

STORMWATER MANAGEMENT REPORT

For
65 Stewart Street, Ottawa

Prepared by:

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Revision 1
April, 2021

1. Project Description:

1.1. Introduction:

Property at 65 Stewart Street is located close to intersection of Stewart Street and Cumberland Street. The property is about 0.06 hectare severed from existing lot which contain an existing two story building built in circa 1970.

Property at 65 Stewart Street is currently R4 Zoning. Due to market demand for residential, the idea initiated to construct a new 3-story dwelling addition to existing two story building.

This report will address the stormwater management requirements associated with the proposed development located 65 Stewart Street within the City of Ottawa. This report is prepared in response to the request from City of Ottawa Planning department.

1.2. Existing Conditions:

The property measure a total area of approximately 0.06 hectare. The site is fronting 300mm diameter PVC Storm main on Stewart Street.



1.3. Guidelines, Previous Studies, And Reports

The following studies were utilized in the preparation of this report:

- Ottawa Sewer Design Guidelines,
City of Ottawa, SDG002, October 2012.
(City Standards)
 - Technical Bulletin ISTB-2018-01
City of Ottawa, March 21, 2018.
(ISTB-2018-01)
 - Technical Bulletin ISTB-2018-04
City of Ottawa, June 27, 2018.
(ISTB-2018-04)

- Ottawa Design Guidelines Water Distribution
City of Ottawa, July 2010.
(Water Supply Guidelines)
 - Technical Bulletin ISD-2010-2
City of Ottawa, December 15, 2010.
(ISD-2010-2)
 - Technical Bulletin ISDTB-2014-02
City of Ottawa, May 27, 2014.
(ISDTB-2014-02)
 - Technical Bulletin ISTB-2018-02
City of Ottawa, March 21, 2018.
(ISTB-2018-02)

- Design Guidelines for Sewage Works,
Ministry of the Environment, 2008.
(MOE Design Guidelines)

- Stormwater Planning and Design Manual,
Ministry of the Environment, March 2003.
(SWMP Design Manual)

- Ontario Building Code Compendium
Ministry of Municipal Affairs and Housing Building Development Branch,
January 1, 2012 Update. (OBC)

- Geotechnical Investigation

2. Stormwater Management

Pre-development Stormwater Conditions:

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system and is located within the Ottawa Central sub-watershed. As such, approvals for proposed development within this area are under the approval authority of the City of Ottawa.

The site is currently occupied by an existing dwelling with grass and mostly asphalt all around the dwelling. Pre-development conditions will be considered as the lesser of current conditions or conditions resulting in a runoff coefficient of 0.5. Based on the existing ground cover the pre-development runoff coefficient was calculated to be 0.60. However, the allowable release rate for the site is calculated using a runoff coefficient of 0.50, the 5 year storm event, time of concentration of 10 min and store up to the 100 years storm event as per direction from City of Ottawa Sewer Design Guideline.

The area for runoff coefficients used for either pre-development or post-development conditions were based on actual areas measured in CAD. Runoff coefficients for surfaces such as roofs, were taken as 0.90, for permeable landscape were taken as 0.50. Refer to appendixes for detail

It was assumed that the existing development contained no stormwater management controls for flow attenuation. The estimated combined pre-development peak flows for the 5 storm events are calculated below:

Allowable Release Rate:

- Time of Concentration = 10 minutes,
- Drainage Area = 0.06 ha

$$Q_{\text{allow}} = 2.78 C I A$$

Where:

Q allow	=	Allowable release rate to storm sewer (L/sec)
C	=	Runoff Coefficient (dimensionless) =0.50
I	=	Average Rainfall Intensity for return period (mm/hr)
	=	$998.071 / (TC + 6.053)^{0.814} = 104.2 \text{ mm/hr (5-year)}$
TC	=	Time of concentration (minutes) =10 min
A	=	Drainage Area (hectares) = 0.06

$$Q_{\text{Allow}} = 8.69 \text{ L/sec} \quad (5\text{-year})$$

Therefore the allowable release rate from the site is 8.69 L/sec for 5-year storm event.

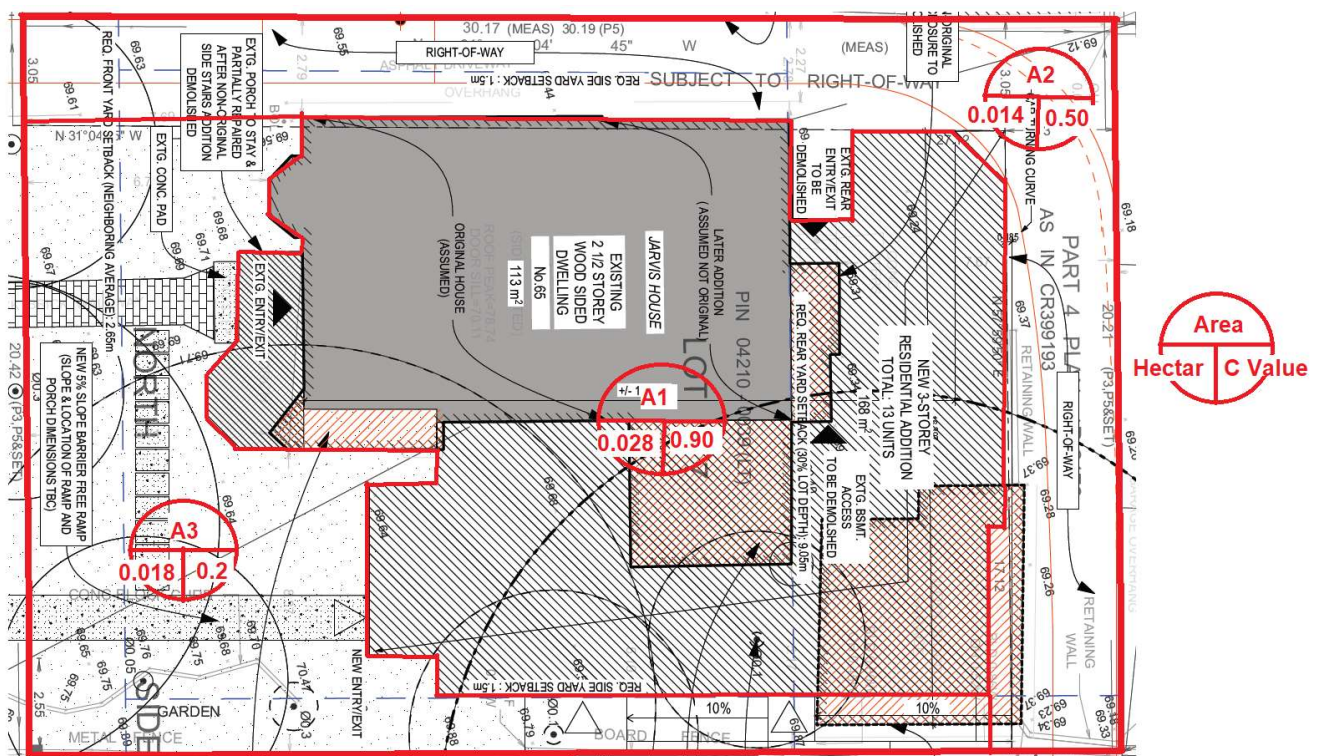
Post-development Stormwater Management Target:

Stormwater management requirements for the proposed development were reviewed with the City of Ottawa, generating the following requirements for the proposed development:

- Meet a total allowable release rate (sanitary and storm) based on a Rational Method Coefficient of 0.50, employing the City of Ottawa IDF parameters for a 5-year storm with a time of concentration equal to or greater than 10 minutes
- Attenuate all storms up to and including the City of Ottawa 100-year design event on site. Post-development 5-year up to and including 100-year storm event shall be controlled to the pre-development 5-year storm event.
- During all construction activities, erosion and sediment shall be controlled by techniques outlined in **Section 5** of this report

Storm Drain Area :

To respect provided requirements, post development storm water management design for this site has been divided to 3 general areas; Grass area, Roof and Parking area:



ALLOWABLE FLOWS FROM SITE (tc = 20 min)

C(max equiv)	I (mm/h)	Area (ha)
0.5	104.2	0.060

Q(allow) 8.69 l/s

I (mm/h)	I (100yr) mm/h
104.2	179

Area ID	Area (ha)	C (5yr)	A x C	C (100yr) (Max of 1.0)	A x C	Type of Flow (Controlled/Uncontrolled)
A1: Proposed Building	0.028	0.9	0.03	1.00	0.03	Controlled
A2: Landscape area	0.014	0.5	0.01	0.63	0.01	Uncontrolled sheet drain
A3: Grass area	0.018	0.2	0.00	0.25	0.00	Uncontrolled sheet drain
Total Site Area (ha)	0.06	---	0.04	---	0.04	Total

C(avg) 5-year = 0.60
C(avg) 100-year = 0.69

Post-development Stormwater Management:

Post development storm water management design for this site includes 3 general areas; Grass area, Roof and Driveway area.

- Grass area will sheet drain as per natural drainage pattern. Pre and post runoff for grass area remain the same.
- Permeable landscape will sheet drain to Stewart street, same as pre-development.
- Roof: Storm runoff during 5yrs and 100yrs storm event will be stored on the roof. In order to ensure that the allowable release rate to the storm sewers is not exceeded, roof drain restrictors will be installed at the roof drains by limiting the rate at which storm runoff is release to the sewers.

As ponds generally form the shape of the roof, the extend and depth of ponding resulting from the 100-year storm was determined using the cone formula equation; $V=1/3 \times A \times H$, A and H are area and height of pond, respectively. Detail of calculation can be found in appendixes. Below is the summary of our calculation:

SUMMARY OF STORMWATER MANAGEMENT

- Pre-development flow rate; **8.69 L/sec**
- Grass area will sheet drain as per pre-development natural drainage patter. Uncontrolled release rate of **1.04 L/Sec** is considered for grass area
- Permeable landscaped area will sheet drain. Uncontrolled release rate of **2.03 L/Sec**
- Allowable Release Rate = **8.69 L/s – 1.04 L/s – 2.03 L/s = 5.62 L/s**

The roof will be controlled to **5.62 L/sec**. This is achieved by means of 3 roof drain each control **1.87 L/sec** or **30 Gal/min**. Based on calculation, the maximum volume required for the roof at post development stage for 100yrs storm event would be **9.76 m³**. The maximum ponding height on the roof based on cone formula will come up to be **210mm**.

The discharge rate from above connected structure will be controlled via an ICD which is selected based on three roof drain of 3” pipe roof drain and fully exposed weir using available manufacturer database, (see appendix) Watts RD100 roof drains is selected.

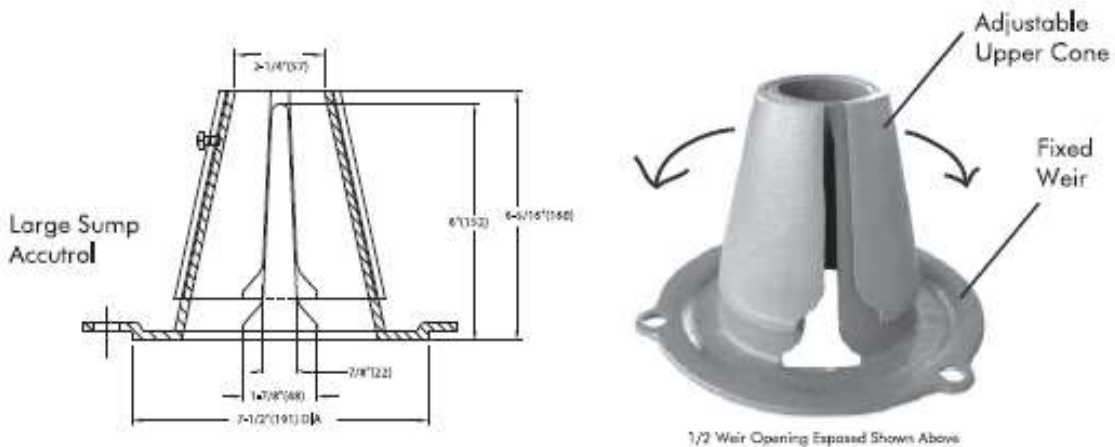
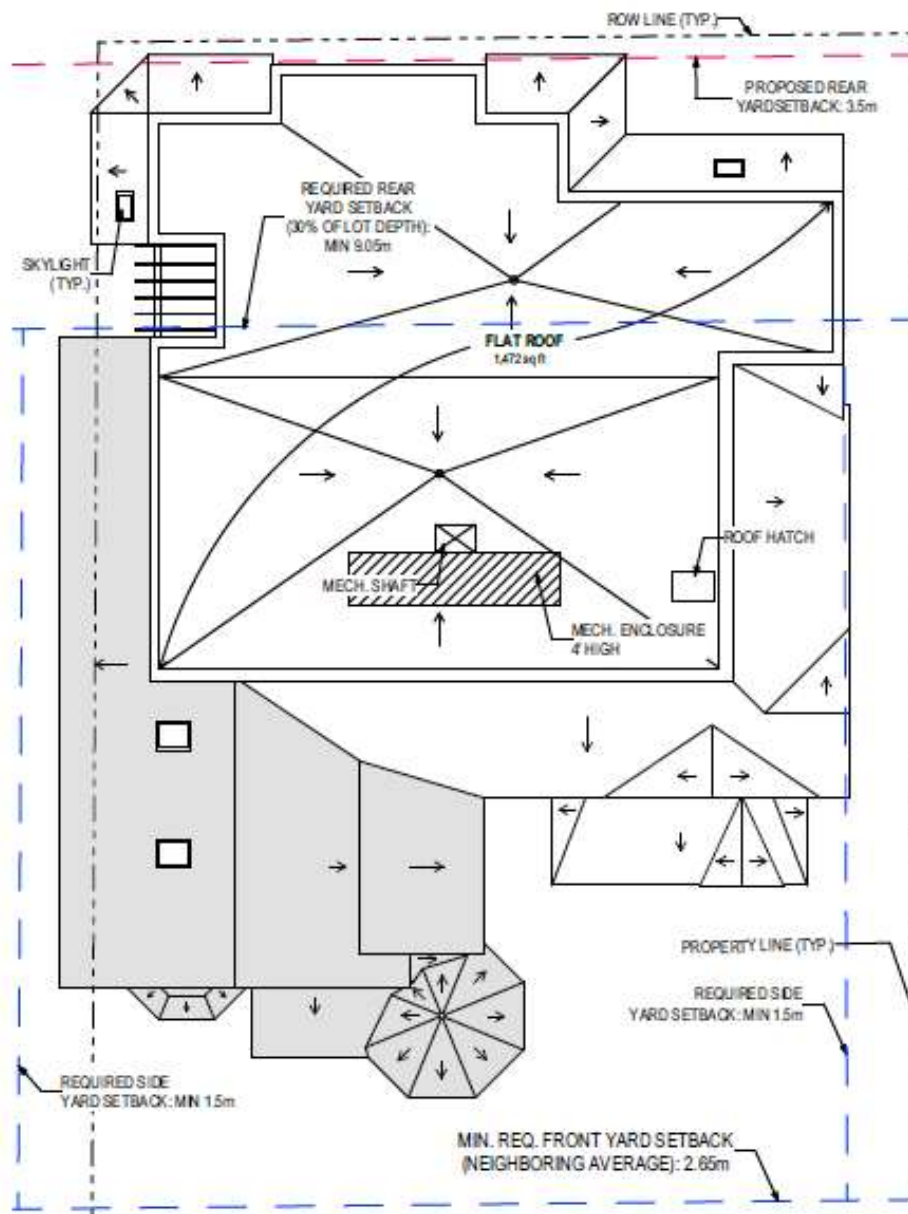


TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	Head of Water					
	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	10	10	10	10	10



5 ROOF PLAN - PROPOSED
SPC-2 SCALE 1/8" = 1'0"

Flat Roof Storage Area

1. Erosion and Sediment Control

Following methods will be utilized to control erosion and sediment:

- Silt fence will be installed around the perimeter of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated.
- Catch basins will have SILTSACKS or an approved equivalent installed under the grate during construction to protect from silt entering the storm sewer system.
- A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.
- Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents:
 - Limit extent of exposed soils at any given time;
 - Re-vegetate exposed areas as soon as possible;
 - Minimize the area to be cleared and grubbed;
 - Protect exposed slopes with plastic or synthetic mulches;
 - Install silt fence to prevent sediment from entering existing ditches;
 - No refueling or cleaning of equipment near existing watercourses;
 - Provide sediment traps and basins during dewatering;
 - Install filter cloth between catch basins and frames;
 - Plan construction at proper time to avoid flooding;
 - Establish material stockpiles away from watercourses, so that barriers and filters may be installed.
- The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:
 - Verification that water is not flowing under silt barriers;
 - Clean and change filter cloth at catch basins.
- Construction and maintenance requirements for erosion and sediment controls to comply with Ontario Provincial Standard Specification OPSS 577, and City of Ottawa specifications.
- A visual inspection shall be completed daily on sediment control barriers and any damage repaired immediately. Care will be taken to prevent damage during construction operations,

Should you have any questions or comments, please feel free to contact undersigned.



Yours truly,
Wissam Elias, P. Eng
Senior Project Manager

APPENDIX A:
Related Correspondence

APPENDIX B:
Storm Drainage Area

APPENDIX C:
Calculations

ALLOWABLE FLOWS FROM SITE (tc = 20 min)

C(max equiv)	I (mm/h)	Area (ha)
0.5	104.2	0.060

Q(allow) 8.69 l/s

I (mm/h)	I (100yr) mm/h
104.2	179

Area ID	Area (ha)	C (5yr)	A x C	C (100yr) (Max of 1.0)	A x C	Type of Flow (Controlled/Uncontrolled)
A1: Proposed Building	0.028	0.9	0.03	1.00	0.03	Controlled
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A3: Grass area	0.018	0.2	0.00	0.25	0.00	Uncontrolled sheet drain
Total Site Area (ha)	0.06	---	0.04	---	0.04	Total

C(avg) 5-year = 0.60
 C(avg) 100-year = 0.69

C(5 gr)	C(100 gr)	Area (ha)			
0.60	0.69	0.060			
Q(restricted) l/s = 5.62		← enter restricted release rate			
t(c)min	I (mm/h)	Q(unrestricted) l/s	Q(restricted) l/s	Q(stored) l/s	V(stored) m ³
5	141.2	14.05	5.62	8.43	2.53
10	104.2	10.37	5.62	4.75	2.85
15	83.6	8.32	5.62	2.70	2.43
20	70.3	6.99	5.62	1.37	1.65
25	60.9	6.06	5.62	0.44	0.66
30	53.9	5.37	5.62	-0.25	-0.45
35	48.5	4.83	5.62	-0.79	-1.66
40	44.2	4.40	5.62	-1.22	-2.93
45	40.6	4.04	5.62	-1.58	-4.25
50	37.7	3.75	5.62	-1.87	-5.62
55	35.1	3.50	5.62	-2.12	-7.01
60	32.9	3.28	5.62	-2.34	-8.43
65	31.0	3.09	5.62	-2.53	-9.87
70	29.4	2.92	5.62	-2.70	-11.32
75	27.9	2.78	5.62	-2.84	-12.80
80	26.6	2.64	5.62	-2.98	-14.28
85	25.4	2.52	5.62	-3.09	-15.78
90	24.3	2.42	5.62	-3.20	-17.29
95	23.3	2.32	5.62	-3.30	-18.81
100	22.4	2.23	5.62	-3.39	-20.34
105	21.6	2.15	5.62	-3.47	-21.87
110	20.8	2.07	5.62	-3.55	-23.41
Max Vol stored	2.85	← enter Vol(m ³)			

STORAGE TABLE (100 Yr Storm)

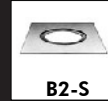
t(c)min	I(100yr) mm/h	Q(actual) l/s	Q(restricted) l/s	Q(stored) l/s	V(stored) m ³
5	242.7	27.8	5.6	22.2	6.66
10	178.6	20.5	5.6	14.9	8.91
15	142.9	16.4	5.6	10.8	9.69
20	120.0	13.8	5.6	8.1	9.76
25	103.8	11.9	5.6	6.3	9.43
30	91.9	10.5	5.6	4.9	8.85
35	82.6	9.5	5.6	3.9	8.09
40	75.1	8.6	5.6	3.0	7.20
45	69.1	7.9	5.6	2.3	6.21
50	64.0	7.3	5.6	1.7	5.14
55	59.6	6.8	5.6	1.2	4.02
60	55.9	6.4	5.6	0.8	2.85
65	52.6	6.0	5.6	0.4	1.63
70	49.8	5.7	5.6	0.1	0.38
75	47.3	5.4	5.6	-0.2	-0.90
80	45.0	5.2	5.6	-0.5	-2.21
85	43.0	4.9	5.6	-0.7	-3.54
90	41.1	4.7	5.6	-0.9	-4.89
95	39.4	4.5	5.6	-1.1	-6.25
100	37.9	4.3	5.6	-1.3	-7.64
105	36.5	4.2	5.6	-1.4	-9.03
110	35.2	4.0	5.6	-1.6	-10.44

Max Vol stored **9.76** ← enter Vol(m³)

APPENDIX D:

Engineering Data Sheet and Architectural Drawings

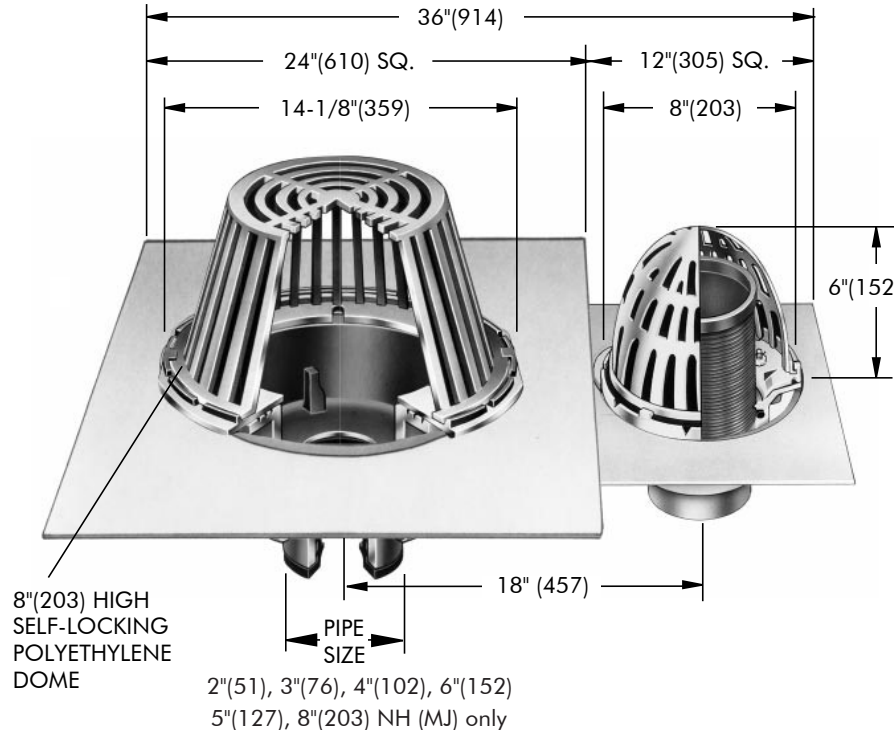
Components:



SPECIFICATION: Watts Drainage Products RD-100-O combined roof drain and secondary overflow system, consisting of galvanized sump receivers; one large sump epoxy coated cast iron body, one small sump epoxy coated cast iron body, combined flashing rings and gravel stop, polyethylene dome strainers and one adjustable 4"(102) diameter ABS overflow standpipe.

Order Code: RD-10 -O-

Ex. RD-102P-O-K



Deck opening 10" (254) with sump receiver 13-1/4" (337)

Deck opening 6-1/2" (165) with sump receiver 8" (203)

Free Area Sq. In.
137

Pipe Sizing (Select One)		
Suffix	Description	
2	2"(51) Pipe Size	<input type="checkbox"/>
3	3"(76) Pipe Size	<input type="checkbox"/>
4	4"(102) Pipe Size	<input type="checkbox"/>
5	5"(127) Pipe Size	<input type="checkbox"/>
6	6"(152) Pipe Size	<input type="checkbox"/>
8	8"(203) Pipe Size	<input type="checkbox"/>

Outlet Type (Select One)		
Suffix	Description	
NH	No Hub (MJ)	<input type="checkbox"/>
P	Push On	<input type="checkbox"/>
T	Threaded Outlet	<input type="checkbox"/>
X	Inside Caulk	<input type="checkbox"/>

Options (Select One or More)		
Suffix	Description	
-A	Accutrol weir (specify # 1-6 slots)	<input type="checkbox"/>
-C	Secondary Membrane Clamp	<input type="checkbox"/>
-D	Underdeck Clamp	<input type="checkbox"/>
-E	Adjustable Extension	<input type="checkbox"/>
-GSS	Stainless Steel Ballast Guard	<input type="checkbox"/>
-H	Adj. to 6" IRMA Ballast Guard	<input type="checkbox"/>
-K	Ductile Iron Dome	<input type="checkbox"/>
-K80	Aluminum Dome	<input type="checkbox"/>
-L	Vandal Proof Dome	<input type="checkbox"/>
-R	2" High External Water Dam	<input type="checkbox"/>
-SO	Side Outlet**	<input type="checkbox"/>
-V	Fixed Extension (1-1/2",2",3",4")	<input type="checkbox"/>
-W-1	Waterproofing Flange	<input type="checkbox"/>
-Z	Extended Integral Wide Flange	<input type="checkbox"/>
-5	Sediment Bucket	<input type="checkbox"/>
-12	Galvanized Dome	<input type="checkbox"/>
-13	All Galvanized	<input type="checkbox"/>
-83	Mesh Covered Dome	<input type="checkbox"/>
-113M	Special Epoxy from 3M Range	<input type="checkbox"/>

Optional Body Material (NH Only)		
Suffix	Description	
-60	PVC Body w/Socket Outlet	<input type="checkbox"/>
-61	ABS Body w/Socket Outlet	<input type="checkbox"/>

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes.
Underdeck Clamp (-BED and -D options) are not available when -SO is selected.

Job Name _____ Contractor _____
 Job Location _____ Contractor's P.O. No. _____
 Engineer _____ Representative _____

WATTS Drainage reserves the right to modify or change product design or construction without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your WATTS Drainage representative for any clarification. Dimensions are subject to manufacturing tolerances.



Adjustable Accutrol Weir
 Tag: _____

Adjustable Flow Control for Roof Drains

ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

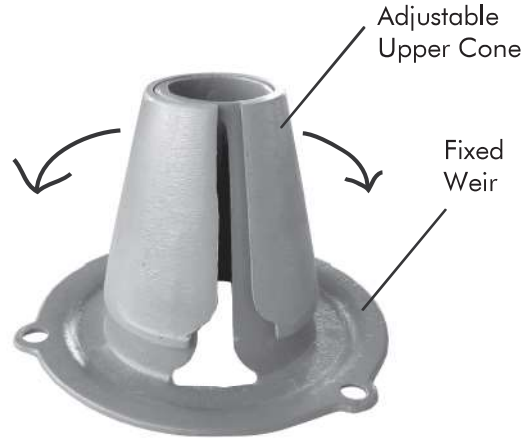
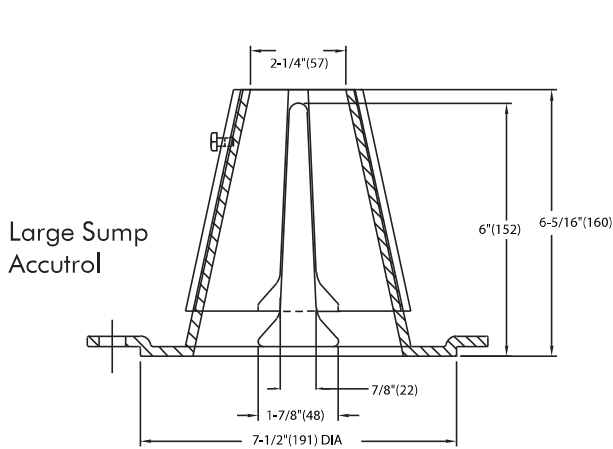
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.

Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2" of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3" of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
 [5 gpm(per inch of head) x 2 inches of head] + 2-1/2 gpm(for the third inch of head) = 12-1/2 gpm.



1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

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3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	10	10	10	10	10

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

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CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca



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