Appendix B
Supporting Stormwater Calculations

NOAA Atlas 14, Volume 10, Version 3
Location name: Uncasville, Connecticut, USA*
Latitude: 41.4341°, Longitude: -72.0977°
Elevation: 8.95 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.08 (3.19-5.14)	4.88 (3.80-6.14)	6.18 (4.80-7.80)	7.26 (5.62-9.19)	8.74 (6.54-11.4)	9.85 (7.22-13.1)	11.0 (7.85-15.1)	12.3 (8.32-17.1)	14.3 (9.24-20.4)	15.8 (10.0-23.0)
10-min	2.89 (2.26-3.64)	3.46 (2.69-4.35)	4.37 (3.40-5.52)	5.14 (3.97-6.50)	6.19 (4.63-8.11)	6.97 (5.11-9.29)	7.80 (5.56-10.7)	8.74 (5.89-12.1)	10.1 (6.55-14.4)	11.2 (7.10-16.3)
15-min	2.27 (1.77-2.85)	2.71 (2.12-3.41)	3.43 (2.67-4.33)	4.03 (3.11-5.11)	4.85 (3.63-6.36)	5.47 (4.01-7.29)	6.12 (4.36-8.40)	6.86 (4.62-9.52)	7.92 (5.14-11.3)	8.80 (5.57-12.8)
30-min	1.61 (1.25-2.02)	1.92 (1.50-2.41)	2.42 (1.88-3.06)	2.84 (2.20-3.60)	3.42 (2.56-4.49)	3.86 (2.83-5.14)	4.32 (3.08-5.92)	4.84 (3.26-6.72)	5.59 (3.62-7.97)	6.21 (3.93-8.99)
60-min	1.04 (0.812-1.31)	1.24 (0.967-1.56)	1.57 (1.22-1.98)	1.84 (1.42-2.33)	2.21 (1.66-2.90)	2.49 (1.83-3.32)	2.79 (1.99-3.82)	3.12 (2.11-4.34)	3.61 (2.34-5.15)	4.01 (2.54-5.81)
2-hr	0.682 (0.538-0.852)	0.814 (0.640-1.02)	1.03 (0.806-1.29)	1.21 (0.939-1.51)	1.45 (1.09-1.89)	1.63 (1.21-2.16)	1.83 (1.31-2.49)	2.05 (1.39-2.82)	2.37 (1.55-3.36)	2.64 (1.68-3.79)
3-hr	0.528 (0.418-0.655)	0.628 (0.497-0.781)	0.793 (0.625-0.987)	0.930 (0.728-1.16)	1.12 (0.847-1.45)	1.26 (0.934-1.66)	1.41 (1.01-1.91)	1.58 (1.07-2.16)	1.83 (1.19-2.57)	2.04 (1.30-2.91)
6-hr	0.336 (0.268-0.413)	0.399 (0.318-0.491)	0.502 (0.399-0.620)	0.587 (0.464-0.728)	0.705 (0.538-0.904)	0.793 (0.593-1.03)	0.886 (0.643-1.19)	0.993 (0.679-1.35)	1.15 (0.755-1.61)	1.28 (0.820-1.81)
12-hr	0.206 (0.166-0.251)	0.244 (0.196-0.298)	0.306 (0.246-0.375)	0.358 (0.285-0.440)	0.429 (0.331-0.546)	0.483 (0.364-0.624)	0.539 (0.394-0.719)	0.604 (0.415-0.814)	0.699 (0.461-0.966)	0.777 (0.500-1.09)
24-hr	0.121 (0.098-0.146)	0.144 (0.117-0.174)	0.182 (0.147-0.221)	0.213 (0.171-0.260)	0.256 (0.199-0.324)	0.289 (0.219-0.371)	0.323 (0.238-0.428)	0.363 (0.251-0.485)	0.422 (0.280-0.578)	0.471 (0.305-0.656)
2-day	0.068 (0.055-0.081)	0.081 (0.067-0.098)	0.104 (0.085-0.125)	0.122 (0.099-0.148)	0.148 (0.116-0.186)	0.167 (0.128-0.213)	0.188 (0.140-0.248)	0.212 (0.148-0.281)	0.249 (0.166-0.339)	0.281 (0.182-0.387)
3-day	0.049 (0.040-0.058)	0.059 (0.048-0.070)	0.075 (0.062-0.090)	0.088 (0.072-0.106)	0.107 (0.084-0.133)	0.121 (0.093-0.153)	0.135 (0.101-0.178)	0.153 (0.107-0.202)	0.180 (0.120-0.243)	0.203 (0.132-0.278)
4-day	0.039 (0.033-0.047)	0.047 (0.039-0.056)	0.060 (0.049-0.072)	0.070 (0.058-0.085)	0.085 (0.067-0.106)	0.096 (0.074-0.121)	0.108 (0.081-0.140)	0.121 (0.085-0.159)	0.142 (0.095-0.192)	0.160 (0.105-0.219)
7-day	0.027 (0.022-0.032)	0.032 (0.026-0.037)	0.040 (0.033-0.047)	0.046 (0.038-0.055)	0.055 (0.044-0.068)	0.062 (0.048-0.078)	0.069 (0.052-0.090)	0.078 (0.055-0.101)	0.090 (0.061-0.121)	0.101 (0.066-0.137)
10-day	0.022 (0.018-0.026)	0.025 (0.021-0.030)	0.031 (0.026-0.037)	0.036 (0.030-0.043)	0.043 (0.034-0.052)	0.048 (0.037-0.059)	0.053 (0.040-0.068)	0.059 (0.042-0.076)	0.068 (0.046-0.090)	0.075 (0.049-0.101)
20-day	0.015 (0.013-0.018)	0.017 (0.015-0.020)	0.020 (0.017-0.024)	0.023 (0.019-0.027)	0.027 (0.021-0.032)	0.029 (0.023-0.036)	0.032 (0.024-0.040)	0.035 (0.025-0.045)	0.039 (0.026-0.051)	0.042 (0.028-0.056)
30-day	0.013 (0.011-0.015)	0.014 (0.012-0.016)	0.016 (0.014-0.019)	0.018 (0.015-0.021)	0.021 (0.017-0.025)	0.022 (0.018-0.027)	0.024 (0.018-0.030)	0.026 (0.019-0.033)	0.028 (0.019-0.037)	0.030 (0.020-0.040)
45-day	0.011 (0.009-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.017)	0.016 (0.013-0.019)	0.017 (0.014-0.021)	0.019 (0.014-0.023)	0.020 (0.014-0.025)	0.021 (0.015-0.028)	0.022 (0.015-0.029)
60-day	0.009 (0.008-0.011)	0.010 (0.009-0.012)	0.011 (0.010-0.013)	0.012 (0.010-0.014)	0.014 (0.011-0.016)	0.015 (0.012-0.018)	0.016 (0.012-0.019)	0.017 (0.012-0.021)	0.018 (0.012-0.023)	0.018 (0.012-0.024)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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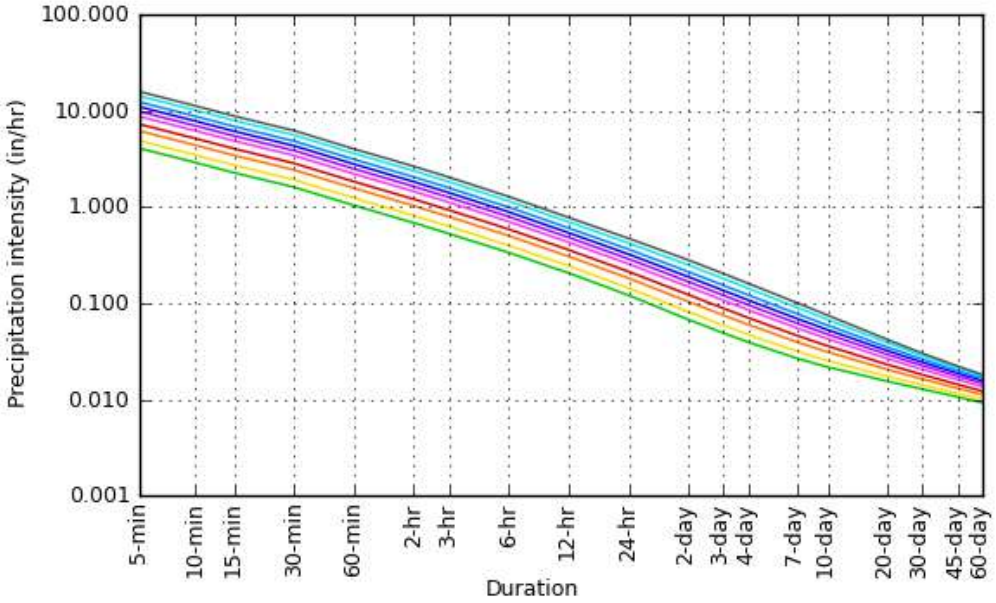
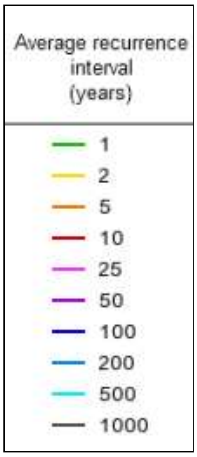
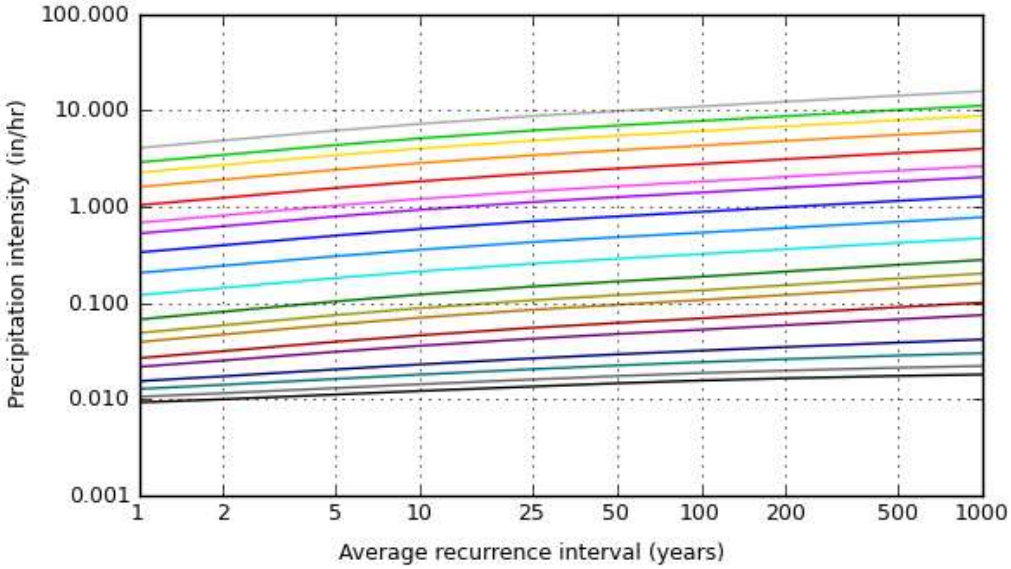
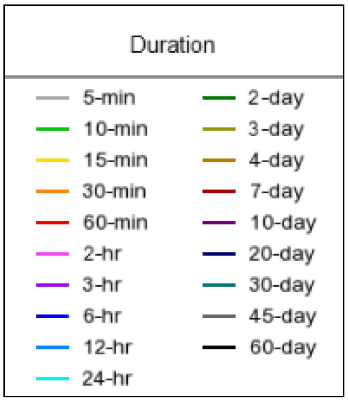
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 41.4341°, Longitude: -72.0977°









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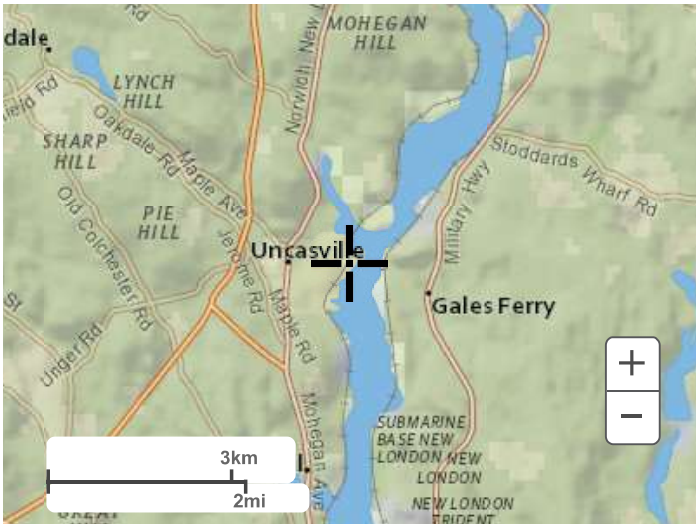
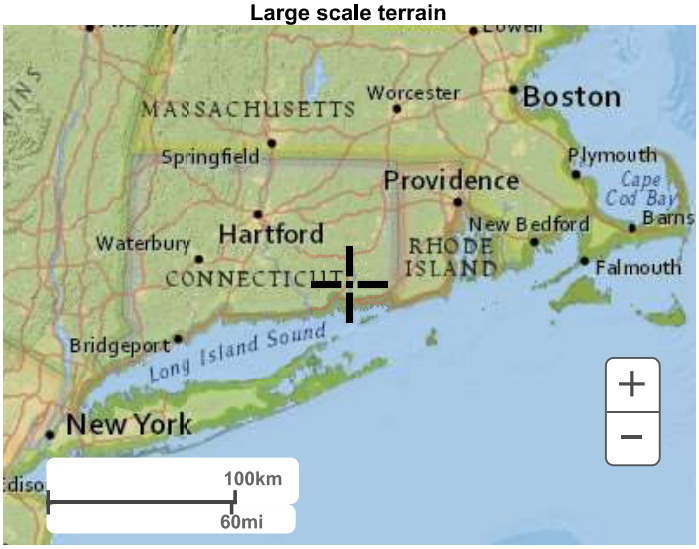
Maps & aerials

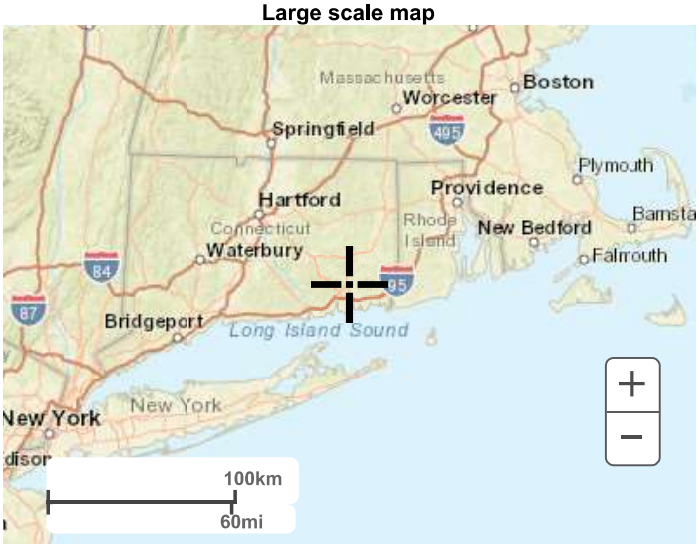
Small scale terrain



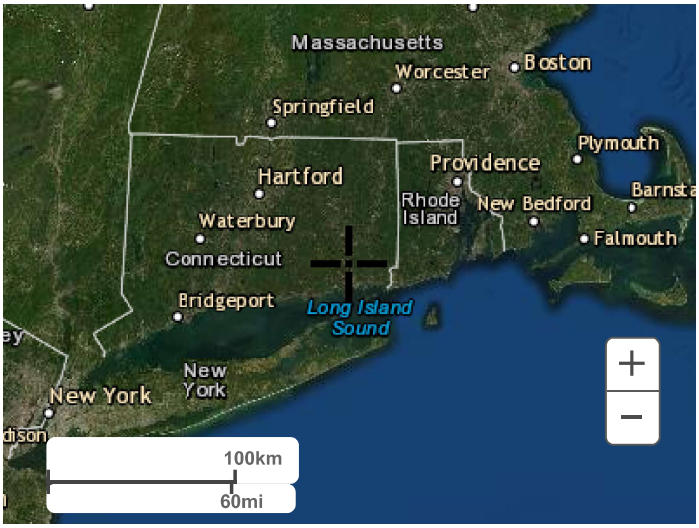
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Hydraulic Analysis Report

Project Data

Project Title: Depot Road

Designer: DCM

Project Date: Thursday, June 16, 2022

Project Units: U.S. Customary Units

Notes:

Rational Analysis: Bench West Subarea1

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.51

Basin Area: 0.5900 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 2.2 cfs

Rational Analysis: Swale West Subarea2

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.66

Basin Area: 1.0500 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 5.1 cfs

Rational Analysis: Swale West Subarea3

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.78

Basin Area: 1.4100 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 8.1 cfs

Rational Analysis: Gutter West Subarea4

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 1.8700 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 13.0 cfs

Rational Analysis: Basins West Subarea4S

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.9700 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 6.7 cfs

Rational Analysis: Basins West Subarea5

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.75

Basin Area: 1.4000 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.04 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 7.7 cfs

Rational Analysis: West Overall

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.81

Basin Area: 6.3200 acres

Rainfall Intensity: 5.57 in/hr

Time of Concentration: 8.50 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 8.50 min

Rational Method Results

Flowrate: 28.7 cfs

Rational Analysis: Swale North Subarea1

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.5200 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 3.6 cfs

Rational Analysis: Swale North Subarea2

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 1.2200 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 8.5 cfs

Rational Analysis: Swale North Subarea3

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.2300 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 1.6 cfs

Rational Analysis: Swale North Subarea4

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.6200 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 4.3 cfs

Rational Analysis: Swale North Overall

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 2.5900 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 18.0 cfs

Rational Analysis: CB E Subarea

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.2100 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 1.5 cfs

Rational Analysis: Swale Middle Subarea1

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.9100 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 6.3 cfs

Rational Analysis: Swale Middle Subarea2

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.9900 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 6.9 cfs

Rational Analysis: Swale Middle Subarea3

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 1.2900 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 9.0 cfs

Rational Analysis: Swale Middle Subarea4

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 1.3900 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 9.7 cfs

Rational Analysis: Swale Middle Overall

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 4.5800 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 31.9 cfs

Rational Analysis: CB F Subarea

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.1800 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 1.3 cfs

Rational Analysis: CB G Subarea

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.0800 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 0.6 cfs

Rational Analysis: Swale South Subarea1

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.8600 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 6.0 cfs

Rational Analysis: Swale South Subarea2

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 1.2600 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 8.8 cfs

Rational Analysis: Swale South Subarea3

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.8100 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 5.6 cfs

Rational Analysis: Swale South Overall

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 2.9300 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 20.4 cfs

Rational Analysis: Pipe Inlet Subarea

Notes:

Rational Method Input Parameters

Runoff Coefficient: 0.95

Basin Area: 0.6900 acres

Rainfall Intensity: 7.26 in/hr

Time of Concentration: 5.00 minutes

Recurrence Year: 10 year

IDF Input Parameters

User Supplied Data

10 year Recurrence, 5 min duration: 7.26 in/hr

10 year Recurrence, 10 min duration: 5.14 in/hr

10 year Recurrence, 15 min duration: 4.03 in/hr

10 year Recurrence, 30 min duration: 2.84 in/hr

10 year Recurrence, 60 min duration: 1.84 in/hr

Time of Concentration Input Parameters

Specified Time of Concentration

Time of Concentration: 5.00 min

Rational Method Results

Flowrate: 4.8 cfs

Channel Analysis: Stockpile Yard Perimeter Swales

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 4.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0300

Flow 8.3000 cfs

Result Parameters

Depth 0.5629 ft

Area of Flow 2.8852 ft^2

Wetted Perimeter 6.5173 ft

Hydraulic Radius 0.4427 ft

Average Velocity 2.8768 ft/s

Top Width 6.2515 ft

Froude Number: 0.7463

Critical Depth 0.4707 ft

Critical Velocity 3.5683 ft/s

Critical Slope: 0.0188 ft/ft

Critical Top Width 5.88 ft

Calculated Max Shear Stress 0.3512 lb/ft^2

Calculated Avg Shear Stress 0.2762 lb/ft^2

Channel Analysis: Salt Storage Perimeter Swale

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 5.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0300

Flow 8.0000 cfs

Result Parameters

Depth 0.4908 ft

Area of Flow 2.9359 ft^2

Wetted Perimeter 7.1950 ft

Hydraulic Radius 0.4080 ft

Average Velocity 2.7249 ft/s

Top Width 6.9632 ft

Froude Number: 0.7395

Critical Depth 0.4063 ft

Critical Velocity 3.3879 ft/s

Critical Slope: 0.0192 ft/ft

Critical Top Width 6.63 ft

Calculated Max Shear Stress 0.3063 lb/ft^2

Calculated Avg Shear Stress 0.2546 lb/ft^2

Channel Analysis: Salt Storage Perimeter Swale

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 5.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0300

Flow 8.1000 cfs

Result Parameters

Depth 0.4943 ft

Area of Flow 2.9603 ft^2

Wetted Perimeter 7.2107 ft

Hydraulic Radius 0.4105 ft

Average Velocity 2.7362 ft/s

Top Width 6.9773 ft

Froude Number: 0.7403

Critical Depth 0.4094 ft

Critical Velocity 3.3999 ft/s

Critical Slope: 0.0192 ft/ft

Critical Top Width 6.64 ft

Calculated Max Shear Stress 0.3085 lb/ft^2

Calculated Avg Shear Stress 0.2562 lb/ft^2

Channel Analysis: Reverse Bench

Notes:

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0250

Flow 2.2000 cfs

Result Parameters

Depth 0.4550 ft

Area of Flow 0.7245 ft^2

Wetted Perimeter 3.3373 ft

Hydraulic Radius 0.2171 ft

Average Velocity 3.0364 ft/s

Top Width 3.1849 ft

Froude Number: 1.1219

Critical Depth 0.4961 ft

Critical Velocity 2.5536 ft/s

Critical Slope: 0.0126 ft/ft

Critical Top Width 4.25 ft

Calculated Max Shear Stress 0.5678 lb/ft^2

Calculated Avg Shear Stress 0.2709 lb/ft^2

Channel Analysis: Stockpile Yard Perimeter Swales

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 4.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0300

Flow 9.7000 cfs

Result Parameters

Depth 0.6143 ft

Area of Flow 3.2121 ft^2

Wetted Perimeter 6.7474 ft

Hydraulic Radius 0.4761 ft

Average Velocity 3.0198 ft/s

Top Width 6.4573 ft

Froude Number: 0.7545

Critical Depth 0.5179 ft

Critical Velocity 3.7192 ft/s

Critical Slope: 0.0183 ft/ft

Critical Top Width 6.07 ft

Calculated Max Shear Stress 0.3833 lb/ft^2

Calculated Avg Shear Stress 0.2971 lb/ft^2

Appendix B

Pipe Sizing Calculations

Manning's Equation for Open Channel Flow

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

Maximum pipe capacities for the trunk line drains are presented below as compared to the peak flow rates calculated using the Rational Method for the contributing watersheds.
Pipes are sized with capacity for the 10-year design storm minimum in accordance with the recommendations of the CT DOT Drainage Manual for curb and gutter systems.

Existing Outlet for West Side of Tracks (24-inch CI at S=0.026)

Q=	**36.58**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.026	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Design Flow - West Overall

Q10= 28.7 CFS

HDS A to Existing 24-inch CI (24-inch HDPE at S=0.017)

Q=	**29.58**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.017	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Design Flow - West Overall

Q10= 28.7 CFS

CB A to HDS A (18-inch HDPE at S = 0.020)

Q=	**14.90**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.02	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Design Flow - West Subarea 5

Q10= 7.7 CFS

CB B to CB A (18-inch HDPE at S = 0.005)

Q=	**7.45**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Design Flow - West Subarea 5

Q10= 7.7 CFS

Appendix B

Pipe Sizing Calculations

CB C to HDS A (24-inch HDPE at S = 0.065)

Q=	**57.83**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.065	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Design Flow - West Subarea 1-4

Q10= 28.4 CFS

CB D to CB C (24-inch HDPE at S = 0.005)

Q=	**16.04**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Design Flow - West Subarea 3+4S

Q10= 14.8 CFS

North Swale to CB C (15-inch HDPE at S = 0.062)

Q=	**16.13**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.062	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Design Flow - West Subarea 1+2

Q10= 7.3 CFS

South Swale to CB C (15-inch HDPE at S = 0.020)

Q=	**9.16**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.02	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Design Flow - West Subarea 3

Q10= 8.1 CFS

CB E to Outlet (15-inch HDPE at S = 0.005)

Q=	**4.58**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Design Flow - CB-E Subarea

Q10= 1.5 CFS

Appendix B

Pipe Sizing Calculations

CB F to Outlet (15-inch HDPE at S = 0.020)

Q=	**9.16**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.02	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Design Flow - CB-F/G Subarea

Q10= 1.9 CFS

CB G to CB F (15-inch HDPE at S = 0.005)

Q=	**4.58**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Design Flow - CB-G Subarea

Q10= 0.6 CFS

Pipe Inlet to HDS B (18-inch RCP at S = 0.003)

Q=	**5.77**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.003	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Design Flow - Pipe Inlet Subarea

Q10= 4.8 CFS

HDS B to DMH (18-inch RCP at S = 0.003)

Q=	**5.77**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.003	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Design Flow - Pipe Inlet Subarea

Q10= 4.8 CFS

DMH to Outlet (Existing 24-inch CI at S = 0.024)

Q=	**35.14**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.024	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Design Flow - Pipe Inlet + South

Q10= 25.1 CFS

Appendix B

Pipe Sizing Calculations

HDS 1 to Outlet (18-inch HDPE at S = 0.03)

Design Flow - North 1-4

Q=	**18.24**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.03	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Q10= 18 CFS

CB 1 to HDS 1 (18-inch HDPE at S = 0.03)

Design Flow - North 1-4

Q=	**18.24**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.03	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Q10= 18 CFS

CB 2 to CB 1 (15-inch HDPE at S = 0.005)

Design Flow - North 1

Q=	**4.58**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Q10= 3.6 CFS

CB 3 to CB 1 (15-inch HDPE at S = 0.009)

Design Flow - North 3-4

Q=	**6.14**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.009	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Q10= 5.9 CFS

CB 4 to CB 3 (15-inch HDPE at S = 0.005)

Design Flow - North4

Q=	**4.58**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Q10= 4.3 CFS

Appendix B

Pipe Sizing Calculations

CB 5 to CB 4 (15-inch HDPE at S = 0.005)

Design Flow - North4

Q=	**4.58**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Q10= 4.3 CFS

CB 6 to CB 5 (15-inch HDPE at S = 0.005)

Design Flow - North4

Q=	**4.58**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Q10= 4.3 CFS

HDS 2 to DMH (24-inch HDPE at S = 0.020)

Design Flow - Middle 1-4

Q=	**32.08**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.02	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Q10= 31.9 CFS

CB 7 to HDS 2 (24-inch HDPE at S = 0.020)

Design Flow - Middle 1-4

Q=	**32.08**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.02	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Q10= 31.9 CFS

CB 8 to CB 7 (18-inch HDPE at S = 0.016)

Design Flow - Middle 1-2

Q=	**13.32**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.016	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Q10= 13.2 CFS

Appendix B

Pipe Sizing Calculations

CB 9 to CB 8 (15-inch HDPE at S = 0.056)

Design Flow - Middle 1

Q=	**15.33**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.23	SF	Area of Pipe
R=	0.3125	FT	Hydraulic Radius = A/P
S=	0.056	FT/FT	Pipe Slope
r=	0.625	FT	Pipe Radius
P=	3.93	FT	Pipe Perimeter

Q10= 6.3 CFS

CB 10 to CB 7 (18-inch HDPE at S = 0.013)

Design Flow - Middle 4

Q=	**12.01**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.013	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Q10= 9.7 CFS

HDS 3 to Existing CB (24-inch HDPE at S = 0.010)

Design Flow - South 1-3

Q=	**22.68**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.01	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Q10= 20.4 CFS

CB 11 to HDS 3 (24-inch HDPE at S = 0.010)

Design Flow - South 1-3

Q=	**22.68**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.01	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Q10= 20.4 CFS

CB 12 to CB 11 (24-inch HDPE at S = 0.011)

Design Flow - South 1-2

Q=	**23.79**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	3.14	SF	Area of Pipe
R=	0.5	FT	Hydraulic Radius = A/P
S=	0.011	FT/FT	Pipe Slope
r=	1	FT	Pipe Radius
P=	6.28	FT	Pipe Perimeter

Q10= 14.8 CFS

Appendix B

Pipe Sizing Calculations

CB 13 to CB 12 (18-inch HDPE at S = 0.005)

Q=	**7.45**	**CFS**	Flow Rate
n=	0.013		Roughness Coefficient
A=	1.77	SF	Area of Pipe
R=	0.375	FT	Hydraulic Radius = A/P
S=	0.005	FT/FT	Pipe Slope
r=	0.75	FT	Pipe Radius
P=	4.71	FT	Pipe Perimeter

Design Flow - South 1

Q10= 6 CFS