DiPrete Engineering

Project # 1193-003

November 26, 2024

Stormwater Management Report

Highlands at Hopkins Hill

Phases 1G, 1H, 1I, 1J, 1M, 1N

Assessors Plat 13, Lot 22

Prepared For:

D2 Homes, Inc.
420 Scrabbletown Road, Suite G
North Kingstown, Rhode Island 02852

Revised on:

January 10, 2024

The purpose of this stormwater management report is to provide water quality for the proposed project Highlands at Hopkins Hill, Phases 1G, 1H, 1I, 1J, 1M, 1N located off Dante Boulevard at the Center of New England in Coventry Rhode Island. The site is located south of Stephanie Drive and West of Dante Boulevard. The project site exists today as completely disturbed, partially constructed residential property. Existing infrastructure was constructed including drainage ponds, drainage structures and lines and sewer structures and lines. The applicant proposed to construct 66 residential units and roadways. The proposed development will be consistent with the original design by John P. Caito Corporation.

Per Case Number KC-2024-0766 the proposed development is required to demonstrate that the watersheds and impervious areas for the project generally matches the watersheds and impervious areas from the 2007-0381 application to RIDEM, the existing detention ponds are considered the existing conditions and considered adequate for runoff control and no further analysis design or construction will be required by RIDEM to satisfy their requirements for peak runoff control. The requirements to do a pre and post analysis and to meet the recharge standards are waived for this project, lastly, the design will be modified to achieve Minimum Standard 3. The case document can be found in Appendix B.

Watersheds and Impervious Areas Generally Match:

The charts below compare the Catio Design to the current DiPrete Layout for the proposed homes and roadways. Values from the Catio Design were obtained from "Amendment to the Drainage Report for Centre of New England Phase 1 Condominium Complex" Coventry/West Greenwich, Rhode Island, Prepared for Universal Properties Group, Inc, Amended September 18, 2007, Revised October 10, 2008. DiPrete Engineering reviewed the watersheds to each basin, including offsite areas. The proposed design focused on maintaining the existing watersheds to each basin to the greatest extent possible.

Table 1 – Watershed Area Comparison (all values in Acres)

Watershed	**6G***	**5**	**5A**	**7***	**11**	**12**
Catio Design	0.835	1.760	12.041	2.338	4.065	4.825
DiPrete Layout	0.613	1.662	13.214	2.342	3.414	2.207
Difference	-0.222	-0.098	1.173	0.004	-0.651	-2.618

Table 2 – Impervious Area Comparison (all values in Acres)

Watershed	**6G***	**5**	**5A**	**7***	**11**	**12**
Catio Design	0.328	1.144	1.784	0.815	1.774	0.694
DiPrete Layout	0.257	0.671	3.568	0.879	1.212	0.647
Difference	-0.071	-0.473	1.784	0.064	-0.562	-0.047

Table 3 – CN Comparison

Watershed	**6G***	**5**	**5A**	**7***	**11**	**12**
Catio Design	62	79	63	59	69	61
DiPrete Layout	67	63	53	61	60	57
Difference	5	-16	-10	2	-9	-4

*Note areas for watersheds 6G and 7 are based on the site contributing areas to the watersheds. Each of these watersheds are part of a larger offsite watershed that discharges to various locations within Centre of New England Phase 1. DiPrete Engineering used watershed maps within the Catio Corporation drainage report to obtain areas and impervious areas for comparison.

Watersheds 6G, 5, 11 and 12 all decrease total area and impervious. Watersheds 5A and 7 both have changes to total area and impervious area. Most of this change is due to the offsite area to the west of the property. DiPrete Engineering reviewed drainage from this neighborhood, including a site investigation to determine the watershed. DiPrete Engineering reviewed all watersheds within HydroCAD for the 10 and 100 year storms. See tables below.

Table 4 – Flow Comparison (CFS)

Watershed	10-yr Peak Flow		100-yr Peak Flow	
	Catio	DE	Catio	DE
6G	1.17	1.15	4.00	3.38
5	4.45	1.95	10.27	6.51
5A	10.86	5.49	35.95	28.55
7	2.66	3.08	10.15	10.88
11	5.68	2.65	16.06	9.73
12	6.34	1.55	22.41	6.52

Table 5 – Volume Comparison (acre feet)

Watershed	10-yr Volume		100-yr Peak Flow	
	Catio	DE	Catio	DE
6G	0.092	0.085	0.286	0.240
5	0.386	0.192	0.904	0.585
5A	1.388	0.848	4.241	3.345
7	0.219	0.244	0.73	0.778
11	0.614	0.337	1.677	1.100
12	0.503	0.184	1.603	0.645

Any change in volume/cfs within all of the watersheds is insignificant and generally matches the original design by Catio Corporation. Excerpts from the Catio Corporation drainage report can be found in appendix C.1. HydroCAD printouts for the Catio Corporation design and the DiPrete Engineering layout can be found in Appendix C.2 and C.3 respectively. Watershed Maps from the Catio Corporation design and the DiPrete Engineering Design can be found in Appendix E.1 and E.2 respectively.

Minimum Standard 3

The original site design by Catio Corporation was based on the 1993 Rhode Island Stormwater Manual and used extended detention basins to achieve water quality. This practice is no longer an approved method for water quality treatment. DiPrete Engineering performed soil evaluations and infiltrometer testing at each of the basin locations. Test hole logs can be found in Appendix D.

Basin	Test Hole	Basin Bottom Elev	Groundwater Elev	Separation (ft)
5	24-9	272.5	266.5	6.0
5A	24-8	271.5	269.5	2.0
5A	24-7	273.0	270.0	3.0
5A	24-6	275.0	270.4	4.6
11	24-4	276.5	272.6	3.9
12	24-3	281.0	276.9	4.1

The basins have sufficient separation to groundwater to be used for water quality treatment. The infiltrometer testing showed rates from 16.0 in/hr to 37.6 in/hr. These rates exceed the maximum rate of 8.3 in/hr allowed for water quality treatment.

To provide water quality treatment, the Jellyfish filter will be used. The Jellyfish is on RIDEM's approved proprietary water quality BMPS list. The Jellyfish has been sized per the RIDEM Certification:

Basin	WQ Flow (cfs)	Jellyfish Filter	Jellyfish Name	Jellyfish WQ Flow Capacity (cfs)
5	0.59	JFPD0406-4-1	JF5	0.60
5A	2.50/1.25*	JFPD0806-9-2	JF5A	1.34
11	0.85	JFPD0806-6-2	JF11	0.94
12	0.53	JFPD0406-4-1	JF12	0.60
300	0.96	JFPD0806-7-2	JF7	1.07

*Watershed 5A contains a large offsite watershed including impervious area from nearby houses, driveways, Bestwick Trail and Minda Lane. The Jellyfish has been sized for the impervious area associated with the proposed development only.

Water quality for watershed 600 is handled by capturing additional impervious area within the Jellyfish for Basin 5A and watershed 300. Watershed 600 could not be captured within the proposed drainage system and discharges to the drainage network in Stephanie Drive. Watershed 600 contains 0.196 of impervious area associated with the proposed development. JellyFish 5A provides additional treatment of 0.098 acres and JellyFish 7 provides additional treatment of 0.098 acres. Note both JellyFish 5A and JellyFish 7 have additional WQ flow capacity approximately equal to 0.22 acres of impervious. The site exceeds minimum water quality requirements.

Water Quality HydroCAD Storm Analysis can be found in Appendix C.4.

Conclusion

The proposed design is consistent with the original design by Catio Corporation. The resultant watersheds, areas, and impervious areas are consistent with the design by Catio Corporation. Minimum Standard 3 has been achieved by providing water quality to each of the Basins through the use of Jellyfish Filters. The proposed design is in compliance Case Number KC-2024-0766.

Appendix A – RIDEM Appendix A Checklist

APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

PROJECT NAME **Highlands at Hopkins Hill, Phases 1G, 1H, 1I, 1J, 1M, 1N**	**(RIDEM USE ONLY)** **STW/WQC File #:** **Date Received:**
TOWN **Coventry**	
BRIEF PROJECT DESCRIPTION: Construction of 66 residential units and associated roadway on a previously disturbed and partially constructed site.	

Stormwater Management Plan (SMP) Elements – Minimum Standards

When submitting a SMP,[1] submit four separately bound documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to Suggestions to Promote Brevity.

Note: **All stormwater construction projects must create a Stormwater Management Plan (SMP). However, not every element listed below is required per the RIDEM Stormwater Rules and the RIPDES Construction General Permit (CGP). This checklist will help identify the required elements to be submitted with an Application for Stormwater Construction Permit & Water Quality Certification.**

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)

☒ Residential	☐ Commercial	☐ Federal	☐ Retrofit	☐ Restoration
☐ Road	☐ Utility	☐ Fill	☐ Dredge	☐ Mine
☐ Other (specify):				

SITE INFORMATION

☒ Vicinity Map

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.)

☒ **Groundwater**	☒ **Surface Water**	☒ **MS4**
☐ GAA	☐ Isolated Wetland	☐ RIDOT
☒ GA	☐ Named Waterbody	☐ RIDOT Alteration Permit is Approved
☐ GB	☐ Unnamed Waterbody Connected to Named Waterbody	☐ Town
		☐ Other (specify): Private Drainage System

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQ_v and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.

☐ Groundwater or Disconnected Wetland	☐ SRWP		
☐ Waterbody Name:	☐ Coldwater	☐ Warmwater	☒ Unassessed
☒ Waterbody ID: *Tributary to Tiogue Lake RI0006014R-05*	☐ 4th order stream of pond 50 acres or more		
☒ TMDL for: *Enterococcus*	☐ Watershed of flood prone river (e.g., Pocasset River)		
☐ Contributes to a priority outfall listed in the TMDL	☐ Contributes stormwater to a public beach		
☒ 303(d) list – Impairment(s) for: *Enterococcus*	☐ Contributes to shellfishing grounds		

[1] Applications for a Construction General Permit that do not require any other permits from RIDEM and will disturb less than 5 acres over the entire course of the project do not need to submit a SMP. The Appendix A checklist must still be submitted.

PROJECT HISTORY Case Number KC-2024-0766		
☐ RIDEM Pre- Application Meeting	Meeting Date:	☐ Minutes Attached
☐ Municipal Master Plan Approval	Approval Date:	☐ Minutes Attached
☐ Subdivision Suitability Required	Approval #:	
☐ Previous Enforcement Action has been taken on the property	Enforcement #:	

FLOODPLAIN & FLOODWAY See Guidance Pertaining to Floodplain and Floodways	
☐ Riverine 100-year floodplain: **FEMA FLOODPLAIN FIRMETTE** has been reviewed and the 100-year floodplain is on site	
☒ Delineated from FEMA Maps	
NOTE: Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional	
☐ Calculated by Professional Engineer	
☐ Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY): Amount of Cut (CY):
☐ Restrictions or modifications are proposed to the flow path or velocities in a floodway	
☐ Floodplain storage capacity is impacted	
☒ Project area is not within 100-year floodplain as defined by RIDEM	

CRMC JURISDICTION
☐ CRMC Assent required
☐ Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:
☐ Sea level rise mitigation has been designed into this project

LUHPPL IDENTIFICATION - MINIMUM STANDARD 8: N/A		
1. OFFICE OF Land Revitalization and Sustainable Materials Management (OLRSMM)		
	☐ Known or suspected releases of HAZARDOUS MATERIAL are present at the site (Hazardous Material is defined in Rule 1.4(A)(33) of 250-140-30-1 of the RIDEM Rules and Regulations for Investigation and Remediation of Hazardous Materials (the Remediation Regulations))	**RIDEM CONTACT:**
	☐ Known or suspected releases of PETROLEUM PRODUCT are present at the site (Petroleum Product as defined in Rule 1.5(A)(84) of 250-140-25-1 of the RIDEM Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials)	
	☐ This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities	**SITE ID#:**
	☐ CERCLIS/Superfund (NPL)	
	☐ State Hazardous Waste Site (SHWS)	
	☐ Environmental Land Usage Restriction (ELUR)	
	☐ Leaking Underground Storage Tank (LUST)	
	☐ Closed Landfill	
Note:	If any boxes in 1 above are checked, the applicant must contact the RIDEM OLRSMM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to "Red," "Yellow" or "Green" as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration.	
2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:		
	☐ Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php	
	☐ Auto Fueling Facility (e.g., gas station)	
	☐ Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area	

	☐ Road Salt Storage and Loading Areas (exposed to rainwater)	
	☐ Outdoor Storage and Loading/Unloading of Hazardous Substances	
3.	**STORMWATER INDUSTRIAL PERMITTING**	
	☐ The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)	Activities: Sector:
	☐ Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.	MSGP permit #
	☐ Additional stormwater treatment is required by the MSGP Explain:	

REDEVELOPMENT STANDARD – MINIMUM STANDARD 6 N/A		
☐ Pre Construction Impervious Area		
	☐ Total Pre-Construction Impervious Area (**TIA**)	
	☐ Total Site Area (**TSA**)	
	☐ Jurisdictional Wetlands (**JW**)	
	☐ Conservation Land (**CL**)	
☐ Calculate the Site Size (defined as contiguous properties under same ownership)		
	☐ Site Size (**SS**) = (**TSA**) – (**JW**) – (**CL**)	
	☐ (**TIA**) / (**SS**) =	☐ (**TIA**) / (**SS**) >**0.4**?
☐ YES, Redevelopment		

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1

(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)
This section may be deleted if not required.

Note: A written description must be provided specifying why each method is not being used or is not applicable at the Site. Appropriate answers may include:

- Town requires … (state the specific local requirement)
- Meets Town's dimensional requirement of …
- Not practical for site because …
- Applying for waiver/variance to achieve this (pending/approved/denied)
- Applying for wavier/variance to seek relief from this (pending/approved/denied)

A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS	**IF NOT IMPLEMENTED, EXPLAIN HERE**
☒ Sensitive resource areas and site constraints are identified (required) ☒ Local development regulations have been reviewed (required) ☒ All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction ☐ Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. **Note:** If Conservation Development has been used, check box and skip to Subpart C ☐ As much natural vegetation and pre-development hydrology as possible has been maintained	Site exists today as completely disturbed and partially constructed. Site is a former gravel pit.

B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS ☒ Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies ☒ Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) ☐ Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's) ☒ Development sites and building envelopes have been positioned outside of floodplains ☒ Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features ☒ Development sites and building envelopes have been located to minimize impacts to steep slopes (≥15%) ☐ Other (describe):	
C) MINIMIZE CLEARING AND GRADING ☒ Site clearing has been restricted to <u>minimum area needed</u> for building footprints, development activities, construction access, and safety. ☒ Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities) ☐ Protection for stands of trees and individual trees and their root zones to be preserved has been specified, and such protection extends at least to the tree canopy drip line(s) ☐ Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent	
D) REDUCE IMPERVIOUS COVER ☒ Reduced roadway widths (≤22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000) ☒ Reduced driveway areas (length minimized via reduced ROW width (≤ 45 ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to ≤ 9 ft. wide one lane; ≤ 18 ft. wide two lanes; shared driveways; pervious surface) ☐ Reduced building footprint: Explain approach: ☐ Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface) ☐ Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around) ☐ Reduced parking lot area: Explain approach ☐ Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc. ☐ Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance) ☒ Other (describe):	Site exists today as completely disturbed and partially constructed. Site is a former gravel pit.
E) DISCONNECT IMPERVIOUS AREA ☐ Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible ☐ Residential street edges allow side-of-the-road drainage into vegetated open swales ☐ Parking lot landscaping breaks up impervious expanse AND accepts runoff ☐ Other (describe):	
F) MITIGATE RUNOFF AT THE POINT OF GENERATION ☐ Small-scale BMPs have been designated to treat runoff as close as possible to the source	

G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION ☐ Low-maintenance landscaping has been proposed using native species and cultivars ☒ Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan ☐ Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots	
H) RESTORE STREAMS/WETLANDS ☐ Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands ☐ Removal of invasive species ☐ Other	N/A

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2 N/A Per Case Number KC-2024-0766		
YES	**NO**	
☐	☐	The project has been designed to meet the groundwater recharge standard.
☐	☐	If "No," the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D);
☐	☐	Your waiver request has been explained in the Narrative, if applicable.
☐	☐	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
☐	☐	If "Yes," has approval for infiltration by the OLRSMM Site Project Manager, per Part 1, Minimum Standard 8, been requested?

TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)
(Add or Subtract Rows as Necessary)

Design Point	Impervious Area Treated (sq ft)	Total Re_v Required (cu ft)	LID Stormwater Credits (see RISDISM Section 4.6.1) Portion of Re_v directed to a QPA (cu ft)	Recharge Required by Remaining BMPs (cu ft)	Recharge Provided by BMPs (cu ft)
DP-1:					
DP-2:					
DP-3:					
DP-4:					
TOTALS:					

Notes:
1. Only BMPs listed in RISDISM Table 3-5 "List of BMPs Acceptable for Recharge" may be used to meet the recharge requirement.
2. Recharge requirement must be satisfied for each waterbody ID.

☐ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):

WATER QUALITY – MINIMUM STANDARD 3		
YES	**NO**	
☒	☐	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
☒	☐	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
☒	☐	If "Yes," either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
☒	☐	If "Yes," either TR-55 or TR-20 was used to calculate WQv; and,
☐	☐	If "No," the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
☐	☐	Not Applicable
☒	☐	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
☒	☐	Does this project propose an increase of impervious cover to a receiving water body with impairments? If "Yes," please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water. Site proposes multiple Jellyfish filters to existing infiltration basins.
☐	☒	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
☐	☒	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
☒	☐	BMPs are proposed that are on the approved technology list . If "Yes," please provide all required worksheets from the manufacturer.
☐	☒	Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements. If "Yes," please describe:

TABLE 3-1: Summary of Water Quality (see RICR 8.9)

Design Point and WB ID	Impervious area treated (sq ft)	Total WQ_v Required (cu ft)	LID Stormwater Credits (see RICR 8.18) WQv directed to a QPA (cu ft)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
DP-1:	315,070	26,255	0	26,255	26,255*
DP-2:					
DP-3:					
DP-4:					
TOTALS:					

Notes:
1. Only BMPs listed in RICR 8.20 and 8.25 or the Approved Technologies List of BMPs is Acceptable for Water Quality treatment.
2. For each Design Point, the Water Quality Volume Standard must be met for each Waterbody ID.

☐ YES ☐ NO	This project has met the setback requirements for each BMP. If "No," please explain:

☒ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.): Stormwater Report

*Minimum provided, Jellyfish Filters have additional capacity during the WQ storm. See 'Minimum Standard 3' in the stormwater management report

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4 N/A Per Case Number KC-2024-0766		
YES	**NO**	
☐	☐	Is this standard waived? If "Yes," please indicate one or more of the reasons below:
		☐ The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters. ☐ The project is a small facility with impervious cover of less than or equal to 1 acre. ☐ The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (Note: LID design strategies can greatly reduce the peak discharge rate).
☐	☐	Conveyance and natural channel protection for the site have been met. If "No,' explain why:

TABLE 4-1: Summary of Channel Protection Volumes (see RICR 8.10)					
Design Point	**Receiving Water Body Name**	**Coldwater Fishery? (Y/N)**	**Total CPv Required (cu ft)**	**Total CPv Provided (cu ft)**	**Average Release Rate Modeled in the 1-yr storm (cfs)**
DP-1:					
DP-2:					
DP-3:					
DP-4:					
TOTALS:					
Note: The Channel Protection Volume Standard must be met in each waterbody ID.					
☐ YES ☐ NO	The CPv is released at roughly a uniform rate over a 24-hour duration (see examples of sizing calculations in Appendix D of the RISDISM).				
☐ YES ☐ NO	Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If "Yes," please indicate restrictions and solutions below.				
☐ Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).					

OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5 N/A Per Case Number KC-2024-0766			
YES	**NO**		
☐	☐	Is this standard waived? If yes, please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See Appendix I for state-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☐	A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).
☐	☐	Does the project flow to an MS4 system or subject to other stormwater requirements? If "Yes," indicate as follows:	
		☐	RIDOT
		☐	Other (specify):
Note: The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.			
		Indicate below which model was used for your analysis. ☐ TR-55 ☐ TR-20 ☐ HydroCAD ☐ Bentley/Haestad ☐ Intellisolve ☐ Other (Specify):	
YES	**NO**		
☐	☐	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):	
☐	☐	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
☐	☐	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
☐	☐	Are the off-site areas shown on the subwatershed maps?	
☐	☐	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
☐	☐	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
☐	☐	Calculate the following:	
		☐	Area of disturbance within the sub-watershed (areas)
		☐	Impervious cover (%)
☐	☐	Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?	
☐	☐	Does this project meet the overbank flood protection standard?	

Table 5-1 Hydraulic Analysis Summary								
Subwatershed (Design Point)	**1.2" Peak Flow** (cfs) **		**1-yr Peak Flow** (cfs)		**10-yr Peak Flow** (cfs)		**100-yr Peak Flow** (cfs)	
	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
DP-1:								
DP-2:								
DP-3:								
DP-4:								
TOTALS:								

** Utilize modified curve number method or split pervious /impervious method in HydroCAD.

Note: The hydraulic analysis must demonstrate no impact to each individual subwatershed DP unless each DP discharges to the same wetland or water resource.

Indicate as follows where the pertinent calculations and/or information for the items above are provided	**Name of report/document, page numbers, appendices, etc.**
Existing conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, and water surface elevations showing methodologies used and supporting calculations.	
Proposed conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, water surface elevations, and routing showing the methodologies used and supporting calculations.	
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	

Table 5-2 Summary of Best Management Practices											
BMP ID	**DP #**	**BMP Type** (e.g., bioretention, tree filter)	**BMP Functions**					**Bypass Type**	**Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4**		
			Pre-Treatment (Y/N/ NA)	Re_v	WQ_v	CP_v (Y/N/ NA)	Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/ No	Technical Justification (Design Report page number)	Distance Provided
JF5	1	WQ JellyFish	Y	N	Y	N	N	I	Y	N/A	N/A
JF5A	1	WQ JellyFish	Y	N	Y	N	N	I	Y	N/A	N/A
JF11	1	WQ JellyFish	Y	N	Y	N	N	I	Y	N/A	N/A
JF12	1	WQ JellyFish	Y	N	Y	N	N	I	Y	N/A	N/A
JF7	1	WQ JellyFish	Y	N	Y	N	N	I	Y	N/A	N/A
		TOTALS:									

Table 5.3 Summary of Soils to Evaluate Each BMP									
DP #	**BMP ID**	**BMP Type** (e.g., bioretention, tree filter)	**Soils Analysis for Each BMP**						
			Test Pit ID# and Ground Elevation		SHWT Elevation (ft)	Bottom of Practice Elevation* (ft)	Separation Distance Provided (ft)	Hydrologic Soil Group (A, B, C, D)	Exfiltration Rate Applied (in/hr)
			Primary	Secondary					
		TOTALS:							

* For underground infiltration systems (UICs) bottom equals bottom of stone, for surface infiltration basins bottom equals bottom of basin, for filters bottom equals interface of storage and top of filter layer

LAND USES WITH HIGHER POTENTIAL POLLUTANTS LOADS (LUHPPLs) – MINIMUM STANDARD 8 N/A			
YES	**NO**	**N/A**	
☐	☐	☐	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.
☐	☐	☐	Are these activities already covered under an MSGP? If "No," please explain if you have applied for an MSGP or intend to do so?
☐	☐	☐	List the specific BMPs that are proposed for this project that receive stormwater from LUHPPL drainage areas. These BMP types must be listed in RISDISM Table 3-3, "Acceptable BMPs for Use at LUHPPLs." Please list BMPs:
☐	☐	☐	Additional BMPs, or additional pretreatment BMP's if any, that meet RIPDES MSGP requirements; Please list BMPs:
			Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

ILLICIT DISCHARGES – MINIMUM STANDARD 9			
Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.			
YES	**NO**	**N/A**	
☒	☐	☐	Have you checked for illicit discharges?
☐	☒	☐	Have any been found and/or corrected? If "Yes," please identify.
☒	☐	☐	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10				
YES	**NO**	**N/A**		
☒	☐	☐	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?	
☒	☐	☐	Have you provided a **separately-bound** document based upon the SESC Template? If yes, proceed to Minimum Standard 11 (the following items can be assumed to be addressed).	
			If "No," include a document with your submittal that addresses the following elements of an SESC Plan:	
			☐	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
			☐	Provide Natural Buffers and Maintain Existing Vegetation
			☐	Minimize Area of Disturbance
			☐	Minimize the Disturbance of Steep Slopes
			☐	Preserve Topsoil
			☐	Stabilize Soils
			☐	Protect Storm Drain Inlets
			☐	Protect Storm Drain Outlets
			☐	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
			☐	Establish Perimeter Controls and Sediment Barriers
			☐	Divert or Manage Run-On from Up-Gradient Areas
			☐	Properly Design Constructed Stormwater Conveyance Channels
			☐	Retain Sediment On-Site
			☐	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
			☐	Apply Construction Activity Pollution Prevention Control Measures
			☐	Install, Inspect, and Maintain Control Measures and Take Corrective Actions
			☐	Qualified SESC Plan Preparer's Information and Certification
			☐	Operator's Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
			☐	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9		
Operation and Maintenance Section		
YES	**NO**	
☒	☐	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
☒	☐	Have you provided a **separately-bound** Operation and Maintenance Plan for the site and for all of the BMPs, and does it address each element of RICR 8.17 and RISDISM Appendix C and E?
☒	☐	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If "No," why not?
☒	☐	Is the property owner or homeowner's association responsible for the stormwater maintenance of all BMP's? If "No," you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.).
☒	☐	Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations). If "Yes," have you obtained them? Or please explain your plan to obtain them:

☐	☒	Is stormwater being directed from public areas to private property? If "Yes," note the following: Note: This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-term maintenance of a stormwater BMP by an individual homeowner.
Pollution Prevention Section		
☒	☐	Designated snow stockpile locations?
☒	☐	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
☒	☐	Asphalt-only based sealants?
☐	☒	Pet waste stations? (Note: If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan).
☒	☐	Regular sweeping? Please describe:
☒	☐	De-icing specifications, in accordance with RISDISM Appendix G. (NOTE: If the groundwater is GAA, or this area contributes to a drinking water supply, then this could be an important part of your pollution prevention plan).
☒	☐	A prohibition of phosphate-based fertilizers? (Note: If the site discharges to a phosphorus impaired waterbody, then this could be an important part of your pollution prevention plan).

PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS

Existing and Proposed Subwatershed Mapping (REQUIRED)			
YES	**NO**		
☒	☐		Existing and proposed drainage area delineations
☒	☐		Locations of all streams and drainage swales
☒	☐		Drainage flow paths, mapped according to the DEM *Guidance for Preparation of Drainage Area Maps* (included in RISDISM Appendix K)
☒	☐		Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
☒	☐		Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
☒	☐		Mapped seasonal high-water-table test pit locations
☒	☐		Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
☒	☐		Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
☒	☐		Mapped bedrock outcrops adjacent to any infiltration BMP
☒	☐		Soils were logged by a:
		☒	DEM-licensed Class IV soil evaluator Name: Tim Twohig License Number D-4073
		☐	RI-registered P.E. Name:

Subwatershed and Impervious Area Summary				
Subwatershed (area to each design point)	**First Receiving Water ID or MS4**	**Area Disturbed (units)**	**Existing Impervious (units)**	**Proposed Impervious (units)**
DP-1:				
DP-2:				
DP-3:				
DP-4:				
TOTALS:				

Site Construction Plans (Indicate that the following applicable specifications are provided)		
YES	**NO**	
☒	☐	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
☒	☐	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas
☒	☐	Boundaries of existing predominant vegetation and proposed limits of clearing
☒	☐	Site Location clarification
☒	☐	Location and field-verified boundaries of resource protection areas such as: ▸ freshwater and coastal wetlands, including lakes and ponds ▸ coastal shoreline features Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)
☒	☐	All required setbacks (e.g., buffers, water-supply wells, septic systems)
☒	☐	Representative cross-section and profile drawings, and notes and details of structural stormwater management practices and conveyances (i.e., storm drains, open channels, swales, etc.), which include: ▸ Location and size of the stormwater treatment practices (type of practice, depth, area). Stormwater treatment practices (BMPs) must have labels that correspond to RISDISM Table 5-2; ▸ Design water surface elevations (applicable storms); ▸ Structural details of outlet structures, embankments, spillways, stilling basins, grade-control structures, conveyance channels, etc.; ▸ Existing and proposed structural elevations (e.g., inverts of pipes, manholes, etc.); ▸ Location of floodplain and, if applicable, floodway limits and relationship of site to upstream and downstream properties or drainage that could be affected by work in the floodplain; ▸ Planting plans for structural stormwater BMPs, including species, size, planting methods, and maintenance requirements of proposed planting
☒	☐	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
☒	☐	Mapping of any OLRSMM-approved remedial actions/systems (including ELURs)
☒	☐	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; ▸ Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements; ▸ Location of existing and proposed conveyance systems, such as grass channels, swales, and storm drains, and location(s) of final discharge point(s) (wetland, waterbody, etc.); ▸ Cross sections of roadways, with edge details such as curbs and sidewalks; ▸ Location and dimensions of channel modifications, such as bridge or culvert crossings
☒	☐	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization

Appendix B – Case Number KC-2024-0766

Case Number: KC-2024-0766
Filed in Kent County Superior Court
Submitted: 9/10/2024 12:59 PM
Envelope: 4792019
Reviewer: Tracy K.

STATE OF RHODE ISLAND **SUPERIOR COURT**
KENT, SC.

D2 HOMES, INC.; and MATTHEW J. MCGOWAN, as and only as Receiver for COMMERCE PARK REALTY, LLC; COMMERCE PARK PROPERTIES, LLC; COMMERCE PARK COMMONS, LLC; COMMERCE PARK ASSOCIATES 4, LLC; CATAPULT REALTY, LLC; and COMMERCE PARK MANAGEMENT, LLC in P.M. No. 13-0350 and P.B. No. 13-5001,	:	
Plaintiffs	:	
v.	:	**C.A. No. KC-2024-0766**
TERRENCE GRAY, in his capacity as Director of the STATE OF RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMEMT,	:	
Defendant.	:	

CONSENT ORDER

Pursuant to the agreement of the Parties in the above-captioned matter and upon the approval of the Court, the following is hereby:

ORDERED, ADJUDGED AND DECREED

1. There are no jurisdictional wetlands located on that portion of land located in Coventry, Rhode Island known as Assessor's Plat 13, Lot 22, comprising sub-phases 1-G, 1-H, 1-I, 1-J, 1-M, and 1-N on the approved master plan with the Town of Coventry,[1] and otherwise described in the Purchase and Sale Agreement between the Receiver and D2 Homes approved by the Court via a March 19, 2024 Order in the Receivership Proceedings[2] ("Property"). Therefore,

[1] The subject Property is part of a residential development within the Centre of New England known as the "Highlands at Hopkins Hill" condominium development ("Highlands").

[2] *Nicholas E. Cambio, Trustee, The Nicholas E. Cambio, Roney A. Malafronte and Vincent Cambio Trust v. Commerce Park Realty, LLC, Commerce Park Property, LLC, Commerce Park Commons, LLC, Commerce Park Associates 4, LLC and Catapult Realty, LLC*, P.M. No. 13-0350 and *Matthew J. McGowan, as Receiver v.*

no wetlands permitting is required for the Property and the construction of 52-66 condominium units at the Property ("Project").

2. The Project requires only a Rhode Island Pollutant Discharge Elimination System Construction General Permit ("RIPDES Permit") from the Rhode Island Department of Environmental Management ("RIDEM"), as well as any other permits required from other local and state agencies, as applicable. The parties further agree that:

a. In the application for a RIPDES Permit, the applicant will demonstrate that the watersheds and impervious area for the Project generally matches the watersheds and impervious areas from the 2007-0381 application for the Property, submitted to RIDEM, as previously reviewed by RIDEM.

b. In the application for a RIPDES Permit, the RIDEM will agree that the existing detention ponds in place at the Property and in close off-site proximity will be considered as the existing conditions and considered adequate for runoff control and no further analysis, design or construction will be required by RIDEM to satisfy the requirement for peak runoff control for the RIPDES application or permit. The requirements to do a pre- and post-analysis and to meet the recharge standards set forth in the RIDEM's Stormwater Management, Design and Installation Rules ("Rules") are waived for the Project.

c. The parties recognize that the existing ponds were not reviewed nor approved for water quality purposes and the applicant for the Project will analyze, design and construct the site to meet current water quality standards through potential modifications to the ponds or outlets, and/or installing water quality devices, roof

---

Commerce Park Management, *LLC,* C.A. No. PB 13-5001, each pending before this Court as Providence County-docketed matters (the "Receivership Proceedings"),

runoff infiltration, and/or other methods to achieve this under the Rules, Minimum Standard 3.

3. The applicant will agree that the dwelling units in the Project will obtain potable water from the Kent County Water Authority.
4. The Parties agree and acknowledge that the next steps shall be:
    a. The applicant will cut the brush and vegetation on the Property to allow the existing infrastructure to be easily accessed;
    b. The applicant will field-survey the elevations and existing infrastructure in place at the Property;
    c. The applicant will conduct soils testing throughout the Property to determine the appropriateness of runoff infiltration and to assess the re-grading that occurred previously;
    d. The applicant will prepare a stormwater plan and supporting data and information for a RIPDES application submission;
    e. The applicant and RIDEM staff will meet prior to the submission of the RIPDES Application; and
    f. The applicant will submit a complete RIPDES application to RIDEM, and the RIDEM will review the same within two (2) months of submission.

ENTER:

BY ORDER:

JUDGE: Richard Licht
Associate Justice

CLERK: Michael C. Rampone
Deputy Clerk I

Dated: September 23, 2024

D2 HOMES, INC.,
By and through its Attorney,

/s/ *Joelle C. Rocha*
Joelle C. Rocha, Esq.
RI Bar No. 7590
DUFFY & SWEENEY, LTD
321 South Main Street, Suite 400
Providence, RI 02903
Tel: (401) 455-0700
jrocha@duffysweeney.com

And

COMMERCE PARK REALTY, LLC
COMMERCE PARK PROPERTIES, LLC,
COMMERCE PARK COMMONS, LLC,
COMMERCE PARK ASSOCIATES 4, LLC,
CATAPULT REALTY, LLC, and
COMMERCE PARK MANAGEMENT, LLC
in P.M. No. 13-0350 and P.B. No. 13-5001

/s/ *Matthew J. McGowan*
Matthew J. McGowan, Esq. as Receiver
RI Bar No. 2770
Sylvia & Kishfy, LLC
56 Exchange Terrace, Suite 200
Providence, RI 02903
Tel: (401-600-0140
mmcgowan@sklawri.com

TERRENCE GRAY, in his capacity as
Director of the STATE OF RHODE
ISLAND DEPARTMENT OF
ENVIRONMENTAL MANAGEMEMT,

By and through its Attorney,

/s/Johann Donall
Johann Donall, Esq.
RI Bar No. 9274
235 Promenade Street, Suite 425
Providence, RI 02908
Tel: (401) 537-4081
Fax: (401) 222-3378
johann@donall@dem.ri.gov

CERTIFICATE OF SERVICE

I hereby certify that on this 10th day of September, 2024, a copy of the foregoing document was filed and served through the Rhode Island ECF system and will be sent electronically to the counsel who are registered participants identified on the Notice of Electronic Filing

The document electronically filed and served is available for viewing and/or downloading from the Rhode Island Judiciary's Electronic Filing System.

/s/ *Joan Durand*

Appendix C.1 Excerpts from Catio Corporation Drainage Report

"Amendment to the Drainage Report for Centre of New England Phase 1 Condominium Complex" Coventry/West Greenwich, Rhode Island, Prepared for Universal Properties Group, Inc, Amended September 18, 2007, Revised October 10, 2008.

AS-BUILT BASINS WITH MODIFICATIONS HYDROLOGIC ANALYSIS

Tc CALCULATIONS:

Name.... WATERSHED 5

```
Segment #1:  Tc: TR-55 Sheet

Mannings n           .2400
Hydraulic Length    150.00 ft
2yr, 24hr P         3.4000 in
Slope              .097000 ft/ft
Avg.Velocity           .25 ft/sec

                                        Segment #1 Time:     10.18 min
------------------------------------------------------------------------

Segment #2:  Tc: TR-55 Shallow
Hydraulic Length    117.71 ft
Slope              .097000 ft/ft
Unpaved
Avg.Velocity          5.03 ft/sec

                                        Segment #2 Time:       .39 min
------------------------------------------------------------------------

Segment #3:  Tc: TR-55 Shallow
Hydraulic Length    181.36 ft
Slope              .025000 ft/ft
Paved
Avg.Velocity          3.21 ft/sec

                                        Segment #3 Time:       .94 min
------------------------------------------------------------------------

Segment #4:  Tc: Length & Vel.
Hydraulic Length    176.49 ft
Avg.Velocity          5.00 ft/sec
                                        Segment #4 Time:       .59 min
------------------------------------------------------------------------
                                             Total Tc:     12.10 min
                                        ========================
```

Name.... WATERSHED 5A

```
Segment #1:  Tc: TR-55 Sheet
Mannings n           .2400
Hydraulic Length    150.00 ft
2yr, 24hr P         3.4000 in
Slope              .027000 ft/ft
Avg.Velocity           .15 ft/sec
                                        Segment #1 Time:     16.98 min
------------------------------------------------------------------------
```

```
Segment #2:  Tc: TR-55 Shallow
Hydraulic Length  1114.93 ft
Slope              .027000 ft/ft

Unpaved
Avg.Velocity         2.65 ft/sec
                                        Segment #2 Time:      7.01 min
-------------------------------------------------------------------------

Segment #3:  Tc: TR-55 Shallow
Hydraulic Length   210.18 ft
Slope              .019000 ft/ft
Paved
Avg.Velocity         2.80 ft/sec
                                        Segment #3 Time:      1.25 min
-------------------------------------------------------------------------

Segment #4:  Tc: Length & Vel.
Hydraulic Length   181.29 ft
Avg.Velocity         5.00 ft/sec
                                        Segment #4 Time:       .60 min
----------------+--------------------------------------------------------
                                              Total Tc:     25.85 min
```

Name.... WATERSHED 7

```
Segment #1:  Tc: TR-55 Sheet
Mannings n           .2400
Hydraulic Length   150.00 ft
2yr, 24hr P        3.4000 in
Slope              .064000 ft/ft
Avg.Velocity          .21 ft/sec
                                        Segment #1 Time:     12.02 min
-------------------------------------------------------------------------

Segment #2:  Tc: TR-55 Shallow
Hydraulic Length   354.00 ft
Slope              .064000 ft/ft
Unpaved
Avg.Velocity         4.08 ft/sec
                                        Segment #2 Time:      1.45 min
-------------------------------------------------------------------------

Segment #3:  Tc: TR-55 Shallow
Hydraulic Length    75.77 ft
Slope              .015000 ft/ft
Paved
Avg.Velocity         2.49 ft/sec
                                        Segment #3 Time:       .51 min
-------------------------------------------------------------------------

Segment #4:  Tc: Length & Vel.
Hydraulic Length   565.00 ft
Avg.Velocity         5.00 ft/sec
                                        Segment #4 Time:      1.88 min

                                              Total Tc:     15.86 min
```

Name.... WATERSHED 6D

```
Segment #1:  Tc: TR-55 Sheet
Mannings n           .2400
Hydraulic Length    58.00 ft
2yr, 24hr P        3.4000 in
Slope             .017200 ft/ft
Avg.Velocity          .10 ft/sec

                                        Segment #1 Time:      .1585 hrs
-------------------------------------------------------------------------

Segment #2:  Tc: TR-55 Sheet
Mannings n           .2400
Hydraulic Length   198.00 ft
2yr, 24hr P        3.4000 in
Slope             .152000 ft/ft
Avg.Velocity          .31 ft/sec

                                        Segment #2 Time:      .1771 hrs
-------------------------------------------------------------------------

Segment #3:  Tc: TR-55 Shallow
Hydraulic Length    44.00 ft
Slope             .035000 ft/ft
Unpaved
Avg.Velocity         3.02 ft/sec

                                        Segment #3 Time:      .0040 hrs
-------------------------------------------------------------------------

Segment #4:  Tc: TR-55 Shallow
Hydraulic Length    10.00 ft
Slope             .035000 ft/ft
Unpaved
Avg.Velocity         3.02 ft/sec

                                        Segment #4 Time:      .0009 hrs
-------------------------------------------------------------------------

Segment #5:  Tc: TR-55 Shallow
Hydraulic Length   285.00 ft
Slope             .010000 ft/ft
Paved
Avg.Velocity         2.03 ft/sec
                                        Segment #5 Time:      .0389 hrs
-------------------------------------------------------------------------
Segment #6:  Tc: Length & Vel.
Hydraulic Length   371.00 ft
Avg.Velocity         5.00 ft/sec

                                        Segment #6 Time:      .0206 hrs

                                              Total Tc:       .4001 hrs
```

Name.... WATERSHED 6F

Segment #1: Tc: TR-55 Sheet

Mannings n	.2400
Hydraulic Length	70.00 ft
2yr, 24hr P	3.4000 in
Slope	.030000 ft/ft
Avg.Velocity	.13 ft/sec

Segment #1 Time: .1475 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	170.00 ft
Slope	.020000 ft/ft
Paved	
Avg.Velocity	2.87 ft/sec

Segment #2 Time: .0164 hrs

Segment #3: Tc: Length & Vel.

Hydraulic Length	160.00 ft
Avg.Velocity	5.00 ft/sec

Segment #3 Time: .0089 hrs

Total Tc: .1728 hrs

Name.... WATERSHED 6E

Segment #1: Tc: TR-55 Sheet

Mannings n	.2400
Hydraulic Length	169.00 ft
2yr, 24hr P	3.4000 in
Slope	.166000 ft/ft
Avg.Velocity	.31 ft/sec

Segment #1 Time: .1506 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	130.00 ft
Slope	.027000 ft/ft
Unpaved	
Avg.Velocity	2.65 ft/sec

Segment #2 Time: .0136 hrs

```
    Segment #3:  Tc: TR-55 Shallow
    Hydraulic Length    185.00 ft
    Slope              .027000 ft/ft
    Paved
Avg.Velocity          3.34 ft/sec
                                          Segment #3 Time:      .0154 hrs
    ------------------------------------------------------------------------

    Segment #4:  Tc: Length & Vel.
    Hydraulic Length     73.00 ft
    Avg.Velocity          5.00 ft/sec
                                          Segment #4 Time:      .0041 hrs
                                        ==========================
                                           Total Tc:      .1837 hrs
```

Name.... WATERSHED 6G

```
    Segment #1:  Tc: User Defined

                                          Segment #1 Time:      .4500 hrs

                                        ==========================
                                           Total Tc:      .4500 hrs
```

Name.... WS 11

```
    Segment #1:  Tc: TR-55 Sheet
    Mannings n            .2400
    Hydraulic Length    150.00 ft
    2yr, 24hr P          3.4000 in
    Slope               .035000 ft/ft
    Avg.Velocity            .16 ft/sec
                                          Segment #1 Time:      15.31 min
    ------------------------------------------------------------------------

    Segment #2:  Tc: TR-55 Shallow
    Hydraulic Length    598.39 ft
    Slope               .035000 ft/ft
    Unpaved
    Avg.Velocity          3.02 ft/sec
                                          Segment #2 Time:      3.30 min
    ------------------------------------------------------------------------

    Segment #3:  Tc: Length & Vel.
    Hydraulic Length    312.59 ft
    Avg.Velocity          5.00 ft/sec
                                          Segment #3 Time:      1.04 min

                                        ==========================
                                           Total Tc:      19.65 min
```

```
Segment #3:  Tc: Length & Vel.
Hydraulic Length     44.64 ft
Avg.Velocity          5.00 ft/sec
                                        Segment #3 Time:        .15 min

                                      ========================
                                       Total Tc:      12.93 min


Tc Equations used...

==== SCS TR-55 Sheet Flow ============================================

     Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

     Where:  Tc = Time of concentration, hrs
             n  = Mannings n
             Lf = Flow length, ft
             P  = 2yr, 24hr Rain depth, inches
             Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow ==============================

     Unpaved surface:
     V  = 16.1345 * (Sf**0.5)

     Paved surface:
     V  = 20.3282 * (Sf**0.5)

     Tc = (Lf / V) / (3600sec/hr)

     Where:  V  = Velocity, ft/sec
             Sf = Slope, ft/ft
             Tc = Time of concentration, hrs
             Lf = Flow length, ft

==== User Defined Length & Velocity ===================================

     Tc = (Lf / V) / (3600sec/hr)

     Where:  Tc = Time of concentration, hrs
             Lf = Flow length, ft
             V  = Velocity, ft/sec
```

CN CALCULATIONS:

Type.... Runoff CN-Area

Name.... WATERSHED 5

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Road	98	.243			98.00
Housing Units	98	.799			98.00
Basin 5	98	.102			98.00
Pervious/grass	39	.484			39.00
Steep Slopes	49	.049			49.00
Offsite Watershed (Ind & Woods)	61	.083			61.00
COMPOSITE AREA & WEIGHTED CN --->		1.760			78.67 (79)

Name.... WATERSHED 5A

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Road	98	.339			98.00
Housing Units	98	1.174			98.00
Basin 5A	98	.271			98.00
Pervious/grass	39	1.275			39.00
Steep Slopes	49	.934			49.00
Offsite Watershed (Ind & Woods)	61	8.048			61.00
COMPOSITE AREA & WEIGHTED CN --->		12.041			63.22 (63)

Name.... WATERSHED 7

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Road	98	.852			98.00
Housing Units	98	.875			98.00
Basin 7	98	.287			98.00
Pervious/grass	39	1.390			39.00
Steep slopes	49	.423			49.00
Offsite Watershed (Ind & Woods)	61	.923			61.00
COMPOSITE AREA & WEIGHTED CN --->		4.750			69.18 (69)

Name.... WATERSHED 6D

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Basin 6D	98	.292			98.00
Impervious	98	1.719			98.00
Offsite Waterdhed (Ind & Woods)	61	3.938			61.00
Woods, sloped area	49	1.549			49.00
Open Space (Good Cond)	39	1.547			39.00
COMPOSITE AREA & WEIGHTED CN --->		9.045			63.41 (63)

Name.... WATERSHED 6F

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Pervious	39	.534			39.00
Impervious	98	.314			98.00
Basin 6F	98	.210			98.00
COMPOSITE AREA & WEIGHTED CN --->		1.058			68.22 (68)

Name.... WATERSHED 6E

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Basin 6E	98	.102			98.00
Offsite Watershed (Ind & Woods)	61	.212			61.00
Woods, sloped area	49	.128			49.00
Impervious	98	.274			98.00
Open Space (good cond)	39	.715			39.00
COMPOSITE AREA & WEIGHTED CN --->		1.431			58.66 (59)

Name.... WATERSHED 6G

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Steep Slopes	49	.171			49.00
Impervious	98	1.287			98.00
Basin 6G	98	.126			98.00
Open Space	39	1.430			39.00
COMPOSITE AREA & WEIGHTED CN --->		3.013			67.23 (67)

Name.... WS 11

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Road	98	.393			98.00
Housing Units	98	1.246			98.00
Basin 11	98	.135			98.00
Pervious/grass	39	1.251			39.00
Steep Slopes	49	.494			49.00
Offsite Watershed (Ind & Woods)	61	.546			61.00
COMPOSITE AREA & WEIGHTED CN --->		4.065			68.92 (69)

Name.... WS 12

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Road	98	.161			98.00
Housing Units	98	.424			98.00
Basin 12	98	.109			98.00
Pervious/grass	39	.864			39.00
Steep Slopes	49	.515			49.00
Offsite Watershed (Ind & Woods)	61	2.752			61.00
COMPOSITE AREA & WEIGHTED CN --->		4.825			61.10 (61)

Name.... WS 14

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Road	98	.173			98.00
Housing Units	98	.616			98.00
Basin 14	98	.104			98.00
Pervious/grass	39	.618			39.00
Steep Slopes	49	.193			49.00
COMPOSITE AREA & WEIGHTED CN --->		1.704			71.05 (71)

Appendix C.2 10 Year and 100 Year HydroCAD Analysis from Catio Corporation Design

Summary for Subcatchment 10: WS 12

Runoff = 6.34 cfs @ 12.10 hrs, Volume= 0.503 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
*	0.161	98	From Catio Drainage Report Dated Oct 2008
*	0.424	98	
*	0.109	98	
*	0.864	39	
*	0.515	49	
*	2.752	61	
	4.825	61	Weighted Average
	4.131	55	85.62% Pervious Area
	0.694	98	14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 20: WS 11

Runoff = 5.68 cfs @ 12.28 hrs, Volume= 0.614 af, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
*	0.393	98	From Catio Drainage Report Dated Oct 2008
*	1.246	98	
*	0.135	98	
*	1.251	39	
*	0.494	49	
*	0.546	61	
	4.065	69	Weighted Average
	2.291	46	56.36% Pervious Area
	1.774	98	43.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.6					**Direct Entry,**

Summary for Subcatchment 30: WS 7

Runoff = 2.66 cfs @ 12.10 hrs, Volume= 0.219 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
*	0.383	98	From Catio Drainage Report Dated Oct 2008
*	0.432	98	
*	1.398	39	
*	0.125	30	
	2.338	59	Weighted Average
	1.523	38	65.14% Pervious Area
	0.815	98	34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 40: WS 5A

Runoff = 10.86 cfs @ 12.41 hrs, Volume= 1.388 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
*	0.339	98	From Catio Drainage Report Dated Oct 2008
*	1.174	98	
*	0.271	98	
*	1.275	39	
*	0.934	49	
*	8.048	61	
	12.041	63	Weighted Average
	10.257	57	85.18% Pervious Area
	1.784	98	14.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.8					**Direct Entry,**

Summary for Subcatchment 50: WS 5

Runoff = 4.45 cfs @ 12.17 hrs, Volume= 0.386 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
*	0.243	98	From Catio Drainage Report Dated Oct 2008
*	0.799	98	
*	0.102	98	
*	0.484	39	
*	0.049	49	
*	0.083	61	
	1.760	79	Weighted Average
	0.616	43	35.00% Pervious Area
	1.144	98	65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1					**Direct Entry,**

Summary for Subcatchment 60: WS 6G

Runoff = 1.17 cfs @ 12.10 hrs, Volume= 0.092 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (ac)	CN	Description
*	0.123	98	From Catio Drainage Report Dated Oct 2008
*	0.205	98	
*	0.507	39	
*	0.000	30	
	0.835	62	Weighted Average
	0.507	39	60.72% Pervious Area
	0.328	98	39.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 10: WS 12

Runoff = 22.41 cfs @ 12.09 hrs, Volume= 1.603 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (ac)	CN	Description
*	0.161	98	From Catio Drainage Report Dated Oct 2008
*	0.424	98	
*	0.109	98	
*	0.864	39	
*	0.515	49	
*	2.752	61	
	4.825	61	Weighted Average
	4.131	55	85.62% Pervious Area
	0.694	98	14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 20: WS 11

Runoff = 16.06 cfs @ 12.26 hrs, Volume= 1.677 af, Depth= 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (ac)	CN	Description
*	0.393	98	From Catio Drainage Report Dated Oct 2008
*	1.246	98	
*	0.135	98	
*	1.251	39	
*	0.494	49	
*	0.546	61	
	4.065	69	Weighted Average
	2.291	46	56.36% Pervious Area
	1.774	98	43.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.6					**Direct Entry,**

Summary for Subcatchment 30: WS 7

Runoff = 10.15 cfs @ 12.09 hrs, Volume= 0.730 af, Depth= 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (ac)	CN	Description
*	0.383	98	From Catio Drainage Report Dated Oct 2008
*	0.432	98	
*	1.398	39	
*	0.125	30	
	2.338	59	Weighted Average
	1.523	38	65.14% Pervious Area
	0.815	98	34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 40: WS 5A

Runoff = 35.95 cfs @ 12.36 hrs, Volume= 4.241 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (ac)	CN	Description
*	0.339	98	From Catio Drainage Report Dated Oct 2008
*	1.174	98	
*	0.271	98	
*	1.275	39	
*	0.934	49	
*	8.048	61	
	12.041	63	Weighted Average
	10.257	57	85.18% Pervious Area
	1.784	98	14.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.8					**Direct Entry,**

Summary for Subcatchment 50: WS 5

Runoff = 10.27 cfs @ 12.16 hrs, Volume= 0.904 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (ac)	CN	Description
*	0.243	98	From Catio Drainage Report Dated Oct 2008
*	0.799	98	
*	0.102	98	
*	0.484	39	
*	0.049	49	
*	0.083	61	
	1.760	79	Weighted Average
	0.616	43	35.00% Pervious Area
	1.144	98	65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1					**Direct Entry,**

Summary for Subcatchment 60: WS 6G

Runoff = 4.00 cfs @ 12.09 hrs, Volume= 0.286 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (ac)	CN	Description
*	0.123	98	From Catio Drainage Report Dated Oct 2008
*	0.205	98	
*	0.507	39	
*	0.000	30	
	0.835	62	Weighted Average
	0.507	39	60.72% Pervious Area
	0.328	98	39.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Appendix C.3 10 Year and 100 Year HydroCAD Analysis from DiPrete Engineering Layout

Summary for Subcatchment 100: Subcat 100 (P12)

Runoff = 1.55 cfs @ 12.26 hrs, Volume= 0.184 af, Depth= 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.918	39	>75% Grass cover, Good, HSG A
0.149	30	Brush, Good, HSG A
0.054	96	Gravel surface, HSG A
0.291	98	Impervious, HSG A
0.356	98	Roofs, HSG A
0.040	98	Water Surface, 0% imp, HSG A
0.399	30	Woods, Good, HSG A
2.207	57	Weighted Average
1.560	39	70.68% Pervious Area
0.647	98	29.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.1490	0.18		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
5.4	178	0.0467	0.55	3.55	**Parabolic Channel, B** W=24.00' D=0.40' Area=6.4 sf Perim=24.0' n= 0.240 Sheet flow over Dense Grass
1.0	137	0.0117	2.20		**Shallow Concentrated Flow, C** Paved Kv= 20.3 fps
0.2	182	0.0500	12.75	15.65	**Pipe Channel, D** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
16.1	597	Total			

Summary for Subcatchment 200: Subcat 200 (P11)

Runoff = 2.65 cfs @ 12.37 hrs, Volume= 0.337 af, Depth= 1.19"
Routed to nonexistent node P11

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
1.703	39	>75% Grass cover, Good, HSG A
0.099	30	Brush, Good, HSG A
0.036	96	Gravel surface, HSG A
0.487	98	Impervious, HSG A
0.000	98	Offsite Impervious, HSG A
0.041	98	Offsite Roofs, HSG A
0.683	98	Roofs, HSG A
0.020	98	Water Surface, 0% imp, HSG A
0.344	30	Woods, Good, HSG A
3.414	60	Weighted Average
2.202	39	64.50% Pervious Area
1.212	98	35.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, A** Grass: Dense n= 0.240 P2= 3.30"
0.2	98	0.2775	8.48		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
4.5	67	0.0070	0.25	1.08	**Parabolic Channel, C** W=13.00' D=0.50' Area=4.3 sf Perim=13.1' n= 0.240 Sheet flow over Dense Grass
0.3	95	0.0101	5.73	7.03	**Pipe Channel, D** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
0.7	298	0.0135	6.63	8.13	**Pipe Channel, E** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
22.9	658	Total			

Summary for Subcatchment 300: Subcat 300 (P7)

Runoff = 3.08 cfs @ 12.10 hrs, Volume= 0.244 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
1.315	39	>75% Grass cover, Good, HSG A
0.488	98	Impervious, HSG A
0.048	98	Offsite Impervious, HSG A
0.050	98	Offsite Roofs, HSG A
0.293	98	Roofs, HSG A
0.000	98	Water Surface, 0% imp, HSG A
0.148	30	Woods, Good, HSG A
2.342	61	Weighted Average
1.464	38	62.50% Pervious Area
0.879	98	37.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 400: Subcat 400 (P5A)

Runoff = 5.49 cfs @ 12.42 hrs, Volume= 0.848 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
7.255	39	>75% Grass cover, Good, HSG A
0.672	98	Impervious, HSG A
1.382	98	Offsite Impervious, HSG A
0.501	98	Offsite Roofs, HSG A
1.013	98	Roofs, HSG A
0.028	98	Water Surface, 0% imp, HSG A
2.363	30	Woods, Good, HSG A
13.214	53	Weighted Average
9.646	37	73.00% Pervious Area
3.568	98	27.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0280	0.09		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	205	0.0576	3.86		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
0.8	409	0.0200	8.06	9.90	**Pipe Channel, C** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
1.6	45	0.0913	0.46	1.61	**Parabolic Channel, D** W=13.00' D=0.40' Area=3.5 sf Perim=13.0' n= 0.400 Sheet flow: Woods+light brush
0.2	84	0.2080	7.34		**Shallow Concentrated Flow, E** Unpaved Kv= 16.1 fps
1.1	507	0.0170	7.44	9.12	**Pipe Channel, F** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
23.1	1,350	Total			

Summary for Subcatchment 500: Subcat 500 (P5)

Runoff = 1.95 cfs @ 12.20 hrs, Volume= 0.192 af, Depth= 1.38"
Routed to nonexistent node 14P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.924	39	>75% Grass cover, Good, HSG A
0.425	98	Impervious, HSG A
0.246	98	Roofs, HSG A
0.010	98	Water Surface, 0% imp, HSG A
0.057	30	Woods, Good, HSG A
1.662	63	Weighted Average
0.991	39	59.62% Pervious Area
0.671	98	40.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0300	0.14		**Sheet Flow, A** Grass: Dense n= 0.240 P2= 3.30"
0.6	191	0.1115	5.38		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
0.7	349	0.0252	7.80	6.13	**Pipe Channel, D** 12.00" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
13.2	640	Total			

Summary for Subcatchment 600: 600 (6G)

Runoff = 1.15 cfs @ 12.09 hrs, Volume= 0.085 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.311	39	>75% Grass cover, Good, HSG A
0.039	96	Gravel surface, HSG A
0.083	98	Impervious, HSG A
0.061	98	Offsite Impervious, HSG A
0.113	98	Roofs, HSG A
0.006	30	Woods, Good, HSG A
0.613	67	Weighted Average
0.356	45	58.06% Pervious Area
0.257	98	41.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 100: Subcat 100 (P12)

Runoff = 6.52 cfs @ 12.23 hrs, Volume= 0.645 af, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.918	39	>75% Grass cover, Good, HSG A
0.149	30	Brush, Good, HSG A
0.054	96	Gravel surface, HSG A
0.291	98	Impervious, HSG A
0.356	98	Roofs, HSG A
0.040	98	Water Surface, 0% imp, HSG A
0.399	30	Woods, Good, HSG A
2.207	57	Weighted Average
1.560	39	70.68% Pervious Area
0.647	98	29.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.1490	0.18		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
5.4	178	0.0467	0.55	3.55	**Parabolic Channel, B** W=24.00' D=0.40' Area=6.4 sf Perim=24.0' n= 0.240 Sheet flow over Dense Grass
1.0	137	0.0117	2.20		**Shallow Concentrated Flow, C** Paved Kv= 20.3 fps
0.2	182	0.0500	12.75	15.65	**Pipe Channel, D** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
16.1	597	Total			

Summary for Subcatchment 200: Subcat 200 (P11)

Runoff = 9.73 cfs @ 12.34 hrs, Volume= 1.100 af, Depth= 3.87"
Routed to nonexistent node P11

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
1.703	39	>75% Grass cover, Good, HSG A
0.099	30	Brush, Good, HSG A
0.036	96	Gravel surface, HSG A
0.487	98	Impervious, HSG A
0.000	98	Offsite Impervious, HSG A
0.041	98	Offsite Roofs, HSG A
0.683	98	Roofs, HSG A
0.020	98	Water Surface, 0% imp, HSG A
0.344	30	Woods, Good, HSG A
3.414	60	Weighted Average
2.202	39	64.50% Pervious Area
1.212	98	35.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, A** Grass: Dense n= 0.240 P2= 3.30"
0.2	98	0.2775	8.48		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
4.5	67	0.0070	0.25	1.08	**Parabolic Channel, C** W=13.00' D=0.50' Area=4.3 sf Perim=13.1' n= 0.240 Sheet flow over Dense Grass
0.3	95	0.0101	5.73	7.03	**Pipe Channel, D** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
0.7	298	0.0135	6.63	8.13	**Pipe Channel, E** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
22.9	658	Total			

Summary for Subcatchment 300: Subcat 300 (P7)

Runoff = 10.88 cfs @ 12.09 hrs, Volume= 0.778 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
1.315	39	>75% Grass cover, Good, HSG A
0.488	98	Impervious, HSG A
0.048	98	Offsite Impervious, HSG A
0.050	98	Offsite Roofs, HSG A
0.293	98	Roofs, HSG A
0.000	98	Water Surface, 0% imp, HSG A
0.148	30	Woods, Good, HSG A
2.342	61	Weighted Average
1.464	38	62.50% Pervious Area
0.879	98	37.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 400: Subcat 400 (P5A)

Runoff = 28.55 cfs @ 12.35 hrs, Volume= 3.345 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
7.255	39	>75% Grass cover, Good, HSG A
0.672	98	Impervious, HSG A
1.382	98	Offsite Impervious, HSG A
0.501	98	Offsite Roofs, HSG A
1.013	98	Roofs, HSG A
0.028	98	Water Surface, 0% imp, HSG A
2.363	30	Woods, Good, HSG A
13.214	53	Weighted Average
9.646	37	73.00% Pervious Area
3.568	98	27.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0280	0.09		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	205	0.0576	3.86		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
0.8	409	0.0200	8.06	9.90	**Pipe Channel, C** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
1.6	45	0.0913	0.46	1.61	**Parabolic Channel, D** W=13.00' D=0.40' Area=3.5 sf Perim=13.0' n= 0.400 Sheet flow: Woods+light brush
0.2	84	0.2080	7.34		**Shallow Concentrated Flow, E** Unpaved Kv= 16.1 fps
1.1	507	0.0170	7.44	9.12	**Pipe Channel, F** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
23.1	1,350	Total			

Summary for Subcatchment 500: Subcat 500 (P5)

Runoff = 6.51 cfs @ 12.19 hrs, Volume= 0.585 af, Depth= 4.23"
Routed to nonexistent node 14P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.924	39	>75% Grass cover, Good, HSG A
0.425	98	Impervious, HSG A
0.246	98	Roofs, HSG A
0.010	98	Water Surface, 0% imp, HSG A
0.057	30	Woods, Good, HSG A
1.662	63	Weighted Average
0.991	39	59.62% Pervious Area
0.671	98	40.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0300	0.14		**Sheet Flow, A** Grass: Dense n= 0.240 P2= 3.30"
0.6	191	0.1115	5.38		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
0.7	349	0.0252	7.80	6.13	**Pipe Channel, D** 12.00" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
13.2	640	Total			

Summary for Subcatchment 600: 600 (6G)

Runoff = 3.38 cfs @ 12.09 hrs, Volume= 0.240 af, Depth= 4.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.311	39	>75% Grass cover, Good, HSG A
0.039	96	Gravel surface, HSG A
0.083	98	Impervious, HSG A
0.061	98	Offsite Impervious, HSG A
0.113	98	Roofs, HSG A
0.006	30	Woods, Good, HSG A
0.613	67	Weighted Average
0.356	45	58.06% Pervious Area
0.257	98	41.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Appendix C.4 HydroCAD Water Quality HydroCAD Storm Analysis

Summary for Subcatchment 100: Subcat 100 (P12)

Runoff = 0.53 cfs @ 12.22 hrs, Volume= 0.053 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Storm Rainfall=1.20"

Area (ac)	CN	Description
0.918	39	>75% Grass cover, Good, HSG A
0.149	30	Brush, Good, HSG A
0.054	96	Gravel surface, HSG A
0.291	98	Impervious, HSG A
0.356	98	Roofs, HSG A
0.040	98	Water Surface, 0% imp, HSG A
0.399	30	Woods, Good, HSG A
2.207	57	Weighted Average
1.560	39	70.68% Pervious Area
0.647	98	29.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.1490	0.18		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
5.4	178	0.0467	0.55	3.55	**Parabolic Channel, B** W=24.00' D=0.40' Area=6.4 sf Perim=24.0' n= 0.240 Sheet flow over Dense Grass
1.0	137	0.0117	2.20		**Shallow Concentrated Flow, C** Paved Kv= 20.3 fps
0.2	182	0.0500	12.75	15.65	**Pipe Channel, D** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
16.1	597	Total			

Summary for Subcatchment 200: Subcat 200 (P11)

Runoff = 0.85 cfs @ 12.29 hrs, Volume= 0.100 af, Depth= 0.35"
Routed to nonexistent node P11

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Storm Rainfall=1.20"

Area (ac)	CN	Description
1.703	39	>75% Grass cover, Good, HSG A
0.099	30	Brush, Good, HSG A
0.036	96	Gravel surface, HSG A
0.487	98	Impervious, HSG A
0.000	98	Offsite Impervious, HSG A
0.041	98	Offsite Roofs, HSG A
0.683	98	Roofs, HSG A
0.020	98	Water Surface, 0% imp, HSG A
0.344	30	Woods, Good, HSG A
3.414	60	Weighted Average
2.202	39	64.50% Pervious Area
1.212	98	35.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	100	0.0120	0.10		**Sheet Flow, A** Grass: Dense n= 0.240 P2= 3.30"
0.2	98	0.2775	8.48		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
4.5	67	0.0070	0.25	1.08	**Parabolic Channel, C** W=13.00' D=0.50' Area=4.3 sf Perim=13.1' n= 0.240 Sheet flow over Dense Grass
0.3	95	0.0101	5.73	7.03	**Pipe Channel, D** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
0.7	298	0.0135	6.63	8.13	**Pipe Channel, E** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
22.9	658	Total			

Summary for Subcatchment 300: Subcat 300 (P7)

Runoff = 0.96 cfs @ 12.08 hrs, Volume= 0.072 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Storm Rainfall=1.20"

Area (ac)	CN	Description
1.315	39	>75% Grass cover, Good, HSG A
0.488	98	Impervious, HSG A
0.048	98	Offsite Impervious, HSG A
0.050	98	Offsite Roofs, HSG A
0.293	98	Roofs, HSG A
0.000	98	Water Surface, 0% imp, HSG A
0.148	30	Woods, Good, HSG A
2.342	61	Weighted Average
1.464	38	62.50% Pervious Area
0.879	98	37.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 400WQ: Subcat 400 (P5A) (WQ)

Runoff = 1.25 cfs @ 12.30 hrs, Volume= 0.146 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Storm Rainfall=1.20"

Area (ac)	CN	Description
7.255	39	>75% Grass cover, Good, HSG A
0.672	98	Impervious, HSG A
0.098	98	Offsite Impervious, HSG A
0.000	98	Offsite Roofs, HSG A
1.013	98	Roofs, HSG A
0.028	98	Water Surface, 0% imp, HSG A
2.363	30	Woods, Good, HSG A
11.429	46	Weighted Average
9.646	37	84.40% Pervious Area
1.783	98	15.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0280	0.09		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	205	0.0576	3.86		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
0.8	409	0.0200	8.06	9.90	**Pipe Channel, C** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
1.6	45	0.0913	0.46	1.61	**Parabolic Channel, D** W=13.00' D=0.40' Area=3.5 sf Perim=13.0' n= 0.400 Sheet flow: Woods+light brush
0.2	84	0.2080	7.34		**Shallow Concentrated Flow, E** Unpaved Kv= 16.1 fps
1.1	507	0.0170	7.44	9.12	**Pipe Channel, F** 15.00" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
23.1	1,350	Total			

Summary for Subcatchment 500: Subcat 500 (P5)

Runoff = 0.59 cfs @ 12.17 hrs, Volume= 0.055 af, Depth= 0.40"
Routed to nonexistent node 14P

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Storm Rainfall=1.20"

Area (ac)	CN	Description
0.924	39	>75% Grass cover, Good, HSG A
0.425	98	Impervious, HSG A
0.246	98	Roofs, HSG A
0.010	98	Water Surface, 0% imp, HSG A
0.057	30	Woods, Good, HSG A
1.662	63	Weighted Average
0.991	39	59.62% Pervious Area
0.671	98	40.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0300	0.14		**Sheet Flow, A** Grass: Dense n= 0.240 P2= 3.30"
0.6	191	0.1115	5.38		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
0.7	349	0.0252	7.80	6.13	**Pipe Channel, D** 12.00" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
13.2	640	Total			

Summary for Subcatchment 600: 600 (6G)

Runoff = 0.28 cfs @ 12.08 hrs, Volume= 0.021 af, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Storm Rainfall=1.20"

Area (ac)	CN	Description
0.311	39	>75% Grass cover, Good, HSG A
0.039	96	Gravel surface, HSG A
0.083	98	Impervious, HSG A
0.061	98	Offsite Impervious, HSG A
0.113	98	Roofs, HSG A
0.006	30	Woods, Good, HSG A
0.613	67	Weighted Average
0.356	45	58.06% Pervious Area
0.257	98	41.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Appendix D Test Hole Logs

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: _____
Property Location: Dante Blvd., Coventry
Date of Test Hole: 10/04/2024
Soil Evaluator: Tim Twohig License Number: D-4073
Weather: Sunny, 70s Shaded: Yes ☐ No ☑ Time: 8:00

TH dth 24-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
^C	0-50"	C	S	2.5Y 5/4	-	-	gr ls	0 m	FR	Fill
C1	50-70"	C	S	2.5Y 5/4	-	-	gr cos	0 sgr	LO	1m
C2	70-84"	C	S	2.5Y 6/3	-	-	s	0 sgr	LO	1
C3	84-132"	-	-	2.5Y 6/2	-	-	s	0 sgr	LO	1

TH dth 24-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
^C	0-80"	C	S	2.5Y 5/4	-	-	gr ls	0 m	FR	Fill
Bwb	8-88"	C	S	10YR 5/4	-	-	gr ls	0 m	FR	3
C	88-144"	-	-	2.5Y 6/3	7.5YR 5/8	C M P	s	0 sgr	LO	1

TH dth 24-1 Soil Class Fill/outwash Total Depth 132" Impervious/Limiting Layer Depth - (og) GW Seepage Depth 132" SHWT 84" (og)
TH dth 24-2 Soil Class Fill/outwash Total Depth 144" Impervious/Limiting Layer Depth - (og) GW Seepage Depth 144" SHWT 93" (og)

Comments: dth 24-1: ^C contains metal pieces. dth 24-2: fill contains asphalt fragments

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: _____
Property Location: Dante Blvd., Coventry
Date of Test Hole: 10/04/2024
Soil Evaluator: Tim Twohig License Number: D-4073
Weather: Sunny, 70s Shaded: Yes ☐ No ☑ Time: 8:00

TH dth 24-3 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
^C	0-62"	C	S	2.5Y 5/4	-	-	gr ls	0 m	FR	Fill
Ab	62-64"	C	B	10YR 2/2	-	-	ls	0 m	FR	3
Bwb	64-73"	C	S	10YR 5/4	-	-	gr ls	1 sbk	VFR	3
C1	73-85"	C	S	2.5Y 6/3	7.5YR 5/8	C M P	cb gr s	0 sgr	LO	1m
C2	85-132"	-	-	2.5Y 6/3	-	-	gr cos	0 sgr	LO	1m

TH dth 24-4 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
^C	0-116"	C	S	2.5Y 4/3	-	-	gr ls	0 m	FR	Fill
^CA	116-126"	C	S	5Y 4/1 and 10YR 2/2	-	-	si + vfs	0 m	VFR	Fill
C	126-132"	-	-	7.5YR 5/6	-	-	cos	0 sgr	LO	1

TH dth 24-3 Soil Class Fill/outwash Total Depth 132" Impervious/Limiting Layer Depth - (og) GW Seepage Depth 132" SHWT 75" (og)
TH dth 24-4 Soil Class Fill/outwash Total Depth 132" Impervious/Limiting Layer Depth - (og) GW Seepage Depth 156" SHWT 108" (og)

Comments: dth 24-4: ^CA appears to be settling basin material - dark-colored, finely textured material generally on top of the lighter colored material. Wire/metal found at 120"

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: _____
Property Location: Dante Blvd., Coventry
Date of Test Hole: 10/04/2024
Soil Evaluator: Tim Twohig License Number: D-4073
Weather: Sunny, 70s Shaded: Yes ☐ No ☑ Time: 8:00

TH dth 24-5 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
^B	0-15"	C	S	2.5Y 5/4	-		-		ls	0 m	FR	Fill
^C	15-42"	C	S	2.5Y 6/3	-		-		s	0 sgr	LO	Fill
C1	42-108"	G	S	2.5Y 4/3	-		-		cb gr s	0 sgr	LO	1m
C2	108-156"	-	-	2.5Y 4/2	-		-		cb gr s	0 sgr	LO	1m

TH dth 24-6 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
^C1	0-35"	C	S	2.5Y 5/4	-		-		gr s	0 sgr	LO	Fill
^C2	35-63"	C	S	2.5Y 4/3	-		-		st cb gr s	0 sgr	LO	Fill
^C3	63-112"	C	S	2.5Y 3/2	-		-		st gr ls	0 m	FR	Fill
C1	112-144"	C	S	2.5Y 5/2					ls	0 m	FR	3
C2	144-156"	-	-	7.5YR 4/4					cos	0 sgr	LO	1

TH dth 24-5 Soil Class Fill/outwash Total Depth 156" Impervious/Limiting Layer Depth - (og) GW Seepage Depth - SHWT 108" (og)
TH dth 24-6 Soil Class Fill/outwash Total Depth 156" Impervious/Limiting Layer Depth - (og) GW Seepage Depth 156" SHWT 112" (og)

Comments: dth 24-5: no seepage observed, but soil very damp at 156". No deeper due to cave-in. dth 24-6: metal wire observed at 48", netting at 70".

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: _____
Property Location: Dante Blvd., Coventry
Date of Test Hole: 10/04/2024
Soil Evaluator: Tim Twohig License Number: D-4073
Weather: Sunny, 70s Shaded: Yes ☐ No ☑ Time: 8:00

TH dth 24-7 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
^C1	0-57"	C	S	2.5Y 6/3	-		-		gr s	0 sgr	LO	Fill
^C2	57-108"	C	S	2.5Y 5/2	-		-		gr s	0 sgr	LO	Fill
C	108-132"	-	-	10YR 5/6	-		-		vcb gr s	0 sgr	LO	1m

TH dth 24-8 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
^C1	0-64"	C	S	2.5Y 6/3	-		-		gr ls	0 m	VFR	Fill
^C2	64-96"	C	S	2.5Y 5/2	-		-		gr s	0 sgr	LO	Fill
C	96-132"	-	-	7.5YR 5/8	-		-		gr cos	0 sgr	LO	1m

TH dth 24-7 Soil Class Fill/ice contact Total Depth 132" Impervious/Limiting Layer Depth - (og) GW Seepage Depth - SHWT 108" (og)
TH dth 24-8 Soil Class Fill/outwash Total Depth 132" Impervious/Limiting Layer Depth - (og) GW Seepage Depth 132" SHWT 96" (og)

Comments: dth 24-7: romex wire at 96". dth 24-8: wire at 82"

Revised 11/25/18

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: _____
Property Location: Dante Blvd., Coventry
Date of Test Hole: 10/04/2024
Soil Evaluator: Tim Twohig License Number: D-4073
Weather: Sunny, 70s Shaded: Yes ☐ No ☑ Time: 8:00

TH dth 24-9 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
^C	0-43"	C	S	2.5Y 5/4	-	-	gr ls	0 m	FR	Fill
C1	43-101"	C	S	2.5Y 6/3	-	-	vst vcb gr s	0 sgr	LO	1m
C2	101-126"	-	-	2.5Y 6/2	10YR 5/8	C F P	s	0 sgr	LO	1

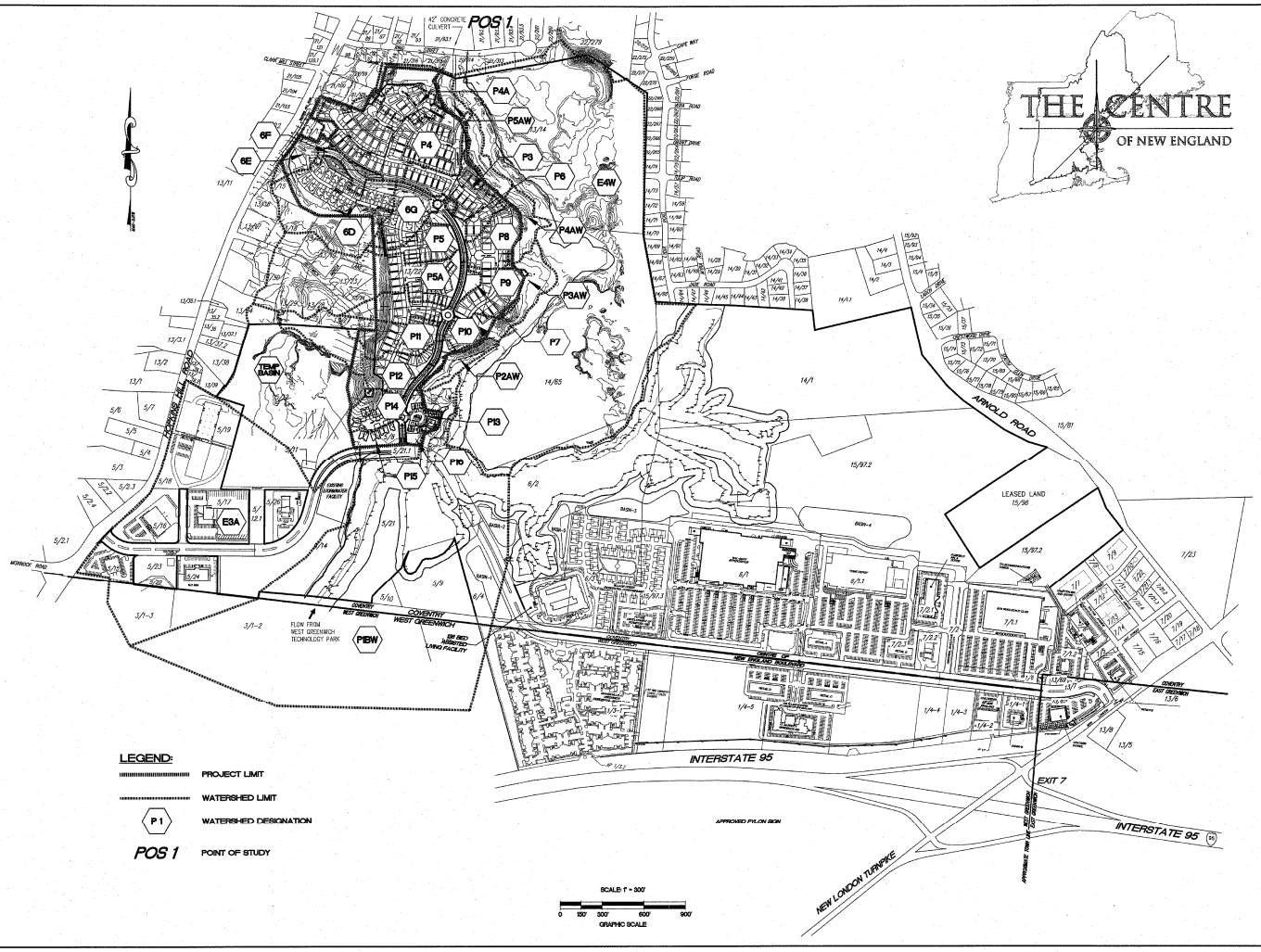
TH____ Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				

TH dth 24-9 Soil Class Fill/outwash Total Depth 126" Impervious/Limiting Layer Depth - (og) GW Seepage Depth - SHWT 101" (og)

TH _____ Soil Class _____ Total Depth _____ Impervious/Limiting Layer Depth _____(og) GW Seepage Depth _____ SHWT _____(og)

Comments: _____

Appendix E.1 Watershed Maps from Catio Corporation Design



THE CENTRE OF NEW ENGLAND

NO.	DATE	REVISION
1.	9/4/09	PER PHASES 1A, 1B, 1C, 1D, 1E
2.	10/7/09	PER COMMENTS

CIVIL ENGINEERS
JOHN P. GAITO CORPORATION
LAND PLANNERS
65 HAMMETT DRIVE
CRANSTON, RHODE ISLAND
02909-4466
401-944-4000
fax - 401-944-4009

PROJECT NO.:	10.028PHI
DATE:	AUGUST 2004
SCALE:	1" = 300'
DESIGNED BY:	COMPILED
DRAWN BY:	COMPILED
CHECKED BY:	J.P.C.

PHASE 1 CONDOMINIUM COMPLEX
POST-WATERSHED MAP

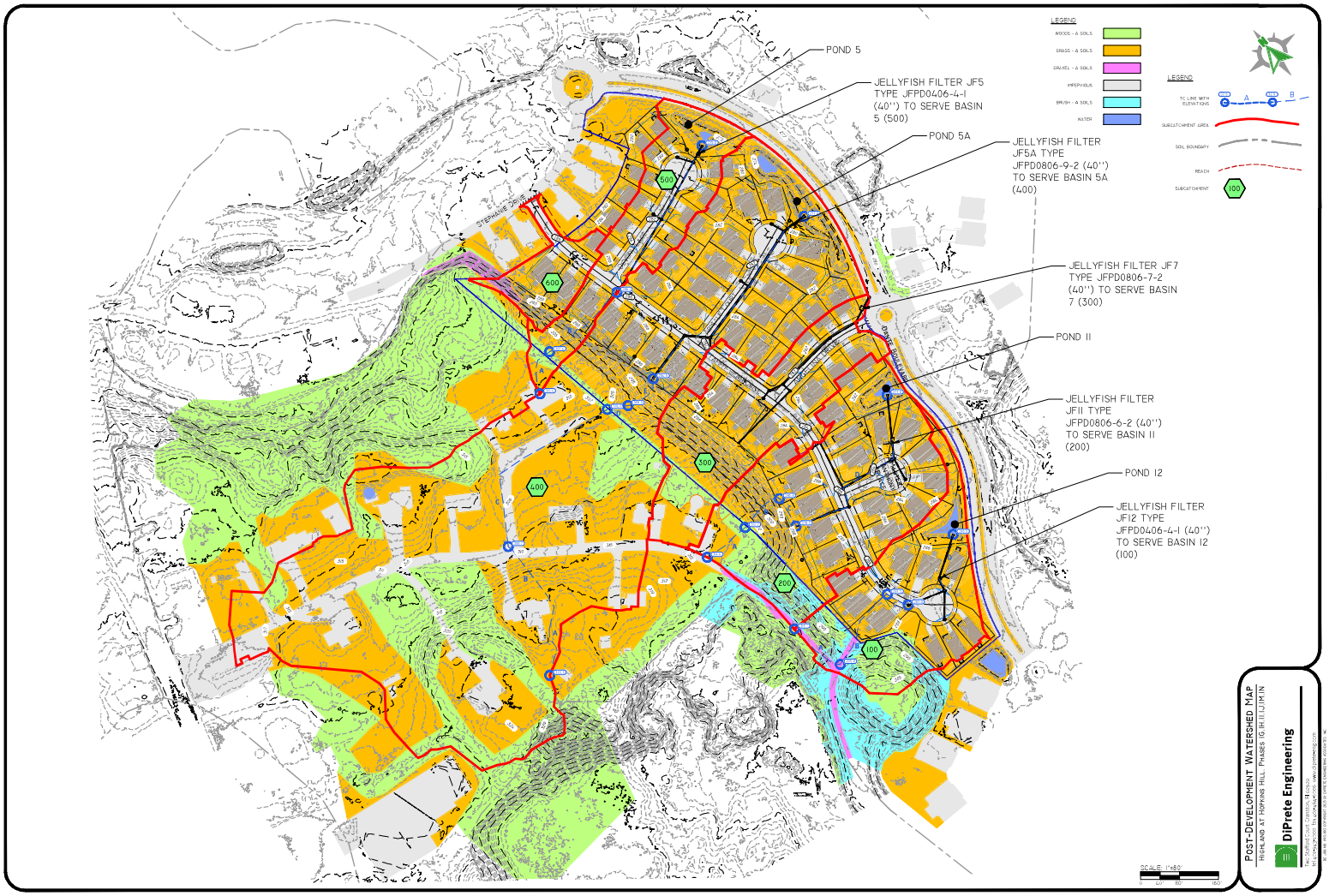
CENTRE OF NEW ENGLAND
CENTRE OF NEW ENGLAND BOULEVARD
COVENTRY RHODE ISLAND

PREPARED FOR
UNIVERSAL PROPERTIES GROUP, INC.

DRAWING NUMBER
1

SHEET 1 OF 1

Appendix E.2 Watershed Maps from DiPrete Engineering Layout


POND 5
JELLYFISH FILTER JF5 TYPE JFPD0406-4-I (40") TO SERVE BASIN 5 (500)
POND 5A
JELLYFISH FILTER JF5A TYPE JFPD0806-9-2 (40") TO SERVE BASIN 5A (400)
JELLYFISH FILTER JF7 TYPE JFPD0806-7-2 (40") TO SERVE BASIN 7 (300)
POND 11
JELLYFISH FILTER JF11 TYPE JFPD0806-6-2 (40") TO SERVE BASIN 11 (200)
POND 12
JELLYFISH FILTER JF12 TYPE JFPD0406-4-I (40") TO SERVE BASIN 12 (100)
LEGEND
WOODS - A SOILS
GRASS - A SOILS
GRAVEL - A SOILS
IMPERVIOUS
BRUSH - A SOILS
WATER
LEGEND
TC LINE WITH ELEVATIONS
SUBCATCHMENT AREA
SOIL BOUNDARY
REACH
SUBCATCHMENT
100
500
600
400
300
200
100
SCALE: 1"=80'
0
40'
80'
160'
POST-DEVELOPMENT WATERSHED MAP
HIGHLAND AT HOPKINS HILL PHASE 1 & 11 SUBDIVISION
DiPrete Engineering

Appendix F Contech Jellyfish Certification and Design Summaries

Contech Engineered Solutions LLC
9100 Centre Pointe Drive, Suite 400
West Chester, OH 45069
Phone: (513) 645-7000
www.ContechES.com

Brian Giroux
DiPrete Engineering Inc
2 Stafford Court
Cranston, RI 02920

January 8, 2025

RE: Highlands at Hopkins Hill (Contech Reference No. 831,512)
Review of Jellyfish Filter Design

Dear Mr. Giroux:

The purpose of this letter is to document Contech Engineered Solutions' review of the plans and the proposed application of the Jellyfish water quality unit for the Highlands at Hopkins Hill site in Coventry, RI.

Contech Engineered Solutions (Contech) has reviewed the Jellyfish Filter design for the Highlands at Hopkins Hill project. We believe the Jellyfish Filter is an appropriate water quality solution for this site. The Jellyfish system is approved for use by the Rhode Island Stormwater Technology Review Committee, with certification dates as revised on August 26, 2021 and will expire on August 10, 2026.

JF5
The engineer of record reports a drainage area of 0.671 acres (impervious) and a water quality flow rate of 0.59 cfs. The Jellyfish is designed in accordance with the tested hydraulic loading rate of the 40-inch cartridges at a maximum rate of 60 gpm with the inclusion of one draindown cartridge at a maximum rate of 30 gpm. To adequately treat the runoff from this area, Contech recommends a Jellyfish model JFPD0406-4-1 (40" cartridge length) with a treatment flow rate of 0.60 cfs.

JF5A
The engineer of record reports a drainage area of 1.783 acres (impervious) and a water quality flow rate of 1.25 cfs. The Jellyfish is designed in accordance with the tested hydraulic loading rate of the 40-inch cartridges at a maximum rate of 60 gpm with the inclusion of one draindown cartridge at a maximum rate of 30 gpm. To adequately treat the runoff from this area, Contech recommends a Jellyfish model JFPD00806-9-2 (40" cartridge length) with a treatment flow rate of 1.34 cfs.

JF11
The engineer of record reports a drainage area of 1.211 acres (impervious) and a water quality flow rate of 0.85 cfs. The Jellyfish is designed in accordance with the tested hydraulic loading rate of the 40-inch cartridges at a maximum rate of 60 gpm with the inclusion of one draindown cartridge at a maximum rate of 30 gpm. To adequately treat the runoff from this area, Contech recommends a Jellyfish model JFPD00806-6-2 (40" cartridge length) with a treatment flow rate of 0.94 cfs.

JF12
The engineer of record reports a drainage area of 0.647 acres (impervious) and a water quality flow rate of 0.53 cfs. The Jellyfish is designed in accordance with the tested hydraulic loading rate of the 40-inch cartridges at a maximum rate of 60 gpm with the inclusion of one draindown cartridge at a maximum rate of 30 gpm. To adequately treat the runoff from this area, Contech recommends a Jellyfish model JFPD0406-4-1 (40" cartridge length) with a treatment flow rate of 0.60 cfs.

Contech Engineered Solutions LLC
9100 Centre Pointe Drive, Suite 400
West Chester, OH 45069
Phone: (513) 645-7000
www.ContechES.com

JF7

The engineer of record reports a drainage area of 0.879 acres (impervious) and a water quality flow rate of 0.96 cfs. The Jellyfish is designed in accordance with the tested hydraulic loading rate of the 40-inch cartridges at a maximum rate of 60 gpm with the inclusion of one draindown cartridge at a maximum rate of 30 gpm. To adequately treat the runoff from this area, Contech recommends a Jellyfish model JFPD00806-7-2 (40" cartridge length) with a treatment flow rate of 1.07 cfs.

Our systems require periodic maintenance to continue operating properly. Given typical runoff pollutant loading rates, Contech recommends maintenance inspections on an annual basis. Maintenance should be performed when sediment depth reaches 12" of accumulation.

This system is expected to operate in accordance with Contech's design intent. Please feel free to contact me if you have any questions or concerns.

Sincerely,

(Sabrina) Zoe Maldonado
Stormwater Design Engineer
Contech Engineered Solutions LLC
(513) 512-5523
sabrina.maldonado@conteches.com

Jellyfish Filter Design Calculation

Contech Engineered Solutions, LLC Engineer:	SZM
Date Prepared:	**12/17/2024**

Site Information

Project Name	**Highlands at Hopkins Hill**	
Project City	**Coventry**	
Project State	**RI**	
Site Designation	**JF5**	
Total Drainage Area, Ad	**0.67**	ac
Post Development Impervious Area, Ai	**0.67**	ac
Pervious Area, Ap	**0.00**	ac
% Impervious	**100%**	
Runoff Coefficient, Rc	**0.95**	

Mass Loading Calculations

Mean Annual Rainfall, P	**46**	in
Agency Required % Removal	**80%**	
Percent Runoff Capture	**90%**	
Mean Annual Runoff, Vt	**95,797**	ft^3
Event Mean Concentration of Pollutant, EMC	**70**	mg/l
Annual Mass Load, M total	**418**	lbs

Filter System

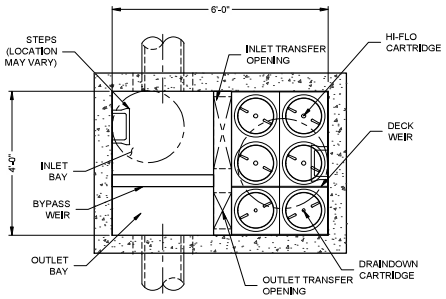
Filtration Brand	**Jellyfish**	
Cartridge Length	**40**	in

Jellyfish Sizing

Water Quality Flow	**0.59**	cfs

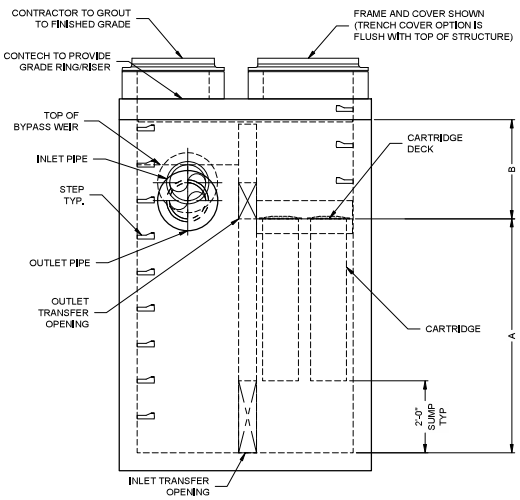
Method to Use **FLOW BASED**

Summary			
Flow	Treatment Flow Rate	0.60	cfs
	Required Size	**JFPD0406-4-1**	
	Mass Capture provided	418	lbs



PLAN VIEW

(TOP SLAB NOT SHOWN FOR CLARITY)



ELEVATION VIEW

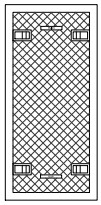
JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE LENGTH AND THE NUMBER OF CARTRIDGES. THE STANDARD PEAK DIVERSION STYLE WITH PRECAST TOP SLAB IS SHOWN. ALTERNATE OFFLINE VAULT, CURB INLET OR SHALLOW PIPE INLET OPTIONS ARE AVAILABLE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.

CARTRIDGE SELECTION

CARTRIDGE LENGTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE INVERT (A)	6'-6"	5'-4"	4'-3"	3'-3"
FLOW RATE HIGH-FLO / DRAINDOWN (CFS) (PER CART)	0.178 / 0.089	0.133 / 0.067	0.089 / 0.045	0.049 / 0.025
MAX. TREATMENT (CFS)	0.89	0.67	0.45	0.25
DECK TO INSIDE TOP (MIN) (B)	5'-0"	4'-0"	4'-0"	4'-0"

FRAME AND COVER
(DIAMETER VARIES)
N.T.S.



24" TRENCH COVER
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED (HF / DD)	*
CARTRIDGE LENGTH	*

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

SEE GENERAL NOTES 6-7 FOR INLET AND OUTLET HYDRAULIC AND SIZING REQUIREMENTS.

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES:

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE. www.ContechES.com
3. JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS-20 OR PER APPROVING JURISDICTION REQUIREMENTS, WHICHEVER IS MORE STRINGENT. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION AND SITE SPECIFIC EARTH COVER REQUIREMENT. TYPICAL CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.
5. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-857, ASTM C-918, AND AASHTO LOAD FACTOR DESIGN METHOD.
6. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION.
7. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS RECOMMENDED TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE (WHERE APPLICABLE) AT EQUAL OR GREATER SLOPE.
8. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

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

Jellyfish Filter

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

JELLYFISH JFPD0406
STANDARD DETAIL
PEAK DIVERSION CONFIGURATION

Jellyfish Filter Design Calculation

Contech Engineered Solutions, LLC Engineer:	SZM
Date Prepared:	**12/17/2024**

Site Information

Project Name	**Highlands at Hopkins Hill**	
Project City	**Coventry**	
Project State	**RI**	
Site Designation	**JF5A**	
Total Drainage Area, Ad	**1.78**	ac
Post Development Impervious Area, Ai	**1.78**	ac
Pervious Area, Ap	**0.00**	ac
% Impervious	**100%**	
Runoff Coefficient, Rc	**0.95**	

Mass Loading Calculations

Mean Annual Rainfall, P	**46**	in
Agency Required % Removal	**80%**	
Percent Runoff Capture	**90%**	
Mean Annual Runoff, Vt	**254,555**	ft^3
Event Mean Concentration of Pollutant, EMC	**70**	mg/l
Annual Mass Load, M total	**1,112**	lbs

Filter System

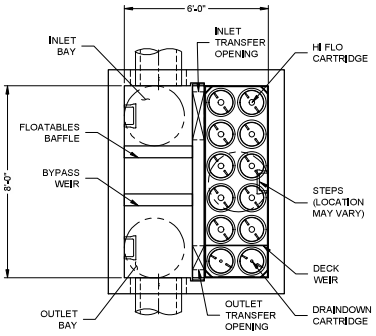
Filtration Brand	**Jellyfish**	
Cartridge Length	**40**	in

Jellyfish Sizing

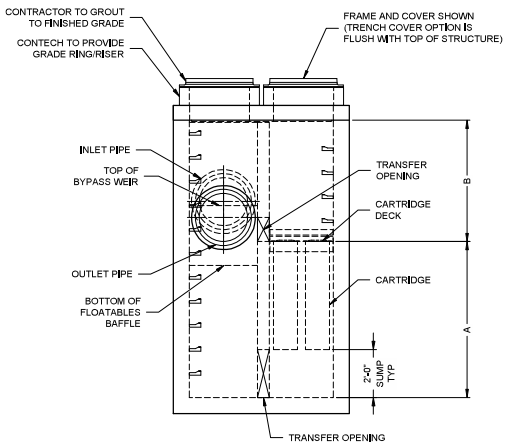
Water Quality Flow	**1.25**	cfs

Method to Use **FLOW BASED**

Summary			
Flow	Treatment Flow Rate	1.34	cfs
	Required Size	**JFPD0806-9-2**	
	Mass Capture provided	929	lbs



PLAN VIEW
(TOP SLAB NOT SHOWN FOR CLARITY)



ELEVATION VIEW

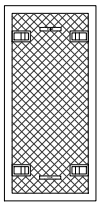
JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE LENGTH AND THE NUMBER OF CARTRIDGES. THE STANDARD PEAK DIVERSION STYLE WITH PRECAST TOP SLAB IS SHOWN. ALTERNATE OFFLINE VAULT AND/OR SHALLOW ORIENTATIONS ARE AVAILABLE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD

CARTRIDGE SELECTION

CARTRIDGE LENGTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE INVERT (A)	6'-6"	5'-4"	4'-3"	3'-3"
FLOW RATE HI-FLO / DRAINDOWN (CFS) (PER CART)	0.178 / 0.089	0.133 / 0.067	0.089 / 0.045	0.049 / 0.025
MAX. TREATMENT (CFS)	1.96	1.47	0.98	0.54
DECK TO INSIDE TOP (MIN) (B)	5.00	4.00	4.00	4.00

FRAME AND COVER
(DIAMETER VARIES)
N.T.S.



24" TRENCH COVER
(LENGTH VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED (HF / DD)	*
CARTRIDGE LENGTH	*

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

SEE GENERAL NOTES 6-7 FOR INLET AND OUTLET HYDRAULIC AND SIZING REQUIREMENTS.

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES:
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE, www.ContechES.com
3. JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS-20 OR PER APPROVING JURISDICTION REQUIREMENTS, WHICHEVER IS MORE STRINGENT, ASSUMING EARTH COVER OF 0' - 10', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.
5. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-857, ASTM C-478, AND AASHTO LOAD FACTOR DESIGN METHOD.
6. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION.
7. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS RECOMMENDED TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE AT EQUAL OR GREATER SLOPE.
8. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

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

Jellyfish Filter

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

JELLYFISH JFPD0806
STANDARD DETAIL
PEAK DIVERSION CONFIGURATION

Jellyfish Filter Design Calculation

Contech Engineered Solutions, LLC Engineer:	SZM
Date Prepared:	**12/17/2024**

Site Information

Project Name	**Highlands at Hopkins Hill**	
Project City	**Coventry**	
Project State	**RI**	
Site Designation	**JF11**	
Total Drainage Area, Ad	**1.21**	ac
Post Development Impervious Area, Ai	**1.21**	ac
Pervious Area, Ap	**0.00**	ac
% Impervious	**100%**	
Runoff Coefficient, Rc	**0.95**	

Mass Loading Calculations

Mean Annual Rainfall, P	**46**	in
Agency Required % Removal	**80%**	
Percent Runoff Capture	**90%**	
Mean Annual Runoff, Vt	**172,892**	ft^3
Event Mean Concentration of Pollutant, EMC	**70**	mg/l
Annual Mass Load, M total	**755**	lbs

Filter System

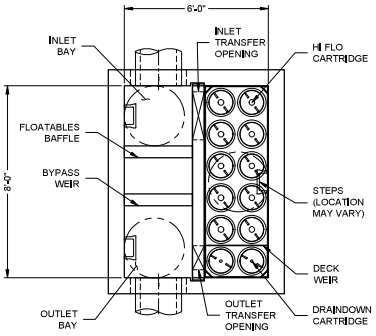
Filtration Brand	**Jellyfish**	
Cartridge Length	**40**	in

Jellyfish Sizing

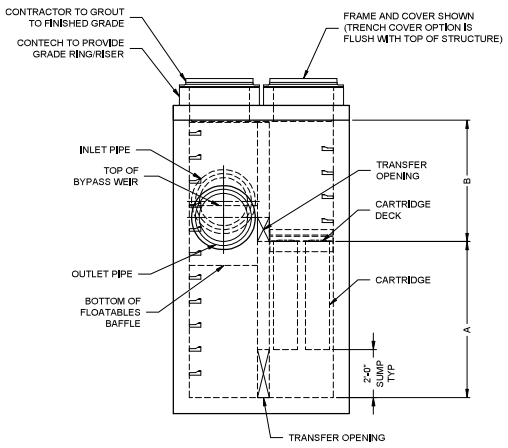
Water Quality Flow	**0.85**	cfs

Method to Use **FLOW BASED**

Summary			
Flow	Treatment Flow Rate	0.94	cfs
	Required Size	**JFPD0806-6-2**	
	Mass Capture provided	650	lbs



PLAN VIEW
(TOP SLAB NOT SHOWN FOR CLARITY)



ELEVATION VIEW

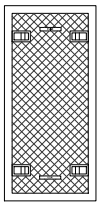
JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE LENGTH AND THE NUMBER OF CARTRIDGES. THE STANDARD PEAK DIVERSION STYLE WITH PRECAST TOP SLAB IS SHOWN. ALTERNATE OFFLINE VAULT AND/OR SHALLOW ORIENTATIONS ARE AVAILABLE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD

CARTRIDGE SELECTION

CARTRIDGE LENGTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE INVERT (A)	6'-6"	5'-4"	4'-3"	3'-3"
FLOW RATE HI-FLO / DRAINDOWN (CFS) (PER CART)	0.178 / 0.089	0.133 / 0.067	0.089 / 0.045	0.049 / 0.025
MAX. TREATMENT (CFS)	1.96	1.47	0.98	0.54
DECK TO INSIDE TOP (MIN) (B)	5.00	4.00	4.00	4.00

FRAME AND COVER
(DIAMETER VARIES)
N.T.S.



24" TRENCH COVER
(LENGTH VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED (HF / DD)	*
CARTRIDGE LENGTH	*

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

SEE GENERAL NOTES 6-7 FOR INLET AND OUTLET HYDRAULIC AND SIZING REQUIREMENTS.

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES:
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C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT).
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Jellyfish Filter

CONTECH ENGINEERED SOLUTIONS LLC
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800-338-1122 513-645-7000 513-645-7993 FAX

JELLYFISH JFPD0806
STANDARD DETAIL
PEAK DIVERSION CONFIGURATION

Jellyfish Filter Design Calculation

Contech Engineered Solutions, LLC Engineer:	SZM
Date Prepared:	**12/17/2024**

Site Information

Project Name	**Highlands at Hopkins Hill**	
Project City	**Coventry**	
Project State	**RI**	
Site Designation	**JF12**	
Total Drainage Area, Ad	**0.65**	ac
Post Development Impervious Area, Ai	**0.65**	ac
Pervious Area, Ap	**0.00**	ac
% Impervious	**100%**	
Runoff Coefficient, Rc	**0.95**	

Mass Loading Calculations

Mean Annual Rainfall, P	**46**	in
Agency Required % Removal	**80%**	
Percent Runoff Capture	**90%**	
Mean Annual Runoff, Vt	**92,371**	ft^3
Event Mean Concentration of Pollutant, EMC	**70**	mg/l
Annual Mass Load, M total	**403**	lbs

Filter System

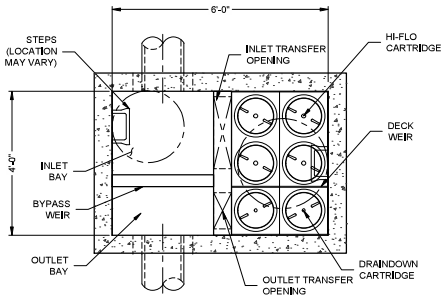
Filtration Brand	**Jellyfish**	
Cartridge Length	**40**	in

Jellyfish Sizing

Water Quality Flow	**0.53**	cfs

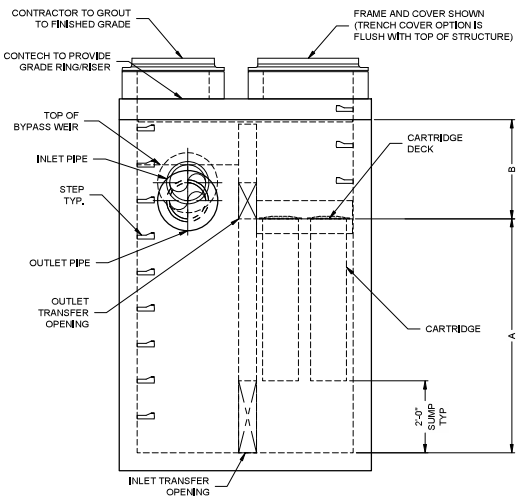
Method to Use **FLOW BASED**

Summary			
Flow	Treatment Flow Rate	0.60	cfs
	Required Size	**JFPD0406-4-1**	
	Mass Capture provided	418	lbs



PLAN VIEW

(TOP SLAB NOT SHOWN FOR CLARITY)



ELEVATION VIEW

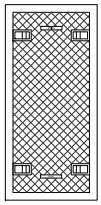
JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE LENGTH AND THE NUMBER OF CARTRIDGES. THE STANDARD PEAK DIVERSION STYLE WITH PRECAST TOP SLAB IS SHOWN. ALTERNATE OFFLINE VAULT, CURB INLET OR SHALLOW PIPE INLET OPTIONS ARE AVAILABLE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.

CARTRIDGE SELECTION

CARTRIDGE LENGTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE INVERT (A)	6'-6"	5'-4"	4'-3"	3'-3"
FLOW RATE HIGH-FLO / DRAINDOWN (CFS) (PER CART)	0.178 / 0.089	0.133 / 0.067	0.089 / 0.045	0.049 / 0.025
MAX. TREATMENT (CFS)	0.89	0.67	0.45	0.25
DECK TO INSIDE TOP (MIN) (B)	5'-0"	4'-0"	4'-0"	4'-0"

FRAME AND COVER
(DIAMETER VARIES)
N.T.S.



24" TRENCH COVER
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED (HF / DD)	*
CARTRIDGE LENGTH	*

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

SEE GENERAL NOTES 6-7 FOR INLET AND OUTLET HYDRAULIC AND SIZING REQUIREMENTS.

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

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5. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-857, ASTM C-918, AND AASHTO LOAD FACTOR DESIGN METHOD.
6. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION.
7. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS RECOMMENDED TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE (WHERE APPLICABLE) AT EQUAL OR GREATER SLOPE.
8. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

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Jellyfish Filter

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JELLYFISH JFPD0406
STANDARD DETAIL
PEAK DIVERSION CONFIGURATION

Jellyfish Filter Design Calculation

Contech Engineered Solutions, LLC Engineer:	SZM
Date Prepared:	**1/8/2025**

Site Information

Project Name	**Highlands at Hopkins Hill**	
Project City	**Coventry**	
Project State	**RI**	
Site Designation	**JF7**	
Total Drainage Area, Ad	**0.88**	ac
Post Development Impervious Area, Ai	**0.88**	ac
Pervious Area, Ap	**0.00**	ac
% Impervious	**100%**	
Runoff Coefficient, Rc	**0.95**	

Mass Loading Calculations

Mean Annual Rainfall, P	**46**	in
Agency Required % Removal	**80%**	
Percent Runoff Capture	**90%**	
Mean Annual Runoff, Vt	**125,628**	ft^3
Event Mean Concentration of Pollutant, EMC	**70**	mg/l
Annual Mass Load, M total	**549**	lbs

Filter System

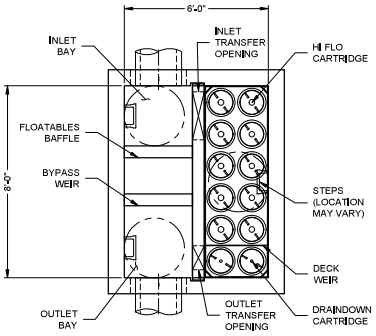
Filtration Brand	**Jellyfish**	
Cartridge Length	**40**	in

Jellyfish Sizing

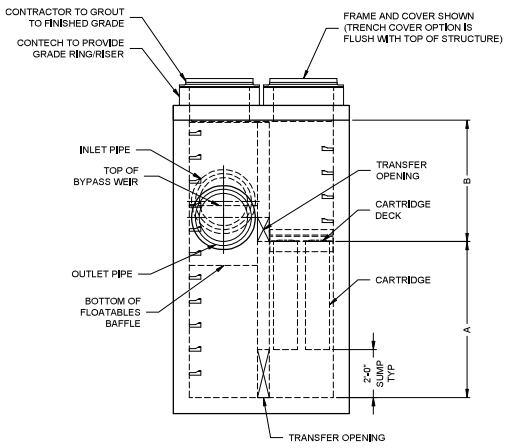
Water Quality Flow	**0.96**	cfs

Method to Use **FLOW BASED**

Summary			
Flow	Treatment Flow Rate	1.07	cfs
	Required Size	**JFPD0806-7-2**	
	Mass Capture provided	743	lbs



PLAN VIEW
(TOP SLAB NOT SHOWN FOR CLARITY)



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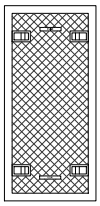
FLOW RATE HI-FLO / DRAINDOWN (CFS) (PER CART)	0.178 / 0.089	0.133 / 0.067	0.089 / 0.045	0.049 / 0.025
MAX. TREATMENT (CFS)	1.96	1.47	0.98	0.54
DECK TO INSIDE TOP (MIN) (B)	5.00	4.00	4.00	4.00

FRAME AND COVER
(DIAMETER VARIES)
N.T.S.



24" TRENCH COVER
(LENGTH VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED (HF / DD)	*
CARTRIDGE LENGTH	*

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

SEE GENERAL NOTES 6-7 FOR INLET AND OUTLET HYDRAULIC AND SIZING REQUIREMENTS.

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

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