Hydrology Analysis Letter For:

Habitat Santee – Mixed Use

Tentative Map #TM2023-1

Site Address: 8932 1st Street, Santee, CA 92071

APN: 384-106-16

Engineer Information:

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PASCO LARET SUITER & ASSOCIATES

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PASCO LARET SUITER & ASSOCIATES

CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING

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06/08/2023 PLSA 3741

Department of Development Services
City of Santee
10601 Magnolia Ave
(619) 258-4100

RE: HYDROLOGY STUDY FOR THE HABITAT SANTEE RESIDENTIAL DEVELOPMENT

The purpose of this letter is to address the hydrology and hydraulics of the improvements associated with the above-mentioned proposed development.

Existing Site Conditions

The project is located at 8932 1st St in the City of Santee. Based on the existing topography available, it does seem that there is no off-site run-on and all flows outlet directly into the Public ROW. The site topography includes a small berm along the southern property line that diverts flow away from the site preventing any run-on from the Third Street ROW. The site property is 28,490 square feet (0.654 acres) and exists today as a single-family home. The existing topography indicates that most of the site flows to the northwest corner of the site before entering the Park Avenue ROW. The remaining drainage flows into the 1st Street or 3rd Street ROW. All site drainage confluences in the flowline northwest of the site in Park Avenue. Since all site drainage ultimately confluences at the same point in the same flowline, this project will be analyzed as one POC. From here, all drainage flows west down Park Avenue, then North along Edgemont Drive until outletting into the Lower San Diego River, where it will eventually be routed to the Pacific Ocean. The existing impervious area of the site is 2,654 square feet or 9.3%. The total peak storm water run-off was calculated using the rational method equation (Q=CiA). The precipitation volume of 2.5 inches was used for design consideration according to the 100yr 6hr Isopluvial Map in the County of San Diego Hydrology Manual. A 6.59 in/hr intensity was determined from the County of San Diego Hydrology Manual Figure 3-1 using the minimum calculated time of concentration of 5 minutes. This resulted in a combined peak pre-project run-off of Q_{100}= 1.74 CFS using the Rational Method Q=CiA using an area runoff coefficient of 0.40 based on a weighted average of values using 0.90 for impervious areas and 0.35 for pervious areas (Type D Soils) per table 3-1 for the undisturbed natural terrain type D soils in the County of San Diego Drainage Design Manual. Note that additional analysis was completed for the 50 year and 10 year storms. These led to peak flows of Q_{50}= 1.67 and Q_{10}= 1.24.

Proposed Site Conditions

The project proposes a residential apartment complex along 1st Street in Santee. The proposed development does not require a permit under CWA 404/401 because as an urban infill the project does not impact wetlands or riparian areas. The impervious area of the proposed developed site is 16,640

square feet or 58.4% of the property. The proposed impervious areas will include impermeable hardscape, roof tops, concrete paving, and other building features. The existing site improvements are proposed to be demolished. Biofiltration landscape planters throughout the building structure, amended soil landscaped areas, tree wells and permeable pavers have been proposed to minimize the total on site impervious area. Note that all public Right-of-Way drainage patterns will be unchanged in proposed conditions. All proposed site drainage will ultimately reach the northwest corner of the site in the Park Avenue flowline where it will ultimately follow the existing drainage flow path. This means that all proposed site drainage will outlet into the Lower San Diego River where it will be routed to the Pacific Ocean. The total post project peak runoff flow of Q_{100}=2.75 was calculated using the Rational Method Q=CiA using an area runoff coefficient of 0.63 using 0.90 for impervious areas and 0.35 for pervious areas (type D Soils). With the post project peak runoff flow being increased from the pre project peak runoff flow (1.74 cfs vs. 2.75 cfs) and peak runoff volume being increased from existing to proposed conditions (2,382 cu-ft in the existing conditions vs. 3,758 cu-ft in the proposed conditions, assuming 2.5 inches of rainfall per the 100-yr 6 hour storm isopluvial map), further detention must be provided to mitigate the increased runoff in proposed conditions.

The site includes 4,903 SF of permeable pavers which can be used to store the excess stormwater volume differential (1,376 cu-ft). The permeable paver area has been designed to receive drainage from SR-15, 19, 20, 21, and 22 (see attached for the "Post-Project Hydrology Map"). Cumulatively, these three drainage areas produce an undetained 100 year peak flow of 1.29 CFS and a peak volume of 1,757 CF. This means that 91% of the total volume to the pavers will be able to be detained within the paver storage area. An outlet orifice is sized from the permeable paver storage to meet a maximum 72 hour drawdown time, which reduces the 91% of the 100 year peak flow of these drainage areas leaving the site from 1.17 CFS down to 0.006138 CFS. Due to this reduction in volume, the onsite permeable pavers lower the post project peak flow from 2.75 CFS to 1.59 CFS (2.75 CFS – 1.17 CFS + 0.006138 CFS) and the peak volume from 3,758 CF to 2,166 CF. Since the ultimate post project peak flow and volume is less than the pre-project flow (1.59 CFS < 1.74 CFS) and (2,166 CF < 2,382 CF), the proposed development meets all detention requirements. Note that additional analysis was completed for the 50 year and 10 year storms. These led to peak flows of Q_{50}= 2.63 and Q_{10}= 1.96.

Storm drain outlets were sized to convey the Q_{100} and V_{100} of drainage areas delineated based on the architectural roof design and landscaping plans based on the requirements of the San Diego Drainage Design Manual section 2.2.3.b for tributary areas under 1-square mile. Q_{100} and V_{100} were calculated with the weighted runoff coefficient based on table 3-1 of the County of San Diego Drainage Design Manual. The precipitation volume of 2.5 inches was used for design consideration according to Figure B-2 of the San Diego Drainage Design manual 100yr 6hr Isopoluvial Map. A 6.59 in/hr intensity was determined from the County of San Diego Hydrology Manual, figure 3-1 assuming the minimum allowable time of concentration of 5 minutes.

Conclusion

Based on the calculations in this report and shown in the Pre and Post hydrology summary table at the end of this study, the proposed on-site development will result in reduced runoff flow rate and volume between existing and proposed conditions and all detention and peak flow mitigation requirements have been met.

Sincerely,

William G Mack, PE
RCE 73620

Habitat First Street
J-3714
6/8/23

100 YR ON-SITE PRE-PROJECT HYDROLOGY									
Drainage Area	Area Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
EX-1	Existing Residential	0.654	28490	2654	9%	91%	0.40	1.74	2382

100 YR ON-SITE POST-PROJECT HYDROLOGY										
BMP Location	Basin Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	% Permeable Pavers	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
DMA-1	Biofiltration	0.01	**580.00**	**555.00**	96%	4%	0%	0.88	0.08	106
DMA-2	Biofiltration	0.02	**797.00**	**767.00**	96%	4%	0%	0.88	0.11	146
DMA-3	Biofiltration	0.02	**685.00**	**659.00**	96%	4%	0%	0.88	0.09	125
DMA-4	Biofiltration	0.01	**586.00**	**566.50**	97%	3%	0%	0.88	0.08	108
DMA-5	Biofiltration	0.02	**1059.00**	**1005.00**	95%	5%	0%	0.87	0.14	192
DMA-6	Biofiltration	0.01	**626.00**	**601.00**	96%	4%	0%	0.88	0.08	115
DMA-7	Biofiltration	0.02	**952.00**	**915.00**	96%	4%	0%	0.88	0.13	174
DMA-8	Biofiltration	0.03	**1196.00**	**1149.00**	96%	4%	0%	0.88	0.16	219
DMA-9	Biofiltration	0.02	**1022.00**	**982.00**	96%	4%	0%	0.88	0.14	187
SM-10	Self-Mit	0.03	**1399.00**	**107.00**	8%	92%	0%	0.39	0.08	114
SR-11	Imperv Disp	0.01	**443.00**	**212.00**	48%	52%	0%	0.61	0.04	57
SR-12	Imperv Disp	0.04	**1942.00**	**946.00**	49%	51%	0%	0.62	0.18	250
SR-13	Imperv Disp	0.01	**221.00**	**85.00**	38%	62%	0%	0.56	0.02	26
SM-14	Self-Mit	0.00	**83.00**	**0.00**	0%	100%	0%	0.35	0.00	6
SR-15	Perm Pavers	0.14	**6245.00**	**1989.00**	32%	6%	63%	0.37	0.35	480
SM-16	Self-Mit	0.00	**27.00**	**0.00**	0%	100%	0%	0.35	0.00	2
DM-17	Deminimis	0.00	**97.00**	**97.00**	100%	0%	0%	0.90	0.01	18
SM-18	Self-Mit	0.00	**179.00**	**8.00**	4%	96%	0%	0.37	0.01	14
SR-19	Imperv Disp	0.06	**2810.00**	**1370.00**	49%	51%	0%	0.62	0.26	362
SR-20	Tree Wells	0.07	**3018.00**	**1935.00**	64%	36%	0%	0.70	0.32	442
SR-21	Tree Wells	0.05	**1971.00**	**1506.00**	76%	24%	0%	0.77	0.23	316
SR-22	Tree Wells	0.02	**1061.00**	**699.00**	66%	34%	0%	0.71	0.12	157
DM-23	Deminimis	0.00	**35.00**	**35.00**	100%	0%	0%	0.90	0.00	7
SM-24	Deminimis	0.01	**244.00**	**0.00**	0%	100%	0%	0.35	0.01	18
DM-25	Self-Mit	0.00	**79.00**	**79.00**	100%	0%	0%	0.90	0.01	15
SM-26	Deminimis	0.00	**186.00**	**0.00**	0%	100%	0%	0.35	0.01	14
SR-27	Self-Mit	0.02	**867.00**	**373.00**	43%	6%	51%	0.46	0.06	83
SM-28	Perm Pavers	0.00	**80.00**	**0.00**	0%	100%	0%	0.35	0.00	6
Totals:		**0.65**	**28490.00**	**16640.50**	58%	26%	15%	0.63	2.75	**3758**

Note:
1

100 Yr Storm at 5 Min TC		
Intensity:	6.59	in/hr
Precip:	2.50	in
Runoff Coefficient		
Impervious	0.90	
Pervious Coefficient	0.35	
Permeable Pavers	0.10	

Pre Project Peak Vol	2382
Post Project Peak Vol	3758
Volume Differential	**1376**
Add'l storage volume required -->	
Total Vol Detained	1591
Adjusted Post Peak Vol	2166
2,166 cf< 2,382 cf, therefore detention requirements have been meet	

Permeable Paver Storage (SR-15)	
Paver Area (sf)	1900.00
Storage Depth (ft)	1.25
Voids	0.67
Storage Available (cf)	1591
Total Vol to Pavers (cf) (SR-15, 19, 20, 21, 22)	**1757**
Total Vol Detained (cf)	1591

**Paver storage provides enough volume to detain approximately 1,591 cf of peak volume from SR-15, 19, 20, 21, and 22. In order to achieve the max allowable drawdown time of 72 hours, an orifice will be proposed to taper this volume out at a rate of 0.006138 cf/s. This effectively reduces the peak flow in the mitigated condition as shown below:

Peak Flow to Pavers (SR-15,19,20,21,22) (cfs)	Ratio of volume detained to Total Vol to pavers	Peak Flow Mitigated by orifice outlet (cfs)	Adjusted Total Peak Flow (Site Total - mitigated)
1.29	0.91	1.17	1.59

1.59 cfs < existing peak flow of 1.74 cfs, therefore all detention requirements have been met

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35

Habitat First Street
J-3714
6/8/23

50 YR ON-SITE PRE-PROJECT HYDROLOGY									
Drainage Area	Area Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
EX-1	Existing Residential	0.654	28490	2654	9%	91%	0.40	1.67	2277

50 YR ON-SITE POST-PROJECT HYDROLOGY										
BMP Location	Basin Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	% Permeable Pavers	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
DMA-1	Biofiltration	0.01	**580.00**	**555.00**	96%	4%	0%	0.88	0.07	101
DMA-2	Biofiltration	0.02	**797.00**	**767.00**	96%	4%	0%	0.88	0.10	140
DMA-3	Biofiltration	0.02	**685.00**	**659.00**	96%	4%	0%	0.88	0.09	120
DMA-4	Biofiltration	0.01	**586.00**	**566.50**	97%	3%	0%	0.88	0.08	103
DMA-5	Biofiltration	0.02	**1059.00**	**1005.00**	95%	5%	0%	0.87	0.13	184
DMA-6	Biofiltration	0.01	**626.00**	**601.00**	96%	4%	0%	0.88	0.08	109
DMA-7	Biofiltration	0.02	**952.00**	**915.00**	96%	4%	0%	0.88	0.12	167
DMA-8	Biofiltration	0.03	**1196.00**	**1149.00**	96%	4%	0%	0.88	0.15	209
DMA-9	Biofiltration	0.02	**1022.00**	**982.00**	96%	4%	0%	0.88	0.13	179
SM-10	Self-Mit	0.03	**1399.00**	**107.00**	8%	92%	0%	0.39	0.08	109
SR-11	Imperv Disp	0.01	**443.00**	**212.00**	48%	52%	0%	0.61	0.04	54
SR-12	Imperv Disp	0.04	**1942.00**	**946.00**	49%	51%	0%	0.62	0.18	239
SR-13	Imperv Disp	0.01	**221.00**	**85.00**	38%	62%	0%	0.56	0.02	25
SM-14	Self-Mit	0.00	**83.00**	**0.00**	0%	100%	0%	0.35	0.00	6
SR-15	Perm Pavers	0.14	**6245.00**	**1989.00**	32%	6%	63%	0.37	0.34	459
SM-16	Self-Mit	0.00	**27.00**	**0.00**	0%	100%	0%	0.35	0.00	2
DM-17	Deminimis	0.00	**97.00**	**97.00**	100%	0%	0%	0.90	0.01	17
SM-18	Self-Mit	0.00	**179.00**	**8.00**	4%	96%	0%	0.37	0.01	13
SR-19	Imperv Disp	0.06	**2810.00**	**1370.00**	49%	51%	0%	0.62	0.25	346
SR-20	Tree Wells	0.07	**3018.00**	**1935.00**	64%	36%	0%	0.70	0.31	422
SR-21	Tree Wells	0.05	**1971.00**	**1506.00**	76%	24%	0%	0.77	0.22	302
SR-22	Tree Wells	0.02	**1061.00**	**699.00**	66%	34%	0%	0.71	0.11	151
DM-23	Deminimis	0.00	**35.00**	**35.00**	100%	0%	0%	0.90	0.00	6
SM-24	Deminimis	0.01	**244.00**	**0.00**	0%	100%	0%	0.35	0.01	17
DM-25	Self-Mit	0.00	**79.00**	**79.00**	100%	0%	0%	0.90	0.01	14
SM-26	Deminimis	0.00	**186.00**	**0.00**	0%	100%	0%	0.35	0.01	13
SR-27	Self-Mit	0.02	**867.00**	**373.00**	43%	6%	51%	0.46	0.06	79
SM-28	Perm Pavers	0.00	**80.00**	**0.00**	0%	100%	0%	0.35	0.00	6
Totals:		**0.65**	**28490.00**	**16640.50**	58%	26%	15%	0.63	2.63	**3592**

Note:
1

100 Yr Storm at 5 Min TC		
Intensity:	6.30	in/hr
Precip:	2.39	in
Runoff Coefficient		
Impervious	0.90	
Pervious Coefficient	0.35	
Permeable Pavers	0.10	

Pre Project Peak Vol	2277
Post Project Peak Vol	3592
Volume Differential	**1316**
Add'l storage volume required -->	
Total Vol Detained	1591
Adjusted Post Peak Vol	2001
2,001 cf< 2,277 cf, therefore detention requirements have been meet	

Permeable Paver Storage (SR-15)	
Paver Area (sf)	1900.00
Storage Depth (ft)	1.25
Voids	0.67
Storage Available (cf)	1591
Total Vol to Pavers (cf) (SR-15, 19, 20, 21, 22)	**1680**
Total Vol Detained (cf)	1591

**Paver storage provides enough volume to detain approximately 1,591 cf of peak volume from SR-15, 19, 20, 21, and 22. In order to achieve the max allowable drawdown time of 72 hours, an orifice will be proposed to taper this volume out at a rate of 0.006138 cf/s. This effectively reduces the peak flow in the mitigated condition as shown below:

Peak Flow to Pavers (SR-15,19,20,21,22) (cfs)	Ratio of volume detained to Total Vol to pavers	Peak Flow Mitigated by orifice outlet (cfs)	Adjusted Total Peak Flow (Site Total - mitigated)
1.23	0.95	1.17	1.47

1.59 cfs < existing peak flow of 1.74 cfs, therefore all detention requirements have been met

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35

Habitat First Street
J-3714
6/8/23

10 YR ON-SITE PRE-PROJECT HYDROLOGY									
Drainage Area	Area Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
EX-1	Existing Residential	0.654	28490	2654	9%	91%	0.40	1.24	1696

10 YR ON-SITE POST-PROJECT HYDROLOGY										
BMP Location	Basin Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	% Permeable Pavers	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
DMA-1	Biofiltration	0.01	**580.00**	**555.00**	96%	4%	0%	0.88	0.06	75
DMA-2	Biofiltration	0.02	**797.00**	**767.00**	96%	4%	0%	0.88	0.08	104
DMA-3	Biofiltration	0.02	**685.00**	**659.00**	96%	4%	0%	0.88	0.07	89
DMA-4	Biofiltration	0.01	**586.00**	**566.50**	97%	3%	0%	0.88	0.06	77
DMA-5	Biofiltration	0.02	**1059.00**	**1005.00**	95%	5%	0%	0.87	0.10	137
DMA-6	Biofiltration	0.01	**626.00**	**601.00**	96%	4%	0%	0.88	0.06	82
DMA-7	Biofiltration	0.02	**952.00**	**915.00**	96%	4%	0%	0.88	0.09	124
DMA-8	Biofiltration	0.03	**1196.00**	**1149.00**	96%	4%	0%	0.88	0.11	156
DMA-9	Biofiltration	0.02	**1022.00**	**982.00**	96%	4%	0%	0.88	0.10	133
SM-10	Self-Mit	0.03	**1399.00**	**107.00**	8%	92%	0%	0.39	0.06	81
SR-11	Imperv Disp	0.01	**443.00**	**212.00**	48%	52%	0%	0.61	0.03	40
SR-12	Imperv Disp	0.04	**1942.00**	**946.00**	49%	51%	0%	0.62	0.13	178
SR-13	Imperv Disp	0.01	**221.00**	**85.00**	38%	62%	0%	0.56	0.01	18
SM-14	Self-Mit	0.00	**83.00**	**0.00**	0%	100%	0%	0.35	0.00	4
SR-15	Perm Pavers	0.14	**6245.00**	**1989.00**	32%	6%	63%	0.37	0.25	342
SM-16	Self-Mit	0.00	**27.00**	**0.00**	0%	100%	0%	0.35	0.00	1
DM-17	Deminimis	0.00	**97.00**	**97.00**	100%	0%	0%	0.90	0.01	13
SM-18	Self-Mit	0.00	**179.00**	**8.00**	4%	96%	0%	0.37	0.01	10
SR-19	Imperv Disp	0.06	**2810.00**	**1370.00**	49%	51%	0%	0.62	0.19	258
SR-20	Tree Wells	0.07	**3018.00**	**1935.00**	64%	36%	0%	0.70	0.23	315
SR-21	Tree Wells	0.05	**1971.00**	**1506.00**	76%	24%	0%	0.77	0.16	225
SR-22	Tree Wells	0.02	**1061.00**	**699.00**	66%	34%	0%	0.71	0.08	112
DM-23	Deminimis	0.00	**35.00**	**35.00**	100%	0%	0%	0.90	0.00	5
SM-24	Deminimis	0.01	**244.00**	**0.00**	0%	100%	0%	0.35	0.01	13
DM-25	Self-Mit	0.00	**79.00**	**79.00**	100%	0%	0%	0.90	0.01	11
SM-26	Deminimis	0.00	**186.00**	**0.00**	0%	100%	0%	0.35	0.01	10
SR-27	Self-Mit	0.02	**867.00**	**373.00**	43%	6%	51%	0.46	0.04	59
SM-28	Perm Pavers	0.00	**80.00**	**0.00**	0%	100%	0%	0.35	0.00	4
Totals:		**0.65**	**28490.00**	**16640.50**	58%	26%	15%	0.63	1.96	**2675**

Note:
1

100 Yr Storm at 5 Min TC		
Intensity:	4.69	in/hr
Precip:	1.78	in
Runoff Coefficient		
Impervious	0.90	
Pervious Coefficient	0.35	
Permeable Pavers	0.10	

Pre Project Peak Vol	1696
Post Project Peak Vol	2675
Volume Differential	**980**
Add'l storage volume required -->	
Total Vol Detained	1251
Adjusted Post Peak Vol	1424
1,424 cf< 1,696 cf, therefore detention requirements have been meet	

Permeable Paver Storage (SR-15)	
Paver Area (sf)	1900.00
Storage Depth (ft)	1.25
Voids	0.67
Storage Available (cf)	1591
Total Vol to Pavers (cf) (SR-15, 19, 20, 21, 22)	**1251**
Total Vol Detained (cf)	1591

**Paver storage provides enough volume to detain approximately 1,591 cf of peak volume from SR-15, 19, 20, 21, and 22. In order to achieve the max allowable drawdown time of 72 hours, an orifice will be proposed to taper this volume out at a rate of 0.006138 cf/s. This effectively reduces the peak flow in the mitigated condition as shown below:

Peak Flow to Pavers (SR-15,19,20,21,22) (cfs)	Ratio of volume detained to Total Vol to pavers	Peak Flow Mitigated by orifice outlet (cfs)	Adjusted Total Peak Flow (Site Total - mitigated)
0.92	1.27	0.92	1.04

1.59 cfs < existing peak flow of 1.74 cfs, therefore all detention requirements have been met

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35

DRAINAGE PATH
8932 1ST STREET

SANTEE, CA
PROJECT NUMBER: 3741
SCALE: NO SCALE
DATE: FEBRUARY, 2023

SHEET 1 OF 1

PREPARED BY:
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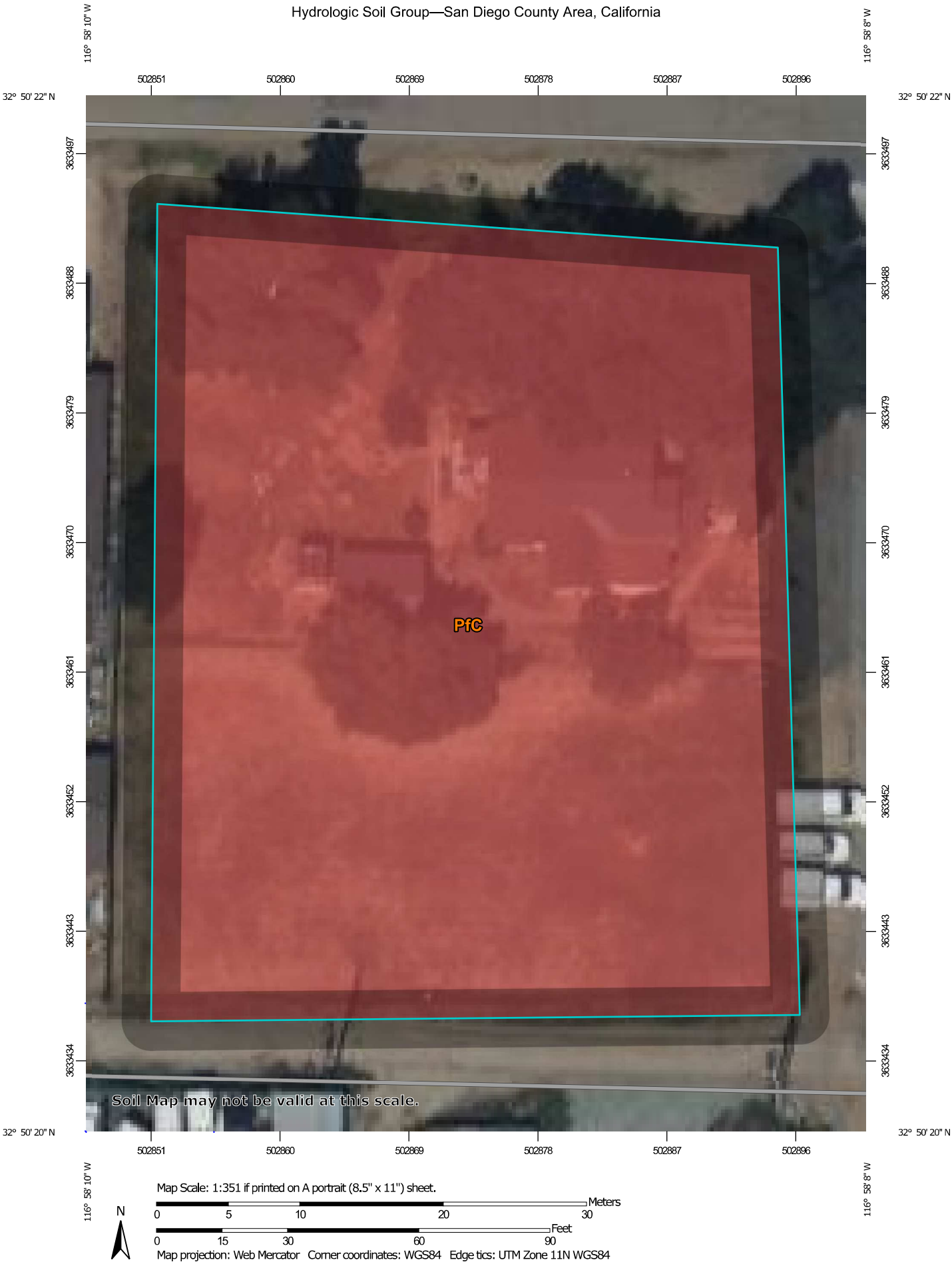


Map Scale: 1:351 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 15 30 60 90

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:24,000.

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: San Diego County Area, California
Survey Area Data: Version 18, Sep 14, 2022

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

Date(s) aerial images were photographed: Mar 24, 2022—Apr 29, 2022

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	D	0.6	100.0%
Totals for Area of Interest			**0.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

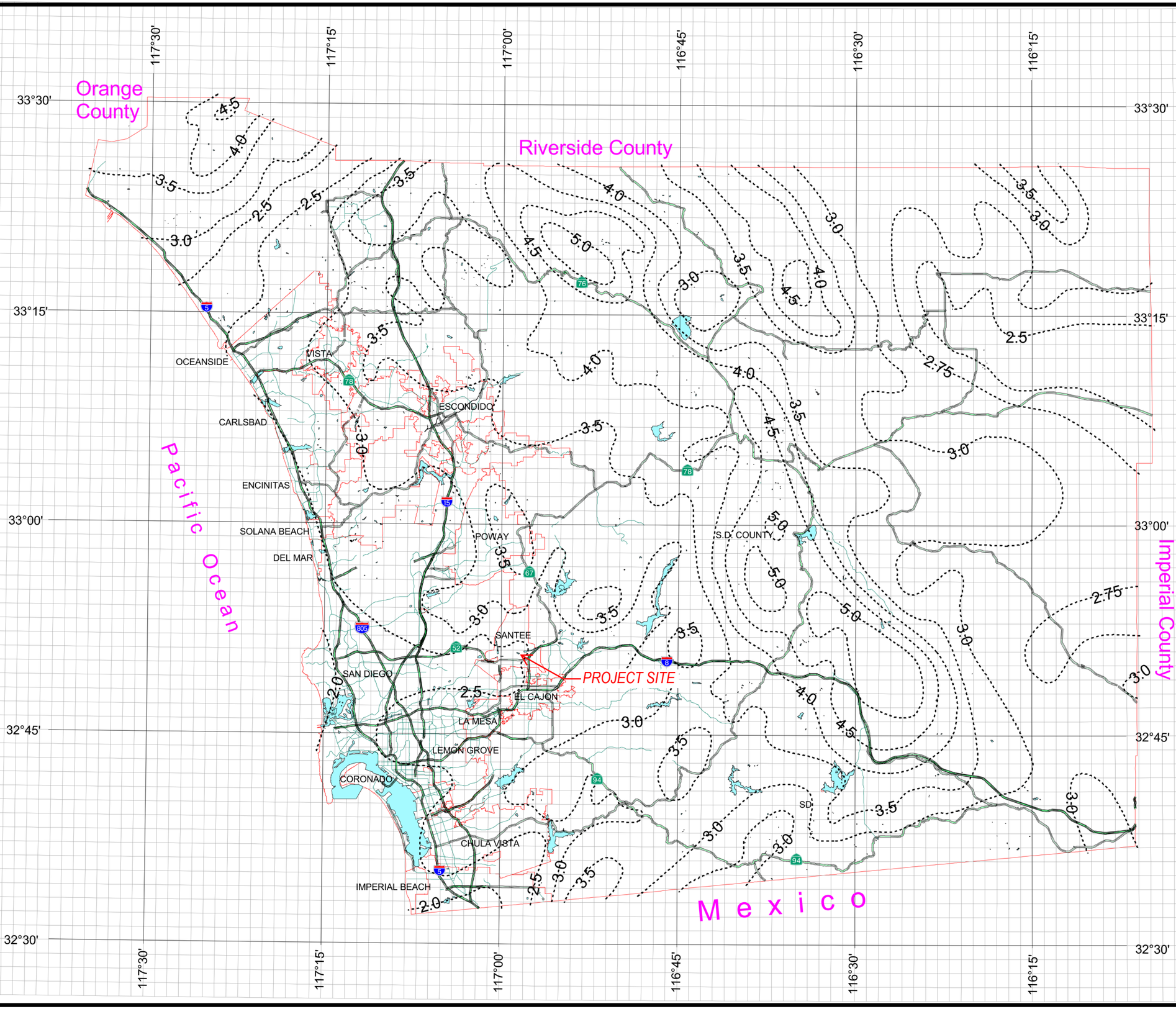
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

RAINFALL DEPTH = 2.5 INCHES



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W E
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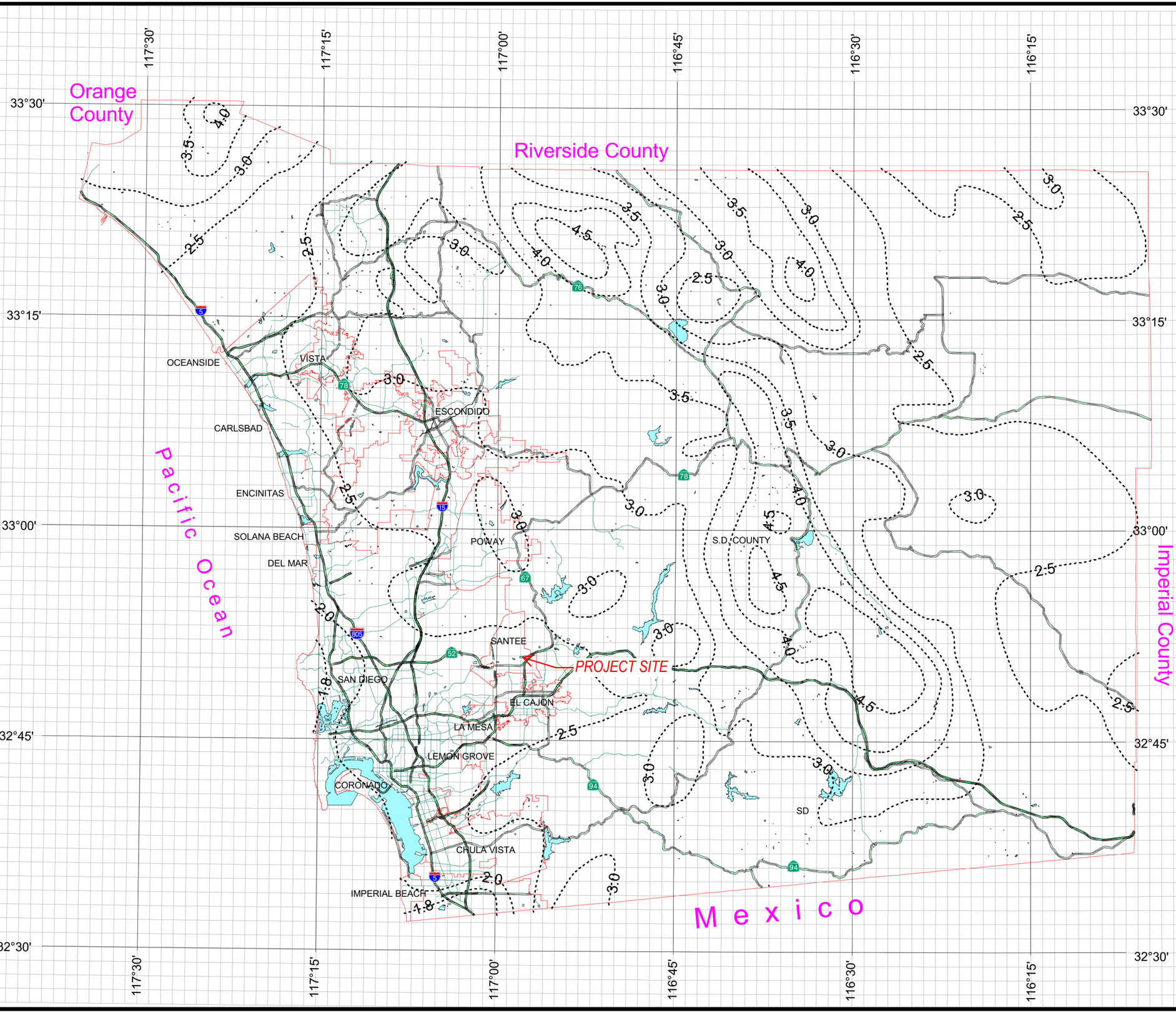
County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

Isopluvial (inches)

RAINFALL DEPTH = 2.39 INCHES



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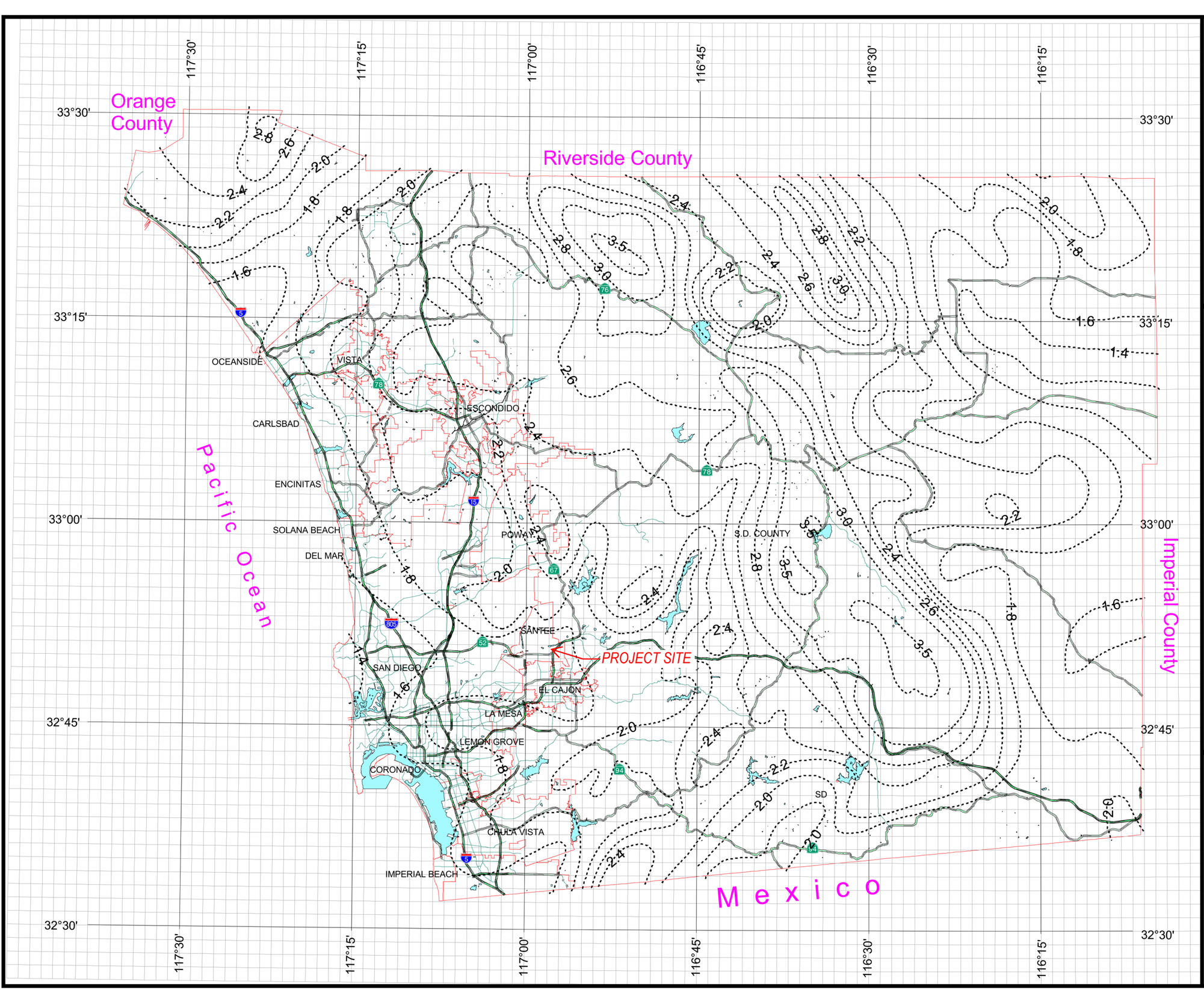
County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

Isopluvial (inches)

RAINFALL DEPTH = 1.78 INCHES



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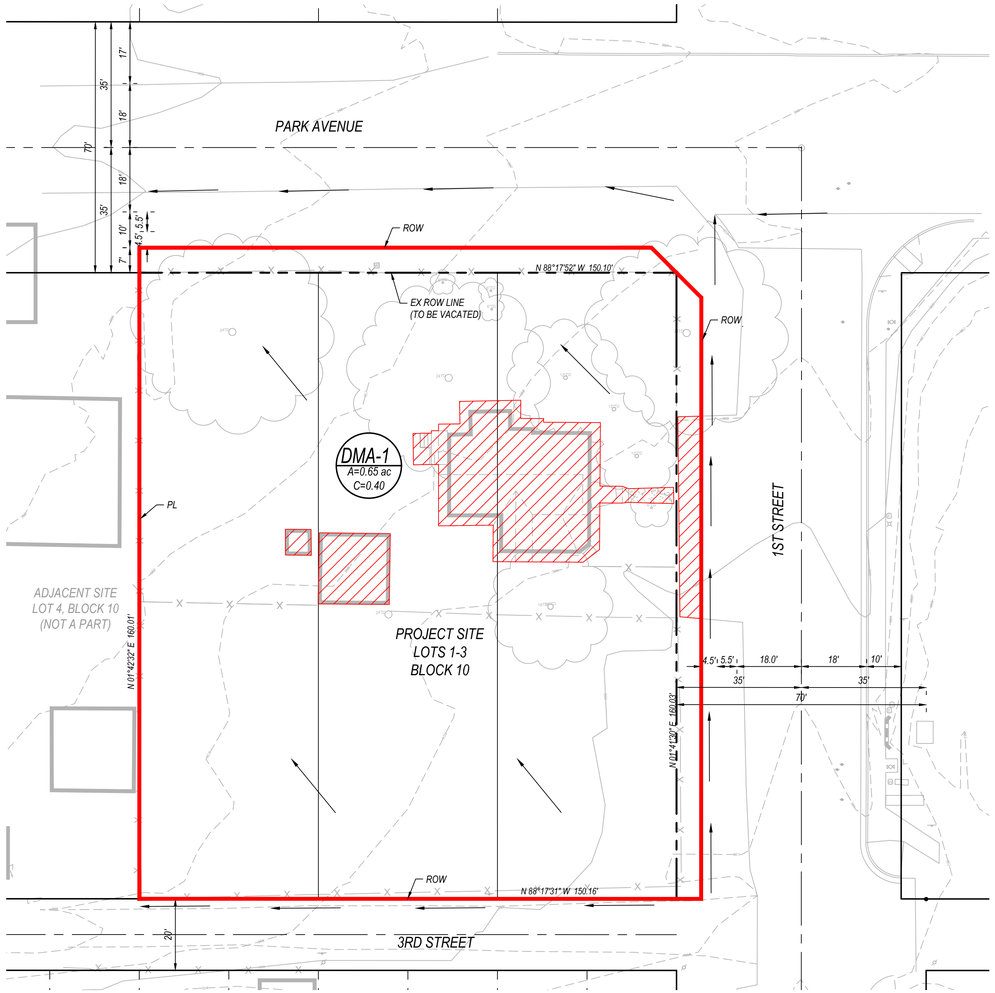

EXISTING HYDROLOGY EXHIBIT

SCALE: 1"=20'

LEGEND:

DRAINAGE MANAGEMENT AREA (DMA)

EXISTING IMPERVIOUS AREA

EXISTING FLOW PATH

IMPERVIOUS AREA TABULATIONS:

EXISTING PERVIOUS AREA: 25,836 S.F. (0.59 ACRES, 91%)
EXISTING IMPERVIOUS AREA: 2,654 S.F. (0.06 ACRES, 9%)
RUNOFF FACTOR: 0.90 = IMPERVIOUS, 0.30 = PERVIOUS
WEIGHTED RUNOFF FACTOR = (9% X 0.90) + (91% X 0.35) = 0.40
Q=CIA = 0.40 * 6.59 IN/HR * 0.65 S.F. = 1.71 CFS
VOL = C * (100 YR STORM RAIN DEPTH) * A
= 0.40 * 2.5 INCHES/12 * 28,490 SF = 2,382 CF

NOTES:

UNDERLYING HYDROLOGIC SOIL GROUP: TYPE D
APPROXIMATE DEPTH TO GROUNDWATER: >30 FEET

PROJECT DATA
SOIL TYPE : URBAN "D"
SLOPE CONDITION : FLAT
PCCYSA : NOT LOCATED WITHIN SITE
GROUNDWATER DEPTH: > 30'

PRE HYDROLOGY MAP

8932 1ST STREET
SANTEE, CA
PROJECT NUMBER: 3741
SACLE: 1" = 20'
DATE: JUNE, 2023

0 20 40 60
GRAPHIC SCALE: 1" = 20'

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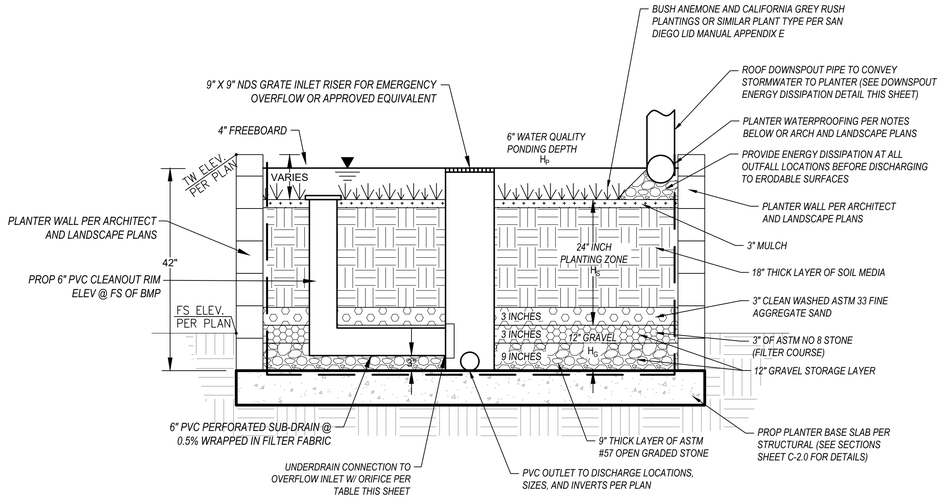
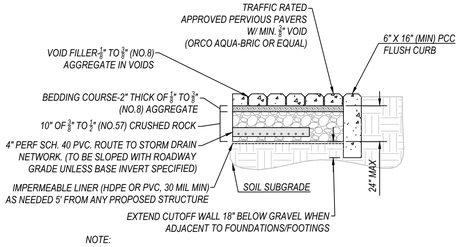


A1 TYPICAL SECTION: BIOFILTRATION PLANTER CROSS SECTION (BF-1)

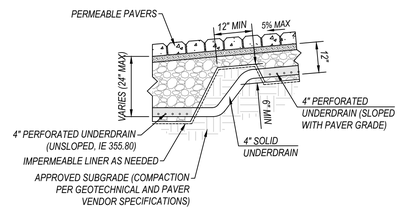
NOT TO SCALE



NOTE:
-ALL AGGREGATE MUST BE CLEAN/WASHED AND FREE OF FINES (SAND, SILT, ETC.)
-THE PAVERS SHALL NOT BE SEALED ONCE THE VOID FILLER HAS BEEN ADDED
-EACH COURSE SHALL BE VIBRATORY COMPACTED BEFORE PLACEMENT OF NEXT COURSE
-SPECIAL APPROVAL REQUIRED FOR USE IN HIGHLY EXPANSIVE SOIL-SUBDRAIN MAY BE REQUIRED
-NOTE THAT THE PERFORATED DRAIN AND IMPERMEABLE LINE WILL BE SLOPED WITH GRADE AND PROVIDE A CONSISTENT 12" SECTION BELOW THE PAVERS IN ALL LOCATIONS OUTSIDE OF THE DELINEATED PERMEABLE PAVER STORAGE AREA. THIS STORAGE AREA WILL HAVE A CONSISTENT ELEVATION FOR THE IMPERMEABLE LINER AND CAN HAVE A MAXIMUM 24" STORAGE DEPTH BELOW THE PAVERS PER GEOTECHNICAL RECOMMENDATIONS

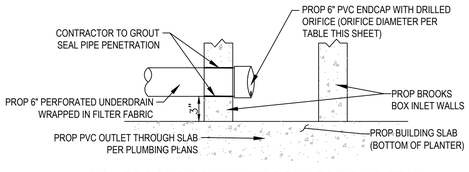
PERMEABLE PAVER DETAIL

NOT TO SCALE



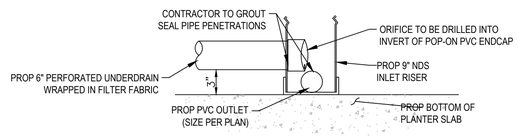
PERMEABLE PAVER SUBBASE & UNDERDRAIN TRANSITION DETAIL

NOT TO SCALE



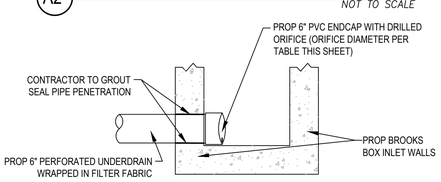
A3 BROOKS BOX INLET CONNECTION DETAIL

NOT TO SCALE



A2 9" NDS INLET CONNECTION DETAIL

NOT TO SCALE



A3 BROOKS BOX INLET CONNECTION DETAIL

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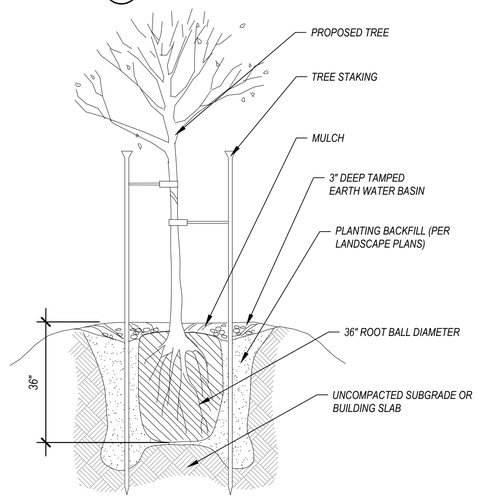
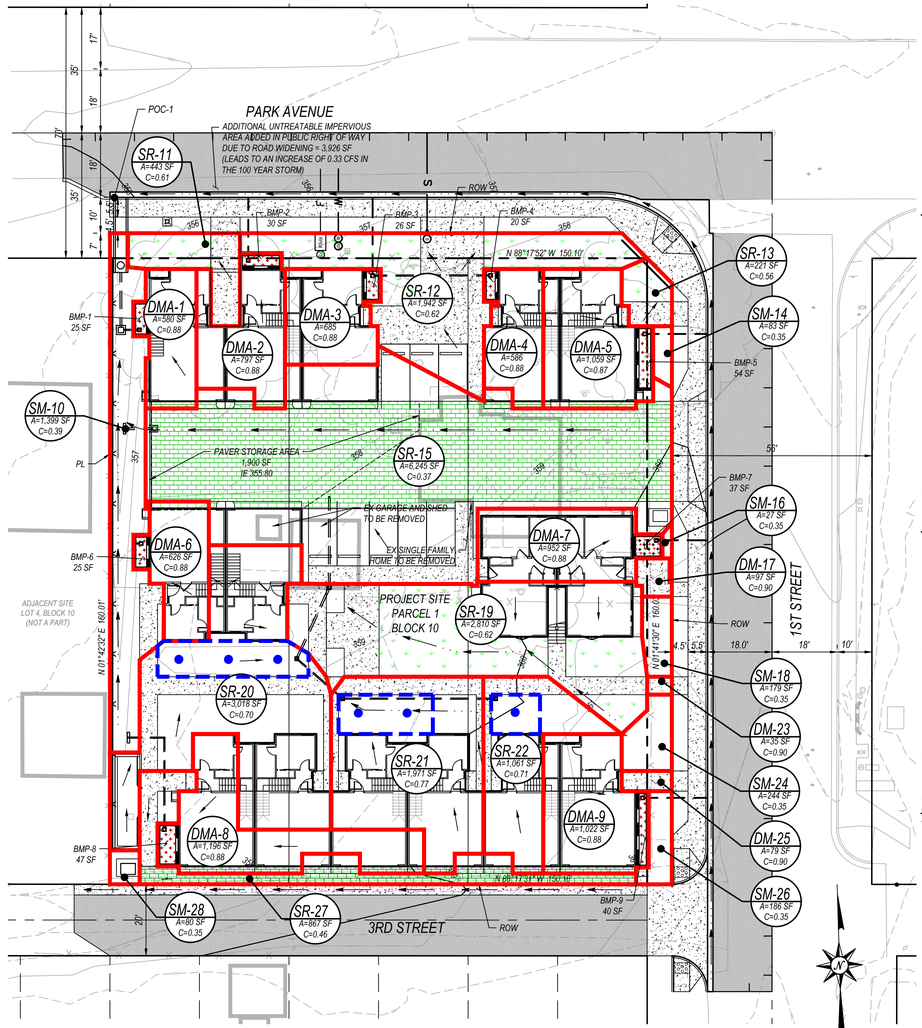


TREE WELL PLANTER DETAIL

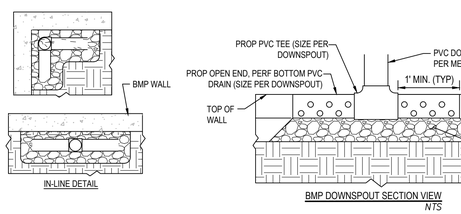
SCALE: NTS

(SEE LANDSCAPE PLANS FOR ADDITIONAL SPECS AND DETAILS)



POST CONSTRUCTION BMP PLAN

SCALE: 1"=20'



DOWNSPOUT ENERGY DISSIPATION/ OUTLET DETAILS

NOT TO SCALE

CONTRACTOR REQUIREMENTS FOR ENGINEER OF WORK POST-CONSTRUCTION BMP CERTIFICATION:

1. THE CONTRACTOR IS TO CONSTRUCT ALL BMPs AS DESIGNATED ON THIS PLAN, PURSUANT TO APPROVED MAINTENANCE AGREEMENT _____ IF IN FIELD CONDITIONS WARRANT A PORTION OF THIS DESIGN INFEASIBLE, THE CONTRACTOR IS TO NOTIFY THE ENGINEER OF WORK IMMEDIATELY.
2. PRIOR TO THE INSTALLATION OF THESE BMPs, THE CONTRACTOR IS TO PROVIDE THE FOLLOWING TO THE ENGINEER OF RECORD:
   - SUBMITTALS FOR SOIL MEDIA MIXES, SAND, AND GRAVEL USED IN BMP CONSTRUCTION.
   - PURCHASE ORDERS FOR ALL PROPRIETARY BMP SYSTEMS.
3. SHOULD THE REQUIRED DOCUMENTATION LISTED ABOVE NOT BE PROVIDED TO THE ENGINEER OF WORK PRIOR TO THE TIME OF INSTALLATION, THE ENGINEER OF WORK RESERVES THE RIGHT TO REFUSE CERTIFICATION OF THESE BMPs UNTIL EITHER THE NECESSARY DOCUMENTATION HAS BEEN PROVIDED, OR A WRITTEN CERTIFICATION OF MATERIAL SPECIFICATION PER PLAN HAS BEEN PROVIDED BY THE CONTRACTOR, THUS ACCEPTING LIABILITY SHOULD IT BE FOUND THAT THESE BMPs WERE NOT INSTALLED TO PLAN AT A LATER DATE.

LEGEND:

DRAINAGE MANAGEMENT AREA (DMA) — X / XX.XX XX.XX SF

BIOFILTRATION AREA

PERMEABLE PAVER AREA

AMENDED SOIL AREA (11" MIN DEPTH)

TREE AND TREE WELL LIMITS

FLOWLINE

100 YEAR PEAK VOLUME TABULATIONS:

EXISTING IMPERVIOUS AREA: 2,654 S.F. (0.06 ACRES, 9%)
EXISTING PERVIOUS AREA: 25,836 S.F. (0.59 ACRES, 91%)
RUNOFF FACTOR: 0.90 = IMPERVIOUS, 0.35 = PERVIOUS, 0.10 = PERMEABLE PAVERS
EXISTING WEIGHTED RUNOFF FACTOR = (9% X 0.90) + (91% X 0.35) = 0.40
EXISTING CONDITION 100 YEAR PEAK RUNOFF VOLUME = C * (100 YR 6HR STORM DEPTH) * A
= 0.40 * 2.5 INCHES/12 * 28,490 SF = 2,382 CF

PROPOSED IMPERVIOUS AREA: 16,640 S.F. (0.38 ACRES, 58%)
PROPOSED PERMEABLE PAVER AREA: 4,348 S.F. (0.10 ACRES, 15%)
RUNOFF FACTOR: 0.90 = IMPERVIOUS, 0.35 = PERVIOUS, 0.10 = PERMEABLE PAVERS
PROPOSED WEIGHTED RUNOFF FACTOR = (58% X 0.90) + (26% X 0.35) + (15% X 0.10)= 0.63
POST PROJECT 100 YEAR PEAK RUNOFF VOLUME = C * (100 YR 6HR STORM DEPTH) * A
= 0.63 * 2.5 INCHES/12 * 28,490 SF = 3,758 CF

VOLUME DIFFERENTIAL = 3,758 CF - 2,382 CF = 1,376 CF
THEREFORE THE PROPOSED PROJECT MUST PROVIDE A MINIMUM 1,376 CF OF ADDITIONAL STORAGE.

PROPOSED ADDITIONAL STORAGE:
PERMEABLE PAVER VOLUME:
PAVER AREA (WITH FLAT BOTTOM FOR DETENTION) = 1,900 SF
PAVER STORAGE DEPTH = 12"
PAVER STORAGE VOIDS = 0.67
TOTAL AVAILABLE PAVER STORAGE = 1,900 SF * 12 INCHES/12 * 0.67 = 1,591 CF
TOTAL VOLUME TO PAVER STORAGE:
SR-15, 19, 20, 21, AND 22 = 1,757 CF --> USE 1,591 CF
1,591 CF OF AVAILABLE STORAGE > 1,376 CF OF REQUIRED VOLUME DIFFERENTIAL, THEREFORE STORAGE REQUIREMENTS HAVE BEEN MET.

100 YEAR PEAK FLOW AND DRAWDOWN TABULATIONS:

PROJECT SITE 100 YR 6-HOUR STORM DEPTH = 2.5 INCHES
Tc = 5 MIN --> INTENSITY = 6.59 IN/HR*
*PER COUNTY OF SAN DIEGO HYDROLOGY MANUAL FIGURE 3-1

EXISTING CONDITION 100 YEAR PEAK FLOW = C * (100 YR 6HR STORM INTENSITY) * A
= 0.40 * 6.59 * 28,490 SF = 1.74 CFS

PROPOSED CONDITION 100 YEAR PEAK FLOW = C * (100 YR 6HR STORM INTENSITY) * A
= 0.63 * 6.59 * 28,490 SF = 2.75 CFS

TOTAL VOLUME TO PAVER AREA = 1,757 CF (USE 1,591 CF - THIS IS THE STORAGE VOLUME PROVIDED IN PAVERS)
MIN Q OUT OF PAVERS TO ACHIEVE 72 HOUR DRAWDOWN TIME (ADDITIONAL VOLUME WILL OVERFLOW):
= 1,591 CF / (72 HR * 60 MIN/HR * 60 SEC/MIN) = 0.006138 CFS
UNDETAINED PEAK FLOW TO PAVER AREA (FROM SR-15, 19, 20, 21, AND 22) = 1.29 CFS
NOTE THAT A PORTION OF THIS WILL OVERFLOW, SO A RATIO IS BEING APPLIED:
TOTAL VOLUME AVAILABLE/ TOTAL VOLUME TO PAVERS = 1,591 CF/ 1,757 CF = 0.91
THEREFORE THE TOTAL FLOW SUBJECT TO DETENTION IS 0.91 * 1.29 CFS = 1.17 CFS
DETAINED PEAK FLOW FROM PAVER AREA = 0.006138 CFS
ADJUSTED TOTAL PEAK FLOW FOLLOWING DETENTION = 2.75 CFS - 1.17 CFS + 0.006138 CFS
= 1.58163CFS < 1.74 CFS
THEREFORE, THE PROPOSED PROJECT REDUCES THE 100-YEAR PEAK FLOW FROM EXISTING TO PROPOSED CONDITIONS.

NOTES:

1. ALL DMAS UTILIZING IMPERVIOUS AREA DISPERSION WILL SATISFY POLLUTANT CONTROL AND HYDROMODIFICATION REQUIREMENTS BY AMENDING THE TOP 11 INCHES OF THE PERVIOUS AREA WITHIN THE DMA (PER FACTSHEET SD-B IMPERVIOUS AREA DISPERSION), AND THE OVERALL PERVIOUS AREA WITHIN EACH DMA IS GREATER THAN 50% OF THE OVERALL DMA.

BIOFILTRATION WATER PROOFING NOTES

1. PREP WALL AND FOOTING - SPRAY APPLY "MARFLEX 5000" COMMERCIAL MEMBRANE TO BACK OF WALL, TOP OF FOOTING AND BOTTOM OF PLANTER PER MANUFACTURER'S SPECIFICATIONS.

2. ADDRESS ANY EXPANSION JOINTS WITH 12-INCH MIN. STRIP OF "SOCO-SHIELD 300" MEMBRANE (10 MIL. MIN. THICKNESS) CENTERED OVER JOINT, ADHERED TO "MARFLEX". OVER SPRAY JOINT WITH "MARFLEX 5000" TO MANUFACTURER'S REQUIRED MIL THICKNESS.

3. APPLY "SOCO-SHIELD 300" MEMBRANE (10 MIL. MIN. THICKNESS) TO ADHERE TO THE "MARFLEX 5000" OVER ENTIRE WALL, STEM WALL AND PLANTER BOTTOM INCLUDING TREATED EXPANSION JOINTS. OVERLAP MATERIAL SEAMS A MIN. OF 6-INCHES IN ALL DIRECTIONS.

4. ATTACH TACK STRIP AT TOP OF MEMBRANE AND ON SIDE ENDS OF WALL FROM TOP OF MEMBRANE TO TOP OF FOOTING.

5. APPLY "COOL-COAT" OF EQUIVALENT U.V. RESISTANT MEMBRANE ABOVE TACK STRIP TO TOP OF WALL PER MANUFACTURER'S SPECIFICATIONS.

ADDITIONAL WATER PROOFING NOTES

1. PER GEOTECHNICAL RECOMMENDATIONS, NO INFILTRATION IS FEASIBLE ON THIS SITE, HOWEVER, SHOULD A WATER QUALITY TREATMENT BMP BE PROPOSED WITH AN OPEN BOTTOM (PERMEABLE PAVERS OR TREE WELLS), AN IMPERMEABLE LINER SHALL BE PROPOSED AT THE BASE OF EACH BMP SECTION TO A DISTANCE AT LEAST 5' FROM THE CLOSET BUILDING STRUCTURE OR RETAINING WALL.

PROJECT DATA
SOIL TYPE: D
SLOPE CONDITION: FLAT
PCCSYA: NOT LOCATED WITHIN SITE
GROUNDWATER DEPTH: > 30'

POST-PROJECT HYDROLOGY MAP

HABITAT FOR HUMANITY – 1ST STREET
SANTEE, CA
PROJECT NUMBER: 3741
SCALE: 1" = 20'
DATE: FEBRUARY, 2023

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