APPENDIX G – HYDROLOGY AND POST CONSTRUCTION STORMWATER QUALITY STUDY

PRELIMINARY HYDROLOGY AND POST CONTRUCTION STORMWATER QUALITY REPORT

FOR

VESTING TENTATIVE TRACT No. 6061
BELTRAMO RANCH
11944 WEST LOS ANGELES AVE.
MOORPARK, CA 90604

Prepared for:

Warmington Residential
3090 Pullman Street
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June, 2021

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1. Introduction

1.1 Project Description

The proposed project site of 7.4-acre is located west of the intersection of Los Angeles Avenue and Tierra Rejada Road, in the City of Moorpark, California. The site currently consists of a community church with several related structures to the north and two residential properties to the south. The site is bounded by West Los Angeles Avenue to the north and residential developments to the west, east and south. The western portion of the site is an unimproved road (Beltramo Ranch Road).
The proposed development includes 47 two-story single family homes, two open spaces and associated streets.

1.2 Study Objectives

The objectives of this study are:

1) Analyze 100-year peak flow of the existing and the proposed conditions.

2) Determine the size of the proposed onsite storm drain system, including pipes and catch basins.

3) Design detention basin to mitigate the difference of 100-year peak flow between the existing and the proposed conditions.

4) Determine stormwater quality management volume and design the underground infiltration basin

2. Key Findings

1) The proposed storm drain system has sufficient capacity to capture and convey 100-year peak flow.

2) A detention basin is designed to mitigate proposed Q_{100} to existing condition, such that there is no increase in runoff release from the proposed project.

3) The proposed detention/infiltration basin includes a 178'x6'x5.5' infiltration trench with 3-48'' CMP perforated pipe of 176' long. Once the system is full water will come out of the 3-36" risers and follow it's existing drainage patterns and outlet to the Arroyo Simi.

4) The effective infiltration rate is 0.3 in/hr after applying a factor of safety of 0.6. The design capture volume (SQDV) of 5,318 cf completely infiltrates through the basin.

3. Hydrologic Data

The project is within rainfall zone J'. The 100-year 24-hour storm is 6.4 inch. The soil classification is Type 5. The 24-hour 85th percentile rainfall is 1.25 inch (Appendix B). The developed imperviousness is based on zoning of the development.

4. Methodology

The project site is under the jurisdiction of the Ventura County Watershed Protection District. All values are calculated in accordance with the District's standards [1] [2].

Time of concentration (Tc) for Q100 is obtained from Calleguas Creek HSPF Design Storm Model Report. (Appendix C). The peak flow and hydrograph are calculated using the modified rational method by the Ventura County Watershed Protection District (VCWPD) embedded in the County's Modified Rational computer model (VCRAT) [4]. A detention basin designed to mitigate the increased flow between existing and proposed conditions is sized based on the routing of the VCRAT hydrograph. The Ventura County stormwater quality requirements for the proposed project are satisfied as defined by the County's Technical Guidance Manual (2011) [2].

In this report, 100-year storm is analyzed as the basis for designing the storm drain system and the detention system. 10-year storm is used to evaluate dry lane condition.

2. Hydrology Analysis

4.1 Existing Condition

Based on the existing drainage pattern, the site is divided into 3 subareas (Map 1). The existing site generally slopes to the south and sheet flows directly to the Arroyo Simi. The hydrology calculation result of Tc and peak flow are provided in Table 1.

4.2 Proposed Condition

The proposed hydrology can be divided into the following six subareas (Map 2):

Subarea A1

This subarea includes Lots 1-5, 45-47 and open space area to the north.
Runoff from Lots 1-5 and 45-47 surface flows on Beltramo Ranch Road, joins the street flow and drains southerly along the street gutter. The flow is intercepted by 7' wide catch basin (CB#1). The flow in the catch basin is directed through an 18" pipe into the most south catch basin (CB#2).

Subarea A2

This subarea includes Lots 6-11 and the south part of Beltramo Ranch Road.
Runoff from Lots 6-11 surface flows on Beltramo Ranch Road, joins the street flow and drains southerly along the street gutter. The flow is intercepted by 7' wide catch basin (CB#2). The flow in the catch basin is directed through a 18'' pipe across the open space area into the proposed underground detention/infiltration trench along the southern side of the open space area.

Subarea A3b

This subarea includes Lots 19-22, 40-44 and north side of "A" Drive between these lots. Runoff from these Lots surface flows on "A" Drive, joins the street flow and drains southerly along the street gutter. The flow is intercepted by 24"x24" grate inlet catch basin (CB#7). The flow in the catch basin is directed through an 18" pipe into the south catch basin of "A" Drive (CB#4).

Subarea A3a

This subarea includes Lots 16-18, 29-27 and north side of "A" Drive between these lots. Runoff from these Lots surface flows on "A" Drive, joins the street flow and drains southerly along the street gutter. The flow is intercepted by 24"x24" grate inlet catch basin (CB#4). The flow in the catch basin is directed through an 18" pipe into the south catch basin of "A" Drive (CB#3).

Subarea A4

This subarea includes Lots 12-15 and 30-33. Runoff from these lots surface flows on "A" Drive, joins the street flow and drains southerly along the street gutter. The flow is intercepted by 24"x24" grate inlet catch basin (CB#3) at the south end of "A" Drive. The flow in the catch basin is directed through an 18" pipe into the 24" pipe on Beltramo Ranch Road.

Subarea A5

This subarea includes Lots 40-44 and the north easterly part of Beltramo Ranch Road. Runoff from Lots 40-44 surface flows on Beltramo Ranch Road, joins the street flow and drains southerly along the street gutter. The flow is intercepted by 7' wide catch basin (CB#5). The flow in the catch basin is directed through an 18" pipe into the south catch basin (CB#2) on Beltramo Ranch Road.

Subarea A6

This subarea includes Lots 34-39 and the south easterly part of Beltramo Ranch Road. Runoff from Lots 34-39 surface flows on Beltramo Ranch Road, joins the street flow and drains southerly along the street gutter. The flow is intercepted by 7' wide catch basin (CB#6). The flow in the catch basin is directed through an 24" pipe into the south catch basin (CB#2) on Beltramo Ranch Road.

Subarea A7

This subarea includes south side of Beltramo Ranch Road.
Runoff from this subarea surface flows west on Beltramo Ranch Road and will be intercepted by CB#2.

Subarea A8

This subarea includes the open space area south side of the project. The water will be following the existing drainage patterns and outlet to the Arroyo Simi.

Per the design storm model [4], the Unit area flow for 100-year storm is 2.69 cfs/ac (Appendix C). Thus, for the site of 7.4 ac, the proposed Q_{100} is approximately 20.8 cfs. Using VCRAT and adjusting the Tc until the peak matches this flow, the Tc is 6 minutes (Appendix D). The peak Q_{100} calculated using VCRAT (Appendix E) of each subarea is summarized in Table 2.

5.3 Detention

The infiltration system will also provide stormwater detention. The simplified Basin Design Procedure from the 2017 Ventura County Hydrology manual was used to calculate preliminary detention volume for the site. Calculations show that the required storage volume is 10,319 cubic feet.
The underground storage are sized to limit runoff leaving the site to existing flows for all storm events, up to a 100-year storm.

The detention criteria of Ventura County is that the proposed peak flow should not exceed the existing condition. The existing and the proposed peak flow of the site for 100-year storm is compared (Table 3). The difference between the combined peak flow and the maximum allowable discharge will be detained. The infiltration system is proposed for this detention. This trench is a 178'x6'x5.5' gravel trench with 3-48'' CMP perforated pipe of 176' long, which provides storage as well as allows for infiltration. The initial flow (containing SQDV) is stored in the trench for infiltration. When water surface reaches the top, water starts to spill out of 3-36" risers and follow the existing drainage patterns.

It is noted that:

1) For VCRAT calculation, a factor of 10 is applied to Subareas A1 thru A8 to adjust small areas to be larger than 5 ac. During the routing, flow split is applied specifying 10% flow left in the mainline that resumes the actual flow.

2) Per the infiltration test report [5] (Appendix F), the measured infiltration has an infiltration rate of 0.6 in/hr. A factor of safety of 2 is applied to the measured infiltration rates.

3) The initial infiltration volume during the 3-hour filling of the basin is considered towards basin volume (Table 4).

5. Hydraulic Calculations and Street Flow Analysis

The storm drain and the catch basins are sized to accommodate 100-year peak flow. Bentley Flowmaster and Los Angeles County catch basin sizing charts were used for the sizing. The storm drain pipes have enough capacity to convey 100-year flow (Table 6, Appendix G).

6. Stormwater Quality Management Plan (SQMP)

Per the infiltration test report for the site[5], the infiltration rate 0.6 in/hr approximately 5' below the ground. Therefore, infiltration-based SQMP measures are feasible. For this site, infiltration trench is proposed.

The design treatment volume (SQDV) is calculated per the TGM and is provided in Table 3.

The stormwater runoff is bypassing through the proposed CDS unit before entering the trench. The CDS is sized to treat the SQDF (3.96 cfs) and it can bypass up to 30 cfs which is greater than the proposed 20.80 cfs.

The collected runoff is then conveyed to the infiltration trench. The trench has enough capacity to treat the design volumes (Table 4). It serves for both infiltration and detention. The infiltration volume is at approximately 2.1' above the trench ground. The volume below this level is reserved for infiltration. The volume above this level is used for detention.
When water fills up in the trench the excessive water will overflow out of the 3-36" risers and follow the existing drainage pattern to the Arroyo Simi.

8. Conclusions

The onsite storm drain system is designed to capture and convey 100-year peak flow. A retention/detention trench is used to control the release of 100-year peak Q from the northern side of the site onto Arroyo Simi such that the outflow does not exceed the existing outflow.

To satisfy the stormwater quality requirements, one infiltration trench is proposed. Pretreatment measures are provided in the CDS unit before water enters the trench.

Overall, the proposed development does not have negative impact to the neighboring and downstream areas.

9. References

1). Hydrology Manual, Ventura County Watershed Protection District, December 2017.

2). Ventura County Technical Guidance Manual for Stormwater Quality Control Measures, July 13, 2011.

3) Calleguas Creek Watershed HSPF Deign Storm Draft Report, Hydrology Section, Watershed Resources and Technology Division, Ventura County Watershed Protection District, July 2013

4) VCRAT2.64 and Spreadsheet User Manual, Ventura County Modified Rational Method Program, Ventura County Watershed Protection District, July 2017.

5).Infiltration Testing Report, Project No.: 1-0379, Alta California Geotechnical Inc., April 19, 2021.

Table 1 – Existing Hydrology (100-year)

	Area	Rainfall zone	SOIL	IMP	Tc	Flood Zone	Q_{100}
A	3.87	J'	5	15.00	15	3	6.2
B	1.98	J'	5	2.60	7	3	4.4
C	1.55	J'	5	0.00	10	3	2.9
Total	7.40						13.5

Table 2 – Proposed Hydrology (100-year)

Subarea	Area	Rainfall Zone	Soil Type	IMP	Tc	Flood Zone	Q_{100}
	ac						
A1	1.58	J'	5	0.42	6	3	4.6
A2	0.78	J'	5	0.42	6	3	2.3
A3	1.38	J'	5	0.42	6	3	4
A4	0.80	J'	5	0.42	6	3	2.3
A5	0.71	J'	5	0.42	6	3	2
A6	0.81	J'	5	0.42	6	3	2.24
A7	0.42	J'	5	0.42	6	3	1.16
A8	0.93	J'	5	0.00	6	3	2.2
Total	7.40						20.8

Table 3 – Stormwater Quality Design Volume (SQDV& SDQF)

Subarea	A	% allow	EIA allowable	IMP	TIA	$A_{retention}$	Soil Type	Cp	C	P (85th percentile)	P	SQDV	SQDF
	(ac)									(in)	(ft)	(cf)	(cfs)
A1	1.58	5	0.079	0.42	0.66	0.585	5	0.05	0.428	1.25	0.10	1135	0.85
A2	0.78	5	0.039	0.42	0.33	0.288	5	0.05	0.428	1.25	0.10	559	0.42
A3	1.38	5	0.069	0.42	0.58	0.509	5	0.05	0.428	1.25	0.10	988	0.74
A4	0.80	5	0.040	0.42	0.34	0.296	5	0.05	0.428	1.25	0.10	576	0.43
A5	0.71	5	0.035	0.42	0.30	0.261	5	0.05	0.428	1.25	0.10	507	0.38
A6	0.81	5	0.041	0.42	0.34	0.300	5	0.05	0.428	1.25	0.10	582	0.43
A7	0.42	5	0.021	0.42	0.18	0.155	5	0.05	0.428	1.25	0.10	302	0.22
A8	0.93	5	0.047	0.42	0.39	0.344	5	0.05	0.428	1.25	0.10	668	0.50
Total	7.40											5318	3.96

Table 4 – Infiltration Trench Summary

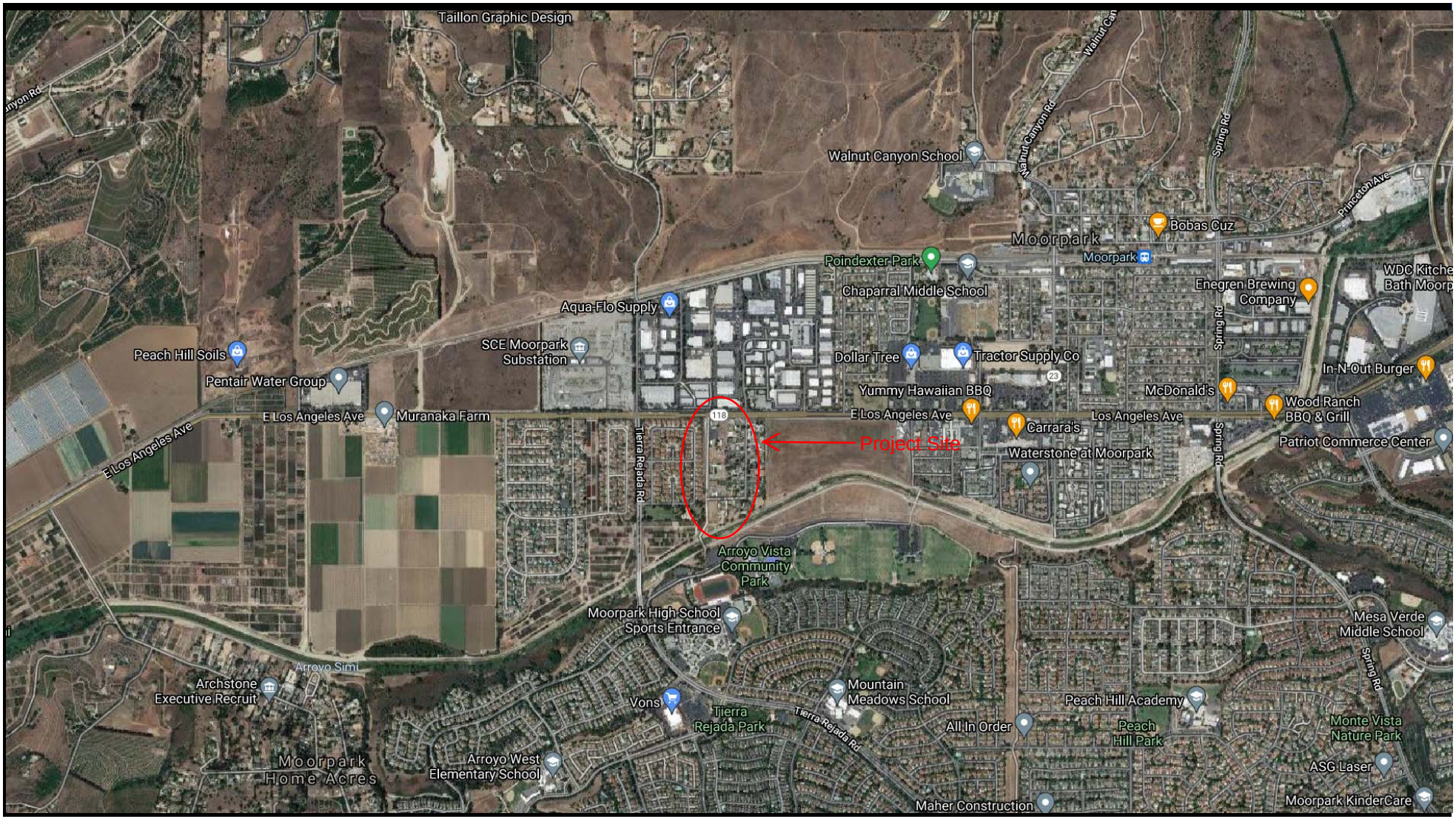
Drainage Area	Area	Infiltraiton rate	Safety Factor	Effective Infiltration Rate	Void Ratio	Pipe Length (3 pipes)	Pipe Diameter	Trench Size	3-hr Filling	Pipe Storage	Gravel Storage	Total Volume Provided
									(cf)			
	(ac)	(in/hr)		(in/hr)		(ft)	(ft)	(ft)	(ft)	(cf)	(cf)	(cf)
A1 thru A7	7.40	0.6	2	0.3	0.40	528	4	16'x5.5'	422.4	6632	3613	10667

Table 5 – Detention Volume for Attenuating Peak Runoff from Small Developed Areas

	Undeveloped	Developed
100-yr 1-d Rain in	6.4	6.4
Soil Type	5	5
Land Use	Open Space	Residential
CN Exhibit 14	61	77
S = 1000/CN-10	6.39	2.99
Yield in	2.28	3.83
Volume Calculation		
Yield Difference in		1.55
Surface Storage		0.50
Net Yield		1.05
Impervious Area ac		2.700
Vol Increase CF- Max Basin Size Req'd		10319.63

APPENDIX A

VICINITY MAP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Walnut Canyon Rd
Spring Rd
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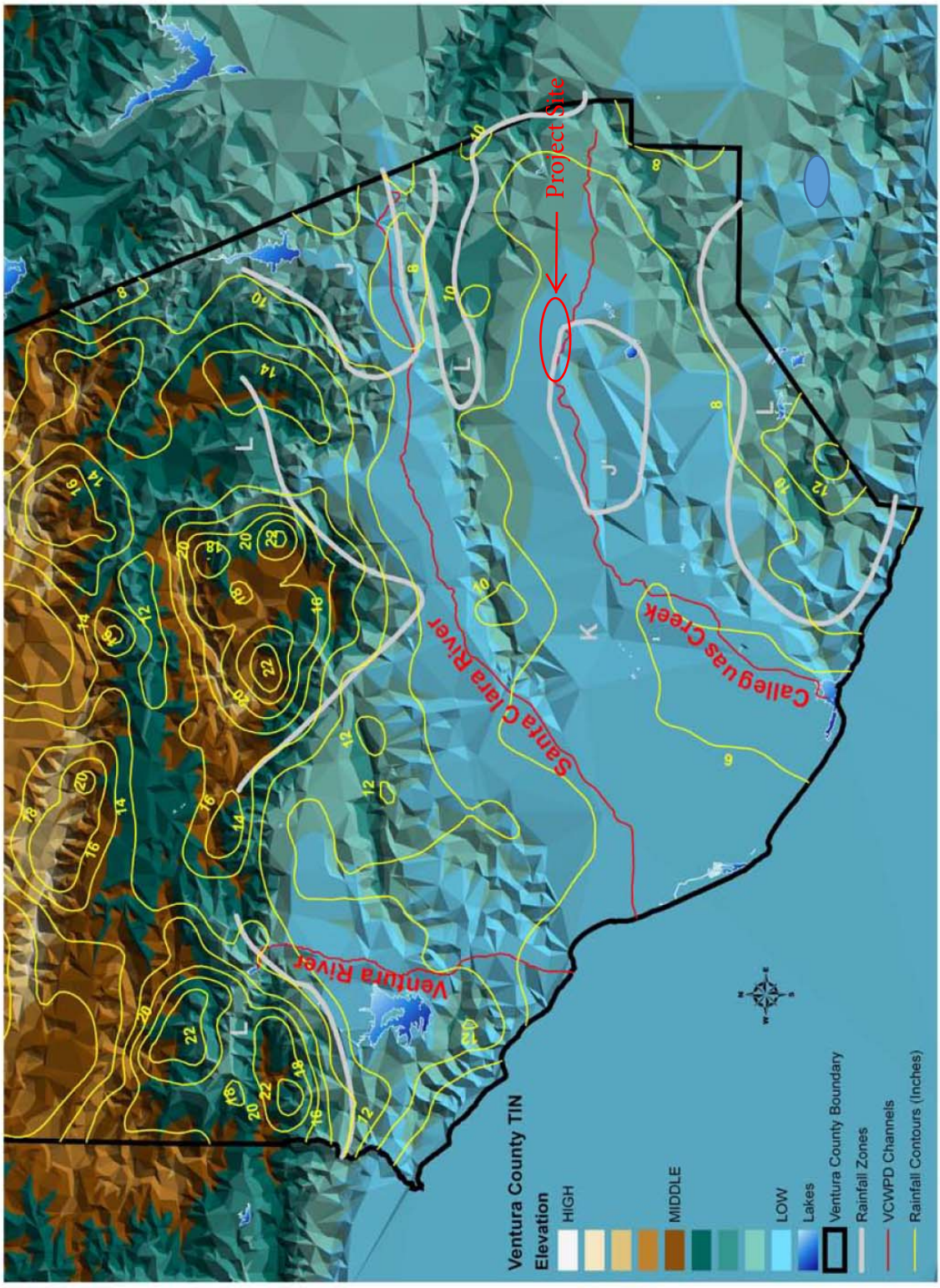
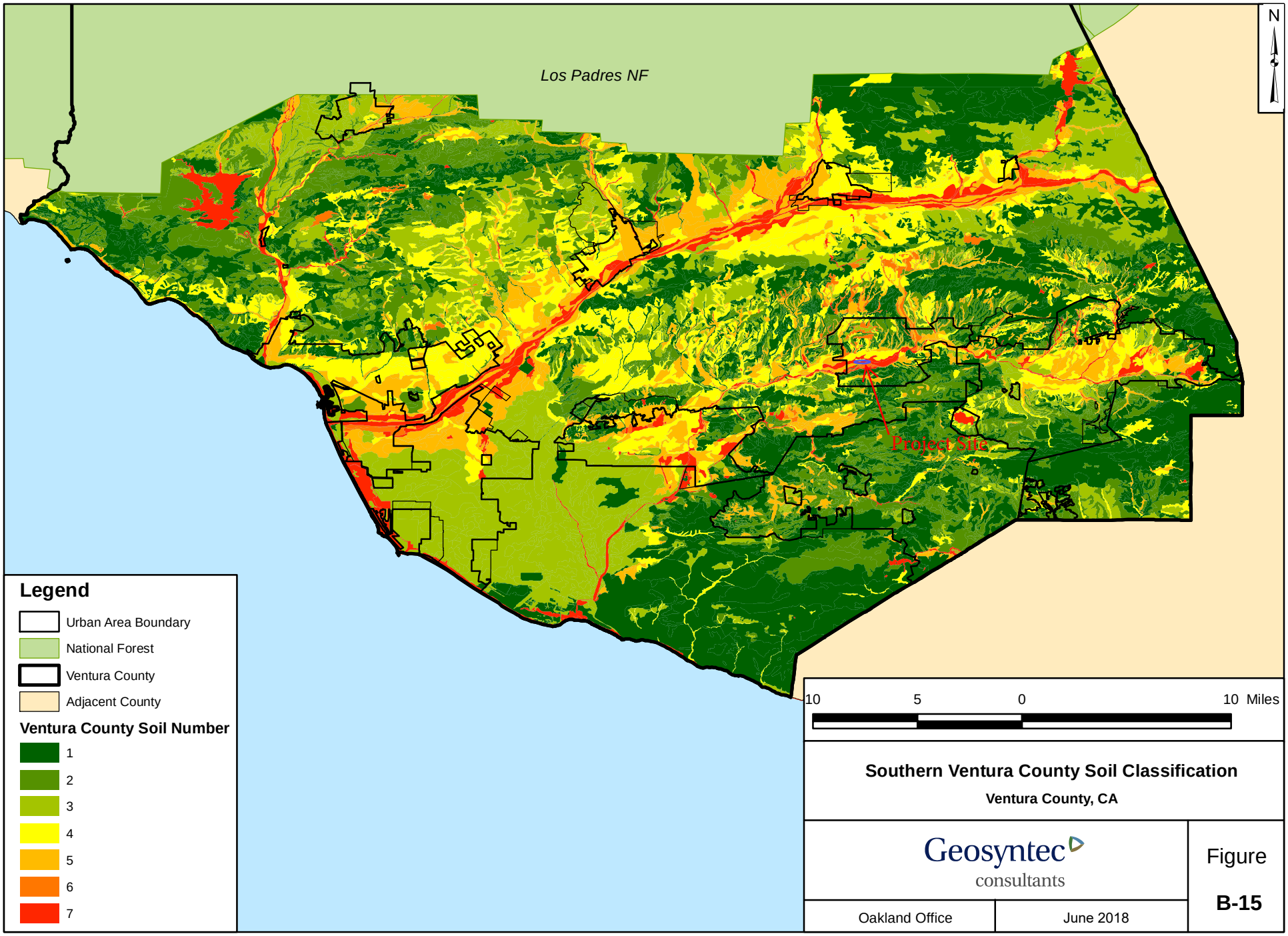
Bobas Cuz
Moorpark
Poindexter Park
Chaparral Middle School
Enegren Brewing Company
WDC Kitche
Bath Moorp
Aqua-Flo Supply
Peach Hill Soils
SCE Moorpark Substation
Dollar Tree
Tractor Supply Co
In-N-Out Burger
Pentair Water Group
Yummy Hawaiian BBQ
McDonald's
Wood Ranch BBQ & Grill
E Los Angeles Ave
Muranaka Farm
Carrara's
Los Angeles Ave
Project Site
Patriot Commerce Center
Waterstone at Moorpark
Tierra Rejada Rd
Arroyo Vista Community Park
Moorpark High School Sports Entrance
Mesa Verde Middle School
Arroyo Simi
Archstone Executive Recruit
Mountain Meadows School
Vons
Tierra Rejada Park
Peach Hill Academy
All In Order
Peach Hill Park
Monte Vista Nature Park
Moorpark Home Acres
Arroyo West Elementary School
ASG Laser
Maher Construction
Moorpark KinderCare

APPENDIX B

HYDROLOGIC DATA

EXHIBIT 1A. DESIGN STORM RAINFALL CONTOURS - 100-YR STORM





Southern Ventura County Soil Classification

Ventura County, CA

Geosyntec consultants

Oakland Office | June 2018

Figure **B-15**

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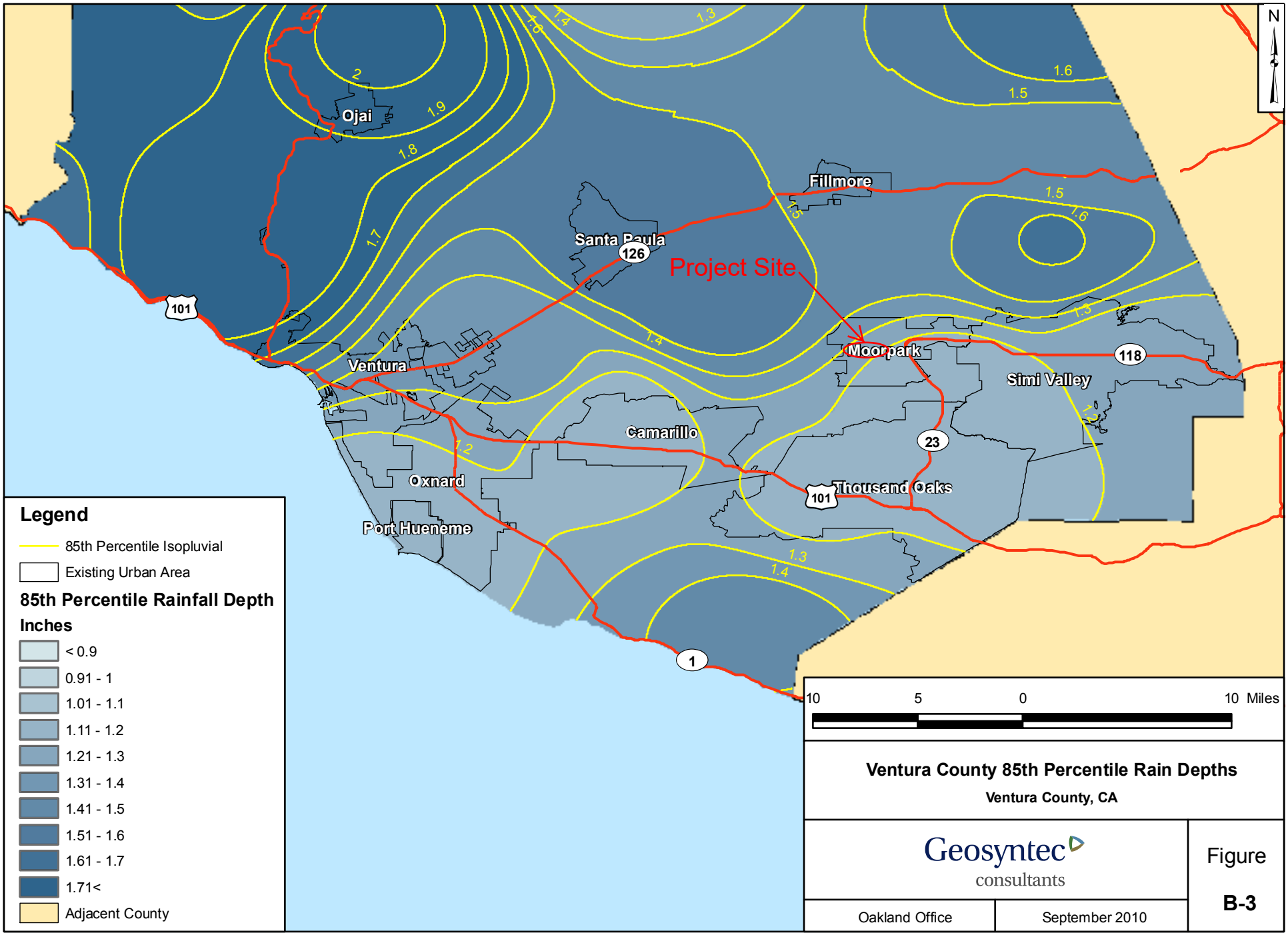


Ventura County 85th Percentile Rain Depths

Ventura County, CA

Geosyntec consultants

Oakland Office | September 2010

Figure **B-3**

P:\GIS\Ventura_County_Manual\Projects\B-3_Ventura_County_85th_Isopluvials_092010.mxd, WHL, September 20, 2010

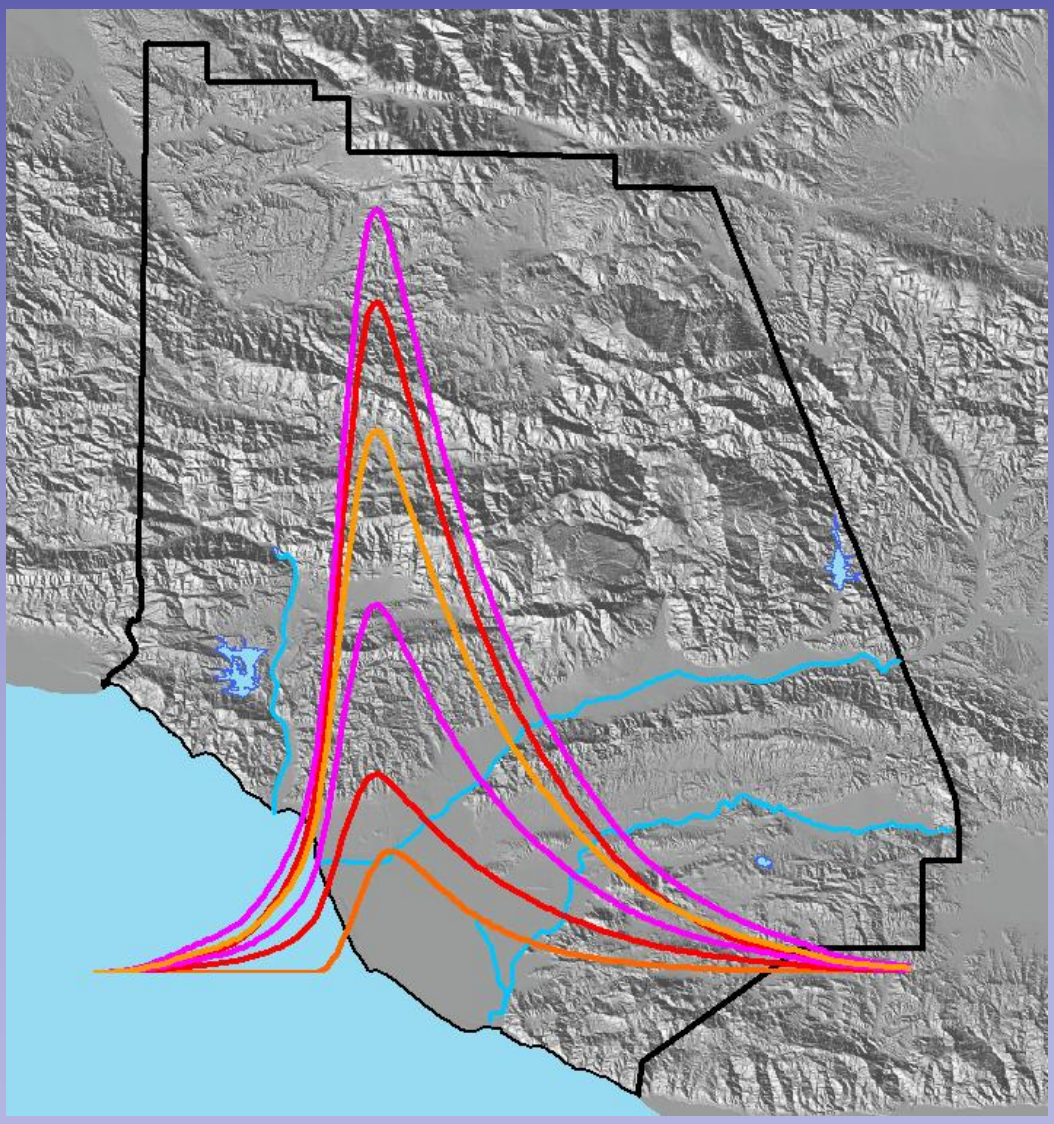
APPENDIX C

CALLEGUAS CREEK

WATERSHED DESIGN STORM

MODEL

CALLEGUAS CREEK WATERSHED
HSPF DESIGN STORM
DRAFT REPORT



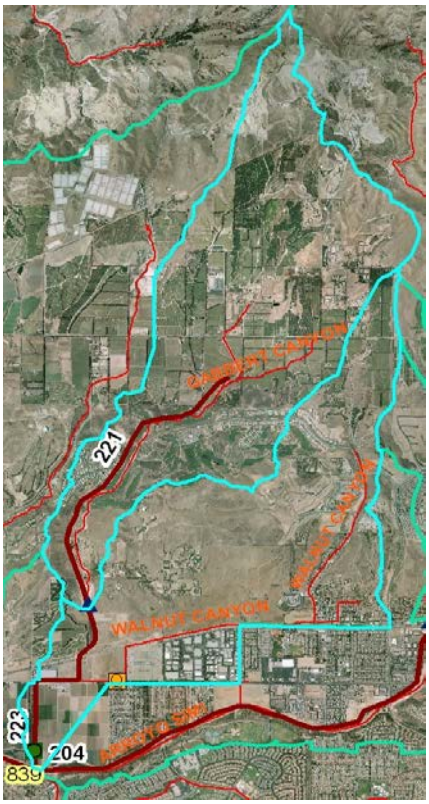
August 2012
Hydrology Section
Watershed Resources and Technology Division
Ventura County Watershed Protection District

Table 6 – Design Storm Model Calibration Results

HSPF ID	HSPF Name	Design Q100 cfs	Hist. Max. cfs	Ratio	2003 VCRat Node	VCRat Area ac	VCRat Inflow cfs	VCRat Outflow	CSUCI Model Q100 cfs	Trib. Q100 cfs	Call101 Model - Q100 cfs	Madera Model Q100 cfs	Royal Model Q100 cfs	Selected Model Q100 cfs	Diff. cfs	% Diff.	Selected Model	Calib Factor	AR Factor	Notes
Gage	REVOLON	13,900	12,900	0.93	5711a	28,199		13,649	13,900	18,300	13,900	13,900	13,900	13,900	-	0%	CSUCI	0.795	0.959	
Gage	NYELD778	2,560	2546	0.99	5401bc	4,855		3,008	2,060	3,130	2,070	2,060	2,060	3,130	(570)	-22%	Trib	1.000	0.990	
Gage	BEARDSLY	7,790	5,359	0.69	5275ac	13,919		8,357	7,760	11,900	7,790	7,760	7,760	7,790	-	0%	Call101	0.783	0.976	
Gage	STACLARA	1,440	1,000	0.69	5264c	1,800		2,189	2,740	4,400	2,750	2,740	2,740	4,400	(2,960)	-206%	Trib	1.000	0.990	
Gage	CONEJO	22,500	13,300	0.59	3630bd	4,170		23,331	15,100	20,100	21,500	17,700	18,100	21,500	1,000	4%	Call101	1.100	0.947	
Gage	ROYAL	12,400	5,320	0.43	319a	20,326		13,691	5,630	8,050	6,540	7,280	7,720	7,720	4,680	38%	Royal	1.000	0.969	
Gage	MADERA	17,200	10,700	0.62	722ab	45,013		17,221	13,300	18,900	15,500	17,200	17,900	17,200	-	0%	Madera	0.985	0.943	
Gage	TAPO804	5,070	4,140	0.82	359b	11,425		11,176	3,610	5,250	4,230	4,720	4,850	5,250	(180)	-4%	Trib	1.000	0.990	Design storm peak from 832
Gage	CC_CSUCI	38,500	25,900	0.67	3850ac	159,771		38,419	38,500	53,500	48,800	48,200	49,400	38,500	-	0%	CSUCI	0.862	0.912	
Gage	CCHWY101	28,300	18,000	0.64	2039a	107,746		27,727	24,800	35,100	28,300	31,200	32,100	28,300	-	0%	Call101	0.950	0.914	
Gage	SBAC830	6,850	4,240	0.62	2690bc	8,637		7,597	3,900	4,850	5,140	4,400	4,460	4,850	2,000	29%	Trib	1.000	0.990	
Gage	ASWO831	3,170	1,200	0.38	40ab	1,736		3,079	929	1,390	1,100	1,250	1,340	1,390	1,780	56%	Trib	1.000	0.990	
Gage	TAPO832	5,070	4,140	0.82	417b	13,109		3,333	4,010	5,760	4,690	5,220	5,340	5,760	(690)	-14%	Trib	1.000	0.990	
Gage	BUSCA833	1,190	1,200	1.01	648b	3,202		2,816	941	1,250	1,050	1,140	1,170	1,250	(60)	-5%	Trib	1.000	0.990	
Gage	SYCAM834	1,250	608	0.49	812b	5,276		1,934	485	593	524	557	565	593	657	53%	Trib	1.000	0.990	
Gage	CAMHL835	3,240	3,580	1.10	5513c	3,013		4,014	2,160	2,770	2,170	2,160	2,160	2,770	470	15%	Trib	1.000	0.990	
Gage	ARCON836	9,000	4,300	0.48	2987c	9,258		10,271	4,670	5,580	6,060	5,210	5,270	5,580	3,420	38%	Trib	1.000	0.990	
Gage	STARO838	5,250	2,986	0.57	3538c	8,419		4,757	2,450	3,700	4,070	3,100	3,180	3,700	1,550	30%	Trib	1.000	0.990	
Gage	GABWL839	2,740	1,820	0.66	1678bd	4,224		3,694	3,310	4,650	3,760	4,150	4,270	4,650	(1,910)	-70%	Trib	1.000	0.990	
Gage	ARPOS841	22,100	16,200	0.73	1683a	82,396		23,330	18,400	26,700	21,700	24,100	24,800	21,700	400	2%	Call101	0.950	0.914	
Gage	ARSTOW84	3,944	1,880	0.48	108ab	5,004		6,404	2,930	4,000	3,340	3,670	3,880	4,000	(56)	-1%	Trib	1.000	0.990	
9003	ASABVWO				306ac	19,765		13,731	4,300	6,090	5,010	5,550	5,870	5,870	7,861	57%	Royal			
9005	ASABVTAP				325a	20,687		13,666	5,760	8,210	6,680	7,430	7,870	7,870	5,796	42%	Royal			
9006	ASABVDRY				448a	35,918		15,644	10,400	14,900	12,100	13,500	14,100	14,100	1,544	10%	Royal			
9007	ASABVBUS				567a	39,465		15,955	11,500	16,500	13,400	14,900	15,500	14,900	1,055	7%	Madera			
9009	ASABVSYC				852ab	51,622		17,141	13,400	19,000	15,500	17,200	17,900	17,200	(59)	0%	Madera			
9010	ASBLWMAD				875ab	52,410		17,174	13,800	19,500	16,000	17,700	18,400	17,700	(526)	-3%	Madera			
9011	WHITEOAK				87bc	2,313		2,817	1,260	1,720	1,450	1,590	1,680	1,720	1,097	39%	Trib			
9012	MTSINAI				56b	911	1,704	930	498	602	543	574	593	602	328	35%	Trib			
9021	UPLLAJAS				159b	4,327		4,545	1,870	2,730	2,220	2,470	2,640	2,730	1,815	40%	Trib			
9022	22LLAJAS				160b	4,327	4,545	543	459	506	477	491	501	506	37	7%	Trib			
9023	CHIVO				166c	2,528		2,180	717	1,080	859	967	1,040	1,080	1,100	50%	Trib			
9024	MARDIVER				182c	381		940	319	489	390	443	474	489	451	48%	Trib			
9025	LWRLLAJA				196b	7,953		3,923	1,350	1,970	1,600	1,780	1,900	1,970	1,953	50%	Trib			
9031	MEIERCYN				304cd	3,869		4,377	1,320	2,040	1,590	1,810	1,940	2,040	2,337	53%	Trib			
9041	WINDMCYN				353c	1,357		2,274	991	1,400	1,140	1,260	1,290	1,400	874	38%	Trib			
9042	LWRGILLI				355c	3,145		3,788	1,130	1,630	1,310	1,460	1,500	1,630	2,158	57%	Trib			

The Gabbert-Walnut gage 839 located downstream of the City of Moorpark has provided peak flow data since 1987. After Water Year 2005 the record was processed to provide 5-min data during storm events. The Gabbert portion of the watershed has a debris basin that controls runoff from the 3.8 sq mi Gabbert subarea and attenuates peaks from smaller storms. Depending on how much sediment has accumulated in the basin, the degree of attenuation can vary. The Walnut portion of the watershed has one regional basin and several smaller homeowner peak flow mitigation basins that are not included in the HSPF model as it is represented in the model with just one subarea and one reach.

The Corps did not analyze the Q100 for this gage but Bulletin 17b analysis shows a Q100 of 2,740 cfs. This value was consistent with the historical maximum peak of 1,820 cfs. However, because the debris and detention basins are not modeled explicitly in the model, the Tributary Model provided a peak of 4,650 cfs or about 70% higher than the Bulletin 17b result. One of the issues with this result could be that the stream gage is only used for peak flows and storm hydrographs so there are very few measurements to confirm the rating, especially at high flow levels. However, it is more likely that the detention facilities and additional hydraulic constrictions above the 0.7 inches of assumed storage need to be included in the HSPF model of the watershed.



15031 1655DE	519.	801.	1177.	1691.	5	1900.	0.02370	11.00	0.00	0.	20	0	B98	0.00
15031 1656D	40.	115.	1217.	1691.	0	0.	0.00000	0.00	0.00	0.	40	9	B98	0.05
15031 1657CD	1217.	1691.	1746.	2213.	2	1500.	0.02600	0.00	0.00	0.	40	0	B98	0.00
15031 1658C	87.	239.	1833.	2223.	2	1950.	0.02560	0.00	0.00	0.	30	11	B98	0.10
15031 1659C	89.	219.	1922.	2224.	0	0.	0.00000	0.00	0.00	0.	40	12	B98	0.10
15031 1660D	64.	155.	64.	155.	3	750.	0.04530	0.00	0.00	0.	40	12	B98	0.05
15031 1661D	61.	148.	125.	297.	4	1300.	0.02150	4.50	0.00	0.	40	12	B98	0.05
15031 1662D	52.	133.	177.	414.	4	1875.	0.01870	5.25	0.00	0.	40	11	B98	0.05
15031 1663D	52.	133.	229.	516.	0	0.	0.00000	0.00	0.00	0.	40	11	B98	0.05

CONFLUENCE Q'S

15031 1664C TC 1174 QC 2224. QCD 2287. QD 64. 15031 1664D TD 1159 QD 516. QDC 2249. QC 1733.
15031 1664CD TCD 1163 QCD 2377. QC 1954. QD 422.

LOCATION	SUBAREA AREA	SUBAREA Q	TOTAL AREA	TOTAL Q	CONV TYPE	CONV LNGTH	CONV SLOPE	CONV SIZE	CONV Z	CONTROL Q	SOIL NAME	TC	RAIN ZONE	PCT IMPV
15031 1664CD	229.	516.	2151.	2377.	1	1800.	0.02330	0.00	0.00	0.	40	0	B98	0.00
15031 1665C	68.	177.	2219.	2355.	0	0.	0.00000	0.00	0.00	0.	40	11	B98	0.10
15031 1666C	44.	114.	2263.	2371.	1	1800.	0.02330	0.00	0.00	0.	40	11	B98	0.10
15031 1667C	86.	211.	2349.	2368.	1	1700.	0.02350	0.00	0.00	0.	40	12	B98	0.10
15031 1668C	71.	174.	2420.	2356.	2	900.	0.02000	0.00	0.00	0.	40	12	B98	0.10
15031 1669C	21.	64.	2441.	2358.	5	100.	0.01750	13.00	0.00	0.	30	9	B98	0.05
15031 1670C	0.	0.	2441.	2358.	5	2120.	0.00980	14.00	0.00	0.	30	99	B98	0.00
15031 1671C	30.	88.	2471.	2360.	0	0.	0.00000	0.00	0.00	0.	30	10	B98	0.15
15031 1672C	58.	136.	2529.	2365.	5	720.	0.01850	8.00	1.50	0.	50	12	B98	0.15
15031 1673C	42.	77.	2571.	2373.	5	220.	0.01630	8.00	0.00	0.	60	11	A97	0.40

CONFLUENCE Q'S

15031 1674B TB 1174 QB 2295. QBC 4623. QC 2328. 15031 1674C TC 1177 QC 2373. QCB 4636. QB 2263.
15031 1674BC TBC 1176 QBC 4649. QB 2281. QC 2368.

LOCATION	SUBAREA AREA	SUBAREA Q	TOTAL AREA	TOTAL Q	CONV TYPE	CONV LNGTH	CONV SLOPE	CONV SIZE	CONV Z	CONTROL Q	SOIL NAME	TC	RAIN ZONE	PCT IMPV

VENTURA COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY / PC 2.21-952

CALLEGUAS CRK.W/EXISTG.DAMS & INC CONEJO,Q100P,DBT/DL/OR,11/2002 STORM DAY 4

LOCATION	SUBAREA AREA	SUBAREA Q	TOTAL AREA	TOTAL Q	CONV TYPE	CONV LNGTH	CONV SLOPE	CONV SIZE	CONV Z	CONTROL Q	SOIL NAME	TC	RAIN ZONE	PCT IMPV
15031 1674BC	2571.	2373.	4360.	4649.	5	1250.	0.00600	14.00	0.00	0.	60	0	A97	0.00
15031 1675B	25.	64.	4385.	4649.	0	0.	0.00000	0.00	0.00	0.	60	10	B98	0.40
15031 1676D	39.	107.	39.	107.	4	1200.	0.01250	3.50	0.00	0.	20	12	B98	0.10
15031 1677D	0.	0.	39.	105.	0	0.	0.00000	0.00	0.00	0.	20	99	A97	0.00

CONFLUENCE Q'S

15031 1678B TB 1177 QB 4649. QBD 4663. QD 14. 15031 1678D TD 1158 QD 105. QDB 2642. QB 2537.
15031 1678BD TBD 1177 QBD 4663. QB 4649. QD 14.

LOCATION	SUBAREA AREA	SUBAREA Q	TOTAL AREA	TOTAL Q	CONV TYPE	CONV LNGTH	CONV SLOPE	CONV SIZE	CONV Z	CONTROL Q	SOIL NAME	TC	RAIN ZONE	PCT IMPV
15031 1678BD	39.	105.	4424.	4663.	5	3300.	0.00900	19.00	0.00	0.	60	0	A97	0.00

CONFLUENCE Q'S

15031 1679A TA 1216 QA 42572. QAB 44431. QB 1859. 15031 1679B TB 1180 QB 4640. QBA 28857. QA 24216.
15031 1679AB TAB 1214 QAB 44487. QA 42496. QB 1990.

LOCATION	SUBAREA AREA	SUBAREA Q	TOTAL AREA	TOTAL Q	CONV TYPE	CONV LNGTH	CONV SLOPE	CONV SIZE	CONV Z	CONTROL Q	SOIL NAME	TC	RAIN ZONE	PCT IMPV
15031 1679AB	4424.	4640.	81856.	44487.	0	0.	0.00000	0.00	0.00	0.	10	0	A97	0.00
15031 1680A	177.	97.	82033.	44487.	5	1550.	0.00350	100.00	1.50	0.	60	43	A97	0.00
15031 1681A	69.	101.	82102.	44474.	5	1300.	0.00350	100.00	1.50	0.	10	30	A97	0.10

APPENDIX D

Tc BACK-CALCULATIONS

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Modified Rational Model Results Report

Job: 1 Project: Beltramo Ranch

Project Description

Proposed_Q100

VCRat version: 2.64.0.30
VCRain version: 201601
DOS EXE version: PC 2.64-201605
VCRain Curve Set: Old VCRat 2.6 Legacy Curves
Curve A: J': J Prime Zone
Curve B: K: K Zone
Curve C: L: L Zone
Curve D: None

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Model Results

NODE ID	SOIL TYPE	RAIN ZONE	TC (MIN)	% IMP	SUBAREA DATA AND RESULTS AREA (AC)	SUBAREA DATA AND RESULTS FLOW (CFS)	ACCUMULATED DATA AREA (AC)	ACCUMULATED DATA FLOW (CFS)	ACCUMULATED DATA TIME (MIN)	ROUTING AFTER ACCUMULATION CHANNEL TYPE	LENGTH (FT)	SLOPE (FT/FT)	SIZE (FT)	H:V (Z)	N VALUES CHNL	N VALUES SIDES	VEL (FT/S)	DEPTH (FT)
1A	050	A100	6	42	74	211	74	211	1156	-------	----	-------	---	----	-----	-----	--	--
2A	---	---	--	--	---	---	74	211	1156	-------	----	-------	---	----	-----	-----	--	--

Issue/Warning Messages

TYPE	ERR NO	PROCEDURE	LOCATION	MESSAGE

NO ISSUES OR WARNINGS DETECTED

HYDROGRAPH PRINTOUT AT: 2A

TOTAL AREA TO HYDROGRAPH: 74 acres
HYDROGRAPH PEAK: 211 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 17.11 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	3.54	200	3.54	300	3.72	400	4.07
500	4.78	600	5.31	700	6.06	800	7.76	900	9.39
1000	11.51	1050	13.82	1100	17.22	1110	21.97	1120	32.37
1130	23.03	1131	27.99	1132	34.12	1133	39.37	1134	44.84
1135	50.07	1136	55.29	1137	55.29	1138	54.54	1139	55.29
1140	55.29	1141	58.90	1142	62.48	1143	66.05	1144	71.07
1145	79.89	1146	87.83	1147	93.08	1148	98.30	1149	88.49
1150	77.90	1151	96.34	1152	179.02	1153	196.65	1154	196.65
1155	206.45	1156	211.02	1157	182.29	1158	91.77	1159	58.90
1160	46.34	1161	37.62	1162	36.74	1163	32.37	1164	27.12
1165	27.99	1166	23.62	1167	22.44	1168	20.96	1169	18.01
1170	20.08	1171	19.19	1172	18.60	1173	18.31	1174	18.01
1175	20.08	1176	16.53	1177	16.24	1178	16.53	1179	15.94
1180	15.65	1181	15.06	1182	14.17	1183	13.58	1184	12.70
1185	12.40	1186	11.81	1187	11.52	1188	11.81	1189	12.11
1190	12.11	1191	12.70	1192	12.99	1193	13.29	1194	13.58
1195	13.58	1196	13.58	1197	13.58	1198	13.58	1199	13.58
1200	13.58	1201	13.88	1202	14.47	1203	14.76	1204	15.06
1205	15.65	1206	15.94	1207	15.94	1208	15.94	1209	15.94
1210	15.94	1211	15.06	1212	14.17	1213	13.29	1214	12.40
1215	11.52	1216	10.63	1217	10.63	1218	10.63	1219	10.63
1220	10.63	1221	10.63	1222	10.63	1223	10.63	1224	10.63
1225	10.63	1226	10.63	1227	10.63	1228	10.63	1229	10.63
1230	10.63	1231	10.63	1232	10.63	1233	10.63	1234	10.63
1235	10.63	1236	10.63	1237	10.63	1238	10.63	1239	10.63
1240	10.63	1241	10.33	1242	10.04	1243	9.74	1244	9.45
1245	9.15	1246	8.86	1247	8.86	1248	8.86	1249	8.86
1250	8.86	1251	8.86	1252	8.86	1253	8.86	1254	8.86
1255	8.86	1256	8.86	1257	8.86	1258	8.86	1259	8.86
1260	8.86	1261	8.86	1262	8.86	1263	8.86	1264	8.86
1265	8.86	1266	8.86	1267	8.86	1268	8.86	1269	8.86
1270	8.86	1271	8.56	1272	8.27	1273	7.97	1274	7.68
1275	7.38	1276	7.09	1277	7.09	1278	7.09	1279	7.09
1280	7.09	1281	7.09	1282	7.09	1283	7.09	1284	7.09
1285	7.09	1286	7.09	1287	7.09	1288	7.09	1289	7.09
1290	7.09	1291	7.09	1292	7.09	1293	7.09	1294	7.09
1295	7.09	1296	7.09	1297	7.09	1298	7.09	1299	7.09
1300	7.09	1310	5.31	1320	5.31	1330	3.54	1340	3.54
1350	5.31	1360	3.54	1370	3.54	1380	3.54	1390	3.54
1400	1.77	1420	0.89	1440	0.71	1460	0.09	1500	0.05

VCRat Model Input

Model Lines

```
005     1  001A Header place holder
005     1  002A Header place holder
999
999
006     1  001A 050042007406A97                                  G1
006     1  002A 010      099A97                               1  2
999
```

APPENDIX E

VCRAT CALCULATIONS (100-YR)

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Modified Rational Model Results Report

Job: 1 Project: Beltramo Ranch

Project Description

Existing Q100

VCRat version: 2.64.0.30
VCRain version: 201601
DOS EXE version: PC 2.64-201605
VCRain Curve Set: Old VCRat 2.6 Legacy Curves
Curve A: J': J Prime Zone
Curve B: K: K Zone
Curve C: L: L Zone
Curve D: None

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Model Results

NODE ID	SOIL TYPE	RAIN ZONE	TC (MIN)	% IMP	SUBAREA DATA AND RESULTS AREA (AC)	SUBAREA DATA AND RESULTS FLOW (CFS)	ACCUMULATED DATA AREA (AC)	ACCUMULATED DATA FLOW (CFS)	ACCUMULATED DATA TIME (MIN)	ROUTING AFTER ACCUMULATION CHANNEL TYPE	LENGTH (FT)	SLOPE (FT/FT)	SIZE (FT)	H:V (Z)	N VALUES CHNL	N VALUES SIDES	VEL (FT/S)	DEPTH (FT)
1A	050	A100	15	15	39	62	39	62	1155	-------	----	-------	---	----	-----	-----	--	--
2A	---	---	--	--	---	---	39	62	1155	-------	----	-------	---	----	-----	-----	--	--
3A	050	A100	7	3	20	44	59	104	1154	-------	----	-------	---	----	-----	-----	--	--
4A	---	---	--	--	---	---	59	104	1154	-------	----	-------	---	----	-----	-----	--	--
5A	050	A100	10	0	16	29	75	133	1154	-------	----	-------	---	----	-----	-----	--	--

```
      6A   ---   ---    --   --    ---    ---       75     133   1154    -------    ----  -------    ---     ----    -----  -----
--    --
      7AF  ************************************************************************************************************
           *          Peak in A:      133.47 cfs @ 1154 min  Q in F:        0.00 cfs  Combined Q:      133.47 cfs   *
           *          Peak in F:        0.00 cfs @    0 min  Q in A:        0.00 cfs  Combined Q:        0.00 cfs   *
           *      Combined Peak:      133.47 cfs @ 1154 min  Q in A:      133.47 cfs      Q in F:        0.00 cfs   *
           ************************************************************************************************************
      7AF  ---   ---    --   --      0      0       75     133   1154    -------    ----  -------    ---     ----    -----  -----
--    --
```

Issue/Warning Messages

TYPE	ERR NO	PROCEDURE	LOCATION	MESSAGE

NO ISSUES OR WARNINGS DETECTED

HYDROGRAPH PRINTOUT AT: 2A

TOTAL AREA TO HYDROGRAPH: 39 acres
HYDROGRAPH PEAK: 62 cfs
TIME OF PEAK: 1155 minutes
HYDROGRAPH VOLUME: 4.26 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.67	200	0.67	300	0.70	400	0.77
500	0.90	600	1.00	700	1.14	800	1.46	900	1.77
1000	2.17	1050	2.60	1100	3.24	1110	3.84	1120	6.86
1130	5.45	1131	6.46	1132	7.46	1133	8.27	1134	9.28
1135	10.28	1136	11.69	1137	13.10	1138	14.31	1139	15.48
1140	16.61	1141	18.54	1142	20.48	1143	22.42	1144	24.41
1145	27.45	1146	29.28	1147	31.26	1148	33.24	1149	31.86
1150	30.34	1151	36.09	1152	54.46	1153	59.54	1154	61.15
1155	61.77	1156	60.78	1157	59.79	1158	59.17	1159	57.43
1160	55.33	1161	53.10	1162	50.91	1163	48.12	1164	48.65
1165	49.05	1166	42.41	1167	20.97	1168	12.70	1169	6.46
1170	5.65	1171	4.42	1172	4.25	1173	4.00	1174	3.96
1175	3.80	1176	3.69	1177	3.53	1178	3.49	1179	3.33
1180	3.25	1181	3.16	1182	3.07	1183	2.98	1184	3.09
1185	2.76	1186	2.69	1187	2.62	1188	2.58	1189	2.53
1190	2.49	1191	2.47	1192	2.45	1193	2.38	1194	2.40
1195	2.38	1196	2.38	1197	2.42	1198	2.45	1199	2.45
1200	2.49	1201	2.53	1202	2.60	1203	2.65	1204	2.67
1205	2.71	1206	2.73	1207	2.76	1208	2.80	1209	2.82
1210	2.85	1211	2.82	1212	2.78	1213	2.73	1214	2.71
1215	2.67	1216	2.60	1217	2.53	1218	2.47	1219	2.40
1220	2.33	1221	2.27	1222	2.20	1223	2.13	1224	2.07
1225	2.00	1226	2.00	1227	2.00	1228	2.00	1229	2.00
1230	2.00	1231	2.00	1232	2.00	1233	2.00	1234	2.00
1235	2.00	1236	2.00	1237	2.00	1238	2.00	1239	2.00
1240	2.00	1241	1.98	1242	1.96	1243	1.93	1244	1.91
1245	1.89	1246	1.87	1247	1.85	1248	1.82	1249	1.80
1250	1.78	1251	1.76	1252	1.73	1253	1.71	1254	1.69
1255	1.67	1256	1.67	1257	1.67	1258	1.67	1259	1.67
1260	1.67	1261	1.67	1262	1.67	1263	1.67	1264	1.67
1265	1.67	1266	1.67	1267	1.67	1268	1.67	1269	1.67
1270	1.67	1271	1.65	1272	1.62	1273	1.60	1274	1.58

1275	1.56	1276	1.53	1277	1.51	1278	1.49	1279	1.47
1280	1.44	1281	1.42	1282	1.40	1283	1.38	1284	1.36
1285	1.33	1286	1.33	1287	1.33	1288	1.33	1289	1.33
1290	1.33	1291	1.33	1292	1.33	1293	1.33	1294	1.33
1295	1.33	1296	1.33	1297	1.33	1298	1.33	1299	1.33
1300	1.33	1310	1.11	1320	1.00	1330	0.78	1340	0.67
1350	0.89	1360	0.78	1370	0.67	1380	0.67	1390	0.67
1400	0.44	1420	0.17	1440	0.13	1460	0.02	1500	0.01

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 4A

TOTAL AREA TO HYDROGRAPH: 59 acres
HYDROGRAPH PEAK: 104 cfs
TIME OF PEAK: 1154 minutes
HYDROGRAPH VOLUME: 5.35 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.74	200	0.74	300	0.77	400	0.85
500	0.99	600	1.10	700	1.26	800	1.61	900	1.95
1000	2.39	1050	2.87	1100	3.57	1110	4.26	1120	9.99
1130	5.90	1131	7.99	1132	10.60	1133	12.78	1134	15.32
1135	17.59	1136	20.25	1137	22.92	1138	23.94	1139	25.11
1140	26.42	1141	29.21	1142	31.99	1143	34.77	1144	37.76
1145	43.05	1146	46.64	1147	50.52	1148	53.66	1149	50.11
1150	46.38	1151	57.22	1152	93.46	1153	102.65	1154	104.27
1155	103.74	1156	103.75	1157	103.76	1158	97.11	1159	74.50
1160	65.32	1161	59.68	1162	55.64	1163	51.71	1164	51.55
1165	50.35	1166	43.48	1167	21.41	1168	13.12	1169	6.82
1170	6.05	1171	4.80	1172	4.61	1173	4.35	1174	4.31
1175	4.14	1176	4.07	1177	3.85	1178	3.81	1179	3.64
1180	3.55	1181	3.45	1182	3.35	1183	3.25	1184	3.35
1185	3.00	1186	2.93	1187	2.85	1188	2.80	1189	2.77
1190	2.72	1191	2.71	1192	2.69	1193	2.63	1194	2.66
1195	2.64	1196	2.64	1197	2.69	1198	2.71	1199	2.70
1200	2.75	1201	2.80	1202	2.87	1203	2.93	1204	2.96
1205	3.01	1206	3.04	1207	3.06	1208	3.11	1209	3.13
1210	3.15	1211	3.12	1212	3.06	1213	3.00	1214	2.96
1215	2.90	1216	2.82	1217	2.74	1218	2.67	1219	2.61
1220	2.54	1221	2.47	1222	2.41	1223	2.34	1224	2.27
1225	2.21	1226	2.21	1227	2.21	1228	2.21	1229	2.21
1230	2.21	1231	2.21	1232	2.21	1233	2.21	1234	2.21
1235	2.21	1236	2.21	1237	2.21	1238	2.21	1239	2.21
1240	2.21	1241	2.18	1242	2.15	1243	2.12	1244	2.10
1245	2.07	1246	2.04	1247	2.02	1248	1.99	1249	1.97
1250	1.95	1251	1.93	1252	1.90	1253	1.88	1254	1.86
1255	1.84	1256	1.84	1257	1.84	1258	1.84	1259	1.84
1260	1.84	1261	1.84	1262	1.84	1263	1.84	1264	1.84
1265	1.84	1266	1.84	1267	1.84	1268	1.84	1269	1.84
1270	1.84	1271	1.81	1272	1.78	1273	1.76	1274	1.73

1275	1.70	1276	1.68	1277	1.65	1278	1.63	1279	1.60
1280	1.58	1281	1.56	1282	1.54	1283	1.52	1284	1.49
1285	1.47	1286	1.47	1287	1.47	1288	1.47	1289	1.47
1290	1.47	1291	1.47	1292	1.47	1293	1.47	1294	1.47
1295	1.47	1296	1.47	1297	1.47	1298	1.47	1299	1.47
1300	1.47	1310	1.21	1320	1.10	1330	0.85	1340	0.74
1350	0.99	1360	0.85	1370	0.74	1380	0.74	1390	0.74
1400	0.48	1420	0.18	1440	0.15	1460	0.02	1500	0.01

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 6A

TOTAL AREA TO HYDROGRAPH: 75 acres
HYDROGRAPH PEAK: 133 cfs
TIME OF PEAK: 1154 minutes
HYDROGRAPH VOLUME: 6.01 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.74	200	0.74	300	0.77	400	0.85
500	0.99	600	1.10	700	1.26	800	1.61	900	1.95
1000	2.39	1050	2.87	1100	3.57	1110	4.26	1120	12.15
1130	5.90	1131	8.46	1132	11.98	1133	14.94	1134	18.39
1135	21.56	1136	25.01	1137	28.38	1138	30.01	1139	31.89
1140	33.90	1141	37.17	1142	40.42	1143	43.76	1144	47.32
1145	53.84	1146	58.51	1147	63.46	1148	67.75	1149	63.38
1150	58.83	1151	72.61	1152	119.11	1153	131.27	1154	133.47
1155	132.27	1156	131.01	1157	129.67	1158	121.96	1159	99.51
1160	90.80	1161	81.67	1162	66.15	1163	57.58	1164	55.40
1165	52.63	1166	44.99	1167	22.01	1168	13.12	1169	6.82
1170	6.05	1171	4.80	1172	4.61	1173	4.35	1174	4.31
1175	4.14	1176	4.07	1177	3.85	1178	3.81	1179	3.64
1180	3.55	1181	3.45	1182	3.35	1183	3.25	1184	3.35
1185	3.00	1186	2.93	1187	2.85	1188	2.80	1189	2.77
1190	2.72	1191	2.71	1192	2.69	1193	2.63	1194	2.66
1195	2.64	1196	2.64	1197	2.69	1198	2.71	1199	2.70
1200	2.75	1201	2.80	1202	2.87	1203	2.93	1204	2.96
1205	3.01	1206	3.04	1207	3.06	1208	3.11	1209	3.13
1210	3.15	1211	3.12	1212	3.06	1213	3.00	1214	2.96
1215	2.90	1216	2.82	1217	2.74	1218	2.67	1219	2.61
1220	2.54	1221	2.47	1222	2.41	1223	2.34	1224	2.27
1225	2.21	1226	2.21	1227	2.21	1228	2.21	1229	2.21
1230	2.21	1231	2.21	1232	2.21	1233	2.21	1234	2.21
1235	2.21	1236	2.21	1237	2.21	1238	2.21	1239	2.21
1240	2.21	1241	2.18	1242	2.15	1243	2.12	1244	2.10
1245	2.07	1246	2.04	1247	2.02	1248	1.99	1249	1.97
1250	1.95	1251	1.93	1252	1.90	1253	1.88	1254	1.86
1255	1.84	1256	1.84	1257	1.84	1258	1.84	1259	1.84
1260	1.84	1261	1.84	1262	1.84	1263	1.84	1264	1.84
1265	1.84	1266	1.84	1267	1.84	1268	1.84	1269	1.84
1270	1.84	1271	1.81	1272	1.78	1273	1.76	1274	1.73

1275	1.70	1276	1.68	1277	1.65	1278	1.63	1279	1.60
1280	1.58	1281	1.56	1282	1.54	1283	1.52	1284	1.49
1285	1.47	1286	1.47	1287	1.47	1288	1.47	1289	1.47
1290	1.47	1291	1.47	1292	1.47	1293	1.47	1294	1.47
1295	1.47	1296	1.47	1297	1.47	1298	1.47	1299	1.47
1300	1.47	1310	1.21	1320	1.10	1330	0.85	1340	0.74
1350	0.99	1360	0.85	1370	0.74	1380	0.74	1390	0.74
1400	0.48	1420	0.18	1440	0.15	1460	0.02	1500	0.01

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 7AF

TOTAL AREA TO HYDROGRAPH: 75 acres
HYDROGRAPH PEAK: 133 cfs
TIME OF PEAK: 1154 minutes
HYDROGRAPH VOLUME: 6.01 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.74	200	0.74	300	0.77	400	0.85
500	0.99	600	1.10	700	1.26	800	1.61	900	1.95
1000	2.39	1050	2.87	1100	3.57	1110	4.26	1120	12.15
1130	5.90	1131	8.46	1132	11.98	1133	14.94	1134	18.39
1135	21.56	1136	25.01	1137	28.38	1138	30.01	1139	31.89
1140	33.90	1141	37.17	1142	40.42	1143	43.76	1144	47.32
1145	53.84	1146	58.51	1147	63.46	1148	67.75	1149	63.38
1150	58.83	1151	72.61	1152	119.11	1153	131.27	1154	133.47
1155	132.27	1156	131.01	1157	129.67	1158	121.96	1159	99.51
1160	90.80	1161	81.67	1162	66.15	1163	57.58	1164	55.40
1165	52.63	1166	44.99	1167	22.01	1168	13.12	1169	6.82
1170	6.05	1171	4.80	1172	4.61	1173	4.35	1174	4.31
1175	4.14	1176	4.07	1177	3.85	1178	3.81	1179	3.64
1180	3.55	1181	3.45	1182	3.35	1183	3.25	1184	3.35
1185	3.00	1186	2.93	1187	2.85	1188	2.80	1189	2.77
1190	2.72	1191	2.71	1192	2.69	1193	2.63	1194	2.66
1195	2.64	1196	2.64	1197	2.69	1198	2.71	1199	2.70
1200	2.75	1201	2.80	1202	2.87	1203	2.93	1204	2.96
1205	3.01	1206	3.04	1207	3.06	1208	3.11	1209	3.13
1210	3.15	1211	3.12	1212	3.06	1213	3.00	1214	2.96
1215	2.90	1216	2.82	1217	2.74	1218	2.67	1219	2.61
1220	2.54	1221	2.47	1222	2.41	1223	2.34	1224	2.27
1225	2.21	1226	2.21	1227	2.21	1228	2.21	1229	2.21
1230	2.21	1231	2.21	1232	2.21	1233	2.21	1234	2.21
1235	2.21	1236	2.21	1237	2.21	1238	2.21	1239	2.21
1240	2.21	1241	2.18	1242	2.15	1243	2.12	1244	2.10
1245	2.07	1246	2.04	1247	2.02	1248	1.99	1249	1.97
1250	1.95	1251	1.93	1252	1.90	1253	1.88	1254	1.86
1255	1.84	1256	1.84	1257	1.84	1258	1.84	1259	1.84
1260	1.84	1261	1.84	1262	1.84	1263	1.84	1264	1.84
1265	1.84	1266	1.84	1267	1.84	1268	1.84	1269	1.84
1270	1.84	1271	1.81	1272	1.78	1273	1.76	1274	1.73

1275	1.70	1276	1.68	1277	1.65	1278	1.63	1279	1.60
1280	1.58	1281	1.56	1282	1.54	1283	1.52	1284	1.49
1285	1.47	1286	1.47	1287	1.47	1288	1.47	1289	1.47
1290	1.47	1291	1.47	1292	1.47	1293	1.47	1294	1.47
1295	1.47	1296	1.47	1297	1.47	1298	1.47	1299	1.47
1300	1.47	1310	1.21	1320	1.10	1330	0.85	1340	0.74
1350	0.99	1360	0.85	1370	0.74	1380	0.74	1390	0.74
1400	0.48	1420	0.18	1440	0.15	1460	0.02	1500	0.01

VCRat Model Input

Model Lines

```
005     1  001A Header place holder
005     1  002A Header place holder
005     1  004A Header place holder
005     1  006A Header place holder
005     1  007AFHeader place holder
999
999
006     1  001A 050015003915A97                              G1
006     1  002A 010      099A97                             1
006     1  003A 050003002007A97
006     1  004A 010      099A97                             1
006     1  005A 050000001610A97
006     1  006A 010      099A97                             1
006     1  007AF010         A97                             11 2
999
```

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Modified Rational Model Results Report

Job: 1 Project: Beltramo Ranch

Project Description

Proposed_Q100

VCRat version: 2.64.0.30
VCRain version: 201601
DOS EXE version: PC 2.64-201605
VCRain Curve Set: Old VCRat 2.6 Legacy Curves
Curve A: J': J Prime Zone
Curve B: K: K Zone
Curve C: L: L Zone
Curve D: None

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Model Results

NODE ID	SOIL TYPE	RAIN ZONE	TC (MIN)	% IMP	SUBAREA DATA AND RESULTS AREA (AC)	SUBAREA DATA AND RESULTS FLOW (CFS)	ACCUMULATED DATA AREA (AC)	ACCUMULATED DATA FLOW (CFS)	TIME (MIN)	ROUTING AFTER ACCUMULATION CHANNEL TYPE	LENGTH (FT)	SLOPE (FT/FT)	SIZE (FT)	H:V (Z)	N VALUES CHNL	N VALUES SIDES	VEL (FT/S)	DEPTH (FT)
1A	050	A100	6	42	16	46	16	46	1156	-------	----	-------	---	----	-----	-----	--	--
2A	---	---	--	--	---	---	16	46	1156	-------	----	-------	---	----	-----	-----	--	--
3B	050	A100	6	42	8	23	8	23	1156	-------	----	-------	---	----	-----	-----	--	--
4B	---	---	--	--	---	---	8	23	1156	-------	----	-------	---	----	-----	-----	--	--
5C	050	A100	6	42	7	20	7	20	1156	-------	----	-------	---	----	-----	-----	--	--

```
      6C   ---   ---    --   --    ---    ---        7      20   1156    -------    ----  -------    ---     ----    -----  -----
--     --
      7D   050   A100    6   42     12     34       12      34   1156    -------    ----  -------    ---     ----    -----  -----
--     --
      8D   ---   ---    --   --    ---    ---       12      34   1156    -------    ----  -------    ---     ----    -----  -----
--     --
      9E   050   A100    6   42     14     40       14      40   1156    -------    ----  -------    ---     ----    -----  -----
--     --
     10E   ---   ---    --   --    ---    ---       14      40   1156    -------    ----  -------    ---     ----    -----  -----
--     --
     11F   050   A100    6   42      8     23        8      23   1156    -------    ----  -------    ---     ----    -----  -----
--     --
     12F   ---   ---    --   --    ---    ---        8      23   1156    -------    ----  -------    ---     ----    -----  -----
--     --
     13DF  ********************************************************************************************************************
           *          Peak in D:       34.22 cfs @ 1156 min  Q in F:       22.81 cfs  Combined Q:       57.03 cfs   *
           *          Peak in F:       22.81 cfs @ 1156 min  Q in D:       34.22 cfs  Combined Q:       57.03 cfs   *
           *      Combined Peak:       57.03 cfs @ 1156 min  Q in D:       34.22 cfs      Q in F:       22.81 cfs   *
           ********************************************************************************************************************
     13DF  ---   ---    --   --      8     23       20      57   1156    -------    ----  -------    ---     ----    -----  -----
--     --
     14A   050   A100    6    0      9     22       25      68   1156    -------    ----  -------    ---     ----    -----  -----
--     --
     15A   ---   ---    --   --    ---    ---       25      68   1156    -------    ----  -------    ---     ----    -----  -----
--     --
     16BF  ********************************************************************************************************************
           *          Peak in B:       22.81 cfs @ 1156 min  Q in F:        0.00 cfs  Combined Q:       22.81 cfs   *
           *          Peak in F:       22.81 cfs @ 1156 min  Q in B:       22.81 cfs  Combined Q:       22.81 cfs   *
           *      Combined Peak:       22.81 cfs @ 1156 min  Q in B:       22.81 cfs      Q in F:        0.00 cfs   *
           ********************************************************************************************************************
     16BF  ---   ---    --   --      0     23        8      23   1156    -------    ----  -------    ---     ----    -----  -----
--     --
     17A   ---   ---    --   --    ---    ---       25      68   1156    -------    ----  -------    ---     ----    -----  -----
--     --
           ********************************************************************************************
           *      INCOMING HYDROGRAPH  PEAK (cfs):     67.89         VOLUME (acre-ft):      4.07      *
           *      NO HYDROGRAPH ADJUSTMENT                                                           *
           *      NO HYDROGRAPH FATTENING                                                            *
           *      RESERVOIR INFLOW:    PEAK (cfs):     67.89 @ 1156  VOLUME (acre-ft):      4.07      *
           *      MAXIMUM ELEVATION:   STAGE (ft):      5.50 @ 1152  VOLUME (acre-ft):      2.36      *
           *      EMERGENCY SPILLWAY:   ELEV (ft):      4.75         VOLUME (acre-ft):      2.14      *
           *          DIFFERENCE:   IN STAGE (ft):     +0.75      IN VOLUME (acre-ft):     -0.22      *
           *          SPILLED FROM 1147 TO 1500 FOR  354 MINUTES                                     *
           *      TOP OF DAM:           ELEV (ft):      5.50         VOLUME (acre-ft):      2.36      *
           *          DIFFERENCE    IN STAGE (ft):      0.00      IN VOLUME (acre-ft):      0.00      *
           *          NO OVERTOP EXPECTED.   PERCNT OF VOLUME REMAINING TO TOP OF DAM:      0.0%      *
           *      RESERVOIR OUTFLOW:   PEAK (cfs):     10.83 @ 1152  VOLUME (acre-ft):      0.39      *
           ********************************************************************************************
     17A   ---   ---    --   --    ---    ---       25      11   1152    -------    ----  -------    ---     ----    -----  -----
--     --
     18A   ---   ---    --   --    ---    ---       25      11   1152    -------    ----  -------    ---     ----    -----  -----
--     --


                                        Issue/Warning Messages
     TYPE      ERR NO   PROCEDURE    LOCATION   MESSAGE

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------
      NO ISSUES OR WARNINGS DETECTED
```

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 2A

TOTAL AREA TO HYDROGRAPH: 16 acres
HYDROGRAPH PEAK: 46 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 3.70 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.77	200	0.77	300	0.80	400	0.88
500	1.03	600	1.15	700	1.31	800	1.68	900	2.03
1000	2.49	1050	2.99	1100	3.72	1110	4.75	1120	7.00
1130	4.98	1131	6.05	1132	7.38	1133	8.51	1134	9.70
1135	10.82	1136	11.95	1137	11.95	1138	11.79	1139	11.95
1140	11.95	1141	12.73	1142	13.51	1143	14.28	1144	15.37
1145	17.27	1146	18.99	1147	20.13	1148	21.25	1149	19.13
1150	16.84	1151	20.83	1152	38.71	1153	42.52	1154	42.52
1155	44.64	1156	45.63	1157	39.41	1158	19.84	1159	12.73
1160	10.02	1161	8.13	1162	7.94	1163	7.00	1164	5.86
1165	6.05	1166	5.11	1167	4.85	1168	4.53	1169	3.89
1170	4.34	1171	4.15	1172	4.02	1173	3.96	1174	3.89
1175	4.34	1176	3.58	1177	3.51	1178	3.58	1179	3.45
1180	3.38	1181	3.26	1182	3.06	1183	2.94	1184	2.75
1185	2.68	1186	2.55	1187	2.49	1188	2.55	1189	2.62
1190	2.62	1191	2.75	1192	2.81	1193	2.87	1194	2.94
1195	2.94	1196	2.94	1197	2.94	1198	2.94	1199	2.94
1200	2.94	1201	3.00	1202	3.13	1203	3.19	1204	3.26
1205	3.38	1206	3.45	1207	3.45	1208	3.45	1209	3.45
1210	3.45	1211	3.26	1212	3.06	1213	2.87	1214	2.68
1215	2.49	1216	2.30	1217	2.30	1218	2.30	1219	2.30
1220	2.30	1221	2.30	1222	2.30	1223	2.30	1224	2.30
1225	2.30	1226	2.30	1227	2.30	1228	2.30	1229	2.30
1230	2.30	1231	2.30	1232	2.30	1233	2.30	1234	2.30
1235	2.30	1236	2.30	1237	2.30	1238	2.30	1239	2.30
1240	2.30	1241	2.23	1242	2.17	1243	2.11	1244	2.04
1245	1.98	1246	1.92	1247	1.92	1248	1.92	1249	1.92
1250	1.92	1251	1.92	1252	1.92	1253	1.92	1254	1.92
1255	1.92	1256	1.92	1257	1.92	1258	1.92	1259	1.92
1260	1.92	1261	1.92	1262	1.92	1263	1.92	1264	1.92
1265	1.92	1266	1.92	1267	1.92	1268	1.92	1269	1.92
1270	1.92	1271	1.85	1272	1.79	1273	1.72	1274	1.66
1275	1.60	1276	1.53	1277	1.53	1278	1.53	1279	1.53
1280	1.53	1281	1.53	1282	1.53	1283	1.53	1284	1.53
1285	1.53	1286	1.53	1287	1.53	1288	1.53	1289	1.53
1290	1.53	1291	1.53	1292	1.53	1293	1.53	1294	1.53
1295	1.53	1296	1.53	1297	1.53	1298	1.53	1299	1.53
1300	1.53	1310	1.15	1320	1.15	1330	0.77	1340	0.77
1350	1.15	1360	0.77	1370	0.77	1380	0.77	1390	0.77
1400	0.38	1420	0.19	1440	0.15	1460	0.02	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 3B

TOTAL AREA TO HYDROGRAPH: 8 acres
HYDROGRAPH PEAK: 23 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 1.85 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.38	200	0.38	300	0.40	400	0.44
500	0.52	600	0.57	700	0.66	800	0.84	900	1.01
1000	1.24	1050	1.49	1100	1.86	1110	2.37	1120	3.50
1130	2.49	1131	3.03	1132	3.69	1133	4.26	1134	4.85
1135	5.41	1136	5.98	1137	5.98	1138	5.90	1139	5.98
1140	5.98	1141	6.37	1142	6.75	1143	7.14	1144	7.68
1145	8.64	1146	9.50	1147	10.06	1148	10.63	1149	9.57
1150	8.42	1151	10.42	1152	19.35	1153	21.26	1154	21.26
1155	22.32	1156	22.81	1157	19.71	1158	9.92	1159	6.37
1160	5.01	1161	4.07	1162	3.97	1163	3.50	1164	2.93
1165	3.03	1166	2.55	1167	2.43	1168	2.27	1169	1.95
1170	2.17	1171	2.07	1172	2.01	1173	1.98	1174	1.95
1175	2.17	1176	1.79	1177	1.76	1178	1.79	1179	1.72
1180	1.69	1181	1.63	1182	1.53	1183	1.47	1184	1.37
1185	1.34	1186	1.28	1187	1.24	1188	1.28	1189	1.31
1190	1.31	1191	1.37	1192	1.40	1193	1.44	1194	1.47
1195	1.47	1196	1.47	1197	1.47	1198	1.47	1199	1.47
1200	1.47	1201	1.50	1202	1.56	1203	1.60	1204	1.63
1205	1.69	1206	1.72	1207	1.72	1208	1.72	1209	1.72
1210	1.72	1211	1.63	1212	1.53	1213	1.44	1214	1.34
1215	1.24	1216	1.15	1217	1.15	1218	1.15	1219	1.15
1220	1.15	1221	1.15	1222	1.15	1223	1.15	1224	1.15
1225	1.15	1226	1.15	1227	1.15	1228	1.15	1229	1.15
1230	1.15	1231	1.15	1232	1.15	1233	1.15	1234	1.15
1235	1.15	1236	1.15	1237	1.15	1238	1.15	1239	1.15
1240	1.15	1241	1.12	1242	1.09	1243	1.05	1244	1.02
1245	0.99	1246	0.96	1247	0.96	1248	0.96	1249	0.96
1250	0.96	1251	0.96	1252	0.96	1253	0.96	1254	0.96
1255	0.96	1256	0.96	1257	0.96	1258	0.96	1259	0.96
1260	0.96	1261	0.96	1262	0.96	1263	0.96	1264	0.96
1265	0.96	1266	0.96	1267	0.96	1268	0.96	1269	0.96
1270	0.96	1271	0.93	1272	0.89	1273	0.86	1274	0.83
1275	0.80	1276	0.77	1277	0.77	1278	0.77	1279	0.77
1280	0.77	1281	0.77	1282	0.77	1283	0.77	1284	0.77
1285	0.77	1286	0.77	1287	0.77	1288	0.77	1289	0.77
1290	0.77	1291	0.77	1292	0.77	1293	0.77	1294	0.77
1295	0.77	1296	0.77	1297	0.77	1298	0.77	1299	0.77
1300	0.77	1310	0.57	1320	0.57	1330	0.38	1340	0.38
1350	0.57	1360	0.38	1370	0.38	1380	0.38	1390	0.38
1400	0.19	1420	0.10	1440	0.08	1460	0.01	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 4B

TOTAL AREA TO HYDROGRAPH: 8 acres
HYDROGRAPH PEAK: 23 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 1.85 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.38	200	0.38	300	0.40	400	0.44
500	0.52	600	0.57	700	0.66	800	0.84	900	1.01
1000	1.24	1050	1.49	1100	1.86	1110	2.37	1120	3.50
1130	2.49	1131	3.03	1132	3.69	1133	4.26	1134	4.85
1135	5.41	1136	5.98	1137	5.98	1138	5.90	1139	5.98
1140	5.98	1141	6.37	1142	6.75	1143	7.14	1144	7.68
1145	8.64	1146	9.50	1147	10.06	1148	10.63	1149	9.57
1150	8.42	1151	10.42	1152	19.35	1153	21.26	1154	21.26
1155	22.32	1156	22.81	1157	19.71	1158	9.92	1159	6.37
1160	5.01	1161	4.07	1162	3.97	1163	3.50	1164	2.93
1165	3.03	1166	2.55	1167	2.43	1168	2.27	1169	1.95
1170	2.17	1171	2.07	1172	2.01	1173	1.98	1174	1.95
1175	2.17	1176	1.79	1177	1.76	1178	1.79	1179	1.72
1180	1.69	1181	1.63	1182	1.53	1183	1.47	1184	1.37
1185	1.34	1186	1.28	1187	1.24	1188	1.28	1189	1.31
1190	1.31	1191	1.37	1192	1.40	1193	1.44	1194	1.47
1195	1.47	1196	1.47	1197	1.47	1198	1.47	1199	1.47
1200	1.47	1201	1.50	1202	1.56	1203	1.60	1204	1.63
1205	1.69	1206	1.72	1207	1.72	1208	1.72	1209	1.72
1210	1.72	1211	1.63	1212	1.53	1213	1.44	1214	1.34
1215	1.24	1216	1.15	1217	1.15	1218	1.15	1219	1.15
1220	1.15	1221	1.15	1222	1.15	1223	1.15	1224	1.15
1225	1.15	1226	1.15	1227	1.15	1228	1.15	1229	1.15
1230	1.15	1231	1.15	1232	1.15	1233	1.15	1234	1.15
1235	1.15	1236	1.15	1237	1.15	1238	1.15	1239	1.15
1240	1.15	1241	1.12	1242	1.09	1243	1.05	1244	1.02
1245	0.99	1246	0.96	1247	0.96	1248	0.96	1249	0.96
1250	0.96	1251	0.96	1252	0.96	1253	0.96	1254	0.96
1255	0.96	1256	0.96	1257	0.96	1258	0.96	1259	0.96
1260	0.96	1261	0.96	1262	0.96	1263	0.96	1264	0.96
1265	0.96	1266	0.96	1267	0.96	1268	0.96	1269	0.96
1270	0.96	1271	0.93	1272	0.89	1273	0.86	1274	0.83
1275	0.80	1276	0.77	1277	0.77	1278	0.77	1279	0.77
1280	0.77	1281	0.77	1282	0.77	1283	0.77	1284	0.77
1285	0.77	1286	0.77	1287	0.77	1288	0.77	1289	0.77
1290	0.77	1291	0.77	1292	0.77	1293	0.77	1294	0.77
1295	0.77	1296	0.77	1297	0.77	1298	0.77	1299	0.77
1300	0.77	1310	0.57	1320	0.57	1330	0.38	1340	0.38
1350	0.57	1360	0.38	1370	0.38	1380	0.38	1390	0.38
1400	0.19	1420	0.10	1440	0.08	1460	0.01	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 5C

TOTAL AREA TO HYDROGRAPH: 7 acres
HYDROGRAPH PEAK: 20 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 1.62 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.34	200	0.34	300	0.35	400	0.39
500	0.45	600	0.50	700	0.57	800	0.73	900	0.89
1000	1.09	1050	1.31	1100	1.63	1110	2.08	1120	3.06
1130	2.18	1131	2.65	1132	3.23	1133	3.72	1134	4.24
1135	4.74	1136	5.23	1137	5.23	1138	5.16	1139	5.23
1140	5.23	1141	5.57	1142	5.91	1143	6.25	1144	6.72
1145	7.56	1146	8.31	1147	8.80	1148	9.30	1149	8.37
1150	7.37	1151	9.11	1152	16.93	1153	18.60	1154	18.60
1155	19.53	1156	19.96	1157	17.24	1158	8.68	1159	5.57
1160	4.38	1161	3.56	1162	3.48	1163	3.06	1164	2.57
1165	2.65	1166	2.23	1167	2.12	1168	1.98	1169	1.70
1170	1.90	1171	1.82	1172	1.76	1173	1.73	1174	1.70
1175	1.90	1176	1.56	1177	1.54	1178	1.56	1179	1.51
1180	1.48	1181	1.42	1182	1.34	1183	1.28	1184	1.20
1185	1.17	1186	1.12	1187	1.09	1188	1.12	1189	1.15
1190	1.15	1191	1.20	1192	1.23	1193	1.26	1194	1.28
1195	1.28	1196	1.28	1197	1.28	1198	1.28	1199	1.28
1200	1.28	1201	1.31	1202	1.37	1203	1.40	1204	1.42
1205	1.48	1206	1.51	1207	1.51	1208	1.51	1209	1.51
1210	1.51	1211	1.42	1212	1.34	1213	1.26	1214	1.17
1215	1.09	1216	1.01	1217	1.01	1218	1.01	1219	1.01
1220	1.01	1221	1.01	1222	1.01	1223	1.01	1224	1.01
1225	1.01	1226	1.01	1227	1.01	1228	1.01	1229	1.01
1230	1.01	1231	1.01	1232	1.01	1233	1.01	1234	1.01
1235	1.01	1236	1.01	1237	1.01	1238	1.01	1239	1.01
1240	1.01	1241	0.98	1242	0.95	1243	0.92	1244	0.89
1245	0.87	1246	0.84	1247	0.84	1248	0.84	1249	0.84
1250	0.84	1251	0.84	1252	0.84	1253	0.84	1254	0.84
1255	0.84	1256	0.84	1257	0.84	1258	0.84	1259	0.84
1260	0.84	1261	0.84	1262	0.84	1263	0.84	1264	0.84
1265	0.84	1266	0.84	1267	0.84	1268	0.84	1269	0.84
1270	0.84	1271	0.81	1272	0.78	1273	0.75	1274	0.73
1275	0.70	1276	0.67	1277	0.67	1278	0.67	1279	0.67
1280	0.67	1281	0.67	1282	0.67	1283	0.67	1284	0.67
1285	0.67	1286	0.67	1287	0.67	1288	0.67	1289	0.67
1290	0.67	1291	0.67	1292	0.67	1293	0.67	1294	0.67
1295	0.67	1296	0.67	1297	0.67	1298	0.67	1299	0.67
1300	0.67	1310	0.50	1320	0.50	1330	0.34	1340	0.34
1350	0.50	1360	0.34	1370	0.34	1380	0.34	1390	0.34
1400	0.17	1420	0.08	1440	0.07	1460	0.01	1500	0.00

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 7D

TOTAL AREA TO HYDROGRAPH: 12 acres
HYDROGRAPH PEAK: 34 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 2.77 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.57	200	0.57	300	0.60	400	0.66
500	0.78	600	0.86	700	0.98	800	1.26	900	1.52
1000	1.87	1050	2.24	1100	2.79	1110	3.56	1120	5.25
1130	3.73	1131	4.54	1132	5.53	1133	6.38	1134	7.27
1135	8.12	1136	8.97	1137	8.97	1138	8.84	1139	8.97
1140	8.97	1141	9.55	1142	10.13	1143	10.71	1144	11.52
1145	12.95	1146	14.24	1147	15.09	1148	15.94	1149	14.35
1150	12.63	1151	15.62	1152	29.03	1153	31.89	1154	31.89
1155	33.48	1156	34.22	1157	29.56	1158	14.88	1159	9.55
1160	7.51	1161	6.10	1162	5.96	1163	5.25	1164	4.40
1165	4.54	1166	3.83	1167	3.64	1168	3.40	1169	2.92
1170	3.26	1171	3.11	1172	3.02	1173	2.97	1174	2.92
1175	3.26	1176	2.68	1177	2.63	1178	2.68	1179	2.59
1180	2.54	1181	2.44	1182	2.30	1183	2.20	1184	2.06
1185	2.01	1186	1.92	1187	1.87	1188	1.92	1189	1.96
1190	1.96	1191	2.06	1192	2.11	1193	2.15	1194	2.20
1195	2.20	1196	2.20	1197	2.20	1198	2.20	1199	2.20
1200	2.20	1201	2.25	1202	2.35	1203	2.39	1204	2.44
1205	2.54	1206	2.59	1207	2.59	1208	2.59	1209	2.59
1210	2.59	1211	2.44	1212	2.30	1213	2.15	1214	2.01
1215	1.87	1216	1.72	1217	1.72	1218	1.72	1219	1.72
1220	1.72	1221	1.72	1222	1.72	1223	1.72	1224	1.72
1225	1.72	1226	1.72	1227	1.72	1228	1.72	1229	1.72
1230	1.72	1231	1.72	1232	1.72	1233	1.72	1234	1.72
1235	1.72	1236	1.72	1237	1.72	1238	1.72	1239	1.72
1240	1.72	1241	1.68	1242	1.63	1243	1.58	1244	1.53
1245	1.48	1246	1.44	1247	1.44	1248	1.44	1249	1.44
1250	1.44	1251	1.44	1252	1.44	1253	1.44	1254	1.44
1255	1.44	1256	1.44	1257	1.44	1258	1.44	1259	1.44
1260	1.44	1261	1.44	1262	1.44	1263	1.44	1264	1.44
1265	1.44	1266	1.44	1267	1.44	1268	1.44	1269	1.44
1270	1.44	1271	1.39	1272	1.34	1273	1.29	1274	1.24
1275	1.20	1276	1.15	1277	1.15	1278	1.15	1279	1.15
1280	1.15	1281	1.15	1282	1.15	1283	1.15	1284	1.15
1285	1.15	1286	1.15	1287	1.15	1288	1.15	1289	1.15
1290	1.15	1291	1.15	1292	1.15	1293	1.15	1294	1.15
1295	1.15	1296	1.15	1297	1.15	1298	1.15	1299	1.15
1300	1.15	1310	0.86	1320	0.86	1330	0.57	1340	0.57
1350	0.86	1360	0.57	1370	0.57	1380	0.57	1390	0.57
1400	0.29	1420	0.14	1440	0.11	1460	0.01	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 8D

TOTAL AREA TO HYDROGRAPH: 12 acres
HYDROGRAPH PEAK: 34 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 2.77 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.57	200	0.57	300	0.60	400	0.66
500	0.78	600	0.86	700	0.98	800	1.26	900	1.52
1000	1.87	1050	2.24	1100	2.79	1110	3.56	1120	5.25
1130	3.73	1131	4.54	1132	5.53	1133	6.38	1134	7.27
1135	8.12	1136	8.97	1137	8.97	1138	8.84	1139	8.97
1140	8.97	1141	9.55	1142	10.13	1143	10.71	1144	11.52
1145	12.95	1146	14.24	1147	15.09	1148	15.94	1149	14.35
1150	12.63	1151	15.62	1152	29.03	1153	31.89	1154	31.89
1155	33.48	1156	34.22	1157	29.56	1158	14.88	1159	9.55
1160	7.51	1161	6.10	1162	5.96	1163	5.25	1164	4.40
1165	4.54	1166	3.83	1167	3.64	1168	3.40	1169	2.92
1170	3.26	1171	3.11	1172	3.02	1173	2.97	1174	2.92
1175	3.26	1176	2.68	1177	2.63	1178	2.68	1179	2.59
1180	2.54	1181	2.44	1182	2.30	1183	2.20	1184	2.06
1185	2.01	1186	1.92	1187	1.87	1188	1.92	1189	1.96
1190	1.96	1191	2.06	1192	2.11	1193	2.15	1194	2.20
1195	2.20	1196	2.20	1197	2.20	1198	2.20	1199	2.20
1200	2.20	1201	2.25	1202	2.35	1203	2.39	1204	2.44
1205	2.54	1206	2.59	1207	2.59	1208	2.59	1209	2.59
1210	2.59	1211	2.44	1212	2.30	1213	2.15	1214	2.01
1215	1.87	1216	1.72	1217	1.72	1218	1.72	1219	1.72
1220	1.72	1221	1.72	1222	1.72	1223	1.72	1224	1.72
1225	1.72	1226	1.72	1227	1.72	1228	1.72	1229	1.72
1230	1.72	1231	1.72	1232	1.72	1233	1.72	1234	1.72
1235	1.72	1236	1.72	1237	1.72	1238	1.72	1239	1.72
1240	1.72	1241	1.68	1242	1.63	1243	1.58	1244	1.53
1245	1.48	1246	1.44	1247	1.44	1248	1.44	1249	1.44
1250	1.44	1251	1.44	1252	1.44	1253	1.44	1254	1.44
1255	1.44	1256	1.44	1257	1.44	1258	1.44	1259	1.44
1260	1.44	1261	1.44	1262	1.44	1263	1.44	1264	1.44
1265	1.44	1266	1.44	1267	1.44	1268	1.44	1269	1.44
1270	1.44	1271	1.39	1272	1.34	1273	1.29	1274	1.24
1275	1.20	1276	1.15	1277	1.15	1278	1.15	1279	1.15
1280	1.15	1281	1.15	1282	1.15	1283	1.15	1284	1.15
1285	1.15	1286	1.15	1287	1.15	1288	1.15	1289	1.15
1290	1.15	1291	1.15	1292	1.15	1293	1.15	1294	1.15
1295	1.15	1296	1.15	1297	1.15	1298	1.15	1299	1.15
1300	1.15	1310	0.86	1320	0.86	1330	0.57	1340	0.57
1350	0.86	1360	0.57	1370	0.57	1380	0.57	1390	0.57
1400	0.29	1420	0.14	1440	0.11	1460	0.01	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 9E

TOTAL AREA TO HYDROGRAPH: 14 acres
HYDROGRAPH PEAK: 40 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 3.24 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.67	200	0.67	300	0.70	400	0.77
500	0.91	600	1.01	700	1.15	800	1.47	900	1.78
1000	2.18	1050	2.61	1100	3.26	1110	4.16	1120	6.12
1130	4.36	1131	5.30	1132	6.45	1133	7.45	1134	8.48
1135	9.47	1136	10.46	1137	10.46	1138	10.32	1139	10.46
1140	10.46	1141	11.14	1142	11.82	1143	12.50	1144	13.44
1145	15.11	1146	16.62	1147	17.61	1148	18.60	1149	16.74
1150	14.74	1151	18.23	1152	33.87	1153	37.20	1154	37.20
1155	39.06	1156	39.92	1157	34.49	1158	17.36	1159	11.14
1160	8.77	1161	7.12	1162	6.95	1163	6.12	1164	5.13
1165	5.30	1166	4.47	1167	4.25	1168	3.97	1169	3.41
1170	3.80	1171	3.63	1172	3.52	1173	3.46	1174	3.41
1175	3.80	1176	3.13	1177	3.07	1178	3.13	1179	3.02
1180	2.96	1181	2.85	1182	2.68	1183	2.57	1184	2.40
1185	2.35	1186	2.23	1187	2.18	1188	2.23	1189	2.29
1190	2.29	1191	2.40	1192	2.46	1193	2.51	1194	2.57
1195	2.57	1196	2.57	1197	2.57	1198	2.57	1199	2.57
1200	2.57	1201	2.63	1202	2.74	1203	2.79	1204	2.85
1205	2.96	1206	3.02	1207	3.02	1208	3.02	1209	3.02
1210	3.02	1211	2.85	1212	2.68	1213	2.51	1214	2.35
1215	2.18	1216	2.01	1217	2.01	1218	2.01	1219	2.01
1220	2.01	1221	2.01	1222	2.01	1223	2.01	1224	2.01
1225	2.01	1226	2.01	1227	2.01	1228	2.01	1229	2.01
1230	2.01	1231	2.01	1232	2.01	1233	2.01	1234	2.01
1235	2.01	1236	2.01	1237	2.01	1238	2.01	1239	2.01
1240	2.01	1241	1.96	1242	1.90	1243	1.84	1244	1.79
1245	1.73	1246	1.68	1247	1.68	1248	1.68	1249	1.68
1250	1.68	1251	1.68	1252	1.68	1253	1.68	1254	1.68
1255	1.68	1256	1.68	1257	1.68	1258	1.68	1259	1.68
1260	1.68	1261	1.68	1262	1.68	1263	1.68	1264	1.68
1265	1.68	1266	1.68	1267	1.68	1268	1.68	1269	1.68
1270	1.68	1271	1.62	1272	1.56	1273	1.51	1274	1.45
1275	1.40	1276	1.34	1277	1.34	1278	1.34	1279	1.34
1280	1.34	1281	1.34	1282	1.34	1283	1.34	1284	1.34
1285	1.34	1286	1.34	1287	1.34	1288	1.34	1289	1.34
1290	1.34	1291	1.34	1292	1.34	1293	1.34	1294	1.34
1295	1.34	1296	1.34	1297	1.34	1298	1.34	1299	1.34
1300	1.34	1310	1.01	1320	1.01	1330	0.67	1340	0.67
1350	1.01	1360	0.67	1370	0.67	1380	0.67	1390	0.67
1400	0.34	1420	0.17	1440	0.13	1460	0.02	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 10E

TOTAL AREA TO HYDROGRAPH: 14 acres
HYDROGRAPH PEAK: 40 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 3.24 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.67	200	0.67	300	0.70	400	0.77
500	0.91	600	1.01	700	1.15	800	1.47	900	1.78
1000	2.18	1050	2.61	1100	3.26	1110	4.16	1120	6.12
1130	4.36	1131	5.30	1132	6.45	1133	7.45	1134	8.48
1135	9.47	1136	10.46	1137	10.46	1138	10.32	1139	10.46
1140	10.46	1141	11.14	1142	11.82	1143	12.50	1144	13.44
1145	15.11	1146	16.62	1147	17.61	1148	18.60	1149	16.74
1150	14.74	1151	18.23	1152	33.87	1153	37.20	1154	37.20
1155	39.06	1156	39.92	1157	34.49	1158	17.36	1159	11.14
1160	8.77	1161	7.12	1162	6.95	1163	6.12	1164	5.13
1165	5.30	1166	4.47	1167	4.25	1168	3.97	1169	3.41
1170	3.80	1171	3.63	1172	3.52	1173	3.46	1174	3.41
1175	3.80	1176	3.13	1177	3.07	1178	3.13	1179	3.02
1180	2.96	1181	2.85	1182	2.68	1183	2.57	1184	2.40
1185	2.35	1186	2.23	1187	2.18	1188	2.23	1189	2.29
1190	2.29	1191	2.40	1192	2.46	1193	2.51	1194	2.57
1195	2.57	1196	2.57	1197	2.57	1198	2.57	1199	2.57
1200	2.57	1201	2.63	1202	2.74	1203	2.79	1204	2.85
1205	2.96	1206	3.02	1207	3.02	1208	3.02	1209	3.02
1210	3.02	1211	2.85	1212	2.68	1213	2.51	1214	2.35
1215	2.18	1216	2.01	1217	2.01	1218	2.01	1219	2.01
1220	2.01	1221	2.01	1222	2.01	1223	2.01	1224	2.01
1225	2.01	1226	2.01	1227	2.01	1228	2.01	1229	2.01
1230	2.01	1231	2.01	1232	2.01	1233	2.01	1234	2.01
1235	2.01	1236	2.01	1237	2.01	1238	2.01	1239	2.01
1240	2.01	1241	1.96	1242	1.90	1243	1.84	1244	1.79
1245	1.73	1246	1.68	1247	1.68	1248	1.68	1249	1.68
1250	1.68	1251	1.68	1252	1.68	1253	1.68	1254	1.68
1255	1.68	1256	1.68	1257	1.68	1258	1.68	1259	1.68
1260	1.68	1261	1.68	1262	1.68	1263	1.68	1264	1.68
1265	1.68	1266	1.68	1267	1.68	1268	1.68	1269	1.68
1270	1.68	1271	1.62	1272	1.56	1273	1.51	1274	1.45
1275	1.40	1276	1.34	1277	1.34	1278	1.34	1279	1.34
1280	1.34	1281	1.34	1282	1.34	1283	1.34	1284	1.34
1285	1.34	1286	1.34	1287	1.34	1288	1.34	1289	1.34
1290	1.34	1291	1.34	1292	1.34	1293	1.34	1294	1.34
1295	1.34	1296	1.34	1297	1.34	1298	1.34	1299	1.34
1300	1.34	1310	1.01	1320	1.01	1330	0.67	1340	0.67
1350	1.01	1360	0.67	1370	0.67	1380	0.67	1390	0.67
1400	0.34	1420	0.17	1440	0.13	1460	0.02	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 11F

TOTAL AREA TO HYDROGRAPH: 8 acres
HYDROGRAPH PEAK: 23 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 1.85 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.38	200	0.38	300	0.40	400	0.44
500	0.52	600	0.57	700	0.66	800	0.84	900	1.01
1000	1.24	1050	1.49	1100	1.86	1110	2.37	1120	3.50
1130	2.49	1131	3.03	1132	3.69	1133	4.26	1134	4.85
1135	5.41	1136	5.98	1137	5.98	1138	5.90	1139	5.98
1140	5.98	1141	6.37	1142	6.75	1143	7.14	1144	7.68
1145	8.64	1146	9.50	1147	10.06	1148	10.63	1149	9.57
1150	8.42	1151	10.42	1152	19.35	1153	21.26	1154	21.26
1155	22.32	1156	22.81	1157	19.71	1158	9.92	1159	6.37
1160	5.01	1161	4.07	1162	3.97	1163	3.50	1164	2.93
1165	3.03	1166	2.55	1167	2.43	1168	2.27	1169	1.95
1170	2.17	1171	2.07	1172	2.01	1173	1.98	1174	1.95
1175	2.17	1176	1.79	1177	1.76	1178	1.79	1179	1.72
1180	1.69	1181	1.63	1182	1.53	1183	1.47	1184	1.37
1185	1.34	1186	1.28	1187	1.24	1188	1.28	1189	1.31
1190	1.31	1191	1.37	1192	1.40	1193	1.44	1194	1.47
1195	1.47	1196	1.47	1197	1.47	1198	1.47	1199	1.47
1200	1.47	1201	1.50	1202	1.56	1203	1.60	1204	1.63
1205	1.69	1206	1.72	1207	1.72	1208	1.72	1209	1.72
1210	1.72	1211	1.63	1212	1.53	1213	1.44	1214	1.34
1215	1.24	1216	1.15	1217	1.15	1218	1.15	1219	1.15
1220	1.15	1221	1.15	1222	1.15	1223	1.15	1224	1.15
1225	1.15	1226	1.15	1227	1.15	1228	1.15	1229	1.15
1230	1.15	1231	1.15	1232	1.15	1233	1.15	1234	1.15
1235	1.15	1236	1.15	1237	1.15	1238	1.15	1239	1.15
1240	1.15	1241	1.12	1242	1.09	1243	1.05	1244	1.02
1245	0.99	1246	0.96	1247	0.96	1248	0.96	1249	0.96
1250	0.96	1251	0.96	1252	0.96	1253	0.96	1254	0.96
1255	0.96	1256	0.96	1257	0.96	1258	0.96	1259	0.96
1260	0.96	1261	0.96	1262	0.96	1263	0.96	1264	0.96
1265	0.96	1266	0.96	1267	0.96	1268	0.96	1269	0.96
1270	0.96	1271	0.93	1272	0.89	1273	0.86	1274	0.83
1275	0.80	1276	0.77	1277	0.77	1278	0.77	1279	0.77
1280	0.77	1281	0.77	1282	0.77	1283	0.77	1284	0.77
1285	0.77	1286	0.77	1287	0.77	1288	0.77	1289	0.77
1290	0.77	1291	0.77	1292	0.77	1293	0.77	1294	0.77
1295	0.77	1296	0.77	1297	0.77	1298	0.77	1299	0.77
1300	0.77	1310	0.57	1320	0.57	1330	0.38	1340	0.38
1350	0.57	1360	0.38	1370	0.38	1380	0.38	1390	0.38
1400	0.19	1420	0.10	1440	0.08	1460	0.01	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 12F

TOTAL AREA TO HYDROGRAPH: 8 acres
HYDROGRAPH PEAK: 23 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 1.85 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.38	200	0.38	300	0.40	400	0.44
500	0.52	600	0.57	700	0.66	800	0.84	900	1.01
1000	1.24	1050	1.49	1100	1.86	1110	2.37	1120	3.50
1130	2.49	1131	3.03	1132	3.69	1133	4.26	1134	4.85
1135	5.41	1136	5.98	1137	5.98	1138	5.90	1139	5.98
1140	5.98	1141	6.37	1142	6.75	1143	7.14	1144	7.68
1145	8.64	1146	9.50	1147	10.06	1148	10.63	1149	9.57
1150	8.42	1151	10.42	1152	19.35	1153	21.26	1154	21.26
1155	22.32	1156	22.81	1157	19.71	1158	9.92	1159	6.37
1160	5.01	1161	4.07	1162	3.97	1163	3.50	1164	2.93
1165	3.03	1166	2.55	1167	2.43	1168	2.27	1169	1.95
1170	2.17	1171	2.07	1172	2.01	1173	1.98	1174	1.95
1175	2.17	1176	1.79	1177	1.76	1178	1.79	1179	1.72
1180	1.69	1181	1.63	1182	1.53	1183	1.47	1184	1.37
1185	1.34	1186	1.28	1187	1.24	1188	1.28	1189	1.31
1190	1.31	1191	1.37	1192	1.40	1193	1.44	1194	1.47
1195	1.47	1196	1.47	1197	1.47	1198	1.47	1199	1.47
1200	1.47	1201	1.50	1202	1.56	1203	1.60	1204	1.63
1205	1.69	1206	1.72	1207	1.72	1208	1.72	1209	1.72
1210	1.72	1211	1.63	1212	1.53	1213	1.44	1214	1.34
1215	1.24	1216	1.15	1217	1.15	1218	1.15	1219	1.15
1220	1.15	1221	1.15	1222	1.15	1223	1.15	1224	1.15
1225	1.15	1226	1.15	1227	1.15	1228	1.15	1229	1.15
1230	1.15	1231	1.15	1232	1.15	1233	1.15	1234	1.15
1235	1.15	1236	1.15	1237	1.15	1238	1.15	1239	1.15
1240	1.15	1241	1.12	1242	1.09	1243	1.05	1244	1.02
1245	0.99	1246	0.96	1247	0.96	1248	0.96	1249	0.96
1250	0.96	1251	0.96	1252	0.96	1253	0.96	1254	0.96
1255	0.96	1256	0.96	1257	0.96	1258	0.96	1259	0.96
1260	0.96	1261	0.96	1262	0.96	1263	0.96	1264	0.96
1265	0.96	1266	0.96	1267	0.96	1268	0.96	1269	0.96
1270	0.96	1271	0.93	1272	0.89	1273	0.86	1274	0.83
1275	0.80	1276	0.77	1277	0.77	1278	0.77	1279	0.77
1280	0.77	1281	0.77	1282	0.77	1283	0.77	1284	0.77
1285	0.77	1286	0.77	1287	0.77	1288	0.77	1289	0.77
1290	0.77	1291	0.77	1292	0.77	1293	0.77	1294	0.77
1295	0.77	1296	0.77	1297	0.77	1298	0.77	1299	0.77
1300	0.77	1310	0.57	1320	0.57	1330	0.38	1340	0.38
1350	0.57	1360	0.38	1370	0.38	1380	0.38	1390	0.38
1400	0.19	1420	0.10	1440	0.08	1460	0.01	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 13DF

TOTAL AREA TO HYDROGRAPH: 20 acres
HYDROGRAPH PEAK: 57 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 4.63 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.96	200	0.96	300	1.01	400	1.10
500	1.29	600	1.44	700	1.64	800	2.10	900	2.54
1000	3.11	1050	3.73	1100	4.65	1110	5.94	1120	8.75
1130	6.22	1131	7.57	1132	9.22	1133	10.64	1134	12.12
1135	13.53	1136	14.94	1137	14.94	1138	14.74	1139	14.94
1140	14.94	1141	15.92	1142	16.89	1143	17.85	1144	19.21
1145	21.59	1146	23.74	1147	25.16	1148	26.57	1149	23.92
1150	21.05	1151	26.04	1152	48.38	1153	53.15	1154	53.15
1155	55.80	1156	57.03	1157	49.27	1158	24.80	1159	15.92
1160	12.52	1161	10.17	1162	9.93	1163	8.75	1164	7.33
1165	7.57	1166	6.38	1167	6.06	1168	5.67	1169	4.87
1170	5.43	1171	5.19	1172	5.03	1173	4.95	1174	4.87
1175	5.43	1176	4.47	1177	4.39	1178	4.47	1179	4.31
1180	4.23	1181	4.07	1182	3.83	1183	3.67	1184	3.43
1185	3.35	1186	3.19	1187	3.11	1188	3.19	1189	3.27
1190	3.27	1191	3.43	1192	3.51	1193	3.59	1194	3.67
1195	3.67	1196	3.67	1197	3.67	1198	3.67	1199	3.67
1200	3.67	1201	3.75	1202	3.91	1203	3.99	1204	4.07
1205	4.23	1206	4.31	1207	4.31	1208	4.31	1209	4.31
1210	4.31	1211	4.07	1212	3.83	1213	3.59	1214	3.35
1215	3.11	1216	2.87	1217	2.87	1218	2.87	1219	2.87
1220	2.87	1221	2.87	1222	2.87	1223	2.87	1224	2.87
1225	2.87	1226	2.87	1227	2.87	1228	2.87	1229	2.87
1230	2.87	1231	2.87	1232	2.87	1233	2.87	1234	2.87
1235	2.87	1236	2.87	1237	2.87	1238	2.87	1239	2.87
1240	2.87	1241	2.79	1242	2.71	1243	2.63	1244	2.55
1245	2.47	1246	2.39	1247	2.39	1248	2.39	1249	2.39
1250	2.39	1251	2.39	1252	2.39	1253	2.39	1254	2.39
1255	2.39	1256	2.39	1257	2.39	1258	2.39	1259	2.39
1260	2.39	1261	2.39	1262	2.39	1263	2.39	1264	2.39
1265	2.39	1266	2.39	1267	2.39	1268	2.39	1269	2.39
1270	2.39	1271	2.31	1272	2.23	1273	2.15	1274	2.07
1275	2.00	1276	1.92	1277	1.92	1278	1.92	1279	1.92
1280	1.92	1281	1.92	1282	1.92	1283	1.92	1284	1.92
1285	1.92	1286	1.92	1287	1.92	1288	1.92	1289	1.92
1290	1.92	1291	1.92	1292	1.92	1293	1.92	1294	1.92
1295	1.92	1296	1.92	1297	1.92	1298	1.92	1299	1.92
1300	1.92	1310	1.44	1320	1.44	1330	0.96	1340	0.96
1350	1.44	1360	0.96	1370	0.96	1380	0.96	1390	0.96
1400	0.48	1420	0.24	1440	0.19	1460	0.02	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 14A

TOTAL AREA TO HYDROGRAPH: 25 acres
HYDROGRAPH PEAK: 68 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 4.07 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.77	200	0.77	300	0.80	400	0.88
500	1.03	600	1.15	700	1.31	800	1.68	900	2.03
1000	2.49	1050	2.99	1100	3.72	1110	4.75	1120	8.21
1130	4.98	1131	6.66	1132	8.83	1133	10.70	1134	12.60
1135	14.39	1136	16.18	1137	16.18	1138	15.92	1139	16.18
1140	16.18	1141	17.41	1142	18.62	1143	19.84	1144	21.54
1145	24.49	1146	27.13	1147	28.87	1148	30.60	1149	27.35
1150	23.83	1151	29.95	1152	57.30	1153	63.14	1154	63.14
1155	66.38	1156	67.89	1157	58.38	1158	28.44	1159	17.41
1160	13.11	1161	10.08	1162	9.77	1163	8.21	1164	6.35
1165	6.66	1166	5.11	1167	4.85	1168	4.53	1169	3.89
1170	4.34	1171	4.15	1172	4.02	1173	3.96	1174	3.89
1175	4.34	1176	3.58	1177	3.51	1178	3.58	1179	3.45
1180	3.38	1181	3.26	1182	3.06	1183	2.94	1184	2.75
1185	2.68	1186	2.55	1187	2.49	1188	2.55	1189	2.62
1190	2.62	1191	2.75	1192	2.81	1193	2.87	1194	2.94
1195	2.94	1196	2.94	1197	2.94	1198	2.94	1199	2.94
1200	2.94	1201	3.00	1202	3.13	1203	3.19	1204	3.26
1205	3.38	1206	3.45	1207	3.45	1208	3.45	1209	3.45
1210	3.45	1211	3.26	1212	3.06	1213	2.87	1214	2.68
1215	2.49	1216	2.30	1217	2.30	1218	2.30	1219	2.30
1220	2.30	1221	2.30	1222	2.30	1223	2.30	1224	2.30
1225	2.30	1226	2.30	1227	2.30	1228	2.30	1229	2.30
1230	2.30	1231	2.30	1232	2.30	1233	2.30	1234	2.30
1235	2.30	1236	2.30	1237	2.30	1238	2.30	1239	2.30
1240	2.30	1241	2.23	1242	2.17	1243	2.11	1244	2.04
1245	1.98	1246	1.92	1247	1.92	1248	1.92	1249	1.92
1250	1.92	1251	1.92	1252	1.92	1253	1.92	1254	1.92
1255	1.92	1256	1.92	1257	1.92	1258	1.92	1259	1.92
1260	1.92	1261	1.92	1262	1.92	1263	1.92	1264	1.92
1265	1.92	1266	1.92	1267	1.92	1268	1.92	1269	1.92
1270	1.92	1271	1.85	1272	1.79	1273	1.72	1274	1.66
1275	1.60	1276	1.53	1277	1.53	1278	1.53	1279	1.53
1280	1.53	1281	1.53	1282	1.53	1283	1.53	1284	1.53
1285	1.53	1286	1.53	1287	1.53	1288	1.53	1289	1.53
1290	1.53	1291	1.53	1292	1.53	1293	1.53	1294	1.53
1295	1.53	1296	1.53	1297	1.53	1298	1.53	1299	1.53
1300	1.53	1310	1.15	1320	1.15	1330	0.77	1340	0.77
1350	1.15	1360	0.77	1370	0.77	1380	0.77	1390	0.77
1400	0.38	1420	0.19	1440	0.15	1460	0.02	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 15A

TOTAL AREA TO HYDROGRAPH: 25 acres
HYDROGRAPH PEAK: 68 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 4.07 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.77	200	0.77	300	0.80	400	0.88
500	1.03	600	1.15	700	1.31	800	1.68	900	2.03
1000	2.49	1050	2.99	1100	3.72	1110	4.75	1120	8.21
1130	4.98	1131	6.66	1132	8.83	1133	10.70	1134	12.60
1135	14.39	1136	16.18	1137	16.18	1138	15.92	1139	16.18
1140	16.18	1141	17.41	1142	18.62	1143	19.84	1144	21.54
1145	24.49	1146	27.13	1147	28.87	1148	30.60	1149	27.35
1150	23.83	1151	29.95	1152	57.30	1153	63.14	1154	63.14
1155	66.38	1156	67.89	1157	58.38	1158	28.44	1159	17.41
1160	13.11	1161	10.08	1162	9.77	1163	8.21	1164	6.35
1165	6.66	1166	5.11	1167	4.85	1168	4.53	1169	3.89
1170	4.34	1171	4.15	1172	4.02	1173	3.96	1174	3.89
1175	4.34	1176	3.58	1177	3.51	1178	3.58	1179	3.45
1180	3.38	1181	3.26	1182	3.06	1183	2.94	1184	2.75
1185	2.68	1186	2.55	1187	2.49	1188	2.55	1189	2.62
1190	2.62	1191	2.75	1192	2.81	1193	2.87	1194	2.94
1195	2.94	1196	2.94	1197	2.94	1198	2.94	1199	2.94
1200	2.94	1201	3.00	1202	3.13	1203	3.19	1204	3.26
1205	3.38	1206	3.45	1207	3.45	1208	3.45	1209	3.45
1210	3.45	1211	3.26	1212	3.06	1213	2.87	1214	2.68
1215	2.49	1216	2.30	1217	2.30	1218	2.30	1219	2.30
1220	2.30	1221	2.30	1222	2.30	1223	2.30	1224	2.30
1225	2.30	1226	2.30	1227	2.30	1228	2.30	1229	2.30
1230	2.30	1231	2.30	1232	2.30	1233	2.30	1234	2.30
1235	2.30	1236	2.30	1237	2.30	1238	2.30	1239	2.30
1240	2.30	1241	2.23	1242	2.17	1243	2.11	1244	2.04
1245	1.98	1246	1.92	1247	1.92	1248	1.92	1249	1.92
1250	1.92	1251	1.92	1252	1.92	1253	1.92	1254	1.92
1255	1.92	1256	1.92	1257	1.92	1258	1.92	1259	1.92
1260	1.92	1261	1.92	1262	1.92	1263	1.92	1264	1.92
1265	1.92	1266	1.92	1267	1.92	1268	1.92	1269	1.92
1270	1.92	1271	1.85	1272	1.79	1273	1.72	1274	1.66
1275	1.60	1276	1.53	1277	1.53	1278	1.53	1279	1.53
1280	1.53	1281	1.53	1282	1.53	1283	1.53	1284	1.53
1285	1.53	1286	1.53	1287	1.53	1288	1.53	1289	1.53
1290	1.53	1291	1.53	1292	1.53	1293	1.53	1294	1.53
1295	1.53	1296	1.53	1297	1.53	1298	1.53	1299	1.53
1300	1.53	1310	1.15	1320	1.15	1330	0.77	1340	0.77
1350	1.15	1360	0.77	1370	0.77	1380	0.77	1390	0.77
1400	0.38	1420	0.19	1440	0.15	1460	0.02	1500	0.01

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 16BF

TOTAL AREA TO HYDROGRAPH: 8 acres
HYDROGRAPH PEAK: 23 cfs
TIME OF PEAK: 1156 minutes
HYDROGRAPH VOLUME: 1.85 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.38	200	0.38	300	0.40	400	0.44
500	0.52	600	0.57	700	0.66	800	0.84	900	1.01
1000	1.24	1050	1.49	1100	1.86	1110	2.37	1120	3.50
1130	2.49	1131	3.03	1132	3.69	1133	4.26	1134	4.85
1135	5.41	1136	5.98	1137	5.98	1138	5.90	1139	5.98
1140	5.98	1141	6.37	1142	6.75	1143	7.14	1144	7.68
1145	8.64	1146	9.50	1147	10.06	1148	10.63	1149	9.57
1150	8.42	1151	10.42	1152	19.35	1153	21.26	1154	21.26
1155	22.32	1156	22.81	1157	19.71	1158	9.92	1159	6.37
1160	5.01	1161	4.07	1162	3.97	1163	3.50	1164	2.93
1165	3.03	1166	2.55	1167	2.43	1168	2.27	1169	1.95
1170	2.17	1171	2.07	1172	2.01	1173	1.98	1174	1.95
1175	2.17	1176	1.79	1177	1.76	1178	1.79	1179	1.72
1180	1.69	1181	1.63	1182	1.53	1183	1.47	1184	1.37
1185	1.34	1186	1.28	1187	1.24	1188	1.28	1189	1.31
1190	1.31	1191	1.37	1192	1.40	1193	1.44	1194	1.47
1195	1.47	1196	1.47	1197	1.47	1198	1.47	1199	1.47
1200	1.47	1201	1.50	1202	1.56	1203	1.60	1204	1.63
1205	1.69	1206	1.72	1207	1.72	1208	1.72	1209	1.72
1210	1.72	1211	1.63	1212	1.53	1213	1.44	1214	1.34
1215	1.24	1216	1.15	1217	1.15	1218	1.15	1219	1.15
1220	1.15	1221	1.15	1222	1.15	1223	1.15	1224	1.15
1225	1.15	1226	1.15	1227	1.15	1228	1.15	1229	1.15
1230	1.15	1231	1.15	1232	1.15	1233	1.15	1234	1.15
1235	1.15	1236	1.15	1237	1.15	1238	1.15	1239	1.15
1240	1.15	1241	1.12	1242	1.09	1243	1.05	1244	1.02
1245	0.99	1246	0.96	1247	0.96	1248	0.96	1249	0.96
1250	0.96	1251	0.96	1252	0.96	1253	0.96	1254	0.96
1255	0.96	1256	0.96	1257	0.96	1258	0.96	1259	0.96
1260	0.96	1261	0.96	1262	0.96	1263	0.96	1264	0.96
1265	0.96	1266	0.96	1267	0.96	1268	0.96	1269	0.96
1270	0.96	1271	0.93	1272	0.89	1273	0.86	1274	0.83
1275	0.80	1276	0.77	1277	0.77	1278	0.77	1279	0.77
1280	0.77	1281	0.77	1282	0.77	1283	0.77	1284	0.77
1285	0.77	1286	0.77	1287	0.77	1288	0.77	1289	0.77
1290	0.77	1291	0.77	1292	0.77	1293	0.77	1294	0.77
1295	0.77	1296	0.77	1297	0.77	1298	0.77	1299	0.77
1300	0.77	1310	0.57	1320	0.57	1330	0.38	1340	0.38
1350	0.57	1360	0.38	1370	0.38	1380	0.38	1390	0.38
1400	0.19	1420	0.10	1440	0.08	1460	0.01	1500	0.01

RESERVOIR ROUTING AT 17A

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*******************************************************************************
*      INCOMING HYDROGRAPH  PEAK (cfs):     67.89         VOLUME (acre-ft):      4.07      *
*      NO HYDROGRAPH ADJUSTMENT                                                 *
*      NO HYDROGRAPH FATTENING                                                  *
*      RESERVOIR INFLOW:    PEAK (cfs):     67.89 @ 1156  VOLUME (acre-ft):      4.07      *
*      MAXIMUM ELEVATION:   STAGE (ft):      5.50 @ 1152  VOLUME (acre-ft):      2.36      *
*      EMERGENCY SPILLWAY:   ELEV (ft):      4.75         VOLUME (acre-ft):      2.14      *
*          DIFFERENCE:   IN STAGE (ft):     +0.75      IN VOLUME (acre-ft):     -0.22      *
*          SPILLED FROM 1147 TO 1500 FOR  354 MINUTES                           *
*      TOP OF DAM:           ELEV (ft):      5.50         VOLUME (acre-ft):      2.36      *
*          DIFFERENCE    IN STAGE (ft):      0.00      IN VOLUME (acre-ft):      0.00      *
*          NO OVERTOP EXPECTED.   PERCNT OF VOLUME REMAINING TO TOP OF DAM:      0.0%      *
*      RESERVOIR OUTFLOW:   PEAK (cfs):     10.83 @ 1152  VOLUME (acre-ft):      0.39      *
*******************************************************************************
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TIME (min)	PRE-ADJ (cfs)	INFLOW (cfs)	OUTFLOW (cfs)	ELEVATION (feet)
0	0.00	0.00	0.00	0.00

Hydrograph Printouts

TIME (min)	PRE-ADJ (cfs)	INFLOW (cfs)	OUTFLOW (cfs)	ELEVATION (feet)
100	0.77	0.77	0.20	0.02
200	0.77	0.77	0.21	0.32
300	0.80	0.80	0.21	0.62
400	0.88	0.88	0.22	0.94
500	1.03	1.03	0.22	1.16
600	1.15	1.15	0.23	1.38
700	1.31	1.31	0.24	1.64
800	1.68	1.68	0.25	1.96
900	2.03	2.03	0.26	2.37
1000	2.49	2.49	0.27	2.87
1050	2.99	2.99	0.28	3.19
1100	3.72	3.72	0.29	3.58
1110	4.75	4.75	0.29	3.68
1120	8.21	8.21	0.30	3.83
1130	4.98	4.98	0.30	4.02
1131	6.66	6.66	0.30	4.04
1132	8.83	8.83	0.30	4.06
1133	10.70	10.70	0.30	4.09
1134	12.60	12.60	0.30	4.12
1135	14.39	14.39	0.30	4.16
1136	16.18	16.18	0.31	4.20
1137	16.18	16.18	0.31	4.25
1138	15.92	15.92	0.31	4.29
1139	16.18	16.18	0.31	4.34
1140	16.18	16.18	0.31	4.39

1141	17.41	17.41	0.31	4.44
1142	18.62	18.62	0.31	4.49
1143	19.84	19.84	0.31	4.54
1144	21.54	21.54	0.32	4.60
1145	24.49	24.49	0.32	4.67
1146	27.13	27.13	0.32	4.74
1147	28.87	28.87	0.98	4.86
1148	30.60	30.60	1.72	4.98
1149	27.35	27.35	2.43	5.10
1150	23.83	23.83	3.58	5.20
1151	29.95	29.95	6.37	5.31
1152	57.30	57.30	10.83	5.50
1153	63.14	63.14	0.00	5.50
1154	63.14	63.14	0.00	5.50
1155	66.38	66.38	0.00	5.50
1156	67.89	67.89	0.00	5.50
1157	58.38	58.38	0.00	5.50
1158	28.44	28.44	0.00	5.50
1159	17.41	17.41	0.00	5.50
1160	13.11	13.11	0.00	5.50
1161	10.08	10.08	0.00	5.50
1162	9.77	9.77	0.00	5.50
1163	8.21	8.21	0.00	5.50
1164	6.35	6.35	0.00	5.50
1165	6.66	6.66	0.00	5.50
1166	5.11	5.11	0.00	5.50
1167	4.85	4.85	0.00	5.50
1168	4.53	4.53	0.00	5.50
1169	3.89	3.89	0.00	5.50
1170	4.34	4.34	0.00	5.50
1171	4.15	4.15	0.00	5.50
1172	4.02	4.02	0.00	5.50
1173	3.96	3.96	0.00	5.50
1174	3.89	3.89	0.00	5.50
1175	4.34	4.34	0.00	5.50
1176	3.58	3.58	0.00	5.50
1177	3.51	3.51	0.00	5.50
1178	3.58	3.58	0.00	5.50
1179	3.45	3.45	0.00	5.50
1180	3.38	3.38	0.00	5.50
1181	3.26	3.26	0.00	5.50
1182	3.06	3.06	0.00	5.50
1183	2.94	2.94	0.00	5.50
1184	2.75	2.75	0.00	5.50
1185	2.68	2.68	0.00	5.50
1186	2.55	2.55	0.00	5.50

TIME (min)	PRE-ADJ (cfs)	INFLOW (cfs)	OUTFLOW (cfs)	ELEVATION (feet)
1187	2.49	2.49	0.00	5.50
1188	2.55	2.55	0.00	5.50
1189	2.62	2.62	0.00	5.50

1190	2.62	2.62	0.00	5.50
1191	2.75	2.75	0.00	5.50
1192	2.81	2.81	0.00	5.50
1193	2.87	2.87	0.00	5.50
1194	2.94	2.94	0.00	5.50
1195	2.94	2.94	0.00	5.50
1196	2.94	2.94	0.00	5.50
1197	2.94	2.94	0.00	5.50
1198	2.94	2.94	0.00	5.50
1199	2.94	2.94	0.00	5.50
1200	2.94	2.94	0.00	5.50
1201	3.00	3.00	0.00	5.50
1202	3.13	3.13	0.00	5.50
1203	3.19	3.19	0.00	5.50
1204	3.26	3.26	0.00	5.50
1205	3.38	3.38	0.00	5.50
1206	3.45	3.45	0.00	5.50
1207	3.45	3.45	0.00	5.50
1208	3.45	3.45	0.00	5.50
1209	3.45	3.45	0.00	5.50
1210	3.45	3.45	0.00	5.50
1211	3.26	3.26	0.00	5.50
1212	3.06	3.06	0.00	5.50
1213	2.87	2.87	0.00	5.50
1214	2.68	2.68	0.00	5.50
1215	2.49	2.49	0.00	5.50
1216	2.30	2.30	0.00	5.50
1217	2.30	2.30	0.00	5.50
1218	2.30	2.30	0.00	5.50
1219	2.30	2.30	0.00	5.50
1220	2.30	2.30	0.00	5.50
1221	2.30	2.30	0.00	5.50
1222	2.30	2.30	0.00	5.50
1223	2.30	2.30	0.00	5.50
1224	2.30	2.30	0.00	5.50
1225	2.30	2.30	0.00	5.50
1226	2.30	2.30	0.00	5.50
1227	2.30	2.30	0.00	5.50
1228	2.30	2.30	0.00	5.50
1229	2.30	2.30	0.00	5.50
1230	2.30	2.30	0.00	5.50
1231	2.30	2.30	0.00	5.50
1232	2.30	2.30	0.00	5.50
1233	2.30	2.30	0.00	5.50
1234	2.30	2.30	0.00	5.50
1235	2.30	2.30	0.00	5.50
1236	2.30	2.30	0.00	5.50
1237	2.30	2.30	0.00	5.50
1238	2.30	2.30	0.00	5.50
1239	2.30	2.30	0.00	5.50
1240	2.30	2.30	0.00	5.50
1241	2.23	2.23	0.00	5.50
1242	2.17	2.17	0.00	5.50
1243	2.11	2.11	0.00	5.50
1244	2.04	2.04	0.00	5.50
1245	1.98	1.98	0.00	5.50
1246	1.92	1.92	0.00	5.50
1247	1.92	1.92	0.00	5.50
1248	1.92	1.92	0.00	5.50
1249	1.92	1.92	0.00	5.50

1250	1.92	1.92	0.00	5.50
1251	1.92	1.92	0.00	5.50
1252	1.92	1.92	0.00	5.50
1253	1.92	1.92	0.00	5.50
1254	1.92	1.92	0.00	5.50
1255	1.92	1.92	0.00	5.50
1256	1.92	1.92	0.00	5.50
1257	1.92	1.92	0.00	5.50

Hydrograph Printouts

TIME (min)	PRE-ADJ (cfs)	INFLOW (cfs)	OUTFLOW (cfs)	ELEVATION (feet)
1258	1.92	1.92	0.00	5.50
1259	1.92	1.92	0.00	5.50
1260	1.92	1.92	0.00	5.50
1261	1.92	1.92	0.00	5.50
1262	1.92	1.92	0.00	5.50
1263	1.92	1.92	0.00	5.50
1264	1.92	1.92	0.00	5.50
1265	1.92	1.92	0.00	5.50
1266	1.92	1.92	0.00	5.50
1267	1.92	1.92	0.00	5.50
1268	1.92	1.92	0.00	5.50
1269	1.92	1.92	0.00	5.50
1270	1.92	1.92	0.00	5.50
1271	1.85	1.85	0.00	5.50
1272	1.79	1.79	0.00	5.50
1273	1.72	1.72	0.00	5.50
1274	1.66	1.66	0.00	5.50
1275	1.60	1.60	0.00	5.50
1276	1.53	1.53	0.00	5.50
1277	1.53	1.53	0.00	5.50
1278	1.53	1.53	0.00	5.50
1279	1.53	1.53	0.00	5.50
1280	1.53	1.53	0.00	5.50
1281	1.53	1.53	0.00	5.50
1282	1.53	1.53	0.00	5.50
1283	1.53	1.53	0.00	5.50
1284	1.53	1.53	0.00	5.50
1285	1.53	1.53	0.00	5.50
1286	1.53	1.53	0.00	5.50
1287	1.53	1.53	0.00	5.50
1288	1.53	1.53	0.00	5.50
1289	1.53	1.53	0.00	5.50
1290	1.53	1.53	0.00	5.50
1291	1.53	1.53	0.00	5.50
1292	1.53	1.53	0.00	5.50
1293	1.53	1.53	0.00	5.50
1294	1.53	1.53	0.00	5.50
1295	1.53	1.53	0.00	5.50
1296	1.53	1.53	0.00	5.50
1297	1.53	1.53	0.00	5.50
1298	1.53	1.53	0.00	5.50

1299	1.53	1.53	0.00	5.50
1300	1.53	1.53	0.00	5.50
1310	1.15	1.15	0.00	5.50
1320	1.15	1.15	0.00	5.50
1330	0.77	0.77	0.00	5.50
1340	0.77	0.77	0.00	5.50
1350	1.15	1.15	0.00	5.50
1360	0.77	0.77	0.00	5.50
1370	0.77	0.77	0.00	5.50
1380	0.77	0.77	0.00	5.50
1390	0.77	0.77	0.00	5.50
1400	0.38	0.38	0.00	5.50
1420	0.19	0.19	0.00	5.50
1440	0.15	0.15	0.00	5.50
1460	0.02	0.02	0.00	5.50
1500	0.01	0.01	0.00	5.50

Stage - Storage - Discharge Curve for Reservoir at 17A

STAGE (ft)	STORAGE (ac-ft)	DISCHARGE (cfs)
0.00	0.000	0.20
1.00	0.262	0.22
4.00	1.790	0.30
4.75	2.143	0.32
5.17	2.277	2.88
5.50	2.363	10.83

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 18A

TOTAL AREA TO HYDROGRAPH: 25 acres
HYDROGRAPH PEAK: 11 cfs
TIME OF PEAK: 1152 minutes
HYDROGRAPH VOLUME: 0.39 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	0.20	200	0.21	300	0.21	400	0.22
500	0.22	600	0.23	700	0.24	800	0.25	900	0.26
1000	0.27	1050	0.28	1100	0.29	1110	0.29	1120	0.30
1130	0.30	1131	0.30	1132	0.30	1133	0.30	1134	0.30
1135	0.30	1136	0.31	1137	0.31	1138	0.31	1139	0.31
1140	0.31	1141	0.31	1142	0.31	1143	0.31	1144	0.32
1145	0.32	1146	0.32	1147	0.98	1148	1.72	1149	2.43
1150	3.58	1151	6.37	1152	10.83	1153	0.00	1154	0.00
1155	0.00	1156	0.00	1157	0.00	1158	0.00	1159	0.00
1160	0.00	1161	0.00	1162	0.00	1163	0.00	1164	0.00
1165	0.00	1166	0.00	1167	0.00	1168	0.00	1169	0.00
1170	0.00	1171	0.00	1172	0.00	1173	0.00	1174	0.00
1175	0.00	1176	0.00	1177	0.00	1178	0.00	1179	0.00
1180	0.00	1181	0.00	1182	0.00	1183	0.00	1184	0.00

1185	0.00	1186	0.00	1187	0.00	1188	0.00	1189	0.00
1190	0.00	1191	0.00	1192	0.00	1193	0.00	1194	0.00
1195	0.00	1196	0.00	1197	0.00	1198	0.00	1199	0.00
1200	0.00	1201	0.00	1202	0.00	1203	0.00	1204	0.00
1205	0.00	1206	0.00	1207	0.00	1208	0.00	1209	0.00
1210	0.00	1211	0.00	1212	0.00	1213	0.00	1214	0.00
1215	0.00	1216	0.00	1217	0.00	1218	0.00	1219	0.00
1220	0.00	1221	0.00	1222	0.00	1223	0.00	1224	0.00
1225	0.00	1226	0.00	1227	0.00	1228	0.00	1229	0.00
1230	0.00	1231	0.00	1232	0.00	1233	0.00	1234	0.00
1235	0.00	1236	0.00	1237	0.00	1238	0.00	1239	0.00
1240	0.00	1241	0.00	1242	0.00	1243	0.00	1244	0.00
1245	0.00	1246	0.00	1247	0.00	1248	0.00	1249	0.00
1250	0.00	1251	0.00	1252	0.00	1253	0.00	1254	0.00
1255	0.00	1256	0.00	1257	0.00	1258	0.00	1259	0.00
1260	0.00	1261	0.00	1262	0.00	1263	0.00	1264	0.00
1265	0.00	1266	0.00	1267	0.00	1268	0.00	1269	0.00
1270	0.00	1271	0.00	1272	0.00	1273	0.00	1274	0.00
1275	0.00	1276	0.00	1277	0.00	1278	0.00	1279	0.00
1280	0.00	1281	0.00	1282	0.00	1283	0.00	1284	0.00
1285	0.00	1286	0.00	1287	0.00	1288	0.00	1289	0.00
1290	0.00	1291	0.00	1292	0.00	1293	0.00	1294	0.00
1295	0.00	1296	0.00	1297	0.00	1298	0.00	1299	0.00
1300	0.00	1310	0.00	1320	0.00	1330	0.00	1340	0.00
1350	0.00	1360	0.00	1370	0.00	1380	0.00	1390	0.00
1400	0.00	1420	0.00	1440	0.00	1460	0.00	1500	0.00

Model Lines

```
005     1  001A Header place holder
005     1  002A Header place holder
005     1  003B Header place holder
005     1  004B Header place holder
005     1  005C Header place holder
005     1  007D Header place holder
005     1  008D Header place holder
005     1  009E Header place holder
005     1  010E Header place holder
005     1  011F Header place holder
005     1  012F Header place holder
005     1  013DFHeader place holder
005     1  014A Header place holder
005     1  015A Header place holder
005     1  016BFHeader place holder
005     1  017A Header place holder
005     1  018A Header place holder
999
999
006     1  001A 050042001606A97                              G1
006     1  002A 010      099A97                          1
006     1  003B 050042000806A97                          1
006     1  004B 010      099A97                          1
006     1  005C 050042000706A97                          1
```

```
006     1  006C 010      099A97                                  1
006     1  007D 050042001206A97                                  1
006     1  008D 010      099A97                                  1
006     1  009E 050042001406A97                                  1
006     1  010E 010      099A97                                  1
006     1  011F 050042000806A97                                  1
006     1  012F 010      099A97                                  1
006     1  013DF010         A97                                  11
006     1  014A 050000000906A97                                  1
006     1  015A 010      099A97                                  1
006     1  016BF010         A97                                  11
006     1  017A 010      099A97                                  1
110
111    4.75    1.00000
112    0.00    1.00    4.00    4.75    5.17    5.50
113   0.000   0.262   1.790   2.143   2.277   2.363
114    0.20    0.22    0.30    0.32    2.88   10.83
110
006     1  018A 010      099A97                                  1  2
999
```

APPENDIX F

INFILTRATION TESTING REPORT

ALTA CALIFORNIA
GEOTECHNICAL INC.

170 North Maple Street, Suite 108
Corona, CA 92880
www.altageotechnical.com

WILDFLOWER DEVELOPMENT SERVICES
4215 Tierra Rejada Rd., Ste. 192
Moorpark, California 93021

April 29, 2021
Project No.: 1-0379

Attention: Ms. Nancy Johns

Subject: ***UPDATED GEOTECHNICAL REPORT***
The Beltramo Ranch Project
City of Moorpark, California

References: See Appendix A

Dear Ms. Johns:

Presented herein is Alta California Geotechnical, Inc.'s (Alta) geotechnical updated report for the Beltramo Ranch project, in the City of Moorpark, California. This report is based on a recent subsurface investigation conducted by Alta, review of the Conceptual Site Plan 3, and a review of the referenced reports.

Alta's review of the data indicates that the proposed development is feasible from a geotechnical standpoint, provided that the recommendations presented in this report are incorporated into the improvement plans and implemented during site development. Included in this report are:

- Discussion of the site geotechnical and geologic conditions.
- Recommendations for remedial and site grading, including unsuitable soil removals/reconditioning.
- Geotechnical site construction recommendations.
- Foundation design parameters.

If you have any questions or should you require any additional information, please contact the undersigned at (951) 509-7090. Alta appreciates the opportunity to provide geotechnical consulting services for your project.

Sincerely,
Alta California Geotechnical, Inc.

FERNANDO RUIZ
Civil Engineering Associate

JAMES B. COYNE
Engineering Geology Associate

Reviewed By:

SCOTT A. GRAY/RGE 2857
Reg. Exp.: 12-31-22
Registered Geotechnical Engineer
President

THOMAS J. MCCARTHY/CEG 2080
Reg. Exp.: 9-30-22
Certified Engineering Geologist
Vice President

Distribution: (1) Addressee

FR: JCB: SAG: TJM:-1-0379, April 29, 2021 (Updated Geotechnical Report, Beltramo Ranch, Moorpark)

3.3 Infiltration Testing

It is Alta's understanding that the project may utilize infiltration systems for storm water disposal. Details of the system are not known at this time.

Infiltration testing was undertaken using one (1) five-foot-deep boring excavated with a handheld power auger. The testing was performed in general accordance with the County of Ventura WQMP standards. The test well was presoaked at least 24 hours prior to testing. During testing, the water level readings were recorded every 30 minutes until the readings stabilized.

The data was then adjusted to provide an infiltration rate utilizing the Porchet Method. The resulting infiltration rates are presented in Table 3-1. The results do not include a factor of safety. Recommendations for infiltration BMP design are presented in Section 6.4.

Table 3-1-Summary of Infiltration Testing (No Factor of Safety)

Test Designation	P-1
Approximate Depth of Test	5 ft
Time Interval	30 minutes
Radius of Test Hole	4 inches
Tested Infiltration Rate	0.6 (in/hr)

4.0 GEOLOGIC CONDITIONS

4.1 Geologic and Geomorphic Setting

Regionally, the subject site is located on the Santa Ynez sub-block of the Traverse Ranges geomorphic province. The Santa Ynez sub-block is bounded on the south by the San Monica and Raymond fault zones, on the north by the Big Pine fault zone, and on the east by the San Gabriel fault zone. This province is characterized by predominantly east-west trending, left lateral and/or reverse faults.

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0379	PROJECT NAME	Beltramo Ranch Project		
DATE STARTED	3/31/21	GROUND ELEV.		BORING DESIG.	P-1
DATE FINISHED	3/31/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	Alta	DRIVE WT.		NOTE	
TYPE OF DRILL RIG	Power Auger	DROP			

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SP	**Alluvium** (Qa): SAND, very fine to fine grained, tannish brown, dry, loose to medium dense, few fine gravel <3/4", with roots. @2.0ft. slightly moist.				
5						TOTAL DEPTH 5.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0379 PLATE P-1

Parcel Addresses & APNs	Existing Zoning
Beltramo Ranch Road APN: 504-0-021-195	RE-1
11930-11934 West Los Angeles Ave. APN: 506-0-030-220 APN: 506-0-030-210 APN: 506-0-030-235 APN: 506-0-030-045	RE-20
11944 West Los Angeles Ave. APN: 506-0-030-255	RO

Proposed Zoning: RPD*

R-1* Developmental Standards:	
Density:	7 du/ac
Front Yard Setback:	20'
Interior Side Yard Setback:	5'
Street Side Yard Setback:	10'
Rear Yard Setback:	15'
Lot Coverage:	50%
Building Height:	35'
Resident Parking:	2.5 sp/unit

*Conceptual Site Plan is compliant with R-1 zoning standards, however project is seeking RPD zoning and High Density Residential (R-1)zoning throughout

Site Plan Summary

Site Area: ±7.4 ac. (±323,000sf)

Home Mix:
47 homes - 60'x53'-6" SFD Two-Story (2000-2200sf)

Site Density: ±6.4 du/ac

Proposed Building Height:
Two-Story Homes: ±26'

Parking Provided:
94 spaces - Garage Spaces
94 spaces - Driveway
76 spaces - Guest On-Street Parking
264 spaces - Total (±5.64 sp/unit)

Building Coverage: ±23%

Open Space Provided:
±88,000sf - Private Yards
±56,000sf - Open Area
±144,000sf - Total Open Space Provided (45% of site)

LEGEND

afu	Artificial Fill - Undocumented
Qa	Alluvium (Bracketed Where Buried)
T-1	Approximate Location of Backhoe Test Pit (Alta, This Report)
P-1	Approximate Location of Infiltration Test (Alta, This Report)
CPT-1	Approximate Location of Cone Penetration Test (Alta, This Report)
B1	Approximate Location of Hollow Stem Auger Boring (Krazan, 2019)
IT1	Approximate Location of Infiltration Test (Krazan, 2019)
— —	Approximate Geologic Contact

PLATE 1

ALTA CALIFORNIA GEOTECHNICAL, INC.
170 N. MAPLE STREET, STE 108, CORONA, CA 92880
TELEPHONE: (951) 509-7090
PROJECT NUMBER: 1-0379 DATE: 4-29-21

ktgy
Architecture + Planning
17911 Von Karman Ave,
Suite 200
Irvine, CA 92614
949.851.2133
ktgy.com

Warmington RESIDENTIAL
Warmington Residential
3090 Pullman Street
Costa Mesa, CA 92626

MOORPARK - BELTRAMO RANCH
MOORPARK, CA # 2018-0860

Representative Site Plan for Road on Outer Edges
CONCEPTUAL SITE PLAN 3
FEBRUARY 19, 2021

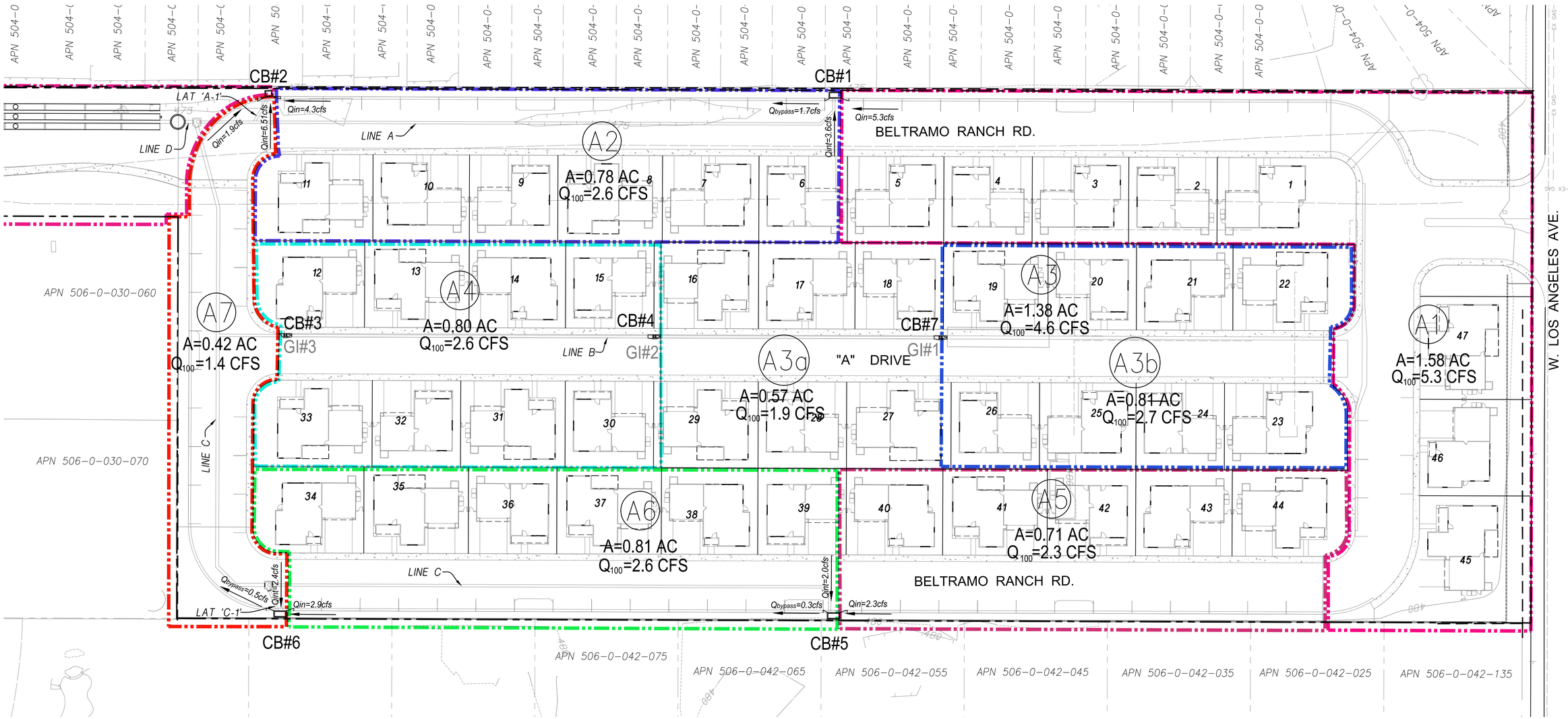
0 25 50 100

AI.0

APPENDIX G

STORM DRAIN PIPE SIZING

(100-YR STORM)



SCALE: 1" = 30'

0 30 60 90

VTTM NO. 6061
CATCH BASIN INTERCEPTION

18 inch PVC - S=0.5%

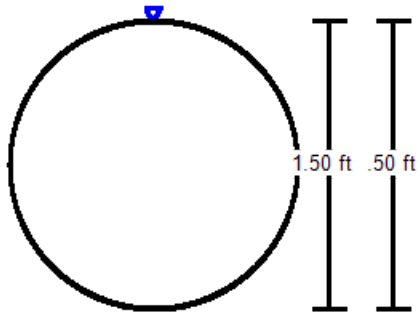
Project Description

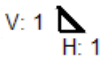
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.00500	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	9.66	ft³/s

Cross Section Image





18 inch-PVC

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.00500	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft
Discharge	9.66	ft³/s

Results

Discharge	9.66	ft³/s
Normal Depth	1.50	ft
Flow Area	1.77	ft²
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.38	ft
Top Width	0.00	ft
Critical Depth	1.20	ft
Percent Full	100.0	%
Critical Slope	0.00524	ft/ft
Velocity	5.46	ft/s
Velocity Head	0.46	ft
Specific Energy	1.96	ft
Froude Number	0.00	
Maximum Discharge	10.39	ft³/s
Discharge Full	9.66	ft³/s
Slope Full	0.00500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

18 inch-PVC

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.20	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00524	ft/ft

24 inch - PVC

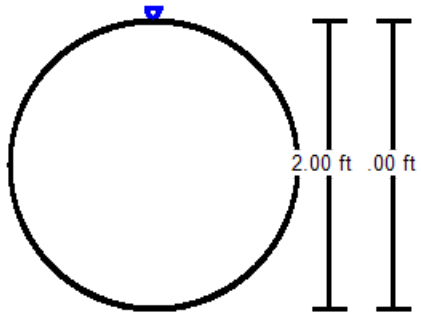
Project Description

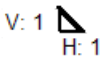
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.00500	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	20.79	ft³/s

Cross Section Image





24 inch PVC - Detailed Report

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.00500	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	20.79	ft³/s

Results

Discharge	20.79	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.63	ft
Percent Full	100.0	%
Critical Slope	0.00502	ft/ft
Velocity	6.62	ft/s
Velocity Head	0.68	ft
Specific Energy	2.68	ft
Froude Number	0.00	
Maximum Discharge	22.37	ft³/s
Discharge Full	20.79	ft³/s
Slope Full	0.00500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

24 inch PVC - Detailed Report

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.63	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00502	ft/ft

APPENDIX H

CATCH BASIN SIZING

(100-YR STORM)

PROJECT:	**Beltramo Ranch**	**UNITED CIVIL, INC.**
TRACT:	**Tract No. 6061**	**30141 AGOURA ROAD, SUITE 215**
SUBJECT:	**CATCH BASIN INTERCEPTION CALCS.**	**AGOURA HILLS, CA 91301-4311**
DATE:	**May, 2021**	

PROP. CATCH BASIN AT ST. STA. X+X.X on Beltramo Ranch

(Storm Drain's Catch Basin No. 1 on Line A)

GIVEN:-

a) Hydrology Subarea Designation: A1

b)Subarea Acreage = 1.58 Acres

c) Subarea's Design 100-Yr. Flow Rate, Q = 4.6 cfs

d) Tributary Prorated C.B. Drainage Area = 1.58 Acres

e) Corresponding Prorated Design 50-Yr. Q = 4.6 cfs

f) Street/Gutter Slope upstream of C.B. Opening, S = 0.005

g) Prop. Curb & Gutter Type: A2-6 (W=18")

h) Street Width = 32'

SOLUTION:-

a) By-Pass Condition for Proposed Catch Basin

b) Calculated Street Flow Depth, d = 0.36' (See Calc. on Next Page)

c) Prop. Catch Basin Type: City of San Buenaventura Std. Plan No. 303

d) Prop. Catch Basin Width & Local Depression Depth: W=7' with L.D.= 2"

e) Per L.A. County Road Dept. Catch Basin Capacity Chart;

Q (intercepted) = 3.6 cfs < Q(tributary) = 4.6 cfs

f) Q(by-pass to Downstream C.B.#2)=(4.6-3.6)=1.0 cfs

CB#1

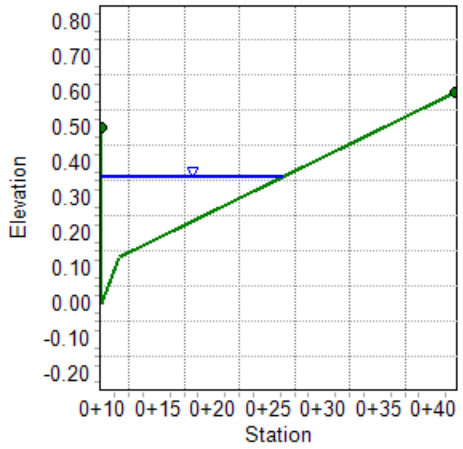
Project Description

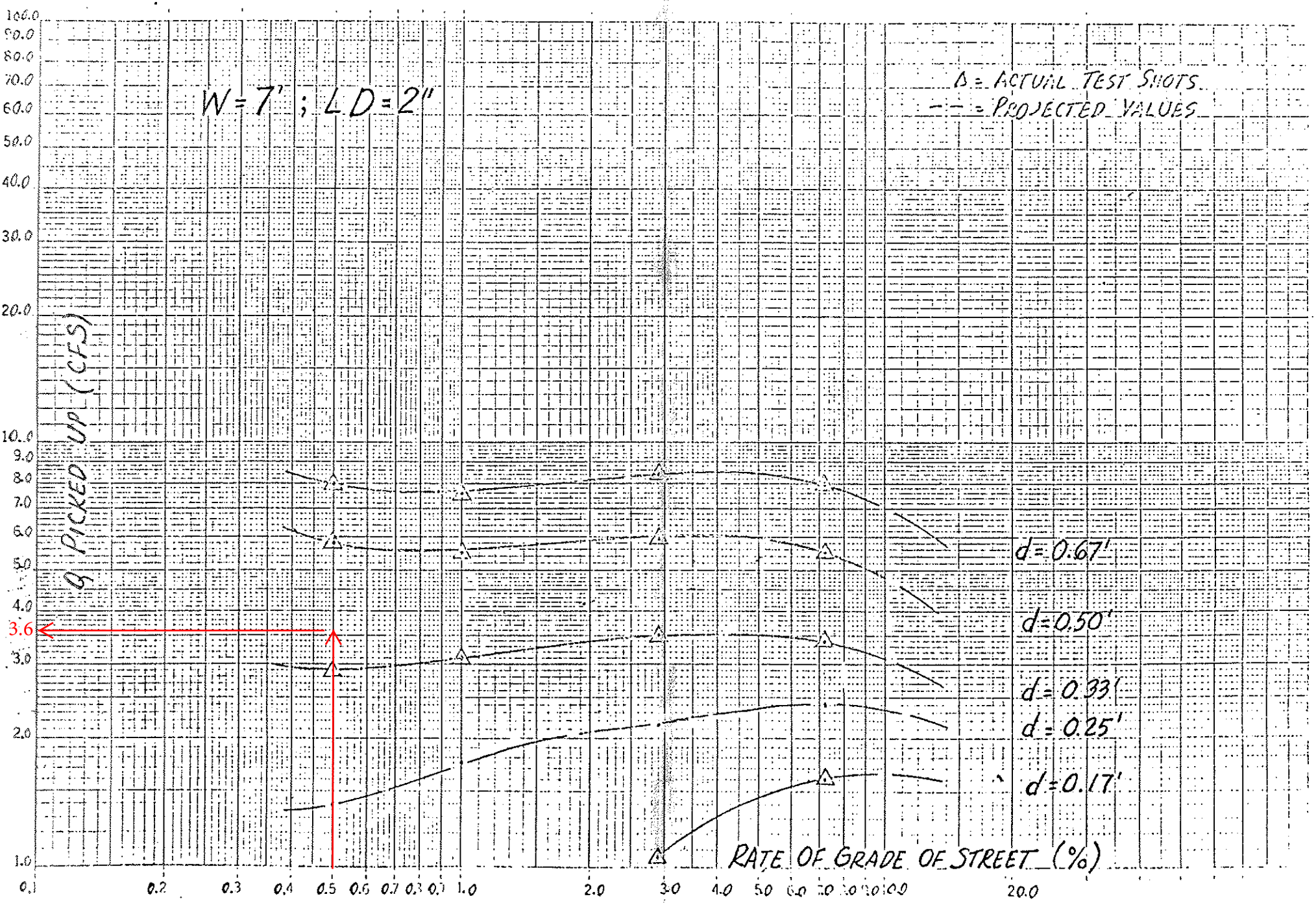
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.36	ft
Discharge	4.60	ft³/s

Cross Section Image




W = 7' ; ∠D = 2"
Δ = ACTUAL TEST SHOTS
– – = PROJECTED VALUES
Q PICKED UP (CFS)
d = 0.67'
d = 0.50'
d = 0.33'
d = 0.25'
d = 0.17'
3.6
RATE OF GRADE OF STREET (%)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
20.0

CB#1

PROJECT:	**Beltramo Ranch**	**UNITED CIVIL, INC.**
TRACT:	**Tract No. 6061**	**30141 AGOURA ROAD, SUITE 215**
SUBJECT:	**CATCH BASIN INTERCEPTION CALCS.**	**AGOURA HILLS, CA 91301-4311**
DATE:	**May, 2021**	

PROP. CATCH BASIN AT ST. STA. X+X.X on Beltramo Ranch

(Storm Drain's Catch Basin No. 2 on Line A)

GIVEN:-

a) Hydrology Subarea Designation: A2 & A7

b)Subarea Acreage = 0.78+0.42 =1.2 Acres

c) Subarea's Design 100-Yr. Flow Rate, Q = 2.3+1.16 = 3.46 cfs

d) Tributary Prorated C.B. Drainage Area = 1.2 Acres

e) Corresponding Prorated Design 50-Yr. Q = 3.46 cfs

f) Also, the by-pass from Upstream C.B #1 is 1.0 cfs

g) Hence, the Actual Design 100-Yr. to C.B. = 3.46+1.0=4.46 cfs

j) Street/Gutter Slope upstream of C.B. Opening, S = 0.005

i) Prop. Curb & Gutter Type: A2-6 (W=18")

k) Street Width = 32'

SOLUTION:-

a) Local Sump Condition for Proposed Catch Basin

b) Prop. Catch Basin Type: City of San Buenaventura Std. Plan No. 303

c) Prop. Catch Basin Width & Local Depression Depth: W=3.5' with L.D.= 2"

d) Max. Ponding Depth above Normal Gutter Grade, D = Diff. Btw. FS at CL & Gutter FL = 0.50'

e) Per L.A. County Flood Control District's Catch Basin Capacities for Sump Condition (D-26);

Q (capacity) = $4.3AD^{0.6}$ where A=Wx0.656 & D=0.50' at C.B. Opening

$= 4.3 \times (3.5 \times 0.656) \times (0.50)^{0.6}$

= 6.51 cfs > Q(tributary) = 4.46 cfs

f) Hence, 100% Interception Provided.

SUMP FORMULA

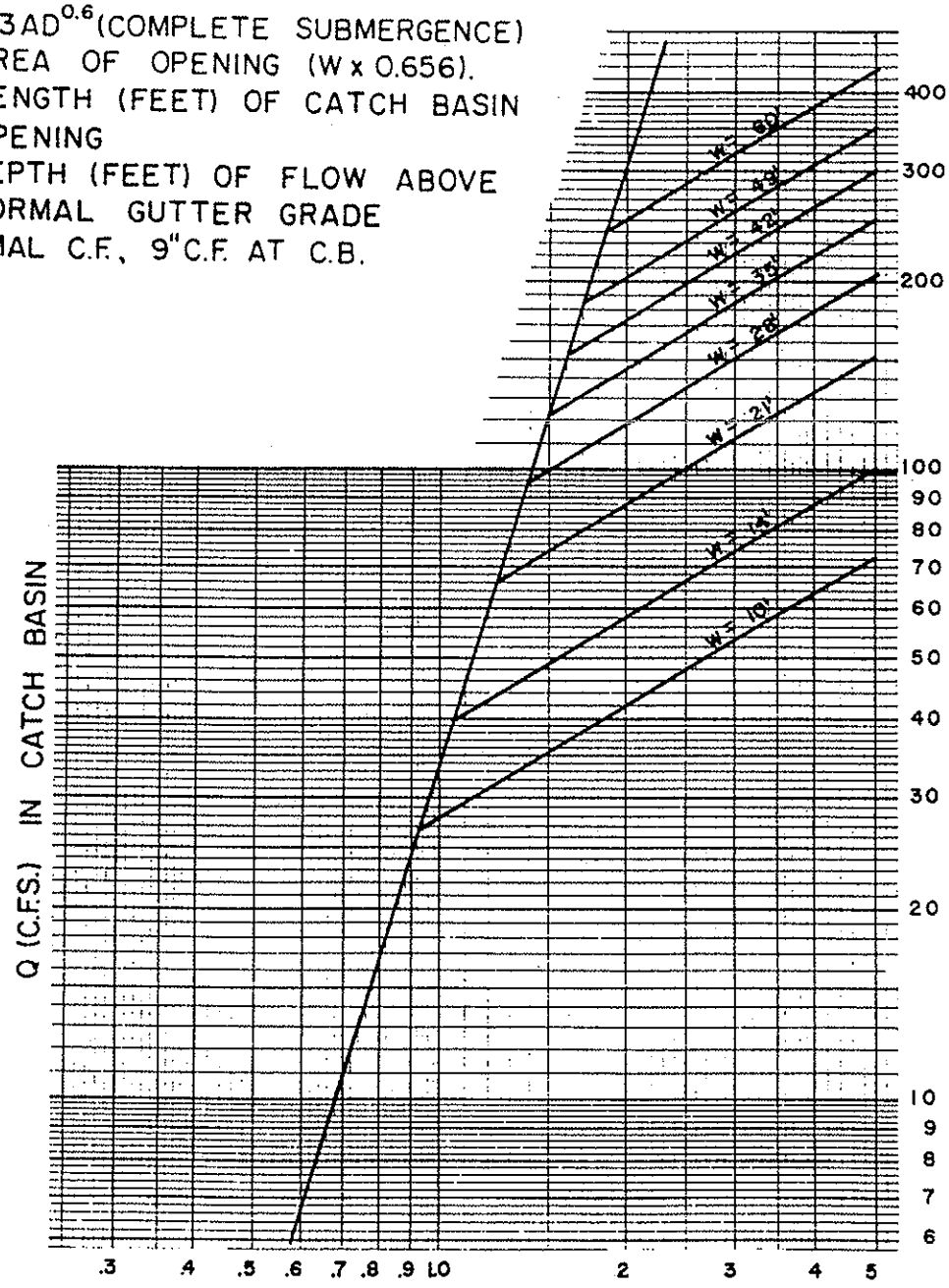
$Q = 4.3AD^{0.6}$ (COMPLETE SUBMERGENCE)

A = AREA OF OPENING (W x 0.656).

W = LENGTH (FEET) OF CATCH BASIN OPENING

D = DEPTH (FEET) OF FLOW ABOVE NORMAL GUTTER GRADE

8" NORMAL C.F., 9"C.F. AT C.B.



D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

Los Angeles County Flood Control District

CATCH BASIN CAPACITIES FOR SUMP CONDITION

TO BE USED FOR C.B. NOS. 1, 2 & 3

PROJECT:	**Beltramo Ranch**	**UNITED CIVIL, INC.**
TRACT:	**Tract No. 6061**	**30141 AGOURA ROAD, SUITE 215**
SUBJECT:	**CATCH BASIN INTERCEPTION CALCS.**	**AGOURA HILLS, CA 91301-4311**
DATE:	**May, 2021**	

PROP. CATCH BASIN AT ST. STA. X+X.X on Beltramo Ranch

(Storm Drain's Catch Basin No. 5 on Line C)

GIVEN:-

a) Hydrology Subarea Designation: A5

b)Subarea Acreage = 0.71 Acres

c) Subarea's Design 100-Yr. Flow Rate, Q = 2.0 cfs

d) Tributary Prorated C.B. Drainage Area = 0.71 Acres

e) Corresponding Prorated Design 50-Yr. Q = 2.0 cfs

f) Street/Gutter Slope upstream of C.B. Opening, S = 0.005

g) Prop. Curb & Gutter Type: A2-6 (W=18")

h) Street Width = 32'

SOLUTION:-

a) By-Pass Condition for Proposed Catch Basin

b) Calculated Street Flow Depth, d = 0.29' (See Calc. on Next Page)

c) Prop. Catch Basin Type: City of San Buenaventura Std. Plan No. 303

d) Prop. Catch Basin Width & Local Depression Depth: W=7' with L.D.= 2"

e) Per L.A. County Road Dept. Catch Basin Capacity Chart;

Q (intercepted) = 2.0 cfs = Q(tributary) = 2.0 cfs

f) Hence, 100% Interception Provided.

CB#5

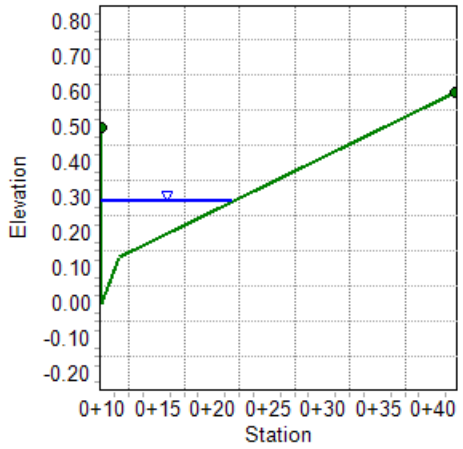
Project Description

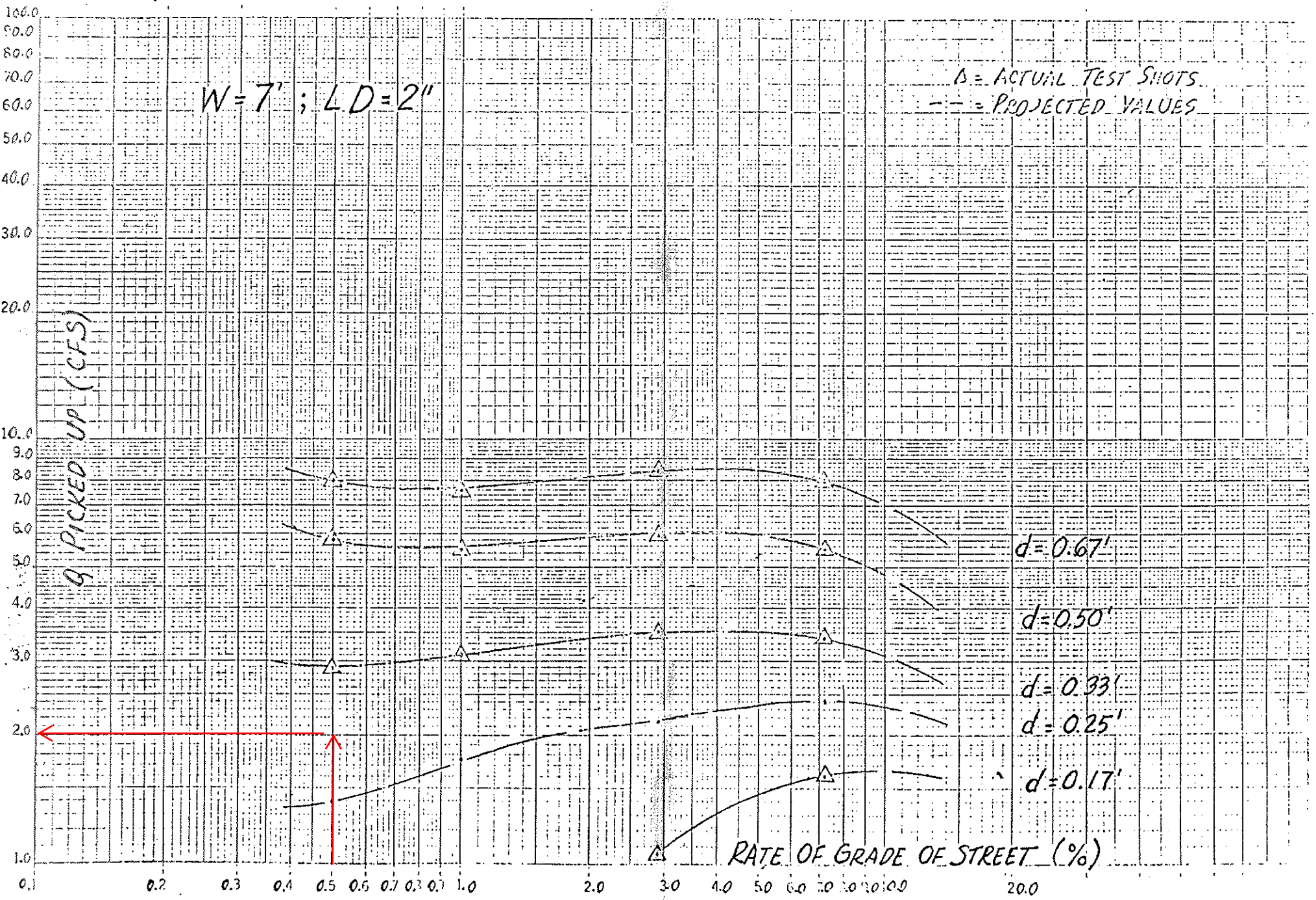
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.29	ft
Discharge	2.00	ft³/s

Cross Section Image




W=7' ; ⊿D=2"
Δ = ACTUAL TEST SHOTS
– – = PROJECTED VALUES
Q PICKED UP (CFS)
d=0.67'
d=0.50'
d=0.33'
d=0.25'
d=0.17'
RATE OF GRADE OF STREET (%)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
20.0

CB#5

PROJECT:	**Beltramo Ranch**	**UNITED CIVIL, INC.**
TRACT:	**Tract No. 6061**	**30141 AGOURA ROAD, SUITE 215**
SUBJECT:	**CATCH BASIN INTERCEPTION CALCS.**	**AGOURA HILLS, CA 91301-4311**
DATE:	**May, 2021**	

PROP. CATCH BASIN AT ST. STA. X+X.X on Beltramo Ranch

(Storm Drain's Catch Basin No. 6 on Line C)

GIVEN:-

a) Hydrology Subarea Designation: A6

b)Subarea Acreage = 0.81 Acres

c) Subarea's Design 100-Yr. Flow Rate, Q = 2.6 cfs

d) Tributary Prorated C.B. Drainage Area = 0.81 Acres

e) Corresponding Prorated Design 50-Yr. Q = 2.6 cfs

f) Also, the by-pass from Upstream C.B #5 = 0.3 cfs

g) Hence, the Actual Design 100-Yr. to C.B. = 2.6+0.3=2.9 cfs

f) Street/Gutter Slope upstream of C.B. Opening, S = 0.005

g) Prop. Curb & Gutter Type: A2-6 (W=18")

h) Street Width = 32'

SOLUTION:-

a) By-Pass Condition for Proposed Catch Basin

b) Calculated Street Flow Depth, d = 0.32' (See Calc. on Next Page)

c) Prop. Catch Basin Type: City of San Buenaventura Std. Plan No. 303

d) Prop. Catch Basin Width & Local Depression Depth: W=7' with L.D.= 2"

e) Per L.A. County Road Dept. Catch Basin Capacity Chart;

Q (intercepted) = 2.4 cfs < Q(tributary) = 2.9 cfs

f) Q(by-pass to Downstream C.B.#2)=(2.9-2.4)=0.5 cfs

CB#6

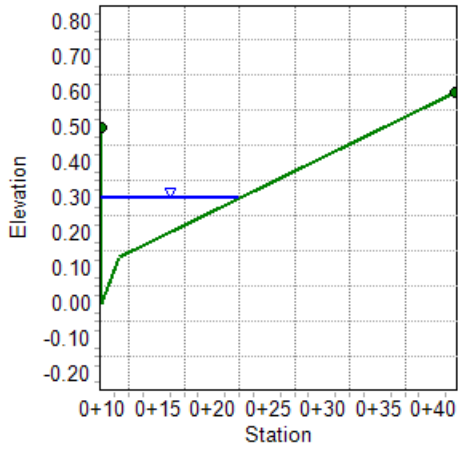
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

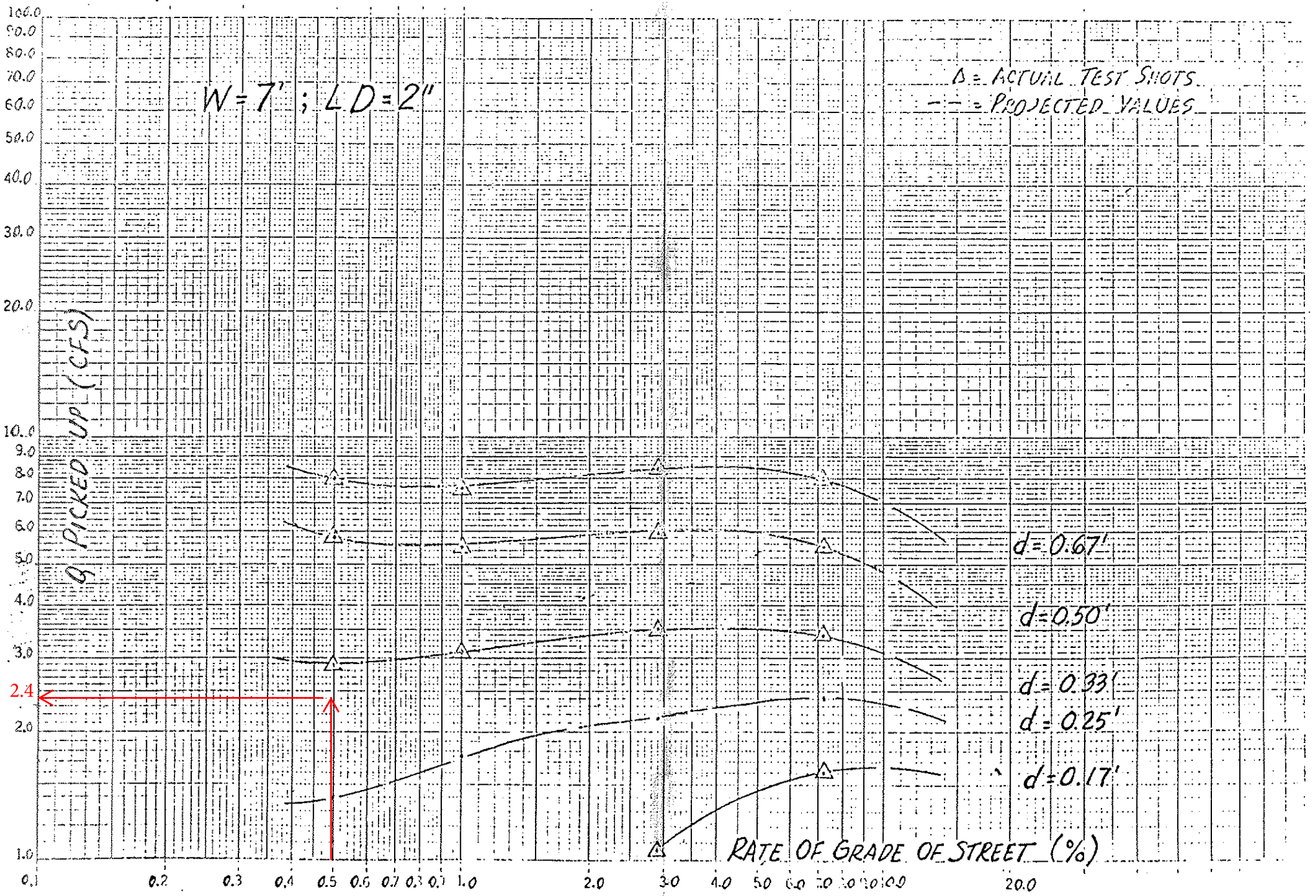
Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.30	ft
Discharge	2.24	ft³/s

Cross Section Image



46 7320



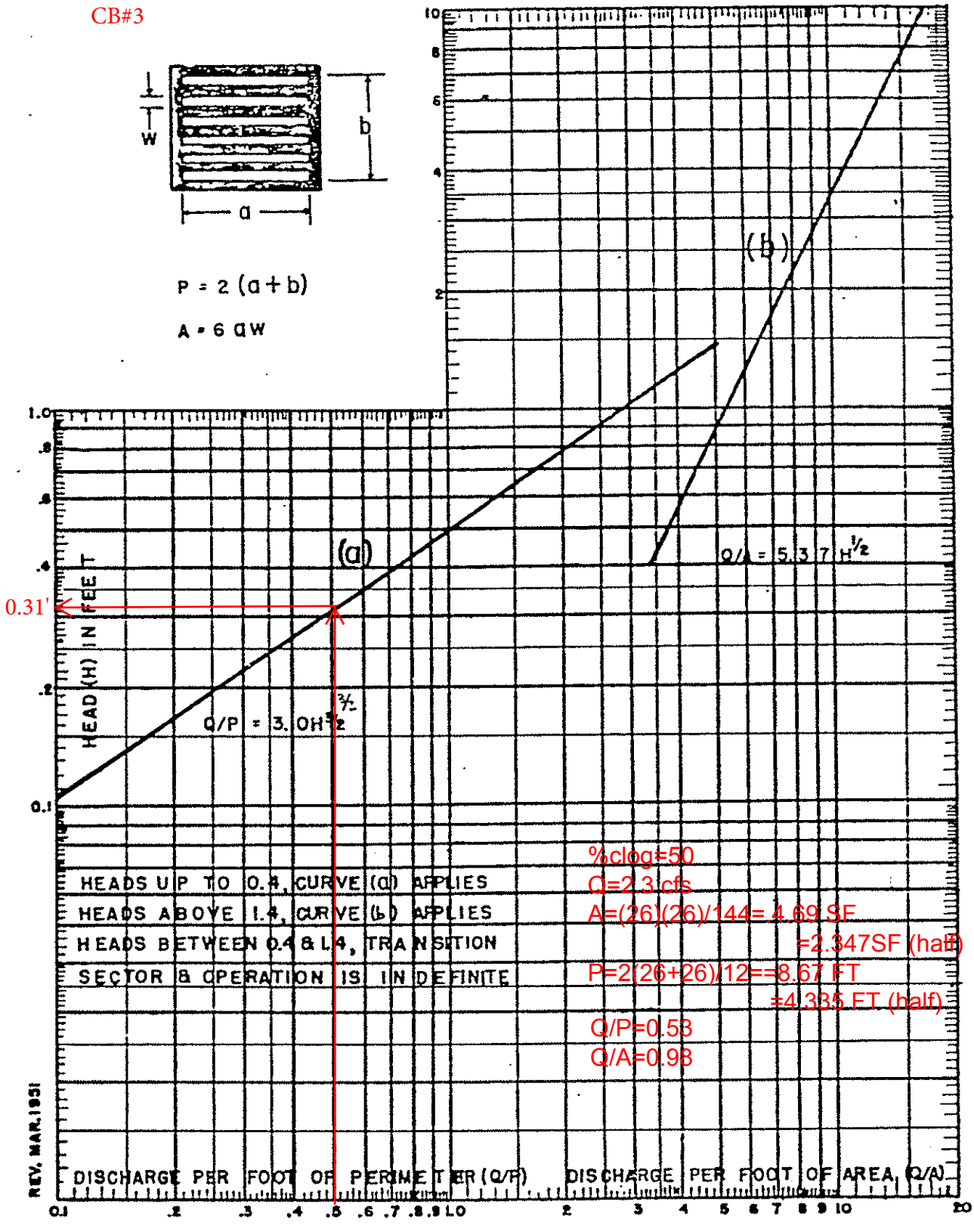
CB#6

Grate Inlet #3

CB#3

P = 2 (a + b)

A = 6 aW



%clog=50

Q=2.3 cfs

A=(26)(26)/144= 4.69 SF

=2.347SF (half)

P=2(26+26)/12==8.67 FT

=4.335 FT (half)

Q/P=0.53

Q/A=0.98

INLET CAPACITY OF GRATE AT SAG

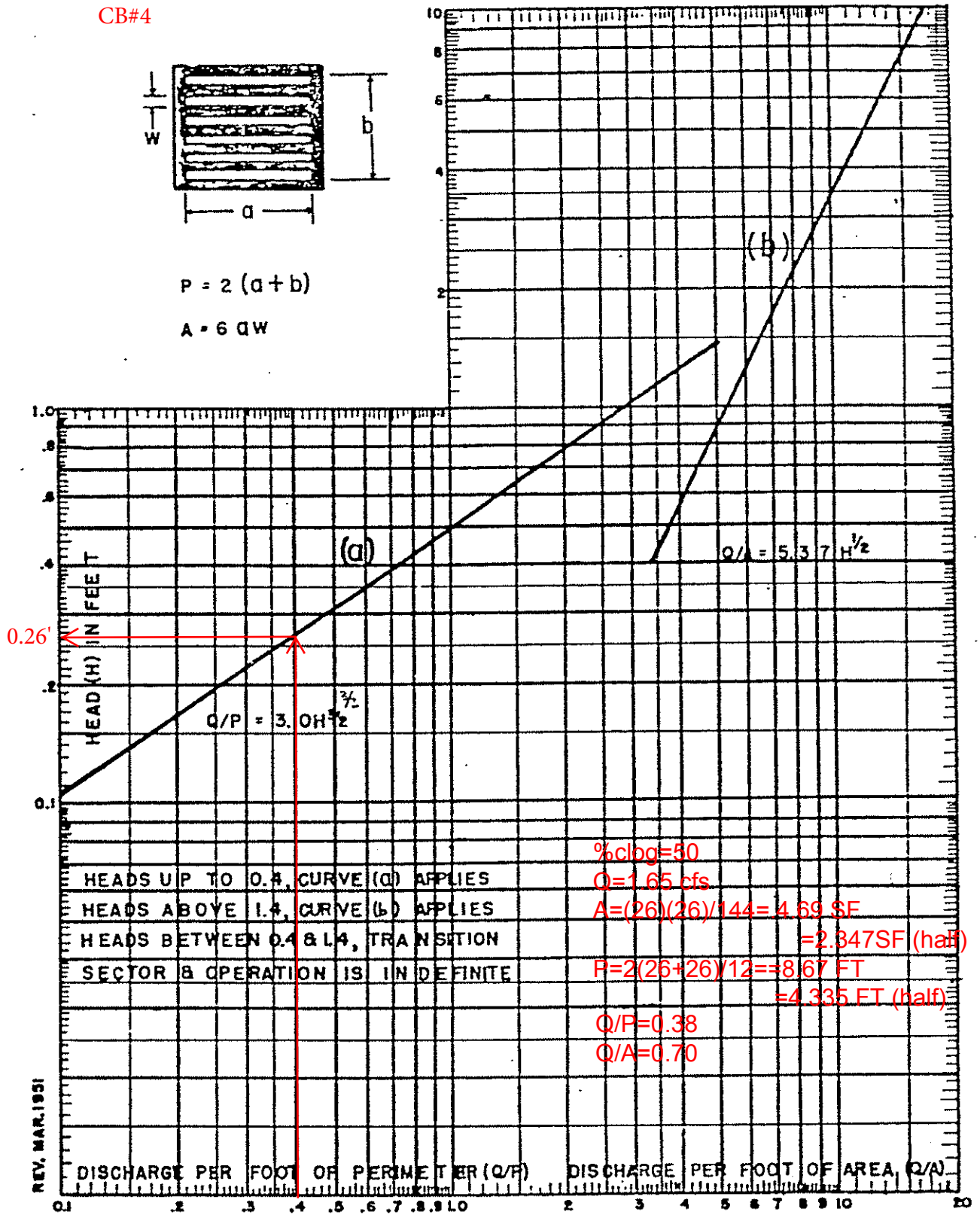
Plate 2.6-0658

Grate Inlet #2

CB#4

P = 2 (a + b)

A = 6 aW



%clog=50

Q=1.65 cfs

A=(26)(26)/144=4.69 SF

=2.347SF (half)

R=2(26+26)/12==8.67 FT

=4.335 FT (half)

Q/P=0.38

Q/A=0.70

INLET CAPACITY OF GRATE AT SAG

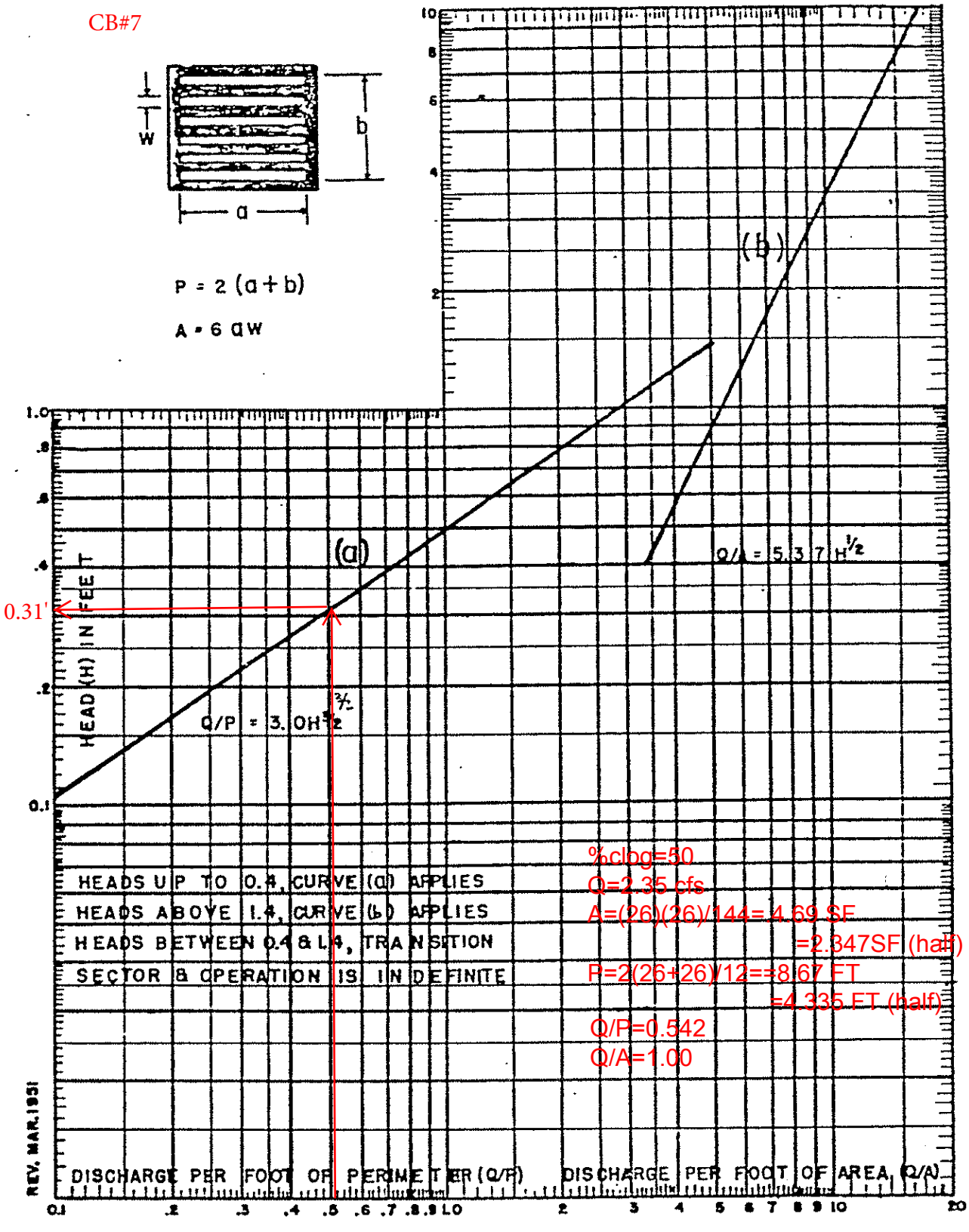
Plate 2.6-0658

Grate Inlet #1

CB#7

P = 2 (a + b)

A = 6 aw



%clog=50

Q=2.35 cfs

A=(26)(26)/144=4.69 SF

=2.347SF (half)

R=2(26+26)/12==8.67 FT

=4.335 FT (half)

Q/P=0.542

Q/A=1.00

INLET CAPACITY OF GRATE AT SAG

Plate 2.6-0658

Appendix J

CONTECH INFILTRATION SYSTEM

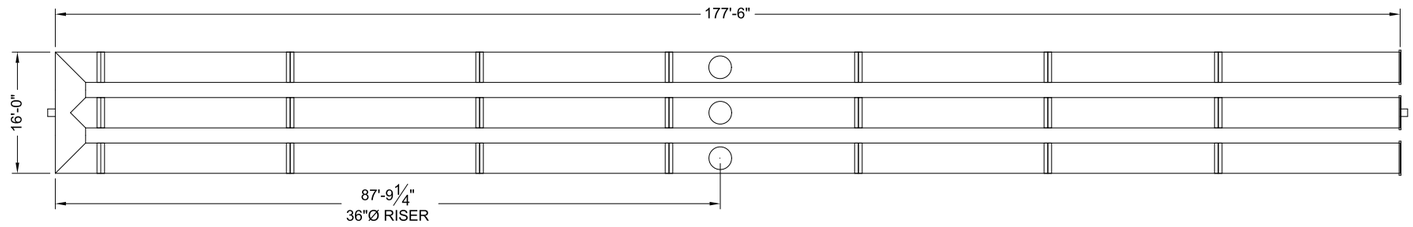
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 537 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 10,454 cf.
- PIPE STORAGE VOLUME = 6,742 cf.
- BACKFILL STORAGE VOLUME = 3,765 cf.
- TOTAL STORAGE PROVIDED = 10,507 cf.

PIPE DETAILS
- DIAMETER = 48 IN.
- CORRUGATION = 2 2/3x1/2
- GAGE = 16
- COATING = ALT2
- WALL TYPE = Perforated
- BARRELL SPACING = 24 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 12 IN.
- ABOVE PIPE = 6 IN.
- WIDTH AT SIDES = 12 IN.
- BELOW PIPE = 6 IN.



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2 2/3" x 1/2" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY

SCALE: 1" = 20'

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DATE	REVISION DESCRIPTION	BY

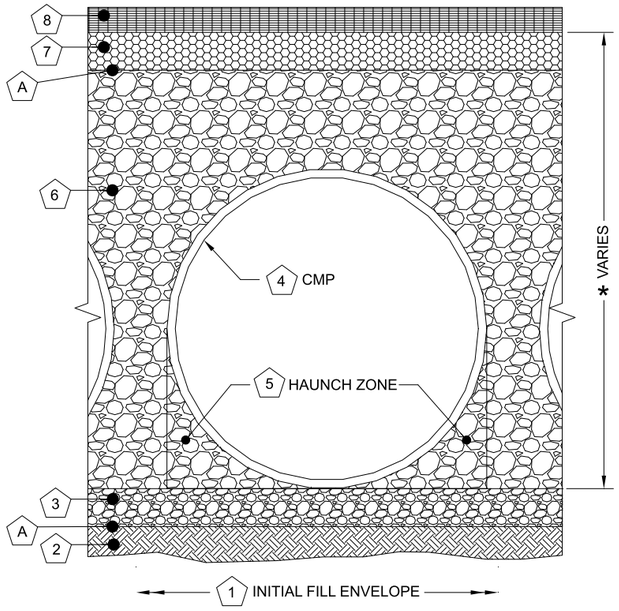
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	5/14/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		



Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (if applicable)			
7 Road Base (if applicable			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6 Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

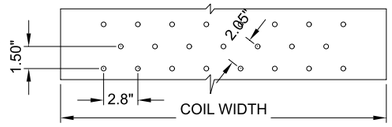
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

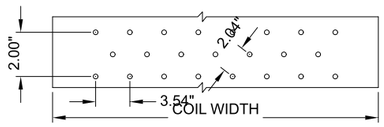
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



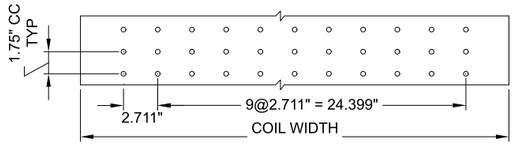
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



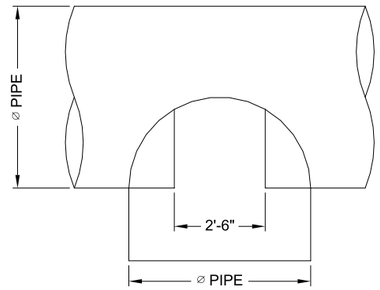
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

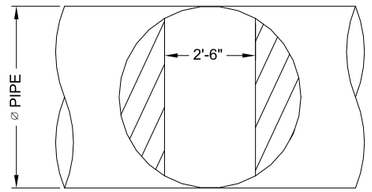
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

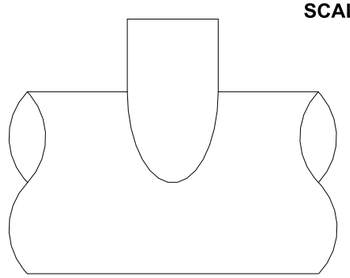


FRONT

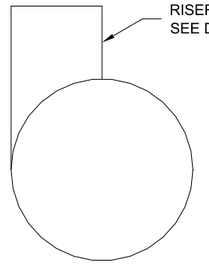
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

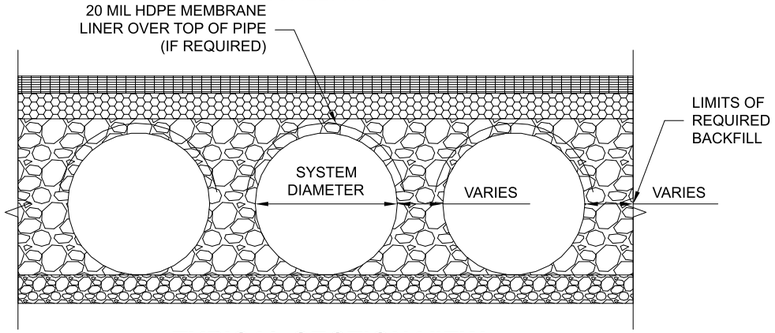


END

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	5/14/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		

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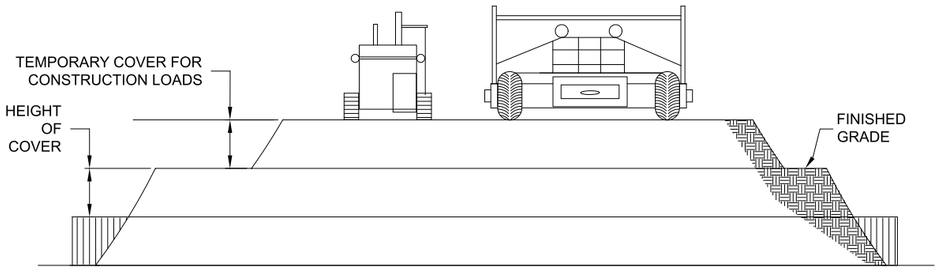


CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

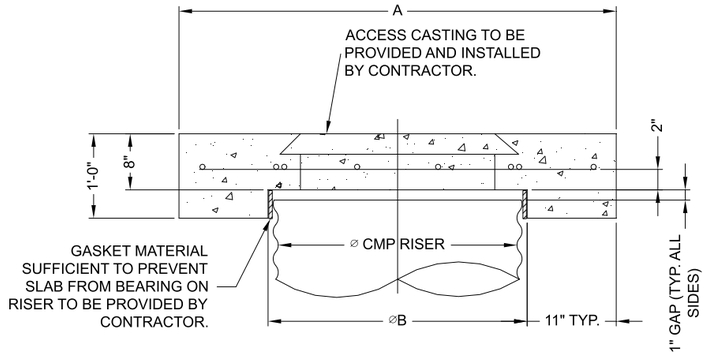
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS
INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

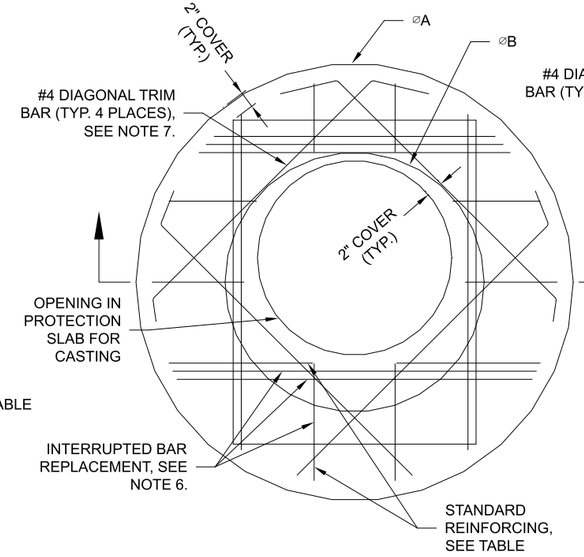
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



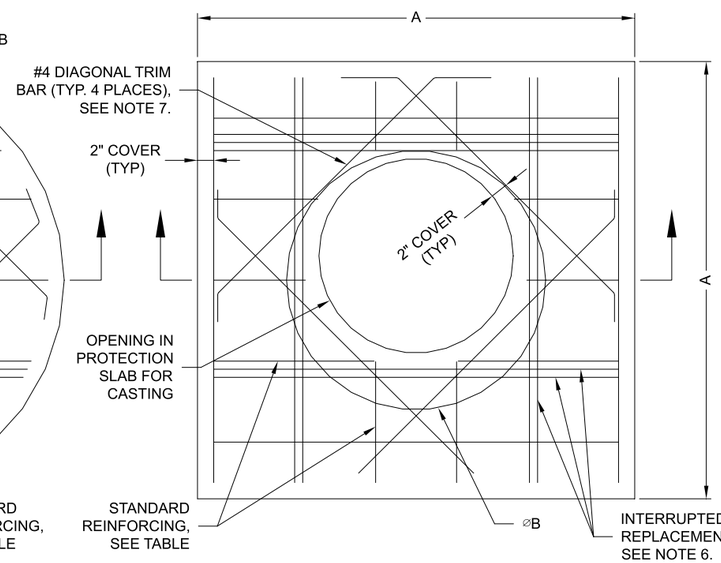
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	5/14/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D3		

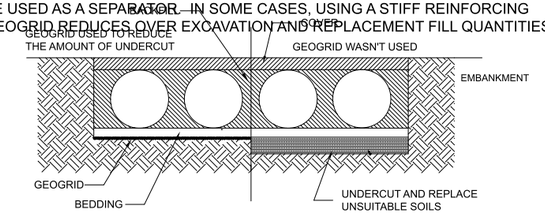
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

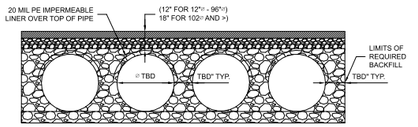


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

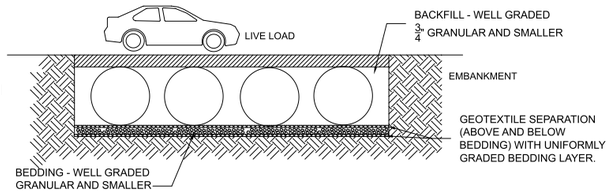
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

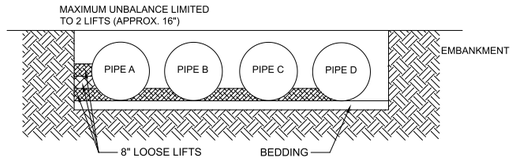
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



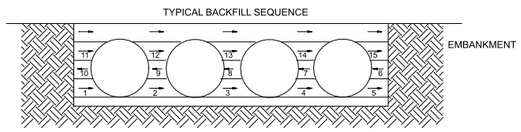
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

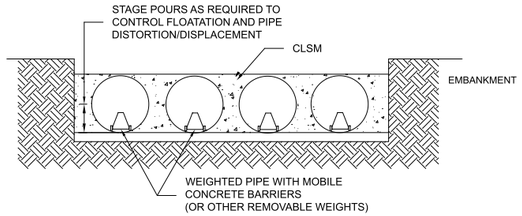


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

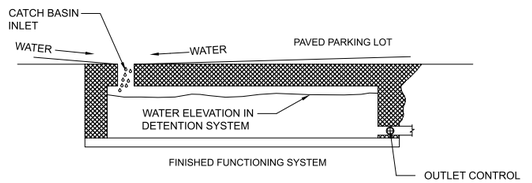


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

C:\EXPORTS\TEMPLATES\CMP_V5.DWG 10/18/2019 10:02 AM

DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

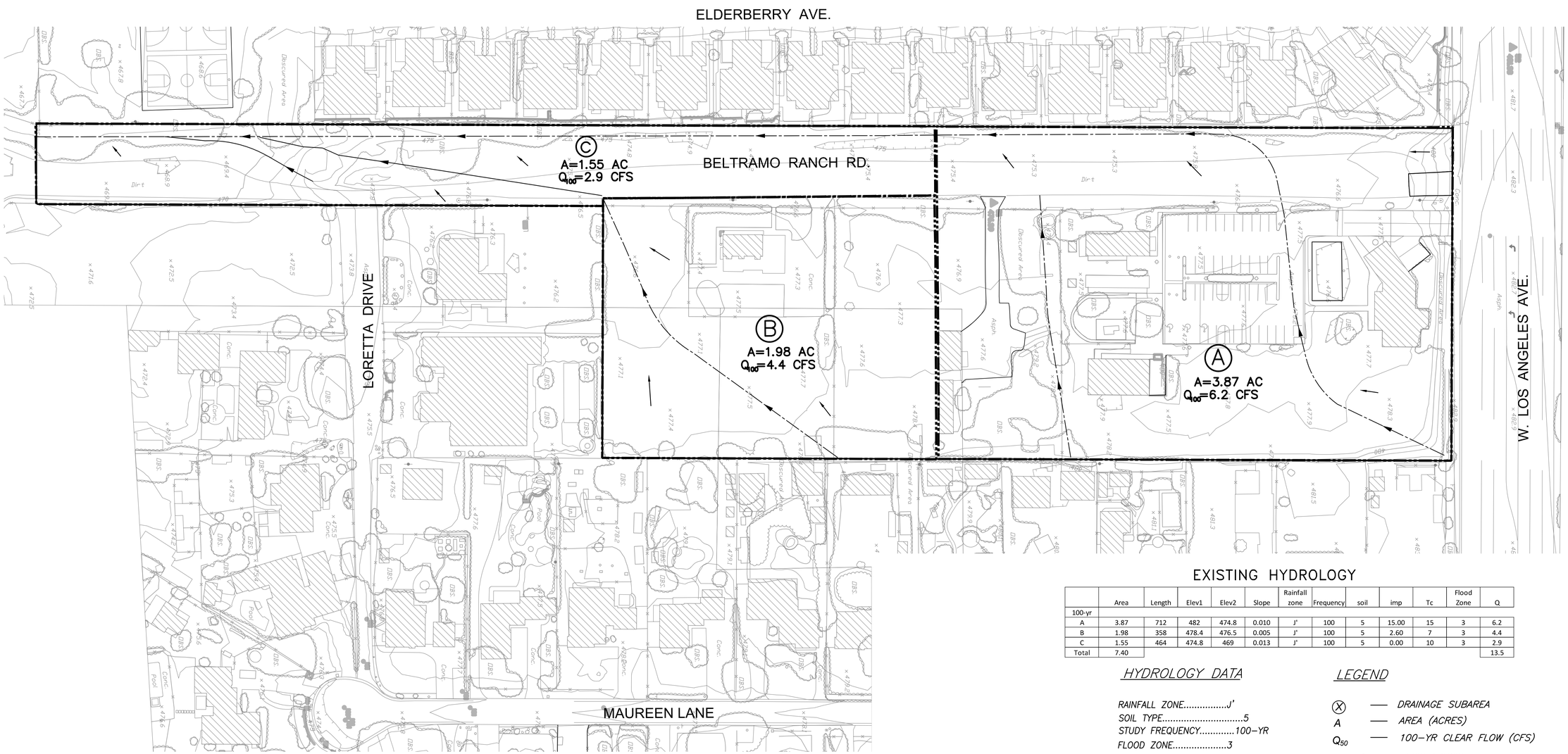
DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	5/14/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

MAPS

HYDROLOGY AND SQMP

HYDROLOGY AND STORMWATER QUALITY MANAGEMENT PLAN
BELTRAMO RANCH, MOORPARK



EXISTING HYDROLOGY

	Area	Length	Elev1	Elev2	Slope	Rainfall zone	Frequency	soil	imp	Tc	Flood Zone	Q
100-yr												
A	3.87	712	482	474.8	0.010	J'	100	5	15.00	15	3	6.2
B	1.98	358	478.4	476.5	0.005	J'	100	5	2.60	7	3	4.4
C	1.55	464	474.8	469	0.013	J'	100	5	0.00	10	3	2.9
Total	7.40											13.5

HYDROLOGY DATA

RAINFALL ZONE.....J'
SOIL TYPE.....5
STUDY FREQUENCY.....100-YR
FLOOD ZONE.....3

LEGEND

- Ⓧ — *DRAINAGE SUBAREA*
- *A* — *AREA (ACRES)*
- Q_{50} — *100-YR CLEAR FLOW (CFS)*
- *FLOW ARROW*
- *SUBAREA BOUNDARY*
- *PROJECT BOUNDARY*
- *FLOW PATH*

SCALE: 1" = 50'

0 50 100 150

DIAL TOLL FREE
811
AT LEAST TWO DAYS
BEFORE YOU DIG
811
Know what's **below.**
Call before you dig.
UNDERGROUND SERVICE ALERT (USA) OF SOUTHERN CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
MATTHEW A SAWYER
NO.72236
EXP. 06-30-22
CIVIL
STATE OF CALIFORNIA

DEVELOPER:
WARMINGTON RESIDENTIAL

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626

DATE 6/2/2021
DESIGNED
DATE
DELINEATED
DATE
CHECKED

PLAN PREPARED BY:

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

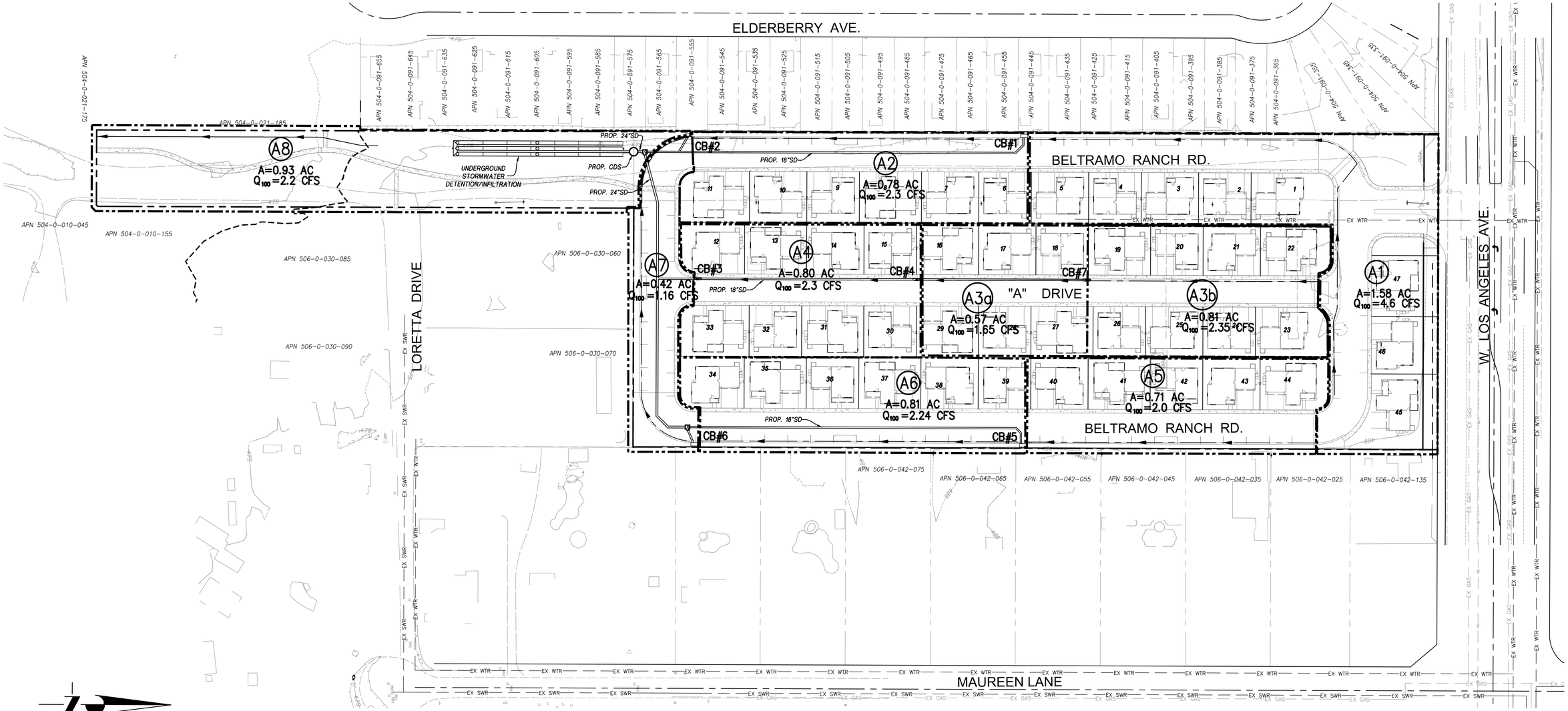
HYDROLOGY AND SQMP-VTTM NO.6061

11930-11934 WEST LOS ANGELES AVENUE
BELTRAMO RANCH
MOORPARK, CA

4/6/2021

HYDROLOGY AND STORMWATER QUALITY MANAGEMENT PLAN

BELTRAMO RANCH, MOORPARK



SCALE: 1" = 50'

0 50 100 150

PROPOSED HYDROLOGY

Subarea	Area	Rainfall Zone	Soil Type	IMP	Tc	Flood Zone	Q_{100}
	ac						
A1	1.58	J'	5	0.42	6	3	4.6
A2	0.78	J'	5	0.42	6	3	2.3
A3a	0.57	J'	5	0.42	6	3	1.65
A3b	0.81	J'	5	0.42	6	3	2.35
A4	0.80	J'	5	0.42	6	3	2.3
A5	0.71	J'	5	0.42	6	3	2
A6	0.81	J'	5	0.42	6	3	2.24
A7	0.42	J'	5	0.42	6	3	1.16
A8	0.93	J'	5	0.00	6	3	2.2
Total	7.40						20.8

LEGEND

- (X) — DRAINAGE SUBAREA
- A — AREA (ACRES)
- Q_{100} — 100-YR CLEAR FLOW (CFS)
- FLOW ARROW
- SUBAREA BOUNDARY
- PROJECT BOUNDARY
- FLOW PATH

HYDROLOGY DATA

RAINFALL ZONE.....J'
SOIL TYPE.....5
STUDY FREQUENCY.....100-YR
FLOOD ZONE.....3

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AT LEAST TWO DAYS
BEFORE YOU DIG
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Know what's below.
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UNDERGROUND SERVICE ALERT (USA) OF SOUTHERN CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
MATTHEW A SAWYER
NO.72236
EXP. 06-30-22
CIVIL
STATE OF CALIFORNIA

DEVELOPER:
WARMINGTON RESIDENTIAL

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626

DATE
DESIGNED
DATE
DELINEATED
DATE
CHECKED

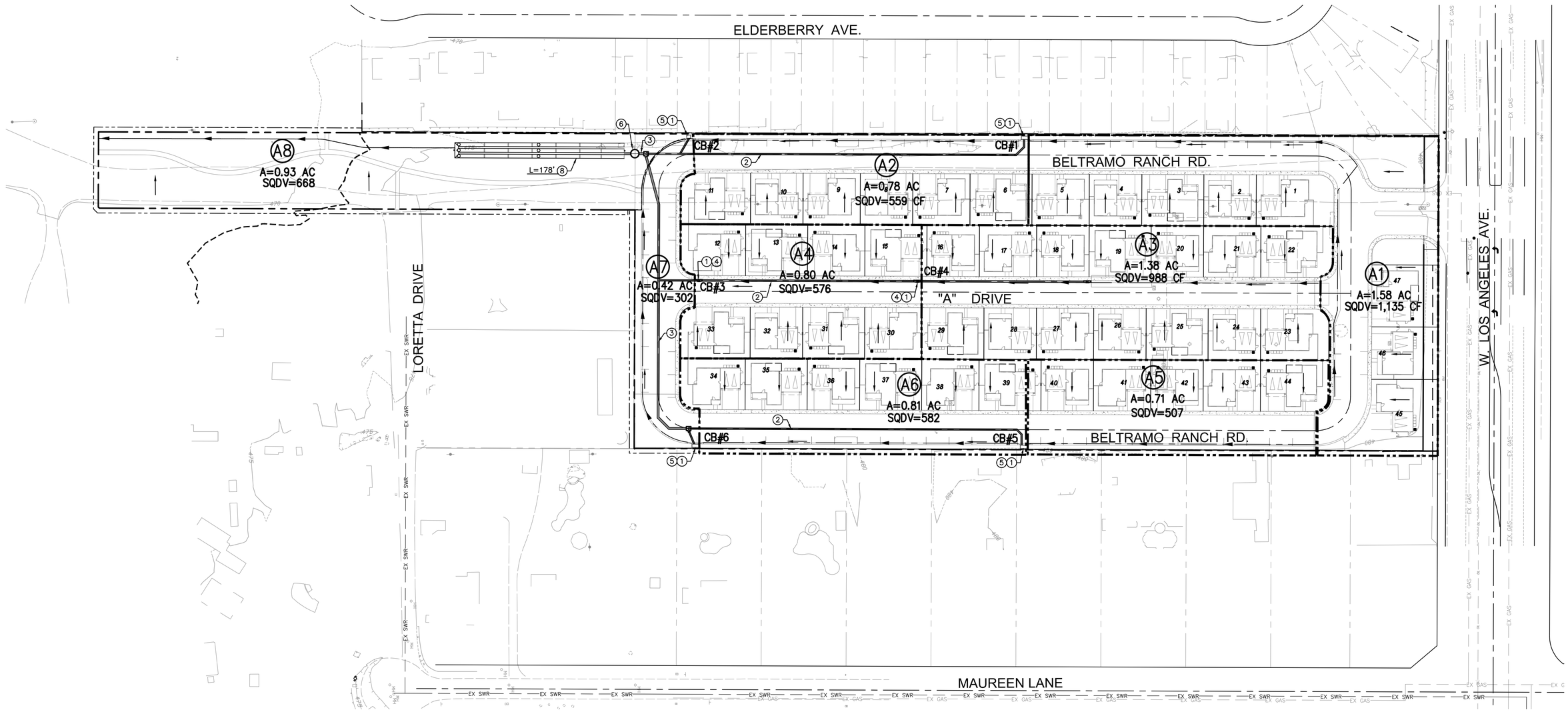
PLAN PREPARED BY:

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

HYDROLOGY AND SQMP-VTTM NO.6061

11930-11934 WEST LOS ANGELES AVENUE
BELTRAMO RANCH
MOORPARK, CA

4/6/2021



SCALE: 1" = 50'

0 50 100 150

DIAL TOLL FREE
811
AT LEAST TWO DAYS
BEFORE YOU DIG

Know what's **below.**
Call before you dig.

UNDERGROUND SERVICE ALERT (USA) OF SOUTHERN CALIFORNIA

CONSTRUCTION NOTES:

1 INSTALL STENCIL SIGNAGE "NO DUMPING–DRAIN TO OCEAN" PER DETAIL A ON SHEET 4.

2 INSTALL 18" RCP STORM DRAIN, PER DETAIL B ON SHEET 4.

3 INSTALL 24" RCP STORM DRAIN, PER DETAIL B ON SHEET 4.

4 INSTALL BROOKS PRODUCT 24"X24" CONCRETE BOX WITH NO TRAFFIC LID, PER DETAIL C ON SHEET 4, OR APPROVED EQUAL.

5 INSTALL CURB OPENING CATCH BASIN, SIZE PER PLAN.

6 INSTALL INLINE CDS UNIT PER DETAIL ON SHEET 4.

7 NOT USED

8 INSTALL 6'X5.5' GRAVEL TRENCH WITH 48" PERFORATED PIPE, PER DETAIL F ON SHEET 4. LENGTH PER PLAN.

9 CONSTRUCT JUNCTION STRUCTURE.

LEGEND

- (X) — DRAINAGE SUBAREA
- A — AREA (ACRES)
- SQDV — DESIGN TREATMENT VOLUME (CF)
- FLOW ARROW
- SUBAREA BOUNDARY
- PROJECT BOUNDARY
- FLOW PATH

SQMP DATA

RAINFALL ZONE.....J'
PERVIOUS RUNOFF COEFFICIENT (Cp).....0.05
85TH PERCENTILE RAINFALL.....1.25 IN

WATER QUALITY TREATMENT VOLUME

Subarea	A	% allow	EIA allowable	IMP	TIA	Aretention	Soil Type	Cp	C	P (85th percentile)	P	SQDV	SQDF
	(ac)									(in)	(ft)	(cf)	(cfs)
A1	1.58	5	0.079	0.42	0.66	0.585	5	0.05	0.428	1.25	0.10	1135	0.85
A2	0.78	5	0.039	0.42	0.33	0.288	5	0.05	0.428	1.25	0.10	559	0.42
A3	1.38	5	0.069	0.42	0.58	0.509	5	0.05	0.428	1.25	0.10	988	0.74
A4	0.80	5	0.040	0.42	0.34	0.296	5	0.05	0.428	1.25	0.10	576	0.43
A5	0.71	5	0.035	0.42	0.30	0.261	5	0.05	0.428	1.25	0.10	507	0.38
A6	0.81	5	0.041	0.42	0.34	0.300	5	0.05	0.428	1.25	0.10	582	0.43
A7	0.42	5	0.021	0.42	0.18	0.155	5	0.05	0.428	1.25	0.10	302	0.22
A8	0.93	5	0.047	0.42	0.39	0.344	5	0.05	0.428	1.25	0.10	668	0.50
Total	7.40											5318	3.96

REGISTERED PROFESSIONAL ENGINEER
MATTHEW A SAWYER
NO.72236
EXP. 06-30-22
CIVIL
STATE OF CALIFORNIA

DEVELOPER:
WARMINGTON RESIDENTIAL

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626

DATE 6/2/2021
DESIGNED
DATE
DELINEATED
DATE
CHECKED

PLAN PREPARED BY:

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

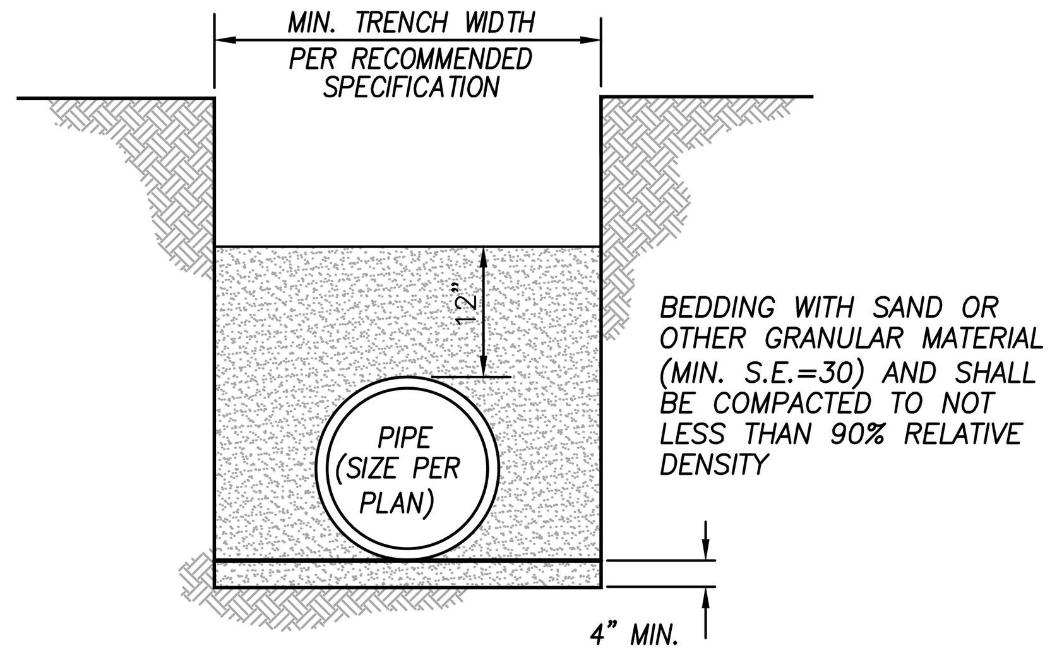
HYDROLOGY AND SQMP-VTTM NO.6061

11930-11934 WEST LOS ANGELES AVENUE
BELTRAMO RANCH
MOORPARK, CA

6/2/2021

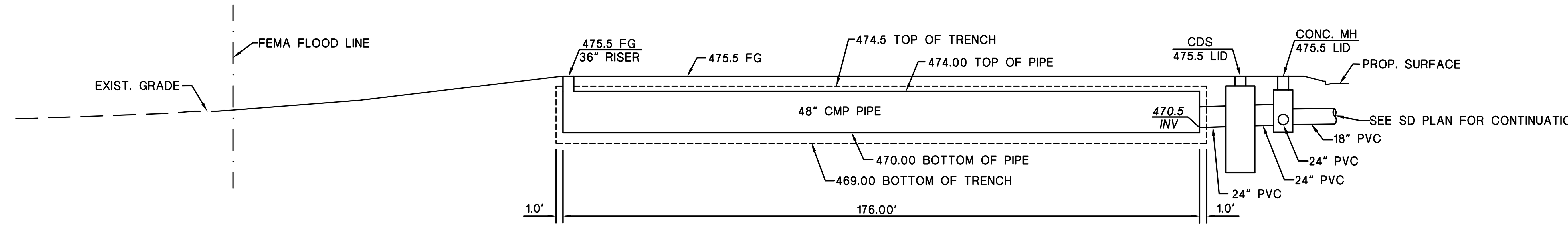
ALL ONSITE CATCH BASINS AND INLETS THAT DISCHARGE INTO AN EXISTING OR PROPOSED STORM DRAIN MUST BE STENCILED OR AFFIXED WITH SIMILAR PROHIBITIVE LANGUAGE TO DISCOURAGE ILLEGAL DUMPING OF POLLUTANTS.

A CATCH BASIN STENCIL



B STORM DRAIN BEDDING (ON SITE ONLY)

NOT TO SCALE



F INFILTRATION SYSTEM PROFILE

NOT TO SCALE

2424 CAST IRON GRATE

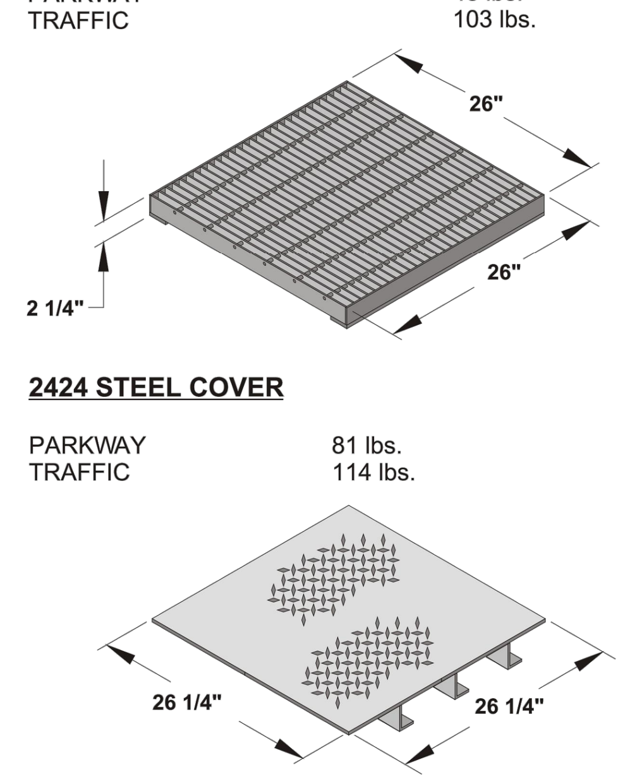
PARKWAY 112 lbs.

2424 STEEL GRATES

PARKWAY 48 lbs.
TRAFFIC 103 lbs.

2424 STEEL COVER

PARKWAY 81 lbs.
TRAFFIC 114 lbs.

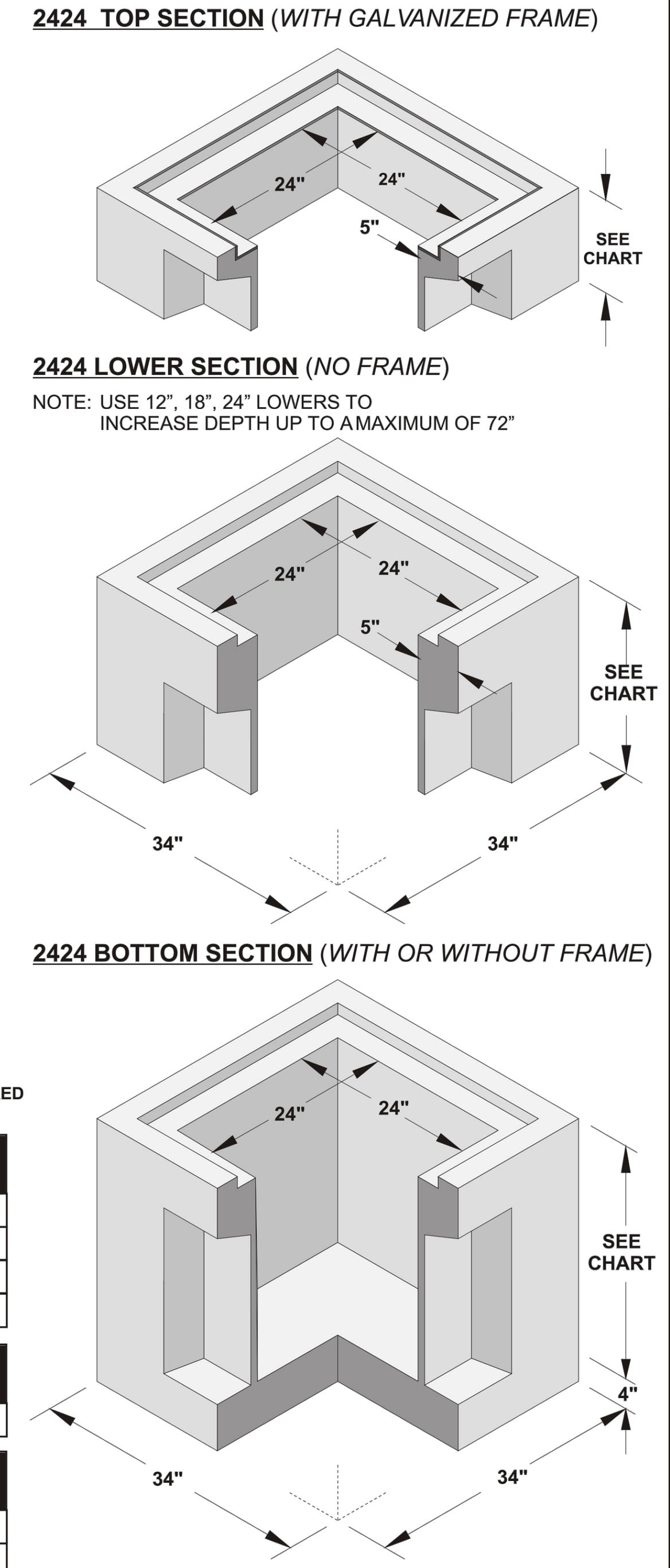


2424 TOP SECTION (WITH GALVANIZED FRAME)

2424 LOWER SECTION (NO FRAME)

NOTE: USE 12", 18", 24" LOWERS TO INCREASE DEPTH UP TO A MAXIMUM OF 72"

2424 BOTTOM SECTION (WITH OR WITHOUT FRAME)



7-04

NOTES:

1. GRATES AND COVERS AVAILABLE PAINTED BLACK OR GALVANIZED
2. "ADA" GRATES AVAILABLE IN PARKWAY & TRAFFIC .
3. "HEEL PROOF" GRATES AVAILABLE IN PARKWAY ONLY
4. A TOP SECTION WITH FRAME MUST BE USED IF BOLT DOWN REQUIRED

TOP SECTION	HT.	LBS	KNOCK-OUTS
2424 T6	6"	270	NONE
2424 T12	12"	495	(4) 6" x 11"
2424 T18	18"	745	(4) 9" x 12"
2424 T24	24"	870	(4) 14" x 14"

EXTENSION SECTION	HT.	LBS	KNOCK-OUTS
2424 E6	6"	270	NONE

LOWER SECTION	HT.	LBS	KNOCK-OUTS
2424 L12	12"	495	(4) 6" x 11"
2424 L18	18"	745	(4) 9" x 12"
2424 L24	24"	870	(4) 14" x 14"

BOTTOM SECTION	HT.	LBS	KNOCK-OUTS
2424 B30	30"	1595	(4) 18" x 18"
2424 B36	36"	1905	(4) 18" x 18"

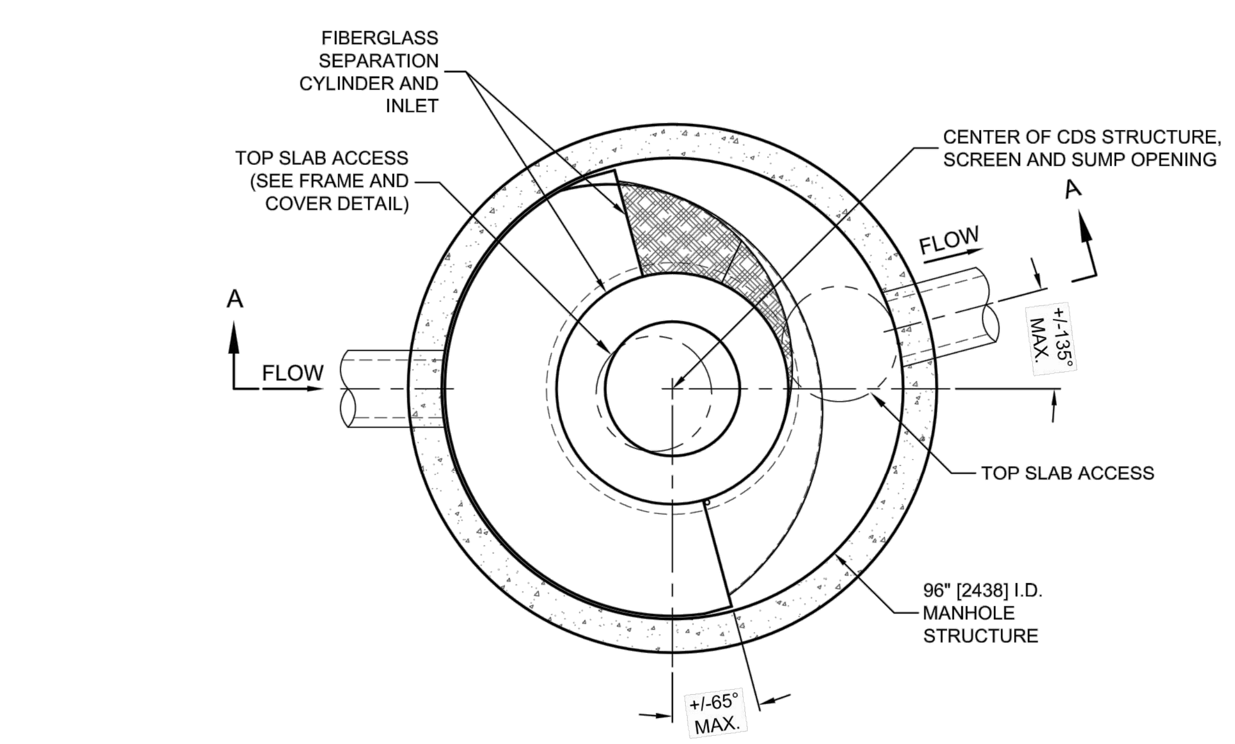
24" x 24" CATCH BASIN

ORG. DWG. DATE 11-23-99 | REV. DWG. DATE 02-28-00

BROOKS PRODUCTS

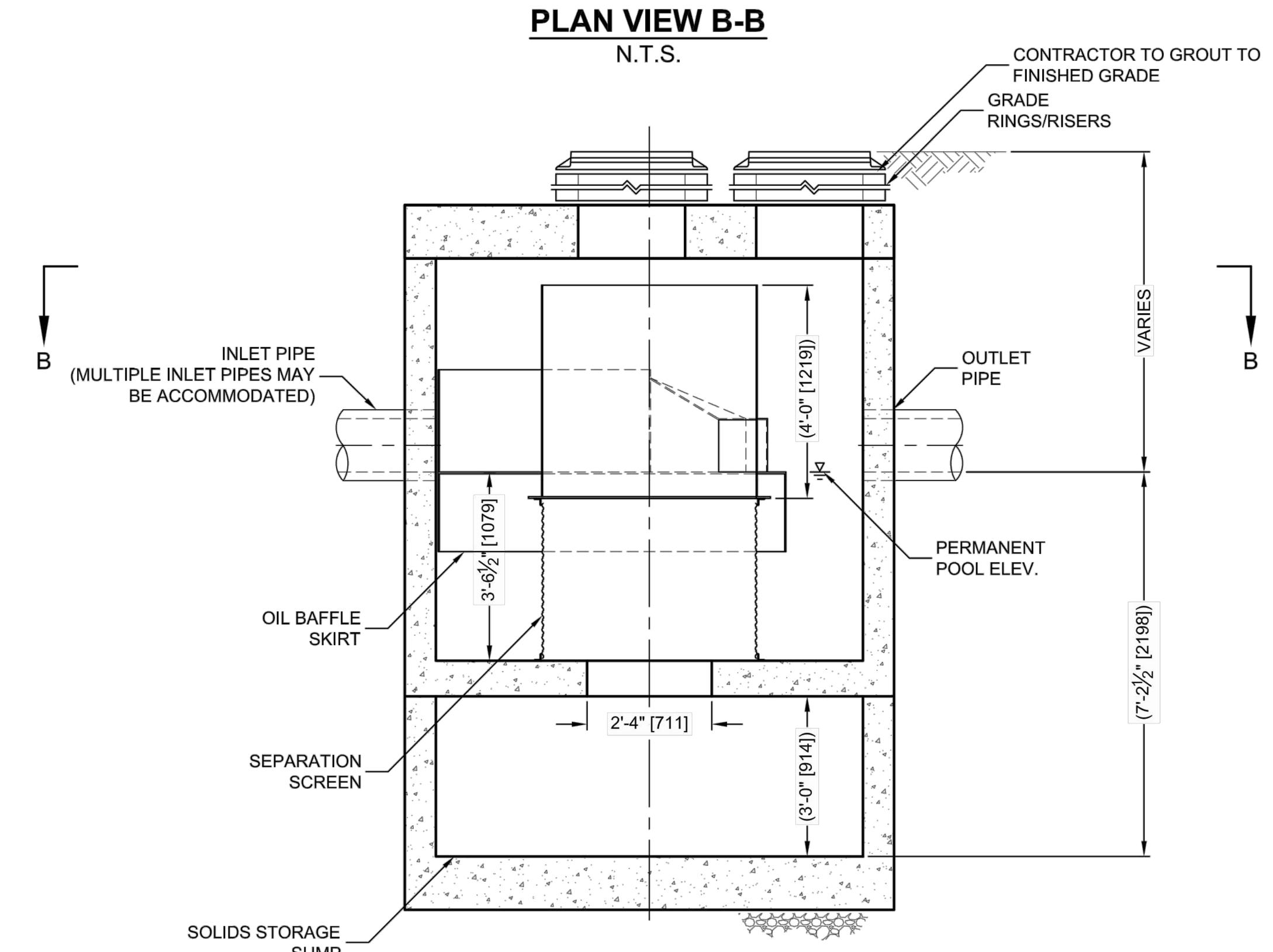
2424 CB

C CONCRETE JUNCTION BOX



PLAN VIEW B-B

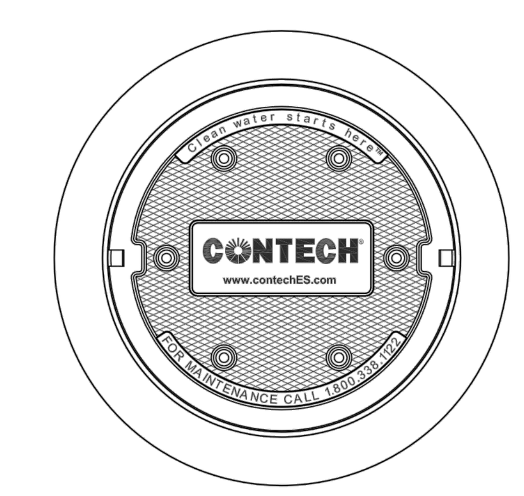
N.T.S.



ELEVATION A-A

N.T.S.

CDS4030-8-C DESIGN NOTES
THE STANDARD CDS4030-8-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.
CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



FRAME AND COVER

(DIAMETER VARIES)

N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECHENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS4030-8-C
INLINE CDS
STANDARD DETAIL

DETAILS

DIAL TOLL FREE
811
AT LEAST TWO DAYS BEFORE YOU DIG

811 Know what's below. Call before you dig.

UNDERGROUND SERVICE ALERT (USA) OF SOUTHERN CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER MATTHEW A SAWYER NO.72236 EXP. 06-30-22 CIVIL STATE OF CALIFORNIA

DEVELOPER:
WARMINGTON RESIDENTIAL
WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626

DATE 6/2/2021
DESIGNED DATE
DELINEATED DATE
CHECKED

PLAN PREPARED BY:
UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

HYDROLOGY AND SQMP-VTTM NO.6061

11930-11934 WEST LOS ANGELES AVENUE
BELTRAMO RANCH
MOORPARK, CA

4/6/2021

HYDROLOGY STUDY

FOR

VESTING TENTATIVE TRACT No. 6061
BELTRAMO RANCH
11944 WEST LOS ANGELES AVE.
MOORPARK, CA 90604

Prepared for:

Warmington Residential
3090 Pullman Street
Costa Mesa, CA 92626

September, 2021

Prepared by:

United Civil Inc.
30141 Agoura Road, Suite 215
Agoura Hills, CA 91301
Tel: (818) 707-8648
Fax: (818) 707-8649

TABLE OF CONTENTS

TABLES

APPENDICES

MAPS

Hydrology and SQMP

1. Introduction

1.1 Project Description

The proposed project site of 7.4-acre is located west of the intersection of Los Angeles Avenue and Tierra Rejada Road, in the City of Moorpark, California. The site currently consists of a community church with several related structures to the north and two residential properties to the south. The site is bounded by West Los Angeles Avenue to the north and residential developments to the west, east and south. The western portion of the site is an unimproved road (Beltramo Ranch Road).
The proposed development includes 47 two-story single family homes, two open spaces and associated streets.

1.2 Study Objectives

The objectives of this study are:

1) Analyze 100-year peak flow of the existing and the proposed conditions.

2) Determine the size of the proposed onsite storm drain system, including pipes and catch basins.

3) Design detention basin to mitigate the difference of 100-year peak flow between the existing and the proposed conditions.

4) Determine stormwater quality management volume and design the underground infiltration basin

2. Key Findings

1) The proposed storm drain system has sufficient capacity to capture and convey 100-year peak flow.

2) A detention basin is designed to mitigate proposed Q_{100} to existing condition, such that there is no increase in runoff release from the proposed project.

3) The proposed infiltration basin includes a 305'x16'x4' trench with 5-24" CMP perforated pipe of 303' long for infiltration of the SQDV. When the system is full the water will arise thru the 18" risers into the detention basin laying on top of the infiltration system.

4) The effective infiltration rate is 0.3 in/hr after applying a factor of safety of 0.6. The design capture volume (SQDV) of 8,749 cf completely infiltrates through the basin.

3. Hydrologic Data

The project is within rainfall zone J'. The 100-year 24-hour storm is 6.4 inch. The soil classification is Type 5. The 24-hour 85th percentile rainfall is 1.25 inch (Appendix B). The developed imperviousness is based on zoning of the development.

4. Methodology

The project site is under the jurisdiction of the Ventura County Watershed Protection District. All values are calculated in accordance with the District's standards [1] [2].

Time of concentration (Tc) for Q100 is obtained using WP methods. The peak flow and hydrograph are calculated using the modified rational method by the Ventura County Watershed Protection District (VCWPD) embedded in the County's Modified Rational computer model (VCRAT) [4]. A detention basin designed to mitigate the increased flow between existing and proposed conditions is sized based on the routing of the VCRAT hydrograph. The Ventura County stormwater quality requirements for the proposed project are satisfied as defined by the County's Technical Guidance Manual (2011) [2].

In this report, 100-year storm is analyzed as the basis for designing the storm drain system and the detention system.

5. Hydrology Analysis

5.1 Existing Condition

Based on the existing drainage pattern, the site is divided into 3 subareas (Map 1). The existing site generally slopes to the south and sheet flows directly to the Arroyo Simi. The hydrology calculation result of Tc and peak flow are provided in Table 1.

5.2 Proposed Condition

The proposed hydrology can be divided into the following five subareas (Map 2). The open space area on the south part of the project is not included in the calculations, assuming the pre- and post- will be the same.
In the developed condition, the 7.4-acre parcel imperviousness will increase from 20% to 58%. Runoff will be collected in catch basins throughout the site,
And an onsite storm drain system will convey runoff to the proposed underground detention/infiltration system located onsite (see the attached Preliminary Hydrology Exhibit for location). Outlet from the retention/detention area will follow existing drainage pattern and outlet to the Arroyo Simi.

5.3 Detention

This project will be served by one underground combined infiltration/detention structure.
The onsite flow from the developed area is conveyed by the 24" storm drain pipe into the 5-24" perforated infiltration pipes. The infiltration pipes and the trench with gravels are sized to store the SQDV for infiltration. The Contech CMP detention system will be installed as underground infiltration structure.
When the system is full, water will arise into the detention basin through the 18" risers. The detention basin is sized to store 1,355 cf, which is equivalent to the detention volume. The size of the basin will be 95'W' x 16'D x 0.8'H.
There are five pipes of 8" in diameter each used as outflow pipes installed at the bottom of the detention basin at 2% slope, which allows maximum of 10.8 cfs flow to be discharged.
When the inflow reaches 10.8 cfs, the detention basin begins filling up. The water in the basin will eventually be released to the downstream channel.
The detention criteria of Ventura County is that the proposed peak flow should not exceed the existing condition. The existing and the proposed peak flow of the site for 100-year storm is compared (Table 3). The difference between the combined peak flow and the maximum allowable discharge will be detained.

It is noted that:

1) For VCRAT calculation, a factor of 10 is applied to Subareas A thru E to adjust small areas to be larger than 5 ac. During the routing, flow split is applied specifying 10% flow left in the mainline that resumes the actual flow.

2) Per the infiltration test report [5] (Appendix F), the measured infiltration has an infiltration rate of 0.6 in/hr. A factor of safety of 2 is applied to the measured infiltration rates.

6. Stormwater Quality Management Plan (SQMP)

Per the infiltration test report for the site[5], the infiltration rate 0.6 in/hr approximately 5' below the ground. Therefore, infiltration-based SQMP measures are feasible. For this site, infiltration trench is proposed.

The design treatment volume (SQDV) is calculated per the TGM and is provided in Table 4.

The stormwater runoff is collected by catch basins, where pretreatment is performed via barrier and filter. The collected runoff is then conveyed to the infiltration system. The infiltration system has enough capacity to treat the design volume of 8,749 cf. The volume of CMP pipes is reserved for infiltration. The volume of the basin is used for detention. The 5-8" outflow pipes installed art the bottom of the detention basin with 2% slope will allow maximum of 10.8 cfs (existing peak flow) to go out and follow the existing pattern to the Arroyo Simi.

7. Conclusions

The onsite storm drain system is designed to capture and convey 100-year peak flow. A retention/detention trench is used to control the release of 100-year peak Q from the northern side of the site onto Arroyo Simi such that the outflow does not exceed the existing outflow.

To satisfy the stormwater quality requirements, one infiltration trench is proposed. Pretreatment measures are provided in the catch basins before water enters the trench.

Overall, the proposed development does not have negative impact to the neighboring and downstream areas.

8. References

1). Hydrology Manual, Ventura County Watershed Protection District, December 2017.

2). Ventura County Technical Guidance Manual for Stormwater Quality Control Measures, July 13, 2011.

3) Calleguas Creek Watershed HSPF Deign Storm Draft Report, Hydrology Section, Watershed Resources and Technology Division, Ventura County Watershed Protection District, July 2013

4) VCRAT2.64 and Spreadsheet User Manual, Ventura County Modified Rational Method Program, Ventura County Watershed Protection District, July 2017.

5).Infiltration Testing Report, Project No.: 1-0379, Alta California Geotechnical Inc., April 19, 2021.

Table 1 – Existing Hydrology (100-year)

	Area	Rainfall zone	SOIL	IMP	Tc	Flood Zone	Subarea Q_{100}*	Accumulated Q_{100}**
	(ac)				(min)		(cfs)	(cfs)
A	5.01	J'	5	0.2	10	3	10.0	10.0
B	1.37	J'	5	0.14	6	3	3.6	**10.8**
C	1.03	J'	5	0.05	6	3	2.5	11.9
Total	7.41							

*: from Tc Calculator

**: from VCRAT

Table 2 – Proposed Hydrology (100-year)

Subarea	Area	Rainfall Zone	Soil Type	IMP	Tc	Flood Zone	Subarea Q_{100}*	Accumulated Q_{100}**
	(ac)				(min)		(cfs)	(cfs)
A	1.49	J'	5	0.58	6	3	4.5	4.5
B	2.18	J'	5	0.58	6	3	6.6	9.3
C	0.32	J'	5	0.58	6	3	1.5	9.6
D	2.37	J'	5	0.58	7	3	6.0	**15.0**
E	1.05	J'	5	0.58	6	3	2.5	15.4
Total	7.41							

*: from Tc Calculator

**: from VCRAT

Table 3 – Summary of Comparison

	Comparison Area*	imp	Accumulated Q_{100}	Hydrograph Volume
	(ac)		(cfs)	(ac-ft)
Existing	6.4	0.1	10.8	0.84
Proposed (regular pavement)	6.4	0.58	15	2.06

*: Subarea C (existing) or Subarea E (proposed) not included

Table 4 – Stormwater Quality Design Volume (SQDV)

Subarea	A	%allow	EIAallowable	imp	TIA	Aret	Soil Type	Cp	C	P (85TH percentile)	P	SQDV_new
	(ac)									(in)	(ft)	(cf)
A	1.49	5	0.075	0.58	0.86	0.790	5	0.05	0.572	1.25	0.10	2050
B	2.18	5	0.109	0.58	1.26	1.155	5	0.05	0.572	1.25	0.10	2999
C	0.32	5	0.016	0.58	0.19	0.170	5	0.05	0.572	1.25	0.10	440
D	2.37	5	0.119	0.58	1.37	1.256	5	0.05	0.572	1.25	0.10	3260
E	1.05											
												8749

Table 5 – Infiltration Trench Summary

Scenario	Area	Vm Required	Infiltraiton rate	Safety Factor	Actual Infiltration Rate	void ratio	Pipe Length	Pipe Diameter	Trench Length	Trench Width	Depth Below Pipe	Depth Above Pipe	Depth of Pit
	(ac)	(cf)	(in/hr)		(in/hr)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
A1 thru D	7.40	0	0.6	2	0.3	0.40	390	4	392	6	1	1	6.0
w/ gravel	7.40	0	0.6	2	0.3	0.40	398	4	400	6	1	1	6.0

Infiltration Area	3-hr infiltration	Pipe Storage	Gravel Storage	Total Volume Provided
(sf)	(cf)	(cf)	(cf)	(cf)
2352	176	4898	3685	8760
2400	0	4999	3760	8759

8inch pipe @ 2%

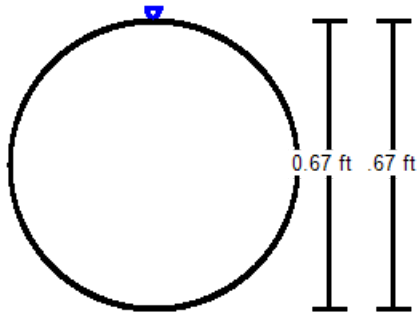
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02000	ft/ft
Normal Depth	0.67	ft
Diameter	0.67	ft
Discharge	2.25	ft³/s

Cross Section Image



V: 1
H: 1

8inch pipe - Detailed Report

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.02000	ft/ft
Normal Depth	0.67	ft
Diameter	0.67	ft

Results

Discharge	2.25	ft^3/s
Flow Area	0.35	ft^2
Wetted Perimeter	2.10	ft
Hydraulic Radius	0.17	ft
Top Width	0.00	ft
Critical Depth	0.64	ft
Percent Full	100.0	%
Critical Slope	0.01741	ft/ft
Velocity	6.39	ft/s
Velocity Head	0.63	ft
Specific Energy	1.30	ft
Froude Number	0.00	
Maximum Discharge	2.42	ft^3/s
Discharge Full	2.25	ft^3/s
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

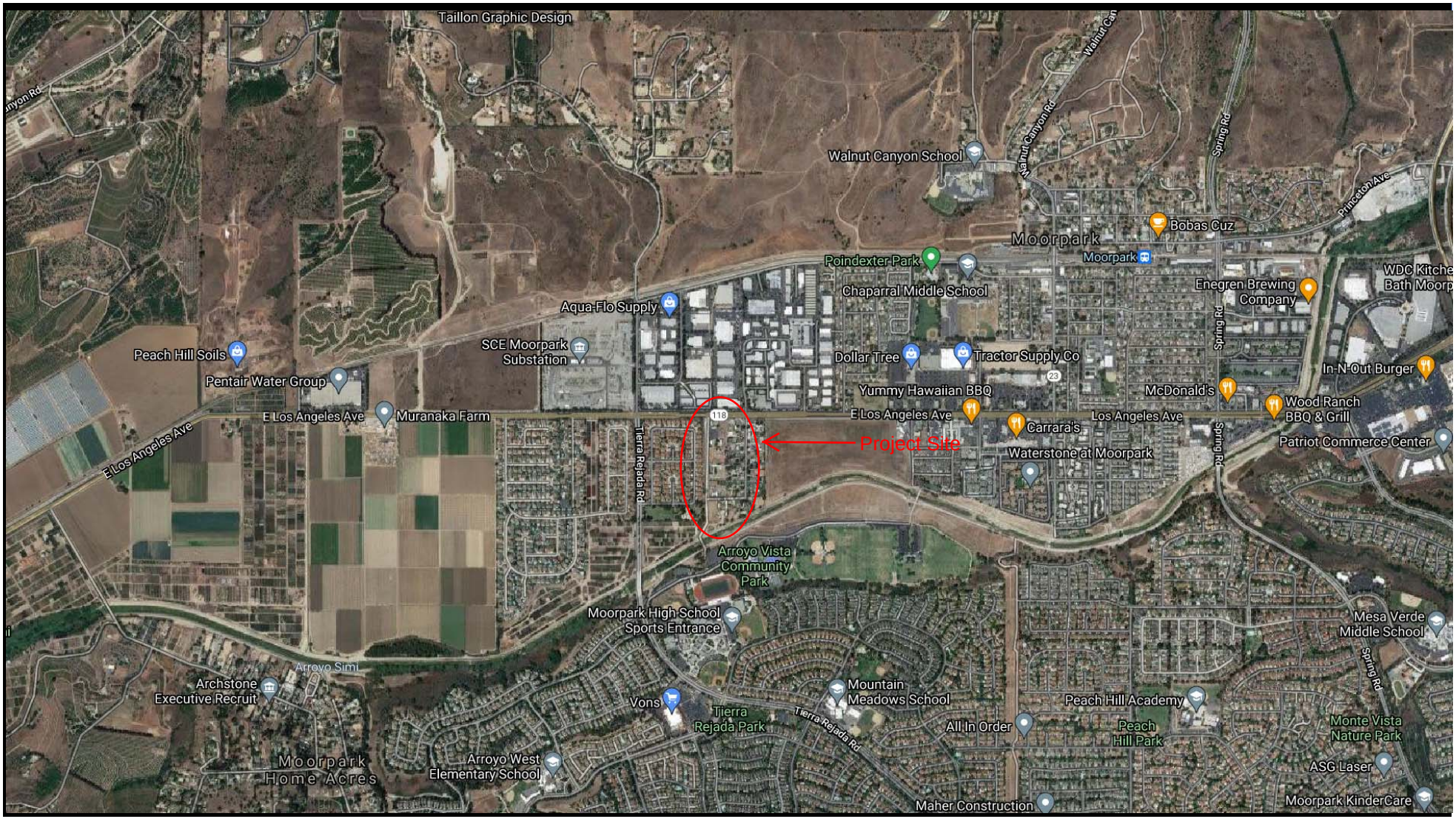
8inch pipe - Detailed Report

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.64	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01741	ft/ft

APPENDIX A

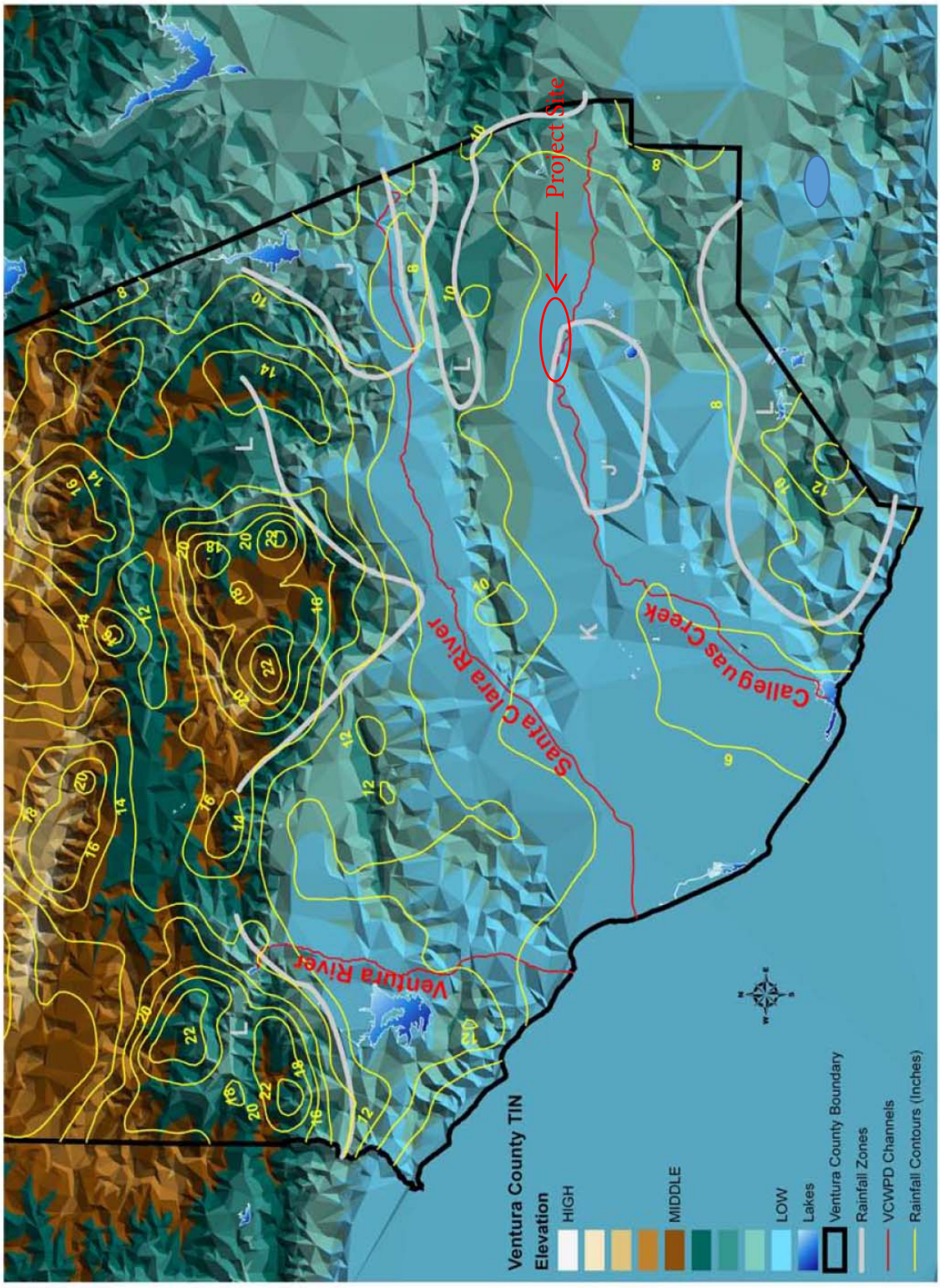
VICINITY MAP

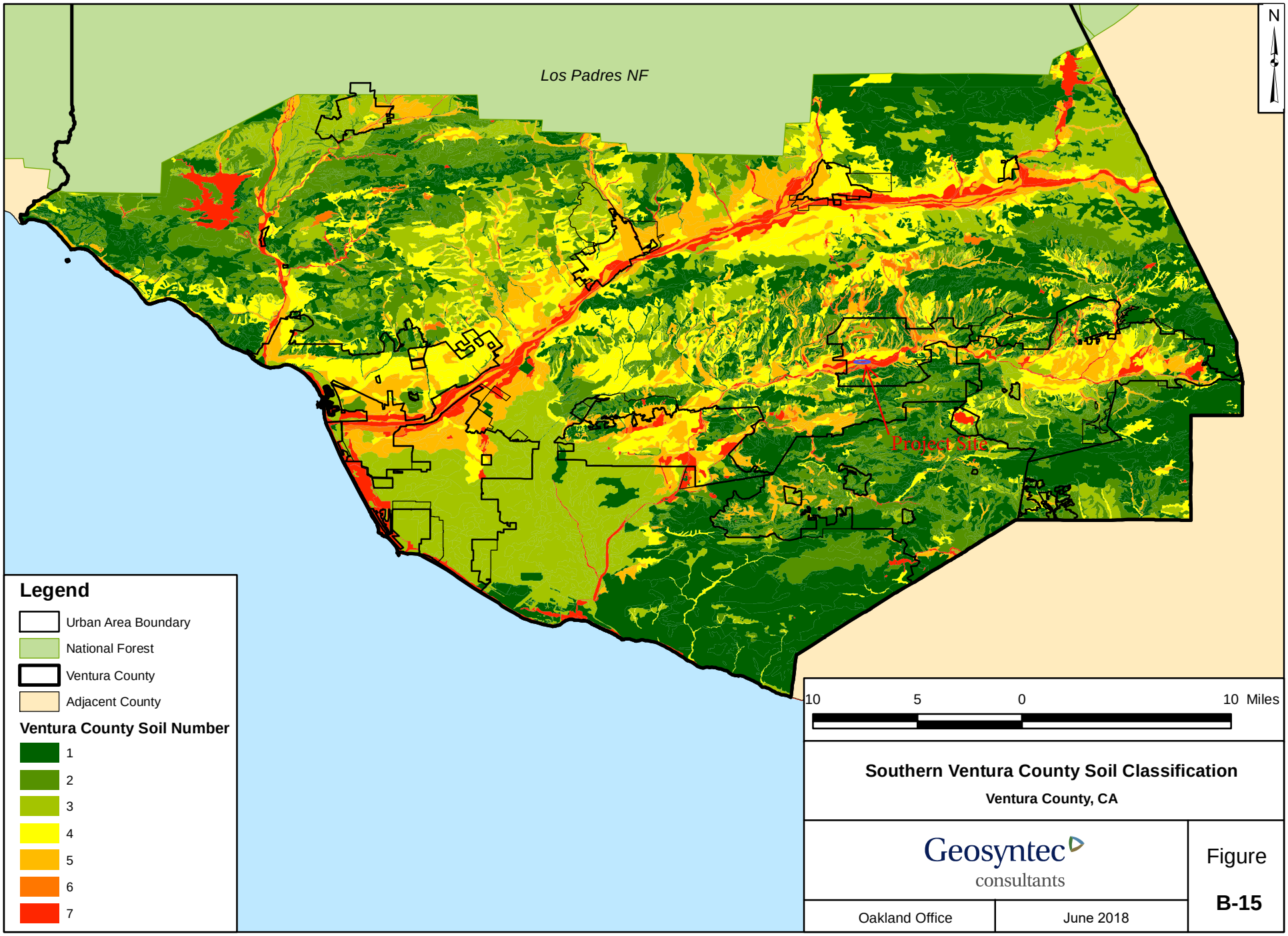

Taillon Graphic Design
Walnut Canyon School
Walnut Canyon Rd
Spring Rd
Princeton Ave
Bobas Cuz
Moorpark
Poindexter Park
Chaparral Middle School
Enegren Brewing Company
WDC Kitche
Bath Moorp
Aqua-Flo Supply
Peach Hill Soils
SCE Moorpark Substation
Dollar Tree
Tractor Supply Co
In-N-Out Burger
Pentair Water Group
Yummy Hawaiian BBQ
McDonald's
Wood Ranch BBQ & Grill
E Los Angeles Ave
Muranaka Farm
Carrara's
Los Angeles Ave
Project Site
Patriot Commerce Center
Waterstone at Moorpark
Tierra Rejada Rd
Arroyo Vista Community Park
Moorpark High School Sports Entrance
Mesa Verde Middle School
Arroyo Simi
Archstone Executive Recruit
Mountain Meadows School
Vons
Tierra Rejada Park
Peach Hill Academy
All In Order
Peach Hill Park
Monte Vista Nature Park
Moorpark Home Acres
Arroyo West Elementary School
ASG Laser
Maher Construction
Moorpark KinderCare

APPENDIX B

HYDROLOGIC DATA

EXHIBIT 1A. DESIGN STORM RAINFALL CONTOURS - 100-YR STORM





Southern Ventura County Soil Classification

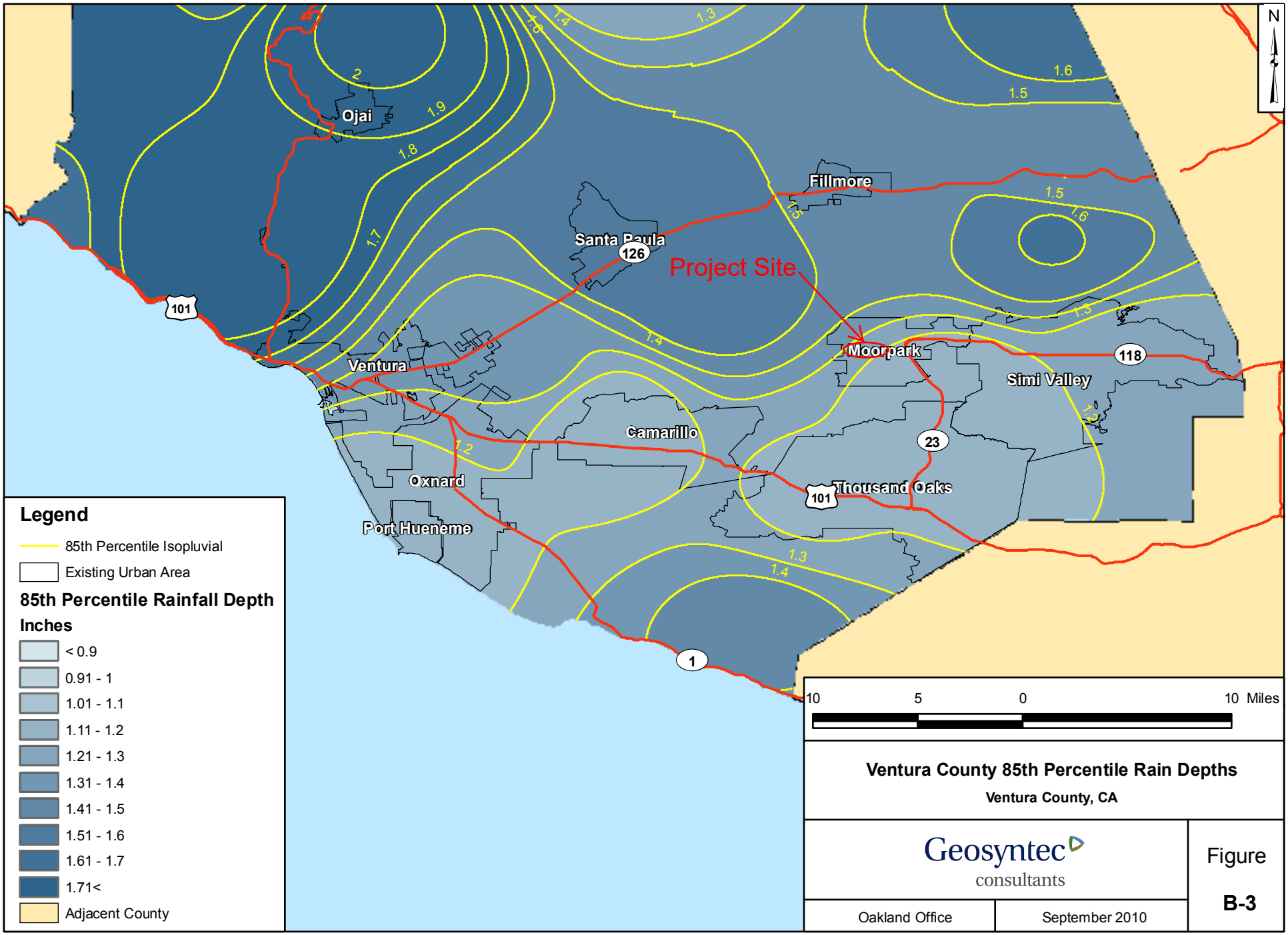
Ventura County, CA

Geosyntec consultants

Oakland Office | June 2018

Figure **B-15**

P:\GIS\Ventura_County_Manual\Projects\B-14_Ventura_Soils_092310.mxd, WHL, September 23, 2010



Ventura County 85th Percentile Rain Depths

Ventura County, CA

Geosyntec consultants

Oakland Office | September 2010

Figure **B-3**

P:\GIS\Ventura_County_Manual\Projects\B-3_Ventura_County_85th_Isopluvials_092010.mxd, WHL, September 20, 2010

APPENDIX C

VCRAT CALCULATIONS (100-YR)

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Modified Rational Model Results Report

Job: 1 Project: Beltramo Ranch

Project Description

Existing Q100

VCRat version: 2.64.0.30
VCRain version: 201601
DOS EXE version: PC 2.64-201605
VCRain Curve Set: Old VCRat 2.6 Legacy Curves
Curve A: J': J Prime Zone
Curve B: K: K Zone
Curve C: L: L Zone
Curve D: None

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Model Results

NODE ID	SOIL TYPE	RAIN ZONE	TC (MIN)	% IMP	SUBAREA DATA AND RESULTS AREA (AC)	SUBAREA DATA AND RESULTS FLOW (CFS)	ACCUMULATED DATA AREA (AC)	ACCUMULATED DATA FLOW (CFS)	TIME (MIN)	ROUTING AFTER ACCUMULATION CHANNEL TYPE	LENGTH (FT)	SLOPE (FT/FT)	SIZE (FT)	H:V (Z)	N VALUES CHNL	N VALUES SIDES	VEL (FT/S)	DEPTH (FT)
1A	050	A100	10	20	50	99	50	99	1154	#40' ROAD	1044	0.00700	---	----	-----	-----	--	--
2B	050	A100	6	14	14	36	14	36	1156	#40' ROAD	403	0.00900	---	----	-----	-----	--	--
3AB	**********																	
	* Peak in A: 83.84 cfs @ 1163 min Q in B: 10.03 cfs Combined Q: 93.86 cfs *																	
	* Peak in B: 33.50 cfs @ 1158 min Q in A: 71.94 cfs Combined Q: 105.44 cfs *																	
	* Combined Peak: 107.96 cfs @ 1159 min Q in A: 77.13 cfs Q in B: 30.83 cfs *																	
	**********																	
3AB	---	---	--	--	14	34	64	108	1159	-------	----	-------	---	----	-----	-----		

```
--     --
       4A   ---   ---    --   --    ---    ---       64     108   1159    -------    ----  -------    ---     ----    -----  -----
--     --
       5A   050   A100    6    5     10     25       74     119   1157   #40' ROAD    557  0.01100    ---     ----    -----  -----
--     --
```

Issue/Warning Messages

TYPE	ERR NO	PROCEDURE	LOCATION	MESSAGE

NO ISSUES OR WARNINGS DETECTED

HYDROGRAPH PRINTOUT AT: 3AB

TOTAL AREA TO HYDROGRAPH: 64 acres
HYDROGRAPH PEAK: 108 cfs
TIME OF PEAK: 1159 minutes
HYDROGRAPH VOLUME: 8.38 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	1.54	200	1.54	300	1.58	400	1.69
500	1.90	600	2.09	700	2.31	800	2.89	900	3.55
1000	4.32	1050	5.10	1100	6.32	1110	6.99	1120	10.54
1130	12.79	1131	12.58	1132	12.28	1133	12.03	1134	12.06
1135	12.35	1136	13.00	1137	14.22	1138	15.91	1139	17.69
1140	19.57	1141	21.52	1142	23.52	1143	25.70	1144	28.14
1145	30.69	1146	33.38	1147	36.34	1148	39.54	1149	42.96
1150	46.38	1151	49.26	1152	51.75	1153	56.01	1154	63.09
1155	73.00	1156	85.39	1157	97.13	1158	105.44	1159	107.96
1160	105.13	1161	100.43	1162	96.34	1163	93.86	1164	91.51
1165	86.55	1166	78.03	1167	67.92	1168	58.30	1169	49.84
1170	42.84	1171	36.92	1172	31.90	1173	27.63	1174	24.06
1175	21.17	1176	18.85	1177	16.94	1178	15.36	1179	14.00
1180	12.86	1181	11.88	1182	11.13	1183	10.42	1184	9.82
1185	9.29	1186	8.79	1187	8.31	1188	7.88	1189	7.49
1190	7.14	1191	6.84	1192	6.58	1193	6.34	1194	6.12
1195	5.93	1196	5.78	1197	5.64	1198	5.54	1199	5.46
1200	5.39	1201	5.34	1202	5.31	1203	5.29	1204	5.29
1205	5.29	1206	5.30	1207	5.32	1208	5.35	1209	5.40
1210	5.44	1211	5.49	1212	5.54	1213	5.59	1214	5.64
1215	5.67	1216	5.69	1217	5.68	1218	5.64	1219	5.58
1220	5.50	1221	5.42	1222	5.32	1223	5.22	1224	5.11
1225	5.00	1226	4.89	1227	4.78	1228	4.69	1229	4.60
1230	4.53	1231	4.47	1232	4.42	1233	4.38	1234	4.34
1235	4.31	1236	4.28	1237	4.25	1238	4.23	1239	4.21
1240	4.20	1241	4.18	1242	4.17	1243	4.16	1244	4.15
1245	4.13	1246	4.12	1247	4.09	1248	4.06	1249	4.03
1250	3.99	1251	3.95	1252	3.91	1253	3.87	1254	3.83
1255	3.78	1256	3.74	1257	3.70	1258	3.66	1259	3.62
1260	3.60	1261	3.57	1262	3.55	1263	3.53	1264	3.52
1265	3.50	1266	3.49	1267	3.48	1268	3.47	1269	3.46
1270	3.46	1271	3.45	1272	3.45	1273	3.44	1274	3.43
1275	3.42	1276	3.41	1277	3.39	1278	3.37	1279	3.34
1280	3.30	1281	3.27	1282	3.23	1283	3.19	1284	3.15
1285	3.11	1286	3.07	1287	3.03	1288	2.99	1289	2.95
1290	2.93	1291	2.90	1292	2.88	1293	2.86	1294	2.84

1295	2.83	1296	2.82	1297	2.81	1298	2.80	1299	2.79
1300	2.78	1310	2.64	1320	2.37	1330	2.10	1340	1.83
1350	1.68	1360	1.78	1370	1.75	1380	1.60	1390	1.56
1400	1.54	1420	1.54	1440	1.54	1460	1.54	1500	1.54

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 5A

TOTAL AREA TO HYDROGRAPH: 74 acres
HYDROGRAPH PEAK: 119 cfs
TIME OF PEAK: 1157 minutes
HYDROGRAPH VOLUME: 9.01 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	1.60	200	1.60	300	1.64	400	1.76
500	1.98	600	2.18	700	2.40	800	3.02	900	3.70
1000	4.50	1050	5.32	1100	6.60	1110	7.34	1120	12.26
1130	13.16	1131	13.63	1132	14.26	1133	14.81	1134	15.62
1135	16.65	1136	18.03	1137	19.25	1138	20.83	1139	22.72
1140	24.59	1141	27.04	1142	29.53	1143	32.20	1144	35.32
1145	39.04	1146	42.76	1147	46.40	1148	50.27	1149	52.43
1150	54.47	1151	59.74	1152	72.83	1153	79.36	1154	86.43
1155	97.61	1156	110.58	1157	118.63	1158	115.33	1159	113.48
1160	108.90	1161	102.94	1162	98.72	1163	95.57	1164	92.42
1165	87.60	1166	78.41	1167	68.28	1168	58.64	1169	50.13
1170	43.17	1171	37.23	1172	32.20	1173	27.92	1174	24.35
1175	21.49	1176	19.11	1177	17.20	1178	15.63	1179	14.26
1180	13.11	1181	12.12	1182	11.36	1183	10.64	1184	10.02
1185	9.49	1186	8.98	1187	8.50	1188	8.07	1189	7.69
1190	7.34	1191	7.05	1192	6.79	1193	6.55	1194	6.34
1195	6.15	1196	6.00	1197	5.86	1198	5.76	1199	5.67
1200	5.61	1201	5.57	1202	5.54	1203	5.53	1204	5.53
1205	5.54	1206	5.56	1207	5.58	1208	5.61	1209	5.65
1210	5.70	1211	5.73	1212	5.77	1213	5.81	1214	5.84
1215	5.86	1216	5.86	1217	5.85	1218	5.81	1219	5.75
1220	5.67	1221	5.59	1222	5.49	1223	5.39	1224	5.29
1225	5.17	1226	5.06	1227	4.95	1228	4.86	1229	4.78
1230	4.71	1231	4.65	1232	4.59	1233	4.55	1234	4.51
1235	4.48	1236	4.45	1237	4.43	1238	4.40	1239	4.39
1240	4.37	1241	4.35	1242	4.33	1243	4.32	1244	4.30
1245	4.28	1246	4.26	1247	4.24	1248	4.21	1249	4.17
1250	4.13	1251	4.09	1252	4.05	1253	4.01	1254	3.97
1255	3.93	1256	3.88	1257	3.84	1258	3.80	1259	3.77
1260	3.74	1261	3.71	1262	3.69	1263	3.68	1264	3.66
1265	3.65	1266	3.63	1267	3.62	1268	3.61	1269	3.61
1270	3.60	1271	3.59	1272	3.58	1273	3.57	1274	3.56
1275	3.54	1276	3.53	1277	3.51	1278	3.48	1279	3.45
1280	3.42	1281	3.38	1282	3.34	1283	3.31	1284	3.27
1285	3.22	1286	3.18	1287	3.14	1288	3.10	1289	3.07
1290	3.04	1291	3.01	1292	2.99	1293	2.98	1294	2.96

1295	2.94	1296	2.93	1297	2.92	1298	2.91	1299	2.90
1300	2.90	1310	2.73	1320	2.46	1330	2.16	1340	1.89
1350	1.76	1360	1.84	1370	1.81	1380	1.65	1390	1.61
1400	1.57	1420	1.55	1440	1.55	1460	1.54	1500	1.54

VCRat Model Input

Model Lines

```
005     1  001A Header place holder
005     1  003ABHeader place holder
005     1  005A Header place holder
999
999
006     1  001A 050020005010A97 01044000700                    G1
006     1  002B 050014001406A97 00403000900
006     1  003AB010          A97                              11
006     1  004A 010      099A97
006     1  005A 050005001006A97 00557001100                    1  2
999
```

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Modified Rational Model Results Report

Job: 1 Project: Beltramo Ranch

Project Description

Prop Q100

VCRat version: 2.64.0.30
VCRain version: 201601
DOS EXE version: PC 2.64-201605
VCRain Curve Set: Old VCRat 2.6 Legacy Curves
Curve A: J': J Prime Zone
Curve B: K: K Zone
Curve C: L: L Zone
Curve D: None

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Model Results

NODE ID	SOIL TYPE	RAIN ZONE	TC (MIN)	% IMP	SUBAREA DATA AND RESULTS AREA (AC)	SUBAREA DATA AND RESULTS FLOW (CFS)	ACCUMULATED DATA AREA (AC)	ACCUMULATED DATA FLOW (CFS)	TIME (MIN)	ROUTING AFTER ACCUMULATION CHANNEL TYPE	LENGTH (FT)	SLOPE (FT/FT)	SIZE (FT)	H:V (Z)	N VALUES CHNL	N VALUES SIDES	VEL (FT/S)	DEPTH (FT)
1A	050	A100	6	58	15	45	15	45	1156	#40' ROAD	936	0.01000	---	----	-----	-----	--	--
2B	050	A100	6	58	22	66	22	66	1156	#40' ROAD	729	0.01000	---	----	-----	-----	--	--
3AB	**********																	
	* Peak in A:					36.61 cfs @ 1160 min	Q in B:	54.58 cfs	Combined Q:	91.19 cfs	*							
	* Peak in B:					57.89 cfs @ 1159 min	Q in A:	35.37 cfs	Combined Q:	93.26 cfs	*							
	* Combined Peak:					93.26 cfs @ 1159 min	Q in A:	35.37 cfs	Q in B:	57.89 cfs	*							
	**********																	
3AB	---	---	--	--	22	58	37	93	1159	-------	----	-------	---	----	-----	-----		

```
--      --
        4A   050   A100    6   58      5     15       42      98   1159   #40' ROAD    285  0.01500    ---      ----    -----  -----
--      --
        5C   050   A100    7   58     24     64       24      64   1157   #40' ROAD   1038  0.01000    ---      ----    -----  -----
--      --
        6AC  ********************************************************************************************************
             *          Peak in A:       96.01 cfs @ 1160 min  Q in C:       54.40 cfs  Combined Q:      150.40 cfs   *
             *          Peak in C:       55.63 cfs @ 1161 min  Q in A:       94.43 cfs  Combined Q:      150.06 cfs   *
             *      Combined Peak:      150.40 cfs @ 1160 min  Q in A:       96.01 cfs      Q in C:       54.40 cfs   *
             ********************************************************************************************************
        6AC  ---   ---    --   --     24     56       66     150   1160    -------    ----  -------    ---      ----    -----  -----
--      --
        7AD:  Clearing Lateral Bank:  D
        7AD:  Control/Diversion:  10% to channel A
             ********************************************************************************************************
             *      Combined Peak:      150.40 cfs @ 1160 min  Q in A:       15.04 cfs      Q in D:      135.36 cfs   *
             *          Peak in A:       15.04 cfs @ 1160 min  Q in D:      135.36 cfs  Combined Q:      150.40 cfs   *
             *          Peak in D:      135.36 cfs @ 1160 min  Q in A:       15.04 cfs  Combined Q:      150.40 cfs   *
             ********************************************************************************************************
        7AD  ---   ---    --   --    ---    ---       66      15   1160    -------    ----  -------    ---      ----    -----  -----
--      --
        8A   050   A100    6    5     10     25       76      36   1156    -------    ----  -------    ---      ----    -----  -----
--      --
             ***************************************************************************************
             *      INCOMING HYDROGRAPH  PEAK (cfs):     36.16         VOLUME (acre-ft):      2.70      *
             *      NO HYDROGRAPH ADJUSTMENT                                                          *
             *      RUNOFF FACTOR(in):   5.27      TOTAL RAIN(in):   8.00      SCS Curve: 77         *
             *      FATTENED HYDROGRAPH  PEAK (cfs):     36.16         VOLUME (acre-ft):     33.36      *
             ***************************************************************************************
        8A   ---   ---    --   --    ---    ---       76      36   ----    -------    ----  -------    ---      ----    -----  -----
--      --
        9A   ---   ---    --   --    ---    ---       76      36   1156    -------    ----  -------    ---      ----    -----  -----
--      --


                                        Issue/Warning Messages
      TYPE      ERR NO   PROCEDURE    LOCATION   MESSAGE

-------------------------------------------------------------------------------------------------------------------------------------------------------
------
        NO ISSUES OR WARNINGS DETECTED
```


Hydrograph Printouts

```
-----------------------------------------------------------------------------------------------
            HYDROGRAPH PRINTOUT AT:    2B
-----------------------------------------------------------------------------------------------
            TOTAL AREA TO HYDROGRAPH:      22    acres
            HYDROGRAPH PEAK:               66    cfs
            TIME OF PEAK:                1156    minutes
            HYDROGRAPH VOLUME:             6.68 acre-ft

     TIME     FLOW    TIME     FLOW    TIME     FLOW    TIME     FLOW    TIME     FLOW
     (min)    (cfs)   (min)    (cfs)   (min)    (cfs)   (min)    (cfs)   (min)    (cfs)
     ---------------------------------------------------------------------------
        0       0.00   100       1.45   200       1.45   300       1.53   400       1.67
```

500	1.96	600	2.18	700	2.49	800	3.19	900	3.85
1000	4.73	1050	5.67	1100	7.07	1110	9.02	1120	12.16
1130	9.46	1131	10.93	1132	12.65	1133	14.12	1134	15.71
1135	17.24	1136	18.76	1137	18.76	1138	18.55	1139	18.76
1140	18.76	1141	19.83	1142	20.89	1143	21.95	1144	23.43
1145	26.08	1146	28.48	1147	30.07	1148	31.66	1149	28.68
1150	25.48	1151	31.06	1152	56.18	1153	61.54	1154	61.54
1155	64.51	1156	65.90	1157	57.17	1158	29.67	1159	19.83
1160	16.14	1161	13.63	1162	13.39	1163	12.16	1164	10.68
1165	10.93	1166	9.70	1167	9.21	1168	8.61	1169	7.39
1170	8.24	1171	7.88	1172	7.64	1173	7.52	1174	7.39
1175	8.24	1176	6.79	1177	6.67	1178	6.79	1179	6.55
1180	6.42	1181	6.18	1182	5.82	1183	5.58	1184	5.21
1185	5.09	1186	4.85	1187	4.73	1188	4.85	1189	4.97
1190	4.97	1191	5.21	1192	5.33	1193	5.45	1194	5.58
1195	5.58	1196	5.58	1197	5.58	1198	5.58	1199	5.58
1200	5.58	1201	5.70	1202	5.94	1203	6.06	1204	6.18
1205	6.42	1206	6.55	1207	6.55	1208	6.55	1209	6.55
1210	6.55	1211	6.18	1212	5.82	1213	5.45	1214	5.09
1215	4.73	1216	4.36	1217	4.36	1218	4.36	1219	4.36
1220	4.36	1221	4.36	1222	4.36	1223	4.36	1224	4.36
1225	4.36	1226	4.36	1227	4.36	1228	4.36	1229	4.36
1230	4.36	1231	4.36	1232	4.36	1233	4.36	1234	4.36
1235	4.36	1236	4.36	1237	4.36	1238	4.36	1239	4.36
1240	4.36	1241	4.24	1242	4.12	1243	4.00	1244	3.88
1245	3.76	1246	3.64	1247	3.64	1248	3.64	1249	3.64
1250	3.64	1251	3.64	1252	3.64	1253	3.64	1254	3.64
1255	3.64	1256	3.64	1257	3.64	1258	3.64	1259	3.64
1260	3.64	1261	3.64	1262	3.64	1263	3.64	1264	3.64
1265	3.64	1266	3.64	1267	3.64	1268	3.64	1269	3.64
1270	3.64	1271	3.52	1272	3.39	1273	3.27	1274	3.15
1275	3.03	1276	2.91	1277	2.91	1278	2.91	1279	2.91
1280	2.91	1281	2.91	1282	2.91	1283	2.91	1284	2.91
1285	2.91	1286	2.91	1287	2.91	1288	2.91	1289	2.91
1290	2.91	1291	2.91	1292	2.91	1293	2.91	1294	2.91
1295	2.91	1296	2.91	1297	2.91	1298	2.91	1299	2.91
1300	2.91	1310	2.18	1320	2.18	1330	1.45	1340	1.45
1350	2.18	1360	1.45	1370	1.45	1380	1.45	1390	1.45
1400	0.73	1420	0.36	1440	0.29	1460	0.04	1500	0.02

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 3AB

TOTAL AREA TO HYDROGRAPH: 37 acres
HYDROGRAPH PEAK: 93 cfs
TIME OF PEAK: 1159 minutes
HYDROGRAPH VOLUME: 11.54 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	2.45	200	2.45	300	2.55	400	2.79

500	3.24	600	3.65	700	4.12	800	5.24	900	6.39
1000	7.80	1050	9.25	1100	11.49	1110	12.99	1120	16.70
1130	18.17	1131	17.94	1132	17.67	1133	17.37	1134	17.30
1135	17.74	1136	18.70	1137	20.10	1138	21.83	1139	23.71
1140	25.45	1141	26.82	1142	27.89	1143	28.79	1144	29.73
1145	30.86	1146	32.20	1147	33.86	1148	36.06	1149	38.72
1150	41.56	1151	43.98	1152	45.15	1153	45.58	1154	49.96
1155	60.40	1156	71.90	1157	81.03	1158	88.65	1159	93.26
1160	91.19	1161	82.31	1162	70.66	1163	59.61	1164	50.42
1165	43.24	1166	37.83	1167	33.43	1168	29.85	1169	26.97
1170	24.55	1171	22.47	1172	20.62	1173	19.05	1174	17.85
1175	16.86	1176	16.03	1177	15.33	1178	14.84	1179	14.44
1180	13.93	1181	13.41	1182	12.97	1183	12.58	1184	12.21
1185	11.85	1186	11.46	1187	11.05	1188	10.63	1189	10.23
1190	9.85	1191	9.51	1192	9.25	1193	9.06	1194	8.94
1195	8.90	1196	8.90	1197	8.95	1198	9.02	1199	9.09
1200	9.15	1201	9.19	1202	9.23	1203	9.26	1204	9.29
1205	9.36	1206	9.47	1207	9.60	1208	9.77	1209	9.96
1210	10.16	1211	10.32	1212	10.46	1213	10.57	1214	10.62
1215	10.58	1216	10.43	1217	10.20	1218	9.89	1219	9.54
1220	9.17	1221	8.82	1222	8.54	1223	8.31	1224	8.12
1225	7.98	1226	7.86	1227	7.76	1228	7.68	1229	7.62
1230	7.57	1231	7.53	1232	7.50	1233	7.47	1234	7.45
1235	7.43	1236	7.41	1237	7.40	1238	7.39	1239	7.38
1240	7.37	1241	7.37	1242	7.36	1243	7.36	1244	7.35
1245	7.32	1246	7.26	1247	7.17	1248	7.07	1249	6.94
1250	6.81	1251	6.69	1252	6.58	1253	6.50	1254	6.43
1255	6.37	1256	6.33	1257	6.29	1258	6.26	1259	6.23
1260	6.21	1261	6.20	1262	6.18	1263	6.17	1264	6.16
1265	6.15	1266	6.15	1267	6.14	1268	6.14	1269	6.13
1270	6.13	1271	6.13	1272	6.13	1273	6.12	1274	6.12
1275	6.09	1276	6.04	1277	5.96	1278	5.86	1279	5.75
1280	5.62	1281	5.50	1282	5.39	1283	5.30	1284	5.23
1285	5.17	1286	5.12	1287	5.08	1288	5.05	1289	5.03
1290	5.00	1291	4.98	1292	4.97	1293	4.96	1294	4.95
1295	4.94	1296	4.93	1297	4.92	1298	4.92	1299	4.91
1300	4.91	1310	4.55	1320	3.95	1330	3.37	1340	2.77
1350	2.78	1360	3.04	1370	2.74	1380	2.47	1390	2.45
1400	2.45	1420	2.45	1440	2.45	1460	2.45	1500	2.45

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 4A

TOTAL AREA TO HYDROGRAPH: 42 acres
HYDROGRAPH PEAK: 98 cfs
TIME OF PEAK: 1159 minutes
HYDROGRAPH VOLUME: 13.06 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	2.78	200	2.78	300	2.90	400	3.17

500	3.69	600	4.14	700	4.68	800	5.96	900	7.27
1000	8.88	1050	10.53	1100	13.10	1110	15.04	1120	19.47
1130	20.32	1131	20.42	1132	20.54	1133	20.58	1134	20.87
1135	21.66	1136	22.97	1137	24.36	1138	26.04	1139	27.97
1140	29.71	1141	31.33	1142	32.64	1143	33.78	1144	35.06
1145	36.79	1146	38.67	1147	40.70	1148	43.25	1149	45.24
1150	47.35	1151	51.04	1152	57.92	1153	59.56	1154	63.94
1155	75.06	1156	86.88	1157	94.02	1158	95.39	1159	97.76
1160	94.86	1161	85.41	1162	73.70	1163	62.38	1164	52.84
1165	45.73	1166	40.03	1167	35.52	1168	31.81	1169	28.65
1170	26.42	1171	24.26	1172	22.35	1173	20.75	1174	19.53
1175	18.73	1176	17.58	1177	16.84	1178	16.39	1179	15.93
1180	15.39	1181	14.82	1182	14.29	1183	13.85	1184	13.40
1185	13.00	1186	12.56	1187	12.12	1188	11.74	1189	11.36
1190	10.98	1191	10.70	1192	10.46	1193	10.30	1194	10.21
1195	10.16	1196	10.17	1197	10.22	1198	10.29	1199	10.36
1200	10.42	1201	10.49	1202	10.58	1203	10.64	1204	10.70
1205	10.82	1206	10.95	1207	11.09	1208	11.26	1209	11.45
1210	11.64	1211	11.73	1212	11.78	1213	11.81	1214	11.78
1215	11.65	1216	11.42	1217	11.19	1218	10.88	1219	10.53
1220	10.16	1221	9.81	1222	9.53	1223	9.30	1224	9.11
1225	8.97	1226	8.85	1227	8.75	1228	8.68	1229	8.61
1230	8.56	1231	8.52	1232	8.49	1233	8.46	1234	8.44
1235	8.42	1236	8.40	1237	8.39	1238	8.38	1239	8.37
1240	8.36	1241	8.33	1242	8.30	1243	8.27	1244	8.23
1245	8.17	1246	8.09	1247	8.00	1248	7.89	1249	7.77
1250	7.64	1251	7.51	1252	7.41	1253	7.32	1254	7.25
1255	7.20	1256	7.15	1257	7.12	1258	7.09	1259	7.06
1260	7.04	1261	7.02	1262	7.01	1263	7.00	1264	6.99
1265	6.98	1266	6.97	1267	6.97	1268	6.96	1269	6.96
1270	6.96	1271	6.93	1272	6.90	1273	6.87	1274	6.83
1275	6.78	1276	6.70	1277	6.63	1278	6.53	1279	6.41
1280	6.28	1281	6.16	1282	6.05	1283	5.96	1284	5.89
1285	5.83	1286	5.78	1287	5.75	1288	5.71	1289	5.69
1290	5.66	1291	5.65	1292	5.63	1293	5.62	1294	5.61
1295	5.60	1296	5.59	1297	5.59	1298	5.58	1299	5.58
1300	5.57	1310	5.05	1320	4.45	1330	3.70	1340	3.10
1350	3.28	1360	3.37	1370	3.08	1380	2.80	1390	2.78
1400	2.61	1420	2.53	1440	2.51	1460	2.45	1500	2.45

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 5C

TOTAL AREA TO HYDROGRAPH: 24 acres
HYDROGRAPH PEAK: 64 cfs
TIME OF PEAK: 1157 minutes
HYDROGRAPH VOLUME: 7.29 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	1.59	200	1.59	300	1.67	400	1.82

500	2.14	600	2.38	700	2.71	800	3.48	900	4.20
1000	5.16	1050	6.19	1100	7.71	1110	9.84	1120	13.26
1130	10.31	1131	11.65	1132	13.26	1133	14.64	1134	16.22
1135	17.65	1136	19.07	1137	20.50	1138	20.30	1139	20.30
1140	20.50	1141	21.50	1142	22.49	1143	23.48	1144	24.67
1145	27.39	1146	29.63	1147	32.06	1148	33.55	1149	30.76
1150	27.95	1151	34.47	1152	57.72	1153	62.96	1154	62.96
1155	61.48	1156	62.77	1157	64.07	1158	56.39	1159	29.26
1160	20.71	1161	16.83	1162	14.87	1163	13.72	1164	13.03
1165	11.42	1166	11.19	1167	10.20	1168	9.86	1169	8.27
1170	9.29	1171	8.84	1172	8.39	1173	8.16	1174	8.16
1175	7.93	1176	8.73	1177	7.37	1178	7.37	1179	7.14
1180	7.14	1181	6.80	1182	6.46	1183	6.23	1184	6.01
1185	5.55	1186	5.55	1187	5.21	1188	5.21	1189	5.44
1190	5.44	1191	5.55	1192	5.78	1193	5.78	1194	6.01
1195	6.12	1196	6.01	1197	6.12	1198	6.12	1199	6.01
1200	6.12	1201	6.23	1202	6.35	1203	6.57	1204	6.69
1205	6.80	1206	7.03	1207	7.14	1208	7.14	1209	7.14
1210	7.14	1211	6.80	1212	6.46	1213	6.12	1214	5.78
1215	5.44	1216	5.10	1217	4.76	1218	4.76	1219	4.76
1220	4.76	1221	4.76	1222	4.76	1223	4.76	1224	4.76
1225	4.76	1226	4.76	1227	4.76	1228	4.76	1229	4.76
1230	4.76	1231	4.76	1232	4.76	1233	4.76	1234	4.76
1235	4.76	1236	4.76	1237	4.76	1238	4.76	1239	4.76
1240	4.76	1241	4.65	1242	4.53	1243	4.42	1244	4.31
1245	4.19	1246	4.08	1247	3.97	1248	3.97	1249	3.97
1250	3.97	1251	3.97	1252	3.97	1253	3.97	1254	3.97
1255	3.97	1256	3.97	1257	3.97	1258	3.97	1259	3.97
1260	3.97	1261	3.97	1262	3.97	1263	3.97	1264	3.97
1265	3.97	1266	3.97	1267	3.97	1268	3.97	1269	3.97
1270	3.97	1271	3.85	1272	3.74	1273	3.63	1274	3.51
1275	3.40	1276	3.29	1277	3.17	1278	3.17	1279	3.17
1280	3.17	1281	3.17	1282	3.17	1283	3.17	1284	3.17
1285	3.17	1286	3.17	1287	3.17	1288	3.17	1289	3.17
1290	3.17	1291	3.17	1292	3.17	1293	3.17	1294	3.17
1295	3.17	1296	3.17	1297	3.17	1298	3.17	1299	3.17
1300	3.17	1310	2.38	1320	2.38	1330	1.59	1340	1.59
1350	2.38	1360	1.59	1370	1.59	1380	1.59	1390	1.59
1400	0.79	1420	0.40	1440	0.32	1460	0.04	1500	0.02

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 6AC

TOTAL AREA TO HYDROGRAPH: 66 acres
HYDROGRAPH PEAK: 150 cfs
TIME OF PEAK: 1160 minutes
HYDROGRAPH VOLUME: 20.59 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	4.36	200	4.36	300	4.55	400	4.96

500	5.77	600	6.49	700	7.33	800	9.30	900	11.38
1000	13.87	1050	16.41	1100	20.39	1110	22.82	1120	28.94
1130	32.11	1131	31.97	1132	31.90	1133	31.85	1134	31.78
1135	31.91	1136	32.62	1137	34.00	1138	35.95	1139	38.33
1140	41.09	1141	43.96	1142	46.60	1143	48.88	1144	50.87
1145	52.87	1146	55.15	1147	57.74	1148	60.73	1149	64.24
1150	68.05	1151	72.07	1152	76.78	1153	82.04	1154	86.78
1155	94.97	1156	109.67	1157	125.68	1158	138.21	1159	145.93
1160	150.40	1161	150.06	1162	141.49	1163	126.47	1164	109.87
1165	94.58	1166	81.81	1167	71.65	1168	63.45	1169	56.66
1170	51.00	1171	46.37	1172	42.49	1173	39.04	1174	36.07
1175	33.67	1176	31.74	1177	30.05	1178	28.52	1179	27.31
1180	26.38	1181	25.53	1182	24.62	1183	23.72	1184	22.93
1185	22.19	1186	21.49	1187	20.79	1188	20.09	1189	19.42
1190	18.76	1191	18.13	1192	17.54	1193	17.04	1194	16.65
1195	16.38	1196	16.20	1197	16.11	1198	16.09	1199	16.14
1200	16.22	1201	16.30	1202	16.39	1203	16.48	1204	16.57
1205	16.65	1206	16.77	1207	16.93	1208	17.13	1209	17.36
1210	17.63	1211	17.92	1212	18.18	1213	18.37	1214	18.51
1215	18.58	1216	18.53	1217	18.35	1218	18.05	1219	17.67
1220	17.21	1221	16.67	1222	16.13	1223	15.62	1224	15.18
1225	14.81	1226	14.50	1227	14.25	1228	14.05	1229	13.88
1230	13.75	1231	13.63	1232	13.54	1233	13.47	1234	13.40
1235	13.35	1236	13.31	1237	13.27	1238	13.24	1239	13.22
1240	13.20	1241	13.18	1242	13.16	1243	13.12	1244	13.09
1245	13.05	1246	12.99	1247	12.90	1248	12.79	1249	12.65
1250	12.48	1251	12.29	1252	12.09	1253	11.90	1254	11.74
1255	11.60	1256	11.48	1257	11.38	1258	11.30	1259	11.24
1260	11.18	1261	11.14	1262	11.10	1263	11.07	1264	11.04
1265	11.02	1266	11.00	1267	10.99	1268	10.98	1269	10.97
1270	10.96	1271	10.95	1272	10.94	1273	10.91	1274	10.88
1275	10.85	1276	10.80	1277	10.73	1278	10.62	1279	10.49
1280	10.34	1281	10.16	1282	9.97	1283	9.78	1284	9.61
1285	9.47	1286	9.35	1287	9.25	1288	9.17	1289	9.10
1290	9.04	1291	8.99	1292	8.95	1293	8.91	1294	8.88
1295	8.86	1296	8.84	1297	8.82	1298	8.81	1299	8.79
1300	8.78	1310	8.21	1320	7.22	1330	6.17	1340	5.12
1350	4.98	1360	5.32	1370	4.99	1380	4.50	1390	4.37
1400	4.36	1420	4.36	1440	4.36	1460	4.36	1500	4.36

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 7A

7AD: Clearing Lateral Bank: D

TOTAL AREA TO HYDROGRAPH: 66 acres
HYDROGRAPH PEAK: 15 cfs
TIME OF PEAK: 1160 minutes
HYDROGRAPH VOLUME: 2.06 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)

0	0.00	100	0.44	200	0.44	300	0.45	400	0.50
500	0.58	600	0.65	700	0.73	800	0.93	900	1.14
1000	1.39	1050	1.64	1100	2.04	1110	2.28	1120	2.89
1130	3.21	1131	3.20	1132	3.19	1133	3.19	1134	3.18
1135	3.19	1136	3.26	1137	3.40	1138	3.60	1139	3.83
1140	4.11	1141	4.40	1142	4.66	1143	4.89	1144	5.09
1145	5.29	1146	5.51	1147	5.77	1148	6.07	1149	6.42
1150	6.80	1151	7.21	1152	7.68	1153	8.20	1154	8.68
1155	9.50	1156	10.97	1157	12.57	1158	13.82	1159	14.59
1160	15.04	1161	15.01	1162	14.15	1163	12.65	1164	10.99
1165	9.46	1166	8.18	1167	7.17	1168	6.34	1169	5.67
1170	5.10	1171	4.64	1172	4.25	1173	3.90	1174	3.61
1175	3.37	1176	3.17	1177	3.00	1178	2.85	1179	2.73
1180	2.64	1181	2.55	1182	2.46	1183	2.37	1184	2.29
1185	2.22	1186	2.15	1187	2.08	1188	2.01	1189	1.94
1190	1.88	1191	1.81	1192	1.75	1193	1.70	1194	1.67
1195	1.64	1196	1.62	1197	1.61	1198	1.61	1199	1.61
1200	1.62	1201	1.63	1202	1.64	1203	1.65	1204	1.66
1205	1.67	1206	1.68	1207	1.69	1208	1.71	1209	1.74
1210	1.76	1211	1.79	1212	1.82	1213	1.84	1214	1.85
1215	1.86	1216	1.85	1217	1.83	1218	1.81	1219	1.77
1220	1.72	1221	1.67	1222	1.61	1223	1.56	1224	1.52
1225	1.48	1226	1.45	1227	1.43	1228	1.40	1229	1.39
1230	1.37	1231	1.36	1232	1.35	1233	1.35	1234	1.34
1235	1.34	1236	1.33	1237	1.33	1238	1.32	1239	1.32
1240	1.32	1241	1.32	1242	1.32	1243	1.31	1244	1.31
1245	1.31	1246	1.30	1247	1.29	1248	1.28	1249	1.26
1250	1.25	1251	1.23	1252	1.21	1253	1.19	1254	1.17
1255	1.16	1256	1.15	1257	1.14	1258	1.13	1259	1.12
1260	1.12	1261	1.11	1262	1.11	1263	1.11	1264	1.10
1265	1.10	1266	1.10	1267	1.10	1268	1.10	1269	1.10
1270	1.10	1271	1.09	1272	1.09	1273	1.09	1274	1.09
1275	1.09	1276	1.08	1277	1.07	1278	1.06	1279	1.05
1280	1.03	1281	1.02	1282	1.00	1283	0.98	1284	0.96
1285	0.95	1286	0.93	1287	0.92	1288	0.92	1289	0.91
1290	0.90	1291	0.90	1292	0.89	1293	0.89	1294	0.89
1295	0.89	1296	0.88	1297	0.88	1298	0.88	1299	0.88
1300	0.88	1310	0.82	1320	0.72	1330	0.62	1340	0.51
1350	0.50	1360	0.53	1370	0.50	1380	0.45	1390	0.44
1400	0.44	1420	0.44	1440	0.44	1460	0.44	1500	0.44

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 7D

TOTAL AREA TO HYDROGRAPH: 0 acres
HYDROGRAPH PEAK: 0 cfs
TIME OF PEAK: 0 minutes
HYDROGRAPH VOLUME: 0.00 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)

0	0.00	100	0.00	200	0.00	300	0.00	400	0.00
500	0.00	600	0.00	700	0.00	800	0.00	900	0.00
1000	0.00	1050	0.00	1100	0.00	1110	0.00	1120	0.00
1130	0.00	1131	0.00	1132	0.00	1133	0.00	1134	0.00
1135	0.00	1136	0.00	1137	0.00	1138	0.00	1139	0.00
1140	0.00	1141	0.00	1142	0.00	1143	0.00	1144	0.00
1145	0.00	1146	0.00	1147	0.00	1148	0.00	1149	0.00
1150	0.00	1151	0.00	1152	0.00	1153	0.00	1154	0.00
1155	0.00	1156	0.00	1157	0.00	1158	0.00	1159	0.00
1160	0.00	1161	0.00	1162	0.00	1163	0.00	1164	0.00
1165	0.00	1166	0.00	1167	0.00	1168	0.00	1169	0.00
1170	0.00	1171	0.00	1172	0.00	1173	0.00	1174	0.00
1175	0.00	1176	0.00	1177	0.00	1178	0.00	1179	0.00
1180	0.00	1181	0.00	1182	0.00	1183	0.00	1184	0.00
1185	0.00	1186	0.00	1187	0.00	1188	0.00	1189	0.00
1190	0.00	1191	0.00	1192	0.00	1193	0.00	1194	0.00
1195	0.00	1196	0.00	1197	0.00	1198	0.00	1199	0.00
1200	0.00	1201	0.00	1202	0.00	1203	0.00	1204	0.00
1205	0.00	1206	0.00	1207	0.00	1208	0.00	1209	0.00
1210	0.00	1211	0.00	1212	0.00	1213	0.00	1214	0.00
1215	0.00	1216	0.00	1217	0.00	1218	0.00	1219	0.00
1220	0.00	1221	0.00	1222	0.00	1223	0.00	1224	0.00
1225	0.00	1226	0.00	1227	0.00	1228	0.00	1229	0.00
1230	0.00	1231	0.00	1232	0.00	1233	0.00	1234	0.00
1235	0.00	1236	0.00	1237	0.00	1238	0.00	1239	0.00
1240	0.00	1241	0.00	1242	0.00	1243	0.00	1244	0.00
1245	0.00	1246	0.00	1247	0.00	1248	0.00	1249	0.00
1250	0.00	1251	0.00	1252	0.00	1253	0.00	1254	0.00
1255	0.00	1256	0.00	1257	0.00	1258	0.00	1259	0.00
1260	0.00	1261	0.00	1262	0.00	1263	0.00	1264	0.00
1265	0.00	1266	0.00	1267	0.00	1268	0.00	1269	0.00
1270	0.00	1271	0.00	1272	0.00	1273	0.00	1274	0.00
1275	0.00	1276	0.00	1277	0.00	1278	0.00	1279	0.00
1280	0.00	1281	0.00	1282	0.00	1283	0.00	1284	0.00
1285	0.00	1286	0.00	1287	0.00	1288	0.00	1289	0.00
1290	0.00	1291	0.00	1292	0.00	1293	0.00	1294	0.00
1295	0.00	1296	0.00	1297	0.00	1298	0.00	1299	0.00
1300	0.00	1310	0.00	1320	0.00	1330	0.00	1340	0.00
1350	0.00	1360	0.00	1370	0.00	1380	0.00	1390	0.00
1400	0.00	1420	0.00	1440	0.00	1460	0.00	1500	0.00

HYDROGRAPH FATTENED AT 8A

```
*****************************************************************************************
*      INCOMING HYDROGRAPH  PEAK (cfs):     36.16         VOLUME (acre-ft):      2.70      *
*      NO HYDROGRAPH ADJUSTMENT                                                           *
*      RUNOFF FACTOR(in):   5.27      TOTAL RAIN(in):   8.00      SCS Curve: 77          *
*      FATTENED HYDROGRAPH  PEAK (cfs):     36.16         VOLUME (acre-ft):     33.36      *
*****************************************************************************************
```

TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)	TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)
0	0.00	0.00	0.00	100	0.49	0.49	1.84
200	0.49	0.49	3.64	300	0.51	0.51	4.32
400	0.56	0.56	5.23	500	0.65	0.65	6.52

600	0.73	0.73	8.29	700	0.83	0.83	10.86
800	1.06	1.06	14.80	900	1.29	1.29	20.76
1000	1.57	1.57	29.10	1050	1.86	1.86	33.26
1100	2.32	2.32	35.73	1110	2.64	2.64	35.94
1120	4.60	4.60	36.07	1130	3.58	3.58	36.12

Hydrograph Printouts

TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)	TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)
1131	4.24	4.24	36.13	1132	5.17	5.17	36.13
1133	5.96	5.96	36.14	1134	6.74	6.74	36.14
1135	7.48	7.48	36.14	1136	8.29	8.29	36.15
1137	8.43	8.43	36.15	1138	8.52	8.52	36.15
1139	8.86	8.86	36.15	1140	9.13	9.13	36.15
1141	9.92	9.92	36.15	1142	10.67	10.67	36.15
1143	11.39	11.39	36.15	1144	12.27	12.27	36.16
1145	13.64	13.64	36.16	1146	14.89	14.89	36.16
1147	15.83	15.83	36.16	1148	16.80	16.80	36.16
1149	15.89	15.89	36.16	1150	14.90	14.90	36.16
1151	17.68	17.68	36.16	1152	28.76	28.76	36.16
1153	31.55	31.55	36.16	1154	32.02	32.02	36.16
1155	34.10	34.10	36.16	1156	36.16	36.16	36.16
1157	34.07	34.07	36.16	1158	23.71	23.71	36.16
1159	20.11	20.11	36.16	1160	18.81	18.81	36.16
1161	17.51	17.51	36.16	1162	16.52	16.52	36.16
1163	14.36	14.36	36.16	1164	11.90	11.90	36.16
1165	10.50	10.50	36.16	1166	8.56	8.56	36.16
1167	7.53	7.53	36.16	1168	6.68	6.68	36.16
1169	5.96	5.96	36.15	1170	5.42	5.42	36.15
1171	4.95	4.95	36.15	1172	4.55	4.55	36.15
1173	4.20	4.20	36.15	1174	3.90	3.90	36.15
1175	3.69	3.69	36.15	1176	3.44	3.44	36.14
1177	3.27	3.27	36.14	1178	3.12	3.12	36.14
1179	2.99	2.99	36.14	1180	2.89	2.89	36.13
1181	2.80	2.80	36.13	1182	2.69	2.69	36.13
1183	2.59	2.59	36.12	1184	2.50	2.50	36.12
1185	2.42	2.42	36.12	1186	2.34	2.34	36.11
1187	2.26	2.26	36.11	1188	2.20	2.20	36.10
1189	2.14	2.14	36.10	1190	2.07	2.07	36.09
1191	2.02	2.02	36.08	1192	1.96	1.96	36.07
1193	1.92	1.92	36.07	1194	1.88	1.88	36.06
1195	1.86	1.86	36.05	1196	1.84	1.84	36.04
1197	1.83	1.83	36.03	1198	1.83	1.83	36.02
1199	1.83	1.83	36.01	1200	1.84	1.84	36.00
1201	1.85	1.85	35.99	1202	1.87	1.87	35.97
1203	1.89	1.89	35.96	1204	1.90	1.90	35.95
1205	1.92	1.92	35.93	1206	1.93	1.93	35.92
1207	1.95	1.95	35.90	1208	1.97	1.97	35.89
1209	1.99	1.99	35.87	1210	2.02	2.02	35.85
1211	2.03	2.03	35.83	1212	2.05	2.05	35.81
1213	2.05	2.05	35.79	1214	2.05	2.05	35.77
1215	2.04	2.04	35.75	1216	2.02	2.02	35.73
1217	2.01	2.01	35.70	1218	1.98	1.98	35.68

1219	1.94	1.94	35.65	1220	1.89	1.89	35.63
1221	1.84	1.84	35.60	1222	1.78	1.78	35.57
1223	1.73	1.73	35.54	1224	1.69	1.69	35.51
1225	1.65	1.65	35.48	1226	1.62	1.62	35.45
1227	1.60	1.60	35.42	1228	1.58	1.58	35.39
1229	1.56	1.56	35.35	1230	1.55	1.55	35.32
1231	1.53	1.53	35.29	1232	1.53	1.53	35.25
1233	1.52	1.52	35.21	1234	1.51	1.51	35.18
1235	1.51	1.51	35.14	1236	1.50	1.50	35.10
1237	1.50	1.50	35.06	1238	1.50	1.50	35.02
1239	1.49	1.49	34.98	1240	1.49	1.49	34.94
1241	1.48	1.48	34.89	1242	1.48	1.48	34.85
1243	1.47	1.47	34.80	1244	1.46	1.46	34.76
1245	1.45	1.45	34.71	1246	1.44	1.44	34.67
1247	1.43	1.43	34.62	1248	1.42	1.42	34.57
1249	1.41	1.41	34.52	1250	1.39	1.39	34.47
1251	1.37	1.37	34.42	1252	1.35	1.35	34.37
1253	1.33	1.33	34.32	1254	1.32	1.32	34.26
1255	1.30	1.30	34.21	1256	1.29	1.29	34.16
1257	1.28	1.28	34.10	1258	1.27	1.27	34.05
1259	1.27	1.27	33.99	1260	1.26	1.26	33.93
1261	1.26	1.26	33.88	1262	1.25	1.25	33.82
1263	1.25	1.25	33.76	1264	1.25	1.25	33.70
1265	1.24	1.24	33.64	1266	1.24	1.24	33.58
1267	1.24	1.24	33.52	1268	1.24	1.24	33.46
1269	1.24	1.24	33.40	1270	1.24	1.24	33.34
1271	1.23	1.23	33.28	1272	1.23	1.23	33.21

Hydrograph Printouts

TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)	TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)
1273	1.22	1.22	33.15	1274	1.21	1.21	33.09
1275	1.20	1.20	33.02	1276	1.19	1.19	32.96
1277	1.19	1.19	32.89	1278	1.18	1.18	32.82
1279	1.16	1.16	32.76	1280	1.15	1.15	32.69
1281	1.13	1.13	32.62	1282	1.11	1.11	32.55
1283	1.09	1.09	32.48	1284	1.08	1.08	32.41
1285	1.06	1.06	32.34	1286	1.05	1.05	32.27
1287	1.04	1.04	32.20	1288	1.03	1.03	32.13
1289	1.02	1.02	32.06	1290	1.02	1.02	31.99
1291	1.01	1.01	31.92	1292	1.01	1.01	31.85
1293	1.01	1.01	31.78	1294	1.00	1.00	31.71
1295	1.00	1.00	31.63	1296	1.00	1.00	31.56
1297	1.00	1.00	31.49	1298	0.99	0.99	31.42
1299	0.99	0.99	31.34	1300	0.99	0.99	31.27
1310	0.91	0.91	30.52	1320	0.81	0.81	29.75
1330	0.67	0.67	28.97	1340	0.57	0.57	28.19
1350	0.58	0.58	27.44	1360	0.59	0.59	26.69
1370	0.56	0.56	25.95	1380	0.51	0.51	25.22
1390	0.49	0.49	24.51	1400	0.46	0.46	23.82
1420	0.45	0.45	22.51	1440	0.45	0.45	21.28
1460	0.44	0.44	20.13	1500	0.44	0.44	18.08

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

Page: 12

Hydrograph Printouts

HYDROGRAPH PRINTOUT AT: 9A

TOTAL AREA TO HYDROGRAPH: 76 acres
HYDROGRAPH PEAK: 36 cfs
TIME OF PEAK: 1144 minutes
HYDROGRAPH VOLUME: 33.36 acre-ft

TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)	TIME (min)	FLOW (cfs)
0	0.00	100	1.84	200	3.64	300	4.32	400	5.23
500	6.52	600	8.29	700	10.86	800	14.80	900	20.76
1000	29.10	1050	33.26	1100	35.73	1110	35.94	1120	36.07
1130	36.12	1131	36.13	1132	36.13	1133	36.14	1134	36.14
1135	36.14	1136	36.15	1137	36.15	1138	36.15	1139	36.15
1140	36.15	1141	36.15	1142	36.15	1143	36.15	1144	36.16
1145	36.16	1146	36.16	1147	36.16	1148	36.16	1149	36.16
1150	36.16	1151	36.16	1152	36.16	1153	36.16	1154	36.16
1155	36.16	1156	36.16	1157	36.16	1158	36.16	1159	36.16
1160	36.16	1161	36.16	1162	36.16	1163	36.16	1164	36.16
1165	36.16	1166	36.16	1167	36.16	1168	36.16	1169	36.15
1170	36.15	1171	36.15	1172	36.15	1173	36.15	1174	36.15
1175	36.15	1176	36.14	1177	36.14	1178	36.14	1179	36.14
1180	36.13	1181	36.13	1182	36.13	1183	36.12	1184	36.12
1185	36.12	1186	36.11	1187	36.11	1188	36.10	1189	36.10
1190	36.09	1191	36.08	1192	36.07	1193	36.07	1194	36.06
1195	36.05	1196	36.04	1197	36.03	1198	36.02	1199	36.01
1200	36.00	1201	35.99	1202	35.97	1203	35.96	1204	35.95
1205	35.93	1206	35.92	1207	35.90	1208	35.89	1209	35.87
1210	35.85	1211	35.83	1212	35.81	1213	35.79	1214	35.77
1215	35.75	1216	35.73	1217	35.70	1218	35.68	1219	35.65
1220	35.63	1221	35.60	1222	35.57	1223	35.54	1224	35.51
1225	35.48	1226	35.45	1227	35.42	1228	35.39	1229	35.35
1230	35.32	1231	35.29	1232	35.25	1233	35.21	1234	35.18
1235	35.14	1236	35.10	1237	35.06	1238	35.02	1239	34.98
1240	34.94	1241	34.89	1242	34.85	1243	34.80	1244	34.76
1245	34.71	1246	34.67	1247	34.62	1248	34.57	1249	34.52
1250	34.47	1251	34.42	1252	34.37	1253	34.32	1254	34.26
1255	34.21	1256	34.16	1257	34.10	1258	34.05	1259	33.99
1260	33.93	1261	33.88	1262	33.82	1263	33.76	1264	33.70
1265	33.64	1266	33.58	1267	33.52	1268	33.46	1269	33.40
1270	33.34	1271	33.28	1272	33.21	1273	33.15	1274	33.09
1275	33.02	1276	32.96	1277	32.89	1278	32.82	1279	32.76
1280	32.69	1281	32.62	1282	32.55	1283	32.48	1284	32.41
1285	32.34	1286	32.27	1287	32.20	1288	32.13	1289	32.06
1290	31.99	1291	31.92	1292	31.85	1293	31.78	1294	31.71
1295	31.63	1296	31.56	1297	31.49	1298	31.42	1299	31.34
1300	31.27	1310	30.52	1320	29.75	1330	28.97	1340	28.19
1350	27.44	1360	26.69	1370	25.95	1380	25.22	1390	24.51
1400	23.82	1420	22.51	1440	21.28	1460	20.13	1500	18.08

♠ Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.64)

Job: 1 Project: Beltramo Ranch

VCRat Model Input

Model Lines

```
005     1  001A Header place holder
005     1  002B Header place holder
005     1  003ABHeader place holder
005     1  004A Header place holder
005     1  005C Header place holder
005     1  006ACHeader place holder
005     1  007ADHeader place holder
005     1  007D Split Header place holder
005     1  008A Header place holder
005     1  009A Header place holder
999
999
006     1  001A 050058001506A97 00936001000                    G1
006     1  002B 050058002206A97 00729001000                  1
006     1  003AB010          A97                             11
006     1  004A 050058000506A97 00285001500                  1
006     1  005C 050058002407A97 01038001000                  1
006     1  006AC010          A97                             11
006     1  007AD010          A97                       00000102 11
006     1  007D 010       099A97                             1 D
006     1  008A 050005001006A97                             1
110
111            1.00000    5.27
110
006     1  009A 010       099A97                             1  2
999
```

APPENDIX D

INFILTRATION TESTING REPORT

ALTA CALIFORNIA
GEOTECHNICAL INC.

170 North Maple Street, Suite 108
Corona, CA 92880
www.altageotechnical.com

WILDFLOWER DEVELOPMENT SERVICES
4215 Tierra Rejada Rd., Ste. 192
Moorpark, California 93021

April 29, 2021
Project No.: 1-0379

Attention: Ms. Nancy Johns

Subject: ***UPDATED GEOTECHNICAL REPORT***
The Beltramo Ranch Project
City of Moorpark, California

References: See Appendix A

Dear Ms. Johns:

Presented herein is Alta California Geotechnical, Inc.'s (Alta) geotechnical updated report for the Beltramo Ranch project, in the City of Moorpark, California. This report is based on a recent subsurface investigation conducted by Alta, review of the Conceptual Site Plan 3, and a review of the referenced reports.

Alta's review of the data indicates that the proposed development is feasible from a geotechnical standpoint, provided that the recommendations presented in this report are incorporated into the improvement plans and implemented during site development. Included in this report are:

- Discussion of the site geotechnical and geologic conditions.
- Recommendations for remedial and site grading, including unsuitable soil removals/reconditioning.
- Geotechnical site construction recommendations.
- Foundation design parameters.

If you have any questions or should you require any additional information, please contact the undersigned at (951) 509-7090. Alta appreciates the opportunity to provide geotechnical consulting services for your project.

Sincerely,
Alta California Geotechnical, Inc.

FERNANDO RUIZ
Civil Engineering Associate

JAMES B. COYNE
Engineering Geology Associate

Reviewed By:

SCOTT A. GRAY/RGE 2857
Reg. Exp.: 12-31-22
Registered Geotechnical Engineer
President

THOMAS J. MCCARTHY/CEG 2080
Reg. Exp.: 9-30-22
Certified Engineering Geologist
Vice President

Distribution: (1) Addressee

FR: JCB: SAG: TJM:-1-0379, April 29, 2021 (Updated Geotechnical Report, Beltramo Ranch, Moorpark)

3.3 Infiltration Testing

It is Alta's understanding that the project may utilize infiltration systems for storm water disposal. Details of the system are not known at this time.

Infiltration testing was undertaken using one (1) five-foot-deep boring excavated with a handheld power auger. The testing was performed in general accordance with the County of Ventura WQMP standards. The test well was presoaked at least 24 hours prior to testing. During testing, the water level readings were recorded every 30 minutes until the readings stabilized.

The data was then adjusted to provide an infiltration rate utilizing the Porchet Method. The resulting infiltration rates are presented in Table 3-1. The results do not include a factor of safety. Recommendations for infiltration BMP design are presented in Section 6.4.

Table 3-1-Summary of Infiltration Testing (No Factor of Safety)

Test Designation	P-1
Approximate Depth of Test	5 ft
Time Interval	30 minutes
Radius of Test Hole	4 inches
Tested Infiltration Rate	0.6 (in/hr)

4.0 GEOLOGIC CONDITIONS

4.1 Geologic and Geomorphic Setting

Regionally, the subject site is located on the Santa Ynez sub-block of the Traverse Ranges geomorphic province. The Santa Ynez sub-block is bounded on the south by the San Monica and Raymond fault zones, on the north by the Big Pine fault zone, and on the east by the San Gabriel fault zone. This province is characterized by predominantly east-west trending, left lateral and/or reverse faults.

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0379	PROJECT NAME	Beltramo Ranch Project		
DATE STARTED	3/31/21	GROUND ELEV.		BORING DESIG.	P-1
DATE FINISHED	3/31/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	Alta	DRIVE WT.		NOTE	
TYPE OF DRILL RIG	Power Auger	DROP			

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SP	**Alluvium** (Qa): SAND, very fine to fine grained, tannish brown, dry, loose to medium dense, few fine gravel <3/4", with roots. @2.0ft. slightly moist.				
5						TOTAL DEPTH 5.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0379 PLATE P-1

Parcel Addresses & APNs	Existing Zoning
Beltramo Ranch Road APN: 504-0-021-195	RE-1
11930-11934 West Los Angeles Ave. APN: 506-0-030-220 APN: 506-0-030-210 APN: 506-0-030-235 APN: 506-0-030-045	RE-20
11944 West Los Angeles Ave. APN: 506-0-030-255	RO

Proposed Zoning: RPD*

R-1* Developmental Standards:	
Density:	7 du/ac
Front Yard Setback:	20'
Interior Side Yard Setback:	5'
Street Side Yard Setback:	10'
Rear Yard Setback:	15'
Lot Coverage:	50%
Building Height:	35'
Resident Parking:	2.5 sp/unit

*Conceptual Site Plan is compliant with R-1 zoning standards, however project is seeking RPD zoning and High Density Residential (R-1)zoning throughout

Site Plan Summary

Site Area: ±7.4 ac. (±323,000sf)

Home Mix:
47 homes - 60'x53'-6" SFD Two-Story (2000-2200sf)

Site Density: ±6.4 du/ac

Proposed Building Height:
Two-Story Homes: ±26'

Parking Provided:
94 spaces - Garage Spaces
94 spaces - Driveway
76 spaces - Guest On-Street Parking
264 spaces - Total (±5.64 sp/unit)

Building Coverage: ±23%

Open Space Provided:
±88,000sf - Private Yards
±56,000sf - Open Area
±144,000sf - Total Open Space Provided (45% of site)

LEGEND

afu	Artificial Fill - Undocumented
Qa	Alluvium (Bracketed Where Buried)
T-1	Approximate Location of Backhoe Test Pit (Alta, This Report)
P-1	Approximate Location of Infiltration Test (Alta, This Report)
CPT-1	Approximate Location of Cone Penetration Test (Alta, This Report)
B1	Approximate Location of Hollow Stem Auger Boring (Krazan, 2019)
IT1	Approximate Location of Infiltration Test (Krazan, 2019)
— —	Approximate Geologic Contact

PLATE 1

ALTA CALIFORNIA GEOTECHNICAL, INC.
170 N. MAPLE STREET, STE 108, CORONA, CA 92880
TELEPHONE: (951) 509-7090
PROJECT NUMBER: 1-0379 DATE: 4-29-21

ktgy
Architecture + Planning
17911 Von Karman Ave,
Suite 200
Irvine, CA 92614
949.851.2133
ktgy.com

Warmington RESIDENTIAL
Warmington Residential
3090 Pullman Street
Costa Mesa, CA 92626

MOORPARK - BELTRAMO RANCH
MOORPARK, CA # 2018-0860

Representative Site Plan for Road on Outer Edges
CONCEPTUAL SITE PLAN 3
FEBRUARY 19, 2021

0 25 50 100

AI.0

Appendix E

CONTECH INFILTRATION SYSTEM

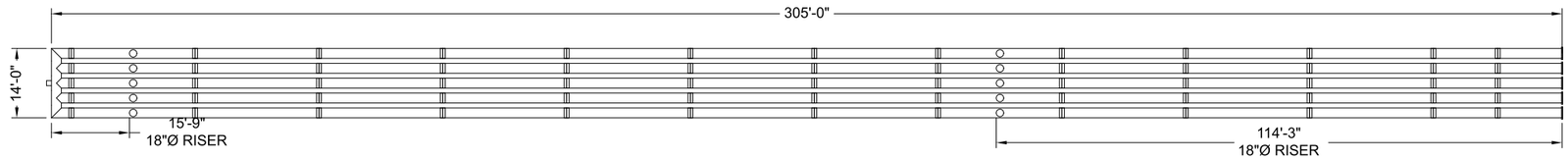
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 1,529 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 8,749 cf.
- PIPE STORAGE VOLUME = 4,803 cf.
- BACKFILL STORAGE VOLUME = 3,973 cf.
- TOTAL STORAGE PROVIDED = 8,776 cf.

PIPE DETAILS
- DIAMETER = 24 IN.
- CORRUGATION = 2 2/3x1/2
- GAGE = 16
- COATING = ALT2
- WALL TYPE = Perforated
- BARRELL SPACING = 12 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 12 IN.
- ABOVE PIPE = 6 IN.
- WIDTH AT SIDES = 12 IN.
- BELOW PIPE = 6 IN.



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 30'

DATE	REVISION DESCRIPTION	BY

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CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	8/30/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		

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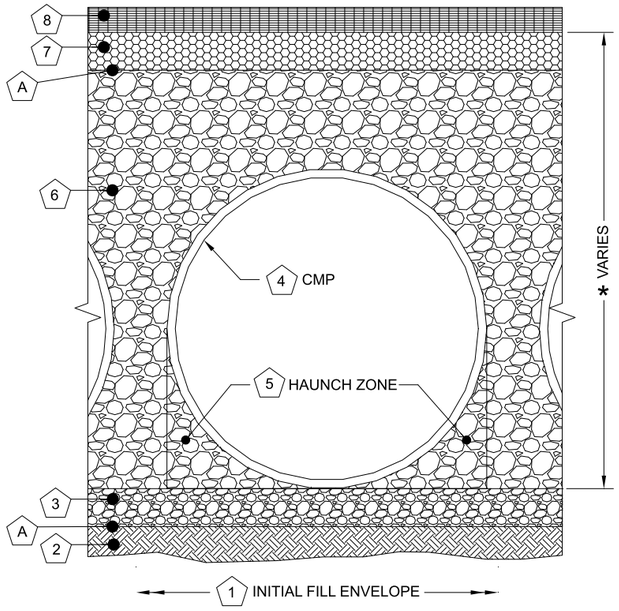


Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (if applicable)			
7 Road Base (if applicable			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6 Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

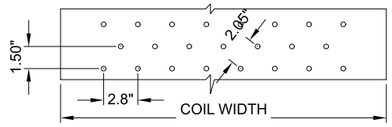
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

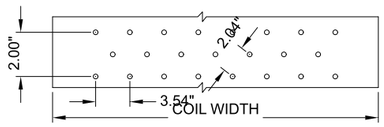
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



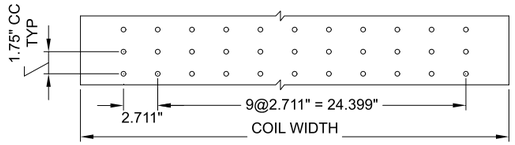
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



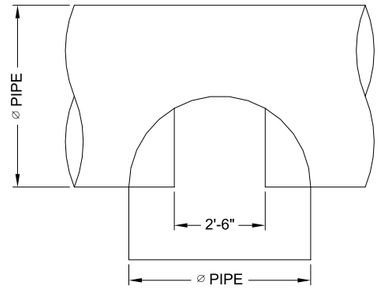
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

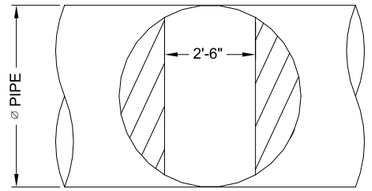
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

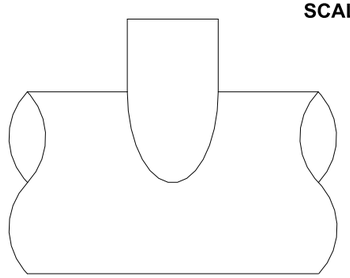


FRONT

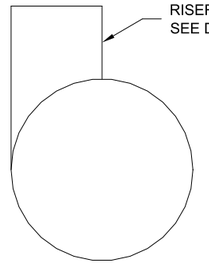
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

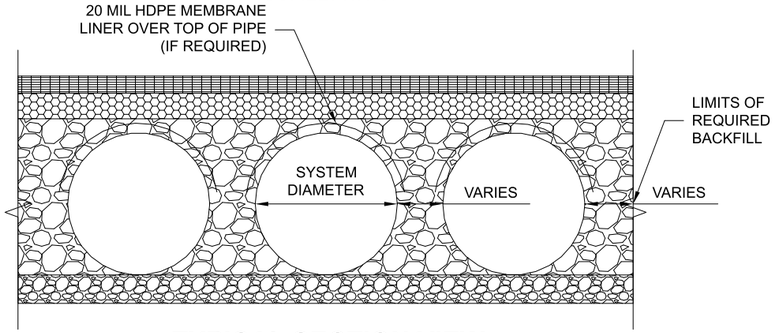


END

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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DYO7606 Beltramo Ranch
Infiltration System
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4754	7606	8/30/2021
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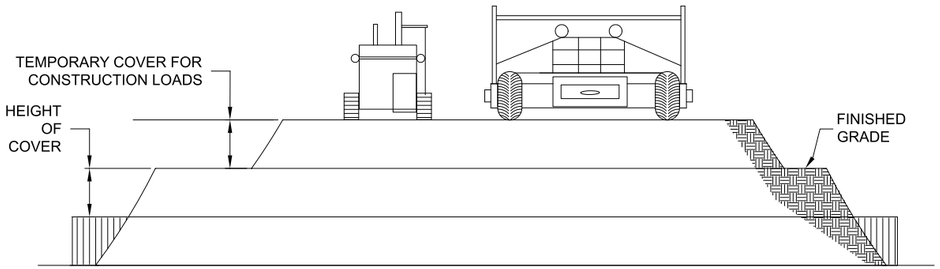

CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

NOTE:
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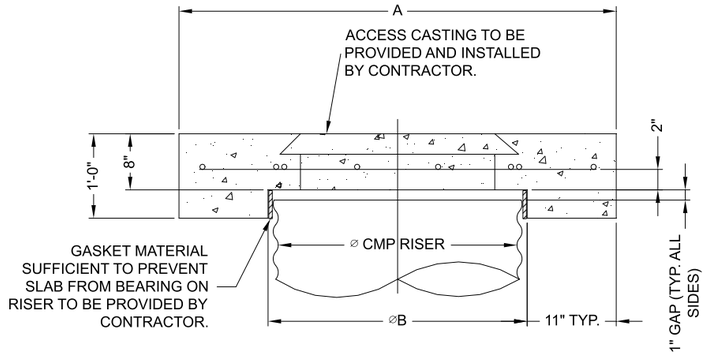
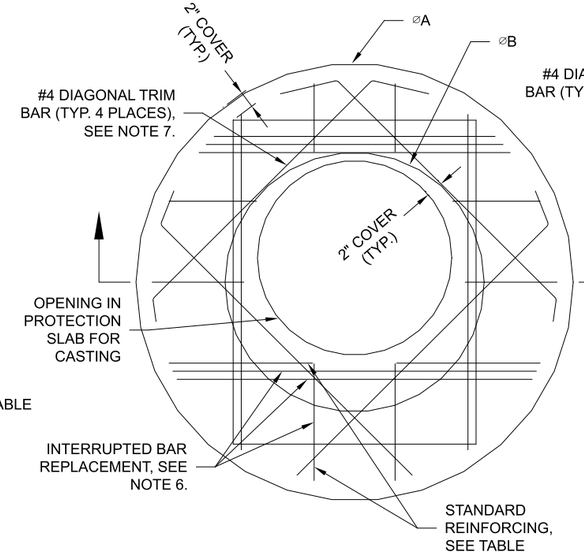


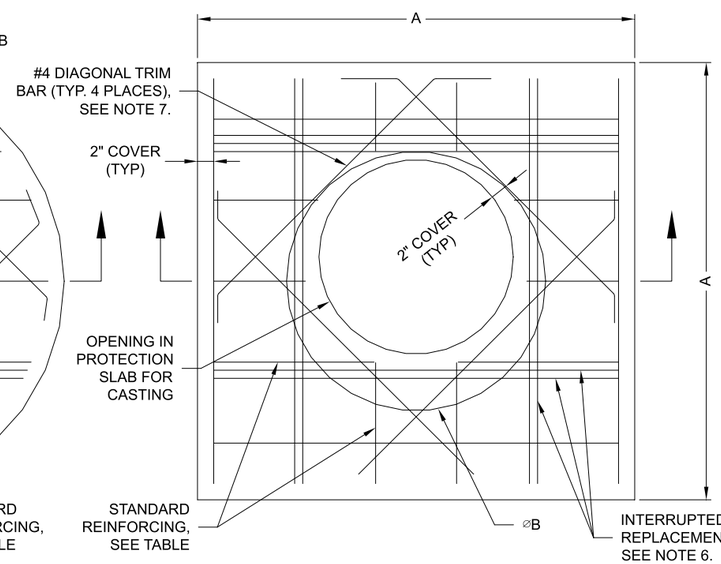
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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CONTECH CMP DETENTION SYSTEMS
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DYO7606 Beltramo Ranch
Infiltration System
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DETENTION SYSTEM

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4754	7606	8/30/2021
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SHEET NO.: D3		

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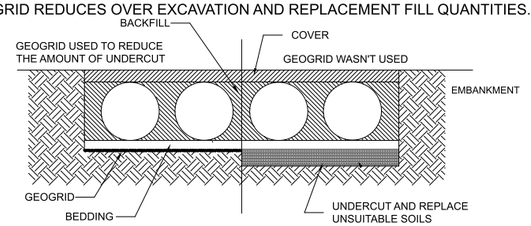
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

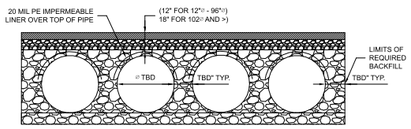


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

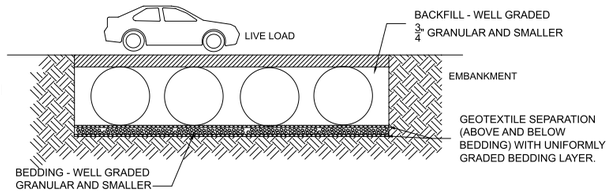
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

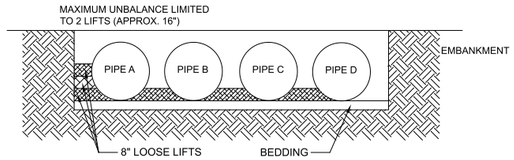
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



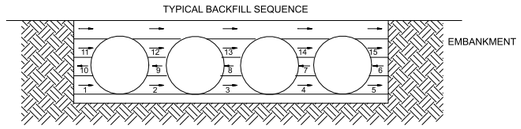
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

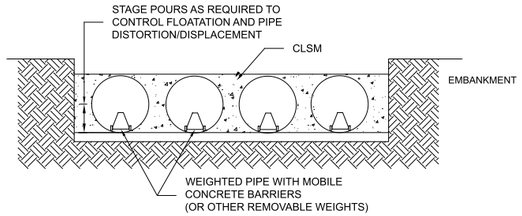


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

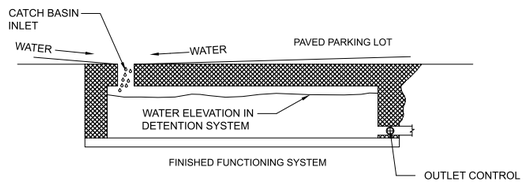


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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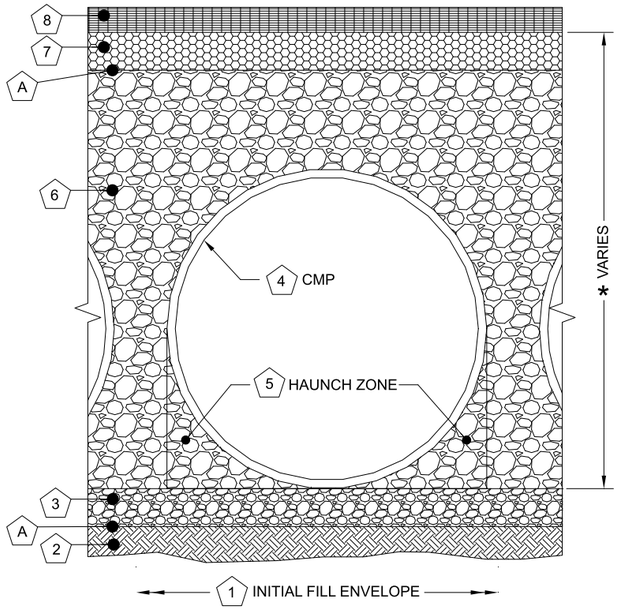
CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	8/30/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		



Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (if applicable)			
7 Road Base (if applicable			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6 Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

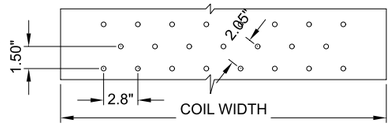
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

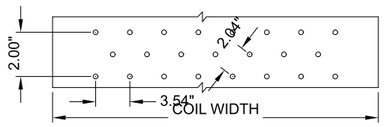
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



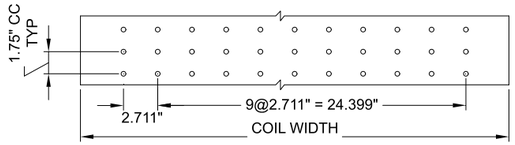
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



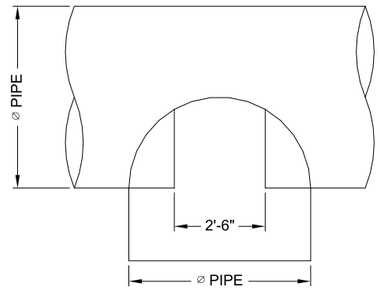
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

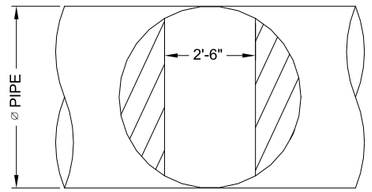
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

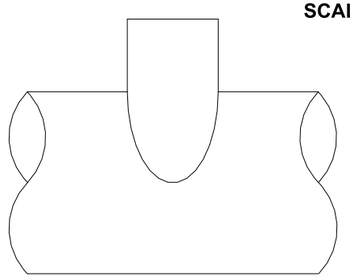


FRONT

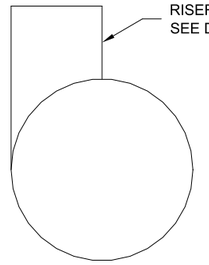
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

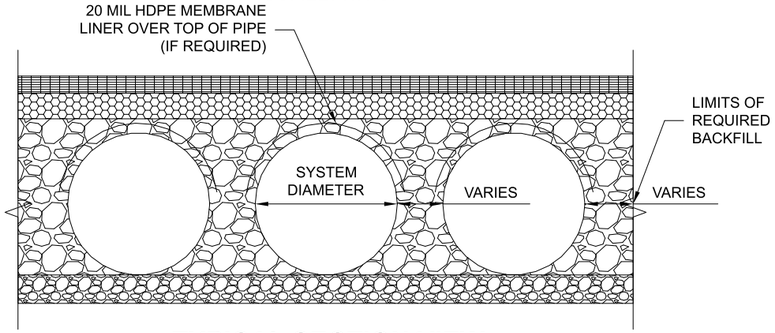


END

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	5/14/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		

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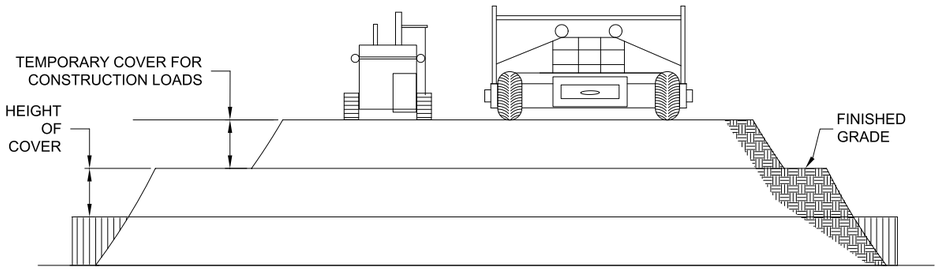


CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

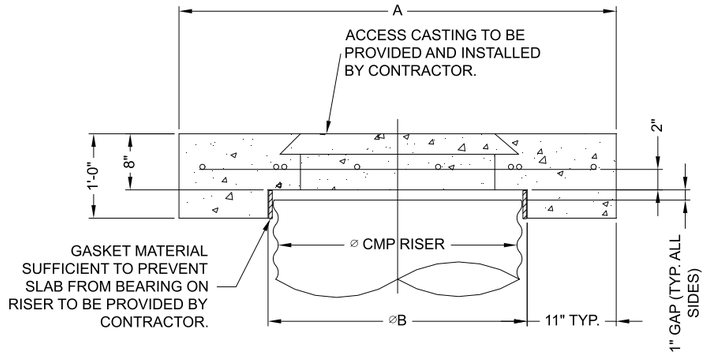
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS
INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

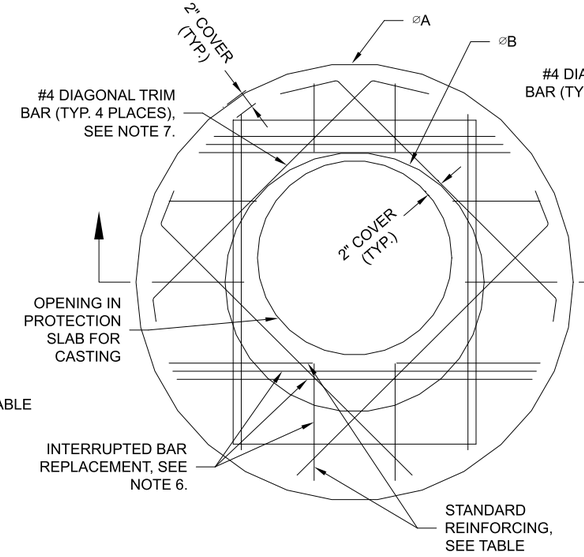
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



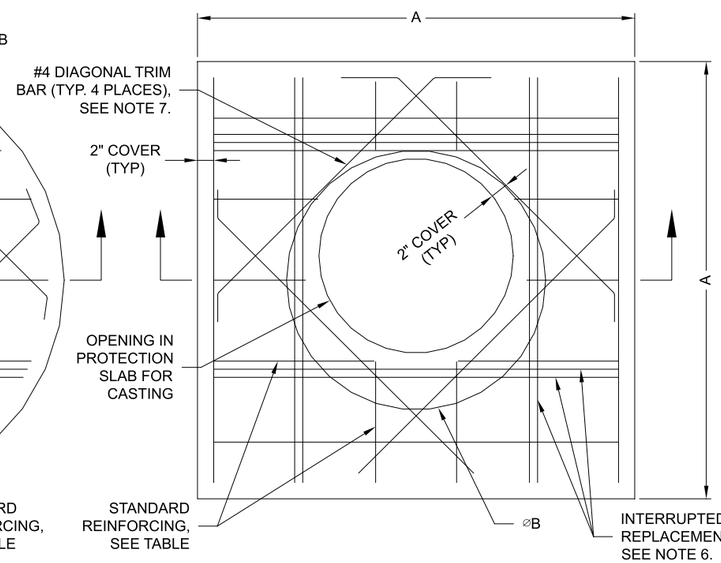
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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CONTECH CMP DETENTION SYSTEMS
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DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	5/14/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D3		

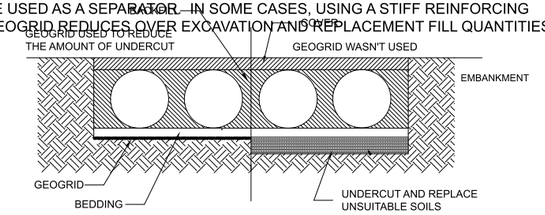
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

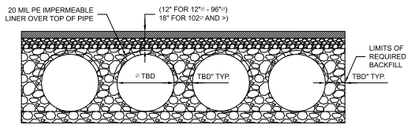


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

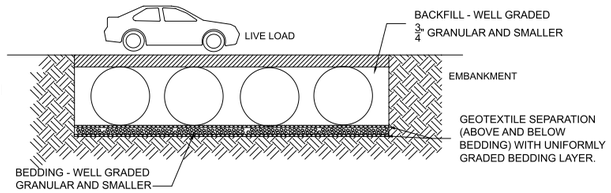
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

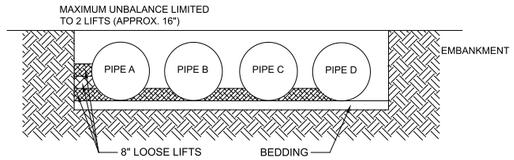
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



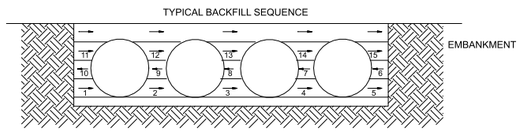
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

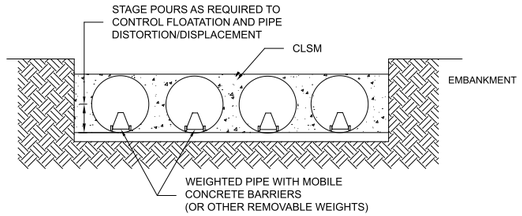


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

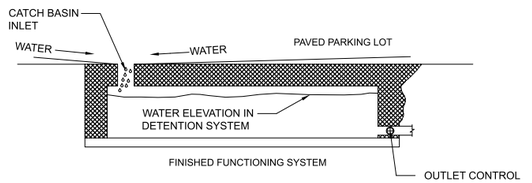


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

C:\EXPORTS\TEMPLATES\CMP_V5.DWG 10/18/2019 10:02 AM

DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

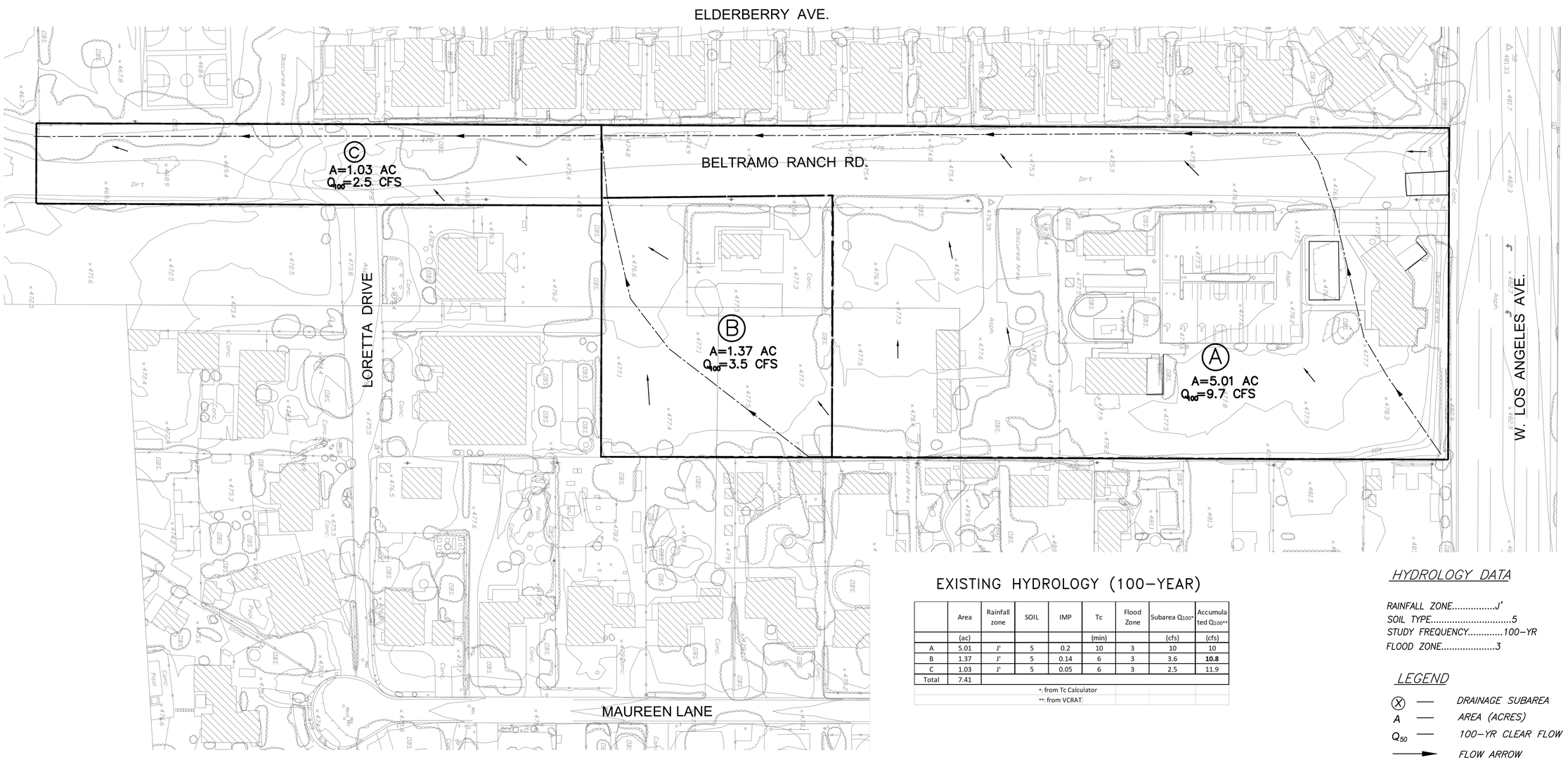
DYO7606 Beltramo Ranch
Infiltration System
Moorpark, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4754	7606	5/14/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

MAPS

HYDROLOGY AND SQMP

HYDROLOGY AND STORMWATER QUALITY MANAGEMENT PLAN
BELTRAMO RANCH, MOORPARK



EXISTING HYDROLOGY (100–YEAR)

	Area	Rainfall zone	SOIL	IMP	Tc	Flood Zone	Subarea Q_{100}*	Accumulated Q_{100}**
	(ac)				(min)		(cfs)	(cfs)
A	5.01	J'	5	0.2	10	3	10	10
B	1.37	J'	5	0.14	6	3	3.6	**10.8**
C	1.03	J'	5	0.05	6	3	2.5	11.9
Total	7.41							

*: from Tc Calculator
**: from VCRAT

HYDROLOGY DATA

RAINFALL ZONE.....J'
SOIL TYPE.....5
STUDY FREQUENCY.....100–YR
FLOOD ZONE.....3

LEGEND

- Ⓧ — *DRAINAGE SUBAREA*
- *A* — *AREA (ACRES)*
- Q_{50} — *100–YR CLEAR FLOW (CFS)*
- *FLOW ARROW*
- *SUBAREA BOUNDARY*
- *PROJECT BOUNDARY*
- *FLOW PATH*

SCALE: 1" = 50'

0 50 100 150

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AT LEAST TWO DAYS
BEFORE YOU DIG
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Know what's **below.**
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UNDERGROUND SERVICE ALERT (USA) OF SOUTHERN CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
MATTHEW A SAWYER
NO.72236
EXP. 06-30-22
CIVIL
STATE OF CALIFORNIA

DEVELOPER:
WARMINGTON RESIDENTIAL

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626

DATE 8/31/2021
O.H.
DESIGNED
DATE 8/31/2021
O.H.
DELINEATED
DATE 8/31/2021
M.A.S.
CHECKED

PLAN PREPARED BY:

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

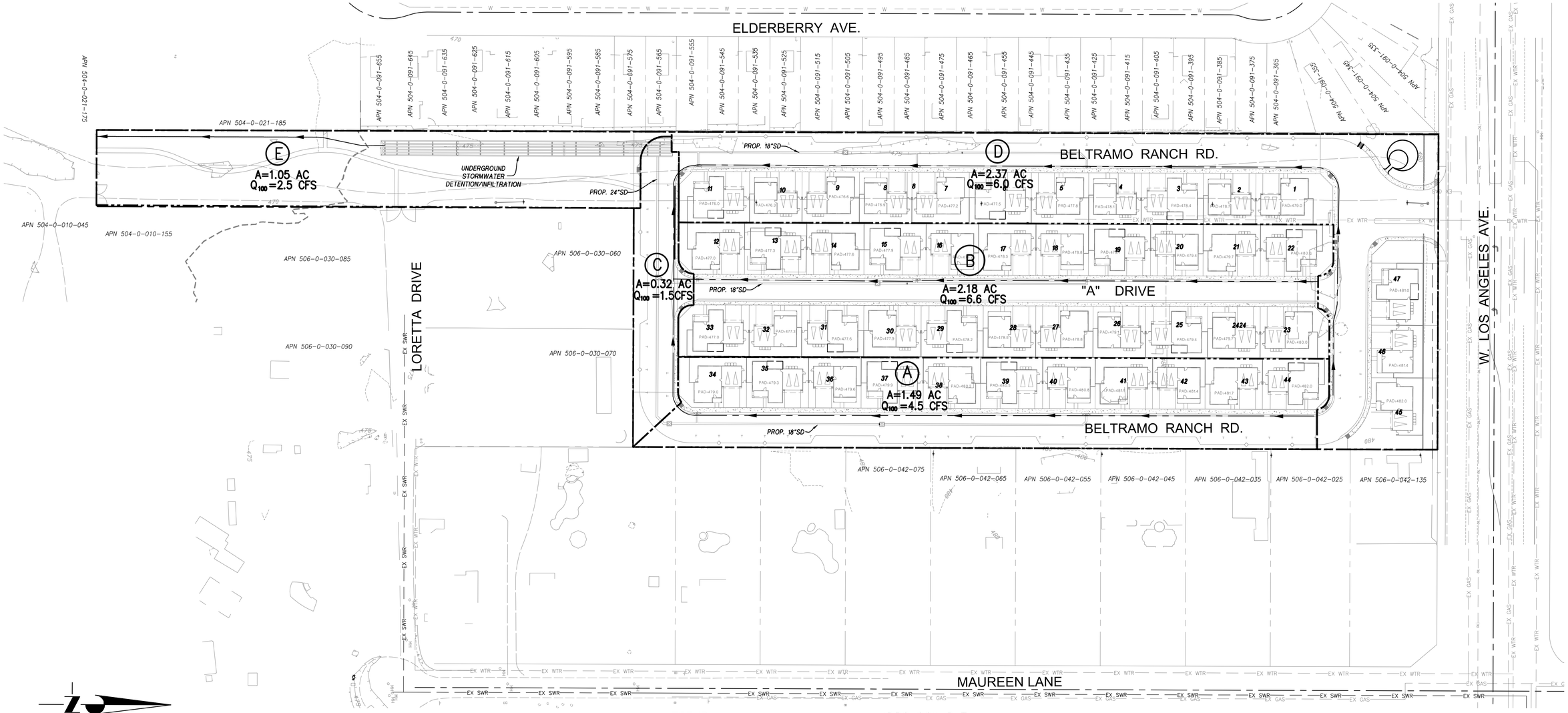
HYDROLOGY AND SQMP-VTTM NO.6061

11930-11944 WEST LOS ANGELES AVENUE
BELTRAMO RANCH
MOORPARK, CA

8/31/2021

HYDROLOGY AND STORMWATER QUALITY MANAGEMENT PLAN

BELTRAMO RANCH, MOORPARK



SCALE: 1" = 50'

0 50 100 150

PROPOSED HYDROLOGY (100-YEAR)

Subarea	Area	Rainfall Zone	Soil Type	IMP	Tc	Flood Zone	Subarea Q_{100}*	Accumulated Q_{100}**
	(ac)				(min)		(cfs)	(cfs)
A	1.49	J'	5	0.58	6	3	4.5	4.5
B	2.18	J'	5	0.58	6	3	6.6	9.3
C	0.32	J'	5	0.58	6	3	1.5	9.6
D	2.37	J'	5	0.58	7	3	6	**15**
E	1.05	J'	5	0.58	6	3	2.5	15.4
Total	7.41							

*: from Tc Calculator

**: from VCRAT

LEGEND

- (X) — DRAINAGE SUBAREA
- A — AREA (ACRES)
- Q_{100} — 100-YR CLEAR FLOW (CFS)
- FLOW ARROW
- SUBAREA BOUNDARY
- PROJECT BOUNDARY
- FLOW PATH

HYDROLOGY DATA

RAINFALL ZONE.....J'
SOIL TYPE.....5
STUDY FREQUENCY.....100-YR
FLOOD ZONE.....3

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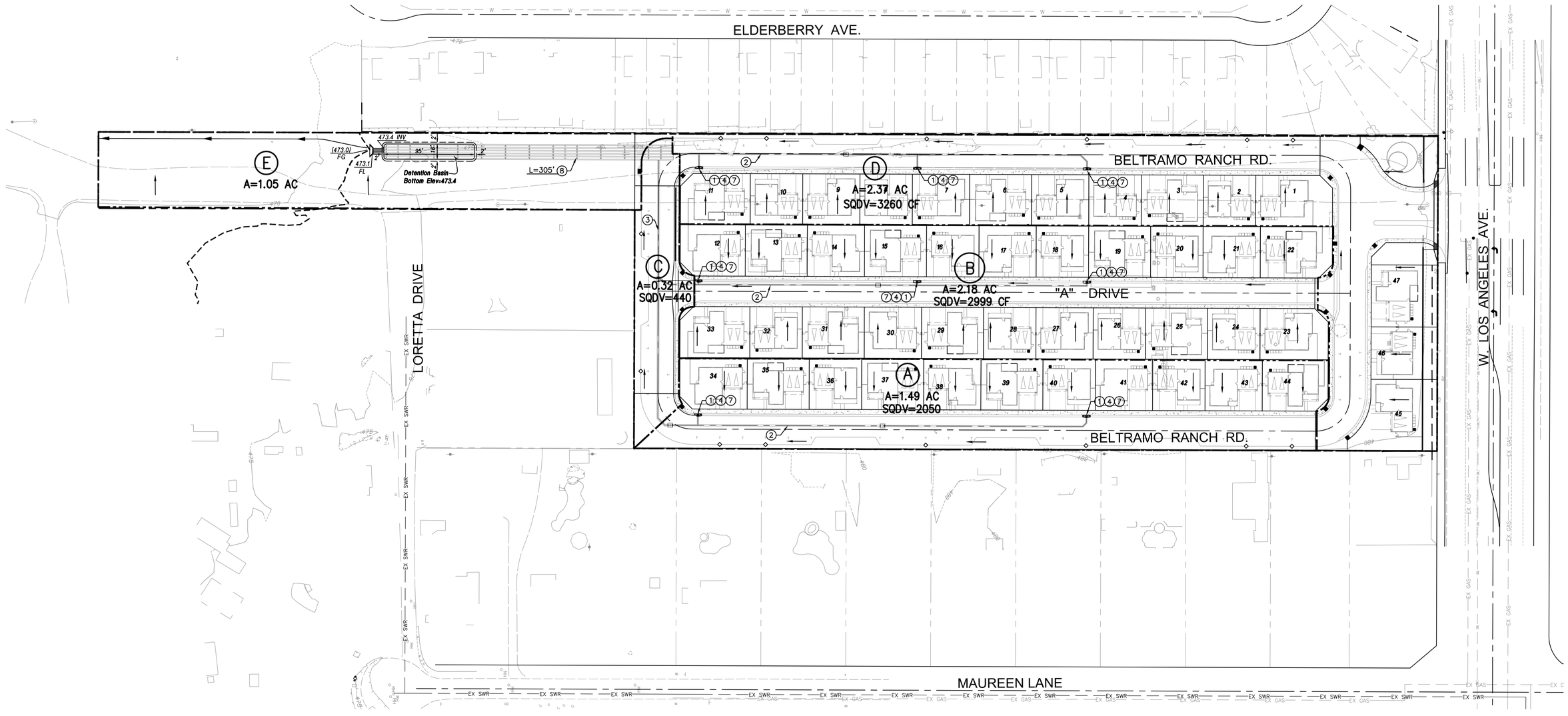

SCALE: 1" = 50'

0 50 100 150

CONSTRUCTION NOTES:

1 INSTALL STENCIL SIGNAGE "NO DUMPING–DRAIN TO OCEAN" PER DETAIL A ON SHEET 4.

2 INSTALL 18" RCP STORM DRAIN, PER DETAIL B ON SHEET 4.

3 INSTALL 24" RCP STORM DRAIN, PER DETAIL B ON SHEET 4.

4 INSTALL BROOKS PRODUCT 24"X24" CONCRETE BOX WITH NO TRAFFIC LID, PER DETAIL C ON SHEET 4, OR APPROVED EQUAL.

5 NOT USED

6 NOT USED

7 INSTALL CATCH BASIN FILTER, PER DETAIL E ON SHEET 4.

8 INSTALL 16'X4' GRAVEL TRENCH WITH 24" PERFORATED PIPE, PER DETAIL F ON SHEET 4. LENGTH PER PLAN.

9 CONSTRUCT JUNCTION STRUCTURE.

LEGEND

- (X) — DRAINAGE SUBAREA
- A — AREA (ACRES)
- SQDV — DESIGN TREATMENT VOLUME (CF)
- FLOW ARROW
- SUBAREA BOUNDARY
- PROJECT BOUNDARY
- FLOW PATH

SQMP DATA

RAINFALL ZONE.....J'

PERVIOUS RUNOFF COEFFICIENT (Cp).....0.05

85TH PERCENTILE RAINFALL.....1.25 IN

WATER QUALITY TREATMENT VOLUME

Subarea	A	%allow	IAallowabl	imp	TIA	Aret	Soil Type	Cp	C	(85TH percentil	P	SQDV_new
	(ac)									(in)	(ft)	(cf)
A	1.49	5	0.075	0.58	0.86	0.790	5	0.05	0.572	1.25	0.10	2050
B	2.18	5	0.109	0.58	1.26	1.155	5	0.05	0.572	1.25	0.10	2999
C	0.32	5	0.016	0.58	0.19	0.170	5	0.05	0.572	1.25	0.10	440
D	2.37	5	0.119	0.58	1.37	1.256	5	0.05	0.572	1.25	0.10	3260
E	1.05											
												8749

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STATE OF CALIFORNIA

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DATE	9/2/2021
O.H. DESIGNED	
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O.H. DELINEATED	
DATE	9/2/2021
M.A.S. CHECKED	

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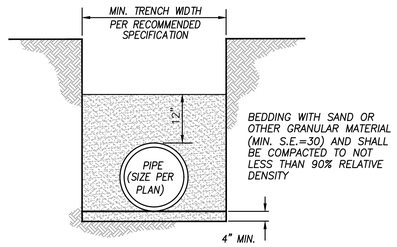
SQMP - VTTM NO.6061

11930-11944 WEST LOS ANGELES AVENUE
BELTRAMO RANCH
MOORPARK, CA

8/31/2021

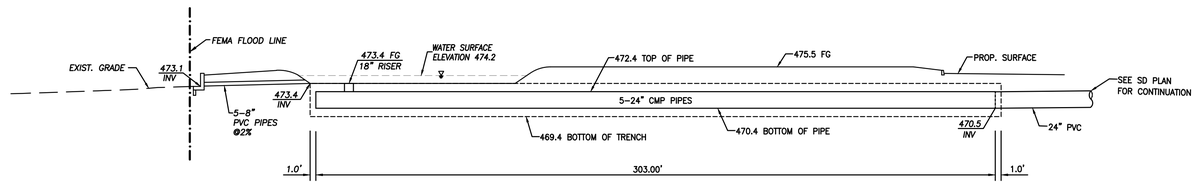
ALL ONSITE CATCH BASINS AND INLETS THAT DISCHARGE INTO AN EXISTING OR PROPOSED STORM DRAIN MUST BE STENCILED OR AFFIXED WITH SIMILAR PROHIBITIVE LANGUAGE TO DISCOURAGE ILLEGAL DUMPING OF POLLUTANTS.

A CATCH BASIN STENCIL



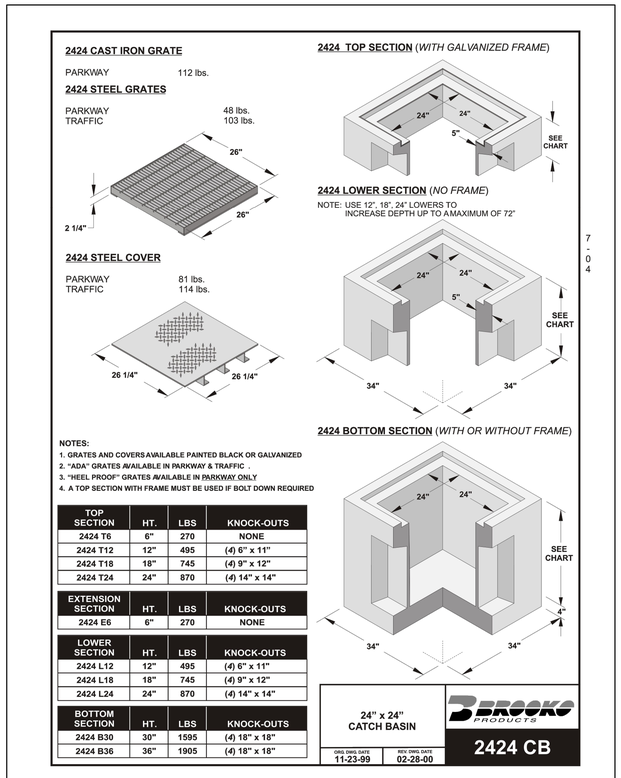
B STORM DRAIN BEDDING (ON SITE ONLY)

NOT TO SCALE



F INFILTRATION SYSTEM PROFILE

NOT TO SCALE



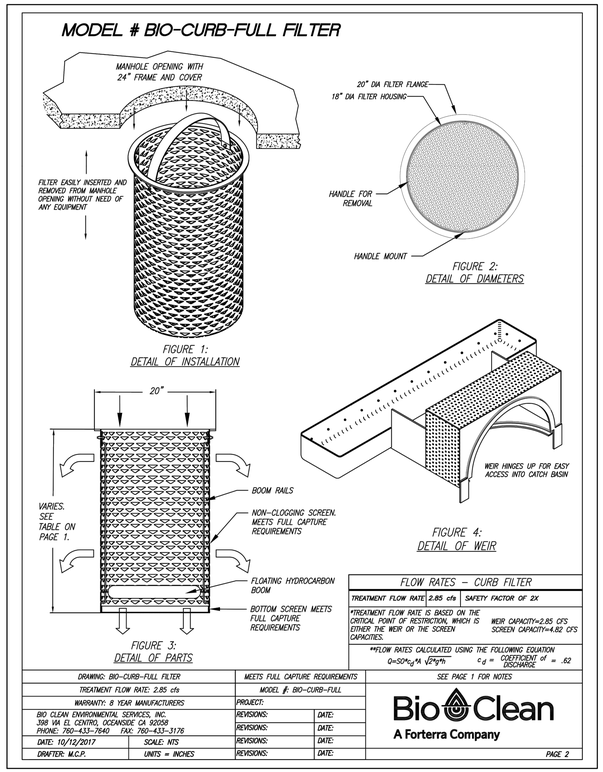
TOP SECTION	HT.	LBS	KNOCK-OUTS
2424 T6	6"	270	NONE
2424 T12	12"	495	(4) 6" x 11"
2424 T18	18"	745	(4) 9" x 12"
2424 T24	24"	870	(4) 14" x 14"

EXTENSION SECTION	HT.	LBS	KNOCK-OUTS
2424 E6	6"	270	NONE

LOWER SECTION	HT.	LBS	KNOCK-OUTS
2424 L12	12"	495	(4) 6" x 11"
2424 L18	18"	745	(4) 9" x 12"
2424 L24	24"	870	(4) 14" x 14"

BOTTOM SECTION	HT.	LBS	KNOCK-OUTS
2424 B30	30"	1595	(4) 18" x 18"
2424 B36	36"	1905	(4) 18" x 18"

C CONCRETE JUNCTION BOX



E CURB OPENING CATCH BASIN FILTER

DETAILS

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REGISTERED PROFESSIONAL ENGINEER MATTHEW A SAWTER NO.72236 EXP. 06-30-22 CIVIL STATE OF CALIFORNIA

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WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626

DATE 9/2/2021 O.H. DESIGNED
DATE 9/2/2021 O.H. DELINEATED
DATE 9/2/2021 M.A.S. CHECKED

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HYDROLOGY AND SQMP-VTTM NO.6061

11930-11944 WEST LOS ANGELES AVENUE
BELTRAMO RANCH
MOORPARK, CA

8/31/2021