Appendix I
Preliminary Hydrology Report

PRELIMINARY HYDROLOGY & HYDRAULICS REPORT

Pilot Palmdale

APN 0236-031-08, -09, and -01

February 2021

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KHA Project # 095426006

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APPENDICES

1 Project Description

Pilot Palmdale (Project) comprises approximately 8.5 acres and is located at the corner of Pearblossom Highway and Fort Tejon Road in the City of Palmdale, California. The Project is in the County of Los Angeles and is located approximately 9 miles north of the Little Rock Reservoir. The Project is a mixed-use development including the construction of a new 11,500 sf travel center, diesel and auto fueling station, car wash, storage building and other uses. The project also proposed auto tractor trailer parking areas, right-of-way improvements, and stormwater Best Management Practices (BMP).

This report will show that the proposed development will decrease 50-year peak flows (Q_{50}) discharge from the site. Additionally, this report will analyze the total off-site Q_{50} peak flows produced from an offsite watershed that is proposed to be diverted around the Project.

1.1 METHODOLOGY

Hydrology and hydraulic calculations were performed using PCSWMM. PCSWMM is a software that integrates various hydrology methods and allows for simultaneous hydrology and hydraulic modeling. The onsite portion of the analysis was completed using the County's Modified Rational Method (MODRAT) while the offsite portion was completed using the SCS Unity Hydrograph Method.

The hydrologic parameters for the analysis was determined using the County's Hydrology GIS application. A copy of the hydrologic map is included in Attachment C. The LA County hydrologic map shows the project area's corresponding 50-year, 24-hour rainfall depths is 2.8-inch, while NOAA 14 shows a rainfall depth of 3.9 in. The dominant soil type for each drainage area was also determined using the hydrologic map in Attachment C.

2 Hydrology Analysis

2.1 FLOODPLAIN INFORMATION

Research into the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Los Angeles County, California and Incorporated Area Panel 700 of 2350 Map Number 06037C0700F Effective Date September 26, 2008 shows that the project lies within Zone X determined to be areas of 0.2% annual chance flood; areas of 1% chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile. See FIRMette attached Appendix E.

2.2 OFFSITE WATERSHED

The project site receives offsite flows from approximately 1378 acres (DA-1) south of Pearblossom Highway. The predominantly pervious, with no major elevation changes and generally flows in the northerly direction. Runoff from this area is collected via a 6'x2' double reinforced concrete box (RCB) on the southwest corner of Pearblossom Highway and 53rd Street East and discharges onto the proposed project area. Once on the project area, this runoff continues to flow in the northwesterly direction until it reaches the northwest corner of the property boundary.

The offsite drainage area consists of primarily undeveloped land with some small low-density residential areas. Longest flow paths and slopes were determined using USGS topography data in AutoCAD. Soil types from the NCRS Web Soil Survey and land covers from aerial imagery were used to the determine the average curve number for the drainage area. An intensity curve was developed for the area using NOAA's Atlas 14 rainfall depths for the area using the SCS method. This information was used in the PCSWMM model. Table 1 below summarizes the peak flow rates for this offsite drainage area.

Table 1: 50-year Offsite Storm Peak Flows

Drainage Area ID	Area (ac)	Imperviousness (%)	NOAA 14 Depth (in)	SCS Curve Number	Clear Peak Flow Rate (cfs)
DA 1	1378	1	3.9	76	291
Total	1378	-	-	-	291

2.2.1 Culvert Analysis

The 6'x2' double RCP culvert was also analyzed in the PCSWMM Model and DA-1 was routed through it. The geometry, material, slopes, and headwall information were entered using the data found on the Pearblossom Highway Widening Street Improvement Plans, refer to Attachment C. A free outfall downstream boundary condition was assumed for the culvert; no hydraulic gradeline profiles were located or received from the City. The calculations show that the culvert does not have enough capacity to convey the calculated peak flow rate from DA 1. Therefore, only the capacity of the culvert will discharge onto the site and will be used as the basis of design for the proposed diversion channel. Table 2 below summarizes the culvert calculations. Full calculations are included in Attachment B.

Table 2: Culvert Calculations

Drainage Area ID	Size	Drainage Area Q50 (cfs)	Culvert Discharge (cfs)
DA 1	6' x 2' DBL RCB	291	261
Total	-	291	261

2.3 EXISTING ON-SITE DRAINAGE CONDITIONS

The existing Project area is part of a larger property which consists of one drainage area. This drainage area (DA 2) is bound by Pearblossom Highway to the south, Fort Tejon Road to the east, a railroad track to the north and a housing development to the west. DA-2 is approximately 28.78 acres and the proposed Project area is located on its southwest corner. The existing site is predominantly pervious, with no major elevation changes. DA 2 generally sheet flows in the northwest direction until it reaches the northwest corner of the area. Runoff from this location ultimately overtops the perimeter and enters a retention pond for the housing development to the west. This drainage area was analyzed using the County's MODRAT methodology in PCSWMM. Table 3 below summarizes the existing on-site peak flows rates. The proposed hydrology map showing proposed major drainage areas and full calculations are included in Appendix A.

Table 3: 50-year On-Site Existing Storm Peak Flows

Drainage Area ID	Area (ac)	Imperviousness (%)	Time of Concentration	Clear Peak Flow Rate (cfs)
DA 2	28.78	5	30	4.65
Total	28.78	-	-	4.65

2.4 PROPOSED ON-SITE DRAINAGE CONDITIONS

Under the proposed conditions, the site consists of three major drainage areas, DA 2, DA 3, and DA 4. Drainage area 4 consists of the 8.22 acres that are being improved as part of the project. This drainage area is collected via multiple inlets and curb and gutter and discharges to an onsite bioretention pond located on the north side of the proposed development. Runoff not feasibly retained in the bioretention area will discharge via a control outlet structure and continue to flow to the northwest corner of the property similarly to existing conditions. A landscaped strip along the western perimeter of DA 4 is proposed to bypass the bioretention system due to grading constraints. This portion will continue to sheet flow in the northwesterly direction similar to that of existing conditions.

Drainage area 2 consists of the proposed diversion channel as well as a portion of Pearblossom Highway that sheet flows north and discharges onto the diversion channel. Drainage area 3 consists of the remaining 19 acres located on the eastern portion of the property which will not be redeveloped at this time as well as a portion of the railroad track that flows onto this area along its northern perimeter. This area will continue to generally flow in the northwest direction. Table 4 below includes a summary of the proposed on-site peak flow rates. The proposed hydrology map showing proposed major drainage areas and full calculations are included in Appendix B.

Table 4: 50-year On-Site Proposed Storm Peak Flows

Drainage Area ID	Area (ac)	Imperviousness (%)	Time of Concentration	Clear Peak Flow Rate (cfs)
DA 2	1.44	99	13	1.09
DA 3	19.14	5	30	3.09
DA 4	8.22	78	12	7.49
Total	28.79	-	-	12.13

3 Hydraulic Analysis

3.1 DIVERSION CHANNEL

The offsite watershed discharging from the 6'x12' double RCP culvert and from Pearblossom Highway is proposed to be diverted around the proposed redevelopment via a lined trapezoidal channel. The channel will be lined with rock to reduce velocities and reduce erosion effects in the channel. The channel will have maximum side slopes of 1 to 1, minimum longitudinal slope of 1.1% and minimum 2-ft of freeboard. PCSWMM was used to route the discharge. Table 5 below summarizes the proposed channel design. Refer to Appendix B for full calculations.

Table 5: Diversion Channel Capacity

Structure	Bottom width (ft)	Channel depth (ft)	Maximum Water Surface Elevation (ft)
Diversion Channel	4.25	5.5	3.47

3.2 DETENTION ANALYSIS- DA4

The proposed Project will ultimately flow to the bioretention area located on the north perimeter of DA-4. This bioretention area has been designed to meet Low Impact Development (LID) requirements as shown in Section 4. Runoff exceeding the design volume and flow rates will overflow via a control outlet structure which will discharge to the north to mimic existing conditions flow patterns. Routing calculations for the bioretention area were completed using the 50-year storm event.

A state storage table was developed for the bioretention area and was entered in the PCSWMM model. The bioretention section consists of approximately 36-inches of soil media, and 1.8 feet of ponding water. Runoff exceeding the ponding depth will discharge via an outlet structure with a weir control (Refer to Appendix C for drawdown calculations). Analyses show that the bioretention area will reduce the proposed peak flow rates to that of existing conditions within the proposed Project. Table 6 below summarizes the bioretention routing analysis. Full calculations are included in Appendix B.

Table 6: Detention Analysis

Drainage Area	Structure	50-year Inflows (cfs)	Bioretention Invert (ft)	Maximum HGL (ft)	Drawdown Time (hr)	Overflow Design Flow Rate (cfs)
4 (excluding 4-I)	Bioretention Area	7.08	2732.97	2737.94	66	0.92
4-I	-	0.41	-	-	-	0.41
Total	-	7.49	-	-	-	1.33

4 Low Impact Development

The proposed Project is considered a Designated Project and must meet the requirements of the LA County LID Standards Manual. All Designated projects must retain 100 percent of the Stormwater Quality Design Volume (SWQDV). The Project proposes to retain the SWQDV via a bioretention area. The SWQDV was calculated using the 0.75-inch, 24-hour event because it is greater than the 85th percentile depth for the site which is 0.47-inch. Preliminary LID calculations were completed using the HydroCalc software and methodology per the LID Standard Manual. Table 7 below summarizes HydroCalc results for the SWQDV. Refer to Appendix C for HydroCalc and drawdown calculations.

Table 7: LID Summary

Drainage Area	Area (ac)	Storm Depth (in)	SWQDV (cf)
DA 4	8.5	0.75	15,915

5 Conclusions and Limitations

The Pilot Palmdale project is proposing to redevelop approximately 8.22 acres. The Project proposes to retain and treat runoff generated from the 0.75-inch storm event via a bioretention area. Runoff exceeding this design will discharge via a control outlet structure and discharge to the northwest of the project. Routing analysis of the bioretention area using the 50-year storm event showed that the bioretention area has enough capacity to reduce peak flow rate from the proposed project to that of existing conditions.

Additionally, the Project proposes to divert approximately offsite drainage around the proposed redevelopment via a lined trapezoidal channel. The offsite drainage peak flow rate has been determined using the peak flows from Pearblossom Highway and the capacity of the 6'x12' double RCP culvert that conveys flows from drainage area 1 under Pearblossom Highway.

APPENDIX A

Existing Conditions

GRAPHIC SCALE IN FEET
0 500 1000 2000

NORTH

HYDRAULIC SUMMARY		
DRAINAGE AREA	AREA (AC)	50-PEAK FLOW RATE (CFS)
1	1378	290.82
2	28.8	4.65
TOTAL	1406.8	295.47

ENLARGEMENT 1

GRAPHIC SCALE IN FEET
0 125 250 500

NORTH

LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH
- PROJECT AREA LIMITS
- X / XX — DRAINAGE AREA (DA) NAME / DA AREA (IN ACRES)

DRAINAGE NOTES

OFFSITE SURFACE CREATED USING USGS AVAILABLE TOPOGRAPHY. ONSITE SURVEY TOPOGRAPHY AVAILABLE FOR ONSITE PORTION.

DISCHARGES FROM DRAINAGE AREA 1 ONTO PROJECT LIMITS IS LIMITED TO THE CAPACITY OF THE EXISTING 6'X12' DOUBLE RCP CULVERT. REFER TO HYDROLOGY AND HYDRAULICS STUDY FOR FULL CALCULATIONS.

No.	REVISIONS	DATE	BY

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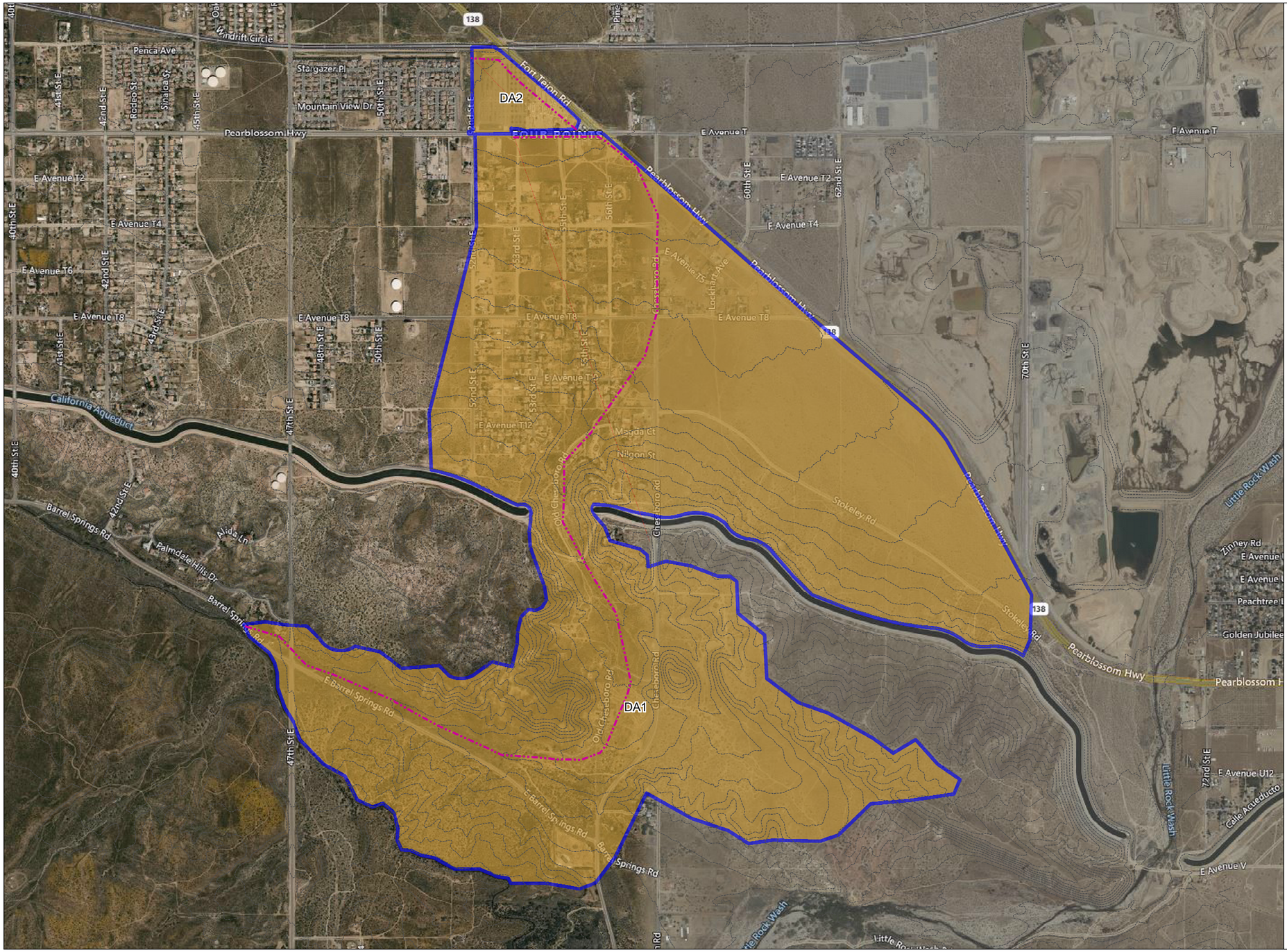
KHA PROJECT 095426006
DATE 02.10.2021
SCALE AS SHOWN
DESIGNED BY
DRAWN BY LAC
CHECKED BY SA

EXISTING DRAINAGE AREAS

PILOT PALMDALE

SHEET NUMBER
1



Legend

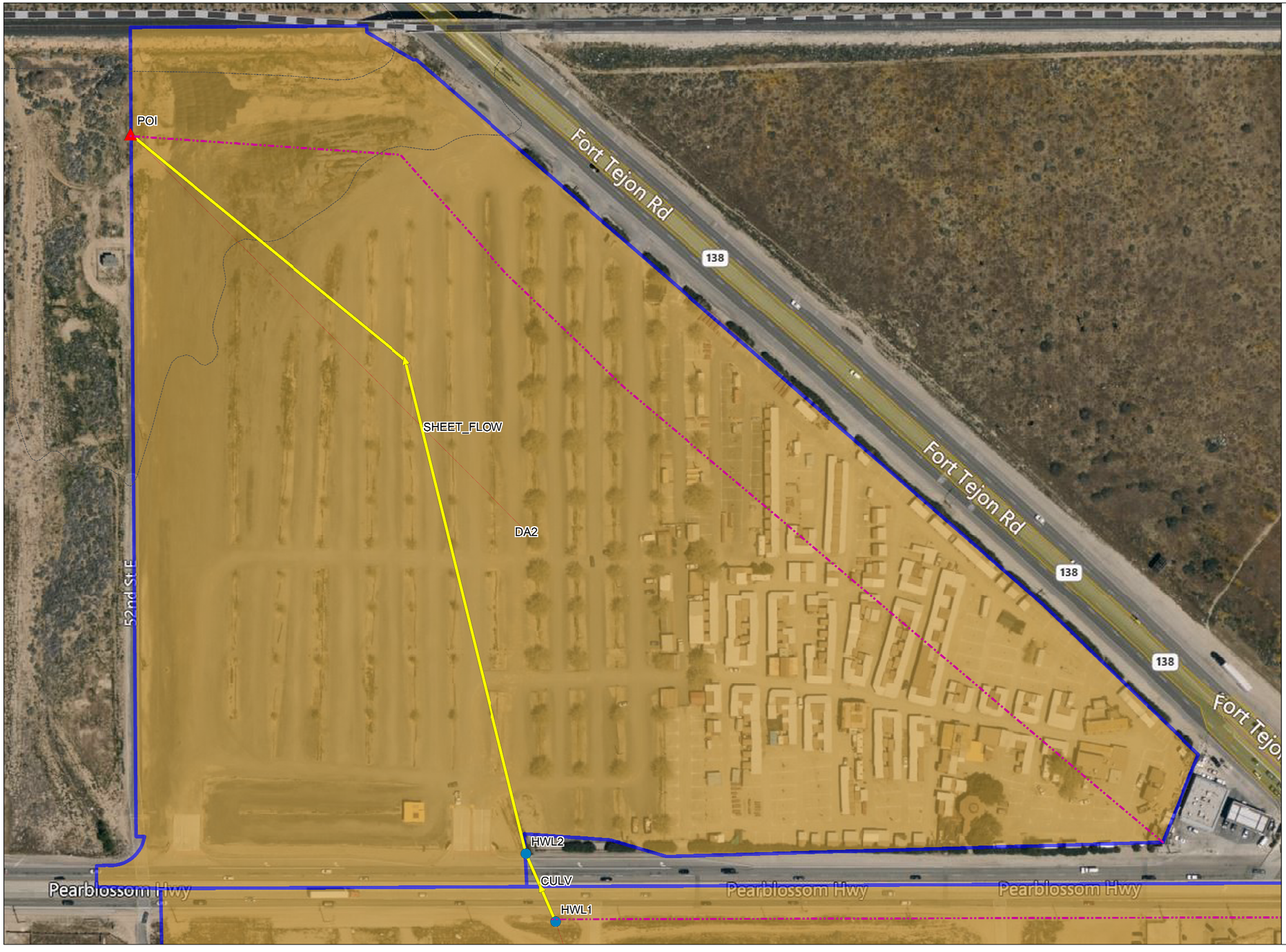
- Offsite Contours
- ARM Subcatchments
- Existing Flow Paths

N

3000 ft

PILOT PALMDALE - HYDROLOGY STUDY
EXISTING DRAINAGE AREAS - PCSWMM
SHEET 1
FEBRUARY 2021

Kimley»Horn



Legend

- Existing Flow Paths
- Junctions
- Outfalls
- Conduits
- Offsite Contours
- ARM Subcatchments

N

300 ft

PILOT PALMDALE - HYDROLOGY STUDY
EXISTING DRAINAGE AREAS - PCSWMM
SHEET 2
FEBRUARY 2021

Kimley»Horn

PCSWMM Report

Existing Hydrology Calculations- 50-yr

Model Pilot_Palmdale_Existing.inp

Kimley-Horn and Associates Inc.

February 11, 2021

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Tables

Table 1: Conduits

Name	Inlet Node	Outlet Node	Length (ft)	Roughness	Geom1 (ft)	Geom2 (ft)	Slope (ft/ft)	Max. |Flow| (cfs)	Max. |Velocity| (ft/s)	Max/Full Depth
CULV	HWL1	HWL2	93.21	0.013	2	6	0.00772	260.87	11.21	1
SHEET_FLOW	HWL2	POI	1251.902	0.014	1	200	0.00987	262.08	5.82	0.68

Table 2: Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)
HWL1	2748.82	2751.84	3.02	2751.84	290.84
HWL2	2748.1	2753.87	2	2750.1	260.87

Table 3: Outfalls

Name	Max. Total Inflow (cfs)
POI	262.48

Table 4A: ARM Subcatchments

Name	Runoff Method	Rain Gage	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)	Time of Concentration (min)	Loss Method
DA1	SCS Dimensionless UH	SCS_Type_I_3.90in	1378.601	16941	1.9	2	250.168	SCS CN
DA2	LA County Rational		28.78	1300	1	9	30	SCS CN

Table 4B: ARM Subcatchments

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Return Period (y)	Soil Type	Total rainfall (in)	Fire Factor	Precipitation (in)	Infiltration (in)	Runoff Depth (in)
DA1	0.2 S	0.632	76	Standard (483.4)	50		0	0	3.9	2.193	1.547
DA2	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0.34	2.78	0	0.426

Table 4C: ARM Subcatchments

Name	Runoff Volume (MG)	Peak Runoff (cfs)
DA1	57.899	290.836
DA2	0.333	4.651

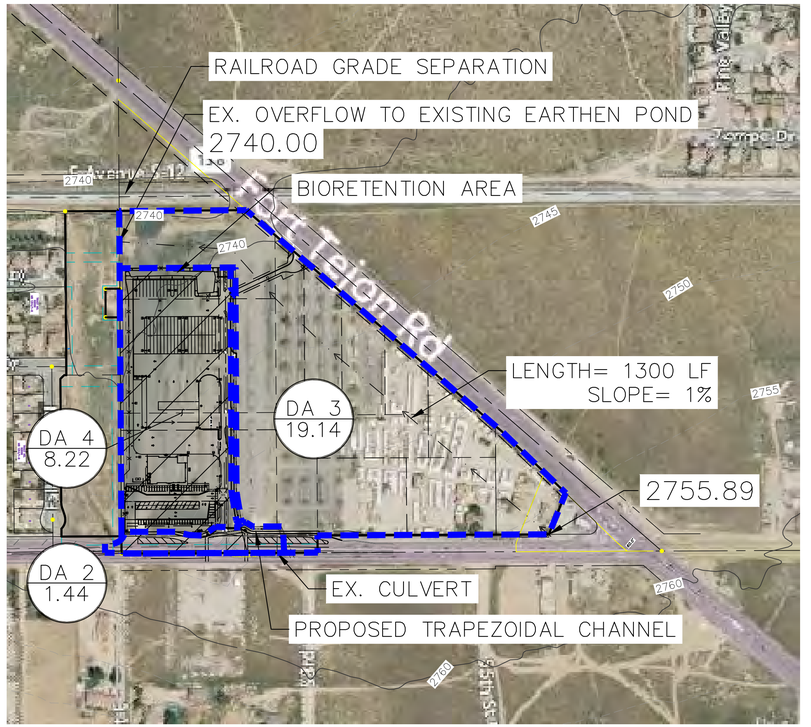
APPENDIX B

Proposed Conditions

GRAPHIC SCALE IN FEET
0 500 1000 2000
NORTH

HYDRAULIC SUMMARY			
DRAINAGE AREA	AREA (AC)	50-PEAK FLOW RATE (CFS)	FINAL DESIGN FLOW RATE (CFS)*
1	1378	290.82	260.40
2	1.4	1.09	1.09
3	19.1	3.09	3.09
4	8.2	7.49	1.33
TOTAL	1398.6	295.00	264.58

*REFER TO DRAINAGE NOTES.



ENLARGEMENT 1

GRAPHIC SCALE IN FEET
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NORTH

LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH
- PROJECT AREA LIMITS
- X / XX — DRAINAGE AREA (DA) NAME / DA AREA (IN ACRES)

DRAINAGE NOTES

OFFSITE SURFACE CREATED USING USGS AVAILABLE TOPOGRAPHY. ONSITE SURVEY TOPOGRAPHY AVAILABLE FOR ONSITE PORTION.

DIVERSION TRAPEZOIDAL CHANNEL DESIGNED TO CONVEY DISCHARGES FROM DRAINAGE AREA 1 WHICH IS LIMITED TO THE CAPACITY OF THE EXISTING 6'X12' DOUBLE RCP CULVERT. REFER TO HYDROLOGY AND HYDRAULICS STUDY FOR FULL CALCULATIONS AND SIZING.

DESIGN FLOW RATE FOR DA-4 WAS CALCULATED BY ROUTING THE RUNOFF THROUGH THE PROPOSED BIORETENTION AREA.

No.	REVISIONS	DATE	BY

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KHA PROJECT 095426006
DATE 02.11.2021
SCALE AS SHOWN
DESIGNED BY
DRAWN BY LAC
CHECKED BY SA

PROPOSED DRAINAGE AREAS

PILOT PALMDALE

SHEET NUMBER
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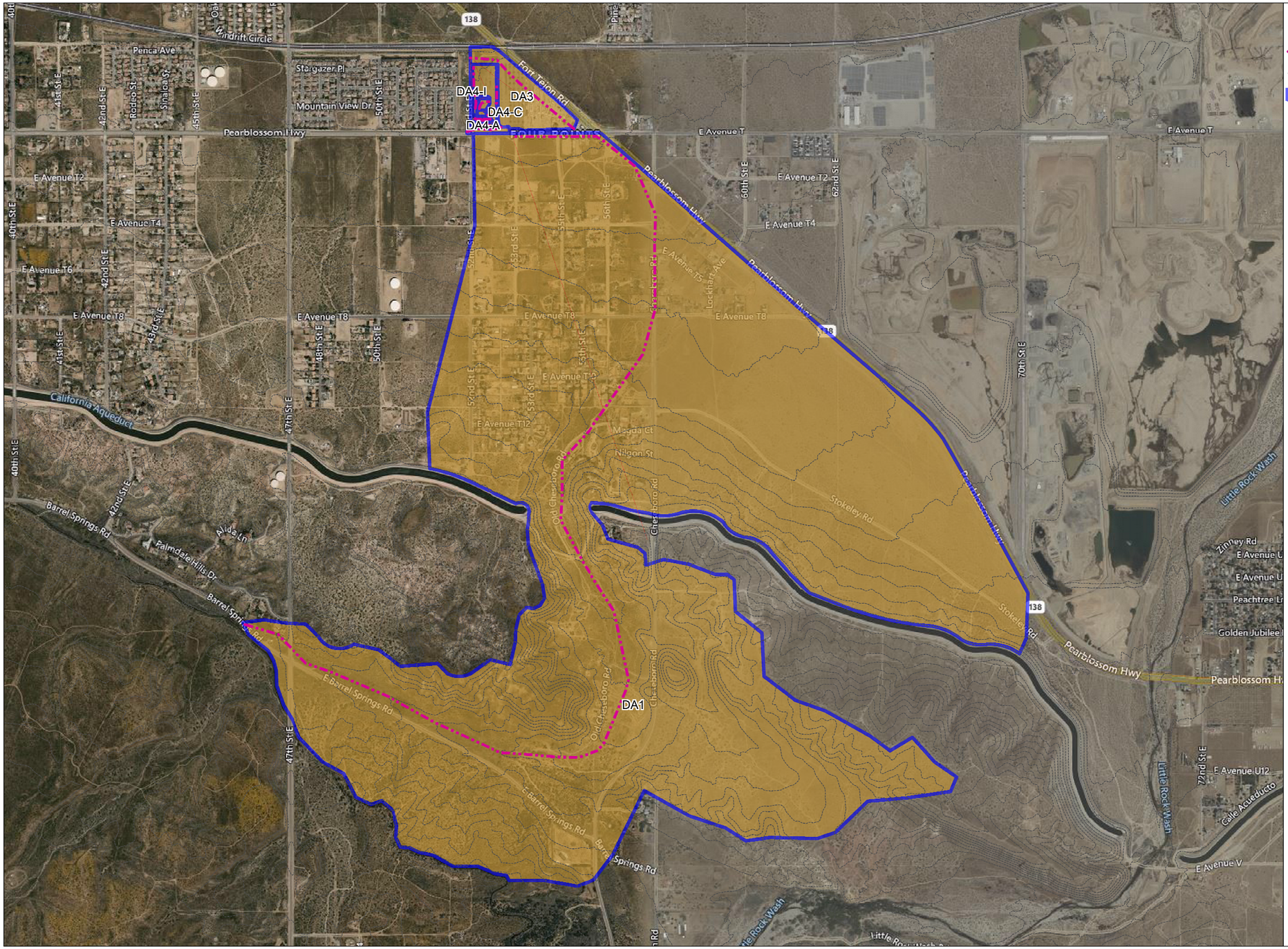


Legend

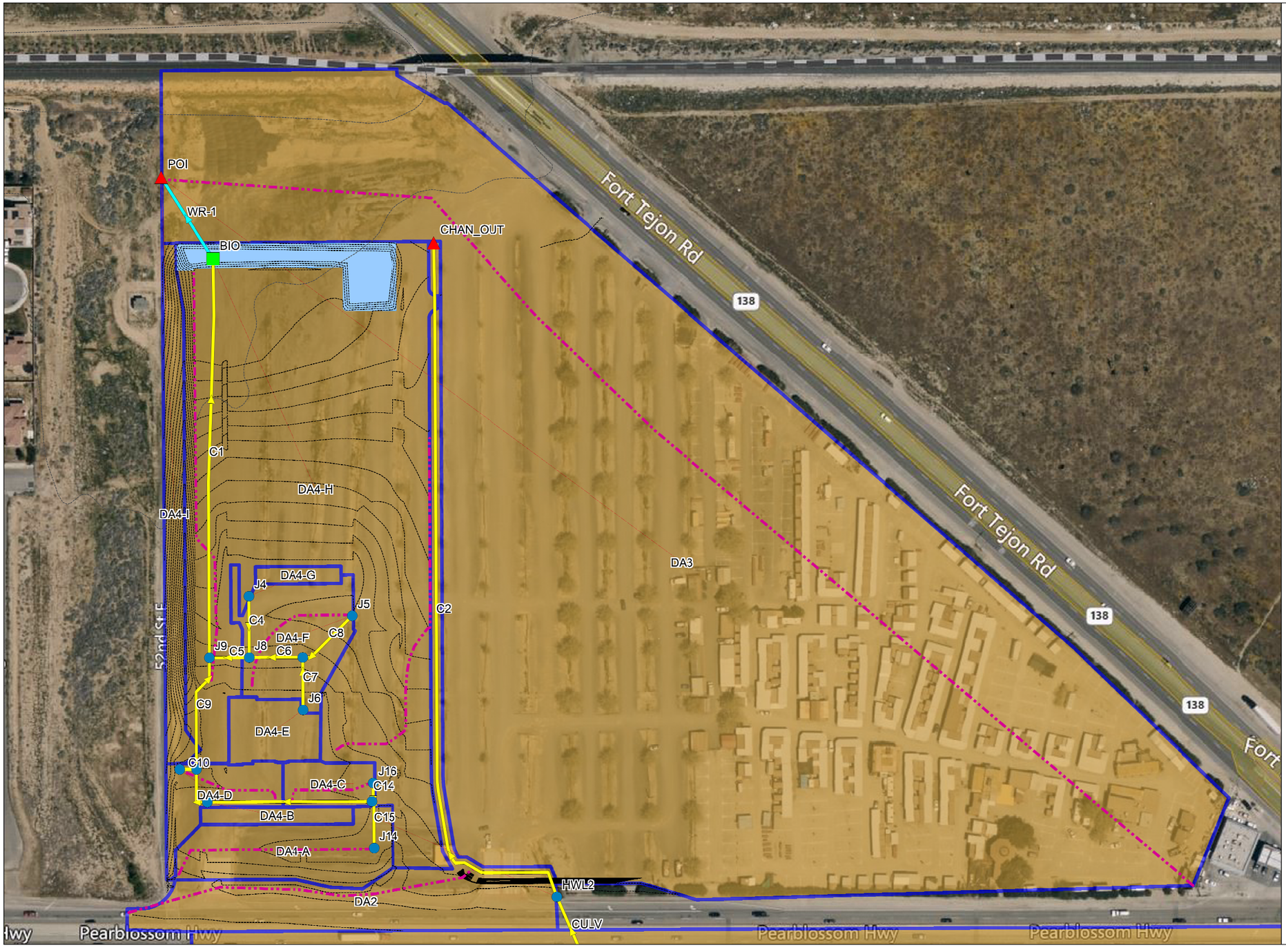
- Flow Paths
- Offsite Contours
- ARM Subcatchments

N

3000 ft

PILOT PALMDALE - HYDROLOGY STUDY
PROPOSED DRAINAGE AREAS - PCSWMM
SHEET 1
FEBRUARY 2021

Kimley»Horn



Legend

- Storages
- Junctions
- Outfalls
- Conduits
- Weirs
- ARM Subcatchments
- Offsite Contours
- Proposed Surface
- Basin
- Flow Paths

N

300 ft

PILOT PALMDALE - HYDROLOGY STUDY
PROPOSED DRAINAGE AREAS - PCSWMM
SHEET 2
FEBRUARY 2021

Kimley»Horn

PCSWMM Report

Proposed Hydrology Calculations- 50-yr

Model Pilot_Palmdale_Proposed.inp

Kimley-Horn and Associates Inc.

February 11, 2021

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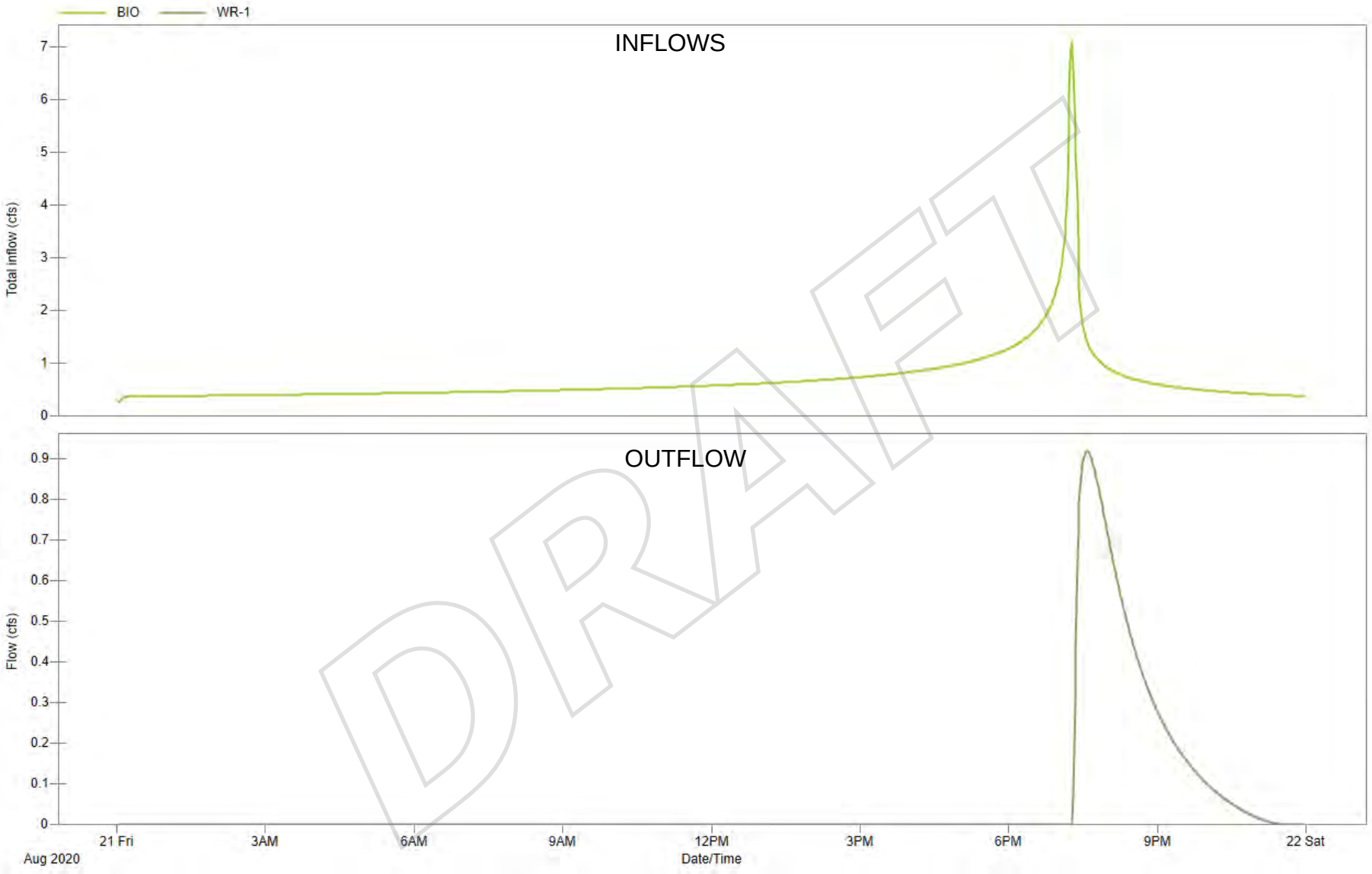

Figure 1: Onsite Hydrographs

Table 1: Conduits

Name	Inlet Node	Outlet Node	Length (ft)	Roughness	Geom1 (ft)	Geom2 (ft)	Slope (ft/ft)	Max. |Flow| (cfs)	Max. |Velocity| (ft/s)	Max/Full Depth
CULV	HWL1	HWL2	93.21	0.013	2	6	0.00772	260.87	11.21	1
C2	HWL2	CHAN_OUT	1078.017	0.025	5.5	4.25	0.01145	261.44	10.77	0.6
C1	J9	BIO	561.041	0.013	1	0	0.01275	2.65	5.87	0.59
C4	J4	J8	88.992	0.013	1	0	0.01	0.11	2.06	0.12
C5	J8	J9	57.63	0.013	1	0	0.01354	1.31	4.68	0.39
C6	J7	J8	78.361	0.013	1	0	0.01353	1.21	4.58	0.37
C7	J6	J7	75.987	0.013	1	0	0.0682	0.4	5.92	0.14
C8	J5	J7	96.477	0.013	1	0	0.01348	0.81	4.1	0.3
C9	J10	J9	169.421	0.013	1	0	0.01003	1.41	4.31	0.44
C10	J11	J10	24.56	0.013	1	0	0.17357	0.44	8.45	0.12
C11	J12	J10	63.039	0.013	1	0	0.00999	1	3.89	0.36
C13	J15	J12	238.908	0.013	1	0	0.01	0.82	3.75	0.33
C14	J16	J15	27.489	0.013	1	0	0.02802	0.3	3.95	0.15
C15	J14	J15	70.459	0.013	1	0	0.00994	0.54	3.26	0.26

Table 2: Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)
HWL1	2748.82	2751.84	3.02	2751.84	290.84
HWL2	2748.1	2753.87	3.46	2751.56	260.98
J4	2745.39	2746.39	0.12	2745.51	0.11
J5	2746.86	2749.36	0.3	2747.16	0.82
J6	2750.73	2751.73	0.14	2750.87	0.4
J7	2745.56	2746.56	0.37	2745.93	1.21
J8	2744.5	2745.5	0.39	2744.89	1.31
J9	2743.72	2744.72	0.6	2744.32	2.7
J10	2745.42	2746.42	0.44	2745.86	1.41
J11	2749.62	2752.62	0.12	2749.74	0.44
J12	2746.05	2746.05	0.36	2746.41	1
J14	2749.14	2752.14	0.26	2749.4	0.54
J15	2748.44	2749.44	0.33	2748.77	0.83
J16	2749.21	2752.21	0.15	2749.36	0.3

Table 3: Outfalls

Name	Max. Total Inflow (cfs)
POI	3.64
CHAN_OUT	261.44

Table 4: Storages

Name	Rim Elev. (ft)	Max. HGL (ft)
BIO	2738	2737.94

Table 5: Weirs

Name	Height (ft)	Length (ft)	Inlet Offset (ft)	Discharge Coeff. (CFS)	Max. |Flow| (cfs)
WR-1	0.23	4	4.8	3.33	0.92

Table 6A: ARM Subcatchments

Name	Runoff Method	Rain Gage	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)	Time of Concentration (min)	Loss Method
DA1	SCS Dimensionless UH	SCS_Type_I_3.90in	1378.601	16941	1.9	2	250.168	SCS CN
DA2	LA County Rational		1.44	500	0.6	72	14	SCS CN
DA3	LA County Rational		19.136	1300	1	5	30	SCS CN
DA4-A	LA County Rational		0.618	306	1	67	10	SCS CN
DA4-B	LA County Rational		0.127	50	1	100	5	SCS CN
DA4-C	LA County Rational		0.198	140	0.9	100	5	SCS CN
DA4-D	LA County Rational		0.316	150	2.4	84	5	SCS CN
DA4-E	LA County Rational		0.268	100	1	100	5	SCS CN
DA4-F	LA County Rational		0.597	207	1.7	100	6	SCS CN
DA4-G	LA County Rational		0.072	50	1	100	5	SCS CN
DA4-H	LA County Rational		5.511	604	2.9	80	12	SCS CN
DA4-I	LA County Rational		0.512	50	1	0	5	SCS CN

Table 6B: ARM Subcatchments

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Return Period (y)	Soil Type	Total rainfall (in)	Fire Factor	Precipitation (in)	Infiltration (in)	Runoff Depth (in)
DA1	0.2 S	0.632	76	Standard (483.4)	50		0	0	3.9	2.193	1.547
DA2	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	1.875
DA3	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0.34	2.78	0	0.426
DA4-A	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	1.769
DA4-B	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	2.481
DA4-C	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	2.481
DA4-D	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	2.137
DA4-E	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	2.481
DA4-F	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	2.481
DA4-G	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	2.481
DA4-H	0.2 S	0.5	80	Standard (483.4)	50	124	2.78	0	2.78	0	2.04
DA4-I	0.2 S	0.5	80	Standard (483.4)	50	120	2.78	0	2.78	0	0.329

Table 6C: ARM Subcatchments

Name	Runoff Volume (MG)	Peak Runoff (cfs)
DA1	57.899	290.836
DA2	0.073	1.09
DA3	0.221	3.092
DA4-A	0.03	0.538
DA4-B	0.009	0.19
DA4-C	0.013	0.296
DA4-D	0.018	0.437
DA4-E	0.018	0.4
DA4-F	0.04	0.817
DA4-G	0.005	0.107
DA4-H	0.305	4.478
DA4-I	0.005	0.413

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APPENDIX C

Low Impact Development Calculations

Peak Flow Hydrologic Analysis

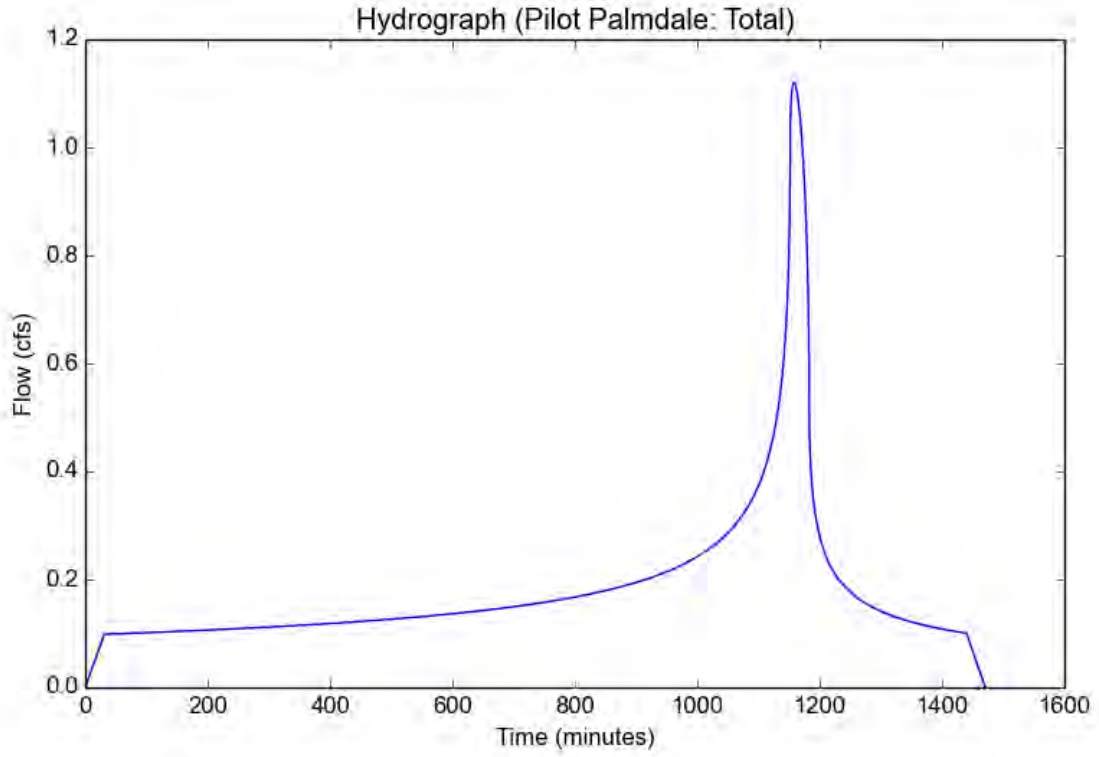
File location: C:/Users/lupita.astorga/OneDrive - KH/Current Projects/WFH/Pilot Palmdale/Appendix (Offsite)/Calculations/Pilot Palmdale - Total-LID.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Pilot Palmdale
Subarea ID	Total
Area (ac)	8.24
Flow Path Length (ft)	604.0
Flow Path Slope (vft/hft)	0.03
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.77
Soil Type	120
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1898
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.716
Time of Concentration (min)	31.0
Clear Peak Flow Rate (cfs)	1.1199
Burned Peak Flow Rate (cfs)	1.1199
24-Hr Clear Runoff Volume (ac-ft)	0.3657
24-Hr Clear Runoff Volume (cu-ft)	15929.7634



BMP Sizing Calculations

All calculations based on the LID Standards Manual, May 2014, for the Los Angeles County

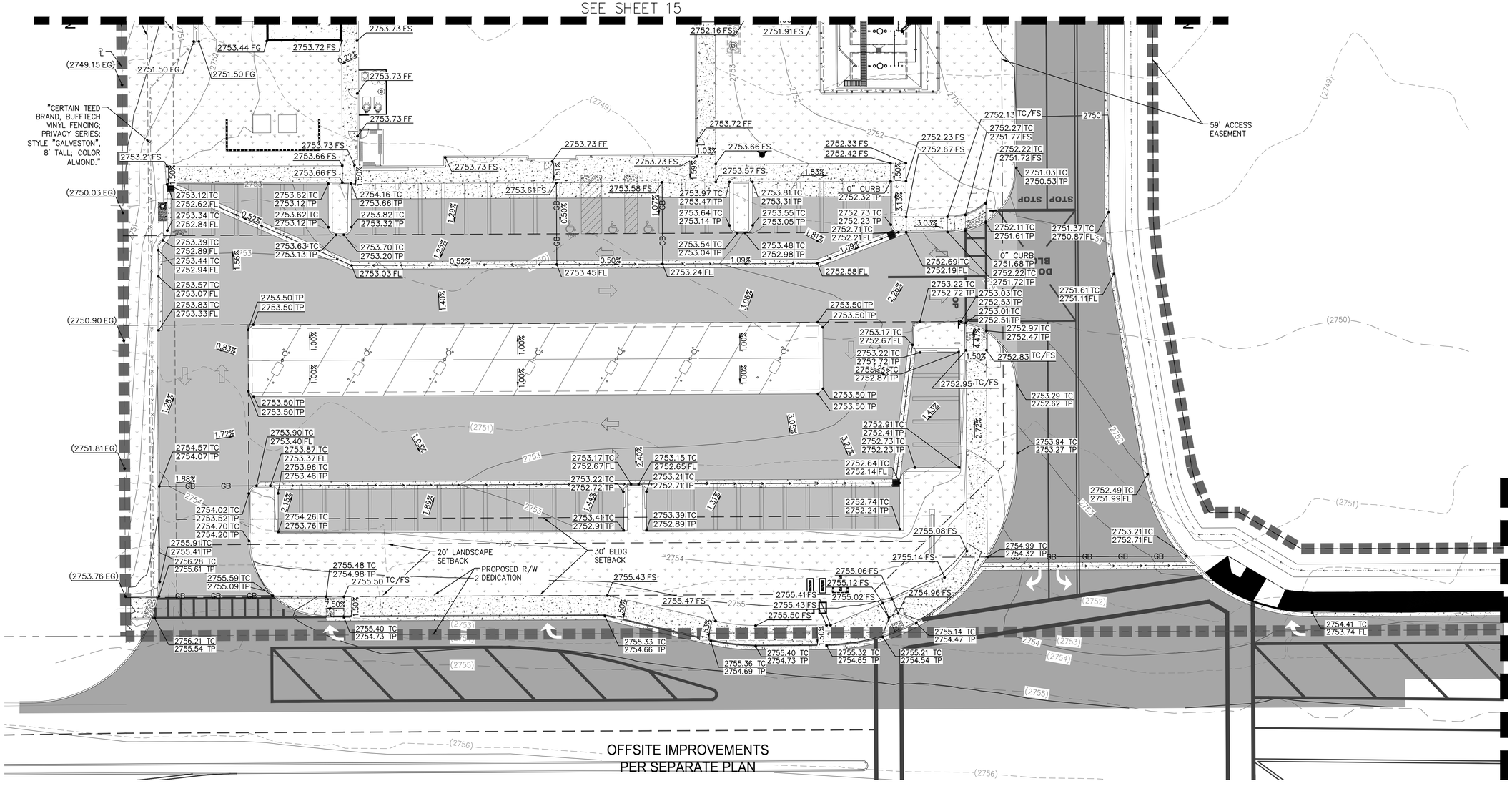
Project Name: Pilot Palmdale
Completed by: KRS
Reviewed by: LAC
Date: 6-Jan-21
Updated: 6-Jan-21
County: Los Angeles

DMA 4		
$f_{measured}$ =	0.727	
S.F. =	2	Safety Factor
f_{design} =	0.36	infiltration rate, in/hr
t =	72	max retention time (max 72 hrs), hr
d_{max} =	2.18	maximum depth of water, ft
d_p =	*2.18*	*ponding depth, ft*
</= d_p =	*1.80*	*maximum allowable is 0.5 ft*
t(final) =	66	design drawdown time (based on max detention depth of 2 ft), hr
SWQDv =	15915	cf
A_s =	8842	required storage area, sf
A_v =	8849	bioretention area provided, sf

APPENDIX D

Preliminary Grading Plan

SEE SHEET 15



SEE SHEET 17

LEGEND

- PROPERTY LINE
- CIVIL LIMITS OF WORK
- CENTERLINE
- EASEMENT LINE SETBACKS
- GB—GB GRADE BREAK
- (2749.00 TC) / (2748.50 TP) EXISTING SPOT ELEVATION
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- 1.00% PROPOSED FLOW (SLOPE AND DIRECTION)
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- HEAVY DUTY ASPHALT PAVEMENT
- STANDARD DUTY ASPHALT PAVEMENT
- LANDSCAPE/ PLANTER AREA
- DETECTABLE WARNINGS

ESTIMATED EARTHWORK QUANTITIES

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FILL:	35,636 CY
NET:	29,751 CY FILL

NOTE: THE ABOVE QUANTITIES ARE APPROXIMATE IN PLACE VOLUMES CALCULATED FROM THE EXISTING GROUND TO THE PROPOSED FINISHED GRADE. EXISTING GROUND IS DEFINED BY THE CONTOURS AND SPOT GRADES ON THE BASE SURVEY. PROPOSED FINISHED GRADE IS DEFINED AS THE FINAL GRADE AS INDICATED ON THE GRADING PLAN(S).

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GRAPHIC SCALE IN FEET
0 10 20 40
1"=20'

WDID# _____

GRADING PERMIT # EN_____

RECOMMENDED BY: _____ DATE

PLANNING DEPT. DATE

ACCEPTED BY CITY ENGINEER: _____ GUILLERMO I. PADILLA RCE 46067 DATE

CHECKED BY: _____ PLAN CHECK ENGINEER DATE

CITY OF PALMDALE
GRADING PLAN

PILOT PALMDALE

GD XX-XX

DESIGNED:
DRAWN:
CHECKED:

SHEET No.
14 OF 24

SOILS ENGINEER'S SEAL/STAMP

LICENSED PROFESSIONAL
REGISTERED PROFESSIONAL ENGINEER
SHEA-MICHAEL ANTI
RCE NO. 78274
STATE OF CALIFORNIA - CIVIL
DATE: 02.10.2021

DEVELOPER

PILOT TRAVEL CENTERS LLC
5508 LONAS DRIVE
KNOXVILLE, TN 37909
(865) 588–7488

Kimley»Horn

3880 LEMON STREET, SUITE 420, RIVERSIDE, CA 92501
PHONE: 951–543–9868
WWW.KIMLEY–HORN.COM

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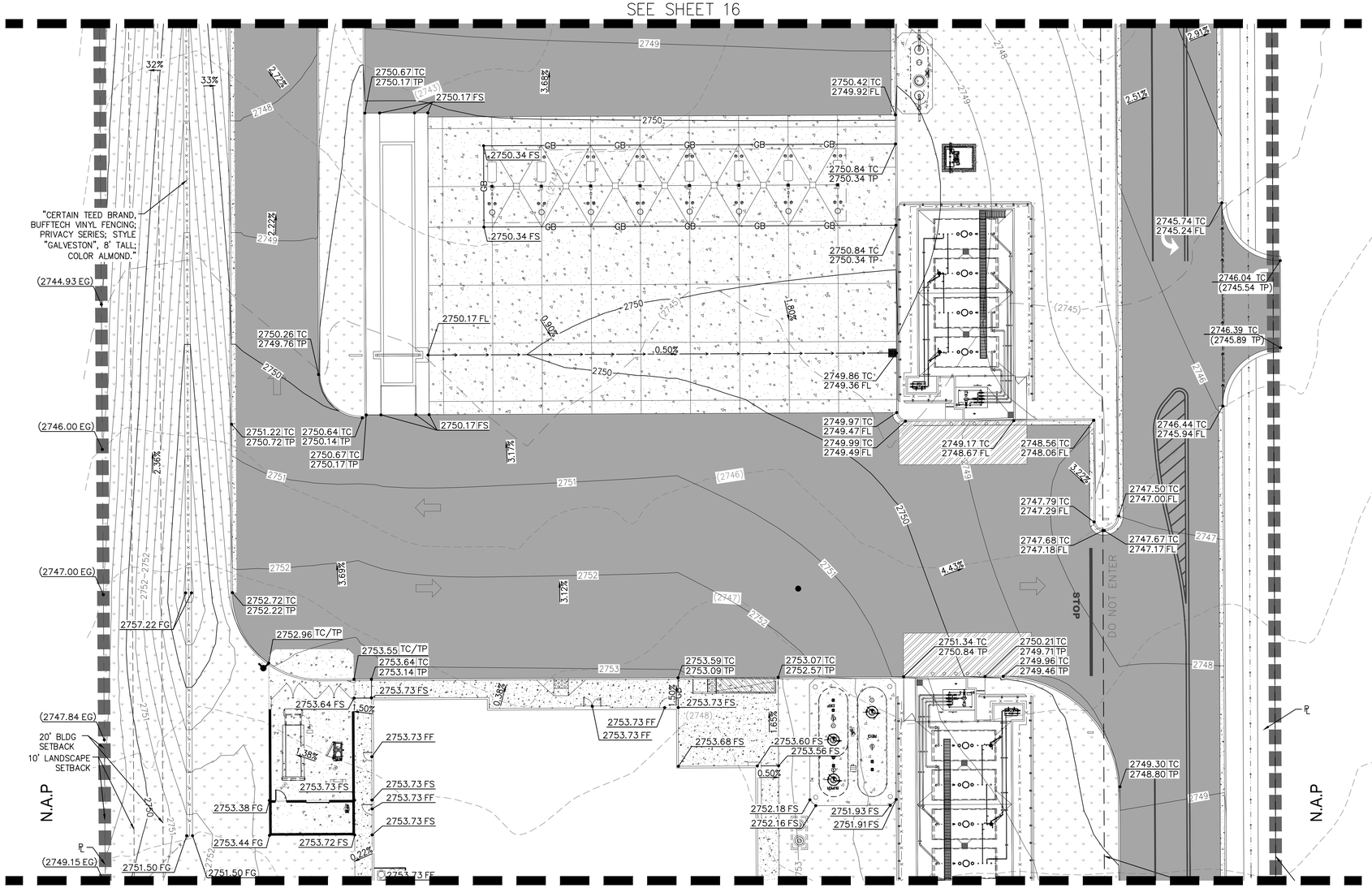
GD XX-XX

SEE SHEET 16



SEE SHEET 14

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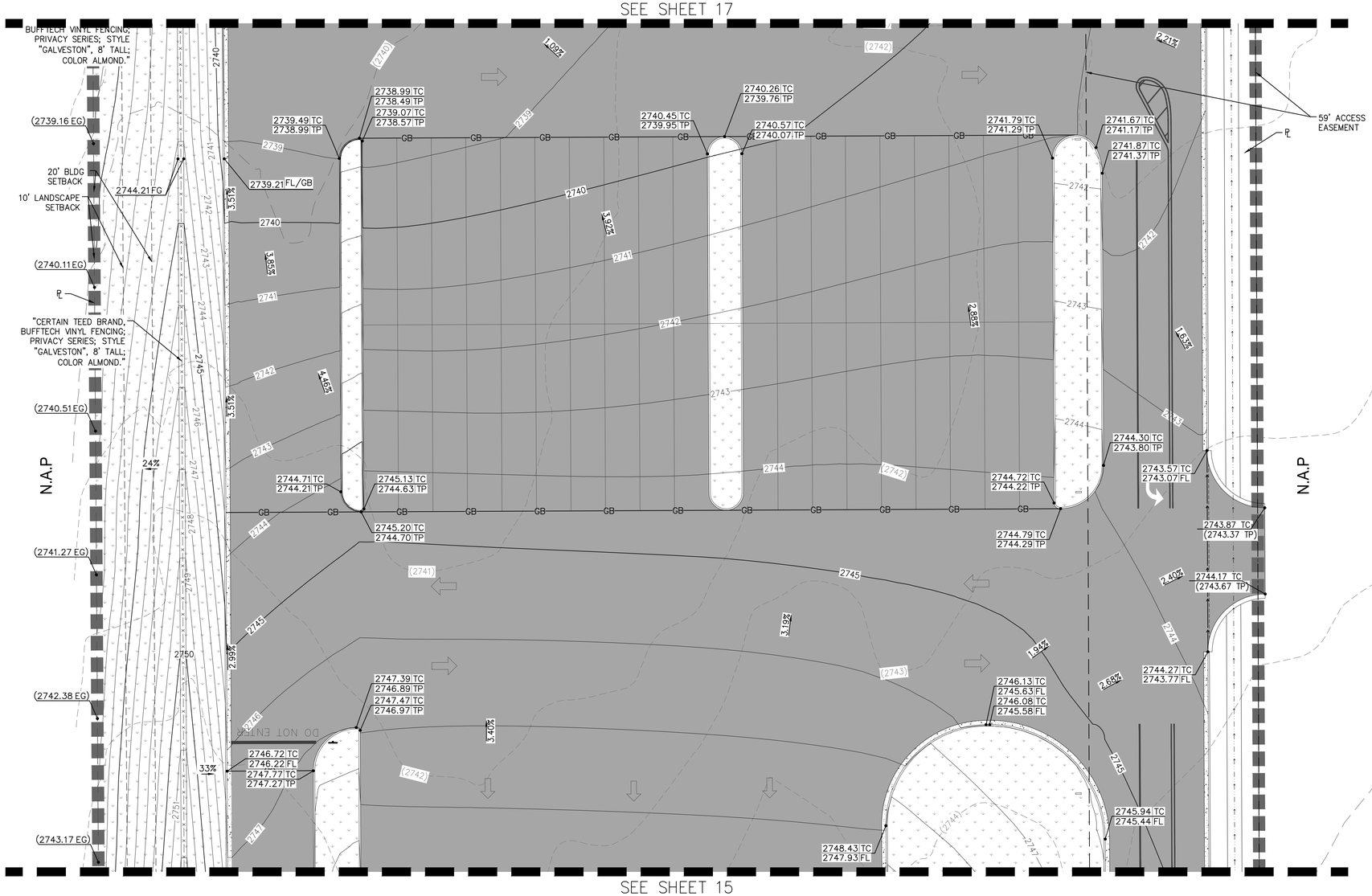

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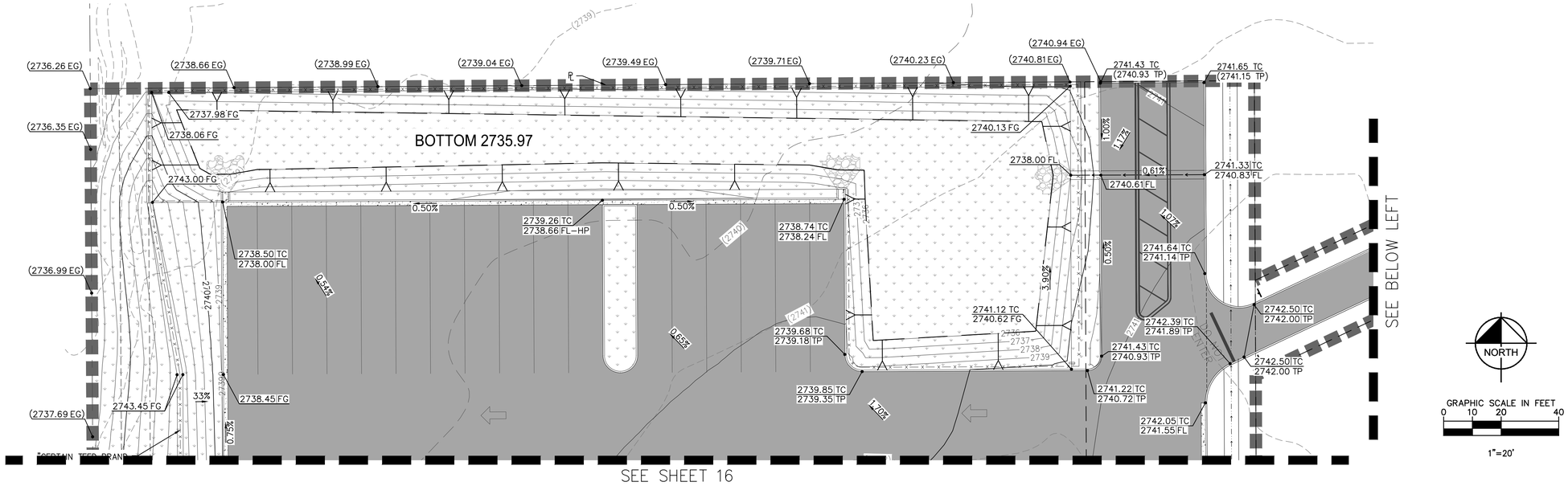

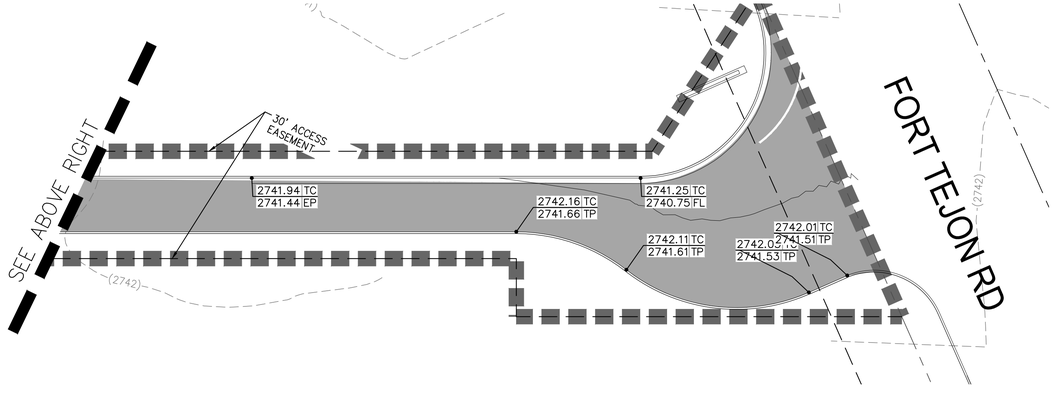

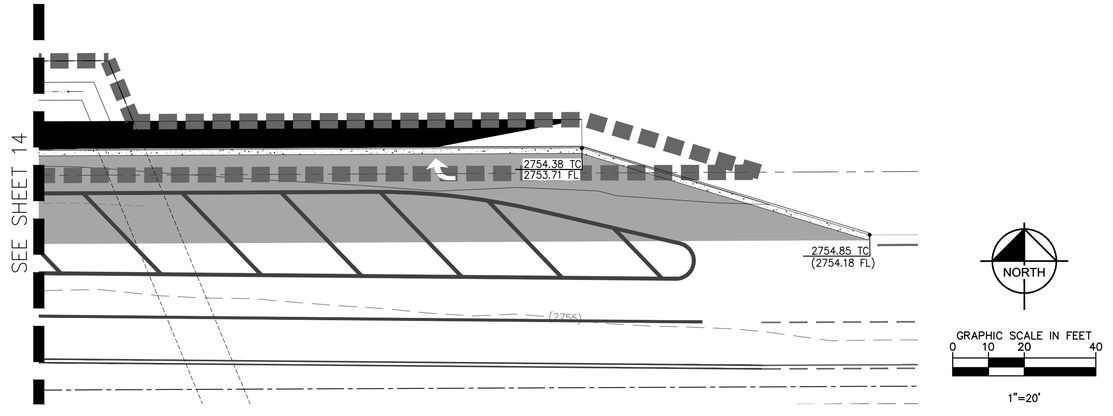

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APPENDIX E

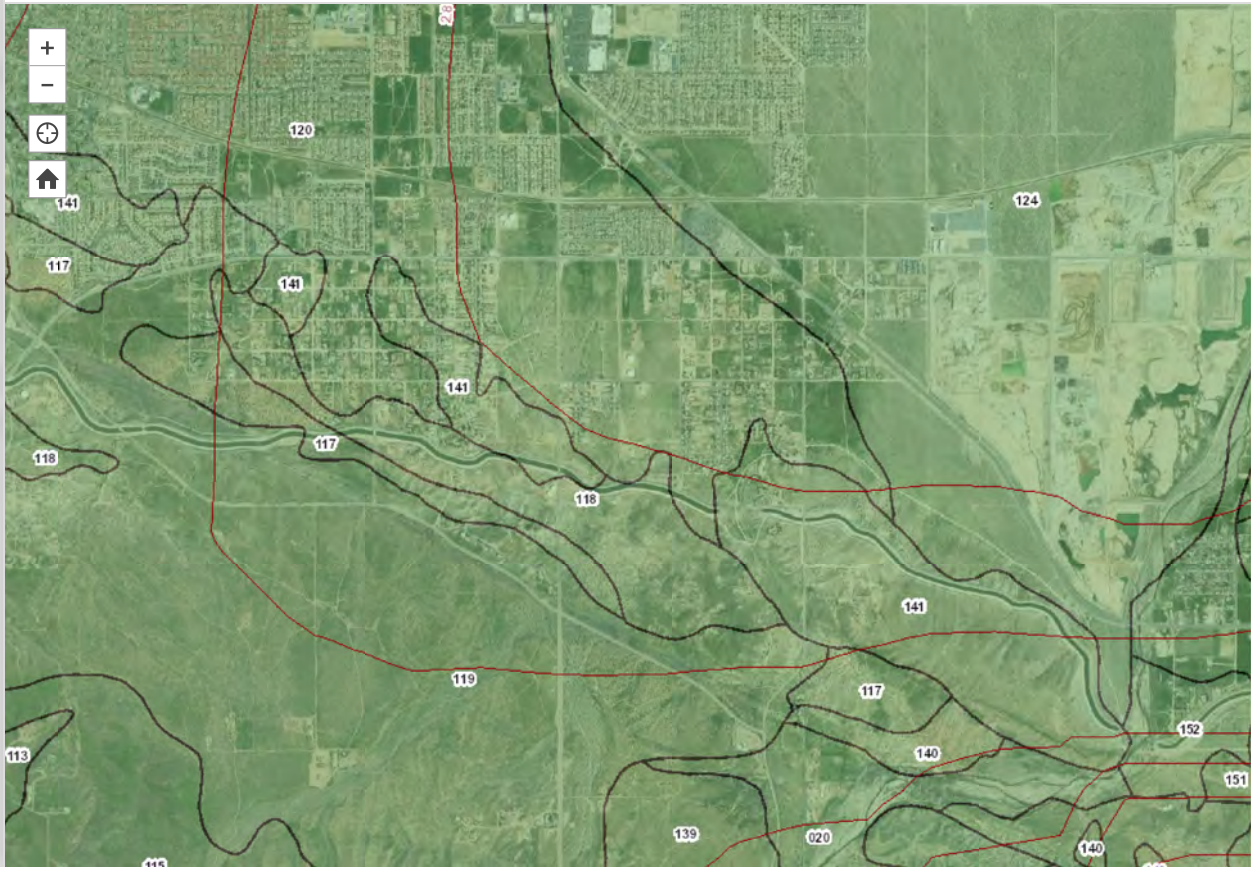
References

About | Legend

Layers

- [x] Hydrology GIS
  - [x] 50yr Two Tenths (Rainfall)
  - [ ] DPA Zones
  - [x] Soils 2004
  - [ ] Final 85th Percentile, 24-hr Rainfall
  - [ ] 1-year, 1-hour Rainfall Intensity
  - [ ] Final 95th Percentile, 24-hr Rainfall
- [x] LA County Parcels

LA County Hydrology Map



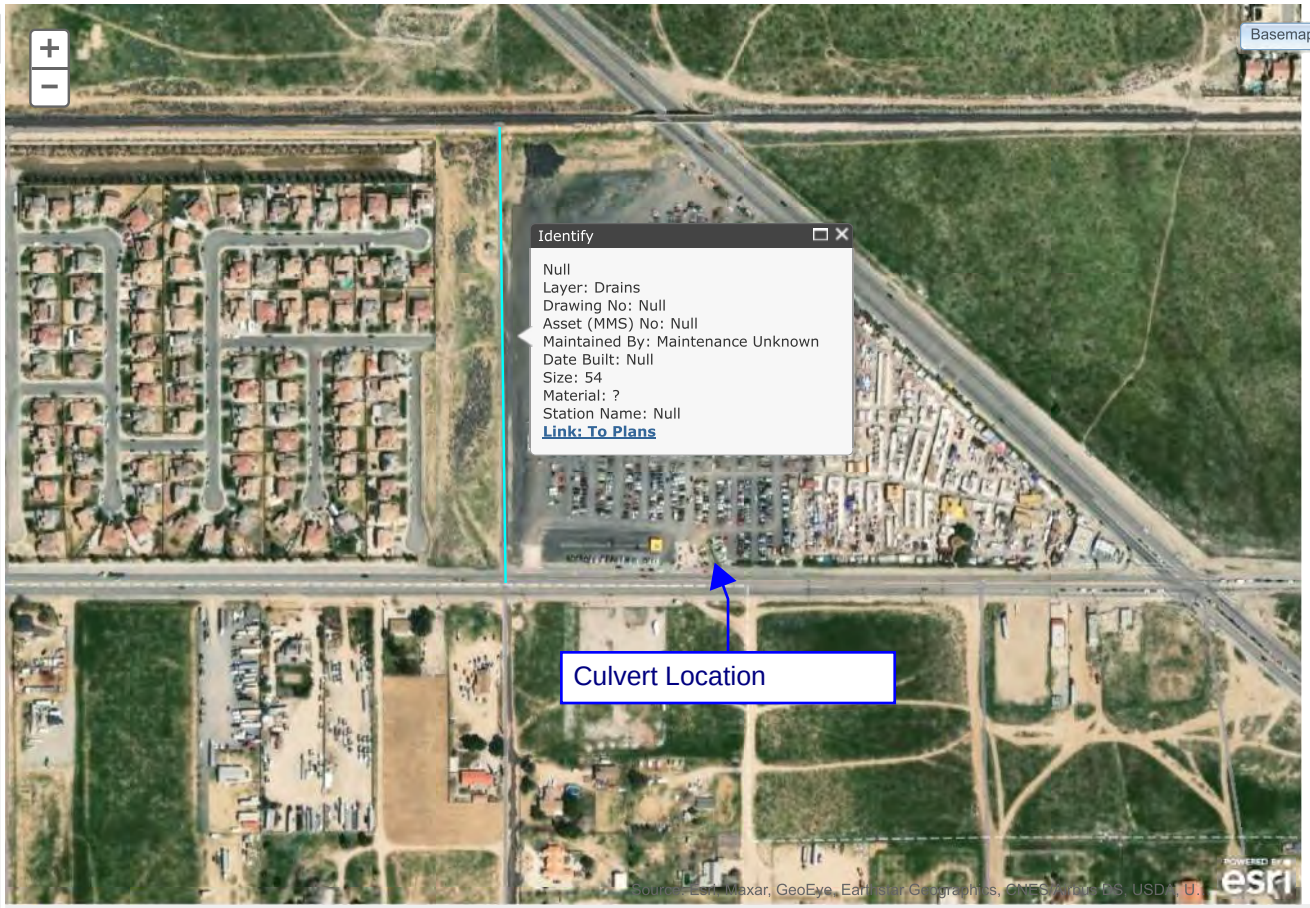
Los Angeles County Storm Drain System

File Geodatabase Download

Search | Layers | Info

- Maintained by City
- Maintained by Caltrans
- Maintenance Unknown
- Maintained by Army Corp

- [x] Catch Basins
  - Maintained by LACFCD
  - Maintained by City
  - Maintained by Road
  - Maintained by Caltrans
  - Maintenance Unknown
  - Maintained by Others
- [x] Maintenance Holes
  - Maintained by LACFCD
  - Maintained by City
  - Maintenance Unknown
- [x] Laterals
  - Maintained by LACFCD
  - Maintained by City
  - Maintained by Road
  - Maintained by Metro/Parks & Recreation
  - Maintained by Private/Permittee/Others
  - Maintained by Caltrans
  - Maintenance Unknown
- [x] MS4 Outfalls
- [x] MS4 Outfalls (CUA)
- [x] Debris Basins
  - Maintained by LACFCD
  - Maintained by City
  - Maintained by Caltrans
  - Maintenance Unknown
- [ ] Inlets/Outlets
  - Inlets
  - Outlets
- [ ] Low Flow Diversion
  - Maintained by LACFCD
  - Maintained by City
- [ ] Flood Right of Way Maps
- [ ] Flood Maintenance Districts Boundary
- [ ] Embankment
- [x] Pseudoline



Map Tips

About | Legend | Layers

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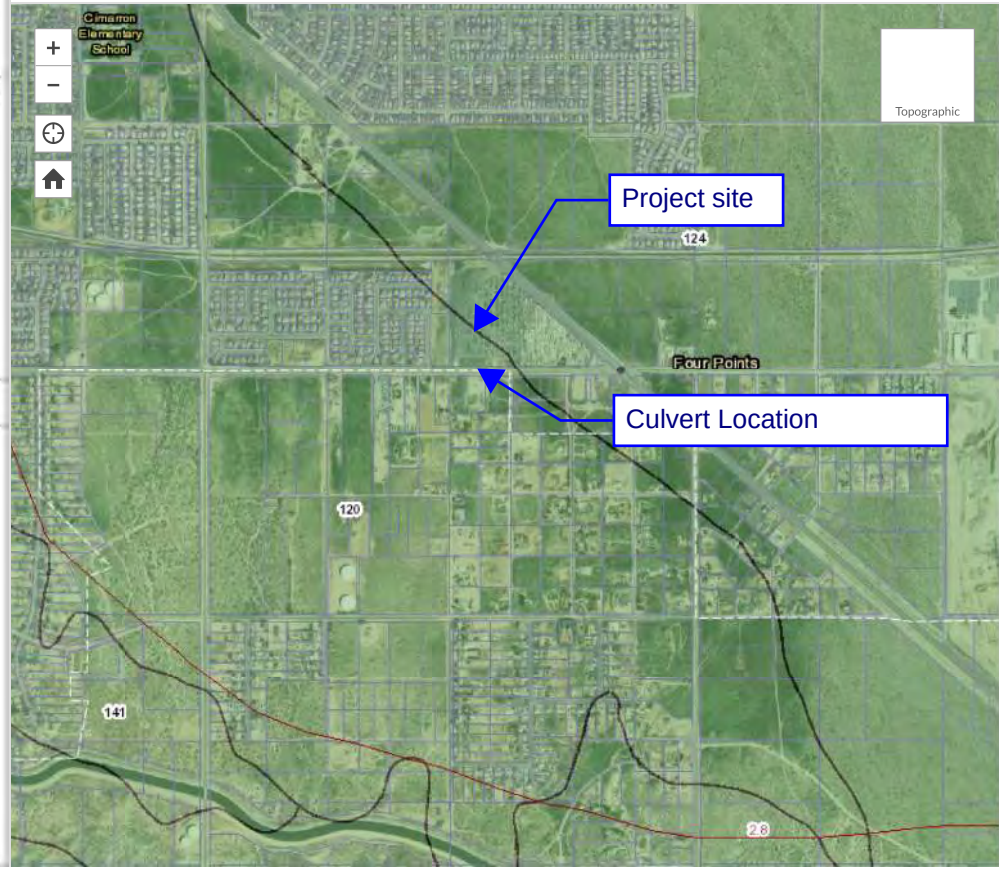

NOAA Atlas 14, Volume 6, Version 2
Location name: Palmdale, California, USA*
Latitude: 34.5427°, Longitude: -118.031°
Elevation: 2757.61 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.069 (0.057-0.084)	0.097 (0.081-0.119)	0.135 (0.111-0.165)	0.166 (0.136-0.204)	0.208 (0.165-0.266)	0.241 (0.187-0.315)	0.275 (0.208-0.368)	0.311 (0.228-0.428)	0.359 (0.253-0.515)	0.397 (0.270-0.590)
10-min	0.099 (0.082-0.121)	0.139 (0.115-0.170)	0.193 (0.159-0.236)	0.237 (0.194-0.293)	0.298 (0.236-0.381)	0.346 (0.268-0.451)	0.395 (0.298-0.528)	0.446 (0.327-0.613)	0.515 (0.362-0.739)	0.569 (0.386-0.845)
15-min	0.120 (0.099-0.146)	0.169 (0.140-0.206)	0.234 (0.193-0.286)	0.287 (0.235-0.354)	0.361 (0.286-0.460)	0.418 (0.324-0.545)	0.477 (0.361-0.638)	0.539 (0.396-0.741)	0.623 (0.438-0.893)	0.688 (0.467-1.02)
30-min	0.168 (0.140-0.205)	0.237 (0.196-0.289)	0.328 (0.271-0.401)	0.403 (0.330-0.497)	0.507 (0.401-0.646)	0.587 (0.455-0.766)	0.670 (0.507-0.896)	0.756 (0.555-1.04)	0.874 (0.615-1.25)	0.965 (0.656-1.44)
60-min	0.236 (0.195-0.287)	0.332 (0.275-0.404)	0.459 (0.379-0.562)	0.564 (0.462-0.696)	0.709 (0.562-0.905)	0.823 (0.637-1.07)	0.939 (0.710-1.25)	1.06 (0.778-1.46)	1.22 (0.862-1.76)	1.35 (0.919-2.01)
2-hr	0.358 (0.297-0.436)	0.490 (0.406-0.598)	0.666 (0.550-0.814)	0.810 (0.663-0.999)	1.01 (0.798-1.29)	1.16 (0.900-1.52)	1.32 (0.997-1.76)	1.48 (1.09-2.04)	1.71 (1.20-2.45)	1.88 (1.28-2.79)
3-hr	0.455 (0.377-0.554)	0.617 (0.511-0.753)	0.832 (0.687-1.02)	1.01 (0.825-1.24)	1.25 (0.989-1.60)	1.44 (1.11-1.87)	1.63 (1.23-2.18)	1.83 (1.34-2.52)	2.10 (1.48-3.01)	2.31 (1.57-3.43)
6-hr	0.654 (0.542-0.796)	0.881 (0.730-1.07)	1.18 (0.975-1.44)	1.43 (1.17-1.76)	1.76 (1.40-2.25)	2.03 (1.57-2.64)	2.29 (1.73-3.06)	2.57 (1.89-3.53)	2.95 (2.07-4.23)	3.24 (2.20-4.81)
12-hr	0.864 (0.716-1.05)	1.18 (0.973-1.43)	1.59 (1.31-1.94)	1.92 (1.58-2.37)	2.39 (1.89-3.05)	2.75 (2.13-3.58)	3.12 (2.35-4.16)	3.50 (2.57-4.81)	4.02 (2.83-5.77)	4.42 (3.01-6.58)
24-hr	1.15 (1.02-1.33)	1.59 (1.41-1.84)	2.18 (1.92-2.52)	2.66 (2.33-3.10)	3.32 (2.81-4.00)	3.84 (3.18-4.72)	4.36 (3.53-5.50)	4.91 (3.87-6.37)	5.67 (4.28-7.66)	6.26 (4.56-8.75)
2-day	1.38 (1.22-1.59)	1.93 (1.71-2.23)	2.67 (2.36-3.08)	3.28 (2.87-3.82)	4.11 (3.48-4.95)	4.77 (3.96-5.86)	5.44 (4.41-6.86)	6.14 (4.84-7.96)	7.11 (5.37-9.61)	7.87 (5.74-11.0)
3-day	1.52 (1.35-1.75)	2.14 (1.90-2.47)	2.99 (2.64-3.45)	3.68 (3.23-4.29)	4.65 (3.94-5.60)	5.40 (4.48-6.65)	6.19 (5.01-7.80)	7.00 (5.51-9.08)	8.14 (6.15-11.0)	9.03 (6.59-12.6)
4-day	1.61 (1.43-1.86)	2.29 (2.02-2.63)	3.20 (2.83-3.70)	3.96 (3.47-4.61)	5.02 (4.25-6.04)	5.85 (4.85-7.19)	6.71 (5.43-8.46)	7.62 (6.00-9.88)	8.88 (6.71-12.0)	9.88 (7.21-13.8)
7-day	1.77 (1.57-2.03)	2.52 (2.23-2.91)	3.56 (3.14-4.11)	4.43 (3.88-5.16)	5.65 (4.79-6.80)	6.62 (5.49-8.14)	7.63 (6.18-9.61)	8.70 (6.85-11.3)	10.2 (7.70-13.8)	11.4 (8.31-15.9)
10-day	1.86 (1.65-2.14)	2.67 (2.36-3.07)	3.78 (3.34-4.36)	4.72 (4.13-5.49)	6.05 (5.12-7.29)	7.11 (5.90-8.75)	8.23 (6.66-10.4)	9.41 (7.41-12.2)	11.1 (8.37-15.0)	12.4 (9.06-17.4)
20-day	2.15 (1.91-2.48)	3.11 (2.75-3.58)	4.45 (3.93-5.14)	5.60 (4.91-6.53)	7.26 (6.15-8.75)	8.61 (7.14-10.6)	10.0 (8.12-12.6)	11.6 (9.11-15.0)	13.7 (10.4-18.6)	15.5 (11.3-21.7)
30-day	2.47 (2.19-2.84)	3.56 (3.16-4.11)	5.12 (4.52-5.91)	6.46 (5.66-7.53)	8.42 (7.13-10.1)	10.0 (8.31-12.3)	11.7 (9.49-14.8)	13.6 (10.7-17.6)	16.2 (12.2-21.9)	18.3 (13.4-25.6)
45-day	2.92 (2.59-3.36)	4.18 (3.70-4.82)	5.99 (5.29-6.92)	7.57 (6.63-8.82)	9.89 (8.38-11.9)	11.8 (9.80-14.5)	13.9 (11.2-17.5)	16.1 (12.7-20.8)	19.2 (14.5-26.0)	21.8 (15.9-30.5)
60-day	3.28 (2.90-3.77)	4.65 (4.12-5.36)	6.63 (5.86-7.66)	8.37 (7.34-9.76)	10.9 (9.27-13.2)	13.1 (10.9-16.1)	15.4 (12.4-19.4)	17.9 (14.1-23.1)	21.4 (16.2-29.0)	24.4 (17.8-34.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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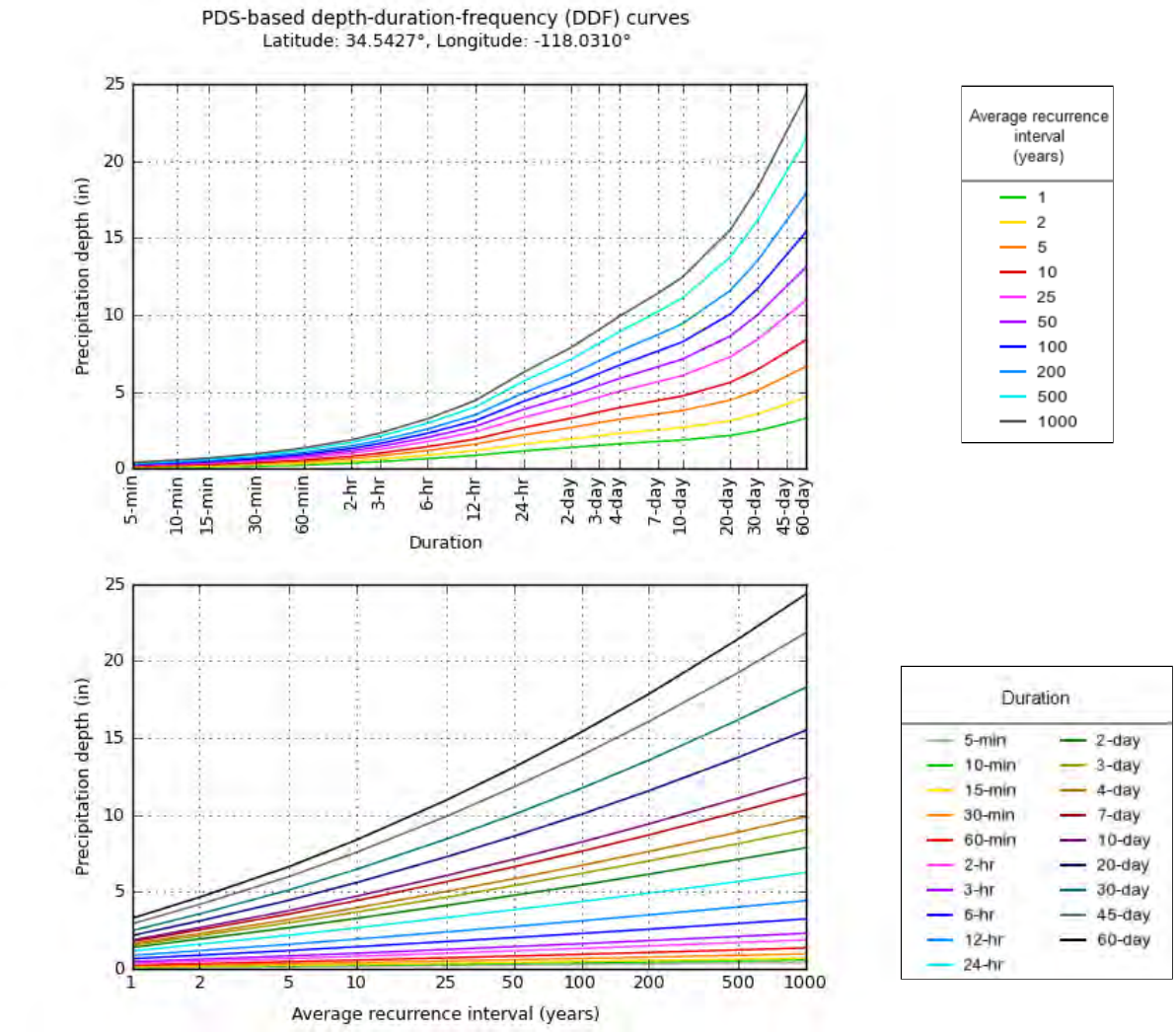
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Jan 12 02:02:49 2021

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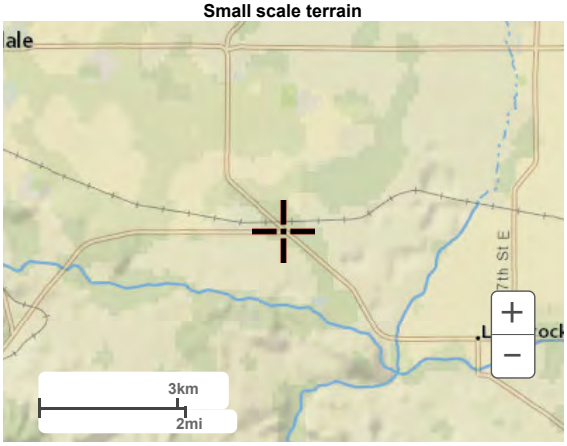
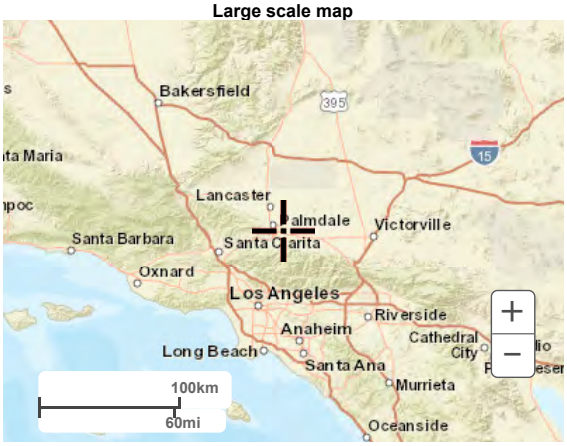
Maps & aerials

Small scale terrain

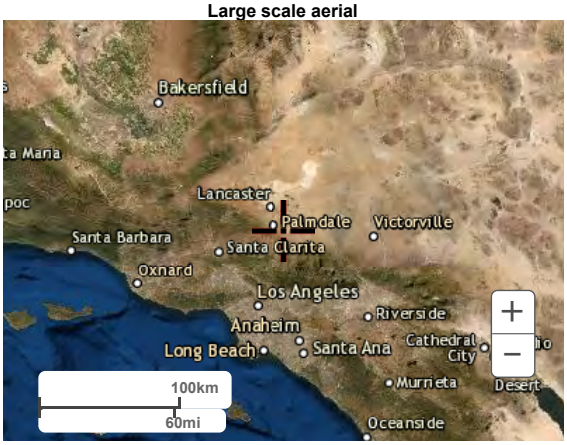


Large scale terrain

Large scale map



Large scale aerial



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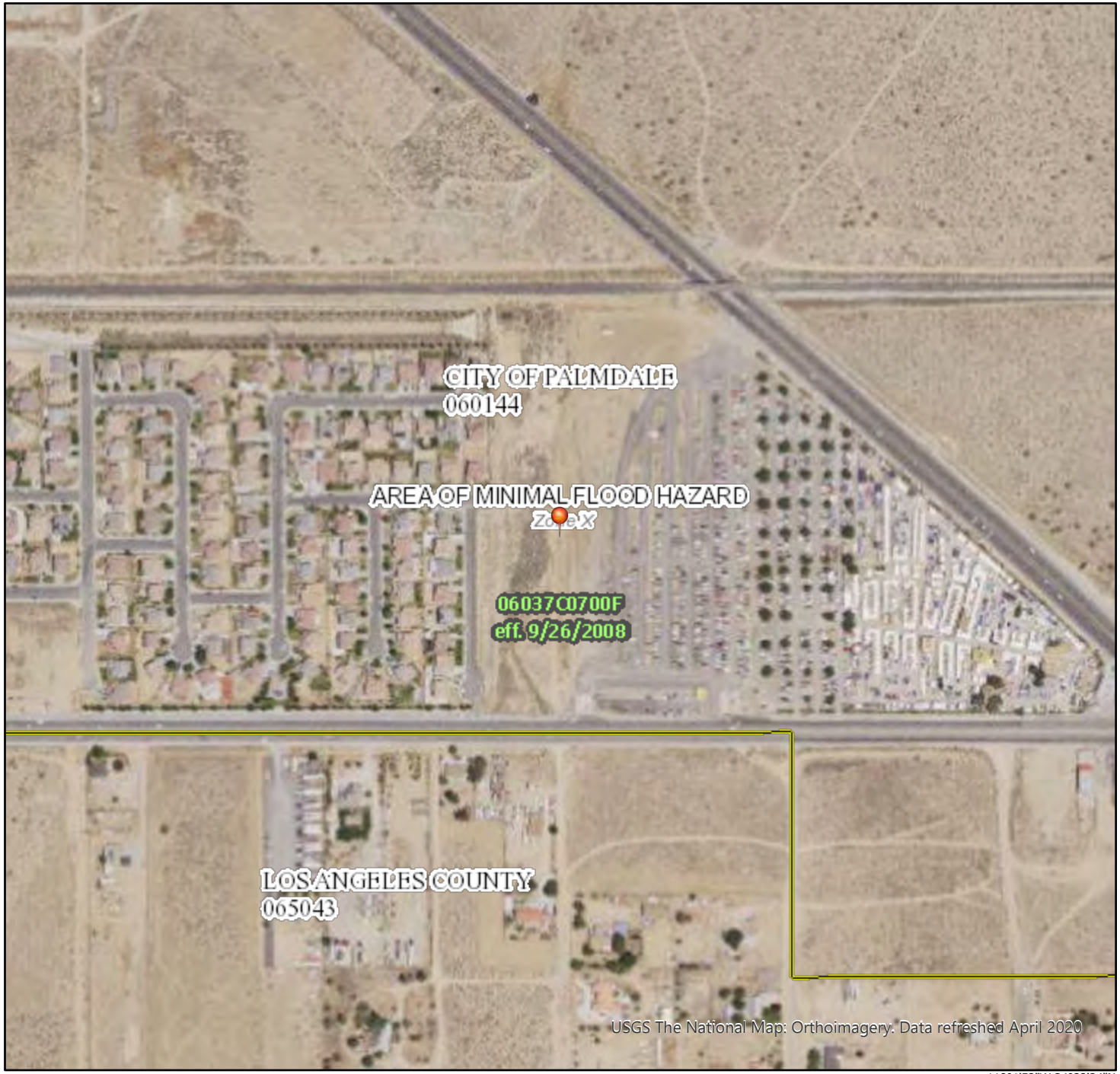
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

National Flood Hazard Layer FIRMette

FEMA

118°2'30"W 34°32'54"N



118°1'53"W 34°32'24"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

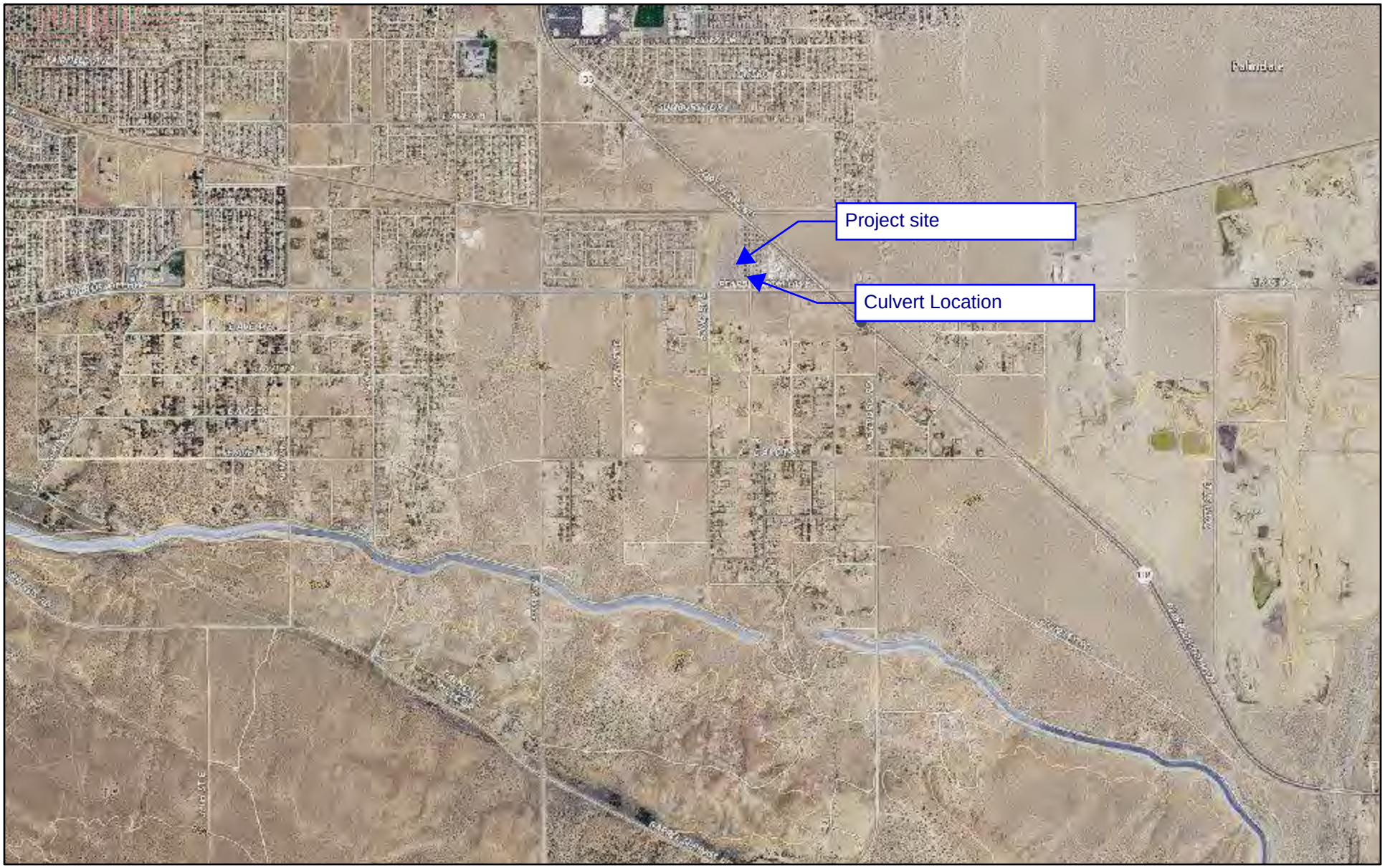
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/20/2020 at 2:56 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

The National Map Advanced Viewer



8/20/2020, 11:03:29 AM

1:31,598

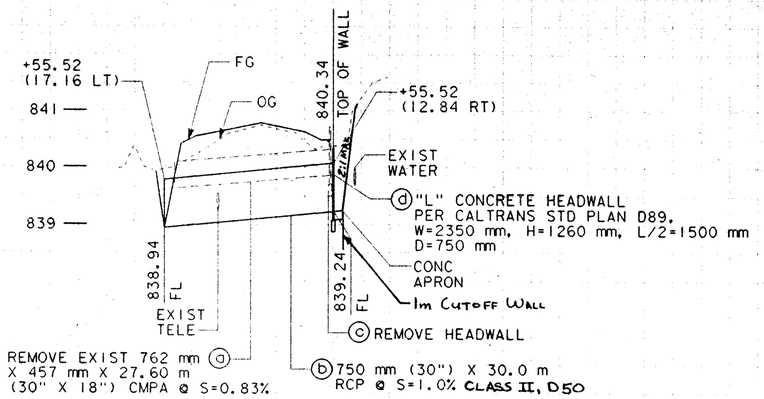
0 0.23 0.45 0.9 mi

0 0.35 0.7 1.4 km

USGS The National Map: Orthoimagery and US Topo. Data refreshed

USGS

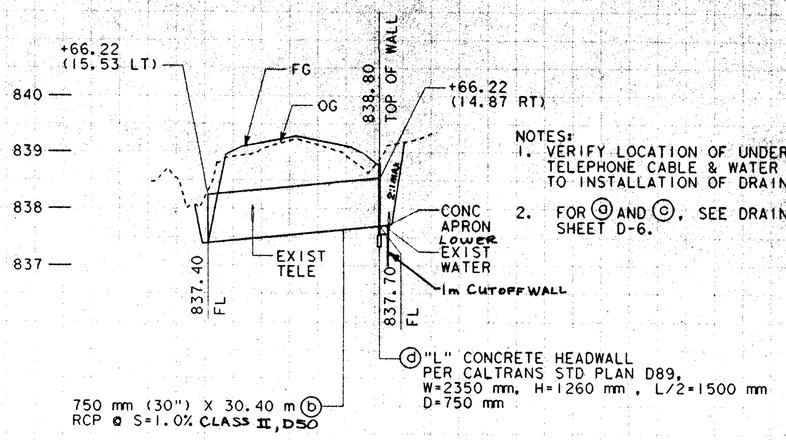
USGS The National Map: Orthoimagery | Garrity, C.P., Soller, D.R. | USGS National Map 3D Elevation Program (3DEP) | USGS TNM - 3D Elevation Program (3DEP). Data Refreshed Weekly. | USGS The National Map: 3D Elevation Program. Data Refreshed July,



NOTE:
VERIFY LOCATION OF UNDERGROUND
TELEPHONE CABLE & WATER LINE PRIOR
TO INSTALLATION OF DRAINAGE SYSTEM 10.

DRAINAGE SYSTEM (10)

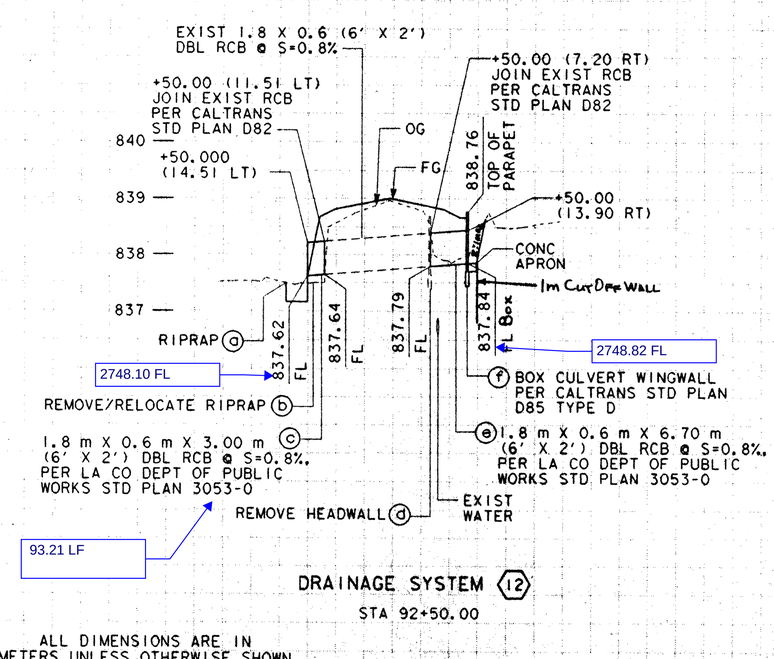
STA 86+55.52



NOTES:
1. VERIFY LOCATION OF UNDERGROUND TELEPHONE CABLE & WATER LINE PRIOR TO INSTALLATION OF DRAINAGE SYSTEM 11.
2. FOR (a) AND (c), SEE DRAINAGE QUANTITIES SHEET D-6.

DRAINAGE SYSTEM (11)

STA 90+66.22



DRAINAGE SYSTEM (12)

STA 92+50.00

ALL DIMENSIONS ARE IN
METERS UNLESS OTHERWISE SHOWN

NOTES:

1. UTILITY LOCATIONS SHOWN ARE APPROXIMATE.
2. ELEVATIONS OF CULVERTS MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.

PREPARED BY:
Svedrup CIVIL, INC.
38424 10th STREET EAST, SUITE 200
PALMDALE, CALIFORNIA 93550
(805) 265-8580

SIGNATURE _____ DATE 6/02/97
Kenneth L. Linhardt R.C.E. #47542

REGISTERED PROFESSIONAL ENGINEER
J. G. JENSEN
No. C 30535
Exp. 3/31/00
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER _____ 6/02/97 DATE

DATE	MK	DESCRIPTION	DATE	MK	DESCRIPTION
		REVISIONS			REVISIONS

CHECKED BY:
_____ DATE 7/14/97
PLAN CHECK ENGINEER

RECOMMENDED BY:
_____ DATE _____
LEON E. SWAIN

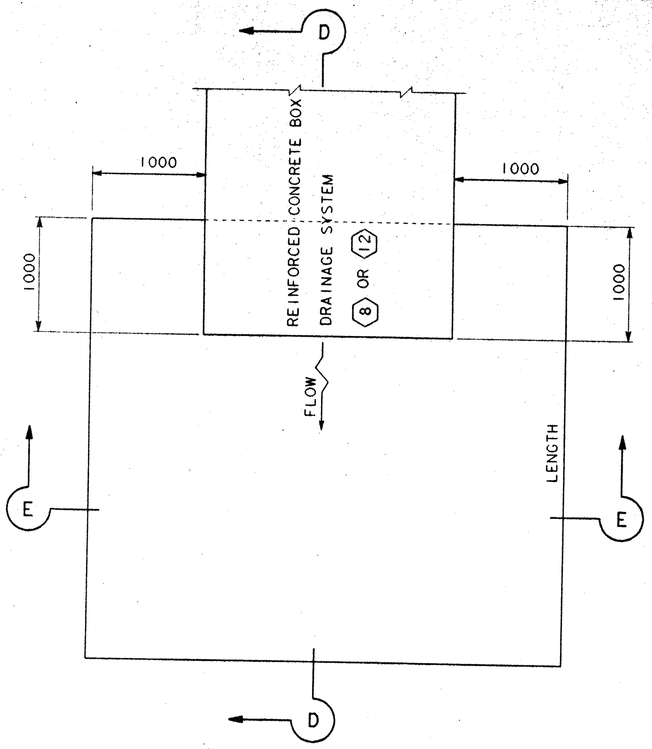
CITY OF PALMDALE
STREET IMPROVEMENT PLANS
PEARBLOSSOM HIGHWAY WIDENING

DRAINAGE PROFILE
SCALE HORIZ 1:500
VERT 1:50
74306
D-3

ST 96-28

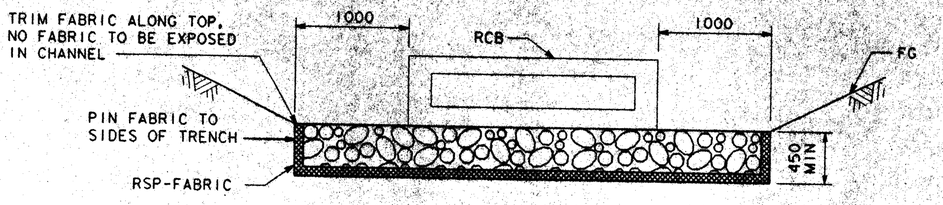
SHT 47 of 88 SHTS

FILE NAME = y:\01626\civil\east\c626d03.dgn

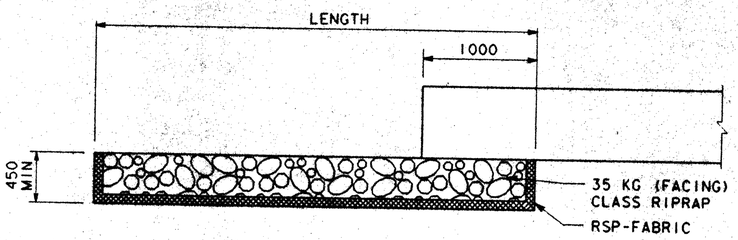


PLAN

DRAINAGE SYSTEM	LENGTH
⟨8⟩	3.35 m
⟨12⟩	4.77 m

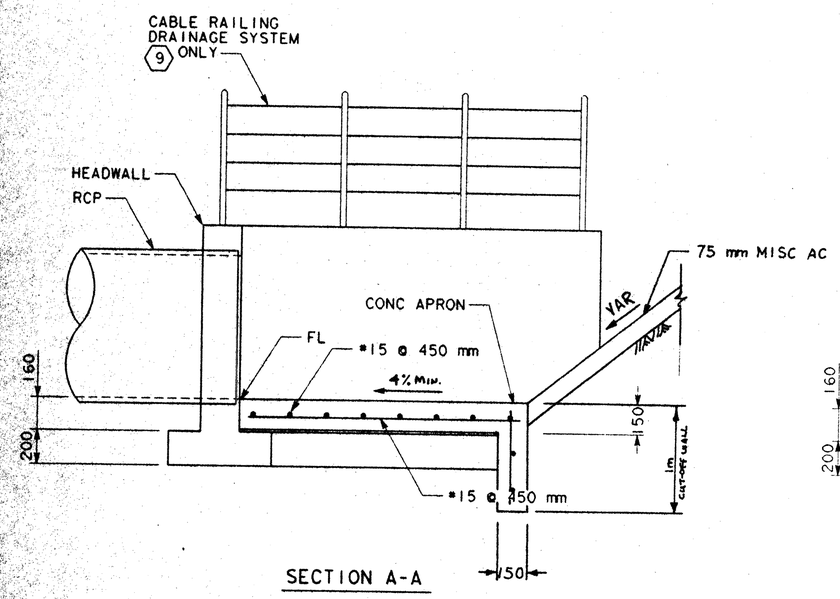


SECTION E-E



SECTION D-D

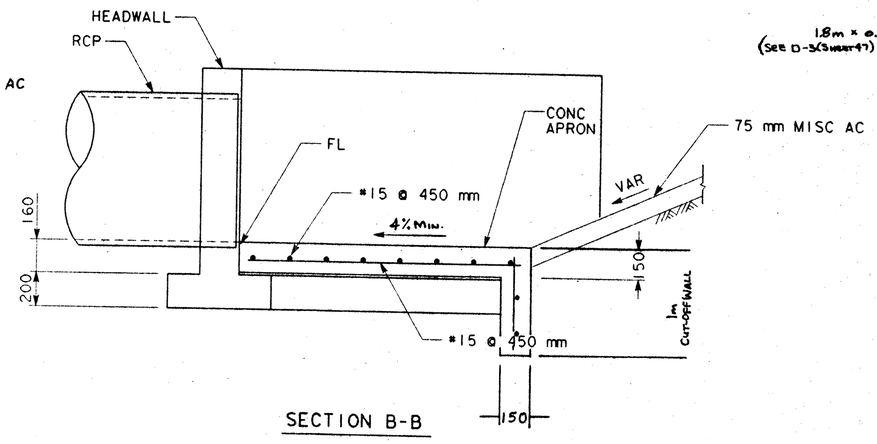
ROCK SLOPE PROTECTION



SECTION A-A

"L" HEADWALL WITH CONCRETE APRON

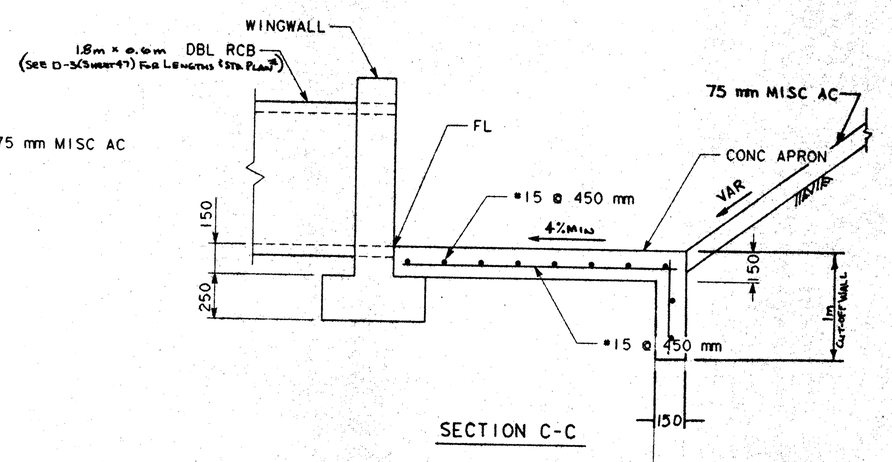
DRAINAGE SYSTEM ⟨9⟩ AND ⟨10⟩



SECTION B-B

"L" HEADWALL WITH CONCRETE APRON

DRAINAGE SYSTEM ⟨11⟩



SECTION C-C

BOX CULVERT WINGWALL WITH CONCRETE APRON

DRAINAGE SYSTEM ⟨12⟩

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

PREPARED BY:
Svedrup CIVIL, INC.
38424 10th STREET EAST, SUITE 200
PALMDALE, CALIFORNIA 93550
(805) 265-8580

SIGNATURE _____ DATE 6/02/97
Kenneth L. Linhardt R.C.E. #47542

REGISTERED PROFESSIONAL ENGINEER — J. G. JENSEN — C 30535 — EXP. 3/31/00 — CIVIL — STATE OF CALIFORNIA

PROJECT ENGINEER 6/23/97 DATE

DATE	MK	DESCRIPTION	DATE	MK	DESCRIPTION
		REVISIONS			REVISIONS

CHECKED BY:
PLAN CHECK ENGINEER DATE 7/17/97

RECOMMENDED BY:
LEON E. SWAIN DATE

CITY OF PALMDALE
STREET IMPROVEMENT PLANS
PEARBLOSSOM HIGHWAY WIDENING

DRAINAGE DETAILS
NO SCALE
74306
D-4

ST 96-28

SHT 48 OF 88 SHTS

p:\01626\civil\east\c626dr04.dgn

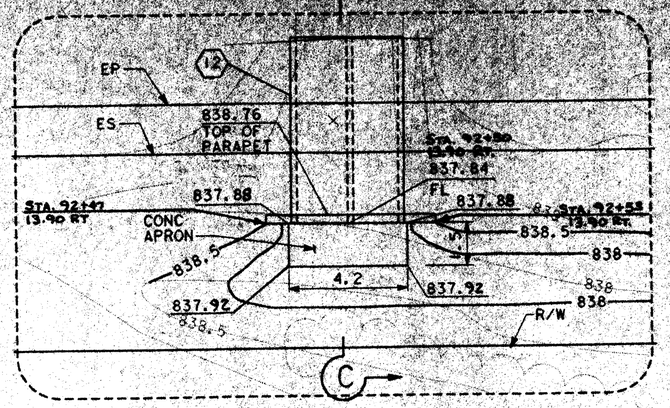
NOTES:

1. CONTRACTOR TO VERIFY TYPE OF ROAD OR DRIVEWAY PAVEMENT AND REPLACE WITH LIKE MATERIAL. GRADE SHOULDERS TO MATCH OR JOIN EXIST ROADS AND DRIVEWAYS.
2. SEE TRAFFIC SIGNAL PLANS FOR FLASHING BEACON RELOCATION.
3. SAWCUT TO A NEAT LINE AT ALL NON-PLANED PAVEMENT JOINS WITHIN PALMDALE CITY LIMITS. REMOVE A MINIMUM 300 mm WIDTH OF EXISTING AC PAVEMENT OR AS SHOWN ON THE LAYOUTS AT JOIN LOCATIONS. REMOVE EXISTING PAVEMENT, BASE, SUBBASE, OR SUBGRADE AS REQUIRED TO CONSTRUCT THE NEW PAVEMENT STRUCTURAL SECTION.
4. ROUGH-CUT ALL NON-PLANED PAVEMENT JOINS WITHIN LOS ANGELES COUNTY LIMITS. REMOVE A MINIMUM 300 mm WIDTH OF EXISTING AC PAVEMENT OR AS SHOWN ON THE LAYOUTS AT JOIN LOCATIONS. REMOVE EXISTING PAVEMENT, BASE, SUBBASE, OR SUBGRADE AS REQUIRED TO CONSTRUCT THE NEW PAVEMENT STRUCTURAL SECTION.
5. VERIFY LOCATION OF WATER LINE PRIOR TO INSTALLATION OF DRAINAGE SYSTEM 12.
6. FOR (12), SEE SHEET D-3.
7. FOR SECTION C-C SEE SHEET D-4.

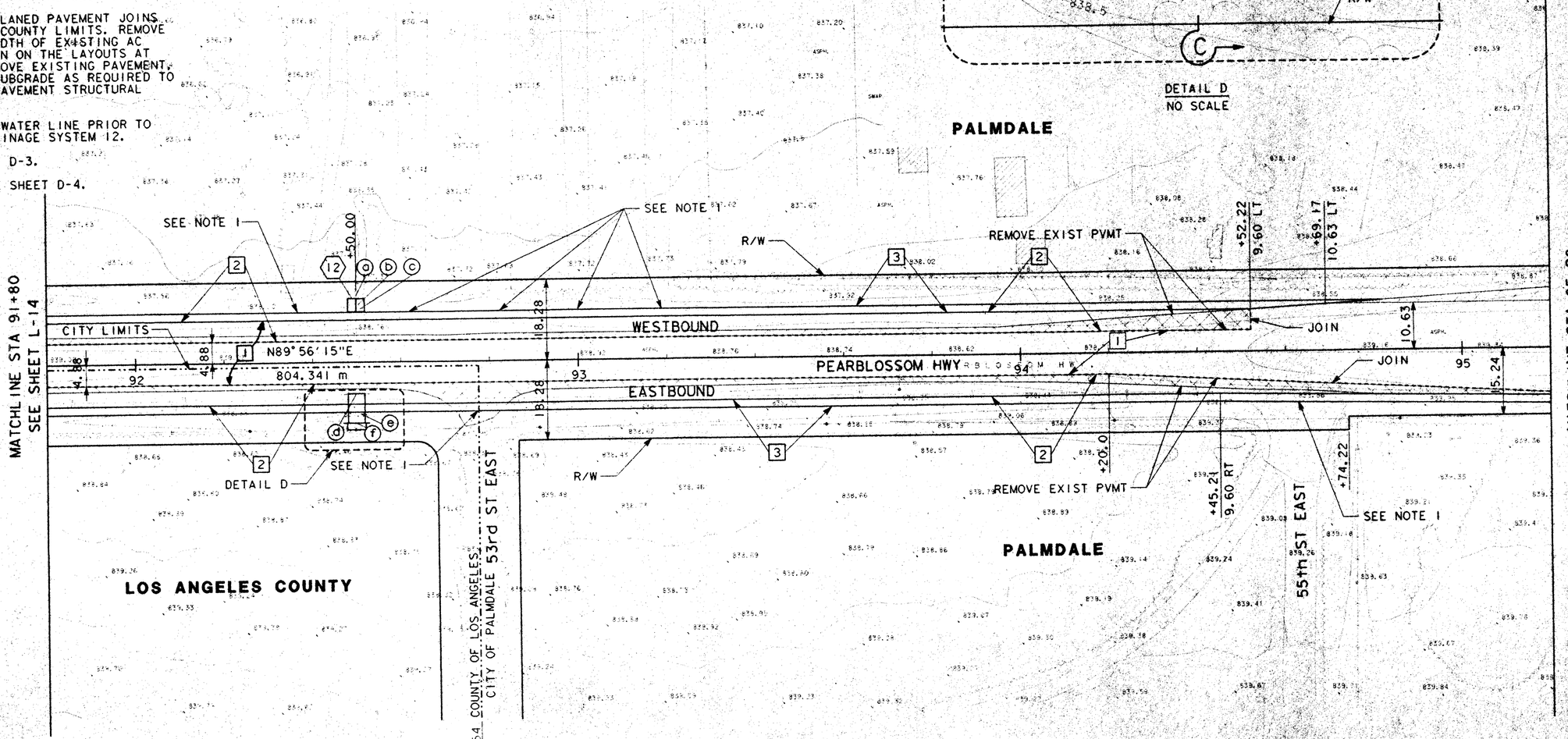
PAVEMENT STRUCTURAL SECTIONS

ASPHALT RUBBER HOT MIX (ARHM-GG-C) VARIABLE THICKNESS

1. 38 mm ARHM-GG-C OVERLAY (SEE SHEET 3, NOTE 12)
2. 38 mm ARHM-GG-C, 90 mm AC, 260 mm CAB
3. 38 mm CAB



DETAIL D
NO SCALE



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

PREPARED BY:
[redacted] CIVIL, INC.
38424 10TH STREET EAST, SUITE 200
PALMDALE, CALIFORNIA 93550
(805) 265-8580
Signature [redacted] DATE 6/02/97

R. C. JENSEN
No. C 30635
exp. 3/31/00
CIVIL
STATE OF CALIFORNIA

9/23/97

DATE	MK	DESCRIPTION	DATE	MK	DESCRIPTION
		REVISIONS			REVISIONS

CHECKED BY:
[redacted] DATE 7/18/97
PLAN CHECK ENGINEER

RECOMMENDED BY:
DATE
LEON E. SWAIN

CITY OF PALMDALE
STREET IMPROVEMENT PLANS
PEARBLOSSOM HIGHWAY WIDENING
STA 91+80 TO STA 95+20

LAYOUT
L-15
SCALE 1"=50'