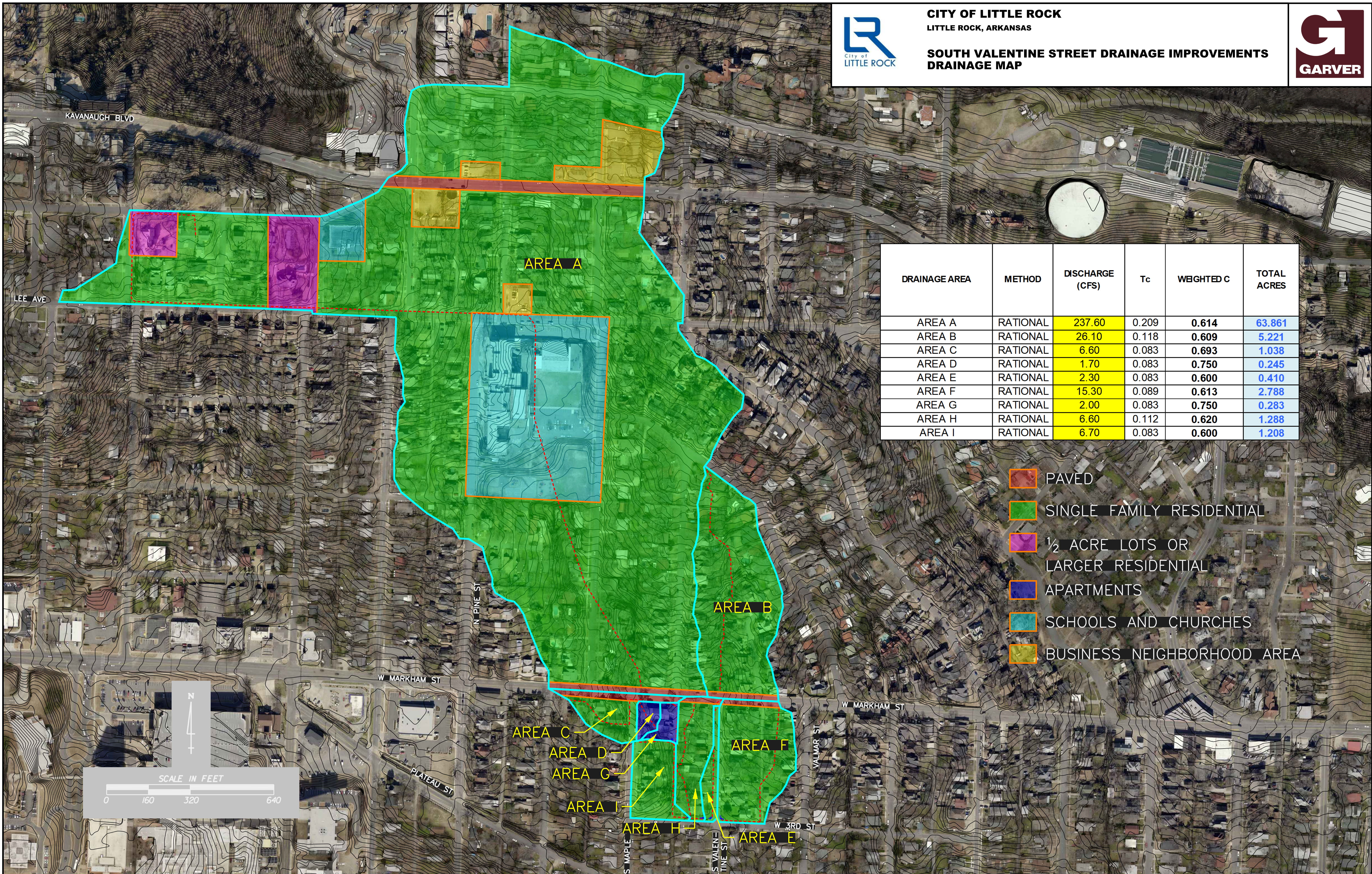**CITY OF LITTLE ROCK**
LITTLE ROCK, ARKANSAS

SOUTH VALENTINE STREET DRAINAGE IMPROVEMENTS
DRAINAGE MAP

GARVER

DRAINAGE AREA	METHOD	DISCHARGE (CFS)	Tc	WEIGHTED C	TOTAL ACRES
AREA A	RATIONAL	237.60	0.209	0.614	63.861
AREA B	RATIONAL	26.10	0.118	0.609	5.221
AREA C	RATIONAL	6.60	0.083	0.693	1.038
AREA D	RATIONAL	1.70	0.083	0.750	0.245
AREA E	RATIONAL	2.30	0.083	0.600	0.410
AREA F	RATIONAL	15.30	0.089	0.613	2.788
AREA G	RATIONAL	2.00	0.083	0.750	0.283
AREA H	RATIONAL	6.60	0.112	0.620	1.288
AREA I	RATIONAL	6.70	0.083	0.600	1.208

Legend:
- PAVED
- SINGLE FAMILY RESIDENTIAL
- ½ ACRE LOTS OR LARGER RESIDENTIAL
- APARTMENTS
- SCHOOLS AND CHURCHES
- BUSINESS NEIGHBORHOOD AREA

AREA A
AREA B
AREA C
AREA D
AREA G
AREA I
AREA H
AREA E
AREA F

KAVANAUGH BLVD
LEE AVE
W. MARKHAM ST
W. MARKHAM ST
PLATEAU ST
W. 3RD ST
N PINE ST
S MAPLE
S VALENTINE ST
VILMAR ST

SCALE IN FEET
0   160   320   640

Project	S. Valentine Street Drainage Improvements	Sheet No. 1 of 1
Job No.	03-15-DR-95	Made By MJM Date 4.24.2019
Subject	Discharge Summary	Chkd. By RCC Date 5.1.2019
Path	\\garverinc.local\gdata\Projects\2018\18017040 - LR - Street and Drainage Projects\Design\VALENTINE ST\Calculations\H&H\[RationalMethodDischarge_Valentine Street.xlsm]SUMMARY	

- 10 YR. Design Storm
- 25 YR. Design Storm
- 50 YR. Design Storm
- 100 YR. Design Storm

DRAINAGE AREA	METHOD	DISCHARGE (CFS)	Tc	WEIGHTED C	TOTAL ACRES	LENGTH OF WATERSHED	BEGIN ELEV. (ON PATH)	END ELEV. (ON PATH)	AVERAGE SLOPE	SINGLE FAMILY RESIDENTIAL (ACRES)	% SINGLE FAMILY RESIDENTIAL	SINGLE FAMILY RESIDENTIAL C	1/2 ACRE LOTS OR LARGER RESIDENTIAL (ACRES)	% 1/2 ACRE LOTS OR LARGER RESIDENTIAL	1/2 ACRE LOTS OR LARGER RESIDENTIAL C	SCHOOLS AND CHRUCHES (ACRES)	% SCHOOLS AND CHURCHES	SCHOOLS AND CHURCHES C	PAVED (ACRES)	% PAVED	PAVED C	BUSINESS NEIGHBORHOOD AREA (ACRES)	% BUSINESS NEIGHBORHOOD AREA	BUSINESS NEIGHBORHOOD AREA C	APARTMENTS (ACRES)	% APARTMENTS	APARTMENTS C	Weighted Mannings Coeffecient
AREA A	RATIONAL	237.60	0.209	0.614	63.861	3676.7	494.0	355.0	3.8%	48.41	75.8%	0.60	2.33	3.6%	0.45	9.29	14.5%	0.65	1.32	2.1%	0.92	2.51	3.9%	0.75		0.0%	0.75	0.013
AREA B	RATIONAL	26.10	0.118	0.609	5.221	936.0	426.0	355.0	7.6%	5.08	97.2%	0.60		0.0%	0.45		0.0%	0.65	0.15	2.8%	0.92		0.0%	0.75		0.0%	0.75	0.035
AREA C	RATIONAL	6.60	0.083	0.693	1.038	409.8	372.5	354.0	4.5%	0.74	71.1%	0.60		0.0%	0.45		0.0%	0.65	0.30	28.9%	0.92		0.0%	0.75		0.0%	0.75	0.027
AREA D	RATIONAL	1.70	0.083	0.750	0.245	129.2	355.4	350.0	4.2%		0.0%	0.60		0.0%	0.45		0.0%	0.65		0.0%	0.92		0.0%	0.75	0.25	100.0%	0.75	0.035
AREA E	RATIONAL	2.30	0.083	0.600	0.410	439.6	357.0	340.4	3.8%	0.41	100.0%	0.60		0.0%	0.45		0.0%	0.65		0.0%	0.92		0.0%	0.75		0.0%	0.75	0.013
AREA F	RATIONAL	15.30	0.089	0.613	2.788	603.1	370.5	340.5	5.0%	2.67	95.9%	0.60		0.0%	0.45		0.0%	0.65	0.12	4.2%	0.92		0.0%	0.75		0.0%	0.75	0.029
AREA G	RATIONAL	2.00	0.083	0.750	0.283	178.6	354.0	348.3	3.2%		0.0%	0.60		0.0%	0.45		0.0%	0.65		0.0%	0.92		0.0%	0.75	0.28	100.0%	0.75	0.016
AREA H	RATIONAL	6.60	0.112	0.620	1.288	643.7	358.0	341.1	2.6%	1.21	93.8%	0.60		0.0%	0.45		0.0%	0.65	0.08	6.2%	0.92		0.0%	0.28		0.0%	0.75	0.028
AREA I	RATIONAL	6.70	0.083	0.600	1.208	469.4	363.0	341.9	4.5%	1.21	100.0%	0.60		0.0%	0.45		0.0%	0.65		0.0%	0.92		0.0%	0.28		0.0%	0.75	0.019

INLET SUMMARY (25-YEAR)

INLET DESCRIPTION	INLET AREA (ACRES)	INLET RUNOFF COEFFICIENT	INLET TIME OF CONC. (MIN)	TOP ELEV.	GUTTER ELEV.	INVERT	BOX SIZE (FT X FT)	HEIGHT (FT)	HYDRAULIC GRADE LINE	HGL BELOW GUTTER?	GUTTER FLOW (CFS)	GUTTER FLOW CAPTURED (CFS)	SPREAD (FT)	ALLOWABLE SPREAD	SPREAD BELOW ALLOWABLE?	DISCHARGE Q25 (CFS)	
AI-1	0.142	0.75	0.083	348.87	347.87	344.37	4'	4.50	347.46	Yes	1.33	1.33	N/A	N/A	N/A	1.33	
AI-2	0.142	0.75	0.083	349.32	348.32	346.16	4'	3.16	347.46	Yes	1.33	1.33	N/A	N/A	N/A	243.25	
CI-1	2.788	0.613	0.089	341.1	340.60	336.35	4'	4.75	341.09	No	15.49	15.49	18	12.50	No	15.49	NOTE 1,2
CI-2	0.41	0.6	0.083	340.76	340.26	338.78	4'	1.98	341.25	No	4.04	4.04	9.6	12.50	Yes	267.07	NOTE 1
CI-3	1.288	0.62	0.112	341.12	340.62	339.09	4'	2.03	341.12	No	8.09	6.48	14.1	12.50	No	246.16	NOTE 1,3
CI-4	1.208	0.6	0.083	341.68	341.18	339.62	4'	2.06	341.68	No	6.69	5.16	11.4	12.50	Yes	242.35	NOTE 1

NOTES:

1. The four proposed inlets are in close proximity to the tie in between the proposed 8' X 2.5' RCB and the existing 5' X 2.5' RCB. Due to the proximity, the headwater created from the existing box prevents the hydraulic grade line in these four proposed inlets from remaining below the gutter elevation during the 25 year storm.

2. This inlet does not meet allowable spread because it has reached its maximum size in a sag and adding additional inlets upstream is outside the focus of the proposed improvements.

3. This inlet does not meet allowable spread because CI-4 upstream of this inlet is at its maximum size and a large adjacent property inputs into the gutter just upstream of this inlet.
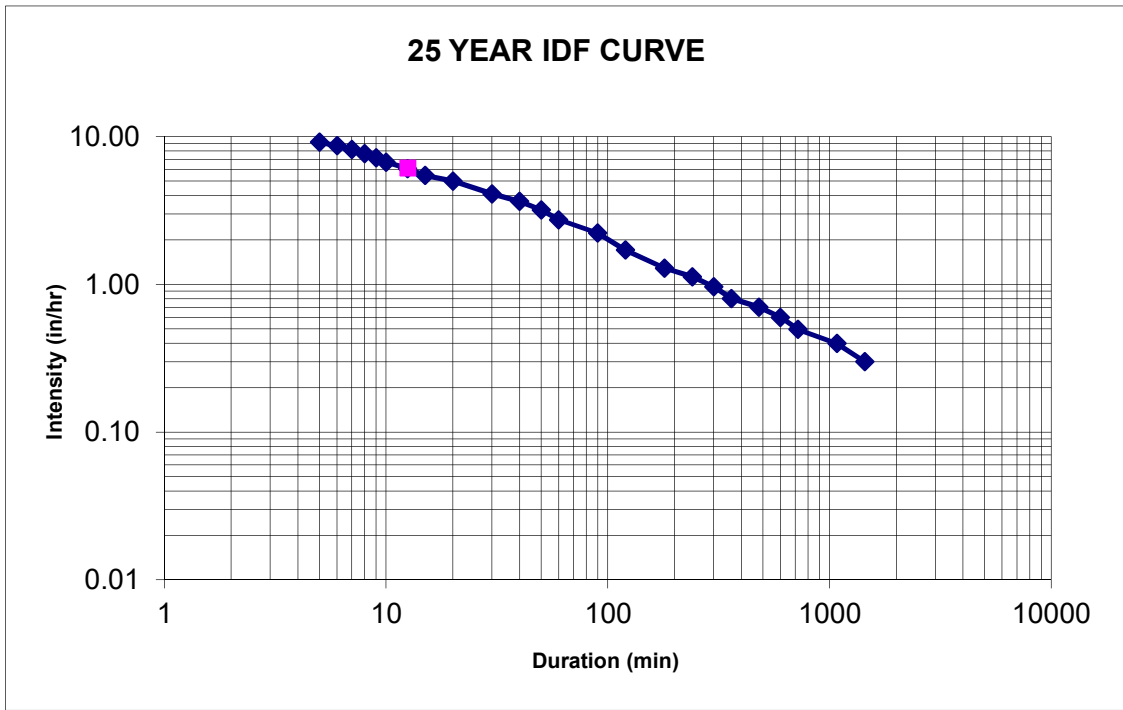
Area Description: **AREA A**

n =	0.013	(Manning's n)
L =	3676.703	(maximum length of runoff for the area (ft))
Δz =	139.00	(change in elevation along L(ft))
S =	0.038	(change in elevation along L divided by L)
C =	0.61	(runoff coeffecient)
A =	63.8605	(area of the watershed (Acres))
K =	56	(constant in the formula for Tc (56 for english units))
I =	6.1	(rainfall (inches per hour))
T_c(min) =	12.6	(time of concentration for the watershed)
T_c(hrs) =	0.21	

Q(cfs) = **237.6** ($C*I*A$)

25 YEAR IDF CURVE

NOTE: Blue numbers represent user input. Black numbers represent calculated values.

| Project | S. Valentine Street Drainage Improvements | Sheet No. | 1 | of | 1 |

| Job No. | 03-15-DR-95 | Made By | MJM | Date | 4.24.2019 |

| Subject | Q25 Rational Method Discharges (A<200 Acres) | Chkd. By | | Date | |

Path   \\garverinc.local\gdata\Projects\2018\18017040 - LR - Street and Drainage Projects\Design\VALENTINE ST\Calculations\H&H

Area Description: **AREA B**

n =	0.035	(Manning's n)
L =	936	(maximum length of runoff for the area (ft))
Δz =	71.00	(change in elevation along L(ft))
S =	0.076	(change in elevation along L divided by L)
C =	0.61	(runoff coeffecient)
A =	5.22	(area of the watershed (Acres))
K =	56	(constant in the formula for Tc (56 for english units))
I =	8.2	(rainfall (inches per hour))
T_c(min) =	7.1	(time of concentration for the watershed)
T_c(hrs) =	0.12	

Q(cfs) =   **26.1**   (C*I*A)
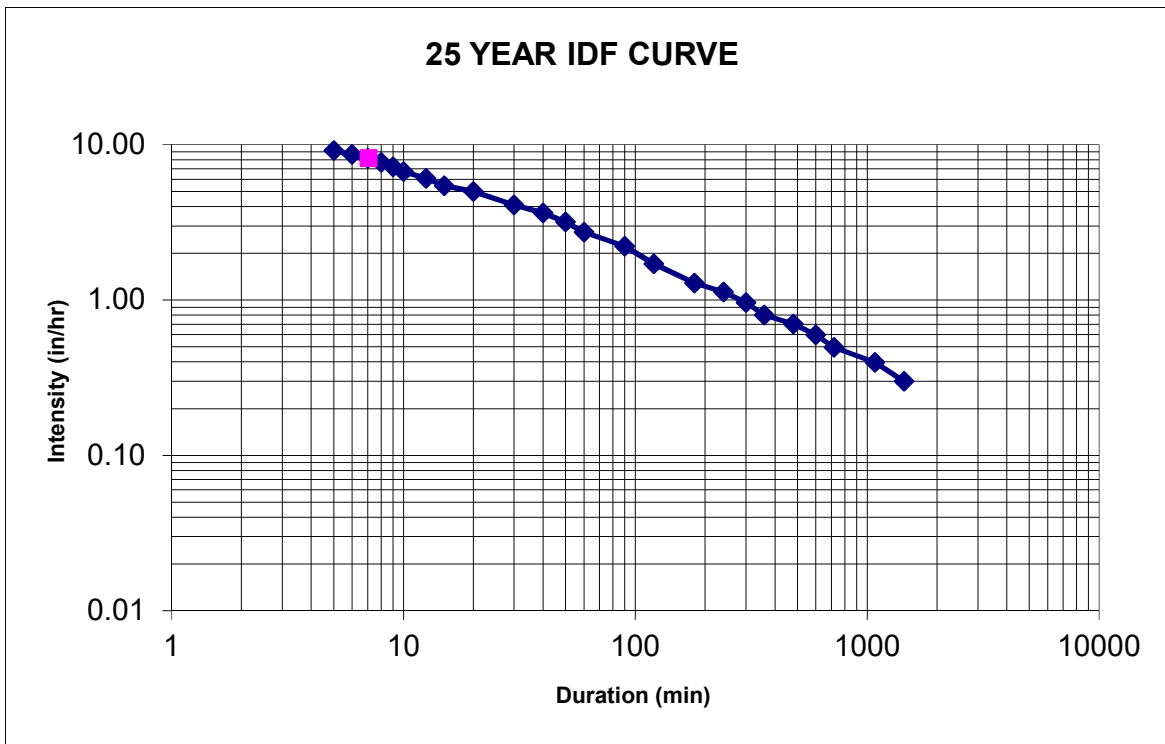
25 YEAR IDF CURVE

NOTE: Blue numbers represent user input. Black numbers represent calculated values.
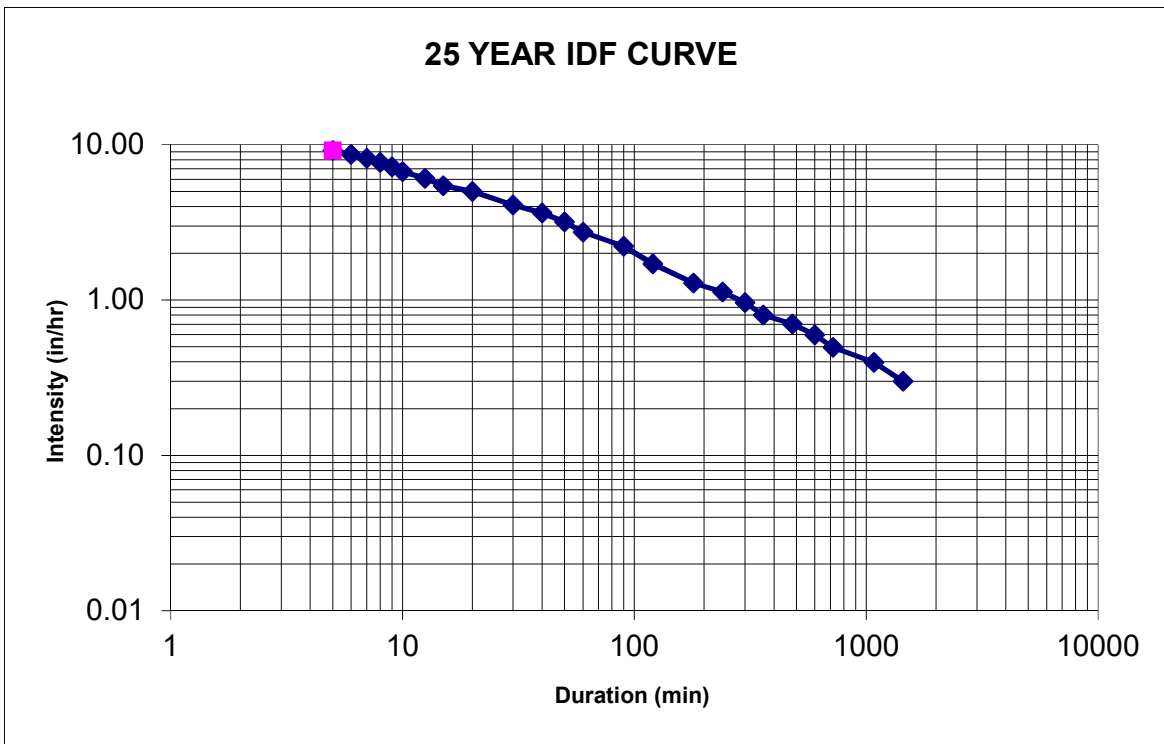
Project S. Valentine Street Drainage Improvements **Sheet No.** 1 **of** 1

Job No. 03-15-DR-95 **Made By** MJM **Date** 4.24.2019

Subject Q25 Rational Method Discharges (A<200 Acres) **Chkd. By** _____ **Date** _____

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Area Description: **AREA C**

$n =$	0.027392535	(Manning's n)
$L =$	410	(maximum length of runoff for the area (ft))
$\Delta z =$	18.50	(change in elevation along L(ft))
$S =$	0.045	(change in elevation along L divided by L)
$C =$	0.69	(runoff coeffecient)
$A =$	1.04	(area of the watershed (Acres))
$K =$	56	(constant in the formula for Tc (56 for english units))
$I =$	9.2	(rainfall (inches per hour))
$T_c(min) =$	5.0	(time of concentration for the watershed)
$T_c(hrs) =$	0.08	

Q(cfs) = **6.6** (C*I*A)

25 YEAR IDF CURVE

NOTE: Blue numbers represent user input. Black numbers represent calculated values.
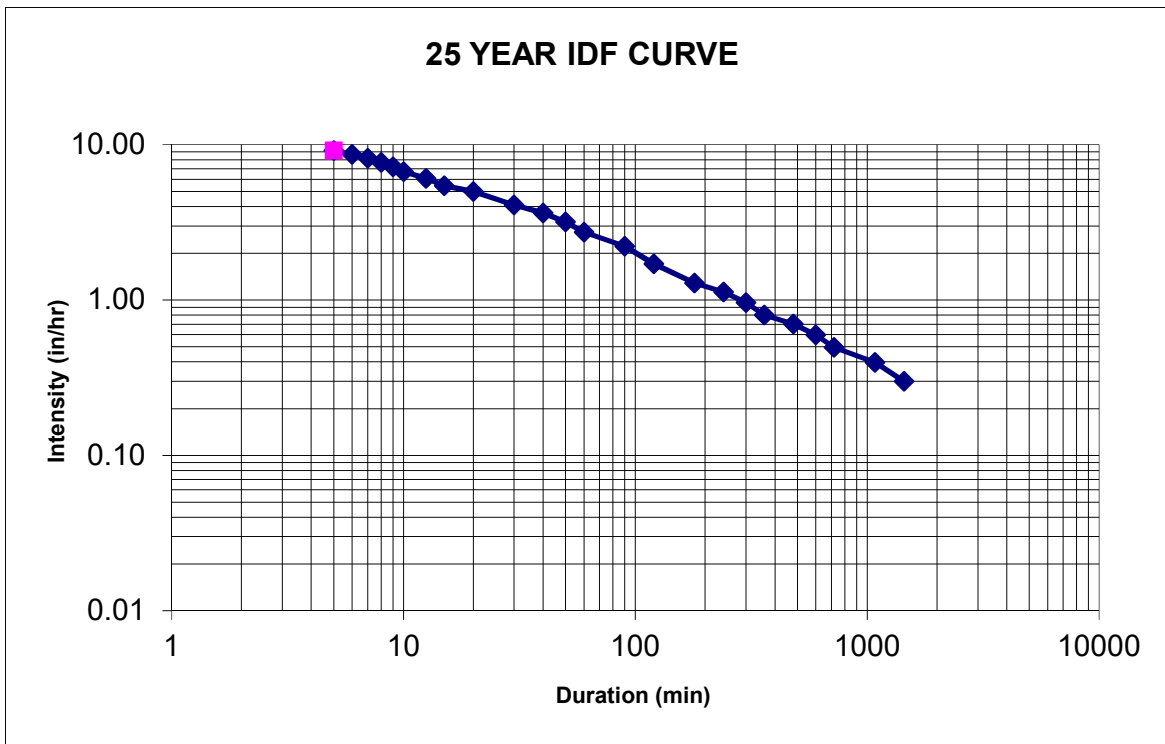
Project S. Valentine Street Drainage Improvements **Sheet No.** 1 **of** 1

Job No. 03-15-DR-95 **Made By** MJM **Date** 4.24.2019

Subject Q25 Rational Method Discharges (A<200 Acres) **Chkd. By** _____ **Date** _____

Path \\garverinc.local\gdata\Projects\2018\18017040 - LR - Street and Drainage Projects\Design\VALENTINE ST\Calculations\H&H

Area Description: **AREA D**

$n =$	0.035	(Manning's n)
$L =$	129	(maximum length of runoff for the area (ft))
$\Delta z =$	5.44	(change in elevation along L(ft))
$S =$	0.042	(change in elevation along L divided by L)
$C =$	0.75	(runoff coeffecient)
$A =$	0.25	(area of the watershed (Acres))
$K =$	56	(constant in the formula for Tc (56 for english units))
$I =$	9.2	(rainfall (inches per hour))
$T_c(min) =$	5.0	(time of concentration for the watershed)
$T_c(hrs) =$	0.08	

Q(cfs) = **1.7** (C*I*A)

25 YEAR IDF CURVE

NOTE: Blue numbers represent user input. Black numbers represent calculated values.

Project S. Valentine Street Drainage Improvements   **Sheet No.** ___1___ **of** ___1___

Job No. 03-15-DR-95   **Made By** ___MJM___ **Date** 4.24.2019

Subject Q25 Rational Method Discharges (A<200 Acres)   **Chkd. By** _____ **Date** _____

Path \\garverinc.local\gdata\Projects\2018\18017040 - LR - Street and Drainage Projects\Design\VALENTINE ST\Calculations\H&H

Area Description: **AREA E**

n =	0.013	(Manning's n)
L =	440	(maximum length of runoff for the area (ft))
Δz =	16.56	(change in elevation along L(ft))
S =	0.038	(change in elevation along L divided by L)
C =	0.60	(runoff coeffecient)
A =	0.41	(area of the watershed (Acres))
K =	56	(constant in the formula for Tc (56 for english units))
I =	9.2	(rainfall (inches per hour))
T_c(min) =	5.0	(time of concentration for the watershed)
T_c(hrs) =	0.08	

Q(cfs) =   **2.3**   (C*I*A)

25 YEAR IDF CURVE

NOTE: Blue numbers represent user input. Black numbers represent calculated values.

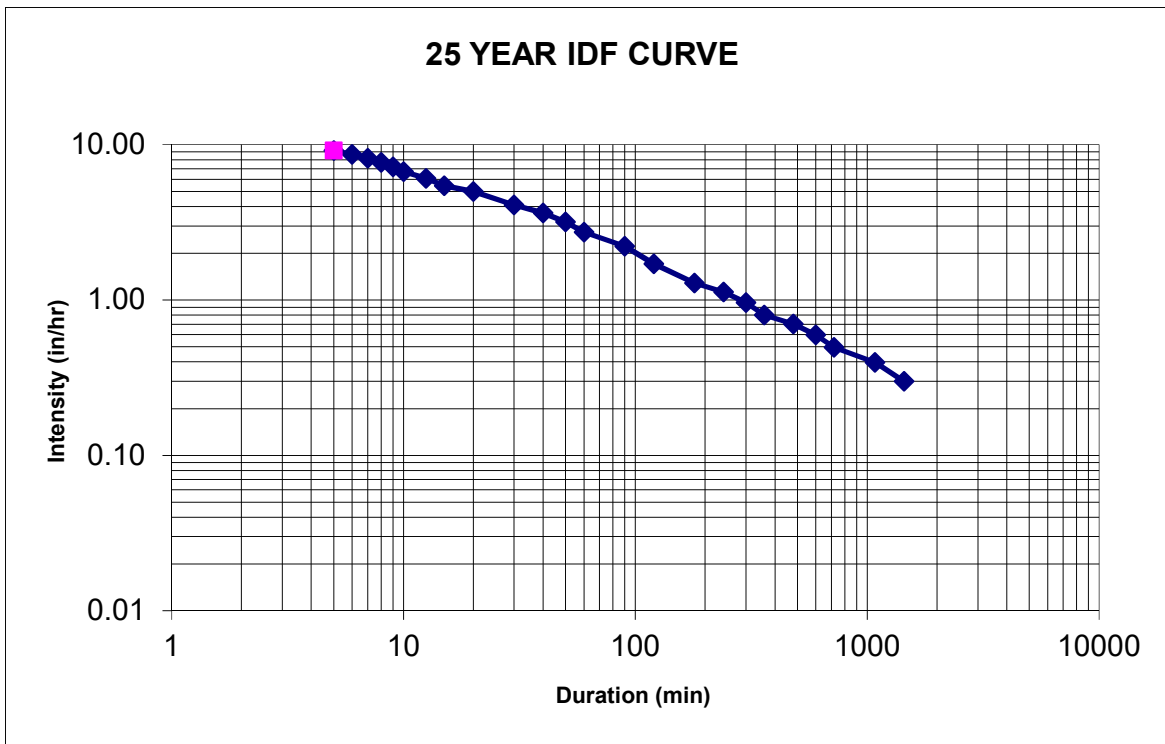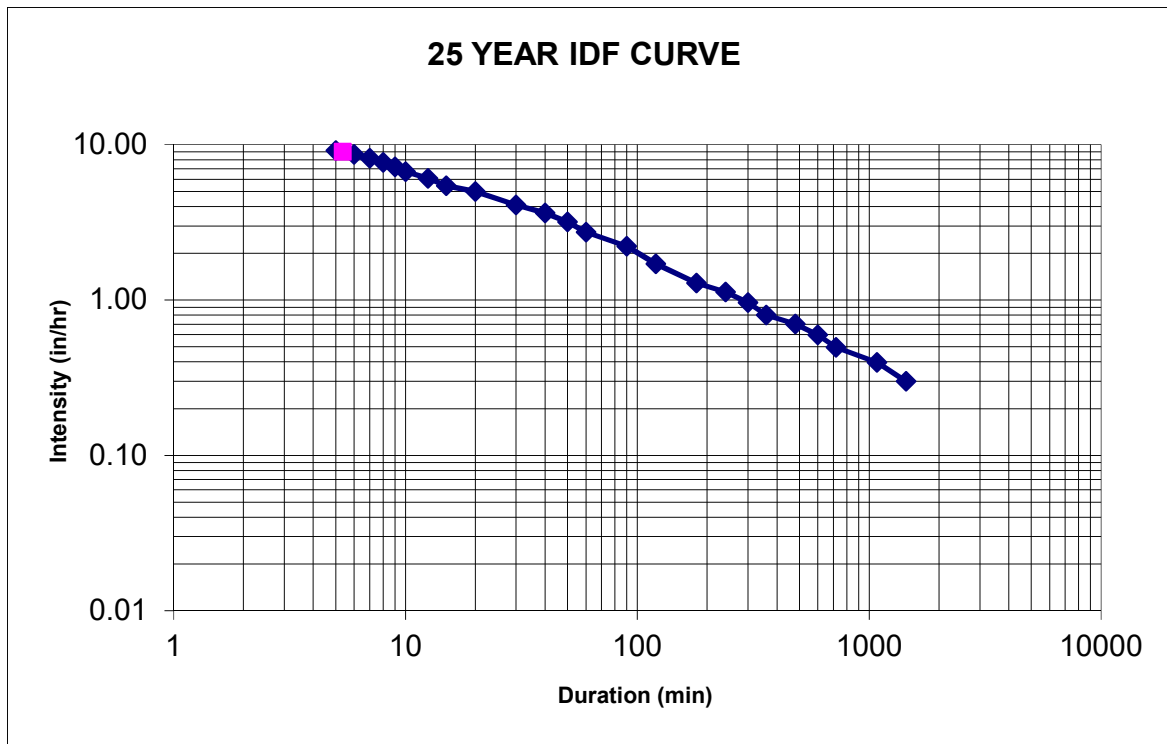**Project**   S. Valentine Street Drainage Improvements   **Sheet No.**   1   **of**   1

Job No.   03-15-DR-95   **Made By**   MJM   **Date**   4.24.2019

Subject   Q25 Rational Method Discharges (A<200 Acres)   **Chkd. By** _____   **Date** _____

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Area Description: **AREA F**

n =	0.029483297	(Manning's n)
L =	603	(maximum length of runoff for the area (ft))
Δz =	30.00	(change in elevation along L(ft))
S =	0.050	(change in elevation along L divided by L)
C =	0.61	(runoff coeffecient)
A =	2.79	(area of the watershed (Acres))
K =	56	(constant in the formula for Tc (56 for english units))
I =	9.0	(rainfall (inches per hour))
T_c(min) =	5.4	(time of concentration for the watershed)
T_c(hrs) =	0.09	

Q(cfs) =   **15.3**   (C*I*A)

25 YEAR IDF CURVE

NOTE: Blue numbers represent user input. Black numbers represent calculated values.

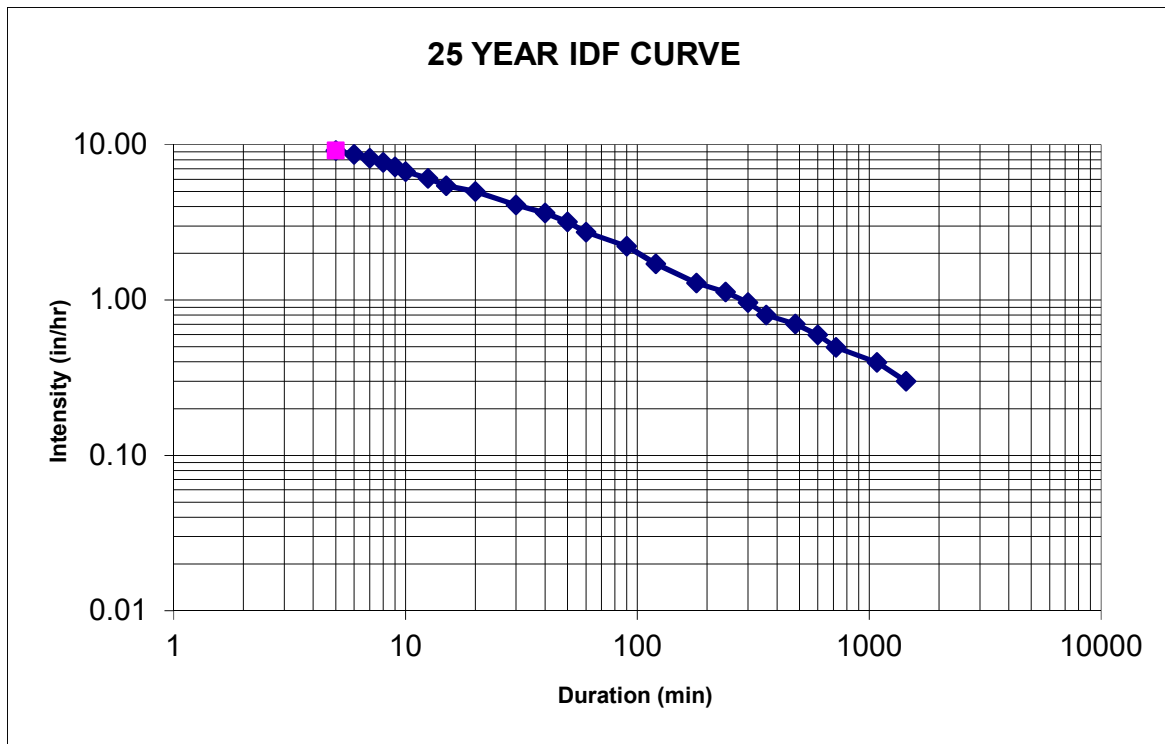| Project	S. Valentine Street Drainage Improvements		Sheet No.	1	of	1

Job No.	03-15-DR-95		Made By	MJM	Date	4.24.2019

Subject	Q25 Rational Method Discharges (A<200 Acres)		Chkd. By		Date	

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Area Description: **AREA G**

n =	0.016321006	(Manning's n)
L =	179	(maximum length of runoff for the area (ft))
Δz =	5.70	(change in elevation along L(ft))
S =	0.032	(change in elevation along L divided by L)
C =	0.75	(runoff coeffecient)
A =	0.28	(area of the watershed (Acres))
K =	56	(constant in the formula for Tc (56 for english units))
I =	9.2	(rainfall (inches per hour))
T_c(min) =	5.0	(time of concentration for the watershed)
T_c(hrs) =	0.08	

Q(cfs) =   **2.0**   (C*I*A)

25 YEAR IDF CURVE

NOTE: Blue numbers represent user input. Black numbers represent calculated values.

Project	S. Valentine Street Drainage Improvements		**Sheet No.**	1	**of**	1

Job No. 03-15-DR-95   **Made By** MJM   **Date** 4.24.2019

Subject Q25 Rational Method Discharges (A<200 Acres)   **Chkd. By** _____   **Date** _____

Path \\garverinc.local\gdata\Projects\2018\18017040 - LR - Street and Drainage Projects\Design\VALENTINE ST\Calculations\H&H

Area Description: **AREA H**

n =	0.027540301	(Manning's n)
L =	644	(maximum length of runoff for the area (ft))
Δz =	16.90	(change in elevation along L(ft))
S =	0.026	(change in elevation along L divided by L)
C =	0.62	(runoff coeffecient)
A =	1.29	(area of the watershed (Acres))
K =	56	(constant in the formula for Tc (56 for english units))
I =	8.3	(rainfall (inches per hour))
T_c(min) =	6.7	(time of concentration for the watershed)
T_c(hrs) =	0.11	

Q(cfs) =   **6.6**   (C*I*A)

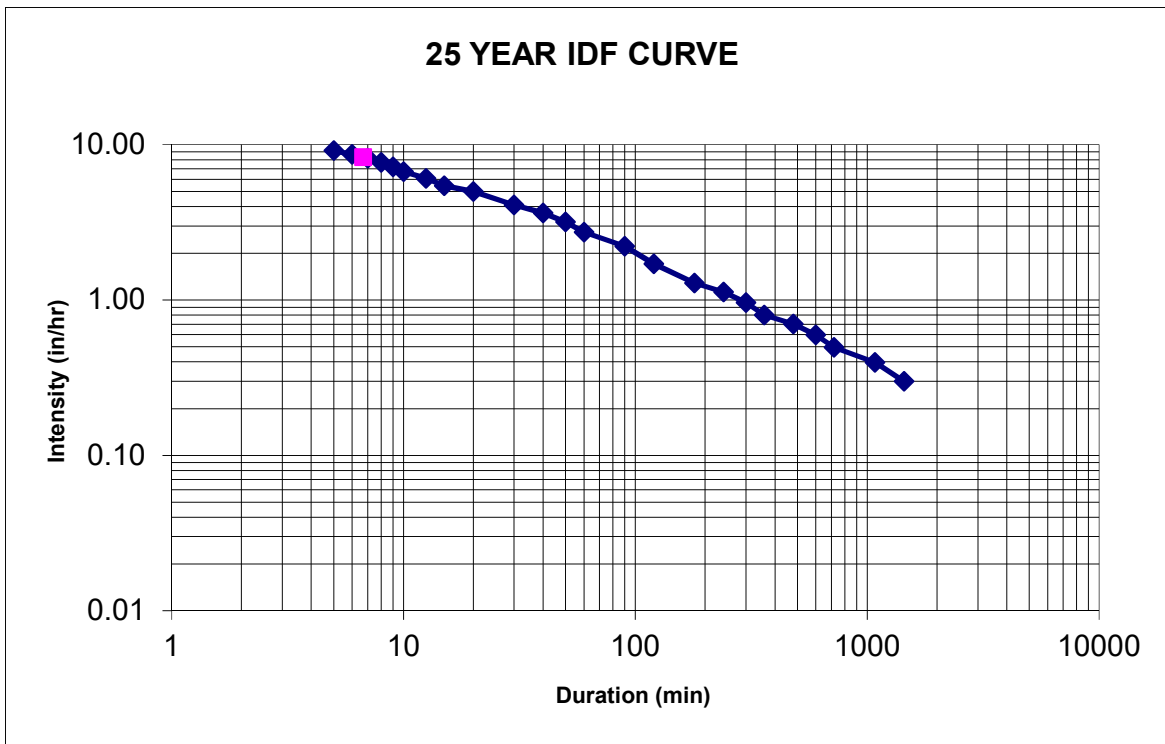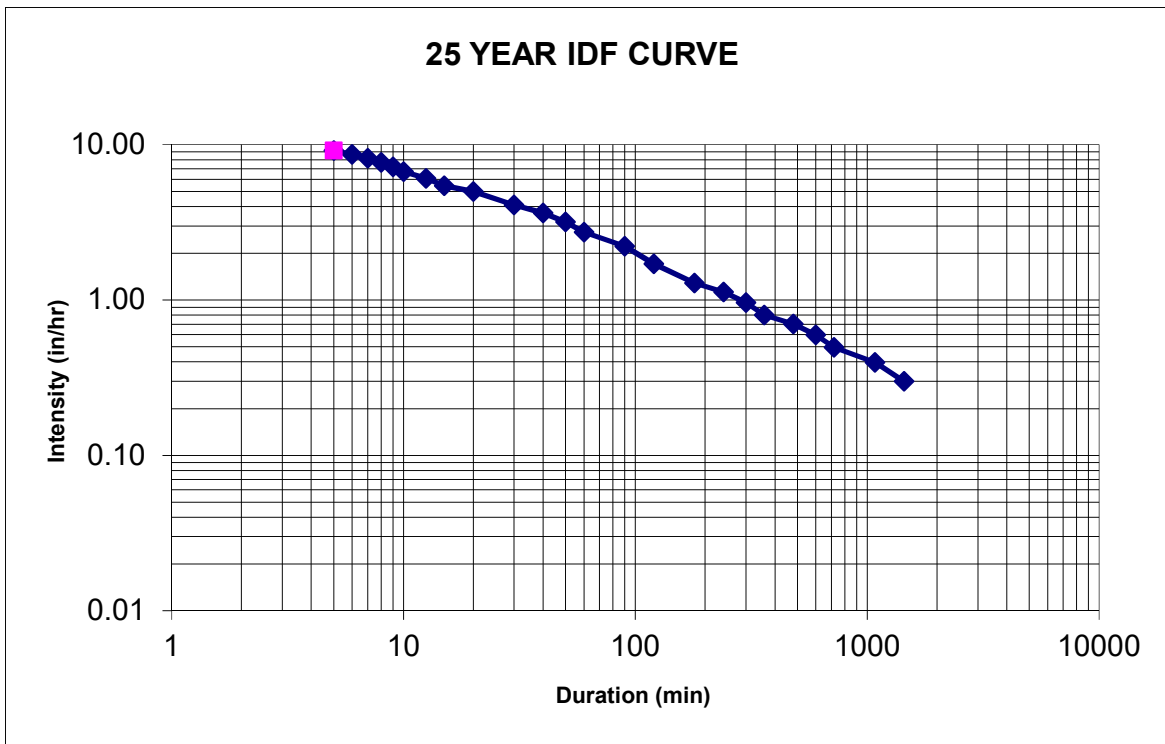NOTE: Blue numbers represent user input. Black numbers represent calculated values.

Project	S. Valentine Street Drainage Improvements		Sheet No.	1	of	1
Job No.	03-15-DR-95		Made By	MJM	Date	4.24.2019
Subject	Q25 Rational Method Discharges (A<200 Acres)		Chkd. By		Date	

Path \\garverinc.local\gdata\Projects\2018\18017040 - LR - Street and Drainage Projects\Design\VALENTINE ST\Calculations\H&H

Area Description: **AREA I**

n =	0.019206533	(Manning's n)
L =	469	(maximum length of runoff for the area (ft))
Δz =	21.09	(change in elevation along L(ft))
S =	0.045	(change in elevation along L divided by L)
C =	0.60	(runoff coeffecient)
A =	1.21	(area of the watershed (Acres))
K =	56	(constant in the formula for Tc (56 for english units))
I =	9.2	(rainfall (inches per hour))
T_c(min) =	5.0	(time of concentration for the watershed)
T_c(hrs) =	0.08	

Q(cfs) =   **6.7**   (C*I*A)

25 YEAR IDF CURVE

NOTE: Blue numbers represent user input. Black numbers represent calculated values.

Existing Storm System - W Markham St to Outfall (West Run) - Base

Elevation (ft)

Station (ft)

Valentine St Existing Drainage.stsw
5/1/2019

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[08.11.04.54]
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Proposed Storm System - W Markham St to Outfall (West Run) - Base

Elevation (ft)

365
364
363
362
361
360
359
358
357
356
355
354
353
352
351
350
349
348
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326
325

-50   0   50   100   150   200   250   300   350   400   450   500   550   600   650   700   750   800   850   900   950   1000   1050   1100   1150   1200

Station (ft)

W. Markham St. RT.
Existing Catch Basin

JB-1
Existing Junction Box

BEGIN PROJECT

END PROJECT

W. Markham St. LT.
Existing Catch Basin

GI-1
Existing Grate Inlet

CI-2
Curb Inlet

Proposed
Box Tie In

AI-2
Area Inlet

AI-1
Area Inlet

Existing
16' X 2.5' RCB

CI-4
Curb Inlet

CI-3
Curb Inlet

Existing
5' X 2.7' RCB

Existing
5' X 2.7' RCB

8' X 2.5' RCB

Proposed
Box Tie In

Existing
5' X 2.7' RCB

8' X 2.5' RCB

8' X 2.5' RCB

Outfall

8' X 2.5' RCB

8' X 2.5' RCB

8' X 2.5' RCB

8' X 2.5' RCB

Existing
5' X 2.5' RCB

Valentine St Proposed Drainage.stsw
5/1/2019

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Proposed Storm System- W Markham to Outfall (East Run) - Base

Valentine St Proposed Drainage.stsw
5/1/2019

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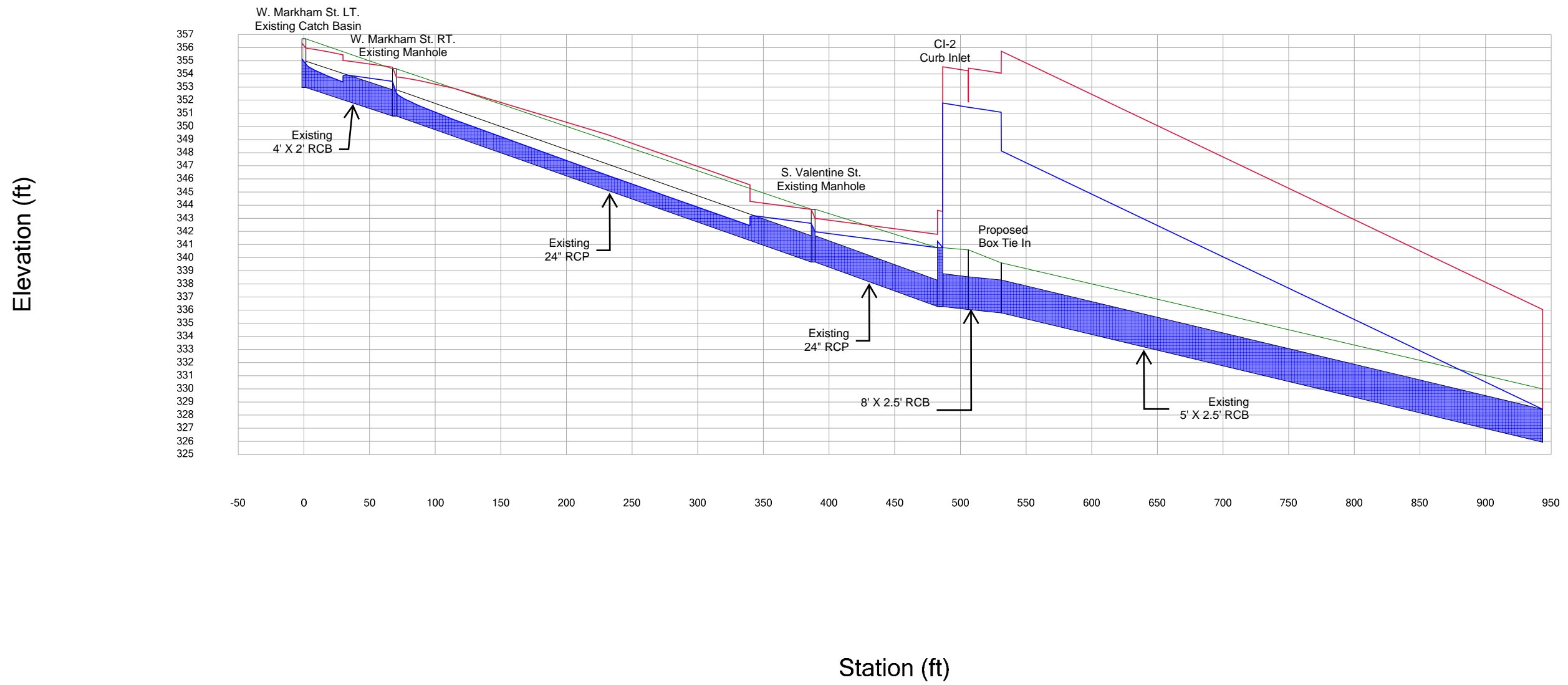
Proposed Storm System - CI-1 to Outfall - Base

Valentine St Proposed Drainage.stsw
5/1/2019

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