Tighe&Bond
Engineers | Environmental Specialists

25-0695-5
March 1, 2017

Mr. Jeremy B. Ginsberg
Planning & Zoning Director
Town of Darien Planning and Zoning Department
2 Renshaw Road
Darien, Connecticut 06820

Re: **Storm Drainage System Design Revisions**
Noroton Heights Shopping Center Project
Darien, CT

Dear Mr. Ginsberg,

Based on comments from the Planning and Zoning Commission (PZC) at the last Public Hearing on February 21, 2017, we have reviewed the design of the stormwater detention system for the Noroton Heights Shopping Center (NHSC) project. As you are aware, the storm drainage system in Heights Road east of the NHSC project site currently experiences flooding during rainfall events. The NHSC project site contributes a very small amount of runoff to this area that experiences flooding - despite that fact the plans and reports presented at the last Public Hearing demonstrated that the proposed project reduces peak flows to the easterly storm drainage system by up to 9%.

At the last Public Hearing, the PZC requested that the applicant review what additional measures could be implemented to further reduce flows to the easterly storm drainage system. In the previous plans, no storm drainage improvements were planned at the lower (employee) parking lot west of Edgerton Street as it was not part of the development site. In order to help alleviate the Town's flooding issue on Heights Road, the NHSC is willing to investigate relocating Detention System #1 from the upper parking lot in front of Palmer's Market to the lower employee parking lot. This change represents a significant additional cost to the NHSC project, as the current plan did not include repaving of or improvements to the employee lot. However, the applicant is willing to explore this revision to further reduce flows to the flood-prone area on Heights Road.

In support of this revision, Tighe & Bond has prepared the attached revised Drawings C6.0, C6.0A and C6.1 as well as the attached revised stormwater management calculations. The on-site area contributing to the Palmer's Market employee parking lot was analyzed in a "fresh meadow" condition as required by the Town of Darien Zoning Regulations. As shown in Table 1 below, with the proposed revised location of Detention System #1 in the employee parking lot, peak stormwater flows will be reduced by up to 27% from existing conditions towards the easterly storm drainage system and by up to 16% from "fresh meadow" conditions. While flows toward the westerly storm drainage system will increase slightly from the previous design and will not be below "fresh meadow" conditions, peak stormwater flows will still be reduced by up to 36% from existing conditions. As the westerly storm drainage system does not currently experience flooding issues, we feel that the proposed design effectively balances the reductions towards both systems, and represents a significant contribution by the applicant towards reducing the Town's flooding issues in Heights Road.

Table 1

Summary of Stormwater Peak Discharge (cfs)

Discharge Location	Condition	Frequency (Years) 2	10	25	50
Design Point #1	Meadow Conditions	5.74	12.94	16.18	19.53
	Existing Conditions	15.13	25.62	30.00	34.40
(West System)	Proposed Conditions	9.72	16.99	19.50	21.97
	% Reduction (Meadow)	NA	NA	NA	NA
	% Reduction (Existing)	36%	34%	35%	36%
Design Point #2	Meadow Conditions	10.76	18.23	21.38	24.56
	Existing Conditions	12.77	21.30	24.83	28.38
(East System)	Proposed Conditions	9.48	15.68	18.17	20.67
	% Reduction (Meadow)	12%	14%	15%	16%
	% Reduction (Existing)	26%	26%	27%	27%

We hope that the proposed revisions are acceptable to the PZC and demonstrate the NHSC's commitment to helping to reduce the Town's flooding issues on Heights Road.

Sincerely,

TIGHE & BOND, INC.

Jonathan A. Richer, P.E.
Project Manager

John W. Block, P.E., L.S.
Senior Vice President

Enclosures: Revised Appendix C – Existing Hydrologic Calculations
Revised Appendix D – Proposed Hydrologic Calculations
Revised Appendix E – Proposed Hydraulic Calculations

J:\P\P0695 J&G Palmer Mixed Use\Administration\Letters\2017-03-01 - Drainage Revisions.doc

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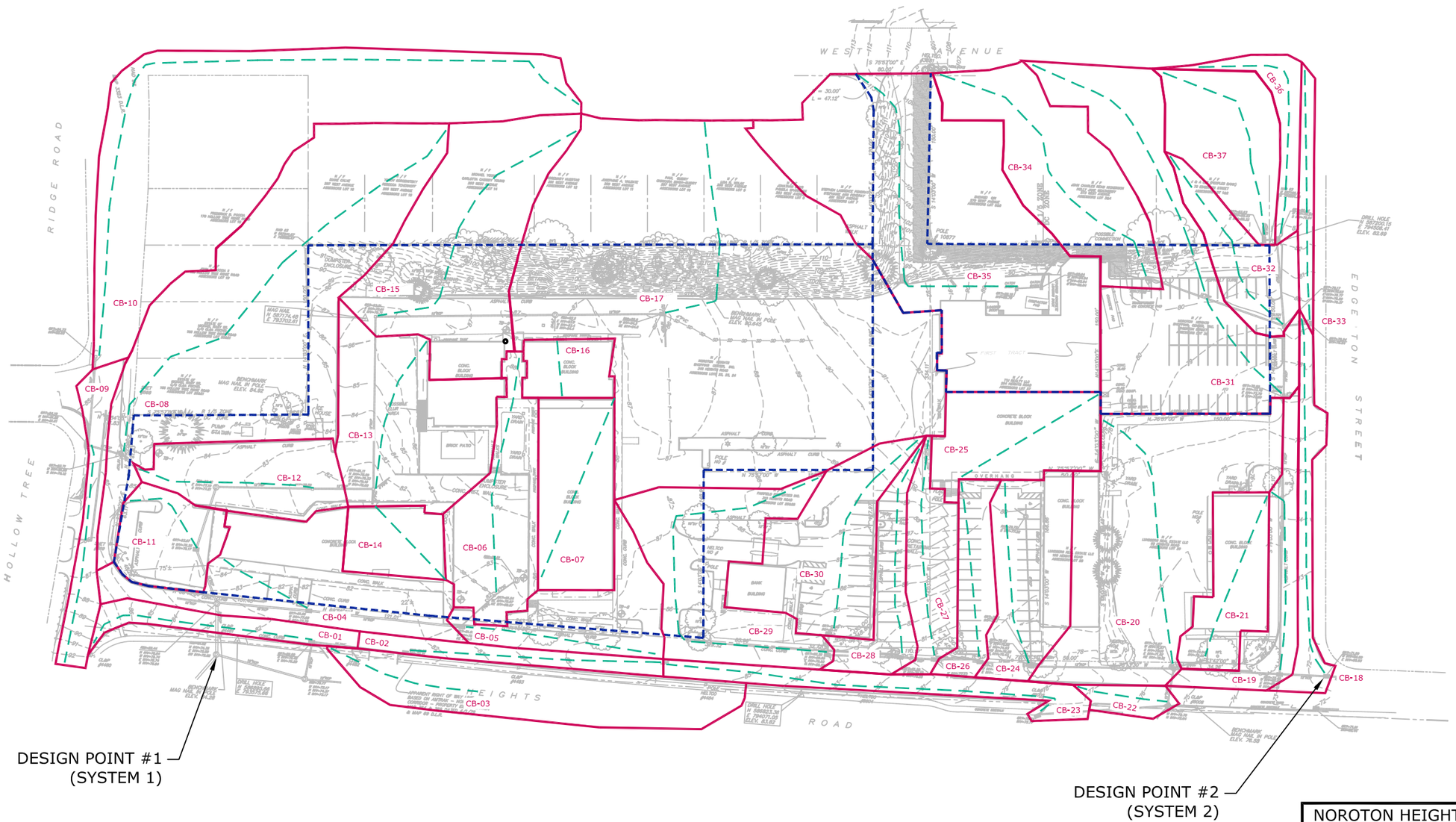
APPENDIX C



LEGEND

- SITE LIMIT (MEADOW CONDITIONS)
- WATERSHED BOUNDARY
- TIME OF CONCENTRATION FLOW PATH

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

NOROTON HEIGHTS SHOPPING CENTER
DARIEN, CT

EXISTING WATERSHED MAP

DATE: 09/16/2016
SCALE: 1" = 100'
FIGURE 3

Tighe&Bond
www.tighebond.com

Mar 01, 2017-3:28pm Plotted By: JCB1
Tighe & Bond, Inc. J:\P\P0695 J&G Palmer Mixed Use\Calculations\Drainage\Current\2017_2-23 (Detention Lower Site)\EXWM-P0695-06.dwg

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-01**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.100	98	9.8000
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.100		9.8000

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	205	0.049	1.9

Total Tc = 1.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-02**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.093	98	9.1140
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.093		9.1140

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	222	0.022	2.8

Total Tc = 2.8 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-03**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.188	98	18.4240
Landscaped and Lawns	0.177	69	12.2130
Site	0.000	65	0.0000
	0.365		30.6370

Weighted CN: 84

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	137	0.029	1.7

Total Tc = 1.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-04**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.129	98	12.6420
Landscaped and Lawns	0.000	69	0.0000
Site	0.280	65	18.2000
	0.409		30.8420

Weighted CN: 75

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	85	0.046	13.3

Total Tc = 13.3 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-05**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.083	98	8.1340
Landscaped and Lawns	0.000	69	0.0000
Site	0.150	65	9.7500
	0.233		17.8840

Weighted CN: 77

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	165	0.022	2.2

Total Tc = 2.2 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-06**
Location: Site - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.000	98	0.0000
Landscaped and Lawns	0.000	69	0.0000
Site	0.290	65	18.8500
	0.290		18.8500

Weighted CN: 65

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	97	0.03	17.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.03	2.79	105	0.6

Total Tc = 18.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-07**
Location: Site - Roof Leader Conc. Block Building, South

Cover Type	Area, ac	CN	A x CN
Pavement	0.000	98	0.0000
Landscaped and Lawns	0.000	69	0.0000
Site	0.263	65	17.0950
	0.263		17.0950

Weighted CN: 65

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	171	0.025	29.7

Total Tc = 29.7 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-08**
Location: Hollow Tree Ridge Road - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.135	98	13.2300
Landscaped and Lawns	0.748	69	51.6120
Site	0.228	65	14.8200
	1.111		79.6620

Weighted CN: 72

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	185	0.15	15.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.015	1.98	193	1.6
Segment C - D	paved	0.036	3.86	41	0.2

Total Tc = 17.3 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-09**
Location: Hollow Tree Ridge Road - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.137	98	13.4260
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.137		13.4260

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	195	0.041	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-10**
Location: Hollow Tree Ridge Road - Central

Cover Type	Area, ac	CN	A x CN
Pavement	0.396	98	38.8080
Landscaped and Lawns	0.711	69	49.0590
Site	0.000	65	0.0000
	1.107		87.8670

Weighted CN: 79

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	60	0.083	5.3
Segment B - C	0.015	240	0.062	2.0

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.055	4.77	362	1.3

Total Tc = 8.5 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
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Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-11**
Location: Site - Southwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.000	98	0.0000
Landscaped and Lawns	0.000	69	0.0000
Site	0.162	65	10.5300
	0.162		10.5300

Weighted CN: 65

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	82	0.024	16.8

Total Tc = 16.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-12**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.000	98	0.0000
Landscaped and Lawns	0.000	69	0.0000
Site	0.232	65	15.0800
	0.232		15.0800

Weighted CN: 65

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	156	0.022	29.1

Total Tc = 29.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-13**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.000	98	0.0000
Landscaped and Lawns	0.000	69	0.0000
Site	0.430	65	27.9500
	0.430		27.9500

Weighted CN: 65

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	140	0.043	20.4

Total Tc = 20.4 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-14**
Location: Site - Roof Leader Conc. Block Building, Southwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.000	98	0.0000
Landscaped and Lawns	0.000	69	0.0000
Site	0.121	65	7.8650
	0.121		7.8650

Weighted CN: 65

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	90	0.03	16.5

Total Tc = 16.5 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
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Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-15**
Location: Site - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.037	98	3.6260
Landscaped and Lawns	0.239	69	16.4910
Site	0.305	65	19.8250
	0.581		39.9420

Weighted CN: 69

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	140	0.1	9.7
Segment B - C	0.4	62	0.37	4.5
Segment C - D	0.4	60	0.067	8.7

Total Tc = 22.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-16**
Location: Site - Roof Leader Conc. Block Building, North

Cover Type	Area, ac	CN	A x CN
Pavement	0.000	98	0.0000
Landscaped and Lawns	0.000	69	0.0000
Site	0.093	65	6.0450
	0.093		6.0450

Weighted CN: 65

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	50	0.025	11.1

Total Tc = 11.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-17**
Location: Site - North

Cover Type	Area, ac	CN	A x CN
Pavement	0.293	98	28.7140
Landscaped and Lawns	0.474	69	32.7060
Site	1.244	65	80.8600
	2.011		142.2800

Weighted CN: 71

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	107	0.075	8.7
Segment B - C	0.4	48	0.583	3.1
Segment C - D	0.4	49	0.031	10.0

Total Tc = 21.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-18**
Location: Heights Road / Edgerton Street Intersection - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.127	98	12.4460
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.127		12.4460

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	300	0.0283	3.2

Total Tc = 3.2 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
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Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-19**
Location: Heights Road / Edgerton Street Intersection - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.119	98	11.6620
Landscaped and Lawns	0.061	69	4.2090
Site	0.000	65	0.0000
	0.180		15.8710

Weighted CN: 88

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	16	0.062	2.1
Segment B - C	0.015	147	0.017	2.2

Total Tc = 4.3 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-20**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.593	98	58.1140
Landscaped and Lawns	0.144	69	9.9360
Site	0.000	65	0.0000
	0.737		68.0500

Weighted CN: 92

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	16	0.2	1.3
Segment B - C	0.015	220	0.01	3.8

Total Tc = 5.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-21**
Location: Site - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.170	98	16.6600
Landscaped and Lawns	0.022	69	1.5180
Site	0.000	65	0.0000
	0.192		18.1780

Weighted CN: 95

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	150	0.035	1.7
Segment B - C	1	0	1	0.0

Total Tc = 1.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-22**
Location: Heights Road - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.045	98	4.4100
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.045		4.4100

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	80	0.031	1.1

Total Tc = 1.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-23**
Location: Heights Road - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.155	98	15.1900
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.155		15.1900

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	300	0.025	3.4

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.025	3.21	60	0.3

Total Tc = 3.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-24**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.249	98	24.4020
Landscaped and Lawns	0.020	69	1.3800
Site	0.000	65	0.0000
	0.269		25.7820

Weighted CN: 96

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	161	0.015	2.5

Total Tc = 2.5 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-25**
Location: Site - Roof Leader Conc. Block Building - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.254	98	24.8920
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.254		24.8920

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	140	0.02	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-26**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.129	98	12.6420
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.129		12.6420

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	155	0.01	2.9

Total Tc = 2.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-27**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.166	98	16.2680
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.166		16.2680

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	190	0.063	1.6

Total Tc = 1.6 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-28**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.146	98	14.3080
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.146		14.3080

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	186	0.06	1.6

Total Tc = 1.6 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-29**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.259	98	25.3820
Landscaped and Lawns	0.000	69	0.0000
Site	0.150	65	9.7500
	0.409		35.1320

Weighted CN: 86

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	130	0.015	2.1
Segment B - C	0.015	104	0.014	1.8

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.015	2.49	134	0.9

Total Tc = 4.8 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-30**
Location: Site - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.336	98	32.9280
Landscaped and Lawns	0.000	69	0.0000
Site	0.010	65	0.6500
	0.346		33.5780

Weighted CN: 97

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	192	0.04	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-31**
Location: Edgerton Street - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.092	98	9.0160
Landscaped and Lawns	0.172	69	11.8680
Site	0.397	65	25.8050
	0.661		46.6890

Weighted CN: 71

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	220	0.081	15.1
Segment B - C	0.4	33	0.167	3.7

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	unpaved	0.027	2.65	128	0.8

Total Tc = 19.6 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-32**
Location: Edgerton Street - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.087	98	8.5260
Landscaped and Lawns	0.013	69	0.8970
Site	0.074	65	4.8100
	0.174		14.2330

Weighted CN: 82

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	92	0.026	11.8
Segment B - C	0.4	31	0.129	3.9

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	unpaved	0.025	2.55	59	0.4

Total Tc = 16.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-33**
Location: Edgerton Street - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.066	98	6.4680
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.066		6.4680

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	220	0.045	2.1

Total Tc = 2.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-34**
Location: Site - Northeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.043	98	4.2140
Landscaped and Lawns	0.300	69	20.7000
Site	0.054	65	3.5100
	0.397		28.4240

Weighted CN: 72

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	240	0.092	15.4
Segment B - C	0.4	30	0.3	2.7

Total Tc = 18.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-35**
Location: Site - Northeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.088	98	8.6240
Landscaped and Lawns	0.332	69	22.9080
Site	0.661	65	42.9650
	1.081		74.4970

Weighted CN: 69

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	198	0.101	19.1

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.044	3.38	102	0.5

Total Tc = 19.6 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-36**
Location: Edgerton Street - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.097	98	9.5060
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.097		9.5060

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	222	0.056	1.9

Total Tc = 1.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations -Fresh Meadow**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-37**
Location: Edgerton Street - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.154	98	15.0920
Landscaped and Lawns	0.106	69	7.3140
Site	0.000	65	0.0000
	0.260		22.4060

Weighted CN: 86

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	127	0.071	10.2
Segment B - C	0.015	64	0.062	0.7

Total Tc = 10.9 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-01**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.100	98	9.8000
Landscaped and Lawns	0.000	69	0.0000
	0.100		9.8000

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	205	0.049	1.9

Total Tc = 1.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-02**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.093	98	9.1140
Landscaped and Lawns	0.000	69	0.0000
	0.093		9.1140

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	222	0.022	2.8

Total Tc = 2.8 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-03**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.188	98	18.4240
Landscaped and Lawns	0.177	69	12.2130
	0.365		30.6370

Weighted CN: 84

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	137	0.029	1.7

Total Tc = 1.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-04**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.372	98	36.4560
Landscaped and Lawns	0.037	69	2.5530
	0.409		39.0090

Weighted CN: 95

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	15	0.02	0.3
Segment B - C	0.24	32	0.062	3.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.02	2.87	32	0.2

Total Tc = 4.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-05**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.229	98	22.4420
Landscaped and Lawns	0.003	69	0.2070
	0.232		22.6490

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	165	0.022	2.2

Total Tc = 2.2 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-06**
Location: Site - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.264	98	25.8720
Landscaped and Lawns	0.026	69	1.7940
	0.290		27.6660

Weighted CN: 95

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	49	0.03	0.7
Segment B - C	0.24	30	0.03	4.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.03	3.52	130	0.6

Total Tc = 5.9 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-07**
Location: Site - Roof Leader Conc. Block Building, South

Cover Type	Area, ac	CN	A x CN
Pavement	0.263	98	25.7740
Landscaped and Lawns	0.000	69	0.0000
	0.263		25.7740

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	171	0.025	2.1

Total Tc = 2.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-08**
Location: Hollow Tree Ridge Road - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.237	98	23.2260
Wooded	0.327	80	26.1600
Landscaped and Lawns	0.545	69	37.6050
	1.109		86.9910

Weighted CN: 78

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	185	0.15	15.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.015	1.98	193	1.6
Segment C - D	paved	0.036	3.86	41	0.2

Total Tc = 17.3 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-09**
Location: Hollow Tree Ridge Road - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.137	98	13.4260
Landscaped and Lawns	0.000	69	0.0000
	0.137		13.4260

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	195	0.041	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-10**
Location: Hollow Tree Ridge Road - Central

Cover Type	Area, ac	CN	A x CN
Pavement	0.396	98	38.8080
Landscaped and Lawns	0.711	69	49.0590
	1.107		87.8670

Weighted CN: 79

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	60	0.083	5.3
Segment B - C	0.015	240	0.062	2.0

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.055	4.77	362	1.3

Total Tc = 8.5 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-11**
Location: Site - Southwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.141	98	13.8180
Landscaped and Lawns	0.020	69	1.3800
	0.161		15.1980

Weighted CN: 94

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	82	0.024	1.2

Total Tc = 1.2 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-12**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.231	98	22.6380
Landscaped and Lawns	0.000	69	0.0000
	0.231		22.6380

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	156	0.022	2.1

Total Tc = 2.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-13**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.393	98	38.5140
Landscaped and Lawns	0.036	69	2.4840
	0.429		40.9980

Weighted CN: 96

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	140	0.043	1.5

Total Tc = 1.5 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-14**
Location: Site - Roof Leader Conc. Block Building, Southwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.121	98	11.8580
Landscaped and Lawns	0.000	69	0.0000
	0.121		11.8580

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	90	0.03	1.2

Total Tc = 1.2 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-15**
Location: Site - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.248	98	24.3040
Wooded	0.163	80	13.0400
Landscaped and Lawns	0.170	69	11.7300
	0.581		49.0740

Weighted CN: 84

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	140	0.1	9.7
Segment B - C	0.4	62	0.37	4.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C- D	paved	0.02	2.87	60	0.3

Total Tc = 14.5 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-16**
Location: Site - Roof Leader Conc. Block Building, North

Cover Type	Area, ac	CN	A x CN
Pavement	0.093	98	9.1140
Landscaped and Lawns	0.000	69	0.0000
	0.093		9.1140

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	50	0.025	0.8

Total Tc = 0.8 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-17**
Location: Site - North

Cover Type	Area, ac	CN	A x CN
Pavement	1.348	98	132.1040
Wooded	0.333	80	26.6400
Landscaped and Lawns	0.328	69	22.6320
	2.009		181.3760

Weighted CN: 90

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	107	0.075	8.7
Segment B - C	0.4	48	0.583	3.1

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C- D	paved	0.031	3.58	49	0.2

Total Tc = 12.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-18**
Location: Heights Road / Edgerton Street Intersection - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.127	98	12.4460
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.127		12.4460

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	300	0.0283	3.2

Total Tc = 3.2 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-19**
Location: Heights Road / Edgerton Street Intersection - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.119	98	11.6620
Landscaped and Lawns	0.061	69	4.2090
Site	0.000	65	0.0000
	0.180		15.8710

Weighted CN: 88

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	16	0.062	2.1
Segment B - C	0.015	147	0.017	2.2

Total Tc = 4.3 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-20**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.593	98	58.1140
Landscaped and Lawns	0.144	69	9.9360
Site	0.000	65	0.0000
	0.737		68.0500

Weighted CN: 92

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	16	0.2	1.3
Segment B - C	0.015	220	0.01	3.8

Total Tc = 5.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-21**
Location: Site - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.170	98	16.6600
Landscaped and Lawns	0.022	69	1.5180
Site	0.000	65	0.0000
	0.192		18.1780

Weighted CN: 95

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	150	0.035	1.7
Segment B - C	1	0	1	0.0

Total Tc = 1.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-22**
Location: Heights Road - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.045	98	4.4100
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.045		4.4100

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	80	0.031	1.1

Total Tc = 1.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-23**
Location: Heights Road - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.155	98	15.1900
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.155		15.1900

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	300	0.025	3.4

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.025	3.21	60	0.3

Total Tc = 3.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-24**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.249	98	24.4020
Landscaped and Lawns	0.020	69	1.3800
Site	0.000	65	0.0000
	0.269		25.7820

Weighted CN: 96

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	161	0.015	2.5

Total Tc = 2.5 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-25**
Location: Site - Roof Leader Conc. Block Building - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.254	98	24.8920
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.254		24.8920

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	140	0.02	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-26**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.129	98	12.6420
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.129		12.6420

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	155	0.01	2.9

Total Tc = 2.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-27**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.166	98	16.2680
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.166		16.2680

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	190	0.063	1.6

Total Tc = 1.6 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-28**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.146	98	14.3080
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.146		14.3080

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	186	0.06	1.6

Total Tc = 1.6 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-29**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.259	98	25.3820
Landscaped and Lawns	0.000	69	0.0000
Site	0.150	65	9.7500
	0.409		35.1320

Weighted CN: 86

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	130	0.015	2.1
Segment B - C	0.015	104	0.014	1.8

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.015	2.49	134	0.9

Total Tc = 4.8 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-30**
Location: Site - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.336	98	32.9280
Landscaped and Lawns	0.000	69	0.0000
Site	0.010	65	0.6500
	0.346		33.5780

Weighted CN: 97

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	192	0.04	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-31**
Location: Edgerton Street - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.386	98	37.8280
Landscaped and Lawns	0.275	69	18.9750
Site	0.000	65	0.0000
	0.661		56.8030

Weighted CN: 86

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	220	0.081	15.1
Segment B - C	0.24	33	0.167	2.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.027	3.34	128	0.6

Total Tc = 18.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-32**
Location: Edgerton Street - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.063	98	6.1740
Landscaped and Lawns	0.111	69	7.6590
Site	0.000	65	0.0000
	0.174		13.8330

Weighted CN: 80

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	92	0.026	11.8
Segment B - C	0.24	31	0.129	2.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.025	3.21	59	0.3

Total Tc = 14.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-33**
Location: Edgerton Street - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.066	98	6.4680
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.066		6.4680

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	220	0.045	2.1

Total Tc = 2.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-34**
Location: Site - Northeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.068	98	6.6640
Landscaped and Lawns	0.329	69	22.7010
Site	0.000	65	0.0000
	0.397		29.3650

Weighted CN: 74

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	240	0.092	15.4
Segment B - C	0.24	30	0.3	1.8

Total Tc = 17.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-35**
Location: Site - Northeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.543	98	53.2140
Landscaped and Lawns	0.538	69	37.1220
Site	0.000	65	0.0000
	1.081		90.3360

Weighted CN: 84

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.15	198	0.101	8.7

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	unpaved	0.044	3.38	102	0.5

Total Tc = 9.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-36**
Location: Edgerton Street - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.097	98	9.5060
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.097		9.5060

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	222	0.056	1.9

Total Tc = 1.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Existing CN & Tc Calculations**
Prepared By: **JCB** Date: **February 13, 2017**

Designation: **CB-37**
Location: Edgerton Street - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.154	98	15.0920
Landscaped and Lawns	0.106	69	7.3140
Site	0.000	65	0.0000
	0.260		22.4060

Weighted CN: 86

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

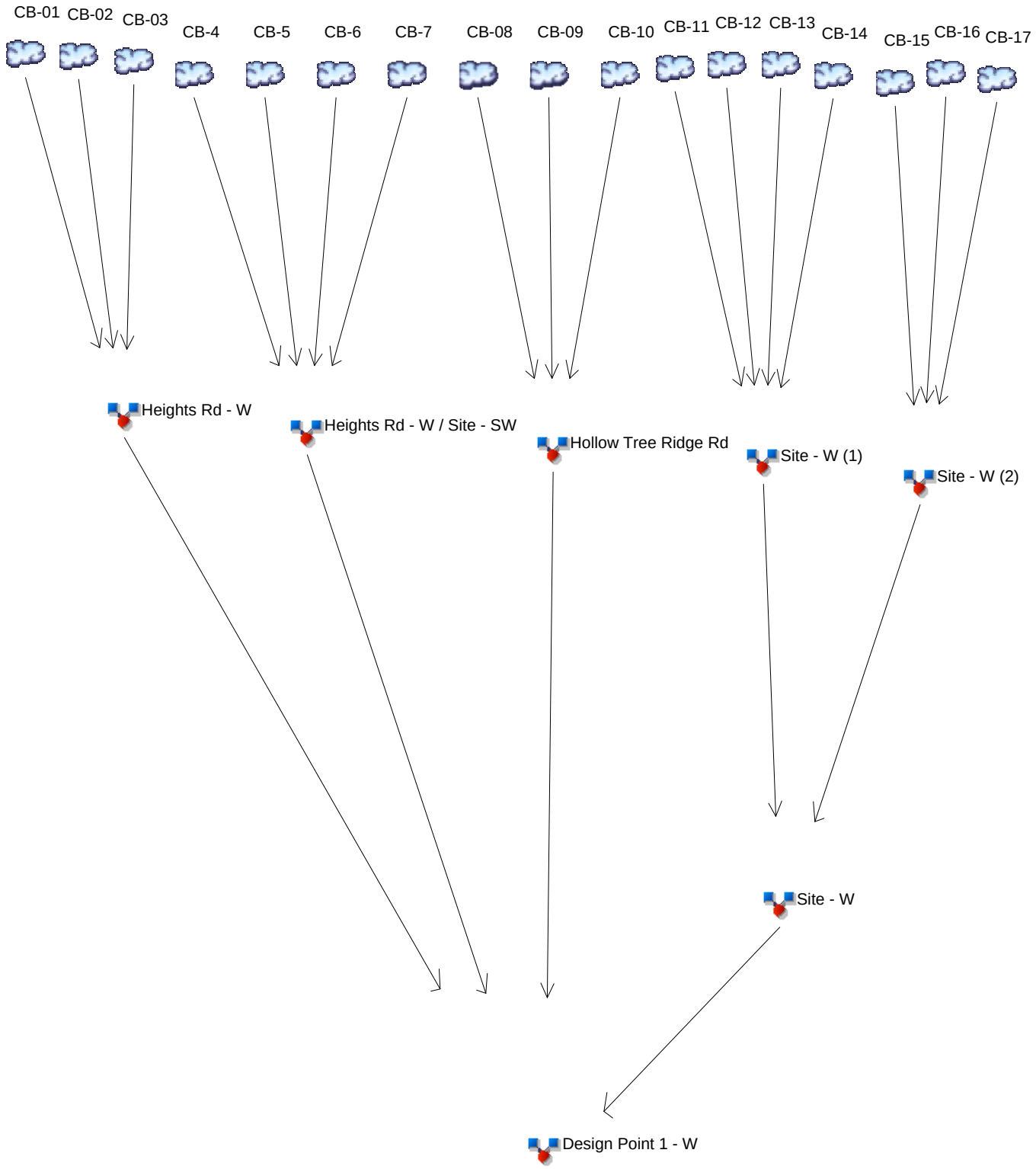
Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	127	0.071	10.2
Segment B - C	0.015	64	0.062	0.7

Total Tc = 10.9 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Project: Existing_Design Point 1_Meadow.gpw	Wednesday, 03 / 1 / 2017

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.309	-------	-------	0.471	0.538	0.605	0.681	CB-01
2	SCS Runoff	------	-------	0.287	-------	-------	0.438	0.500	0.562	0.633	CB-02
3	SCS Runoff	------	-------	0.734	-------	-------	1.346	1.602	1.859	2.151	CB-03
4	SCS Runoff	------	-------	0.398	-------	-------	0.866	1.075	1.289	1.538	CB-4
5	SCS Runoff	------	-------	0.333	-------	-------	0.696	0.854	1.014	1.199	CB-5
6	SCS Runoff	------	-------	0.126	-------	-------	0.374	0.494	0.620	0.770	CB-6
7	SCS Runoff	------	-------	0.097	-------	-------	0.286	0.378	0.474	0.588	CB-7
8	SCS Runoff	------	-------	0.843	-------	-------	1.987	2.502	3.032	3.652	CB-08
9	SCS Runoff	------	-------	0.423	-------	-------	0.646	0.737	0.829	0.933	CB-09
10	SCS Runoff	------	-------	1.636	-------	-------	3.298	4.013	4.736	5.569	CB-10
11	SCS Runoff	------	-------	0.070	-------	-------	0.209	0.276	0.347	0.430	CB-11
12	SCS Runoff	------	-------	0.086	-------	-------	0.253	0.333	0.418	0.519	CB-12
13	SCS Runoff	------	-------	0.178	-------	-------	0.526	0.694	0.872	1.084	CB-13
14	SCS Runoff	------	-------	0.055	-------	-------	0.166	0.218	0.273	0.339	CB-14
15	SCS Runoff	------	-------	0.337	-------	-------	0.865	1.110	1.366	1.666	CB-15
16	SCS Runoff	------	-------	0.047	-------	-------	0.143	0.188	0.236	0.292	CB-16
17	SCS Runoff	------	-------	1.353	-------	-------	3.270	4.146	5.052	6.113	CB-17
18	Combine	1, 2, 3,	-------	1.331	-------	-------	2.256	2.641	3.026	3.465	Heights Rd - W
19	Combine	4, 5, 6, 7,	-------	0.749	-------	-------	1.814	2.299	2.800	3.389	Heights Rd - W / Site - SW
20	Combine	8, 9, 10,	-------	2.595	-------	-------	5.368	6.584	7.825	9.262	Hollow Tree Ridge Rd
21	Combine	11, 12, 13, 14,	-------	0.377	-------	-------	1.118	1.478	1.856	2.306	Site - W (1)
22	Combine	15, 16, 17,	-------	1.731	-------	-------	4.254	5.412	6.610	8.015	Site - W (2)
23	Combine	21, 22	-------	2.104	-------	-------	5.372	6.890	8.466	10.32	Site - W
24	Combine	18, 19, 20, 23	-------	5.745	-------	-------	12.94	16.18	19.53	23.45	Design Point 1 - W

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.309	2	724	1,044	------	------	------	CB-01
2	SCS Runoff	0.287	2	724	971	------	------	------	CB-02
3	SCS Runoff	0.734	2	724	2,194	------	------	------	CB-03
4	SCS Runoff	0.398	2	732	1,682	------	------	------	CB-4
5	SCS Runoff	0.333	2	724	1,018	------	------	------	CB-5
6	SCS Runoff	0.126	2	738	684	------	------	------	CB-6
7	SCS Runoff	0.097	2	748	620	------	------	------	CB-7
8	SCS Runoff	0.843	2	734	4,002	------	------	------	CB-08
9	SCS Runoff	0.423	2	724	1,430	------	------	------	CB-09
10	SCS Runoff	1.636	2	726	5,675	------	------	------	CB-10
11	SCS Runoff	0.070	2	738	382	------	------	------	CB-11
12	SCS Runoff	0.086	2	748	547	------	------	------	CB-12
13	SCS Runoff	0.178	2	742	1,032	------	------	------	CB-13
14	SCS Runoff	0.055	2	734	278	------	------	------	CB-14
15	SCS Runoff	0.337	2	738	1,796	------	------	------	CB-15
16	SCS Runoff	0.047	2	732	226	------	------	------	CB-16
17	SCS Runoff	1.353	2	738	6,976	------	------	------	CB-17
18	Combine	1.331	2	724	4,209	1, 2, 3,	------	------	Heights Rd - W
19	Combine	0.749	2	728	4,004	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	2.595	2	726	11,107	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	0.377	2	740	2,239	11, 12, 13,	------	------	Site - W (1)
22	Combine	1.731	2	738	8,998	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	2.104	2	738	11,237	21, 22	------	------	Site - W
24	Combine	5.745	2	726	30,557	18, 19, 20, 23	------	------	Design Point 1 - W

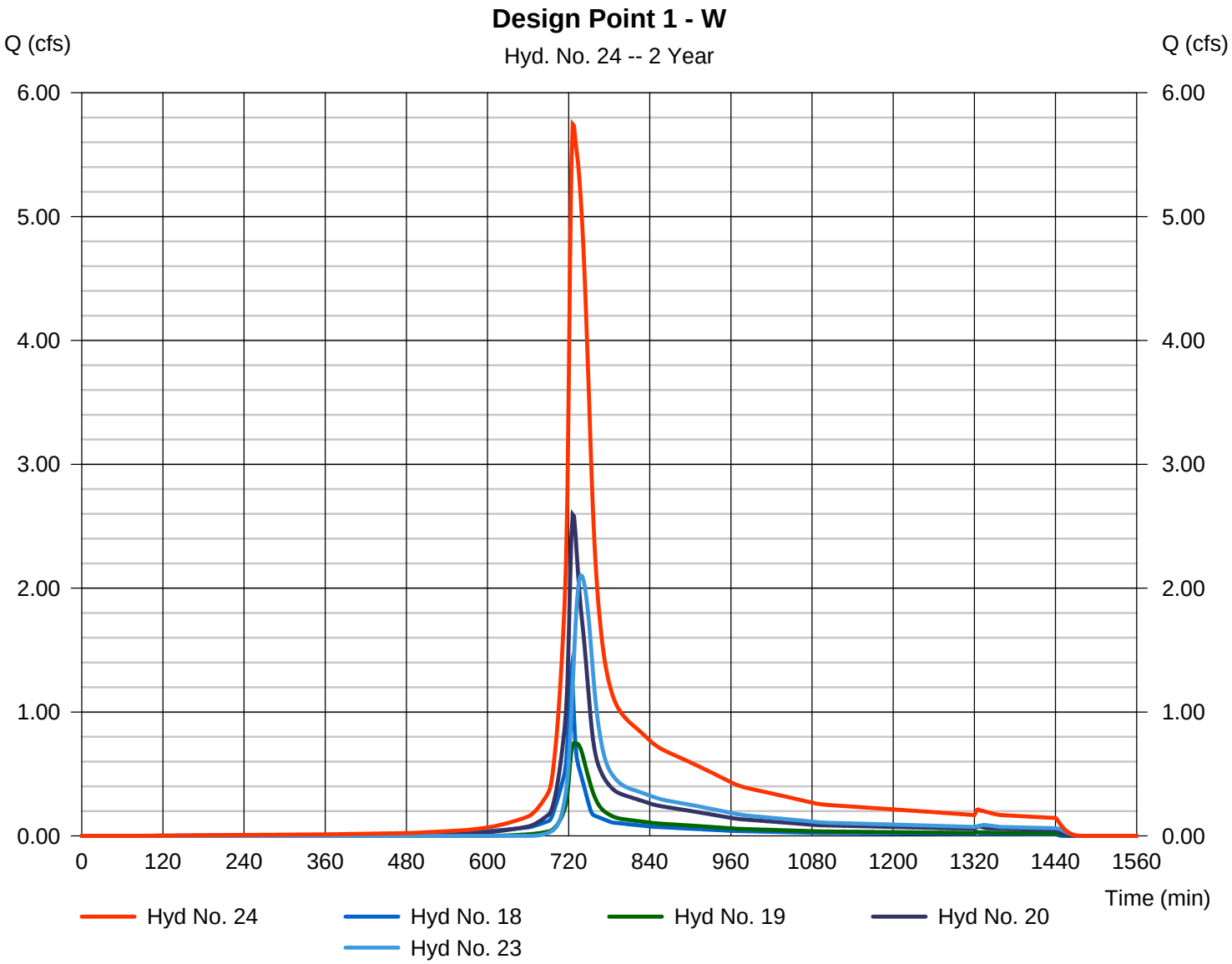
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

Design Point 1 - W

Hydrograph type	= Combine	Peak discharge	= 5.745 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 30,557 cuft
Inflow hyds.	= 18, 19, 20, 23	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.471	2	724	1,621	------	------	------	CB-01
2	SCS Runoff	0.438	2	724	1,507	------	------	------	CB-02
3	SCS Runoff	1.346	2	724	4,062	------	------	------	CB-03
4	SCS Runoff	0.866	2	730	3,545	------	------	------	CB-4
5	SCS Runoff	0.696	2	724	2,080	------	------	------	CB-5
6	SCS Runoff	0.374	2	734	1,741	------	------	------	CB-6
7	SCS Runoff	0.286	2	742	1,579	------	------	------	CB-7
8	SCS Runoff	1.987	2	734	8,864	------	------	------	CB-08
9	SCS Runoff	0.646	2	724	2,221	------	------	------	CB-09
10	SCS Runoff	3.298	2	726	11,258	------	------	------	CB-10
11	SCS Runoff	0.209	2	734	972	------	------	------	CB-11
12	SCS Runoff	0.253	2	742	1,393	------	------	------	CB-12
13	SCS Runoff	0.526	2	738	2,627	------	------	------	CB-13
14	SCS Runoff	0.166	2	732	708	------	------	------	CB-14
15	SCS Runoff	0.865	2	736	4,202	------	------	------	CB-15
16	SCS Runoff	0.143	2	730	576	------	------	------	CB-16
17	SCS Runoff	3.270	2	736	15,726	------	------	------	CB-17
18	Combine	2.256	2	724	7,191	1, 2, 3,	------	------	Heights Rd - W
19	Combine	1.814	2	728	8,945	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	5.368	2	726	22,343	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	1.118	2	736	5,700	11, 12, 13,	------	------	Site - W (1)
22	Combine	4.254	2	736	20,504	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	5.372	2	736	26,204	21, 22	------	------	Site - W
24	Combine	12.94	2	728	64,682	18, 19, 20, 23	------	------	Design Point 1 - W

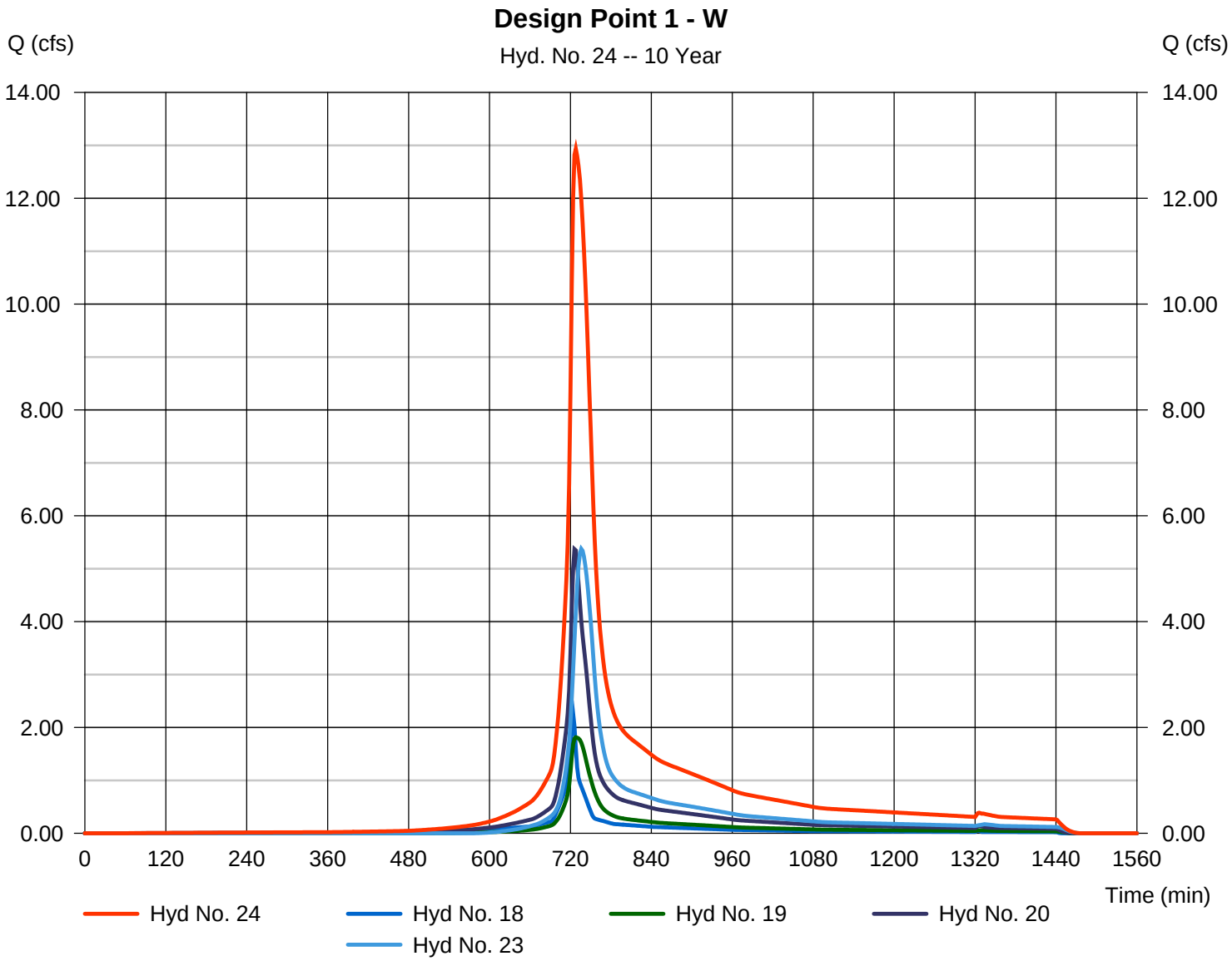
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

Design Point 1 - W

Hydrograph type	= Combine	Peak discharge	= 12.94 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 64,682 cuft
Inflow hyds.	= 18, 19, 20, 23	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.538	2	724	1,859	------	------	------	CB-01
2	SCS Runoff	0.500	2	724	1,729	------	------	------	CB-02
3	SCS Runoff	1.602	2	724	4,865	------	------	------	CB-03
4	SCS Runoff	1.075	2	730	4,383	------	------	------	CB-4
5	SCS Runoff	0.854	2	724	2,552	------	------	------	CB-5
6	SCS Runoff	0.494	2	734	2,248	------	------	------	CB-6
7	SCS Runoff	0.378	2	742	2,039	------	------	------	CB-7
8	SCS Runoff	2.502	2	734	11,090	------	------	------	CB-08
9	SCS Runoff	0.737	2	724	2,547	------	------	------	CB-09
10	SCS Runoff	4.013	2	726	13,715	------	------	------	CB-10
11	SCS Runoff	0.276	2	734	1,256	------	------	------	CB-11
12	SCS Runoff	0.333	2	742	1,799	------	------	------	CB-12
13	SCS Runoff	0.694	2	736	3,393	------	------	------	CB-13
14	SCS Runoff	0.218	2	732	915	------	------	------	CB-14
15	SCS Runoff	1.110	2	736	5,325	------	------	------	CB-15
16	SCS Runoff	0.188	2	730	744	------	------	------	CB-16
17	SCS Runoff	4.146	2	736	19,757	------	------	------	CB-17
18	Combine	2.641	2	724	8,452	1, 2, 3,	------	------	Heights Rd - W
19	Combine	2.299	2	728	11,222	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	6.584	2	726	27,351	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	1.478	2	736	7,362	11, 12, 13,	------	------	Site - W (1)
22	Combine	5.412	2	736	25,825	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	6.890	2	736	33,187	21, 22	------	------	Site - W
24	Combine	16.18	2	728	80,213	18, 19, 20, 23	------	------	Design Point 1 - W

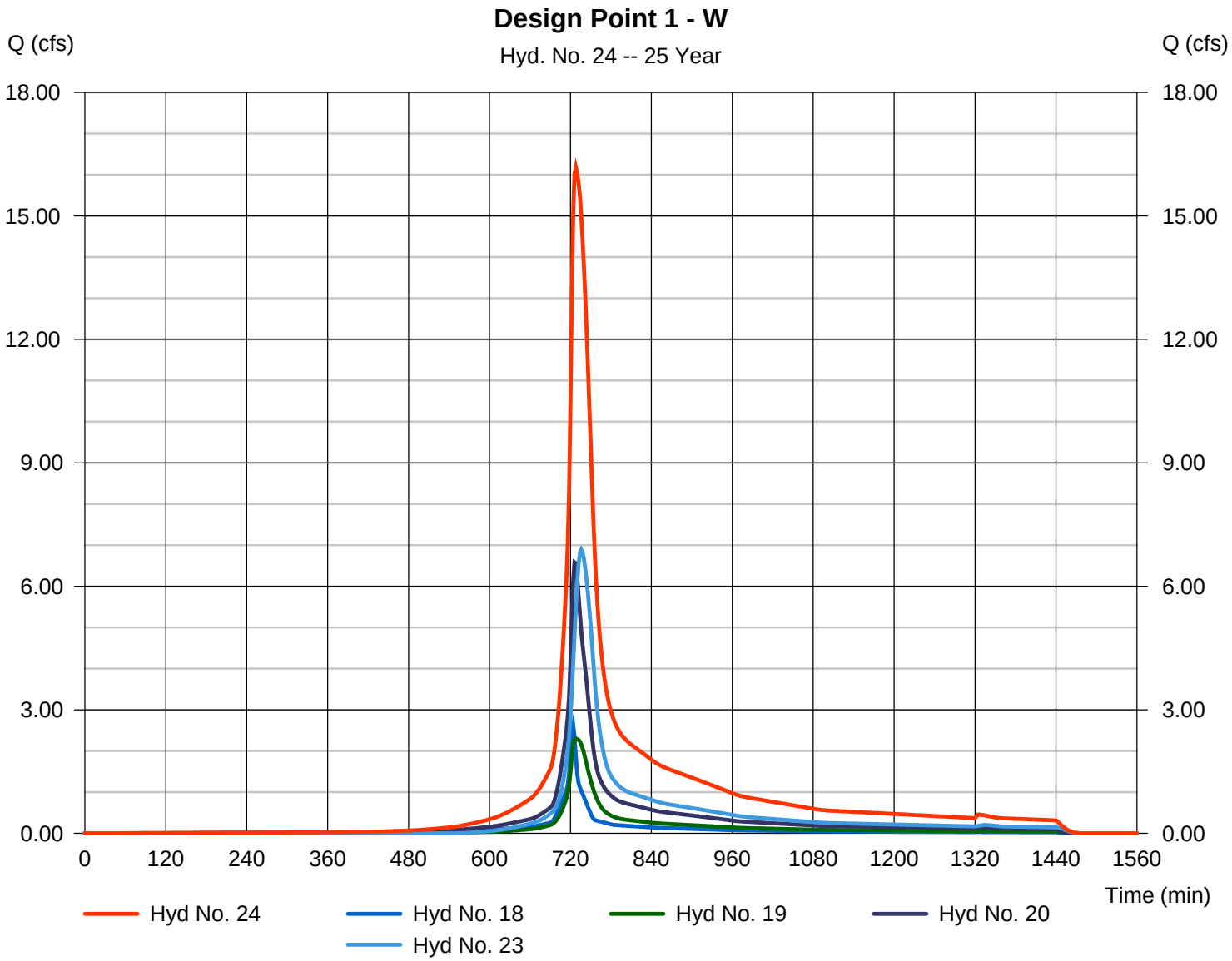
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

Design Point 1 - W

Hydrograph type	= Combine	Peak discharge	= 16.18 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 80,213 cuft
Inflow hyds.	= 18, 19, 20, 23	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.605	2	724	2,097	------	------	------	CB-01
2	SCS Runoff	0.562	2	724	1,950	------	------	------	CB-02
3	SCS Runoff	1.859	2	724	5,679	------	------	------	CB-03
4	SCS Runoff	1.289	2	730	5,248	------	------	------	CB-4
5	SCS Runoff	1.014	2	724	3,037	------	------	------	CB-5
6	SCS Runoff	0.620	2	734	2,786	------	------	------	CB-6
7	SCS Runoff	0.474	2	742	2,526	------	------	------	CB-7
8	SCS Runoff	3.032	2	734	13,403	------	------	------	CB-08
9	SCS Runoff	0.829	2	724	2,873	------	------	------	CB-09
10	SCS Runoff	4.736	2	726	16,230	------	------	------	CB-10
11	SCS Runoff	0.347	2	734	1,556	------	------	------	CB-11
12	SCS Runoff	0.418	2	742	2,229	------	------	------	CB-12
13	SCS Runoff	0.872	2	736	4,204	------	------	------	CB-13
14	SCS Runoff	0.273	2	732	1,133	------	------	------	CB-14
15	SCS Runoff	1.366	2	736	6,501	------	------	------	CB-15
16	SCS Runoff	0.236	2	730	921	------	------	------	CB-16
17	SCS Runoff	5.052	2	736	23,957	------	------	------	CB-17
18	Combine	3.026	2	724	9,726	1, 2, 3,	------	------	Heights Rd - W
19	Combine	2.800	2	728	13,598	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	7.825	2	726	32,506	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	1.856	2	736	9,122	11, 12, 13,	------	------	Site - W (1)
22	Combine	6.610	2	736	31,379	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	8.466	2	736	40,502	21, 22	------	------	Site - W
24	Combine	19.53	2	728	96,331	18, 19, 20, 23	------	------	Design Point 1 - W

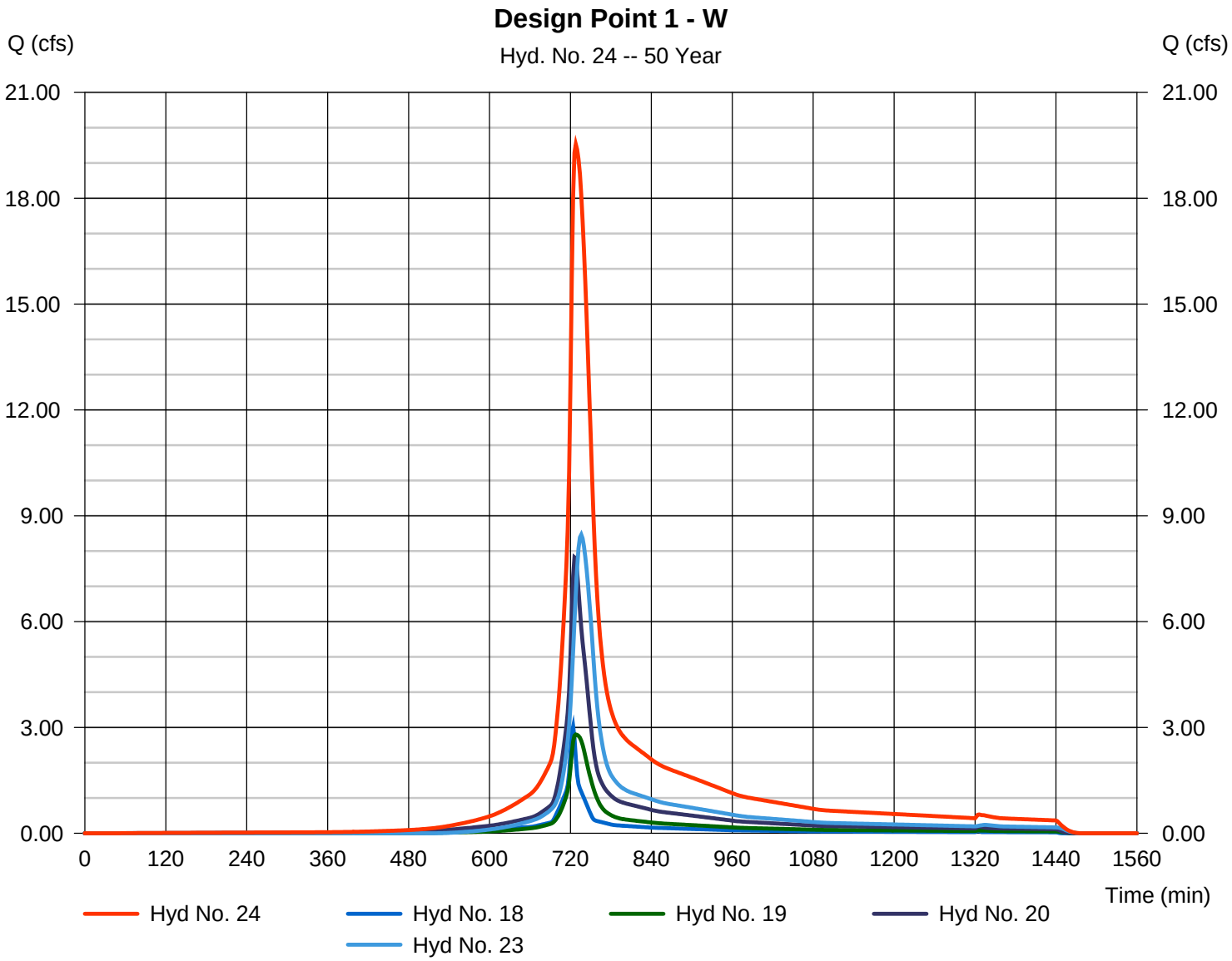
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

Design Point 1 - W

Hydrograph type	= Combine	Peak discharge	= 19.53 cfs
Storm frequency	= 50 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 96,331 cuft
Inflow hyds.	= 18, 19, 20, 23	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.681	2	724	2,369	------	------	------	CB-01
2	SCS Runoff	0.633	2	724	2,203	------	------	------	CB-02
3	SCS Runoff	2.151	2	724	6,621	------	------	------	CB-03
4	SCS Runoff	1.538	2	730	6,262	------	------	------	CB-4
5	SCS Runoff	1.199	2	724	3,605	------	------	------	CB-5
6	SCS Runoff	0.770	2	734	3,430	------	------	------	CB-6
7	SCS Runoff	0.588	2	740	3,110	------	------	------	CB-7
8	SCS Runoff	3.652	2	734	16,132	------	------	------	CB-08
9	SCS Runoff	0.933	2	724	3,245	------	------	------	CB-09
10	SCS Runoff	5.569	2	726	19,159	------	------	------	CB-10
11	SCS Runoff	0.430	2	734	1,916	------	------	------	CB-11
12	SCS Runoff	0.519	2	740	2,744	------	------	------	CB-12
13	SCS Runoff	1.084	2	736	5,176	------	------	------	CB-13
14	SCS Runoff	0.339	2	732	1,395	------	------	------	CB-14
15	SCS Runoff	1.666	2	736	7,897	------	------	------	CB-15
16	SCS Runoff	0.292	2	728	1,134	------	------	------	CB-16
17	SCS Runoff	6.113	2	736	28,922	------	------	------	CB-17
18	Combine	3.465	2	724	11,193	1, 2, 3,	------	------	Heights Rd - W
19	Combine	3.389	2	728	16,407	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	9.262	2	726	38,536	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	2.306	2	736	11,231	11, 12, 13,	------	------	Site - W (1)
22	Combine	8.015	2	736	37,953	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	10.32	2	736	49,184	21, 22	------	------	Site - W
24	Combine	23.45	2	728	115,319	18, 19, 20, 23	------	------	Design Point 1 - W

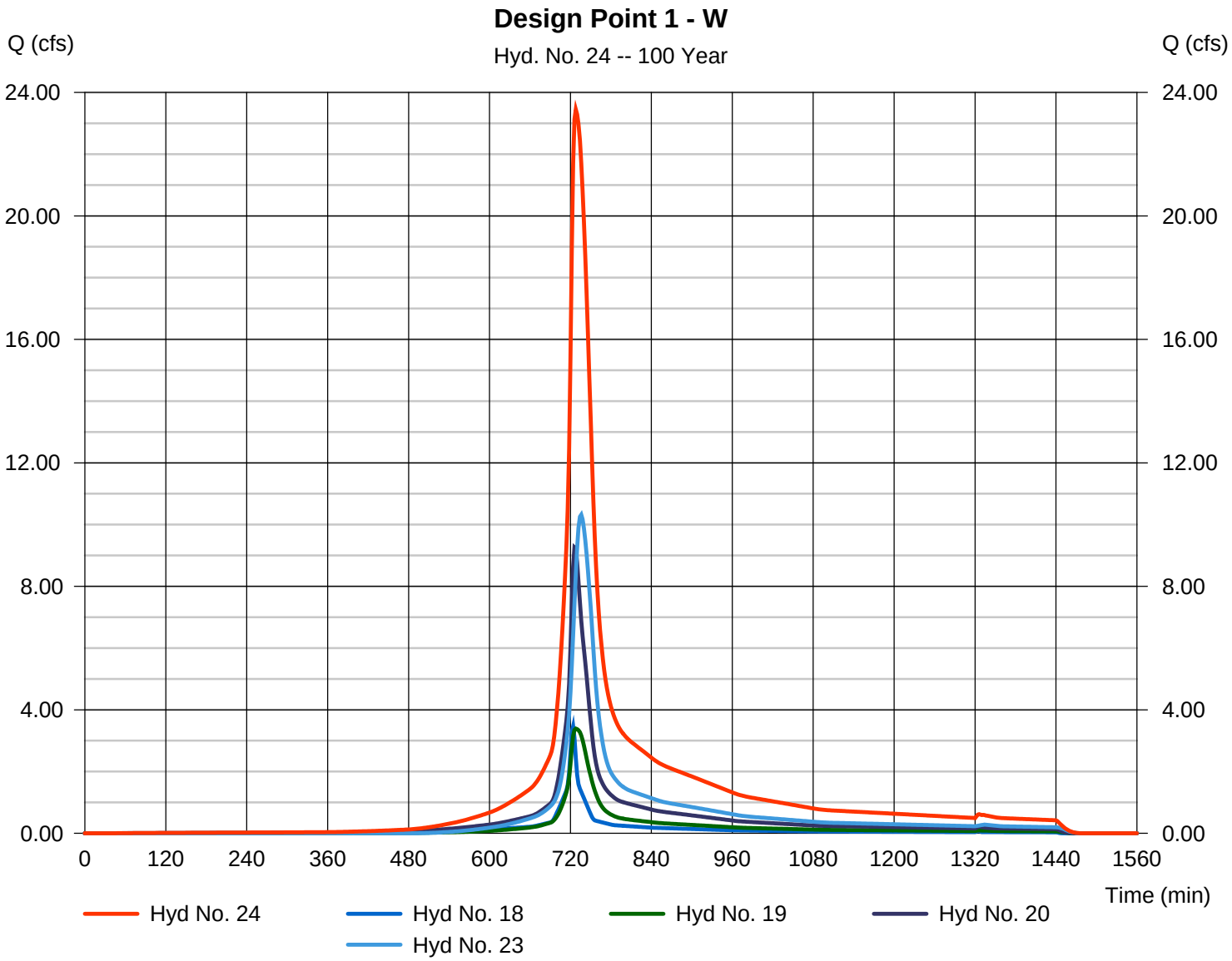
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

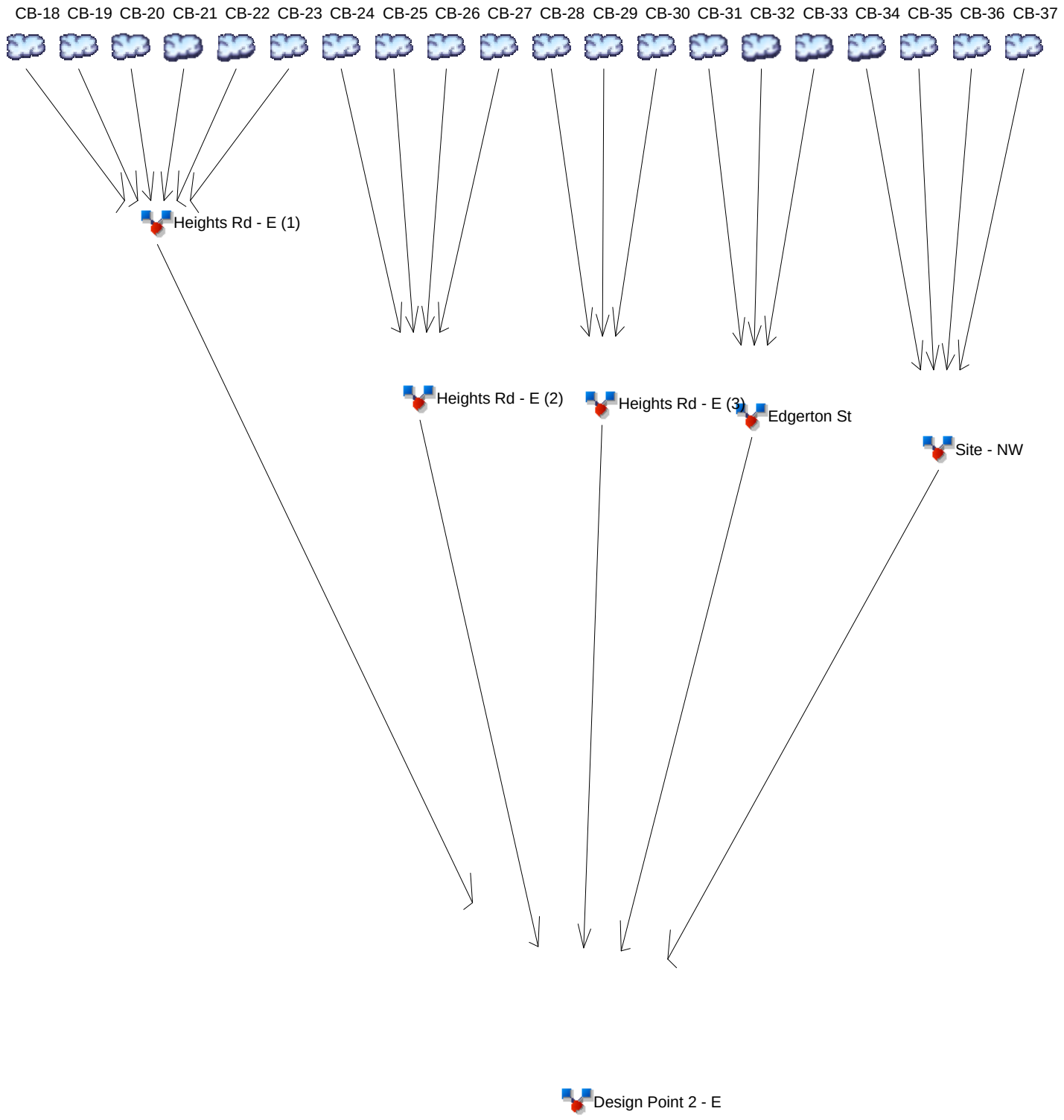
Design Point 1 - W

Hydrograph type	= Combine	Peak discharge	= 23.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 115,319 cuft
Inflow hyds.	= 18, 19, 20, 23	Contrib. drain. area	= 0.000 ac



Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Project: Existing_Design Point 2_Meadow.gpw

Wednesday, 03 / 1 / 2017

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.392	-------	-------	0.599	0.683	0.768	0.865	CB-18
2	SCS Runoff	------	-------	0.425	-------	-------	0.732	0.858	0.983	1.126	CB-19
3	SCS Runoff	------	-------	1.993	-------	-------	3.239	3.747	4.253	4.828	CB-20
4	SCS Runoff	------	-------	0.562	-------	-------	0.881	1.011	1.141	1.289	CB-21
5	SCS Runoff	------	-------	0.139	-------	-------	0.212	0.242	0.272	0.306	CB-22
6	SCS Runoff	------	-------	0.479	-------	-------	0.731	0.834	0.937	1.055	CB-23
7	SCS Runoff	------	-------	0.805	-------	-------	1.248	1.430	1.610	1.816	CB-24
8	SCS Runoff	------	-------	0.785	-------	-------	1.197	1.367	1.536	1.729	CB-25
9	SCS Runoff	------	-------	0.399	-------	-------	0.608	0.694	0.780	0.878	CB-26
10	SCS Runoff	------	-------	0.513	-------	-------	0.783	0.893	1.004	1.130	CB-27
11	SCS Runoff	------	-------	0.451	-------	-------	0.688	0.786	0.883	0.994	CB-28
12	SCS Runoff	------	-------	0.894	-------	-------	1.587	1.874	2.161	2.488	CB-29
13	SCS Runoff	------	-------	1.054	-------	-------	1.620	1.852	2.083	2.348	CB-30
14	SCS Runoff	------	-------	0.468	-------	-------	1.134	1.436	1.749	2.114	CB-31
15	SCS Runoff	------	-------	0.243	-------	-------	0.465	0.559	0.654	0.762	CB-32
16	SCS Runoff	------	-------	0.204	-------	-------	0.311	0.355	0.399	0.449	CB-33
17	SCS Runoff	------	-------	0.301	-------	-------	0.710	0.894	1.084	1.305	CB-34
18	SCS Runoff	------	-------	0.662	-------	-------	1.699	2.179	2.678	3.264	CB-35
19	SCS Runoff	------	-------	0.300	-------	-------	0.457	0.522	0.587	0.660	CB-36
20	SCS Runoff	------	-------	0.488	-------	-------	0.871	1.030	1.189	1.370	CB-37
21	Combine	1, 2, 3,	-------	3.991	-------	-------	6.393	7.375	8.355	9.470	Heights Rd - E (1)
22	Combine	4, 5, 6, 7, 8, 9, 10,	-------	2.502	-------	-------	3.837	4.384	4.930	5.554	Heights Rd - E (2)
23	Combine	11, 12, 13,	-------	2.400	-------	-------	3.896	4.512	5.127	5.829	Heights Rd - E (3)
24	Combine	14, 15, 16,	-------	0.788	-------	-------	1.721	2.137	2.563	3.060	Edgerton St
25	Combine	17, 18, 19, 20,	-------	1.517	-------	-------	3.386	4.226	5.091	6.102	Site - NW
26	Combine	21, 22, 23, 24, 25	-------	10.76	-------	-------	18.23	21.38	24.56	28.22	Design Point 2 - E

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.392	2	724	1,326	------	------	------	CB-18
2	SCS Runoff	0.425	2	724	1,278	------	------	------	CB-19
3	SCS Runoff	1.993	2	724	6,134	------	------	------	CB-20
4	SCS Runoff	0.562	2	724	1,792	------	------	------	CB-21
5	SCS Runoff	0.139	2	724	470	------	------	------	CB-22
6	SCS Runoff	0.479	2	724	1,618	------	------	------	CB-23
7	SCS Runoff	0.805	2	724	2,607	------	------	------	CB-24
8	SCS Runoff	0.785	2	724	2,651	------	------	------	CB-25
9	SCS Runoff	0.399	2	724	1,346	------	------	------	CB-26
10	SCS Runoff	0.513	2	724	1,733	------	------	------	CB-27
11	SCS Runoff	0.451	2	724	1,524	------	------	------	CB-28
12	SCS Runoff	0.894	2	724	2,676	------	------	------	CB-29
13	SCS Runoff	1.054	2	724	3,480	------	------	------	CB-30
14	SCS Runoff	0.468	2	736	2,253	------	------	------	CB-31
15	SCS Runoff	0.243	2	730	997	------	------	------	CB-32
16	SCS Runoff	0.204	2	724	689	------	------	------	CB-33
17	SCS Runoff	0.301	2	734	1,430	------	------	------	CB-34
18	SCS Runoff	0.662	2	736	3,282	------	------	------	CB-35
19	SCS Runoff	0.300	2	724	1,012	------	------	------	CB-36
20	SCS Runoff	0.488	2	728	1,871	------	------	------	CB-37
21	Combine	3.991	2	724	12,618	1, 2, 3,	------	------	Heights Rd - E (1)
22	Combine	2.502	2	724	8,337	4, 5, 6, 7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	2.400	2	724	7,680	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	0.788	2	732	3,938	14, 15, 16,	------	------	Edgerton St
25	Combine	1.517	2	732	7,596	17, 18, 19, 20,	------	------	Site - NW
26	Combine	10.76	2	724	40,170	21, 22, 23, 24, 25	------	------	Design Point 2 - E

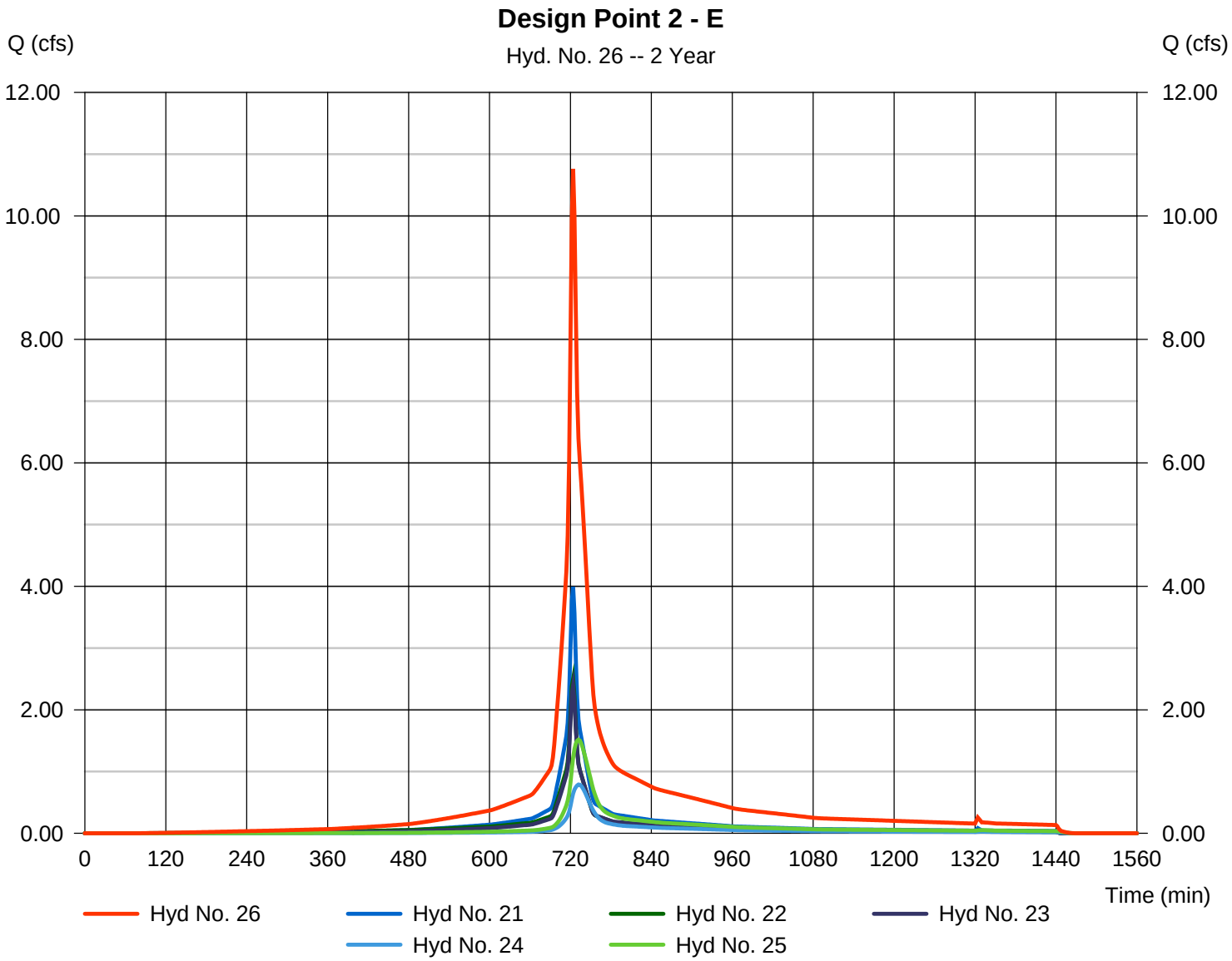
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

Design Point 2 - E

Hydrograph type	= Combine	Peak discharge	= 10.76 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 40,170 cuft
Inflow hyds.	= 21, 22, 23, 24, 25	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.599	2	724	2,059	------	------	------	CB-18
2	SCS Runoff	0.732	2	724	2,247	------	------	------	CB-19
3	SCS Runoff	3.239	2	724	10,256	------	------	------	CB-20
4	SCS Runoff	0.881	2	724	2,888	------	------	------	CB-21
5	SCS Runoff	0.212	2	724	729	------	------	------	CB-22
6	SCS Runoff	0.731	2	724	2,512	------	------	------	CB-23
7	SCS Runoff	1.248	2	724	4,149	------	------	------	CB-24
8	SCS Runoff	1.197	2	724	4,117	------	------	------	CB-25
9	SCS Runoff	0.608	2	724	2,091	------	------	------	CB-26
10	SCS Runoff	0.783	2	724	2,691	------	------	------	CB-27
11	SCS Runoff	0.688	2	724	2,367	------	------	------	CB-28
12	SCS Runoff	1.587	2	724	4,826	------	------	------	CB-29
13	SCS Runoff	1.620	2	724	5,472	------	------	------	CB-30
14	SCS Runoff	1.134	2	734	5,078	------	------	------	CB-31
15	SCS Runoff	0.465	2	730	1,896	------	------	------	CB-32
16	SCS Runoff	0.311	2	724	1,070	------	------	------	CB-33
17	SCS Runoff	0.710	2	734	3,167	------	------	------	CB-34
18	SCS Runoff	1.699	2	734	7,681	------	------	------	CB-35
19	SCS Runoff	0.457	2	724	1,572	------	------	------	CB-36
20	SCS Runoff	0.871	2	728	3,374	------	------	------	CB-37
21	Combine	6.393	2	724	20,692	1, 2, 3,	------	------	Heights Rd - E (1)
22	Combine	3.837	2	724	13,048	4, 5, 6, 7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	3.896	2	724	12,664	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	1.721	2	732	8,044	14, 15, 16,	------	------	Edgerton St
25	Combine	3.386	2	732	15,795	17, 18, 19, 20,	------	------	Site - NW
26	Combine	18.23	2	724	70,244	21, 22, 23, 24, 25	------	------	Design Point 2 - E

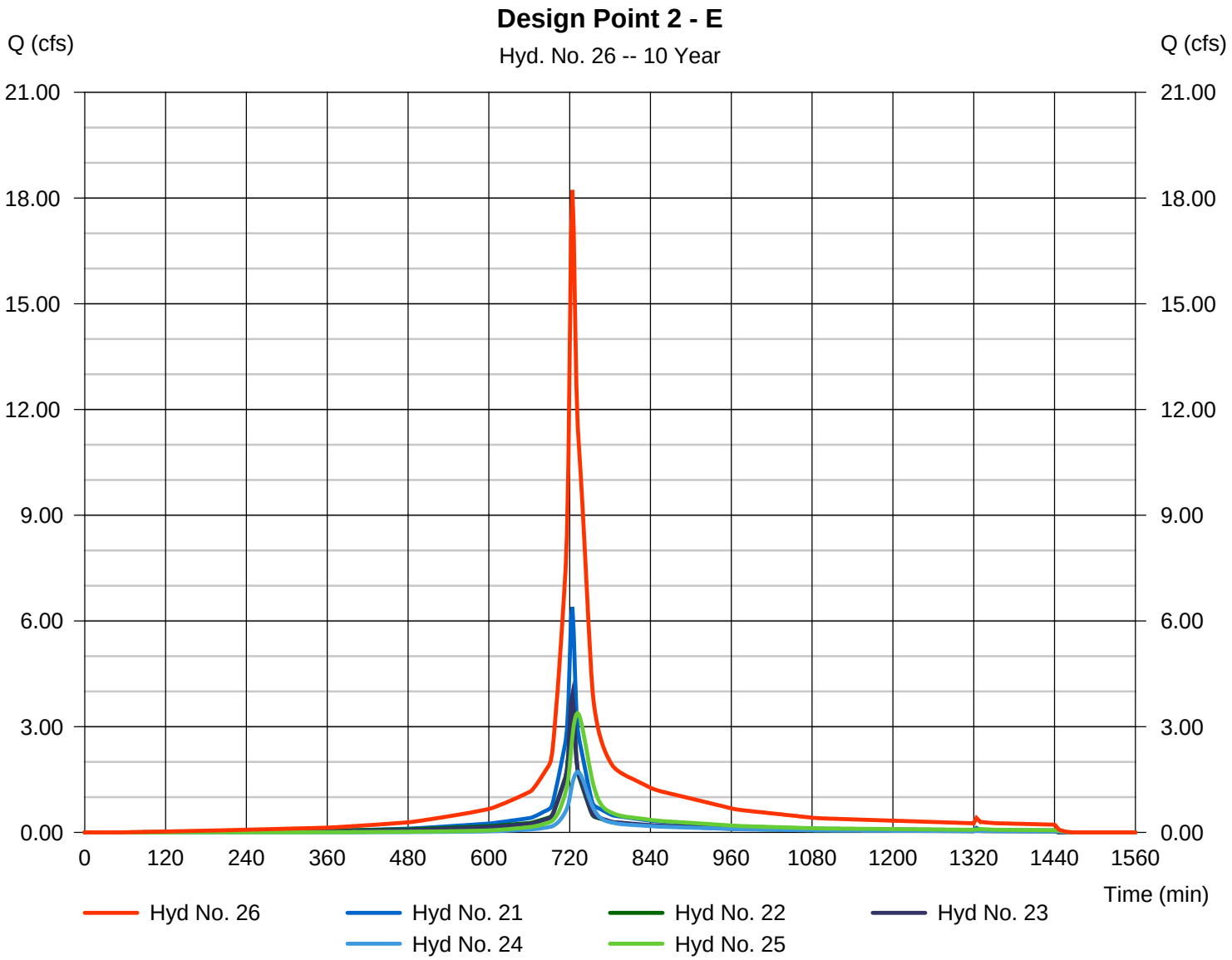
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

Design Point 2 - E

Hydrograph type	=	Combine	Peak discharge	=	18.23 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	70,244 cuft
Inflow hyds.	=	21, 22, 23, 24, 25	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.683	2	724	2,361	------	------	------	CB-18
2	SCS Runoff	0.858	2	724	2,657	------	------	------	CB-19
3	SCS Runoff	3.747	2	724	11,976	------	------	------	CB-20
4	SCS Runoff	1.011	2	724	3,341	------	------	------	CB-21
5	SCS Runoff	0.242	2	724	836	------	------	------	CB-22
6	SCS Runoff	0.834	2	724	2,881	------	------	------	CB-23
7	SCS Runoff	1.430	2	724	4,787	------	------	------	CB-24
8	SCS Runoff	1.367	2	724	4,721	------	------	------	CB-25
9	SCS Runoff	0.694	2	724	2,398	------	------	------	CB-26
10	SCS Runoff	0.893	2	724	3,086	------	------	------	CB-27
11	SCS Runoff	0.786	2	724	2,714	------	------	------	CB-28
12	SCS Runoff	1.874	2	724	5,741	------	------	------	CB-29
13	SCS Runoff	1.852	2	724	6,294	------	------	------	CB-30
14	SCS Runoff	1.436	2	734	6,380	------	------	------	CB-31
15	SCS Runoff	0.559	2	730	2,286	------	------	------	CB-32
16	SCS Runoff	0.355	2	724	1,227	------	------	------	CB-33
17	SCS Runoff	0.894	2	734	3,963	------	------	------	CB-34
18	SCS Runoff	2.179	2	734	9,733	------	------	------	CB-35
19	SCS Runoff	0.522	2	724	1,803	------	------	------	CB-36
20	SCS Runoff	1.030	2	728	4,015	------	------	------	CB-37
21	Combine	7.375	2	724	24,052	1, 2, 3,	------	------	Heights Rd - E (1)
22	Combine	4.384	2	724	14,992	4, 5, 6, 7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	4.512	2	724	14,749	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	2.137	2	732	9,893	14, 15, 16,	------	------	Edgerton St
25	Combine	4.226	2	732	19,514	17, 18, 19, 20,	------	------	Site - NW
26	Combine	21.38	2	724	83,200	21, 22, 23, 24, 25	------	------	Design Point 2 - E

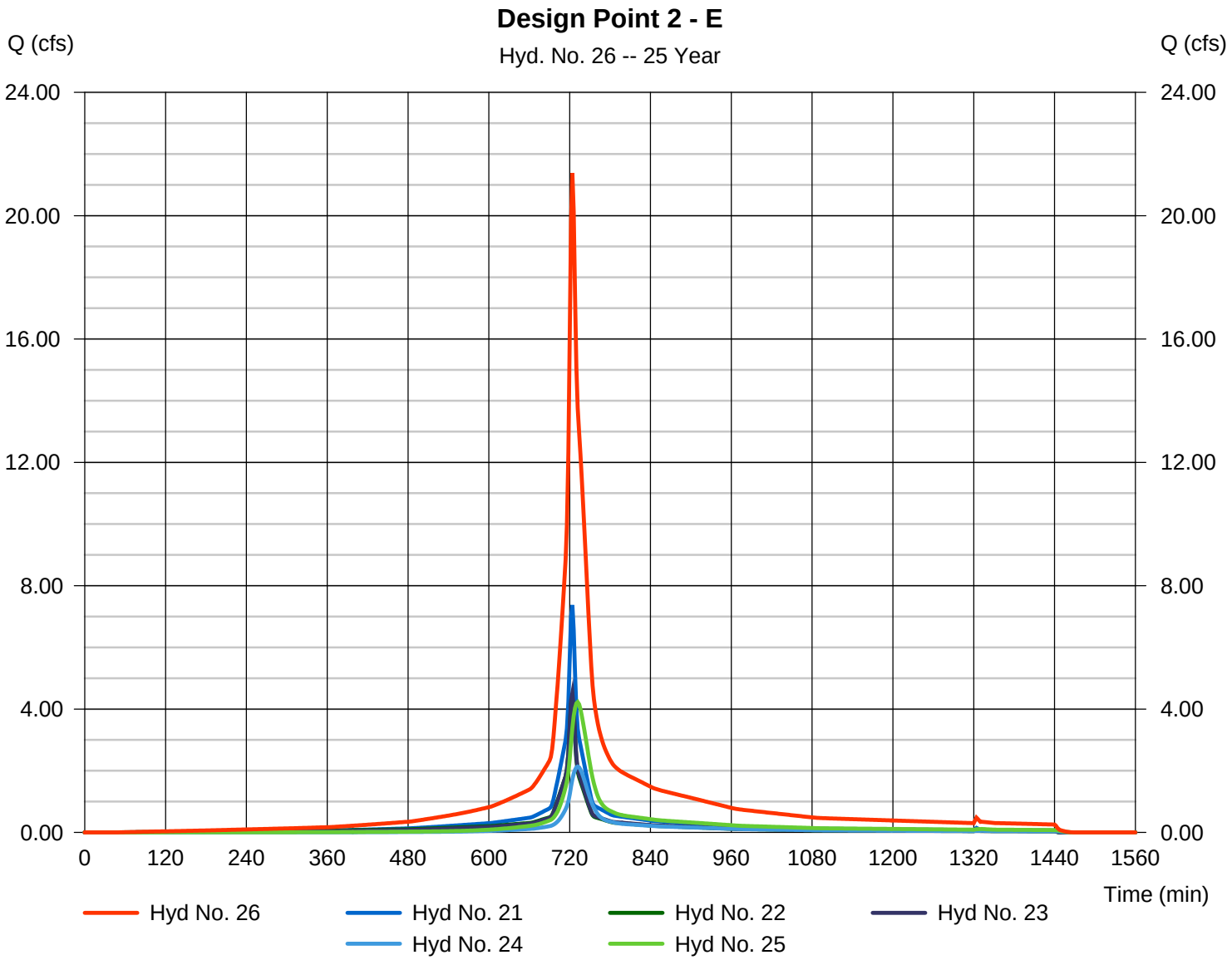
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

Design Point 2 - E

Hydrograph type	= Combine	Peak discharge	= 21.38 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 83,200 cuft
Inflow hyds.	= 21, 22, 23, 24, 25	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.768	2	724	2,663	------	------	------	CB-18
2	SCS Runoff	0.983	2	724	3,070	------	------	------	CB-19
3	SCS Runoff	4.253	2	724	13,702	------	------	------	CB-20
4	SCS Runoff	1.141	2	724	3,796	------	------	------	CB-21
5	SCS Runoff	0.272	2	724	944	------	------	------	CB-22
6	SCS Runoff	0.937	2	724	3,250	------	------	------	CB-23
7	SCS Runoff	1.610	2	724	5,425	------	------	------	CB-24
8	SCS Runoff	1.536	2	724	5,326	------	------	------	CB-25
9	SCS Runoff	0.780	2	724	2,705	------	------	------	CB-26
10	SCS Runoff	1.004	2	724	3,481	------	------	------	CB-27
11	SCS Runoff	0.883	2	724	3,061	------	------	------	CB-28
12	SCS Runoff	2.161	2	724	6,668	------	------	------	CB-29
13	SCS Runoff	2.083	2	724	7,116	------	------	------	CB-30
14	SCS Runoff	1.749	2	734	7,736	------	------	------	CB-31
15	SCS Runoff	0.654	2	730	2,683	------	------	------	CB-32
16	SCS Runoff	0.399	2	724	1,384	------	------	------	CB-33
17	SCS Runoff	1.084	2	734	4,789	------	------	------	CB-34
18	SCS Runoff	2.678	2	734	11,883	------	------	------	CB-35
19	SCS Runoff	0.587	2	724	2,034	------	------	------	CB-36
20	SCS Runoff	1.189	2	728	4,663	------	------	------	CB-37
21	Combine	8.355	2	724	27,424	1, 2, 3,	------	------	Heights Rd - E (1)
22	Combine	4.930	2	724	16,936	4, 5, 6, 7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	5.127	2	724	16,845	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	2.563	2	732	11,803	14, 15, 16,	------	------	Edgerton St
25	Combine	5.091	2	732	23,369	17, 18, 19, 20,	------	------	Site - NW
26	Combine	24.56	2	724	96,378	21, 22, 23, 24, 25	------	------	Design Point 2 - E

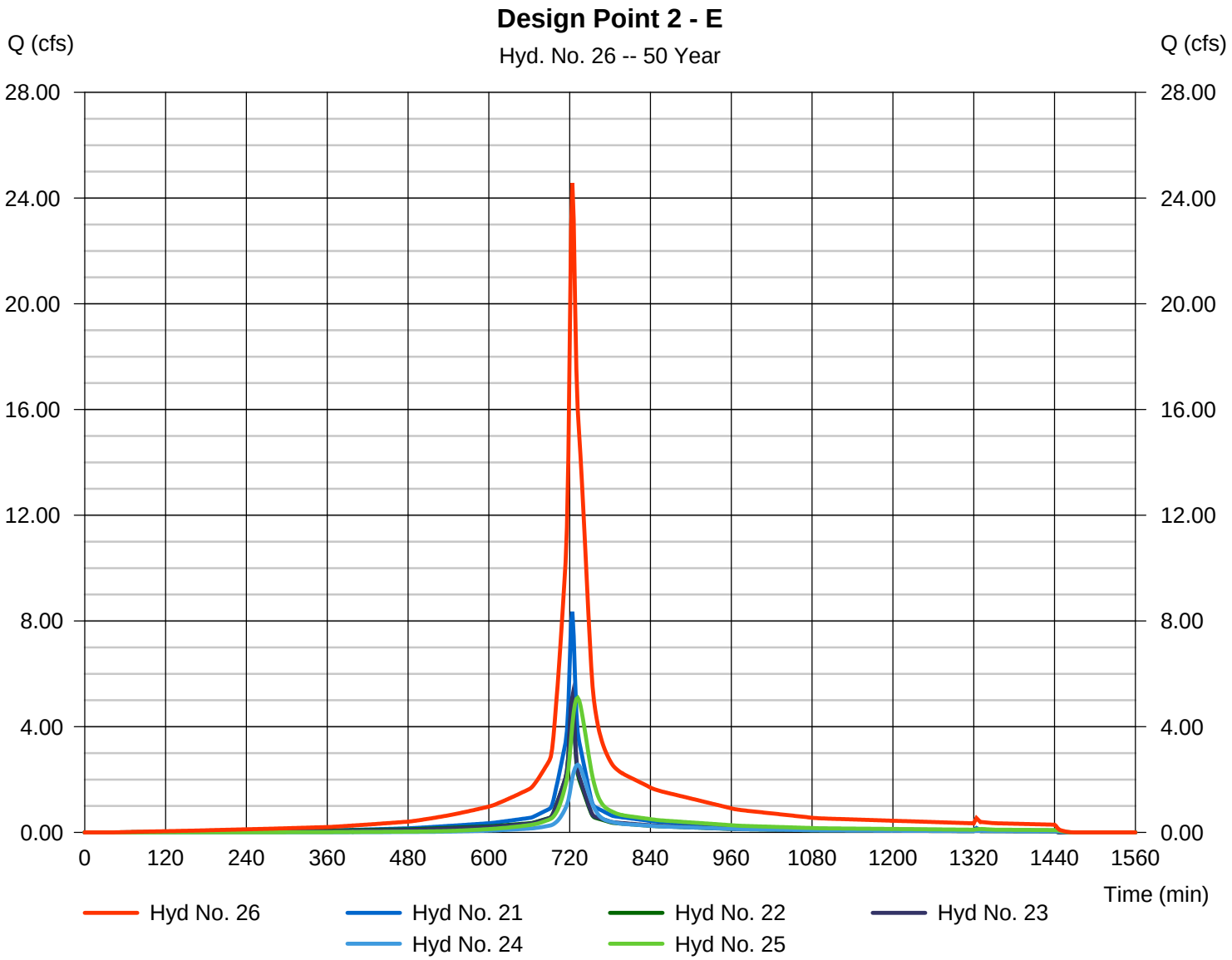
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

Design Point 2 - E

Hydrograph type	=	Combine	Peak discharge	=	24.56 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	96,378 cuft
Inflow hyds.	=	21, 22, 23, 24, 25	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.865	2	724	3,008	------	------	------	CB-18
2	SCS Runoff	1.126	2	724	3,545	------	------	------	CB-19
3	SCS Runoff	4.828	2	724	15,681	------	------	------	CB-20
4	SCS Runoff	1.289	2	724	4,316	------	------	------	CB-21
5	SCS Runoff	0.306	2	724	1,066	------	------	------	CB-22
6	SCS Runoff	1.055	2	724	3,672	------	------	------	CB-23
7	SCS Runoff	1.816	2	724	6,155	------	------	------	CB-24
8	SCS Runoff	1.729	2	724	6,017	------	------	------	CB-25
9	SCS Runoff	0.878	2	724	3,056	------	------	------	CB-26
10	SCS Runoff	1.130	2	724	3,932	------	------	------	CB-27
11	SCS Runoff	0.994	2	724	3,458	------	------	------	CB-28
12	SCS Runoff	2.488	2	724	7,736	------	------	------	CB-29
13	SCS Runoff	2.348	2	724	8,056	------	------	------	CB-30
14	SCS Runoff	2.114	2	734	9,340	------	------	------	CB-31
15	SCS Runoff	0.762	2	730	3,143	------	------	------	CB-32
16	SCS Runoff	0.449	2	724	1,563	------	------	------	CB-33
17	SCS Runoff	1.305	2	734	5,765	------	------	------	CB-34
18	SCS Runoff	3.264	2	734	14,435	------	------	------	CB-35
19	SCS Runoff	0.660	2	724	2,298	------	------	------	CB-36
20	SCS Runoff	1.370	2	728	5,410	------	------	------	CB-37
21	Combine	9.470	2	724	31,288	1, 2, 3,	------	------	Heights Rd - E (1)
22	Combine	5.554	2	724	19,159	4, 5, 6, 7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	5.829	2	724	19,251	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	3.060	2	732	14,046	14, 15, 16,	------	------	Edgerton St
25	Combine	6.102	2	732	27,907	17, 18, 19, 20,	------	------	Site - NW
26	Combine	28.22	2	724	111,652	21, 22, 23, 24, 25	------	------	Design Point 2 - E

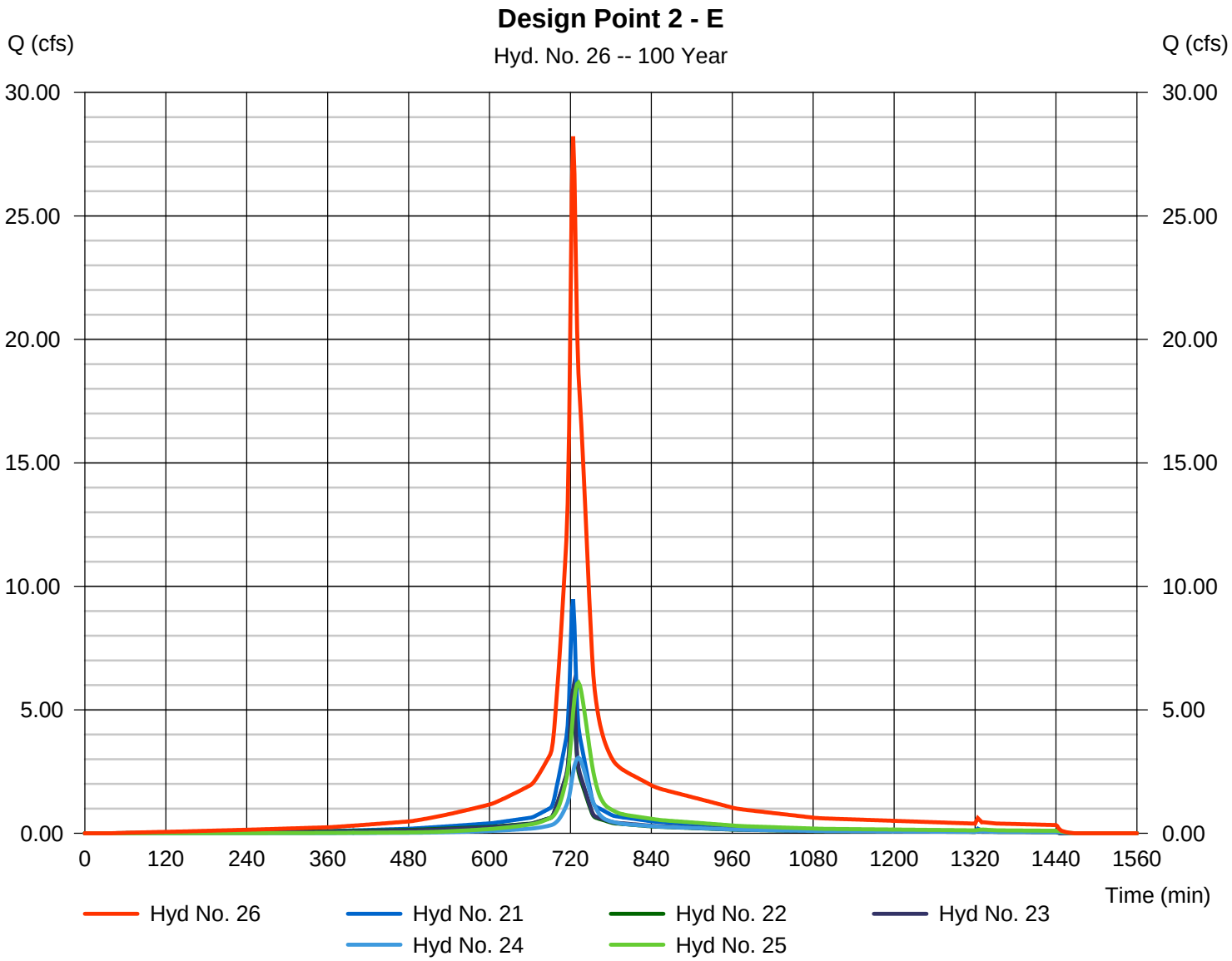
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

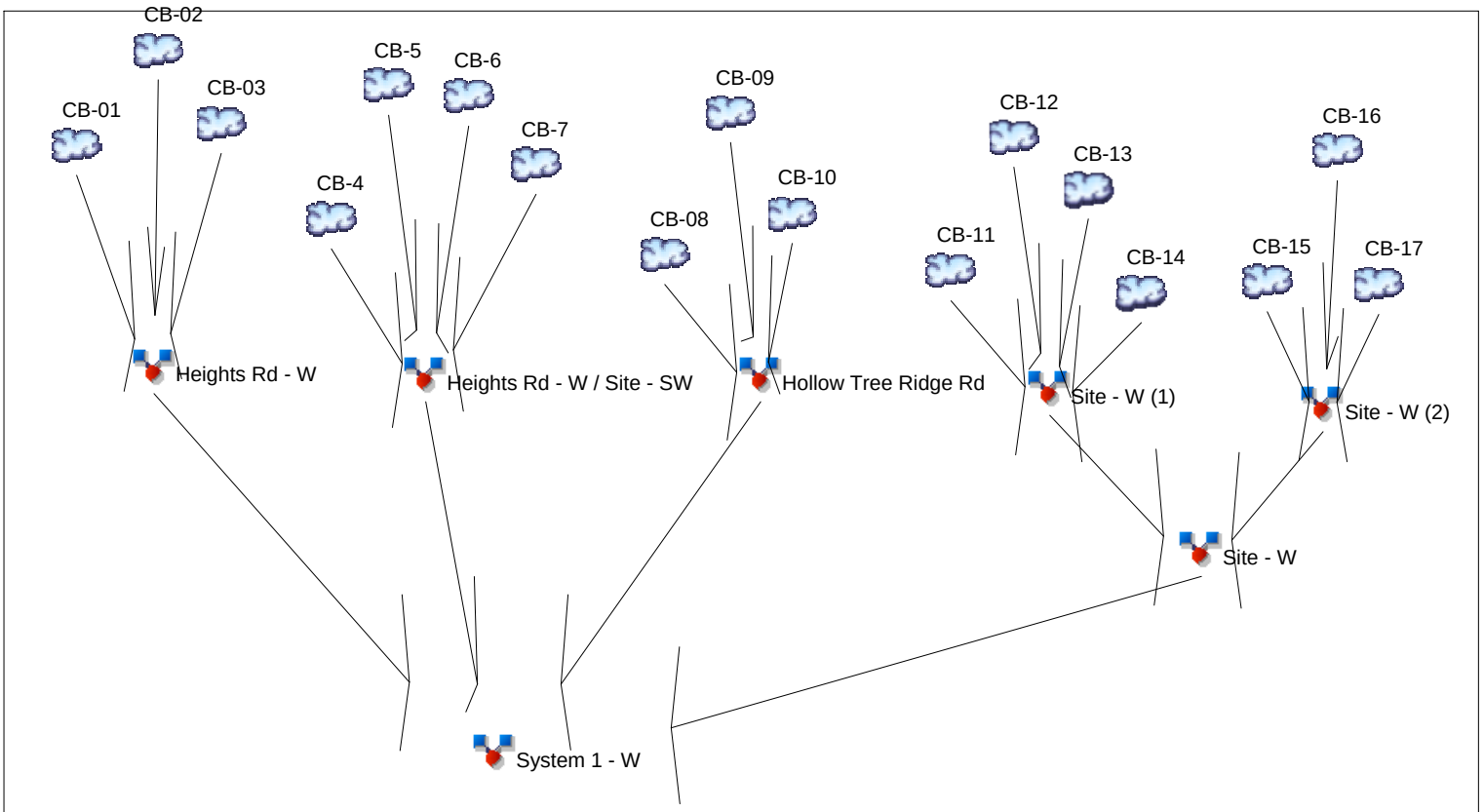
Design Point 2 - E

Hydrograph type	=	Combine	Peak discharge	=	28.22 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	111,652 cuft
Inflow hyds.	=	21, 22, 23, 24, 25	Contrib. drain. area	=	0.000 ac



Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.309	-------	-------	0.471	0.538	0.605	0.681	CB-01
2	SCS Runoff	------	-------	0.287	-------	-------	0.438	0.500	0.562	0.633	CB-02
3	SCS Runoff	------	-------	0.734	-------	-------	1.346	1.602	1.859	2.151	CB-03
4	SCS Runoff	------	-------	1.198	-------	-------	1.877	2.154	2.431	2.745	CB-4
5	SCS Runoff	------	-------	0.720	-------	-------	1.098	1.254	1.409	1.586	CB-5
6	SCS Runoff	------	-------	0.850	-------	-------	1.331	1.528	1.723	1.947	CB-6
7	SCS Runoff	------	-------	0.813	-------	-------	1.240	1.415	1.591	1.791	CB-7
8	SCS Runoff	------	-------	1.208	-------	-------	2.476	3.024	3.584	4.232	CB-08
9	SCS Runoff	------	-------	0.423	-------	-------	0.646	0.737	0.829	0.933	CB-09
10	SCS Runoff	------	-------	1.636	-------	-------	3.298	4.013	4.736	5.569	CB-10
11	SCS Runoff	------	-------	0.463	-------	-------	0.734	0.844	0.954	1.080	CB-11
12	SCS Runoff	------	-------	0.717	-------	-------	1.094	1.248	1.403	1.580	CB-12
13	SCS Runoff	------	-------	1.287	-------	-------	1.995	2.285	2.574	2.904	CB-13
14	SCS Runoff	------	-------	0.374	-------	-------	0.570	0.651	0.732	0.824	CB-14
15	SCS Runoff	------	-------	0.891	-------	-------	1.645	1.960	2.277	2.638	CB-15
16	SCS Runoff	------	-------	0.287	-------	-------	0.438	0.500	0.562	0.633	CB-16
17	SCS Runoff	------	-------	4.402	-------	-------	7.383	8.604	9.819	11.20	CB-17
18	Combine	1, 2, 3,	-------	1.331	-------	-------	2.256	2.641	3.026	3.465	Heights Rd - W
19	Combine	4, 5, 6,	-------	3.581	-------	-------	5.547	6.351	7.154	8.069	Heights Rd - W / Site - SW
20	Combine	7, 8, 9, 10,	-------	2.926	-------	-------	5.821	7.070	8.334	9.792	Hollow Tree Ridge Rd
21	Combine	11, 12, 13,	-------	2.841	-------	-------	4.394	5.029	5.663	6.387	Site - W (1)
22	Combine	14, 15, 16, 17,	-------	5.453	-------	-------	9.273	10.84	12.41	14.20	Site - W (2)
23	Combine	21, 22	-------	7.751	-------	-------	12.82	14.90	16.98	19.35	Site - W
24	Combine	18, 19, 20, 23	-------	15.13	-------	-------	25.62	30.00	34.40	39.42	System 1 - W

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.309	2	724	1,044	------	------	------	CB-01
2	SCS Runoff	0.287	2	724	971	------	------	------	CB-02
3	SCS Runoff	0.734	2	724	2,194	------	------	------	CB-03
4	SCS Runoff	1.198	2	724	3,818	------	------	------	CB-4
5	SCS Runoff	0.720	2	724	2,432	------	------	------	CB-5
6	SCS Runoff	0.850	2	724	2,707	------	------	------	CB-6
7	SCS Runoff	0.813	2	724	2,745	------	------	------	CB-7
8	SCS Runoff	1.208	2	734	5,433	------	------	------	CB-08
9	SCS Runoff	0.423	2	724	1,430	------	------	------	CB-09
10	SCS Runoff	1.636	2	726	5,675	------	------	------	CB-10
11	SCS Runoff	0.463	2	724	1,456	------	------	------	CB-11
12	SCS Runoff	0.717	2	724	2,422	------	------	------	CB-12
13	SCS Runoff	1.287	2	724	4,167	------	------	------	CB-13
14	SCS Runoff	0.374	2	724	1,263	------	------	------	CB-14
15	SCS Runoff	0.891	2	730	3,632	------	------	------	CB-15
16	SCS Runoff	0.287	2	724	971	------	------	------	CB-16
17	SCS Runoff	4.402	2	728	17,024	------	------	------	CB-17
18	Combine	1.331	2	724	4,209	1, 2, 3,	------	------	Heights Rd - W
19	Combine	3.581	2	724	11,702	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	2.926	2	728	12,538	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	2.841	2	724	9,308	11, 12, 13,	------	------	Site - W (1)
22	Combine	5.453	2	728	21,627	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	7.751	2	726	30,935	21, 22	------	------	Site - W
24	Combine	15.13	2	724	59,383	18, 19, 20, 23	------	------	System 1 - W

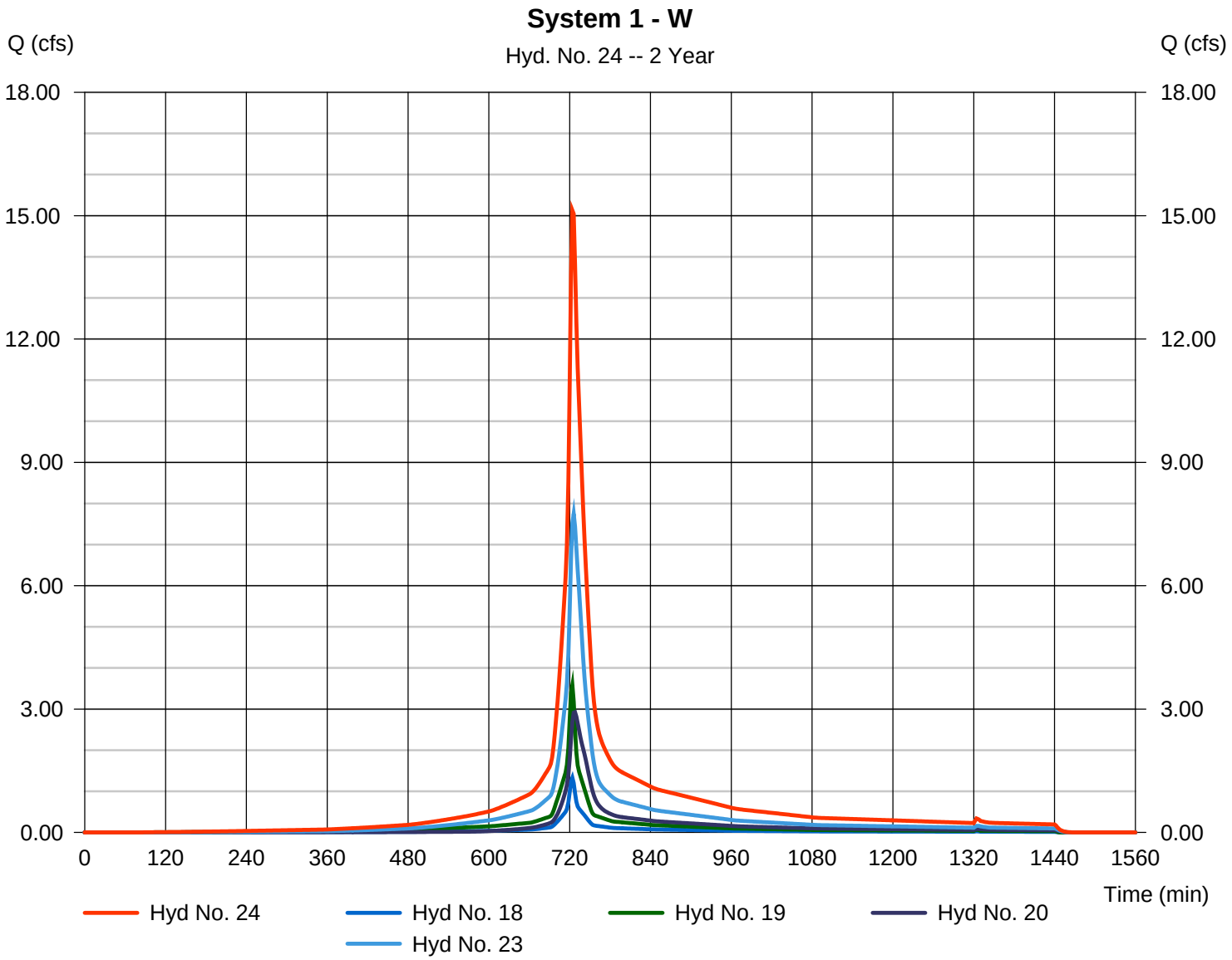
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

System 1 - W

Hydrograph type	= Combine	Peak discharge	= 15.13 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 59,383 cuft
Inflow hyds.	= 18, 19, 20, 23	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.471	2	724	1,621	------	------	------	CB-01
2	SCS Runoff	0.438	2	724	1,507	------	------	------	CB-02
3	SCS Runoff	1.346	2	724	4,062	------	------	------	CB-03
4	SCS Runoff	1.877	2	724	6,151	------	------	------	CB-4
5	SCS Runoff	1.098	2	724	3,777	------	------	------	CB-5
6	SCS Runoff	1.331	2	724	4,362	------	------	------	CB-6
7	SCS Runoff	1.240	2	724	4,263	------	------	------	CB-7
8	SCS Runoff	2.476	2	734	10,936	------	------	------	CB-08
9	SCS Runoff	0.646	2	724	2,221	------	------	------	CB-09
10	SCS Runoff	3.298	2	726	11,258	------	------	------	CB-10
11	SCS Runoff	0.734	2	724	2,375	------	------	------	CB-11
12	SCS Runoff	1.094	2	724	3,761	------	------	------	CB-12
13	SCS Runoff	1.995	2	724	6,633	------	------	------	CB-13
14	SCS Runoff	0.570	2	724	1,961	------	------	------	CB-14
15	SCS Runoff	1.645	2	730	6,725	------	------	------	CB-15
16	SCS Runoff	0.438	2	724	1,507	------	------	------	CB-16
17	SCS Runoff	7.383	2	728	29,181	------	------	------	CB-17
18	Combine	2.256	2	724	7,191	1, 2, 3,	------	------	Heights Rd - W
19	Combine	5.547	2	724	18,553	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	5.821	2	728	24,415	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	4.394	2	724	14,730	11, 12, 13,	------	------	Site - W (1)
22	Combine	9.273	2	728	37,414	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	12.82	2	726	52,143	21, 22	------	------	Site - W
24	Combine	25.62	2	724	102,302	18, 19, 20, 23	------	------	System 1 - W

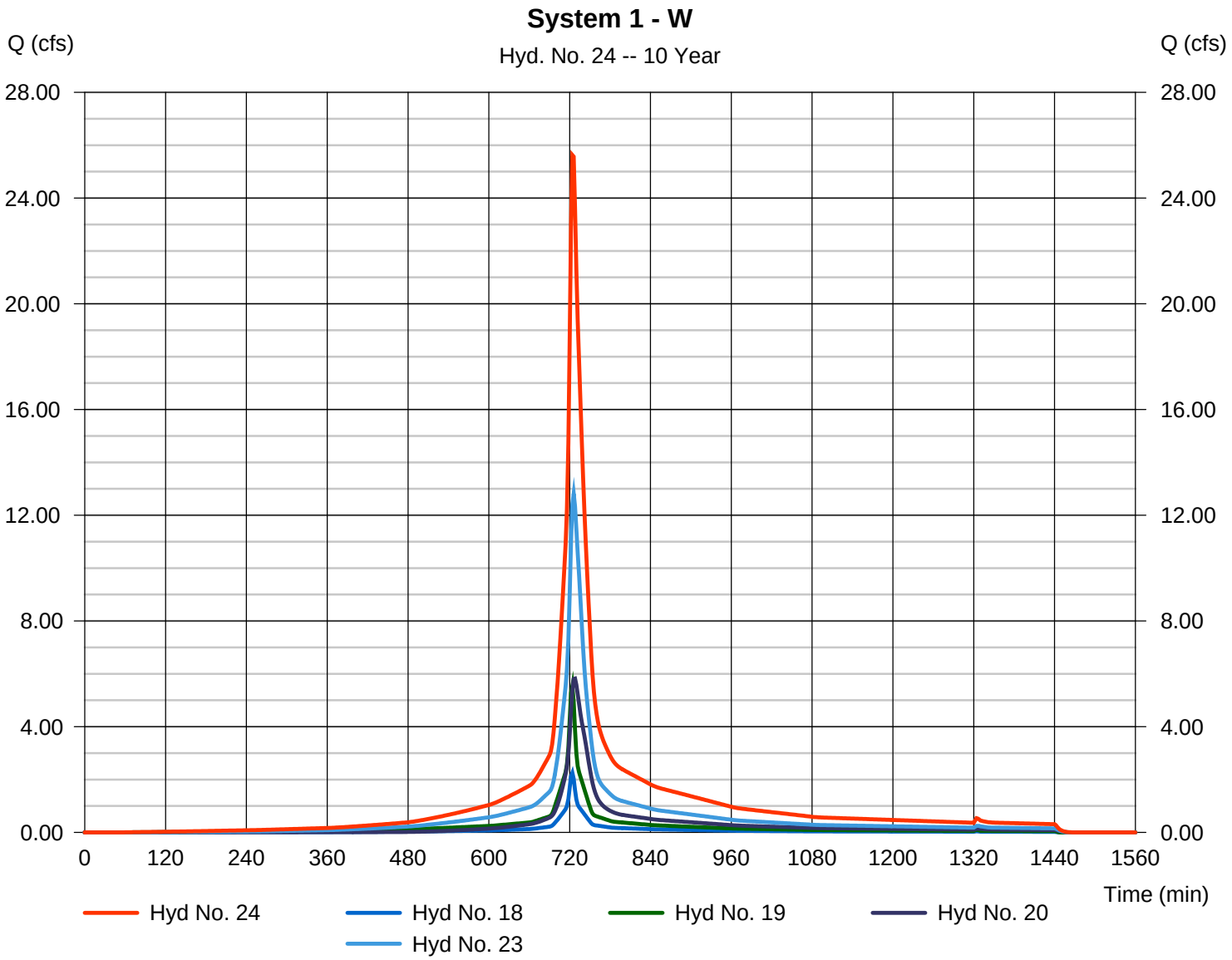
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

System 1 - W

Hydrograph type	=	Combine	Peak discharge	=	25.62 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	102,302 cuft
Inflow hyds.	=	18, 19, 20, 23	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.538	2	724	1,859	------	------	------	CB-01
2	SCS Runoff	0.500	2	724	1,729	------	------	------	CB-02
3	SCS Runoff	1.602	2	724	4,865	------	------	------	CB-03
4	SCS Runoff	2.154	2	724	7,118	------	------	------	CB-4
5	SCS Runoff	1.254	2	724	4,331	------	------	------	CB-5
6	SCS Runoff	1.528	2	724	5,047	------	------	------	CB-6
7	SCS Runoff	1.415	2	724	4,889	------	------	------	CB-7
8	SCS Runoff	3.024	2	734	13,370	------	------	------	CB-08
9	SCS Runoff	0.737	2	724	2,547	------	------	------	CB-09
10	SCS Runoff	4.013	2	726	13,715	------	------	------	CB-10
11	SCS Runoff	0.844	2	724	2,756	------	------	------	CB-11
12	SCS Runoff	1.248	2	724	4,313	------	------	------	CB-12
13	SCS Runoff	2.285	2	724	7,651	------	------	------	CB-13
14	SCS Runoff	0.651	2	724	2,249	------	------	------	CB-14
15	SCS Runoff	1.960	2	730	8,054	------	------	------	CB-15
16	SCS Runoff	0.500	2	724	1,729	------	------	------	CB-16
17	SCS Runoff	8.604	2	728	34,283	------	------	------	CB-17
18	Combine	2.641	2	724	8,452	1, 2, 3,	------	------	Heights Rd - W
19	Combine	6.351	2	724	21,384	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	7.070	2	728	29,631	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	5.029	2	724	16,970	11, 12, 13,	------	------	Site - W (1)
22	Combine	10.84	2	728	44,065	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	14.90	2	726	61,035	21, 22	------	------	Site - W
24	Combine	30.00	2	724	120,503	18, 19, 20, 23	------	------	System 1 - W

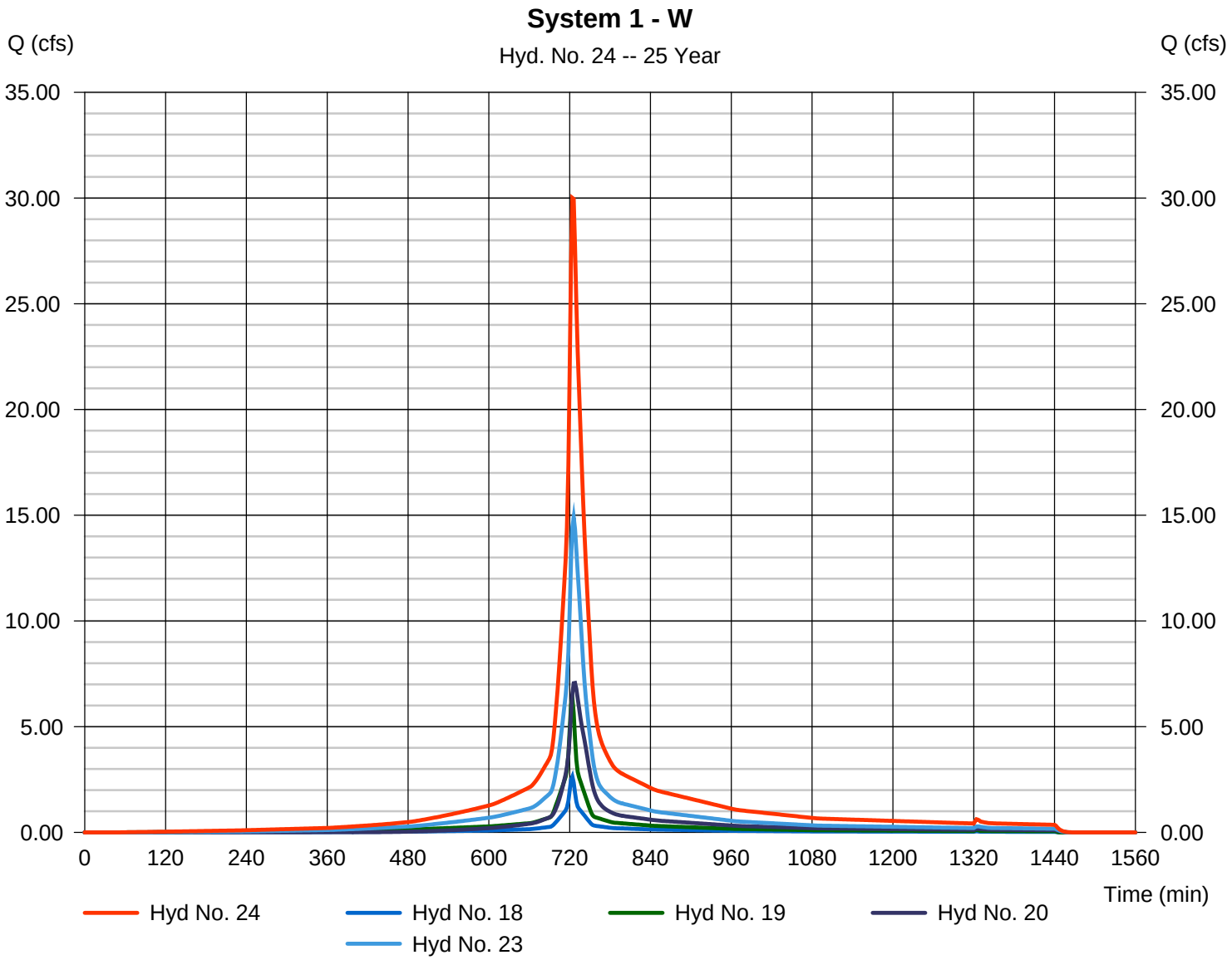
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

System 1 - W

Hydrograph type	=	Combine	Peak discharge	=	30.00 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	120,503 cuft
Inflow hyds.	=	18, 19, 20, 23	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.605	2	724	2,097	------	------	------	CB-01
2	SCS Runoff	0.562	2	724	1,950	------	------	------	CB-02
3	SCS Runoff	1.859	2	724	5,679	------	------	------	CB-03
4	SCS Runoff	2.431	2	724	8,085	------	------	------	CB-4
5	SCS Runoff	1.409	2	724	4,886	------	------	------	CB-5
6	SCS Runoff	1.723	2	724	5,733	------	------	------	CB-6
7	SCS Runoff	1.591	2	724	5,515	------	------	------	CB-7
8	SCS Runoff	3.584	2	732	15,867	------	------	------	CB-08
9	SCS Runoff	0.829	2	724	2,873	------	------	------	CB-09
10	SCS Runoff	4.736	2	726	16,230	------	------	------	CB-10
11	SCS Runoff	0.954	2	724	3,139	------	------	------	CB-11
12	SCS Runoff	1.403	2	724	4,865	------	------	------	CB-12
13	SCS Runoff	2.574	2	724	8,671	------	------	------	CB-13
14	SCS Runoff	0.732	2	724	2,537	------	------	------	CB-14
15	SCS Runoff	2.277	2	730	9,402	------	------	------	CB-15
16	SCS Runoff	0.562	2	724	1,950	------	------	------	CB-16
17	SCS Runoff	9.819	2	728	39,417	------	------	------	CB-17
18	Combine	3.026	2	724	9,726	1, 2, 3,	------	------	Heights Rd - W
19	Combine	7.154	2	724	24,219	4, 5, 6,	------	------	Heights Rd - W / Site - SW
20	Combine	8.334	2	728	34,970	7, 8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	5.663	2	724	19,212	11, 12, 13,	------	------	Site - W (1)
22	Combine	12.41	2	728	50,769	14, 15, 16, 17,	------	------	Site - W (2)
23	Combine	16.98	2	726	69,981	21, 22	------	------	Site - W
24	Combine	34.40	2	724	138,895	18, 19, 20, 23	------	------	System 1 - W

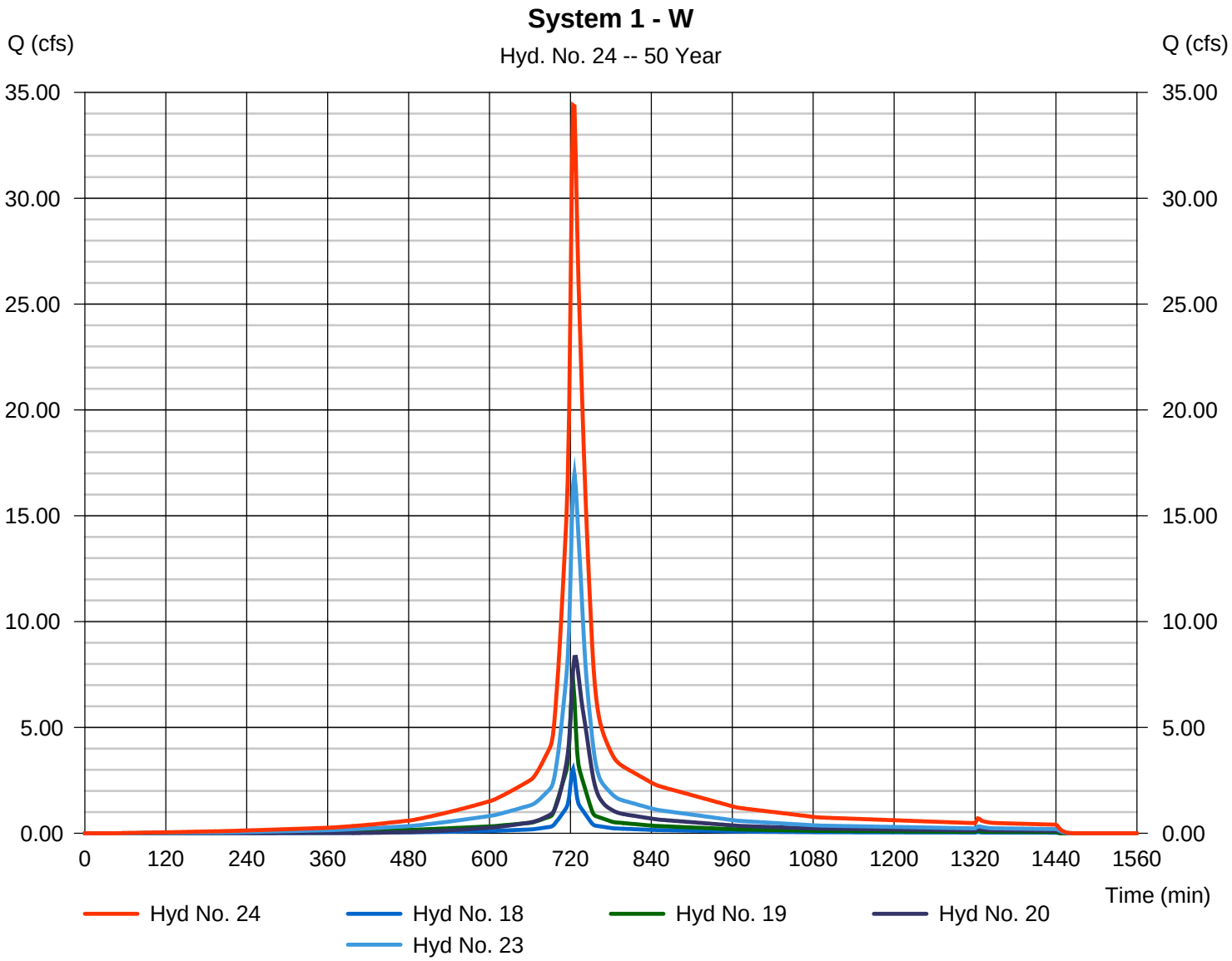
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

System 1 - W

Hydrograph type	= Combine	Peak discharge	= 34.40 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 138,895 cuft
Inflow hyds.	= 18, 19, 20, 23	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.681	2	724	2,369	------	------	------	CB-01
2	SCS Runoff	0.633	2	724	2,203	------	------	------	CB-02
3	SCS Runoff	2.151	2	724	6,621	------	------	------	CB-03
4	SCS Runoff	2.745	2	724	9,193	------	------	------	CB-4
5	SCS Runoff	1.586	2	724	5,519	------	------	------	CB-5
6	SCS Runoff	1.947	2	724	6,518	------	------	------	CB-6
7	SCS Runoff	1.791	2	724	6,230	------	------	------	CB-7
8	SCS Runoff	4.232	2	732	18,780	------	------	------	CB-08
9	SCS Runoff	0.933	2	724	3,245	------	------	------	CB-09
10	SCS Runoff	5.569	2	726	19,159	------	------	------	CB-10
11	SCS Runoff	1.080	2	724	3,576	------	------	------	CB-11
12	SCS Runoff	1.580	2	724	5,496	------	------	------	CB-12
13	SCS Runoff	2.904	2	724	9,838	------	------	------	CB-13
14	SCS Runoff	0.824	2	724	2,866	------	------	------	CB-14
15	SCS Runoff	2.638	2	730	10,960	------	------	------	CB-15
16	SCS Runoff	0.633	2	724	2,203	------	------	------	CB-16
17	SCS Runoff	11.20	2	728	45,314	------	------	------	CB-17
18	Combine	3.465	2	724	11,193	1, 2, 3,	------	------	Heights Rd - W
19	Combine	8.069	2	724	27,461	4, 5, 6, 7,	------	------	Heights Rd - W / Site - SW
20	Combine	9.792	2	726	41,184	8, 9, 10,	------	------	Hollow Tree Ridge Rd
21	Combine	6.387	2	724	21,776	11, 12, 13, 14,	------	------	Site - W (1)
22	Combine	14.20	2	728	58,477	15, 16, 17,	------	------	Site - W (2)
23	Combine	19.35	2	726	80,253	21, 22	------	------	Site - W
24	Combine	39.42	2	724	160,091	18, 19, 20, 23	------	------	System 1 - W

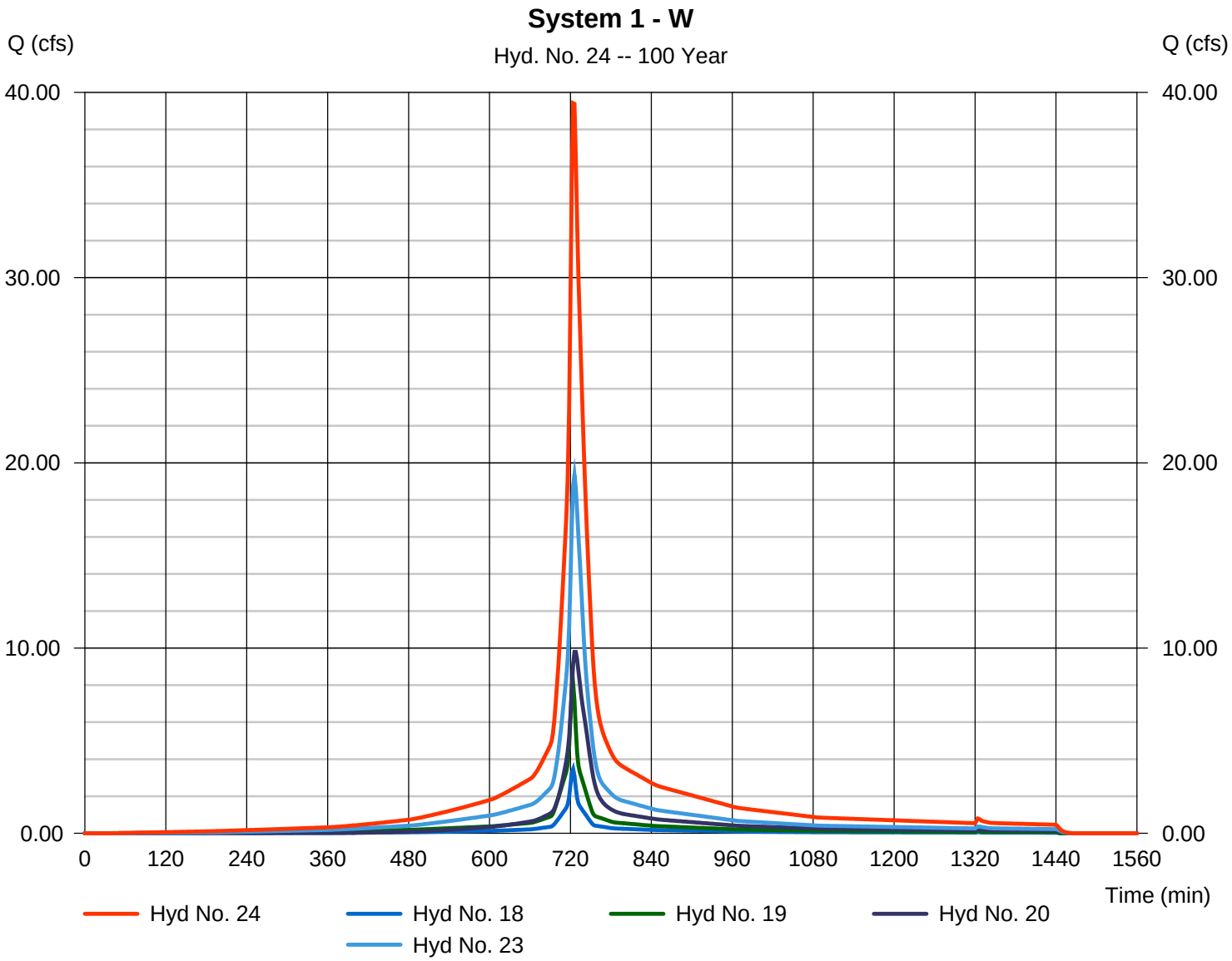
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 24

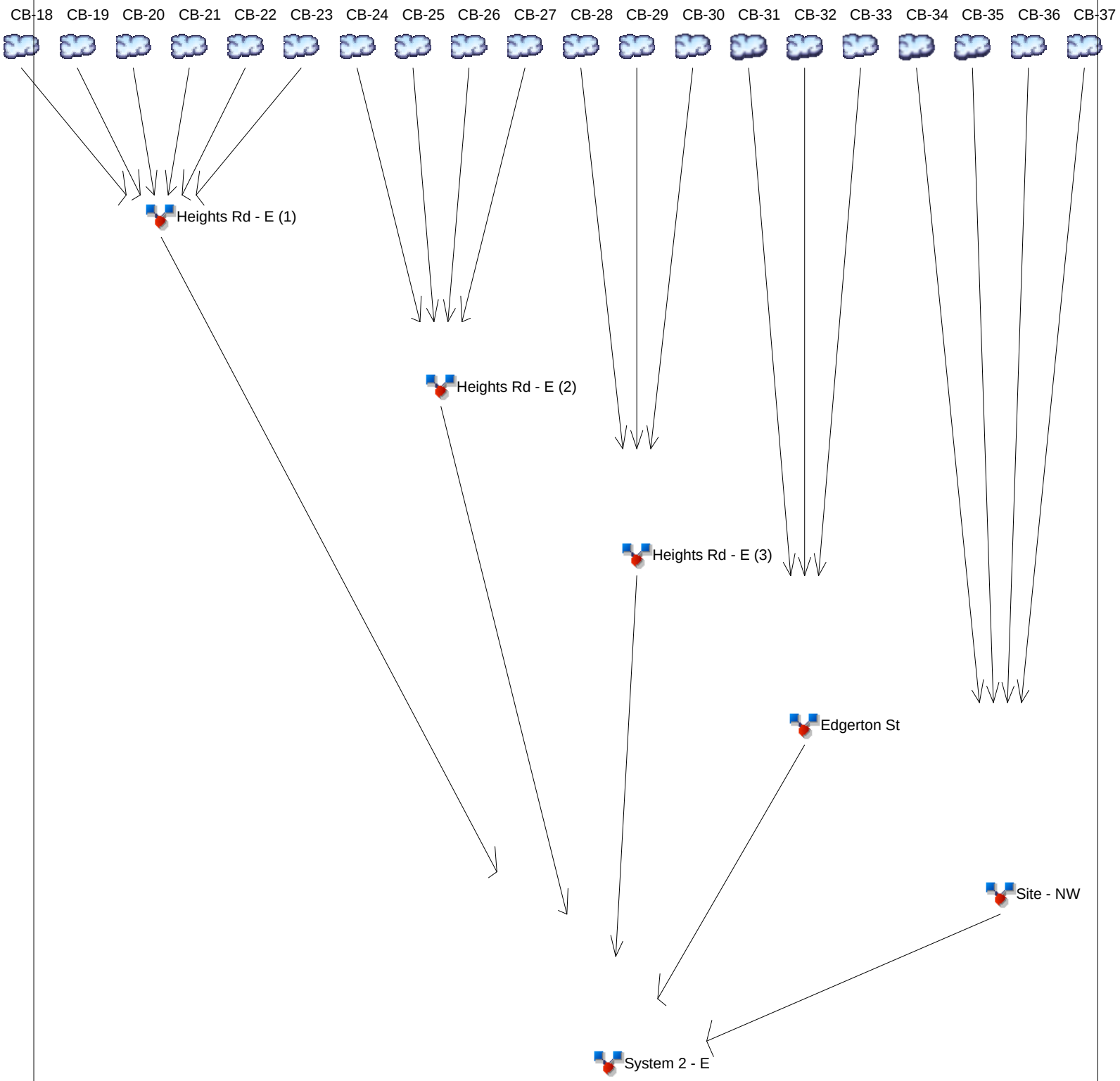
System 1 - W

Hydrograph type	= Combine	Peak discharge	= 39.42 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 160,091 cuft
Inflow hyds.	= 18, 19, 20, 23	Contrib. drain. area	= 0.000 ac



Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Project: Existing_Design Point 2.gpw	Wednesday, 03 / 1 / 2017

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.392	-------	-------	0.599	0.683	0.768	0.865	CB-18
2	SCS Runoff	------	-------	0.425	-------	-------	0.732	0.858	0.983	1.126	CB-19
3	SCS Runoff	------	-------	1.993	-------	-------	3.239	3.747	4.253	4.828	CB-20
4	SCS Runoff	------	-------	0.562	-------	-------	0.881	1.011	1.141	1.289	CB-21
5	SCS Runoff	------	-------	0.139	-------	-------	0.212	0.242	0.272	0.306	CB-22
6	SCS Runoff	------	-------	0.479	-------	-------	0.731	0.834	0.937	1.055	CB-23
7	SCS Runoff	------	-------	0.805	-------	-------	1.248	1.430	1.610	1.816	CB-24
8	SCS Runoff	------	-------	0.785	-------	-------	1.197	1.367	1.536	1.729	CB-25
9	SCS Runoff	------	-------	0.399	-------	-------	0.608	0.694	0.780	0.878	CB-26
10	SCS Runoff	------	-------	0.513	-------	-------	0.783	0.893	1.004	1.130	CB-27
11	SCS Runoff	------	-------	0.451	-------	-------	0.688	0.786	0.883	0.994	CB-28
12	SCS Runoff	------	-------	0.894	-------	-------	1.587	1.874	2.161	2.488	CB-29
13	SCS Runoff	------	-------	1.054	-------	-------	1.620	1.852	2.083	2.348	CB-30
14	SCS Runoff	------	-------	1.043	-------	-------	1.864	2.205	2.546	2.935	CB-31
15	SCS Runoff	------	-------	0.221	-------	-------	0.438	0.531	0.625	0.733	CB-32
16	SCS Runoff	------	-------	0.204	-------	-------	0.311	0.355	0.399	0.449	CB-33
17	SCS Runoff	------	-------	0.343	-------	-------	0.768	0.956	1.150	1.374	CB-34
18	SCS Runoff	------	-------	2.029	-------	-------	3.734	4.448	5.163	5.979	CB-35
19	SCS Runoff	------	-------	0.300	-------	-------	0.457	0.522	0.587	0.660	CB-36
20	SCS Runoff	------	-------	0.488	-------	-------	0.871	1.030	1.189	1.370	CB-37
21	Combine	1, 2, 3,	-------	3.991	-------	-------	6.393	7.375	8.355	9.470	Heights Rd - E (1)
22	Combine	4, 5, 6, 7, 8, 9, 10,	-------	2.502	-------	-------	3.837	4.384	4.930	5.554	Heights Rd - E (2)
23	Combine	11, 12, 13,	-------	2.400	-------	-------	3.896	4.512	5.127	5.829	Heights Rd - E (3)
24	Combine	14, 15, 16,	-------	1.356	-------	-------	2.439	2.891	3.343	3.860	Edgerton St
25	Combine	17, 18, 19, 20,	-------	3.002	-------	-------	5.558	6.637	7.723	8.967	Site - NW
26	Combine	21, 22, 23, 24, 25	-------	12.77	-------	-------	21.30	24.83	28.38	32.42	System 2 - E

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.392	2	724	1,326	------	------	------	CB-18
2	SCS Runoff	0.425	2	724	1,278	------	------	------	CB-19
3	SCS Runoff	1.993	2	724	6,134	------	------	------	CB-20
4	SCS Runoff	0.562	2	724	1,792	------	------	------	CB-21
5	SCS Runoff	0.139	2	724	470	------	------	------	CB-22
6	SCS Runoff	0.479	2	724	1,618	------	------	------	CB-23
7	SCS Runoff	0.805	2	724	2,607	------	------	------	CB-24
8	SCS Runoff	0.785	2	724	2,651	------	------	------	CB-25
9	SCS Runoff	0.399	2	724	1,346	------	------	------	CB-26
10	SCS Runoff	0.513	2	724	1,733	------	------	------	CB-27
11	SCS Runoff	0.451	2	724	1,524	------	------	------	CB-28
12	SCS Runoff	0.894	2	724	2,676	------	------	------	CB-29
13	SCS Runoff	1.054	2	724	3,480	------	------	------	CB-30
14	SCS Runoff	1.043	2	734	4,612	------	------	------	CB-31
15	SCS Runoff	0.221	2	732	911	------	------	------	CB-32
16	SCS Runoff	0.204	2	724	689	------	------	------	CB-33
17	SCS Runoff	0.343	2	734	1,591	------	------	------	CB-34
18	SCS Runoff	2.029	2	726	6,931	------	------	------	CB-35
19	SCS Runoff	0.300	2	724	1,012	------	------	------	CB-36
20	SCS Runoff	0.488	2	728	1,871	------	------	------	CB-37
21	Combine	3.991	2	724	12,618	1, 2, 3,	------	------	Heights Rd - E (1)
22	Combine	2.502	2	724	8,337	4, 5, 6, 7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	2.400	2	724	7,680	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	1.356	2	732	6,212	14, 15, 16,	------	------	Edgerton St
25	Combine	3.002	2	726	11,406	17, 18, 19, 20,	------	------	Site - NW
26	Combine	12.77	2	724	46,254	21, 22, 23, 24, 25	------	------	System 2 - E

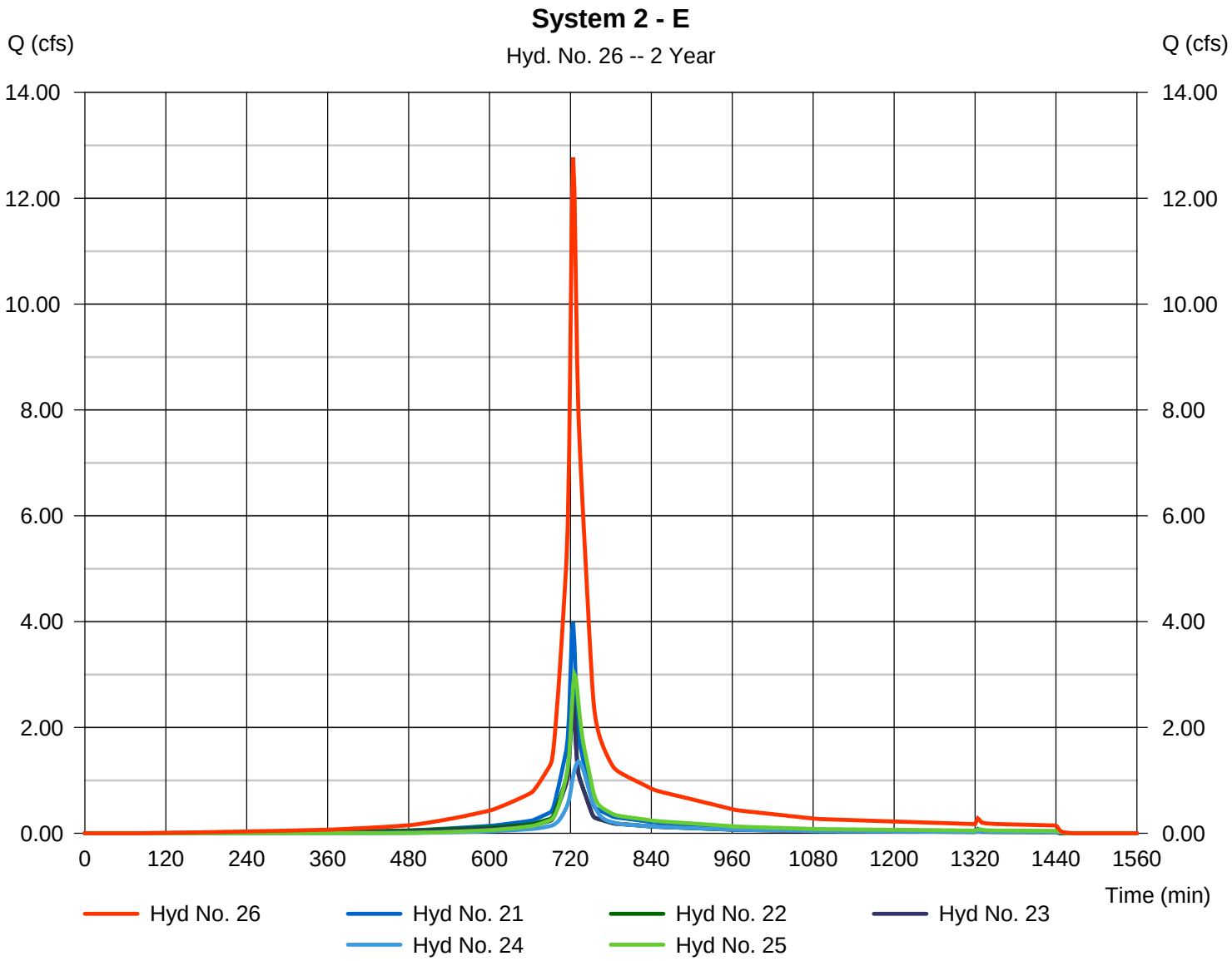
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

System 2 - E

Hydrograph type	= Combine	Peak discharge	= 12.77 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 46,254 cuft
Inflow hyds.	= 21, 22, 23, 24, 25	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.599	2	724	2,059	------	------	------	CB-18
2	SCS Runoff	0.732	2	724	2,247	------	------	------	CB-19
3	SCS Runoff	3.239	2	724	10,256	------	------	------	CB-20
4	SCS Runoff	0.881	2	724	2,888	------	------	------	CB-21
5	SCS Runoff	0.212	2	724	729	------	------	------	CB-22
6	SCS Runoff	0.731	2	724	2,512	------	------	------	CB-23
7	SCS Runoff	1.248	2	724	4,149	------	------	------	CB-24
8	SCS Runoff	1.197	2	724	4,117	------	------	------	CB-25
9	SCS Runoff	0.608	2	724	2,091	------	------	------	CB-26
10	SCS Runoff	0.783	2	724	2,691	------	------	------	CB-27
11	SCS Runoff	0.688	2	724	2,367	------	------	------	CB-28
12	SCS Runoff	1.587	2	724	4,826	------	------	------	CB-29
13	SCS Runoff	1.620	2	724	5,472	------	------	------	CB-30
14	SCS Runoff	1.864	2	732	8,319	------	------	------	CB-31
15	SCS Runoff	0.438	2	730	1,782	------	------	------	CB-32
16	SCS Runoff	0.311	2	724	1,070	------	------	------	CB-33
17	SCS Runoff	0.768	2	734	3,407	------	------	------	CB-34
18	SCS Runoff	3.734	2	726	12,833	------	------	------	CB-35
19	SCS Runoff	0.457	2	724	1,572	------	------	------	CB-36
20	SCS Runoff	0.871	2	728	3,374	------	------	------	CB-37
21	Combine	6.393	2	724	20,692	1, 2, 3, 4, 5, 6,	------	------	Heights Rd - E (1)
22	Combine	3.837	2	724	13,048	7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	3.896	2	724	12,664	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	2.439	2	732	11,170	14, 15, 16,	------	------	Edgerton St
25	Combine	5.558	2	726	21,187	17, 18, 19, 20,	------	------	Site - NW
26	Combine	21.30	2	724	78,762	21, 22, 23, 24, 25	------	------	System 2 - E

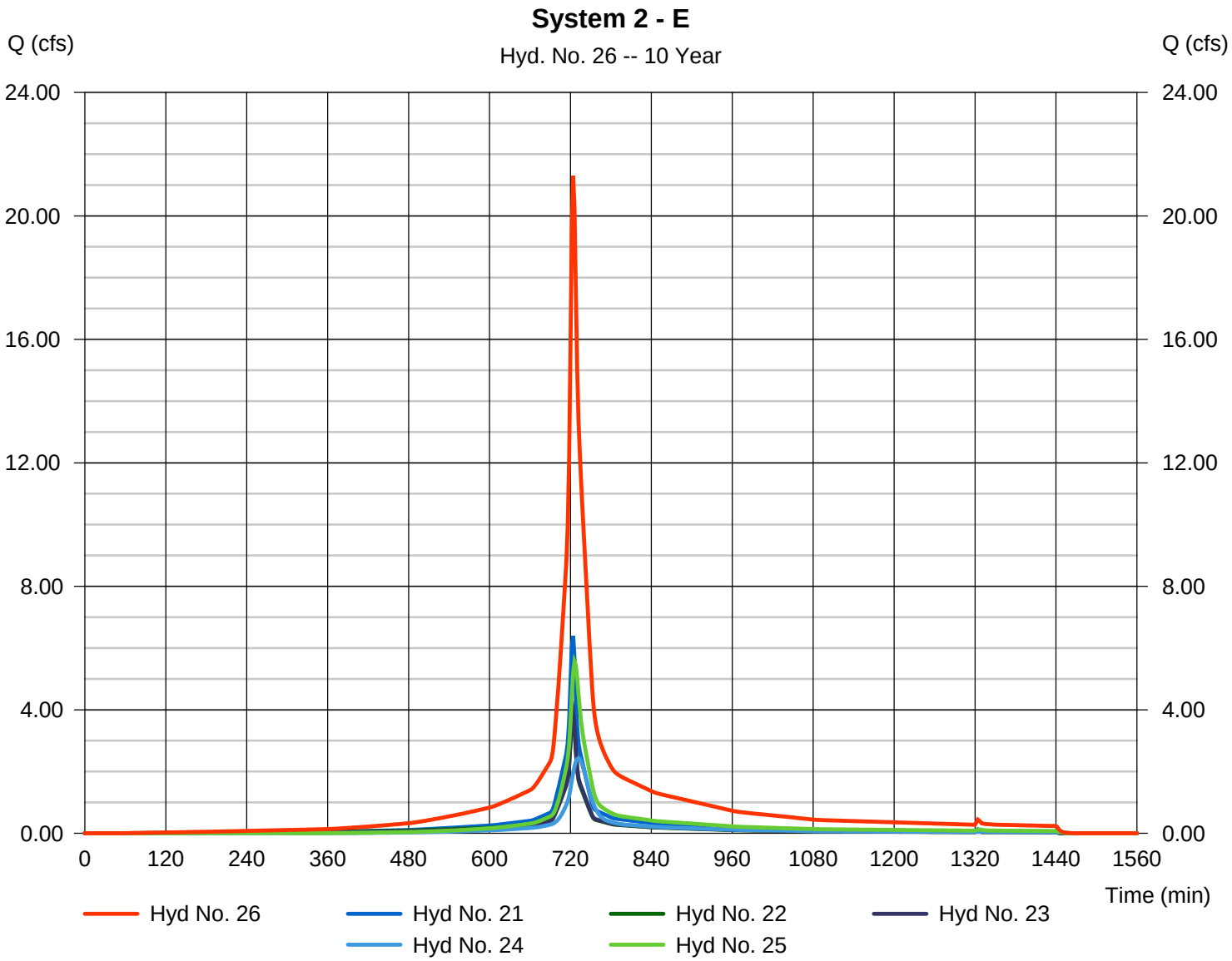
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

System 2 - E

Hydrograph type	=	Combine	Peak discharge	=	21.30 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	78,762 cuft
Inflow hyds.	=	21, 22, 23, 24, 25	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.683	2	724	2,361	------	------	------	CB-18
2	SCS Runoff	0.858	2	724	2,657	------	------	------	CB-19
3	SCS Runoff	3.747	2	724	11,976	------	------	------	CB-20
4	SCS Runoff	1.011	2	724	3,341	------	------	------	CB-21
5	SCS Runoff	0.242	2	724	836	------	------	------	CB-22
6	SCS Runoff	0.834	2	724	2,881	------	------	------	CB-23
7	SCS Runoff	1.430	2	724	4,787	------	------	------	CB-24
8	SCS Runoff	1.367	2	724	4,721	------	------	------	CB-25
9	SCS Runoff	0.694	2	724	2,398	------	------	------	CB-26
10	SCS Runoff	0.893	2	724	3,086	------	------	------	CB-27
11	SCS Runoff	0.786	2	724	2,714	------	------	------	CB-28
12	SCS Runoff	1.874	2	724	5,741	------	------	------	CB-29
13	SCS Runoff	1.852	2	724	6,294	------	------	------	CB-30
14	SCS Runoff	2.205	2	732	9,898	------	------	------	CB-31
15	SCS Runoff	0.531	2	730	2,163	------	------	------	CB-32
16	SCS Runoff	0.355	2	724	1,227	------	------	------	CB-33
17	SCS Runoff	0.956	2	734	4,229	------	------	------	CB-34
18	SCS Runoff	4.448	2	726	15,369	------	------	------	CB-35
19	SCS Runoff	0.522	2	724	1,803	------	------	------	CB-36
20	SCS Runoff	1.030	2	728	4,015	------	------	------	CB-37
21	Combine	7.375	2	724	24,052	1, 2, 3,	------	------	Heights Rd - E (1)
22	Combine	4.384	2	724	14,992	4, 5, 6, 7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	4.512	2	724	14,749	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	2.891	2	732	13,287	14, 15, 16,	------	------	Edgerton St
25	Combine	6.637	2	726	25,415	17, 18, 19, 20,	------	------	Site - NW
26	Combine	24.83	2	724	92,495	21, 22, 23, 24, 25	------	------	System 2 - E

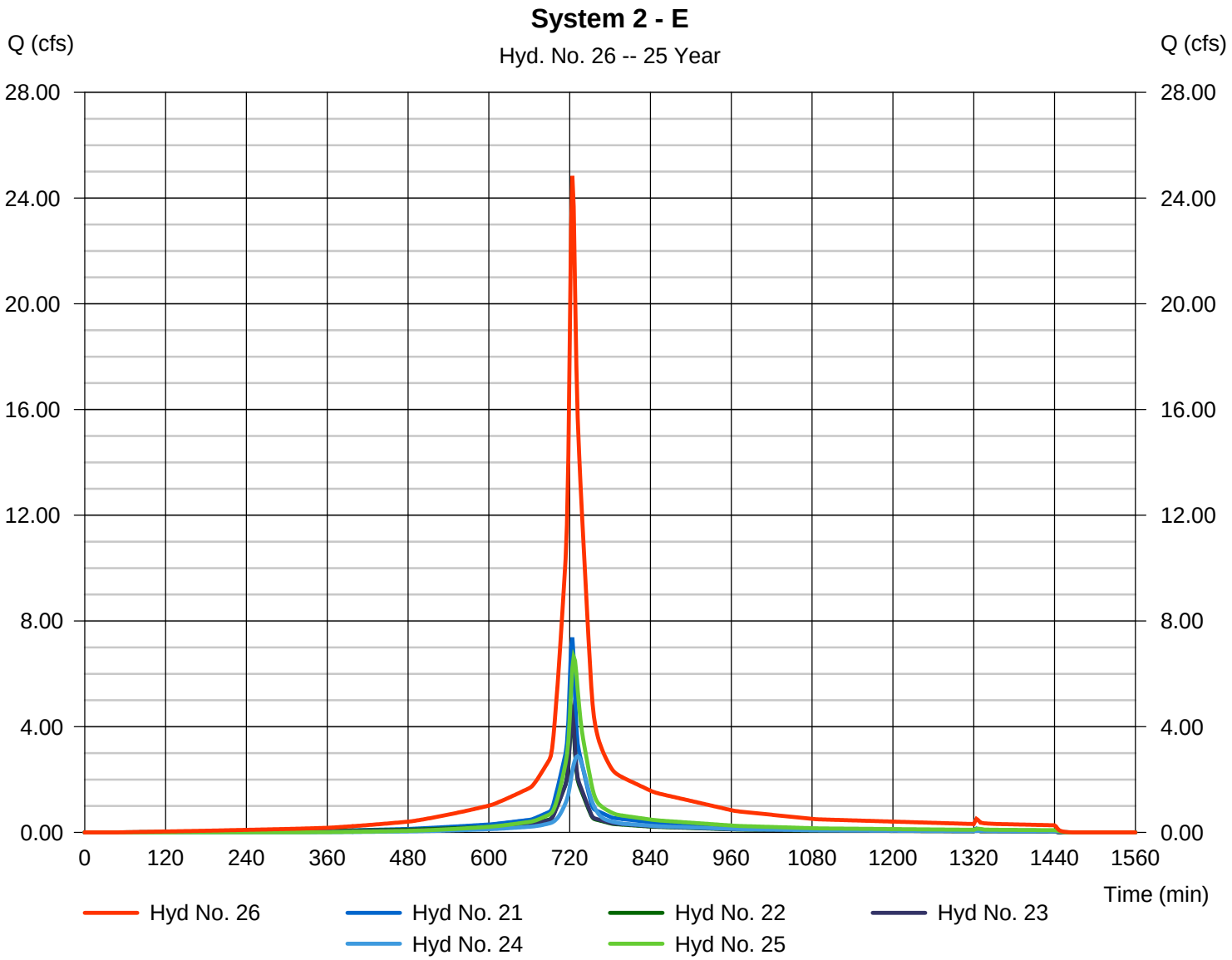
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

System 2 - E

Hydrograph type	=	Combine	Peak discharge	=	24.83 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	92,495 cuft
Inflow hyds.	=	21, 22, 23, 24, 25	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.768	2	724	2,663	------	------	------	CB-18
2	SCS Runoff	0.983	2	724	3,070	------	------	------	CB-19
3	SCS Runoff	4.253	2	724	13,702	------	------	------	CB-20
4	SCS Runoff	1.141	2	724	3,796	------	------	------	CB-21
5	SCS Runoff	0.272	2	724	944	------	------	------	CB-22
6	SCS Runoff	0.937	2	724	3,250	------	------	------	CB-23
7	SCS Runoff	1.610	2	724	5,425	------	------	------	CB-24
8	SCS Runoff	1.536	2	724	5,326	------	------	------	CB-25
9	SCS Runoff	0.780	2	724	2,705	------	------	------	CB-26
10	SCS Runoff	1.004	2	724	3,481	------	------	------	CB-27
11	SCS Runoff	0.883	2	724	3,061	------	------	------	CB-28
12	SCS Runoff	2.161	2	724	6,668	------	------	------	CB-29
13	SCS Runoff	2.083	2	724	7,116	------	------	------	CB-30
14	SCS Runoff	2.546	2	732	11,495	------	------	------	CB-31
15	SCS Runoff	0.625	2	730	2,552	------	------	------	CB-32
16	SCS Runoff	0.399	2	724	1,384	------	------	------	CB-33
17	SCS Runoff	1.150	2	734	5,079	------	------	------	CB-34
18	SCS Runoff	5.163	2	726	17,941	------	------	------	CB-35
19	SCS Runoff	0.587	2	724	2,034	------	------	------	CB-36
20	SCS Runoff	1.189	2	728	4,663	------	------	------	CB-37
21	Combine	8.355	2	724	27,424	1, 2, 3,	------	------	Heights Rd - E (1)
22	Combine	4.930	2	724	16,936	4, 5, 6, 7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	5.127	2	724	16,845	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	3.343	2	732	15,431	14, 15, 16,	------	------	Edgerton St
25	Combine	7.723	2	726	29,716	17, 18, 19, 20,	------	------	Site - NW
26	Combine	28.38	2	724	106,353	21, 22, 23, 24, 25	------	------	System 2 - E

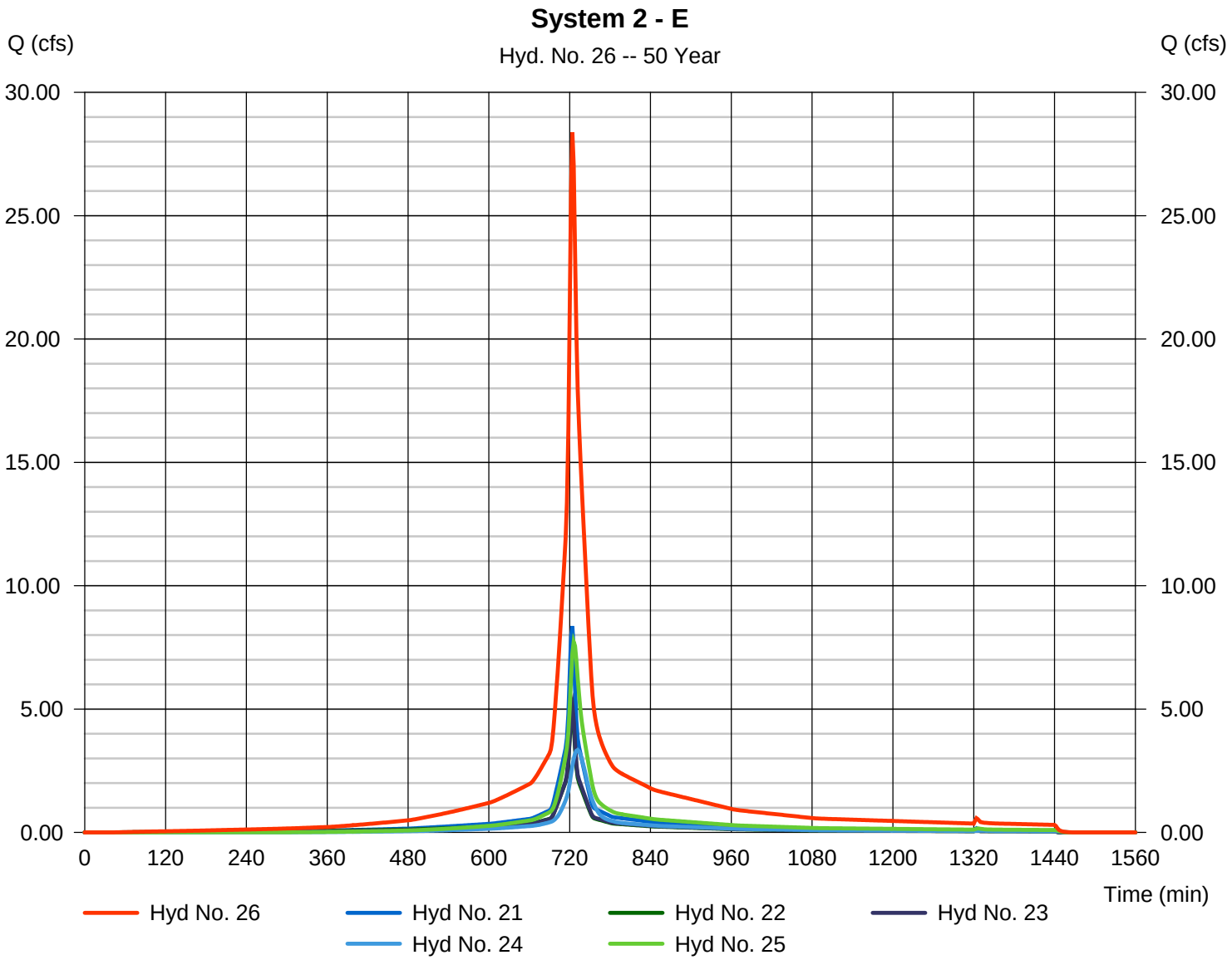
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

System 2 - E

Hydrograph type	= Combine	Peak discharge	= 28.38 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 106,353 cuft
Inflow hyds.	= 21, 22, 23, 24, 25	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.865	2	724	3,008	------	------	------	CB-18
2	SCS Runoff	1.126	2	724	3,545	------	------	------	CB-19
3	SCS Runoff	4.828	2	724	15,681	------	------	------	CB-20
4	SCS Runoff	1.289	2	724	4,316	------	------	------	CB-21
5	SCS Runoff	0.306	2	724	1,066	------	------	------	CB-22
6	SCS Runoff	1.055	2	724	3,672	------	------	------	CB-23
7	SCS Runoff	1.816	2	724	6,155	------	------	------	CB-24
8	SCS Runoff	1.729	2	724	6,017	------	------	------	CB-25
9	SCS Runoff	0.878	2	724	3,056	------	------	------	CB-26
10	SCS Runoff	1.130	2	724	3,932	------	------	------	CB-27
11	SCS Runoff	0.994	2	724	3,458	------	------	------	CB-28
12	SCS Runoff	2.488	2	724	7,736	------	------	------	CB-29
13	SCS Runoff	2.348	2	724	8,056	------	------	------	CB-30
14	SCS Runoff	2.935	2	732	13,337	------	------	------	CB-31
15	SCS Runoff	0.733	2	730	3,005	------	------	------	CB-32
16	SCS Runoff	0.449	2	724	1,563	------	------	------	CB-33
17	SCS Runoff	1.374	2	734	6,077	------	------	------	CB-34
18	SCS Runoff	5.979	2	726	20,916	------	------	------	CB-35
19	SCS Runoff	0.660	2	724	2,298	------	------	------	CB-36
20	SCS Runoff	1.370	2	728	5,410	------	------	------	CB-37
21	Combine	9.470	2	724	31,288	1, 2, 3, 4, 5, 6,	------	------	Heights Rd - E (1)
22	Combine	5.554	2	724	19,159	7, 8, 9, 10,	------	------	Heights Rd - E (2)
23	Combine	5.829	2	724	19,251	11, 12, 13,	------	------	Heights Rd - E (3)
24	Combine	3.860	2	732	17,905	14, 15, 16,	------	------	Edgerton St
25	Combine	8.967	2	726	34,700	17, 18, 19, 20,	------	------	Site - NW
26	Combine	32.42	2	724	122,304	21, 22, 23, 24, 25	------	------	System 2 - E

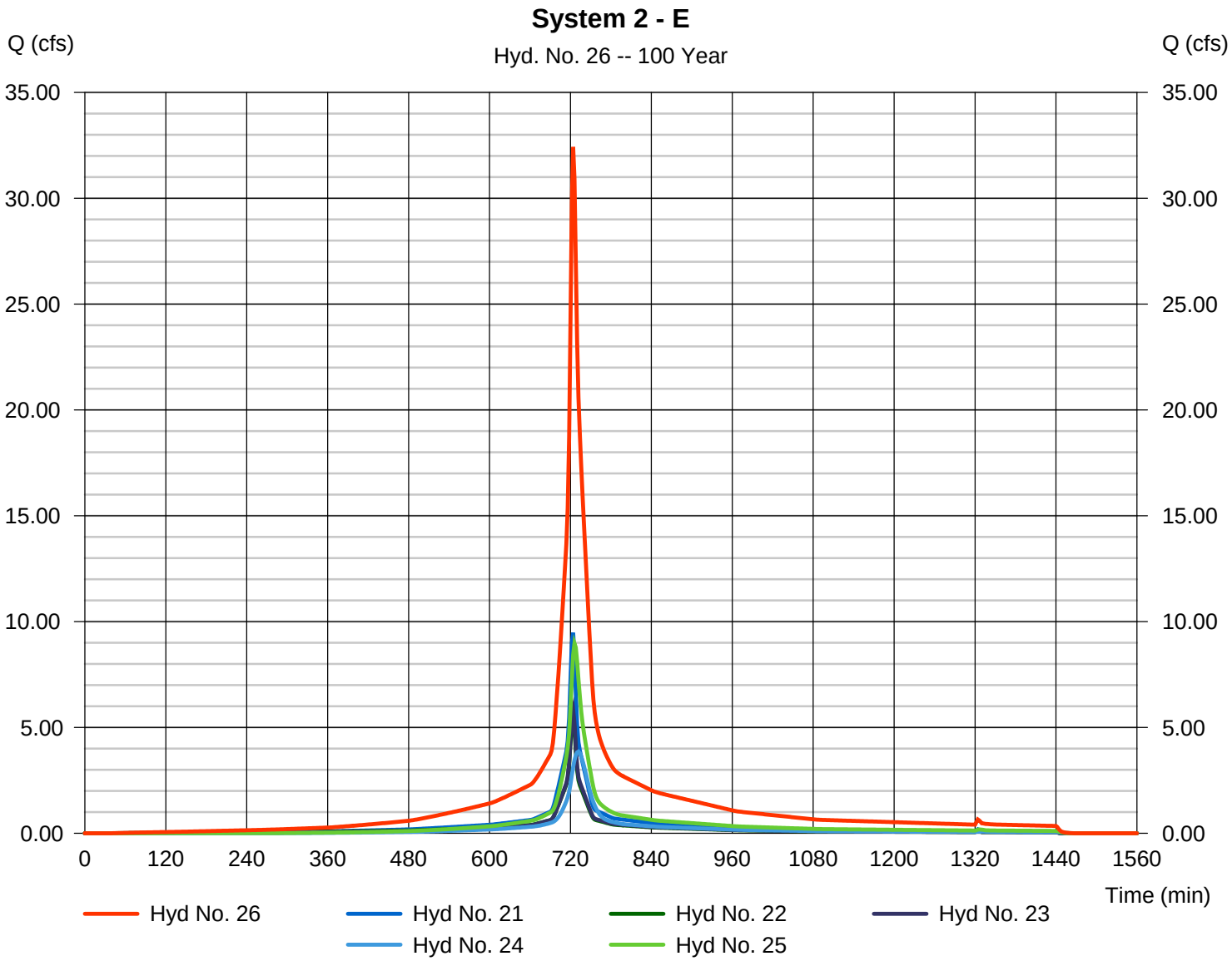
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 26

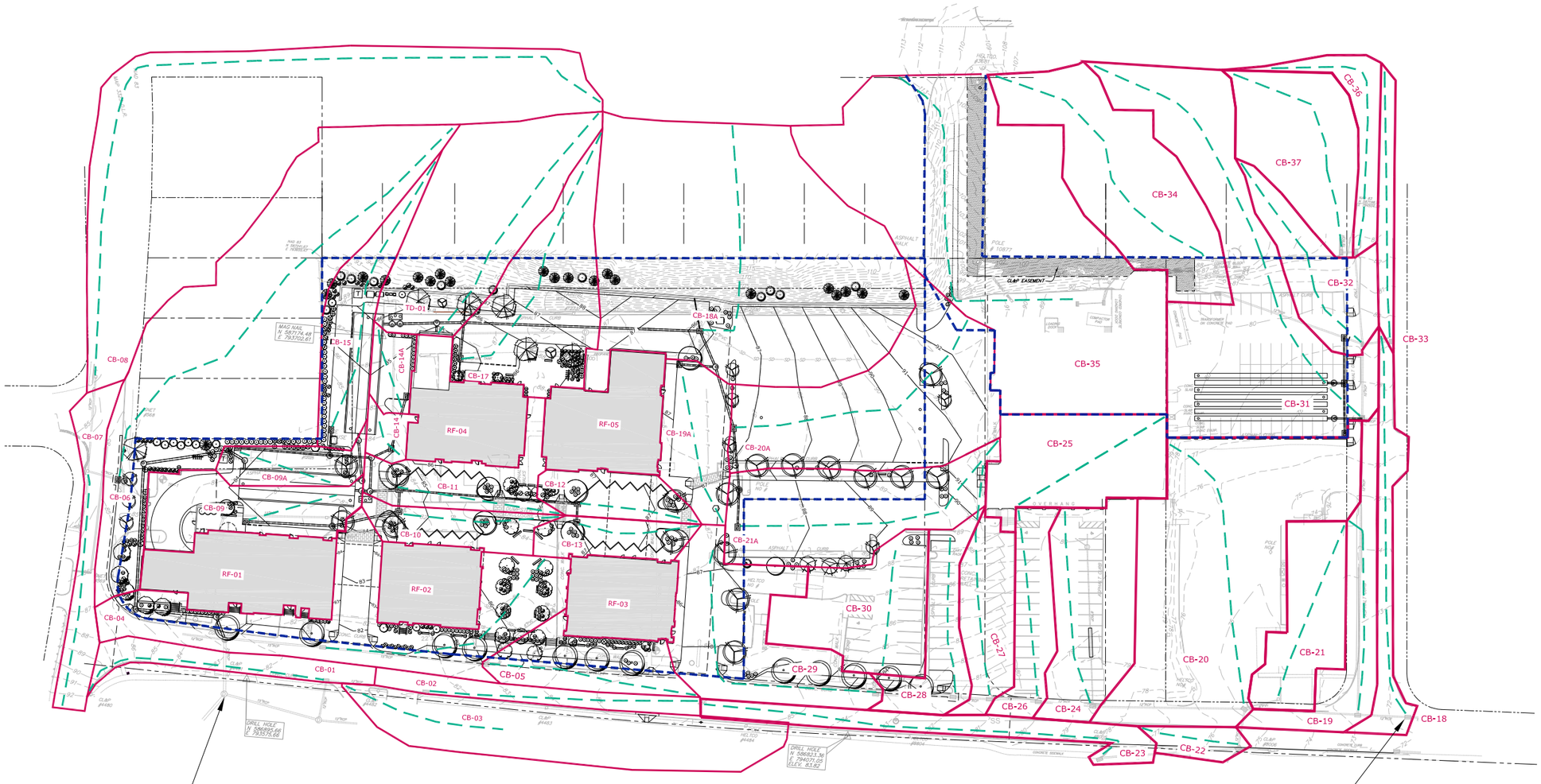
System 2 - E

Hydrograph type	=	Combine	Peak discharge	=	32.42 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	122,304 cuft
Inflow hyds.	=	21, 22, 23, 24, 25	Contrib. drain. area	=	0.000 ac



Tighe&Bond

APPENDIX D



LEGEND

- SITE LIMIT
- WATERSHED BOUNDARY
- TIME OF CONCENTRATION FLOW PATH

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

NOROTON HEIGHTS SHOPPING CENTER
DARIEN, CT

PROPOSED WATERSHED MAP

DATE: 03/01/2017
SCALE: 1" = 100'
FIGURE 3

Tighe&Bond
www.tighebond.com

Mar 01, 2017-3:34pm Plotted By: JCB1
Tighe & Bond, Inc. J:\P\P0695 J&G Palmer Mixed Use\Calculations\Drainage\Current\2017_2-23 (Detention Lower Site)\PRWM-P0695-06.dwg

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-01**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.100	98	9.8000
Landscaped and Lawns	0.000	69	0.0000
	0.100		9.8000

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	205	0.049	1.9

Total Tc = 1.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-02**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.093	98	9.1140
Landscaped and Lawns	0.000	69	0.0000
	0.093		9.1140

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	222	0.022	2.8

Total Tc = 2.8 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-03**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.188	98	18.4240
Landscaped and Lawns	0.177	69	12.2130
	0.365		30.6370

Weighted CN: 84

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	137	0.029	1.7

Total Tc = 1.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-04**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.403	98	39.4940
Landscaped and Lawns	0.064	69	4.4160
	0.467		43.9100

Weighted CN: 94

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	63	0.008	1.5
Segment B - C	0.015	83	0.062	0.8

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.008	1.82	68	0.6

Total Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-05**
Location: Heights Road - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.156	98	15.2880
Landscaped and Lawns	0.007	69	0.4830
	0.163		15.7710

Weighted CN: 97

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	171	0.01	3.1

Total Tc = 3.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-06**
Location: Hollow Tree Ridge Road - Central

Cover Type	Area, ac	CN	A x CN
Pavement	0.246	98	24.1080
Landscaped and Lawns	0.696	69	48.0240
	0.942		72.1320

Weighted CN: 77

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.4	185	0.15	15.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.015	1.98	193	1.6
Segment C - D	paved	0.036	3.86	41	0.2

Total Tc = 17.3 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-07**
Location: Hollow Tree Ridge Road - Central

Cover Type	Area, ac	CN	A x CN
Pavement	0.137	98	13.4260
Landscaped and Lawns	0.000	69	0.0000
	0.137		13.4260

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	195	0.041	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-08**
Location: Hollow Tree Ridge Road - Central

Cover Type	Area, ac	CN	A x CN
Pavement	0.396	98	38.8080
Landscaped and Lawns	0.711	69	49.0590
	1.107		87.8670

Weighted CN: 79

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	60	0.083	5.3
Segment B - C	0.015	240	0.062	2.0

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.055	4.77	362	1.3

Total Tc = 8.5 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-09**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.149	98	14.6020
Landscaped and Lawns	0.042	69	2.8980
	0.191		17.5000

Weighted CN: 92

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	75	0.02	1.2

Total Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-09A**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.076	98	7.4480
Landscaped and Lawns	0.014	69	0.9660
	0.090		8.4140

Weighted CN: 93

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	80	0.02	1.3

Total Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-10**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.068	98	6.6640
Landscaped and Lawns	0.036	69	2.4840
	0.104		9.1480

Weighted CN: 88

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	135	0.01	2.6

Total Tc = 2.6 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-11**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.115	98	11.2700
Landscaped and Lawns	0.035	69	2.4150
	0.150		13.6850

Weighted CN: 91

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	136	0.01	2.6

Total Tc = 2.6 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-12**
Location: Site - Central

Cover Type	Area, ac	CN	A x CN
Pavement	0.054	98	5.2920
Landscaped and Lawns	0.030	69	2.0700
	0.084		7.3620

Weighted CN: 88

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	126	0.015	2.1

Total Tc = 2.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-13**
Location: Site - Central

Cover Type	Area, ac	CN	A x CN
Pavement	0.052	98	5.0960
Landscaped and Lawns	0.039	69	2.6910
	0.091		7.7870

Weighted CN: 86

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	100	0.015	1.7

Total Tc = 1.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Consulting Engineers
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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-14**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.027	98	2.6460
Landscaped and Lawns	0.006	69	0.4140
	0.033		3.0600

Weighted CN: 93

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	115	0.017	1.8

Total Tc = 1.8 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-14A**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.049	98	4.8020
Landscaped and Lawns	0.003	69	0.2070
	0.052		5.0090

Weighted CN: 96

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	67	0.025	1.0

Total Tc = 1.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-15**
Location: Site - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.082	98	8.0360
Landscaped and Lawns	0.103	69	7.1070
	0.185		15.1430

Weighted CN: 82

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	90	0.2	5.1
Segment B - C	0.4	30	0.16	3.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.025	3.21	115	0.6

Total Tc = 9.3 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **TD-01**
Location: Site - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.104	98	10.1920
Landscaped and Lawns	0.316	69	21.8040
	0.420		31.9960

Weighted CN: 76

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	150	0.07	11.8
Segment B - C	0.4	30	0.25	2.9

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.05	4.55	50	0.2

Total Tc = 14.9 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-17**
Location: Site - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.168	98	16.4640
Landscaped and Lawns	0.132	69	9.1080
	0.300		25.5720

Weighted CN: 85

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	110	0.07	9.2
Segment B - C	0.4	32	0.55	2.3

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.035	3.80	82	0.4

Total Tc = 11.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-18A**
Location: Site - North

Cover Type	Area, ac	CN	A x CN
Pavement	0.490	98	48.0200
Landscaped and Lawns	0.719	69	49.6110
	1.209		97.6310

Weighted CN: 81

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	110	0.065	9.5
Segment B - C	0.4	40	0.7	2.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.09	6.10	45	0.1

Total Tc = 12.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-19A**
Location: Site - North

Cover Type	Area, ac	CN	A x CN
Pavement	0.117	98	11.4660
Landscaped and Lawns	0.034	69	2.3460
	0.151		13.8120

Weighted CN: 91

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	127	0.01	2.4

Total Tc = 2.4 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-20A**
Location: Site - North

Cover Type	Area, ac	CN	A x CN
Pavement	0.356	98	34.8880
Landscaped and Lawns	0.039	69	2.6910
	0.395		37.5790

Weighted CN: 95

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	271	0.025	3.1

Total Tc = 3.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-21A**
Location: Site - Central

Cover Type	Area, ac	CN	A x CN
Pavement	0.277	98	27.1460
Landscaped and Lawns	0.050	69	3.4500
	0.327		30.5960

Weighted CN: 94

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	244	0.02	3.1

Total Tc = 3.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **RF-01**
Location: Site - Southwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.206	98	20.1880
Landscaped and Lawns	0.000	69	0.0000
	0.206		20.1880

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	100	0.01	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **RF-02**
Location: Site - Southwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.124	98	12.1520
Landscaped and Lawns	0.000	69	0.0000
	0.124		12.1520

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	100	0.01	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **RF-03**
Location: South

Cover Type	Area, ac	CN	A x CN
Pavement	0.131	98	12.8380
Landscaped and Lawns	0.000	69	0.0000
	0.131		12.8380

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	100	0.01	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **RF-04**
Location: Site - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.173	98	16.9540
Landscaped and Lawns	0.000	69	0.0000
	0.173		16.9540

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	100	0.01	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **RF-05**
Location: Site - North

Cover Type	Area, ac	CN	A x CN
Pavement	0.183	98	17.9340
Landscaped and Lawns	0.000	69	0.0000
	0.183		17.9340

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	150	0.01	2.8

Total Tc = 2.8 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-18**
Location: Heights Road / Edgerton Street Intersection - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.127	98	12.4460
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.127		12.4460

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	300	0.0283	3.2

Total Tc = 3.2 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-19**
Location: Heights Road / Edgerton Street Intersection - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.119	98	11.6620
Landscaped and Lawns	0.061	69	4.2090
Site	0.000	65	0.0000
	0.180		15.8710

Weighted CN: 88

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	16	0.062	2.1
Segment B - C	0.015	147	0.017	2.2

Total Tc = 4.3 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-20**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.593	98	58.1140
Landscaped and Lawns	0.144	69	9.9360
Site	0.000	65	0.0000
	0.737		68.0500

Weighted CN: 92

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	16	0.2	1.3
Segment B - C	0.015	220	0.01	3.8

Total Tc = 5.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-21**
Location: Site - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.170	98	16.6600
Landscaped and Lawns	0.022	69	1.5180
Site	0.000	65	0.0000
	0.192		18.1780

Weighted CN: 95

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	150	0.035	1.7
Segment B - C	1	0	1	0.0

Total Tc = 1.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-22**
Location: Heights Road - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.045	98	4.4100
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.045		4.4100

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	80	0.031	1.1

Total Tc = 1.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-23**
Location: Heights Road - Southeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.155	98	15.1900
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.155		15.1900

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	300	0.025	3.4

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.025	3.21	60	0.3

Total Tc = 3.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-24**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.249	98	24.4020
Landscaped and Lawns	0.020	69	1.3800
Site	0.000	65	0.0000
	0.269		25.7820

Weighted CN: 96

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	161	0.015	2.5

Total Tc = 2.5 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-25**
Location: Site - Roof Leader Conc. Block Building - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.254	98	24.8920
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.254		24.8920

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	140	0.02	2.0

Total Tc = 2.0 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-26**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.129	98	12.6420
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.129		12.6420

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	155	0.01	2.9

Total Tc = 2.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-27**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.166	98	16.2680
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.166		16.2680

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	190	0.063	1.6

Total Tc = 1.6 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-28**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.145	98	14.2100
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.145		14.2100

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	129	0.06	1.2

Total Tc = 1.2 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-29**
Location: Heights Road - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.297	98	29.1060
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.297		29.1060

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	104	0.015	1.8

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.015	2.49	134	0.9

Total Tc = 2.7 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-30**
Location: Site - South

Cover Type	Area, ac	CN	A x CN
Pavement	0.232	98	22.7360
Landscaped and Lawns	0.067	69	4.6230
Site	0.000	65	0.0000
	0.299		27.3590

Weighted CN: 92

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	96	0.04	1.1

Total Tc = 1.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-31**
Location: Edgerton Street - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.386	98	37.8280
Landscaped and Lawns	0.275	69	18.9750
Site	0.000	65	0.0000
	0.661		56.8030

Weighted CN: 86

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	220	0.081	15.1
Segment B - C	0.24	33	0.167	2.5

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.027	3.34	128	0.6

Total Tc = 18.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-32**
Location: Edgerton Street - West

Cover Type	Area, ac	CN	A x CN
Pavement	0.063	98	6.1740
Landscaped and Lawns	0.111	69	7.6590
Site	0.000	65	0.0000
	0.174		13.8330

Weighted CN: 80

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	92	0.026	11.8
Segment B - C	0.24	31	0.129	2.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	paved	0.025	3.21	59	0.3

Total Tc = 14.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-33**
Location: Edgerton Street - East

Cover Type	Area, ac	CN	A x CN
Pavement	0.066	98	6.4680
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.066		6.4680

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	220	0.045	2.1

Total Tc = 2.1 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-34**
Location: Site - Northeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.068	98	6.6640
Landscaped and Lawns	0.329	69	22.7010
Site	0.000	65	0.0000
	0.397		29.3650

Weighted CN: 74

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	240	0.092	15.4
Segment B - C	0.24	30	0.3	1.8

Total Tc = 17.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-35**
Location: Site - Northeast

Cover Type	Area, ac	CN	A x CN
Pavement	0.543	98	53.2140
Landscaped and Lawns	0.538	69	37.1220
Site	0.000	65	0.0000
	1.081		90.3360

Weighted CN: 84

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.15	198	0.101	8.7

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment C - D	unpaved	0.044	3.38	102	0.5

Total Tc = 9.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **CB-36**
Location: Edgerton Street - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.097	98	9.5060
Landscaped and Lawns	0.000	69	0.0000
Site	0.000	65	0.0000
	0.097		9.5060

Weighted CN: 98

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.015	222	0.056	1.9

Total Tc = 1.9 Min.
Min Tc = 5.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Palmer Mixed Use**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Proposed CN & Tc**
Prepared By: **JCB** Date: **February 23, 2017**

Designation: **CB-37**
Location: Edgerton Street - Northwest

Cover Type	Area, ac	CN	A x CN
Pavement	0.154	98	15.0920
Landscaped and Lawns	0.106	69	7.3140
Site	0.000	65	0.0000
	0.260		22.4060

Weighted CN: 86

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

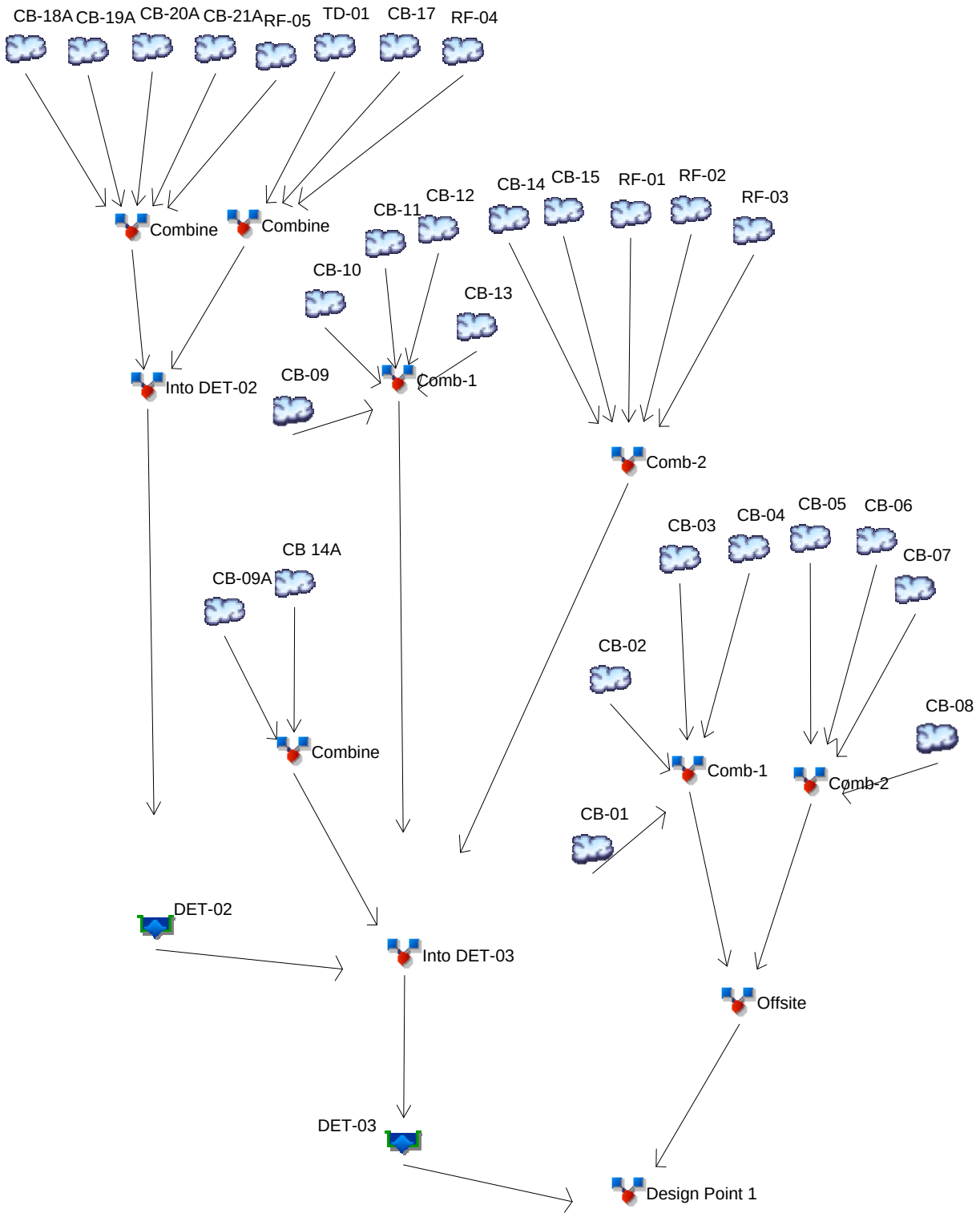
Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	127	0.071	10.2
Segment B - C	0.015	64	0.062	0.7

Total Tc = 10.9 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	1.811	-------	-------	3.524	4.254	4.989	-------	CB-18A
2	SCS Runoff	------	-------	0.396	-------	-------	0.652	0.757	0.861	-------	CB-19A
3	SCS Runoff	------	-------	1.157	-------	-------	1.813	2.081	2.347	-------	CB-20A
4	SCS Runoff	------	-------	0.935	-------	-------	1.482	1.705	1.927	-------	CB-21A
5	SCS Runoff	------	-------	0.566	-------	-------	0.863	0.985	1.107	-------	RF-05
6	SCS Runoff	------	-------	0.433	-------	-------	0.923	1.140	1.361	-------	TD-01
7	SCS Runoff	------	-------	0.540	-------	-------	0.980	1.163	1.347	-------	CB-17
8	SCS Runoff	------	-------	0.637	-------	-------	0.971	1.109	1.246	-------	RF-04
9	Combine	1, 2, 3,	-------	4.532	-------	-------	7.759	9.108	10.46	-------	Combine
10	Combine	4, 5, 6, 7, 8,	-------	1.432	-------	-------	2.588	3.081	3.578	-------	Combine
11	Combine	9, 10	-------	5.918	-------	-------	10.24	12.06	13.88	-------	Into DET-02
12	SCS Runoff	------	-------	0.516	-------	-------	0.839	0.971	1.102	-------	CB-09
13	SCS Runoff	------	-------	0.246	-------	-------	0.423	0.496	0.568	-------	CB-10
14	SCS Runoff	------	-------	0.393	-------	-------	0.648	0.752	0.855	-------	CB-11
15	SCS Runoff	------	-------	0.198	-------	-------	0.341	0.400	0.459	-------	CB-12
16	SCS Runoff	------	-------	0.199	-------	-------	0.353	0.417	0.481	-------	CB-13
17	SCS Runoff	------	-------	0.092	-------	-------	0.147	0.170	0.193	-------	CB-14
18	SCS Runoff	------	-------	0.317	-------	-------	0.604	0.726	0.848	-------	CB-15
19	SCS Runoff	------	-------	0.637	-------	-------	0.971	1.109	1.246	-------	RF-01
20	SCS Runoff	------	-------	0.383	-------	-------	0.585	0.667	0.750	-------	RF-02
21	SCS Runoff	------	-------	0.405	-------	-------	0.618	0.705	0.792	-------	RF-03
22	Combine	12, 13, 14,	-------	1.552	-------	-------	2.604	3.035	3.465	-------	Comb-1
23	Combine	15, 16, 17, 18, 19, 20, 21,	-------	1.810	-------	-------	2.887	3.333	3.779	-------	Comb-2
24	SCS Runoff	------	-------	0.309	-------	-------	0.471	0.538	0.605	-------	CB-01
25	SCS Runoff	------	-------	0.287	-------	-------	0.438	0.500	0.562	-------	CB-02
26	SCS Runoff	------	-------	0.734	-------	-------	1.346	1.602	1.859	-------	CB-03
27	SCS Runoff	------	-------	0.927	-------	-------	1.474	1.697	1.920	-------	CB-04
28	SCS Runoff	------	-------	0.497	-------	-------	0.763	0.872	0.981	-------	CB-05
29	SCS Runoff	------	-------	0.970	-------	-------	2.030	2.491	2.960	-------	CB-06
30	SCS Runoff	------	-------	0.423	-------	-------	0.646	0.737	0.829	-------	CB-07
31	SCS Runoff	------	-------	1.636	-------	-------	3.298	4.013	4.736	-------	CB-08
32	Combine	24, 25, 26,	-------	1.955	-------	-------	3.264	3.804	4.345	-------	Comb-1
33	Combine	27, 28, 29, 30, 31,	-------	3.167	-------	-------	6.126	7.401	8.693	-------	Comb-2
34	Combine	32, 33	-------	5.072	-------	-------	9.281	11.07	12.88	-------	Offsite

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
35	Reservoir	11	-------	4.451	-------	-------	7.616	8.458	9.261	-------	DET-02
36	SCS Runoff	------	-------	0.251	-------	-------	0.402	0.464	0.525	-------	CB-09A
37	SCS Runoff	------	-------	0.156	-------	-------	0.241	0.276	0.311	-------	CB 14A
38	Combine	36, 37	-------	0.406	-------	-------	0.643	0.740	0.836	-------	Combine
39	Combine	22, 23, 35, 38	-------	6.715	-------	-------	12.66	14.35	15.86	-------	Into DET-03
40	Reservoir	39	-------	5.684	-------	-------	9.000	9.929	10.79	-------	DET-03
41	Combine	34, 40	-------	9.723	-------	-------	16.99	19.50	21.97	-------	Design Point 1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.811	2	728	7,006	------	------	------	CB-18A
2	SCS Runoff	0.396	2	724	1,209	------	------	------	CB-19A
3	SCS Runoff	1.157	2	724	3,687	------	------	------	CB-20A
4	SCS Runoff	0.935	2	724	2,939	------	------	------	CB-21A
5	SCS Runoff	0.566	2	724	1,910	------	------	------	RF-05
6	SCS Runoff	0.433	2	732	1,817	------	------	------	TD-01
7	SCS Runoff	0.540	2	728	2,070	------	------	------	CB-17
8	SCS Runoff	0.637	2	724	2,150	------	------	------	RF-04
9	Combine	4.532	2	724	16,751	1, 2, 3,	------	------	Combine
10	Combine	1.432	2	726	6,037	4, 5, 6, 7, 8,	------	------	Combine
11	Combine	5.918	2	724	22,788	9, 10	------	------	Into DET-02
12	SCS Runoff	0.516	2	724	1,590	------	------	------	CB-09
13	SCS Runoff	0.246	2	724	739	------	------	------	CB-10
14	SCS Runoff	0.393	2	724	1,201	------	------	------	CB-11
15	SCS Runoff	0.198	2	724	597	------	------	------	CB-12
16	SCS Runoff	0.199	2	724	595	------	------	------	CB-13
17	SCS Runoff	0.092	2	724	285	------	------	------	CB-14
18	SCS Runoff	0.317	2	726	1,087	------	------	------	CB-15
19	SCS Runoff	0.637	2	724	2,150	------	------	------	RF-01
20	SCS Runoff	0.383	2	724	1,294	------	------	------	RF-02
21	SCS Runoff	0.405	2	724	1,367	------	------	------	RF-03
22	Combine	1.552	2	724	4,721	12, 13, 14,	------	------	Comb-1
23	Combine	1.810	2	724	6,184	15, 16, 17, 18, 19,	------	------	Comb-2
24	SCS Runoff	0.309	2	724	1,044	20, 21, ------	------	------	CB-01
25	SCS Runoff	0.287	2	724	971	------	------	------	CB-02
26	SCS Runoff	0.734	2	724	2,194	------	------	------	CB-03
27	SCS Runoff	0.927	2	734	4,557	------	------	------	CB-04
28	SCS Runoff	0.497	2	724	1,640	------	------	------	CB-05
29	SCS Runoff	0.970	2	734	4,390	------	------	------	CB-06
30	SCS Runoff	0.423	2	724	1,430	------	------	------	CB-07
31	SCS Runoff	1.636	2	726	5,675	------	------	------	CB-08
32	Combine	1.955	2	724	8,766	24, 25, 26,	------	------	Comb-1
33	Combine	3.167	2	726	13,134	27, 28, 29, 30,	------	------	Comb-2
34	Combine	5.072	2	726	21,900	31, 32, 33	------	------	Offsite

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Reservoir	4.451	2	732	22,756	11	79.51	4,987	DET-02
36	SCS Runoff	0.251	2	724	779	------	------	------	CB-09A
37	SCS Runoff	0.156	2	724	504	------	------	------	CB 14A
38	Combine	0.406	2	724	1,283	36, 37	------	------	Combine
39	Combine	6.715	2	728	34,945	22, 23, 35, 38	------	------	Into DET-03
40	Reservoir	5.684	2	736	34,914	39	78.79	5,050	DET-03
41	Combine	9.723	2	730	56,814	34, 40	------	------	Design Point 1

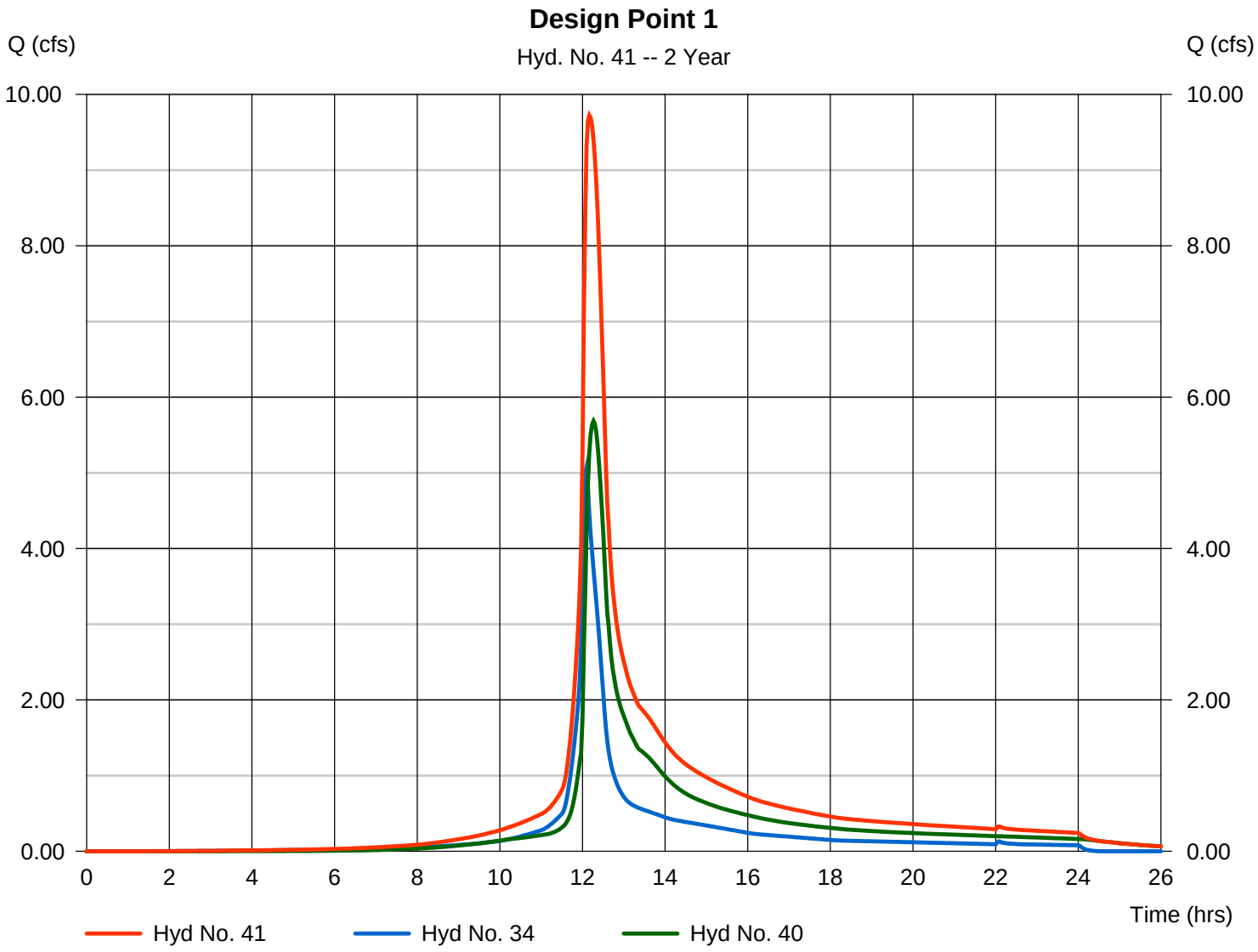
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 41

Design Point 1

Hydrograph type	= Combine	Peak discharge	= 9.723 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 56,814 cuft
Inflow hyds.	= 34, 40	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.524	2	728	13,511	------	------	------	CB-18A
2	SCS Runoff	0.652	2	724	2,046	------	------	------	CB-19A
3	SCS Runoff	1.813	2	724	5,941	------	------	------	CB-20A
4	SCS Runoff	1.482	2	724	4,794	------	------	------	CB-21A
5	SCS Runoff	0.863	2	724	2,966	------	------	------	RF-05
6	SCS Runoff	0.923	2	730	3,769	------	------	------	TD-01
7	SCS Runoff	0.980	2	728	3,782	------	------	------	CB-17
8	SCS Runoff	0.971	2	724	3,339	------	------	------	RF-04
9	Combine	7.759	2	724	29,259	1, 2, 3, 4, 5,	------	------	Combine
10	Combine	2.588	2	726	10,891	6, 7, 8,	------	------	Combine
11	Combine	10.24	2	724	40,149	9, 10	------	------	Into DET-02
12	SCS Runoff	0.839	2	724	2,658	------	------	------	CB-09
13	SCS Runoff	0.423	2	724	1,299	------	------	------	CB-10
14	SCS Runoff	0.648	2	724	2,033	------	------	------	CB-11
15	SCS Runoff	0.341	2	724	1,049	------	------	------	CB-12
16	SCS Runoff	0.353	2	724	1,074	------	------	------	CB-13
17	SCS Runoff	0.147	2	724	471	------	------	------	CB-14
18	SCS Runoff	0.604	2	726	2,068	------	------	------	CB-15
19	SCS Runoff	0.971	2	724	3,339	------	------	------	RF-01
20	SCS Runoff	0.585	2	724	2,010	------	------	------	RF-02
21	SCS Runoff	0.618	2	724	2,123	------	------	------	RF-03
22	Combine	2.604	2	724	8,112	12, 13, 14, 15, 16,	------	------	Comb-1
23	Combine	2.887	2	724	10,012	17, 18, 19, 20, 21,	------	------	Comb-2
24	SCS Runoff	0.471	2	724	1,621	------	------	------	CB-01
25	SCS Runoff	0.438	2	724	1,507	------	------	------	CB-02
26	SCS Runoff	1.346	2	724	4,062	------	------	------	CB-03
27	SCS Runoff	1.474	2	734	7,433	------	------	------	CB-04
28	SCS Runoff	0.763	2	724	2,578	------	------	------	CB-05
29	SCS Runoff	2.030	2	734	8,969	------	------	------	CB-06
30	SCS Runoff	0.646	2	724	2,221	------	------	------	CB-07
31	SCS Runoff	3.298	2	726	11,258	------	------	------	CB-08
32	Combine	3.264	2	724	14,624	24, 25, 26, 27,	------	------	Comb-1
33	Combine	6.126	2	726	25,026	28, 29, 30, 31,	------	------	Comb-2
34	Combine	9.281	2	726	39,650	32, 33	------	------	Offsite

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Reservoir	7.616	2	732	40,117	11	80.15	6,823	DET-02
36	SCS Runoff	0.402	2	724	1,286	------	------	------	CB-09A
37	SCS Runoff	0.241	2	724	802	------	------	------	CB 14A
38	Combine	0.643	2	724	2,088	36, 37	------	------	Combine
39	Combine	12.66	2	726	60,329	22, 23, 35, 38	------	------	Into DET-03
40	Reservoir	9.000	2	742	60,298	39	79.97	8,364	DET-03
41	Combine	16.99	2	726	99,948	34, 40	------	------	Design Point 1

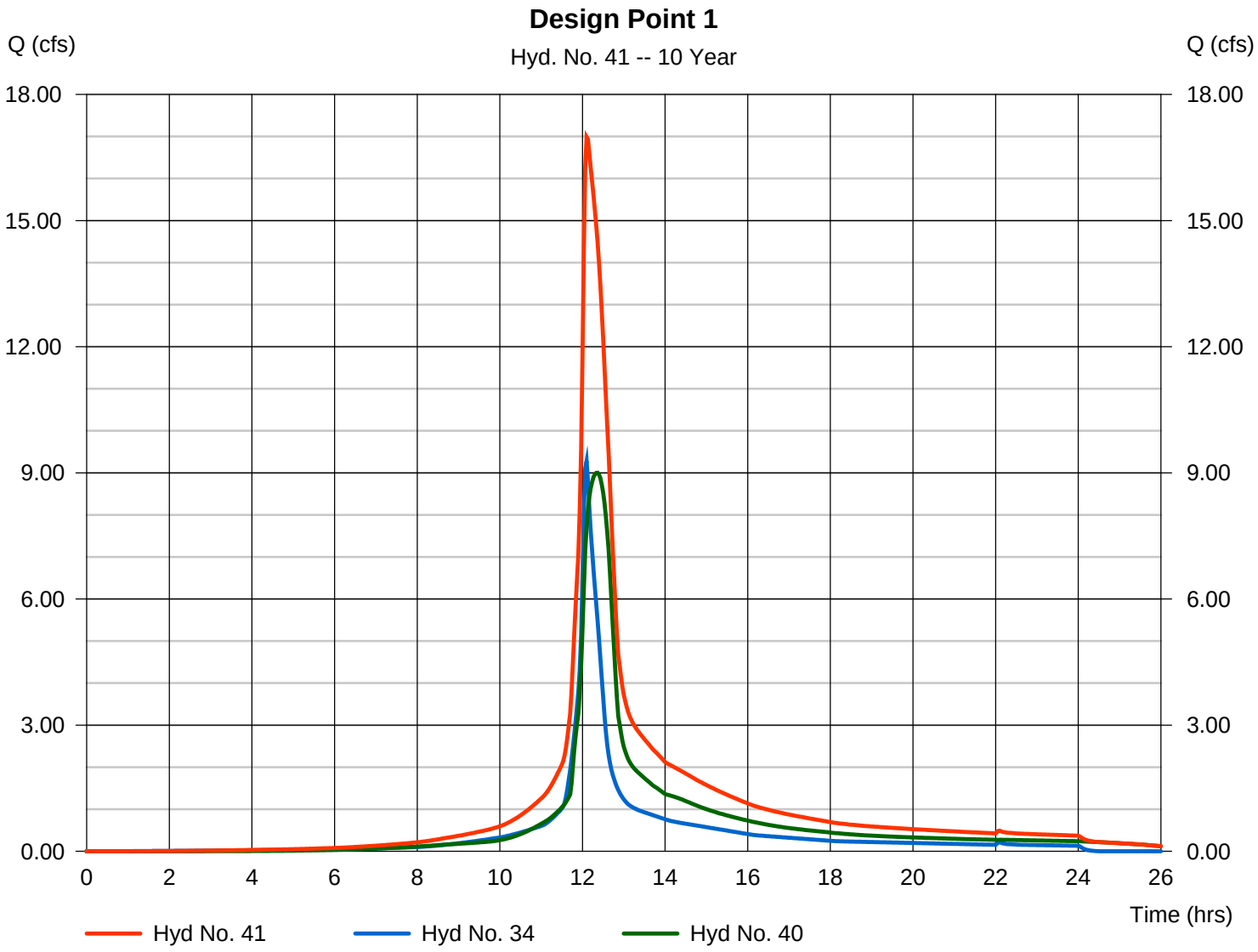
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 41

Design Point 1

Hydrograph type	=	Combine	Peak discharge	=	16.99 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	99,948 cuft
Inflow hyds.	=	34, 40	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.254	2	728	16,345	------	------	------	CB-18A
2	SCS Runoff	0.757	2	724	2,397	------	------	------	CB-19A
3	SCS Runoff	2.081	2	724	6,874	------	------	------	CB-20A
4	SCS Runoff	1.705	2	724	5,564	------	------	------	CB-21A
5	SCS Runoff	0.985	2	724	3,402	------	------	------	RF-05
6	SCS Runoff	1.140	2	730	4,642	------	------	------	TD-01
7	SCS Runoff	1.163	2	728	4,515	------	------	------	CB-17
8	SCS Runoff	1.109	2	724	3,829	------	------	------	RF-04
9	Combine	9.108	2	724	34,581	1, 2, 3,	------	------	Combine
10	Combine	3.081	2	726	12,986	4, 5, 6, 7, 8,	------	------	Combine
11	Combine	12.06	2	724	47,567	9, 10	------	------	Into DET-02
12	SCS Runoff	0.971	2	724	3,104	------	------	------	CB-09
13	SCS Runoff	0.496	2	724	1,535	------	------	------	CB-10
14	SCS Runoff	0.752	2	724	2,381	------	------	------	CB-11
15	SCS Runoff	0.400	2	724	1,240	------	------	------	CB-12
16	SCS Runoff	0.417	2	724	1,277	------	------	------	CB-13
17	SCS Runoff	0.170	2	724	549	------	------	------	CB-14
18	SCS Runoff	0.726	2	726	2,493	------	------	------	CB-15
19	SCS Runoff	1.109	2	724	3,829	------	------	------	RF-01
20	SCS Runoff	0.667	2	724	2,305	------	------	------	RF-02
21	SCS Runoff	0.705	2	724	2,435	------	------	------	RF-03
22	Combine	3.035	2	724	9,537	12, 13, 14,	------	------	Comb-1
23	Combine	3.333	2	724	11,611	15, 16, 17, 18, 19,	------	------	Comb-2
24	SCS Runoff	0.538	2	724	1,859	20, 21, ------	------	------	CB-01
25	SCS Runoff	0.500	2	724	1,729	------	------	------	CB-02
26	SCS Runoff	1.602	2	724	4,865	------	------	------	CB-03
27	SCS Runoff	1.697	2	734	8,627	------	------	------	CB-04
28	SCS Runoff	0.872	2	724	2,965	------	------	------	CB-05
29	SCS Runoff	2.491	2	734	11,006	------	------	------	CB-06
30	SCS Runoff	0.737	2	724	2,547	------	------	------	CB-07
31	SCS Runoff	4.013	2	726	13,715	------	------	------	CB-08
32	Combine	3.804	2	724	17,079	24, 25, 26,	------	------	Comb-1
33	Combine	7.401	2	726	30,232	27, 28, 29, 30,	------	------	Comb-2
34	Combine	11.07	2	726	47,311	31, 32, 33	------	------	Offsite

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Reservoir	8.458	2	734	47,535	11	80.51	7,885	DET-02
36	SCS Runoff	0.464	2	724	1,497	------	------	------	CB-09A
37	SCS Runoff	0.276	2	724	925	------	------	------	CB 14A
38	Combine	0.740	2	724	2,422	36, 37	------	------	Combine
39	Combine	14.35	2	724	71,105	22, 23, 35, 38	------	------	Into DET-03
40	Reservoir	9.929	2	742	71,074	39	80.48	9,779	DET-03
41	Combine	19.50	2	726	118,385	34, 40	------	------	Design Point 1

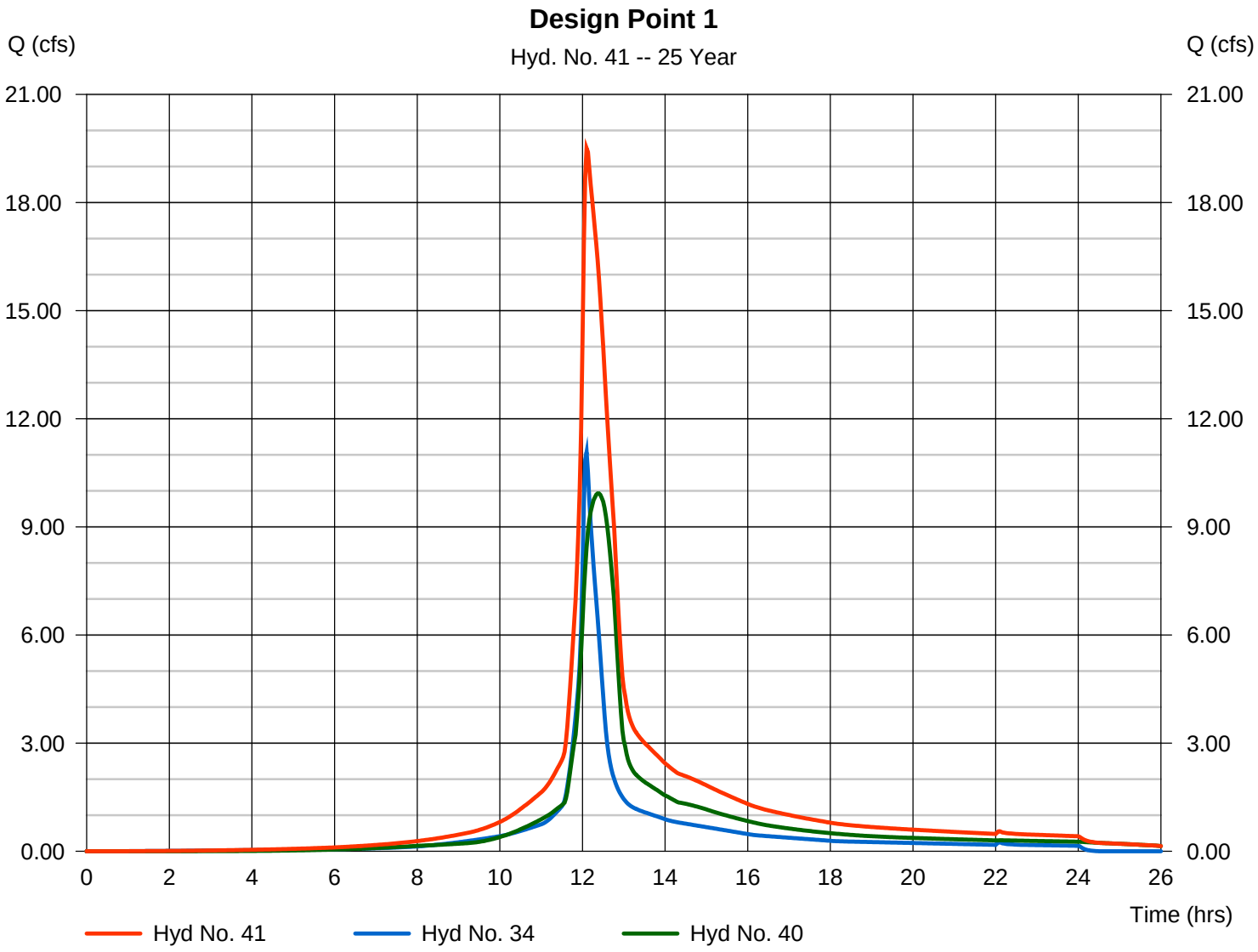
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 41

Design Point 1

Hydrograph type	=	Combine	Peak discharge	=	19.50 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	118,385 cuft
Inflow hyds.	=	34, 40	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.989	2	728	19,235	------	------	------	CB-18A
2	SCS Runoff	0.861	2	724	2,749	------	------	------	CB-19A
3	SCS Runoff	2.347	2	724	7,809	------	------	------	CB-20A
4	SCS Runoff	1.927	2	724	6,335	------	------	------	CB-21A
5	SCS Runoff	1.107	2	724	3,837	------	------	------	RF-05
6	SCS Runoff	1.361	2	730	5,541	------	------	------	TD-01
7	SCS Runoff	1.347	2	728	5,257	------	------	------	CB-17
8	SCS Runoff	1.246	2	724	4,319	------	------	------	RF-04
9	Combine	10.46	2	724	39,965	1, 2, 3, 4, 5,	------	------	Combine
10	Combine	3.578	2	726	15,118	6, 7, 8,	------	------	Combine
11	Combine	13.88	2	724	55,082	9, 10	------	------	Into DET-02
12	SCS Runoff	1.102	2	724	3,551	------	------	------	CB-09
13	SCS Runoff	0.568	2	724	1,774	------	------	------	CB-10
14	SCS Runoff	0.855	2	724	2,731	------	------	------	CB-11
15	SCS Runoff	0.459	2	724	1,433	------	------	------	CB-12
16	SCS Runoff	0.481	2	724	1,484	------	------	------	CB-13
17	SCS Runoff	0.193	2	724	626	------	------	------	CB-14
18	SCS Runoff	0.848	2	726	2,926	------	------	------	CB-15
19	SCS Runoff	1.246	2	724	4,319	------	------	------	RF-01
20	SCS Runoff	0.750	2	724	2,600	------	------	------	RF-02
21	SCS Runoff	0.792	2	724	2,747	------	------	------	RF-03
22	Combine	3.465	2	724	10,972	12, 13, 14, 15, 16,	------	------	Comb-1
23	Combine	3.779	2	724	13,218	17, 18, 19, 20, 21,	------	------	Comb-2
24	SCS Runoff	0.605	2	724	2,097	------	------	------	CB-01
25	SCS Runoff	0.562	2	724	1,950	------	------	------	CB-02
26	SCS Runoff	1.859	2	724	5,679	------	------	------	CB-03
27	SCS Runoff	1.920	2	734	9,823	------	------	------	CB-04
28	SCS Runoff	0.981	2	724	3,352	------	------	------	CB-05
29	SCS Runoff	2.960	2	734	13,099	------	------	------	CB-06
30	SCS Runoff	0.829	2	724	2,873	------	------	------	CB-07
31	SCS Runoff	4.736	2	726	16,230	------	------	------	CB-08
32	Combine	4.345	2	724	19,549	24, 25, 26, 27,	------	------	Comb-1
33	Combine	8.693	2	726	35,553	28, 29, 30, 31,	------	------	Comb-2
34	Combine	12.88	2	726	55,103	32, 33	------	------	Offsite

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Reservoir	9.261	2	736	55,050	11	80.92	9,057	DET-02
36	SCS Runoff	0.525	2	724	1,708	------	------	------	CB-09A
37	SCS Runoff	0.311	2	724	1,049	------	------	------	CB 14A
38	Combine	0.836	2	724	2,757	36, 37	------	------	Combine
39	Combine	15.86	2	724	81,997	22, 23, 35, 38	------	------	Into DET-03
40	Reservoir	10.79	2	744	81,967	39	80.99	11,237	DET-03
41	Combine	21.97	2	726	137,070	34, 40	------	------	Design Point 1

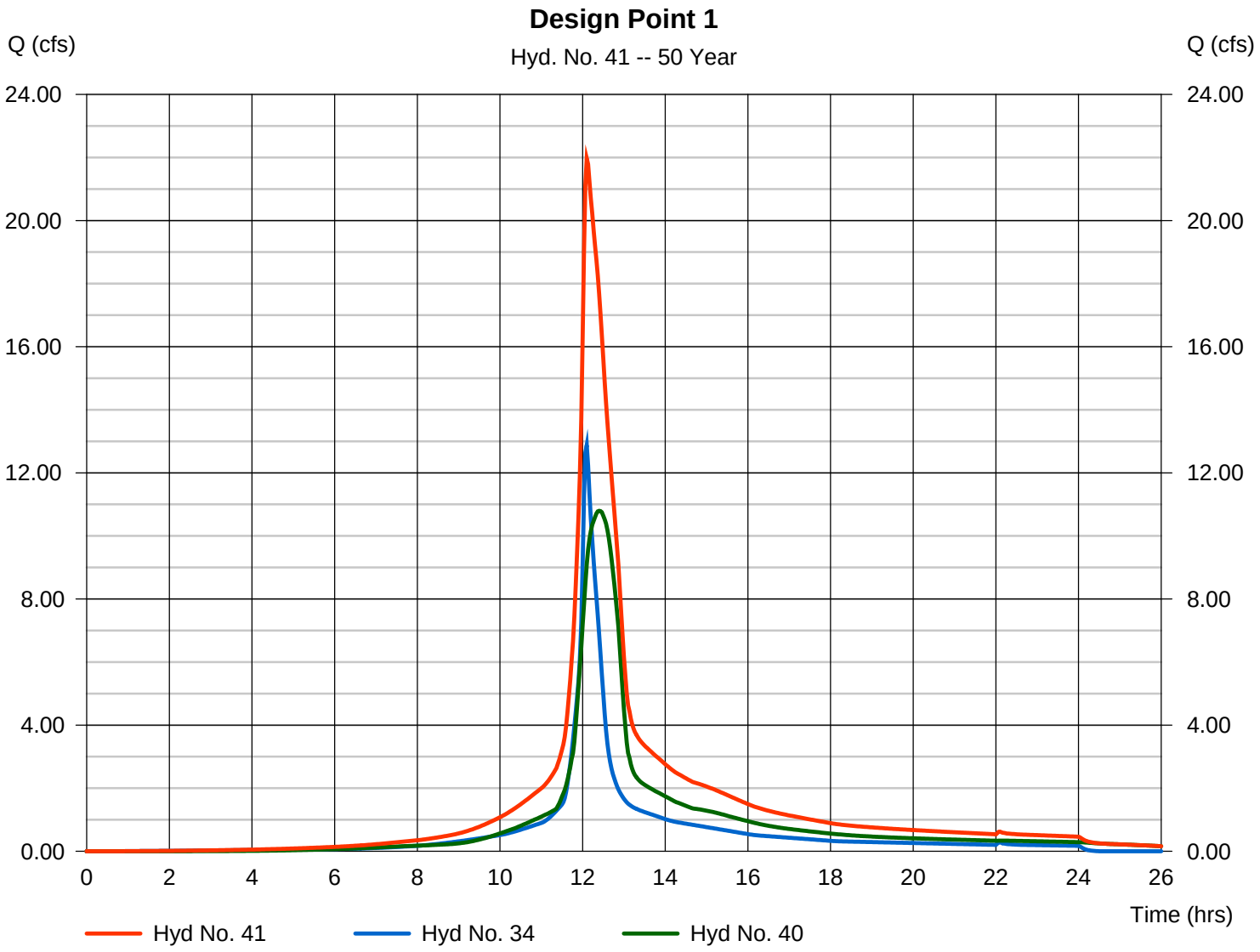
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 41

Design Point 1

Hydrograph type	=	Combine	Peak discharge	=	21.97 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	137,070 cuft
Inflow hyds.	=	34, 40	Contrib. drain. area	=	0.000 ac



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Pond No. 2 - DET-02

Pond Data

UG Chambers -Invert elev. = 77.80 ft, Rise x Span = 4.00 x 8.00 ft, Barrel Len = 100.00 ft, No. Barrels = 3, Slope = 0.00%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	77.80	n/a	0	0
0.40	78.20	n/a	1,165	1,165
0.80	78.60	n/a	1,165	2,330
1.20	79.00	n/a	1,165	3,495
1.60	79.40	n/a	1,165	4,660
2.00	79.80	n/a	1,165	5,825
2.40	80.20	n/a	1,165	6,990
2.80	80.60	n/a	1,165	8,155
3.20	81.00	n/a	1,165	9,320
3.60	81.40	n/a	1,165	10,485
4.00	81.80	n/a	1,165	11,650

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	4.00	8.00	0.00
Span (in)	= 15.00	4.00	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 77.80	77.80	78.20	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	1.00	1.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

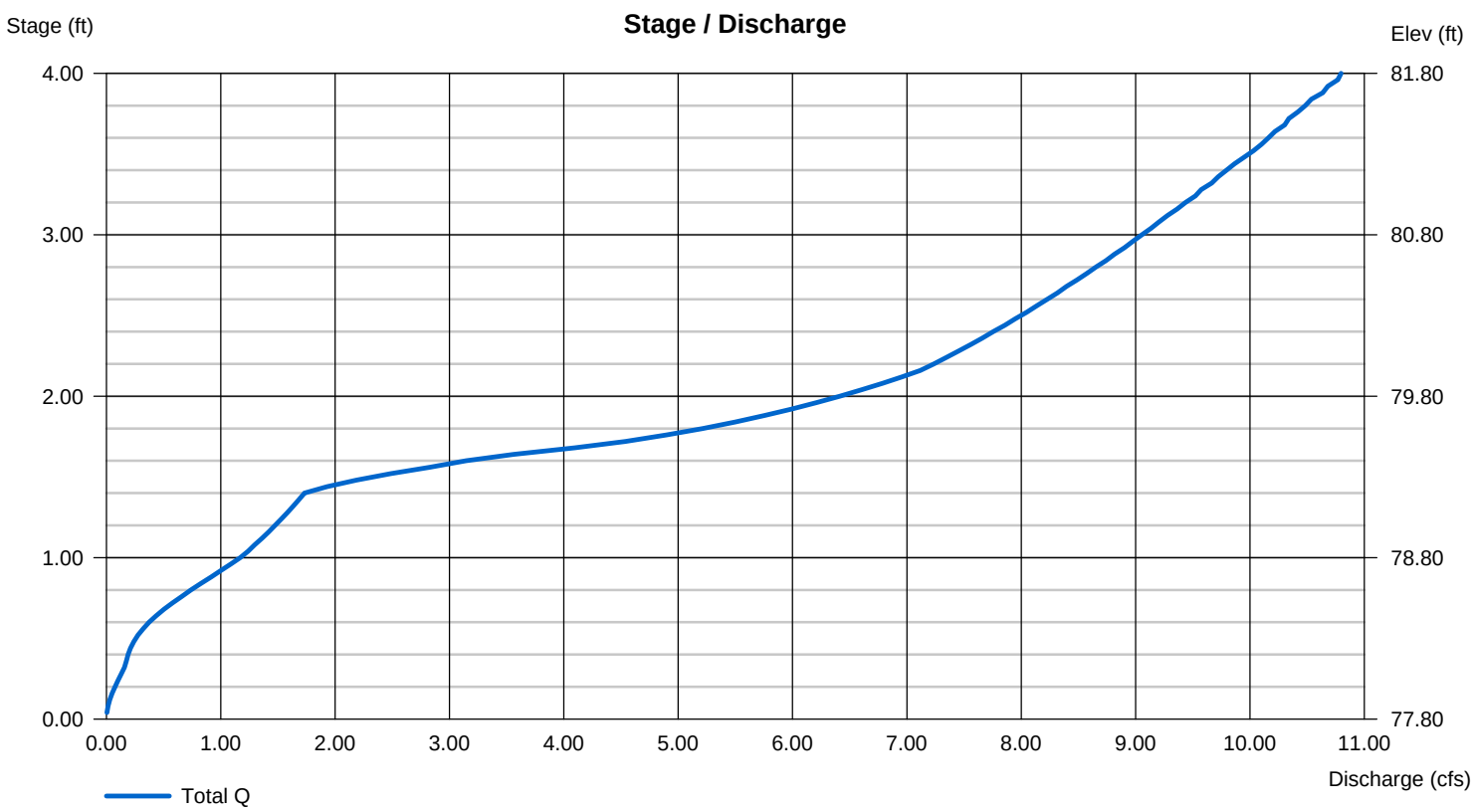
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 79.20	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Pond No. 3 - DET-03

Pond Data

UG Chambers -Invert elev. = 77.00 ft, Rise x Span = 4.00 x 8.00 ft, Barrel Len = 96.00 ft, No. Barrels = 3, Slope = 0.00%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	77.00	n/a	0	0
0.40	77.40	n/a	1,127	1,127
0.80	77.80	n/a	1,127	2,253
1.20	78.20	n/a	1,127	3,380
1.60	78.60	n/a	1,127	4,506
2.00	79.00	n/a	1,127	5,633
2.40	79.40	n/a	1,127	6,760
2.80	79.80	n/a	1,127	7,886
3.20	80.20	n/a	1,127	9,013
3.60	80.60	n/a	1,127	10,139
4.00	81.00	n/a	1,127	11,266

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	4.00	8.00	0.00
Span (in)	= 15.00	4.00	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 77.00	77.00	77.50	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	1.00	1.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

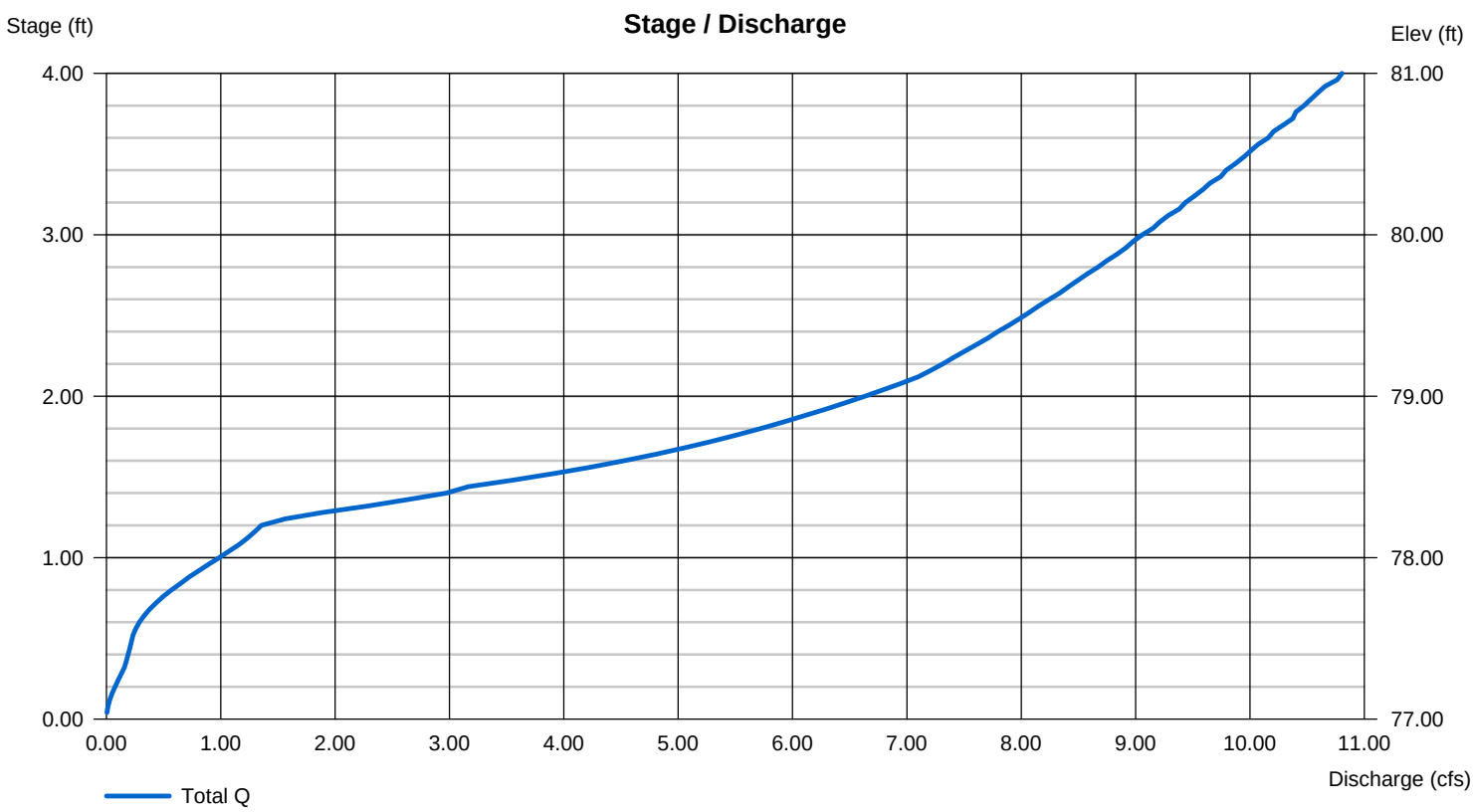
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 78.20	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

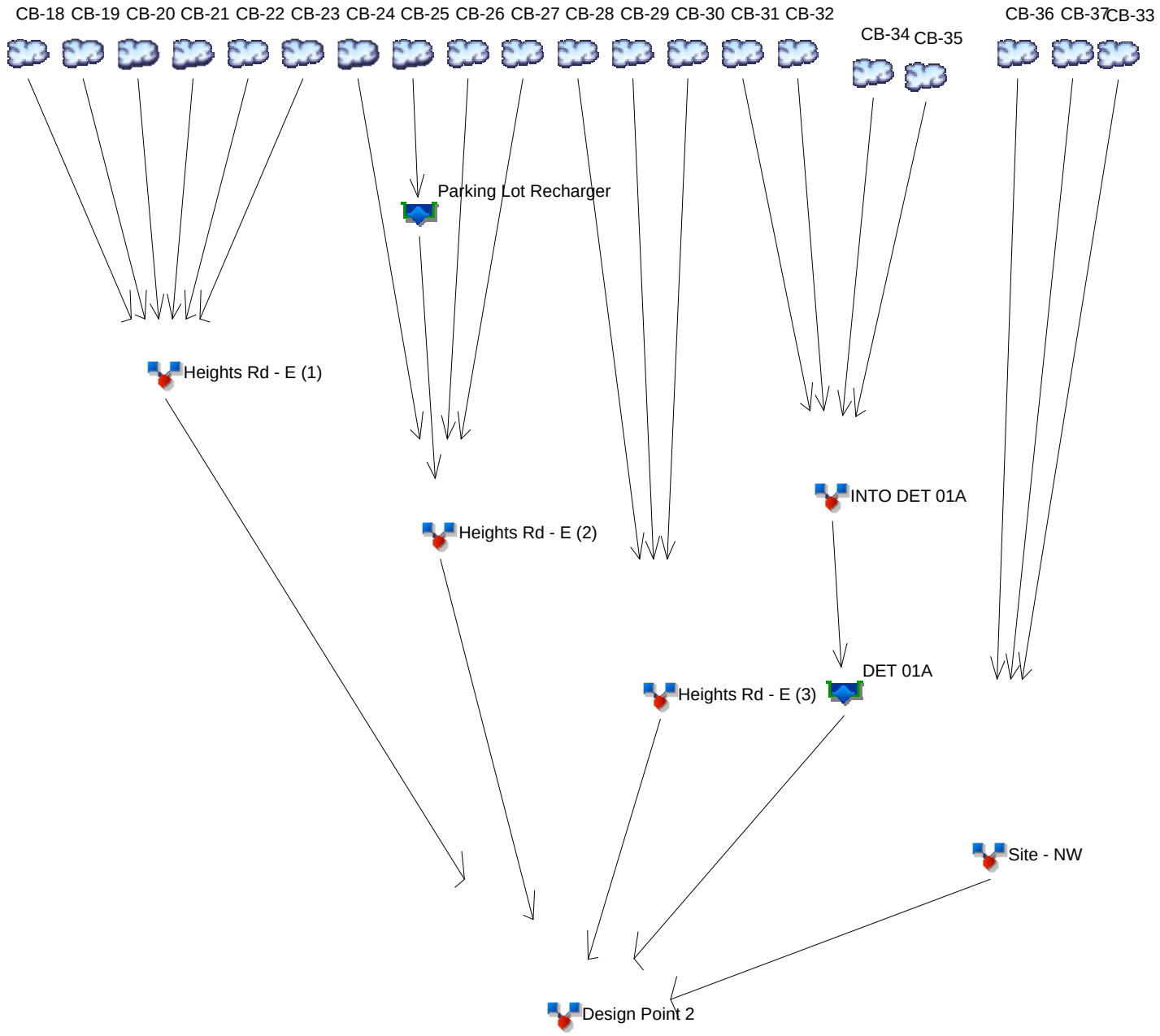
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Project: Proposed_Design Point 2.gpw	Wednesday, 03 / 1 / 2017

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.392	-------	-------	0.599	0.683	0.768	-------	CB-18
2	SCS Runoff	------	-------	0.425	-------	-------	0.732	0.858	0.983	-------	CB-19
3	SCS Runoff	------	-------	1.993	-------	-------	3.239	3.747	4.253	-------	CB-20
4	SCS Runoff	------	-------	0.562	-------	-------	0.881	1.011	1.141	-------	CB-21
5	SCS Runoff	------	-------	0.139	-------	-------	0.212	0.242	0.272	-------	CB-22
6	SCS Runoff	------	-------	0.479	-------	-------	0.731	0.834	0.937	-------	CB-23
7	SCS Runoff	------	-------	0.805	-------	-------	1.248	1.430	1.610	-------	CB-24
8	SCS Runoff	------	-------	0.785	-------	-------	1.197	1.367	1.536	-------	CB-25
9	SCS Runoff	------	-------	0.399	-------	-------	0.608	0.694	0.780	-------	CB-26
10	SCS Runoff	------	-------	0.513	-------	-------	0.783	0.893	1.004	-------	CB-27
11	SCS Runoff	------	-------	0.451	-------	-------	0.688	0.786	0.883	-------	CB-28
12	SCS Runoff	------	-------	0.918	-------	-------	1.400	1.598	1.796	-------	CB-29
13	SCS Runoff	------	-------	0.717	-------	-------	1.094	1.248	1.403	-------	CB-30
14	SCS Runoff	------	-------	1.043	-------	-------	1.864	2.205	2.546	-------	CB-31
15	SCS Runoff	------	-------	0.221	-------	-------	0.438	0.531	0.625	-------	CB-32
16	SCS Runoff	------	-------	0.204	-------	-------	0.311	0.355	0.399	-------	CB-33
17	SCS Runoff	------	-------	0.343	-------	-------	0.768	0.956	1.150	-------	CB-34
18	SCS Runoff	------	-------	2.029	-------	-------	3.734	4.448	5.163	-------	CB-35
19	SCS Runoff	------	-------	0.300	-------	-------	0.457	0.522	0.587	-------	CB-36
20	SCS Runoff	------	-------	0.488	-------	-------	0.871	1.030	1.189	-------	CB-37
21	Reservoir	8	-------	0.779	-------	-------	1.187	1.351	1.514	-------	Parking Lot Recharger
22	Combine	1, 2, 3,	-------	3.991	-------	-------	6.393	7.375	8.355	-------	Heights Rd - E (1)
23	Combine	4, 5, 6, 7, 9, 10,	-------	2.495	-------	-------	3.826	4.368	4.909	-------	Heights Rd - E (2)
24	Combine	21, 11, 12, 13,	-------	2.086	-------	-------	3.182	3.632	4.082	-------	Heights Rd - E (3)
25	Combine	16, 19, 20,	-------	0.911	-------	-------	1.513	1.763	2.013	-------	Site - NW
26	Combine	14, 15, 17,	-------	3.386	-------	-------	6.353	7.607	8.867	-------	INTO DET 01A
27	Reservoir	18, 26	-------	0.823	-------	-------	2.774	4.015	4.700	-------	DET 01A
28	Combine	22, 23, 24, 25, 27	-------	9.484	-------	-------	15.68	18.17	20.67	-------	Design Point 2

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.392	2	724	1,326	------	------	------	CB-18
2	SCS Runoff	0.425	2	724	1,278	------	------	------	CB-19
3	SCS Runoff	1.993	2	724	6,134	------	------	------	CB-20
4	SCS Runoff	0.562	2	724	1,792	------	------	------	CB-21
5	SCS Runoff	0.139	2	724	470	------	------	------	CB-22
6	SCS Runoff	0.479	2	724	1,618	------	------	------	CB-23
7	SCS Runoff	0.805	2	724	2,607	------	------	------	CB-24
8	SCS Runoff	0.785	2	724	2,651	------	------	------	CB-25
9	SCS Runoff	0.399	2	724	1,346	------	------	------	CB-26
10	SCS Runoff	0.513	2	724	1,733	------	------	------	CB-27
11	SCS Runoff	0.451	2	724	1,524	------	------	------	CB-28
12	SCS Runoff	0.918	2	724	3,100	------	------	------	CB-29
13	SCS Runoff	0.717	2	724	2,422	------	------	------	CB-30
14	SCS Runoff	1.043	2	734	4,612	------	------	------	CB-31
15	SCS Runoff	0.221	2	732	911	------	------	------	CB-32
16	SCS Runoff	0.204	2	724	689	------	------	------	CB-33
17	SCS Runoff	0.343	2	734	1,591	------	------	------	CB-34
18	SCS Runoff	2.029	2	726	6,931	------	------	------	CB-35
19	SCS Runoff	0.300	2	724	1,012	------	------	------	CB-36
20	SCS Runoff	0.488	2	728	1,871	------	------	------	CB-37
21	Reservoir	0.779	2	724	2,172	8	77.80	167	Parking Lot Recharger
22	Combine	3.991	2	724	12,618	1, 2, 3, 4, 5, 6,	------	------	Heights Rd - E (1)
23	Combine	2.495	2	724	7,858	7, 9, 10, 21,	------	------	Heights Rd - E (2)
24	Combine	2.086	2	724	7,046	11, 12, 13,	------	------	Heights Rd - E (3)
25	Combine	0.911	2	724	3,572	16, 19, 20,	------	------	Site - NW
26	Combine	3.386	2	728	14,046	14, 15, 17, 18,	------	------	INTO DET 01A
27	Reservoir	0.823	2	756	5,582	26	74.56	5,131	DET 01A
28	Combine	9.484	2	724	36,676	22, 23, 24, 25, 27	------	------	Design Point 2

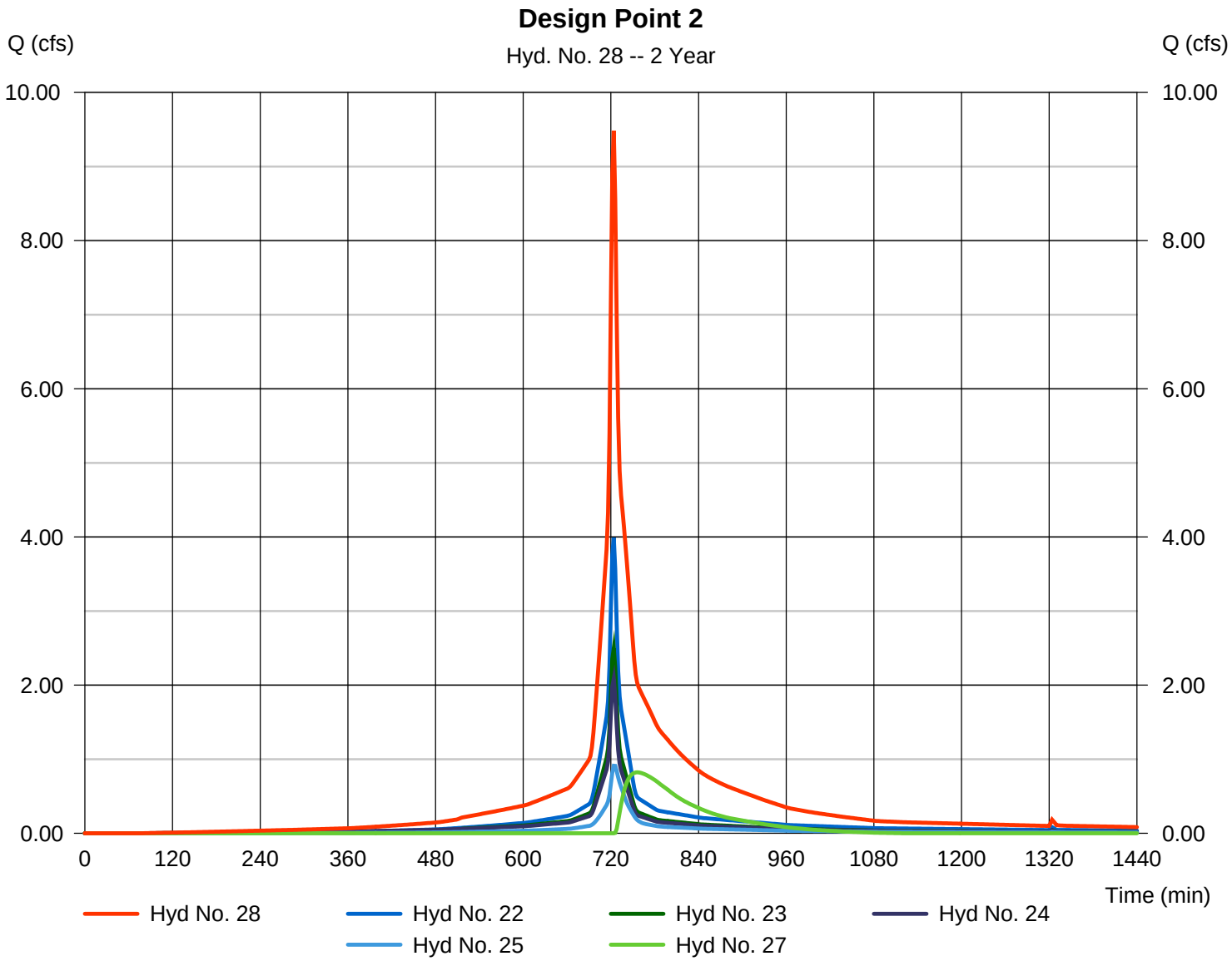
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 28

Design Point 2

Hydrograph type	=	Combine	Peak discharge	=	9.484 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	36,676 cuft
Inflow hyds.	=	22, 23, 24, 25, 27	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.599	2	724	2,059	------	------	------	CB-18
2	SCS Runoff	0.732	2	724	2,247	------	------	------	CB-19
3	SCS Runoff	3.239	2	724	10,256	------	------	------	CB-20
4	SCS Runoff	0.881	2	724	2,888	------	------	------	CB-21
5	SCS Runoff	0.212	2	724	729	------	------	------	CB-22
6	SCS Runoff	0.731	2	724	2,512	------	------	------	CB-23
7	SCS Runoff	1.248	2	724	4,149	------	------	------	CB-24
8	SCS Runoff	1.197	2	724	4,117	------	------	------	CB-25
9	SCS Runoff	0.608	2	724	2,091	------	------	------	CB-26
10	SCS Runoff	0.783	2	724	2,691	------	------	------	CB-27
11	SCS Runoff	0.688	2	724	2,367	------	------	------	CB-28
12	SCS Runoff	1.400	2	724	4,814	------	------	------	CB-29
13	SCS Runoff	1.094	2	724	3,761	------	------	------	CB-30
14	SCS Runoff	1.864	2	732	8,319	------	------	------	CB-31
15	SCS Runoff	0.438	2	730	1,782	------	------	------	CB-32
16	SCS Runoff	0.311	2	724	1,070	------	------	------	CB-33
17	SCS Runoff	0.768	2	734	3,407	------	------	------	CB-34
18	SCS Runoff	3.734	2	726	12,833	------	------	------	CB-35
19	SCS Runoff	0.457	2	724	1,572	------	------	------	CB-36
20	SCS Runoff	0.871	2	728	3,374	------	------	------	CB-37
21	Reservoir	1.187	2	724	3,613	8	78.09	179	Parking Lot Recharger
22	Combine	6.393	2	724	20,692	1, 2, 3, 4, 5, 6,	------	------	Heights Rd - E (1)
23	Combine	3.826	2	724	12,545	7, 9, 10, 21,	------	------	Heights Rd - E (2)
24	Combine	3.182	2	724	10,942	11, 12, 13,	------	------	Heights Rd - E (3)
25	Combine	1.513	2	726	6,017	16, 19, 20,	------	------	Site - NW
26	Combine	6.353	2	728	26,341	14, 15, 17, 18,	------	------	INTO DET 01A
27	Reservoir	2.774	2	748	15,650	26	75.64	9,042	DET 01A
28	Combine	15.68	2	724	65,845	22, 23, 24, 25, 27	------	------	Design Point 2

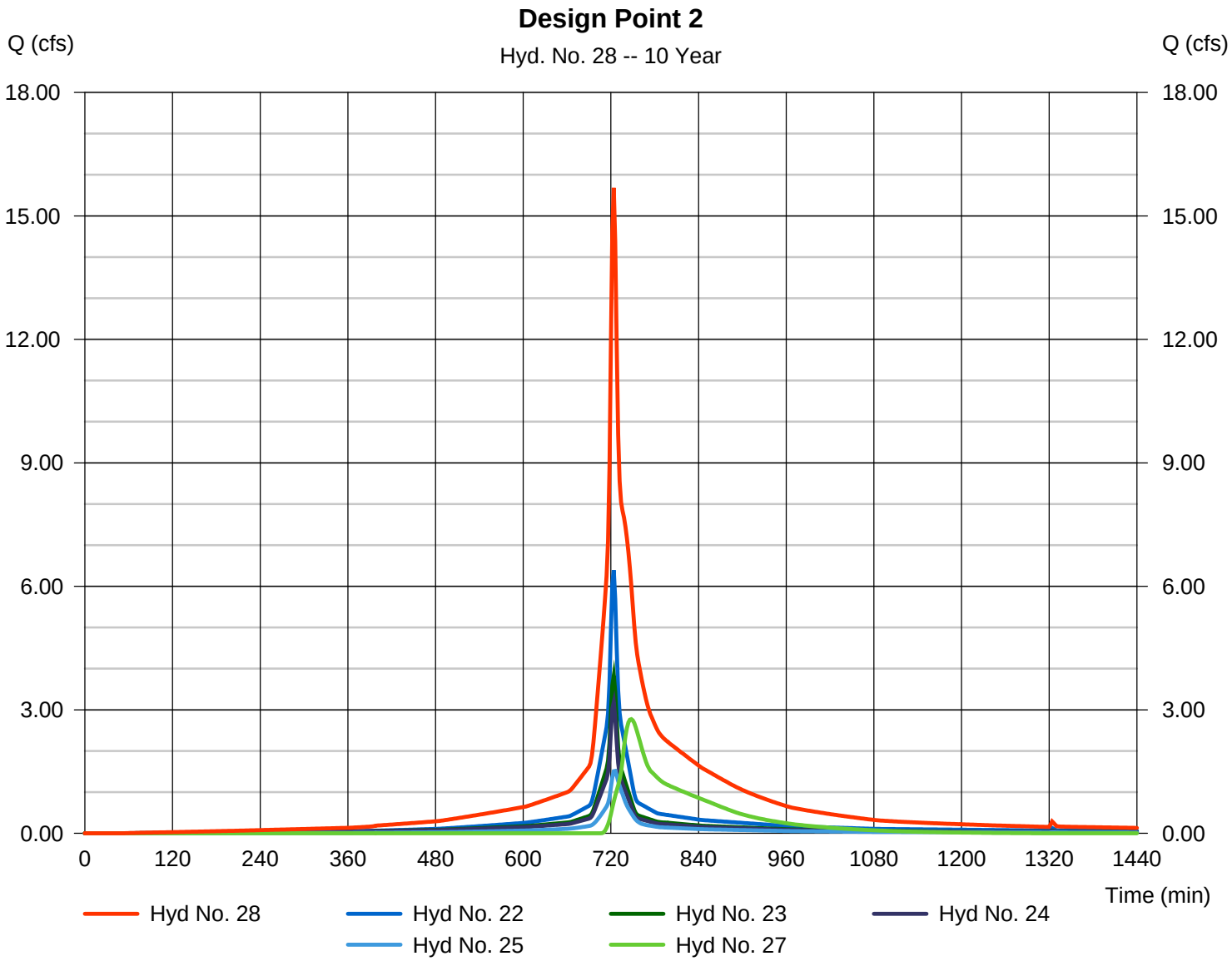
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 28

Design Point 2

Hydrograph type	= Combine	Peak discharge	= 15.68 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 65,845 cuft
Inflow hyds.	= 22, 23, 24, 25, 27	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.683	2	724	2,361	------	------	------	CB-18
2	SCS Runoff	0.858	2	724	2,657	------	------	------	CB-19
3	SCS Runoff	3.747	2	724	11,976	------	------	------	CB-20
4	SCS Runoff	1.011	2	724	3,341	------	------	------	CB-21
5	SCS Runoff	0.242	2	724	836	------	------	------	CB-22
6	SCS Runoff	0.834	2	724	2,881	------	------	------	CB-23
7	SCS Runoff	1.430	2	724	4,787	------	------	------	CB-24
8	SCS Runoff	1.367	2	724	4,721	------	------	------	CB-25
9	SCS Runoff	0.694	2	724	2,398	------	------	------	CB-26
10	SCS Runoff	0.893	2	724	3,086	------	------	------	CB-27
11	SCS Runoff	0.786	2	724	2,714	------	------	------	CB-28
12	SCS Runoff	1.598	2	724	5,521	------	------	------	CB-29
13	SCS Runoff	1.248	2	724	4,313	------	------	------	CB-30
14	SCS Runoff	2.205	2	732	9,898	------	------	------	CB-31
15	SCS Runoff	0.531	2	730	2,163	------	------	------	CB-32
16	SCS Runoff	0.355	2	724	1,227	------	------	------	CB-33
17	SCS Runoff	0.956	2	734	4,229	------	------	------	CB-34
18	SCS Runoff	4.448	2	726	15,369	------	------	------	CB-35
19	SCS Runoff	0.522	2	724	1,803	------	------	------	CB-36
20	SCS Runoff	1.030	2	728	4,015	------	------	------	CB-37
21	Reservoir	1.351	2	724	4,211	8	78.24	185	Parking Lot Recharger
22	Combine	7.375	2	724	24,052	1, 2, 3, 4, 5, 6,	------	------	Heights Rd - E (1)
23	Combine	4.368	2	724	14,481	7, 9, 10, 21,	------	------	Heights Rd - E (2)
24	Combine	3.632	2	724	12,547	11, 12, 13,	------	------	Heights Rd - E (3)
25	Combine	1.763	2	726	7,045	16, 19, 20,	------	------	Site - NW
26	Combine	7.607	2	728	31,657	14, 15, 17, 18,	------	------	INTO DET 01A
27	Reservoir	4.015	2	744	20,319	26	76.02	10,040	DET 01A
28	Combine	18.17	2	724	78,445	22, 23, 24, 25, 27	------	------	Design Point 2

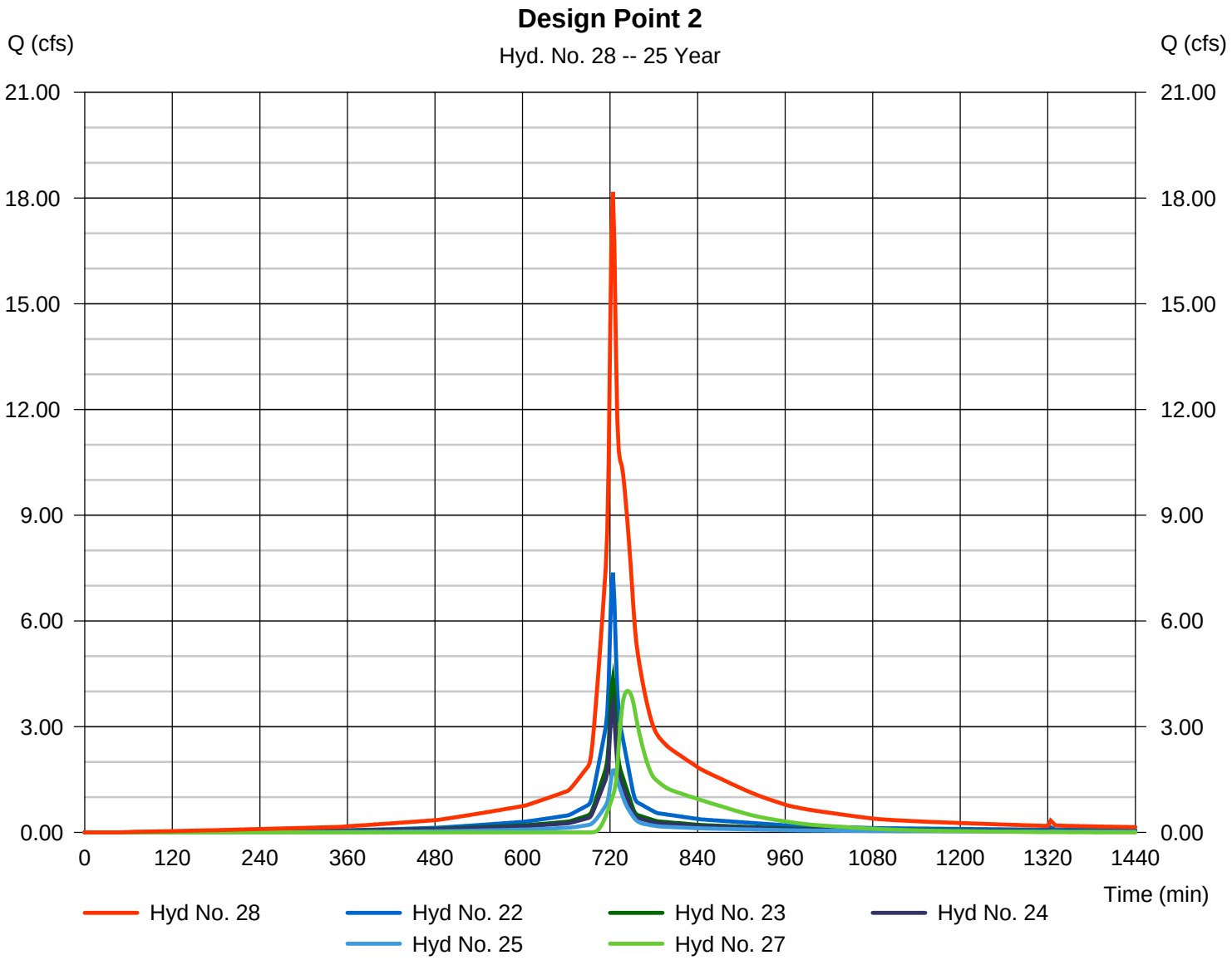
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 28

Design Point 2

Hydrograph type	= Combine	Peak discharge	= 18.17 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 78,445 cuft
Inflow hyds.	= 22, 23, 24, 25, 27	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.768	2	724	2,663	------	------	------	CB-18
2	SCS Runoff	0.983	2	724	3,070	------	------	------	CB-19
3	SCS Runoff	4.253	2	724	13,702	------	------	------	CB-20
4	SCS Runoff	1.141	2	724	3,796	------	------	------	CB-21
5	SCS Runoff	0.272	2	724	944	------	------	------	CB-22
6	SCS Runoff	0.937	2	724	3,250	------	------	------	CB-23
7	SCS Runoff	1.610	2	724	5,425	------	------	------	CB-24
8	SCS Runoff	1.536	2	724	5,326	------	------	------	CB-25
9	SCS Runoff	0.780	2	724	2,705	------	------	------	CB-26
10	SCS Runoff	1.004	2	724	3,481	------	------	------	CB-27
11	SCS Runoff	0.883	2	724	3,061	------	------	------	CB-28
12	SCS Runoff	1.796	2	724	6,228	------	------	------	CB-29
13	SCS Runoff	1.403	2	724	4,865	------	------	------	CB-30
14	SCS Runoff	2.546	2	732	11,495	------	------	------	CB-31
15	SCS Runoff	0.625	2	730	2,552	------	------	------	CB-32
16	SCS Runoff	0.399	2	724	1,384	------	------	------	CB-33
17	SCS Runoff	1.150	2	734	5,079	------	------	------	CB-34
18	SCS Runoff	5.163	2	726	17,941	------	------	------	CB-35
19	SCS Runoff	0.587	2	724	2,034	------	------	------	CB-36
20	SCS Runoff	1.189	2	728	4,663	------	------	------	CB-37
21	Reservoir	1.514	2	724	4,810	8	78.42	192	Parking Lot Recharger
22	Combine	8.355	2	724	27,424	1, 2, 3, 4, 5, 6,	------	------	Heights Rd - E (1)
23	Combine	4.909	2	724	16,420	7, 9, 10, 21,	------	------	Heights Rd - E (2)
24	Combine	4.082	2	724	14,154	11, 12, 13,	------	------	Heights Rd - E (3)
25	Combine	2.013	2	726	8,080	16, 19, 20,	------	------	Site - NW
26	Combine	8.867	2	728	37,066	14, 15, 17, 18,	------	------	INTO DET 01A
27	Reservoir	4.700	2	744	25,176	26	76.58	11,248	DET 01A
28	Combine	20.67	2	724	91,254	22, 23, 24, 25, 27	------	------	Design Point 2

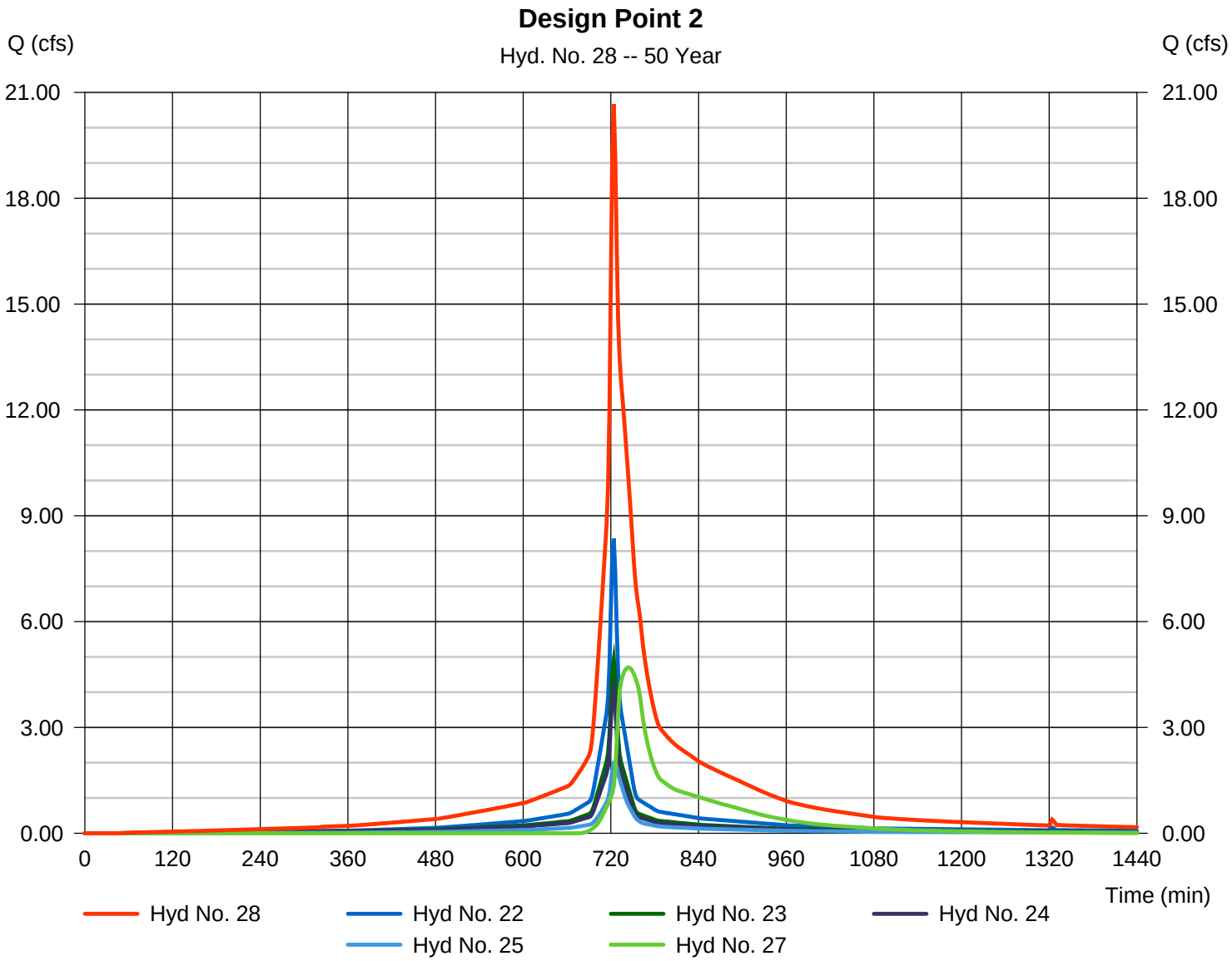
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Hyd. No. 28

Design Point 2

Hydrograph type	=	Combine	Peak discharge	=	20.67 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	91,254 cuft
Inflow hyds.	=	22, 23, 24, 25, 27	Contrib. drain. area	=	0.000 ac



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 03 / 1 / 2017

Pond No. 2 - DET-01A

Pond Data

UG Chambers -Invert elev. = 73.79 ft, Rise x Span = 2.21 x 3.92 ft, Barrel Len = 110.00 ft, No. Barrels = 7, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 72.79 ft, Width = 6.00 ft, Height = 4.21 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	72.79	n/a	0	0
0.42	73.21	n/a	863	863
0.84	73.63	n/a	863	1,726
1.26	74.05	n/a	1,390	3,116
1.68	74.47	n/a	1,688	4,804
2.11	74.89	n/a	1,635	6,439
2.53	75.32	n/a	1,540	7,979
2.95	75.74	n/a	1,381	9,360
3.37	76.16	n/a	1,032	10,391
3.79	76.58	n/a	863	11,254
4.21	77.00	n/a	863	12,117

Culvert / Orifice Structures

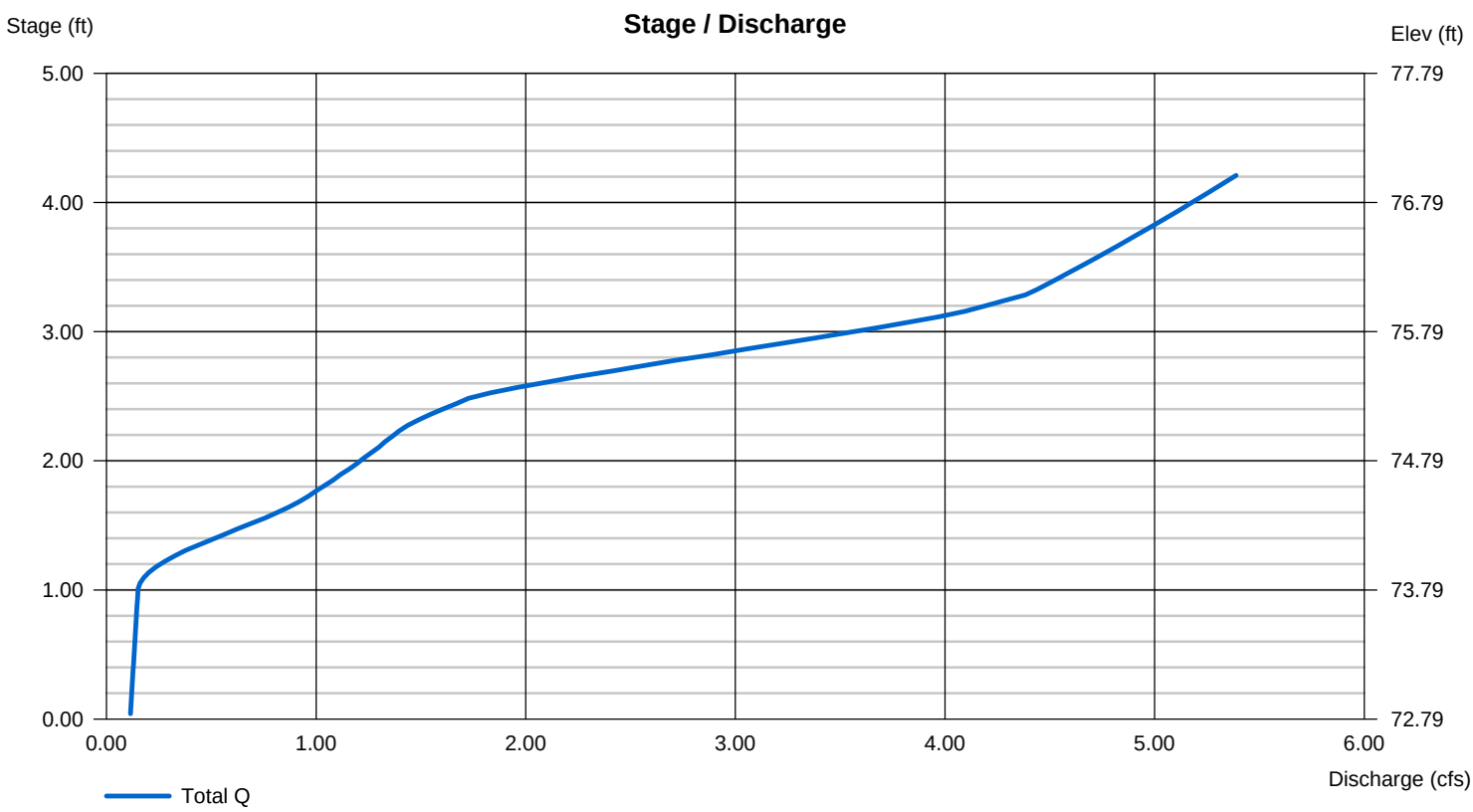
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	8.00	12.00	0.00
Span (in)	= 12.00	8.00	12.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 73.79	73.79	75.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	1.00	1.00	n/a
N-Value	= .011	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 77.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 1.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Noroton Heights Shopping Center**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Water Quality Flow**
Prepared By: **JCB** Date: **March 1, 2017**

Required Water Quality Volume (WQv) - WQS 1

Total Area in acres (A)	=	2.313
Impervious Area in acres	=	1.060
Percent of Impervious Area (I)	=	46
Volumetric Runoff Coefficient (R)		

R = 0.05+0.009(I) = 0.462

WQv = (1")(R)(A) / 12 = **0.0891 ac*ft** = **3883 cf**

Required Water Quality Flow (WQf)

WQv (Ac*ft)	=	0.0891
Drainage Area (Ac)	=	2.313

Q= WQv*12 / DA = **0.462 in**

Runoff Depth in inches (Q)	=	**0.462**	**in**
Design Precipitation in inches (P)	=	**1**	**in**

CN=1000/[10+5*P+10Q-10*(Q²+1.25QP)^1/2] = **93 CN**

From table 4-1 in chapter 4, TR-55

I_a = **0.105 in**
I_a / P = **0.105**

From Exhibit 4-11 in chapter 4, TR-55

q_u = **650 csm/in**

Unit peak discharge in csm/in (q_u)	=	**650**
Area in square miles (A)	=	**0.004**
Runoff Depth in inches (Q)	=	**0.462**

WQF=q_u*A*Q = **1.086 cfs**

Calculated in accordence with the 2004 Connecticut Stormwater Quality Manual Sections 7.4.1 and 7.4.2

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Noroton Heights Shopping Center**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Water Quality Flow**
Prepared By: **JCB** Date: **March 1, 2017**

Required Water Quality Volume (WQv) - WQS 2

Total Area in acres (A)	=	3.239
Impervious Area in acres	=	1.818
Percent of Impervious Area (I)	=	56
Volumetric Runoff Coefficient (R)		

R = 0.05+0.009(I) = 0.555

WQv = (1")(R)(A) / 12 = **0.1498 ac*ft**
= **6527 cf**

Required Water Quality Flow (WQf)

WQv (Ac*ft)	=	0.1498
Drainage Area (Ac)	=	3.239

Q= WQv*12 / DA = **0.555 in**

Runoff Depth in inches (Q)	=	**0.555**	**in**
Design Precipitation in inches (P)	=	**1**	**in**

CN=1000/[10+5*P+10Q-10*(Q²+1.25QP)^1/2] = **95 CN**

From table 4-1 in chapter 4, TR-55

I_a = **0.128 in**
I_a / P = **0.128**

From Exhibit 4-11 in chapter 4, TR-55

q_u = **625 csm/in**

Unit peak discharge in csm/in (q_u)	=	**625**
Area in square miles (A)	=	**0.005**
Runoff Depth in inches (Q)	=	**0.555**

WQF=q_u*A*Q = **1.756 cfs**

Calculated in accordence with the 2004 Connecticut Stormwater Quality Manual Sections 7.4.1 and 7.4.2

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **Noroton Heights Shopping Center**
Project Number: **P 0695**
Project Location: **Darien, CT**
Description: **Water Quality Flow**
Prepared By: **JCB** Date: **September 15, 2016**

Required Water Quality Volume (WQv) - WQS 3

Total Area in acres (A)	=	1.394
Impervious Area in acres	=	1.172
Percent of Impervious Area (I)	=	84
Volumetric Runoff Coefficient (R)		

R = 0.05+0.009(I) = 0.807

WQv = (1")(R)(A) / 12 = **0.0937 ac*ft**
= **4082 cf**

Required Water Quality Flow (WQf)

WQv (Ac*ft)	=	0.0937
Drainage Area (Ac)	=	1.394

Q= WQv*12 / DA = **0.807 in**

Runoff Depth in inches (Q)	=	**0.807**	**in**
Design Precipitation in inches (P)	=	**1**	**in**

CN=1000/[10+5*P+10Q-10*(Q²+1.25QP)^1/2] = **98 CN**

From table 4-1 in chapter 4, TR-55

I_a = **0.041 in**
I_a / P = **0.041**

From Exhibit 4-11 in chapter 4, TR-55

q_u = **650 csm/in**

Unit peak discharge in csm/in (q_u)	=	**900**
Area in square miles (A)	=	**0.002**
Runoff Depth in inches (Q)	=	**0.807**

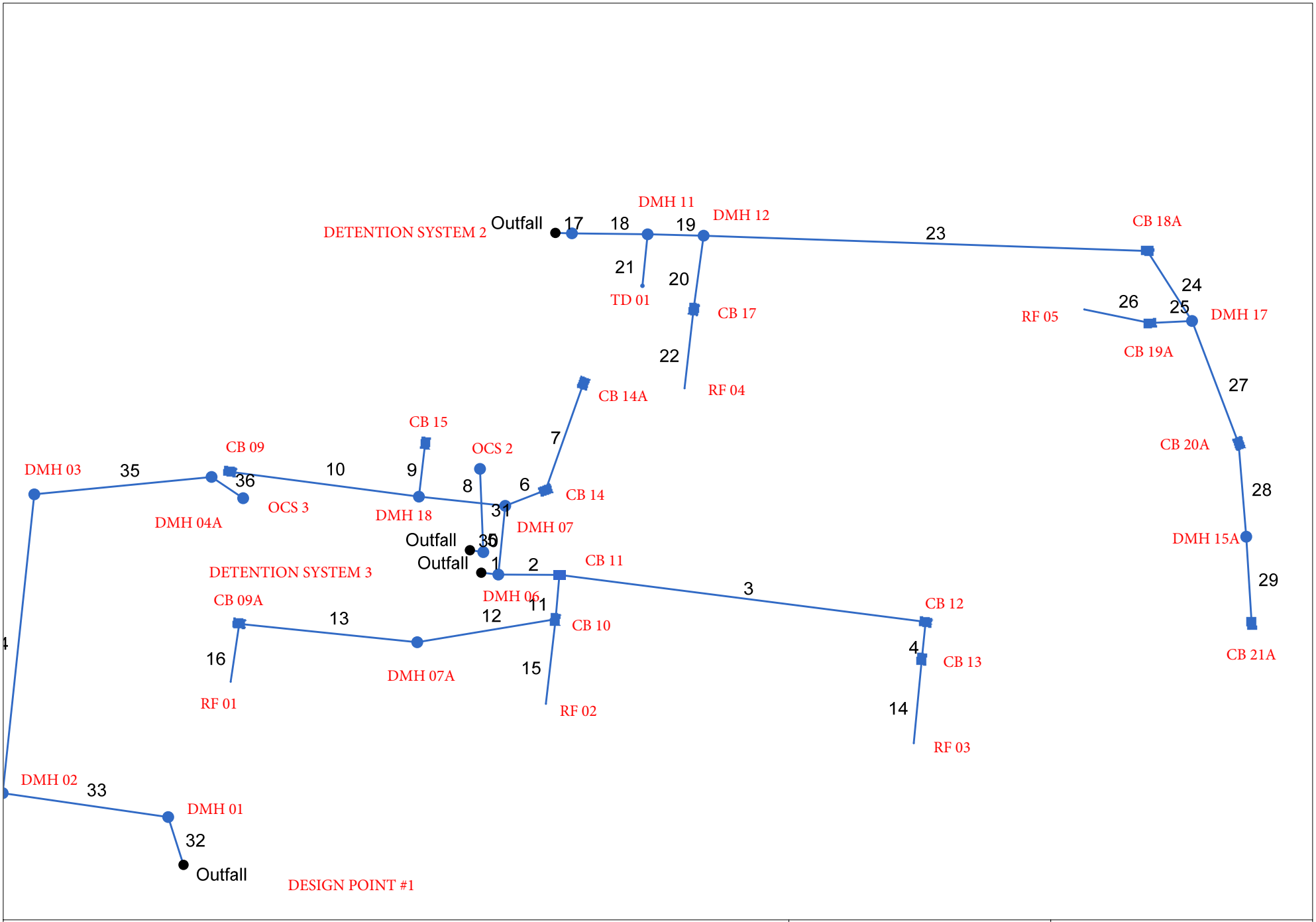
WQF=q_u*A*Q = **1.581 cfs**

Calculated in accordence with the 2004 Connecticut Stormwater Quality Manual Sections 7.4.1 and 7.4.2

Tighe&Bond

APPENDIX E

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



Project File: Proposed.stm	Number of lines: 36	Date: 3/1/2017

Storm Sewers v10.40

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	7	0.00	1.43	0.00	0.00	1.11	0.0	10.2	6.9	7.64	0.00	6.22	15	0.00	77.00	77.00	79.90	79.98	84.50	84.50	Pipe - (30)
2	1	24	0.15	0.97	0.76	0.11	0.78	5.0	6.6	7.8	6.09	16.73	4.96	15	5.72	77.00	78.40	80.58	80.77	84.50	86.07	Pipe - (28)
3	2	148	0.08	0.30	0.69	0.06	0.23	5.0	5.6	8.1	1.86	0.00	3.15	12	2.97	78.40	82.80	81.34	83.38	86.07	86.40	Pipe - (27)
4	3	15	0.09	0.22	0.64	0.06	0.18	5.0	5.5	8.1	1.42	0.00	3.29	12	1.32	82.80	83.00	83.38	83.50	86.40	86.40	Pipe - (26)
5	1	28	0.00	0.46	0.00	0.00	0.32	0.0	9.9	7.0	2.24	0.00	1.83	15	1.08	77.00	77.30	80.58	80.61	84.50	84.50	Pipe - (29)
6	5	17	0.03	0.08	0.79	0.02	0.07	5.0	6.6	7.8	0.52	0.00	3.89	12	3.16	80.65	81.20	80.84	81.50	84.50	84.60	Pipe - (33)
7	6	46	0.05	0.05	0.87	0.04	0.04	4.0	4.0	8.2	0.36	0.00	1.94	15	1.64	81.20	81.95	81.50	82.18	84.60	84.90	Pipe - (71)
8	5	35	0.00	0.38	0.00	0.00	0.25	0.0	9.7	7.0	1.79	0.00	2.27	12	0.98	79.31	79.65	80.66	80.74	84.50	84.57	Pipe - (78)
9	8	22	0.19	0.19	0.57	0.11	0.11	9.3	9.3	7.1	0.77	0.00	3.96	12	2.07	80.80	81.25	81.05	81.62	84.57	84.60	Pipe - (15)
10	8	77	0.19	0.19	0.77	0.15	0.15	5.0	5.0	8.2	1.21	0.00	2.31	12	0.98	79.65	80.40	80.82	80.90	84.57	83.90	Pipe - (70)
11	2	18	0.10	0.52	0.69	0.07	0.44	5.0	6.4	7.8	3.43	0.00	2.80	15	1.12	78.40	78.60	81.34	81.39	86.07	84.80	Pipe - (34)
12	11	56	0.00	0.30	0.00	0.00	0.26	0.0	5.9	8.0	2.06	0.00	1.68	15	1.58	78.60	79.49	81.60	81.65	84.80	84.20	Pipe - (35) (1)
13	12	72	0.09	0.30	0.81	0.07	0.26	5.0	5.2	8.2	2.11	0.00	1.77	15	1.55	79.49	80.60	81.67	81.72	84.20	83.90	Pipe - (35)
14	4	34	0.13	0.13	0.90	0.12	0.12	5.0	5.0	8.2	0.97	0.00	2.64	12	0.37	83.00	83.13	83.50	83.58	86.40	0.00	
15	11	34	0.12	0.12	0.90	0.11	0.11	5.0	5.0	8.2	0.92	0.00	1.17	12	0.37	78.85	78.98	81.60	81.62	84.80	0.00	
16	13	24	0.21	0.21	0.90	0.19	0.19	5.0	5.0	8.2	1.53	0.00	2.03	12	0.37	80.85	80.94	81.80	81.83	83.90	0.00	
17	End	7	0.00	3.16	0.00	0.00	2.07	0.0	15.2	6.0	12.39	0.00	7.01	18	0.00	77.80	77.80	80.11	80.19	85.75	85.70	Pipe - (23)
18	17	30	0.00	3.16	0.00	0.00	2.07	0.0	15.1	6.0	12.41	0.00	7.02	18	1.31	77.80	78.20	80.30	80.67	85.70	85.54	Pipe - (41)
19	18	23	0.00	2.74	0.00	0.00	1.88	0.0	12.5	6.4	12.10	0.00	6.85	18	0.44	78.20	78.30	81.43	81.69	85.54	85.50	Pipe - (46)
20	19	30	0.30	0.47	0.64	0.19	0.35	11.8	11.8	6.6	2.27	0.00	4.01	12	1.33	81.70	82.10	82.42	82.74	85.50	84.50	Pipe - (42)
21	18	21	0.42	0.42	0.45	0.19	0.19	14.9	14.9	6.0	1.14	0.00	1.45	12	0.37	78.45	78.53	81.43	81.45	85.54	0.00	
22	20	32	0.17	0.17	0.90	0.15	0.15	5.0	5.0	8.2	1.26	0.00	2.54	12	0.37	82.10	82.22	82.74	82.79	84.50	0.00	
23	19	178	1.21	2.27	0.54	0.65	1.53	12.0	12.0	6.5	10.03	0.00	5.67	18	2.04	78.30	81.93	82.42	83.80	85.50	85.90	
24	23	33	0.00	1.06	0.00	0.00	0.88	0.0	5.9	8.0	7.01	0.00	3.97	18	0.93	81.93	82.24	84.44	84.57	85.90	86.92	
25	24	17	0.15	0.33	0.76	0.11	0.28	5.0	5.3	8.2	2.25	0.00	1.84	15	3.02	82.30	82.81	84.81	84.83	86.92	86.90	
26	25	27	0.18	0.18	0.90	0.16	0.16	5.0	5.0	8.2	1.34	0.00	1.70	12	0.37	83.06	83.16	84.86	84.89	86.90	0.00	
27	24	53	0.40	0.73	0.84	0.34	0.60	5.0	5.7	8.0	4.85	0.00	3.95	15	1.90	82.23	83.23	84.81	85.07	86.92	86.70	

Project File: Proposed.stm | Number of lines: 36 | Run Date: 3/1/2017

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
28	27	38	0.00	0.33	0.00	0.00	0.27	0.0	5.3	8.1	2.18	0.00	1.77	15	0.96	83.23	83.59	85.19	85.22	86.70	87.15	
29	28	35	0.33	0.33	0.81	0.27	0.27	5.0	5.0	8.2	2.20	0.00	1.80	15	0.92	83.72	84.04	85.23	85.26	87.15	87.60	
30	End	5	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	8.46	0.00	10.77	12	0.00	77.00	77.00	79.90	80.16	0.00	84.65	Pipe - (79)
31	30	34	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.46	0.00	6.89	15	1.04	77.00	77.35	81.97	82.46	84.65	84.70	Pipe - (32)
32	End	20	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	9.93	0.00	6.06	18	0.20	76.04	76.08	77.25	77.56	82.44	83.20	Pipe - (72)
33	32	67	0.00	0.00	0.00	0.00	0.00	0.0	0.6	0.0	9.93	0.00	5.62	18	0.48	76.08	76.40	78.02	78.53	83.20	85.50	Pipe - (19)
34	33	121	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	9.93	0.00	5.62	18	0.25	76.40	76.70	79.02	79.94	85.50	85.10	Pipe - (18)
35	34	71	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9.93	0.00	5.62	18	0.36	76.70	76.95	80.42	80.97	85.10	81.42	Pipe - (17) (1)
36	35	15	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9.93	0.00	5.62	18	0.33	76.95	77.00	81.31	81.42	81.42	84.20	Pipe - (17)

Project File: Proposed.stm | Number of lines: 36 | Run Date: 3/1/2017

NOTES:Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82; Return period =Yrs. 25 ; c = cir e = ellip b = box