Progressive Engineering Services Ltd.
Consulting Engineers
2043 Hidden Valley Crescent, Kitchener
ON N2C 2R2 (519) 748-0101

May 21, 2025

JC Group Inc.
Att: Jerry Cybalski
1120 Victoria Street North
Kitchener, ON N2B 3T2

Re: 1280 Dundas Street South (Regional Road #8), Cambridge
Proposed 12 Storey Residential Development
Functional Servicing and Stormwater Management Brief

Please find attached PDF versions of the engineering drawings for the above project, they include:

- Grading, Drainage and Stormwater Management Plan dated May 15, 2025
- Servicing Plan dated May 15, 2025
- Existing conditions plan (at the time of the topographic survey)

Branchton Road along this frontage was reconstructed in 2013 which included the upgrading of the underground utilities. It is proposed that the sanitary, storm and water servicing for this proposal will be from these mains. At the same time, the intersection was reconstructed and Dundas Street South now is a 4 lane roadway with turning lanes. The Regional Municipality of Waterloo (RMOW) is presently engaged in upgrading the intersection with traffic signals and marked crosswalks. A 'road widening' was taken by the RMOW along the Branchton Road frontage to accommodate these upgrades.

It is to be pointed out that the frontage along Dundas Street South is part under the RMOW jurisdiction with the remainder under the jurisdiction of the MTO. The highway narrows to two lanes a short distance east of this site. Any potential upgrades to the highway to 4 lanes will not impact this site since 4 lanes already exist along this frontage.

The only existing entrance to the property is to the MTO right of way and it is proposed that it be shifted a bit further east away from the signalized intersection. A second entrance is proposed to Branchton Road.

1. Sanitary Sewer Servicing

It is proposed that the site be services by a new sanitary service to the existing 300mm sanitary main on Branchton Road. The proposed 12 storey building will feature 88 units with a projected total population of 176 persons. The site will require a 150mm sanitary service, as per the calculation below.

May. 15, 2025 **Progressive Engineering Services Ltd**

1280 Dundas Street South, Cambridge

Cambridge, Ontario - Sanitary Service Sizing

Population projection for the site is: 88 units) mix of 1 & 2 bedroom units) at 2 persons per unit average = 176 persons

Ave daily domestic flow is to be between 225-450 l/cap./day (design manual). Using the mean flow of 337.3 l/cap./day:

Site Area (ha)	
Commercial(ha)	
Residential	0.378
Res. Population	176

Industrial/Commercial Flow

	m^3/ha/day	m^3/sec
Design Flow	30	0.0000
Peaking Factor	*2.7*	- -
Extra. Flow	- -	*0*
Q_p (m^3/s)=	81	0.0000

Residential Flow

Q_p=(PqM)/86.4 + IA		
Q_p (m^3/s)=	**0.005**	P (1000's) 0.176
		q (l/s) 337.5
		$M=5/P^{0.2}$ *7.08*
		IA (extran.) *0.00000378*

Peak flows

	Q(m^3/s)	Q_{tot}(m^3/s)
Residential	0.005	- -
Commercial/Emp.	0.000	***0.005***
Moderate Industry	0.000	***0.005***
Heavy Industry	0.000	***0.005***

Pipe Capacity	
$Q=1/n \cdot R^{2/3} \cdot A \cdot S^{1/2}$	
Slope =	2.00%
Diameter =	150 mm
Manning's 'n'	0.013
$Q_{1/2\ full}$ =	0.011 m^3/s
Q_{full} =	0.022 m^3/s
$V_{1/2\ full}$ =	0.61 m/s
V_{full} =	1.22 m/s

A 100mm sanitary service is too small
The site requires a 150mm sanitary sewer on site, and at anticipated peak flow times it will run just under half full.

2. Water Servicing

There exists a hydrant on Branchton Road that is approximately 60m away from the main entrance. A Siamese Connection will be required on the building near the front entrance for fire fighting purposes. Due to the height of the proposed building, the site will require a 200mm water service for domestic and fire flow requirements. The mechanical designer will need to confirm this during detail design of the building.

The proposed 200mm water service will be connected to the 400mm watermain on Branchton Road as per the attached servicing drawing. This water service has plenty of clearance above the sanitary main and will need to pass under the 825mm storm sewer at that location with 0.5m clearance, as per the DGSSMS document from the RMOW.

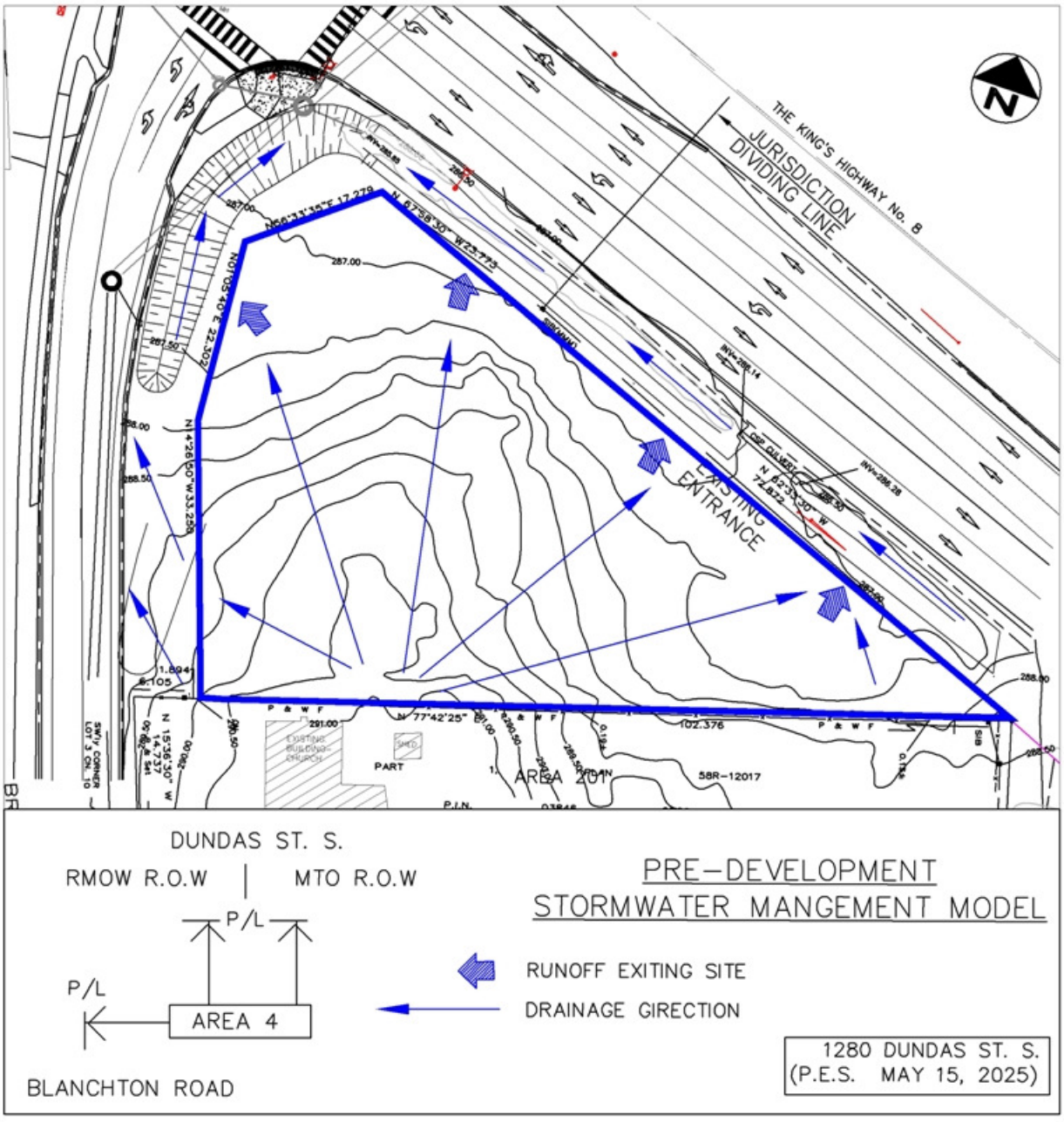
3. Storm Sewer Servicing

In the pre-development condition the site is undeveloped and drains to the Dundas Street South and MTO roadside ditch. This ditch drains to the storm sewer system that drains via an 1800mm by 900mm box culvert to the north side of Dundas Street south and outlets to a wetland located near there. This box culvert also accommodates the storm sewer system on Branchton Road. The storm sewer on Branchton Road is an 855mm by 1345mm elliptical concrete pipe at the location where the proposed storm connection for the new storm service is proposed.

Stormwater Management

- **Pre-development**

The existing drainage condition and modeling is shown on the figure below:

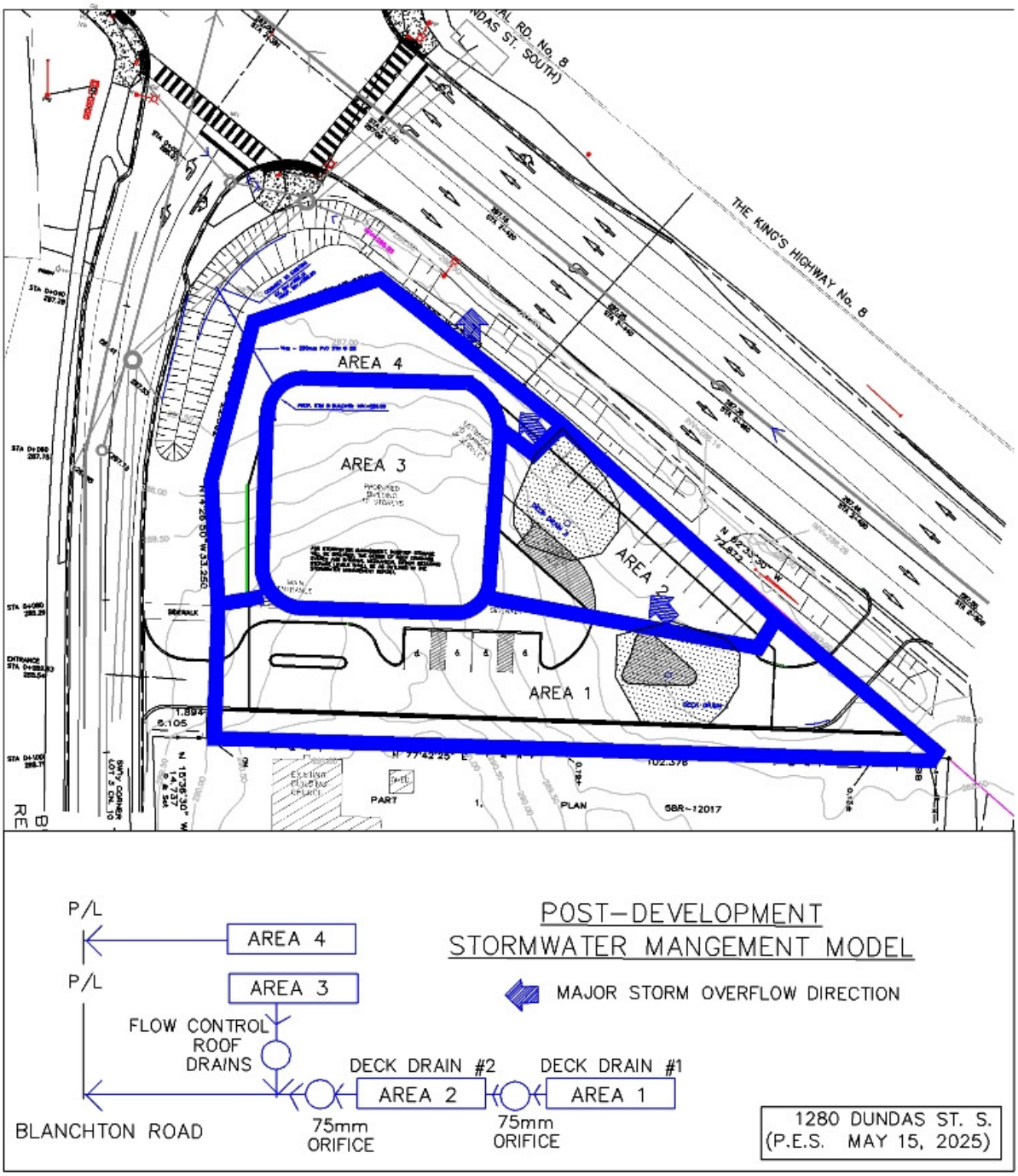


Pre and post runoff conditions were modeled using the OTTHYMO runoff model for the site. The rainfall hyetograph was obtained using conventional SCS methods and is the one applicable in the RMOW. IDF curve parameters used for the 5 and 100 year storm events are the ones stipulated by the Cambridge, RMOW and the MTO and they are identified in the model.

The results of the pre-development modeling are as follows:

Pre-development 5-year peak runoff level is 0.015m3/s (Table 1)
Pre-development 100-year peak runoff level is 0.073m3/s (Table 2)

- **Post-development**



We have specified 50mm orifices under the first parking level deck for both Deck drains number 1 & 2. We have also specified 'flow control' roof drains to attenuate flows from the 0.236 rooftop area. Therefore the rooftop is to feature 4 roof drains each releasing 0.00634m^3/s, for a maximum discharge of 0.0254m^3/s. The building is to be designed structurally to accommodate a maximum storage depth of 150mm with an average storage depth of 75mm. Scupper drains will be required to assure the roof will not be overloaded. The roof drain details have been attached to this design brief.

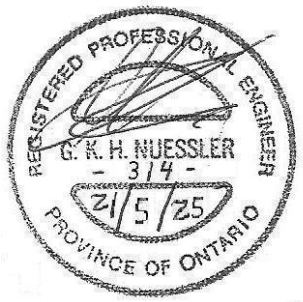
The modeling provided the following results for the post development condition:

- Post-development 5-year peak runoff level is 0.019m^3/s (Table 3)
- Post-development 100-year peak runoff level is 0.025m^3/s (Table 4)

Due to the small site area, the peak discharge rates are also small. We recommend that although the peak discharge rate for the 5 year storm event is slightly higher than the predevelopment discharge rate, it can be considered acceptable. The peak discharge rate from the 100 year storm event will be reduced by 66%.

We trust that this meets with your approval. Should you have any further comments or questions, please feel free to contact me.

Yours truly,



Guenter K. Nuessler, P.Eng.
Progressive Engineering Services Ltd.

```
1     ****************************************************
      **       M I C R O H Y M O --- 3
      **      (P . C . O T T H Y M O)
      **       V E R S I O N  2.0
      **       ADAPTED FOR MICROCOMPUTER BY
      **       ANDREW  BRODIE  ASSOCIATES  INC.
      ** Progressive Engineering Services Ltd.
      ****************************************************
       THE METRIC UNITS OPTION HAS BEEN SPECIFIED

    ************************************************************
    * TABLE 1     MAY 15, 2025
    * 5 YEAR PRE-DEVELOPMENT FLOW FOR:
    * 1280 DUNDAS ST S, CAMBRIDE, ONTARIO
    ************************************************************
    *
    * CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM AREA 1
    *
    * DRAINAGE AREA '1' MAKES UP THE MAKES UP THE ENTIRE SITE
    *               5 YEAR 3 HOUR CHICAGO STORM
    *               COEFFICIENT A=1593 CONSTANT B=11 EXPONENT C=0.8789
    START             0.0 HOURS
    COMPUTE URBHYD     ID=1 HYD=101 DT=0.0833 DA=0.378 HA
                  CKK=1.0 XIMP=0.00 TIMP=0.00 NI=36
                  XX=-1 CN=74 IA=8.1  DD=0.0
                  DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
                  SLI=4.0 LGI=80 MNI=0.015
                  SLP=4.0 LGP=80 MNP=0.25
                  HYETOGRAPH MM/HR (FIVE MIN. INCR.)
                  3.060 3.350 3.701 4.133 4.675
                  5.373 6.302 7.592 9.481 12.464
                  17.723 28.798 61.688 139.288 70.598
                  39.223 25.908 18.860 14.609 11.813
                  9.856 8.421 7.331 6.479 5.796
                  5.238 4.775 4.385 4.052 3.765
                  3.516 3.297 3.103 3.050 0.000
                  0.000
      UNIT PEAK =    .036 CMS
      PEAK INTENSITY(RAIN EXCESS) =      .03 MM/HR
      STORAGE COEFF. SC =   44.05 MINS

      SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

      UNIT PEAK =    .102 CMS
      PEAK INTENSITY(RAIN EXCESS) =    30.11 MM/HR
```

```
   STORAGE COEFF. SC =   14.04 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   TOTAL RAINFALL =    46.79 MM

   PEAK DISCHARGE =      .015 CMS  RUNOFF VOLUME =   11.70 MM  TIME TO
  PEAK =   1.499 HRS

   RUNOFF VOLUMETRIC COEFFICIENT =   .25

*
* PRINT HYD        ID=1
*


FINISH

1     ***************************************************
      **       M I C R O H Y M O --- 3
      **      (P . C . O T T H Y M O)
      **       V E R S I O N  2.0
      **       ADAPTED FOR MICROCOMPUTER BY
      **       ANDREW  BRODIE  ASSOCIATES  INC.
      ** Progressive Engineering Services Ltd.
      ***************************************************
       THE METRIC UNITS OPTION HAS BEEN SPECIFIED

*************************************************************
* TABLE 2     MAY 15, 2025
* 100 YEAR PRE-DEVELOPMENT FLOW FOR:
* 1280 DUNDAS ST S, CAMBRIDE, ONTARIO
*************************************************************
*
* CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM THE SITE
*
* DRAINAGE AREA '1' MAKES UP THE ENTIRE SITE
*              100 YEAR 3 HOUR CHICAGO STORM
*              COEFFICIENT A=4688 CONSTANT B=17 EXPONENT C=0.9624
START            0.0 HOURS
COMPUTE URBHYD     ID=1 HYD=101 DT=0.0833 DA=0.378 HA
               CKK=1.0 XIMP=0.08 TIMP=0.08 NI=42
               XX=-1 CN=74 IA=8.1  DD=0.0
               DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
               SLI=4.0 LGI=80 MNI=0.015
               SLP=4.0 LGP=80 MNP=0.25
               HYETOGRAPH MM/HR (FIVE MIN. INCR.)
```

3.050 3.329 3.697 4.139 4.677
5.343 6.181 7.261 8.686 10.630
13.389 17.509 24.096 35.695 59.347
121.588 239.354 137.518 80.536 53.348
38.191 28.843 22.653 18.332 15.189
12.826 11.003 9.564 8.407 7.462
6.679 6.022 5.465 4.988 4.577
4.219 3.906 3.629 3.384 3.166
3.050 0.000

UNIT PEAK = .336 CMS
PEAK INTENSITY(RAIN EXCESS) = 239.35 MM/HR
STORAGE COEFF. SC = 1.13 MINS

SUM OF THE UNIT HYDROGRAPH CO-ORDINATES = 12.00

UNIT PEAK = .150 CMS
PEAK INTENSITY(RAIN EXCESS) = 102.60 MM/HR
STORAGE COEFF. SC = 8.60 MINS

SUM OF THE UNIT HYDROGRAPH CO-ORDINATES = 12.00

TOTAL RAINFALL = 88.12 MM

PEAK DISCHARGE = .073 CMS RUNOFF VOLUME = 41.73 MM TIME TO PEAK = 1.666 HRS

RUNOFF VOLUMETRIC COEFFICIENT = .47

*****
*****
*** PRINT HYD ID=1**
*****

FINISH

```
1     ***************************************************
      **       M I C R O H Y M O --- 3
      **      (P . C . O T T H Y M O)
      **       V E R S I O N  2.0
      **       ADAPTED FOR MICROCOMPUTER BY
      **       ANDREW  BRODIE  ASSOCIATES  INC.
      ** Progressive Engineering Services Ltd.
      ***************************************************
       THE METRIC UNITS OPTION HAS BEEN SPECIFIED

    ***********************************************************
    * TABLE 3     MAY 15, 2025
    * 5 YEAR POST-DEVELOPMENT FLOW FOR:
    * 1280 DUNDAS ST S, CAMBRIDE, ONTARIO
    ***********************************************************
    *
    * CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM
    * AREA '1' DRAINING INTO DECK DRAIN 1
    *
    *              5 YEAR 3 HOUR CHICAGO STORM
    *              COEFFICIENT A=1593 CONSTANT B=11 EXPONENT C=0.8789
    START             0.0 HOURS
    COMPUTE URBHYD     ID=1 HYD=101 DT=0.0833 DA=0.071 HA
                  CKK=1.0 XIMP=0.00 TIMP=0.00 NI=36
                  XX=-1 CN=79 IA=8.1  DD=0.0
                  DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
                  SLI=4.0 LGI=12 MNI=0.015
                  SLP=4.0 LGP=12 MNP=0.25
                  HYETOGRAPH MM/HR (FIVE MIN. INCR.)
                  3.060 3.350 3.701 4.133 4.675
                  5.373 6.302 7.592 9.481 12.464
                  17.723 28.798 61.688 139.288 70.598
                  39.223 25.908 18.860 14.609 11.813
                  9.856 8.421 7.331 6.479 5.796
                  5.238 4.775 4.385 4.052 3.765
                  3.516 3.297 3.103 3.050 0.000
                  0.000
      UNIT PEAK =    .101 CMS
      PEAK INTENSITY(RAIN EXCESS) =      .03 MM/HR
      STORAGE COEFF. SC =   14.11 MINS

      SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

      UNIT PEAK =    .239 CMS
      PEAK INTENSITY(RAIN EXCESS) =    37.62 MM/HR
      STORAGE COEFF. SC =    4.12 MINS
```

```
   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   TOTAL RAINFALL =    46.79 MM

   PEAK DISCHARGE =     .006 CMS  RUNOFF VOLUME =   14.09 MM  TIME TO
   PEAK =   1.416 HRS

   RUNOFF VOLUMETRIC COEFFICIENT =   .30

*
* PRINT HYD        ID=1
*
*************************************************************************
* ATTENUATE PEAK FLOW FROM AREA '1' DRAINING INTO DECK DRAIN 1
* THE OUTLET OF AREA 1 IS THE 50mm DIAMETER ORIFICE UNDER
* DECK OF THE FIRST PARKING LEVEL
*
ROUTE RESERVOIR    ID=2 HYD=100 ID=1
                OUTFLOW (cms)       STORAGE (ha-m)
                    0.0000          0.0000
                    O.0040          0.0001
                    0.0065          0.0002
                    0.0068          0.0029
   PEAK DISCHARGE =     .0048 CMS  RUNOFF VOLUME= 14.0936 MM
* PRINT HYD        ID=2
*
*
*************************************************************************
* CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM
* AREA '2' DRAINING INTO DECK DRAIN 2
*              5 YEAR 3 HOUR CHICAGO STORM
*              COEFFICIENT A=1593 CONSTANT B=11 EXPONENT C=0.8789
START            0.0 HOURS
COMPUTE URBHYD     ID=3 HYD=102 DT=0.0833 DA=0.063 HA
              CKK=1.0 XIMP=0.93 TIMP=0.93 NI=36
              XX=-1 CN=79 IA=8.1  DD=0.0
              DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
              SLI=4.0 LGI=18 MNI=0.015
              SLP=4.0 LGP=18 MNP=0.25
              RAIN CODE =-1
   UNIT PEAK =    .340 CMS
   PEAK INTENSITY(RAIN EXCESS) =   139.29 MM/HR
   STORAGE COEFF. SC =     .57 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00
```

```
   UNIT PEAK =    .209 CMS
   PEAK INTENSITY(RAIN EXCESS) =    37.62 MM/HR
   STORAGE COEFF. SC =    5.25 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   TOTAL RAINFALL =    46.79 MM

   PEAK DISCHARGE =      .023 CMS  RUNOFF VOLUME =   43.11 MM  TIME TO
  PEAK =   1.333 HRS

   RUNOFF VOLUMETRIC COEFFICIENT =   .92

*
* PRINT HYD         ID=3
*
*
ADD HYD           ID=4 HYD=103 ID=3 ID=2
   PEAK FLOW =      .025 CMS     RUNOFF VOLUME =    27.73 MM     TIME TO
PEAK=  1.33 HOURS
        ADD HYD      ID=4     HYD NO=103     ID I=3        ID II=2
*
*
* ATTENUATE PEAK FLOW FROM AREA '1' & '2' DRAINING AT DECK DRAIN 2
* THE OUTLET OF IS ANOTHER 50mm DIAMETER ORIFICE UNDER THE
* DECK OF THE FIRST PARKING LEVEL
*
ROUTE RESERVOIR     ID=5 HYD=200 ID=4
                OUTFLOW (cms)       STORAGE (ha-m)
                    0.0000          0.0000
                    O.0040          0.0001
                    0.0065          0.0002
                    0.0068          0.0027
   PEAK DISCHARGE =     .0066 CMS  RUNOFF VOLUME= 27.7338 MM
* PRINT HYD         ID=5
*
* CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM
*
* DRAINAGE AREA '3' WHICH MAKES UP THE ROOF AREA
*
*               5 YEAR 3 HOUR CHICAGO STORM
*               COEFFICIENT A=1593 CONSTANT B=11 EXPONENT C=0.8789
START             0.0 HOURS
COMPUTE URBHYD      ID=1 HYD=104 DT=0.0833 DA=0.089 HA
               CKK=1.0 XIMP=0.99 TIMP=0.99 NI=36
               XX=-1 CN=79 IA=8.1  DD=0.0
               DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
```

```
            SLI=1.0 LGI=17 MNI=0.015
            SLP=1.0 LGP=17 MNP=0.25
            RAIN CODE =-1
  UNIT PEAK =    .339 CMS
  PEAK INTENSITY(RAIN EXCESS) =   139.29 MM/HR
  STORAGE COEFF. SC =     .84 MINS

  SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

  UNIT PEAK =    .163 CMS
  PEAK INTENSITY(RAIN EXCESS) =    37.62 MM/HR
  STORAGE COEFF. SC =    7.69 MINS

  SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

  TOTAL RAINFALL =    46.79 MM

  PEAK DISCHARGE =      .034 CMS  RUNOFF VOLUME =   44.98 MM  TIME TO
 PEAK =   1.333 HRS

  RUNOFF VOLUMETRIC COEFFICIENT =   .96

*
* PRINT HYD        ID=1
*
* ATTENUATE THE DRAINAGE FROM THE ROOF WITH 4 FC ROOF DRAINS IN
PLACE:
*
ROUTE RESERVOIR    ID=2 HYD=105 ID=1
                OUTFLOW (cms)       STORAGE (ha-m)
                    0.0000          0.0000
                    0.0263          0.0067
  PEAK DISCHARGE =     .0081 CMS  RUNOFF VOLUME= 44.9777 MM
* PRINT HYD        ID=2
*
*ADD THE DRAINAGE FROM THE ROOF TO THE DRAINAGE FROM AREA 2
ADD HYD          ID=3 HYD=106 ID=2 ID=5
  PEAK FLOW =      .015 CMS    RUNOFF VOLUME =    34.62 MM    TIME TO
PEAK=  1.58 HOURS
       ADD HYD      ID=3    HYD NO=106    ID I=2        ID II=5
*
* PRINT HYD        ID=3
*
**********************************************************************
*CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM AREA 4
*THIS AREA DRAINS UNATTENUATED
*
```

```
*               5 YEAR 3 HOUR CHICAGO STORM
*               COEFFICIENT A=1593 CONSTANT B=11 EXPONENT C=0.8789
START             0.0 HOURS
COMPUTE URBHYD      ID=4 HYD=107 DT=0.0833 DA=0.071 HA
                CKK=1.0 XIMP=0.00 TIMP=0.00 NI=36
                XX=-1 CN=74 IA=8.1  DD=0.0
                DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
                SLI=4.0 LGI=12 MNI=0.015
                SLP=4.0 LGP=12 MNP=0.25
                HYETOGRAPH MM/HR (FIVE MIN. INCR.)
                3.060 3.350 3.701 4.133 4.675
                5.373 6.302 7.592 9.481 12.464
                17.723 28.798 61.688 139.288 70.598
                39.223 25.908 18.860 14.609 11.813
                9.856 8.421 7.331 6.479 5.796
                5.238 4.775 4.385 4.052 3.765
                3.516 3.297 3.103 3.050 0.000
                0.000
   UNIT PEAK =    .340 CMS
   PEAK INTENSITY(RAIN EXCESS) =   139.29 MM/HR
   STORAGE COEFF. SC =     .45 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   UNIT PEAK =    .228 CMS
   PEAK INTENSITY(RAIN EXCESS) =    30.11 MM/HR
   STORAGE COEFF. SC =    4.50 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   TOTAL RAINFALL =    46.79 MM

   PEAK DISCHARGE =      .005 CMS  RUNOFF VOLUME =   11.70 MM  TIME TO
   PEAK =   1.416 HRS

   RUNOFF VOLUMETRIC COEFFICIENT =   .25

*
* PRINT HYD         ID=4
*
* ADD THE attenuated HYD FROM COMBINED AREAS 1,TO ATTENUATED 2 & 3
* TO THE UNATTENUATED HYD FROM AREA 4.
*
ADD HYD           ID=5 HYD=104 ID=4 ID=3
   PEAK FLOW =      .019 CMS     RUNOFF VOLUME =    29.08 MM     TIME TO
PEAK=  1.42 HOURS
        ADD HYD      ID=5    HYD NO=104    ID I=4        ID II=3
```

```
*
* PRINT HYD         ID=5
*
* THIS PEAK FLOW IS THE TOTAL LEAVING THE SITE DURING THIS STORM
*


1      ***************************************************
   **       M I C R O H Y M O --- 3       **
   **      (P . C . O T T H Y M O)      **
   **       V E R S I O N  2.0                **
   **       ADAPTED FOR MICROCOMPUTER BY          **
   **       ANDREW  BRODIE  ASSOCIATES  INC.      **
   ** Progressive Engineering Services Ltd.         **
   ***************************************************
    THE METRIC UNITS OPTION HAS BEEN SPECIFIED

***********************************************************
* TABLE 4     MAY 15, 2025
* 100 YEAR POST-DEVELOPMENT FLOW FOR:
* 1280 DUNDAS ST S, CAMBRIDE, ONTARIO
***********************************************************
*
*
* CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM
* AREA '1' DRAINING INTO DECK DRAIN 1
*
*              100 YEAR 3 HOUR CHICAGO STORM
*              COEFFICIENT A=4688 CONSTANT B=17 EXPONENT C=0.9624
START             0.0 HOURS
COMPUTE URBHYD     ID=1 HYD=101 DT=0.0833 DA=0.071 HA
               CKK=1.0 XIMP=0.00 TIMP=0.00 NI=42
               XX=-1 CN=79 IA=8.1  DD=0.0
               DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
               SLI=4.0 LGI=12 MNI=0.015
               SLP=4.0 LGP=12 MNP=0.25
               HYETOGRAPH MM/HR (FIVE MIN. INCR.)
               3.050 3.329 3.697 4.139 4.677
               5.343 6.181 7.261 8.686 10.630
               13.389 17.509 24.096 35.695 59.347
               121.588 239.354 137.518 80.536 53.348
               38.191 28.843 22.653 18.332 15.189
               12.826 11.003 9.564 8.407 7.462
               6.679 6.022 5.465 4.988 4.577
               4.219 3.906 3.629 3.384 3.166
               3.050 0.000
   UNIT PEAK =    .101 CMS
```

```
   PEAK INTENSITY(RAIN EXCESS) =      .03 MM/HR
   STORAGE COEFF. SC =   14.11 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   UNIT PEAK =    .291 CMS
   PEAK INTENSITY(RAIN EXCESS) =   121.56 MM/HR
   STORAGE COEFF. SC =    2.57 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   TOTAL RAINFALL =    88.12 MM

   PEAK DISCHARGE =      .022 CMS  RUNOFF VOLUME =   43.40 MM  TIME TO
  PEAK =   1.583 HRS

   RUNOFF VOLUMETRIC COEFFICIENT =   .49

*
* PRINT HYD         ID=1
*
**********************************************************************
* ATTENUATE PEAK FLOW FROM AREA '1' DRAINING INTO DECK DRAIN 1
* THE OUTLET OF AREA 1 IS THE 75mm DIAMETER ORIFICE UNDER
* DECK OF THE FIRST PARKING LEVEL
*
ROUTE RESERVOIR     ID=2 HYD=100 ID=1
                OUTFLOW (cms)       STORAGE (ha-m)
                    0.0000          0.0000
                    O.0040          0.0001
                    0.0065          0.0002
                    0.0068          0.0029
   PEAK DISCHARGE =      .0066 CMS  RUNOFF VOLUME= 43.4003 MM
* PRINT HYD         ID=2
*
*
**********************************************************************
* CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM
* AREA '2' DRAINING INTO DECK DRAIN 2
*               5 YEAR 3 HOUR CHICAGO STORM
*               COEFFICIENT A=1593 CONSTANT B=11 EXPONENT C=0.8789
START             0.0 HOURS
COMPUTE URBHYD      ID=3 HYD=102 DT=0.0833 DA=0.063 HA
               CKK=1.0 XIMP=0.93 TIMP=0.93 NI=42
               XX=-1 CN=79 IA=8.1  DD=0.0
               DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
               SLI=4.0 LGI=18 MNI=0.015
```

```
            SLP=4.0 LGP=18 MNP=0.25
            RAIN CODE =-1
   UNIT PEAK =    .340 CMS
   PEAK INTENSITY(RAIN EXCESS) =   239.35 MM/HR
   STORAGE COEFF. SC =     .46 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   UNIT PEAK =    .266 CMS
   PEAK INTENSITY(RAIN EXCESS) =   121.56 MM/HR
   STORAGE COEFF. SC =    3.28 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   TOTAL RAINFALL =    88.12 MM

   PEAK DISCHARGE =      .040 CMS  RUNOFF VOLUME =   83.60 MM  TIME TO
  PEAK =   1.583 HRS

   RUNOFF VOLUMETRIC COEFFICIENT =   .95

*
* PRINT HYD        ID=3
*
*
 ADD HYD          ID=4 HYD=103 ID=3 ID=2
   PEAK FLOW =      .047 CMS    RUNOFF VOLUME =    62.30 MM    TIME TO
PEAK=  1.58 HOURS
        ADD HYD      ID=4    HYD NO=103    ID I=3        ID II=2
*
*
* ATTENUATE PEAK FLOW FROM AREA '1' & '2' DRAINING AT DECK DRAIN 2
* THE OUTLET OF IS ANOTHER 75mm DIAMETER ORIFICE UNDER THE
* DECK OF THE FIRST PARKING LEVEL
*
 ROUTE RESERVOIR    ID=5 HYD=200 ID=4
                OUTFLOW (cms)       STORAGE (ha-m)
                    0.0000          0.0000
                    O.0040          0.0001
                    0.0065          0.0002
                    0.0068          0.0027
 STORAGE-DISCHARGE TABLE EXCEEDED.
   PEAK DISCHARGE =     .0091 CMS  RUNOFF VOLUME= 62.2981 MM
* PRINT HYD        ID=5
*
* CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM
*
```

```
* DRAINAGE AREA '3' WHICH MAKES UP THE ROOF AREA
*
*               5 YEAR 3 HOUR CHICAGO STORM
*               COEFFICIENT A=1593 CONSTANT B=11 EXPONENT C=0.8789
START             0.0 HOURS
COMPUTE URBHYD     ID=1 HYD=104 DT=0.0833 DA=0.089 HA
                CKK=1.0 XIMP=0.99 TIMP=0.99 NI=42
                XX=-1 CN=79 IA=8.1  DD=0.0
                DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
                SLI=1.0 LGI=17 MNI=0.015
                SLP=1.0 LGP=17 MNP=0.25
                RAIN CODE =-1
   UNIT PEAK =    .340 CMS
   PEAK INTENSITY(RAIN EXCESS) =   239.35 MM/HR
   STORAGE COEFF. SC =     .68 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   UNIT PEAK =    .220 CMS
   PEAK INTENSITY(RAIN EXCESS) =   121.56 MM/HR
   STORAGE COEFF. SC =    4.81 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   TOTAL RAINFALL =    88.12 MM

   PEAK DISCHARGE =      .059 CMS  RUNOFF VOLUME =   86.19 MM  TIME TO
  PEAK =   1.583 HRS

   RUNOFF VOLUMETRIC COEFFICIENT =   .98

*
* PRINT HYD         ID=1
*
* ATTENUATE THE DRAINAGE FROM THE ROOF WITH 4 FC ROOF DRAINS IN
PLACE:
*
ROUTE RESERVOIR     ID=2 HYD=105 ID=1
                 OUTFLOW (cms)       STORAGE (ha-m)
                     0.0000          0.0000
                     0.0263          0.0067
   PEAK DISCHARGE =      .0154 CMS  RUNOFF VOLUME= 86.1888 MM
* PRINT HYD         ID=2
*
*ADD THE DRAINAGE FROM THE ROOF TO THE DRAINAGE FROM AREA 2
ADD HYD           ID=3 HYD=106 ID=2 ID=5
   PEAK FLOW =       .023 CMS     RUNOFF VOLUME =    71.83 MM     TIME TO
```

```
PEAK=  1.92 HOURS
        ADD HYD      ID=3    HYD NO=106    ID I=2        ID II=5
*
* PRINT HYD        ID=3
*
**********************************************************************
*CALCULATE THE PEAK RUNOFF LEVEL FLOWING FROM AREA 4
*THIS AREA DRAINS UNATTENUATED
*
*               5 YEAR 3 HOUR CHICAGO STORM
*               COEFFICIENT A=1593 CONSTANT B=11 EXPONENT C=0.8789
START             0.0 HOURS
COMPUTE URBHYD     ID=4 HYD=107 DT=0.0833 DA=0.071 HA
                CKK=1.0 XIMP=0.00 TIMP=0.00 NI=42
                XX=-1 CN=74 IA=8.1  DD=0.0
                DPSI=1.5 DPSP=0.00 STI=0.0 STP=0.0
                SLI=4.0 LGI=12 MNI=0.015
                SLP=4.0 LGP=12 MNP=0.25
                HYETOGRAPH MM/HR (FIVE MIN. INCR.)
                3.060 3.350 3.701 4.133 4.675
                5.373 6.302 7.592 9.481 12.464
                17.723 28.798 61.688 139.288 70.598
                39.223 25.908 18.860 14.609 11.813
                9.856 8.421 7.331 6.479 5.796
                5.238 4.775 4.385 4.052 3.765
                3.516 3.297 3.103 3.050 0.000
                0.000
   UNIT PEAK =    .340 CMS
   PEAK INTENSITY(RAIN EXCESS) =   239.35 MM/HR
   STORAGE COEFF. SC =     .36 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   UNIT PEAK =    .228 CMS
   PEAK INTENSITY(RAIN EXCESS) =    30.11 MM/HR
   STORAGE COEFF. SC =    4.50 MINS

   SUM OF THE UNIT HYDROGRAPH CO-ORDINATES =   12.00

   TOTAL RAINFALL =    46.79 MM

   PEAK DISCHARGE =      .005 CMS  RUNOFF VOLUME =   11.70 MM  TIME TO
  PEAK =   1.416 HRS

   RUNOFF VOLUMETRIC COEFFICIENT =   .25

*
```

*** PRINT HYD ID=4**
*****
*** ADD THE attenuated HYD FROM COMBINED AREAS 1,TO ATTENUATED 2 & 3**
*** TO THE UNATTENUATED HYD FROM AREA 4.**
*****
ADD HYD ID=5 HYD=104 ID=4 ID=3
PEAK FLOW = .025 CMS RUNOFF VOLUME = 57.31 MM TIME TO PEAK= 1.83 HOURS
ADD HYD ID=5 HYD NO=104 ID I=4 ID II=3
*****
*** PRINT HYD ID=5**
*****
*** THIS PEAK FLOW IS THE TOTAL LEAVING THE SITE DURING THIS STORM**
*****

FINISH

Flow Control Roof Drain to be specified (or approved equivalent).

WATTS DRAINAGE

RD-100

Tag: _____

Large Capacity Roof Drain

Components:

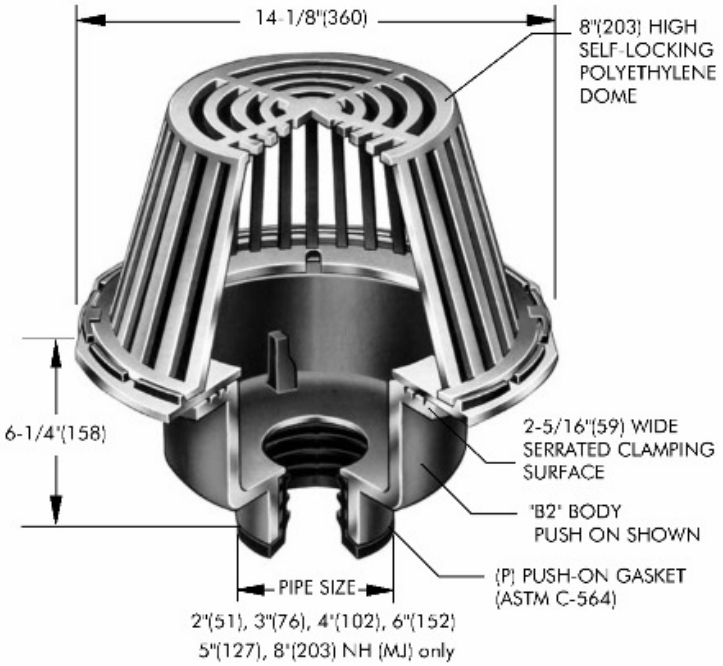

B2


B2-DM


B2-FLG


FC-2

SPECIFICATION: Watts Drainage Products RD-100 epoxy coated cast iron roof drain with deep sump, wide serrated flashing flange, flashing clamp device with integral gravel stop and self-locking polyethylene (standard) dome strainer.



Free Area Sq. In.
137

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

** 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.

Order Code: RD-10 ☐☐-☐-☐

Ex. RD-102P-K

Pipe Sizing (Select One)

Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size	☐
6	6"(152) Pipe Size	☐
8	8"(203) Pipe Size	☐

Outlet Type (Select One)

Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Options (Select One or More)

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

Optional Body Material (NH Only)

Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

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

ES-WD-RD-100 CANADA 0403

(Dimension) Denotes Millimeters

WATTS® DRAINAGE	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

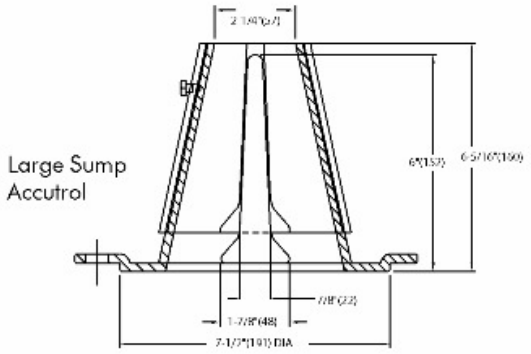
ADJUSTABLE ACCUTROL(for Large Sump Roof Drains only)

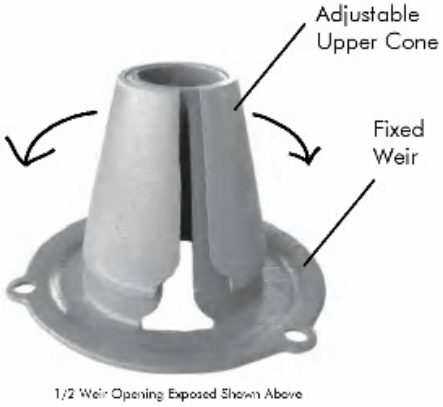
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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

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

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

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