

DRAINAGE PIPE CONVEYANCE CALCULATIONS

FOR

MAIN STREET NB PHASE 1G

BLOCK 141, LOT 43
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY, NEW JERSEY

OWNER/APPLICANT:

NORTH BRUNSWICK TOD ASSOCIATES, LLC
2300 US ROUTE 1
NORTH BRUNSWICK, NJ 08902

AUGUST 2024

Prepared By:



575 ROUTE 28, SUITE 110
RARITAN, NEW JERSEY 08869

Adonis Crispo, P.E.
N. J. License Number 44152

SUMMARY:

The amended North Brunswick TOD Phase 1G site plan involves modifications to the existing commuter parking area to construct a new retail building on Tax Lot 43, Block 141. The subject property is in the Retail Parcel L-2, MainStreet NB Redevelopment Project, Block 148, Lot 24 and Block 141, Lots 29, 43, 120, 123 and 142 in North Brunswick Township, Middlesex County, New Jersey as referenced in the Stormwater Management Report Addendum #2 prepared by One Water Consulting, LLC dated February 22, 2024.

Tax Lot 43 is bordered by Commerce Boulevard to the east, Grand Avenue to the south and NJ State Highway Route 1 to the north.

The proposed retail building will be constructed in the easterly section of the existing commuter parking area near the intersection of Grand Avenue and Commerce Boulevard. The proposed site modifications involve removal of existing paved parking stalls and driveway aisles, and construction of a retail building including a dumpster and a 'banked' drive through.

STORM PIPE DESIGN/CALCULATIONS

The existing commuter parking area (Lot 43) is tributary to the wet pond 'C'. The existing stormwater basin, basin inflow/outflow pipes and stormwater collection systems along Grand Avenue, Commerce Boulevard and portion of Route 1 northbound were previously installed within the limits of improvements for Retail Parcel L2. The reconfigured stormwater collection system within the proposed retail building will tie-in to existing inlets along Grand Avenue. Existing inlets and storm pipes from the mid-section to the westerly end of the commuter parking area will remain. The following information were obtained from the original design by Crest Engineering:

- Design storm: 25-year per approved stormwater report
- Existing pipe data: As-built plans by Crest Engineering

Tributary to Existing Basin (Wet Pond) C

This report provides pipe conveyance capacity of the existing and reconfigured stormwater pipes and inlets associated with basin inflow pipe designated as F.E.S. CA-1. This project will have no stormwater impact on other existing inflow pipes to Wet Pond 'C'.

The Hydraflow[®] software was used to determine pipe conveyance capacities of existing and reconfigured stormwater pipes. Based on the pipe analysis for the 25-year design storm, a section of the existing 24" HDPE pipe between inlets CDI-CA-12 and CDI CA-13 across Commerce Boulevard will be under a slight surcharge condition. The hydraulic grade line on CDI CA-13 (upstream inlet) is elevation 113.96' which

is below the existing inlet grate at elevation 114.17'. The pipe analysis used a starting water surface elevation on wet pond 'C' at 109.43' that was provided by One Water Consulting, LLC.

Based on the attached pipe calculations for F.E.S. CA-1 storm network, the existing and reconfigured stormwater pipes tributary to wet pond 'C' will have adequate capacity to convey the 25-year design storm.

Roof Leader Sizing

All roof runoffs will be connected to the reconfigured storm system adjacent to the proposed retail building. Roof leader sizing calculations are provided in this report. Pipe sizes, min. slopes and inverts are shown on the utility plan and drainage area maps.

Attachments:

Hydraflow® Storm Sewer Output Data: Wet Pond 'C',
NOAA Point Precipitation, North Brunswick
Inlet Drainage Area, Composite 'C' Calculations
Roof Leader Sizing Calculations
Inlet Tributary Drainage Map, Sheet DA-3

**INLET DRAINAGE AREA
COMPOSITE "C" CALCULATIONS**

HSG 'C' OPEN SPACE = 0.51; IMPV. = 0.99

HSG 'D' OPEN SPACE = 0.65; IMPV. = 0.99

LINE No.	STRUCTURE	AREA (SF)	O.S. (C) (SF)	O.S. (D) (SF)	IMPV. (SF)	"C"	AREA (Ac.)	
EXISTING WET POND C								
1	STMH CA-2							
2	STMH CA-4							
3	CDI CA-5	7,947	1,187		6,760	0.92	0.18	
4	CDI CA-10	16,722	5,118		11,604	0.84	0.38	
5	CDI CA-12	9,175	3,008		6,167	0.83	0.21	
6	CDI CA-13	7,064	816		6,248	0.93	0.16	
7	STMH CA-14A							
8	Ex. H.W.	Data from Crest Hydraulic Calcs, rev 11/23/11, page 17 of 45					0.62	5.50
9	CDI CA-11	15,829	5,118		10,711	0.83	0.36	
10	CDI CA-6	7,291	999		6,292	0.92	0.17	
11	CDI CA-7	6,819	1,724		5,095	0.87	0.16	
12	CDI CA-8	4,565	1,511		3,054	0.83	0.10	
13	CDI CA-8A	5,707	607		5,100	0.94	0.13	
14	CDI CA-8B	2,149	1,171		978	0.73	0.05	
15	CDI CA-9	3,301	385		2,916	0.93	0.08	
16	CDI CA-7A	1,963	507		1,456	0.87	0.05	
17	CDI CAR-6B	3,124	659		2,465	0.89	0.07	
18	CDI CAR-6C	3,609	1,081		2,528	0.85	0.08	
19	CDI CA-6A	3,967	1,058		2,909	0.86	0.09	
20	CDI CA-3	13,646	2,402		11,244	0.91	0.31	
21	CDI CAR-15	12,954	2,346		10,608	0.90	0.30	
							8.39	

NOAA Atlas 14, Volume 2, Version 3
Location name: North Brunswick, New Jersey,
USA*



Latitude: 40.4396°, Longitude: -74.5047°
Elevation: 111.26 ft**

* source: ESRI Maps
 ** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

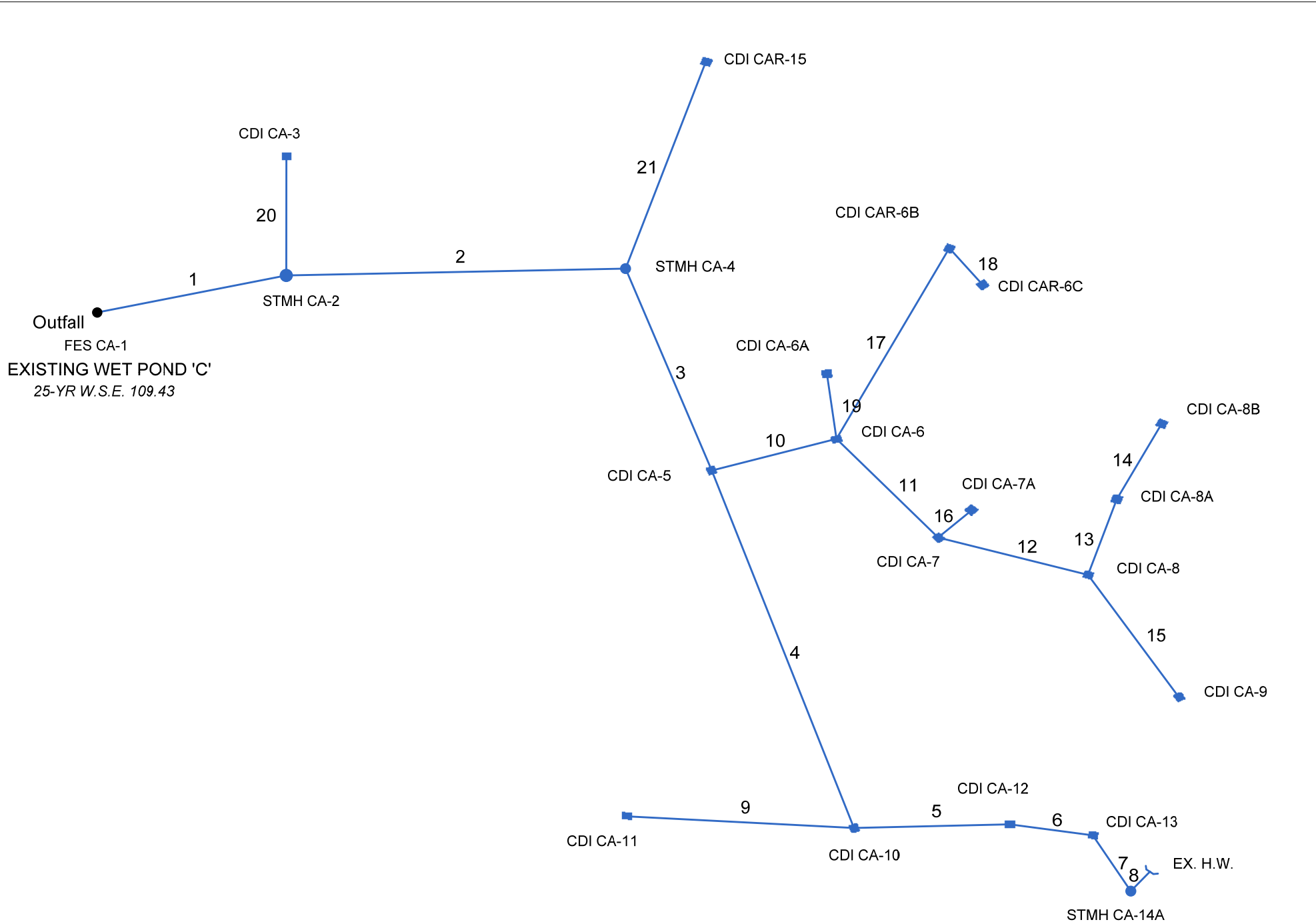
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.00 (3.61-4.43)	4.76 (4.31-5.27)	5.65 (5.10-6.25)	6.30 (5.68-6.96)	7.09 (6.36-7.82)	7.64 (6.82-8.42)	8.20 (7.28-9.05)	8.70 (7.69-9.62)	9.34 (8.17-10.3)	9.80 (8.52-10.9)
10-min	3.20 (2.89-3.53)	3.81 (3.45-4.21)	4.52 (4.09-5.00)	5.04 (4.54-5.56)	5.65 (5.06-6.23)	6.09 (5.43-6.71)	6.52 (5.79-7.19)	6.90 (6.10-7.63)	7.39 (6.46-8.18)	7.72 (6.71-8.59)
15-min	2.66 (2.41-2.95)	3.20 (2.89-3.53)	3.82 (3.44-4.22)	4.25 (3.83-4.69)	4.77 (4.28-5.26)	5.14 (4.58-5.66)	5.49 (4.88-6.06)	5.80 (5.13-6.42)	6.20 (5.42-6.87)	6.46 (5.62-7.18)
30-min	1.83 (1.65-2.02)	2.21 (2.00-2.44)	2.71 (2.45-3.00)	3.08 (2.77-3.40)	3.53 (3.17-3.90)	3.87 (3.45-4.27)	4.20 (3.74-4.64)	4.52 (3.99-4.99)	4.93 (4.31-5.46)	5.23 (4.55-5.82)
60-min	1.14 (1.03-1.26)	1.38 (1.25-1.53)	1.74 (1.57-1.92)	2.00 (1.81-2.21)	2.35 (2.11-2.60)	2.62 (2.34-2.89)	2.90 (2.57-3.20)	3.17 (2.80-3.50)	3.54 (3.10-3.92)	3.82 (3.32-4.25)
2-hr	0.696 (0.624-0.774)	0.847 (0.761-0.940)	1.08 (0.966-1.19)	1.25 (1.12-1.39)	1.50 (1.33-1.66)	1.70 (1.50-1.88)	1.90 (1.67-2.10)	2.11 (1.85-2.34)	2.41 (2.08-2.69)	2.65 (2.27-2.96)
3-hr	0.514 (0.462-0.574)	0.626 (0.564-0.699)	0.796 (0.715-0.887)	0.928 (0.831-1.03)	1.11 (0.990-1.24)	1.26 (1.12-1.40)	1.42 (1.25-1.57)	1.58 (1.38-1.76)	1.81 (1.56-2.01)	1.99 (1.69-2.22)
6-hr	0.329 (0.296-0.369)	0.400 (0.359-0.447)	0.507 (0.454-0.565)	0.595 (0.531-0.661)	0.720 (0.636-0.798)	0.825 (0.725-0.913)	0.938 (0.816-1.04)	1.06 (0.912-1.17)	1.23 (1.05-1.37)	1.38 (1.16-1.53)
12-hr	0.198 (0.177-0.224)	0.241 (0.215-0.271)	0.307 (0.273-0.345)	0.363 (0.322-0.407)	0.446 (0.392-0.499)	0.518 (0.452-0.578)	0.597 (0.515-0.665)	0.684 (0.582-0.763)	0.813 (0.680-0.909)	0.924 (0.760-1.03)
24-hr	0.114 (0.105-0.125)	0.138 (0.127-0.151)	0.177 (0.162-0.194)	0.210 (0.192-0.231)	0.261 (0.237-0.285)	0.305 (0.274-0.333)	0.353 (0.315-0.386)	0.408 (0.359-0.447)	0.490 (0.425-0.538)	0.561 (0.478-0.617)
2-day	0.066 (0.060-0.073)	0.080 (0.073-0.088)	0.102 (0.093-0.113)	0.121 (0.110-0.133)	0.149 (0.134-0.164)	0.172 (0.154-0.190)	0.198 (0.176-0.218)	0.227 (0.199-0.250)	0.269 (0.233-0.297)	0.304 (0.260-0.338)
3-day	0.047 (0.043-0.051)	0.056 (0.052-0.062)	0.072 (0.066-0.079)	0.085 (0.077-0.093)	0.104 (0.094-0.114)	0.119 (0.107-0.131)	0.137 (0.122-0.150)	0.155 (0.137-0.171)	0.183 (0.159-0.202)	0.206 (0.177-0.228)
4-day	0.037 (0.034-0.041)	0.045 (0.041-0.049)	0.057 (0.052-0.062)	0.067 (0.061-0.073)	0.081 (0.074-0.089)	0.093 (0.084-0.102)	0.106 (0.095-0.116)	0.120 (0.106-0.131)	0.140 (0.123-0.154)	0.157 (0.136-0.173)
7-day	0.025 (0.023-0.027)	0.030 (0.028-0.032)	0.037 (0.034-0.040)	0.043 (0.040-0.047)	0.052 (0.047-0.056)	0.059 (0.054-0.064)	0.067 (0.060-0.072)	0.075 (0.067-0.082)	0.087 (0.077-0.095)	0.096 (0.084-0.106)
10-day	0.020 (0.018-0.021)	0.024 (0.022-0.025)	0.029 (0.027-0.031)	0.033 (0.031-0.036)	0.039 (0.036-0.043)	0.045 (0.041-0.048)	0.050 (0.045-0.054)	0.056 (0.050-0.060)	0.063 (0.057-0.069)	0.070 (0.062-0.077)
20-day	0.013 (0.013-0.014)	0.016 (0.015-0.017)	0.019 (0.018-0.020)	0.021 (0.020-0.023)	0.025 (0.023-0.026)	0.027 (0.025-0.029)	0.030 (0.028-0.032)	0.033 (0.030-0.035)	0.036 (0.033-0.039)	0.039 (0.035-0.042)
30-day	0.011 (0.011-0.012)	0.013 (0.012-0.014)	0.015 (0.015-0.016)	0.017 (0.016-0.018)	0.019 (0.018-0.020)	0.021 (0.020-0.022)	0.023 (0.021-0.024)	0.024 (0.023-0.026)	0.026 (0.025-0.028)	0.028 (0.026-0.030)
45-day	0.009 (0.009-0.010)	0.011 (0.011-0.012)	0.013 (0.012-0.013)	0.014 (0.013-0.015)	0.016 (0.015-0.017)	0.017 (0.016-0.018)	0.018 (0.017-0.019)	0.019 (0.018-0.020)	0.021 (0.019-0.022)	0.022 (0.020-0.023)
60-day	0.008 (0.008-0.009)	0.010 (0.009-0.010)	0.011 (0.011-0.012)	0.012 (0.012-0.013)	0.014 (0.013-0.014)	0.015 (0.014-0.015)	0.016 (0.015-0.016)	0.016 (0.016-0.017)	0.017 (0.016-0.018)	0.018 (0.017-0.019)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	85.966	0.00	8.38	0.00	0.00	5.93	0.0	26.3	3.8	22.48	35.24	3.18	36	0.28	99.97	100.21	109.43	109.53	104.97	113.66	CA2 - CA1
2	1	150.032	0.00	8.07	0.00	0.00	5.65	0.0	25.7	3.8	21.66	26.58	4.41	30	0.42	106.51	107.14	109.68	110.10	113.66	114.84	CA4 - CA2
3	2	116.914	0.18	7.77	0.92	0.17	5.38	10.0	25.2	3.9	20.82	28.64	4.24	30	0.49	107.14	107.71	110.39	110.69	114.84	113.66	CA5 - CA4
4	3	205.464	0.38	6.61	0.84	0.32	4.35	10.0	24.6	3.9	17.06	18.06	5.43	24	0.64	108.56	109.87	111.11	112.28	113.66	114.42	CA10 -CA5
5	4	68.834	0.21	5.87	0.83	0.17	3.73	10.0	24.3	3.9	14.72	17.88	4.68	24	0.62	109.87	110.30	112.97	113.26	114.42	114.58	CA12 - CA10
6	5	37.234	0.16	5.66	0.93	0.15	3.56	10.0	24.2	4.0	14.07	13.87	4.48	24	0.38	110.30	110.44	113.43	113.58	114.58	114.17	CA13 - CA12
7	6	34.821	0.00	5.50	0.00	0.00	3.41	0.0	24.1	4.0	13.52	27.10	4.30	24	1.44	110.44	110.94	113.96	114.08	114.17	117.02	CA14A - CA13
8	7	13.566	5.50	5.50	0.62	3.41	3.41	24.0	24.0	4.0	13.53	22.98	4.31	24	1.03	111.94	112.08	114.37	114.42	117.02	114.83	EHW - CA14A
9	4	100.706	0.36	0.36	0.83	0.30	0.30	10.0	10.0	5.8	1.73	4.82	1.41	15	0.56	110.62	111.18	112.97	113.04	114.42	114.08	CA11 - CA10
10	3	57.788	0.17	0.98	0.92	0.16	0.86	10.0	15.1	4.9	4.25	7.26	4.20	15	1.26	109.91	110.64	111.11	111.47	113.66	113.79	CA6 - CA5
11	10	70.251	0.16	0.57	0.87	0.14	0.50	10.0	14.6	5.0	2.50	6.49	3.54	15	1.01	110.69	111.40	111.47	112.03	113.79	114.20	CA7 - CA6
12	11	69.309	0.10	0.36	0.83	0.08	0.32	10.0	13.8	5.1	1.62	5.86	3.05	15	0.82	111.40	111.97	112.03	112.47	114.20	115.42	CA8 - CA7
13	12	43.295	0.13	0.18	0.94	0.12	0.16	10.0	12.8	5.3	0.84	3.54	2.21	15	0.30	112.02	112.15	112.47	112.57	115.42	114.80	CA8A - CA8
14	13	46.000	0.05	0.05	0.73	0.04	0.04	10.0	10.0	5.8	0.21	2.52	1.36	12	0.50	112.25	112.48	112.61	112.68	114.80	114.90	CA8B - CA8A
15	12	78.199	0.08	0.08	0.93	0.07	0.07	10.0	10.0	5.8	0.43	3.35	1.40	15	0.27	112.02	112.23	112.47	112.55	115.42	115.43	CA9 - CA8
16	11	21.000	0.05	0.05	0.87	0.04	0.04	10.0	10.0	5.8	0.25	6.46	1.29	15	1.00	111.50	111.71	112.03	111.90	114.20	114.76	CA7A - CA7
17	10	115.657	0.07	0.15	0.89	0.06	0.13	10.0	11.3	5.5	0.72	5.06	1.84	15	0.61	110.71	111.42	111.47	111.75	113.79	114.82	CAR6B - CA6
18	17	24.733	0.08	0.08	0.85	0.07	0.07	10.0	10.0	5.8	0.39	7.90	2.42	15	1.50	111.52	111.89	111.75	112.13	114.82	114.50	CAR6C-CAR6B
19	10	36.000	0.09	0.09	0.86	0.08	0.08	10.0	10.0	5.8	0.45	4.57	0.68	15	0.50	110.71	110.89	111.47	111.48	113.79	114.32	CA6A - CA6
20	1	65.224	0.31	0.31	0.91	0.28	0.28	10.0	10.0	5.8	1.63	3.66	2.90	15	0.32	111.21	111.42	111.80	112.00	113.66	114.22	CA3 - CA2
21	2	118.616	0.30	0.30	0.90	0.27	0.27	10.0	10.0	5.8	1.56	5.56	3.43	15	0.74	109.89	110.77	110.39	111.27	114.84	114.37	CAR15 - CA4

Project File: 21-042-1 NBTOD Cannabis R0.stm

Number of lines: 21

Run Date: 6/28/2024

NOTES: Intensity = 55.31 / (Inlet time + 11.00) ^ 0.74; Return period = Yrs. 25 ; c = cir e = ellip b = box

HYDRAULIC CALCULATIONS
 project name MAIN ST. - N.B.
 design event 25 YR
 "c" - paved 0.00 "n" - 0.010
 "c" - lawn 0.25 (CAPS)

Date: 8/19/11
 Job Number: 5300
 Revised: 11/23/11

CREST

Engineering Associates Inc.

C USED = 0.96 (U.O.N.)

BASIN "C" (RUN CA)

BASIN C C (OF 6)

Location	Structure Number		Time of concentration		Tributary Area		DESIGN								SEWER INVERT				REMARKS	
	FROM	TO	to upper end	in section	Incremental to inlet, acres	c	total area, acres	Average c	"T" inches per hour	Q, cfs	diameter, inches	length, feet	slope, %	Q capacity, cfs	velocity, fps	upper end		lower end		
FLOW																	PIPE			
																	ALL PIPES ADS. N-12 UNLESS NOTED			
																	top of casting	invert	top of casting	invert
	CA 15	CA 11			0.32	0.96	0.32	0.96	6.6	2.02	15	166	0.5	5.95	4.85	GR 115.00	110.63	SR 115.0	109.80	
PT 1 - 1.8Ac COMMERCE 2.27 PUMP & 1.5 RE WOTL.	CA-14	STMH CA-13	20		2.75	0.99	5.5	0.62	4.7	16.0	24	11	1.0	29.4	9.36	TOP 115.5	112.0	PIM 115.50	111.89	
	CA-13	CA 11			-	-	5.5	0.62	4.7	16.0	24	73	1.0	29.4	9.36	PIM 115.50	109.76	SR 115.0	109.03	
	CA 12	CA 11			0.1	0.96	0.1	0.96	6.6	0.6	15	35	1.0	8.41	6.85	GR 115.30	110.12	SR 115.0	109.78	
	CA 11A	CA 9			0.17	0.96	6.09	0.65	4.7	18.6	24	37	1.0	29.4	9.36	GR 114.25	109.03	GR 115.30	108.66	
	CA 10A	CA 10			0.07	0.96	0.07	0.96	6.6	0.5	15	61	1.0	8.41	6.85	GR 115.84	110.80	GR 115.79	110.19	
	CA 10	CA 9			0.06	0.96	0.13	0.96	6.6	0.9	15	70	1.0	8.41	6.85	GR 115.79	110.19	GR 115.30	109.41	
	CA 9	CA 5			0.1	0.96	6.32	0.66	4.7	19.6	24	186	0.5	20.8	6.6	GR 115.30	108.66	GR 113.54	107.73	
	CA 8	CA 5			0.54	0.96	1.54	0.96	6.6	3.42	15	125	0.3	4.6	3.75	GR 113.63	111.00	GR 113.54	110.62	

100 Rike Drive
 Millstone Township, NJ 08535
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 crestnj@crestengineering.net
 www.crestengineering.net

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 Toms River, NJ 08753
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 cresttr@crestengineering.net

As Landmark Land Consultants, Englewood, Florida 941-475-5651
 As HEDJ Engineering, Sarasota, Florida 941-955-9948

Horizontal Storm Drain | Roof Leader Sizing

Design Parameters		
	$i_{25\text{-yr}}$ ($T_c=5 \text{ min.}$)	7.09 in/hr
	Runoff Coeff "c"	0.99
	Manning's "n"	0.01 PVC pipe
	$Q = ciA$, $A=\text{Roof Area}$	See Data cfs
Roof Leader Conveyance Capacities:		
	4" PVC @ 2.0%	0.35 cfs
	6" PVC @ 1.0%	0.73 cfs
	6" PVC @ 2.0%	1.03 cfs
Retail Building		
	Total Roof Area	3,800 s.f.
	Roof Runoff	0.61 cfs
	Use 8" PVC @ 1.0% [Min.]	0.73 cfs

