

TANGENT INLET MAY ENTER ON ANY SIDE OF THE DOWNSTREAM DEFENDER **PLAN VIEW**

DESIGN NOTES:

- 1) THE OUTLET PIPE INVERT SHOULD BE AT THE SAME ELEVATION OR LOWER THAN INVERTS INTO THE UPSTREAM CHAMBER.
- 2) THE DOWNSTREAM DEFENDER HAS A SUBMERGED INLET PIPE. THE INLET PIPE INVERT IS ONE INLET PIPE DIAMETER BELOW THE OUTLET PIPE INVERT. THE INLET PIPE ENTERS THE UNIT TANGENTIALLY. THE INLET PIPE SLOPE SHOULD NOT EXCEED 15%. HEADLOSS AT PEAK TREATMENT FLOW USES THE MAXIMUM PIPE DIAMETER FOR THAT UNIT. HEADLOSS WILL INCREASE WITH SMALLER INLET PIPES.
- 3) * DISTANCES ARE APPROXIMATE AND DEPEND ON TOP SLAB THICKNESS. ASSUMES A 4" FRAME AND COVER. CONFIRM WITH A HYDRO REPRESENTATIVE.
- 4) ** MAY NOT BE AVAILABLE IN ALL AREAS. CONFIRM WITH A HYDRO REPRESENTATIVE.

MODEL NUMBER & DIAMETER (FT)	PEAK TREATMENT FLOW (CFS)	MAXIMUM PIPE DIAMETER (IN)	HEADLOSS AT PEAK TREATMENT FLOW (IN)	OIL STORAGE CAPACITY (GALLONS)	SEDIMENT STORAGE CAPACITY (CUBIC YARDS)	MIN. DIST. FROM OUTLET INVERT TO TOP OF RIM (FT)*	STANDARD DIST. FROM SUMP FLOOR TO OUTLET INVERT (FT)
4	3.0	12	8	70	0.70	2.8	4.08
6	8.0	18	12	216	2.10	3.24	5.86
8	15.0	24	13	540	4.65	4.2	7.67
10 **	25.0	30	15	1,050	8.70	5.0	9.44
12 **	38.0	36	16	1,770	14.70	5.6	11.18

REVISION HISTORY DATE DESCRIPTION REV BY KJM 6/7/12 MIN RIM Date Scale

11/1/2011 Drawn

Notes

NTS Checked Approved

ЕМН Title

DOWNSTREAM DEFENDER®

STORM DRAIN FIT



Stormwater Solutions 94 Hutchins Drive Portland, Maine 04102 Tel: (207) 756-6200 Fax: (207) 756-6212 stormwaterinquiry@hydro-int.com

CAD Ref: SDFIT

Project No.

DrawingNo. SDFIT Rev. 1

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NOT FOR CONSTRUCTION - CONTACT HYDRO INTERNATIONAL FOR SITE SPECIFIC DRAWINGS RIM: 82 5/8 in (2099mm) T.O.S. 78 5/8 in (1997mm) LEDGER: 61 1/4 in (1556mm) OUTLET: 49 in (1245mm) INLET: 37 in (940mm) SKIRT: 28 1/2 in (724mm) SUMP: 0 in (0mm) SECTION A-A STONE BASE PER PROJECT **SPECIFICATIONS**

Notes

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE. 2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING DOWNSTREAM DEFENDER MANHOLE. 3. TYPICALLY DOWNSTREAM DEFENDERS WILL BE DELIVERED TO THE PROJECT SITE WITH A TOP SLAB ELEVATION 12"± BELOW FINISHED GRADE. PURCHASER SHALL BE RESPONSIBLE FOR GRADE RINGS OR BLOCK AND MORTAR NECESSARY TO MEET FINAL GRADE.

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9/14/2011				5/16'	' = 1'-0"
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Title

4-FT (1.22m) DIAMETER DOWNSTREAM DEFENDER

GENERAL ARRANGEMENT

Hydro & International &

Stormwater Solutions 94 Hutchins Drive Portland, Maine 04102 Tel: (207) 756-6200 Fax: (207) 756-6212 stormwaterinquiry@hydro-int.com

CAPACITIES:

SIZE

48 in

30 in

12 in

12 in

- 1. Peak treatment flow: 3.0 cfs (85 l/s)
- 2. Sediment storage capacity: 0.70 Cu. yd. (0.54 cu. m.)
- 3. Oil storage capacity: 70 Gal. (265 liters)

ADDITIONAL DESIGN INFORMATION:

- 1. The outlet pipe stub (not shown) is a roto-molded product with an I.D. of 12 in. that cannot be modified. To avoid the use of a reducer or expander on the outlet a 12 in. outlet pipe should be used if possible. The orientation of the outlet pipe can be adjusted to suit site conditions.
- 2. Maximum pipe size is 12 in. The inlet pipe invert should be placed one inlet pipe diameter below the outlet pipe invert. The I.D. of the inlet pipe should be placed tangent to the I.D. of the manhole. The orientation of the inlet pipe can be adjusted to suit site conditions. Headloss at 3.0 cfs with a 12 in. inlet: 8 in. (203 mm). Headloss will increase with smaller inlet pipes.
- 3. Sediment shall be stored in a zone that is isolated form the main flow path and protected from re-entrainment by the benching skirt.
- 4. Dimensions are general and intended for guidance only.

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ITEM

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PRECASTER)

LEDGER ANGLE

DIP PLATE

SUPPORT FRAME

BENCHING SKIRT

FRAME AND COVER

INLET PIPE (BY OTHERS)

OUTLET PIPE (BY OTHERS) 1

PIPE COUPLING (BY OTHERS)

CENTER SHAFT AND CONE

Parts List

DESCRIPTION

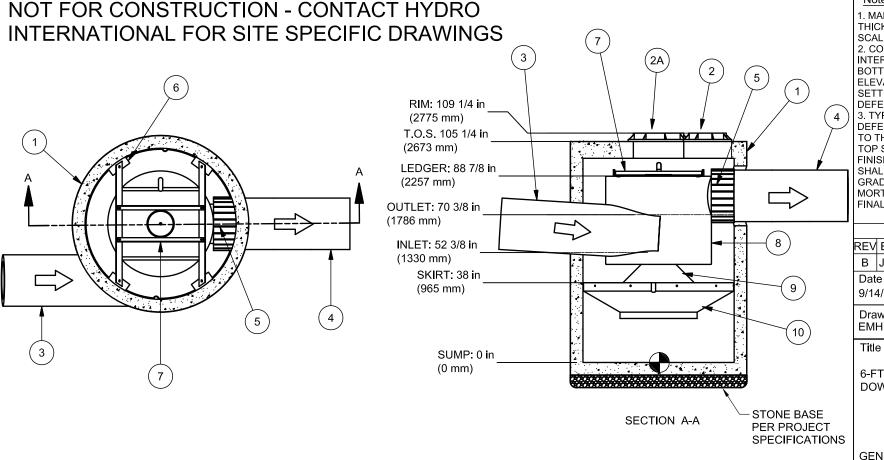
PRECAST MANHOLE (BY HYDRO VIA

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CAD Ref: D4GA_SI

Project No.

Drawing No. D4GA SI Rev. A



Notes

- 1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
- 2. CONTACT HYDRO INTERNATIONAL FOR A **BOTTOM OF STRUCTURE ELEVATION PRIOR TO** SETTING DOWNSTREAM DEFENDER MANHOLE.
- 3. TYPICALLY DOWNSTREAM **DEFENDERS WILL BE DELIVERED** TO THE PROJECT SITE WITH A TOP SLAB ELEVATION 12"± BELOW FINISHED GRADE. PURCHASER SHALL BE RESPONSIBLE FOR GRADE RINGS OR BLOCK AND MORTAR NECESSARY TO MEET FINAL GRADE.

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REVISION HISTORY

Title

6-FT (1.82m) DIAMETER DOWNSTREAM DEFENDER

KJM

GENERAL ARRANGEMENT



Stormwater Solutions 94 Hutchins Drive Portland, Maine 04102 Tel: (207) 756-6200 Fax: (207) 756-6212 stormwaterinquiry@hydro-int.com

CAPACITIES:

SIZE

72 **i**n

18 **i**n

24 in

18 in

18 in

- 1. Peak treatment flow: 8.0 cfs (227 l/s)
- 2. Sediment storage capacity: 2.10 Cu. yd. (1.61 cu. m.)
- 3. Oil storage capacity: 216 Gal. (818 liters)

ADDITIONAL DESIGN INFORMATION:

- 1. The outlet pipe stub (not shown) is a roto-molded product with an I.D. of 18 in. that cannot be modified. To avoid the use of a reducer or expander on the outlet an 18 in. outlet pipe should be used if possible. The orientation of the outlet pipe can be adjusted to suit site conditions.
- 2. Maximum pipe size is 18 in. The inlet pipe invert should be placed one inlet pipe diameter below the outlet pipe invert. The I.D. of the inlet pipe should be placed tangent to the I.D. of the manhole. The orientation of the inlet pipe can be adjusted to suit site conditions. Headloss at 8.0 cfs with an 18 in, inlet: 12 in. (305 mm). Headloss will increase with smaller inlet pipes.
- 3. Sediment shall be stored in a zone that is isolated form the main flow path and protected from re-entrainment by the benching skirt.
- 4. Dimensions are general and intended for guidance only.

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ITEM

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PRECASTER)

FRAME AND COVER

FRAME AND COVER

LEDGER ANGLE

DIP PLATE

SUPPORT FRAME

BENCHING SKIRT

INLET PIPE (BY OTHERS)

OUTLET PIPE (BY OTHERS) 1

CENTER SHAFT AND CONE

PIPE COUPLING (BY OTHERS)

Parts List

DESCRIPTION

PRECAST MANHOLE (BY HYDRO VIA

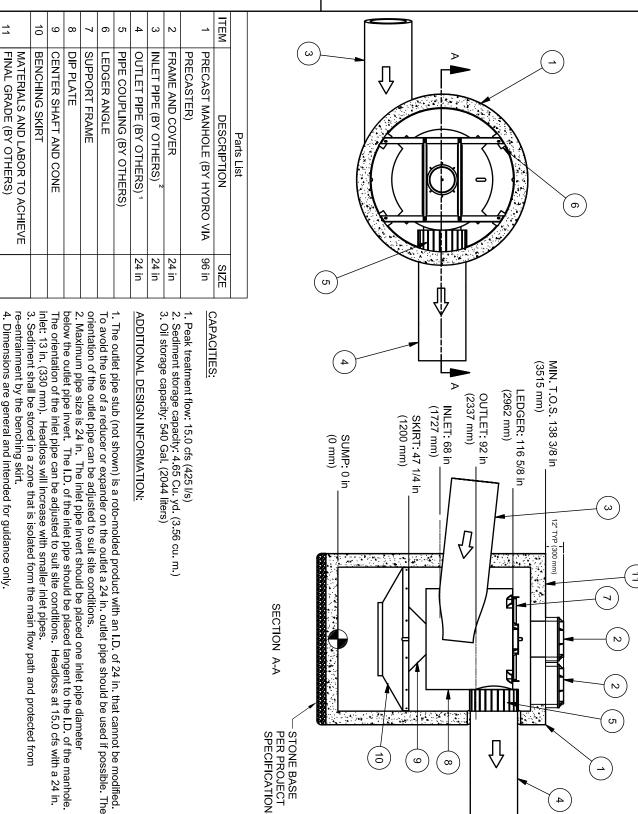
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CAD Ref: D6GA

Project No.

DrawingNo D6GA Rev. B

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THICKNESSES ARE NOT TO I. MANHOLE WALL AND SLAB

FINISHED GRADE. PURCHASER SHALL BE RESPONSIBLE FOR GRADE RINGS OR BLOCK AND 3. TYPICALLY DOWNSTREAM DEFENDERS WILL BE DELIVERED DEFENDER MANHOLE. PRIOR TO SETTING DOWNSTREAM OF STRUCTURE ELEVATION INTERNATIONAL FOR A BOTTOM CONTACT HYDRO TOP SLAB ELEVATION 12"± BELOW TO THE PROJECT SITE WITH A

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FINAL GRADE

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8-FT (2.44m) DIAMETER DOWNSTREAM DEFENDER

PER PROJECT SPECIFICATIONS STONE BASE

GENERAL ARRANGEMENT



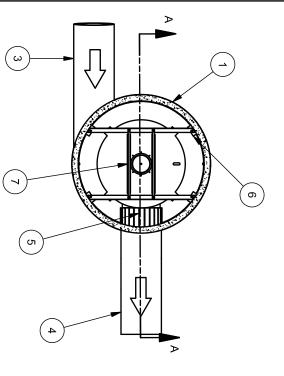
stormwaterinquiry@hydro-int.com Portland, Maine 04102 Tel: (207) 756-6200 Stormwater Solutions Fax: (207) 756-6212 94 Hutchins Drive

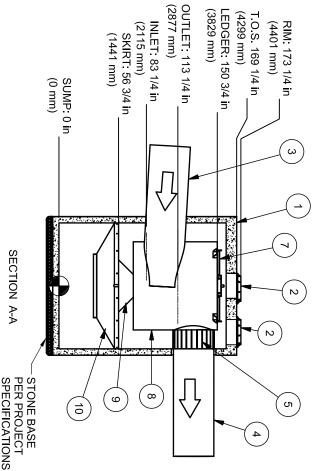
Project No. CAD Ref: D8GA

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DrawingNo. D8GA

INTERNATIONAL FOR SITE SPECIFIC DRAWINGS NOT FOR CONSTRUCTION - CONTACT HYDRO





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CENTER SHAFT AND CONE	DIP PLATE	SUPPORT FRAME	LEDGER ANGLE	PIPE COUPLING (BY OTHERS)	OUTLET PIPE (BY OTHERS) 1	INLET PIPE (BY OTHERS) 2	FRAME AND COVER	PRECASTER)	PRECAST MANHOLE (BY HYDRO VIA	DESCRIPTION	Parts List	
					30 in	ui 08	24 in		120 i n	SIZE		

CAPACITIES:

- 1. Peak treatment flow: 25.0 cfs (708 l/s)
- Sediment storage capacity: 8.70 Cu. yd. (6.65 cu. m.)
 Oil storage capacity: 1050 Gal. (3975 liters)

ADDITIONAL DESIGN INFORMATION:

- 1. The outlet pipe stub (not shown) is a roto-molded product with an I.D. of 30 in. that cannot be modified. To avoid the use of a reducer or expander on the outlet a 30 in. outlet pipe should be used if possible.
- inlet: 15 in. (381 mm). Headloss will increase with smaller inlet pipes. below the outlet pipe invert. The I.D. of the inlet pipe should be placed tangent to the I.D. of the manhole. The orientation of the outlet pipe can be adjusted to suit site conditions. 2. Maximum pipe size is 30 in. The inlet pipe invert should be placed one inlet pipe diameter The orientation of the inlet pipe can be adjusted to suit site conditions. Headloss at 25.0 cfs with a 30 in.
- Sediment shall be stored in a zone that is isolated form the main flow path and protected from re-entrainment by the benching skirt.
- Dimensions are general and intended for guidance only.

INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING DOWNSTREAM FINAL GRADE MORTAR NECESSARY TO MEET SHALL BE RESPONSIBLE FOR FINISHED GRADE. PURCHASER DEFENDERS WILL BE DELIVERED SCALE GRADE RINGS OR BLOCK AND TO THE PROJECT SITE WITH A TYPICALLY DOWNSTREAM DEFENDER MANHOLE CONTACT HYDRO THICKNESSES ARE NOT TO MANHOLE WALL AND SLAB TOP SLAB ELEVATION 12"± BELOW

REV BY DATE DESCRIPTION B JLL 1/7/13 Metric Dim. Date Scale 9/14/2011 1/8" = 1'-0" Drawn Checked Approved EMH KJM		11	교	REVISION HISTORY	HST	ORY
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DOWNSTREAM DEFENDER 10-FT (3.05m) DIAMETER

GENERAL ARRANGEMENT



stormwaterinquiry@hydro-int.com Portland, Maine 04102 Stormwater Solutions Fax: (207) 756-6212 Tel: (207) 756-6200 94 Hutchins Drive

CAD Ref. D10GA

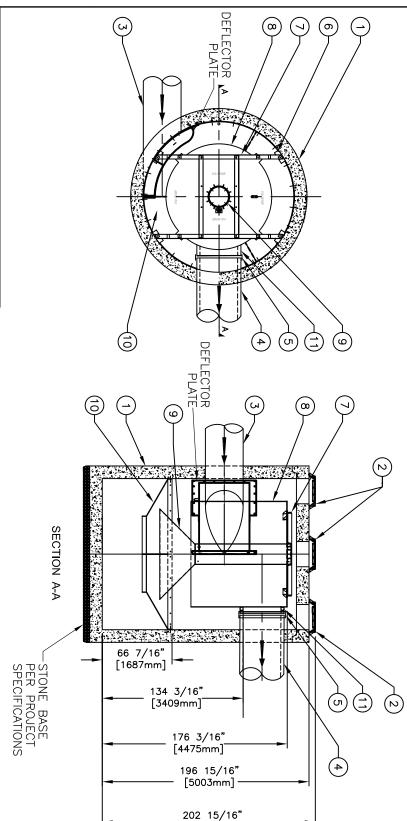
Project No.

DrawingNo. D10GA Rev. B

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	Parts List	
Mati	DESCRIPTION	SIZE
1	PRECAST MANHOLE (BY HYDRO VIA	144 i n
	PRECASTER)	
2	FRAME AND COVER	24 in
3	INLET PIPE (BY OTHERS) 2	36 in
4	OUTLET PIPE (BY OTHERS) 1	36 in
5	PIPE COUPLING (BY OTHERS)	
6	LEDGER ANGLE	
7	SUPPORT FRAME	
8	DIP PLATE	
9	CENTER SHAFT AND CONE	
10	BENCHING SKIRT	
11	OUTLET PIPE STUB 1	36 i n

CAPACITIES:

- 1. Peak treatment flow: 38.0 cfs (1076 l/s)
- Sediment storage capacity: 14.70 Cu. yd. (11.24 cu. m.)
 Oil storage capacity: 1770 Gal. (6700 liters)

ADDITIONAL DESIGN INFORMATION:

- 1. The outlet pipe stub is a roto-molded product with an I.D. of 36 in. that cannot be modified. To The orientation of the outlet pipe can be adjusted to suit site conditions. avoid the use of a reducer or expander on the outlet a 36 in. outlet pipe should be used if possible.
- The orientation of the inlet pipe can be adjusted to suit site conditions. Headloss at 38.0 cfs with a 36 in. inlet: 16 in. (406 mm). Headloss will increase with smaller inlet pipes. the outlet pipe invert. The I.D. of the inlet pipe should be placed tangent to the I.D. of the manhole Maximum pipe size is 36 in. The inlet pipe invert should be placed one inlet pipe diameter below
- re-entrainment by the benching skirt. 3. Sediment shall be stored in a zone that is isolated form the main flow path and protected from
- 4. Dimensions are general and intended for guidance only.

Notes
. MANHOLE WALL AND SLAB
HICKNESSES ARE NOT TO SCALE.
CONTACT HYDRO
NTERNATIONAL FOR A BOTTOM
OF STRUCTURE ELEVATION PRIOR
O SETTING DOWNSTREAM
EFENDER MANHOLE.
TYPICALLY DOWNSTREAM

10721 FINAL GRADE. FINISHED GRADE. PURCHASER MORTAR NECESSARY TO MEET GRADE RINGS OR BLOCK AND SHALL BE RESPONSIBLE FOR SLAB ELEVATION 12"± BELOW DEFENDERS WILL BE DELIVERED TO THE PROJECT SITE WITH A TOP

	RE	REVISION HISTORY	HIST	ORY
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[5155mm]

12-FT DIAMETER
DOWNSTREAM DEFENDER

Title

GENERAL ARRANGEMENT



stormwaterinquiry@hydro-int.com Portland, Maine 04102 Tel: (207) 756-6200 Fax: (207) 756-6212 Stormwater Solutions 94 Hutchins Drive

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