Appendix H:

Hydrology & Hydraulic Report

HYDROLOGY & HYDRAULIC REPORT

CAMBRIA HOTEL

CITY OF PLEASANT HILL

CONTRA COSTA COUNTY

CALIFORNIA

Prepared for
Stratus Development Partners, LLC
17 Corporate Plaza Dr, Suite 200
Newport Beach, CA 92660

Prepared By
Milani & Associates

February 2019

Milani & Associates
2655 Stanwell Drive, Suite 105
Concord, California, 94520

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Summary:

Milani & Associates has performed a hydrology and hydraulic study for Stratus Development Partners, the applicant/developer for the proposed Cambria Hotel. The project site consists of approximately 2.49 gross acres of relatively flat land on the west side of North Main street south of Oak Park Boulevard in the City of Pleasant Hill, CA.

The existing site contains a restaurant (Black Angus Steak house) with the associated commercial improvements, a sound wall in the West side, and a parking lot. Additionally, the project site contains several mature trees, both within the existing parking area and the site's perimeter, including Oak, Pepper and other species.

The table below reflects the distribution of pervious and impervious surface elements between the pre- and post-development conditions:

Table 1:

Item	Impervious Surface (SF)	Pervious Surface (SF)	Total (SF)
Pre-Development Conditions	76,792	31,812	108,604
Post-Development Conditions	92,440	16,164	108,604
Difference	10,648	(10,648)	
Difference (%)	17%	(49%)	

Table 1 above reflects that the post development project converts approximately 10,700 sf of existing landscape/unpaved areas (pervious areas) in to impervious areas (roof/pavement areas). Conversion of pervious to imperious surface area represents 17% of the overall proposed development footprint. The increase in impervious surface area within the proposed development footprint we result in a small increase in the drainage "C" factor which will result in an increase in post development excess storm flows.

This project follows City of Pleasant Hill Public Work Standards design guidelines, approved by resolution No 87-00, for general drainage design.

This proposed project contains onsite private C-3 facilities that provide adequate LID treatment for the new proposed development footprint.

To mitigate the increase in storm water runoff due to the increase of impervious surfaces under the post development proposal onsite detention drainage facilities will be implemented to mitigate post-development storm flows to levels not exceeding existing pre-development excess storm flows.

Design Considerations:

- The Cambria Hotel and Suites development will be constructed as a single-phase project.
- The project consists of a single four (4) story building, containing 155 Guest Rooms, with 133 onsite parking spaces provided.
- The hotel is served by existing public streets which border the development footprint..
- The site development footprint consists of approximately 0.57 acres.
- Access to the Project Site is provided by two points of ingress/egress, the first driveway is located along the east side of the project from North Main Street and the second is located along the north side from Oak Park Blvd.
- The proposed site drainage will utilize three (3) tie in points to existing drainage border in the project development footprint. The tie in points are located at an existing catch basin on Oak Park Boulevard and two existing catch basins on North Main Street. The tie in points are reflected on the site development footprint.
- Water quality parameters will be provided through the installation of eight (8) C-3 LID biotreatment areas.

Overland Release:

The project development is designed to provide overland release through the private street system serving the project development. The private parking lot and the internal access drive both drain towards onsite water treatment facilities and storm drain inlets. The enclosed hydrology map reflects the design overland release drainage path.

As stipulated in the regulations this project will drain to a City-owned and maintained drainage facilities located both on Oak Park boulevard and N Main St.

Hydrology Modeling:

The hydrology model utilizes the HydraFlow Version 8.0 software program. This model utilizes the rational method to determine excess storm water runoff rates for design purposes. The program utilizes a mathematical algorithm to compute a rainfall intensity (i.e. – measured in inches/hour) based upon a computed time of concentration, T_c, measured in minutes. The mathematical model has been calibrated by utilizing City of Pleasant Hill current rainfall intensity charts for both ten (10) year and one hundred (100) year recurrence intervals and a mean annual precipitation (MAP) of nineteen (19.0”). Copies of current Contra Costa County rainfall-depth-duration curves and rainfall isohyet map are attached in Appendix “A” of this report.

Hydraulic Modeling:

The hydraulic model utilizes a subprogram within the HydraFlow Version 8.0 software program. All hydraulic grade lines are computed utilizing a standard step method with the application of hydraulic losses at all structures computed by the application of a hydraulic loss coefficient applied to the upstream velocity head. The attached tabular computer outputs tabulate the anticipated storm flow (cfs), velocity, depth of flow and upstream/downstream flow lines and hydraulic grade lines for each line in the hydraulic model.

The starting hydraulic grade line was taken as 70.50' on section A, 74.46' on section B and 73.50' on section C. The starting HGL grades were taken as the soffet elevation of the existing outlet pipe at the point of connection.

The hydrology map attached in Appendix "A" of this report provides a visual mapping of line designation numbers in the tabular format to the locations in the design drawings. Hydrology and hydraulic computations have been prepared for the post-development conditions for the Cambria Hotel Development for ten (10) year, and one hundred (100) year recurrence intervals and are attached in Appendix "A" of this report.

Pre- and Post-Development Analysis:

A simple rational method storm drain computation is utilized to model the pre- and post-development conditions for the fifteen (10) year and one hundred (100) year recurrence intervals, using a mean annual precipitation (MAP) of nineteen inches (19.0"). The Pre and Post development project discharge flow rates are discussed below.

Runoff Coefficients:

The Contra Costa design guidelines provide C-factors for varying levels of land development. The onsite pre- and post-development C-factor for landscaped areas and impervious areas (paving and roofs) were taken as 0.4 and 0.95, respectively.

Time of Concentration:

The post-development initial time of concentration is taken as ten minutes (10'). This accounts for the significant amount of additional impervious area created or added in comparison to the existing conditions.

The pre-development time of concentration is determined to be ten minutes (10') due to the limited topographic relief of the existing site.

The table below shows the rainfall intensity rate:

Time of Concentration (')	10-year (inches/hr)	100-year (inches/hr)
10	1.98	2.88

The rainfall intensity rates were obtained from the precipitation duration-frequency-depth curves from the Contra Costa County Public Works Department.

Pre-Development Computations:

Rational Method: Q = CiA (t_c=10')

Impervious Area = 1.76 acres

Landscaped Area = 0.73 acres

Q_{10} = [0.95 x 1.98 x 1.76] + [0.4 x 1.98 x 0.73] = **3.89 cfs**

Q_{100} = [0.95 x 2.88 x 1.76] + [0.4 x 2.88 x 0.73] = **5.66 cfs**

Post-Development Computations:

Rational Method: Q = CiA (t_c=10')

Impervious Area = 2.12 acres

Landscaped Area = 0.37 acres

Q_{10} = [0.95 x 1.98 x 2.12] + [0.4 x 1.98 x 0.37] = **4.28 cfs**

Q_{100} = [0.95 x 2.88 x 2.12] + [0.4 x 2.88 x 0.37] = **6.23 cfs**

Hydrograph Analysis – Stage Storage Determination:

An analysis of the between the pre and post development conditions indicates that under post development conditions the site will discharge a combined excess storm flow of 4.28 cfs, an increase of 0.39 cfs, being a 9.11 % increase from the existing onsite conditions.

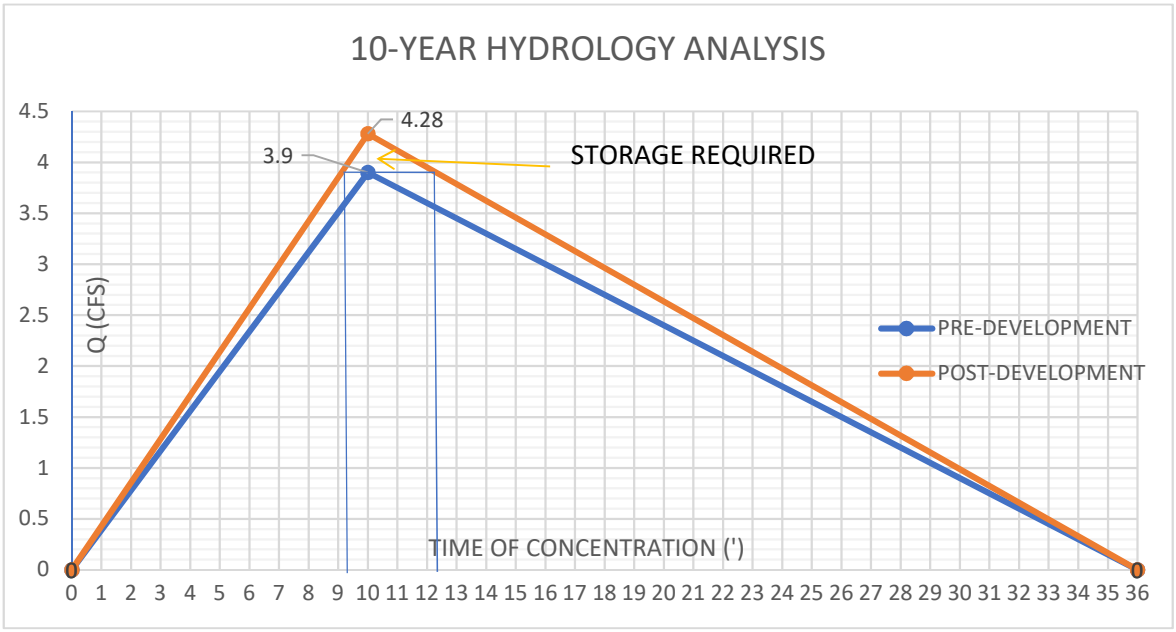
The small increase in discharge flow, 0.39 cfs will not pose a significant impact on existing downstream facilities.

APPENDIX “A”

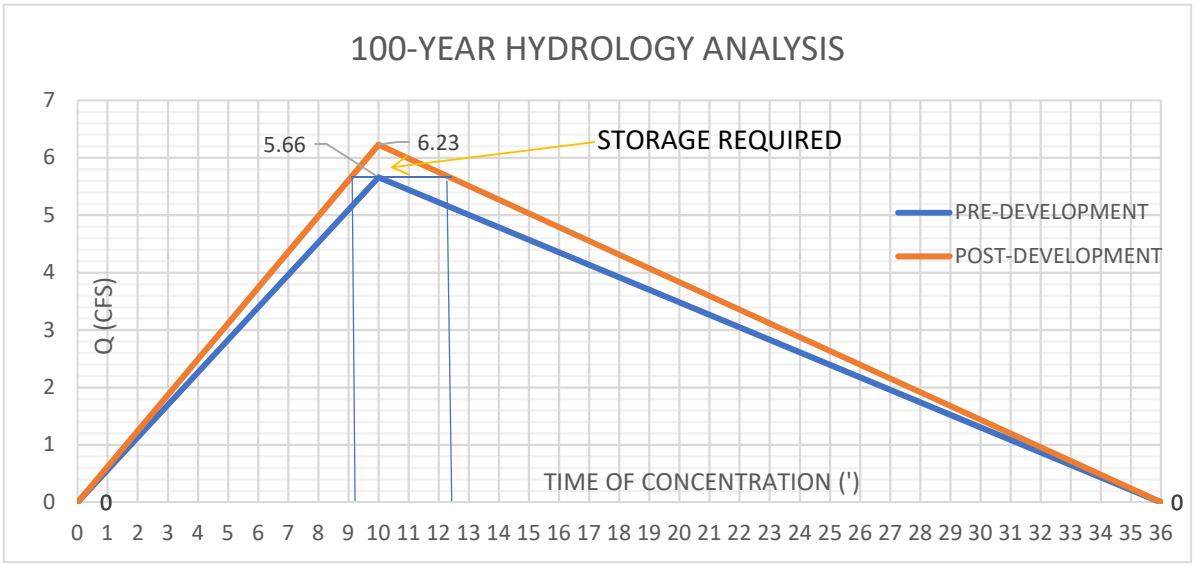
10-YEAR, 100-YEAR &

HYDROGRAPHS

Pre-Development Time of Concentration = 10'
Post-Development Time of Concentration = 10'



Storage Required for 10-Year: V=(0.5)*(4.28-3.9)*(12.5-9.2)*(60)=37.62 CF



Storage Required for 100-Year: V=(0.5)*(6.23-5.66)*(12.5-9.2)*(60)=56.43 CF

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HYDROLOGY MAP

GARGUILO/SILVA
170-092-031

OAK PARK HILLS CHAPEL
170-092-048

OTSUKA
170-092-006

170-092-040

170-092-039

GATRELL
170-092-041

PLEASANT CT.

OAK PARK BOULEVARD

N MAIN STREET

DA #1
3,074.11 SF
0.071 ACRES
C=0.95
tc=5'

DA #2
3,439.94 SF
0.079 ACRES
C=0.95
tc=5'

DA #3
446.69 SF
0.022 ACRES
C=0.40
tc=5'

DA # 4
521.56 SF
0.012 ACRES
C=0.40
tc=5'

DA #5
8,693.16 SF
0.200 ACRES
C=0.95
tc=5'

DA #6
180.66 SF
0.004 ACRES
C=0.40
tc=5'

DA #7
16,339.03 SF
0.375 ACRES
C=0.95
tc=5'

DA #8
22,766.40 SF
0.523 ACRES
C=0.95
tc=5'

DA #9
3,626.13 SF
0.083 ACRES
C=0.95
tc=5'

DA #10
211.42 SF
0.005 ACRES
C=0.40
tc=5'

DA #11
1,776.91 SF
0.041 ACRES
C=0.95
tc=5'

DA #12
179.38 SF
0.004 ACRES
C=0.40
tc=5'

DA #13
104.23 SF
0.002 ACRES
C=0.40
tc=5'

DA #14
1,904.82 SF
0.044 ACRES
C=0.95
tc=5'

DA #15
232.95 SF
0.005 ACRES
C=0.40
tc=5'

DA #16
71.18 SF
0.002 ACRES
C=0.40
tc=5'

DA #17
6,605.91 SF
0.152 ACRES
C=0.95
tc=5'

DA #18
4,640.51 SF
0.107 ACRES
C=0.95
tc=5'

DA #19
4,947.10 SF
0.114 ACRES
C=0.95
tc=5'

DA #20
4,512.73 SF
0.104 ACRES
C=0.95
tc=5'

DA #21
329.67 SF
0.008 ACRES
C=0.40
tc=5'

DA #22
4,443.61 SF
0.102 ACRES
C=0.95
tc=5'

DA #23
181.83 SF
0.004 ACRES
C=0.95
tc=5'

DA #24
220.96 SF
0.005 ACRES
C=0.40
tc=5'

DA #25
951.86 SF
0.022 ACRES
C=0.40
tc=5'

DA #26
1,004.33 SF
0.023 ACRES
C=0.40
tc=5'

DA #27
675.76 SF
0.016 ACRES
C=0.40
tc=5'

DA #28
644.48 SF
0.015 ACRES
C=0.40
tc=5'

DA #29
1,061.46 SF
0.024 ACRES
C=0.40
tc=5'

DA #30
764.42 SF
0.018 ACRES
C=0.40
tc=5'

DA #31
1,759.42 SF
0.040 ACRES
C=0.40
tc=5'

DA #32
2,113.11 SF
0.049 ACRES
C=0.40
tc=5'

DA #33
833.52 SF
0.019 ACRES
C=0.40
tc=5'

DA #34
3,175.88 SF
0.073 ACRES
C=0.40
tc=5'

DA #35
949.25 SF
0.022 ACRES
C=0.40
tc=5'

DA #36
626.26 SF
0.014 ACRES
C=0.40
tc=5'

686.41 SF
0.016 ACRES

LEGEND:

- DRAINAGE AREA BOUNDARY
- STORM DRAIN PIPE
- STORM DRAIN CATCH BASIN

SCALE: 1"=20'

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3131 N. MAIN STREET
CITY OF PLEASANT HILL **CONTRA COSTA COUNTY** **CALIFORNIA**

CAMBRIA HOTEL

HYDROLOGY MAP

A.P.N. 170-092-50
A.P.N. 170-092-054 & -055
A.P.N. 170-092-057 THRU -059

DESIGNED UNDER THE DIRECTION OF:

MICHAEL E. MILANI DATE
R.C.E. No. 35121 REGISTRATION EXPIRES 9-30-19

DESIGN:	KRA/AB	JOB NO:	1200
DRAWN:	KRA/SMS/LML	DATE:	2/27/2019
CHECKED:	KRA	SCALE:	AS SHOWN

REGISTERED PROFESSIONAL ENGINEER — MICHAEL EUGENE MILANI — No.35121 — EXP. 09/30/19 — CIVIL — STATE OF CALIFORNIA

NO.	REVISIONS	BY	APP	DATE

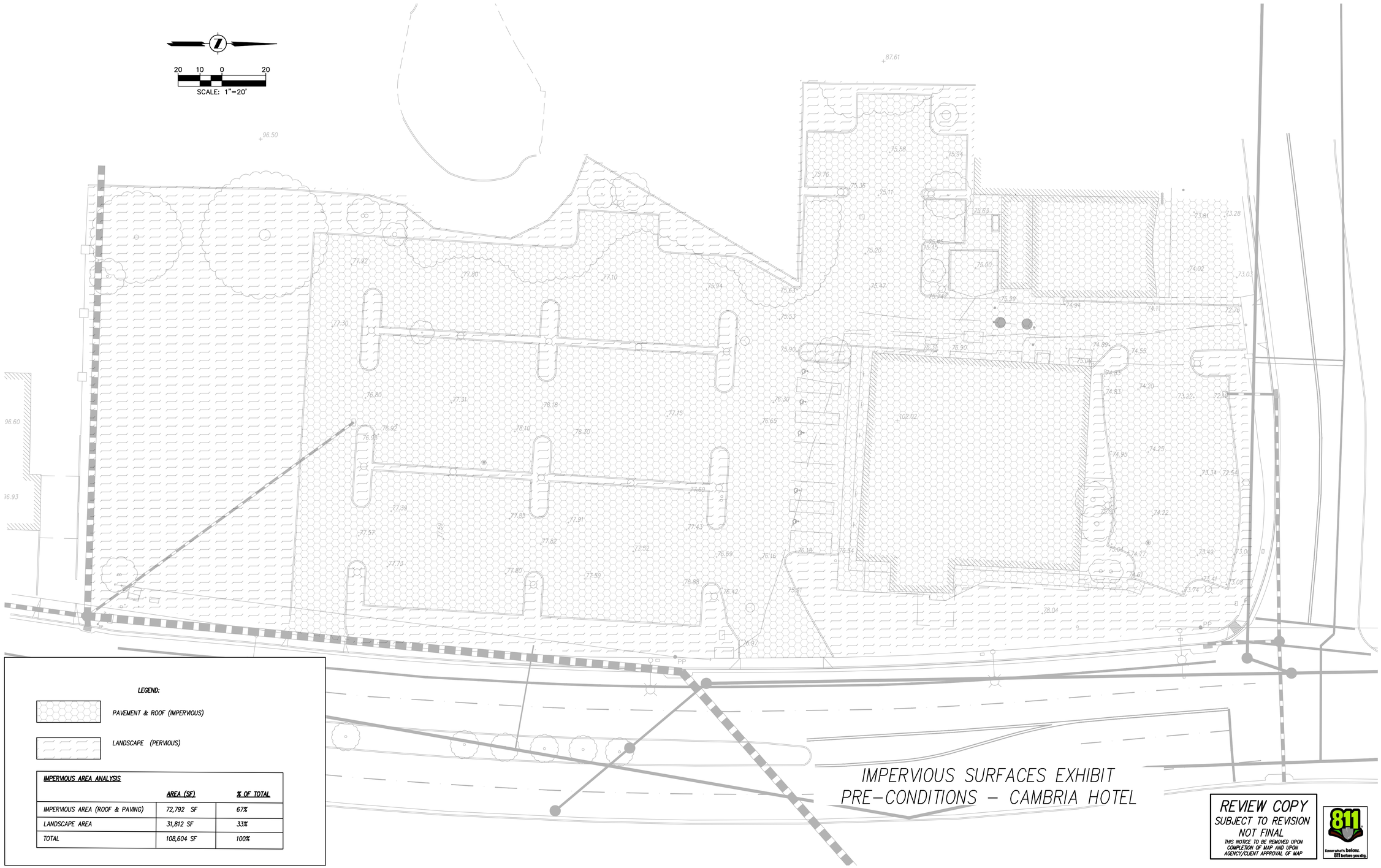
SHEET 1 OF 1 SHEETS

R:\Jobs\1200\Hydrology & Hydraulics\1200 HYDROLOGY MAP.dwg Hydrology Map 2-27-19 05:21:56 PM AlexBarajas

IMPERVIOUS SURFACE PRE-CONDITIONS

20 10 0 20

SCALE: 1"=20'



LEGEND:

PAVEMENT & ROOF (IMPERVIOUS)

LANDSCAPE (PERVIOUS)

IMPERVIOUS AREA ANALYSIS	AREA (SF)	% OF TOTAL
IMPERVIOUS AREA (ROOF & PAVING)	72,792 SF	67%
LANDSCAPE AREA	31,812 SF	33%
TOTAL	108,604 SF	100%

IMPERVIOUS SURFACES EXHIBIT
PRE-CONDITIONS - CAMBRIA HOTEL

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3131 N. MAIN STREET — CAMBRIA HOTEL — A.P.N. 170-092-50, A.P.N. 170-092-054 & -055, A.P.N. 170-092-057 THRU -059

IMPERVIOUS SURFACE EXHIBIT PRE CONDITIONS

CITY OF PLEASANT HILL — CONTRA COSTA COUNTY — CALIFORNIA

DESIGNED UNDER THE DIRECTION OF:

MICHAEL E. MILANI — DATE

R.C.E. No. 35121 REGISTRATION EXPIRES 9-30-19

DESIGN: KRA/AB	JOB NO: 1200
DRAWN: KRA/SMS/LML	DATE: 2/28/2019
CHECKED: KRA	SCALE: AS SHOWN

REGISTERED PROFESSIONAL ENGINEER — MICHAEL EUGENE MILANI — No. 35121 — EXP. 09/30/19 — CIVIL — STATE OF CALIFORNIA

NO.	REVISIONS	BY	APP	DATE

SHEET 1 OF 2 SHEETS

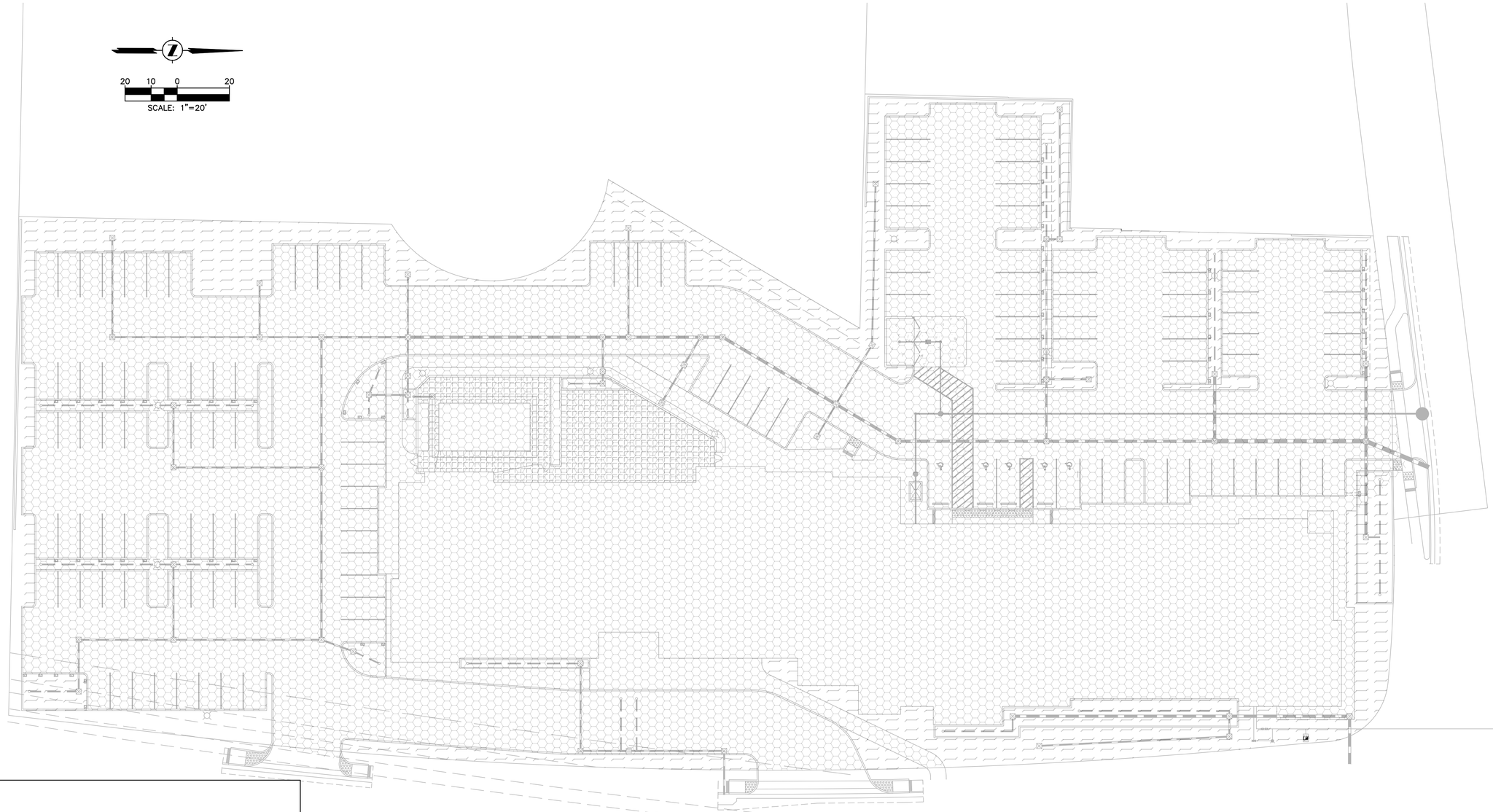
R:\Jobs\1200\Hydrology & Hydraulics\1200 PRE-POST HYDROLOGY.dwg Impervious Surface Preconditions Exhibit 2-28-19 08:37:05 AM AlexBarajas

IMPREVIOUS SURFACE

POST-CONDITIONS

20 10 0 20

SCALE: 1"=20'



LEGEND:

PAVEMENT & ROOF (IMPERVIOUS)

LANDSCAPE (PERVIOUS)

IMPERVIOUS AREA ANALYSIS

	AREA (SF)	% OF TOTAL
IMPERVIOUS AREA (ROOF & PAVING)	92,440 SF	85%
LANDSCAPE AREA	16,164 SF	15%
TOTAL	108,604 SF	100%

IMPERVIOUS SURFACES EXHIBIT
POST CONDITIONS – CAMBRIA HOTEL

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A.P.N. 170-092-054 & -055
A.P.N. 170-092-057 THRU -059

IMPERVIOUS SURFACE EXHIBIT POST CONDITIONS

CITY OF PLEASANT HILL — CONTRA COSTA COUNTY — CALIFORNIA

DESIGNED UNDER THE DIRECTION OF:

MICHAEL E. MILANI — DATE
R.C.E. No. 35121 REGISTRATION EXPIRES 9-30-19

DESIGN: KRA/AB	JOB NO: 1200
DRAWN: KRA/SMS/LML	DATE: 2/28/2019
CHECKED: KRA	SCALE: AS SHOWN

REGISTERED PROFESSIONAL ENGINEER — MICHAEL EUGENE MILANI — No. 35121 — EXP. 09/30/19 — CIVIL — STATE OF CALIFORNIA

NO.	REVISIONS	BY	APP	DATE

SHEET 2 OF 2 SHEETS

R:\Jobs\1200\Hydrology & Hydraulics\1200 PRE-POST HYDROLOGY.dwg Impervious Surface Post-conditions 2-28-19 08:37:47 AM AlexBarajas

HYDRAFLOW 10-YEAR

STORM ANALYSIS REPORT

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	26.1	0.00	1.49	0.00	0.00	1.39	0.0	8.6	3.0	4.14	8.76	2.38	18	0.50	69.13	69.00	70.52	70.50	72.50	72.50	A-1
2	1	58.0	0.00	1.03	0.00	0.00	0.96	0.0	8.2	3.0	2.92	11.52	1.99	18	0.86	69.63	69.13	70.63	70.63	72.50	73.46	A-2
3	2	64.5	0.00	0.95	0.00	0.00	0.88	0.0	7.9	3.1	2.77	8.74	1.70	18	0.50	69.97	69.65	71.17	71.15	73.46	74.25	A-3
4	3	56.8	0.00	0.72	0.00	0.00	0.68	0.0	7.6	3.2	2.19	8.71	1.33	18	0.49	70.25	69.97	71.48	71.47	74.25	74.87	A-4
5	4	27.8	0.00	0.72	0.00	0.00	0.68	0.0	7.4	3.3	2.22	8.81	1.29	18	0.50	70.39	70.25	71.76	71.75	74.87	75.15	A-5
6	5	50.5	0.00	0.67	0.00	0.00	0.64	0.0	7.1	3.4	2.14	8.73	1.28	18	0.50	70.64	70.39	71.90	71.89	75.15	75.65	A-6
7	6	8.5	0.00	0.67	0.00	0.00	0.64	0.0	7.1	3.4	2.15	5.40	2.73	12	1.65	70.88	70.74	71.95	71.93	75.65	75.73	A-7
8	7	27.6	0.00	0.67	0.00	0.00	0.63	0.0	6.9	3.4	2.17	3.00	2.77	12	0.51	71.12	70.98	72.12	72.07	75.73	76.15	A-8
9	8	9.9	0.00	0.66	0.00	0.00	0.62	0.0	6.9	3.4	2.15	2.99	2.74	12	0.51	71.17	71.12	72.26	72.24	76.15	76.25	A-9
10	9	74.7	0.00	0.66	0.00	0.00	0.62	0.0	6.5	3.6	2.24	2.92	2.89	12	0.48	71.63	71.27	72.57	72.38	76.25	75.98	A-10
11	10	33.2	0.00	0.48	0.00	0.00	0.46	0.0	6.3	3.7	1.67	1.49	4.80	8	1.08	72.41	72.05	73.17	72.72	75.98	76.04	A-11
12	11	23.7	0.00	0.04	0.00	0.00	0.04	0.0	5.5	4.0	0.15	0.97	0.46	8	0.46	73.03	72.92	73.59	73.59	76.04	76.23	A-12
13	12	56.5	0.00	0.02	0.00	0.00	0.02	0.0	5.2	4.2	0.08	0.52	0.81	6	0.62	73.45	73.10	73.63	73.60	76.23	77.80	A-13
14	1	36.8	0.39	0.39	0.95	0.37	0.37	5.0	5.0	4.3	1.59	8.92	0.93	18	0.52	69.43	69.24	70.75	70.74	72.50	73.95	A-14
15	1	29.8	0.07	0.07	0.95	0.07	0.07	5.0	5.0	4.3	0.29	2.99	0.38	12	0.50	69.78	69.63	70.63	70.63	72.50	73.01	A-15
16	2	27.8	0.08	0.08	0.95	0.08	0.08	5.0	5.0	4.3	0.33	3.83	0.46	12	0.83	71.55	71.32	72.32	72.32	73.46	74.58	A-16
17	3	23.8	0.00	0.23	0.00	0.00	0.20	0.0	5.6	4.0	0.80	1.01	2.35	8	0.50	71.00	70.88	71.61	71.55	74.25	75.26	A-17
18	5	26.6	0.02	0.04	0.95	0.02	0.04	5.0	5.3	4.1	0.17	0.57	1.10	6	0.75	72.70	72.50	73.01	73.00	75.15	76.58	A-18
19	5	14.3	0.00	0.00	0.40	0.00	0.00	5.0	5.0	4.3	0.01	0.68	0.05	6	1.05	72.65	72.50	73.00	73.00	75.15	76.30	A-19
20	8	41.8	0.01	0.01	0.95	0.01	0.01	5.0	5.0	4.3	0.04	0.47	0.27	6	0.50	74.71	74.50	75.00	75.00	76.15	77.22	A-20
21	10	24.1	0.02	0.02	0.95	0.02	0.02	5.0	5.0	4.3	0.08	1.33	0.26	8	0.87	72.21	72.00	72.71	72.71	75.98	76.00	A-21

Project File: 2019-02-22- Hydrology and Hydraulics Section A.I-D-F File: City of Pleasant Hill-19.00.IDF

Total number of lines: 44

Run Date: 02-27-2019

NOTES: Intensity = 12.90 / (Tc + 0.00) ^ 0.68; Return period = 10 Yrs. ; Initial tailwater elevation = 70.50 (ft)

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	12	20.0	0.02	0.02	0.95	0.02	0.02	5.0	5.0	4.3	0.08	0.47	0.45	6	0.50	73.20	73.10	73.60	73.60	76.23	76.00	A-22
23	13	38.1	0.02	0.02	0.95	0.02	0.02	5.0	5.0	4.3	0.08	0.56	0.65	6	0.71	75.42	75.15	75.66	75.65	77.80	79.50	A-23
24	7	12.6	0.00	0.00	0.00	0.00	0.00	0.0	5.1	4.2	0.01	0.83	0.04	6	1.59	72.70	72.50	73.00	73.00	75.73	75.60	A-24
25	24	16.8	0.00	0.00	0.40	0.00	0.00	5.0	5.0	4.3	0.01	0.72	0.05	6	1.19	72.90	72.70	73.20	73.20	75.60	76.40	A-25
26	9	15.0	0.00	0.00	0.00	0.00	0.00	0.0	5.0	4.3	0.00	1.56	0.01	8	1.20	72.55	72.37	73.04	73.04	76.25	75.00	A-26
27	26	6.0	0.00	0.00	0.40	0.00	0.00	5.0	5.0	4.3	0.00	1.01	0.01	8	0.50	72.58	72.55	73.22	73.22	75.00	75.49	A-27
28	10	14.9	0.00	0.16	0.00	0.00	0.15	0.0	5.1	4.2	0.63	1.10	3.44	6	2.75	72.51	72.10	72.91	72.71	75.98	75.10	A-28
29	28	7.0	0.00	0.16	0.95	0.00	0.15	5.0	5.1	4.2	0.63	0.94	3.45	6	2.00	72.75	72.61	73.15	73.12	75.10	75.07	A-29
30	29	14.9	0.15	0.15	0.95	0.14	0.14	5.0	5.0	4.3	0.62	0.73	3.23	6	1.21	73.02	72.84	73.47	73.37	75.07	75.24	A-30
31	11	50.0	0.00	0.44	0.00	0.00	0.42	0.0	6.0	3.8	1.58	1.71	4.70	8	1.44	73.55	72.83	74.14	73.53	76.04	76.20	A-31
32	31	66.1	0.00	0.33	0.00	0.00	0.31	0.0	5.6	4.0	1.24	1.25	3.64	8	0.77	74.46	73.95	75.06	74.62	76.20	77.20	A-32
33	32	13.0	0.11	0.11	0.95	0.10	0.10	5.0	5.0	4.3	0.45	0.49	2.28	6	0.54	74.61	74.54	75.34	75.28	77.20	75.83	A-33
34	32	56.9	0.00	0.22	0.00	0.00	0.21	0.0	5.3	4.1	0.86	0.46	4.38	6	0.49	74.41	74.13	76.24	75.28	77.20	77.00	A-34
35	34	36.1	0.00	0.11	0.00	0.00	0.10	0.0	5.1	4.2	0.44	0.55	2.46	6	0.69	76.28	76.03	76.67	76.54	77.00	77.00	A-35
36	34	28.9	0.11	0.11	0.95	0.10	0.10	5.0	5.0	4.3	0.45	0.48	2.31	6	0.52	76.19	76.04	76.66	76.54	77.00	77.00	A-36
37	35	19.9	0.11	0.11	0.95	0.10	0.10	5.0	5.0	4.3	0.45	0.61	2.50	6	0.85	76.54	76.37	76.93	76.87	77.00	77.44	A-37
38	31	60.0	0.00	0.11	0.00	0.00	0.10	0.0	5.2	4.2	0.44	0.39	2.23	6	0.35	74.28	74.07	74.78	74.57	76.20	76.90	A-38
39	38	30.0	0.11	0.11	0.95	0.10	0.10	5.0	5.0	4.3	0.45	0.62	2.39	6	0.87	74.54	74.28	74.97	74.85	76.90	75.86	A-39
40	18	61.9	0.02	0.02	0.95	0.02	0.02	5.0	5.0	4.3	0.08	0.60	1.07	6	0.81	73.30	72.80	73.44	73.30	76.58	76.00	A-40
41	17	11.9	0.00	0.00	0.95	0.00	0.00	5.0	5.0	4.3	0.02	0.61	0.09	6	0.84	71.30	71.20	71.70	71.70	75.26	75.26	A-41
42	17	53.8	0.20	0.22	0.95	0.19	0.20	5.0	5.3	4.1	0.82	1.14	2.37	8	0.63	71.23	70.89	71.86	71.70	75.26	75.26	A-42

Project File: 2019-02-22- Hydrology and Hydraulics Section A.I-D-F File: City of Pleasant Hill-19.00.IDF

Total number of lines: 44

Run Date: 02-27-2019

NOTES: Intensity = 12.90 / (Tc + 0.00) ^ 0.68; Return period = 10 Yrs. ; Initial tailwater elevation = 70.50 (ft)

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
43	42	5.1	0.01	0.02	0.40	0.00	0.01	5.0	5.3	4.1	0.04	0.66	0.19	6	0.98	71.35	71.30	71.95	71.95	75.26	75.26	A-43
44	43	49.7	0.01	0.01	0.40	0.00	0.00	5.0	5.0	4.3	0.02	0.53	0.12	6	0.64	71.67	71.35	71.95	71.95	75.26	75.26	A-44

Project File: 2019-02-22- Hydrology and Hydraulics Section A.I-D-F File: City of Pleasant Hill-19.00.IDF

Total number of lines: 44

Run Date: 02-27-2019

NOTES: Intensity = 12.90 / (Tc + 0.00) ^ 0.68; Return period = 10 Yrs. ; Initial tailwater elevation = 70.50 (ft)

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	18.4	0.00	0.61	0.00	0.00	0.58	0.0	5.7	2.5	1.44	5.89	2.41	12	1.96	73.82	73.46	74.41	74.46	75.00	75.62	B-1
2	1	46.1	0.00	0.61	0.00	0.00	0.58	0.0	5.5	2.5	1.46	7.41	2.73	12	3.10	75.25	73.82	75.76	74.82	75.62	78.71	B-2
3	2	83.1	0.54	0.54	0.95	0.51	0.51	5.0	5.0	2.6	1.34	2.99	1.70	12	0.51	74.50	74.08	76.05	75.97	78.71	0.00	B-3
4	2	9.2	0.00	0.07	0.00	0.00	0.07	0.0	5.4	2.5	0.17	0.49	0.86	6	0.54	75.30	75.25	75.97	75.97	78.71	78.71	B-4
5	4	73.0	0.07	0.07	0.95	0.07	0.07	5.0	5.0	2.6	0.17	0.47	1.00	6	0.49	75.66	75.30	76.03	75.98	78.71	77.38	B-5

Project File: 2019-02-22- Hydrology and Hydraulics Section B I-D-F File: City of Pleasant Hill-17.5.IDF

Total number of lines: 5

Run Date: 02-27-2019

NOTES: Intensity = 13.75 / (Tc + 5.00) ^ 0.72; Return period = 10 Yrs. ; Initial tailwater elevation = 74.46 (ft)

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	17.6	0.04	0.18	0.40	0.02	0.12	5.0	5.5	2.5	0.30	0.65	1.78	6	0.97	73.17	73.00	73.51	73.50	78.21	75.83	C-1
2	1	36.5	0.01	0.14	0.40	0.01	0.10	5.0	5.3	2.6	0.26	0.47	1.50	6	0.49	73.35	73.17	73.72	73.67	75.83	74.79	C-2
3	2	18.5	0.05	0.13	0.40	0.02	0.10	5.0	5.2	2.6	0.25	0.49	1.33	6	0.54	73.45	73.35	73.87	73.85	74.79	75.32	C-3
4	3	33.5	0.08	0.08	0.95	0.08	0.08	5.0	5.0	2.6	0.20	0.92	1.66	6	1.94	74.10	73.45	74.33	73.95	75.32	78.58	C-4

Project File: 2019-02-22- Hydrology and Hydraulics Section CI-D-F File: City of Pleasant Hill-17.5.IDF

Total number of lines: 4

Run Date: 02-27-2019

NOTES: Intensity = 13.75 / (Tc + 5.00) ^ 0.72; Return period = 10 Yrs. ; Initial tailwater elevation = 73.50 (ft)

HYDRAFLOW 100-YEAR

STORM ANALYSIS REPORT

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	18.4	0.00	0.61	0.00	0.00	0.58	0.0	5.7	3.6	2.06	5.89	3.37	12	1.96	73.82	73.46	74.43	74.46	75.00	75.62	B-1
2	1	46.1	0.00	0.61	0.00	0.00	0.58	0.0	5.5	3.6	2.10	7.41	3.41	12	3.10	75.25	73.82	75.86	74.82	75.62	78.71	B-2
3	2	83.1	0.54	0.54	0.95	0.51	0.51	5.0	5.0	3.8	1.92	2.99	2.44	12	0.51	74.50	74.08	76.30	76.13	78.71	0.00	B-3
4	2	9.2	0.00	0.07	0.00	0.00	0.07	0.0	5.4	3.7	0.24	0.49	1.24	6	0.54	75.30	75.25	76.14	76.13	78.71	78.71	B-4
5	4	73.0	0.07	0.07	0.95	0.07	0.07	5.0	5.0	3.8	0.25	0.47	1.27	6	0.49	75.66	75.30	76.27	76.17	78.71	77.38	B-5

Project File: 2019-02-22- Hydrology and Hydraulics Section B I-D-F File: City of Pleasant Hill-17.5.IDF | Total number of lines: 5 | Run Date: 02-27-2019

NOTES: Intensity = 19.76 / (Tc + 5.00) ^ 0.72; Return period = 100 Yrs. ; Initial tailwater elevation = 74.46 (ft)

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	17.6	0.04	0.18	0.40	0.02	0.12	5.0	5.5	3.6	0.43	0.65	2.46	6	0.97	73.17	73.00	73.54	73.50	78.21	75.83	C-1
2	1	36.5	0.01	0.14	0.40	0.01	0.10	5.0	5.3	3.7	0.37	0.47	2.01	6	0.49	73.35	73.17	73.77	73.67	75.83	74.79	C-2
3	2	18.5	0.05	0.13	0.40	0.02	0.10	5.0	5.2	3.7	0.35	0.49	1.87	6	0.54	73.45	73.35	73.89	73.85	74.79	75.32	C-3
4	3	33.5	0.08	0.08	0.95	0.08	0.08	5.0	5.0	3.8	0.29	0.92	2.04	6	1.94	74.10	73.45	74.37	73.95	75.32	78.58	C-4

Project File: 2019-02-22- Hydrology and Hydraulics Section CI-D-F File: City of Pleasant Hill-17.5.IDF

Total number of lines: 4

Run Date: 02-27-2019

NOTES: Intensity = 19.76 / (Tc + 5.00) ^ 0.72; Return period = 100 Yrs. ; Initial tailwater elevation = 73.50 (ft)

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	26.1	0.00	1.49	0.00	0.00	1.39	0.0	8.6	4.4	6.19	8.76	3.54	18	0.50	69.13	69.00	70.55	70.50	72.50	72.50	A-1
2	1	58.0	0.00	1.03	0.00	0.00	0.96	0.0	8.2	4.6	4.37	11.52	2.74	18	0.86	69.63	69.13	70.78	70.75	72.50	73.46	A-2
3	2	64.5	0.00	0.95	0.00	0.00	0.88	0.0	7.9	4.7	4.15	8.74	2.52	18	0.50	69.97	69.65	71.20	71.15	73.46	74.25	A-3
4	3	56.8	0.00	0.72	0.00	0.00	0.68	0.0	7.6	4.8	3.29	8.71	1.98	18	0.49	70.25	69.97	71.50	71.47	74.25	74.87	A-4
5	4	27.8	0.00	0.72	0.00	0.00	0.68	0.0	7.4	4.9	3.34	8.81	1.93	18	0.50	70.39	70.25	71.76	71.75	74.87	75.15	A-5
6	5	50.5	0.00	0.67	0.00	0.00	0.64	0.0	7.1	5.1	3.21	8.73	1.91	18	0.50	70.64	70.39	71.91	71.89	75.15	75.65	A-6
7	6	8.5	0.00	0.67	0.00	0.00	0.64	0.0	7.1	5.1	3.22	5.40	4.10	12	1.65	70.88	70.74	72.03	71.98	75.65	75.73	A-7
8	7	27.6	0.00	0.67	0.00	0.00	0.63	0.0	6.9	5.2	3.27	3.00	4.16	12	0.51	71.12	70.98	72.45	72.29	75.73	76.15	A-8
9	8	9.9	0.00	0.66	0.00	0.00	0.62	0.0	6.9	5.2	3.23	2.99	4.12	12	0.51	71.17	71.12	72.78	72.72	76.15	76.25	A-9
10	9	74.7	0.00	0.66	0.00	0.00	0.62	0.0	6.5	5.4	3.37	2.92	4.30	12	0.48	71.63	71.27	73.53	73.04	76.25	75.98	A-10
11	10	33.2	0.00	0.48	0.00	0.00	0.46	0.0	6.3	5.5	2.52	1.49	7.22	8	1.08	72.41	72.05	74.85	73.81	75.98	76.04	A-11
12	11	23.7	0.00	0.04	0.00	0.00	0.04	0.0	5.5	6.0	0.23	0.97	0.66	8	0.46	73.03	72.92	75.66	75.66	76.04	76.23	A-12
13	12	56.5	0.00	0.02	0.00	0.00	0.02	0.0	5.2	6.3	0.12	0.52	0.61	6	0.62	73.45	73.10	75.69	75.67	76.23	77.80	A-13
14	1	36.8	0.39	0.39	0.95	0.37	0.37	5.0	5.0	6.5	2.40	8.92	1.40	18	0.52	69.43	69.24	70.76	70.75	72.50	73.95	A-14
15	1	29.8	0.07	0.07	0.95	0.07	0.07	5.0	5.0	6.5	0.43	2.99	0.55	12	0.50	69.78	69.63	70.75	70.75	72.50	73.01	A-15
16	2	27.8	0.08	0.08	0.95	0.08	0.08	5.0	5.0	6.5	0.49	3.83	0.69	12	0.83	71.55	71.32	72.32	72.32	73.46	74.58	A-16
17	3	23.8	0.00	0.23	0.00	0.00	0.20	0.0	5.6	6.0	1.21	1.01	3.47	8	0.50	71.00	70.88	71.66	71.55	74.25	75.26	A-17
18	5	26.6	0.02	0.04	0.95	0.02	0.04	5.0	5.3	6.2	0.26	0.57	1.62	6	0.75	72.70	72.50	73.02	73.00	75.15	76.58	A-18
19	5	14.3	0.00	0.00	0.40	0.00	0.00	5.0	5.0	6.5	0.01	0.68	0.08	6	1.05	72.65	72.50	73.00	73.00	75.15	76.30	A-19
20	8	41.8	0.01	0.01	0.95	0.01	0.01	5.0	5.0	6.5	0.06	0.47	0.41	6	0.50	74.71	74.50	75.00	75.00	76.15	77.22	A-20
21	10	24.1	0.02	0.02	0.95	0.02	0.02	5.0	5.0	6.5	0.12	1.33	0.35	8	0.87	72.21	72.00	73.81	73.81	75.98	76.00	A-21

Project File: 2019-02-22- Hydrology and Hydraulics Section A.I-D-F File: City of Pleasant Hill-19.00.IDF

Total number of lines: 44

Run Date: 02-27-2019

NOTES: Intensity = 20.14 / (Tc + 0.00) ^ 0.70; Return period = 100 Yrs. ; Initial tailwater elevation = 70.50 (ft)

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	12	20.0	0.02	0.02	0.95	0.02	0.02	5.0	5.0	6.5	0.12	0.47	0.63	6	0.50	73.20	73.10	75.68	75.67	76.23	76.00	A-22
23	13	38.1	0.02	0.02	0.95	0.02	0.02	5.0	5.0	6.5	0.12	0.56	0.84	6	0.71	75.42	75.15	75.71	75.70	77.80	79.50	A-23
24	7	12.6	0.00	0.00	0.00	0.00	0.00	0.0	5.1	6.4	0.01	0.83	0.07	6	1.59	72.70	72.50	73.00	73.00	75.73	75.60	A-24
25	24	16.8	0.00	0.00	0.40	0.00	0.00	5.0	5.0	6.5	0.01	0.72	0.07	6	1.19	72.90	72.70	73.20	73.20	75.60	76.40	A-25
26	9	15.0	0.00	0.00	0.00	0.00	0.00	0.0	5.0	6.5	0.01	1.56	0.02	8	1.20	72.55	72.37	73.04	73.04	76.25	75.00	A-26
27	26	6.0	0.00	0.00	0.40	0.00	0.00	5.0	5.0	6.5	0.01	1.01	0.01	8	0.50	72.58	72.55	73.22	73.22	75.00	75.49	A-27
28	10	14.9	0.00	0.16	0.00	0.00	0.15	0.0	5.1	6.4	0.94	1.10	4.81	6	2.75	72.51	72.10	74.12	73.81	75.98	75.10	A-28
29	28	7.0	0.00	0.16	0.95	0.00	0.15	5.0	5.1	6.4	0.95	0.94	4.84	6	2.00	72.75	72.61	74.62	74.48	75.10	75.07	A-29
30	29	14.9	0.15	0.15	0.95	0.14	0.14	5.0	5.0	6.5	0.94	0.73	4.77	6	1.21	73.02	72.84	75.28	74.98	75.07	75.24	A-30
31	11	50.0	0.00	0.44	0.00	0.00	0.42	0.0	6.0	5.7	2.39	1.71	6.83	8	1.44	73.55	72.83	77.06	75.66	76.04	76.20	A-31
32	31	66.1	0.00	0.33	0.00	0.00	0.31	0.0	5.6	6.0	1.87	1.25	5.36	8	0.77	74.46	73.95	78.92	77.78	76.20	77.20	A-32
33	32	13.0	0.11	0.11	0.95	0.10	0.10	5.0	5.0	6.5	0.68	0.49	3.45	6	0.54	74.61	74.54	79.50	79.36	77.20	75.83	A-33
34	32	56.9	0.00	0.22	0.00	0.00	0.21	0.0	5.3	6.2	1.30	0.46	6.62	6	0.49	74.41	74.13	81.55	79.36	77.20	77.00	A-34
35	34	36.1	0.00	0.11	0.00	0.00	0.10	0.0	5.1	6.4	0.67	0.55	3.40	6	0.69	76.28	76.03	82.60	82.23	77.00	77.00	A-35
36	34	28.9	0.11	0.11	0.95	0.10	0.10	5.0	5.0	6.5	0.68	0.48	3.45	6	0.52	76.19	76.04	82.53	82.23	77.00	77.00	A-36
37	35	19.9	0.11	0.11	0.95	0.10	0.10	5.0	5.0	6.5	0.68	0.61	3.45	6	0.85	76.54	76.37	82.98	82.78	77.00	77.44	A-37
38	31	60.0	0.00	0.11	0.00	0.00	0.10	0.0	5.2	6.3	0.66	0.39	3.37	6	0.35	74.28	74.07	78.38	77.78	76.20	76.90	A-38
39	38	30.0	0.11	0.11	0.95	0.10	0.10	5.0	5.0	6.5	0.68	0.62	3.45	6	0.87	74.54	74.28	78.87	78.56	76.90	75.86	A-39
40	18	61.9	0.02	0.02	0.95	0.02	0.02	5.0	5.0	6.5	0.12	0.60	1.29	6	0.81	73.30	72.80	73.48	73.30	76.58	76.00	A-40
41	17	11.9	0.00	0.00	0.95	0.00	0.00	5.0	5.0	6.5	0.02	0.61	0.13	6	0.84	71.30	71.20	71.85	71.85	75.26	75.26	A-41
42	17	53.8	0.20	0.22	0.95	0.19	0.20	5.0	5.3	6.2	1.24	1.14	3.54	8	0.63	71.23	70.89	72.26	71.85	75.26	75.26	A-42

Project File: 2019-02-22- Hydrology and Hydraulics Section A.I-D-F File: City of Pleasant Hill-19.00.IDF

Total number of lines: 44

Run Date: 02-27-2019

NOTES: Intensity = 20.14 / (Tc + 0.00) ^ 0.70; Return period = 100 Yrs. ; Initial tailwater elevation = 70.50 (ft)

Hydraflow 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 (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
43	42	5.1	0.01	0.02	0.40	0.00	0.01	5.0	5.3	6.2	0.05	0.66	0.28	6	0.98	71.35	71.30	72.45	72.45	75.26	75.26	A-43
44	43	49.7	0.01	0.01	0.40	0.00	0.00	5.0	5.0	6.5	0.03	0.53	0.13	6	0.64	71.67	71.35	72.45	72.45	75.26	75.26	A-44

Project File: 2019-02-22- Hydrology and Hydraulics Section A.I-D-F File: City of Pleasant Hill-19.00.IDF

Total number of lines: 44

Run Date: 02-27-2019

NOTES: Intensity = 20.14 / (Tc + 0.00) ^ 0.70; Return period = 100 Yrs. ; Initial tailwater elevation = 70.50 (ft)

MEAN ANNUAL

PRECIPITATION MAP

122°15′ 122°00′ 121°45′

38°00′ 37°45′

SITE LOCATION
Cambria Hotel Development
MAP = 19.0"

Cambria Hotel
Development
Pleasant Hill, CA
Job No. 1200
02-27-2019

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ISOHYETS SHOWN IN INCHES
ISOHYETS SHOWN IN MILLIMETERS

SCALE
MILES 0 1 2 3 4 5 MILES
KILOMETERS 0 1 2 3 4 5 6 7 8 KILOMETERS
ONE KILOMETER = ⅝ MILE

CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

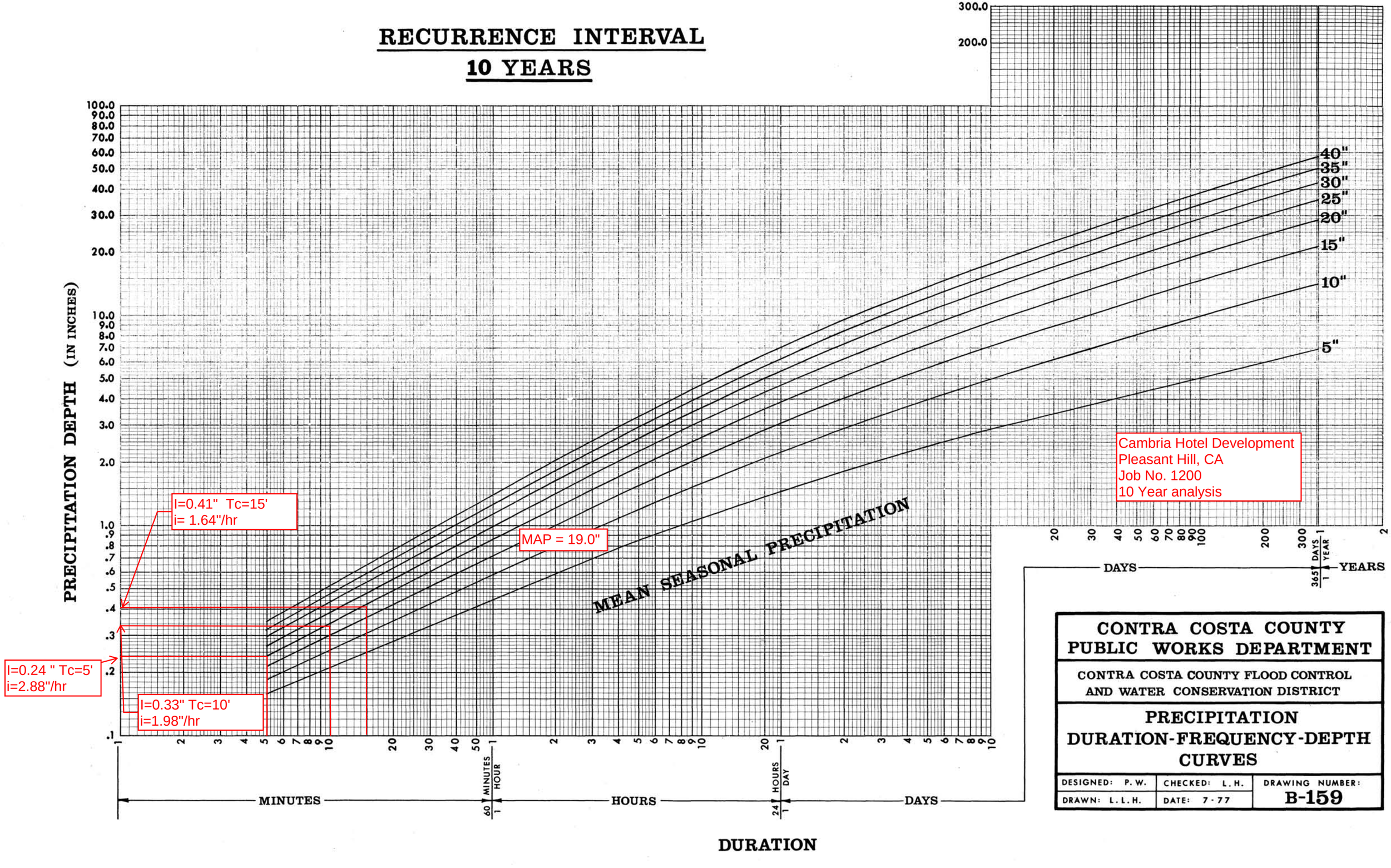
MEAN SEASONAL ISOHYETS
COMPILED FROM PRECIPITATION RECORDS
1879 - 1973

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 12-77	B-166

RAINFALL INTENSITY

10-YEAR STORM

RECURRENCE INTERVAL
10 YEARS

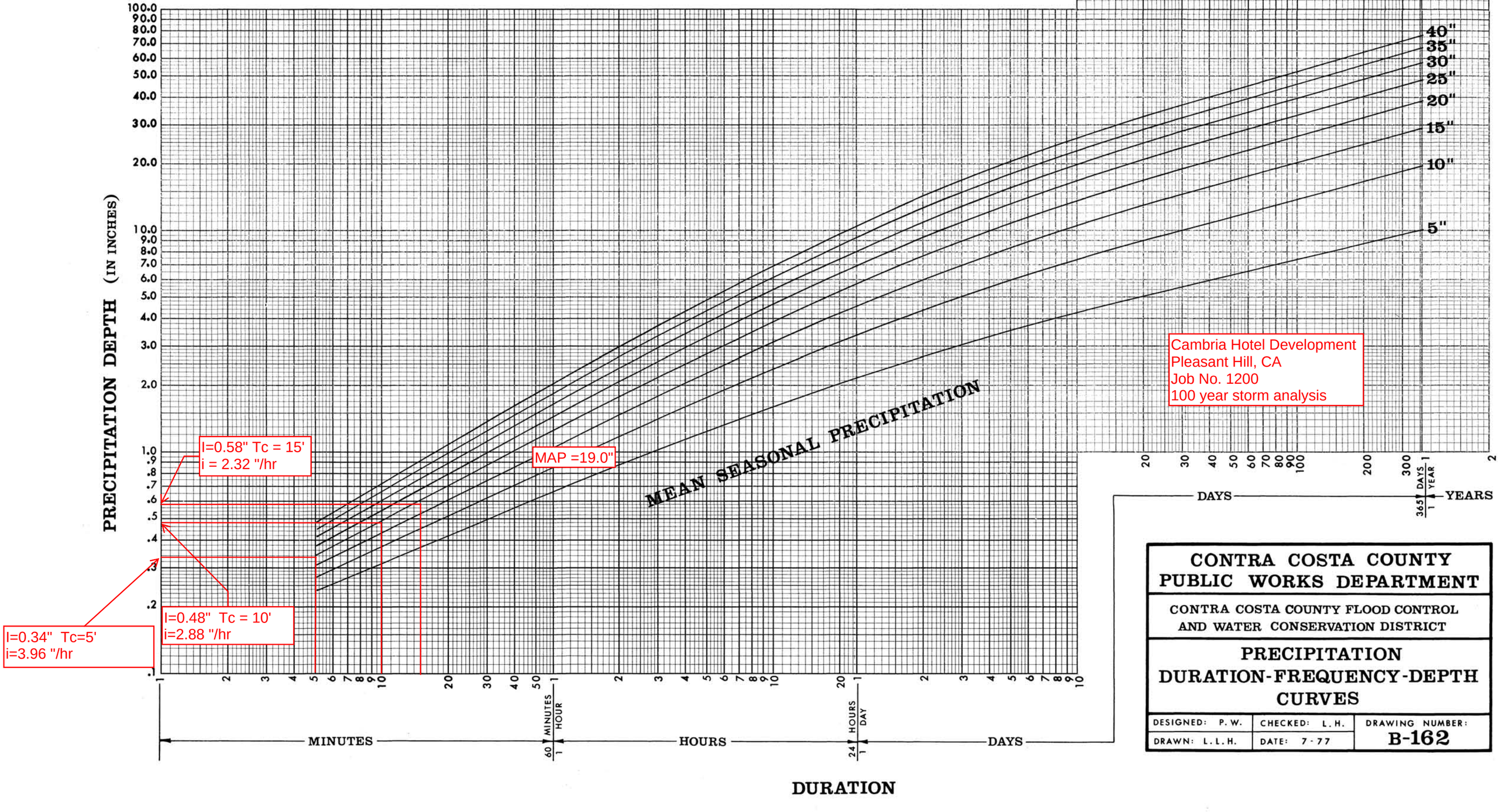


CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER: B-159
DRAWN: L. L. H.	DATE: 7-77	

RAINFALL INTENSITY

100-YEAR STORM

RECURRENCE INTERVAL
100 YEARS



Cambria Hotel Development
Pleasant Hill, CA
Job No. 1200
100 year storm analysis

CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

PRECIPITATION
DURATION-FREQUENCY-DEPTH
CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER: B-162
DRAWN: L. L. H.	DATE: 7-77	