Stormwater Management Report

for:

The Easton at Rutgers Plaza

Block 385, Lot 2.07 Township of Franklin Somerset County, New Jersey

Prepared By:

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Under the Immediate Supervision of:

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ST/MAD/hc MEA # 2021.019.01 Dated: October 26, 2023 menlo engineering associates

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TABLE OF CONTENTS

ITEM	PAGE
Introduction	1
Stormwater Management Plan & Design	1
Conclusion	2
Тах Мар	3
Road Map	4
U.S.G.S. Map	5
APPENDICES	
Appendix A: Pre-Development Condition	_A
Appendix B: Post-Development Condition	_B
Appendix C: Pipe Calculations	_C
Appendix D: Water Quality Calculations	_D
Appendix E: NJDEP Nonstructural Strategies Points System (NSPS)	E
Appendix F: Drainage Area Maps	_F

INTRODUCTION

The following Stormwater Management Report details the design of the stormwater management plan for a proposed development located in the Township of Franklin, Somerset County, New Jersey and has been prepared by Menlo Engineering Associates, Inc. in accordance with the standards of the Township of Franklin, the County of Somerset, the New Jersey Soil Conservation Service, and the New Jersey Department of Environmental Protection. This report supplements, and should be reviewed in conjunction with, the project development plans prepared by Menlo Engineering Associates, Inc.

The purpose of this report is to demonstrate that the proposed stormwater management system adequately convey stormwater runoff, and to assist Engineers at the Municipal, County, and State levels in evaluating the drainage calculations and considerations incorporated in the design as shown on the plans submitted. The report supplements, and should be reviewed in conjunction with, the project development plans prepared by Menlo Engineering Associates, Inc. This office will readily respond to questions and requests for additional calculations or verification of the proposed design by Municipal, County, or State Engineers, and will be responsive to their suggestions and modifications to the design in conformance to the applicable codes in the interest of land use control consistent with environmental protection.

STORMWATER MANAGEMENT PLAN & DESIGN

The guidelines for hydraulic design, as prepared by the Soil Conservation District, the Township of Franklin, Somerset County, and the New Jersey Department of Environmental Protection have been utilized for the drainage design of this project. The purpose of the drainage design is to safely convey the stormwater runoff and attenuate the discharges in accordance with regulations promulgated by the above cited agencies.

The stormwater management plan for the site is to provide for conveyance of stormwater runoff from the proposed 4-story apartment building and parking lot retrofit to the existing stormwater collection system. The stormwater collection system will consist of inlets and pipe networks. The stormwater conveyance system has been designed for the 25-year storm and the inlet grates have been designed to comply with the most current regulations.

The proposed redevelopment results in a net decrease in impervious coverage of 1.46 acres. Moreover, the proposed redevelopment does not increase the peak runoff rates for the pre-construction condition leaving the site for the two-, ten-, and 100-year storm events, on the contrary, it decreases the peak runoff rates for the post construction conditions.

Summary Tables:

The following tables summarize the reduction of runoff for the 2, 10, 25, and 100-year storm events as analyzed utilizing the Rational method:

STORM	EXISTING RUNOFF FROM SITE (CFS)	PROPOSED RUNOFF FROM SITE (CFS)	FLOW REDUCTION (CFS)
100	201.8	197.4	4.4
25	169.0	165.3	3.7
10	146.3	143.1	3.2
2	106.0	103.6	2.4

Environmental Site Analysis.

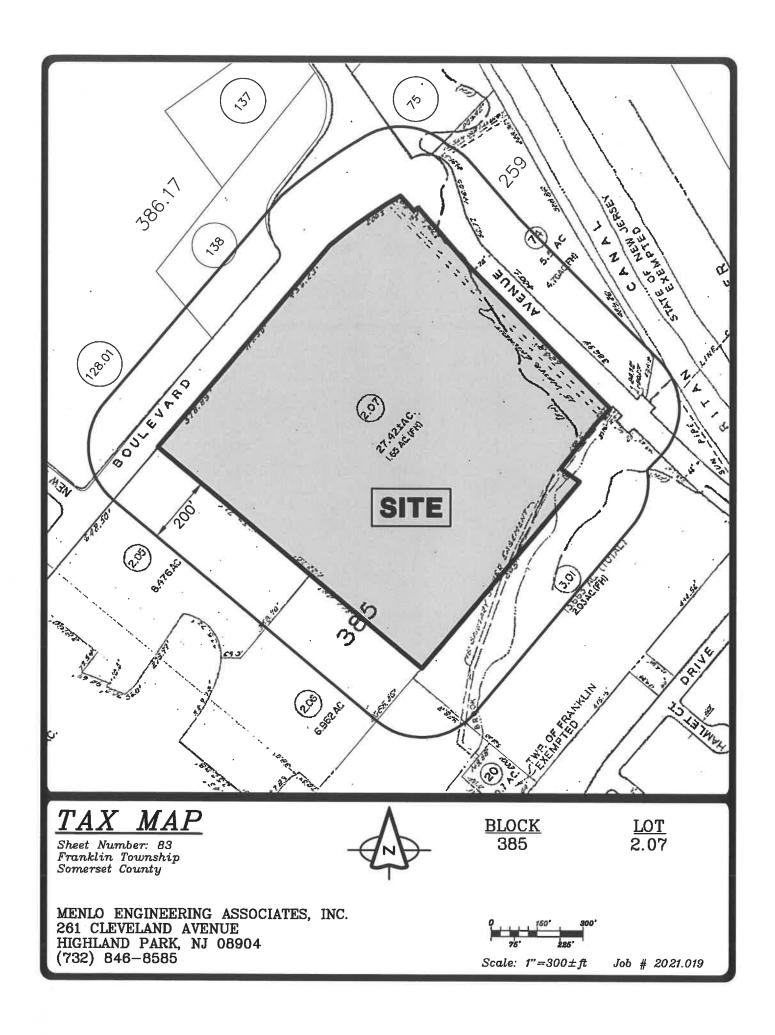
In accordance with the township ordinance 330-27.A(2), the 27.42 acres parcel is currently developed and consists of 21.60 acres of impervious coverage. Most of the site is classified as Klinesville soil which belongs to the hydraulic group D. The existing runoff is collected by an underground pipe network that discharges into Seeley's Brook which is maintained in the proposed conditions. Also, the existing drainage patterns are maintained in the proposed condition. Moreover, in the proposed conditions the impervious coverage is decreased to 20.14 acres which will generate lower peak runoff flows than in the existing condition. The site does not contain any environmentally sensitive features nor any unique conditions.

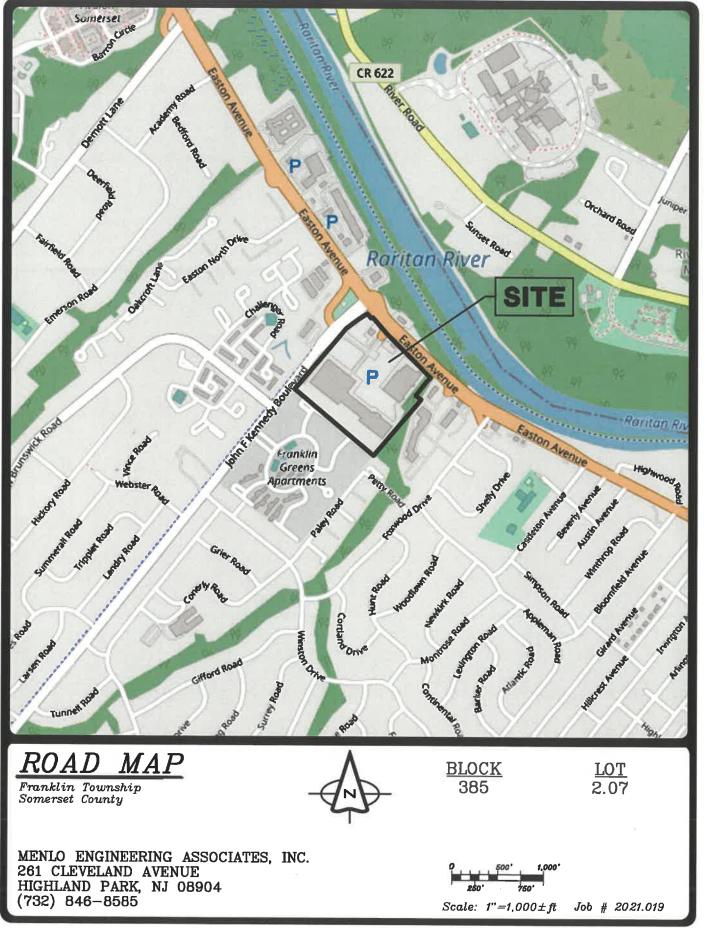
Land Use Planning and Source Control Plan.

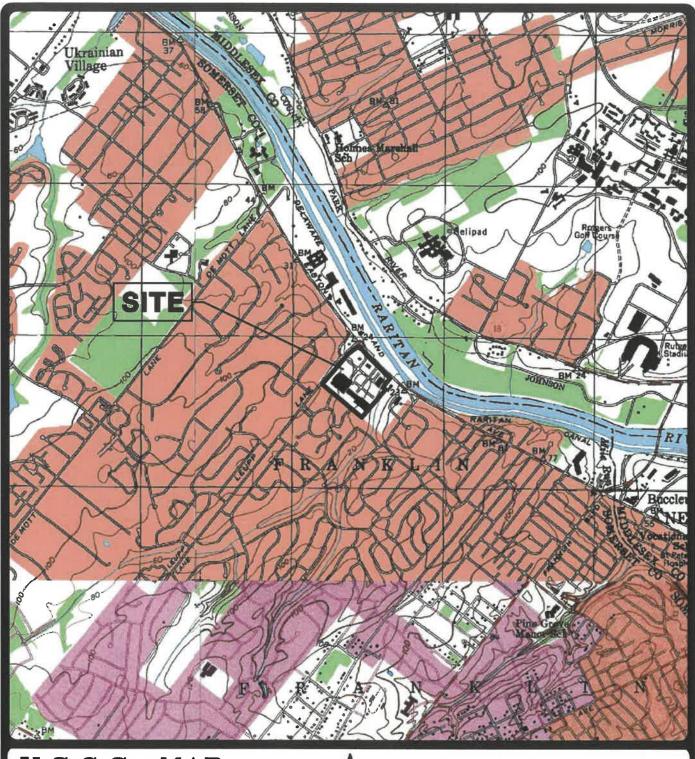
In accordance with the township ordinance 330-27.A(4), as mentioned in this report the proposed redevelopment proposes a 1.46 acres of impervious reduction from the existing conditions. Therefore, water quality, quantity and ground water recharge are met by increasing the pervious areas. The existing peak runoff flows for the two-, ten- and 100-year storm are decreased in the proposed conditions. Since there is no increase in volume for the two-year storm the groundwater recharge standards are met. By providing two Water Quality Structures with a Removal TSS rate of 50% the stormwater runoff quality standards are met (see Appendix D for Water Quality Structure Sizing Calculations).

CONCLUSION

The proposed stormwater management system for the proposed redevelopment has been designed with provisions for safe and efficient control of stormwater runoff in a manner which will not adversely affect the existing drainage patterns found in the surrounding areas. It is the opinion of this office that the proposed development will not have any negative impacts on the drainage characteristics of the site, or the immediately surrounding areas. Further, it is the opinion of this office, that the proposed development will be in compliance with all applicable stormwater management regulations as established by the NJDEP and the Township of Franklin Standards.







U.S.G.S. MAP

Quad Name: Plainfield Franklin Township Somerset County



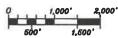
BLOCK 385

<u>LOT</u> 2.07

MENLO ENGINEERING ASSOCIATES, INC.

261 CLEVELAND AVENUE HIGHLAND PARK, NJ 08904 (732) 846-8585

<u>State Plane Coordinates:</u> N: 611,406.76 ft. E: 495,678.94 ft.



Scale: 1"=2,000±ft Job # 2021.019

APPENDIX A: PRE-DEVELOPMENT CONDITION

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PRE-DEVELOPMENT DRAINAGE CONDITION

I. Total Drainage Area:

27.42 Acres

II. Soil Groups/Types:

KkoC -Klinesville

Type

III. Time of Concentration:

10 Minutes

IV Rainfall Intensity:

<u>Storm</u>	Rainfall(in/hr)
100-YR	8.00
25-YR	6.70
10-YR	5.80
2-YR	4.20
1-YR	3.20

V. Weighted 'c' Calulation:

Land Use	<u>Area</u>	% of Cover	C Value	<u>Total</u>
Impervious	21.60 Acres	0.79	0.99	0.78
Gravel	0.00 Acres	0.00	0.84	0.00
Grass	5.82 Acres	0.21	0.65	0.14
Woods	0.00 Acres	0.00	0.59	0.00
			Weighted 'c':	0.92

VI. Q=ciA

Q=	<u>c</u>	<u>I</u>	<u>A</u>	=	Q_
$Q_{100} =$	0.92	8.00	27.42	=	201.8
Q ₂₅ =	0.92	6.70	27.42	=	169.0
Q ₁₀ =	0.92	5.80	27.42	=	146.3
$Q_2 =$	0.92	4.20	27.42	=	106.0

APPENDIX B: POST-DEVELOPMENT CONDITION

POST DEVELOPMENT RUNOFF CONDITION

I. Total Drainage Area:

27.42 Acres

II. Soil Groups/Types:

KkoC -Klinesville

Type D

III. Time of Concentration:

10 Minutes

IV Rainfall Intensity:

<u>Storm</u>	Rainfall(in/hr)
100-YR	8.00
25-YR	6.70
10-YR	5.80
2-YR	4.20
1-YR	3.20

V. Weighted 'c' Calulation:

Land Use	Area	% of Cover	C Value	Total
Impervious	20.14 Acres	0.73	0.99	0.73
Gravel	0.00 Acres	0.00	0.84	0.00
Grass	7.28 Acres	0.27	0.65	0.17
Woods	0.00 Acres	0.00	0.59	0.00
			Weighted 'c':	0.90

VI. Q=ciA

Q=	<u>c</u>	<u>I</u>	<u>A</u>	=	Q
$Q_{100} =$	0.90	8.00	27.42	=	197.4
Q ₂₅ =	0.90	6.70	27.42	=	165.3
Q ₁₀ =	0.90	5.80	27.42	=	143.1
$Q_2 =$	0.90	4.20	27.42	=	103.6

APPENDIX C: PIPE CALCULATIONS

		20	2021.019-R	-RUI	GERS	PLA	ZA - W	/EIGE	ITED	UTGERS PLAZA - WEIGHTED 'C' VALUES	LUES			
				SOIL	TYPE(S): (Kko(OIL TYPE(S): (KkoC) KLINESVILLE (TYPE 'D')	SVILLE	(TYPE	(D')				
	TOTAL	TOTAL IMPERVIOUS	VIOUS	ار. ا	0.99	GR	GRASS	ار <i>ر</i> =	0.65	WOODS	SOC	-,C,=	0.59	TOTAL
STRUCTURE AREA (acres)	AREA (acres)	AREA (acres)	%	Ç	IMPERV AREA 'C' (acres)	AREA (acres)	%	,C,	GRASS AREA 'C' (acres)	AREA (acres)	%	رر.	WOODS 'C'	C C (F+I+N)
A2	0.41	0.33	%08	0.99	08.0	0.08	20%	0.65	0.13		%0	0.59	00.00	0.92
TOTALS	0.41	0.33	%08	0.99	08.0	80.0	70%	0.65	0.13	0.00	%0	0.59	00.0	

n-val Pipe		0.013	
Invert	£	10.	
Invert	£	44.50	2/2021
Vel	(ft/s)	3.57	Date: 8/12/2021
Line	(%)	0.39	
Line	(in)	ਨ	
Capac	(cfs)	4.04	_
Flow	(cfs)	2.54	Number of lines: 1
Known	(cfs)	0.00	Number
Total	(cfs)	7.54	
- Sys	(min) (in/hr)	6.73	
2	(min)	10.0	
Total	(ac)	0.41	
<u>n</u> o	(cfs)	2.54	
- I	(in/hr)	6.73	
Inlet	(min)	10.0	
Runoff	(0)	0.92	
Drng	(ac)	0.41	
Line	(t)	103.471	
Gnd/Rim El Up	(#)	47.00	Project File: 2021.019-LINE A.stm
Line		79	121.019-1
들으		24	t File: 20
Line No.		-	Projec

Storm Sewers

NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs.; ** Critical depth

		TOTAL	'C' (F+J+N)	0.99	0.92	
ES		WOODS $C' = 0.59$	WOODS 'C'	00.0	00.0	0.00
		_,C,=	رَ	0% 0.59	0% 0.59	0.59
VA]		SC	%	%0	%0	%0
D'C'	E 'D')	WOOI	AREA % 'C' (acres)			0.00 0% 0.59
HITE	LE (TYF	0.65	GRASS 'C'	0.00	0.14	0.12
EIG	SVIL	'C' =	Ç	99.0 %0	99.0	9.65
W	INE	S	%		21% 0.65	19% 0.65
AZA -	koC) KI	GRASS	AREA (acres)		80.0	80.0
RS PL	SOIL TYPE(S): (KkoC) KLINESVILLE (TYPE 'D')	0.99	IMPERV C'	0.99	0.78	0.81
GE	TYP	رر = ار	,C,	66.0	66.0	66.0
RUL	SOIL	SOOI	%	100% 0.99	79% 0.99	81% 0.99
2021.019-RUTGERS PLAZA - WEIGHTED 'C' VALUES		IMPERVIOUS 'C' =	AREA (acres)	0.05	0:30	0.35
202			AREA (acres)	0.05	0.38	0.43
			STRUCTURE	B2	B3	TOTALS

n-val Pipe		0.013	
Invert	æ	44.50	
Invert	Œ	44.70	2/2021
Vel	(£/\s)	3.25	Date: 8/12/2021
Line	(%)	0.98	<u> </u>
Line	(in)	2 2 2	
Capac Full	(cfs)	3.78	8
Flow	(cfs)	2.35	of lines:
Known	(cfs)	00 00 00 00 00 00 00 00 00 00 00 00 00	Number of lines: 2
Total Runoff	(cfs)	7.93	
- Sys	(in/hr)	6.73	
5	(min)	10.0	
Total	(ac)	0.38	
nc.	(cfs)	2.35	
i E	(in/hr)	6.73	
Inlet	(min)	10.0	
Runoff	<u>©</u>	0.99	
Drng Area	(ac)	0.038	
Line Length	æ	58.245	
Gnd/Rim El Up	£	47.10	Project File: 2021.019-LINE B.stm
Line		P27	21.019-L
Inlet D		83 83	File: 20
Line No.		- 2	Project

Storm Sewers

NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs.; ** Critical depth

		2021.01	9-RI	JTG	ERS P	LAZA	- W	EK	1.019-RUTGERS PLAZA - WEIGHTED 'C' VALUES	C' V	AL	UES		
			SC	IL T	YPE(S): (KkoC) KI	INE	SVII	SOIL TYPE(S): (KkoC) KLINESVILLE (TYPE 'D'	E 'D')				
	TOTAL	IMPERV	ERVIOUS	= , <u>C</u>	0.99	GRASS		,C, =	0.65	WOODS	S	,C, =	0.59	TOTAL
TRUCTUR	AREA	AREA	%	رَ	IMPERV	AREA	%	رِّ	יטי אטע מט	AREA	7/0	5	WOODS	WEIGHTE
	(acres)	(acres)	0)	Ç	(acres)	?)	O CICHAID	(acres)	/0	ر	'C'	D'C'
C2.1	0.22	0.22	100% 0.99	66.0	0.99		0% 0.65	9.02	00.0		%0	65.0 %0	0.00	0.99
C2.2	0.23	0.23	100% 0.99	66.0	0.99		0% 0.65	9.02	00.0		%0	0% 0.59	0.00	0.99
C2.3	0.04	0.04	100% 0.99	66.0	0.99		0% 0.65	9.02	00.0		%0	0% 0.59	0.00	0.99
C2.4	0.07	0.07	100% 0.99	0.99	0.99		0% 0.65	0.65	00.0		%0	0% 0.59	0.00	0.99
C2.5	0.05	0.05	100% 0.99	66.0	0.99		0% 0.65	9.02	00.0		%0	0% 0.59	0.00	0.99
C2.6	0.05	0.05	100% 0.99	66'0	66.0		0% 0.65	0.65	00.0		%0	0% 0.59	0.00	0.99
C4	0.26	0.26	100% 0.99	66.0	0.99		0% 0.65	9.02	00.0		%0	0% 0.59	0.00	0.99
C4.1	0.26	0.26	100% 0.99	66.0	0.99		0% 0.65	0.65	00.0		%0	0% 0.59	0.00	0.99
CS	0.03	0.03	100% 0.99	66.0	0.99		0% 0.65	9.02	00.0		%0	0% 0.59	0.00	0.99
9) (Ce	0.02	0.02	100% 0.99	66.0	0.99		0% 0.65	99.0	00.0		%0	0% 0.59	0.00	0.99
C2	0.03	0.03	100% 0.99	66.0	0.99		0% 0.65	9.02	00.0		%0	0% 0.59	0.00	0.99
8 2	0.05	0.05	100% 0.99	66.0	0.99		0% 0.65	9.02	00.0		%0	0% 0.59	0.00	66.0
60	0.05	0.05	100% 0.99	66.0	0.99		0% 0.65	9.02	0.00		%0	0% 0.59	0.00	0.99
C10	0.04	0.04	100% 0.99	0.99	0.99		0% 0.65	9.02	00.0		%0	0% 0.59	00.0	0.99
C11	90.0	90.0	100% 0.99	66.0	0.99		0% 0.65	9.02	0.00		%0	0% 0.59	0.00	0.99
TOTALS	1.46	1.46	100% 0.99	66.0	66'0	0.00	0% 0.65	9.02	00.0	0.00	%0	0% 0.59	0.00	

1																				
Hamporn Area Coeff Time Inter 1 Coa Area T.C. Sys Runoff Coa	n-val	<u> </u>	0.013	0.013	0.013	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.013	0.013	0.013	0.013	0.010	0.010	0.010	
Changith Area Coeff Time Injet 1 Coef Coef Coeff C	Invert	Ē Ē	39.00	41.00	42.00	42.85	43.45	43.80	44.15	44.60	45.00	45.45	44.80	42.20	42.80	43.20	43.85	44.30	44.85	
Change Coordinary Carolinary Carolin	Invert	8 €	39.75	41.90	42.75	43.35	43.70	44.05	44.50	44.90	45.35	45.70	45.25	42.70	43.10	43.75	44.20	44.75	45.25	2/2021
Change Coordinary Carolinary Carolin	Vel	(fl/s)	5.20	5.52	5.56	3.25	5.25	5.03	4.61	3.87	3.26	2.77	4.08	5.18	3.93	2.90	4.42	3.09	2.48	ate: 8/1
Change Dring Runorif Index 1 Index Total Total Total Known Frow Capac Lunaght Area Coeff Time Index Qa Area Total Time Caeff Time Index Caeff Time	Line	(%)	0.50	1.00	1.02	1.02	1.20	1.20	1.00	1.15	1.09	1.20	1.08	1.03	1.13	1.04	1.04	1.05	1.06	П
Line Deng Coeff Time 1 Incr Total TC Sys Runoff Gr Flow (47) (ac) (Time)			24	15	15	12	ω	ω	∞	00	Φ	00	15	15	15	15	80	œ	φ	
Line Drug Runoff Inlet i Inc Total Total<	Capac	(cfs)	15.94	6.47	6.51	4.67	1.72	1.72	1.57	1.69	1.64	1.72	6.71	6.54	6.87	6.58	1.60	1.61	1.61	17
Line Drug Runoff Inlet i Inc Total Total<	Flow	(cfs)	8.79	4.96	5.02	1.78	1.60	1.47	1.29	0.97	99.0	0.40	1.73	4.01	2.69	1.33	1.08	0.65	0.33	of lines:
Line	Кпомп	(cfs)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00.0	0.00	0.00	00:00	0.00	0.00	00.00	Number
Line Drng Runoff Inlet I Incr Total TC (ft) (ac) (C) (min) (in/hr) (cfs) (ac) (min) 150.973 0.00 0.00 0.00 0.00 1.46 12.4 89.646 0.00 0.00 0.00 0.00 1.46 12.4 89.646 0.00 0.00 0.00 0.00 1.46 12.4 89.646 0.00 0.00 0.00 0.00 1.46 12.4 89.646 0.00 0.00 0.00 0.00 1.46 12.4 89.646 0.00 0.00 0.00 0.00 1.73 0.80 11.7 73.686 0.20 0.99 10.0 6.73 0.20 0.11 20.813 0.02 0.99 10.0 6.73 0.25 10.0 20.813 0.05 0.99 10.0 6.73 0.24 10.0 48.742 0.22 <th>Total</th> <th>(cfs)</th> <th>8.79</th> <th>4.96</th> <th>5.02</th> <th>1.78</th> <th>1.60</th> <th>1.47</th> <th>1.29</th> <th>26.0</th> <th>99.0</th> <th>0.40</th> <th>1.73</th> <th>4.01</th> <th>2.69</th> <th>1.33</th> <th>1.08</th> <th>0.65</th> <th>0.33</th> <th></th>	Total	(cfs)	8.79	4.96	5.02	1.78	1.60	1.47	1.29	26.0	99.0	0.40	1.73	4.01	2.69	1.33	1.08	0.65	0.33	
Line Drng Runoff Inlet i Incr Total (ft) (ac) (C) (min) (in/hr) (cfs) (ac) 150.973 0.00 0.00 0.00 0.00 1.46 89.646 0.00 0.00 0.00 0.00 1.46 89.646 0.00 0.00 0.00 0.00 0.00 73.686 0.26 0.99 10.0 6.73 1.73 0.80 73.686 0.26 0.99 10.0 6.73 0.20 0.28 20.813 0.02 0.99 10.0 6.73 0.20 0.28 20.813 0.03 0.99 10.0 6.73 0.20 0.23 20.813 0.05 0.99 10.0 6.73 0.20 0.05 20.813 0.06 0.99 10.0 6.73 0.44 0.99 10.0 6.73 0.44 20.827 0.07 0.99 10.0 6.73 </th <th> 8</th> <th>(in/hr)</th> <th>90.9</th> <th>6.26</th> <th>6.34</th> <th>6.43</th> <th>6.45</th> <th>6.47</th> <th>6.52</th> <th>6.56</th> <th>6.64</th> <th>6.73</th> <th>6.73</th> <th>6.14</th> <th>6.18</th> <th>6.39</th> <th>6.43</th> <th>6.54</th> <th>6.73</th> <th></th>	8	(in/hr)	90.9	6.26	6.34	6.43	6.45	6.47	6.52	6.56	6.64	6.73	6.73	6.14	6.18	6.39	6.43	6.54	6.73	
Line Drng Runoff Inlet i Incr Length Area Coeff Time Inlet a 150.973 0.00 0.00 0.00 0.00 150.973 0.00 0.00 0.00 0.00 89.646 0.00 0.00 0.00 0.00 73.686 0.26 0.99 10.0 6.73 1.73 49.168 0.03 0.99 10.0 6.73 0.20 20.813 0.02 0.99 10.0 6.73 0.73 20.813 0.02 0.99 10.0 6.73 0.73 20.813 0.02 0.99 10.0 6.73 0.73 20.813 0.05 0.99 10.0 6.73 0.73 20.813 0.06 0.99 10.0 6.73 0.74 41.625 0.22 0.99 10.0 6.73 0.74 20.813 0.07 0.99 10.0 6.73	5	(min)	12.4	11.7	11.4	11.1	11.0	10.9	10.7	10.6	10.3	10.0	10.0	12.2	12.0	11.2	11.0	10.7	10.0	
Line Drng Runoff Inlet i	Total	(ac)	1.46	0.80	0.80	0.28	0.25	0.23	0.20	0.15	0.10	90.0	0.26	99.0	0.44	0.21	0.17	0.10	0.05	
Line Length Drng Area Runoff Time Coeff Time Coeff Time Coeff Time (ft) (ac) (C) (min) 150.973 0.00 0.00 0.0 89.646 0.00 0.00 0.0 73.686 0.26 0.99 10.0 73.686 0.05 0.09 10.0 20.813 0.02 0.99 10.0 20.813 0.05 0.99 10.0 20.813 0.05 0.99 10.0 20.813 0.05 0.99 10.0 48.742 0.22 0.99 10.0 26.000 0.04 0.99 10.0 53.000 0.04 0.99 10.0 53.000 0.04 0.99 10.0 42.725 0.05 0.99 10.0 37.882 0.05 0.99 10.0	<u>5</u> 0		0.00	0.00	1.73	0.20	0.13	0.20	0.33	0.33	0.27	0.40	1.73	1.47	1.53	0.27	0.47	0.33	0.33	
Line Drng Runoff Length Area Coeff (ft) (ac) (C) (150.973 0.00 0.00 89.646 0.00 0.00 73.686 0.26 0.99 20.813 0.02 0.99 20.813 0.05 0.99 20.813 0.05 0.99 32.170 0.04 0.99 20.813 0.05 0.99 42.725 0.05 0.99 37.882 0.05 0.99 37.882 0.05 0.99	- 10			0.00	6.73	6.73	6.73	6.73			6.73	6.73	6.73	6.73	6.73	6.73		6.73		
Line Dring Length Area (ft) (ac) 150.973 0.00 89.646 0.00 73.686 0.26 49.168 0.03 20.813 0.02 20.813 0.05 35.128 0.05 32.170 0.04 20.813 0.05 32.170 0.04 20.813 0.05 37.882 0.05 37.882 0.05			0.0	0.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Line Length (ft) 150.973 89.646 73.686 49.168 20.813 35.128 32.170 20.813 41.625 41.625 42.725 37.882	Runoff	(0)	0.00	0.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	
	Drng	(ac)	00.0	00.00	0.26	0.03	0.02	0.03	0.05	0.05	0.04	90.0	0.26	0.22	0.23	0.04	0.07	0.05	0.05	
Line Inlet Line Gnd/Rim No. ID FI Up No. ID EI Up 1 C2 P30 47.50 2 C3 P39 48.10 3 C4 P38 48.25 4 C5 P37 48.70 5 C6 P36 48.70 6 C7 P35 48.70 10 C10 P32 48.25 11 C4.1 P40 48.25 12 C2.1 P24 48.25 13 C2.2 P23 48.25 14 C2.3 P22 48.25 15 C2.4 P21 48.25 16 C2.5 P20 48.25 16 C2.6 P19 48.25 17 C2.6 P19 48.25 17 C2.6 P19 48.25 17 C2.6 P19 48.25	Line	(#)	150.973	89.646	73.686	49.168	20.813	20.813	35.128	26.000	32.170	20.813	41.625	48.742	26.513	53.000	33.697	42.725	37.882	
Line Inlet Line No. ID ID ID	Gnd/Rim El Up	(#)	47.50	48.10	48.25	48.70	48.70	48.70	48.80	48.80	48.70	48.70	48.25	48.25	48.25	48.25	48.25	48.25	48.25	-INE C.stm
Line Inlet No. ID 1	Line		P30	P39	P38	P37	P36	P35	P34	P33	P32	P31	P40	P24	P23	P22	P21	P20	P19	121.019-1
Project Projec	Inlet D	1	22	ឌ	2	CS	8	C7	ొ	ව	C10	C11	2.	C2.1	C2.2	C2.3	C2.4	C2.5	C2.6	t File: 20
	Line No.		-	2	ო	4	2	9	7	80	6	9	Ξ	12	13	4	15	9	17	Project

NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs.; ** Critical depth

	202	1.019	RU	5	ERS P	LAZA	- WE	IGE	TTED	2021.019-RUTGERS PLAZA - WEIGHTED 'C' VALUES	LUI	ES	
			SOII	TY	PE(S):(SOIL TYPE(S): (KkoC) KLINESVILLE (TYPE 'D')	LINESA	/ILLI	CTYPE	('D')			
	TOTAL	IMPERVIOUS 'C' =	SOOI	ر <u>ر</u> =	0.99	GR.	GRASS	,C,=	'C' = 0.65	WOODS $C' = 0.59$]C,=	= 0.59	TOTAL
STRUCTURE	AREA (acres)	AREA	%	Ç	IMPERV AREA	AREA	%	<u></u>	GRASS A	REA	.C. %	WOODS	'C'
	(acres)	(acres)			ن	(acres)			ن	(acres)		Ċ	(F+J+N)
D4	0.08	0.08 100% 0.99	100%	66.0	0.99		%0	0.65	0.65 0.00	06	0% 0.59	0.00	0.99
TOTALS	0.08	0.08	100% 0.99	0.99	0.09	0.00	%0	0.65	0.65 0.00	0.00 0% 0.59	6 0.59	0.00	

	n-val Pipe		0.013	0.013	0.013	0.013	
	Invert	(#)	38.80	39.00	39.15	42.10	
	Invert Up	(ft)	38.90	39.15	39.30	43.70	Date: 8/12/2021
	Vel	(ft/s)	2.20	2.51	2.34	3.48	Date: 8
	Line	(%)	0.50	0.96	0.92	2.55	
	Line	(ju)	24	24	24	1	
	Capac	(cts)	16.04	22.11	21.72	10.32	4
	Flow	(cfs)	0.43	0.45	0.48	0.53	Number of lines: 4
	Known	(cfs)	0.00	0.00	0.00	0.00	Numb
	Total Runoff	(cts)	0.43	0.45	0.48	0.53	
	- Sys	(in/hr)	5.44	5.73	6.09	6.73	
	J.	(min)	15.6	14.0	12.4	10.0	
	Total	(ac)	0.08	0.08	0.08	0.0	
	a a	(cfs)	00:00	0.00	0.00	0.53	
	<u>- je</u>	(in/hr)	0.00	0.00	0.00	6.73	
	Time	(min)	0.0	0.0	0.0	10.0	
	Runoff	<u>(</u>)	0.00	00.00	0.00	66 C	
	Drng Area	(ac)	0.00	0.00	0.00	0.08	
	Line Length	£)	19.876	15.704	16.272	62.663	
	Gnd/Rim El Up	£	47.30	47.00	45.54	47.70	Project File: 2021.019-LINE D.stm
	Cine		P43	P42	P4	P25	21.019-
	Inlet		5	05	23	7	t File: 20
•	Line No.		-	2	ო	4	Project

NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs.; ** Critical depth

	2	2021.01	9-R	UT	GERS P	LAZA	- W	EI	HITED	1.019-RUTGERS PLAZA - WEIGHTED 'C' VALUES	LUE	70	
			S	OIL 7	SOIL TYPE(S): (KkoC) KLINESVILLE (TYPE 'D')	(KkoC) K	LINE	SVII	LE (TYP)	E'D')			
	TOTAL	IMPERVI	SOC	ا <u>ر</u> =	PERVIOUS C' = 0.99	GRASS	П	,C,=	0.65	WOODS 'C'=	C'=	0.59	TOTAL
TRUCTUR	AREA	AREA	%	ڔٞ	IMPERV	AREA	%	رَ	יטי אס א מכי יטי אס א	AREA 0	1,51	WOODS	WEIGHTE
	(acres)	(acres)	9)	Ç	(acres)	0/	ر	OKA33 C	(acres)	۰ ر	'C'	D 'C'
E1	0.19	0.09	47%	47% 0.99	0.47	0.10	53% 0.65	0.65	0.34	0,	0% 0.59	0.00	0.81
TOTALS	0.19	60'0	47%	47% 0.99	0.47	0.10	53% 0.65	9.02	0.34	0.00	0% 0.59	0.00	

Page 1			
_	n-val Pipe	0.013	
	=	39.20 36.20	
	Invert Up	39.50 39.50	5/2021
		3.06	Date: 8/5/2021
	Line	0.91	
		22	
	Capac Full	6.17	7
		1.04	Number of lines: 1
	Known	0.00	Numbe
	Total Runoff	1.04	
	i Sys	6.73 6.73	
		10.0	
		0.19	
		1.04	
	i Inlet		
	Inlet Time		
	~ 0	0.83	
		0.19	
	Line Length	32.822	
	Gnd/Rim El Up	43.10	Project File: 2021.019-LINE E.stm
alc	Line	Σ	21.019-
Pipe Calc	Inlet	E3	t File: 20
Pip	Line No.	-	Project

NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs.; ** Critical depth

	(4	2021.019	9-RI	JTG	ERS P	.019-RUTGERS PLAZA - WEIGHTED 'C' VALUES	×	EIC	HTED	'C' VA	TU	ES	
			SC	JIL T	YPE(S): (SOIL TYPE(S): (KkoC) KLINESVILLE (TYPE 'D')	NE	SVIL	LE (TYPI	3 'D')			
	TOTAL	IMPERVI	PERVIOUS 'C' =	,C,=	0.99	GRASS $'C' =$	Ħ	_;_	0.65	WOODS	Ļ	'C' = 0.59	TOTAL
TRUCTUR	AREA	AREA	70	رِّ	IMPERV	AREA	à	٢	יטי ממ ע פר	AREA	2	MOODS	WEIGHTE
	(acres)	(acres)	0,	ر	ن	(acres)	0,	ر	C UKASS C	(acres)	2 %	ر رز	D'C'
F2.1	0.63	0.63	100% 0.99	66'0	0.99		0% 0.65	0.65	0.00		0% 0.59	59 0.00	0.99
F2.1	0.39	0.39	100% 0.99	66.0	0.99) %0	0.65	0.00		0% 0.59	59 0.00	0.99
F3	0.74	0.74	100% 0.99	0.99	0.99		%0	9.02	0.00		0% 0.59	59 0.00	0.99
TOTALS	1.76	1.76	100% 0.99	66.0	0.99	00.0	0% 0.65	0.65	00.0	0.00	0% 0.59	59 0.00	

									\vdash														
No.	inet O	ë e	Gnd/Rim EI Up	Line	Drng Area	Runoff	Inlet	inet	<u>င်</u> ဇ	Total Area	င	- Sys	Total Runoff	Known	Flow	Capac	Line	Line Slope	Vel	Invert Up	Invert	n-val Pipe	
			£)	æ	(ac)	(0)	(min)	(in/hr)	(cts)	(ac)	(min)	(in/hr)	(cts)	(cts)	(cfs)	(cts)	(in)	(%)	(ft/s)	(£)	(#)		
-	22	£	39.50	12.811	0.39	0.99	10.0	6.73	2.60	1.76	10.4	6.62	11.54	0.00	11.54	14.67	18	1.95	7.12	35.65	35.40	0.013	
2	F2.1	P5	39.50	31.807	0.63	66.0	10.0	6.73	4.20	0.63	10.0	6.73	4.20	0.00	4.20	6.27	15	0.94	3.56	35.95	35.65	0.013	
ო	£	P2	40.75	90.193	0.74	0.99	10.0	6.73	4.93	0.74	10.0	6.73	4.93	0.00	4.93	6.45	15	1.00	4.62	36.55	35.65	0.013	
Project	File: 20.	21.019-L	Project File: 2021.019-LINE F.stm											Number	Number of lines: 3	т		7	Date: 8/5/2021	5/2021			
NOTE	3: Intensi	ly = 42.3	NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 Return period = 25 Yrs.;	ne + 5.10)	^ 0.68	Return pe	riod = 25		** Critical depth	depth													

APPENDIX D: WATER QUALITY CALCULATIONS



WQ DEVICE #1



WQ DEVICE #2









Prepared by Menlo Engineering Associates, Inc HydroCAD® 10.10-4b s/n 01129 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: WQ DEVICE #1

Runoff

=

2.14 cfs @

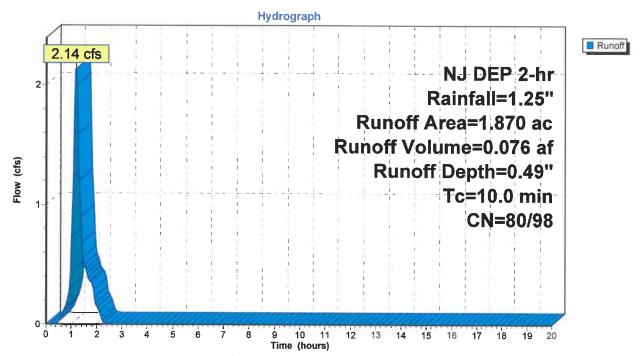
1.16 hrs, Volume=

0.076 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs NJ DEP 2-hr Rainfall=1.25"

	Area (a	ac)	CN	Desc	ription			
	0.6	00	98	Pave	d parking,	HSG D		
	1.1	90	80	>75%	6 Grass co	ver, Good,	HSG D	
*	0.0	80	98	Cond	rete			
	1.8	70	87	Weig	hted Aver	age		
	1.1	90	80	63.6	4% Pervio	us Area		
	0.6	80	98	36.30	3% Imperv	ious Area		
		Lengti		Slope	Velocity	Capacity	Description	
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)		
	10.0						Direct Entry,	

Subcatchment 1S: WQ DEVICE #1



Page 7

2021.019-Rutgers Plaza-WQ

Prepared by Menlo Engineering Associates, Inc HydroCAD® 10.10-4b s/n 01129 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 2S: WQ DEVICE #2

Runoff

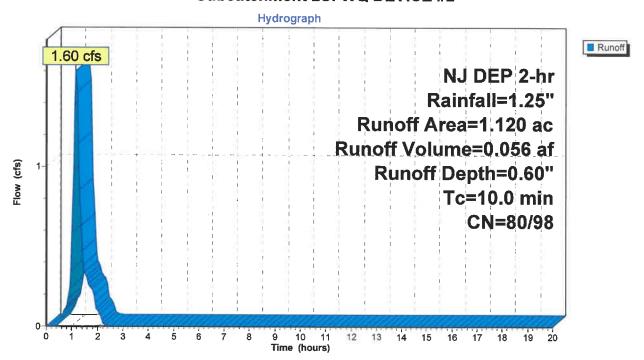
1.60 cfs @ 1.16 hrs, Volume=

0.056 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs NJ DEP 2-hr Rainfall=1.25"

Area	(ac)	CN	Desc	cription			
0.	500	98	Pave	ed parking,	HSG D		
0.	570	80	>75%	% Grass co	over, Good	HSG D	
0.	050	98	Cond	crete			
1.	120	89	Weig	hted Aver	age		
0.	570	80	50.8	9% Pervio	us Area		
0.	550	98	49.1	1% Imperv	rious Area		
Tc				Velocity	Capacity	Description	
(min)	(fee	t)	(ft/ft)	(ft/sec)	(cfs)		
10.0						Direct Entry,	
	0. 0. 0. 1. 0. 0. Tc (min)	(min) (fee	0.500 98 0.570 80 0.050 98 1.120 89 0.570 80 0.550 98 Tc Length (min) (feet)	0.500 98 Pave 0.570 80 >759 0.050 98 Cond 1.120 89 Weig 0.570 80 50.8 0.550 98 49.1 To Length Slope (min) (feet) (ft/ft)	0.500 98 Paved parking, 0.570 80 >75% Grass co 0.050 98 Concrete 1.120 89 Weighted Aver 0.570 80 50.89% Pervio 0.550 98 49.11% Imperv Tc Length Slope Velocity (min) (feet) (ft/ft) (ft/sec)	0.500 98 Paved parking, HSG D 0.570 80 >75% Grass cover, Good, 0.050 98 Concrete 1.120 89 Weighted Average 0.570 80 50.89% Pervious Area 0.550 98 49.11% Impervious Area Tc Length Slope Velocity Capacity (min) (feet) (ft/ft) (ft/sec) (cfs)	0.500 98 Paved parking, HSG D 0.570 80 >75% Grass cover, Good, HSG D 0.050 98 Concrete 1.120 89 Weighted Average 0.570 80 50.89% Pervious Area 0.550 98 49.11% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)

Subcatchment 2S: WQ DEVICE #2





State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER Lt. Governor DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Nonpoint Pollution Control

Division of Water Quality

401-02B

Post Office Box 420

Trenton, New Jersey 08625-0420 609-633-7021 Fax: 609-777-0432 http://www.state.nj.us/dep/dwq/bnpc_home.htm CATHERINE R. McCABE

Commissioner

May 18, 2020

Derek M. Berg
Director – Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re:

MTD Lab Certification Cascade SeparatorTM On-line Installation

TSS Removal Rate 50%

Dear Mr. Berg:

This revised certification letter supersedes the Department's prior certification dated October 1, 2019. This revision was completed to reflect Contech's enhanced fabrication capability to manufacture a smaller-size unit of its the Cascade SeparatorTM Manufactured Treatment Device (MTD), while still meeting the scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. Based on this modification, Table A-1 of the New Jersey Corporation for Advanced Technology (NJCAT) Verification report located at http://www.njcat.org/uploads/newDocs/NJCATTechnologyVerificationFinal.pdf has been revised to specify this smaller unit and associated maximum treatment flow rate. Table 1 below has been revised to reflect this same updated model size and flow rate.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC (Contech) has requested an MTD Laboratory Certification for the Cascade SeparatorTM stormwater treatment system.

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25,

2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated September 2019) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the Cascade Separator[™] stormwater treatment system at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

- 1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.
- 2. The Cascade SeparatorTM shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.
- 3. This Cascade SeparatorTM cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
- 4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.
- 5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Cascade SeparatorTM. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://www.conteches.com/Portals/0/Documents/Maintenance%20Guides/Cascade-Maintenance%20Guide.pdf?ver=2018-11-05-093254-300. for any changes to the maintenance requirements.

6. Sizing Requirement:

The example below demonstrates the sizing procedure for the Cascade SeparatorTM:

Example:

A 0.25-acre impervious site is to be treated to 50% TSS removal using a Cascade SeparatorTM. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:

time of concentration = 10 minutes i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual) c = 0.99 (runoff coefficient for impervious) $Q = ciA = 0.99 \times 3.2 \times 0.25 = 0.79$ cfs

Given the site runoff is 0.79 cfs and based on Table A-1 below, the Cascade Separator™ Model CS-3 with an MTFR of 1.02 cfs would be the smallest model approved that could be used for this site to remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1.

Table A-1 Cascade Separator™ Models and Associated MTFRs

Model	Manhole Diameter (ft)	MTFR (cfs)	50% Maximum Sediment Storage Area Volume (ft ³)
CS-3	3	1.02	5.3
CS-4	4	1.80	9.4
CS-5	5	2.81	14.7
CS-6	6	4.05	21.2
CS-8	8	7.20	37.7
CS-10	10	11.3	58.9
CS-12	12	16.2	84.8

A detailed maintenance plan is mandatory for any project with a stormwater BMP subject to the Stormwater Management rules under N.J.A.C. 7:8. The plan must include all of the items identified in the Maintenance requirements section of the Stormwater Management rules under N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Brian Salvo of my office at (609) 633-7021.

Sincerely,

Gabriel Mahon, Chief

Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File

Richard Magee, NJCAT Jim Murphy, NJDEP-BNPC Vince Mazzei, NJDEP-DLUR Brian Salvo, NJDEP-BNPC

APPENDIX E: DRAINAGE AREA MAPS