

Preliminary Hydrology and Hydraulic Calculations

for

Grand Avenue Mixed Use City of Novato, California

Prepared For:

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March 01, 2024

I. Project Description

Grand Avenue Mixed Use is a 1.1 acres project located to the North of Grand Avenue and East of 4th Street in Novato. The Project is proposed of commercial/residential use.

II. Design Criteria

1. The analyses used in these calculations are in accordance with the Storm Water Design Criteria from City of Novato and The Marin County Municipal Code.
2. The Intensity-Duration-Frequency Curve was used provided by the City of Novato Engineering Division, Department of Community Development, dated Nov, 1987.
3. The Runoff coefficient value is between $C = 0.50-0.90$ depending upon the percentage of impervious and pervious surface for each drainage area.
4. The storm drain pipes are designed for a 25-year storm. A minimum freeboard of 24 inches from the Hydraulic Grade Line (HGL) to the gutter flow lines must be maintained at all times during the 25-year design storm as per the Marin County Municipal Code.
5. The starting HGL at the proposed stormwater inlet on Grand Avenue is taken as 19.40 assuming 24 inches below the existing gutter flow line.

III. Minimum Pipe Velocity Under Normal Flow

Storm drain pipes are designed to have a minimum 2 ft/s during normal flow (no back water). Attached are reports showing velocity calculations under normal flow conditions.

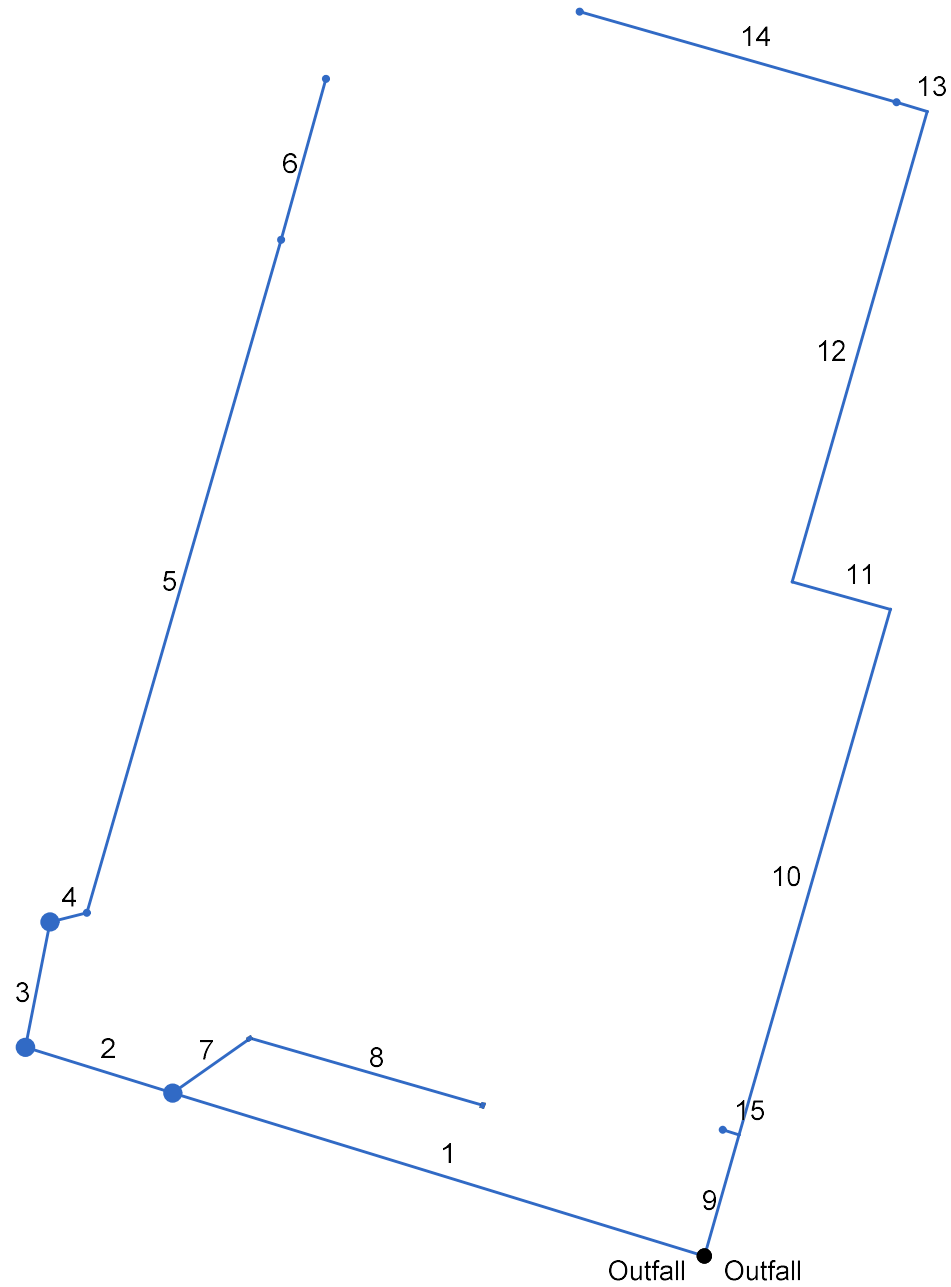
IV. Results

The design storm drain meets the City of Novato freeboard requirements. See attached calculations for the proposed storm drain pipe size.

March 1, 2024
Job No. 201033

On-Site Hydrology & Hydraulic Calculations

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



Storm Sewer Tabulation

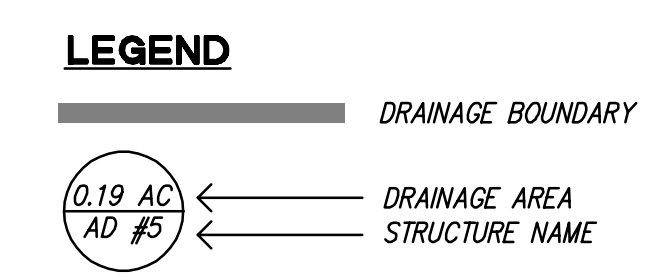
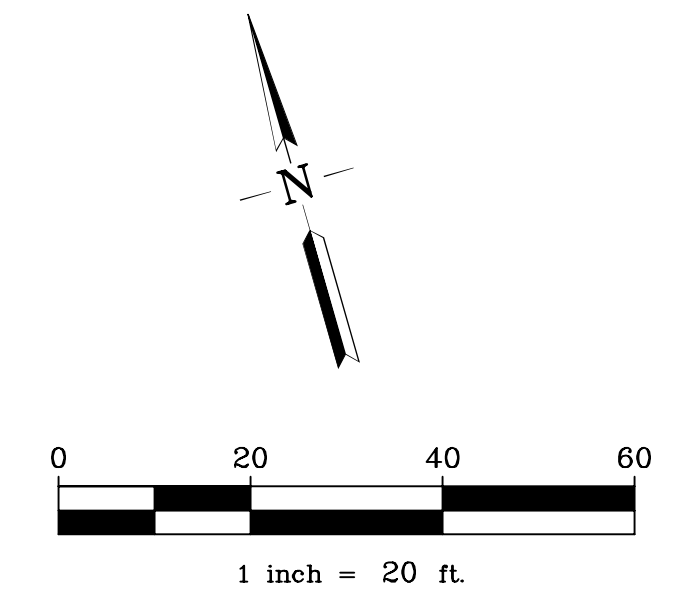
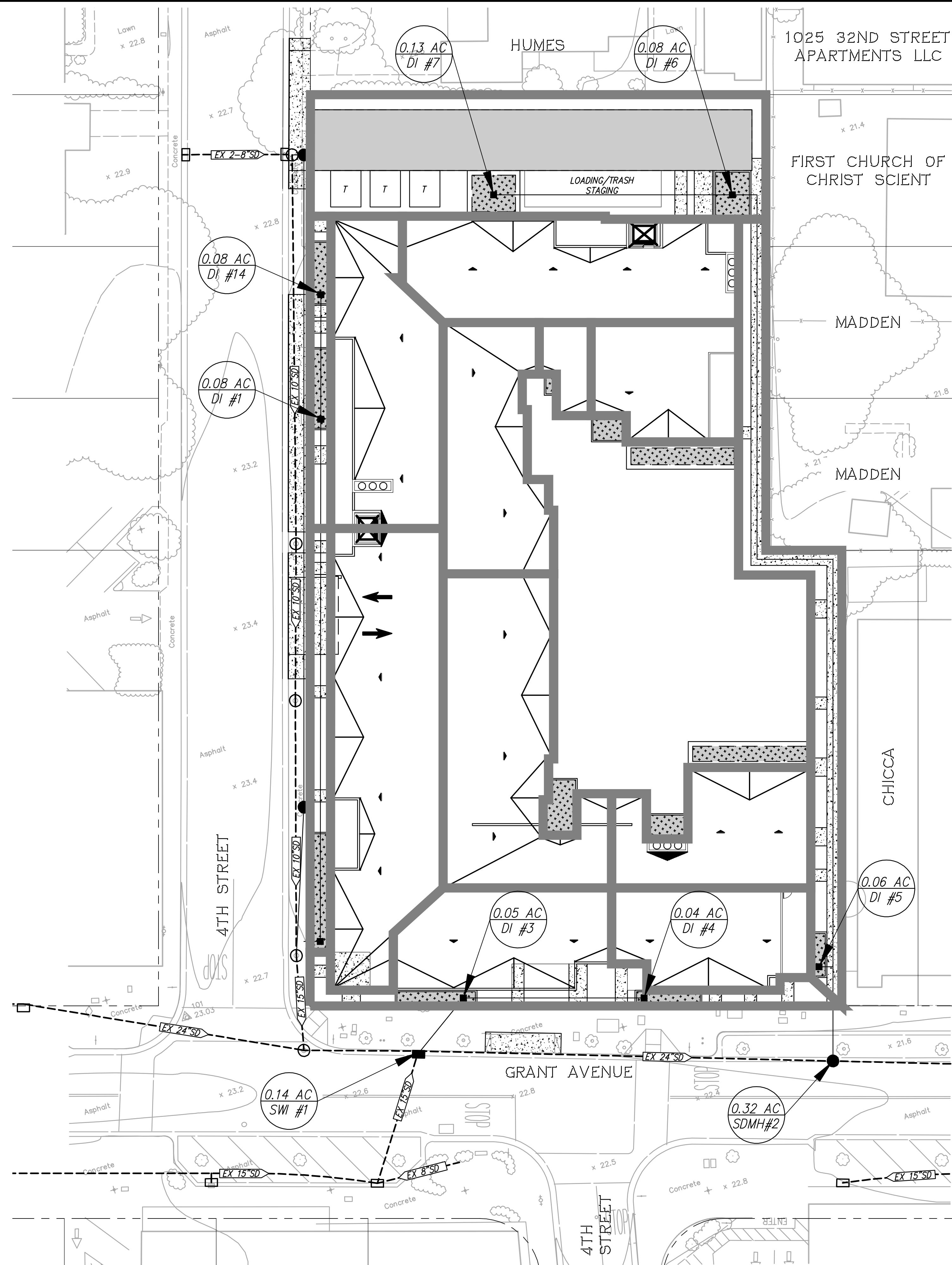
Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	136.410	0.03	0.19	0.90	0.03	0.14	10.0	27.8	1.6	0.23	17.55	0.08	24	0.51	17.20	17.90	19.40	19.40	22.28	22.60	Pipe - (28)
2	1	37.745	0.00	0.10	0.00	0.00	0.07	0.0	17.4	2.0	0.15	12.61	0.06	24	0.26	17.90	18.00	19.40	19.40	22.60	23.08	Pipe - (27)
3	2	31.314	0.00	0.10	0.00	0.00	0.07	0.0	13.7	2.2	0.16	5.59	0.14	15	0.64	18.10	18.30	19.40	19.40	23.08	23.10	Pipe - (36)
4	3	9.145	0.03	0.10	0.90	0.03	0.07	10.0	13.3	2.2	0.17	1.29	0.48	8	0.55	18.40	18.45	19.40	19.40	23.10	23.00	Pipe - (49)
5	4	172.000	0.03	0.07	0.90	0.03	0.05	10.0	10.6	2.5	0.12	1.23	1.03	8	0.50	18.55	19.41	19.40	19.58	23.00	23.74	Pipe - (48)
6	5	41.000	0.04	0.04	0.50	0.02	0.02	10.0	10.0	2.6	0.05	0.58	1.22	6	0.51	19.41	19.62	19.58	19.73	23.74	23.95	Pipe - (47)
7	1	23.327	0.03	0.06	0.50	0.02	0.04	10.0	12.8	2.3	0.10	1.25	0.28	8	0.51	18.00	18.12	19.40	19.40	22.60	22.93	Pipe - (46)
8	7	59.498	0.03	0.03	0.90	0.03	0.03	10.0	10.0	2.6	0.07	0.58	0.35	6	0.50	18.22	18.52	19.40	19.40	22.93	22.75	Pipe - (45)
9	End	31.005	0.00	0.16	0.00	0.00	0.11	0.0	20.2	1.8	0.20	1.25	0.56	8	0.52	17.30	17.46	19.40	19.40	22.28	22.66	Pipe - (42) (2)
10	9	134.162	0.00	0.10	0.00	0.00	0.08	0.0	15.4	2.1	0.16	1.23	0.46	8	0.50	17.46	18.13	19.41	19.42	22.66	23.21	Pipe - (42)
11	10	25.000	0.00	0.10	0.00	0.00	0.08	0.0	14.5	2.2	0.16	1.26	0.47	8	0.52	18.13	18.26	19.42	19.43	23.21	23.33	Pipe - (41)
12	11	120.000	0.00	0.10	0.00	0.00	0.08	0.0	10.9	2.5	0.19	1.23	0.56	8	0.50	18.26	18.86	19.43	19.44	23.33	23.10	Pipe - (40)
13	12	8.090	0.03	0.10	0.90	0.03	0.08	10.0	10.8	2.5	0.19	1.23	1.37	8	0.49	18.86	18.90	19.45	19.10	23.10	23.23	Pipe - (39)
14	13	80.583	0.07	0.07	0.70	0.05	0.05	10.0	10.0	2.6	0.13	1.23	1.68	8	0.50	18.90	19.30	19.10	19.46	23.23	23.63	Pipe - (38)
15	9	4.583	0.06	0.06	0.50	0.03	0.03	10.0	10.0	2.6	0.08	1.15	0.22	8	0.44	17.56	17.58	19.41	19.41	22.66	22.48	Pipe - (44)

Project File: 201033-Hydro.stm

Number of lines: 15

Run Date: 2/29/2024

NOTES: Intensity = 7.81 / (Inlet time + 0.20) ^ 0.48; Return period = Yrs. 25 ; c = cir e = ellip b = box



GRANT AVENUE MIXED USE DRAINAGE AREA MAP

CITY OF NOVATO, MARIN COUNTY, CALIFORNIA
FOR: AM& ASSOCIATES



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