Bellecci & Associates

HYDROLOGY AND HYDRAULIC CALUCLATION

for

HOME 2 SUITES

550 GATEWAY BOULEVARD,
CITY OF SOUTH SAN FRANCISCO, SAN MATEO COUNTY
CALIFORNIA

December 2017

Client
Shri Krishna Enterprises
300 Gateway Boulevard
South San Francisco, CA, 94080

CONCORD
2290 Diamond Blvd. Suite 100
Concord, CA 94520-5744

PLEASANTON
7041 Koll Center Parkway, Suite 132
Pleasanton, CA 94566-3127

Civil Engineering Land Surveying

ONSITE HYDRAULIC CALCULATIONS

Element Details			
ID	27	Notes	
Label	Base Calculation Options		

Hydraulic Summary			
Flow Profile Method	Backwater Analysis	Average Velocity Method	Actual Uniform Flow Velocity
Number of Flow Profile Steps	5	Minimum Structure Headloss	0.00ft
Hydraulic Grade Convergence Test	0.00ft	Minimum Time of Concentration	0.083hours

Inlets			
Neglect Side Flow?	False	Active Components for Combination Inlets In Sag	Grate and Curb
Neglect Gutter Cross Slope For Side Flow?	False	Active Components for Combination Inlets on Grade	Grate and Curb

HEC-22 Energy Losses			
Elevations Considered Equal Within	0.50ft	Depressed Unsubmerged Factor	1.000
Consider Non-Piped Plunging Flow?	False	Half Bench Submerged Factor	0.950
Flat Submerged Factor	1.000	Half Bench Unsubmerged Factor	0.150
Flat Unsubmerged Factor	1.000	Full Bench Submerged Factor	0.750
Depressed Submerged Factor	1.000	Full Bench Unsubmerged Factor	0.070

Headloss (AASHTO)			
Expansion, Ke	0.350	Shaping Adjustment, Cs	0.500
Contraction, Kc	0.250	Non-Piped Flow Adjustment, Cn	1.300

Bend Angle vs. Bend Loss Curve

Bend Angle (degrees)	Bend Loss Coefficient, Kb
0.00	0.000
15.00	0.190
30.00	0.350
45.00	0.470
60.00	0.560
75.00	0.640
90.00	0.700

Gravity Hydraulics	
Governing Upstream Pipe Selection Method	Pipe with Maximum QV

ONSITE HYDRAULIC CALCULATIONS

Catchment Summary

Label	Area (User Defined) (acres)	Time of Concentration (hours)	Runoff Coefficient (Rational)	Catchment CA (acres)	Catchment Intensity (in/h)	Catchment Rational Flow (cfs)
DMA 3	0.070	0.167	0.880	0.062	1.929	0.12
DMA 4	0.240	0.167	0.880	0.211	1.929	0.41
DMA 5	0.180	0.167	0.880	0.158	1.929	0.31
DMA 6	0.420	0.167	0.880	0.370	1.929	0.72
DMA 1	0.090	0.167	0.880	0.079	1.929	0.15
DMA 2	0.290	0.167	0.880	0.255	1.929	0.50
DMA 7	0.640	0.167	0.880	0.563	1.930	1.10

Conduit Summary

Label	Section Type	Branch ID	Subnetwork Outfall	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Depth (In) (ft)	Depth (Out) (ft)
Pipe from CB7 – IMP1	Circle	6	O-2	0.15	2.60	24.23	24.23	0.73	0.83
Pipe from CB16 – IMP3	Circle	5	O-6	0.12	1.91	23.73	23.73	0.81	0.83
Pipe from CB1-CB2	Circle	4	O-4	0.50	2.08	21.53	21.29	0.34	0.39
Pipe from CB2-MH3	Circle	4	O-4	0.48	2.05	21.29	21.23	0.39	0.74
Pipe from CB13-MH12	Circle	2	O-5	0.31	1.80	21.74	21.74	0.67	0.75
Pipe from AD14-MH12	Circle	3	O-5	1.51	2.75	22.05	21.74	0.67	0.75
Pipe from MH12-MH11	Circle	2	O-5	1.76	2.82	21.74	21.32	0.75	0.80
Pipe from MH11-IMP2	Circle	2	O-5	1.69	2.75	21.32	21.23	0.80	0.83
Pipe from MH3-IMP2	Circle	4	O-4	0.46	2.00	21.23	21.23	0.74	0.83
Pipe from CB10-IMP2	Circle	1	O-3	0.72	6.63	21.35	21.23	0.35	0.83

Node Summary

Label	Element Type	Subnetwork Outfall	Flow (Total In) (cfs)	Flow (Total Out) (cfs)	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
SDMH 12	Manhole	O-5	1.81	1.76	25.80	20.99	21.74	21.86
SDMH-11	Manhole	O-5	1.76	1.69	25.30	18.52	21.42	21.42
SDMH 3	Manhole	O-4	0.48	0.46	25.10	20.49	21.24	21.24
AD14	Catch Basin	O-5	1.51	1.51	25.74	21.38	22.16	22.16
CB-13	Catch Basin	O-5	0.31	0.31	25.99	21.07	21.74	21.74
CB-10	Catch Basin	O-3	0.72	0.72	25.00	21.00	21.48	21.48
CB-1	Catch Basin	O-4	0.50	0.50	25.19	21.19	21.60	21.60
CB-2	Catch Basin	O-4	0.50	0.48	26.18	20.90	21.34	21.34
CB-16	Catch Basin	O-6	0.12	0.12	26.92	22.92	23.73	23.73
CB-7	Catch Basin	O-2	0.15	0.15	27.50	23.50	24.23	24.23
O-2	Outfall	(N/A)	(N/A)	0.15	25.40	23.40	(N/A)	(N/A)
O-3	Outfall	(N/A)	(N/A)	0.72	23.40	20.40	(N/A)	(N/A)
O-4	Outfall	(N/A)	(N/A)	0.45	23.40	20.40	(N/A)	(N/A)
O-5	Outfall	(N/A)	(N/A)	1.67	23.40	20.40	(N/A)	(N/A)
O-6	Outfall	(N/A)	(N/A)	0.12	26.90	20.90	(N/A)	(N/A)

Starting Hgl @ Imp 1- 24.23, Starting HGL @ IMP 2 : 21.23, Starting HGL @ IMP3 – 23.73.

ONSITE HYDRAULIC CALCULATIONS

Inlet Summary

Label	Inlet Type	Catalog Inlet Type	Catalog Inlet	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Bypass Target	Capture Efficiency (Calculated) (%)	Depth (Gutter) (ft)	Spread / Top Width (ft)
AD14	(N/A)	(N/A)	(N/A)	1.51	0.00	(N/A)	100.0	0.00	0.0
CB-13	(N/A)	(N/A)	(N/A)	0.31	0.00	(N/A)	100.0	0.00	0.0
CB-10	(N/A)	(N/A)	(N/A)	0.72	0.00	(N/A)	100.0	0.00	0.0
CB-1	(N/A)	(N/A)	(N/A)	0.50	0.00	(N/A)	100.0	0.00	0.0
CB-2	(N/A)	(N/A)	(N/A)	0.00	0.00	(N/A)	100.0	0.00	0.0
CB-16	(N/A)	(N/A)	(N/A)	0.12	0.00	(N/A)	100.0	0.00	0.0
CB-7	(N/A)	(N/A)	(N/A)	0.15	0.00	(N/A)	100.0	0.00	0.0

Pond Summary

Label	Element Type	Subnetwork Outfall	Flow (Total In) (cfs)	Flow (Total Out) (cfs)	Hydraulic Grade (ft)	Volume (gal)

Summary of Hydraulic Grade Line Analysis @ Storm Drain point of Connection

Element Details			
ID	27	Notes	
Label	Base Calculation Options		

Hydraulic Summary			
Flow Profile Method	Backwater Analysis	Average Velocity Method	Actual Uniform Flow Velocity
Number of Flow Profile Steps	5	Minimum Structure Headloss	0.00ft
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Bend Angle (degrees)	Bend Loss Coefficient, Kb
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Gravity Hydraulics	
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Summary of Hydraulic Grade Line Analysis @ Storm Drain point of Connection

Catchment Summary

Label	Area (User Defined) (acres)	Time of Concentration (hours)	Runoff Coefficient (Rational)	Catchment CA (acres)	Catchment Intensity (in/h)	Catchment Rational Flow (cfs)
Dma 2,4,5, 6, and 7	1.690	0.170	0.880	1.487	1.915	2.87
Dma 1	0.137	0.170	0.880	0.121	1.915	0.23

Conduit Summary

Label	Section Type	Branch ID	Subnetwork Outfall	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Depth (In) (ft)	Depth (Out) (ft)
Pipe from MH6 – MH5	Circle	1	CB 9	2.86	5.10	17.61	16.08	0.68	0.58
Pipe from MH5 – FI4	Circle	1	CB 9	2.87	6.63	18.71	17.41	0.68	0.48
Pipe from CB9 – MH 6	Circle	1	CB 9	3.03	5.13	16.16	15.87	0.66	1.50

Node Summary

Label	Element Type	Subnetwork Outfall	Flow (Total In) (cfs)	Flow (Total Out) (cfs)	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
FI-4	Manhole	CB 9	2.87	2.87	22.57	18.03	18.99	18.99
MH-6	Manhole	CB 9	3.09	3.03	25.65	15.50	16.57	16.41
MH-5	Manhole	CB 9	2.87	2.86	25.17	16.93	18.29	17.88
CB 9	Outfall	(N/A)	(N/A)	2.98	20.80	12.88	(N/A)	(N/A)

Inlet Summary

Label	Inlet Type	Catalog Inlet Type	Catalog Inlet	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Bypass Target	Capture Efficiency (Calculated) (%)	Depth (Gutter) (ft)	Spread / Top Width (ft)

Pond Summary

Label	Element Type	Subnetwork Outfall	Flow (Total In) (cfs)	Flow (Total Out) (cfs)	Hydraulic Grade (ft)	Volume (gal)