RANSOM Consulting, Inc.

Consulting Engineers and Scientists

Ocean Gate Garage Stormwater Management Narrative

Date:	June 13, 2017
From:	Thomas Nosal, E.I.
Peer Review:	John Mahoney, P.E.
	Stephen J. Bradstreet, P.E.
Location:	48-72 Brown Street, Portland, Maine

Existing Conditions:

The site is a 39,039 SF (0.90 acres) parcel located at 48-72 Brown Street, comprised of an Upper Lot (accessed from Casco Street) and Lower Lot (accessed from Brown Street and Cumberland Avenue) which are separated by a retaining wall.

The lower lot, bordered by Cumberland Avenue and Brown Street, represents approximately 60% of the total parcel and consists almost entirely of surface parking. It slopes at approximately 5% from south to north, draining primarily to a catch basin at the northeast corner of the lot which is connected to the combined sewer on Brown Street.

The upper lot, bordered by Casco Street, represents approximately 40% of the total parcel and is also devoted almost entirely to surface parking, with the exception of an approximately 1,000 SF drive-through bank kiosk. The upper lot is sloped more gently at approximately 1%, and drains towards catch basins which are connected to the combined sewer on Casco Street.

Based on the Cumberland County USDA soil survey GIS data, the existing soils on this site belong to hydrological soil group A, excessively drained.

Proposed Development:

The owner is proposing to construct a five-level parking garage with parking for 257 vehicles. The new structure will occupy almost the entire lower lot, and will be accessible from Cumberland Avenue, Brown Street, and from the existing upper lot. Because nearly the entire existing site is impervious, the project will not produce a significant change in impervious area.

Runoff will be collected on the rooftop level via several catch basins, which will drain to downspouts that will distribute runoff to two series of planters located at sidewalk level. As described in more detail below, the planters will contain Focal Point biofiltration systems designed to manage stormwater quality. After passing through the Focal Point system, runoff

will drain to the combined sewer. Runoff from rain events that exceed the infiltration capacity of the Focal Point system will bypass directly to the combined sewer.

Stormwater Management – Basic Standards:

Erosion and sedimentation control measures are detailed and described in the plans. Good housekeeping practices shall be in accordance with Maine DEP Best Management Practices. A post construction stormwater management plan and a stormwater BMP inspection and maintenance log are included with this submission.

Stormwater Management - Quality:

Because this project qualifies as a redevelopment project, it is required that management of stormwater quality in accordance with Chapter 500 be provided for a minimum of 50% of the redeveloped area. However, the applicant is proposing to exceed this requirement by using the FocalPoint biofiltration system to manage stormwater quality for a runoff volume generated by 1.6" of rain across the entire roof of the proposed parking garage. Furthermore, an under-drained sand filter will be installed to filter discharge from the area in which snow will be stored in the winter; this area will also receive runoff from the existing driveway of the Ambassador apartment complex, 37 Casco Street.

The FocalPoint system is similar in configuration to a standard rain garden system where stormwater runoff flows through a soil filter that removes pollutants and reduces temperature. R-Tanks are positioned below the soil filter to act as high-capacity underdrains. Where standard rain gardens have permeability rates in the range of 2 – 3 inches per hour; the FocalPoint system's engineered soil filter media provides permeability rates in excess of 100 inches per hour. This permeability rate is guaranteed by the manufacturer and they provide testing at no additional cost. This high permeability facilitates treatment of relatively large impervious areas with small rain gardens making the FocalPoint system ideal for compact urban developments.

The FocalPoint system is approved by Maine DEP and is sized and designed in accordance with Chapter 7.5 in Volume III of the Maine Stormwater Best Management Practices Manual.

The applicant is proposing to install a 360 SF FocalPoint system with a 4" ponding depth. The FocalPoint system will be contained within two series of concrete planters (one series of 3 planters and a series of 5 planters for 8 planters total) at sidewalk level at the edge of the building. Each concrete planter is approximately 45 SF, and because they follow the grade of the sidewalk in a stepped fashion, runoff that cannot infiltrate in an upstream planter will overflow to the next planter. The FocalPoint chambers (which underdrain the filtration media) will be connected to a stormdrain system. The downstream planter in each series will have a riser pipe with a beehive to collect runoff that exceeds the infiltration capacity of the entire series of planters. See the plan sheet C5 for details of the norther set of planters on Brown Street and Cumberland Avenue, as well as sections of the planters.

The drainage areas of the roof of the parking garage are depicted in plan sheet C4. Drainage Areas A and B are directed to the northernmost series of planters. Drainage Area C is directed to the two uphill planters on the northern set of planters on Brown Street. Drainage Areas D and E are directed to the southern set of planters. The calculations in the attached spreadsheet demonstrate that these subsets of planters are appropriately sized to accommodate runoff generated by their sub-catchment areas from 1.6" of rainfall without overflowing. In total, approximately 21,000 SF of impervious area is treated by the FocalPoint system.

Stormwater Management - Quantity:

Because the land use and impervious cover of the site will not change significantly with the construction of the proposed parking garage, this project is not required to provide management of stormwater quantity. However, although not required, it is expected that the Focal Point system will reduce peak flows to the combined sewer. Significant storage will be provided by the ponding in the planters, by the crushed stone surrounding the R-Tank chambers, and by installing the outlets of the Focal Point R-Tank chambers approximately 8" above the invert of the chambers themselves. This runoff stored in the planters will infiltrate into the ground. This in turn will help to reduce the occurrence, duration and severity of combined sewer overflows.

Ocean Gate Garage: Post-Construction Stormwater Compliance Requirements

The Applicant shall maintain the BMPs in accordance with the approved plan and shall demonstrate compliance with the plan as follows:

(a) *Inspections.* The owner or operator of a BMP shall hire a qualified post-construction stormwater inspector to at least annually, inspect the BMPs, including but not limited to any parking areas, catch basins, pipes and related structures, and other treatment devices in accordance with all municipal and state inspection, cleaning and maintenance requirements of the approved post- construction stormwater management plan.

(b) *Maintenance and repair.* If the BMP requires maintenance, repair or replacement to function as intended by the approved post-construction stormwater management plan, the owner or operator of the BMP shall take corrective action(s) to address the deficiency or deficiencies as soon as possible after the deficiency is discovered and shall provide a record of the deficiency and corrective action(s) to the department of public services ("DPS") in the annual report.

(c) *Annual report.* The owner or operator of a BMP or a qualified post-construction stormwater inspector hired by that person, shall, on or by June 30 of each year, provide a completed and signed certification to DPS in a form provided by DPS, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they require maintenance or repair, including the record of the deficiency and corrective action(s) taken.

(d) *Filing fee.* Any persons required to file and annual certification under this section shall include with the annual certification a filing fee established by DPS to pay the administrative and technical costs of review of the annual certification.

(e) *Right of entry.* In order to determine compliance with this article and with the post-construction stormwater management plan, DPS may enter upon property at reasonable hours with the consent of the owner, occupant or agent to inspect the BMPs.

Ocean Gate Garage: Stormwater BMP Inspection and Maintenance Log

The City of Portland, ME requires ongoing annual inspections to ensure the proper maintenance and operation of stormwater management facilities. Inspections must be conducted by third parties qualified by the City.

A. General Information

Use only one Cover Sheet per site with as many specific structural BMP Inspection Report attachments as needed. Attach required color digital photos of site, structures and devices as applicable with captions.

Project Name:	**Ocean Gate Garage**	**Inspection Date:**	
Parcel Map, Block and Lot:	**037 D004**	**Current Weather:**	
BMP Owner:	**Ocean Gate, LLC**	**Date / Amount Last Precip:**	
Owner Mailing Address:	**151 Newbury Street, Portland, Maine 04101**	**3PI Company:**	
		3PI Mailing Address:	
Owner Phone #:	207 773 1919		
Owner Email:	ed@oceangaterealty.com	**Inspector Name:**	
		Inspector Phone #:	
		Inspector Email:	

B. Inspection Report Attachments

Please document the number of each structural BMP type found at this site in the blank spaces provided below. Use additional Attachments if / as needed and submit all Attachments together with the Cover Sheet as a single report.

BMP Type	Number BMPs at site
Focal Point Stormwater Treatment Planters (Planter Rain Gardens)	8
Underdrained Sand Filter	1
Catch Basins	3
Vegetated Areas (Grass)	---
Other (describe	

C. Inspection Results

FAIL** ☐

** If any one item on an Inspection Report attachment is coded as "Work Needed" then entire BMP fails inspection.

** If a site has multiple BMPs and one fails inspection, mark as "Fail" until all BMPs pass inspection.

Note: Applicable BMP Inspection Reports and confirmatory color digital photos summarizing required repairs must be submitted to the City following completion of the preliminary inspection. A re-inspection and certification must be completed within 60 days of the failed preliminary report. It is recommended that the inspector be part of the repair / maintenance process to ensure that repairs are performed properly.

PASS ☐

Note: a qualified professional (as determined by the City) must sign below and include all applicable Inspection Report attachments and confirmatory digital color photos with captions.

D. Professional Certification (as qualified by City of Portland Stormwater Program Coordinator)

To be completed only when all BMPs at this site are functioning as designed with no outstanding maintenance issues.

I, _____, as a duly qualified third party inspector attest that a thorough inspection has been completed for ALL applicable BMPs that are associated with this particular site. All inspected structural BMPs are performing as designed and intended and are in compliance with the provisions of the City Portland's Standards

Signature: _____

Date: _____

Form Adapted from the City of South Portland's Annual Structural BMP Inspection Report Cover Sheet

	Date:
General Information	**Observations**
Inspection duration (hours)	
Days since last precipitation	
Quantity of last precipitation (in)	
Type of inspection	
Storm event	
Current weather	
Photos taken	☐ Yes ☐ No ☐ NA
Nearby natural resources	☐ Yes ☐ No ☐ NA
Copy of ESC plan	☐ Yes ☐ No ☐ NA
MEDEP Permit # (*if applicable*)	
General info notes	

Vegetated Areas	**Observations**
No bare areas (< 90% covered) with sparse growth	☐ Yes ☐ No ☐ NA
No erosion	☐ Yes ☐ No ☐ NA
Notes	
Catch Basin Systems	**Observations**
Accumulated sediments from inflow channels and pipes between basins have been removed and legally disposed of	☐ Yes ☐ No ☐ NA
Floating debris and floating oils have been removed from any baffle or grease trap	☐ Yes ☐ No ☐ NA
Notes	
Focal Point Stormwater Treatment Planters (Rain Gardens)	**Observations**
Accumulated sediments and debris (trash) within the infiltration area have been removed and legally disposed of	☐ Yes ☐ No ☐ NA
Plantings are healthy	☐ Yes ☐ No ☐ NA
No erosion has occurred; grading of stone transition areas as designed.	☐ Yes ☐ No ☐ NA
Overflow riser pipe and beehive grate in downstream planters is free and obstructed by material or plant growth.	☐ Yes ☐ No ☐ NA
Mulch replaced (annually).	☐ Yes ☐ No ☐ NA
Notes	
Parking/Driveway Area	
Accumulated winter sand has been cleared	☐ Yes ☐ No ☐ NA
Pavement swept to help remove sediment	☐ Yes ☐ No ☐ NA
No stormwater is impeded by accumulations of material	☐ Yes ☐ No ☐ NA

Notes:	
Other Comments	**Observations**
Corrective action needed	☐ Yes ☐ No ☐ NA
If corrective action in needed, please explain detail	
Verbal notification provided to responsible party	☐ Yes ☐ No
Verbal notification contact	
Follow up required	☐ Yes ☐ No
Final comment notes	

Photos (*use additional pages as needed*)
Review Notes
Date Reviewed: Reviewed by: Date entered: Date edited: Edited by:

Ocean Gate Garage, Portland, Maine

STORMWATER DRAINAGE SYSTEM
MAINTENANCE AGREEMENT AND
RELEASE FROM LIABILITY

IN CONSIDERATION OF the site plan and subdivision approval granted by the Planning Board of the City of Portland to a plan entitled **Ocean Gate Garage** prepared for **Adams Apple LLC,** by **Ransom Consulting, Inc**. dated **_____, 20__** recorded in the Cumberland County Registry of Deeds in Plan Book _____, Page _____ (the "Plan") and pursuant to a condition thereof, **Ocean Gate LLC** (owner) having a mailing address of **151 Newbury Street, Portland, Maine 04101**, the owner of the subject premises, does hereby agree, for itself, its successors and assigns (the "Owner"), as follows:

Maintenance Agreement

That it will, at its own cost and expense and at all times in perpetuity, maintain in good repair and in proper working order the stormwater drainage system, as shown on said plan, including but not limited to the **Focal Point stormwater treatment planters (rain gardens) and catch basin system** in strict compliance with the Maintenance of Facilities as described in the **Ocean Gate Garage Stormwater Management Narrative and the Ocean Gate Garage Stormwater Inspection and Maintenance Log** (Stormwater Management Plan) dated **, 20__** and Chapter 32 of the Portland City Code. Owner of the subject premises further agrees to keep a Stormwater Maintenance Log that will be made available for inspection by the City of Portland upon reasonable notice and request.

This Agreement is for the benefit of the said City of Portland and all persons in lawful possession of the property; further, that the said City of Portland may enforce this Agreement by an action at law or in equity in any court of competent jurisdiction; further, that after giving the Owner written notice as described in this Agreement, and a stated time to perform, that the said City of Portland, by its authorized agents or representatives, may, but is not obligated to, enter upon the property in question to maintain, repair, or replace said stormwater drainage system, including but not limited to the **Focal Point stormwater treatment planters (rain gardens) and catch basin system** thereon in the event of any failure or neglect thereof, the cost and expense thereof to be reimbursed in full to the said City of Portland by the Owner upon written demand. Any funds owed to the City under this paragraph shall be secured by a lien on the property.

This Agreement shall bind the undersigned only so long as it retains any interest in said premises, and shall run with the land and be binding upon the Owner's successors and assigns as their interests may from time to time appear. The Owner agrees to provide a copy of this Agreement to any successor or assign and to forward to the City an Addendum signed by any successor or assign in which the successor or assign states that the successor or assign has read the Agreement, agrees to all its terms and conditions.

For the purpose of this Agreement the real estate shown by chart, block and lot number in the records on file in the City Assessor's office shall constitute "the property" that may be entered by the City and liened if the City is not paid all of its costs and charges following the mailing of a written demand for payment to the Owner pursuant to the process and with the same force and effect as that established by 36 M.R.S.A. §§ 942 and 943 for real estate tax liens.

Any written notices or demands required by this Agreement shall be complete on the date the notice is mailed to the owner of record as shown on the tax roles on file in the City Assessor's Office. If the property has more than one owner on said tax rolls, service shall be complete by mailing it to only the first listed owner. The failure to receive any written notice required by this Agreement shall not prevent the City from entering the property and performing maintenance or repairs on the stormwater system, or any component thereof, or liening it or create a cause of action against the City.

Dated at Portland, Maine this_____day of _____, 20__.

_____

By:_____

Its: _____

STATE OF MAINE
CUMBERLAND, ss. Date: _____

Personally appeared the above-named_____, and acknowledged the foregoing instrument to be his/his free act and deed in his/her said capacity, and the free act and deed of said_____.

Before me,

_____

Notary Public/Attorney at Law

Print name: _____

CONVERGENT WATER TECHNOLOGIES

ACF FP and RT Calc 1.8

This calculator is designed to provide sizing and performance guidance for the FocalPoint Bio-Filtration and RTank Underground Storage Systems based on TR-55 protocol and distribution curves. There are three types of cells the user will want to be familiar with: White Cells are intended for user input, Green Cells require a selection off of the dropdown toggle switch and the Blue Cells contain the calculated result.

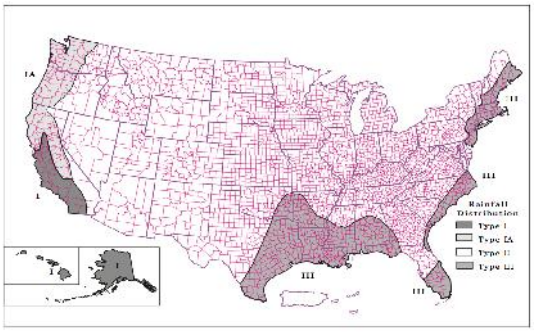
Contact:	John Mahoney	Project Name:	Portland Housing Project
Company:	Ransom Consulting Inc.	Location:	Portland Maine
Phone:			
Email:			

Water Quality Volume Calculator

Step 1 - Rainfall Distribution

1.1 - SCS Type: Type III

See TR-55 Map Tab below to determine which type event is appropriate for your area



Step 2 - Basis for Water Quality Volume

2.1 - Enter Methodolgy: Maine (Scroll Down)

Directions

Select one of the following from Toggle:
Manual if WQv is already calculated
TR-55 to Calculate WQv and use that volume in one step
New York to Calculate WQv off Figure 4.1 of NY SWM Manual
Maine to Calculate WQv as 1" off Impervious and 0.4" off pervious

Step 3 - Enter Data As Described For Basis for Water Quality Chosen in Step 2 Highlighted in Blue Below

3 - Manual Input			Directions
3.1 If "Manual", enter Water Quality volume	10,000	ft^3	Enter the Water Quality Volume (WQv) here.
3.2 If "Manual", enter Design Event volume	25,000	ft^3	Enter the Design Event here (if different than WQv).

Note: If FocalPoint not being used and runoff will be routed directly to RTank, enter "No" in cell E10 on FocalPoint Design worksheet

3.2 - TR-55 Input				Directions
Enter Methodology	Toggle	W.Q. Volume		Use Toggle to select first flush of full event volume
Runoff (First Flush) or Rainfall (W.Q. Volume) Depth		7.54		Depth of First Flush treatment Requirement - in inches
Design Event Rainfall Depth		7.54		Depth of total rainfall event in inches

Subarea	Cover Condition	Area to BMP (ft^2)	TR-55 CN Value	
Post Cover 1	Roof	2,919	98	Enter cover conditions and CNs
Post Cover 2				
Post Cover 3				
	Total	2,919		

	W.Q. Event	Design Event	
Post Cover 1	1,776	1,776	ft^3
Post Cover 2	0	0	ft^3
Post Cover 3	0	0	ft^3
RESULTS	**1,776**	**1,776**	ft^3

3.3 - New York			
90% Rainfall Amount (P)	1.00	inches	Enter rainfall depth from Figure 4.1, page 4-2 of NY SWM Design Man.
Impervious cover (I)	55.00%		Enter % of Impervious Cover
Drainage Area (A)	103,456	ft^2	Enter Drainage Area
Water Quality Volume (WQ_v)	4,699	ft^3	
Design Event Volume (Manual Entry)	10,000	ft^3	Enter Design Event Volume

3.4 - Maine			
Drainage Area A+B			
Impervious Cover	8,113	ft^2	Enter ft3 of Impervious Cover
Pervious Cover	0	ft^2	Enter ft3 of Pervious Cover
Water Quality Volume	1,082	ft^3	
Drainage Area C			
Impervious Cover	5,656	ft^2	Enter ft3 of Impervious Cover
Pervious Cover	0	ft^2	Enter ft3 of Pervious Cover
Water Quality Volume	754	ft^3	
Drainage Area D+E			
Impervious Cover	7,231	ft^2	Enter ft3 of Impervious Cover
Pervious Cover	0	ft^2	Enter ft3 of Pervious Cover
Water Quality Volume	964	ft^3	

FocalPoint
BIOFILTRATION SYSTEMS

Water Quality Volume and Design Event			**Directions**
Water Quality Volume (WQv)	1,082	ft^3	Water Quality Volume calculated from previous Sheet
Design Event	1,082	ft^3	Total event volume calculated from previous sheet

System Configuration			
Is FocalPoint used?	Yes		Enter Yes if FocalPoint used. Enter No if runoff flows directly into RTank and proceed to RTank Design worksheet

Step 4 - FocalPoint Configuration			
4.1 - FocalPoint Factor of Safety	1		Enter optional factor-of-safety
4.2 - FocalPoint bed area	135	ft^2	Enter target FocalPoint footprint, 20 SF min. (See Step 4.5)
4.3 - Storage volume above FocalPoint provided	45	ft^3	Enter available surface storage volume (See Step 4.5)
4.4 - Desired treatment time	24	hours	Select 24, 48, 72 or 96 hrs from toggle
4.5 - Water Quality Volume treated prior to overflow?	**Yes**		If Yes = WQv has been treated If No = larger FocalPoint bed (Step 4.2) and/or surface storage volume (Step 4.3) required
4.6 - FocalPoint drain within desired time?	**Yes**		If Yes = time goal has been met If No = larger FocalPoint bed (Step 4.2) required
4.7 - Flow in excess of storage volume above	To RTank		Select routing location for overflow/bypass vol. from toggle: Off site to disregard flow, RTank to store for retention / detention, harvesting, or infiltration

Step 5 - Evaluation of Design			
5.1 - Volume treated prior to overflow	No Overflow	ft^3	Result = Volume ft3 treated prior to overflow/bypass
5.2 - Total volume treated	1,082	ft^3	Result = Total Volume ft3 treated

Time (hrs)	Rainfall Distribution	Cumulative Rainfall (ft^3)	Incremetal Runoff into FocalPoint (ft^3)	FocalPoint Test (-)	Incremental Volume thru FocalPoint (ft^3)	Incremental Volume to Storage Above (ft^3)	Total Volume in Storage Above (ft^3)	Incremental Volume Overflow (ft^3)
0.0	0.00	0						
0.2	0.00	2	2	**Flow through**	2	0	0	0
0.4	0.00	4	2	**Flow through**	2	0	0	0
0.6	0.01	6	2	**Flow through**	2	0	0	0
0.8	0.01	9	2	**Flow through**	2	0	0	0
1.0	0.01	11	2	**Flow through**	2	0	0	0
1.2	0.01	13	2	**Flow through**	2	0	0	0
1.4	0.01	15	2	**Flow through**	2	0	0	0
1.6	0.02	17	2	**Flow through**	2	0	0	0
1.8	0.02	19	2	**Flow through**	2	0	0	0
2.0	0.02	22	2	**Flow through**	2	0	0	0
2.2	0.02	24	2	**Flow through**	2	0	0	0
2.4	0.02	26	2	**Flow through**	2	0	0	0
2.6	0.03	28	2	**Flow through**	2	0	0	0
2.8	0.03	31	2	**Flow through**	2	0	0	0
3.0	0.03	33	2	**Flow through**	2	0	0	0
3.2	0.03	36	2	**Flow through**	2	0	0	0
3.4	0.04	38	3	**Flow through**	3	0	0	0
3.6	0.04	41	3	**Flow through**	3	0	0	0
3.8	0.04	44	3	**Flow through**	3	0	0	0
4.0	0.04	47	3	**Flow through**	3	0	0	0
4.2	0.05	49	3	**Flow through**	3	0	0	0
4.4	0.05	52	3	**Flow through**	3	0	0	0
4.6	0.05	55	3	**Flow through**	3	0	0	0
4.8	0.05	58	3	**Flow through**	3	0	0	0
5.0	0.06	61	3	**Flow through**	3	0	0	0
5.2	0.06	65	3	**Flow through**	3	0	0	0
5.4	0.06	68	3	**Flow through**	3	0	0	0
5.6	0.07	71	3	**Flow through**	3	0	0	0
5.8	0.07	74	3	**Flow through**	3	0	0	0
6.0	0.07	78	3	**Flow through**	3	0	0	0
6.2	0.08	81	4	**Flow through**	4	0	0	0
6.4	0.08	85	4	**Flow through**	4	0	0	0
6.6	0.08	89	4	**Flow through**	4	0	0	0
6.8	0.09	93	4	**Flow through**	4	0	0	0
7.0	0.09	98	4	**Flow through**	4	0	0	0
7.2	0.09	103	5	**Flow through**	5	0	0	0
7.4	0.10	107	5	**Flow through**	5	0	0	0
7.6	0.10	113	5	**Flow through**	5	0	0	0
7.8	0.11	118	5	**Flow through**	5	0	0	0
8.0	0.11	123	6	**Flow through**	6	0	0	0
8.2	0.12	129	6	**Flow through**	6	0	0	0
8.4	0.13	136	6	**Flow through**	6	0	0	0
8.6	0.13	142	7	**Flow through**	7	0	0	0
8.8	0.14	150	7	**Flow through**	7	0	0	0
9.0	0.15	158	8	**Flow through**	8	0	0	0
9.2	0.15	166	8	**Flow through**	8	0	0	0
9.4	0.16	175	9	**Flow through**	9	0	0	0
9.6	0.17	184	9	**Flow through**	9	0	0	0
9.8	0.18	194	10	**Flow through**	10	0	0	0
10.0	0.19	204	10	**Flow through**	10	0	0	0
10.2	0.20	216	11	**Flow through**	11	0	0	0
10.4	0.21	228	12	**Flow through**	12	0	0	0
10.6	0.22	241	13	**Flow through**	13	0	0	0
10.8	0.24	255	14	**Flow through**	14	0	0	0

11.0	0.25	271	15	Flow through	15	0	0	0
11.2	0.27	288	18	Flow through	18	0	0	0
11.4	0.29	310	22	Flow through	22	0	0	0
11.6	0.31	340	30	Flow through	30	0	0	0
11.8	0.37	404	64	Flow through	64	0	0	0
12.0	0.50	541	137	Flow through	137	0	0	0
12.2	0.63	678	137	Flow through	137	0	0	0
12.4	0.69	742	64	Flow through	64	0	0	0
12.6	0.71	772	30	Flow through	30	0	0	0
12.8	0.73	794	22	Flow through	22	0	0	0
13.0	0.75	812	18	Flow through	18	0	0	0
13.2	0.76	827	15	Flow through	15	0	0	0
13.4	0.78	841	14	Flow through	14	0	0	0
13.6	0.79	854	13	Flow through	13	0	0	0
13.8	0.80	866	12	Flow through	12	0	0	0
14.0	0.81	878	11	Flow through	11	0	0	0
14.2	0.82	888	10	Flow through	10	0	0	0
14.4	0.83	898	10	Flow through	10	0	0	0
14.6	0.84	907	9	Flow through	9	0	0	0
14.8	0.85	916	9	Flow through	9	0	0	0
15.0	0.85	924	8	Flow through	8	0	0	0
15.2	0.86	932	8	Flow through	8	0	0	0
15.4	0.87	940	7	Flow through	7	0	0	0
15.6	0.87	946	7	Flow through	7	0	0	0
15.8	0.88	953	6	Flow through	6	0	0	0
16.0	0.89	959	6	Flow through	6	0	0	0
16.2	0.89	964	6	Flow through	6	0	0	0
16.4	0.90	969	5	Flow through	5	0	0	0
16.6	0.90	975	5	Flow through	5	0	0	0
16.8	0.91	979	5	Flow through	5	0	0	0
17.0	0.91	984	5	Flow through	5	0	0	0
17.2	0.91	989	4	Flow through	4	0	0	0
17.4	0.92	993	4	Flow through	4	0	0	0
17.6	0.92	997	4	Flow through	4	0	0	0
17.8	0.92	1,001	4	Flow through	4	0	0	0
18.0	0.93	1,004	4	Flow through	4	0	0	0
18.2	0.93	1,008	3	Flow through	3	0	0	0
18.4	0.93	1,011	3	Flow through	3	0	0	0
18.6	0.94	1,014	3	Flow through	3	0	0	0
18.8	0.94	1,017	3	Flow through	3	0	0	0
19.0	0.94	1,021	3	Flow through	3	0	0	0
19.2	0.95	1,024	3	Flow through	3	0	0	0
19.4	0.95	1,027	3	Flow through	3	0	0	0
19.6	0.95	1,030	3	Flow through	3	0	0	0
19.8	0.95	1,033	3	Flow through	3	0	0	0
20.0	0.96	1,035	3	Flow through	3	0	0	0
20.2	0.96	1,038	3	Flow through	3	0	0	0
20.4	0.96	1,041	3	Flow through	3	0	0	0
20.6	0.96	1,044	3	Flow through	3	0	0	0
20.8	0.97	1,046	3	Flow through	3	0	0	0
21.0	0.97	1,049	3	Flow through	3	0	0	0
21.2	0.97	1,051	3	Flow through	3	0	0	0
21.4	0.97	1,054	2	Flow through	2	0	0	0
21.6	0.98	1,056	2	Flow through	2	0	0	0
21.8	0.98	1,059	2	Flow through	2	0	0	0
22.0	0.98	1,061	2	Flow through	2	0	0	0
22.2	0.98	1,063	2	Flow through	2	0	0	0
22.4	0.99	1,066	2	Flow through	2	0	0	0
22.6	0.99	1,068	2	Flow through	2	0	0	0
22.8	0.99	1,070	2	Flow through	2	0	0	0
23.0	0.99	1,072	2	Flow through	2	0	0	0
23.2	0.99	1,074	2	Flow through	2	0	0	0
23.4	0.99	1,076	2	Flow through	2	0	0	0
23.6	1.00	1,078	2	Flow through	2	0	0	0
23.8	1.00	1,080	2	Flow through	2	0	0	0
24.0	1.00	1,082	2	Flow through	2	0	0	0
24.2					0	0	0	0
24.4					0	0	0	0
24.6					0	0	0	0
24.8					0	0	0	0
25.0					0	0	0	0
25.2					0	0	0	0
25.4					0	0	0	0
25.6					0	0	0	0
25.8					0	0	0	0
26.0					0	0	0	0
26.2					0	0	0	0
26.4					0	0	0	0
26.6					0	0	0	0
26.8					0	0	0	0
27.0					0	0	0	0
27.2					0	0	0	0
27.4					0	0	0	0
27.6					0	0	0	0
27.8					0	0	0	0
28.0					0	0	0	0
28.2					0	0	0	0
28.4					0	0	0	0
28.6					0	0	0	0
28.8					0	0	0	0
29.0					0	0	0	0
29.2					0	0	0	0
29.4					0	0	0	0
29.6					0	0	0	0

FocalPoint
BIOFILTRATION SYSTEMS

ACF FP and RT Calc 1.8

Water Quality Volume and Design Event			**Directions**
Water Quality Volume (WQv)	754	ft^3	Water Quality Volume calculated from previous Sheet
Design Event	754	ft^3	Total event volume calculated from previous sheet

System Configuration			
Is FocalPoint used?	Yes		Enter Yes if FocalPoint used. Enter No if runoff flows directly into RTank and proceed to RTank Design worksheet

Step 4 - FocalPoint Configuration			
4.1 - FocalPoint Factor of Safety	1		Enter optional factor-of-safety
4.2 - FocalPoint bed area	90	ft^2	Enter target FocalPoint footprint, 20 SF min. (See Step 4.5)
4.3 - Storage volume above FocalPoint provided	30	ft^3	Enter available surface storage volume (See Step 4.5)
4.4 - Desired treatment time	24	hours	Select 24, 48, 72 or 96 hrs from toggle
4.5 - Water Quality Volume treated prior to overflow?	**Yes**		If Yes = WQv has been treated If No = larger FocalPoint bed (Step 4.2) and/or surface storage volume (Step 4.3) required
4.6 - FocalPoint drain within desired time?	**Yes**		If Yes = time goal has been met If No = larger FocalPoint bed (Step 4.2) required
4.7 - Flow in excess of storage volume above	To RTank		Select routing location for overflow/bypass vol. from toggle: Off site to disregard flow, RTank to store for retention / detention, harvesting, or infiltration

Step 5 - Evaluation of Design			
5.1 - Volume treated prior to overflow	No Overflow	ft^3	Result = Volume ft3 treated prior to overflow/bypass
5.2 - Total volume treated	754	ft^3	Result = Total Volume ft3 treated

Time (hrs)	Rainfall Distribution	Cumulative Rainfall (ft^3)	Incremetal Runoff into FocalPoint (ft^3)	FocalPoint Test (-)	Incremental Volume thru FocalPoint (ft^3)	Incremental Volume to Storage Above (ft^3)	Total Volume in Storage Above (ft^3)	Incremental Volume Overflow (ft^3)
0.0	0.00	0						
0.2	0.00	2	2	Flow through	2	0	0	0
0.4	0.00	3	2	Flow through	2	0	0	0
0.6	0.01	5	2	Flow through	2	0	0	0
0.8	0.01	6	2	Flow through	2	0	0	0
1.0	0.01	8	2	Flow through	2	0	0	0
1.2	0.01	9	2	Flow through	2	0	0	0
1.4	0.01	11	2	Flow through	2	0	0	0
1.6	0.02	12	2	Flow through	2	0	0	0
1.8	0.02	14	2	Flow through	2	0	0	0
2.0	0.02	15	2	Flow through	2	0	0	0
2.2	0.02	17	2	Flow through	2	0	0	0
2.4	0.02	18	2	Flow through	2	0	0	0
2.6	0.03	20	2	Flow through	2	0	0	0
2.8	0.03	21	2	Flow through	2	0	0	0
3.0	0.03	23	2	Flow through	2	0	0	0
3.2	0.03	25	2	Flow through	2	0	0	0
3.4	0.04	27	2	Flow through	2	0	0	0
3.6	0.04	29	2	Flow through	2	0	0	0
3.8	0.04	30	2	Flow through	2	0	0	0
4.0	0.04	32	2	Flow through	2	0	0	0
4.2	0.05	34	2	Flow through	2	0	0	0
4.4	0.05	36	2	Flow through	2	0	0	0
4.6	0.05	39	2	Flow through	2	0	0	0
4.8	0.05	41	2	Flow through	2	0	0	0
5.0	0.06	43	2	Flow through	2	0	0	0
5.2	0.06	45	2	Flow through	2	0	0	0
5.4	0.06	47	2	Flow through	2	0	0	0
5.6	0.07	50	2	Flow through	2	0	0	0
5.8	0.07	52	2	Flow through	2	0	0	0
6.0	0.07	54	2	Flow through	2	0	0	0
6.2	0.08	57	2	Flow through	2	0	0	0
6.4	0.08	59	3	Flow through	3	0	0	0
6.6	0.08	62	3	Flow through	3	0	0	0
6.8	0.09	65	3	Flow through	3	0	0	0
7.0	0.09	68	3	Flow through	3	0	0	0
7.2	0.09	71	3	Flow through	3	0	0	0
7.4	0.10	75	3	Flow through	3	0	0	0
7.6	0.10	78	4	Flow through	4	0	0	0
7.8	0.11	82	4	Flow through	4	0	0	0
8.0	0.11	86	4	Flow through	4	0	0	0
8.2	0.12	90	4	Flow through	4	0	0	0
8.4	0.13	94	4	Flow through	4	0	0	0
8.6	0.13	99	5	Flow through	5	0	0	0
8.8	0.14	104	5	Flow through	5	0	0	0
9.0	0.15	110	6	Flow through	6	0	0	0
9.2	0.15	116	6	Flow through	6	0	0	0
9.4	0.16	122	6	Flow through	6	0	0	0
9.6	0.17	128	6	Flow through	6	0	0	0
9.8	0.18	135	7	Flow through	7	0	0	0
10.0	0.19	143	7	Flow through	7	0	0	0
10.2	0.20	150	8	Flow through	8	0	0	0
10.4	0.21	159	8	Flow through	8	0	0	0
10.6	0.22	168	9	Flow through	9	0	0	0
10.8	0.24	178	10	Flow through	10	0	0	0

11.0	0.25	189	11	Flow through	11	0	0	0
11.2	0.27	201	12	Flow through	12	0	0	0
11.4	0.29	216	15	Flow through	15	0	0	0
11.6	0.31	237	21	Flow through	21	0	0	0
11.8	0.37	281	44	Flow through	44	0	0	0
12.0	0.50	377	96	Flow through	96	0	0	0
12.2	0.63	473	96	Flow through	96	0	0	0
12.4	0.69	517	44	Flow through	44	0	0	0
12.6	0.71	538	21	Flow through	21	0	0	0
12.8	0.73	553	15	Flow through	15	0	0	0
13.0	0.75	566	12	Flow through	12	0	0	0
13.2	0.76	576	11	Flow through	11	0	0	0
13.4	0.78	586	10	Flow through	10	0	0	0
13.6	0.79	595	9	Flow through	9	0	0	0
13.8	0.80	604	8	Flow through	8	0	0	0
14.0	0.81	611	8	Flow through	8	0	0	0
14.2	0.82	619	7	Flow through	7	0	0	0
14.4	0.83	626	7	Flow through	7	0	0	0
14.6	0.84	632	6	Flow through	6	0	0	0
14.8	0.85	638	6	Flow through	6	0	0	0
15.0	0.85	644	6	Flow through	6	0	0	0
15.2	0.86	650	5	Flow through	5	0	0	0
15.4	0.87	655	5	Flow through	5	0	0	0
15.6	0.87	660	5	Flow through	5	0	0	0
15.8	0.88	664	4	Flow through	4	0	0	0
16.0	0.89	668	4	Flow through	4	0	0	0
16.2	0.89	672	4	Flow through	4	0	0	0
16.4	0.90	676	4	Flow through	4	0	0	0
16.6	0.90	679	4	Flow through	4	0	0	0
16.8	0.91	683	3	Flow through	3	0	0	0
17.0	0.91	686	3	Flow through	3	0	0	0
17.2	0.91	689	3	Flow through	3	0	0	0
17.4	0.92	692	3	Flow through	3	0	0	0
17.6	0.92	695	3	Flow through	3	0	0	0
17.8	0.92	697	3	Flow through	3	0	0	0
18.0	0.93	700	2	Flow through	2	0	0	0
18.2	0.93	702	2	Flow through	2	0	0	0
18.4	0.93	704	2	Flow through	2	0	0	0
18.6	0.94	707	2	Flow through	2	0	0	0
18.8	0.94	709	2	Flow through	2	0	0	0
19.0	0.94	711	2	Flow through	2	0	0	0
19.2	0.95	713	2	Flow through	2	0	0	0
19.4	0.95	715	2	Flow through	2	0	0	0
19.6	0.95	718	2	Flow through	2	0	0	0
19.8	0.95	720	2	Flow through	2	0	0	0
20.0	0.96	722	2	Flow through	2	0	0	0
20.2	0.96	724	2	Flow through	2	0	0	0
20.4	0.96	725	2	Flow through	2	0	0	0
20.6	0.96	727	2	Flow through	2	0	0	0
20.8	0.97	729	2	Flow through	2	0	0	0
21.0	0.97	731	2	Flow through	2	0	0	0
21.2	0.97	733	2	Flow through	2	0	0	0
21.4	0.97	734	2	Flow through	2	0	0	0
21.6	0.98	736	2	Flow through	2	0	0	0
21.8	0.98	738	2	Flow through	2	0	0	0
22.0	0.98	740	2	Flow through	2	0	0	0
22.2	0.98	741	2	Flow through	2	0	0	0
22.4	0.99	743	2	Flow through	2	0	0	0
22.6	0.99	744	2	Flow through	2	0	0	0
22.8	0.99	746	2	Flow through	2	0	0	0
23.0	0.99	747	1	Flow through	1	0	0	0
23.2	0.99	749	1	Flow through	1	0	0	0
23.4	0.99	750	1	Flow through	1	0	0	0
23.6	1.00	751	1	Flow through	1	0	0	0
23.8	1.00	753	1	Flow through	1	0	0	0
24.0	1.00	754	1	Flow through	1	0	0	0
24.2					0	0	0	0
24.4					0	0	0	0
24.6					0	0	0	0
24.8					0	0	0	0
25.0					0	0	0	0
25.2					0	0	0	0
25.4					0	0	0	0
25.6					0	0	0	0
25.8					0	0	0	0
26.0					0	0	0	0
26.2					0	0	0	0
26.4					0	0	0	0
26.6					0	0	0	0
26.8					0	0	0	0
27.0					0	0	0	0
27.2					0	0	0	0
27.4					0	0	0	0
27.6					0	0	0	0
27.8					0	0	0	0
28.0					0	0	0	0
28.2					0	0	0	0
28.4					0	0	0	0
28.6					0	0	0	0
28.8					0	0	0	0
29.0					0	0	0	0
29.2					0	0	0	0
29.4					0	0	0	0
29.6					0	0	0	0

FocalPoint
BIOFILTRATION SYSTEMS

Water Quality Volume and Design Event			**Directions**
Water Quality Volume (WQv)	964	ft^3	Water Quality Volume calculated from previous Sheet
Design Event	964	ft^3	Total event volume calculated from previous sheet

System Configuration			
Is FocalPoint used?	Yes		Enter Yes if FocalPoint used. Enter No if runoff flows directly into RTank and proceed to RTank Design worksheet

Step 4 - FocalPoint Configuration			
4.1 - FocalPoint Factor of Safety	1		Enter optional factor-of-safety
4.2 - FocalPoint bed area	135	ft^2	Enter target FocalPoint footprint, 20 SF min. (See Step 4.5)
4.3 - Storage volume above FocalPoint provided	45	ft^3	Enter available surface storage volume (See Step 4.5)
4.4 - Desired treatment time	24	hours	Select 24, 48, 72 or 96 hrs from toggle
4.5 - Water Quality Volume treated prior to overflow?	**Yes**		If Yes = WQv has been treated If No = larger FocalPoint bed (Step 4.2) and/or surface storage volume (Step 4.3) required
4.6 - FocalPoint drain within desired time?	**Yes**		If Yes = time goal has been met If No = larger FocalPoint bed (Step 4.2) required
4.7 - Flow in excess of storage volume above	To RTank		Select routing location for overflow/bypass vol. from toggle: Off site to disregard flow, RTank to store for retention / detention, harvesting, or infiltration

Step 5 - Evaluation of Design			
5.1 - Volume treated prior to overflow	No Overflow	ft^3	Result = Volume ft3 treated prior to overflow/bypass
5.2 - Total volume treated	964	ft^3	Result = Total Volume ft3 treated

Time (hrs)	Rainfall Distribution	Cumulative Rainfall (ft^3)	Incremetal Runoff into FocalPoint (ft^3)	FocalPoint Test (-)	Incremental Volume thru FocalPoint (ft^3)	Incremental Volume to Storage Above (ft^3)	Total Volume in Storage Above (ft^3)	Incremental Volume Overflow (ft^3)
0.0	0.00	0						
0.2	0.00	2	2	Flow through	2	0	0	0
0.4	0.00	4	2	Flow through	2	0	0	0
0.6	0.01	6	2	Flow through	2	0	0	0
0.8	0.01	8	2	Flow through	2	0	0	0
1.0	0.01	10	2	Flow through	2	0	0	0
1.2	0.01	12	2	Flow through	2	0	0	0
1.4	0.01	13	2	Flow through	2	0	0	0
1.6	0.02	15	2	Flow through	2	0	0	0
1.8	0.02	17	2	Flow through	2	0	0	0
2.0	0.02	19	2	Flow through	2	0	0	0
2.2	0.02	21	2	Flow through	2	0	0	0
2.4	0.02	23	2	Flow through	2	0	0	0
2.6	0.03	25	2	Flow through	2	0	0	0
2.8	0.03	27	2	Flow through	2	0	0	0
3.0	0.03	30	2	Flow through	2	0	0	0
3.2	0.03	32	2	Flow through	2	0	0	0
3.4	0.04	34	2	Flow through	2	0	0	0
3.6	0.04	37	2	Flow through	2	0	0	0
3.8	0.04	39	2	Flow through	2	0	0	0
4.0	0.04	41	3	Flow through	3	0	0	0
4.2	0.05	44	3	Flow through	3	0	0	0
4.4	0.05	47	3	Flow through	3	0	0	0
4.6	0.05	49	3	Flow through	3	0	0	0
4.8	0.05	52	3	Flow through	3	0	0	0
5.0	0.06	55	3	Flow through	3	0	0	0
5.2	0.06	58	3	Flow through	3	0	0	0
5.4	0.06	60	3	Flow through	3	0	0	0
5.6	0.07	63	3	Flow through	3	0	0	0
5.8	0.07	66	3	Flow through	3	0	0	0
6.0	0.07	69	3	Flow through	3	0	0	0
6.2	0.08	73	3	Flow through	3	0	0	0
6.4	0.08	76	3	Flow through	3	0	0	0
6.6	0.08	80	4	Flow through	4	0	0	0
6.8	0.09	83	4	Flow through	4	0	0	0
7.0	0.09	87	4	Flow through	4	0	0	0
7.2	0.09	91	4	Flow through	4	0	0	0
7.4	0.10	96	4	Flow through	4	0	0	0
7.6	0.10	100	5	Flow through	5	0	0	0
7.8	0.11	105	5	Flow through	5	0	0	0
8.0	0.11	110	5	Flow through	5	0	0	0
8.2	0.12	115	5	Flow through	5	0	0	0
8.4	0.13	121	6	Flow through	6	0	0	0
8.6	0.13	127	6	Flow through	6	0	0	0
8.8	0.14	134	7	Flow through	7	0	0	0
9.0	0.15	141	7	Flow through	7	0	0	0
9.2	0.15	148	7	Flow through	7	0	0	0
9.4	0.16	156	8	Flow through	8	0	0	0
9.6	0.17	164	8	Flow through	8	0	0	0
9.8	0.18	173	9	Flow through	9	0	0	0
10.0	0.19	182	9	Flow through	9	0	0	0
10.2	0.20	192	10	Flow through	10	0	0	0
10.4	0.21	203	11	Flow through	11	0	0	0
10.6	0.22	215	12	Flow through	12	0	0	0
10.8	0.24	227	13	Flow through	13	0	0	0

11.0	0.25	241	14	Flow through	14	0	0	0
11.2	0.27	257	16	Flow through	16	0	0	0
11.4	0.29	276	19	Flow through	19	0	0	0
11.6	0.31	303	27	Flow through	27	0	0	0
11.8	0.37	360	57	Flow through	57	0	0	0
12.0	0.50	482	122	Flow through	122	0	0	0
12.2	0.63	604	122	Flow through	122	0	0	0
12.4	0.69	661	57	Flow through	57	0	0	0
12.6	0.71	688	27	Flow through	27	0	0	0
12.8	0.73	707	19	Flow through	19	0	0	0
13.0	0.75	723	16	Flow through	16	0	0	0
13.2	0.76	737	14	Flow through	14	0	0	0
13.4	0.78	749	13	Flow through	13	0	0	0
13.6	0.79	761	12	Flow through	12	0	0	0
13.8	0.80	772	11	Flow through	11	0	0	0
14.0	0.81	782	10	Flow through	10	0	0	0
14.2	0.82	791	9	Flow through	9	0	0	0
14.4	0.83	800	9	Flow through	9	0	0	0
14.6	0.84	808	8	Flow through	8	0	0	0
14.8	0.85	816	8	Flow through	8	0	0	0
15.0	0.85	824	8	Flow through	8	0	0	0
15.2	0.86	830	7	Flow through	7	0	0	0
15.4	0.87	837	7	Flow through	7	0	0	0
15.6	0.87	843	6	Flow through	6	0	0	0
15.8	0.88	849	6	Flow through	6	0	0	0
16.0	0.89	854	5	Flow through	5	0	0	0
16.2	0.89	859	5	Flow through	5	0	0	0
16.4	0.90	864	5	Flow through	5	0	0	0
16.6	0.90	868	5	Flow through	5	0	0	0
16.8	0.91	873	4	Flow through	4	0	0	0
17.0	0.91	877	4	Flow through	4	0	0	0
17.2	0.91	881	4	Flow through	4	0	0	0
17.4	0.92	884	4	Flow through	4	0	0	0
17.6	0.92	888	4	Flow through	4	0	0	0
17.8	0.92	891	3	Flow through	3	0	0	0
18.0	0.93	895	3	Flow through	3	0	0	0
18.2	0.93	898	3	Flow through	3	0	0	0
18.4	0.93	901	3	Flow through	3	0	0	0
18.6	0.94	904	3	Flow through	3	0	0	0
18.8	0.94	906	3	Flow through	3	0	0	0
19.0	0.94	909	3	Flow through	3	0	0	0
19.2	0.95	912	3	Flow through	3	0	0	0
19.4	0.95	915	3	Flow through	3	0	0	0
19.6	0.95	917	3	Flow through	3	0	0	0
19.8	0.95	920	3	Flow through	3	0	0	0
20.0	0.96	923	3	Flow through	3	0	0	0
20.2	0.96	925	3	Flow through	3	0	0	0
20.4	0.96	927	2	Flow through	2	0	0	0
20.6	0.96	930	2	Flow through	2	0	0	0
20.8	0.97	932	2	Flow through	2	0	0	0
21.0	0.97	935	2	Flow through	2	0	0	0
21.2	0.97	937	2	Flow through	2	0	0	0
21.4	0.97	939	2	Flow through	2	0	0	0
21.6	0.98	941	2	Flow through	2	0	0	0
21.8	0.98	943	2	Flow through	2	0	0	0
22.0	0.98	945	2	Flow through	2	0	0	0
22.2	0.98	948	2	Flow through	2	0	0	0
22.4	0.99	950	2	Flow through	2	0	0	0
22.6	0.99	951	2	Flow through	2	0	0	0
22.8	0.99	953	2	Flow through	2	0	0	0
23.0	0.99	955	2	Flow through	2	0	0	0
23.2	0.99	957	2	Flow through	2	0	0	0
23.4	0.99	959	2	Flow through	2	0	0	0
23.6	1.00	961	2	Flow through	2	0	0	0
23.8	1.00	962	2	Flow through	2	0	0	0
24.0	1.00	964	2	Flow through	2	0	0	0
24.2					0	0	0	0
24.4					0	0	0	0
24.6					0	0	0	0
24.8					0	0	0	0
25.0					0	0	0	0
25.2					0	0	0	0
25.4					0	0	0	0
25.6					0	0	0	0
25.8					0	0	0	0
26.0					0	0	0	0
26.2					0	0	0	0
26.4					0	0	0	0
26.6					0	0	0	0
26.8					0	0	0	0
27.0					0	0	0	0
27.2					0	0	0	0
27.4					0	0	0	0
27.6					0	0	0	0
27.8					0	0	0	0
28.0					0	0	0	0
28.2					0	0	0	0
28.4					0	0	0	0
28.6					0	0	0	0
28.8					0	0	0	0
29.0					0	0	0	0
29.2					0	0	0	0
29.4					0	0	0	0
29.6					0	0	0	0