FLAHAVAN ESTATES
HYDROLOGY ANALYSIS

FLAHAVAN ESTATES

8841 Old Redwood Highway
A.P.N: 046-223-018
PROJECT #21104
November 13, 2022

ANALISYS PREPARED BY
TDG CONSULTING CIVIL ENGINEERS, INC.
CIVIL ENGINEERING – LAND SURVEYING
883 3rd Street, Santa Rosa, CA 95404
(707) 577-0425 Office (707) 573-1418 FAX
tdg@sonic.net

OWNER
Synergy Group.
435 E street
SANTA ROSA CA 95404
(707) 577-0425

Charlie Traboulsi RPE No.34079

Mr. Phillip E. Wadsworth
Sonoma County Water Agency
Flood and Drainage Review
2227 Capricorn Way, Building E, Suit 108
Santa Rosa CA 95407

Dear Phil:

Enclosed for your initial plan check are the following items for FLAHAVAN STATES subdivision 8841 Old Redwood Highway Cotati CA.94931:

Page(s)	Item
1	Transmittal Letter
3-6	Explanation of Analysis approach
2	Submittal Information sheet
Attached	Tentative Map
Attached	Final Map or Parcel Map (if applicable)
Attachment 1	Hydrology Map
TableC-1 (8-9)	Establish Factors used in Analysis
10-21	Hydrology Calculation (*) 10-year Storm and (*) 100-year Storm
10-21	Hydraulic Calculations
Attachments A1 – A4	Establish Starting HGL (from Altman Acres Subdivision Hydrology map & Calculations file #6-8-36-30)
Attachment 2	Overland Release Map
22-24	Curb Water Depth Calculations
36	Inlet Capacity calculations
37	Assessor Parcel Map with Site Outlined

Please contact me if you have any questions or comments regarding this submittal.
Thanks.
TDG Consulting Civil Engineers, Inc

Charlie Traboulsi

FLOOD AND DRAINAGE REVIEW PLAN SUBMITTAL CHECKLIST

PROJECT NAME: ESTATES AT ROSS RANCH SUBDIVISION
DATE:
SCWA FILE# _____

- ✓ TRASNMITTAL LETTER
- ✓ EXPLANATION OF ANALYSIS
- ✓ SUBMITTAL INFORMATION SHEET
- ✓ PLAN CHECK FEE
- ✓ IMPROVEMENTS PLANS
- ✓ FINAL MAP OR PARCEL MAP
- ✓ HYDROLOGY MAP
- ✓ ESTABLISH FACTORS USED IN ANALYSIS
- ✓ HYDROLOGY CALCULATIONS
- ✓ 10-YEAR STORM
- ✓ 100-YEAR STORM
- ✓ HYDRAULIC CALCULATIONS
- ✓ ESTABLISH STARTING HGL
- ✓ EGL AND HGL PLOTS
- ✓ 100-YEAR STORM ROUTING
- ✓ 100-YEAR STORM ELEVATION VS FINISH FLOOR ELEVATIONS
- ✓ INLET CAPACITY CALCULATIONS
- ✓ CURB WATER DEPTH CALCULATIONS
- ✓ ASSESOR PARCEL MAP WITH SITE OUTLINED
- ✓ COPY OF THE CONDITIONS OF APPROVAL OF THE PROJECT

INTRODUCTION

This submittal package contains the hydrology maps and hydraulic calculations for FLAHAVAN ESTATES project.

The references used for this report are:

- Flood Control Design Criteria Manual 2020 (FMDM), Sonoma County Water Agency

This drainage report analyzes the flow capacity of the underground storm drain system for the 10-year storm event.

All documentation used in supporting our analysis is included in the various sections or the exhibits section of this package.

PROJECT DESCRIPTION

This plan is being developed to control run-off from development of a 35 lot Major subdivision. The project is located at 8841 Old Redwood Highway, south of City of Cotati. The Parcel is approximately 7.12 acres in size. The proposed development will consist of 35 lots and 2 landscape Parcels. Two new roads are proposed through the property Longship Lane Viking Way whish is Connecting to Redwood Highway.

EXISTING SITE CONDITION

The site with A.P.N 046-223-018 with address 8841 Old Redwood High Highway; the Parcel is at Neighborhood Low Density designated there is an existing residence with multiples barn/sheds within the subject site; and existing driveway connecting the main residence and structures from Old Redwood Highway; existing vegetation is a combine grass, trees. Project site slope northeast at 0% to 12% ±. The is an existing 24" CMP (Corrugated Metal Pipe) which base on the City of Cotati Storm Drian Master Plan conveys the drainage from west to east of Redwood Highway; the condition of the mentioned 24" CMP base on site observations, the pipe bottom is totally eroded, and most be replaced.

HYDROLOGY

The following hydrology calculations were performed using variables of the modified Rational Method. The variables used in the analysis were obtained from the latest SCWA Flood Control Design Criteria Manual 2020. Runoff coefficients were calculated for each

tributary area based on "table C-1" shown on Hydrology Soil Group C with Low Density and average slope >2%-6% of 0.42 and >6%-12% 0.47 respectably and Hydrology Soil Group D with Low Density and average slope >2%-6% of 0.47 and >6%-12% 0.52 respectably; C_V and a value of 0.90 used for C_P. Additionally, the initial time of concentrations are per the SCWA Flood Control Design Criteria Manual plate 3-3, and were set at 7,10,15 minutes for this project. These two variables reflect the current land use of the property.

The intensity of the rainfall the information was obtained from the NOAA Atlas 14 at the site project location see attached table.

The hydrology calculations were performed using the Hydraflow Storm Sewers Extension for Civil 3D software developed and marketed by Autodesk. This software suite calculates the peak flow of a catchment by simultaneously calculating a basin's hydrologic characteristics and hydraulic capacity. This differs from the traditional approach of calculating the hydrology independent of any hydraulic or backwater effects. In some situations, this sort of analysis appears to lengthen the time of concentration of a basin due to the velocity in the pipes of the system being calculated under backwater conditions rather than under full-flow/ gravity depth velocities. Such an approach is slightly less conservative, but is probably more realistic. Further explanation of the implications of this approach is discussed in the Hydraulic Section of this submittal.

The enclosed FLAHAVAN ESTATES project Map define the limits of the local catchments and have been used as the basis for determining the runoff quantities that the project's storm drain systems must convey. The limits of these areas were determined by the proposed project improvements.

HYDRAULICS

Basis

As was mentioned in the preceding section, the hydraulics for this project was analyzed simultaneously with the hydrology of the project. Therefore, the hydraulics and hydrology are more interdependent than had they been analyzed separately.

Starting HGL

The starting 10-year HGL was assigned preliminary as the crown elevation of the 24" CMP at the point connection from the existing CB at the east side of Redwood Highway as a conservative assumption; the elevation of the HGL will be adjusted per actual elevation base on the hydrology study from the Altman Acres Subdivision & Rosen Ranch Subdivision.

The storm drain network will connect on to Existing CB located about 400' northwest of Eucalyptus Avenue & across the site on Old Redwood Highway east side the existing 24" CMP will be replaced. The stating HLG elevation has been revised base on 2.53 feet of difference on datum elevations between onsite elevation versus "Altman Acres Subdivision" improvement Plans elevation. the SCWA File # 6-8-36-30. The elevations were adjusted as follows per the SCWA File # 6-8-36-30. 10 year HGL=114.59 to HGL=117.12 feet and 100 year HGL 116.16 to HGL= 118.69 feet see attached sheets.

Note: HGL calculations were based on the Drainage report for Altman Acres Subdivision file # 6-8-36-30 dated 12/11/2001.

Project Datum

Benchmark: city of Cotati BM #CP2 - A 2" aluminum disc stamped "City of Cotati control PLS 8614 found in top of street curb on the southerly side of East Cotati Avenue across from the Rancho Adobe fire station feet, elevation - 110.616 (NAVD 88)

System Analysis

The Autodesk software automatically computes losses at junctions and inlets of a system based on data adapted from FHWA HEC No. 22. The hydrology/backwater analysis of this submittal is based on this method. The following Storm Sewer Tabulations show the HGLs for the piped storm drain system networks within the project. The attached FLAHAVAN ESTATES Hydrology Map show the project tributary areas and storm drain system in relation to the calculations.

Inlet Capacity Analysis

The capacity of inlet structures within the model has been calculated by the software. The software calculates the capacity of all inlet structures within the model and reports the capture efficiency. The proposed Catch Basin (CB) within the project's tributary boundaries have been analyzed. Had the capacity of any of CB's been exceeded, the capture efficiency would have been reported to be less than 100%. During the 10-year storm event, the proposed CB's structures within the study area have an efficiency level of 100%. The worst-case gutter depth for catch basins and depth of water are included in the hydraulic pages.

100-Year Overland Release

The proposed storm drain improvements for FLAHAVAN ESTATES project were designed for the 10-year storm event. During the 100-year storm event, the project will route drainage

over land. FLAHAVAN ESTATES Hydrology Map included a map showing the flood routing course and areas of anticipated inundation, and flood routing during a 100-year event. The route was determined by calculating the HGL at each proposed inlets of the project, in addition to analyzing the degree of ponding that must occur in order for the flow to pass obstacles, such as curbs and high points. The finish floor elevations, accumulation escape elevations, and local break point escape elevations can all be seen on this map.

CONCLUSION

The hydraulic calculations contained in this report demonstrate that that during the 10-year storm event the HGL is below the inlet elevation of all drainage structures. All building structures will remain flood free during the 100-year storm event.
There will be no additional negative impacts to the adjacent properties with respect to pre-project and post-project flooding.

TRIBUTARIES

Drainage Area	Asphalt sf²	Sidewalk sf²	Driveway sf²	Roof sf²	Landscape sf²	Total Area sf²	Total Area acres	C-value
Tributary-DI 1 (PUB)	3913	1060	0	0	2833	7806	0.18	0.73
Tributary-DI 2 (PUB)	6537	1424	0	0	4188	12149	0.28	0.74
Tributary-CB 1 (PUB)	10524	2837	10814	17219	57641	81816	1.88	0.80
Tributary -CB 2 (PUB)	9000	3114	9374	14529	34041	70058	1.61	0.65
Tributary-CB 3 (PUB)	13268	4011	11340	19235	30088	77942	1.79	0.70
Tributary-HW-1 (PUB)	0	0	0	0	639977	639977	14.69	0.47
Tributary-DI-3 (PUB)	0	0	0	0	6821	6821	0.16	0.47
Tributary P.D.I-(1)	0	0	0	1232	22852	24084	0.55	0.46
Tributary P.D.I-(2)	0	0	0	1232	21359	22591	0.52	0.47
Tributary P.D.I-(3)	0	0	0	1232	18019	19251	0.44	0.47
Tributary P.D.I-(4)	0	0	0	1234	39993	41227	0.95	0.45
Tributary P.D.I-(5)	0	0	0	2728	18694	21422	0.49	0.50
Tributary P.D.I-(6)	0	0	0	514	22826	23340	0.54	0.45
Tributary P.D.I-(7)	0	0	0	0	11688	11688	0.27	0.44
Tributary P.D.I-(8)	0	0	0	0	13597	13597	0.31	0.44
Tributary P.D.I-(9)	0	0	0	0	21660	21660	0.50	0.44
Tributary P.D.I-(11)	0	0	0	0	11968	11968	0.27	0.44
Tributary P.D.I-(12)	0	0	0	0	16861	16861	0.39	0.44
Tributary P.D.I-(13)	0	0	0	0	71625	71625	1.64	0.44
Tributary P.D.I-(14)	0	0	0	1211	2025	3236	0.07	0.58
Tributary P.D.I-(15)	0	0	0	843	2314	3157	0.07	0.53
Tributary P.D.I-(16)	0	0	0	843	2314	3157	0.07	0.53
Tributary P.D.I-(17)	0	0	0	843	2314	3157	0.07	0.53
Tributary P.D.I-(18)	0	0	0	1211	1946	3157	0.07	0.62
Tributary P.D.I-(19)	0	0	0	843	2314	3157	0.07	0.56
Tributary P.D.I-(20)	0	0	0	843	2314	3157	0.07	0.56
Tributary P.D.I-(21)	0	0	0	1211	1946	3157	0.07	0.62
Tributary P.D.I-(22)	0	0	0	843	2314	3157	0.07	0.56
Tributary P.D.I-(23)	0	0	0	843	2314	3157	0.07	0.56
Tributary P.D.I-(24)	0	0	0	1211	1946	3157	0.07	0.62
Tributary P.D.I-(25)	0	0	0	624	1466	2090	0.05	0.58
Tributary P.D.I-(26)	0	0	0	652	1438	2090	0.05	0.58
Tributary P.D.I-(27)	0	0	0	0	618	618	0.01	0.44
Tributary P.D.I-(28)	0	0	0	0	7669	7669	0.18	0.44
Tributary P.D.I-(29)	0	0	0	0	17825	17825	0.41	0.44
Tributary P.D.I-(30)	0	0	0	0	48332	48332	1.11	0.44

IMPERVIOS SURFACE LEGEND

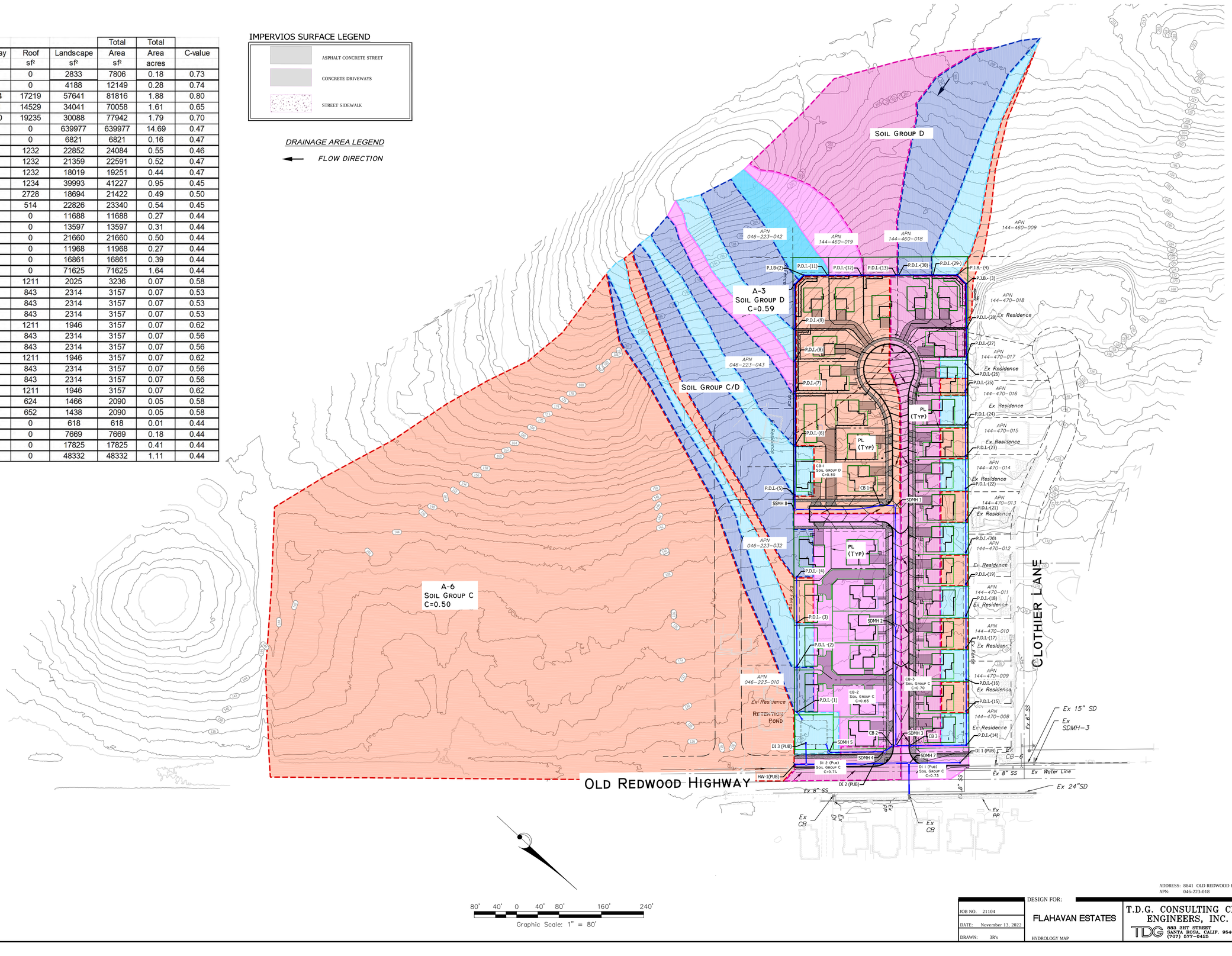
ASPHALT CONCRETE STREET

CONCRETE DRIVEWAYS

STREET SIDEWALK

DRAINAGE AREA LEGEND

FLOW DIRECTION



80' 40' 0 40' 80' 160' 240'

Graphic Scale: 1" = 80'

ADDRESS: 8841 OLD REDWOOD HIGHWAY
APN: 046-223-018

JOB NO. 21104	DESIGN FOR: FLAHAVAN ESTATES	T.D.G. CONSULTING CIVIL ENGINEERS, INC.
DATE: November 13, 2022		TDG 883 3HT STREET SANTA ROSA, CALIF. 95404 (707) 577-0425
DRAWN: 3R's	HYDROLOGY MAP	

ATTACHMENT 1

C-values for Drainage Areas

Surface Type	Asphalt	Sidewalk	Driveway	Rooftop	Park & Recreation
Low Desity Average Slope > 2%-6% Solid Group C	0.9	0.9	0.9	0.9	0.39
Low Desity Average Slope >6%-12% Solid Group C	0.9	0.9	0.9	0.9	0.44
Low Desity average Slope >2%-6% Solid Group D	0.9	0.9	0.9	0.9	0.44
Low Desity average Slope >6%-12% Solid Group D	0.9	0.9	0.9	0.9	0.49

Drainage Area	Asphalt sf²	Sidewalk sf²	Driveway sf²	Roof sf²	Landscape sf²	Total Area sf²	Total Area acres	C-value
Tributary-DI 1 (PUB)	3913	1060	0	0	2833	7806	0.18	0.73
Tributary-DI 2 (PUB)	6537	1424	0	0	4188	12149	0.28	0.74
Tributary-CB 1 (PUB)	10524	2837	10814	17219	57641	81816	1.88	0.80
Tributary -CB 2 (PUB)	9000	3114	9374	14529	34041	70058	1.61	0.65
Tributary-CB 3 (PUB)	13268	4011	11340	19235	30088	77942	1.79	0.70
Tributary-HW-1 (PUB)	0	0	0	0	639977	639977	14.69	0.47
Tributary-DI-3 (PUB)	0	0	0	0	6821	6821	0.16	0.47
Tributary P.D.I-(1)	0	0	0	1232	22852	24084	0.55	0.46
Tributary P.D.I-(2)	0	0	0	1232	21359	22591	0.52	0.47
Tributary P.D.I-(3)	0	0	0	1232	18019	19251	0.44	0.47
Tributary P.D.I-(4)	0	0	0	1234	39993	41227	0.95	0.45
Tributary P.D.I-(5)	0	0	0	2728	18694	21422	0.49	0.50
Tributary P.D.I-(6)	0	0	0	514	22826	23340	0.54	0.45
Tributary P.D.I-(7)	0	0	0	0	11688	11688	0.27	0.44
Tributary P.D.I-(8)	0	0	0	0	13597	13597	0.31	0.44
Tributary P.D.I-(9)	0	0	0	0	21660	21660	0.50	0.44
Tributary P.D.I-(11)	0	0	0	0	11968	11968	0.27	0.44
Tributary P.D.I-(12)	0	0	0	0	16861	16861	0.39	0.44
Tributary P.D.I-(13)	0	0	0	0	71625	71625	1.64	0.44
Tributary P.D.I-(14)	0	0	0	1211	2025	3236	0.07	0.58
Tributary P.D.I-(15)	0	0	0	843	2314	3157	0.07	0.53
Tributary P.D.I-(16)	0	0	0	843	2314	3157	0.07	0.53
Tributary P.D.I-(17)	0	0	0	843	2314	3157	0.07	0.53
Tributary P.D.I-(18)	0	0	0	1211	1946	3157	0.07	0.62
Tributary P.D.I-(19)	0	0	0	843	2314	3157	0.07	0.56
Tributary P.D.I-(20)	0	0	0	843	2314	3157	0.07	0.56
Tributary P.D.I-(21)	0	0	0	1211	1946	3157	0.07	0.62
Tributary P.D.I-(22)	0	0	0	843	2314	3157	0.07	0.56
Tributary P.D.I-(23)	0	0	0	843	2314	3157	0.07	0.56
Tributary P.D.I-(24)	0	0	0	1211	1946	3157	0.07	0.62
Tributary P.D.I-(25)	0	0	0	624	1466	2090	0.05	0.58
Tributary P.D.I-(26)	0	0	0	652	1438	2090	0.05	0.58
Tributary P.D.I-(27)	0	0	0	0	618	618	0.01	0.44
Tributary P.D.I-(28)	0	0	0	0	7669	7669	0.18	0.44
Tributary P.D.I-(29)	0	0	0	0	17825	17825	0.41	0.44
Tributary P.D.I-(30)	0	0	0	0	48332	48332	1.11	0.44

Table C-1. Runoff Coefficients (*Cs*) (Incremental Rational Method)

Land Use	Lot Size (acres)	Impervious Fraction	Average Slope (%)			
			0-2	>2-6	>6-12	>12
Soil Type A						
Residential[1]						
Rural		0.03	0.24	0.28	0.34	0.38
Very low density	2	0.11	0.29	0.34	0.38	0.42
	1	0.24	0.38	0.42	0.46	0.49
Low density	1/2	0.32	0.43	0.47	0.50	0.53
	1/3	0.41	0.50	0.53	0.56	0.58
Medium-low density	1/4	0.49	0.55	0.58	0.60	0.62
Medium density	1/8	0.70	0.70	0.71	0.73	0.74
Medium-high density	1/18	1	0.90	0.90	0.90	0.90
Business, commercial, etc.		1	0.90	0.90	0.90	0.90
General industrial		1	0.90	0.90	0.90	0.90
Parks and recreation		0.05	0.25	0.25	0.30	0.35
Ag and open space		0.02	0.23	0.23	0.28	0.33
Soil Type B						
Residential[1]						
Rural		0.03	0.28	0.33	0.39	0.43
Very low density	2	0.11	0.34	0.38	0.43	0.47
	1	0.24	0.42	0.45	0.50	0.53
Low density	1/2	0.32	0.47	0.50	0.54	0.57
	1/3	0.41	0.53	0.56	0.59	0.61
Medium-low density	1/4	0.49	0.58	0.60	0.63	0.65
Medium density	1/8	0.70	0.71	0.73	0.74	0.76
Medium-high density	1/18	1	0.90	0.90	0.90	0.90
Business, commercial, etc.		1	0.90	0.90	0.90	0.90
General industrial		1	0.90	0.90	0.90	0.90
Parks and recreation		0.05	0.25	0.30	0.34	0.40
Ag and open space		0.02	0.23	0.28	0.33	0.38
Soil Type C						
Residential[1]						
Rural		0.03	0.33	0.38	0.43	0.47
Very low density	2	0.11	0.38	0.42	0.47	0.51
	1	0.24	0.45	0.49	0.53	0.57
Low density	1/2	0.32	0.50	0.53	0.57	0.60

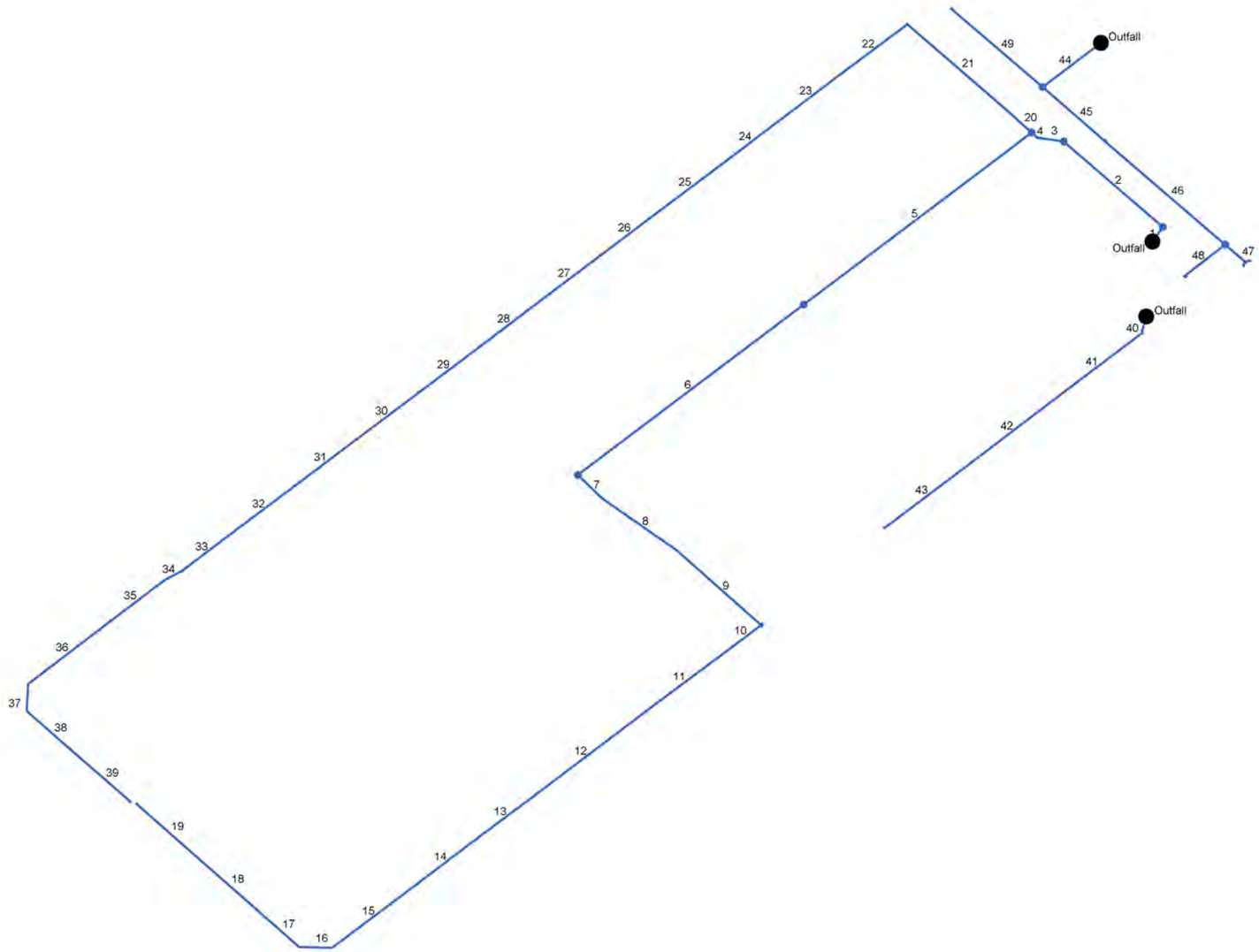
Land Use	Lot Size (acres)	Impervious Fraction	Average Slope (%)			
			0-2	>2-6	>6-12	>12
	1/3	0.41	0.56	0.59	0.62	0.64
Medium-low density	1/4	0.49	0.60	0.63	0.65	0.68
Medium density	1/8	0.70	0.73	0.74	0.76	0.77
Medium-high density	1/18	1	0.90	0.90	0.90	0.90
Business, commercial, etc.		1	0.90	0.90	0.90	0.90
General industrial		1	0.90	0.90	0.90	0.90
Parks and recreation		0.05	0.34	0.39	0.44	0.48
Ag and open space		0.02	0.33	0.38	0.43	0.47
Soil Type D						
Residential[1]						
Rural		0.03	0.38	0.43	0.48	0.52
Very low density	2	0.11	0.42	0.47	0.52	0.55
	1	0.24	0.49	0.53	0.57	0.60
Low density	1/2	0.32	0.54	0.57	0.61	0.63
	1/3	0.41	0.59	0.62	0.65	0.67
Medium-low density	1/4	0.49	0.63	0.65	0.68	0.70
Medium density	1/8	0.70	0.74	0.76	0.77	0.78
Medium-high density	1/18	1	0.90	0.90	0.90	0.90
Business, commercial		1	0.90	0.90	0.90	0.90
General industrial		1	0.90	0.90	0.90	0.90
Parks and recreation		0.05	0.39	0.44	0.49	0.53
Ag and open space		0.02	0.38	0.42	0.48	0.52

[1] *Percent impervious values are based on analysis conducted by ESA for Sonoma County Water Agency (Sonoma Water) in 2014, using a sample of existing developed areas.*

[2] *For residential areas, composite* C *values were developed as follows:* C *values for soil type from Los Angeles County Hydrology Manual (1991) were modified for slope using the vegetated areas curve from Plate B-1 of SCWA (1983) for pervious areas within a given slope range and a* C *of 0.90 for all impervious areas.*

Source: Approach adapted from McCuen 1989

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



Project File: 21104-SD.stm	Number of lines: 49	Date: 11/13/2022

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	SD1	14.09	15	Cir	14.930	115.89	115.94	0.335	117.13*	117.72*	1.97	119.69	End	Manhole
2	SD 2	14.16	15	Cir	105.185	115.94	116.15	0.200	119.69*	124.00*	1.35	125.34	1	Manhole
3	SD 3	14.18	15	Cir	19.055	116.15	116.18	0.157	125.34*	126.13*	2.03	128.16	2	Curb-
4	SD3	12.07	15	Cir	6.335	116.18	116.19	0.158	128.16*	128.35*	1.50	129.85	3	Manhole
5	SD 5	7.89	15	Cir	226.459	116.19	121.00	2.124	129.85*	132.74*	0.10	132.83	4	Manhole
6	SD 6	8.10	15	Cir	224.563	121.00	130.00	4.008	132.83*	135.85*	0.68	136.52	5	Manhole
7	SD 7	8.13	15	Cir	27.447	130.00	130.27	0.984	136.52*	136.90*	0.34	137.24	6	Curb-
8	SD 8	4.69	15	Cir	71.658	130.27	131.71	2.010	137.24*	137.56*	0.03	137.59	7	None
9	SD 9	4.78	15	Cir	90.728	131.71	133.50	1.973	137.59*	138.02*	0.24	138.25	8	Manhole
10	SD 10	4.81	15	Cir	27.432	133.50	134.90	5.104	138.25*	138.38*	0.12	138.50	9	DropGrate
11	SD 11	4.28	12	Cir	94.684	134.90	139.63	4.996	138.50	140.50	n/a	140.50 j	10	DropGrate
12	SD 12	3.75	12	Cir	100.682	148.00	155.97	7.916	148.41	156.79	0.23	156.79	11	DropGrate
13	SD 13	3.49	12	Cir	58.996	155.97	157.15	2.000	156.79	157.95	n/a	157.95 j	12	DropGrate
14	SD 14	3.18	12	Cir	59.983	157.15	158.35	2.001	157.95	159.11	n/a	159.11 j	13	DropGrate
15	SD 15	2.68	12	Cir	83.678	158.35	160.02	1.996	159.11	160.72	n/a	160.72 j	14	None
16	SD 16	2.70	12	Cir	23.964	160.02	160.50	2.003	160.72	161.20	n/a	161.20	15	None
17	SD 17	2.73	12	Cir	45.775	160.50	161.42	2.010	161.20	162.13	0.16	162.13	16	DropGrate
18	SD 18	2.47	12	Cir	64.246	161.42	162.70	1.992	162.13	163.37	n/a	163.37 j	17	DropGrate
19	SD 19	2.05	12	Cir	64.891	162.70	164.00	2.003	163.37	164.61	n/a	164.61 j	18	DropGrate
20	SD 20	5.07	15	Cir	26.335	116.19	116.25	0.228	129.85*	129.99*	0.13	130.12	4	Curb-
21	SD 21	2.60	15	Cir	106.667	118.51	118.68	0.159	130.12*	130.27*	0.11	130.38	20	DropGrate
22	SD 22	2.55	12	Cir	64.317	118.68	119.05	0.575	130.38*	130.66*	0.08	130.74	21	DropGrate
23	SD 23	2.50	12	Cir	59.742	119.05	120.25	2.009	130.74*	130.99*	0.08	131.07	22	DropGrate
24	SD 24	2.45	12	Cir	60.311	120.25	122.25	3.316	131.07*	131.31*	0.08	131.39	23	DropGrate
25	SD 25	2.40	12	Cir	59.906	122.25	123.75	2.504	131.39*	131.62*	0.07	131.69	24	DropGrate
26	SD 26	2.34	12	Cir	59.968	123.75	125.65	3.168	131.69*	131.91*	0.07	131.98	25	DropGrate
27	SD 27	2.28	12	Cir	60.033	125.65	128.55	4.831	131.98*	132.19*	0.07	132.26	26	DropGrate
28	SD 28	2.23	12	Cir	59.775	130.05	133.05	5.019	132.26	133.69	n/a	133.69 j	27	DropGrate
29	SD 29	2.16	12	Cir	60.747	134.55	137.55	4.938	134.89	138.18	0.13	138.18	28	DropGrate
30	SD 30	2.11	12	Cir	61.658	137.55	138.78	1.995	138.18	139.40	n/a	139.40 j	29	DropGrate
31	SD 31	2.05	12	Cir	60.616	145.00	146.21	1.996	145.43	146.82	n/a	146.82	30	DropGrate

Project File: 21104-SD.stm | Number of lines: 49 | Run Date: 11/13/2022

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
32	SD 32	1.99	12	Cir	61.972	148.00	149.24	2.001	148.42	149.84	0.13	149.84	31	DropGrate
33	SD 33	1.95	12	Cir	51.170	150.00	151.15	2.247	150.40	151.74	0.12	151.74	32	DropGrate
34	SD 34	1.89	12	Cir	15.814	151.15	151.34	1.201	151.74	151.92	n/a	151.92 j	33	DropGrate
35	SD 35	1.91	12	Cir	52.672	155.00	156.05	1.993	155.41	156.64	n/a	156.64	34	DropGrate
36	SD 36	1.77	12	Cir	82.869	159.65	161.31	2.003	160.04	161.88	0.17	161.88	35	None
37	SD 37	1.79	12	Cir	24.083	161.31	161.79	1.993	161.88	162.36	0.18	162.36	36	None
38	SD 38	1.82	12	Cir	45.390	161.79	162.70	2.005	162.36	163.27	n/a	163.27	37	DropGrate
39	SD 39	1.39	12	Cir	65.131	162.70	164.00	1.996	163.27	164.50	n/a	164.50 j	38	DropGrate
40	SD 40	2.84	12	Cir	15.802	115.25	116.04	4.999	116.11	116.76	n/a	116.76 j	End	DropGrate
41	SD 41	2.26	12	Cir	86.500	122.42	124.51	2.416	122.85	125.15	n/a	125.15	40	DropGrate
42	SD 42	1.70	12	Cir	82.500	124.51	128.64	5.006	125.15	129.19	n/a	129.19 j	41	DropGrate
43	SD 43	1.21	12	Cir	86.500	129.22	131.37	2.486	129.52	131.83	n/a	131.83	42	DropGrate
44	SD 44	31.13	24	Cir	58.114	115.77	116.06	0.499	117.65*	118.60*	1.53	120.13	End	Manhole
45	SD 45	39.86	24	Cir	66.052	116.06	116.39	0.500	120.13*	121.88*	1.25	123.13	44	DropGrate
46	SD 46	39.74	24	Cir	128.006	116.39	117.03	0.500	123.13*	126.50*	2.49	128.98	45	Manhole
47	SD 47	19.60	24	Cir	21.787	117.03	117.14	0.505	128.98*	129.12*	0.61	129.73	46	OpenHeadwall
48	SD 48	20.30	18	Cir	40.625	117.03	118.25	3.003	128.98*	130.28*	2.05	132.33	46	DropGrate
49	SD 49	0.37	15	Cir	96.292	116.06	116.54	0.498	120.13*	120.13*	0.00	120.13	44	DropGrate

Project File: 21104-SD.stm | Number of lines: 49 | Run Date: 11/13/2022

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

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	14.930	0.00	12.27	0.00	0.00	7.03	7.0	14.4	2.0	14.09	4.05	11.49	15	0.33	115.89	115.94	117.13	117.72	117.42	123.79	SD1
2	1	105.185	0.00	12.27	0.00	0.00	7.03	7.0	14.2	2.0	14.16	3.13	11.54	15	0.20	115.94	116.15	119.69	124.00	123.79	122.94	SD 2
3	2	19.055	1.61	12.27	0.65	1.05	7.03	7.0	14.2	2.0	14.18	2.78	11.55	15	0.16	116.15	116.18	125.34	126.13	122.94	122.64	SD 3
4	3	6.335	0.00	10.66	0.00	0.00	5.98	7.0	14.2	2.0	12.07	2.78	9.84	15	0.16	116.18	116.19	128.16	128.35	122.64	122.35	SD3
5	4	226.459	0.00	6.29	0.00	0.00	3.48	7.0	11.1	2.3	7.89	10.20	6.43	15	2.12	116.19	121.00	129.85	132.74	122.35	127.85	SD 5
6	5	224.563	0.00	6.29	0.00	0.00	3.48	7.0	10.5	2.3	8.10	14.00	6.60	15	4.01	121.00	130.00	132.83	135.85	127.85	135.91	SD 6
7	6	27.447	1.88	6.29	0.80	1.50	3.48	7.0	10.5	2.3	8.13	6.94	6.63	15	0.98	130.00	130.27	136.52	136.90	135.91	135.90	SD 7
8	7	71.658	0.00	4.41	0.00	0.00	1.98	7.0	10.1	2.4	4.69	9.92	3.82	15	2.01	130.27	131.71	137.24	137.56	135.90	133.23	SD 8
9	8	90.728	0.00	4.41	0.00	0.00	1.98	7.0	9.7	2.4	4.78	9.83	3.89	15	1.97	131.71	133.50	137.59	138.02	133.23	140.01	SD 9
10	9	27.432	0.49	4.41	0.50	0.25	1.98	7.0	9.6	2.4	4.81	15.80	3.92	15	5.10	133.50	134.90	138.25	138.38	140.01	136.84	SD 10
11	10	94.684	0.54	3.92	0.45	0.24	1.73	7.0	9.3	2.5	4.28	8.62	5.67	12	5.00	134.90	139.63	138.50	140.50	136.84	157.64	SD 11
12	11	100.682	0.27	3.38	0.44	0.12	1.49	7.0	9.0	2.5	3.75	10.85	8.98	12	7.92	148.00	155.97	148.41	156.79	157.64	157.67	SD 12
13	12	58.996	0.31	3.11	0.44	0.14	1.37	7.0	8.7	2.5	3.49	5.46	5.12	12	2.00	155.97	157.15	156.79	157.95	157.67	168.67	SD 13
14	13	59.983	0.50	2.80	0.44	0.22	1.23	7.0	8.5	2.6	3.18	5.46	4.85	12	2.00	157.15	158.35	157.95	159.11	168.67	171.67	SD 14
15	14	83.678	0.00	2.30	0.00	0.00	1.01	7.0	8.1	2.6	2.68	5.45	4.36	12	2.00	158.35	160.02	159.11	160.72	171.67	178.67	SD 15
16	15	23.964	0.00	2.30	0.00	0.00	1.01	7.0	8.0	2.7	2.70	5.46	4.58	12	2.00	160.02	160.50	160.72	161.20	178.67	179.15	SD 16
17	16	45.775	0.27	2.30	0.44	0.12	1.01	7.0	7.8	2.7	2.73	5.47	4.61	12	2.01	160.50	161.42	161.20	162.13	179.15	163.08	SD 17
18	17	64.246	0.39	2.03	0.44	0.17	0.89	7.0	7.4	2.8	2.47	5.45	4.27	12	1.99	161.42	162.70	162.13	163.37	163.08	164.37	SD 18
19	18	64.891	1.64	1.64	0.44	0.72	0.72	7.0	7.0	2.8	2.05	5.46	3.86	12	2.00	162.70	164.00	163.37	164.61	164.37	165.67	SD 19
20	4	26.335	1.79	4.37	0.70	1.25	2.50	7.0	14.1	2.0	5.07	3.34	4.13	15	0.23	116.19	116.25	129.85	129.99	122.35	122.64	SD 20
21	20	106.667	0.07	2.58	0.58	0.04	1.25	7.0	13.2	2.1	2.60	2.79	2.12	15	0.16	118.51	118.68	130.12	130.27	122.64	122.44	SD 21
22	21	64.317	0.07	2.51	0.53	0.04	1.21	7.0	12.9	2.1	2.55	2.93	3.25	12	0.58	118.68	119.05	130.38	130.66	122.44	122.64	SD 22
23	22	59.742	0.07	2.44	0.53	0.04	1.17	7.0	12.6	2.1	2.50	5.47	3.18	12	2.01	119.05	120.25	130.74	130.99	122.64	124.01	SD 23
24	23	60.311	0.07	2.37	0.53	0.04	1.13	7.0	12.3	2.2	2.45	7.03	3.12	12	3.32	120.25	122.25	131.07	131.31	124.01	126.00	SD 24
25	24	59.906	0.07	2.30	0.62	0.04	1.10	7.0	12.0	2.2	2.40	6.10	3.06	12	2.50	122.25	123.75	131.39	131.62	126.00	127.56	SD 25
26	25	59.968	0.07	2.23	0.56	0.04	1.05	7.0	11.7	2.2	2.34	6.87	2.98	12	3.17	123.75	125.65	131.69	131.91	127.56	129.80	SD 26
27	26	60.033	0.07	2.16	0.56	0.04	1.01	7.0	11.3	2.2	2.28	8.48	2.91	12	4.83	125.65	128.55	131.98	132.19	129.80	133.88	SD 27
28	27	59.775	0.07	2.09	0.62	0.04	0.98	7.0	11.0	2.3	2.23	8.64	3.52	12	5.02	130.05	133.05	132.26	133.69	133.88	136.94	SD 28

Project File: 21104-SD.stm

Number of lines: 49

Run Date: 11/13/2022

NOTES:Intensity = 7.41 / (Inlet time + 0.10) ^ 0.49; Return period =Yrs. 10 ; 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)	
29	28	60.747	0.07	2.02	0.56	0.04	0.93	7.0	10.6	2.3	2.16	8.57	6.63	12	4.94	134.55	137.55	134.89	138.18	136.94	139.13	SD 29
30	29	61.658	0.07	1.95	0.56	0.04	0.89	7.0	10.3	2.4	2.11	5.45	4.09	12	1.99	137.55	138.78	138.18	139.40	139.13	140.45	SD 30
31	30	60.616	0.07	1.88	0.62	0.04	0.85	7.0	9.9	2.4	2.05	5.45	5.26	12	2.00	145.00	146.21	145.43	146.82	140.45	147.88	SD 31
32	31	61.972	0.05	1.81	0.58	0.03	0.81	7.0	9.5	2.4	1.99	5.46	5.21	12	2.00	148.00	149.24	148.42	149.84	147.88	150.91	SD 32
33	32	51.170	0.05	1.76	0.58	0.03	0.78	7.0	9.2	2.5	1.95	5.78	5.32	12	2.25	150.00	151.15	150.40	151.74	150.91	152.32	SD 33
34	33	15.814	0.01	1.71	0.44	0.00	0.75	7.0	9.1	2.5	1.89	4.23	3.91	12	1.20	151.15	151.34	151.74	151.92	152.32	153.01	SD 34
35	34	52.672	0.18	1.70	0.44	0.08	0.75	7.0	8.7	2.6	1.91	5.45	5.15	12	1.99	155.00	156.05	155.41	156.64	153.01	161.32	SD 35
36	35	82.869	0.00	1.52	0.00	0.00	0.67	7.0	8.1	2.6	1.77	5.46	5.03	12	2.00	159.65	161.31	160.04	161.88	161.32	162.98	SD 36
37	36	24.083	0.00	1.52	0.00	0.00	0.67	7.0	7.9	2.7	1.79	5.45	3.89	12	1.99	161.31	161.79	161.88	162.36	162.98	163.46	SD 37
38	37	45.390	0.41	1.52	0.44	0.18	0.67	7.0	7.6	2.7	1.82	5.46	3.93	12	2.00	161.79	162.70	162.36	163.27	163.46	164.36	SD 38
39	38	65.131	1.11	1.11	0.44	0.49	0.49	7.0	7.0	2.8	1.39	5.45	3.26	12	2.00	162.70	164.00	163.27	164.50	164.36	164.36	SD 39
40	End	15.802	0.55	2.46	0.46	0.25	1.13	7.0	9.0	2.5	2.84	8.63	4.31	12	5.00	115.25	116.04	116.11	116.76	116.58	125.74	SD 40
41	40	86.500	0.52	1.91	0.47	0.24	0.88	7.0	8.6	2.6	2.26	6.00	5.67	12	2.42	122.42	124.51	122.85	125.15	125.74	129.18	SD 41
42	41	82.500	0.44	1.39	0.47	0.21	0.63	7.0	7.9	2.7	1.70	8.63	3.49	12	5.01	124.51	128.64	125.15	129.19	129.18	133.64	SD 42
43	42	86.500	0.95	0.95	0.45	0.43	0.43	7.0	7.0	2.8	1.21	6.08	4.72	12	2.49	129.22	131.37	129.52	131.83	133.64	136.23	SD 43
44	End	58.114	0.00	30.36	0.00	0.00	14.39	7.0	12.3	2.2	31.13	17.31	10.04	24	0.50	115.77	116.06	117.65	118.60	0.00	122.55	SD 44
45	44	66.052	0.28	30.18	0.74	0.21	14.26	7.0	7.2	2.8	39.86	17.32	12.69	24	0.50	116.06	116.39	120.13	121.88	122.55	122.95	SD 45
46	45	128.006	0.00	29.90	0.00	0.00	14.05	7.0	7.1	2.8	39.74	17.33	12.65	24	0.50	116.39	117.03	123.13	126.50	122.95	123.59	SD 46
47	46	21.787	14.69	14.69	0.47	6.90	6.90	7.0	7.0	2.8	19.60	17.41	6.24	24	0.50	117.03	117.14	128.98	129.12	123.59	123.70	SD 47
48	46	40.625	15.21	15.21	0.47	7.15	7.15	7.0	7.0	2.8	20.30	19.71	11.49	18	3.00	117.03	118.25	128.98	130.28	123.59	119.96	SD 48
49	44	96.292	0.18	0.18	0.73	0.13	0.13	7.0	7.0	2.8	0.37	4.94	0.30	15	0.50	116.06	116.54	120.13	120.13	122.55	122.61	SD 49

Project File: 21104-SD.stm

Number of lines: 49

Run Date: 11/13/2022

NOTES:Intensity = 7.41 / (Inlet time + 0.10) ^ 0.49; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	14.09	115.89	117.13	1.24	1.23	11.49	2.05	119.18	3.766	14.930	115.94	117.72	1.25	1.23	11.48	2.05	119.77	4.056	3.911	0.584	0.96	1.97
2	15	14.16	115.94	119.69	1.25	1.23	11.54	2.07	121.76	4.100	105.185	116.15	124.00	1.25	1.23	11.54	2.07	126.07	4.099	4.099	4.312	0.65	1.35
3	15	14.18	116.15	125.34	1.25	1.23	11.55	2.08	127.42	4.108	19.055	116.18	126.13	1.25	1.23	11.55	2.07	128.20	4.106	4.107	0.783	0.98	2.03
4	15	12.07	116.18	128.16	1.25	1.23	9.84	1.50	129.67	2.978	6.335	116.19	128.35	1.25	1.23	9.83	1.50	129.85	2.977	2.977	0.189	1.00	1.50
5	15	7.89	116.19	129.85	1.25	1.23	6.43	0.64	130.50	1.273	226.459	121.00	132.74	1.25	1.23	6.43	0.64	133.38	1.272	1.273	2.882	0.15	0.10
6	15	8.10	121.00	132.83	1.25	1.23	6.60	0.68	133.51	1.342	224.563	130.00	135.85	1.25	1.23	6.60	0.68	136.52	1.342	1.342	3.013	1.00	0.68
7	15	8.13	130.00	136.52	1.25	1.23	6.63	0.68	137.21	1.351	27.447	130.27	136.90	1.25	1.23	6.62	0.68	137.58	1.351	1.351	0.371	0.50	0.34
8	15	4.69	130.27	137.24	1.25	1.23	3.82	0.23	137.46	0.449	71.658	131.71	137.56	1.25	1.23	3.82	0.23	137.78	0.449	0.449	0.322	0.15	0.03
9	15	4.78	131.71	137.59	1.25	1.23	3.90	0.24	137.83	0.467	90.728	133.50	138.02	1.25	1.23	3.89	0.24	138.25	0.467	0.467	0.424	1.00	0.24
10	15	4.81	133.50	138.25	1.25	1.23	3.92	0.24	138.49	0.473	27.432	134.90	138.38	1.25	1.23	3.92	0.24	138.62	0.472	0.472	0.130	0.50	0.12
11	12	4.28	134.90	138.50	1.00	0.73	5.45	0.46	138.96	1.229	94.684	139.63	140.50 j	0.87**	0.73	5.90	0.54	141.04	1.121	1.175	n/a	0.50	n/a
12	12	3.75	148.00	148.41	0.41*	0.30	12.54	0.46	148.86	0.000	100.682	155.97	156.79	0.82**	0.69	5.41	0.46	157.25	0.000	0.000	n/a	0.50	0.23
13	12	3.49	155.97	156.79	0.82	0.67	5.04	0.42	157.21	0.000	58.996	157.15	157.95 j	0.80**	0.67	5.20	0.42	158.37	0.000	0.000	n/a	0.50	0.21
14	12	3.18	157.15	157.95	0.80	0.64	4.74	0.38	158.33	0.000	59.983	158.35	159.11 j	0.76**	0.64	4.95	0.38	159.49	0.000	0.000	n/a	0.50	0.19
15	12	2.68	158.35	159.11	0.76	0.59	4.16	0.32	159.44	0.000	83.678	160.02	160.72 j	0.70**	0.59	4.56	0.32	161.04	0.000	0.000	n/a	0.74	n/a
16	12	2.70	160.02	160.72	0.70	0.59	4.59	0.32	161.05	0.000	23.964	160.50	161.20	0.70**	0.59	4.57	0.32	161.53	0.000	0.000	n/a	0.76	n/a
17	12	2.73	160.50	161.20	0.70	0.59	4.63	0.33	161.53	0.000	45.775	161.42	162.13	0.71**	0.59	4.60	0.33	162.46	0.000	0.000	n/a	0.50	0.16
18	12	2.47	161.42	162.13	0.71	0.56	4.15	0.30	162.43	0.000	64.246	162.70	163.37 j	0.67**	0.56	4.39	0.30	163.67	0.000	0.000	n/a	0.50	0.15
19	12	2.05	162.70	163.37	0.67	0.50	3.65	0.26	163.63	0.000	64.891	164.00	164.61 j	0.61**	0.50	4.08	0.26	164.87	0.000	0.000	n/a	1.00	n/a
20	15	5.07	116.19	129.85	1.25	1.23	4.13	0.27	130.12	0.525	26.335	116.25	129.99	1.25	1.23	4.13	0.27	130.26	0.525	0.525	0.138	0.50	0.13
21	15	2.60	118.51	130.12	1.25	1.23	2.12	0.07	130.19	0.139	106.667	118.68	130.27	1.25	1.23	2.12	0.07	130.34	0.139	0.139	0.148	1.50	0.11
22	12	2.55	118.68	130.38	1.00	0.79	3.25	0.16	130.54	0.437	64.317	119.05	130.66	1.00	0.79	3.25	0.16	130.82	0.437	0.437	0.281	0.50	0.08
23	12	2.50	119.05	130.74	1.00	0.79	3.18	0.16	130.90	0.420	59.742	120.25	130.99	1.00	0.79	3.18	0.16	131.15	0.420	0.420	0.251	0.50	0.08
24	12	2.45	120.25	131.07	1.00	0.79	3.12	0.15	131.22	0.404	60.311	122.25	131.31	1.00	0.79	3.12	0.15	131.47	0.404	0.404	0.243	0.50	0.08
25	12	2.40	122.25	131.39	1.00	0.79	3.06	0.15	131.54	0.387	59.906	123.75	131.62	1.00	0.79	3.06	0.15	131.77	0.387	0.387	0.232	0.50	0.07
26	12	2.34	123.75	131.69	1.00	0.79	2.98	0.14	131.83	0.367	59.968	125.65	131.91	1.00	0.79	2.98	0.14	132.05	0.367	0.367	0.220	0.50	0.07
27	12	2.28	125.65	131.98	1.00	0.79	2.91	0.13	132.12	0.350	60.033	128.55	132.19	1.00	0.79	2.91	0.13	132.33	0.350	0.350	0.210	0.50	0.07
28	12	2.23	130.05	132.26	1.00	0.53	2.84	0.12	132.38	0.333	59.775	133.05	133.69 j	0.64**	0.53	4.21	0.28	133.96	0.615	0.474	n/a	0.50	n/a

Project File: 21104-SD.stm | Number of lines: 49 | Run Date: 11/13/2022

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
29	12	2.16	134.55	134.89	0.34*	0.24	9.09	0.27	135.16	0.000	60.747	137.55	138.18	0.63**	0.52	4.16	0.27	138.45	0.000	0.000	n/a	0.50	0.13
30	12	2.11	137.55	138.18	0.63	0.51	4.06	0.26	138.44	0.000	61.658	138.78	139.40 j	0.62**	0.51	4.12	0.26	139.66	0.000	0.000	n/a	0.50	n/a
31	12	2.05	145.00	145.43	0.43*	0.32	6.45	0.26	145.68	0.000	60.616	146.21	146.82	0.61**	0.50	4.08	0.26	147.08	0.000	0.000	n/a	0.50	n/a
32	12	1.99	148.00	148.42	0.42*	0.31	6.40	0.25	148.67	0.000	61.972	149.24	149.84	0.60**	0.49	4.03	0.25	150.09	0.000	0.000	n/a	0.50	0.13
33	12	1.95	150.00	150.40	0.40*	0.29	6.64	0.25	150.65	0.000	51.170	151.15	151.74	0.59**	0.49	4.00	0.25	151.99	0.000	0.000	n/a	0.50	0.12
34	12	1.89	151.15	151.74	0.59	0.48	3.88	0.24	151.99	0.000	15.814	151.34	151.92 j	0.58**	0.48	3.95	0.24	152.17	0.000	0.000	n/a	0.50	n/a
35	12	1.91	155.00	155.41	0.41*	0.30	6.32	0.25	155.65	0.000	52.672	156.05	156.64	0.59**	0.48	3.97	0.25	156.88	0.000	0.000	n/a	0.50	n/a
36	12	1.77	159.65	160.04	0.39*	0.29	6.20	0.23	160.27	0.000	82.869	161.31	161.88	0.57**	0.46	3.86	0.23	162.11	0.000	0.000	n/a	0.75	0.17
37	12	1.79	161.31	161.88	0.57	0.46	3.90	0.23	162.11	0.000	24.083	161.79	162.36	0.57**	0.46	3.88	0.23	162.59	0.000	0.000	n/a	0.75	0.18
38	12	1.82	161.79	162.36	0.57	0.46	3.95	0.24	162.60	0.000	45.390	162.70	163.27	0.57**	0.47	3.90	0.24	163.51	0.000	0.000	n/a	0.50	n/a
39	12	1.39	162.70	163.27	0.57	0.39	2.97	0.20	163.47	0.000	65.131	164.00	164.50 j	0.50**	0.39	3.55	0.20	164.69	0.000	0.000	n/a	1.00	n/a
40	12	2.84	115.25	116.11	0.86	0.61	3.95	0.34	116.45	0.000	15.802	116.04	116.76 j	0.72**	0.61	4.68	0.34	117.10	0.000	0.000	n/a	0.93	n/a
41	12	2.26	122.42	122.85	0.43*	0.32	7.10	0.28	123.13	0.000	86.500	124.51	125.15	0.64**	0.53	4.24	0.28	125.43	0.000	0.000	n/a	0.50	n/a
42	12	1.70	124.51	125.15	0.64	0.45	3.18	0.23	125.38	0.000	82.500	128.64	129.19 j	0.55**	0.45	3.80	0.23	129.42	0.000	0.000	n/a	0.50	0.11
43	12	1.21	129.22	129.52	0.30*	0.20	6.04	0.18	129.70	0.000	86.500	131.37	131.83	0.46**	0.36	3.40	0.18	132.01	0.000	0.000	n/a	1.00	n/a
44	24	31.13	115.77	117.65	1.88*	3.06	10.16	1.61	119.25	1.394	58.114	116.06	118.60	2.00	3.14	9.91	1.53	120.13	1.614	1.504	0.874	1.00	1.53
45	24	39.86	116.06	120.13	2.00	3.14	12.69	2.50	122.63	2.648	66.052	116.39	121.88	2.00	3.14	12.69	2.50	124.38	2.647	2.647	1.749	0.50	1.25
46	24	39.74	116.39	123.13	2.00	3.14	12.65	2.49	125.62	2.631	128.006	117.03	126.50	2.00	3.14	12.65	2.49	128.98	2.630	2.631	3.368	1.00	2.49
47	24	19.60	117.03	128.98	2.00	3.14	6.24	0.61	129.59	0.640	21.787	117.14	129.12	2.00	3.14	6.24	0.61	129.73	0.640	0.640	0.139	1.00	0.61
48	18	20.30	117.03	128.98	1.50	1.77	11.49	2.05	131.04	3.184	40.625	118.25	130.28	1.50	1.77	11.49	2.05	132.33	3.183	3.184	1.293	1.00	2.05
49	15	0.37	116.06	120.13	1.25	1.23	0.30	0.00	120.13	0.003	96.292	116.54	120.13	1.25	1.23	0.30	0.00	120.13	0.003	0.003	0.003	1.00	0.00

Project File: 21104-SD.stm

Number of lines: 49

Run Date: 11/13/2022

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	SD1	23.13	15	Cir	14.930	115.89	115.94	0.335	117.14*	118.74*	5.30	124.05	End	Manhole
2	SD 2	23.22	15	Cir	105.185	115.94	116.15	0.200	124.05*	135.64*	3.62	139.26	1	Manhole
3	SD 3	23.24	15	Cir	19.055	116.15	116.18	0.157	139.26*	141.37*	5.46	146.83	2	Curb-
4	SD3	19.79	15	Cir	6.335	116.18	116.19	0.158	146.83*	147.34*	4.04	151.38	3	Manhole
5	SD 5	12.60	15	Cir	226.459	116.19	121.00	2.124	151.38*	158.73*	0.25	158.97	4	Manhole
6	SD 6	12.85	15	Cir	224.563	121.00	130.00	4.008	158.97*	166.55*	1.70	168.26	5	Manhole
7	SD 7	12.88	15	Cir	27.447	130.00	130.27	0.984	168.26*	169.19*	0.86	170.04	6	Curb-
8	SD 8	7.39	15	Cir	71.658	130.27	131.71	2.010	170.04*	170.84*	0.08	170.93	7	None
9	SD 9	7.50	15	Cir	90.728	131.71	133.50	1.973	170.93*	171.97*	0.58	172.55	8	Manhole
10	SD 10	7.53	15	Cir	27.432	133.50	134.90	5.104	172.55*	172.87*	0.29	173.17	9	DropGrate
11	SD 11	6.67	12	Cir	94.684	134.90	139.63	4.996	173.17*	176.00*	0.56	176.56	10	DropGrate
12	SD 12	5.81	12	Cir	100.682	148.00	155.97	7.916	176.56*	178.85*	0.43	179.27	11	DropGrate
13	SD 13	5.40	12	Cir	58.996	155.97	157.15	2.000	179.27*	180.43*	0.37	180.79	12	DropGrate
14	SD 14	4.91	12	Cir	59.983	157.15	158.35	2.001	180.79*	181.76*	0.30	182.07	13	DropGrate
15	SD 15	4.10	12	Cir	83.678	158.35	160.02	1.996	182.07*	183.01*	0.31	183.33	14	None
16	SD 16	4.12	12	Cir	23.964	160.02	160.50	2.003	183.33*	183.60*	0.32	183.92	15	None
17	SD 17	4.15	12	Cir	45.775	160.50	161.42	2.010	183.92*	184.45*	0.22	184.67	16	DropGrate
18	SD 18	3.72	12	Cir	64.246	161.42	162.70	1.992	184.67*	185.27*	0.17	185.44	17	DropGrate
19	SD 19	3.06	12	Cir	64.891	162.70	164.00	2.003	185.44*	185.85*	0.24	186.09	18	DropGrate
20	SD 20	8.30	15	Cir	26.335	116.19	116.25	0.228	151.38*	151.76*	0.36	152.11	4	Curb-
21	SD 21	4.24	15	Cir	106.667	118.51	118.68	0.159	152.11*	152.50*	0.28	152.78	20	DropGrate
22	SD 22	4.14	12	Cir	64.317	118.68	119.05	0.575	152.78*	153.52*	0.22	153.74	21	DropGrate
23	SD 23	4.05	12	Cir	59.742	119.05	120.25	2.009	153.74*	154.40*	0.21	154.60	22	DropGrate
24	SD 24	3.96	12	Cir	60.311	120.25	122.25	3.316	154.60*	155.24*	0.20	155.44	23	DropGrate
25	SD 25	3.87	12	Cir	59.906	122.25	123.75	2.504	155.44*	156.04*	0.19	156.23	24	DropGrate
26	SD 26	3.75	12	Cir	59.968	123.75	125.65	3.168	156.23*	156.79*	0.18	156.97	25	DropGrate
27	SD 27	3.65	12	Cir	60.033	125.65	128.55	4.831	156.97*	157.51*	0.17	157.68	26	DropGrate
28	SD 28	3.55	12	Cir	59.775	130.05	133.05	5.019	157.68*	158.18*	0.16	158.34	27	DropGrate
29	SD 29	3.43	12	Cir	60.747	134.55	137.55	4.938	158.34*	158.82*	0.15	158.97	28	DropGrate
30	SD 30	3.33	12	Cir	61.658	137.55	138.78	1.995	158.97*	159.43*	0.14	159.57	29	DropGrate
31	SD 31	3.22	12	Cir	60.616	145.00	146.21	1.996	159.57*	159.99*	0.13	160.12	30	DropGrate

Project File: 21104-Storm Drain 100 YRS 20221113.stm

Number of lines: 49

Run Date: 11/13/2022

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
32	SD 32	3.11	12	Cir	61.972	148.00	149.24	2.001	160.12*	160.53*	0.12	160.65	31	DropGrate
33	SD 33	3.03	12	Cir	51.170	150.00	151.15	2.247	160.65*	160.96*	0.12	161.08	32	DropGrate
34	SD 34	2.93	12	Cir	15.814	151.15	151.34	1.201	161.08*	161.17*	0.11	161.28	33	DropGrate
35	SD 35	2.95	12	Cir	52.672	155.00	156.05	1.993	161.28*	161.59*	0.11	161.70	34	DropGrate
36	SD 36	2.71	12	Cir	82.869	159.65	161.31	2.003	161.70	162.05	0.22	162.27	35	None
37	SD 37	2.72	12	Cir	24.083	161.31	161.79	1.993	162.27	162.50	n/a	162.50 j	36	None
38	SD 38	2.76	12	Cir	45.390	161.79	162.70	2.005	162.50	163.41	n/a	163.41	37	DropGrate
39	SD 39	2.07	12	Cir	65.131	162.70	164.00	1.996	163.41	164.61	n/a	164.61 j	38	DropGrate
40	SD 40	4.41	12	Cir	15.802	115.25	116.04	4.999	116.19	116.92	n/a	116.92 j	End	DropGrate
41	SD 41	3.49	12	Cir	86.500	122.42	124.51	2.416	122.97	125.31	n/a	125.31	40	DropGrate
42	SD 42	2.58	12	Cir	82.500	124.51	128.64	5.006	125.31	129.33	n/a	129.33 j	41	DropGrate
43	SD 43	1.81	12	Cir	86.500	129.22	131.37	2.486	129.59	131.94	0.24	131.94	42	DropGrate
44	SD 44	50.24	24	Cir	58.114	115.77	116.06	0.499	118.69*	121.14*	3.98	125.11	End	Manhole
45	SD 45	59.90	24	Cir	66.052	116.06	116.39	0.500	125.11*	129.06*	2.83	131.89	44	DropGrate
46	SD 46	59.49	24	Cir	128.006	116.39	117.03	0.500	131.89*	139.44*	5.57	145.01	45	Manhole
47	SD 47	29.30	24	Cir	21.787	117.03	117.14	0.505	145.01*	145.32*	1.35	146.68	46	OpenHeadwall
48	SD 48	30.34	18	Cir	40.625	117.03	118.25	3.003	145.01*	147.90*	4.58	152.49	46	DropGrate
49	SD 49	0.56	15	Cir	96.292	116.06	116.54	0.498	125.11*	125.12*	0.00	125.12	44	DropGrate

Project File: 21104-Storm Drain 100 YRS 20221113.stm

Number of lines: 49

Run Date: 11/13/2022

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

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	14.930	0.00	12.27	0.00	0.00	7.03	7.0	11.9	3.3	23.13	4.05	18.85	15	0.33	115.89	115.94	117.14	118.74	117.42	123.79	SD1
2	1	105.185	0.00	12.27	0.00	0.00	7.03	7.0	11.8	3.3	23.22	3.13	18.93	15	0.20	115.94	116.15	124.05	135.64	123.79	122.94	SD 2
3	2	19.055	1.61	12.27	0.65	1.05	7.03	7.0	11.8	3.3	23.24	2.78	18.94	15	0.16	116.15	116.18	139.26	141.37	122.94	122.64	SD 3
4	3	6.335	0.00	10.66	0.00	0.00	5.98	7.0	11.8	3.3	19.79	2.78	16.13	15	0.16	116.18	116.19	146.83	147.34	122.64	122.35	SD3
5	4	226.459	0.00	6.29	0.00	0.00	3.48	7.0	9.8	3.6	12.60	10.20	10.27	15	2.12	116.19	121.00	151.38	158.73	122.35	127.85	SD 5
6	5	224.563	0.00	6.29	0.00	0.00	3.48	7.0	9.4	3.7	12.85	14.00	10.47	15	4.01	121.00	130.00	158.97	166.55	127.85	135.91	SD 6
7	6	27.447	1.88	6.29	0.80	1.50	3.48	7.0	9.3	3.7	12.88	6.94	10.50	15	0.98	130.00	130.27	168.26	169.19	135.91	135.90	SD 7
8	7	71.658	0.00	4.41	0.00	0.00	1.98	7.0	9.1	3.7	7.39	9.92	6.03	15	2.01	130.27	131.71	170.04	170.84	135.90	133.23	SD 8
9	8	90.728	0.00	4.41	0.00	0.00	1.98	7.0	8.8	3.8	7.50	9.83	6.11	15	1.97	131.71	133.50	170.93	171.97	133.23	140.01	SD 9
10	9	27.432	0.49	4.41	0.50	0.25	1.98	7.0	8.8	3.8	7.53	15.80	6.14	15	5.10	133.50	134.90	172.55	172.87	140.01	136.84	SD 10
11	10	94.684	0.54	3.92	0.45	0.24	1.73	7.0	8.6	3.9	6.67	8.62	8.50	12	5.00	134.90	139.63	173.17	176.00	136.84	157.64	SD 11
12	11	100.682	0.27	3.38	0.44	0.12	1.49	7.0	8.3	3.9	5.81	10.85	7.40	12	7.92	148.00	155.97	176.56	178.85	157.64	157.67	SD 12
13	12	58.996	0.31	3.11	0.44	0.14	1.37	7.0	8.2	3.9	5.40	5.46	6.87	12	2.00	155.97	157.15	179.27	180.43	157.67	168.67	SD 13
14	13	59.983	0.50	2.80	0.44	0.22	1.23	7.0	8.0	4.0	4.91	5.46	6.25	12	2.00	157.15	158.35	180.79	181.76	168.67	171.67	SD 14
15	14	83.678	0.00	2.30	0.00	0.00	1.01	7.0	7.7	4.0	4.10	5.45	5.22	12	2.00	158.35	160.02	182.07	183.01	171.67	178.67	SD 15
16	15	23.964	0.00	2.30	0.00	0.00	1.01	7.0	7.7	4.1	4.12	5.46	5.24	12	2.00	160.02	160.50	183.33	183.60	178.67	179.15	SD 16
17	16	45.775	0.27	2.30	0.44	0.12	1.01	7.0	7.5	4.1	4.15	5.47	5.29	12	2.01	160.50	161.42	183.92	184.45	179.15	163.08	SD 17
18	17	64.246	0.39	2.03	0.44	0.17	0.89	7.0	7.3	4.2	3.72	5.45	4.74	12	1.99	161.42	162.70	184.67	185.27	163.08	164.37	SD 18
19	18	64.891	1.64	1.64	0.44	0.72	0.72	7.0	7.0	4.2	3.06	5.46	3.90	12	2.00	162.70	164.00	185.44	185.85	164.37	165.67	SD 19
20	4	26.335	1.79	4.37	0.70	1.25	2.50	7.0	11.7	3.3	8.30	3.34	6.76	15	0.23	116.19	116.25	151.38	151.76	122.35	122.64	SD 20
21	20	106.667	0.07	2.58	0.58	0.04	1.25	7.0	11.2	3.4	4.24	2.79	3.46	15	0.16	118.51	118.68	152.11	152.50	122.64	122.44	SD 21
22	21	64.317	0.07	2.51	0.53	0.04	1.21	7.0	11.0	3.4	4.14	2.93	5.27	12	0.58	118.68	119.05	152.78	153.52	122.44	122.64	SD 22
23	22	59.742	0.07	2.44	0.53	0.04	1.17	7.0	10.8	3.5	4.05	5.47	5.16	12	2.01	119.05	120.25	153.74	154.40	122.64	124.01	SD 23
24	23	60.311	0.07	2.37	0.53	0.04	1.13	7.0	10.5	3.5	3.96	7.03	5.04	12	3.32	120.25	122.25	154.60	155.24	124.01	126.00	SD 24
25	24	59.906	0.07	2.30	0.62	0.04	1.10	7.0	10.3	3.5	3.87	6.10	4.92	12	2.50	122.25	123.75	155.44	156.04	126.00	127.56	SD 25
26	25	59.968	0.07	2.23	0.56	0.04	1.05	7.0	10.1	3.6	3.75	6.87	4.78	12	3.17	123.75	125.65	156.23	156.79	127.56	129.80	SD 26
27	26	60.033	0.07	2.16	0.56	0.04	1.01	7.0	9.9	3.6	3.65	8.48	4.65	12	4.83	125.65	128.55	156.97	157.51	129.80	133.88	SD 27
28	27	59.775	0.07	2.09	0.62	0.04	0.98	7.0	9.7	3.6	3.55	8.64	4.52	12	5.02	130.05	133.05	157.68	158.18	133.88	136.94	SD 28

Project File: 21104-Storm Drain 100 YRS 20221113.stm

Number of lines: 49

Run Date: 11/13/2022

NOTES:Intensity = 10.96 / (Inlet time + 0.10) ^ 0.48; Return period =Yrs. 100 ; 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)	
29	28	60.747	0.07	2.02	0.56	0.04	0.93	7.0	9.4	3.7	3.43	8.57	4.37	12	4.94	134.55	137.55	158.34	158.82	136.94	139.13	SD 29
30	29	61.658	0.07	1.95	0.56	0.04	0.89	7.0	9.2	3.7	3.33	5.45	4.24	12	1.99	137.55	138.78	158.97	159.43	139.13	140.45	SD 30
31	30	60.616	0.07	1.88	0.62	0.04	0.85	7.0	8.9	3.8	3.22	5.45	4.11	12	2.00	145.00	146.21	159.57	159.99	140.45	147.88	SD 31
32	31	61.972	0.05	1.81	0.58	0.03	0.81	7.0	8.7	3.8	3.11	5.46	3.95	12	2.00	148.00	149.24	160.12	160.53	147.88	150.91	SD 32
33	32	51.170	0.05	1.76	0.58	0.03	0.78	7.0	8.4	3.9	3.03	5.78	3.86	12	2.25	150.00	151.15	160.65	160.96	150.91	152.32	SD 33
34	33	15.814	0.01	1.71	0.44	0.00	0.75	7.0	8.4	3.9	2.93	4.23	3.73	12	1.20	151.15	151.34	161.08	161.17	152.32	153.01	SD 34
35	34	52.672	0.18	1.70	0.44	0.08	0.75	7.0	8.1	3.9	2.95	5.45	3.76	12	1.99	155.00	156.05	161.28	161.59	153.01	161.32	SD 35
36	35	82.869	0.00	1.52	0.00	0.00	0.67	7.0	7.7	4.0	2.71	5.46	3.91	12	2.00	159.65	161.31	161.70	162.05	161.32	162.98	SD 36
37	36	24.083	0.00	1.52	0.00	0.00	0.67	7.0	7.6	4.1	2.72	5.45	4.05	12	1.99	161.31	161.79	162.27	162.50	162.98	163.46	SD 37
38	37	45.390	0.41	1.52	0.44	0.18	0.67	7.0	7.4	4.1	2.76	5.46	4.64	12	2.00	161.79	162.70	162.50	163.41	163.46	164.36	SD 38
39	38	65.131	1.11	1.11	0.44	0.49	0.49	7.0	7.0	4.2	2.07	5.45	3.78	12	2.00	162.70	164.00	163.41	164.61	164.36	164.36	SD 39
40	End	15.802	0.55	2.46	0.46	0.25	1.13	7.0	8.4	3.9	4.41	8.63	5.90	12	5.00	115.25	116.04	116.19	116.92	116.58	125.74	SD 40
41	40	86.500	0.52	1.91	0.47	0.24	0.88	7.0	8.0	4.0	3.49	6.00	6.56	12	2.42	122.42	124.51	122.97	125.31	125.74	129.18	SD 41
42	41	82.500	0.44	1.39	0.47	0.21	0.63	7.0	7.6	4.1	2.58	8.63	4.17	12	5.01	124.51	128.64	125.31	129.33	129.18	133.64	SD 42
43	42	86.500	0.95	0.95	0.45	0.43	0.43	7.0	7.0	4.2	1.81	6.08	5.33	12	2.49	129.22	131.37	129.59	131.94	133.64	136.23	SD 43
44	End	58.114	0.00	30.36	0.00	0.00	14.39	7.0	10.5	3.5	50.24	17.31	15.99	24	0.50	115.77	116.06	118.69	121.14	0.00	122.55	SD 44
45	44	66.052	0.28	30.18	0.74	0.21	14.26	7.0	7.2	4.2	59.90	17.32	19.07	24	0.50	116.06	116.39	125.11	129.06	122.55	122.95	SD 45
46	45	128.006	0.00	29.90	0.00	0.00	14.05	7.0	7.0	4.2	59.49	17.33	18.94	24	0.50	116.39	117.03	131.89	139.44	122.95	123.59	SD 46
47	46	21.787	14.69	14.69	0.47	6.90	6.90	7.0	7.0	4.2	29.30	17.41	9.33	24	0.50	117.03	117.14	145.01	145.32	123.59	123.70	SD 47
48	46	40.625	15.21	15.21	0.47	7.15	7.15	7.0	7.0	4.2	30.34	19.71	17.17	18	3.00	117.03	118.25	145.01	147.90	123.59	119.96	SD 48
49	44	96.292	0.18	0.18	0.73	0.13	0.13	7.0	7.0	4.2	0.56	4.94	0.45	15	0.50	116.06	116.54	125.11	125.12	122.55	122.61	SD 49

Project File: 21104-Storm Drain 100 YRS 20221113.stm

Number of lines: 49

Run Date: 11/13/2022

NOTES:Intensity = 10.96 / (Inlet time + 0.10) ^ 0.48; Return period =Yrs. 100 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	23.13	115.89	117.14	1.25	1.23	18.85	5.52	122.66	10.566	14.930	115.94	118.74	1.25**	1.23	18.85	5.52	124.27	10.932	10.749	1.605	0.96	5.30
2	15	23.22	115.94	124.05	1.25	1.23	18.93	5.57	129.62	11.026	105.185	116.15	135.64	1.25**	1.23	18.92	5.57	141.21	11.022	11.024	11.60	0.65	3.62
3	15	23.24	116.15	139.26	1.25	1.23	18.94	5.58	144.84	11.043	19.055	116.18	141.37	1.25**	1.23	18.94	5.58	146.95	11.038	11.040	2.104	0.98	5.46
4	15	19.79	116.18	146.83	1.25	1.23	16.13	4.04	150.88	8.003	6.335	116.19	147.34	1.25**	1.23	16.12	4.04	151.38	8.000	8.002	0.507	1.00	4.04
5	15	12.60	116.19	151.38	1.25	1.23	10.27	1.64	153.02	3.244	226.459	121.00	158.73	1.25	1.23	10.26	1.64	160.37	3.243	3.243	7.344	0.15	0.25
6	15	12.85	121.00	158.97	1.25	1.23	10.47	1.70	160.68	3.375	224.563	130.00	166.55	1.25	1.23	10.47	1.70	168.26	3.373	3.374	7.577	1.00	1.70
7	15	12.88	130.00	168.26	1.25	1.23	10.50	1.71	169.97	3.391	27.447	130.27	169.19	1.25	1.23	10.50	1.71	170.90	3.390	3.391	0.931	0.50	0.86
8	15	7.39	130.27	170.04	1.25	1.23	6.03	0.56	170.61	1.118	71.658	131.71	170.84	1.25	1.23	6.03	0.56	171.41	1.117	1.118	0.801	0.15	0.08
9	15	7.50	131.71	170.93	1.25	1.23	6.11	0.58	171.51	1.150	90.728	133.50	171.97	1.25	1.23	6.11	0.58	172.55	1.150	1.150	1.044	1.00	0.58
10	15	7.53	133.50	172.55	1.25	1.23	6.14	0.59	173.14	1.161	27.432	134.90	172.87	1.25	1.23	6.14	0.59	173.46	1.160	1.160	0.318	0.50	0.29
11	12	6.67	134.90	173.17	1.00	0.79	8.50	1.12	174.29	2.993	94.684	139.63	176.00	1.00	0.79	8.50	1.12	177.12	2.991	2.992	2.833	0.50	0.56
12	12	5.81	148.00	176.56	1.00	0.79	7.40	0.85	177.41	2.272	100.682	155.97	178.85	1.00	0.79	7.40	0.85	179.70	2.271	2.271	2.287	0.50	0.43
13	12	5.40	155.97	179.27	1.00	0.79	6.87	0.73	180.01	1.957	58.996	157.15	180.43	1.00	0.79	6.87	0.73	181.16	1.956	1.956	1.154	0.50	0.37
14	12	4.91	157.15	180.79	1.00	0.79	6.25	0.61	181.40	1.617	59.983	158.35	181.76	1.00	0.79	6.25	0.61	182.37	1.617	1.617	0.970	0.50	0.30
15	12	4.10	158.35	182.07	1.00	0.79	5.22	0.42	182.49	1.128	83.678	160.02	183.01	1.00	0.79	5.22	0.42	183.44	1.128	1.128	0.944	0.74	0.31
16	12	4.12	160.02	183.33	1.00	0.79	5.24	0.43	183.75	1.139	23.964	160.50	183.60	1.00	0.79	5.24	0.43	184.03	1.139	1.139	0.273	0.76	0.32
17	12	4.15	160.50	183.92	1.00	0.79	5.29	0.44	184.36	1.160	45.775	161.42	184.45	1.00	0.79	5.29	0.44	184.89	1.160	1.160	0.531	0.50	0.22
18	12	3.72	161.42	184.67	1.00	0.79	4.74	0.35	185.02	0.931	64.246	162.70	185.27	1.00	0.79	4.74	0.35	185.62	0.930	0.931	0.598	0.50	0.17
19	12	3.06	162.70	185.44	1.00	0.79	3.90	0.24	185.68	0.630	64.891	164.00	185.85	1.00	0.79	3.90	0.24	186.09	0.630	0.630	0.409	1.00	0.24
20	15	8.30	116.19	151.38	1.25	1.23	6.77	0.71	152.10	1.409	26.335	116.25	151.76	1.25	1.23	6.76	0.71	152.47	1.408	1.408	0.371	0.50	0.36
21	15	4.24	118.51	152.11	1.25	1.23	3.46	0.19	152.30	0.368	106.667	118.68	152.50	1.25	1.23	3.46	0.19	152.69	0.367	0.367	0.392	1.50	0.28
22	12	4.14	118.68	152.78	1.00	0.79	5.27	0.43	153.21	1.152	64.317	119.05	153.52	1.00	0.79	5.27	0.43	153.95	1.152	1.152	0.741	0.50	0.22
23	12	4.05	119.05	153.74	1.00	0.79	5.16	0.41	154.15	1.102	59.742	120.25	154.40	1.00	0.79	5.16	0.41	154.81	1.102	1.102	0.658	0.50	0.21
24	12	3.96	120.25	154.60	1.00	0.79	5.04	0.40	155.00	1.053	60.311	122.25	155.24	1.00	0.79	5.04	0.39	155.63	1.053	1.053	0.635	0.50	0.20
25	12	3.87	122.25	155.44	1.00	0.79	4.92	0.38	155.81	1.005	59.906	123.75	156.04	1.00	0.79	4.92	0.38	156.41	1.004	1.004	0.602	0.50	0.19
26	12	3.75	123.75	156.23	1.00	0.79	4.78	0.35	156.58	0.946	59.968	125.65	156.79	1.00	0.79	4.78	0.35	157.15	0.945	0.946	0.567	0.50	0.18
27	12	3.65	125.65	156.97	1.00	0.79	4.65	0.34	157.31	0.896	60.033	128.55	157.51	1.00	0.79	4.65	0.34	157.84	0.895	0.895	0.538	0.50	0.17
28	12	3.55	130.05	157.68	1.00	0.79	4.52	0.32	157.99	0.846	59.775	133.05	158.18	1.00	0.79	4.52	0.32	158.50	0.846	0.846	0.506	0.50	0.16

Project File: 21104-Storm Drain 100 YRS 20221113.stm

Number of lines: 49

Run Date: 11/13/2022

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
29	12	3.43	134.55	158.34	1.00	0.79	4.37	0.30	158.64	0.791	60.747	137.55	158.82	1.00	0.79	4.37	0.30	159.12	0.791	0.791	0.481	0.50	0.15
30	12	3.33	137.55	158.97	1.00	0.79	4.24	0.28	159.25	0.745	61.658	138.78	159.43	1.00	0.79	4.24	0.28	159.71	0.745	0.745	0.459	0.50	0.14
31	12	3.22	145.00	159.57	1.00	0.79	4.11	0.26	159.83	0.699	60.616	146.21	159.99	1.00	0.79	4.11	0.26	160.25	0.699	0.699	0.424	0.50	0.13
32	12	3.11	148.00	160.12	1.00	0.79	3.95	0.24	160.37	0.648	61.972	149.24	160.53	1.00	0.79	3.95	0.24	160.77	0.648	0.648	0.402	0.50	0.12
33	12	3.03	150.00	160.65	1.00	0.79	3.86	0.23	160.88	0.618	51.170	151.15	160.96	1.00	0.79	3.86	0.23	161.19	0.618	0.618	0.316	0.50	0.12
34	12	2.93	151.15	161.08	1.00	0.79	3.73	0.22	161.30	0.577	15.814	151.34	161.17	1.00	0.79	3.73	0.22	161.39	0.577	0.577	0.091	0.50	0.11
35	12	2.95	155.00	161.28	1.00	0.79	3.76	0.22	161.50	0.586	52.672	156.05	161.59	1.00	0.79	3.76	0.22	161.81	0.586	0.586	0.309	0.50	0.11
36	12	2.71	159.65	161.70	1.00	0.79	3.45	0.18	161.88	0.492	82.869	161.31	162.05	0.74	0.62	4.37	0.30	162.34	0.619	0.555	0.460	0.75	0.22
37	12	2.72	161.31	162.27	0.96	0.59	3.52	0.33	162.60	0.000	24.083	161.79	162.50 j	0.71**	0.59	4.59	0.33	162.82	0.000	0.000	n/a	0.75	n/a
38	12	2.76	161.79	162.50	0.71	0.59	4.65	0.33	162.83	0.000	45.390	162.70	163.41	0.71**	0.60	4.62	0.33	163.74	0.000	0.000	n/a	0.50	n/a
39	12	2.07	162.70	163.41	0.71	0.51	3.47	0.26	163.67	0.000	65.131	164.00	164.61 j	0.61**	0.51	4.10	0.26	164.88	0.000	0.000	n/a	1.00	0.26
40	12	4.41	115.25	116.19	0.94	0.73	5.76	0.57	116.75	0.000	15.802	116.04	116.92 j	0.88**	0.73	6.03	0.57	117.49	0.000	0.000	n/a	0.93	0.53
41	12	3.49	122.42	122.97	0.55*	0.44	7.92	0.42	123.39	0.000	86.500	124.51	125.31	0.80**	0.67	5.20	0.42	125.73	0.000	0.000	n/a	0.50	n/a
42	12	2.58	124.51	125.31	0.80	0.58	3.85	0.31	125.62	0.000	82.500	128.64	129.33 j	0.69**	0.58	4.48	0.31	129.64	0.000	0.000	n/a	0.50	n/a
43	12	1.81	129.22	129.59	0.37*	0.27	6.76	0.24	129.83	0.000	86.500	131.37	131.94	0.57**	0.47	3.90	0.24	132.18	0.000	0.000	n/a	1.00	0.24
44	24	50.24	115.77	118.69	2.00	3.14	16.00	3.98	122.67	4.207	58.114	116.06	121.14	2.00	3.14	15.99	3.98	125.11	4.205	4.206	2.444	1.00	3.98
45	24	59.90	116.06	125.11	2.00	3.14	19.07	5.65	130.77	5.979	66.052	116.39	129.06	2.00**	3.14	19.07	5.65	134.72	5.977	5.978	3.949	0.50	2.83
46	24	59.49	116.39	131.89	2.00	3.14	18.94	5.58	137.47	5.896	128.006	117.03	139.44	2.00	3.14	18.93	5.57	145.01	5.894	5.895	7.546	1.00	5.57
47	24	29.30	117.03	145.01	2.00	3.14	9.33	1.35	146.37	1.431	21.787	117.14	145.32	2.00	3.14	9.33	1.35	146.68	1.430	1.431	0.312	1.00	1.35
48	18	30.34	117.03	145.01	1.50	1.77	17.17	4.59	149.60	7.116	40.625	118.25	147.90	1.50**	1.77	17.17	4.58	152.49	7.114	7.115	2.890	1.00	4.58
49	15	0.56	116.06	125.11	1.25	1.23	0.45	0.00	125.12	0.006	96.292	116.54	125.12	1.25	1.23	0.45	0.00	125.12	0.006	0.006	0.006	1.00	0.00

Project File: 21104-Storm Drain 100 YRS 20221113.stm

Number of lines: 49

Run Date: 11/13/2022

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

10 Year Data

Altman Acres Subdivision
Head Water Calculations

CATEGORY:				PIPE DATA						HEAD LOSSES				ELEVATIONS			
ITEM:	LENGTH	DIAMETER	AREA	MANNINGS COEFF	FLOW	VELOCITY	VELOCITY HEAD	FRICTION SLOPE	FRICTION LOSS	CONTRAC-TION LOSS	ENLARGE-MENT LOSS	BENDS & LOSSES	SUMMATION OF LOSSES	ENERGY GRADE	HYDRAULIC GRADE	INLET GRADE	INVERT GRADE
SYMBOL:	L (ft)	D (ft)	A (ft2)	n	Q (ft3/s)	V (ft/s)	$V^2/2g$ (ft)	S_fL (ft/ft)	$H_f=S_fL$ (ft)	H_c (ft)	H_e (ft)	H_B (ft)	(ft)	E.G.L.	H.G.L.	F.G.	INV.
Macklin Subdivision Phase 2 10 Year (CB No. 9):														110.93	110.87		
OUTLET		3.63	10.35	0.014	20.7	2.00	0.062				0.06		0.06	110.99	110.87		
34"x53"SD	77	3.63	10.35	0.014	20.7	2.00	0.062	0.0100	0.77				0.77				
INLET		3.63	10.35	0.014	20.7	2.00	0.062			0.01			0.01	111.76	111.64		
SDMH 4												0.09	0.09	111.87		116.95	107.87
OUTLET		3.63	10.35	0.014	20.7	2.00	0.062				0.02		0.02	111.88	111.87		
34"x53"SD	45	3.63	10.35	0.014	20.7	2.00	0.062	0.0100	0.45				0.45				
INLET		3.63	10.35	0.014	20.7	2.00	0.062			0.01			0.01	112.33	112.32		
SDMH 3												0.09	0.09	112.44		117.04	109.10
OUTLET		3.63	10.35	0.014	20.73	2.00	0.062				0.02		0.02	112.45	112.44		
34"x53"SD	59	3.63	10.35	0.014	20.73	2.00	0.062	0.0100	0.59				0.59				
INLET		3.63	10.35	0.014	20.73	2.00	0.062			0.01			0.01	113.04	113.03		
SDMH 2												0.15	0.15	113.20		116.57	109.69
OUTLET		3.63	10.35	0.014	20.85	2.01	0.063				0.02		0.02	112.45	112.44		
34"x53"SD	114	3.63	10.35	0.014	20.85	2.01	0.063	0.0004	0.05				0.05				
INLET		3.63	10.35	0.014	20.85	2.01	0.063			0.01			0.01	112.50	112.48		
SDMH 1												0.15	0.15	112.65		115.77	110.83
OUTLET		2.5	4.91	0.014	12.25	2.50	0.097				0.02		0.02	112.68	112.65		
30" SD	5	2.5	4.91	0.014	12.25	2.50	0.097	0.0100	0.05				0.05				
INLET		2.5	4.91	0.014	12.25	2.50	0.097			0.01			0.01	112.73	112.70		
CB No. 6												0.14	0.14	112.89		116.07	110.88
OUTLET		2.5	4.91	0.014	12.23	2.49	0.096				0.02		0.02	112.91	112.89	119.57	
30" SD	112	2.5	4.91	0.014	12.23	2.49	0.096	0.0100	1.12				1.12				
INLET		2.5	4.91	0.014	12.23	2.49	0.096			0.01			0.01	114.03	114.01		
JB No. 1												0.00	0.00	112.74		120.59	112.00
OUTLET		2	3.14	0.014	0.36	0.11	0.000				1.82		1.82	114.56	114.56		
24"SD	6	2	3.14	0.014	0.36	0.11	0.000	0.0050	0.03				0.03				
INLET		2	3.14	0.014	0.36	0.11	0.000			0.00			0.00	114.59	114.59		
CB No. 5												0.00	0.00	114.59		120.37	114.27
OUTLET		1.25	1.23	0.014	0.33	0.27	0.001				0.00		0.00	114.59	114.59	119.87	
15" SD	138	1.25	1.23	0.014	0.33	0.27	0.001	0.0050	0.69				0.69				
INLET		1.25	1.23	0.014	0.33	0.27	0.001			0.00			0.00	115.28	115.28		
CB No. 4												0.00	0.00	115.28		119.64	114.68
OUTLET		1.25	1.23	0.014	0.23	0.19	0.001				0.00		0.00	115.28	115.28	119.14	
15" SD	90	1.25	1.23	0.014	0.23	0.19	0.001	0.0050	0.45				0.45				
INLET		1.25	1.23	0.014	0.23	0.19	0.001			0.00			0.00	115.73	115.73		
CB No. 3												0.00	0.00	115.73		119.46	114.95
OUTLET		1.25	1.23	0.014	0.19	0.15	0.000				0.00		0.00	115.74	115.73	118.96	
15" SD	125	1.25	1.23	0.014	0.19	0.15	0.000	0.0050	0.63				0.63				
INLET		1.25	1.23	0.014	0.19	0.15	0.000			0.00			0.00	116.36	116.36		
CB No. 2												0.00	0.00	116.36		119.21	115.32
OUTLET		1.25	1.23	0.014	0.13	0.11	0.000				0.00		0.00	116.36	116.36	118.71	
15" SD	119	1.25	1.23	0.014	0.13	0.11	0.000	0.0050	0.60				0.60				
INLET		1.25	1.23	0.014	0.13	0.11	0.000			0.00			0.00	116.96	116.96		
CB No. 1												0.00	0.00	116.96		118.93	115.68

118.54

Justed elevation
HGL 117.12

100 Year Data

Altman Acres Subdivision
Head Water Calculations

CATEGORY:	PIPE DATA									HEAD LOSSES				ELEVATIONS			
ITEM:	LENGTH	DIAMETER	AREA	MANNINGS COEFF.	FLOW	VELOCITY	VELOCITY HEAD	FRICTION SLOPE	FRICTION LOSS	CONTRAC-TION LOSS	ENLARGE-MENT LOSS	BENDS & LOSSES	SUMMATION OF LOSSES	ENERGY GRADE	HYDRAULIC GRADE	INLET GRADE	INVERT GRADE
SYMBOL:	L (ft)	D (ft)	A (ft2)	n	Q (ft3/s)	V (ft/s)	$V^2/2g$ (ft)	S_fL (ft/ft)	$H_f=S_fL$ (ft)	H_c (ft)	H_e (ft)	H_B (ft)	(ft)	E.G.L.	H.G.L.	F.G.	INV.
Macklin Subdivision Phase 2 10 Year (CB No. 9):														114.24	114.07		
OUTLET		3.63	10.35	0.014	34.52	3.34	0.173				0.17		0.17	114.42	114.07		
34"x53"SD	77	3.63	10.35	0.014	34.52	3.34	0.173	0.0011	0.09				0.09				
INLET		3.63	10.35	0.014	34.52	3.34	0.173			0.03			0.03	114.50	114.16		
SDMH 4												0.26	0.26	114.79		116.95	107.87
OUTLET		3.63	10.35	0.014	34.52	3.34	0.173				0.04		0.04	114.83	114.79		
34"x53"SD	45	3.63	10.35	0.014	34.52	3.34	0.173	0.0011	0.05				0.05				
INLET		3.63	10.35	0.014	34.52	3.34	0.173			0.03			0.03	114.88	114.84		
SDMH 3												0.26	0.26	115.16		117.04	109.10
OUTLET		3.63	10.35	0.014	34.25	3.31	0.170				0.04		0.04	115.21	115.16		
34"x53"SD	59	3.63	10.35	0.014	34.25	3.31	0.170	0.0011	0.07				0.07				
INLET		3.63	10.35	0.014	34.25	3.31	0.170			0.03			0.03	115.27	115.23		
SDMH 2												0.39	0.39	115.68		116.57	109.69
OUTLET		3.63	10.35	0.014	34.26	3.31	0.170				0.04		0.04	115.21	115.16		
34"x53"SD	114	3.63	10.35	0.014	34.26	3.31	0.170	0.0011	0.13				0.13				
INLET		3.63	10.35	0.014	34.26	3.31	0.170			0.03			0.03	115.33	115.29		
SDMH 1												0.39	0.39	115.68		115.77	110.83
OUTLET		2.5	4.91	0.014	20.02	4.08	0.258				0.06		0.06	115.75	115.68		
30" SD	5	2.5	4.91	0.014	20.02	4.08	0.258	0.0028	0.01				0.01				
INLET		2.5	4.91	0.014	20.02	4.08	0.258			0.04			0.04	115.76	115.70		
CB No. 6												0.39	0.39	115.74		~~116.07~~	110.88
OUTLET		2.5	4.91	0.014	19.99	4.07	0.258				0.06		0.06	115.81	115.74	115.57	
30" SD	112	2.5	4.91	0.014	19.99	4.07	0.258	0.0028	0.31				0.31				
INLET		2.5	4.91	0.014	19.99	4.07	0.258			0.04			0.04	116.12	116.05		
JB No. 1												0.00	0.00	116.16		120.59	112.00
OUTLET		2	3.14	0.014	0.48	0.15	0.000				0.00		0.00	116.16	116.16		
24"SD	6	2	3.14	0.014	0.48	0.15	0.000	0.0000	0.00				0.00				
INLET		2	3.14	0.014	0.48	0.15	0.000			0.00			0.00	116.16	116.16		
CB No. 5												0.00	0.00	116.16		~~120.37~~	114.27
OUTLET		1.25	1.23	0.014	0.43	0.35	0.002				0.00		0.00	116.16	116.16	119.87	
15" SD	138	1.25	1.23	0.014	0.43	0.35	0.002	0.0001	0.01				0.01				
INLET		1.25	1.23	0.014	0.43	0.35	0.002			0.00			0.00	116.17	116.17		
CB No. 4												0.00	0.00	116.17		~~119.64~~	114.68
OUTLET		1.25	1.23	0.014	0.37	0.30	0.001				0.00		0.00	116.17	116.17	119.14	
15" SD	90	1.25	1.23	0.014	0.37	0.30	0.001	0.0000	0.00				0.00				
INLET		1.25	1.23	0.014	0.37	0.30	0.001			0.00			0.00	116.17	116.17		
CB No. 3												0.00	0.00	116.17		~~119.46~~	114.95
OUTLET		1.25	1.23	0.014	0.29	0.24	0.001				0.00		0.00	116.18	116.17	118.96	
15" SD	125	1.25	1.23	0.014	0.29	0.24	0.001	0.0000	0.00				0.00				
INLET		1.25	1.23	0.014	0.29	0.24	0.001			0.00			0.00	116.18	116.18		
CB No. 2												0.00	0.00	116.18		~~119.21~~	115.32
OUTLET		1.25	1.23	0.014	0.19	0.15	0.000				0.00		0.00	116.18	116.18	118.71	
15" SD	119	1.25	1.23	0.014	0.19	0.15	0.000	0.0000	0.00				0.00				
INLET		1.25	1.23	0.014	0.19	0.15	0.000			0.00			0.00	116.18	116.18		
CB No. 1												0.00	0.00	116.18		~~118.93~~ 118.54	115.68

OK

FLOOD

justed elevation
HGL 118.69

OFFSITE HYDROLOGY MAP

1 of 2

HYDROLOGY MAP
ALTAMONT ACRES

Drainage Areas

MACKLIN DRIVE

JOHN ROBERTS DRIVE

LASKER LANE

OLD REDWOOD HWY

CLOTHIER LANE

Q=0.07 AC

P=0.10 AC

R=0.12 AC

S=0.12 AC

T=0.08 AC

U=0.04 AC

K=0.53 AC

J=0.11 AC

I=0.11 AC

H=0.10 AC

G=0.77 AC

F=0.22 AC

X=0.11 AC

W=0.13 AC

V=0.48 AC

A=0.56 AC

O=0.08 AC

N=0.07 AC

Y=0.07 AC

M=0.5 AC

B=0.08 AC

C=0.06 AC

D=0.08 AC

E=0.11 AC

117.2 PAD

117.5 PAD

118.5 PAD

117.7 PAD

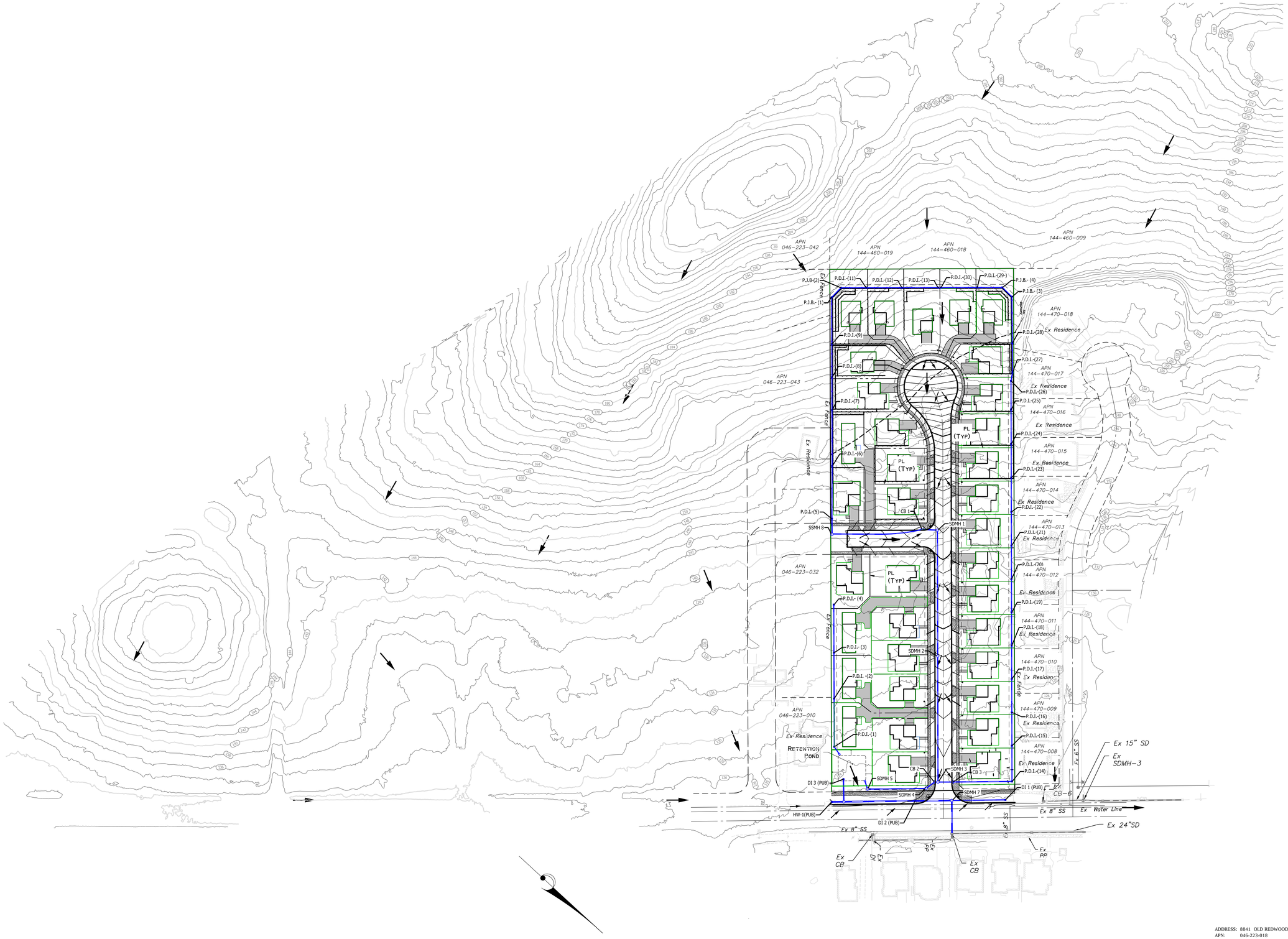
117.0 PAD

EXISTING
24" CMP

POINT OF
CONNECTION

2/2
HYDROLOGY MAP
ALTMAN ACRES
6-8-24:30

ATTACHMENT A4



ADDRESS: 8841 OLD REDWOOD HIGHWAY
APN: 046-223-018

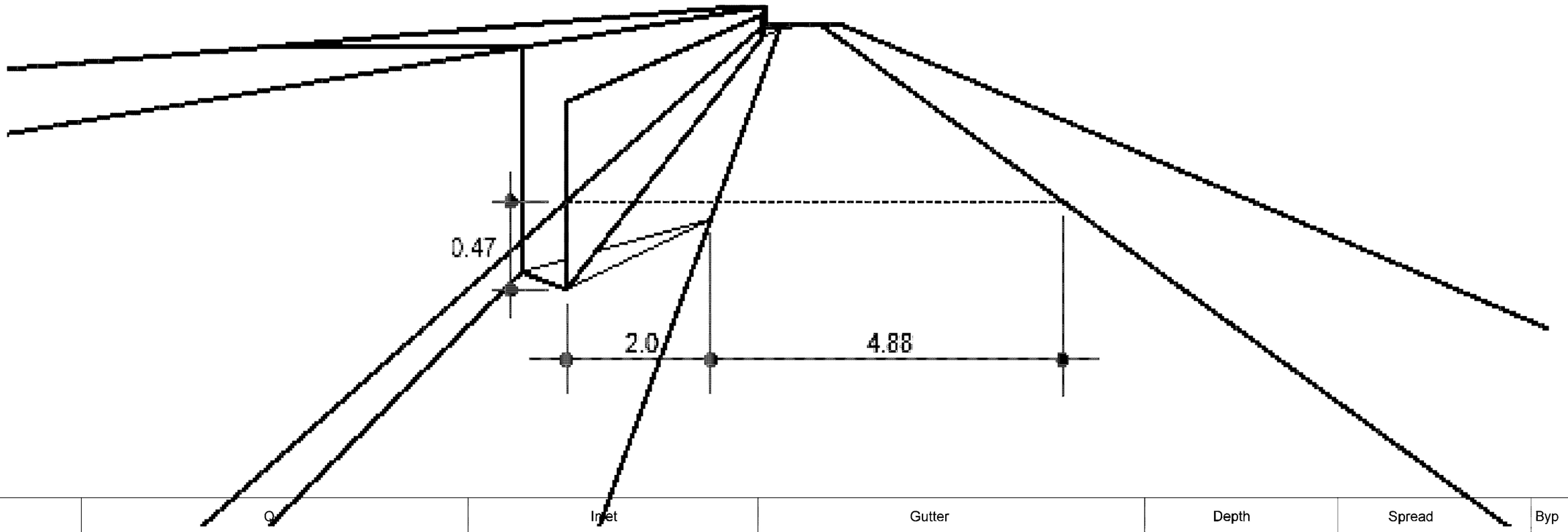
JOB NO. 21104	DESIGN FOR:	T.D.G. CONSULTING CIVIL ENGINEERS, INC.
DATE: November 13, 2022	FLAHAVAN ESTATES	TDG 883 3HT STREET SANTA ROSA, CALIF. 95404 (707) 577-0425
DRAWN: 3R's	100 YEAR OVERLAND RELASE ROUTE	

ATTACHMENT 2

Inlet Section (Line 8 - Curb Inlet) - CB-1

All dimensions in feet

Line 8 - Curb Inlet in Sag - CB-1



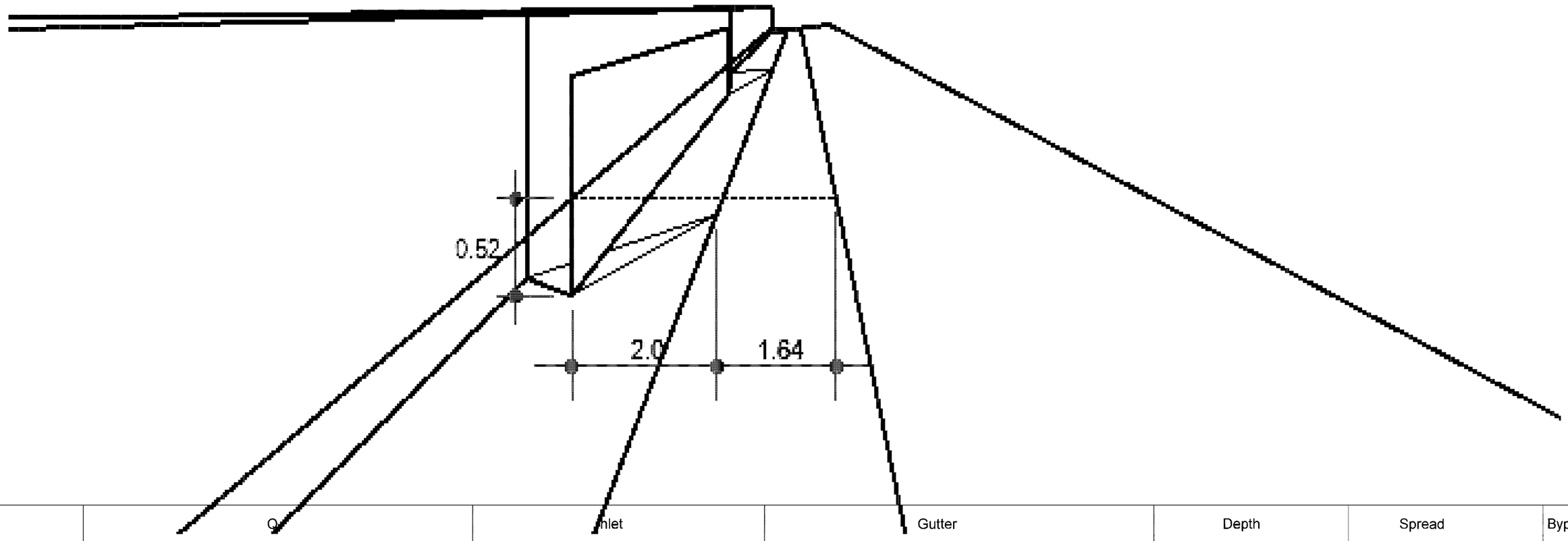
Line #	Q				Inlet			Gutter				Depth		Spread		Byp
	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Length (ft)	Depr (in)	Throat (in)	Width (ft)	Slope (ft/ft)	Sw (ft/ft)	Sx (ft/ft)	Gutter (ft)	Inlet (ft)	Gutter (ft)	Inlet (ft)	Line (ft)
8	5.48	0.00	5.48	0.00	43.00	4.0	4.0	2.00	Sag	0.020	0.020	0.14	6.88	n/a	n/a	Sag

Project File: | No. Lines: 15 | Run Date: 11/13/2022

Inlet Section (Line 7 - Curb Inlet) - CB-3

All dimensions in feet

Line 7 - Curb Inlet in Sag - CB-3



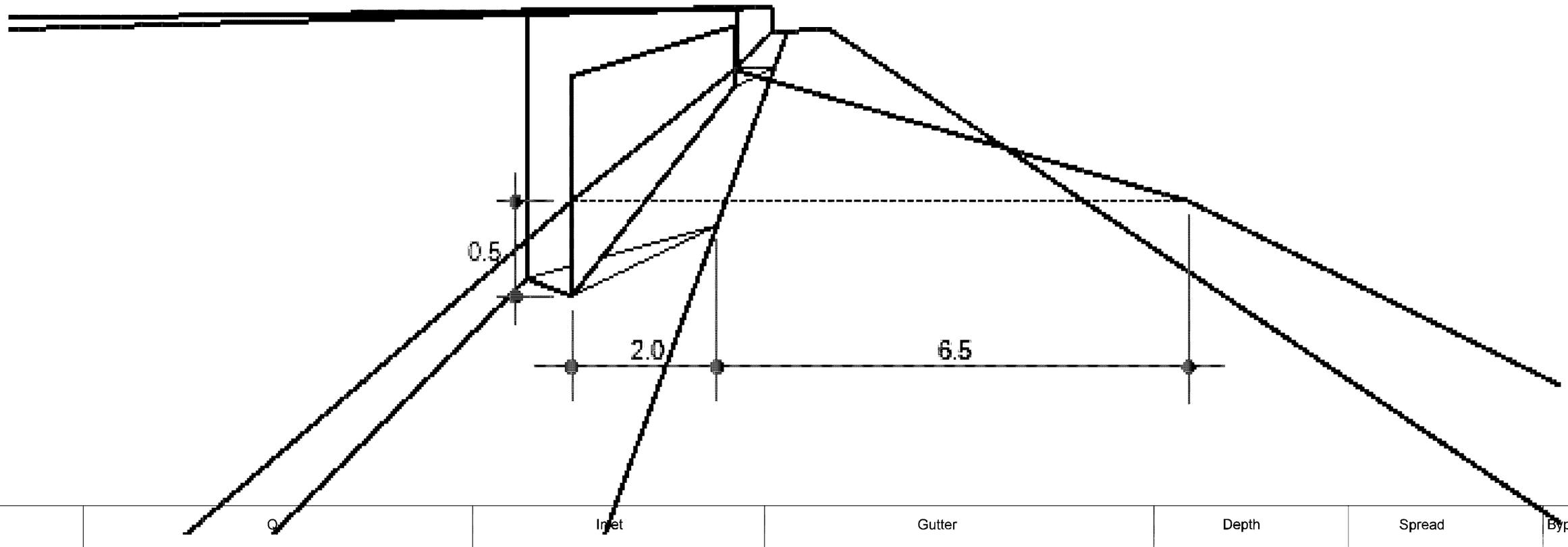
Line #	Q				Inlet			Gutter				Depth		Spread		Byp
	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Length (ft)	Depr (in)	Throat (in)	Width (ft)	Slope (ft/ft)	Sw (ft/ft)	Sx (ft/ft)	Gutter (ft)	Inlet (ft)	Gutter (ft)	Inlet (ft)	Line (ft)
7	3.12	0.00	3.12	0.00	13.81	4.0	6.0	2.00	Sag	0.050	0.050	0.18	3.64	n/a	n/a	Sag

Project File:	No. Lines: 15	Run Date: 11/13/2022

Inlet Section (Line 3 - Curb Inlet) - CB 2

All dimensions in feet

Line 3 - Curb Inlet on Grade - CB 2



Line #	Q				Inlet			Gutter				Depth		Spread		Byp
	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Length (ft)	Depr (in)	Throat (in)	Width (ft)	Slope (ft/ft)	Sw (ft/ft)	Sx (ft/ft)	Gutter (ft)	Inlet (ft)	Gutter (ft)	Inlet (ft)	Line (ft)
3	2.70	0.00	2.70	0.00	15.62	4.0	6.0	2.00	0.020	0.020	0.020	0.17	8.50	0.00	0.01	Offsite

Project File:

No. Lines: 15

Run Date: 11/13/2022

NOAA Atlas 14, Volume 6, Version 2
Location name: Cotati, California, USA*
Latitude: 38.3177°, Longitude: -122.7008°
Elevation: 137.64 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.93** (1.72-2.20)	**2.38** (2.11-2.70)	**2.96** (2.63-3.38)	**3.46** (3.04-3.98)	**4.14** (3.49-4.96)	**4.67** (3.84-5.74)	**5.22** (4.18-6.60)	**5.81** (4.49-7.58)	**6.61** (4.87-9.07)	**7.26** (5.14-10.4)
10-min	**1.39** (1.24-1.57)	**1.70** (1.51-1.94)	**2.13** (1.88-2.42)	**2.48** (2.17-2.86)	**2.96** (2.50-3.55)	**3.35** (2.75-4.12)	**3.74** (2.99-4.73)	**4.16** (3.22-5.44)	**4.74** (3.49-6.50)	**5.20** (3.68-7.42)
15-min	**1.12** (0.996-1.27)	**1.38** (1.22-1.56)	**1.72** (1.52-1.96)	**2.00** (1.75-2.30)	**2.39** (2.02-2.86)	**2.70** (2.22-3.32)	**3.02** (2.41-3.82)	**3.36** (2.59-4.38)	**3.82** (2.82-5.24)	**4.19** (2.97-5.98)
30-min	**0.782** (0.696-0.888)	**0.962** (0.854-1.09)	**1.20** (1.06-1.37)	**1.40** (1.23-1.61)	**1.67** (1.41-2.01)	**1.89** (1.55-2.32)	**2.11** (1.69-2.67)	**2.35** (1.81-3.07)	**2.67** (1.97-3.67)	**2.93** (2.08-4.19)
60-min	**0.558** (0.497-0.634)	**0.686** (0.610-0.780)	**0.856** (0.758-0.977)	**0.998** (0.875-1.15)	**1.19** (1.01-1.43)	**1.35** (1.11-1.66)	**1.51** (1.20-1.91)	**1.67** (1.29-2.19)	**1.91** (1.41-2.62)	**2.09** (1.48-2.99)
2-hr	**0.422** (0.375-0.478)	**0.513** (0.456-0.583)	**0.634** (0.561-0.722)	**0.732** (0.642-0.843)	**0.867** (0.731-1.04)	**0.972** (0.798-1.19)	**1.08** (0.861-1.36)	**1.19** (0.919-1.55)	**1.34** (0.987-1.84)	**1.46** (1.03-2.08)
3-hr	**0.355** (0.316-0.404)	**0.432** (0.383-0.491)	**0.531** (0.470-0.605)	**0.612** (0.537-0.705)	**0.722** (0.608-0.865)	**0.806** (0.663-0.990)	**0.892** (0.713-1.13)	**0.980** (0.758-1.28)	**1.10** (0.811-1.51)	**1.20** (0.845-1.71)
6-hr	**0.263** (0.234-0.299)	**0.320** (0.284-0.364)	**0.394** (0.349-0.449)	**0.453** (0.397-0.522)	**0.532** (0.449-0.638)	**0.593** (0.488-0.728)	**0.654** (0.523-0.827)	**0.717** (0.554-0.936)	**0.800** (0.590-1.10)	**0.865** (0.612-1.24)
12-hr	**0.180** (0.160-0.204)	**0.221** (0.197-0.252)	**0.275** (0.244-0.314)	**0.318** (0.279-0.366)	**0.375** (0.316-0.450)	**0.419** (0.344-0.514)	**0.462** (0.369-0.584)	**0.506** (0.392-0.662)	**0.565** (0.416-0.776)	**0.611** (0.432-0.872)
24-hr	**0.121** (0.109-0.137)	**0.151** (0.136-0.172)	**0.190** (0.171-0.217)	**0.221** (0.197-0.254)	**0.262** (0.227-0.310)	**0.293** (0.248-0.352)	**0.324** (0.269-0.398)	**0.355** (0.287-0.447)	**0.396** (0.309-0.518)	**0.427** (0.323-0.576)
2-day	**0.080** (0.072-0.091)	**0.100** (0.090-0.114)	**0.126** (0.113-0.144)	**0.146** (0.130-0.168)	**0.173** (0.149-0.204)	**0.193** (0.164-0.232)	**0.212** (0.176-0.261)	**0.232** (0.188-0.292)	**0.258** (0.201-0.337)	**0.277** (0.210-0.374)
3-day	**0.062** (0.055-0.070)	**0.077** (0.069-0.088)	**0.097** (0.087-0.110)	**0.112** (0.100-0.129)	**0.133** (0.115-0.157)	**0.147** (0.125-0.177)	**0.162** (0.135-0.199)	**0.177** (0.143-0.223)	**0.196** (0.153-0.256)	**0.210** (0.159-0.283)
4-day	**0.051** (0.046-0.058)	**0.065** (0.058-0.073)	**0.081** (0.073-0.092)	**0.094** (0.084-0.108)	**0.111** (0.096-0.131)	**0.123** (0.104-0.148)	**0.135** (0.112-0.166)	**0.147** (0.119-0.185)	**0.162** (0.127-0.212)	**0.174** (0.131-0.235)
7-day	**0.035** (0.032-0.040)	**0.044** (0.040-0.050)	**0.056** (0.050-0.064)	**0.065** (0.057-0.074)	**0.076** (0.066-0.090)	**0.084** (0.071-0.101)	**0.092** (0.076-0.113)	**0.100** (0.081-0.126)	**0.110** (0.086-0.144)	**0.117** (0.089-0.158)
10-day	**0.028** (0.025-0.032)	**0.036** (0.032-0.040)	**0.045** (0.040-0.051)	**0.052** (0.046-0.059)	**0.061** (0.052-0.072)	**0.067** (0.057-0.081)	**0.073** (0.061-0.090)	**0.079** (0.064-0.100)	**0.087** (0.068-0.114)	**0.093** (0.070-0.125)
20-day	**0.019** (0.017-0.021)	**0.024** (0.021-0.027)	**0.030** (0.027-0.034)	**0.035** (0.031-0.040)	**0.040** (0.035-0.048)	**0.044** (0.038-0.053)	**0.048** (0.040-0.059)	**0.052** (0.042-0.065)	**0.056** (0.044-0.074)	**0.060** (0.045-0.081)
30-day	**0.015** (0.014-0.017)	**0.019** (0.017-0.022)	**0.024** (0.022-0.028)	**0.028** (0.025-0.032)	**0.033** (0.028-0.038)	**0.036** (0.030-0.043)	**0.039** (0.032-0.047)	**0.041** (0.033-0.052)	**0.045** (0.035-0.059)	**0.047** (0.036-0.064)
45-day	**0.012** (0.011-0.014)	**0.016** (0.014-0.018)	**0.020** (0.018-0.022)	**0.023** (0.020-0.026)	**0.026** (0.023-0.031)	**0.028** (0.024-0.034)	**0.031** (0.025-0.038)	**0.033** (0.026-0.041)	**0.035** (0.027-0.046)	**0.037** (0.028-0.050)
60-day	**0.011** (0.010-0.012)	**0.014** (0.013-0.016)	**0.017** (0.016-0.020)	**0.020** (0.018-0.023)	**0.023** (0.020-0.027)	**0.025** (0.021-0.030)	**0.027** (0.022-0.033)	**0.028** (0.023-0.036)	**0.030** (0.024-0.040)	**0.032** (0.024-0.043)

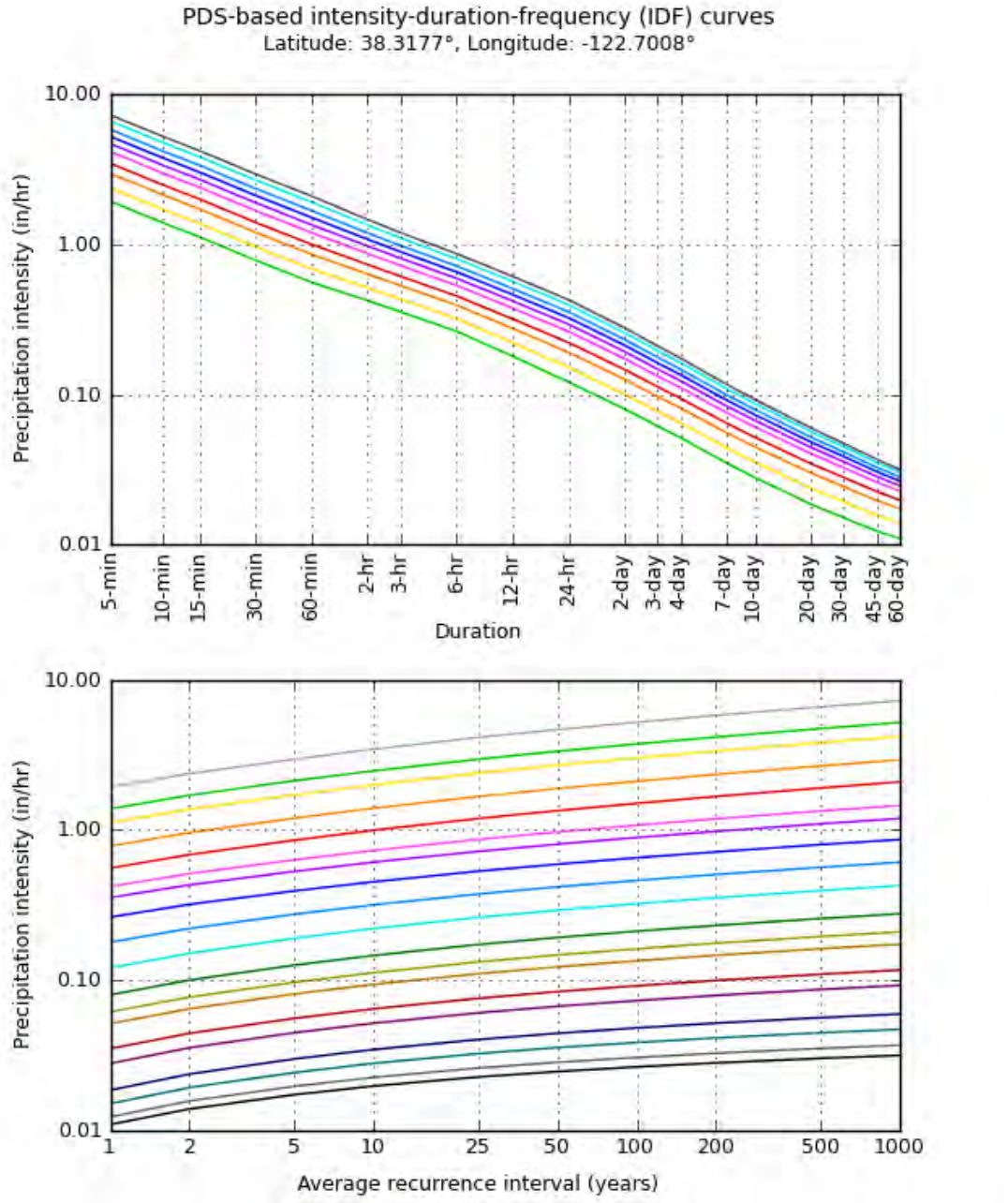
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



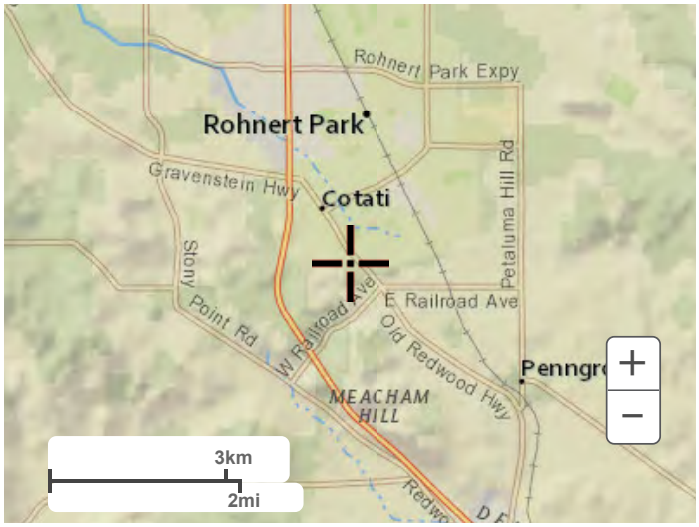
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Sun Oct 24 17:54:50 2021

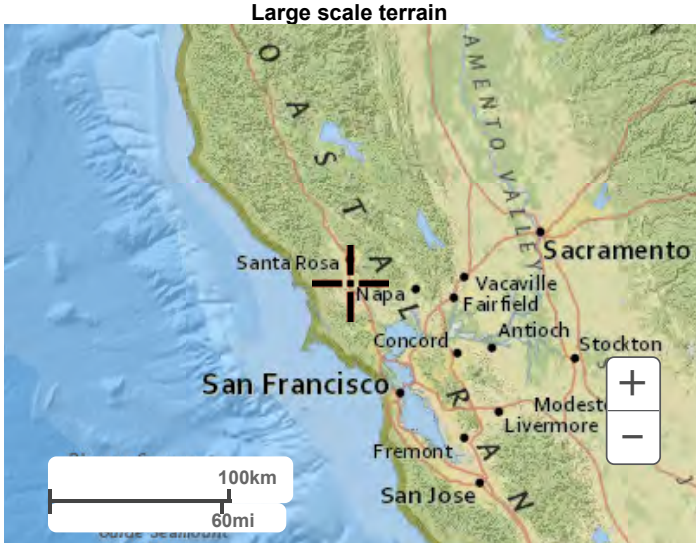
Back to Top

Maps & aerials

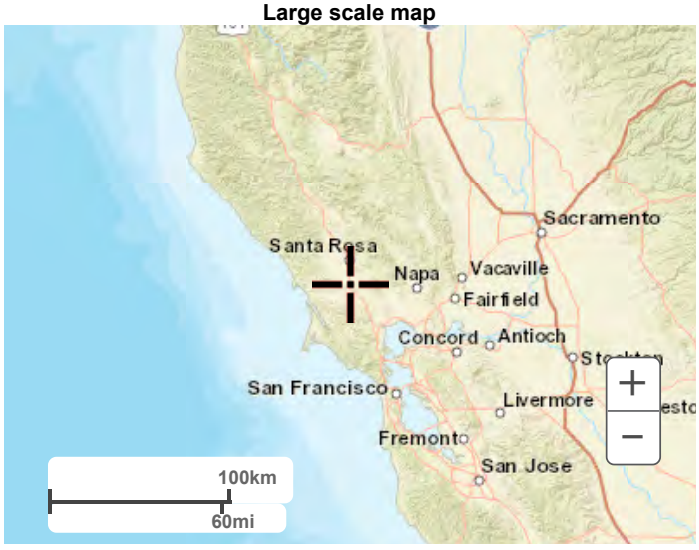
Small scale terrain



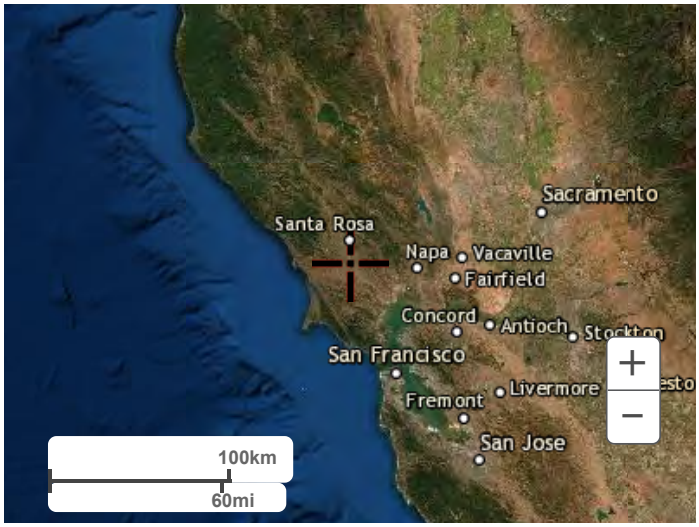
Large scale terrain



Large scale map



Large scale aerial



Back to Top

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

Map Scale: 1:2,370 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 15, Sep 10, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 1, 2020—Jun 5, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CtD	Cotati fine sandy loam, 9 to 15 percent slopes	1.6	21.0%
HaB	Haire fine sandy loam, hummocky, 0 to 5 percent slopes	6.1	79.0%
Totals for Area of Interest		**7.7**	**100.0%**

Sonoma County, California

CtD—Cotati fine sandy loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfc4
Elevation: 60 to 800 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 59 degrees F
Frost-free period: 230 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Cotati and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cotati

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 22 inches: fine sandy loam
H2 - 22 to 51 inches: clay
H3 - 51 to 61 inches: weathered bedrock

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches; 40 to 60 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R004BY066CA - CLAYPAN
Hydric soil rating: No

Minor Components

Goldridge

Percent of map unit: 8 percent
Hydric soil rating: No

Steinbeck

Percent of map unit: 7 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 15, Sep 10, 2021

Sonoma County, California

HaB—Haire fine sandy loam, hummocky, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: hfdm
Elevation: 20 to 2,400 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Haire and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haire

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 20 inches: fine sandy loam
H2 - 20 to 36 inches: clay
H3 - 36 to 60 inches: very cobbly clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R014XG912CA - Loamy Terrace

Hydric soil rating: No

Minor Components

Zamora

Percent of map unit: 10 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 15, Sep 10, 2021

DESIGN CRITERIA

1. GATE IS IN SUMP AREA (LOW POINT)

2. Q= 1/2 PERIMETER IN FEET (ASSUME 35 40 PERCENT OF THE PEREMETER IS BLOCKED WITH DEBRIS AND 10 15 PERCENT IS TAKEN UP BY THE GRATE BEARING BARS)

3. A=CI = AREA IN ACRES

WHERE
Q= WEIR DISCHARGE IN C.F.S
C= 0.9 FOR PAVED AREAS
I= 2.48 INCHES PER HOUR FOR FOR T = 10 MINUTES

S.R.C.P MODEL	INSIDE GRATE DIMENSION a" x b"	P=a+b IN FEET	H=0.1'		H=0.2'		H=0.3'		H=0.4'	
			Q cfs	Acres	Q cfs	Acres	Q cfs	Acres	Q cfs	Acres
EK	12X12	2.00	0.19	0.10	0.54	0.28	0.99	0.52	1.52	0.80
BK	16X16	2.67	0.25	0.13	0.72	0.38	1.32	0.70	2.03	1.07
IK	16X24	3.33	0.32	0.17	0.89	0.47	1.64	0.87	2.53	1.34
2K	24X24	4.00	0.38	0.20	1.00	0.57	1.97	1.04	3.04	1.61
3K	24X30	4.50	0.43	0.23	1.21	0.64	2.22	1.17	3.42	1.81
5K	30X30	5.00	0.47	0.25	1.34	0.71	2.46	1.30	3.79	2.01
IL	24X36	5.00	0.47	0.25	1.34	0.71	2.46	1.30	3.79	2.01
IM	36X36	6.00	0.57	0.30	1.61	0.85	2.96	1.56	4.55	2.41
3L	24X48	6.00	0.57	0.30	1.61	0.85	2.96	1.56	4.55	2.41
3M	36X48	7.00	0.66	0.35	1.88	0.99	3.45	1.83	5.31	2.81
IR	48X48	8.00	0.76	0.40	2.15	1.14	3.94	2.09	6.07	3.21

DI	TYPE
DI-1 (PUB)	2K
DI-2 (PUB)	2K
DI-3 (PUB)	2K
P.D.I-(1)	BK
P.D.I-(2)	BK
P.D.I-(3)	BK
P.D.I-(4)	BK
P.D.I-(5)	BK
P.D.I-(6)	BK
P.D.I-(7)	BK
P.D.I-(8)	BK
P.D.I-(9)	BK
P.D.I-(11)	BK
P.D.I-(12)	BK
P.D.I-(13)	BK
P.D.I-(14)	5K
P.D.I-(15)	EK

DI	TYPE
P.D.I-(16)	EK
P.D.I-(17)	EK
P.D.I-(18)	EK
P.D.I-(19)	EK
P.D.I-(20)	EK
P.D.I-(21)	EK
P.D.I-(22)	EK
P.D.I-(23)	EK
P.D.I-(24)	EK
P.D.I-(25)	EK
P.D.I-(26)	EK
P.D.I-(27)	EK
P.D.I-(28)	EK
P.D.I-(29)	IK
P.D.I-(30)	5K

COUNTY ASSESSOR'S PARCEL MAP

NOTE: This map was prepared for Assessment purposes only and does not indicate either parcel legality or a valid building site. No liability is assumed for the accuracy of the data delineated. The acreages are based on the information supplied to the Assessor (i.e. recorded survey maps recorded deeds, prior assessment maps, etc.)

NOTE: Assessor's parcels do not necessarily constitute legal lots. To verify legal parcel status, check with the appropriate city or county community development or planning division.

SCALE: 1"=400'

1.	N50°30'W	105.00
2.	N77°30'W	106.97
3.	N86°30'W	97.68
4.	N71°30'W	85.61
5.	N27°30'W	81.02
6.	N 7°30'E	89.15
7.	N16°30'E	94.40
8.	N28°30'E	90.83
9.	N53°30'E	90.81
10.	N66°30'E	62.86
11.	N66°30'E	42.84

Pcl. Map No. 97-0019
Bk 618, Pgs. 4-6, Rec. 2-23-01

Parcel Map No. 86-627
Bk. 405 Pg. 43-44, Rec. 10-23-87

Parcel Map No. 1481
Book 142 page 18, Rec. 3/3/70

Parcel Map No. 954
Book 109 page 35

Parcel Map No. 6544
Book 316, Pages 27 & 28
Rec. 12/31/80

Parcel Map No. 1706B
Bk. 233 pg. 40, Rec. 5/25/76

Parcel Map No. 7087
Bk. 323, Pg. 48-49, Rec. 7/24/81

Pcl. Map No. MNS 98-0044
Bk. 615, Pgs. 21-24, Rec. 11-28-00

Pcl. Map 6573
Bk. 278 Pg. 29 Rec. 10/27/78

Parcel Map No. 7269
Bk. 328 Pgs. 19-20, Rec. 11-13-81

Pcl. Map 3547
Bk. 183 Pg. 23 Rec. 12/28/72

Pcl. Map 3507
Bk. 183 Pg. 27 Rec. 12/29/72

Parcel Map 7673
Bk. 355 Pp. 28-29 Rec. 8-10-84

Pcl. Map MNS 96-0004
Bk. 578, Pgs. 18-20, Rec. 5-12-98

Pcl. Map No. 98-0001
Bk. 591, Pgs. 22-24
Rec. 5-21-99

Pcl. Map 3744
BK. 195 PG. 46
REC. 9-11-73

Pcl. Map No. 5211
Bk. 233 pg. 27, Rec. 5/10/76

Pcl. Map 2295
Bk. 159 Pg. Rec. 8-6-71

Parcel Map No. 3120
REC. 06-20-1972 IN BK. 175, MAPS, PGS. 01-00

Part of RANCHO COTATI SUBDIVISION No. 2
REC. 10-06-1892 IN BK. 10, MAPS, PGS. 06-00

TAX RATE AREA
67-004 67-006
8-010

046-22

THIS SITE

R/S 757/32 R/S 216/35

REVISED
10-25-99=PM RL
12-04-00=56(222) RL
07-26-01=44(224) RL
03-15-04=58(222) RL
05-14-04=R/S RL
03-10-14=R/S BJ
03-21-14=P/O BJ

Assessor's Map Bk. 046, Pg. 22
Sonoma County, Calif. (ACAD)
3/10/14 BJ
HYBRID

Ag Pre 2-376-72
2603/736
W 1-1-14

A	S87°28'29"E	32.01
	S82°58'04"E	90.24
B	N89°30'W	44.84
C	R=465	L=118.76
D	R=535	L=102.40
E	S81°00'E	86.00
F	R=65	L=136.10
G	N38°08'E	116.30
H	R=135	L=86.99
I	S41°30'W	32.21
J	S1°30'W	60.32
K	N72°30'E	171.08
L	S23°59'15"E	74.90
M	N50°00'E	36.00
N	R=270	L=142.08
O	S25°30'E	72.84