Hydrology and Hydraulic Analysis

Pastori Storm Drain Outfall
Town of Fairfax, California

Dated: April 9, 2010

Prepared For:
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Purpose

The suspended terminal section of the 24-inch storm drain outfall of the existing storm drain system at Pastori Avenue, was blown away during a heavy storm event. The storm water flowing from the system into San Anselmo Creek is discharging directly onto the bank beneath the failed culvert. The bank needs to be stabilized to prevent against future bank erosion.

In addition, the Town of Fairfax reported localized flooding in the area of Kent Avenue and Belle Avenue. The storm drain system was unable to effectively convey storm water from the north side of Sir Frances Drake Boulevard (SFDB), causing the storm water to flow across SFDB into the residential area of Kent Avenue and Belle Avenue. It is suspected that the existing storm drain line in SFDB is dilapidated and in need of replacement, the line was video inspected and found to be in disrepair.

The intent of this analysis is to evaluate the storm drain system in four scenarios (see below), and determine the flow rate and velocity of storm water entering San Anselmo Creek at the Pastori Avenue outfall, and determine if localized flooding is expected to occur.

This analysis should not be used for design purposes. Any future storm drain improvements or rehabilitations should be designed based on detailed survey data that does not exist at this time.

Scenarios Analyzed

1. Historic Condition: The storm drain system (see Figure 1, "Storm Drain System," in the Figures section of this report following the Appendices) prior to the installation of the 48-inch pipe within Pastori Avenue.
2. Current Condition: The existing storm drain system (see Figure 1, "Storm Drain System") with the 48-inch pipe within Pastori Avenue and the 24-inch outfall to San Anselmo Creek.
3. Proposed Condition: The proposed storm drain system (see Figure 1, "Storm Drain System") with the 48-inch pipe within Pastori Avenue and the 48-inch outfall to San Anselmo Creek.
4. Future Condition: The future storm drain system (see Figure 1, "Storm Drain System") with the 48-inch pipe within Pastori Avenue, the 48-inch outfall to San Anselmo Creek, and improvement/ rehabilitation of the upstream pipes.

Analysis Methodology

The four scenarios were analyzed in accordance with the County of Marin Hydrology Manual dated August 2, 2000. The system was analyzed using the Rational Method:

$$Q=CiA$$

Where Q = flow rate (cubic feet per second, cfs)
C = runoff coefficient
i = rainfall intensity (inches per hour)
A = watershed area (acres)

As shown in Figure 2, "Watershed Map", the USGS Quadrangle Map (San Rafael, 7.5 and 15 minutes) was used to augment the existing survey, and determine the tributary areas of each catch basin.

The time of concentration (Tc) for areas less than 1 acre was assumed to be 5 minutes. The Tc for areas between 1 and 2 acre was assumed to be 10 minutes. For areas larger than 2 acres, the Tc was calculated (see Appendix B). For the assumed channel section, used in the Tc calculations, a 10 foot wide section with 5 to 1 side slopes, lined by weedy grass with a corresponding Manning's n-value of 0.045.

The Caltrans Zonal Method was used to determine rainfall intensities for the 10-, 25-, 50-, and 100-year storm intervals (see Appendix A).

Runoff Coefficients (C-values) were determined using aerial photography and USGS Quadrangle Map topography (see Figure 3, "Runoff Coefficient Map"). Fully developed Sub-sheds, with little landscaping, were assigned a C-value of 0.9. Fully developed Sub-sheds, with landscaping, were assigned a C-value of 0.7. Partially developed Sub-sheds, with landscaping or natural areas, were assigned a C-value of 0.6.

Storm drain data (inverts, material, size, etc.) for Scenario 1, Historic Condition, in Pastori Avenue was taken from a survey performed by Caruthers Land Surveying and a supplemental survey by RW Davis and Associates which were prepared prior to June 5, 2008. The Pastori Avenue storm drain improvements analyzed in Scenario 2, Current Condition, and Scenario 3, Proposed Condition, were determined from the Pastori Avenue Storm Drain Replacement plans, prepared by CSW|ST2, dated June 5, 2008. Other storm drain data was determined during a field visit by Kerry Ettinger and Julia Harberson on March 23, 2010 (see Site Visit Summary below and Appendix L). Some storm drain characteristics were assumed (see list of assumptions below).

Storm drain data for Scenario 4, Future Condition, in Pastori Avenue is based on the Pastori Avenue Storm Drain Replacement plans, prepared by CSW|ST2, dated June 5, 2008. Storm drain data in SFDB was based on assumed improvements to the existing storm drain pipes. The SFDB storm drain improvements include upsizing pipes, replacing derelict pipes, and increasing inlet sizes.

The Manning's roughness coefficients (n-value) were assigned based on industry standards. High Density Polyethylene (HDPE) and Polyvinyl Chloride (PVC) pipes received an n-value of 0.012. Vitrified Clay Pipes (VCP) were assigned and n-value of 0.014. See the list of assumptions below for the n-value of the dilapidated VCP in SFDB.

The starting Hydraulic Grade Line (HGL) of the model was set to the crown of the outfall pipe (83.94 under Scenario 1 and 2, and 86.94 for Scenarios 3 and 4). The FEMA Flood Map (see Appendix M) states that the discharge is contained in the channel at the Pastori Avenue outfall location in San Anselmo Creek and has a 0.2% Annual Chance of Flood (500 year recurrence interval). There is no FEMA Flood Profile for this section of San Anselmo Creek; also the exact water surface elevation (WSEL) cannot be determined without further topographic information. However, San Anselmo Creek peak flow discharges at the Pastori

Avenue Bridge crossing can be estimated using drainage area ratio extrapolation from estimated in the 1977 Flood Insurance Study for the Town of Fairfax prepared by the U.S. Department of Housing and Urban Development. The estimated 500-year peak discharge is about 4,700-5,100 cfs. Therefore, using an assumed channel section (based on limited survey data) and a creek flow rate of 5,100 cfs, a WSEL was calculated using the FlowMaster 2005 computer program to approximate the surface of the water relative to the outfall. Based on this calculation, the WSEL was predicted to be below the invert of the outfall pipe and discharges from the Pastori outfall transition through critical depth in freefall to the creek below. Critical depth is just below the crown of the outfall pipe for the 10-year return frequency event, therefore, the starting HGL was conservatively assumed to be at the crown of the outfall pipe for each scenario modeled.

The computer analysis program Hydraflow Storm Sewer Extension for AutoCAD Civil 3D 2008 was used to analyze the four scenarios (see Appendix D through Appendix K for the output results of each model).

For the purposes of this analysis, flooding is defined as any point where the predicted HGL is above the curb, and therefore, not contained within the street section.

Assumptions

1. All pipes smaller than 18-inches (unless confirmed otherwise) are PVC or HDPE and have an n-value of 0.012.
2. Pipes with unknown diameter were assigned a diameter of 18-inches; these pipes are called out in the Pipe Table (see Appendix C).
3. The old VCP storm drain lines in SFDB were assigned an n-value of 0.035 (similar to an n-value for a stone channel with weeds) based on the video evidence.
4. The dilapidated VCP storm drain will be replaced with either PVC or HDPE in scenario 4.
5. Grate elevations, for structures not surveyed, were estimated based on aerial topography.
6. Invert elevations, for structures not surveyed, were determined by subtracting the known depth of the structure (determined during the March 23, 2010 site visit) from the estimated grate elevation.
7. Invert data for Structures SDMH#4, SDMH#5, and SDMH#6 were calculated assuming a straight line between the inverts upstream and downstream of the structure.
8. Sub-shed A was divided in half and the resultant areas were assigned to be tributary to CB#9 and CB#10.
9. Sub-shed B was divided and resulting areas were assigned to be tributary to CB#11, CB#12, CB#13, CB#14, CB#15, and CB#16 (see Appendix C, "Sub-shed B Table").
10. Pipe running north along Kent Avenue from CB#4 is either caved in or abandoned and not part of the storm drain system (the pipe was not included in any of the scenarios analyzed).
11. Scenario 4, Future Condition, is based on assumed improvements which include, upsizing pipes, replacing derelict pipes, increasing inlet sizes.

Site Visit Summary

Visual observations of the Pastori Avenue storm drain outfall project were taken on March 23, 2010 by CSW|ST2 employees Kerry Ettinger and Julia Harberson. Pipe data necessary to build a model of the existing storm drain system was gathered (see Appendix C for Pipe and Inlet data) during this visit. Such data included grate size of inlet structures, pipe diameter, pipe material, and depth of the inlet structure. See Appendix L for the raw data determined during the site visit.

Conversations with residents shed light onto the flooding experienced in the areas of Kent Avenue and Belle Avenue. One resident observed that CB#12, CB#13, and CB#14 "clog early" in large storm events. The same resident noted that storm water "shoots" past CB#16 and "jumps" across SFDB at Kent Avenue near the Marin Tack & Feed and Don's Market Wine & Liquor. Another resident noted that several feet of flooding occurred at CB#17 and CB#18 during the February 2010 storm events, and had occurred in past storm events as well. Another resident pointed out that storm water accumulating in CB#17 and CB#18 is pumped through private property and discharged at 43 Belle Avenue then runs free along Belle Avenue to Pastori Avenue and then into Oak Knoll Avenue and eventually reaching San Anselmo Creek. As such, this area is not part of the Pastori Avenue Storm Drain outfall watershed but is affected by the storm water jumping across SFDB (see Figure 1, "Storm Drain System" and Appendix C, "Hydrology Table", Sub-Shed H).

Results of Analysis

Table 1 depicts the flow rate in cubic feet per second (cfs), at the Pastori Avenue outfall, for each storm interval and scenario analyzed. Table 2 shows the velocities in feet per second (fps), at the Pastori Avenue outfall, for each storm interval and scenario analyzed.

Table 1: Flow Rate at Pastori Avenue Outfall (cfs)

Scenario	10-Year	25-Year	50-Year	100-Year
1	137.9	161.9	175.0	192.6
2	135.6	159.7	172.8	190.5
3	135.9	159.9	172.9	190.5
4	133.7	156.6	169.6	187.3

Table 2: Velocities at Pastori Avenue Outfall (fps)

Scenario	10-Year	25-Year	50-Year	100-Year
1	43.89	51.54	55.70	61.33
2	43.18	50.85	55.00	60.64
3	11.11	12.98	13.94	15.28
4	10.92	12.74	13.70	15.03

Table 3 lists the catch basins, at which the hydraulic model predicted the HGL, or water surface elevation, would be above the finished grade (FG) and during which storm recurrence interval it would occur.

Table 3: HGL above FG at Catch Basin

Catch Basin	Scenario	10-Year	25-Year	50-Year	100-Year
#1	1	x	x	x	x
	2		x	x	x
	3				
	4				
#2	1	x	x	x	x
	2	x	x	x	x
	3				x
	4				
#3	1	x	x	x	x
	2	x	x	x	x
	3				x
	4				
#4	1	x	x	x	x
	2	x	x	x	x
	3				x
	4				
#5	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#6	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#7	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#8	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#9	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#10	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#11	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x

Catch Basin	Scenario	10-Year	25-Year	50-Year	100-Year
#12	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#13	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#14	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#15	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x
#16	1	x	x	x	x
	2	x	x	x	x
	3	x	x	x	x
	4		x	x	x

Table 4: Inlet Depth and Spread (ft)

Interval	10-Year		25-Year		50-Year		100-Year	
Catch Basin	Depth	Spread	Depth	Spread	Depth	Spread	Depth	Spread
#3	n/a	n/a	n/a	n/a	0.32	16.00	0.33	16.50
#5	0.82	41.00	0.88	44.00	0.94	47.00	1.00	50.00
#6	n/a	n/a	0.30	15.00	0.32	16.00	0.34	17.00
#9	0.33	16.35	0.35	17.35	0.36	17.85	0.37	18.50
#10	0.33	16.35	0.35	17.35	0.36	17.85	0.37	18.50
#11	0.41	20.75	0.45	22.70	0.47	23.65	0.50	24.90
#12	0.71	35.40	0.76	38.15	0.76	39.60	0.83	41.35
#13	0.78	38.95	0.83	41.70	0.86	43.10	0.90	44.90
#14	0.47	23.45	0.50	24.95	0.51	25.70	0.53	26.70
#16	0.38	19.10	0.40	20.25	0.42	20.85	0.43	21.60

Note 1: Catch basin listed when depth is greater than curb or spread at inlet is greater than 15 feet.
Note 2: See Figure 4, "Inlet Schematic," for depth and spread graphical representations.

Table 4 shows the inlet depth and spread based on the inlet geometry, at critical catch basins for Scenarios 1, 2, and 3. The depth and spread depicted in Table 4 do not account for actual ponding area and depth or the HGL of the storm drain system, but rather Table 4 indicates critical catch basins where flooding may occur due to incapacity of the grate and/or curb opening. A detailed topographic survey of SFDB and the Kent Avenue and Belle Avenue area would be required for a refined flooding and ponding analysis.

Conclusions

- There is a large reduction in velocities from Scenarios 1 and 2 to Scenarios 3 and 4 that is due to the increase in the outfall pipe diameter from 24-inches to 48-inches.The outfall velocities calculated for Scenario 1, Historic Condition, vary from 43.89 fps to 61.33 fps, depending on the storm recurrence interval being analyzed. Velocities calculated for Scenario 2, Current Condition, range from 43.18 fps to 60.64 fps. Scenario 2 outfall velocities are slightly reduced from Scenario 1 due to the installation of the 48-inch storm drain main in Pastori Avenue. The outfall velocities calculated for Scenario 3, Proposed Condition, vary from 11.11 fps to 15.28 fps. Velocities calculated for Scenario 4, Future Condition, range from 10.92 fps to 15.03 fps.

- The large reduction in velocities and the small reduction in flow rates is due to the changes in the storm drain system which cause the system to go from pressure flow to gravity flow. Scenario 1, Historic Condition, and Scenario 2, Current Condition, both with a 24-inch outfall pipe, are under pressure flow. This is likely the result of an under capacity outfall pipe and water ponding/ flooding upstream of the system, creating hydraulic head which forces the storm water into the storm drain system and to exit the outfall at a high velocity. As such, the peak discharges seen in Scenario 1 and Scenario 2 are largely due to the storm water being forced through the storm drain system rapidly. The peak discharge for Scenario 2 is less than that of Scenario 1 due to the 48-inch storm drain main in Pastori Avenue. The 48-inch main in Scenario 2 is adequately sized to convey the design storm. As such the storm water in the 48-inch main does not experience pressure force until it reaches the 24-inch outfall, which slightly reduces the peak discharge over that experienced in Scenario 1. Peak discharge is calculated based on the time it takes for storm water to travel from the furthest point in the watershed to the outfall. When a storm drain system is under pressure flow, the travel time is reduced and the peak discharge is increased (see Appendix D through Appendix G for Tc).

  Scenario 3, Proposed Condition, and Scenario 4, Future Condition, both with a 48-inch outfall pipe, are under gravity flow. This is due to the larger pipes and inlets allowing storm water to be more efficiently conveyed through the storm drain system. Scenario 3 has an adequately sized outfall. As such the pipe velocity through Pastori Avenue to the outfall is slower than that modeled under Scenario 2. As such, the peak discharge is slightly smaller. However, the storm drain pipes in SFDB are still undersized and force storm water through at a faster rate then Scenario 4. Scenario 4, one possible storm drain upgrade, includes improvements to SFDB. These improvements create a more effectively sized storm drain system over Scenario 3 and produce a longer travel time in the watershed creating a slightly reduced peak discharge.

- The changes in flow rates or discharge at the Pastori Avenue outfall, through each scenario, are minor. The same volume of storm water is entering San Anselmo Creek through each scenario analyzed, however, the time at which the flow peaks and the rate of the peak flow vary. There is only an approximate 3% reduction in

peak discharge to San Anselmo Creek from Scenario 1, Historic Condition, to Scenario 4, Future Condition. Given the peak flow rates discussed in this analysis, the change in flow rate between each scenario is statistically negligible.

- The ponding/ flooding is reduced from Scenario 1, Historic Condition, to Scenario 4, Future Condition. There are two reasons why ponding occurs: First, localized flooding is expected to occur where the HGL exceeds the ground surface elevation. With each improvement to the storm drain pipe system, in each consecutive scenario, the expected level of flooding or ponding is decreased (see Appendix D through Appendix G, for predicted HGL elevations of the pipe systems). Second, localized flooding is expected to occur due to incapacity of the grate and/or curb opening of the inlets. With each improvement to the storm drain pipe system, in each consecutive scenario, while HGLs decrease due to increased pipe capacity, inlet depth and spread remain constant (see Table 4: Inlet Depth and Spread and Appendix H through Appendix K for inlet calculation results).

  As seen in Table 3, the hydraulic model predicts that during a 10-year recurrence interval storm event, under Scenario 4, Future Condition, there will be no flooding or ponding. However, flooding or ponding may occur during the 25-, 50-, and 100-year recurrence interval storm event.

  The storm drain system analyzed in Scenario 4, Future Condition, is one possible solution to the storm water issues in the Kent Avenue and Belle Avenue area. Other solutions include, but are not limited to, routing the storm water from the intersection of Kent Avenue and SFDB through the residential neighborhood and connecting to the Pastori Avenue 48-inch line at a deeper point in the system. Another option is to direct the storm water from the City of San Anselmo side of the Pastori Avenue outfall watershed to another outfall discharging to the San Anselmo Creek.

Appendix A
Intensity-Duration-Frequency Calculations

CSW | ST2
CSW/Stuber-Stroeh Engineering Group, Inc. 45 Leveroni Court, Novato, CA 94949 Tel 415.883.9850 Fax 415.883.9835
1310 Redwood Way, Suite 200, Petaluma, CA 94954 Tel 707.795.4764 Fax 707.795.0516

SHEET NO. 1/5

JOB NO. 4.1086.14 JOB Pastori Storm Drain Outfall BY JAH DATE 3/19/10

CLIENT Fairfax SUBJECT Intensity-Duration-Frequency CHK'D _____ DATE _____

CalTrans Zonal Method

Chart "I" => $P_{60} = 1.5$

Chart "V" => Zone = C, Subzone = 2

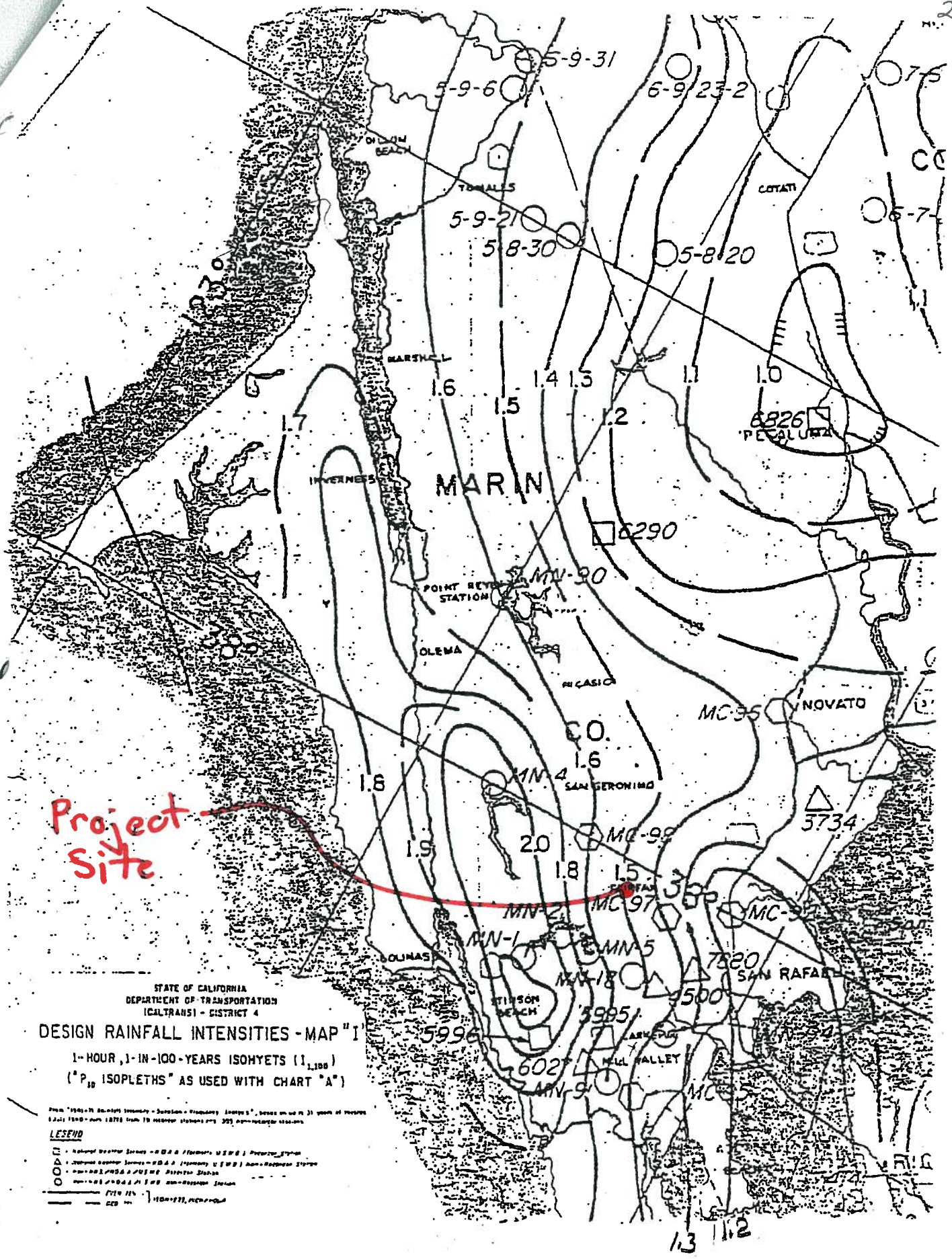
$R_{D,T}$

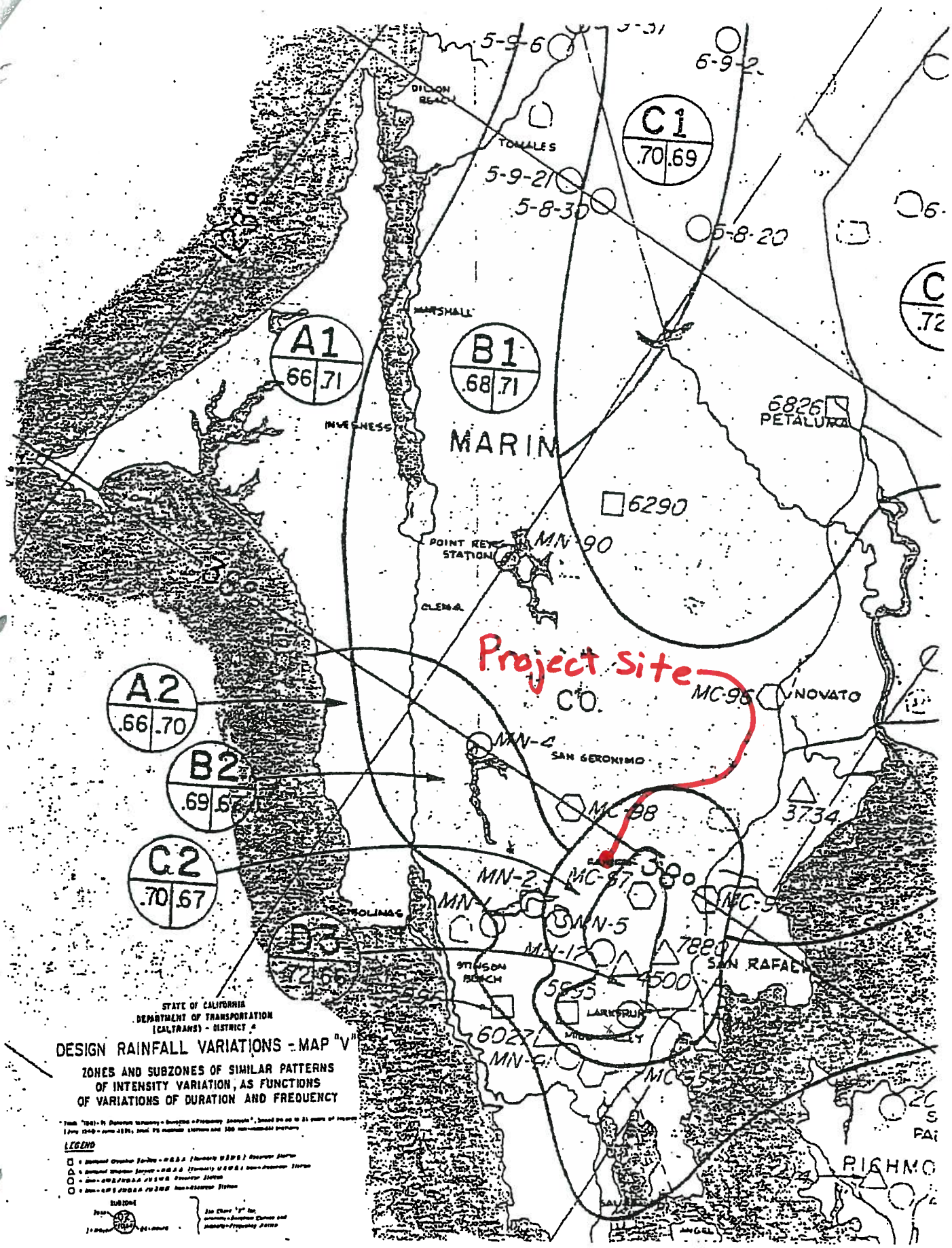
Frequency	5 min	10 min	15 min	30 min	1 hr
10-yr	0.72	0.7175	0.7125	0.7075	0.70
25-yr	0.84	0.837	0.835	0.833	0.82
50-yr	0.92	0.915	0.91	0.905	0.90
100-yr	1.0	1.0	1.0	1.0	1.0

Duration

Frequency	5 min	10 min	15 min	30 min	1 hr
10-yr	3.17	2.36	1.92	1.42	1.05
25-yr	3.44	2.76	2.25	1.67	1.23
50-yr	4.05	3.02	2.46	1.81	1.35
100-yr	4.4	3.3	2.7	2.0	1.5

Note: Intensity in inches per hour


MARIN
TOMALES
COTATI
MARSHALL
INVERNESS
POINT REYES STATION
OLEMA
NICASIO
NOVATO
SAN GERONIMO
SAN RAFAEL
STINSON BEACH
MILL VALLEY
Project Site
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
(CALTRANS) - DISTRICT 4
DESIGN RAINFALL INTENSITIES - MAP "I"
1-HOUR, 1-IN-100-YEARS ISOHYETS ($I_{1,100}$)
("P_{10} ISOPLETHS" AS USED WITH CHART "A")
LEGEND


A1
.66 .71
B1
.68 .71
C1
.70 .69
A2
.66 .70
B2
.69 .67
C2
.70 .67
D3
.72 .66
MARIN
CO.
Project Site
POINT REYES STATION
MN-90
6290
6826
PETALUMA
NOVATO
MC-96
MN-4
SAN GERONIMO
MC-98
3734
MC-87
MN-2
MN-5
MC-5
SAN RAFAEL
4500
5855
6027
MC-55
TOMALES
INVERNESS
MARSHALL
DILLON BEACH
STINSON BEACH
LARKSPUR
CLEMA
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
(CALTRANS) - DISTRICT 4
DESIGN RAINFALL VARIATIONS - MAP "V"
ZONES AND SUBZONES OF SIMILAR PATTERNS
OF INTENSITY VARIATION, AS FUNCTIONS
OF VARIATIONS OF DURATION AND FREQUENCY
LEGEND

Q = CIA

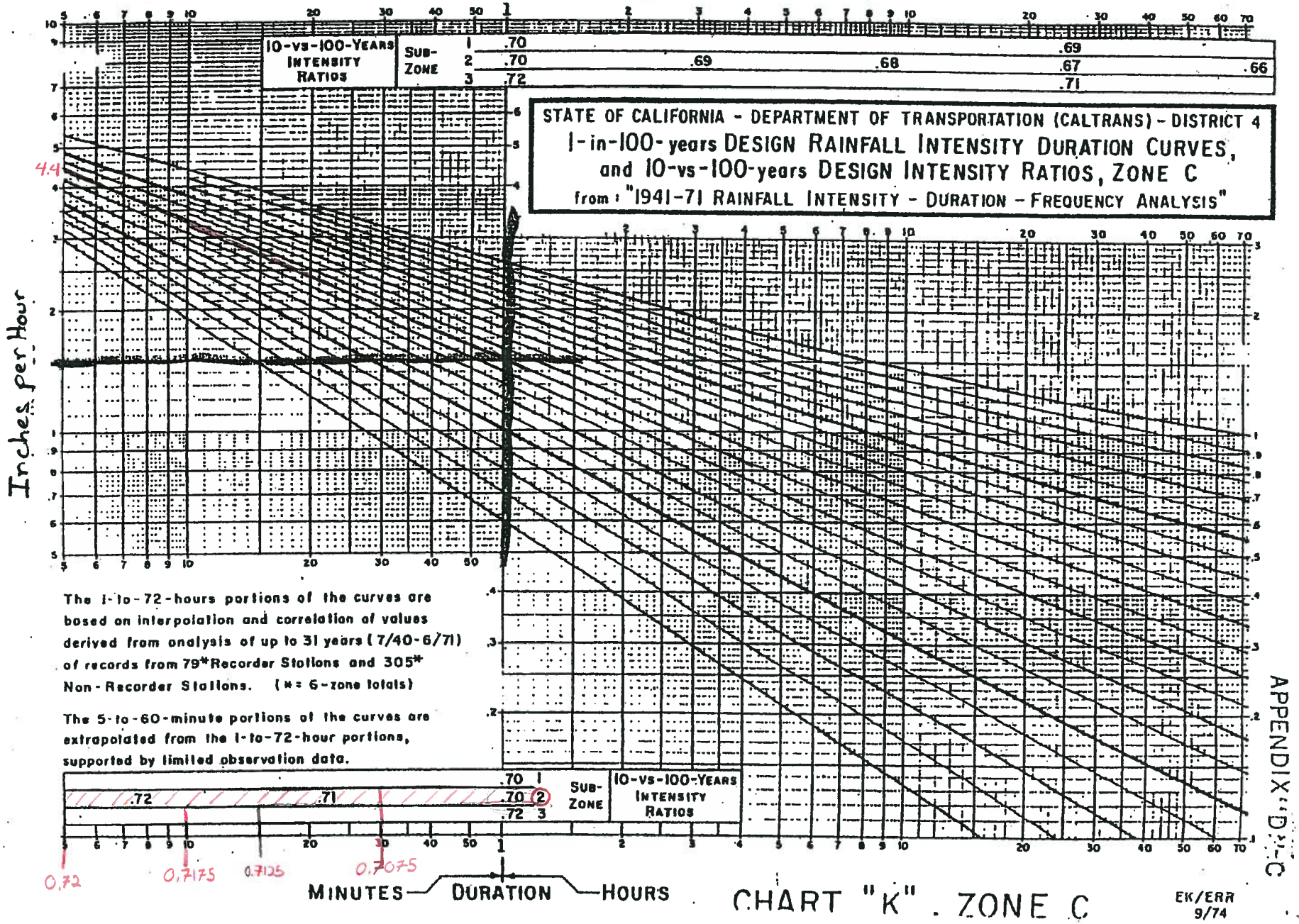


CHART "K". ZONE C

EK/ERR 9/74

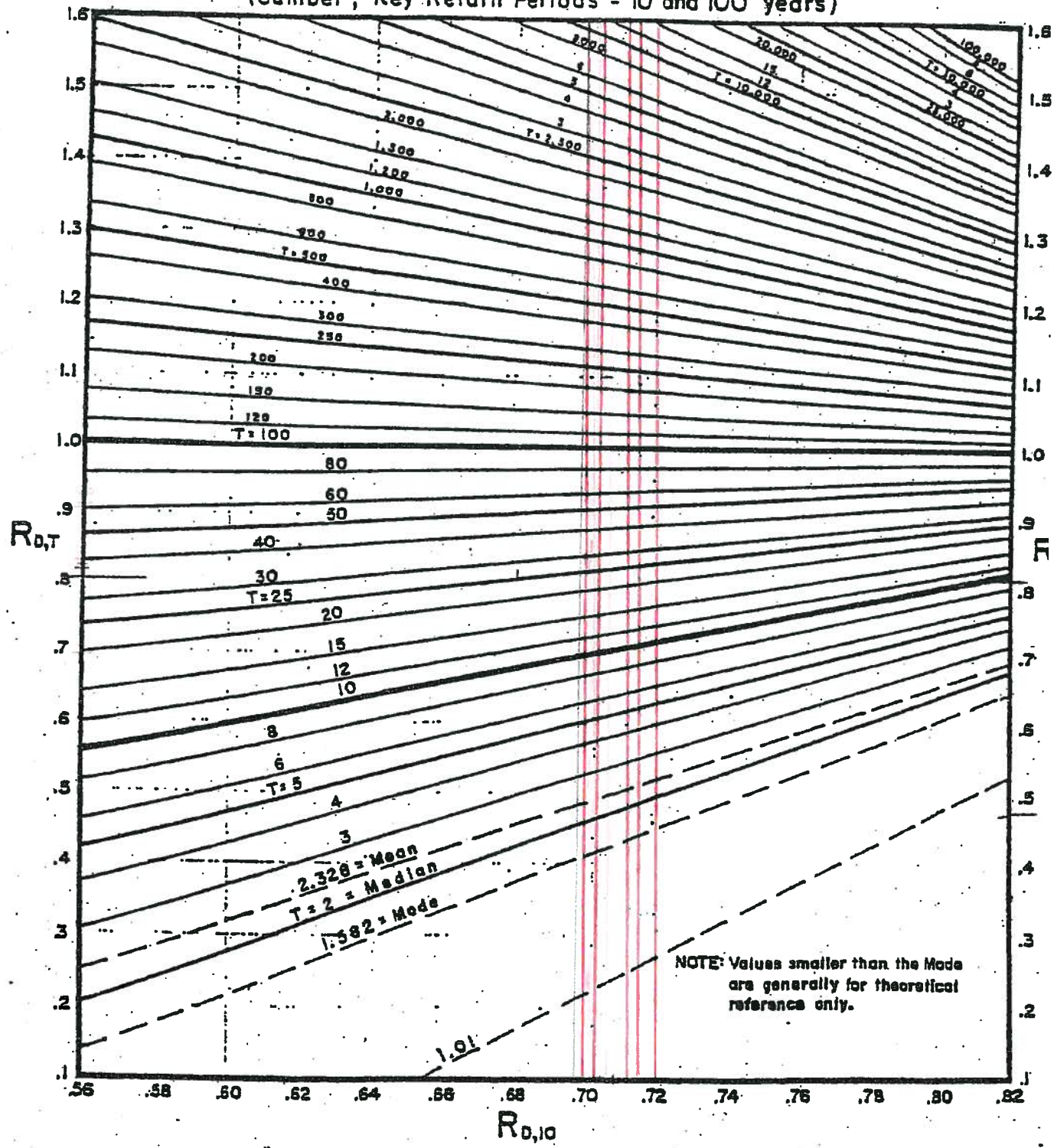
APPENDIX "D"-C

4/5

STATE OF CALIFORNIA – DEPARTMENT OF TRANSPORTATION (CALTRANS) – DISTRICT 4

FREQUENCY DISTRIBUTION RATIOS CHART "R"

(Gumbel ; Key Return Periods = 10 and 100 years)



EQUATIONS SEE "1941-71 RAINFALL INTENSITY-DURATION-FREQUENCY ANALYSIS"

(29) $R_{D,T} = I_{D,T} / I_{D,100}$, where

(31) $I_{D,T} = I_{D,100}\left\{1 + \left[\left(\frac{1-R_{D,10}}{y_{100}-y_{10}}\right)(y_T - y_{100})\right]\right\}$ and

( ) $y_T = -\ln\left[-\ln(1-1/T)\right]$

T = Return Period, Years

R = Ratio

I_D = Intensity (For a given duration D), Inches/Hr.

Other parameters, such as discharge rate (Q) may be substituted for I_D.

Appendix B
Time of Concentration Calculations

CSW | ST2
CSW/Stuber-Stroeh Engineering Group, Inc. 45 Leveroni Court, Novato, CA 94949 Tel 415.883.9850 Fax 415.883.9835
1310 Redwood Way, Suite 200, Petaluma, CA 94954 Tel 707.795.4764 Fax 707.795.0516

SHEET NO. 1/6

JOB NO. 4.1086.14 JOB Pastori Storm Drain Outfall BY JAH DATE 3/19/10

CLIENT Fairfax SUBJECT Time of Concentration CHK'D _____ DATE _____

Overland Flow Equation

$$t_{c_o} = \frac{1.8(1.1-C)\sqrt{L}}{(S \times 100)^{1/3}} + 5\,\text{min}$$

where: C = runoff coefficient
L = longest run (ft)
S = average slop (ft/ft)
t_c = time of concentration (min)

Channelized Flow Equation

$$t_{c_c} = L/V$$

where: L = longest run (ft)
V = velocity (ft/s)

Sub-Shed A

Point 1 to Point 2:

$L = 300\,\text{ft}$

$$S = \frac{450' - 350'}{300\,\text{ft}} = 0.33\ \text{ft/ft}$$

$$t_{c_o} = \frac{1.8(1.1-0.6)\sqrt{300}}{(0.33 \times 100)^{1/3}} + 5\,\text{min} = \underline{\underline{9.9\,\text{min}}}$$

Point 2 to Point 3:

Channelized Flow →

$t_c = 9.9\,\text{min} \therefore i = 2.36\,\text{in/hr}$

$Q_2 = (0.6)(2.36)(1.24\,\text{ac}) = 1.76\,\text{cfs}$

$Q/\text{Ac} = 1.76\,\text{cfs}/1.24\,\text{ac} = 1.42\,\text{cfs/ac}$

CSW | ST2
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JOB NO. 4.1086.14 JOB Pastori Storm Drain Outfall BY JAH DATE 3/19/10
CLIENT Fairfax SUBJECT Time of Concentration CHK'D _____ DATE _____

Sub-Shed A continued

$Q_{est} = (37.79\,ac)(1.42\,cfs/ac) = 53.66\,cfs$

Average Flow →

$$Q_{Ave} = 1.76\,cfs + \frac{53.66\,cfs - 1.76\,cfs}{2} = 27.71\,cfs$$

$$S = \frac{350' - 100'}{2467\,ft} = 0.10\ ft/ft$$

Assume Channel Section →

$n = 0.045$

$V = 6.24\ ft/s$ ← see FlowMaster 2005 Worksheet for Sub-Shed A

$$t_{cc} = 2{,}467\,ft\left(\frac{1\,s}{6.24\,ft}\right)\left(\frac{1\,min}{60\,s}\right) = \underline{\underline{6.59\ min}}$$

Point 1 to Point 3:

$T_c = t_{co} + t_{cc}$

$= 9.9\,min + 6.59\,min$

$$\boxed{T_{c_A} = 16.58\ min}$$

Worksheet for Sub-Shed A

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.045	
Channel Slope:	0.10000	ft/ft
Left Side Slope:	5.00	ft/ft (H:V)
Right Side Slope:	5.00	ft/ft (H:V)
Discharge:	27.71	ft^3/s

Results		
Normal Depth:	0.94	ft
Flow Area:	4.44	ft^2
Wetted Perimeter:	9.61	ft
Top Width:	9.43	ft
Critical Depth:	1.14	ft
Critical Slope:	0.03655	ft/ft
Velocity:	6.24 = V	ft/s
Velocity Head:	0.60	ft
Specific Energy:	1.55	ft
Froude Number:	1.60	
Flow Type:	Supercritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	0.94	ft
Critical Depth:	1.14	ft
Channel Slope:	0.10000	ft/ft
Critical Slope:	0.03655	ft/ft

CSW | ST2
CSW/Stuber-Stroeh Engineering Group, Inc. 45 Leveroni Court, Novato, CA 94949 Tel 415.883.9850 Fax 415.883.9835
1310 Redwood Way, Suite 200, Petaluma, CA 94954 Tel 707.795.4764 Fax 707.795.0516

JOB NO. 4.1086.14 JOB Pastori Storm Drain Outfall BY JAH DATE 3/19/10
CLIENT Fairfax SUBJECT Time of Concentration CHK'D DATE

Sub-Shed B

Point 4 to Point 5:

$L = 300\ ft$

$S = \frac{640' - 600}{300\ ft} = 0.13\ ft/ft$

$t_{c_o} = \frac{1.8(1.1-0.7)\sqrt{300}}{(0.13 \times 100)^{1/3}} + 5\ min = \underline{10.30\ min}$

Point 5 to Point 6:

Channelized Flow →

$t_c = 10.30\ min \therefore i = 2.33\ in/hr$

$Q_5 = (0.7)(2.33)(0.92\ ac) = 1.63\ cfs$

$Q/AC = (1.63\ cfs)/(0.92\ ac) = 1.77\ cfs/ac$

$Q_{est} = (59.05\ ac)(1.77\ cfs/ac) = 104.52\ cfs$

Average Flow →

$Q_{Ave} = 1.63\ cfs + \frac{104.52\ cfs - 1.63\ cfs}{2} = 53.07\ cfs$

$S = \frac{600' - 100'}{3549\ ft} = 0.14\ ft/ft$

CSW | ST2
CSW/Stuber-Stroeh Engineering Group, Inc. 45 Leveroni Court, Novato, CA 94949 Tel 415.883.9850 Fax 415.883.9835
1310 Redwood Way, Suite 200, Petaluma, CA 94954 Tel 707.795.4764 Fax 707.795.0516

SHEET NO. 5/6

JOB NO. 4.1086.14 JOB Pastori Storm Drain Outfall BY JAH DATE 3/19/10

CLIENT Fairfax SUBJECT Time of Concentration CHK'D _____ DATE _____

Sub-Shed B continued

Assume Channel Section →

$n = 0.045$

$V = 8.33$ ft/s ← See Flow Master 2005 Worksheet for Sub-Shed B

$$t_{cc} = 3{,}549 \text{ ft} \left(\frac{1 \text{ s}}{8.33 \text{ ft}}\right)\left(\frac{1 \text{ min}}{60 \text{ s}}\right) = \underline{\underline{7.10 \text{ min}}}$$

Point 4 to Point 6:

$$T_c = t_{co} + t_{cc}$$

$$= 10.3 \text{ min} + 7.10 \text{ min}$$

$$\boxed{T_{c_B} = 17.40 \text{ min}}$$

Worksheet for Sub-Shed B

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.045	
Channel Slope:	0.14000	ft/ft
Left Side Slope:	5.00	ft/ft (H:V)
Right Side Slope:	5.00	ft/ft (H:V)
Discharge:	53.07	ft^3/s

Results		
Normal Depth:	1.13	ft
Flow Area:	6.37	ft^2
Wetted Perimeter:	11.51	ft
Top Width:	11.29	ft
Critical Depth:	1.48	ft
Critical Slope:	0.03352	ft/ft
Velocity:	8.33 = V	ft/s
Velocity Head:	1.08	ft
Specific Energy:	2.21	ft
Froude Number:	1.95	
Flow Type:	Supercritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	1.13	ft
Critical Depth:	1.48	ft
Channel Slope:	0.14000	ft/ft
Critical Slope:	0.03352	ft/ft

Appendix C
Hydrology, Pipe, and Inlet Data

Pastori Storm Drain Outfall
(Town of Fairfax)
Job No. 4.1086.14

Hydrology Table												
Sub-Shed Characteristics					Rainfall Intensity (in/hr)				Flow Rate (cfs)			
Sub-Shed	Area (sf)	Area (ac)	C-value	Tc (min)	I_{10}	I_{25}	I_{50}	I_{100}	Q_{10}	Q_{25}	Q_{50}	Q_{100}
A	1,646,228	37.79	0.6	16.58	1.86	2.18	2.39	2.62	42.18	49.43	54.19	59.41
B	2,572,234	59.05	0.7	17.40	1.84	2.15	2.35	2.59	76.06	88.87	97.14	107.06
C	62,137	1.43	0.6	10*	2.36	2.76	3.02	3.30	2.02	2.36	2.58	2.82
D	43,079	0.99	0.9	5*	3.17	3.44	4.05	4.40	2.82	3.06	3.60	3.92
E	31,365	0.72	0.7	5*	3.17	3.44	4.05	4.40	1.60	1.73	2.04	2.22
F	42,521	0.98	0.9	5*	3.17	3.44	4.05	4.40	2.78	3.02	3.56	3.87
G	23,514	0.54	0.9	5*	3.17	3.44	4.05	4.40	1.54	1.67	1.97	2.14
H**	59,044	1.36	0.7	10*	2.36	2.76	3.02	3.30	2.24	2.62	2.87	3.13
I	28,533	0.66	0.7	5*	3.17	3.44	4.05	4.40	1.46	1.59	1.87	2.03
J	36,590	0.84	0.7	5*	3.17	3.44	4.05	4.40	1.86	2.02	2.38	2.59
K	37,835	0.87	0.7	5*	3.17	3.44	4.05	4.40	1.93	2.09	2.47	2.68
	Total Area	**103.86**										

* Time of Concentration is assumed
** Not a part of the watershed

Sub-Shed B Table												
Sub-Shed Characteristics					Rainfall Intensity (in/hr)				Flow Rate (cfs)			
Inlet	Area (sf)	Area (ac)	C-value	Tc (min)	I_{10}	I_{25}	I_{50}	I_{100}	Q_{10}	Q_{25}	Q_{50}	Q_{100}
CB#11	7,050	0.16	0.9	5*	3.17	3.44	4.05	4.40	0.46	0.50	0.59	0.64
CB#12	4,711	0.11	0.9	5*	3.17	3.44	4.05	4.40	0.31	0.33	0.39	0.43
CB#13	805	0.02	0.9	5*	3.17	3.44	4.05	4.40	0.05	0.06	0.07	0.07
CB#14	1,268,253	29.12	0.7	17.40	1.84	2.15	2.35	2.59	37.50	43.82	47.89	52.79
CB#15	23,162	0.53	0.9	5*	3.17	3.44	4.05	4.40	1.52	1.65	1.94	2.11
CB#16	1,268,253	29.12	0.7	17.40	1.84	2.15	2.35	2.59	37.50	43.82	47.89	52.79
	Total Area	**59.05**										

* Time of Concentration is assumed

Pastori Storm Drain Outfall
(Town of Fairfax)
Job No. 4.1086.14

Pipe Table							
Pipe Number	**Pipe Size (inches)**	**Pipe Length (feet)**	**Structure (Upstream)**	**Invert (Upstream)**	**Structure (Down stream)**	**Invert (Down stream)**	**Pipe Material**
1	24*	14	SDMH#1	82.26	Outfall	81.94	VCP
2	48*	278	SDMH#2	88.51	SDMH#1	84.75	HDPE
3	18	186	CB#1	94.93	SDMH#2	88.51	PVC
4	18	31	SDMH#5	95.38	CB#1	94.93	PVC
5	18	31	CB#2	95.85	SDMH#5	95.38	PVC
6**	18	185	SDMH#6	96.22	SDMH#5	95.38	PVC
7	12	47	CB#3	96.91	SDMH#6	96.22	PVC
8	12	94	CB#4	96.67	SDMH#6	96.22	PVC
9	48	22	BC	88.86	SDMH#2	88.61	HDPE
10	15	6	CB#5	89.82	BC	89.92	HDPE
11	15	20	CB#6	92.15	BC	89.92	HDPE
12	48	121	BC	90.78	BC	88.86	HDPE
13	15	18	CB#7	92.22	BC	91.54	HDPE
14	48	141	SDMH#3	92.58	BC	90.78	HDPE
15	24	25	BC	94.11	SDMH#3	93.22	VCP
16	18	21	BC	95.62	BC	94.11	VCP
17	18	26	CB#10	97.51	BC	95.62	VCP
18	24	16	BC	95.08	BC	94.11	VCP
19	12	5	CB#8	98.18	BC	95.08	VCP
20	24	21	CB#9	96.59	BC	95.08	VCP
21	18	140	CB#11	97.78	BC	95.62	VCP
22	18	82	CB#12	98.23	CB#11	97.78	VCP
23	18	88	CB#13	98.60	CB#12	98.23	VCP
24	18	13	BC	98.62	CB#13	98.60	VCP
25	12	15	CB#14	99.38	BC	98.62	VCP
26	18	33	SDMH#4	98.68	BC	98.62	VCP
27	12	18	CB#16	98.72	SDMH#4	98.68	VCP
28	18	16	CB#15	98.78	SDMH#4	98.68	VCP

* Size varies per scenario
**Pipe 6 has an assumed diameter of 18"

Data observed during 3/23/10 Site Visit

Note: Table represents scenario 2, the current condition.

Pastori Storm Drain Outfall
(Town of Fairfax)
Job No. 4.1086.14

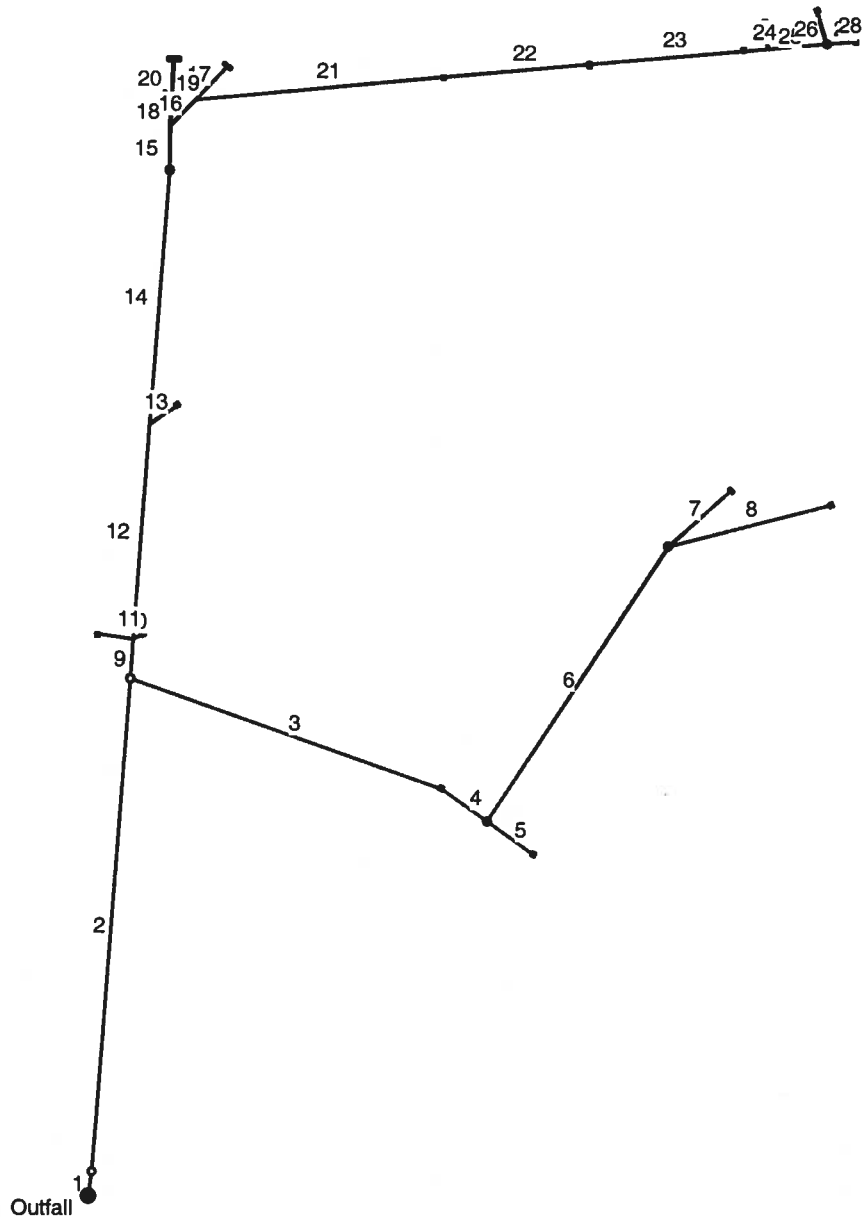
Structure Table				
Inlet Number	**Grate Elevation**	**Invert (in/out)**	**On Sag or Grade?**	**Grate Size (ftxft)**
SDMH#1	94.36	84.75 / 82.26	n/a	n/a
SDMH#2	97.14	(18)=89.25 (48)=88.61/ (48)=88.51	n/a	n/a
CB#1	98.1	94.93 / 94.93	Sag	2 x 2.5
SDMH#5	98.5	95.38 / 95.38	n/a	
CB#2	98.1	na / 95.85	Sag	2 x 2.5
SDMH#6	98.7	96.22 / 96.22	n/a	
CB#3	98.5	na / 96.91	Sag	2 x 2.5
CB#4	98.5	na / 96.67	Sag	2 x 2.5
CB#5	95.77	na / 89.82	Sag	2 x 2.5
CB#6	95.9	na / 92.15	Sag	2 x 2.5
CB#7	95.22	na / 92.22	Sag	2 x 2.5
SDMH#3	99.55	93.22 / 92.58	n/a	n/a
CB#8	100.06	na / 98.18	Sag	2 x 2.5
CB#9	100.52	na / 96.59	Grade	2 x 2.5
CB#10	100.78	na / 97.51	Grade	2 x 2.5
CB#11	100.2	97.78 / 97.78	Grade	2 x 2.5
CB#12	100.4	98.23 / 98.23	Sag	2 x 2.5
CB#13	100.6	98.60 / 98.60	Grade	2 x 2.5
CB#14	100.8	na / 99.38	Sag	2 x 2.5
SDMH#4	100.8	98.68 / 98.68	n/a	n/a
CB#15	100.7	na / 98.78	Sag	2 x 2.5
CB#16	100.8	na / 98.72	Grade	2 x 2.5
CB#17	98.5	n/a	Sag	2 x 2.5
CB#18	98.5	n/a	Sag	2 x 2.5

	Data assumed from aerial topography
	Data assumed
	Data observed during 3/23/10 Site Visit

Notes:
1. Inverts were assigned based on the assumed grate elevations minus the depth of the structure determined during the 3/23/10 Site Visit.
2. Table represents scenario 2, the current condition.

Appendix D
Hydraflow Storm Sewer Calculations
– Scenario 1

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Scenario 1.stm	Number of lines: 28	Date: 04-01-2010

Hydraflow Storm Sewers Extension v6.052

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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	17.8	1.8	137.9	32.40	43.89	24	2.38	81.94	82.27	83.94	89.93	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	17.7	1.8	138.2	32.44	44.00	24	2.39	82.27	88.90	94.42	214.82	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	7.4	2.6	6.69	19.88	3.79	18	3.05	89.25	94.93	244.91	245.56	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	7.2	2.6	5.21	13.64	2.95	18	1.44	94.93	95.38	245.67	245.73	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.1	1.88	13.94	1.06	18	1.50	95.38	95.85	245.87	245.88	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.8	2.9	3.95	7.67	2.24	18	0.45	95.38	96.22	245.87	246.09	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.1	2.72	4.65	3.46	12	1.45	96.22	96.91	246.15	246.38	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.1	1.50	2.67	1.91	12	0.48	96.22	96.67	246.15	246.29	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.7	1.8	133.7	32.41	42.55	24	2.38	88.16	88.68	244.91	253.77	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.1	14.24	26.41	11.60	15	19.40	89.92	91.14	281.92	282.27	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.1	2.75	19.90	2.24	15	11.01	89.92	92.15	281.92	281.96	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.6	1.8	124.0	32.44	39.47	24	2.39	88.68	91.56	281.92	324.01	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.1	1.55	11.54	1.27	15	3.71	91.54	92.22	343.86	343.87	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.6	1.8	123.3	32.47	39.24	24	2.39	91.56	94.93	343.86	392.46	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.6	1.8	123.3	13.02	39.25	24	2.40	94.93	95.53	396.05	449.89	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.6	1.8	98.07	2.58	55.50	18	0.44	95.53	95.62	467.86	598.42	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	1.8	24.31	10.49	13.76	18	7.24	95.62	97.51	631.46	641.61	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	1.8	25.85	12.99	8.23	24	2.39	95.53	95.91	467.86	469.36	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.3	1.96	9.30	2.50	12	49.40	95.91	98.18	470.28	470.38	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	1.8	24.31	15.03	7.74	24	3.20	95.91	96.59	470.28	472.06	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	1.8	74.47	4.84	42.15	18	1.54	95.62	97.78	631.46	1142.37	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	1.8	74.27	2.89	42.03	18	0.55	97.78	98.23	1156.17	1452.50	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	1.8	74.16	2.53	41.97	18	0.42	98.23	98.60	1466.23	1783.85	100.40	100.60	

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; 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)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	1.8	74.14	1.50	41.96	18	0.15	98.60	98.62	1797.54	1846.66	100.60	100.62	
25	24	15.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	1.8	36.68	8.78	20.76	18	5.07	98.62	99.38	1874.02	1887.29	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	1.8	37.52	1.66	21.23	18	0.18	98.62	98.68	1874.02	1904.80	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	1.8	36.68	1.79	20.76	18	0.21	98.68	98.72	1911.81	1928.61	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.1	1.47	1.95	0.83	18	0.25	98.68	98.72	1911.81	1911.83	100.80	100.80	

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	17.8	2.1	161.9	32.40	51.54	24	2.38	81.94	82.27	83.94	92.19	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	17.7	2.1	162.2	32.44	51.65	24	2.39	82.27	88.90	98.39	264.26	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	7.1	3.0	7.75	19.88	4.39	18	3.05	89.25	94.93	305.72	306.59	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	7.0	3.0	6.02	13.64	3.41	18	1.44	94.93	95.38	306.74	306.82	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.4	2.09	13.94	1.18	18	1.50	95.38	95.85	307.01	307.02	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.7	3.3	4.47	7.67	2.53	18	0.45	95.38	96.22	307.01	307.29	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.4	3.03	4.65	3.86	12	1.45	96.22	96.91	307.36	307.66	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.4	1.67	2.67	2.13	12	0.48	96.22	96.67	307.36	307.54	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.7	2.1	156.9	32.41	49.95	24	2.38	88.16	88.68	305.72	317.93	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.4	15.87	26.41	12.94	15	19.40	89.92	91.14	356.70	357.14	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.4	3.06	19.90	2.49	15	11.01	89.92	92.15	356.70	356.75	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.6	2.1	145.5	32.44	46.32	24	2.39	88.68	91.56	356.70	414.66	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.4	1.73	11.54	1.41	15	3.71	91.54	92.22	442.00	442.01	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.6	2.1	144.6	32.47	46.04	24	2.39	91.56	94.93	442.00	508.88	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.1	144.6	13.02	46.05	24	2.40	94.93	95.53	513.82	587.92	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.1	115.0	2.58	65.11	18	0.44	95.53	95.62	612.64	792.31	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.2	28.48	10.49	16.12	18	7.24	95.62	97.51	837.78	851.70	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.2	30.29	12.99	9.64	24	2.39	95.53	95.91	612.64	614.71	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.6	2.27	9.30	2.89	12	49.40	95.91	98.18	615.97	616.10	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.2	28.48	15.03	9.07	24	3.20	95.91	96.59	615.97	618.41	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.1	87.34	4.84	49.43	18	1.54	95.62	97.78	837.78	1540.51	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.1	87.09	2.89	49.29	18	0.55	97.78	98.23	1559.50	1966.97	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.1	86.95	2.53	49.21	18	0.42	98.23	98.60	1985.86	2422.47	100.40	100.60	

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.1	86.92	1.50	49.19	18	0.15	98.60	98.62	2441.29	2508.81	100.60	100.62	
25	24	15.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.1	42.99	8.78	24.33	18	5.07	98.62	99.38	2546.43	2564.66	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.1	43.99	1.66	24.89	18	0.18	98.62	98.68	2546.43	2588.72	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.1	42.99	1.79	24.33	18	0.21	98.68	98.72	2598.35	2621.44	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.4	1.64	1.95	0.93	18	0.25	98.68	98.72	2598.35	2598.38	100.80	100.80	

Project File: Scenario 1.stm

Number of lines: 28

Run Date: 04-02-2010

NOTES: Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	17.7	2.3	175.0	32.40	55.70	24	2.38	81.94	82.27	83.94	93.58	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	17.6	2.3	175.3	32.44	55.81	24	2.39	82.27	88.90	100.81	294.47	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.9	3.4	8.62	19.88	4.88	18	3.05	89.25	94.93	342.88	343.95	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.7	3.4	6.70	13.64	3.79	18	1.44	94.93	95.38	344.14	344.24	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.8	2.34	13.94	1.32	18	1.50	95.38	95.85	344.47	344.48	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.7	3.6	4.99	7.67	2.83	18	0.45	95.38	96.22	344.47	344.82	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.8	3.39	4.65	4.32	12	1.45	96.22	96.91	344.91	345.28	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.8	1.87	2.67	2.38	12	0.48	96.22	96.67	344.91	345.13	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.6	2.3	169.5	32.41	53.97	24	2.38	88.16	88.68	342.88	357.13	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.8	17.75	26.41	14.47	15	19.40	89.92	91.14	402.40	402.95	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.8	3.42	19.90	2.79	15	11.01	89.92	92.15	402.40	402.46	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.6	2.3	157.2	32.44	50.04	24	2.39	88.68	91.56	402.40	470.05	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.8	1.94	11.54	1.58	15	3.71	91.54	92.22	501.96	501.98	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.3	156.2	32.47	49.73	24	2.39	91.56	94.93	501.96	580.03	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.3	156.3	13.02	49.74	24	2.40	94.93	95.53	585.79	672.27	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.3	124.3	2.58	70.34	18	0.44	95.53	95.62	701.12	910.80	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.3	30.76	10.49	17.41	18	7.24	95.62	97.51	963.86	980.11	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.3	32.72	12.99	10.42	24	2.39	95.53	95.91	701.12	703.53	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.9	2.47	9.30	3.14	12	49.40	95.91	98.18	705.00	705.16	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.3	30.76	15.03	9.79	24	3.20	95.91	96.59	705.00	707.85	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.3	94.35	4.84	53.39	18	1.54	95.62	97.78	963.86	1783.85	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.3	94.08	2.89	53.24	18	0.55	97.78	98.23	1806.01	2281.42	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.3	93.91	2.53	53.15	18	0.42	98.23	98.60	2303.46	2812.81	100.40	100.60	

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; 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)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.3	93.88	1.50	53.13	18	0.15	98.60	98.62	2834.77	2913.55	100.60	100.62	
25	24	15.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.3	46.43	8.78	26.28	18	5.07	98.62	99.38	2957.43	2978.70	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.3	47.51	1.66	26.89	18	0.18	98.62	98.68	2957.43	3006.76	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.3	46.43	1.79	26.28	18	0.21	98.68	98.72	3018.00	3044.93	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.8	1.83	1.95	1.04	18	0.25	98.68	98.72	3018.00	3018.03	100.80	100.80	

Project File: Scenario 1.stm

Number of lines: 28

Run Date: 04-02-2010

NOTES: Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	17.7	2.5	192.6	32.40	61.33	24	2.38	81.94	82.27	83.94	95.63	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	17.6	2.5	193.0	32.44	61.44	24	2.39	82.27	88.90	104.40	339.09	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.7	3.7	9.51	19.88	5.38	18	3.05	89.25	94.93	397.76	399.06	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.6	3.7	7.39	13.64	4.18	18	1.44	94.93	95.38	399.29	399.42	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	4.2	2.55	13.94	1.44	18	1.50	95.38	95.85	399.69	399.71	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.6	4.0	5.47	7.67	3.09	18	0.45	95.38	96.22	399.69	400.12	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	4.2	3.69	4.65	4.70	12	1.45	96.22	96.91	400.23	400.66	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	4.2	2.03	2.67	2.59	12	0.48	96.22	96.67	400.23	400.49	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.6	2.5	186.6	32.41	59.41	24	2.38	88.16	88.68	397.76	415.03	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	4.2	19.34	26.41	15.76	15	19.40	89.92	91.14	469.89	470.55	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	4.2	3.73	19.90	3.04	15	11.01	89.92	92.15	469.89	469.97	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.6	2.5	173.0	32.44	55.08	24	2.39	88.68	91.56	469.89	551.86	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	4.2	2.11	11.54	1.72	15	3.71	91.54	92.22	590.53	590.55	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.5	171.9	32.47	54.74	24	2.39	91.56	94.93	590.53	685.09	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.5	172.0	13.02	54.75	24	2.40	94.93	95.53	692.07	796.82	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.5	136.8	2.58	77.41	18	0.44	95.53	95.62	831.76	1085.74	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.6	33.83	10.49	19.14	18	7.24	95.62	97.51	1150.01	1169.66	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.6	35.99	12.99	11.46	24	2.39	95.53	95.91	831.76	834.68	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	3.2	2.70	9.30	3.44	12	49.40	95.91	98.18	836.46	836.65	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.6	33.83	15.03	10.77	24	3.20	95.91	96.59	836.46	839.91	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.5	103.8	4.84	58.76	18	1.54	95.62	97.78	1150.01	2142.99	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.5	103.5	2.89	58.58	18	0.55	97.78	98.23	2169.83	2745.46	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.5	103.3	2.53	58.48	18	0.42	98.23	98.60	2772.14	3388.78	100.40	100.60	

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; c = cir e = ellip b = box

Storm Sewer Tabulation

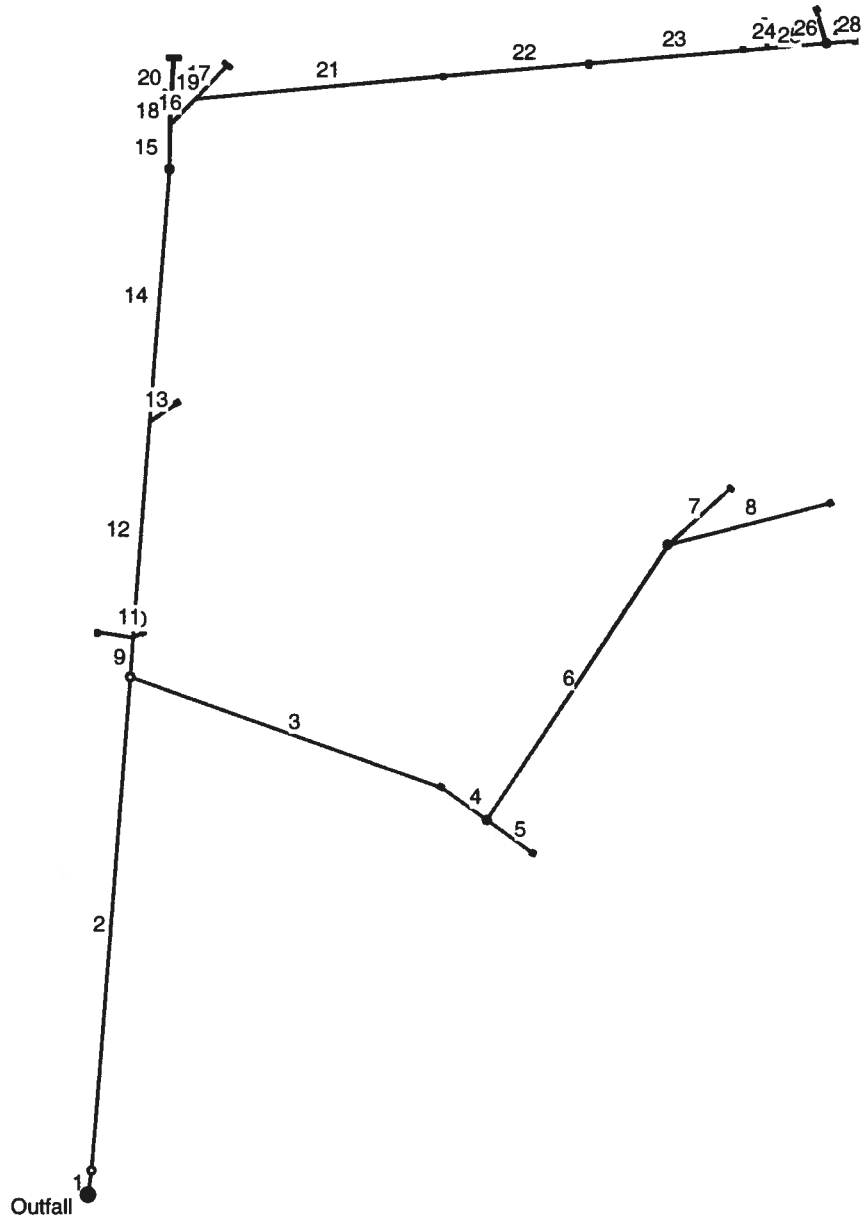
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.5	103.3	1.50	58.46	18	0.15	98.60	98.62	3415.36	3510.73	100.60	100.62	
25	24	15.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.5	51.09	8.78	28.91	18	5.07	98.62	99.38	3563.85	3589.59	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.5	52.27	1.66	29.58	18	0.18	98.62	98.68	3563.85	3623.57	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.5	51.09	1.79	28.91	18	0.21	98.68	98.72	3637.17	3669.78	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	4.2	2.00	1.95	1.13	18	0.25	98.68	98.72	3637.17	3637.21	100.80	100.80	

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; c = cir e = ellip b = box

Appendix E
Hydraflow Storm Sewer Calculations
– Scenario 2

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Scenario 2.stm	Number of lines: 28	Date: 04-01-2010

Hydraflow Storm Sewers Extension v6.052

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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.5	1.8	135.6	32.40	43.18	24	2.38	81.94	82.27	83.94	89.74	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	18.1	1.8	137.0	180.8	10.91	48	1.35	84.76	88.51	94.08	96.24	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	7.4	2.6	6.70	19.88	3.79	18	3.05	89.25	94.93	98.09	98.73	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	7.2	2.6	5.21	13.64	2.95	18	1.44	94.93	95.38	98.84	98.91	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.1	1.88	13.94	1.06	18	1.50	95.38	95.85	99.04	99.05	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.8	2.9	3.95	7.67	2.24	18	0.45	95.38	96.22	99.04	99.27	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.1	2.72	4.65	3.46	12	1.45	96.22	96.91	99.32	99.56	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.1	1.50	2.67	1.91	12	0.48	96.22	96.67	99.32	99.47	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	18.0	1.8	132.6	197.0	10.55	48	1.60	88.51	88.86	98.09	98.25	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.1	14.24	30.82	11.60	15	19.40	89.92	91.14	99.98	100.24	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.1	2.75	23.22	2.24	15	11.01	89.92	92.15	99.98	100.01	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.8	1.8	123.4	196.3	9.82	48	1.59	88.86	90.78	99.98	100.74	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.1	1.55	13.47	1.27	15	3.71	91.54	92.22	101.97	101.98	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.6	1.8	123.3	175.8	9.81	48	1.28	90.78	92.58	101.97	102.85	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.6	1.8	123.3	15.86	39.25	24	3.56	93.22	94.11	103.08	156.92	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.6	1.8	98.07	10.55	55.50	18	7.31	94.11	95.62	174.88	305.44	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	1.8	24.31	10.49	13.76	18	7.24	95.62	97.51	338.49	348.63	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	1.8	25.85	20.75	8.23	24	6.10	94.11	95.08	174.88	176.39	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.3	1.96	10.86	2.50	12	67.47	95.08	98.18	177.31	177.41	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	1.8	24.31	22.39	7.74	24	7.10	95.08	96.59	177.31	179.09	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	1.8	74.47	4.84	42.15	18	1.54	95.62	97.78	338.49	849.40	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	1.8	74.27	2.89	42.03	18	0.55	97.78	98.23	863.20	1159.53	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	1.8	74.16	2.53	41.97	18	0.42	98.23	98.60	1173.26	1490.87	100.40	100.60	

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	1.8	74.14	1.50	41.96	18	0.15	98.60	98.62	1504.56	1553.69	100.60	100.62	
25	24	15.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	1.8	36.68	8.78	20.76	18	5.07	98.62	99.38	1581.05	1594.32	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	1.8	37.52	1.66	21.23	18	0.18	98.62	98.68	1581.05	1611.82	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	1.8	36.68	1.79	20.76	18	0.21	98.68	98.72	1618.83	1635.64	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.1	1.47	1.95	0.83	18	0.25	98.68	98.72	1618.83	1618.86	100.80	100.80	

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.3	2.1	159.7	32.40	50.85	24	2.38	81.94	82.27	83.94	91.97	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	18.0	2.1	161.1	180.8	12.82	48	1.35	84.76	88.51	98.00	100.98	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	7.1	3.0	7.75	19.88	4.39	18	3.05	89.25	94.93	103.54	104.40	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	7.0	3.0	6.02	13.64	3.41	18	1.44	94.93	95.38	104.55	104.64	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.4	2.09	13.94	1.18	18	1.50	95.38	95.85	104.82	104.83	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.7	3.3	4.47	7.67	2.53	18	0.45	95.38	96.22	104.82	105.10	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.4	3.03	4.65	3.86	12	1.45	96.22	96.91	105.17	105.47	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.4	1.67	2.67	2.13	12	0.48	96.22	96.67	105.17	105.35	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.9	2.1	155.8	197.0	12.40	48	1.60	88.51	88.86	103.54	103.76	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.4	15.87	30.82	12.94	15	19.40	89.92	91.14	106.15	106.47	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.4	3.06	23.22	2.49	15	11.01	89.92	92.15	106.15	106.19	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.8	2.1	145.0	196.3	11.54	48	1.59	88.86	90.78	106.15	107.19	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.4	1.73	13.47	1.41	15	3.71	91.54	92.22	108.89	108.90	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.6	2.1	144.6	175.8	11.51	48	1.28	90.78	92.58	108.89	110.11	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.1	144.6	15.86	46.05	24	3.56	93.22	94.11	110.42	184.52	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.1	115.0	10.55	65.11	18	7.31	94.11	95.62	209.24	388.90	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.2	28.48	10.49	16.12	18	7.24	95.62	97.51	434.37	448.30	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.2	30.29	20.75	9.64	24	6.10	94.11	95.08	209.24	211.30	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.6	2.27	10.86	2.89	12	67.47	95.08	98.18	212.56	212.70	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.2	28.48	22.39	9.07	24	7.10	95.08	96.59	212.56	215.01	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.1	87.34	4.84	49.43	18	1.54	95.62	97.78	434.37	1137.11	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.1	87.09	2.89	49.29	18	0.55	97.78	98.23	1156.10	1563.57	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.1	86.95	2.53	49.21	18	0.42	98.23	98.60	1582.45	2019.06	100.40	100.60	

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.1	86.92	1.50	49.19	18	0.15	98.60	98.62	2037.88	2105.41	100.60	100.62	
25	24	15.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.1	42.99	8.78	24.33	18	5.07	98.62	99.38	2143.02	2161.25	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.1	43.99	1.66	24.89	18	0.18	98.62	98.68	2143.02	2185.31	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.1	42.99	1.79	24.33	18	0.21	98.68	98.72	2194.94	2218.04	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.4	1.64	1.95	0.93	18	0.25	98.68	98.72	2194.94	2194.97	100.80	100.80	

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; 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)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.3	2.2	172.8	32.40	55.00	24	2.38	81.94	82.27	83.94	93.34	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	17.9	2.2	174.1	180.8	13.86	48	1.35	84.76	88.51	100.40	103.88	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.9	3.4	8.62	19.88	4.88	18	3.05	89.25	94.93	106.86	107.93	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.7	3.4	6.70	13.64	3.79	18	1.44	94.93	95.38	108.12	108.23	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.8	2.34	13.94	1.32	18	1.50	95.38	95.85	108.45	108.46	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.7	3.6	4.99	7.67	2.83	18	0.45	95.38	96.22	108.45	108.81	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.8	3.39	4.65	4.32	12	1.45	96.22	96.91	108.89	109.26	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.8	1.87	2.67	2.38	12	0.48	96.22	96.67	108.89	109.12	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.9	2.3	168.5	197.0	13.41	48	1.60	88.51	88.86	106.86	107.12	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.8	17.75	30.82	14.47	15	19.40	89.92	91.14	109.91	110.32	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.8	3.42	23.22	2.79	15	11.01	89.92	92.15	109.91	109.96	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.7	2.3	156.7	196.3	12.47	48	1.59	88.86	90.78	109.91	111.14	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.8	1.94	13.47	1.58	15	3.71	91.54	92.22	113.12	113.13	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.3	156.2	175.8	12.43	48	1.28	90.78	92.58	113.12	114.54	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.3	156.3	15.86	49.74	24	3.56	93.22	94.11	114.90	201.38	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.3	124.3	10.55	70.34	18	7.31	94.11	95.62	230.23	439.91	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.3	30.76	10.49	17.41	18	7.24	95.62	97.51	492.97	509.22	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.3	32.72	20.75	10.42	24	6.10	94.11	95.08	230.23	232.64	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.9	2.47	10.86	3.14	12	67.47	95.08	98.18	234.11	234.27	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.3	30.76	22.39	9.79	24	7.10	95.08	96.59	234.11	236.96	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.3	94.35	4.84	53.39	18	1.54	95.62	97.78	492.97	1312.96	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.3	94.08	2.89	53.24	18	0.55	97.78	98.23	1335.12	1810.53	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.3	93.91	2.53	53.15	18	0.42	98.23	98.60	1832.56	2341.92	100.40	100.60	

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.3	93.88	1.50	53.13	18	0.15	98.60	98.62	2363.88	2442.66	100.60	100.62	
25	24	15.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.3	46.43	8.78	26.28	18	5.07	98.62	99.38	2486.54	2507.80	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.3	47.51	1.66	26.89	18	0.18	98.62	98.68	2486.54	2535.87	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.3	46.43	1.79	26.28	18	0.21	98.68	98.72	2547.10	2574.04	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.8	1.83	1.95	1.04	18	0.25	98.68	98.72	2547.10	2547.14	100.80	100.80	

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.2	2.5	190.5	32.40	60.64	24	2.38	81.94	82.27	83.94	95.37	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	17.9	2.5	191.8	180.8	15.27	48	1.35	84.76	88.51	103.95	108.17	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.7	3.7	9.51	19.88	5.38	18	3.05	89.25	94.93	111.79	113.09	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.6	3.7	7.39	13.64	4.18	18	1.44	94.93	95.38	113.32	113.45	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	4.2	2.55	13.94	1.44	18	1.50	95.38	95.85	113.72	113.74	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.6	4.0	5.47	7.67	3.09	18	0.45	95.38	96.22	113.72	114.15	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	4.2	3.69	4.65	4.70	12	1.45	96.22	96.91	114.26	114.69	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	4.2	2.03	2.67	2.59	12	0.48	96.22	96.67	114.26	114.52	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.9	2.5	185.6	197.0	14.77	48	1.60	88.51	88.86	111.79	112.10	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	4.2	19.34	30.82	15.76	15	19.40	89.92	91.14	115.50	115.98	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	4.2	3.73	23.22	3.04	15	11.01	89.92	92.15	115.50	115.55	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.7	2.5	172.5	196.3	13.73	48	1.59	88.86	90.78	115.50	116.98	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	4.2	2.11	13.47	1.72	15	3.71	91.54	92.22	119.38	119.40	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.5	171.9	175.8	13.68	48	1.28	90.78	92.58	119.38	121.11	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.5	172.0	15.86	54.75	24	3.56	93.22	94.11	121.54	226.29	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.5	136.8	10.55	77.41	18	7.31	94.11	95.62	261.23	515.21	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.6	33.83	10.49	19.14	18	7.24	95.62	97.51	579.48	599.13	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.6	35.99	20.75	11.46	24	6.10	94.11	95.08	261.23	264.15	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	3.2	2.70	10.86	3.44	12	67.47	95.08	98.18	265.93	266.12	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.6	33.83	22.39	10.77	24	7.10	95.08	96.59	265.93	269.38	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.5	103.8	4.84	58.76	18	1.54	95.62	97.78	579.48	1572.46	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.5	103.5	2.89	58.58	18	0.55	97.78	98.23	1599.30	2174.93	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.5	103.3	2.53	58.48	18	0.42	98.23	98.60	2201.61	2818.25	100.40	100.60	

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; c = cir e = ellip b = box

Storm Sewer Tabulation

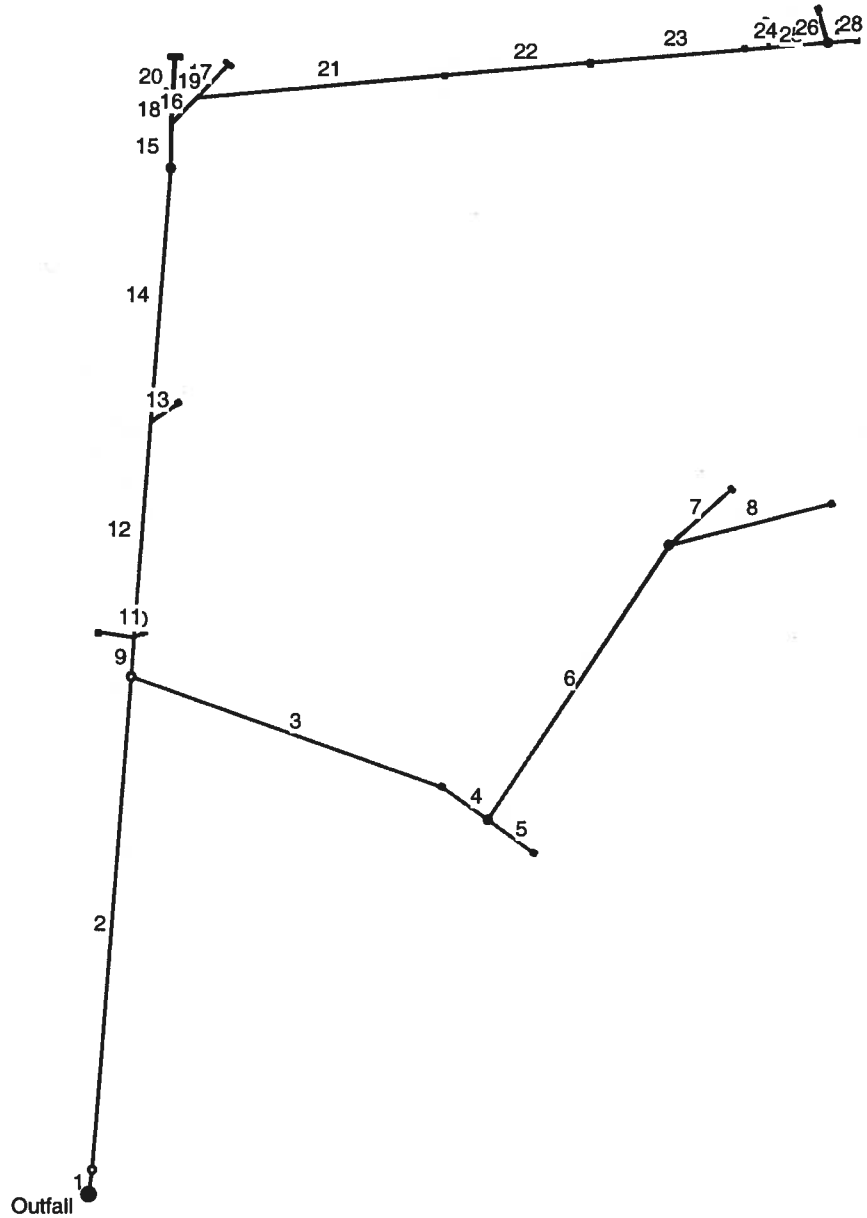
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.5	103.3	1.50	58.46	18	0.15	98.60	98.62	2844.83	2940.20	100.60	100.62	
25	24	15.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.5	51.09	8.78	28.91	18	5.07	98.62	99.38	2993.32	3019.07	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.5	52.27	1.66	29.58	18	0.18	98.62	98.68	2993.32	3053.04	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.5	51.09	1.79	28.91	18	0.21	98.68	98.72	3066.64	3099.25	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	4.2	2.00	1.95	1.13	18	0.25	98.68	98.72	3066.64	3066.68	100.80	100.80	

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; c = cir e = ellip b = box

Appendix F
Hydraflow Storm Sewer Calculations
– Scenario 3

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Scenario 3.stm	Number of lines: 28	Date: 04-01-2010

Hydraflow Storm Sewers Extension v6.052

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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.4	1.8	135.9	205.8	11.11	48	2.38	81.94	82.27	85.94	85.87	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	18.1	1.8	137.0	180.8	13.79	48	1.35	84.76	88.51	87.36	92.00	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.4	2.8	7.11	19.88	4.80	18	3.05	89.25	94.93	94.16	95.95	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.3	2.8	5.52	13.64	4.67	18	1.44	94.93	95.38	95.95	96.28	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.1	1.88	13.94	2.56	18	1.50	95.38	95.85	96.28	96.37	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.5	3.0	4.04	7.67	4.05	18	0.45	95.38	96.22	96.28	96.99	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.1	2.72	4.65	4.42	12	1.45	96.22	96.91	96.99	97.61	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.1	1.50	2.67	2.96	12	0.48	96.22	96.67	96.99	97.19	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	18.0	1.8	132.6	197.0	10.55	48	1.60	88.51	88.86	94.16	94.32	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.1	14.24	30.82	11.60	15	19.40	89.92	91.14	96.05	96.31	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.1	2.75	23.22	2.24	15	11.01	89.92	92.15	96.05	96.08	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.8	1.8	123.4	196.3	9.82	48	1.59	88.86	90.78	96.05	96.81	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.1	1.55	13.47	1.27	15	3.71	91.54	92.22	98.04	98.05	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.6	1.8	123.3	175.8	9.81	48	1.28	90.78	92.58	98.04	98.92	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.6	1.8	123.3	15.86	39.25	24	3.56	93.22	94.11	99.15	152.99	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.6	1.8	98.07	10.55	55.50	18	7.31	94.11	95.62	170.95	301.51	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	1.8	24.31	10.49	13.76	18	7.24	95.62	97.51	334.56	344.70	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	1.8	25.85	20.75	8.23	24	6.10	94.11	95.08	170.95	172.46	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.3	1.96	10.86	2.50	12	67.47	95.08	98.18	173.38	173.48	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	1.8	24.31	22.39	7.74	24	7.10	95.08	96.59	173.38	175.16	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	1.8	74.47	4.84	42.15	18	1.54	95.62	97.78	334.56	845.47	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	1.8	74.27	2.89	42.03	18	0.55	97.78	98.23	859.27	1155.60	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	1.8	74.16	2.53	41.97	18	0.42	98.23	98.60	1169.33	1486.94	100.40	100.60	

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	1.8	74.14	1.50	41.96	18	0.15	98.60	98.62	1500.63	1549.76	100.60	100.62	
25	24	15.250	29.12	29.12	0.70	20.38	20.38	17.4	17.4	1.8	36.68	8.71	20.76	18	4.98	98.62	99.38	1577.12	1590.61	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	1.8	37.52	1.66	21.23	18	0.18	98.62	98.68	1577.12	1607.89	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	1.8	36.68	1.79	20.76	18	0.21	98.68	98.72	1614.90	1631.71	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.1	1.47	1.95	0.83	18	0.25	98.68	98.72	1614.90	1614.93	100.80	100.80	

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.3	2.1	159.9	205.8	12.98	48	2.38	81.94	82.27	85.94	85.95	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	18.0	2.1	161.1	180.8	14.60	48	1.35	84.76	88.51	87.70	92.39	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.4	3.2	8.08	19.88	5.24	18	3.05	89.25	94.93	94.99	96.02	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.2	3.2	6.27	13.64	4.93	18	1.44	94.93	95.38	96.02	96.34	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.4	2.09	13.94	2.65	18	1.50	95.38	95.85	96.34	96.40	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.5	3.3	4.54	7.67	4.23	18	0.45	95.38	96.22	96.34	97.03	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.4	3.03	4.65	4.65	12	1.45	96.22	96.91	97.03	97.65	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.4	1.67	2.67	3.02	12	0.48	96.22	96.67	97.03	97.24	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.9	2.1	155.8	197.0	12.40	48	1.60	88.51	88.86	94.99	95.21	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.4	15.87	30.82	12.94	15	19.40	89.92	91.14	97.60	97.92	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.4	3.06	23.22	2.49	15	11.01	89.92	92.15	97.60	97.64	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.8	2.1	145.0	196.3	11.54	48	1.59	88.86	90.78	97.60	98.65	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.4	1.73	13.47	1.41	15	3.71	91.54	92.22	100.34	100.36	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.6	2.1	144.6	175.8	11.51	48	1.28	90.78	92.58	100.34	101.56	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.1	144.6	15.86	46.05	24	3.56	93.22	94.11	101.87	175.97	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.1	115.0	10.55	65.11	18	7.31	94.11	95.62	200.69	380.36	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.2	28.48	10.49	16.12	18	7.24	95.62	97.51	425.82	439.75	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.2	30.29	20.75	9.64	24	6.10	94.11	95.08	200.69	202.76	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.6	2.27	10.86	2.89	12	67.47	95.08	98.18	204.02	204.15	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.2	28.48	22.39	9.07	24	7.10	95.08	96.59	204.02	206.46	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.1	87.34	4.84	49.43	18	1.54	95.62	97.78	425.82	1128.56	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.1	87.09	2.89	49.29	18	0.55	97.78	98.23	1147.55	1555.02	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.1	86.95	2.53	49.21	18	0.42	98.23	98.60	1573.90	2010.51	100.40	100.60	

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.1	86.92	1.50	49.19	18	0.15	98.60	98.62	2029.33	2096.86	100.60	100.62	
25	24	15.250	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.1	42.99	8.71	24.33	18	4.98	98.62	99.38	2134.47	2153.01	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.1	43.99	1.66	24.89	18	0.18	98.62	98.68	2134.47	2176.77	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.1	42.99	1.79	24.33	18	0.21	98.68	98.72	2186.40	2209.49	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.4	1.64	1.95	0.93	18	0.25	98.68	98.72	2186.40	2186.43	100.80	100.80	

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.2	2.2	172.9	205.8	13.94	48	2.38	81.94	82.27	85.94	86.02	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	17.9	2.2	174.1	180.8	15.12	48	1.35	84.76	88.51	87.91	92.72	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.9	3.4	8.63	19.88	4.88	18	3.05	89.25	94.93	95.70	96.77	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.7	3.4	6.70	13.64	3.79	18	1.44	94.93	95.38	96.96	97.06	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.8	2.34	13.94	1.33	18	1.50	95.38	95.85	97.29	97.30	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.7	3.6	4.99	7.67	2.87	18	0.45	95.38	96.22	97.29	97.61	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.8	3.39	4.65	4.32	12	1.45	96.22	96.91	97.71	98.07	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.8	1.87	2.67	2.38	12	0.48	96.22	96.67	97.71	97.93	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.9	2.3	168.5	197.0	13.41	48	1.60	88.51	88.86	95.70	95.96	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.8	17.75	30.82	14.47	15	19.40	89.92	91.14	98.75	99.16	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.8	3.42	23.22	2.79	15	11.01	89.92	92.15	98.75	98.80	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.7	2.3	156.7	196.3	12.47	48	1.59	88.86	90.78	98.75	99.98	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.8	1.94	13.47	1.58	15	3.71	91.54	92.22	101.96	101.97	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.3	156.2	175.8	12.43	48	1.28	90.78	92.58	101.96	103.38	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.3	156.3	15.86	49.74	24	3.56	93.22	94.11	103.74	190.22	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.3	124.3	10.55	70.34	18	7.31	94.11	95.62	219.07	428.75	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.3	30.76	10.49	17.41	18	7.24	95.62	97.51	481.81	498.06	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.3	32.72	20.75	10.42	24	6.10	94.11	95.08	219.07	221.48	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.9	2.47	10.86	3.14	12	67.47	95.08	98.18	222.95	223.11	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.3	30.76	22.39	9.79	24	7.10	95.08	96.59	222.95	225.80	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.3	94.35	4.84	53.39	18	1.54	95.62	97.78	481.81	1301.80	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.3	94.08	2.89	53.24	18	0.55	97.78	98.23	1323.96	1799.37	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.3	93.91	2.53	53.15	18	0.42	98.23	98.60	1821.40	2330.76	100.40	100.60	

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.3	93.88	1.50	53.13	18	0.15	98.60	98.62	2352.72	2431.49	100.60	100.62	
25	24	15.250	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.3	46.43	8.71	26.28	18	4.98	98.62	99.38	2475.37	2497.00	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.3	47.51	1.66	26.89	18	0.18	98.62	98.68	2475.37	2524.71	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.3	46.43	1.79	26.28	18	0.21	98.68	98.72	2535.94	2562.88	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.8	1.83	1.95	1.04	18	0.25	98.68	98.72	2535.94	2535.98	100.80	100.80	

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.2	2.5	190.5	205.8	15.28	48	2.38	81.94	82.27	85.94	86.09	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	17.9	2.5	191.8	180.8	15.74	48	1.35	84.76	88.51	88.32	92.78	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.7	3.7	9.51	19.88	5.38	18	3.05	89.25	94.93	96.40	97.70	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.6	3.7	7.39	13.64	4.18	18	1.44	94.93	95.38	97.93	98.06	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	4.2	2.55	13.94	1.44	18	1.50	95.38	95.85	98.33	98.35	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.6	4.0	5.47	7.67	3.09	18	0.45	95.38	96.22	98.33	98.76	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	4.2	3.69	4.65	4.70	12	1.45	96.22	96.91	98.87	99.30	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	4.2	2.03	2.67	2.59	12	0.48	96.22	96.67	98.87	99.13	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	17.9	2.5	185.6	197.0	14.77	48	1.60	88.51	88.86	96.40	96.71	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	4.2	19.34	30.82	15.76	15	19.40	89.92	91.14	100.11	100.59	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	4.2	3.73	23.22	3.04	15	11.01	89.92	92.15	100.11	100.16	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	17.7	2.5	172.5	196.3	13.73	48	1.59	88.86	90.78	100.11	101.59	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	4.2	2.11	13.47	1.72	15	3.71	91.54	92.22	103.99	104.01	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.5	171.9	175.8	13.68	48	1.28	90.78	92.58	103.99	105.72	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	17.5	2.5	172.0	15.86	54.75	24	3.56	93.22	94.11	106.15	210.90	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	17.5	2.5	136.8	10.55	77.41	18	7.31	94.11	95.62	245.84	499.82	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.6	33.83	10.49	19.14	18	7.24	95.62	97.51	564.09	583.74	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.6	35.99	20.75	11.46	24	6.10	94.11	95.08	245.84	248.76	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	3.2	2.70	10.86	3.44	12	67.47	95.08	98.18	250.54	250.73	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.6	33.83	22.39	10.77	24	7.10	95.08	96.59	250.54	253.99	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	17.5	2.5	103.8	4.84	58.76	18	1.54	95.62	97.78	564.09	1557.07	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.5	2.5	103.5	2.89	58.58	18	0.55	97.78	98.23	1583.91	2159.54	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.4	2.5	103.3	2.53	58.48	18	0.42	98.23	98.60	2186.22	2802.86	100.40	100.60	

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; c = cir e = ellip b = box

Storm Sewer Tabulation

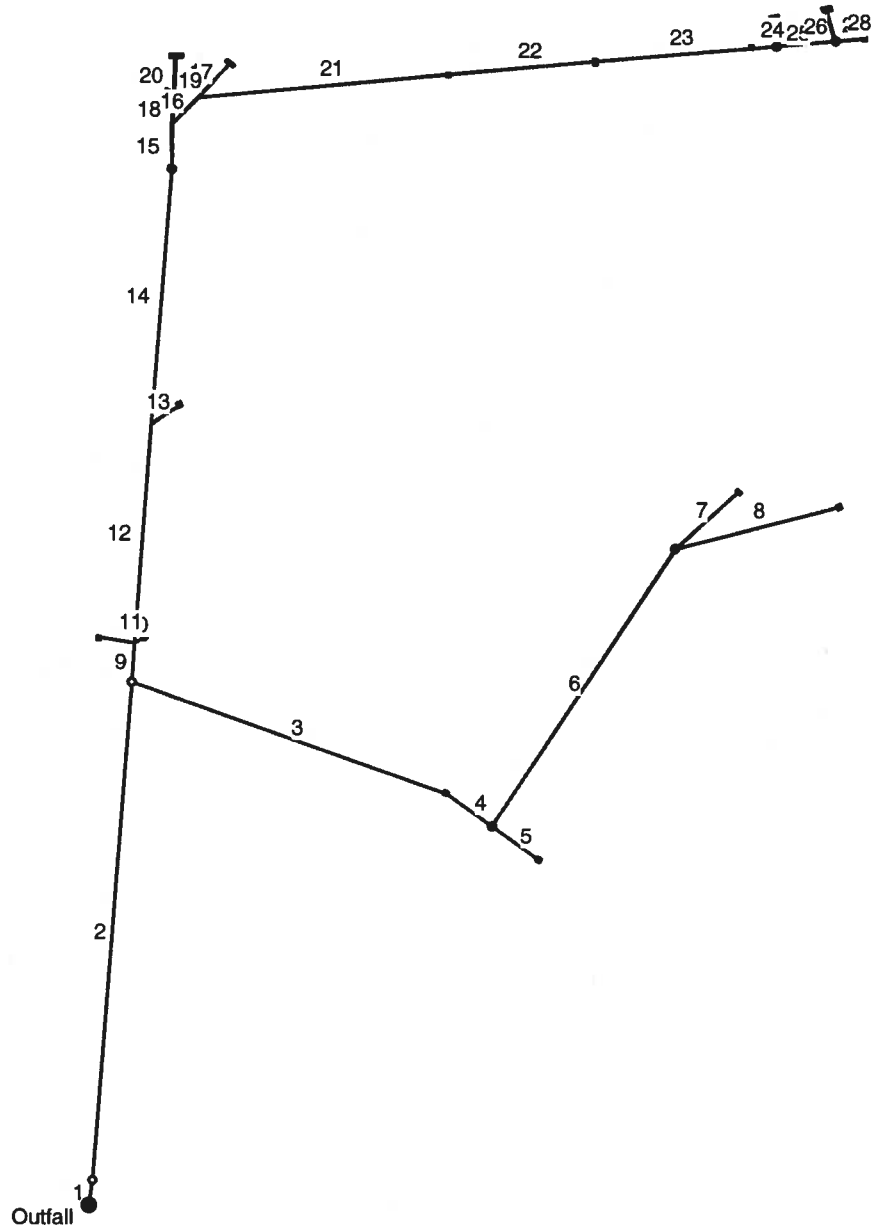
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.4	2.5	103.3	1.50	58.46	18	0.15	98.60	98.62	2829.44	2924.81	100.60	100.62	
25	24	15.250	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.5	51.09	8.71	28.91	18	4.98	98.62	99.38	2977.93	3004.10	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.5	52.27	1.66	29.58	18	0.18	98.62	98.68	2977.93	3037.65	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.5	51.09	1.79	28.91	18	0.21	98.68	98.72	3051.25	3083.86	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	4.2	2.00	1.95	1.13	18	0.25	98.68	98.72	3051.25	3051.29	100.80	100.80	

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; c = cir e = ellip b = box

Appendix G
Hydraflow Storm Sewer Calculations
– Scenario 4

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Scenario 4.stm	Number of lines: 28	Date: 04-02-2010

Hydraflow Storm Sewers Extension v6.052

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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	19.1	1.7	133.7	205.8	10.92	48	2.38	81.94	82.27	85.94	85.88	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	18.8	1.7	134.7	180.8	13.70	48	1.35	84.76	88.51	87.33	91.98	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.4	2.8	7.11	19.88	4.80	18	3.05	89.25	94.93	91.98	95.95	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.3	2.8	5.52	13.64	4.67	18	1.44	94.93	95.38	95.95	96.28	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.1	1.88	13.94	2.56	18	1.50	95.38	95.85	96.28	96.37	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.5	3.0	4.04	7.67	4.05	18	0.45	95.38	96.22	96.28	96.99	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.1	2.72	4.65	4.42	12	1.45	96.22	96.91	96.99	97.61	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.1	1.50	2.67	2.96	12	0.48	96.22	96.67	96.99	97.19	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	18.7	1.7	130.4	197.0	11.39	48	1.60	88.51	88.86	91.98	92.24	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.1	14.24	30.82	11.60	15	19.40	89.92	91.14	92.24	92.50	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.1	2.75	23.22	3.20	15	11.01	89.92	92.15	92.24	92.81	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	18.6	1.7	121.3	196.3	10.89	48	1.59	88.86	90.78	92.24	94.04	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.1	1.55	13.47	1.27	15	3.71	91.54	92.22	94.04	94.05	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	18.3	1.8	121.0	175.8	11.05	48	1.28	90.78	92.58	94.04	95.83	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	18.3	1.8	121.1	293.7	12.49	48	3.56	93.22	94.11	95.83	97.37	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	18.3	1.8	96.41	219.3	9.33	48	1.99	94.11	94.52	97.37	97.42	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	1.8	24.31	34.57	7.74	24	1.99	94.73	95.25	97.42	97.68	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	1.8	25.86	178.5	4.19	36	6.10	94.11	95.08	97.37	97.25	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.3	1.96	201.3	1.93	24	67.47	95.08	98.18	97.55	98.68	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	1.8	24.31	54.72	8.04	24	4.99	95.08	96.14	97.55	97.89	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	18.0	1.8	73.61	110.0	8.14	48	0.50	94.52	95.22	97.42	97.76	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.8	1.8	73.63	110.2	8.76	48	0.50	95.22	95.63	97.76	98.17	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.7	1.8	73.76	110.1	8.77	48	0.50	95.63	96.07	98.17	98.61	100.40	100.60	

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.6	1.8	73.77	111.7	8.69	48	0.52	96.07	96.14	98.61	98.72	100.60	100.62	
25	24	15.250	29.12	29.12	0.70	20.38	20.38	17.4	17.4	1.8	36.68	52.33	5.19	36	0.52	96.14	96.22	99.87	99.91	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.5	1.8	37.48	71.41	3.09	48	0.21	96.14	96.21	99.87	99.89	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	1.8	36.68	52.42	5.19	36	0.53	96.21	96.31	100.04	100.09	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.1	1.47	16.09	0.83	18	2.00	96.21	96.53	100.04	100.04	100.80	100.80	

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	19.2	2.0	156.6	205.8	12.74	48	2.38	81.94	82.27	85.94	85.92	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	18.9	2.0	157.7	180.8	14.53	48	1.35	84.76	88.51	87.65	92.28	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.4	3.2	8.08	19.88	5.24	18	3.05	89.25	94.93	94.85	96.02	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.2	3.2	6.27	13.64	4.93	18	1.44	94.93	95.38	96.02	96.34	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.4	2.09	13.94	2.65	18	1.50	95.38	95.85	96.34	96.40	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.5	3.3	4.54	7.67	4.23	18	0.45	95.38	96.22	96.34	97.03	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.4	3.03	4.65	4.65	12	1.45	96.22	96.91	97.03	97.65	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.4	1.67	2.67	3.02	12	0.48	96.22	96.67	97.03	97.24	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	18.9	2.0	152.6	197.0	12.14	48	1.60	88.51	88.86	94.85	95.06	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.4	15.87	30.82	12.94	15	19.40	89.92	91.14	97.35	97.67	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.4	3.06	23.22	2.49	15	11.01	89.92	92.15	97.35	97.39	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	18.7	2.0	141.9	196.3	11.29	48	1.59	88.86	90.78	97.35	98.35	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.4	1.73	13.47	1.41	15	3.71	91.54	92.22	99.98	99.99	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	18.5	2.1	141.6	175.8	11.27	48	1.28	90.78	92.58	99.98	101.15	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	18.4	2.1	141.7	293.7	11.28	48	3.56	93.22	94.11	101.44	101.65	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	18.4	2.1	112.8	219.3	8.98	48	1.99	94.11	94.52	103.13	103.24	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.2	28.48	34.57	9.07	24	1.99	94.73	95.25	104.11	104.46	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.2	30.29	178.5	4.29	36	6.10	94.11	95.08	103.13	103.16	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.6	2.27	201.3	0.72	24	67.47	95.08	98.18	103.41	103.41	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.2	28.48	54.72	9.07	24	4.99	95.08	96.14	103.41	103.70	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	18.1	2.1	86.19	110.0	6.86	48	0.50	94.52	95.22	104.11	104.54	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.9	2.1	86.30	110.2	6.87	48	0.50	95.22	95.63	104.90	105.15	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.6	2.1	86.52	110.1	6.89	48	0.50	95.63	96.07	105.52	105.79	100.40	100.60	

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.6	2.1	86.55	111.7	6.89	48	0.52	96.07	96.14	106.16	106.20	100.60	100.62	
25	24	15.250	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.1	42.99	52.33	6.08	36	0.52	96.14	96.22	106.94	107.00	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.5	2.1	43.94	71.41	3.50	48	0.21	96.14	96.21	106.94	106.97	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.1	42.99	52.42	6.08	36	0.53	96.21	96.31	107.16	107.23	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.4	1.64	16.09	0.93	18	2.00	96.21	96.53	107.16	107.16	100.80	100.80	

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	19.1	2.2	169.6	205.8	13.70	48	2.38	81.94	82.27	85.94	86.00	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	18.8	2.2	170.8	180.8	15.09	48	1.35	84.76	88.51	87.86	92.32	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.7	3.4	8.74	19.88	5.08	18	3.05	89.25	94.93	95.29	96.28	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.6	3.4	6.78	13.64	4.38	18	1.44	94.93	95.38	96.49	96.47	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	3.8	2.34	13.94	1.61	18	1.50	95.38	95.85	96.85	96.84	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.7	3.7	5.00	7.67	3.50	18	0.45	95.38	96.22	96.85	97.19	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	3.8	3.39	4.65	4.73	12	1.45	96.22	96.91	97.38	97.69	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	3.8	1.87	2.67	2.44	12	0.48	96.22	96.67	97.38	97.58	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	18.7	2.2	165.2	197.0	13.15	48	1.60	88.51	88.86	95.29	95.54	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	3.8	17.75	30.82	14.47	15	19.40	89.92	91.14	98.23	98.63	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	3.8	3.42	23.22	2.79	15	11.01	89.92	92.15	98.23	98.28	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	18.6	2.2	153.6	196.3	12.23	48	1.59	88.86	90.78	98.23	99.40	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	3.8	1.94	13.47	1.58	15	3.71	91.54	92.22	101.31	101.32	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	18.4	2.2	153.2	175.8	12.19	48	1.28	90.78	92.58	101.31	102.68	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	18.4	2.2	153.3	293.7	12.20	48	3.56	93.22	94.11	103.02	103.27	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	18.3	2.2	122.0	219.3	9.71	48	1.99	94.11	94.52	105.00	105.13	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.3	30.76	34.57	9.79	24	1.99	94.73	95.25	106.14	106.55	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.3	32.72	178.5	4.63	36	6.10	94.11	95.08	105.00	105.03	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	2.9	2.47	201.3	0.79	24	67.47	95.08	98.18	105.32	105.33	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.3	30.76	54.72	9.79	24	4.99	95.08	96.14	105.32	105.66	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	18.0	2.2	93.20	110.0	7.42	48	0.50	94.52	95.22	106.14	106.64	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.8	2.3	93.28	110.2	7.42	48	0.50	95.22	95.63	107.07	107.37	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.6	2.3	93.49	110.1	7.44	48	0.50	95.63	96.07	107.79	108.11	100.40	100.60	

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.6	2.3	93.52	111.7	7.44	48	0.52	96.07	96.14	108.54	108.59	100.60	100.62	
25	24	15.250	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.3	46.43	52.33	6.57	36	0.52	96.14	96.22	109.45	109.51	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.3	47.47	71.41	3.78	48	0.21	96.14	96.21	109.45	109.48	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.3	46.43	52.42	6.57	36	0.53	96.21	96.31	109.70	109.78	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	3.8	1.83	16.09	1.04	18	2.00	96.21	96.53	109.70	109.71	100.80	100.80	

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	13.862	0.00	103.9	0.00	0.00	77.40	0.0	18.9	2.4	187.3	205.8	15.03	48	2.38	81.94	82.27	85.94	86.08	94.41	94.31	
2	1	277.859	0.00	103.9	0.00	0.00	77.40	0.0	18.6	2.4	188.5	180.8	15.66	48	1.35	84.76	88.51	88.22	92.78	94.31	97.14	
3	2	186.000	0.84	3.23	0.70	0.59	2.57	5.0	6.7	3.7	9.51	19.88	5.38	18	3.05	89.25	94.93	96.28	97.58	97.14	98.10	
4	3	31.280	0.00	2.39	0.00	0.00	1.98	0.0	6.6	3.7	7.39	13.64	4.18	18	1.44	94.93	95.38	97.80	97.93	98.10	98.50	AREA J
5	4	31.280	0.87	0.87	0.70	0.61	0.61	5.0	5.0	4.2	2.55	13.94	1.44	18	1.50	95.38	95.85	98.21	98.22	98.50	98.10	AREA K
6	4	184.728	0.00	1.52	0.00	0.00	1.37	0.0	5.6	4.0	5.47	7.67	3.09	18	0.45	95.38	96.22	98.21	98.63	98.50	98.70	
7	6	47.487	0.98	0.98	0.90	0.88	0.88	5.0	5.0	4.2	3.69	4.65	4.70	12	1.45	96.22	96.91	98.74	99.17	98.70	98.50	AREA F
8	6	94.077	0.54	0.54	0.90	0.49	0.49	5.0	5.0	4.2	2.03	2.67	2.59	12	0.48	96.22	96.67	98.74	99.00	98.70	98.50	AREA G
9	2	21.833	0.00	100.7	0.00	0.00	74.84	0.0	18.6	2.4	182.4	197.0	14.51	48	1.60	88.51	88.86	96.28	96.58	97.14	97.14	
10	9	6.288	0.66	0.66	7.00	4.62	4.62	5.0	5.0	4.2	19.34	30.82	15.76	15	19.40	89.92	91.14	99.85	100.33	97.14	95.77	AREA I
11	9	20.245	0.99	0.99	0.90	0.89	0.89	5.0	5.0	4.2	3.73	23.22	3.04	15	11.01	89.92	92.15	99.85	99.91	97.14	95.50	AREA D
12	9	120.710	0.00	99.01	0.00	0.00	69.33	0.0	18.5	2.4	169.5	196.3	13.49	48	1.59	88.86	90.78	99.85	101.28	97.14	96.00	
13	12	18.348	0.72	0.72	0.70	0.50	0.50	5.0	5.0	4.2	2.11	13.47	1.72	15	3.71	91.54	92.22	103.60	103.62	96.00	95.22	AREA E
14	12	141.019	0.00	98.29	0.00	0.00	68.82	0.0	18.3	2.5	168.9	175.8	13.44	48	1.28	90.78	92.58	103.60	105.27	96.00	99.55	
15	14	24.987	0.00	98.29	0.00	0.00	68.82	0.0	18.3	2.5	169.0	293.7	13.45	48	3.56	93.22	94.11	105.69	105.98	99.55	100.25	
16	15	20.643	0.00	77.96	0.00	0.00	54.74	0.0	18.2	2.5	134.5	219.3	10.71	48	1.99	94.11	94.52	108.10	108.25	100.25	100.88	
17	16	26.118	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.6	33.83	34.57	10.77	24	1.99	94.73	95.25	109.48	109.98	100.88	100.38	AREA A2
18	15	15.899	0.00	20.33	0.00	0.00	14.09	0.0	16.6	2.6	35.99	178.5	5.09	36	6.10	94.11	95.08	108.10	108.13	100.25	100.27	
19	18	4.595	1.43	1.43	0.60	0.86	0.86	10.0	10.0	3.2	2.70	201.3	0.86	24	67.47	95.08	98.18	108.49	108.49	100.27	100.27	AREA C
20	18	21.255	18.90	18.90	0.70	13.23	13.23	16.6	16.6	2.6	33.83	54.72	10.77	24	4.99	95.08	96.14	108.49	108.89	100.27	100.29	AREA A1
21	16	140.114	0.16	59.06	0.90	0.14	41.51	5.0	18.0	2.5	102.7	110.0	8.17	48	0.50	94.52	95.22	109.48	110.09	100.88	100.20	
22	21	81.700	0.11	58.90	0.90	0.10	41.36	5.0	17.8	2.5	102.7	110.2	8.18	48	0.50	95.22	95.63	110.61	110.97	100.20	100.40	
23	22	87.837	0.02	58.79	0.90	0.02	41.26	5.0	17.6	2.5	102.9	110.1	8.19	48	0.50	95.63	96.07	111.49	111.87	100.40	100.60	

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; 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		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
24	23	13.591	0.00	58.77	0.00	0.00	41.25	0.0	17.6	2.5	102.9	111.7	8.19	48	0.52	96.07	96.14	112.39	112.45	100.60	100.62	
25	24	15.250	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.5	51.09	52.33	7.23	36	0.52	96.14	96.22	113.49	113.57	100.62	100.80	AREA B1
26	24	33.242	0.00	29.65	0.00	0.00	20.86	0.0	17.4	2.5	52.23	71.41	4.16	48	0.21	96.14	96.21	113.49	113.53	100.62	100.80	
27	26	19.000	29.12	29.12	0.70	20.38	20.38	17.4	17.4	2.5	51.09	52.42	7.23	36	0.53	96.21	96.31	113.80	113.90	100.80	100.80	AREA B2
28	26	16.000	0.53	0.53	0.90	0.48	0.48	5.0	5.0	4.2	2.00	16.09	1.13	18	2.00	96.21	96.53	113.80	113.81	100.80	100.80	

Project File: Scenario 4.stm

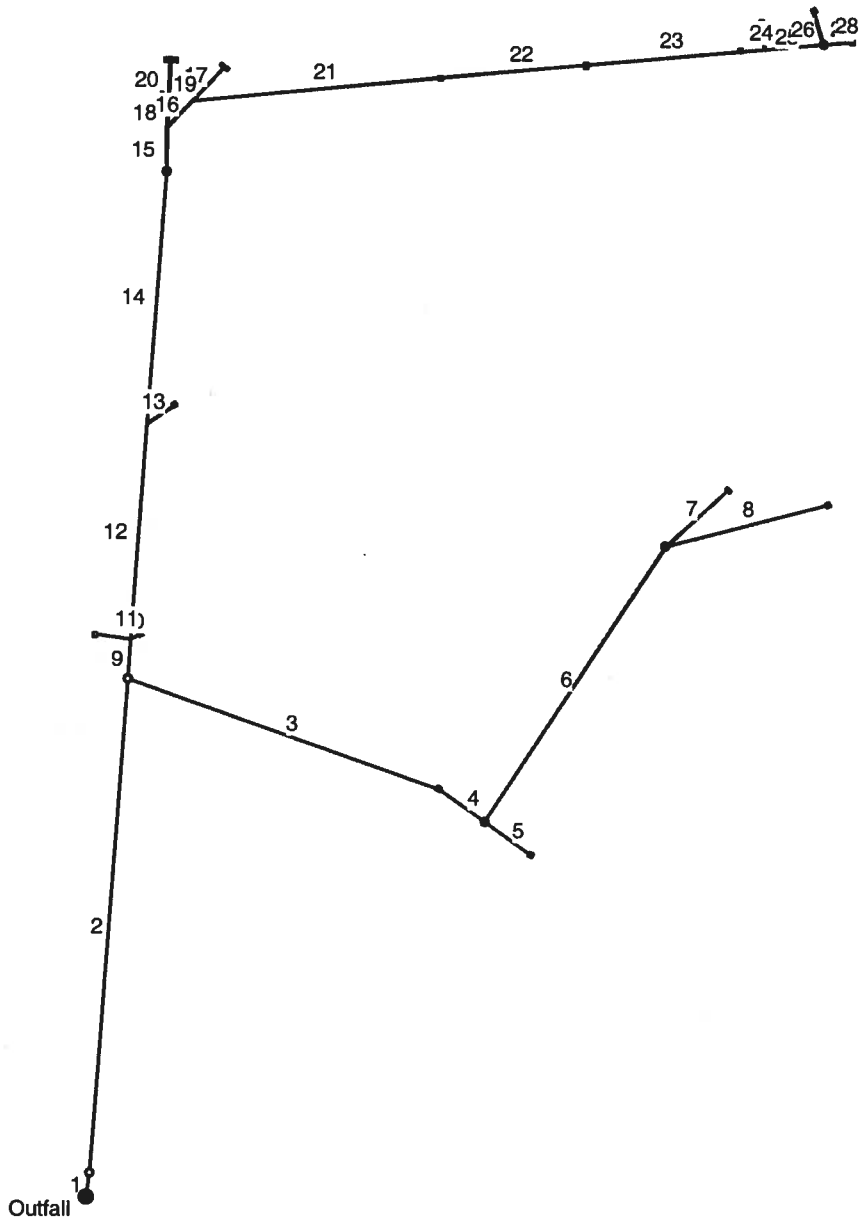
Number of lines: 28

Run Date: 04-02-2010

NOTES: Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; c = cir e = ellip b = box

Appendix H
Hydraflow Storm Sewer Inlet Calculations – Scenario 1

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Scenario 1.stm	Number of lines: 28	Date: 04-01-2010

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	47.57	0.00	47.57	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	47.57	0.00	47.57	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	1
3	CB#1	1.81	0.00	1.81	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.21	10.50	0.21	10.50	0.0	2
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	3
5	CB#2	1.88	0.00	1.88	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.22	11.00	0.22	11.00	0.0	4
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	4
7	CB#3	2.72	0.00	2.72	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.27	13.50	0.27	13.50	0.0	Off
8	CB#4	1.50	0.00	1.50	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.19	9.50	0.19	9.50	0.0	6
9	BC	0.00	47.57	0.00	47.57	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	2
10	CB#5	14.24	0.00	14.24	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.82	41.00	0.82	41.00	0.0	9
11	CB#6	2.75	0.00	2.75	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.28	14.00	0.28	14.00	0.0	9
12	BC	0.00	47.57	0.00	47.57	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.55	0.00	1.55	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.19	9.50	0.19	9.50	0.0	12
14	SDMH#3	0.00	47.57	0.00	47.57	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	12
15	BC	0.00	47.57	0.00	47.57	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	33.95	0.00	33.95	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	24.31	0.00	8.74	15.56	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.33	16.35	0.33	16.35	0.0	16
18	BC	0.00	13.63	0.00	13.63	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	1.96	0.00	1.96	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.22	11.00	0.22	11.00	0.0	18
20	CB#9	24.31	0.00	10.68	13.63	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.33	16.35	0.33	16.35	0.0	18
21	CB#11	0.44	24.75	6.81	18.38	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.41	20.75	0.41	20.75	0.0	16
22	CB#12	0.31	37.88	13.43	24.75	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.71	35.40	0.71	35.40	0.0	21
23	CB#13	0.06	49.29	11.46	37.88	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.78	38.95	0.78	38.95	0.0	22

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	36.68	26.79	14.17	49.29	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.47	23.45	0.47	23.45	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	24
27	CB#16	36.68	0.00	9.89	26.79	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.38	19.10	0.38	19.10	0.0	25
28	CB#15	1.47	0.00	1.47	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.013	0.18	6.00	0.18	6.00	0.0	Off

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	59.16	0.00	59.16	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	59.16	0.00	59.16	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	1
3	CB#1	2.02	0.00	2.02	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.23	11.50	0.23	11.50	0.0	2
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	3
5	CB#2	2.09	0.00	2.09	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.23	11.50	0.23	11.50	0.0	4
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	4
7	CB#3	3.03	0.00	3.03	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.29	14.50	0.29	14.50	0.0	Off
8	CB#4	1.67	0.00	1.67	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.20	10.00	0.20	10.00	0.0	6
9	BC	0.00	59.16	0.00	59.16	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	2
10	CB#5	15.87	0.00	15.87	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.88	44.00	0.88	44.00	0.0	9
11	CB#6	3.06	0.00	3.06	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.30	15.00	0.30	15.00	0.0	9
12	BC	0.00	59.16	0.00	59.16	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.73	0.00	1.73	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.20	10.00	0.20	10.00	0.0	12
14	SDMH#3	0.00	59.16	0.00	59.16	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	12
15	BC	0.00	59.16	0.00	59.16	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	42.62	0.00	42.62	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	28.48	0.00	9.73	18.74	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.35	17.35	0.35	17.35	0.0	16
18	BC	0.00	16.54	0.00	16.54	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.27	0.00	2.27	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.24	12.00	0.24	12.00	0.0	18
20	CB#9	28.48	0.00	11.94	16.54	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.35	17.35	0.35	17.35	0.0	18
21	CB#11	0.49	31.36	7.98	23.87	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.45	22.70	0.45	22.70	0.0	16
22	CB#12	0.34	46.41	15.39	31.36	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.76	38.15	0.76	38.15	0.0	21
23	CB#13	0.06	59.24	12.89	46.41	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.83	41.70	0.83	41.70	0.0	22

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (In)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	42.99	32.03	15.79	59.24	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.50	24.95	0.50	24.95	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	24
27	CB#16	42.99	0.00	10.96	32.03	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.40	20.25	0.40	20.25	0.0	25
28	CB#15	1.64	0.00	1.64	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.013	0.20	7.00	0.20	7.00	0.0	Off

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	65.72	0.00	65.72	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	65.72	0.00	65.72	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	1
3	CB#1	2.26	0.00	2.26	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.24	12.00	0.24	12.00	0.0	2
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	3
5	CB#2	2.34	0.00	2.34	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.25	12.50	0.25	12.50	0.0	4
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	4
7	CB#3	3.39	0.00	3.39	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.32	16.00	0.32	16.00	0.0	Off
8	CB#4	1.87	0.00	1.87	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.21	10.50	0.21	10.50	0.0	6
9	BC	0.00	65.72	0.00	65.72	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	2
10	CB#5	17.75	0.00	17.75	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.94	47.00	0.94	47.00	0.0	9
11	CB#6	3.42	0.00	3.42	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.32	16.00	0.32	16.00	0.0	9
12	BC	0.00	65.72	0.00	65.72	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.94	0.00	1.94	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.22	11.00	0.22	11.00	0.0	12
14	SDMH#3	0.00	65.72	0.00	65.72	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	12
15	BC	0.00	65.72	0.00	65.72	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	47.54	0.00	47.54	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	30.76	0.00	10.24	20.52	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.36	17.85	0.36	17.85	0.0	16
18	BC	0.00	18.17	0.00	18.17	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.47	0.00	2.47	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.26	13.00	0.26	13.00	0.0	18
20	CB#9	30.76	0.00	12.58	18.17	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.36	17.85	0.36	17.85	0.0	18
21	CB#11	0.55	35.04	8.57	27.03	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.47	23.65	0.47	23.65	0.0	16
22	CB#12	0.38	51.14	16.47	35.04	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.79	39.60	0.79	39.60	0.0	21
23	CB#13	0.07	64.71	13.64	51.14	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.86	43.10	0.86	43.10	0.0	22

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	46.43	34.89	16.62	64.71	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.51	25.70	0.51	25.70	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	24
27	CB#16	46.43	0.00	11.54	34.89	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.42	20.85	0.42	20.85	0.0	25
28	CB#15	1.83	0.00	1.83	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.013	0.21	7.50	0.21	7.50	0.0	Off

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	74.71	0.00	74.71	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	74.71	0.00	74.71	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	1
3	CB#1	2.46	0.00	2.46	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.26	13.00	0.26	13.00	0.0	2
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	3
5	CB#2	2.55	0.00	2.55	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.26	13.00	0.26	13.00	0.0	4
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	4
7	CB#3	3.69	0.00	3.69	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.33	16.50	0.33	16.50	0.0	Off
8	CB#4	2.03	0.00	2.03	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.23	11.50	0.23	11.50	0.0	6
9	BC	0.00	74.71	0.00	74.71	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	2
10	CB#5	19.34	0.00	19.34	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	1.00	50.00	1.00	50.00	0.0	9
11	CB#6	3.73	0.00	3.73	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.34	17.00	0.34	17.00	0.0	9
12	BC	0.00	74.71	0.00	74.71	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	2.11	0.00	2.11	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.23	11.50	0.23	11.50	0.0	12
14	SDMH#3	0.00	74.71	0.00	74.71	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	12
15	BC	0.00	74.71	0.00	74.71	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	54.33	0.00	54.33	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	33.83	0.00	10.92	22.91	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.37	18.50	0.37	18.50	0.0	16
18	BC	0.00	20.38	0.00	20.38	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.70	0.00	2.70	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.013	0.27	13.50	0.27	13.50	0.0	18
20	CB#9	33.83	0.00	13.44	20.38	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.37	18.50	0.37	18.50	0.0	18
21	CB#11	0.60	40.20	9.38	31.42	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.50	24.90	0.50	24.90	0.0	16
22	CB#12	0.41	57.58	17.80	40.20	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.83	41.35	0.83	41.35	0.0	21
23	CB#13	0.08	72.14	14.63	57.58	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.90	44.90	0.90	44.90	0.0	22

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

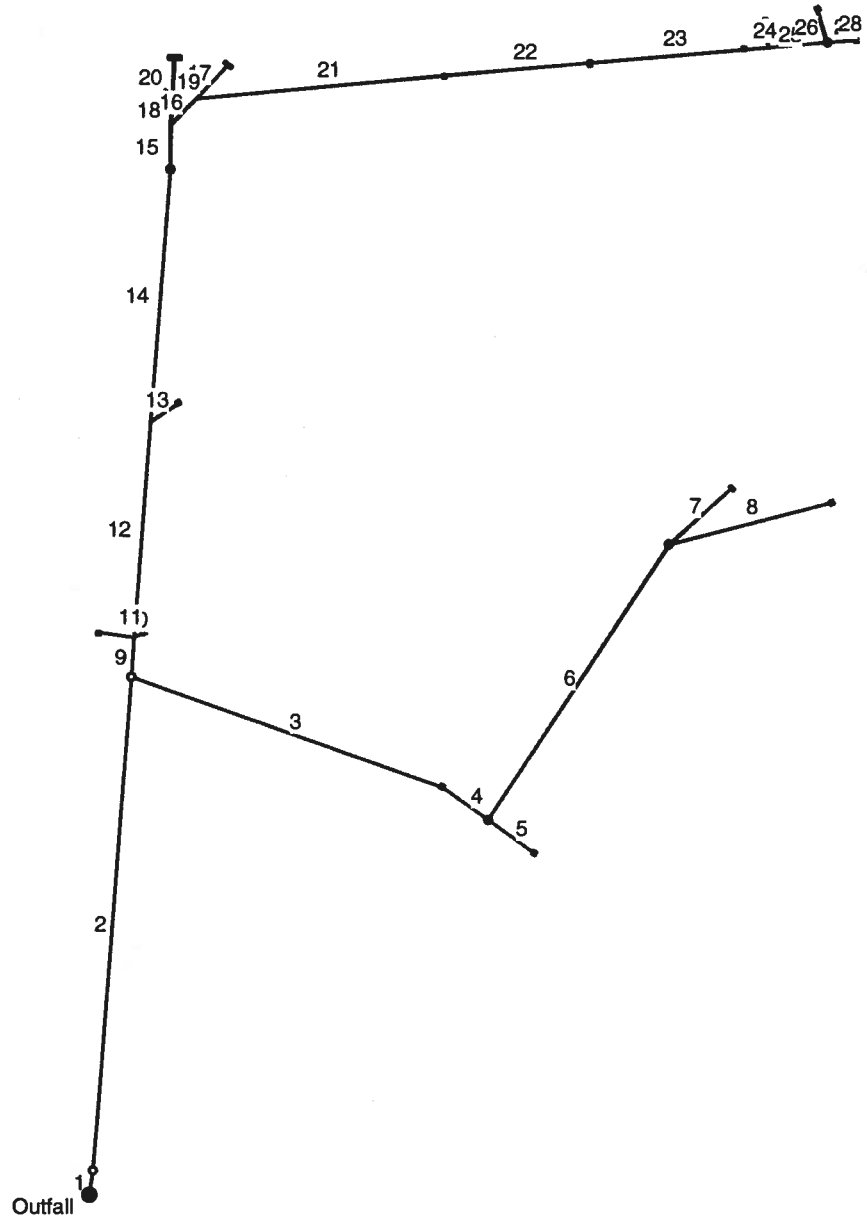
Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	51.09	38.81	17.76	72.14	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.53	26.70	0.53	26.70	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	24
27	CB#16	51.09	0.00	12.28	38.81	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.43	21.60	0.43	21.60	0.0	25
28	CB#15	2.00	0.00	2.00	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.013	0.22	8.00	0.22	8.00	0.0	Off

Project File: Scenario 1.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Appendix I
Hydraflow Storm Sewer Inlet Calculations – Scenario 2

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Scenario 2.stm	Number of lines: 28	Date: 04-01-2010

Hydraflow Storm Sewers Extension v6.052

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	1.81	0.00	1.81	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.21	10.50	0.21	10.50	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	1.88	0.00	1.88	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	2.72	0.00	2.72	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.27	13.50	0.27	13.50	0.0	Off
8	CB#4	1.50	0.00	1.50	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.19	9.50	0.19	9.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	14.24	0.00	14.24	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.82	41.00	0.82	41.00	0.0	Off
11	CB#6	2.75	0.00	2.75	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.28	14.00	0.28	14.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.55	0.00	1.55	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.19	9.50	0.19	9.50	0.0	Off
14	SDMH#3	0.00	47.57	0.00	47.57	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	47.57	0.00	47.57	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	33.95	0.00	33.95	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	24.31	0.00	8.74	15.56	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.33	16.35	0.33	16.35	0.0	16
18	BC	0.00	13.63	0.00	13.63	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	1.96	0.00	1.96	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
20	CB#9	24.31	0.00	10.68	13.63	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.33	16.35	0.33	16.35	0.0	18
21	CB#11	0.44	24.75	6.81	18.38	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.41	20.75	0.41	20.75	0.0	16
22	CB#12	0.31	37.88	13.43	24.75	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.71	35.40	0.71	35.40	0.0	21
23	CB#13	0.06	49.29	11.46	37.88	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.78	38.95	0.78	38.95	0.0	22

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	36.68	26.79	14.17	49.29	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.47	23.45	0.47	23.45	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	36.68	0.00	9.89	26.79	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.38	19.10	0.38	19.10	0.0	25
28	CB#15	1.47	0.00	1.47	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.000	0.18	6.00	0.18	6.00	0.0	Off

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.02	0.00	2.02	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.09	0.00	2.09	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.03	0.00	3.03	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.29	14.50	0.29	14.50	0.0	Off
8	CB#4	1.67	0.00	1.67	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.20	10.00	0.20	10.00	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	15.87	0.00	15.87	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.88	44.00	0.88	44.00	0.0	Off
11	CB#6	3.06	0.00	3.06	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.30	15.00	0.30	15.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.73	0.00	1.73	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.20	10.00	0.20	10.00	0.0	Off
14	SDMH#3	0.00	59.16	0.00	59.16	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	59.16	0.00	59.16	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	42.62	0.00	42.62	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	28.48	0.00	9.73	18.74	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.35	17.35	0.35	17.35	0.0	16
18	BC	0.00	16.54	0.00	16.54	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.27	0.00	2.27	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.24	12.00	0.24	12.00	0.0	Off
20	CB#9	28.48	0.00	11.94	16.54	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.35	17.35	0.35	17.35	0.0	18
21	CB#11	0.49	31.36	7.98	23.87	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.45	22.70	0.45	22.70	0.0	16
22	CB#12	0.34	46.41	15.39	31.36	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.76	38.15	0.76	38.15	0.0	21
23	CB#13	0.06	59.24	12.89	46.41	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.83	41.70	0.83	41.70	0.0	22

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	42.99	32.03	15.79	59.24	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.50	24.95	0.50	24.95	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	42.99	0.00	10.96	32.03	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.40	20.25	0.40	20.25	0.0	25
28	CB#15	1.64	0.00	1.64	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.000	0.20	7.00	0.20	7.00	0.0	Off

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.26	0.00	2.26	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.24	12.00	0.24	12.00	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.34	0.00	2.34	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.25	12.50	0.25	12.50	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.39	0.00	3.39	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.32	16.00	0.32	16.00	0.0	Off
8	CB#4	1.87	0.00	1.87	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.21	10.50	0.21	10.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	17.75	0.00	17.75	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.94	47.00	0.94	47.00	0.0	Off
11	CB#6	3.42	0.00	3.42	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.32	16.00	0.32	16.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.94	0.00	1.94	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
14	SDMH#3	0.00	65.72	0.00	65.72	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	65.72	0.00	65.72	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	47.54	0.00	47.54	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	30.76	0.00	10.24	20.52	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.36	17.85	0.36	17.85	0.0	16
18	BC	0.00	18.17	0.00	18.17	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.47	0.00	2.47	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
20	CB#9	30.76	0.00	12.58	18.17	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.36	17.85	0.36	17.85	0.0	18
21	CB#11	0.55	35.04	8.57	27.03	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.47	23.65	0.47	23.65	0.0	16
22	CB#12	0.38	51.14	16.47	35.04	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.79	39.60	0.79	39.60	0.0	21
23	CB#13	0.07	64.71	13.64	51.14	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.86	43.10	0.86	43.10	0.0	22

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	46.43	34.89	16.62	64.71	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.51	25.70	0.51	25.70	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	46.43	0.00	11.54	34.89	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.42	20.85	0.42	20.85	0.0	25
28	CB#15	1.83	0.00	1.83	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.000	0.21	7.50	0.21	7.50	0.0	Off

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.46	0.00	2.46	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.55	0.00	2.55	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.69	0.00	3.69	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.33	16.50	0.33	16.50	0.0	Off
8	CB#4	2.03	0.00	2.03	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	19.34	0.00	19.34	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	1.00	50.00	1.00	50.00	0.0	Off
11	CB#6	3.73	0.00	3.73	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.34	17.00	0.34	17.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	2.11	0.00	2.11	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
14	SDMH#3	0.00	74.71	0.00	74.71	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	74.71	0.00	74.71	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	54.33	0.00	54.33	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	33.83	0.00	10.92	22.91	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.37	18.50	0.37	18.50	0.0	16
18	BC	0.00	20.38	0.00	20.38	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.70	0.00	2.70	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.27	13.50	0.27	13.50	0.0	Off
20	CB#9	33.83	0.00	13.44	20.38	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.37	18.50	0.37	18.50	0.0	18
21	CB#11	0.60	40.20	9.38	31.42	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.50	24.90	0.50	24.90	0.0	16
22	CB#12	0.41	57.58	17.80	40.20	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.83	41.35	0.83	41.35	0.0	21
23	CB#13	0.08	72.14	14.63	57.58	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.90	44.90	0.90	44.90	0.0	22

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

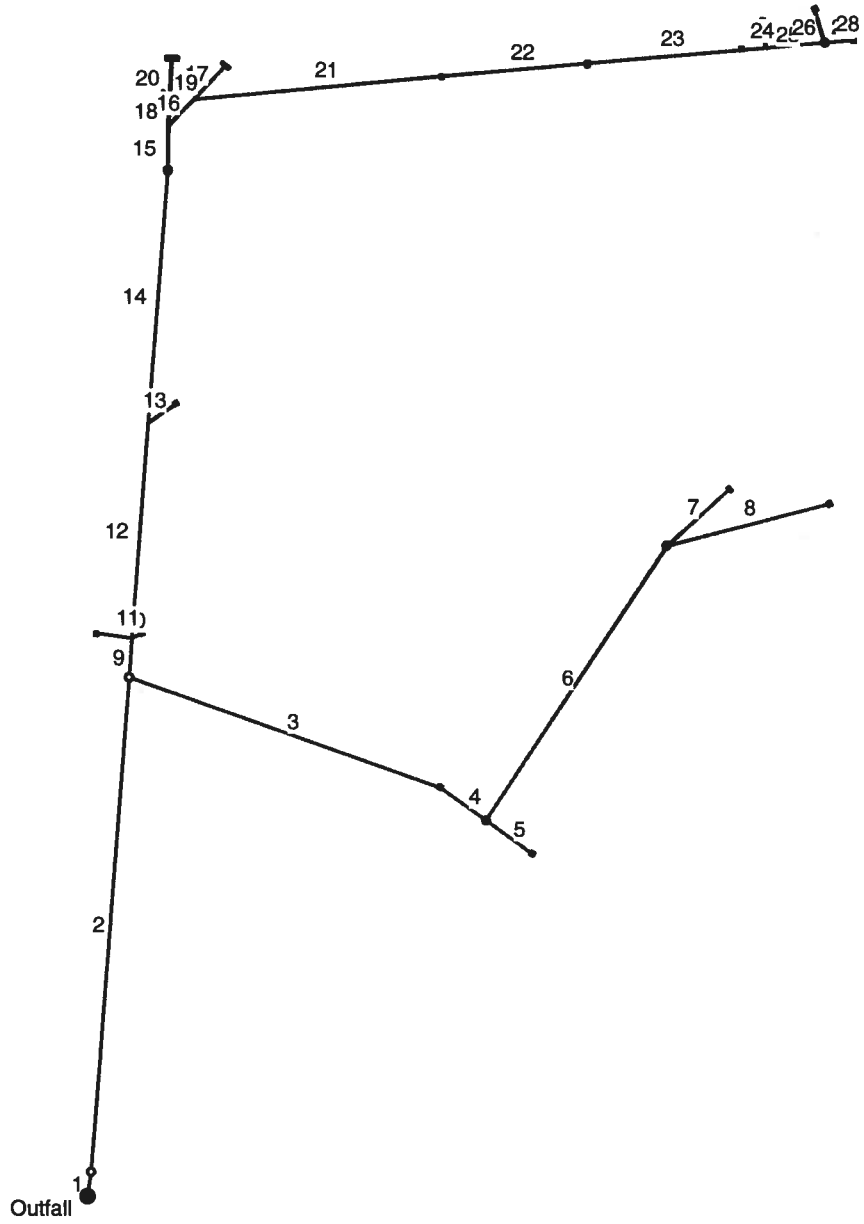
Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	51.09	38.81	17.76	72.14	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.53	26.70	0.53	26.70	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	51.09	0.00	12.28	38.81	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.43	21.60	0.43	21.60	0.0	25
28	CB#15	2.00	0.00	2.00	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.000	0.22	8.00	0.22	8.00	0.0	Off

Project File: Scenario 2.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Appendix J
Hydraflow Storm Sewer Inlet Calculations – Scenario 3

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Scenario 3.stm	Number of lines: 28	Date: 04-01-2010

Hydraflow Storm Sewers Extension v6.052

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb inlet		Grate inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	1.81	0.00	1.81	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.21	10.50	0.21	10.50	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	1.88	0.00	1.88	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	2.72	0.00	2.72	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.27	13.50	0.27	13.50	0.0	Off
8	CB#4	1.50	0.00	1.50	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.19	9.50	0.19	9.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	14.24	0.00	14.24	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.82	41.00	0.82	41.00	0.0	Off
11	CB#6	2.75	0.00	2.75	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.28	14.00	0.28	14.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
13	CB#7	1.55	0.00	1.55	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.19	9.50	0.19	9.50	0.0	Off
14	SDMH#3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
16	BC	0.00	33.95	0.00	33.95	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	CB#10	24.31	0.00	8.74	15.56	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.33	16.35	0.33	16.35	0.0	16
18	BC	0.00	13.63	0.00	13.63	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
19	CB#8	1.96	0.00	1.96	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
20	CB#9	24.31	0.00	10.68	13.63	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.33	16.35	0.33	16.35	0.0	18
21	CB#11	0.44	24.75	6.81	18.38	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.41	20.75	0.41	20.75	0.0	16
22	CB#12	0.31	37.88	13.43	24.75	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.71	35.40	0.71	35.40	0.0	21
23	CB#13	0.06	49.29	11.46	37.88	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.78	38.95	0.78	38.95	0.0	22

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
25	CB#14	36.68	26.79	14.17	49.29	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.47	23.45	0.47	23.45	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	36.68	0.00	9.89	26.79	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.38	19.10	0.38	19.10	0.0	25
28	CB#15	1.47	0.00	1.47	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.000	0.18	6.00	0.18	6.00	0.0	Off

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.02	0.00	2.02	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.09	0.00	2.09	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.03	0.00	3.03	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.29	14.50	0.29	14.50	0.0	Off
8	CB#4	1.67	0.00	1.67	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.20	10.00	0.20	10.00	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	15.87	0.00	15.87	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.88	44.00	0.88	44.00	0.0	Off
11	CB#6	3.06	0.00	3.06	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.30	15.00	0.30	15.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
13	CB#7	1.73	0.00	1.73	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.20	10.00	0.20	10.00	0.0	Off
14	SDMH#3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
16	BC	0.00	42.62	0.00	42.62	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	CB#10	28.48	0.00	9.73	18.74	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.35	17.35	0.35	17.35	0.0	16
18	BC	0.00	16.54	0.00	16.54	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
19	CB#8	2.27	0.00	2.27	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.24	12.00	0.24	12.00	0.0	Off
20	CB#9	28.48	0.00	11.94	16.54	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.35	17.35	0.35	17.35	0.0	18
21	CB#11	0.49	31.36	7.98	23.87	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.45	22.70	0.45	22.70	0.0	16
22	CB#12	0.34	46.41	15.39	31.36	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.76	38.15	0.76	38.15	0.0	21
23	CB#13	0.06	59.24	12.89	46.41	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.83	41.70	0.83	41.70	0.0	22

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
25	CB#14	42.99	32.03	15.79	59.24	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.50	24.95	0.50	24.95	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	42.99	0.00	10.96	32.03	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.40	20.25	0.40	20.25	0.0	25
28	CB#15	1.64	0.00	1.64	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.000	0.20	7.00	0.20	7.00	0.0	Off

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.26	0.00	2.26	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.24	12.00	0.24	12.00	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.34	0.00	2.34	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.25	12.50	0.25	12.50	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.39	0.00	3.39	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.32	16.00	0.32	16.00	0.0	Off
8	CB#4	1.87	0.00	1.87	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.21	10.50	0.21	10.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	17.75	0.00	17.75	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.94	47.00	0.94	47.00	0.0	Off
11	CB#6	3.42	0.00	3.42	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.32	16.00	0.32	16.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
13	CB#7	1.94	0.00	1.94	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
14	SDMH#3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
16	BC	0.00	47.54	0.00	47.54	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	CB#10	30.76	0.00	10.24	20.52	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.36	17.85	0.36	17.85	0.0	16
18	BC	0.00	18.17	0.00	18.17	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
19	CB#8	2.47	0.00	2.47	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
20	CB#9	30.76	0.00	12.58	18.17	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.36	17.85	0.36	17.85	0.0	18
21	CB#11	0.55	35.04	8.57	27.03	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.47	23.65	0.47	23.65	0.0	16
22	CB#12	0.38	51.14	16.47	35.04	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.79	39.60	0.79	39.60	0.0	21
23	CB#13	0.07	64.71	13.64	51.14	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.86	43.10	0.86	43.10	0.0	22

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
25	CB#14	46.43	34.89	16.62	64.71	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.51	25.70	0.51	25.70	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	46.43	0.00	11.54	34.89	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.42	20.85	0.42	20.85	0.0	25
28	CB#15	1.83	0.00	1.83	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.000	0.21	7.50	0.21	7.50	0.0	Off

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.46	0.00	2.46	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.55	0.00	2.55	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.69	0.00	3.69	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.33	16.50	0.33	16.50	0.0	Off
8	CB#4	2.03	0.00	2.03	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	19.34	0.00	19.34	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	1.00	50.00	1.00	50.00	0.0	Off
11	CB#6	3.73	0.00	3.73	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.34	17.00	0.34	17.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
13	CB#7	2.11	0.00	2.11	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
14	SDMH#3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
16	BC	0.00	54.33	0.00	54.33	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	CB#10	33.83	0.00	10.92	22.91	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.37	18.50	0.37	18.50	0.0	16
18	BC	0.00	20.38	0.00	20.38	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
19	CB#8	2.70	0.00	2.70	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.27	13.50	0.27	13.50	0.0	Off
20	CB#9	33.83	0.00	13.44	20.38	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.37	18.50	0.37	18.50	0.0	18
21	CB#11	0.60	40.20	9.38	31.42	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.50	24.90	0.50	24.90	0.0	16
22	CB#12	0.41	57.58	17.80	40.20	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.83	41.35	0.83	41.35	0.0	21
23	CB#13	0.08	72.14	14.63	57.58	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.90	44.90	0.90	44.90	0.0	22

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

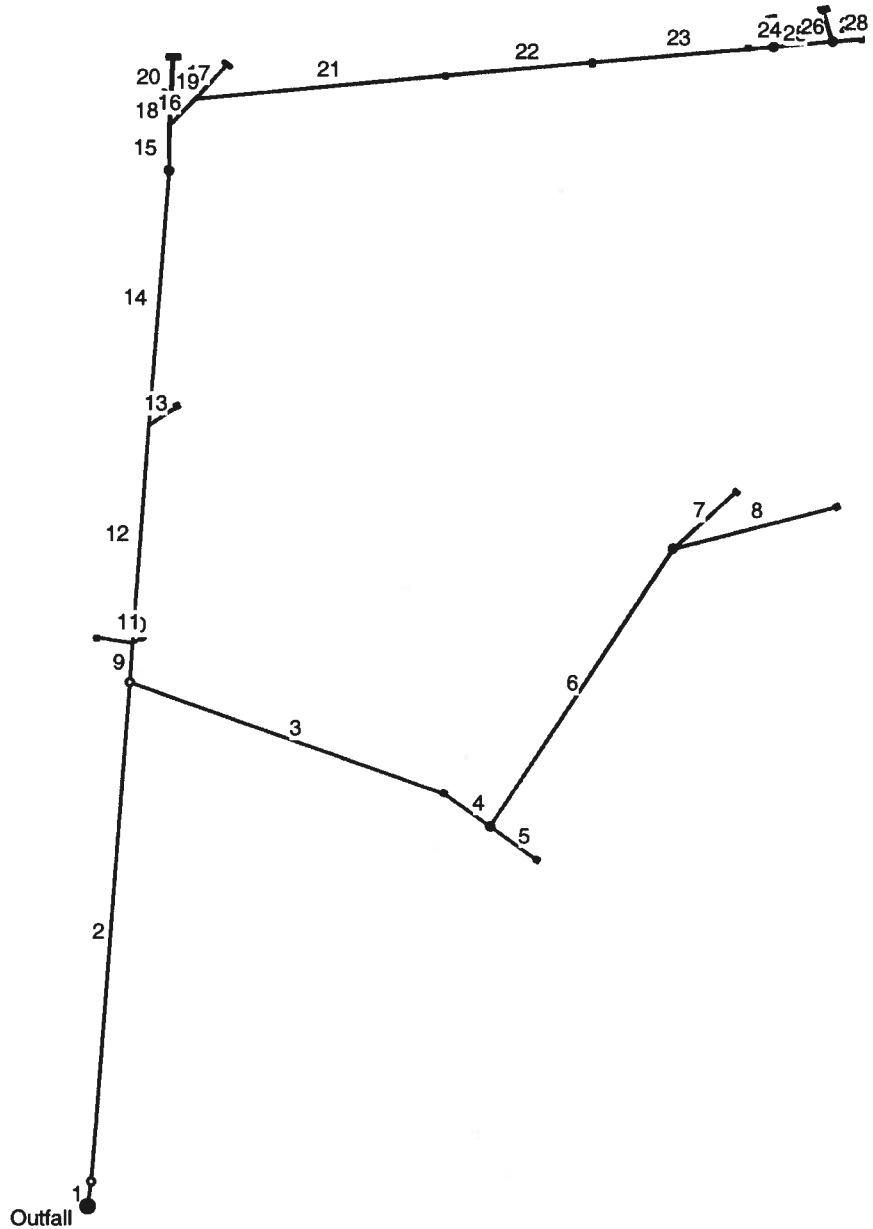
Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (In)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
25	CB#14	51.09	38.81	17.76	72.14	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.53	26.70	0.53	26.70	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	51.09	0.00	12.28	38.81	Comb	5.0	2.50	0.00	2.50	2.00	0.050	2.00	0.020	0.020	0.013	0.43	21.60	0.43	21.60	0.0	25
28	CB#15	2.00	0.00	2.00	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.000	0.22	8.00	0.22	8.00	0.0	Off

Project File: Scenario 3.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Appendix K
Hydraflow Storm Sewer Inlet Calculations – Scenario 4

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Scenario 4.stm	Number of lines: 28	Date: 04-02-2010

Hydraflow Storm Sewers Extension v6.052

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	1.81	0.00	1.81	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.21	10.50	0.21	10.50	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	1.88	0.00	1.88	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	2.72	0.00	2.72	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.27	13.50	0.27	13.50	0.0	Off
8	CB#4	1.50	0.00	1.50	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.19	9.50	0.19	9.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	14.24	0.00	14.24	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.82	41.00	0.82	41.00	0.0	Off
11	CB#6	2.75	0.00	2.75	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.28	14.00	0.28	14.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.55	0.00	1.55	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.19	9.50	0.19	9.50	0.0	Off
14	SDMH#3	0.00	45.58	0.00	45.58	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	45.58	0.00	45.58	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	31.95	0.00	31.95	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	24.31	0.00	8.74	15.56	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.33	16.35	0.33	16.35	0.0	16
18	BC	0.00	13.63	0.00	13.63	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	1.96	0.00	1.96	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
20	CB#9	24.31	0.00	10.68	13.63	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.33	16.35	0.33	16.35	0.0	18
21	CB#11	0.44	22.33	6.39	16.39	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.40	20.00	0.40	20.00	0.0	16
22	CB#12	0.31	34.67	12.64	22.33	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.68	34.25	0.68	34.25	0.0	21
23	CB#13	0.06	45.50	10.88	34.67	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.76	37.80	0.76	37.80	0.0	22

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	Future MH	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	36.68	25.12	16.30	45.50	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.46	23.20	0.46	23.20	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	36.68	0.00	11.56	25.12	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.38	19.10	0.38	19.10	0.0	25
28	CB#15	1.47	0.00	1.47	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.013	0.18	6.00	0.18	6.00	0.0	Off

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 6.28 / (Inlet time + 0.10) ^ 0.44; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.02	0.00	2.02	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.09	0.00	2.09	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.03	0.00	3.03	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.29	14.50	0.29	14.50	0.0	Off
8	CB#4	1.67	0.00	1.67	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.20	10.00	0.20	10.00	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	15.87	0.00	15.87	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.88	44.00	0.88	44.00	0.0	Off
11	CB#6	3.06	0.00	3.06	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.30	15.00	0.30	15.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.73	0.00	1.73	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.20	10.00	0.20	10.00	0.0	Off
14	SDMH#3	0.00	56.83	0.00	56.83	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	56.83	0.00	56.83	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	40.29	0.00	40.29	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	28.48	0.00	9.73	18.74	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.35	17.35	0.35	17.35	0.0	16
18	BC	0.00	16.54	0.00	16.54	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.27	0.00	2.27	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.24	12.00	0.24	12.00	0.0	Off
20	CB#9	28.48	0.00	11.94	16.54	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.35	17.35	0.35	17.35	0.0	18
21	CB#11	0.49	28.54	7.49	21.54	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.44	21.90	0.44	21.90	0.0	16
22	CB#12	0.34	42.76	14.56	28.54	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.74	37.00	0.74	37.00	0.0	21
23	CB#13	0.06	54.98	12.28	42.76	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.81	40.55	0.81	40.55	0.0	22

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	Future MH	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	42.99	30.17	18.18	54.98	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.49	24.70	0.49	24.70	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	42.99	0.00	12.82	30.17	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.40	20.25	0.40	20.25	0.0	25
28	CB#15	1.64	0.00	1.64	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.013	0.20	7.00	0.20	7.00	0.0	Off

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.08 / (Inlet time + 1.50) ^ 0.46; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.26	0.00	2.26	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.24	12.00	0.24	12.00	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.34	0.00	2.34	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.25	12.50	0.25	12.50	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.39	0.00	3.39	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.32	16.00	0.32	16.00	0.0	Off
8	CB#4	1.87	0.00	1.87	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.21	10.50	0.21	10.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	17.75	0.00	17.75	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.94	47.00	0.94	47.00	0.0	Off
11	CB#6	3.42	0.00	3.42	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.32	16.00	0.32	16.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	1.94	0.00	1.94	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
14	SDMH#3	0.00	63.19	0.00	63.19	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	63.19	0.00	63.19	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	45.02	0.00	45.02	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	30.76	0.00	10.24	20.52	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.36	17.85	0.36	17.85	0.0	16
18	BC	0.00	18.17	0.00	18.17	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.47	0.00	2.47	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
20	CB#9	30.76	0.00	12.58	18.17	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.36	17.85	0.36	17.85	0.0	18
21	CB#11	0.55	32.02	8.07	24.50	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.46	22.85	0.46	22.85	0.0	16
22	CB#12	0.38	47.26	15.62	32.02	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.77	38.45	0.77	38.45	0.0	21
23	CB#13	0.07	60.21	13.02	47.26	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.84	41.95	0.84	41.95	0.0	22

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	Future MH	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	46.43	32.93	19.16	60.21	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.51	25.45	0.51	25.45	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	46.43	0.00	13.51	32.93	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.42	20.85	0.42	20.85	0.0	25
28	CB#15	1.83	0.00	1.83	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.013	0.21	7.50	0.21	7.50	0.0	Off

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 7.67 / (Inlet time + 0.10) ^ 0.42; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SDMH#1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	SDMH#2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB#1	2.46	0.00	2.46	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
4	SDMH#5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	CB#2	2.55	0.00	2.55	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.26	13.00	0.26	13.00	0.0	Off
6	SDMH#6	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	CB#3	3.69	0.00	3.69	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.33	16.50	0.33	16.50	0.0	Off
8	CB#4	2.03	0.00	2.03	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
9	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB#5	19.34	0.00	19.34	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	1.00	50.00	1.00	50.00	0.0	Off
11	CB#6	3.73	0.00	3.73	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.34	17.00	0.34	17.00	0.0	Off
12	BC	0.00	0.00	0.00	0.00	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
13	CB#7	2.11	0.00	2.11	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.23	11.50	0.23	11.50	0.0	Off
14	SDMH#3	0.00	71.88	0.00	71.88	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	BC	0.00	71.88	0.00	71.88	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	14
16	BC	0.00	51.49	0.00	51.49	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
17	CB#10	33.83	0.00	10.92	22.91	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.37	18.50	0.37	18.50	0.0	16
18	BC	0.00	20.38	0.00	20.38	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	15
19	CB#8	2.70	0.00	2.70	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.020	0.020	0.000	0.27	13.50	0.27	13.50	0.0	Off
20	CB#9	33.83	0.00	13.44	20.38	Comb	5.0	7.50	0.00	7.50	2.00	0.050	2.00	0.020	0.020	0.013	0.37	18.50	0.37	18.50	0.0	18
21	CB#11	0.60	36.84	8.86	28.59	Comb	5.0	2.50	0.00	2.50	2.00	0.015	2.00	0.020	0.020	0.013	0.48	24.10	0.48	24.10	0.0	16
22	CB#12	0.41	53.39	16.97	36.84	Comb	5.0	3.50	0.00	3.50	2.00	0.002	2.00	0.020	0.020	0.013	0.80	40.25	0.80	40.25	0.0	21
23	CB#13	0.08	67.31	14.00	53.39	Comb	5.0	2.50	0.00	2.50	2.00	0.002	2.00	0.020	0.020	0.013	0.87	43.75	0.87	43.75	0.0	22

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	Future MH	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	23
25	CB#14	51.09	36.71	20.49	67.31	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.53	26.45	0.53	26.45	0.0	23
26	SDMH#4	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
27	CB#16	51.09	0.00	14.37	36.71	Comb	5.0	5.00	0.00	5.00	2.00	0.050	2.00	0.020	0.020	0.013	0.43	21.60	0.43	21.60	0.0	25
28	CB#15	2.00	0.00	2.00	0.00	Comb	5.0	2.50	5.00	2.50	2.00	Sag	2.00	0.050	0.020	0.013	0.22	8.00	0.22	8.00	0.0	Off

Project File: Scenario 4.stm | Number of lines: 28 | Run Date: 04-02-2010

NOTES: Inlet N-Values = 0.014 ; Intensity = 8.24 / (Inlet time + 0.10) ^ 0.42; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Appendix L
Field Notes

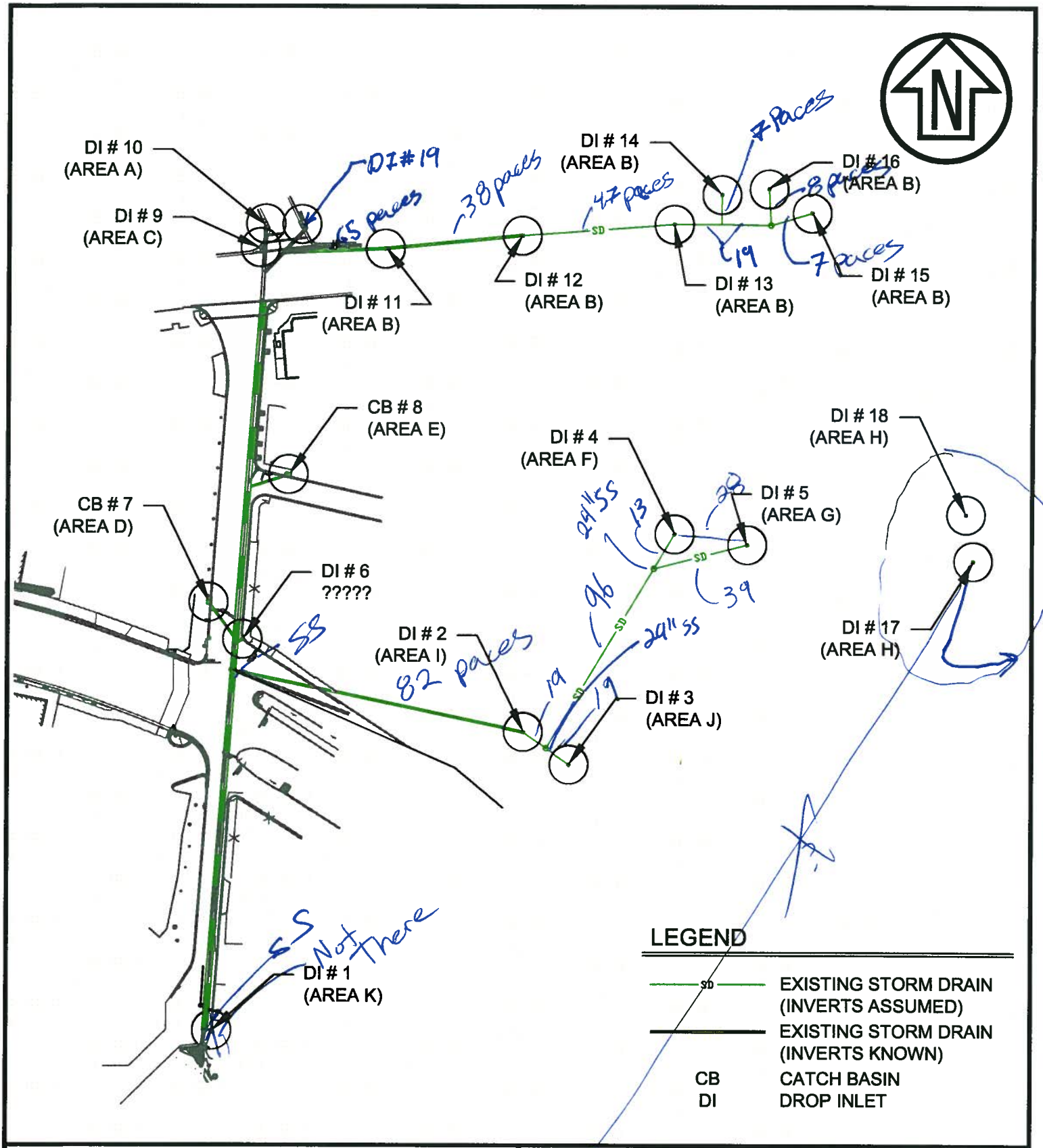
Pastori Storm Drain Outfall
(Town of Fairfax)
Job No. 4.1086.14
Date: 03/23/2010
By: Julia Harberson
Weather: Sunny

Field Observations

Inlet Number	Invert (in below grate)	On Sag or Grade?	Grate Size (ftxft)	Pipe Size (in)	Pipe Material	Notes/ Comments
#1						
#2	38	S	2.5x2	18	Green PVC	
#3	27	S	2.5x2	18	Green PVC	Size hard to tell
#4	19	S	2.5x2	12	" "	
#5	22	S	2.5x2	12	" "	12" coming in (think abandoned)
#6		S	2.5x2			
#7		S	2.5x2			
#8		slight sag	2x2.5	18		cobbles
#9					VCP	
#10					VCP	
#11	29	G	2x2.5	18	VCP	
#12	26	G	3.5x2	18	VCP	small amount water
#13	~~17~~ 24	slight sag	2.5x2	18	VCP	DI fill ~~dirt~~ water
#14	~~24~~ 17	G	2.5x2	~~18~~ ?	VCP	DI fill dirt
Clogs → #15	23	slight sag	2.5x2	18	VCP	DI fill water
~~Clogs~~ shelf past → #16	25	G	2.5x2	12	white PVC?	
#17	Sump	discharges	" into	12 pastori/bell	PVC @ 43 Belle Ave. ↳ Belle → pastori	(not part of watershed)
#18						

Additional Comments:
#19 VCP

Assume ~~topo~~ overflow @ Kent (@ Tak & Feed (observer) liquorestore)



CSW | ST2	Rev. -	Date: 03/22/2010
	Job No. 4.1086.14	Scale: 1"=100'

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45 Leveroni Court
Novato, CA 94949
tel: 415.883.9850
fax: 415.883.9835

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PASTORI AVE STORM DRAIN OUTFALL

~~FIGURE 1~~

STORM DRAIN SYSTEM

FAIRFAX MARIN COUNTY CALIFORNIA

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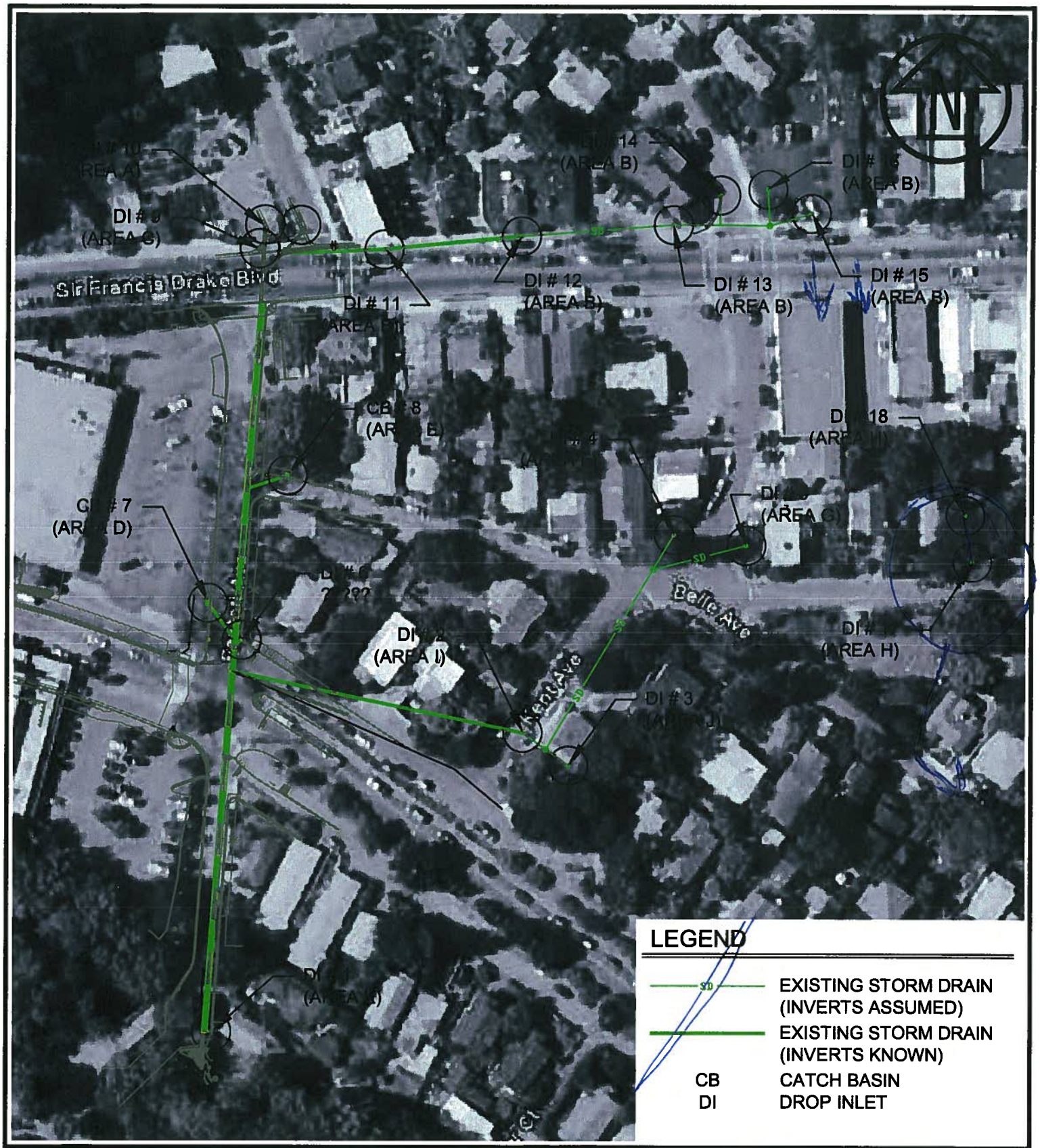

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	Job No. 4.1086.14	Scale: 1"=100'

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PASTORI AVE STORM DRAIN OUTFALL
FIGURE 1
STORM DRAIN SYSTEM

FAIRFAX MARIN COUNTY CALIFORNIA

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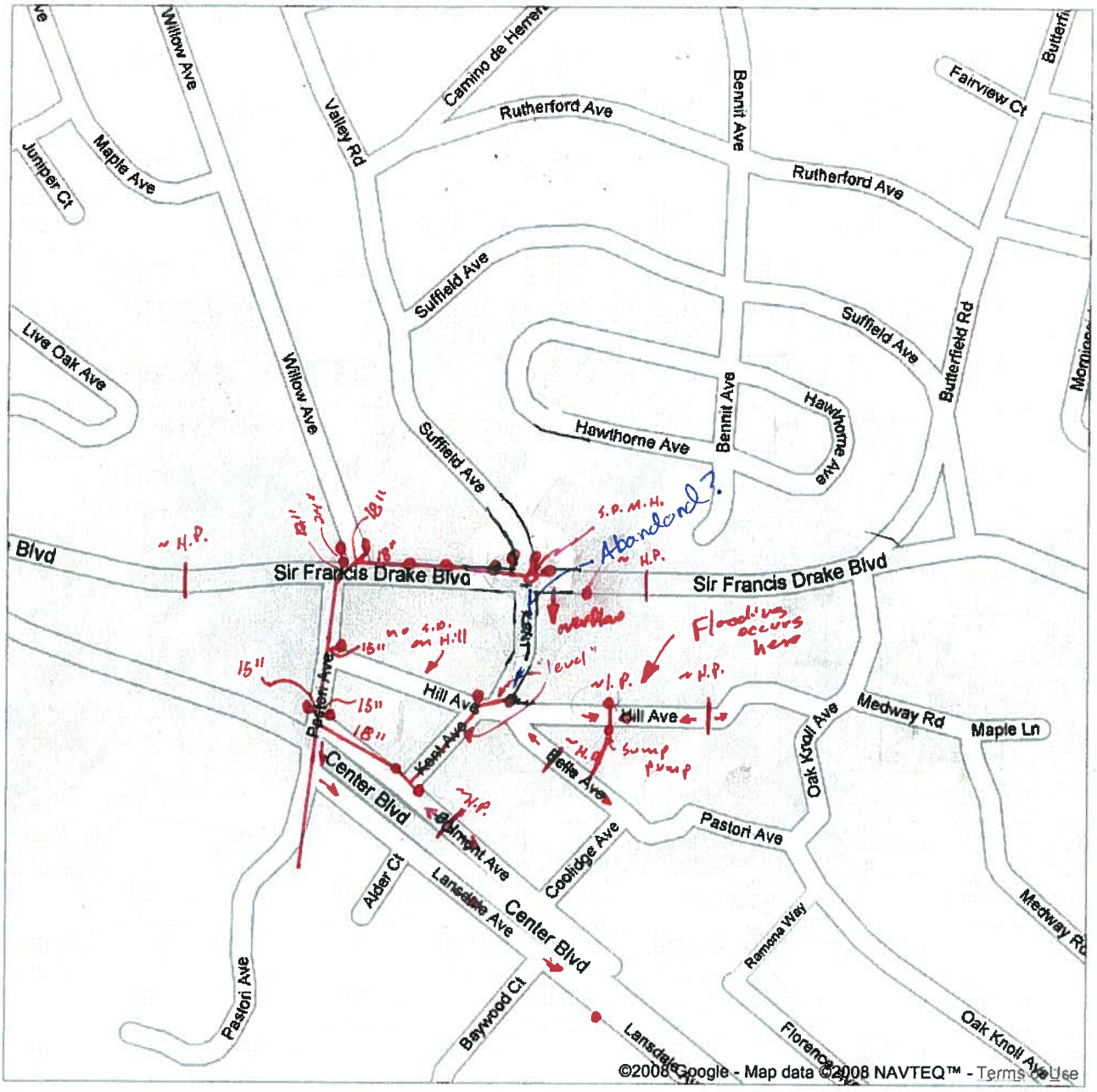
Google Maps

Get Google Maps on your phone
Text the word "GMAPS" to 466453



Pastori Storm Drain Outfall
(Town of Fairfax)
Job No. 4.1086.14
Date: 03/23/2010
By: Julia Harberson
Weather: Sunny

Field Visit Photographs		
Photo Number	**Description**	**Notes**
1	#13	
2	#14	
3	#16	
4	#15	
5	#12	
6	#11	
7	#19	
8	#10	
9	#9	
10	#8	
11	#7	
12	#6	
13	#2	
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PASTORI STORM DRAIN OUTFALL – SITE VISIT, MARCH 23, 2010

CB #13

CB #14

CB #16

CB #15

CB #12

CB #11

CB #19

CB #10

CB #9

CB #8

CB #7

CB #6

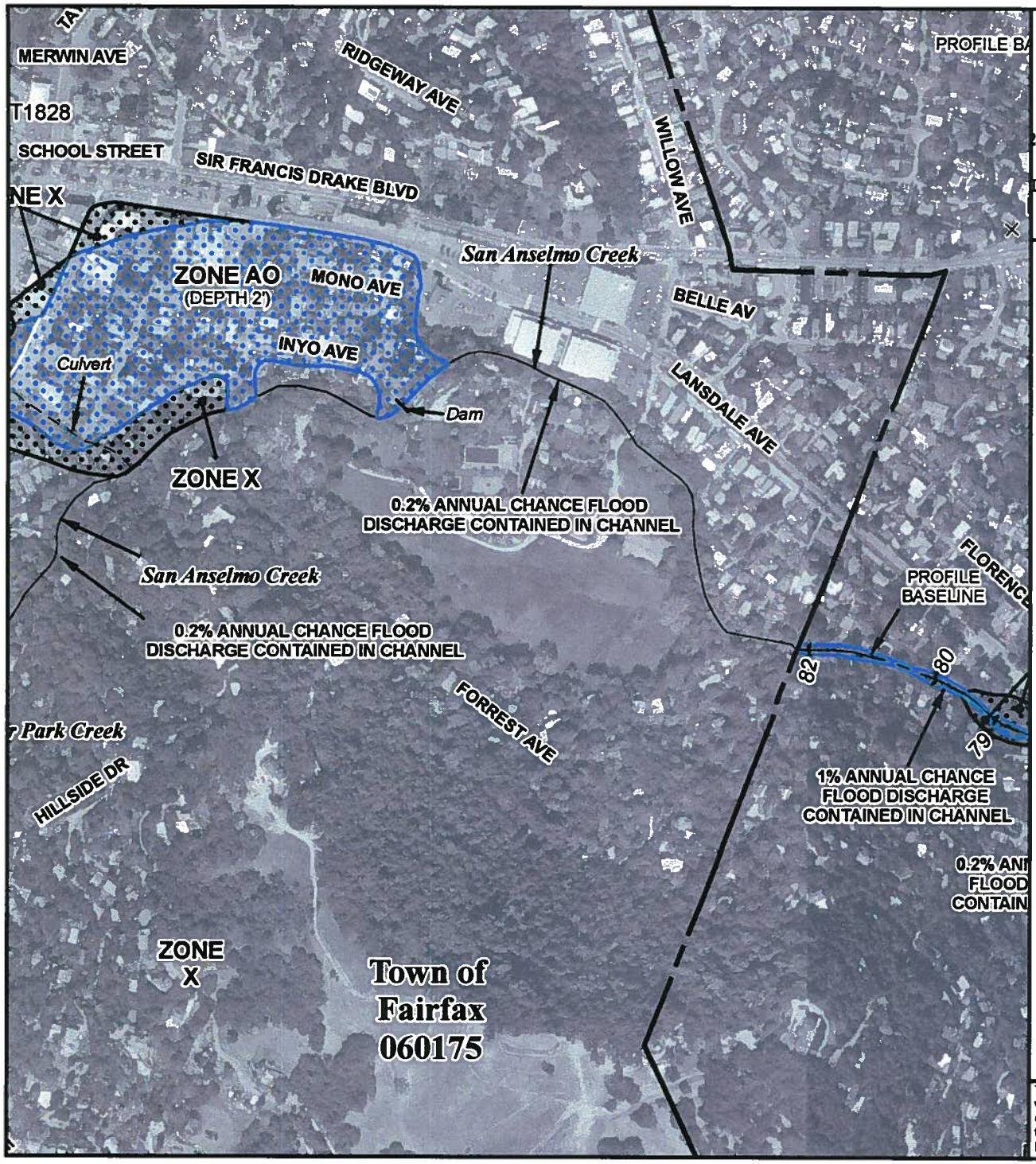
CB #2

CB #3

CB #4

CB #5

Appendix M
FEMA Map



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0452D

FIRM

FLOOD INSURANCE RATE MAP

MARIN COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 452 OF 531

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FAIRFAX, TOWN OF	060175	0452	D
MARIN COUNTY	060173	0452	D
ROSS, TOWN OF	060179	0452	D
SAN ANSELMO, CITY OF	060180	0452	D
SAN RAFAEL, CITY OF	065058	0452	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06041C0452D

EFFECTIVE DATE
MAY 4, 2009

Federal Emergency Management Agency

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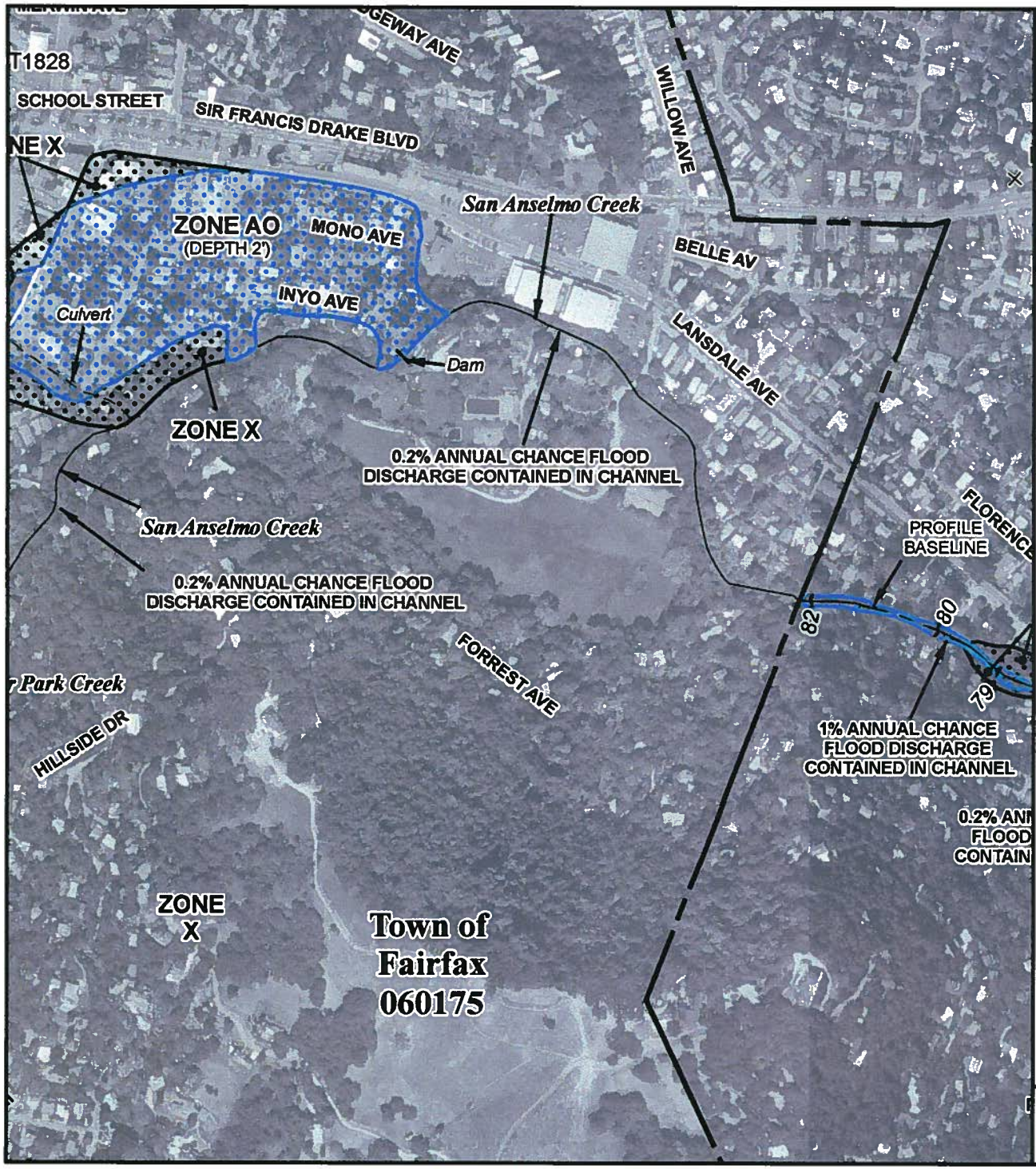

MAP SCALE 1" = 500'

50 0 500 1000 FEET

METER

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

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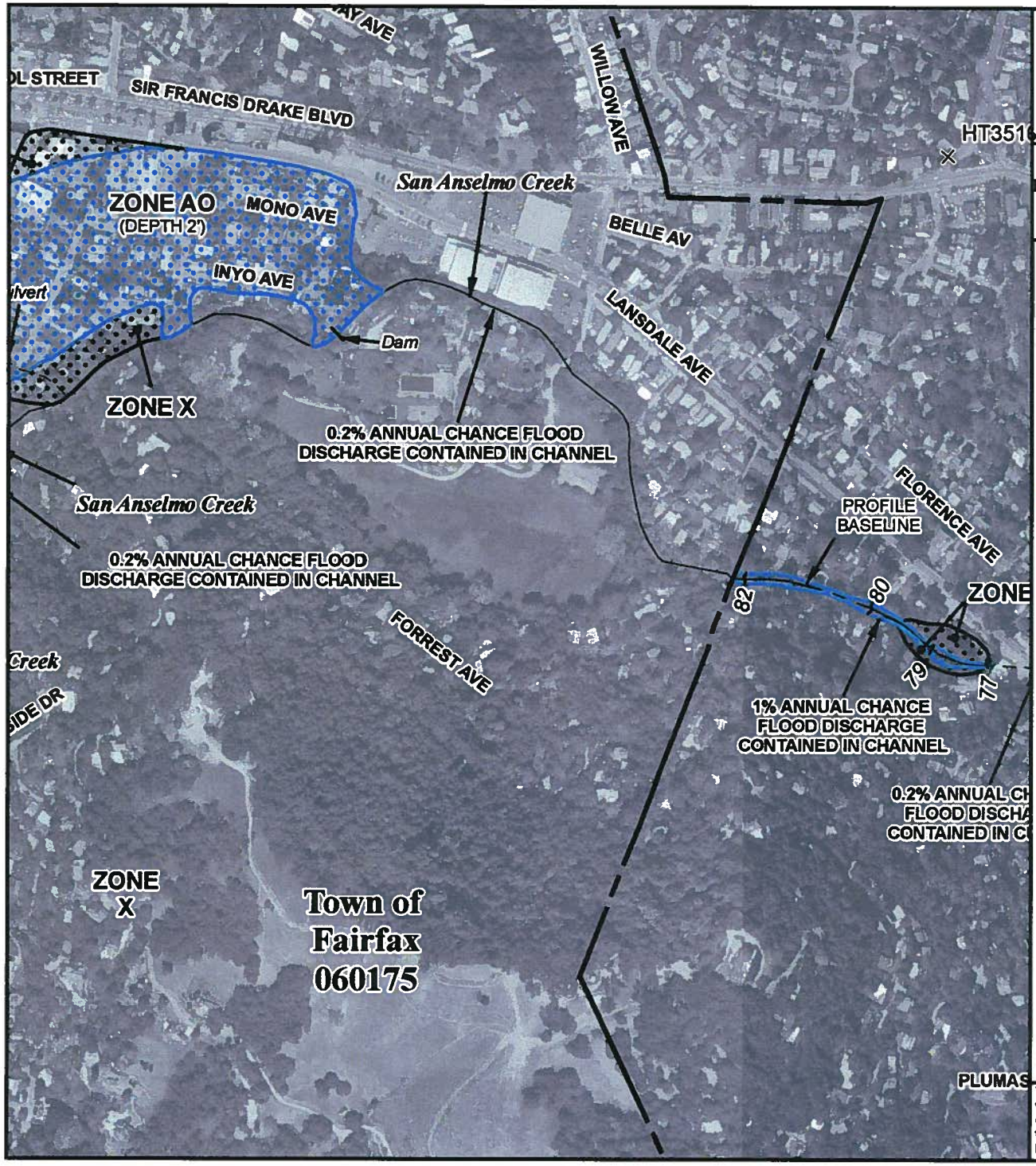

MAP SCALE 1" = 500'

50 0 500 1000 FEET

METER

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4076000mN	1000-meter Universal Transverse Mercator grid values, zone 10
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone III (FIPSZONE 0403), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
May 4, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

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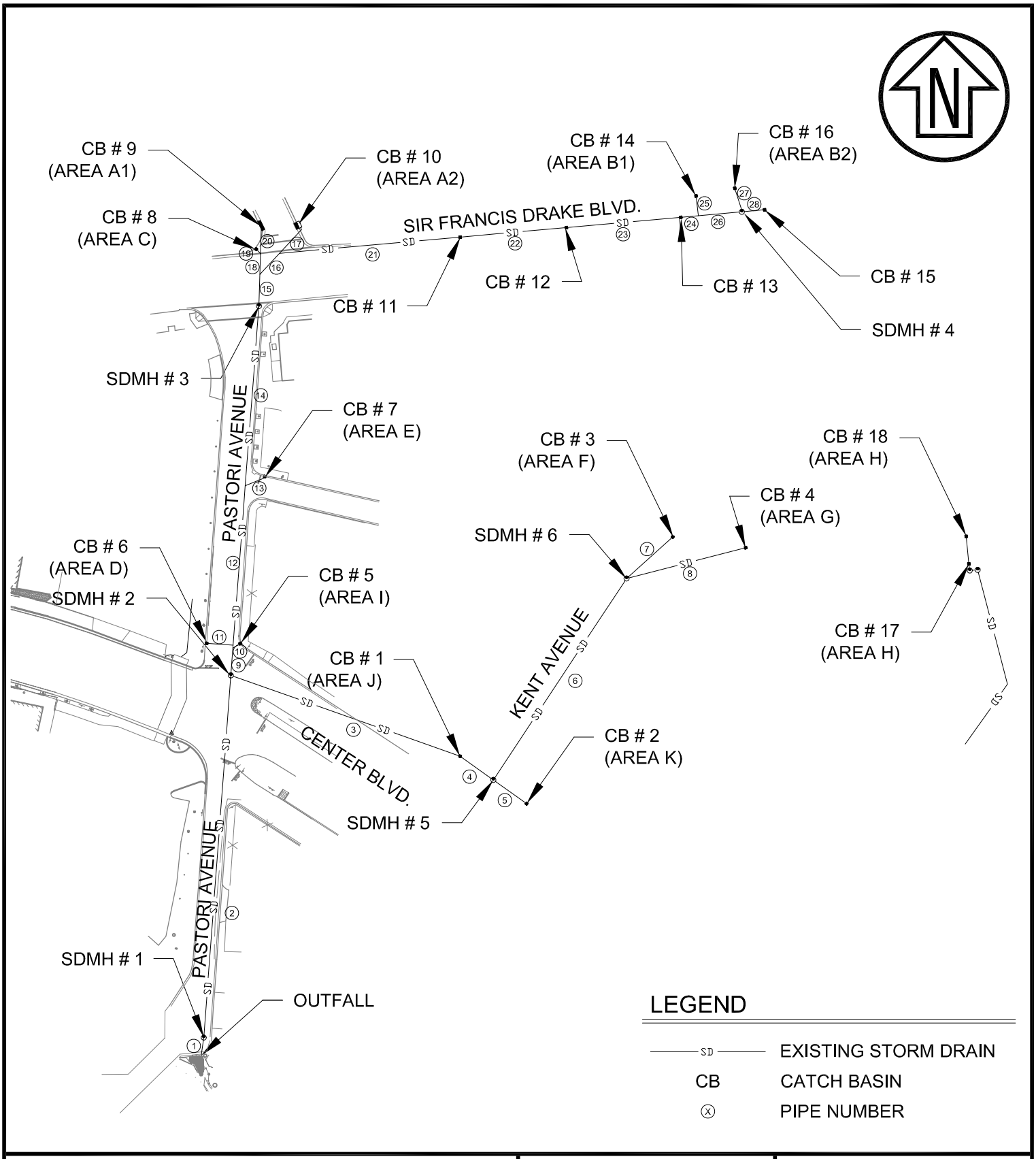
Figures



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PASTORI AVE STORM DRAIN OUTFALL
FIGURE 1
STORM DRAIN SYSTEM

FAIRFAX MARIN COUNTY CALIFORNIA

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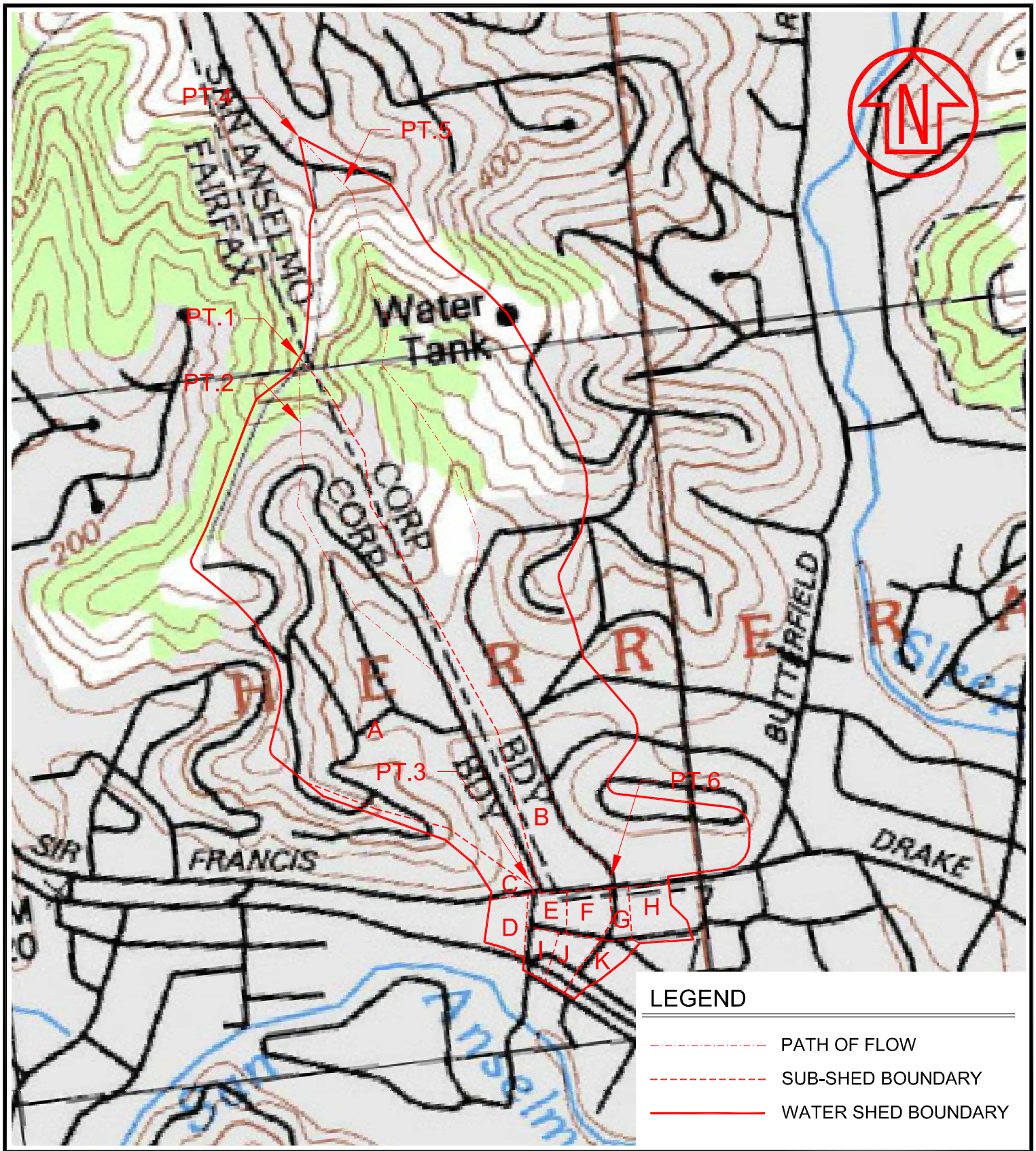

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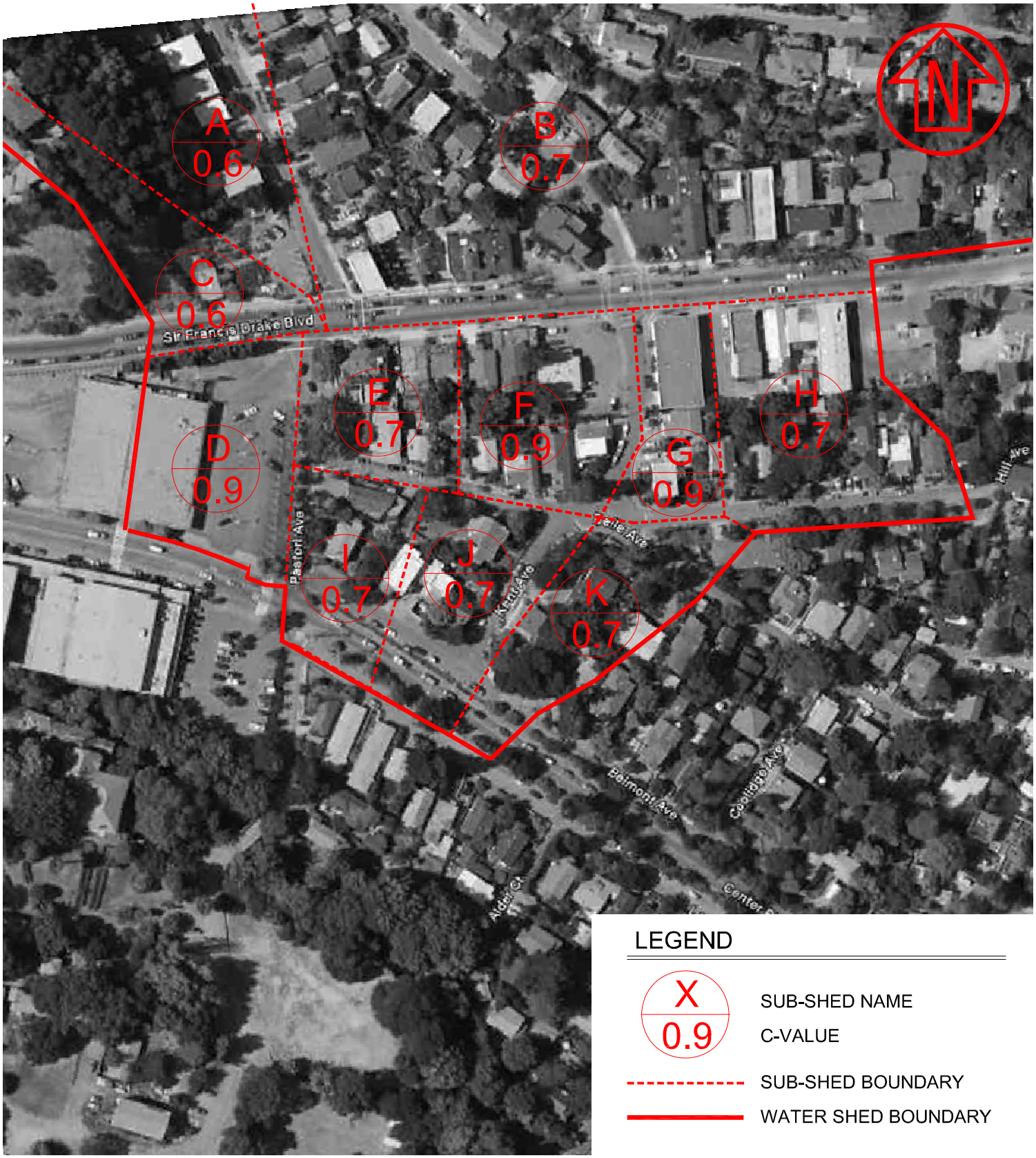
Job No. 4.1086.14	Scale: 1"=600'

PASTORI AVE STORM DRAIN OUTFALL
FIGURE 2
WATERSHED MAP

FAIRFAX MARIN COUNTY CALIFORNIA

N:\CIVIL\4\4108614\dwg\Exhibit\Quad Map.dwg, 4/09/2010 - 09:39 AM, harja, 1:1



LEGEND

X / 0.9 — SUB-SHED NAME / C-VALUE

SUB-SHED BOUNDARY

WATER SHED BOUNDARY

CSW | ST2

CSW/Stuber-Stroeh Engineering Group, Inc.
45 Leveroni Court
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Rev. -	Date: 03/22/2010
Job No. 4.1086.14	Scale: 1"=150'

PASTORI AVE STORM DRAIN OUTFALL
FIGURE 3
RUNOFF COEFFICIENT MAP

FAIRFAX MARIN COUNTY CALIFORNIA

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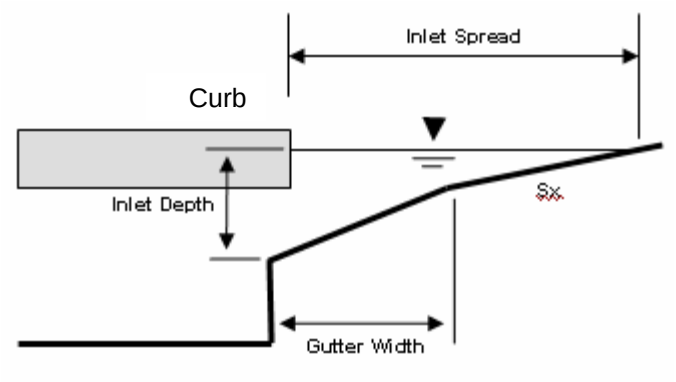

Inlet Spread & Depth

(Diagram from Hydraflow Storm Sewers Extension for Civil 3D 2008)

Figure 4 – Inlet Schematic