inches [mm]		
	'A'	'B'	'C'
2" [51] No-Hub Outlet	2 [51]	2-3/8 [60]	1-1/8 [29]
3" [76] No-Hub Outlet	3 [76]	3-3/8 [86]	1-1/8 [29]
4" [102] No-Hub Outlet	4 [102]	4-3/8 [111]	1-1/8 [29]
5" [127] No-Hub Outlet	4-15/16 [126]	5-5/16 [135]	1-1/2 [38]
6" [152] No-Hub Outlet	5-15/16 [151]	6-5/16 [160]	1-1/2 [38]
8" [203] No-Hub Outlet	7-15/16 [202]	8-3/8 [213]	2 [51]
10" [254] No-Hub Outlet	10 [254]	10-9/16 [268]	2 [51]
12" [305] No-Hub Outlet	12 [305]	12-9/16 [319]	2 [51]
2" [51] Neo-Loc Outlet	2 [51]	3-3/8 [86]	3 [76]
3" [76] Neo-Loc Outlet	3 [76]	4-3/8 [111]	4 [102]
4" [102] Neo-Loc Outlet	4 [102]	5-1/2 [140]	5-1/8 [130]
2" [51] I.C. Outlet	2-5/8 [67]	3-1/16 [78]	-
3" [76] I.C. Outlet	3-3/4 [95]	4-3/16 [106]	-
4" [102] I.C. Outlet	4-3/4 [121]	5-3/16 [132]	-
5" [127] I.C. Outlet	5-3/4 [146]	6-3/16 [157]	-
6" [152] I.C. Outlet	6-3/4 [172]	7-3/16 [183]	-
8" [203] I.C. Outlet	8-7/8 [226]	9-1/2 [241]	-
2" [51] N.P.T. Outlet	2 [51]	9/16 [14]	3-1/4 [83]
3" [76] N.P.T. Outlet	3 [76]	3/4 [19]	4-1/2 [114]
4" [102] N.P.T. Outlet	4 [102]	15/16 [24]	5-5/8 [143]
5" [127] N.P.T. Outlet	5 [127]	15/16 [24]	6-11/16 [170]
6" [152] N.P.T. Outlet	6 [152]	15/16 [24]	7-3/4 [197]
8" [203] N.P.T. Outlet	8 [203]	1-1/8 [29]	9-3/8 [238]
2" [51] NL w/-TC	2 [51]	3-3/8 [86]	3 [76]
3" [76] NL w/-TC	3 [76]	4-3/8 [111]	4 [102]
4" [102] NL w/-TC	4 [102]	5-1/2 [140]	5-1/8 [130]



## NEO-LOC DRAIN GASKET with INTEGRAL TEST CAP

The Zurn Neo-Loc Gasket with Integral Test Cap is a unique pipe connection designed to secure a drain fixture to the drain line. This labor-saving compression gasket is compatible with plastic, steel, no-hub, extra heavy, and service weight cast iron soil pipe. Both the Neo-Loc drain body and compression gasket are designed to simply push onto the stub end of the pipe. A pipe stop molded into each drain body ensures a proper fit.



It is often required by plumbing codes that drain lines be tested for leakage once installation is complete. This test is typically performed by plugging all openings in the drain line system and applying a hydrostatic pressure charge of not less than 10-ft. head pressure to the lines for at least 15 minutes prior to inspection. The slightest loss of pressure in the system may indicate a possible leak.

Preparation to perform such testing can be a time-consuming and labor-intensive process. All drain fixtures must be plugged prior to line pressurization, and unplugged upon test completion. Current methods of preparation may involve the use of an inflatable test plug (Figure 1). Each plug is inserted into an opening in the drain line and inflated to block off the line. Once testing is complete, the plugs have to be deflated and removed. This whole process requires initial setup and post-test removal of the plugs, costing valuable time.

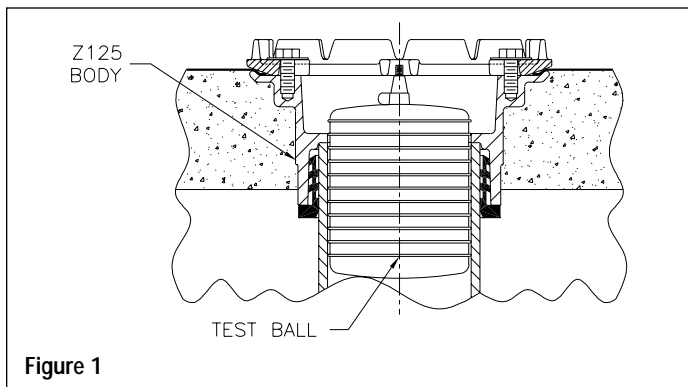


Figure 1

The Zurn Neo-Loc Gasket with Integral Test Cap eliminates the need for multiple test plugs and requires no loss of time for setup, prior to line system pressurization. The test cap is already in place when the drain body is installed, allowing for immediate testing (Figure 2). There is no need to carry multiple plugs from one drain fixture to another.

**Maximum Operating Pressure - 10 psi.**  
**Material conforms to ASTM standard C564.**

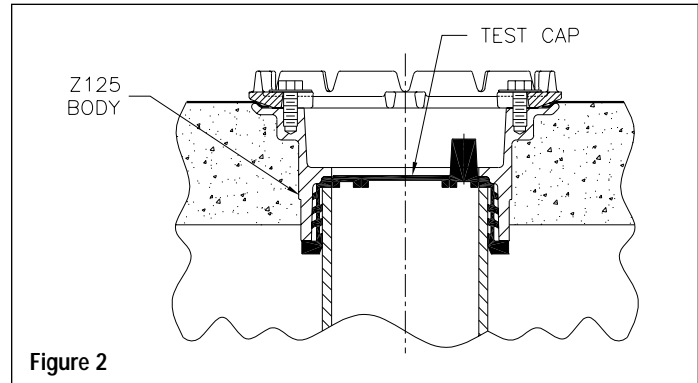


Figure 2

### Benefits of Using the Neo-Loc Gasket with Integral Test Cap

- No setup time required. The test cap is already installed along with the gasketed drain body. There is no need to carry around separate test plugs and equipment from drain to drain.
- During construction and installation, dirt and debris often fall down into the drain line, creating possible blockage problems. The test cap portion of the gasket prevents this from occurring prior to line system pressurization.
- Ease of removal. The test cap portion is easily removed and discarded, leaving a clean-edged opening for water to flow through the gasket and pipe.
- Individual test plugs may become lost, damaged, and unusable after some use. The need to replace these plugs is eliminated, saving the contractor and customer money.

### Installation of the Gasket

1. Make sure that the end of the drain pipe is cut square, is free of any burrs, and all sharp edges are broken.
2. Lubricate the inner and outer ribs of the gasket and the outside diameter of the pipe.
3. Fully insert the gasket into the properly sized Neo-Loc drain body.
4. Push the drain body and gasket onto the end of the drain line until the pipe comes to a secure stop.

## NEO-LOC DRAIN GASKET with INTEGRAL TEST CAP, continued

### Instructions for Removal of the Test Cap

Once testing of the drain line system is complete and permission has been given to open the lines, the test cap portion of the gasket can be removed by following these quick, easy steps:

1. Locate the dotted cutting line near the pull handle on the top surface of the gasket (Figure 3).
2. Using a sharp-bladed utility knife, reach down into the drain body and cut into the gasket along the dotted line. It is important to make sure that the cut is made fully through the two annular shaped rings shown in Figure 4. Failure to cut through these rings can result in tearing of the pull handle during removal of the cap.
3. Using a pair of long-handled channel lock pliers, grab the handle firmly and pull in a radial direction opposite of the cutting line (Figure 3).
4. Continue pulling the handle until the cap portion is completely severed from the body of the gasket.
5. Figure 5 shows a finished installation of the gasket after testing has been completed.

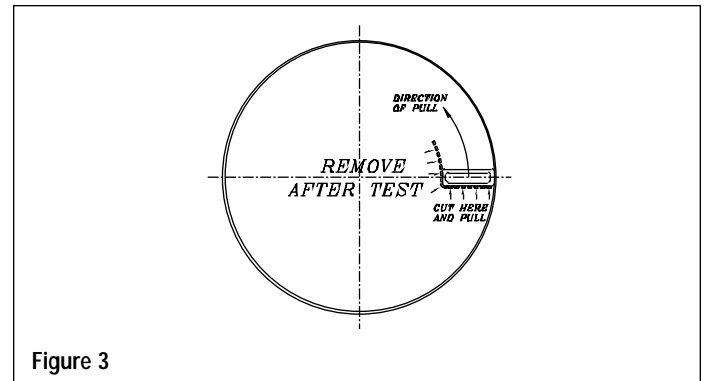


Figure 3

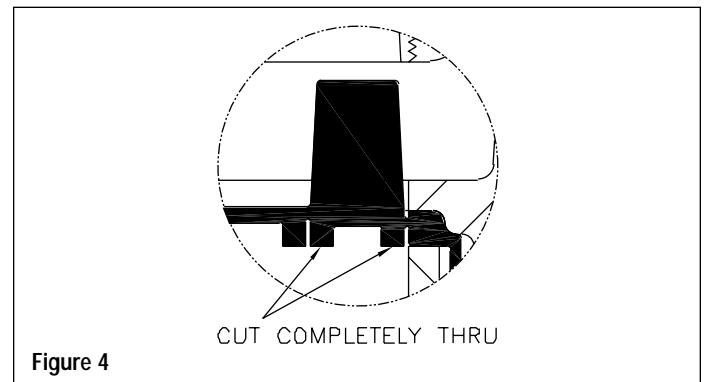


Figure 4

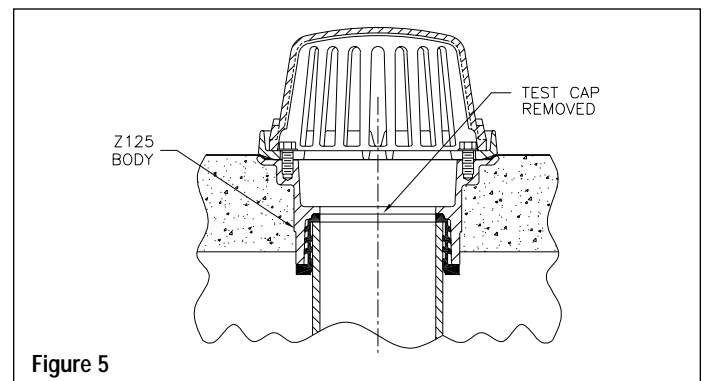


Figure 5

## OPTIONS and VARIATIONS

All Zurn floor drain options are specified as a PREFIX and/or SUFFIX letter or number added to the series designation. Below are the available options. Each item in this section is listed with its individual prefix and suffix variation. For illustrations of certain products and options, refer to the installation drawings shown on the following pages.

### PREFIXES

<b>Z</b>	D.C.C.I. Dura-Coated Cast Iron or Standard Assembly
<b>ZB</b>	D.C.C.I. Body with Polished Bronze Top
<b>ZN</b>	D.C.C.I. Body with Polished Nickel Bronze Top
<b>ZS</b>	D.C.C.I. Body with Stainless Steel Top
<b>ZAB</b>	Bronze with Polished Top
<b>ZANB</b>	Nickel Bronze with Polished Top
<b>ZARB</b>	Plain Bronze Body and Top

### SUFFIXES

<b>-A</b>	Auxiliary Vent Connection
<b>-AA</b>	All Acid Resisting Epoxy Coated
<b>-AR</b>	Acid Resisting Epoxy Coated Cast Iron
<b>-BS</b>	Bronze Mesh Screen Over Dome/Liner for Bucket
<b>-BT</b>	Bell Trap Bucket Bucket used in conjunction with extended piping (IC outlet only) which allows a bell trap to form in bottom of drain. This feature traps water in the bottom of a drain and should not be used where freezing conditions occur, nor where a sanitary environment is required.
<b>-C</b>	Clamp Collar or Underdeck Clamp Clamp collar should be used when a waterproofing membrane is part of the floor construction. Underdeck clamp should be used to clamp drain body into deck.
<b>-CP</b>	Chrome-Plated Top
<b>-D</b>	Dome Grate
<b>-DB</b>	Bottom Dome Strainer
<b>-DC</b>	Dura-Coated Interior
<b>-DF</b>	Deflector Grate Grate is placed at an angle within the drain body to deflect flow, prevent splashing and the forming of a whirlpool action.
<b>-DG</b>	Duresist Grate or Cover Used to replace a cast iron grate or solid cover where heavier loading is required. Consult general reference section for specifications on Duresist (Ductile) iron.
<b>-DP</b>	Decorative Polished Top
<b>-DX</b>	Dex-O-Tex Flange Required when applied latex flooring is used. Wide flange assures watertight and permanent bond to drain.
<b>-EF</b>	Extension Frame
<b>-ES</b>	Extension Section (Trench Grate Section – See Z664 and Z665)
<b>-F</b>	Extension Frame When specified this option allows for extension of the drain body. Additional height requirements must be specified.
<b>-FC</b>	Extension Frame and Secondary Clamp Collar (Specify extension height.) When specified, this option allows for a waterproofing membrane to be clamped at body.
<b>-FG</b>	Free Set Grate

### SUFFIXES, continued

<b>-G</b>	Galvanized Cast Iron
<b>-GG</b>	Galvanized Cast Iron Grate
<b>-GT</b>	Top Grate (See Z566 and Z568)
<b>-H</b>	Hinged Grate
<b>-HD</b>	Heavy-Duty Grate Grate having a safe live load between 5,000 and 7,499 pounds.
<b>-HL</b>	Hinged Locking Grate
<b>-HP</b>	Heel-Proof Grate
<b>-HT</b>	Square Hinged Grate
<b>-IG</b>	Integral Grate One-piece grate and frame (see Z300 and Z310).
<b>-J<sub>1</sub></b>	Auxiliary Inlet Connection (Specify 1-1/2" or 2" size.)
<b>-J<sub>2</sub></b>	Two (2) Auxiliary Inlet Connections 90° Apart
<b>-J<sub>3</sub></b>	Two (2) Auxiliary Inlet Connections 180° Apart
<b>-J<sub>4</sub></b>	Three (3) Auxiliary Inlet Connections
<b>-J<sub>5</sub></b>	Four (4) Auxiliary Inlet Connections
<b>-K</b>	Seepage Pan/Anchor Flange
<b>-KC</b>	Seepage Pan with Clamp Collar
<b>-LB</b>	Less Shallow Drain Body
<b>-LD</b>	Less Dome
<b>-LG</b>	Less Grate
<b>-LV</b>	Less Backwater Valve
<b>-LY</b>	Less Sediment Bucket
<b>-M</b>	Side Outlet Adapter via End Plate
<b>-NE</b>	Spark Proof Non-Conductive Top
<b>-P</b>	Trap Primer Connection (Specify 1/2" or 3/4" size.) Either a NPT tap on side wall of drain or an adapter piece used for connecting a Z1022 trap primer.
<b>-PD</b>	Prom Deck Grate
<b>-PH</b>	Packing House Grate with 3/8" Diameter Holes Heavy-duty deep flanged (tractor) grate designed with (39) 1/2" diameter concave holes for vermin proof applications.
<b>-PS</b>	Perforated Standpipe
<b>-R</b>	Sump Receiver
<b>-S</b>	Secondary Strainer
<b>-SB</b>	Shallow Drain Body
<b>-SC</b>	Solid Cover
<b>-SD</b>	Longer Standpipe (Specify height required.)
<b>-SG</b>	Solid Gasketed Cover Solid secured gasket cover specified when drains may not be used for extended periods of time, or where special purpose drains are not used for normal drainage.
<b>-SH</b>	Four (4) Securing Holes in Flange
<b>-SS</b>	Stainless Mesh Screen Over Dome/Liner for Bucket
<b>-ST</b>	Solid Top (See Z300 and Z310)

## OPTIONS and VARIATIONS

---

### SUFFIXES, continued

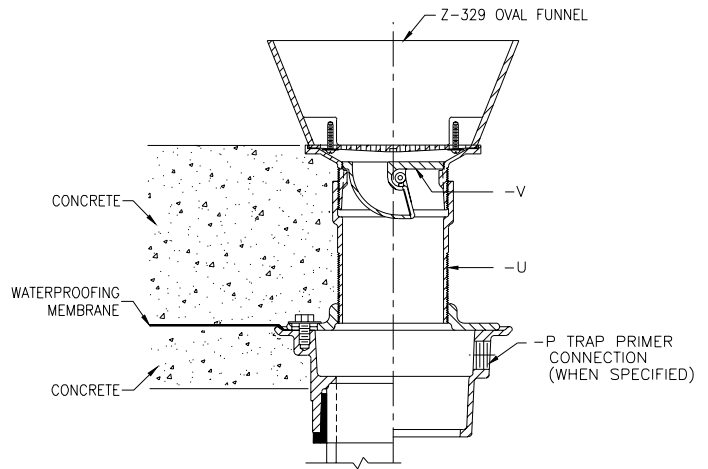
-SW	Spanner Wrench for Cover (See Z400, Type T)	-XJ	Expansion Joint (See Z190)
-S6	6" Diameter Stainless Steel Top	-Y	Sediment Bucket
-T	Square Top	-YA	Aluminum Sediment Bucket
-TG	Tractor Grate	-YF	Free Standing Bucket
-TS	Top Secured with Slotted Screws	-()L	Grating/Frame Placed in Long Dimension (See Z700 Series)
-U	3" High Extension Adapter (See Z400 Series)	-()W	Grating/Frame Placed in Wide Dimension (See Z700 Series)
-UC	Upper Body Clamp Collar (See Z627)	-4	4" Diameter Funnel
-V	Backwater Valve Designed for gravity flow applications. If kept clean and properly maintained it will restrict backflow surges, providing a degree of protection.	-6	6" Diameter Funnel
-VP	Vandal-Proof Secured Top	-9	9" Oval Funnel
-W	Winter Closure Plug (See Z511)	-45	45° Outlet
-WB	Water Supply Control Box (See Z1464)	-90	90° Side Outlet
-WS	Wide Slotted Grate		

## TYPICAL APPLICATIONS

### Z415-U-V with Type "B" with Z329 Oval Funnel

The Z415 Adjustable Floor and Shower Drain is one of Zurn's most versatile drains. Drain is illustrated with adjustable strainer extension (-U), backwater valve (-V), and "Type B" top with Z329 oval funnel. Regularly furnished with an invertible clamping collar and adjustable head assembly which allows maximum adjustability.

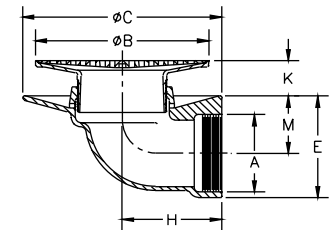
For other available strainer variations, see the Z400 series.



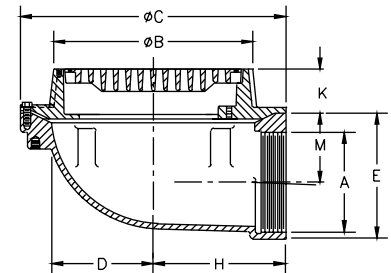
### Z415-90, Z508-90, Z541-90

Typifies a Zurn floor drain with a 90° side outlet. Drains of this type are designed for applications which require horizontal piping where depth is a problem. The (-90) 90° side outlet option is available on various types of Zurn floor drains. See chart below for dimensional data.

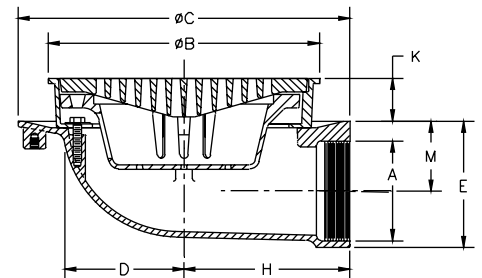
Z415-90 Illustrated



Z508-90 Illustrated



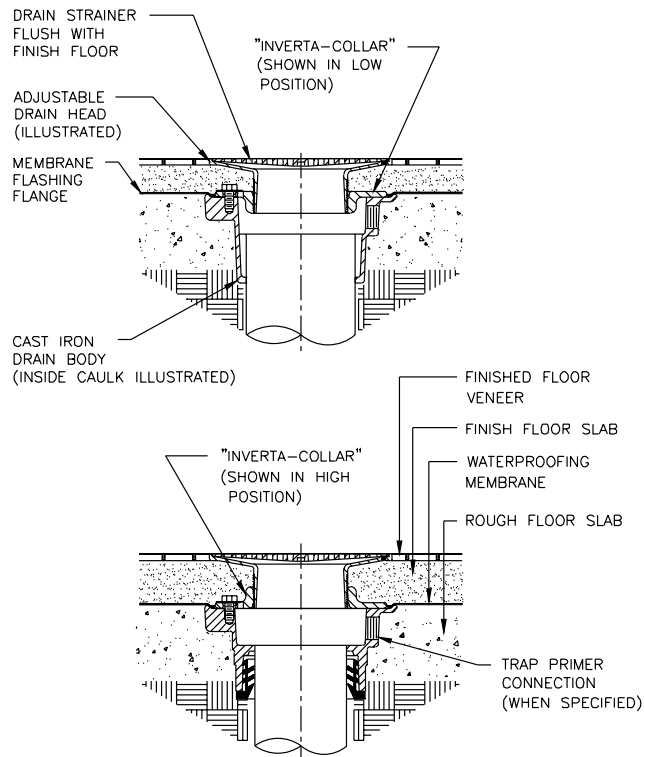
Z541-90 Illustrated



Product No.	Dimensions in Inches							
	A	B	C	D	E	H	K	M
Z415-90	2	6	9	-	4-3/8	4-1/2	1 Min	3-1/2
	3	7	9	-	4-3/8	4-1/2	2 Max	2-1/2
Z505-90	2	12-1/4	15	5-1/2	5-3/4	7-1/2	2	4-1/8
Z509-90	3	12-1/4	15	5-1/2	5-3/4	7-1/2	2	3-5/8
Z512-90	4	12-1/4	15	5-1/2	5-3/4	7-1/2	2	4-3/4
Z540-90	5	12-1/4	15	5-7/8	7-7/8	7-1/2	2	4-3/4
Z541-90	6	12-1/4	15	5-7/8	7-7/8	7-1/2	2	4-1/4
Z610-90								4-1/4
Z508-90	2	9	12	4-3/4	5-3/4	6	2	4-1/8
Z550-90	3	9	12	4-3/4	5-3/4	6	2	3-5/8
Z554-90	4	9	12	4-3/4	5-3/4	6	2	3-1/8
Z555-90	5	9	12	4-3/4	6-3/4	6-1/2	2	3-5/8

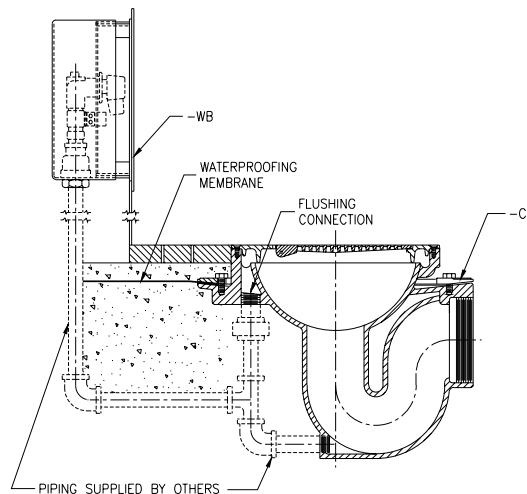
## TYPICAL APPLICATIONS

A typical Zurn Floor Drain (See Z415 illustrated at right) can be installed in most floor construction. The drain pipe is run to an elevation below the expected finished floor level, so that the drain top will be flush with (or slightly below) the finished floor. Dimensional data for all drain heights and outlet types are shown in this Technical Information Guide and Zurn Submittal Drawings. The drain body is secured to the pipe with any of four connections – threaded, no-hub, inside caulk, or the Zurn Neo-Loc. The type of connection should be specified upon ordering any Zurn drain. Once the drain is set in place, the initial concrete subfloor is poured to an elevation level with the top flange of the drain body. The waterproofing membrane is run up to and over the flange. The clamping collar is placed on the drain and secured. The strainer is then screwed into the clamping collar and finished floor is poured to finished grade. Note the Z415 collar can be used on either side to change the total adjustment of the head elevation (for example 1/2"-1-5/8" on one side, 1-3/8"-2-3/8" on the other). Also, care should be taken to protect the top finish during installation through the use of cardboard, tape, or other protective material applied by the plumber.



### Z300-C-WB

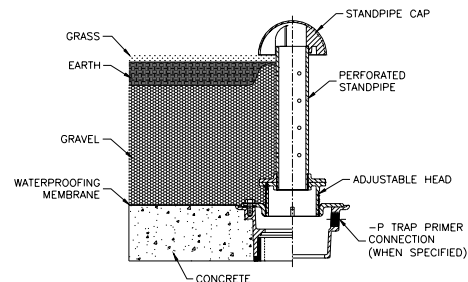
Thoroflush Drain is designed for use in areas where frequent flushing and cleanliness is required. Drain is illustrated with clamping collar (-C) and water supply control box (-WB). The Z300 is also available with a loose set grate (-LG) or integral grate (-IG) if desired.



### Z350

Planting Area Drains are ideally suited for indoor atrium areas, outdoor roof top promenade deck areas, and ground level planting areas where excess water must be drained. Perforated standpipe should be encased in gravel to allow adequate percolation.

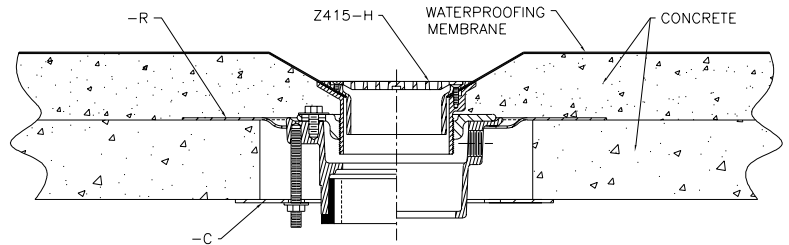
For other available Planting Area Drains, see Z348, Z349, and Z352.



## TYPICAL APPLICATIONS

### Z415-C-R with Type 'H' Strainer

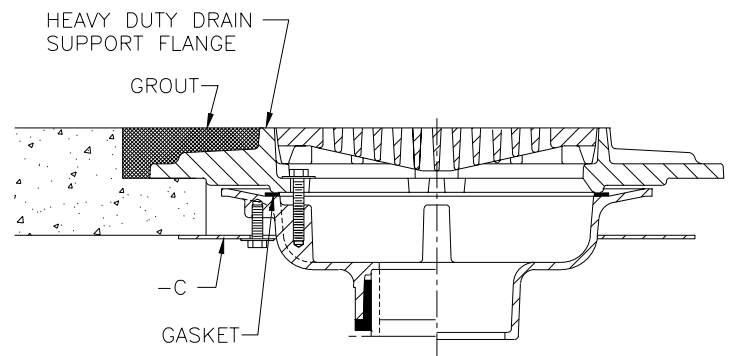
6" or 9" top floor and shower drain installed in concrete floor with underdeck clamp (-C) and sump receiver (-R). Type 'H' Strainer is used to clamp membrane at top surface of finished floor structure.



### Z534-C

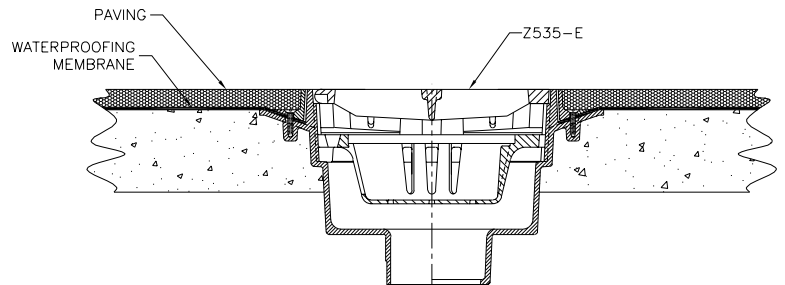
Parking Deck Drains are designed for economical installation in precast construction. Wide heavy-duty flange allows shallow core drilling or boxing out and maximum strength at load bearing surface. Heavy-duty non-tilt grate is standard and underdeck clamp (-C) is available to securely fasten drain body to deck from underside.

For other available Parking Deck Drains, see Z533, Z535, Z536, and Z537.



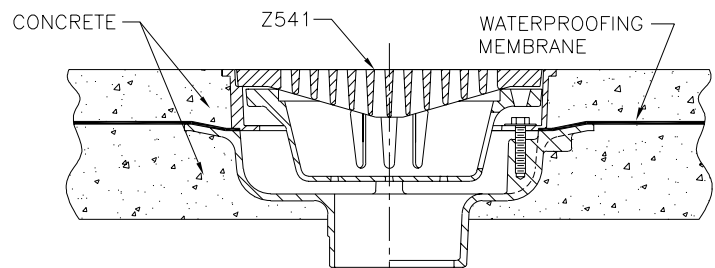
### Z535-E

Heavy-duty parking structure drain illustrated with top extension section (-E) installed in a concrete slab with waterproofing membrane and top pavement surface.



### Z541

12" diameter heavy-duty drain with suspended sediment bucket installed in a multiple poured concrete slab with waterproofing membrane secured with combination flashing clamp and frame.

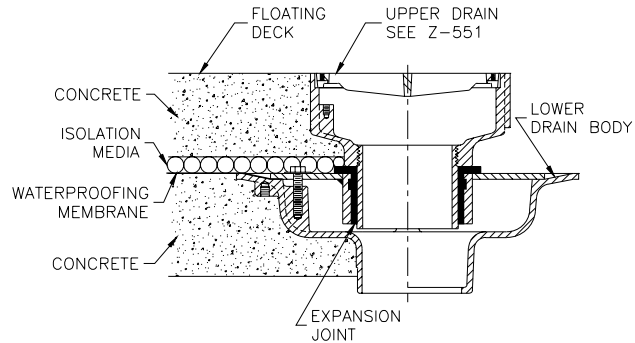


## TYPICAL APPLICATIONS

### Z624

Isolation Drains are designed for areas where building construction requires the drain to function in a floor structure which is independent of the concrete sub-structure. Construction of this nature is typical to mechanical equipment rooms, studios, music rooms, computer rooms and laboratories.

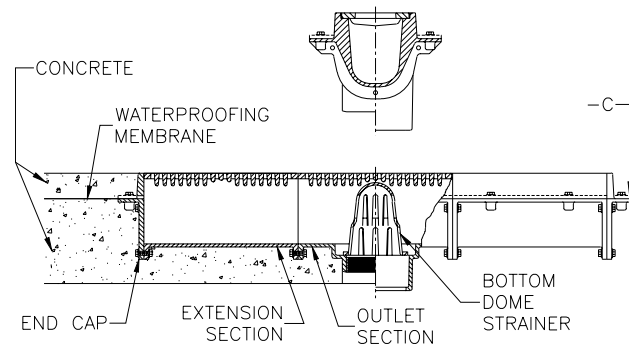
For other available Isolation Drains or Cleanouts, see Z625, Z626, and Z627.



### Z664-C

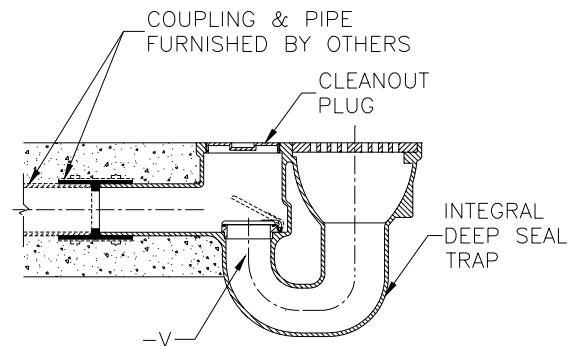
Extra-heavy-duty modular trench drain is illustrated with bottom dome strainer and clamping collar (-C). This drain is used in areas where single drainage units are not practical. For example, where inclined or sloped surfaces require drainage across a wide area. The Z664 is also suited for vehicular traffic applications and grating may be ordered in ductile iron when greater load requirements are desired. Outlet and extension modules should be ordered in 12" increments, and it is advisable that one outlet be used for each 8-foot section of drain.

For other available trench drains, see Z665 and Z667.



### Z730-V

9" top medium-duty drain is installed in a concrete slab. The Z730 offers an integral trap, no-hub side outlet and a floor level cleanout as standard. Drain is illustrated with flapper type backwater valve (-V) to resist backflow.





## MATERIALS and FINISHES

**Zurn Cast Iron** conforms to ASTM Specification for Gray Iron Castings A 48-83, Class 25. It is produced utilizing the latest equipment and newest developed foundry techniques. Zurn cast iron castings are characterized by a high degree of strength, corrosion-resistance, workmanship, and finish.

**Zurn Duresist** is a ductile iron complying with ASTM Specification A 536-84, Grade 60-45-10. Its physical properties make it ideal for grates and drain components that are subjected to severe and heavy duty service. Its chemical characteristics make possible a degree of corrosion-resistance far superior to that of cast iron. Zurn Duresist exhibits remarkable stress qualities, possessing a yield strength in the same range as that of cast carbon steel, while its ability to absorb the shock loading of traffic areas is unequalled, making its use ideal for all areas where extra heavy duty service is a requirement – whether indoors or outdoors – in chemical and metal processing plants or other industrial applications.

“**Zurn Dura Coat**” is a specially formulated paint designed to resist cracking and chipping. Dura Coat is a latex based coating developed to be used with cast iron substrate.

**Zurn Galvanized Cast Iron** is a process of applying heavy zinc coating to a thoroughly cleaned iron casting. This coating contains 95% zinc. Zurn galvanizing can be supplied on all cast iron parts. It increases longevity and is recommended wherever the discoloration caused by oxidation of cast iron is objectionable. Galvanize should be used in coastal and industrial areas where corrosive atmosphere may be encountered. Zurn galvanizing meets and exceeds Federal Specification MIL-P-21035, MIL-P-26915A, MIL-P-26433, and MIL-C-10578 (Type II). It also meets ASTM A239-89 and is listed by Underwriters Laboratories, Inc. (U.L.)

**Cadmium Plated Cast Iron** is a process of applying a heavy cadmium coating to a thoroughly cleaned iron casting. This coating contains 95% cadmium in a cold applied process. Cadmium plating can be supplied on all cast iron parts. It increases longevity and is recommended wherever the discoloration caused by oxidation of cast iron is objectionable.

### Properties of Basic Ductile Versus Cast Iron

Metal	Cast Iron	Ductile Iron
Specification	Class 25	60-45-10
Tensile Strength (PSI)	25/30,000	60/80,000
Yield Strength (PSI)	NIL	45/60,000
Elongation	NIL	10% to 25%
Modules of Elasticity	16 x 10	24 x 10

**Zurn Bronze** is a semi-red brass conforming to ASTM Specification for Copper Alloy Sand Casting B 584-90, Copper Alloy No. 844. The exposed surface is normally supplied possessing a satin sheen texture which allows it to blend unobtrusively with surrounding finishes. When the application requires, Zurn Bronze can be polished to a high gloss.

**Zurn Nickel Bronze** is a unique material that is ideally suited to traffic-bearing grates and strainers in finished floor areas. It affords the combined advantage of greater strength, better appearance, and longer service life at the same price as chrome plated brass. Superior ductility and shock resistance are the result of a copper nickel alloy (Copper Alloy 997) having a wearing surface similar in appearance to satin chrome plate; however, because it does not have a plated surface it cannot chip, peel, crack, or wear off. It is highly resistant to corrosion; however, the process of oxidation will naturally occur over time with most metals. Methods have been developed to prevent, preserve, and restore metals affected by oxidation.

**Chrome Plated Bronze** is ideal for installation in walls, gutters, and other areas where a bright decorative finish is desired, and is not subject to the abrasive action of foot and other traffic. It is not recommended for installations where the abrasion will eventually wear through and cause peeling. It should always be specified for swimming pool fittings due to its high resistance to the halogens (chlorine, etc.), encountered in swimming pool sanitation.

**Aluminum** supplied is casting grade 319. This is an alloy containing both silicon and copper. It is a solid cast metal in a pleasing light gray color. The light weight, coupled with its exceptional strength and corrosion resistance, makes it ideal for drain components such as sediment buckets and strainers. When used with acid-resisting porcelain enamel coated drains, the possibility of chipping is minimized.

**Zurn Stainless Steel** castings are normally produced in Type CF8 (304) which is an 18-8 Austenitic Stainless possessing excellent corrosion resistant qualities. For some applications where conditions demand, Type CF8M (316) stainless steel can be supplied. Items formed from stainless steel sheet and other stainless steel products are regularly furnished in Type 304 with 316 as an optional material.

**A.R.C.** Acid Resisting Epoxy Coating is a baked-on powder coating, which produces a smooth, hard, high gloss finish. This epoxy based coating offers high impact resistance and excellent life expectancy in all drainage applications. Zurn A.R.C. coating conforms to the requirements of F.D.A. (Food and Drug Administration) Regulation 21-CFR5 117.1360.

**A.R.E.** Acid Resisting Porcelain Enamel is a substantially vitreous or glassy inorganic coating bonded to metal by fusion at a high temperature above 800°F. This coating offers excellent acid, abrasion, and wear resistance. The coating is extremely hard and is the ultimate for sanitation in drainage applications. Zurn A.R.E. coating conforms to the requirements of F.D.A. (Food and Drug Administration) Regulation 21-CFR5 117.1360.

Appendix D  
Fire Flow Calculations  
Sanitary Design Sheet

**Table D1**

**FIRE FLOW CALCULATION as per  
FIRE UNDERWRITERS SURVEY (1999)**

22-Aug-24

**PROJECT:** 63 Albany Road, Oshawa

**1. Fire Flow Equation**

$$F = 220 C \sqrt{A}$$

where F is the required fire flow [LPM]  
C is the coefficient determined by type of construction [unitless]  
A is the total protection area [sq.m]

**2. Architecture Information (To be confirmed)**

Type of Construction	Non Combustible	
Fire Rating	One hour - Vertical Fire Protection	
Sprinkler Provided (Y/N)	Y	
<b>Total Floor Area [sq.m]</b>	3593	Largest Floor + 25% of two adjoining floors
Coefficient, C [1]	0.8	
Fire Flow, F [LPM]	10549	

**3. Occupancy Reduction**

Occupancy Adjustment	0.85	- 15 % reduction for occupancy
Fire Flow, F [LPM]	8967	

**4. Sprinkler Reduction**

Sprinkler Reduction	0.30	Automatic Sprinkler System (30%)
Sprinkler Reduction [LPM]	2690	

**5. Exposure Adjustment**

North	0.10
East	0.10
South	0.20
West	0.10
<b>Total</b>	<b>0.50</b>
Exposure Adjustment [LPM]	4483

**6. Required Fire Flow, Duration & Volume**

Fire Flow, F [LPM]	8967	
Sprinkler Reduction [LPM]	2690	
Exposure Adjustment [LPM]	4483	
Required Fire Flow [LPM]	10760	
Required Fire Flow [LPM]	<b>11000</b>	Round to nearest 1000
Required Fire Flow [LPS]	<b>183</b>	
Req. Duration of Fire Flow [hrs]	2	
Req. Storage [cubic.m]	1320	

PROJECT	Residential Development, 63 Albany Road, Oshawa		<b>CITY OF OSHAWA</b>												
CONSULTANT	JIC Ltd		<b>DESIGN CHART S01: SANITARY SEWER - POST DEVELOPMENT CONDITION</b>												
PROJECT NO.	22-516														

AREA (Land Use Type)	UPSTREAM MH	DOWNSTREAM MH	FLOW					TOTAL AREA (ha.)	DESIGN FLOW			CUM. DESIGN FLOW (l/s)	PIPE				
			Area (ha.)	Units	EQUIV. POP.	PEAK FACT.	AVG. FLOW (l/s)		INFILTRATION FLOW (l/s)	PEAK FLOW (l/s)	LENGTH (m)		SIZE (mm)	GRADE	CAP. (l/s)	(DES.) CAP. (%)	DES. VEL.FULL
<b>Residential</b>	BUILDING PLUG	SAN MH 1	0.640	315	614	3.93	2.58	0.64	0.166	9.988	10.0	1.0	200	2.00	46.4	22%	0.73
	SAN MH 1	SAN MH 2									10.0	17.0	200	2.00	46.4	22%	0.73

Note:  
 Avg. Flow = 364 l/capita/day  
 Infiltration Flow = 22.5 l/ha/day  
 Calculated Peaking Factor = 3.93 (Max = 3.8)

Apartments	No. Units	Persons/Unit	Population
<b>Tower</b>			
Studio	4	1.5	<b>6</b>
1 Bedroom	185	1.5	<b>278</b>
2 Bedroom	102	2.5	<b>255</b>
3 Bedroom	6	3.5	<b>21</b>
T. House			
3 Bedroom	18	3.0	<b>54</b>
Total	315	-	614

Appendix E

# Jellyfish Sizing Summary



# STANDARD OFFLINE Jellyfish Filter Sizing Report

## Project Information

Date	Wednesday, August 14, 2024
Project Name	63 Albany St.
Project Number	
Location	Oshawa

## Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.

Please see [www.ImbriumSystems.com](http://www.ImbriumSystems.com) for more information.

## Jellyfish Filter System Recommendation

The Jellyfish Filter model JF6-3-1 is recommended to meet the water quality objective by treating a flow of 17.7 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 199 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF6-3-1	3	1	1.8	17.7	199

## The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

## Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see [www.ImbriumSystems.com](http://www.ImbriumSystems.com) for more information.

Thank you for the opportunity to present this information to you and your client.

## Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

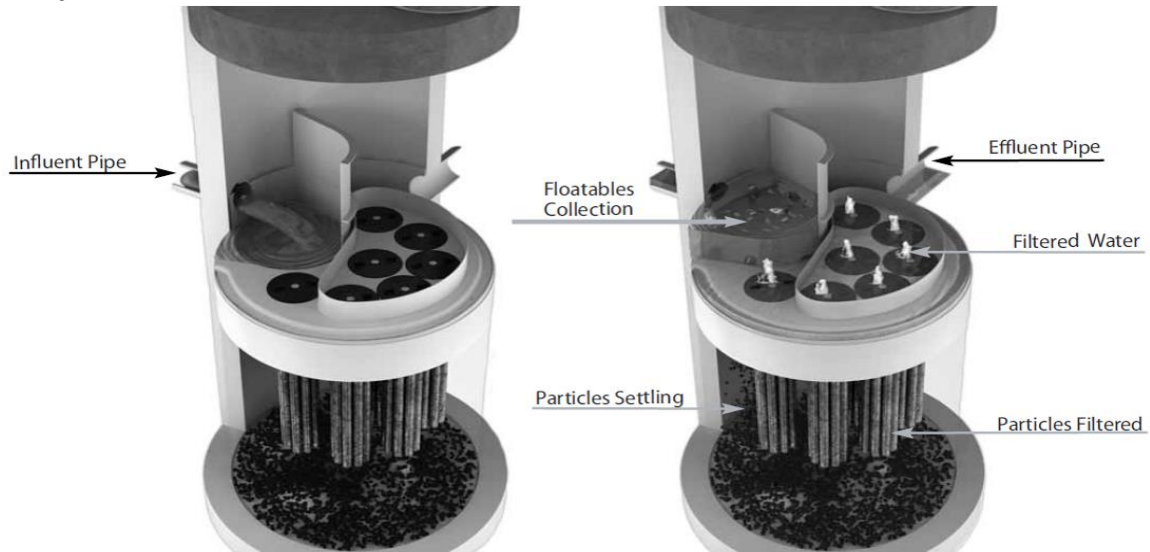
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 77% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

## Field Proven Performance

The Jellyfish filter has been field-tested on an urban site with 25 TAPE qualifying rain events and field monitored according to the TAPE field test protocol, demonstrating:

- A median TSS removal efficiency of 90%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitored storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 77%, and a median Total Nitrogen removal of 51%.

## Jellyfish Filter Treatment Functions



*Pre-treatment and Membrane Filtration*

## Project Information

Date:	Wednesday, August 14, 2024
Project Name:	63 Albany St.
Project Number:	
Location:	Oshawa

## Designer Information

Company:	Jain Infrastructure Consultants Ltd.
Contact:	Usman Arif
Phone #:	

## Notes

--

## Design System Requirements

<b>Flow Loading</b>	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	<b>13.4 L/s</b>
<b>Sediment Loading</b>	Treating 90% of the average annual runoff volume, 2727 m³, with a suspended sediment concentration of 60 mg/L.	<b>164 kg</b>

## Recommendation

The Jellyfish Filter model JF6-3-1 is recommended to meet the water quality objective by treating a flow of 17.7 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 199 kg, which meets or exceeds the estimated average annual sediment load.

## Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

## Drainage Area

Total Area:	0.64 ha
Runoff Coefficient:	0.7

## Upstream Detention

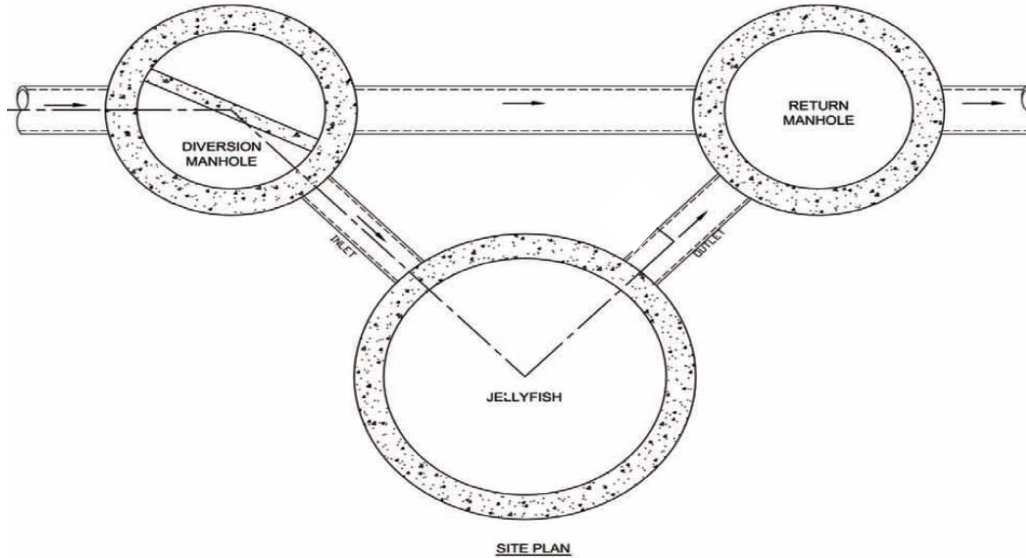
Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
<b>JF6-3-1</b>	<b>3</b>	<b>1</b>	<b>1.8</b>	<b>5205</b>	<b>0.79</b>	<b>848</b>	<b>17.7</b>	<b>199</b>
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	5	1	1.8	5205	0.79	848	27.8	313
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679



## Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



*Jellyfish Filter Typical Layout*

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	62°	150	200
<b>1.8</b>	<b>59°</b>	<b>200</b>	<b>250</b>
2.4	52°	250	300
3.0	48°	300	450
3.6	40°	300	450

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head calculations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged conditions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

# STANDARD SPECIFICATION STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

## PART 1 – GENERAL

### 1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

### 1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures  
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections  
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets  
ASTM D 4101: Specification for Copolymer steps construction

#### CAN/CSA-A257.4-M92

Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

#### CAN/CSA-A257.4-M92

Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

### 1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

### 1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

### 1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

## PART 2 – PRODUCTS

## 2.1 GENERAL

- 2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.
- 2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.
- 2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft<sup>2</sup> (0.142 lps/m<sup>2</sup>).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft <sup>2</sup> / m <sup>2</sup> )	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

- 2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

- 2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.
- 2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.
- 2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.
- 2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.
- 2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

## 2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

- 2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.
- 2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.
- 2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.
- 2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.
- 2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

### PART 3 – PERFORMANCE

#### 3.1 GENERAL

- 3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).
- 3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.
- 3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.
- 3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.
- 3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft<sup>2</sup> (0.142 lps/m<sup>2</sup>).

### 3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

- 3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.
- 3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.
- 3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent  $d_{50}$  of 15 microns or lower for all monitored storm events.
- 3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.
- 3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.
- 3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

### 3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

- 3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.
- 3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).
- 3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

- 3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.
- 3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.
- 3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.
- 3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

## **PART 4 – EXECUTION**

### **4.1 INSTALLATION**

#### **4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE**

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.

4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

#### 4.2 MAINTENANCE ACCESS WALL

In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

### PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after it has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

#### 5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

### END OF SECTION



# DRAWING NOT TO BE USED FOR CONSTRUCTION

**GENERAL NOTES:**

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. JELLYFISH STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE JELLYFISH SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATIONAL PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECTS BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

**JELLYFISH STRUCTURE & DESIGN NOTES:**

1. 762 MM Ø (30") MAINTENANCE ACCESS WALL TO BE USED FOR CLEANOUT AND ACCESS BELOW CARTRIDGE DECK.
2. CASTINGS OR DOORS OF THE JELLYFISH MANHOLE STRUCTURE TO EXTEND TO DESIGN FINISH GRADE. DEPTHS IN EXCESS OF 3.65 M (12') MAY REQUIRE THE DESIGN AND INSTALLATION OF INTERMEDIATE SAFETY GRATES OR OTHER STRUCTURAL ELEMENTS.
3. CASTINGS AND GRADE RINGS, OR DOORS AND DOOR RISERS, OR BOTH, SHALL BE GROUTED FOR WATERTIGHTNESS. STRUCTURE SHALL MEET AASHTO HS-20, ASSUMING EARTH COVER OF 0' - 3', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE IMBRIUM LOGO.
4. ALL STRUCTURAL SECTIONS AND PARTS TO MEET OR EXCEED ASTM C-478, ASTM C-443, AND ASTM D-4097 CORRESPONDING TO AASHTO SPECIFICATIONS, AND ANY OTHER SITE OR LOCAL STANDARDS.
5. CONCRETE RISER SECTIONS FROM BOTTOM TO TOP WILL BE ADDED AS REQUIRED INCLUDING TRANSITION PIECES TO SMALLER DIAMETER RISERS FOR SURFACE ACCESSES WHERE WARRANTED BY SERVICING DEPTH.
6. IF MINIMUM DEPTH FROM TOP OF CARTRIDGE DECK TO BOTTOM OF STRUCTURAL TOP SLAB CANNOT BE ACHIEVED DUE TO PIPING INVERT ELEVATIONS OR OTHER SITE CONSTRAINTS. ALTERNATIVE HATCH CONFIGURATIONS MAY BE AVAILABLE. HATCH DOORS SHOULD BE SIZED TO PROVIDE FULL ACCESS ABOVE THE CARTRIDGES TO ACCOMMODATE MAINTENANCE.
7. STEPS TO BE APPROXIMATELY 330 MM (13") APART AND DIMENSIONS MUST MEET LOCAL STANDARDS. STEPS MUST BE INSTALLED AFTER CARTRIDGE DECK IS IN PLACE.
8. CONFIGURATION OF INLET AND OUTLET PIPE CAN VARY TO MEET SITE'S NEEDS.
9. IT IS THE RESPONSIBILITY OF OTHERS TO PROPERLY PROTECT THE TREATMENT DEVICE, AND KEEP THE DEVICE OFFLINE DURING CONSTRUCTION. FILTER CARTRIDGES SHALL NOT BE INSTALLED UNTIL THE PROJECT SITE IS CLEAN AND FREE OF DEBRIS, BY OTHERS. THE PROJECT SITE INCLUDES ANY SURFACE THAT CONTRIBUTES STORM DRAINAGE TO THE TREATMENT DEVICE. CARTRIDGES SHALL BE FURNISHED NEW, AT THE TIME OF FINAL ACCEPTANCE.
10. THIS DRAWING MUST BE VIEWED IN CONJUNCTION WITH THE STANDARD JELLYFISH SPECIFICATION, AND STORMWATER QUALITY FILTER TREATMENT JELLYFISH DOCUMENTS.

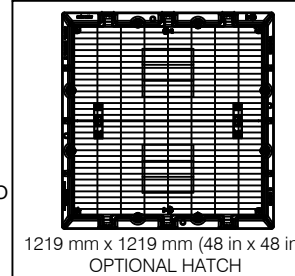
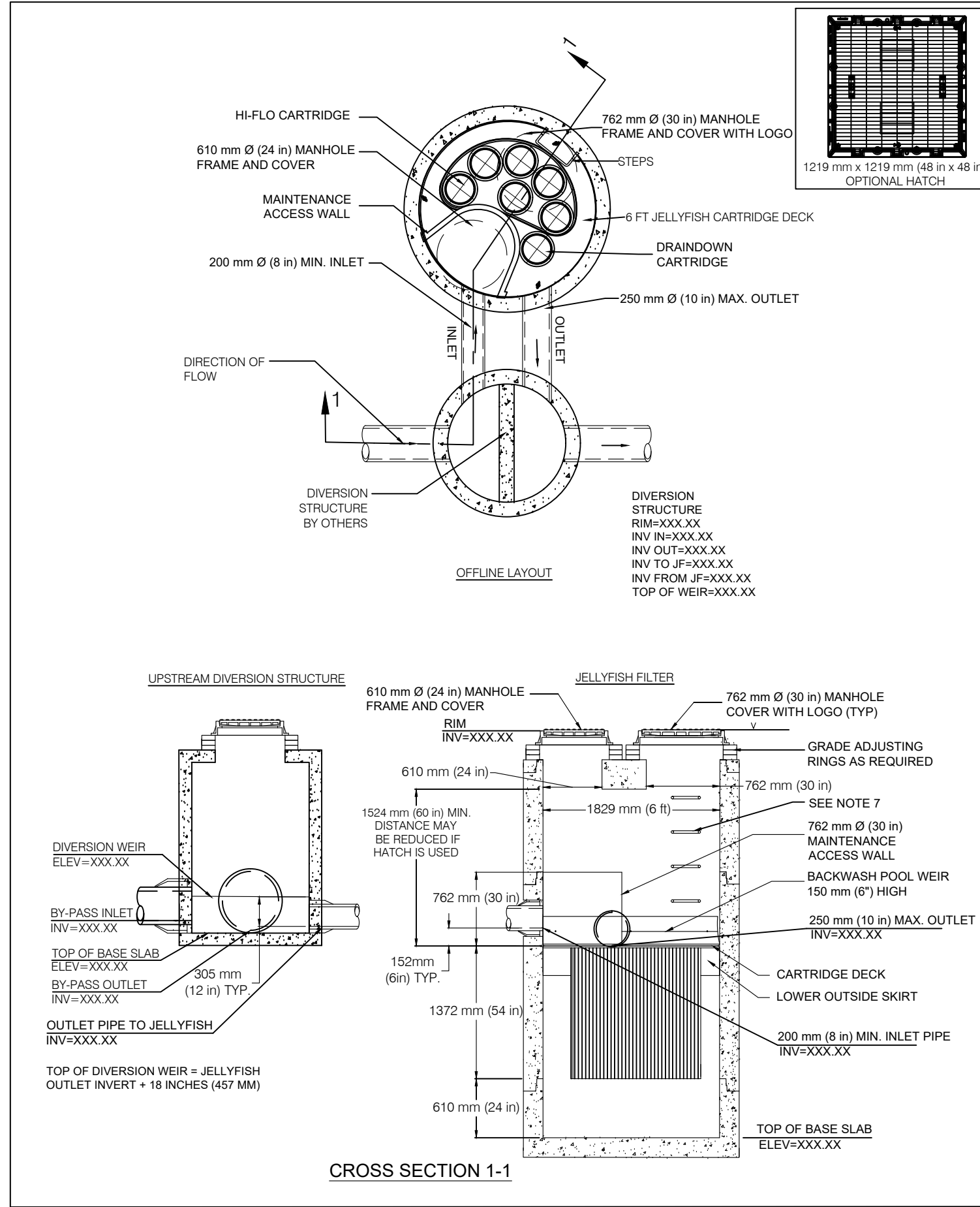
**INSTALLATION NOTES**

- A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
- C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
- D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
- E. CARTRIDGE INSTALLATION, BY IMBRIUM, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT IMBRIUM TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.

STANDARD OFFLINE JELLYFISH RECOMMENDED PIPE DIAMETERS			
MODEL DIAMETER (m)	MINIMUM ANGLE INLET/OUTLET PIPES	MINIMUM INLET PIPE DIAMETER (mm)	MINIMUM OUTLET PIPE DIAMETER (mm)
1.2	62	150	200
1.8	59	200	250
2.4	52	250	300
3.0	48	300	450
3.6	40	300	450

CONTACT IMBRIUM SYSTEMS FOR ALTERNATE PIPE DIAMETERS

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL JELLYFISH FILTER REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE.



JELLYFISH DESIGN NOTES					
JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN. Ø1829 mm (72") MANHOLE JELLYFISH PEAK TREATMENT CAPACITY IS 32.8 L/s (1.16 CFS). TREATMENT FLOW RATE IS BASED ON 457 MM (18") OF HEAD PRESSURE.					
CARTRIDGE SELECTION	54"	40"	27"	15"	
CARTRIDGE DEPTH	90"	76"	63"	51"	
OUTLET INVERT TO STRUCTURE BASE SLAB	5.09 / 2.55	3.68 / 1.84	2.55 / 1.27	1.41 / 0.71	
FLOW RATE HIGH-FLO / DRAINDOWN (L/s) (per cart)	57 / 28	42 / 21	28 / 14	16 / 8	
SEDIMENT CAPACITY HIGH-FLO / DRAINDOWN (kg) (per cart)	370	273	182	104	
MAX. CARTS HIGH-FLO/DRAINDOWN	32.8	24.6	16.4	9.06	
MAX. SEDIMENT CAPACITY (kg)					
MAX. TREATMENT (L/s)					

SITE SPECIFIC DATA REQUIREMENTS					
JELLYFISH MODEL	*				
STRUCTURE ID	*				
WATER QUALITY FLOW RATE (L/s)	*				
PEAK FLOW RATE (L/s)	*				
RETURN PERIOD OF PEAK FLOW (yrs)	*				
# OF CARTRIDGES REQUIRED (HF / DD)	*				
CARTRIDGE SIZE (inches)	*				
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

\* PER ENGINEER OF RECORD

**JF6 STANDARD**  
Scale = 1:50

USA: 888-279-9826 CA: 800-952-4801 INTL: +1-415-960-9900  
 7037 Ridge Road, Suite 350, Hervey, MD 21076  
 IMBRIUM SYSTEMS, INC. A DIVISION OF IMBRIUM SYSTEMS, LLC  
 10000 CENTRAL EXPRESSWAY, SUITE 100, DALLAS, TEXAS 75243  
 214-343-8888 FAX: 214-343-8889  
 WWW.IMBRIUMSYSTEMS.COM

DATE:	#####
DESIGNED:	BSF
CHECKED:	BSF
APPROVED:	SP
PROJECT #:	#####
PROJECT NAME:	#####
SHEET:	1 OF 2

I:\MBRUM\PRODUCTS\JELLYFISH FILTER\40 DRAWINGS & DETAILS\SISTANDARD DETAILS\JELLYFISH FILTER.JF6 - OFFLINE DIVERSION MANHOLE.DWG 9/17/2017 1:49 PM

**JELLYFISH® FILTER - SPECIFICATIONS**

**GENERAL**

- A. **WORK INCLUDED:** SPECIFIES REQUIREMENTS FOR CONSTRUCTION AND PERFORMANCE OF AN UNDERGROUND STORMWATER QUALITY, MEMBRANE FILTRATION, AND TREATMENT DEVICE THAT REMOVES POLLUTANTS FROM STORMWATER RUNOFF THROUGH THE UNIT OPERATIONS OF SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.
- B. **REFERENCE STANDARDS:**  
 ASTM C 891: SPECIFICATION FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES  
 ASTM C 478: SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS  
 ASTM C 990: SPECIFICATION FOR JOINTS FOR CONCRETE MANHOLES USING PREFORMED FLEXIBLE JOINT SEALANTS  
 ASTM D 4101: SPECIFICATION FOR COPOLYMER STEPS CONSTRUCTION
- C. **SHOP DRAWINGS:** SHOP DRAWINGS FOR THE STRUCTURE AND PERFORMANCE ARE TO BE SUBMITTED WITH EACH ORDER TO THE CONTRACTOR. CONTRACTOR SHALL FORWARD SHOP DRAWING SUBMITTAL TO THE CONSULTING ENGINEER FOR APPROVAL. SHOP DRAWINGS ARE TO DETAIL THE STRUCTURE PRECAST CONCRETE AND CALL OUT OR NOTE THE FIBERGLASS (FRP) INTERNALS/COMPONENTS.
- D. **PRODUCT SUBSTITUTIONS:** NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD. SUBMISSIONS FOR SUBSTITUTIONS REQUIRE REVIEW AND APPROVAL BY THE ENGINEER OF RECORD, FOR HYDRAULIC PERFORMANCE, IMPACT TO PROJECT DESIGNS, EQUIVALENT TREATMENT PERFORMANCE, AND ANY REQUIRED PROJECT PLAN AND REPORT (HYDROLOGY/HYDRAULIC, WATER QUALITY, STORMWATER POLLUTION) MODIFICATIONS THAT WOULD BE REQUIRED BY THE APPROVING JURISDICTIONS/AGENCIES. CONTRACTOR TO COORDINATE WITH THE ENGINEER OF RECORD ANY APPLICABLE MODIFICATIONS TO THE PROJECT ESTIMATES OF COST, BONDING AMOUNT DETERMINATIONS, PLAN CHECK FEES FOR CHANGES TO APPROVED DOCUMENTS, AND/OR ANY OTHER REGULATORY REQUIREMENTS RESULTING FROM THE PRODUCT SUBSTITUTION.
- E. **HANDLING AND STORAGE:** PREVENT DAMAGE TO MATERIALS DURING STORAGE AND HANDLING.

**PRODUCTS**

- A. THE DEVICE SHALL BE A CYLINDRICAL OR RECTANGULAR, ALL CONCRETE STRUCTURE (INCLUDING RISERS), CONSTRUCTED FROM PRECAST CONCRETE RISER AND SLAB COMPONENTS OR MONOLITHIC PRECAST STRUCTURE(S), INSTALLED TO CONFORM TO ASTM C 891 AND TO ANY REQUIRED STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS, WHICHEVER IS MORE STRINGENT. THE DEVICE SHALL BE WATERTIGHT.
- B. THE CYLINDRICAL CONCRETE DEVICE SHALL INCLUDE A FIBERGLASS CARTRIDGE DECK INSERT. THE RECTANGULAR CONCRETE DEVICE SHALL INCLUDE A COATED ALUMINUM INSERT. IN EITHER INSTANCE, THE INSERT SHALL BE BOLTED AND SEALED WATERTIGHT INSIDE THE PRECAST CONCRETE CHAMBER. THE INSERT SHALL SERVE AS: (A) A HORIZONTAL DIVIDER BETWEEN THE LOWER TREATMENT ZONE AND THE UPPER TREATED EFFLUENT ZONE; (B) A DECK FOR ATTACHMENT OF FILTER CARTRIDGES SUCH THAT THE MEMBRANE FILTER ELEMENTS OF EACH CARTRIDGE EXTEND INTO THE LOWER TREATMENT ZONE; (C) A PLATFORM FOR MAINTENANCE WORKERS TO SERVICE THE FILTER CARTRIDGES (MAXIMUM MANNED WEIGHT = 450 POUNDS); (D) A CONDUIT FOR CONVEYANCE OF TREATED WATER TO THE EFFLUENT PIPE.
- C. MEMBRANE FILTER CARTRIDGES SHALL BE COMPRISED OF REUSABLE CYLINDRICAL MEMBRANE FILTER ELEMENTS CONNECTED TO A PERFORATED HEAD PLATE. THE NUMBER OF MEMBRANE FILTER ELEMENTS PER CARTRIDGE SHALL BE A MINIMUM OF ELEVEN 2.75-INCH (70-MM) OR GREATER DIAMETER ELEMENTS. THE LENGTH OF EACH FILTER ELEMENT SHALL BE A MINIMUM 15 INCHES (381 MM). EACH CARTRIDGE SHALL BE FITTED INTO THE CARTRIDGE DECK BY INSERTION INTO A CARTRIDGE RECEPTACLE THAT IS PERMANENTLY MOUNTED INTO THE CARTRIDGE DECK. EACH CARTRIDGE SHALL BE SECURED BY A CARTRIDGE LID THAT IS THREADED ONTO THE RECEPTACLE, OR SIMILAR MECHANISM TO SECURE THE CARTRIDGE INTO THE DECK. THE MAXIMUM TREATMENT FLOW RATE OF A FILTER CARTRIDGE SHALL BE CONTROLLED BY AN ORIFICE IN THE CARTRIDGE LID, OR ON THE INDIVIDUAL CARTRIDGE ITSELF, AND BASED ON A DESIGN FLUX RATE (SURFACE LOADING RATE) DETERMINED BY THE MAXIMUM TREATMENT FLOW RATE PER UNIT OF FILTRATION MEMBRANE SURFACE AREA. THE MAXIMUM FLUX RATE SHALL BE 0.21 GPM/FT<sup>2</sup> (0.142 LPS/M<sup>2</sup>). EACH MEMBRANE FILTER CARTRIDGE SHALL ALLOW FOR MANUAL INSTALLATION AND REMOVAL.
- D. ALL FILTER CARTRIDGES AND MEMBRANES SHALL BE REUSABLE AND ALLOW FOR THE USE OF FILTRATION MEMBRANE RINSING PROCEDURES TO RESTORE FLOW CAPACITY AND SEDIMENT CAPACITY, EXTENDING CARTRIDGE SERVICE LIFE.
- E. ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.
- F. THE DEVICE SHALL INCLUDE A MINIMUM 24 INCHES (610 MM) OF SUMP BELOW THE BOTTOM OF THE CARTRIDGES FOR SEDIMENT ACCUMULATION, UNLESS OTHERWISE SPECIFIED BY THE DESIGN ENGINEER. DEPTHS LESS THAN 24" MAY HAVE AN IMPACT ON THE TOTAL PERFORMANCE AND/OR LONGEVITY BETWEEN CARTRIDGE MAINTENANCE/REPLACEMENT OF THE DEVICE.
- G. ALL PRECAST CONCRETE COMPONENTS SHALL BE MANUFACTURED TO A MINIMUM LIVE LOAD OF HS-20 TRUCK LOADING OR GREATER BASED ON LOCAL REGULATORY SPECIFICATIONS, UNLESS OTHERWISE MODIFIED OR SPECIFIED BY THE DESIGN ENGINEER, AND SHALL BE WATERTIGHT.
- H. GASKETS AND/OR SEALANTS TO PROVIDE WATER TIGHT SEAL BETWEEN CONCRETE JOINTS. JOINTS SHALL BE SEALED WITH PREFORMED JOINT SEALING COMPOUND CONFORMING TO ASTM C 990.
- I. FRAME AND COVERS MUST BE MANUFACTURED FROM CAST-IRON OR OTHER COMPOSITE MATERIAL TESTED TO WITHSTAND H-20 OR GREATER DESIGN LOADS, AND AS APPROVED BY THE LOCAL REGULATORY BODY. FRAMES AND COVERS MUST BE EMBOSSED WITH THE NAME OF THE DEVICE MANUFACTURER OR THE DEVICE BRAND NAME.
- J. DOOR AND HATCHES, IF PROVIDED SHALL MEET DESIGNATED LOADING REQUIREMENTS OR AT A MINIMUM FOR INCIDENTAL VEHICULAR TRAFFIC.
- K. ALL CONCRETE COMPONENTS SHALL BE MANUFACTURED ACCORDING TO LOCAL SPECIFICATIONS AND SHALL MEET THE REQUIREMENTS OF ASTM C 478.
- L. THE FIBERGLASS PORTION OF THE FILTER DEVICE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING STANDARD: ASTM D-4097: CONTACT MOLDED GLASS FIBER REINFORCED CHEMICAL RESISTANT TANKS.
- M. STEPS SHALL BE CONSTRUCTED ACCORDING TO ASTM D4101 OF COPOLYMER POLYPROPYLENE, AND BE DRIVEN INTO PREFORMED OR PRE-DRILLED HOLES AFTER THE CONCRETE HAS CURED, INSTALLED TO CONFORM TO APPLICABLE SECTIONS OF STATE, PROVINCIAL AND MUNICIPAL BUILDING CODES, HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF SUCH DEVICES.
- N. ALL PRECAST CONCRETE SECTIONS SHALL BE INSPECTED TO ENSURE THAT DIMENSIONS, APPEARANCE AND QUALITY OF THE PRODUCT MEET LOCAL MUNICIPAL SPECIFICATIONS AND ASTM C 478.

**PERFORMANCE**

- A. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL FUNCTION TO REMOVE POLLUTANTS BY THE FOLLOWING UNIT TREATMENT PROCESSES; SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.
- B. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL REMOVE OIL, DEBRIS, TRASH, COARSE AND FINE PARTICULATES, PARTICULATE-BOUND POLLUTANTS, METALS AND NUTRIENTS FROM STORMWATER DURING RUNOFF EVENTS.
- C. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TYPICALLY UTILIZE AN EXTERNAL BYPASS TO DIVERT EXCESSIVE FLOWS. INTERNAL BYPASS SYSTEMS SHALL BE EQUIPPED WITH A FLOATABLES BAFFLE, AND MUST PASS WATER OVER THE CARTRIDGE DECK, AND AVOID PASSAGE THROUGH THE SUMP AND/OR CARTRIDGE FILTRATION ZONE.
- D. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TREAT 100% OF THE REQUIRED WATER QUALITY TREATMENT FLOW BASED ON A MAXIMUM TREATMENT FLUX RATE (SURFACE LOADING RATE) ACROSS THE MEMBRANE FILTER CARTRIDGES NOT TO EXCEED 0.21 GPM/FT<sup>2</sup> (0.142 LPS/M<sup>2</sup>).
- E. AT A MINIMUM, THE STORMWATER QUALITY FILTER DEVICE SHALL HAVE BEEN FIELD TESTED AND VERIFIED WITH A MINIMUM 25 QUALIFYING STORM EVENTS AND FIELD MONITORING CONDUCTED ACCORDING TO THE TARP TIER II OR TAPE FIELD TEST PROTOCOL, AND HAVE RECEIVED NJCAT VERIFICATION.
- F. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TSS REMOVAL EFFICIENCY OF 85% AND A MINIMUM MEDIAN SSC REMOVAL EFFICIENCY OF 95%.
- G. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED THE ABILITY TO CAPTURE FINE PARTICLES AS INDICATED BY A MINIMUM MEDIAN REMOVAL EFFICIENCY OF 75% FOR THE PARTICLE FRACTION LESS THAN 25 MICRONS, AN EFFLUENT D50 OF 15 MICRONS OR LOWER FOR ALL MONITORED STORM EVENTS, AND AN EFFLUENT TURBIDITY OF 15 NTUS OR LOWER.
- H. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL PHOSPHORUS REMOVAL OF 55%, AND A MINIMUM MEDIAN TOTAL NITROGEN REMOVAL OF 50%.
- I. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL ZINC REMOVAL OF 50%, AND A MINIMUM MEDIAN TOTAL COPPER REMOVAL OF 75%.

**INSPECTION AND MAINTENANCE**

- A. DURABILITY OF MEMBRANES ARE SUBJECT TO GOOD HANDLING PRACTICES DURING INSPECTION AND MAINTENANCE (REMOVAL, RINSING, AND REINSERTION) EVENTS, AND SITE SPECIFIC CONDITIONS THAT MAY HAVE HEAVIER OR LIGHTER LOADING ONTO THE CARTRIDGES, AND POLLUTANT VARIABILITY THAT MAY IMPACT THE MEMBRANE STRUCTURAL INTEGRITY. MEMBRANE MAINTENANCE AND REPLACEMENT SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- B. INSPECTION WHICH INCLUDES TRASH AND FLOATABLES COLLECTION, SEDIMENT DEPTH DETERMINATION, AND VISIBLE DETERMINATION OF BACKWASH POOL DEPTH SHALL BE EASILY CONDUCTED FROM GRADE (OUTSIDE THE STRUCTURE).
- C. MANUAL RINSING OF THE REUSABLE FILTER CARTRIDGES SHALL PROMOTE RESTORATION OF THE FLOW CAPACITY AND SEDIMENT CAPACITY OF THE FILTER CARTRIDGES, EXTENDING CARTRIDGE SERVICE LIFE.
- D. SEDIMENT REMOVAL FROM THE FILTER TREATMENT DEVICE SHALL BE ABLE TO BE CONDUCTED USING A STANDARD MAINTENANCE TRUCK AND VACUUM APPARATUS, AND A MINIMUM ONE POINT OF ENTRY TO THE SUMP THAT IS UNOBSTRUCTED BY FILTER CARTRIDGES.
- E. MAINTENANCE ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.
- F. FILTER CARTRIDGES SHALL BE ABLE TO BE MAINTAINED WITHOUT THE USE OF ADDITIONAL LIFTING EQUIPMENT.

**EXECUTION**


- A. THE INSTALLATION OF A WATERTIGHT PRECAST CONCRETE DEVICE SHOULD CONFORM TO ASTM C 891 AND TO ANY STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF MANHOLES, WHICHEVER IS MORE STRINGENT. SELECTED SECTIONS OF A GENERAL SPECIFICATION THAT ARE APPLICABLE ARE SUMMARIZED BELOW.
- B. THE WATERTIGHT PRECAST CONCRETE DEVICE IS INSTALLED IN SECTIONS IN THE FOLLOWING SEQUENCE:
  - AGGREGATE BASE
  - BASE SLAB
  - TREATMENT CHAMBER AND CARTRIDGE DECK RISER SECTION(S)
  - BYPASS SECTION
  - CONNECT INLET AND OUTLET PIPES
  - CONCRETE RISER SECTION(S) AND/OR TRANSITION SLAB (IF REQUIRED)
  - MAINTENANCE RISER SECTION(S) (IF REQUIRED)
  - FRAME AND ACCESS COVER
- C. INLET AND OUTLET PIPES SHOULD BE SECURELY SET INTO THE DEVICE USING APPROVED PIPE SEALS (FLEXIBLE BOOT CONNECTIONS, WHERE APPLICABLE) SO THAT THE STRUCTURE IS WATERTIGHT, AND SUCH THAT ANY PIPE INTRUSION INTO THE DEVICE DOES NOT IMPACT THE DEVICE FUNCTIONALITY.
- D. ADJUSTMENT UNITS (E.G. GRADE RINGS) SHOULD BE INSTALLED TO SET THE FRAME AND COVER AT THE REQUIRED ELEVATION. THE ADJUSTMENT UNITS SHOULD BE LAID IN A FULL BED OF MORTAR WITH SUCCESSIVE UNITS BEING JOINED USING SEALANT RECOMMENDED BY THE MANUFACTURER. FRAMES FOR THE COVER SHOULD BE SET IN A FULL BED OF MORTAR AT THE ELEVATION SPECIFIED.
- E. IN SOME INSTANCES THE MAINTENANCE ACCESS WALL, IF PROVIDED, SHALL REQUIRE AN EXTENSION ATTACHMENT AND SEALING TO THE PRECAST WALL AND CARTRIDGE DECK AT THE JOB SITE, RATHER THAN AT THE PRECAST FACILITY. IN THIS INSTANCE, INSTALLATION OF THESE COMPONENTS SHALL BE PERFORMED ACCORDING TO INSTRUCTIONS PROVIDED BY THE MANUFACTURER.
- F. FILTER CARTRIDGES SHALL BE INSTALLED IN THE CARTRIDGE DECK AFTER THE CONSTRUCTION SITE IS FULLY STABILIZED AND IN ACCORDANCE WITH THE MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONTRACTOR TO CONTACT THE MANUFACTURER TO SCHEDULE CARTRIDGE DELIVERY AND REVIEW PROCEDURES/REQUIREMENTS TO BE COMPLETED TO THE DEVICE PRIOR TO INSTALLATION OF THE CARTRIDGES AND ACTIVATION OF THE SYSTEM.
- G. MANUFACTURER SHALL COORDINATE DELIVERY OF FILTER CARTRIDGES AND OTHER INTERNAL COMPONENTS WITH CONTRACTOR. FILTER CARTRIDGES SHALL BE DELIVERED AND INSTALLED COMPLETE AFTER SITE IS STABILIZED AND UNIT IS READY TO ACCEPT CARTRIDGES. UNIT IS READY TO ACCEPT CARTRIDGES AFTER IS HAS BEEN CLEANED OUT AND ANY STANDING WATER, DEBRIS, AND OTHER MATERIALS HAVE BEEN REMOVED. CONTRACTOR SHALL TAKE APPROPRIATE ACTION TO PROTECT THE FILTER CARTRIDGE RECEPTACLES AND FILTER CARTRIDGES FROM DAMAGE DURING CONSTRUCTION, AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND GUIDANCE. FOR SYSTEMS WITH CARTRIDGES INSTALLED PRIOR TO FULL SITE STABILIZATION AND PRIOR TO SYSTEM ACTIVATION, THE CONTRACTOR CAN PLUG INLET AND OUTLET PIPES TO PREVENT STORMWATER AND OTHER INFLUENT FROM ENTERING THE DEVICE. PLUGS MUST BE REMOVED DURING THE ACTIVATION PROCESS.
- H. THE MANUFACTURER SHALL PROVIDE AN OWNER'S MANUAL UPON REQUEST.
- I. AFTER CONSTRUCTION AND INSTALLATION, AND DURING OPERATION, THE DEVICE SHALL BE INSPECTED AND CLEANED AS NECESSARY BASED ON THE MANUFACTURER'S RECOMMENDED INSPECTION AND MAINTENANCE GUIDELINES AND THE LOCAL REGULATORY AGENCY/BODY.
- J. WHEN REPLACEMENT MEMBRANE FILTER ELEMENTS AND/OR OTHER PARTS ARE REQUIRED, ONLY MEMBRANE FILTER ELEMENTS AND PARTS APPROVED BY THE MANUFACTURER FOR USE WITH THE STORMWATER QUALITY FILTER DEVICE SHALL BE INSTALLED.

**END OF SECTION**

The design and information shown on this drawing is provided as a service to the project owner, engineer or contractor. It is not to be used, in whole or in part, for any other project without the prior written consent of Imbrum. Failure to comply with the terms of this disclaimer may constitute a breach of contract. Imbrum does not assume any liability or responsibility for such use. If discrepancies between the supplied information upon which this drawing was prepared and the actual conditions are encountered as the work progresses, these discrepancies must be reported to Imbrum immediately for re-evaluation of the design. Imbrum accepts no responsibility for any errors or omissions or for any inaccurate information supplied by others.

#	#	#	#	#
#	#	#	#	#
#	#	#	#	#
#	#	#	#	#
0	10/01/2014	INITIAL RELEASE	BSF	BY
MARK	DATE	REVISION DESCRIPTION		

**JELLYFISH FILTER SPECIFICATIONS**



**JF6 STANDARD**  
Scale = 1:50

www.imbrumsystems.com



7037 Ridge Road, Suite 350, Hanover, MD 21076  
USA 888-279-9826 CA 800-956-4801 INTL +1-415-960-9900

**Jellyfish® Filter**  
A DIVISION OF IMBRUM SYSTEMS, INC.  
10000 CENTRAL EXPRESSWAY, SUITE 100, FORT WORTH, TEXAS 76135  
TEL: 817-734-9999 FAX: 817-734-9998  
WWW.IMBRUMSYSTEMS.COM

DATE: #####

DESIGNED: BSF	DRAWN: BSF
CHECKED: BSF	APPROVED: SP
PROJECT #: #####	PROJECT NAME: #####

SHEET: 2 OF 2

# **STANDARD PERFORMANCE SPECIFICATION STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE**

## **PART 1 – GENERAL**

### 1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

### 1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental Management – Environmental Technology Verification (ETV)

### 1.3 SUBMITTALS

- 1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.
- 1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: filtration surface area, treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.
- 1.3.3 Unless directed otherwise by the Engineer of Record, filtration treatment device product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

## **PART 2 – PRODUCTS**

### 2.1 GENERAL

- 2.1.1 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the internal components. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of their installed placement for the entire length of the cartridge.
- 2.1.2 Pollutant Storage: The Filter device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants.

## **PART 3 – PERFORMANCE**

### 3.1 GENERAL

- 3.1.1 Verification – The stormwater quality filter treatment device shall have been field tested in accordance with either TARP Tier II Protocol (TARP, 2003) and New Jersey Tier II Stormwater Test Requirements – Amendments to TARP Tier II Protocol (NJDEP, 2009) or Washington State Technology Assessment Protocol – Ecology (TAPE), 2011 or later version. The field test shall have been verified in accordance with ISO 14034:2016 Environmental Management – Environmental Technology Verification (ETV). See Section 3.2 of this specification for field test performance requirements.

### 3.2 FIELD TEST PERFORMANCE

The field test (as specified in section 3.1.1) shall have monitored a minimum of twenty (20) TARP or TAPE qualifying storm events, and report at **minimum** the following results:

- 3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have ISO 14034 ETV verified load based median TSS removal efficiency of at least 85% and load based median SSC removal efficiency of at least 98%.
- 3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.
- 3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, and an effluent  $d_{50}$  of 15 microns or lower for all monitored storm events.
- 3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce turbidity such that effluent turbidity is 15 NTU or lower.
- 3.2.5 Nutrients & Metals – The stormwater quality filter treatment device shall have ISO 14034 ETV Verified minimum load based removal efficiencies for the following:
- 3.2.5.1 Total Phosphorus (TP) Removal - Median TP removal efficiency of at least 49%.
- 3.2.5.2 Total Nitrogen (TN) Removal - Median TN removal efficiency of at least 39%.
- 3.2.5.3 Total Zinc (Zn) Removal - Median Zn removal efficiency of at least 69%.
- 3.2.5.4 Total Copper (Cu) Removal - Median Cu removal efficiency of at least 91%.

**END OF SECTION**