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October 28, 2021

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Letter of Map Revision (LOMR) Application & Responses to FEMA 8/12/2021 Request for Additional Data
Las Posas Estates Drain and N. Ramona Place Drain, Camarillo, CA
OCTOBER 2021

Enclosed, please find updated hydrologic and hydraulic engineering analysis, flood maps, and data in support of a Letter of Map Revision (LOMR) request prepared on behalf of the County of Ventura and the City of Camarillo, California.

RESPONSES TO FEMA'S 8/12/2021 LETTER The responses to FEMA's 8/12/2021 letter and the 9/2/2021 Conference Call are provided below.

LOMR APPLICATION & REPORT The information and data in the submittal package are enclosed. The LOMR Application includes a detailed Technical Report, 2-Dimensional HEC-RAS computer models, field recon and photos, project hydrology, as-built record drawings, Certified Topographic Workmap, Annotated FIRM, MT-2 Forms 1 thru 3, Concurrence Forms, and all other relevant data and information.

FEE PAYMENT In consultation with Ventura County Public Works Agency, this LOMR application is deemed fee exempt as it provides more detailed scientific data and analysis.

LEGAL NOTICES The legal public notices have not been prepared as of yet. Generally, that step is performed last in the application process since it includes specifics about changes to flood elevations between data sets. Legal public notices will be prepared after the approval of the LOMR analysis following appropriate templates available in the MT-2 instructions.

COMMUNITY CONCURRENCE The Effective Zone A study area is primarily located within the Unincorporated County Areas of Ventura County. Additionally, there is a small area that falls with the City of Camarillo's City Limits. Therefore, Community Concurrence Forms are provided from both affected communities.

LOMC ONLINE - NO FEE ELECTRONIC SUBMITTAL The LOMR Application is being submitted as a No Fee Electronic Submittal via the Letter of Map Change (LOMC) Online platform.

ELECTRONIC DATA The complete LOMR Application and all supporting forms and data can be downloaded through the following Dropbox link:

https://www.dropbox.com/sh/ajtaxdba7a6w7tw/AABy60nE8NtOkrQ5Fu3u6_cza?dl=0

Thank you for considering our LOMR application. I may be contacted at (805) 340-4744 or by email at kasraie@kasraieconsulting.com should you have any questions.

Sincerely,

Hassan Kasraie, PE, CFM
President

ENCLOSURE

Summary of Additional Data Required to Support a Letter of Map Revision (LOMR) 8/12/2021	
Case No.:	21-09-1325P 316-AD
Communities:	City of Camarillo and Unincorporated Areas of Ventura County, CA
Community Nos.:	065020 and 060413
Flooding Source:	Las Posas Estates Drain, North Ramona Place Drain, Ramona Detention Basin, Las Posas Estates Detention Basin
FIRM Panel Affected:	06111C0927F

The following are additional information and data shown in blue in response to the August 12, 2021 letter:

1. Our review revealed culverts, storm drains, and basins that were not previously modeled and constructed or modified after the effective floodplain information. Due to these structures, the fee required for your request is $8,000 for "LOMR Based on Bridge, Culvert, Channel, Hydrology, or Combination Thereof" and must be submitted before we can continue processing your request. Payment of this fee must be made in the form of a check or money order, payable in U.S. funds to the National Flood Insurance Program, or a credit card payment (Visa or MasterCard only). For identification purposes, the case number referenced above must be included on the check or money order. We will not perform a detailed technical review of your request until we receive this payment.

   Response 10/28/2021:

   According to the Flood Insurance Study, the analysis for the effective FIRM for Las Posas Estates Drain and North Ramona Place Drain was completed in 1983. This resulted in mapping the area as an Effective Zone A as shown on the historical FIRM Panel 0604130905B dated October 31, 1985.

   The Las Posas Estates Detention Basin (DD3-08M) was originally constructed by Soil Conservation Service in 1956 and upgraded by Ventura Country Watershed Protection District (VCWPD) in 1992, and the Ramona Detention Dam (DD3-16M) was originally constructed by Soil Conservation Service in 1961 and upgraded by VCWPD in 1992. This is evidenced by the as-built drawings.

   This LOMR application was prepared based solely on submission of more detailed data including Lidar topography, updated hydrology, and the latest hydraulic modeling technique. All structures (culverts, storm drains, and basins) involved in this LOMR application were pre-FIRM structures. We, therefore, kindly request that you reconsider our fee waiver request.

2. Our review revealed hydraulic structures included in the submitted hydrologic and hydraulic modeling. Please provide Application/Certification Form 3, entitled "Riverine Structures Form", which was omitted from your previous submittal.

   Response 10/28/2021:

The submittal was updated to include Form 3 for the main channel (Las Posas Estates Drain) and two detention basins.

3. The submitted topographic work map entitled "Certified Topographic Workmap," certified by Mr. Hassan Kasraie, P.E., CFM, dated April 27, 2021, does not provide essential information required to complete our review of this request. Please submit a revised topographic work map, certified by a registered professional engineer, that shows all applicable items listed in Section C of Application/Certification Form 2, entitled "Riverine Hydrology & Hydraulics Form," as well as the following missing information:
    a. Boundary delineations of the existing conditions base (1-percent-annual-chance) floodplain and 0.2-percent-annual-chance floodplain for Ramona Detention Basin and Las Posas Estates Detention Basin;
    b. Boundary delineations of the existing conditions base floodplain and 0.2-percent-annual-
    chance floodplain extended to zero flood depth;
    c. Boundary delineations of the existing conditions Zone AE or Zone AH base floodplain
    determined by the average depth across the entire inundated area to avoid the presence of concentric rings along Las Posas Estates Drain Channel north and south; and
    d. Locations, alignments and labels of all nodes, links, and transects used in the EPA SWMM and HEC-RAS models.

Response 10/28/2021:

A certified topographic work map is included in this submittal with all required items listed in Section C of MT-2 Form 2 shown. The certified work map also includes the following items requested:

a. The existing conditions base floodplain and 0.2-percent-annual-chance floodplain boundaries for Ramona Detention Basin and Las Posas Estates Detention Basin are delineated on the revised work map. The base flood elevations are set at the design water surface elevations which are 1 ft below the crests of the emergency spillways (169.42 ft NAVD88 for Los Posas Estates Drain detention basin and 172.42 ft NAVD88 for Ramona detention basin) per VCWPD's detention basin manual (see Attachment 6). Since the detention basins are designed for base flood event, the 0.2-percent-annual-chance flood elevations are set at the top of dams (176.92 ft NAVD88 and 178.42 ft NAVD88 respectively).
b. Boundaries of the existing conditions base floodplain and 0.2-percent-annual-chance floodplain downstream of the two basins in the study area are plotted on the revised work map (please refer to the explanations below).
c. The AE and AH base floodplain shown on the original work map was removed in this revised work map (please refer to the explanations below).
d. Per our conference call on September 2, 2021, we suggested, and FEMA concurred that the EPA SWMM model be dropped from the application package. As a result, there is no response to this comment.

Since our conference call on September 2, 2021, additional refinement to the HEC-RAS 2D model has been completed and a revised base floodplain with flow depth of zero (0) ft at boundaries been prepared (see Attachment 4). Based on GIS analysis, the average depth of the base floodplain is 0.72 ft. Using FEMA Zone X definition: "areas of 1% annual chance flood with average depth less than one foot", we recommend the base floodplain area be mapped as Zone X (see Topographic Workmap and Annotaated FIRM in Attachment 4.

Additionally, although the drainage area at the downstream limit of the study area is 613 acres (0.96 sq. mile), the majority (422 acres or 69%) of the watershed is regulated by the two detention basins. Upgrades of the two basin dams in the 1990's ensured that the dams meet the VCWPD's dam safety standards. The VCWPD's basin operation and maintenance (O&M) manual (see Attachment 6) confirms that the basins will function as designed. As designed, the 130 cfs outflow of Ramona Detention Basin will be contained in the underground culvert system which has a flow capacity of 130 cfs, and the 62 cfs outflow from Las Posas Detention Basin will be contained in the open channel system which has a flow capacity of 100 cfs. As such, the only source of flooding is scattered across the un-regulated 191 acres (0.3 sq. mile) drainage area downstream of the two detention basins. Using FEMA Zone X definition: "areas with drainage areas of less than one square mile", the flood source drainage area (0.3 sq. mile) is way smaller than the 1-square-mile Zone X threshold. We, therefore, recommend the base floodplain area be mapped as Zone X.

Using the refined HEC-RAS 2D model, we delineated the 0.2-percent-annual-chance floodplain and produced a topographic work map where areas within the 0.2-percent-annual-chance floodplain are mapped as Zone X.

4. The submitted field measurements did not provide the complete information required for verification of the hydraulic structures. Please resubmit the field measurements including the length and inverts of the structures, certified by a registered professional engineer.

   Response 10/28/2021:

   The hydraulic structures were coded into the hydraulic models using as-built record drawings supplemented by field measurements. A structure field survey table was added to the figure named "Field Locations and Channel Key" in Attachment 1. Structure elevations were obtained from the digital elevation model (DEM).

5. The submitted drainage area map entitled "Figure 1 Las Posas Estates Subareas and Basin Locations," prepared by Ventura County Public Works Agency Watershed Planning and Permits Division, dated January 2021, does not provide essential information required to complete our review of this request. Please submit a revised drainage area map with topographic contour information and certified by a registered professional engineer.

   Response 10/28/2021:

New figure map provided, see Figure 5: Site Hydrology in Section 5.2 of the Technical Support Data Notebook (TSDN).

6. Please provide documentation of the input hydrographs used for the submitted EPA SWMM and HEC-RAS hydraulic models. Please also provide documentation for the "500-year overflow" boundary conditions.

   Response 10/28/2021:

   The submitted TSDN provides additional information on how the input hydrographs were established, see section 5.2 Prorated Inflows for Hydraulic Modeling.

   Section 5.2 also provides information for the 500-year overflow. For this condition the basins were assumed to be full. For Las Posas Estates Detention Basin, hydrographs from VCRat Node 5166B were used and for Ramona Detention Basin, VCRat Node 5173D hydrograph was used.

   Table 4 in section 5.2 of the TSDN was modified to provide more information and facilitate review.

   For inflow hydrographs, please refer to Attachment 3 of the TSDN.

   The EPA SWMM hydraulic model will not be part of this submittal, WSPG rating curves were developed instead, see Attachment 3. FEMA confirmed that WSPG rating curve can be used and SWMM model was eliminated.

7. Please provide the City of Camarillo Master Plan of Drainage referenced for the inflow at Junction 373 of the submitted EPA SWMM model.

   Response 10/28/2021:

   The EPA SWMM hydraulic model will not be part of this submittal, this comment is no longer applicable.

8. The drainage area sizes and discharges listed in Table 2 of the submitted technical data support notebook (TDSN) entitled, "Las Posas Estates Drain and North Ramona Place Drain LOMR," differ from those provided in the hydrological analysis report entitled, "Revelon Slough Watershed Las Posas Estates Drain VCRat Design Hydrology Draft." Please verify and revise the discharges to match the 2003 VCRat model, or provide justification for why this is not necessary.

   Response 10/28/2021:

   Table 2 reports subarea flows and areas, while Table 1 from the "Revolon Slough Watershed Las Posas Estates Drain VCRat Design Hydrology Draft" reports cumulative flows and areas. Table 2 in section 4.1 of the TSDN was updated to report cumulative areas and flows to facilitate comparison with Table 1 2003 model results Las Posas Estates Drain of the Hydrology report.

9. Our review revealed inflows into the storm drain system that were not modeled in the

submitted EPA SWMM model. The inflows from 24" RCPs at approximately Station 7+75 and 11+65 on Sheet 2 of the "Las Posas Estates Drain – Unit II" plan should be modeled. Please revise the EPASMM model to include these inflows.

Response 10/28/2021:

The EPA SWMM hydraulic model will not be part of the revised TSDN, this comment is no longer applicable.

10. The lengths and inverts of the pipe and box culvert south of the Ramona Place and Calle Tierra Vista intersection in the submitted EPASWMM model do not seem to match the submitted as-built information. the Lengths of junction boxes and their inverts for the pipe and box culvert south of the Ramona Pl and Calle Tierra Vista Intersection do not match the submitted as-built information. Additionally, the junction structures were not represented in the EPASWMM model. Please revise the hydraulic structures data to be consistent with the submitted as-built plans.

Response 10/28/2021

The EPA SWMM hydraulic model will not be part of the revised TSDN, this comment is no longer applicable.

11. The defined limits of the 2D mesh for the HEC-RAS 2D analysis are not adequate to define the full floodplain. For example, the base and 0.2-percent-annual-chance floodplain reaches the south boundary of the Las Posas Estates Drain mesh before it has been fully delineated to 0.0 feet. The shallow flooding outflow boundary condition should be removed, and the area between the old boundary condition and east interceptor channel should be included in the mesh. Additionally, the mesh boundary should be extended to capture the base and 0.2% floodplain to 0.0 depth near the west interceptor channel, the legacy channel, and inlet into Las Posas Estates Drain pipe (Box out). Please expand the 2D mesh to adequately show the base and 0.2% floodplain.

Response 10/28/2021

12. The 2D mesh was updated to ensure 500-year floodplain is fully covered. Our review revealed Courant computational time step option was not selected in the submitted HEC-RAS model. Please revise or provide justification for the time steps chosen.

Response 10/222/201

The hydraulic model was updated to use the Courant computational time step option.

13. Our review revealed the submitted existing conditions HEC-RAS model used the diffusive wave equations. The full momentum equations are generally more accurate and applicable for a wider set of conditions. Please revise the hydraulic analysis to use the full momentum equations or provide justification for why this is not necessary.

Response 10/28/2021

The hydraulic model was updated to use the Full Momentum equations. The model was found not to be sensitive to the addition of the acceleration terms in the momentum equations.

14. Our review revealed the normal 2D equations were used as the overflow computation method for hydraulic structures in the submitted HEC-RAS model. Please provide justification for using the normal 2D equations over the weir flow equations or revise if necessary.

    Response 10/28/2021

    The hydraulic model was updated, the culvert overflows use weir flow equations. The model results do not appear to be sensitive to this change.

15. Our review revealed unreasonably high velocities in the channels and at the boundaries of the submitted HEC-RAS model, which appear to be an instability. Please review and revise the existing conditions HEC-RAS model.

    Response 10/28/2021

    The hydraulic model was updated, and the velocity issue was resolved with the updated rating curves.

16. Our review revealed that the submitted hydraulic analysis was not calibrated. Please update the submittal to include calibration if possible.

    Response 10/28/2021:

    There are no flow or recorded depth gages this far upstream in the watershed with which to calibrate the model. On the other hand, long-time local residents have indicated that they have not experienced flooding issues in this area.

17. Please provide a statement from a registered professional engineer that individual legal notices were mailed to all property owners affected by any widening and/or shifting in the Special Flood Hazard Area, the area that would be inundated by the flood having a 1-percent of being equaled or exceeded in any given year (base flood) and/or increase in Base Flood Elevations. Please copy the community on this correspondence. You may submit a draft copy of the notification for verification of content, prior to distribution.

    Response 10/28/2021:

    During the 9/2/2021 meeting with FEMA reviewers, it was agreed that public notification will be provided after FEMA approves the flood models and maps.

Las Posas Estates Drain and North Ramona Place Drain LOMR
Camarillo, CA

Prepared for:

PUBLIC WORKS
VENTURA COUNTY

Prepared by:

KASRAIE CONSULTING

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October 2021

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1 Executive Summary

Kasraie Consulting was contracted by Ventura County Public Works Agency to prepare a new hydrology and hydraulic analysis of Las Posas Estates Drain and North Ramona Place Drain and to prepare a Letter of Map Revision (LOMR) based on the results. Las Posas Estates Drain and N. Ramona Place Drain are located along Ramona Place (Pl) between Las Posas Estates Detention Basin (DD3-08M) and Ramona Detention Dam (DD3-23), in Camarillo, California. These drains are part of a 613-acre watershed currently mapped by the Federal Emergency Management Agency (FEMA) as an Approximate Zone A, Special Flood Hazard Area (SFHA) on the Flood Insurance Rate Map (FIRM), see Figure 1. With the exception of a small area within the City limits, the current flood zone is within the Unincorporated Ventura County.

The purpose of the LOMR submittal is to provide a corrected floodplain which reflects storm drain and surface drainage features in the study area. The updated analysis and mapping are based on more detailed data including County of Ventura storm drain plans, 2018 LiDAR elevations (NAVD88), updated hydrology, and plans for Las Posas Estates Detention Basin and Ramona Detention Dam. The latter were upgraded in 1992 from sediment/debris basins to detention basins with sufficient volume capacity to attenuate the 100-year design storm peaks.

Hydrologic calculations were completed by the Ventura County Watershed Protection District (VCWPD) using their VCRat (Version v2.64) model. The VCRat model is a FEMA locally accepted hydrology model for floodplain studies in Ventura County. Surface flooding hydraulic calculations were performed using HEC-RAS 2D.

The underground portion of Las Posas Estates Drain, downstream of the Ramona Place and Calle Tierra Vista intersection, was designed for the higher of the 50-year storm event Hydraulic Grade Line (HGL) plus design freeboard (see Y3-3091 and Y3-3092, Attachment 1), and/or the 100-year storm event HGL plus super-elevations. The Effective FIRM shows the 1-percent-annual chance, 100-year, flood discharge contained in the structure. This segment of the drainage system is located within the City limits of the City of Camarillo.

Upstream of the Ramona Pl. and Calle Tierra Vista intersection new flood maps were prepared based on the results of the 2-Dimensional HEC-RAS model. Guidance for Flood Risk Analysis and Mapping Shallow Flooding Analysis and Mapping (December 2020) Section 2 defines shallow flooding to depths 3.0 feet or less; shallow flood hazard zones include: Zone A, Zone AO, Zone AH and Zone X. The new inundation map proposes to remove the Special Flood Hazard Area (Zone A) and map the area as Zone X.

Per FEMA's definition a Zone X corresponds to areas of 0.2% annual chance flood hazard, areas of 1% annual chance flood with average depths of less than one (1) foot or with drainage areas less than one (1) square mile (640 acres). The project location meets all three requirements, the total drainage area is 613 acres, of which 168 acres are tributary to Las Posas Estates Detention Basin and 254 acres are tributary to Ramona Detention. Further the average peak 100-year flood depth is 0.72 foot, under one foot.

A certified topographic Workmap and annotated FIRM are included as Attachment 4.

2 Background/Modeling/Mapping

2.1 Effective Flood Hazard Mapping

Federal Emergency Management Agency (FEMA) shows/defines an Approximate Zone A SFHA on map panel 06111C0927F along the N. Ramona Place, between Las Posas Estates Detention Basin and Ramona Detention Dam, see Figure 1. The majority of the Effective Zone A is located within the unincorporated areas of Ventura County, with a small area within the limits of the City of Camarillo.

2.2 Site Description

Las Posas Estates Drain and North Ramona Place drain are located within the city of Camarillo in California. This study has a 613-acre watershed, less than one square mile. An overview of the drainage system is illustrated in Figure 2.

Las Posas Estates Detention Basin to Underground Drain

Las Posas Estates Detention Basin has a tributary area of 168 acres with a peak inflow of 495 cfs (507 cfs, as-built) and reduced outflow of 62 cfs. The drainage patterns downstream of the Las Posas Estates Detention Basin side (east side) of the project area consists of surface flow that is intercepted by two trapezoidal channels running parallel to Ramona Place, on the south and north sides of the street. On the northside of the street a trapezoidal ditch conveys surface flows which join the Las Posas Estates Drain via a 36″x22″ corrugated metal pipe arch (CMPA). On the southside of Ramona Place surface flows and outflow from the Las Posas Estates Detention Basin are captured by Las Posas Estates Drain via trapezoidal open channel and conveyed to a transition structure, where the flow enters the underground portion of Las Posas Estates Drain.

Ramona Detention Basin to Underground Drain

On the west side of the study area, Ramona Detention Dam has a tributary area of 254 acres with a peak inflow of 602 cfs (583 cfs as-built) and reduced outflow of 130 cfs. Outflow from the Ramona Detention Dam side is conveyed by the N. Ramona Place Drain via a reinforced concrete pipe eventually joining the underground portion of Las Posas Estates Drain via a 72″x44″ CMPA. Surface flows downstream of the detention basin are conveyed by the street to a rectangular interceptor channel which then discharges to the underground portion of Las Posas Estate Drain.

Figure 1: Annotated FIRMETTE

National Flood Hazard Layer FIRMette

FEMA

119°5'27"W 34°14'35"N

119°4'49"W 34°14'5"N

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

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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 / 17.5 Cross Sections with 1% Annual Chance 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

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 4/5/2021 at 3:05 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.

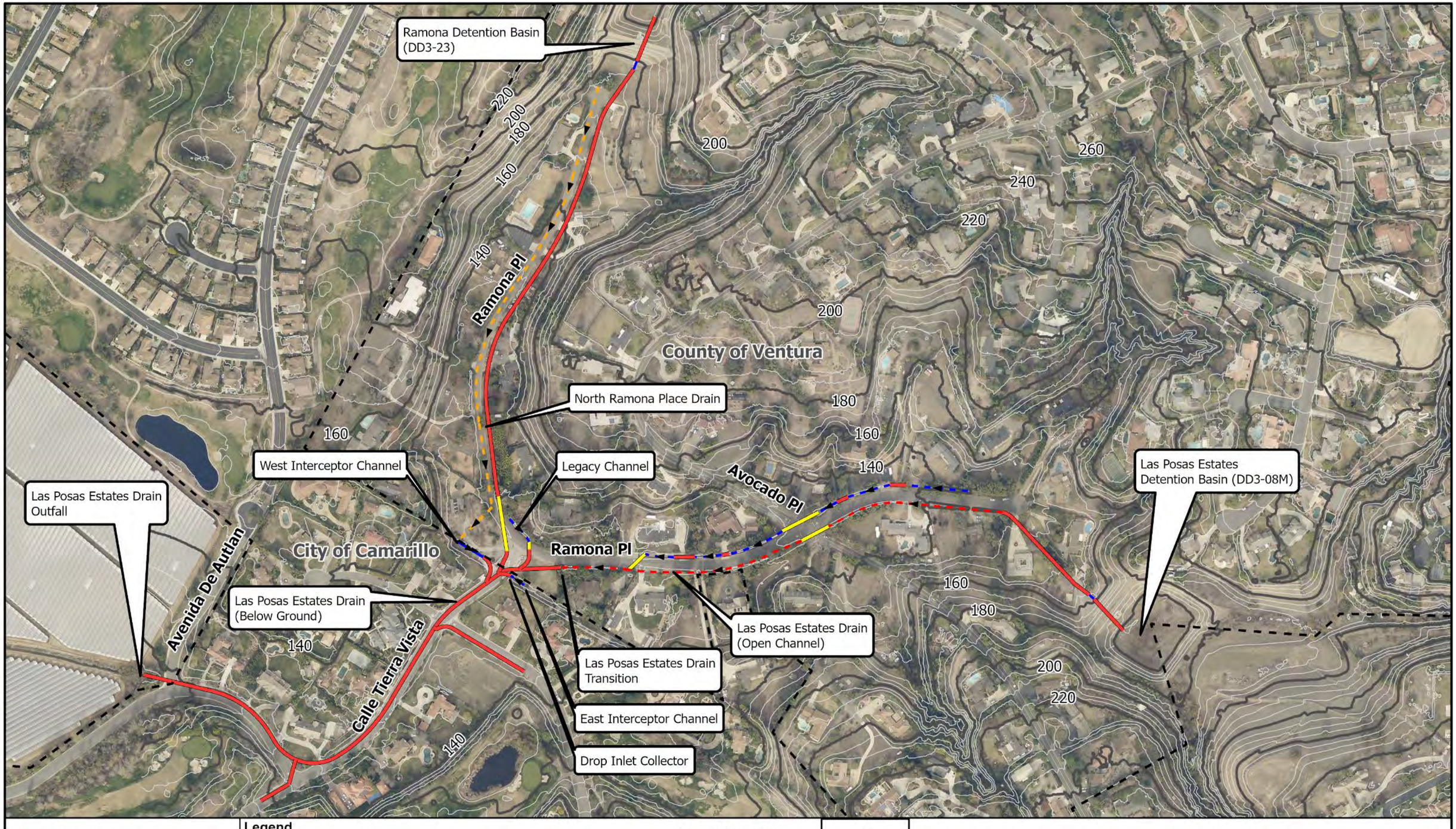


Figure 2: Las Posas Estates Drainage System Overview

3 Supporting Data

3.1 Record Drawings

Compiled "As-Built" record drawings for the storm drain system within the project area were provided by the VCWPD. The record drawings have been included as Attachment 1. Key features and associated record drawings are summarized Table 1 below.

Table 1: Key Record Drawings

Feature	Description	Record Drawing
N. Ramona Place Drain	48-IN & 54-IN RCP	Y3-3125
North Ditch(runs northern side of Ramona Pl) connection to Las Posas Estates Drain	36"x22" corrugated metal pipe arch	Y3-0026
West interceptor channel	Rectangular Channel	Y3-3092 ("Line A")
Underground portion of Las Posas Estates Drain	72"x44" CMP	Y3-0049 and Y3-3092 ("Line B")
East Interceptor Channel	Drop inlet Collector	Y3-3095 ("Line C")
Drains area 5179, channel upstream of CMP is full of debris	Line D",58"x36" CMPA	Y3-3092 ("Line D")

Elevations listed in record drawings are in NGVD 29 vertical datum.

3.2 Vertical Datum

All elevation data for the project is in the NAVD88 vertical datum. Elevations from storm drain as-builts were converted from the National Geodetic Vertical Datum of 1929 (NGVD29) by adding the VERTCON conversion factor (2.421-feet). The shift was established using the National Geodetic Survey (NGS) Height Conversion Methodology using the VERTCON tool: https://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.prl The location used for the datum shift is illustrated in Figure 3.

Figure 3: VertCon Datum Shift Estimate

3.3 Field Reconnaissance

Staff from Kasraie Consulting conducted two site visits in February of 2021. The purpose of these visits was to review hydraulic field conditions, review site drainage features, and take field measurements of hydraulic features to supplement information in the Record Drawings. Key field measurements are included in Attachment 1.

3.4 GIS Data

The following Geographic Information Systems (GIS) data sources were utilized in this study:

- 2016 County of Ventura 9-inch Aerial Imagery
- Post-Thomas Fire 2018 Digital Elevation Model (DEM) based on Light Detection and Ranging (LiDAR) was acquired from the NOAA Data Access Viewer: https://coast.noaa.gov/dataviewer/#/

4 Hydrology

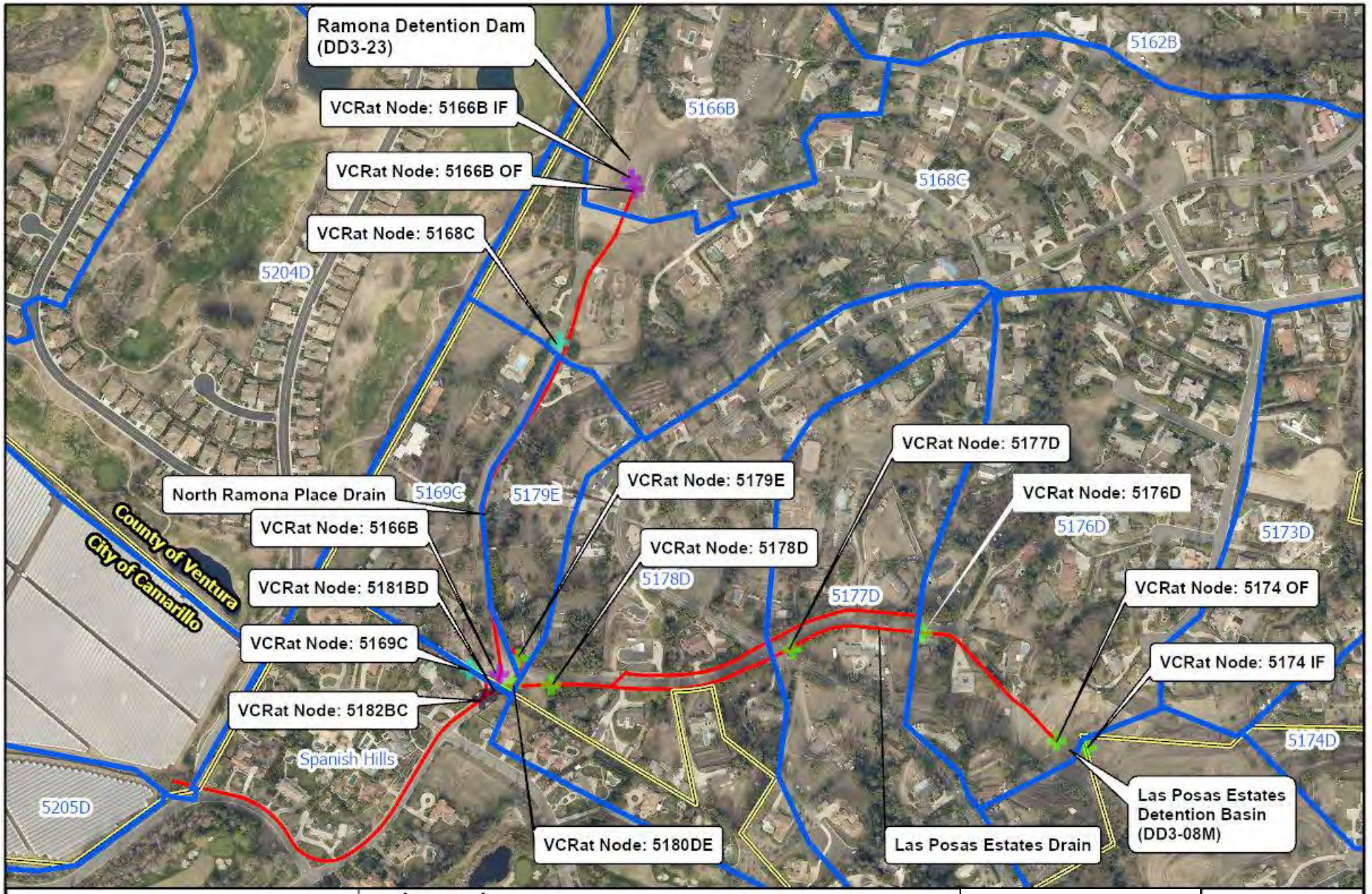
4.1 Source Hydrology Model

Hydrology for Las Posas Estates and N. Ramona Place Drains was provided by VCWPD. The hydrology report is included in Attachment 2, *The Revolon Slough Watershed Las Posas Estates Drain VCRat Design Hydrology Draft*.

The hydrology was based on VCWPD's VCRat Model of the Calleguas Creek Watershed, which is a FEMA locally accepted model for studies in Ventura County. The subareas modeled in VCRat that drain to Las Posas Estates Drain and N. Ramona Place Drain are summarized in Table 2. Along with Peak Discharges for the 100-year (Q_{100}) and 500-year (Q_{500}).

Table 2: Summary of peak discharges and VCRat Subareas

Subarea Name	Summary of flows used in HEC-RAS model (VcRat output)				Summary of values from Table 1. VCPWA-WP Report January 2021	
	Subarea Drainage Area (acres)	Subarea Q_{100} (cfs)	Cumulative Drainage Area (acres)	Cumulative Flow (Q, cfs)	Cumulative Drainage Area (acres)	Q_{100} (cfs)
5166B (Ramona Basin Inflow)	25	92	254	602	254	602
5167B (Ramona Basin Outflow)	-	-	254	130	254	130
5168C (local)	52	143.8	52	144	52	144
5169C (local)	17	47.1	69	175	69	175
5173D (Las Posas Basin Inflow	54	141	168	495	168	495
5174D (Las Posas Basin Outflow	-	-	168	62	168	62
5176D (local)	39	135.5	207	186	207	186
5177D (local)	32	93.4	239	277	239	277
5178D (local)	44	110	283	381	283	381



KASRAIE CONSULTING

Legend

- Calleguas Watershed Subareas
- City Limits
- Redline Channel

Hydrology Nodes (VCRat Line)

- B
- C
- D
- XX

Figure 4: VCRat Model Elements

N W E S

Hydrographs were exported from VCRat for the 100-year event, for the subareas listed in Table 2. The exported 100-year Hydrographs were scaled for the for the 500-year event using the ratios listed in Table 3.

Table 3: Summary of Scaling Rations

Peak Event	Ratio* (Q_{event}/Q_{100})
Q_{100}	1
Q_{500}	1.561
*Ratios provided by VCWPD, see Report in Attachment 2 for details	

The Ramona and Las Posas Estate detention basins are not designed to attenuate flooding for the 500-year event. A separate 500-year outflow for each basin was estimated as described in Section 5.2.

5 Hydraulics

The U.S. Army Corps of Engineers (USACE) HEC-RAS computer software, Version 6.0 was utilized for two-dimensional (2D) hydraulic surface flow computations. Hydraulic results were computed for the 100- and 500-year (1- and 0.2-percent-annual chance) events.

5.1 Modeling Approach

The HEC-RAS two-dimensional (2D) modeling capabilities were utilized to provide detailed surface hydraulic computations through the study area. WSPG model was used to generate rating curves for the outlet boundary conditions of the HECRAS model at locations where surface flows enter and are confined to the storm drain network, see Attachment 3 for WSPG model electronic files.

5.2 Prorated Inflows for Hydraulic Modeling

The hydrographs developed in VCRat were prorated based on contributing area to establish localized inflow hydrographs at a smaller project scale. Figure 5 illustrates subareas and Area Ratios (AR) used to prorate the VCRat hydrographs to generate localized inflow hydrographs for hydraulic modeling purposes and it details the location of the Inflow Boundary Conditions (BC) for the HEC-RAS 2D model. A summary of scale ratios used to prorate peak discharge inflow for each model is provided in Table 4.

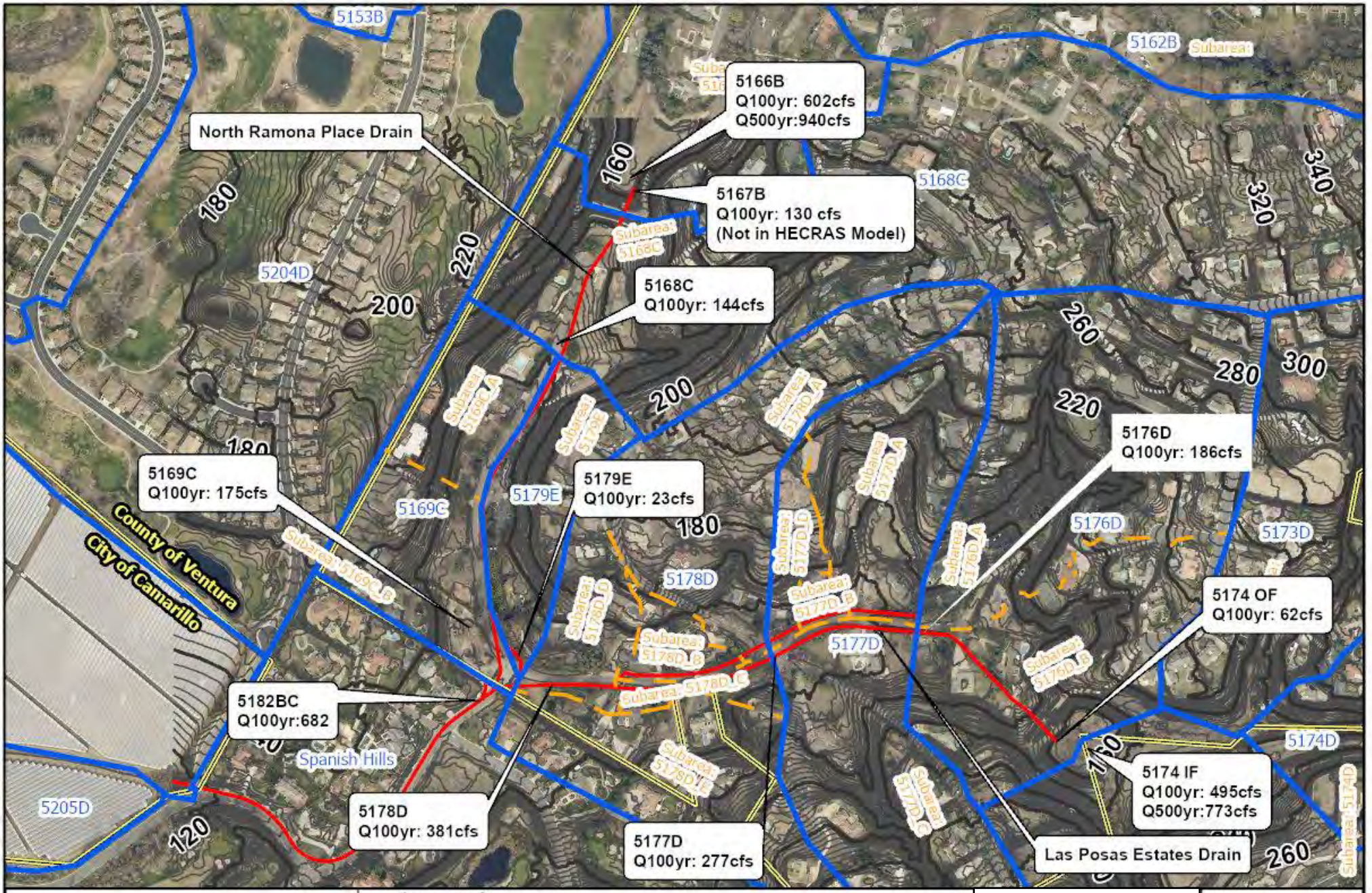
For the 500-year HEC-RAS Analysis, the outflow from the Ramona and Las Posas Estate detention basins was conservatively assumed to match the 500-year inflow to the basins with no reduction, based on VCRat 5166B and 5173D, respectively. It was assumed that the 500-year flow at the detention basin locations would go over the spillway and come out of the bubbler structures on the downstream face of the dam

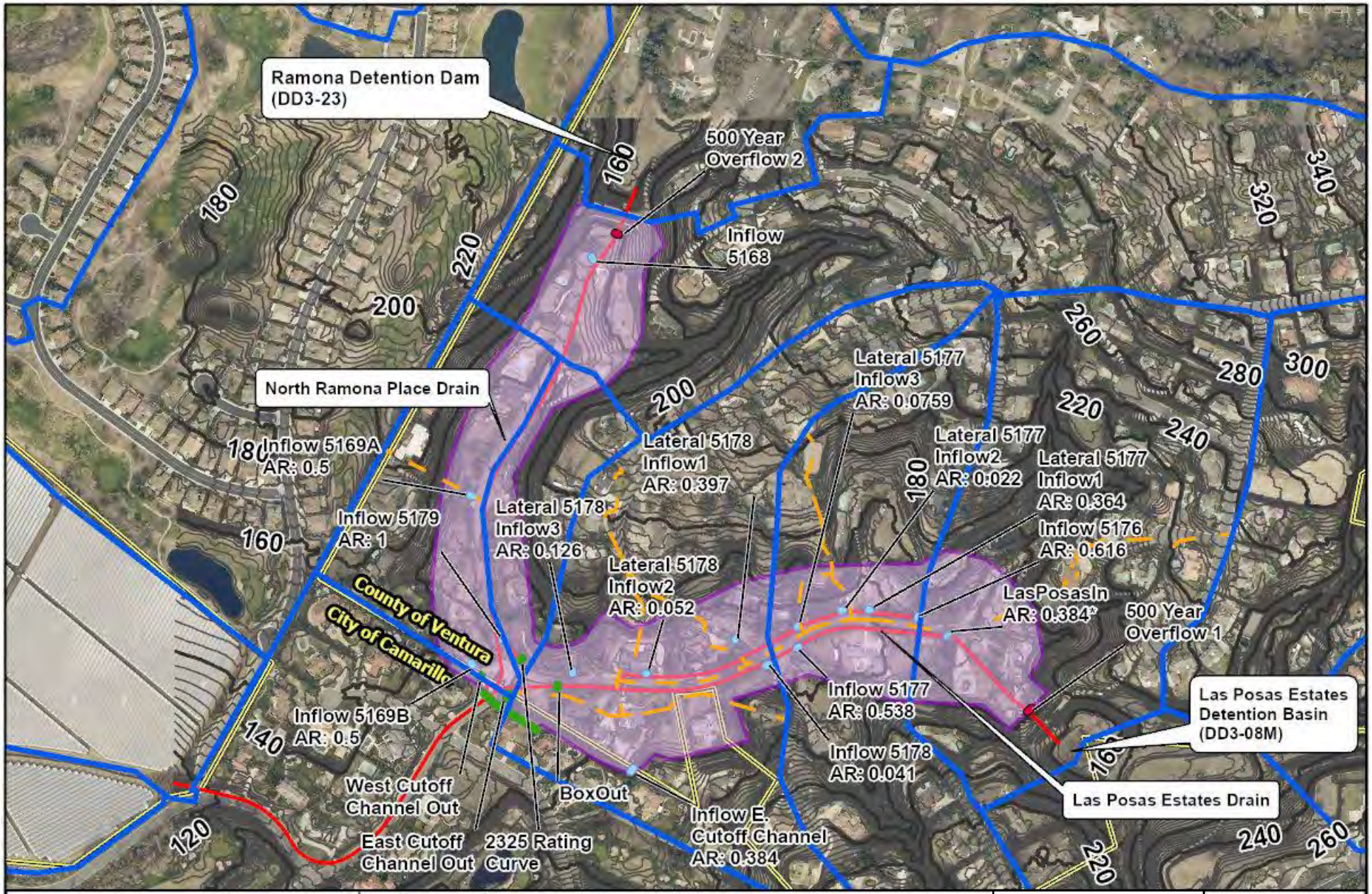
embankment. These unreduced inflows were added as a separate boundary condition utilized only in the 500-year simulation.

Table 4: Summary of Model Inflows

Inflow Location	Time Series	HEC-RAS BC Name	Scale Factor = AR * Peak Ratio (Peak Rations in Table 3)		Q Peak (cfs) *HECRAS	
			100-Year	500-Year	100-Year	500-Year
Ramona Detention Basin Outflow	5167B	N/A Contained in North Ramona Storm Drain	-	-	-	-
North end of Ramona Place	5168C	5168	1	1.561	143.8	224.5
West Interceptor Channel Lateral Inflow	5169C	5169A	0.5	0.781	23.6	36.8
		5169B	0.5	0.781	23.6	36.8
Legacy Channel	5179E	5179	1	1.561	23.1	30.1
Las Posas Estates Detention Basin Outflow	5174D & 5176D	Las Posas In*	0.384	0.599	103.0	81.2
Inflow to Channel on North Side of Las Posas	5176D	5176	0.616	0.962	83.5	130.4
Total flow for Time Series 5174D & 5176D:					186.5	211.5
Las Posas Estates Drain Just Upstream of Avocado	5177D	Inflow_5177	0.538	0.840	50.1	78.5
North Ditch Lateral Flows Upstream of Avocado	5177D	LateralInflow5177 1	0.364	0.568	33.9	53.1
	5177D	LateralInflow5177 2	0.022	0.034	2.1	3.8
	5177D	LateralInflow5177 3	0.076	0.119	7.1	11.1
North Ditch Lateral Inflow downstream of Avocado	5178D	Lateral 5178 Inflow 1	0.397	0.620	43.7	68.2
Las Posas Estates Drain Just downstream of Avocado Place	5178D	Inflow5178	0.041	0.064	4.5	7.0
LateralInflow5177 6	5178D	Lateral 5178 Inflow 2	0.052	0.081	7.4	11.5
North Ditch Lateral Inflow near Transition	5178D	Lateral 5178 Inflow 3	0.126	0.197	13.9	21.7
East Interceptor Channel Inflow	5178D	Inflow East Cutoff	0.384	0.599	42.2	65.9
Las Posas Estates Detention Basin (Q_{500})**	5173D	500-Year Overflow 1	N/A	1.561	495.11***	772.9
Ramona Detention Basin Overflow (Q_{500})**	5166B	500-Year Overflow 2	N/A	1.561	601.92***	939.6

*The hydrograph for Las Posas In is a combination of the outflow from the basin (Qpeak=62cfs) plus the area weighted contribution from subarea 5176D using area scale factor 0.384
**The 100-year hydrographs for the basins were scaled by 1.561 to obtain the 500-Year basin overflow.
*** The 100-year inflow hydrographs into the detention basins were not used in the HEC-RAS model.


5153B
5162B
Subarea1
North Ramona Place Drain
5166B
Q100yr: 602cfs
Q500yr:940cfs
5167B
Q100yr: 130 cfs
(Not in HECRAS Model)
5168C
Q100yr: 144cfs
5168C
5204D
160
180
200
220
260
280
300
320
340
5169C
Q100yr: 175cfs
5179E
Q100yr: 23cfs
5176D
Q100yr: 186cfs
5169C
5179E
5176D
5173D
5178D
5177D
5174 OF
Q100yr: 62cfs
County of Ventura
City of Camarillo
5182BC
Q100yr:682
Spanish Hills
5205D
5178D
Q100yr: 381cfs
5177D
Q100yr: 277cfs
5174D
5174 IF
Q100yr: 495cfs
Q500yr:773cfs
Las Posas Estates Drain
120
Legend
City Limits
Redline Channel
Calleguas Watershed Subareas
Subarea boundary for Inflow Conditions HECRAS
KASRAIE CONSULTING
Figure 5: Site Hydrology
N
W
E
S



KASRAIE CONSULTING

Legend

- City Limits
- Redline Channel
- HECRAS Model Limits
- Inflow BC (Active all Events)
- Inflow BC (Active 500yr Events Only)
- Outflow,
- Calleguas Watershed Subareas
- Subarea boundary for Inflow Conditions HECRAS

Figure 6: HEC-RAS 2D Inflow BC with Area Ratios (AR)

N W E S

5.3 HEC-RAS 2D

A two-dimensional (2D) hydraulic analysis was performed using U.S Army Corps of Engineers (USACE) HEC-RAS computer software, Version 6.0.

5.3.1 Elevation Data

The Post-Thomas Fire 2018 DEM, was used as the base terrain for hydraulic calculations. The geometry of the channels on the north and south sides of N. Ramona Place was added to the base terrain based on record drawings and field measurements to create the final terrain layer utilized in HEC-RAS.

5.3.2 2D Mesh Development

The 2D computational extent for the model, which may be viewed in Figure 6: HEC-RAS 2D Inflow BC with Area Ratios (AR), covers an approximately 34-acre area and extends from just downstream of Ramona Detention Dam to the North Ramona Place Drain at Ramona Place and Calle Tiera Vista and to the east end of Ramona Place. The HEC-RAS software allows for a variable grid cell size and number of faces. The model contains approximately 55,000 cells. Cells in the model vary in size with an average grid cell size of about 5 feet by 5 feet. Larger gird cell sizes, approximately 20 feet by 20 feet were used in drainage ditches where cell faces create a uniform section through the drainage channel.

5.3.3 Manning's "n" Values

Manning's n values were assigned based on land use from 2016 Aerial Imagery, field observations, and engineering judgment, see Table 5.

Table 5: HEC-RAS Manning Roughness Coefficient, "n"

Cover	Manning Roughness, "n"
Brush and shrub	0.080
Buildings	0.200
Concrete channel	0.015
Golf course	0.050
Open space	0.050
Residential low density	0.070
Roadway	0.024

5.3.4 Hydraulic Structures

A total of seven roadway and private drive crossings were modeled based on available record drawings and field observations. Hydraulic structures were added as 2D Grid to 2D Grid connections in HEC-RAS, which allows the simulation of culvert and embankment overflow connections between grid cells. The "Use Weir Equation Option" was applied for estimating flows over the culvert embankments.

5.3.5 Boundary Conditions

The HEC-RAS model features three types of boundary conditions: inflow hydrographs, outflow rating curves, and normal depth outflow boundaries.

5.3.5.1 Inflow Hydrographs

Inflow hydrographs were added to the model based on the scale factors in Table 4 at the locations illustrated in Figure 6.

5.3.5.2 Outflow Rating Curves

Surface flows are collected by the storm drain network at four locations including:

- The Las Posas Estates Drain Transition Structure
- East Interceptor - Drop Inlet Collector
- West Interceptor Channel
- Legacy Channel

At each location, a rating curve is used in the model to describe the hydraulic conditions and capacities of the storm drain system. Rating curves were developed based on the results of WSPG version 14.08 analysis of the inlet channel and drains. At low flow rates, less than 10 cfs, normal depth calculations were used in the rating curves to stabilize the model during initialization when the culvert entrances are not limiting the channel flow capacity. Rating curve plots are included in Attachment 3.

5.3.5.3 Normal Depth Outflow Boundary

Two normal depth outflow boundary was applied to the downstream end of the model to terminate the extent of overland flow in the simulation. The boundary conditions are utilized where the 500-year overland flow is not fully captured by the cutoff channels at the downstream limit of study.

5.3.6 Volume Conservation

HECRAS does not allow for the use of internal outlet boundary conditions. Because of this restriction it was necessary to create multiple 2D areas around the storm drain entrance locations. For the 100-year simulation three 2D areas were active: EastCutOffGrid, LegacyChanGrid, and Perimeter each 2D area had percent error of 0.002%, 0.5% and 1.4% respectively. Volume conservation is an indicator of the stability and accuracy of a 2D flow model. The target volume error for most 2D models is 1% or a total error less than 1-acre-foot. The total volume conservation error for the 100-year simulation was 1.7%, totaling 1.38 acre-ft. The error observed is acceptable given the limitation of the outflow boundary configurations. Review of the structures and outlet hydrographs show a stable simulation.

6 Results

A certified topographic workmap and annotated FIRM, provided as Attachment 4, have been prepared based on the results of the new analysis. FEMA MT-2 Forms, included as Attachment 5, have been prepared to support a LOMR based on results of this study.

Digital copies HEC-RAS model have been uploaded to Dropbox and may be accessed at the following link:

https://www.dropbox.com/sh/7hgp0ovpc1twqni/AAD7Io6eenGBA-dEm5FQmblfa?dl=0

Additional LOMR supporting data is provided digitally in the Dropbox file.

6.1 HEC RAS Model Results

The 2D hydraulic model results indicate overland flooding in the project area is less than one foot, with the average 100-year depth of 0.72 feet in the study area.

6.2 Floodplain Mapping Approach

The proposed inundation map removes the Special Flood Hazard Area (Zone A) and replaces it with a Zone X, see Attachment 4.

Per FEMA's definition a Zone X corresponds to areas of 0.2% annual chance of flood hazard, areas of 1% annual chance flood with average peak depths of less than one (1) foot or with drainage areas less than one (1) square mile (640 acres).

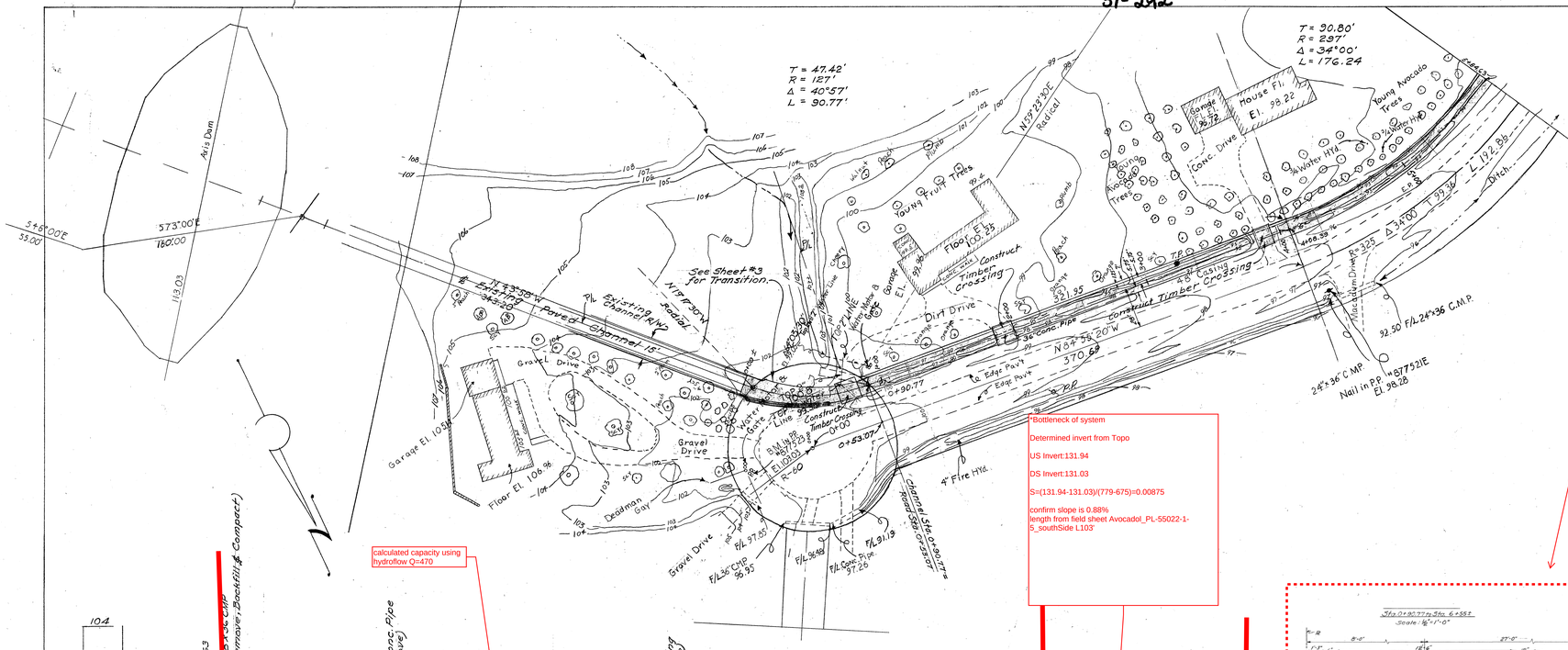
The results show that the average depth is 0.72 feet, and the drainage area is 613 acres, effectively 422 of these acres are attenuated by Ramona Detention Dam and Las Posas Estates Detention Basin.

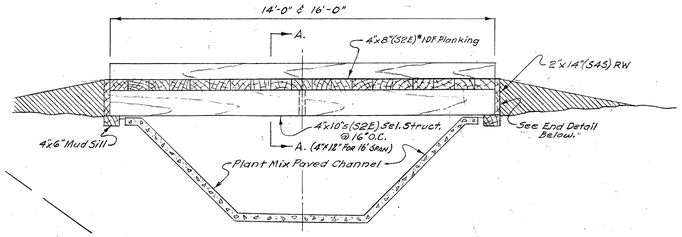
In accordance with FEMA Guidance for Flood Risk Analysis and Mapping / Flood Profiles (December 2020), profiles are not required for shallow flooding areas. In the cases where 2D analysis includes 1D component profiles are not required for minor reaches (convey less than 20% of the flow or are less than 1,000-feet long). Profiles are not required and will not be provided for channels modeled in 2D.

Attachment 1: Record Drawings and Field Measurements

37-292

37-292A





ELEVATION
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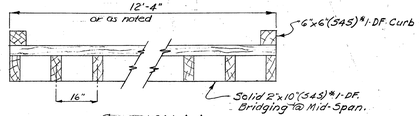
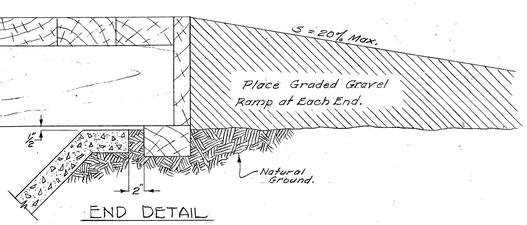


SECTION A-A.
Scale: ½"=1'-0"



END DETAIL
Scale: 1½"=1'-0"

TIMBER CROSSING

calculated capacity using hydroflow Q=470

calculated capacity ysing Hydraflow Q =550

"Bottleneck of system

Determined invert from Topo

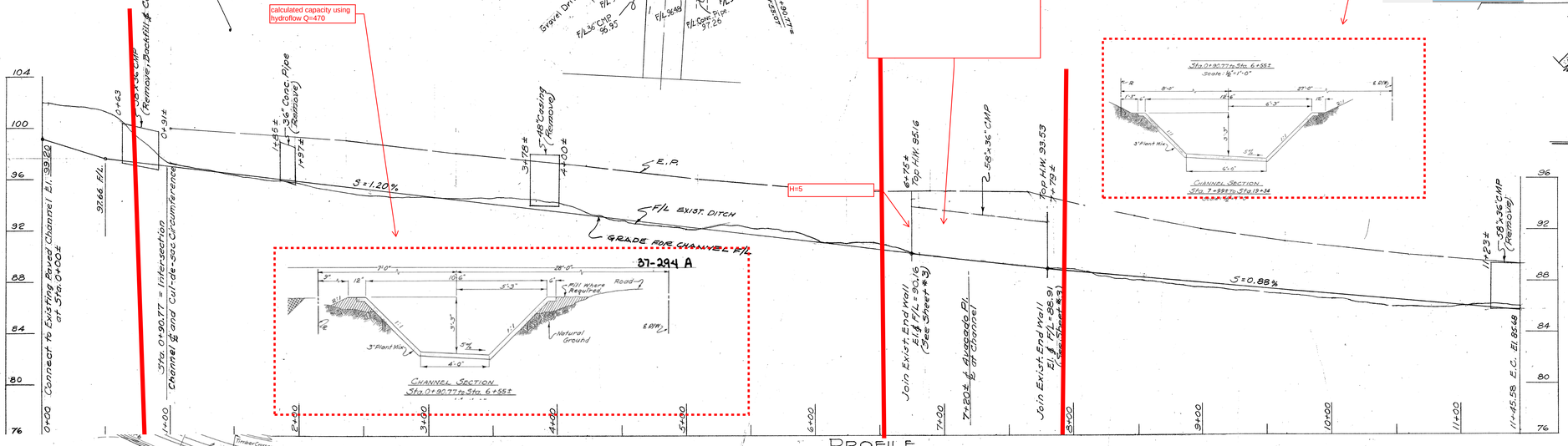
US Invert:131.94

DS Invert:131.03

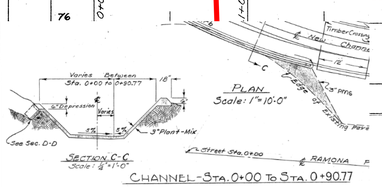
S=(131.94-131.03)/(779-675)=0.00875

confirm slope is 0.88%
length from field sheet Avocadol_PL-55022-1-5_southSide L103'

H=5



PROFILE
Scale: Horiz. 1"=40'
Vert. 1"=4



COMPLETE No "AS BUILT" 8-28-58

VENTURA COUNTY FLOOD CONTROL DISTRICT ZONE 3

COUNTY OF VENTURA
DEPARTMENT OF PUBLIC WORKS

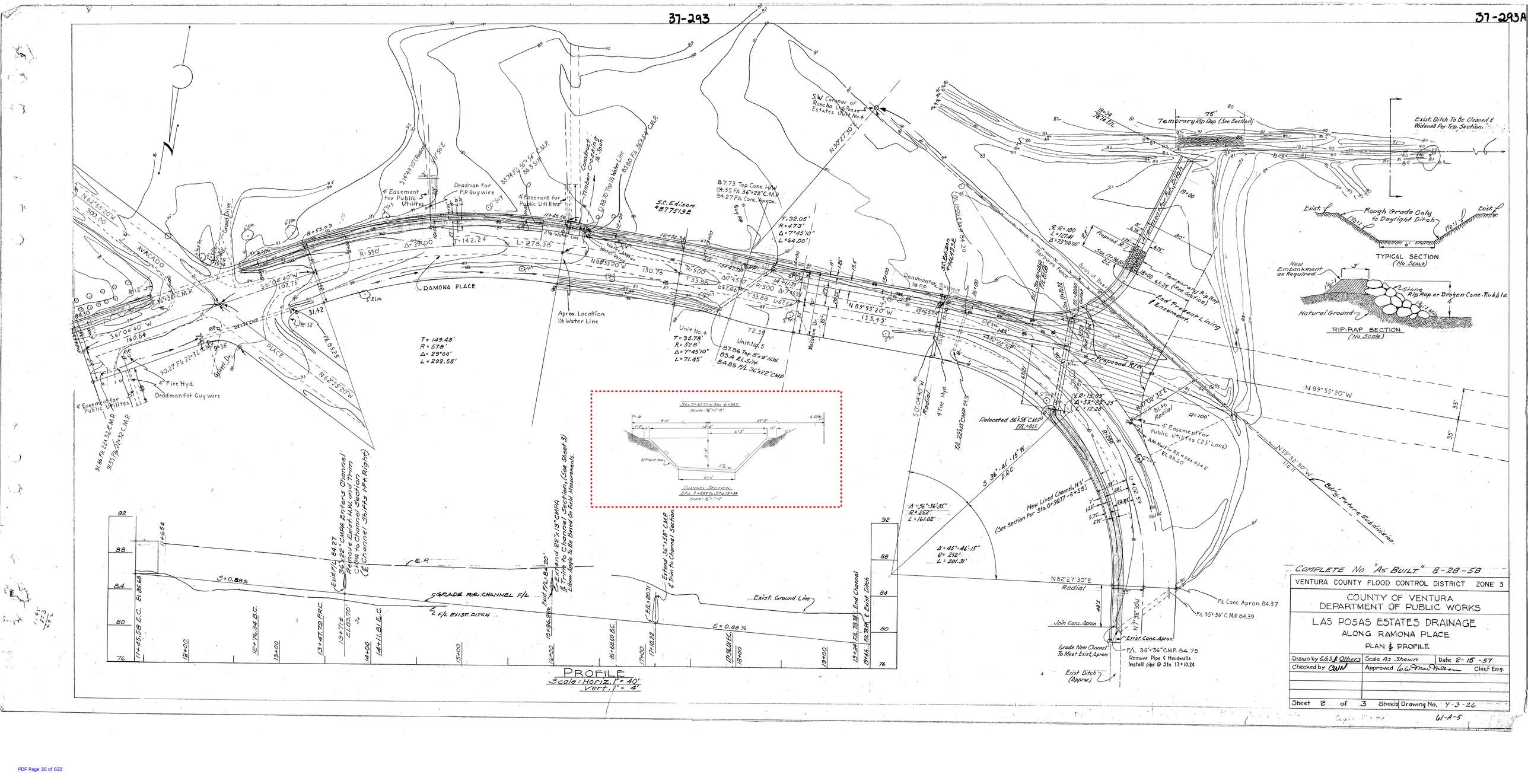
LAS POSAS ESTATES DRAINAGE
ALONG RAMONA PLACE

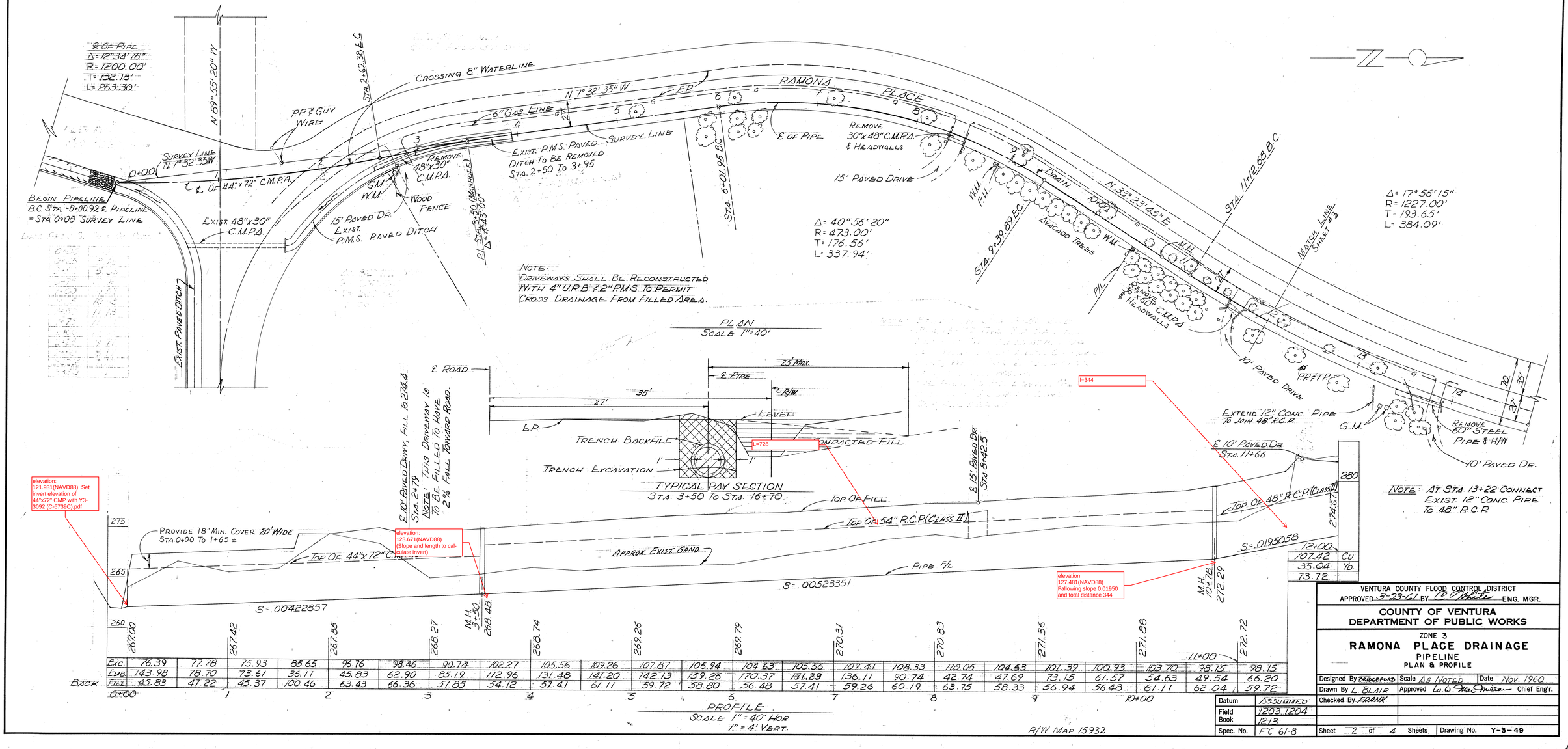
PLAN & PROFILE

Drawn by S.U.S. & Others	Scale As Shown	Date 2-15-57
Checked by CMN	Approved W. W. Thomas Chief Eng.	
Sheet 1 of 3 Sheets	Drawing No. Y-3-25	

61-A-5

PDF Page


AVACADO
RAMONA PLACE
PLACE
Gravel Drive
Gravel Dr.
N 62°55'20"W 300.00
S 61°04'40"W 160.64
S 61°04'40"W 107.76
N 62°55'20"W
N 89°55'20"W 130.76
N 89°55'20"W 153.45
R=550'
Δ=29°00'
L=278.36
T=142.24
R=500'
T=33.88
L=67.86
T=149.48'
R=578'
Δ=29°00'
L=292.55'
T=35.78'
R=528'
Δ=7°45'10"
L=71.45'
T=32.05'
R=473'
Δ=7°45'10"
L=64.00'
R=12'
Δ=90°00'00"
L=18.85
R=100'
L=127.41
Δ=73°00'00"
R=13.08'
Δ=33°22'25"
L=12.20
Δ=96°-36'-35"
R=252'
L=161.02'
Δ=45°-46'-15"
R=252'
L=201.31'
Δ=34°-02'-32"
R=100'
L=59.46
S 36°-41'-15"W P.R.C.
N 82°27'30"E Radial
S 01°04'40"W Radial
N 30°27'30"E
N 59°32'30"W 115.11'
Bal'ce, Future Subdivision
Proposed R/W
Existing R/W
Proposed B.C.
Existing B.C.
Burkwire Fence
Back of Existing Curb
Back of Proposed Curb
Temporary Rip Rap (See Section)
End Proposed Lining & Easement
Exist. Ditch To Be Cleaned & Widened Per Typ. Section.
Exist. Ground Line
Grade New Channel To Meet Exist. Apron
Exist Ditch (Approx.)
Join Conc. Apron
Exist. Conc. Apron
F/L Conc. Apron. 84.37
F/L 35"x56" C.M.P. 84.39
F/L 35"x56" C.M.P. 84.75
Remove Pipe & Headwalls
Install pipe @ Sta. 17+10.24
Relocated 36"x58" C.M.P.
F/L=81.5
F/L 22"x13" C.M.P. 84.31
F/L 15"x20" C.M.P. 84.20
Deadman for Guy wire
4" Fire Hyd.
4' Easement for Public Utilities
4' Easement for Public Utilities (25' Long)
Deadman for P.P. Guy wire
Construct Trinder Crossing
Aprox. Location 1½ Water Line
Water Meter
Unit No. 4
Unit No. 3
Median Dr.
S.W. Corner of Rancho Las Posas Estates Unit No. 4
S.C. Edison #877519E
Temporary Rip Rap (See Section)
New Embankment as Required.
Rough Grade Only to Daylight Ditch
Natural Ground
Rip-Rap or Broken Conc. Rubble
Min.
TYPICAL SECTION
(No Scale)
RIP-RAP SECTION
(No Scale)
CHANNEL SECTION
Sta. 7+99.81 to Sta. 19+34
Scale: ½"=1'-0"
3' Plant Hill
Sta. 0+30.77 to Sta. 6+55.5
Scale: ½"=1'-0"
PROFILE
Scale: Horiz. 1"=40'
Vert. 1"=4'
E.P.
S=0.88%
S=0.88%
Grade for Channel F/L
2 F/L Exist. Ditch
Exist F/L 84.27
36"x22" CMPA Enters Channel
Remove Exist. Hdwl. and Trim
Ends to Channel Section
(E Channel Sta. 19+34 I/A Right)
Extend 36"x58" C.M.P. & Trim to Channel Section
Extend 22"x13" CMPA & Trim to Channel Section. (See Sheet 3)
Elbow Angle To be Based On Field Measurements.
End F/L 84.20
End Channel & Exist Ditch
F/L 80.71
F/L 78.31
F/L 78.84
F/L 80.01
Elev. 84.27
Elev. 85.68
Elev. 85.76
Elev. 84.20
Elev. 84.31
Elev. 84.75
Elev. 84.39
Elev. 84.37
Elev. 84.25
Elev. 84.34
Elev. 84.29
Elev. 84.20



	267.00	267.42	267.85	268.27	268.74	269.26	269.79	270.31	270.83	271.36	271.88	272.72
Exc.	76.39	77.78	75.93	85.65	96.76	98.46	90.74	102.27	105.56	109.26	107.87	106.94
Fub.	143.98	78.70	73.61	36.11	45.83	62.90	85.19	112.96	131.48	141.20	142.13	159.26
Fill	45.83	41.22	45.37	100.46	63.43	66.36	51.85	54.12	57.41	61.11	59.72	58.80

104.63	105.56	107.41	108.33	110.05	104.63	101.39	100.93	103.70	98.15	98.15	104.67	104.67	104.67	104.67	104.67	104.67	104.67	104.67	104.67	104.67	104.67	104.67
170.37	131.29	136.11	90.74	42.74	47.69	73.15	61.57	54.63	49.54	66.20	59.72	59.72	59.72	59.72	59.72	59.72	59.72	59.72	59.72	59.72	59.72	59.72
57.41	59.26	60.19	63.75	58.33	56.94	56.48	61.11	62.04	59.72													

Datum	ASSUMED
Field Book	1203, 1204, 1213
Spec. No.	FC 61-8

VENTURA COUNTY FLOOD CONTROL DISTRICT
APPROVED 3-23-61 BY C. C. Martin ENG. MGR.

COUNTY OF VENTURA
DEPARTMENT OF PUBLIC WORKS

ZONE 3

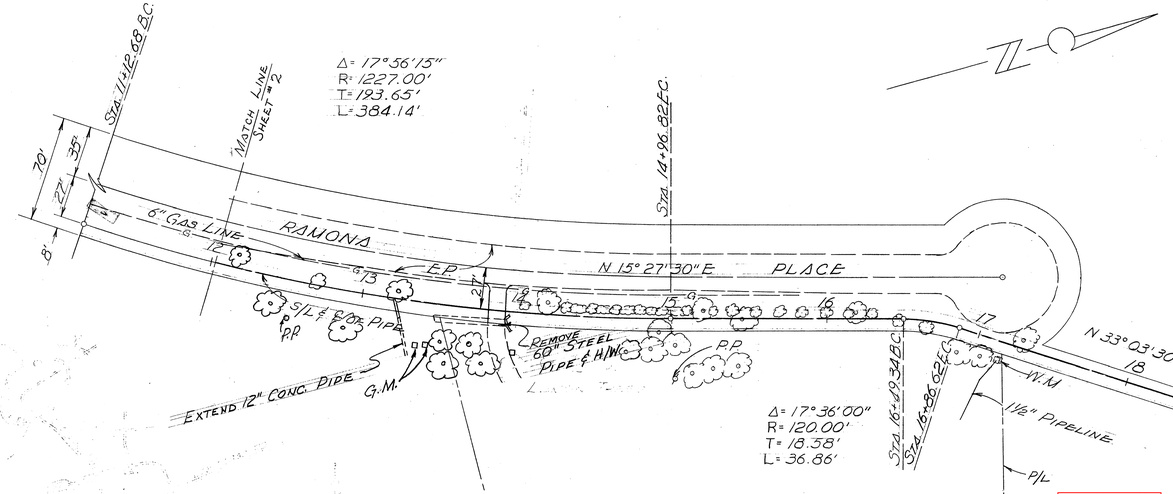
RAMONA PLACE DRAINAGE

PIPELINE
PLAN & PROFILE

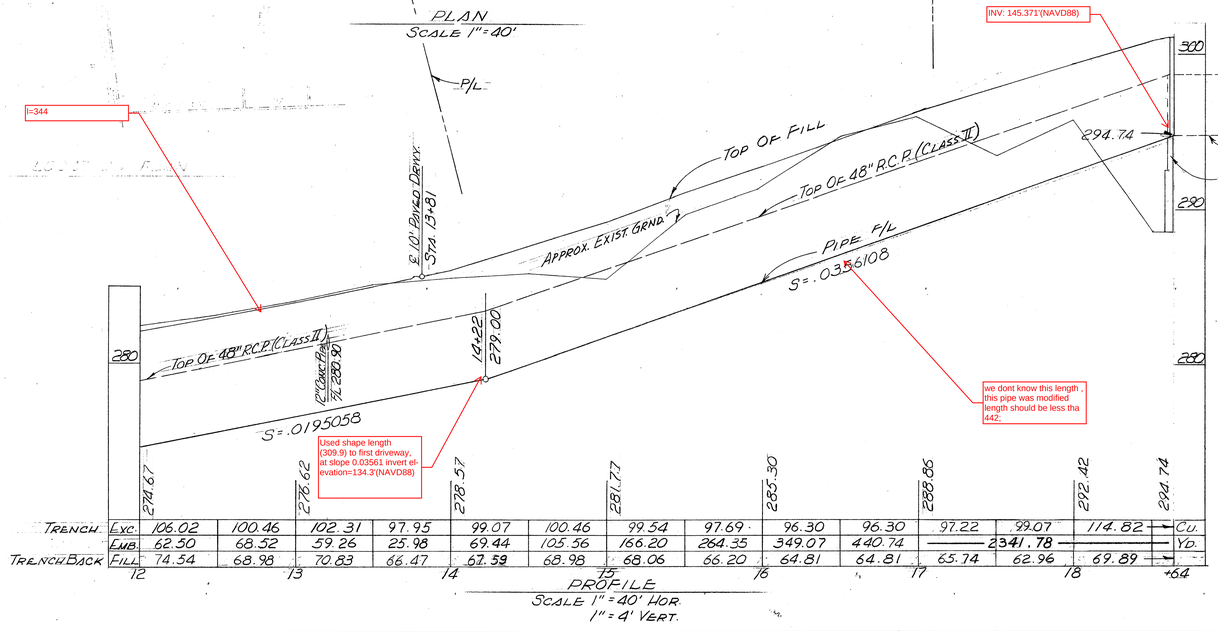
Designed By BRIDGEFORD	Scale As NOTED	Date Nov. 1960	
Drawn By L. BLAIR	Approved L. C. McMullen	Chief Eng'r.	
Checked By FRANK			
Sheet 2 of 4 Sheets	Drawing No. Y-3-49		

37-308

37-308 A



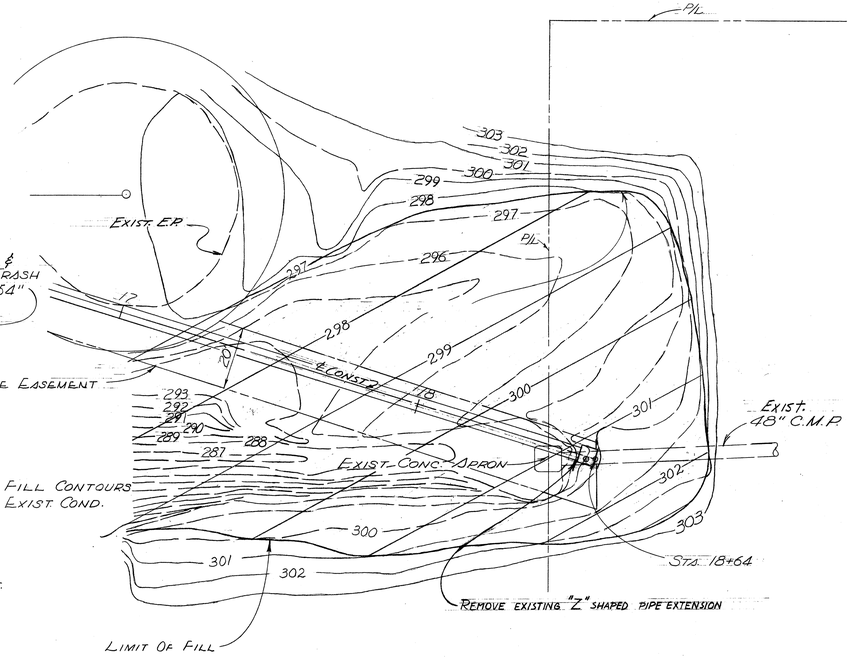
PLAN
SCALE 1" = 40'



TRENCH	EXC.	106.02	100.46	102.31	97.95	99.07	100.46	99.54	97.69	96.30	96.30	97.22	99.07	114.82	CU.
	EMB.	62.50	68.52	59.26	25.98	69.44	105.56	166.20	264.35	349.07	440.74	2341.78			YD.
TRENCH BACK FILL		74.54	68.98	70.83	66.47	67.59	68.98	68.06	66.20	64.81	64.81	65.74	62.96	69.89	

12 13 14 15 16 17 18 +64

PROFILE
SCALE 1" = 40' HOR.
1" = 4' VERT.



NOTE:
EXTEND FILL CONTOURS TO MEET EXIST. COND.

BACKFILL AREA
LAYOUT PLAN
SCALE 1" = 20'
TOTAL CUBIC YARDS OF EMB.
2341.78

R/W Map 15932

VENTURA COUNTY FLOOD CONTROL DISTRICT
APPROVED 3-23-61 BY [signature] ENG. MGR.

COUNTY OF VENTURA
DEPARTMENT OF PUBLIC WORKS

ZONE 3

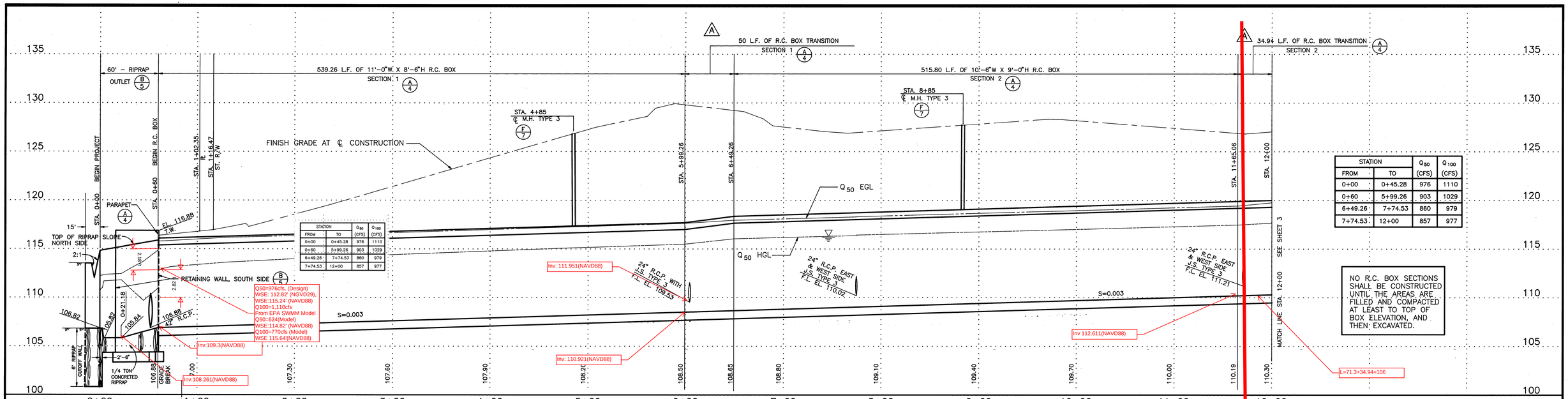
RAMONA PLACE DRAINAGE

PIPELINE
PLAN & PROFILE

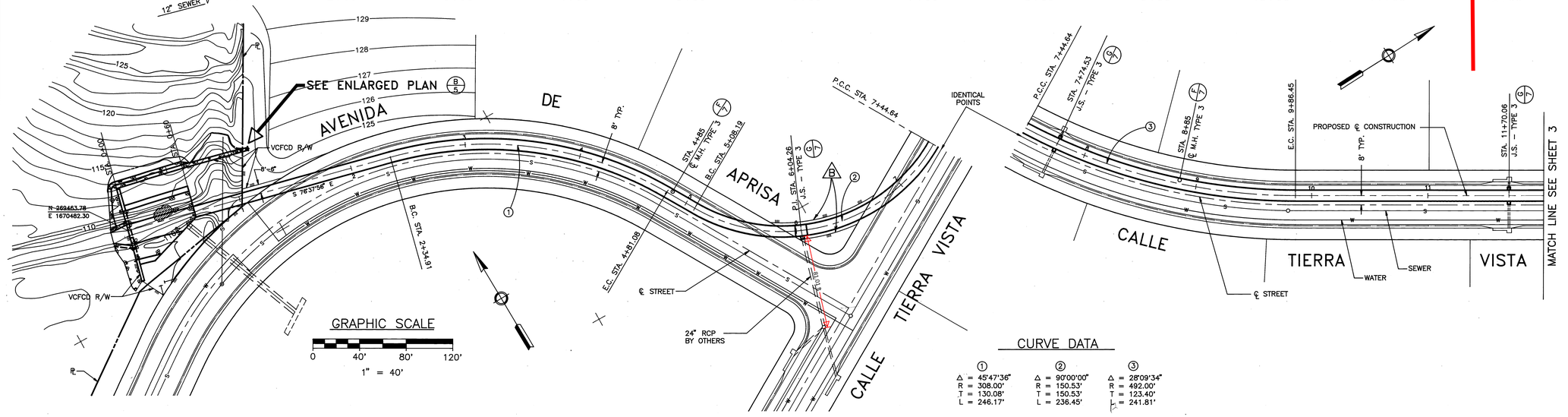
Designed By BRIDGEFORD	Scale AS NOTED	Date NOV. 1960	
Drawn By L. BLAIR	Approved [signature] Chief Engr.		
Checked By FRANK			

Datum	ASSUMED				
Field Book	1213, 1203				
	1204				
Spec. No.	FC 61-8	Sheet 3 of 4 Sheets	Drawing No.	Y-3-50	

MICROFILM



STATION		Q_{50}	Q_{100}
FROM	TO	(CFS)	(CFS)
0+00	0+45.28	976	1110
0+60	5+99.26	903	1029
6+49.26	7+74.53	860	979
7+74.53	12+00	857	977



CURVE DATA

①	②	③
Δ = 45°47'36"	Δ = 90°00'00"	Δ = 28°09'34"
R = 308.00'	R = 150.53'	R = 492.00'
T = 130.08'	T = 150.53'	T = 123.40'
L = 246.17'	L = 236.45'	L = 241.81'

RECORD DRAWING
DATE PROJECT COMPLETED 9/23/92
REVISIONS SUBMITTED BY VCFCD
DRAWING REVISED BY [signature] 2/8/93
APPROVED BY HEC DATE 2/8/93

AS BUILT

REVISION	DESCRIPTION	APP.	DATE
D			
C			
B	ADD VCFCD R/W LIMITS	JG	10-31-91
A	MODIFY TRANS. LENGTH	JG	10-31-91

PREPARED BY: Hawks & Associates
2323 Portola Road Suite 150
Ventura, CA 93003 (805) 658-8611
Engineering-Planning-Surveying-Photogrammetry
RCE 17100 EXP. 6-30-93 10/4/91 DATE

DESIGNED C.H. DRAWN D.R. CHECKED W.F.
PROJ. ENG. RECOMMENDED
REG. NO. DATE APPROVED 10-16-91

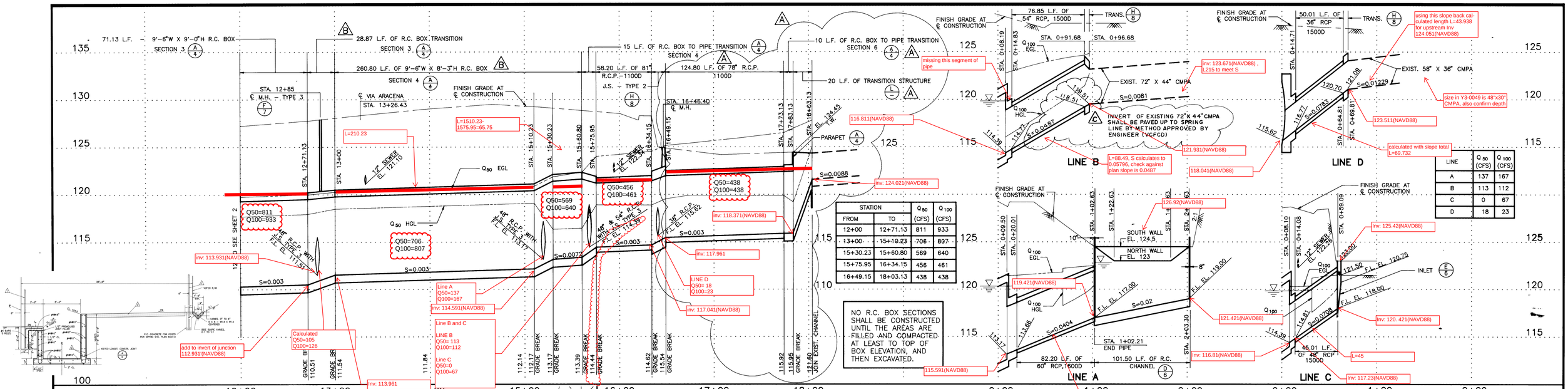
COUNTY OF VENTURA – PUBLIC WORKS AGENCY
VENTURA COUNTY FLOOD CONTROL DISTRICT

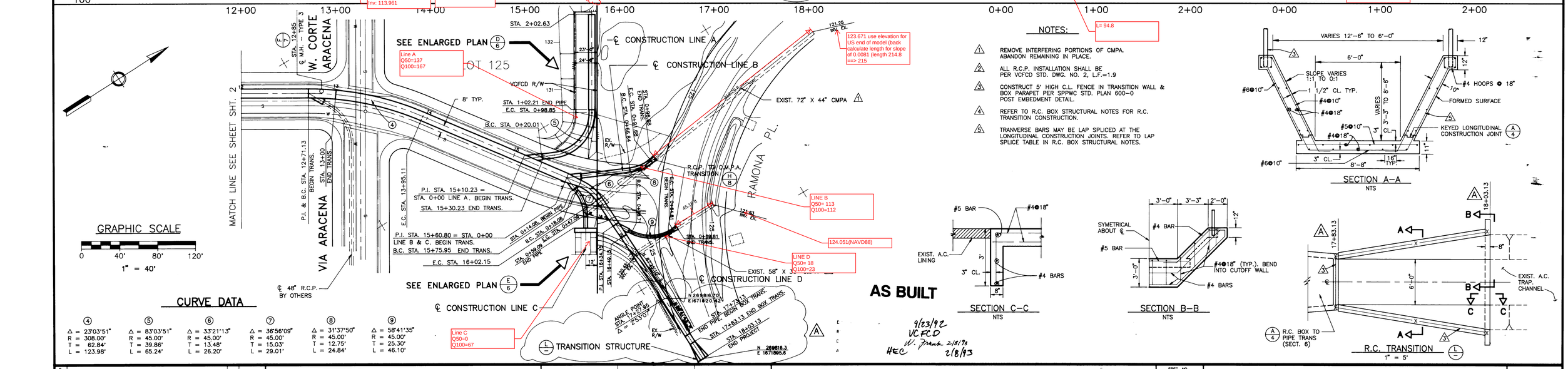
SPEC. NO.
PROJ. NO. 80826

LAS POSAS ESTATES DRAIN – UNIT 11
PLAN AND PROFILE
STA. 0+00 TO STA. 12+00

SHEET 2 OF 11
DRAWING NO. Y-3-3091

PDF Page 33 of 622





NOTES:

1. REMOVE INTERFERING PORTIONS OF CMPA. ABANDON REMAINING IN PLACE.
2. ALL R.C.P. INSTALLATION SHALL BE PER VCFCD STD. DWG. NO. 2, L.F.=1.9
3. CONSTRUCT 5' HIGH C.L. FENCE IN TRANSITION WALL & BOX PARAPET PER SPPWC STD. PLAN 600-0 POST EMBEDMENT DETAIL.
4. REFER TO R.C. BOX STRUCTURAL NOTES FOR R.C. TRANSITION CONSTRUCTION.
5. TRANVERSE BARS MAY BE LAP SPLICED AT THE LONGITUDINAL CONSTRUCTION JOINTS. REFER TO LAP SPLICE TABLE IN R.C. BOX STRUCTURAL NOTES.

SECTION A–A
NTS

SECTION C–C
NTS

SECTION B–B
NTS

R.C. BOX TO PIPE TRANS (SECT. 6) A/4

R.C. TRANSITION L/–
1" = 5'

AS BUILT
9/23/92
VCFCD
W. Frank 2/18/93
HEC 2/8/93

	REVISION	DESCRIPTION	APP.	DATE
0				
1	REVISE LINE B SLOPE & NOTE TO PAVE CMPA			11-7-91
2	MODIFY TRANS. & EXTEND BOX			12-31-91
3	EXTEND 78", RCP RELOCATE TRANS. UPSTREAM			10-31-91

PREPARED BY: Hawks & Associates, 2323 Portola Road Suite 150, Ventura, CA 93003 (805) 658-8611, Engineering–Planning–Surveying–Photogrammetry
RCE 17100 EXP. 6-30-93 10/9/91 DATE

DESIGNED C.H. DRAWN D.R. CHECKED W.F.
PROJ. ENG. REG. NO. DATE
RECOMMENDED APPROVED

COUNTY OF VENTURA – PUBLIC WORKS AGENCY
VENTURA COUNTY FLOOD CONTROL DISTRICT

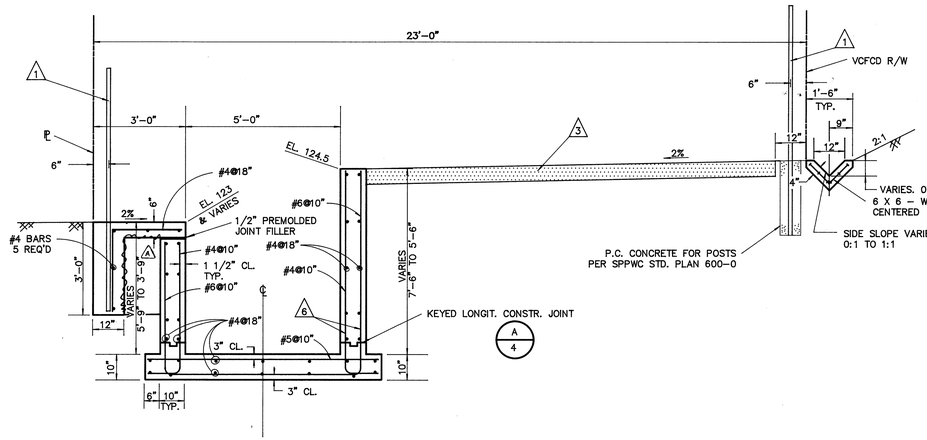
SPEC. NO.
PROJ. NO. 80826

LAS POSAS ESTATES DRAIN – UNIT 11
PLAN & PROFILE – STA. 12+00 TO STA. 18+03.13
PROFILES – LINE A, B, C & D

SHEET 3 OF 11
DRAWING NO. Y-3-3092

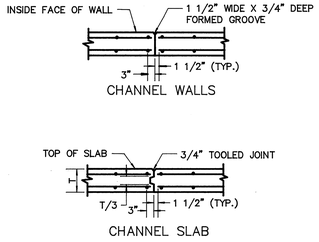
C-6739C

MICROFILM

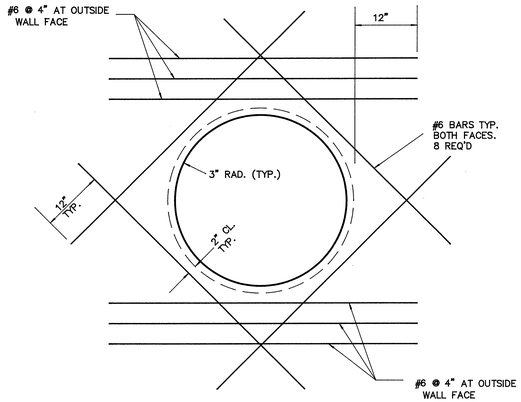


SECTION A-A

N.T.S.

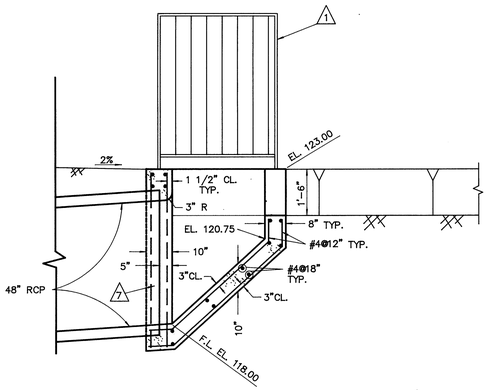


TRANSVERSE CONSTRUCTION JOINT DETAILS



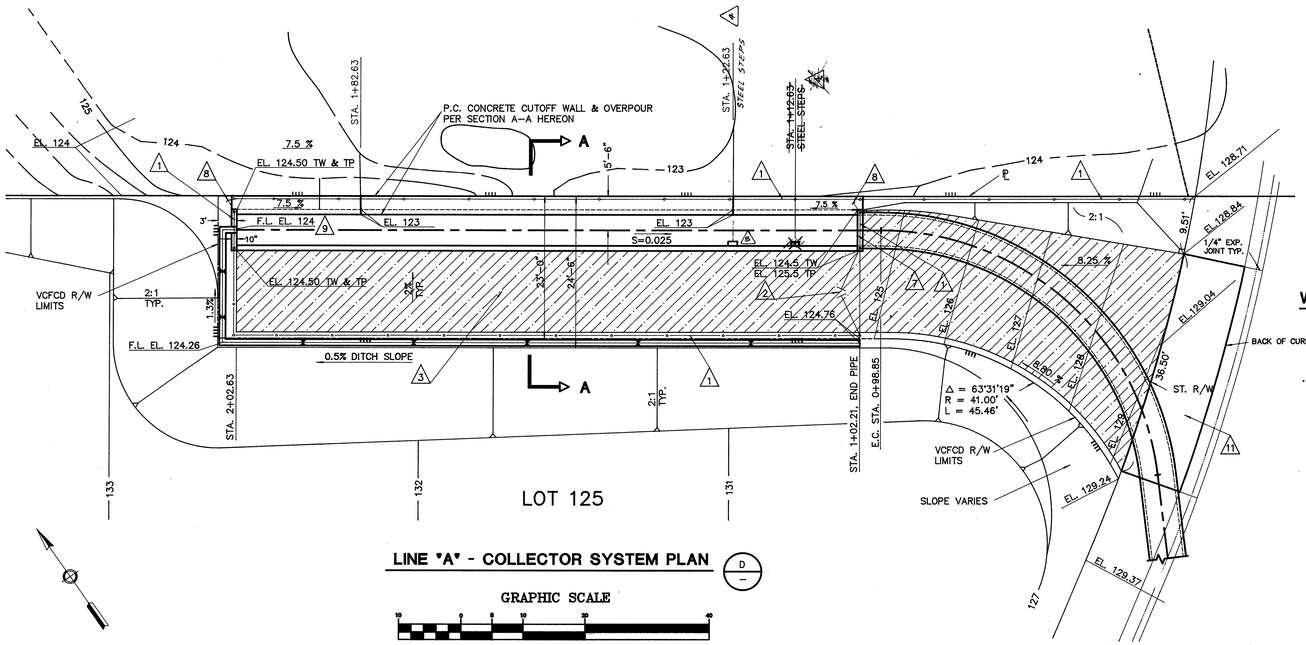
ADDITIONAL WALL REINFORCING AT PIPE CONNECTIONS

K



SECTION B-B

N.T.S.



LINE "A" - COLLECTOR SYSTEM PLAN

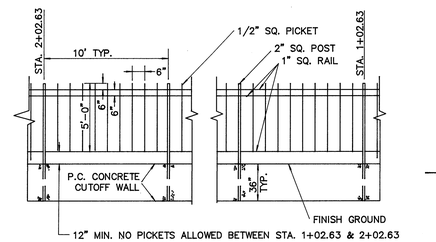
D

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)

1 inch = 10 ft.

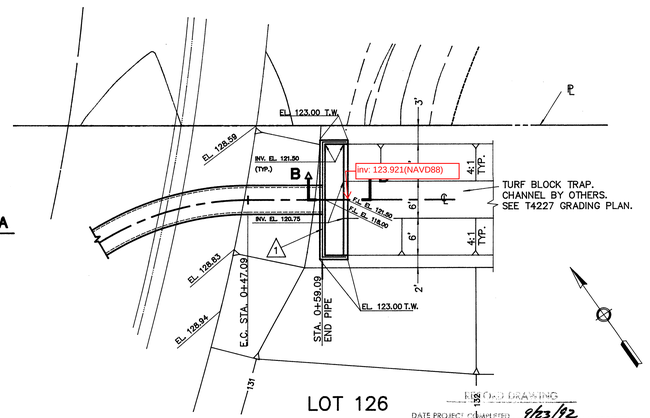


WROUGHT - IRON FENCE INSTALLATION ALONG LINE A

N.T.S.

NOTES

1. CONSTRUCT 5' HIGH WROUGHT-IRON FENCE ALONG PROPERTY LINE PER TRACT 4227-2 LANDSCAPING PLANS. INSTALL FENCE POSTS IN END WALLS PER SPPWC STANDARD PLAN 600-0 POST EMBEDMENT DETAIL. FENCE SHALL BE INSTALLED PER DETAIL HEREON BETWEEN STA. 1+02.63 & 2+02.63.
2. CONSTRUCT 14' WIDE X 5' HIGH D.L. WROUGHT IRON GATE WITH STOPS.
3. CONSTRUCT 6" C.M.B. WITH SOIL STERILIZATION.
4. CONSTRUCT STEEL STEPS PER SPPWC STANDARD PLAN 635-0.
5. REFER TO R.C. BOX STRUCTURAL NOTES FOR R.C. CHANNEL CONSTRUCTION.
6. TRANSVERSE BARS MAY BE LAP SPLICED AT THE LONGITUDINAL CONSTRUCTION JOINTS. REFER TO LAP SPLICE TABLE IN R.C. BOX STRUCTURAL NOTES.
7. PROVIDE ADDITIONAL WALL REINF. AT PIPE CONNECTION PER (K)
8. CONSTRUCT 3' WIDE X 5' HIGH WROUGHT IRON GATE
9. CONSTRUCT 6" DEEP X 12" WIDE "V" NOTCH IN END WALL.
10. WROUGHT-IRON FENCE & GATES SHALL BE PRIMED AND PAINTED PER SSPWC, SECT. 310
11. CONSTRUCT 7" THICK P.C. CONCRETE DRIVEWAY WITH #4 @ 18" REINF.



LINE "C" - COLLECTOR SYSTEM PLAN

E

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)

1 inch = 10 ft.

AS BUILT

RECORD DRAWING

DATE PROJECT COMPLETED 9/23/92

REVISIONS SUBMITTED BY VCFCD

DRAWING REVISED BY W. Franks 2/8/93

APPROVED BY HEC DATE 2/8/93

REV.	DESCRIPTION	APP.	DATE
D			
C			
B	STEEL STEPS LOCATED AT STA. 1+22.63		
A	SOLID CONC. THROUGHOUT THIS SECTION		

PREPARED BY: Hawks & Associates, 2363 Portola Road Suite 150, Ventura, CA 93003 (805) 650-6611, Engineering-Planning-Surveying-Photogrammetry. RCE 17200 EXP. 6/30/93. 10/15/91 DATE

DESIGNED C.H. | DRAWN C.H. | CHECKED W.F.

PROJ. ENG. | RECOMMENDED | REG. NO. | DATE | APPROVED 10-16-91

COUNTY OF VENTURA - PUBLIC WORKS AGENCY

VENTURA COUNTY FLOOD CONTROL DISTRICT

SPEC. NO.

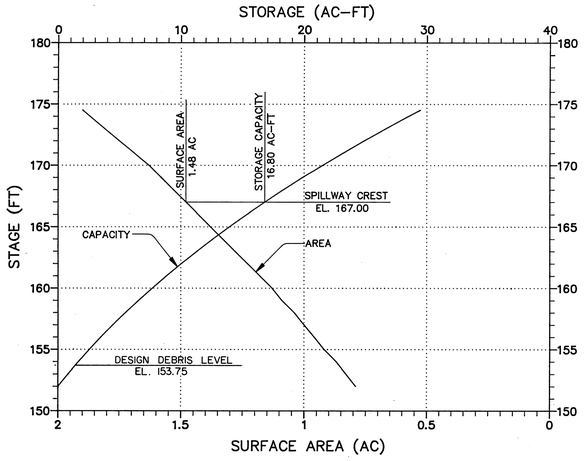
PROJ. NO. 80826

LAS POSAS ESTATES DRAIN - UNIT II

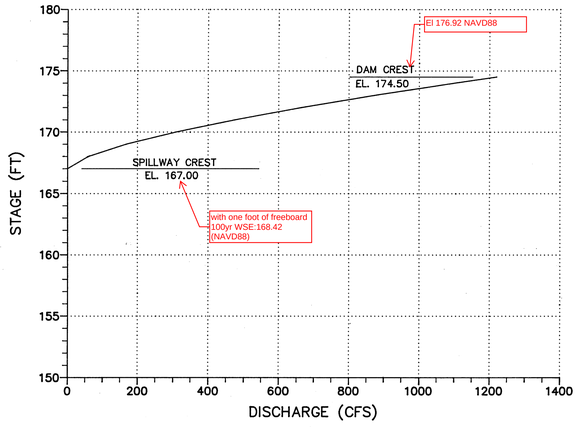
MISCELLANEOUS DETAILS

SHEET 6 OF 11

DRAWING NO. Y-3-3095



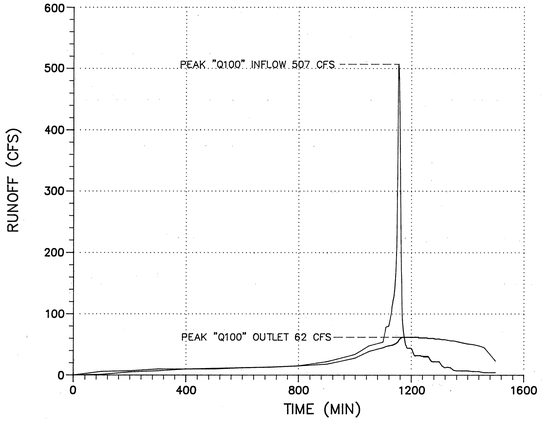
AREA–CAPACITY CURVE



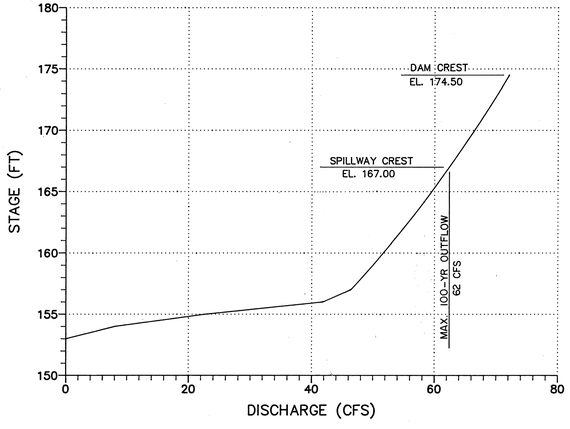
STAGE–DISCHARGE CURVE
EMERGENCY SPILLWAY

DRAINAGE AREA MAP

1000 500 0 1000 2000
SCALE OF FEET



DESIGN STORM HYDROGRAPH



STAGE–DISCHARGE CURVE
OUTLET PIPE

RECORD DRAWING
DATE PROJECT COMPLETED 10-20-92
REVISIONS SUBMITTED BY KG
DRAWING REVISED BY TL
APPROVED BY HEO DATE 4-5-93

REVISION	DESCRIPTION	APP.	DATE
D			
C			
B			
A			
△			

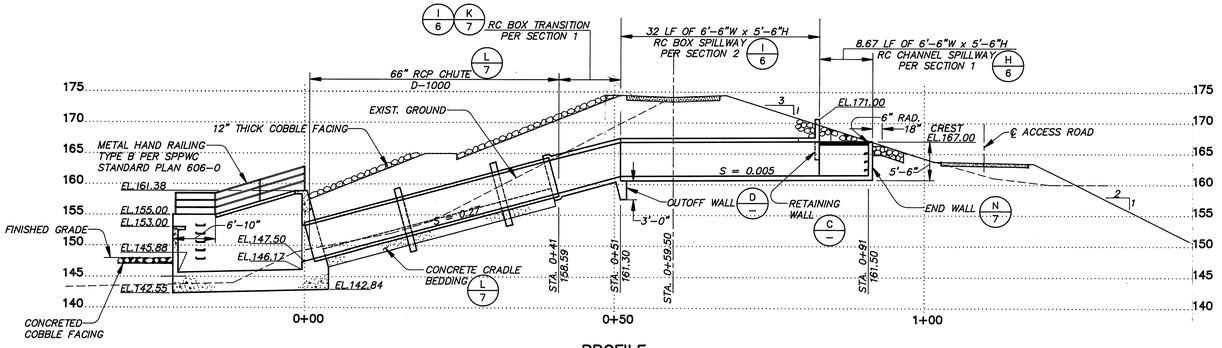
DESIGNED M. SEYEDAN | DRAWN T. FRASER | CHECKED D. AWREY
PROJ. ENG. | RECOMMENDED
REG. NO. | DATE | APPROVED

COUNTY OF VENTURA - PUBLIC WORKS AGENCY
VENTURA COUNTY FLOOD CONTROL DISTRICT

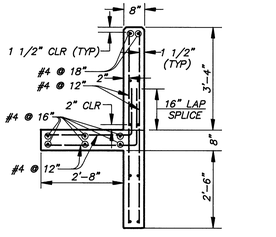
SPEC. NO.
PROJ. NO. 88060

LAS POSAS ESTATES DETENTION BASIN
HYDROLOGIC AND HYDRAULIC DATA

SHEET 2 OF 17
DRAWING NO. Y-3-3102

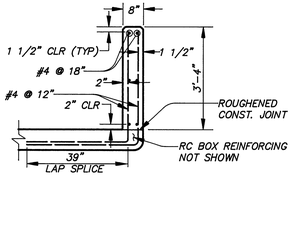


PROFILE



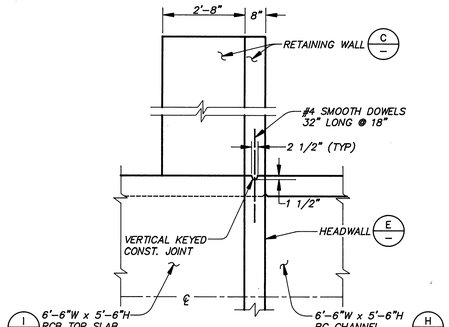
RETAINING WALL DETAIL C/—

SCALE OF FEET



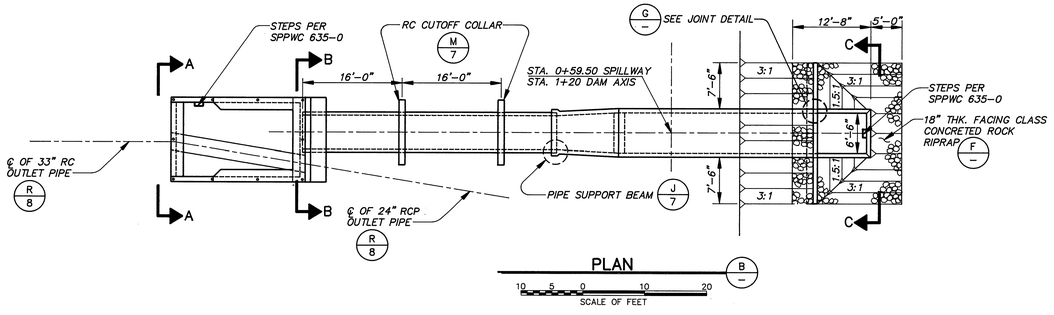
HEADWALL DETAIL E/—

SCALE OF FEET



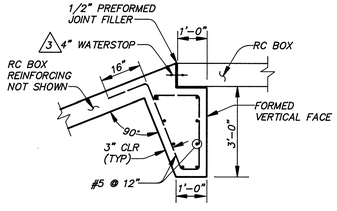
JOINT DETAIL — PLAN G/—

SCALE OF FEET

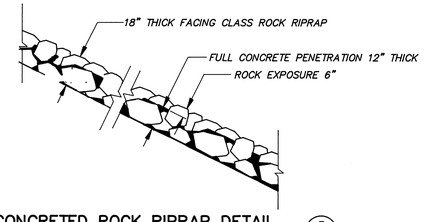


PLAN B/—

SCALE OF FEET

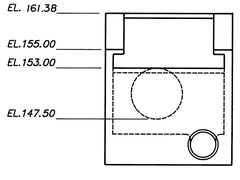


CUTOFF WALL DETAIL D/—

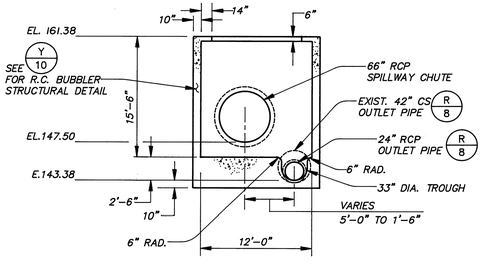


CONCRETED ROCK RIPRAP DETAIL F/—

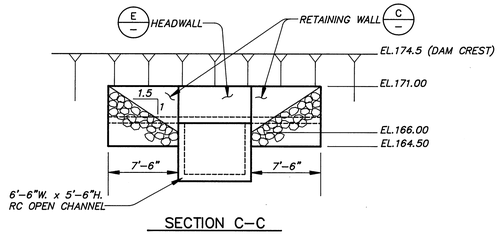
NOT TO SCALE



SECTION A—A



SECTION B—B



SECTION C—C

NOTES:

1. STRUCTURAL NOTES ON SHEET NO. 6 APPLY TO ALL DETAILS HEREON.
2. EMBANKMENT FILL SHALL BE COMPLETED TO AT LEAST 12" ABOVE THE SPILLWAY FLOWLINE, THEN IT SHALL BE REEXCAVATED FOR THE CONSTRUCTION OF SPILLWAY.
3. 4" POLYVINYL CHLORIDE WATERSTOP (SPLIT RIBBED CENTER BULB TYPE) SHALL BE CONTECH VINYLSTOP NO. 413S, BURKE VINYLOK WATERSTOP R.S.B. 316-4, OR AN APPROVED EQUAL AND SHALL BE INSTALLED FOR THE FULL PERIMETER OF THE BOX.

RECORD DRAWING

DATE PROJECT COMPLETED 10-20-92
REVISIONS SUBMITTED BY KG
DRAWING REVISED BY TL
APPROVED BY HEC DATE 4-5-93

D			
C			
B			
A			
△	REVISION DESCRIPTION	APP.	DATE

REGISTERED PROFESSIONAL ENGINEER — No. 17176 — Expires-6/30 — CIVIL — STATE OF CALIFORNIA

DESIGNED M. SEYEDAN	DRAWN T. FRASER	CHECKED D. AWREY
PROJ. ENG.	RECOMMENDED	
REG. NO. DATE	APPROVED	

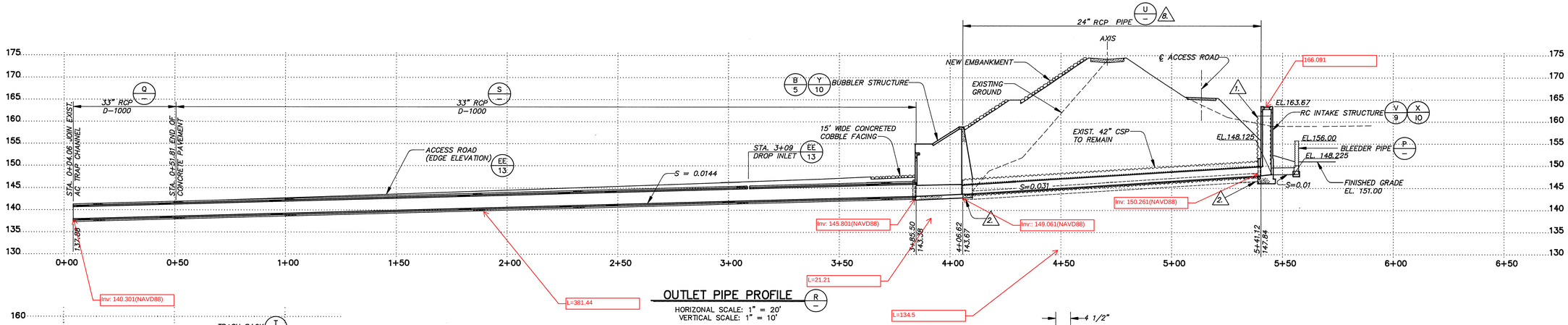
COUNTY OF VENTURA - PUBLIC WORKS AGENCY
VENTURA COUNTY FLOOD CONTROL DISTRICT

SPEC. NO.
PROJ. NO. 88060

LAS POSAS ESTATES DETENTION BASIN
ENERGENCY SPILLWAY DETAILS

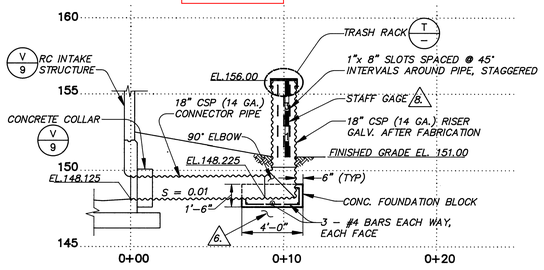
SHEET 5 OF 17
DRAWING NO. Y-3-3105

PDF Page 37 of 622



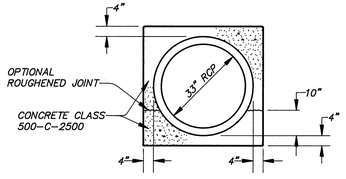
OUTLET PIPE PROFILE

HORIZONAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 10'

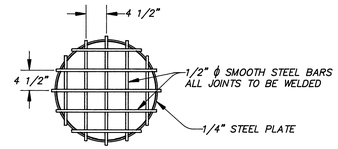


BLEEDER PIPE PROFILE

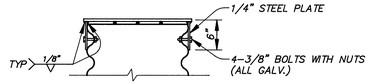
SCALE OF FEET



DETAIL A



TOP VIEW



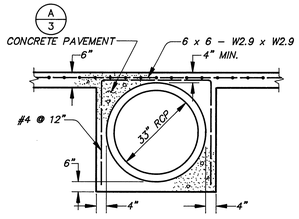
SECTION

TRASH RACK DETAIL

NOT TO SCALE

NOTES:

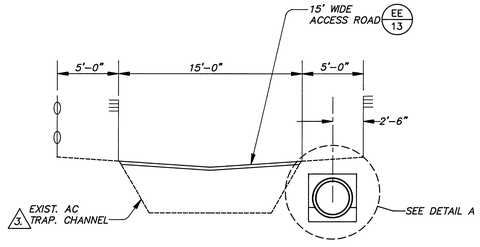
1. REMOVE EXISTING 54" CS PIPE RISER AND CONCRETE THRUST BLOCK.
2. REMOVE INTERFERING PORTION OF EXISTING CONCRETE CRADLE AS REQUIRED.
3. EXISTING AC TRAP. CHANNEL SHALL BE REMOVED PRIOR TO INSTALLATION OF 33" RCP OUTLET PIPE.
4. THE SPACE BETWEEN THE NEW 24" RCP PIPE AND THE EXISTING 42" CSP SHALL BE FILLED WITH CONCRETE SLURRY CLASS 100-E-100. PROVIDE REQUIRED RESTRAINING TO PREVENT FLOATATION.
5. GALVANIZE ALL FERROUS PARTS AFTER FABRICATION.
6. EXCAVATE AREA UNDER THE BLEEDER PIPE FOUNDATION BLOCK TO ELEV. 145.00 AND ONE FOOT BEYOND THE OUTSIDE LIMITS AND REPLACE WITH APPROVED MATERIAL COMPACTED TO 95% OF MAXIMUM DENSITY.
7. STAFF GAGE SHALL BE 3" x 1/8" GALVANIZED STEEL PLATE 5'-6" LONG AND ATTACHED TO THE RISER BY 3/8" Ø x 1" HEX-HD SS TAPPING SCREWS. IT SHALL BE NUMERED STARTING WITH "0" AT ELEVATION 151 AND PAINTED BLACK AND WHITE AT ALTERNATING FOOT. NUMBERS SHALL BE U.S. STANDARD CAPITAL AND LOWER CASE "C" LETTERS WITH HEIGHT OF 3" AND STROKE WIDTH 0.16" PER INCH OF LETTER HEIGHT.
8. ~~24" HIGH~~ DENSITY POLYETHYLENE (HDPE) PIPE WITH CORRUGATED ~~EXTERIOR~~ AND SMOOTH ~~INTERIOR~~ SHALL BE ADVANCED DRAINAGE SYSTEM N-12 PIPE OR APPROVED EQUAL. ~~PIPE AND FITTINGS SHALL BE MANUFACTURED FROM HIGH DENSITY POLYETHYLENE RESIN WHICH SHALL MEET OR EXCEED THE REQUIREMENTS OF TYPE III, CATEGORY 4, GRADE P33, CLASS C PER ASTM D 1248.~~



OUTLET PIPE INSTALLATION DETAIL

STA. 0+13.00 T STA. 0+51.81

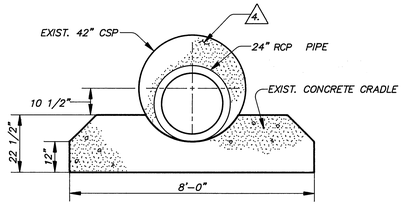
NOT TO SCALE



OUTLET PIPE INSTALLATION & TYPICAL SECTION

STA. 0+50.81 TO STA. 3+85.50

NOT TO SCALE



OUTLET PIPE INSTALLATION DETAIL

STA. 4+06.62 TO STA. 5+41.12

NOT TO SCALE

RECORD DRAWING
DATE PROJECT COMPLETED 10-20-92
REVISIONS SUBMITTED BY RG
DRAWING REVISED BY TR
APPROVED BY MEC DATE 4-5-93

REVISION	DESCRIPTION	APP.	DATE
D			
C			
B			
A			
△			

REGISTERED PROFESSIONAL ENGINEER — CHRISTOPHER K. SHEA — No. 43135 — Exp. 6/30/94 — CIVIL — STATE OF CALIFORNIA

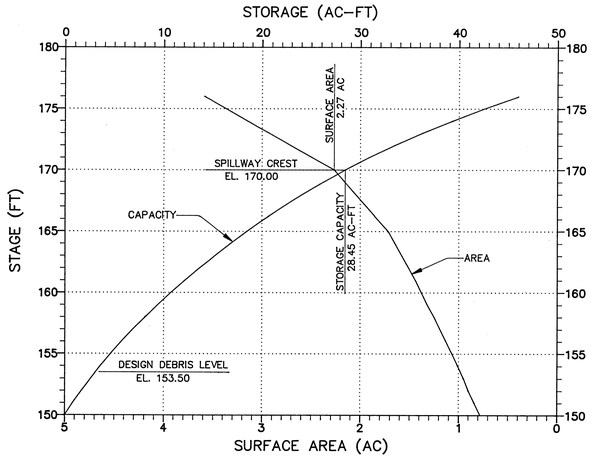
DESIGNED M. SEYEDAN | DRAWN T. FRASER | CHECKED D. AWREY
PROJ. ENG. | RECOMMENDED
REG. NO. | DATE | APPROVED

COUNTY OF VENTURA - PUBLIC WORKS AGENCY
VENTURA COUNTY FLOOD CONTROL DISTRICT

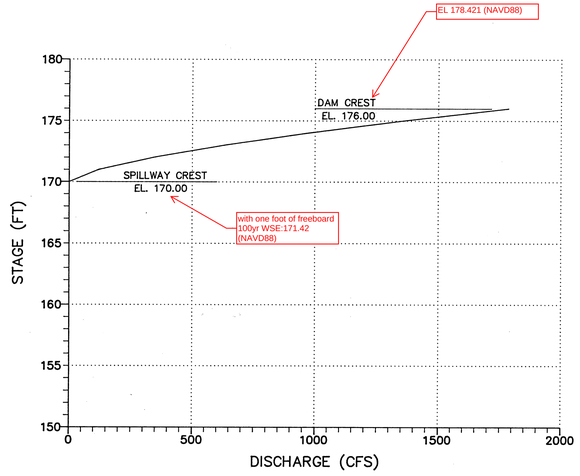
SPEC. NO.
PROJ. NO. 88060

LAS POSAS ESTATES DETENTION BASIN
OUTLET AND BLEEDER PIPE PROFILES AND DETAILS

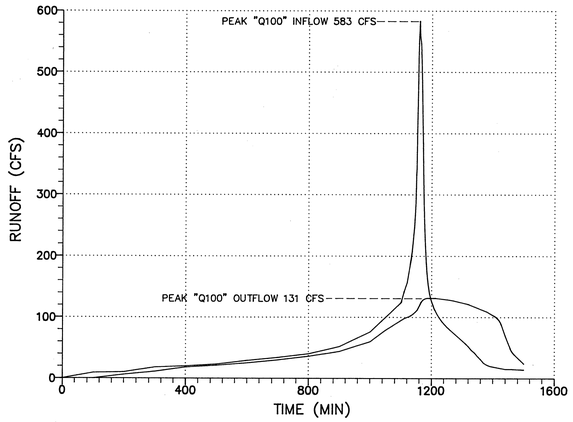
SHEET 8 OF 17
DRAWING NO. Y-3-3108



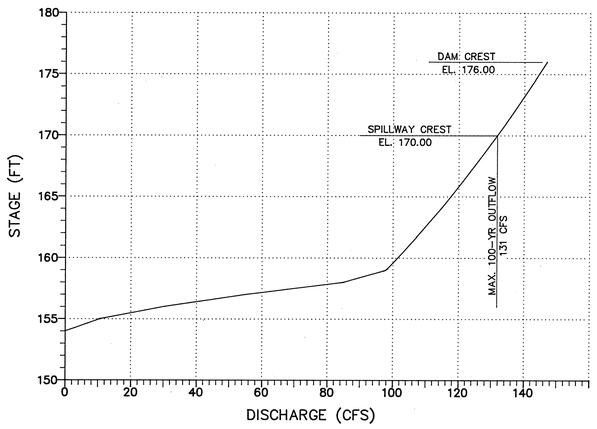
AREA–CAPACITY CURVE



STAGE–DISCHARGE CURVE
EMERGENCY SPILLWAY



DESIGN STORM HYDROGRAPH



STAGE–DISCHARGE CURVE
OUTLET PIPE

DRAINAGE AREA MAP

1000 500 0 1000 2000
SCALE OF FEET

N

RECORD DRAWING
DATE PROJECT COMPLETED 10-20-92
REVISIONS SUBMITTED BY KG
DRAWING REVISED BY TL
APPROVED BY HEC DATE 4-5-93

REVISION	DESCRIPTION	APP.	DATE
D			
C			
B			
A			
△			

DESIGNED M. SEYEDAN | DRAWN T. FRASER | CHECKED D. AWREY
PROJ. ENG. | RECOMMENDED
REG. NO. | DATE | APPROVED

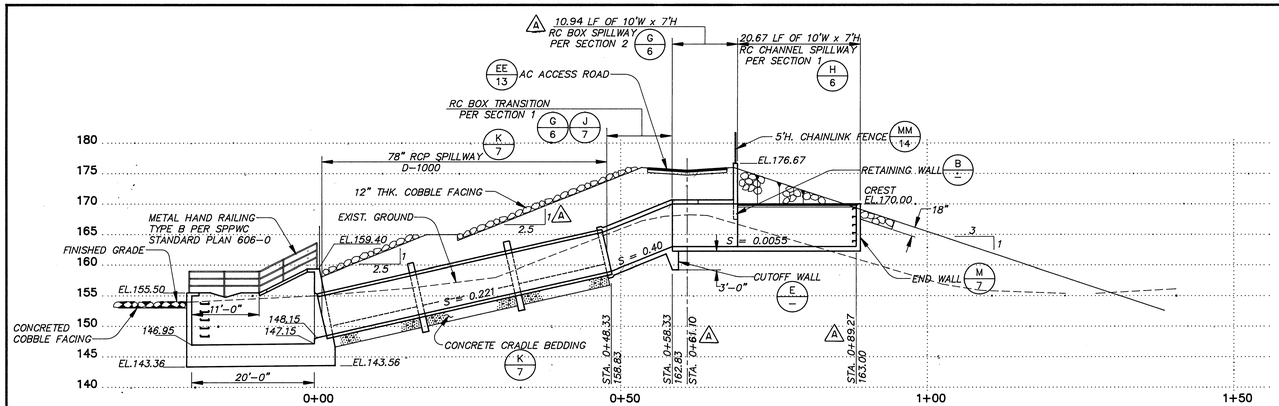
COUNTY OF VENTURA - PUBLIC WORKS AGENCY
VENTURA COUNTY FLOOD CONTROL DISTRICT

SPEC. NO.
PROJ. NO. 88070

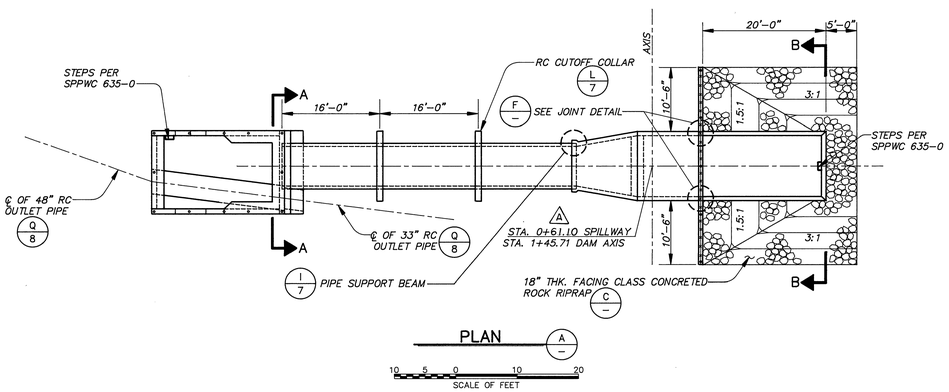
RAMONA DETENTION BASIN
HYDROLOGIC AND HYDRAULIC DATA

SHEET 2 OF 17
DRAWING NO. Y-3-3119

PDF Page 39 of 622

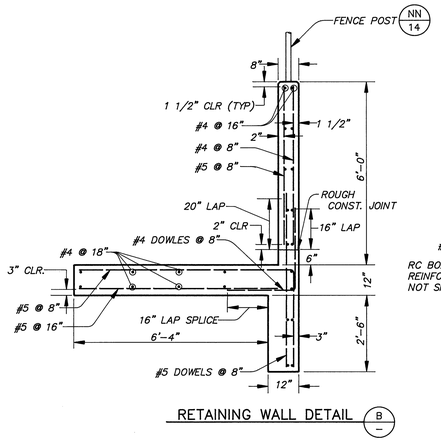


PROFILE

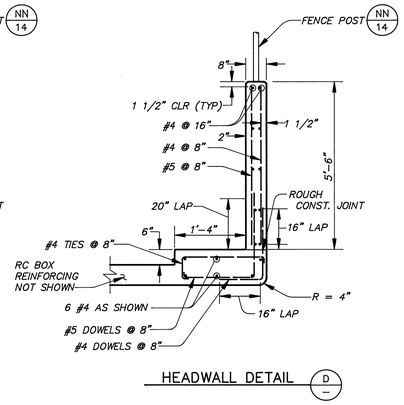


PLAN

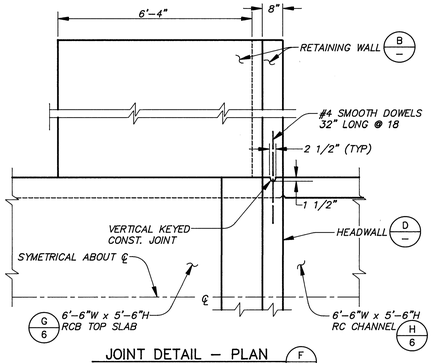
SCALE OF FEET



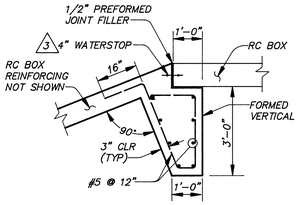
RETAINING WALL DETAIL B



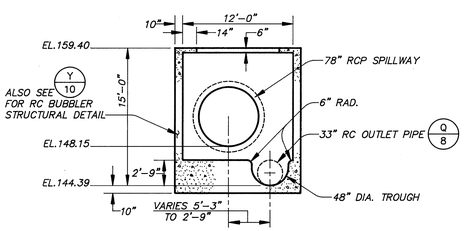
HEADWALL DETAIL D



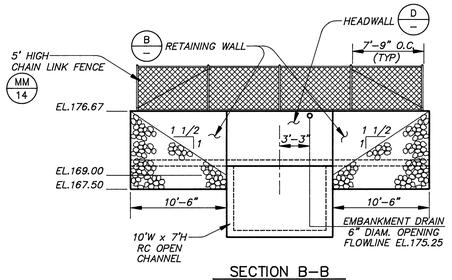
JOINT DETAIL – PLAN F



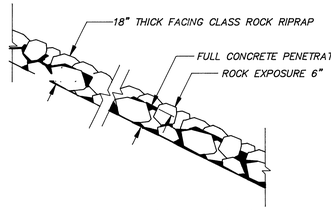
CUTOFF WALL DETAIL E



SECTION A–A



SECTION B–B



CONCRETED ROCK RIPRAP DETAIL C

NOT TO SCALE

NOTES:

1. STRUCTURAL NOTES ON SHEET 6 APPLY TO ALL DETAILS HEREON.
2. EMBANKMENT FILL SHALL BE COMPLETED TO AT LEAST 12" ABOVE THE SPILLWAY FLOWLINE, THEN IT SHALL BE REEXCAVATED FOR THE CONSTRUCTION OF SPILLWAY.
3. 4" POLYVINYL CHLORIDE WATERSTOP (SPLIT RIBBED CENTER BULB TYPE) SHALL BE CONTECH VINYLSTOP NO. 413S, BURKE VINYLOK WATERSTOP R.S.B. 316-4, OR AN APPROVED EQUAL AND SHALL BE INSTALLED FOR THE FULL PERIMETER OF THE BOX.

RECORD DRAWING
DATE PROJECT COMPLETED 10-20-92
REVISIONS SUBMITTED BY KG
DRAWING REVISED BY TL
APPROVED BY HEC DATE 4-5-93

NO.	REVISION	DESCRIPTION	APP.	DATE
D				
C				
B				
A	REVISE RC BOX LENGTH, STATIONING, AND D/S BANK SLOPE		RC	3/26/97
△				

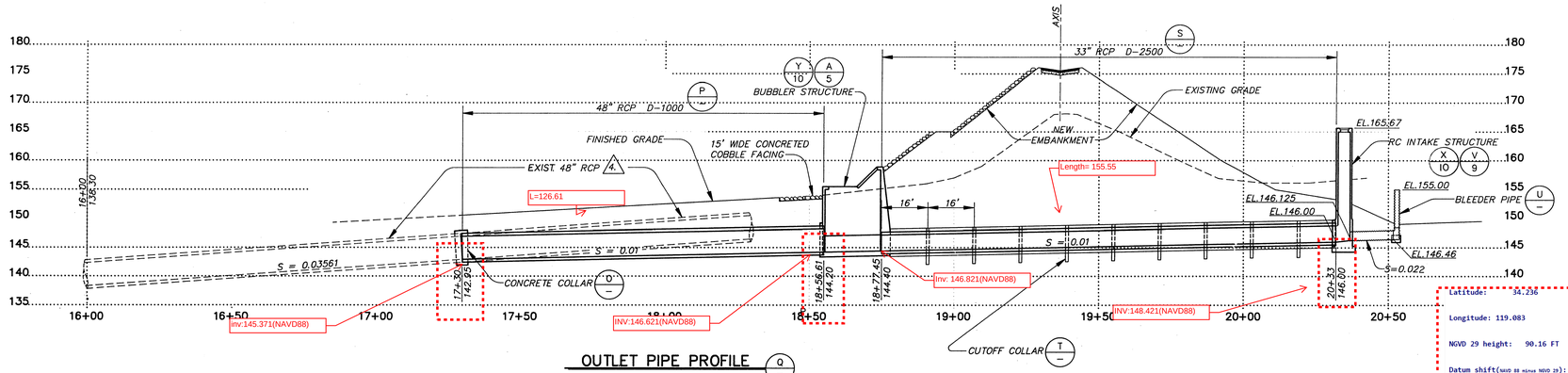
DESIGNED M. SEYEDAN | DRAWN T. FRASER | CHECKED D. AWREY
PROJ. ENG. | RECOMMENDED
REG. NO. | DATE | APPROVED

COUNTY OF VENTURA - PUBLIC WORKS AGENCY
VENTURA COUNTY FLOOD CONTROL DISTRICT

SPEC. NO.
PROJ. NO. 88070

RAMONA DETENTION BASIN
EMERGENCY SPILLWAY DETAILS

SHEET 5 OF 17
DRAWING NO. Y-3-3122



OUTLET PIPE PROFILE (Q)

HORIZONAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 10'

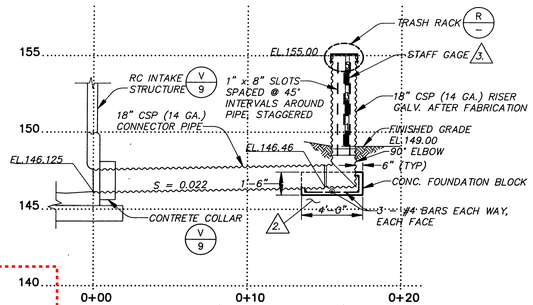
Latitude: 34.236

Longitude: 119.083

NGVD 29 height: 90.16 FT

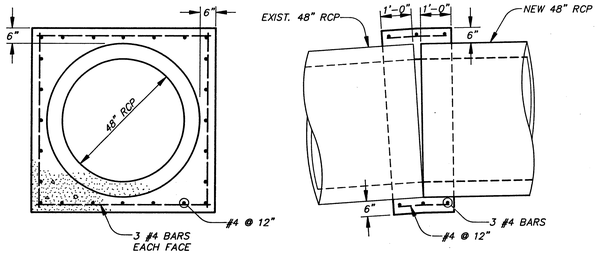
Datum shift(NAVD 88 minus NGVD 29): 2.421 feet

Converted to NAVD 88 height: 92.581 feet



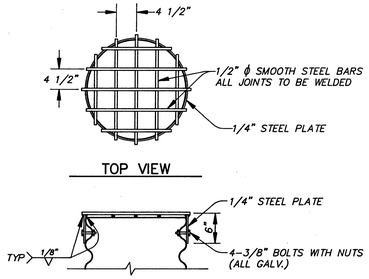
BLEEDER PIPE PROFILE (U)

SCALE OF FEET



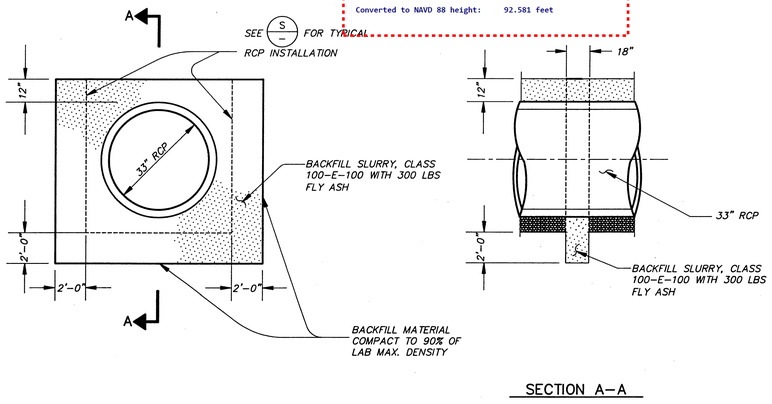
CONCRETE COLLAR (O)

SCALE OF FEET



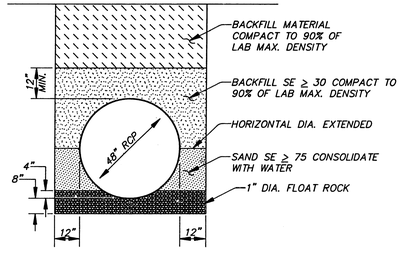
TRASH RACK DETAIL (R)

NOT TO SCALE



RCP OUTLET CUTOFF COLLAR DETAIL (T)

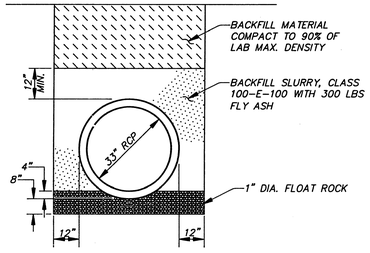
NOT TO SCALE



TYPICAL RC PIPE INSTALLATION (P)

STA 17+30 TO STA 18+56.61

NOT TO SCALE



TYPICAL RC PIPE INSTALLATION (S)

STA 18+77.45 TO STA 20+33

NOT TO SCALE

NOTES:

1. GALVANIZE ALL FERROUS PARTS AFTER FABRICATION.
2. EXCAVATE AREA UNDER THE BLEEDER PIPE FOUNDATION BLOCK TO ELEV. 143.00 AND ONE FOOT BEYOND THE OUTSIDE LIMITS AND REPLACE WITH APPROVED MATERIAL COMPACTED TO 95% OF MAXIMUM DENSITY.
3. STAFF GAGE SHALL BE 3" X 1/8" GALVANIZED STEEL PLATE 6'-6" LONG AND ATTACHED TO THE RISER BY 3/8" Ø x 1" HEX-HD SS TAPPING SCREWS. IT SHALL BE NUMERED STARTING WITH "0" AT ELEVATION 149 AND PAINTED BLACK AND WHITE AT ALTERNATING FOOT. NUMBERS SHALL BE U.S. STANDARD CAPITAL AND LOWER CASE "C" LETTERS WITH HEIGHT OF 3" AND STROKE WIDTH 0.16" PER INCH OF LETTER HEIGHT.
4. REMOVE INTERFERING PORTION OF EXISTING 48" RCP. BACKFILL TO FINISH GRADE BEFORE EXCAVATING FOR NEW PIPE LOCATION. REMOVED RCP MAY BE REUSED SUBJECT TO APPROVAL BY THE ENGINEER.

RECORD DRAWING

DATE PROJECT COMPLETED 10-20-92
REVISIONS SUBMITTED BY KG
DRAWING REVISED BY TL
APPROVED BY HEC DATE 4-5-93

REVISION	DESCRIPTION	APP.	DATE
D			
C			
B			
A			
△			

3/15/93

REGISTERED PROFESSIONAL ENGINEER No. 17176 Exp. 6/30/93 CIVIL STATE OF CALIFORNIA

DESIGNED M. SEYEDAN DRAWN T. FRASER CHECKED D. AWREY
PROJ. ENG. RECOMMENDED
REG. NO. DATE APPROVED

COUNTY OF VENTURA - PUBLIC WORKS AGENCY
VENTURA COUNTY FLOOD CONTROL DISTRICT

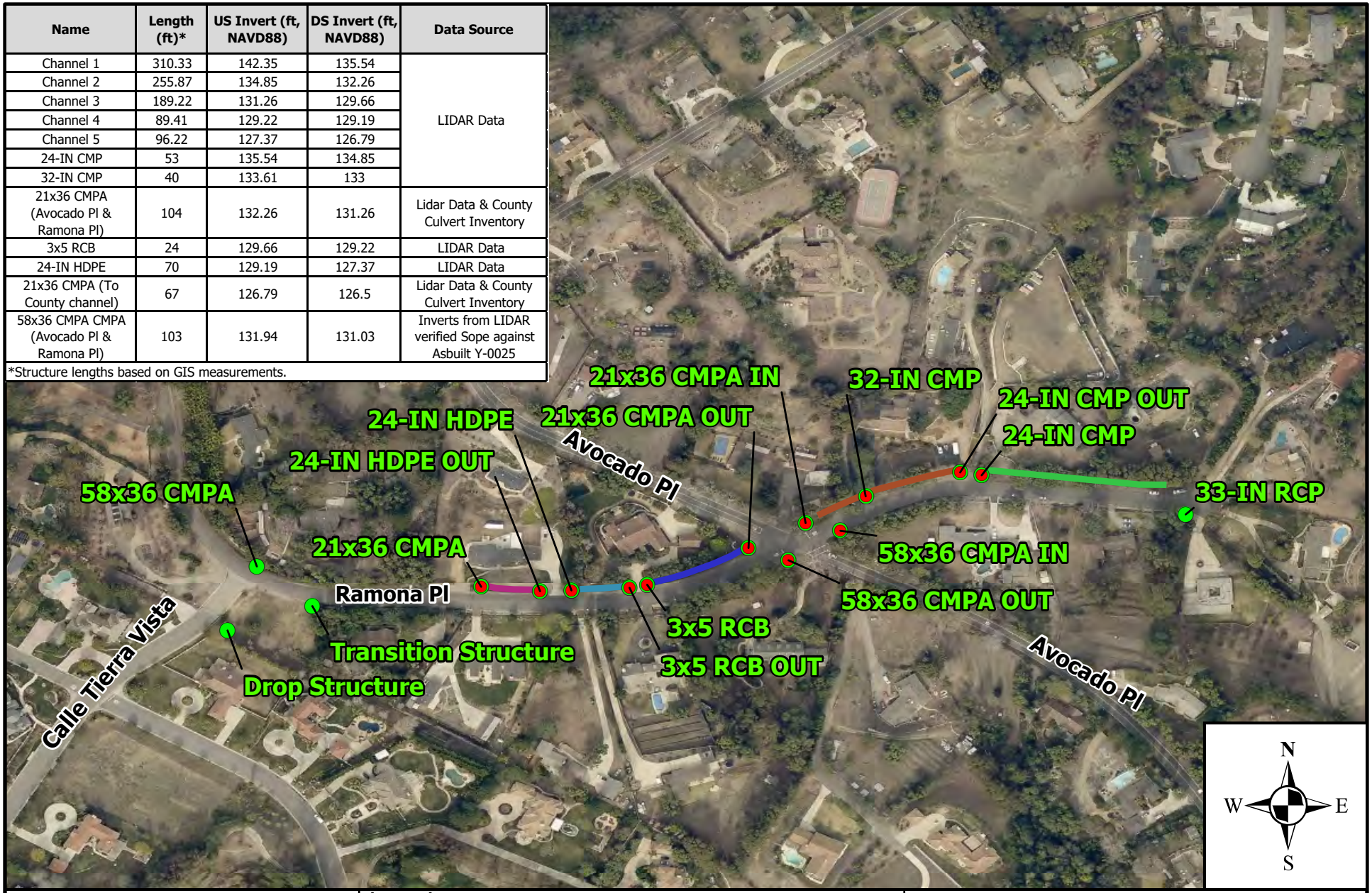
SPEC. NO.
PROJ. NO. 88070

RAMONA DETENTION BASIN
OUTLET AND BLEEDER PIPE PROFILES AND DETAILS

SHEET 8 OF 17
DRAWING NO. Y-3-3125

Name	Length (ft)*	US Invert (ft, NAVD88)	DS Invert (ft, NAVD88)	Data Source
Channel 1	310.33	142.35	135.54	LIDAR Data
Channel 2	255.87	134.85	132.26	
Channel 3	189.22	131.26	129.66	
Channel 4	89.41	129.22	129.19	
Channel 5	96.22	127.37	126.79	
24-IN CMP	53	135.54	134.85	
32-IN CMP	40	133.61	133	
21x36 CMPA (Avocado Pl & Ramona Pl)	104	132.26	131.26	Lidar Data & County Culvert Inventory
3x5 RCB	24	129.66	129.22	LIDAR Data
24-IN HDPE	70	129.19	127.37	LIDAR Data
21x36 CMPA (To County channel)	67	126.79	126.5	Lidar Data & County Culvert Inventory
58x36 CMPA CMPA (Avocado Pl & Ramona Pl)	103	131.94	131.03	Inverts from LIDAR verified Sope against Asbuilt Y-0025

*Structure lengths based on GIS measurements.



KASRAIE CONSULTING

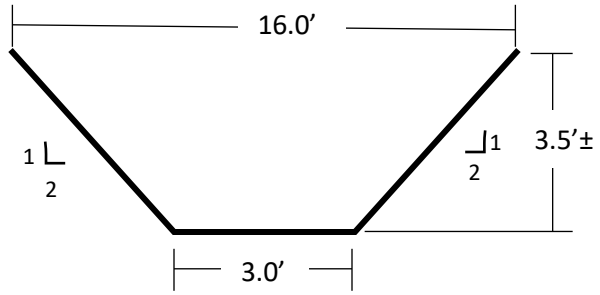
Legend

- Field Point Locations
- Channel 1
- Channel 2
- Channel 3
- Channel 4
- Channel 5
- Modeleld as Culverts in HEC-RAS

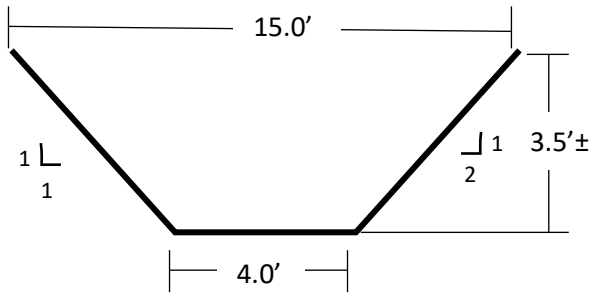
Field Locations And Channel Key

Field Measurements 2/20/2021

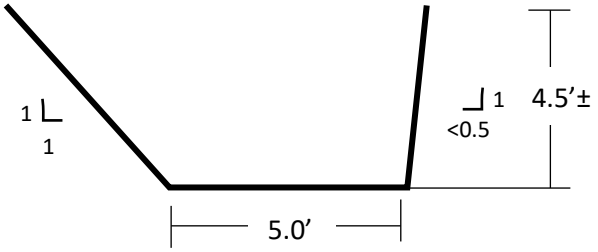
CHANNEL 1



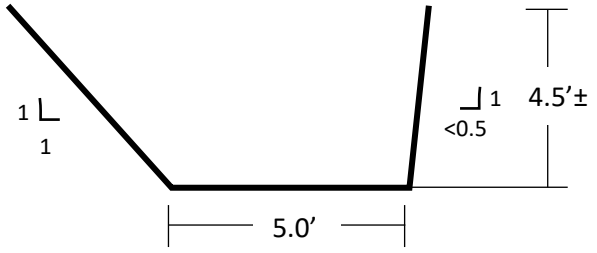
CHANNEL 2



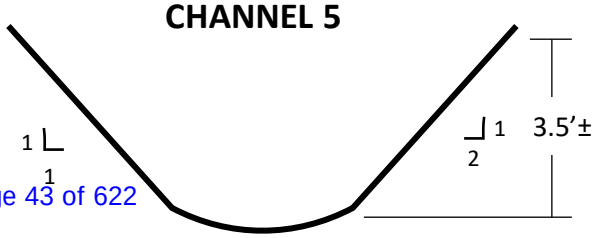
CHANNEL 3



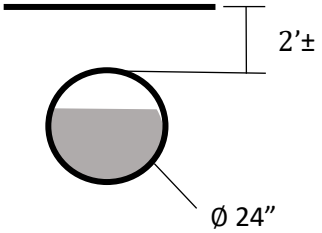
CHANNEL 4



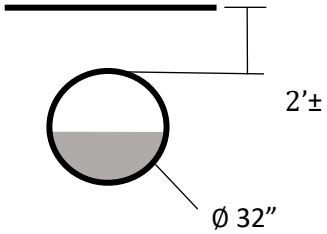
CHANNEL 5



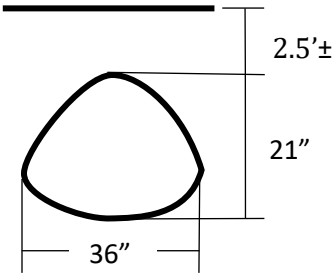
24-IN CMP



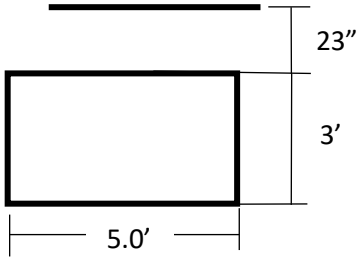
32-IN CMP



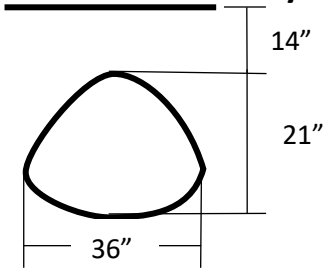
21x36-IN CMPA – AVOCADO & RAMONA



3’x5’ RCB



21x36-IN CMPA – To County Channel



COUNTY OF VENTURA – CULVERT INVENTORY

ROAD NAME: AVOCADO PLACE AREA: LPE ROAD NO. 55022 CUL. 1 OF 5

LOG MILE: 0.25 LOG MILE 0.00 = 1368' N/O CRESTVIEW AVE. DIR. OF TRAVEL: N

ROADWAY: NO. LANES: 2 TYPE: AC WIDTH: 27.0'
SHOULDER TYPE: AC APRON WIDTH: 1.0'

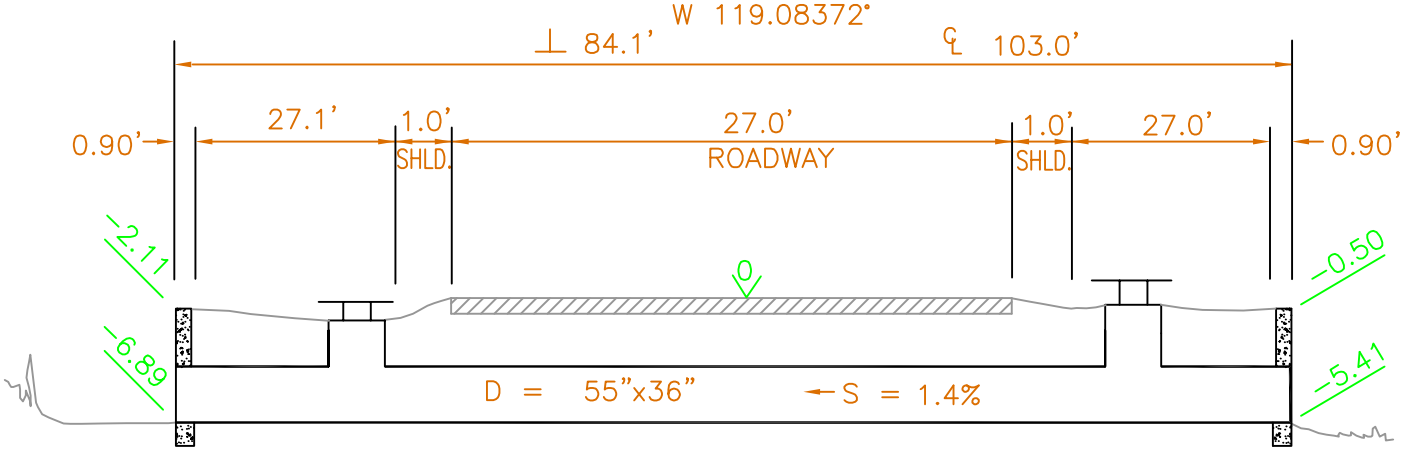
APPROACHES: NO. LANES: 2 TYPE: AC WIDTH: 26.0'
SHOULDER TYPE: BERM WIDTH: 1.0'

GUARDRAIL – LEFT: NONE RIGHT: NONE REFLECTORS – LEFT: PADDLE RIGHT: PADDLE

HORIZONTAL ALIGNMENT: STRAIGHT VERTICAL ALIGNMENT: FLAT

COMPILED BY: TS–DV DATE: 12–21–88 CHECKED BY: JR–JS DATE: 07–16–08

N 34.23683°
W 119.08372°



TYPICAL CROSS SECTION
N.T.S

CULVERT DATA

TYPE: CMPA SIZE: 55"x36" SKEW ∠: 35 ° REF. DWG. NO. 33326

GALVINIZED: (Y)/N BITUMINOUS COATED: Y/(N) CAPACITIES – EXIST: ____ CFS, Q50: ____ CFS

HEADWALLS – INLET: RC OUTLET: RC
WINGWALLS – INLET: RC OUTLET: RC

REMARKS: DROP INLETS W/ APRON ON BOTH SIDES S/O INTERSECTION OF RAMONA PL.
DI LEFT: CUT = 5.33', RIM = –1.47'. DI RIGHT: CUT = 5.00', RIM = 1.12'.

WARNING: Do not use this information for Design purposes. Information on this page may not be completely accurate. Further research is necessary to verify the accuracy of the data.

Avocado Place
ROAD NAME
LPE
AREA
0.25
LOG MILE
1368’ N/O Crestview Ave.
LOG MILE 0.00 AT
July 16, 2008
DATE

INLET

REMARKS

OUTLET

OVERVIEW

COUNTY OF VENTURA – CULVERT INVENTORY

ROAD NAME: AVOCADO PLACE AREA: LPE ROAD NO. 55022 CUL. 2 OF 5

LOG MILE: 0.26 LOG MILE 0.00 = 1368' N/O CRESTVIEW AVE. DIR. OF TRAVEL: N

ROADWAY: NO. LANES: 2 TYPE: AC WIDTH: 27.0'

SHOULDER TYPE: NONE WIDTH:

APPROACHES: NO. LANES: 2 TYPE: AC WIDTH: 26.0'

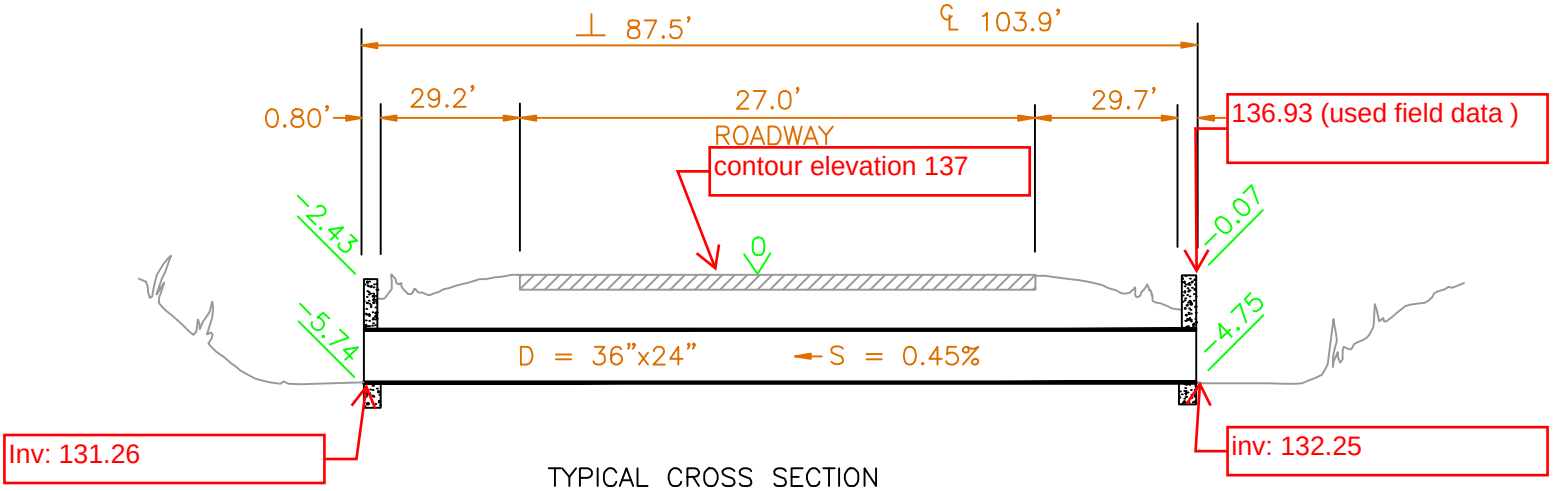
SHOULDER TYPE: NONE WIDTH:

GUARDRAIL – LEFT: NONE RIGHT: NONE REFLECTORS – LEFT: PADDLE RIGHT: NONE

HORIZONTAL ALIGNMENT: STRAIGHT VERTICAL ALIGNMENT: –GRADE

COMPILED BY: TS–BJ DATE: 7–16–08 CHECKED BY: DATE: 7–21–08

N 34.23700°
W 119.08408°



TYPICAL CROSS SECTION
N.T.S

CULVERT DATA

TYPE: CMPA SIZE: 36"x24" SKEW ∠: +32.6° REF. DWG. NO. 33326

GALVINIZED: (Y)/N BITUMINOUS COATED: Y/(N) CAPACITIES – EXIST: ____ CFS, Q50: ____ CFS

HEADWALLS – INLET: RC OUTLET: RC

WINGWALLS – INLET: NONE OUTLET: NONE

REMARKS: INLET SILTED 20%

WARNING: Do not use this information for Design purposes. Information on this page may not be completely accurate. Further research is necessary to verify the accuracy of the data.

Avocado Place
ROAD NAME
LPE
AREA
0.26
LOG MILE
1368’ N/O Crestview Ave.
LOG MILE 0.00 AT
July 16, 2008
DATE

INLET

REMARKS

OUTLET

OVERVIEW

COUNTY OF VENTURA – CULVERT INVENTORY

ROAD NAME: RAMONA PLACE AREA: LPE ROAD NO. 55431 CUL. 1 OF 2

LOG MILE: 0.25 LOG MILE 0.00 = CDS EAST END DIR. OF TRAVEL: N

ROADWAY: NO. LANES: 2 TYPE: AC WIDTH: 32.5'

SHOULDER TYPE: BASE RT., NONE LT. WIDTH: AS SHOWN

APPROACHES: NO. LANES: TYPE: WIDTH:

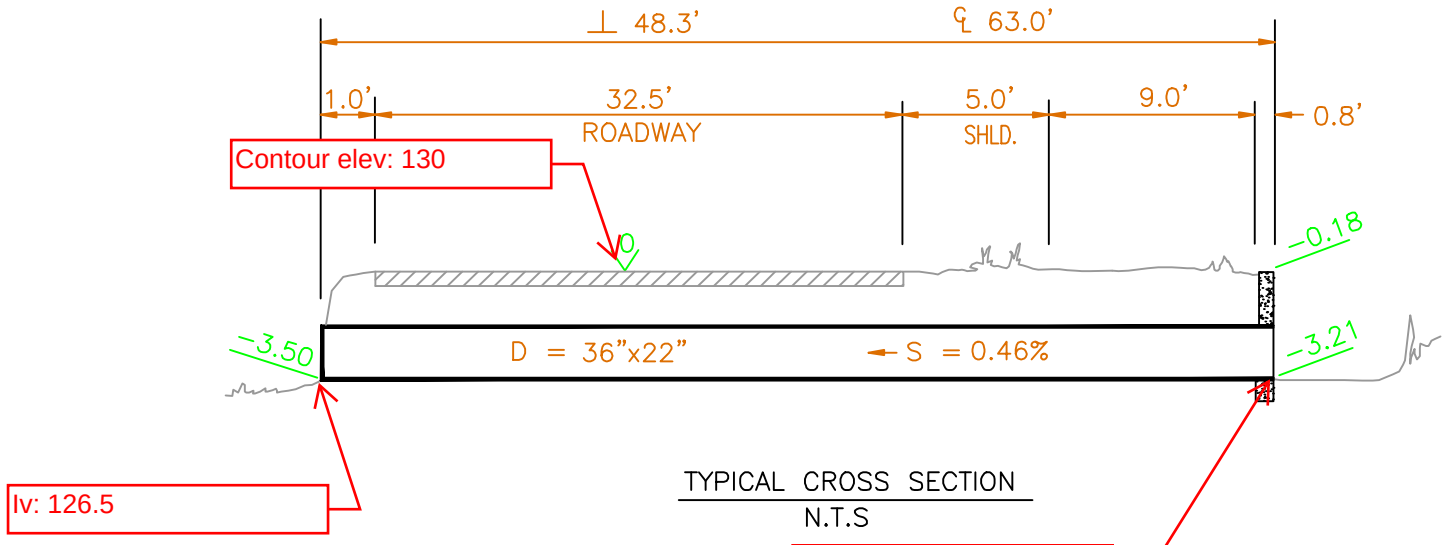
SHOULDER TYPE: WIDTH:

GUARDRAIL – LEFT: NONE RIGHT: NONE REFLECTORS – LEFT: NONE RIGHT: NONE

HORIZONTAL ALIGNMENT: STRAIGHT VERTICAL ALIGNMENT: FLAT

COMPILED BY: BJ/DV DATE: 1-3-89 CHECKED BY: JR DATE: 7-21-08

N 34.23669°
W 119.08589°



TYPICAL CROSS SECTION
N.T.S

CULVERT DATA

TYPE: CMPA SIZE: 36"x22" SKEW ∠: +40.0 ° REF. DWG. NO.

GALVINIZED: (Y)/N BITUMINOUS COATED: Y/(N) CAPACITIES – EXIST: ____ CFS, Q50: ____ CFS

HEADWALL – INLET: RC HEADWALL – OUTLET: NONE

WINGWALL – INLET: NONE WINGWALL – OUTLET: NONE

REMARKS: AC CHANNEL AT OUTLET.

WARNING: Do not use this information for Design purposes. Information on this page may not be completely accurate. Further research is necessary to verify the accuracy of the data.

Ramona Place
ROAD NAME
LPE
AREA
0.25
LOG MILE
CDS East End
LOG MILE 0.00 AT
July 21, 2008
DATE

INLET

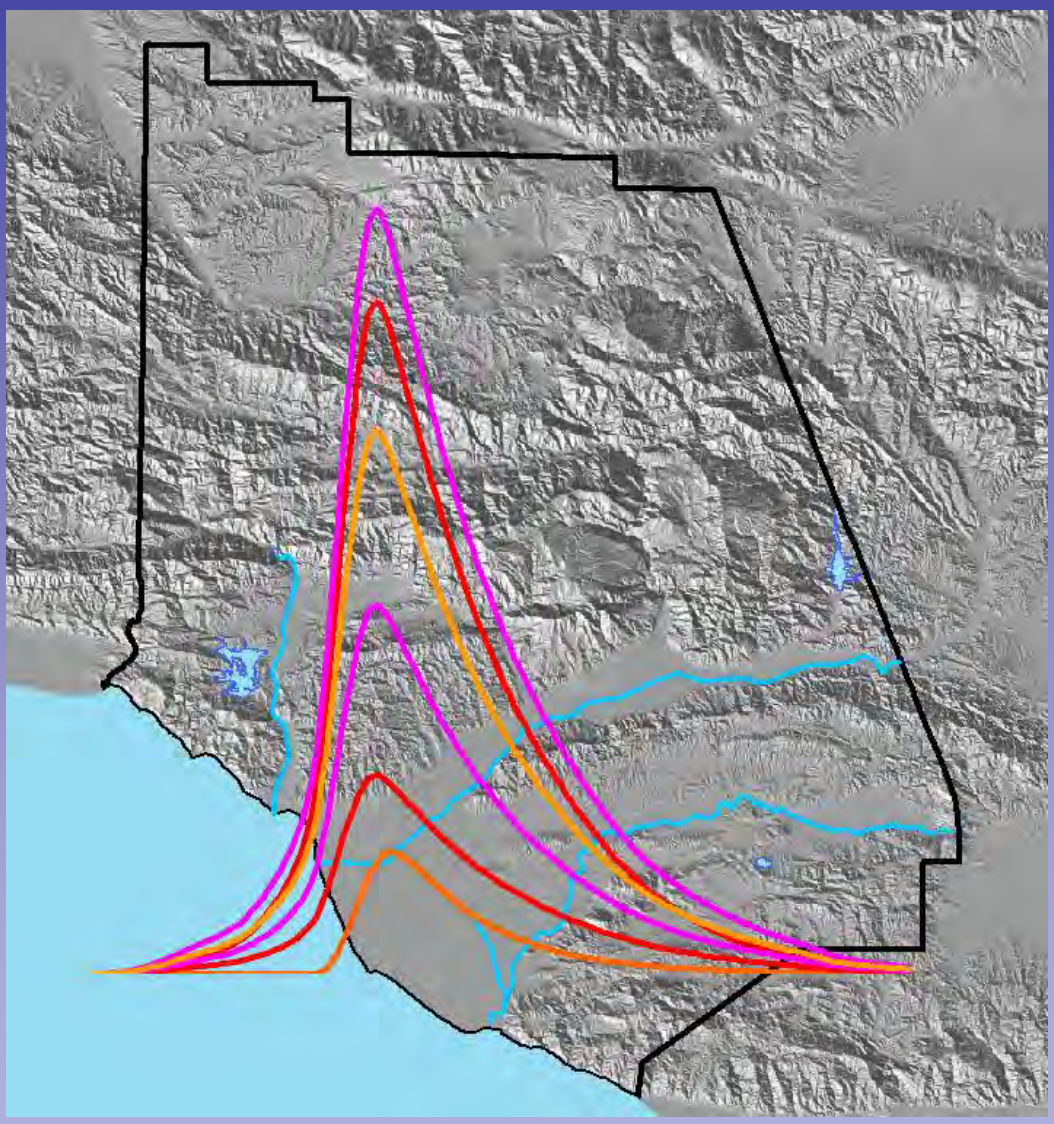
REMARKS

OUTLET

OVERVIEW

Attachment 2: Hydrology Report

REVELON SLOUGH WATERSHED
Las Posas Estates Drain
VCRat Design Hydrology Draft



January 2021

Hydrology Section
Watershed Planning and Permits Division
Ventura County Public Works Agency- Watershed Protection

PUBLIC WORKS
VENTURA COUNTY

Ventura County

Watershed Protection

Hydrology Section

Project xxxxx

District Director:	Glenn Shephard
Deputy Director:	Sergio Vargas
Eng. Manager (Acting):	Ron Marotto
Project Manager:	Yunsheng Su
Author:	Mark Bandurraga
Reviewer(s):	Ron Marotto, Yunsheng Su

EXECUTIVE SUMMARY

This report documents the work done by the Hydrology Section of the Ventura County Watershed Protection District (WP) in providing the design hydrology for Las Posas Estates and Ramona Place Drains in Camarillo. The hydrology will be used by a consultant to prepare a Letter of Map Revision (LOMR) due to the expected reduction in floodplain from the construction of the Las Posas and Ramona Detention Dams in the watershed.

Previously the watershed was home to two debris basins to reduce the sediment load to the Las Posas and Ramona Place Drains and downstream WP facilities. The debris basins did not have capacity to detain the full 100-yr storm hydrographs and according to WP's policies could not be relied upon for peak attenuation in design storms. Beginning in 1992 the debris basins were replaced by detention basins with sufficient volume to attenuate the 100-yr design storm peaks without any flow over the emergency spillways. After that, the basins were included in design storm modeling of the watershed.

The hydrology for this project is based on WP's official VCRat model (VCWPD, 2003). The VCRat model is a FEMA locally-accepted hydrology model for floodplain studies in Ventura County. The results from this model were previously used by FEMA (2018) for their work to update the Floodplain Insurance Study (FIS) for much of the Calleguas Creek Watershed. FEMA's contractor for the hydraulic analyses using the 2003 Model results was Nolte and Associates (2004).

The FIS was prepared as part of the work done for the Calleguas Creek Watershed Management Plan (CCWMP). The report for this project was previously available on CCWMP's website but is not currently available from there. WP makes the report, maps, and model results available on their website. The model has been used extensively for FEMA studies and design projects for development in the watershed.

The 2003 CCWMP model shows peak inflow to the basins totaling almost 1,000 cfs for a tributary area of abut 370 ac. The basins reduced the outflow to a total of about 192 cfs. This reduced the peak in the Las Posas Estates Drain at the City boundary to about 682 cfs.

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1. INTRODUCTION

This report documents the work done by the Hydrology Section of the Ventura County Watershed Protection District (WP) in providing the design hydrology for Las Posas Estates and Ramona Place Drains in Camarillo. The hydrology will be used by a consultant to prepare a Letter of Map Revision (LOMR) due to the expected reduction in floodplain from the construction of the Las Posas and Ramona Detention Dams in the watershed.

Previously the watershed was home to two debris basins to reduce the sediment load to the Las Posas and Ramona Place Drains and downstream WP facilities. The debris basins did not have capacity to detain the full 100-yr storm hydrographs and according to WP's policies could not be relied upon for peak attenuation in design storms. Beginning in 1992 the debris basins were replaced by detention basins with sufficient volume to attenuate the 100-yr design storm peaks without flow occurring over the emergency spillway. After that, the basins were included in design storm modeling of the watershed according to WP's policies.

2. 2003 REVOLON SLOUGH VCRAT MODEL

The hydrology for this project is based on WP's official VCRat model (VCWPD, 2003) of the Calleguas Creek Watershed. Revolon Slough confluences with Calleguas Creek just upstream of its outlet to Mugu Lagoon near the Pacific Ocean. The VCRat model is a FEMA locally-accepted hydrology model for floodplain studies in Ventura County. The letter from FEMA is provided in Appendix A. The results from this model were previously used by FEMA (2018) for their work to update the Floodplain Insurance Study (FIS) for major portions of the Calleguas Creek Watershed. FEMA's contractor for the hydraulic analyses using the 2003 Model results was Nolte and Associates (2004) and is referenced in their 2018 FIS report.

The FIS was prepared as part of the work done for the Calleguas Creek Watershed Management Plan (CCWMP). The report for this project was previously available on CCWMP's website but is not currently available from there. WP makes the report, maps, and model results available on their website and has provided the report in Appendix B. The model has been used extensively for FEMA studies and design projects for development in the watershed.

The portion of the model applicable to the Las Posas Estates Drain watershed as shown in Figure 1 is provided in Appendix C. The model represents the outflow from the Las Posas Estates Basin and downstream subareas as being conveyed in a trapezoidal channel. The model conveys the outflow from the Ramona Basin to the Las Posas Estates Drain confluence in a pipe. Model runoff from the subareas downstream of the dam is conveyed to the confluence in a vegetated channel with varying dimensions.

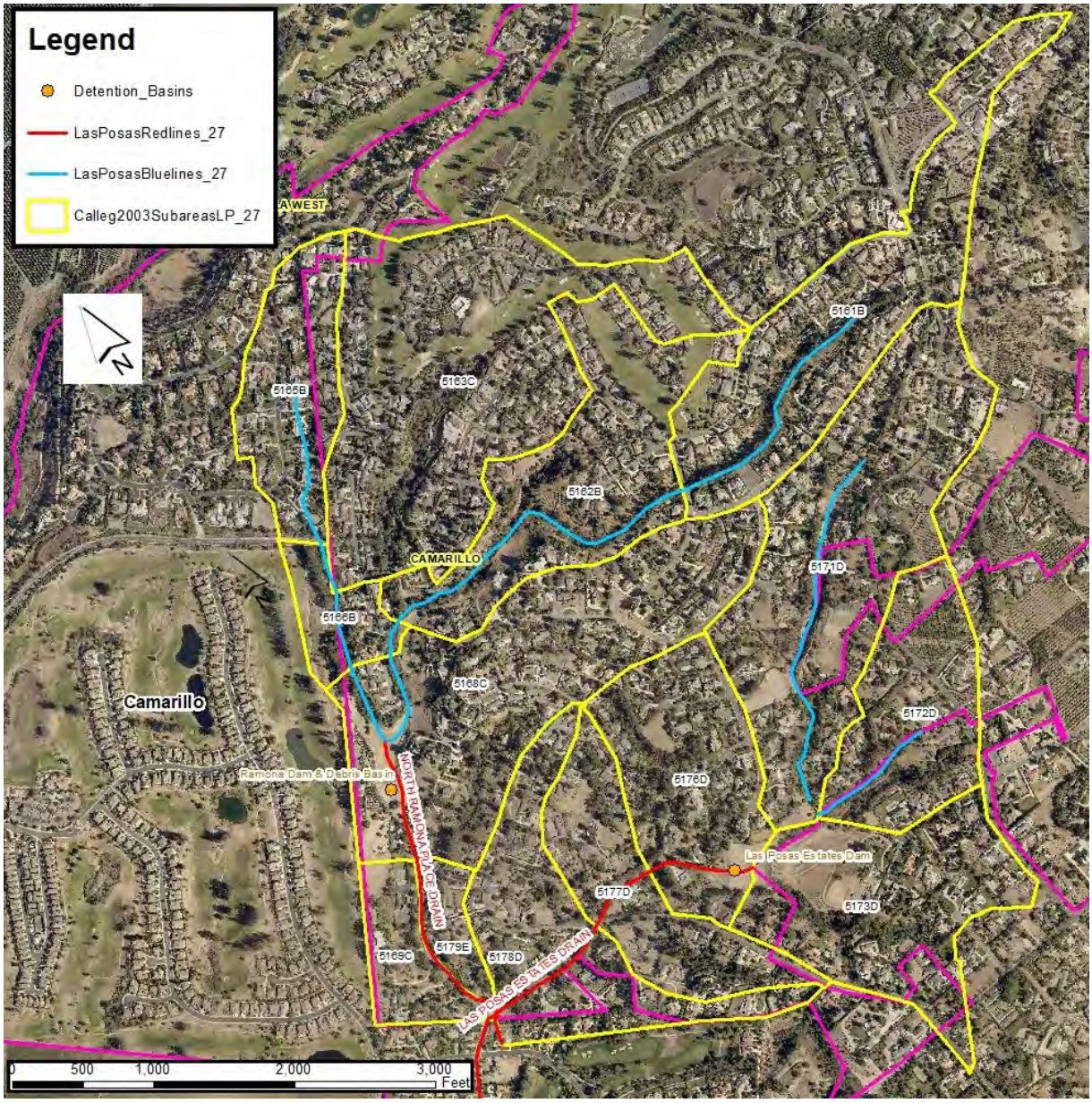


Figure 1 –Las Posas Estates Subareas and Basin Locations

2.1 Model Parameter Evaluation

The 2003 Model used year 2000 land uses in determining the percent impervious values in the subareas. Figure 2 shows that the land uses in the Las Posas Estates Drain have not changed since 2000. The golf courses outside of the watershed were under development at that time, but this would not affect the hydrology within the watershed. Almost all subareas in the model used an effective impervious value of 0.15, corresponding to an actual imperviousness of about 0.30. One subarea upstream of the Ramona Basin used an effective impervious value of 0.10 due the presence of a golf course in the subarea.

The Times of Concentration (Tc) used in the model average about 10 mins, reflecting the relatively short overland flow pathways in the subareas. Only one subarea of 84 ac had a Tc as long as 16 mins.

The soils used in the models that created the design storm hydrographs were all Type 1 (clay) for Ramona Basin and primarily Type 2 (silty clay) for Las Posas Basin.

2.2 Areal Reduction

Model peaks for watersheds bigger than 640 ac are reduced because the storm cells yielding design storm intensities are generally not bigger than 1 sq mi. In this case, the watershed is smaller than 1 sq mi, so no areal reduction factors are applied.

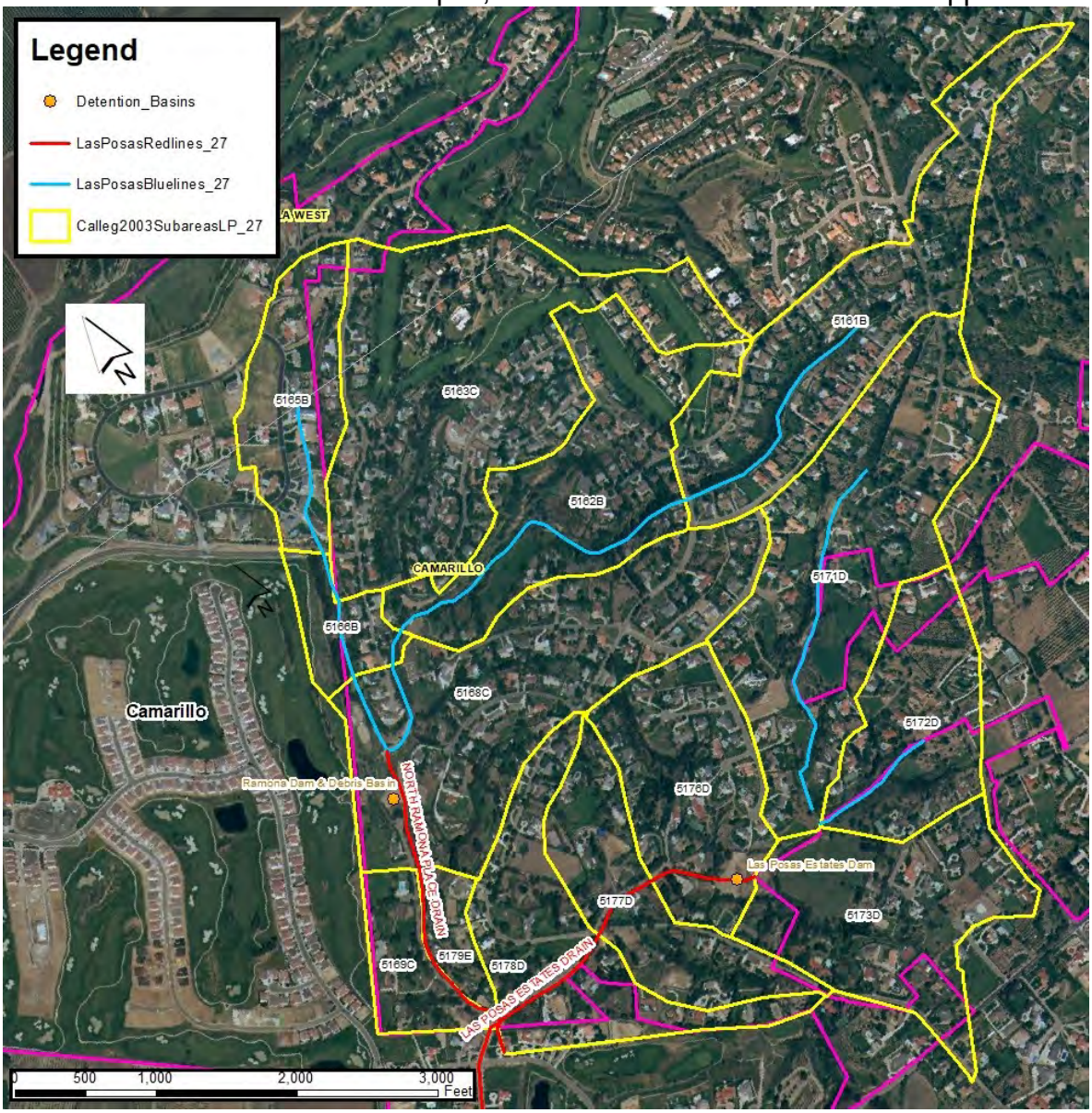


Figure 2 –Las Posas Estates Land Uses, 2000 Aerial

2.3 Las Posas and Ramona Detention Basins

The Las Posas Estates Debris Basin constructed by the Soil Conservation Service to reduce sedimentation in downstream channels was replaced by a detention basin in 1992. The detention basin was designed to detain and attenuate peaks up to the 100-yr level. The 1992 Design Model shows a 100-yr inflow peak to the basin of about 500 cfs, and an outflow peak of 62 cfs.

The Ramona Debris Basin was also reconstructed in 1992 to provide detention for design storms up to the 100-yr level. The 100-yr inflow peak to the basin is about 600 cfs, with an outflow peak of about 130 cfs. The Ramona outflow hydrograph used in the 2003 Model rounded the peak outflow to 130 cfs.

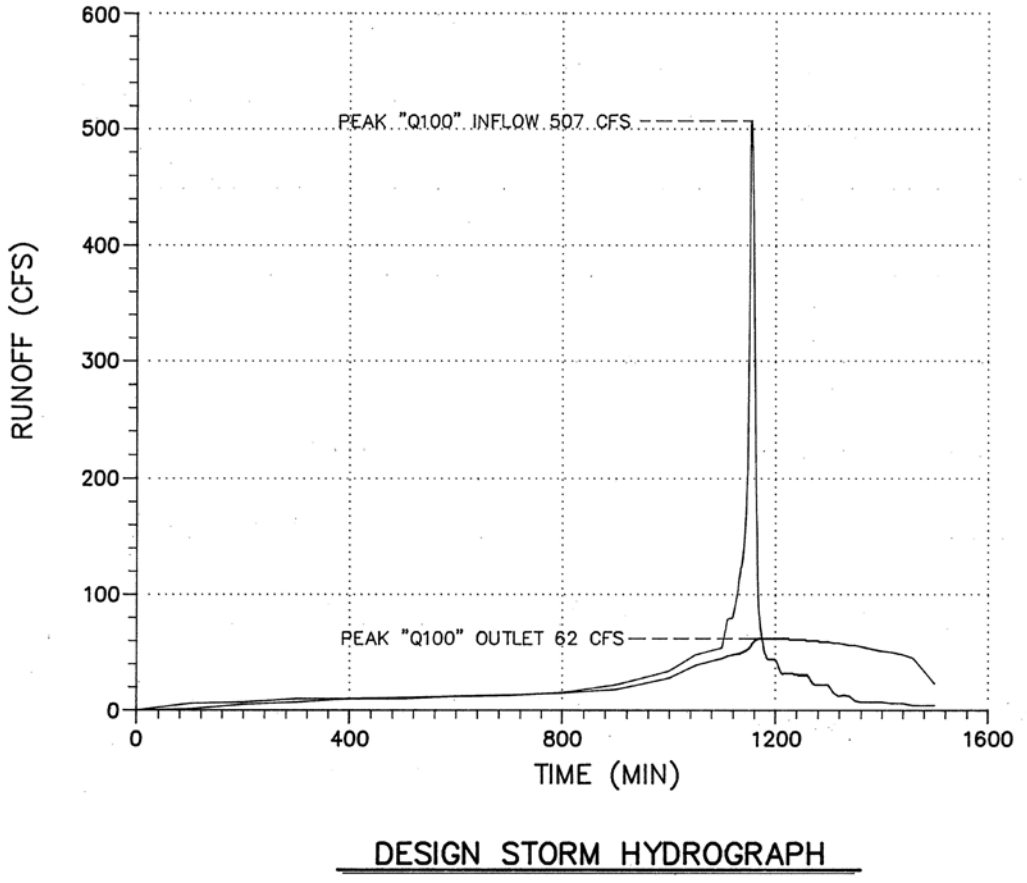


Figure 3. Las Posas Design Storm Hydrograph- As-Builts

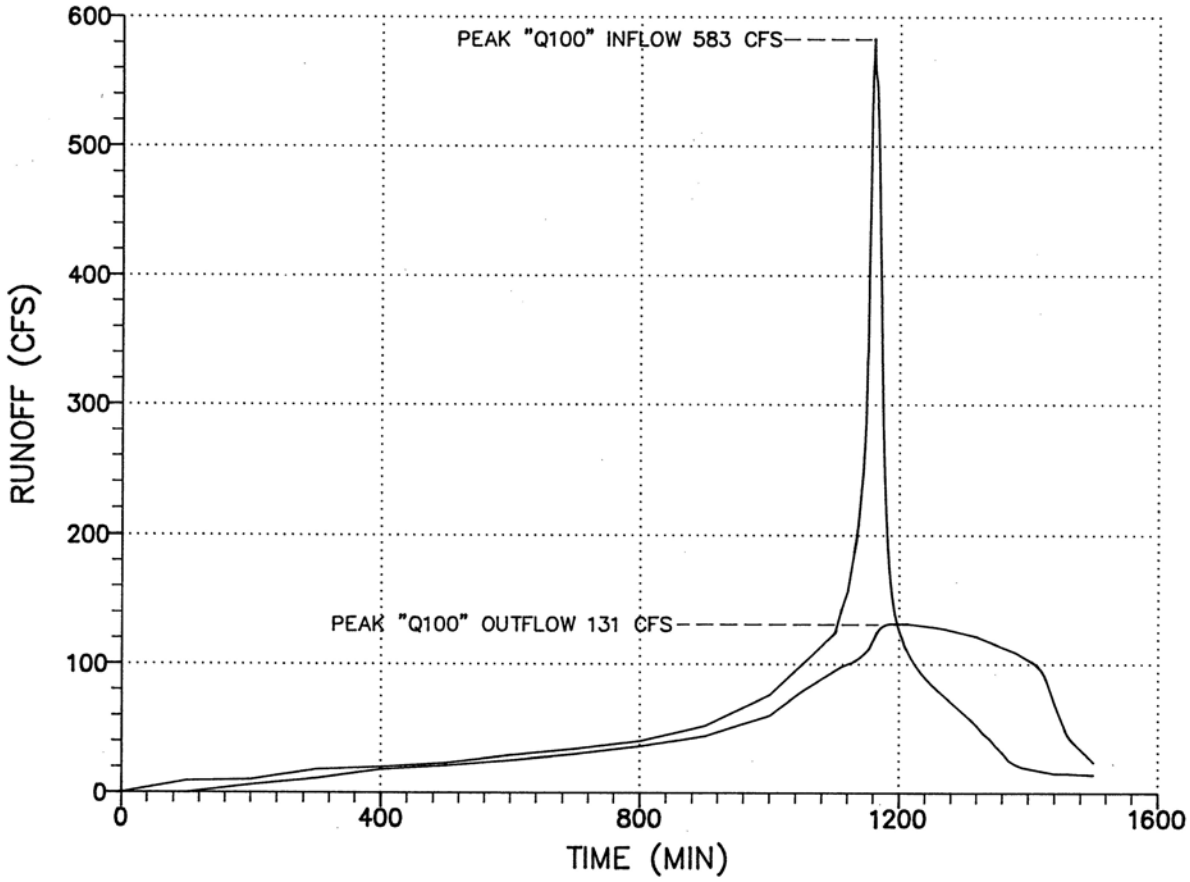


Figure 4. Ramona Design Storm Hydrographs- As-Builts

2.4 Design Storm Ratios

As explained in the VCWPD (2003) report, the 2003 Model consisted of a 100-yr run. Design peaks for other storm levels were provided using design storm ratios based on flow frequency analyses of available stream gage data in the Calleguas Creek Watershed. This is part of the standard methods described in WP's Design Hydrology Manual (2017). In the 2003 report, 500-yr peaks were not provided for the Revolon model. For this analysis, a 500-yr peak design storm ratio was estimated from the US Army Corps of Engineers (COE, 2003) analysis of the Revolon Slough stream gage done in support of the Calleguas Creek FIS. Based on their data, the 500/100 yr ratio was 1.561.

3. MODEL RESULTS

The model results for the Las Posas Estates and Ramona Place Drains are given in Table 1.

Table 1. 2003 Model Results- Las Posas Estates Drain

MODEL ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR WITH AR	500 YR WITH AR
	REVOLON SL. WATERSHED - CALLEGUAS CK. PRESENT CONDITION HYDROLOGY	(ac)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
5167B	RAMONA DBRIS/DETNT. BASIN ROUTED & FATTENED HYDROGRAPH (Qout=130)	254	16	33	48	99	130	203
5168C	DOWNSTREAM OF RAMONA BASIN	52	18	37	54	110	144	225
5169C	UPSTREAM OF LAS POSAS DRAIN CONFLUENCE	69	22	44	65	133	175	273
5174D	LAS POSAS DEBRIS/DETENTION BASIN RTED FAT HYDROGRAPH (Qout=62)	168	8	16	23	47	62	97
5176D	SUBAREA DOWNSTREAM OF LAS POSAS ESTATES DAM	207	23	47	69	142	186	290
5177D	SUBAREA ENDING AT RAMONA AND AVOCADO	239	35	70	103	211	277	432
5178D	LAST SUBAREA BEFORE CONFL. W/ RAMONA PLACE DRAIN	283	48	97	142	290	381	595
5179E	SMALL SUBAREA AT RAMONA AND LAS POSAS ESTATES CONFL.	7	3	6	9	18	23	36
5180DE	LAS POSAS ESTATES DRAIN + 5179E	290	51	102	150	307	403	629
5182BC	LAS POSAS ESTATES DRN. OVERLAND FLOW @ TR.BNDRY W/RTN.BOX	613	86	173	254	519	682	1,065

4. SUMMARY AND CONCLUSIONS

The hydrology summarized in this report will be used by a consultant to prepare a LOMR for this watershed. The construction of the basins in 1992 reduced the peaks for the downstream areas, and this should result in a reduction of the floodplain currently shown on FEMA maps of the area.

The 2003 model used for this effort is still applicable because land uses have not changed in the watersheds and the hydrology methods used in the analysis follow WP methods as described in their Design Hydrology Manual (2017). The design hydrology methods used to evaluate the 100-yr inflow and outflow hydrographs also used the District's methods.

The 2003 CCWMP model shows peak inflow to the basins totaling almost 1,000 cfs for a tributary area of about 370 ac. The basins reduced the outflow to a total of about 192 cfs. This reduced the peak at the City boundary to about 682 cfs.

5. REFERENCES

COE, 2003. Calleguas Creek Watershed Feasibility Study Hydrology Appendix. February, 2003. U. S. Army Corps of Engineers Los Angeles District.

FEMA, 2018. Flood Insurance Study, Ventura County and Incorporated Areas, Revised April 4, 1918.

Kasraie Consulting, 2009. City of Camarillo Storm Drain System Master Plan, CI4223, Hydrology and Deficiency Study. October 2009.

NOAA, 2014. NOAA Atlas 14, Precipitation Frequency Atlas of the United States. Volume 6 Version 2.3.

Nolte and Associates, Inc. (September 2004). *Ventura County Flood Insurance Study*. Prepared for the Federal Emergency Management Agency.

VCWPD, 2003. Calleguas Creek Watershed Hydrology Study Present Condition. Ventura County Public Works Agency Watershed Protection District, March 2003.

VCWPD, 2017. Design Hydrology Manual. Ventura County Public Works Agency Watershed Protection District, December, 2010.

6. APPENDIX A- FEMA APPROVAL LETTER

U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

FEMA

October 13, 2011

Bruce Rindahl
Manager, Watershed Resources and Technology Section
Ventura County Watershed Protection District
800 South Victoria Avenue
Ventura, California 93009

Dear Mr. Rindahl:

Thank you for your letter dated July 13, 2011, to the Department of Homeland Security, Federal Emergency Management Agency (FEMA) regarding the certification of the Ventura County Watershed Protection District's VCRat computer program for local use. You provided additional information to support the model's approval for use in National Flood Insurance Program (NFIP) applications, including a summary of the model for inclusion on the FEMA accepted model list. We appreciate your efforts to seek FEMA's acceptance of the VCRat program.

FEMA agrees that the VCRat program meets the minimum requirements for use in NFIP hydrologic analysis applications in Ventura County, California. The program will be added to the list of locally accepted hydrologic models.

If you need additional information or assistance, please contact me by telephone at (202) 212-2252.

Sincerely,

Siamak Esfandiary, Ph.D., P.E.
Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

cc: Ray Lenaburg, FEMA Region IX

www.fema.gov

U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

FEMA

RECEIVED
JUN 22 2011

JUN 20 2011

WATERSHED PROTECTION DIST.

Bruce Rindahl
Manager, Watershed Resources and Technology Division
Ventura County Watershed Protection District
800 South Victoria Avenue
Ventura, California 93009

Dear Mr. Rindahl:

Thank you for your letter dated May 19, 2011, to the Department of Homeland Security, Federal Emergency Management Agency (FEMA) regarding the certification of the Ventura County Watershed Protection District's VCRat computer program. You requested that the model be approved for use in National Flood Insurance Program (NFIP) applications, such as completing Flood Insurance Studies and revisions or conditional revisions to Flood Insurance Rate Maps (FIRMs). We appreciate your effort to seek FEMA's acceptance of the VCRat program.

As you may know, FEMA maintains two lists of acceptable models: one for nationally accepted models and one for models that are certified by State and regional agencies for use within their jurisdiction. I understand that you wish to have the VCRat program approved for local use.

As outlined in Section 65.6 of the NFIP regulations, any computer program used to perform hydrologic or hydraulic analyses in support of a FIRM revision must meet the following criteria:

(i) It must have been reviewed and accepted by a governmental agency responsible for the implementation of programs for flood control and/or the regulation of floodplains.

(ii) It must be well documented, including source codes and user's manuals.

(iii) It must be available to FEMA and all present and future parties impacted by flood insurance mapping developed or amended using the program. For programs not generally available from a Federal agency, the source code and user's manuals must be sent to FEMA free of charge, with fully documented permission from the owner that FEMA may release the code and user's manuals to such impacted parties.

Thank you for including the user's manual with your letter. This information, along with the fact that the program is in the public domain, meets the requirements of items (ii) and (iii), above. To complete the approval process for the VCRat program, the model must meet the following criteria for item (i):

- The model must be used or planned to be used by communities for NFIP studies;

- The model must provide for new capabilities beyond any non-proprietary model on the existing accepted models lists; and
- The model must be reviewed, tested, and accepted with respect to its use in the design of flood-control structures or floodplain land use regulation. A written certification must be provided by the review agency to FEMA. Certification criteria are described in detail in the enclosed document, *Clarification of National Flood Insurance Program Criteria for Certification of Coastal, Hydrologic, and Hydraulic Models*, dated October 10, 2001. This document is also available at http://www.fema.gov/library/viewRecord.do?id=3233.

To support the certification, please provide copies of or links to other documentation regarding the model's applicability, capabilities, and limitations, as this information will be used to develop the "comments" section of the model list at http://www.fema.gov/plan/prevent/fhm/en_hyola.shtm. FEMA will review and evaluate the certification materials and make the final determination on whether the model meets the minimum requirements of the NFIP.

I hope this information is helpful to you in addressing the concerns of your constituent. If you need additional information or assistance, please contact me at (202) 212-2252.

Sincerely,

Siamak Esfandiary, Ph.D., P.E., CFM, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Enclosure

cc: Ray Lenaburg, FEMA Region IX

Clarification of National Flood Insurance Program Criteria for Certification of Costal, Hydrologic and Hydraulic Models

In accordance with Title 44 of the Code of Federal Regulations (44 CFR), Subparagraph 65.6(a)(6)(i) of the National Flood Insurance Program (NFIP) regulations, any computer program used to perform hydrologic and hydraulic analyses in support of a map revision must meet the following criteria:

- The model must have been reviewed and accepted by a governmental agency responsible for the implementation of programs for flood control and/or the regulation of flood plain lands.

- For computer programs adopted by non-Federal agencies, certification by a responsible agency official must be provided which states that the program has been reviewed, tested, and accepted by that agency for purposes of design of flood control structures or flood plain land use regulations.

This document provides guidance on the certification of computer programs for performing hydrologic and hydraulic analyses for map revisions and other NFIP purposes.

Hydrologic and hydraulic models developed by Federal agencies responsible for the implementation of flood control programs, floodplain regulation, and/or flood hazard analysis clearly meet the criteria stated in Paragraph 65.6(a)(6)(i). Models developed by non-Federal agencies or private entities must be certified by a governmental agency responsible for the implementation of programs for flood control and/or regulation of floodplain lands. The certifying agency can be a Federal agency or non-Federal agency, such as a state water conservation board or regional flood control district. If the certifying agency is not a Federal agency, the certifying agency must review, test, and accept the model. The requirements for certification, listed below, are more rigorous than simply applying the model for a given project.

- The certifying agency must review the model in sufficient detail to conclude that the model is scientifically correct and technically sound. The model must be based on sound hydrodynamic, hydrologic or hydraulic principles. For this review, the certifying agency may rely on published technical papers by authors other than the model developers that demonstrate the model is technically sound. FEMA may request the certifying agency to provide the list of reviewed technical references.

- The certifying agency must test the model with measured data or compare the model to other similar models on FEMA's list of "Numerical Models Accepted for Use in the NFIP" (http://www.fema.gov/fhm/en_modl.shtm) to determine whether the model can adequately reproduce the measured data or provide results comparable to other models accepted by FEMA. A summary of the testing methods and results should be provided to FEMA.

- The certifying agency must accept the model for its use in administering programs for the design of flood control structures and/or the regulation of floodplain lands.

- With the request for approval of the model submitted to FEMA, the certifying agency must cite and describe specific examples of using the model to demonstrate the applicability of the model to the NFIP for purpose of the design of flood control structures and/or the regulation of floodplain lands.

October 10, 2001
Magee FIMA-HM-HS

- If necessary, FEMA may request the certifying agency to provide assistance, such as providing answers to technical questions, relative to the use of the certified model for Flood Insurance Studies and appeals in the NFIP.

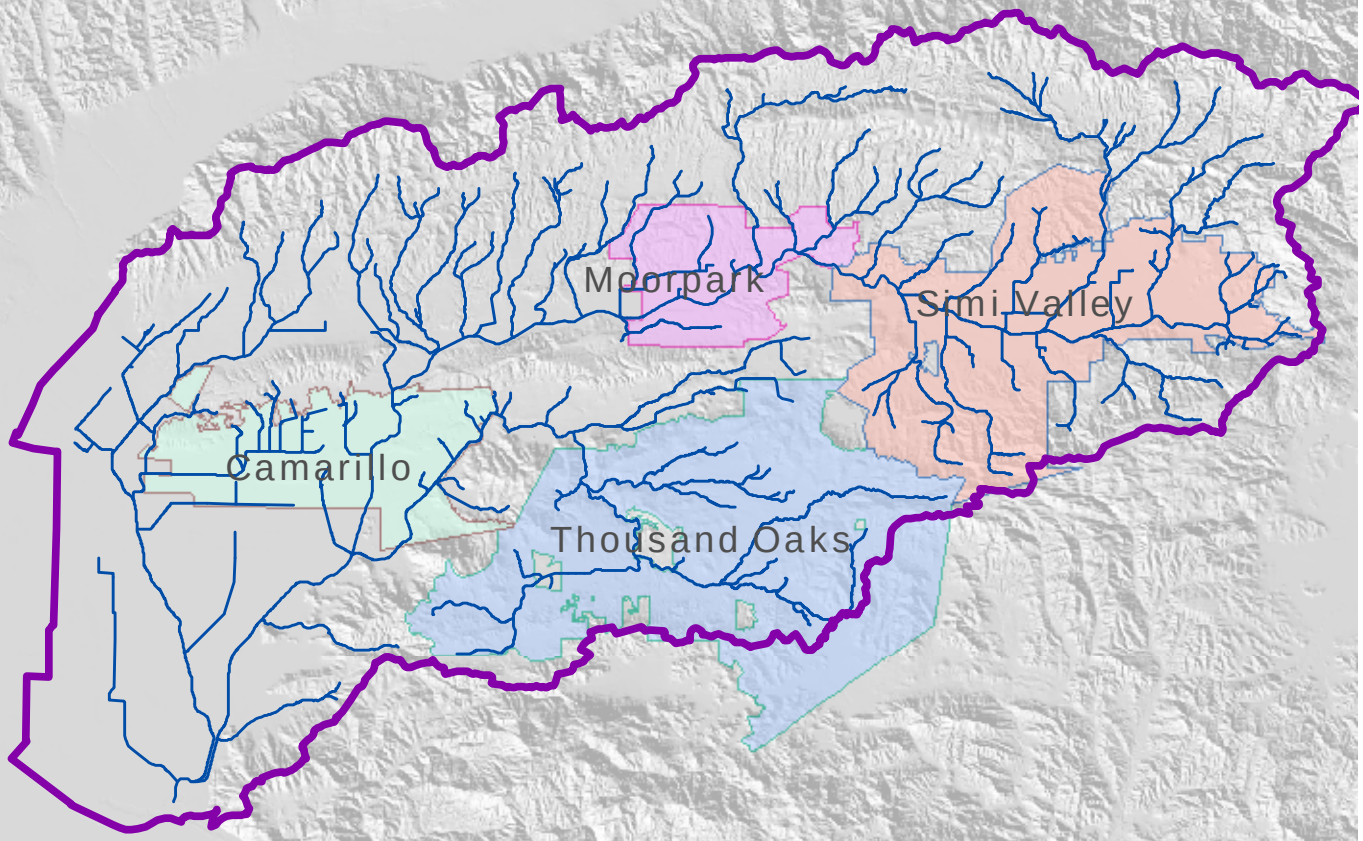
- The certification must be provided by a responsible agency official who has the authority to certify the model on behalf of the agency.

If these and the criteria outlined in 44 CFR Subparagraphs 65.6(a)(6)(ii) and (iii) are met, FEMA will accept the model and included it on the list of "Numerical Models Accepted for Use in the NFIP," which is posted on the FEMA Flood Hazard Mapping website at http://www.fema.gov/fhm/en_modl.shtm . The area of applicability of the model will be consistent with the area of responsibility of the certifying agency (i.e., local, regional or national).

October 10, 2001
Magee FIMA-HM-HS

7. APPENDIX B- CCWMP REPORT

CALLEGUAS CREEK WATERSHED HYDROLOGY STUDY PRESENT CONDITION

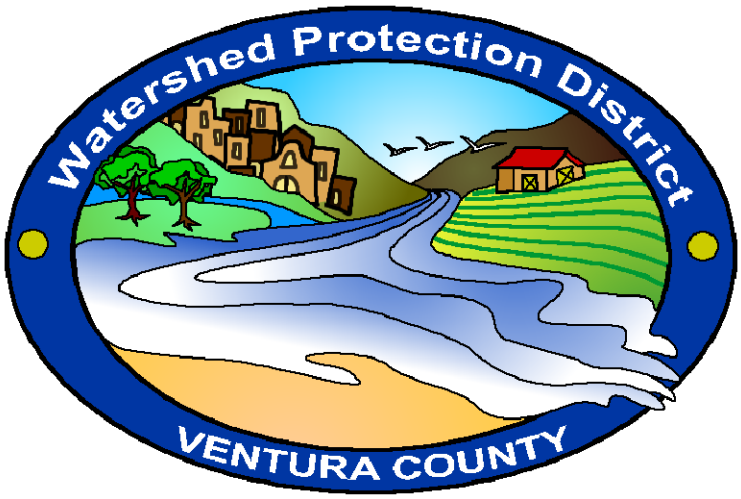


Ventura County Public Works Agency
Watershed Protection District
March 2003

CALLEGUAS CREEK WATERSHED

HYDROLOGY STUDY

PRESENT CONDITION



Ventura County Public Works Agency
Watershed Protection District

March 2003

ACKNOWLEDGEMENTS

This report represents the combined effort of a large number of agencies and individuals whose contributions are hereby gratefully acknowledged.

Supervisor Judy Mikels
Calleguas Municipal Water District
US Army Corps Of Engineers, Los Angeles District
City of Camarillo
City of Moorpark
City of Simi Valley
City of Thousand Oaks
Calleguas Creek Watershed Management Plan Participants

The following members of the Ventura County Watershed Protection District staff have been instrumental in the creation of this hydrologic report:

Scott Holder, Robin Jester, Hassan Kasraie, David Laak, Jayme Laber, Olga Ready, Louise Shi, Dolores Taylor, John Trone, Denny Tuan, Sergio Vargas

CALLEGUAS CREEK HYDROLOGY REPORT

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FINAL

CALLEGUAS CREEK HYDROLOGY REPORT

SECTION I

INTRODUCTION/HISTORY

Calleguas Creek drains an area of approximately 343 square miles, predominantly in southern Ventura County and outlets into the Pacific Ocean at Mugu Lagoon. The watershed includes Arroyo Conejo, Conejo Creek, Arroyo Santa Rosa, Arroyo Simi, Arroyo Las Posas, and Calleguas Creek, as well as Revolon Slough and Mugu Lagoon. The Santa Susana Mountains, South Mountain, and Oak Ridge Mountains form the northern boundary of the watershed. The Simi Hills and Santa Monica Mountains distinguish the southern boundary (See Fig. 1).

HISTORICAL MODELS

The Calleguas Creek Watershed has been modeled several times since the early 1960's. The first study by Boyle Engineering used the older Soil Conservation Service (SCS) method which was limited by the allowable rainfall intensities. Typically, the maximum intensity was about 2-inches per hour. Recording raingage records for Ventura County indicated much higher values, which were as high as 5-inches per hour for short duration times. Because valuable background information on each sub-watershed had been calculated which included weighted CN value, 12-hours design precipitation, and aerial reduced rainfall, the report was used by Ventura County Flood Control District (DISTRICT) staff for rural watersheds until 1985.

MODIFIED RATIONAL HYDROLOGY METHOD ADOPTION

Beginning in 1970, when a comparison of DISTRICT flowrates with Los Angeles Public Works (LAPW) design flows indicated much lower values at the border between us, the DISTRICT adopted the Modified Rational Method for all Design Hydrology. Hydrologists from LAPW trained DISTRICT hydrologists in the computer model developed by them. Using the newest Soil Survey Report completed by the SCS for Ventura County in 1970, the soils of Ventura County were carefully divided into seven hydrologic soils with loss rates varying from one-quarter of an inch per hour to over two inches per hour in beach sand. Staff, working closely with consultants such as Koebig and Koebig and Toups Corporation (now called Hawks and Associates) jointly developed Master Drainage Plans. Included for the City of Thousand Oaks were all major and minor tributaries to Arroyo Conejo from the headwaters in Lang Ranch to the final junction of North Fork Arroyo Conejo at Hill Canyon where the channel changes name to Conejo Creek prior to junction with Arroyo Santa Rosa. In Simi Valley the entire watershed was modeled from the headwaters by Rocky Peak to Alamos Canyon junction on the Arroyo Simi downstream of Madera Road. For City of

Calleguas Creek
Watershed Boundary
Santa Barbara Co.
Los Angeles Co.
Ojai
Fillmore
Santa Paula
Moorpark
Simi Valley
Thousand Oaks
Camarillo
Oxnard
San Buenaventura
Port Hueneme
Pacific Ocean
SANTA CLARA RIVER
CALLEGUAS CREEK
ARROYO SIMI
ARROYO CONEJO
NORTH FORK ARROYO CONEJO
CONEJO CREEK
LAS POSAS CREEK
CAMARILLO HILLS DRAIN
RICE ROAD DRAIN
STREET DRAIN
DORIS DRAIN
BEARDSLEY
SANTA ROSA
LANG CREEK
HUNT WASH
MAHAN BARRANCA
FOX BARRANCA
MILLIGAN BARRANCA
CLARK BARRANCA
BARROW BARRANCA
ELLSWORTH BARRANCA
ADAMS BARRANCA
PAGAN CANYON
HALL CANYON
MANUEL CANYON
COYOTE CREEK
MATILIJA CREEK
VENTURA FW
DRY CANYON
CUYAMA RIVER
NORTH FORK LOCKWOOD CREEK
LOCKWOOD CREEK
AMARGOSA CREEK
EAST FORK SEYMOUR CREEK
ST AUBER CREEK
ALAMOS CANYON
BEARTRAP CREEK
BOULDER CREEK
BEAR CREEK
OLEARY CREEK
SESPE CREEK
POLECR EEK
BASOLO DITCH
HOLSER CANYON
HAPPY CAMP CANYON
TRIPAS CANYON
WINDMILL CANYON
CHIVO CANYON
LAS LLAJAS CANYON
ERRINGER DRAIN
MEIER CANYON
PCH
COAST HWY
Calleguas Creek
Vicinity Map
N
0
3.5
7 Miles
VCFCD Redline Channels
Major Roads
Cities
Calleguas Creek Watershed Boundary
Figure 1

Camarillo, their entire Sphere of Influence was included. All of these Master Drainage Plans include maps of existing facilities at the time of the study as well as proposed improvements to the drainage system for each area. DISTRICT engineers and hydrologists modeled many other areas within the Calleguas Watershed.

NWS-SACRAMENTO MODEL IN REAL-TIME

As a result of damages to Point Mugu Naval Air Station, caused by the Calleguas Creek Levee failure in February 1980, the Navy signed an agreement with the DISTRICT and the National Weather Service (NWS) to provide flood-warning to the base from both Calleguas Creek and Revolon Slough. The DISTRICT installed rain and streamgages purchased by the Navy and Real-time models using streamgage records from the gage at Camarillo State Hospital (now California State University at Channel Islands) were calibrated by the NWS. These models, with minor calibration, have been running for 20 years with varying results depending on the saturation of the watershed. The wetter the ground, the better the prediction of flood peaks will be when applying the forecast rain. As a result of this earlier in the storm season, the results are not as accurate. Another compounding factor at the beginning of each water year is that upstream waste water treatment plant effluent keeps the low flow channel of the stream wet while the surrounding area can be very dry.

In the El Nino year 1983, record peaks were recorded at each of the Calleguas Creek Watershed streamgages. For the twenty years prior to these record-breaking peak discharges, urbanization with accompanying channelization concentrated flows much quicker and with considerably more volume of flow.

Another factor affecting the volume of runoff occurred with the availability of better quality water imported from northern California. Distributed by the Calleguas Municipal Water District, widespread use of the better tasting water meant that local wells no longer were pumped. Within a relative short time of average to above average water years, a rising ground water problem impacted industry within the Easy Street neighborhood of the City of Simi Valley, causing concern. The City responded by drilling five de-watering wells to relieve the pressure and discharged into tributary channels. Consequently, the Arroyo Simi, which used to be dry most of the year, now has perennial flow that encourages growth of plants.

COE HEC-1 MODEL UPDATE

Because of the damages experienced along the Calleguas Creek, DISTRICT staff convinced the Army Corps of Engineers (COE) to restudy the Hydrology to supercede their earlier work of the 1970's. In several cases, the future percent imperviousness used in the earlier study had been exceeded. The result of that re-study which included evaluation of streamgage records and regional skew study was published in 1987. The peak discharges published were the values used for project design, whether developer funded or government projects.

In 1989, Simons-Li, requested Present and Future Design Flowrates for many points along Calleguas Creek for use in sediment transport study. The 1987 COE study furnished fewer locations and no hydrographs since the values were impacted by the frequency curves of streamgages within the watershed. DISTRICT staff adopted the COE parameters including the routing parameters but applied Modified Rational Design Rainfall to aid in hydrograph timing with Master Drainage Plan flows junctioning with the main channel. The results at common points of concentration were amazingly close to the adopted COE values. A report was never published but copies of the model output and summary sheets were widely distributed to cities, developers, and flood control designers.

HSPF CALIBRATION MODEL

The DISTRICT, in an effort to improve and expand it's technical procedures, is exploring the use of continuous watershed simulation as a tool for fulfilling its flood control, water resource management, and water quality management obligations. A pilot study to evaluate the use of the U.S. EPA Hydrologic Simulation Program -FORTRAN (HSPF) (Bicknell et al., 1997; 2001) as a management tool for comprehensive watershed assessment within the climatic, physiographic, and topographic conditions of Ventura County was initiated in 2001 by Aqua Terra Consultants. The objective of the pilot study is to setup, calibrate, and validate HSPF to the Arroyo Simi watershed within the Calleguas Creek basin of Ventura County for 'current/recent' hydrologic conditions, and then evaluate the use of the information available from the model on flow-duration, flood-peak analysis, flow velocity distributions, bed/bank shear stress calculations, etc. for assessing flood control facilities and streambed/bank protection efforts. Ultimately, the model may be extended and expanded to assess erosion and flooding issues within the entire Calleguas Creek basin to help evaluate potential remediation alternatives for Mugu Lagoon.

HSPF is a comprehensive watershed model of hydrology and water quality, that includes modeling of both land surface and subsurface hydrologic and water quality processes, linked and closely integrated with corresponding stream and reservoir processes. It is the premier model currently available for comprehensive watershed assessments. HSPF has enjoyed widespread usage and acceptance, since its initial release in 1980, as demonstrated through hundreds of applications across the U.S. and abroad. HSPF is jointly supported and maintained by both the U.S. EPA and the USGS, a rare occurrence where two federal agencies agree on support of a single modeling system. In addition, HSPF is the primary watershed model included in the EPA BASINS modeling system and it has recently been incorporated into the U.S. Army Corps of Engineers Watershed Modeling System (WMS). This widespread usage and support has helped to ensure the continuing availability and maintenance of the code for two decades, in spite of varying federal priorities and budget restrictions. HSPF is currently being used for watershed studies in Minnesota, Washington State, Oregon, Australia, Kentucky, South Carolina, Nevada, and Florida.

FINAL

SECTION II

METHODS AND TECHNIQUES

MODIFIED RATIONAL HYDROLOGY MODEL -VCRAT COMPUTER MODEL

In 1997, it was decided to develop a complete watershed model of the Calleguas, including Revolon Slough, using the Modified Rational Method. Sub-watersheds were carefully digitized; while the imperviousness was compared to the latest aerial photos, and routing reaches were measured from Rocky Peak to Mugu Lagoon. Wherever improvements existed, the as-built slope and channel configuration was coded into the model. The majority of the sub-areas are less than 100 acres, but in some rural areas, larger sub-areas seemed appropriate. For each subarea, the input has the following parameters:

- area in acres,
- time of concentration in minutes,
- percent effective imperviousness,
- hydrologic soil type, and
- Rainfall zone with storm frequency.

The Ventura County Modified Rational Method (VCRAT) version 2.2 was utilized for the study analysis. This method was originally developed by the Los Angeles County Flood Control District (LACFCD) and was adopted by the Ventura County Flood Control District (VCFCD) in 1975 with some modifications to reflect the local runoff conditions. For example, the collector street for Ventura County is a 40-feet wide street with eight inch curbs whereas the County of Los Angles uses a 36 feet wide street with wider gutter and 8-inch curbs. The two methods differ also in that the VCFCD version was based upon a family of soil types using loss rates from 0.25-inches per hour to 2-inches per hour; whereas the LACFCD model was based on infiltration tests. A more detailed description of the VCRAT model is furnished in an excerpt from the 1991 VCFCD Hydrology Manual included in Appendix 1.

The computer program produces a 200-point hydrograph for each sub-area, which it adds to the next area downstream. In this way it accounts for changes in Times of Concentration between subareas. Channel storage from routing point to routing point also is accounted for, treating each reach as if it were a reservoir. Timing at junctions between two laterals or the main channel and a lateral can be requested to help in doing hydraulic analysis.

In the current hydrology study update, the VCRAT runoff simulation model (with detention basins included) was used to determine 100-year peak discharges. The detention basins were designed to attenuate the 100-year peak flows to a value that closely matched the pre-development condition or to reduce flows to values that would not exceed the capacity of the downstream improvements where possible. Computer input and output and calculation results for Calleguas Creek and its tributaries are included in Appendix 2a and 2b. The

computer input and output for Revolon Slough and its tributaries are included in Appendix 3a and 3b.

MODEL APPLICATIONS

The study area is divided into two separate watersheds for modeling purposes. Model 1 represents all tributaries to and including Calleguas Creek. Model 2 represents all tributaries to and including Revolon Slough. The latter has complete hydrology for 10-yr, 50-yr and 100-yr storms compared to only 100-year for the Calleguas. For the former, actual multipliers from real stream gage records analysis produced 2, 5, 10, 50, and 500-year present condition flowrates. Table 1 lists every important concentration point to accurately determine cumulative flows along every tributary and main channel. For individual subarea flows, the actual Modified Rational output printouts contained in Appendix 2b and 3b should be used.

Research of available data from previous studies, GIS analysis, and field inspections were used as the main data sources to determine site parameters, street flow configuration, and drainage patterns.

AREAL REDUCTION

One of the most important factors in completing such a large-scale model is to account for the decreased intensity over such a large area. The COE, SCS, and other hydrologic modelers have long recognized the difference between Point Rainfall and Areal Precipitation. Examination of recording rain gage charts for a given storm shows a pattern of shifted high intensity with time to reflect the passage of bands of rain across or up the valley of a watershed for most severe winter storms. In August 1966, the DISTRICT adopted the first HYDROLOGY MANUAL, which included an aerial reduction curve for Calleguas Creek indicating decrease in rainfall intensity for watershed area. This same curve is contained in the Ventura County Modified Rational Method computer model. To develop a curve of reduced design flowrates for larger areas, the computer was instructed to recycle at various points along the main channel and each major tributary. The resulting values of reduced peak outflow at these recycling points were divided by the unaerial-reduced peak flows to produce an Aerial Reduction Factor (ARF). Each of these values was plotted along major tributaries as well as along the main channel with area in thousands of acres as the abscissa and the ARF or peak reduction factor as ordinates. See Figures 6 – 9 or ARF curves.

USER FRIENDLY TABLES

To aid the user of this complex model, a matrix of flowrates versus key points is included in Table 1. For any location, the cumulative drainage area is listed, the model ID number and letter, the present condition 100-year flow without aerial reduction, the aerial reduction factor from the curve, and the reduced flowrate. In addition, peak flows for other frequencies are listed. 50-year, 10-year, 5-year and 2-year peaks are from multipliers derived from streamgage frequency analysis of annual peaks.

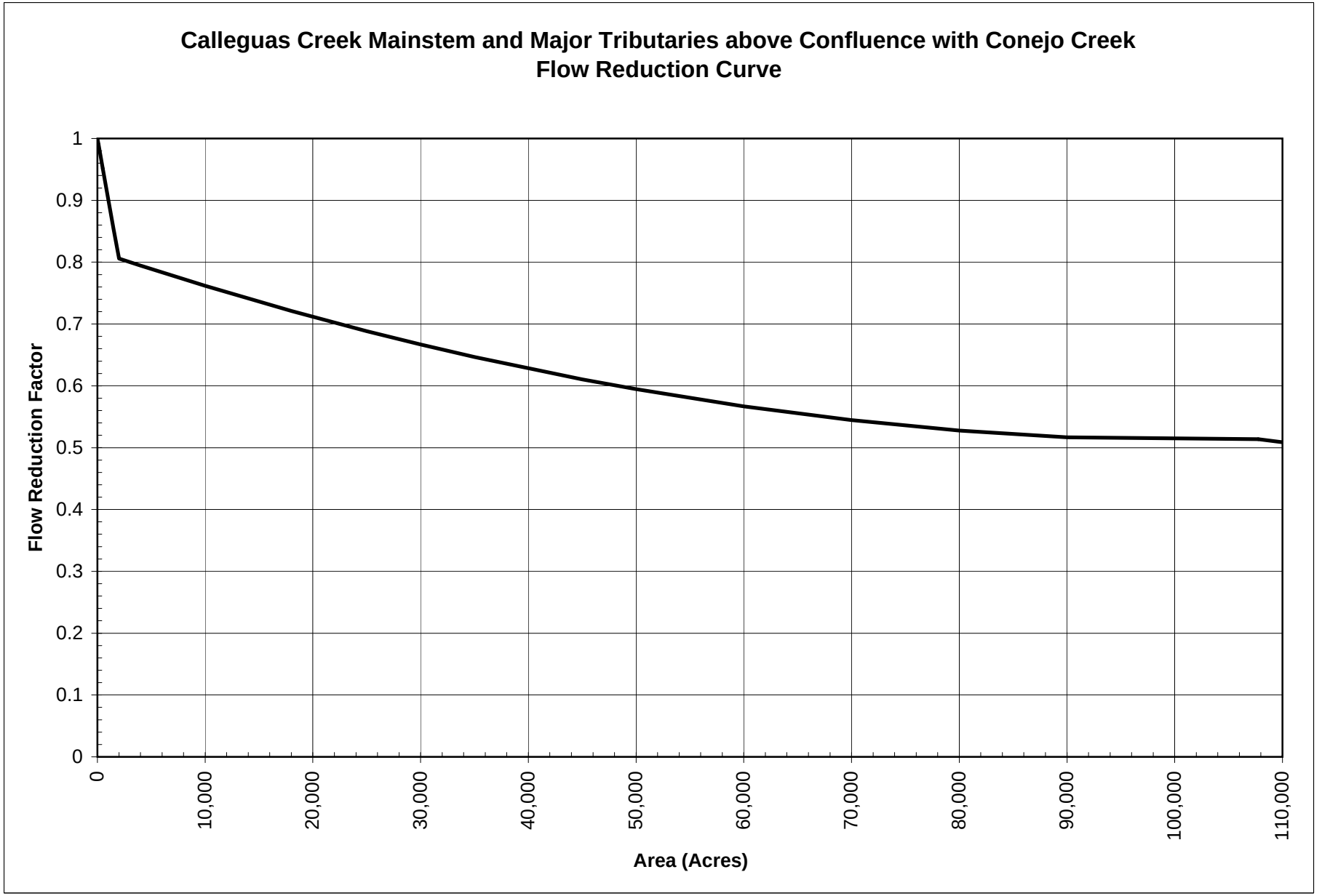

Calleguas Creek Mainstem and Major Tributaries above Confluence with Conejo Creek
Flow Reduction Curve
Flow Reduction Factor
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
100,000
110,000
Area (Acres)

Figure 6

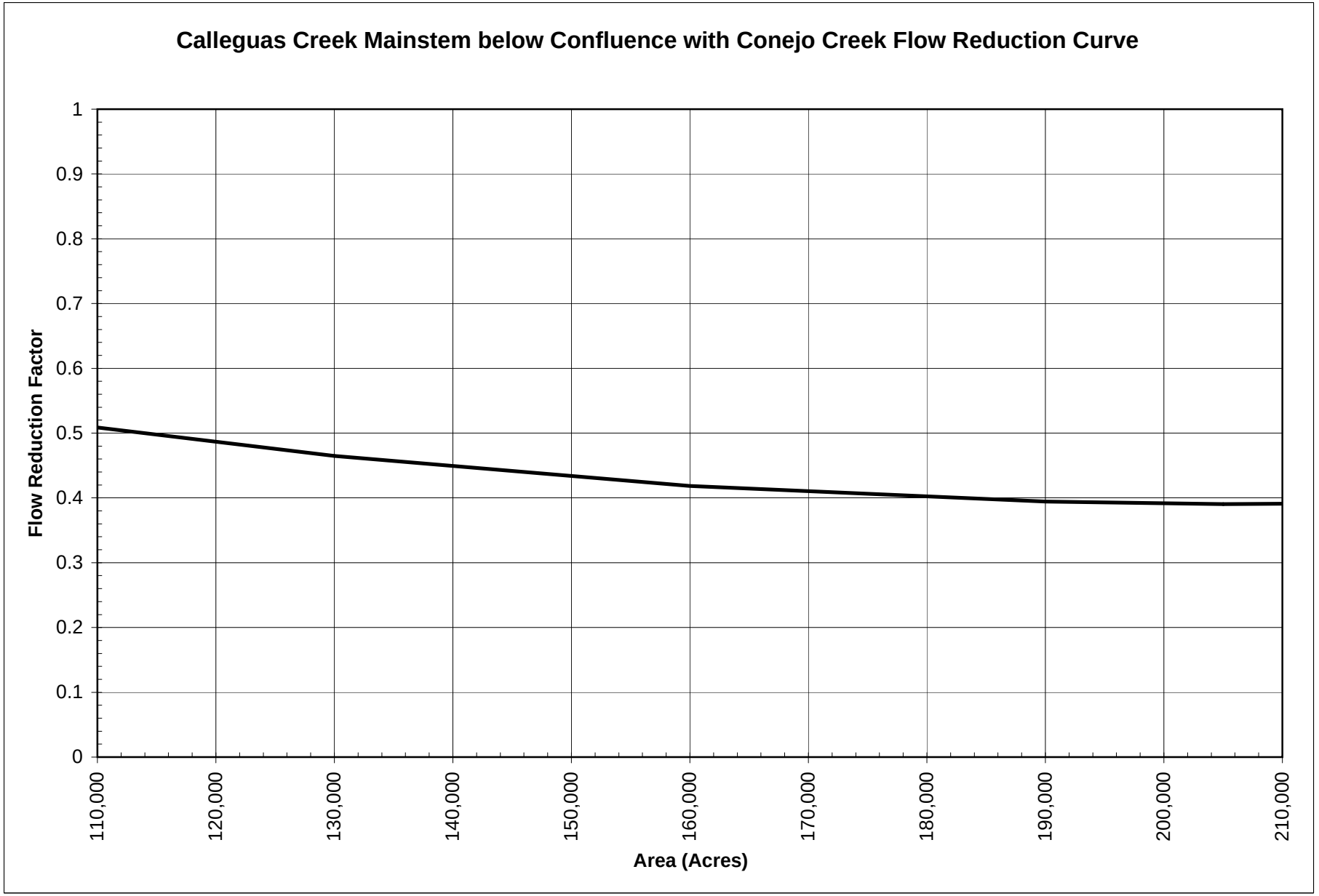

Calleguas Creek Mainstem below Confluence with Conejo Creek Flow Reduction Curve
Flow Reduction Factor
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
110,000
120,000
130,000
140,000
150,000
160,000
170,000
180,000
190,000
200,000
210,000
Area (Acres)

Figure 7

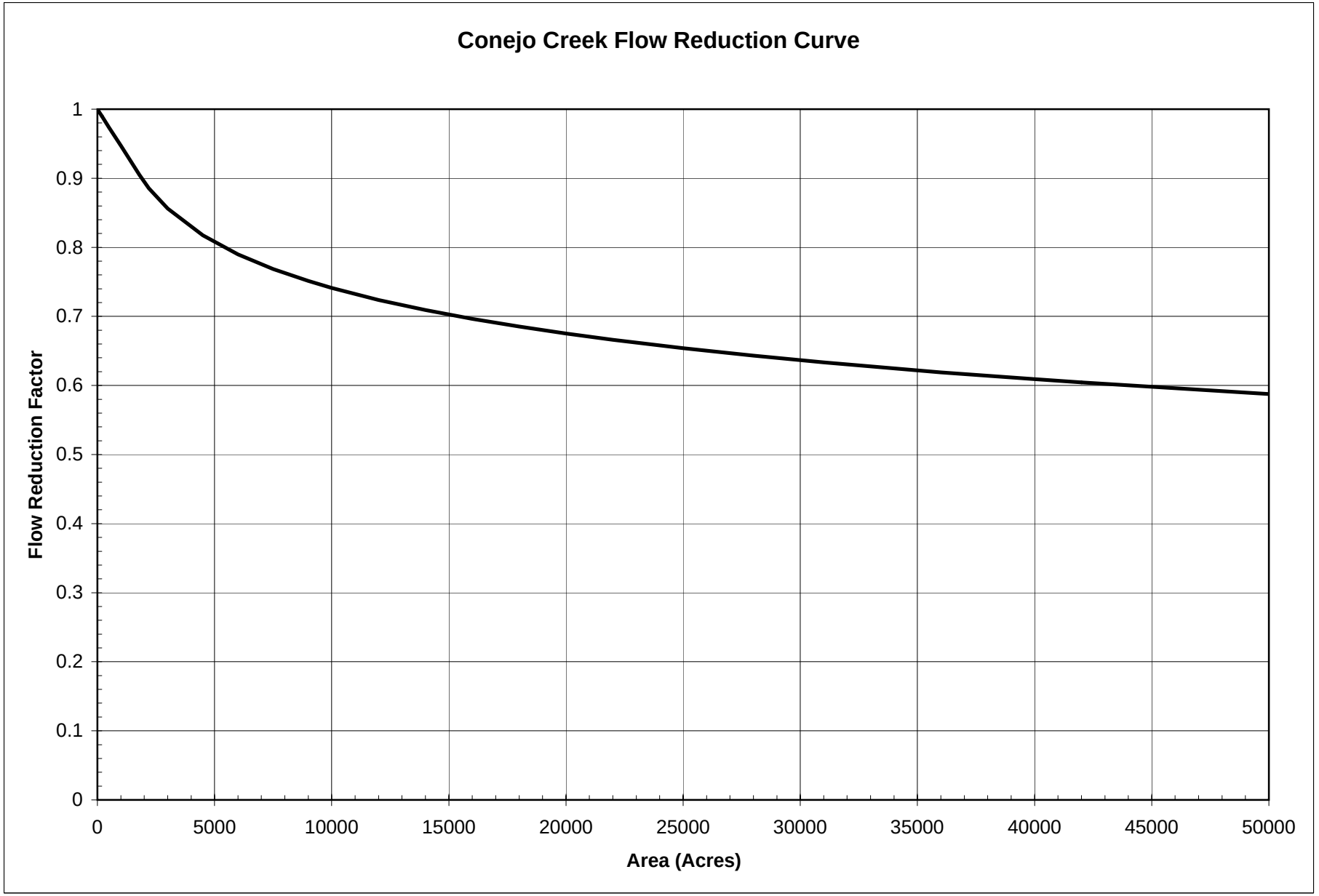

Conejo Creek Flow Reduction Curve
Flow Reduction Factor
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
5000
10000
15000
20000
25000
30000
35000
40000
45000
50000
Area (Acres)

Figure 8

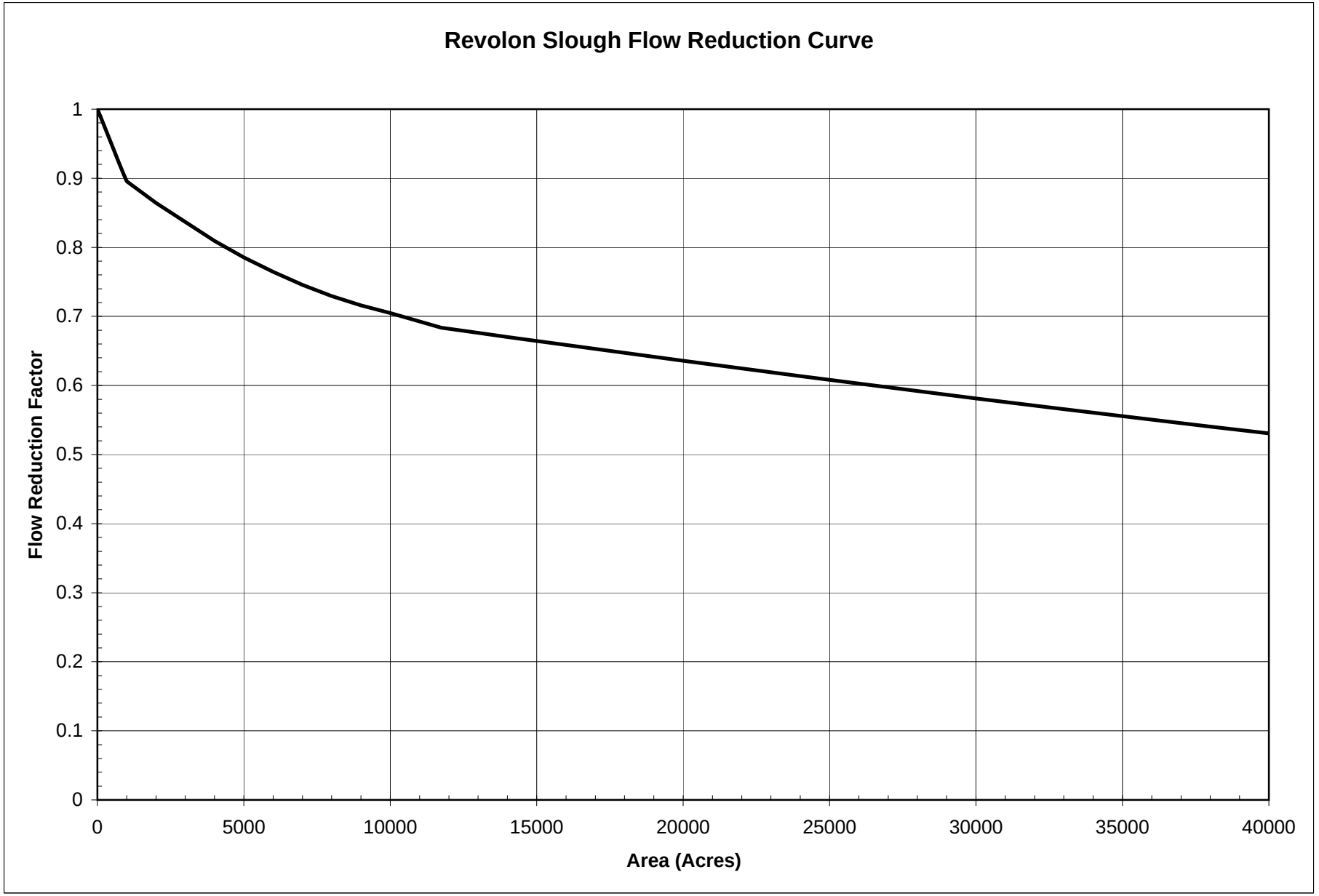

Revolon Slough Flow Reduction Curve
Flow Reduction Factor
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
5000
10000
15000
20000
25000
30000
35000
40000
Area (Acres)

Figure 9

GIS AND THE CALLEGUAS CREEK HYDROLOGY MODEL

The current hydrologic study of the Calleguas Creek Watershed has been significantly aided by the use of a Geographic Information System (GIS). The County of Ventura and the Flood Control Department have a very sophisticated GIS set up that allows desktop access to a wide array of geographic data.

A GIS is mapping software that links information about “where things are” with information about “what things are like”. Unlike with a paper map, where "what you see is what you get," a GIS map can combine many layers of information.

For this particular study the GIS layers that were utilized included: Hydrologic soils type, 3-D topography, streams and rivers, Flood Control facilities, aerial photography, parcel lot lines, major hydrologic drainage areas and very detailed subarea boundaries matching or correcting those of the VCRAT input model.

GIS helped to accurately and quickly populate the VCRAT hydrologic model input parameters for each subarea. The April 2000 detailed aerial photography was used to determine proper percent imperviousness factors, and for locating drainage patterns and current land use.

Topographic contour data was used to calculate accurate slopes of the main flowpaths. The streams and rivers layer helped in verifying channel location and routing order while the existing Flood Control facilities layer was used to verify proper channel type designation and the physical dimensions of all channels in the study area.

To determine the proper soil type for each subarea, a simple “cookie cutting” process was used. This resulted in a very accurate percentage of each soil type contained in each subarea. A weighted average was then input into the model.

The parcel lot line layer and street centerline layer were used as guides when adjusting subarea boundaries that happened to fall on housing tracts or developments.
GIS was a perfect tool for this hydrologic study. From instantaneous and extremely accurate subarea acreage calculations, to quick and easy subarea boundary editing, to presentation quality map production, it proved to be invaluable.

SECTION III

DESCRIPTION OF STUDY AREA

For Detailed Aerial Photos of Entire Watershed see Fig.2A-2D

LOCATION

SIMI VALLEY

The City of Simi Valley is located in the southeastern portion of Ventura County immediately adjacent to Los Angeles County. The developed portions of the City of Simi Valley are situated primarily on the valley floor with many proposed developments extending up the alluvial fans coming out of canyons. The valley is defined by the Santa Susanna Mountains on the north and east and by the Simi Hills on the south. The Santa Susanna Mountains separate the Simi Valley from the Santa Clara River Valley and Towns of Fillmore and Piru to the north. The Simi Hills separate the valley from the city of Thousand Oaks to the southwest, and Moorpark Sphere of Influence separates the western limit.

The major drainage course through the valley is the Arroyo Simi. This major channel drains from the extreme limits of the watershed in the east and northeast, then westerly through the Las Posas Valley (as Arroyo Las Posas) to the Oxnard Plain (as Calleguas Creek) and the Pacific Ocean.

Tributaries to Arroyo Simi from the Santa Susanna Mountains on the north are, from west to east, Alamos Canyon, Brea Canyon, North Simi Drain, Dry Canyon, Tapo Canyon, Chivo Canyon and Las Llajas Canyon. Canyons draining the Simi Hills from the south are Sycamore Canyon, Bus Canyon, Erringer Road Drain, Runkle Canyon, Meier Canyon and finally Black Canyon in Santa Susanna area.

MOORPARK

Moorpark Sphere of Influence comprises the drainage area tributary to Arroyo Simi from the junction with Canyon Number 2 on the east and Walnut-Gabbert Canyon on the west. It includes Peach Hill Wash, Castro Williams Drain, Happy Camp Canyon, Strathearn Canyon and other smaller unnamed watersheds.

In the urbanized area of the City of Moorpark, Gabbert and Walnut Canyon contain several reaches of improved concrete flood control channels that provide some flood protection for the City of Moorpark. While some reaches and crossings are undersized for today's modern

Design Flowrates, these facilities collect and convey storm runoff to the Arroyo Simi. Currently, a large portion of the Walnut-Gabbert watershed is not developed; however, there are planning efforts for private development on a significant portion of this area. The channel systems provide some flood protection benefit through an east to west channel alignment, which results in intercepting the drainage from the mouth of several large tributary canyons.

Existing stormwater detention facilities within Peach Hill Wash and Gabbert Canyon are the principal elements in a detention oriented approach for flood control, providing peak flow reduction based on temporary storage of the runoff volume. There are several basin sites have been selected for detailed evaluation at various locations within the watershed after performing feasibility screening of numerous alternatives.

CAMARILLO

The City of Camarillo is situated at the northeastern corner of the Oxnard Plain. The watershed of the city expanded on two major drainage courses: Calleguas Creek and Revolon Slough. The study area that drains to Calleguas Creek includes the easterly portion of the Camarillo Hills, south facing slopes of the Las Posas Hills, and Conejo Mountain and contains slopes ranging from five percent to 30 percent. Somis Drain, Saint John's Drain, and Lewis Road Drain under DISTRICT jurisdiction all drain to Calleguas Creek. Regular maintenance is performed on St. John's Debris Basin east of the St. John Seminary.

The majority of the Camarillo Hills south facing slopes drains to tributaries of Camarillo Hills Drain that eventually junctions with Revolon Slough to the west. There are several networks of regional facilities under the jurisdiction of the DISTRICT. Most of these consist of open channels, both lined and unlined, except collector drains in closed conduits. Moving from west to east tributaries to Camarillo Hills Drain includes Crestview Drain, Edgemore Drain, West Camarillo Hills Drain, Mission Drain, and Ponderosa Drain. Coming from the Las Posas Estates area and Spanish Hill's drainage are Ramona Place Drain and Las Posas Estates Drain which is split 60 percent of runoff going to Beardsley Wash and the other 40 percent of the flow goes to Camarillo Hills Drain west of the Camarillo Airport. To prevent hillside slope erosion entering the improved channels and lowering flow capacity, several debris basins are constructed in the upstream canyons. Regular maintenance is done on West Camarillo Hills West Branch Debris Basin, West Camarillo Hills East Branch Debris Basin, and Edgemore Debris Basin.

THOUSAND OAKS

Thousand Oaks study area is situated primarily within the watershed of the Arroyo Conejo, including Newbury Park, portions of Westlake Village, and nearly the entire city of Thousand Oaks. The developed portions of the city are situated primarily on the Conejo Valley floor and on slopes less than 25%.

The major drainage course through the City is the Arroyo Conejo. Major tributaries going from west to east includes South Branch Arroyo Conejo and North Fork Arroyo Conejo.

Each of these main tributaries contains large sub-watersheds. Included in South Branch Arroyo Conejo is Conejo Mountain Creek, Newbury Park Drain Numbers One and Newbury Park Drain Number Two. The South Branch Arroyo Conejo is a large part of the city, and the many studies on the watershed and its tributaries were done to update the 1990 FEMA hydrology. The DISTRICT requires that all new developments in the watershed provide flood detention to reduce downstream the 100-year flood peaks. The numerous detention basins that have been required by the VCFCD resulted in substantially reduced peak flows and reduction of areas subject to the 100-year flooding. Several detention dams and debris basins receive regular maintenance on this important rapidly developing watershed. They include Arroyo Conejo South Branch West Tributary Debris/Detention Basin, Conejo Mountain Creek Upper Debris Basin and Conejo Mountain Creek at Baseline Debris/Detention Basin, and South Branch Arroyo Conejo Debris Basin.

Major Tributaries to North Fork Arroyo Conejo, from west to east are Olsen Channel, Waverly Channel, Castano Channel and Castano Tributary. All of this area upstream is very developed but much of the impact of that urbanization is mitigated when all the improved drains join to meander through Wildwood Park. Draining directly to Arroyo Conejo are Lang Creek, Thousand Oaks North Drain, Erbes Road Drain, and Skeleton Canyon. Lang Creek Detention/Debris Dam is under construction and will mitigate the increased flows from Lang Ranch developments.

Not included in Conejo Creek drainage are south and eastern portions of the City including the Westlake Village that drain into Los Angeles County via Potrero Creek and Schoolhouse Canyon.

SANTA ROSA VALLEY

The Santa Rosa Valley is located approximately 6 miles east of the City of Camarillo. It is limited on the north by Las Posas Hills; on the south by the Mountclef Ridge; on the east by the Tierra Rejada Valley upstream of Highway 23 and on the west by the original grant line of Rancho Calleguas.

The Arroyo Santa Rosa headwaters begins in the Tierra Rejada Valley upstream of Highway 23 where the natural channel is called Tierra Rejada Creek. At the mouth of the Tierra Rejada Valley, the channel is called Arroyo Santa Rosa that traverses in a general east to west direction to its confluence with Conejo Creek. A large tributary coming from Norwegian Grade and east of Moorpark Road is Arroyo Santa Rosa Tributary that runs parallel to Santa Rosa Road and crosses it twice. Increased flows due to development are somewhat mitigated by the Santa Rosa Road Debris Basin constructed in 1957 by the Soil Conservation Service, however the lack of an adequate improved channel downstream of the basin results in the generation of a large floodplain. The Tributary junctions to Arroyo Santa Rosa downstream of Honey Hill Drive. Steep slopes descending from the hills north and south, and moderate prevailing slope from east to west characterize the area. Considerable urbanization has occurred in past ten years of very large single family homes; many with horses, tennis courts, and swimming pools.

SOILS CLASSIFICATION

The characteristics of the soils in the study area are another major factor affecting the rate of runoff and subsequent planning of storm drain facilities. The 1970 Soil Conservation Service Soil Survey of Ventura Area, California delineated many distinct soil types that were carefully divided into seven hydrologic soils from a set of maps covering the south half of Ventura County. Based on several soil properties, especially loss rate, the runoff potential is calculated as a function of applied rainfall intensity minus loss. Since the Design Storms assume three prior days of wetting with lesser storms followed by a fourth day with maximum design intensities, the loss rate is considered constant.

Group A (Soil Type 6 and 7): Soils have a high infiltration rate (1.5 to 2.0 inches per hours respectively) when thoroughly wetted; chiefly deep, well drained to excessively drained sand, gravel or both. Rate of water transmission is high; thus, runoff potential is low.
Group B (Soil Type 4 and 5): Soils have moderate infiltration rate (0.75 to 1.0 inches per hours respectively) when thoroughly wetted; chiefly soils that are moderately deep to deep, moderately well drained to well drained, and moderately coarse textured. Rate of water transmission is moderate.

Group C (Soil Type 2 and 3): Soils have slow infiltration rate (0.4 to 0.5 inches per hour respectively) when thoroughly wetted; chiefly soils that have a layer impeding downward movement of water, or moderately fine textured soils that have slow infiltration when dry. Rate of water transmission is low.

Group D (Soil Type 1): Soils have a very low infiltration rate (0.25 inches per hour) when wetted. They are chiefly clays that have a high shrink-swell potential, soils that have a high permanent water table, soils that have a claypan clay layer at or near the surface, or soils that are shallow over nearly impervious material. Rate of transmission is very slow; thus, runoff potential is very high.

Figures 3A-3D depict the distribution of various soil types within the study area.

LAND USE

Land use is a significant factor in the study since Time of Concentration and Percent Effective Imperviousness are most important parameters for developing a runoff model. “Existing” land use (including recently as-built developments or projects under construction) is considered in this study. (See Figure 4A-4D) For the future land use assumptions the model will incorporate the following: The specific cities General Plans, previous smaller scale hydrologic studies, Ventura County Land Use GIS coverage from the Southern California Association of Governments (1997) and any updates. The Present Condition Model completed in this report is governed by careful analysis of Year 2000 aerial photography. However, a Future Condition Model has been hampered by the inability thus

far for city planners to agree on a simple set of land uses to which effective imperviousness can be applied. Once agreement is reached, a Future Condition Model can be produced in less than one year.

CLIMATOLOGY

The Calleguas Creek watershed is a temperate Mediterranean Climate regime with mild temperatures with little variation in temperature extremes. For example, wintertime temperatures in a normal January would show the Average Maximum Temperature within Calleguas Watershed ranges from the low 60's to the high 60's degrees Fahrenheit. For Average Minimum Temperature most areas range from the low 40's inland to the upper 40's near the coast. Freezing temperatures (below 32 degrees Fahrenheit) usually occurs between December and February but only for a few hours and mainly in the Eastern part of the watershed. In summertime there is more variation between the Eastern part of the watershed especially for Average Maximum Temperature in July. Where the coastal area averages highs in the low 70's degrees Fahrenheit, Thousand Oaks and Simi Valley are upper 80's degrees Fahrenheit. It is not uncommon for "Santa Ana" wind events to have maximum temperatures within the watershed in the mid 90's or higher at any time of year, but most often occur during late September through December.

The summers are generally long and dry, with rain seldom occurring in May through August. Quite often if the fall months are wet, the winter following will be drier than normal. A normal year (Base Period of 1957 to 1992) has 73% of the annual rainfall between December and March. Snowfall is very rare. Mean annual precipitation is between 12 inches on the Oxnard Plain near Point Mugu to 21 inches in the higher elevations of Tapo Canyon with a weighted average of 15 inches per year (See Table 2, 36-Year Mean Annual Precipitation Table). Major winter storms generally originate over the Pacific Ocean as a result of the interaction between Polar Pacific and Tropical Pacific air masses that move eastward across the basin. These storms often last several days, and are accompanied by heavy precipitation. The other type storms that can cause damage are "Pineapple Connection" storms where a cold Winter Upper Level Low pressure center collides with a warm and very wet Subtropical Jet Stream originating out of the Hawaiian Islands area. Both types of storms create a Southwesterly flow that enhances the orographic effect of rainfall on the watershed.

RUNOFF CHARACTERISTICS

Undeveloped areas of Calleguas Creek Watershed comprise approximately 39 percent of the total area where some of the rainfall is intercepted by vegetation and evaporates, and some percolates into the ground resulting in relatively minor amounts of storm runoff except in very large storms. Other open areas, such as agricultural operations, parks, and golf courses contain some imperviousness for haul roads, parking lots, and associated buildings but rainfall has a chance to run across the cultivated furrows or grass in the fairway to percolate. The result is low to moderate runoff depending on the intensity of the rainfall. As

Table 2

Rain Gage #	Gage Name	Lat/Long	Monthly Average Rainfall (in.) Based on data from WY 1957-1992												Yearly Average Rainfall (in.) WY 1957-1992
			Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	
3	Camarillo-Springfield Ranch	34:12:17 119:04:04	0.30	1.81	1.66	2.68	2.97	2.37	0.77	0.09	0.03	0.01	0.06	0.25	12.98
49	Santa Rosa Valley-Worthington Ranch	34:14:54 118:56:25	0.38	1.97	1.81	2.87	2.93	2.54	0.94	0.11	0.02	0.01	0.06	0.26	13.9
128	Thousand Oaks - County Fire Station	34:13:06 118:51:56	0.34	2.14	2.01	3.08	3.41	2.87	1.15	0.12	0.03	0.03	0.09	0.23	15.48
141	Moorpark - County Fire Station	34:17:14 118:52:52	0.39	1.95	1.88	2.83	2.98	2.83	0.98	0.16	0.03	0.02	0.10	0.24	14.38
154	Simi - County Fire Station	34:17:38 118:42:29	0.37	1.92	1.96	2.81	3.18	2.91	1.02	0.16	0.03	0.02	0.14	0.27	14.79
169	Thousand Oaks-Weather Station	34:10:44 118:51:01	0.33	2.16	2.10	3.07	3.50	2.88	1.13	0.11	0.03	0.02	0.09	0.22	15.64
187	Susana Knolls-County Fire Station	34:15:44 118:40:10	0.36	2.30	2.25	3.22	3.75	3.11	1.29	0.19	0.03	0.01	0.11	0.26	16.87
188	Newbury Park-County Fire Station	34:11:10 118:55:45	0.33	1.93	1.97	3.06	3.21	2.87	0.90	0.12	0.02	0.01	0.06	0.22	14.71
189	Somis-Deboni	34:17:05 119:04:20	0.37	1.95	2.06	3.15	3.49	2.94	1.04	0.12	0.03	0.01	0.06	0.28	15.5
190	Somis-Bard	34:16:58 119:00:25	0.39	1.98	2.05	2.91	3.08	2.81	0.98	0.12	0.02	0.01	0.07	0.24	14.69
191	Moorpark-Downing Ranch	34:19:34 118:53:42	0.48	2.33	2.26	3.43	3.68	3.21	1.11	0.18	0.04	0.02	0.11	0.26	17.11
192	Moorpark-Everett	34:15:02 118:50:36	0.34	1.85	1.70	2.66	2.85	2.64	0.93	0.13	0.02	0.02	0.09	0.21	13.43
193	Santa Susana	34:16:05 118:42:32	0.32	1.69	1.92	2.68	2.98	2.87	0.99	0.14	0.03	0.02	0.13	0.24	13.99
194	Camarillo-Adohr	34:12:17 119:00:45	0.30	1.61	1.66	2.53	2.65	2.43	0.80	0.09	0.03	0.01	0.07	0.22	12.39
196	Tapo Canyon	34:19:33 118:43:06	0.45	2.42	2.63	3.76	4.15	3.52	1.35	0.20	0.04	0.02	0.14	0.29	18.97
223	Point Mugu-USN	34:06:46 119:07:10	0.26	1.59	1.51	2.50	2.82	2.12	0.79	0.08	0.03	0.01	0.07	0.34	12.11

urbanization occurs, roofs and paved surfaces cover substantial portions of the surface area, significant increases occur in the storm runoff with even small storms. Therefore, as the density of development increases the resultant increase in storm runoff creates the need for drainage facilities to protect the valuable property from harm.

SECTION V

STUDY RESULTS

This report is intended to be used as a baseline condition for all communities within the Calleguas Creek Watershed for planning purposes. The information included in this report was derived from a model of present conditions and should not be used for design of future channels or improvements. Flowrates can be used to update Flood Insurance Rate Maps, to evaluate the need for detention from impact of new project flows, and to perform deficiency studies of existing facilities. Since the modified rational computer program computes a hydrograph for each subarea, junction analysis for every lateral drain, and performs storage routing within each reach, the output reflects a complex model not a simple peak producing calculation. Input can be modified to evaluate the impact of any channelization, detention basin or diversion prior to final design of a project. The second volume of this report will be to produce a design condition hydrology applying proposed future development and proposed improvement projects.

CALCULATED AND ESTIMATED PEAK FLOWS

Peak discharges for the 100-year frequency storm event were determined with the Calleguas Creek Watershed VCRAT model. Calculated peak discharges at specific points for Calleguas Creek and its tributaries are tabulated in Table 1a. Calculated peak discharges at specific points for Revolon Slough and its tributaries are tabulated in Table 1b. Hydrology maps are included as Figures 5a – 5d.

RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR PRESENT	500 YR PRESENT
	CALLEGUAS CRK.W/EXISTG. DAMS & INC CONEJO PRESENT CONDITION HYDROLOGY	(ACRES)	0.079	0.200	0.325	0.748	AERIAL RED.	100 yr.AERIAL RED.x
			(m+u+n)	(m+u+n)	(m+u+n)	(m+u+n)		1.787
11B	ARROYO SIMI AT HWY. 118.(HEADWATERS)	256	56	141	229	527	704	1258
22A	ARROYO SIMI AT KUEHNER DR.	1053	169	427	694	1597	2135	3815
40AB	ARROYO SIMI PRIOR TO JCT. W/ WHITE OAK	1736	243	616	1001	2303	3079	5501
57B	WHITE OAK AT RONALD REAGAN FWY W/ MT. SINAI BASIN	975	74	186	303	697	932	1666
58B	WHITE OAK CHL.PRIOR TO JCT.W/HUMMINGBIRD W/BASIN	1009	74	187	304	699	934	1669
79C	HUMMINGBIRD CREEK DOWNSTREAM OF RONALD REAGAN FWY	1000	158	400	651	1497	2002	3577
82CD	HUMMINGBIRD CREEK AT KUEHNER DR.	1120	170	430	698	1607	2148	3839
85CD	HUMMINGBIRD CREEK AT ALSCOT AVENUE	1236	181	459	745	1716	2294	4099
87BC	WHITE OAK CHL.AFTER JCT.W/HUMMINGBIRD	2319	223	563	916	2107	2817	5035
88B	WHITE OAK PRIOR JCT.W/ARROYO SIMI	2361	222	562	914	2103	2812	5025
96AB	ARROYO SIMI AFTER JCT.W/WHITE OAK CHANNEL W/BASIN AT MT.SINAI	4426	467	1181	1920	4419	5907	10556
108AB	ARROYO SIMI AT STOW STREET (NEW STREAMGAGE SITE)	5004	506	1281	2081	4790	6404	11443
124A	ARROYO SIMI PRIOR TO JCT W/STEARNS ST.DRN.	5653	522	1321	2147	4941	6606	11805
134B	STEARNS ST.DRN.AT HWY 118	432	66	168	272	627	838	1498
145B	STEARNS ST.DRN.PRIOR JCT W/ARROYO SIMI	920	132	333	542	1247	1667	2978
146AB	ARROYO SIMI AFTER JCT.W/STEARNS ST. DRN.	6573	584	1479	2403	5530	7393	13211
147A	ARROYO SIMI UPSTREAM OF LAS LLAJAS CANYON CHANNEL	6636	585	1481	2406	5538	7404	13230
159BC	LAS LLAJAS DAM INFLOW	4327	363	920	1494	3439	4598	8216
160B	LAS LLAJAS DAM OUTFLOW Q100 FR VCRAT RUN,6/97,Y=3.97"LS	4327	43	109	176	406	543	970
173C	CHIVO CYN W/NO DAM PRIOR TO JCT.W/LAS LLAJAS	2528	230	583	947	2180	2915	5208
174BC	LAS LLAJAS CHL AFTER JCT.W/CHIVO CYN(NO DAM ON CHIVO)	6855	260	658	1069	2460	3289	5877
182C	MARR DIVERSION PRIOR TO JCT.W/LAS LLAJAS	381	72	181	294	677	905	1618
183BC	LAS LLAJAS AFTER JCT.W/MARR DIVERSION	7294	280	709	1152	2651	3544	6334
192C	KADOTA FIG CHL PRIOR TO JCT W/LAS LLAJAS	322	72	181	295	678	907	1620
193BC	LAS LLAJAS AFTER JCT.W/KADOTA FIG AT ALAMO ST.	7764	304	771	1252	2882	3853	6885
194B	LAS LLAJAS AT HWY 118 W/DAM ON LAS LLAJAS	7836	304	770	1251	2878	3848	6876
196B	LAS LLAJAS PRIOR TO JCT.W/ARROYO SIMI (NO DAM ON CHIVO)	7953	310	785	1275	2934	3923	7010
197AB	ARROYO SIMI AFTER JCT.W/LAS LLAJAS (ONE DAM) NO A.R.	14589	822	2081	3382	7785	10407	18598
217A	ARROYO SIMI PRIOR TO JCT W/TAPO ST.DRN.	15200	815	2064	3354	7720	10321	18444
233BC	TAPO ST. DRN.AT LOS ANGELES AVENUE	489	79	201	326	751	1004	1794
236AB	ARROYO SIMI AFTER JCT.W/TAPO ST. DRN.	15819	822	2080	3380	7780	10401	18586
270C	MEIER CYN.EAST FK.NR.BRANDIS CAMP	2104	213	538	875	2013	2691	4810
294D	MEIER CYN.WEST FK.PRIOR JCT.W/EAST FK.	1284	173	438	712	1638	2190	3914
296CD	MEIER CYN AFTER JCT.EAST & WEST FKS.	3388	346	875	1422	3273	4376	7819
303C	MEIER CYN PRIOR TO JCT.W/ARROYO SIMI	3744	342	867	1409	3243	4335	7747
306AC	ARROYO SIMI AFTER JCT.W/MEIER CANYON	19765	1085	2746	4463	10271	13731	24538
325A	ARROYO SIMI PRIOR TO JCT W/TAPO CYN CHL.	20687	1080	2733	4442	10222	13666	24422
343B	TRIPAS CYN PRIOR TO JCT.W/TAPO CYN	5556	474	1201	1952	4493	6006	10733
347BC	TAPO CANYON AFTER JCT.W/ TRIPAS CYN	6888	612	1548	2516	5791	7742	13835
355C	GILDEBRAND CANYON PRIOR TO JCT.W/TAPO CANYON	3142	299	758	1231	2834	3788	6770
356BC	TAPO CANYON AFTER JCT.W/GILDEBRAND CYN.	10536	872	2207	3587	8256	11037	19723
358B	TAPO CYN CHAL. AT TAPO CANYON ROAD (NO DAM)	11356	882	2234	3630	8355	11170	19960
359B	TAPO CANYON AT CANYON MOUTH W/LS SUBAREAS RUN,6/97,DDT/LS	11425	883	2235	3632	8360	11176	19972
390B	TAPO CYN AT HWY 118 W/SPLITS OF CAPACITY AT XINGS	12231	544	1378	2239	5153	6888	12310
	TAPO CANYON W/ SPLITS AT COCHRAN STREET	12327	239	606	985	2267	3031	5417
418B	TAPO CYN PRIOR TO JCT W/ARROYO SIMI W/LS SUBAREAS	13182	274	694	1127	2595	3469	6199
419AB	ARROYO SIMI AFTER JCT W/TAPO CYN CHL	33869	1190	3014	4897	11271	15068	26926
423BC	RUNKLE CANYON HEADWATERS ABOVE DAM	722	137	347	564	1299	1736	3103
424B	RUNKLE CANYON DAM INFLOW Q100,AR=0.92,Y=3.6,VVM/DDT/LS,6/97	954	106	269	437	1006	1345	2403
437B	RUNKLE CANYON AT FITZGERALD ST.	1632	160	405	658	1514	2024	3616
440B	RUNKLE CANYON PRIOR TO JCT. W/ARROYO SIMI	1782	163	413	671	1544	2065	3690
441AB	ARROYO SIMI AFTER JCT. W/RUNKLE CANYON	35651	1239	3138	5099	11736	15689	28037
452B	TAPO HILLS DIVERSION NO.2 INFLOW TO DAM	140	30	75	122	282	377	673
453B	TAPO HILLS DIVERSION NO. 2 OUTFLOW FROM DAM	140	6	14	23	53	71	127
460C	TAPO HILLS DIVERSION NO. 1 INFLOW TO DAM	110	23	59	95	220	294	525
460C	TAPO HILLS DIVERSION NO. 1 OUTFLOW FROM DAM	110	4	11	18	42	56	100
466B	DITCH ROAD DRAIN PRIOR TO JCT.W/DRY CANYON	385	30	75	122	280	374	669
488C	DRY CANYON CHANNEL PRIOR TO JCT.W/DITCH RD.DRN.	787	102	257	418	962	1286	2298
489BC	DRY CANYON CHANNEL AFTER JCT.W/DITCH RD.DRN.	1172	123	312	507	1167	1561	2789
500B	DRY CANYON CHANNEL AT HWY 118	1476	137	348	565	1300	1738	3105
509B	DRY CANYON CHANNEL AT RR PRIOR TO JCT W/LATERAL	1786	171	433	704	1621	2167	3872
513C	DRY CYN.LATERAL PRIOR TO JCT W/DRY CYN AB.RR	213	34	86	140	323	432	772
514BC	DRY CYN.CHL.AFTER JCT.W/LATERAL DRN.AB.RR	1999	193	488	794	1827	2442	4365
519B	DRY CANYON AT HEYWOOD STREET	2216	213	538	874	2012	2690	4807
520B	DRY CYN.CHL.PRIOR TO JCT.W/ARROYO SIMI	2234	212	537	873	2008	2685	4798

Table 1a

FINAL

RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR PRESENT	500 YR PRESENT
	CALLEGUAS CRK.W/EXISTG. DAMS & INC CONEJO PRESENT CONDITION HYDROLOGY	(ACRES)	0.079	0.200	0.325	0.748	AERIAL RED.	AERIAL RED.
			(m+u+n)	(m+u+n)	(m+u+n)	(m+u+n)		1.787
528AB	ARROYO SIMI AFTER JCT.W/DRY CYN DRAIN	38152	1262	3195	5192	11949	15974	28546
534B	ERRINGER ROAD LATERAL AT FITZGERALD PRIOR TO JCT.	228	42	105	171	394	527	942
542CD	EXISTING ERRINGER DEBRIS BASIN INFLOW	333	59	148	241	555	742	1326
548BC	ERRINGER RD. DRN. AFTER JCT.W/LATERAL	751	78	197	320	736	984	1759
550B	ERRINGER DRAIN AT ARCANE STREET	804	82	207	336	773	1034	1847
552B	ERRINGER RD. DRN. PRIOR TO JCT. W/ARROYO SIMI	874	83	210	341	785	1049	1874
553AB	ARROYO SIMI AFTER JCT.W/ERRINGER RD.DRN.	39026	1265	3204	5206	11982	16018	28625
563AB	ARROYO SIMI UPSTREAM OF BUS CANYON DRAIN	39334	1263	3198	5197	11961	15990	28575
568AB	ARROYO SIMI AT FIRST STREET	39538	1261	3192	5187	11939	15961	28523
596BC	BUS CANYON AT CYN.MOUTH AB.BRIDAL PATH HOMES	1657	208	526	855	1967	2630	4700
600B	BUS CANYON AT FIRST STREET	1913	198	500	813	1871	2502	4471
605C	BUS CANYON INFLOW TO DETENTION AREA	146	21	52	85	195	260	465
606C	BUS CANYON TRIBUTARY, OUTFLOW THRU DAM	146	10	25	40	92	123	220
609B	BUS CANYON BEFORE JNC W/BUS CAN. TRIB.	2257	198	500	813	1872	2502	4471
630C	BUS CANYON DRAIN TRIBUTARY AT FITZGERALD ROAD	590	89	225	366	841	1125	2010
633C	BUS CANYON DRAIN TRIBUTARY AT FIRST STREET	698	99	252	409	941	1259	2249
637C	BUS CANYON TRIBUTARY PRIOR TO JCT. W/BUS AT ROYAL	780	108	273	443	1020	1363	2436
638BC	BUS CANYON AFTER JCT.W/TRIBUTARY AT ROYAL AVE.	3037	220	558	906	2086	2789	4983
648B	BUS CANYON AT ARROYO SIMI PRIOR TO JCT.	3202	222	563	915	2106	2816	5032
649AB	ARROYO SIMI AFTER JCT.W/BUS CYN,EXISTING DAMS ONLY	42740	1346	3408	5537	12744	17038	30446
665B	NORTH SIMI DRAIN INFLOW TO PROPOSED DETENTION DAM	699	80	203	331	761	1017	1817
671BC	NORTH SIMI DRN AFTER JCT W/LATL ABOVE HWY 118 ROUTED TO CALDWELL	874	83	211	343	789	1054	1884
684BD	NORTH SIMI DRN W/COCHRAN ST LATERAL LIMITED TO 150 CFS	1183	97	245	399	918	1227	2193
686BC	NORTH SIMI DRN AFTER JCT. W/NORTH LATERAL AT FIRST STREET	1217	98	248	402	926	1238	2213
693BC	NORTH SIMI DRN AT FIRST STREET WITH 10-YEAR LIMITED PIPES	1443	108	274	445	1024	1369	2447
707AB	ARROYO SIMI AFTER JCT. W/NO SIMI DRN. W/NO DAM & NO LATL.	44451	1362	3448	5603	12895	17240	30808
722AB	ARROYO SIMI AT MADERA ROAD W/EXISTING DAMS	45013	1360	3444	5597	12881	17221	30774
739B	OAK CYN. AT LONG CANYON RD.	1477	176	446	724	1666	2228	3981
743B	OAK CYN .AT SYCAMORE DAM PRIOR TO JCT.W/OTHER TRIBS.	1831	165	419	681	1567	2095	3743
763CD	SYCAMORE CYN. AFTER JCT. W/TRIBUTARY NR.LAKE PK.DR.	755	95	241	392	902	1206	2155
785D	WEST FK. SYCAMORE CYN. PRIOR TO JCT. W/SYCAMORE	1461	163	412	670	1542	2062	3684
786CD	SYCAMORE CYN. AFTER JCT. W/ WEST FK. INFLOW TO DAM	2250	229	580	942	2168	2899	5180
795BC	SYCAMORE CYN. DAM TOTAL INFLOW	4390	399	1011	1642	3780	5053	9030
796B	SYCAMORE CANYON DETENT. DAM OUTFLOW, DBT/LS,7/97,Y=3.74"	4390	99	250	406	934	1249	2232
799C	SINALOA LAKE OUTFLOW	197	33	84	136	314	420	750
809B	SYCAMORE CYN CHL AT MADERA RD XING W/BONITA DR.	5114	136	345	561	1291	1726	3084
812B	SYCAMORE CYN CHL. PRIOR TO JCT. W/ARR. SIMI W/DAM	5276	153	386	628	1445	1932	3453
813AB	ARROYO SIMI AFTER JCT.W/ SYCAMORE CYN. W/ EXISTING DAMS	50289	1351	3420	5558	12791	17100	30558
837B	BREA CYN. AT CITY BOUNDARY	907	149	376	611	1407	1881	3361
847BC	BREA CYN. AT HIGHWAY 118	1181	154	391	635	1462	1954	3492
851B	BREA CYN PRIOR TO JCT. W/ ARROYO SIMI	1333	158	399	649	1493	1996	3566
852AB	ARROYO SIMI AFTER JCT. W/BREA CYN.	51622	1354	3428	5571	12822	17141	30632
871B	OUTLET FROM SIMI VLY SANITARY LANDFILL AB. HWY 118	192	36	91	148	341	455	814
990B	ALAMOS CYN AT CITY BOUNDARY	3496	290	735	1195	2750	3676	6569
998B	ALAMOS CYN. AT HWY. 118	3753	309	782	1271	2924	3910	6987
1000B	ALAMOS CYN.PRIOR TO JCT. W/ ARROYO SIMI (@railroad)	3804	310	784	1274	2932	3920	7005
1002AB	ARROYO SIMI AFTER JCT. W/ALAMOS CYN. Q-100P W/ EXISTING DAMS '97	56751	1379	3491	5673	13057	17455	31192
1031AB	ARROYO SIMI DOWNSTREAM OF ALAMOS CYN. MDP LIMIT LINE	57696	1376	3485	5662	13032	17423	31135

RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR PRESENT	500 YR PRESENT
	CALLEGUAS CRK.W/EXISTG. DAMS & INC CONEJO PRESENT CONDITION HYDROLOGY	(ACRES)	0.107	0.244	0.374	0.775	AERIAL RED.	100 yr.AERIAL RED.x
			(m+u+n)	(m+u+n)	(m+u+n)	(m+u+n)		1.653
	CANYON NO.2 - EXIST.COND.Q100, W/J',DT/WF/LS 7/97,FN=CYN20797.HI							
1071B	OIL FIELD CYN PRIOR TO JCT W/ NO. 2 CANYON	964	137	313	479	993	1281	2117
1086E	NUMBER 2 CYN. PRIOR TO JCT. W/ OIL FIELD CYN.	710	123	281	430	891	1150	1901
1087BE	NUMBER 2 CANYON AFTER JCT. W/ OIL FIELD CYN.	1674	237	540	828	1715	2213	3658
1114D	CAMPUS ROAD CYN PRIOR TO JCT. W/ NO. 2 CANYON	877	139	318	487	1009	1302	2152
1115BD	NUMBER 2 CYN. AFTER JCT W/ CAMPUS RD CYN AT CITY BOUNDARY	3050	385	878	1346	2790	3600	5950
1125BF	CANYON NO.2 AT HWY 118 XING PRIOR TO JCT. W/ARR.SIMI	3321	386	880	1349	2796	3607	5963
1126AB	ARROYO SIMI AFTER JCT. W/ NUMBER 2 CYN.	61379	2062	4702	7208	14936	19272	31857
1128B	STRATHEARN CYN TR3963 Q100FW/RAMSEYER PROJ.W/J' DDT/GKC/LS,7/97	42	10	24	37	76	98	161
1138B	INLET Q AT TERMINUS 16TH CIRCLE & 17TH CIRCLE	440	71	163	249	516	666	1101
1139B	Q @ PRIVATE RECREATION AREA, PARCEL R-3	488	72	163	250	518	669	1105
1143B	Q @ [STL STRS. [STVR; P-2	519	72	163	250	519	670	1107
1145D	INLET Q AT TERMINUS C STREET	26	9	21	32	66	85	140
1148E	INLET Q AT 7TH CIRCLE	59	15	34	52	109	140	232
1161C	INLET Q AT PECAN AVENUE	414	63	144	221	457	590	976
1163BC	STRATHEARN CYN EAST FK.W/PECAN ST.PIPE INCL	1157	150	343	526	1089	1405	2323
1193D	STRATHEARN CANYON PRIOR TO CONFLUENCE WITH 111B	1452	181	413	633	1312	1693	2799
1194BD	STRATHERN CANYON AT TRACT BOUNDARY	2618	292	667	1022	2117	2732	4516
1197B	STRATHEARN CANYON AT ARROYO SIMI, W/ TR.3963	2675	292	666	1021	2116	2730	4513
1198AB	ARROYO SIMI AFTER JCT. W/ STRATHERN CYN.	64050	2152	4907	7521	15585	20110	33242
1277B	HAPPY CAMP CYN.AT REG. PK.UPSTREAM BOUNDARY	3920	349	796	1220	2529	3263	5393
1301B	HAPPY CAMP CYN AT DAM SITE #1A	5389	367	838	1284	2661	3434	5676
1316CE	HAPPY CAMP CYN AT DAM SITE #1B	891	105	239	366	758	978	1616
1317C	NO. FK. HAPPY CAMP CYN PRIOR TO W/ HAPPY CAMP MAIN CHL.	947	102	232	355	735	949	1569
1318BC	HAPPY CAMP CYN. AFTER JCT. W/ NO. FK. HCC	6408	431	982	1505	3118	4024	6651
1322BE	HAPPY CAMP CYN AT DAM SITE #2	6582	434	990	1517	3144	4057	6706
1329B	HAPPY CAMP CYN AT DAM SITE #3	7041	428	977	1497	3103	4003	6618
1330B	HAPPY CAMP CYN. AT CITY LIMIT BOUNDARY	7119	426	971	1489	3085	3981	6581
1337B	HAPPY CAMP CANYON AT HWY 118	7481	432	985	1510	3129	4038	6674
1343B	HAPPY CAMP CYN AT ARROYO SIMI	7589	433	986	1512	3133	4042	6682
1344AB	ARROYO SIMI AFTER JCT. W/HAPPY CAMP CYN. AT VA COLONY	72423	2374	5413	8297	17193	22185	36672
1350B	CASTRO WILLIAMS SPILLWAY WITH ROUTED FLOW FROM WEST, DDT/BJ	62	16	38	58	119	154	255
1361B	CASTRO WILLIAMS NEAR LOS ANGELES AVE.IN MOORPARK	357	61	140	215	445	574	949
1401AC	ARROYO SIMI AT NEW LOS ANGELES AVE. NEAR SCIENCE DR.	72906	2374	5413	8297	17193	22184	36670
1417B	CASTRO WILLIAMS SPILLWAY NEAR LOS ANGELES AVE.	928	164	375	574	1190	1536	2539
1427AB	ARROYO SIMI AT SPRING STREET- SITE OF GAGE 801	74000	2373	5412	8295	17190	22180	36664
1450AB	ARROYO SIMI AT LIBERTY BELL RD. (LETA YANCY)	74311	2372	5408	8290	17179	22166	36640
1463B	SHASTA DRAIN PRIOR TO JCT. W/ARR.SIMI	179	24	56	86	177	229	378
1464AB	ARROYO SIMI AFTER JCT.W/SHASTA DRAIN	74490	2371	5407	8288	17174	22160	36630
1472AB	ARROYO SIMI AT TIERRA REJADA ROAD.	74711	2368	5399	8275	17148	22127	36575
1490A	ARROYO LAS POSAS PRIOR JCT WITH PEACH HILL	74905	2364	5390	8262	17120	22091	36516
1491B	PEACH HILL UPDATE W/AS-BUILT PLANS & DEV.(NEW MAP) DT/BA/89	0	6	14	21	44	57	94
1501BC	PEACH HILL AT UPSTREAM END OF HAWKES FEMA STUDY	276	70	159	244	506	653	1079
1508D	PIPE IN TIERRA REJADA PRIOR TO JCT.W/PEACH HILL	172	43	98	151	312	403	666
1511E	PEACH HILL TRIBUTARY FRON NO.PRIOR TO JCT.W/MAIN CH.	154	35	81	124	257	331	547
1512BE	PEACH HILL WASH AFTER JCT.W/NO TRIBUTARY 1989 UPDAT	552	118	268	411	852	1099	1816
1513BD	PEACH HILL WASH AFTER JCT.W/PIPE IN TIERRA REJ. UPDT	724	152	346	531	1100	1420	2347
1520D	EAST BRANCH OF PIPE LATERAL PRIOR TO JCT.W/WEST BRCH.	234	49	113	173	358	462	764
1525E	WEST BRANCH OF PIPE LATERAL PRIOR TO JCT.W/EAST BRCH.	255	56	127	194	403	520	859
1526DE	102 INCH PIPE IN MT.MEADOW PRIOR TO JCT.W/MAIN BRCH.	489	102	232	356	738	952	1573
1527BD	PEACH HILL WASH AFTER JCT.W/102 IN PIPE UPDATE 89	1344	250	571	875	1814	2340	3868
1530C	PEACH HILL TRIBUTARY PRIOR TO JCT.W/MAIN UPDATE 89	37	10	22	34	69	90	148
1535BD	PEACH HILL WASH-TOTAL INFLOW INTO RETENTION BASIN	1619	228	519	796	1650	2128	3518
1536B	PEACH HILL WASH-OUTFLOW FRM RETENT.BSN.'89,Y=3.9W/125%DBR	1619	159	363	556	1152	1486	2456
1540B	PEACH HILL WASH-RTED.THRU BSN.PRIOR TO JCT.W/HOME ACRES	1664	159	361	554	1148	1482	2449
1555D	HOMEACRES DRN.PRR TO JCT.W/PEACH HILL RTED.THRU BASIN UPD	785	100	229	351	727	938	1550
1556BD	PEACH HILL WASH-AFTER JCT.W/HOMEACRES,INC.BSN.RTE. 89 UPD.	2449	231	526	806	1671	2156	3564
1557B	PEACH HILL WASH-AT ARR. SIMI W/RTED.BSN & HOMEACRES UPD	2527	227	518	795	1647	2125	3512
1558AB	ARROYO LAS POSAS AFTER JT.W/PEACH HILL WASH & HOMEACRES	77432	2421	5521	8463	17537	22629	37405
1561B	WALNUT-GABBERT CYN,ULT.LNDUSE, J&K ZONE RAIN DDT/DKT 5/96	94	24	55	84	175	226	373
1566B	WALNUT CANYON ROAD	390	88	201	308	638	823	1360
1567B	DOWNSTREAM OF WALNUT CANYON	439	96	220	337	697	900	1488
1574BC	WALNUT CYN JCT.W/WEST LATL.ULTIMATE LANDUSE NO DETN.	709	146	334	512	1060	1368	2261
1586E	MOORPARK DRN. NO. 1 PRIOR TO WALNUT CYN JCT.	27	8	18	28	58	75	124
1587DE	MOORPARK DRAIN NO. 1 PER '95 MDP W/ULTIMATE CONDITION	144	31	71	109	226	292	482
1588BD	WALNUT CYN DRN.JCT W/MPK DRN.NO.1 W/ULTIMATE LANDUSE	853	169	385	591	1224	1580	2611
1589B	WALNUT CYN . CHL. AFTER JCT. W/ MPK. DRN. NO. 1	853	168	383	588	1218	1571	2597

RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR PRESENT	500 YR PRESENT
	CALLEGUAS CRK.W/EXISTG. DAMS & INC CONEJO PRESENT CONDITION HYDROLOGY	(ACRES)	0.107	0.244	0.374	0.775	AERIAL RED.	100 yr.AERIAL RED.x
			(m+u+n)	(m+u+n)	(m+u+n)	(m+u+n)		1.653
1595BC	WALNUT CYN DRN.JCT W/LATL.BEFORE GABBERT RD. ULTIMATE	1048	191	436	669	1385	1788	2955
1606CE	WALNUT TRIBUTARY AT FUTURE FREEWAY XING, ULTIMATE	468	98	223	342	708	914	1510
1608BC	WALNUT CYN. AFTER JCT. W/LATERALS ADJACENT TO GABBERT RD.	1546	198	453	694	1437	1855	3066
1609B	WALNUT CYN. CHL. PRIOR TO JCT. W/ GABBERT CYN. DRN.	1616	199	453	695	1440	1859	3072
1610B	WALNUT CANYON AT HWY 118 PRIOR JCT. ULTIMATE CONDITION	1616	199	453	694	1438	1855	3067
1621D	DRAIN FROM EAST ALONG HWY 118 PRIOR TO JCT. W/WALNUT	173	40	90	138	287	370	611
1622BD	WALNUT CYN AT HWY 118 AFTER JCT. W/HWY DRAIN FROM EAST	1789	203	464	711	1473	1901	3142
1640DF	EPWORTH DRAIN AT BROADWAY; ULTIMATE LANDUSE	538	79	179	275	569	735	1214
1655DE	EPWORTH DRN AT JCT.W/GABBERT NR.MPK CITY LMTS. ULTIMATE	1177	160	365	560	1161	1498	2476
1664CD	GABBERT CYN AFTER JCT W/MPK.COUNTRY CLUB ESTAT.ULTIMATE	2151	205	467	716	1483	1914	3163
1669C	GABBERT DEBRIS BASIN INFLOW ULTIMATE, NO DETENTION	2441	203	462	709	1468	1894	3132
1673C	GABBERT CYN PRIOR JCT. W/WALNUT CYN, ULTIMATE LAND USE	2571	204	465	712	1476	1905	3149
1674BC	WALNUT-GABBERT AT JCT.ABOVE HWY 118 ULTIMATE LAND USE	4360	394	899	1378	2855	3684	6090
1678BD	GABBERT CYN AT ARROYO SIMI, ULTIMATE, NO RETENTION	4424	395	901	1382	2863	3694	6106
1679AB	ARROYO LAS POSAS AFTER JCT.W/GABBERT CYN NR. HITCH BLVD.	81856	2501	5702	8741	18112	23371	38632
1683A	ARROYO LAS POSAS PRIOR TO GRIMES CANYON Q-100P (@HITCH BLVD.-CS9)	82396	2496	5692	8725	18081	23330	38564
1700BC	SOUTH GRIMES WITH TRIBUTARY	2996	215	491	752	1559	2011	3324
1705AB	ARROYO LAS POSAS WITH SOUTH GRIMES CANYON WASH	86257	2581	5885	9020	18691	24118	39867
1713AB	ARROYO LAS POSAS AFTER JCT. W/HUNT WASH CYN.	87925	2597	5922	9078	18810	24271	40121
1717A	LAS POSAS HILLS PRIOR JUNC. W/ARROYO LAS POSAS	88364	2594	5915	9067	18788	24242	40072
1744B	LONG CANYON PRIOR TO JCT W/ ARROYO LAS POSAS	3240	271	617	946	1960	2529	4181
1746AB	ARROYO LAS POSAS AFTER JCT. W/LONG CYN	91743	2686	6125	9388	19455	25103	41495
1753B	MAHAN BARRANCA AT HWY 118 PRIOR TO JCT.W/ARR. LAS POSAS	1385	103	234	359	745	961	1588
1755AB	ARROYO LAS POSAS AFTER JCT. W/ MAHAN BARR.	93613	2720	6203	9507	19701	25420	42020
1764B	SAND CANYON PRIOR TO JCT W/ ARROYO LAS POSAS	1630	207	471	722	1497	1931	3192
1766AB	ARROYO LAS POSAS AFTER JCT. W/SAND CANYON	95297	2742	6253	9585	19862	25629	42364
	VCRAT MODEL-COYOTE & FOX CYNS,PRESENT COND.,DDT/LS,12/97							
1799B	PUERTA ZUELA PRIOR TO JCT.W/DONLON DRN.	1970	186	423	649	1344	1734	2867
1804C	DONLON DRN. PRIOR TO JCT.W/PUERTA ZUELA	252	34	78	119	247	319	527
1805BC	PUERTA ZUELA AFTER JCT. W/ DONLON DRAIN	2222	204	465	713	1477	1905	3150
1828CD	COYOTE CYN AT BRADLEY RD CROSSING	1555	201	457	701	1453	1875	3099
1838C	COYOTE CYN PRIOR TO JCT. W/PUERTA ZUELA	2253	194	443	679	1407	1816	3001
1839BC	COYOTE CYN AFTER JCT. W/ PUERTA ZUELA	4475	373	851	1305	2703	3488	5766
1845B	COYOTE CANYON PRIOR CONFLUCENCE WITH FOX CANYON	5015	384	875	1342	2781	3588	5931
1879CD	FOX CANYON AFTER JCT. W/BOONE CYN	2234	262	598	917	1899	2451	4051
1883C	FOX CYN NORTH OF HWY 118 PRIOR TO JCT W/ BERYLWOOD CYN	2484	262	597	915	1896	2446	4044
1891D	BERYLWOOD CYN. AT HWY 118 PRIOR TO JCT W/ FOX CYN.	589	87	199	305	632	816	1348
1892CD	DOWNSTREAM OF FOX CANYON CONFL. W/BERYLWOOD CANYON	3073	285	649	995	2062	2660	4397
1894C	FOX CANYON DEBRIS BASIN	3170	284	648	993	2057	2654	4388
1897C	FOX CANYON PRIOR CONFLUENCE WITH COYOTE CANYON	3279	285	650	996	2064	2663	4401
1898BC	COYOTE CYN AFTER JCT W/ FOX CYN BARRANCA	8294	644	1469	2252	4667	6022	9954
1899AB	ARROYO LAS POSAS W/COYOTE AND FOX CANYONS	104015	2959	6748	10343	21432	27655	45713
1900A	ARROYO LAS POSAS AT SOMIS AFTER JCT.W/FOX & COYOTE	104098	2958	6745	10338	21422	27642	45692
1944B	GROVES PLACE DRAIN AT LEWIS RD. PRIOR TO JCT.W/ARR.LAS POSAS	262	39	88	135	280	362	598
1945AB	CALLEGUAS CK. AT SEMINARY BEND	105509	2962	6754	10353	21454	27682	45759
1959B	ST. JOHN'S DRAIN PRIOR TO JCT. W/ CALLEGUAS	369	73	167	256	530	684	1130
1960AB	CALLEGUAS CK. AFTER JCT. W/ ST. JOHN'S DRAIN (@UPLAND RD.)	105897	2964	6758	10359	21467	27699	45786
1981A	CALLEGUAS CRK. AT ADOLFO ROAD	106543	2963	6758	10358	21464	27696	45782
1986D	SOMIS DRAIN	82	24	55	85	176	227	376
2007D	SOMIS DRAIN AT E.LOOP-LAS POSAS RD	292	71	162	248	514	664	1097
2014BE	SOMIS DRAIN DOWN TO SHEPERD DRIVE AND DARA STREET	655	110	252	386	800	1032	1706
2019BD	WEST DRAIN TRIBUTARY WITH SOUTHERN PACIFIC (LEWIS RD.-DURKIN)	745	121	275	422	875	1129	1866
2023B	SOMIS DR. PRIOR TO JCT W/CALLEGUAS CREEK	886	123	280	429	890	1148	1898
2024AB	CALLEGUAS CREEK AFTER JCT.W/SOMIS DRAIN	107447	2972	6778	10390	21529	27780	45920
2038AD	CALLEGUAS CREEK AFTER JCT W/FLYNN ROAD DRAIN (CS5)	107746	2974	6782	10395	21541	27795	45945
2046AB	CALLEGUAS CREEK AT PLEASANT VALLEY ROAD	107941	2980	6796	10417	21587	27854	46043
2050A	CALLEGUAS CREEK BEFORE JCT W/CONEJO CREEK & LEWIS DRAIN	107995	2972	6776	10387	21523	27772	45907
2051B	LEWIS ROAD DRAIN AT DURKIN STREET	36	8	18	27	56	73	120
2086AB	CALLEGUAS CREEK WITH LEWIS ROAD DRAIN	109256	2960	6749	10345	21436	27659	45721

Table 1a

FINAL

RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR PRESENT	500 YR PRESENT
	CALLEGUAS CRK.W/EXISTG. DAMS & INC CONEJO PRESENT CONDITION HYDROLOGY	(ACRES)	0.142	0.287	0.416	0.796	AERIAL RED.	100 yr.AERIAL RED.x
			(m+u+n)	(m+u+n)	(m+u+n)	(m+u+n)		1.587
	CONEJO CREEK W/T.O. MDP SUBAREAS RENUMBERED							
	SO.BR & CMT Q100 LG/SV/DH/DT FROM SBR-1-93 NEW FN=SBAC997.HI							
2112BC	SO.BR.ARR.CON.TRIBUTARY FROM SO.FK.STATE PARK AREA PRR TO JCT.	632	106	214	310	592	744	1181
2220C	SO.BR.ARROYO CONEJO INFLOW TO DETENTION BASIN-TR. 4831	244	122	246	356	682	857	1360
2246CE	SO. BR. ARR. CONEJO TRIB. FROM TR.4831	307	143	290	420	804	1010	1603
2275C	SO.BR.ARR.CON.POTRERO INFLOW TO BASIN AREA	358	168	340	493	944	1186	1882
2277F	SO.BR.ARR.CON. OUTFLOW HYDROGRAPH FROM POTRERO BASIN(AR=0.974,YIELD=6.2")	0	46	93	135	259	325	516
2299C	SO.BR.ARR.CON.EAST TRIBUTARY PRIOR TO JCT.W/MAIN CHAL.	927	117	237	344	658	827	1313
2300BC	SO.BR.ARR.CON-EAST AND WEST COMBINE 50% YIELD 5.25" & AR	1611	195	393	570	1091	1370	2174
2301BF	SO.BR.ARR.CON.-EAST, WEST AND POTRERO BASIN COMBINED	1611	238	481	697	1334	1676	2660
2305B	SO BR.ARR.CON.ALONG REINO RD.PRIOR TO KIMBER BASIN(64A)	1611	238	480	696	1332	1673	2655
2332C	NEWBURY PK DRN # 3 PRIOR TO JCT.W/SO. BR. ARR. CONEJO	867	314	634	919	1759	2210	3507
2334BC	SO.BR.ARR.CON. PRIOR TO PROPOSED 2000 CFS SPLIT ,W/NO R.F.	2544	519	1048	1519	2907	3652	5796
2336BF	SO. BR. ARR. CON. 2200 CFS SPLIT FLOW AT REINO RD BYPASS	2544	312	631	915	1751	2200	3491
2340B	SO. BR. ARR. CON. BEFORE CONFL. WITH CONEJO MOUNTAIN CR.	2567	334	674	977	1870	2349	3728
2500CE	CON. MT. CK. INPUT HYDROGRAPH BEFORE BYPASS BASIN	1049	318	643	932	1784	2241	3557
2510C	CMC BYPASS LOW FLOW ROUTING W/BYPASS CUTOFF 940 CFS	1537	5	10	14	27	34	54
2524CD	CONEJO MT CK. BYPASS W/LOCAL AREA DOWNSTREAM OF DAM	1657	182	368	534	1022	1284	2037
2528BC	SO.BR.ARR.CON.-INFLOW HYDROGRAPH AT MAURICE ("A") ST. FLOW THROUGH BASIN	4224	507	1024	1484	2840	3568	5662
2539B	SO.BR. ARR. CON. OUTFLOW HYDRO. FROM MAURICE ST. ROUTED TO U/S HWY 101	4224	491	993	1440	2755	3461	5493
2545B	SO.BR. ARR. CON. OUTFLOW HYDROGRAPH AT COHEN'S PROPERTY KIMBER/REINO	4363	497	1005	1457	2788	3503	5559
2549B	SO.BR.ARR.CON. ALONG REINO PRIOR TO BORCHARD INTERSECTION W/DAMS UPS.	4408	498	1006	1458	2791	3506	5564
2559BC	SO.BR.ARR.CON. AT REINO & BORCHARD RD. W/UPSTREAM DAMS AND AREA RED.	4737	571	1153	1672	3199	4019	6378
2611BC	SO. BR.ARR.CON. INFLOW HYDRO. TO EXISTING FLOWAGE EASMT. U/STM. OF HWY101	6529	934	1887	2735	5233	6574	10433
2612BF	SO.BR.ARR.CON.AFTER SPLIT TO CHUTE AT HWY.101 & BORCHARD RD.	6529	639	1292	1872	3582	4500	7142
2613F	SO.BR.ARR.CON. BYPASS BASIN ABOVE HWY. 101 W/ ADJUSTED VOLUME & ROUTING	0	295	595	863	1651	2074	3291
2615B	SO.BR.ARR.CON. AT HWY.101 & BORCHARD RD FLOW INTO CHUTE	6529	639	1292	1872	3582	4500	7142
2647D	SO.BR.ARR. CONEJO. POSSIBLE FUTURE BASIN SITE	523	175	354	512	981	1232	1955
2689C	LATERAL FLOW TO SO. BR. NEAR VENTU PARK ROAD PRIOR TO JCT. W/SO. BR. ARR. CON.	2108	562	1136	1646	3150	3957	6280
2690BC	SO.BR. ARR.CON. AFTER JCT. W/LATERAL BELOW VENTU PARK. RD.W/CHUTE UPSTREAM	8637	1182	2388	3462	6624	8322	13207
2704B	SO.BR. ARR. CON. PRIOR TO CONF W/ARR CONEJO W/DAMS & CHUTE UPSREAM	8637	1182	2388	3462	6624	8322	13207
	LANG CK.W/OUT RBF BSN-VCFCD RTG.TO ARR.CON.JCT. DBT 1/99							
2764CE	LANG CREEK AT WESTLAKE BLVD DEBRIS BSN SITE.YIELD=3.8	2158	403	814	1180	2258	2836	4501
2768CD	LANG CK.W/OUT DETENTION DAM	2245	403	814	1180	2258	2836	4501
2782CD	LANG CREEK AT ERBES W/OUT DETENTION DAM	2875	418	845	1225	2345	2946	4675
2785C	LANG CREEK AT EL MONTE W/OUT DETENTION DAM	3038	421	851	1234	2360	2965	4706
2791C	LANG CREEK UPSTREAM OF HWY 23 W/OUT DETENTION DAM	3260	427	862	1250	2391	3004	4767
2802CD	LANG CREEK AT SPALDING W/OUT DETENTION DAM	3676	460	930	1348	2580	3241	5144
2804C	LANG CREEK DOWN TO COMBES AVE. AND PAIGE LN.	3768	466	942	1366	2614	3284	5211
2805C	LANG CRK DOWNSTREAM OF WILBUR RD. W/OUT DETENT. DAM	3839	474	958	1389	2657	3338	5298
2807C	LANG CRK PRIOR TO JCT. W/ARR.CONEJO W/OUT DETENT. DAM	3892	476	962	1394	2668	3351	5319
2842D	SKELETON CYN. AT CRESTHAVEN CROSSING	1179	293	593	860	1645	2066	3279
2852D	SKELETON CYN. AT HILLCREST W/VCFCD ROUTING 1/99	1594	337	681	986	1887	2371	3763
2879E	LOS ROBLES DRAIN AT HWY. 101 NEAR HAMPSHIRE ROAD XING	129	61	123	178	342	429	681
2890E	LOS ROBLES DRAIN AT OAK VIEW DRIVE	474	200	403	585	1119	1406	2231
2891E	LOS ROBLES DRN.PRIOR JCT.W/ARR.CON. W/VCFCD RTG.	523	214	432	627	1199	1506	2390
2895DE	ARR.CON.AFTER JCT.W/ROBLES DRN. W/VCFCD ROUTING	2904	623	1260	1826	3494	4389	6966
2898D	ARROYO CONEJO PRIOR TO JCT. W/ ERBES ROAD DRAN.	2954	637	1288	1866	3571	4486	7120
2907E	ERBES RD.DRN.PRIOR JCT.W/ARR.CON. DEV W/VCFCD RTG.	255	97	196	284	543	682	1082
2908DE	ARROYO CONEJO AFTER JCT. W/ ERBES ROAD DRAIN	3209	699	1412	2047	3918	4922	7811
2927DE	ARROYO CONEJO AT HODENCAMP RD. PRIOR TO JCT. W/ T.O. NO. DRAIN	3621	754	1523	2208	4225	5308	8424
2967E	THOUSAND OAKS NO. DRAIN AT LA JOLLA DRIVE	579	217	438	634	1214	1525	2420
2970E	THOUSAND OAKS NO. DRAIN AT HWY. 23 (DOWN TO HOUSTON-GREENWICH)	726	253	511	741	1417	1781	2826
2972E	THOUSAND OAKS NO.DRN.PRIOR JCT.W/ARR.CON. W/VCFCD RTG	805	266	537	779	1490	1872	2970
2973DE	ARROYO CONEJO AFTER JCT. W/ T.O. NO. DRN. W/VCFCD RTG.	5044	1114	2252	3264	6246	7847	12453
2974D	ARROYO CONEJO DOWN TO BOARDWALK AV.	5111	1117	2258	3274	6264	7869	12488
2976CD	ARR.CON.AFTER JCT.W/LANG CRK W/NO DAM UPS. W/VC.RTG.	9003	1459	2948	4274	8177	10273	16303
2977C	ARROYO CONEJO AT MOORPARK RD. W/NO DAM ON LANG CK.	9003	1457	2946	4269	8169	10263	16288
3019CD	ARROYO CONEJO DOWN TO W.THOUSAND OAKS BL.	10188	1589	3211	4654	8905	11188	17755
3029C	ARROYO CONEJO W. OF LYNN RD. PRIOR TO JCT. W/ PARK DRAIN	10488	1592	3218	4664	8925	11212	17793
3045D	PARK DRAIN PRIOR TO JCT. W/ ARROYO CONEJO AT LYNN RD.	742	153	310	450	860	1081	1715
3046CD	ARROYO CONEJO AFTER JCT. W/ PARK DRAIN WEST OF LYNN RD.	11230	1684	3403	4933	9439	11858	18818
3076D	HAIGH ROAD DRAIN AT HWY. 101	201	78	158	229	439	551	875
3079C	ARROYO CONEJO JUST PRIOR TO JCT.W/SO.BR.ARR.CON.(T.O. MPD #379A)	12311	1731	3499	5071	9704	12191	19347
3080BC	AR.CONEJO AFTER JCT.W/ SO.BR.ARROYO CONEJO (TO MPD #579AB)	20948	2408	4867	7055	13499	16958	26912
3087C	AMGEM DRAIN PRIOR TO JCT. W/ ARROYO CONEJO	124	33	66	95	183	229	364
3088BC	ARROYO CONEJO AFTER JCT. W/ DRAIN FROM AMGEM DEVELOPMENT	21259	2409	4868	7057	13503	16963	26921

RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR PRESENT	500 YR PRESENT
	CALLEGUAS CRK.W/EXISTG. DAMS & INC CONEJO PRESENT CONDITION HYDROLOGY	(ACRES)	0.142	0.287	0.416	0.796	AERIAL RED.	100 yr.AERIAL RED.x
			(m+u+n)	(m+u+n)	(m+u+n)	(m+u+n)		1.587
3167D	NO.FK.ARR. CONEJO TRIBUTARY AT HWY. 23 AND AVENIDA DE LOS ARBOLES	120	49	98	142	272	342	542
3181D	CASTANO CHL.TRIBUTARY PRIOR TO JCT.W/CASTANO CHL. NO. OF LOS ARBOLES	232	89	181	262	501	629	998
3188E	CASTANO CHL.PRIOR TO JCT.W/CASTANO TRIBUTARY	190	78	157	228	437	548	870
3189DE	CASTANO CHL. AFTER JCT. W/ CASTANO TRIBUTARY	422	156	315	457	875	1099	1744
3190D	CASTANO CHANNEL PRIOR TO JCT. W/ NO.FK. ARR. CONEJO	505	173	350	508	971	1220	1937
3204C	NO. FK. ARROYO CONEJO WEST OF LYNN ROAD	1754	373	754	1093	2092	2629	4172
3205C	NO. FK. ARROYO CONEJO PRIOR TO JCT. W/ WAVERLY CHANNEL	1813	379	767	1111	2126	2671	4239
3211DE	WAVERLY CHANNEL DOWN TO MOORPARK ROAD	157	63	128	185	354	444	705
3221D	WAVERLY CHANNEL AT LYNN ROAD	644	196	396	573	1097	1378	2187
3233D	WAVERLY CHANNEL PRIOR TO JCT. W/ NO.FK. ARR. CONEJO	1070	306	619	898	1718	2158	3425
3234CD	NO. FK. ARROYO CONEJO W/WAWERLY CHNL.	2883	638	1290	1870	3579	4496	7135
3250D	OLSEN CHANNEL AT MOORPARK ROAD	251	123	249	360	690	866	1375
3258D	OLSEN CHANNEL WEST OF CAL LUTHERAN COLLEGE AT MEMORIAL PARKWAY	580	193	389	564	1080	1357	2154
3276D	OLSEN CHANNEL AT AVENIDA DE LOS ARBOLES	1400	302	610	884	1692	2126	3373
3280CD	NO. FK. ARR. CONEJO AFTER JCT. W/ OLSEN CHANNEL	4773	884	1786	2588	4953	6222	9874
3292C	NO. FK. ARROYO CONEJO PRIIOR TO JCT W/ ARROYO CONEJO	5312	862	1742	2525	4832	6071	9634
3293BC	CONEJO CREEK AFTER JCT. W/ NO. FK. ARROYO CONEJO	28725	3214	6496	9415	18016	22633	35918
3300B	CONEJO CREEK BEFORE JCT. W/ ARROYO SANTA ROSA (TO MPD #800A)	29033	3205	6478	9390	17968	22573	35823
3332C	SOUTH FORK TIERRA REJADA CK(EVERETT RANCH W/J'RAIN	1196	275	555	805	1540	1934	3069
3387DE	TIERRA REJADA VLY AT U/S FACE OF 23 FREEWAY	1397	258	522	756	1447	1818	2885
3388D	TIERRA REJADA VLY AT D/S FACE OF 23 FREEWAY	1397	258	521	755	1444	1814	2879
3395CD	TIERRA REJADA VLY AT MOORPARK RD(W.OF 23 FREEWAY)	3643	619	1251	1813	3469	4358	6917
3398CE	TIERRA REJADA VLY AT W OF MRPARK RD,W/ MRPARK HIGHLANDS	3719	629	1272	1844	3528	4432	7033
3424D	TIERRA REJADA VLY, SO. CHNL AT SANTA ROSA MOUTH (J'100)	374	63	127	184	352	442	702
3428CD	TIERRA REJADA VLY AT ARR STA ROSA MOUTH,W/O PC-4,(J'ZN)	4516	667	1348	1953	3737	4695	7451
3430C	ARROYO SANTA ROSA AT CONCRETE ARCH DAM (J'100)	4648	654	1322	1917	3668	4608	7313
3449CD	ARR.STA.ROSA AT E.LAS POSAS RD.JCT.W/PENFIELD&SMITH UPDAT	5329	635	1284	1861	3561	4473	7099
3452CD	ARR.STA.ROSA DWNSTRM.OF LOS POSAS RD (D/S OF FLOOD WALL)	5426	635	1284	1861	3560	4472	7098
3454C	ARR.STA.ROSA @ THE BRIDGE @ SANTA ROSA RD.	5510	603	1218	1765	3378	4243	6734
3466CD	ARR.STA.ROSA AFTER JCT.W/DUVAL RD.DRN,PRIOR TO JCT.W/TRIB.	5945	596	1205	1747	3342	4199	6664
3473DE	STA.ROSA TRIB.AT MOUTH OF McRAE RANCH	344	89	180	261	500	628	997
3480DE	STA.ROSA TRIB.AT INTERSECTION OF MOORPARK RD & SANTA ROSA RD.	509	122	247	358	685	860	1365
3503DE	STA.ROSA TRIB.AT VISTA ARROYO DR.	1109	189	382	553	1059	1330	2111
3513DE	STA.ROSA TRIB.AT STA.ROSA RD.BELOW DEBRIS DAM,P&S UPDATE	1379	216	436	632	1209	1519	2411
3535D	STA.ROSA TRIB.PRIOR TO JCT.W/ARR.STA.ROSA, P&S UPDATE	2398	325	657	952	1821	2288	3631
3536CD	ARR.STA.ROSA @JCT.W/SAT.ROSA TRIB, PENFIELD &SMITH UPDATE	8343	677	1369	1984	3796	4769	7568
3568CD	ARR.STA.ROSA PRIOR JCT.W/CONJ. CK.W/PENFIELD&SMITH UPDATE	9186	672	1359	1970	3769	4735	7514
3570BC	CONEJO CREEK AFTER JCT. W/ARR.STA.ROSA PRESENT	38437	3299	6667	9664	18492	23231	36867
3597BC	CONEJO CREEK AFTER JCT. W/ BARBARA DRIVE DRAIN	39701	2953	5969	8652	16556	20799	33008
3621C	CAMROSA DRAIN PRIOR TO JCT. W/CONEJO CREEK	409	107	216	314	600	754	1197
3630BD	CONEJO CREEK AT GAGE VC800	41370	3136	6339	9188	17581	22087	35051
3647C	UPLAND RD.DRN.PRIOR TO JCT. W/CONEJO CK.	592	203	409	594	1136	1427	2264
3648BC	CONEJO CREEK AFTER JCT.W/ UPLAND RD. DRN.	42174	3298	6665	9661	18486	23223	36855
3677D	MISSION OAKS DRN. PRIOR TO JCT.W/CONEJO CR.	448	136	274	397	760	955	1515
3680BD	CONEJO CREEK AFTER JCT.W/MISSION OAKS DRN.	43668	3305	6680	9682	18527	23275	36937
3705DE	OAK GROVE CHANNEL PRIOR TO JCT.W/CONEJO CR.	1210	380	768	1113	2129	2675	4245
3706BD	CONEJO CREEK AFTER JCT. W/OAK GROVE CHL.	45092	3283	6635	9618	18403	23120	36691
3724C	EAST CAMARILLO DRN.PRIOR TO JCT. W/ CONEJO CR.	844	205	415	602	1151	1446	2295
3725BC	CONEJO CREEK AFTER JCT.W/ EAST CAMARILLO DRN.	45936	3276	6621	9597	18363	23070	36611
3727B	CONEJO CREEK AT HWY 101 W/SO BR.ARR.CON. BASINS	46018	3264	6597	9563	18298	22987	36481
3755BC	CONEJO CR. AT RIDGE VIEWS ST. (NEXT TO ADOHR LANE)	47517	3263	6595	9560	18292	22980	36469
3788BC	CONEJO CREEK AT HOWARD ROAD	48878	3185	6436	9329	17852	22427	35591
3800BC	CONEJO CREEK AT PANCHO ROAD	49164	3178	6422	9309	17813	22378	35514
3811BE	CONEJO CREEK PRIOR TO JCT.W/CALLEGUAS CK.	49677	3173	6412	9295	17785	22343	35458
3812AB	CALLEGUAS CK. AFTER JCT.W/CONEJO CREEK	158933	5461	11037	15998	30611	38456	61029
3850AC	CALLEGUAS CK. AT CSUCI ACCESS RD.(GAGE 805) (CS3)	159771	5456	11026	15982	30582	38419	60971

RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR PRESENT	500 YR PRESENT
	CALLEGUAS CRK.W/EXISTG. DAMS & INC CONEJO PRESENT CONDITION HYDROLOGY	(ACRES)	0.079	0.200	0.325	0.748	AERIAL RED.	100 yr.AERIAL RED.x
			(m+u+n)	(m+u+n)	(m+u+n)	(m+u+n)		1.787
	LONG GRADE CANYON PRESENT DDT/LG 6/99(FN=LONGGRDE.99I)							
3884B	LONG GRADE CANYON Q100 PRESENT NEAR OLD DEBRIS DAM SITE	1372	180	455	740	1702	2276	4067
3888B	LONG GRADE CANYON Q100 PRESENT AT RINCON DR.CROSSING	1531	176	444	722	1662	2222	3970
3889B	LONG GRADE CANYON Q100 PRESENT-CAMARILLO DR. & STA.BARB. AVE	1578	175	442	718	1653	2210	3950
3893D	CAMARILLO DR. DRN. PRIOR TO JCT. W/LONGGRADE PRESENT	354	34	87	142	326	436	778
3894BD	LONG GRADE CYN.AFTER JCT.W/CAMARILLO DR. DRN.PRESENT	1932	195	494	803	1847	2469	4413
3899B	LONG GRADE CYN. AT LEWIS ROAD - JCT. W/CALLEGUAS CK.	2526	157	398	646	1488	1989	3554
3900AB	CALLEGUAS CREEK AFTER CONFLUENCE W/LONG GRADE CYN.	162297	3007	7614	12372	28475	38068	68028
3938BC	BROOME RANCH DRAIN PRIOR TO JCT W/CALLEGUAS CK.	1319	38	96	156	359	480	857
3943AB	CALLEGUAS CREEK AFTER JCT. W/ BROOME DRAIN	164032	2990	7570	12302	28312	37851	67640
4015BD	GUADALASCA DRAIN PRIOR TO JCT W/CALLEGUAS CK.	3093	239	605	983	2263	3026	5408
4029A	CALLEGUAS CK.AT HWY. 1 PRIOR TO JCT W/ REVOLON SLOUGH	167708	2972	7525	12228	28144	37626	67237

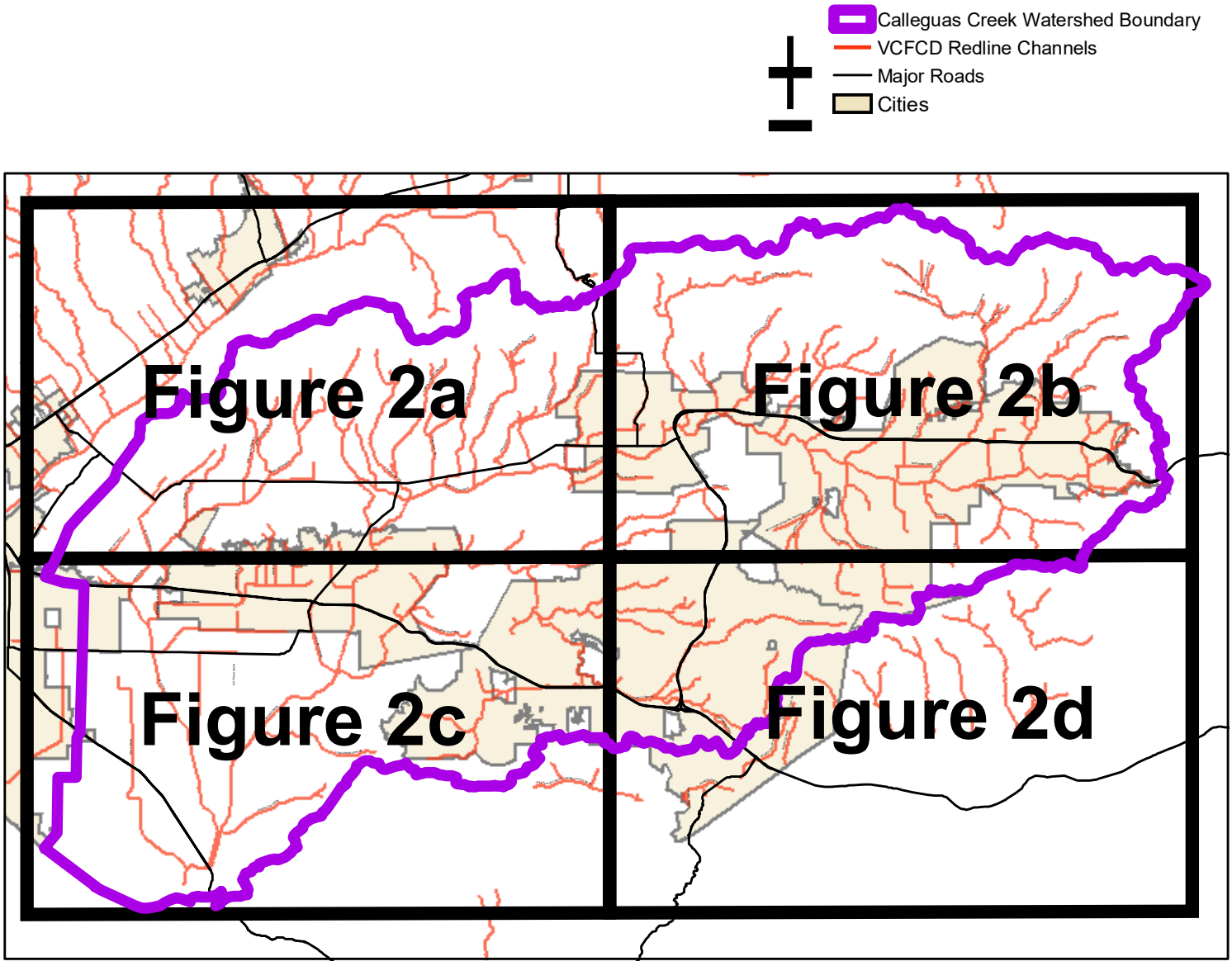
RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA	2 YR WITH AR	5 YR WITH AR	10 YR WITH AR	50 YR WITH AR	100 YR PRESENT
	REVOLON SL. WATERSHED - CALLEGUAS CK. PRESENT CONDITION HYDROLOGY	(ACRES)	0.126	0.254	0.373	0.762	AERIAL RED.
			(MXD+URBAN)	(MXD+URBAN)	(MXD+URBAN)	(MXD+URBAN)	
5001A	REVOLON SLOUGH-CALLEG. MODEL OR/DBT 10/2002 FN=RVLN5000.99I	141	47	95	139	284	373
5007A	HONDA BARR. WEST FORK AT BERYLWOOD ROAD	817	122	247	362	741	973
5016AB	HONDA BARR CONFLUENCE W/BERYLWOOD DITCH (EAST FK)	1428	190	384	563	1150	1511
5019A	HONDA BARR. AT PRICE ROAD CROSSING	1779	191	386	566	1158	1521
5035C	ARROYO COLORADO AT BERYLWOOD ROAD	1185	222	449	659	1347	1768
5037C	ARROYO COLORADO PRIOR TO JCT. W/DITCH FROM PRICE RD	1253	203	410	602	1230	1615
5042E	PRICE ROAD DRAIN AT BERYLWOOD ROAD	345	46	92	135	277	363
5043CE	ARROYO COLORADO AFTER JCT.W/ PRICE ROAD DRN.	1598	241	488	716	1464	1922
5049A	HONDA BARR. AFTER CONFLUENCE WITH ARROYO COLORADO	3878	400	809	1186	2424	3183
5057BE	AGGEN RD DRN. JCT. W/NATURAL CHANNEL	540	131	265	388	794	1042
5072BC	LOS ANGELES AVE. DRN.W/ AGGEN RD DRN.JCT.	1523	261	528	775	1584	2080
5079B	LOS ANGELES AVE. DITCH PRIOR TO JCT.W/ HONDA BARR	1896	292	590	866	1769	2324
5083AB	HONDA BARR. AT CENTER SCHOOL RD.XING	5925	551	1116	1637	3346	4394
5100DE	MILLIGAN BARRANCA AT LA LOMA ROAD XING	1126	160	324	475	971	1276
5105D	MILLIGAN BARRANCA AT LA AVE.(HWY 118)CROSSING	1669	189	382	560	1144	1502
5107AD	HONDA BARR.CONFLUENCE W/MILLIGAN BARR.	8006	697	1410	2067	4226	5550
5111AB	BEARDSLEY WASH AT CONFLUENCE WITH LAS POSAS DRN	8195	701	1418	2080	4252	5584
5119BC	LAS POSAS DRN.PRIOR TO JCT.W/BEARDSLEY	180	55	111	163	334	439
5121AB	BEARDSLEY WASH AFTER JCT. W/ LAS POSAS DRAIN	8634	707	1432	2100	4292	5637
5145CE	DITCH FROM WALNUT AVE PRIOR TO CROSSING LA AVE.	904	170	345	506	1035	1359
5149C	MESA SCHOOL DRAIN PRIOR TO JCT.W/ BEARDSLEY WASH	1138	184	371	545	1113	1462
5167B	RAMONA DBRIS/DETNT. BASIN ROUTED & FATTENED HYDROGRAPH (Qout=130)	254	16	33	48	99	130
5174D	LAS POSAS DEBRIS/DETENTION BASIN RTED FAT HYDROGRAPH (Qout=62)	168	8	16	23	47	62
5182BC	LAS POSAS ESTATES DRN. OVERLAND FLOW @ TR.BNDRY W/RTN.BOX	613	84	170	250	511	671
5185D	SPANISH HILLS DRN.Q10F INTO LAKE (LOT99) FROM ARACENE CT.	57	23	46	68	139	182
5196D	SPANISH HILLS DRN-50 AC INTO LAKE LOT 101	50	16	32	46	95	124
5203BD	LAS POSAS ESTATES DRN. AFTER JCT.W/TR.4227 MR LAKES	946	135	273	401	819	1075
5204E	TRACT 4948 OUTFLOW HYDRGRPH W/DKT APPRV. BSN 2A RAT	95	3	7	10	20	26
5205E	LAS POSAS EST.DRN-NORTH TRB. INC. BASIN IN TR 4948 PRIOR TO JCT W/CHNL	122	14	29	43	87	115
5206BE	LAS POS.EST.DRN, WITHPOST-TR 4227&4948 W/RTN.	1068	136	276	404	826	1085
5208D	TRACT 4948 OUTFLOW HYDROGRAPH W/DKT APPROVED BASIN	36	5	10	15	30	40
5209D	TRIB.TO LAS POSAS EST.DRN,POST TR.4948 W/RTN.PRR.TO JCT W/MAIN	56	13	26	37	76	100
5212BD	LAS POSAS ESTATES DRN.,POST TR 4227 &4948 W/RTN	1156	146	295	432	884	1160
5216BF	LAS POSAS ESTATES DRN. W/60% SPLIT TO BEARDSLEY	1279	97	197	289	591	776
5219B	LAS POSAS ESTATES DIVERSION PRIOR TO JCT W/BEARDSLEY(60%)	1371	94	191	280	572	751
5220AB	BEARDSLEY WASH AFTER JCT. W/ LAS POSAS ESTATES DRAIN (60%)	11738	849	1719	2521	5154	6768
5234CD	LA VISTA DRN & UPPER PART OF LA AVE.W/S.CLR	666	127	256	376	768	1008
5242E	LA VISTA DRAIN TRIBUTARY PRIOR TO JCT W/LA VISTA DRN.	361	75	153	224	458	601
5243CE	LA VISTA DRN @ LA VISTA RD.AFTER JCT W/ TRIBUTARY	1115	199	403	590	1207	1585
5262D	WRIGHT RD. DRN. W/ DITCH PRIOR TO SANTA CLARA DRN. JCT.	433	97	197	288	589	774
5263CD	SANTA CLARA DRAIN AFTER JCT. W/ WRIGHT ROAD DRN.	1787	278	563	826	1688	2217
5268C	SANTA CLARA DRAIN DIVERSION PRIOR TO JCT. W/ BEARDSLEY WASH	2103	275	557	817	1670	2192
5272AC	BEARDSLEY WASH AFTER JCT. W/ SANTA CLARA DRN. DIVERSION	13841	1048	2121	3111	6360	8352
5275AC	BEARDSLEY WASH AT CENTRAL AVE. BRIDGE (GAGE SITE)	13919	1049	2123	3113	6364	8357
5279A	BEARDSLEY WASH PRIOR TO JCT. W/ NYELAND DRAIN ABOVE HWY 101	14056	1048	2121	3110	6357	8349
5284B	UPPER NYELAND DRN. NEAR SATICOY COUNTRY CLUB	334	62	126	184	377	495
5293BC	UPPER NYELAND OVERFLOW-CLUBHOUSE DR. INTO DITCH	849	127	257	376	769	1010
5297BD	UPPER NYELAND DRN.AT CLUBHOUSE DR. PRIOR TO XING LA AVE.	1111	147	298	437	894	1174
5299B	UPPER NYELAND DRN. PRIOR TO JCT. W/FERRO DITCH	1131	147	297	435	890	1168
5305D	FERRO CANYON CHL. AT LA AVE.PRIOR JCT.W/UPPER NYELAND DRN.	544	102	206	302	617	811
5306BD	NYELAND DRAIN AFTER JCT. W/ FERRO CHANNEL BELOW HWY 118 (LA AVE)	1675	227	459	674	1377	1809
5334BC	NYELAND DRAIN AT CENTRAL AVE.W/UPPER NYELAND NOT DIVERTED	2829	286	578	848	1734	2277
5375C	NYELAND DRN.TRIB.(ROSE RD-CENTRAL-101-STA.CLARA) W/BOYER	886	117	236	347	709	931
5376BC	NYELAND DRN. AFTER JCT.OF TRIB. W/BOYER PROJ.(AUTO CTR.)	4119	351	711	1043	2132	2800
5378B	NYELAND DRN. @ SANTA CLR & FRIEDRICH W/ BOYER(AUTO CTR.)	4119	350	708	1038	2122	2786
5380BE	NYELAND DRN AFTER JCT. W/ NYELAND ACRES SIDE DRN. W/ BOYER	4181	350	709	1040	2125	2791
5391D	LATERAL A AFTER JCT. W/LOCAL AREA	145	36	73	106	217	286
5392BD	NYELAND DRN.AFTER JCT W/LATERAL A	4482	352	713	1046	2139	2809
5400CE	NYELAND DRN.TRIB. TO NO.PRIOR TO JCT. W/NYELAND	373	38	77	113	232	305
5401BC	NYELAND DRN AFTER JCT. W/NORTH LATERALS-INC 477B W/BOYER	4855	377	764	1120	2290	3008
5406AB	NYELAND DRN. JUNCTION W/BEARDSLEY WASH	19003	1255	2541	3726	7618	10003

Table 1b

FINAL

RAT ID NO	LOCATION POINT FOR FLOWRATE VALUES LISTED	AREA (ACRES)	2 YR WITH AR 0.126 (MXD+URBAN)	5 YR WITH AR 0.254 (MXD+URBAN)	10 YR WITH AR 0.373 (MXD+URBAN)	50 YR WITH AR 0.762 (MXD+URBAN)	100 YR PRESENT AERIAL RED.
	REVOLON SL. WATERSHED - CALLEGUAS CK. PRESENT CONDITION HYDROLOGY WITH AREA AND IMPERVIOUSNESS BY GIS DL/DBT 2/02						
5439C	CAMARILLO HILLS DRN PRIOR TO JCT. W/ PONDEROSA DRN.	742	152	307	450	921	1209
5450CD	CAMARILLO HILLS DRN. AFTER JCT. W/ PONDEROSA DRAIN	1106	212	430	630	1288	1691
5471DE	MISSION DRAIN PRIOR TO JCT. W/ CAM. HILLS DRAIN	519	128	260	381	778	1022
5472CD	CAMARILLO HILLS DRN. AFTER JCT. W/ MISSION DRAIN	1776	330	669	981	2005	2633
5485D	WEST CAMARILLO HILLS DRN. PRIOR TO JCT. W/ CAM. HILLS DRN.	467	117	237	348	710	933
5487CD	CAMARILLO HILLS DRN. AFTER JCT. W/ WEST CAM. HILLS DRN.	2287	422	854	1252	2560	3362
5499D	EDGEMORE DRN. PRIOR TO JCT. W/ CAM. HILLS DRAIN	363	93	189	277	565	743
5501CD	CAMARILLO HILLS DRN. AFTER JCT. W/ EDGEMORE DRN.	2650	482	975	1430	2923	3839
5504C	CAMARILLO HILLS DRN. AT PONDEROSA DR. AND REDWOOD AVE.	2704	484	979	1435	2934	3853
5507CD	CAMARILLO HILLS DRN. AT POINT WHERE CHL. CURVES TO SOUTH	2777	488	987	1448	2960	3888
5513C	CAMARILLO HILLS DRN. PRIOR TO JCT. WITH CRESTVIEW DRN.	3013	504	1020	1495	3057	4014
5517D	LEONARD PROJECT DIVERSION FROM PLEASANT VLY RD. DRN. PRIOR JCT.	157	49	99	145	297	390
5518CD	CAMARILLO HILLS DRN. AFTER JCT. W/ LEONARD PIPE NR. LAS POSAS RD.	3170	533	1079	1582	3234	4246
5527D	CRESTVIEW DRN. PRIOR TO JCT. W/ CAMARILLO HILLS DRN.	385	115	233	342	699	917
5528CD	CAMARILLO HILLS DRN. AFTER JCT. W/ CRESTVIEW DRN.	3555	601	1216	1783	3644	4786
5529C	CAMARILLO HILLS DRN AT LAS POSAS RD. BELOW HWY. 101	3555	599	1211	1777	3632	4769
5577C	CAMARILLO HILLS DRN. PRIOR TO JCT. W/ LAS POSAS ESTATES DRN. (40%)	4776	563	1140	1672	3417	4487
5584D	LAS POSAS ESTATES DRN. AT SR 101 W/60% DIVRS.TO BEARDSLEY	189	93	188	276	564	741
5586D	LAS POS. EST. DRN. PRIOR JCT. W/CAM. HILLS DRN. W/DIVR.	235	88	178	262	535	702
5590CD	CAM. HILLS DRN. AFTER JCT. W/ LAS POSAS ESTATES DRN. 40%	5011	595	1204	1766	3610	4741
5601CD	CAMARILLO HILLS DRAIN AFTER JCT. W/ LARGE AG. AREA WEST	5550	579	1171	1717	3511	4610
5602AC	REVOLON SLOUGH AT CONFL. W/ CAMARILLO HILLS DRAIN	24818	1617	3272	4798	9809	12881
5617BC	REVOLON TRIB. AT DEL NORTE BLVD. (PRTY. LINE SAKIOKA)	467	55	112	164	336	441
5618B	REVOLON TRIB. PRESENT CONDITION W/ NO DETN. OR DIVERSION	467	55	111	163	334	438
5623D	PROCTOR AND GAMBLE SITE W/ NO RUNOFF LEAVING SITE	60	17	35	52	106	139
5627B	REVOLON TRIB. AT SAKIOKA DIVERSION (EXC. PROC-GAMBLE)	730	89	179	263	538	706
5638E	REVOLON TRIB AT STURGIS, W/ SAKIOKA RTN. AND DIVERSION (EXC. P&G)	219	43	87	128	261	343
5640E	REVOLON TRIB. AT STURGIS PRIOR TO JCT. W/ SAKIOKA DITCH	287	36	73	107	218	286
5642B	SAKIOKA DITCH PRIOR TO JCT. W/ STURGIS RD. DRAIN	843	97	197	289	590	775
5644AB	REVOLON SLOUGH AFTER JCT. W/ REVOLON TRIB. INC. SAKIOKA DITCH	26018	1653	3346	4907	10030	13172
5649AB	REVOLON SLOUGH AT STURGIS W/O PLEASANT VALLEY DRAIN	26232	1654	3349	4911	10039	13183
5650A	REVOLON SLOUGH AT FIFTH STREET	26249	1653	3345	4906	10029	13170
5654C	FIFTH STREET DRAIN AT POSSIBLE RETN.SITE FOR ASSMT.DIST.	183	24	48	70	143	188
5663C	FLOW N-SIDE OF RR WEST OF REVOLON SLOUGH	383	29	58	85	175	229
5684C	INFLOW TO LEONARD TRACT Q10F W/VTA BLVD. DIVERSION TO CAM. HILLS	86	29	58	85	174	229
5685CD	OUTFLOW FROM LEONARD TRACT RETEN. BASIN Q10 F, W/ VTA BLVD. DIVERSION	86	6	11	17	34	45
5686D	SUMP IN LEONARD TRACT W/45 CFS OUTLET Q10F W/VTA BLVD DIVERSION	0	23	47	69	142	186
5693C	FIFTH STREET DRAIN AT POSSIBLE RETN.SITE FOR ASSMT.DIST,	55	16	32	47	96	126
5709AB	REV.SL. AFTER JCT W/PLEAST.VLY.RD.DRN.W/ SAK.DIVR.& RETN.	28115	1714	3468	5086	10398	13654
5739A	REVOLON. SL. AT WOOD RD.BELOW LAGUNA W/TRIB.W/ SAK DIVR.& RTN	29126	1701	3442	5048	10319	13551
5750AB	REVOLON SL. AT WOOD RD. BELOW LAGUNA RD. W/ LAGUNA TRIB	29602	1699	3438	5042	10306	13534
5781CD	CAWELTI RD. DRAIN UPPER REACH	453	107	217	318	650	853
5796B	LAS POSAS RD.DRN.AT LAGUNA RD.	2527	295	597	875	1789	2349
5822BC	REVOLON SLOUGH TRIBUTARY ABOVE LAGUNA RD(LARGE FARM DRN.)	3585	423	857	1257	2569	3373
5849AB	REVOLON SL. AFTER CONFLUENCE WITH LARGE FARM DRN. TRIB.	34238	1756	3553	5211	10653	13990
5869AC	REVOLON SL. AT JCT.W/ HUENEME RD. DRAIN	35065	1747	3536	5185	10600	13920
5916AB	REVOLON SL. AT LAS POSAS RD.	37087	1746	3534	5182	10594	13912
5935AB	REVOLON SLOUGH PRIOR TO CONFLUENCE W/ CALLEGUAS CREEK	37911	1726	3494	5124	10475	13755

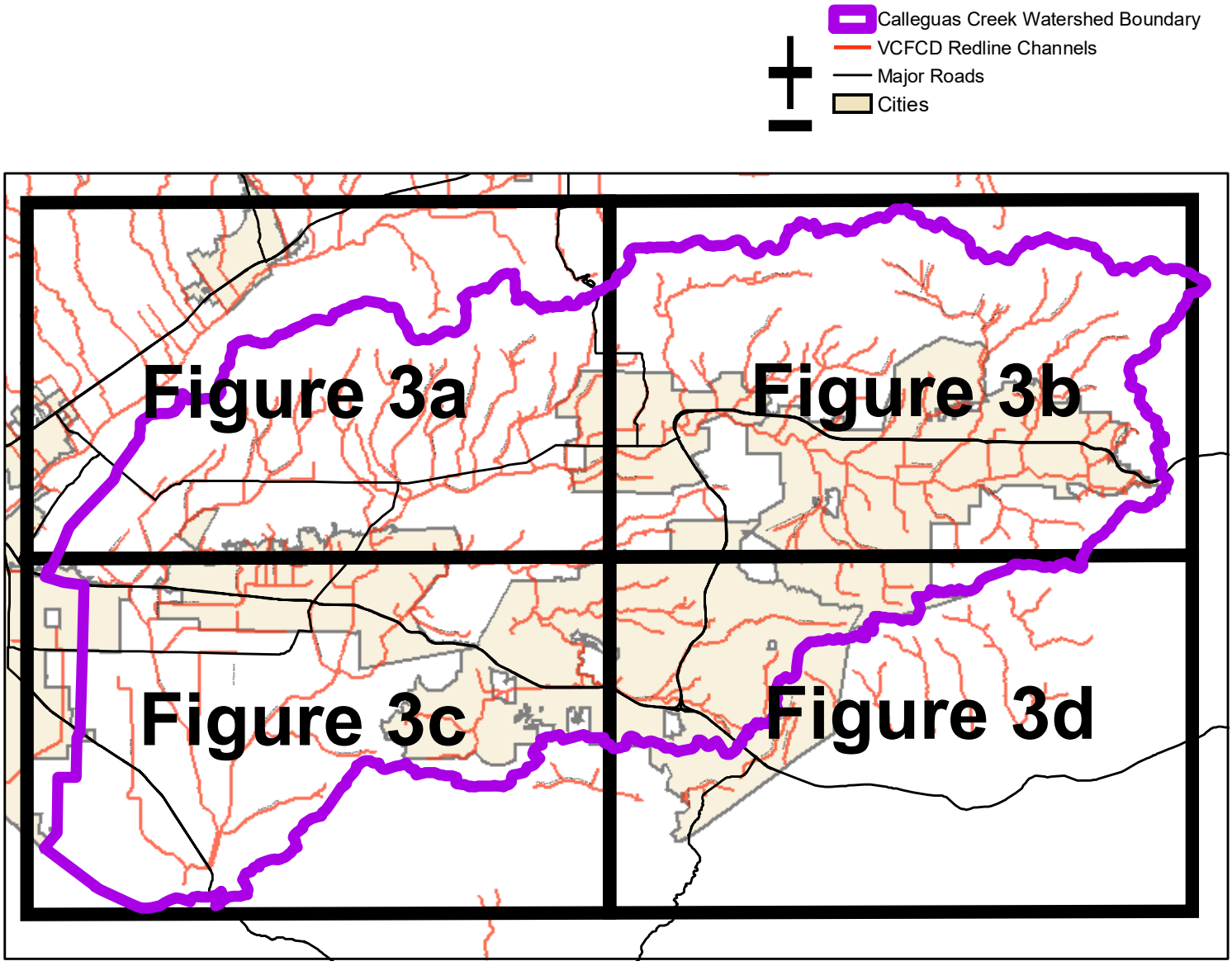
Aerial Photo
Map Index



Please see enclosed CD, "Calleguas Creek Watershed Present Condition PDF Maps"

Filenames: Aerial-NW.pdf, Aerial-NE.pdf, Aerial-SW.pdf, Aerial-SE.pdf

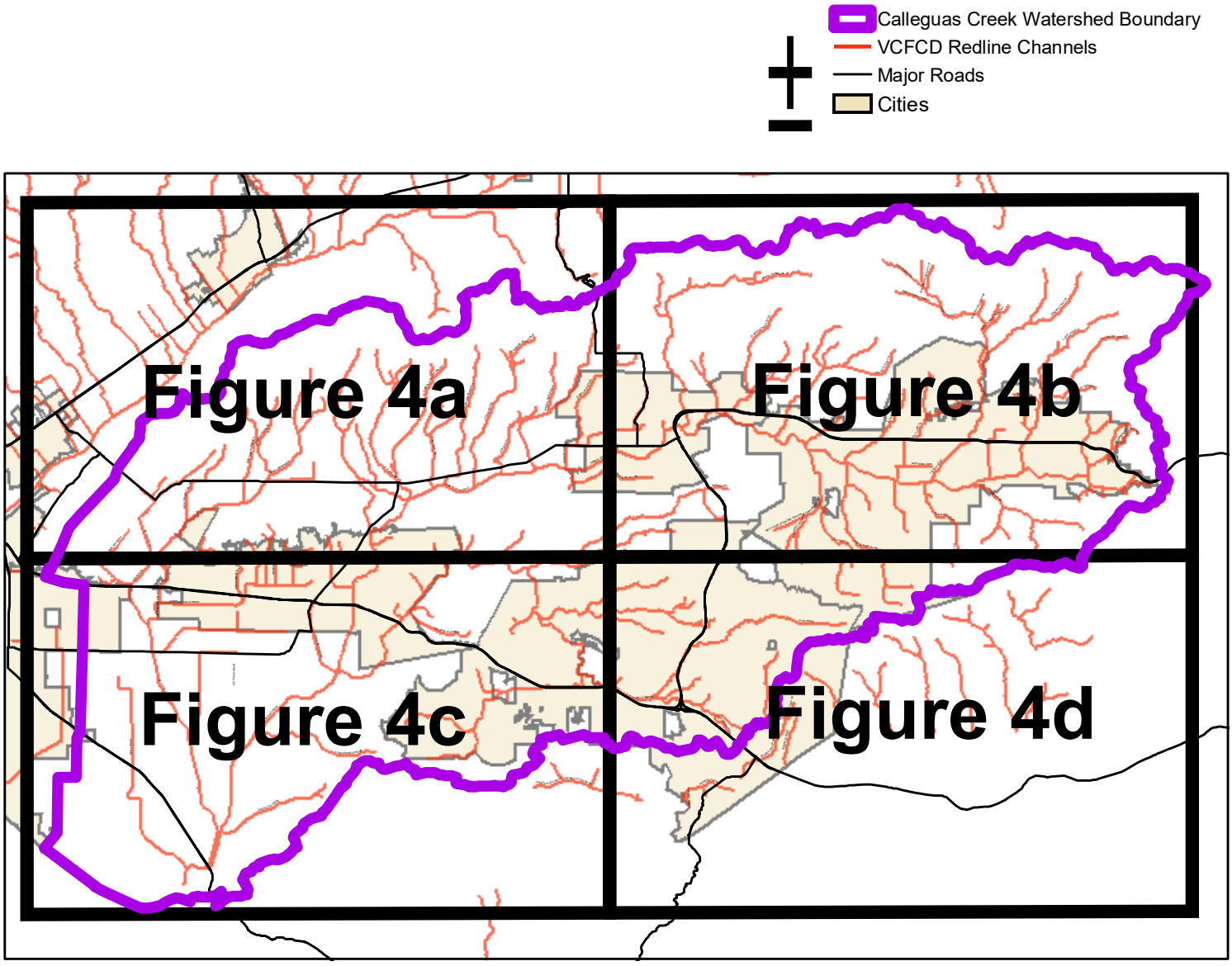
General Soil Map Index



Please see enclosed CD, "Calleguas Creek Watershed Present Condition PDF Maps"

Filenames: Gensoilmap-NW.pdf, Gensoilmap-NE.pdf, Gensoilmap-SW.pdf, Gensoilmap-SE.pdf

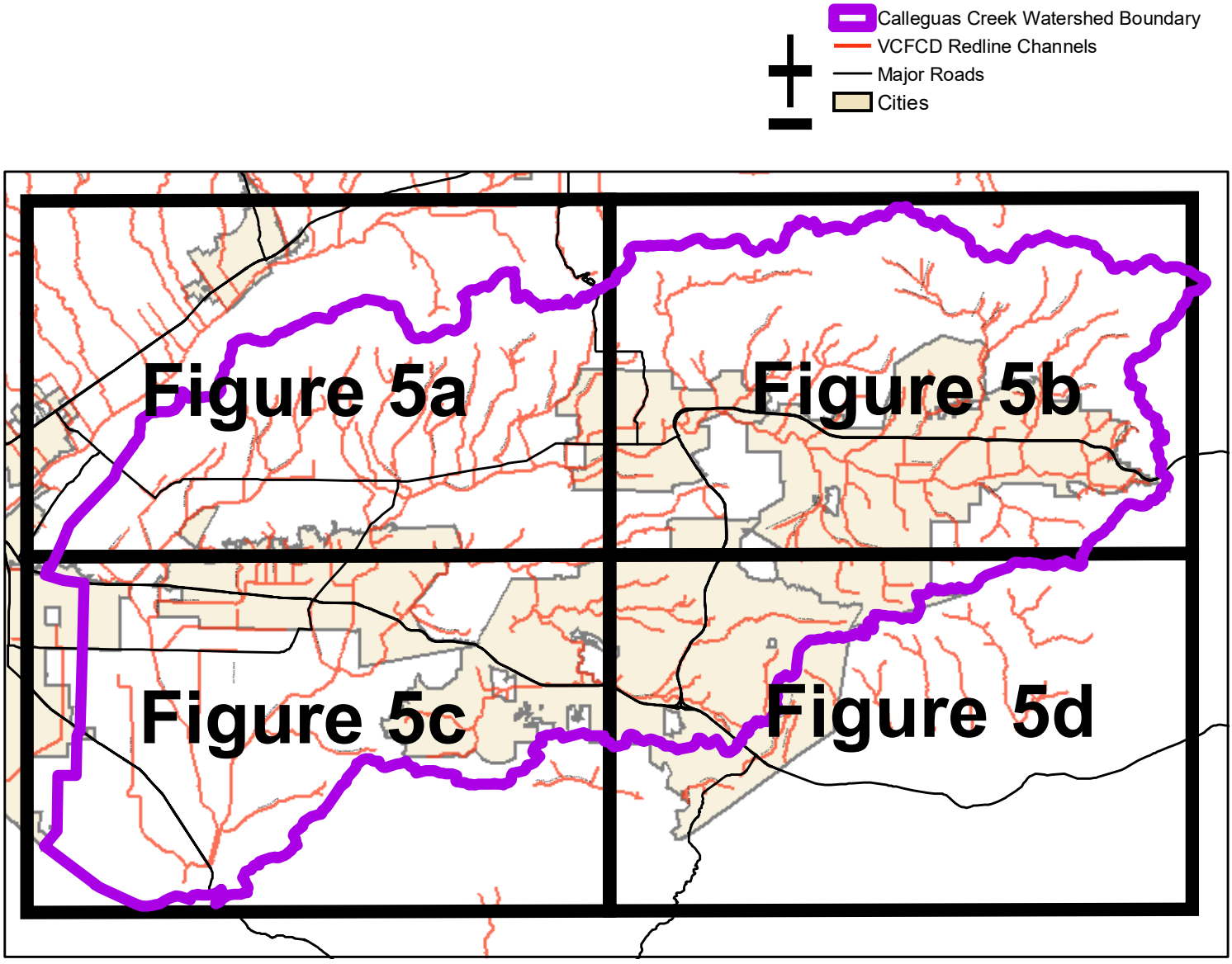
Present Land Use
Map Index



Please see enclosed CD, "Calleguas Creek Watershed Present Condition PDF Maps"

Filenames: landuse-NW.pdf, landuse-NE.pdf, landuse-SW.pdf, landuse-SE.pdf

Hydrology Map
Map Index



Please see enclosed CD, "Calleguas Creek Watershed Present Condition PDF Maps"

Filenames: hydromap-NW.pdf, hydromap-NE.pdf, hydromap-SW.pdf, hydromap-SE.pdf

8. APPENDIX C- VCRAT MODEL OUTPUT

Partial listing for Las Posas Estates subareas and hydrographs.

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.6)
Modified Rational Model Results Report
Job: 15100 Project: REVOLON

Project Description

REVOLON SLOUGH-CALLEGUAS CK.STY.Q100P OR/DBT 11/2002 FN=RVLN5000.99I

VCRat version: 2.6.2009.7
VCRain version: 200703
DOS EXE version: PC 2.2-200809

Ventura County Watershed Protection District
Modified Rational Method Hydrology Program (VCRat v2.6)
Job: 15100 Project: REVOLON
Model Results

NODE ID	SOIL TYPE	RAIN ZONE	TC (MIN)	% IMP	AREA (AC)	FLOW (CFS)	ACCUMULATED AREA (AC)	ACCUMULATED FLOW (CFS)	TIME (MIN)	CHANNEL TYPE	LENGTH (FT)	SLOPE (FT/FT)	SIZE (FT)	H:V (Z)	N VALUES CHNL	N VALUES SIDES	VEL (FT/S)	DEPTH (FT)
5161B	010	K100	11	15	52	162	52	162	1154	MOUNTAIN	2600	0.07000	---	----	-----	-----	--	--
5162B	010	K100	12	15	50	148	102	260	1160	-------	----	-------	---	----	-----	-----	--	--
5163C	010	K100	16	15	84	211	84	211	1156	MOUNTAIN	300	0.03000	---	----	-----	-----	--	--
5164BC	---	---	--	--	84	211	186	465	1160	MOUNTAIN	1000	0.03000	---	----	-----	-----	--	--
5165B	010	K100	8	10	43	157	229	539	1159	-------	----	-------	---	----	-----	-----	--	--
5166B : RAMONA DEBRIS BASIN INFLOW Q-100P																		
5166B	010	K100	8	15	25	92	254	602	1159	MOUNTAIN	1500	0.03000	---	----	-----	-----	--	--
5167B : RAMONA DEB./DET. BASIN ROUTED & FATTENED HYDROGRAPH(QOUT=130))Q-100P																		
5167B : Clearing Hydrograph Bank: B																		
5167B : Import Hydro: 5167B																		
5167B	---	---	--	--	254	130	254	130	1184	PIPE	1864	0.01770	3.50	----	-----	-----	--	--
5168C	020	K100	12	15	52	144	52	144	1154	VALLEY	1400	0.01770	---	----	-----	-----	--	--
5169C	030	K100	11	15	17	47	69	175	1159	-------	----	-------	---	----	-----	-----	--	--
5170D	---	---	--	--	---	---				-------	----	-------	---	----	-----	-----	--	--
5171D	020	K100	9	15	73	238	73	238	1153	-------	----	-------	---	----	-----	-----	--	--
5172D	020	K100	8	15	41	142	114	381	1154	MOUNTAIN	800	0.02000	---	----	-----	-----	--	--
5173D : LAS POSAS ESTATES DETENT/DEBRIS BASIN INFLOW Q-100P																		
5173D	010	K100	15	15	54	141	168	495	1158	-------	----	-------	---	----	-----	-----	--	--
5174D : LAS POSAS DEB./DET. BASIN ROUTED & FATTENED HYDROGRAPH (QOUT = 62)																		
5174D : Clearing Hydrograph Bank: D																		
5174D : Import Hydro: 5174D																		
5174D	---	---	--	--	168	62	168	62	1166	CHANNEL	600	0.02000	10	1.00	0.019	0.019	--	--
5175D	---	---	--	--	---	---	168	62	1177	CHANNEL	800	0.02000	10	1.00	0.019	0.019	--	--
5176D	020	K100	8	15	39	135	207	186	1154	CHANNEL	700	0.02000	6	1.00	0.019	0.019	--	--
5177D	020	K100	11	15	32	93	239	277	1155	CHANNEL	1000	0.01500	6	1.00	0.019	0.019	--	--
5178D	030	K100	13	15	44	110	283	381	1157	-------	----	-------	---	----	-----	-----	--	--
5179E	030	K100	8	15	7	23	7	23	1154	PIPE	400	0.01000	2.00	----	-----	-----	--	--
5180DE	---	---	--	--	7	23	290	403	1157	-------	----	-------	---	----	-----	-----	--	--
5181BD	---	---	--	--	290	403	544	516	1157	-------	----	-------	---	----	-----	-----	--	--
5182BC: LAS POSAS EST.DRN. OVERLAND FLOW @ TR. BOUNDARY W/ RTN. BOX Q-100P																		
5182BC **********																		

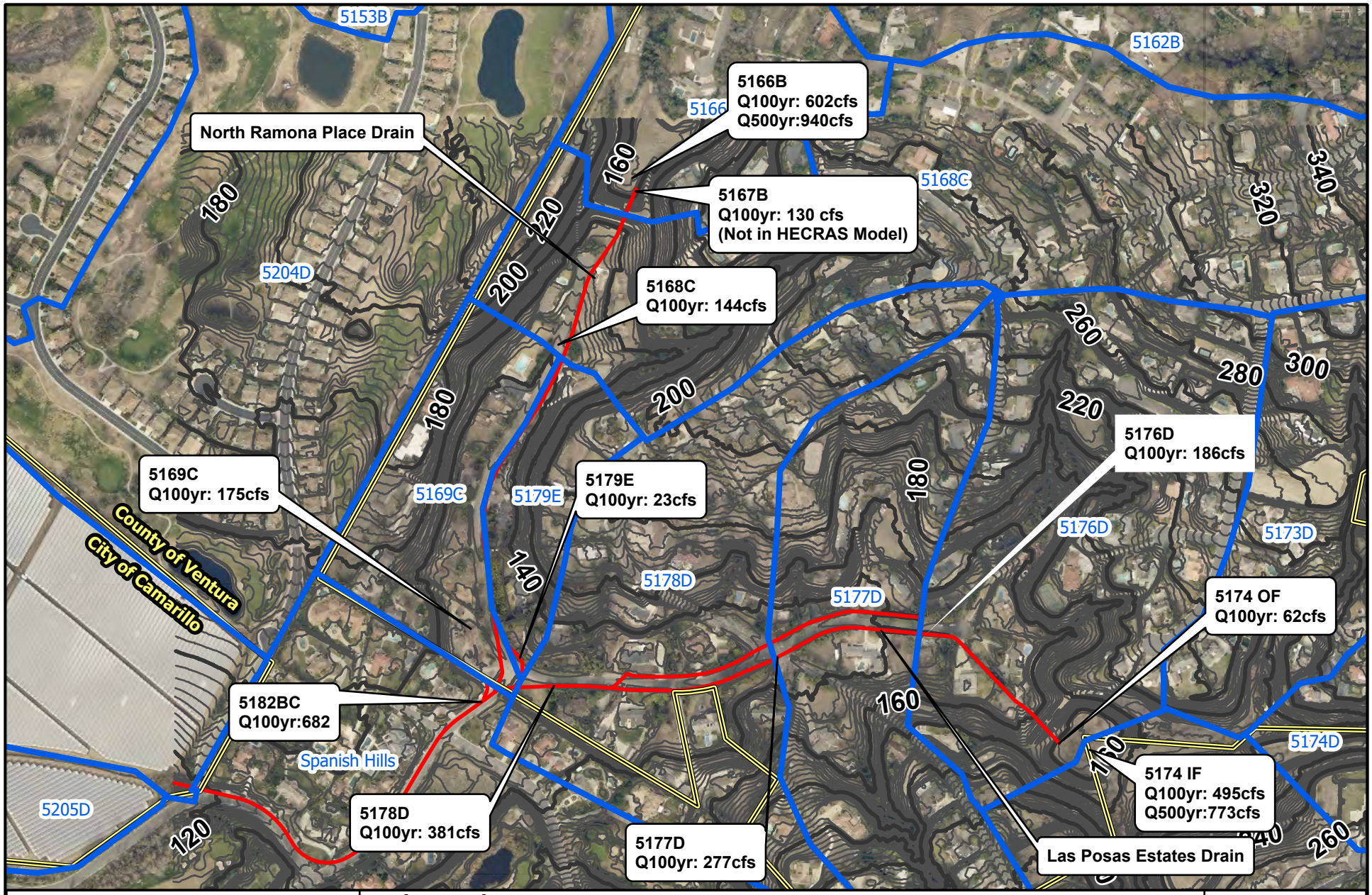
```
           *          Peak in B:      516.01 cfs @ 1157 min  Q in C:      165.89 cfs  Combined Q:      681.90 cfs   *
           *          Peak in C:      174.75 cfs @ 1159 min  Q in B:      492.44 cfs  Combined Q:      667.19 cfs   *
           *      Combined Peak:      681.90 cfs @ 1157 min  Q in B:      516.01 cfs      Q in C:      165.89 cfs   *
           ********************************************************************************************************
   5182BC  ---   ---    --   --     69    175      613     682   1157    CHANNEL     240  0.00300     11     0.00    0.014  0.014    --     --


IMPORTHYDRO VCRat3 5167B
TIME   1      0    100    200    300    400    500    600    700    800    900
FLOW   1   0.00   1.00   6.00   9.00  14.00  18.00  21.00  26.00  36.00  45.00
TIME  11   1000   1050   1100   1110   1120   1130   1131   1132   1133   1134
FLOW  11  61.00  82.00  97.00  99.00  101.0  104.0  105.0  105.0  106.0  106.0
TIME  21   1135   1136   1137   1138   1139   1140   1141   1142   1143   1144
FLOW  21  106.0  107.0  107.0  107.0  108.0  108.0  108.0  108.0  109.0  109.0
TIME  31   1145   1146   1147   1148   1149   1150   1151   1152   1153   1154
FLOW  31  109.0  109.0  110.0  110.0  110.0  111.0  111.0  112.0  112.0  113.0
TIME  41   1155   1156   1157   1158   1159   1160   1161   1162   1163   1164
FLOW  41  114.0  115.0  115.0  116.0  117.0  118.0  119.0  120.0  121.0  122.0
TIME  51   1165   1166   1167   1168   1169   1170   1171   1172   1173   1174
FLOW  51  122.0  123.0  124.0  125.0  125.0  126.0  126.0  127.0  127.0  128.0
TIME  61   1175   1176   1177   1178   1179   1180   1181   1182   1183   1184
FLOW  61  128.0  128.0  129.0  129.0  129.0  129.0  129.0  129.0  129.0  130.0
TIME  71   1185   1186   1187   1188   1189   1190   1191   1192   1193   1194
FLOW  71  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0
TIME  81   1195   1196   1197   1198   1199   1200   1201   1202   1203   1204
FLOW  81  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0
TIME  91   1205   1206   1207   1208   1209   1210   1211   1212   1213   1214
FLOW  91  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0  130.0
TIME 101   1215   1216   1217   1218   1219   1220   1221   1222   1223   1224
FLOW 101  130.0  129.0  129.0  129.0  129.0  129.0  129.0  129.0  129.0  129.0
TIME 111   1225   1226   1227   1228   1229   1230   1231   1232   1233   1234
FLOW 111  129.0  129.0  129.0  129.0  129.0  129.0  129.0  128.0  128.0  128.0
TIME 121   1235   1236   1237   1238   1239   1240   1241   1242   1243   1244
FLOW 121  128.0  128.0  128.0  128.0  128.0  128.0  128.0  128.0  128.0  128.0
TIME 131   1245   1246   1247   1248   1249   1250   1251   1252   1253   1254
FLOW 131  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0  127.0
TIME 141   1255   1256   1257   1258   1259   1260   1261   1262   1263   1264
FLOW 141  127.0  127.0  126.0  126.0  126.0  126.0  126.0  126.0  126.0  126.0
TIME 151   1265   1266   1267   1268   1269   1270   1271   1272   1273   1274
FLOW 151  126.0  126.0  126.0  125.0  125.0  125.0  125.0  125.0  125.0  125.0
TIME 161   1275   1276   1277   1278   1279   1280   1281   1282   1283   1284
FLOW 161  125.0  125.0  125.0  124.0  124.0  124.0  124.0  124.0  124.0  124.0
TIME 171   1285   1286   1287   1288   1289   1290   1291   1292   1293   1294
FLOW 171  124.0  124.0  123.0  123.0  123.0  123.0  123.0  123.0  123.0  123.0
TIME 181   1295   1296   1297   1298   1299   1300   1310   1320   1330   1340
FLOW 181  123.0  122.0  122.0  122.0  122.0  122.0  121.0  120.0  118.0  117.0
TIME 191   1350   1360   1370   1380   1390   1400   1420   1440   1460   1500
FLOW 191  115.0  114.0  112.0  110.0  109.0  107.0  98.00  60.00  33.00  25.00
IMPORTHYDRO VCRat3 5174D
TIME   1      0    100    200    300    400    500    600    700    800    900
FLOW   1   0.00   0.00   2.00   3.00   4.00   5.00   5.00   6.00   7.00   8.00
TIME  11   1000   1050   1100   1110   1120   1130   1131   1132   1133   1134
FLOW  11  19.00  33.00  45.00  46.00  47.00  47.00  47.00  47.00  48.00  48.00
TIME  21   1135   1136   1137   1138   1139   1140   1141   1142   1143   1144
FLOW  21  48.00  48.00  48.00  48.00  48.00  48.00  48.00  49.00  49.00  49.00
TIME  31   1145   1146   1147   1148   1149   1150   1151   1152   1153   1154
FLOW  31  49.00  49.00  49.00  49.00  50.00  50.00  50.00  51.00  51.00  51.00
```

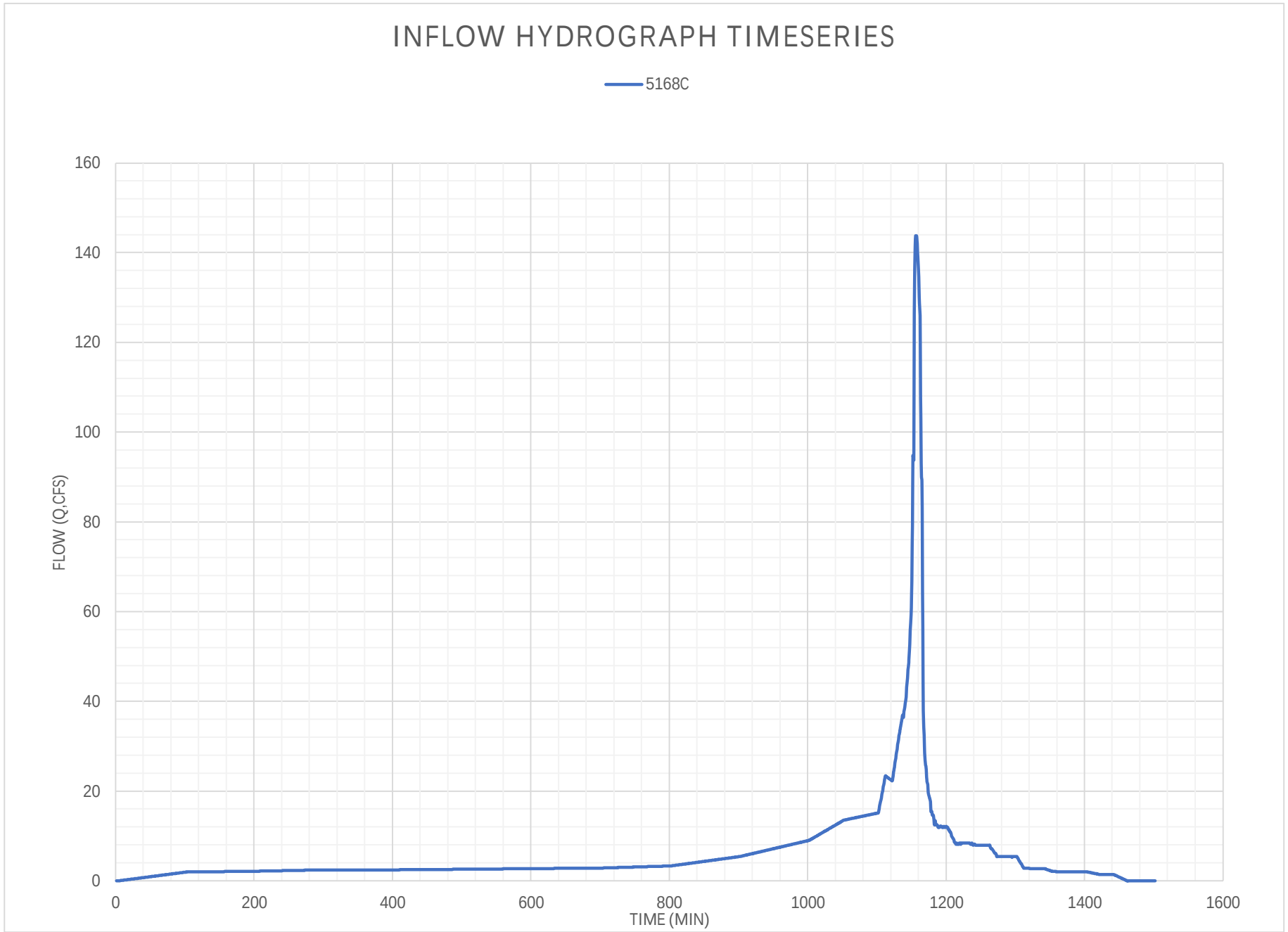
TIME	41	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164
FLOW	41	52.00	52.00	53.00	53.00	53.00	54.00	54.00	54.00	54.00	54.00
TIME	51	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174
FLOW	51	54.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00
TIME	61	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184
FLOW	61	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00
TIME	71	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194
FLOW	71	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00
TIME	81	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204
FLOW	81	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00
TIME	91	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214
FLOW	91	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00
TIME	101	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224
FLOW	101	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00
TIME	111	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234
FLOW	111	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00
TIME	121	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244
FLOW	121	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00
TIME	131	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254
FLOW	131	62.00	62.00	62.00	62.00	54.00	54.00	54.00	54.00	54.00	54.00
TIME	141	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264
FLOW	141	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00
TIME	151	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274
FLOW	151	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00
TIME	161	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284
FLOW	161	54.00	54.00	54.00	54.00	54.00	54.00	53.00	53.00	53.00	53.00
TIME	171	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294
FLOW	171	53.00	53.00	53.00	53.00	53.00	53.00	53.00	53.00	53.00	53.00
TIME	181	1295	1296	1297	1298	1299	1300	1310	1320	1330	1340
FLOW	181	53.00	53.00	53.00	53.00	53.00	53.00	52.00	52.00	51.00	51.00
TIME	191	1350	1360	1370	1380	1390	1400	1420	1440	1460	1500
FLOW	191	50.00	50.00	49.00	49.00	48.00	48.00	47.00	45.00	28.00	14.00

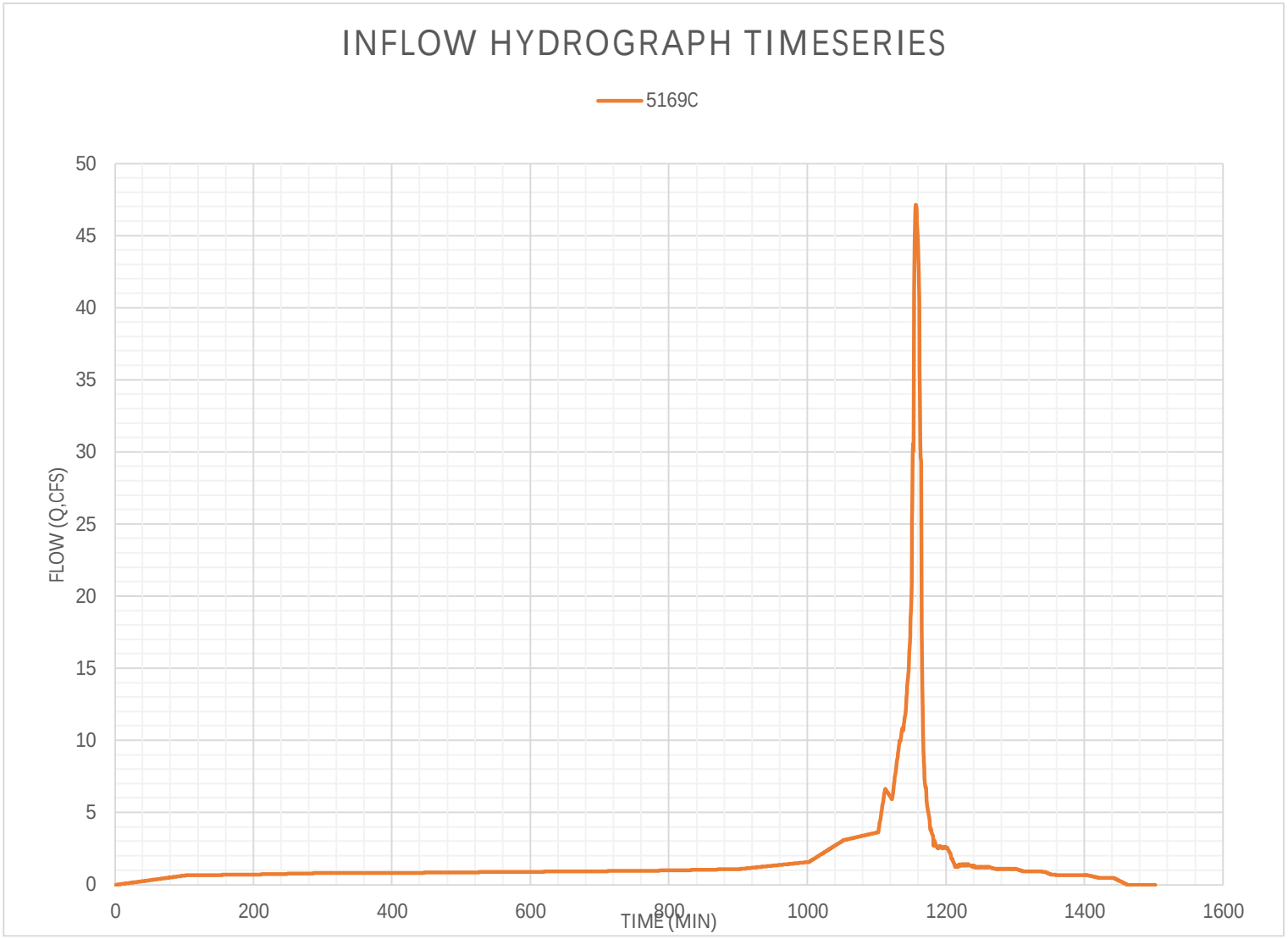
Attachment 3: Rating Curves, WSPG Files, HEC-RAS Files

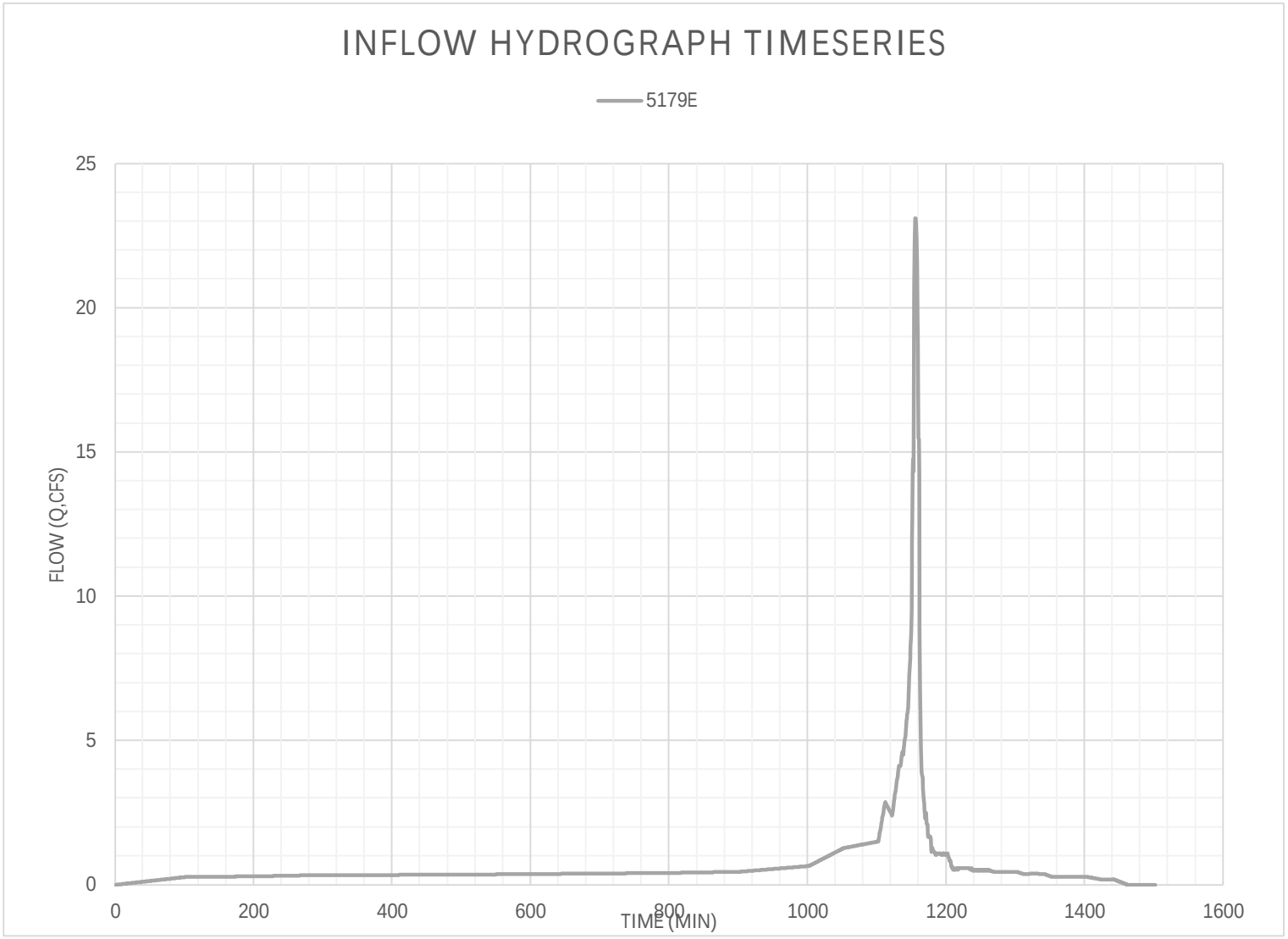
Electronic Files:

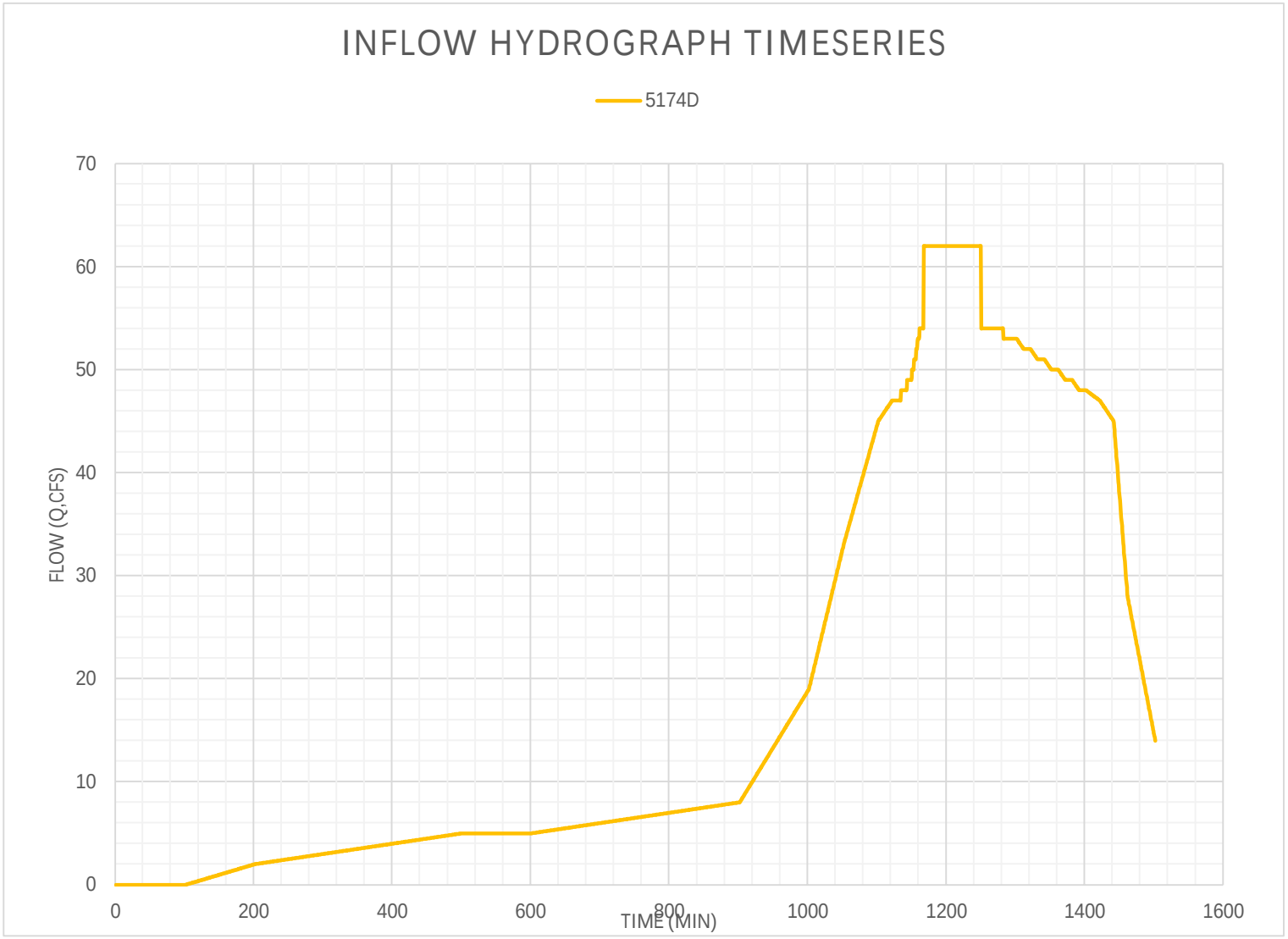
https://www.dropbox.com/sh/p31p8a7r4a8q8ik/AABEarchucfpeTixjRyNWEFCa?dl=0

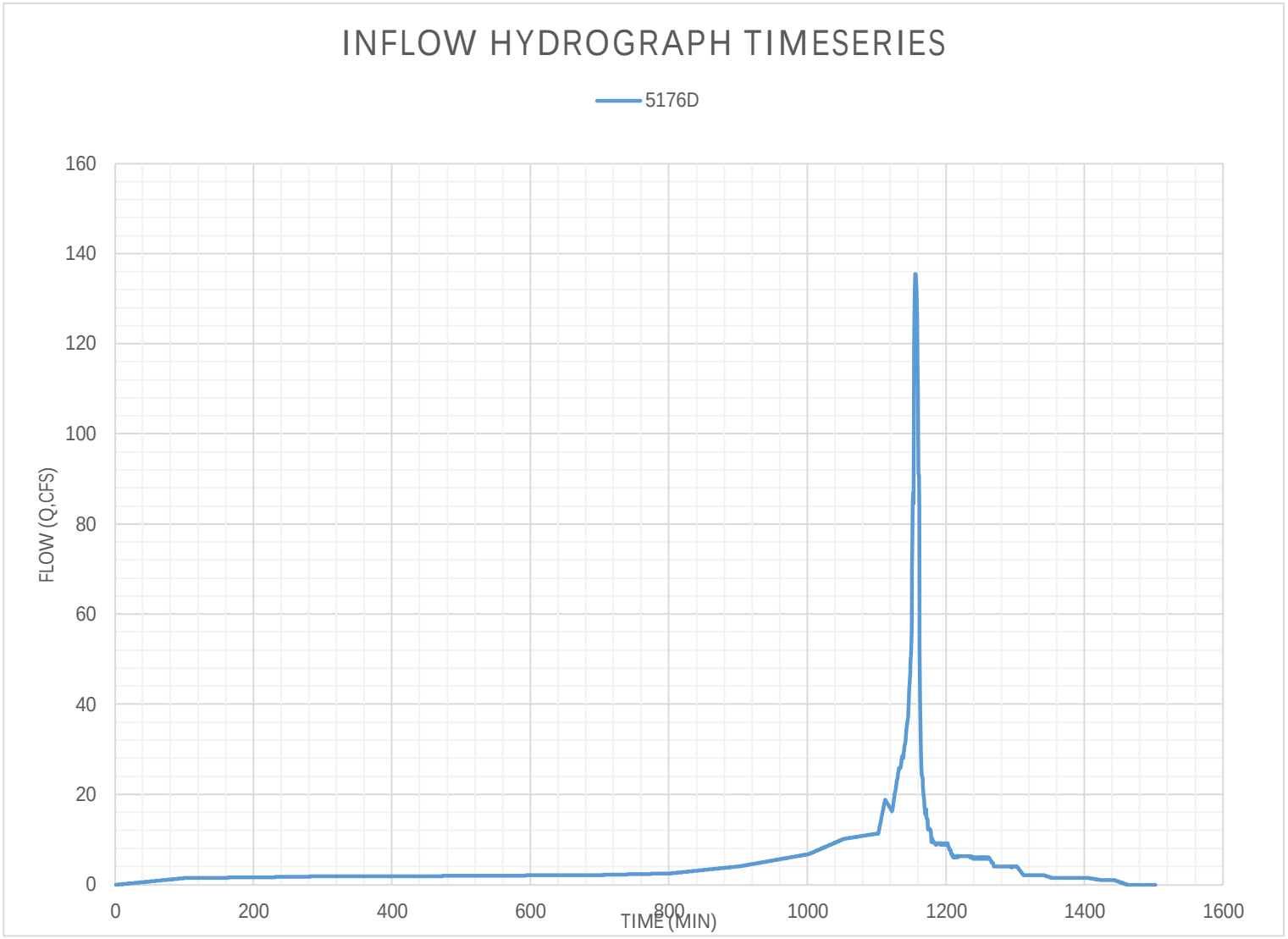

5153B
5162B
5166B
Q100yr: 602cfs
Q500yr:940cfs
5166
North Ramona Place Drain
5167B
Q100yr: 130 cfs
(Not in HECRAS Model)
5168C
5204D
5168C
Q100yr: 144cfs
5176D
Q100yr: 186cfs
5169C
Q100yr: 175cfs
5169C
5179E
5179E
Q100yr: 23cfs
5176D
5173D
County of Ventura
City of Camarillo
5178D
5177D
5174 OF
Q100yr: 62cfs
5182BC
Q100yr:682
Spanish Hills
5174D
5174 IF
Q100yr: 495cfs
Q500yr:773cfs
5205D
5178D
Q100yr: 381cfs
5177D
Q100yr: 277cfs
Las Posas Estates Drain
160
180
120
200
140
220
260
280
300
320
340
KASRAIE CONSULTING
Legend
City Limits
Redline Channel
Calleguas Watershed Subareas
Key Inflow Timeseries
N
W
E
S

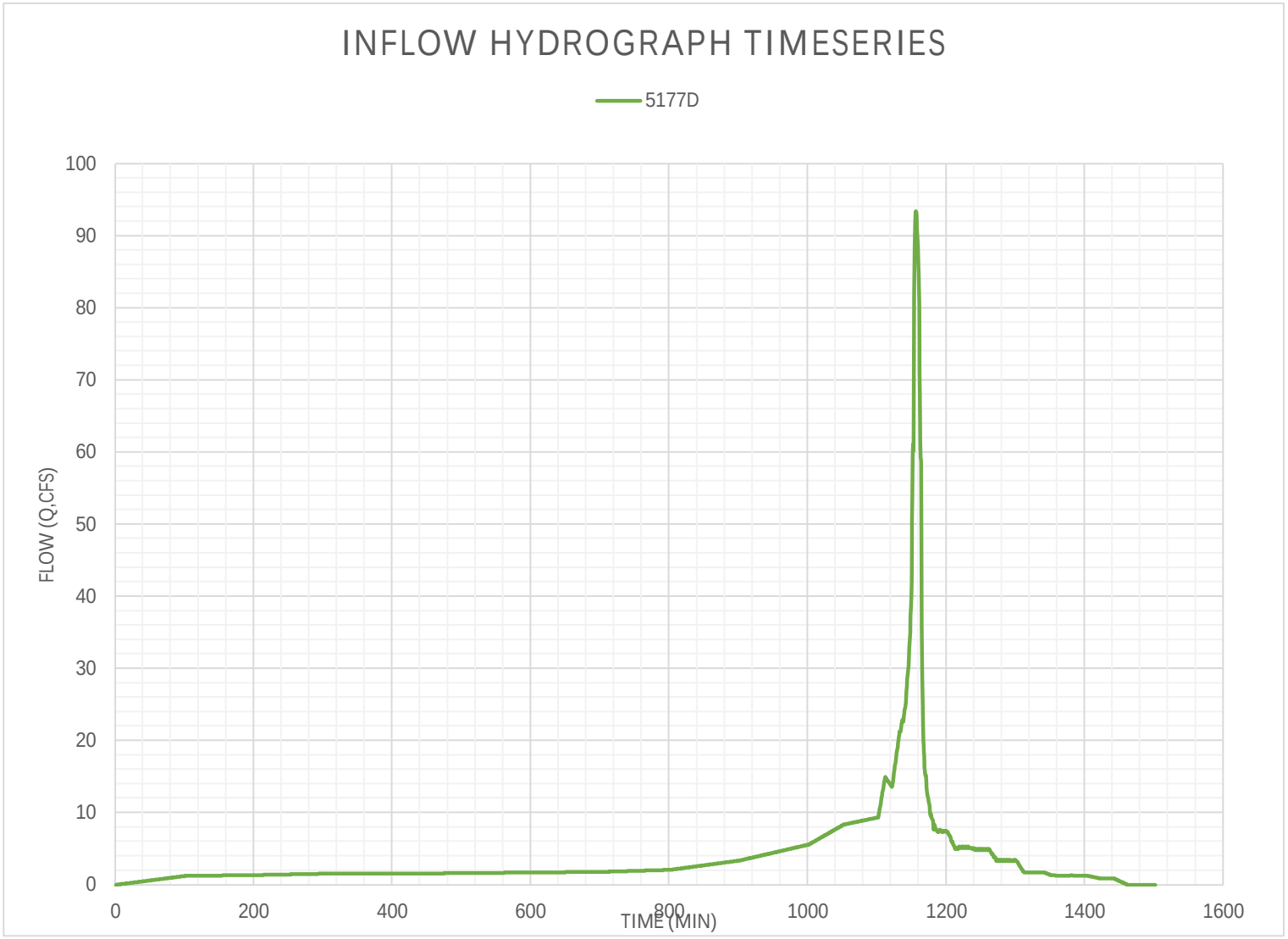

INFLOW HYDROGRAPH TIMESERIES
5168C
FLOW (Q,CFS)
TIME (MIN)
0
20
40
60
80
100
120
140
160
0
200
400
600
800
1000
1200
1400
1600

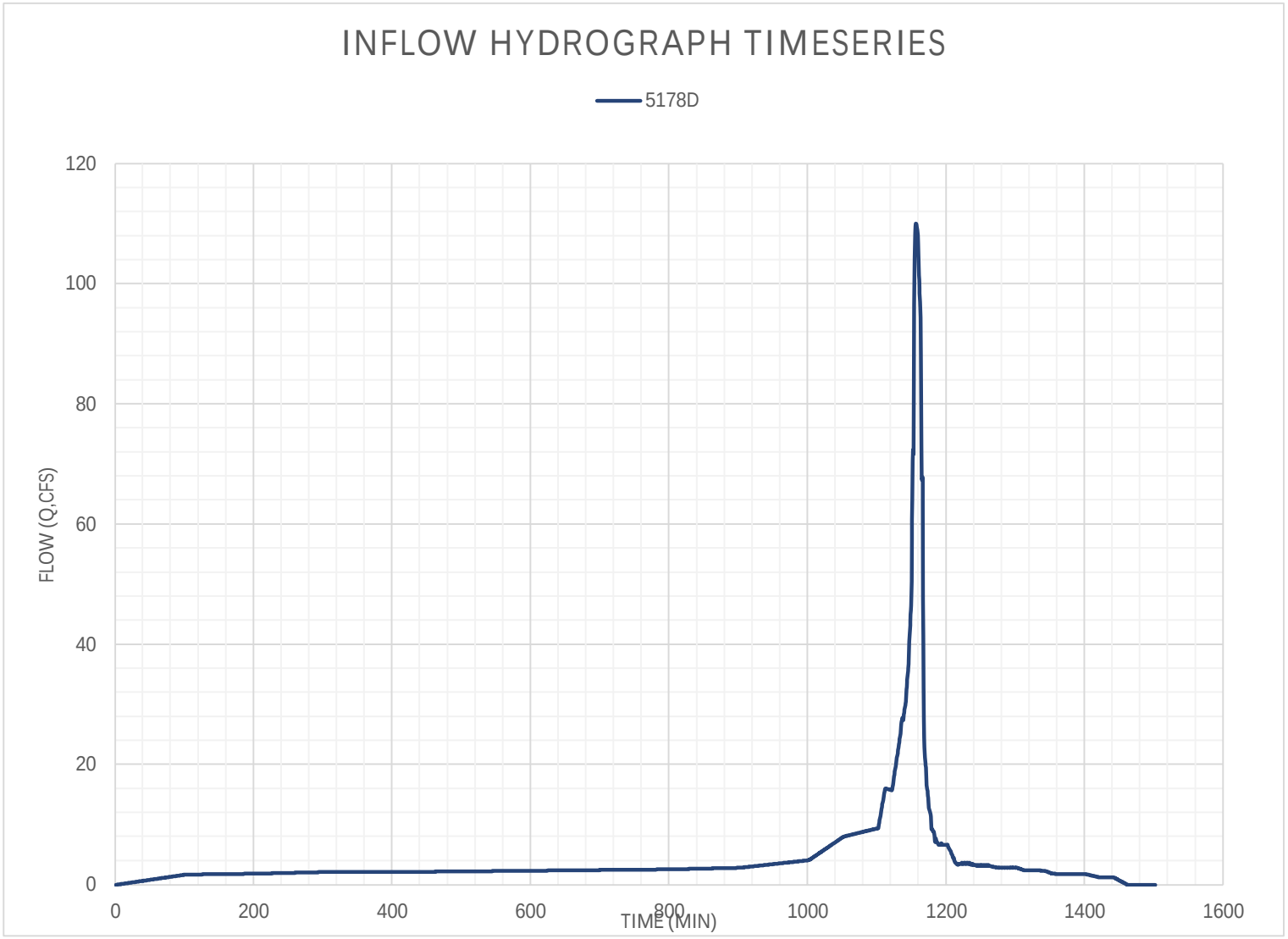

INFLOW HYDROGRAPH TIMESERIES
5169C
FLOW (Q,CFS)
TIME (MIN)
0
5
10
15
20
25
30
35
40
45
50
0
200
400
600
800
1000
1200
1400
1600

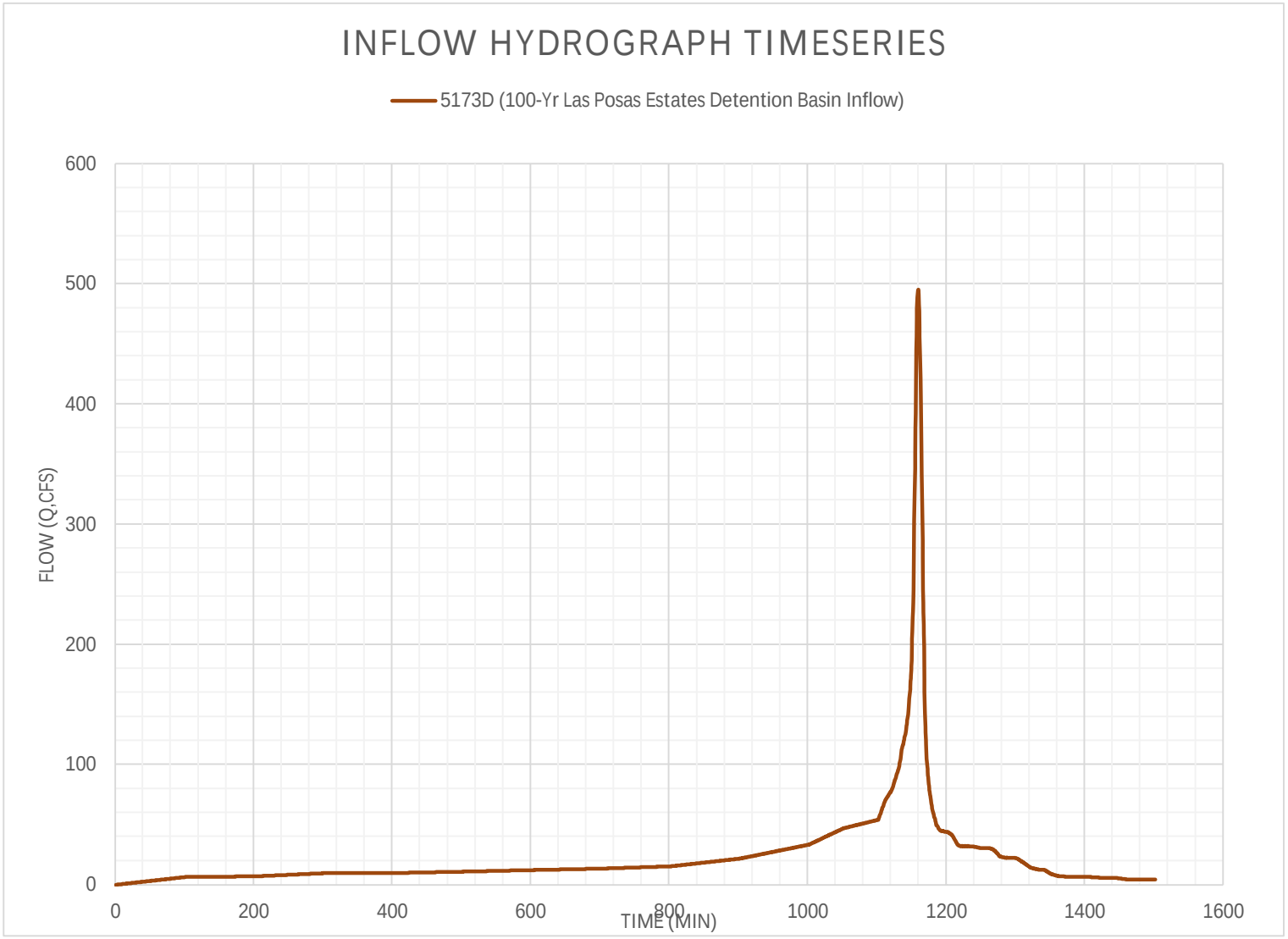

INFLOW HYDROGRAPH TIMESERIES
5179E
25
20
15
10
5
0
FLOW (Q,CFS)
0
200
400
600
800
1000
1200
1400
1600
TIME (MIN)

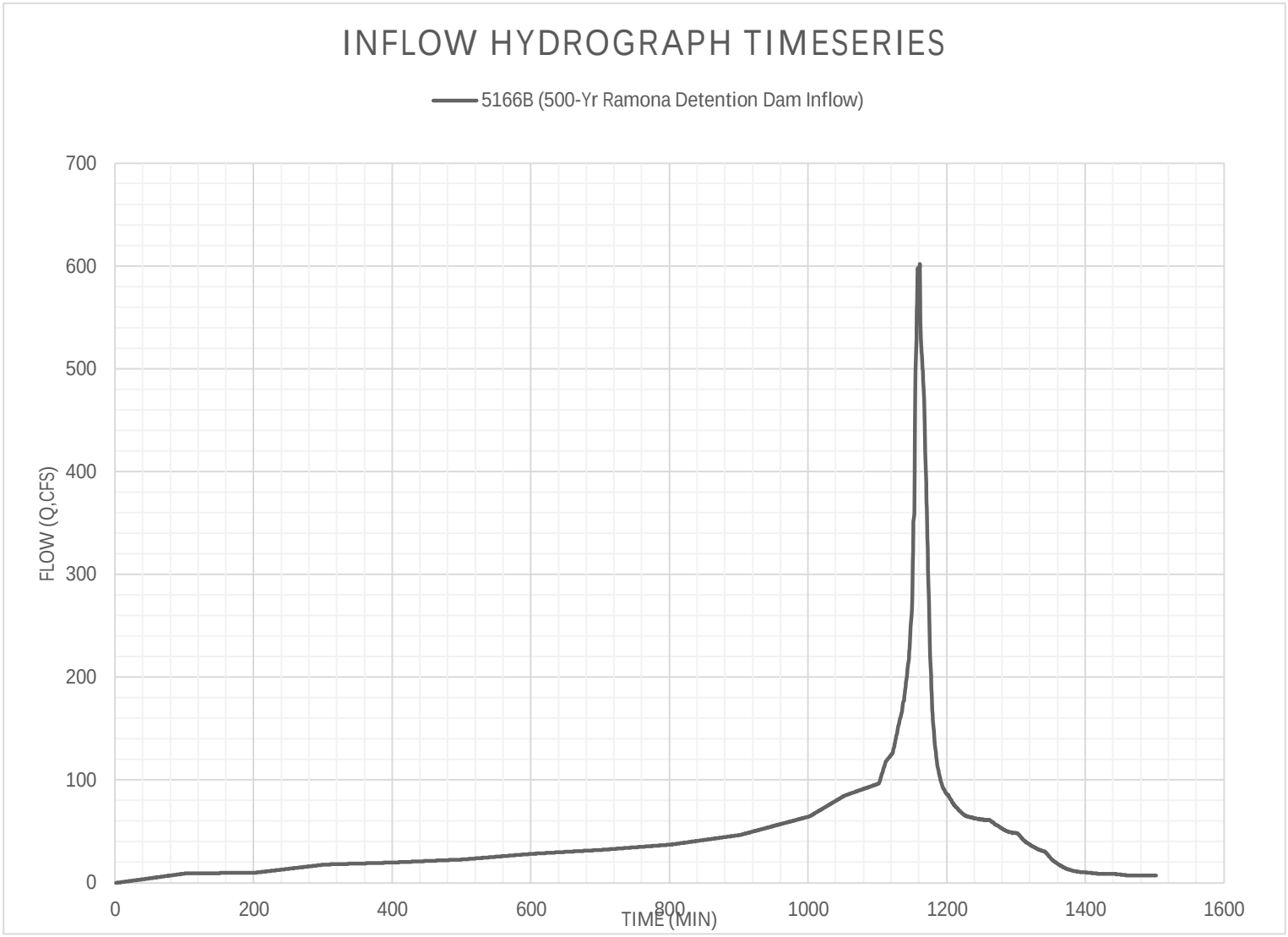

INFLOW HYDROGRAPH TIMESERIES
5174D
FLOW (Q,CFS)
TIME (MIN)
0
10
20
30
40
50
60
70
0
200
400
600
800
1000
1200
1400
1600


INFLOW HYDROGRAPH TIMESERIES
5176D
160
140
120
100
80
60
40
20
0
FLOW (Q,CFS)
0
200
400
600
800
1000
1200
1400
1600
TIME (MIN)


INFLOW HYDROGRAPH TIMESERIES
5177D
FLOW (Q,CFS)
TIME (MIN)
0
10
20
30
40
50
60
70
80
90
100
0
200
400
600
800
1000
1200
1400
1600


INFLOW HYDROGRAPH TIMESERIES
5178D
120
100
80
60
40
20
0
FLOW (Q,CFS)
0
200
400
600
800
1000
1200
1400
1600
TIME (MIN)


INFLOW HYDROGRAPH TIMESERIES
5173D (100-Yr Las Posas Estates Detention Basin Inflow)
FLOW (Q,CFS)
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
1400
1600
TIME (MIN)


INFLOW HYDROGRAPH TIMESERIES
5166B (500-Yr Ramona Detention Dam Inflow)
FLOW (Q,CFS)
0
100
200
300
400
500
600
700
0
200
400
600
800
1000
1200
1400
1600
TIME (MIN)

TIME	Time Series Name:								
	5168C	5169C	5179E	5174D	5176D	5177D	5178D	5173D (Las Posas Inflow)	5166B (Ramona Inflow)
	FLOW	FLOW	FLOW	FLOW	FLOW	FLOW	FLOW	FLOW	FLOW
0	0	0	0	0	0	0	0	0	0
1	0.02	0.0065	0.0027	0	0.015	0.0123	0.0169	0.0646	0.0922
2	0.04	0.013	0.0054	0	0.03	0.0246	0.0338	0.1292	0.1844
3	0.06	0.0195	0.0081	0	0.045	0.0369	0.0507	0.1938	0.2766
4	0.08	0.026	0.0108	0	0.06	0.0492	0.0676	0.2584	0.3688
5	0.1	0.0325	0.0135	0	0.075	0.0615	0.0845	0.323	0.461
6	0.12	0.039	0.0162	0	0.09	0.0738	0.1014	0.3876	0.5532
7	0.14	0.0455	0.0189	0	0.105	0.0861	0.1183	0.4522	0.6454
8	0.16	0.052	0.0216	0	0.12	0.0984	0.1352	0.5168	0.7376
9	0.18	0.0585	0.0243	0	0.135	0.1107	0.1521	0.5814	0.8298
10	0.2	0.065	0.027	0	0.15	0.123	0.169	0.646	0.922
11	0.22	0.0715	0.0297	0	0.165	0.1353	0.1859	0.7106	1.0142
12	0.24	0.078	0.0324	0	0.18	0.1476	0.2028	0.7752	1.1064
13	0.26	0.0845	0.0351	0	0.195	0.1599	0.2197	0.8398	1.1986
14	0.28	0.091	0.0378	0	0.21	0.1722	0.2366	0.9044	1.2908
15	0.3	0.0975	0.0405	0	0.225	0.1845	0.2535	0.969	1.383
16	0.32	0.104	0.0432	0	0.24	0.1968	0.2704	1.0336	1.4752
17	0.34	0.1105	0.0459	0	0.255	0.2091	0.2873	1.0982	1.5674
18	0.36	0.117	0.0486	0	0.27	0.2214	0.3042	1.1628	1.6596
19	0.38	0.1235	0.0513	0	0.285	0.2337	0.3211	1.2274	1.7518
20	0.4	0.13	0.054	0	0.3	0.246	0.338	1.292	1.844
21	0.42	0.1365	0.0567	0	0.315	0.2583	0.3549	1.3566	1.9362
22	0.44	0.143	0.0594	0	0.33	0.2706	0.3718	1.4212	2.0284
23	0.46	0.1495	0.0621	0	0.345	0.2829	0.3887	1.4858	2.1206
24	0.48	0.156	0.0648	0	0.36	0.2952	0.4056	1.5504	2.2128
25	0.5	0.1625	0.0675	0	0.375	0.3075	0.4225	1.615	2.305
26	0.52	0.169	0.0702	0	0.39	0.3198	0.4394	1.6796	2.3972
27	0.54	0.1755	0.0729	0	0.405	0.3321	0.4563	1.7442	2.4894
28	0.56	0.182	0.0756	0	0.42	0.3444	0.4732	1.8088	2.5816
29	0.58	0.1885	0.0783	0	0.435	0.3567	0.4901	1.8734	2.6738
30	0.6	0.195	0.081	0	0.45	0.369	0.507	1.938	2.766
31	0.62	0.2015	0.0837	0	0.465	0.3813	0.5239	2.0026	2.8582
32	0.64	0.208	0.0864	0	0.48	0.3936	0.5408	2.0672	2.9504
33	0.66	0.2145	0.0891	0	0.495	0.4059	0.5577	2.1318	3.0426
34	0.68	0.221	0.0918	0	0.51	0.4182	0.5746	2.1964	3.1348
35	0.7	0.2275	0.0945	0	0.525	0.4305	0.5915	2.261	3.227
36	0.72	0.234	0.0972	0	0.54	0.4428	0.6084	2.3256	3.3192
37	0.74	0.2405	0.0999	0	0.555	0.4551	0.6253	2.3902	3.4114
38	0.76	0.247	0.1026	0	0.57	0.4674	0.6422	2.4548	3.5036
39	0.78	0.2535	0.1053	0	0.585	0.4797	0.6591	2.5194	3.5958
40	0.8	0.26	0.108	0	0.6	0.492	0.676	2.584	3.688
41	0.82	0.2665	0.1107	0	0.615	0.5043	0.6929	2.6486	3.7802
42	0.84	0.273	0.1134	0	0.63	0.5166	0.7098	2.7132	3.8724

43	0.86	0.2795	0.1161	0	0.645	0.5289	0.7267	2.7778	3.9646
44	0.88	0.286	0.1188	0	0.66	0.5412	0.7436	2.8424	4.0568
45	0.9	0.2925	0.1215	0	0.675	0.5535	0.7605	2.907	4.149
46	0.92	0.299	0.1242	0	0.69	0.5658	0.7774	2.9716	4.2412
47	0.94	0.3055	0.1269	0	0.705	0.5781	0.7943	3.0362	4.3334
48	0.96	0.312	0.1296	0	0.72	0.5904	0.8112	3.1008	4.4256
49	0.98	0.3185	0.1323	0	0.735	0.6027	0.8281	3.1654	4.5178
50	1	0.325	0.135	0	0.75	0.615	0.845	3.23	4.61
51	1.02	0.3315	0.1377	0	0.765	0.6273	0.8619	3.2946	4.7022
52	1.04	0.338	0.1404	0	0.78	0.6396	0.8788	3.3592	4.7944
53	1.06	0.3445	0.1431	0	0.795	0.6519	0.8957	3.4238	4.8866
54	1.08	0.351	0.1458	0	0.81	0.6642	0.9126	3.4884	4.9788
55	1.1	0.3575	0.1485	0	0.825	0.6765	0.9295	3.553	5.071
56	1.12	0.364	0.1512	0	0.84	0.6888	0.9464	3.6176	5.1632
57	1.14	0.3705	0.1539	0	0.855	0.7011	0.9633	3.6822	5.2554
58	1.16	0.377	0.1566	0	0.87	0.7134	0.9802	3.7468	5.3476
59	1.18	0.3835	0.1593	0	0.885	0.7257	0.9971	3.8114	5.4398
60	1.2	0.39	0.162	0	0.9	0.738	1.014	3.876	5.532
61	1.22	0.3965	0.1647	0	0.915	0.7503	1.0309	3.9406	5.6242
62	1.24	0.403	0.1674	0	0.93	0.7626	1.0478	4.0052	5.7164
63	1.26	0.4095	0.1701	0	0.945	0.7749	1.0647	4.0698	5.8086
64	1.28	0.416	0.1728	0	0.96	0.7872	1.0816	4.1344	5.9008
65	1.3	0.4225	0.1755	0	0.975	0.7995	1.0985	4.199	5.993
66	1.32	0.429	0.1782	0	0.99	0.8118	1.1154	4.2636	6.0852
67	1.34	0.4355	0.1809	0	1.005	0.8241	1.1323	4.3282	6.1774
68	1.36	0.442	0.1836	0	1.02	0.8364	1.1492	4.3928	6.2696
69	1.38	0.4485	0.1863	0	1.035	0.8487	1.1661	4.4574	6.3618
70	1.4	0.455	0.189	0	1.05	0.861	1.183	4.522	6.454
71	1.42	0.4615	0.1917	0	1.065	0.8733	1.1999	4.5866	6.5462
72	1.44	0.468	0.1944	0	1.08	0.8856	1.2168	4.6512	6.6384
73	1.46	0.4745	0.1971	0	1.095	0.8979	1.2337	4.7158	6.7306
74	1.48	0.481	0.1998	0	1.11	0.9102	1.2506	4.7804	6.8228
75	1.5	0.4875	0.2025	0	1.125	0.9225	1.2675	4.845	6.915
76	1.52	0.494	0.2052	0	1.14	0.9348	1.2844	4.9096	7.0072
77	1.54	0.5005	0.2079	0	1.155	0.9471	1.3013	4.9742	7.0994
78	1.56	0.507	0.2106	0	1.17	0.9594	1.3182	5.0388	7.1916
79	1.58	0.5135	0.2133	0	1.185	0.9717	1.3351	5.1034	7.2838
80	1.6	0.52	0.216	0	1.2	0.984	1.352	5.168	7.376
81	1.62	0.5265	0.2187	0	1.215	0.9963	1.3689	5.2326	7.4682
82	1.64	0.533	0.2214	0	1.23	1.0086	1.3858	5.2972	7.5604
83	1.66	0.5395	0.2241	0	1.245	1.0209	1.4027	5.3618	7.6526
84	1.68	0.546	0.2268	0	1.26	1.0332	1.4196	5.4264	7.7448
85	1.7	0.5525	0.2295	0	1.275	1.0455	1.4365	5.491	7.837
86	1.72	0.559	0.2322	0	1.29	1.0578	1.4534	5.5556	7.9292
87	1.74	0.5655	0.2349	0	1.305	1.0701	1.4703	5.6202	8.0214
88	1.76	0.572	0.2376	0	1.32	1.0824	1.4872	5.6848	8.1136
89	1.78	0.5785	0.2403	0	1.335	1.0947	1.5041	5.7494	8.2058

90	1.8	0.585	0.243	0	1.35	1.107	1.521	5.814	8.298
91	1.82	0.5915	0.2457	0	1.365	1.1193	1.5379	5.8786	8.3902
92	1.84	0.598	0.2484	0	1.38	1.1316	1.5548	5.9432	8.4824
93	1.86	0.6045	0.2511	0	1.395	1.1439	1.5717	6.0078	8.5746
94	1.88	0.611	0.2538	0	1.41	1.1562	1.5886	6.0724	8.6668
95	1.9	0.6175	0.2565	0	1.425	1.1685	1.6055	6.137	8.759
96	1.92	0.624	0.2592	0	1.44	1.1808	1.6224	6.2016	8.8512
97	1.94	0.6305	0.2619	0	1.455	1.1931	1.6393	6.2662	8.9434
98	1.96	0.637	0.2646	0	1.47	1.2054	1.6562	6.3308	9.0356
99	1.98	0.6435	0.2673	0	1.485	1.2177	1.6731	6.3954	9.1278
100	2	0.65	0.27	0	1.5	1.23	1.69	6.46	9.22
101	2.0018	0.6506	0.2702	0.02	1.5013	1.2311	1.6915	6.4651	9.2265
102	2.0036	0.6512	0.2704	0.04	1.5026	1.2322	1.693	6.4702	9.233
103	2.0054	0.6518	0.2706	0.06	1.5039	1.2333	1.6945	6.4753	9.2395
104	2.0072	0.6524	0.2708	0.08	1.5052	1.2344	1.696	6.4804	9.246
105	2.009	0.653	0.271	0.1	1.5065	1.2355	1.6975	6.4855	9.2525
106	2.0108	0.6536	0.2712	0.12	1.5078	1.2366	1.699	6.4906	9.259
107	2.0126	0.6542	0.2714	0.14	1.5091	1.2377	1.7005	6.4957	9.2655
108	2.0144	0.6548	0.2716	0.16	1.5104	1.2388	1.702	6.5008	9.272
109	2.0162	0.6554	0.2718	0.18	1.5117	1.2399	1.7035	6.5059	9.2785
110	2.018	0.656	0.272	0.2	1.513	1.241	1.705	6.511	9.285
111	2.0198	0.6566	0.2722	0.22	1.5143	1.2421	1.7065	6.5161	9.2915
112	2.0216	0.6572	0.2724	0.24	1.5156	1.2432	1.708	6.5212	9.298
113	2.0234	0.6578	0.2726	0.26	1.5169	1.2443	1.7095	6.5263	9.3045
114	2.0252	0.6584	0.2728	0.28	1.5182	1.2454	1.711	6.5314	9.311
115	2.027	0.659	0.273	0.3	1.5195	1.2465	1.7125	6.5365	9.3175
116	2.0288	0.6596	0.2732	0.32	1.5208	1.2476	1.714	6.5416	9.324
117	2.0306	0.6602	0.2734	0.34	1.5221	1.2487	1.7155	6.5467	9.3305
118	2.0324	0.6608	0.2736	0.36	1.5234	1.2498	1.717	6.5518	9.337
119	2.0342	0.6614	0.2738	0.38	1.5247	1.2509	1.7185	6.5569	9.3435
120	2.036	0.662	0.274	0.4	1.526	1.252	1.72	6.562	9.35
121	2.0378	0.6626	0.2742	0.42	1.5273	1.2531	1.7215	6.5671	9.3565
122	2.0396	0.6632	0.2744	0.44	1.5286	1.2542	1.723	6.5722	9.363
123	2.0414	0.6638	0.2746	0.46	1.5299	1.2553	1.7245	6.5773	9.3695
124	2.0432	0.6644	0.2748	0.48	1.5312	1.2564	1.726	6.5824	9.376
125	2.045	0.665	0.275	0.5	1.5325	1.2575	1.7275	6.5875	9.3825
126	2.0468	0.6656	0.2752	0.52	1.5338	1.2586	1.729	6.5926	9.389
127	2.0486	0.6662	0.2754	0.54	1.5351	1.2597	1.7305	6.5977	9.3955
128	2.0504	0.6668	0.2756	0.56	1.5364	1.2608	1.732	6.6028	9.402
129	2.0522	0.6674	0.2758	0.58	1.5377	1.2619	1.7335	6.6079	9.4085
130	2.054	0.668	0.276	0.6	1.539	1.263	1.735	6.613	9.415
131	2.0558	0.6686	0.2762	0.62	1.5403	1.2641	1.7365	6.6181	9.4215
132	2.0576	0.6692	0.2764	0.64	1.5416	1.2652	1.738	6.6232	9.428
133	2.0594	0.6698	0.2766	0.66	1.5429	1.2663	1.7395	6.6283	9.4345
134	2.0612	0.6704	0.2768	0.68	1.5442	1.2674	1.741	6.6334	9.441
135	2.063	0.671	0.277	0.7	1.5455	1.2685	1.7425	6.6385	9.4475
136	2.0648	0.6716	0.2772	0.72	1.5468	1.2696	1.744	6.6436	9.454

137	2.0666	0.6722	0.2774	0.74	1.5481	1.2707	1.7455	6.6487	9.4605
138	2.0684	0.6728	0.2776	0.76	1.5494	1.2718	1.747	6.6538	9.467
139	2.0702	0.6734	0.2778	0.78	1.5507	1.2729	1.7485	6.6589	9.4735
140	2.072	0.674	0.278	0.8	1.552	1.274	1.75	6.664	9.48
141	2.0738	0.6746	0.2782	0.82	1.5533	1.2751	1.7515	6.6691	9.4865
142	2.0756	0.6752	0.2784	0.84	1.5546	1.2762	1.753	6.6742	9.493
143	2.0774	0.6758	0.2786	0.86	1.5559	1.2773	1.7545	6.6793	9.4995
144	2.0792	0.6764	0.2788	0.88	1.5572	1.2784	1.756	6.6844	9.506
145	2.081	0.677	0.279	0.9	1.5585	1.2795	1.7575	6.6895	9.5125
146	2.0828	0.6776	0.2792	0.92	1.5598	1.2806	1.759	6.6946	9.519
147	2.0846	0.6782	0.2794	0.94	1.5611	1.2817	1.7605	6.6997	9.5255
148	2.0864	0.6788	0.2796	0.96	1.5624	1.2828	1.762	6.7048	9.532
149	2.0882	0.6794	0.2798	0.98	1.5637	1.2839	1.7635	6.7099	9.5385
150	2.09	0.68	0.28	1	1.565	1.285	1.765	6.715	9.545
151	2.0918	0.6806	0.2802	1.02	1.5663	1.2861	1.7665	6.7201	9.5515
152	2.0936	0.6812	0.2804	1.04	1.5676	1.2872	1.768	6.7252	9.558
153	2.0954	0.6818	0.2806	1.06	1.5689	1.2883	1.7695	6.7303	9.5645
154	2.0972	0.6824	0.2808	1.08	1.5702	1.2894	1.771	6.7354	9.571
155	2.099	0.683	0.281	1.1	1.5715	1.2905	1.7725	6.7405	9.5775
156	2.1008	0.6836	0.2812	1.12	1.5728	1.2916	1.774	6.7456	9.584
157	2.1026	0.6842	0.2814	1.14	1.5741	1.2927	1.7755	6.7507	9.5905
158	2.1044	0.6848	0.2816	1.16	1.5754	1.2938	1.777	6.7558	9.597
159	2.1062	0.6854	0.2818	1.18	1.5767	1.2949	1.7785	6.7609	9.6035
160	2.108	0.686	0.282	1.2	1.578	1.296	1.78	6.766	9.61
161	2.1098	0.6866	0.2822	1.22	1.5793	1.2971	1.7815	6.7711	9.6165
162	2.1116	0.6872	0.2824	1.24	1.5806	1.2982	1.783	6.7762	9.623
163	2.1134	0.6878	0.2826	1.26	1.5819	1.2993	1.7845	6.7813	9.6295
164	2.1152	0.6884	0.2828	1.28	1.5832	1.3004	1.786	6.7864	9.636
165	2.117	0.689	0.283	1.3	1.5845	1.3015	1.7875	6.7915	9.6425
166	2.1188	0.6896	0.2832	1.32	1.5858	1.3026	1.789	6.7966	9.649
167	2.1206	0.6902	0.2834	1.34	1.5871	1.3037	1.7905	6.8017	9.6555
168	2.1224	0.6908	0.2836	1.36	1.5884	1.3048	1.792	6.8068	9.662
169	2.1242	0.6914	0.2838	1.38	1.5897	1.3059	1.7935	6.8119	9.6685
170	2.126	0.692	0.284	1.4	1.591	1.307	1.795	6.817	9.675
171	2.1278	0.6926	0.2842	1.42	1.5923	1.3081	1.7965	6.8221	9.6815
172	2.1296	0.6932	0.2844	1.44	1.5936	1.3092	1.798	6.8272	9.688
173	2.1314	0.6938	0.2846	1.46	1.5949	1.3103	1.7995	6.8323	9.6945
174	2.1332	0.6944	0.2848	1.48	1.5962	1.3114	1.801	6.8374	9.701
175	2.135	0.695	0.285	1.5	1.5975	1.3125	1.8025	6.8425	9.7075
176	2.1368	0.6956	0.2852	1.52	1.5988	1.3136	1.804	6.8476	9.714
177	2.1386	0.6962	0.2854	1.54	1.6001	1.3147	1.8055	6.8527	9.7205
178	2.1404	0.6968	0.2856	1.56	1.6014	1.3158	1.807	6.8578	9.727
179	2.1422	0.6974	0.2858	1.58	1.6027	1.3169	1.8085	6.8629	9.7335
180	2.144	0.698	0.286	1.6	1.604	1.318	1.81	6.868	9.74
181	2.1458	0.6986	0.2862	1.62	1.6053	1.3191	1.8115	6.8731	9.7465
182	2.1476	0.6992	0.2864	1.64	1.6066	1.3202	1.813	6.8782	9.753
183	2.1494	0.6998	0.2866	1.66	1.6079	1.3213	1.8145	6.8833	9.7595

184	2.1512	0.7004	0.2868	1.68	1.6092	1.3224	1.816	6.8884	9.766
185	2.153	0.701	0.287	1.7	1.6105	1.3235	1.8175	6.8935	9.7725
186	2.1548	0.7016	0.2872	1.72	1.6118	1.3246	1.819	6.8986	9.779
187	2.1566	0.7022	0.2874	1.74	1.6131	1.3257	1.8205	6.9037	9.7855
188	2.1584	0.7028	0.2876	1.76	1.6144	1.3268	1.822	6.9088	9.792
189	2.1602	0.7034	0.2878	1.78	1.6157	1.3279	1.8235	6.9139	9.7985
190	2.162	0.704	0.288	1.8	1.617	1.329	1.825	6.919	9.805
191	2.1638	0.7046	0.2882	1.82	1.6183	1.3301	1.8265	6.9241	9.8115
192	2.1656	0.7052	0.2884	1.84	1.6196	1.3312	1.828	6.9292	9.818
193	2.1674	0.7058	0.2886	1.86	1.6209	1.3323	1.8295	6.9343	9.8245
194	2.1692	0.7064	0.2888	1.88	1.6222	1.3334	1.831	6.9394	9.831
195	2.171	0.707	0.289	1.9	1.6235	1.3345	1.8325	6.9445	9.8375
196	2.1728	0.7076	0.2892	1.92	1.6248	1.3356	1.834	6.9496	9.844
197	2.1746	0.7082	0.2894	1.94	1.6261	1.3367	1.8355	6.9547	9.8505
198	2.1764	0.7088	0.2896	1.96	1.6274	1.3378	1.837	6.9598	9.857
199	2.1782	0.7094	0.2898	1.98	1.6287	1.3389	1.8385	6.9649	9.8635
200	2.18	0.71	0.29	2	1.63	1.34	1.84	6.97	9.87
201	2.1831	0.711	0.2905	2.01	1.6324	1.3419	1.8427	6.9964	9.9491
202	2.1862	0.712	0.291	2.02	1.6348	1.3438	1.8454	7.0228	10.0282
203	2.1893	0.713	0.2915	2.03	1.6372	1.3457	1.8481	7.0492	10.1073
204	2.1924	0.714	0.292	2.04	1.6396	1.3476	1.8508	7.0756	10.1864
205	2.1955	0.715	0.2925	2.05	1.642	1.3495	1.8535	7.102	10.2655
206	2.1986	0.716	0.293	2.06	1.6444	1.3514	1.8562	7.1284	10.3446
207	2.2017	0.717	0.2935	2.07	1.6468	1.3533	1.8589	7.1548	10.4237
208	2.2048	0.718	0.294	2.08	1.6492	1.3552	1.8616	7.1812	10.5028
209	2.2079	0.719	0.2945	2.09	1.6516	1.3571	1.8643	7.2076	10.5819
210	2.211	0.72	0.295	2.1	1.654	1.359	1.867	7.234	10.661
211	2.2141	0.721	0.2955	2.11	1.6564	1.3609	1.8697	7.2604	10.7401
212	2.2172	0.722	0.296	2.12	1.6588	1.3628	1.8724	7.2868	10.8192
213	2.2203	0.723	0.2965	2.13	1.6612	1.3647	1.8751	7.3132	10.8983
214	2.2234	0.724	0.297	2.14	1.6636	1.3666	1.8778	7.3396	10.9774
215	2.2265	0.725	0.2975	2.15	1.666	1.3685	1.8805	7.366	11.0565
216	2.2296	0.726	0.298	2.16	1.6684	1.3704	1.8832	7.3924	11.1356
217	2.2327	0.727	0.2985	2.17	1.6708	1.3723	1.8859	7.4188	11.2147
218	2.2358	0.728	0.299	2.18	1.6732	1.3742	1.8886	7.4452	11.2938
219	2.2389	0.729	0.2995	2.19	1.6756	1.3761	1.8913	7.4716	11.3729
220	2.242	0.73	0.3	2.2	1.678	1.378	1.894	7.498	11.452
221	2.2451	0.731	0.3005	2.21	1.6804	1.3799	1.8967	7.5244	11.5311
222	2.2482	0.732	0.301	2.22	1.6828	1.3818	1.8994	7.5508	11.6102
223	2.2513	0.733	0.3015	2.23	1.6852	1.3837	1.9021	7.5772	11.6893
224	2.2544	0.734	0.302	2.24	1.6876	1.3856	1.9048	7.6036	11.7684
225	2.2575	0.735	0.3025	2.25	1.69	1.3875	1.9075	7.63	11.8475
226	2.2606	0.736	0.303	2.26	1.6924	1.3894	1.9102	7.6564	11.9266
227	2.2637	0.737	0.3035	2.27	1.6948	1.3913	1.9129	7.6828	12.0057
228	2.2668	0.738	0.304	2.28	1.6972	1.3932	1.9156	7.7092	12.0848
229	2.2699	0.739	0.3045	2.29	1.6996	1.3951	1.9183	7.7356	12.1639
230	2.273	0.74	0.305	2.3	1.702	1.397	1.921	7.762	12.243

231	2.2761	0.741	0.3055	2.31	1.7044	1.3989	1.9237	7.7884	12.3221
232	2.2792	0.742	0.306	2.32	1.7068	1.4008	1.9264	7.8148	12.4012
233	2.2823	0.743	0.3065	2.33	1.7092	1.4027	1.9291	7.8412	12.4803
234	2.2854	0.744	0.307	2.34	1.7116	1.4046	1.9318	7.8676	12.5594
235	2.2885	0.745	0.3075	2.35	1.714	1.4065	1.9345	7.894	12.6385
236	2.2916	0.746	0.308	2.36	1.7164	1.4084	1.9372	7.9204	12.7176
237	2.2947	0.747	0.3085	2.37	1.7188	1.4103	1.9399	7.9468	12.7967
238	2.2978	0.748	0.309	2.38	1.7212	1.4122	1.9426	7.9732	12.8758
239	2.3009	0.749	0.3095	2.39	1.7236	1.4141	1.9453	7.9996	12.9549
240	2.304	0.75	0.31	2.4	1.726	1.416	1.948	8.026	13.034
241	2.3071	0.751	0.3105	2.41	1.7284	1.4179	1.9507	8.0524	13.1131
242	2.3102	0.752	0.311	2.42	1.7308	1.4198	1.9534	8.0788	13.1922
243	2.3133	0.753	0.3115	2.43	1.7332	1.4217	1.9561	8.1052	13.2713
244	2.3164	0.754	0.312	2.44	1.7356	1.4236	1.9588	8.1316	13.3504
245	2.3195	0.755	0.3125	2.45	1.738	1.4255	1.9615	8.158	13.4295
246	2.3226	0.756	0.313	2.46	1.7404	1.4274	1.9642	8.1844	13.5086
247	2.3257	0.757	0.3135	2.47	1.7428	1.4293	1.9669	8.2108	13.5877
248	2.3288	0.758	0.314	2.48	1.7452	1.4312	1.9696	8.2372	13.6668
249	2.3319	0.759	0.3145	2.49	1.7476	1.4331	1.9723	8.2636	13.7459
250	2.335	0.76	0.315	2.5	1.75	1.435	1.975	8.29	13.825
251	2.3381	0.761	0.3155	2.51	1.7524	1.4369	1.9777	8.3164	13.9041
252	2.3412	0.762	0.316	2.52	1.7548	1.4388	1.9804	8.3428	13.9832
253	2.3443	0.763	0.3165	2.53	1.7572	1.4407	1.9831	8.3692	14.0623
254	2.3474	0.764	0.317	2.54	1.7596	1.4426	1.9858	8.3956	14.1414
255	2.3505	0.765	0.3175	2.55	1.762	1.4445	1.9885	8.422	14.2205
256	2.3536	0.766	0.318	2.56	1.7644	1.4464	1.9912	8.4484	14.2996
257	2.3567	0.767	0.3185	2.57	1.7668	1.4483	1.9939	8.4748	14.3787
258	2.3598	0.768	0.319	2.58	1.7692	1.4502	1.9966	8.5012	14.4578
259	2.3629	0.769	0.3195	2.59	1.7716	1.4521	1.9993	8.5276	14.5369
260	2.366	0.77	0.32	2.6	1.774	1.454	2.002	8.554	14.616
261	2.3691	0.771	0.3205	2.61	1.7764	1.4559	2.0047	8.5804	14.6951
262	2.3722	0.772	0.321	2.62	1.7788	1.4578	2.0074	8.6068	14.7742
263	2.3753	0.773	0.3215	2.63	1.7812	1.4597	2.0101	8.6332	14.8533
264	2.3784	0.774	0.322	2.64	1.7836	1.4616	2.0128	8.6596	14.9324
265	2.3815	0.775	0.3225	2.65	1.786	1.4635	2.0155	8.686	15.0115
266	2.3846	0.776	0.323	2.66	1.7884	1.4654	2.0182	8.7124	15.0906
267	2.3877	0.777	0.3235	2.67	1.7908	1.4673	2.0209	8.7388	15.1697
268	2.3908	0.778	0.324	2.68	1.7932	1.4692	2.0236	8.7652	15.2488
269	2.3939	0.779	0.3245	2.69	1.7956	1.4711	2.0263	8.7916	15.3279
270	2.397	0.78	0.325	2.7	1.798	1.473	2.029	8.818	15.407
271	2.4001	0.781	0.3255	2.71	1.8004	1.4749	2.0317	8.8444	15.4861
272	2.4032	0.782	0.326	2.72	1.8028	1.4768	2.0344	8.8708	15.5652
273	2.4063	0.783	0.3265	2.73	1.8052	1.4787	2.0371	8.8972	15.6443
274	2.4094	0.784	0.327	2.74	1.8076	1.4806	2.0398	8.9236	15.7234
275	2.4125	0.785	0.3275	2.75	1.81	1.4825	2.0425	8.95	15.8025
276	2.4156	0.786	0.328	2.76	1.8124	1.4844	2.0452	8.9764	15.8816
277	2.4187	0.787	0.3285	2.77	1.8148	1.4863	2.0479	9.0028	15.9607

278	2.4218	0.788	0.329	2.78	1.8172	1.4882	2.0506	9.0292	16.0398
279	2.4249	0.789	0.3295	2.79	1.8196	1.4901	2.0533	9.0556	16.1189
280	2.428	0.79	0.33	2.8	1.822	1.492	2.056	9.082	16.198
281	2.4311	0.791	0.3305	2.81	1.8244	1.4939	2.0587	9.1084	16.2771
282	2.4342	0.792	0.331	2.82	1.8268	1.4958	2.0614	9.1348	16.3562
283	2.4373	0.793	0.3315	2.83	1.8292	1.4977	2.0641	9.1612	16.4353
284	2.4404	0.794	0.332	2.84	1.8316	1.4996	2.0668	9.1876	16.5144
285	2.4435	0.795	0.3325	2.85	1.834	1.5015	2.0695	9.214	16.5935
286	2.4466	0.796	0.333	2.86	1.8364	1.5034	2.0722	9.2404	16.6726
287	2.4497	0.797	0.3335	2.87	1.8388	1.5053	2.0749	9.2668	16.7517
288	2.4528	0.798	0.334	2.88	1.8412	1.5072	2.0776	9.2932	16.8308
289	2.4559	0.799	0.3345	2.89	1.8436	1.5091	2.0803	9.3196	16.9099
290	2.459	0.8	0.335	2.9	1.846	1.511	2.083	9.346	16.989
291	2.4621	0.801	0.3355	2.91	1.8484	1.5129	2.0857	9.3724	17.0681
292	2.4652	0.802	0.336	2.92	1.8508	1.5148	2.0884	9.3988	17.1472
293	2.4683	0.803	0.3365	2.93	1.8532	1.5167	2.0911	9.4252	17.2263
294	2.4714	0.804	0.337	2.94	1.8556	1.5186	2.0938	9.4516	17.3054
295	2.4745	0.805	0.3375	2.95	1.858	1.5205	2.0965	9.478	17.3845
296	2.4776	0.806	0.338	2.96	1.8604	1.5224	2.0992	9.5044	17.4636
297	2.4807	0.807	0.3385	2.97	1.8628	1.5243	2.1019	9.5308	17.5427
298	2.4838	0.808	0.339	2.98	1.8652	1.5262	2.1046	9.5572	17.6218
299	2.4869	0.809	0.3395	2.99	1.8676	1.5281	2.1073	9.5836	17.7009
300	2.49	0.81	0.34	3	1.87	1.53	2.11	9.61	17.78
301	2.49	0.81	0.34	3.01	1.87	1.53	2.11	9.6112	17.8006
302	2.49	0.81	0.34	3.02	1.87	1.53	2.11	9.6124	17.8212
303	2.49	0.81	0.34	3.03	1.87	1.53	2.11	9.6136	17.8418
304	2.49	0.81	0.34	3.04	1.87	1.53	2.11	9.6148	17.8624
305	2.49	0.81	0.34	3.05	1.87	1.53	2.11	9.616	17.883
306	2.49	0.81	0.34	3.06	1.87	1.53	2.11	9.6172	17.9036
307	2.49	0.81	0.34	3.07	1.87	1.53	2.11	9.6184	17.9242
308	2.49	0.81	0.34	3.08	1.87	1.53	2.11	9.6196	17.9448
309	2.49	0.81	0.34	3.09	1.87	1.53	2.11	9.6208	17.9654
310	2.49	0.81	0.34	3.1	1.87	1.53	2.11	9.622	17.986
311	2.49	0.81	0.34	3.11	1.87	1.53	2.11	9.6232	18.0066
312	2.49	0.81	0.34	3.12	1.87	1.53	2.11	9.6244	18.0272
313	2.49	0.81	0.34	3.13	1.87	1.53	2.11	9.6256	18.0478
314	2.49	0.81	0.34	3.14	1.87	1.53	2.11	9.6268	18.0684
315	2.49	0.81	0.34	3.15	1.87	1.53	2.11	9.628	18.089
316	2.49	0.81	0.34	3.16	1.87	1.53	2.11	9.6292	18.1096
317	2.49	0.81	0.34	3.17	1.87	1.53	2.11	9.6304	18.1302
318	2.49	0.81	0.34	3.18	1.87	1.53	2.11	9.6316	18.1508
319	2.49	0.81	0.34	3.19	1.87	1.53	2.11	9.6328	18.1714
320	2.49	0.81	0.34	3.2	1.87	1.53	2.11	9.634	18.192
321	2.49	0.81	0.34	3.21	1.87	1.53	2.11	9.6352	18.2126
322	2.49	0.81	0.34	3.22	1.87	1.53	2.11	9.6364	18.2332
323	2.49	0.81	0.34	3.23	1.87	1.53	2.11	9.6376	18.2538
324	2.49	0.81	0.34	3.24	1.87	1.53	2.11	9.6388	18.2744

325	2.49	0.81	0.34	3.25	1.87	1.53	2.11	9.64	18.295
326	2.49	0.81	0.34	3.26	1.87	1.53	2.11	9.6412	18.3156
327	2.49	0.81	0.34	3.27	1.87	1.53	2.11	9.6424	18.3362
328	2.49	0.81	0.34	3.28	1.87	1.53	2.11	9.6436	18.3568
329	2.49	0.81	0.34	3.29	1.87	1.53	2.11	9.6448	18.3774
330	2.49	0.81	0.34	3.3	1.87	1.53	2.11	9.646	18.398
331	2.49	0.81	0.34	3.31	1.87	1.53	2.11	9.6472	18.4186
332	2.49	0.81	0.34	3.32	1.87	1.53	2.11	9.6484	18.4392
333	2.49	0.81	0.34	3.33	1.87	1.53	2.11	9.6496	18.4598
334	2.49	0.81	0.34	3.34	1.87	1.53	2.11	9.6508	18.4804
335	2.49	0.81	0.34	3.35	1.87	1.53	2.11	9.652	18.501
336	2.49	0.81	0.34	3.36	1.87	1.53	2.11	9.6532	18.5216
337	2.49	0.81	0.34	3.37	1.87	1.53	2.11	9.6544	18.5422
338	2.49	0.81	0.34	3.38	1.87	1.53	2.11	9.6556	18.5628
339	2.49	0.81	0.34	3.39	1.87	1.53	2.11	9.6568	18.5834
340	2.49	0.81	0.34	3.4	1.87	1.53	2.11	9.658	18.604
341	2.49	0.81	0.34	3.41	1.87	1.53	2.11	9.6592	18.6246
342	2.49	0.81	0.34	3.42	1.87	1.53	2.11	9.6604	18.6452
343	2.49	0.81	0.34	3.43	1.87	1.53	2.11	9.6616	18.6658
344	2.49	0.81	0.34	3.44	1.87	1.53	2.11	9.6628	18.6864
345	2.49	0.81	0.34	3.45	1.87	1.53	2.11	9.664	18.707
346	2.49	0.81	0.34	3.46	1.87	1.53	2.11	9.6652	18.7276
347	2.49	0.81	0.34	3.47	1.87	1.53	2.11	9.6664	18.7482
348	2.49	0.81	0.34	3.48	1.87	1.53	2.11	9.6676	18.7688
349	2.49	0.81	0.34	3.49	1.87	1.53	2.11	9.6688	18.7894
350	2.49	0.81	0.34	3.5	1.87	1.53	2.11	9.67	18.81
351	2.49	0.81	0.34	3.51	1.87	1.53	2.11	9.6712	18.8306
352	2.49	0.81	0.34	3.52	1.87	1.53	2.11	9.6724	18.8512
353	2.49	0.81	0.34	3.53	1.87	1.53	2.11	9.6736	18.8718
354	2.49	0.81	0.34	3.54	1.87	1.53	2.11	9.6748	18.8924
355	2.49	0.81	0.34	3.55	1.87	1.53	2.11	9.676	18.913
356	2.49	0.81	0.34	3.56	1.87	1.53	2.11	9.6772	18.9336
357	2.49	0.81	0.34	3.57	1.87	1.53	2.11	9.6784	18.9542
358	2.49	0.81	0.34	3.58	1.87	1.53	2.11	9.6796	18.9748
359	2.49	0.81	0.34	3.59	1.87	1.53	2.11	9.6808	18.9954
360	2.49	0.81	0.34	3.6	1.87	1.53	2.11	9.682	19.016
361	2.49	0.81	0.34	3.61	1.87	1.53	2.11	9.6832	19.0366
362	2.49	0.81	0.34	3.62	1.87	1.53	2.11	9.6844	19.0572
363	2.49	0.81	0.34	3.63	1.87	1.53	2.11	9.6856	19.0778
364	2.49	0.81	0.34	3.64	1.87	1.53	2.11	9.6868	19.0984
365	2.49	0.81	0.34	3.65	1.87	1.53	2.11	9.688	19.119
366	2.49	0.81	0.34	3.66	1.87	1.53	2.11	9.6892	19.1396
367	2.49	0.81	0.34	3.67	1.87	1.53	2.11	9.6904	19.1602
368	2.49	0.81	0.34	3.68	1.87	1.53	2.11	9.6916	19.1808
369	2.49	0.81	0.34	3.69	1.87	1.53	2.11	9.6928	19.2014
370	2.49	0.81	0.34	3.7	1.87	1.53	2.11	9.694	19.222
371	2.49	0.81	0.34	3.71	1.87	1.53	2.11	9.6952	19.2426

372	2.49	0.81	0.34	3.72	1.87	1.53	2.11	9.6964	19.2632
373	2.49	0.81	0.34	3.73	1.87	1.53	2.11	9.6976	19.2838
374	2.49	0.81	0.34	3.74	1.87	1.53	2.11	9.6988	19.3044
375	2.49	0.81	0.34	3.75	1.87	1.53	2.11	9.7	19.325
376	2.49	0.81	0.34	3.76	1.87	1.53	2.11	9.7012	19.3456
377	2.49	0.81	0.34	3.77	1.87	1.53	2.11	9.7024	19.3662
378	2.49	0.81	0.34	3.78	1.87	1.53	2.11	9.7036	19.3868
379	2.49	0.81	0.34	3.79	1.87	1.53	2.11	9.7048	19.4074
380	2.49	0.81	0.34	3.8	1.87	1.53	2.11	9.706	19.428
381	2.49	0.81	0.34	3.81	1.87	1.53	2.11	9.7072	19.4486
382	2.49	0.81	0.34	3.82	1.87	1.53	2.11	9.7084	19.4692
383	2.49	0.81	0.34	3.83	1.87	1.53	2.11	9.7096	19.4898
384	2.49	0.81	0.34	3.84	1.87	1.53	2.11	9.7108	19.5104
385	2.49	0.81	0.34	3.85	1.87	1.53	2.11	9.712	19.531
386	2.49	0.81	0.34	3.86	1.87	1.53	2.11	9.7132	19.5516
387	2.49	0.81	0.34	3.87	1.87	1.53	2.11	9.7144	19.5722
388	2.49	0.81	0.34	3.88	1.87	1.53	2.11	9.7156	19.5928
389	2.49	0.81	0.34	3.89	1.87	1.53	2.11	9.7168	19.6134
390	2.49	0.81	0.34	3.9	1.87	1.53	2.11	9.718	19.634
391	2.49	0.81	0.34	3.91	1.87	1.53	2.11	9.7192	19.6546
392	2.49	0.81	0.34	3.92	1.87	1.53	2.11	9.7204	19.6752
393	2.49	0.81	0.34	3.93	1.87	1.53	2.11	9.7216	19.6958
394	2.49	0.81	0.34	3.94	1.87	1.53	2.11	9.7228	19.7164
395	2.49	0.81	0.34	3.95	1.87	1.53	2.11	9.724	19.737
396	2.49	0.81	0.34	3.96	1.87	1.53	2.11	9.7252	19.7576
397	2.49	0.81	0.34	3.97	1.87	1.53	2.11	9.7264	19.7782
398	2.49	0.81	0.34	3.98	1.87	1.53	2.11	9.7276	19.7988
399	2.49	0.81	0.34	3.99	1.87	1.53	2.11	9.7288	19.8194
400	2.49	0.81	0.34	4	1.87	1.53	2.11	9.73	19.84
401	2.4913	0.8105	0.3401	4.01	1.871	1.5308	2.1111	9.7415	19.8693
402	2.4926	0.811	0.3402	4.02	1.872	1.5316	2.1122	9.753	19.8986
403	2.4939	0.8115	0.3403	4.03	1.873	1.5324	2.1133	9.7645	19.9279
404	2.4952	0.812	0.3404	4.04	1.874	1.5332	2.1144	9.776	19.9572
405	2.4965	0.8125	0.3405	4.05	1.875	1.534	2.1155	9.7875	19.9865
406	2.4978	0.813	0.3406	4.06	1.876	1.5348	2.1166	9.799	20.0158
407	2.4991	0.8135	0.3407	4.07	1.877	1.5356	2.1177	9.8105	20.0451
408	2.5004	0.814	0.3408	4.08	1.878	1.5364	2.1188	9.822	20.0744
409	2.5017	0.8145	0.3409	4.09	1.879	1.5372	2.1199	9.8335	20.1037
410	2.503	0.815	0.341	4.1	1.88	1.538	2.121	9.845	20.133
411	2.5043	0.8155	0.3411	4.11	1.881	1.5388	2.1221	9.8565	20.1623
412	2.5056	0.816	0.3412	4.12	1.882	1.5396	2.1232	9.868	20.1916
413	2.5069	0.8165	0.3413	4.13	1.883	1.5404	2.1243	9.8795	20.2209
414	2.5082	0.817	0.3414	4.14	1.884	1.5412	2.1254	9.891	20.2502
415	2.5095	0.8175	0.3415	4.15	1.885	1.542	2.1265	9.9025	20.2795
416	2.5108	0.818	0.3416	4.16	1.886	1.5428	2.1276	9.914	20.3088
417	2.5121	0.8185	0.3417	4.17	1.887	1.5436	2.1287	9.9255	20.3381
418	2.5134	0.819	0.3418	4.18	1.888	1.5444	2.1298	9.937	20.3674

419	2.5147	0.8195	0.3419	4.19	1.889	1.5452	2.1309	9.9485	20.3967
420	2.516	0.82	0.342	4.2	1.89	1.546	2.132	9.96	20.426
421	2.5173	0.8205	0.3421	4.21	1.891	1.5468	2.1331	9.9715	20.4553
422	2.5186	0.821	0.3422	4.22	1.892	1.5476	2.1342	9.983	20.4846
423	2.5199	0.8215	0.3423	4.23	1.893	1.5484	2.1353	9.9945	20.5139
424	2.5212	0.822	0.3424	4.24	1.894	1.5492	2.1364	10.006	20.5432
425	2.5225	0.8225	0.3425	4.25	1.895	1.55	2.1375	10.0175	20.5725
426	2.5238	0.823	0.3426	4.26	1.896	1.5508	2.1386	10.029	20.6018
427	2.5251	0.8235	0.3427	4.27	1.897	1.5516	2.1397	10.0405	20.6311
428	2.5264	0.824	0.3428	4.28	1.898	1.5524	2.1408	10.052	20.6604
429	2.5277	0.8245	0.3429	4.29	1.899	1.5532	2.1419	10.0635	20.6897
430	2.529	0.825	0.343	4.3	1.9	1.554	2.143	10.075	20.719
431	2.5303	0.8255	0.3431	4.31	1.901	1.5548	2.1441	10.0865	20.7483
432	2.5316	0.826	0.3432	4.32	1.902	1.5556	2.1452	10.098	20.7776
433	2.5329	0.8265	0.3433	4.33	1.903	1.5564	2.1463	10.1095	20.8069
434	2.5342	0.827	0.3434	4.34	1.904	1.5572	2.1474	10.121	20.8362
435	2.5355	0.8275	0.3435	4.35	1.905	1.558	2.1485	10.1325	20.8655
436	2.5368	0.828	0.3436	4.36	1.906	1.5588	2.1496	10.144	20.8948
437	2.5381	0.8285	0.3437	4.37	1.907	1.5596	2.1507	10.1555	20.9241
438	2.5394	0.829	0.3438	4.38	1.908	1.5604	2.1518	10.167	20.9534
439	2.5407	0.8295	0.3439	4.39	1.909	1.5612	2.1529	10.1785	20.9827
440	2.542	0.83	0.344	4.4	1.91	1.562	2.154	10.19	21.012
441	2.5433	0.8305	0.3441	4.41	1.911	1.5628	2.1551	10.2015	21.0413
442	2.5446	0.831	0.3442	4.42	1.912	1.5636	2.1562	10.213	21.0706
443	2.5459	0.8315	0.3443	4.43	1.913	1.5644	2.1573	10.2245	21.0999
444	2.5472	0.832	0.3444	4.44	1.914	1.5652	2.1584	10.236	21.1292
445	2.5485	0.8325	0.3445	4.45	1.915	1.566	2.1595	10.2475	21.1585
446	2.5498	0.833	0.3446	4.46	1.916	1.5668	2.1606	10.259	21.1878
447	2.5511	0.8335	0.3447	4.47	1.917	1.5676	2.1617	10.2705	21.2171
448	2.5524	0.834	0.3448	4.48	1.918	1.5684	2.1628	10.282	21.2464
449	2.5537	0.8345	0.3449	4.49	1.919	1.5692	2.1639	10.2935	21.2757
450	2.555	0.835	0.345	4.5	1.92	1.57	2.165	10.305	21.305
451	2.5563	0.8355	0.3451	4.51	1.921	1.5708	2.1661	10.3165	21.3343
452	2.5576	0.836	0.3452	4.52	1.922	1.5716	2.1672	10.328	21.3636
453	2.5589	0.8365	0.3453	4.53	1.923	1.5724	2.1683	10.3395	21.3929
454	2.5602	0.837	0.3454	4.54	1.924	1.5732	2.1694	10.351	21.4222
455	2.5615	0.8375	0.3455	4.55	1.925	1.574	2.1705	10.3625	21.4515
456	2.5628	0.838	0.3456	4.56	1.926	1.5748	2.1716	10.374	21.4808
457	2.5641	0.8385	0.3457	4.57	1.927	1.5756	2.1727	10.3855	21.5101
458	2.5654	0.839	0.3458	4.58	1.928	1.5764	2.1738	10.397	21.5394
459	2.5667	0.8395	0.3459	4.59	1.929	1.5772	2.1749	10.4085	21.5687
460	2.568	0.84	0.346	4.6	1.93	1.578	2.176	10.42	21.598
461	2.5693	0.8405	0.3461	4.61	1.931	1.5788	2.1771	10.4315	21.6273
462	2.5706	0.841	0.3462	4.62	1.932	1.5796	2.1782	10.443	21.6566
463	2.5719	0.8415	0.3463	4.63	1.933	1.5804	2.1793	10.4545	21.6859
464	2.5732	0.842	0.3464	4.64	1.934	1.5812	2.1804	10.466	21.7152
465	2.5745	0.8425	0.3465	4.65	1.935	1.582	2.1815	10.4775	21.7445

466	2.5758	0.843	0.3466	4.66	1.936	1.5828	2.1826	10.489	21.7738
467	2.5771	0.8435	0.3467	4.67	1.937	1.5836	2.1837	10.5005	21.8031
468	2.5784	0.844	0.3468	4.68	1.938	1.5844	2.1848	10.512	21.8324
469	2.5797	0.8445	0.3469	4.69	1.939	1.5852	2.1859	10.5235	21.8617
470	2.581	0.845	0.347	4.7	1.94	1.586	2.187	10.535	21.891
471	2.5823	0.8455	0.3471	4.71	1.941	1.5868	2.1881	10.5465	21.9203
472	2.5836	0.846	0.3472	4.72	1.942	1.5876	2.1892	10.558	21.9496
473	2.5849	0.8465	0.3473	4.73	1.943	1.5884	2.1903	10.5695	21.9789
474	2.5862	0.847	0.3474	4.74	1.944	1.5892	2.1914	10.581	22.0082
475	2.5875	0.8475	0.3475	4.75	1.945	1.59	2.1925	10.5925	22.0375
476	2.5888	0.848	0.3476	4.76	1.946	1.5908	2.1936	10.604	22.0668
477	2.5901	0.8485	0.3477	4.77	1.947	1.5916	2.1947	10.6155	22.0961
478	2.5914	0.849	0.3478	4.78	1.948	1.5924	2.1958	10.627	22.1254
479	2.5927	0.8495	0.3479	4.79	1.949	1.5932	2.1969	10.6385	22.1547
480	2.594	0.85	0.348	4.8	1.95	1.594	2.198	10.65	22.184
481	2.5953	0.8505	0.3481	4.81	1.951	1.5948	2.1991	10.6615	22.2133
482	2.5966	0.851	0.3482	4.82	1.952	1.5956	2.2002	10.673	22.2426
483	2.5979	0.8515	0.3483	4.83	1.953	1.5964	2.2013	10.6845	22.2719
484	2.5992	0.852	0.3484	4.84	1.954	1.5972	2.2024	10.696	22.3012
485	2.6005	0.8525	0.3485	4.85	1.955	1.598	2.2035	10.7075	22.3305
486	2.6018	0.853	0.3486	4.86	1.956	1.5988	2.2046	10.719	22.3598
487	2.6031	0.8535	0.3487	4.87	1.957	1.5996	2.2057	10.7305	22.3891
488	2.6044	0.854	0.3488	4.88	1.958	1.6004	2.2068	10.742	22.4184
489	2.6057	0.8545	0.3489	4.89	1.959	1.6012	2.2079	10.7535	22.4477
490	2.607	0.855	0.349	4.9	1.96	1.602	2.209	10.765	22.477
491	2.6083	0.8555	0.3491	4.91	1.961	1.6028	2.2101	10.7765	22.5063
492	2.6096	0.856	0.3492	4.92	1.962	1.6036	2.2112	10.788	22.5356
493	2.6109	0.8565	0.3493	4.93	1.963	1.6044	2.2123	10.7995	22.5649
494	2.6122	0.857	0.3494	4.94	1.964	1.6052	2.2134	10.811	22.5942
495	2.6135	0.8575	0.3495	4.95	1.965	1.606	2.2145	10.8225	22.6235
496	2.6148	0.858	0.3496	4.96	1.966	1.6068	2.2156	10.834	22.6528
497	2.6161	0.8585	0.3497	4.97	1.967	1.6076	2.2167	10.8455	22.6821
498	2.6174	0.859	0.3498	4.98	1.968	1.6084	2.2178	10.857	22.7114
499	2.6187	0.8595	0.3499	4.99	1.969	1.6092	2.2189	10.8685	22.7407
500	2.62	0.86	0.35	5	1.97	1.61	2.22	10.88	22.77
501	2.6214	0.8604	0.3502	5	1.971	1.6109	2.2211	10.8932	22.8251
502	2.6228	0.8608	0.3504	5	1.972	1.6118	2.2222	10.9064	22.8802
503	2.6242	0.8612	0.3506	5	1.973	1.6127	2.2233	10.9196	22.9353
504	2.6256	0.8616	0.3508	5	1.974	1.6136	2.2244	10.9328	22.9904
505	2.627	0.862	0.351	5	1.975	1.6145	2.2255	10.946	23.0455
506	2.6284	0.8624	0.3512	5	1.976	1.6154	2.2266	10.9592	23.1006
507	2.6298	0.8628	0.3514	5	1.977	1.6163	2.2277	10.9724	23.1557
508	2.6312	0.8632	0.3516	5	1.978	1.6172	2.2288	10.9856	23.2108
509	2.6326	0.8636	0.3518	5	1.979	1.6181	2.2299	10.9988	23.2659
510	2.634	0.864	0.352	5	1.98	1.619	2.231	11.012	23.321
511	2.6354	0.8644	0.3522	5	1.981	1.6199	2.2321	11.0252	23.3761
512	2.6368	0.8648	0.3524	5	1.982	1.6208	2.2332	11.0384	23.4312

513	2.6382	0.8652	0.3526	5	1.983	1.6217	2.2343	11.0516	23.4863
514	2.6396	0.8656	0.3528	5	1.984	1.6226	2.2354	11.0648	23.5414
515	2.641	0.866	0.353	5	1.985	1.6235	2.2365	11.078	23.5965
516	2.6424	0.8664	0.3532	5	1.986	1.6244	2.2376	11.0912	23.6516
517	2.6438	0.8668	0.3534	5	1.987	1.6253	2.2387	11.1044	23.7067
518	2.6452	0.8672	0.3536	5	1.988	1.6262	2.2398	11.1176	23.7618
519	2.6466	0.8676	0.3538	5	1.989	1.6271	2.2409	11.1308	23.8169
520	2.648	0.868	0.354	5	1.99	1.628	2.242	11.144	23.872
521	2.6494	0.8684	0.3542	5	1.991	1.6289	2.2431	11.1572	23.9271
522	2.6508	0.8688	0.3544	5	1.992	1.6298	2.2442	11.1704	23.9822
523	2.6522	0.8692	0.3546	5	1.993	1.6307	2.2453	11.1836	24.0373
524	2.6536	0.8696	0.3548	5	1.994	1.6316	2.2464	11.1968	24.0924
525	2.655	0.87	0.355	5	1.995	1.6325	2.2475	11.21	24.1475
526	2.6564	0.8704	0.3552	5	1.996	1.6334	2.2486	11.2232	24.2026
527	2.6578	0.8708	0.3554	5	1.997	1.6343	2.2497	11.2364	24.2577
528	2.6592	0.8712	0.3556	5	1.998	1.6352	2.2508	11.2496	24.3128
529	2.6606	0.8716	0.3558	5	1.999	1.6361	2.2519	11.2628	24.3679
530	2.662	0.872	0.356	5	2	1.637	2.253	11.276	24.423
531	2.6634	0.8724	0.3562	5	2.001	1.6379	2.2541	11.2892	24.4781
532	2.6648	0.8728	0.3564	5	2.002	1.6388	2.2552	11.3024	24.5332
533	2.6662	0.8732	0.3566	5	2.003	1.6397	2.2563	11.3156	24.5883
534	2.6676	0.8736	0.3568	5	2.004	1.6406	2.2574	11.3288	24.6434
535	2.669	0.874	0.357	5	2.005	1.6415	2.2585	11.342	24.6985
536	2.6704	0.8744	0.3572	5	2.006	1.6424	2.2596	11.3552	24.7536
537	2.6718	0.8748	0.3574	5	2.007	1.6433	2.2607	11.3684	24.8087
538	2.6732	0.8752	0.3576	5	2.008	1.6442	2.2618	11.3816	24.8638
539	2.6746	0.8756	0.3578	5	2.009	1.6451	2.2629	11.3948	24.9189
540	2.676	0.876	0.358	5	2.01	1.646	2.264	11.408	24.974
541	2.6774	0.8764	0.3582	5	2.011	1.6469	2.2651	11.4212	25.0291
542	2.6788	0.8768	0.3584	5	2.012	1.6478	2.2662	11.4344	25.0842
543	2.6802	0.8772	0.3586	5	2.013	1.6487	2.2673	11.4476	25.1393
544	2.6816	0.8776	0.3588	5	2.014	1.6496	2.2684	11.4608	25.1944
545	2.683	0.878	0.359	5	2.015	1.6505	2.2695	11.474	25.2495
546	2.6844	0.8784	0.3592	5	2.016	1.6514	2.2706	11.4872	25.3046
547	2.6858	0.8788	0.3594	5	2.017	1.6523	2.2717	11.5004	25.3597
548	2.6872	0.8792	0.3596	5	2.018	1.6532	2.2728	11.5136	25.4148
549	2.6886	0.8796	0.3598	5	2.019	1.6541	2.2739	11.5268	25.4699
550	2.69	0.88	0.36	5	2.02	1.655	2.275	11.54	25.525
551	2.6914	0.8804	0.3602	5	2.021	1.6559	2.2761	11.5532	25.5801
552	2.6928	0.8808	0.3604	5	2.022	1.6568	2.2772	11.5664	25.6352
553	2.6942	0.8812	0.3606	5	2.023	1.6577	2.2783	11.5796	25.6903
554	2.6956	0.8816	0.3608	5	2.024	1.6586	2.2794	11.5928	25.7454
555	2.697	0.882	0.361	5	2.025	1.6595	2.2805	11.606	25.8005
556	2.6984	0.8824	0.3612	5	2.026	1.6604	2.2816	11.6192	25.8556
557	2.6998	0.8828	0.3614	5	2.027	1.6613	2.2827	11.6324	25.9107
558	2.7012	0.8832	0.3616	5	2.028	1.6622	2.2838	11.6456	25.9658
559	2.7026	0.8836	0.3618	5	2.029	1.6631	2.2849	11.6588	26.0209

560	2.704	0.884	0.362	5	2.03	1.664	2.286	11.672	26.076
561	2.7054	0.8844	0.3622	5	2.031	1.6649	2.2871	11.6852	26.1311
562	2.7068	0.8848	0.3624	5	2.032	1.6658	2.2882	11.6984	26.1862
563	2.7082	0.8852	0.3626	5	2.033	1.6667	2.2893	11.7116	26.2413
564	2.7096	0.8856	0.3628	5	2.034	1.6676	2.2904	11.7248	26.2964
565	2.711	0.886	0.363	5	2.035	1.6685	2.2915	11.738	26.3515
566	2.7124	0.8864	0.3632	5	2.036	1.6694	2.2926	11.7512	26.4066
567	2.7138	0.8868	0.3634	5	2.037	1.6703	2.2937	11.7644	26.4617
568	2.7152	0.8872	0.3636	5	2.038	1.6712	2.2948	11.7776	26.5168
569	2.7166	0.8876	0.3638	5	2.039	1.6721	2.2959	11.7908	26.5719
570	2.718	0.888	0.364	5	2.04	1.673	2.297	11.804	26.627
571	2.7194	0.8884	0.3642	5	2.041	1.6739	2.2981	11.8172	26.6821
572	2.7208	0.8888	0.3644	5	2.042	1.6748	2.2992	11.8304	26.7372
573	2.7222	0.8892	0.3646	5	2.043	1.6757	2.3003	11.8436	26.7923
574	2.7236	0.8896	0.3648	5	2.044	1.6766	2.3014	11.8568	26.8474
575	2.725	0.89	0.365	5	2.045	1.6775	2.3025	11.87	26.9025
576	2.7264	0.8904	0.3652	5	2.046	1.6784	2.3036	11.8832	26.9576
577	2.7278	0.8908	0.3654	5	2.047	1.6793	2.3047	11.8964	27.0127
578	2.7292	0.8912	0.3656	5	2.048	1.6802	2.3058	11.9096	27.0678
579	2.7306	0.8916	0.3658	5	2.049	1.6811	2.3069	11.9228	27.1229
580	2.732	0.892	0.366	5	2.05	1.682	2.308	11.936	27.178
581	2.7334	0.8924	0.3662	5	2.051	1.6829	2.3091	11.9492	27.2331
582	2.7348	0.8928	0.3664	5	2.052	1.6838	2.3102	11.9624	27.2882
583	2.7362	0.8932	0.3666	5	2.053	1.6847	2.3113	11.9756	27.3433
584	2.7376	0.8936	0.3668	5	2.054	1.6856	2.3124	11.9888	27.3984
585	2.739	0.894	0.367	5	2.055	1.6865	2.3135	12.002	27.4535
586	2.7404	0.8944	0.3672	5	2.056	1.6874	2.3146	12.0152	27.5086
587	2.7418	0.8948	0.3674	5	2.057	1.6883	2.3157	12.0284	27.5637
588	2.7432	0.8952	0.3676	5	2.058	1.6892	2.3168	12.0416	27.6188
589	2.7446	0.8956	0.3678	5	2.059	1.6901	2.3179	12.0548	27.6739
590	2.746	0.896	0.368	5	2.06	1.691	2.319	12.068	27.729
591	2.7474	0.8964	0.3682	5	2.061	1.6919	2.3201	12.0812	27.7841
592	2.7488	0.8968	0.3684	5	2.062	1.6928	2.3212	12.0944	27.8392
593	2.7502	0.8972	0.3686	5	2.063	1.6937	2.3223	12.1076	27.8943
594	2.7516	0.8976	0.3688	5	2.064	1.6946	2.3234	12.1208	27.9494
595	2.753	0.898	0.369	5	2.065	1.6955	2.3245	12.134	28.0045
596	2.7544	0.8984	0.3692	5	2.066	1.6964	2.3256	12.1472	28.0596
597	2.7558	0.8988	0.3694	5	2.067	1.6973	2.3267	12.1604	28.1147
598	2.7572	0.8992	0.3696	5	2.068	1.6982	2.3278	12.1736	28.1698
599	2.7586	0.8996	0.3698	5	2.069	1.6991	2.3289	12.1868	28.2249
600	2.76	0.9	0.37	5	2.07	1.7	2.33	12.2	28.28
601	2.7613	0.9004	0.3702	5.01	2.071	1.7008	2.3312	12.2121	28.3184
602	2.7626	0.9008	0.3704	5.02	2.072	1.7016	2.3324	12.2242	28.3568
603	2.7639	0.9012	0.3706	5.03	2.073	1.7024	2.3336	12.2363	28.3952
604	2.7652	0.9016	0.3708	5.04	2.074	1.7032	2.3348	12.2484	28.4336
605	2.7665	0.902	0.371	5.05	2.075	1.704	2.336	12.2605	28.472
606	2.7678	0.9024	0.3712	5.06	2.076	1.7048	2.3372	12.2726	28.5104

607	2.7691	0.9028	0.3714	5.07	2.077	1.7056	2.3384	12.2847	28.5488
608	2.7704	0.9032	0.3716	5.08	2.078	1.7064	2.3396	12.2968	28.5872
609	2.7717	0.9036	0.3718	5.09	2.079	1.7072	2.3408	12.3089	28.6256
610	2.773	0.904	0.372	5.1	2.08	1.708	2.342	12.321	28.664
611	2.7743	0.9044	0.3722	5.11	2.081	1.7088	2.3432	12.3331	28.7024
612	2.7756	0.9048	0.3724	5.12	2.082	1.7096	2.3444	12.3452	28.7408
613	2.7769	0.9052	0.3726	5.13	2.083	1.7104	2.3456	12.3573	28.7792
614	2.7782	0.9056	0.3728	5.14	2.084	1.7112	2.3468	12.3694	28.8176
615	2.7795	0.906	0.373	5.15	2.085	1.712	2.348	12.3815	28.856
616	2.7808	0.9064	0.3732	5.16	2.086	1.7128	2.3492	12.3936	28.8944
617	2.7821	0.9068	0.3734	5.17	2.087	1.7136	2.3504	12.4057	28.9328
618	2.7834	0.9072	0.3736	5.18	2.088	1.7144	2.3516	12.4178	28.9712
619	2.7847	0.9076	0.3738	5.19	2.089	1.7152	2.3528	12.4299	29.0096
620	2.786	0.908	0.374	5.2	2.09	1.716	2.354	12.442	29.048
621	2.7873	0.9084	0.3742	5.21	2.091	1.7168	2.3552	12.4541	29.0864
622	2.7886	0.9088	0.3744	5.22	2.092	1.7176	2.3564	12.4662	29.1248
623	2.7899	0.9092	0.3746	5.23	2.093	1.7184	2.3576	12.4783	29.1632
624	2.7912	0.9096	0.3748	5.24	2.094	1.7192	2.3588	12.4904	29.2016
625	2.7925	0.91	0.375	5.25	2.095	1.72	2.36	12.5025	29.24
626	2.7938	0.9104	0.3752	5.26	2.096	1.7208	2.3612	12.5146	29.2784
627	2.7951	0.9108	0.3754	5.27	2.097	1.7216	2.3624	12.5267	29.3168
628	2.7964	0.9112	0.3756	5.28	2.098	1.7224	2.3636	12.5388	29.3552
629	2.7977	0.9116	0.3758	5.29	2.099	1.7232	2.3648	12.5509	29.3936
630	2.799	0.912	0.376	5.3	2.1	1.724	2.366	12.563	29.432
631	2.8003	0.9124	0.3762	5.31	2.101	1.7248	2.3672	12.5751	29.4704
632	2.8016	0.9128	0.3764	5.32	2.102	1.7256	2.3684	12.5872	29.5088
633	2.8029	0.9132	0.3766	5.33	2.103	1.7264	2.3696	12.5993	29.5472
634	2.8042	0.9136	0.3768	5.34	2.104	1.7272	2.3708	12.6114	29.5856
635	2.8055	0.914	0.377	5.35	2.105	1.728	2.372	12.6235	29.624
636	2.8068	0.9144	0.3772	5.36	2.106	1.7288	2.3732	12.6356	29.6624
637	2.8081	0.9148	0.3774	5.37	2.107	1.7296	2.3744	12.6477	29.7008
638	2.8094	0.9152	0.3776	5.38	2.108	1.7304	2.3756	12.6598	29.7392
639	2.8107	0.9156	0.3778	5.39	2.109	1.7312	2.3768	12.6719	29.7776
640	2.812	0.916	0.378	5.4	2.11	1.732	2.378	12.684	29.816
641	2.8133	0.9164	0.3782	5.41	2.111	1.7328	2.3792	12.6961	29.8544
642	2.8146	0.9168	0.3784	5.42	2.112	1.7336	2.3804	12.7082	29.8928
643	2.8159	0.9172	0.3786	5.43	2.113	1.7344	2.3816	12.7203	29.9312
644	2.8172	0.9176	0.3788	5.44	2.114	1.7352	2.3828	12.7324	29.9696
645	2.8185	0.918	0.379	5.45	2.115	1.736	2.384	12.7445	30.008
646	2.8198	0.9184	0.3792	5.46	2.116	1.7368	2.3852	12.7566	30.0464
647	2.8211	0.9188	0.3794	5.47	2.117	1.7376	2.3864	12.7687	30.0848
648	2.8224	0.9192	0.3796	5.48	2.118	1.7384	2.3876	12.7808	30.1232
649	2.8237	0.9196	0.3798	5.49	2.119	1.7392	2.3888	12.7929	30.1616
650	2.825	0.92	0.38	5.5	2.12	1.74	2.39	12.805	30.2
651	2.8263	0.9204	0.3802	5.51	2.121	1.7408	2.3912	12.8171	30.2384
652	2.8276	0.9208	0.3804	5.52	2.122	1.7416	2.3924	12.8292	30.2768
653	2.8289	0.9212	0.3806	5.53	2.123	1.7424	2.3936	12.8413	30.3152

654	2.8302	0.9216	0.3808	5.54	2.124	1.7432	2.3948	12.8534	30.3536
655	2.8315	0.922	0.381	5.55	2.125	1.744	2.396	12.8655	30.392
656	2.8328	0.9224	0.3812	5.56	2.126	1.7448	2.3972	12.8776	30.4304
657	2.8341	0.9228	0.3814	5.57	2.127	1.7456	2.3984	12.8897	30.4688
658	2.8354	0.9232	0.3816	5.58	2.128	1.7464	2.3996	12.9018	30.5072
659	2.8367	0.9236	0.3818	5.59	2.129	1.7472	2.4008	12.9139	30.5456
660	2.838	0.924	0.382	5.6	2.13	1.748	2.402	12.926	30.584
661	2.8393	0.9244	0.3822	5.61	2.131	1.7488	2.4032	12.9381	30.6224
662	2.8406	0.9248	0.3824	5.62	2.132	1.7496	2.4044	12.9502	30.6608
663	2.8419	0.9252	0.3826	5.63	2.133	1.7504	2.4056	12.9623	30.6992
664	2.8432	0.9256	0.3828	5.64	2.134	1.7512	2.4068	12.9744	30.7376
665	2.8445	0.926	0.383	5.65	2.135	1.752	2.408	12.9865	30.776
666	2.8458	0.9264	0.3832	5.66	2.136	1.7528	2.4092	12.9986	30.8144
667	2.8471	0.9268	0.3834	5.67	2.137	1.7536	2.4104	13.0107	30.8528
668	2.8484	0.9272	0.3836	5.68	2.138	1.7544	2.4116	13.0228	30.8912
669	2.8497	0.9276	0.3838	5.69	2.139	1.7552	2.4128	13.0349	30.9296
670	2.851	0.928	0.384	5.7	2.14	1.756	2.414	13.047	30.968
671	2.8523	0.9284	0.3842	5.71	2.141	1.7568	2.4152	13.0591	31.0064
672	2.8536	0.9288	0.3844	5.72	2.142	1.7576	2.4164	13.0712	31.0448
673	2.8549	0.9292	0.3846	5.73	2.143	1.7584	2.4176	13.0833	31.0832
674	2.8562	0.9296	0.3848	5.74	2.144	1.7592	2.4188	13.0954	31.1216
675	2.8575	0.93	0.385	5.75	2.145	1.76	2.42	13.1075	31.16
676	2.8588	0.9304	0.3852	5.76	2.146	1.7608	2.4212	13.1196	31.1984
677	2.8601	0.9308	0.3854	5.77	2.147	1.7616	2.4224	13.1317	31.2368
678	2.8614	0.9312	0.3856	5.78	2.148	1.7624	2.4236	13.1438	31.2752
679	2.8627	0.9316	0.3858	5.79	2.149	1.7632	2.4248	13.1559	31.3136
680	2.864	0.932	0.386	5.8	2.15	1.764	2.426	13.168	31.352
681	2.8653	0.9324	0.3862	5.81	2.151	1.7648	2.4272	13.1801	31.3904
682	2.8666	0.9328	0.3864	5.82	2.152	1.7656	2.4284	13.1922	31.4288
683	2.8679	0.9332	0.3866	5.83	2.153	1.7664	2.4296	13.2043	31.4672
684	2.8692	0.9336	0.3868	5.84	2.154	1.7672	2.4308	13.2164	31.5056
685	2.8705	0.934	0.387	5.85	2.155	1.768	2.432	13.2285	31.544
686	2.8718	0.9344	0.3872	5.86	2.156	1.7688	2.4332	13.2406	31.5824
687	2.8731	0.9348	0.3874	5.87	2.157	1.7696	2.4344	13.2527	31.6208
688	2.8744	0.9352	0.3876	5.88	2.158	1.7704	2.4356	13.2648	31.6592
689	2.8757	0.9356	0.3878	5.89	2.159	1.7712	2.4368	13.2769	31.6976
690	2.877	0.936	0.388	5.9	2.16	1.772	2.438	13.289	31.736
691	2.8783	0.9364	0.3882	5.91	2.161	1.7728	2.4392	13.3011	31.7744
692	2.8796	0.9368	0.3884	5.92	2.162	1.7736	2.4404	13.3132	31.8128
693	2.8809	0.9372	0.3886	5.93	2.163	1.7744	2.4416	13.3253	31.8512
694	2.8822	0.9376	0.3888	5.94	2.164	1.7752	2.4428	13.3374	31.8896
695	2.8835	0.938	0.389	5.95	2.165	1.776	2.444	13.3495	31.928
696	2.8848	0.9384	0.3892	5.96	2.166	1.7768	2.4452	13.3616	31.9664
697	2.8861	0.9388	0.3894	5.97	2.167	1.7776	2.4464	13.3737	32.0048
698	2.8874	0.9392	0.3896	5.98	2.168	1.7784	2.4476	13.3858	32.0432
699	2.8887	0.9396	0.3898	5.99	2.169	1.7792	2.4488	13.3979	32.0816
700	2.89	0.94	0.39	6	2.17	1.78	2.45	13.41	32.12

701	2.8947	0.9405	0.3902	6.01	2.1735	1.7829	2.4511	13.4291	32.1712
702	2.8994	0.941	0.3904	6.02	2.177	1.7858	2.4522	13.4482	32.2224
703	2.9041	0.9415	0.3906	6.03	2.1805	1.7887	2.4533	13.4673	32.2736
704	2.9088	0.942	0.3908	6.04	2.184	1.7916	2.4544	13.4864	32.3248
705	2.9135	0.9425	0.391	6.05	2.1875	1.7945	2.4555	13.5055	32.376
706	2.9182	0.943	0.3912	6.06	2.191	1.7974	2.4566	13.5246	32.4272
707	2.9229	0.9435	0.3914	6.07	2.1945	1.8003	2.4577	13.5437	32.4784
708	2.9276	0.944	0.3916	6.08	2.198	1.8032	2.4588	13.5628	32.5296
709	2.9323	0.9445	0.3918	6.09	2.2015	1.8061	2.4599	13.5819	32.5808
710	2.937	0.945	0.392	6.1	2.205	1.809	2.461	13.601	32.632
711	2.9417	0.9455	0.3922	6.11	2.2085	1.8119	2.4621	13.6201	32.6832
712	2.9464	0.946	0.3924	6.12	2.212	1.8148	2.4632	13.6392	32.7344
713	2.9511	0.9465	0.3926	6.13	2.2155	1.8177	2.4643	13.6583	32.7856
714	2.9558	0.947	0.3928	6.14	2.219	1.8206	2.4654	13.6774	32.8368
715	2.9605	0.9475	0.393	6.15	2.2225	1.8235	2.4665	13.6965	32.888
716	2.9652	0.948	0.3932	6.16	2.226	1.8264	2.4676	13.7156	32.9392
717	2.9699	0.9485	0.3934	6.17	2.2295	1.8293	2.4687	13.7347	32.9904
718	2.9746	0.949	0.3936	6.18	2.233	1.8322	2.4698	13.7538	33.0416
719	2.9793	0.9495	0.3938	6.19	2.2365	1.8351	2.4709	13.7729	33.0928
720	2.984	0.95	0.394	6.2	2.24	1.838	2.472	13.792	33.144
721	2.9887	0.9505	0.3942	6.21	2.2435	1.8409	2.4731	13.8111	33.1952
722	2.9934	0.951	0.3944	6.22	2.247	1.8438	2.4742	13.8302	33.2464
723	2.9981	0.9515	0.3946	6.23	2.2505	1.8467	2.4753	13.8493	33.2976
724	3.0028	0.952	0.3948	6.24	2.254	1.8496	2.4764	13.8684	33.3488
725	3.0075	0.9525	0.395	6.25	2.2575	1.8525	2.4775	13.8875	33.4
726	3.0122	0.953	0.3952	6.26	2.261	1.8554	2.4786	13.9066	33.4512
727	3.0169	0.9535	0.3954	6.27	2.2645	1.8583	2.4797	13.9257	33.5024
728	3.0216	0.954	0.3956	6.28	2.268	1.8612	2.4808	13.9448	33.5536
729	3.0263	0.9545	0.3958	6.29	2.2715	1.8641	2.4819	13.9639	33.6048
730	3.031	0.955	0.396	6.3	2.275	1.867	2.483	13.983	33.656
731	3.0357	0.9555	0.3962	6.31	2.2785	1.8699	2.4841	14.0021	33.7072
732	3.0404	0.956	0.3964	6.32	2.282	1.8728	2.4852	14.0212	33.7584
733	3.0451	0.9565	0.3966	6.33	2.2855	1.8757	2.4863	14.0403	33.8096
734	3.0498	0.957	0.3968	6.34	2.289	1.8786	2.4874	14.0594	33.8608
735	3.0545	0.9575	0.397	6.35	2.2925	1.8815	2.4885	14.0785	33.912
736	3.0592	0.958	0.3972	6.36	2.296	1.8844	2.4896	14.0976	33.9632
737	3.0639	0.9585	0.3974	6.37	2.2995	1.8873	2.4907	14.1167	34.0144
738	3.0686	0.959	0.3976	6.38	2.303	1.8902	2.4918	14.1358	34.0656
739	3.0733	0.9595	0.3978	6.39	2.3065	1.8931	2.4929	14.1549	34.1168
740	3.078	0.96	0.398	6.4	2.31	1.896	2.494	14.174	34.168
741	3.0827	0.9605	0.3982	6.41	2.3135	1.8989	2.4951	14.1931	34.2192
742	3.0874	0.961	0.3984	6.42	2.317	1.9018	2.4962	14.2122	34.2704
743	3.0921	0.9615	0.3986	6.43	2.3205	1.9047	2.4973	14.2313	34.3216
744	3.0968	0.962	0.3988	6.44	2.324	1.9076	2.4984	14.2504	34.3728
745	3.1015	0.9625	0.399	6.45	2.3275	1.9105	2.4995	14.2695	34.424
746	3.1062	0.963	0.3992	6.46	2.331	1.9134	2.5006	14.2886	34.4752
747	3.1109	0.9635	0.3994	6.47	2.3345	1.9163	2.5017	14.3077	34.5264

748	3.1156	0.964	0.3996	6.48	2.338	1.9192	2.5028	14.3268	34.5776
749	3.1203	0.9645	0.3998	6.49	2.3415	1.9221	2.5039	14.3459	34.6288
750	3.125	0.965	0.4	6.5	2.345	1.925	2.505	14.365	34.68
751	3.1297	0.9655	0.4002	6.51	2.3485	1.9279	2.5061	14.3841	34.7312
752	3.1344	0.966	0.4004	6.52	2.352	1.9308	2.5072	14.4032	34.7824
753	3.1391	0.9665	0.4006	6.53	2.3555	1.9337	2.5083	14.4223	34.8336
754	3.1438	0.967	0.4008	6.54	2.359	1.9366	2.5094	14.4414	34.8848
755	3.1485	0.9675	0.401	6.55	2.3625	1.9395	2.5105	14.4605	34.936
756	3.1532	0.968	0.4012	6.56	2.366	1.9424	2.5116	14.4796	34.9872
757	3.1579	0.9685	0.4014	6.57	2.3695	1.9453	2.5127	14.4987	35.0384
758	3.1626	0.969	0.4016	6.58	2.373	1.9482	2.5138	14.5178	35.0896
759	3.1673	0.9695	0.4018	6.59	2.3765	1.9511	2.5149	14.5369	35.1408
760	3.172	0.97	0.402	6.6	2.38	1.954	2.516	14.556	35.192
761	3.1767	0.9705	0.4022	6.61	2.3835	1.9569	2.5171	14.5751	35.2432
762	3.1814	0.971	0.4024	6.62	2.387	1.9598	2.5182	14.5942	35.2944
763	3.1861	0.9715	0.4026	6.63	2.3905	1.9627	2.5193	14.6133	35.3456
764	3.1908	0.972	0.4028	6.64	2.394	1.9656	2.5204	14.6324	35.3968
765	3.1955	0.9725	0.403	6.65	2.3975	1.9685	2.5215	14.6515	35.448
766	3.2002	0.973	0.4032	6.66	2.401	1.9714	2.5226	14.6706	35.4992
767	3.2049	0.9735	0.4034	6.67	2.4045	1.9743	2.5237	14.6897	35.5504
768	3.2096	0.974	0.4036	6.68	2.408	1.9772	2.5248	14.7088	35.6016
769	3.2143	0.9745	0.4038	6.69	2.4115	1.9801	2.5259	14.7279	35.6528
770	3.219	0.975	0.404	6.7	2.415	1.983	2.527	14.747	35.704
771	3.2237	0.9755	0.4042	6.71	2.4185	1.9859	2.5281	14.7661	35.7552
772	3.2284	0.976	0.4044	6.72	2.422	1.9888	2.5292	14.7852	35.8064
773	3.2331	0.9765	0.4046	6.73	2.4255	1.9917	2.5303	14.8043	35.8576
774	3.2378	0.977	0.4048	6.74	2.429	1.9946	2.5314	14.8234	35.9088
775	3.2425	0.9775	0.405	6.75	2.4325	1.9975	2.5325	14.8425	35.96
776	3.2472	0.978	0.4052	6.76	2.436	2.0004	2.5336	14.8616	36.0112
777	3.2519	0.9785	0.4054	6.77	2.4395	2.0033	2.5347	14.8807	36.0624
778	3.2566	0.979	0.4056	6.78	2.443	2.0062	2.5358	14.8998	36.1136
779	3.2613	0.9795	0.4058	6.79	2.4465	2.0091	2.5369	14.9189	36.1648
780	3.266	0.98	0.406	6.8	2.45	2.012	2.538	14.938	36.216
781	3.2707	0.9805	0.4062	6.81	2.4535	2.0149	2.5391	14.9571	36.2672
782	3.2754	0.981	0.4064	6.82	2.457	2.0178	2.5402	14.9762	36.3184
783	3.2801	0.9815	0.4066	6.83	2.4605	2.0207	2.5413	14.9953	36.3696
784	3.2848	0.982	0.4068	6.84	2.464	2.0236	2.5424	15.0144	36.4208
785	3.2895	0.9825	0.407	6.85	2.4675	2.0265	2.5435	15.0335	36.472
786	3.2942	0.983	0.4072	6.86	2.471	2.0294	2.5446	15.0526	36.5232
787	3.2989	0.9835	0.4074	6.87	2.4745	2.0323	2.5457	15.0717	36.5744
788	3.3036	0.984	0.4076	6.88	2.478	2.0352	2.5468	15.0908	36.6256
789	3.3083	0.9845	0.4078	6.89	2.4815	2.0381	2.5479	15.1099	36.6768
790	3.313	0.985	0.408	6.9	2.485	2.041	2.549	15.129	36.728
791	3.3177	0.9855	0.4082	6.91	2.4885	2.0439	2.5501	15.1481	36.7792
792	3.3224	0.986	0.4084	6.92	2.492	2.0468	2.5512	15.1672	36.8304
793	3.3271	0.9865	0.4086	6.93	2.4955	2.0497	2.5523	15.1863	36.8816
794	3.3318	0.987	0.4088	6.94	2.499	2.0526	2.5534	15.2054	36.9328

795	3.3365	0.9875	0.409	6.95	2.5025	2.0555	2.5545	15.2245	36.984
796	3.3412	0.988	0.4092	6.96	2.506	2.0584	2.5556	15.2436	37.0352
797	3.3459	0.9885	0.4094	6.97	2.5095	2.0613	2.5567	15.2627	37.0864
798	3.3506	0.989	0.4096	6.98	2.513	2.0642	2.5578	15.2818	37.1376
799	3.3553	0.9895	0.4098	6.99	2.5165	2.0671	2.5589	15.3009	37.1888
800	3.36	0.99	0.41	7	2.52	2.07	2.56	15.32	37.24
801	3.381	0.991	0.4104	7.01	2.5357	2.0829	2.5626	15.3839	37.3338
802	3.402	0.992	0.4108	7.02	2.5514	2.0958	2.5652	15.4478	37.4276
803	3.423	0.993	0.4112	7.03	2.5671	2.1087	2.5678	15.5117	37.5214
804	3.444	0.994	0.4116	7.04	2.5828	2.1216	2.5704	15.5756	37.6152
805	3.465	0.995	0.412	7.05	2.5985	2.1345	2.573	15.6395	37.709
806	3.486	0.996	0.4124	7.06	2.6142	2.1474	2.5756	15.7034	37.8028
807	3.507	0.997	0.4128	7.07	2.6299	2.1603	2.5782	15.7673	37.8966
808	3.528	0.998	0.4132	7.08	2.6456	2.1732	2.5808	15.8312	37.9904
809	3.549	0.999	0.4136	7.09	2.6613	2.1861	2.5834	15.8951	38.0842
810	3.57	1	0.414	7.1	2.677	2.199	2.586	15.959	38.178
811	3.591	1.001	0.4144	7.11	2.6927	2.2119	2.5886	16.0229	38.2718
812	3.612	1.002	0.4148	7.12	2.7084	2.2248	2.5912	16.0868	38.3656
813	3.633	1.003	0.4152	7.13	2.7241	2.2377	2.5938	16.1507	38.4594
814	3.654	1.004	0.4156	7.14	2.7398	2.2506	2.5964	16.2146	38.5532
815	3.675	1.005	0.416	7.15	2.7555	2.2635	2.599	16.2785	38.647
816	3.696	1.006	0.4164	7.16	2.7712	2.2764	2.6016	16.3424	38.7408
817	3.717	1.007	0.4168	7.17	2.7869	2.2893	2.6042	16.4063	38.8346
818	3.738	1.008	0.4172	7.18	2.8026	2.3022	2.6068	16.4702	38.9284
819	3.759	1.009	0.4176	7.19	2.8183	2.3151	2.6094	16.5341	39.0222
820	3.78	1.01	0.418	7.2	2.834	2.328	2.612	16.598	39.116
821	3.801	1.011	0.4184	7.21	2.8497	2.3409	2.6146	16.6619	39.2098
822	3.822	1.012	0.4188	7.22	2.8654	2.3538	2.6172	16.7258	39.3036
823	3.843	1.013	0.4192	7.23	2.8811	2.3667	2.6198	16.7897	39.3974
824	3.864	1.014	0.4196	7.24	2.8968	2.3796	2.6224	16.8536	39.4912
825	3.885	1.015	0.42	7.25	2.9125	2.3925	2.625	16.9175	39.585
826	3.906	1.016	0.4204	7.26	2.9282	2.4054	2.6276	16.9814	39.6788
827	3.927	1.017	0.4208	7.27	2.9439	2.4183	2.6302	17.0453	39.7726
828	3.948	1.018	0.4212	7.28	2.9596	2.4312	2.6328	17.1092	39.8664
829	3.969	1.019	0.4216	7.29	2.9753	2.4441	2.6354	17.1731	39.9602
830	3.99	1.02	0.422	7.3	2.991	2.457	2.638	17.237	40.054
831	4.011	1.021	0.4224	7.31	3.0067	2.4699	2.6406	17.3009	40.1478
832	4.032	1.022	0.4228	7.32	3.0224	2.4828	2.6432	17.3648	40.2416
833	4.053	1.023	0.4232	7.33	3.0381	2.4957	2.6458	17.4287	40.3354
834	4.074	1.024	0.4236	7.34	3.0538	2.5086	2.6484	17.4926	40.4292
835	4.095	1.025	0.424	7.35	3.0695	2.5215	2.651	17.5565	40.523
836	4.116	1.026	0.4244	7.36	3.0852	2.5344	2.6536	17.6204	40.6168
837	4.137	1.027	0.4248	7.37	3.1009	2.5473	2.6562	17.6843	40.7106
838	4.158	1.028	0.4252	7.38	3.1166	2.5602	2.6588	17.7482	40.8044
839	4.179	1.029	0.4256	7.39	3.1323	2.5731	2.6614	17.8121	40.8982
840	4.2	1.03	0.426	7.4	3.148	2.586	2.664	17.876	40.992
841	4.221	1.031	0.4264	7.41	3.1637	2.5989	2.6666	17.9399	41.0858

842	4.242	1.032	0.4268	7.42	3.1794	2.6118	2.6692	18.0038	41.1796
843	4.263	1.033	0.4272	7.43	3.1951	2.6247	2.6718	18.0677	41.2734
844	4.284	1.034	0.4276	7.44	3.2108	2.6376	2.6744	18.1316	41.3672
845	4.305	1.035	0.428	7.45	3.2265	2.6505	2.677	18.1955	41.461
846	4.326	1.036	0.4284	7.46	3.2422	2.6634	2.6796	18.2594	41.5548
847	4.347	1.037	0.4288	7.47	3.2579	2.6763	2.6822	18.3233	41.6486
848	4.368	1.038	0.4292	7.48	3.2736	2.6892	2.6848	18.3872	41.7424
849	4.389	1.039	0.4296	7.49	3.2893	2.7021	2.6874	18.4511	41.8362
850	4.41	1.04	0.43	7.5	3.305	2.715	2.69	18.515	41.93
851	4.431	1.041	0.4304	7.51	3.3207	2.7279	2.6926	18.5789	42.0238
852	4.452	1.042	0.4308	7.52	3.3364	2.7408	2.6952	18.6428	42.1176
853	4.473	1.043	0.4312	7.53	3.3521	2.7537	2.6978	18.7067	42.2114
854	4.494	1.044	0.4316	7.54	3.3678	2.7666	2.7004	18.7706	42.3052
855	4.515	1.045	0.432	7.55	3.3835	2.7795	2.703	18.8345	42.399
856	4.536	1.046	0.4324	7.56	3.3992	2.7924	2.7056	18.8984	42.4928
857	4.557	1.047	0.4328	7.57	3.4149	2.8053	2.7082	18.9623	42.5866
858	4.578	1.048	0.4332	7.58	3.4306	2.8182	2.7108	19.0262	42.6804
859	4.599	1.049	0.4336	7.59	3.4463	2.8311	2.7134	19.0901	42.7742
860	4.62	1.05	0.434	7.6	3.462	2.844	2.716	19.154	42.868
861	4.641	1.051	0.4344	7.61	3.4777	2.8569	2.7186	19.2179	42.9618
862	4.662	1.052	0.4348	7.62	3.4934	2.8698	2.7212	19.2818	43.0556
863	4.683	1.053	0.4352	7.63	3.5091	2.8827	2.7238	19.3457	43.1494
864	4.704	1.054	0.4356	7.64	3.5248	2.8956	2.7264	19.4096	43.2432
865	4.725	1.055	0.436	7.65	3.5405	2.9085	2.729	19.4735	43.337
866	4.746	1.056	0.4364	7.66	3.5562	2.9214	2.7316	19.5374	43.4308
867	4.767	1.057	0.4368	7.67	3.5719	2.9343	2.7342	19.6013	43.5246
868	4.788	1.058	0.4372	7.68	3.5876	2.9472	2.7368	19.6652	43.6184
869	4.809	1.059	0.4376	7.69	3.6033	2.9601	2.7394	19.7291	43.7122
870	4.83	1.06	0.438	7.7	3.619	2.973	2.742	19.793	43.806
871	4.851	1.061	0.4384	7.71	3.6347	2.9859	2.7446	19.8569	43.8998
872	4.872	1.062	0.4388	7.72	3.6504	2.9988	2.7472	19.9208	43.9936
873	4.893	1.063	0.4392	7.73	3.6661	3.0117	2.7498	19.9847	44.0874
874	4.914	1.064	0.4396	7.74	3.6818	3.0246	2.7524	20.0486	44.1812
875	4.935	1.065	0.44	7.75	3.6975	3.0375	2.755	20.1125	44.275
876	4.956	1.066	0.4404	7.76	3.7132	3.0504	2.7576	20.1764	44.3688
877	4.977	1.067	0.4408	7.77	3.7289	3.0633	2.7602	20.2403	44.4626
878	4.998	1.068	0.4412	7.78	3.7446	3.0762	2.7628	20.3042	44.5564
879	5.019	1.069	0.4416	7.79	3.7603	3.0891	2.7654	20.3681	44.6502
880	5.04	1.07	0.442	7.8	3.776	3.102	2.768	20.432	44.744
881	5.061	1.071	0.4424	7.81	3.7917	3.1149	2.7706	20.4959	44.8378
882	5.082	1.072	0.4428	7.82	3.8074	3.1278	2.7732	20.5598	44.9316
883	5.103	1.073	0.4432	7.83	3.8231	3.1407	2.7758	20.6237	45.0254
884	5.124	1.074	0.4436	7.84	3.8388	3.1536	2.7784	20.6876	45.1192
885	5.145	1.075	0.444	7.85	3.8545	3.1665	2.781	20.7515	45.213
886	5.166	1.076	0.4444	7.86	3.8702	3.1794	2.7836	20.8154	45.3068
887	5.187	1.077	0.4448	7.87	3.8859	3.1923	2.7862	20.8793	45.4006
888	5.208	1.078	0.4452	7.88	3.9016	3.2052	2.7888	20.9432	45.4944

889	5.229	1.079	0.4456	7.89	3.9173	3.2181	2.7914	21.0071	45.5882
890	5.25	1.08	0.446	7.9	3.933	3.231	2.794	21.071	45.682
891	5.271	1.081	0.4464	7.91	3.9487	3.2439	2.7966	21.1349	45.7758
892	5.292	1.082	0.4468	7.92	3.9644	3.2568	2.7992	21.1988	45.8696
893	5.313	1.083	0.4472	7.93	3.9801	3.2697	2.8018	21.2627	45.9634
894	5.334	1.084	0.4476	7.94	3.9958	3.2826	2.8044	21.3266	46.0572
895	5.355	1.085	0.448	7.95	4.0115	3.2955	2.807	21.3905	46.151
896	5.376	1.086	0.4484	7.96	4.0272	3.3084	2.8096	21.4544	46.2448
897	5.397	1.087	0.4488	7.97	4.0429	3.3213	2.8122	21.5183	46.3386
898	5.418	1.088	0.4492	7.98	4.0586	3.3342	2.8148	21.5822	46.4324
899	5.439	1.089	0.4496	7.99	4.0743	3.3471	2.8174	21.6461	46.5262
900	5.46	1.09	0.45	8	4.09	3.36	2.82	21.71	46.62
901	5.496	1.0949	0.452	8.11	4.1171	3.3822	2.8327	21.8269	46.801
902	5.532	1.0998	0.454	8.22	4.1442	3.4044	2.8454	21.9438	46.982
903	5.568	1.1047	0.456	8.33	4.1713	3.4266	2.8581	22.0607	47.163
904	5.604	1.1096	0.458	8.44	4.1984	3.4488	2.8708	22.1776	47.344
905	5.64	1.1145	0.46	8.55	4.2255	3.471	2.8835	22.2945	47.525
906	5.676	1.1194	0.462	8.66	4.2526	3.4932	2.8962	22.4114	47.706
907	5.712	1.1243	0.464	8.77	4.2797	3.5154	2.9089	22.5283	47.887
908	5.748	1.1292	0.466	8.88	4.3068	3.5376	2.9216	22.6452	48.068
909	5.784	1.1341	0.468	8.99	4.3339	3.5598	2.9343	22.7621	48.249
910	5.82	1.139	0.47	9.1	4.361	3.582	2.947	22.879	48.43
911	5.856	1.1439	0.472	9.21	4.3881	3.6042	2.9597	22.9959	48.611
912	5.892	1.1488	0.474	9.32	4.4152	3.6264	2.9724	23.1128	48.792
913	5.928	1.1537	0.476	9.43	4.4423	3.6486	2.9851	23.2297	48.973
914	5.964	1.1586	0.478	9.54	4.4694	3.6708	2.9978	23.3466	49.154
915	6	1.1635	0.48	9.65	4.4965	3.693	3.0105	23.4635	49.335
916	6.036	1.1684	0.482	9.76	4.5236	3.7152	3.0232	23.5804	49.516
917	6.072	1.1733	0.484	9.87	4.5507	3.7374	3.0359	23.6973	49.697
918	6.108	1.1782	0.486	9.98	4.5778	3.7596	3.0486	23.8142	49.878
919	6.144	1.1831	0.488	10.09	4.6049	3.7818	3.0613	23.9311	50.059
920	6.18	1.188	0.49	10.2	4.632	3.804	3.074	24.048	50.24
921	6.216	1.1929	0.492	10.31	4.6591	3.8262	3.0867	24.1649	50.421
922	6.252	1.1978	0.494	10.42	4.6862	3.8484	3.0994	24.2818	50.602
923	6.288	1.2027	0.496	10.53	4.7133	3.8706	3.1121	24.3987	50.783
924	6.324	1.2076	0.498	10.64	4.7404	3.8928	3.1248	24.5156	50.964
925	6.36	1.2125	0.5	10.75	4.7675	3.915	3.1375	24.6325	51.145
926	6.396	1.2174	0.502	10.86	4.7946	3.9372	3.1502	24.7494	51.326
927	6.432	1.2223	0.504	10.97	4.8217	3.9594	3.1629	24.8663	51.507
928	6.468	1.2272	0.506	11.08	4.8488	3.9816	3.1756	24.9832	51.688
929	6.504	1.2321	0.508	11.19	4.8759	4.0038	3.1883	25.1001	51.869
930	6.54	1.237	0.51	11.3	4.903	4.026	3.201	25.217	52.05
931	6.576	1.2419	0.512	11.41	4.9301	4.0482	3.2137	25.3339	52.231
932	6.612	1.2468	0.514	11.52	4.9572	4.0704	3.2264	25.4508	52.412
933	6.648	1.2517	0.516	11.63	4.9843	4.0926	3.2391	25.5677	52.593
934	6.684	1.2566	0.518	11.74	5.0114	4.1148	3.2518	25.6846	52.774
935	6.72	1.2615	0.52	11.85	5.0385	4.137	3.2645	25.8015	52.955

936	6.756	1.2664	0.522	11.96	5.0656	4.1592	3.2772	25.9184	53.136
937	6.792	1.2713	0.524	12.07	5.0927	4.1814	3.2899	26.0353	53.317
938	6.828	1.2762	0.526	12.18	5.1198	4.2036	3.3026	26.1522	53.498
939	6.864	1.2811	0.528	12.29	5.1469	4.2258	3.3153	26.2691	53.679
940	6.9	1.286	0.53	12.4	5.174	4.248	3.328	26.386	53.86
941	6.936	1.2909	0.532	12.51	5.2011	4.2702	3.3407	26.5029	54.041
942	6.972	1.2958	0.534	12.62	5.2282	4.2924	3.3534	26.6198	54.222
943	7.008	1.3007	0.536	12.73	5.2553	4.3146	3.3661	26.7367	54.403
944	7.044	1.3056	0.538	12.84	5.2824	4.3368	3.3788	26.8536	54.584
945	7.08	1.3105	0.54	12.95	5.3095	4.359	3.3915	26.9705	54.765
946	7.116	1.3154	0.542	13.06	5.3366	4.3812	3.4042	27.0874	54.946
947	7.152	1.3203	0.544	13.17	5.3637	4.4034	3.4169	27.2043	55.127
948	7.188	1.3252	0.546	13.28	5.3908	4.4256	3.4296	27.3212	55.308
949	7.224	1.3301	0.548	13.39	5.4179	4.4478	3.4423	27.4381	55.489
950	7.26	1.335	0.55	13.5	5.445	4.47	3.455	27.555	55.67
951	7.296	1.3399	0.552	13.61	5.4721	4.4922	3.4677	27.6719	55.851
952	7.332	1.3448	0.554	13.72	5.4992	4.5144	3.4804	27.7888	56.032
953	7.368	1.3497	0.556	13.83	5.5263	4.5366	3.4931	27.9057	56.213
954	7.404	1.3546	0.558	13.94	5.5534	4.5588	3.5058	28.0226	56.394
955	7.44	1.3595	0.56	14.05	5.5805	4.581	3.5185	28.1395	56.575
956	7.476	1.3644	0.562	14.16	5.6076	4.6032	3.5312	28.2564	56.756
957	7.512	1.3693	0.564	14.27	5.6347	4.6254	3.5439	28.3733	56.937
958	7.548	1.3742	0.566	14.38	5.6618	4.6476	3.5566	28.4902	57.118
959	7.584	1.3791	0.568	14.49	5.6889	4.6698	3.5693	28.6071	57.299
960	7.62	1.384	0.57	14.6	5.716	4.692	3.582	28.724	57.48
961	7.656	1.3889	0.572	14.71	5.7431	4.7142	3.5947	28.8409	57.661
962	7.692	1.3938	0.574	14.82	5.7702	4.7364	3.6074	28.9578	57.842
963	7.728	1.3987	0.576	14.93	5.7973	4.7586	3.6201	29.0747	58.023
964	7.764	1.4036	0.578	15.04	5.8244	4.7808	3.6328	29.1916	58.204
965	7.8	1.4085	0.58	15.15	5.8515	4.803	3.6455	29.3085	58.385
966	7.836	1.4134	0.582	15.26	5.8786	4.8252	3.6582	29.4254	58.566
967	7.872	1.4183	0.584	15.37	5.9057	4.8474	3.6709	29.5423	58.747
968	7.908	1.4232	0.586	15.48	5.9328	4.8696	3.6836	29.6592	58.928
969	7.944	1.4281	0.588	15.59	5.9599	4.8918	3.6963	29.7761	59.109
970	7.98	1.433	0.59	15.7	5.987	4.914	3.709	29.893	59.29
971	8.016	1.4379	0.592	15.81	6.0141	4.9362	3.7217	30.0099	59.471
972	8.052	1.4428	0.594	15.92	6.0412	4.9584	3.7344	30.1268	59.652
973	8.088	1.4477	0.596	16.03	6.0683	4.9806	3.7471	30.2437	59.833
974	8.124	1.4526	0.598	16.14	6.0954	5.0028	3.7598	30.3606	60.014
975	8.16	1.4575	0.6	16.25	6.1225	5.025	3.7725	30.4775	60.195
976	8.196	1.4624	0.602	16.36	6.1496	5.0472	3.7852	30.5944	60.376
977	8.232	1.4673	0.604	16.47	6.1767	5.0694	3.7979	30.7113	60.557
978	8.268	1.4722	0.606	16.58	6.2038	5.0916	3.8106	30.8282	60.738
979	8.304	1.4771	0.608	16.69	6.2309	5.1138	3.8233	30.9451	60.919
980	8.34	1.482	0.61	16.8	6.258	5.136	3.836	31.062	61.1
981	8.376	1.4869	0.612	16.91	6.2851	5.1582	3.8487	31.1789	61.281
982	8.412	1.4918	0.614	17.02	6.3122	5.1804	3.8614	31.2958	61.462

983	8.448	1.4967	0.616	17.13	6.3393	5.2026	3.8741	31.4127	61.643
984	8.484	1.5016	0.618	17.24	6.3664	5.2248	3.8868	31.5296	61.824
985	8.52	1.5065	0.62	17.35	6.3935	5.247	3.8995	31.6465	62.005
986	8.556	1.5114	0.622	17.46	6.4206	5.2692	3.9122	31.7634	62.186
987	8.592	1.5163	0.624	17.57	6.4477	5.2914	3.9249	31.8803	62.367
988	8.628	1.5212	0.626	17.68	6.4748	5.3136	3.9376	31.9972	62.548
989	8.664	1.5261	0.628	17.79	6.5019	5.3358	3.9503	32.1141	62.729
990	8.7	1.531	0.63	17.9	6.529	5.358	3.963	32.231	62.91
991	8.736	1.5359	0.632	18.01	6.5561	5.3802	3.9757	32.3479	63.091
992	8.772	1.5408	0.634	18.12	6.5832	5.4024	3.9884	32.4648	63.272
993	8.808	1.5457	0.636	18.23	6.6103	5.4246	4.0011	32.5817	63.453
994	8.844	1.5506	0.638	18.34	6.6374	5.4468	4.0138	32.6986	63.634
995	8.88	1.5555	0.64	18.45	6.6645	5.469	4.0265	32.8155	63.815
996	8.916	1.5604	0.642	18.56	6.6916	5.4912	4.0392	32.9324	63.996
997	8.952	1.5653	0.644	18.67	6.7187	5.5134	4.0519	33.0493	64.177
998	8.988	1.5702	0.646	18.78	6.7458	5.5356	4.0646	33.1662	64.358
999	9.024	1.5751	0.648	18.89	6.7729	5.5578	4.0773	33.2831	64.539
1000	9.06	1.58	0.65	19	6.8	5.58	4.09	33.4	64.72
1001	9.15	1.6102	0.6624	19.28	6.8674	5.6352	4.1684	33.672	65.12
1002	9.24	1.6404	0.6748	19.56	6.9348	5.6904	4.2468	33.944	65.52
1003	9.33	1.6706	0.6872	19.84	7.0022	5.7456	4.3252	34.216	65.92
1004	9.42	1.7008	0.6996	20.12	7.0696	5.8008	4.4036	34.488	66.32
1005	9.51	1.731	0.712	20.4	7.137	5.856	4.482	34.76	66.72
1006	9.6	1.7612	0.7244	20.68	7.2044	5.9112	4.5604	35.032	67.12
1007	9.69	1.7914	0.7368	20.96	7.2718	5.9664	4.6388	35.304	67.52
1008	9.78	1.8216	0.7492	21.24	7.3392	6.0216	4.7172	35.576	67.92
1009	9.87	1.8518	0.7616	21.52	7.4066	6.0768	4.7956	35.848	68.32
1010	9.96	1.882	0.774	21.8	7.474	6.132	4.874	36.12	68.72
1011	10.05	1.9122	0.7864	22.08	7.5414	6.1872	4.9524	36.392	69.12
1012	10.14	1.9424	0.7988	22.36	7.6088	6.2424	5.0308	36.664	69.52
1013	10.23	1.9726	0.8112	22.64	7.6762	6.2976	5.1092	36.936	69.92
1014	10.32	2.0028	0.8236	22.92	7.7436	6.3528	5.1876	37.208	70.32
1015	10.41	2.033	0.836	23.2	7.811	6.408	5.266	37.48	70.72
1016	10.5	2.0632	0.8484	23.48	7.8784	6.4632	5.3444	37.752	71.12
1017	10.59	2.0934	0.8608	23.76	7.9458	6.5184	5.4228	38.024	71.52
1018	10.68	2.1236	0.8732	24.04	8.0132	6.5736	5.5012	38.296	71.92
1019	10.77	2.1538	0.8856	24.32	8.0806	6.6288	5.5796	38.568	72.32
1020	10.86	2.184	0.898	24.6	8.148	6.684	5.658	38.84	72.72
1021	10.95	2.2142	0.9104	24.88	8.2154	6.7392	5.7364	39.112	73.12
1022	11.04	2.2444	0.9228	25.16	8.2828	6.7944	5.8148	39.384	73.52
1023	11.13	2.2746	0.9352	25.44	8.3502	6.8496	5.8932	39.656	73.92
1024	11.22	2.3048	0.9476	25.72	8.4176	6.9048	5.9716	39.928	74.32
1025	11.31	2.335	0.96	26	8.485	6.96	6.05	40.2	74.72
1026	11.4	2.3652	0.9724	26.28	8.5524	7.0152	6.1284	40.472	75.12
1027	11.49	2.3954	0.9848	26.56	8.6198	7.0704	6.2068	40.744	75.52
1028	11.58	2.4256	0.9972	26.84	8.6872	7.1256	6.2852	41.016	75.92
1029	11.67	2.4558	1.0096	27.12	8.7546	7.1808	6.3636	41.288	76.32

1030	11.76	2.486	1.022	27.4	8.822	7.236	6.442	41.56	76.72
1031	11.85	2.5162	1.0344	27.68	8.8894	7.2912	6.5204	41.832	77.12
1032	11.94	2.5464	1.0468	27.96	8.9568	7.3464	6.5988	42.104	77.52
1033	12.03	2.5766	1.0592	28.24	9.0242	7.4016	6.6772	42.376	77.92
1034	12.12	2.6068	1.0716	28.52	9.0916	7.4568	6.7556	42.648	78.32
1035	12.21	2.637	1.084	28.8	9.159	7.512	6.834	42.92	78.72
1036	12.3	2.6672	1.0964	29.08	9.2264	7.5672	6.9124	43.192	79.12
1037	12.39	2.6974	1.1088	29.36	9.2938	7.6224	6.9908	43.464	79.52
1038	12.48	2.7276	1.1212	29.64	9.3612	7.6776	7.0692	43.736	79.92
1039	12.57	2.7578	1.1336	29.92	9.4286	7.7328	7.1476	44.008	80.32
1040	12.66	2.788	1.146	30.2	9.496	7.788	7.226	44.28	80.72
1041	12.75	2.8182	1.1584	30.48	9.5634	7.8432	7.3044	44.552	81.12
1042	12.84	2.8484	1.1708	30.76	9.6308	7.8984	7.3828	44.824	81.52
1043	12.93	2.8786	1.1832	31.04	9.6982	7.9536	7.4612	45.096	81.92
1044	13.02	2.9088	1.1956	31.32	9.7656	8.0088	7.5396	45.368	82.32
1045	13.11	2.939	1.208	31.6	9.833	8.064	7.618	45.64	82.72
1046	13.2	2.9692	1.2204	31.88	9.9004	8.1192	7.6964	45.912	83.12
1047	13.29	2.9994	1.2328	32.16	9.9678	8.1744	7.7748	46.184	83.52
1048	13.38	3.0296	1.2452	32.44	10.0352	8.2296	7.8532	46.456	83.92
1049	13.47	3.0598	1.2576	32.72	10.1026	8.2848	7.9316	46.728	84.32
1050	13.56	3.09	1.27	33	10.17	8.34	8.01	47	84.72
1051	13.5924	3.101	1.2746	33.24	10.1942	8.36	8.0382	47.141	84.9594
1052	13.6248	3.112	1.2792	33.48	10.2184	8.38	8.0664	47.282	85.1988
1053	13.6572	3.123	1.2838	33.72	10.2426	8.4	8.0946	47.423	85.4382
1054	13.6896	3.134	1.2884	33.96	10.2668	8.42	8.1228	47.564	85.6776
1055	13.722	3.145	1.293	34.2	10.291	8.44	8.151	47.705	85.917
1056	13.7544	3.156	1.2976	34.44	10.3152	8.46	8.1792	47.846	86.1564
1057	13.7868	3.167	1.3022	34.68	10.3394	8.48	8.2074	47.987	86.3958
1058	13.8192	3.178	1.3068	34.92	10.3636	8.5	8.2356	48.128	86.6352
1059	13.8516	3.189	1.3114	35.16	10.3878	8.52	8.2638	48.269	86.8746
1060	13.884	3.2	1.316	35.4	10.412	8.54	8.292	48.41	87.114
1061	13.9164	3.211	1.3206	35.64	10.4362	8.56	8.3202	48.551	87.3534
1062	13.9488	3.222	1.3252	35.88	10.4604	8.58	8.3484	48.692	87.5928
1063	13.9812	3.233	1.3298	36.12	10.4846	8.6	8.3766	48.833	87.8322
1064	14.0136	3.244	1.3344	36.36	10.5088	8.62	8.4048	48.974	88.0716
1065	14.046	3.255	1.339	36.6	10.533	8.64	8.433	49.115	88.311
1066	14.0784	3.266	1.3436	36.84	10.5572	8.66	8.4612	49.256	88.5504
1067	14.1108	3.277	1.3482	37.08	10.5814	8.68	8.4894	49.397	88.7898
1068	14.1432	3.288	1.3528	37.32	10.6056	8.7	8.5176	49.538	89.0292
1069	14.1756	3.299	1.3574	37.56	10.6298	8.72	8.5458	49.679	89.2686
1070	14.208	3.31	1.362	37.8	10.654	8.74	8.574	49.82	89.508
1071	14.2404	3.321	1.3666	38.04	10.6782	8.76	8.6022	49.961	89.7474
1072	14.2728	3.332	1.3712	38.28	10.7024	8.78	8.6304	50.102	89.9868
1073	14.3052	3.343	1.3758	38.52	10.7266	8.8	8.6586	50.243	90.2262
1074	14.3376	3.354	1.3804	38.76	10.7508	8.82	8.6868	50.384	90.4656
1075	14.37	3.365	1.385	39	10.775	8.84	8.715	50.525	90.705
1076	14.4024	3.376	1.3896	39.24	10.7992	8.86	8.7432	50.666	90.9444

1077	14.4348	3.387	1.3942	39.48	10.8234	8.88	8.7714	50.807	91.1838
1078	14.4672	3.398	1.3988	39.72	10.8476	8.9	8.7996	50.948	91.4232
1079	14.4996	3.409	1.4034	39.96	10.8718	8.92	8.8278	51.089	91.6626
1080	14.532	3.42	1.408	40.2	10.896	8.94	8.856	51.23	91.902
1081	14.5644	3.431	1.4126	40.44	10.9202	8.96	8.8842	51.371	92.1414
1082	14.5968	3.442	1.4172	40.68	10.9444	8.98	8.9124	51.512	92.3808
1083	14.6292	3.453	1.4218	40.92	10.9686	9	8.9406	51.653	92.6202
1084	14.6616	3.464	1.4264	41.16	10.9928	9.02	8.9688	51.794	92.8596
1085	14.694	3.475	1.431	41.4	11.017	9.04	8.997	51.935	93.099
1086	14.7264	3.486	1.4356	41.64	11.0412	9.06	9.0252	52.076	93.3384
1087	14.7588	3.497	1.4402	41.88	11.0654	9.08	9.0534	52.217	93.5778
1088	14.7912	3.508	1.4448	42.12	11.0896	9.1	9.0816	52.358	93.8172
1089	14.8236	3.519	1.4494	42.36	11.1138	9.12	9.1098	52.499	94.0566
1090	14.856	3.53	1.454	42.6	11.138	9.14	9.138	52.64	94.296
1091	14.8884	3.541	1.4586	42.84	11.1622	9.16	9.1662	52.781	94.5354
1092	14.9208	3.552	1.4632	43.08	11.1864	9.18	9.1944	52.922	94.7748
1093	14.9532	3.563	1.4678	43.32	11.2106	9.2	9.2226	53.063	95.0142
1094	14.9856	3.574	1.4724	43.56	11.2348	9.22	9.2508	53.204	95.2536
1095	15.018	3.585	1.477	43.8	11.259	9.24	9.279	53.345	95.493
1096	15.0504	3.596	1.4816	44.04	11.2832	9.26	9.3072	53.486	95.7324
1097	15.0828	3.607	1.4862	44.28	11.3074	9.28	9.3354	53.627	95.9718
1098	15.1152	3.618	1.4908	44.52	11.3316	9.3	9.3636	53.768	96.2112
1099	15.1476	3.629	1.4954	44.76	11.3558	9.32	9.3918	53.909	96.4506
1100	15.18	3.64	1.5	45	11.38	9.34	9.42	54.05	96.69
1101	16.008	3.941	1.636	45.1	12.129	9.897	10.078	55.651	98.824
1102	16.836	4.242	1.772	45.2	12.878	10.454	10.736	57.252	100.958
1103	17.664	4.543	1.908	45.3	13.627	11.011	11.394	58.853	103.092
1104	18.492	4.844	2.044	45.4	14.376	11.568	12.052	60.454	105.226
1105	19.32	5.145	2.18	45.5	15.125	12.125	12.71	62.055	107.36
1106	20.148	5.446	2.316	45.6	15.874	12.682	13.368	63.656	109.494
1107	20.976	5.747	2.452	45.7	16.623	13.239	14.026	65.257	111.628
1108	21.804	6.048	2.588	45.8	17.372	13.796	14.684	66.858	113.762
1109	22.632	6.349	2.724	45.9	18.121	14.353	15.342	68.459	115.896
1110	23.46	6.65	2.86	46	18.87	14.91	16	70.06	118.03
1111	23.342	6.578	2.814	46.1	18.611	14.774	15.975	70.997	118.88
1112	23.224	6.506	2.768	46.2	18.352	14.638	15.95	71.934	119.73
1113	23.106	6.434	2.722	46.3	18.093	14.502	15.925	72.871	120.58
1114	22.988	6.362	2.676	46.4	17.834	14.366	15.9	73.808	121.43
1115	22.87	6.29	2.63	46.5	17.575	14.23	15.875	74.745	122.28
1116	22.752	6.218	2.584	46.6	17.316	14.094	15.85	75.682	123.13
1117	22.634	6.146	2.538	46.7	17.057	13.958	15.825	76.619	123.98
1118	22.516	6.074	2.492	46.8	16.798	13.822	15.8	77.556	124.83
1119	22.398	6.002	2.446	46.9	16.539	13.686	15.775	78.493	125.68
1120	22.28	5.93	2.4	47	16.28	13.55	15.75	79.43	126.53
1121	23.295	6.301	2.572	47	17.241	14.251	16.517	81.257	129.735
1122	24.31	6.672	2.744	47	18.202	14.952	17.284	83.084	132.94
1123	25.325	7.043	2.916	47	19.163	15.653	18.051	84.911	136.145

1124	26.34	7.414	3.088	47	20.124	16.354	18.818	86.738	139.35
1125	27.355	7.785	3.26	47	21.085	17.055	19.585	88.565	142.555
1126	28.37	8.156	3.432	47	22.046	17.756	20.352	90.392	145.76
1127	29.385	8.527	3.604	47	23.007	18.457	21.119	92.219	148.965
1128	30.4	8.898	3.776	47	23.968	19.158	21.886	94.046	152.17
1129	31.415	9.269	3.948	47	24.929	19.859	22.653	95.873	155.375
1130	32.43	9.64	4.12	47	25.89	20.56	23.42	97.7	158.58
1131	33.51	10	4.12	47	25.89	21.24	24.26	101.02	160.75
1132	34.52	10	4.12	47	25.89	21.24	25.09	104.49	162.92
1133	35.26	10.26	4.26	48	26.73	21.74	26.45	108.55	166.77
1134	36.25	10.61	4.46	48	27.84	22.41	27.21	112.38	171.38
1135	37	10.87	4.61	48	28.67	22.91	27.79	115.5	175.68
1136	36.5	10.69	4.51	48	28.12	22.57	27.4	116.67	177.55
1137	37.74	11.13	4.76	48	29.51	23.4	28.36	119.72	183.31
1138	38.73	11.48	4.96	48	30.62	24.07	29.12	122.6	188.64
1139	39.72	11.83	5.15	48	31.74	24.73	29.89	125.08	194.01
1140	40.96	12.27	5.4	48	33.13	25.56	30.84	127.96	199.99
1141	43.18	13.05	5.7	48	34.79	27.06	32.56	132.24	206.46
1142	45.16	13.75	5.89	49	35.89	28.39	34.09	136.64	211.85
1143	47.12	14.44	6.13	49	37.26	29.7	35.62	141.62	217.97
1144	49.32	14.95	6.67	49	40.28	30.68	37.31	147.4	227.52
1145	52.73	16.06	7.25	49	43.57	32.81	40.5	154.92	238.02
1146	55.9	17.26	7.85	49	47.1	35.1	43.13	162.58	249.56
1147	59.3	18.84	8.46	49	50.62	38.18	45.57	171.65	261.78
1148	63.88	19.82	9.02	49	53.87	40.12	48.08	182.08	274.47
1149	79.05	25.13	11.84	50	70.08	50.47	60.75	204.32	312.2
1150	94.8	30.59	14.75	50	86.91	61.09	72.42	227.51	351.99
1151	93.81	30.16	14.36	50	84.64	60.26	71.67	245.28	361.8
1152	126.6	41.12	20.61	51	120.77	81.67	96.5	302.85	446.81
1153	141.51	46.35	23.1	51	135.5	91.85	108.47	346.31	497.55
1154	143.78	47.14	23.1	51	135.5	93.37	110	391.89	529.87
1155	143.78	47.05	22.66	52	132.9	93.2	110	445.83	565.52
1156	142.77	46	22.07	52	129.43	91.17	109.42	479.02	597.8
1157	138.98	44.7	18.84	53	110.49	88.62	108.09	493.65	595.76
1158	134.68	43.22	15.49	53	91.17	85.74	104.85	495.11	584.87
1159	130.14	41.65	15.44	53	90.89	82.68	101.43	482.76	601.92
1160	126.1	35.84	8.92	54	53.33	71.33	98.4	456.2	546.33
1161	107.93	29.65	5.5	54	33.69	59.27	94.41	422.06	519.06
1162	90.1	29.31	4.46	54	27.84	58.6	80.82	385.39	511.56
1163	89.11	17.61	3.86	54	24.46	35.75	67.38	341.76	500.86
1164	56.64	11.92	3.7	54	23.58	24.9	67.75	286.39	489.46
1165	37.99	9.73	3.18	54	20.64	20.75	41.44	234.91	470.85
1166	32.49	8.53	2.91	62	19.17	18.47	27.59	208.44	447.49
1167	28.56	7.41	2.6	62	17.4	16.36	22.87	160.3	418.23
1168	25.95	6.76	2.28	62	15.63	15.13	20.23	131.3	388.35
1169	25.42	6.76	2.49	62	16.81	15.13	19.21	117.25	363.92
1170	22.55	5.83	2.13	62	14.78	13.38	16.56	105.08	333.7

1171	21.5	5.28	2.07	62	14.5	12.33	15.54	96.33	305.79
1172	19.7	5.09	1.66	62	12.25	12	14.52	89.49	272.85
1173	18.95	4.82	1.71	62	12.53	11.5	12.91	83.78	245.37
1174	18.45	4.64	1.66	62	12.25	11.16	12.51	78.85	220.87
1175	17.7	3.81	1.66	62	12.25	9.65	11.91	73.92	201.36
1176	15.46	3.9	1.55	62	11.69	9.82	11.3	70.53	184.62
1177	15.46	3.63	1.14	62	9.44	9.32	9.29	66.89	167.75
1178	14.71	3.53	1.29	62	10.28	9.15	9.29	63.82	158.5
1179	14.71	3.35	1.19	62	9.72	8.81	8.89	60.14	148.25
1180	14.21	2.71	1.14	62	9.44	7.64	8.89	58.69	139.87
1181	12.46	3.08	1.14	62	9.44	8.31	8.49	56.36	133.19
1182	13.46	2.89	1.09	62	9.16	7.97	7.09	54.39	126.82
1183	12.71	2.71	1.04	62	8.87	7.64	7.69	52.18	121.03
1184	12.46	2.71	1.04	62	8.87	7.64	7.29	49.59	116.13
1185	12.46	2.62	1.09	62	9.16	7.47	7.09	49.46	112.48
1186	11.96	2.53	1.09	62	9.16	7.3	6.88	47.95	108.84
1187	11.96	2.53	1.09	62	9.16	7.3	6.68	46.91	105.58
1188	11.96	2.62	1.09	62	9.16	7.47	6.68	46.21	102.77
1189	12.21	2.71	1.09	62	9.16	7.64	6.68	45.5	100.17
1190	12.21	2.62	1.04	62	8.87	7.47	6.68	44.94	97.23
1191	12.21	2.62	1.09	62	9.16	7.47	6.88	44.73	95.61
1192	11.96	2.53	1.04	62	8.87	7.3	6.68	44.61	93.29
1193	11.96	2.53	1.04	62	8.87	7.3	6.68	44.71	91.73
1194	11.96	2.62	1.09	62	9.16	7.47	6.68	44.54	90.9
1195	12.21	2.62	1.09	62	9.16	7.47	6.68	44.37	89.64
1196	11.96	2.53	1.04	62	8.87	7.3	6.68	44.02	87.95
1197	11.96	2.62	1.04	62	8.88	7.47	6.68	43.89	86.92
1198	12.21	2.62	1.09	62	9.16	7.47	6.68	44.05	86.59
1199	11.96	2.53	1.04	62	8.88	7.3	6.68	43.86	85.41
1200	11.96	2.53	1.09	62	9.16	7.3	6.68	43.83	85.33
1201	11.46	2.43	0.98	62	8.59	7.14	6.28	43.53	83.85
1202	11.46	2.34	0.93	62	8.31	6.97	6.08	43.28	82.91
1203	10.96	2.25	0.83	62	7.75	6.8	5.88	42.82	81.48
1204	10.96	2.16	0.83	62	7.75	6.63	5.68	42.57	81.06
1205	10.46	1.98	0.72	62	7.19	6.3	5.48	42.21	79.6
1206	9.96	1.79	0.62	62	6.63	5.96	5.08	41.47	78.09
1207	9.71	1.79	0.62	62	6.63	5.96	4.88	40.98	77.55
1208	9.46	1.61	0.52	62	6.06	5.63	4.47	39.96	75.95
1209	9.21	1.52	0.57	62	6.35	5.46	4.47	39.13	75.76
1210	8.71	1.43	0.52	62	6.06	5.29	4.07	37.95	74.5
1211	8.46	1.24	0.52	62	6.06	4.95	3.67	36.94	73.75
1212	8.21	1.33	0.52	62	6.06	5.12	3.67	35.94	73.01
1213	8.46	1.33	0.57	62	6.35	5.12	3.47	34.97	72.76
1214	8.21	1.33	0.57	62	6.35	5.12	3.47	34.11	71.97
1215	8.21	1.24	0.52	62	6.06	4.95	3.27	33.1	70.67
1216	8.21	1.33	0.57	62	6.35	5.12	3.47	32.86	70.41
1217	8.46	1.43	0.57	62	6.35	5.29	3.47	32.59	69.71

1218	8.46	1.33	0.57	62	6.35	5.12	3.47	32.42	69.02
1219	8.21	1.33	0.57	62	6.35	5.12	3.47	32.06	68.35
1220	8.46	1.33	0.57	62	6.35	5.12	3.47	32.14	67.73
1221	8.46	1.43	0.57	62	6.35	5.29	3.67	32.31	67.16
1222	8.46	1.43	0.57	62	6.35	5.29	3.47	32.08	66.61
1223	8.46	1.33	0.57	62	6.35	5.12	3.47	32.03	66.11
1224	8.46	1.33	0.57	62	6.35	5.12	3.67	32.01	65.68
1225	8.46	1.43	0.57	62	6.35	5.29	3.67	32.26	65.31
1226	8.46	1.43	0.57	62	6.35	5.29	3.47	32.26	65.01
1227	8.46	1.33	0.57	62	6.35	5.12	3.47	32.01	64.76
1228	8.46	1.33	0.57	62	6.35	5.12	3.67	31.99	64.54
1229	8.46	1.43	0.57	62	6.35	5.29	3.67	32.25	64.35
1230	8.46	1.43	0.57	62	6.35	5.29	3.47	32.25	64.21
1231	8.46	1.33	0.57	62	6.35	5.12	3.47	32	64.09
1232	8.46	1.33	0.57	62	6.35	5.12	3.67	31.99	63.99
1233	8.21	1.33	0.52	62	6.06	5.12	3.47	32.03	63.39
1234	8.21	1.33	0.52	62	6.06	5.12	3.27	32.03	63.32
1235	8.46	1.33	0.57	62	6.35	5.12	3.47	31.99	63.75
1236	8.21	1.24	0.52	62	6.06	4.95	3.47	31.77	63.16
1237	7.96	1.24	0.49	62	5.78	4.95	3.27	31.75	62.54
1238	8.21	1.33	0.52	62	6.06	5.12	3.27	31.86	62.95
1239	8.21	1.24	0.52	62	6.06	4.95	3.27	31.54	62.87
1240	7.96	1.2	0.49	62	5.78	4.79	3.27	31.29	62.23
1241	7.96	1.24	0.52	62	6.06	4.95	3.27	31.41	62.62
1242	7.96	1.24	0.52	62	6.06	4.95	3.13	31.27	62.53
1243	7.96	1.2	0.49	62	5.78	4.79	3.13	30.95	61.91
1244	7.96	1.24	0.52	62	6.06	4.95	3.27	30.86	62.3
1245	7.96	1.24	0.52	62	6.06	4.95	3.13	30.77	62.18
1246	7.96	1.2	0.49	62	5.78	4.79	3.13	30.73	61.56
1247	7.96	1.24	0.52	62	6.06	4.95	3.27	30.68	61.96
1248	7.96	1.24	0.52	62	6.06	4.95	3.13	30.63	61.87
1249	7.96	1.2	0.49	54	5.78	4.79	3.13	30.61	61.27
1250	7.96	1.24	0.52	54	6.06	4.95	3.27	30.58	61.68
1251	7.96	1.24	0.52	54	6.06	4.95	3.13	30.55	61.59
1252	7.96	1.2	0.49	54	5.78	4.79	3.13	30.55	60.99
1253	7.96	1.24	0.52	54	6.06	4.95	3.27	30.53	61.42
1254	7.96	1.24	0.52	54	6.06	4.95	3.13	30.51	61.35
1255	7.96	1.2	0.49	54	5.78	4.79	3.13	30.52	60.79
1256	7.96	1.24	0.52	54	6.06	4.95	3.27	30.51	61.24
1257	7.96	1.24	0.52	54	6.06	4.95	3.13	30.49	61.19
1258	7.96	1.2	0.49	54	5.78	4.79	3.13	30.5	60.65
1259	7.96	1.24	0.52	54	6.06	4.95	3.27	30.5	61.12
1260	7.96	1.24	0.52	54	6.06	4.95	3.13	30.48	61.09
1261	7.96	1.2	0.49	54	5.78	4.79	3.13	30.49	60.56
1262	7.46	1.19	0.49	54	5.5	4.62	3.1	30.06	60.03
1263	7.21	1.18	0.48	54	5.22	4.45	3.04	29.84	59.5
1264	7.21	1.16	0.47	54	4.94	4.28	3.04	29.85	58.97

1265	6.96	1.16	0.47	54	4.94	4.28	3.04	29.63	58.91
1266	6.71	1.15	0.46	54	4.66	4.12	2.98	29.31	58.25
1267	6.46	1.12	0.45	54	4.1	3.78	2.95	28.84	57.03
1268	6.21	1.12	0.45	54	4.1	3.78	2.95	28.29	56.77
1269	6.21	1.12	0.45	54	4.1	3.78	2.92	27.93	56.46
1270	5.96	1.1	0.45	54	4.1	3.45	2.89	27.33	56.11
1271	5.46	1.08	0.45	54	4.1	3.28	2.86	26.47	55.72
1272	5.46	1.08	0.45	54	4.1	3.28	2.84	25.96	55.32
1273	5.46	1.1	0.45	54	4.1	3.45	2.84	25.42	54.91
1274	5.46	1.1	0.45	54	4.1	3.45	2.81	24.52	54.47
1275	5.46	1.08	0.45	54	4.1	3.28	2.81	23.89	53.99
1276	5.46	1.08	0.45	54	4.1	3.28	2.84	23.51	53.53
1277	5.46	1.1	0.45	54	4.1	3.45	2.84	23.47	53.09
1278	5.46	1.1	0.45	54	4.1	3.45	2.81	23.3	52.67
1279	5.46	1.08	0.45	54	4.1	3.28	2.81	22.91	52.28
1280	5.46	1.08	0.45	54	4.1	3.28	2.84	22.73	51.88
1281	5.46	1.1	0.45	53	4.1	3.45	2.84	22.84	51.48
1282	5.46	1.1	0.45	53	4.1	3.45	2.81	22.8	51.09
1283	5.46	1.08	0.45	53	4.1	3.28	2.81	22.51	50.74
1284	5.46	1.08	0.45	53	4.1	3.28	2.84	22.41	50.42
1285	5.46	1.1	0.45	53	4.1	3.45	2.84	22.58	50.14
1286	5.46	1.1	0.45	53	4.1	3.45	2.81	22.6	49.9
1287	5.46	1.08	0.45	53	4.1	3.28	2.81	22.34	49.69
1288	5.46	1.08	0.45	53	4.1	3.28	2.84	22.27	49.5
1289	5.46	1.1	0.45	53	4.1	3.45	2.84	22.48	49.34
1290	5.46	1.1	0.45	53	4.1	3.45	2.81	22.51	49.19
1291	5.46	1.08	0.45	53	4.1	3.28	2.81	22.28	49.07
1292	5.46	1.08	0.45	53	4.1	3.28	2.84	22.22	48.96
1293	5.21	1.08	0.44	53	3.82	3.28	2.81	22.22	48.35
1294	5.46	1.1	0.45	53	4.1	3.45	2.81	22.48	48.77
1295	5.46	1.08	0.45	53	4.1	3.28	2.81	22.25	48.69
1296	5.46	1.08	0.45	53	4.1	3.28	2.84	22.2	48.61
1297	5.46	1.1	0.45	53	4.1	3.45	2.84	22.41	48.52
1298	5.46	1.1	0.45	53	4.1	3.45	2.81	22.38	48.45
1299	5.46	1.08	0.45	53	4.1	3.28	2.81	22.1	48.39
1300	5.46	1.08	0.45	53	4.1	3.28	2.84	22.08	48.35
1301	5.199	1.064	0.442	52.9	3.897	3.126	2.799	21.701	47.575
1302	4.938	1.048	0.434	52.8	3.694	2.972	2.758	21.322	46.8
1303	4.677	1.032	0.426	52.7	3.491	2.818	2.717	20.943	46.025
1304	4.416	1.016	0.418	52.6	3.288	2.664	2.676	20.564	45.25
1305	4.155	1	0.41	52.5	3.085	2.51	2.635	20.185	44.475
1306	3.894	0.984	0.402	52.4	2.882	2.356	2.594	19.806	43.7
1307	3.633	0.968	0.394	52.3	2.679	2.202	2.553	19.427	42.925
1308	3.372	0.952	0.386	52.2	2.476	2.048	2.512	19.048	42.15
1309	3.111	0.936	0.378	52.1	2.273	1.894	2.471	18.669	41.375
1310	2.85	0.92	0.37	52	2.07	1.74	2.43	18.29	40.6
1311	2.844	0.919	0.371	52	2.073	1.738	2.423	17.882	40.159

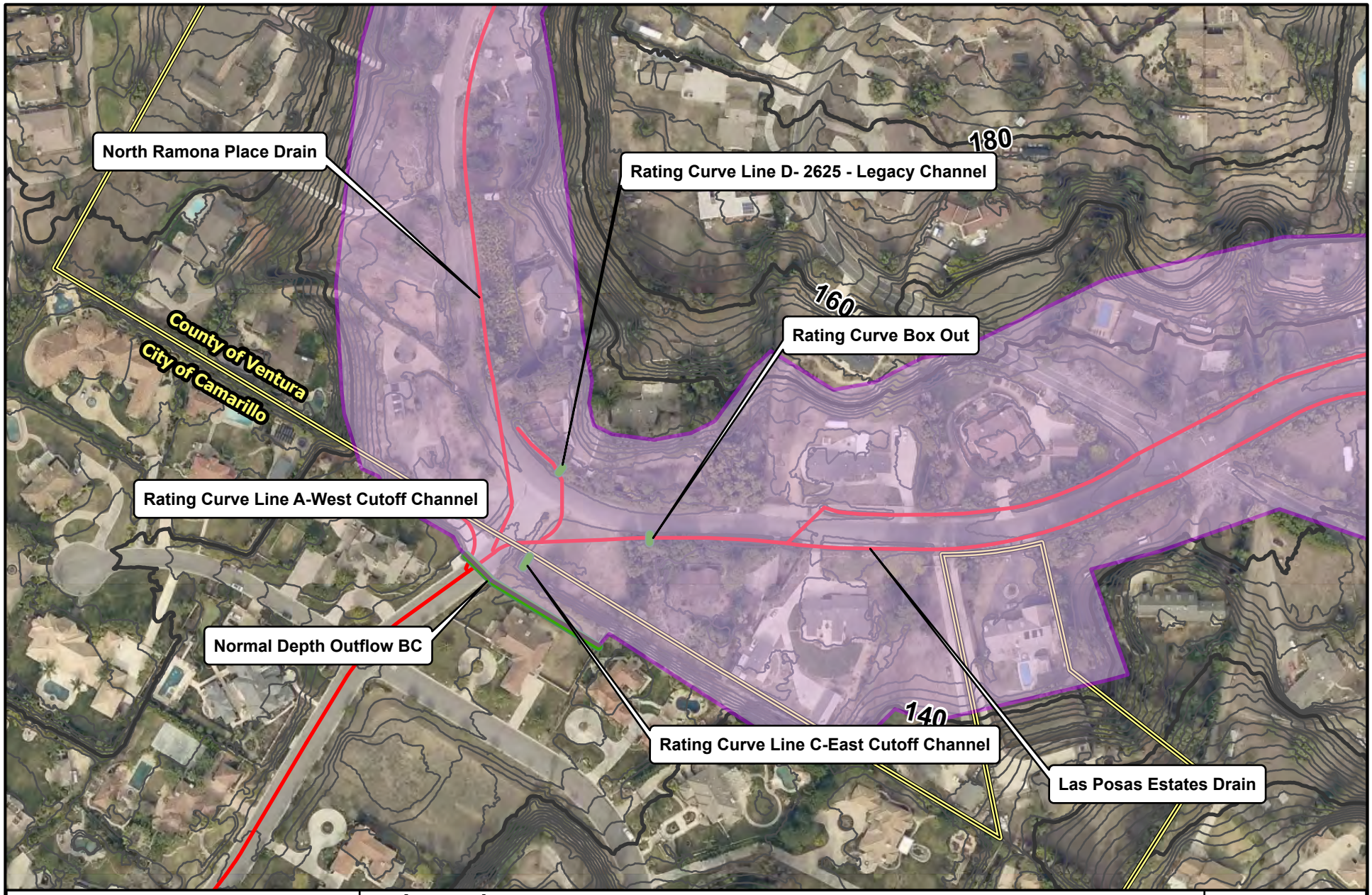
1312	2.838	0.918	0.372	52	2.076	1.736	2.416	17.474	39.718
1313	2.832	0.917	0.373	52	2.079	1.734	2.409	17.066	39.277
1314	2.826	0.916	0.374	52	2.082	1.732	2.402	16.658	38.836
1315	2.82	0.915	0.375	52	2.085	1.73	2.395	16.25	38.395
1316	2.814	0.914	0.376	52	2.088	1.728	2.388	15.842	37.954
1317	2.808	0.913	0.377	52	2.091	1.726	2.381	15.434	37.513
1318	2.802	0.912	0.378	52	2.094	1.724	2.374	15.026	37.072
1319	2.796	0.911	0.379	52	2.097	1.722	2.367	14.618	36.631
1320	2.79	0.91	0.38	52	2.1	1.72	2.36	14.21	36.19
1321	2.791	0.911	0.38	51.9	2.1	1.72	2.361	14.061	35.813
1322	2.792	0.912	0.38	51.8	2.1	1.72	2.362	13.912	35.436
1323	2.793	0.913	0.38	51.7	2.1	1.72	2.363	13.763	35.059
1324	2.794	0.914	0.38	51.6	2.1	1.72	2.364	13.614	34.682
1325	2.795	0.915	0.38	51.5	2.1	1.72	2.365	13.465	34.305
1326	2.796	0.916	0.38	51.4	2.1	1.72	2.366	13.316	33.928
1327	2.797	0.917	0.38	51.3	2.1	1.72	2.367	13.167	33.551
1328	2.798	0.918	0.38	51.2	2.1	1.72	2.368	13.018	33.174
1329	2.799	0.919	0.38	51.1	2.1	1.72	2.369	12.869	32.797
1330	2.8	0.92	0.38	51	2.1	1.72	2.37	12.72	32.42
1331	2.796	0.918	0.379	51	2.097	1.718	2.367	12.689	32.199
1332	2.792	0.916	0.378	51	2.094	1.716	2.364	12.658	31.978
1333	2.788	0.914	0.377	51	2.091	1.714	2.361	12.627	31.757
1334	2.784	0.912	0.376	51	2.088	1.712	2.358	12.596	31.536
1335	2.78	0.91	0.375	51	2.085	1.71	2.355	12.565	31.315
1336	2.776	0.908	0.374	51	2.082	1.708	2.352	12.534	31.094
1337	2.772	0.906	0.373	51	2.079	1.706	2.349	12.503	30.873
1338	2.768	0.904	0.372	51	2.076	1.704	2.346	12.472	30.652
1339	2.764	0.902	0.371	51	2.073	1.702	2.343	12.441	30.431
1340	2.76	0.9	0.37	51	2.07	1.7	2.34	12.41	30.21
1341	2.704	0.88	0.361	50.9	2.02	1.662	2.296	12.048	29.423
1342	2.648	0.86	0.352	50.8	1.97	1.624	2.252	11.686	28.636
1343	2.592	0.84	0.343	50.7	1.92	1.586	2.208	11.324	27.849
1344	2.536	0.82	0.334	50.6	1.87	1.548	2.164	10.962	27.062
1345	2.48	0.8	0.325	50.5	1.82	1.51	2.12	10.6	26.275
1346	2.424	0.78	0.316	50.4	1.77	1.472	2.076	10.238	25.488
1347	2.368	0.76	0.307	50.3	1.72	1.434	2.032	9.876	24.701
1348	2.312	0.74	0.298	50.2	1.67	1.396	1.988	9.514	23.914
1349	2.256	0.72	0.289	50.1	1.62	1.358	1.944	9.152	23.127
1350	2.2	0.7	0.28	50	1.57	1.32	1.9	8.79	22.34
1351	2.185	0.697	0.28	50	1.566	1.314	1.884	8.638	21.859
1352	2.17	0.694	0.28	50	1.562	1.308	1.868	8.486	21.378
1353	2.155	0.691	0.28	50	1.558	1.302	1.852	8.334	20.897
1354	2.14	0.688	0.28	50	1.554	1.296	1.836	8.182	20.416
1355	2.125	0.685	0.28	50	1.55	1.29	1.82	8.03	19.935
1356	2.11	0.682	0.28	50	1.546	1.284	1.804	7.878	19.454
1357	2.095	0.679	0.28	50	1.542	1.278	1.788	7.726	18.973
1358	2.08	0.676	0.28	50	1.538	1.272	1.772	7.574	18.492

1359	2.065	0.673	0.28	50	1.534	1.266	1.756	7.422	18.011
1360	2.05	0.67	0.28	50	1.53	1.26	1.74	7.27	17.53
1361	2.053	0.671	0.28	49.9	1.534	1.262	1.742	7.22	17.161
1362	2.056	0.672	0.28	49.8	1.538	1.264	1.744	7.17	16.792
1363	2.059	0.673	0.28	49.7	1.542	1.266	1.746	7.12	16.423
1364	2.062	0.674	0.28	49.6	1.546	1.268	1.748	7.07	16.054
1365	2.065	0.675	0.28	49.5	1.55	1.27	1.75	7.02	15.685
1366	2.068	0.676	0.28	49.4	1.554	1.272	1.752	6.97	15.316
1367	2.071	0.677	0.28	49.3	1.558	1.274	1.754	6.92	14.947
1368	2.074	0.678	0.28	49.2	1.562	1.276	1.756	6.87	14.578
1369	2.077	0.679	0.28	49.1	1.566	1.278	1.758	6.82	14.209
1370	2.08	0.68	0.28	49	1.57	1.28	1.76	6.77	13.84
1371	2.081	0.68	0.28	49	1.57	1.281	1.761	6.766	13.627
1372	2.082	0.68	0.28	49	1.57	1.282	1.762	6.762	13.414
1373	2.083	0.68	0.28	49	1.57	1.283	1.763	6.758	13.201
1374	2.084	0.68	0.28	49	1.57	1.284	1.764	6.754	12.988
1375	2.085	0.68	0.28	49	1.57	1.285	1.765	6.75	12.775
1376	2.086	0.68	0.28	49	1.57	1.286	1.766	6.746	12.562
1377	2.087	0.68	0.28	49	1.57	1.287	1.767	6.742	12.349
1378	2.088	0.68	0.28	49	1.57	1.288	1.768	6.738	12.136
1379	2.089	0.68	0.28	49	1.57	1.289	1.769	6.734	11.923
1380	2.09	0.68	0.28	49	1.57	1.29	1.77	6.73	11.71
1381	2.086	0.679	0.28	48.9	1.566	1.287	1.767	6.727	11.594
1382	2.082	0.678	0.28	48.8	1.562	1.284	1.764	6.724	11.478
1383	2.078	0.677	0.28	48.7	1.558	1.281	1.761	6.721	11.362
1384	2.074	0.676	0.28	48.6	1.554	1.278	1.758	6.718	11.246
1385	2.07	0.675	0.28	48.5	1.55	1.275	1.755	6.715	11.13
1386	2.066	0.674	0.28	48.4	1.546	1.272	1.752	6.712	11.014
1387	2.062	0.673	0.28	48.3	1.542	1.269	1.749	6.709	10.898
1388	2.058	0.672	0.28	48.2	1.538	1.266	1.746	6.706	10.782
1389	2.054	0.671	0.28	48.1	1.534	1.263	1.743	6.703	10.666
1390	2.05	0.67	0.28	48	1.53	1.26	1.74	6.7	10.55
1391	2.053	0.671	0.28	48	1.534	1.262	1.742	6.699	10.499
1392	2.056	0.672	0.28	48	1.538	1.264	1.744	6.698	10.448
1393	2.059	0.673	0.28	48	1.542	1.266	1.746	6.697	10.397
1394	2.062	0.674	0.28	48	1.546	1.268	1.748	6.696	10.346
1395	2.065	0.675	0.28	48	1.55	1.27	1.75	6.695	10.295
1396	2.068	0.676	0.28	48	1.554	1.272	1.752	6.694	10.244
1397	2.071	0.677	0.28	48	1.558	1.274	1.754	6.693	10.193
1398	2.074	0.678	0.28	48	1.562	1.276	1.756	6.692	10.142
1399	2.077	0.679	0.28	48	1.566	1.278	1.758	6.691	10.091
1400	2.08	0.68	0.28	48	1.57	1.28	1.76	6.69	10.04
1401	2.048	0.6695	0.2755	47.95	1.5455	1.2605	1.733	6.65	9.971
1402	2.016	0.659	0.271	47.9	1.521	1.241	1.706	6.61	9.902
1403	1.984	0.6485	0.2665	47.85	1.4965	1.2215	1.679	6.57	9.833
1404	1.952	0.638	0.262	47.8	1.472	1.202	1.652	6.53	9.764
1405	1.92	0.6275	0.2575	47.75	1.4475	1.1825	1.625	6.49	9.695

1406	1.888	0.617	0.253	47.7	1.423	1.163	1.598	6.45	9.626
1407	1.856	0.6065	0.2485	47.65	1.3985	1.1435	1.571	6.41	9.557
1408	1.824	0.596	0.244	47.6	1.374	1.124	1.544	6.37	9.488
1409	1.792	0.5855	0.2395	47.55	1.3495	1.1045	1.517	6.33	9.419
1410	1.76	0.575	0.235	47.5	1.325	1.085	1.49	6.29	9.35
1411	1.728	0.5645	0.2305	47.45	1.3005	1.0655	1.463	6.25	9.281
1412	1.696	0.554	0.226	47.4	1.276	1.046	1.436	6.21	9.212
1413	1.664	0.5435	0.2215	47.35	1.2515	1.0265	1.409	6.17	9.143
1414	1.632	0.533	0.217	47.3	1.227	1.007	1.382	6.13	9.074
1415	1.6	0.5225	0.2125	47.25	1.2025	0.9875	1.355	6.09	9.005
1416	1.568	0.512	0.208	47.2	1.178	0.968	1.328	6.05	8.936
1417	1.536	0.5015	0.2035	47.15	1.1535	0.9485	1.301	6.01	8.867
1418	1.504	0.491	0.199	47.1	1.129	0.929	1.274	5.97	8.798
1419	1.472	0.4805	0.1945	47.05	1.1045	0.9095	1.247	5.93	8.729
1420	1.44	0.47	0.19	47	1.08	0.89	1.22	5.89	8.66
1421	1.44	0.47	0.19	46.9	1.08	0.89	1.22	5.89	8.6595
1422	1.44	0.47	0.19	46.8	1.08	0.89	1.22	5.89	8.659
1423	1.44	0.47	0.19	46.7	1.08	0.89	1.22	5.89	8.6585
1424	1.44	0.47	0.19	46.6	1.08	0.89	1.22	5.89	8.658
1425	1.44	0.47	0.19	46.5	1.08	0.89	1.22	5.89	8.6575
1426	1.44	0.47	0.19	46.4	1.08	0.89	1.22	5.89	8.657
1427	1.44	0.47	0.19	46.3	1.08	0.89	1.22	5.89	8.6565
1428	1.44	0.47	0.19	46.2	1.08	0.89	1.22	5.89	8.656
1429	1.44	0.47	0.19	46.1	1.08	0.89	1.22	5.89	8.6555
1430	1.44	0.47	0.19	46	1.08	0.89	1.22	5.89	8.655
1431	1.44	0.47	0.19	45.9	1.08	0.89	1.22	5.89	8.6545
1432	1.44	0.47	0.19	45.8	1.08	0.89	1.22	5.89	8.654
1433	1.44	0.47	0.19	45.7	1.08	0.89	1.22	5.89	8.6535
1434	1.44	0.47	0.19	45.6	1.08	0.89	1.22	5.89	8.653
1435	1.44	0.47	0.19	45.5	1.08	0.89	1.22	5.89	8.6525
1436	1.44	0.47	0.19	45.4	1.08	0.89	1.22	5.89	8.652
1437	1.44	0.47	0.19	45.3	1.08	0.89	1.22	5.89	8.6515
1438	1.44	0.47	0.19	45.2	1.08	0.89	1.22	5.89	8.651
1439	1.44	0.47	0.19	45.1	1.08	0.89	1.22	5.89	8.6505
1440	1.44	0.47	0.19	45	1.08	0.89	1.22	5.89	8.65
1441	1.368	0.4465	0.1805	44.15	1.026	0.8455	1.159	5.815	8.5755
1442	1.296	0.423	0.171	43.3	0.972	0.801	1.098	5.74	8.501
1443	1.224	0.3995	0.1615	42.45	0.918	0.7565	1.037	5.665	8.4265
1444	1.152	0.376	0.152	41.6	0.864	0.712	0.976	5.59	8.352
1445	1.08	0.3525	0.1425	40.75	0.81	0.6675	0.915	5.515	8.2775
1446	1.008	0.329	0.133	39.9	0.756	0.623	0.854	5.44	8.203
1447	0.936	0.3055	0.1235	39.05	0.702	0.5785	0.793	5.365	8.1285
1448	0.864	0.282	0.114	38.2	0.648	0.534	0.732	5.29	8.054
1449	0.792	0.2585	0.1045	37.35	0.594	0.4895	0.671	5.215	7.9795
1450	0.72	0.235	0.095	36.5	0.54	0.445	0.61	5.14	7.905
1451	0.648	0.2115	0.0855	35.65	0.486	0.4005	0.549	5.065	7.8305
1452	0.576	0.188	0.076	34.8	0.432	0.356	0.488	4.99	7.756

1453	0.504	0.1645	0.0665	33.95	0.378	0.3115	0.427	4.915	7.6815
1454	0.432	0.141	0.057	33.1	0.324	0.267	0.366	4.84	7.607
1455	0.36	0.1175	0.0475	32.25	0.27	0.2225	0.305	4.765	7.5325
1456	0.288	0.094	0.038	31.4	0.216	0.178	0.244	4.69	7.458
1457	0.216	0.0705	0.0285	30.55	0.162	0.1335	0.183	4.615	7.3835
1458	0.144	0.047	0.019	29.7	0.108	0.089	0.122	4.54	7.309
1459	0.072	0.0235	0.0095	28.85	0.054	0.0445	0.061	4.465	7.2345
1460	0	0	0	28	0	0	0	4.39	7.16
1461	0	0	0	27.65	0	0	0	4.39	7.16
1462	0	0	0	27.3	0	0	0	4.39	7.16
1463	0	0	0	26.95	0	0	0	4.39	7.16
1464	0	0	0	26.6	0	0	0	4.39	7.16
1465	0	0	0	26.25	0	0	0	4.39	7.16
1466	0	0	0	25.9	0	0	0	4.39	7.16
1467	0	0	0	25.55	0	0	0	4.39	7.16
1468	0	0	0	25.2	0	0	0	4.39	7.16
1469	0	0	0	24.85	0	0	0	4.39	7.16
1470	0	0	0	24.5	0	0	0	4.39	7.16
1471	0	0	0	24.15	0	0	0	4.39	7.16
1472	0	0	0	23.8	0	0	0	4.39	7.16
1473	0	0	0	23.45	0	0	0	4.39	7.16
1474	0	0	0	23.1	0	0	0	4.39	7.16
1475	0	0	0	22.75	0	0	0	4.39	7.16
1476	0	0	0	22.4	0	0	0	4.39	7.16
1477	0	0	0	22.05	0	0	0	4.39	7.16
1478	0	0	0	21.7	0	0	0	4.39	7.16
1479	0	0	0	21.35	0	0	0	4.39	7.16
1480	0	0	0	21	0	0	0	4.39	7.16
1481	0	0	0	20.65	0	0	0	4.39	7.16
1482	0	0	0	20.3	0	0	0	4.39	7.16
1483	0	0	0	19.95	0	0	0	4.39	7.16
1484	0	0	0	19.6	0	0	0	4.39	7.16
1485	0	0	0	19.25	0	0	0	4.39	7.16
1486	0	0	0	18.9	0	0	0	4.39	7.16
1487	0	0	0	18.55	0	0	0	4.39	7.16
1488	0	0	0	18.2	0	0	0	4.39	7.16
1489	0	0	0	17.85	0	0	0	4.39	7.16
1490	0	0	0	17.5	0	0	0	4.39	7.16
1491	0	0	0	17.15	0	0	0	4.39	7.16
1492	0	0	0	16.8	0	0	0	4.39	7.16
1493	0	0	0	16.45	0	0	0	4.39	7.16
1494	0	0	0	16.1	0	0	0	4.39	7.16
1495	0	0	0	15.75	0	0	0	4.39	7.16
1496	0	0	0	15.4	0	0	0	4.39	7.16
1497	0	0	0	15.05	0	0	0	4.39	7.16
1498	0	0	0	14.7	0	0	0	4.39	7.16
1499	0	0	0	14.35	0	0	0	4.39	7.16

1500	0	0	0	14	0	0	0	4.39	7.16



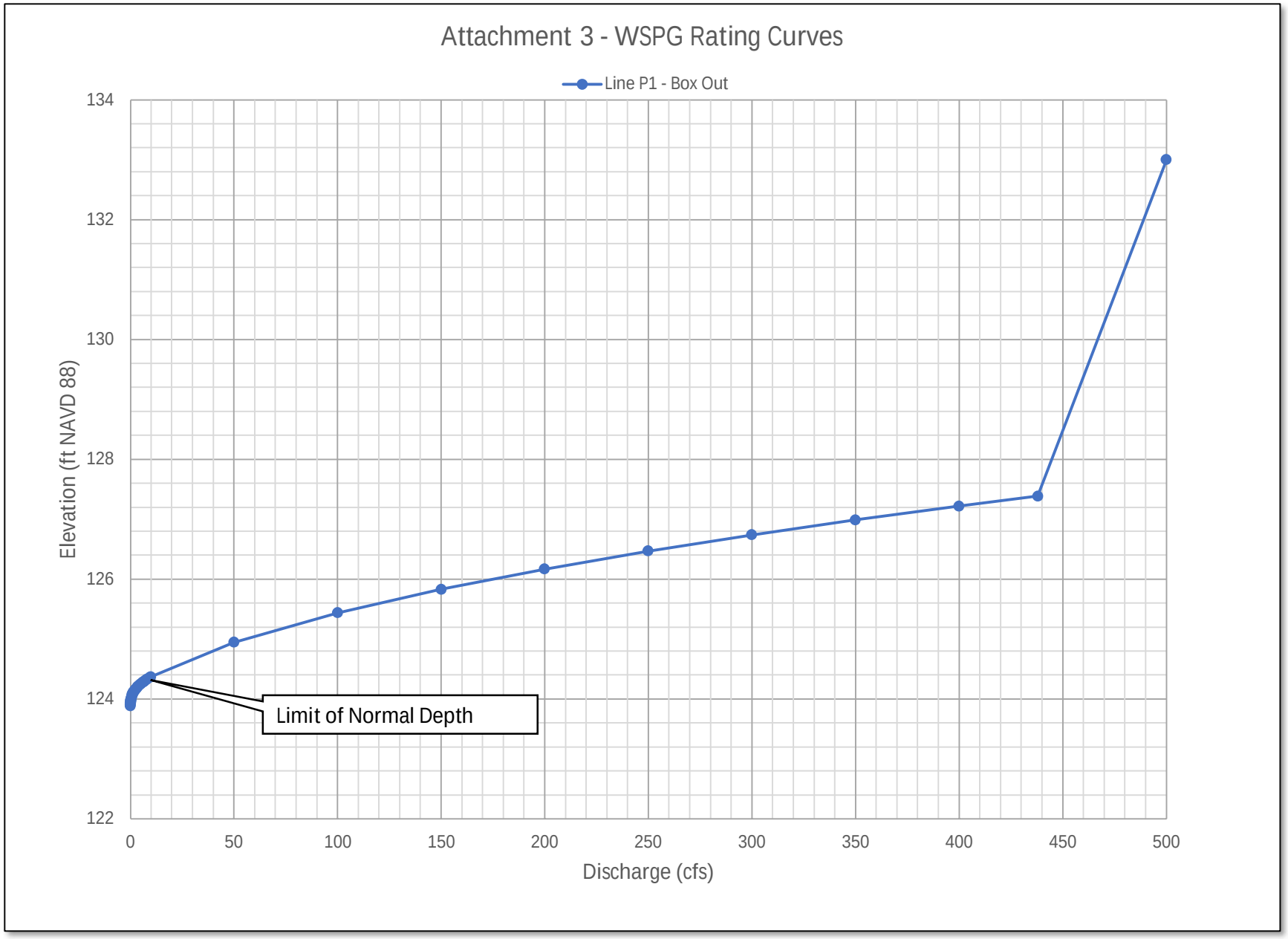
KASRAIE CONSULTING

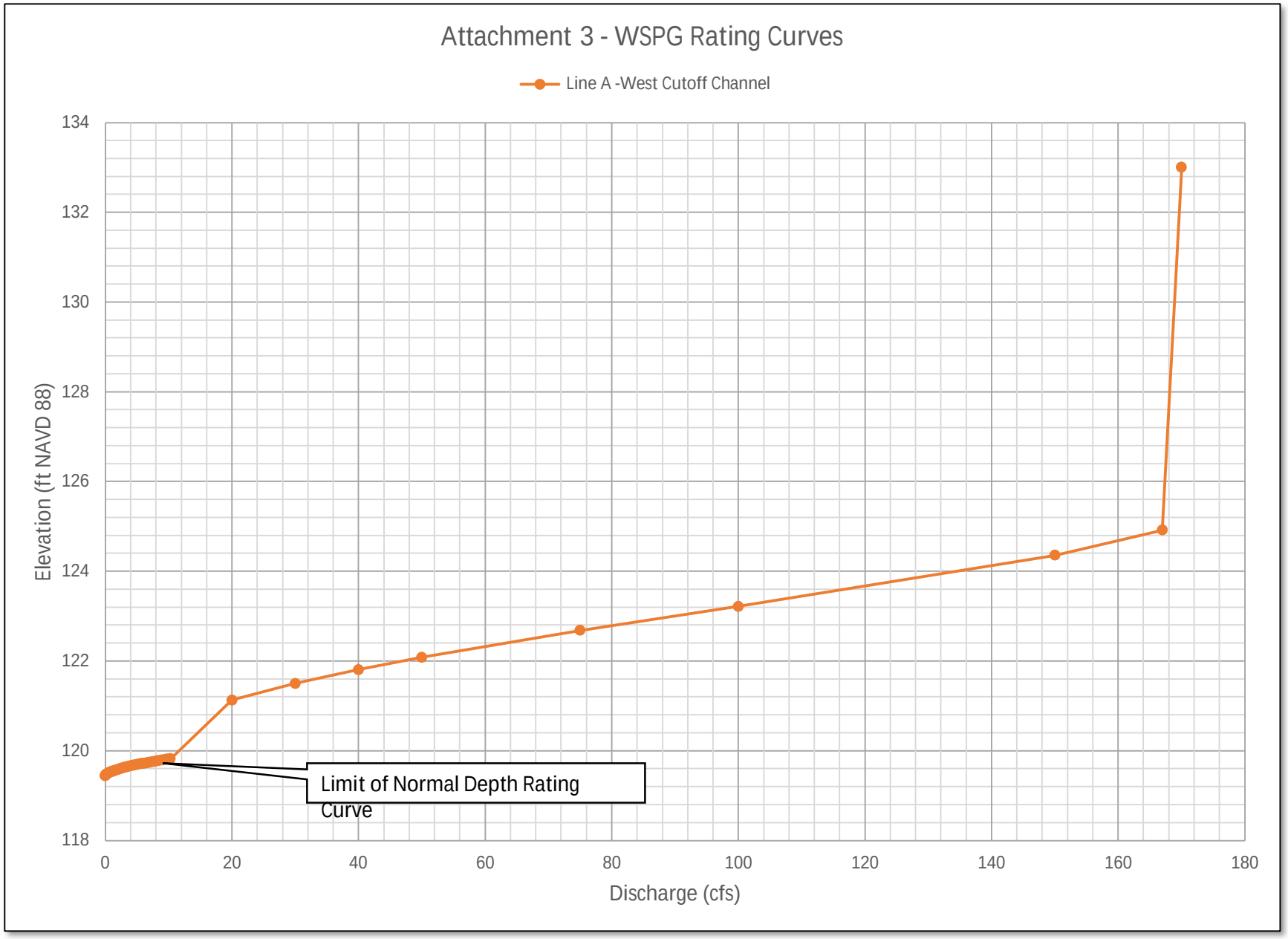
Legend

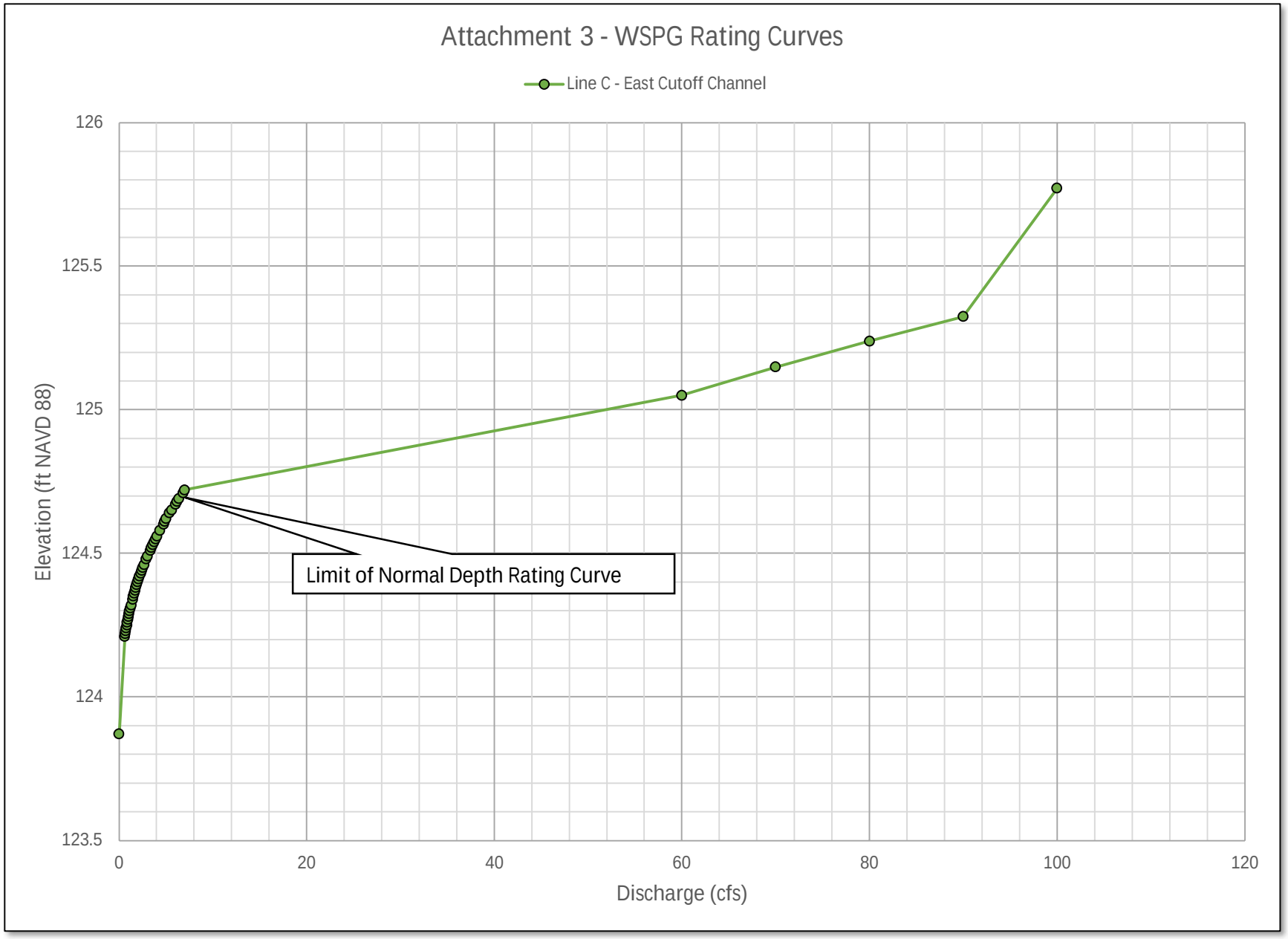
- City Limits
- Redline Channel
- Outflow,

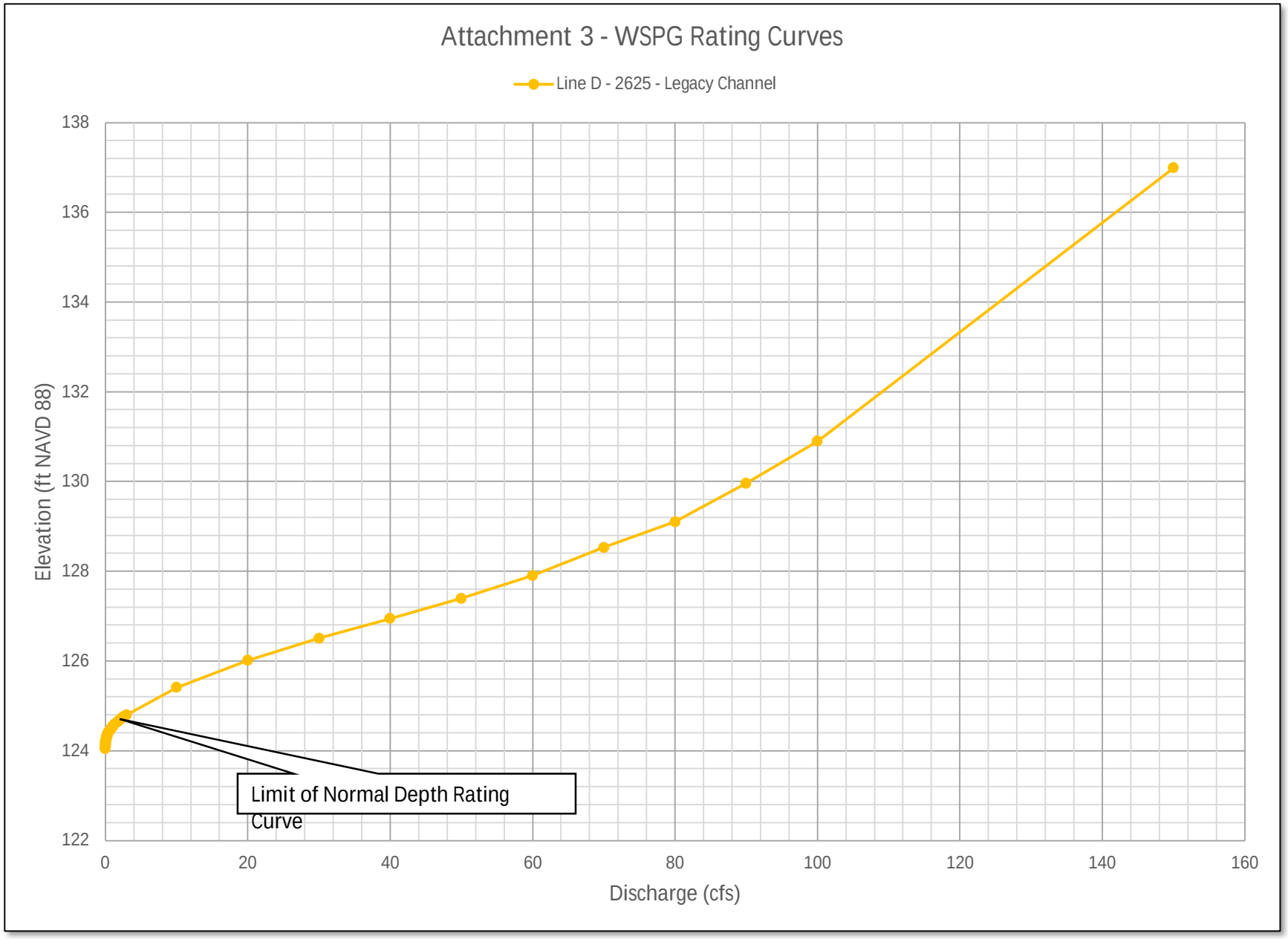
Key Outflow BC Locations

N
W E
S


Attachment 3 - WSPG Rating Curves
Line P1 - Box Out
Elevation (ft NAVD 88)
134
132
130
128
126
124
122
0
50
100
150
200
250
300
350
400
450
500
Discharge (cfs)
Limit of Normal Depth


Attachment 3 - WSPG Rating Curves
Line A -West Cutoff Channel
Elevation (ft NAVD 88)
134
132
130
128
126
124
122
120
118
0
20
40
60
80
100
120
140
160
180
Discharge (cfs)
Limit of Normal Depth Rating Curve


Attachment 3 - WSPG Rating Curves
Line C - East Cutoff Channel
126
125.5
125
124.5
124
123.5
Elevation (ft NAVD 88)
0
20
40
60
80
100
120
Discharge (cfs)
Limit of Normal Depth Rating Curve


Attachment 3 - WSPG Rating Curves
Line D - 2625 - Legacy Channel
Elevation (ft NAVD 88)
138
136
134
132
130
128
126
124
122
0
20
40
60
80
100
120
140
160
Discharge (cfs)
Limit of Normal Depth Rating Curve

Attachment 4: Floodplain Mapping

Ramona Detention Dam
(DD3-23)

EFFECTIVE
ZONE A

North Ramona Place Drain

RAMONA PL

AVOCADO PL

EFFECTIVE
ZONE A

AVOCADO PL

RAMONA PL

VIA ARACENA

AVENIDA DE ARRISA

Las Posas Estates Drain

Las Posas Estates
Detention Basin
(DD3-08M)

County of Ventura

City of Camarillo

N
W E
S

LEGEND

- City Limits
- 100-Year DepthContours
  - Minor Contour
  - Major Contour
- 100-Year Depth (ft)
  - 0 - 0.5
  - 0.5 - 1.0
  - 1.0 - 1.5
  - 1.5 - 2
  - 2 - 3
  - 3 - 4
  - 4 - 5
  - 5 - 6.1
- FEMA Effective Zone A (January 7, 2015)
- 2021 County Parcels
- Index 20 FT Contours
- Intermediate 2 FT Contours

REGISTERED PROFESSIONAL ENGINEER
HASSAN H. KASRAIE
EXP. 3/31/2022
C 42360
CIVIL
STATE OF CALIFORNIA

Date Prepared: 10/27/2021

0 50 100 150
Feet
1 inch = 150 feet
On 22x34 Sheet
FIRM Original Scale: 1"=500'

KASRAIE CONSULTING

HEC-RAS 2D 100-Year Floodplain to Zero Depth (Average Depth 0.72 feet)

Spatial Reference: NAD 1983 State Plane California V FIPS 0405 Feet; North American Vertical Datum of 1988

Ramona Detention Dam
(DD3-23)

PROPOSED
ZONE AE

EFFECTIVE
ZONE A

BFE
171.42

LIMIT OF
STUDY

North Ramona Place Drain

PROPOSED
ZONE X

RAMONA PL

AVOCADO PL

PROPOSED
ZONE X

PROPOSED
ZONE X

EFFECTIVE
ZONE A

PROPOSED
ZONE AE

LIMIT OF
STUDY

AVENIDA DE APRISA

VIA ARACENA

RAMONA PL

AVOCADO PL

LIMIT OF
STUDY

BFE
168.42

Las Posas Estates Drain

Las Posas Estates
Detention Basin
(DD3-08M)

County of Ventura

City of Camarillo

N
W E
S

LEGEND

- City Limits
- Limit of Study
- FEMA Effective Zone A (January 7, 2015)
- 100-Year Inundation (Zone AE, Basin WSE)
- 500-Year Inundation (Zone X, Basin WSE)
- 500-Year Inundation (Computed Zone X)
- 2021 County Parcels
- Redline Channel
- Index 20 FT Contours
- Intermediate 2 FT Contours

REGISTERED PROFESSIONAL ENGINEER
HASSAN H. KASRAIE
EXP. 3/31/2022
C 42360
CIVIL
STATE OF CALIFORNIA

Date Prepared: 10/28/2021

0 50 100 150
Feet
1 inch = 150 feet
On 22x34 Sheet
FIRM Original Scale: 1"=500'

KASRAIE CONSULTING

Certified Topographic Workmap
Las Posas Estates Drain
&
North Ramona Place Drain
City of Camarillo/County of Ventura

Spatial Reference: NAD 1983 State Plane California V FIPS 0405 Feet; North American Vertical Datum of 1988

Ramona Detention Dam
(DD3-23)

ZONE AE

EFFECTIVE
ZONE A

ZONE X

BFE
171.42

ZONE A

LIMIT OF STUDY

LIMIT OF
STUDY

North Ramona Place Drain

North Ramona Place Drain

EFFECTIVE
ZONE A

Las Posas Estates Drain

EFFECTIVE
ZONE A

ZONE X

ZONE X

ZONE AE

LIMIT OF STUDY

RAMONA PL

ZONE A

LIMIT OF STUDY

Las Posas Estates Drain

LIMIT OF
STUDY

BFE
168.42

Las Posas Estates
Detention Basin
(DD3-08M)

LIMIT OF
STUDY

1%-ANNUAL-CHANCE FLOOD
DISCHARGE CONTAINED IN
STRUCTURE

County of Ventura

City of Camarillo

North

LA PATERA DR

LA CRESCENTA DR

AVOCADO PL

VIA ARACENA

CORTE CORRIDA

RAMONA PL

AVENIDA DE AU

S DR

VIA TERRADO

N
W E
S

LEGEND

Redline Channel
Ventura Buildings
City Limits
500-Year Inundation (Computed Zone X)
100-Year Inundation (Zone AE)
Limit of Study

Panel 0927F (Effective Date January 7, 2015)

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

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

Panel 0927F

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

Date Prepared: 10/28/2021

0 50 100 150
Feet
1 inch = 150 feet
On 22x34 Sheet
FIRM Original Scale: 1"=500'

KASRAIE CONSULTING

Annotated FIRM
Panel 0927
City of Camarillo/
County of Ventura

Attachment 5: MT-2 Forms & Checklist

Submittal Summary

Form	Description	Discussion
Form 1 - Overview & Concurrence	Form provides basic information regarding the revision request and requires the signatures of the requester, community official, and engineer. This form is required for all revision requests.	Included
Form 2 - Riverine Hydrology & Hydraulics	Form provides basic information on the scope and methodology of hydrologic and/or hydraulic analyses that are prepared in support of the revision request. This form should be used for revision requests that involve new or revised hydrologic and/or hydraulic analyses of rivers, streams, ponds, or small lakes.	Included.
Form 3 - Riverine Structures Form	Provides basic information regarding hydraulic structures constructed in the stream channel or floodplain. This form *should be used for revision requests that involve new or proposed channelization, bridges/culverts, dams/basins, and/or levee/floodwall systems.* For levee/floodwall systems, the form requires the signature of the registered Professional Engineer in charge of completing the submittal	Included.
Form 4 - Coastal Analysis Form	Provides basic information on the scope and methodology of any coastal analyses prepared in support of the revision request. This form should be used for revision requests that involve new or revised coastal analyses.	Not included. Not in coastal hazard area. No costal hazards.
Form 5 - Coastal Structures Form	Provides basic information regarding hydraulic structures constructed along the coast. This form should be used for revision requests that involve new or proposed levees/dikes, breakwaters, bulkheads, seawalls, and/or revetments along the coast.	Not included, not in coastal hazard area. No coastal hazards.
Form 6 - Alluvial Fan Flooding Form	Provides basic information for analyses of alluvial fans. This form should be used for revision requests involving alluvial fans.	Not included, not in alluvial fan.
Payment Information Form	Provides information regarding any fees required for a CLOMR, LOMR, or External Data Request	No payment required as this is revision is based on new topographic data, improved methodology/data
ESA Compliance Documentation	Describes the documentation that must be submitted for CLOMRs. Before FEMA reviews a CLOMR application, CLOMR applicants are responsible for documenting to FEMA that they have complied with ESA requirements.	Not a CLOMR, not required and not included.

MT-2 REVISION REQUEST SUBMITTAL CHECKLIST

PART A: GENERAL REQUIREMENTS

ELEMENTS	Yes	N/A
NARRATIVE: Please provide a written description of the purpose of the request, the scope of the proposed/as-built project, and the methodology used to analyze the project effects.	X	
MT-2 APPLICATION FORMS: Please provide completed forms applicable to your request. Ensure that MT-2 Form 1 was signed by the requester, certifying engineer, and each community affected by the revision.	X	
HYDROLOGIC ANALYSIS: If applicable, please provide a FEMA-acceptable hydrologic analysis in digital format, a drainage area map, and associated backup information (e.g., calculations used to determine lag time, CN, and loss values, as well as land use and soil maps). FEMA-acceptable models can be accessed at https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/numerical-models-meeting-minimum-requirements.	X	
HYDRAULIC ANALYSIS: Please provide a FEMA-acceptable hydraulic analysis in digital format. Information on FEMA-acceptable models can be accessed at https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/numerical-models-meeting-minimum-requirements.	X	
CERTIFIED TOPOGRAPHIC WORK MAP: Please provide a certified topographic work map that meets the mapping requirements outlined in MT-2 Form 2. If available, please provide spatially referenced Geographic Information System (GIS) data. If GIS data are not available, you may submit digital Computer-Aided Design (CAD) data.	X	
ANNOTATED FIRM: Please submit a revised Flood Insurance Rate Map (FIRM), at the scale of the effective FIRM, which shows the revised boundary delineation of the base (1-percent-annual-chance) floodplain, 0.2-percent-annual-chance floodplain, and regulatory floodway and how it ties into the boundary delineation shown on the effective FIRM at the downstream and upstream ends of the revised reach.	X	
REVIEW FEE PAYMENT: Please include the appropriate review fee payment. The current fee schedule is available on the FEMA website at https://www.fema.gov/flood-map-related-fees.		X
MEET 65.10 REQUIREMENT: If you intend to show that a berm/levee/floodwall reduces the flood hazard, please submit all the NFIP data requirements outlined in Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR §65.10).		X
OPERATION AND MAINTENANCE PLAN: If the request involves a berm, levee, floodwall, dam, and/or detention basin project, please submit an officially adopted operation and maintenance plan.	X	
PROPOSED/AS-BUILT PLANS: Please submit proposed/as-built plans, certified by a registered Professional Engineer, for all project elements for which this applies.	X	
FLOODWAY NOTICE: If the revision results in changing or establishing regulatory floodway boundaries, please provide a floodway public notice or a statement by your community that it has notified all affected property owners, in compliance with the National Flood Insurance Program (NFIP) regulations at 44 CFR §65.7(b)(1).		X
PROPERTY OWNER NOTIFICATION: If the revision results in any widening/shifting/establishing of a base floodplain and/or any increasing/establishing of Base Flood Elevations (BFEs), please provide copies of the individual legal notices sent to all property owners affected by increased flood hazards.		X

PART B: CONDITIONAL LETTER OF MAP REVISION (CLOMR) - SPECIFIC REQUIREMENTS

ENDANGERED SPECIES ACT (ESA) COMPLIANCE: Please submit documentation of compliance with the ESA requirements. To learn more about ESA compliance, please see page 28 of the MT-2 instructions.		X
REGULATORY REQUIREMENTS OF 44 CFR §65.12: If the proposed project results in BFE increases between the pre-project (existing) conditions and the proposed conditions, and they are more than 0.00 foot as a result of encroachment within a regulatory floodway, or more than 1.0 foot in a Zone AE area that has no regulatory floodway, please submit: (a) certification that no structures are affected by the increased BFE; (b) documentation of individual legal notices sent to all affected property owners, explaining the impact of the proposed action on their property; and (c) an evaluation of alternatives that would not result in a BFE increase.		X

Note: Applicants are encouraged to submit their Letter of Map Change (LOMC) revision request using the Online LOMC tool. To learn more about the Online LOMC tool, please visit the FEMA website at https://www.fema.gov/online-lomc.

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

☒ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
065020	City of Camarillo	CA	06111C	0927F	01/07/15
060413	Ventura County	CA	06111C	0927F	01/07/15

2. a. Flooding Source: Las Posas Estates Drain and North Ramona Place Drain

   b. Types of Flooding: ☒ Riverine ☐ Coastal ☒ Shallow Flooding (e.g., Zones AO and AH)
   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Las Posas Estates Drain and North Ramona Place Drain

4. FEMA zone designations affected: A (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

   a. The basis for this revision request is (check all that apply)

   ☐ Physical Change ☒ Improved Methodology/Data ☐ Regulatory Floodway Revision ☐ Base Map Changes
   ☐ Coastal Analysis ☒ Hydraulic Analysis ☒ Hydrologic Analysis ☐ Corrections
   ☐ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☐ Natural Changes
   ☒ New Topographic Data ☐ Other (Attach Description)

   Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization ☐ Levee/Floodwall ☐ Bridge/Culvert ☐ Dam ☐ Fill ☐ Other (Attach Description)

6. ☐ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: $0 Please see transmittal letter

☒ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Jeff Pratt, PE	Company: County of Ventura	
Mailing Address: 800 S. Victoria Avenue Ventura CA, 93009	Daytime Telephone No.: (805) 654-2073	Fax No.:
	E-Mail Address: jeff.pratt@ventura.org	
Signature of Requester (required): Jeff Pratt	Date: 5/12/21	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Naftalia Tucker, PE Assistant Director Public Works, City Engineer	Community Name: City of Camarillo	
Mailing Address: 601 Carmen Drive Camarillo CA, 93010	Daytime Telephone No.: (805) 388-5343	Fax No.:
	E-Mail Address: ttucker@cityofcamarillo.org	
Community Official's Signature (required): Naftalia Tucker	Date: 5/19/21	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Hassan Kasraie, PE, CFM	License No.: C 42360		Expiration Date: 03/31/2022
Company Name: Kasraie Consulting	Telephone No.: (805) 340-4744		Fax No.:
Signature: Hassan Kasraie	Date: 04/16/2021	E-Mail Address: kasraie@kasraieconsulting.com	

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if …
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☐ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

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Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
065020	City of Camarillo	CA	06111C	0927F	01/07/15
060413	Ventura County	CA	06111C	0927F	01/07/15

2. a. Flooding Source: Las Posas Estates Drain and North Ramona Place Drain

   b. Types of Flooding: ☒ Riverine ☐ Coastal ☒ Shallow Flooding (e.g., Zones AO and AH)
   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Las Posas Estates Drain and North Ramona Place Drain

4. FEMA zone designations affected: A (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

   a. The basis for this revision request is (check all that apply)

   ☐ Physical Change ☒ Improved Methodology/Data ☐ Regulatory Floodway Revision ☐ Base Map Changes
   ☐ Coastal Analysis ☒ Hydraulic Analysis ☒ Hydrologic Analysis ☐ Corrections
   ☐ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☐ Natural Changes
   ☒ New Topographic Data ☐ Other (Attach Description)

   Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization ☐ Levee/Floodwall ☐ Bridge/Culvert

☐ Dam ☐ Fill ☐ Other (Attach Description)

6. ☐ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: $0 Please see transmittal letter

☒ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Jeff Pratt, PE	Company: County of Ventura	
Mailing Address: 800 S. Victoria Avenue Ventura CA, 93009	Daytime Telephone No.: (805) 654-2073	Fax No.:
	E-Mail Address: jeff.pratt@ventura.org	
Signature of Requester (required):	Date: 5/12/21	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Jeff Pratt, PE Floodplain Administrator & Public Works Agency Director	Community Name: County of Ventura	
Mailing Address: 800 S. Victoria Avenue Ventura CA, 93009	Daytime Telephone No.: (805) 654-2073	Fax No.:
	E-Mail Address: jeff.pratt@ventura.org	
Community Official's Signature (required):	Date: 5/12/21	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Hassan Kasraie, PE, CFM	License No.: C 42360	Expiration Date: 03/31/2022
Company Name: Kasraie Consulting	Telephone No.: (805) 340-4744	Fax No.:
Signature: Hassan Kasraie	Date: 04/16/2021	E-Mail Address: kasraie@kasraieconsulting.com

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if …
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☐ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Las Posas Estates Drain and North Ramona Place Drain

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section B) ☐ No existing analysis ☒ Improved data
☒ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
N/A			

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model → Specify Model: VCRat
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? ☐ Yes ☒ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation..

Effects of sediment transport and bulking were not included because there are two major debris/detention basins in the watershed.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit*	N/A			
Upstream Limit*				

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: HECRAS 2D

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4.

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name: N/A	Plan Name:	File Name:	Plan Name:	
Corrected Effective Model*	File Name: N/A	Plan Name:	File Name:	Plan Name:	
Existing or Pre-Project Conditions Model	File Name: LasPosas.prj	Plan Name: Existing 100-Year	File Name:	Plan Name:	NAVD88
Revised or Post-Project Conditions Model	File Name: N/A	Plan Name:	File Name:	Plan Name:	
Other - (attach description)	File Name: LasPosas.prj	Plan Name: Existing 500-Year	File Name:	Plan Name:	NAVD88

* For details, refer to the corresponding section of the instructions.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☒ Digital Mapping (GIS/CADD) Data Submitted (preferred)

Topographic Information: Post-Thomas Fire 2018 DEM based on LiDAR data

Source: NOAA data (https://coast.noaa.gov/dat) Date: 2018

Accuracy: USGS Quality Level 2 (QL2) , Metadata included

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No

   a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:

   - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
   - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

   b. Does this LOMR request cause increase in the BFE and/or SFHA compared with the effective BFEs and/or SFHA? ☐ Yes ☒ No
   If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notifications can be found in the MT-2 Form 2 Instructions.

2. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☒ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being established. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA).

For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency

RIVERINE STRUCTURES FORM (FORM 3)

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472 , Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.
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DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

Flooding Source: Las Posas Estates Drain and North Ramona Place Drain

Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization:	complete Section B
Bridge/Culvert:	complete Section C
Dam:	complete Section D
Levee/Floodwall:	complete Section E
Sediment Transport:	complete Section F (if required)

Description Of Modeled Structure

1. Name of Structure: Avacado Place So (58x36 CMPA)

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Intersection Avocado Pl & Ramona Pl (South side)

   Downstream Limit/Cross Section: NA

   Upstream Limit/Cross Section: NA

2. Name of Structure: RamonaNorth_C6 (21x36 CMPA)

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Intersection Avocado Pl & Ramona Pl (North side)

   Downstream Limit/Cross Section: NA

   Upstream Limit/Cross Section: NA

3. Name of Structure: RamonaNorth_C12 (21x36 CMPA,To County channel)

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: 380ft East of Calle Tierra Vista & Ramona Pl intersecti

   Downstream Limit/Cross Section: NA

   Upstream Limit/Cross Section: NA

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

B. CHANNELIZATION

Flooding Source: NA

Name of Structure: _____

1. Hydraulic Considerations

The channel was designated to carry _____ (cfs) and/or the _____ - year flood

The design elevation in the channel is based on (check one):

☐ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

☐ Inlet to channel ☐ Outlet to channel ☐ At Drop Structures ☐ At Transitions

☐ Other locations (specify): _____

2. Channel Design Plans

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Accessory Structures

The channelization includes (check one):

☐ Levees [Attach Section E (Levee/Floodwall)] ☐ Drop structures ☐ Superelevated sections ☐ Energy dissipater

☐ Transitions in cross sectional geometry ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)] ☐ Weir

☐ Other (Describe): _____

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☐ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: Las Posas Estates Detention Basin (DD3-08M)

Name of Structure: Avocado Place So

1. This revision reflects (check one):

☒ Bridge/Culvert not modeled in the FIS

☐ Modified Bridge/Culvert previously modeled in the FIS

☐ Revised analysis of Bridge/Culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

☒ Dimensions (height, width, span, radius, length)
☒ Shape (culverts only)
☒ Material
☐ Beveling and Rounding
☐ Wink Wall Angle
☐ Skew Angle
☐ Distance between Cross Sections
☐ Erosion Protection
☐ Low Chord Elevations - Upstream and Downstream
☒ Top of Road Elevations - Upstream and Downstream
☐ Structure Invert Elevations - Upstream and Downstream
☐ Stream Invert Elevations - Upstream and Downstream
☐ Cross-Section Locations

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☐ Yes ☒ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

D. DAM/BASIN

Flooding Source: Calleguas Creek Watershed

Name of Structure: Las Posas Estates Detention Dam (DD3-08M)

1. This request is for (check one): ☒ Existing Dam/Basin ☐ New Dam/Basin ☐ Modification of existing Dam/Basin

2. The Dam/Basin was designed by (check one): ☐ Federal Agency ☐ State Agency ☐ Private Organization

☒ Local Government Agency Name of the Agency or Organization: _____

3. The Dam was permitted as (check one): ☐ Federal Dam ☐ State Dam

Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

Permit or ID number NA Permitting Agency or Organization _____

a. ☒ Local Government Dam ☐ Private Dam

Provided related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☒ Yes ☐ No

If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

Was the dam/basin designed using critical duration storm? (must account for the maximum volume of runoff)

☒ Yes, provide supporting documentation with your completed Form 2.

☐ No, provide a written explanation and justification for not using the critical duration storm.

Effects of sediment transport and bulking were not included because there are two major debris/detention basins in the watershed.

5. Does the submittal include debris/sediment yield analysis? ☐ Yes ☒ No

If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why debris/sediment analysis was not considered?

6. Does the Base Flood Elevation behind the dam/basin or downstream of the dam/basin change? ☒ Yes ☐ No

If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

Stillwater Elevation Behind the Dam/Basin

FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)	NA	NA
50-year (2%)	NA	NA
100-year (1%)	NA	168.42 (NAVD88)
500-year (0.2%)	NA	176.92 (NAVD88)
Normal Pool Elevation	NA	NA

7. Please attach a copy of the formal Operation and Maintenance Plan See Attachment 6

E. LEVEE/FLOODWALL

1. System Elements

a. This Levee/Floodwall analysis is based on (check one): ☐ Upgrading of an existing levee/floodwall system ☐ A newly constructed levee/floodwall system ☐ Reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☐ Earthen embankment, dike, berm, etc Stationed _____ to _____

☐ Structured floodwall Stationed _____ to _____

☐ Other (describe): _____ Stationed _____ to _____

E. LEVEE/FLOODWALL (CONTINUED)

c. Structural Type (check one): ☐ Monolithic cast-in place reinforced concrete ☐ Reinforced concrete masonry block ☐ Sheet piling ☐ Other (describe): _____

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☐ No

If Yes, by which agency? _____

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

1. Plan of the levee embankment and floodwall structures. Sheet Numbers: _____
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
3. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
4. A layout detail for the embankment protection measures. Sheet Numbers: _____
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, Floodwall structure, closure structures, and pump stations. Sheet Numbers: _____

2. Freeboard

a. The minimum freeboard provided above the BFE is:

_____

Riverine

3.0 feet or more at the downstream end and throughout	☐ Yes	☐ No
3.5 feet or more at the upstream end	☐ Yes	☐ No
4.0 feet within 100 feet upstream of all structures and/or constrictions	☐ Yes	☐ No

Coastal

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).	☐ Yes	☐ No
2.0 feet above the 1%-annual-chance stillwater surge elevation	☐ Yes	☐ No

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

3. Closures

a. Openings through the levee system (check one): ☐ Exists ☐ Does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data
In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

E. LEVEE/FLOODWALL (CONTINUED)

4. Embarkment Protection

a. The maximum levee slope land side is: _____

b. The maximum levee slope flood side is: _____

c. The range of velocities along the levee during the base flood is: _____ (min) to _____ (max)

d. Embankment material is protected by (describe what kind): _____

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive Stress
Attach referrences

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								
Sta _____ to _____								

(Extend table on an added sheet as needed and reference each entry)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embarkment and Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:

☐ Overall height: STA:_____ , height _____ ft.

☐ Limiting foundation soil strength:

Strength ϕ = _____ degrees, c = _____ psf

Slope: SS = _____ (h) to _____ (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):

c. Summary of stability analysis results: _____

E. LEVEE/FLOODWALL (CONTINUED)

5. Embarkment and Foundation Stability (continued)

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No
If Yes, describe methodology used:

e. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No

h. The duration of the base flood hydrograph against the embankment is _____ hours.

Attach engineering analysis to support construction plans.

6. Floodwall and Foundation Stability

a. Describe analysis submittal based on Code (check one): ☐ UBC (1988) ☐ Other (specify): _____

b. Stability analysis submitted provides for: ☐ Overturning ☐ Sliding ☐ If not, explain: _____

c. Loading included in the analyses were: ☐ Lateral earth @ P_A = _____ psf; P_p = _____ psf

☐ Surcharge-Slope @ _____, ☐ surface _____ psf

☐ Wind @ P_w = _____ psf

☐ Seepage (Uplift); _____ ☐ Earthquake @ P_{eq} = _____ %g

☐ 1%-annual-chance significant wave height: _____ ft.

☐ 1%-annual-chance significant wave period: _____ sec.

d. Summary of Stability Analysis Results: Factors of Safety.
Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)
Note: (Extend table on an added sheet as needed and reference)

E. LEVEE/FLOODWALL (CONTINUED)

e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin?

b. The computed settlement range is _____ ft. to _____ ft.

c. Settlement of the levee crest is determined to be primarily from : ☐ Foundation consolidation

☐ Embankment compression ☐ Other (Describe): _____

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

Drainage to pressure conduit: _____ acres

Drainage to ponding area: _____ acres

b. Relationship Established:

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: _____ cfs

e. Which flooding conditions were analyzed?

Gravity flow (Interior Watershed)	☐ Yes	☐ No
Common storm (River Watershed)	☐ Yes	☐ No
Historical ponding probability	☐ Yes	☐ No
Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

f. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection.
☐ Yes ☐ No If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is : _____ cfs

h. The length of levee system used to drive this seepage rate in item g: _____ ft.

E. LEVEE/FLOODWALL (CONTINUED)

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants: _____ For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric; are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)
Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem

Hydrocompaction ☐ is ☐ is not a problem

Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure? ☐ Yes ☐ No

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No

If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why sediment transport was not considered.

10. Operational Plan and Criteria

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations? ☐ Yes ☐ No

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations? ☐ Yes ☐ No

If the answer is No to any of the above, please attach supporting documentation.

E. LEVEE/FLOODWALL (CONTINUED)

11. Maintenance Plan

Please attach a copy of the fomal maintenance plan for the levee/floodwall

12. Operational and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

CERTIFICATION OF THE LEVEE DOCUMENTATION

This certification is to be signed and sealed by a licensed registered professional engineer authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.10(e) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: _____ License No.: _____ Expiration Date: _____

Company Name: Telephone No.: _____ Fax No.: _____

Signature: _____ Date: _____ E-mail Address: _____

CERTIFICATION OF THE LEVEE DOCUMENTATION

Flooding Source: _____

Name of Structure: _____

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume _____ acres-feet

Debris load associated with the base flood discharge: Volume _____ acres-feet

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: _____

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition: _____

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport: _____

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

Additional Structure Information:

C. BRIDGE/CULVERT

Flooding Source: Las Posas Estates Detention Basin (DD3-08M)

Name of Structure: Ramona North C6

1. This revision reflects (check one):
   - [x] Bridge/Culvert not modeled in the FIS
   - [ ] Modified Bridge/Culvert previously modeled in the FIS
   - [ ] Revised analysis of Bridge/Culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):
   - [x] Dimensions (height, width, span, radius, length)
   - [x] Shape (culverts only)
   - [x] Material
   - [ ] Beveling and Rounding
   - [ ] Wink Wall Angle
   - [ ] Skew Angle
   - [ ] Distance between Cross Sections
   - [ ] Erosion Protection
   - [ ] Low Chord Elevations - Upstream and Downstream
   - [x] Top of Road Elevations - Upstream and Downstream
   - [ ] Structure Invert Elevations - Upstream and Downstream
   - [ ] Stream Invert Elevations - Upstream and Downstream
   - [ ] Cross-Section Locations

4. Sediment Transport Considerations

   Are the hydraulics of the channel affected by sediment transport? [ ] Yes [x] No

   If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

Flooding Source: Las Posas Estates Detention Basin (DD3-08M)

Name of Structure: Ramona North C12

1. This revision reflects (check one):
   - [x] Bridge/Culvert not modeled in the FIS
   - [ ] Modified Bridge/Culvert previously modeled in the FIS
   - [ ] Revised analysis of Bridge/Culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):
   - [x] Dimensions (height, width, span, radius, length)
   - [x] Shape (culverts only)
   - [x] Material
   - [ ] Beveling and Rounding
   - [ ] Wink Wall Angle
   - [ ] Skew Angle
   - [ ] Distance between Cross Sections
   - [ ] Erosion Protection
   - [ ] Low Chord Elevations - Upstream and Downstream
   - [x] Top of Road Elevations - Upstream and Downstream
   - [ ] Structure Invert Elevations - Upstream and Downstream
   - [ ] Stream Invert Elevations - Upstream and Downstream
   - [ ] Cross-Section Locations

4. Sediment Transport Considerations

   Are the hydraulics of the channel affected by sediment transport? [ ] Yes [x] No

   If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

D. DAM/BASIN

Flooding Source: Calleguas Creek Watershed

Name of Structure: Ramona Detention Dam (DD2-23)

1. This request is for (check one): ☒ Existing Dam/Basin ☐ New Dam/Basin ☐ Modification of existing Dam/Basin

2. The Dam/Basin was designed by (check one): ☐ Federal Agency ☐ State Agency ☐ Private Organization

☒ Local Government Agency Name of the Agency or Organization: _____

3. The Dam was permitted as (check one): ☐ Federal Dam ☐ State Dam

Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

Permit or ID number NA Permitting Agency or Organization _____

a. ☒ Local Government Dam ☐ Private Dam

Provided related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☒ Yes ☐ No

If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

Was the dam/basin designed using critical duration storm? (must account for the maximum volume of runoff)

☒ Yes, provide supporting documentation with your completed Form 2.

☐ No, provide a written explanation and justification for not using the critical duration storm.

Effects of sediment transport and bulking were not included because there are two major debris/detention basins in the watershed.

5. Does the submittal include debris/sediment yield analysis? ☐ Yes ☒ No

If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why debris/sediment analysis was not considered?

6. Does the Base Flood Elevation behind the dam/basin or downstream of the dam/basin change? ☒ Yes ☐ No

If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

Stillwater Elevation Behind the Dam/Basin

FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)	NA	NA
50-year (2%)	NA	NA
100-year (1%)	NA	171.42 (NAVD88)
500-year (0.2%)	NA	178.42 (NAVD88)
Normal Pool Elevation	NA	NA

7. Please attach a copy of the formal Operation and Maintenance Plan See Attachment 6

E. LEVEE/FLOODWALL

1. System Elements

a. This Levee/Floodwall analysis is based on (check one): ☐ Upgrading of an existing levee/floodwall system ☐ A newly constructed levee/floodwall system ☐ Reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☐ Earthen embankment, dike, berm, etc Stationed _____ to _____

☐ Structured floodwall Stationed _____ to _____

☐ Other (describe): _____ Stationed _____ to _____

Attachment 6: Dam Safety Manual

Dam Safety Manual

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Arundell Barranca Dam

I. Introduction

The Ventura County Watershed Protection District (District) has established this Dam Safety Program (DSP) for all dams under its jurisdiction. The program includes elements such as inspection, maintenance, repairs, security, and emergency action plans.

This manual describes the policy and division of responsibilities for managing the Ventura County Watershed Protection District's Dam Safety Program. The District's policy is to ensure that no dam creates an unacceptable risk to public safety and welfare, property or the environment and to maintain high standards in the practices and procedures the District uses for planning, engineering design, construction, repairs, operation, maintenance, emergency preparedness, and evaluation of existing dams.

For the purposes of this document, a dam is defined as a flood control facility designed to impound water and/or debris. The DSP is managed through the District's Operations and Maintenance Department, under the direction of the Dam Safety Officer as discussed in Section II.

The District maintains 43 dams within its jurisdiction. They are located in Watershed Zones 1, 2, 3 and 4. The District is divided into four watershed zones, roughly corresponding to the major river systems in the county. Zone 1 follows the boundaries of the Ventura River Watershed and coastal drainages in the western part of the county. Zone 2 follows the boundaries of the Santa Clara River Watershed and local coastal drainages in the cities of San Buenaventura and Oxnard. Zone 3 follows the boundaries of the Calleguas Creek Watershed and its tributaries. Zone 4 is a mixture of Malibu coastal drainages in the southern part of the county and the relatively undeveloped Cuyama River Watershed in the northern part of the county.

Dams under the jurisdiction of the District are classified by their size, use, and construction type. All dams in District jurisdiction, with the exception of Matilija Dam, are "earthen dams" and are detention or debris dams. Matilija Dam is a reservoir and concrete arch dam. Dams exceeding a specified height and/or capacity fall under the regulation of the California Department of Safety of Dams (DSOD). Annual permits fees must be paid to DSOD for any dam under their jurisdiction. These fees are to cover annual inspections and management of the State Dam Safety Program.

DSOD engineers and engineering geologists also review and approve plans and specifications for the design of dams and oversee their construction to ensure compliance with the approved plans and specifications.

II. Dam Safety Program Management

The Dam Safety Program (DSP) shall be managed by a "Dam Safety Officer" who is assisted by the resources and staff of the District's O&M (Operations and Maintenance) Division, D&C (Design and Construction) Division, and Permits Section. Specific duties within the DSP are described in this section. Staff currently assigned DSP duties for this fiscal year are identified in Appendix D.

The Dam Safety Officer (DSO)

The DSO is responsible for the overall management of the DSP. The DSO acts in the interest of public safety by providing assurance that the dams under their care will function adequately and not pose a threat to lives and property. This position is currently assigned to the District O&M Division Manager and is supported by O&M staff. Specific duties and responsibilities of the DSO are as follows:

- Periodic Inspection. Ensure that Inspections shall be conducted to identify deficiencies to reasonably assure safe operation and confirm that maintenance is being adequately performed.
- Maintenance of Existing Facilities. Ensure that the tasks that are generally accepted as routine in keeping the facility in a serviceable condition are being performed and that funds are budgeted to ensure those tasks can be performed. The DSO includes costs for repair and maintenance in the budget.
- Notifications. Notify the District Director of any significant occurrence at a District dam. The DSO will notify the District Director and PWA Director of any dam emergency. Additional notifications, as outlined in the respective dam's EAP (Emergency Action Plan), may also be required. The DSO will notify the Deputy Director of District's Design and Construction Division of any significant structural damage identified at a dam.
- Security. Promptly document and report suspicious activities and notify the appropriate authorities.
- DSOD. Coordinate DSOD inspections and be the point of contact for all communication.
- Plan Review and Approval. Coordinate with the District's Permits Branch to assure the adequacy of design and engineering design reports, construction plans and specifications for dams prior to permit issuance. The DSO also reviews Operation and Maintenance (O&M) plans and Emergency Action Plans. (See Section VIII for more details on Emergency Action Plans).
- Records and Inventory. Maintain the District's inventory of dams in the Operations and Maintenance Division, Saticoy Operations Yard as a basic source of information on the physical characteristics of District facilities.
- Manage consultants. Utilize consultants as needed on DSP activities (as a supplement to District staff).

Public Works Superintendant (PWS)

PWS are responsible for scheduling and supervising Field Crews (Maintenance Workers, Equipment Operators, etc.) for DSP support activities including:

- Maintenance Program. Supervise field crews' day-to-day work as they perform regular facility maintenance.
- Storm Patrol. Direct storm patrol efforts in their respective watershed zones.
- Routine Inspection. Direct routine dam inspection and repair activities as needed.

- DSOD Dam Inspections. Accompany the DSOD Inspector on annual state-size dam inspections.

Alternate DSO

The position is currently assigned to the Engineer Manager II (EM II). The Alternate DSO will act on the DSO's behalf if the DSO is unable to perform his duties. The EM II will provide technical and management assistance as necessary.

Dam Safety Coordinator (DSC)

The DSC will coordinate all DSP & EAP correspondence and discussions. The coordinator is responsible for preparing revisions of the DSP manual and EAPs. The coordinator is responsible for receiving and retaining all DSP inspection forms and photos. The DSC will maintain the DSP files and coordinate scanning and storage of electronic files as necessary.

III. Inventory

As of November 2010, there are 43 dams maintained by the Ventura County Watershed Protection District. These dams have been built for the purpose of flood control and/or water supply. These dams are typically owned in fee by the District or are maintained under easements with the recorded land owners. The number is expected to increase as dams are constructed to protect new developments.

A. CLASSIFICATION OF DISTRICT DAMS

Dams under the District's jurisdiction are classified by their (1) use, (2) construction type, and (3) size.

Dam Use

All District dams, with the exception of Matilija Dam, serve their purpose as "dry dams." A dry dam is a dam intended for the temporary storage of sediment and debris (or a portion of the design flood hydrograph, or both) in order to reduce bulking, peak flood flows, and sediment deposition on the downstream reaches of a channel. Specific types of basins are as follows:

Flow-Through Detention Basin – A flow-through, or inline, detention basin is placed with a dam in the channel or constructed such that the channel flows directly into the basin. A flow-through detention basin may store all or a portion of the design storm volume, depending on the desired flood attenuation. It is assumed that flow-through basins have a debris basin upstream in close proximity of the detention basin. It is assumed that minimal debris is produced between the upstream debris basin and the flow-through basin.

Bypass Basin – A bypass, or offline, detention basin is placed with a dam outside the channel and is designed so that the upper portion of the storm hydrograph flow is diverted into the basin. The storage volume of the basin is determined by the extent of desired attenuation of the peak in the downstream channel.

Combination Debris and Detention Basin – A combination debris and detention basin generally consists of a flow-through basin with additional storage volume provided for sediment and debris storage.

Debris Basin – A debris basin is a dam designed to trap and temporarily store sediment and debris transported by a channel from the upstream watershed, reducing the bulking of the storm flow and downstream sediment deposition.

Reservoir Dam – A reservoir dam is a barrier that impounds a natural or artificial pond or lake used for the storage and regulation of water. Matilija Dam is the only reservoir dam under District jurisdiction.

Construction Type

Earthen Dam - All dams in District jurisdiction, with the exception of Matilija Dam, are "earthen dams." These dams are constructed of compacted fill materials and have reinforced spillways of different designs. Appendix A describes earthen dam design in greater detail.

Concrete Arch Dam - Matilija Dam is a concrete arch dam. Section IX describes Matilija Dam in further detail.

Dam Size

The last "classification" for District dams is size. Of the 43 dams, 8 are large enough to be regulated by the California Division of Safety of Dams (DSOD). Section C explains DSOD dams thoroughly.

B. DAM INVENTORY LISTING

ID No.	Dam	Use
Watershed Zone One		
41903	Dent	Debris Basin
41182	Fresno	Debris Basin
41904	Live Oak	Detention Basin
41901	Matilija	Reservoir, Detention, Debris
41911	McDonald	Detention Basin
41902	Stewart	Debris Basin
Watershed Zone 2		
43906	Adams Barranca	Debris Basin
42901	Arundell Barranca	Detention Basin
43902	Cavin Road	Debris Basin
43907	Fagan Canyon	Debris Basin
43902	Franklin Barranca	Debris Basin
43901	Jepson Wash	Debris Basin
43903	Real Canyon Wash	Debris Basin
43904	Warring Canyon	Debris Basin
Watershed Zone 3		
47921	Arielle	Detention Basin
45904	West Camarillo Hills East Branch	Debris Basin
45903	West Camarillo Hills West Branch	Debris Basin
45911	Coyote Canyon	Debris Basin
45902	Edgemore	Debris Basin
47904	Erringer Road	Debris Basin
45908	Ferro	Debris Basin
45910	Fox Barranca	Debris Basin
47901	Gabbert Canyon	Debris Basin
45909	Honda West	Debris Basin
46911	Lang Creek	Debris Basin
46911	Lang Creek	Detention Dam
47908	Las Llajas Canyon	Detention Dam

Watershed Zone 3 (continued)

45906	Las Posas Estates	Detention Basin
47917	Line C Arroyo Simi	Detention Basin
47920	Muirfield	Detention Basin
47918	No. 2 Canyon	Debris Basin
45907	Ramona	Detention Dam
47907	Runkle Canyon	Detention Basin
46902	Santa Rosa Road No. 2	Debris Basin
46905	South Branch Arroyo Conejo	Debris Basin
46903	Potrero Road East	Debris Basin
46904	Potrero Road West	Detention Basin
47903	Sycamore Canyon	Detention Dam
47906	Tapo Hills No. 2	Debris Basin
47905	Tapo Hills No. 1	Debris Basin
47919	Walnut Canyon	Debris Basin

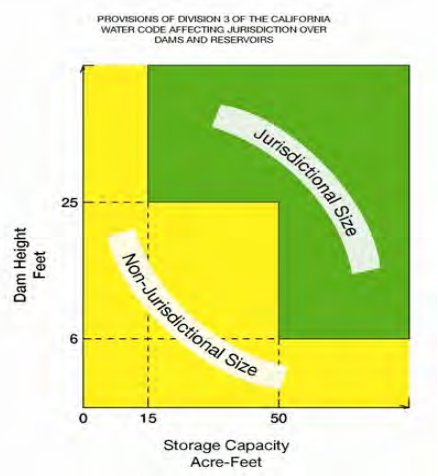
Watershed Zone 4

48901	Bridgegate	Debris Basin
48021	Potrero Creek Sediment Control	Debris Basin

C. DSOD STATE-SIZE DAMS

Dams exceeding a specified height and/or capacity fall under the regulation of the California Department of Safety of Dams (DSOD). Annual permit fees must be paid to DSOD for any dam under their jurisdiction. These fees are to cover annual inspections and management of the State Dam Safety Program. Additional plan review and approval (and the associated fees) are required for invasive repair or investigative activities. Dams herein referred to as DSOD or "State-Size" Dams, are defined by the following criteria, extracted from Division 3 of the California Water Code, "Statutes and Regulations Pertaining to Supervision of Dams and Reservoirs." The criterion for DSOD dams are as follows:

- Greater than 25-feet-high and more than 15 acre-foot capacity, or
- Greater than 6-feet-high and more than 50 acre-foot capacity.



Dam height is measured from the downstream toe to the maximum storage elevation/spillway.

Specific exemptions from DSOD jurisdiction apply to:

- Obstructions in a canal to raise, lower, or divert water
- Levees
- Railroad fills
- Road or highway fills
- Circular tanks
- Tanks elevated above the ground
- Barriers off-stream for agricultural use
- Sewage Sludge Drying Facilities
- Obstructions in channels or watercourses which are 15 feet or less in height, with single purpose of spreading water within the bed of the stream or watercourse upstream for percolation underground
- Small Waste Water Control Facility ponds
- Federal Dams

A complete text of exemptions is provided in "Statutes and Regulations Pertaining to Supervision of Dams and Reservoirs," California Water Code, Division 3, Dams and Reservoirs, Part 1, Supervision of Dams and Reservoirs, Chapter 1, Definitions, 6000-6008.

DSOD Dams maintained by the District are as follows:

Watershed Zone 1

Matilija Dam	Ojai	State Dam Number 86-000
Stewart Canyon	Ojai	State Dam Number 86-009

Watershed Zone 2

Arundell Barranca Dam	Ventura	State Dam No. 86-010

Watershed Zone 3

Ferro Debris Basin	Somis	State Dam No. 86-0008
Lang Creek Dam	Thousand Oaks	State Dam No. 86-011
Las Llajas Canyon Dam	Simi Valley	State Dam No. 86-0005
Runkle Canyon Dam	Simi Valley	State Dam No. 86-003
Sycamore Canyon Dam	Simi Valley	State Dam No. 86-006

Bleeder tower replacement — Jepson

IV. Inspection

The District will maintain a regular inspection program to identify problems and provide safe maintenance of dams. The DSP Inspection Program includes three types of inspections: periodic maintenance inspections, periodic structural inspections, and informal observations by District personnel. Critical damage or repairs identified during any type of inspection shall be reported to the DSO on an urgent basis as described below.

A. PERIODIC MAINTENANCE INSPECTIONS

Pre & Post Winter Inspections:

District personnel will inspect all dams just prior to October 15 and just after April 1. The staff member will complete the Embankment Dam Inspection Checklist (included in Appendix B) for each dam. In addition, the inspector will take photographs of the riser with bleeder tower and the dam as a whole and retain as documentation of the dam's condition. The inspection reports and the digital photographs will be submitted, twice a year, to the Engineering Technician/Dam Safety Coordinator before October 15 and after April 1.

Las Llajas Canyon Dam

District personnel who perform periodic dam maintenance inspections shall receive approximately two hours of dam inspection training, from a reputable dam Inspection expert, a minimum of once every two years.

Storm Patrol Inspections

District personnel will inspect all dams during all significant storm events. A significant storm event is defined as a predicted rainfall exceeding 2 inches over a 24 hour period. If a storm of greater than 1 inch of rain over a 24-hour period has occurred, and the dam is located in a recent burn area (within the last three years), an inspection of those dams will also be required. The staff member will complete the Condition of Basin Report (included in Appendix C) for each inspection date.

Post Earthquake Inspections

District personnel will inspect all dams within 36 miles of any reported earthquake with a Richter magnitude scale greater than 3.7. The staff member will complete the Embankment Dam Inspection Checklist (included in Appendix B) for each dam. In addition, the inspector will take photographs of the riser with bleeder tower and the dam as a whole to retain as documentation of the dam's condition. The inspection reports and the digital photographs will be submitted to the Engineering Technician/Dam Safety Coordinator within 24 hours of the reported earthquake.

B. PERIODIC STRUCTURAL INSPECTIONS

District dams will receive periodic structural inspection under the following schedule:

DSOD Dams

DSOD dams are inspected on an annual basis by a DSOD inspector. The inspector is to be joined by a District representative who will facilitate and observe the inspection.

Other District Dams

Inspections of non-DSOD dams will be conducted by a registered civil engineer or engineering geologist at a minimum of once every five (5) years. Inspection records shall be submitted to the DSC and retained per O&M Procedures.

Inside of the riser with bleeder pipes shall be inspected with a remote camera a minimum of once every five (5) years. Past and scheduled remote camera inspections are listed in the inspection log in Appendix F.

C. INFORMAL OBSERVATIONS/INSPECTIONS

District personnel observing damage during non-scheduled inspections shall complete a Facility Damage Report (Section D) and submit it to the DSO and the DSC within 24 hours of observance.

D. FACILITY DAMAGE REPORTS

A Facility Damage Report (FDR) shall be completed according to established procedures outlined in Appendix E. The FDR shall be completed within eight hours if an emergency condition has been identified by inspection personnel. The DSC will distribute/notify the responsible parties of the damaged facility according to FDR protocol.

FDRs are not required for routine maintenance activities as discussed in Section IV.A.

E. SUSPICIOUS ACTIVITY OR SUSPICIOUS OBJECTS

Observations of suspected illegal activities, homeless trespass, or homeland security concerns shall be reported immediately (1) to the DSO, (2) the local police by calling 911 or, if a cell phone is not available, by (3) two-way radio. All Crew Members/vehicles are equipped with GPS units in an effort to facilitate defining a location. Details of the suspicious activity/object should be given to the authorities and should include a GPS location.

Staff are instructed to observe, report, and take photographs, if possible, but they are **not** to engage in confrontations with the public, nor are they allowed to carry any type of weapon – including pepper spray, mace, firearm, or knife.

District Homeland Security Training will be conducted on a regular basis per the program established by the Public Works Health and Safety Officer.

V. Debris Basin Monitoring

Heavy debris flows including eroded sediment, rock, vegetation, and trash may clog channels resulting in property damage and possibly loss of life. Therefore, the District shall closely monitor the debris levels in its dams. The quantity of debris flow is affected by several factors including precipitation, the frequency of burning in the watershed, soil types, and the drainage size area. The procedures for monitoring and estimating the accumulation of debris are discussed here.

All debris basins are equipped with a staff gauge installed at, or painted on, the outlet structure. The staff gauge is designed so that the level of debris may be easily monitored and recorded. Debris level measurements must be taken after any significant storm event and again after water levels have declined. The information obtained during these inspections is recorded in the Condition of Basin Report (Appendix C). At the beginning of the rainy season and again after the rainy season is over, the Debris Basin Level List will be updated and circulated. An example of the Debris Basin Level List is provided in Appendix F. Please see VI.C. for the District's policy on basin clean outs.

Stage storage curves are used to calculate the quantity of debris in the basin and percent of capacity used are to be maintained in the "Detention Dams and Debris Basins Manual." These curves will be reviewed at the completion of each basin cleanout as basin dimensions may have changed. The basin's capacity and sediment are determined using field observations and the basin's storage curve. Storage curves for each basin are available in the Detention Dams and Debris Basins Manual and are available at: K:\OM\Projects Studies-Analyses\Basin Level Calculations.

An aerial survey of the following debris basins shall be conducted prior to October 15 of each year:

Stewart	Dent
Real	Warring
Jepson	Arundell
Cavin	Adams
Fagan	Runkle
Coyote	Edgemore
Fox	Ferro
Gabbert	Camarillo Hills East
Camarillo Hills West	Honda West
Santa Rosa No. 2	Las Posas Estates
Ramona	South Branch Arroyo Conejo
Calleguas Creek	Lower Calleguas Creek
Sycamore	Las Llajas
Tapo Hills No. 2	Tapo Hills No. 2
No. 2 Canyon	Lang Ranch
Potrero Creek	Bridgegate Debris Basin

The flights provide a baseline for the Federal Emergency Management Agency (FEMA) to use when processing reimbursement claims following any declared emergencies. Survey data will be collected and held for processing, if needed. Aerial surveys or field surveys are performed after all basin cleanouts are completed. A Flight Log shall be maintained on an annual basis. An example of the Flight Log can be found in Appendix G.

Surveys shall not be performed for debris basins for which the District does not have a responsibility for removal of debris (See Section VI.G., HOA Maintenance).

Dent Debris Basin — Ventura

VI. Maintenance

Dams shall be maintained to keep them safe. Occasional upgrades or rehabilitation may also be necessary due to deterioration, changing technical standards, better understanding of the area's precipitation conditions, and increases in downstream populations and changing land use.

The District's maintenance shall include four types of maintenance: (A) routine maintenance, (B) repairs, (C) sediment removal, and (D) rodent control.

A. ROUTINE MAINTENANCE

The District O&M Division will perform routine annual maintenance activities as follows:

Brush & Weed Control

The District will follow U.S. Army Corps of Engineers requirements to remove vegetation greater than 6-inches in height within 15-feet and on any dam slope designed to impound water. Plants and trees with deep roots can compromise dam integrity, hinder structural inspection, clog outlet structures, and inhibit flow. A District maintenance supervisor or crew leader will make a visual determination of what vegetation needs to be reduced or removed.

Vegetation will also be removed or reduced by herbicides to provide an unobstructed view of the toe of the slope to allow for visual inspection. Only vegetative material will be sprayed; herbicide is not to be applied to open water or bare earth. Backpack herbicide spraying will only be used to treat otherwise inaccessible areas along channels or in basins. As an alternative to herbicide treatment, the District may remove undesirable plants in basin bottoms by mechanical means (for example, discing, mowing or hydroaxe) or by hand crews. Discing and mowing are common weed control methods for basin bottoms during the summer and fall when basins are dry enough for equipment. Chippers may be used to reduce the weed mass prior to removing it from the site. This will prevent vegetation from establishing itself on all dam surfaces.

Access Road Work

The District maintains access roads associated with facilities on an as-needed basis. Most of the access roads have a compacted unpaved surface that needs periodic resurfacing due to normal deterioration from use and from erosion. Resurfacing roads will generally occur in the winter when there is more crew availability, but it can occur any time of the year. Resurfacing generally will consist of grading roads smooth, placing base aggregate on the road, and compacting with heavy equipment.

Fence Repairs

Maintain District fences as needed.

Piezometer Readings (Runkle Dam only)

The crew member will check the piezometers as follows: (1) remove lids/caps on monitoring well; (2) turn the power switch (to the water meter) on and slowly lower the stainless steel probe into the PVC piping. If/when the probe detects water, the device will make an audible sound; (3) make note of the depth (indicated by the scale on the side of the wire gauge). The readings will be reported to the DSC.

During the dry season, the piezometer will be checked once per month. During the rainy season it will be checked during a rain event and approximately five days after the rain has stopped.

B. REPAIRS

Damage reported through the FDR (Section IV.D.) process shall be evaluated and prioritized for repair by the DSO.

Structural repairs will be referred to the District engineering staff by the DSO. All structural repairs shall comply with the District Design Manual (excerpts are included in Appendix A Earthen Dam Design).

These repairs may include:

- Concrete inlets
- Concrete outlets
- Riser with bleeder pipes
- Reinforced spillways

Routine damage repairs will be referred to O&M Superintendants for repair by O&M forces. These repairs may include:

- Slope erosion
- Rodent damage
- Fence repairs
- Small drain repairs
- NPDES structures

C. SEDIMENT REMOVAL

The capacity of the District's debris basins is currently designed to be 125% of debris produced by a 100-year storm for watersheds less than 5 square miles or 100% of the debris produced by a 100-year storm plus 25 times the mean and annual debris produced for a watershed greater than 5 square miles. The additional volume, greater than that produced from a 100-year storm is intended to provide a reserve for the District so that some debris can be allowed to accumulate without requiring removal.

During the District's annual maintenance planning for cleaning the basins, the elevation of the deposited debris is matched up to the stage storage curves to determine if the deposited debris has exceeded 25% of capacity. If the deposited debris is less than 25% of capacity, then the debris will be left in place for re-evaluation after the following rainy season. The process will be repeated until the deposited debris exceeds the 25% of capacity, at which time the basin will be scheduled to be cleaned out.

The standard guidelines outlined here are modified when a basin's watershed area has been burned. If a watershed area has been significantly burned, the Operations

and Maintenance Division will clean out the debris basins on the following schedule:

- First winter after a burn impact: 5% debris capacity limit met;
- Second winter after a burn impact: 10% debris capacity limit met;
- Third winter after a burn impact: 15% debris capacity limit met;
- Fourth winter after a burn impact: 25% debris capacity limit met.

D. RODENT CONTROL — INTEGRATED PEST MANAGEMENT PROGRAM

In accordance with DSOD requirements, the District maintains all state-size dams to meet public safety standards. DSOD has a zero tolerance policy for ground squirrel and other rodent infestations at critical facilities where failure would affect public safety. Because of this, the District will maintain the Ventura County Board of Supervisors approved Integrated Pest Management Program (IPMP) rodent control program for critical structures, which includes all the dams in the DSP.

Ground squirrels are found throughout the District. District maintenance personnel will note any ground squirrel damage during routine facility inspections. When damage is identified, the District will schedule repairs, which will consist of destroying the burrows and restoring the structural integrity of the damaged facility. In addition, the District will conduct a pest control program on an ongoing basis to prevent ground squirrel damage at critical facilities. Currently this is accomplished by using bait stations with diphacinone treated oats. The IPMP requires anticoagulant bait stations to be used throughout the year. This bait was selected because individual squirrels consume the poisoned bait and die before they have a chance to establish new burrows in critical facility structures. The District will use secured bait stations, which provide some protection from vandalism and misuse. Bait stations are to be checked on a weekly basis.

E. PROJECT CONTRACTING

Maintenance and repairs that cannot be completed by O&M staff due to either the repair's complexity, size, or resource availability may be completed through the contracting procedures specified in the Public Works Project Procedures Processing Manual (PPPM). Design work shall typically be completed by District engineers with a construction contract advertised for public bid or quote.

Purchase orders (PO) may be used for smaller and less complex maintenance activities.

F. GRAFFITI

O&M forces will paint over graffiti in accordance with the Board of Supervisors approved Watershed Protection District Ordinance, which outlines the District's policy for graffiti removal. The District will remove graffiti identified as "obscene or racist." Other graffiti will not be addressed. The District will continue to encourage and assist volunteer groups that wish to adopt portions of District facilities that are marked by graffiti. No-Cost access permits will be required for all volunteers.

G. HOA MAINTENANCE

Through a separate agreement, a Home Owners Association (HOA) may have responsibility for routine maintenance of non-structural areas and may also be responsible for debris removal. Dams with HOA maintenance responsibility include:

- Arielle Debris Basin
- Muirfield Debris Basin

VII. Security Fencing

Dams are hazardous facilities and therefore require District standard border fencing and gates to maintain security. In addition, fencing may be required in areas of acute hazard such as along vertical walls.

Typical fence repair

Gates, fences, and "no trespassing" signs are kept in working order to discourage dumping and vandalism. Typically, fences that are placed along District easement or property boundaries are to be repaired on an as-needed basis.

Remote, uninhabited, or inaccessible areas may not require fencing. Signs delineating the District property line may be placed along the property line at selected intervals and/or at corners.

VIII. Emergency Action Plans

Preparation and annual maintenance of individual Emergency Action Plans (EAPs) is required for each DSOD dam. Each EAP defines the response required in the event of a dam-related emergency. In compliance with State Dam Safety programs, the District's emergency action plans include the following information:

- Emergency Notification Flowchart and Information
- The Statement of Purpose
- Emergency Detection, Evaluation, and Action
- General Responsibilities
- Preparedness
- Inundation Maps

The District's EAPs will be submitted to the DSOD and Sheriff's Office of Emergency Services.

A generic EAP will be maintained and updated on an annual basis for all non-DSOD dams. This EAP will include a chapter for all District-operated dams in each watershed zone.

IX. Matilija Dam

Matilija Dam is the District's only reservoir dam and its only concrete arch dam. It is owned and maintained by the District but is operated by the Casitas Municipal Water District under a special agreement. Shortly after its construction in 1949, numerous cracks began to develop in the dam due to a reaction between the silica in the concrete and the aggregate material used, known as alkali-silica reactivity (ASR). Subsequent investigations of the dam have been performed, and the center of the dam was lowered by 40 feet during the 1960's.

A special DSOD approved monitoring program is required for the dam that includes quarterly surveys for potential movement, monitoring of crack propagation, and readings of strain gauges. The dam is monitored on a quarterly basis. In 2004, the United States Army Corps of Engineers reviewed all previous reports and studies conducted on Matilija dam and concluded the dam is a high hazard dam with potentially substantial consequences in the remote event of dam failure. The report also noted that the "loads" on the dam have increased "dramatically" since the original design and construction. Loads include internal stresses from ASR, steadily increasing silt loading, and dramatically increased seismic loading. Despite these increased loads, the studies conclude the dam is stable in its current configuration, and regular monitoring and regular surveys should be conducted. Consultant recommendations also state that seismic stability analyses should be conducted every ten years. The District will complete these analyses as part of the DSP.

Matilija Dam

Appendices

APPENDIX A DETENTION AND DEBRIS BASIN DESIGN

(From the District Design Manual)

Refer to Chapter 1, Facility Design, in the District's Design Manual.

APPENDIX B EMBANKMENT DAM INSPECTION CHECKLIST

Embankment Dam Inspection Checklist / Report

Each item of the checklist should be completed. Repair is required when obvious problems are observed. Monitoring is recommended if there is a potential for a problem to occur in the future. Investigation is necessary if the reason for the observed problem is not obvious. A brief description should be made of any noted irregularities, needed maintenance, or problems. Abbreviations and short descriptions are recommended.

Dam Number:	Dam Name:	Type	
Contacts:			
Inspected By:		Date:	
Reviewed By:		Date:	
Storage Level: ft. Above/below Spillway Crest		Total Freeboard:	Photos (yes/no
Item:		Comments:	

Dam Number	Dam Name:	Type		Investigate	Monitor

ITEM	YES	NO	N/A
1. GENERAL CONDITIONS			
a. Alterations to dam?			
b. Development in downstream floodplain?			
c. Development around resevoir?			
2. CREST			
a. Settlements, slides, depressions?			
b. Misalignment?			
c. Longiudinal/Transverse cracking?			
d. Animal burrows?			
e. Adverse vegetation?			
f. Erosion?			
3. EMBANKMENT			
a. Are trees growing on embankment?			
b. Is brush/weed control needed?			
c. Are trees/brush growing at waterline?			
d. Is drift debris present?			
e. Are cracks, settlement, or bulges present?			
f. Are animal burrows present?			
g. Are animal trails present?			
h. Any vehicular trails present?			
i. Any seepage observed?			
4. UPSTREAM SLOPE			
a. Erosion?			
b. Adequate ground cover?			
c. Longiudinal/Transverse cracking?			
d. Inadequate riprap?			
e. Stone deterioration?			
f. Settlements, slides, depressions?			
g. Animal burrows?			
5. DOWNSTREAM SLOPE			
a. Erosion?			
b. Adequate ground cover?			
c. Longiudinal/Transverse cracking?			
d. Inadequate riprap?			
e. Stone deterioration?			
f. Settlements, slides, depressions?			
g. Animal burrows?			
h. Soft spots or boggy areas?			
i. Movement at or beyond toe?			
6. INLET STRUCTURE AND GATE VALVES			
a. Does concrete exhibit deterioration?			
b. Is concrete reinforcement exposed?			
c. Was leakage observed inside inlet?			
d. Any corrosion of metal appurtenances?			
e. Is trash rack obstructed?			
f. Is trash rack corroded?			
g. Is gate stem broken or bent?			
h. Are components missing?			
i. Was gate determined not operational?			
j. Has inlet been modified to alter water surface?			
7. EMERGENCY SPILLWAY - TERMINAL STRUCTURE			
a. If concrete, do surfaces show:			
1. displacement or offset?			
2. loss of joint material?			
3. leakage?			
4. exposed reinforcement?			
b. If concrete, do joints show:			
1. displacement or offset?			
2. loss of joint material?			
3. leakage?			
c. Do the energy dissipators show:			
1. signs of deterioration?			
2. debris cover?			
3. signs of inadequacy?			
8. EMERGENCY SPILLWAY - OUTLET CHANNEL unlined, concrete, riprap, other			
a. Eroding or backcutting?			
b. Sloughing?			
c. Obstructed or restricted?			
9. DRAINAGE / SEEPAGE CONTROL			
a. Internal drains flowing? Est. Left gpm; Est. Right gpm			
b. Boils at or beyond toe?			
c. Seepage at or beyond toe? Estimated gpm			

d. Does seepage contain fines?			
10. ABUTMENT CONTACTS			
a. Erosion?			
b. Differential movement?			
c. Cracks?			
d. Settlements, slides, depression, bulges?			
e. Seepage? Est. Left gpm; Est. Right gpm			
f. Animal burrows?			
11. OUTLET WORKS APPROACH CHANNEL			
a. Eroding or backcutting?			
b. Sloughing?			
c. Restricted by vegetation?			
d. Obstructed with debris?			
e. Silted in?			
12. OUTLET WORKS INLET STRUCTURE			
a. Seepage into structure?			
b. Sloughing?			
c. If concrete, do surfaces show:			
1. spalling or scaling?			
2. cracking?			
3. erosion?			
4. exposed reinforcement?			
d. Do the joints show:			
1. displacement or offset?			
2. loss of joint material?			
3. leakage?			
e. Are the trash racks:			
1. broken or bent?			
2. corroded or rusted?			
3. obstructed?			
f. Sluice/Drain gates:			
1. broken or bent?			
2. corroded or rusted?			
3. leaking?			
4. seated properly?			
5. operational?			
6. periodically maintained?			
7. date last operated?			
13. OUTLET WORKS CONDUIT concrete, metal, plastic			
a. Seepage into conduit?			
b. Debris present?			
c. If concrete, do surfaces show:			
1. spalling or scaling?			
2. cracking?			
3. erosion?			
4. exposed reiforcement?			
5. other?			
d. If metal, do surfaces show:			
1. corrosion?			
2. protective coating deficit?			
3. misalignment or split seams?			
e. Do the joints show:			
1. displacement or offset?			
2. loss of joint material?			
3. leakage?			
14. OUTLET WORKS - STILLING BASIN/POOL			
a. If concrete, do surfaces show:			
1. spalling or scaling?			
2. cracking?			
3. erosion?			
4. exposed reinforcement?			
b. If concrete do joints show:			
1. displacement or offset?			
2. loss of joint material?			
3. leakage?			
15. OUTLET WORKS - OUTLET CHANNEL unlined, concrete, riprap, other			
a. Eroding or backcutting?			
b. Sloughing?			
c. Obstructed?			
d. Poorly riprapped?			
e. Tailwater elevation and flow condition:			
16. EMERGENCY SPILLWAY - APPROACH CHANNEL unlined, concrete, riprap, other			
a. Eroding or backcutting?			
b. Sloughing?			
c. Restricted by vegetation?			
d. Obstructed with debris?			
e. Silted in?			
ACTIONS TAKEN: (Identify all work performed preceding 12 months, including approximate cost and date completed).			
ACTIONS NEEDED: (Identify items by priority: low - next 12 months; high - as soon as possible).			

APPENDIX C CONDITION OF BASIN REPORT

Watershed Protection District O&M-Moorpark Office
Storm Protection Report
Conditions of Debris Basins for Zones 3&4

Zone 3&4 Date: October 7, 2010

Debris Basins/Dams	City	Water Level	Silt Level	Comments and Additional Pictures
Santa Rosa Debris Basin #2	S.R.V.	0	1'	
S. Branch Arroyo Conejo Debris Basin	N.Park	N/A	N/A	
Sycamore Canyon Dam	Simi	0	2'	
Tapo Hills Diversion Debris Basin #1	Simi	0	0	
Tapo Hills Diversion Debris Basin #2	Simi	0	1'	
W. Camarillo Hills Debris Basin East Brn.	Cam.	0	*	
(Off of San Miguel/Mission)				
W. Camarillo Hills Debris Basin West Brn.	Cam.	0	1'	
(Off of Estabon)				
Walnut Canyon Detention Basin	Mpk.	0	1.6'	
Calleguas Creek In-Channel Debris Basin	Ox. Plains	0	0	
Little Simi/Line "C" Detention Basin	Mpk.	0	2'	

APPENDIX D CURRENT FISCAL YEAR DAM SAFETY PROGRAM STAFF

Current Fiscal Year Dam Safety Program Staff

Dam Safety Officer	Karl Novak	805-672-2106
Alternate Dam Safety Officer	Jacques LeBlanc	805-672-2108
Health and Safety Officer	Phil Raba	805-650-4074
D&C Deputy Director	Peter Sheydayi	805-654-2016
Permits Section Manager	Tom Wolfington	805-654-2061
Dam Safety Coordinator	Marie McKenzie	805-672-2101

APPENDIX E FACILITY DAMAGE REPORT PROCEDURES

VENTURA COUNTY WATERSHED PROTECTION DISTRICT
FACILITY DAMAGE REPORT

GIVE THE COMPLETED FORM TO YOUR ZONE SUPERINTENDENT, OR YOUR DEPUTY DIRECTOR WITHIN 24 HOURS OR ASAP

1. Your Name:	**Date**:	**Time**: ☐ AM ☐ PM
2. Is this a response to a public complaint: ☐ Yes ☐ No		
Name of caller:	**Phone** #:(- 0.00)	**Address**:
3. Zone	**Name of River/Stream (if known)**:	
Location of damage (be specific, give cross streets, attach map or air photo):		
Thomas Guide Page # and Grid:	**Lat/Long (if known)**:	
USGS Quad Sheet Name (if known):		
4. Name of facility (if known):		
Project # of facility (may be completed later):		
Type of facility: ☐ RC-lined channel ☐Rock-lined channel ☐Earthen channel ☐ Dam ☐Culvert ☐ Levee ☐ Stabilizer ☐ Basin inlet/outlet ☐Access Road ☐ Fence ☐ Trash rack ☐ Other (describe):		
Is this a District owned/operated facility? ☐ Yes ☐ No ☐ Don't know		
Is a work area/access easement needed? ☐ Yes ☐ No ☐ Don't know		
5. Description of damages (estimate length/area, extent of damage at this location):		
6. Action taken: ☐ Yes ☐ No	**If yes, describe** (use extra sheet if needed):	
7. Responsible Division (may be determined later): ☐O&M ☐D&C ☐ AP ☐ES ☐Roads ☐Water/San		
8. Did you take photos? ☐ Yes ☐ No (take no more than 5 per site, attach prints to this form)		
Where are photos archived? ☐CD ☐ Prints ☐K Drive (pic #s _____)		
9. Description of repair and cost estimate (may be completed later, use extra sheet if needed):		

Instructions on how/when to complete a Facility Damage Report (FDR)

If you are out in the field, and you encounter damage to our facilities, we would like you to alert us as follows:

☐ Make note of your location: Zone, facility name, type of facility and description;

☐ Please document the time and a description of the damages;

☐ If you take any action, please make notes of what you did; and

☐ Please take photographs.

When you are back in your office, please use your notes to complete the Facility Damage Report. This report must be given to your Deputy Director as soon as possible and within 24-hours of the time the damage was discovered.

The report is located on the K Drive in a folder named "Facility Damage Reports." The document is a Microsoft Word Document titled: "Facility_Damage_Report.docx."

Please fill out the form as completely as possible. The more detail you provide, the better equipped we will be to repair the damage. Once the form is complete, save it and email it to Marie McKenzie (marie.mckenzie@ventura.org).

A Work Order will be created in the Maintstar Management System, including the photographs, and Operations and Maintenance will use this number when referring to the FDR.

The report, work order number and photographs will be emailed to the Deputy Directors of Planning and Regulatory, Design and Construction, Operations and Maintenance and the Manager of Environmental Services. The email will also be sent to District Superintendents and the Operations and Maintenance Engineer Managers.

Waverly Channel
in Thousand Oaks
Work Order
Number 658

APPENDIX F DEBRIS BASIN LEVEL LIST

ZONE	Basin	Picture	Staff Gauge Ft	Max Capacity to Spillway CYD	Current Volume CYD	% Full	Date Recorded	Date Flown	Accumulator data set	Comments
1	Dent 41903		3	2,844	110	4%	8/11/2010	11/5/2010		
1	Stewart 41902		1	104,215	300	0%	10/28/2010	11/5/2010		
2	Adams 43908		2	69,018	1,171	2%	8/11/2010	11/5/2010		
2	Arundell 42901		1	91,302	3,387	4%	8/11/2010	10/11/2010		
2	Devin 43902		1	4,913	100	2%	8/18/2010	11/5/2010		
2	Fegan 43907		1	72,000	300	0%	8/11/2010	11/5/2010		
2	Franklin 42902		N/A	8,080	N/A	N/A	10/22/2009	11/5/2010		
2	Jepson 43901		2	31,828	1,144	4%	8/18/2010	11/5/2010		
2	Real 43903		12	22,000	11,234	51%	8/17/2010	11/5/2010		Clean out 2010 18,345 CY
2	Waring 43904		5	40,875	1,300	3%	8/18/2010	11/5/2010		Clean out 2010 2,627
3	Camarillo Hills East 46904		Bottom of spillway pipe	7,000	6000	85%		11/5/2010		property areas issues
3	Camarillo Hills West 45903		1	5,250	400	8%	8/17/2010	11/5/2010		
3	Cayetano 46911		0	24,800	0	0%	8/10/2010	11/5/2010		2010 9,722 CY removed
3	Edgemont 46902		0	2,860	517	0%	8/23/2010	11/5/2010		2010 517 CY removed
3	Ferro 46908		3	38,000	1,814	5%	8/6/2010	11/5/2010		
3	Fox 46910		0	14,700	0	0%	10/28/2010	11/5/2010		2010 3803 CY Removed
3	Gabbert 47901		0	49,050	0	0%	7/28/2010	11/5/2010		summer 2010 29,880 CY
3	Hondo West 46909		1	10,350	600	6%	7/20/2010	11/5/2010		
3	Laug Creek DB 46911		0	29,942	0	0%	8/20/2010	11/5/2010		Past burn area
3	Laug Creek Det. Basin		0	425,270	0	0%	8/20/2010	11/5/2010		
3	Las Llajas 47908		3	2,017,000	400	0%	6/3/2010	10/8/2010		Past burn area
3	Las Posas 46906		2	24,884	1,800	7%	8/17/2010	11/5/2010		
3	Line "C" Arroyo Simi 47917		2.8	16,330	1,800	11%	7/14/2010	11/5/2010		
3	No. 2 Canyon 47918		0	58,900	0	0%	8/18/2010	11/5/2010		Past burn area
3	Polvaro West 46904		2	22,312	3,300	15%	8/17/2010	11/5/2010		
3	Ramona 45907		3	41,280	800	2%	8/17/2010	11/5/2010		
3	Runkle 47907		1	161,000	1,100	1%	5/19/2010	11/5/2010		
3	Santa Rosa 46901		1	7,300	300	4%	8/17/2010	11/5/2010		
3	Polvaro East 46903		<2	86,047	0	0%	8/11/2010	11/5/2010		
3	Sycamore 47903		2	108,460	13,000	12%	6/3/2010	10/8/2010		table unable to remove
3	Tapo #2 47906		1	28,200	2,000	8%	7/14/2010	11/5/2010		Past burn area
3	Tapo #1 47905		0	41,190	0	0%	7/14/2010	11/5/2010		Past burn area
3	Walnut Canyon 47919		N/A	N/A	N/A	N/A	8/17/2010	11/5/2010		No warrant info available
4	Polvaro Creek In-Channel 48021		0	5,828	0	0%	8/17/2010	11/5/2010		
4	Bridgegate 48901		1	12,888	0	0%	8/17/2010	11/5/2010		

APPENDIX G FLIGHT LOG

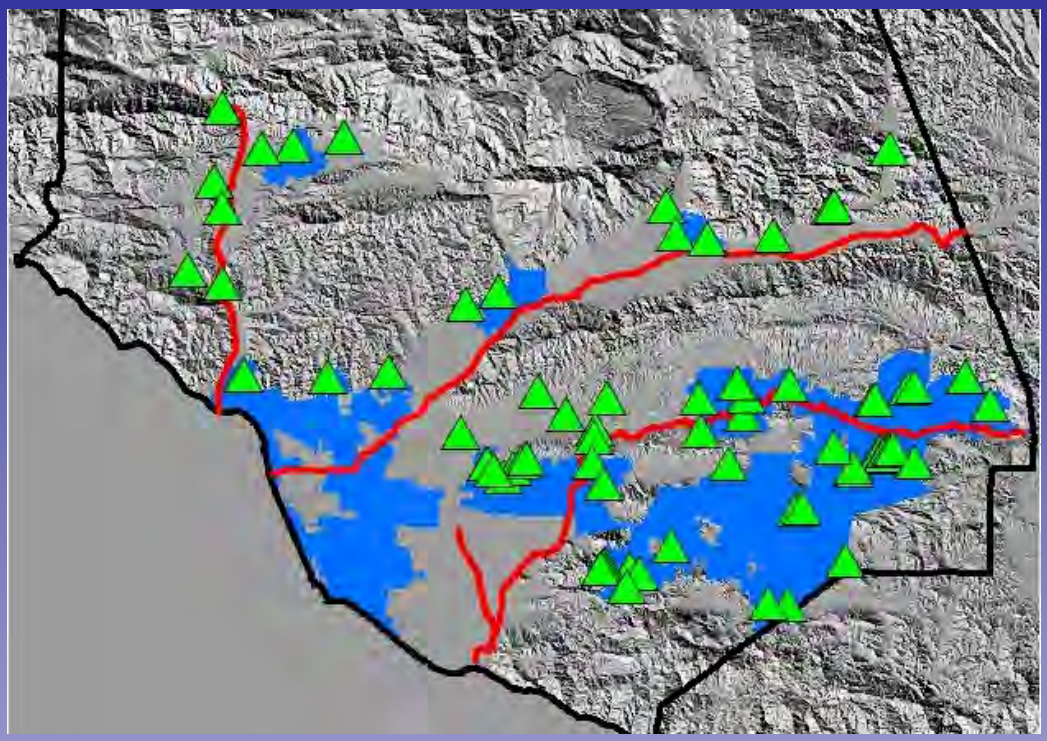
PROJECT NO.	DEBRIS BASIN	2007	2008	2009	2010
	Watershed Zone One				
41906	Dent Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
41182	Fresno Debris Basin				
41904	Live Oak Detention Basin				
41901	Matilija Reservoir, Detention, Debris				
41911	McDonald Debris Basin				
41902	Stewart Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2007
	Watershed Zone 2				
43906	Adams Barranca Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2007
42901	Arundell Barranca Detention Basin	11/10/2007		9/30/2009	10/11/2010
43902	Cavin Road Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2007
43907	Fagan Canyon Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
43902	Franklin Barranca Debris Basin				11/5/2010
43901	Jepson Wash Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
93202	Pole Creek Debris Basin				
43903	Real Canyon Wash Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
43904	Warring Canyon Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
	Watershed Zone 3				
47921	Arielle Debris Basin				
45904	West Camarillo Hills East Branch Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
45903	West Camarillo Hills West Branch Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
46909	Conejo Mountain Creek No. 1 Detention Basin				
45911	Coyote Canyon Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
45902	Edgemore Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
47904	Erringer Road Debris Basin				
45908	Ferro Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
45910	Fox Barranca Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
47901	Gabbert Canyon Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
45909	Honda West Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
46911	Lang Creek Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
47908	Las Llajas Canyon Detention Dam	11/10/2007		9/30/2009	10/8/2010
45906	Las Posas Estates Detention Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
47917	Line C Arroyo Simi Detention Basin				11/5/2010
47920	Muirfield Debris Basin,				
47915	No. 2 Canyon Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
45907	Ramona Detention Dam	12/13/2007	9/25/2008	10/23/2009	11/5/2010
47907	Runkle Canyon Detention Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
46901	Santa Rosa Road No. 1 Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
46902	Santa Rosa Road No. 2 Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
46905	South Branch Arroyo Conejo Debris Basin	12/13/2007	9/25/2008	10/23/2009	
46903	Potrero Road East Debris Basin				11/5/2010
46904	Potrero Road West Debris Basin				11/5/2010
47903	Sycamore Canyon Detention Dam	11/10/2007		10/2/2009	10/8/2010
47906	Tapo Hills No. 2 Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
47905	Tapo Hills No. 1 Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
47919	Walnut Canyon Debris Basin				11/5/2010
	Watershed Zone 4				
48901	Bridgegate Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010
48021	Potrero Creek Sediment Control Debris Basin	12/13/2007	9/25/2008	10/23/2009	11/5/2010

Watershed Protection District
Operations & Maintenance
11251-B Riverbank Drive
Ventura, CA 93004

Attachment 7: Debris and Detention Basin Manual

Debris and Detention Basin Manual

March 2018 Draft



Hydrology Section, Watershed Resources and Technology Division
Ventura County Watershed Protection District

Ventura County

Watershed Protection District

Hydrology Section

Project 80440

District Director: Glenn Shephard

Engineering Manager: Bruce Rindahl

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1. Introduction

Debris and detention basins play an important role in the control and attenuations of floodwaters and sediment in Ventura County. The Debris and Detention Basin Manual (Manual) provides an inventory of debris and detention basins in Ventura County owned and maintained by Ventura County Watershed Protection District (District). It provides a summary of the District and its basins, and summarizes the technical and hydrologic data for each basin. Basins have been grouped alphabetically in four sections corresponding to District Zones 1, 2, 3 and 4.

The information provided for each basin is as follows:

1. A summary of design data, construction data, and a list of reference drawing numbers including existing topographic maps of each basin.
2. Expected debris yields for design conditions and for six months after a watershed fire; capacity remaining at the time of the aerial surveys; date of any Presidentially-Declared Disasters due to flooding; basin debris removal dates and quantities; and Average Annual Debris Production (AADP) data.
3. Map with an aerial photo background showing the watershed area and land use at the date of the aerial photo (September 2004).
4. Street map showing a route to the maintenance access road for the basin.
5. Stage-discharge-capacity curve, which includes operational and emergency spillway flows, if available, up to flow rates expected in a 100-year event.

A summary of the detention and debris basin is provided in Table 1. The data provided in this Manual are not intended for use in hydrologic analyses to be submitted to the District for technical review. For these analyses, the Hydrology Section of the Planning and Regulatory Division of the District should be contacted to obtain the official reference information contained in their files.

Basin Name	Number	Year Constructed or Reconstructed	State Regulated Dam	Watershed Area	Flood Storage to Emergency Spillway	Expected Debris Production for 100-Year Storm	Emergency Spillway	Principal Spillway	Debris Bleeder
			(Y/N)	(AC.)	(CY)	(CY)	(Y/N)	(Y/N)	(Y/N)
ZONE 1									
Dent Debris Basin	DB1-01	1981	N	19	4,100	1,624	Y	Y	N
Fresno Canyon Debris Trap	DB1-04	2005	N	866	2,760	53,900	N	Y	N
Live Oak Diversion Dam	DD1-05	2002	N	794	45,527	20,952	Y	Y	N
Matilija Dam	86-000	1947	Y	34,940	810,000	NA	Y	Y	N
McDonald Canyon Detention Basin	DD1-04	1998	N	573	32,393	3,974	Y	Y	Y
Stewart Canyon Creek Debris Basin	DB1-02	1963	Y	1,266	104,215	209,000	Y	Y	Y
ZONE 2									
Adams Barranca Debris Basin	DB2-07	1994	N	5,387	72,023	149,000	Y	N	Y
Arundell Barranca Detention Basin	DD2-06M	1995	Y	1,754	223,150	42,290	Y	Y	Y
Cavin Road Debris Basin	DB2-03	1933	N	90	4,100	2,943	N	Y	N
Fagan Canyon Debris Basin	DB2-08	1994	N	1,856	72,000	104,600	Y	N	Y
Jepson Wash Debris Basin	DB2-02	2011	N	858	33,850	55,800	Y	N	Y
Pole Creek Debris Basin	DB2-09	2009	N	5,532	440,440	361,700	Y	Y	Y

Basin Name	Number	Year Constructed or Reconstructed	State Regulated Dam	Watershed Area	Flood Storage to Emergency Spillway	Expected Debris Production for 100-Year Storm	Emergency Spillway	Principal Spillway	Debris Bleeder
			(Y/N)	(AC.)	(CY)	(CY)	(Y/N)	(Y/N)	(Y/N)
Real Wash Debris Basin	DB2-04	1964	N	160	22,000	11,500	Y	N	Y
Warring Canyon Debris Basin	DB2-05	2003	N	695	33,100	52,400	Y	Y	Y
ZONE 3									
Arielle NPDES and Detention Basin	DD3-26	2002	N	42	5,080	378	Y	Y	N
Canyon No. 2 Debris Basin	DB3-39	2004	N	3,900	99,832	79,170	Y	Y	N
Castro Williams Debris Basin	DB3-06	2004	N	330	58,403	8,599	Y	Y	N
Conejo Mtn Creek Detention Basin No. 1	DD3-33	2001	N	1,537	77,100	1,065	Y	Y	Y
Conejo Mtn Creek Detention Basin No. 2	DD3-34	2004	N	498	6,275	165	Y	Y	Y
Conejo Mtn Creek Detention Basin No. 3	DD3-35	2004	N	443	53,400	2,994	Y	Y	Y
Conejo Mtn Creek Detention Basin No. 4	DD3-36	2004	N	250	13,450	642	Y	Y	Y
Conejo Mtn Creek Debris Basin No. 5	DB3-37	2004	N	212	11,680	3,204	Y	Y	Y
Coyote Canyon Debris Basin	DB3-15	1955	N	4,400	24,500	152,459	Y	N	Y
Covington Detention Basin	DD3-27	1997	N	47	5,020	0	Y	Y	Y
Crosby (Rudolph) Detention Basin	DD3-28	1997	N	55	6,450	0	Y	Y	Y
Edgemore Debris Basin	DB3-11	1991	N	105	2,950	1,188	Y	N	Y

Basin Name	Number	Year Constructed or Reconstructed	State Regulated Dam	Watershed Area	Flood Storage to Emergency Spillway	Expected Debris Production for 100-Year Storm	Emergency Spillway	Principal Spillway	Debris Bleeder
			(Y/N)	(AC.)	(CY)	(CY)	(Y/N)	(Y/N)	(Y/N)
Erringer Road Debris Basin	DB3-12	1997	N	315	33,250	11,633	Y	Y	Y
Ferro Debris Basin	DB3-13	1985	Y	395	34,500	7,758	Y	Y	Y
Fox Barranca Debris Basin	DB3-14	1991	N	3,100	14,700	99,181	Y	N	Y
Gabbert Canyon Debris Basin	DB3-09	1963	N	2,350	16,300	56,900	Y	N	Y
Honda West Debris Basin	DB3-07	1955	N	740	10,350	55,662	Y	N	Y
Lang Creek Debris Basin	DB3-31	2004	N	2,325	26,942	22,052	Y	N	Y
Lang Creek Detention Basin	DD3-31	2004	Y	2,325	425,270	0	Y	Y	N
Las Llajas Canyon Detention Dam	DD3-20	1980	Y	4,384	2,017,000	190,983	Y	Y	N
Las Posas Estates Detention Basin	DD3-08M	1992	N	168	24,684	1,938	Y	Y	Y
Line "C" Arroyo Simi Detention Basin	DD3-30	1997	N	635	16,330	12,956	N	Y	Y
Muirfield Detention Basin	DD3-25	2002	N	24	2,300	442	Y	Y	Y
N. Simi Drain Debris Basin	DB3-32	2003	N	704	14,582	8,700	Y	Y	Y
N. Simi Drain Detention Basin	DD3-32	2004	N	704	61,630	0	Y	Y	Y
Peach Hill Wash Retention Basin	DD3-23	1988	N	1,589	121,970	4,541	Y	Y	N
Ramona Detention Dam	DD3-16M	1992	N	254	41,230	3,732	Y	Y	Y

Basin Name	Number	Year Constructed or Reconstructed	State Regulated Dam	Watershed Area	Flood Storage to Emergency Spillway	Expected Debris Production for 100-Year Storm	Emergency Spillway	Principal Spillway	Debris Bleeder
			(Y/N)	(AC.)	(CY)	(CY)	(Y/N)	(Y/N)	(Y/N)
Runkle Canyon Detention Basin	DD3-17	1950	Y	958	161,000	41,613	Y	Y	Y
Santa Rosa Road Debris Basin No. 2	DB3-05	1957	N	1,101	49,000	5,420	Y	Y	Y
South Branch Arroyo Conejo Debris Basin	DB3-22	2003	N	2,542	50,417	100,850	Y	Y	Y
South Potrero (Dos Vientos) Debris Basin	DB3-24	1995	N	359	17,500	13,900	Y	Y	Y
South Potrero (Dos Vientos) Detention Basin	DD3-24	1995	N	359	56,000	0	Y	Y	Y
Sycamore Canyon Dam	DD3-21	1981	Y	4,380	106,460	59,260	Y	Y	N
Sycamore Park Detention Basin	DD3-29	1997	N	33	6,450	1,473	Y	Y	N
Tapo Hills No. 1 Detention Basin (West)	DD3-18	1971	N	104	36,140	5,730	Y	N	Y
Tapo Hills No. 2 Detention Basin (East)	DB3-19	1977	N	133	41,190	4,000	N	Y	Y
Walnut Canyon- Basin 0	DD3-37	2005	N	338	36,950	12,680	Y	Y	Y
West Camarillo Hills West Branch Debris Basin	DB3-01	1986	N	74	5,250	1,268	Y	N	Y
ZONE 4									
Bridgegate Debris Basin	DB4-02	2004	N	262	12,936	4,517	Y	Y	Y
Potrero Creek Sediment Control Basin	DB4-01	2002	N	1,541	11,245	10,340	Y	N	Y

Basin Name	Number	Year Constructed or Reconstructed	State Regulated Dam	Watershed Area	Flood Storage to Emergency Spillway	Expected Debris Production for 100-Year Storm	Emergency Spillway	Principal Spillway	Debris Bleeder
			(Y/N)	(AC.)	(CY)	(CY)	(Y/N)	(Y/N)	(Y/N)
Obsolete Basins									
Franklin Barranca Debris Basin (Transferred to homeowner)	DB2-01	1996	N	330	5,050	11,507	Y	Y	Y
St. John's Debris Basin (Transferred to HOA)	DB3-03	1957	N	240	50,000	2,849	Y	N	Y
San Antonio Debris Basin (Destroyed by flood)	DB1-03	1986	N	6,280	14,600	455,700	Weir	N	N
Santa Rosa Rd No. 1 Debris Basin (Destroyed in 1978)	DB#-04	-	-	-	-	-	-	-	-
West Camarillo Hills East Branch Debris Basin (No easement access after landslide)	DB3-02	1955	N	92	1,840	1,432	Y	Y	Y
Non-Functional Basins									
Crestview Debris Basin	DB3-10	1934	N	80	2,350	1,005	N	Y	N
Not Accepted Basins									
Erringer Road Detention Basin	DD3-								

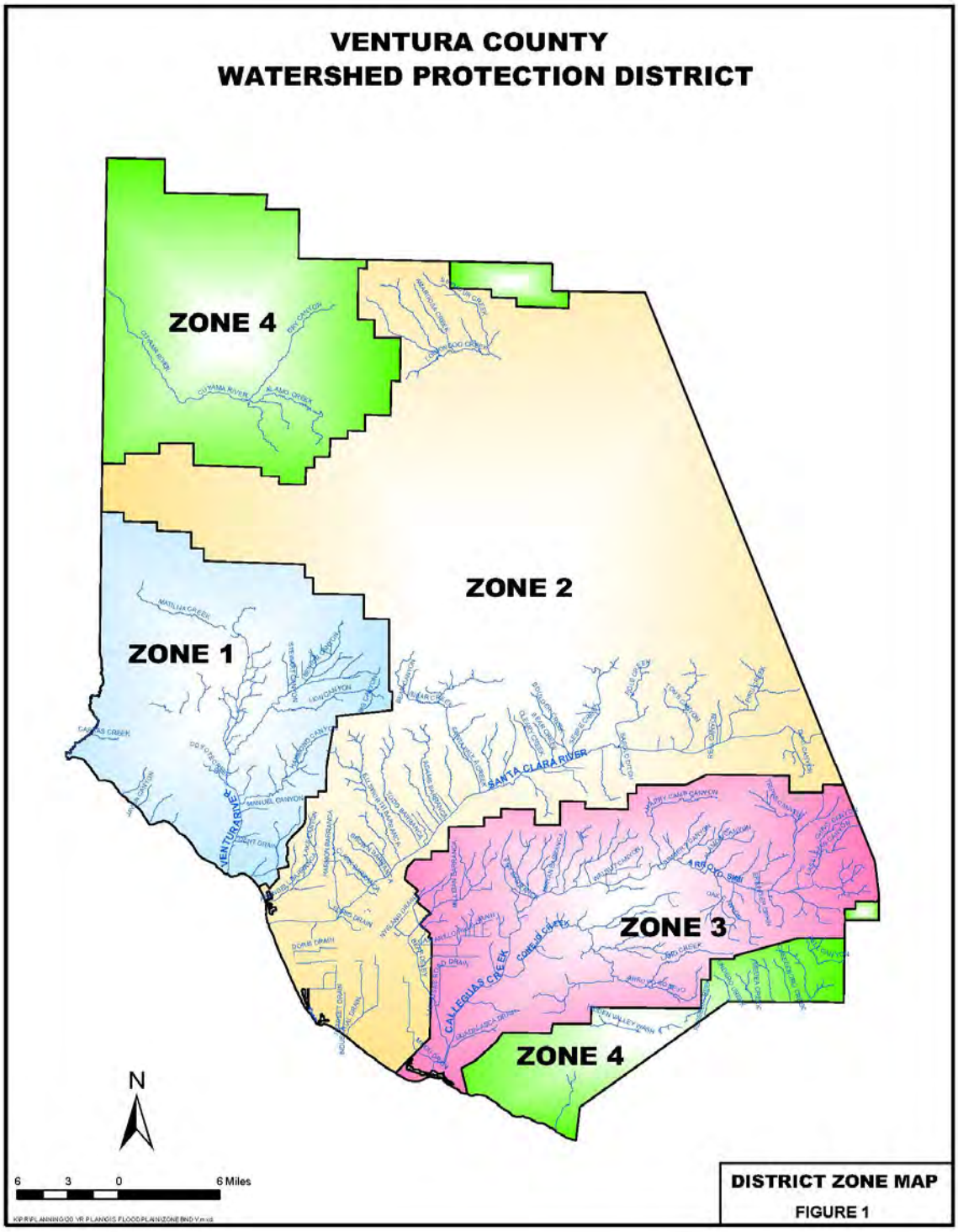
1.1 Watershed Protection District Description

The Ventura County Watershed Protection District (then known as the Ventura County Flood Control District) was formed on September 12, 1944, when the California State Legislature approved the Ventura County Flood Control Act. The District was formed, in part, to provide for the control and conservation of flood and storm waters and for the protection of watercourses, watersheds, public highways, life and property in the district from damage or destruction from these waters. On January 1, 2003, the name was changed to the Ventura County Watershed Protection District to reflect changes in community values, regulatory requirements, and funding opportunities. The name change also reflected the District's desire to emphasize integrated watershed management and solve flood control problems with environmentally sound approaches. The District's mission is to protect life, property, watercourses, watersheds, and public infrastructure from the dangers and damages associated with flood and stormwaters. Goals of the District include:

- Comprehensive, long range watershed planning
- Collaboration with watershed stakeholders
- Administration of adopted regulations, policies, and resolutions
- Responsible and accountable use of public resources
- Excellence in public service

The District's ongoing activities are funded through property taxes, benefit assessments, and land development fees. To facilitate management of revenues and projects, the District was divided into four zones, roughly corresponding to the major river systems in the county as shown in Figure 1. Zone 1 essentially follows the boundaries of the Ventura River Watershed and coastal drainages in the western part of the county. Zone 2 basically follows the boundaries of the Santa Clara River Watershed and local coastal drainages in the cities of San Buenaventura and Oxnard. Zone 3 essentially follows the boundaries of the Calleguas Creek Watershed and its tributaries. Zone 4 is a mixture of Malibu coastal drainages in the southern part of the county and the relatively undeveloped Cuyama River Watershed in the northern part of the county. Benefit assessment monies collected from each zone are dedicated to support operations and maintenance and NPDES (National Pollutant Discharge Elimination System) permit activities within that zone. Property tax monies raised within a zone are spent on construction projects and to support District planning studies within that zone.

The District's authority over its jurisdictional channels and basins is established through a number of ordinances and policies passed by its Board of Supervisors. The primary ordinance establishing District authority and the requirement to obtain permits for any encroachment into District jurisdictional channels, including rights-of-way, is Ordinance FC-18 ("An Ordinance Relating to the Protection and Regulation of Flood Control Facilities and Watercourses"), as amended by Ordinances FC-20, FC-21, FC-22, FC-23, and FC-27.


VENTURA COUNTY
WATERSHED PROTECTION DISTRICT
ZONE 4
ZONE 2
ZONE 1
ZONE 3
ZONE 4
SANTA CLARA RIVER
VENTURA RIVER
CALLEGUAS CREEK
N
6 3 0 6 Miles
DISTRICT ZONE MAP
FIGURE 1

1.2 Detention, Debris, and State-Size Basins

The District's basins play an important role in the control of floodwaters and sediment in Ventura County. The debris basins primarily capture sediment mobilized by stream and watershed erosion. Debris basins can also attenuate flood peaks if enough storage volume is available in the basin, depending on the design of the outlet works and recurrence interval of the storm. Debris basins are expected to discharge through the emergency spillway in the 100-yr storm.

Detention basins are designed with outlet works and enough storage to capture the expected 100-yr sediment volume and significantly reduce the 100-yr inflow flood peaks through the principal outlet. Emergency spillways are designed to convey flow out of the basin if the principal outlet becomes blocked. The District's policy is that debris basins cannot be used to attenuate design storm inflow peaks in hydrology models due to the difficulties in evaluating the rapidly varying flow over the emergency spillways. The only exception to this policy is the Runkle Detention Dam which is included in hydrology studies even though it is expected to spill over the emergency spillway during the 100-yr storm.

If basin volumes or dam designs exceed certain state criteria, they are regulated as "State-Size" basins by the California State Division of Safety of Dams (DSOD). State-Size basins generally can store more than 50 acre-feet of water during a storm or have dams that are more than 25-feet high. They are inspected annually by DSOD. The District's State-Size debris basins include Stewart and Ferro Basins. The State-Size detention basins are Arundell, Matilija, Lang Creek, Runkle, Sycamore Dam and Las Llajas Basins.

1.3 Sediment Equilibrium

Debris basins are designed to trap sediment that can deposit in channels during flow events. For example, during the storm event beginning January 8, 2005, the Pole Creek channel in the City of Fillmore was filled with sediment, leaving little or no capacity for runoff from the watershed and leading to channel overflow. The removal of the sediment from the flow in a debris basin would have decreased the overflow that occurred. However, flow downstream of a debris basin can have a greater sediment transport capacity, and can cause erosion in a downstream natural channel.

The observation of scour in natural channels downstream of debris basins has led to a better understanding of the concept of sediment equilibrium. Sediment equilibrium is reached when a natural channel has no net deposition or erosion, and when the sediment inflow to the reach equals the sediment outflow. Based on this, in some cases it may be better to design a channel with a slope that maintains the sediment balance than to provide a debris basin. Sediment transport models are designed to model the scour and deposition occurring in creek and river systems. The formulation of sediment transport models for Calleguas Creek and the Ventura River have led to a better understanding of the sediment equilibrium for these systems. A sediment transport model will be prepared for the Santa Clara River as part of the on-going Santa Clara Watershed Protection Plan.

1.4 Manual Updates

Technical data in this report will be updated periodically to reflect changes in storage capacity due to deposition, Average Annual Debris Production (AADP), basin clean-outs or structural modifications. Data regarding newly constructed debris or detention basins will be added to the next manual revision following construction. Prior to their inclusion in this Manual, records for newly constructed basins will be available from the Hydrology Section files until an update is needed. Updates are generally done following a storms leading to a Disaster Declaration, where debris basins are typically filled with sediment and require clean-out. Updates include debris dams that are upgraded to take advantage of detention potential. Updates also include basins that have been modified to provide increased spillway capacity. Several such basins included in the 1999 update were Las Posas Estates, Ramona, and Arundell Barranca basins. The new basins included in the 2005 manual update were the following:

Zone1
Live Oak Creek Diversion Dam
McDonald Canyon Detention Basin

Zone 2
None

Zone 3
Line “C” Arroyo Simi Detention Basin
Lang Ranch Dam- Debris and Detention Basins

Zone 4
Potrero Creek Sediment Control (Instream and Underwater Dike Structures)

The additional basins included in this Manual update are the following:

Zone1
Matilija Dam

Zone 2
Pole Creek Debris Basin

Zone 3
Arielle NPDES & Detention Basin
Covington Detention Basin
Conejo Mountain Creek Basins 1 through 5
Crosby(Rudolph) Detention Basin

Erringer Road Detention Basin
Muirfield NPDES & Detention Basin
North Simi Drain Debris and Detention Basins
Sycamore Park Detention Basin

Zone 4
Bridgegate Debris Basin

Basins that are no longer being maintained by the District are the following:
Zone 1
Franklin Debris Basin – Filled with sediment and planted with an orchard, it was no longer functional and ownership was transferred to the adjacent homeowner who uses the dam as an access road to their house.

Zone 3
St. John's Debris Basin – This historical debris basin was reconstructed as a homeowner detention basin to mitigate the increased flow from an upstream development and ownership was transferred to the HOA.

West Camarillo Hills Drain East Branch Debris Basin – This basin was no longer maintained by the District after a landslide occurred in the early 2000s and it was determined that we did not have an easement to use for access.

As of January, 2016, Crestview Debris Basin in Zone 3 is no longer functional due to having an orchard planted in it and the District is evaluating it for removal. Santa Rosa Road Basin in Zone 3 is being studied by a consultant for the District to determine if it should be removed or reconstructed. Cavin Road Basin in Zone 2 has been studied by the District and the preferred alternative is to reconstruct the outlet tower to pass more fine sediment through the basin but continue to capture sand and gravel sized sediment.

Most of the larger basins designed to provide flood water detention across the County belong to the District. There are numerous smaller HOA detention basins in the various cities that are not maintained by the District and are not included in this manual. One of the bigger HOA basins that is not maintained by the District is located in the eastern end of the City of Simi Valley- Mt. Sinai Basin. This basin is included in the District's official hydrology models of this area.

There are a number of relatively large reservoirs in the County that are primarily used for water storage but provide some peak stormflow attenuation. These include: Las Casitas Dam owned by the US Bureau of Reclamation (USBR) in Zone 1, Pyramid Dam owned by the United Water Conservation District (UWCD) in Zone 2, Lake Bard owned by the Calleguas Municipal Water District in Zone 3, and Lake Sherwood owned by the Lake Sherwood Association that drains to the Pacific Ocean in Zone 4.

2. Basin Data Summary

Many of the smaller and older debris basins in the County were built by other agencies and then ownership was transferred to the District. The NRCS (then SCS) built many basins to limit the damage from flooding after fires. Collecting the data included in this manual has entailed contacting these agencies and obtaining the design information, as-builts and topographic surveys, and any sediment removal data.

2.1 Basin Technical Data

The technical information included for each basin includes the following:

1. Whether a basin was designed to capture sediment (debris basin) or to attenuate storm inflow (detention basin). This information is included in the name of the basin.
2. Storage capacity based on a control of either the emergency spillway invert if one is present, or the top of the dam.
3. Operational and emergency spillway type and dimensions.
4. Dam length and elevation.
5. Watershed area and 100-year peak inflow based on hydrologic models of the watershed.
6. Construction data, including agency and year of construction.
7. Agency responsible for operation and maintenance.
8. Reference drawing numbers, including District as-built “Y-Drawing” numbers, Ventura County map numbers, and topographic drawing numbers where available. Copies of these maps are available from the Ventura County Survey and Mapping Counter.

2.2 Coordinates

The Lambert, NAD 27 California State Plane Zone V coordinates in feet of each basin are given for the longitudinal center-line of the spillway at the crest, (where a spillway exists). On dams without spillways the coordinates are for the midpoint on the centerline of the crest of the embankment. Spillway sizes and dam dimensions were field checked in 1982 for the basins constructed prior to that date.

2.3 Watershed and Access Maps

A map is provided for each basin showing the watershed boundary overlain on an aerial photo obtained in 2003. Watershed areas were previously delineated and planimetered on U.S. Geological Survey, 7-1/2 quadrangle maps. The current watershed boundaries were delineated as part of the effort to prepare a GIS watershed boundary shapefile for use in hydrologic analyses. The aerial photo shows the land uses in the watershed as of 2003. A street map is provided showing the best way to reach the basin for maintenance access and inspections.

2.4 Basin Volume Data

Debris design volumes for each basin are indicated as Level Capacity and Maximum Debris Capacity. Unless otherwise noted, both are calculated using the emergency spillway elevation (invert for rectangular channels and weir elevation for drop box inlets) as the control with the additional volume attainable with

debris slope included in the Maximum Debris Capacity. If the basin does not have a spillway, the debris control point is assumed to be the top of the dam. Originally, maximum debris storage capacities were computed by assuming a debris slope extending upstream from the control elevation equal to 0.6 times the original streambed slope. Some basins are physically incapable of containing a sloped debris profile such as the Dent Debris Basin in Zone 1. For this basin, debris capacity is based assuming a debris slope of 0 percent. More recently, the basin maximum debris capacity has been calculated assuming that debris could accumulate at a maximum slope of 2 percent based on field observations of full basins after wet years with large volumes of sediment deposited in the basins.

In Fiscal Years1969-1970, 1970-1971, and 1971-1972, aerial surveys were flown for topographic mapping of all debris basins except Dent, Ferro, Las Posas Estates, and Ramona. These maps served as a baseline to compare to other cleanout amounts and remaining capacities. As new basins were constructed their design topographic maps were used to evaluate the basin capacities.

2.5 Stage-Discharge-Storage Curves

To establish a consistent basis for discharge computations at each debris basin, stage-discharge curves were computed assuming all intake ports were flowing freely. Therefore, the stage-discharge curve shown represents the maximum potential discharge from each basin up to top of spillway (without freeboard). The stage-storage capacity curves published in this revised Manual are based on the latest DTM topography and debris slopes that were developed following the 1980 Disaster for basins that were constructed prior to that year. The detention basin routing to estimate the peak outflow is done assuming the basin contains 125% of the 100-yr design debris volume placed level in the basin at the beginning of the design storm. If a stage-storage-discharge curve has been developed for use in a hydrology model, the reference to the model and data are provided.

2.6 Basin Outlet Design

Basin design has evolved over time to reflect better understanding of the issues associated with debris accumulation and blocking of outlet structures. Basins designed in the 1950s had perforated CMP pipe outlets to slowly drain ponded water and an emergency spillway to convey high flows through the basin. Newer designs provided operating spillways in the form of riser towers to increase flows out of the basin prior to inflow of the peak portion of the hydrograph. Grates were used to prevent trash and debris from blocking the risers and operating spillway inlets, and emergency spillways were reinforced with concrete to prevent possible dam erosion and failure during high flows. Subsequently, operating spillways were designed in a way to prevent vortices from limiting flow into the riser towers and provided with inclined grates to prevent trash from accumulating at the riser tower inlets and blocking the inflow. Newer emergency spillway design alternatives have included drop box inlets. The following figures show the various types of control structures used in District Basins.

2.7 Basin Label

Each basin has been assigned a label in one of the following formats: DBx-xx or DDx-xx. The first two letters indicate if the basin was designed primarily for debris capture (DB) or for detention (DD). The third character is the zone number, and the last two characters are the two digit numbers of the basins in each zone. The numbers are assigned based on the original basin construction date. If a basin has been reconstructed to provide additional storage volume or revise the outlet works, an "M" indicating that it has been modified is added to the name.

Real Wash Debris Basin- Zone 2. Perforated CMP Debris Bleeder Riser Tower

Runkle Detention Basin-Zone 3. Operating Spillway- Perforated 48” RCP Riser with Grated Weir Inlet

Warring Canyon Debris Basin- Zone 2. Operating Spillway- Riser Tower with Debris Bleeder Orifice Inlets and Weir Inlet Top Protected with Inclined Trash Rack

Las Lllajas Detention Basin- Zone 3. Operating Spillway, Reinforced Concrete Two-Way Riser Tower with Projecting Top and Side Inlets with Trash Rack

Real Wash Debris Basin- Zone 2. Emergency Spillway: Reinforced Concrete Rectangular Channel

Ferro Debris Basin- Zone 3. Emergency Spillway- Side Inlet Drop Box (riser tower in the background)

Adams Wash Debris Basin- Zone 2. Emergency Spillway, Three-Sided Drop Box Inlet (with attached perforated CMP debris bleeder)

3. Debris Data

3.1 Basin Debris Volume Design Criteria

Debris basins are sometimes designed to hold the 100-yr predicted design sediment volume, but many debris basins were built after fires and have less than the 100-yr design volume. Detention basins, designed to attenuate inflow peaks, are required to have sufficient volume for the 100-yr design sediment volume in order to ensure that they can provide detention. Current VCWPD detention basin design criteria for debris storage volumes are as follows:

1. For detention basins with tributary watersheds totaling less than five square miles, the volume required for debris storage is 125 percent of the debris volume expected from the 100-yr storm. This volume is assumed to be present in the basin at 0 percent slope prior to any flood routing.
2. For detentions basins with tributary watersheds totaling more than five square miles, the volume required for debris storage is the sum of 25-mean annual deposition volumes plus the design debris from one 100-yr storm prior to routing of the flood hydrograph.

Most of the detention basins were designed using Criterion 1 above. A number of the debris basins do not have sufficient storage for the 100-yr debris yield and therefore could possibly fill with sediment during extreme storm events. These basins are not expected to provide detention or attenuate peak flows except during relatively small storm events. Debris basins are not included in design hydrology models.

3.2 Debris Yield

Debris production rates are provided for the 100-year, 50-year, and 25-year storms assuming either design conditions (a fire has not occurred in the watershed for 4.5 years) or recent burn conditions (a complete burn occurred six months prior to the design storm). The conceptual model supporting the fire factor is that most fires occur in the late summer or early fall. Therefore, by the time most of the rainfall has occurred at the end of March of the next year, 0.5 of a season has elapsed. Dr. Kevin Scott, USGS, published an extensive study of the transverse ranges in Ventura and Los Angeles Counties following the 1969 flood (Scott and Williams, 1974. “Erosion and Sediment Yields in the Mountain Watersheds of the Transverse Ranges, Ventura and Los Angeles Counties, California—Analysis of Rates and Processes). The study identified several parameters that affect the production rate including drainage area, 1-day rainfall, 10-day rainfall, slope failure areas contributing, fire factor, and watershed shape. A regression formula was developed with these parameters as follows:

$$SY = 17.54(A)^{0.828} \times (ER)^{1.382} \times (FF)^{0.251} \times (SF)^{0.375} \times (K)^{0.840}$$

The definitions of the various parameters are:

SY = Sediment Yield, cubic yards.

A = Area of the Watershed, square miles.

ER = Elongation Ratio, A ratio produced by dividing the diameter of a circle with an area equal to that of the watershed in square feet by the maximum watershed length measured in a straight line parallel to the main channel, also in feet.

FF = Fire Factor, The percentage of non-recovery of vegetative cover in the burned watershed. Values of the Fire Factor range from a maximum value of 100 immediately after the fire; to a value of 88 six months after the fire; to a value of 20 4.5 years after the fire; to a value of 1 7.5 years after the fire. The approach assumes a watershed is completely recovered from a burn after 7.5 years.

SF = Slope Failures. The area of the watershed in acres that is prone to slipping divided by the drainage area in square miles. The USGS published this value for a number of watersheds in Ventura County based on field surveys. If a study area is near one of these watersheds, these values should be used. If a study area is not near one of the USGS watersheds, the California State Division of Mines has developed a map of known landslides and potential slips on 1" = 6000' scale. The information has been transposed to USGS 7-1/2' Quad maps for easier interpretation. This map is used to develop a SF value.

K = Dimensionless Rainfall Factor, This varies for different storm frequencies and is the product of the square of the 1-day precipitation value and the 10-day precipitation value for a given storm frequency in inches. The 10-day precipitation value gives the measure of watershed saturation, while the 1-day value provides a measure of the rainfall intensity causing peak runoff and sediment erosion. The Ventura County Hydrology Manual contains maps for the 10-, 25-, 50-, and 100-yr 24-hour rainfall isohyetals that can be used to establish the average 24-hr value for a watershed. The District's Pearson III analyses of historic rainfall data from their rain gage network are then used to obtain the n-yr 10-day values for the calculation.

The USGS study also concluded that the AADP is approximately 8 to 13 percent of the 50-year debris yield in Zones 1 and 2. Smaller watersheds (up to 5 square miles in area) have an AADP of 13 percent of the 50-yr yield while other watersheds greater than 5 - 10 square miles in area have AADP's on the order of 10 percent of the 50-yr yield. In Zone 3, the study author's concluded that due to the high percentage of fines in the soils there, only 3% of the 50-yr yield could be expected to occur on an average basis (Personal communication, Rhea Williams, USGS, November, 1976).

District records include up to thirty years of record for several of the basins. Disaster years were 1969, 1978, 1980, 1983, 1992, 1995, 1998, and possibly 2005. Some AADP values were agreed upon by the District and the Federal Emergency Management Agency (FEMA) following the Presidentially Declared Disasters. These values are marked in the tables of Basin Debris Removal History. The AADP is calculated by averaging the annual debris removal quantities for each basin, omitting debris quantities removed after disasters. With additional years of record, these values will be updated. Some basins have no history of debris removal quantities or a limited number of topographic analyses for basin volume

changes based on aerial topography. For these, the Scott and Williams theoretical value has been tabulated as AADP as indicated in the Manual.

In 2009 the District evaluated the basin removal data available since 1969. The results were documented in a draft report "Sediment Yield Method Update" dated December, 2009. The evaluation results were consistent with other studies by the USGS (2009) and Army Corps of Engineers (2000) which showed that some other parameters correlated better with removal quantities than those identified in the 1973 study. Relief ratio (RR) provided better results than elongation ratio, and slope failure did not improve the regression to the removal data. For small watersheds (less than 1.6 sq mi), maximum hourly rainfall intensities improved the regression compared with longer duration rain data. For large watersheds, the 1-day and 10-day rain values were highly cross-correlated. Testing of both data sets in the regressions found better results with the use of the 10-day rainfall.

The evaluation resulted in two regression equations to be used for large watersheds depending on whether they had been burned in the last seven years. The report recommended another equation to be used for Zone 1 and 2 small watersheds and a fourth equation to be used for small watersheds in Zone 3. The use of the recommended equations to evaluate the District's basins shows design quantities that are much more consistent with the largest historical removal volumes that obtained through the other methods. The equations were also used in an evaluation of the Pole Creek Debris Basin and were found to provide reasonable results. Until the report is finalized, the draft report must be requested from the District and any proposed use of its equations must be approved in advance by the District.

3.3 Debris Cleanout Elevation

The Manual also provides an estimate of the elevation related to the maximum debris volume that should be allowed to accumulate (assuming level storage) before the debris is excavated back to the design topography. Current VCWPD standard is to initiate cleanout of a detention basin if the deposition volume is close to or exceeds 25 percent of the debris design volume. Using this criterion, a detention basin would never lack enough capacity to store the debris volume from a 100-yr event and possibly fail to meet the design detention requirements of the basin.

For debris basins with enough volume to hold 125 percent of 100-year design sediment volume, the clean-out elevation is estimated following the detention basin criterion. Debris basins that have insufficient capacity for the 100-yr design sediment volume have clean-out elevations estimated by the following:

1. Elevation corresponding to the difference of the maximum storage volume minus the 100-yr design yield.
2. Elevation corresponding to 10 percent of the 100-yr design yield or the operating spillway (weir or invert) elevation, whichever is lower.

3.4 Basin Debris Removal History

The debris removal volumes are provided in a basin history table. The data in the table includes the date, action, remaining capacity, volume removed, and Average Annual Debris Production (AADP). Standard practice is to collect aerial survey data after the winter season to provide topography on pre-cleanout conditions. If the debris level in a basin exceeded the elevation requiring a clean-out, another aerial or field survey was done after the clean-out to determine the removed volume. The removal volumes and remaining capacity values with marked as result from aerial surveys in the history table.

If a basin did not appear to have significant debris accumulation from winter season storms, available aerial survey flight data for that basin were not digitized. Exact dates for some cleanouts were not available, but the assumption was made that cleanouts were completed just prior to the aerial survey. Small increases in remaining capacity where no cleanout occurred are due to errors of survey. Increases in remaining capacity from one aerial survey to the next are due to differences in the excavation limits.

The digitized topographic information has been evaluated in several different ways. When the District's Hydrology Section did the analysis, they used a planimeter to measure the areas enclosed by each contour level on the topographic map for the contour integration method. They then calculated the incremental volume between contour levels using the conic equation and summed them to find the total excavation volume. When the District's Design and Construction Division took over responsibility for evaluating removal volumes, they used an average-end method with cross-sections on a 50-ft spacing. In 1987, the method was changed to using a Digital Terrain Model (DTM) that used aerial topography data with a 5-foot resolution. The DTM method was thought to give much higher accuracy for pay quantity estimates. Currently the Operations and Maintenance Division converts the pre- and post-cleanout topographic maps to Triangulated Irregular Network (TIN) surfaces and uses AutoCAD to subtract the surfaces and find the excavated volume.

A 2008 study done by the District on pre- and post-cleanout topographical data for Gabbert Debris Basin performed the various volume calculation methods and found that the results differed by only 1%. Using the post-cleanout data to evaluate the remaining capacity of Gabbert resulted in similar results except that the contour integration method differed by about 2%.

In 2005 O&M started reporting the excavation volumes for smaller basins using the truck counts contained on the contractor pay sheets. A volume generated in this way is marked as a "Truck Count" in the history table. A 2015 study by the District showed that the truck count volumes could differ from the topographical evaluation results. For larger basins where significant quantities of debris are removed, the volumes continue to be analyzed with aerial survey data and AutoCAD analyses.

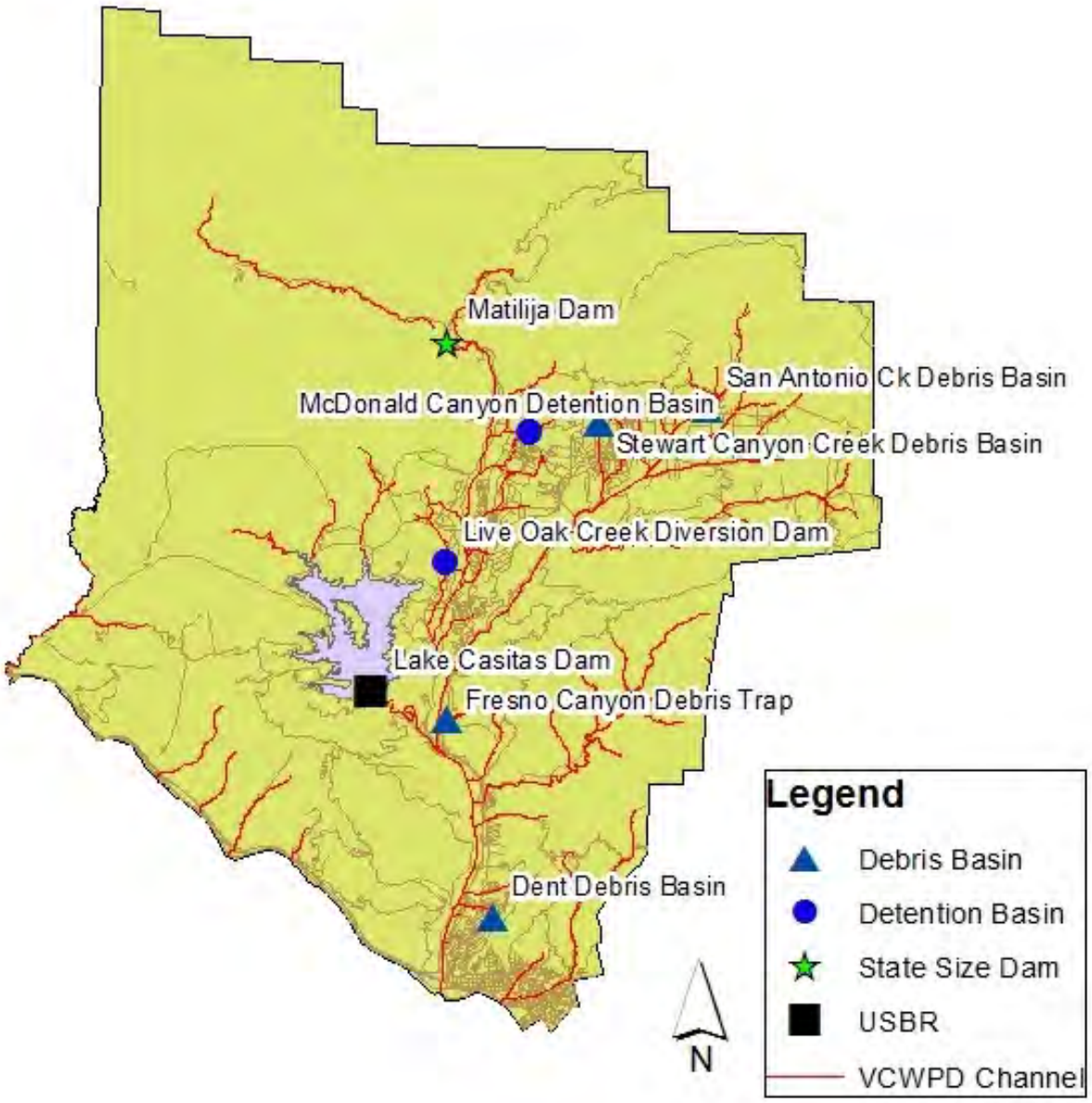
3.4 Channel Debris Removal History

Upper channel reaches of Ventura County streams generally have relatively steep slopes and convey sediment from undeveloped watersheds downstream to historic floodplain or fan areas with relatively flat slopes. As the velocities and sediment transport capacity of the flow decrease in the floodplain areas, the sediment is deposited in channels. This reduces the channel conveyance capacity and increases the potential for breakouts and flooding to occur. Streams subject to significant deposition requiring sediment removal include Pole Creek in the Santa Clara River watershed, a number of the creeks in the upper Arroyo Simi, the Arroyo Las Posas section of Calleguas Creek, and Calleguas Creek. VCWPD is required to remove sediment debris from these channels after storm events frequently enough so that the channels can be considered in-channel debris basins. Appendix A provides a summary of the annual sediment removal quantities for the channel reaches that require frequent cleaning.

4. Acronyms

AADP	Average Annual Debris Production		
CMP	Corrugated Metal Pipe	CMPA	Corrugated Metal Pipe- Arch
CSP	Corrugated Steel Pipe	GIS	Geographic Information System
NAD	North American Datum	NAVD	North American Vertical Datum
NGVD	National Geodetic Vertical Datum	NRCS	Natural Resources Conservation Service
RC	Reinforced Concrete	RCP	Reinforced Concrete Pipe
RCB	Reinforced Concrete Box	SCS	Soil Conservation Service

Zone 1 Basins



DENT DEBRIS BASIN DB1-01

LOCATION: Ventura, behind (eastward) De Anza Junior High School
on Ventura Avenue, approximately 7,600 ft N from Main Street.
N 294,100; E 1,611,200 (Lambert Zone 5 Coordinates)
Ventura 7-1/2' Quadrangle Map

DESIGN DATA	(Elevations NGVD29)
Design Agency	Ventura County Watershed Protection District
Level Capacity	3,200 cy at emergency spillway, 2,700 cy at op. spillway
Maximum Debris Capacity	4,100 to top of dam (11-8-87 DTM)
Inflow and Outflow Rates	Q_{100}IN = 82 cfs, Q_{100}OUT=NA
Debris Cleanout Elevation	136 ft (1,075 cy) [provides 100-yr debris yield vol. below operating spillway]
EMERGENCY SPILLWAY	
Type	24-in CSP
Invert Elevation	143.4 ft
Spillway Length	NA
Capacity	40 cfs
PRINCIPAL SPILLWAY	
Type	3 ft x 3 ft Drop Box Inlet
RCB Weir Elevation	142 ft
Outlet Conduit	24 in CSP
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill
Dam Crest Elevation	149 ft
Length	NA
Width at Crest	NA
Surface Area of Full Basin	0.18 ac
Watershed Area	19 ac from GIS Watershed Layer Shapefile
CONSTRUCTION DATA	
Construction Agency	Shell Oil Co. & VCWPD
Completion Date	1950, Reconstructed 1981
REFERENCE DRAWINGS	
Construction Drawings	33167 Obsolete, Y-1-411, Y-1-439-44
Topographic Drawings(pre-const)	33167 Fencing Y-1-43, T-246 (6-12-80), T-341 (12-8-85), 11-8-87 DTM, 10-16-89 DTM
Right-of-Way Drawings	109MR52 (Easement)

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
Historic 100-YEAR	1,624	2,354
Historic 50-YEAR	1,255	1,820
Historic 25-YEAR	928	1,346
Updated 100-YEAR	1,270	1,842
Updated 50-YEAR	970	1,406
Updated 25-YEAR	719	1,043

Updated with NOAA Rainfall in 2017 Hydrology Manual

BASIN HISTORY: **DENT DEBRIS BASIN**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
09-69	Cleanout		245	
09-70	Cleanout		1,993	
06-72	Aerial Survey	1,870		
05-74	Cleanout		1,039	
12-75	Cleanout		1,235	
03-78	Disaster Declaration			
02-80	Disaster Declaration			
06-80	Aerial Survey	930		
12-80	Cleanout		2,700	
12-80	Aerial Survey	3,150		
10-81	Aerial survey	Not Digitized		
03-83	Disaster Declaration			
09-83	Cleanout		2,195	
10-83	Aerial Survey	Not Digitized		
09-85	Cleanout		1,414	
12-85	Aerial Survey	3,346		
07-86	Aerial Survey	3,212		
07-86	Cleanout		475	
10-86	Aerial Survey	3,641		
11-87	Aerial Survey	4,062		
11-88	Aerial Survey	Not Digitized		
10-89	Aerial Survey	4,070		
09-90	Aerial Survey	Not Digitized		
05-91	Aerial Survey	2,887		

BASIN HISTORY: DENT DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-92	Disaster Declaration			263**
05-92	Aerial Survey	2,009		
06-92	Cleanout		878	
06-92	Aerial Survey	4,070		
07-93	Cleanout		704	
07-93	Aerial Survey	4,070		
01-95	Disaster Declaration			270
08-95	Cleanout		1,796	
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	2,900		
02-98	Disaster Declaration			270
07-98	Aerial Survey	755		
12-98	Cleanout		3,662	
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
12-01	Cleanout		787.5	
09-03	Cleanout		408	
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			231
09-05	Cleanout		1,054- Survey	
08-05	TIN volume to Elev29 142 ft	1,834 to Elev 142 ft		
11-05	TIN volume to Elev29 142 ft	2,844 to Elev 142 ft	1,010	

NOTES

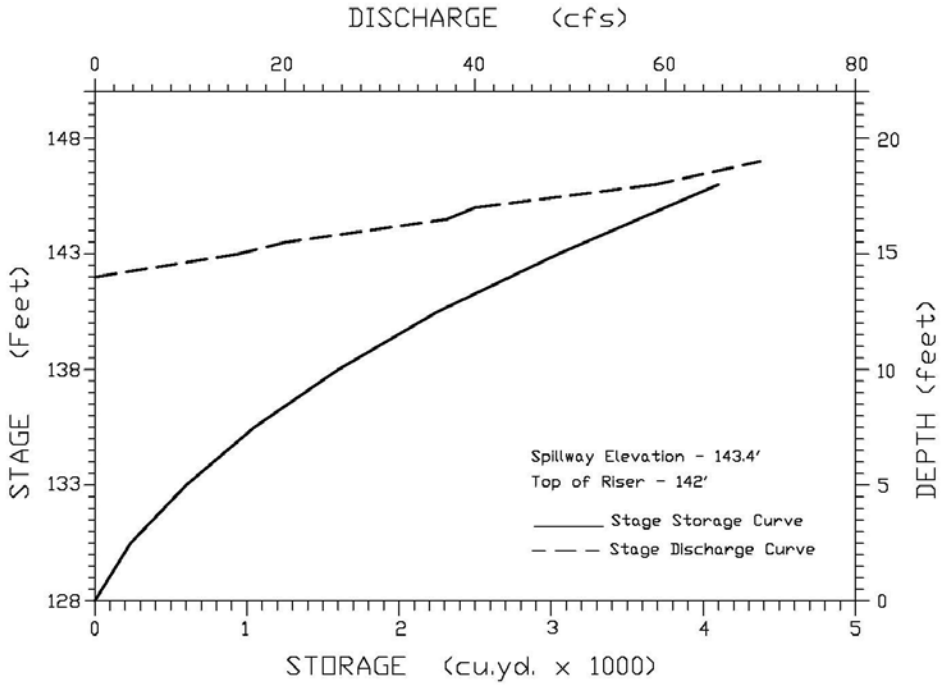
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

NA= Not Available / Not Applicable

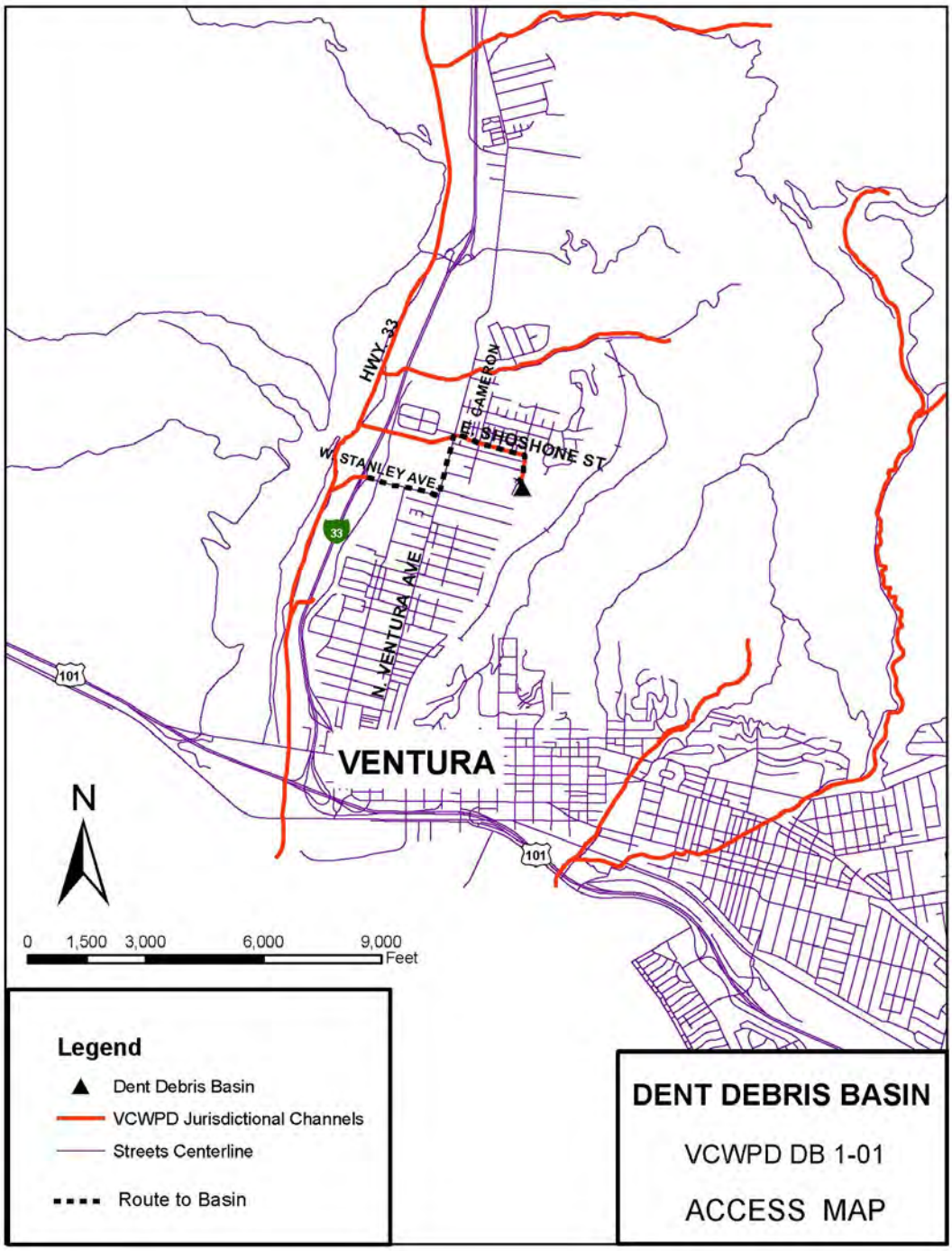
DENT DRAIN
N
0 200 400 800 1,200 1,600
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
DENT DEBRIS BASIN
VCWPD DB 1-01
WATERSHED MAP

DENT DEBRIS BASIN



2005 Volumes After Cleanout

Elev. Ft 29	
126	-
127	27.0
128	98.9
129	193.3
130	306.4
131	434.8
132	577.0
133	733.4
134	904.5
135	1,095.9
136	1,302.8
137	1,519.4
138	1,751.5
139	1,999.2
140	2,263.0
141	2,543.4
142	2,840.9
143	3,156.1
144	3,489.3
145	3,841.2
146	4,212.2
147	4,603.3


HWY 33
E. CAMERON
E. SHOSHONE ST
W. STANLEY AVE
N. VENTURA AVE
33
101
101
VENTURA
N
0 1,500 3,000 6,000 9,000
Feet
Legend
Dent Debris Basin
VCWPD Jurisdictional Channels
Streets Centerline
Route to Basin
DENT DEBRIS BASIN
VCWPD DB 1-01
ACCESS MAP

FRESNO CANYON DEBRIS TRAP DB1-04

LOCATION: Next to Highway 33 in Casitas Springs, Ventura County
N 316,830 E 1,605,830. (Lambert Zone 5 Coordinates)
Ventura East 7-1/2' Quad

DESIGN DATA

Design Agency	VCWPD O&M Division
Maximum Debris Capacity	2,760 cy at 280 ft NAVD88
Maximum Debris Elevation	280 ft NAVD88
100-Yr Inflow and Outflow Rates	IN= 1,673 cfs; OUT=Similar due to lack of storage
Debris Cleanout Elevation	Annual cleanouts due to small capacity
EMERGENCY SPILLWAY	
Type	None
Weir Elevation	-
Spillway Length	-
Capacity w/o Freeboard	-
PRINCIPAL SPILLWAY	
Type	54-in RCP
Bottom Weir/Top Elevation	271.91 ft NAVD88
Outlet Conduit	54 in RCP
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	-
Outlet Conduit	-
DAM	
Dam Type	Hwy33 Road Bed
Dam Crest Elevation	~280 ft NAVD88
Length	NA
Surface Area of Full Basin	~9,700 sf at elev. 280 ft NAVD88
Watershed Area	866 ac
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	VCWPD O&M Division
Completion Date	10-2005
REFERENCE DRAWINGS	
Construction Drawings	X-1-xxxx thru X-1-xxxx (Not in Facilities Database)
Topographic Drwgs(as-built)	X-1-0667 (10-2005 cleanout)
Right-of-Way Drawings	

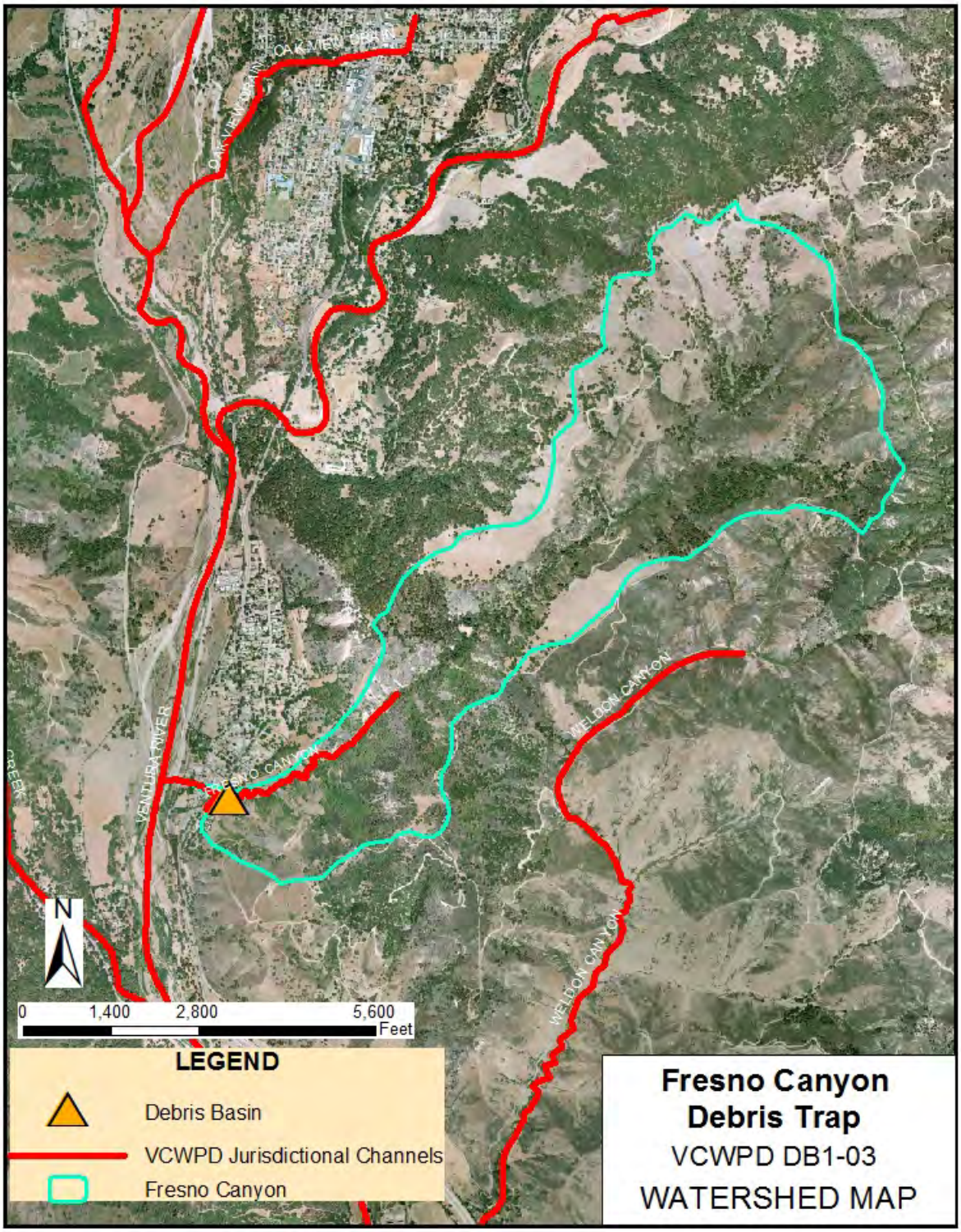
EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	53,932	78,226
50-YEAR	40,872	59,284
10-YEAR	17,487	25,364

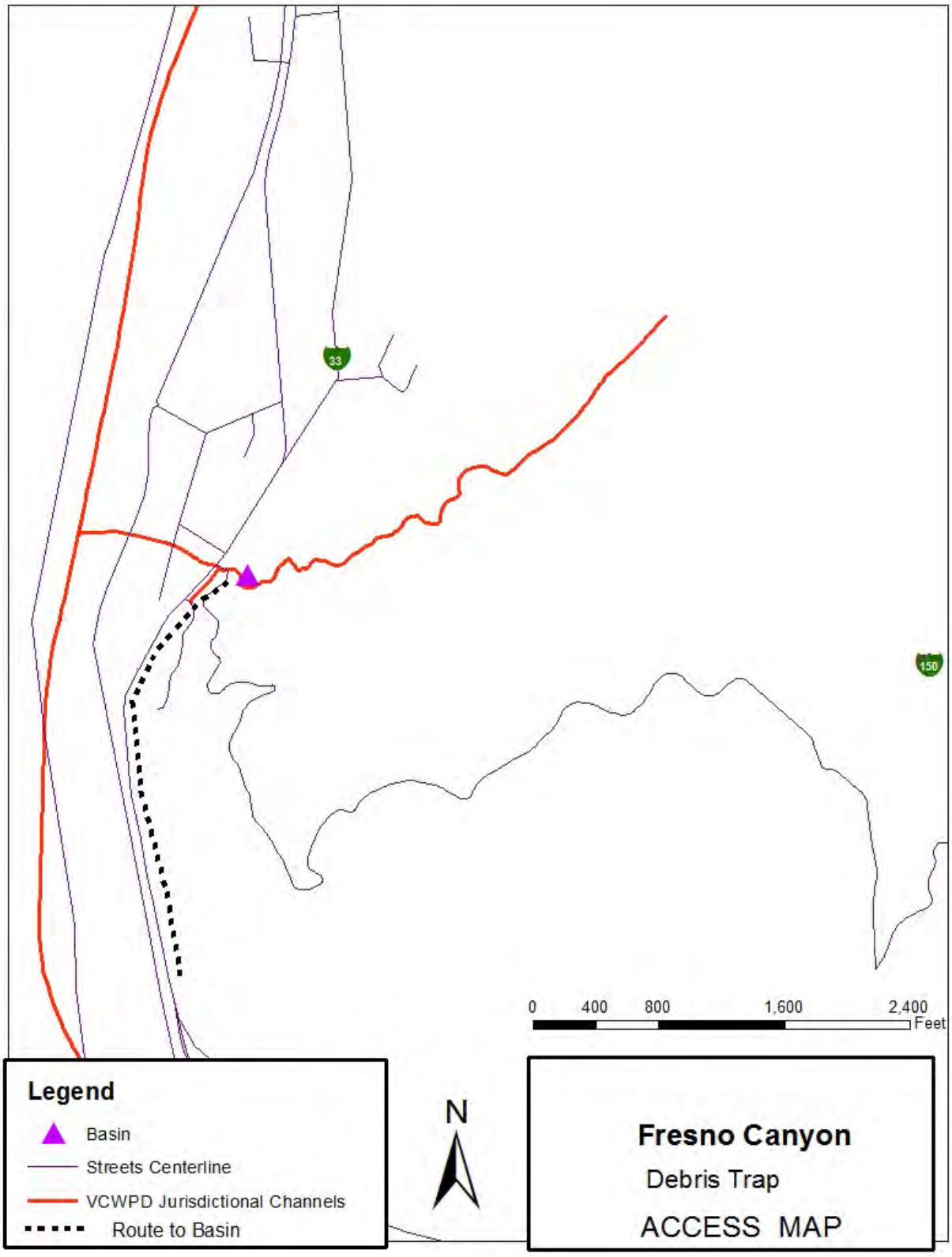
BASIN HISTORY:

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
10-05	Basin Excavated to Design Dimension	2,760 below elev. 280 ft NAVD88		NA
2009	Cleanout- Truck Count	Not surveyed	160	NA
2010	Cleanout- Truck Count	Not surveyed	8	NA

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris
NA= Not Available / Not Applicable
*** Theoretical value from Scott and Williams (1978), 10% of 50-yr yield estimate.


OAK VIEW DRIVE
OAK VIEW DRIVE
VENTURA RIVER
FRESNO CANYON
WELDON CANYON
WELDON CANYON
N
0 1,400 2,800 5,600
Feet
LEGEND
Debris Basin
VCWPD Jurisdictional Channels
Fresno Canyon
Fresno Canyon
Debris Trap
VCWPD DB1-03
WATERSHED MAP


33
150
0 400 800 1,600 2,400
Feet
Legend
Basin
Streets Centerline
VCWPD Jurisdictional Channels
Route to Basin
N
Fresno Canyon
Debris Trap
ACCESS MAP

LIVE OAK CREEK DIVERSION DD1-05

LOCATION: City of Ojai. From Santa Ana Blvd north to Riverside Rd.
Approximately 1500 ft north from the intersection Burnhan-Riverside
E 1,606,094.68, N 335,410 (Lambert Zone 5 Coordinates)
Matilija, 7 ½' Quadrangle Map

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Flood Storage Capacity	28.22 ac-ft or 45,527.3 cy assuming no debris accumulation in basin
100-Yr Inflow and Outflow Rates	Q_{100}IN = 1,305 cfs, Q_{100}OUT=807 cfs from as-builts
Debris Cleanout Elevation	475 ft (5,238 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	18 in diameter cobbles with concrete
Invert/Weir Elevation	486 ft NGVD29
Capacity with Freeboard	1,190 cfs at elev. 491.0 ft
PRINCIPAL SPILLWAY	
Type	10 ft W x13 D ft RC Intake structure 17 ft H, 8 ft X8 ft low flow inlet, weir elevation 465 ft; 2-12 ft X4 ft high level inlets with trash racks, weir elevations 475 ft
Top Elevation	480.00 ft
Outlet Conduit	RC Box 8 ft x 6 ft
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill
Dam Crest Elevation	494 ft
Length	318 ft
Surface Area of Full Basin	3.47 ac
Watershed Area	794 ac from GIS Watershed Layer Shapefile
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	Gregg J. Harris Construction, Inc for VCWPD
Completion Date	2002
REFERENCE DRAWINGS	
Construction Drawings	Y-1-0584 – Y-1-0599
Right-of-Way Drawings	Y-1-0600 – Y-1-0601
Topographic Drawings	Y-1-0602

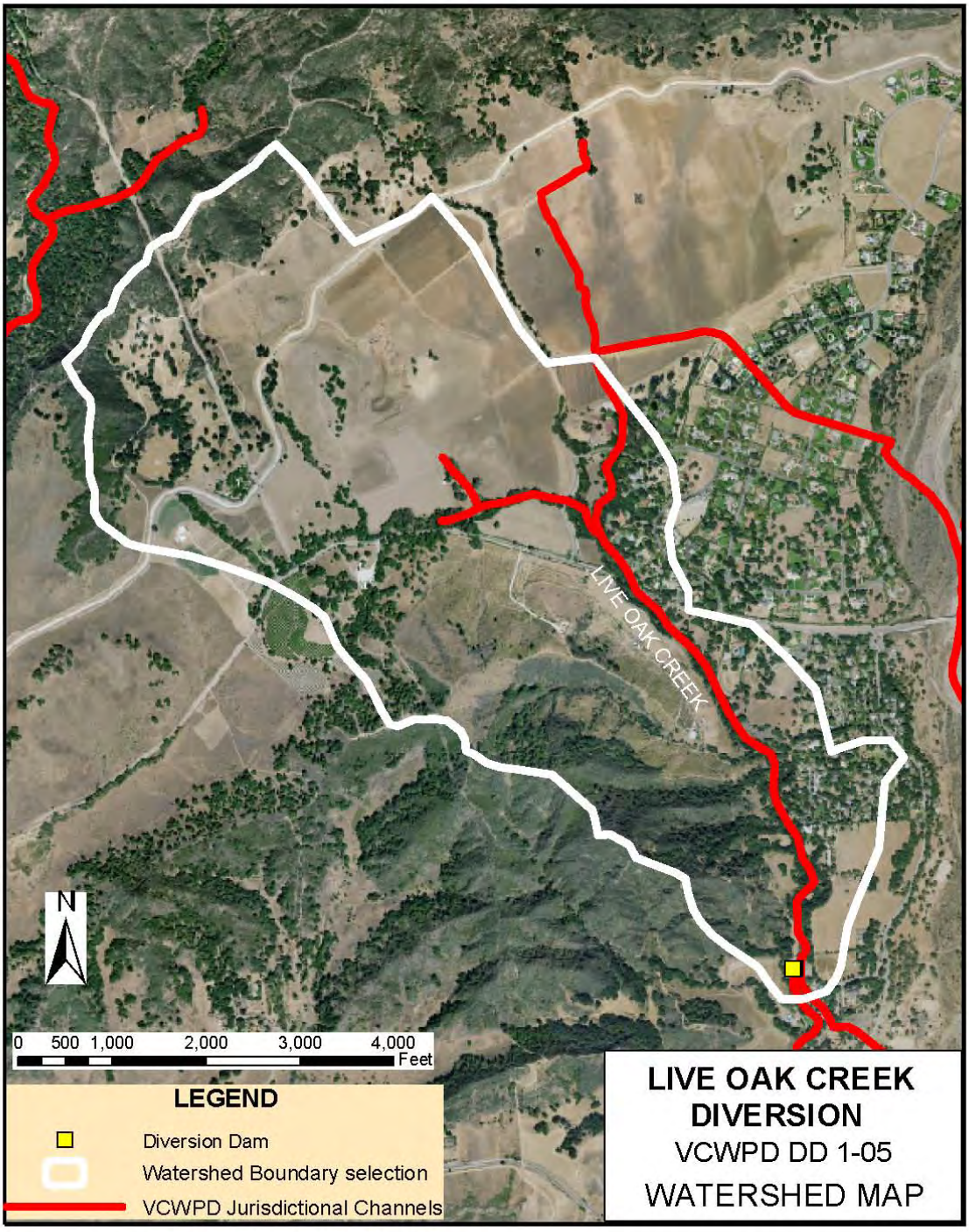
EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	20,952	16,825
50-YEAR	15,991	12,841
25-YEAR	9,012*	7,255*

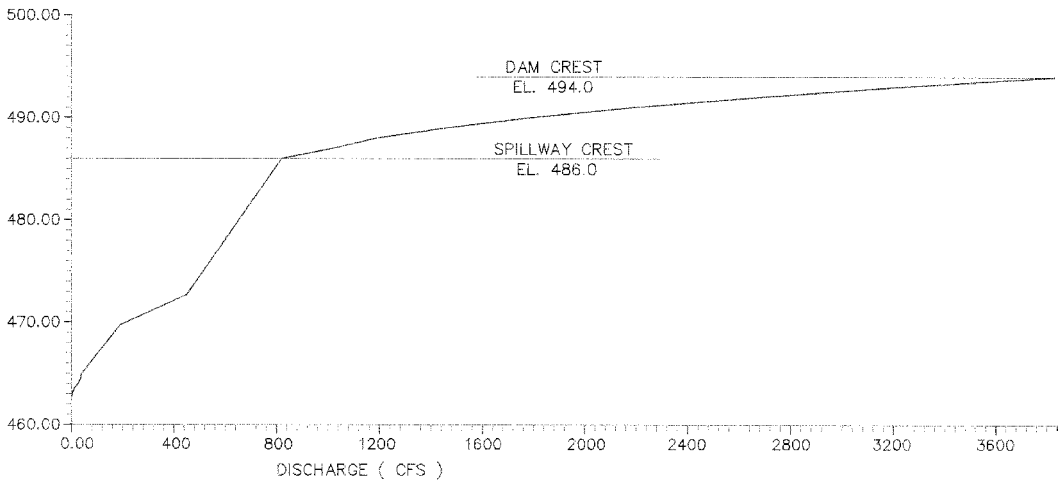
BASIN HISTORY: LIVE OAK CREEK DIVERSION

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-05	Disaster Declaration			1,600***

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris
NA= Not Available / Not Applicable
*** Theoretical value from Scott and Williams (1978), 10% of 50-yr yield estimate.

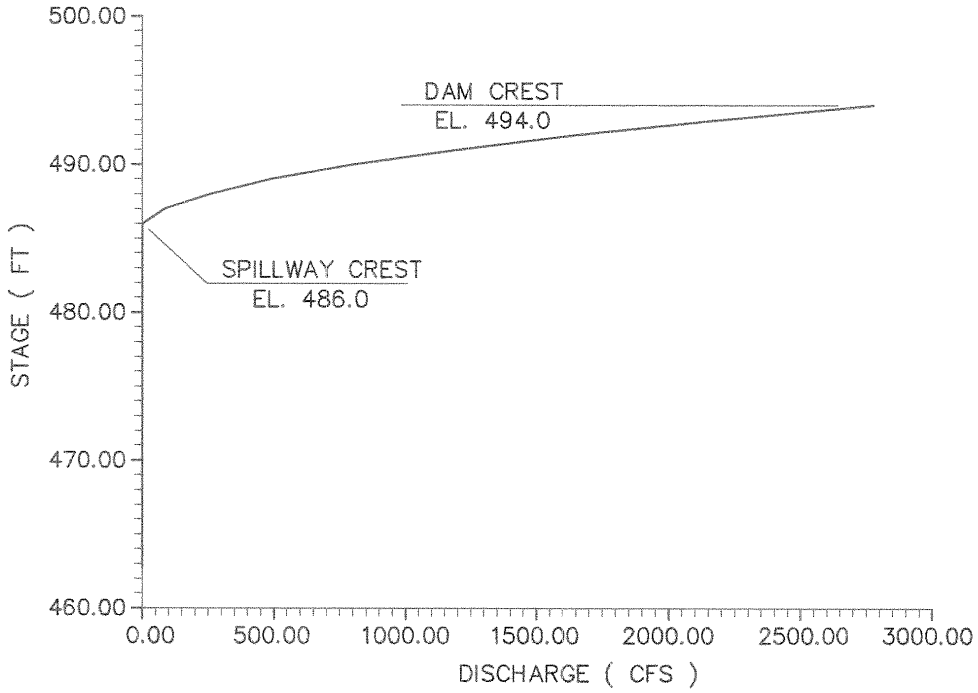

LIVE OAK CREEK
N
0 500 1,000 2,000 3,000 4,000
Feet
LEGEND
Diversion Dam
Watershed Boundary selection
VCWPD Jurisdictional Channels
LIVE OAK CREEK DIVERSION
VCWPD DD 1-05
WATERSHED MAP



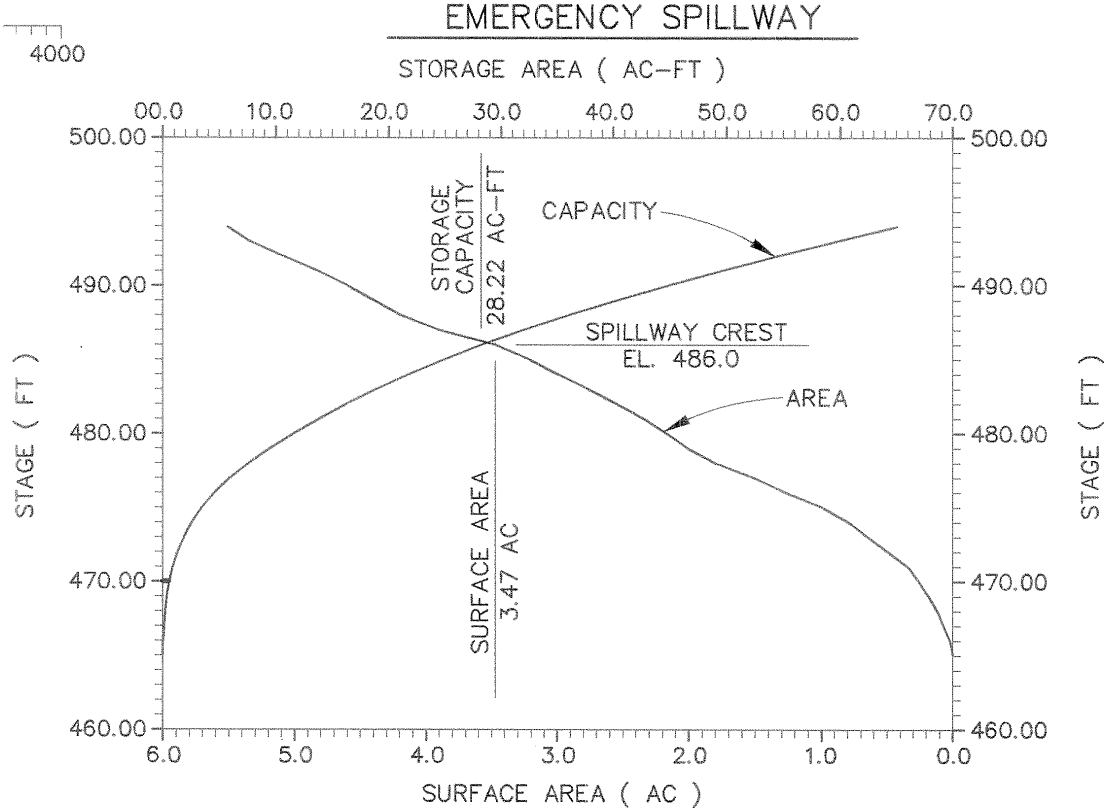
RC PIPE CONDUIT + RC LOW-FLOW PIPE+EMERGENCY SPILLWAY

STAGE DISCHARGE CURVES

Live Oak Creek Diversion



EMERGENCY SPILLWAY

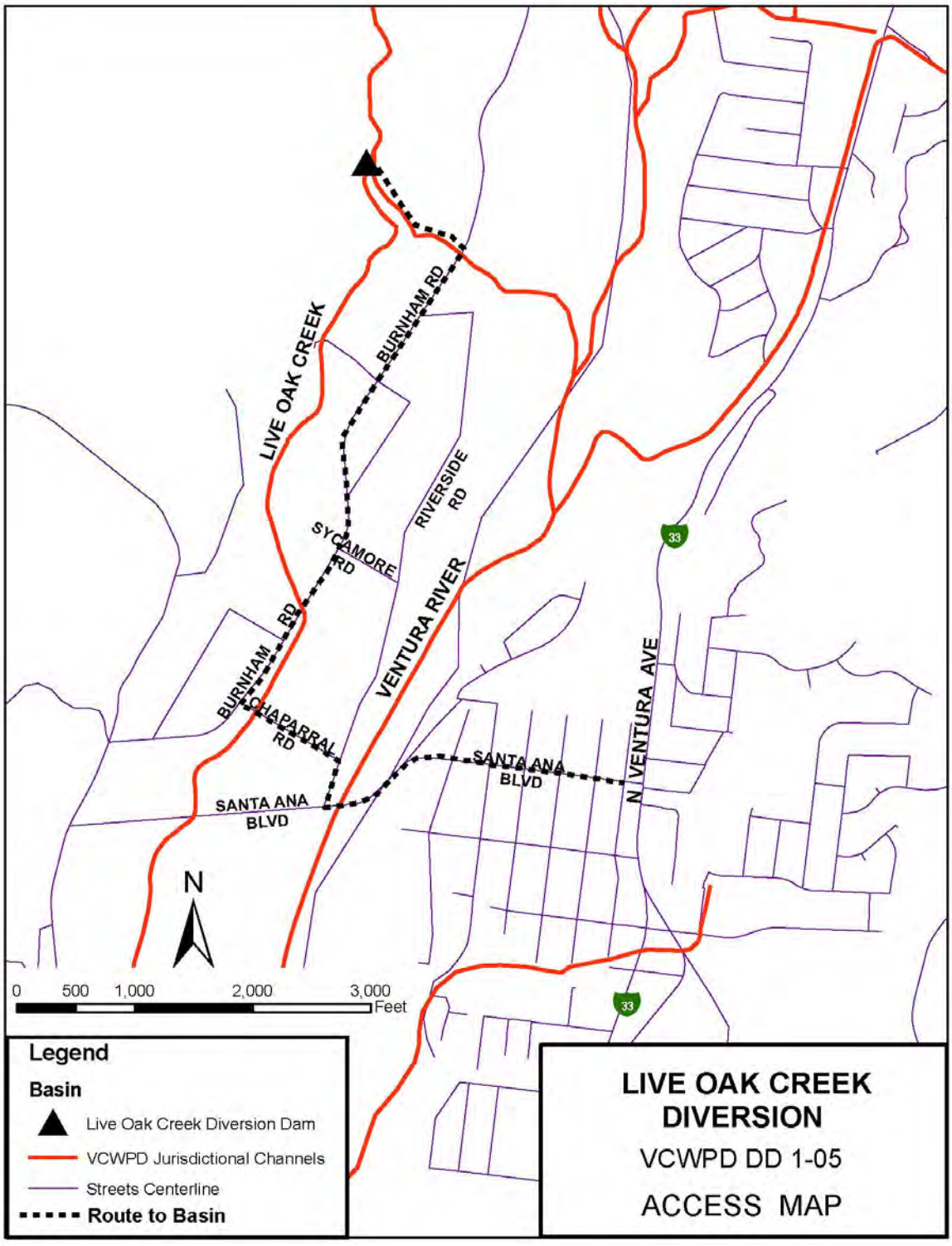


AREA-CAPACITY CURVE

Live Oak Creek Diversion

Live Oak Stage Storage Discharge Design Data

Elevation	Volume	Pipe & Low Flow Outlet	Emergency Spillway	Total Discharge
Ft. NGVD29	Cu. Yds	Cfs	Cfs	Cfs
460	-	-	-	-
462	-	-	-	-
464	-	25	-	25
466	-	70	-	70
468	-	135	-	135
470	-	215	-	215
472	1,048.6	390	-	390
474	4,033.3	485	-	485
476	7,259.9	550	-	550
478	12,099.8	600	-	600
480	18,553.0	652	-	652
482	25,974.1	707	-	707
484	35,331.3	762	-	762
486	45,527.3	818	-	818
488	58,078.8	1,187	250	1,437
490	72,437.2	1,780	800	2,580
492	87,279.5	2,663	1,640	4,303
494	104,864.5	3,829	2,770	6,599


LIVE OAK CREEK
BURNHAM RD
RIVERSIDE RD
SYCAMORE RD
VENTURA RIVER
BURNHAM RD
CHAPARRAL RD
SANTA ANA BLVD
SANTA ANA BLVD
N VENTURA AVE
33
33
N
0 500 1,000 2,000 3,000 Feet
Legend
Basin
Live Oak Creek Diversion Dam
VCWPD Jurisdictional Channels
Streets Centerline
Route to Basin
LIVE OAK CREEK DIVERSION
VCWPD DD 1-05
ACCESS MAP

MATILIJA DAM State Dam No. 86-000

LOCATION: Dam approximately 1,200 ft west of Highway 33 north of Meiners Oaks area in Ventura County
N 360,900 E 1,606,000. (Lambert Zone 5 Coordinates)
Matilija 7-1/2'Quad

DESIGN DATA

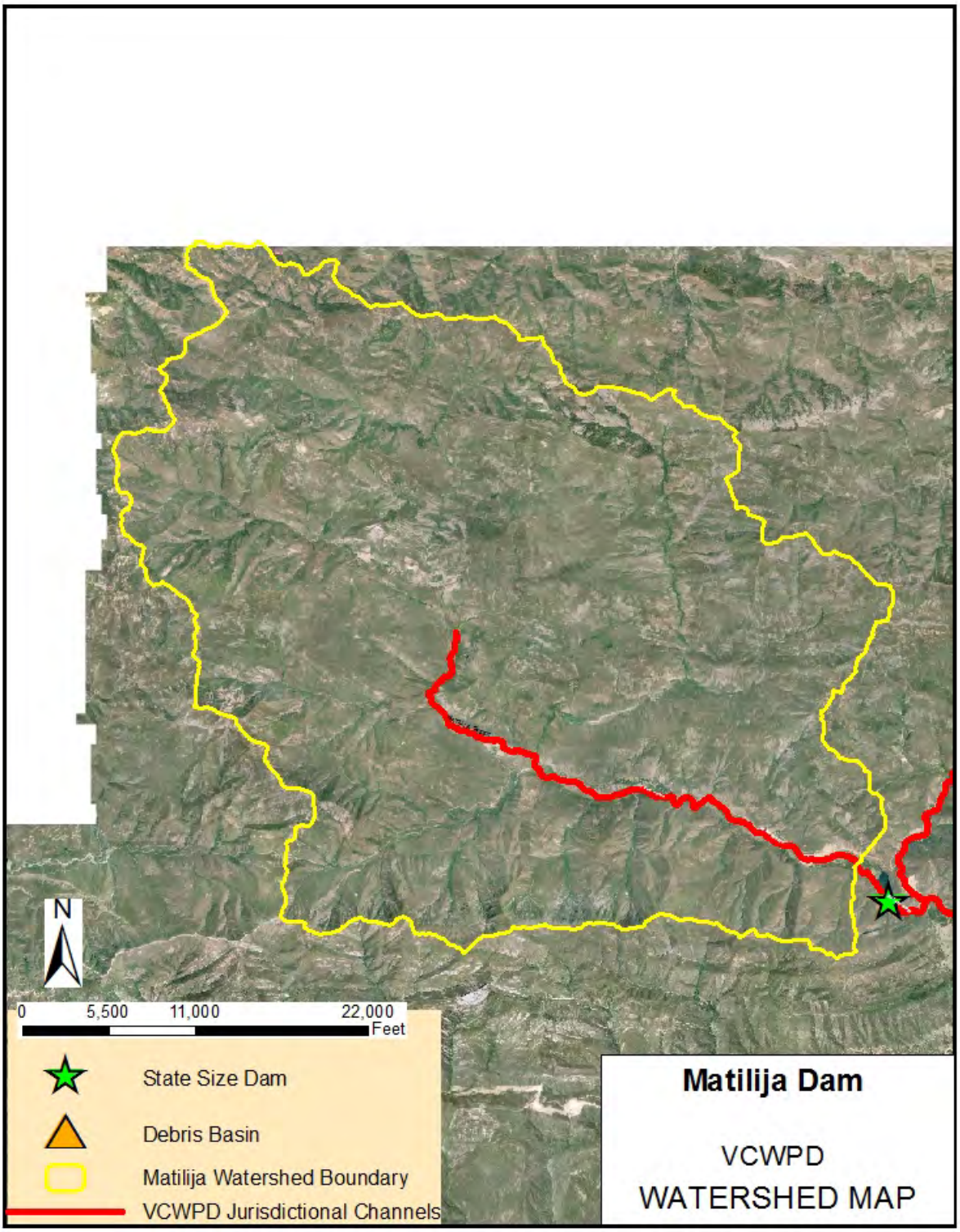
Design Agency	VCWPD
Flood Storage Capacity	7,018 ac-ft design, 500 ac-ft current
Maximum Debris Elevation	1097.6 ft NAVD88- notch in dam
100-Yr Inflow and Outflow Rates	IN= 21,600 cfs; OUT=Similar due to lack of storage
Debris Cleanout Elevation	None
EMERGENCY SPILLWAY	
Type	Weir flow over top of dam- dam notched in 1965
Weir Elevation	1097.6 ft NAVD88
Spillway Length	-
Capacity w/o Freeboard	-
PRINCIPAL SPILLWAY	
Type	36-in relief valve, max Q=250 cfs
Bottom Weir/Top Elevation	
Outlet Conduit	36 in RCP
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	-
Outlet Conduit	-
DAM	
Dam Type	Concrete Arch Dam
Dam Crest Elevation	1097.6 ft NAVD88 at 1965 Notch
Length	620 ft
Surface Area of Full Basin	NA
Watershed Area	54.6 sq mi, 34,945 ac
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	1947
REFERENCE DRAWINGS	
Construction Drawings	X-1-0001 thru X-1-0027
Topographic Drwgs(as-built)	X-1-0001
Right-of-Way Drawings	

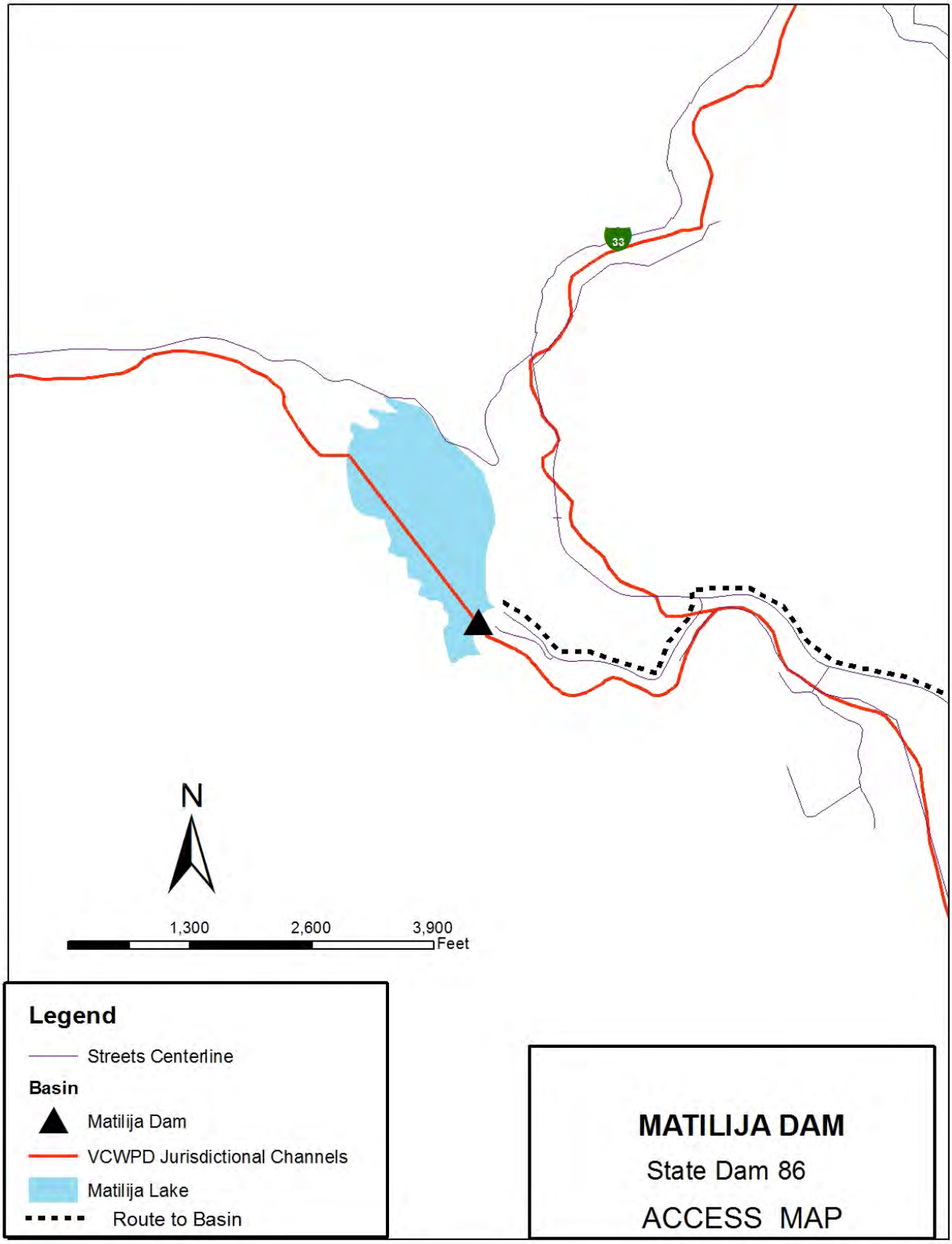
Based on the estimated 6.0 million cubic yards (3,719 acre-ft) of sediment deposited behind Matilija dam since its construction, and using trap efficiencies as presented in
USBR Table 0.1, the sediment yield is estimated to be 1.92 acre-ft/mi^2/yr (0.79 mm/yr) or 105 acre-ft/yr upstream of Matilija Dam. (USBR, 2003, Draft).

USBR Table 0.1. Historical Reservoir deposition.

	Active Storage Volume (ac-ft)			
Elevation (NAVD 88)	**1970**	**1983**	**1994**	**2002 est.***
1042.6	14.2	0	0	0
1047.6	93	0	0	0
1052.6	219	0	0	0
1057.6	367	0	0	0
1062.6	533	57	0	0
1067.6	724	172	0	0
1072.6	947	305	39	0
1077.6	1199	468	153	0
1082.6	1479	662	283	0
1087.6	1789	906	447	24
1092.6	2121	1190	666	250
1097.6	2473	1480	930	500
* 2002 was estimated based on a 500 acre-ft total capacity and zero capacity at elevation of 1087 feet				

Reference: Hydrology, Hydraulics and Sediment Studies of Alternatives for the Matilija Dam Ecosystem Restoration Project, Ventura CA. US Department of the Interior, Bureau of Reclamation, Technical Service Center, Sedimentation and River Hydraulics Group. Draft dated December 18, 2003


N
0
5,500
11,000
22,000
Feet
State Size Dam
Debris Basin
Matilija Watershed Boundary
VCWPD Jurisdictional Channels
Matilija Dam
VCWPD
WATERSHED MAP


33
N
1,300
2,600
3,900
Feet
Legend
Streets Centerline
Basin
Matilija Dam
VCWPD Jurisdictional Channels
Matilija Lake
Route to Basin
MATILIJA DAM
State Dam 86
ACCESS MAP

McDONALD DETENTION BASIN DD1-06

LOCATION: Approximately ¼ mile east of the junction of Highway 33 and Fairview Road, in the Meiners Oaks area in Ventura County
N 350,477 E 1,615,750. (Lambert Zone 5 Coordinates)
Matilija 7-1/2'Quad

DESIGN DATA	Basin has 78-in RCP bypass channel designed for Q100= 590cfs; (Elevations shown are NGVD29)
Design Agency	VCWPD
Flood Storage Capacity	14.5 ac-ft (23,393 cy) above debris storage volume
Maximum Debris Elevation	801 ft NGVD29, 125% of 100-yr debris volume
100-Yr Inflow and Outflow Rates	IN= 629 cfs; OUT=52 cfs from as-builts
Debris Cleanout Elevation	798.72 ft NGVD29 [Max. Debris Cap from As-Builts]
EMERGENCY SPILLWAY	
Type	RC Drop Box Inlet (30 ft Long x 10 ft wide)
Weir Elevation	813 ft NGVD29
Spillway Length	70 ft
Capacity w/o Freeboard	Q100=630 cfs
PRINCIPAL SPILLWAY	
Type	RC Riser Tower with Grated Inlet 12.25 ft H ft X 3 ft W
Bottom Weir/Top Elevation	801.00/814.00 ft NGVD29
Outlet Conduit	24 in RCP
DEBRIS BLEEDER/RISER	
Type	2 ft X2 ft low flow inlet in RC Riser Tower with Trash Rack
Top Elevation	799.00 NGVD29
Outlet Conduit	24-in RCP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	816 ft NGVD29
Length	Length 238 ft
Surface Area of Full Basin	2.63 ac
Watershed Area	573 ac from GIS Watershed Shapefile
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	1998
REFERENCE DRAWINGS	
Construction Drawings	Y-1-560 thru Y-1-578
Topographic Drwgs(pre-const)	Y-1-57
Right-of-Way Drawings	Y-1-560 thru Y-1-561

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition (Note 1)**	**100% Burn**
100-YEAR	20,179 (3,974)	37,490 (5,765)
50-YEAR	15,396 (3,015)	28,603 (4,372)
25-YEAR	10,020 (1,833)	31,936 (2,658)

(Note 1) Basin designed so that majority of sediment bypasses basin. Only 46-ac of 573-ac watershed contribute sediment to basin, with yield estimates provided in ( ).

BASIN HISTORY: MCDONALD CANYON DETENTION BASIN

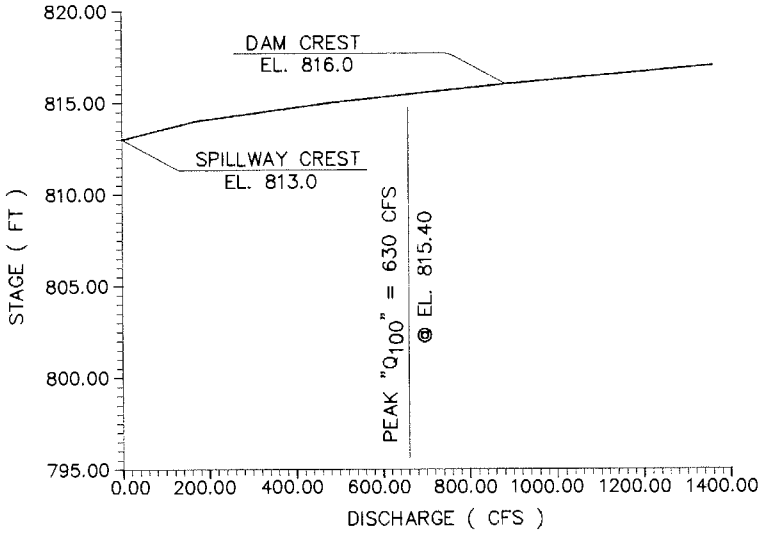
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
07-98	Cleanout		76	
01-05	Disaster Declaration			300***

Notes

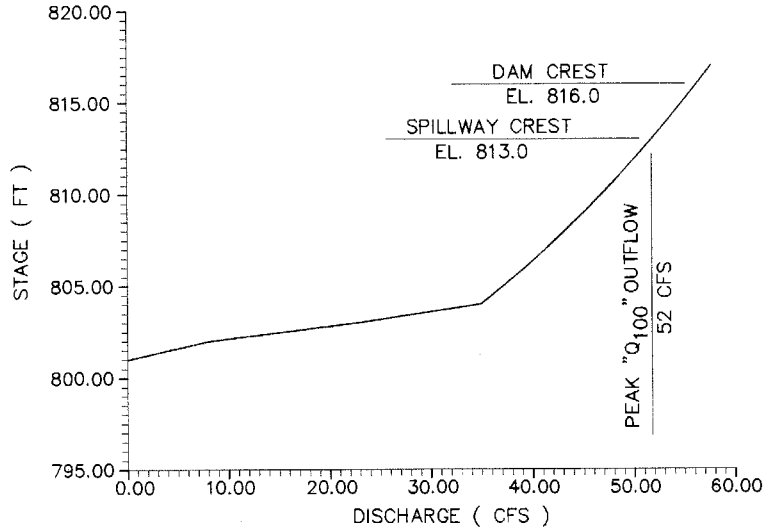
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

NA= Not Available / Not Applicable

*** Theoretical value from Scott and Williams (1978), 10% of 50-yr yield estimate.



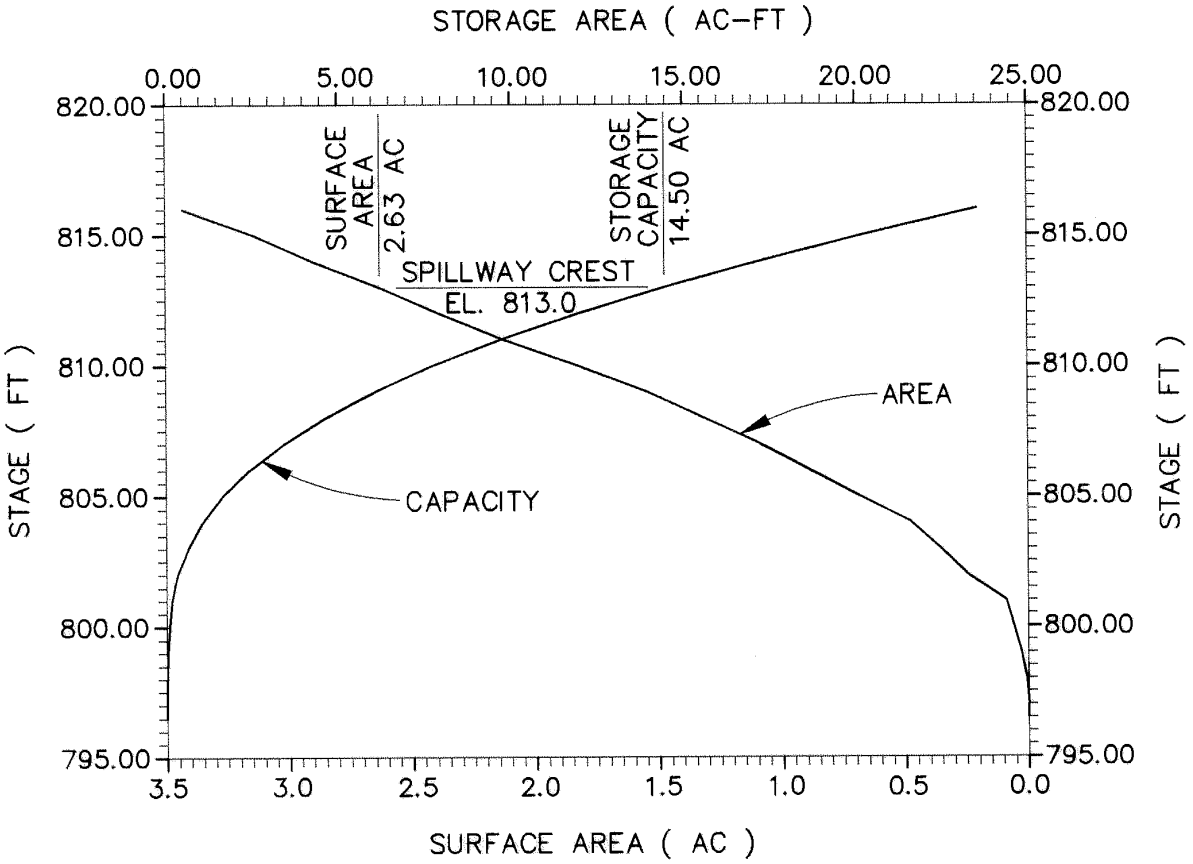
EMERGENCY SPILLWAY



OUTLET PIPE

STAGE DISCHARGE CURVES

McDonald Canyon Detention Basin



AREA-CAPACITY CURVE

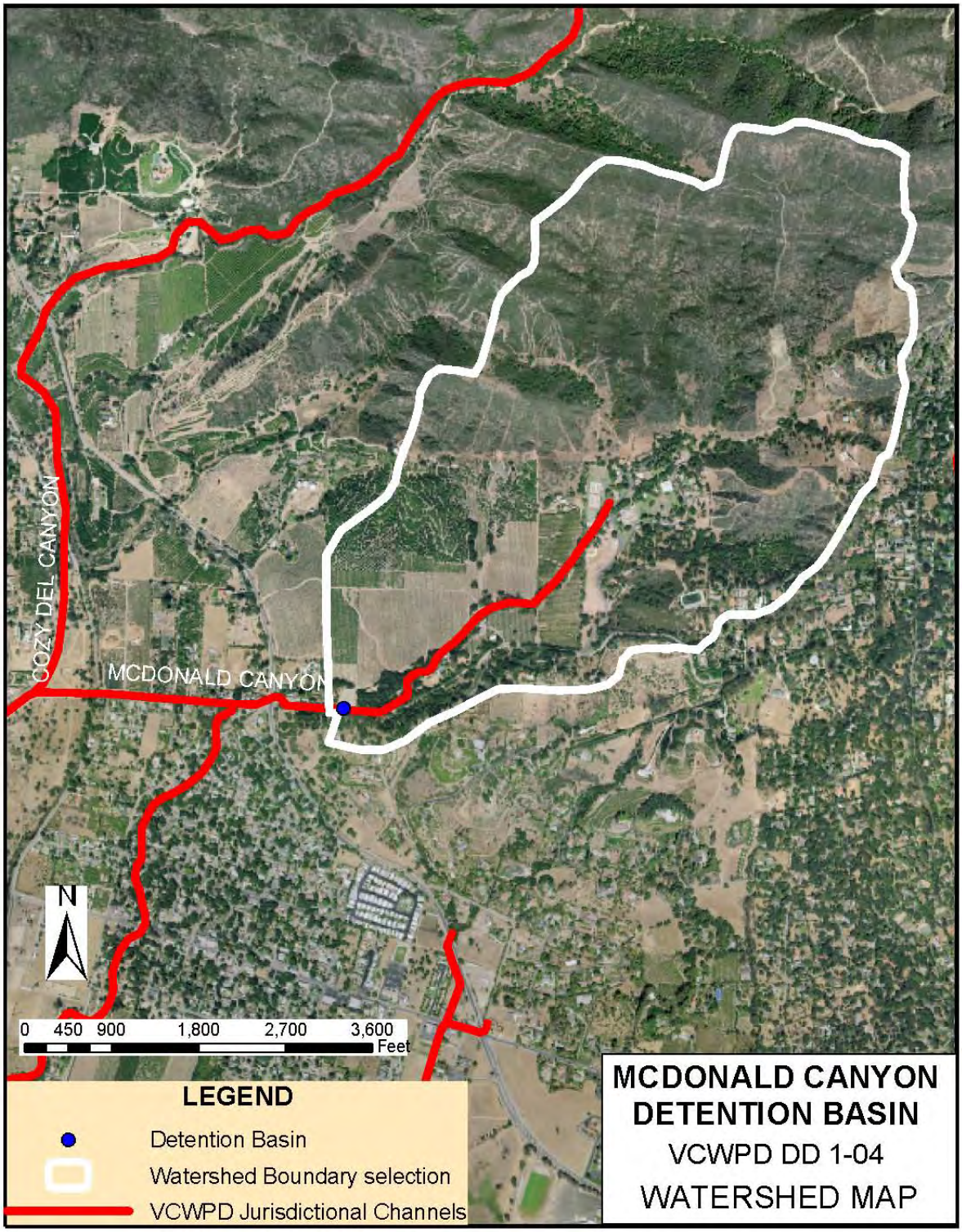
McDonald Canyon Detention Basin

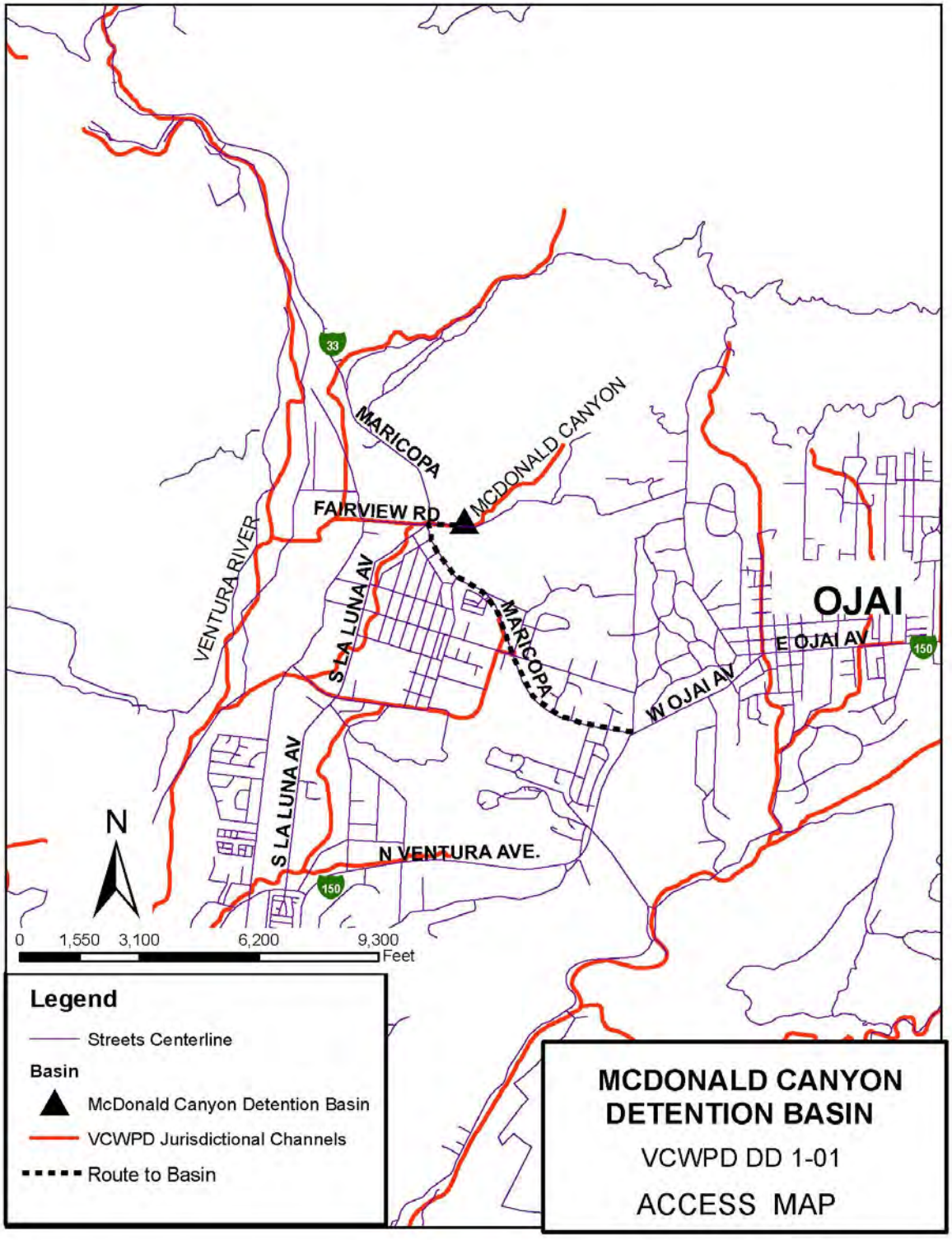
(Appears to be flood storage only- does not show debris storage volume)

Stage-Storage-Discharge Data

Elevation	Volume	Outlet Pipe	Emer. Spillway	Total Disch.
Ft NGVD29	Cu. Yds	Cfs	Cfs	Cfs
795	-	-		-
796	-	-		-
797	-	-		-
798	-	-		-
800	-	-		-
801	403	-		-
802	807	8.0		8.0
803	968	22.9		22.9
804	1,613	35.0		35.0
805	2,581	37.0		37.0
806	3,872	39.0		39.0
807	5,485	41.2		41.2
808	7,341	43.0		43.0
809	9,680	45.0		45.0
810	12,422	47.0		47.0
811	15,810	48.0		48.0
812	19,360	50.0		50.0
813	23,393	52.0	-	52.0
814	28,233	53.2	170.0	223.2
815	32,669	55.0	480.0	535.0
816	37,913	56.2	881.0	937.2

Note: Net volume above design debris level


COZY DEL CANYON
MCDONALD CANYON
N
0 450 900 1,800 2,700 3,600
Feet
LEGEND
Detention Basin
Watershed Boundary selection
VCWPD Jurisdictional Channels
MCDONALD CANYON
DETENTION BASIN
VCWPD DD 1-04
WATERSHED MAP


33
MARICOPA
MCDONALD CANYON
FAIRVIEW RD
VENTURA RIVER
S LA LUNA AV
MARICOPA
OJAI
E OJAI AV
150
W OJAI AV
S LA LUNA AV
N VENTURA AVE.
150
N
0 1,550 3,100 6,200 9,300
Feet
Legend
Streets Centerline
Basin
McDonald Canyon Detention Basin
VCWPD Jurisdictional Channels
Route to Basin
MCDONALD CANYON
DETENTION BASIN
VCWPD DD 1-01
ACCESS MAP

SAN ANTONIO CREEK DEBRIS BASIN DB1-03 (Obsolete)

LOCATION: Ojai Valley, 800 ft northwest of Carne and Thacher Rds; N 353,209; E 1,636,282 (Lambert Zone 5 Coordinates)
Ojai 7-1/2'Quad

DESIGN DATA	Built in response to fire, destroyed by flood
Design Agency	VCWPD (VCFCD)
Flood Storage Capacity	14,600 cy (12-12-90 DTM)
Maximum Debris Capacity	30,000 cy (12-12-90 DTM)
100-Yr Inflow and Outflow Rates	IN= 5,800 cfs; OUT=same
Basin Type	In-Line Channel Basin
EMERGENCY SPILLWAY	
Type	Berm Across Channel
Weir Elevation	970 ft NGVD29
Spillway Length	112 ft wide x 5 ft high
Capacity w/o Freeboard	6,400 cfs
PRINCIPAL SPILLWAY	
Type	None
Bottom Weir/Top Elevation	-
Outlet Conduit	-
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	-
Outlet Conduit	-
DAM	
Dam Type	Earthen
Dam Crest Elevation	970 ft NGVD29
Length	170 ft
Surface Area of Full Basin	1.6 ac level, 3.7 ac at max. debris cap.
Watershed Area	6,280 ac from 1999 Basin Manual
Width at Crest	-
CONSTRUCTION DATA	
Construction Agency	VCFCD
Completion Date	1986
REFERENCE DRAWINGS	
Construction Drawings	FC 8609, pages 49-52
Topographic Drwgs(pre-const)	T-439 (9-86), 12-12-90 DTM, T440 (9-94)
Right-of-Way Drawings	Fee 88-114290 Deed 10164.1

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition)**	**100% Burn**
100-YEAR	455,660	660,919
50-YEAR	348,022	504,793
25-YEAR	249,693	362,170

BASIN HISTORY:

DATE	ACTION	REMAINING CAPACITY	REMOVED	AADP*
Jul-86	Aerial Survey	3,400		
Nov-86	Cleanout		26,600	34,800***
Oct-90	Aerial Survey	Not Digitized		
Dec-90	Aerial Survey	30,000		
Jun-91	Aerial Survey	Not Digitized		
Feb-92	Disaster Declaration			4,586**
May-92	Aerial Survey	9,400		
Dec-92	Cleanout		20,600	
Jan-93	Aerial Survey	30,000		
Sep-94	Aerial Survey	18,000		
Jan-95	Disaster Declaration			3,325
Jan-95	Aerial Survey	1,800		
Jul-96	Aerial Survey	Not Digitized		
Jul-97	Aerial Survey	2,640		3,881
Feb-98	Disaster Declaration	Berm Destroyed by Storm, Not Reconstructed		

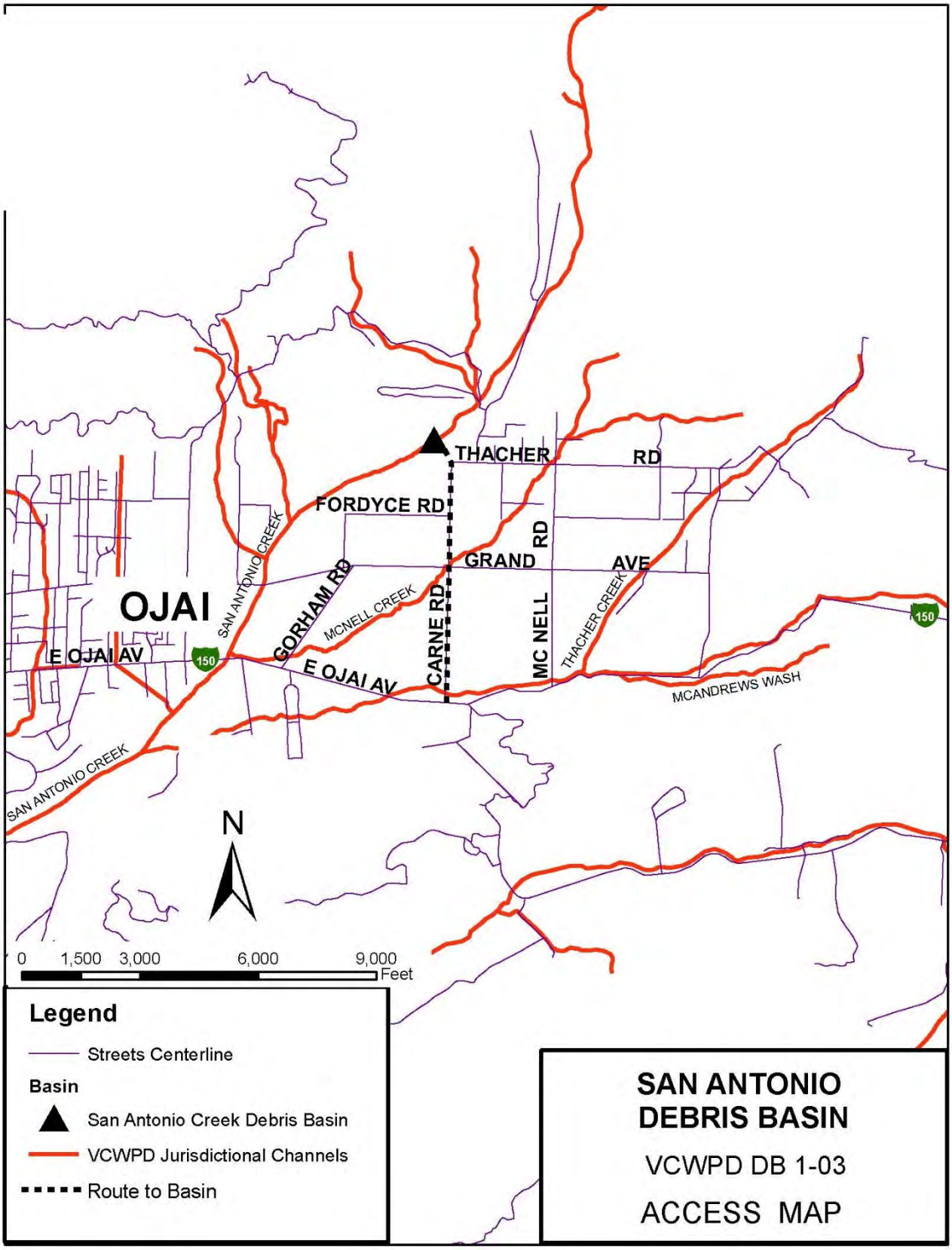
Notes

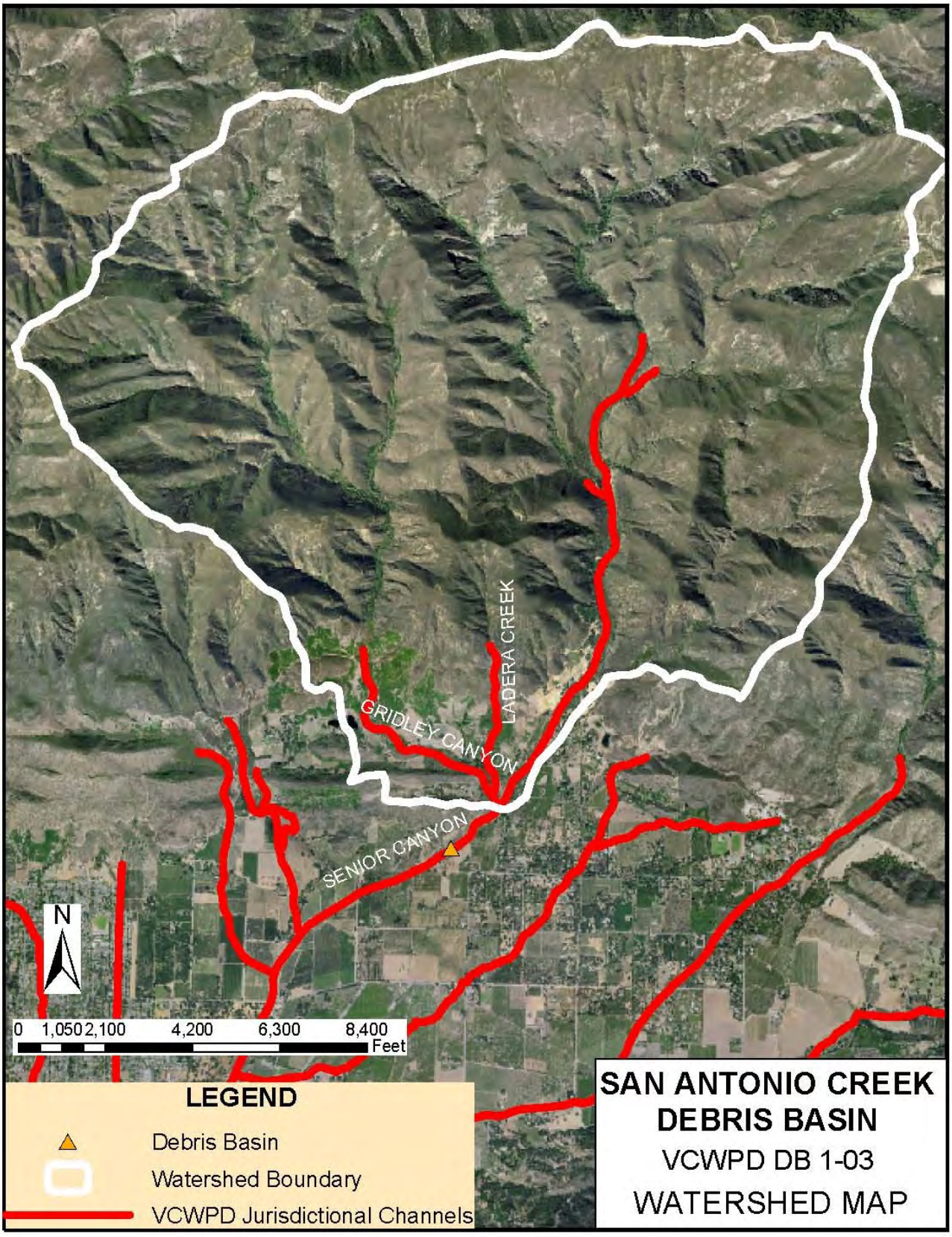
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

NA= Not Available / Not Applicable

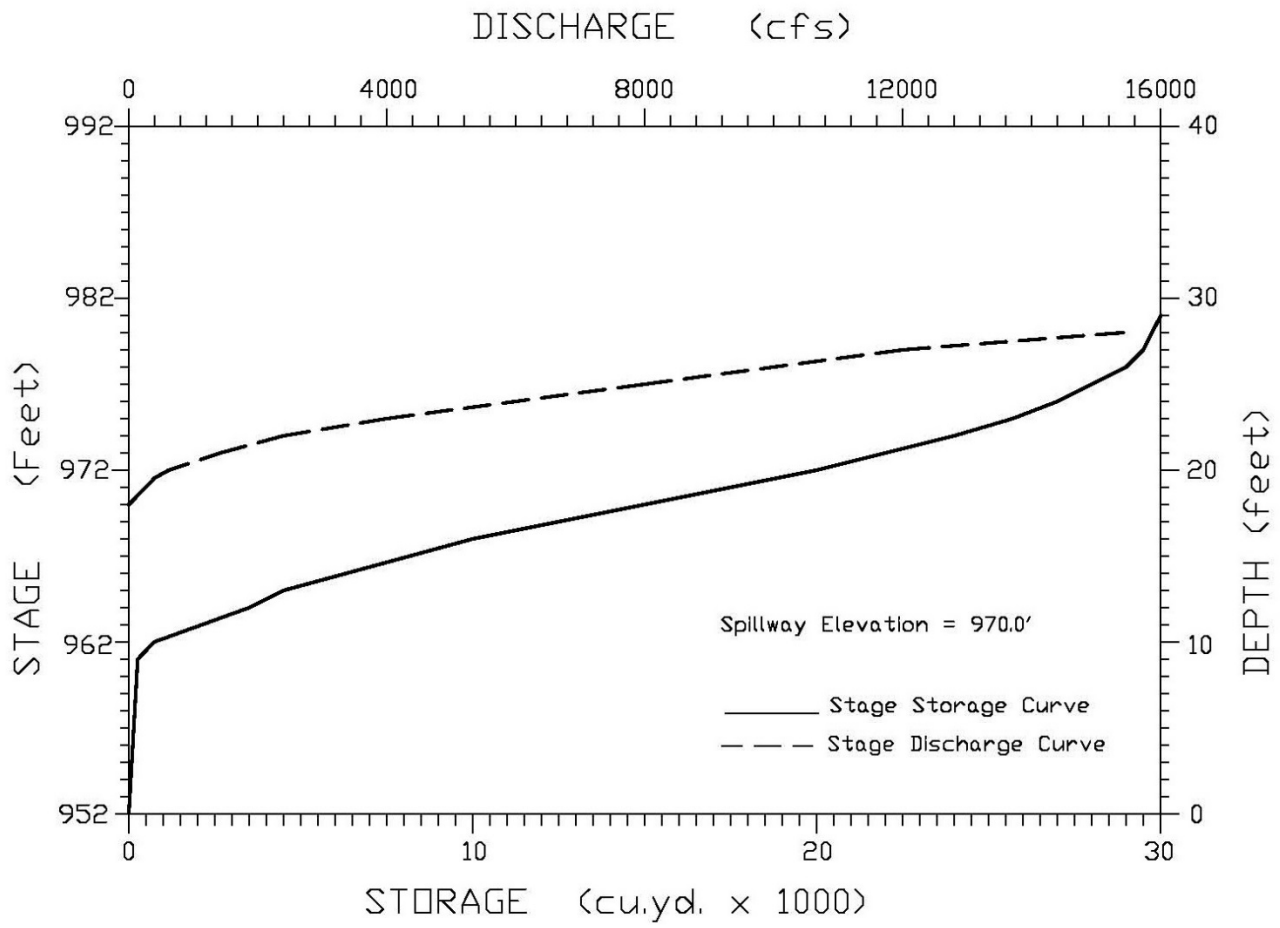
*** Theoretical value from Scott and Williams (1978), 10% of 50-yr yield estimate.

** FEMA Accepted Value


THACHER
RD
FORDYCE RD
GRAND
AVE
RD
OJAI
SAN ANTONIO CREEK
GORHAM RD
MCNELL CREEK
CARNE RD
MC NELL
THACHER CREEK
E OJAI AV
150
E OJAI AV
MCANDREWS WASH
SAN ANTONIO CREEK
N
0 1,500 3,000 6,000 9,000
Feet
Legend
Streets Centerline
Basin
San Antonio Creek Debris Basin
VCWPD Jurisdictional Channels
Route to Basin
SAN ANTONIO
DEBRIS BASIN
VCWPD DB 1-03
ACCESS MAP


LADERA CREEK
GRIDLEY CANYON
SENIOR CANYON
N
0 1,050 2,100 4,200 6,300 8,400
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
SAN ANTONIO CREEK
DEBRIS BASIN
VCWPD DB 1-03
WATERSHED MAP

SAN ANTONIO CREEK DEBRIS BASIN



STEWART CANYON CREEK DEBRIS BASIN State Dam No: 86-009 DB1-02

LOCATION: Ojai, 2000 ft north end of Canada Street. Enter off Signal Street about 2400 ft north of Grand Avenue.
N 351,500; E 1,623,500 (Lambert Zone 5 Coordinates)
Ojai 7-1/2' Quadrangle Map

DESIGN DATA	(Elevations NGVD29)
Design Agency	US Army Corps of Engineers
Level Capacity	104,215 cy (7-10-89 DTM) at 920 ft
Maximum Debris Capacity	328,300 cy (12-18-85)
Inflow and Outflow Rates	Q_{100}IN = 2,642 cfs, Q_{100}OUT=NA
Debris Cleanout Elevation	914 ft NGVD29 (52,250 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	Rectangular Concrete Channel 80 ft wide x 14 ft high
Invert Elevation	920 ft NGVD29
Spillway Length	NA
Capacity	11,200 cfs (without freeboard)
PRINCIPAL SPILLWAY	
Type	4 ft x 4 ft Weir Inlet on Riser Tower 25.5 ft High (925.5 ft)
Weir Elevation	925.5 ft but 36: RCP controls
Outlet Conduit	36 in RCP
DEBRIS BLEEDER/RISER	
Type	7 sets of 12 4”x12” Orifices on Riser Tower to 23 ft above ground, beginning at elev. 903 ft
Top Elevation	Same as principal spillway
Outlet Conduit	Same as principal spillway
DAM	
Dam Type	Earthfill
Dam Crest Elevation	934 ft
Length	1,300 ft
Width at Crest	NA
Surface Area of Full Basin	10 ac
Watershed Area	1,266 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	Corps of Engineers
Completion Date	1963
REFERENCE DRAWINGS	
Construction Drawings	Y-1-47A thru Z
Topographic Drwgs(pre-const)	T-63-10 (2-6-70), T-63-11 (2-6-70), T-273 (10-2-81), 11-8-87 DTM, 10-16-89 DTM
Right-of-Way Drawings	37547

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	209,000	300,000
50-YEAR	157,000	225,000
25-YEAR	112,000	161,000

BASIN HISTORY: **STEWART CANYON CREEK DEBRIS BASIN**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
09-69	Cleanout		150,000	
02-70	Aerial Survey	314,500		
11-70	Aerial Survey	314,200		
05-71	Aerial Survey	314,200		
05-72	Cleanout		13,400	
05-72	Aerial Survey	327,619		
05-73	Aerial Survey	313,802		
10-75	Cleanout		2,900	
10-75	Aerial Survey	316,690		
03-78	Cleanout		2,950	
03-78	Disaster Declaration			
02-80	Disaster Declaration			
06-80	Aerial Survey	Not Digitized		
10-81	Aerial Survey	319,638		
03-83	Disaster Declaration			
08-85	Cleanout		6,365	
12-85	Aerial Survey	328,274		
07-86	Aerial Survey	324,882		
11-87	Aerial Survey	303,962		
10-89	Aerial Survey	302,425		
09-90	Aerial Survey	Not Digitized		
06-91	Aerial Survey	Not Digitized		
02-92	Disaster Declaration			2,781**
05-92	Aerial Survey	Not Digitized		
01-95	Disaster Declaration			2,781
08-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	319,154		
02-98	Disaster Declaration			2,781
07-98	Aerial Survey	313,674		
12-99	Aerial Survey	Not Digitized		

BASIN HISTORY: STEWART CANYON CREEK DEBRIS BASIN

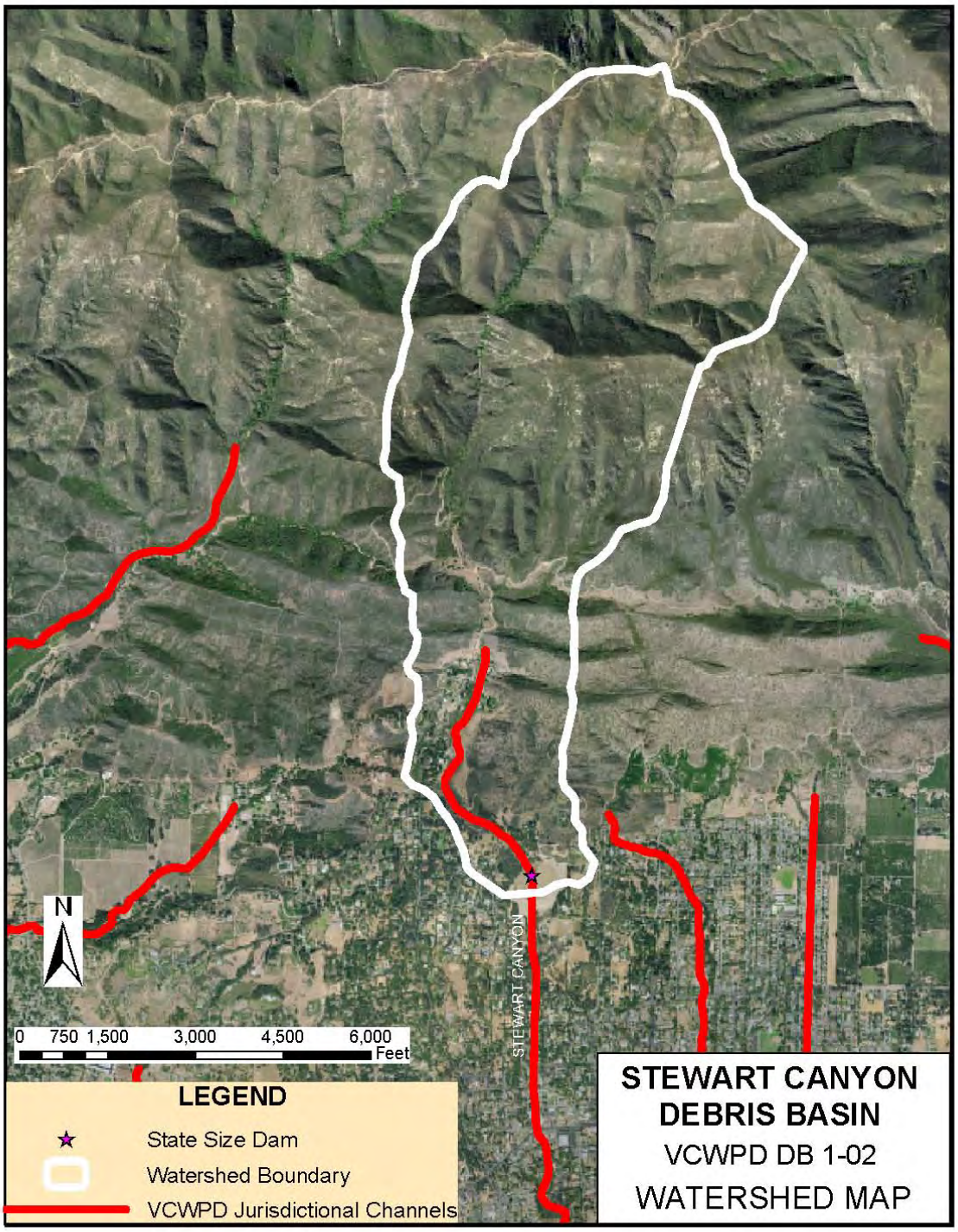
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
08-01	Aerial Survey	Not Digitized		
12-02	Aerial Survey	Not Digitized		
01-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			2,264

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

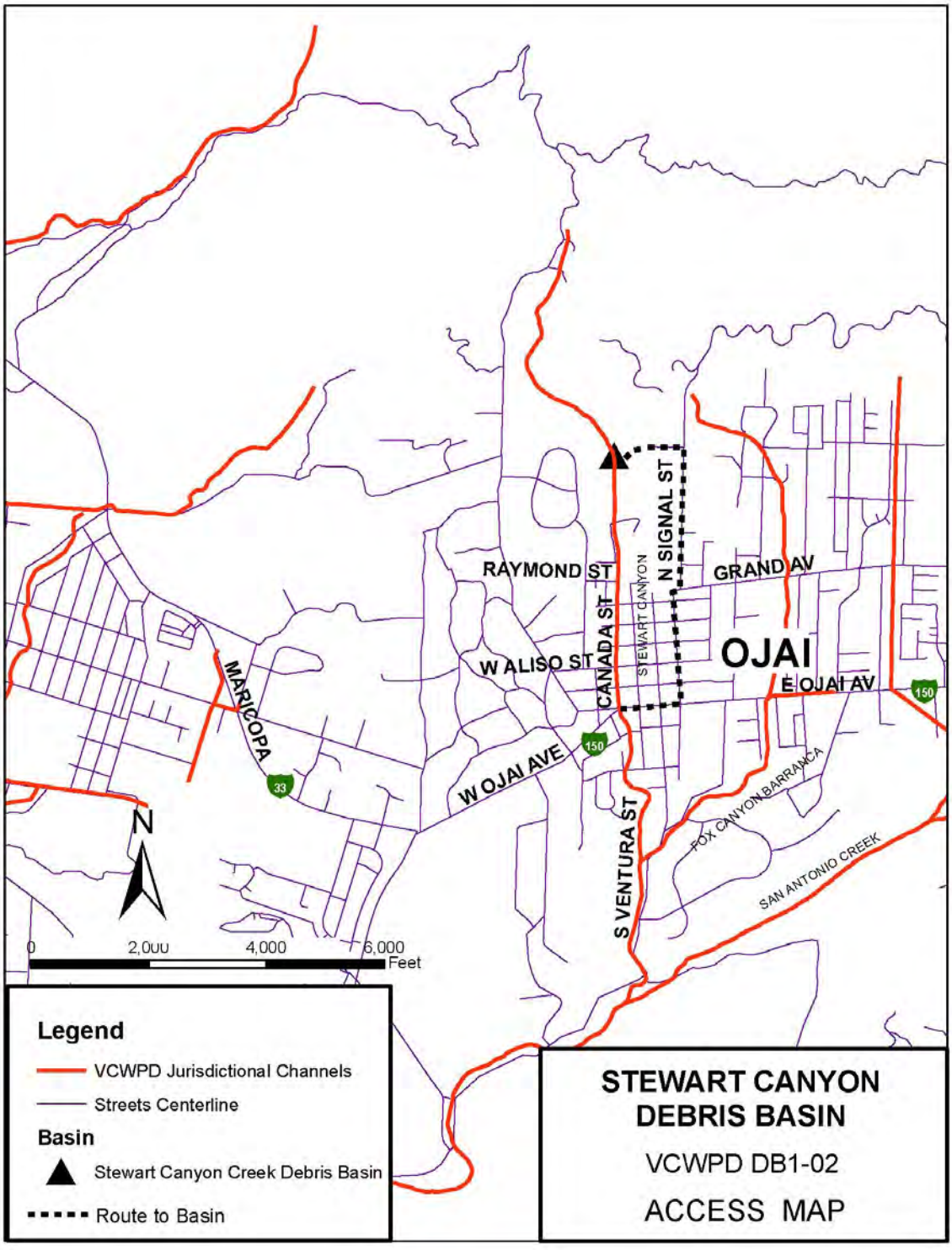
NA= Not Available / Not Applicable


N
0 750 1,500 3,000 4,500 6,000
Feet
STEWART CANYON
LEGEND
State Size Dam
Watershed Boundary
VCWPD Jurisdictional Channels
STEWART CANYON
DEBRIS BASIN
VCWPD DB 1-02
WATERSHED MAP

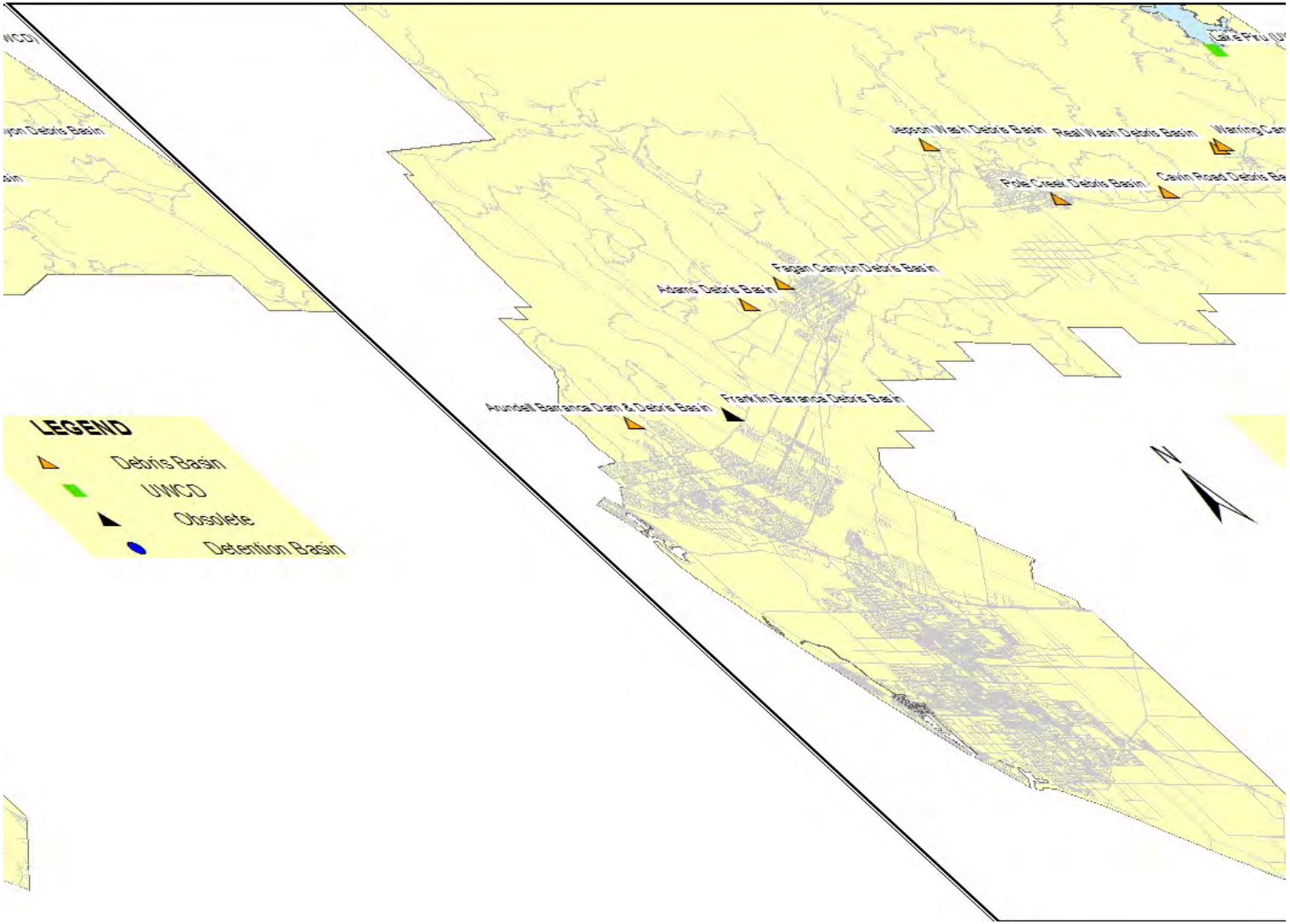
Stage-Storage-Discharge Data Summary

		Feb-1975	Nov-2005
Elev. Ft NGVD29	Total Disch. Cfs	Cum. Vol. af	Cum. Vol. af
900	-	0	
902	-	1.30	0.00
904	6.7	3.71	0.06
906	15.1	7.02	0.33
908	43.7	11.55	1.83
910	78.5	17.89	6.15
912	103.0	25.40	12.51
914	118.5	33.80	20.33
916	143.0	43.47	29.62
918	149.0	54.30	40.27
920	155.0	66.29	52.21
922	793.0	79.27	NA
924	1,958.0	92.82	NA
926	3,464.0	106.53	NA
928	5,245.0	119.86	NA
930	7,264.0	132.53	NA
932	9,498.0	144.30	NA
934	11,924.0	154.84	NA

NA= Not analyzed


RAYMOND ST
N SIGNAL ST
GRAND AV
STEWART CANYON
CANADA ST
OJAI
W ALISO ST
E OJAI AV
150
MARICOPA
33
W OJAI AVE
150
S VENTURA ST
FOX CANYON BARRANCA
SAN ANTONIO CREEK
N
0
2,000
4,000
6,000
Feet
Legend
VCWPD Jurisdictional Channels
Streets Centerline
Basin
Stewart Canyon Creek Debris Basin
Route to Basin
STEWART CANYON
DEBRIS BASIN
VCWPD DB1-02
ACCESS MAP

Zone 2 Basins



ADAMS BARRANCA DEBRIS BASIN DB2-07

LOCATION: Santa Paula, W of boundary, between Peck & Briggs Rds, approx. 1/4 mi N of Foothill Rd,& E of Adams Cyn Rd ; N 311,350, E 1,667,237 (Lambert Zone 5 Coordinates) ; Santa Paula 7-1/2' USGS Quadrangle

DESIGN DATA	(Elevations NGVD29)
Design Agency	Ventura County Watershed Protection District
Level Capacity	72,023 cy
Maximum Debris Capacity	84,600 cy
Inflow and Outflow Rates	Q_{100}IN = 3,800 cfs, Q_{100}OUT=3,800 cfs (Y-2-2235)
Debris Cleanout Elevation	340.5 ft (14,900 cy) [10% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	RC Drop Box Spillway 15 ft W x 18.5 ft H x 30 ft L
Weir Elevation	353 ft NGVD29
Spillway Weir Length	75 ft
Design Discharge	3,800 cfs
PRINCIPAL SPILLWAY	
Type	None
Top Elevation	NA
Size	NA
DEBRIS BLEEDER/RISER	
Type	Semi-Circular Perforated 36-in CSP
Top Elevation	351.75 ft NGVD29
Outlet Conduit	Connected to Emergency Spillway
DAM	
Dam Type	Earthfill
Dam Crest Elevation	364 NGVD29
Length	330 ft
Width at Crest	20 ft
Surface Area of Full Basin	3.3 ac
Watershed Area	5,387 ac from GIS Watershed Layer
CONSTRUCTION DATA	
Construction Agency	VCWPD with NRCS after fire
Completion Date	1994
REFERENCE DRAWINGS	
Construction Drawings	Y-2-2233 thru Y-2-2247
Topographic Drwgs(pre-const)	Y-3-3432; T-449-6 (1995); 12-21-95 DTM
Right-of-Way Drawings	Y-2-2234

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	149,000	221,650
50-YEAR	114,320	168,960
25-YEAR	50,410	74,500

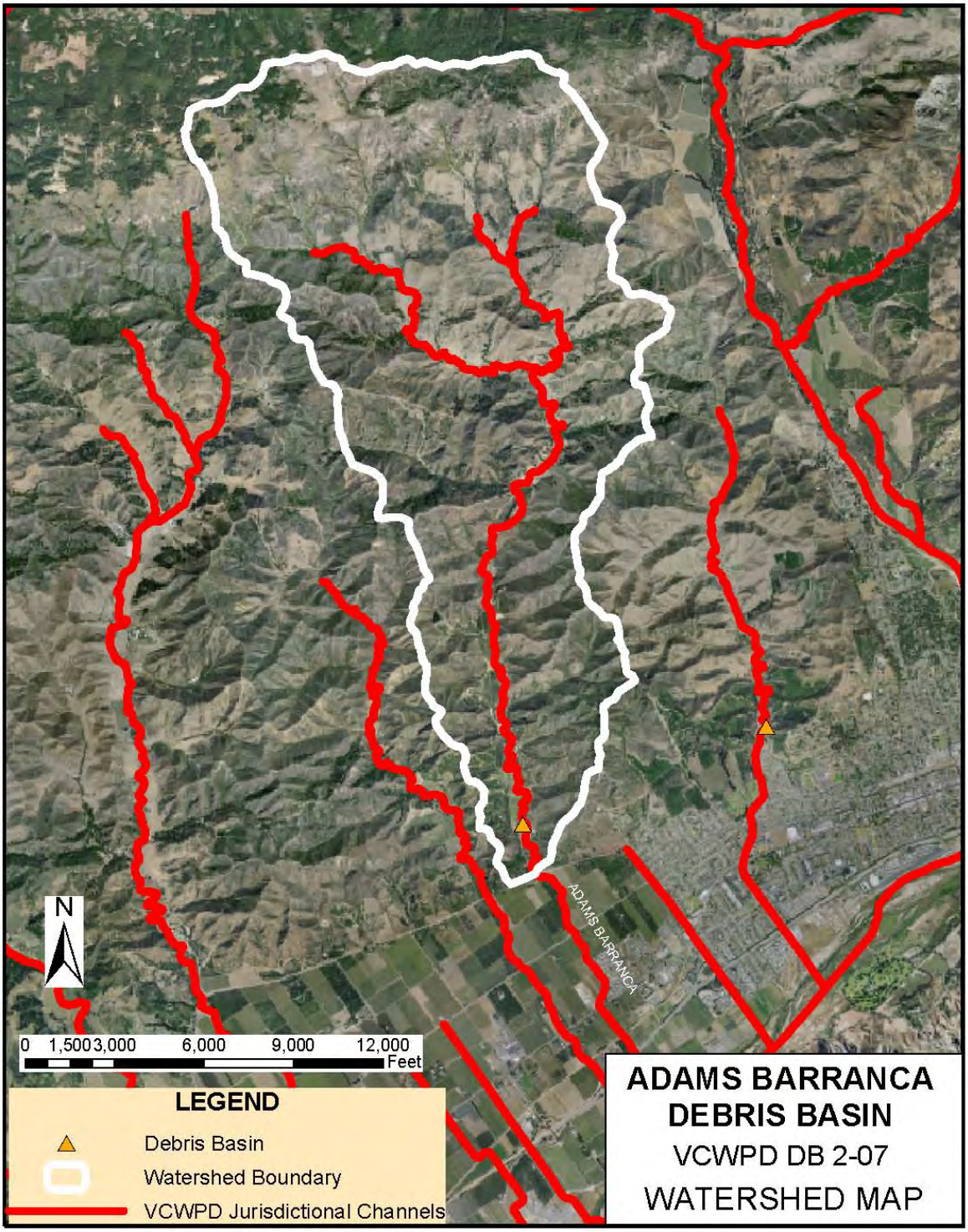
BASIN HISTORY: **ADAMS BARRANCA DEBRIS BASIN**

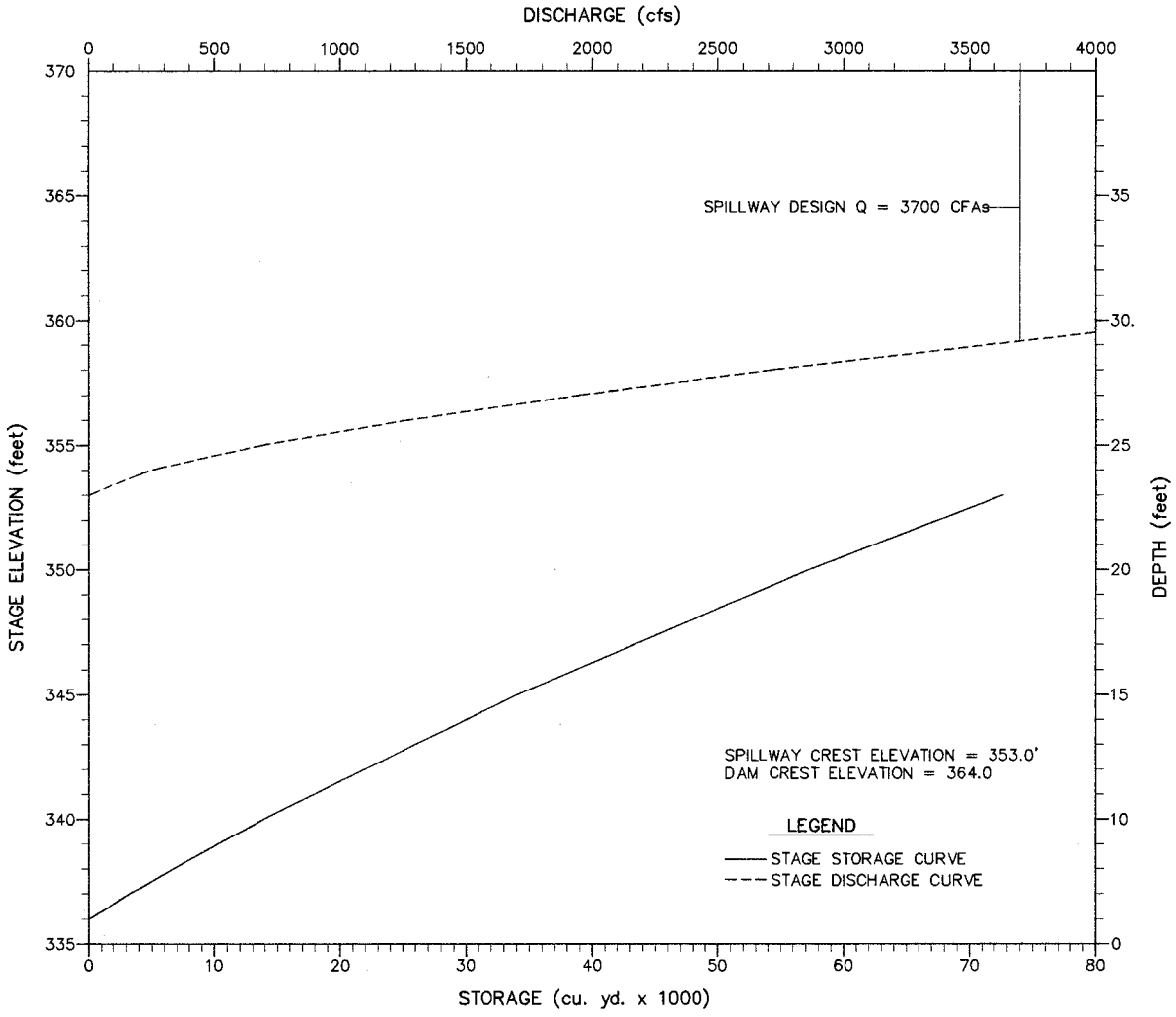
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
09-94	Aerial Survey	84,200		
01-95	Disaster Declaration			5,940
06-95	Aerial Survey	24,200		
12-95	Cleanout		61,505	
12-95	Aerial Survey	85,705		
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	78,080		
02-98	Disaster Declaration			3,510
07-98	Aerial Survey	4,330		
12-98	Cleanout		75,806	
12-98	Aerial Survey	80,135		
05-99	Cleanout		56	
12-99	Aerial survey	Not Digitized		
08-01	Aerial survey	Not Digitized		
11-02	Cleanout		448	
12-02	Aerial survey	Not Digitized		
11-03	Aerial survey	Not Digitized		
01-05	Disaster Declaration			982
07-05	Multiple Cleanouts		112,089	
12-05	Aerial Survey	62,594 cy to elev 353 ft		
05-08	Aerial Survey	40,226 cy to elev 353 ft		
05-08	TIN analysis up to elev 364 ft Top of Dam	Cut vol 7,281 cy Fill vol 29,481 cy		
05-08	O&M Records		30,626	
09-08	Aerial Survey	70,262 cy to elev 353 ft	30,036	

NOTES

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

NA= Not Available / Not Applicable


N
0 1,500 3,000 6,000 9,000 12,000
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
ADAMS BARRANCA
ADAMS BARRANCA
DEBRIS BASIN
VCWPD DB 2-07
WATERSHED MAP



STAGE - STORAGE & DISCHARGE CURVES

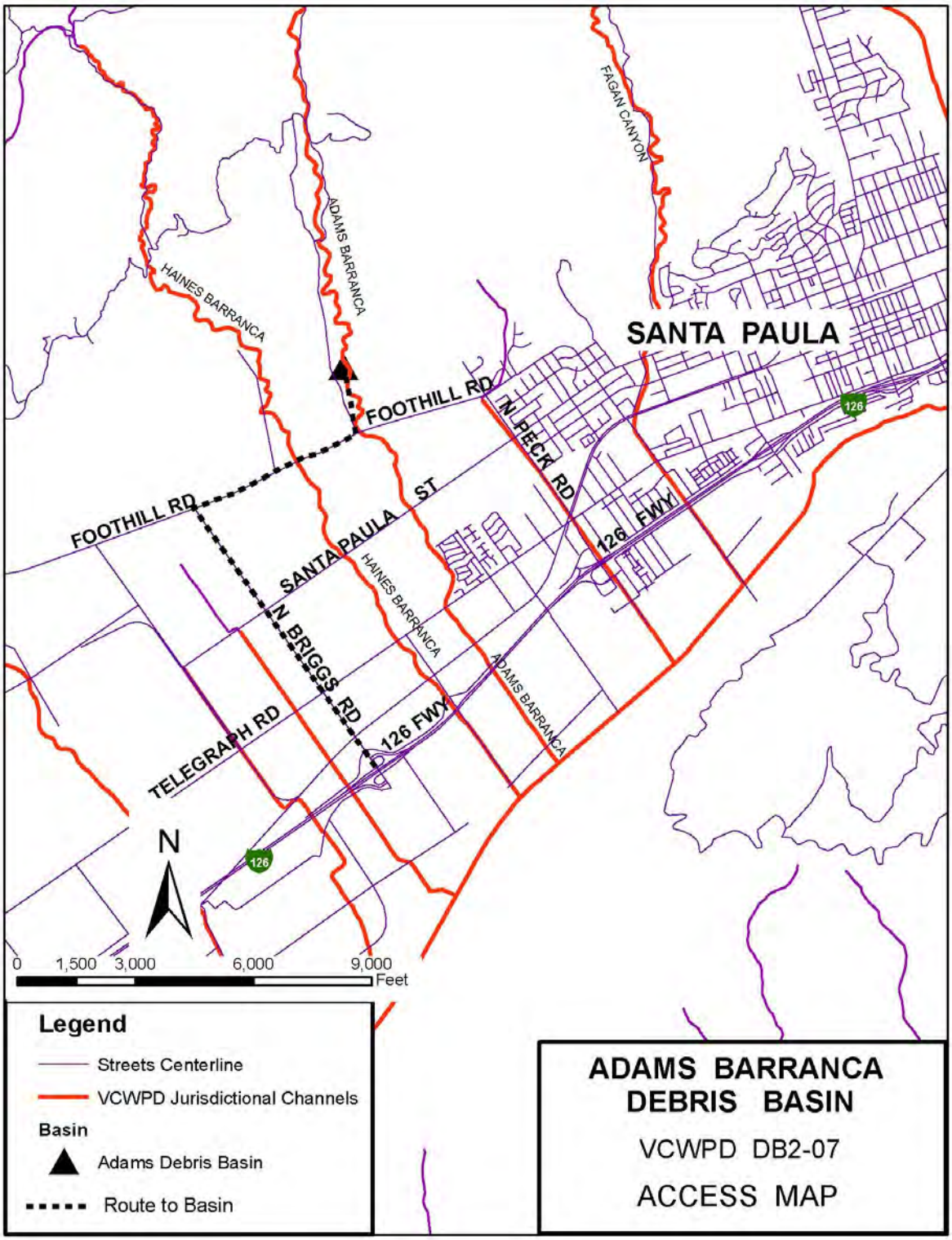
Adams Debris Basin

Stage Storage Discharge Data Summary

Elevation	Design Vol.	Emergency Spillway Discharge	Sep- 2008 Vol.
Ft. NGVD29	Cu. Yds	Cfs	Cu. Yds
335	-		-
336	-		898
337	3,000		3,556
338	6,700		6,735
339	10,200		10,057
340	14,000		13,514
341	18,000		17,096
342	22,000		20,803
343	26,000		24,636
344	30,000		28,595
345	34,200		32,683
346	38,700		36,899
347	43,300		41,247
348	48,000		45,726
349	52,500		50,339
350	57,000		55,089
351	62,300		59,976
352	67,500		65,001
353	72,700	-	70,165
354	NA	243	NA
355	NA	688	NA
356	NA	1,264	NA
357	NA	1,946	NA
358	NA	2,720	NA
359	NA	3,575	NA
360	NA	4,505	NA
361	NA	5,504	NA
362	NA	6,568	NA
363	NA	7,692	NA
364	NA	8,875	NA

Note: Sep-2008 volume from conic analysis using post cleanout Autocad dwg

NA= Not Analyzed


SANTA PAULA
FOOTHILL RD
FOOTHILL RD
N PECK RD
SANTA PAULA ST
126 FWY
N BRIGGS RD
126 FWY
TELEGRAPH RD
HAINES BARRANCA
ADAMS BARRANCA
FAGAN CANYON
HAINES BARRANCA
ADAMS BARRANCA
126
126
N
0 1,500 3,000 6,000 9,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Adams Debris Basin
Route to Basin
ADAMS BARRANCA
DEBRIS BASIN
VCWPD DB2-07
ACCESS MAP

ARUNDELL BARRANCA DETENTION BASIN State Dam No: 86-010 DD2-06M

LOCATION: Ventura Foothills, approximately 5,500 ft N of Foothill Rd.
East of and adjacent to Sexton Cyn. Rd;
N 293,060, E 1,632,117 (Lambert Zone 5 Coordinates)
Saticoy 7-1/2'Quadrangle Map

DESIGN DATA

Design Agency	VCWPD
Level Capacity	138 ac-ft
Maximum Debris Capacity	52,863 cy at elev. 541.8 ft NGVD29 (125% of 100-yr Yield)
Inflow and Outflow Rates	Q10=1,006 cfs; Q100=2,390 cfs OUT: Q100=1,820 cfs
Debris Cleanout Elevation	530.7 ft (10,573 cy) [25% of 1-dam 100-yr debris yield.]
EMERGENCY SPILLWAY	
Type	Box Inlet Spillway 60 ft long x 20 ft wide
Weir Elevation	572 ft NGVD29
Spillway Length	140 ft (60 ft+20 ft+60 ft)
Capacity	9,400 cfs (without freeboard during PMF)
PRINCIPAL SPILLWAY	
Rectangular Tower with Catwalk; with Projecting Pivoting Louver Trash Racks	4 ft W X 8 ft H Low Level Inlet with Trash Rack to Elev 548, 2-8 ft W x 3 ft H Tower Inlets Bottom Elev. 551 ft, Top Elev 554 ft
Tower Top Elevation	555 ft NGVD29
Outlet Conduit	48-in RCP
DEBRIS BLEEDER/RISER	
Type	Semi-Circular Perforated CSP on Riser Tower
Top Elevation	540 ft NGVD29
Outlet Conduit	Principal Spillway Outlet
DAM	
Dam Type	Earthfill
Dam Crest Elevation	580 ft NGVD29
Length	377 ft
Width at Crest	20 ft
Surface Area of Full Basin	5.9 ac
Watershed Area	1,754 ac
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	Reconstructed 1995
REFERENCE DRAWINGS	
Construction Drawings	Y-2-2322 thru Y-2-2356
Topographic Drwgs(pre-const)	Y-2-2327 thru Y-2-2328
Right-of-Way Drawings	Y-2-2325

EXPECTED DEBRIS PRODUCTION (cy); Note 1		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	22,576 (42,290)	32,745 (60,470)
50-YEAR	17,259 (31,610)	25,033 (45,350)
25-YEAR	12,403 (23,150)	17,990 (33,200)

Note 1: Sexton Canyon Only, Assumes Lake Canyon Dam in Place. Quantities without Lake Canyon in ().

BASIN HISTORY: ARUNDELL BARRANCA DETENTION BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-96	New Dam Completed			5,308**
01-96	Aerial Survey	64,800		
06-96	Aerial Survey	49,523		
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	48,420		
02-98	Disaster Declaration			5,308
07-98	Aerial Survey	45,570		
05-99	Cleanout		101,450	
05-99	Aerial Survey	64,800		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
12-02	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			6,419
05-05	Aerial Survey	148,664 to elev 572 ft		
01-06	Aerial Survey	239,441 to elev 572 ft	91,000 D&C (O&M 91,403)	
07-11	O&M Truck Count		19,667	
05-12	Aerial Survey WR&T TIN analysis	233,332 to elev 572 ft 138,553 to elev 560 ft		
05-15	Upper portion of basin reconfigured for spillway work			
05-17	Aerial Survey WR&T TIN analysis	113,808 to elev 560 ft 24,745 deposited since 2012		
	OLD BASIN DATA DB2-06			
02-69	Disaster Declaration			
10-70	Aerial Survey	36,100		
09-71	Cleanout		20,000	
01-72	Aerial Survey	35,900		
07-72	Cleanout		4,100	
05-73	Aerial Survey	25,225		

BASIN HISTORY: **ARUNDELL BARRANCA DETENTION BASIN**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
09-73	Cleanout		15,400	
11-73	Aerial Survey	39,650		
06-74	Aerial Survey	33,200		
10-75	Aerial Survey	25,606		
10-76	Aerial Survey	21,900		
12-77	Aerial Survey	18,600		
03-78	Disaster Declaration			
11-78	Aerial Survey	3,905		
05-79	Cleanout		19,100	
06-79	Aerial Survey	20,100		
02-80	Disaster Declaration			5,643**
06-80	Aerial Survey	2,610		
12-80	Cleanout		21,000	
11-82	Aerial Survey	16,400		
03-83	Disaster Declaration			4,882**
04-83	Aerial Survey	8,960		
12-85	Cleanout		61,000	
12-85	Aerial Survey	58,380		
11-87	Aerial Survey	53,899		
02-89	Cleanout		4,200	
10-89	Aerial Survey	58,115		
03-90	Cleanout		5,000	5,260
10-90	Aerial Survey	64,800		
06-91	Aerial Survey	36,300		
12-91	Cleanout		36,000	
12-91	Aerial Survey	64,900		
02-92	Disaster Declaration			5,403**
05-92	Aerial Survey	37,400		
05-92	Cleanout		30,700	
12-92	Aerial Survey	68,100		
07-93	Aerial Survey	31,700		
01-94	Cleanout		33,800	
01-94	Aerial Survey	65,500		
01-95	Disaster Declaration			5,308
03-95	Disaster Declaration			5,308
05-95	Aerial Survey	Not Digitized		
06-95	Cleanout & Excavation		76,334	
06-95	Aerial Survey	76,330		
01-96	**New Dam Completed**			

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** From historical record of DB2-06

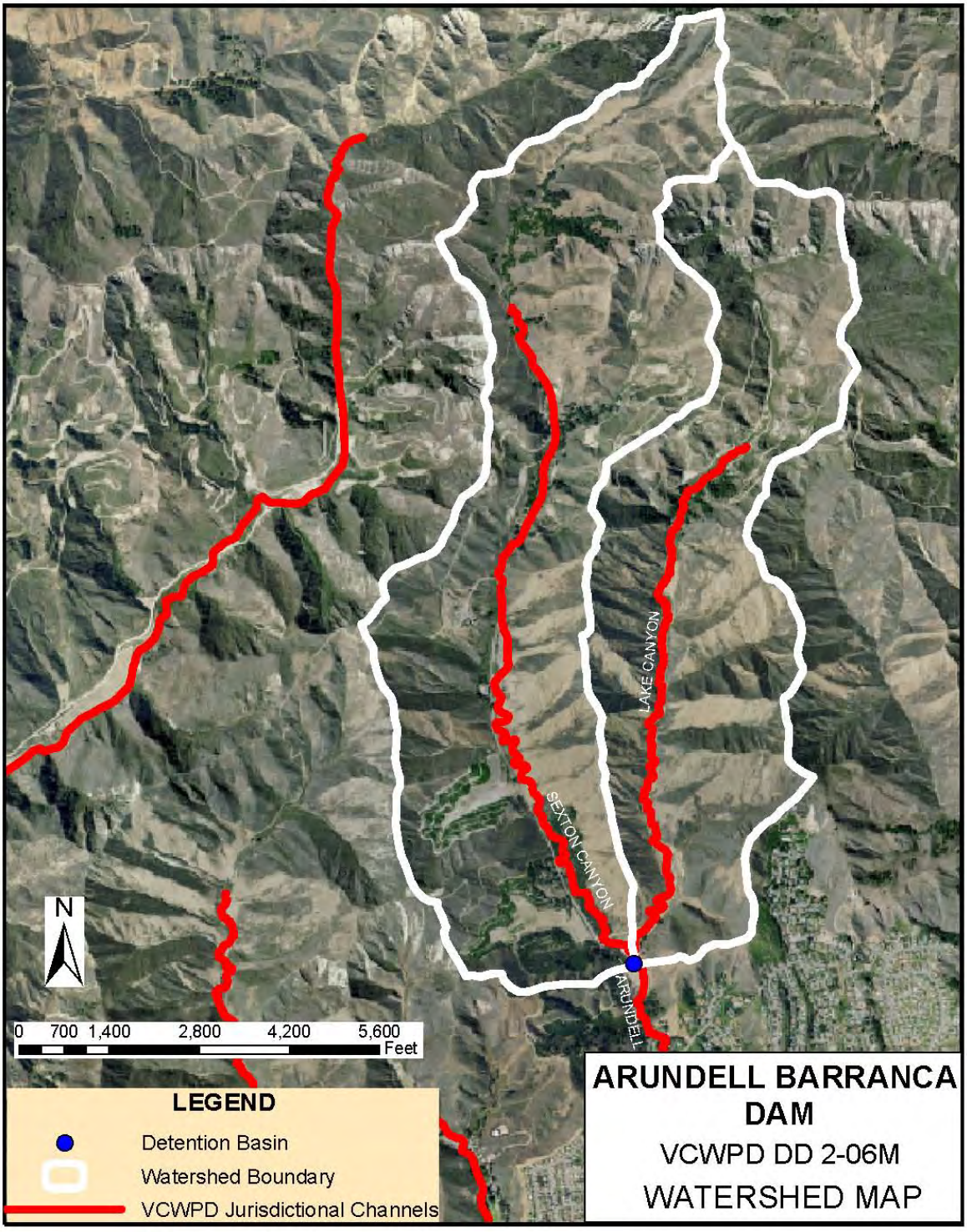
NA= Not Available / Not Applicable

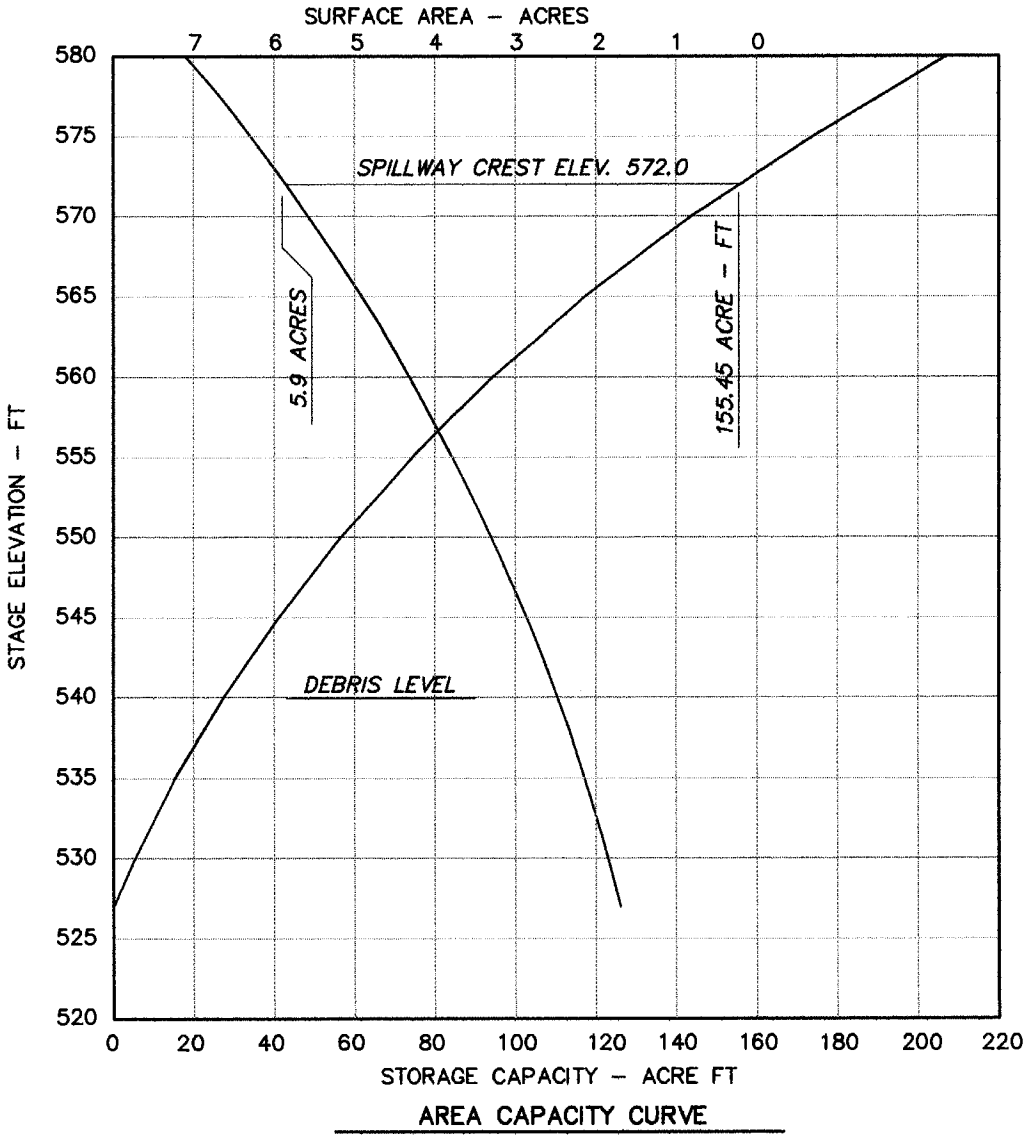
History

Replaces DB2-06 from 1999 Manual. DB had level capacity of 52,600 cy, and max capacity of 64,800 cy. Basin 100-yr inflow rate was 2,770 cfs; spillway had capacity of 2,600 cfs. Constructed in 1970 by VCFCD. Drawings Y-2-651-655. ROW 17172.

Debris Basin Production Data (cy)

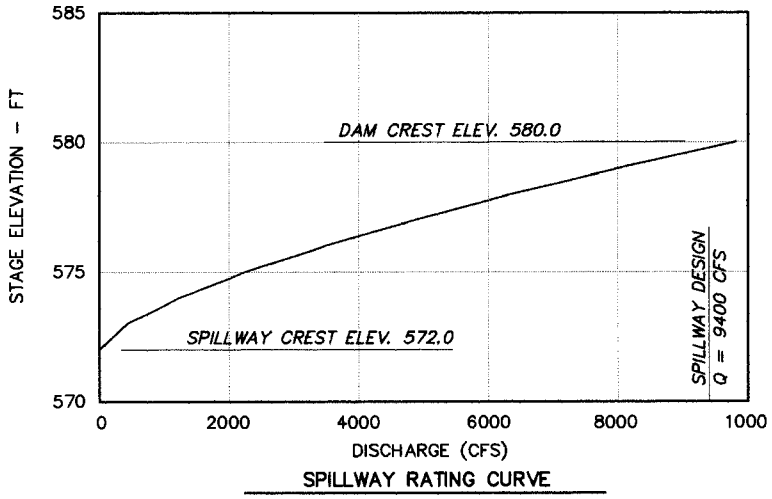
Storm Frequency	Design Conditions	100% Burn
100-yr	42,290	60,470
50-yr	31,610	45,350
25-yr	23,150	33,200


LAKE CANYON
SEXTON CANYON
ARUNDELL
N
0 700 1,400 2,800 4,200 5,600
Feet
LEGEND
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
ARUNDELL BARRANCA DAM
VCWPD DD 2-06M
WATERSHED MAP

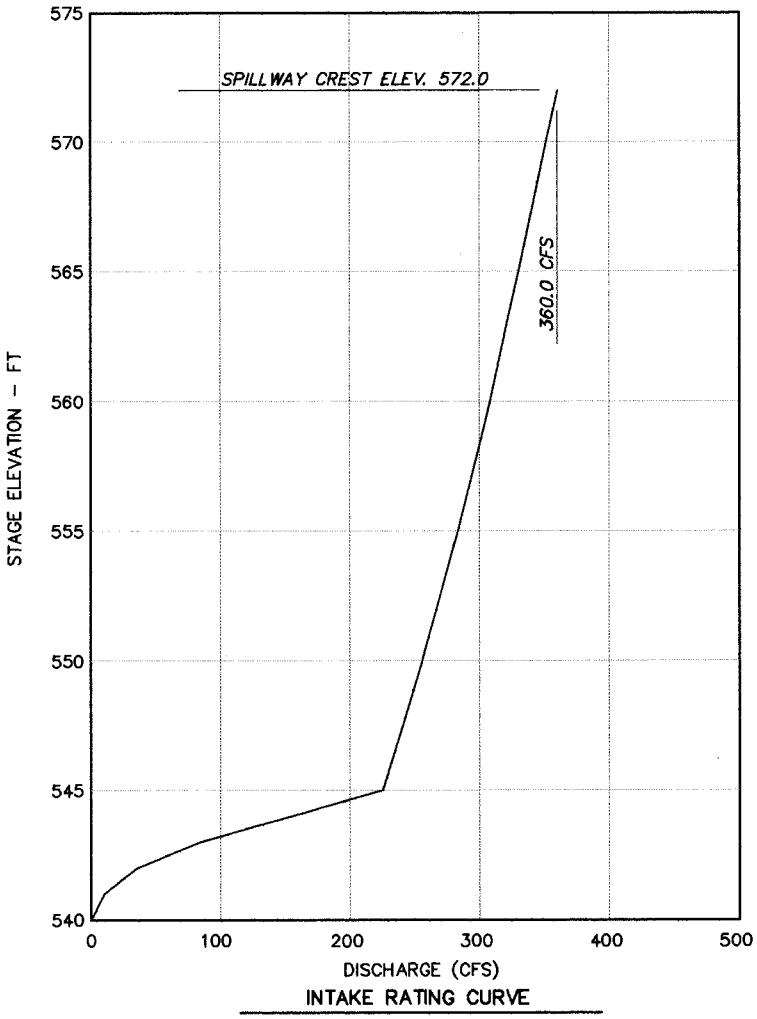


Arundell Barranca Detention Basin

Note: Debris level shown is for 2 basin design



SPILLWAY RATING CURVE



INTAKE RATING CURVE

Arundell Barranca Detention Basin

Note: Emergency Spillway Rating Revised by NHC, 2013

NHC 2013 Emergency Spillway Rating Curves. Current is Alt 6A

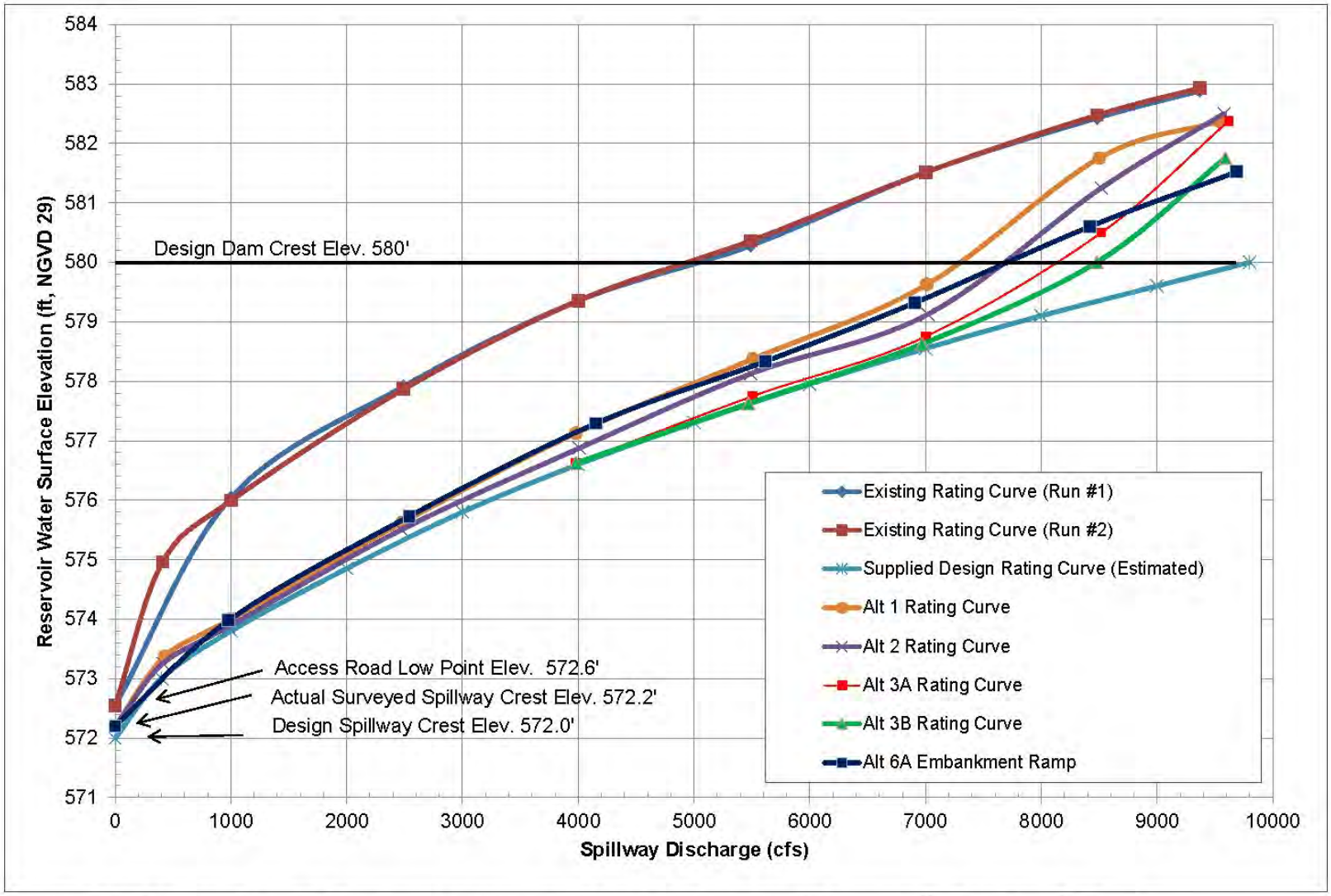


Figure 4-1: Alternative 6 rating curve compared to existing conditions and other model tests

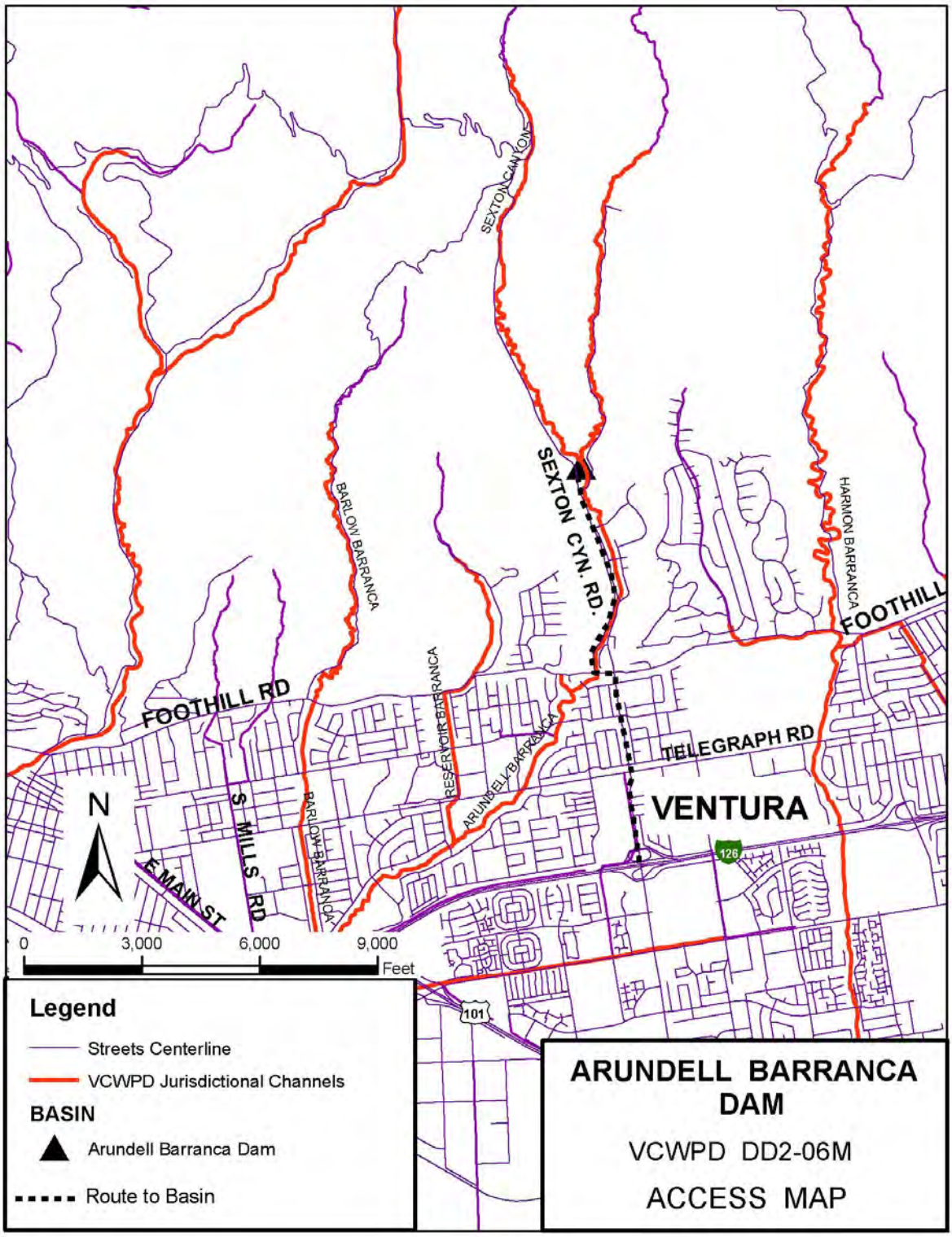
Hydrology Model Routing Data, 2017

Design Data		10-Yr Burn		100-Yr Design		100-Yr Burn	
Elev ft NGVD29	Vol. (af)	Vol. (af)	Disch. (cfs)	Vol. (af)	Disch. (cfs)	Vol. (af)	Disch. (cfs)
527.30	0.00						
530.00	5.20						
532.26	9.99	0.00	0.00				
535.00	16.20	6.21	0.00				
538.00	23.20	13.21	0.00				
540.00	28.20	18.21	0.00				
541.00	30.70	20.71	11.00				
541.80	32.77	22.78	32.00	0.00	-		
543.00	36.10	26.11	85.00	3.33	11.00		
543.53	37.48	27.49	122.00	4.71	25.00	0.00	0.00
545.00	41.60	31.61	225.69	8.83	32.00	4.12	22.78
547.00	47.40	37.41	236.00	14.63	225.69	9.92	81.19
549.00	53.50	43.51	249.00	20.73	236.00	16.02	156.25
550.00	57.00	47.01	255.91	24.23	242.91	19.52	178.67
555.00	74.10	64.11	282.91	41.33	269.91	36.62	282.10
560.00	94.60	84.61	307.56	61.83	294.56	57.12	307.56
565.00	118.50	108.51	330.37	85.73	317.37	81.02	330.37
570.00	146.30	136.31	351.71	113.53	338.71	108.82	351.71
572.00	155.45	145.46	359.89	122.68	346.89	117.97	359.89
573.00	161.25	151.26	760.0	128.48	760.0	123.77	760.0
574.00	167.45	157.46	1,340.0	134.68	1,340.0	129.97	1,340.0
575.00	174.00	164.01	2,190.0	141.23	2,190.0	136.52	2,190.0
576.00	180.80	170.81	3,180.0	148.03	3,180.0	143.32	3,181.0
580.00	207.50	197.51	8,040.0	174.73	8,040.0	170.02	8,040.0

Notes: Discharge Data based on Mori Seyedan calculations, 2005.
Volume data adjusted to reflect sediment volumes.

NHC 2013 Emergency Spillway Rating Table.

Elev. ft NGVD29	572.2	573	574	575	576	577	578	579	580	581	581.5
Disch. cfs	-	400	980	1,830	2,820	3,800	5,100	6,480	7,680	8,980	9,370


SEXTON CANYON
SEXTON CYN. RD.
BARLOW BARRANCA
RESERVOIR BARRANCA
ARUNDELL BARRANCA
HARMON BARRANCA
FOOTHILL RD
FOOTHILL
TELEGRAPH RD
VENTURA
S. MILLS RD
E. MAIN ST
126
101
N
0
3,000
6,000
9,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
BASIN
Arundell Barranca Dam
Route to Basin
ARUNDELL BARRANCA DAM
VCWPD DD2-06M
ACCESS MAP

CAVIN ROAD DEBRIS BASIN DB2-03

LOCATION: Fillmore, 1/4 mile u/s from Telegraph Rd. at Cavin Rd.
Enter at Double H-N Ranch about 0.2 miles E of Cavin;
N 328.900, E 1,743,900 (Lambert Zone 5 Coordinates);
Piru 7 1/2' Quad.

DESIGN DATA	*Capacities Indicated are Based on a Top of Riser Elevation of 683.5 NGVD29; (Elevations NGVD29)
Design Agency	VCWPD
Level Capacity *	4,100 cy (11-8-87 DTM)
Maximum Debris Capacity *	8,700 cy (11-8-87 DTM)
Inflow and Outflow Rates	Q100in=99 cfs; Q100out=NA
Debris Cleanout Elevation	677 ft NGVD29 (736 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	None
Invert Elevation	NA
Spillway Length	NA
Capacity	NA
PRINCIPAL SPILLWAY	
Type	4.5 ft x 4.5 ft RC Tower 16 ft High with Top Weir Inlet
Weir Elevation	683.5 NGVD29
Outlet Conduit	48 in RCP
DEBRIS BLEEDER/RISER	
Type	None
DAM	
Dam Type	Earthfill
Dam Crest Elevation	691 NGVD29
Length	170 ft
Width at Crest	NA
Surface Area of Full Basin	0.4 ac
Watershed Area	90 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	Ventura County Flood Control District
Completion Date	1933
REFERENCE DRAWINGS	
Construction Drawings	31276 - 31277
Topographic Drwgs(pre-const)	312175, T-63-17 (10-29-71), T-63-17 12-13-85), 11-87 DTM, 5-31-91 DTM
Right-of-Way Drawings	31274

Note: Basin studied by WP&P Division. The Final Report dated 10/2015 concluded that the basin provides significant benefit and recommended improving the outlet.

EXPECTED DEBRIS PRODUCTION (cy):		
StormFrequency	**DesignCondition**	**100% Burn**
100-YEAR	13,413 (2,943)	19,456(4,269)
50-YEAR	7,062(2,139)	10,244(3,102)
25-YEAR	4,992(1,560)	7,23(2,263)8

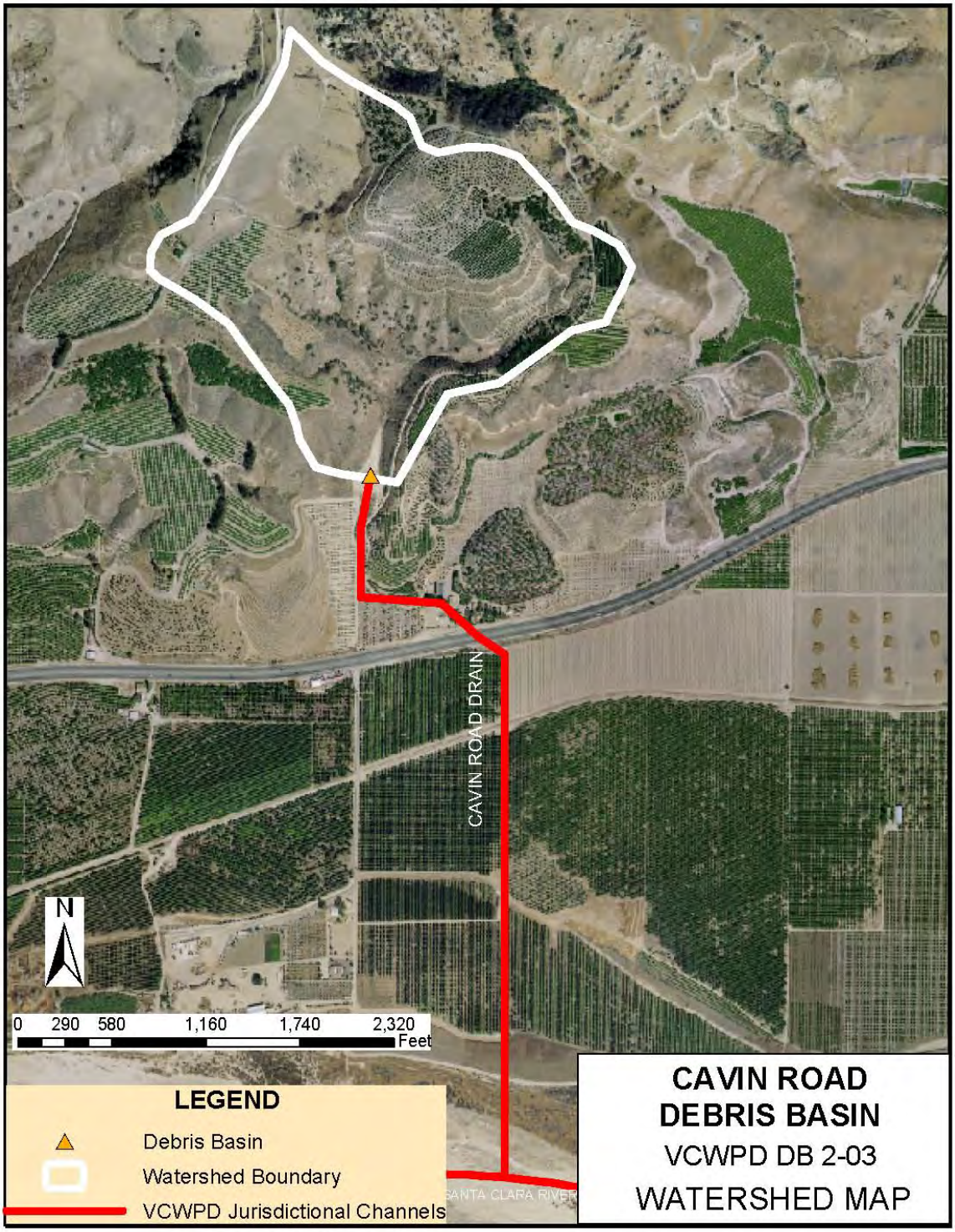
Note: () is updated sediment yield due to orchards in watershed, only 33 ac undeveloped.

BASIN HISTORY: CAVIN ROAD DEBRIS BASIN

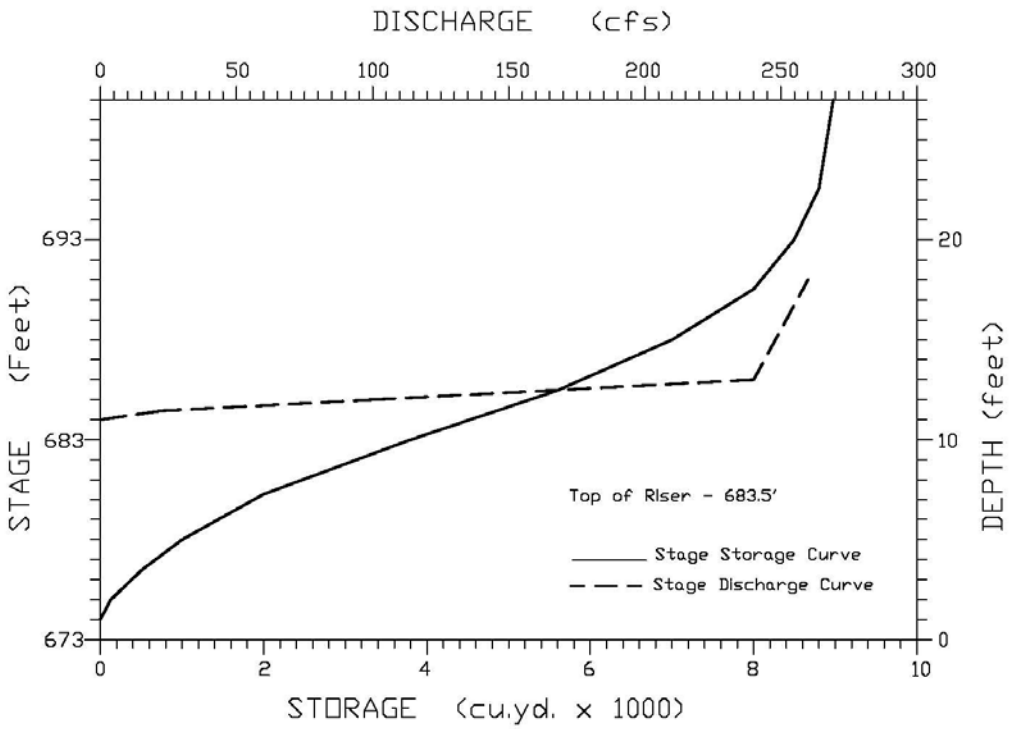
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
10-71	Aerial Survey	7,379		
03-78	Disaster Declaration			
10-81	Aerial Survey	Not Digitized		
03-83	Disaster Declaration			
04-83	Aerial Survey	2,886		
04-84	Cleanout		5,640	470**
09-84	Aerial Survey	8,690		
12-85	Aerial Survey	8,681		
07-86	Aerial Survey	8,540		
11-87	Aerial Survey	8,716		
11-88	Aerial Survey	Not Digitized		
09-90	Aerial Survey	Not Digitized		
05-91	Aerial Survey	7,339		
02-92	Disaster Declaration			362**
05-92	Aerial Survey	Not Digitized		
06-92	Cleanout		4,283	
01-95	Disaster Declaration			
07-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey	8,841		
07-97	Aerial Survey	Not Digitized		
02-98	Disaster Declaration			362
07-98	Aerial Survey	4,100		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
12-02	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
11-03	Watershed partially Burned by Piru Fire			
11-03	Cleanout		1,736	
12-04	Cleanout		458	
01-05	Disaster Declaration			209
08-05	Aerial Survey	900 to elev 683.5 ft		
11-05	Aerial Survey	4,458 to elev 683.5 ft		
11-05	O&M Autocad Analysis		4,341	
11-05	WR&T TIN vol. analysis		4,539	

Notes * AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration


CAVIN ROAD DRAIN
N
0 290 580 1,160 1,740 2,320
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
SANTA CLARA RIVER
CAVIN ROAD
DEBRIS BASIN
VCWPD DB 2-03
WATERSHED MAP

CAVIN ROAD DEBRIS BASIN

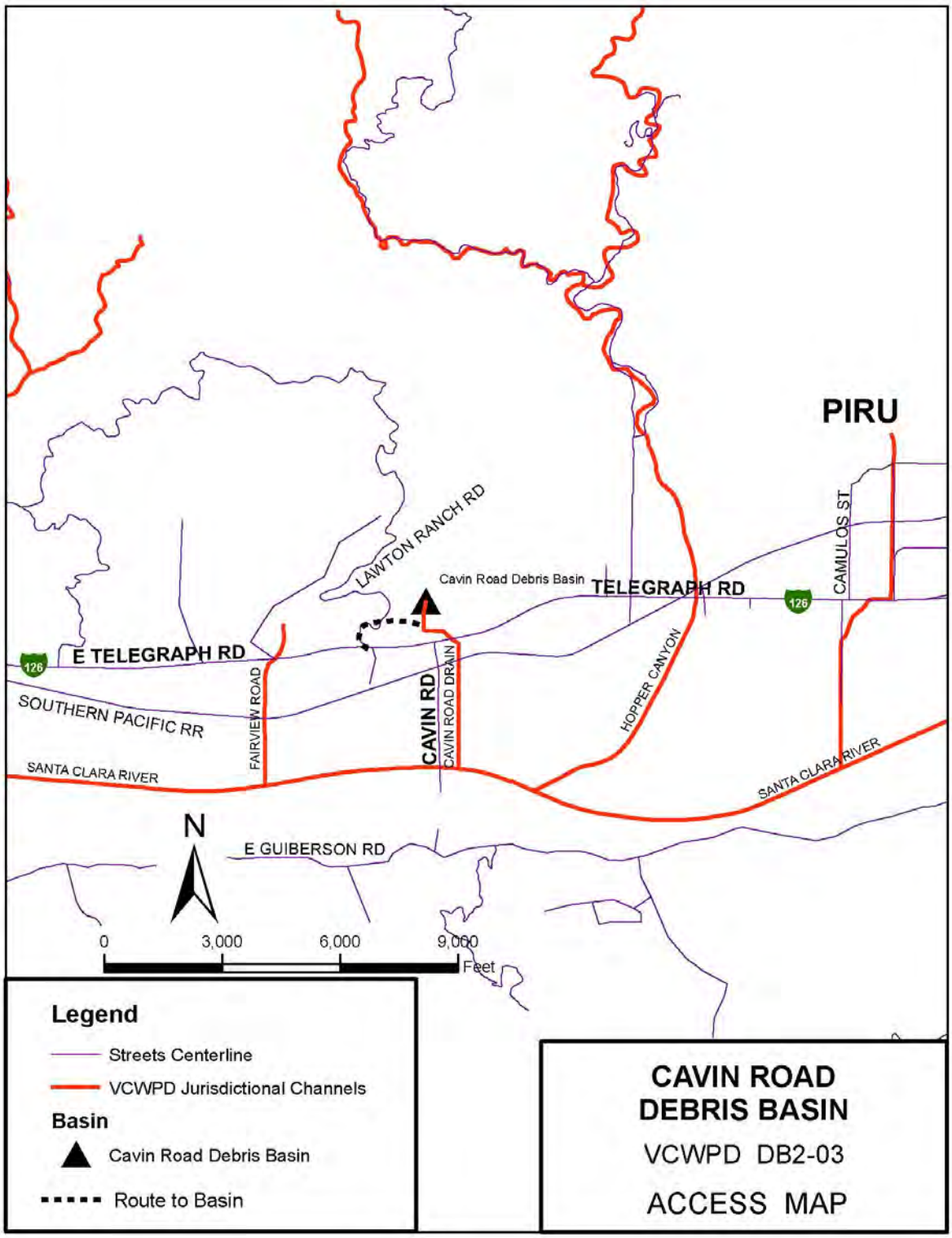


Summary of Discharge Data, 2015 Pre-Design Report

Elevation (ft, NGVD29)	Depth (ft)	Outflow Discharge (cfs)		Remarks
		Existing	Updated	
683.5	0	0	0	Weir Flow
684	0.5	0	18	
684.5	1.0	30	50	
685	1.5	90	93	
685.5	2.0	170	143	
686	2.5	240	199	
687	3.5	244	240	Orifice Flow
688	4.5	248	246	
689	5.5	251	251	
690	6.5	256	257	
691	7.5	260	262	

Stage-Storage Data, 11-05 Cleanout Volume

Elevation	11-05 Cleanout
Ft. NGVD29	CY
674	-
675	141
676	392
677	723
678	1,123
679	1,587
680	2,113
681	2,697
683.5	4,403


PIRU
LAWTON RANCH RD
Cavin Road Debris Basin
TELEGRAPH RD
CAMULOS ST
126
E TELEGRAPH RD
SOUTHERN PACIFIC RR
FAIRVIEW ROAD
CAVIN RD
CAVIN ROAD DRAIN
HOPPER CANYON
SANTA CLARA RIVER
SANTA CLARA RIVER
N
E GUIBERSON RD
0
3,000
6,000
9,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Cavin Road Debris Basin
Route to Basin
CAVIN ROAD
DEBRIS BASIN
VCWPD DB2-03
ACCESS MAP

FAGAN CANYON DEBRIS BASIN DB2-08

LOCATION: Santa Paula, north boundary, approximately one-half mile north of Santa Paula Street, adjacent to and easterly of the extension of Cemetery Road. N 314,730, E 1,675,020 (Lambert Zone 5 Coordinates); Santa Paula 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	Ventura County Watershed Protection District
Level Capacity	72,000 cy (09-27-94 DTM)
Maximum Debris Capacity	88,400 cy
Inflow and Outflow Rates	Q100in=2,100 cfs; Q100out=NA
Debris Cleanout Elevation	330 ft NGVD29 (10,460 cy) [10% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	15 ft W X 30 ft L X 21 ftD RC Drop Inlet
Weir Elevation	346.0 ft NGVD29
Spillway Length	75 ft
Capacity w/o freeboard	6,085 cfs
PRINCIPAL SPILLWAY	
Type	None
Invert Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	24-in slotted CSP with 36-in low level inlet at bottom
Top Elevation	346 ft NGVD29
Outlet Conduit	36-in RCP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	350 ft NGVD29
Length	400 ft
Width at Crest	NA
Surface Area of Full Basin	3.22 ac
Watershed Area	1,856 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	VCWPD with NRCS after fire
Completion Date	1994
REFERENCE DRAWINGS	
Construction Drawings	Y-2-2310 to Y-2-2321
Topographic Drawings	Y-2-2311; T-439 (9-27-94) DTM; Y-3-3397 (1995) T-499-7 (12-21-95)
Right-of-Way Drawings	Y-2-2311

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	104,600	154,000
50-YEAR	79,300	116,750
10-YEAR	21,300	31,400

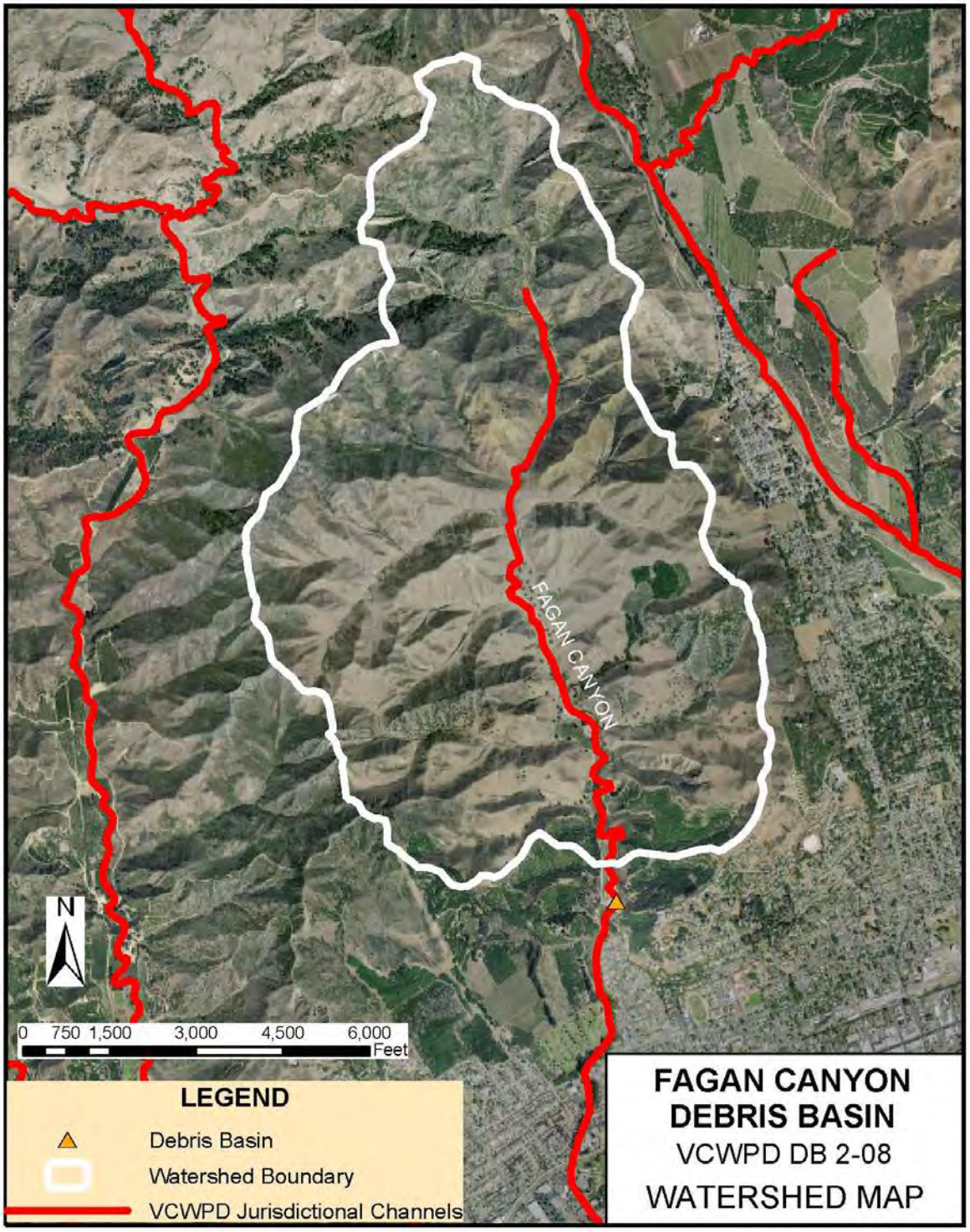
BASIN HISTORY: **FAGAN CANYON DEBRIS BASIN**

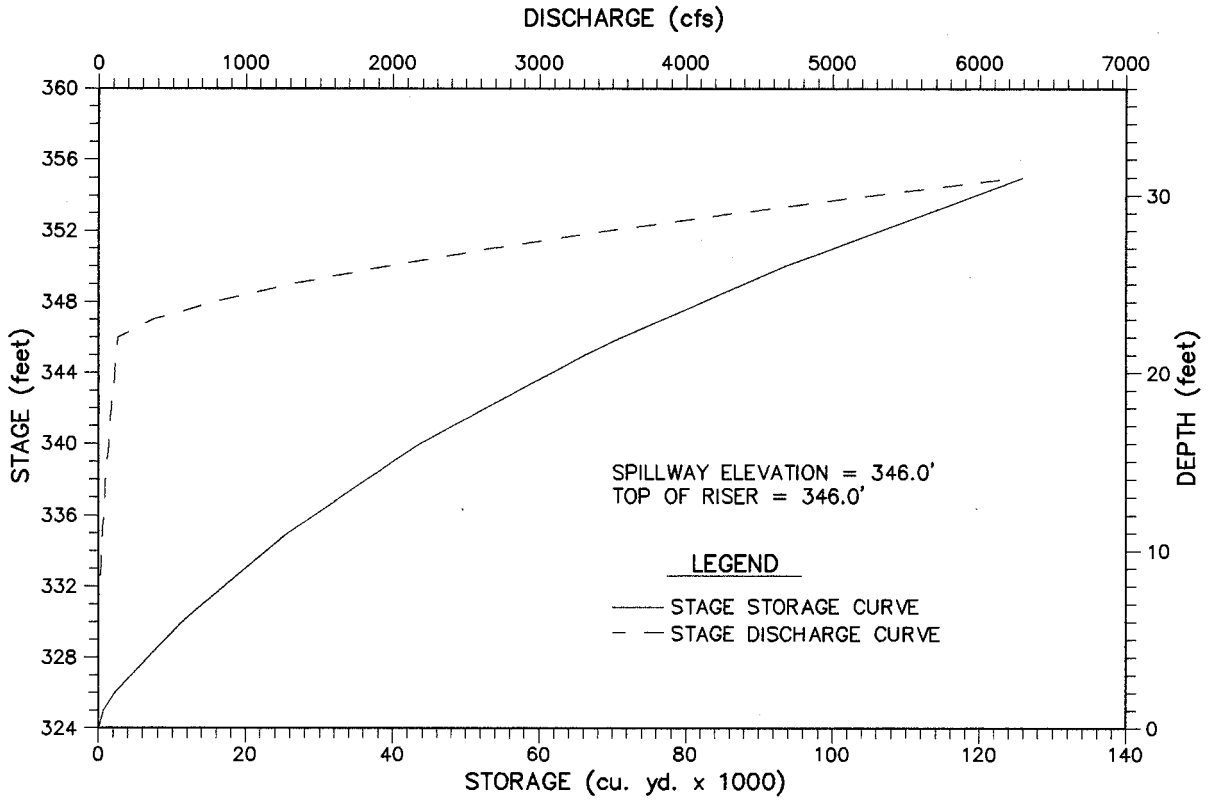
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
08-94	Basin Constructed			
09-94	Aerial Survey	88,400		
01-95	Cleanout		128	
01-95	Disaster Declaration			5,874
06-95	Aerial Survey	42,100		
10-95	Cleanout		42,850	
12-95	Aerial Survey	84,950		
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	81,470		
02-98	Disaster Declaration			2,203
07-98	Aerial Survey	38,170		
12-98	Cleanout		48,460	
12-98	Aerial Survey	86,630		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
12-02	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
02-04	Cleanout		582	
01-05	Disaster Declaration			2,200
07-05	Aerial Survey Analysis by O&M		53,512	
09-05	Pre- and post-cleanout TIN volume analysis by WR&T	09-05 TIN did not extend to spillway elevation 346 contour for capacity analysis	55,627	

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

NA= Not Available / Not Applicable


FAGAN CANYON
N
0 750 1,500 3,000 4,500 6,000
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
FAGAN CANYON
DEBRIS BASIN
VCWPD DB 2-08
WATERSHED MAP



STAGE - STORAGE & DISCHARGE CURVES A

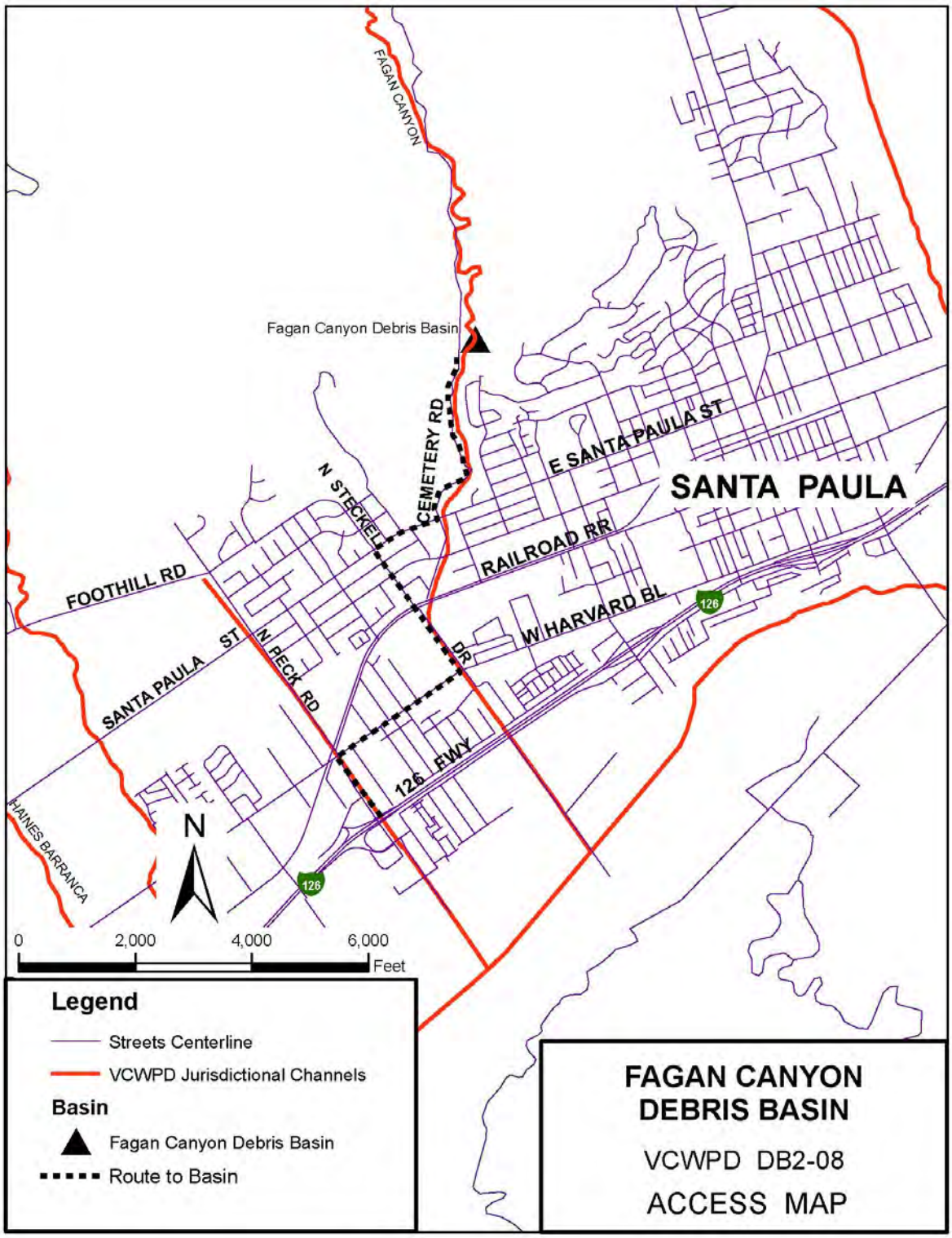
Fagan Canyon Debris Basin

Stage-Storage-Discharge Data Summary

Elevation	Design Vol.	Riser Disch.	Spillway Disch.	2005 Vol. (1)
Ft. NGVD29	Cu. Yds		Cfs	Cu. Yds
324	0			-
325	622			579
326	2,214			2,054
327				4,059
328				6,224
329				8,533
330	11,185	-		10,973
331		2.60		13,541
332		7.87		16,235
333				19,056
334		17.42		22,006
335	25,646			25,085
336		32.91		28,296
337				31,639
338		47.33		35,117
339				38,731
340	43,695	67.69		42,483
341				NA
342		85.74		NA
343				NA
344		109.98		NA
345	66,144			NA
346	71,242	131.07	-	NA
347		145.12	225	NA
348		148.24	638	NA
349		151.30	1,171	NA
350	93,525	154.30	1,803	NA
351		157.24	2,520	NA
352		160.12	3,313	NA
353		162.96	4,174	NA
354		165.74	5,100	NA
355	125,850	168.48	6,086	NA

Note (1): 2005 data from AutoCAD TIN analysis after September cleanout

NA- Not Analyzed


FAGAN CANYON
Fagan Canyon Debris Basin
CEMETERY RD
N STECKEL
E SANTA PAULA ST
SANTA PAULA
RAILROAD RR
FOOTHILL RD
W HARVARD BL
126
SANTA PAULA ST
N PECK RD
DR
126 FWY
HAINES BARRANCA
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Fagan Canyon Debris Basin
Route to Basin
FAGAN CANYON
DEBRIS BASIN
VCWPD DB2-08
ACCESS MAP

FRANKLIN BARRANCA DEBRIS BASIN DB2-01 (Obsolete)

LOCATION: Saticoy, 1400 ft NW from Wells/Foothill Rd Intersection, near Alto Mutual Reservoir; N 294,800, E 1,647,400 (Lambert Zone 5 Coordinates); Saticoy 7 1/2'Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	Ventura County Watershed Protection District
Level Capacity	5,050 cy (10-29-71, T-63-16)
Maximum Debris Capacity	24,500 cy (10-29-71, T-63-16)
Inflow and Outflow Rates	Q100in=800 cfs; Q100out=290 cfs
Debris Cleanout Elevation	403.5 ft NGVD29 (2,250 cy) [cap. to op. spillway invert]
EMERGENCY SPILLWAY	
Type	4.25 ft x 2.7 ft CSPA
Invert Elevation	406.74 NGVD29
Spillway Length	NA
Capacity	NA
PRINCIPAL SPILLWAY	
Type	60 in Vertical CSP 39.1 ft High
Top Weir Elevation	403.5 NGVD29
Outlet Conduit	42 in RCP
DEBRIS BLEEDER/RISER	
Type	None
Top Weir Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill (used as access road for house)
Dam Crest Elevation	413 NGVD29
Length	140 ft
Width at Crest	15 ft
Surface Area of Full Basin	1.1 ac
Watershed Area	330 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	Ventura County Watershed Protection District
Completion Date	1934, replaced riser 1996
REFERENCE DRAWINGS	
Construction Drawings	30898, Y-2-2373 thru 2377
Topographic Drawings	T-63-3 (2-6-70) 30897
Right-of-Way Drawings	Easement Deed #358 or 378

Avocado trees planted in basin as of 5/2005, no record of basin cleanout since 1978, basin ownership transferred to homeowner using dam as access to house.

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	11,507	16,685
50-YEAR	8,856	12,845
25-YEAR	6,247	9,058

BASIN HISTORY: **FRANKLIN BARRANCA DEBRIS BASIN**

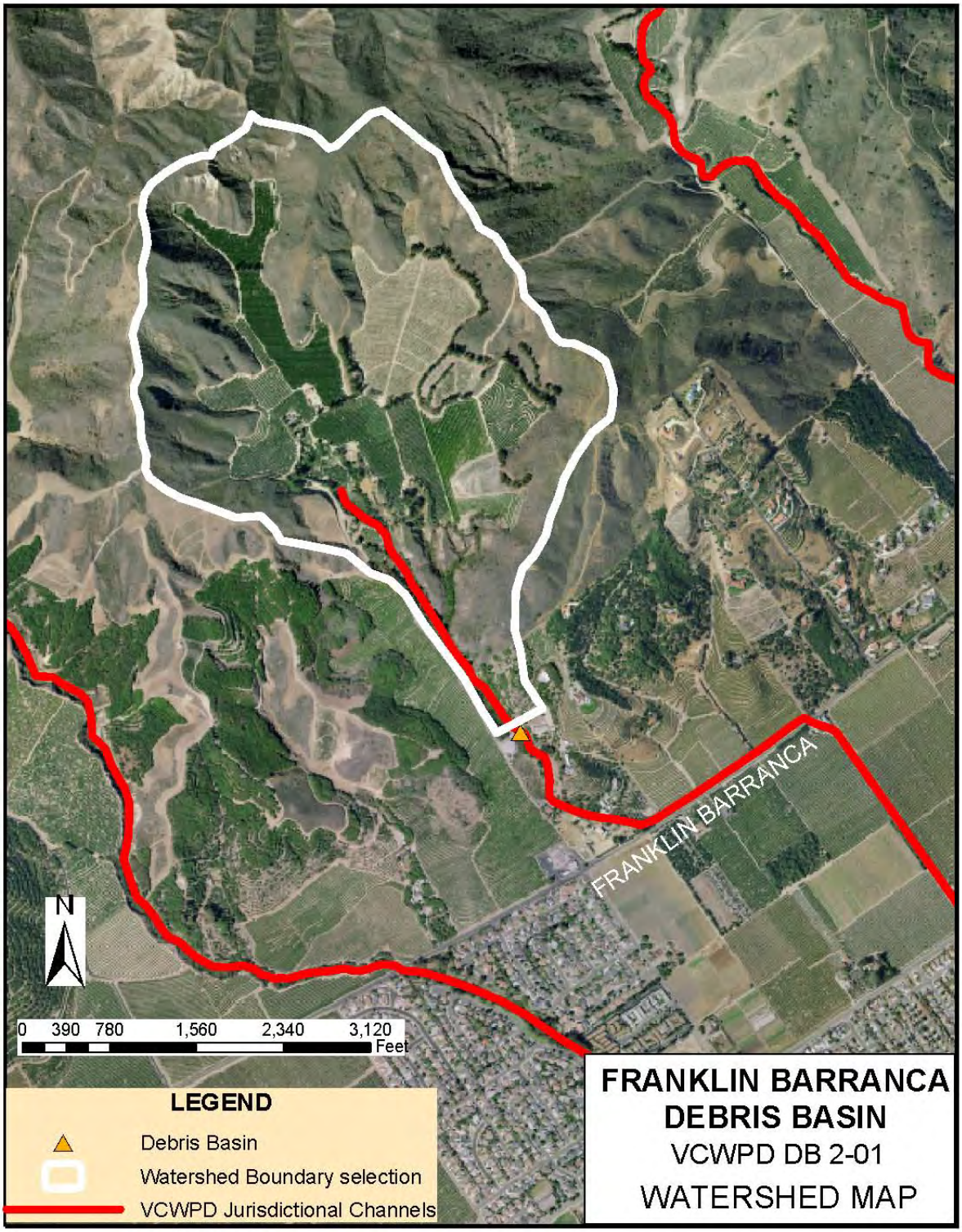
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
01-70	Aerial Survey	Not Digitized		
02-70	Aerial Survey	8,328		
11-70	Aerial Survey	8,128		
05-71	Aerial Survey	7,422		
05-72	Aerial Survey	Not Digitized		
05-73	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			
06-78	Aerial Survey	1,402		
10-81	Aerial Survey	Not Digitized		
03-83	Disaster Declaration			890***
10-90	Aerial Survey	Not Digitized		
06-91	Aerial Survey	Not Digitized		
02-92	Disaster Declaration			890
05-92	Aerial Survey	Not Digitized		
01-95	Disaster Declaration			890
05-96	Outlet repaired/modified			
02-98	Disaster Declaration			890
01-05	Disaster Declaration			

Notes

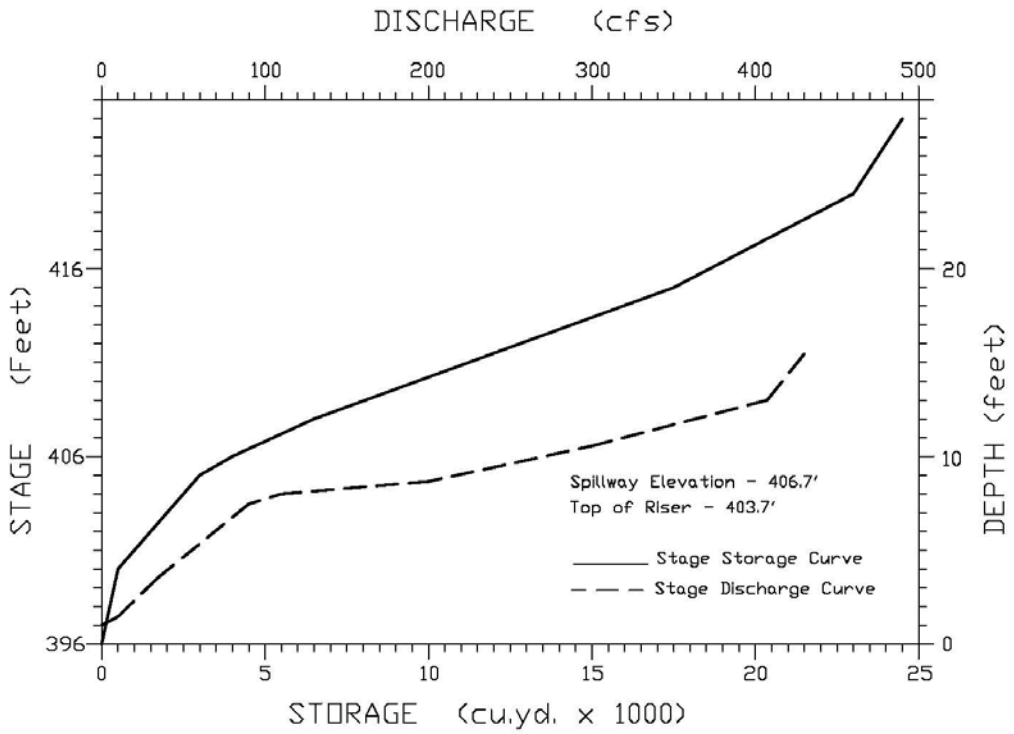
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

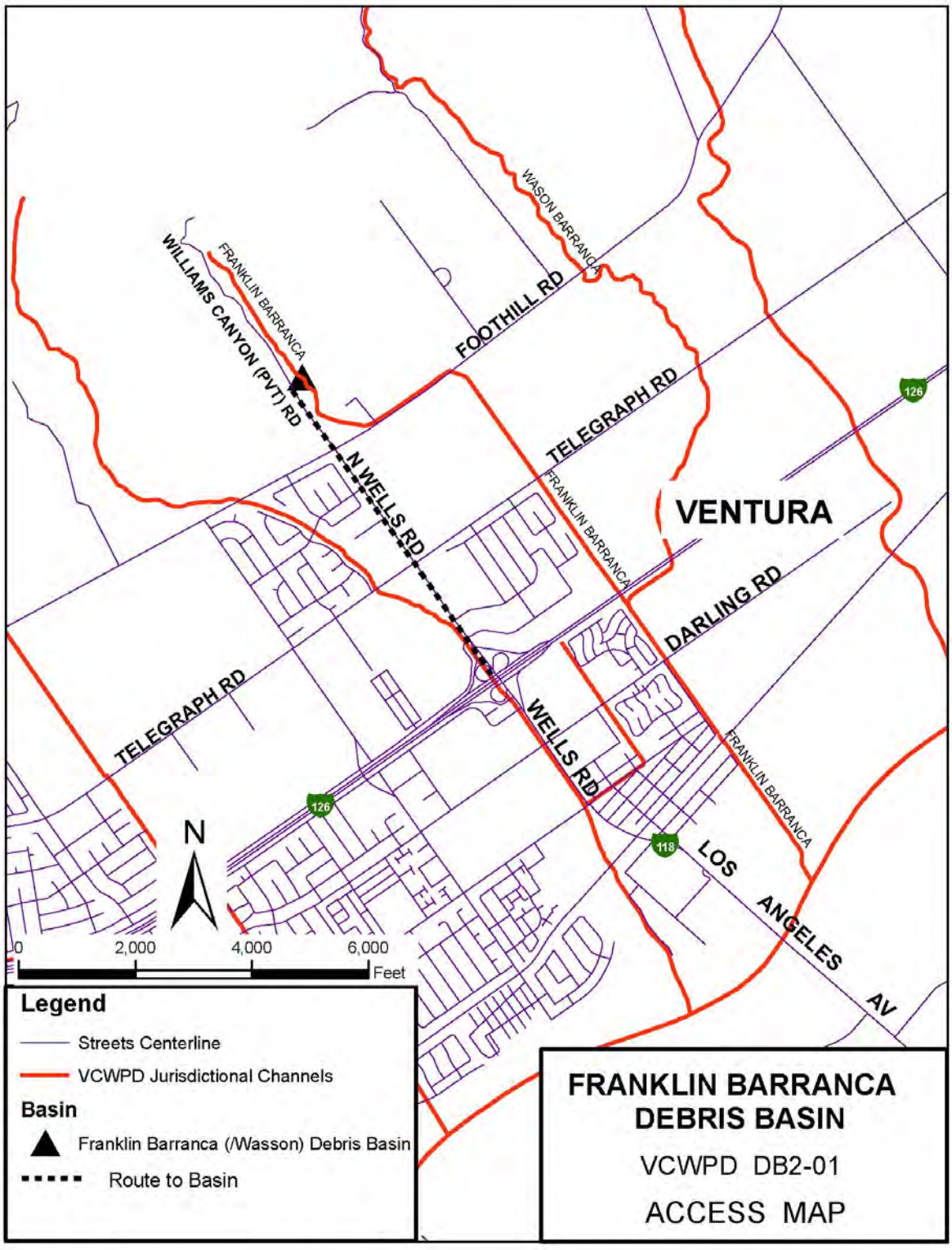
*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable


FRANKLIN BARRANCA
N
0 390 780 1,560 2,340 3,120
Feet
LEGEND
Debris Basin
Watershed Boundary selection
VCWPD Jurisdictional Channels
FRANKLIN BARRANCA
DEBRIS BASIN
VCWPD DB 2-01
WATERSHED MAP

FRANKLIN BARRANCA DEBRIS BASIN




WILLIAMS CANYON (PVT) RD
FRANKLIN BARRANCA
WASON BARRANCA
FOOTHILL RD
TELEGRAPH RD
N WELLS RD
VENTURA
FRANKLIN BARRANCA
DARLING RD
TELEGRAPH RD
WELLS RD
FRANKLIN BARRANCA
126
126
118
LOS ANGELES AV
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Franklin Barranca (/Wasson) Debris Basin
Route to Basin
FRANKLIN BARRANCA
DEBRIS BASIN
VCWPD DB2-01
ACCESS MAP

JEPSON WASH DEBRIS BASIN DB2-02

LOCATION: Fillmore, approximately 2000 ft u/s from Grand Ave.
Enter at end of Oak Ave
N 336,400, E 1,717,000 (Lambert Zone 5 Coordinates); Fillmore 7 1/2' Quad

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	33,850 cy (12-13-87 DTM)
Maximum Debris Capacity	54,750 cy (12-13-87 DTM)
Inflow and Outflow Rates	Q100in=1,624 cfs; Q100out=NA
Debris Cleanout Elevation	587 ft NGVD29 (5,550 cy) [10% of 100-yr debris yield)
EMERGENCY SPILLWAY	Reconstructed 2011
Type	14 ft wide x 25 ft long drop inlet spillway
Weir Elevation	597.5 ft NGVD29
Spillway Length	NA
Capacity	3,950 cfs
PRINCIPAL SPILLWAY	
Type	None
DEBRIS BLEEDER/RISER	Reconstructed 2011
Type	½ 48 in Slotted CMP, invert elev. 580 ft
Low Level Inlet	Bottom 5' of CMP with trash rack
Slots	4 slots/row spaced ~1 ft apart; rows spaced 1 ft
Slot Elevation	Extend 585 to 596.25 ft,
Outlet Conduit	Discharges to drop inlet spillway
DAM	
Dam Type	Earthfill
Dam Crest Elevation	605 NGVD29
Length	700 ft
Width at Crest	NA
Surface Area of Full Basin	2.7 ac
Watershed Area	858 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	Ventura County Flood Control District
Completion Date	1961; Spillway reconstructed in 2011
REFERENCE DRAWINGS	
Construction Drawings	Y-2-3458 to Y-2-3468 Spillway Redesign
Topographic Drawings	T-63-7 (2-6-70), T-33-2 (12-13-85), 12-23-87 DTM, 10-5-89 DTM
Right-of-Way Drawings	15907

JEPSON WASH DEBRIS BASIN (Superseded)

LOCATION: Fillmore, approximately 2000 ft u/s from Grand Ave.
Enter at end of Oak Ave
N 336,400, E 1,717,000 (Lambert Zone 5 Coordinates);
Fillmore 7 1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	33,850 cy (12-13-87 DTM)
Maximum Debris Capacity	54,750 cy (12-13-87 DTM)
Inflow and Outflow Rates	Q100in=1,624 cfs; Q100out=NA
Debris Cleanout Elevation	587 ft NGVD29 (5,580 cy) [10% of 100-yr debris yield)
EMERGENCY SPILLWAY	
Type	36 ft wide x 7.25 ft high Triple RCB
Invert Elevation	598.0 ft NGVD29
Spillway Length	NA
Capacity	1,482 cfs
PRINCIPAL SPILLWAY	
Type	None
Invert Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	Slotted 18 in CSP
Top Elevation	597.5 ft NGVD29
Outlet Conduit	18 in CSP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	604 NGVD29
Length	700 ft
Width at Crest	NA
Surface Area of Full Basin	2.7 ac
Watershed Area	858 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	Ventura County Flood Control District
Completion Date	1961; Spillway reconstructed in 2012
REFERENCE DRAWINGS	
Construction Drawings	Y-2-143 thru Y-2-146;
Topographic Drawings	T-63-7 (2-6-70), T-33-2 (12-13-85), 12-23-87 DTM, 10-5-89 DTM
Right-of-Way Drawings	15907

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	55,800	80,100
50-YEAR	42,000	60,400
25-YEAR	29,900	43,000

BASIN HISTORY: JEPSON WASH DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
09-69	Cleanout		41,000	
02-70	Aerial Survey	43,088		
11-70	Aerial Survey	Not Digitized		
11-70	Aerial Survey	42,074		
12-70	Aerial Survey	40,337		
05-71	Aerial Survey	33,751		
08-71	Cleanout		1,800	
10-71	Aerial Survey	36,499		
01-72	Aerial Survey	33,101		
10-72	Cleanout		9,100	
11-72	Aerial Survey	42,059		
05-73	Aerial Survey	22,798		
08-73	Cleanout		27,000	
11-73	Aerial Survey	49,371		
06-74	Aerial Survey	43,204		
06-75	Aerial Survey	37,082		
10-75	Aerial Survey	38,460		
09-76	Cleanout		5,000	
10-76	Aerial Survey	44,087		
07-77	Cleanout		1,700	
12-77	Aerial Survey	44,174		
01-78	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			
06-78	Aerial Survey	11,137		
10-78	Cleanout		33,400	
10-78	Aerial Survey	45,582		
11-78	Aerial Survey	Not Digitized		
06-80	Aerial Survey	13,520		
02-80	Disaster Declaration			
12-80	Cleanout		41,720	
12-80	Aerial Survey	53,010		6,664**

BASIN HISTORY: JEPSON WASH DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
10-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	49,810		
03-83	Disaster Declaration			5,880**
04-83	Aerial Survey	17,781		
02-84	1st Cleanout		26,000	
02-84	Aerial Survey	43,803		
03-84	2nd Cleanout		7,400	
03-84	Aerial Survey	51,178		
07-85	Cleanout		4,291	
12-85	Aerial Survey	53,198		
07-86	Aerial Survey	39,955		
10-86	Cleanout		15,654	
10-86	Aerial Survey	55,027		
10-87	Aerial Survey	54,700		
10-88	Aerial Survey	Not Digitized		
10-89	Aerial Survey	53,858		4,034
09-90	Aerial Survey	Not Digitized		
05-91	Aerial Survey	49,865		4,031
02-92	Disaster Declaration			3,953**
05-92	Aerial Survey	38,880		
11-92	Cleanout		15,867	
11-92	Aerial Survey	54,750		
07-93	Aerial Survey	26,400		
10-93	Cleanout		28,700	
01-94	Aerial Survey	55,100		
01-95	Disaster Declaration			4,355
06-95	Aerial Survey	21,350		
09-95	Cleanout		33,250	
12-95	Aerial Survey	54,750		
07-96	Aerial Survey	Not Digitized		
08-96	Cleanout		3,540	
07-97	Aerial Survey	43,660		
02-98	Disaster Declaration			4,239
03-98	Field Survey	18,800		
07-98	Aerial Survey	16,400		
12-98	Cleanout		37,580	
12-98	Aerial Survey	53,980		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		

BASIN HISTORY: JEPSON WASH DEBRIS BASIN

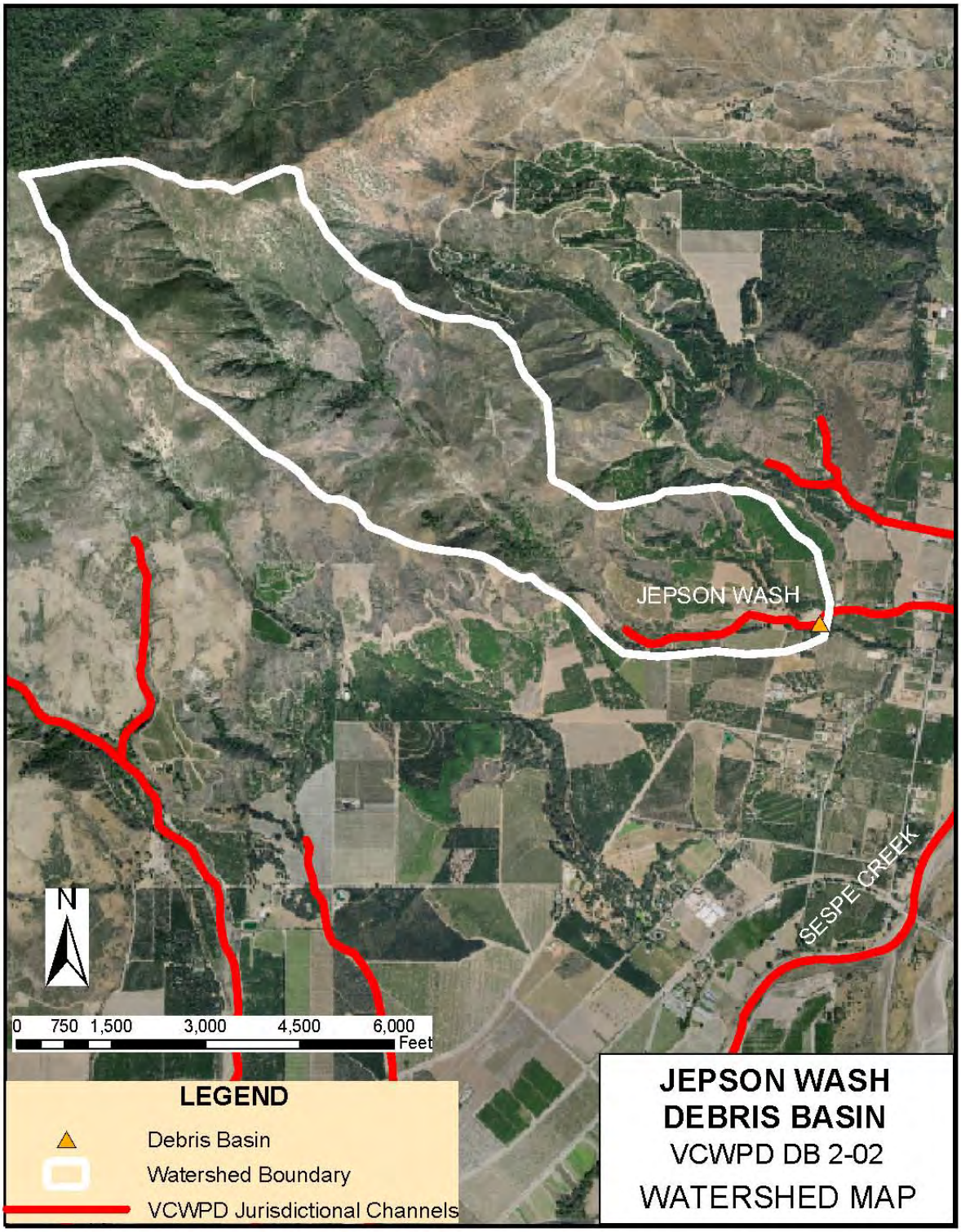
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
12-02	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
02-04	Cleanout		872	
08-04	Cleanout		6,768	
01-05	Disaster Declaration			3,556
07-05	Cleanout- Aerial Survey Analysis by O&M		56,952 fm O&M analysis	
09-05	Aerial Survey analysis by WR&T	34,066 to elev 598 ft spillway		
09-06	Cleanout- Truck Count		248	
10-06	WR&T Aerial Survey Analysis	1,781 net vol change		
05-08	WR&T Aerial Survey Analysis	23,902 to elev 598 spillway, 8,385 net vol change fm 2006		
08-08	Cleanout- Aerial Survey Analysis by O&M		11,282	
08-08	WR&T Aerial Survey Analysis	34,361 to elev 598 spillway		
01-12	WR&T Aerial Survey Analysis	25,088 to elev 598 spillway		

Notes

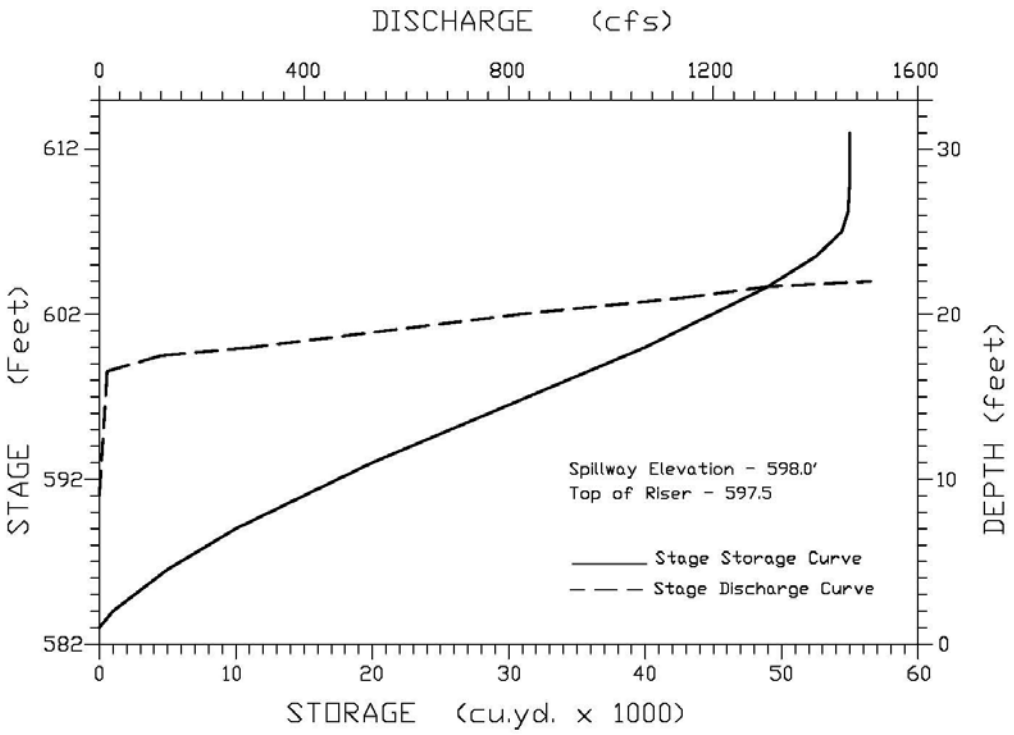
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

NA= Not Available / Not Applicable


JEPSON WASH
SESPE CREEK
N
0 750 1,500 3,000 4,500 6,000
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
JEPSON WASH
DEBRIS BASIN
VCWPD DB 2-02
WATERSHED MAP

JEPSON WASH DEBRIS BASIN



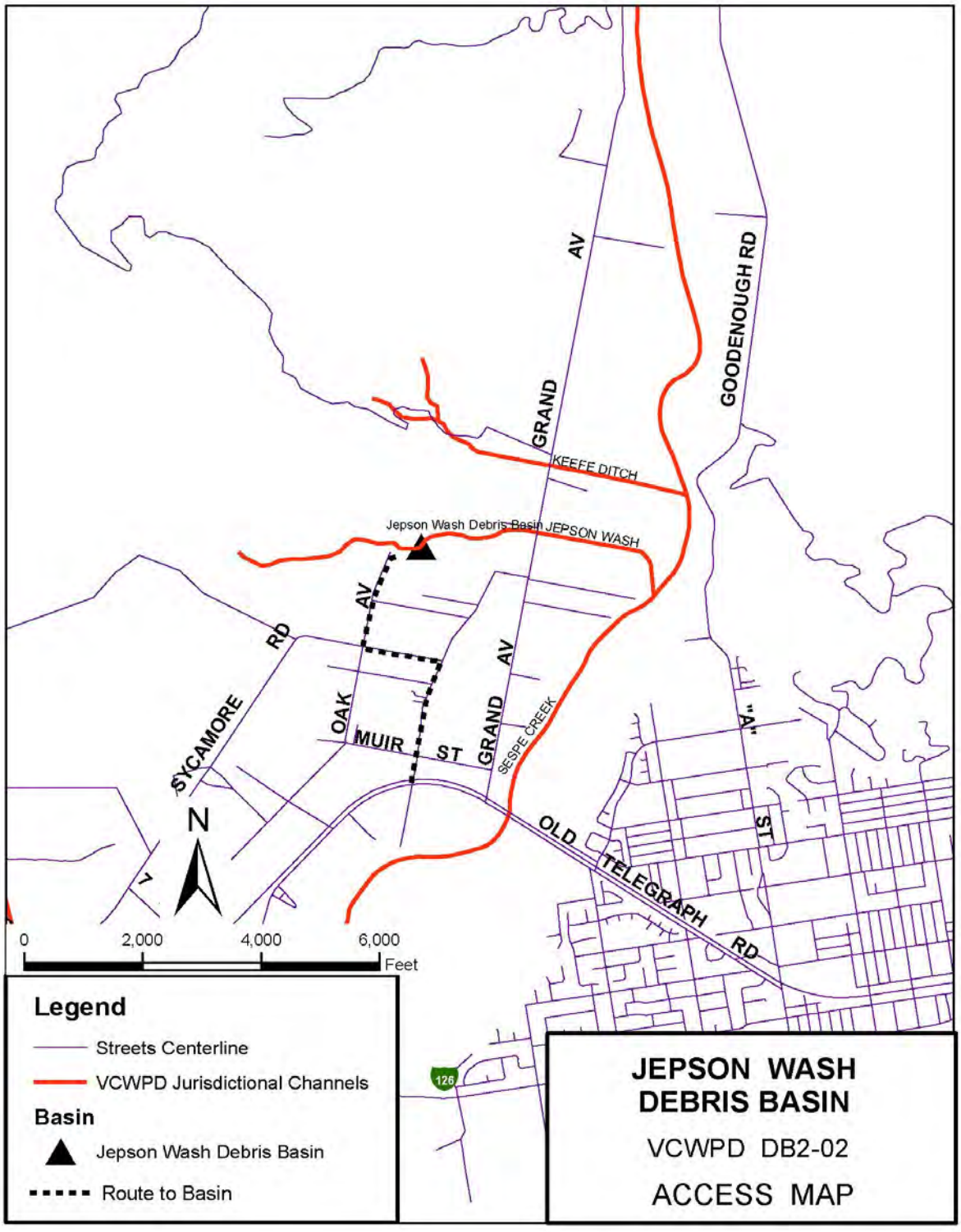
Historic Stage-Storage Discharge Data

Stage-Storage-Discharge Data Summary

Elevation	1970 Vol.	1961 Riser Disch.	2011 Riser Disch.	2011 Spillway Disch.	2012 Vol.
Ft. NGVD29	Cu. Yds	Note (1)	Not Available	Cfs	Cu. Yds
580					-
581					9
582					21
583					47
584					106
585	-				592
586	1,000				1,697
587	2,000				2,884
588	3,200	-			4,151
589	4,600	0.50			5,501
590	6,200	1.30			6,959
591	8,200	2.50			8,569
592	10,500	3.90			10,350
593	13,300	5.75			12,300
594	16,300	7.75			14,419
595	20,000	9.75			16,711
596	24,000	11.75			19,177
597	28,200	14.00			21,804
597.5	32,500	15.25		-	
598		16.50		100	24,580
599				340	27,496
600				840	30,538
601				1,380	NA
601.4				1,624	NA
602				2,000	NA
602.5				2,400	NA
603				2,800	NA
603.75				3,430	NA
604				3,680	NA

Note (1) Historic Riser removed as part of Spillway Reconstruction in 2011

NA= Not Analyzed


AV
GRAND
GOODENOUGH RD
KEEFE DITCH
Jepson Wash Debris Basin
JEPSON WASH
AV
RD
SYCAMORE
OAK
MUIR
ST
GRAND
AV
SESPE CREEK
"A"
ST
OLD
TELEGRAPH
RD
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Jepson Wash Debris Basin
Route to Basin
126
JEPSON WASH
DEBRIS BASIN
VCWPD DB2-02
ACCESS MAP

POLE CREEK DEBRIS BASIN DB2-09

LOCATION: Fillmore, Between Heritage Valley and El Dorado Mobile Homes Adj to Hwy 126
N 327,782,E 1,727,542 (Lambert Zone 5 Coordinates);
Fillmore 7 1/2' Quad.

DESIGN DATA	Elevations in NAVD88
Design Agency	Pace Engineering
Level Capacity	440,440 cy (273 af) at spillway invert
Debris Cleanout Elev.	466.5 ft NAVD88 at upstream end of basin
100-Yr Inflow Rate	7,370 cfs,
Outflow Rate	Assumed same as inflow for design hydrology modeling
Cleanout Elevation	20% of 100-yr Volume (72,340cy) Elev. 441.75 ft
EMERGENCY SPILLWAY	
Type	Soil Cement End Sill
Crest Elevation	441.7 ft NAVD29
Spillway Length	337.9 ft
Capacity w/o Freeboard	NA
PRINCIPAL SPILLWAY	
Type	Slotted RC Riser Tower with 3.5 ftW x 4ft H inlet
Top Elevation	448 ft NAVD88
Outlet	36-in RCP
DEBRIS BLEEDER	
Type	None
BYPASS CHANNEL	6ft W x 5ft H low flow fish passage
Bypass Flow	37 cfs
DAM	
Dam Type	Soil Cement End Sill
Dam Crest Elevation	441.7 ft NAVD29
Length	337.9 ft
Surface Area of Full Basin	15 ac
Watershed Area	8.645 sq mi from GIS/Watersheds.shp file
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	2009
REFERENCE DRAWINGS	
Construction Drawings	Y-2-3060 to 3094E
Right-of-Way Drawings	Y-2-3084
Topographic Drawings	Y-2-3065 to 3067

EXPECTED DEBRIS PRODUCTION (cy): Note 1		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	361,700	524,600
50-YEAR	276,000	400,300
25-YEAR	200,800	291,200
10-YEAR	121,600	176,400
2-YEAR	29,400	42,700

Note 1: Design 100-yr debris production equivalent to ~0.5 in of soil across entire watershed. Large amount is due to estimate of slope failure area from DMG 1972 landslide map of 80 ac/sq mi. Scott and Williams (1978) found Sf=6 ac/sq mi during their field investigations. Re-evaluations of VCWPD removal data have resulted in design 100-yr yields ranging from 70,000 to 289,000 cy.

*

BASIN HISTORY: **Pole Creek Basin**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	Channel cleanout data prior to basin provided in Appendix A.	Channel removal quantities range from 22,000 cy in 1992 to 140,000cy in 1995.		
Jan-05	Channel cleanout after storm prior to basin construction	Estimated at 72,200 cy by PACE (2010)		

PACE,2010. Pole Creek Sediment Yield Study.

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

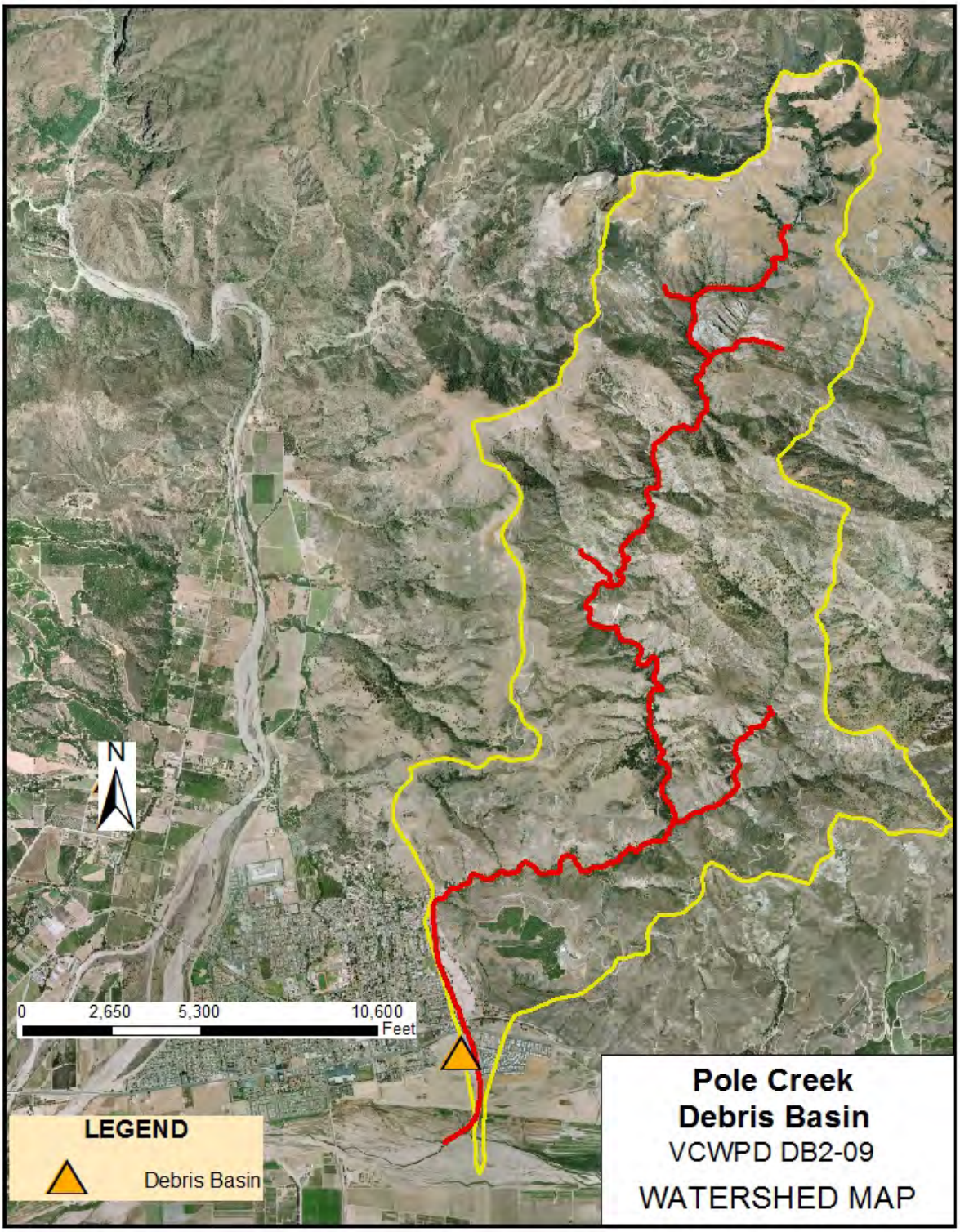
** FEMA Accepted Value for Disaster Declaration

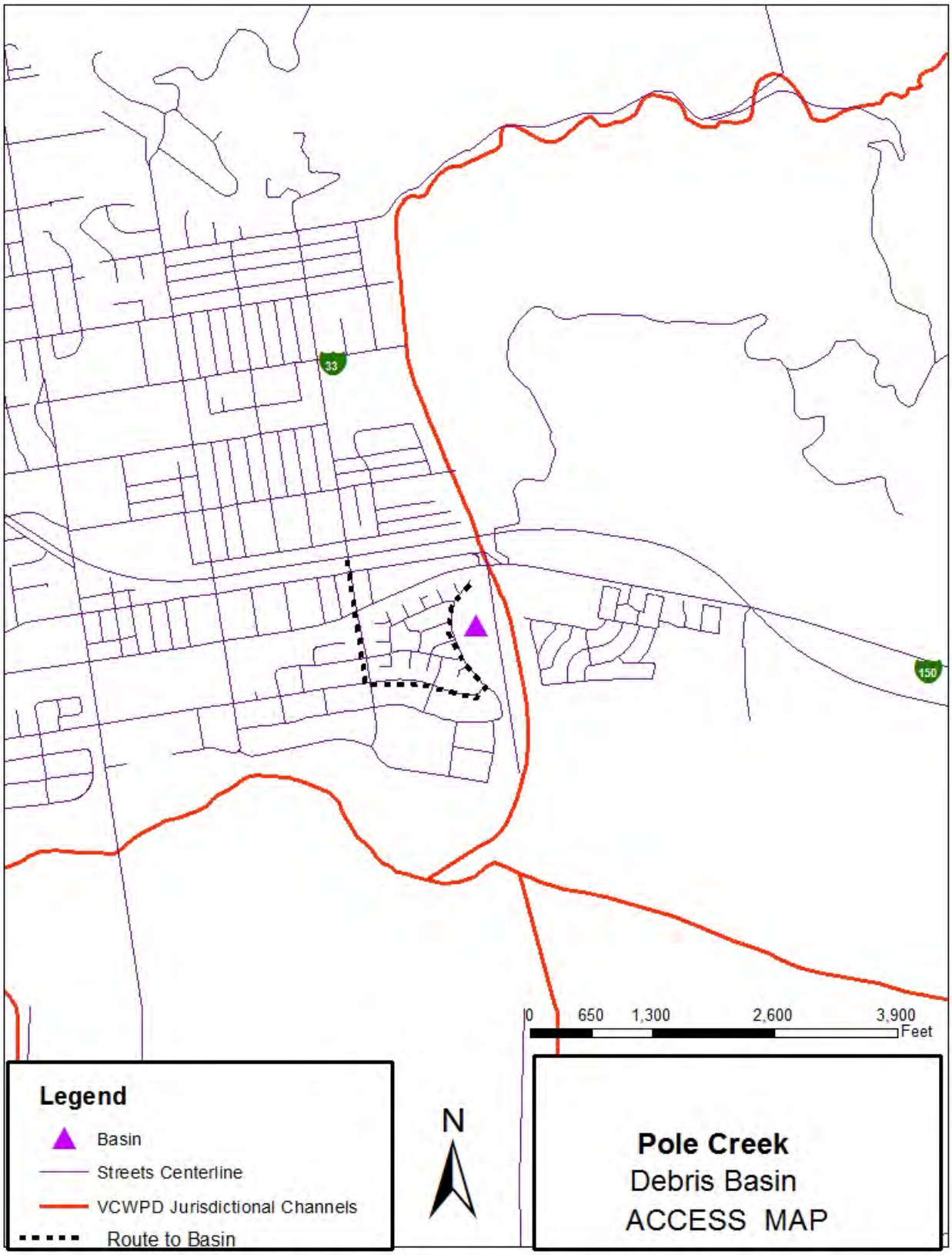
*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable

Pole Creek Debris Basin Stage-Storage

Elevation (ft) NAVD 88	Area (ac)	Total Volume (ac-ft)
438.00	11.76	0.00
439.00	11.96	11.86
440.00	12.17	23.93
441.00	12.38	36.20
442.00	12.59	48.69
443.00	12.80	61.38
444.00	13.01	74.29
445.00	13.22	87.40
446.00	13.42	100.72
447.00	13.63	114.25
448.00	13.84	127.98
449.00	14.04	141.92
450.00	14.26	156.07
451.00	14.47	170.44
452.00	14.82	185.08
453.00	14.47	199.72
454.00	13.56	213.74
455.00	12.43	226.73
456.00	10.99	238.45
457.00	9.30	248.59
458.00	7.52	257.00
459.00	5.61	263.57
460.00	3.86	268.31
461.00	2.17	271.32
462.00	0.73	272.77


N
0 2,650 5,300 10,600
Feet
LEGEND
Debris Basin
Pole Creek
Debris Basin
VCWPD DB2-09
WATERSHED MAP


33
150
0
650
1,300
2,600
3,900
Feet
Legend
Basin
Streets Centerline
VCWPD Jurisdictional Channels
Route to Basin
N
Pole Creek
Debris Basin
ACCESS MAP

REAL WASH DEBRIS BASIN DB2-04

LOCATION: Piru, 1900 ft upstream from Center Street, 2500 ft west of Main Street.
N 336,000, E 1,758,000 (Lambert Zone 5 Coordinates.)
Piru 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	22,000 (10-5-89 DTM) 22,500 (11-91 DTM)
Maximum Debris Capacity	31,600 (10-5-89 DTM) 32,100 (11-91 DTM)
Inflow and Outflow Rates	Q100in=375 cfs on Y-2-308; Q100out=same
Debris Cleanout Elevation	857 ft (10,500 cy) [level cap.-100yr debris yield]
EMERGENCY SPILLWAY	
Type	12 ft wide x 6.75 ft high RC Channel
Invert Elevation	865.5 ft NGVD29
Spillway Length	NA
Capacity	459 cfs from as-builts
PRINCIPAL SPILLWAY	
Type	None
Invert Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	Reconstructed in 2010
Type	Slotted 24-in CSP 12.3 ft high; 31-in high collar added In 2010 with 5-in openings to increase sediment outflow
Elevations	858.8 ft top; 847 ft bottom of collar and riser
Outlet Conduit	18-in CSP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	872 ft
Length	330 ft
Width at Crest	NA
Surface Area of Full Basin	1.6 ac
Watershed Area	160 ac from Quad
CONSTRUCTION DATA	
Construction Agency	VCWPD with Storm Drain Maintenance District No.2
Completion Date	1964
REFERENCE DRAWINGS	
Construction Drawings	Y-2-308 and Y-2-310; Spec WP11-02(I) for riser mod.
Topographic Drawings	NA
Right-of-Way Drawings	T-63-8 (2-6-70) T-52-1 (10-7-67); T-256 (10-22-80) 12-23-87 DTM; 10-5-89 DTM, T-432 (10-19-94)

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	11,500	16,400
50-YEAR	8,500	12,200
25-YEAR	6,000	8,600

BASIN HISTORY: **REAL WASH DEBRIS BASIN**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
10-67	Aerial Survey	Not Digitized		
02-69	Disaster Declaration			
09-69	Cleanout		19,300	
01-70	Aerial Survey	Not Digitized		
11-70	Aerial Survey	19,878		
12-70	Aerial Survey	17,175		
05-71	Aerial Survey	15,503		
05-72	Aerial Survey	11,875		
06-72	Cleanout		6,000	
11-72	Aerial Survey	19,926		
05-73	Aerial Survey	14,499		
09-73	Cleanout		6,500	
11-73	Aerial Survey	20,606		
06-74	Aerial Survey	19,755		
06-75	Aerial Survey	18,365		
10-75	Aerial Survey	18,260		
09-76	Cleanout		3,300	
10-76	Aerial Survey	22,251		
12-77	Aerial Survey	20,720		
01-78	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			
06-78	Aerial Survey	2,276		
11-78	Cleanout		18,400	
12-78	Aerial Survey	21,187		
02-80	Disaster Declaration			
06-80	Aerial Survey	7,026		
11-80	Cleanout		17,100	2,514**
11-80	Aerial Survey	23,920		
10-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	21,315		
03-83	Disaster Declaration			

BASIN HISTORY: **REAL WASH DEBRIS BASIN**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
04-83	Aerial Survey	13,834		
09-84	Cleanout		25,070	2,507**
09-84	Aerial Survey	25,886		
12-85	Aerial Survey	25,947		
07-86	Aerial Survey	19,864		
10-86	Cleanout		13,500	
10-86	Aerial Survey	29,958		
12-87	Aerial Survey	29,402		
10-88	Aerial Survey	Not Digitized		
07-89	Cleanout		6,224	2,014
10-89	Aerial Survey	31,576		
09-90	Aerial Survey	Not Digitized		
05-91	Aerial Survey	26,877		
11-91	Cleanout		6,742	
11-91	Aerial Survey	32,106		
02-92	Disaster Declaration			2,573**
05-92	Aerial Survey	19,140		
11-92	Cleanout		13,500	
11-92	Aerial Survey	31,112		
06-94	Aerial Survey	11,488		
10-94	Aerial Survey	11,330		
12-94	Cleanout		23,590	
12-94	Aerial Survey	30,750		
01-95	Disaster Declaration			5,225**
02-95	Cleanout		22,160	
05-95	Aerial Survey	3,000		
12-95	Cleanout		28,250	
12-95	Aerial Survey	31,250		
07-96	Aerial Survey			
08-96	Aerial Survey	11,050		
01-97	Field Survey	2,950		
01-97	Cleanout		19,580	
04-97	Aerial Survey	22,530		
07-97	Aerial Survey	Not Digitized		
02-98	Disaster Declaration			3,709***
03-98	Field Survey	5,240		
06-98	Cleanout		25,470	
06-98	Aerial Survey	28,150		
12-99	Aerial Survey	Not Digitized		

BASIN HISTORY: **REAL WASH DEBRIS BASIN**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
09-00	Cleanout		1,300	
08-01	Aerial Survey	Not Digitized		
10-02	Cleanout		8,916	
12-02	Aerial Survey	Not Digitized		
08-03	Cleanout		152	
09-03	Cleanout		5,962	
11-03	Aerial Survey	Not Digitized		
08-04	Cleanout		3,864	
09-04	Cleanout		5,177	
01-05	Disaster Declaration			4,124
07-05	Cleanout O&M Analysis		47,318	
08-05	WR&T TIN analysis	25,068 up to elev 865.5 ft		
10-06	Cleanout O&M Analysis		21,291	
Oct-06	WR&T TIN analysis	22,995 up to elev 865.5 ft		
Sep-08	WR&T TIN analysis	22,815 up to elev 865.5 ft		
May-10	WR&T TIN analysis	7,152 up to elev 865.5 ft		
May-11	WR&T TIN analysis	7,781 up to elev 865.5 ft		
May-11	WR&T TIN analysis	16,393 accumulated from 10-06		
Jul-11	Cleanout- O&M Truck Count		14,365	
Jun-12	WR&T TIN analysis	19,405 up to elev 865.5 ft		
Jun-15	Cleanout- O&M Truck Count		7,410	
05-17	WR&T TIN analysis	7,013 up to elev 865.5 ft 12,392 cy net deposit fm 6-12		
07-17	Cleanout- Truck Count		3,388	

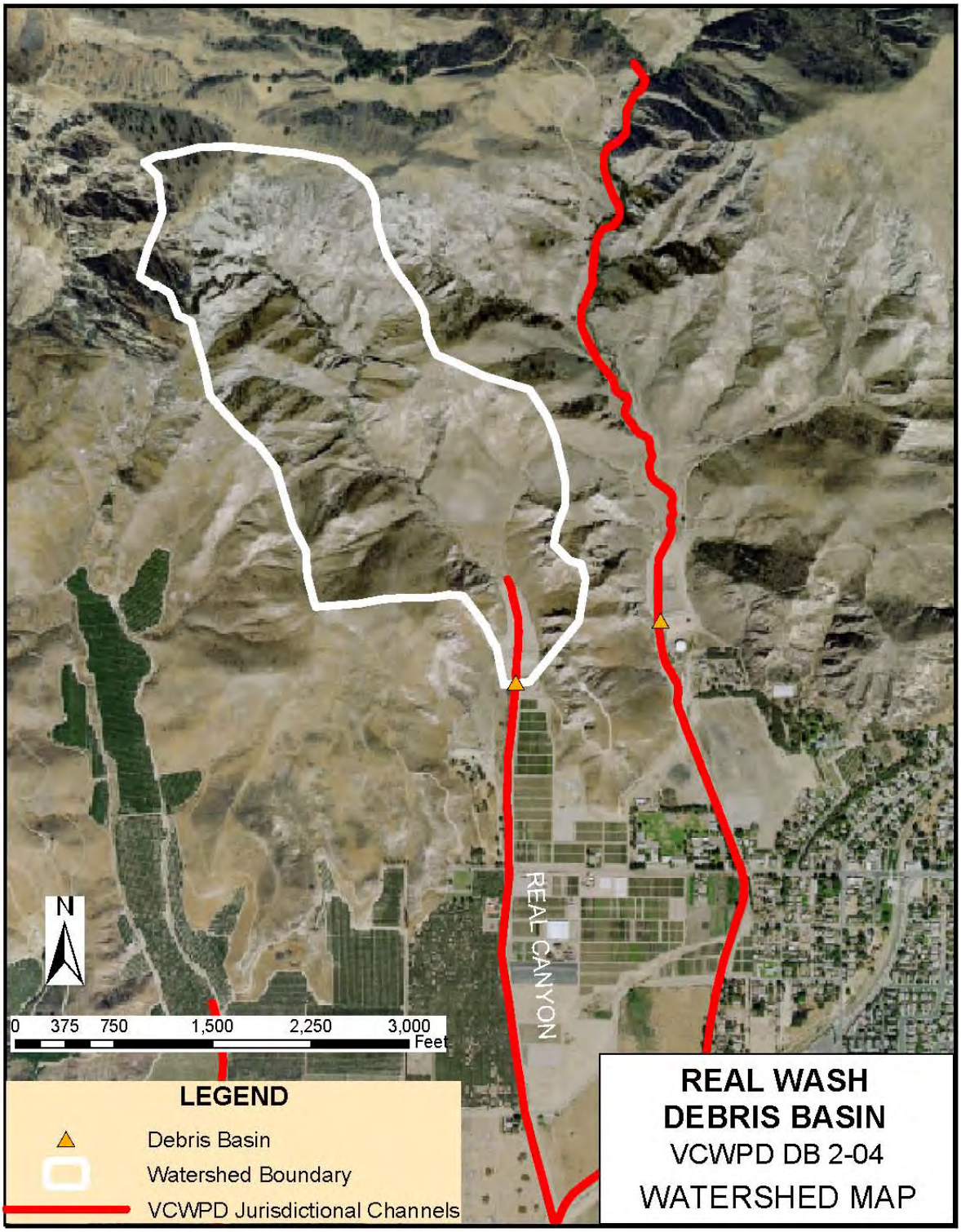
Notes

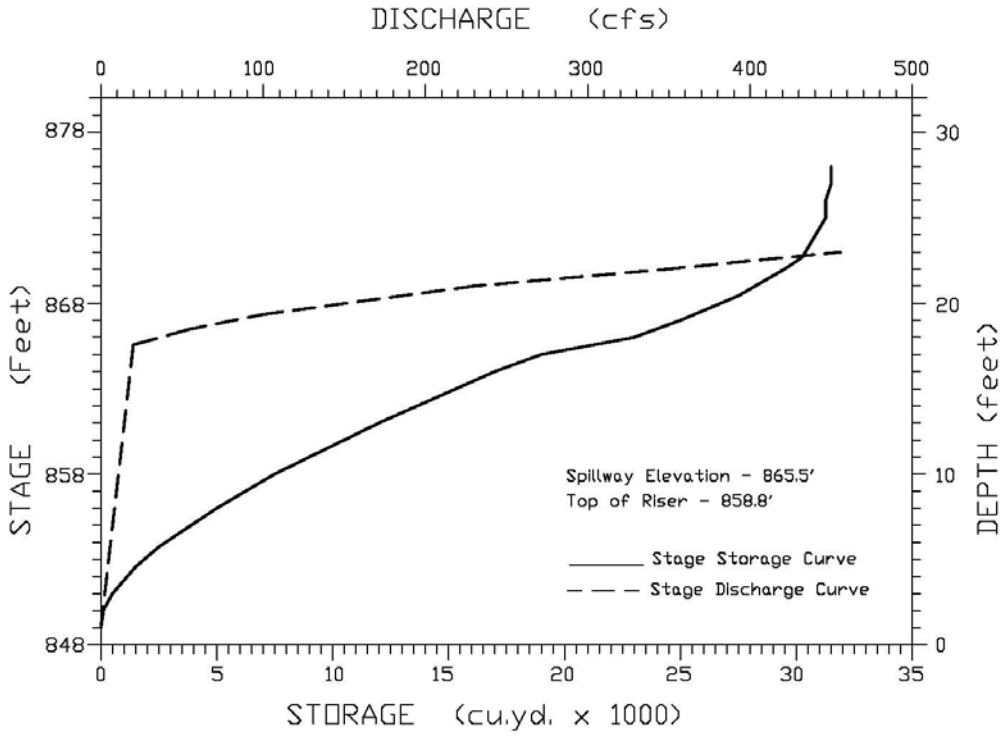
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable

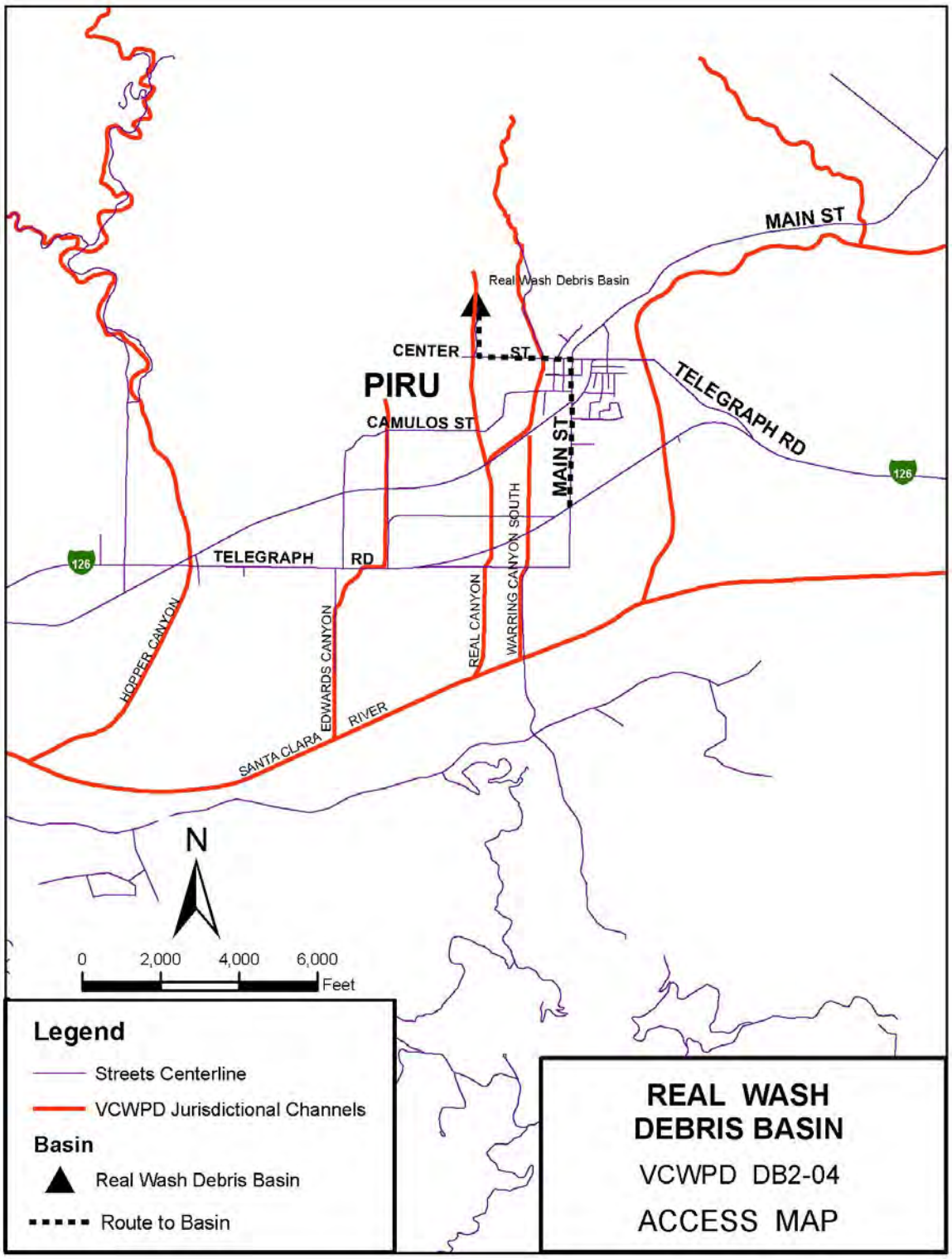

N
0 375 750 1,500 2,250 3,000
Feet
REAL CANYON
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
REAL WASH
DEBRIS BASIN
VCWPD DB 2-04
WATERSHED MAP


DISCHARGE (cfs)
0
100
200
300
400
500
878
868
858
848
STAGE (Feet)
30
20
10
0
DEPTH (feet)
0
5
10
15
20
25
30
35
STORAGE (cu.yd. x 1000)
Spillway Elevation - 865.5'
Top of Riser - 858.8'
Stage Storage Curve
Stage Discharge Curve

Stage-Storage-Discharge Data Summary

Elevation	1982 Vol	Riser Disch.	Spill Disch.	2008 Vol.
Ft. NGVD29	Cu. Yds	1972	Cfs	Cu. Yds
847	65			0
848	277	0.00		42
849	628	0.14		294
850	1,097	0.74		853
851	1,659	1.58		1,603
852	2,299	2.62		2,488
853	3,025	3.82		3,481
854	3,840	5.16		4,564
855	4,734	6.62		5,727
856	5,706	8.20		6,970
857	6,757	9.90		8,292
858	7,878	11.30		9,692
859	9,075	12.60		11,174
860	10,350	13.40		12,736
861	11,697	14.30		14,379
862	13,142	16.10		16,103
863	14,664	17.20		17,910
864	16,322	17.60		19,800
865	18,068	18.00		21,774
865.5	19,999	18.20	-	22,792
866.5	22,025		53	-
867.5	23,935		114	-
868.5	25,478		194	-
869.5	26,604		289	-
870.5	27,299		396	-
871	27,875		453	-

Note: Low Flow Riser Modified in 2010, Flow Values not recalculated


MAIN ST
Real Wash Debris Basin
CENTER ST
PIRU
CAMULOS ST
TELEGRAPH RD
126
MAIN ST
WARRING CANYON SOUTH
TELEGRAPH RD
126
HOPPER CANYON
EDWARDS CANYON
REAL CANYON
SANTA CLARA RIVER
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Real Wash Debris Basin
Route to Basin
REAL WASH
DEBRIS BASIN
VCWPD DB2-04
ACCESS MAP

WARRING CANYON DEBRIS BASIN DB2-05

LOCATION: Piru, 2000 ft u/s from Center Street, 800 ft W from Main St;
N 336,000, E 1,759,000 (Lambert Zone 5 Coordinates);
Piru 7 1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	33,100 cy (10-30-86) based on original spillway at 851.5 ft
Maximum Debris Capacity	59,500 cy (10-30-86)
Inflow and Outflow Rates	Q100in=1,350 cfs; Q100out=NA, Q50 in= 980 cfs
Debris Cleanout Elevation	837 ft (7,100 cy) [max. cap.-100yr debris yield]
EMERGENCY SPILLWAY	
Type	44 ft wide inlet to 26 ft wide x 9.75 ft high RC Channel
Invert Elevation	851.7 ft NGVD29
Spillway Length	69 ft at 0.05 slope to dam face
Capacity	Has 3 ft freeboard for Q100 = 1,350 cfs,
PRINCIPAL SPILLWAY	
Type	6.5 ft X10 ft RC Tower Weir Inlet with Trash Rack
Weir Elevation	851.08 ft NGVD29
Outlet Conduit	48-in RCP invert elev. 823.75 ft
DEBRIS BLEEDER/RISER	
Type	Slots in Spillway Riser Tower 5"x9", 21" on center, 6/row
Elevations	78 slots from 827.5 to 850 ft
Subgrade	4 slots below grade, lowest at 824. 6 ft 18" on center
DAM	
Dam Type	Earthfill
Dam Crest Elevation	860 ft NGVD29
Length	320 ft
Width at Crest	NA
Surface Area of Full Basin	2.3 ac
Watershed Area	695 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	VCWPD 1952; Riser tower reconstructed in 2003
Completion Date	Spillway reconstructed 2014
REFERENCE DRAWINGS	
Construction Drawings	31399c, 33183 thru 33184; Riser Tower Y-2-2737-2745 Y-2-3759-3767, Revised emergency spillway.
Topographic Drawings	T-52-2 (10-7-67), T-63-12 (2-6-70); T-63-13 (11-12-70) T-255 (10-22-80); T-335 (12-13-85) 12-23-87 DTM; 10-5-89 DTM, 10-5-90 DTM
Right-of-Way Drawings	15956

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	52,400	75,000
50-YEAR	38,800	55,600
25-YEAR	27,200	39,000

BASIN HISTORY: WARRING CANYON DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
10-67	Aerial Survey	Not Digitized		
02-69	Disaster Declaration			
06-6	Cleanout		27,100	
01-70	Cleanout		18,000	
02-70	Aerial Survey	Not Digitized		
10-70	Cleanout		11,300	
11-70	Aerial Survey	36,054		
12-70	Aerial Survey	32,054		
05-71	Cleanout		125	
05-71	Aerial Survey	32,174		
01-72	Aerial Survey	28,000		
09-72	Cleanout		9,400	
11-72	Aerial Survey	37,300		
05-73	Aerial Survey	23,406		
09-73	Cleanout		14,200	
10-73	Aerial Survey	37,034		
06-74	Aerial Survey	35,969		
10-75	Aerial Survey	33,247		
10-76	Cleanout		6,250	
10-76	Aerial Survey	39,288		
12-77	Aerial Survey	35,046		
01-78	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			
06-78	Aerial Survey	3,884		
11-78	Cleanout		30,700	8,143**
11-78	Aerial Survey	34,562		
06-80	Aerial Survey	2,628		
11-80	Cleanout		27,100	8,829**
11-80	Aerial Survey	32,196		
10-81	Aerial Survey	Not Digitized		
08-82	Cleanout		7,200	
11-82	Aerial Survey	39,890		

BASIN HISTORY: WARRING CANYON DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
03-83	Disaster Declaration			
04-83	Aerial Survey	16,478		
11-83	Aerial Survey	12,762		
01-84	Cleanout		24,940	
01-84	Aerial Survey	40,174		
09-84	Cleanout		12,904	
09-84	Aerial Survey	51,878		
12-85	Aerial Survey	49,922		
07-86	Aerial Survey	31,639		
10-86	Cleanout		27,036	
10-86	Aerial Survey	59,456		
10-87	Aerial Survey	Not Digitized		
12-87	Aerial Survey	53,952		
12-88	Aerial Survey	Not Digitized		
07-89	Cleanout		6,188	5,100
10-89	Aerial Survey	57,099		
09-90	Aerial Survey	58,326		
05-91	Aerial Survey	56,125		
06-91	Cleanout		5,664	
11-91	Aerial Survey	61,080		
02-92	Disaster Declaration			5,611**
05-92	Aerial Survey	30,890		
09-92	Cleanout		31,300	
09-92	Aerial Survey	62,820		
12-92	Aerial Survey	Not Digitized		
09-93	Aerial Survey	40,130		
02-94	Cleanout		22,200	
03-94	Aerial Survey	62,770		
01-95	Disaster Declaration			6,022
06-95	Aerial Survey	11,570		
11-95	Cleanout		50,650	
11-95	Aerial Survey	62,220		
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	52,500		
02-98	Disaster Declaration			5,049***
07-98	Aerial Survey	8,440		
12-98	Cleanout		50,244	
12-98	Aerial Survey	58,690		
12-99	Aerial Survey	Not Digitized		

BASIN HISTORY: WARRING CANYON DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
08-01	Aerial Survey	Not Digitized		
12-02	Aerial Survey	Not Digitized		
04-02	Aerial Survey	53,375		
NA	Cleanout	Volume Unknown	NA	
03-03	Aerial Survey	62,314		
12-04	Cleanout- O&M Analysis		17,450	
12-04	WR&T TIN analysis	37,068 to elev 850.5 ft		
01-05	Disaster Declaration			4,927
07-05	Cleanout- O&M analysis		85,687	
07-05	Cleanout- O&M analysis		21,965-Survey	
09-05	WR&T TIN analysis	38,955 to elev 850.5 ft		
10-06	Cleanout- O&M analysis		6,890	
10-06	WR&T TIN analysis	36,102 to elev 850.5 ft		
10-10	WR&T TIN analysis	33,593 to elev 850.5 ft		
07-11	Cleanout- O&M Truck Count		3,582	
05-17	WR&T TIN analysis	16,334 to elev 850.5 ft 17,259 net deposit fm 2010		

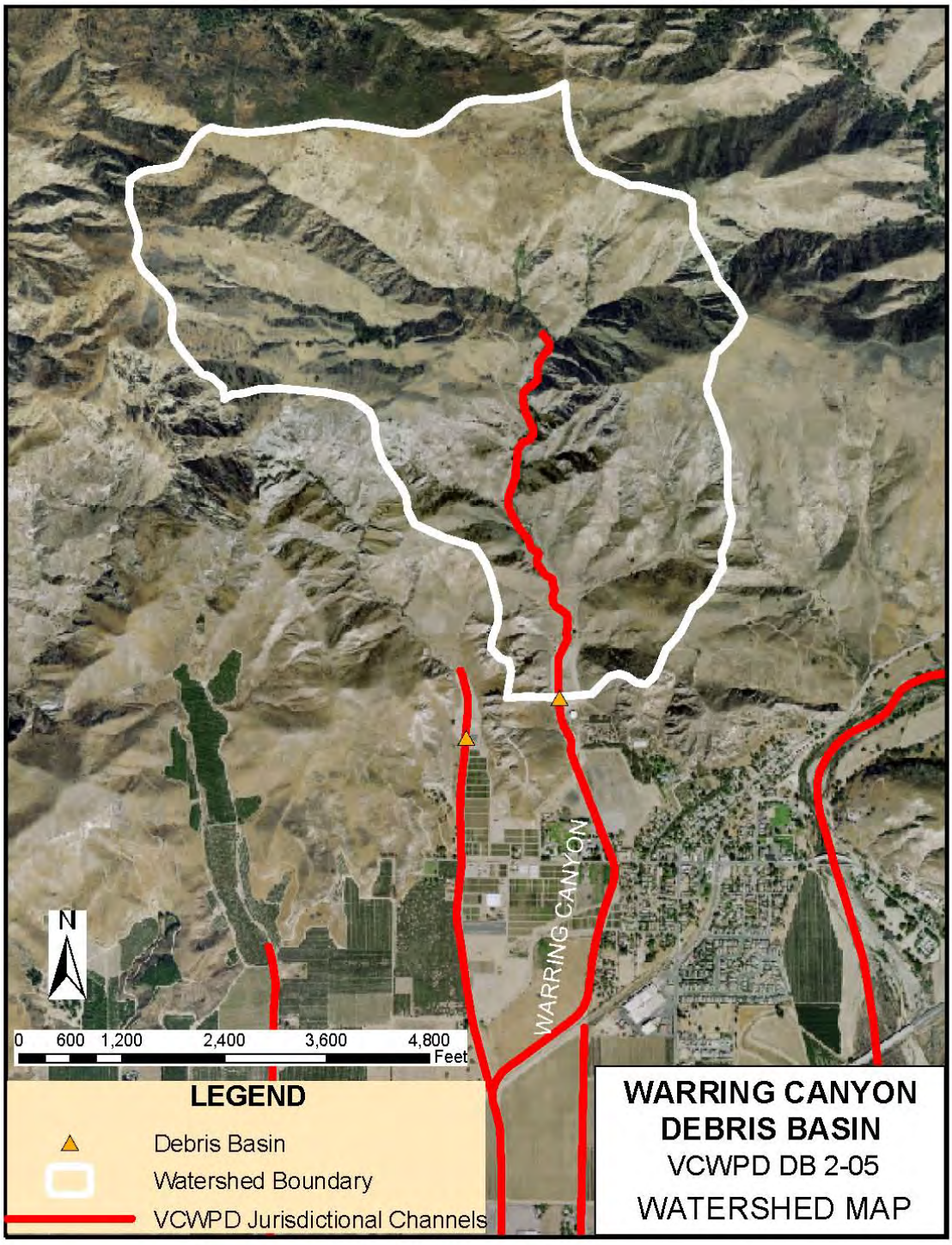
Notes

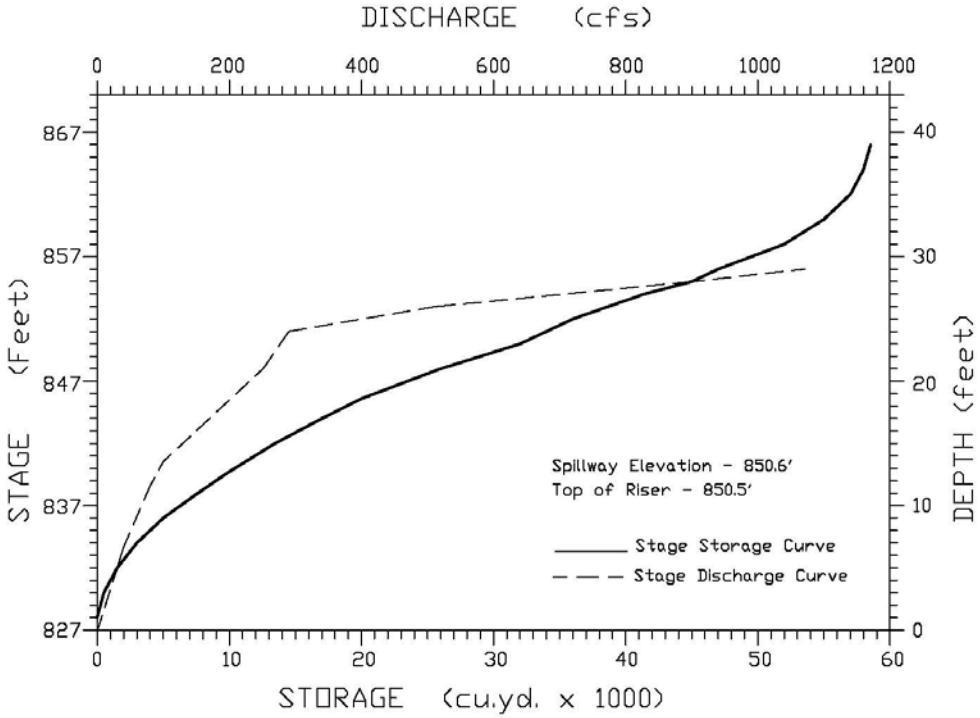
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable

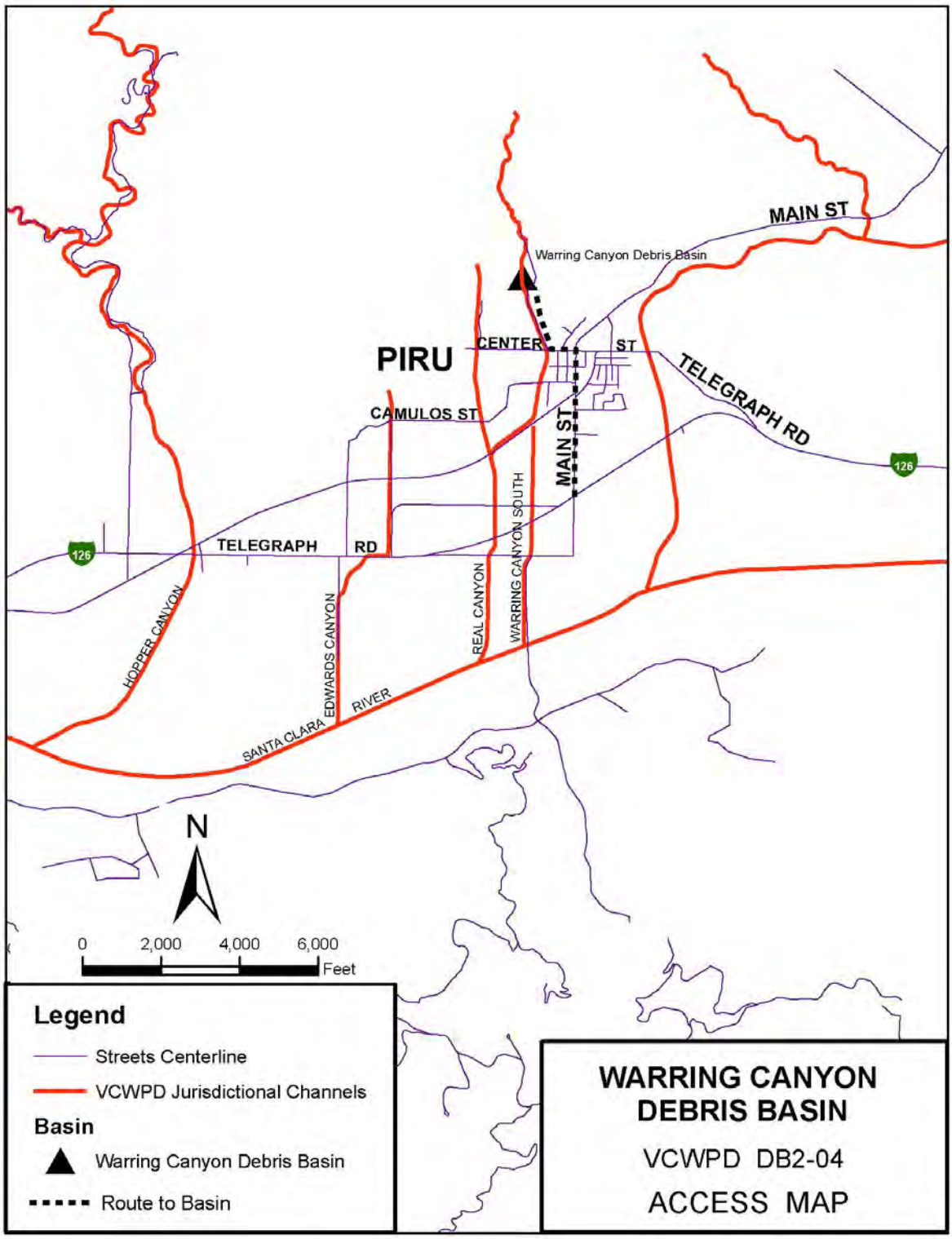

N
0 600 1,200 2,400 3,600 4,800
Feet
WARRING CANYON
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
WARRING CANYON
DEBRIS BASIN
VCWPD DB 2-05
WATERSHED MAP

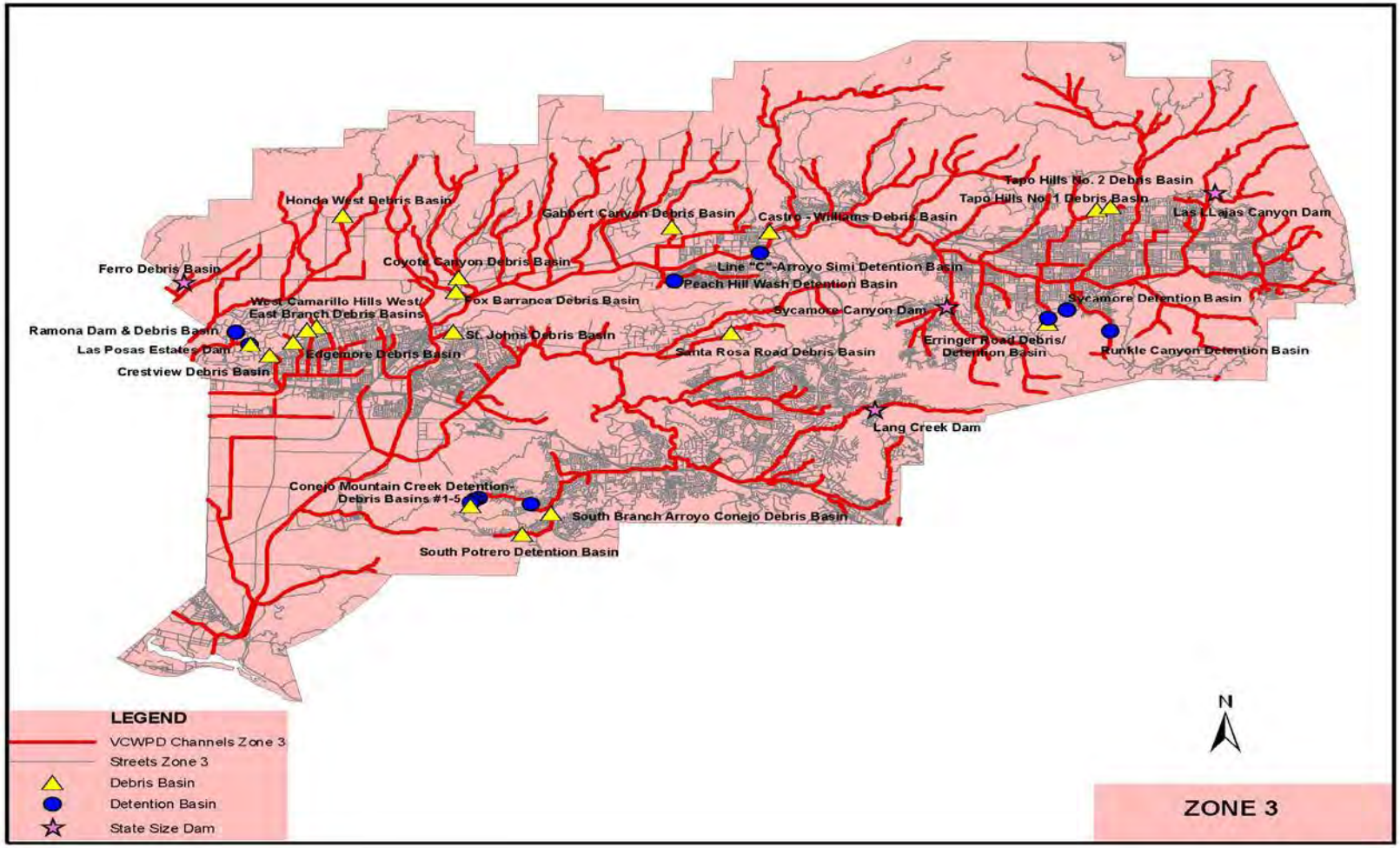


Superseded Stage-Storage-Discharge Data

Stage-Storage-Discharge Table

Elevation Ft. NGVD29	10-06 Vol. Cu. Yds	Elevation Ft. NGVD29	Riser Tower Cfs	Elevation Ft. NGVD29	Emergency Spillway Cfs
826	0	824.00	0.00		
827	10	825.17	9.91		
828	100	826.67	17.97		
829	350	828.83	27.02		
830	752	830.58	35.84		
831	1,304	832.33	44.57		
832	1,990	834.08	53.26		
833	2,803	835.83	61.91		
834	3,735	837.58	70.55		
835	4,774	839.33	79.18		
836	5,915	841.08	87.80		
837	7,159	842.83	95.65		
838	8,508	844.58	98.85		
839	9,968	846.33	101.95		
840	11,546	848.08	104.96		
841	13,249	849.83	107.88		
842	15,090	851.00	110.73		
843	17,076	852.00	128.20		
844	19,199	853.00	162.80		
845	21,454	854.00	200.12		
846	23,841	855.00	235.89		
847	26,352	856.00	279.44		
848	28,981	857.00	307.75		
849	31,731	858.00	314.22		
850	34,600	859.00	319.99		
850.5	36,079	860.00	325.66		
851.5	39,126				


MAIN ST
Warring Canyon Debris Basin
PIRU
CENTER ST
TELEGRAPH RD
CAMULOS ST
MAIN ST
126
TELEGRAPH RD
WARRING CANYON SOUTH
126
HOPPER CANYON
EDWARDS CANYON
REAL CANYON
SANTA CLARA RIVER
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Warring Canyon Debris Basin
Route to Basin
WARRING CANYON
DEBRIS BASIN
VCWPD DB2-04
ACCESS MAP



Zone 3 Basins

ARIELLE NPDES & DETENTION BASIN DD3-26

LOCATION: Simi Valley, Between Erringer and Bus Canyon Tributaries off Arielle Drive
N 274,100,E 1,770,700 (Lambert Zone 5 Coordinates);
Simi 7 1/2' Quad.

DESIGN DATA	Elevations ft NGVD29
Design Agency	Crosby Mead Benton
Level Capacity	5,080 cy at spillway invert (Y-3-3837) NPDES + Det.
Maximum Debris Capacity	None
100-Yr Inflow Rate	111 cfs
Outflow Rate	14.7 cfs at emergency spillway invert
Debris Cleanout Elevation	95 cy, Elev. 899 ft (25% of 100-yr Volume
EMERGENCY SPILLWAY	
Type	Top of Tower Adj. to Principal Spillway, 4 x 6 ft drop inlet
Invert Elevation	910.7 ft NGVD29
Design Elevation	Q100=111 cfs at elev 912.2
Capacity w/o Freeboard	250 cfs at dam crest of 913.2
PRINCIPAL SPILLWAY	
Type	4 ft x 4 ft Rect. Tower w/ 2 4x5' openings protected by trash rack
Inlet Weir Elevations	904.1 ft NGVD29
Outlet Conduit	36 in RCP
Outflow Rates	14.7 cfs at Em. Spill. Invert of 910.7
DEBRIS BLEEDER	
Type	None
DAM	
Dam Type	Earthfill topped by roadbed
Dam Crest Elevation	913.2 ft NGVD29
Length	115 ft from GIS
Surface Area of Full Basin	0.46 ac
Watershed Area	42 ac from Simi Valley MDP Update (Draft as of 2015)
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	Crosby Mead Benton
Completion Date	2002
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3836 to 3848
Right-of-Way Drawings	NA
Topographic Drawings	NA

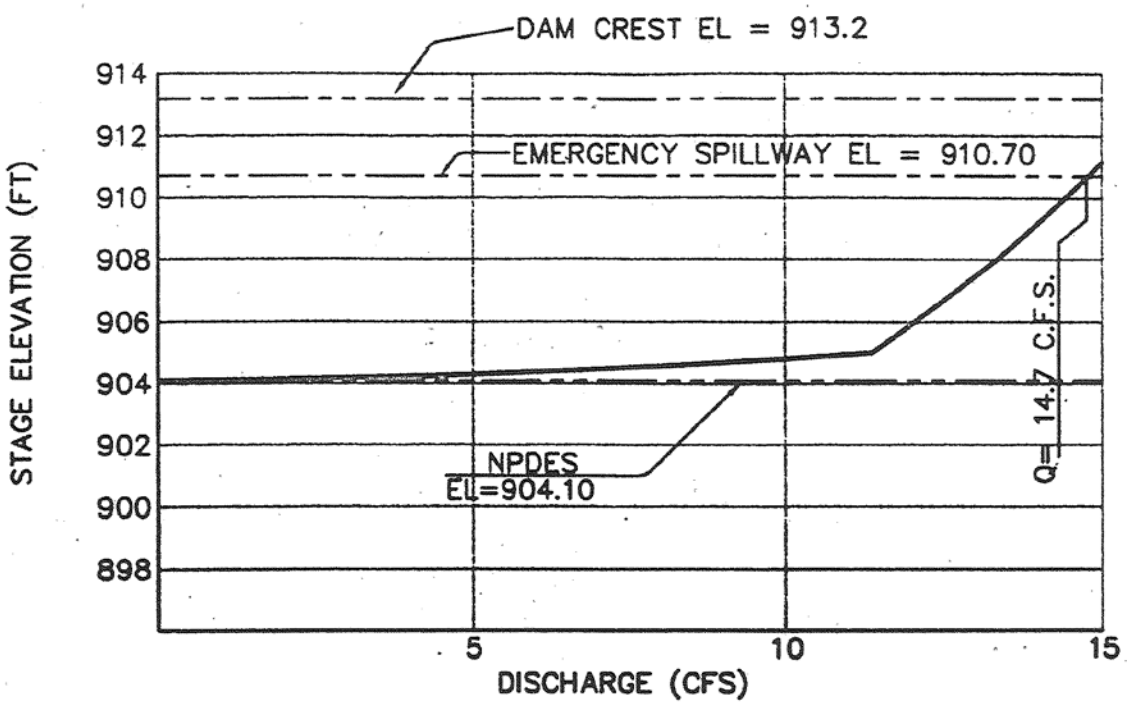
EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	378	548
50-YEAR	310	450
25-YEAR	219	317
10-YEAR	121	175

Note: Basin is surrounded by developed area and sediment would have to traverse the local drainage system to reach Arielle. Only smalll amounts of sediment expected to impact the basin.

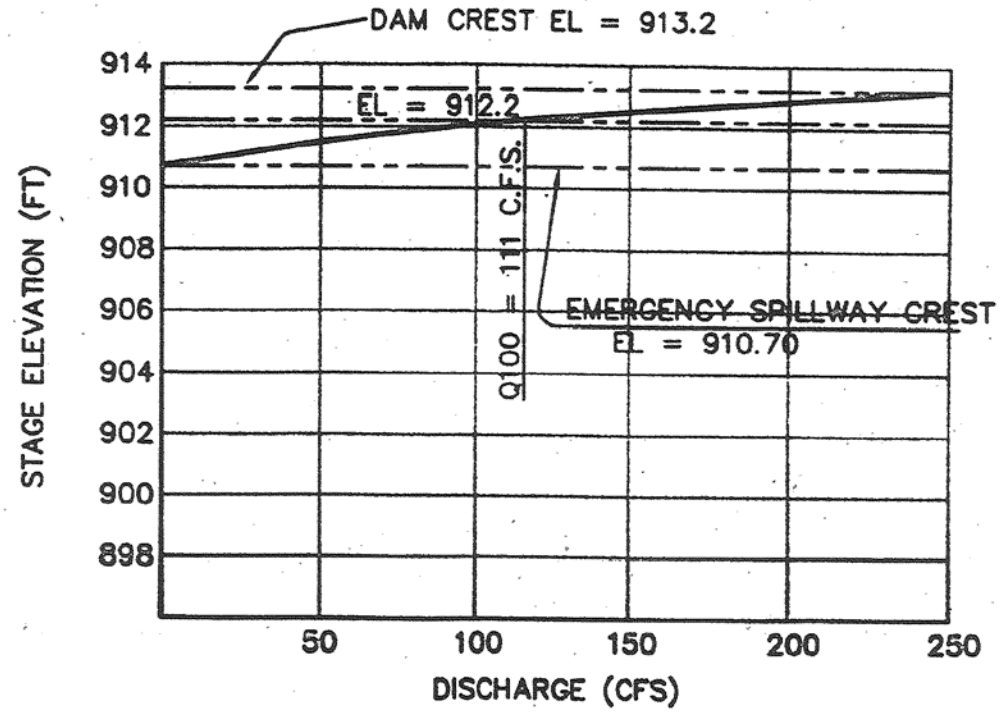
*

BASIN HISTORY:

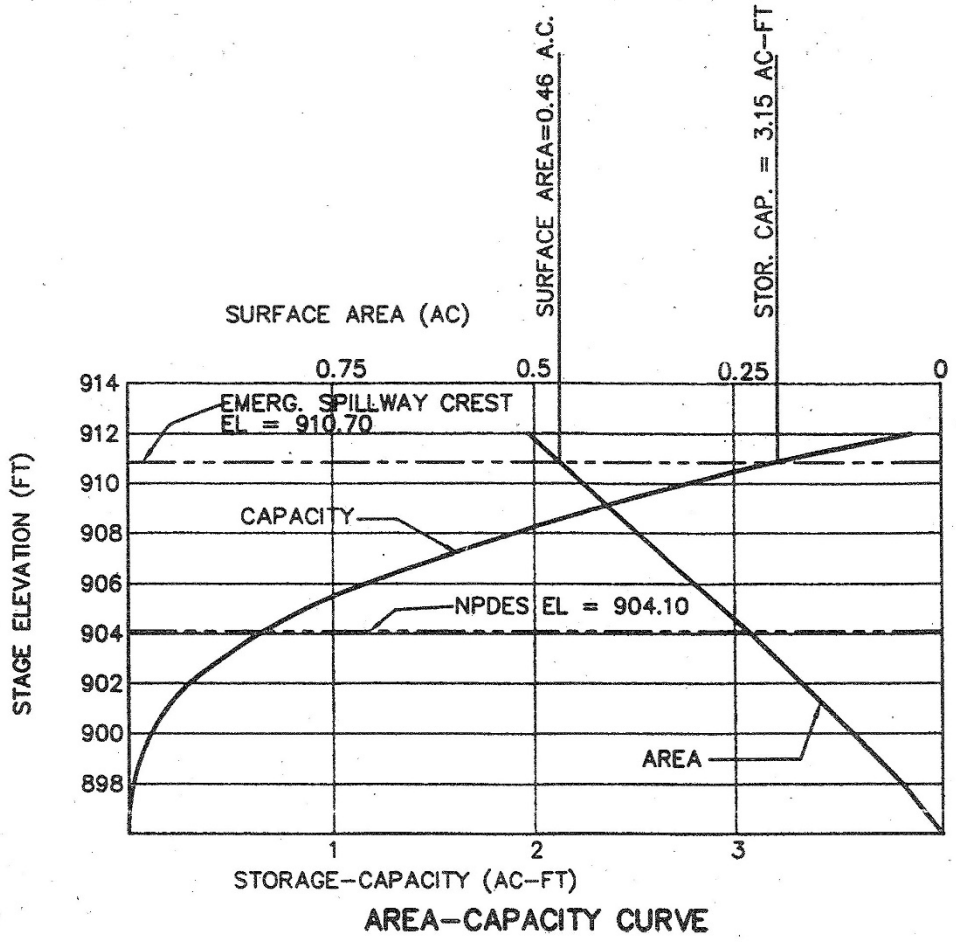
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No removal data reported by O&M			



STAGE-DISCHARGE CURVE
OUTLET PIPE



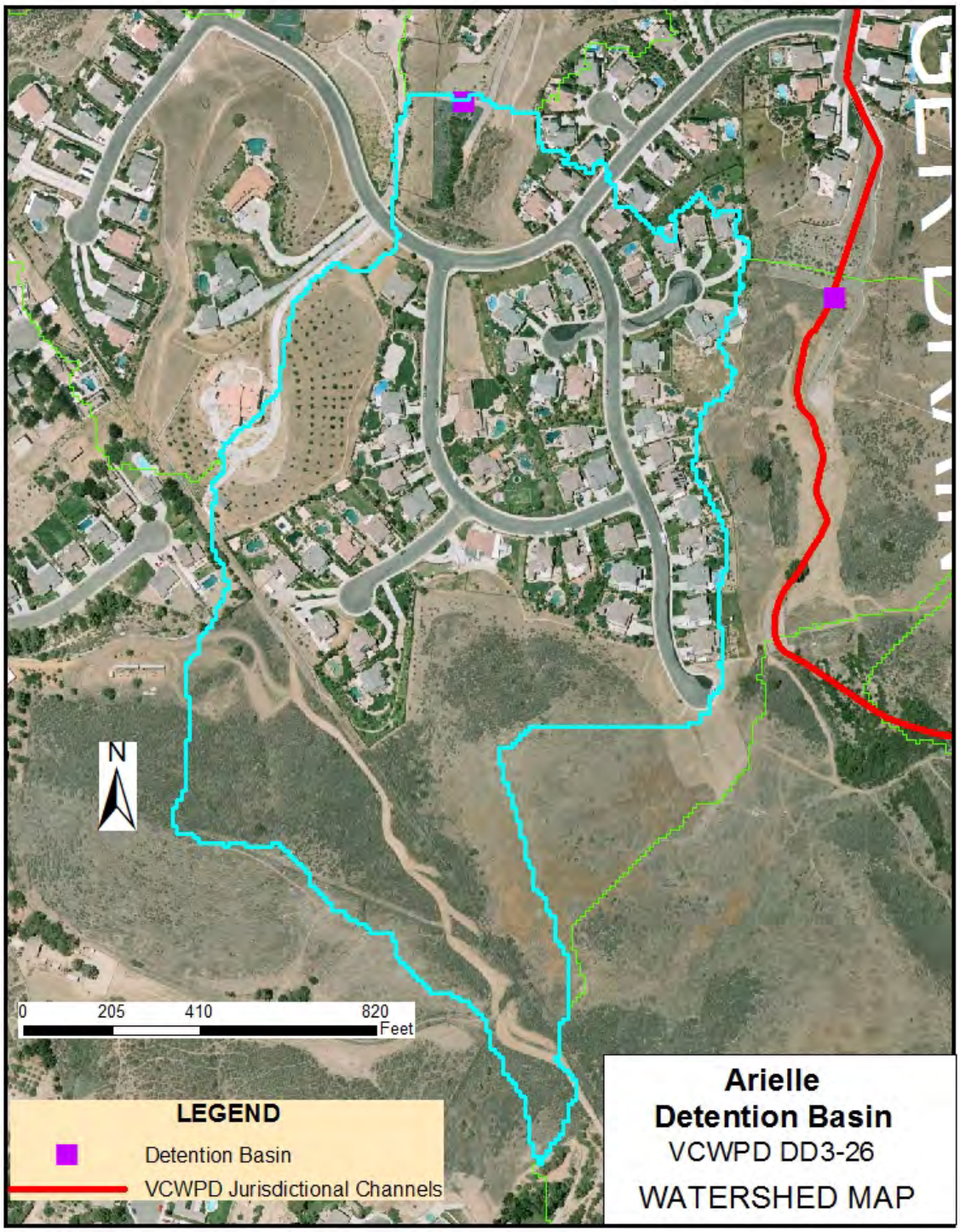
STAGE-DISCHARGE CURVE
EMERGENCY SPILLWAY

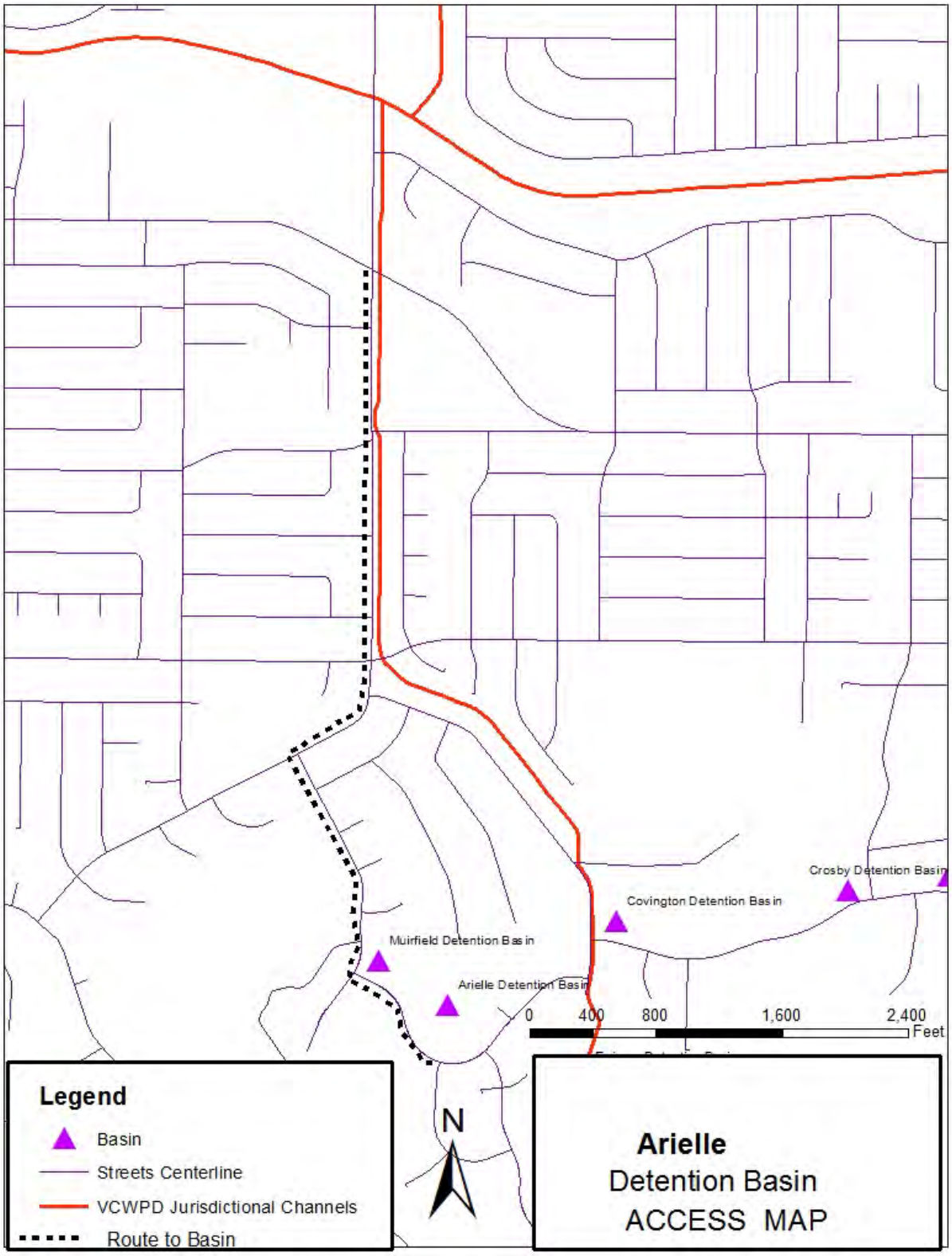


AREA-CAPACITY CURVE

Stage-Storage-Discharge Data

Elevation	Design Vol	Riser Disch.	Spill Disch.	10-11 Vol.
Ft. NGVD29	Cu. Yds	cfs	cfs	Cu. Yds
896	-			
897				
898	50			
899				
900	174			0
901				55
902	471			135
903				252
904	1,068	-		419
905		11.25		644
906	1,886	12.00		932
907				1,280
908	3,028	13.20		1,693
909				2,173
910	4,417	14.20		2,719
910.7	5,082	14.70	-	
911			15	3,330
912	6,205		100	4,005
913			240	4,745


N
0 205 410 820
Feet
LEGEND
Detention Basin
VCWPD Jurisdictional Channels
Arielle
Detention Basin
VCWPD DD3-26
WATERSHED MAP


Crosby Detention Basin
Covington Detention Basin
Muirfield Detention Basin
Arielle Detention Basin
0 400 800 1,600 2,400
Feet
Legend
Basin
Streets Centerline
VCWPD Jurisdictional Channels
Route to Basin
N
Arielle
Detention Basin
ACCESS MAP

CANYON NO. 2 DEBRIS BASIN DB3-39

LOCATION: Moorpark , adjacent to Moorpark College
N 291,115,E 1,748,085 (Lambert Zone 5 Coordinates);
Moorpark 7 1/2' Quad.

DESIGN DATA	Elevations in ft NGVD29
Design Agency	VCWPD
Level Capacity	99,832 cy at Elev. 636 ft
Maximum Debris Capacity	NA
10 and 100-Yr Inflow Rate	1,349 cfs, 3,607 cfs; 10-yr bulked rate 1,970 cfs
Outflow Rate	NA
Debris Cleanout Elevation	Elev 630 ft, 20,660 cy (Level Cap. – 100-yr design vol.)
EMERGENCY SPILLWAY	
Type	Concreted Rip Rap- Trapezoidal Shape
Invert Elevation	636 ft
Spillway Width	100 ft Base; 180 ft Top Width, Variable Side Slopes
Capacity w/o Freeboard	NA
PRINCIPAL SPILLWAY	
Type	12 ft high RC slotted tower with 9.5 ft x 6 ft xsec,
Inlet Weir Elevations	RC tower top at 634 ft NGVD29, topped by trash rack
Outlet Conduit	48-in RCP with invert elev 622 ft
Outflow Rates	NA
DEBRIS BLEEDER	None
DAM	
Dam Type	Earthfill Dam Topped by concreted rip rap spillway
Dam Crest Elevation	636 ft invert to 643 ft top of bank
Length	180 ft
Surface Area of Full Basin	NA
Watershed Area	3,900 ac based on 2000 Condition VCRat Model
CONSTRUCTION DATA	
Construction Agency	VCWPD with NRCS to provide 10-yr protection
Completion Date	Plans Dated 7/1/2004
REFERENCE DRAWINGS	
Construction Drawings	Y-3-4235 to 4251
Right-of-Way Drawings	Same
Topographic Drawings	Same

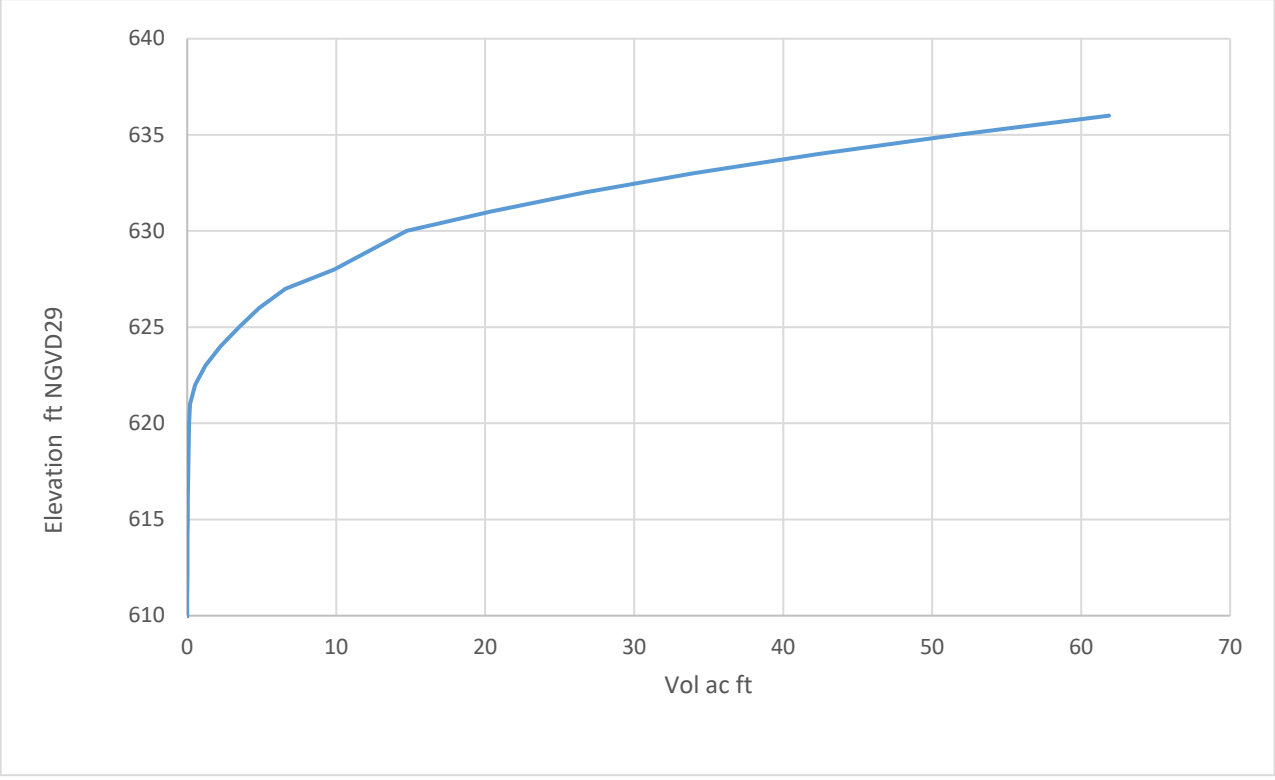
EXPECTED DEBRIS PRODUCTION (cy):			
Storm Frequency	Unburned Condition FF=1	Design Condition FF=20	100% Burn FF=88
100-YEAR	37,326	79,171	113,184
50-YEAR	28,452	60,349	86,276
25-YEAR	20,419	43,311	61,918
10-YEAR	12,510	26,535	37,934

Note: Design records do not show that Design Condition data were calculated in 2003, only unburned and burned conditions.

BASIN HISTORY:

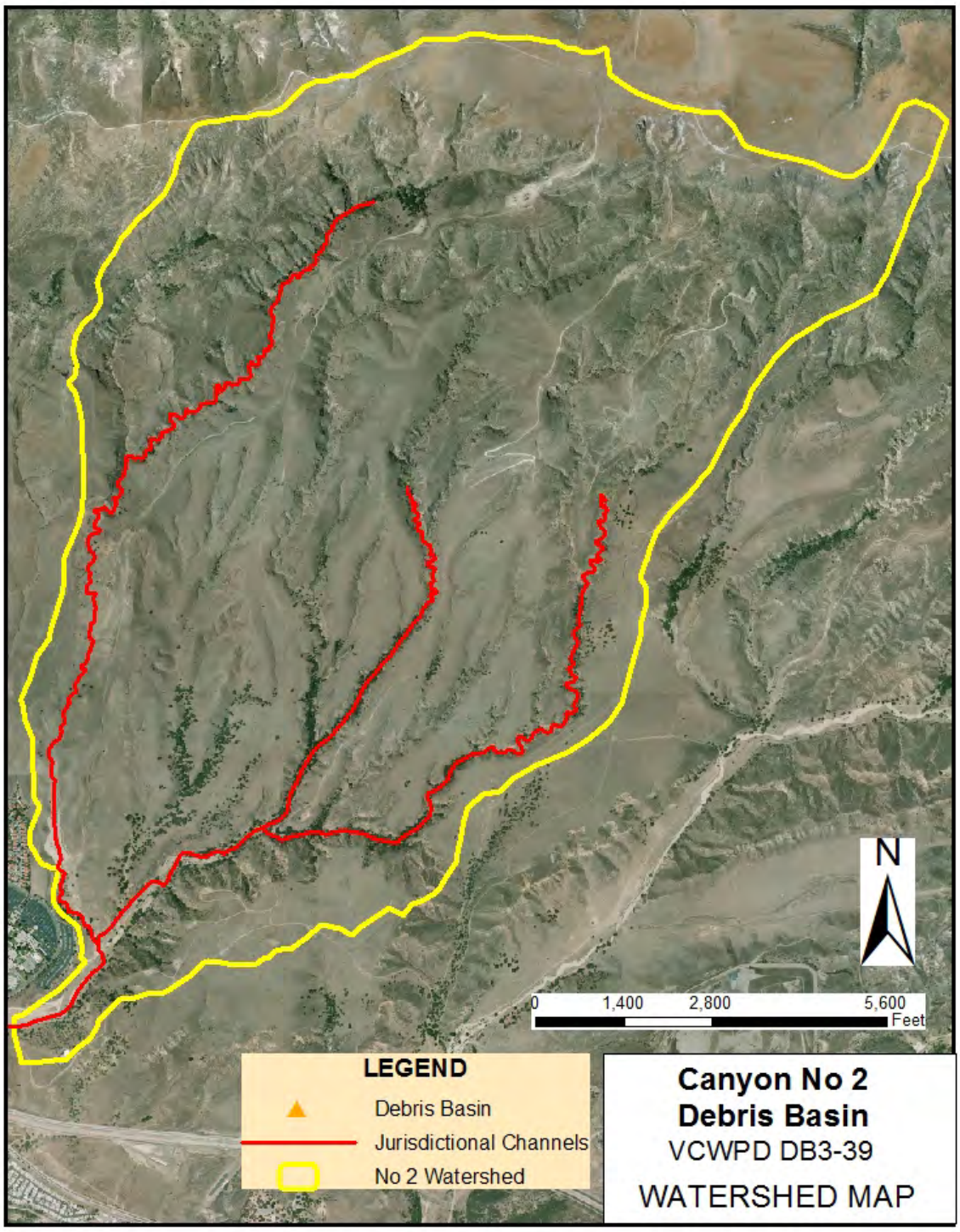
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No removal data reported by O&M			

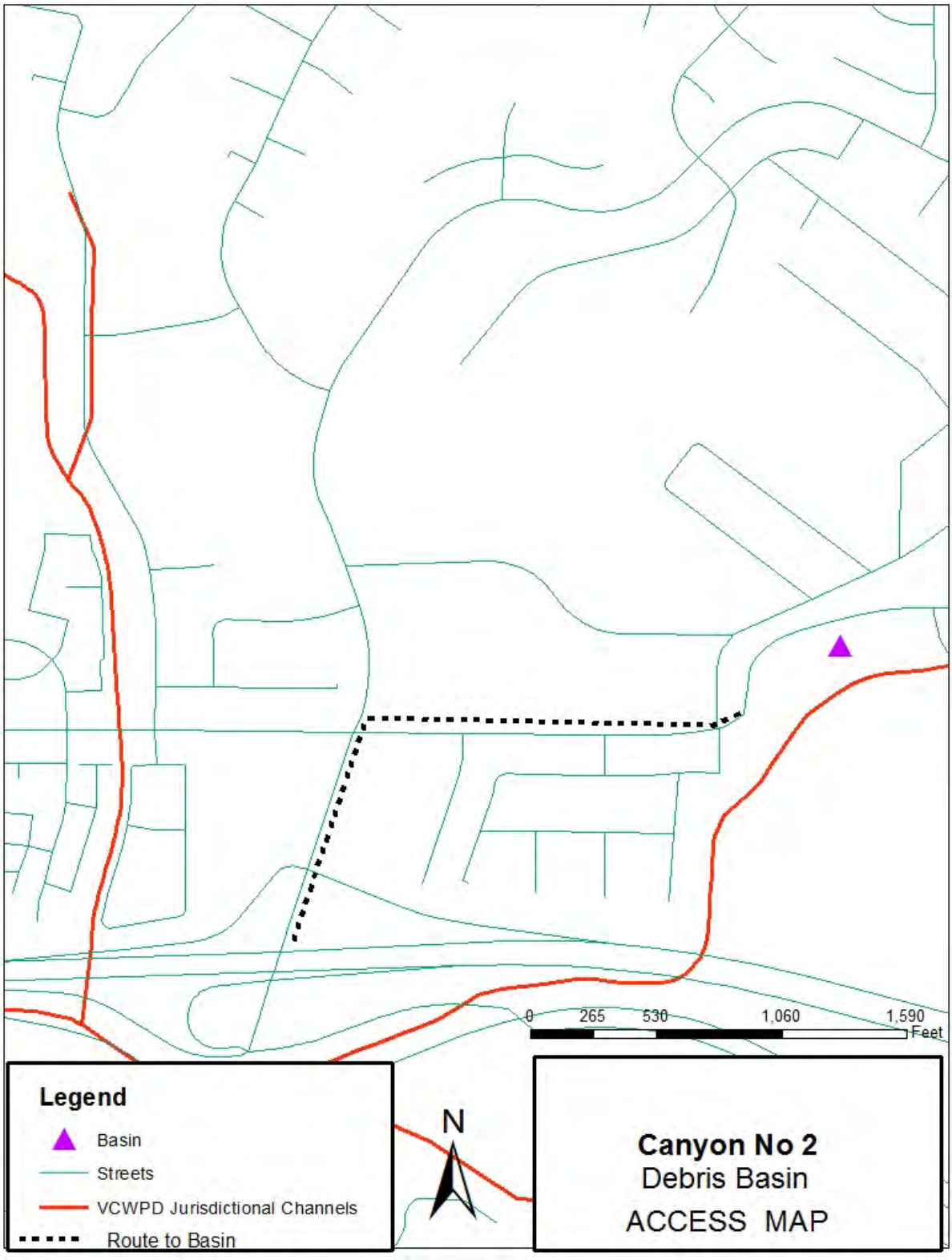
Stage Storage Data from AutoCAD Analysis of Feb 2004 TIN



Stage-Storage Data from 2004 TIN Analysis

Elev.	Feb04 Vol.
ft NGVD29	CY
608	-
609	1
610	4
611	8
612	15
613	25
614	37
615	54
616	73
617	97
618	124
619	156
620	194
621	320
622	848
623	1,968
624	3,600
625	5,608
626	7,776
627	10,630
628	15,882
630	23,778
631	32,807
632	43,025
633	54,822
634	68,281
635	83,337
636	99,822


N
0 1,400 2,800 5,600
Feet
LEGEND
Debris Basin
Jurisdictional Channels
No 2 Watershed
Canyon No 2
Debris Basin
VCWPD DB3-39
WATERSHED MAP


0 265 530 1,060 1,590
Feet
Legend
Basin
Streets
VCWPD Jurisdictional Channels
Route to Basin
N
Canyon No 2
Debris Basin
ACCESS MAP

CASTRO-WILLIAMS DEBRIS BASIN DB3-06

LOCATION: Moorpark. 500 ft north of Los Angeles Ave., approximately 1000 ft East of Spring Street
N 287,600 E 1,736,600 (Lambert Zone 5 Coordinates)
Simi, 7 ½ Quad

DESIGN DATA	(Elevations NGVD29)
Design Agency	Soil Conservation Service
Level Capacity	36.2 ac-ft or 58,403 cy excluding western subarea
Maximum Debris Capacity	NA
100-Yr Inflow and Outflow	Q100in=496 cfs from VCRAT model; Q100out=NA
Debris Cleanout Elevation	579 ft NGVD29 (2,150 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	10 ft W x 4 ft H Rectangular RC Channel along access rd
Invert Elevation	600 ft NGVD29
Spillway Length	110 ft
Capacity with freeboard	496 cfs
PRINCIPAL SPILLWAY	
Type	60-in RCP with Wingwalls and Trash Rack
Invert Elevation	580 ft (NGVD29)
Outlet Conduit	60-in RCP
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill
Dam Crest Elevation	600 ft NGVD29
Length	520 ft.
Width at Crest	NA
Surface Area of Full Basin	2.6 ac
Watershed Area	330 ac
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service
Completion Date	1957; new- 2004
REFERENCE DRAWINGS	
Construction Drawings	37453-56
Topographic Drwgs (pre-const)	37457 t-92-1 (dated 4-13-71)
Right-of-Way Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	8,599	12,473
50-YEAR	6,545	9,493
25-YEAR	4,689	6,802

BASIN HISTORY: CASTRO-WILLIAMS DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
04-72	Aerial Survey	141,800		
01-05	Disaster Declaration			537***
07-05	Cleanout		5,526-Survey	

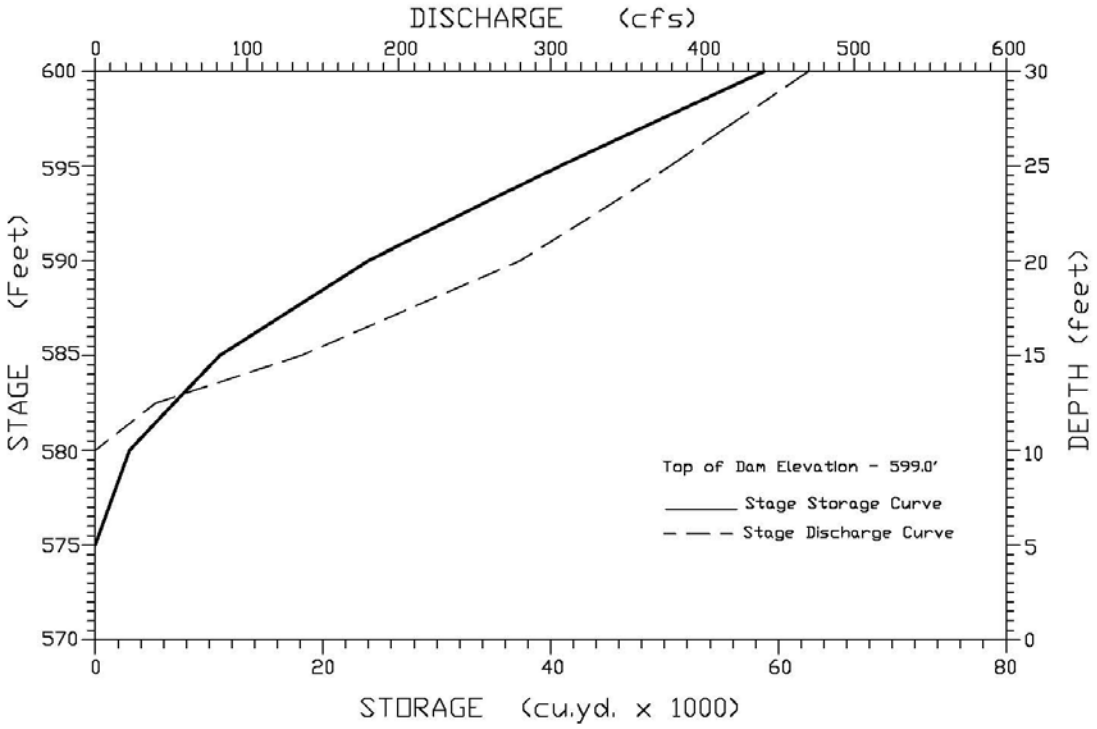
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

*** Theoretical Value from Kevin Scott Formula, 10% of 50-yr Sediment Yield per Las Llajas approach

NA= Not Available / Not Applicable

N
0 390 780 1,560 2,340 3,120
Feet
ARROYO SIMI
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
CASTRO- WILLIAMS
DEBRIS BASIN
VCWPD DB 3-06
WATERSHED MAP

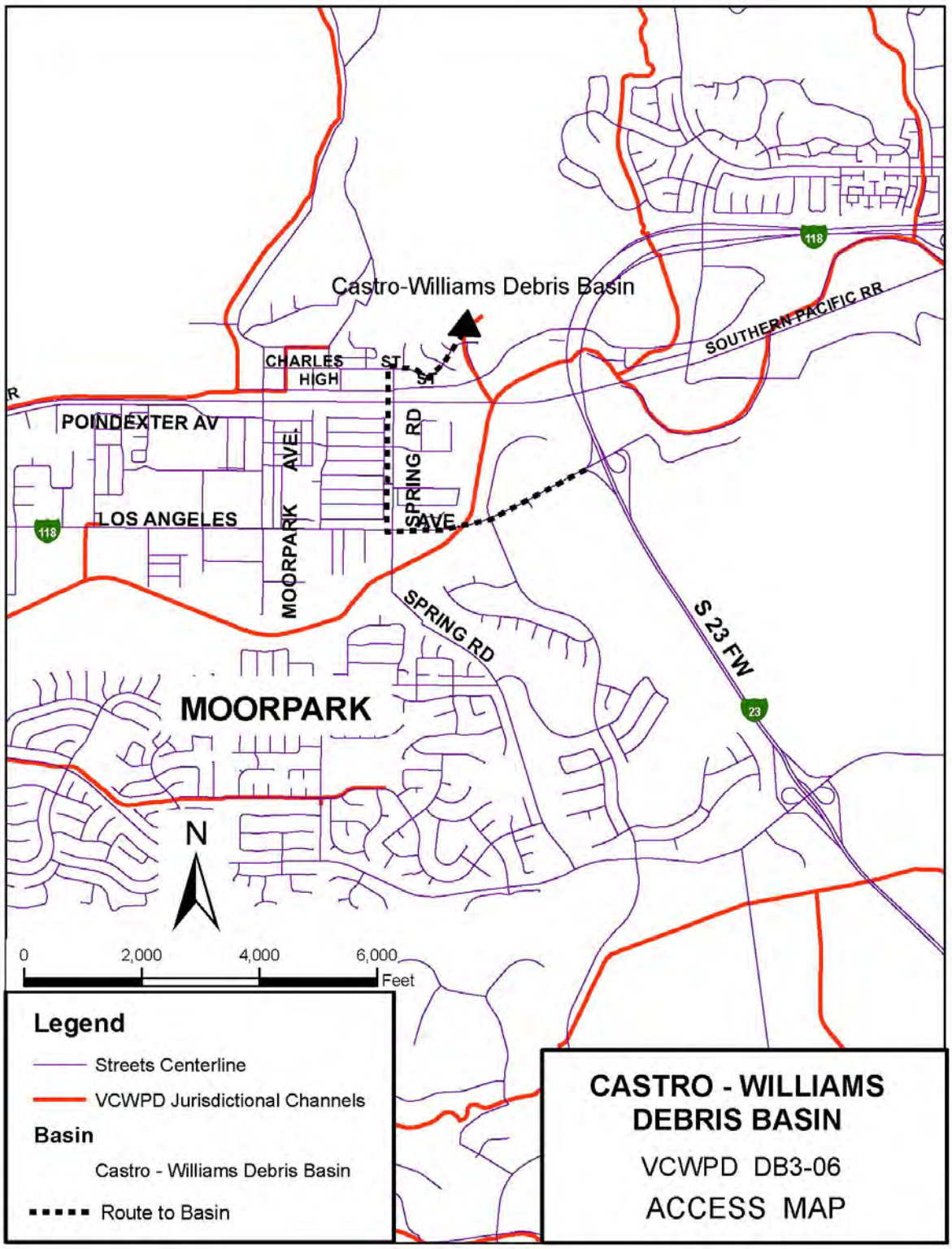


Historic Stage-Storage Discharge Data

Updated Stage-Storage-Discharge Data, 2003

Elevation	RCP cfs	Spillway cfs	Total Discharge	Storage AF 1972	Storage (cu.yd) 1972
575.0	-	-	-	-	-
580.0	-	-	-	1.925	3,106
582.5	41	-	41	4.458	7,191
585.0	135	-	135	6.990	11,277
590.0	280	-	280	15.155	24,450
593.0	340	-	340	21.452	34,609
595.0	380	-	380	25.922	41,820
597.0	416	-	416	30.138	48,622
600.0	470	-	470	36.249	58,481
601.0	480	30	510	NA	NA
602.0	490	85	575	NA	NA
603.0	500	156	656	NA	NA
604.0	510	240	750	NA	NA
605.0	520	335	855	NA	NA

NA= Not Analyzed


Castro-Williams Debris Basin
SOUTHERN PACIFIC RR
CHARLES HIGH
ST
POINDEXTER AV
AVE
SPRING RD
LOS ANGELES
MOORPARK
SPRING RD
S 23 FW
MOORPARK
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Castro - Williams Debris Basin
Route to Basin
CASTRO - WILLIAMS DEBRIS BASIN
VCWPD DB3-06
ACCESS MAP

CONEJO MOUNTAIN CREEK DETENTION BASIN NO.1 DD3-33

LOCATION: City of Thousand Oaks, at Via Rio and E.Kimber Drive
N: 244,746 E: 1,708,278 (Lambert Zone 5 Coordinates)
Newbury Park, 7 1/2 Quad

DESIGN DATA	Elevations NGVD29 ft
Design Agency	HAALAND GROUP
Level Capacity	47.7 ac-ft or 77,100 cy at elev. 737 ft NGVD29
Maximum Debris Capacity	None
100-Yr Inflow Rate	1,517 cfs over bypass spillway, 940 cfs to bypass
Outflow Rate	940 cfs fm bypass, 12 cfs from det basin, 952 cfs total
Debris Cleanout Elevation	Elev 726 ft, 265 cy (25% of 100-yr design debris vol.
EMERGENCY SPILLWAY	
Type	2 13'8"Wx16'H Drop Box Inlet Spillway
Weir Elevation	737.0 ft NGVD29
Max. Capacity	2,459 cfs at elev.741.5 ft
UPSTREAM BYPASS SPILLWAY	
Diversion Dam	120' long, Elev. 742.4 to 744.3 ft west to east
Bypass Channel	8' Wx 7.5'H RCB connected to Emergency Spillway
Channel Design Flow Rate	Q100=940 cfs
OPERATIONAL OUTLET	
Type	24" RCP
Invert Elevation	723.0 ft
DEBRIS BLEEDER/RISER FOR BYPASS	
Type	24" semi circular vertical CMP w/ 3"x9" slots
Top and Bottom Elevation	744.0 and 737.75 ft
Outlet Conduit	24" RCP
DETENTION BASIN DAM	
Dam Type	Earthfill
Dam Crest Elevation	Max. 745 ft
Length	780 ft
Surface Area of Full Basin	5.06 ac
Watershed Area	1,537 ac (GIS acreage=1535 ac, Conejo Mountain Creek)
CONSTRUCTION DATA	
Construction Agency	GrayStone Homes
Completion Date	2001
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3687 thru Y-3-3703
Topographic Drwgs(pre-const)	NA
Right-of-Way Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy): Limited sediment from adjacent undeveloped hillsides expected to reach facilities through local culverts		
Storm Frequency	**Design Condition Upstream Bypass Basin**	**100% Burn Upstream Bypass Basin**
100-YEAR	1,065	1,544
50-YEAR	794	1,152
10-YEAR	338	490
Storm Frequency	**Design Condition Detention Basin**	**100% Burn Detention Basin**
100-YEAR	195	283
50-YEAR	145	211
10-YEAR	62	90

BASIN HISTORY: CONEJO MOUNTAIN CREEK DETENTION BASIN NO.1

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No cleanouts reported as of 2015			
Oct-2011	TIN analysis by WR&T	55,211 to elevation 737 ft		

Notes

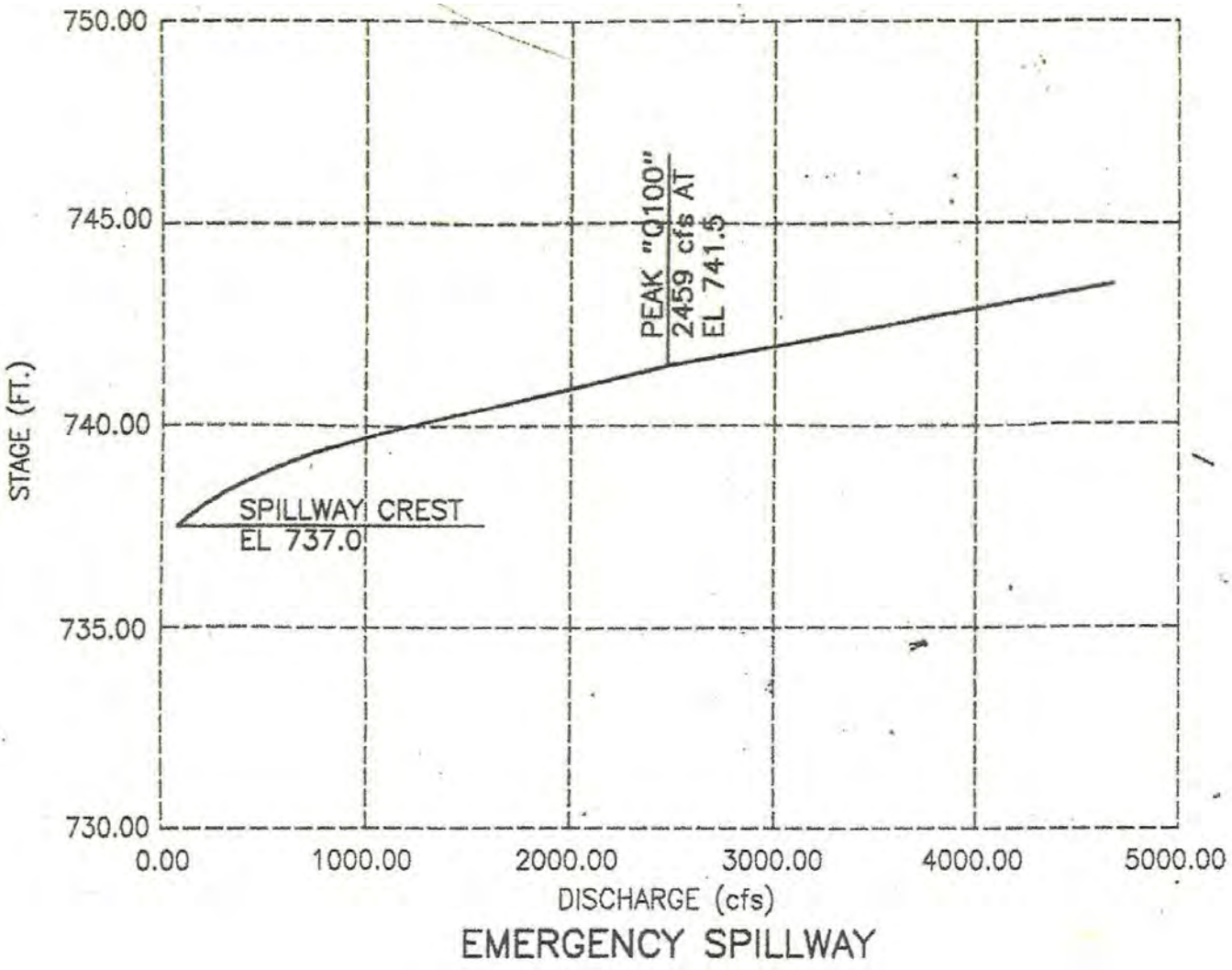
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

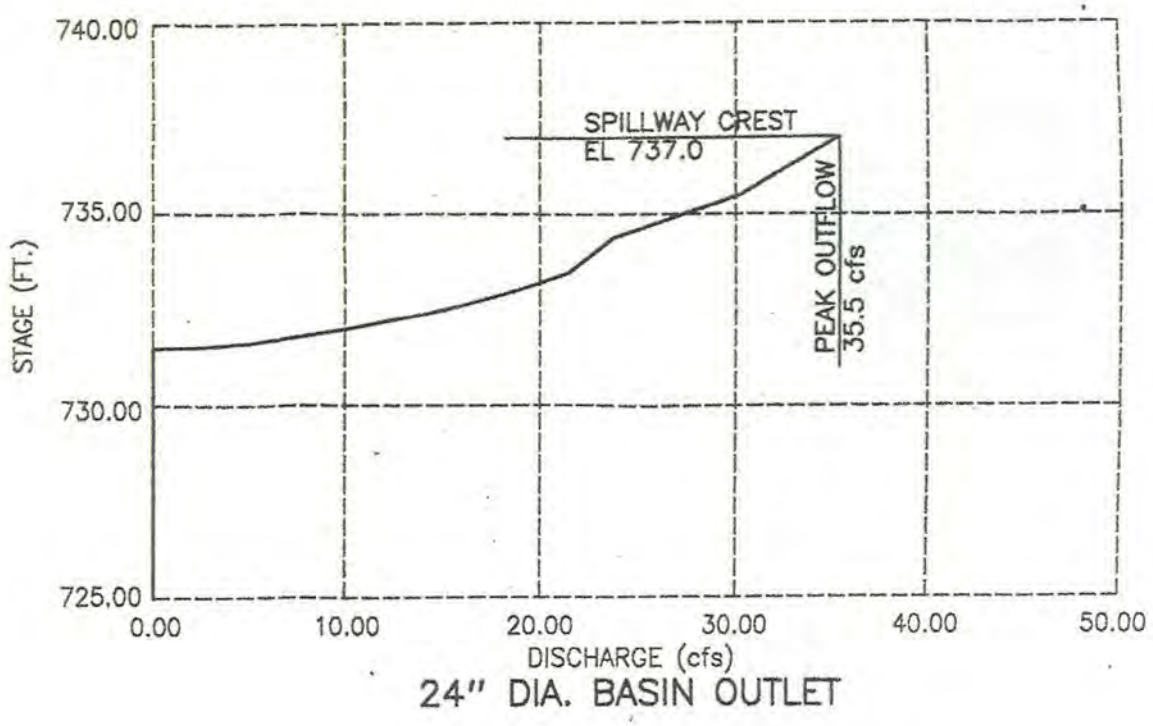
** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

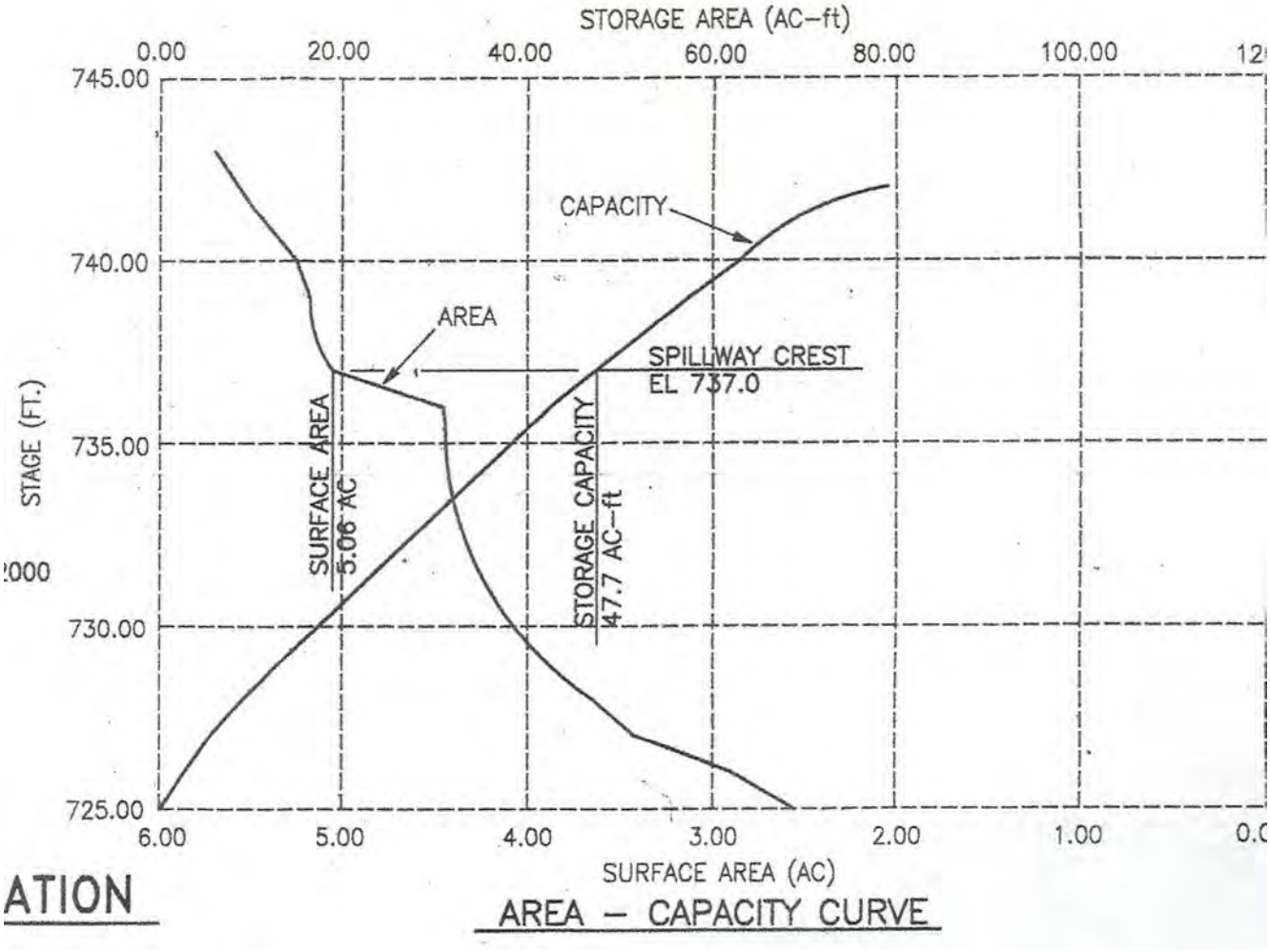
NA= Not Available / Not Applicable

Original Design Data from Plans



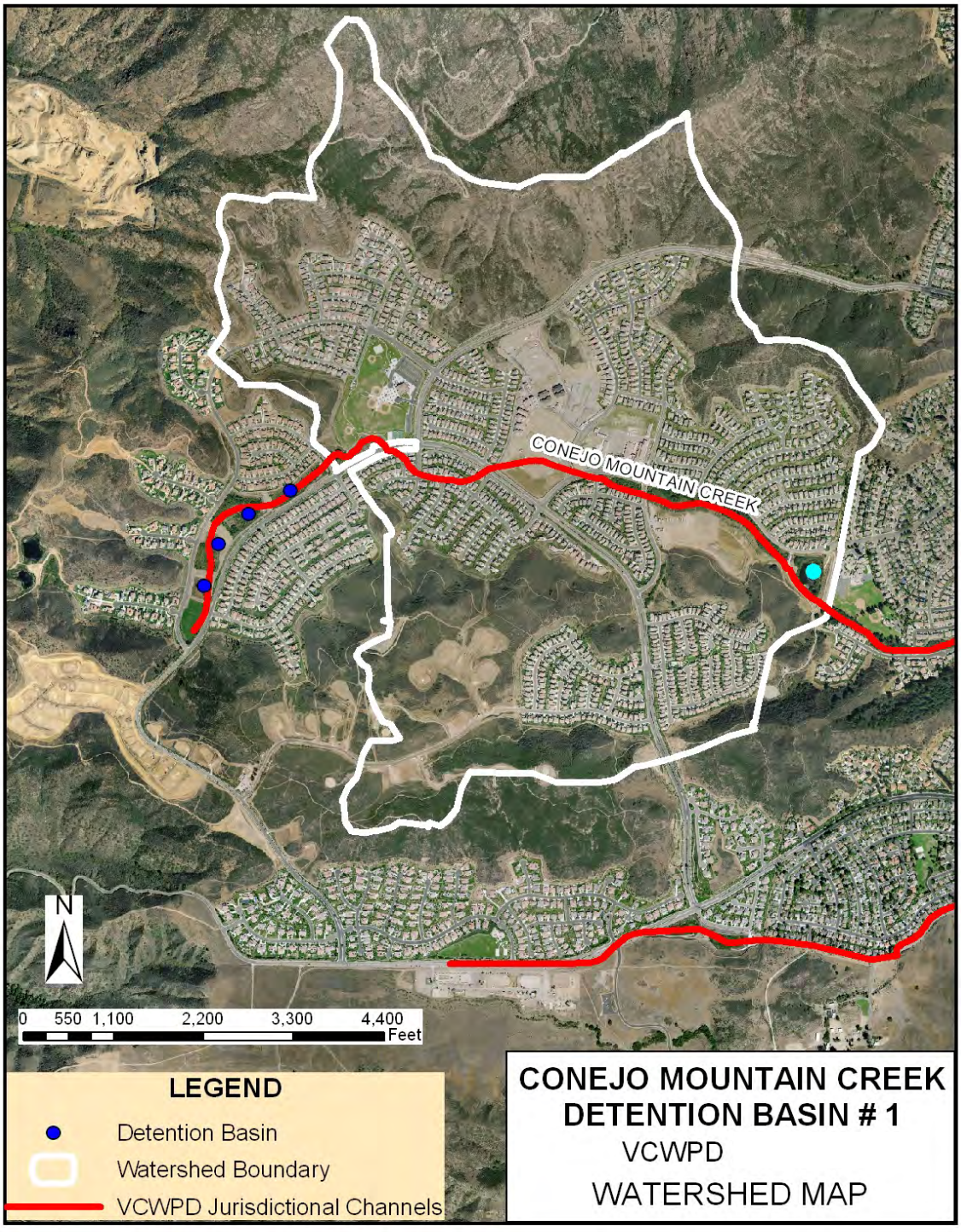


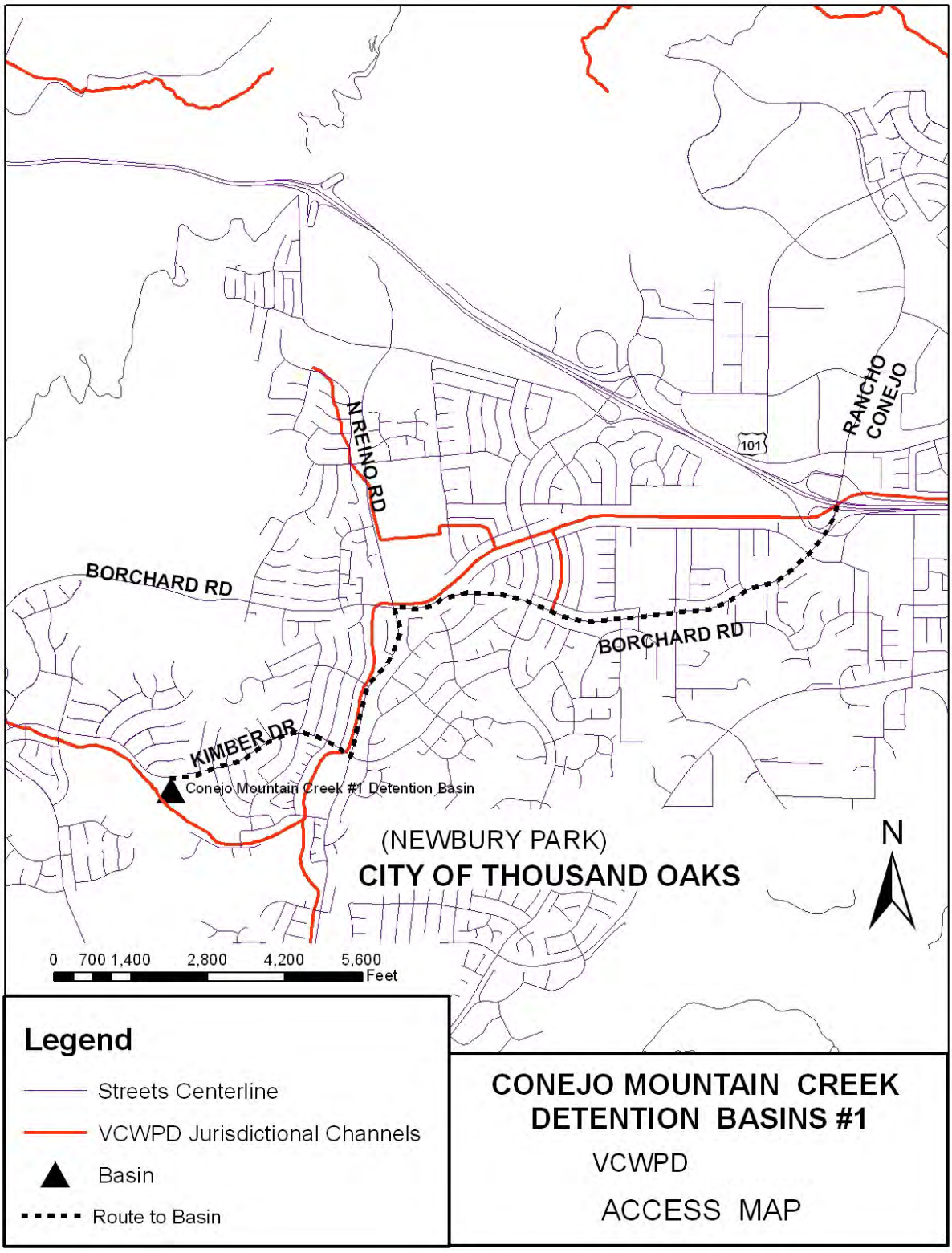
24" DIA. BASIN OUTLET



ATION

AREA – CAPACITY CURVE


CONEJO MOUNTAIN CREEK
N
0 550 1,100 2,200 3,300 4,400
Feet
LEGEND
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
CONEJO MOUNTAIN CREEK
DETENTION BASIN # 1
VCWPD
WATERSHED MAP


N REINO RD
RANCHO CONEJO
101
BORCHARD RD
BORCHARD RD
KIMBER DR
Conejo Mountain Creek #1 Detention Basin
(NEWBURY PARK)
CITY OF THOUSAND OAKS
N
0 700 1,400 2,800 4,200 5,600
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Route to Basin
CONEJO MOUNTAIN CREEK
DETENTION BASINS #1
VCWPD
ACCESS MAP

CONEJO MOUNTAIN CREEK DETENTION BASIN NO.2 DD3-34

LOCATION: City of Thousand Oaks, at Rancho Dos Vientos Drive and Via Rincon
N:246,340 E:1,702,250 (Lambert Zone 5 Coordinates)
Newbury Park, 7 1/2 Quad

DESIGN DATA

Design Agency	VTN, INC
Level Capacity Below Spillway	3.95 ac-ft or 6,275 cu.yds
Design Water Surface Elev.	838.73 ft NGVD29
100-Yr Inflow Rate	Q100=348 cfs
Outflow Rate	Q100=193 cfs at 838.73 ft NGVD29
Debris Cleanout Elevation	

EMERGENCY SPILLWAY

Type	22 ft x 45 ft Drop Box Inlet to 20 ft W x 6 ft H RC Box
Weir Elevation	839.84 ft
Max. Capacity	1,575 cfs

PRINCIPAL SPILLWAY

Type	10 ft x 9 ft Plan View – Tower Intake structure, RCP
Tower Bottom and Top Elevation	832 and 839.3 ft
Outlet Conduit	54 in RCP

DEBRIS BLEEDER/RISER

Type	Trash Rack on front of Principal Spillway Tower
Top Elevation	Same as Principal
Outlet Conduit	Same as Principal

DAM

Dam Type	Earthfill
Dam Crest Elevation	846.3 ft min. elev.
Length	100 ft
Surface Area of Full Basin	1.6 ac
Watershed Area	498 ac (2006 Thousand Oaks MDP VCRat Model)

CONSTRUCTION DATA

Construction Agency	Operating Engineers
Completion Date	2004

REFERENCE DRAWINGS

Construction Drawings	Y-3-3619 thru Y-3-3639
Topographic Drwgs(pre-const)	
Right-of-Way Drawings	

EXPECTED DEBRIS PRODUCTION (cy): Limited sediment expected to reach facility through local culverts		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	165	240
50-YEAR	123	179
10-YEAR	53	76

BASIN HISTORY: **CONEJO MOUNTAIN CREEK DETENTION BASIN NO. 2**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No cleanouts reported as of 2015			

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

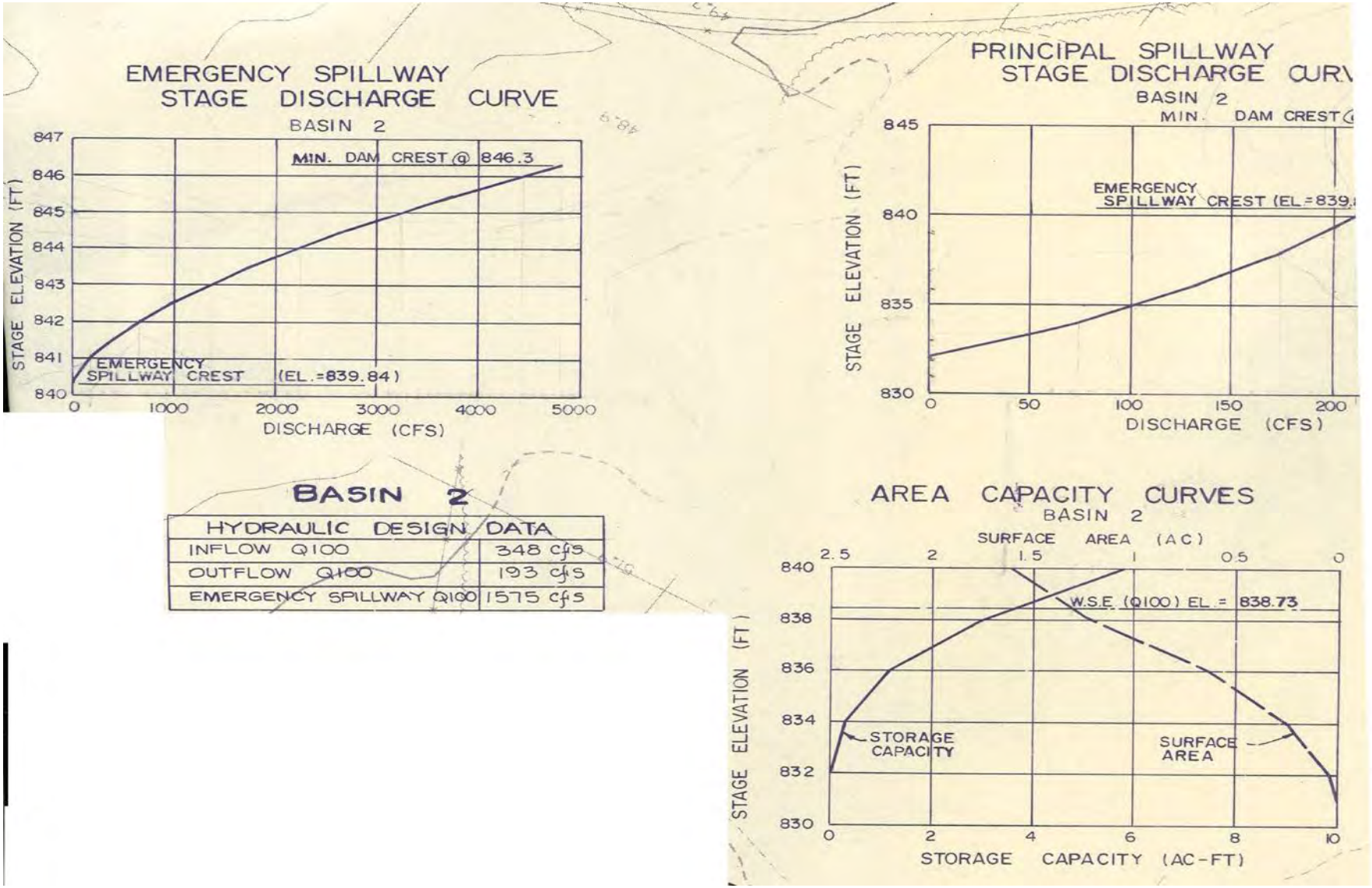
** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable

ACCESS MAP AND WATERSHED MAP

SEE MAPS FOR CONEJO MOUNTAIN CREEK BASIN 5



Original Design Data from Plans

CONEJO MOUNTAIN CREEK DETENTION BASIN NO.3 DD3-35

LOCATION: City of Thousand Oaks, at Rancho Dos Vientos Drive and Via Ricardo
N:245,865 E:1,701,475 (Lambert Zone 5 Coordinates)
Newbury Park, 7 1/2 Quad

DESIGN DATA

Design Agency	VTN, INC
Level Capacity	33.1 ac-ft or 53,400 cy
Maximum Debris Capacity	NA
100-Yr Inflow Rate	Q100=834 cfs
Outflow Rate	Q100=147 cfs at 861.77 ft
Debris Cleanout Elevation	
EMERGENCY SPILLWAY	
Type	42.5 ft x 26 ft Drop Box Inlet to 12 ft W x 7 ft H RC Box
Weir Elevation	862.64 ft
Max Capacity	1,443 cfs
PRINCIPAL SPILLWAY	
Type	10 ft x 7 ft Intake Tower Structure, RCP
Bottom and Top Inlet Elevations	848 and 862 ft
Outlet Type	36” RCP
DEBRIS BLEEDER/RISER	
Type	Trash Rack on front of Principal Spillway Tower
Top Elevation	Same as Principal
Outlet Conduit	Same as Principal
DAM	
Dam Type	Earthfill
Dam Crest Elevation	Min. 868.5 ft NGVD29
Length	240 ft
Surface Area of Full Basin	4.5 ac
Watershed Area	443 ac (2006 Thousand Oaks MDP VCRat Model)
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Operating Engineers
Completion Date	2004
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3619 thru Y-3-3639
Topographic Drwgs(pre-const)	NA
Right-of-Way Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy): Limited sediment expected to reach facility through local culverts; Historic debris basins also capture sediment before reaching basin		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	2,994	4,343
50-YEAR	2,233	3,239
10-YEAR	951	1,379

BASIN HISTORY: **CONEJO MOUNTAIN CREEK DETENTION BASIN NO. 3**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No removal data reported by O&M as of 2015			

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

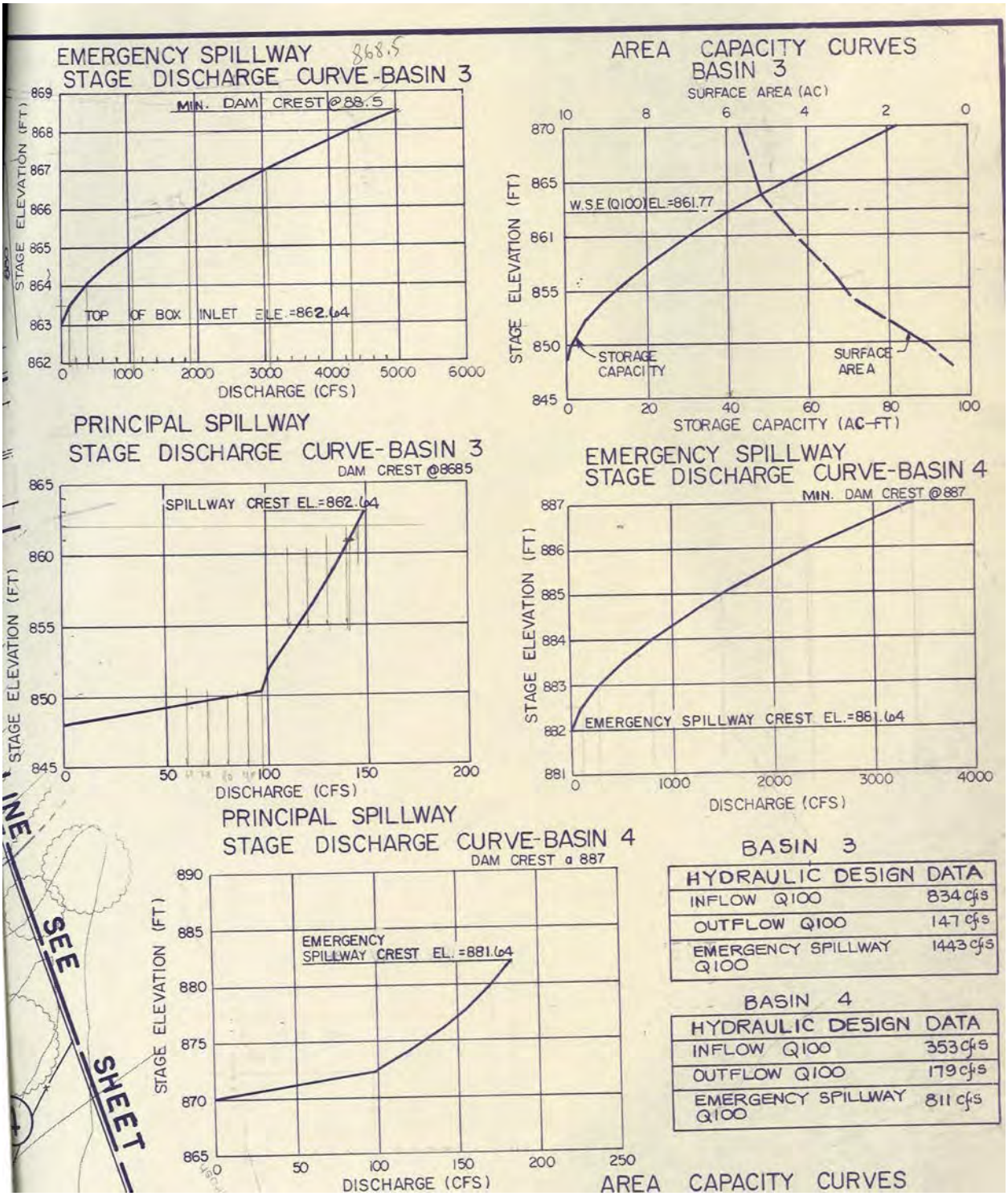
*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable

ACCESS MAP AND WATERSHED MAP

SEE MAPS FOR CONEJO MOUNTAIN CREEK BASIN 5

Original Design Data from Plans



CONEJO MOUNTAIN CREEK DETENTION BASIN NO.4 DD3-36

LOCATION: City of Thousand Oaks, at Rancho Dos Vientos Drive and Via Ricardo
N: 244,940 E: 1,700,940 (Lambert Zone 5 Coordinates)
Newbury Park, 7 1/2 Quad

DESIGN DATA

Design Agency	VTN, INC
Level Capacity	8.34 ac-ft or 13,450cy
Maximum Debris Capacity	NA
100-Yr Inflow Rate	Q100=353 cfs
Outflow Rate	Q100=179 cfs at 881.08 ft NGVD29
Debris Cleanout Elevation	
EMERGENCY SPILLWAY	
Type	33 ft x 18 ft Drop Box Inlet to 8 ft x 6 ft RC Box
Weir Elevation	881.64 ft NGVD29
Max. Capacity	811 cfs
PRINCIPAL SPILLWAY	
Type	10 ft x 7 ft Intake Tower Structure with Trash Rack
Bottom and Top Elevation	872.24 and 882.24 ft
Outlet Conduit	42 in RCP
DEBRIS BLEEDER/RISER	
Type	Trash Rack on front of Principal Spillway Tower
Top Elevation	Same as Principal
Outlet Conduit	Same as Principal
DAM	
Dam Type	Earthfill
Dam Crest Elevation	Min. 887.0 ft NGVD29
Length	NA
Surface Area of Full Basin	1.9 ac
Watershed Area	250 ac (2006 Thousand Oaks MDP VCRat Model)
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Operating Engineers
Completion Date	2004
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3619 thru Y-3-3639
Topographic Drwgs(pre-const)	
Right-of-Way Drawings	

EXPECTED DEBRIS PRODUCTION (cy): Limited sediment expected to reach facility through local culverts; Historic debris basins also capture sediment		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	642	932
50-YEAR	479	695
10-YEAR	204	296

BASIN HISTORY: CONEJO MOUNTAIN CREEK DETENTION BASIN NO.4

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No removal data reported by O&M as of 2015			

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

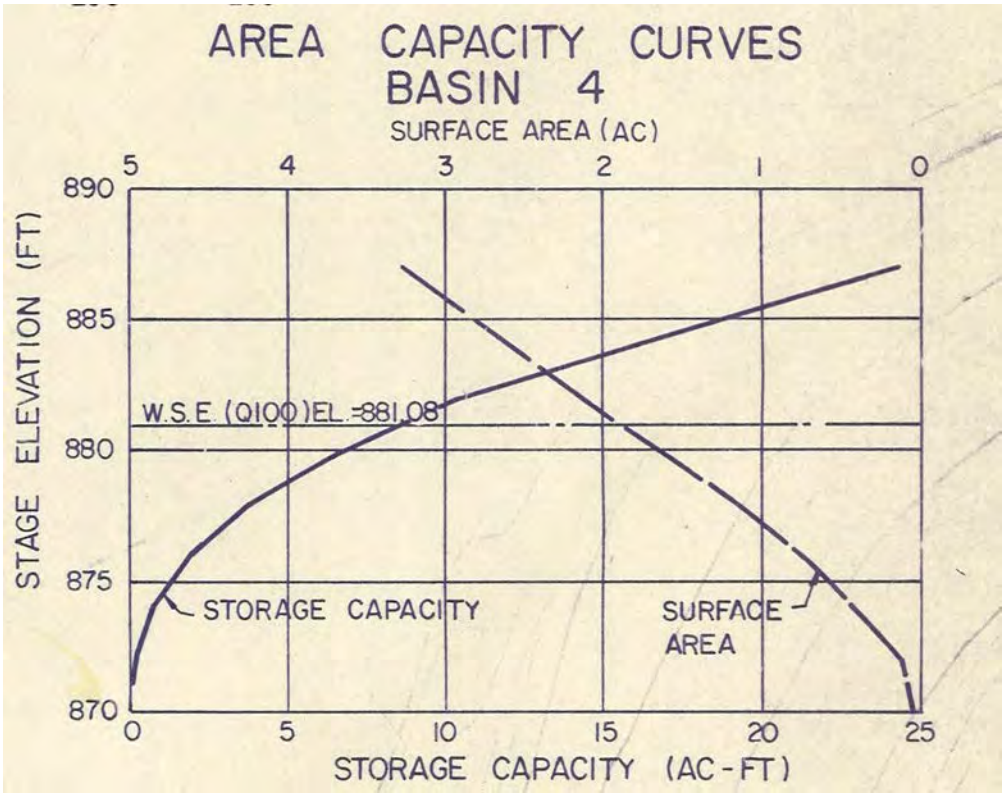
*** Theoretical Value from Kevin Scott Formula

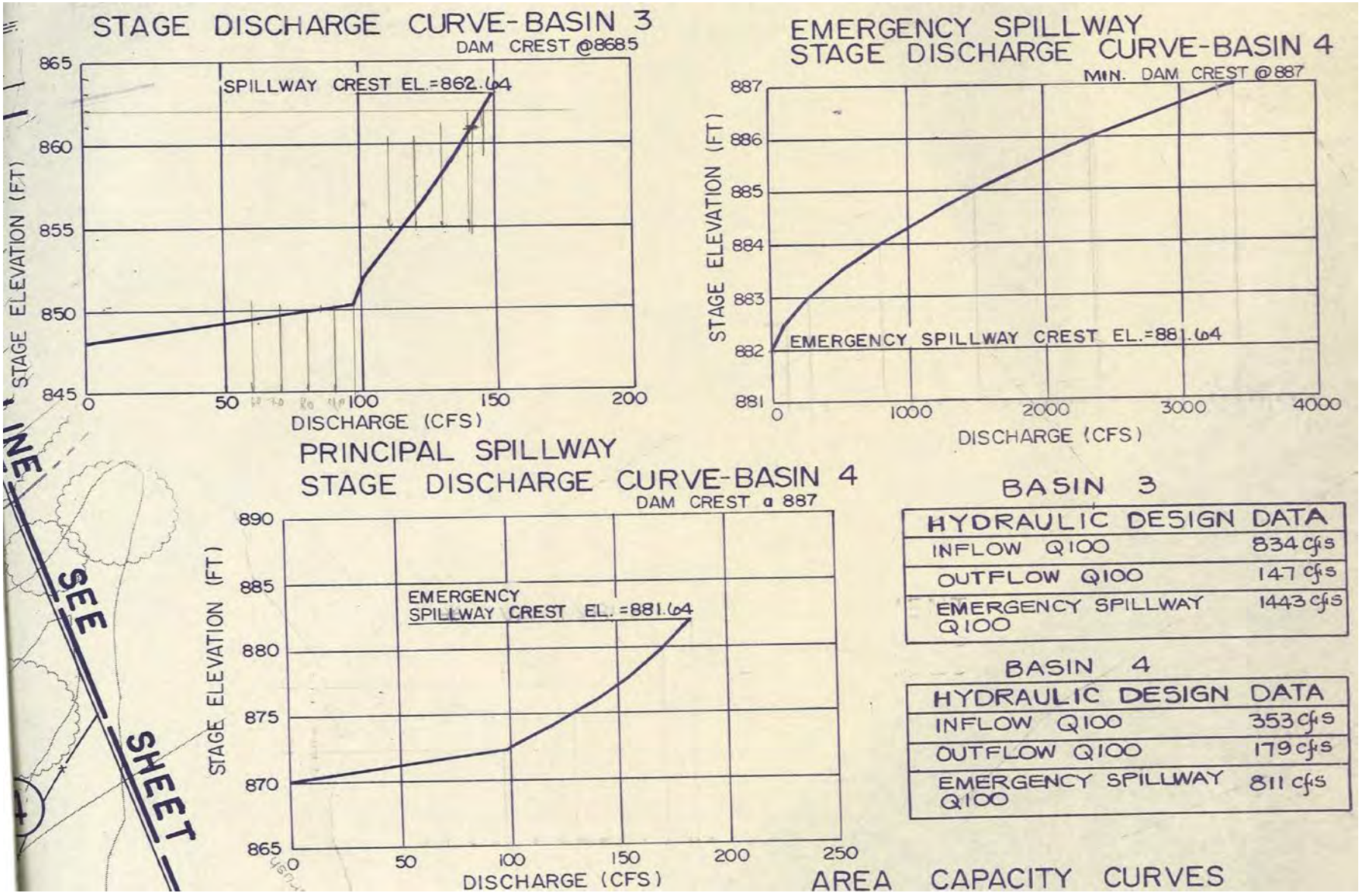
NA= Not Available / Not Applicable

ACCESS MAP AND WATERSHED MAP

SEE MAPS FOR CONEJO MOUNTAIN CREEK BASIN 5

Original Design Data from Plans




STAGE DISCHARGE CURVE-BASIN 3
DAM CREST @8685
SPILLWAY CREST EL.=862.64
STAGE ELEVATION (FT)
865
860
855
850
845
0
50
100
150
200
DISCHARGE (CFS)
EMERGENCY SPILLWAY
STAGE DISCHARGE CURVE-BASIN 4
MIN. DAM CREST @887
STAGE ELEVATION (FT)
887
886
885
884
883
882
881
EMERGENCY SPILLWAY CREST EL.=881.64
0
1000
2000
3000
4000
DISCHARGE (CFS)
PRINCIPAL SPILLWAY
STAGE DISCHARGE CURVE-BASIN 4
DAM CREST a 887
STAGE ELEVATION (FT)
890
885
880
875
870
865
EMERGENCY
SPILLWAY CREST EL. =881.64
0
50
100
150
200
250
DISCHARGE (CFS)
SEE
SHEET
BASIN 3
HYDRAULIC DESIGN DATA
INFLOW Q100 834 cfs
OUTFLOW Q100 147 cfs
EMERGENCY SPILLWAY Q100 1443 cfs
BASIN 4
HYDRAULIC DESIGN DATA
INFLOW Q100 353 cfs
OUTFLOW Q100 179 cfs
EMERGENCY SPILLWAY Q100 811 cfs
AREA CAPACITY CURVES

CONEJO MOUNTAIN CREEK DETENTION BASIN NO.5 DD3-37

LOCATION: City of Thousand Oaks, at Rancho Dos Vientos Drive and Via Ricardo
N: 244,940 E: 1,700,765 (Lambert Zone 5 Coordinates)
Newbury Park, 7 1/2 Quad

DESIGN DATA

Design Agency	VTN, INC
Level Capacity Below Spillway	7.24 af or 11,680 cy
Maximum Debris Capacity	2.5 af; 125% of 100-yr capacity
100-Yr Inflow Rate	Q100=612 cfs
Outflow Rate	Q100=213 cfs at 899,7 ft NGVD29
Debris Cleanout Elevation	
EMERGENCY SPILLWAY	
Type	32 ft x 15 ft Drop Box Inlet to 7x6.25 ft RC Box
Weir Elevation	899.87 ft NGVD29
Max. Capacity	678 cfs for Q100 or 2,900 cfs at top of dam
PRINCIPAL SPILLWAY	
Type	10 ft x 8 ft Intake Tower Structure with Trash Rack
Bottom and Top Elevations	892 and 899.7 ft
Outlet Conduit	42 in RCP
DEBRIS BLEEDER/RISER	
Type	Trash Rack on front of Principal Spillway Tower
Top Elevation	Same as Principal
Outlet Conduit	Same as Principal
DAM	
Dam Type	Earthfill
Dam Crest Elevation	NA
Length	240 ft
Surface Area of Full Basin	NA
Watershed Area	212 ac (2006 Thousand Oaks MDP VCRat Model)
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Operating Engineers
Completion Date	2004
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3619 thru Y-3-3639
Topographic Drwgs(pre-const)	
Right-of-Way Drawings	

EXPECTED DEBRIS PRODUCTION (cy):			
Storm Frequency	**1995 Design Condition**	**2013 Design Yield**	**100% Burn**
100-YEAR	3,876	3,204	4,647
50-YEAR	2,979	2,390	3,466
10-YEAR	1,348	1,017	1,476

Note: 1995 Design Condition includes developed area but reduces design fire factor accordingly. 2013 Design Yield only evaluates undeveloped area tributary to basin. 1995 Study decreased inflow to basin by 1192 due to now defunct debris basin in the watershed, so the 100-yr design volume was 3,876-1,192=2,684. Required volume was therefore 1.25*2,684 or about 2.1 af as shown on the design plans.

BASIN HISTORY: CONEJO MOUNTAIN CREEK DETENTION BASIN NO.5

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No removal data reported by O&M as of 2015			

Notes

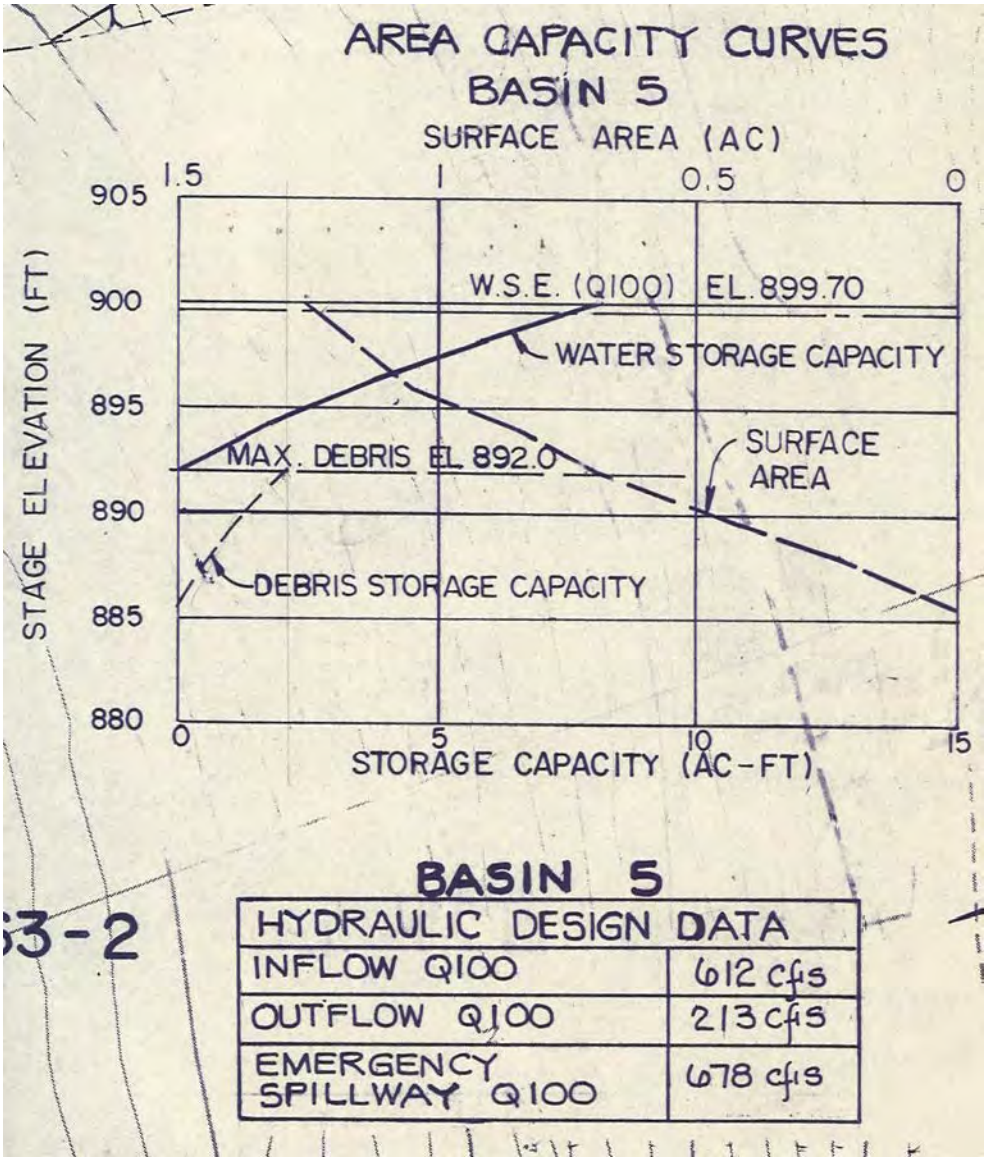
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

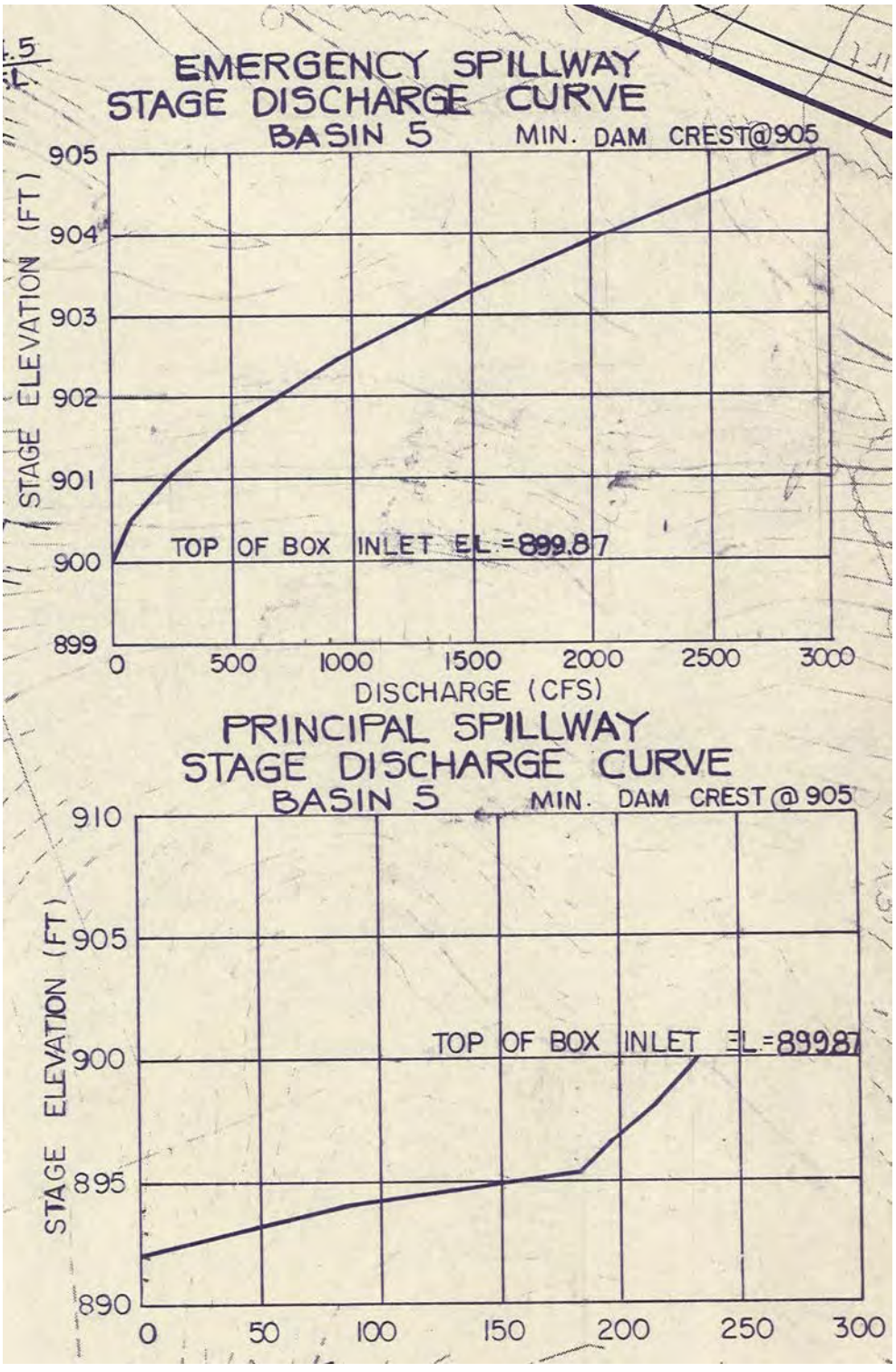
NA= Not Available / Not Applicable

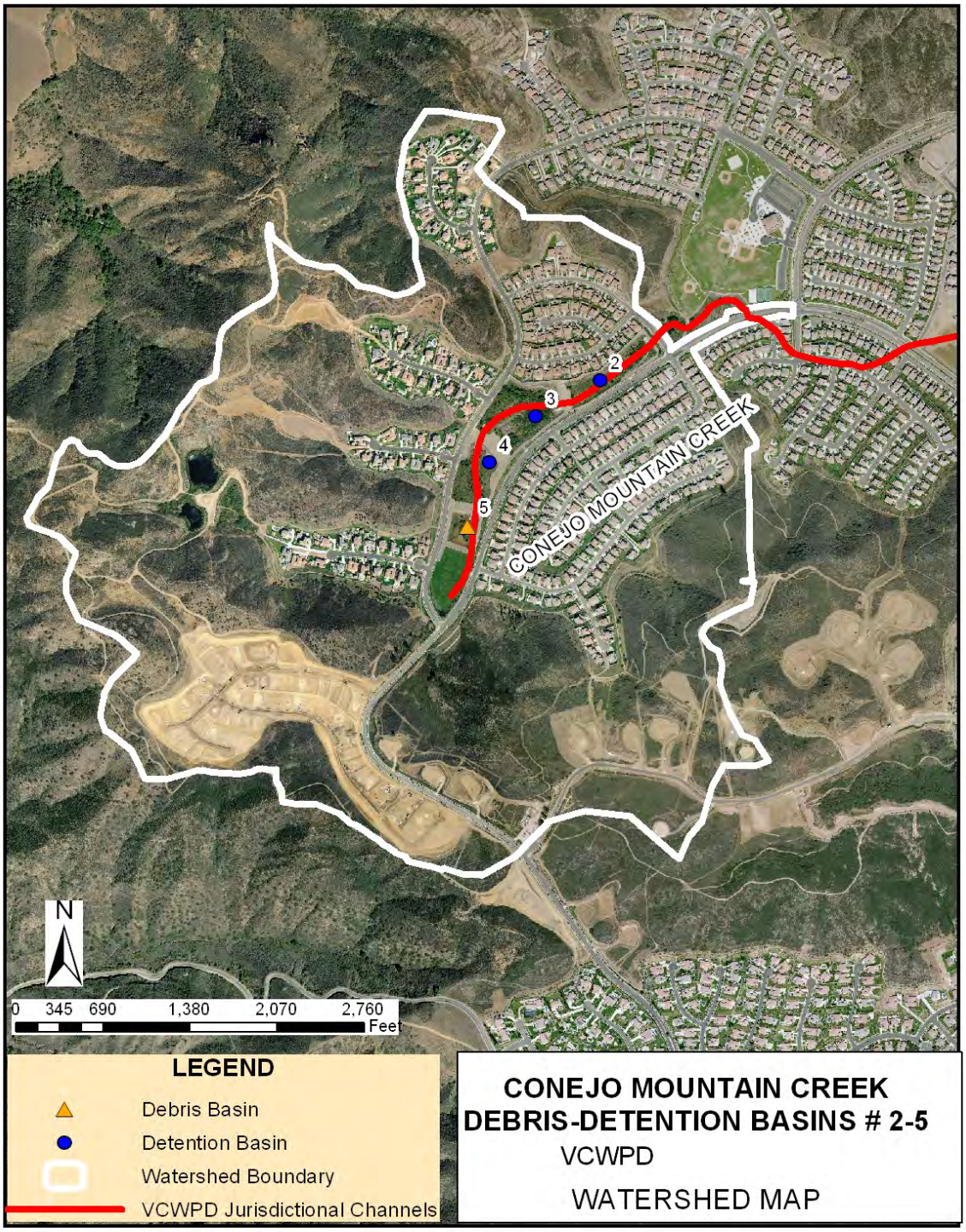
Original Design Data from Plans

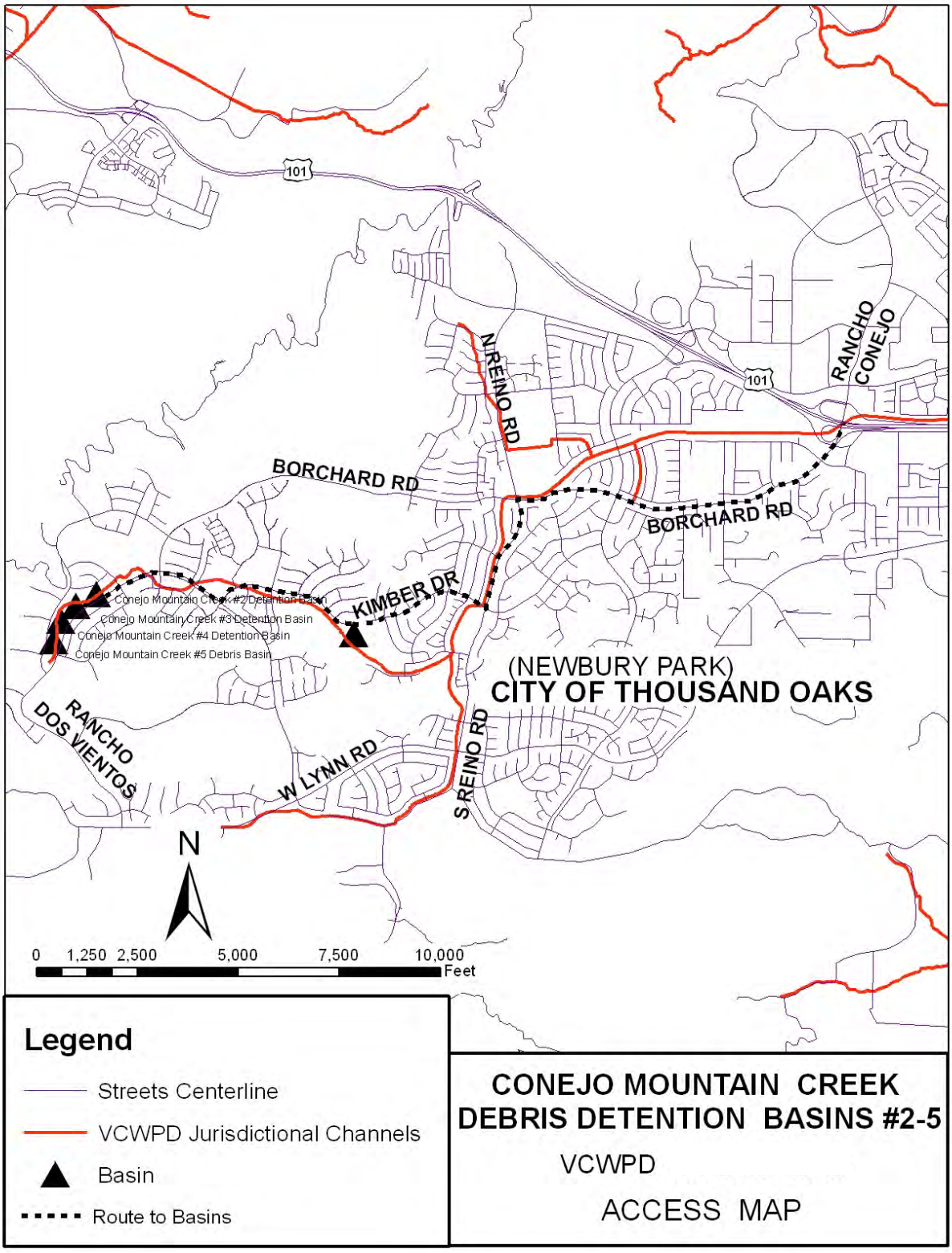


BASIN 5

HYDRAULIC DESIGN DATA	
INFLOW Q100	612 cfs
OUTFLOW Q100	213 cfs
EMERGENCY SPILLWAY Q100	678 cfs


EMERGENCY SPILLWAY
STAGE DISCHARGE CURVE
BASIN 5
MIN. DAM CREST@905
STAGE ELEVATION (FT)
905
904
903
902
901
900
899
TOP OF BOX INLET EL.=899.87
0
500
1000
1500
2000
2500
3000
DISCHARGE (CFS)
PRINCIPAL SPILLWAY
STAGE DISCHARGE CURVE
BASIN 5
MIN. DAM CREST@905
STAGE ELEVATION (FT)
910
905
900
895
890
TOP OF BOX INLET EL.=899.87
0
50
100
150
200
250
300


2
3
4
5
CONEJO MOUNTAIN CREEK
N
0 345 690 1,380 2,070 2,760
Feet
LEGEND
Debris Basin
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
CONEJO MOUNTAIN CREEK
DEBRIS-DETENTION BASINS # 2-5
VCWPD
WATERSHED MAP


101
N REINO RD
RANCHO CONEJO
BORCHARD RD
BORCHARD RD
KIMBER DR
Conejo Mountain Creek #2 Detention Basin
Conejo Mountain Creek #3 Detention Basin
Conejo Mountain Creek #4 Detention Basin
Conejo Mountain Creek #5 Debris Basin
(NEWBURY PARK)
CITY OF THOUSAND OAKS
RANCHO DOS VIENTOS
W LYNN RD
S REINO RD
N
0 1,250 2,500 5,000 7,500 10,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Route to Basins
CONEJO MOUNTAIN CREEK
DEBRIS DETENTION BASINS #2-5
VCWPD
ACCESS MAP

COVINGTON DETENTION BASIN DD3-27

LOCATION: Simi Valley, 3000 ft S of Fitzgerald Ave and 1000 ft E of Erringer Rd.;
N 274,625,E 1,771,800 (Lambert Zone 5 Coordinates);
Simi 7 1/2' Quad.

DESIGN DATA

Design Agency	Crosby-Mead-Benton
Level Capacity	5,020 cy at spillway invert (Y-3-3732)
Maximum Debris Capacity	0 cy (upstream development removes sediment)
100-Yr Inflow Rate	158 cfs
Outflow Rate	48 cfs at 888.54 ft NGVD29
Debris Cleanout Elevation	No debris expected to reach basin
EMERGENCY SPILLWAY	
Type	36-in RCP Vertical Pipe
Crest Elevation	888.6 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	53 cfs
PRINCIPAL SPILLWAY	
Type	6 ft x 6 ft Concrete Riser Tower, Top Elev 891.6 ft
Inlet Weir Elevations	883 ft NGVD29
Outlet Conduit	24 to 36 in RCP
DEBRIS BLEEDER/RISER	
Type	6-in Perforated Pipe Laid at 1% Min. Grade w/ Gravel
Start Elevation	873 ft NGVD29, Length Approx. 80 ft
Outlet Conduit	Connects to Principal Spillway
DAM	
Dam Type	Earthfill
Dam Crest Elevation	891.6 ft NGVD29
Length	~300 ft
Surface Area of Full Basin	0.5 ac
Watershed Area	47 ac from Simi Valley Master Plan Update Subareas
Width at Crest	15 ft
CONSTRUCTION DATA	
Construction Agency	Centex
Completion Date	1997
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3726-3745
Right-of-Way Drawings	NA
Topographic Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy): Surrounded by development that prevents undeveloped area sediment from reaching basin		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	0	0
50-YEAR	0	0
25-YEAR	0	0

BASIN HISTORY: COVINGTON BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No cleanouts reported by O&M			

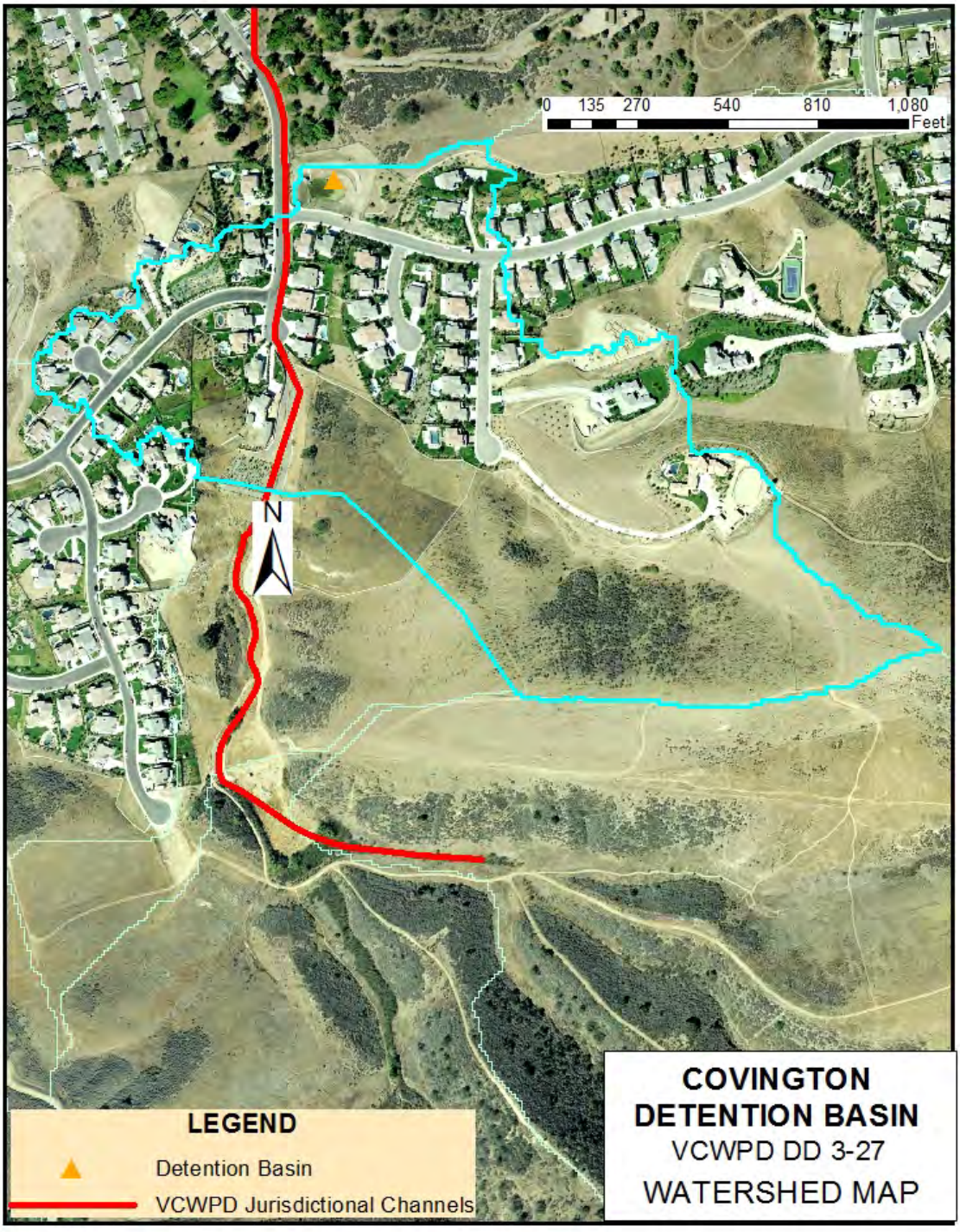
Notes

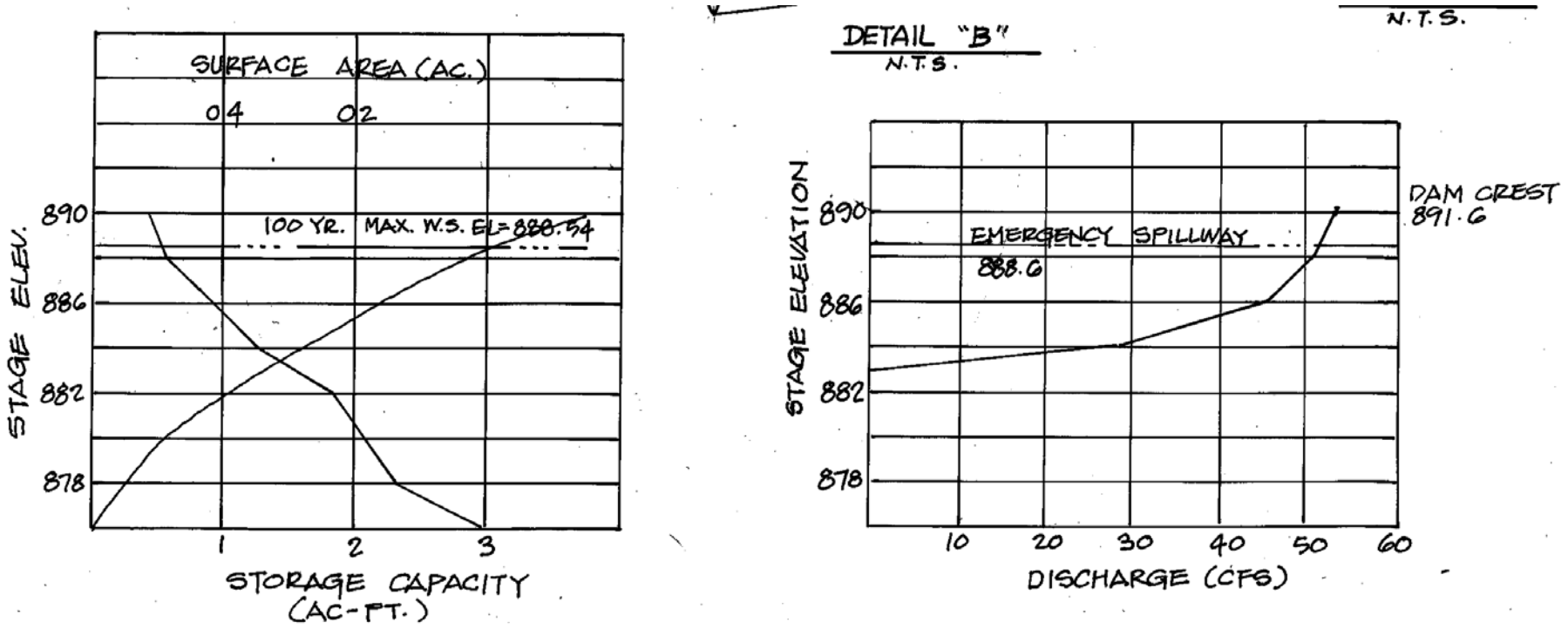
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

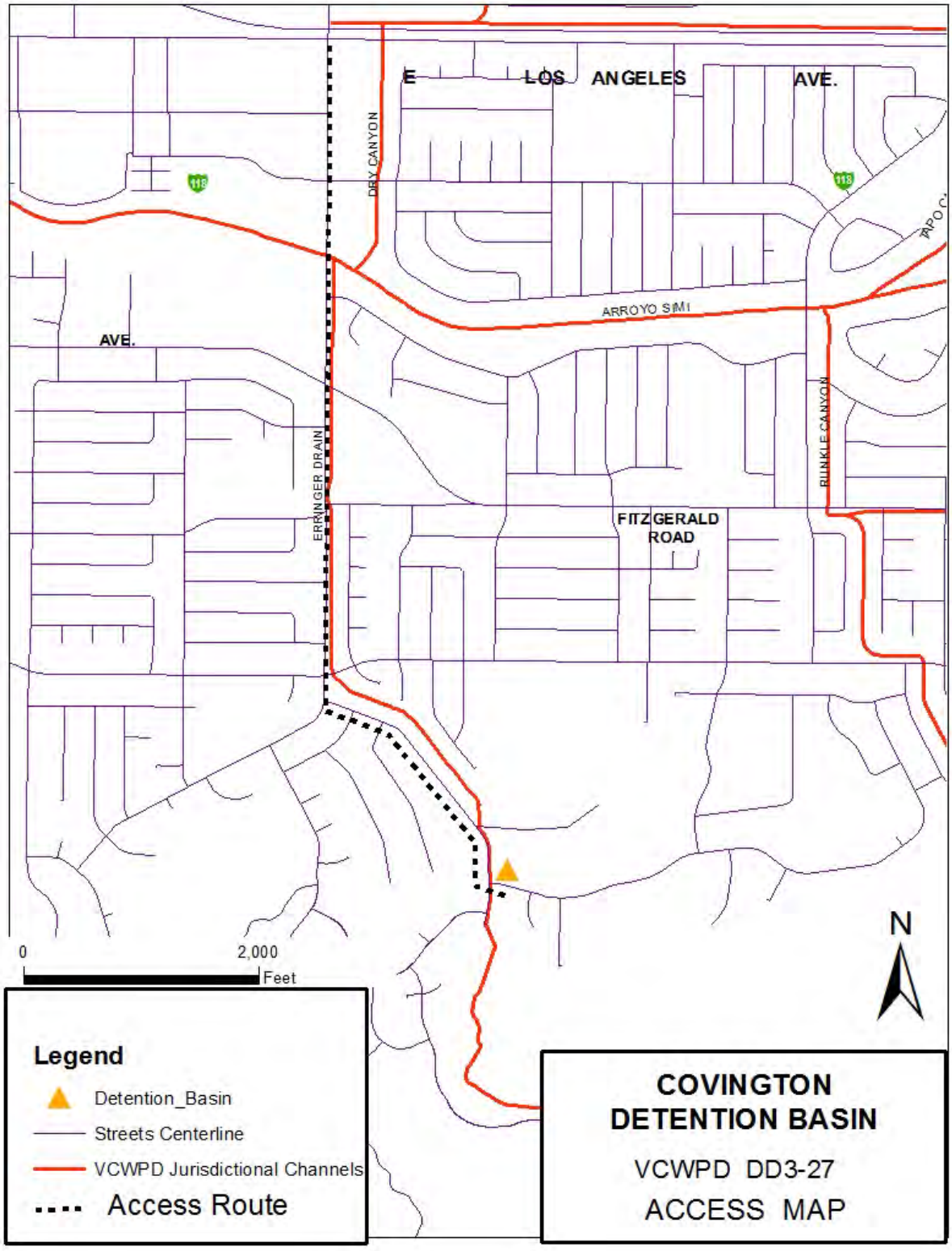
*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable


0 135 270 540 810 1,080
Feet
N
LEGEND
Detention Basin
VCWPD Jurisdictional Channels
COVINGTON
DETENTION BASIN
VCWPD DD 3-27
WATERSHED MAP



Covington Detention Basin


E LOS ANGELES AVE.
AVE.
DRY CANYON
ARROYO SIMI
ERRINGER DRAIN
RUNKLE CANYON
FITZGERALD ROAD
118
0
2,000
Feet
N
Legend
Detention_Basin
Streets Centerline
VCWPD Jurisdictional Channels
Access Route
COVINGTON DETENTION BASIN
VCWPD DD3-27
ACCESS MAP

COYOTE CANYON DEBRIS BASIN DB3-15

LOCATION: Somis, 650 ft north of Los Angeles Ave., W of Donlon Rd;
N 280,000 E 1,699,400(Lambert Zone 5 Coordinates);
Moorpark and Sta Paula 7 1/2' Quad

DESIGN DATA	(Elevations NGVD29)
Design Agency	Soil Conservation Service
Level Capacity	24,500 cy (10-5-90 DTM)
Maximum Debris Capacity	25,300 cy (10-5-90 DTM)
Inflow and Outflow Rate	Q100in=3,490 cfs (VCRAT, 2003); Q100out=NA
Debris Cleanout Elevation	324 ft NGVD29 (15,250 cy) [10% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	40 ft wide x 6.5 ft high RC Rectangular Channel
Invert Elevation	328.5 NGVD29
Spillway Length	NA
Capacity w/o Freeboard	2,400 cfs at dam crest
PRINCIPAL SPILLWAY	
Type	None
Invert Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	24-in Slotted CSP
Top Elevation	329 ft NGVD29
Outlet Conduit	18 in HDPE & 10 in Steel Pipe
DAM	
Dam Type	Earthfill
Dam Crest Elevation	335 ft NGVD29
Length	280 ft
Width at Crest	NA
Surface Area of Full Basin	1.5 ac
Watershed Area	4,400 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service
Completion Date	1955
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1055 thru Y-3-1056
Topographic Drwgs(pre-const)	T-63-1 (2-6-70), T-63-14 (11-2-71), T-263 (10-22-80), T-334 (12-13-85), 10-31-88DTM,10-16-89DTM,10-5-90DTM
Right-of-Way Drawings	15821

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	152,459	221,066
50-YEAR	114,365	165,829
25-YEAR	78,348	113,604

BASIN HISTORY: COYOTE CANYON DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
09-69	Cleanout		12,000	
02-70	Aerial Survey	Not Digitized		
11-71	Aerial Survey	21,352		
05-73	Aerial Survey	1,772		
10-73	Cleanout		14,800	
11-73	Aerial Survey	16,580		
06-75	Aerial Survey	6,672		
09-75	Cleanout		19,000	
10-75	Aerial Survey	25,715		
10-76	Aerial Survey	22,048		
12-77	Aerial Survey	19,700		
01-78	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			
06-78	Aerial Survey	800		
02-79	Cleanout		19,900	
02-79	Aerial Survey	19,162		
02-80	Disaster Declaration			
06-80	Aerial Survey	787		
12-80	Cleanout		21,800	6,610**
12-80	Aerial Survey	22,586		
10-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	14,298		
03-83	Disaster Declaration			
04-83	Aerial Survey	1,823		
08-84	Cleanout		450	
08-84	Aerial Survey	2,275		
10-84	1st Cleanout		17,150	
10-84	Aerial Survey	19,437		
11-84	2nd Cleanout		1,819	
11-84	Aerial Survey	21,256		
07-85	Cleanout		2,957	
12-85	Aerial Survey	21,582		
07-86	Aerial Survey	13,129		
08-86	Cleanout		9,311	
10-86	Aerial Survey	22,043		
07-87	Cleanout		2,125	

BASIN HISTORY: COYOTE CANYON DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
10-87	Aerial Survey	Not Digitized		
10-88	Aerial Survey	23,324		
10-89	Aerial Survey	21,711		
06-90	Cleanout		2,292	3,158
09-90	Aerial Survey	25,336		
05-91	Aerial Survey	21,759		
07-91	Cleanout		3,978	
11-91	Aerial Survey	25,737		
02-92	Disaster Declaration			2,938**
05-92	Aerial Survey	18,640		
11-92	Cleanout		6,921	
11-92	Aerial Survey	25,672		
07-93	Aerial Survey	15,100		
12-93	Cleanout		10,640	
01-94	Aerial Survey	26,576		
07-94	Cleanout		620	
12-94	Aerial Survey	25,740		
01-95	Disaster Declaration			2,570
05-95	Aerial Survey	12,900		
11-95	Cleanout		12,570	
11-95	Aerial Survey	25,470		
07-96	Cleanout		1,216	
07-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey	19,730		
02-98	Disaster Declaration			3,213
07-98	Aerial Survey	880		
11-98	Cleanout		23,970	
11-98	Aerial Survey	24,850		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
11-03	Cleanout		1,863	
12-03	Cleanout		5,833	
12-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			2,831
07-05	Multiple Cleanouts-	Truck Count	49,076	
11-05	TIN analysis by WR&T	24,257 to elev. 328.5 ft		
07-08	Cleanout by O&M	Truck Count	10,680	
12-08	TIN analysis by WR&T	23,921 to elev. 328.5 ft		
12-08	TIN analysis 05 vs 08		Cut vol 2,246 Fill vol 3,561	
07-10	Cleanout by O&M	Truck Count	9,452	
05-11	TIN analysis by WR&T	17,728 to elev. 328.5 ft		
05-11	TIN analysis 11 vs 08		Cut vol 223 Fill vol 6,679	

BASIN HISTORY: COYOTE CANYON DEBRIS BASIN

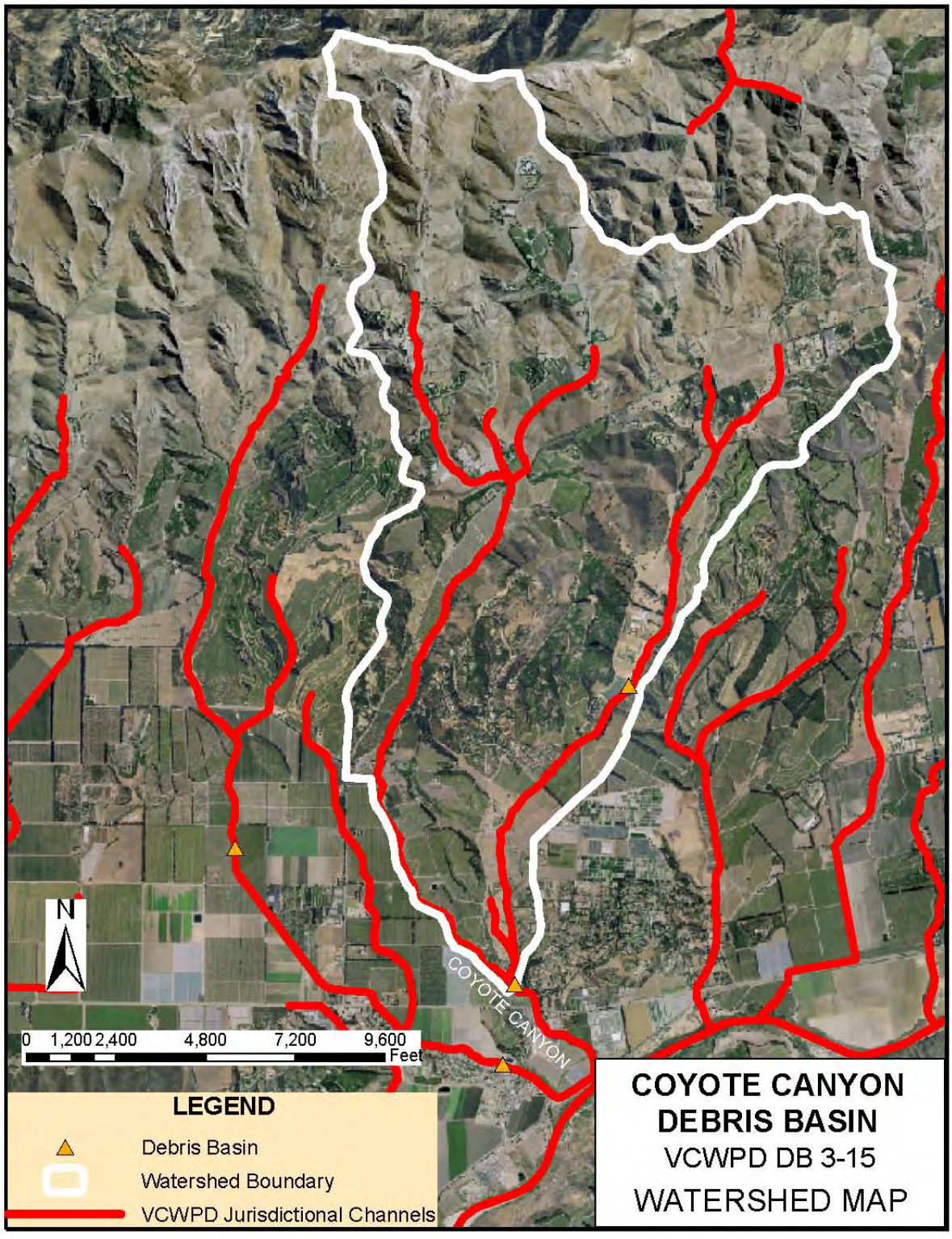
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
06-12	TIN analysis by WR&T	18,017 to elev. 328.5 ft		
07-12	Cleanout by O&M	Truck Count	8,712	
10-12	TIN analysis by WR&T	24,412 to elev. 328.5 ft	6,393	
10-14	TIN analysis by WR&T	23,356 to elev. 328.5 ft 1,054 deposit since 10-12		
05-17	TIN analysis by WR&T	17,689 to elev. 328.5 ft 5,667 deposit since 10-14		
07-17	Cleanout by O&M	Truck Count	7,812	

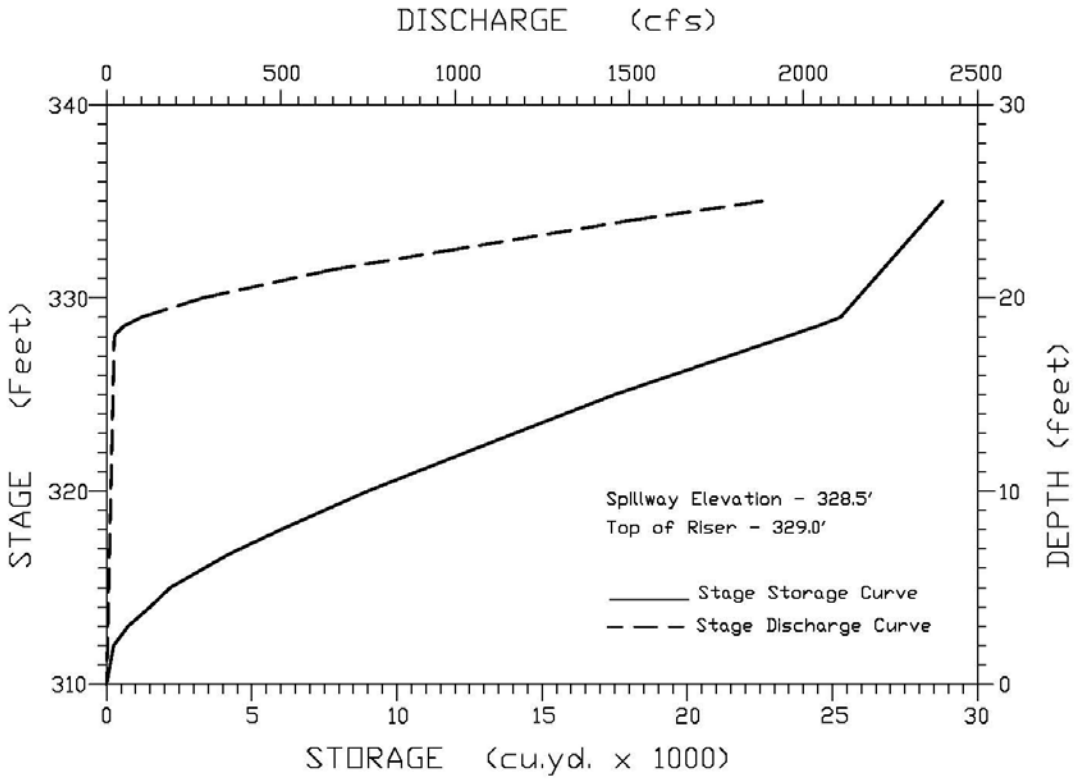
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

NA= Not Available / Not Applicable

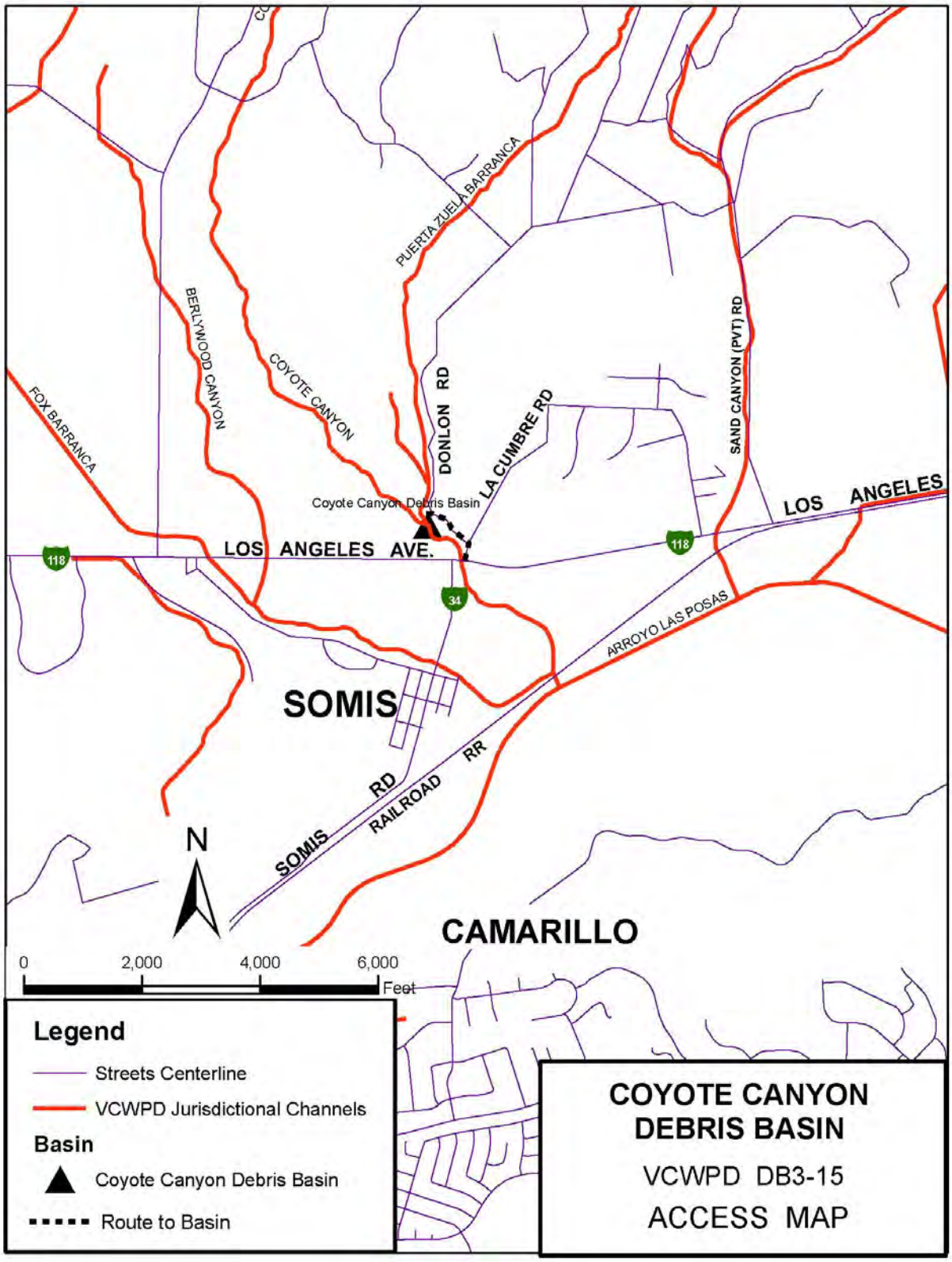

N
0 1,200 2,400 4,800 7,200 9,600
Feet
COYOTE CANYON
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
COYOTE CANYON
DEBRIS BASIN
VCWPD DB 3-15
WATERSHED MAP



Stage-Storage-Discharge Data

Elevation	Spill Disch.	10-2012 TIN Vol.
Ft. NGVD29	cfs	Cu. Yds
307.5		0
308		25
309		221
310		646
311		1,255
312		1,981
313		2,794
314		3,680
315		4,628
316		5,633
317		6,691
318		7,809
319		9,011
320		10,302
321		11,665
322		13,102

Elevation	Spill Disch.	10-2012 TIN Vol.
Ft. NGVD29	cfs	Cu. Yds
323		14,615
324		16,207
325		17,876
326		19,625
327		21,455
328		23,372
328.5	-	24,365
329	40	
330	200	
331	445	
332	730	
333	1,070	
334	1,445	
335	1,860	


PUERTA ZUELA BARRANCA
BERLYWOOD CANYON
COYOTE CANYON
FOX BARRANCA
DONLON RD
LA CUMBRE RD
SAND CANYON (PVT) RD
Coyote Canyon Debris Basin
LOS ANGELES AVE.
LOS ANGELES
118
34
ARROYO LAS POSAS
SOMIS
SOMIS RD
RAILROAD RR
CAMARILLO
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Coyote Canyon Debris Basin
Route to Basin
COYOTE CANYON
DEBRIS BASIN
VCWPD DB3-15
ACCESS MAP

CRESTVIEW DEBRIS BASIN DB3-10 (Nonfunctional)

LOCATION: City of Camarillo 2000 ft upstream from Las Posas Road adjacent to Crestview Avenue.
N 268,000, E 1,676,200 (Lambert Zone 5 Coordinates);
Camarillo 7-1/2' Quad.

DESIGN DATA	Avocado Orchard as of 2/2005; (Elevations NGVD29)
Design Agency	VC Watershed Protection District
Level Capacity	2,350 cy (10-29-71, T-63-16)
Maximum Debris Capacity	11,100 cy (10-29-71, T-63-16)
Inflow and Outflow Rate	Q100in=218 cfs; Q100out=NA
Debris Cleanout Elevation	197 ft NGVD29 (250 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	None
Invert Elevation	NA
Spillway Length	NA
Capacity	NA
PRINCIPAL SPILLWAY	
Type	4.5 ft x 4.5 ft RCB Weir Inlet, Tower 28 ft high
Weir Elevation	200 ft NGVD29
Outlet Conduit	48 in RCP to 36 in RCP
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill
Dam Crest Elevation	204.5 ft
Length	100 ft
Width at Crest	NA
Surface Area of Full Basin	1.47 ac
Watershed Area	80 ac from Quad Map
CONSTRUCTION DATA	
Construction Agency	VC Flood Control District
Completion Date	1934
REFERENCE DRAWINGS	
Construction Drawings	31246 thru 31249 B
Topographic Drwgs(pre-const)	31247, T-63-16 (10-29-71)
Right-of-Way Drawings	31246

Due to avocado orchard in basin, District may give up ownership of basin.

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	1,005	1,460
50-YEAR	770	1,126
25-YEAR	567	824

BASIN HISTORY: CRESTVIEW DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
10-71	Aerial Survey	11,100		
05-72	Aerial Survey	Not Digitized		
05-73	Aerial Survey	Not Digitized		
02-78	Disaster Declaration			
03-78	Disaster Declaration			
02-80	Disaster Declaration			
06-80	Aerial Survey	Not Digitized		
11-81	Aerial Survey	Not Digitized		
03-83	Disaster Declaration			100***
10-90	Aerial Survey	Not Digizited		
06-91	Aerial Survey	Not Digitized		
02-92	Disaster Declaration			100***
05-92	Aerial Survey	Not Digitized		
01-95	Disaster Declaration			100***
02-98	Disaster Declaration			
06-03	Basin planted with orchard	Not being maintained by O&M		
01-05	Disaster Declaration			77***

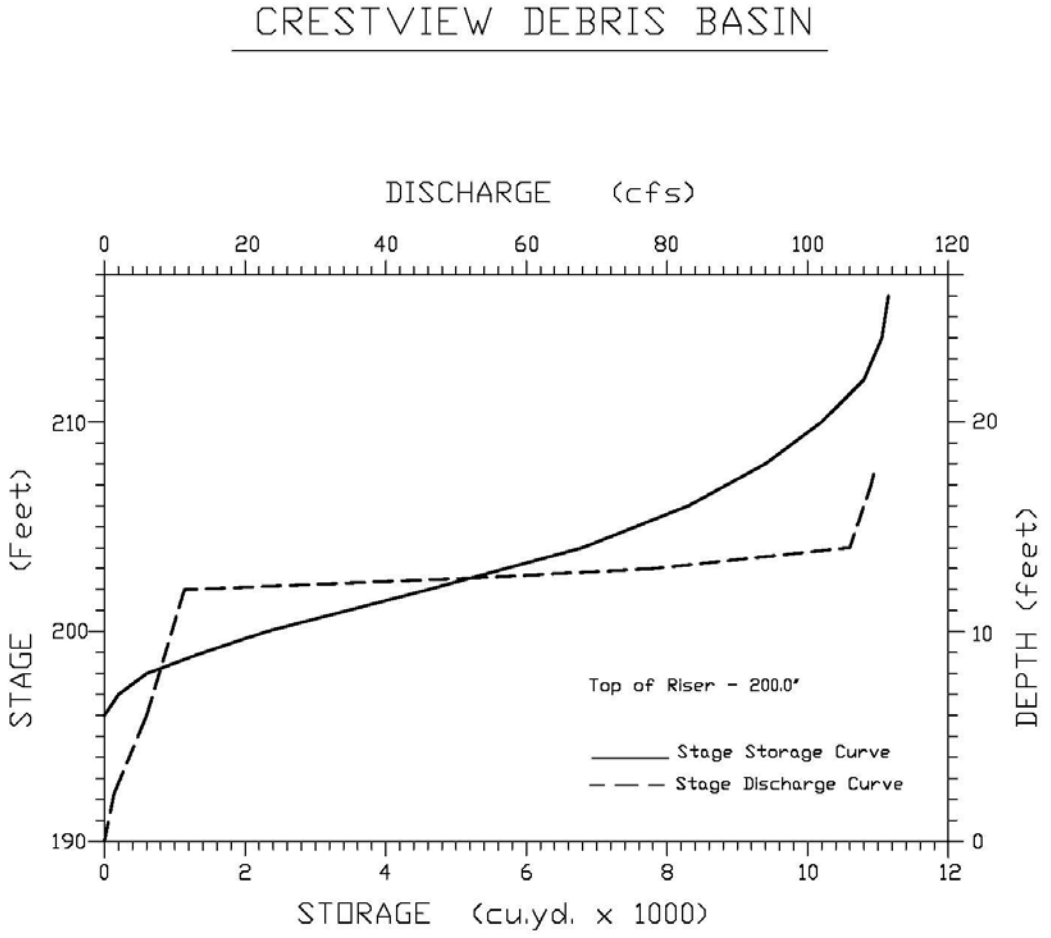
Notes

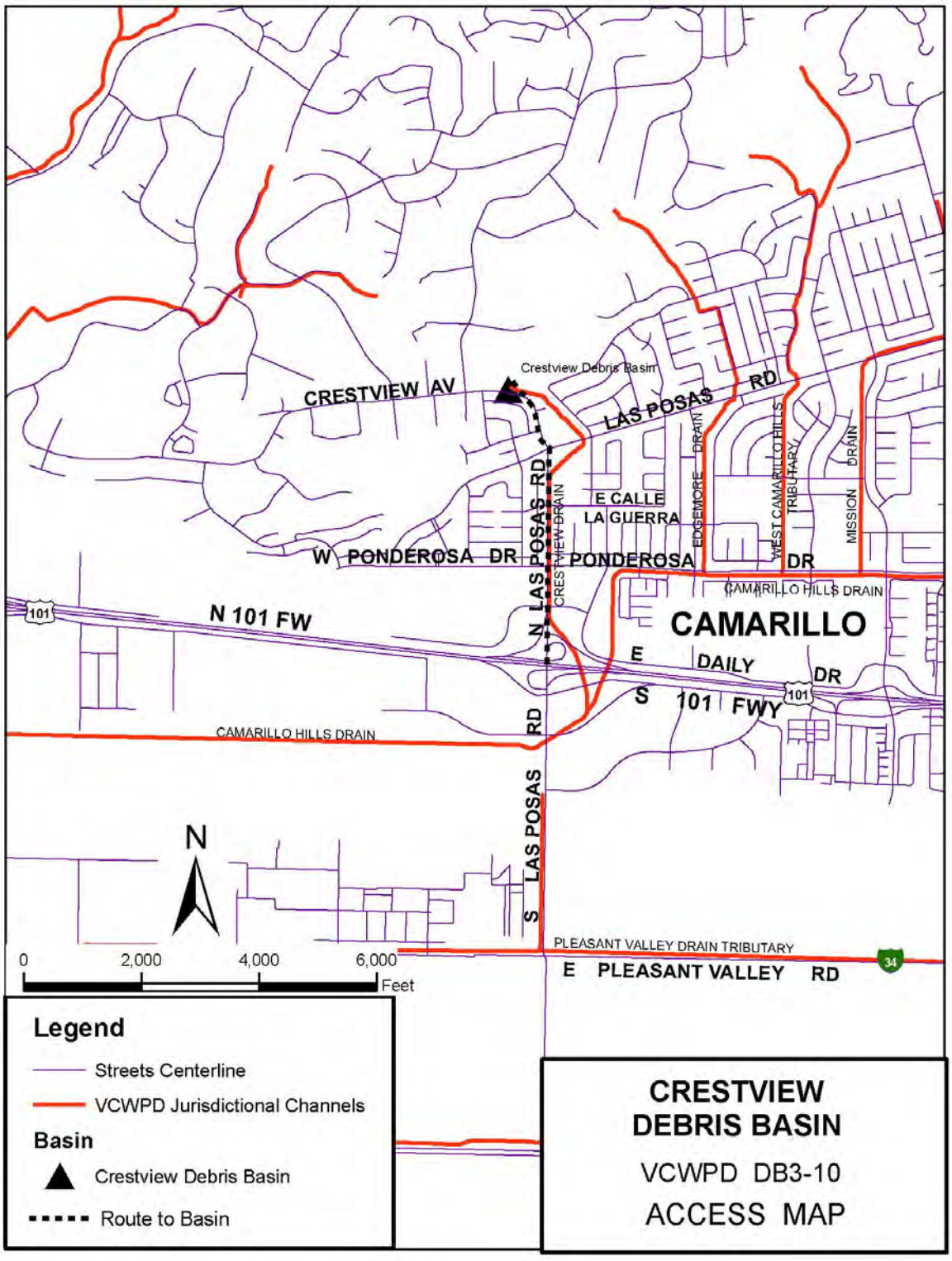
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

*** Theoretical Value, 10% of 50-yr sediment yield based on Scott and Williams, 1978

NA= Not Available / Not Applicable

CRESTVIEW DRAIN
CAMARILLO HILLS DRAIN
N
0 355 710 1,420 2,130 2,840
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
CRESTVIEW
DEBRIS BASIN
VCWPD DB 3-10
WATERSHED MAP


CRESTVIEW DEBRIS BASIN
DISCHARGE (cfs)
0
20
40
60
80
100
120
210
200
190
STAGE (Feet)
20
10
0
DEPTH (feet)
Top of Riser - 200.0'
Stage Storage Curve
Stage Discharge Curve
0
2
4
6
8
10
12
STORAGE (cu.yd. x 1000)


Crestview Debris Basin
CRESTVIEW AV
LAS POSAS RD
E CALLE LA GUERRA
EDGEMORE DRAIN
WEST CAMARILLO HILLS TRIBUTARY
MISSION DRAIN
W PONDEROSA DR
PONDEROSA DR
N LAS POSAS RD
CRESTVIEW DRAIN
CAMARILLO HILLS DRAIN
101
N 101 FW
CAMARILLO
E DAILY DR
S 101 FWY
CAMARILLO HILLS DRAIN
S LAS POSAS RD
N
0 2,000 4,000 6,000 Feet
PLEASANT VALLEY DRAIN TRIBUTARY
E PLEASANT VALLEY RD
34
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Crestview Debris Basin
Route to Basin
CRESTVIEW DEBRIS BASIN
VCWPD DB3-10
ACCESS MAP

CROSBY (RUDOLPH) DETENTION BASIN DD3-28

LOCATION: Simi Valley, Intersection of Crosby and Rudolph Sts
N 274,800,E 1,773,265 (Lambert Zone 5 Coordinates);
Simi 7 1/2' Quad.

DESIGN DATA

Design Agency	Crosby-Mead-Benton
Level Capacity	6,450 cy at spillway invert (Y-3-3733)
Maximum Debris Capacity	0 cy (upstream development removes sediment)
100-Yr Inflow Rate	167 cfs, (10-yr 140.3 cfs)
Outflow Rate	60 cfs at 889.74 ft NGVD29, 10-yr 55 cfs
Debris Cleanout Elevation	No debris expected to reach basin
EMERGENCY SPILLWAY	
Type	36-in RCP Vertical Pipe
Crest Elevation	896.8 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	61 cfs
PRINCIPAL SPILLWAY	
Type	6 ft x 6 ft Concrete Riser Tower, Top Elev 900.0 ft
Inlet Weir Elevations	883 ft NGVD29
Outlet Conduit	24 to 36 in RCP
DEBRIS BLEEDER/RISER	
Type	6-in Perforated Pipe Laid at 1% Min. Grade w/ Gravel
Start Elevation	880 ft NGVD29, Length Approx. 140 ft
Outlet Conduit	Connects to Principal Spillway
DAM	
Dam Type	Earthfill
Dam Crest Elevation	900 ft NGVD29
Length	~300 ft on 3 sides of basin
Surface Area of Full Basin	~0.5 ac
Watershed Area	55 ac from Simi Valley MDP (draft)
Width at Crest	15 ft
CONSTRUCTION DATA	
Construction Agency	Centex
Completion Date	1997 (Called Rudolph on Y drawings)
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3726-3745
Right-of-Way Drawings	NA
Topographic Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy): Surrounded by development that keeps sediment from basin		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	0	0
50-YEAR	0	0
25-YEAR	0	0

BASIN HISTORY: CROSBY BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No cleanout data reported by O&M			

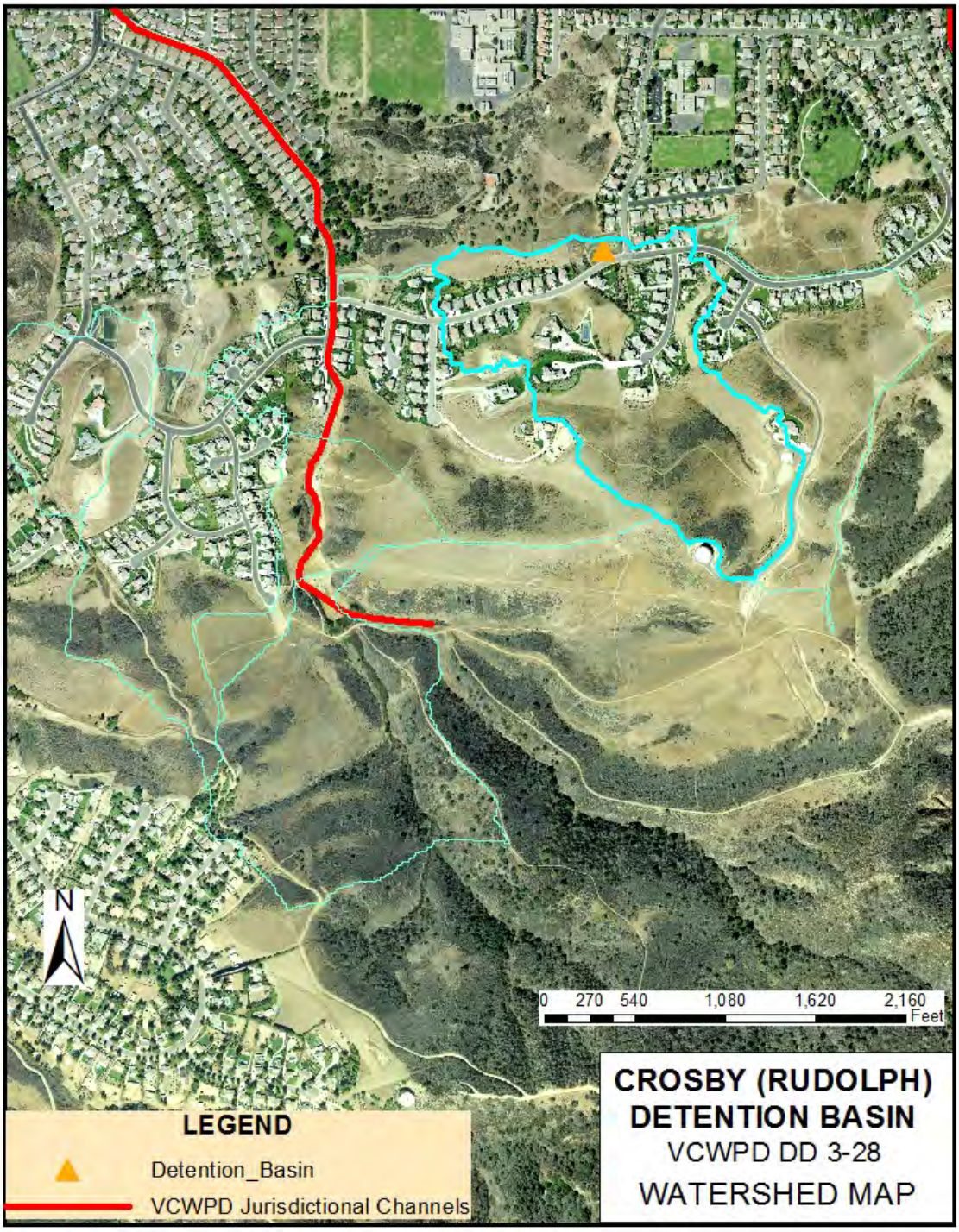
Notes

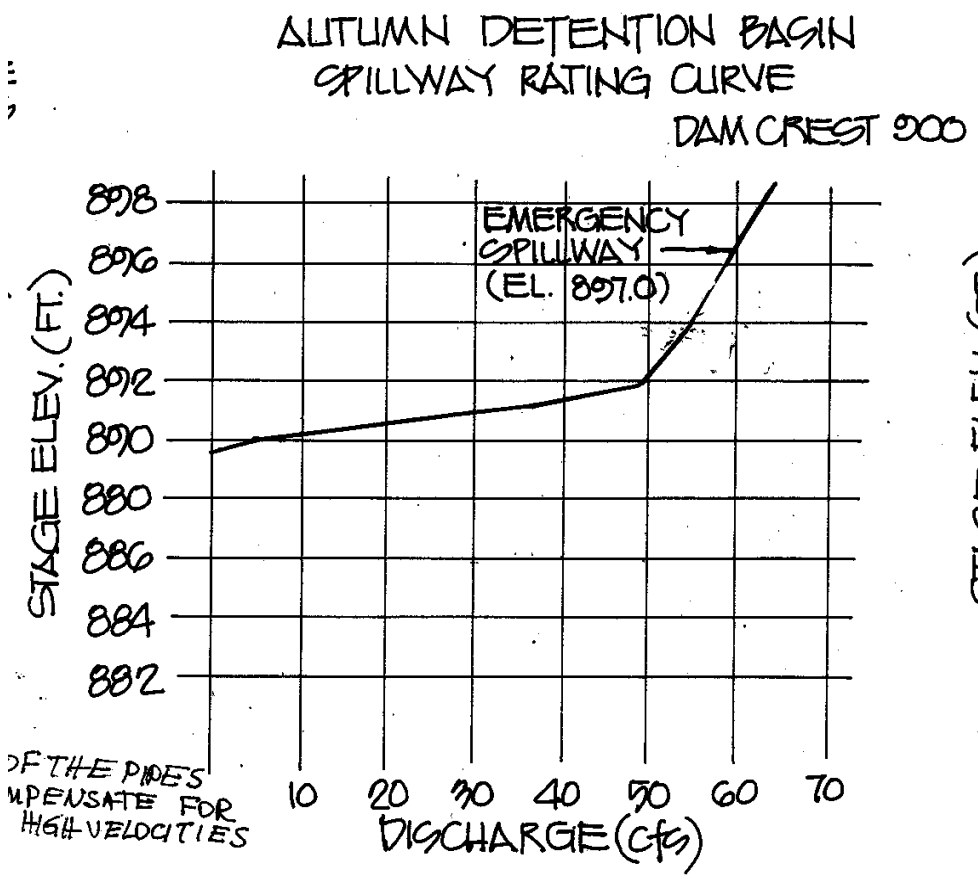
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

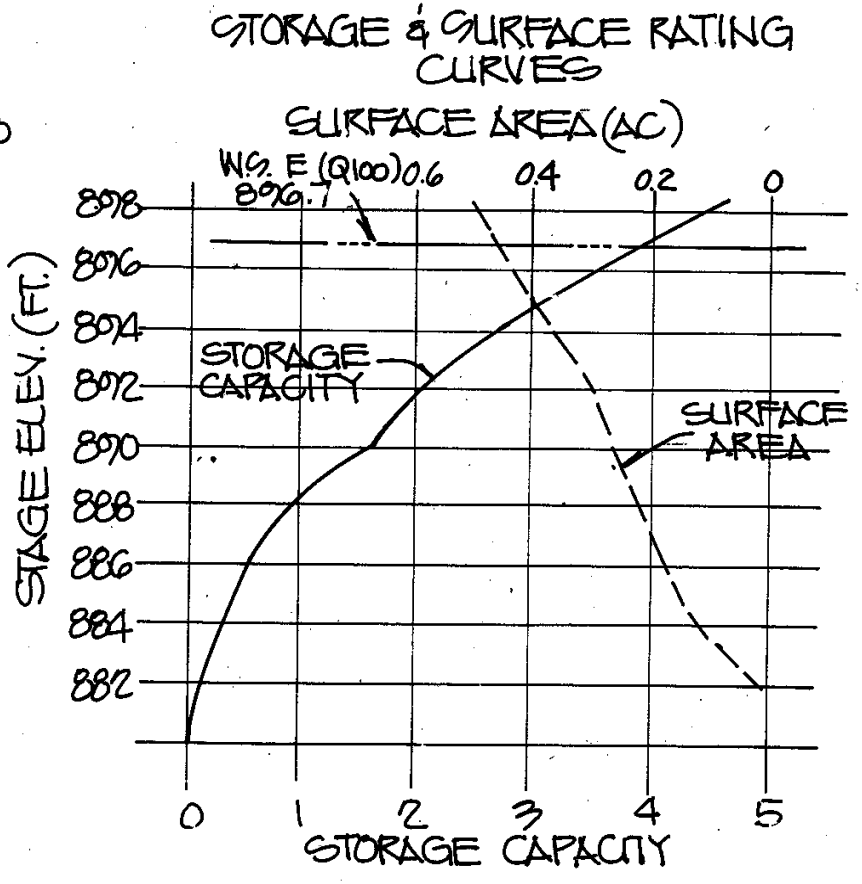
** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

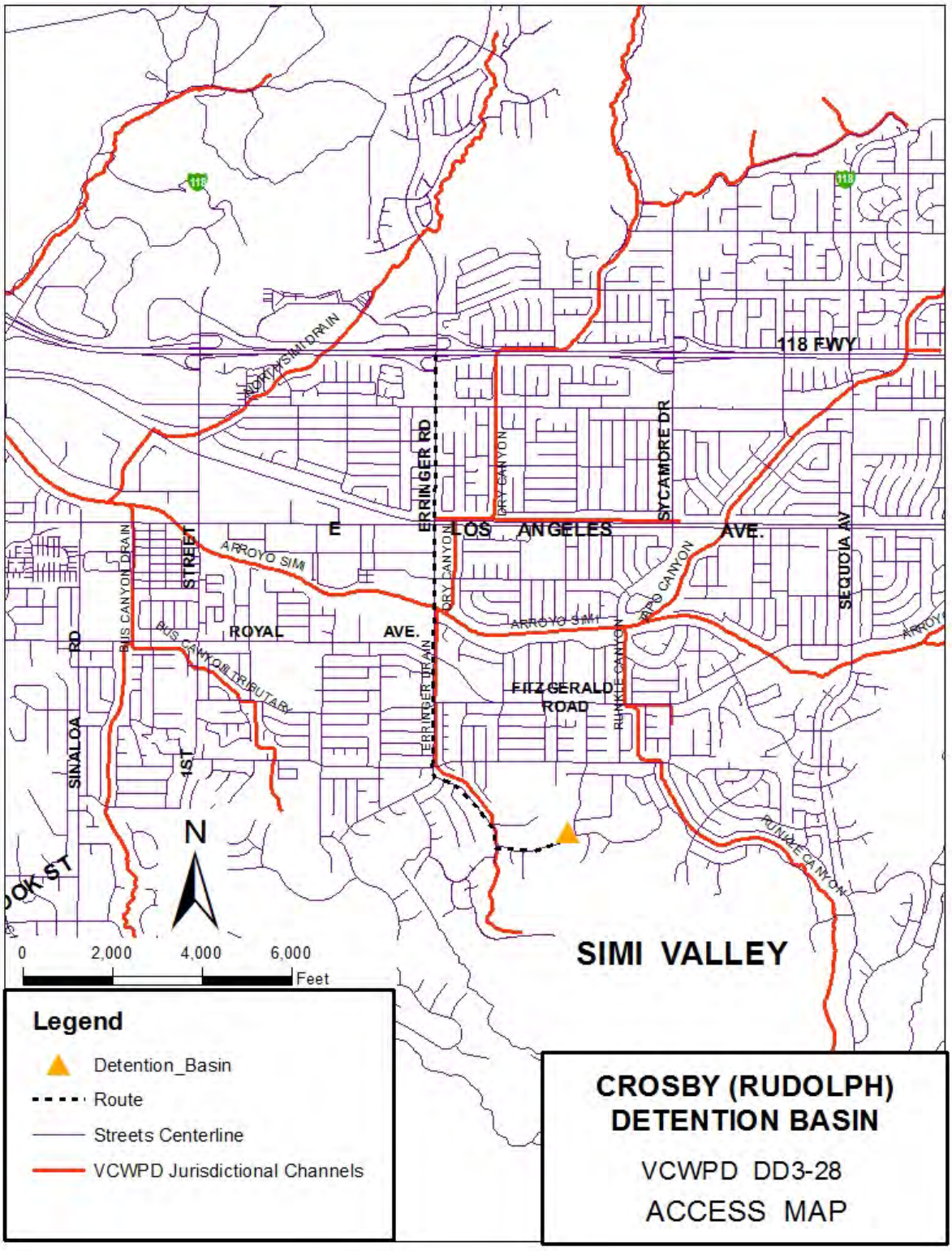
NA= Not Available / Not Applicable


N
0 270 540 1,080 1,620 2,160
Feet
LEGEND
Detention_Basin
VCWPD Jurisdictional Channels
CROSBY (RUDOLPH)
DETENTION BASIN
VCWPD DD 3-28
WATERSHED MAP





Crosby Detention Basin


118 FWY
ERRINGER RD
DRY CANYON
SYCAMORE DR
LOS ANGELES AVE.
E
STREET
ARROYO SIMI
BUS CANYON DRAIN
ROYAL AVE.
BUS CANYON TRIBUTARY
ARROYO SIMI
RIPS CANYON
SEQUOIA AV
FITZGERALD ROAD
RUNKLE CANYON
SINALOA RD
1ST
N
0 2,000 4,000 6,000
Feet
SIMI VALLEY
Legend
Detention_Basin
Route
Streets Centerline
VCWPD Jurisdictional Channels
CROSBY (RUDOLPH)
DETENTION BASIN
VCWPD DD3-28
ACCESS MAP

EDGEMORE DEBRIS BASIN DB3-11

LOCATION: Camarillo, 1/2 mile east from the intersection of Crestview Road and 1/2 mile north of Las Posas Road. N 270,000, E 1,678,600 (Lambert Zone 5 Coordinates); Camarillo 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	Soil Conservation Service
Level Capacity	2,950 cy (11-8-87 DTM)
Maximum Debris Capacity	4,000 cy (11-8-87 DTM)
Inflow and Outflow Rates	Q100in=300 cfs; Q100out=NA
Debris Cleanout Elevation	264 ft NGVD29 (1,760 cy) [level cap.-100yr debris yield]
EMERGENCY SPILLWAY	
Type	14 ft x 6 ft Drop Box Inlet
Weir Elevation	264.93 ft fm as-builts
Spillway Length	NA
Capacity with Freeboard	300 cfs
PRINCIPAL SPILLWAY	
Type	None
Invert Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	12 in Perforated CSP 22 ft High
Top Elevation	270.23 ft NGVD29
Outlet Conduit	10 in Steel Pipe
DAM	
Dam Type	Earthfill
Dam Crest Elevation	271 ft NGVD29
Length	80 ft
Width at Crest	NA
Surface Area of Full Basin	0.3 ac
Watershed Area	105 ac from Quad
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service
Completion Date	1955; Drop Box Spillway Reconstructed 1991
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1093 thru 1098; Y-3-3072 through -3075
Topographic Drwgs(pre-const)	T-63-18 (10-29-71), T-254(10-22-30), 12-13-85, 11-8-87 DTM, 10-5-89 DTM, 10-5-90 DTM
Right-of-Way Drawings	72MR67, 91MR15

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	1,188	1,723
50-YEAR	905	1,313
25-YEAR	511	741

BASIN HISTORY: EDGEMORE DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
10-71	Aerial Survey	2,900		
05-72	Aerial Survey	Not Digitized		
05-73	Aerial Survey	Not Digitized		
06-75	Aerial Survey	1,494		
09-75	Cleanout		950	
10-75	Aerial Survey	3,508		
03-78	Disaster Declaration			
06-78	Aerial Survey	906		
10-78	Cleanout		2,500	
02-80	Disaster Declaration			
06-80	Aerial Survey	1,016		
10-80	Cleanout		2,350	538**
10-80	Aerial Survey	3,341		
11-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	2,910		
03-83	Disaster Declaration			
04-83	Aerial Survey	1,660		
12-83	Cleanout		1,575	430**
01-84	Aerial Survey	3,235		
01-84	Cleanout		105	
02-84	Aerial Survey	3,340		
06-85	Cleanout		519	
12-85	Aerial Survey	3,859		
07-86	Aerial Survey	3,684		
08-86	Cleanout		350	
10-86	Aerial Survey	4,034		
11-87	Aerial Survey	4,007		
11-88	Aerial Survey	Not Digitized		
10-89	Aerial Survey	3,541		120
09-90	Aerial Survey	3,122		

BASIN HISTORY: EDGEMORE DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
05-91	Aerial Survey	3,169		
07-91	Cleanout		620	
11-91	Aerial Survey	3,789		
02-92	Disaster Declaration			276**
05-92	Aerial Survey	1,505		
05-92	Cleanout		2,495	
12-92	Aerial Survey	4,000		
07-93	Cleanout		160	
01-95	Disaster Declaration			256
07-95	Cleanout		1,326	
07-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey	3,898		
02-98	Disaster Declaration			158
07-98	Aerial Survey	1,870		
06-99	Cleanout		1,880	
06-99	Aerial Survey	3,750		
01-99	Aerial Survey	Not Digitized		
12-99	Aerial Survey	Not Digitized		
07-01	Aerial Survey	3,510		
05-02	Aerial Survey	3,200		
11-03	Aerial Survey	Not Digitized		
12-04	Cleanout		736	
01-05	Disaster Declaration			139
08-05	Cleanout- Survey analysis by O&M		1,334- Survey	
08-05	TIN analysis by WR&T	1,423 to elev 265		
10-05	TIN analysis by WR&T		1,387 fill vol 52 cut vol	
06-06	TIN analysis by WR&T	284 to elev 265		
06-06	TIN analyses by WR&T 06-06 Vs 10-05 TINs		1,300 fill vol 86 cut vol	
07-06	CAD analysis by O&M		1519	
10-06	TIN analysis by WR&T	1,591 to elev 265		
10-06	TIN analyses by WR&T 10-06 Vs 06-06 TINs		1,485 fill vol 37 cut vol	
07-08	Cleanout by O&M	Truck count	864	
09-08	TIN analysis by WR&T	1,738 to elev 265		
09-08	TIN analyses by WR&T 09-08 Vs 10-06 TINs		249 fill vol 39 cut vol	

BASIN HISTORY: EDGEMORE DEBRIS BASIN

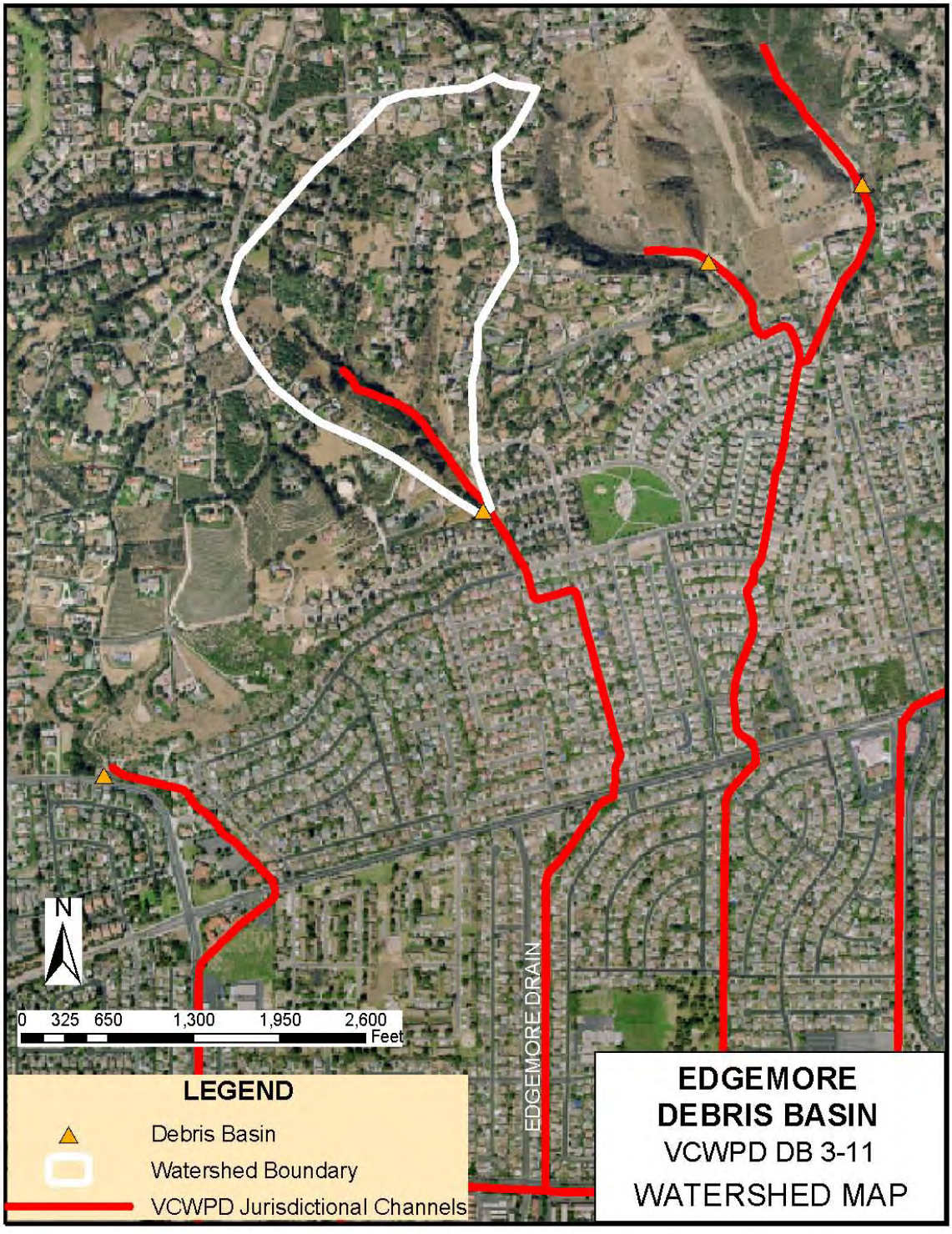
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
07-09	Cleanout by O&M	Truck count	600	
05-10	TIN analysis by WR&T	1,178 to elev 265		
07-10	Cleanout by O&M	Truck count	517	
05-11	TIN analysis by WR&T	333 to elev 265		
07-11	Cleanout by O&M	Truck count	1,582	
06-12	TIN analysis by WR&T	1,535 to elev 265		
08-12	Cleanout by O&M	Truck count	514	
10-12	TIN analysis by WR&T	1,742 to elev 265		
10-14	TIN file corrupted			
07-15	Cleanout by O&M	Truck count	524	

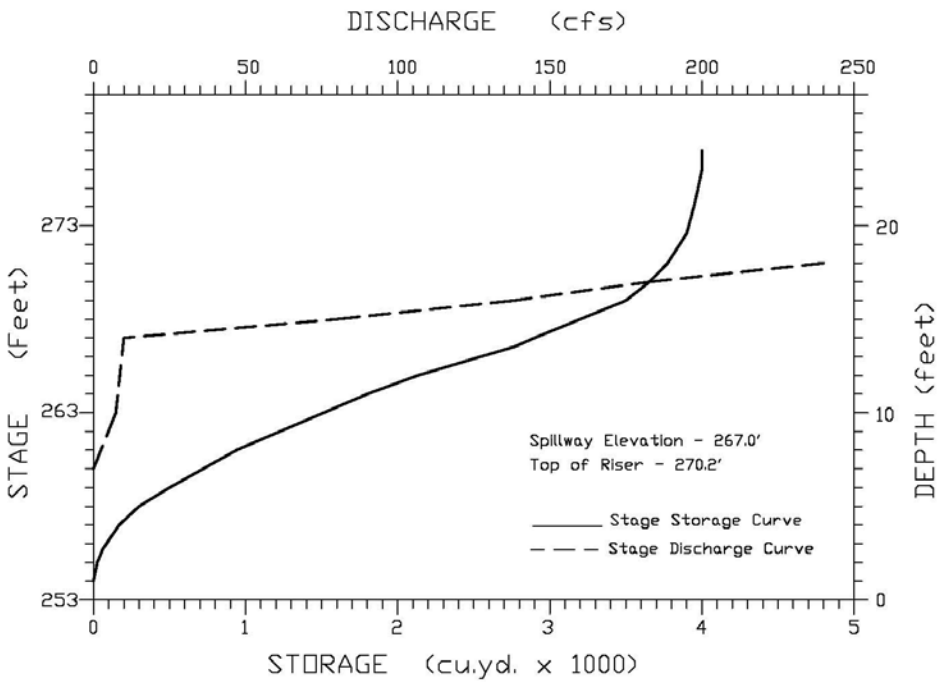
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

NA= Not Available / Not Applicable

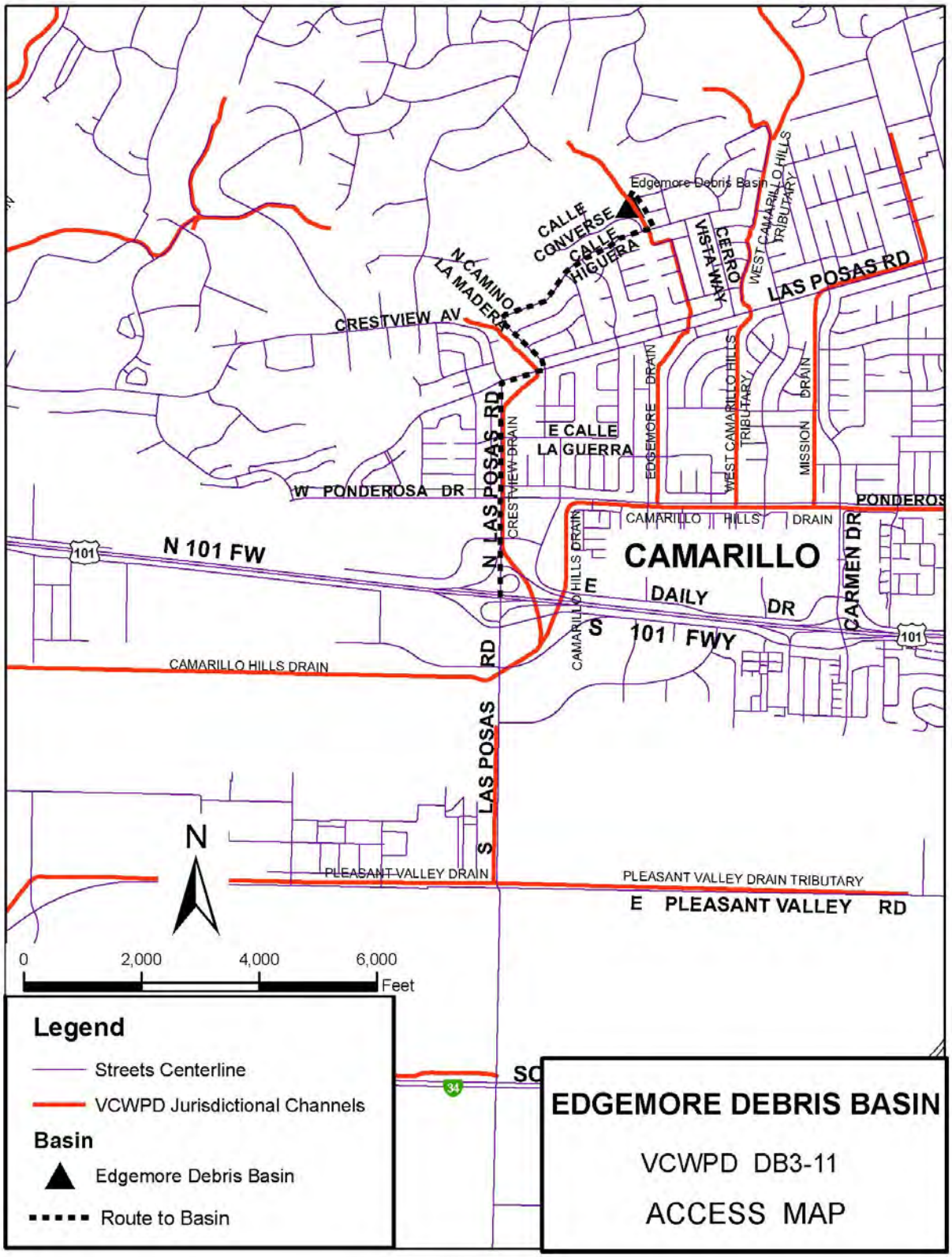

N
0 325 650 1,300 1,950 2,600
Feet
EDGEMORE DRAIN
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
EDGEMORE
DEBRIS BASIN
VCWPD DB 3-11
WATERSHED MAP



Superseded Stage Storage Discharge Data

Stage Storage Discharge Data, Revised Spillway

Elevation	Riser Disch.	Spill Disch.	10-12 Vol.
Ft. NGVD29	cfs	cfs	Cu. Yds
253			0
254			18
255			77
256			154
257			248
258			358
259			487
260			633
261			800
262			990
263	0.00		1,210
264	9.80		1,463
265	10.00		1,753
266	10.20	-	NA
267	10.40	101	NA
268	10.60	305	NA
269	10.80	569	NA
270	11.00	881	NA


Edgemore Debris Basin
CALLE CONVERSE
CALLE HIGUERA
N CAMINO LA MADERA
CRESTVIEW AV
LAS POSAS RD
CERRO VISTA WAY
WEST CAMARILLO HILLS TRIBUTARY
EDGEMORE DRAIN
MISSION DRAIN
E CALLE LA GUERRA
W PONDEROSA DR
PONDEROS
CRESTVIEW DRAIN
CAMARILLO HILLS DRAIN
CAMARILLO
N 101 FW
S 101 FWY
E DAILY DR
CARMEN DR
101
CAMARILLO HILLS DRAIN
N LAS POSAS RD
S LAS POSAS RD
PLEASANT VALLEY DRAIN
PLEASANT VALLEY DRAIN TRIBUTARY
E PLEASANT VALLEY RD
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Edgemore Debris Basin
Route to Basin
EDGEMORE DEBRIS BASIN
VCWPD DB3-11
ACCESS MAP

ERRINGER ROAD DEBRIS BASIN DB3-12 (Not maintained by WPD)

LOCATION: Simi Valley, 3500 ft S of Fitzgerald Ave and 1000 ft E of Erringer Rd.;
N 273,000,E 1,771,500 (Lambert Zone 5 Coordinates);
Thousand Oaks 7 1/2' Quad.
Upstream of HOA-Maintained Erringer and Covington Detention Basins

DESIGN DATA

Design Agency	Soil Conservation Service, CMB for Tract 3045
Level Capacity	33,250 cy (10-29-71, T-63-19)
Maximum Debris Capacity	39,400 cy (10-29-71, T-63-19)
Design Debris Level @ 948.7 ft	14,540 cy (125% of 100yr design debris vol.)
100-Yr Inflow Rate	700 cfs
Outflow Rate	No attenuation of design peak from Debris Basin but 100-yr outflow 654 cfs if attenuation is modeled
EMERGENCY SPILLWAY	
Type	24 ft wide x 5 ft high Grouted Rip-Rap Trap. Channel
Invert Elevation	955 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	800 cfs at top of dam elev. 960 ft
PRINCIPAL SPILLWAY	
Type	4 ft Wx 6 ftD Concrete Riser Tower with 4 ft X5 ft Inlets on 3 Faces
Inlet Weir Elevations	948.7 ft NGVD29
Outlet Conduit	18 in RCP
DEBRIS BLEEDER/RISER	
Type	18-in Perforated CSP
Top Elevation	952 ft NGVD29
Outlet Conduit	Connects to Principal Spillway 18-in RCP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	960 ft NGVD29
Length	220 ft
Surface Area of Full Basin	0.3 ac
Watershed Area	315 ac from Quad Map
Width at Crest	15 ft
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service; VCWPD
Completion Date	1957; Outlet Works Modified 1997
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1145-48; Y-3-3726-3745
Right-of-Way Drawings	NA
Topographic Drawings	T-63-19 (10-29-71)

Historic WPD Basin but modified by TR3045 project and not accepted back as of 2018

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	11,633	16,874
50-YEAR	8,972	13,014
25-YEAR	6,506	9,437

BASIN HISTORY: ERRINGER ROAD DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			900***
10-71	Aerial Survey	39,400		
03-78	Disaster Declaration			900***
02-80	Disaster Declaration			900***
10-81	Aerial Survey	Not Digitized		
03-83	Disaster Declaration			900***
10-90	Aerial Survey	Not Digitized		
06-91	Aerial Survey	Not Digitized		
02-92	Disaster Declaration			900***
05-92	Aerial Survey	Not Digitized		
01-95	Disaster Declaration			900***
02-98	Disaster Declaration			900***
01-05	Disaster Declaration			
	No cleanouts reported by O&M			

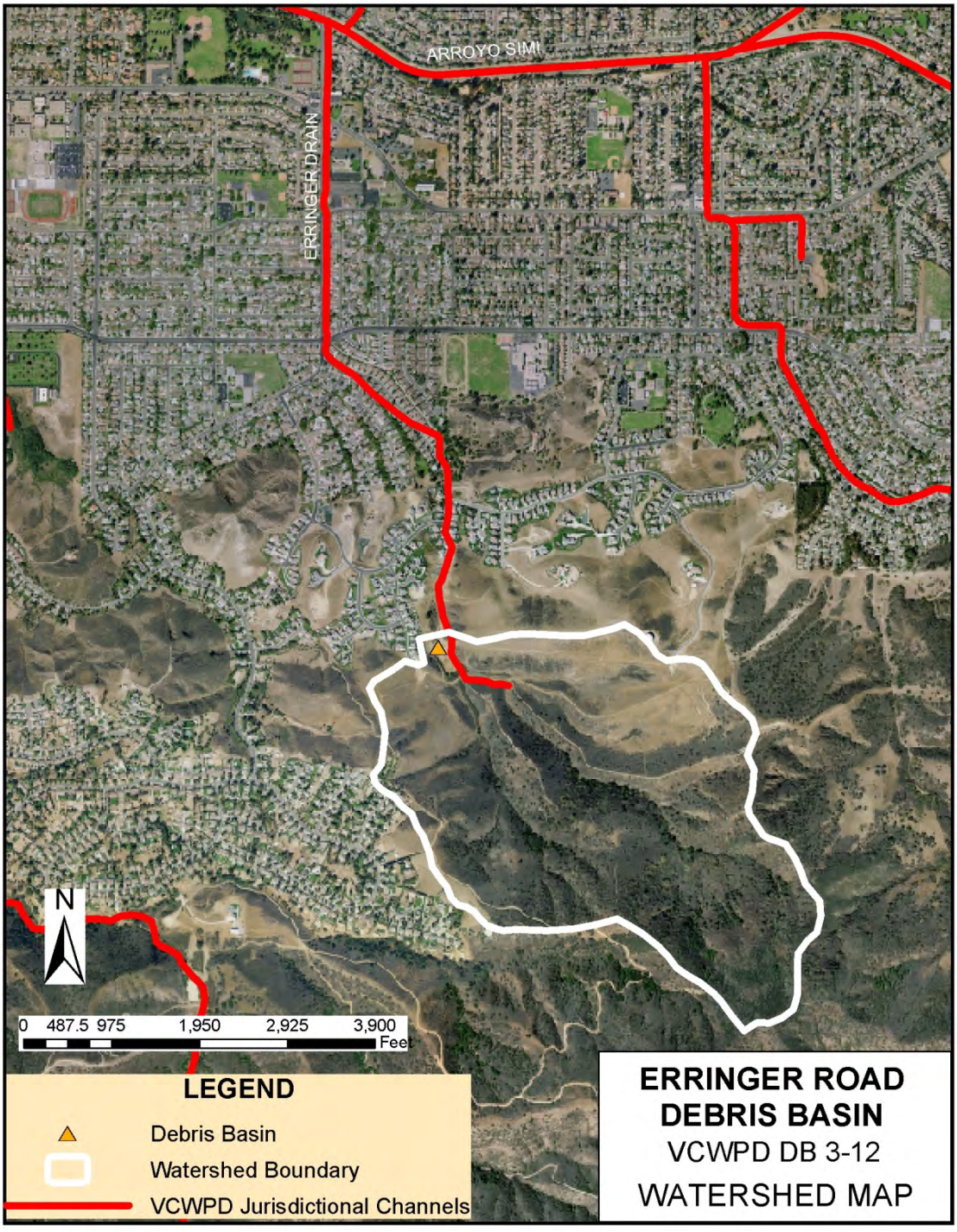
Notes

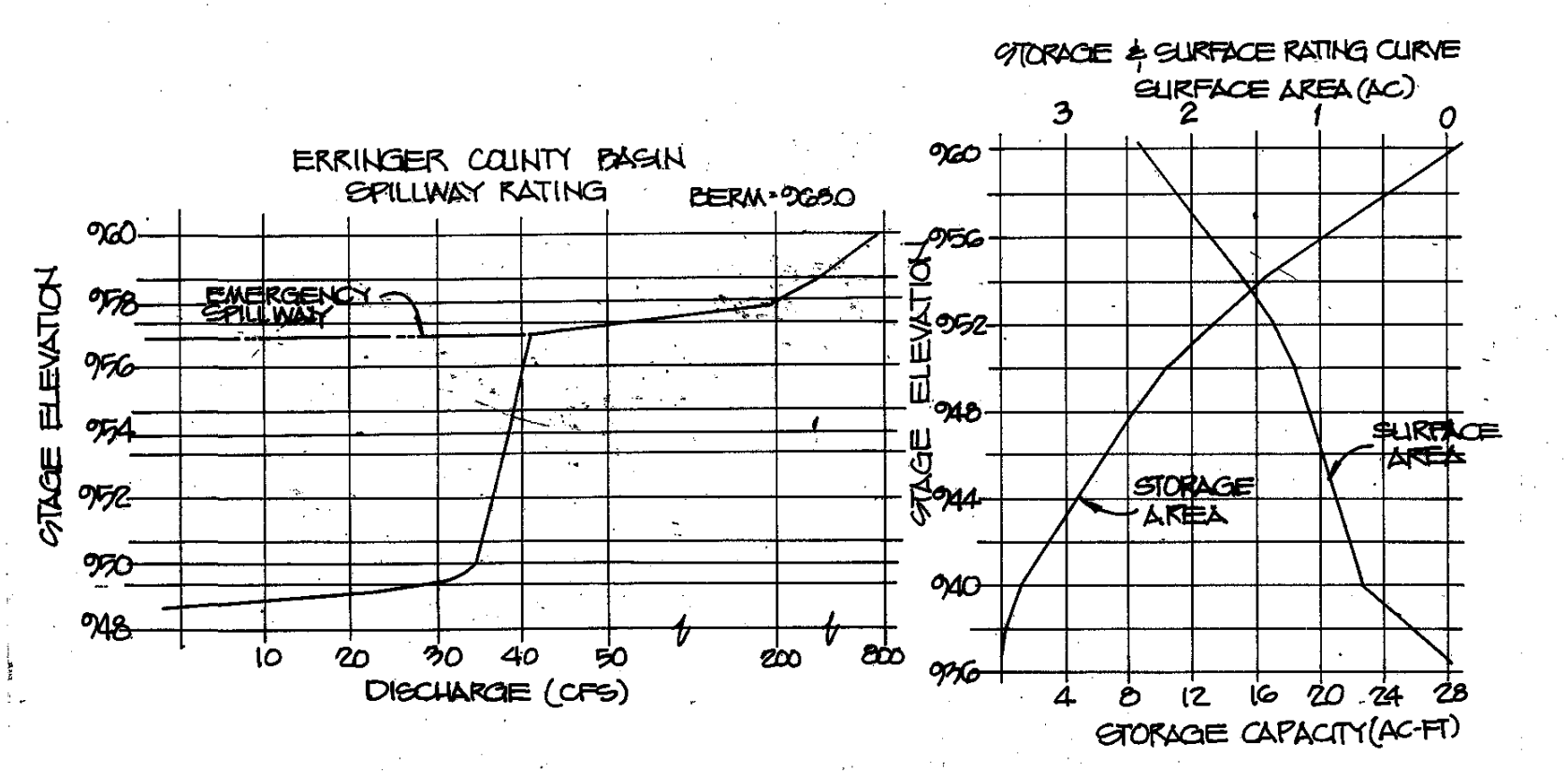
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

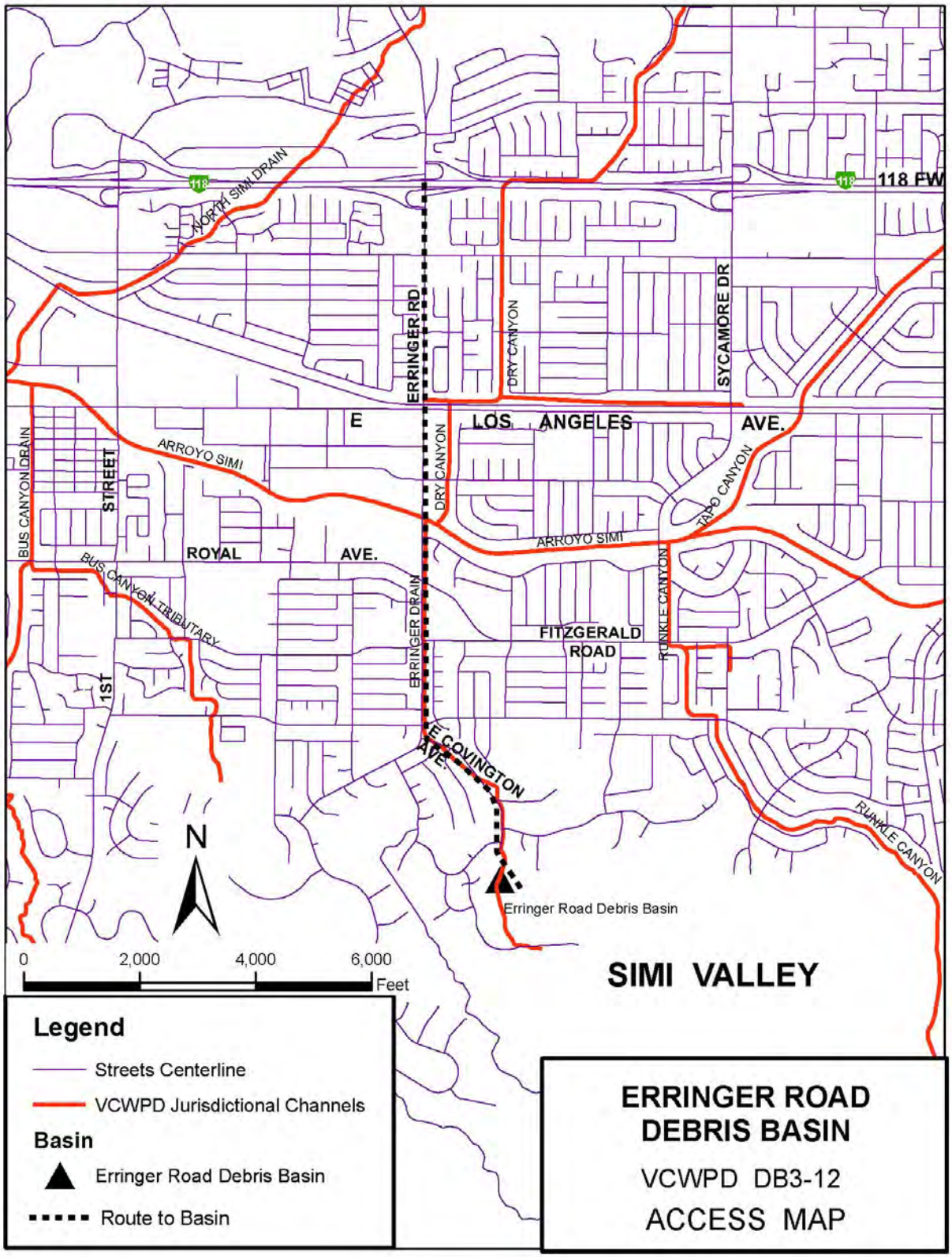
*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable


ARROYO SIMI
ERRINGER DRAIN
N
0 487.5 975 1,950 2,925 3,900
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
ERRINGER ROAD
DEBRIS BASIN
VCWPD DB 3-12
WATERSHED MAP



Erringer Road Debris Basin


NORTH SIMI DRAIN
118
118 FW
ERRINGER RD
DRY CANYON
SYCAMORE DR
E
LOS ANGELES
AVE.
ARROYO SIMI
BUS CANYON DRAIN
1ST STREET
ROYAL
AVE.
BUS CANYON TRIBUTARY
ERRINGER DRAIN
TAPO CANYON
RUNKLE CANYON
FITZGERALD ROAD
E. COVINGTON AVE.
N
Erringer Road Debris Basin
0
2,000
4,000
6,000
Feet
SIMI VALLEY
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Erringer Road Debris Basin
Route to Basin
ERRINGER ROAD
DEBRIS BASIN
VCWPD DB3-12
ACCESS MAP

ERRINGER ROAD DETENTION BASIN DD3-XX (Not Accepted by WPD)

LOCATION: Simi Valley, 3000 ft S of Fitzgerald Ave and 1000 ft E of Erringer Rd.;
N 273,650,E 1,771,570 (Lambert Zone 5 Coordinates);
Simi 7 1/2' Quad.
Upstream of Covington Detention Basin

DESIGN DATA

Design Agency	Crosby-Mead-Benton
Level Capacity	50,500 cy at spillway invert (Y-3-3728)
Maximum Debris Capacity	0 cy (upstream debris basin removes sediment)
100-Yr Inflow Rate	700 cfs if debris basin does not attenuate peak
Outflow Rate	89 cfs at 935.8 ft NGVD29
EMERGENCY SPILLWAY	
Type	10 ft wide x 6 ft drop box inlet to 72-in RCP
Crest Elevation	936 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	Q100=654 cfs if Princ. Spillway blocked; assumed attenuated flow from debris basin as inflow
PRINCIPAL SPILLWAY	
Type	6 ft x 6 ft Concrete Riser Tower, Top Elev 920.0 ft
Inlet Weir Elevations	911 ft NGVD29
Outlet Conduit	36 in RCP
DEBRIS BLEEDER/RISER	
Type	24-in Vertical Perforated CSP
Top Elevation	911 ft NGVD29
Outlet Conduit	Connects to Principal Spillway
DAM	
Dam Type	Earthfill
Dam Crest Elevation	944 ft NGVD29
Length	220 ft
Surface Area of Full Basin	0.3 ac
Watershed Area	315 ac from Quad Map
Width at Crest	15 ft
CONSTRUCTION DATA	
Construction Agency	Centex
Completion Date	1997
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3726-3745
Right-of-Way Drawings	NA
Topographic Drawings	NA

Part of TR3045 project but not accepted by WPD as of 2018

EXPECTED DEBRIS PRODUCTION (cy): Debris Basin intercepts sediment		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	0	0
50-YEAR	0	0
25-YEAR	0	0

BASIN HISTORY: **ERRINGER ROAD DETENTION BASIN**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No cleanout data available			

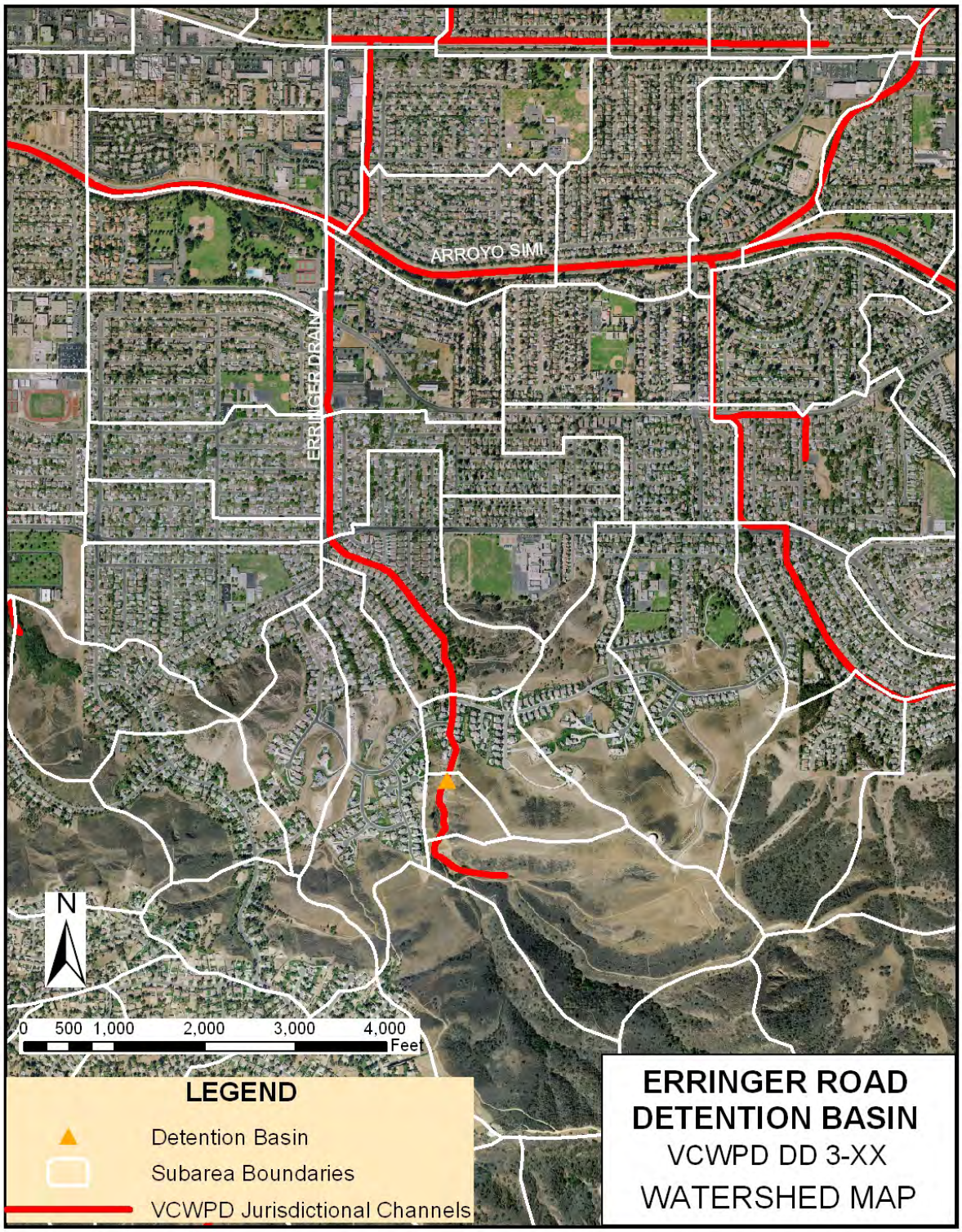
Notes

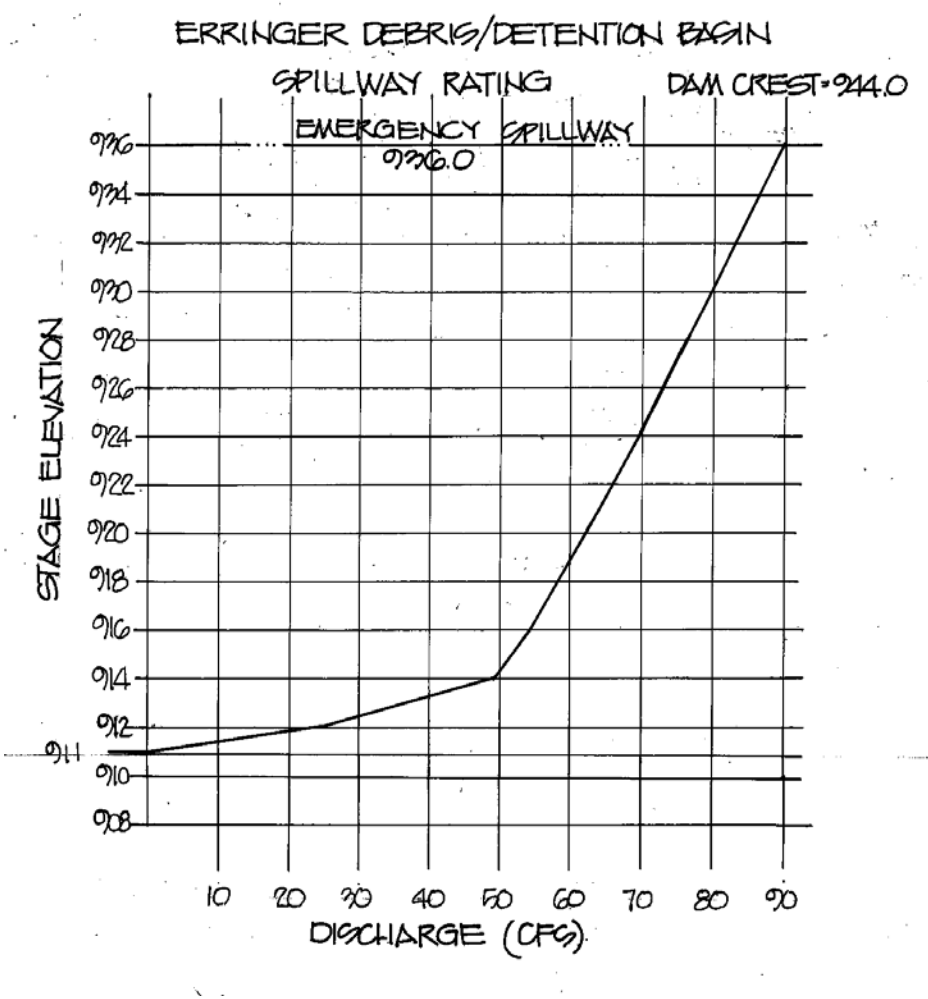
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

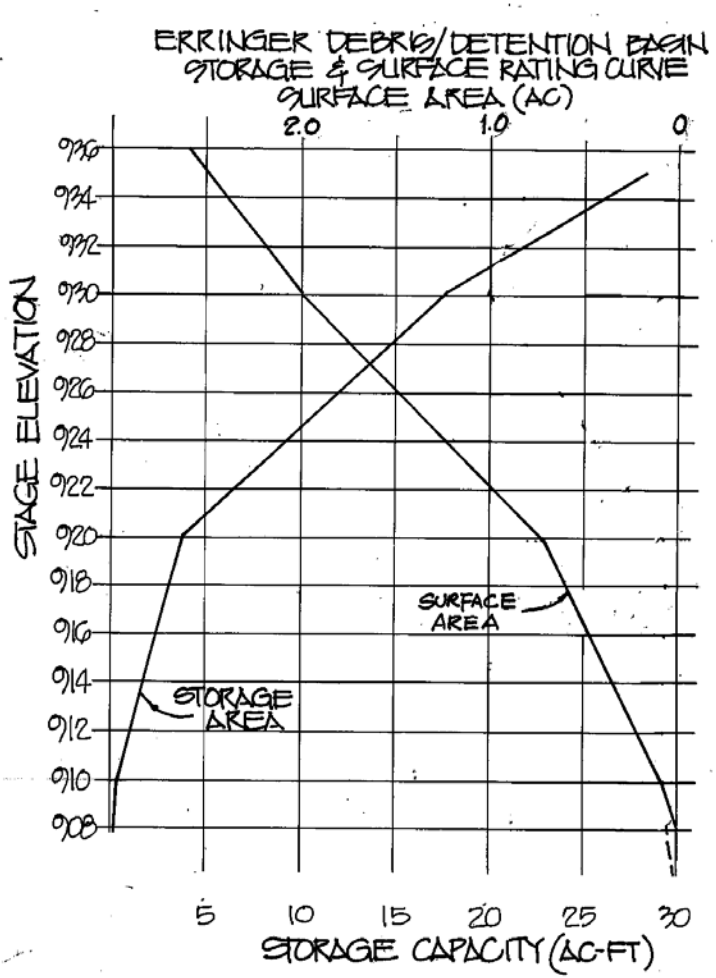
** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

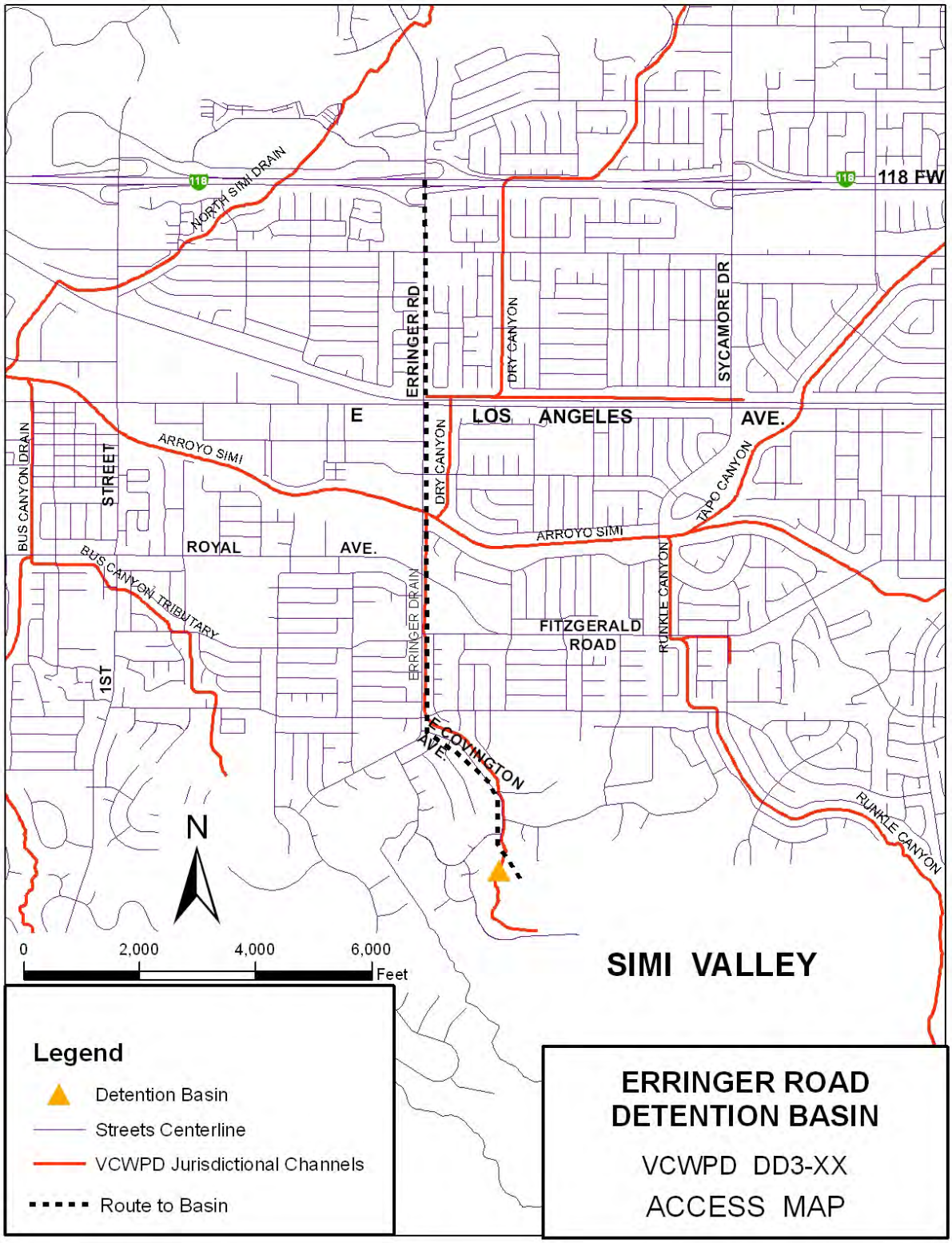
NA= Not Available / Not Applicable


ARROYO SIMI.
ERRINGER DRAIN
N
0 500 1,000 2,000 3,000 4,000
Feet
LEGEND
Detention Basin
Subarea Boundaries
VCWPD Jurisdictional Channels
ERRINGER ROAD
DETENTION BASIN
VCWPD DD 3-XX
WATERSHED MAP





Erringer Road Detention Basin


NORTH SIMI DRAIN
118
118 FW
ERRINGER RD
DRY CANYON
SYCAMORE DR
E
LOS ANGELES
AVE.
ARROYO SIMI
BUS CANYON DRAIN
STREET
DRY CANYON
TAPO CANYON
ROYAL
AVE.
ARROYO SIMI
BUS CANYON TRIBUTARY
ERRINGER DRAIN
RUNKLE CANYON
FITZGERALD
ROAD
1ST
E COVINGTON
AVE.
RUNKLE CANYON
N
0
2,000
4,000
6,000
Feet
SIMI VALLEY
Legend
Detention Basin
Streets Centerline
VCWPD Jurisdictional Channels
Route to Basin
ERRINGER ROAD
DETENTION BASIN
VCWPD DD3-XX
ACCESS MAP

FERRO DEBRIS BASIN State Dam No: 86-008 DB3-13

LOCATION: Saticoy, 2100 ft u/s from Los Angeles Ave. near
Santa Clara Ave and Saticoy Country Club;
N 279,500, E 1,665,800 (Lambert Zone5 Coordinates);
Santa Paula 7 1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	34,500 cy (10-16-89 DTM)
Maximum Debris Capacity	37,700 cy (10-16-89 DTM)
Inflow and Outflow Rates	Q100in=426 cfs; Q100out=NA
Debris Cleanout Elevation	168 ft (26,750 cy) [provides cap for 100-yr debris yield below emergency spillway]
EMERGENCY SPILLWAY	
Type	40 ft Weir to Side Channel Spillway, 8 ft High
Side Weir Elevation	172 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	2,600 cfs
PRINCIPAL SPILLWAY	
Type	Top of RC Riser Tower, 7.5 ft x 4.5 ft Weir Inlet
Weir Elevation	170.33 ft NGVD
Outlet Conduit	30-in RCP
DEBRIS BLEEDER/RISER	
Type	Orifice Holes in Principal Spillway Riser Tower
Top Elevation	170.33 ft NGVD
Outlet Conduit	Principal Spillway Outlet
DAM	
Dam Type	Earthfill
Dam Crest Elevation	180 ft NGVD29
Length	325 ft
Surface Area of Full Basin	1.63 ac
Watershed Area	395 ac from Quad Map
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD, Rebuilt in 1985 by Soil Conservation Service
Completion Date	1933, Rebuilt 1985
REFERENCE DRAWINGS	
Construction Drawings	SCS CA-E-23894, Sheets 1-98
Right-of-Way Drawings	17020
Topographic Drawings	T-337(06-23-78),Superceded by T-342 (12-18-85),11-08-87DTM,10-16-89DTM,

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	7,758	11,253
50-YEAR	5,919	8,585
25-YEAR	4,246	6,158

BASIN HISTORY: **FERRO DEBRIS BASIN**

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
08-75	Aerial Survey	3,087		
NA	Cleanout		4,813	
03-78	Disaster Declaration			
06-78	Aerial Survey	7,900		
04-79	Cleanout		2,800	
04-79	Aerial Survey	9,499		
02-8	Disaster Declaration			
06-80	Aerial Survey	25		
11-80	Cleanout		5,646	592**
11-80	Aerial Survey	3,985		
11-82	Aerial Survey	3,452		
03-83	Disaster Declaration			
04-83	Aerial Survey	175		
12-85+	Aerial Survey	38,642		
07-86	Aerial Survey	Not Digitized		
11-87	Aerial Survey	37,412		
11-88	Aerial Survey	Not Digitized		
10-89	Aerial Survey	37,676		
09-90	Aerial Survey	Not Digitized		
06-91	Aerial Survey	36,822		
02-92	Disaster Declaration			451**
05-92	Aerial Survey	32,750		
12-92	Cleanout		5,400	
12-92	Aerial Survey	37,700		
01-95	Disaster Declaration			581
06-95	Aerial Survey	33,340		
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	32,910		
02-98	Disaster Declaration			530
07-98	Aerial Survey	26,870		

BASIN HISTORY: FERRO DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
12-99	Aerial Survey	Not Digitized		
07-01	Aerial Survey	25,580		
12-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			1,112
06-06	TIN analysis by WR&T	22,370 at elev 172		
06-07	TIN analysis by WR&T	31,436 at elev 172		
06-07	O&M Survey Data Analysis After cleanout		13,016	
06-07	TIN analysis by WR&T 06 vs 07 TIN	07 TIN after cleanout	10,627 fill vol 48 cut vol	

Notes

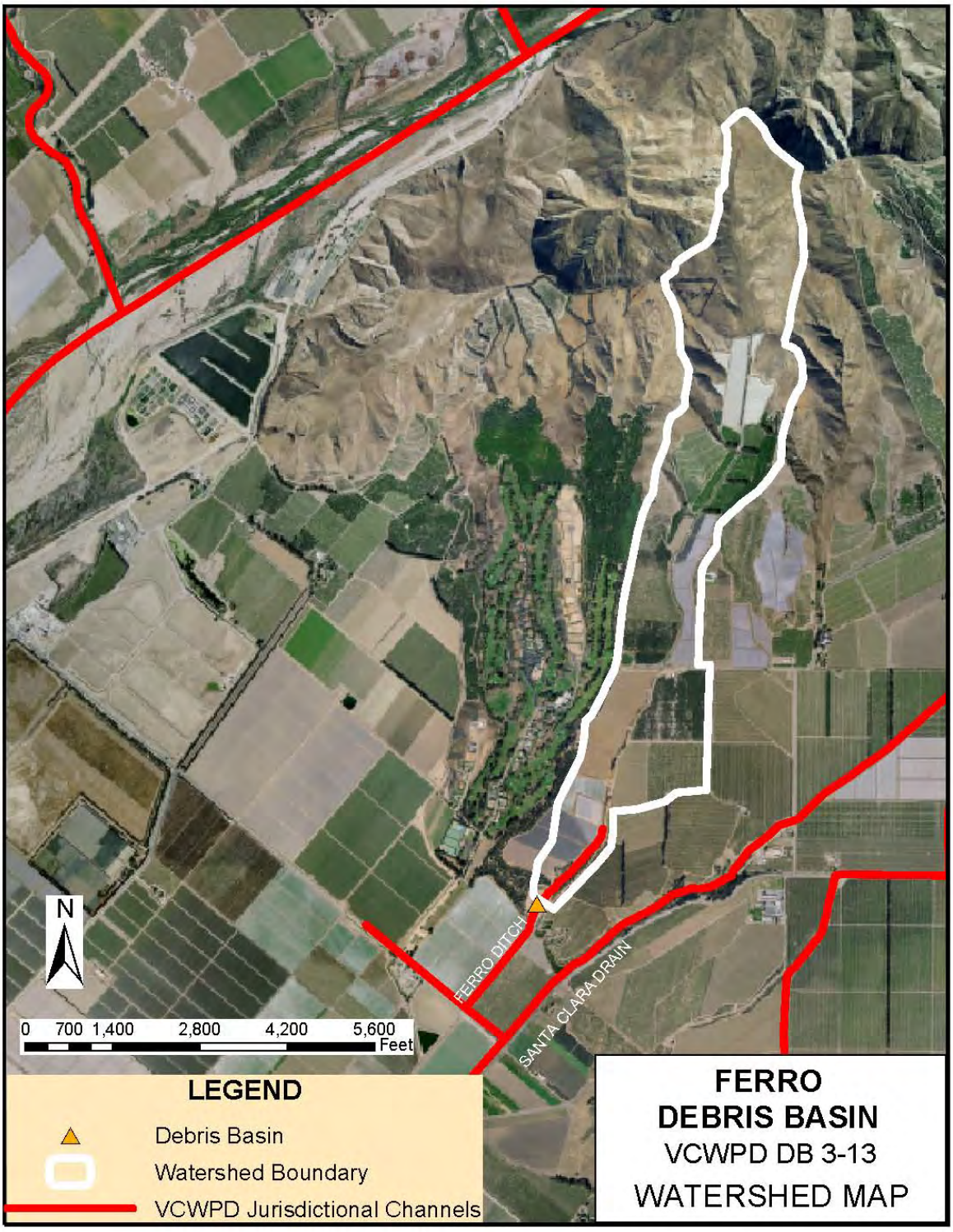
+New Dam Constructed

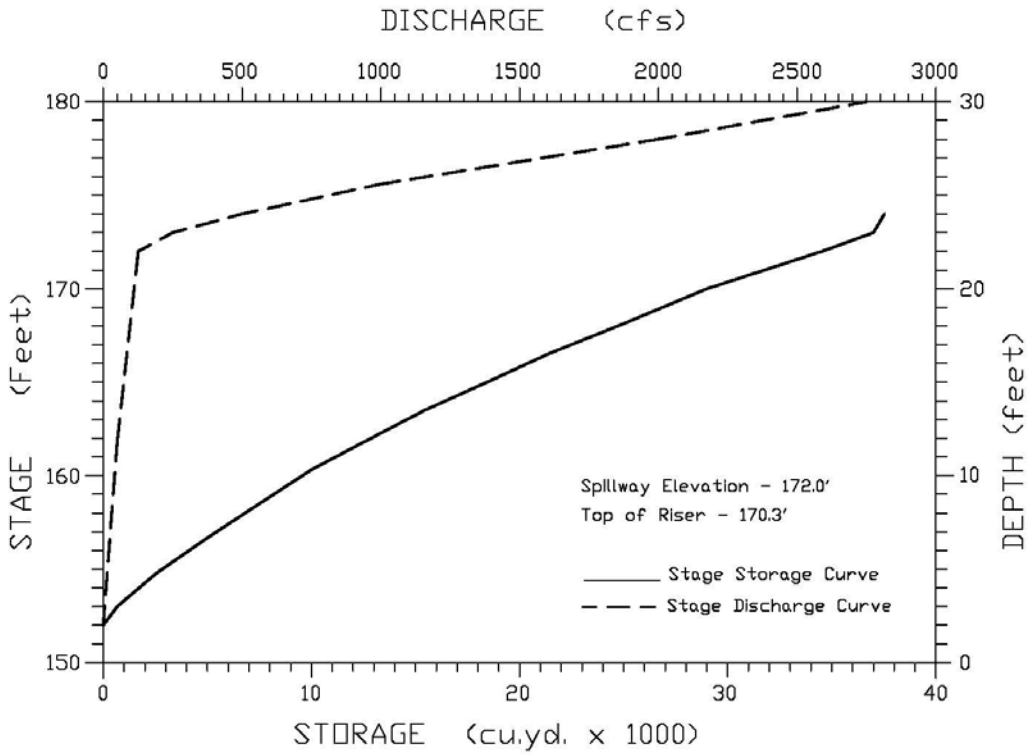
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable


N
0 700 1,400 2,800 4,200 5,600
Feet
FERRO DITCH
SANTA CLARA DRAIN
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
FERRO
DEBRIS BASIN
VCWPD DB 3-13
WATERSHED MAP

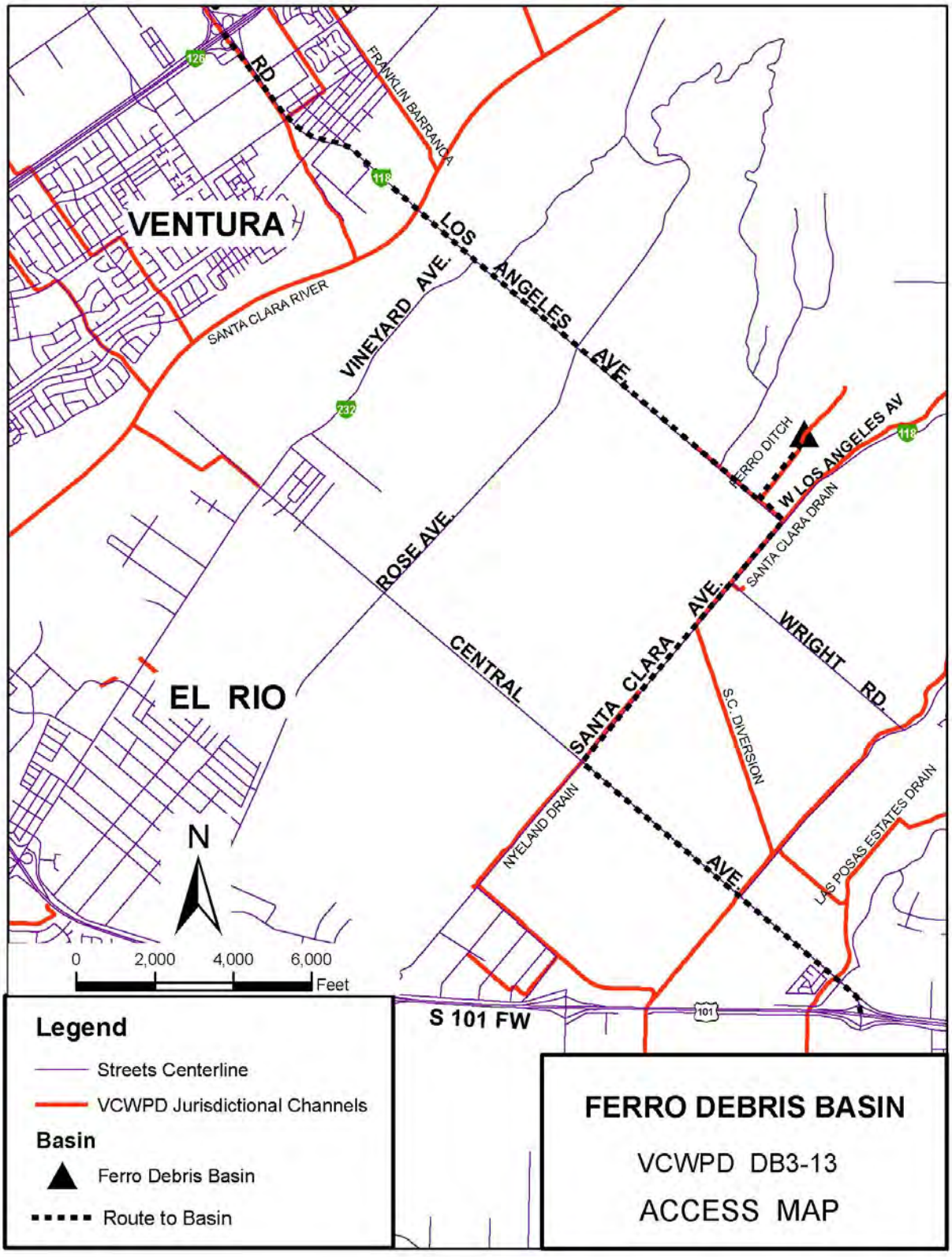


Stage Storage Discharge Curves

Stage Storage Discharge Table

Elevation	Riser Disch.	Spill Disch.	06-07 Vol.
Ft. NGVD29	cfs	cfs	Cu. Yds
150	0		0
151	1		15
152	2		74
153			381
154	8		1,187
155			2,303
156	16		3,490
157			4,746
158	25		6,072
159			7,468
160	36		8,936
161			10,479
162	47		NA
163			NA
164	62		NA
165			NA
166	76		NA
167			NA
168	92		NA
170	110		NA
172	121	-	NA
174	124	400	NA
176	127	1,000	NA
178	129	1,850	NA
180	132	2,732	NA

NA= Not Analyzed


VENTURA
EL RIO
SANTA CLARA RIVER
FRANKLIN BARRANCA
VINEYARD AVE.
LOS ANGELES AVE.
W LOS ANGELES AV
FERRO DITCH
ROSE AVE.
CENTRAL
SANTA CLARA AVE.
SANTA CLARA DRAIN
WRIGHT RD.
S.C. DIVERSION
NYELAND DRAIN
LAS POSAS ESTATES DRAIN
S 101 FW
N
0 2,000 4,000 6,000 Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Ferro Debris Basin
Route to Basin
FERRO DEBRIS BASIN
VCWPD DB3-13
ACCESS MAP

FOX BARRANCA DEBRIS BASIN DB3-14

LOCATION: Somis, 400 ft west of Somis Road; 1500 ft south of Los Angeles Avenue; N 277,900, E 1,699,000 (Lambert Zone 5 Coordinates); Moorpark 7 1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	Soil Conservation Service
Level Capacity	14,700 cy (10-5-90 DTM)
Maximum Debris Capacity	19,300 cy (10-5-90 DTM)
Inflow and Outflow Rates	Q100in=2,600 cfs; Q100out=NA
Debris Cleanout Elevation	304 ft NGVD29 (9,900 cy) [10% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	20 ft Weir to Drop Box Inlet 6 ft Deep
Side Weir Elevation	306 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	1,400 cfs
PRINCIPAL SPILLWAY	
Type	None
Weir Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	12 in Slotted CSP 25 ft High with Catwalk
Top Elevation	305.5 ft NGVD29
Outlet Conduit	10 in Steel Pipe
DAM	
Dam Type	Earthfill
Dam Crest Elevation	312 ft NGVD29
Length	120 ft
Surface Area of Full Basin	1.4 ac
Watershed Area	3,100 ac from Quad
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service; VCWPD
Completion Date	1956; Outlet Works Modified 1991
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1082 to 1085; Y-3-3081-3083
Topographic Drwgs(pre-const)	15812
Right-of-Way Drawings	T-632 (2-6-70), 10-31-88 DTM, 10-5-89 DTM, 10-5-90 DTM

EXPECTED DEBRIS PRODUCTION (cy): Development and channel constraints limit debris conveyed to basin		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	99,181	143,858
50-YEAR	75,782	109,920
25-YEAR	54,329	78,803

BASIN HISTORY: FOX BARRANCA DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
02-70	Aerial Survey	12,923		
05-72	Aerial Survey	8,212		
05-73	Aerial Survey	5,045		
10-73	Cleanout		7,600	
11-73	Aerial Survey	12,923		
10-75	Aerial Survey	8,317		
10-76	Cleanout		16,000	
10-76	Aerial Survey	16,000		
12-77	Aerial Survey	15,962		
01-78	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			
06-78	Aerial Survey	1,607		
12-78	Cleanout		14,000	
12-78	Aerial Survey	12,813		
12-78	Cleanout		1,390	
01-79	Aerial Survey	14,203		
02-80	Disaster Declaration			
06-80	Aerial Survey	830		
12-80	Cleanout		12,026	3,536**
12-80	Aerial Survey	12,079		
10-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	7,882		
03-83	Disaster Declaration			
04-83	Aerial Survey	1,347		
08-84	Aerial Survey	1,163		
10-84	Cleanout		9,871	2,336**
10-84	Aerial Survey	11,034		
11-84	Cleanout		874	
11-84	Aerial Survey	11,908		

BASIN HISTORY: FOX BARRANCA DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
08-85	Cleanout		4,102	
12-85	Aerial Survey	13,721		
07-86	Aerial Survey	11,797		
09-86	Cleanout		10,400	
10-86	Aerial Survey	15,399		
10-87	Cleanout		1,391	
10-87	Aerial Survey	16,790		
08-88	Cleanout		6,580	
10-88	Aerial Survey	17,650		
05-89	Cleanout		1,320	
10-89	Aerial Survey	17,744		
05-90	Cleanout		2,100	3,032
09-90	Aerial Survey	19,263		
05-91	Aerial Survey	10,745		
09-91	Aerial Survey			
11-91	Cleanout		9,800	
11-91	Aerial Survey	20,563		
02-92	Disaster Declaration			3,060**
05-92	Aerial Survey	5,260		
10-92	Cleanout		15,117	
10-92	Aerial Survey	19,180		
11-92	Aerial Survey	19,300		
07-93	Aerial Survey	15,010		
10-93	Cleanout		8,650	
10-93	Aerial Survey	23,660		
12-93	Aerial Survey	Not Digitized		
05-94	Cleanout		1,816	
06-94	Aerial Survey	25,480		
01-95	Disaster Declaration			3,260
05-95	Aerial Survey	480		
11-95	Cleanout		15,550	
11-95	Aerial Survey	20,150		
07-96	Aerial Survey	15,140		
11-96	Cleanout		4,160	
11-96	Aerial Survey	19,300		
05-97	Aerial Survey	16,460		
02-98	Disaster Declaration			3,828
07-98	Aerial Survey	2,040		
01-99	Aerial Survey	Not Digitized		

BASIN HISTORY: FOX BARRANCA DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
06-99	Cleanout		16,270	
06-99	Aerial Survey	18,310		
12-99	Aerial Survey	Not Digitized		
07-01	Aerial Survey	6,818		
NA	Cleanout	Unknown	NA	
07-02	Aerial Survey	19,310		
11-03	Cleanout		2,444	
12-03	Cleanout		2,896	
12-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			3,030
07-05	Survey Analysis by O&M after cleanout		12,018	
11-05	TIN analysis by WR&T	16,661 to elev 306		
06-06	TIN analysis by WR&T 06 vs 05		6,053 Fill vo 108 Cut vol	
06-06	TIN analysis by WR&T	11,522 to elev 306		
07-07	Cleanout by O&M	Truck Count	8,076	
07-07	TIN analysis by WR&T	14,783 to elev 306		
05-08	Cleanout by O&M	Truck Count	3,257	
05-08	TIN analysis by WR&T	11,744 to elev 306		
05-10	Cleanout by O&M	Truck Count	3,603	
05-10	TIN analysis by WR&T	11,181 to elev 306		
05-11	Cleanout by O&M	Truck Count	3,604	
05-11	TIN analysis by WR&T	11,874 to elev 306		
07-15	Cleanout by O&M	Truck Count	5,088	
05-17	TIN analysis by WR&T	10,204 to elev 306 ft 1,604 net deposit since 05-11 6,457 net deposit since 11-05		
07-17	Cleanout by O&M	Truck Count	6,284	

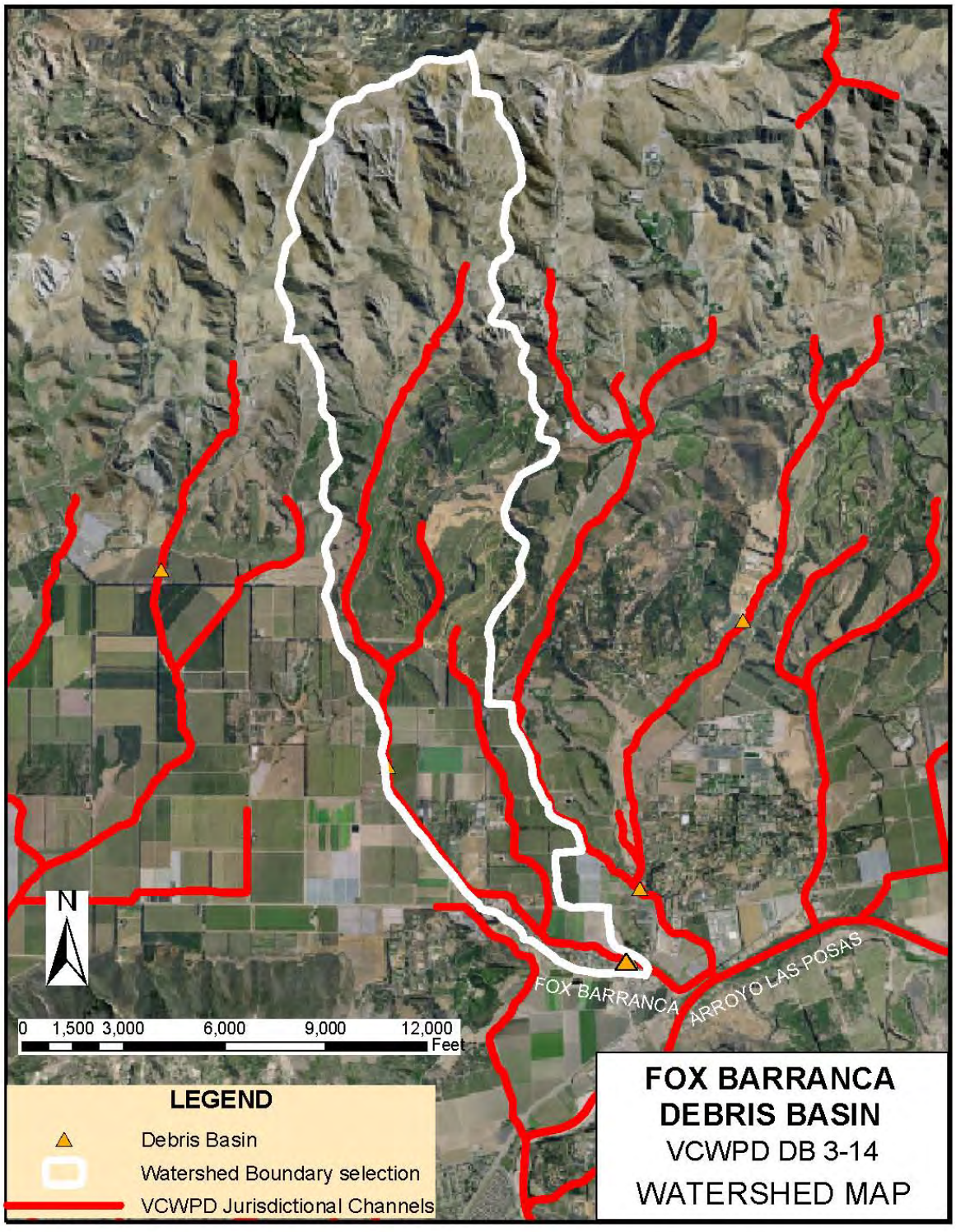
Notes

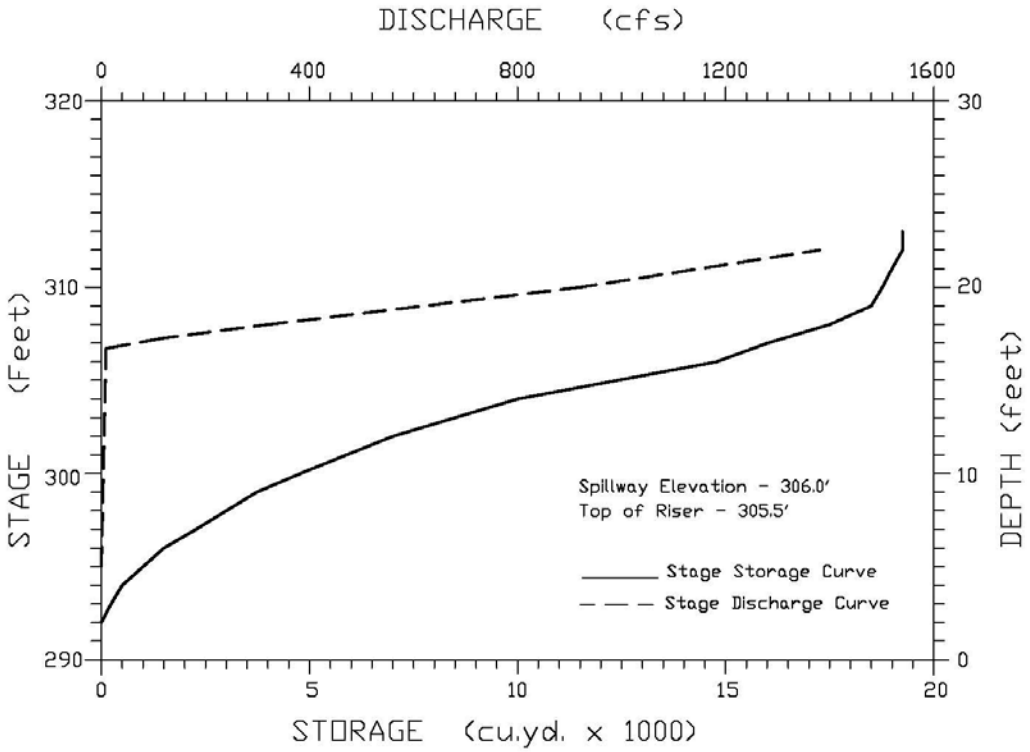
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable

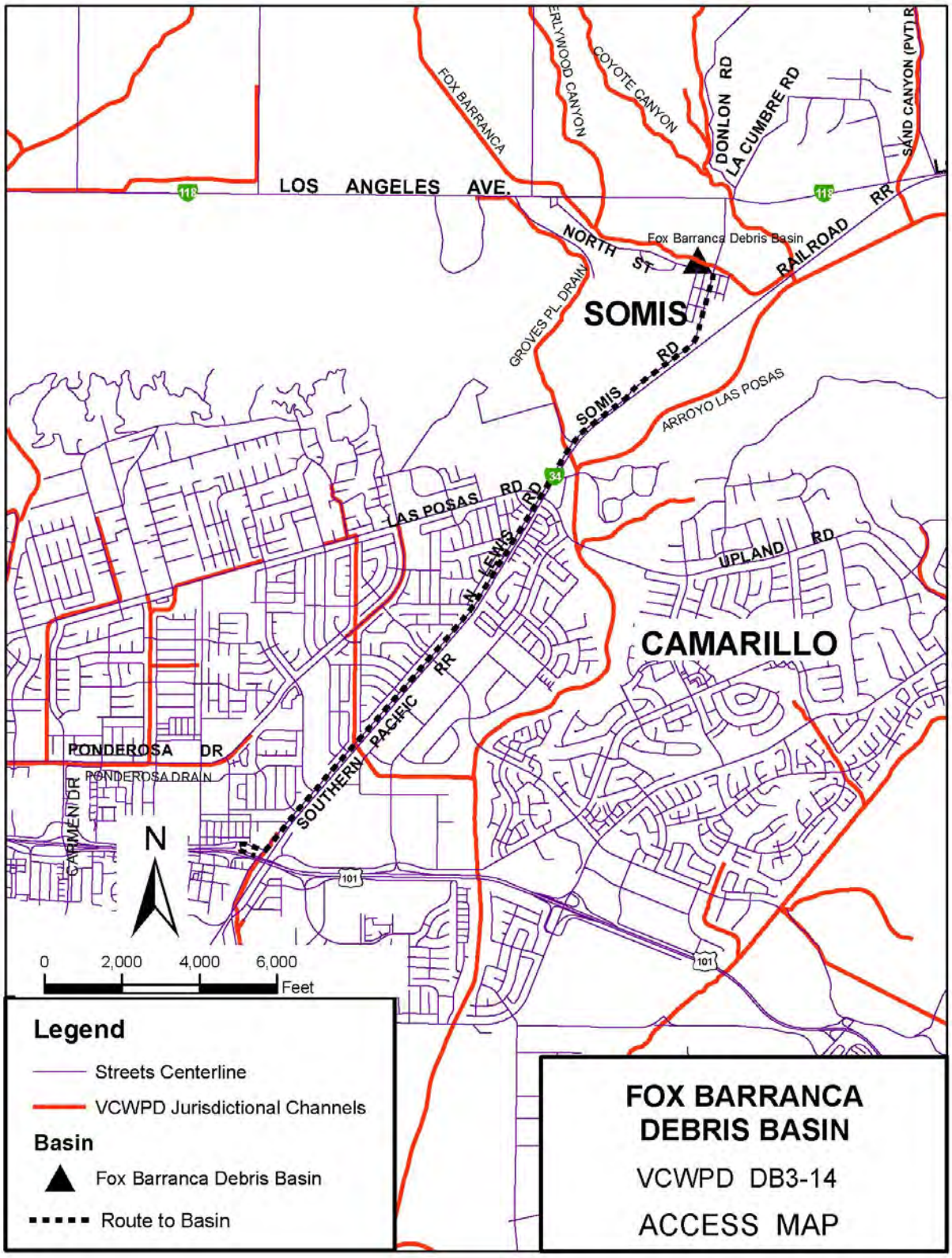

N
0 1,500 3,000 6,000 9,000 12,000
Feet
FOX BARRANCA
ARROYO LAS POSAS
LEGEND
Debris Basin
Watershed Boundary selection
VCWPD Jurisdictional Channels
FOX BARRANCA
DEBRIS BASIN
VCWPD DB 3-14
WATERSHED MAP



Stage Storage Discharge Curves

Stage Storage Discharge Table

Elevation	Riser Discharge	Spillway Discharge	11-05 Vol.
Ft. NGVD29	cfs	cfs	Cu. Yds
289			0
290			107
291			275
292			518
293			858
294			1,312
295	0.0		1,884
296	0.7		2,598
297	1.9		3,476
298	3.4		4,509
299	5.2		5,678
300	5.6		6,965
301			8,353
302	6.0		9,830
303			11,392
304	6.3		13,039
305			14,773
306	6.6	-	NA
307	6.8	90	NA
308	6.9	312	NA
309	7.0	641	NA
310	7.1	939	NA
311	7.2	1,160	NA
312	7.3	1,397	NA


LOS ANGELES AVE.
FOX BARRANCA
BERLYWOOD CANYON
COYOTE CANYON
DONLON RD
LA CUMBRE RD
SAND CANYON (PVT) R
RR
Fox Barranca Debris Basin
NORTH ST
RAILROAD
GROVES PL DRAIN
SOMIS
SOMIS RD
ARROYO LAS POSAS
LAS POSAS RD
LEWIS RD
UPLAND RD
CAMARILLO
SOUTHERN PACIFIC RR
PONDEROSA DR
PONDEROSA DRAIN
CARMEN DR
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Fox Barranca Debris Basin
Route to Basin
FOX BARRANCA
DEBRIS BASIN
VCWPD DB3-14
ACCESS MAP

GABBERT CANYON DEBRIS BASIN DB3-09

LOCATION: 1.5 mi west of Moorpark, approximately 3,000 ft north of Los Angeles Ave., Latitude-34 17'11", Longitude-118 54'34".
N 287,400, E 1,725,300 (Lambert Zone 5 Coordinates);
Moorpark 7 1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	Soil Conservation Service
Level Capacity	16,300 cy (12-9-87 DTM)
Maximum Debris Capacity	49,050 cy (12-9-87 DTM)
Inflow and Outflow Rates	Q100in=1,894 (Calleguas 2003) cfs; Q100out=NA
Debris Cleanout Elevation	510 ft NGVD29 (5,700 cy) [10% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	40 ft wide x 8 ft high RC Rectangular Channel Side Weir
Side Weir Elevation	517 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	1,252 cfs (from GEI report 2004); 2,500 cfs from Q-Elev Curve. Downstream channel capacity Q100=925 cfs
PRINCIPAL SPILLWAY	
Type	None
Weir Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	14-in Slotted CSP Riser 11-ft High with Catwalk
Top Elevation	517.48 ft NGVD29
Outlet Conduit	14 in CSP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	525 ft NGVD29
Length	800 ft
Surface Area of Full Basin	4.8 ac
Watershed Area	2,350 ac from Quad
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service VCWPD (Agency Number 12-10-040-327, Date 04-03-63
Completion Date	1963
REFERENCE DRAWINGS	
Construction Drawings	Y-2-291 thru 296; Y-3-192 thru 197
Right-of-Way Drawings	16050 and 16051
Topographic Drawings	T-63-4 (2-6-70), T-63-15 (11-2-71), T-259 (10-22-80), 12-9-87 DTM, 10-16-89 DTM

Basin being studied by District for possible upgrade.

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	56,900	81,600
50-YEAR	42,700	61,200
25-YEAR	30,800	44,200

BASIN HISTORY: GABBERT CANYON DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
09-69	Cleanout		25,000	
11-70	Aerial Survey	53,689		
01-70	Aerial Survey	Not Digitized		
12-70	Aerial Survey	43,392		
05-71	Cleanout		1,500	
05-71	Aerial Survey	46,883		
09-71	Cleanout		5,400	
10-71	Aerial Survey	56,423		
07-72	Cleanout		13,300	
11-72	Aerial Survey	57,659		
05-73	Aerial Survey	42,122		
10-73	Cleanout		16,600	
10-73	Aerial Survey	58,708		
06-74	Aerial Survey	58,453		
06-75	Aerial Survey	55,584		
10-76	Cleanout		6,200	
10-76	Aerial Survey	62,281		
03-78	Disaster Declaration			
06-78	Aerial Survey	11,943		
10-78	Cleanout		48,400	
10-78	Cleanout		5,350	
11-78	Aerial Survey	55,425		
02-80	Disaster Declaration			
06-80	Aerial Survey	Not Digitized		
12-80	Cleanout		47,290	7,379**
12-80	Aerial Survey	54,453		
09-81	Aerial Survey	Not Digitized		
11-82	Cleanout		1,290	
11-82	Aerial Survey	55,743		
03-83	Disaster Declaration			
04-83	Aerial Survey	9,989		
10-83	Cleanout		6,774	
10-83	Aerial Survey	16,763		

BASIN HISTORY: GABBERT CANYON DEBRIS BASIN

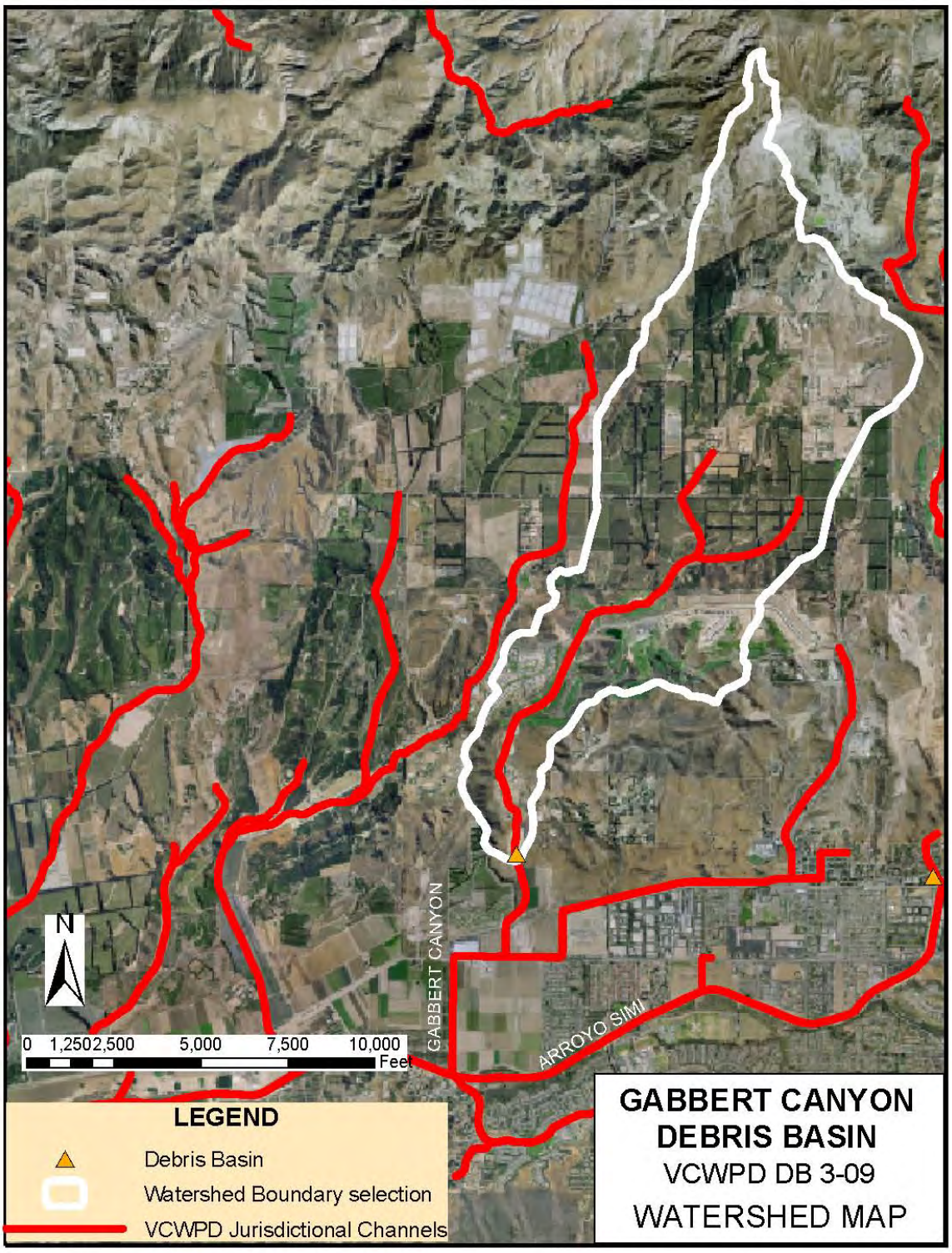
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
12-83	Cleanout		36,900	
12-83	Aerial Survey	54,236		
12-85	Aerial Survey	51,623		
06-86	Aerial Survey	25,939		
08-86	Cleanout		29,770	
10-86	Aerial Survey	50,998		
10-87	Aerial Survey	Not Digitized		
12-87	Aerial Survey	49,042		
10-88	Aerial Survey	Not Digitized		4,253
10-89	Aerial Survey	Not Digitized		
09-90	Aerial Survey	Not Digitized		
05-91	Aerial Survey	38,432		
07-91	Cleanout		27,070	
11-91	Aerial Survey	56,885		
02-92	Disaster Declaration			4,742**
05-92	Aerial Survey	38,715		
10-92	Cleanout		21,650	
10-92	Aerial Survey	51,210		
07-93	Cleanout		28,345	
12-93	Aerial Survey	52,065		
01-94	Aerial Survey	Not Digitized		
01-95	Disaster Declaration			5,209
05-95	Aerial Survey	7,850		
12-95	Cleanout		41,900	
12-95	Aerial Survey	49,750		
07-96	Aerial Survey	Not Digitized		
05/97	Aerial Survey	37,640		
02-98	Disaster Declaration			6,450
03-98	Field Survey	5,050		
06-98	Cleanout		58,190	
06-98	Aerial Survey	53,150		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			6,114
07-05	Multiple Cleanouts by O&M		81,059	
07-05	Cleanout		14,484-Survey	
09-05	TIN analysis by O&M	19,897 to elev. 517		
07-10	Cleanout by O&M	Truck Count	29,680	

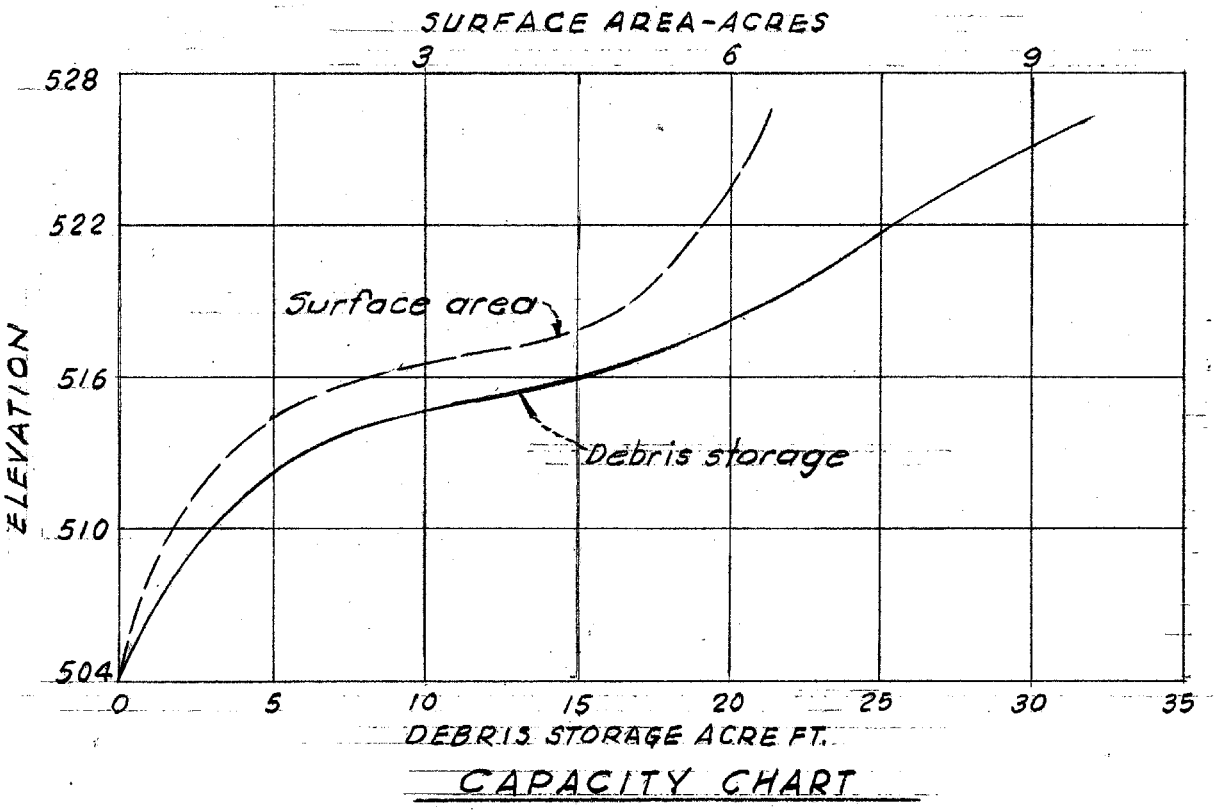
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

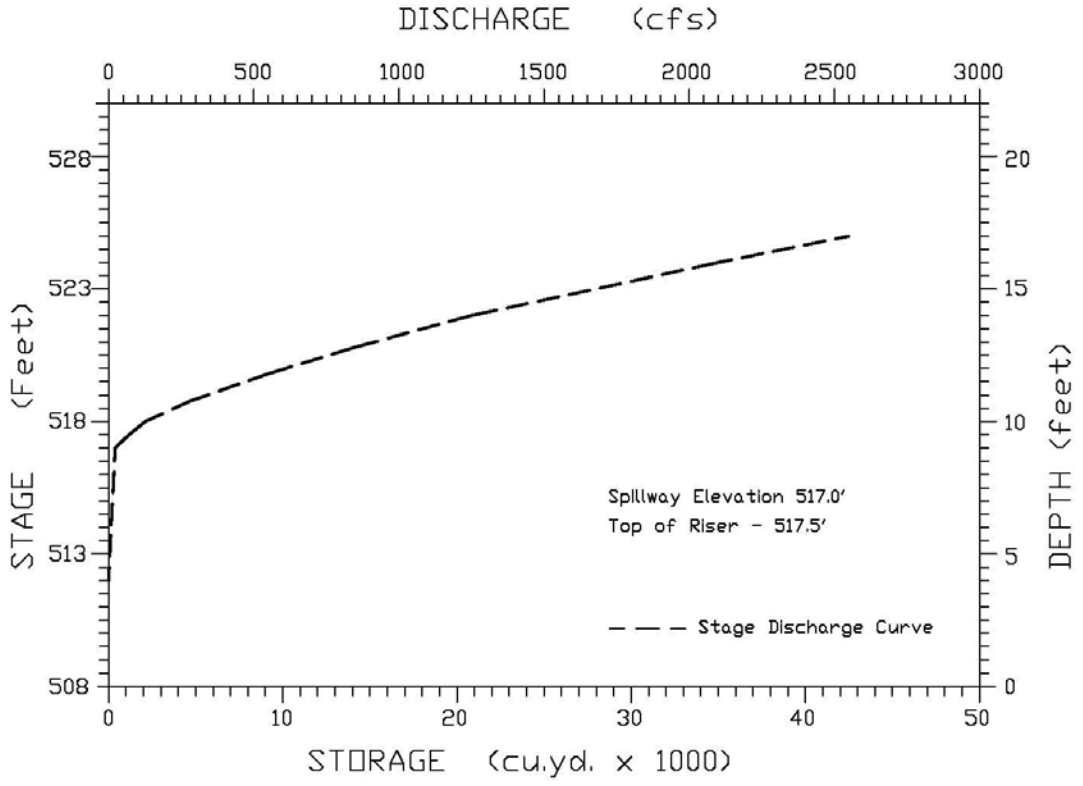
** FEMA Accepted Value for Disaster Declaration

NA= Not Available / Not Applicable


N
0 1,250 2,500 5,000 7,500 10,000
Feet
GABBERT CANYON
ARROYO SIMI
LEGEND
Debris Basin
Watershed Boundary selection
VCWPD Jurisdictional Channels
GABBERT CANYON
DEBRIS BASIN
VCWPD DB 3-09
WATERSHED MAP



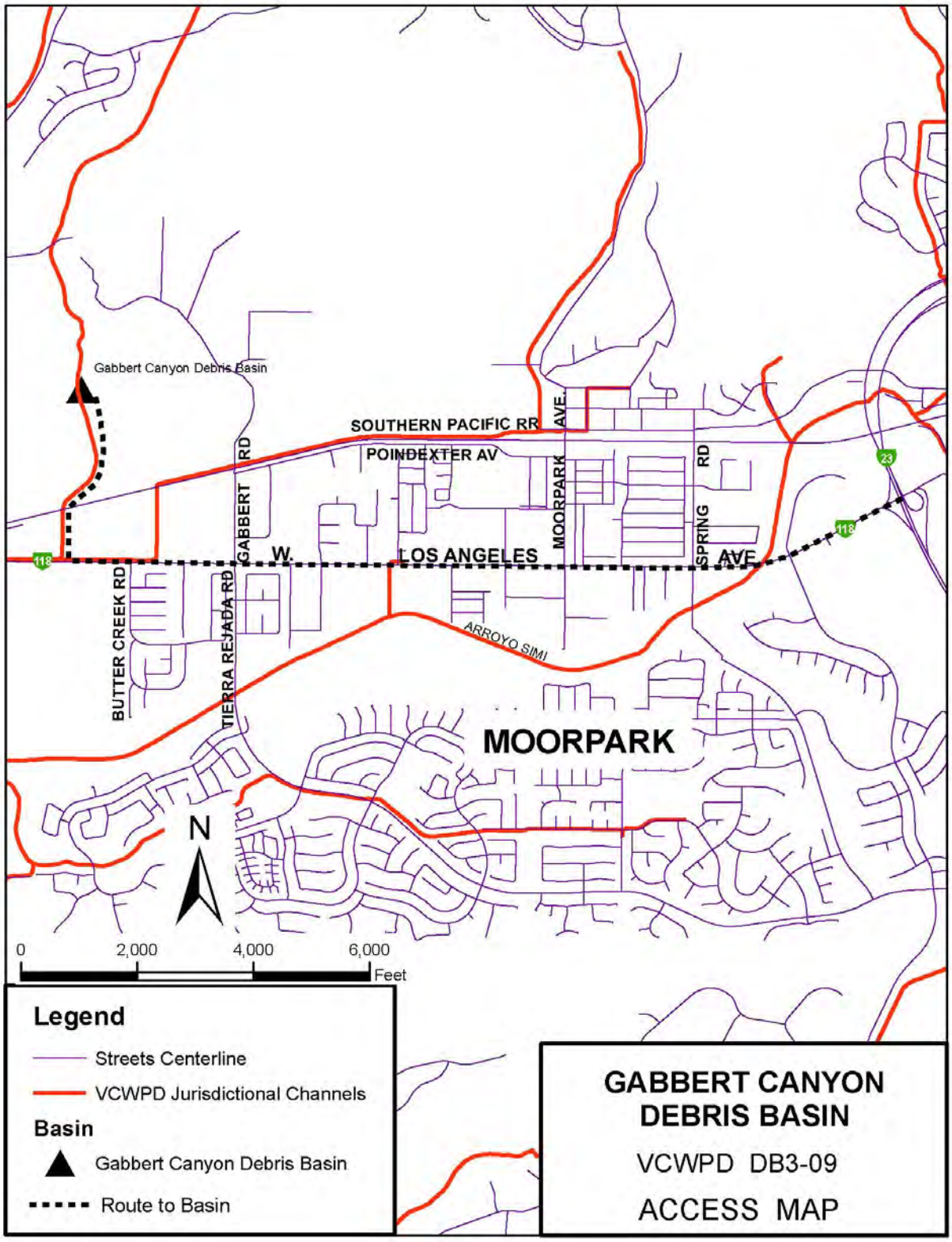
Gabbert Canyon Debris Basin



Stage Storage Discharge Table

Elevation	Riser Disch.	Spillway Disch.	11-05 Vol.
Ft. NGVD29	cfs	cfs	Cu. Yds
510	0		0
511	0.7		372
512	2.5		1,447
513	4.8		3,319
514	7.6		6,172
515	9.6		9,967
516	10.4		14,545
517	11.1	-	19,795
518	11.8	112	25,480
519	12.7	315	NA
520	13.2	580	NA
521	13.6	895	NA
522	14.0	1,250	NA
523	14.4	1,650	NA
524	14.8	2,070	NA
525	15.2	2,530	NA

NA=Not Analyzed


Gabbert Canyon Debris Basin
SOUTHERN PACIFIC RR
POINDEXTER AV
GABBERT RD
MOORPARK AVE.
SPRING RD
W. LOS ANGELES AVE
BUTTER CREEK RD
TIERRA REJADA RD
ARROYO SIMI
MOORPARK
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Gabbert Canyon Debris Basin
Route to Basin
GABBERT CANYON DEBRIS BASIN
VCWPD DB3-09
ACCESS MAP

HONDA WEST DEBRIS BASIN DB3-07

LOCATION: About 500 ft north of Berylwood Road, approx. 2000 ft east of Price Rd.
Latitude 34 17'28" Longitude-119 02'33"
N 289,500, E 1,685,100 (Lambert Zone 5 Cordinates);
Santa Paula 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	Soil Conservation Service
Level Capacity	10,350 cy (10-16-89 DTM)
Maximum Debris Capacity	14,300 cy (10-16-89 DTM)
Inflow and Outflow Rates	Q100in=820 cfs; Q100out=NA
Debris Cleanout Elevation	576 ft NGVD29 (5,600 cy) [10% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	22 ft W x 5 ft H RC Rectangular Channel with Wingwalls
Invert Elevation	578.5 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	690 cfs
PRINCIPAL SPILLWAY	
Type	None
Weir Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	14 in Slotted CSP 22 ft High
Top Elevation	581.33 ft NGVD29
Outlet Conduit	14-in CSP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	583.5 ft NGVD29
Length	150 ft
Surface Area of Full Basin	1.5 ac
Watershed Area	740 ac from Quad Map
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service
Completion Date	1955
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1032-1037
Right-of-Way Drawings	17189-90
Topographic Drawings	T-63-6 (2-6-70), T-258 (11-14-80), 11-8-87 DTM, 10-16-89 DTM

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	55,662	80,736
50-YEAR	42,486	61,625
25-YEAR	30,473	44,200

BASIN HISTORY: HONDA WEST DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
01-70	Aerial Survey	Not Digitized		
02-70	Aerial Survey	4,150		
01-72	Aerial Survey	Not Digitized		
08-77	Cleanout		9,000	
12-77	Aerial Survey	13,200		
01-78	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			
06-78	Aerial Survey	1,850		
05-79	Cleanout		10,500	
02-80	Disaster Declaration			
06-80	Aerial Survey	Not Digitized		
11-80	Aerial Survey	11,304		795**
10-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	11,997		
03-83	Disaster Declaration			
04-83	Aerial Survey	Not Digitized		
11-83	Aerial Survey	9,013		
04-84	Cleanout		5,377	100**
10-84	Aerial Survey	14,266		
12-85	Aerial Survey	14,441		
07-86	Aerial Survey	12,985		
11-86	Aerial Survey	Not Digitized		
11-87	Aerial Survey	13,040		
10-89	Aerial Survey	13,798		562
09-90	Aerial Survey	Not Digitized		
06-91	Aerial Survey	13,050		
02-92	Disaster Declaration			129**
05-92	Aerial Survey	11,950		
07-92	Cleanout		1,102	
07-92	Aerial Survey	13,052		

BASIN HISTORY: HONDA WEST DEBRIS BASIN

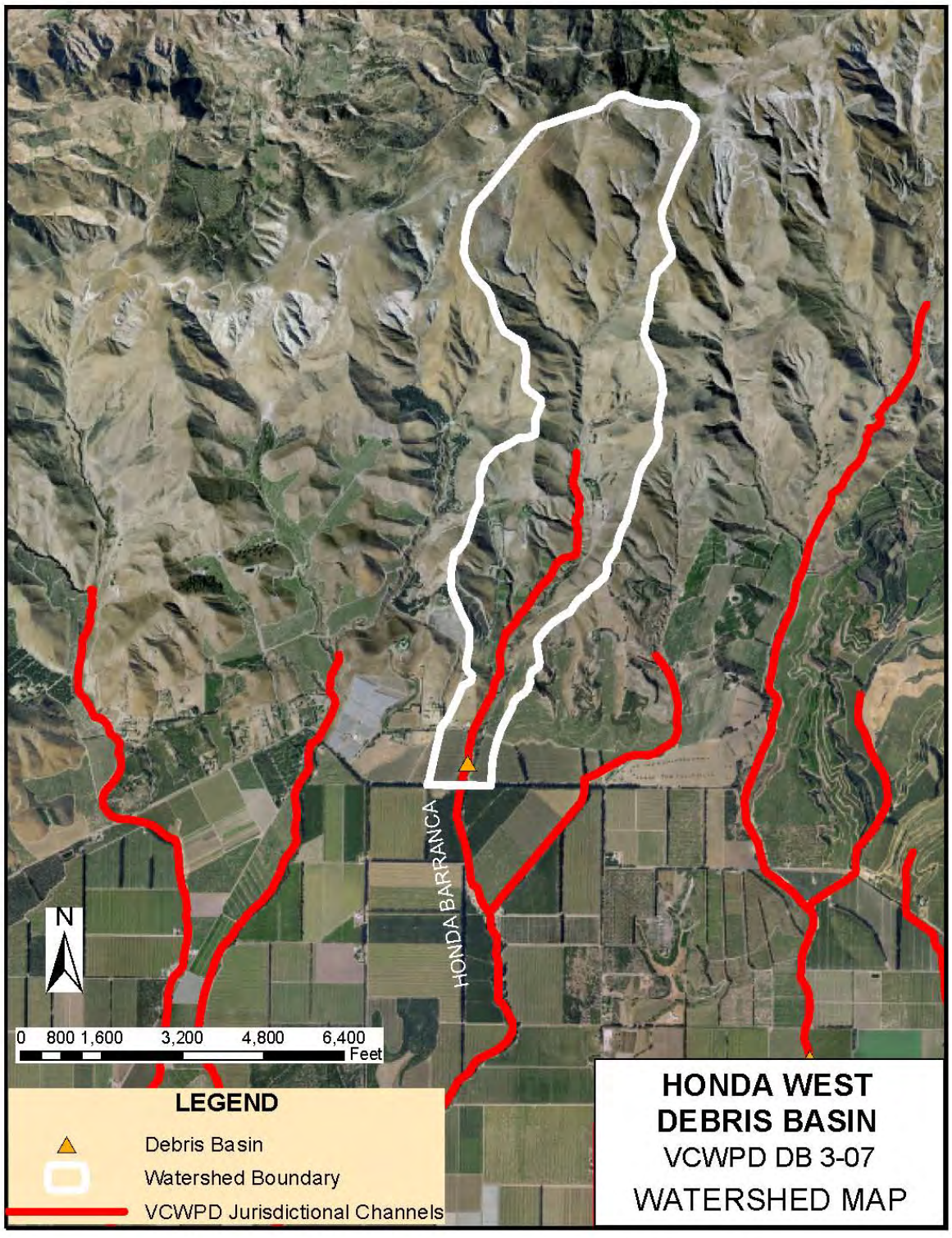
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
09-93	Cleanout		968	
01-95	Disaster Declaration			164
05-96	Cleanout		1,292	
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	12,884		
02-98	Disaster Declaration			488
07-98	Aerial Survey	11,020		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
11-03	Cleanout		945	
12-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			112
07-05	Cleanout by O&M	Survey Analysis	10,872	
11-05	TIN analysis by WR&T	9,415 to elev 578		
11-05	TIN analysis by WR&T- 11-05 vs 05-05		11,323 Fill vol 127 Cut vol	
05-17	TIN analysis by WR&T- 11-05 vs 05-17	No cleanouts reported since 2005	2,387 Fill vol 64 Cut Vol	

Notes

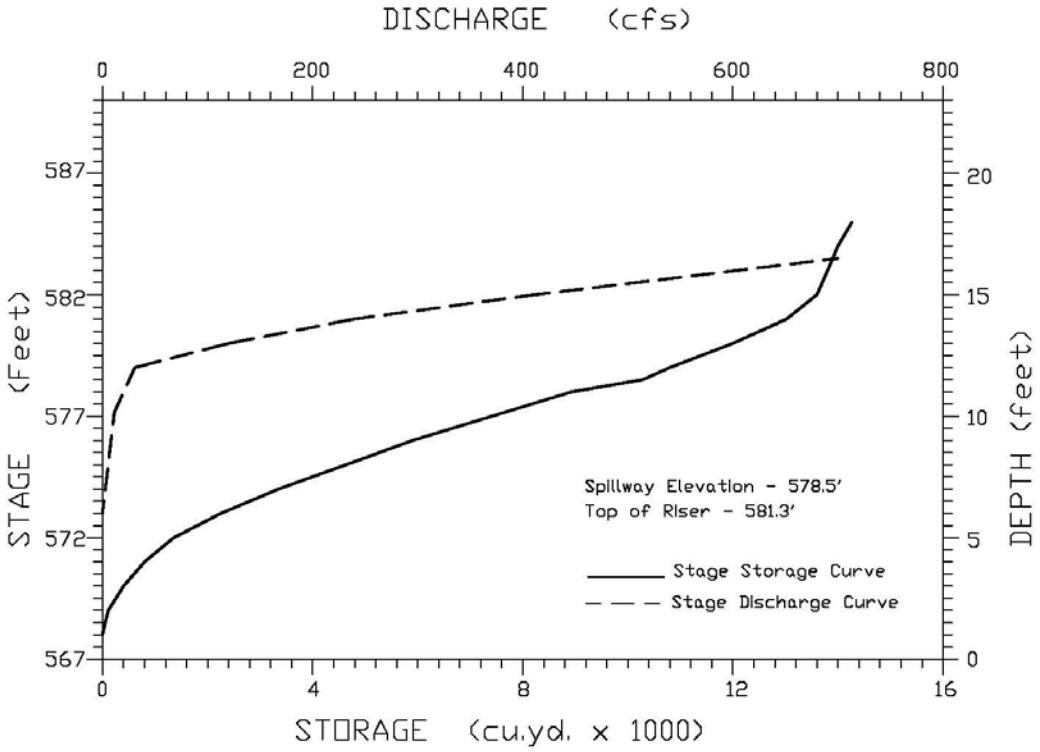
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

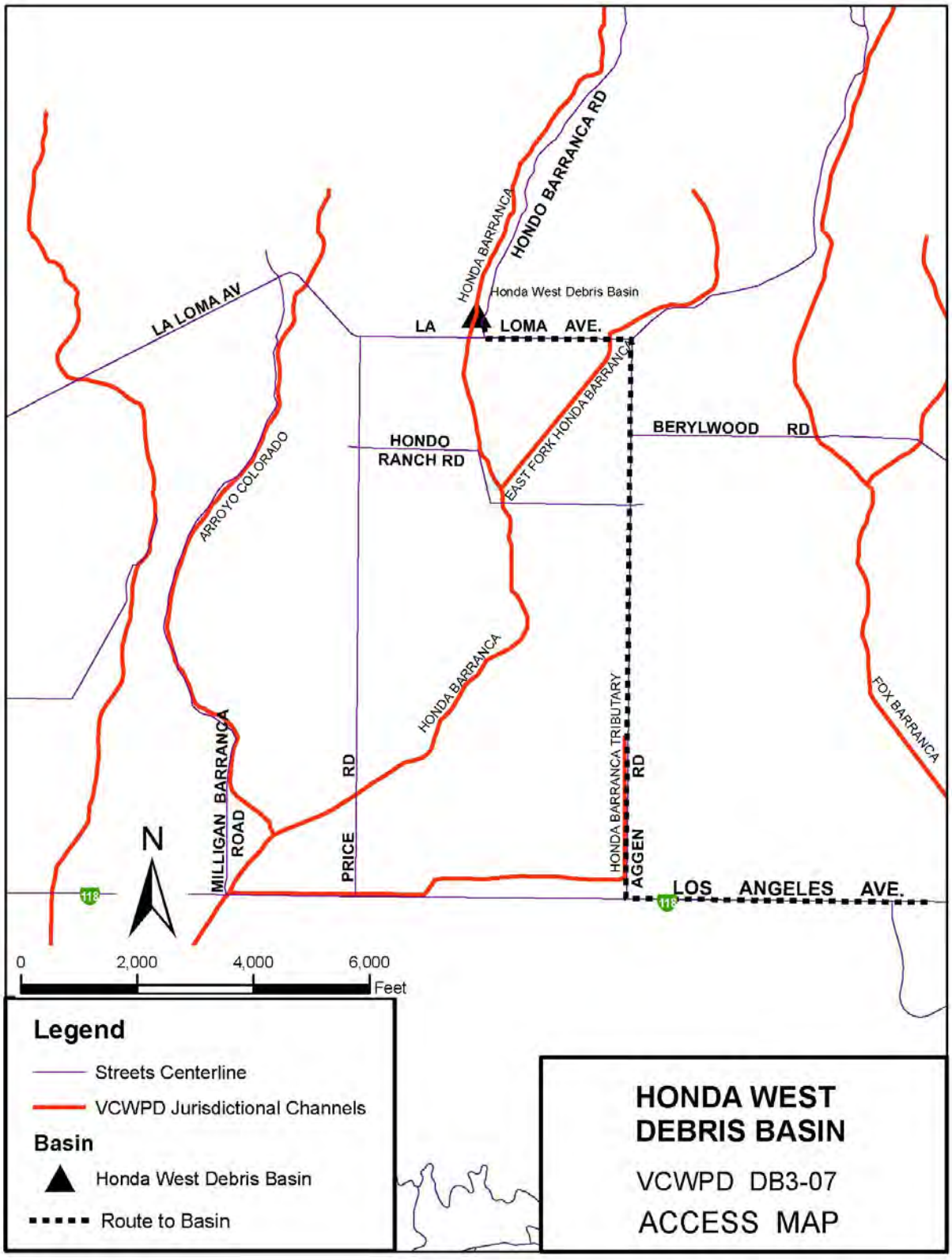
** FEMA Accepted Value for Disaster Declaration

NA= Not Available / Not Applicable


HONDA BARRANCA
N
0 800 1,600 3,200 4,800 6,400
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
HONDA WEST
DEBRIS BASIN
VCWPD DB 3-07
WATERSHED MAP

HONDA WEST DEBRIS BASIN




HONDO BARRANCA RD
HONDA BARRANCA
Honda West Debris Basin
LA LOMA AV
LA LOMA AVE.
HONDO RANCH RD
EAST FORK HONDA BARRANCA
BERYLWOOD RD
ARROYO COLORADO
HONDA BARRANCA
FOX BARRANCA
HONDA BARRANCA TRIBUTARY
MILLIGAN BARRANCA
ROAD
PRICE RD
AGGEN RD
LOS ANGELES AVE.
118
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Honda West Debris Basin
Route to Basin
HONDA WEST
DEBRIS BASIN
VCWPD DB3-07
ACCESS MAP

LANG CREEK DEBRIS BASIN DB3-31

LOCATION: City of Thousand Oaks, Located at Westlake Blvd and Lang Ranch
N 259,660, E 1,751,001 (Lambert Zone 5 Coordinates)
Thousand Oaks Quad Map

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	16.7 ac-ft or 26,942 cy
Design Debris Capacity	15 ac-ft (24,195 cy) at 1,040 ft NGVD29 fm as-built
Inflow and Outflow Rates	Q100in= 2,906 cfs at 1,046.1 ft NGVD29; Q100out=NA
Debris Cleanout Elevation	1033 ft NGVD29 (5,500 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	Drop Box Inlet 12 ft W x 42.3 ft L RC, Bott. 1020.36 ft NGVD29
Weir Elevation	1041 ft NGVD29
Outlet Conduit	12 ft Wx12 ft H RCB
Capacity w/o Freeboard	NA
PRINCIPAL SPILLWAY	
Type	None
RCB Weir Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	½ inx10 in slots in Drop Box Inlet Upstream Face beginning at 1025 ft NGVD29
Top Elevation	1040.36 ft NGVD29
Outlet Conduit	Emergency Spillway
DAM	
Dam Type	Earthfill
Dam Crest Elevation	1049 ft NGVD29 (Westlake Blvd)
Length	NA
Width at Crest	NA
Surface Area of Full Basin	2.3 ac
Watershed Area	2,234 ac from GIS Watershed Layer Shapefile
CONSTRUCTION DATA	
Construction Agency	VCWPD with City of Thousand Oaks
Completion Date	2004
REFERENCE DRAWINGS	
Construction Drawings	Y-3-4049 – Y-3-4094
Right-of-Way Drawings	17625 - 17626
Topographic Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	22,052	37,830
50-YEAR	16,806	28,831
25-YEAR	12,857	21,911

BASIN HISTORY: LANG CREEK DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-05	Disaster Declaration			1,680***
07-05	Survey analysis by O&M after cleanout		1,535-Survey	
11-05	TIN analysis by WR&T 11-05 vs 08-05		1,505 Fill vol 26 Cut vol	

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

*** Theoretical Value from Scott and Williams (1978), 10% of 50-yr Design Yield

NA= Not Available / Not Applicable

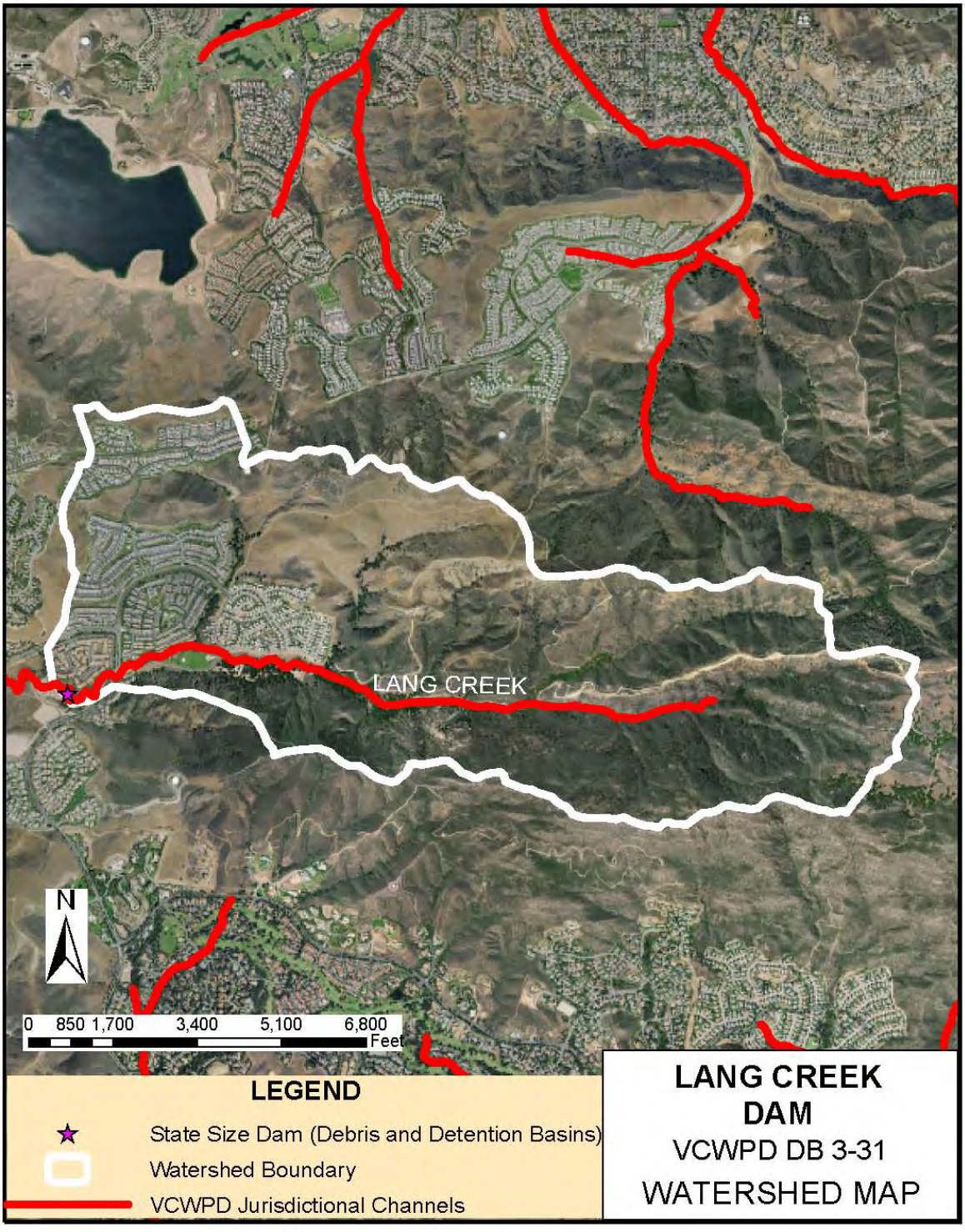
LANG CREEK DETENTION BASIN DD3-31

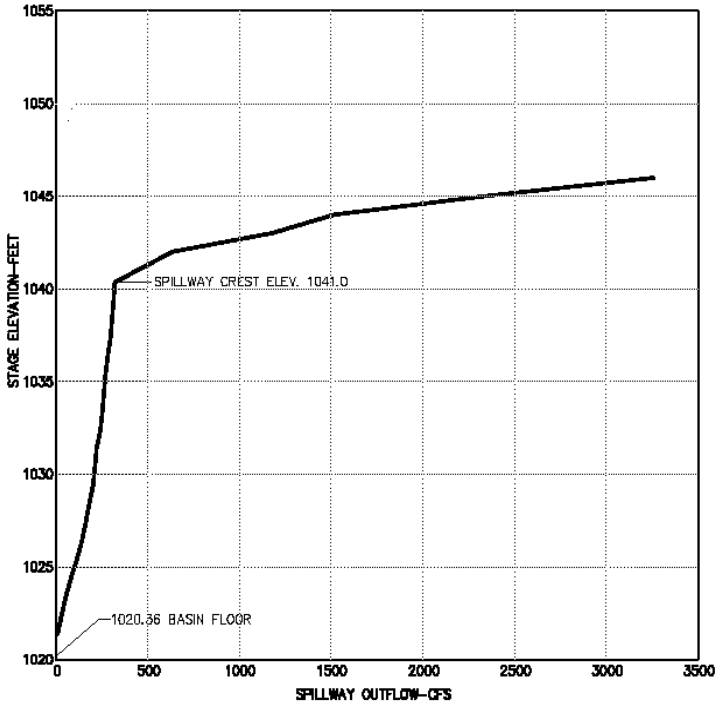
LOCATION: City of Thousand Oaks, Located downstream of Westlake Blvd.,
Near Lang Ranch
N 259,653, E 1,750,084 (Lambert Zone 5 Coordinates)
Thousand Oaks Quad Map

DESIGN DATA

Design Agency	VCWPD
Level Capacity	263 ac-ft at Spillway
Maximum Debris Capacity	None- Debris Basin Intercepts
Inflow Rates	Q50=2,476 cfs, Q100=2,906 cfs
Outflow Rates	Q50=608 cfs, Q100=647 cfs at 1031.7 ft NGVD29
EMERGENCY SPILLWAY	
Type	Drop Box Inlet, 17 ft (W) x 94 ft (L)
Weir Elevation	1034 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	7,127 cfs
PRINCIPAL SPILLWAY	
Type	RC Intake Tower 29 ft High with Catwalk
Top Elevation	1014 ft;
Outlet Conduit	60 in RCP
Low Level Inlet	5 ft X5 ft low level inlet at 985 ft NGVD29 with sloped trash rack
Top Elevation	High Stage Inlet 10 ft Wx5 ft H at 1,008 ft NGVD29
DEBRIS BLEEDER/RISER	None
DAM	
Dam Type	Earthfill
Dam Crest Elevation	1040.8 ft NGVD29
Length	345 ft
Surface Area of Full Basin	12 ac
Watershed Area	2,325 ac from GIS Watershed Layer Shapefile
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD with City of Thousand Oaks
Completion Date	2004
REFERENCE DRAWINGS	
Construction Drawings	Y-3-4049 – Y-3-4094
Right-of-Way Drawings	17625 - 17626
Topographic Drawings	NA

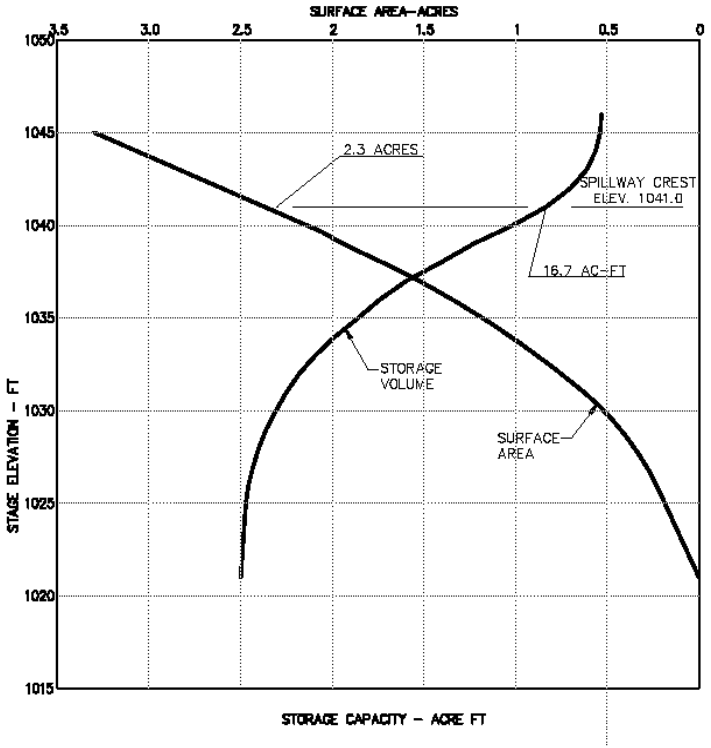
Sediment Yield and Debris Removal Information- refer to Lang Creek Debris Basin


LANG CREEK
N
0 850 1,700 3,400 5,100 6,800
Feet
LEGEND
State Size Dam (Debris and Detention Basins)
Watershed Boundary
VCWPD Jurisdictional Channels
LANG CREEK DAM
VCWPD DB 3-31
WATERSHED MAP



SPILLWAY RATING CURVE

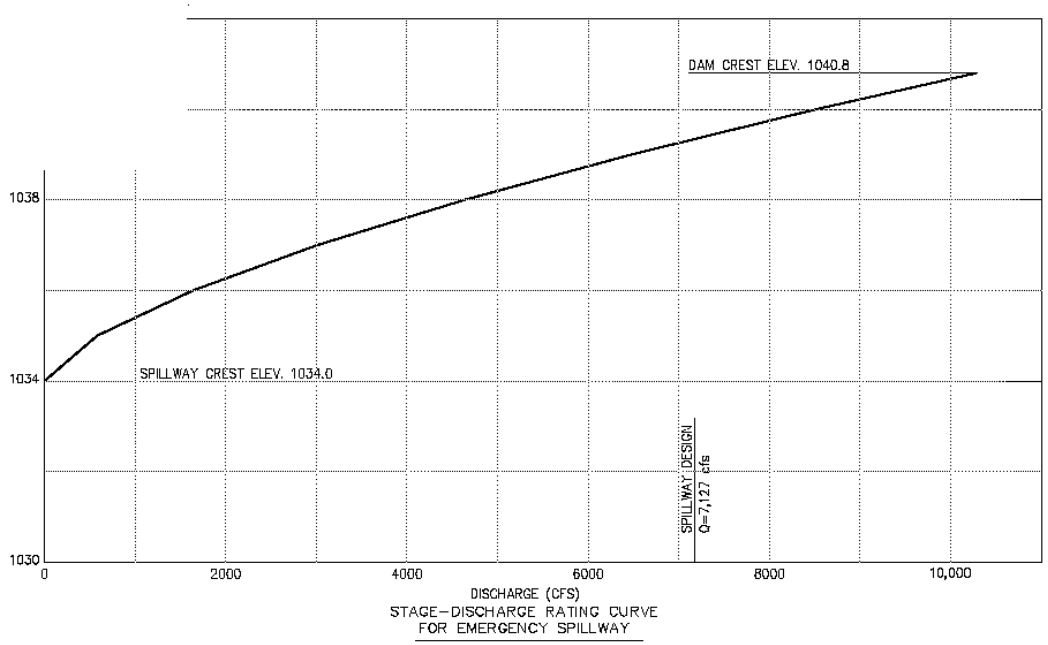
SCALE: HORIZ 1"=500 CFS
VERT 1"=5'

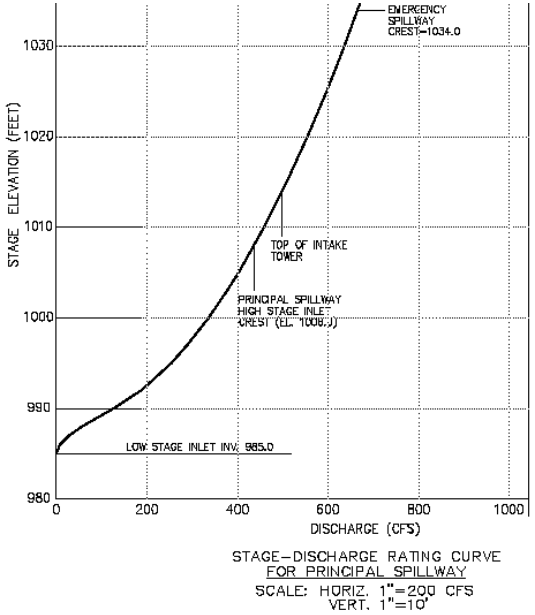


AREA-CAPACITY CURVES

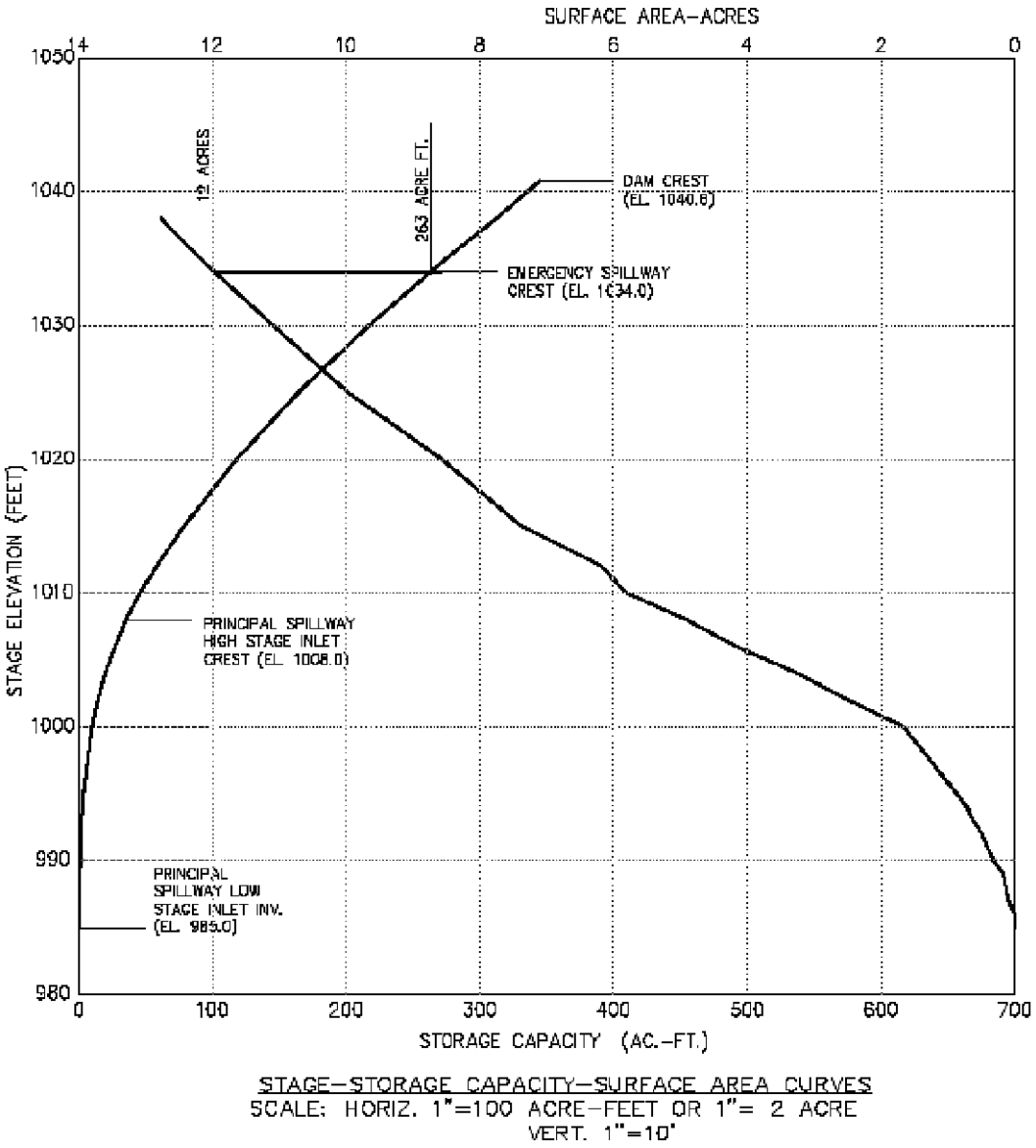
SCALE: HORIZ 1"=5 AC-FT OR 1"=0.5 ACRES
VERT 1"=5'

Lang Creek Debris Basin





Lang Creek Detention Basin

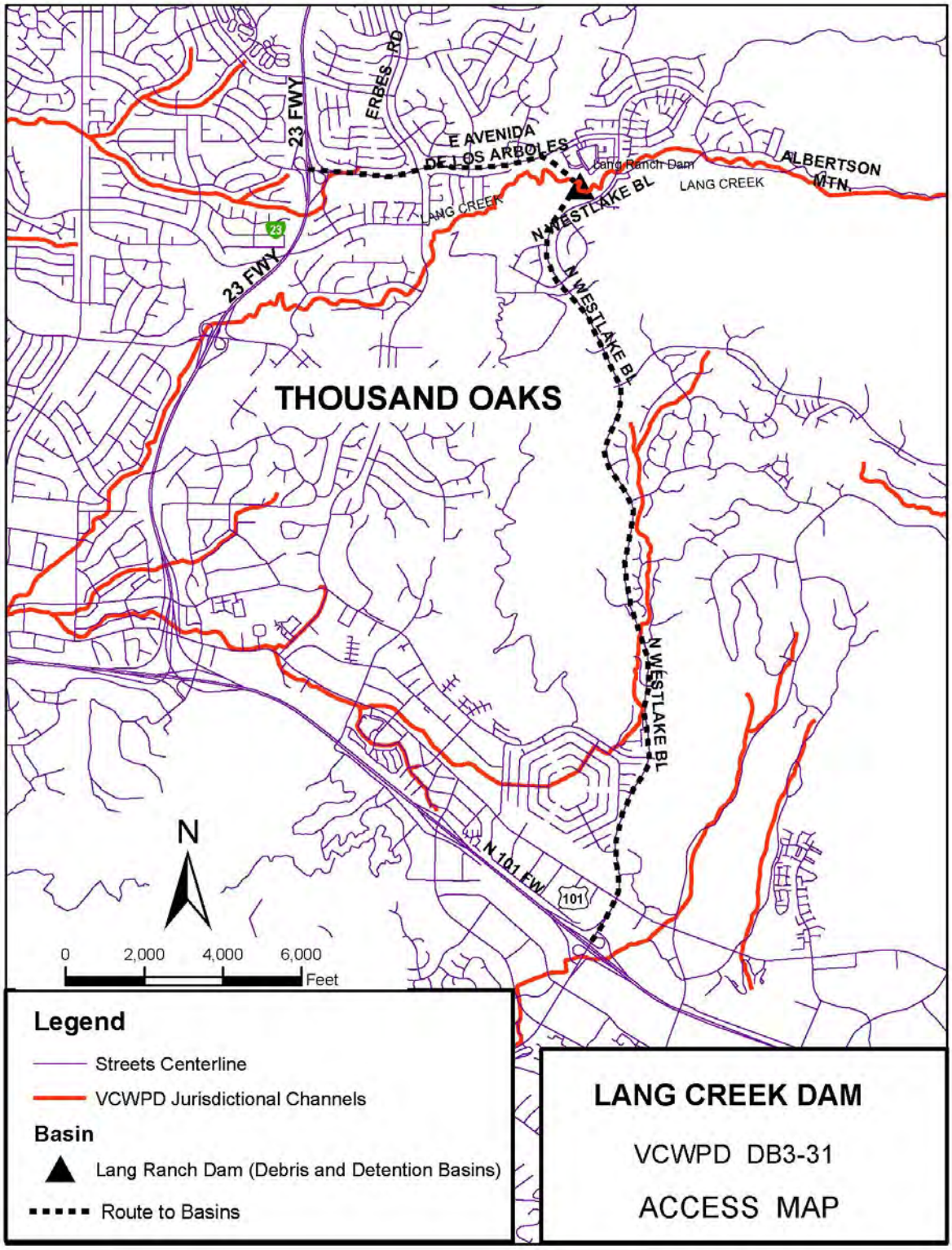


STAGE–STORAGE CAPACITY–SURFACE AREA CURVES
SCALE: HORIZ. 1"=100 ACRE–FEET OR 1"= 2 ACRE
VERT. 1"=10'

Lang Creek Detention Basin

Lang Stage-Storage-Discharge Data Estimated from As-Builts

Elevation	As-Built	Riser	Spillway	Total
Ft. NGVD29	Ac-Ft	Cfs	Cfs	Cfs
985	0	0		-
986		8		8
987		28		28
988		56		56
989		90		90
990	0.7	134		134
992	2.0	184		184
994	3.0	234		234
996	5.0	272		272
998	7.0	308		308
1000	10.0	334		334
1002	14.0	366		366
1004	20.0	390		390
1006	28.0	412		412
1008	36.0	432		432
1010	47.0	456		456
1012	60.0	480		480
1014	72.0	496		496
1016	86.0	518		518
1018	102.0	534		534
1020	119.0	556		556
1022	138.0	572		572
1024	154.0	588		588
1026	174.0	604		604
1028	195.0	620		620
1030	216.0	636		636
1032	240.0	652		652
1034	263.0	668	0	668
1035	275.5	675	590	1,265
1036	288.0	682	1,470	2,152
1037	301.0	691	3,000	3,691
1038	314.0	700	4,660	5,360
1039	325.0	704	6,370	7,074
1040	336.0	708	8,500	9,208


THOUSAND OAKS
23 FWY
ERBES RD
E AVENIDA DE LOS ARBOLES
Lang Ranch Dam
LANG CREEK
ALBERTSON MTN.
N WESTLAKE BL
N 101 FWY
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Lang Ranch Dam (Debris and Detention Basins)
Route to Basins
LANG CREEK DAM
VCWPD DB3-31
ACCESS MAP

LAS LLAJAS CANYON DETENTION DAM State Dam No. 86-005 DD3-20

LOCATION: Simi Valley, approx. 1 mi. N of Alamo St and west of the extension of Stearns St;
N 292,560, E 1,792,140 (Lambert Zone 5 Coordinates);
Santa Susana 7 1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Flood Storage Capacity	1,250 ac-ft (2,017,000 cy) with no debris storage
Design Debris Capacity	187.5 ac-ft (302,500 cy) at 1192 ft NGVD29
Inflow and Outflow Rates	Q100in=6,000 cfs; Q100out=600 cfs
Debris Cleanout Elevation	1180 ft (111,500 cy) [Design capacity-100yr debris yield]
EMERGENCY SPILLWAY	
Type	Earthen Trap Channel with Concrete Sill Channel Stabilizer 120-ft Wide x 20-ft High
Invert Elevation	1,227.5 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	7,600 cfs
PRINCIPAL SPILLWAY	
Type	10 ft x 5 ft RC Rectangular Intake Tower with Side Inlets and Projecting Top
Top and Flowline Elevations	1194.25 ft NGVD29; 1157.25 ft NGVD29
Outlet Conduit	54 in RCP
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill, 80 ft High
Dam Crest Elevation	1,240 ft NGVD29
Length	640 ft
Surface Area of Full Basin	45.4 ac
Watershed Area	4,384 ac from Quad
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	1980
REFERENCE DRAWINGS	
Construction Drawings	Y-3-2134 to Y-3-2155
Right-of-Way Drawings	17015 - 17019
Topographic Drawings	Y-3-2135; T-154 and T-271

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	190,983	277,014
50-YEAR	142,477	206,657
25-YEAR	63,512	92,121

Design debris capacity based on 25*Mean Annual Deposition + 100-Yr Design Volume

BASIN HISTORY: LAS LLAJAS CANYON DETENTION DAM

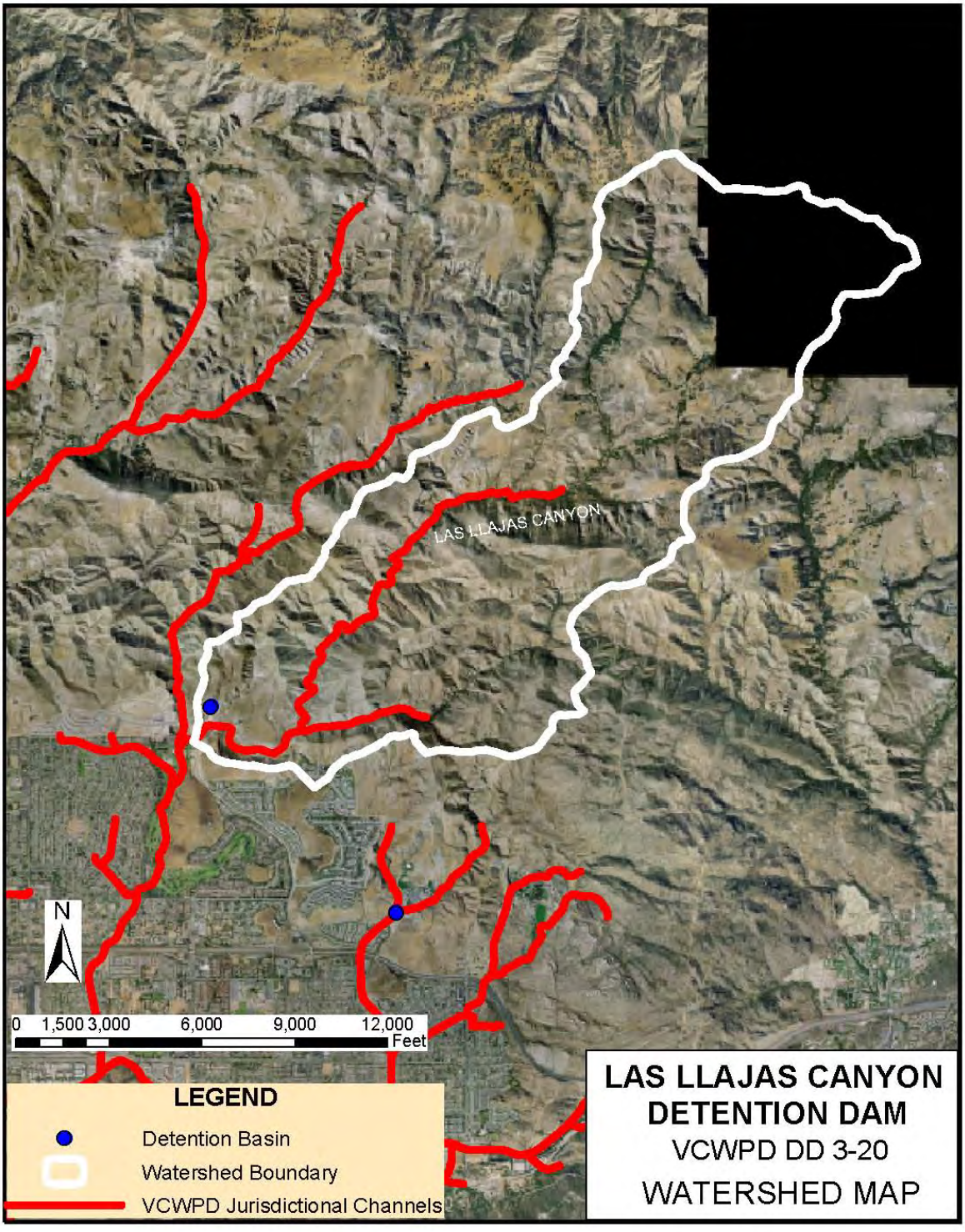
DATE	ACTION	REMAINING CAPACITY (ac-ft)	REMOVED (cy)	AADP* (cy)
01-80	Dam Constructed			
11-81	As Built Survey	933.70 (ac-ft)		
03-83	Disaster Declaration			4,500***
12-85	Aerial Survey	Not Digitized		
02-92	Disaster Declaration			4,500***
08-93	Cleanout		4,009	
01-95	Disaster Declaration			4,500***
08-96	Aerial Survey	Not Digitized		
02-98	Disaster Declaration			4,500***
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
12-03	Aerial Survey	Not Digitized		
11-04	Cleanout by O&M	Aerial Survey Analysis	159,336	
11-04	TIN analysis by WR&T 11-04 vs 07-04		25,109 Fill vol 38,621 Cut vol	
01-05	Disaster Declaration			4,300***
10-05	Cleanout by O&M	Aerial Survey Analysis	66,907	
04-05	TIN analysis by WR&T 04-05 vs 11-04		226,531 Fill vol 22,361 Cut vol	
12-05	TIN analysis by WR&T 12-05 vs 11-04		122,844 Fill vol 153,643 Cut vol	
08-06	TIN analysis by WR&T 08-06 vs 12-05		106,875 Fill vol 9,523 Cut vol	

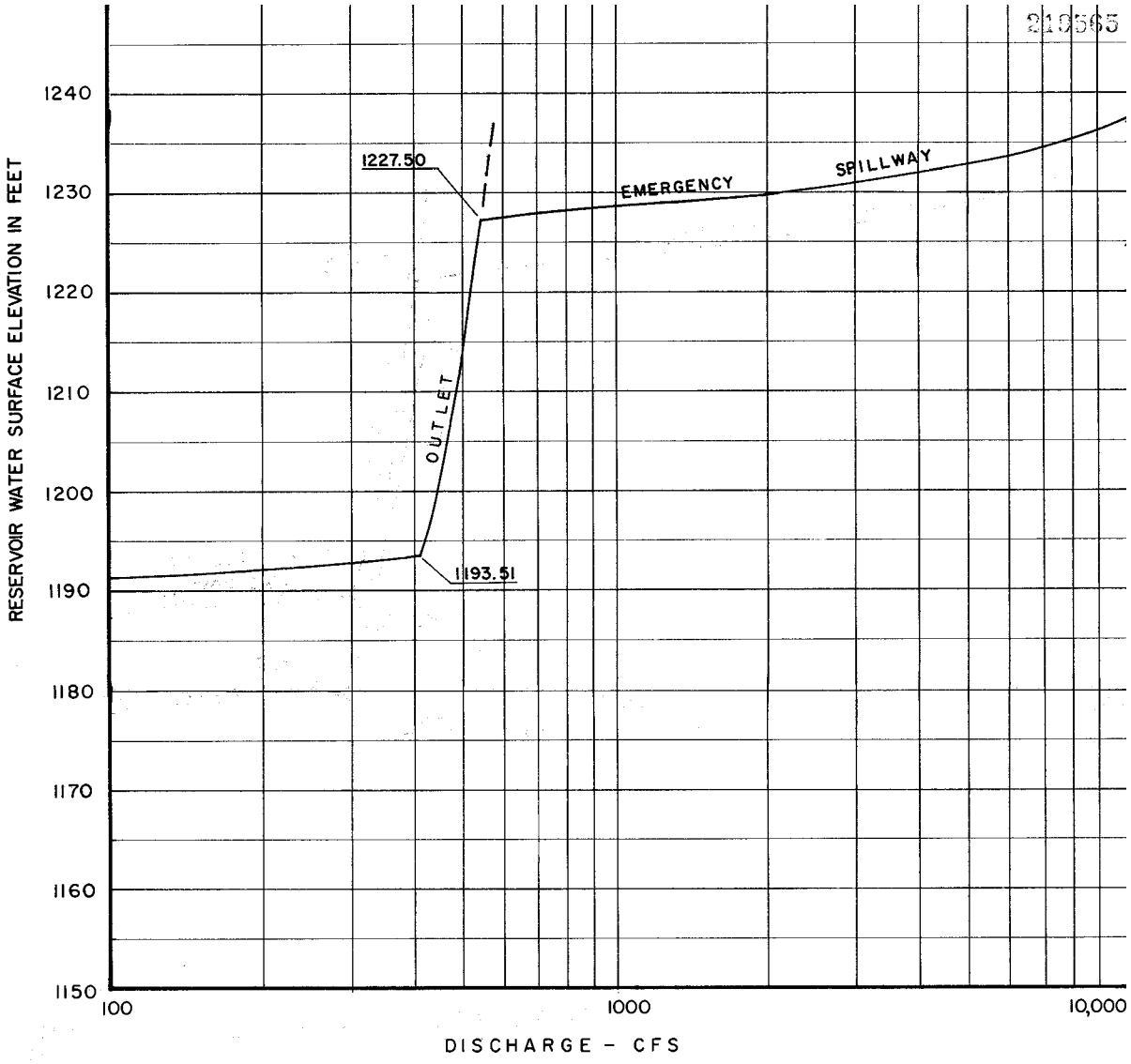
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

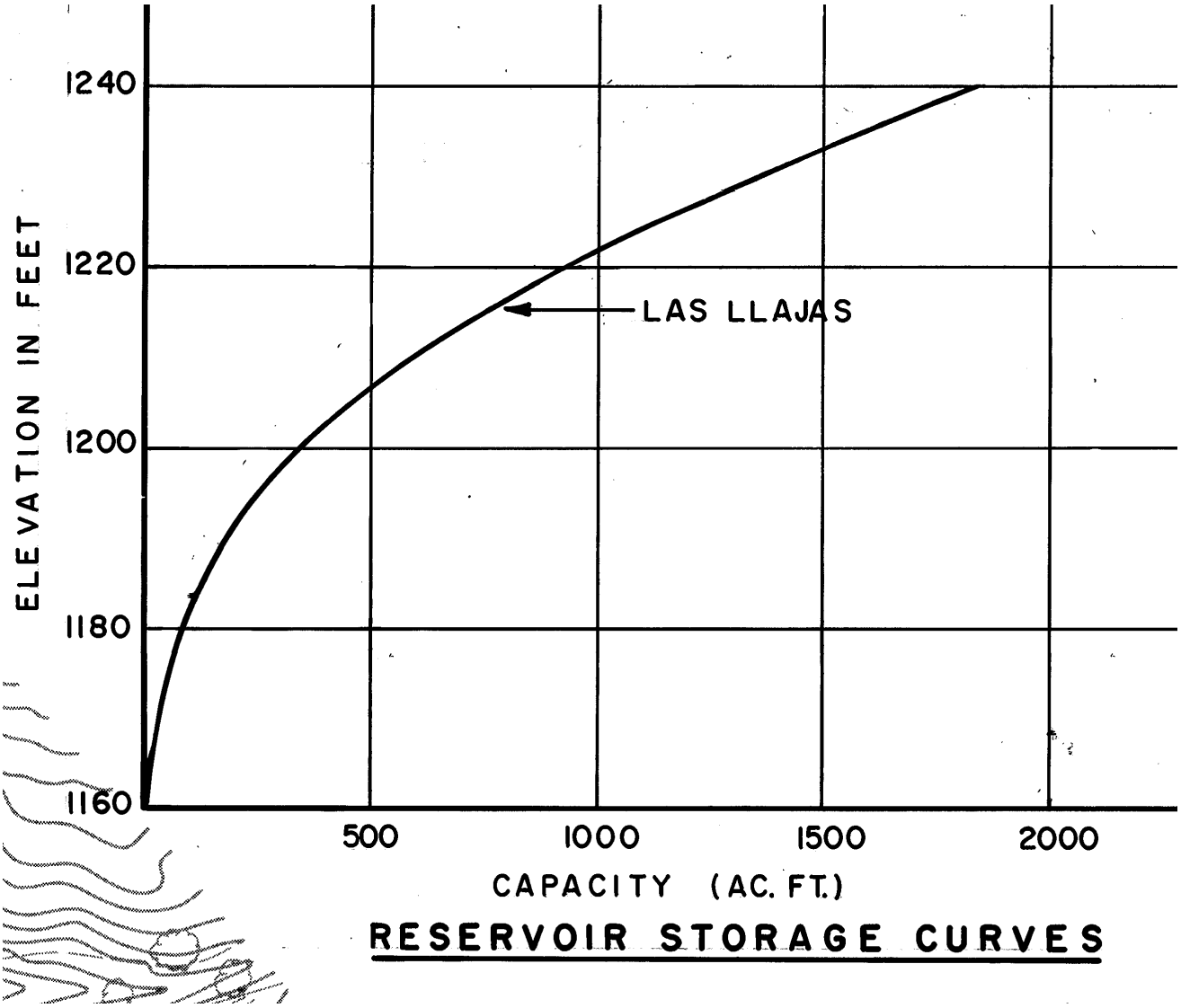
*** Theoretical Value from Kevin Scott Formula; ~3% of Sediment Yield from 50-yr storm, Updated 7/2005

NA= Not Available / Not Applicable


LAS LLAJAS CANYON
N
0 1,500 3,000 6,000 9,000 12,000
Feet
LEGEND
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
LAS LLAJAS CANYON
DETENTION DAM
VCWPD DD 3-20
WATERSHED MAP



Las Llajas Detention Basin



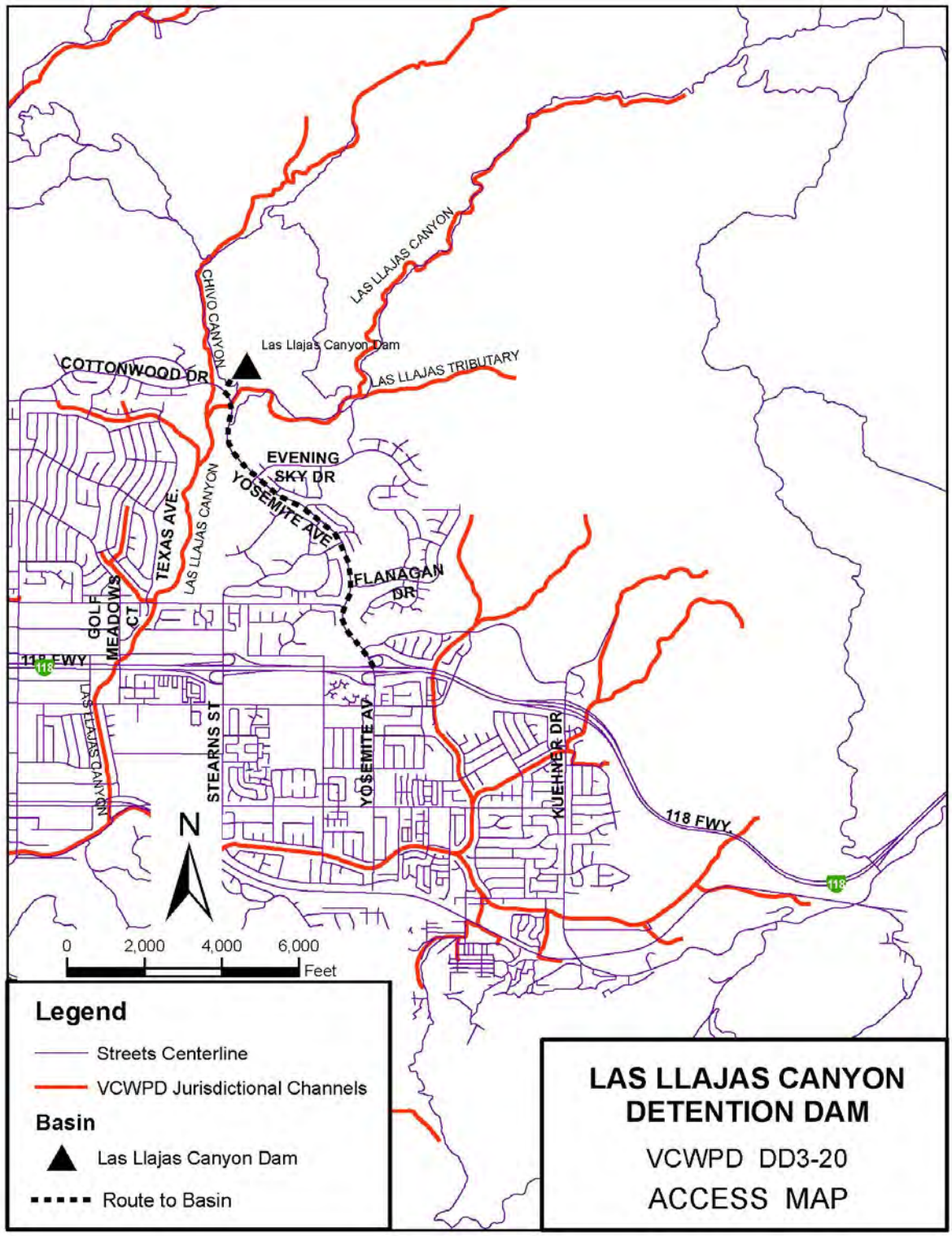
RESERVOIR STORAGE CURVES

Stage Storage Discharge Data

			VCRat Design Model Data		
Elevation	As-Built Vol.	10/05 TIN Vol.	Elevation	Net Vol.	Total Q
Ft. NGVD29	Ac-Ft	Ac-Ft	Ft. NGVD29	Ac-Ft	Cfs
1162	-	-			
1164		0.285			
1166	17.50	1.109			
1168	27.50	2.203			
1170	35.00	3.523			
1172	40.00	5.052			
1174	50.00	6.952			
1176	60.00	9.324			
1178	70.00	12.094			
1180	85.00	15.538			
1182	100.00	19.768			
1184	110.00	24.620			
1186	130.00	31.743			
1188	155.00	42.441			
1190	175.00	56.137	1190	0	0
1192	200.00	72.589	1191	17	46
1194	230.00	93.689	1192	33	129
1196	260.00	120.592	1193	50	236
1198	300.00	151.640	1194	67	364
1200	340.00	186.821	1194.6	75	418
1202	380.00	226.553	1200	170	460
1204	425.00	270.655			
1206	475.00	318.719			
1208	525.00	370.943			
1210	580.00	427.516	1210	428	500
1212	650.00	488.342			
1214	700.00	552.838			
1216	760.00	621.528			
1218	850.00	694.575			
1220	930.00	770.950	1220	788	538
1222	1,010.00	NA	1225	965	554
1224	1,080.00	NA			
1226	1,165.00	NA			
1228	1,260.00	NA	1228	1,093	664.8

			VCRat Design Model Data		
Elevation	As-Built Vol.	10/05 TIN Vol.	Elevation	Net Vol.	Total Q
Ft. NGVD29	Ac-Ft	Ac-Ft	Ft. NGVD29	Ac-Ft	Cfs
1230	1,360.00	NA	1229	1,129	1,148.4
1232	1,450.00	NA	1230	1,175	2,102.0
1234	1,560.00	NA	1231	1,218	3,455.4
1236	1,650.00	NA	1232	1,260	4,438.8
1238	1,740.00	NA	1235	1,428	8,189.0
1240	1,825.00	NA	1235.38	1,444	8,338.3

NA= Not Analyzed


LAS LLAJAS CANYON
CHINO CANYON
Las Llajas Canyon Dam
COTTONWOOD DR
LAS LLAJAS TRIBUTARY
EVENING SKY DR
YOSEMITE AVE
LAS LLAJAS CANYON
TEXAS AVE
FLANAGAN DR
GOLF MEADOWS CT
118 FWY
LAS LLAJAS CANYON
STEARNS ST
YOSEMITE AV
KUEHNER DR
118 FWY
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Las Llajas Canyon Dam
Route to Basin
LAS LLAJAS CANYON DETENTION DAM
VCWPD DD3-20
ACCESS MAP

LAS POSAS ESTATES DETENTION BASIN DD3-08M

LOCATION: Camarillo Hills, NW of City of Camarillo, at the southerly terminus of Ramona Pl; N 269,600, E 1,673,700(Lambert Zone 5 Coordinates);. Camarillo7-1/2' Quad

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Flood Storage Capacity	15.30 ac-ft (24,684 cy) abv debris storage, 16.8 ac-ft total
Design Debris Storage	1.5 ac-ft (2,423 cy) at 153.75 ft NGVD29 fm as-built
Maximum Debris Storage	Design Debris Storage (125% of 100-Yr Yield)
Inflow and Outflow Rates	Q50in=421 cfs, Q100in=507 cfs; Q100out=62 cfs
Debris Cleanout Elevation	152 ft (485 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	RC Drop Box Inlet 8.67 ft L X 6.5 ft W X 5.5 ft H
Drop Box Weir Elevation	167 ft NGVD29
Spillway Weir Length	23.85 ft
Capacity w/o Freeboard	729 cfs
PRINCIPAL SPILLWAY	
Type	3 ft x 5 ft RC Rectangular Tower with Side Inlet
Minimum Inlet and Maximum Tower Elevation	153 ft NGVD29; 163.67 ft NGVD29
Outlet Conduit	24-in RCP
DEBRIS BLEEDER/RISER	
Type	18-in Perforated CSP
Top Elevation	156 ft NGVD29
Outlet Conduit	18 in CSP
DAM	
Dam Type	Earthfill 22.5 ft High
Dam Crest Elevation	174.5 ft NGVD29
Length	260 ft
Surface Area of Full Basin	1.48 ac
Watershed Area	168 ac
Width at Crest	17 ft
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service, Reconstructed by VCWPD
Completion Date	1956, 1992
REFERENCE DRAWINGS	
Construction Drawings	Y-3-11, Y-3-12; Y-3-3101, to Y-3-3117
Right-of-Way Drawings	17,028 & 17,029
Topographic Drawings	11-6-92 (DTM)

EXPECTED DEBRIS PRODUCTION (cy)		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	1,938	2,798
50-YEAR	1,486	2,146
25-YEAR	1,073	1,549

BASIN HISTORY: LAS POSAS ESTATES DETENTION BASIN

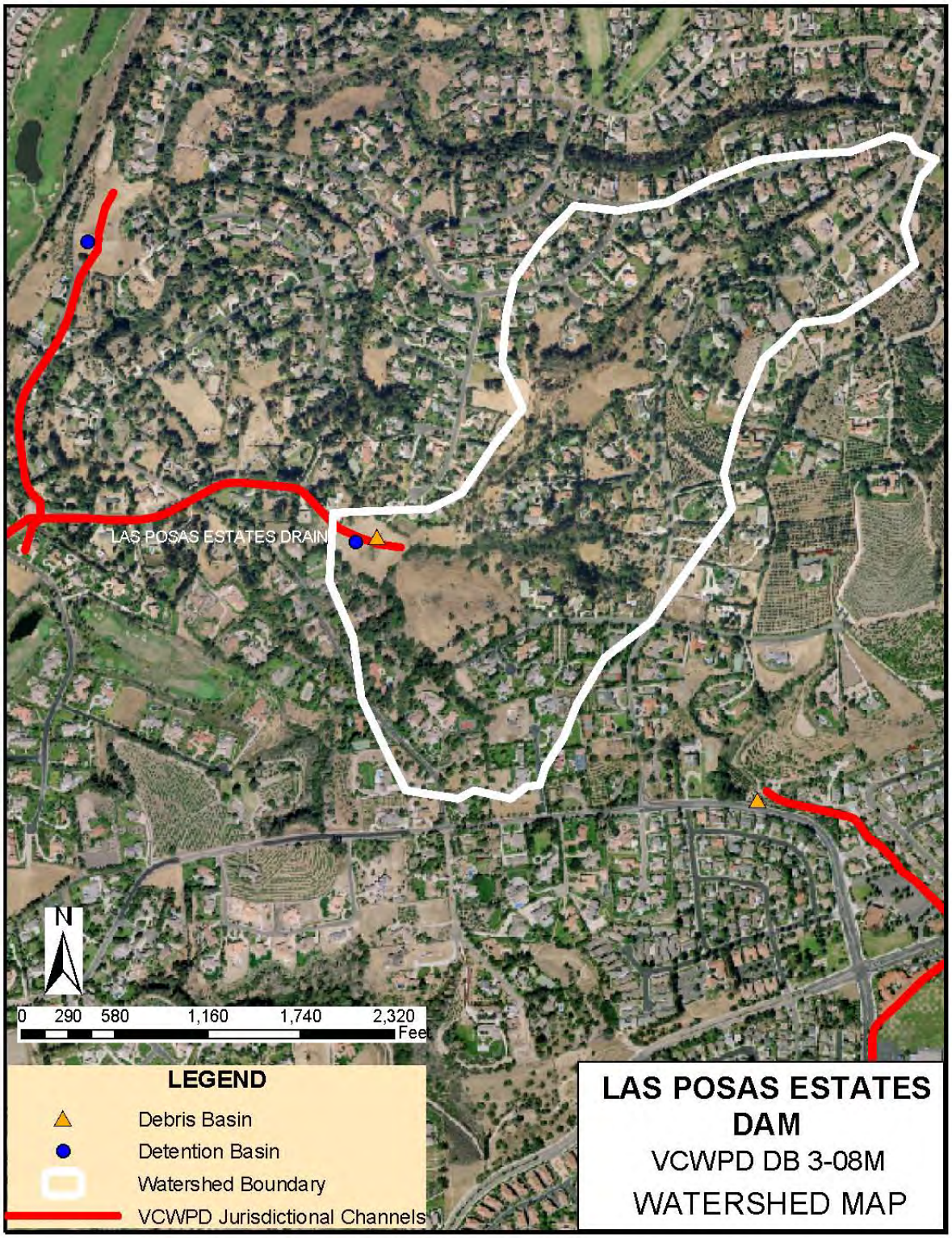
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
11-92	**New Basin Completed**			
11-92	Aerial Survey	2,423 debris storage, 24,684 flood		720
02-94	Cleanout		4,009	
01-95	Disaster Declaration			
08-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey	Not Digitized		
02-98	Disaster Declaration			590
07-98	Aerial Survey	-196 cy debris storage (over max debris cap)		
03-99	Cleanout		1,184	
12-99	Aerial Survey			
04-99	Cleanout		728	
08-01	Aerial Survey	Not Digitized		
12-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			881
		OLD DEBRIS BASIN DB3-08		
02-69	Disaster Declaration			
07-75	Cleanout		11,250	
07-75	Aerial Survey	8,500 out of 15,200 max		
03-78	Disaster Declaration			
04-78	Aerial Survey	14,844		100***
02-80	Disaster Declaration			
11-81	Aerial Survey	Not Digitized		
03-83	Disaster Declaration			
12-85	Aerial Survey	15,200		
08-86	Cleanout		270	
02-91	Aerial Survey	12,384		
02-92	Disaster Declaration			720
11-92		**NEW BASIN COMPLETED**		

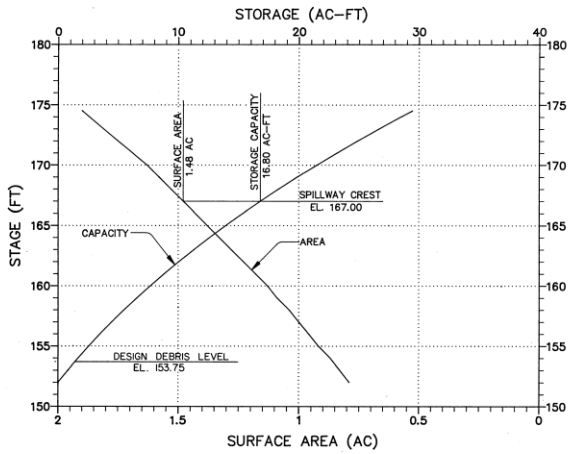
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

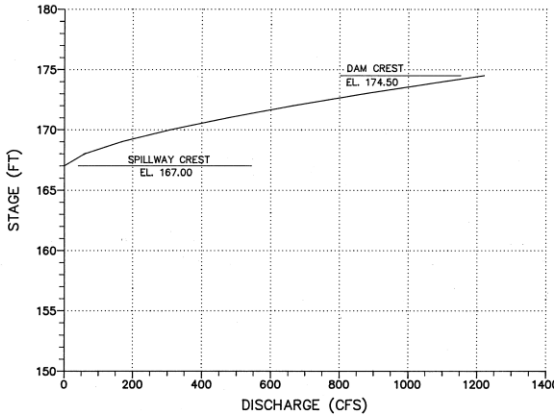
*** Theoretical Value Scott and Williams (1978) (10% of 50-yr yield for old basin

NA= Not Available / Not Applicable

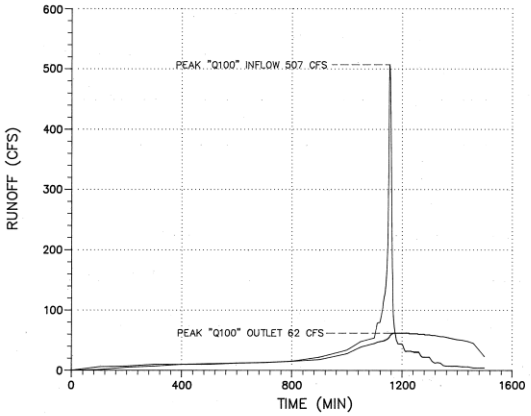

LAS POSAS ESTATES DRAIN
N
0 290 580 1,160 1,740 2,320
Feet
LEGEND
Debris Basin
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
LAS POSAS ESTATES DAM
VCWPD DB 3-08M
WATERSHED MAP



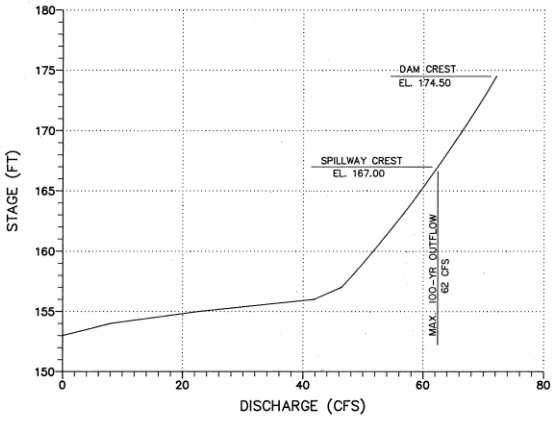
AREA–CAPACITY CURVE



STAGE–DISCHARGE CURVE
EMERGENCY SPILLWAY



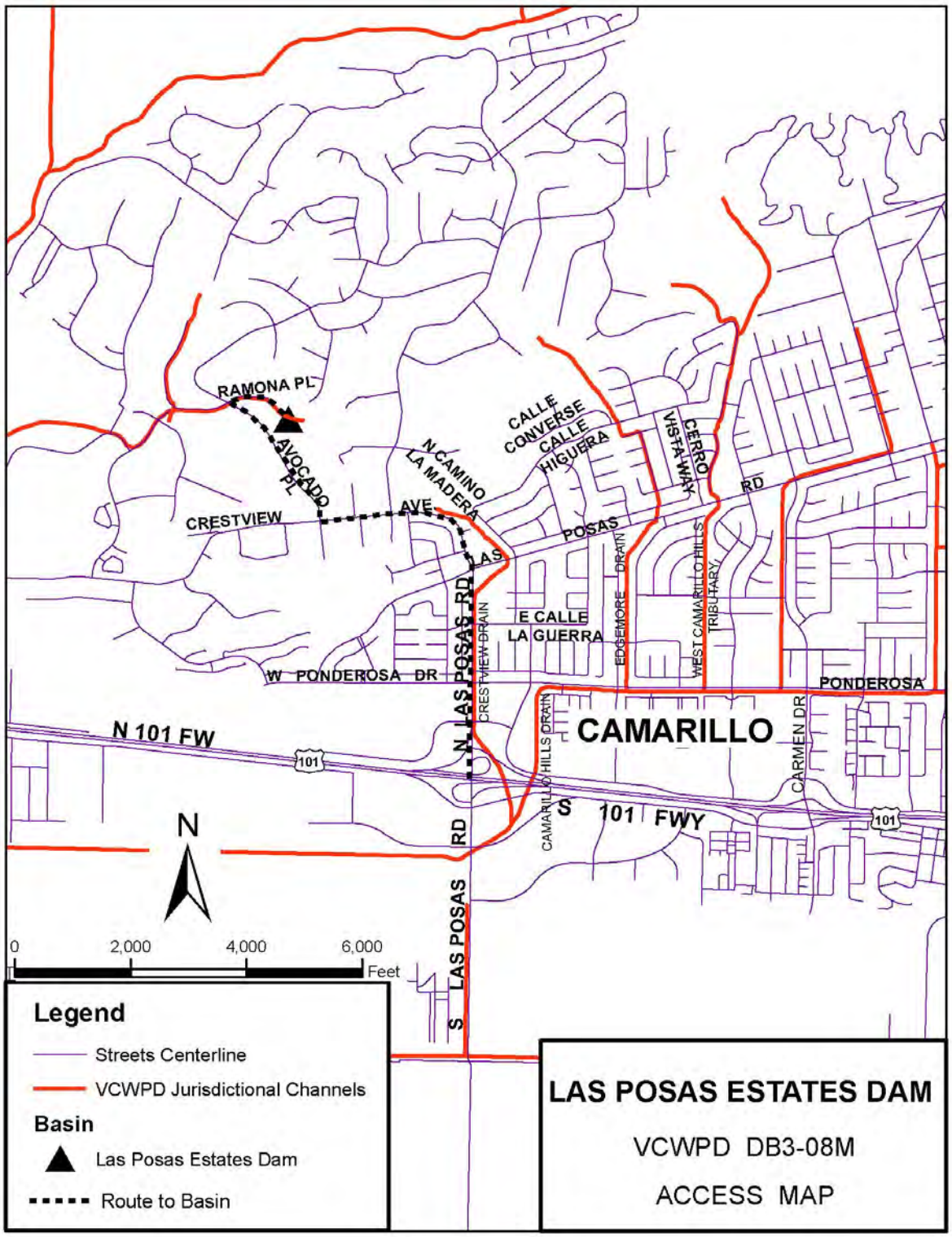
DESIGN STORM HYDROGRAPH



STAGE–DISCHARGE CURVE
OUTLET PIPE

Las Posas Estates Detention Basin

Elevation	1997 Data Net Vol.	As-Built	Riser	Spillway	Total
Ft. NGVD29	Ac-Ft	Ac-Ft	Cfs	Cfs	Cfs
152	-	-	0.0		-
153	-	0.8	0.0		-
154	0.170	1.6	8.1		8.1
155	1.060	2.5	22.8		22.8
156	2.000	3.5	41.8		41.8
157	2.980	4.4	46.4		46.4
158	4.000	5.6	48.2		48.2
159	5.070	6.1	50.0		50.0
160	6.180	7.1	51.7		51.7
161	7.330	8.8	53.3		53.3
162	8.540	10.0	55.0		55.0
163	9.790	11.3	56.5		56.5
164	11.090	12.7	58.0		58.0
165	12.440	13.9	59.5		59.5
166	13.850	15.3	61.0		61.0
167	15.300	16.8	62.4	-	62.4
168	16.810	18.3	63.7	59.4	123.2
169	18.360	20.0	65.0	168.1	233.1
170	19.970	21.5	66.3	308.8	375.1
171	21.640	23.2	67.5	405.3	472.9
172	23.360	24.8	68.7	491.5	560.2
173	25.140	26.6	69.8	582.9	652.8
174	26.980	28.9	70.9	679.6	750.5
174.5	28.890	29.5	71.4	729.7	801.1


RAMONA PL
AVOCADO PL
CRESTVIEW AVE
N CAMINO LA MADERA
CALLE CONVERSE
CALLE HIGUERA
VISTA WAY
CERRO RD
POSAS
LAS
N LAS POSAS RD
E CALLE LA GUERRA
EDGEMORE DRAIN
WEST CAMARILLO HILLS TRIBUTARY
CRESTVIEW DRAIN
W PONDEROSA DR
PONDEROSA
CAMARILLO
CAMARILLO HILLS DRAIN
CARMEN DR
N 101 FW
S 101 FWY
101
S LAS POSAS RD
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Las Posas Estates Dam
Route to Basin
LAS POSAS ESTATES DAM
VCWPD DB3-08M
ACCESS MAP

LINE "C" ARROYO SIMI DETENTION BASIN DD3-30

LOCATION: City of Moorpark, near Spring Road and
N 283,730 E 1,736,280 (Lambert Zone 5 Coordinates)
Moorpark 7 1/2 Quad

DESIGN DATA	(Elevations NGVD29)
Design Agency	Ramseyer and Associates, Inc
Level Capacity	10.1 ac-ft at Q100 elev 524.6 ft NGVD29 fm as-builts
Maximum Debris Capacity	NA
Inflow and Outflow Rates	Q50,Q100IN=347,389 cfs; OUT=154,254 ft (wsel 524.6 ft)
Debris Cleanout Elevation	517.5 ft (3,240 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	None
Invert/Weir Elevation	NA
Spillway Length	NA
Capacity	NA
PRINCIPAL SPILLWAY	
Type	8 ft W 11 ft Deep x 17 ft Tall Riser Tower with Catwalk
High Level Inlet Data	9 ft W x8 ft H opening with weir at 521.4 ft NGVD29
Outlet Conduit and Capacity	8 ft W x 5 ft H RC Box 92 ft long; Q100=254.2 cfs
DEBRIS BLEEDER/RISER	
Type	2.5 ft tall 48 in Perforated Semi-Circular CSP below 3.0 ft tall trash rack covering 3 ft W x 4.5 ft H low level opening in Riser Tower
Low Level Inlet Elevations	Bottom 513 ft; Top 517.5 NGVD29
Outlet Conduit	Principal Spillway Outlet
DAM	
Dam Type	Earthfill with Soil Cement
Dam Crest Elevation	530 ft NGVD29
Length	NA
Width at Crest	NA
Surface Area of Full Basin	NA
Watershed Area	635 ac
CONSTRUCTION DATA	
Construction Agency	Ramseyer and Associates
Completion Date	8/1997
REFERENCE DRAWINGS	
Construction Drawings	Y3-3655 – Y3-3673 Arroyo Simi Bank Protection
Topographic Drwgs(pre-const)	NA
Right-of-Way Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	12,956	18,793
50-YEAR	9,878	14,328
25-YEAR	6,390	1,010

BASIN HISTORY: LINE "C" DETENTION BASIN

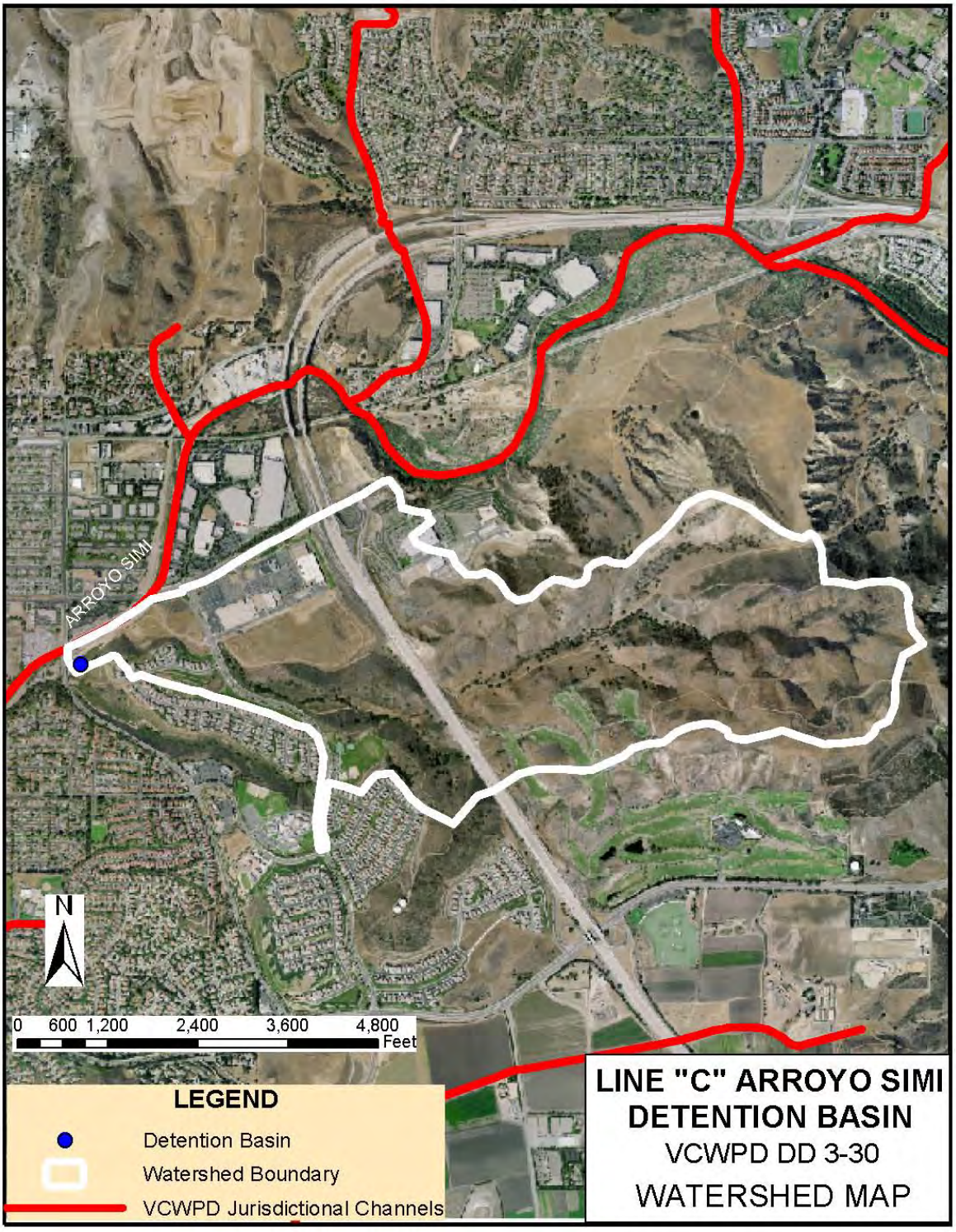
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-05	Disaster Declaration	No cleanout data reported by O&M		990***

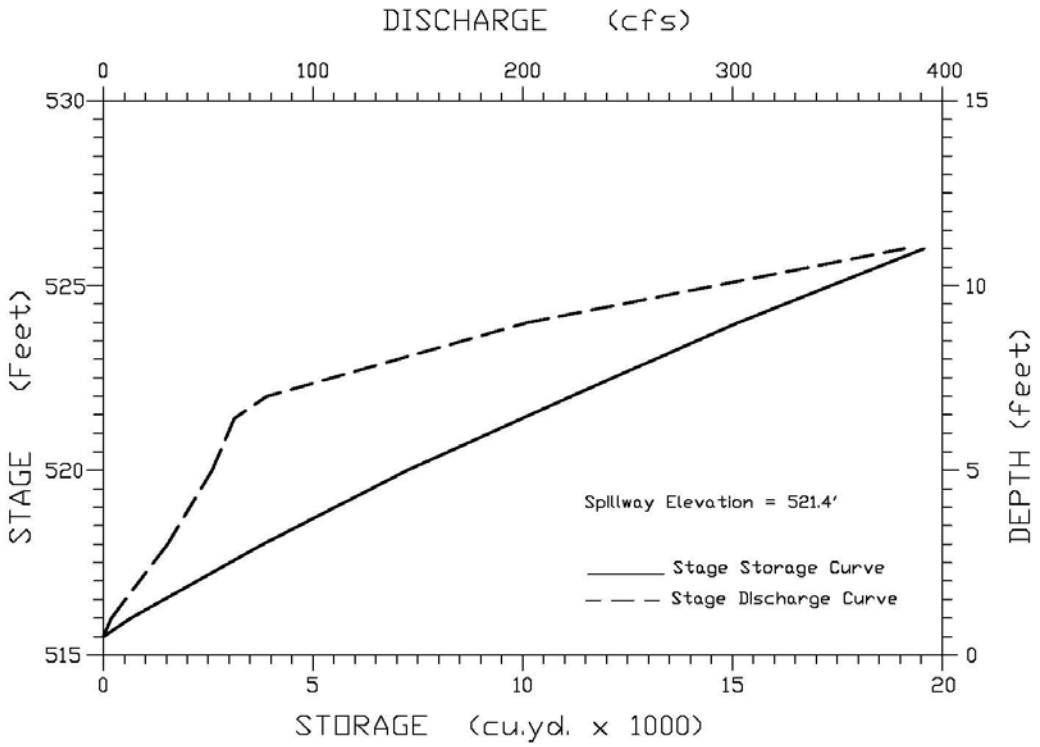
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

*** Theoretical Value from Scott and Williams (1978) 10% of 50-Yr Design Sediment Yield

NA= Not Available / Not Applicable

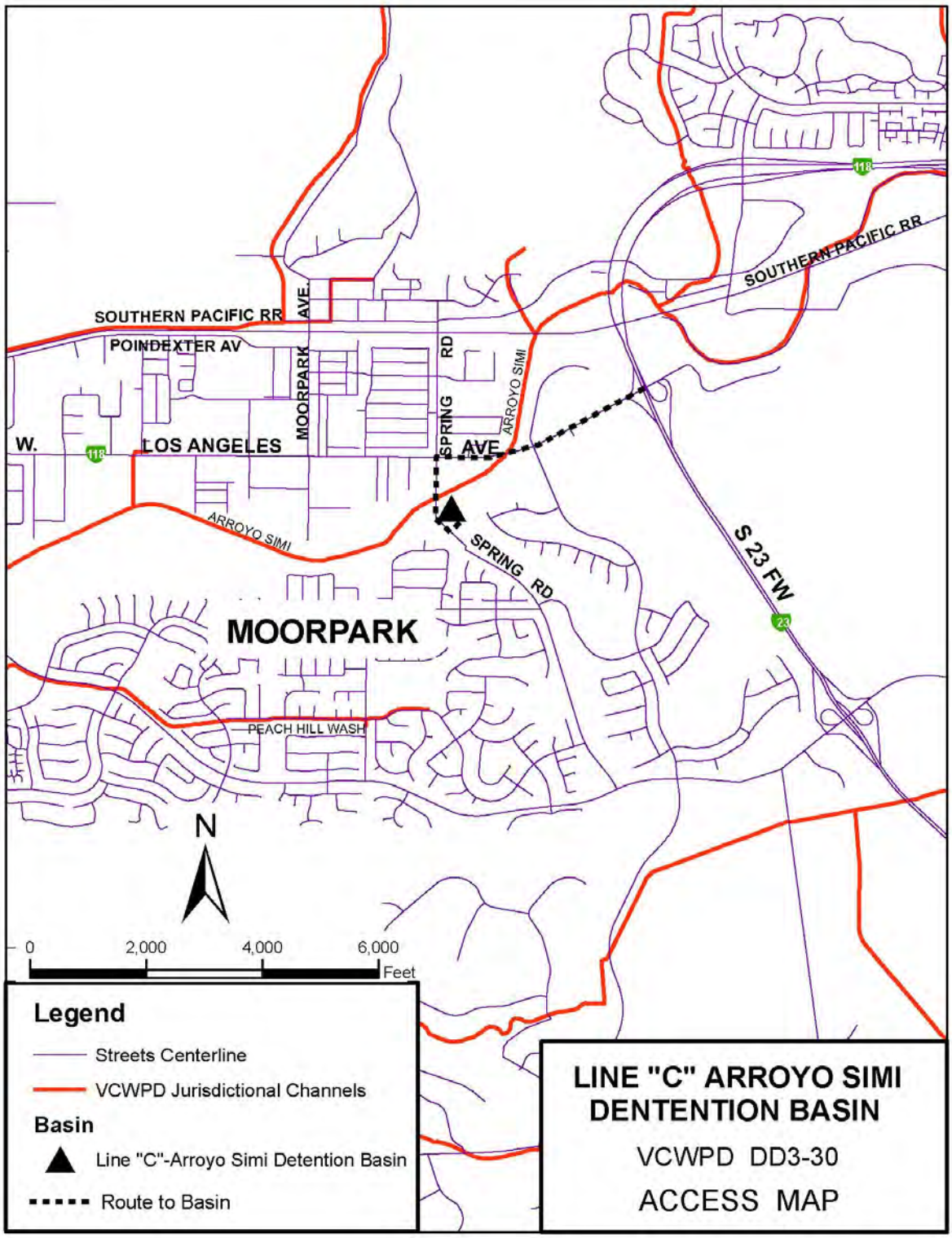

ARROYO SIMI
N
0 600 1,200 2,400 3,600 4,800
Feet
LEGEND
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
LINE "C" ARROYO SIMI
DETENTION BASIN
VCWPD DD 3-30
WATERSHED MAP



Stage Storage Discharge Data

Elevation	Volume	Discharge
Ft. NGVD29	Ac-Ft	cfs
515.5	-	-
516.0	0.40	3.8
518.0	2.34	30.6
520.0	4.51	51.9
521.4	6.14	62.4
522.0	6.84	77.8
524.0	9.32	202.4
526.0	12.05	382.0

Source: VCRat Model Data supplied by Ramseyer (design engineer)


SOUTHERN PACIFIC RR
POINDEXTER AV
MOORPARK AVE.
SPRING RD
ARROYO SIMI
W. LOS ANGELES AVE
ARROYO SIMI
SPRING RD
MOORPARK
PEACH HILL WASH
SOUTHERN PACIFIC RR
S 23 FW
N
0 2,000 4,000 6,000 Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Line "C"-Arroyo Simi Detention Basin
Route to Basin
LINE "C" ARROYO SIMI DENTENTION BASIN
VCWPD DD3-30
ACCESS MAP

MUIRFIELD NPDES & DETENTION BASINS DD3-25

LOCATION: Simi Valley, Between Erringer and Bus Canyon Tributaries nr Muirfield Drive
N 274,390,E 1,770,270 (Lambert Zone 5 Coordinates);
Simi 7 1/2' Quad.

DESIGN DATA	(Elevations ft NGVD29)
Design Agency	Crosby Mead Benton
Level Capacity	2,300 cy at spillway invert (Y-3-3837)
Maximum Debris Capacity	125% of 100-yr Volume
100-Yr Inflow Rate	78 cfs,
Outflow Rate	23 cfs at emergency spillway invert
Debris Cleanout Elevation	Elev. 885 ft 110 cy (25% of 100-yr sediment volume)
EMERGENCY SPILLWAY	
Type	Top of Tower Adj. to Principal Spillway, 4 x 6 ft drop inlet
Crest Elevation	892 ft NGVD29
Spillway Length	16 ft
Capacity w/o Freeboard	190 cfs
PRINCIPAL SPILLWAY	
Type	4 ft x 4 ft Rect. Tower w/ 2 4x5' openings protected by trash rack
Inlet Weir Elevations	887.5 ft NGVD29
Outlet Conduit	36 in RCP
Outflow Rates	23 cfs w/ full basin
DEBRIS BLEEDER	
Type	None
DAM	
Dam Type	Earthfill topped by roadbed
Dam Crest Elevation	894.2 ft NGVD29
Length	NA
Surface Area of Full Basin	0.27 ac
Watershed Area	24 ac Simi Valley MDP (draft)
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	Crosby Mead Benton
Completion Date	2002
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3836 to 3848 "Arielle and Muirfield Detention Basins"
Right-of-Way Drawings	NA
Topographic Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	442	640
50-YEAR	363	526
25-YEAR	256	371
10-YEAR	141	205

Note, undeveloped areas drain to basin through culverts and pipes which are expected to decrease the amount of sediment arriving at the basin

*

BASIN HISTORY:

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
		No cleanout data reported by O&M		

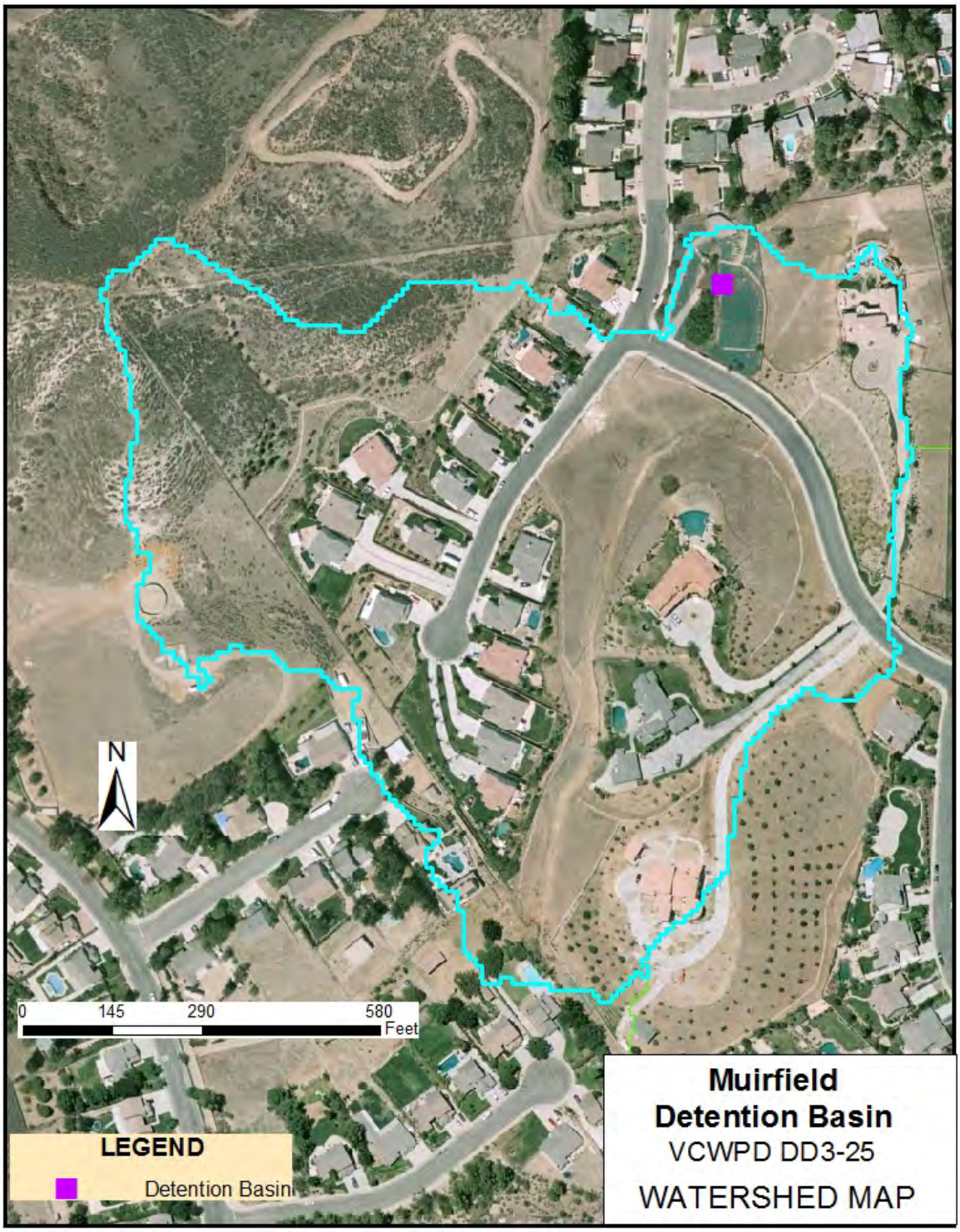
Notes

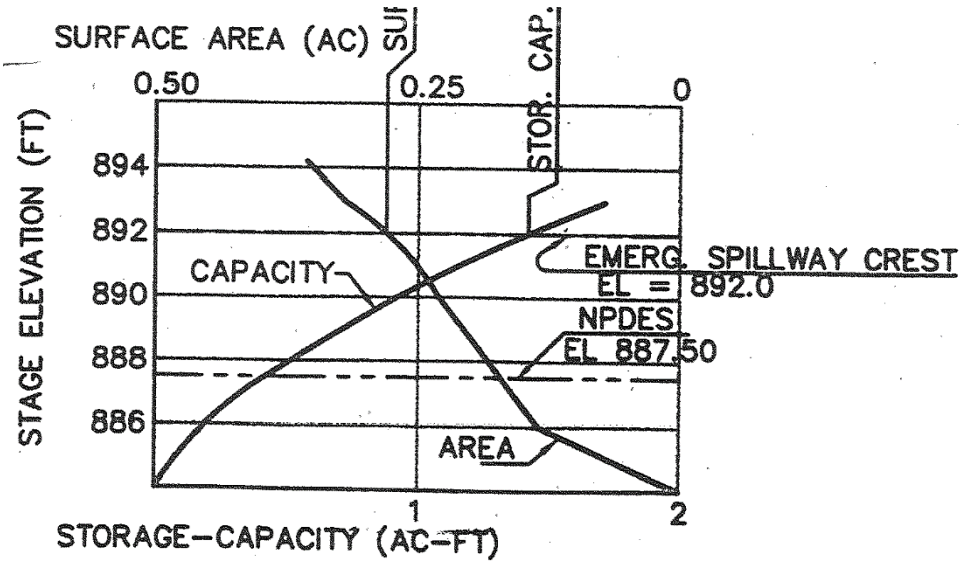
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

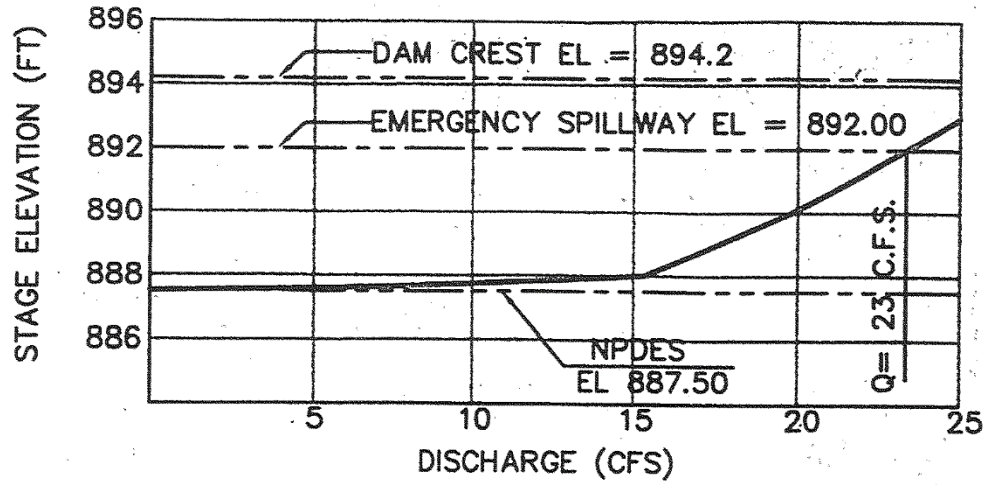
NA= Not Available / Not Applicable


N
0 145 290 580
Feet
LEGEND
Detention Basin
Muirfield
Detention Basin
VCWPD DD3-25
WATERSHED MAP

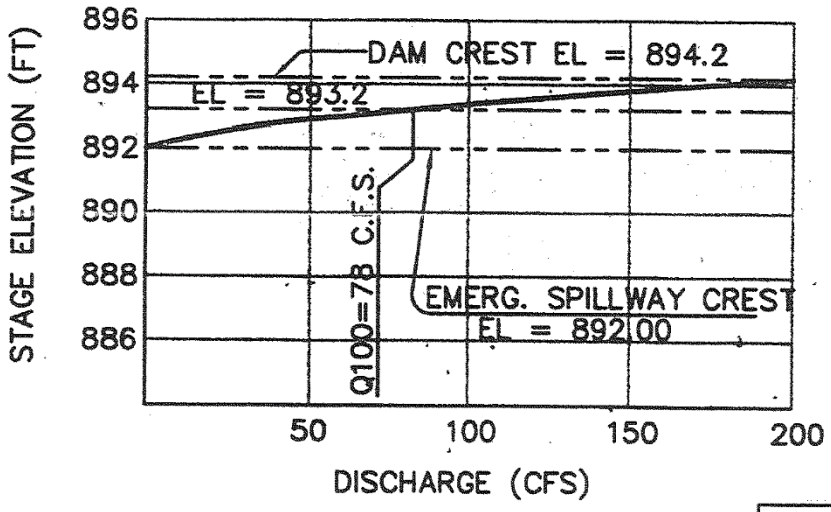


Stage Storage Discharge Data From As-Builts

Elevation	As-Built Vol	10/2011 TIN Vol	Riser Disch.	Spillway Disch.	Total Q
Ft. NGVD29	Ac-Ft	Ac-Ft	CFS	CFS	CFS
884	-				
885	0.077				
886	0.182	-			
887	0.327	0.003			
887.5	0.414	NA	-		-
888	0.518	0.037	15.0		15.0
889	0.695	0.131	17.5		17.5
890	0.914	0.270	19.8		19.8
891	1.145	0.435	21.4		21.4
892	1.420	0.623	23.0	-	23.0
893	1.700	0.834	25.0	62.2	87.2
893.2	NA	NA	25.1	78.0	103.1
894	NA	1.068	NA	NA	NA
895	NA	1.325	NA	NA	NA
896	NA	1.606	NA	NA	NA



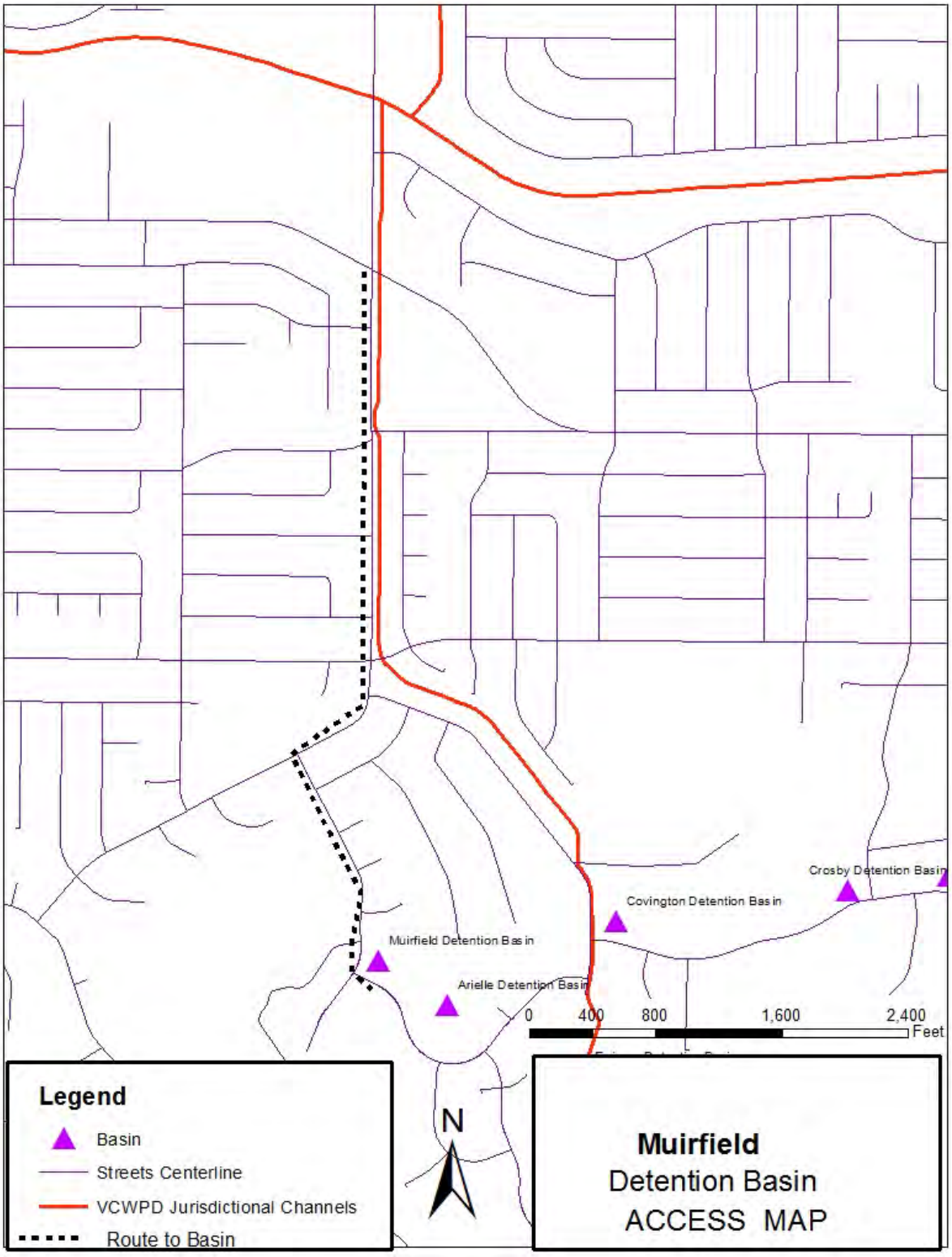
STAGE-DISCHARGE CURVE
OUTLET PIPE



STAGE-DISCHARGE CURVE
EMERGENCY SPILLWAY

R

DATE PROJECT CC


Crosby Detention Basin
Covington Detention Basin
Muirfield Detention Basin
Arielle Detention Basin
0
400
800
1,600
2,400
Feet
Legend
Basin
Streets Centerline
VCWPD Jurisdictional Channels
Route to Basin
N
Muirfield
Detention Basin
ACCESS MAP

NORTH SIMI DRAIN DEBRIS BASIN DB3-32

LOCATION: City of Simi Valley, North of Alamo St on Erringer Road
N: 287,664 E: 1,769,444 (Lambert Zone 5 Coordinates)
Simi Valley, Quad Map

DESIGN DATA

Design Agency	VTN WEST, INC
Level Capacity	9.04 ac-ft
Maximum Debris Capacity	9.04 ac-ft or 14,582 cu.yd- assumed same as level capacity
Design Debris Volume	4.3 ac-ft or 6,937 cu.yd at 983.6 ft NGVD29 fm as-builts
Inflow Rate	Q100=1,404 cfs, outflow assumed same for modeling
Outflow Rate	Q100 Water Surface Elev 989.14 ft NGVD29
Debris Cleanout Elevation	Elev. 981 ft, 1,390 cy (25% of 100-yr sediment volume)
EMERGENCY SPILLWAY	
Type	120 ft W x 4 ft H Rectangular RC Spillway
Weir Elevation	987 ftNGVD29
Spillway Length	137 ft
Capacity with and w/o Freeboard	4,300 cfs from stage discharge curve on as-builts
PRINCIPAL SPILLWAY	
Type	4 ft W X 7.5 ftD Riser RC Tower Bottom 978.8 ft with Inclined Trash Rack from 986 to 991 ft NGVD29
Inlet Weir Elevations	986 ft NGVD29
Outlet Conduit	24-in RCP
DEBRIS BLEEDER/RISER	
Type	5 inx9 in Slots in Riser Tower to 986 ft NGVD29
Top Elevation	NA
Outlet Conduit	Principal Spillway Outlet
DAM	
Dam Type	Earthfill
Dam Crest Elevation	992.5 ft NGVD29
Length	NA
Surface Area of Full Basin	1.54 ac
Watershed Area	704 ac from GIS; 291 developed
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	2003
REFERENCE DRAWINGS	
Construction Drawings	Y3-3915-3943
Right-of-Way Drawings	NA
Topographic Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy): 2017 Calcs		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	8,700 (5,550)	12,615
50-YEAR	5,080	7,370
25-YEAR	3,760	5,455
10-YEAR	2,275	3,300

Note: Most sediment traverses ditches and culverts before reaching basin. Sediment may be trapped in system before reaching basin. Design 100-yr Vol of 5,550 cy calculated assuming 4.3 ac-ft shown on plans is 125% of design data.

BASIN HISTORY: NORTH SIMI DRAIN DETENTION BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-05	Disaster Declaration			
		No data reported by O&M		

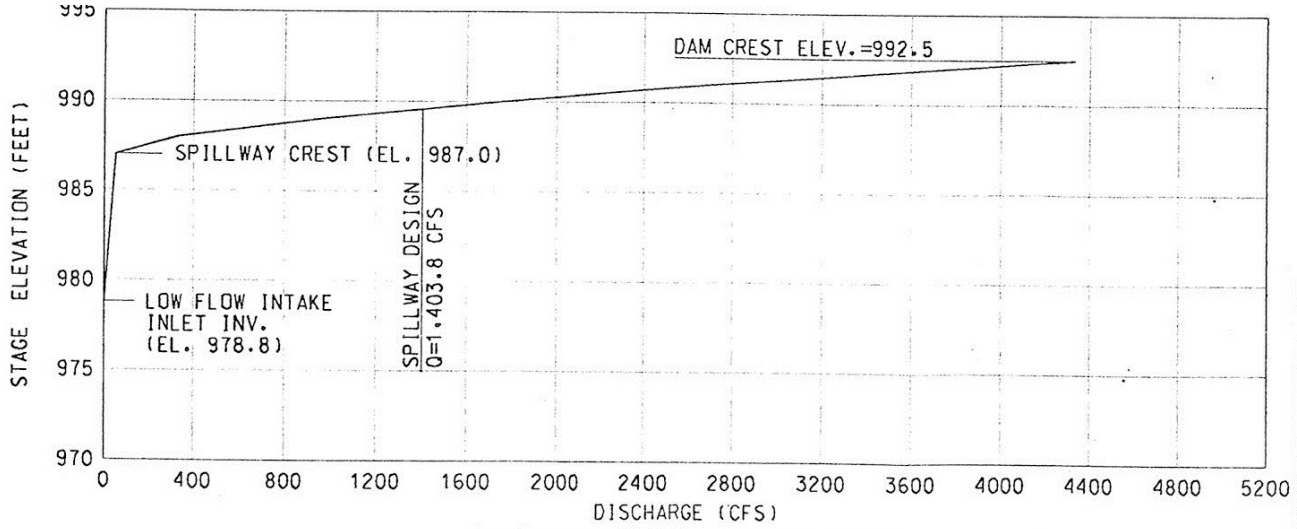
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

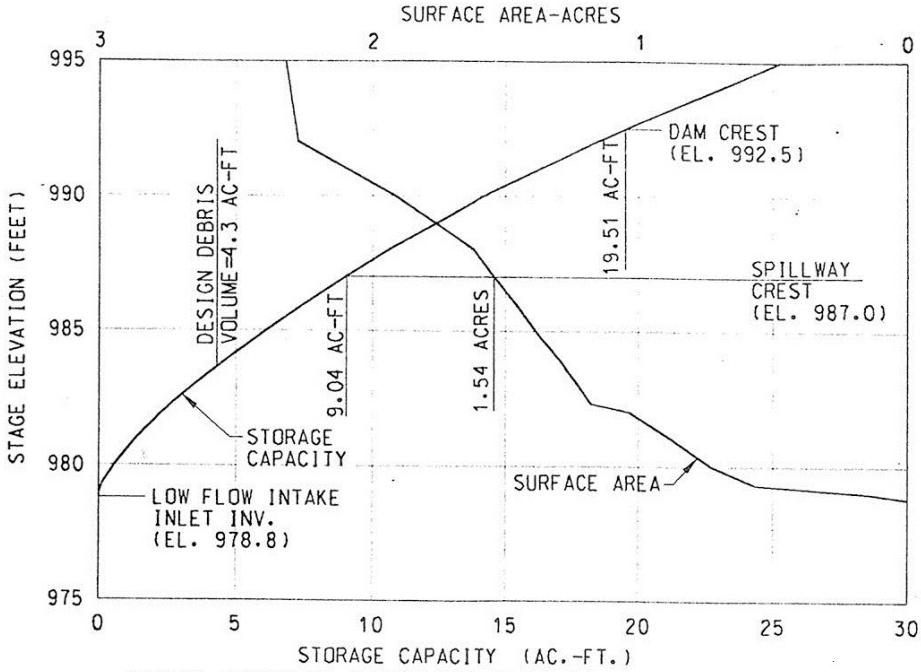
** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable



STAGE-DISCHARGE RATING CURVE
(FOR DEBRIS BASIN)



STAGE-STORAGE CAPACITY-SURFACE AREA CURVES
(FOR DEBRIS BASIN)

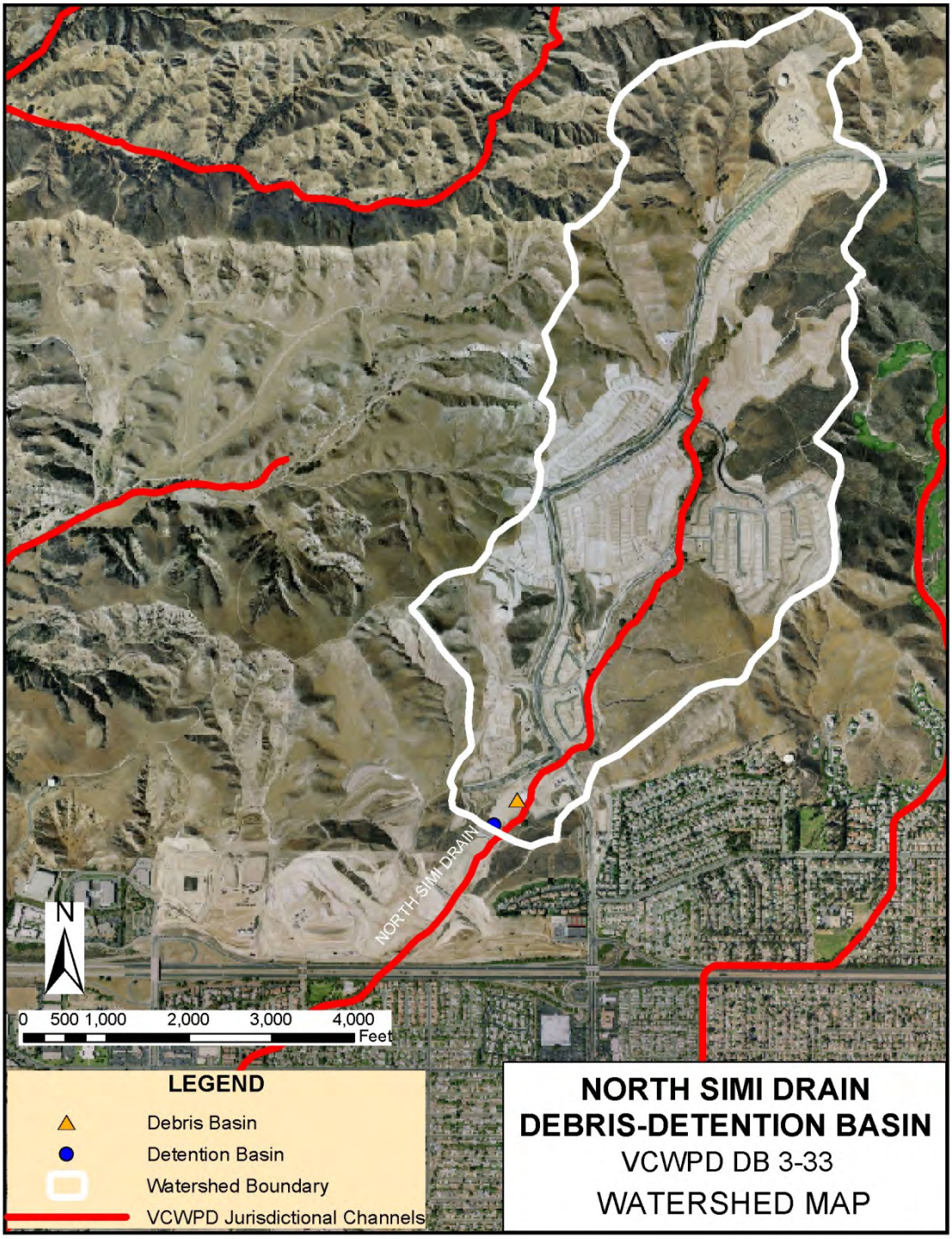
Watershed and Access Maps Same as Detention Basin DD3-32

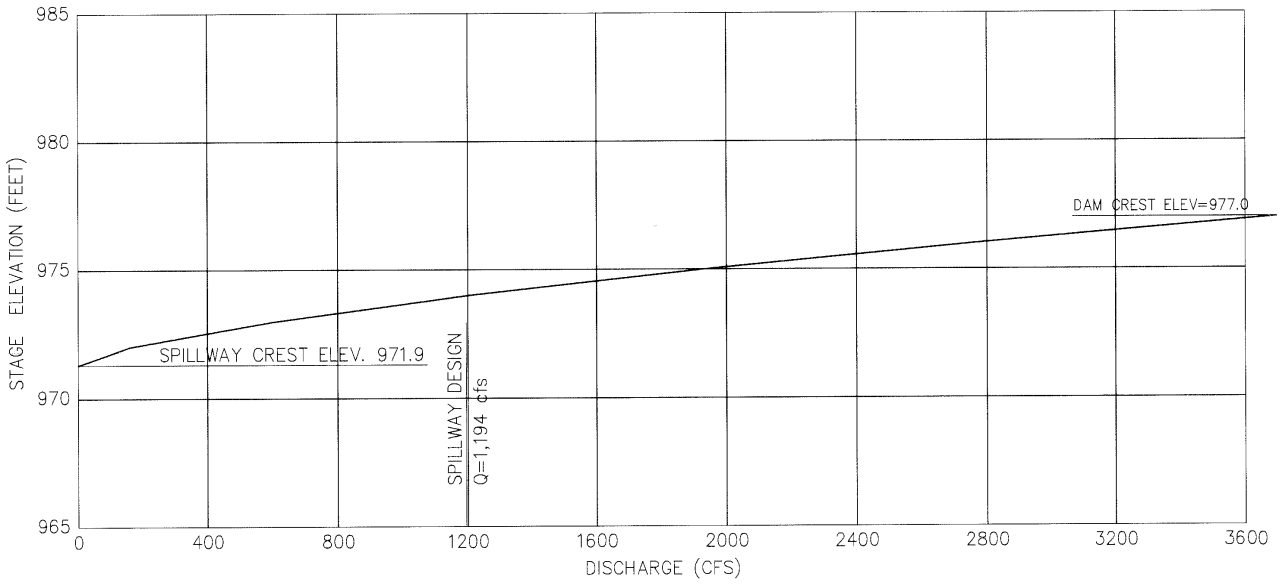
NORTH SIMI DRAIN DETENTION BASIN DD3-32

LOCATION: City of Simi Valley, North of Alamo St on Erringer Road
N: 287,664 E:1,769,444 (Lambert Zone 5 Coordinates)
Simi Valley, Quad Map

DESIGN DATA

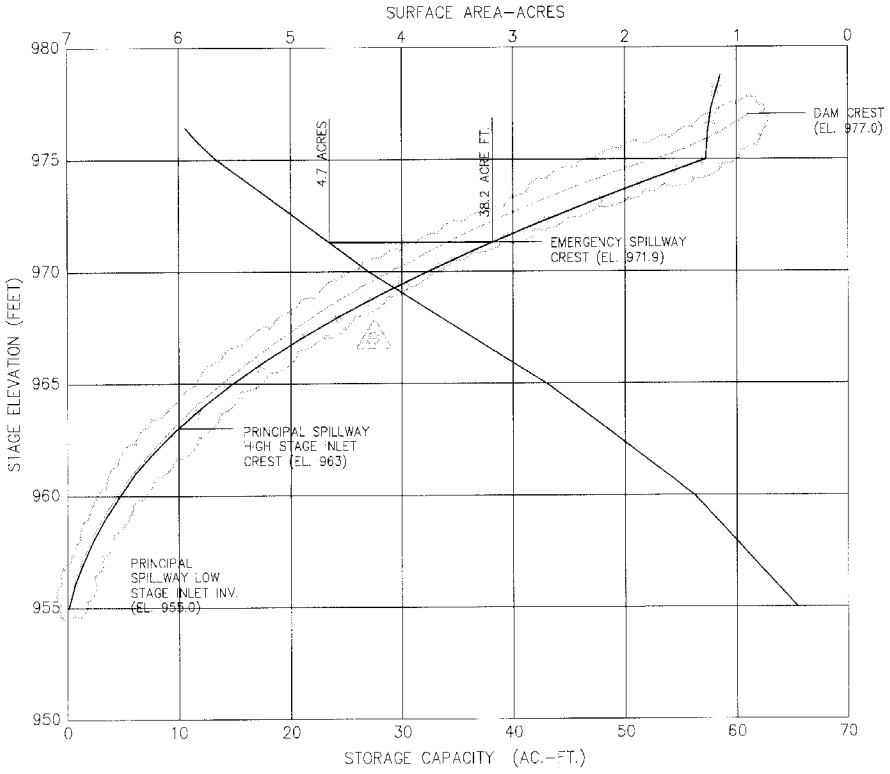
Design Agency	RBF
Level Capacity	38.2 ac-ft (61,630 cy)
Maximum Debris Capacity	None- Debris Basin Intercepts Sediment
100-Yr Water Surface Elev.	970.9 ft NGVD29
100-Yr Inflow Rate	1,404 cfs assuming no attenuation in debris basin
100-Yr Outflow	684 cfs from plans
EMERGENCY SPILLWAY	
Type	40 ft L X 15 ft W Drop Box Inlet Spillway
Weir Elevation	971.9 ft NGVD29
Spillway Length	95 ft
Capacity w/o Freeboard	1,194 cfs w/ blocked Princ. Spillway, 3,600 cfs at dam crest
PRINCIPAL SPILLWAY	
Type	13 ft X 11.5 ft Riser RC Tower with Low and High Level Inlets and Catwalk, Grated Top at 967 ft NGVD29
Inlet Weir Elevations	962 ft for 6 ft Wx4 ft H High Level Inlet; 955 ft for 6 ft Wx4 ft H Low Level
Outlet Conduit	84-in RCP
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill
Dam Crest Elevation	977.0 ft NGVD29
Length	~500 ft from as-builts
Surface Area of Full Basin	4.7 ac
Watershed Area	704 ac (GIS acreage=704 ac, Upper North Simi Drain)
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	2004
REFERENCE DRAWINGS	
Construction Drawings	Y3-3915- 3943
Right-of-Way Drawings	NA
Topographic Drawings	NA


NORTH SIMI DRAIN
N
0 500 1,000 2,000 3,000 4,000
Feet
LEGEND
Debris Basin
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
NORTH SIMI DRAIN
DEBRIS-DETENTION BASIN
VCWPD DB 3-33
WATERSHED MAP

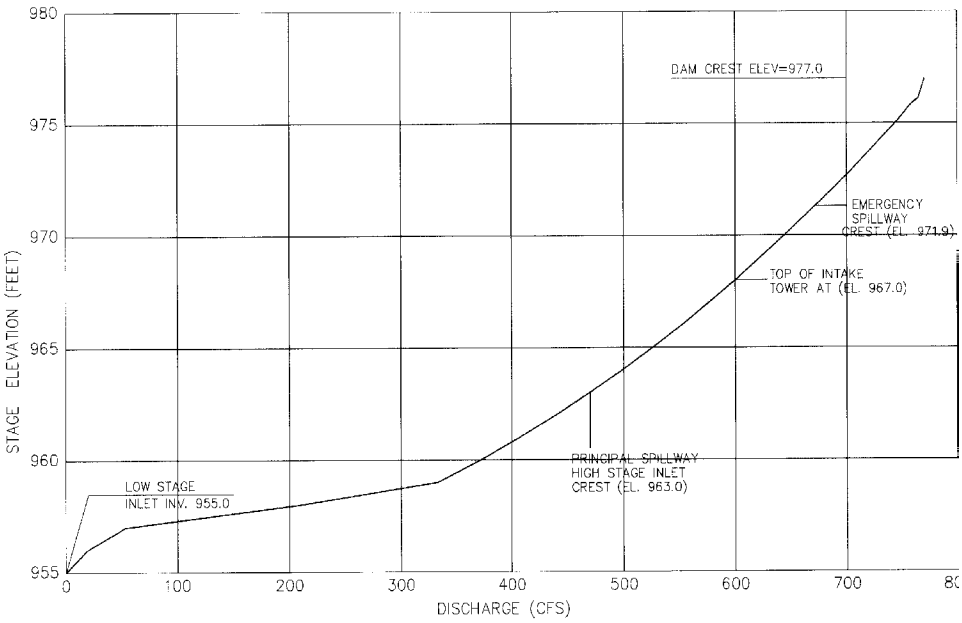


STAGE–DISCHARGE RATING CURVE
FOR EMERGENCY SPILLWAY

North Simi Drain Detention Basin



STAGE–STORAGE CAPACITY–SURFACE AREA CURVES
SCALE: HORIZ. 1"=100 ACRE–FEET OR 1"=1 ACRE
VERT. 1"=5'

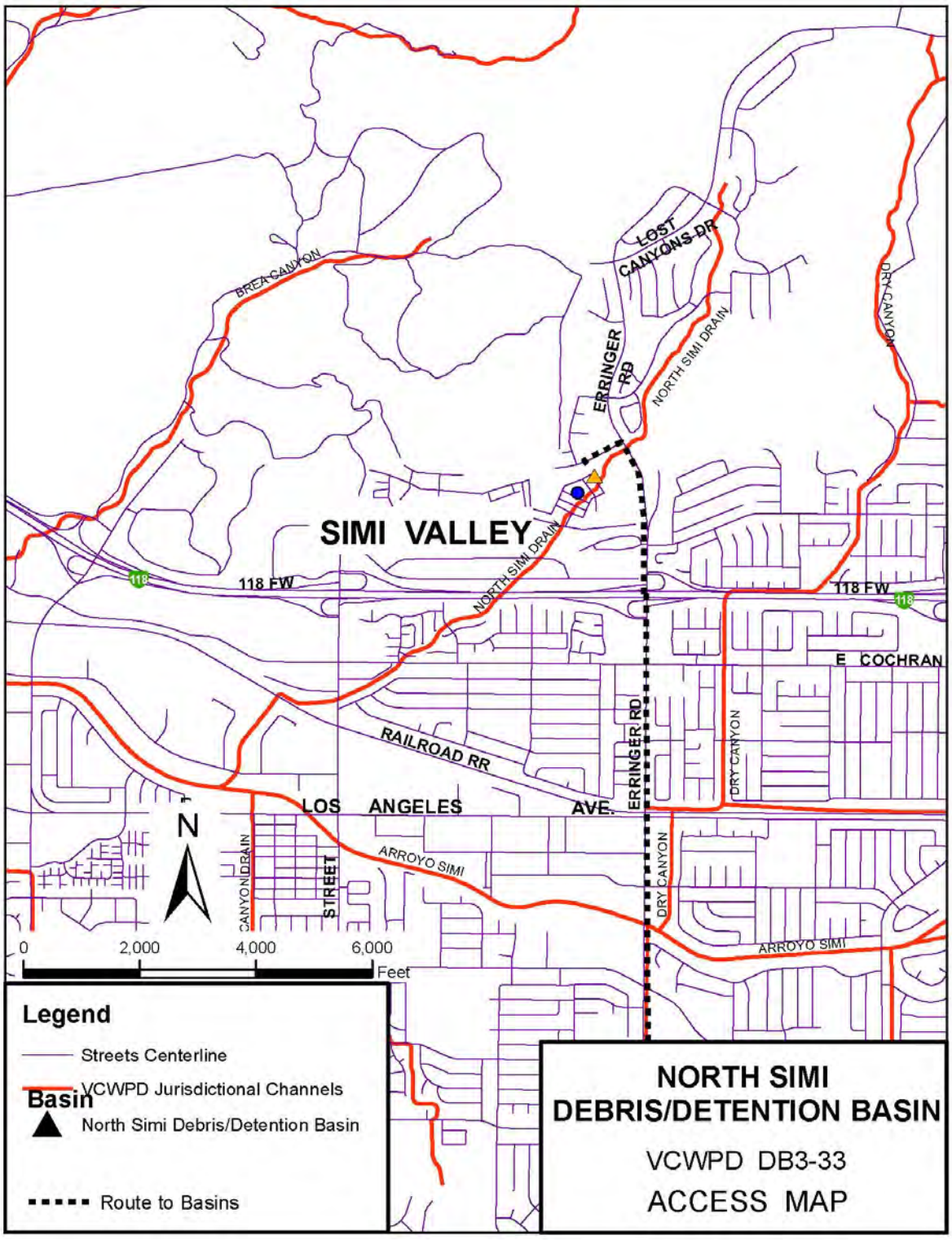


STAGE–DISCHARGE RATING CURVE
FOR PRINCIPAL SPILLWAY

North Simi Drain Detention Basin

Stage Storage Discharge Data from As-Builts

Elevation	Vol	Riser Disch.	Spill Disch.	Total Disch.
Ft. NGVD29	Ac-ft	cfs	cfs	cfs
955	-	-		-
956	0.6	18.5		18.5
957	1.4	52.0		52.0
958	2.3	208.0		208.0
959	3.4	337.0		337.0
960	4.8	372.0		372.0
961	6.2	405.0		405.0
962	7.8	440.0		440.0
963	9.4	470.0		470.0
964	11.6	500.0		500.0
965	13.8	527.0		527.0
966	16.4	546.0		546.0
967	19.0	576.0		576.0
968	22.0	600.0		600.0
969	25.2	622.0		622.0
970	29.0	645.0		645.0
971	32.6	665.0	-	665.0
972	37.0	684.0	160	844.0
973	41.4	706.0	612	1,318.0
974	47.0	724.0	1,194	1,918.0
975	52.6	745.0	1,940	2,685.0
976	57.4	762.0	2,684	3,446.0
977	61.0	770.0	3,696	4,466.0


SIMI VALLEY
BREA CANYON
LOST CANYONS DR
ERRINGER RD
NORTH SIMI DRAIN
DRY CANYON
118 FW
E COCHRAN
RAILROAD RR
LOS ANGELES AVE.
ARROYO SIMI
STREET
CANYON DRAIN
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
North Simi Debris/Detention Basin
Route to Basins
NORTH SIMI
DEBRIS/DETENTION BASIN
VCWPD DB3-33
ACCESS MAP

PEACH HILL WASH RETENTION BASIN DD3-23

LOCATION: Moorpark, approx.1 mi. W of Tierra Rejada Rd., adjacent to Mountain Trail St. in Mt Meadows development; N 279,433 E 1,725,776 (Lambert Zone 5 Cordinates); Moorpark 7 1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	DMJM
Flood Storage Capacity	75.6 ac-ft (121,968 cy)
Design Debris Capacity	5,676 cy At Elevation 461.62 (NGVD29)
Inflow and Outflow Rates	Q50,Q100IN=2100, 2,523 cfs; OUT=893, 911 cfs
Debris Cleanout Elevation	459 ft (1,135 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	16 ft W X 8 ft H RC Box Culvert with Wing Walls
Invert Elevation	470 NGVD29
Spillway Length	NA
Capacity w/o Freeboard	2,523 cfs
PRINCIPAL SPILLWAY	
Type	10 ft W X 6 ft H RCB Culvert with Wing Walls
Weir Elevation	456 ft NGVD29
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill , 24 ft
Dam Crest Elevation	480 ft NGVD29
Length	240 ft
Surface Area of Full Basin	3.0 ac
Watershed Area	1,589 ac from Quad
Width at Crest	40 ft
CONSTRUCTION DATA	
Construction Agency	Private Developer in City of Moorpark
Completion Date	1985 (Dam/Spillway) 1988 (Basin Improv.)
REFERENCE DRAWINGS	
Construction Drawings	Y-3-2540 thru Y-3-2551
Right-of-Way Drawings	118MR16
Topographic Drawings	1870 - L1A (City of Moorpark)

Basin is maintained by City, District is responsible for Dam Maintenance Only

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	4,541	6,587
50-YEAR	3,466	5,027
25-YEAR	2,486	3,606

BASIN HISTORY: **PEACH HILL WASH RETENTION BASIN**

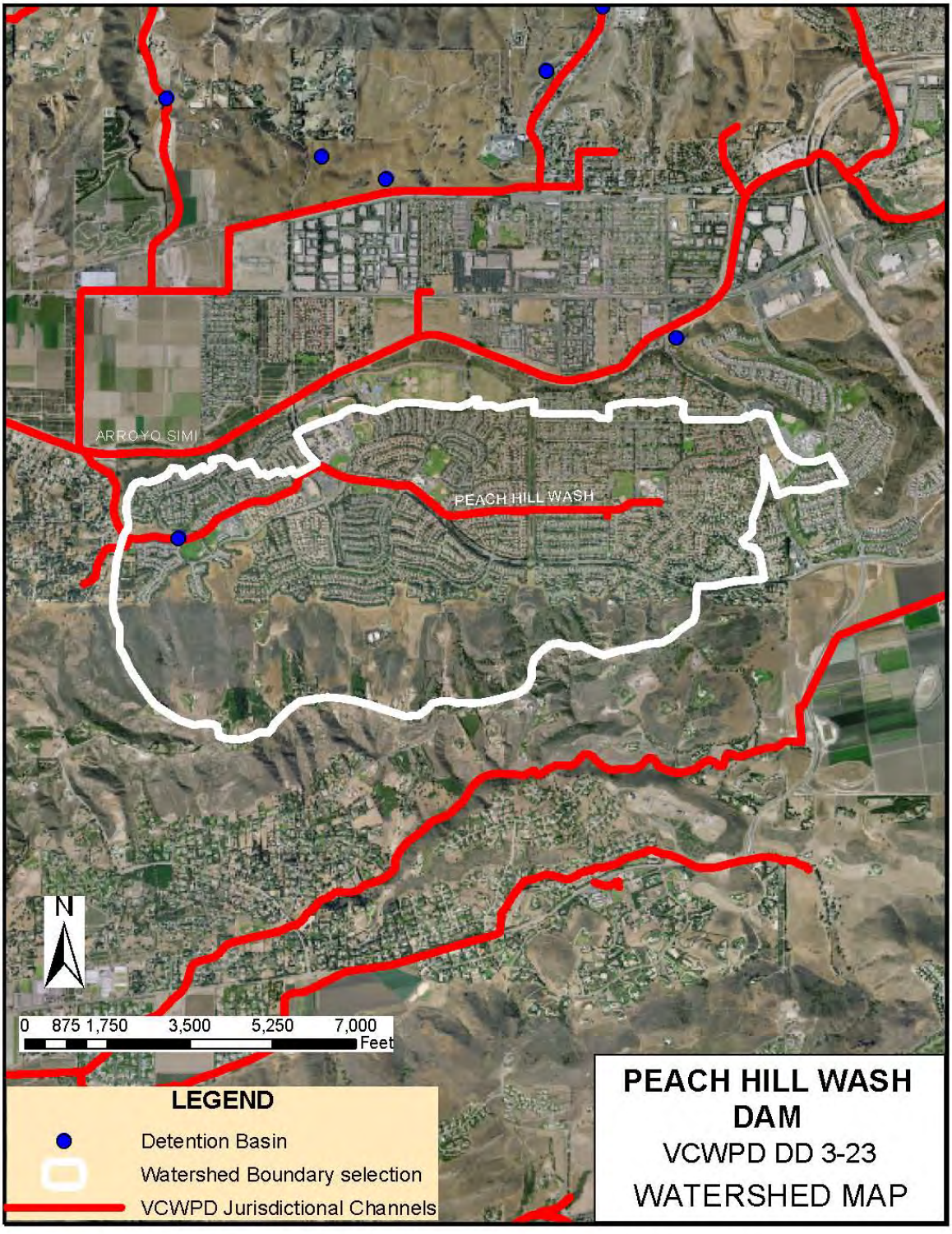
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-85	Dam Constructed			350***
02-92	Disaster Declaration			350***
01-95	Disaster Declaration			350***
02-98	Disaster Declaration			350***
01-05	Disaster Declaration			350***
	O&M does not do cleanouts on basin, only has dam maintenance responsibility.			

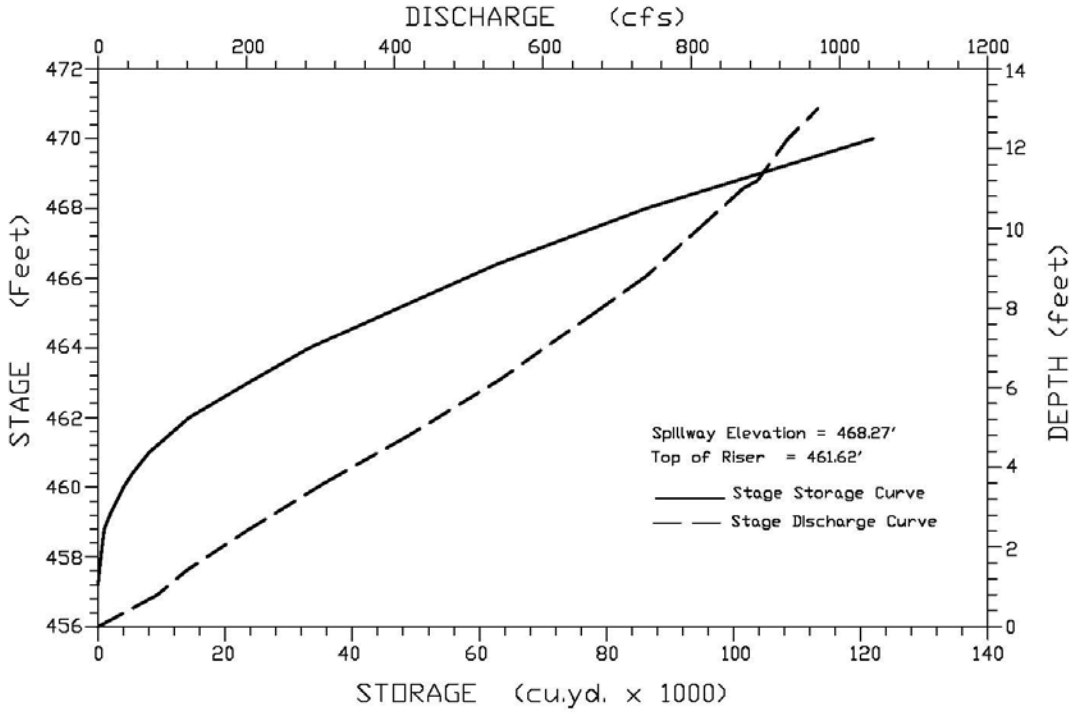
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

*** Theoretical Value from Scott and Williams (1978), 10% of 50-Yr Sediment Yield

NA= Not Available / Not Applicable

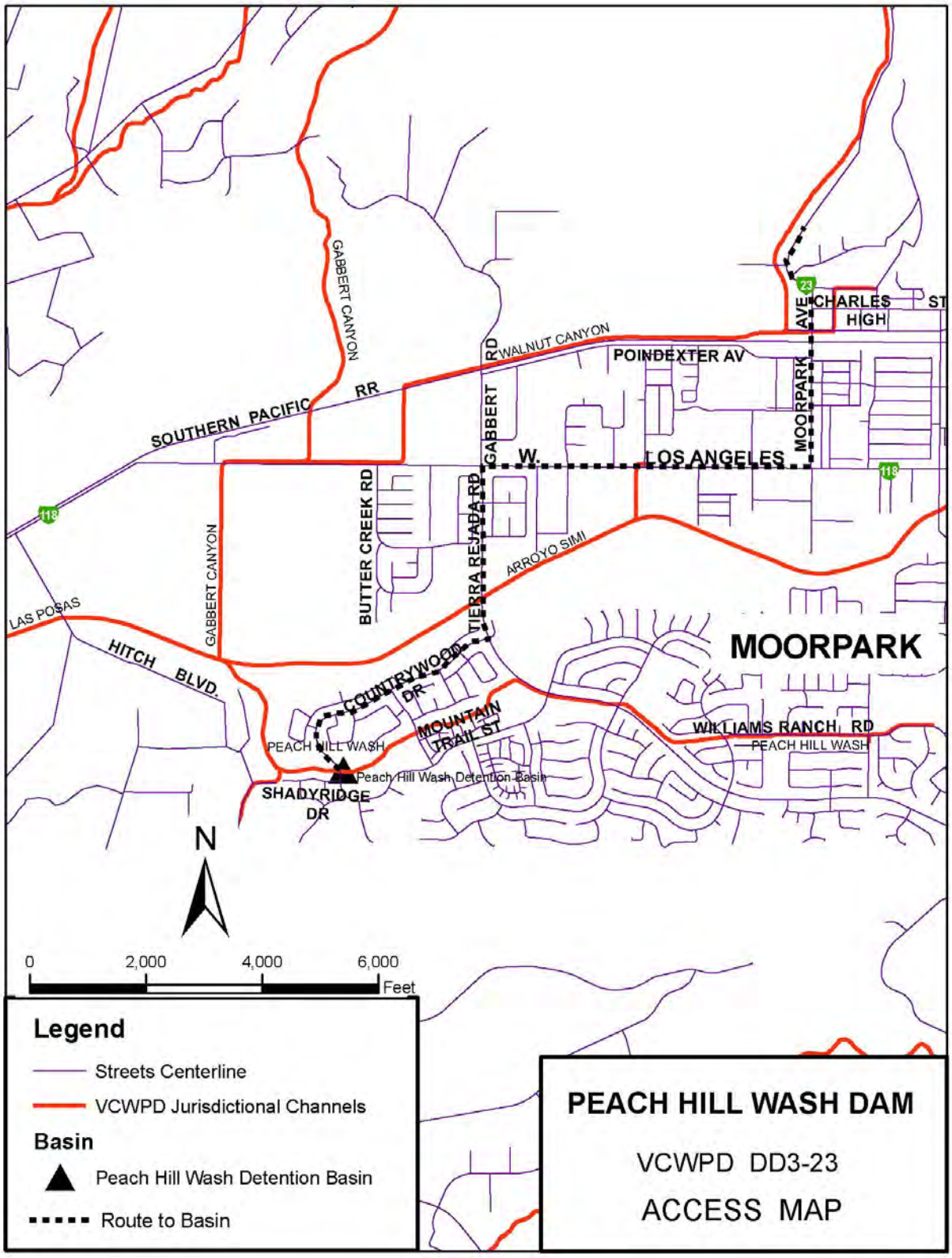

ARROYO SIMI
PEACH HILL WASH
N
0 875 1,750 3,500 5,250 7,000
Feet
LEGEND
Detention Basin
Watershed Boundary selection
VCWPD Jurisdictional Channels
PEACH HILL WASH DAM
VCWPD DD 3-23
WATERSHED MAP



Net Stage Storage Discharge Routing Data from 2003 Calleguas VCRat Model

Elevation	VCRat Vol	VCRat Total Disch.
Ft. NGVD29	Ac-ft	cfs
456.00	-	-
457.00	-	-
458.00	-	-
459.00	-	-
460.00	1.75	240
461.00	5.77	330
462.00	10.07	430
463.00	14.57	520
464.00	19.17	600
465.00	24.07	680
466.00	32.17	750
467.00	41.07	810
468.00	50.77	880
469.00	61.17	920
470.00	72.07	970
471.00	80.27	1,010
472.00	95.87	2,523

Note: Appears to account for 25% of 100-yr debris volume
Does not account for 125% of 100-yr volume.


GABBERT CANYON
SOUTHERN PACIFIC RR
WALNUT CANYON RD
POINDEXTER AV
CHARLES HIGH ST
MOORPARK AVE
GABBERT RD
W. LOS ANGELES
BUTTER CREEK RD
TIERRA REJADA RD
ARROYO SIMI
LAS POSAS
HITCH BLVD.
GABBERT CANYON
COUNTRYWOOD DR
MOUNTAIN TRAIL ST
SHADYRIDGE DR
PEACH HILL WASH
Peach Hill Wash Detention Basin
WILLIAMS RANCH RD
PEACH HILL WASH
MOORPARK
N
0 2,000 4,000 6,000 Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Peach Hill Wash Detention Basin
Route to Basin
PEACH HILL WASH DAM
VCWPD DD3-23
ACCESS MAP

RAMONA DETENTION DAM DD3-16M

LOCATION: Camarillo Hills, NW of Camarillo, at northerly terminus of Ramona Pl;

N 271,555 E 1,672,195 (Lambert Zone5 Coordinates);
Camarillo 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Flood Storage Capacity	25.56 ac-ft above debris storage of 2.89 ac-ft
Design Debris Capacity	4,665 cy (2.89 ac-ft) at 153.5 ft (NGVD29)
Inflow and Outflow Rates	Q_{100}IN= 583 cfs, Q_{100}OUT= 131 cfs
Debris Cleanout Elevation	151 ft (930 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	RC Drop Box Inlet Spillway
Weir Elevation	170 ft NGVD29
Weir Length	50 ft
Design Discharge	1,187 cfs
PRINCIPAL SPILLWAY	
Type and Top Elevation	4 ft X 3 ft RC Rectangular Tower with Side Inlet and Catwalk, Top Elev. 165.67 ft NGVD29
Side Inlet Bottom Elevation	154 ft NGVD29
Outlet Conduit	36 in RCP
DEBRIS BLEEDER/RISER	
Type	18 in Perforated CSP
Top Elevation	155 ft NGVD29
Outlet Conduit	18 in CSP
DAM	
Dam Type	Earthfill 29 ft High
Dam Crest Elevation	176 ft NGVD29
Length	255 ft
Surface Area of Full Basin	2.27 ac
Watershed Area	254 ac from Quad Map
Width at Crest	17 ft
CONSTRUCTION DATA	
Construction Agency	SCS; VCWPD
Completion Date	1961; Basin Reconstructed in 1992
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3118 thru Y-3-3134
Right-of-Way Drawings	;Y-3-3121
Topographic Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	3,732	5,422
50-YEAR	2,763	4,014
25-YEAR	2,038	2,961

BASIN HISTORY: RAMONA DETENTION DAM

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
11-92	**New Dam Completed**	**DEBRIS CAP 4,665 cy**		273**
11-92	Aerial Survey	4,665 debris storage		
01-95	Disaster Declaration			284***
07-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey	4,825 debris storage		
02-98	Disaster Declaration			284***
07-98	Aerial Survey	1,236 out of 4,665		
12-99	Aerial survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
12-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			271
05-17	WR&T TIN analysis	21,824 at elev 165 ft Design storage approx. 22,665 at elev 165 ft		
	OLD BASIN DB3-16	**DEBRIS CAP 5,500 cy**		
02-69	Disaster Declaration			
10-69	Cleanout		2,500	
06-75	Aerial Survey	1,851		
03-78	Disaster Declaration			
04-78	Aerial Survey	15		
02-80	Disaster Declaration			
11-81	Cleanout		4,110	
12-81	Aerial Survey	Not Digitized		
03-83	Disaster Declaration			
04-83	Aerial Survey	773		284***
07-83	Cleanout		2,214	
12-85	Aerial Survey	2,397		
07-86	Cleanout		223	

BASIN HISTORY: RAMONA DETENTION DAM

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
07-86	Aerial Survey	2,620		
07-86	Cleanout		2,900	
11-87	Aerial Survey	5,549		
11-88	Aerial Survey	Not Digitized		
10-89	Aerial Survey	4,707		
09-90	Aerial Survey	Not Digitized		
06-91	Aerial Survey	4,640		
02-92	Disaster Declaration			273**
11-92	**New Dam Constructed**			

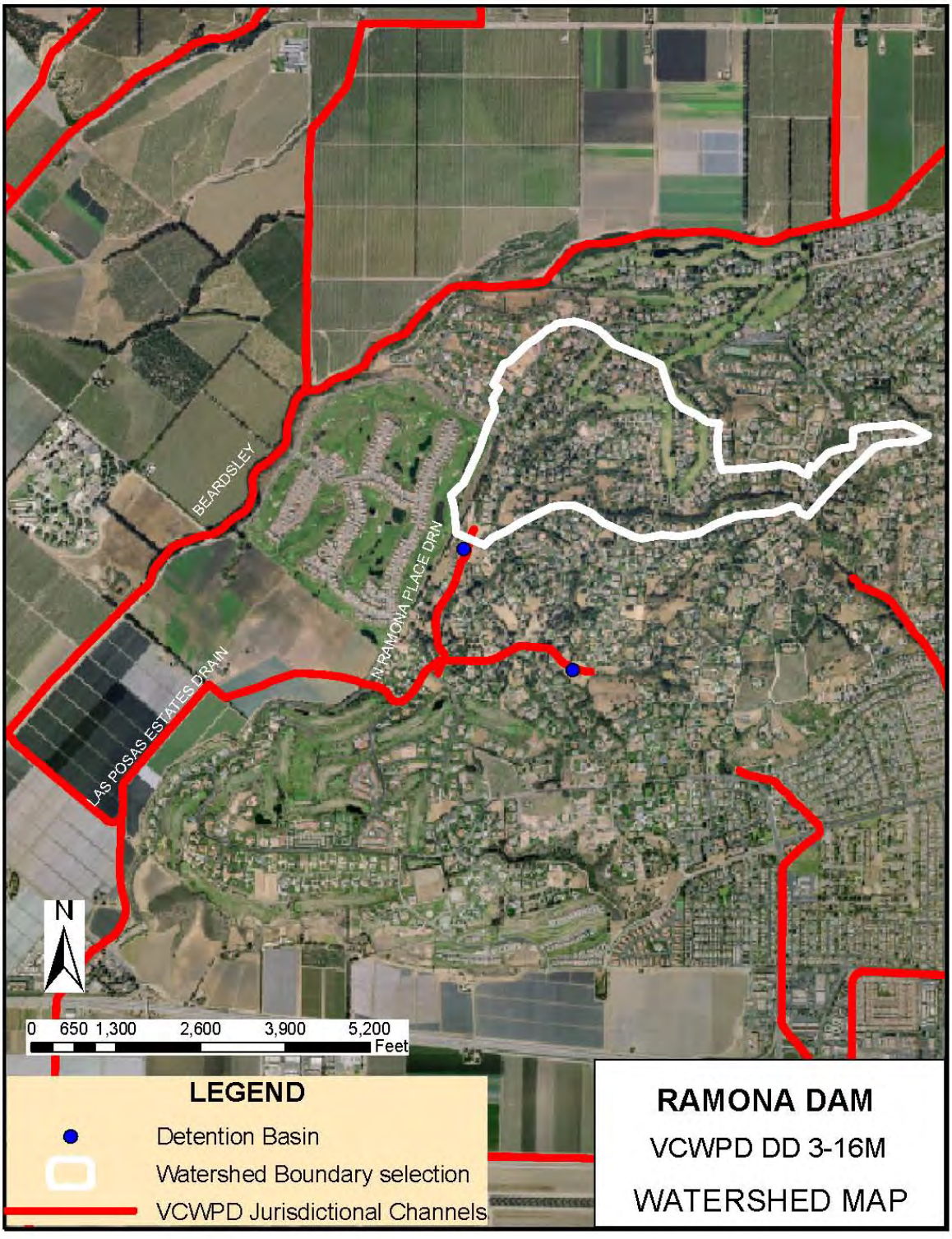
Notes

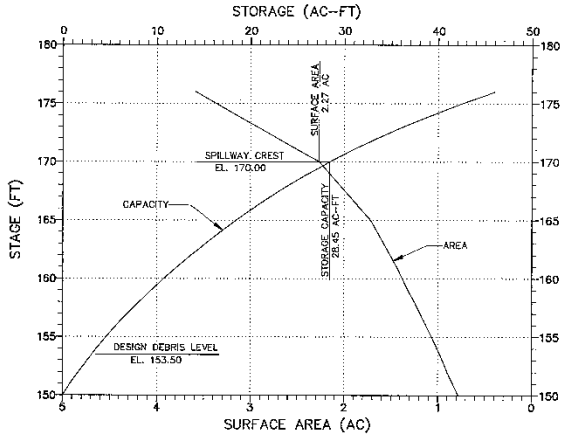
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

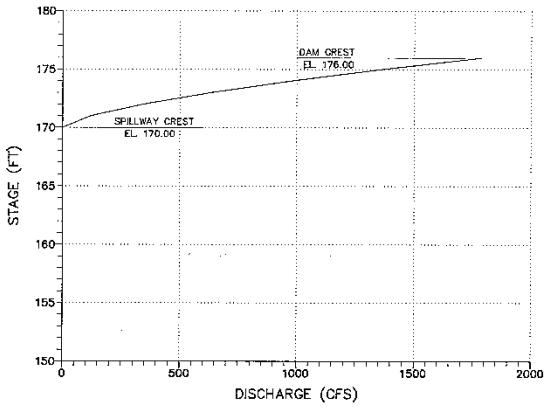
*** Theoretical Value from Scott and Williams (1978) 10% of 50-Yr Debris Yield for old basin

NA= Not Available / Not Applicable

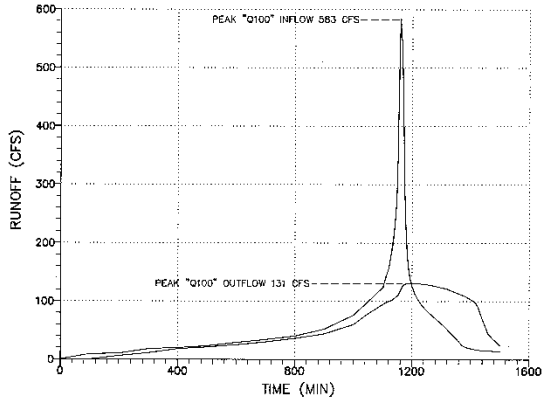

BEARDSLEY
N RAMONA PLACE DRN
LAS POSAS ESTATES DRAIN
N
0 650 1,300 2,600 3,900 5,200
Feet
LEGEND
Detention Basin
Watershed Boundary selection
VCWPD Jurisdictional Channels
RAMONA DAM
VCWPD DD 3-16M
WATERSHED MAP



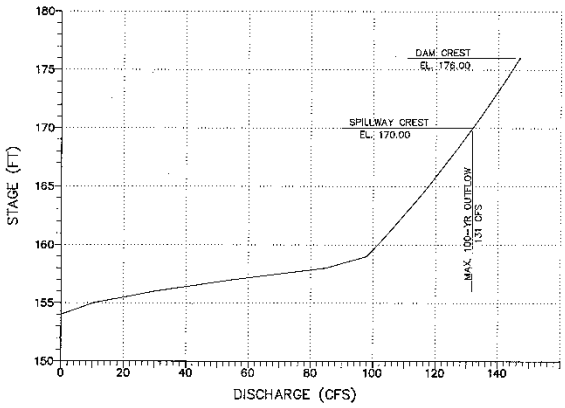
AREA--CAPACITY CURVE



STAGE--DISCHARGE CURVE
EMERGENCY SPILLWAY



DESIGN STORM HYDROGRAPH



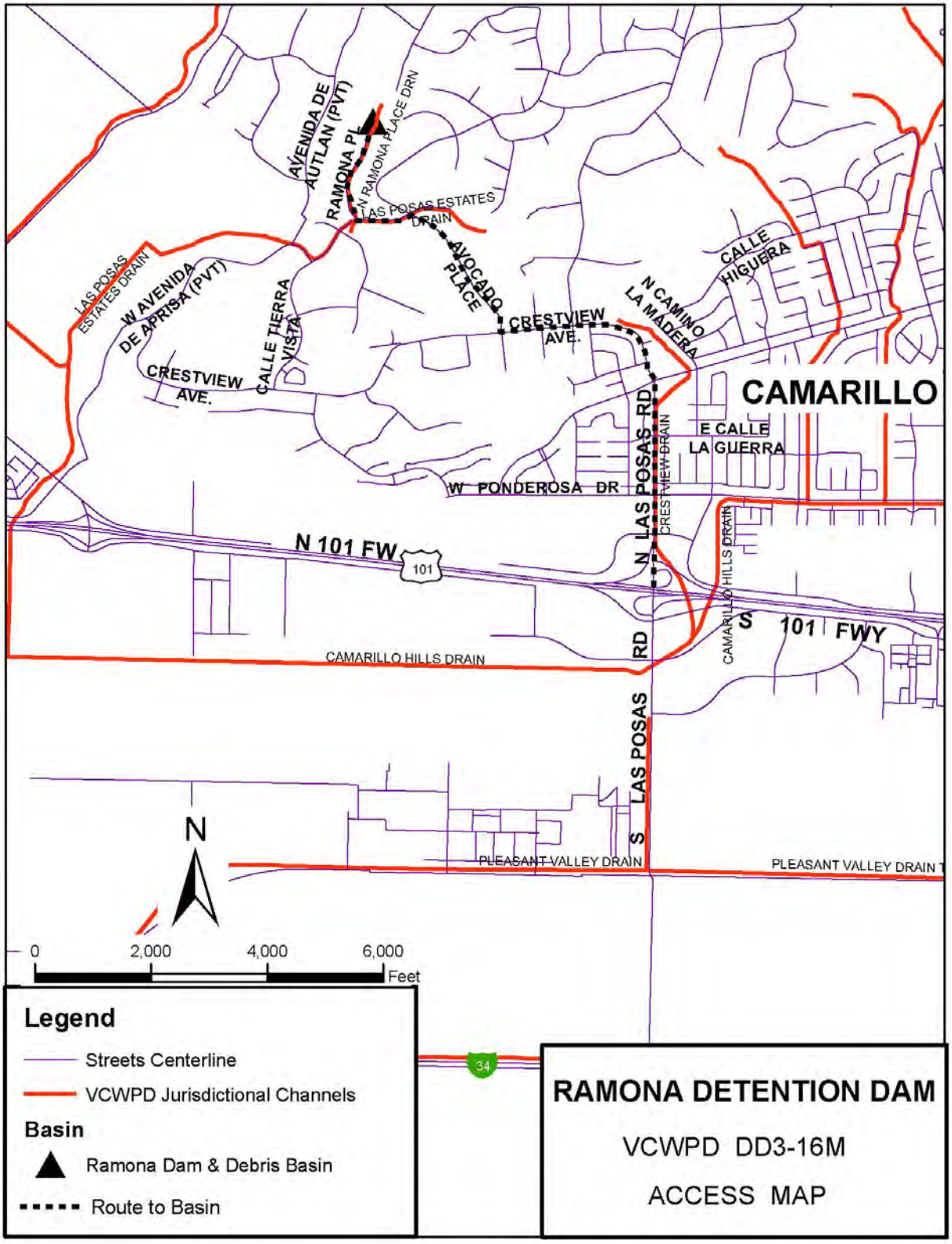
STAGE--DISCHARGE CURVE
OUTLET PIPE

Ramona Detention Basin- Emergency Spillway Data Superceded

Stage Storage Discharge Data Summary

Elevation	1998 TIN Vol.	As-Built Vol.	Riser	Emergency Spillway	Total
Ft. NGVD29	Ac-Ft	Ac-Ft	Cfs	Cfs	Cfs
150	-	-	0.0		-
151	-	0.8	0.0		-
152	-	1.6	0.0		-
153	0.023	2.6	0.0		-
154	0.173	3.5	0.0		-
155	0.616	4.7	10.6		10.6
156	1.448	5.6	30.0		30.0
157	2.533	6.9	55.1		55.1
158	3.734	8.2	84.9		84.9
159	5.011	9.4	97.9		97.9
160	6.352	10.7	101.4		101.4
161	7.759	12.2	104.8		104.8
162	9.232	13.6	108.2		108.2
163	10.773	15.2	111.4		111.4
164	12.382	16.6	114.5		114.5
165	14.072	18.4	117.5		117.5
166	15.851	20.3	120.5		120.5
167	17.722	22.0	123.4		123.4
168	19.689	24.0	126.2		126.2
169	21.772	26.2	129.0		129.0
170	24.007	28.5	131.7	-	131.7
171	26.458	30.8	134.3	121.5	255.8
172	NA	33.3	136.9	343.7	480.6
173	NA	36.0	139.5	631.3	770.8
174	NA	39.0	142.0	895.0	1,037.0
175	NA	42.3	144.5	1,187.0	1,331.5
176	NA	46.0	146.9	NA	NA

NA=Not Analyzed


AVENIDA DE AUTLAN (PVT)
RAMONA PL
N RAMONA PLACE DRN
LAS POSAS ESTATES DRAIN
AVOCADO PLACE
CRESTVIEW AVE.
CALLE HIGUERA
N CAMINO LA MADERA
LAS POSAS ESTATES DRAIN
W AVENIDA DE APRISA (PVT)
CALLE TIERRA VISTA
CRESTVIEW AVE.
CAMARILLO
E CALLE LA GUERRA
W PONDEROSA DR
N LAS POSAS RD
CRESTVIEW DRAIN
N 101 FW
101
CAMARILLO HILLS DRAIN
S 101 FWY
CAMARILLO HILLS DRAIN
S LAS POSAS RD
N
PLEASANT VALLEY DRAIN
PLEASANT VALLEY DRAIN
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Ramona Dam & Debris Basin
Route to Basin
34
RAMONA DETENTION DAM
VCWPD DD3-16M
ACCESS MAP

RUNKLE CANYON DETENTION BASIN State Dam No. 86-003 DD3-17

LOCATION: City of Simi Valley, 7000 ft south of Royal Avenue;
N 271,000 - E 1,779,000 (Lambert Zone 5 Coordinates);
Calabasas 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	99.8 ac-ft (161,000 cy 2-6-70, T-63-9)
Max. Expected Debris Capacity	32.2 ac-ft (52,015 cy) [125%of 100-Yr Debris Yield]
100-Yr Inflow and Outflow Rates	IN=2,200 cfs, OUT=1,300 cfs (2003 VCWPD Study)
Debris Cleanout Elevation	1,060 ft (10,400 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	40 ft wide (at entrance) x 10 ft high Trapezoidal RC Channel
Invert Elevation	1,086.5 ft
Spillway Length	NA
Capacity w/o Freeboard	3,875 cfs
PRINCIPAL SPILLWAY	
Type	48 in RCP Vertical Riser Tower, Open Top, 14 ft High
Weir Elevation	1,072.8 ft
Outlet Conduit	24 in Steel Pipe Outlet
DEBRIS BLEEDER/RISER	
Type	Perforations in Principal Spillway Riser Tower
Top Elevation	1,072.8 ft
Outlet Conduit	Principal Spillway Outlet
DAM	
Dam Type	Earthfill
Dam Crest Elevation	1,096 ft
Length	295 ft
Surface Area of Full Basin	5.7 ac
Watershed Area	958 ac from Quad Map
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	1950
REFERENCE DRAWINGS	
Construction Drawings	FC 3000
Right-of-Way Drawings	FC 3003
Topographic Drawings	FC 3000,3004, T-63-9 (2-6-70), 486-19 (7-3-97)

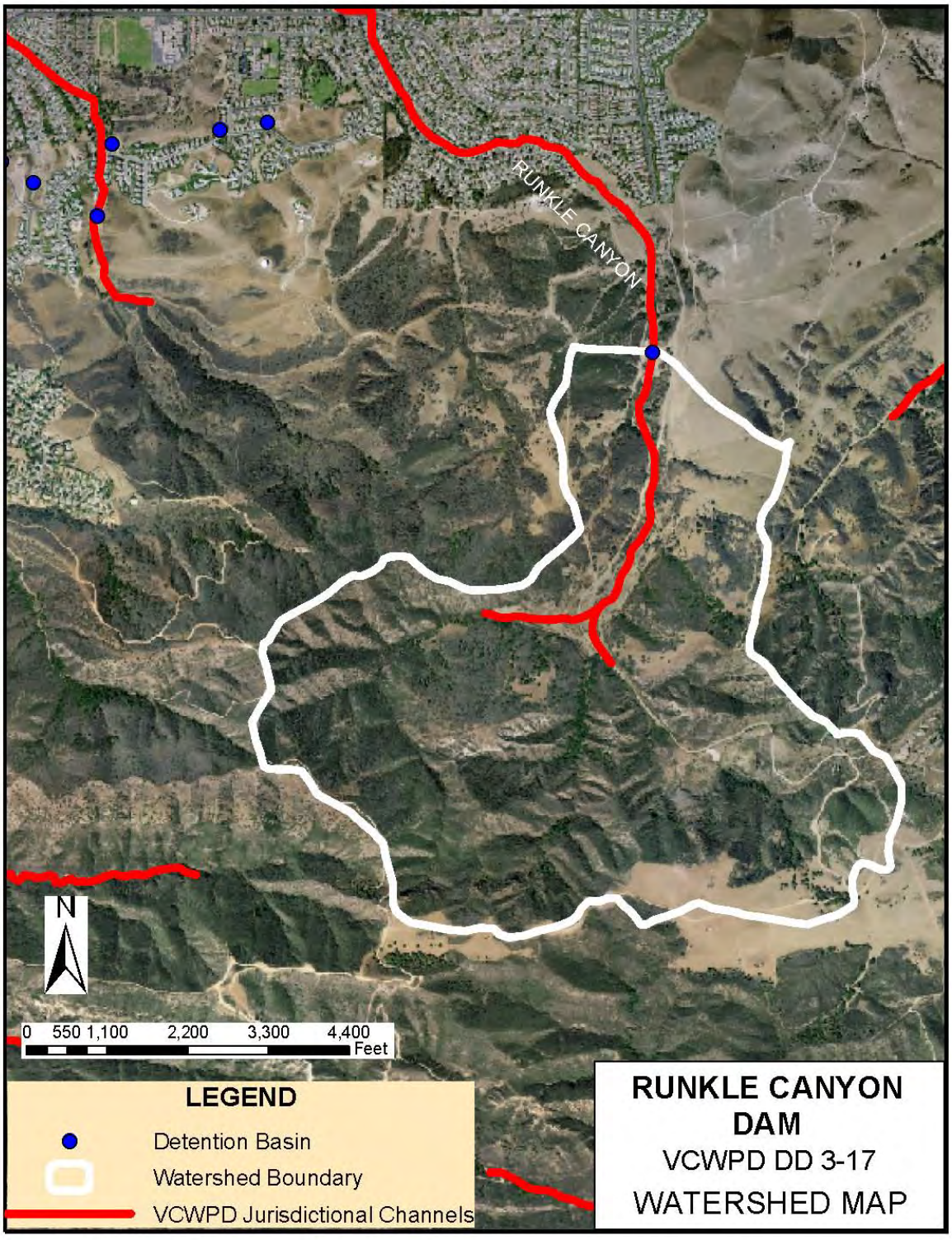
EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	41,613	59,907
50-YEAR	32,000	46,068
25-YEAR	23,186	33,379

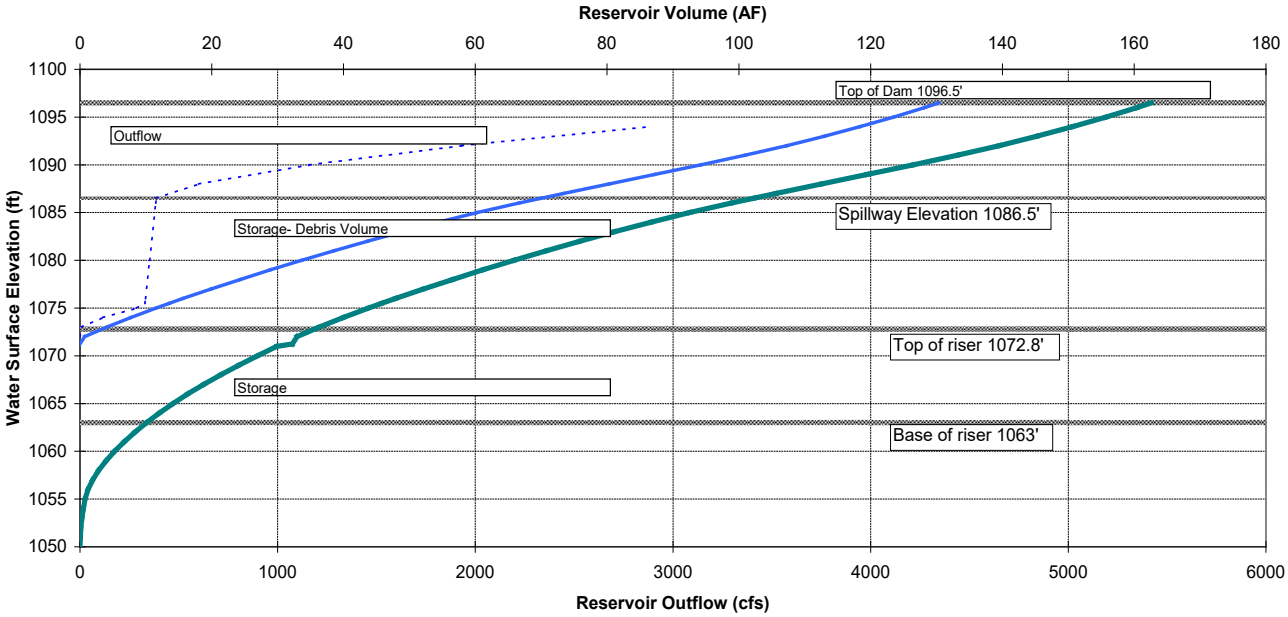
BASIN HISTORY: RUNKLE CANYON DETENTION BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
02-70	Aerial Survey	161,000		
11-70	Aerial Survey	Not Digitized		
12-70	Aerial Survey	150,200		
10-71	Aerial Survey	Not Digitized		
05-72	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			3,200***
02-80	Disaster Declaration			3,200***
09-81	Aerial Survey	Not Digitized		
09-82	Cleanout		126,150	
11-82	Aerial Survey	140,844		
03-83	Disaster Declaration			3,200***
10-90	Aerial Survey	Not Digitized		
06-91	Aerial Survey	Not Digitized		
02-92	Disaster Declaration			3,200***
05-92	Aerial Survey	131,000+		
09-94	Cleanout		7,600	
01-95	Disaster Declaration			3,200***
06-95	Aerial Survey	89,350		
10-95	Cleanout		5,600	
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	94,950		
02-98	Disaster Declaration			3,200***
05-98	Aerial Survey	80,500		
03-99	Aerial Survey	82,690		
06-99	Cleanout		12,080	
06-99	Aerial Survey	94,770		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
12-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			
07-05	Survey analysis by O&M		11,412	
11-05	TIN analysis by WR&T 08-05 vs 11-05		10,737 Fill vol 142 Cut vol	

Notes * AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

*** Theoretical Value from Scott and Williams (1978); 10% of 50-Yr Design Debris Volume


RUNKLE CANYON
N
0 550 1,100 2,200 3,300 4,400
Feet
LEGEND
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
RUNKLE CANYON
DAM
VCWPD DD 3-17
WATERSHED MAP



Stage Storage Discharge Summary- 2003 Calleguas VCRat Model

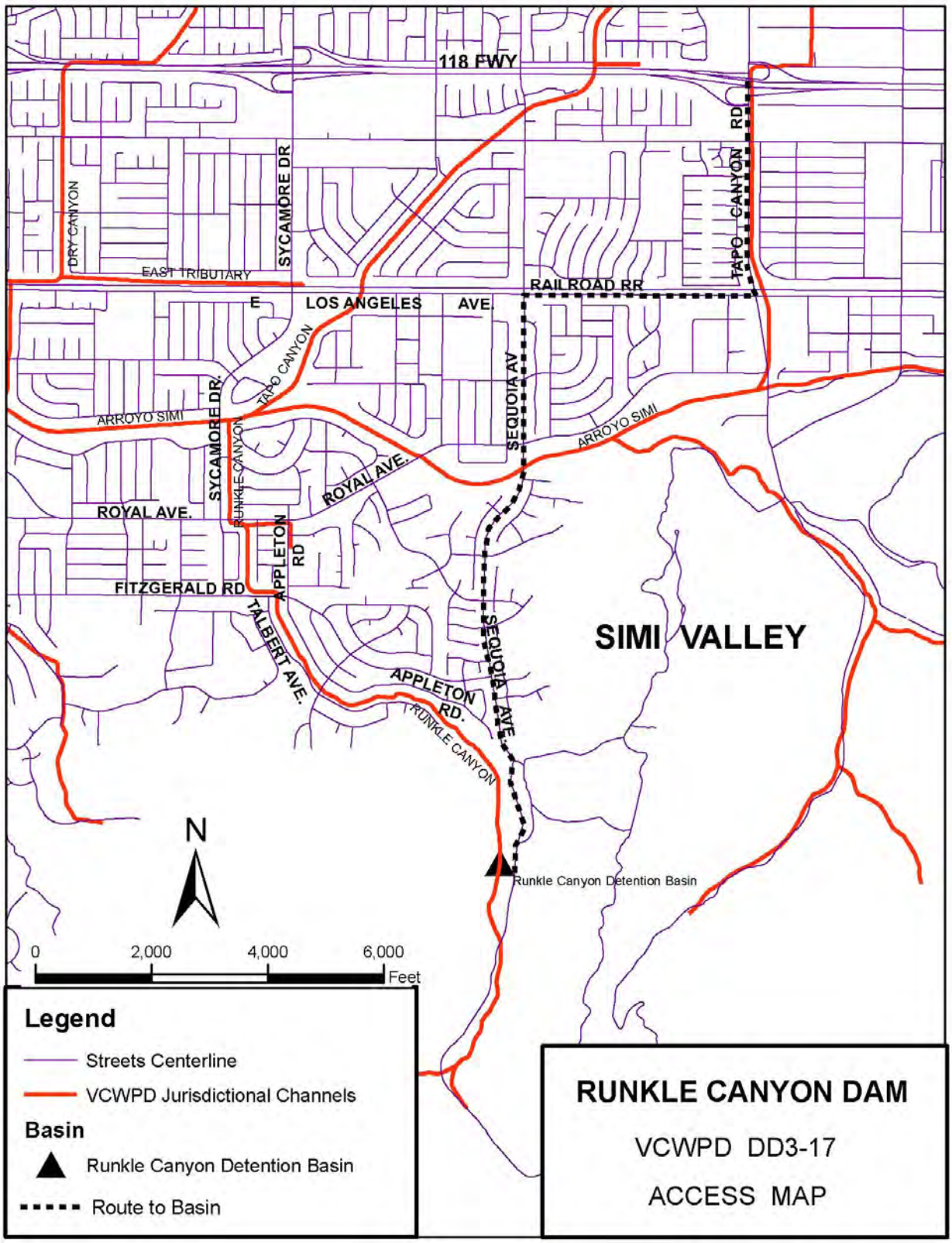
Elevation	Vol.	Total Disch.
Ft. NGVD29	Ac-Ft	Cfs
1071.75	0	-
1072.00	0.73	-
1073.00	4.09	3.9
1074.00	7.72	51.0
1075.00	11.54	52.0
1080.00	33.67	56.0
1086.00	66.96	61.0
1088.00	80.32	386.0
1090.00	94.22	994.0
1092.00	107.31	1,805.0
1094.00	118.42	2,792.0
1096.00	128.22	3,942.0

Note: Discharge Calculations assumed emergency spillway invert of 1086 ft.

Stage Storage Discharge Summary- Detailed Calculations

Elevation	1970 Topo Vol.	Net Vol.	Riser	Spillway	Total
Ft. NGVD29	Ac-Ft	Ac-Ft	Cfs	Cfs	Cfs
1049.4					-
1050	0.008				-
1051	0.050				-
1052	0.138				-
1053	0.288				-
1054	0.499				-
1055	0.772				-
1056	1.213				-
1057	1.909				-
1058	2.834				-
1059	3.952				-
1060	5.245				-
1061	6.716				-
1062	8.335		-		-
1063	10.100		-		-
1064	12.020		-		-
1065	14.106		-		-
1066	16.359		-		-
1067	18.770		-		-
1068	21.336		-		-
1069	24.053		-		-
1070	26.917		-		-
1071	29.872		-		-
1071.23	32.241	-	-		-
1072	32.950	0.709	-		-
1073	36.309	4.068	3.9		3.9
1074	39.945	7.704	51.0		51.0
1075	43.775	11.534	52.0		52.0
1076	47.831	15.590	52.9		52.9
1077	52.101	19.860	53.8		53.8
1078	56.551	24.310	54.7		54.7
1079	61.156	28.915	55.6		55.6
1080	65.889	33.648	56.4		56.4
1081	70.780	38.539	57.3		57.3
1082	75.852	43.611	58.1		58.1
1083	81.099	48.858	58.9		58.9

Elevation	1970 Topo Vol.	Net Vol.	Riser	Spillway	Total
Ft. NGVD29	Ac-Ft	Ac-Ft	Cfs	Cfs	Cfs
1084	86.636	54.395	59.8		59.8
1085	92.562	60.321	60.6		60.6
1086	98.896	66.655	61.3		61.3
1086.5	102.261	70.020	61.7	-	61.7
1087	105.626	73.385	62.1	39.8	101.9
1088	112.533	80.292	62.9	208.7	271.5
1089	119.460	87.219	63.7	453.1	516.8
1090	126.429	94.188	64.4	757.4	821.8
1091	133.197	100.956	65.2	1,114.3	1,179.4
1092	139.516	107.275	65.9	1,519.1	1,585.0
1093	145.272	113.031	66.6	1,969.1	2,035.8
1094	150.630	118.389	67.3	2,462.2	2,529.5
1095	155.724	123.483	68.1	2,996.7	3,064.8
1096	160.434	128.193	68.8	3,571.5	3,640.3
1096.5	162.609	130.368	69.1	3,873.8	3,942.9
1097	164.783	132.542	69.5	4,185.8	4,255.2
1098	168.765	136.524	70.2	4,838.7	4,908.9
1099	172.327	140.086	70.8	5,529.8	5,600.6
1100	175.420	143.179	71.5	6,258.6	6,330.1


118 FWY
DRY CANYON
SYCAMORE DR
EAST TRIBUTARY
E LOS ANGELES AVE.
RAILROAD RR
TAPO CANYON RD
TAPO CANYON
SEQUOIA AV
ARROYO SIMI
SYCAMORE DR.
RUNKLE CANYON
ROYAL AVE.
APPLETON RD
FITZGERALD RD
TALBERT AVE.
SIMI VALLEY
APPLETON RD.
SEQUOIA AVE.
Runkle Canyon Detention Basin
N
0 2,000 4,000 6,000 Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Runkle Canyon Detention Basin
Route to Basin
RUNKLE CANYON DAM
VCWPD DD3-17
ACCESS MAP

SANTA ROSA ROAD #2 DEBRIS BASIN DB3-05

LOCATION: Santa Rosa Valley, 100 ft north of Santa Rosa Road, approx.1.3 miles westerly from Moorpark Road, 2000 ft west from Timber School
N 271,500, E 1,732,700, (Lambert Zone 5 Coordinates);
Newbury Park 7-1/2' Quad

DESIGN DATA	*Capacities Indicated Are Based on a Top Of Riser Elevation of 387.0 ft.; (All Elevations NGVD29)
Design Agency	Soil Conservation Service
Level Capacity	7,300* cy (12-12-90 DTM) at top of riser
Maximum Debris Capacity	15,000* cy (12-12-90 DTM); 0.013 slope from top of riser
Inflow and Outflow Rates	Q_{100}IN= 1,600 cfs, Q_{100}OUT= NA
Debris Cleanout Elevation	381 ft (1,250 cy) [10% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	12 ft x 5 ft high Trapezoidal Earth Channel
Invert Elevation	396.0 ft
Spillway Length	NA
Capacity w/o Freeboard	610 cfs
PRINCIPAL SPILLWAY	
Type	Top of Vertical 36-in RCP 14.8 ft High
Weir Elevation	387 ft NGVD29
Outlet Conduit	24-in RCP
DEBRIS BLEEDER/RISER	
Type	Perforated 10-in steel pipe 14.8 ft High
Top Elevation	387 ft
Outlet Conduit	Connected to Principal Spillway Outlet
DAM	
Dam Type	Earthfill
Dam Crest Elevation	401 ft
Length	160 ft
Surface Area of Full Basin	3.3 ac
Watershed Area	1,101 ac from Quad Map
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service
Completion Date	1957
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1191 & 92
Right-of-Way Drawings	NA
Topographic Drawings	T-22-11 (10-29-71), Western Aerial, (9-15-80 DTM)(12-12-90 DTM)

Basin planned for removal as a result of recent study.

EXPECTED DEBRIS PRODUCTION (cy):*		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	12,505 [5,420]	18,135 [7,870]
50-YEAR	9,536 [4,400]	13,837 [6,390]
25-YEAR	6,834 [3,500]	9,900 [5,080]

***Calculations updated in 2015 to account for development in watershed**

BASIN HISTORY: SANTA ROSA ROAD DEBRIS BASIN

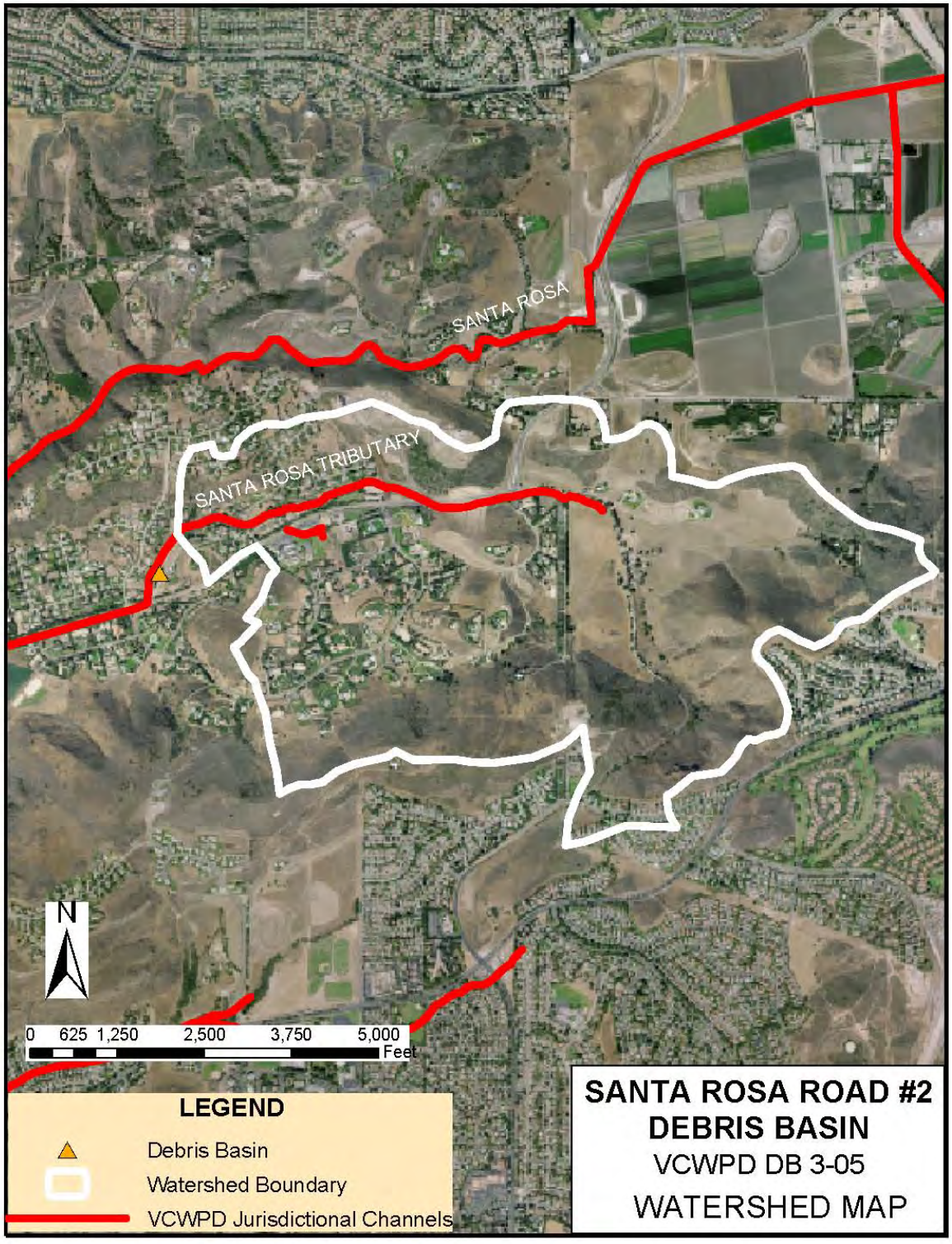
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			950***
10-71	Aerial Survey	6,614		
03-78	Disaster Declaration			950***
02-80	Disaster Declaration			950***
09-80	Cleanout		2,600	950***
09-80	Aerial Survey	9,200		
07-81	Aerial Survey	Not Digitized		
10-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	10,914		
03-83	Disaster Declaration			552
08-90	Cleanout		7,700	
10-90	Aerial Survey			
12-90	Aerial Survey	14,957		
06-91	Aerial Survey			
08-91	Aerial Survey	14,889		
02-92	Disaster Declaration			598
05-92	Aerial Survey	13,350		
07-92	Cleanout		1,650	
07-93	Cleanout		2,290	
07-93	Aerial Survey	15,000		
07-94	Cleanout		288	
01-95	Disaster Declaration			646
07-95	Cleanout		1573	
07-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey	13,900		
02-98	Disaster Declaration			652
07-98	Aerial Survey	12,500		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			

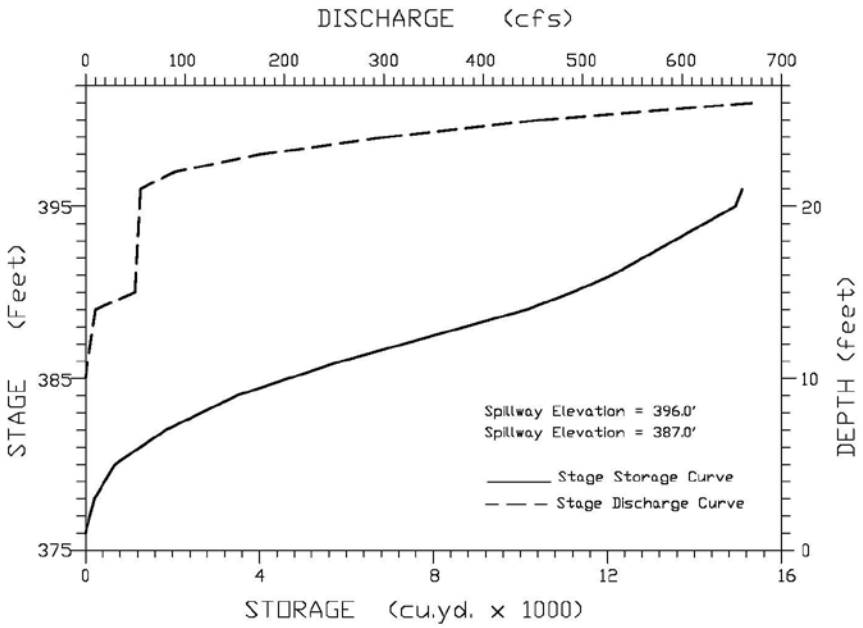
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

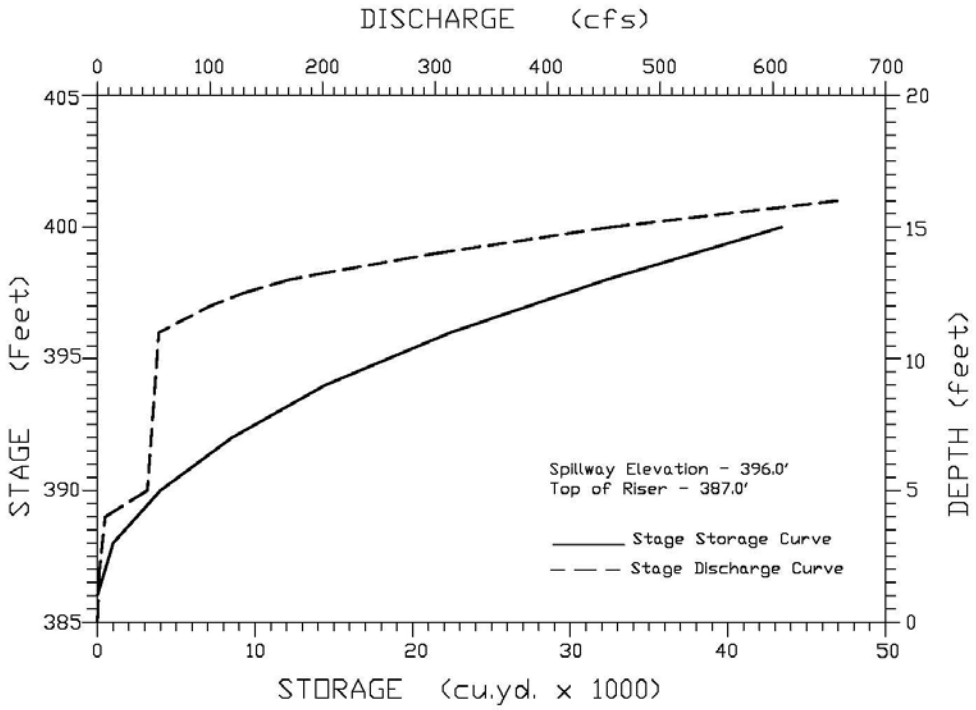
*** Theoretical Value from Scott and Williams (1978); 10% of 50-Yr Design Yield

NA= Not Available / Not Applicable


SANTA ROSA
SANTA ROSA TRIBUTARY
N
0 625 1,250 2,500 3,750 5,000
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
SANTA ROSA ROAD #2
DEBRIS BASIN
VCWPD DB 3-05
WATERSHED MAP



Stage- Debris Storage Curve of Assuming Sloped Debris Cone Begins at Elev 387 (Top of Riser), Slope=0.013, 1991 Manual

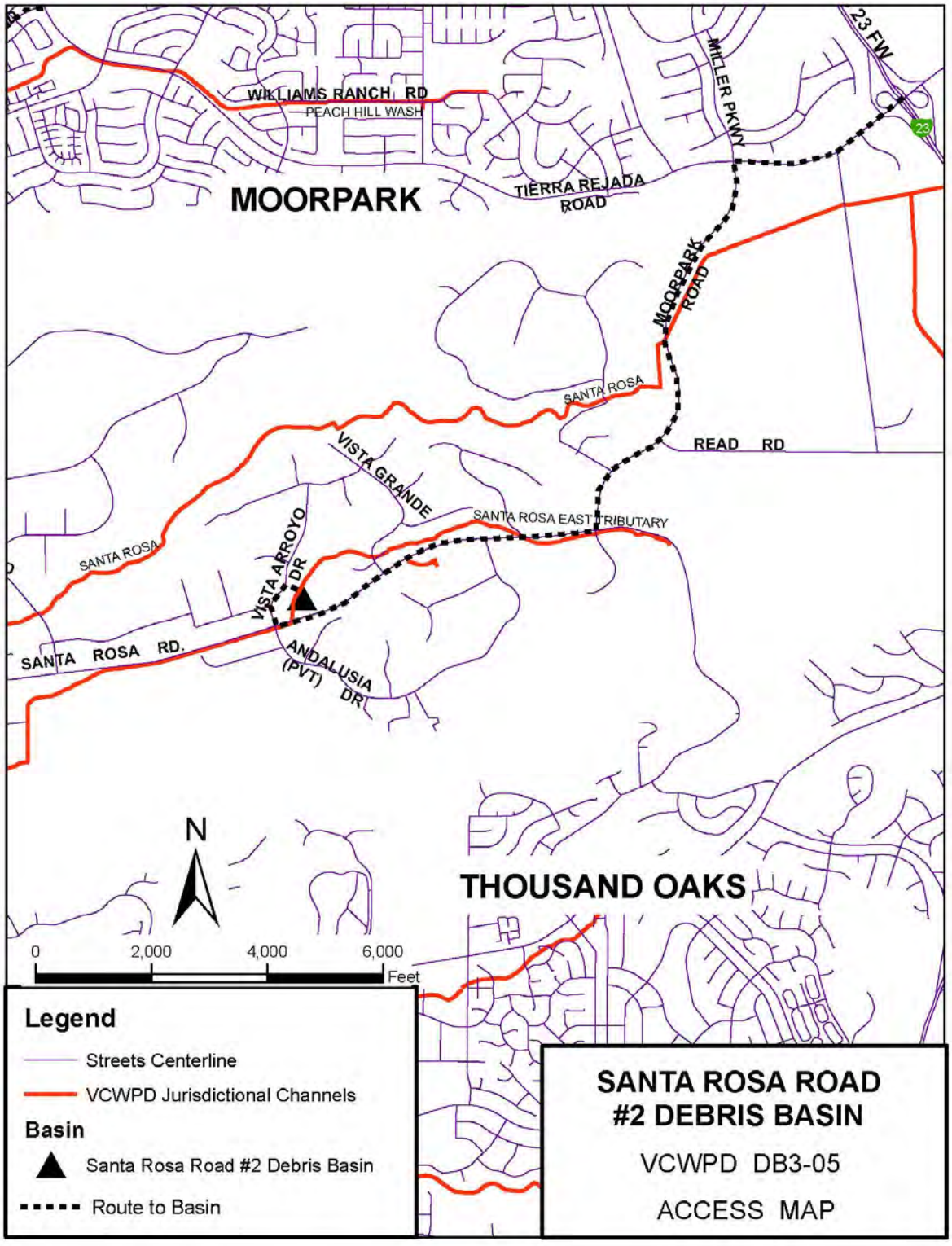


Stage-Debris Storage Curve Assuming Sloped Debris Cone Begins at Elev396 (Spillway Invert) from 1999 Manual, Slope=0.013

Stage Storage Discharge Data

Elevation	Debris Vol. 387 Datum	Debris Vol. 396 Datum	Riser Disch.	Spill Disch.	Total Disch.
Ft. NGVD29	Cu. Yds	Cu. Yds	Cfs	Cfs	Cfs
376	-	-	-		-
378	133	133	-		-
380	719	719	-		-
382	1,892	1,892	-		-
384	3,554	3,554	0.5		0.5
386	5,836	5,836	1.5		1.5
387	7,272	7,272	2.1		2.1
388	8,754	8,908	5.7		5.7
390	10,088	12,787	47.0		47.0
391	11,210	15,042	48.0		48.0
392	12,119	17,623	50.0		50.0
393	12,867	20,632	51.0		51.0
394	13,560	24,103	52.0		52.0
395	14,264	28,093	54.0		54.0
396	14,958	30,344	55.0	-	55.0
397	NA	37,619	56.0	37.8	93.8
398	NA	42,553	57.0	119.0	176.0
399	NA	47,305	58.0	240.0	298.0
400	NA	51,738	59	403.0	462.0

Note: Debris volumes calculated assuming cone with slope of 0.013 begins at datum elevation


WILLIAMS RANCH RD
PEACH HILL WASH
MOORPARK
TIERRA REJADA ROAD
MILLER PKWY
23 FWY
23
MOORPARK ROAD
SANTA ROSA
READ RD
VISTA GRANDE
SANTA ROSA EAST TRIBUTARY
SANTA ROSA
VISTA ARROYO DR
SANTA ROSA RD.
ANDALUSIA (PVT) DR
THOUSAND OAKS
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Santa Rosa Road #2 Debris Basin
Route to Basin
SANTA ROSA ROAD
#2 DEBRIS BASIN
VCWPD DB3-05
ACCESS MAP

SOUTH BRANCH ARROYO CONEJO DEBRIS BASIN (BYPASS) DB3-22

LOCATION: Adjacent to Reino Road, 2,000 ft north of Kimber Drive,
N 243,790 E 1,710580 (Lambert Zone 5 Coordinates)
Newbury Park 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	50,417 cy
Maximum Debris Capacity	NA
100-Yr Inflow and Outflow Rates	IN: 3,600 cfs; 2,200 cfs bypassed downstream; Remainder diverted to basin, basin outflow=187 cfs
Debris Cleanout Elevation	707 ft (10,100 cy) [10% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	140 ft W x 3.3 ft High Trapezoidal Grouted Rip-Rap
Invert Elevation	722.00 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	2,300 cfs
PRINCIPAL SPILLWAY	
Type	36-in Horizonal CMP
Invert Elevation	701.56 ft NGVD29
Outlet Conduit	36-in CMP
DEBRIS BLEEDER/RISER	
Type	24-in Slotted CMP Riser, Closed Top
Top Elevation	711.50
Outlet Conduit	Principal Spillway Outlet
DAM	
Dam Type	Earthfill
Dam Crest Elevation	725.3 ft NGVD29
Length	350 ft
Surface Area of Full Basin	2.07 ac
Watershed Area	2,209 ac
CONSTRUCTION DATA	
Construction Agency	VCWPD with SCS
Completion Date	August, 2003
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3330 thru Y-3-3337C; Y-3-4139 thru Y-3-4149
Right-of-Way Drawings	N/A
Topographic Drawings	NA

Basin rebuilt in 2003 to bypass sediment

EXPECTED DEBRIS PRODUCTION (cy): Not delivered to basin due to 2003 bypass structure		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	100,850	129,030
50-YEAR	77,100	98,670
25-YEAR	54,450	69,670

BASIN HISTORY: SOUTH BRANCH ARROYO CONEJO DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	OLD DEBRIS BASIN			
01-95	Disaster Declaration			10,000***
02-95	Construction Completed	29,750 y		
05-95	Sounding Survey	21,750**		
07-96	Aerial Survey	Not Digitized		
07-97	Aerial Survey	Not Digitized		
02-98	Disaster Declaration			10,000***
06-99	Final Cleanout planned prior to modification and construction of a detention basin on this site			
12-99	Aerial Survey	Not Digitized		
08-03	NEW BASIN CONSTRUCTED			
01-05	Disaster Declaration			

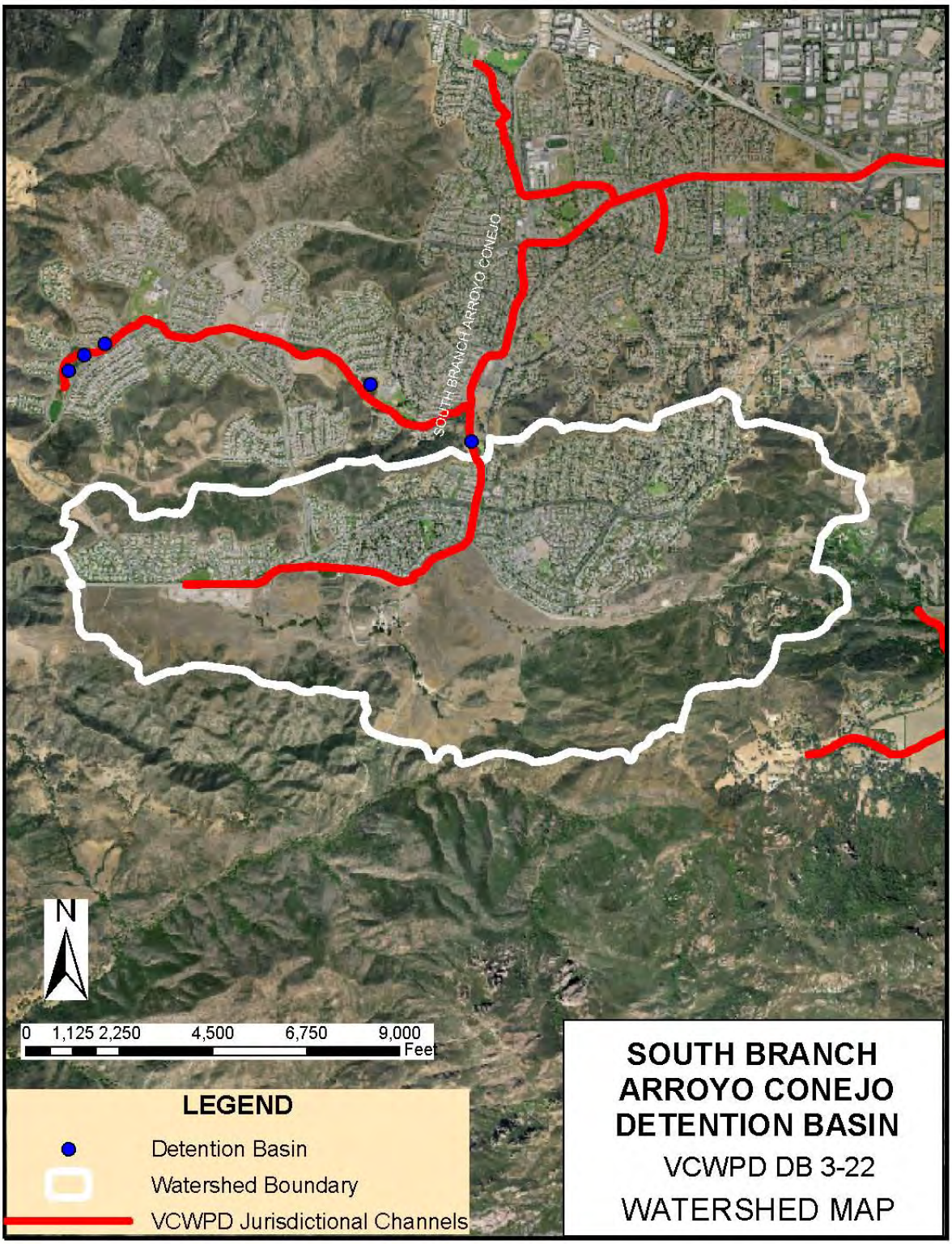
Notes

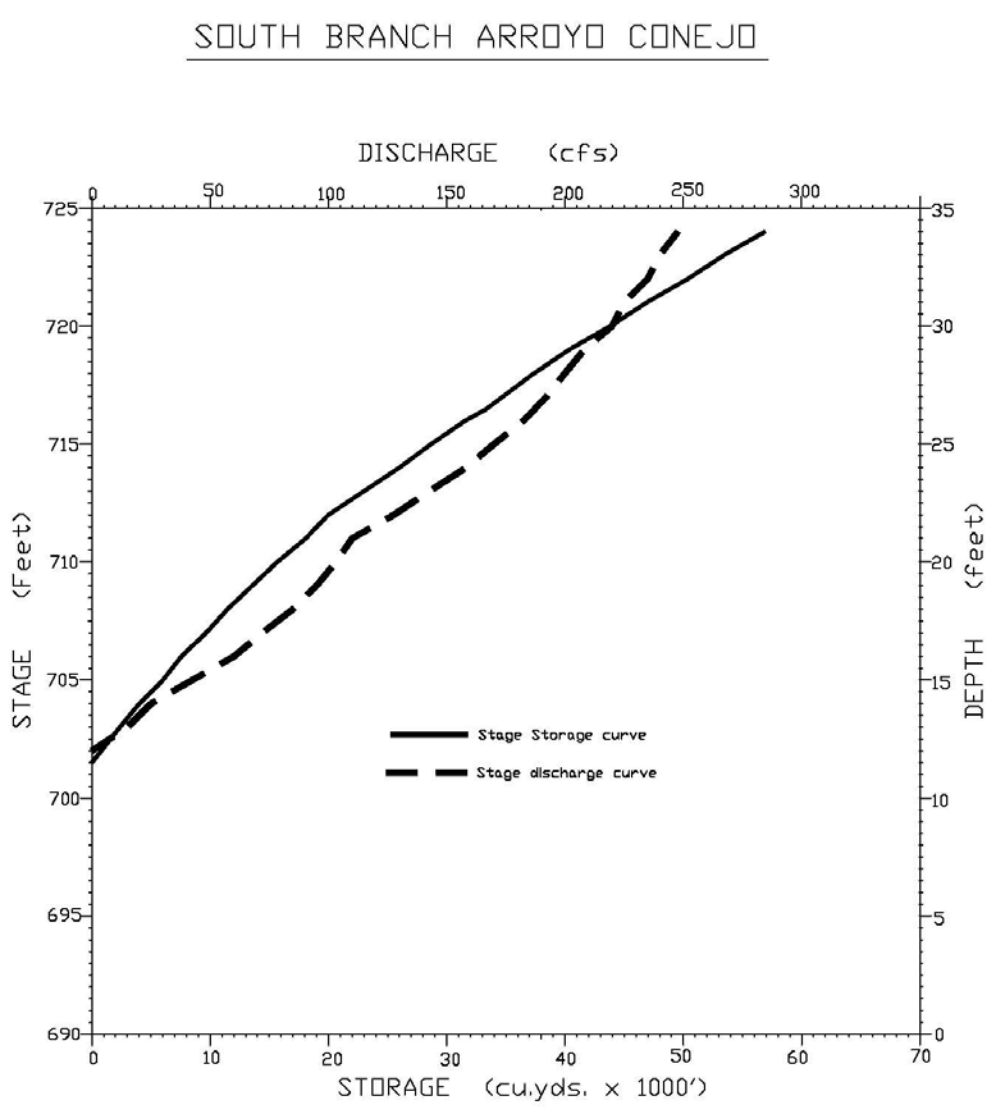
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** Estimated from sounding survey

*** Theoretical Value from Scott and Williams (1978); 10% of 50-Yr Debris Yield

NA= Not Available / Not Applicable


SOUTH BRANCH ARROYO CONEJO
N
0 1,125 2,250 4,500 6,750 9,000
Feet
LEGEND
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
SOUTH BRANCH
ARROYO CONEJO
DETENTION BASIN
VCWPD DB 3-22
WATERSHED MAP



South Branch Bypass Basin Stage Storage Discharge Curve

Design Binder Bypass Basin Stage Storage Discharge Curve

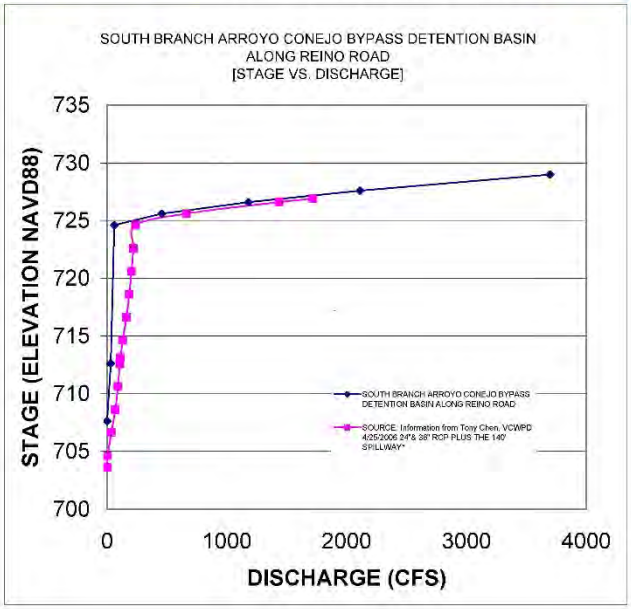
Elevation	Design Vol.	Outlet Disch.
Ft. NGVD29	Cu. Yds	Cfs
701.56	-	-
702	694	1.0
703	2,364	13.5
704	4,033	25.9
705	5,824	43.9
706	7,614	61.8
707	9,551	73.5
708	11,487	85.1
709	13,536	94.6
710	15,649	103.3
711	18,029	115.1
712	20,408	126.9
713	23,022	144.3
714	25,700	158.5
715	28,475	170.6
716	31,330	181.5
717	34,267	191.6
718	37,316	200.9
719	40,494	208.9
720	43,769	217.2
721	47,092	225.2
722	50,416	232.8
723	53,755	240.2
724	57,095	247.3

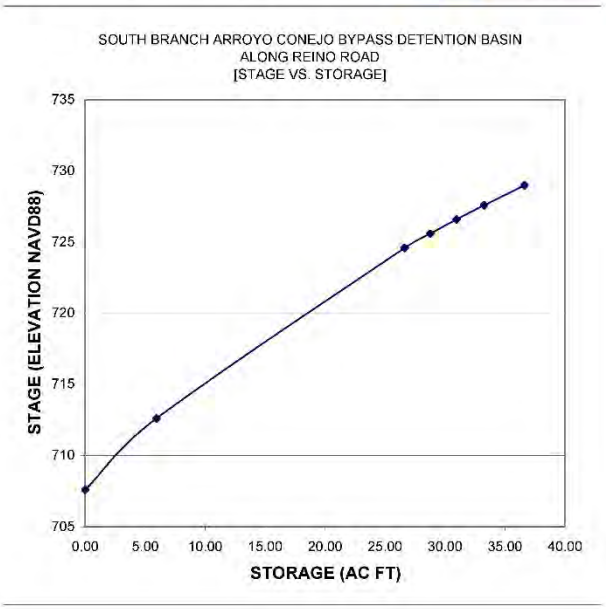
SOUTH BRANCH ARROYO CONEJO BYPASS DETENTION BASIN ALONG REINO ROAD		
SOURCE: Information from Tony Chen, VCWPD 4/25/2006 24"& 36" RCP PLUS THE 140' SPILLWAY*		
ELEVATION NGVD29	ELEVATION NAVD88	DISCHARGE
701	703.6	0
702	704.6	5
704	706.6	36
706	708.6	69
708	710.6	90
710	712.6	107
710.5	713.1	112
712	714.6	130
714	716.6	162
716	718.6	185
718	720.6	204
720	722.6	221
722	724.6	237
723	725.6	665
724	726.6	1439
724.3	726.9	1718
* 24" RCP INVERT AT ELEV 710, 36" RCP INVERT AT ELEV 700, 140' LONG WEIR SPILLWAY WITH C=3.0 AT ELEV 722 (NGVD29)		

Ref: Kasraie Consulting, 2006. City of Thousand Oaks Storm Drain System Master Plan Detention Basin Manual. October.

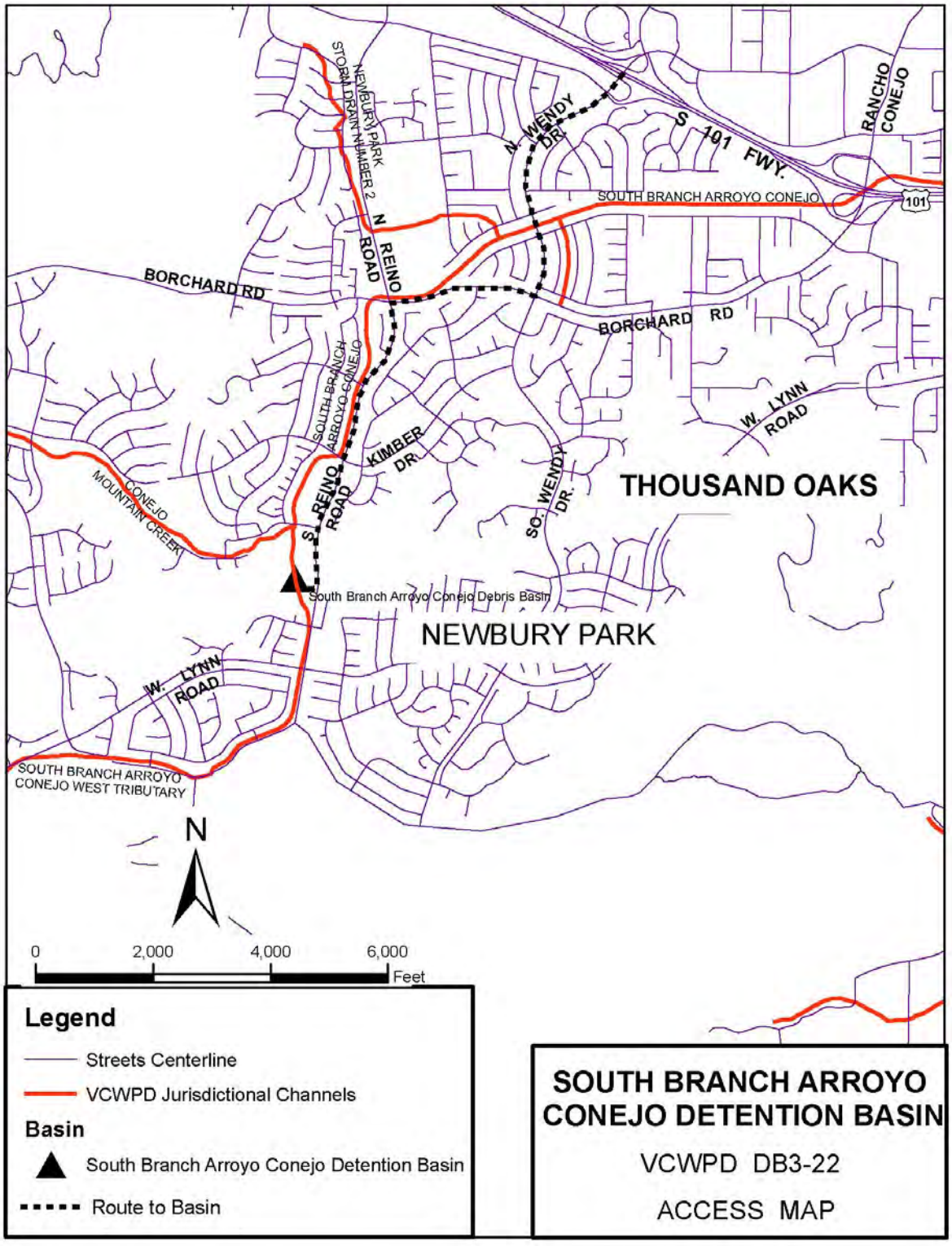
2006 T.O. SDSMP VCRAT NODE# 468F
Owned/Maintained By: VCWPD

SOUTH BRANCH ARROYO CONEJO BYPASS DETENTION BASIN ALONG REINO ROAD											NOT USED	USED
BYPASS FLOW:	2200 CFS											VCWPD*
SPILLWAY: 140' LONG, WEIR COEFFICIENT=2.8												
ELEV	ELEV-NAVD88	DEPTH	ACRES	AVG_AC	INCR_VOL	TOT_VOL	INLET_DEPTH	HW/D (24")	Q24"	WEIR FLOW	OUTFLOW	DISCHARGE
705	707.6	0	1.02	0.00	0.00	0.00	0	0	0	0	0	0
710	712.6	5	1.35	1.19	5.93	5.93	5	2.5	30	0	30	107
722	724.6	12	2.10	1.73	20.70	26.63	17	8.5	60	0	60	237
723	725.6	1	2.17	2.14	2.14	28.76	18	9	65	392	457	665
724	726.6	1	2.20	2.19	2.19	30.95	19	9.5	70	1109	1179	1439
725	727.6	1	2.40	2.30	2.30	33.25	20	10	75	2037	2112	2370
726.4	729	1.4	2.40	2.40	3.36	36.60	21.4	10.7	80	3618	3698	3700





Ref: Kasraie Consulting, 2006. City of Thousand Oaks Storm Drain System Master Plan Detention Basin Manual. October.


NEWBURY PARK STORM DRAIN NUMBER 2
N. WENDY DR.
S 101 FWY.
RANCHO CONEJO
SOUTH BRANCH ARROYO CONEJO
101
N REINO ROAD
BORCHARD RD
BORCHARD RD
SOUTH BRANCH ARROYO CONEJO
KIMBER DR.
W. LYNN ROAD
CONEJO MOUNTAIN CREEK
S. REINO ROAD
SO. WENDY DR.
THOUSAND OAKS
South Branch Arroyo Conejo Debris Basin
NEWBURY PARK
W. LYNN ROAD
SOUTH BRANCH ARROYO CONEJO WEST TRIBUTARY
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
South Branch Arroyo Conejo Detention Basin
Route to Basin
SOUTH BRANCH ARROYO CONEJO DETENTION BASIN
VCWPD DB3-22
ACCESS MAP

SOUTH POTRERO (DOS VIENTOS) DEBRIS BASIN DB3-24

LOCATION: Located between Lynn Rd. and Potrero Rd., Newbury Park.
N: 240,580 E: 1,707,398 (Lambert Zone 5 Coordinates); Newbury Pk 7 ½ minute Quad

BASIN DESIGN DATA	RCB 2.5 ft wide x 2 ft high transitioning to 36-in RCP at bottom of 84-in RCP allows sediment and runoff into debris basin.
Design Agency	VTN WEST, INC
Level Capacity	17,500 cy from contour data on as-builts
Maximum Debris Capacity	Debris Basin Intercepts All Debris
100-Yr Inflow and Outflow Rates	In=79 cfs; Out= 79 cfs (No attenuation from debris basin)
Debris Cleanout Elevation	831 ft NGVD29 (3,475 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	18 ft W x 3 ft H Rectangular RC Channel
Invert Elevation	838 ft NGVD29 at dam face
Spillway Length	NA
Capacity	79 cfs from as-builts
PRINCIPAL SPILLWAY	
Type	24-in Slotted CSP
Top Elevation	837 ft NGVD29
Outlet Conduit	24-in RCP
DEBRIS BLEEDER/RISER	
Type	24-in Slotted CSP low level outlet
Top Elevation	830 ft NGVD29
Outlet Conduit	Principal Spillway Outlet
DAM	
Dam Type	Earthfill
Dam Crest Elevation	841 ft NGVD29
Length	NA
Width at Crest	20 ft
Surface Area of Full Basin	72,700 sf at elev 840 ft NGVD29
Watershed Area	359 ac from GIS Watershed Layer Shapefile
CONSTRUCTION DATA	
Construction Agency	VTN West
Completion Date	1995
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3378 to Y-3-3389D “Dos Vientos South Potrero Basin”
Topographic Drawings(pre-const)	NA
Right-of-Way Drawings	NA

EXPECTED DEBRIS PRODUCTION (cu. yd.):		
Storm Frequency	Design Condition	100% Burn
100-YEAR	13,900	20,162
50-YEAR	10,609	15,387
25-YEAR	7,617	11,048

BASIN HISTORY: **DOS VIENTOS DETENTION BASIN**

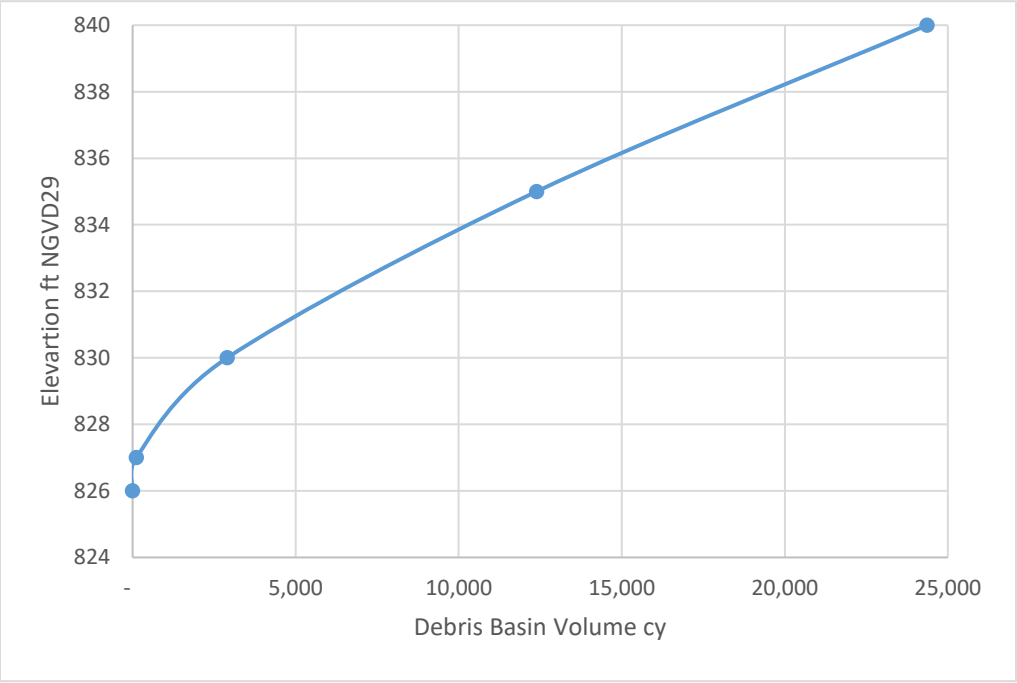
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-05	Disaster Declaration			1,060***
	No cleanout data reported by O&M			

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

*** Theoretical Value, 10% of 50-Yr Yield per Scott and Williams (1978)

NA= Not Available / Not Applicable



S. Potrero Debris Basin Elev vs Volume Based on As-Built Contours

SOUTH POTRERO (DOS VIENTOS) DETENTION BASIN DD3-24

LOCATION: Located between Lynn Rd. and Potrero Rd., Newbury Park.
N: 240,580 E: 1,707,398 (Lambert Zone 5 Coordinates); Newbury Pk 7 ½ minute Quad

DETENTION BASIN DESIGN DATA (has upstream debris basin)	84-in RCP with low level outlet into debris basin for sediment bypasses debris basin and outlets into detention basin;
Design Agency	VTN WEST, INC
Level Capacity	34.74 ac-ft from contour data on Y-3-3380
Maximum Debris Capacity	Debris Basin Intercepts All Debris
100-Yr Inflow and Outflow Rates	In=1,121 cfs; Out= 369 cfs from as-builts
Debris Cleanout Elevation	None as debris basin intercepts all debris
EMERGENCY SPILLWAY	
Type	60 ft W x 4.5 ft H Rectangular RC Channel
Invert Elevation	811.7 ft NGVD29 at upstream face of dam
Spillway Length	NA
Capacity	NA
PRINCIPAL SPILLWAY	
Type	16 ft Wx11 ft Lx21 ft H RC Riser Tower with Projecting Top and Catwalk; Bottom 787 ft, top 808 ft NGVD29
High Level Inlet	7.25 ft H x 10 ft W inlet with rotating slats, bottom at 800 ft
Low Level Inlet	6 ft H x 10 ft W Grated inlet; bottom at 794 ft NGVD29
Outlet Conduit	48-in RCP
DEBRIS BLEEDER/RISER	
Type	24-in Slotted CSP
Top Elevation	795 ft NGVD29
Outlet Conduit	Principal Spillway Outlet
DAM	
Dam Type	Earthfill
Dam Crest Elevation	815 ft NGVD29
Length	NA
Width at Crest	20 ft
Surface Area of Full Basin	NA
Watershed Area	359 ac from GIS Watershed Layer Shapefile
CONSTRUCTION DATA	
Construction Agency	VTN West
Completion Date	1995
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3378 to Y-3-3389D “Dos Vientos South Potrero Basin”
Topographic Drawings(pre-const)	NA
Right-of-Way Drawings	NA

EXPECTED DEBRIS PRODUCTION (cu. yd.): None, debris basin expected to receive most of sediment		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	0	0
50-YEAR	0	0
25-YEAR	0	0

BASIN HISTORY: DOS VIENTOS DETENTION BASIN

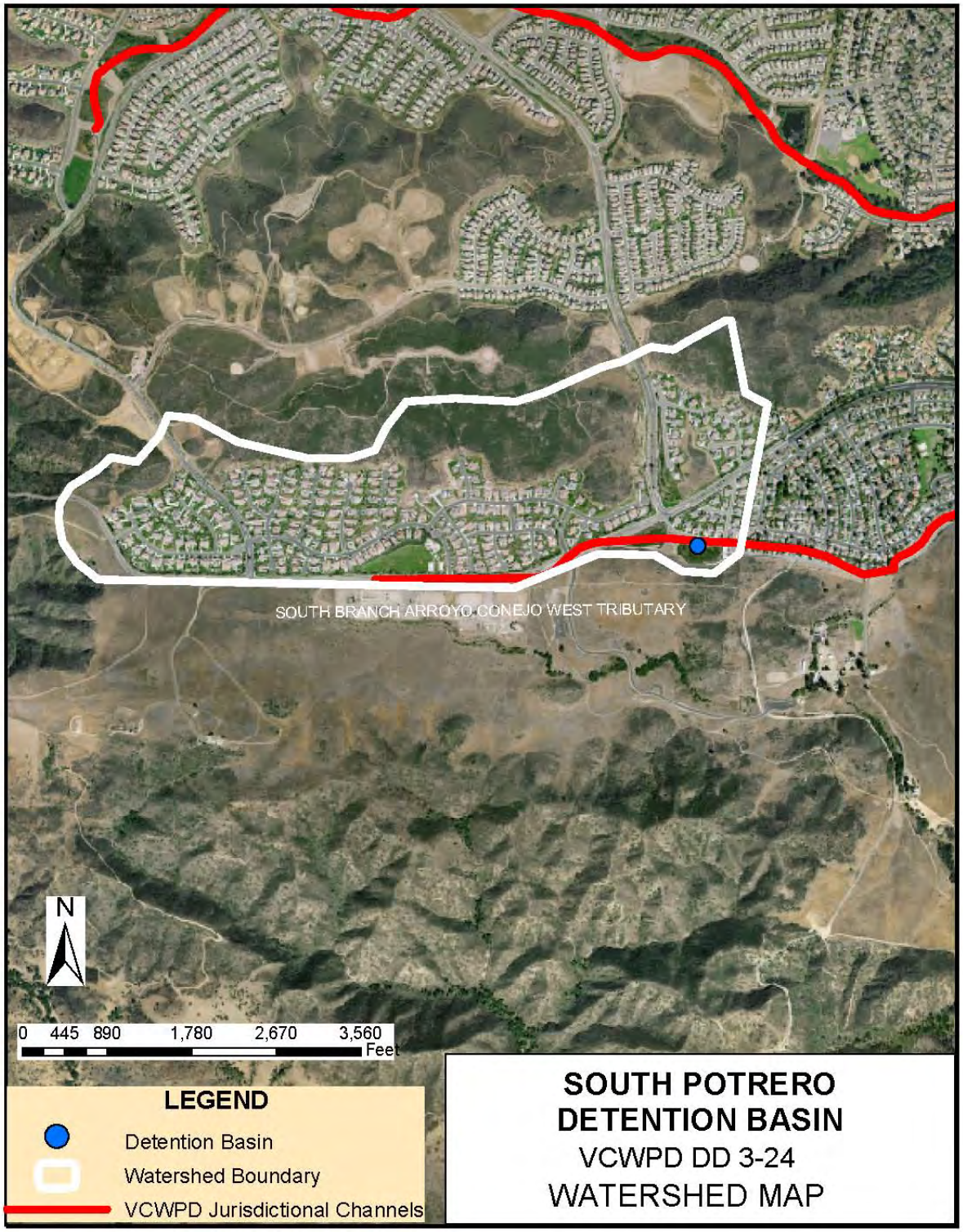
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-05	Disaster Declaration			1,060***
	No cleanout data reported by O&M			

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

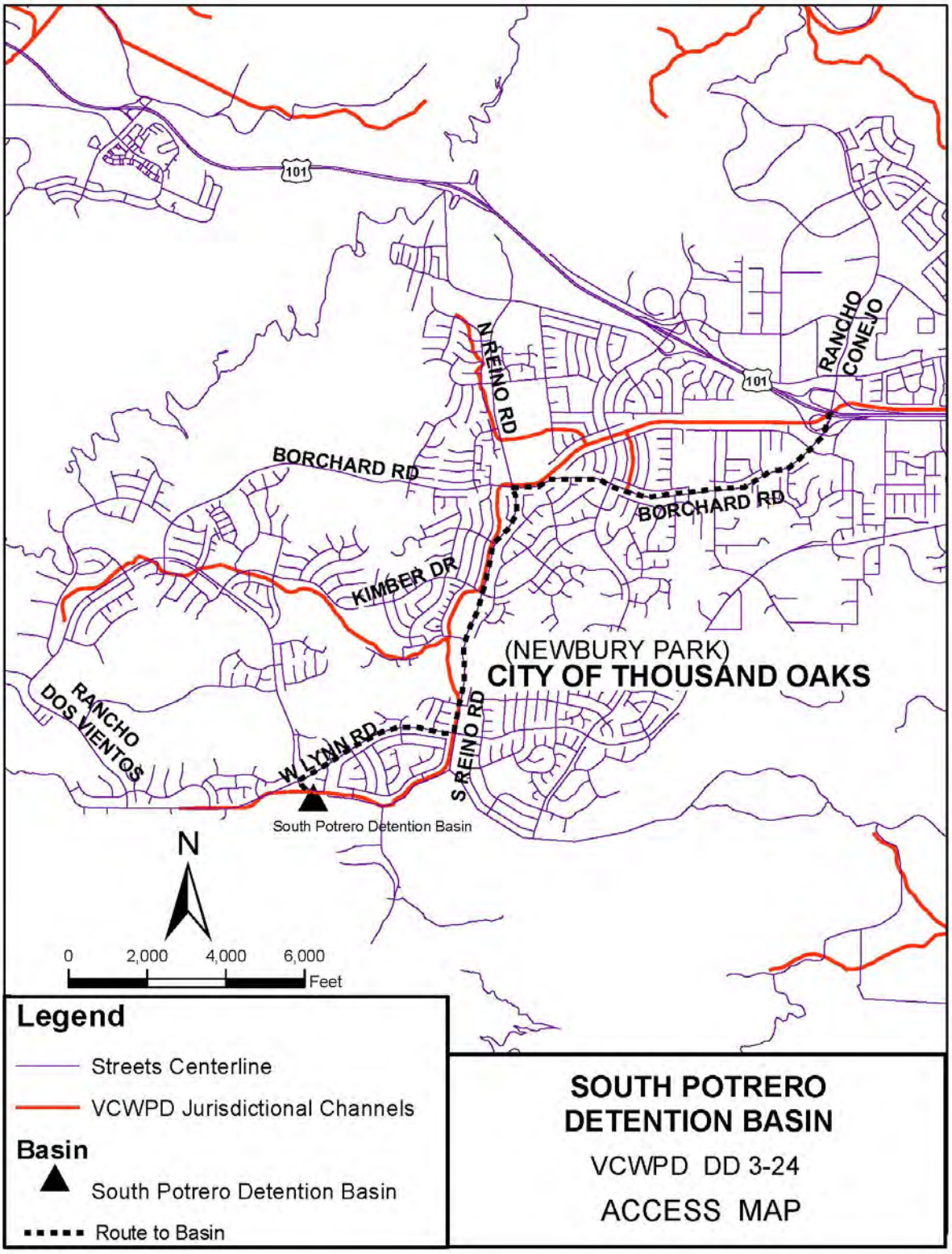
*** Theoretical Value, 10% of 50-Yr Yield per Scott and Williams (1978)

NA= Not Available / Not Applicable


SOUTH BRANCH ARROYO CONEJO WEST TRIBUTARY
N
0 445 890 1,780 2,670 3,560
Feet
LEGEND
Detention Basin
Watershed Boundary
VCWPD Jurisdictional Channels
SOUTH POTRERO
DETENTION BASIN
VCWPD DD 3-24
WATERSHED MAP

Stage Storage Discharge Table, VCRat Routing Data, Calleguas 2003 Model

Elevation	Design Vol.	Outlet Disch.	Spillway Disch.	Total Disch.
Ft. NGVD29	Ac-Ft	Cfs	Cfs	Cfs
794	-	-		-
795	1.64	30.0		30.0
796	3.55	84.9		84.9
797	5.46	155.9		155.9
797.71	6.82	200.0		200.0
798	7.37	210.0		210.0
799	9.28	222.0		222.0
800	11.19	235.0		235.0
801	13.37	245.0		245.0
802	15.56	270.0		270.0
803	17.75	280.0		280.0
804	19.94	290.0		290.0
805	22.12	300.0		300.0
806	24.61	315.0		315.0
807	27.09	325.0		325.0
808	29.58	335.0		335.0
809	32.06	345.0		345.0
810	34.55	350.0		350.0
811	37.35	358.0		358.0
811.7	39.32	363.6	-	363.6
812	40.16	366.0	27.6	393.6
813	42.96	374.0	249.0	623.0
814	45.77	382.0	586.0	968.0
815	48.57	390.0	1,007.1	1,397.1
Interpolated				


101
N REINO RD
RANCHO CONEJO
BORCHARD RD
KIMBER DR
(NEWBURY PARK)
CITY OF THOUSAND OAKS
RANCHO DOS VIENTOS
W LYNN RD
S REINO RD
South Potrero Detention Basin
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
South Potrero Detention Basin
Route to Basin
SOUTH POTRERO DETENTION BASIN
VCWPD DD 3-24
ACCESS MAP

ST. JOHNS DEBRIS BASIN DB3-03 (Obsolete)

LOCATION: Camarillo, approximately 1.5 miles north of Santa Rosa Road; east from Somis Road behind St. John's Seminary; N 271,600, E 1,698,000 (Lambert Zone 5Coordinates); Newbury Park 7-1/2' Quad

District transferred basin to developer in 2006, basin redesigned and HOA maintained

DESIGN DATA

Design Agency	Soil Conservation Service
Level Capacity	50,000 cy (10-29-71) T-22-11
Maximum Debris Capacity	87,600 cy (11-16-88 DTM)
100-Yr Inflow Rate	500 cfs
Outflow Rate	Assumed same for hydrology models
EMERGENCY SPILLWAY	
Type	10 ft W x 5 ft H
Invert Elevation	286 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	313 cfs
PRINCIPAL SPILLWAY	
Type	None
Weir Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	Perforated 10 in Steel Pipe 13.8 ft High
Top Elevation	277 ft NGVD29
Outlet Conduit	10 in Steel Pipe
DAM	
Dam Type	Earthfill
Dam Crest Elevation	292 ft NGVD29
Length	400 ft
Surface Area of Full Basin	4.1 ac
Watershed Area	240 ac from Quad Map
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service
Completion Date	1957
REFERENCE DRAWINGS	
Construction Drawings	SCS 7-E-15512 (C-13-1J)
Right-of-Way Drawings	10196.1 Easement
Topographic Drawings	T-63-20 (11-2-71), 11-16-88 DTM

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	2,849	4,134
50-YEAR	2,181	3,164
25-YEAR	1,565	2,271

BASIN HISTORY: ST. JOHNS DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
10-71	Aerial Survey	50,000		284***
03-78	Disaster Declaration			
02-80	Disaster Declaration			
10-81	Aerial Survey	Not Digitized		
03-83	Disaster Declaration			
08-88	Cleanout		3,936	
11-88	Aerial Survey	32,700		
10-90	Aerial Survey	Not Digitized		
06-91	Aerial Survey	70,430		
02-92	Disaster Declaration			273**
01-95	Disaster Declaration			284
05-96	Cleanout		2,260	
07-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey			
02-98	Disaster Declaration			248****
12-99	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			

Notes

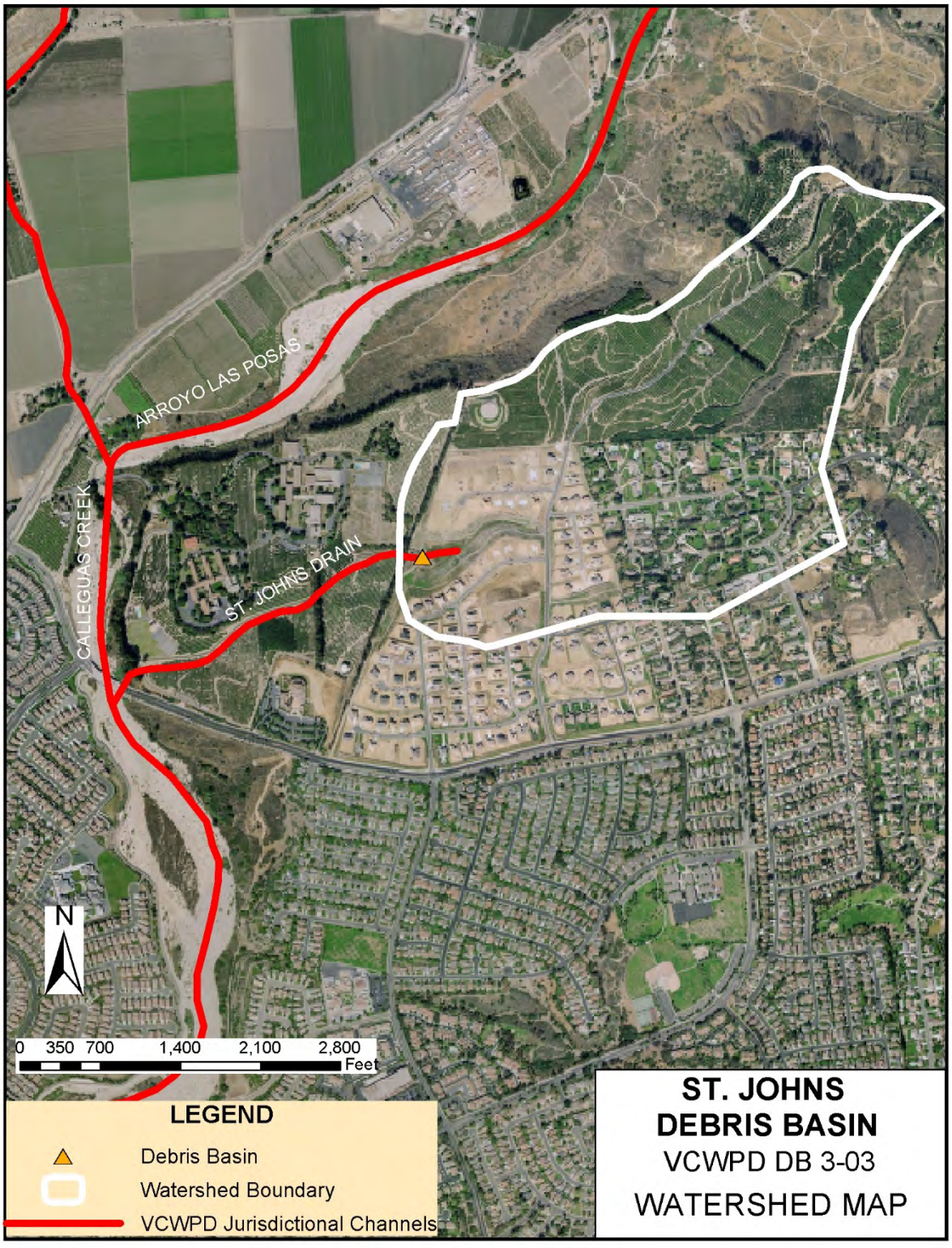
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

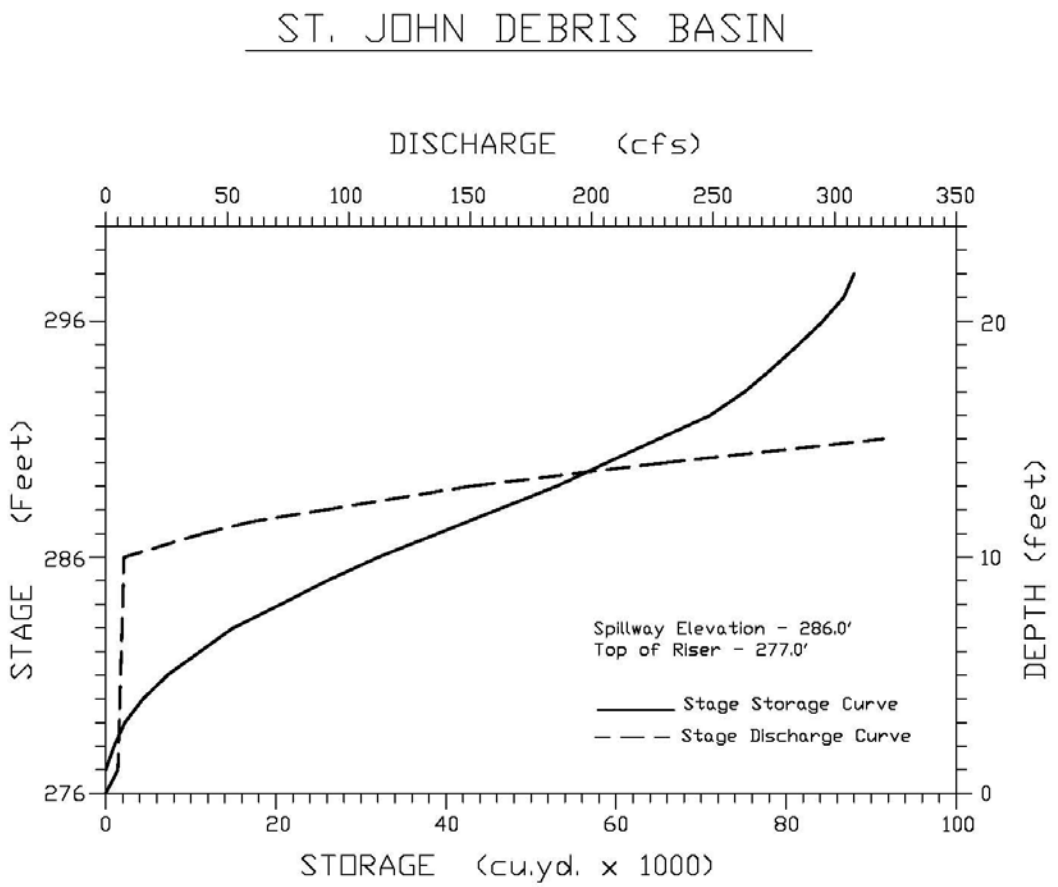
** FEMA Accepted Value for Disaster Declaration

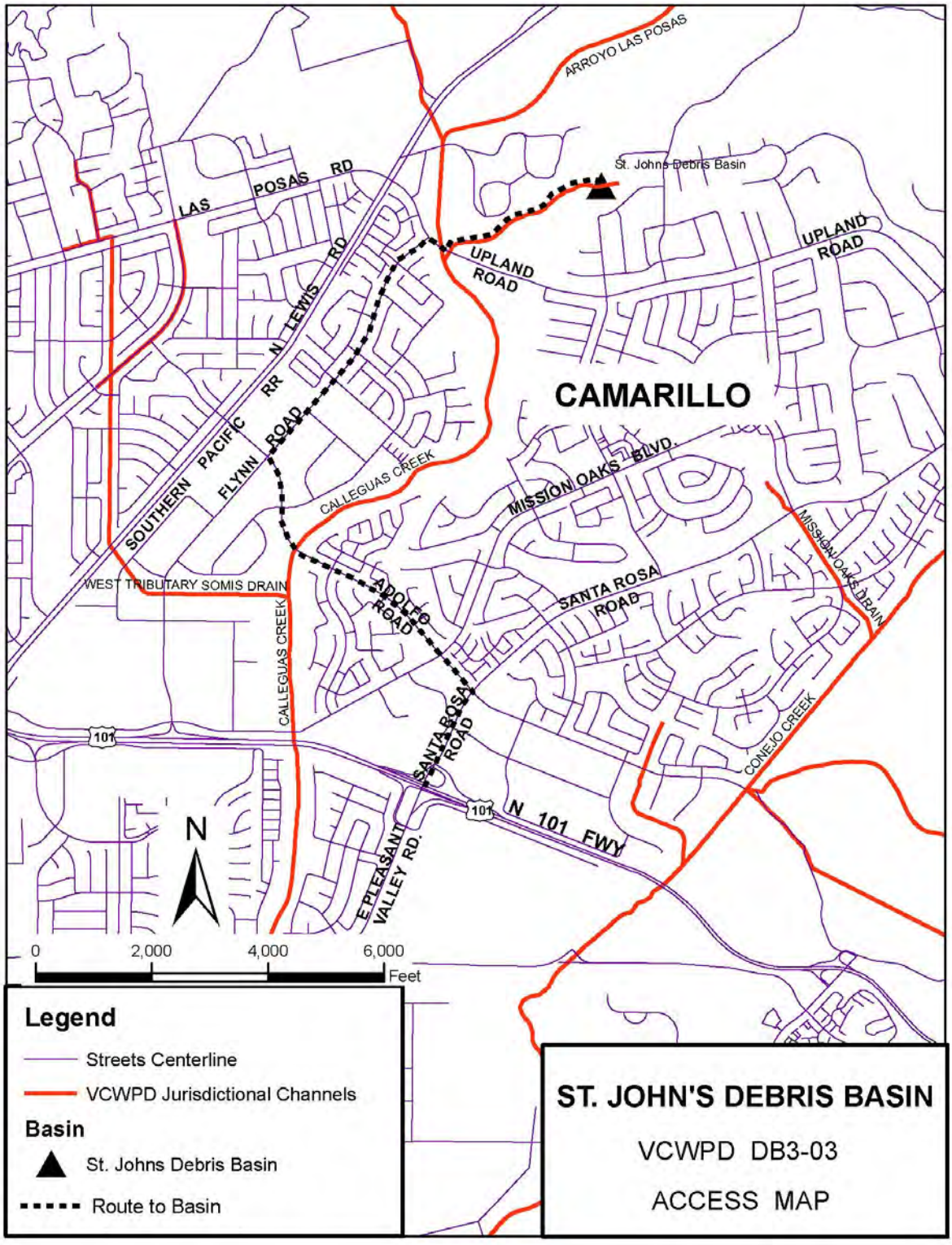
*** Theoretical Value from Kevin Scott Formula

****Based on FEMA Method

NA= Not Available / Not Applicable


ARROYO LAS POSAS
CALLEGUAS CREEK
ST. JOHNS DRAIN
N
0 350 700 1,400 2,100 2,800
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
ST. JOHNS
DEBRIS BASIN
VCWPD DB 3-03
WATERSHED MAP


ST. JOHN DEBRIS BASIN
DISCHARGE (cfs)
0
50
100
150
200
250
300
350
296
286
276
STAGE (Feet)
20
10
0
DEPTH (feet)
0
20
40
60
80
100
STORAGE (cu.yd. x 1000)
Spillway Elevation - 286.0'
Top of Riser - 277.0'
Stage Storage Curve
Stage Discharge Curve


ARROYO LAS POSAS
St. Johns Debris Basin
LAS POSAS RD
N LEWIS RD
UPLAND ROAD
UPLAND ROAD
CAMARILLO
SOUTHERN PACIFIC RR
FLYNN ROAD
CALLEGUAS CREEK
MISSION OAKS BLVD.
MISSION OAKS DRAIN
WEST TRIBUTARY SOMIS DRAIN
ADOLFO ROAD
SANTA ROSA ROAD
CALLEGUAS CREEK
SANTA ROSA ROAD
CONEJO CREEK
101
101
N 101 FWY
E PLEASANT VALLEY RD.
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
St. Johns Debris Basin
Route to Basin
ST. JOHN'S DEBRIS BASIN
VCWPD DB3-03
ACCESS MAP

SYCAMORE CANYON DAM State Dam No. 86-006 DD3-21

LOCATION: Simi Valley, approximately 1.0 mile south of Los Angeles Avenue, just east of Madera Road. N 275,357, E 1,759,401 (Lambert Zone 5 Ca. Coordinates), Simi Valley 7-1/2' Quad.

DESIGN DATA	Flood storage assumes debris storage full (above 780 ft); (All Elevations NGVD29)
Design Agency	VCWPD
Flood Storage Capacity	660 ac ft above 780 ft (890 ac-ft per State Dam Book)
Maximum Debris Storage	172,500 cy or 107 ac-ft @ 780 ft (25*Mean Annual+100Yr Debris Yield)
Q50:Q100 Inflow and Outflow Rates	IN=4,117: 4,900 cfs; OUT=178: 190 cfs as designed
Q100 Outflow	OUIT=376 cfs using HSPF model and revised storage
Debris Cleanout Elevation	780 ft (172,500 cy) [Max. debris storage level] (storage curve below 780 ft not available) based on as-builts
EMERGENCY SPILLWAY	
Type	Rectangular RC Weir 80 ft Wide
Invert Weir Elevation	797 ft NGVD29
Capacity w/o Freeboard	12,000 cfs
PRINCIPAL SPILLWAY	
Type	4 ft x 6 ft RC Tower with Flared Top and Sidewall Inlets
Weir Elevation	789.33 ft NGVD29
Outlet Conduit	48 in RCP
DEBRIS BLEEDER/RISER	
Type	None
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill
Dam Crest Elevation	810 ft NGVD29
Length	1520 ft
Surface Area of Full Basin	70 ac at spillway invert per as-built
Watershed Area	4,380 ac from Quad Map and GIS Shapefile
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	1981
REFERENCE DRAWINGS	
Construction Drawings	Y-3-2109 to Y-3-2133
Right-of-Way Drawings	Y-3-2110
Topographic Drawings	Y-3-2110

EXPECTED DEBRIS PRODUCTION (cu. yd.):		
Storm Frequency	Design Condition (Note 1)	100% Burn
100-YEAR	59,260 (32,135) [17,900]	80,200
50-YEAR	45,290 (24,560) [14,500]	61,310
25-YEAR	32,560 (16,660) [11,500]	44,080

(Note 1) Debris production re-evaluated in 2005 to account for developed watershed areas that do not contribute sediment to dam- total area reduced from 6.8 to 4.7 sq. mi. yielding debris production estimates shown in ( ). In 2013 sediment re-evaluated based on development and yields reduced as shown in [ ].

BASIN HISTORY: SYCAMORE CANYON DAM

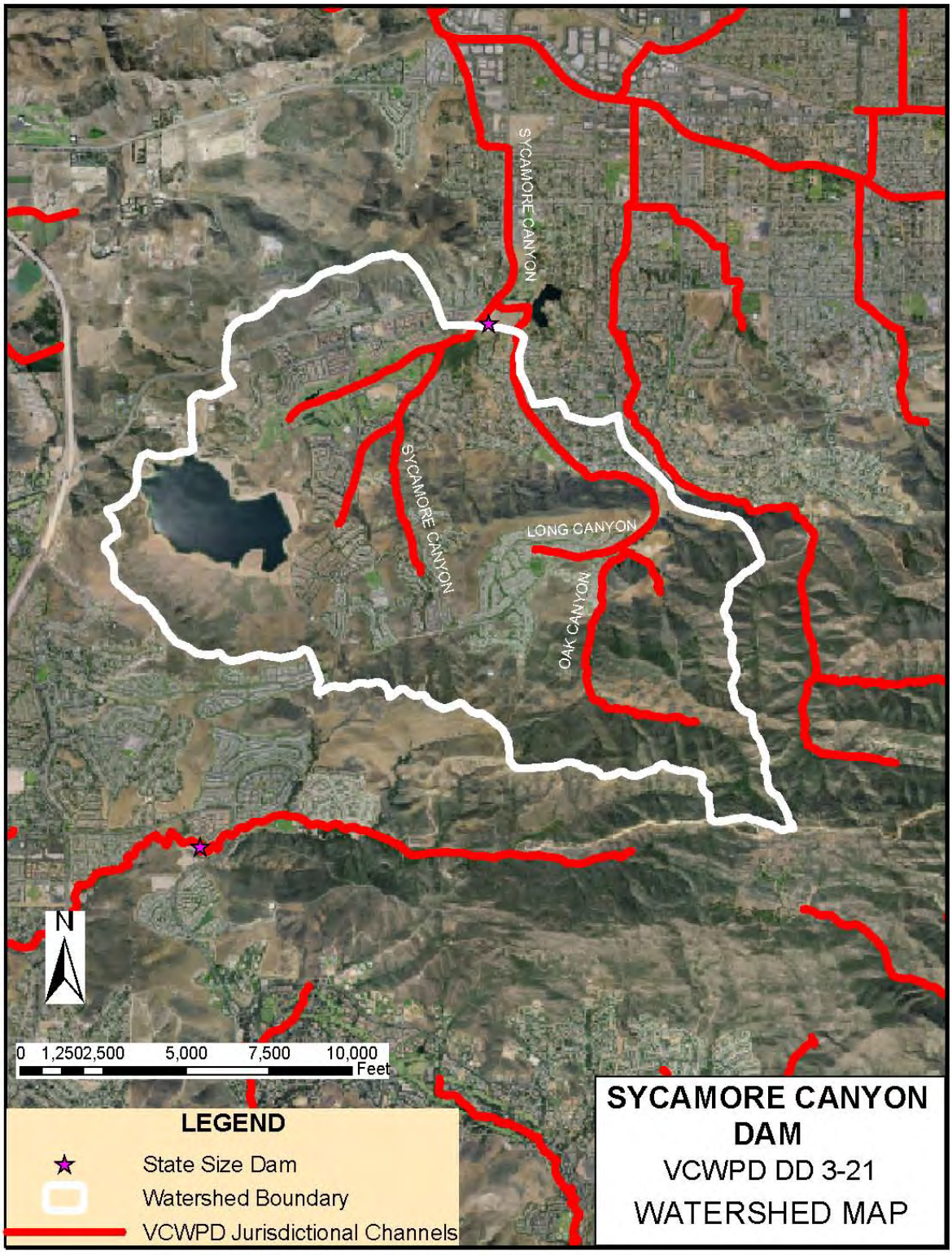
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
01-81	Dam Constructed	1,064,800 (660ac-ft)		
03-83	Disaster Declaration			4,530***
08-96	Aerial Survey	Not Digitized		
02-92	Disaster Declaration			4,530***
01-95	Disaster Declaration			4,530***
08-96	Aerial Survey	Not Digitized		
02-98	Disaster Declaration			4,530***
07-98	Aerial Survey	Digitized but not evaluated		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
12-02	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			2,460***
	No clean out data reported by O&M.			
08-06	WR&T analysis with 08-06 and 05-05 TINs using overlapping areas		9,401 Fill vol 43,6952 Cut vol	

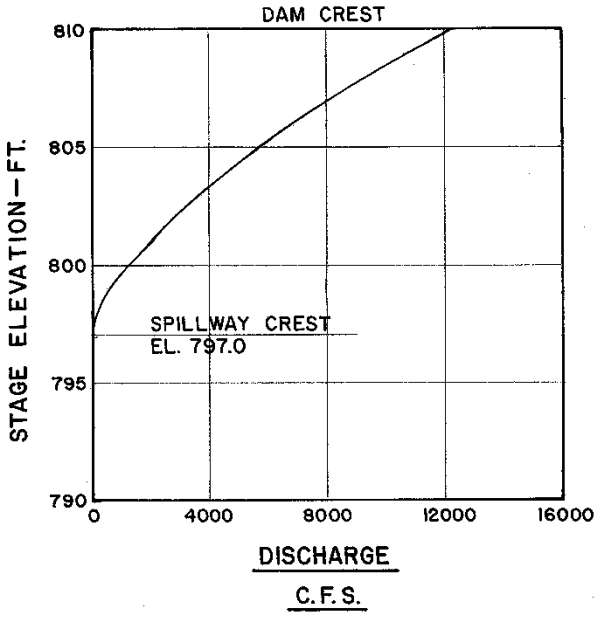
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

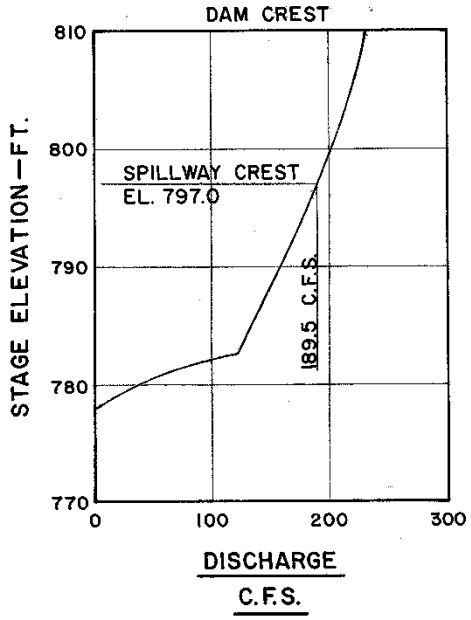
*** Theoretical Value from Scott and Williams (1978); 10% of 50-Yr Design Yield

NA= Not Available / Not Applicable

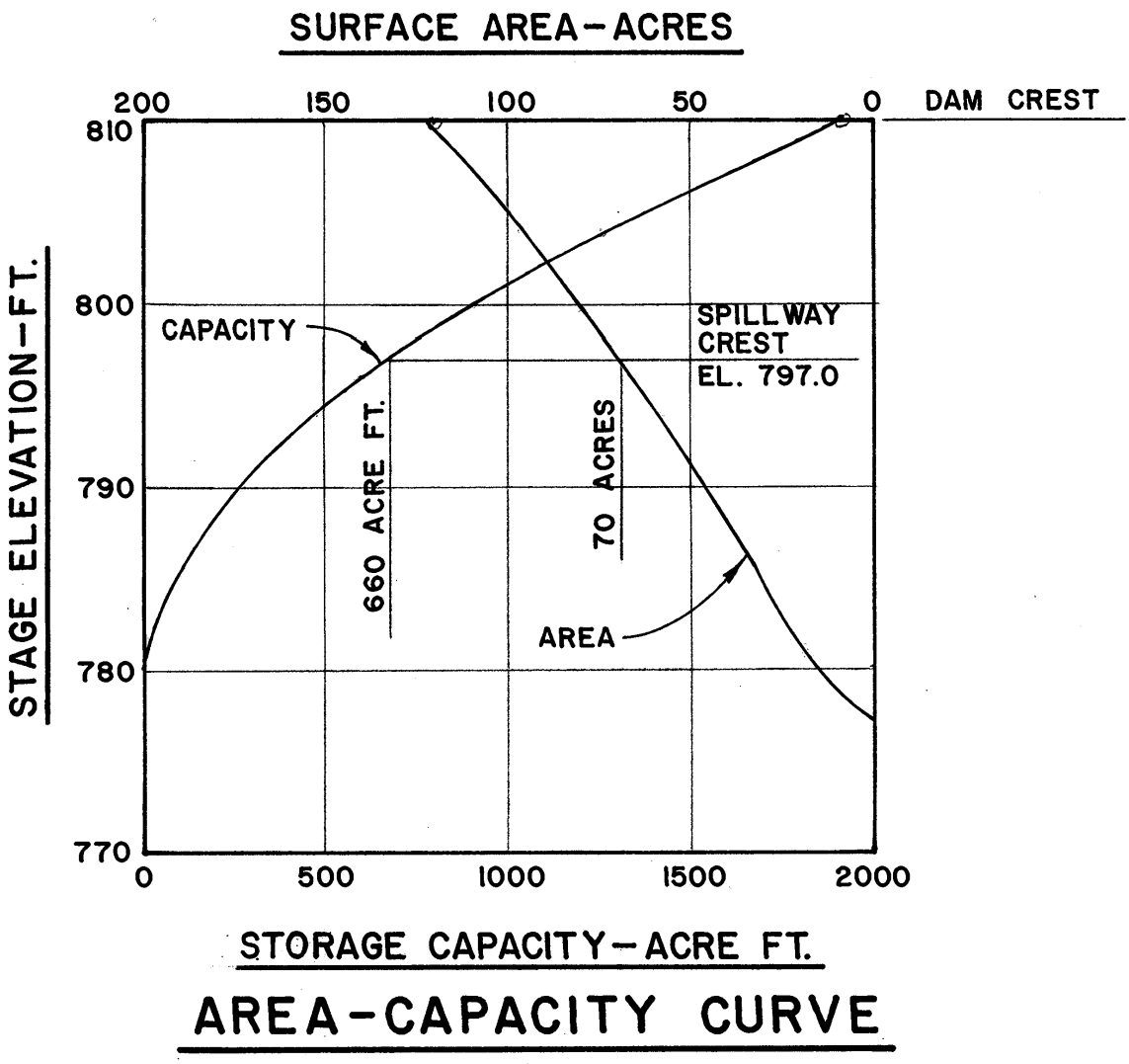

SYCAMORE CANYON
SYCAMORE CANYON
LONG CANYON
OAK CANYON
N
0 1,2502,500 5,000 7,500 10,000
Feet
LEGEND
State Size Dam
Watershed Boundary
VCWPD Jurisdictional Channels
SYCAMORE CANYON DAM
VCWPD DD 3-21
WATERSHED MAP



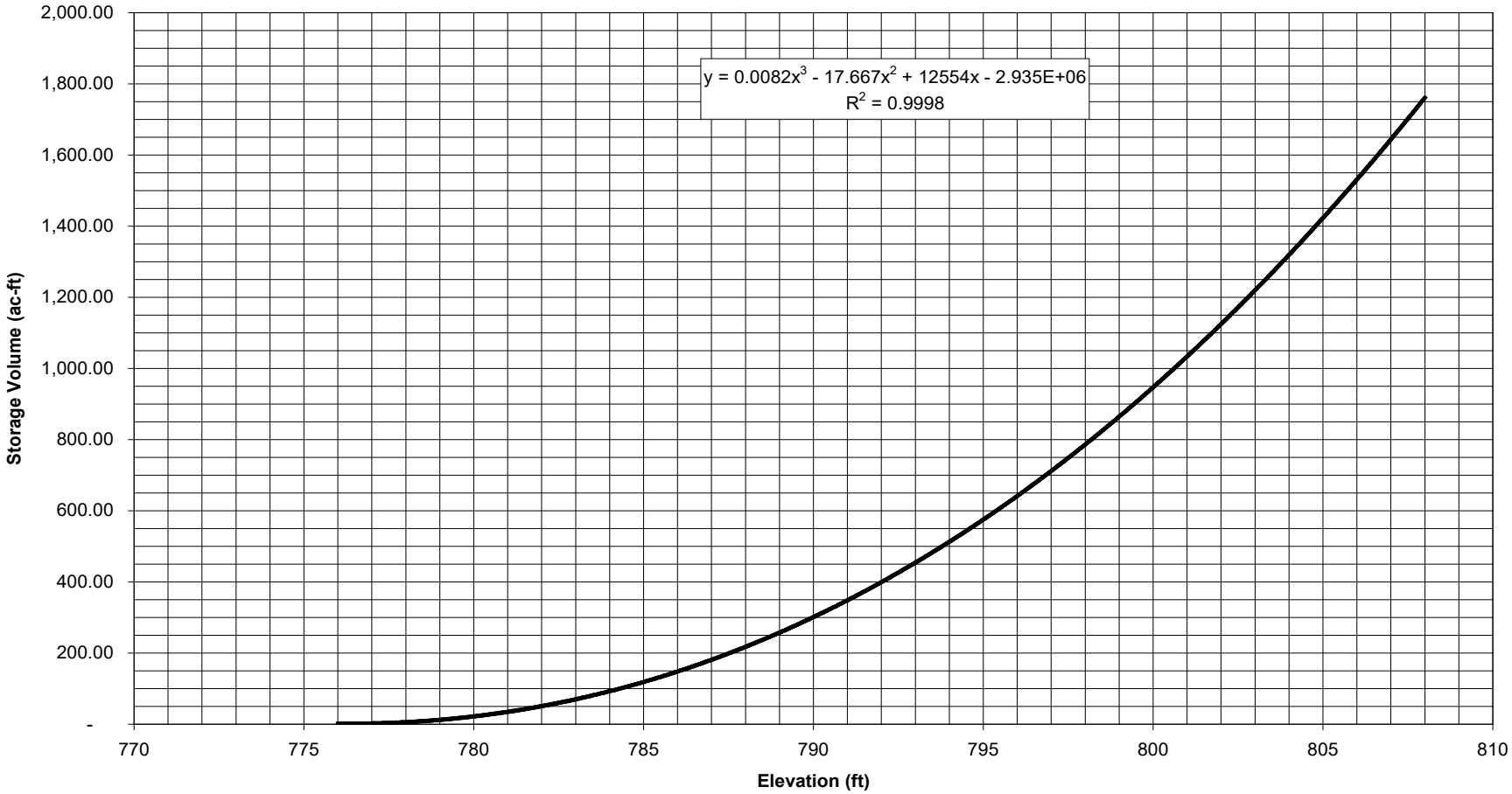
SPILLWAY RATING CURVE



Sycamore Detention Basin



Sycamore Detention Basin Capacity Above Debris Storage

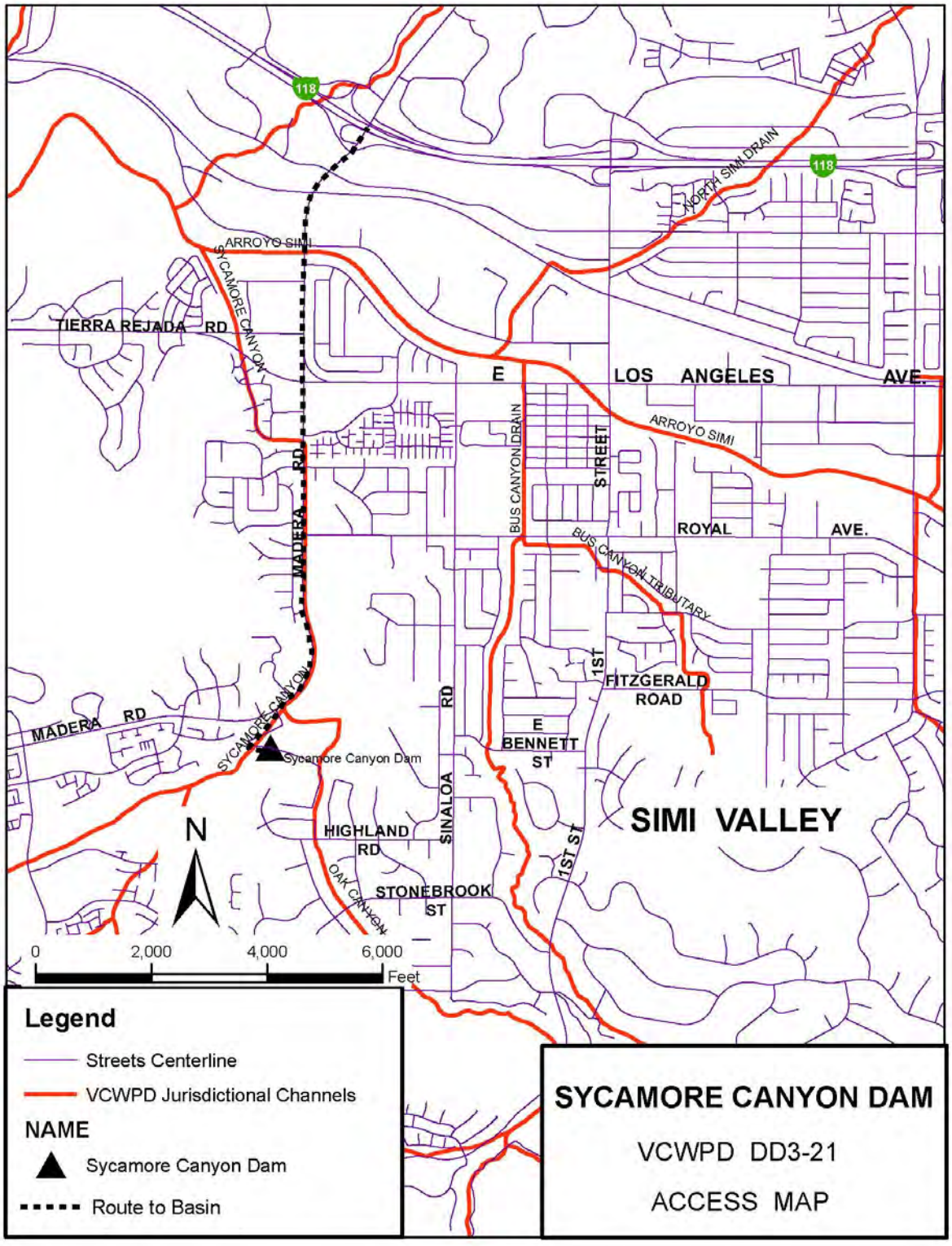


Sycamore Detention Basin Capacity Including Debris Storage (Elev. 776-781 planimetered from as-builts)

Data from 2013 Sycamore Dam Hydrology Update Report

Elev. ft NAVD88	Elev. ft NGVD 29	Depth ft	Net Vol. minus Veg. ac-ft	Net Flood Storage ac-ft	Emerg. Spillway Flow cfs	Outlet Tower Flow cfs	Outflow Sum cfs	Surface Area ac.
780.00	777.39	0.00	-	-	-	0.0	-	0.00
782.00	779.39	2.00	0.716	-	-	17.0	17.0	0.36
784.00	781.39	4.00	14.524	-	-	72.0	72.0	6.90
785.21	782.60	5.21	33.561	0	0	120.0	120.0	10.23
786.00	783.39	6.00	45.945	12.39	0	125.0	125.0	15.71
788.00	785.39	8.00	88.254	54.69	0	135.0	135.0	21.15
790.00	787.39	10.00	138.514	104.95	0	145.0	145.0	25.13
792.00	789.39	12.00	200.502	166.94	0	156.0	156.0	30.99
794.00	791.39	14.00	270.170	236.61	0	167.0	167.0	34.83
796.00	793.39	16.00	348.214	314.65	0	175.0	175.0	39.02
798.00	795.39	18.00	438.587	405.03	0	184.0	184.0	45.19
799.61	797.00	19.61	523.664	490.10	0	189.5	189.5	51.35
800.00	797.39	20.00	544.272	510.71	100	193.0	293.0	52.84
801.00	798.39	21.00	605.561	572.00	300	197.0	497.0	57.07
802.00	799.39	22.00	666.849	633.29	800	200.0	1,000	61.29
804.00	801.39	24.00	803.114	769.55	2,300	209.0	2,509	68.13
806.00	803.39	26.00	960.175	926.62	4,050	218.0	4,268	78.53
808.00	805.39	28.00	1,130.787	1,097.2	5,800	224.0	6,024	85.31
810.00	807.39	30.00	1,316.528	1,283.0	8,600	229.0	8,829	92.87
812.00	809.39	32.00	1,445.291	1,411.7	11,600	234.0	11,834	100.00

Note: Veg. volume = 10.0 ac-ft; 100-yr design debris volume + storage = 33.56 ac-ft


118
NORTH SIMI DRAIN
ARROYO SIMI
SYCAMORE CANYON
TIERRA REJADA RD
E
LOS ANGELES AVE.
ARROYO SIMI
BUS CANYON DRAIN
STREET
ROYAL AVE.
BUS CANYON TRIBUTARY
MADERA RD
1ST
FITZGERALD ROAD
E BENNETT ST
SINALOA RD
Sycamore Canyon Dam
SIMI VALLEY
HIGHLAND RD
STONEBROOK ST
OAK CANYON
1ST ST
N
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
NAME
Sycamore Canyon Dam
Route to Basin
SYCAMORE CANYON DAM
VCWPD DD3-21
ACCESS MAP

SYCAMORE PARK DETENTION BASIN DD3-29

LOCATION: Simi Valley, On Rudolph upstream of Crosby St
N 273,860,E 1,774,900 (Lambert Zone 5 Coordinates);
Simi 7 1/2' Quad.

DESIGN DATA

Design Agency	Crosby-Mead-Benton
Level Capacity	6,450 cy at spillway invert (Y-3-3734)
Maximum Debris Capacity	NA
100-Yr Inflow Rate	109 cfs
Outflow Rate	38 cfs at 911.3 ft NGVD29, 10-yr 25 cfs
Debris Cleanout Elevation	903 ft 370 cy (25% of 100-yr sediment volume)
EMERGENCY SPILLWAY	
Type	36-in RCP Vertical Pipe
Crest Elevation	911.3 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	38 cfs
PRINCIPAL SPILLWAY	
Type	6 ft x 6 ft Concrete Riser Tower, Top Elev 910.0 ft
Inlet Weir Elevations	906.8 ft NGVD29
Outlet Conduit	24 to 36 in RCP
DEBRIS BLEEDER/RISER	
Type	6-in Perforated Pipe Laid at 1% Min. Grade w/ Gravel
Start Elevation	901 ft NGVD29, Length Approx. 100 ft
Outlet Conduit	Connects to Principal Spillway
DAM	
Dam Type	Earthfill
Dam Crest Elevation	914 ft NGVD29
Length	~230 ft on 2 sides of basin
Surface Area of Full Basin	~0.4 ac
Watershed Area	33 ac from Simi Valley MDP (draft)
Width at Crest	15 ft
CONSTRUCTION DATA	
Construction Agency	Centex
Completion Date	1997
REFERENCE DRAWINGS	
Construction Drawings	Y-3-3726-3745
Right-of-Way Drawings	NA
Topographic Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	1,473	2,137
50-YEAR	1,210	1,755
25-YEAR	854	1,238
10-YEAR	470	682

Note: Development between basin and undeveloped area expected to minimize sediment inflow to basin

BASIN HISTORY: SYCAMORE PARK BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No cleanout data reported by O&M			

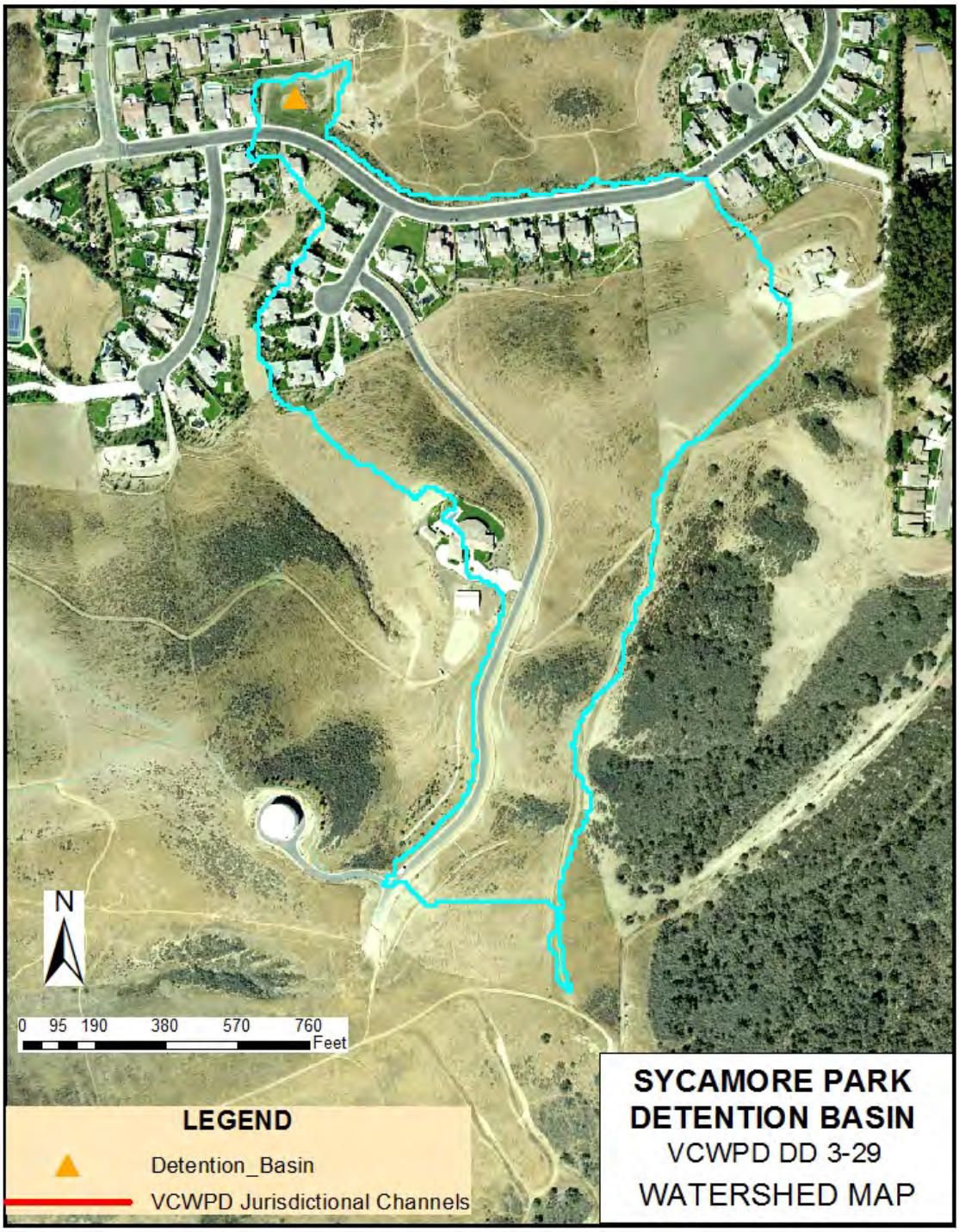
Notes

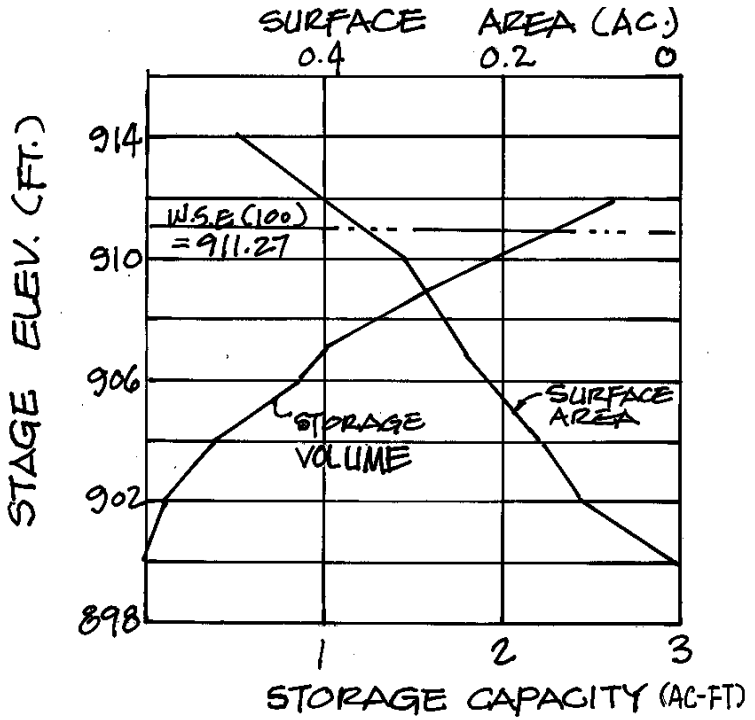
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

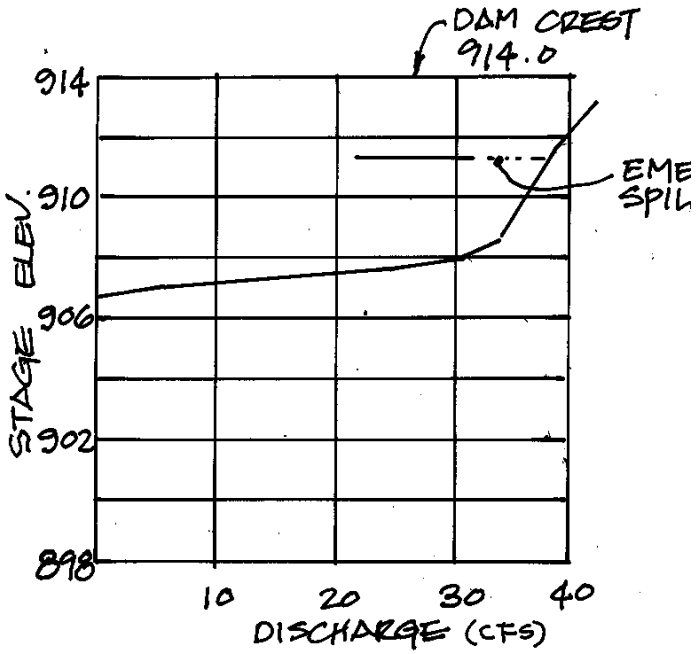
*** Theoretical Value from Kevin Scott Formula

NA= Not Available / Not Applicable


N
0 95 190 380 570 760
Feet
LEGEND
Detention_Basin
VCWPD Jurisdictional Channels
SYCAMORE PARK
DETENTION BASIN
VCWPD DD 3-29
WATERSHED MAP

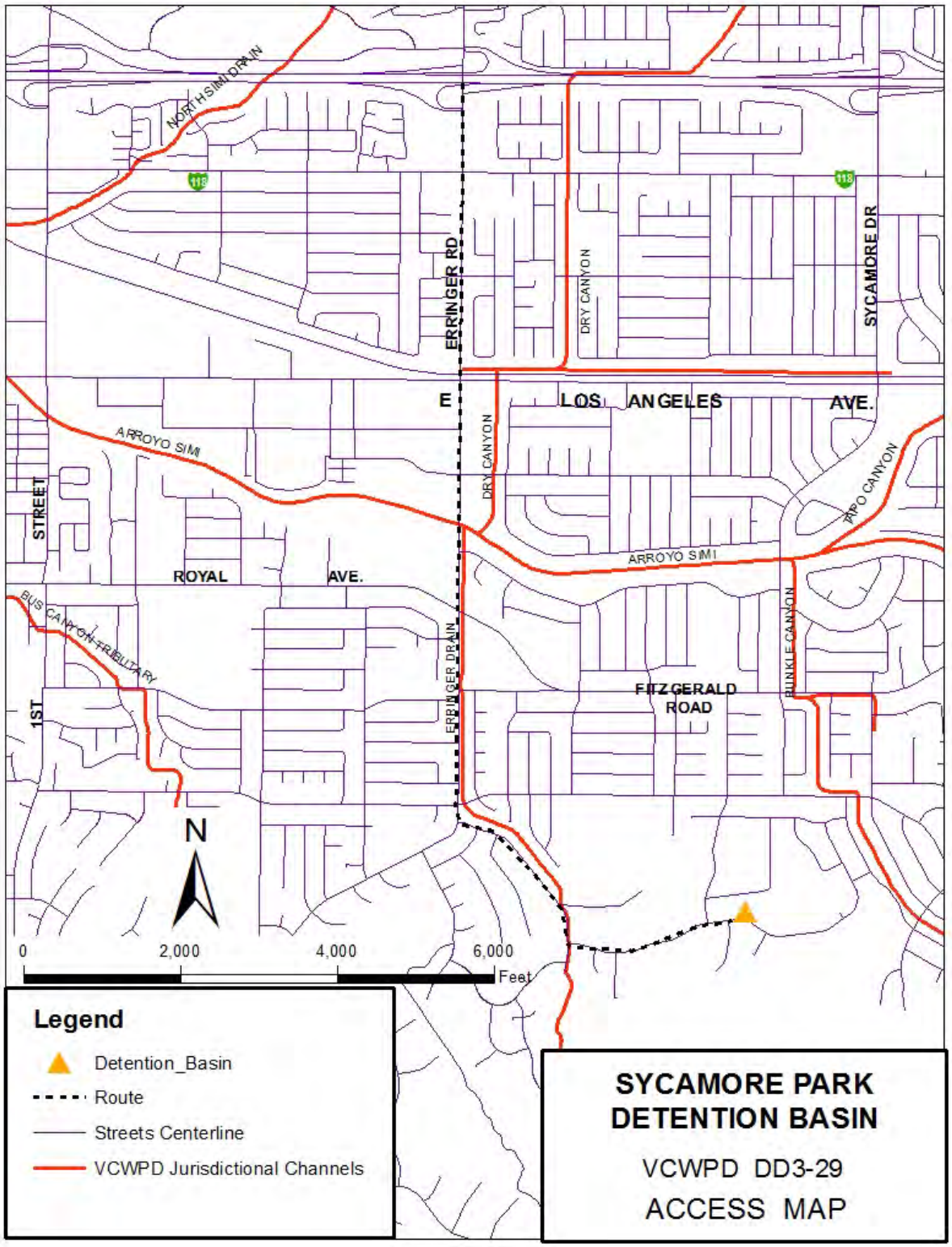


STORAGE AND SURFACE RATING CURVE



SPILLWAY RATING CURVE

Sycamore Park Detention Basin


NORTH SIMI DRAIN
ERRINGER RD
DRY CANYON
SYCAMORE DR
E
LOS ANGELES
AVE.
ARROYO SIMI
STREET
DRY CANYON
PIPO CANYON
ROYAL
AVE.
ARROYO SIMI
BUS CANYON TRIBUTARY
ERRINGER DRAIN
RUNKLE CANYON
1ST
FITZGERALD
ROAD
N
0
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6,000
Feet
Legend
Detention_Basin
Route
Streets Centerline
VCWPD Jurisdictional Channels
SYCAMORE PARK
DETENTION BASIN
VCWPD DD3-29
ACCESS MAP

TAPO HILLS NO. 1 (WEST) DETENTION BASIN DD3-18

LOCATION: Simi Valley, between Dry Canyon and Tapo Canyon
About 1000 ft north of Township Avenue.
N290400, E1777800 (Lambert Zone 5 Coordinates)
Santa Susana 7.5' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	36,140 cu.yds. at Spillway Weir Elev of 1149.5 ft NGVD29
Maximum Debris Capacity	56,000 cu.yds. level T-245 (7-8-80); 75,000 cy sloped
100-Yr Inflow and Outflow Rates	IN:290 cfs; OUT:42.1 cfs at 1,148 ft NGVD29 (Y-3-1726)
Debris Cleanout Elevation	1133.5 ft (1,430 cy) (25% of 100-yr vol)
EMERGENCY SPILLWAY	
Type	20 ft Long x 12 ft Wide x 5.5 ft Deep Side Channel Inlet
Invert Weir Elevation	1,149.5 ft NGVD29
Spillway Weir Length	20 ft
Capacity w/o Freeboard	~800 cfs
PRINCIPAL SPILLWAY	
Type	None
Weir Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	30 in CSP 19 ft High
Top Elevation	1147.5 ft NGVD29
Outlet Conduit	24 in RCP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	1,155 ft NGVD29
Length	250 ft
Surface Area of Full Basin	2.2 ac
Watershed Area	104 ac
Width at Crest	20 ft
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	1971
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1008-1018, Y-3-1726 (Hydrology)
Right-of-Way Drawings	T-75-3 (2-11-71)
Topographic Drawings	T-75-5-(2-11-71), T-245 (07-08-80)

Basin designed as debris basin but riser modified by Y3-1713 Schedule II project to function as detention basin. Basin included in District's official Calleguas model 2003.

EXPECTED DEBRIS PRODUCTION (cy): 1990 and [1973] values		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	5,730 (1) [5,450]	8,310
50-YEAR	4,380 [4,150]	6,350
25-YEAR	3,150 [2,975]	1,580

(1) Design Binder (1974) used 50-yr sediment yield of about 4,200 cy for design volume as shown on as-builts. Scott and Williams estimated 50-yr yield of 4,150 cy. 25- and 100-yr values estimated using rainfall ratios. Current basin design value would be 5,730*1.25= 7,160 cy.

BASIN HISTORY: TAPO HILLS NO. 1 WEST BASIN

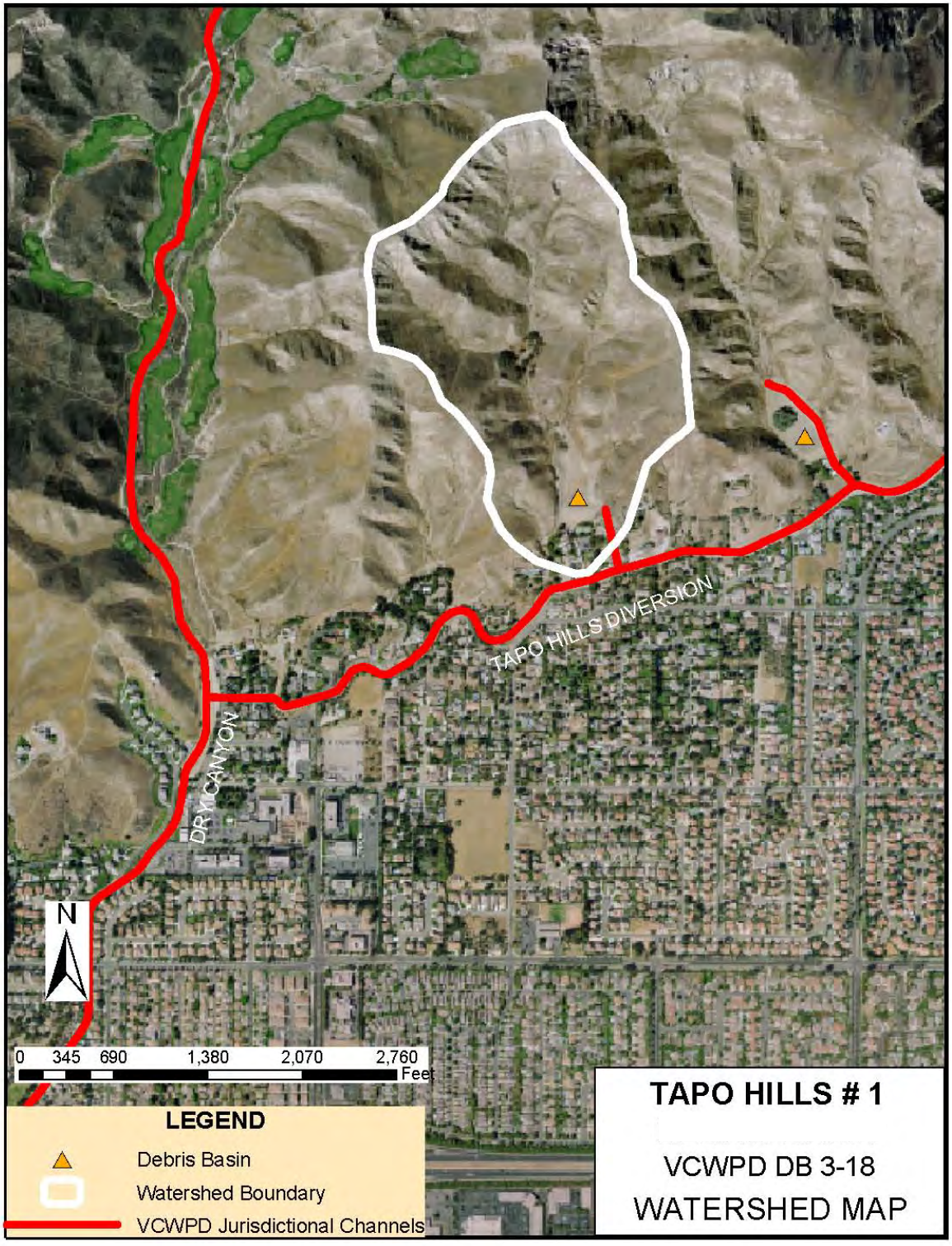
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
10-70	Construction			
02-71	Aerial Survey	75,000		
05-72	Aerial Survey	Not Digitized		
05-73	Aerial Survey			
02-75	Aerial Survey	72,970		
10-75	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			440***
02-80	Disaster Declaration			440***
07-80	Cleanout			
09-81	Aerial Survey	Not Digitized		
03-83	Disaster Declaration			440***
12-85	Aerial Survey	58,900		
02-92	Disaster Declaration			440***
01-95	Disaster Declaration			440***
08-96	Aerial Survey	Not Digitized		
08-98	Disaster Declaration			
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			440***
07-05	Cleanout – Survey analysis by O&M		4,353	
10-05	TIN analysis by WR&T 10-05 vs 05-05 TINs		3,599 Fill vol 1,039 Cut vol	
10-05	TIN analysis by WR&T	26,073 to elev 1,150 ft NGVD29		

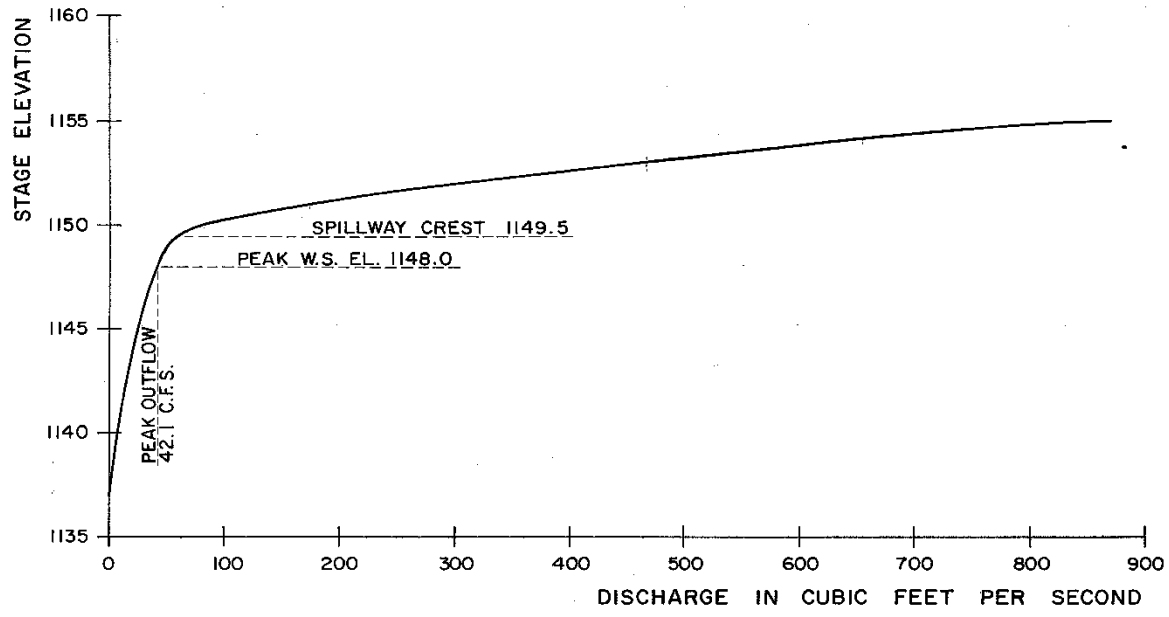
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

*** Theoretical Value from Scott and Williams (1978)- 10% of 50-Yr Design Debris Production

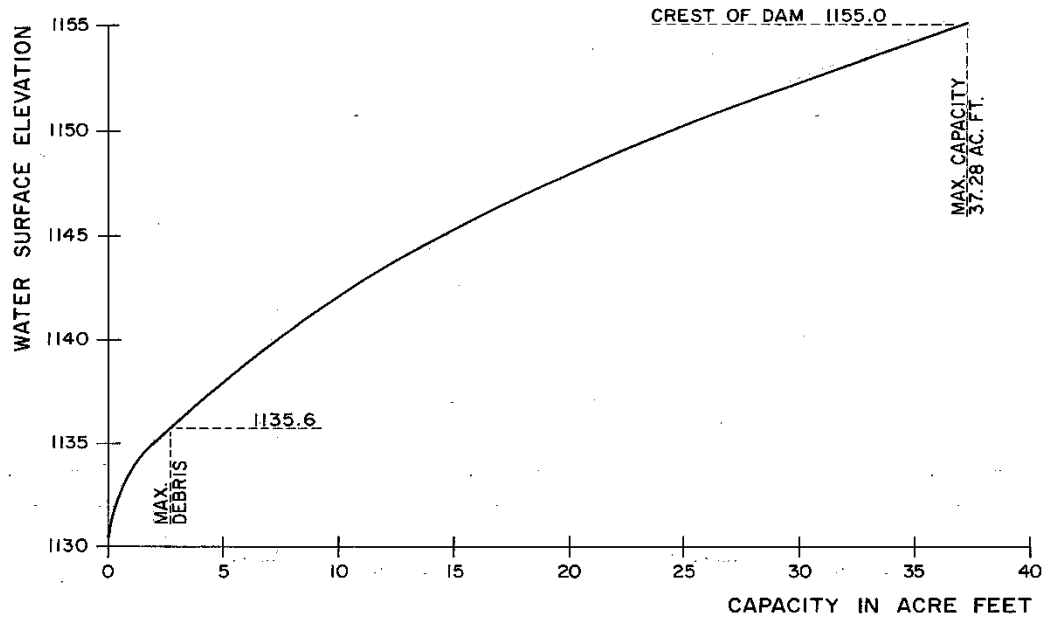
NA= Not Available / Not Applicable


TAPO HILLS DIVERSION
DRY CANYON
N
0 345 690 1,380 2,070 2,760
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
TAPO HILLS # 1
VCWPD DB 3-18
WATERSHED MAP



STAGE - DISCHARGE CURVE

WEST DAM

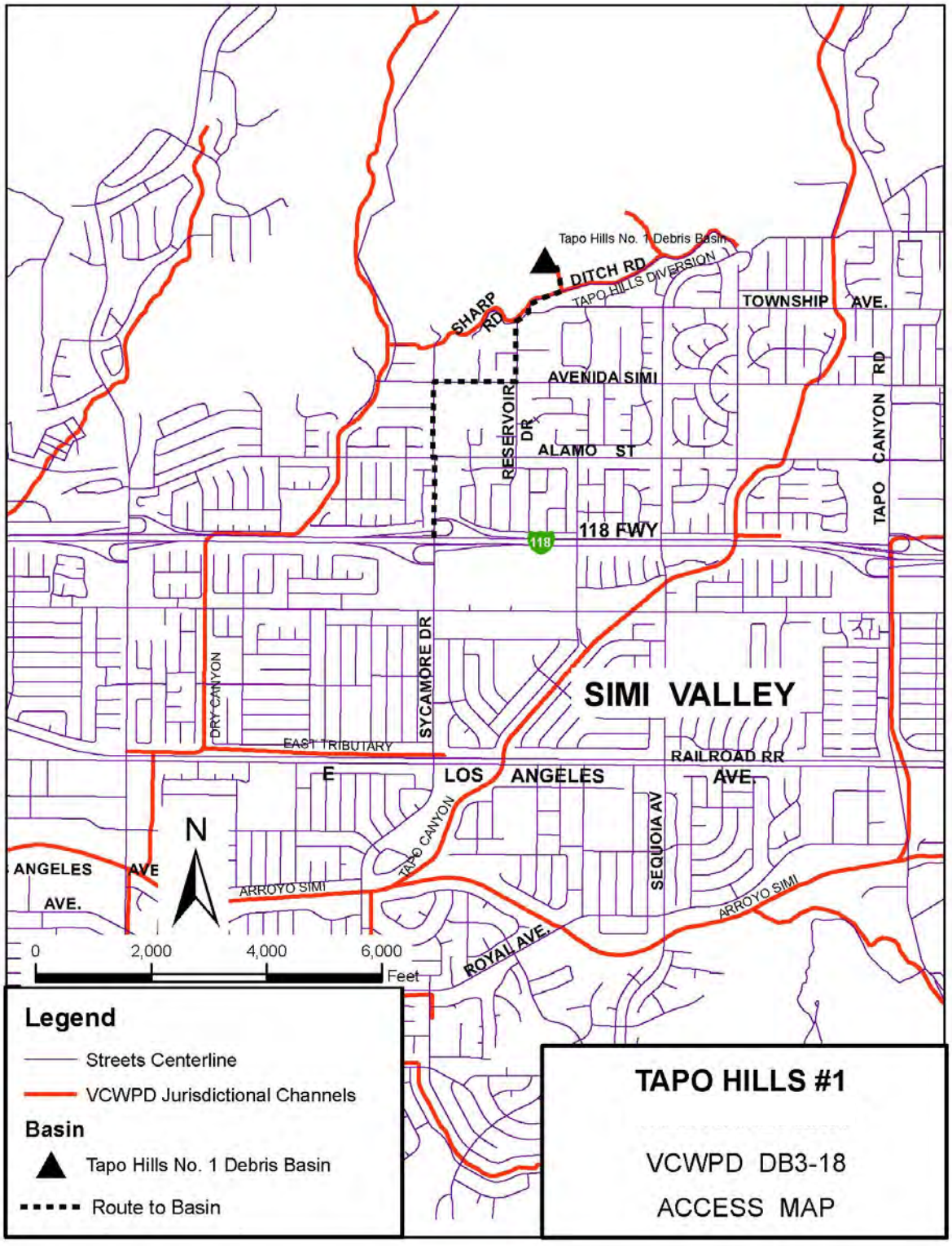


Stage Storage Discharge Data from Y-3-1726; Discharge data superseded by silting of bleeder riser to elev 1137.5 due to 125% of 100-yr debris volume.

Stage Storage Discharge Data

Elevation	As-Built Design Vol.	2003 VCRat Vol.	2018 Net Vol.	Riser	Net Riser with Silt	Spillway	Total
Ft. NGVD29	Ac-Ft	Ac-Ft	Ac-Ft	Cfs	Cfs	Cfs	Cfs
1131	0			-			
1132	0.3			1.2			
1133	0.7			3.1			
1134	1.2			5.6			
1135	2.0	-		8.6			
1136	2.9	0.8		12.0			
1137	3.9	1.6		15.8			
1137.5	4.4	NA	-	17.8	-		-
1138	5.0	2.5	0.562	19.9	0.5		0.5
1139	6.1	3.6	1.662	24.3	2.0		2.0
1140	7.4	4.7	2.962	29.0	4.3		4.3
1141	8.5	5.9	4.062	33.9	7.1		7.1
1142	9.9	7.3	5.462	39.1	10.3		10.3
1143	11.1	8.8	6.662	44.5	13.9		13.9
1144	12.9	10.4	8.462	49.7	17.8		17.8
1145	14.4	12.1	9.962	52.0	22.0		22.0
1146	16.2	13.7	11.762	53.2	26.6		26.6
1147	17.9	15.6	13.462	54.4	31.2		31.2
1147.5	19.0	16.6	14.512	55.0	33.3		33.3
1148	20.0	17.6	15.562	55.6	46.3		46.3
1149	21.9	19.6	17.462	56.7	56.7		56.7
1149.5	23.1	20.8	18.612	57.3	57.3	-	57.3
1150	24.2	21.9	19.762	57.8	57.8	22	79.8
1151	27.4	24.0	22.962	58.9	58.9	114	172.9
1152	30.0	26.6	25.562	60.0	60.0	245	305.0
1153	32.3	29.2	27.862	61.1	61.1	406	467.1
1154	35.0	31.8	30.562	62.1	62.1	592	654.1
1155	37.3	34.6	32.842	63.1	63.1	800	863.1

NA= Not Analyzed


Tapo Hills No. 1 Debris Basin
DITCH RD
TAPO HILLS DIVERSION
SHARP RD
TOWNSHIP AVE.
AVENIDA SIMI
RESERVOIR DR
ALAMO ST
TAPO CANYON RD
118 FWY
118
SYCAMORE DR
DRY CANYON
SIMI VALLEY
EAST TRIBUTARY
LOS ANGELES
RAILROAD RR AVE.
TAPO CANYON
SEQUOIA AV
ARROYO SIMI
ROYAL AVE.
ANGELES AVE
AVE.
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Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Tapo Hills No. 1 Debris Basin
Route to Basin
TAPO HILLS #1
VCWPD DB3-18
ACCESS MAP

TAPO HILLS NO. 2 DETENTION BASIN DD3-19

LOCATION: Simi Valley, between Dry Canyon and Tapo Canyon
About 1200 ft north of Township Avenue.
N290,508, E1,779,514 (Lambert Zone 5 Coordinates)
Santa Susanna 7.5' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	41,190 cu.yds. (T-245) 7-8-80 to top of spillway 1,153 ft
Maximum Debris Capacity	51,820 cu.yds. (T-245) 7-8-80 level at top of dam
100-Yr Inflow and Outflow Rates	IN:364 cfs; OUT: 111.3 cfs fm as-builts
Debris Cleanout Elevation	1,138.6 ft (1,000 cy) [25% of 100-yr volume from as-builts]
EMERGENCY SPILLWAY	
Type	None
Invert Weir Elevation	NA
Spillway Length	NA
Capacity w/o Freeboard	NA
PRINCIPAL SPILLWAY	
Type	6 ft x 4 ft RC Tower 23 ft High with Flared Top and Sidewall Inlets Max. Capacity 210 cfs
Top Elevation	1,153 ft NGVD29
Outlet Conduit	36-in RCP
DEBRIS BLEEDER/RISER	
Type	18-in Perforated CMP
Top Elevation	1,140.75 ft NGVD29
Outlet Conduit	18-in CMP to principal spillway tower
DAM	
Dam Type	Earthfill
Dam Crest Elevation	1,155 ft NGVD29
Length	240 ft
Surface Area of Full Basin	1.33 ac
Watershed Area	133 ac
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	1977
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1713 thru Y-3-1726
Right-of-Way Drawings	Y-3-1715
Topographic Drawings	T-245 (7-8-80)

Basin designed not to spill in 100-yr storm but lacking emergency spillway. Outflow at higher heads controlled by 36-in RCP outlet pipe under outlet control. Basin included in 2003 Calleguas Model.

EXPECTED DEBRIS PRODUCTION (cy): (1), (2)		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	4,000 (1)	5,803
50-YEAR	3,049	4,422
25-YEAR	2,184	3,167

(1) Design debris capacity based on as-builts used 50-yr vol of 3,650 cy from Scott and Williams (1973). Assumed debris would accumulate with a slope so estimated level elevation of 1140.5 could be assumed to be 1140 ft. Corresponded to 1.68 ac-ft on stage-storage curve.

(2) Current design values calculated in 1990. Reserved storage for basin design is4,000*1.25= 5,000 cy.

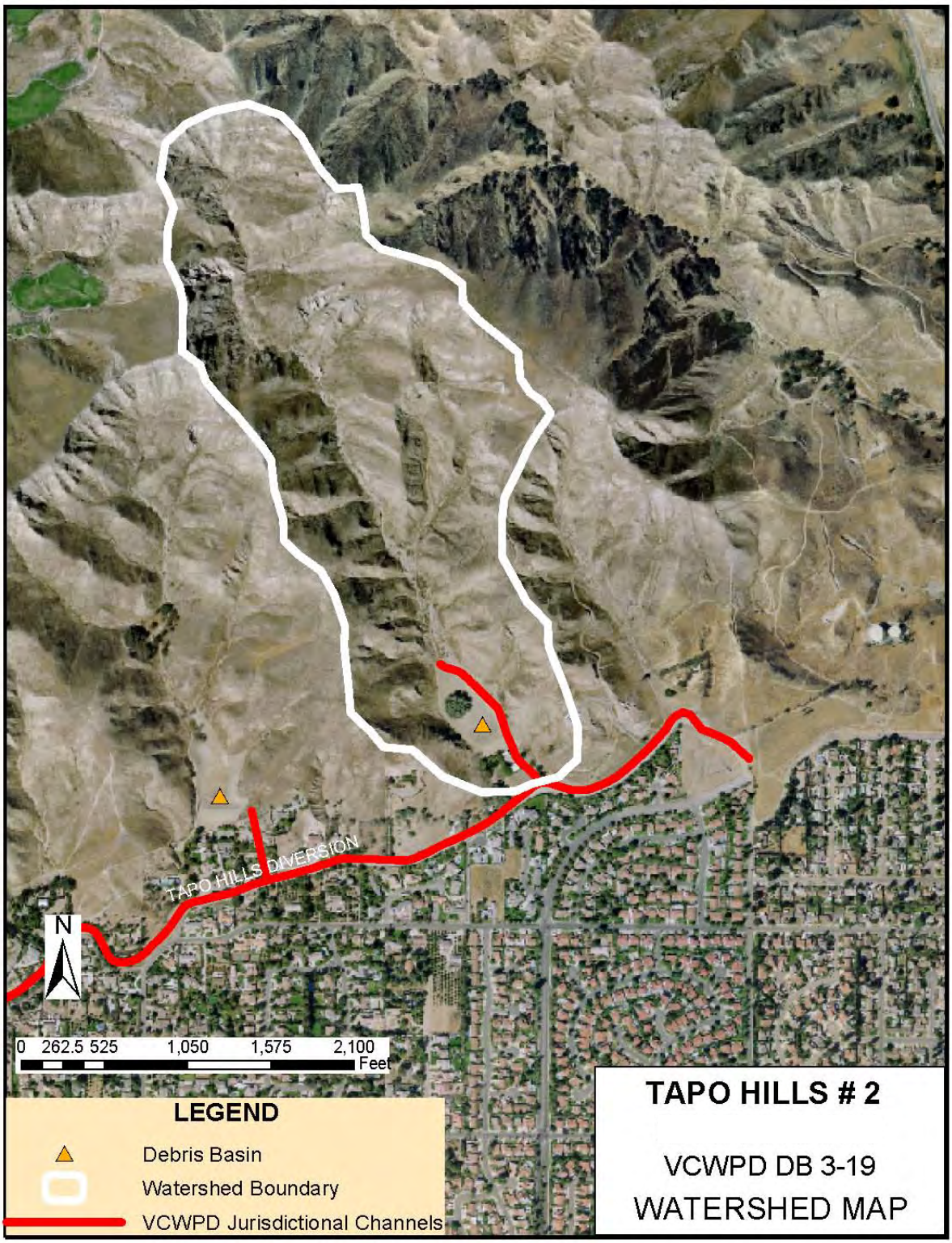
BASIN HISTORY: TAPO HILLS NO. 2 EAST BASIN

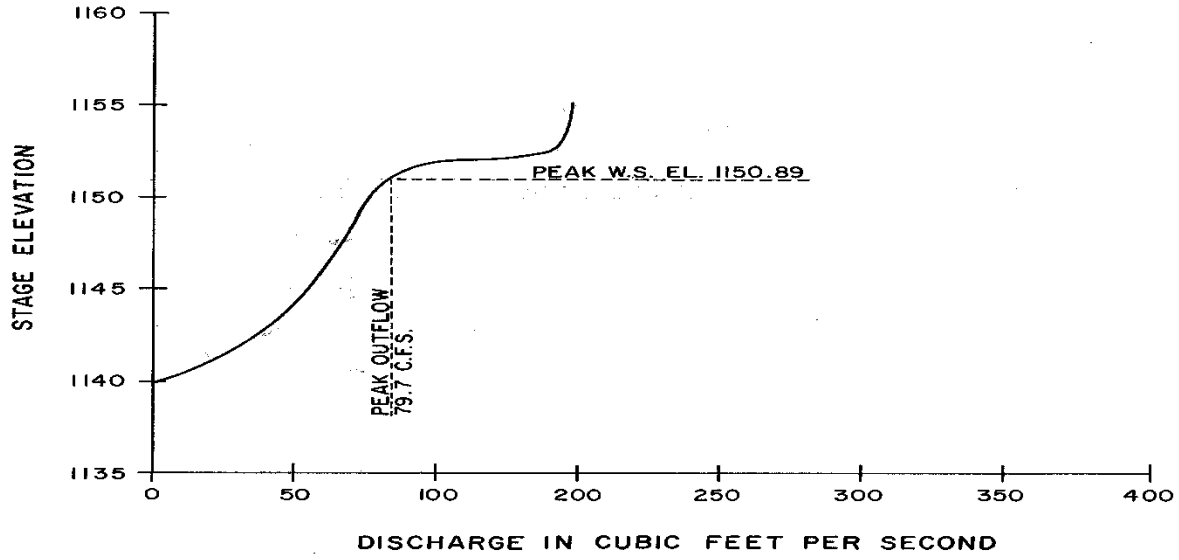
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
09-78	Construction	51,040		
06-80	Aerial Survey	44,580		
07-80	Aerial Survey	52,370		
11-85	Cleanout		6,500	
12-85	Aerial Survey	54,150		
08-91	Cleanout		4,262	
02-92	Disaster Declaration			
01-95	Disaster Declaration			
08-96	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			928
07-05	Cleanout – Survey analysis by O&M		4,353	
10-05	TIN analysis by WR&T 10-05 vs 05-05 TINs		3,599 Fill vol 1,039 Cut vol	
10-05	TIN analysis by WR&T	26,073 to elev 1,150 ft NGVD29		

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

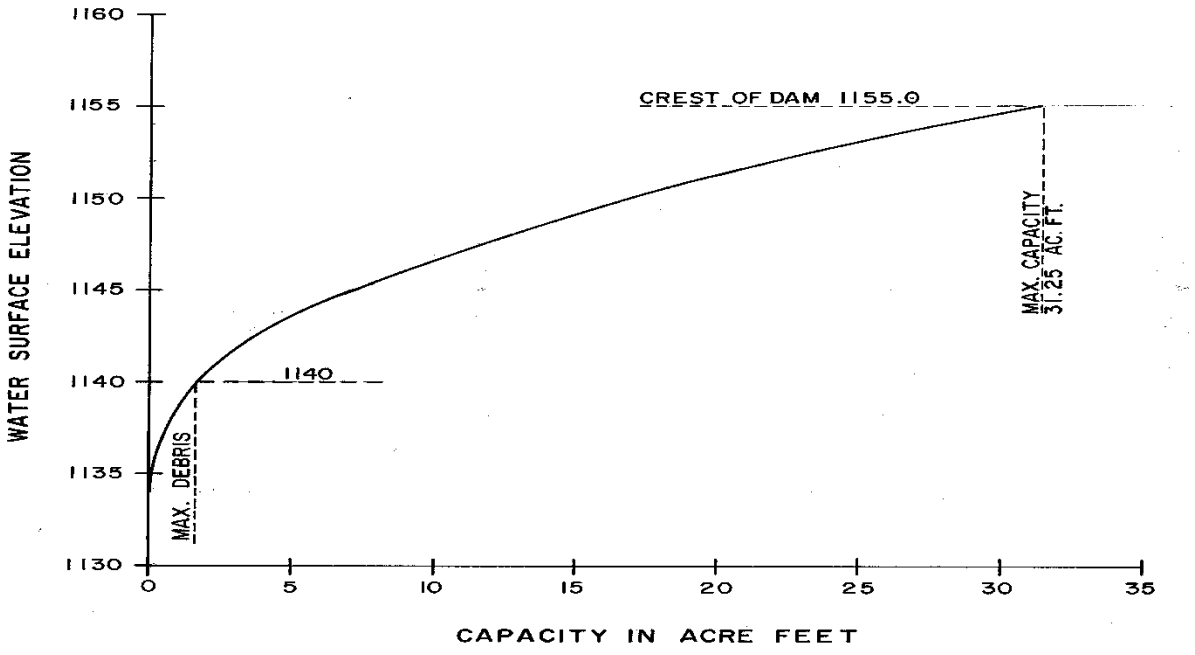
NA= Not Available / Not Applicable


TAPO HILLS DIVERSION
N
0 262.5 525 1,050 1,575 2,100
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
TAPO HILLS # 2
VCWPD DB 3-19
WATERSHED MAP



STAGE-DISCHARGE CURVE

EAST DAM



RESERVOIR CAPACITY CURVE

EAST DAM

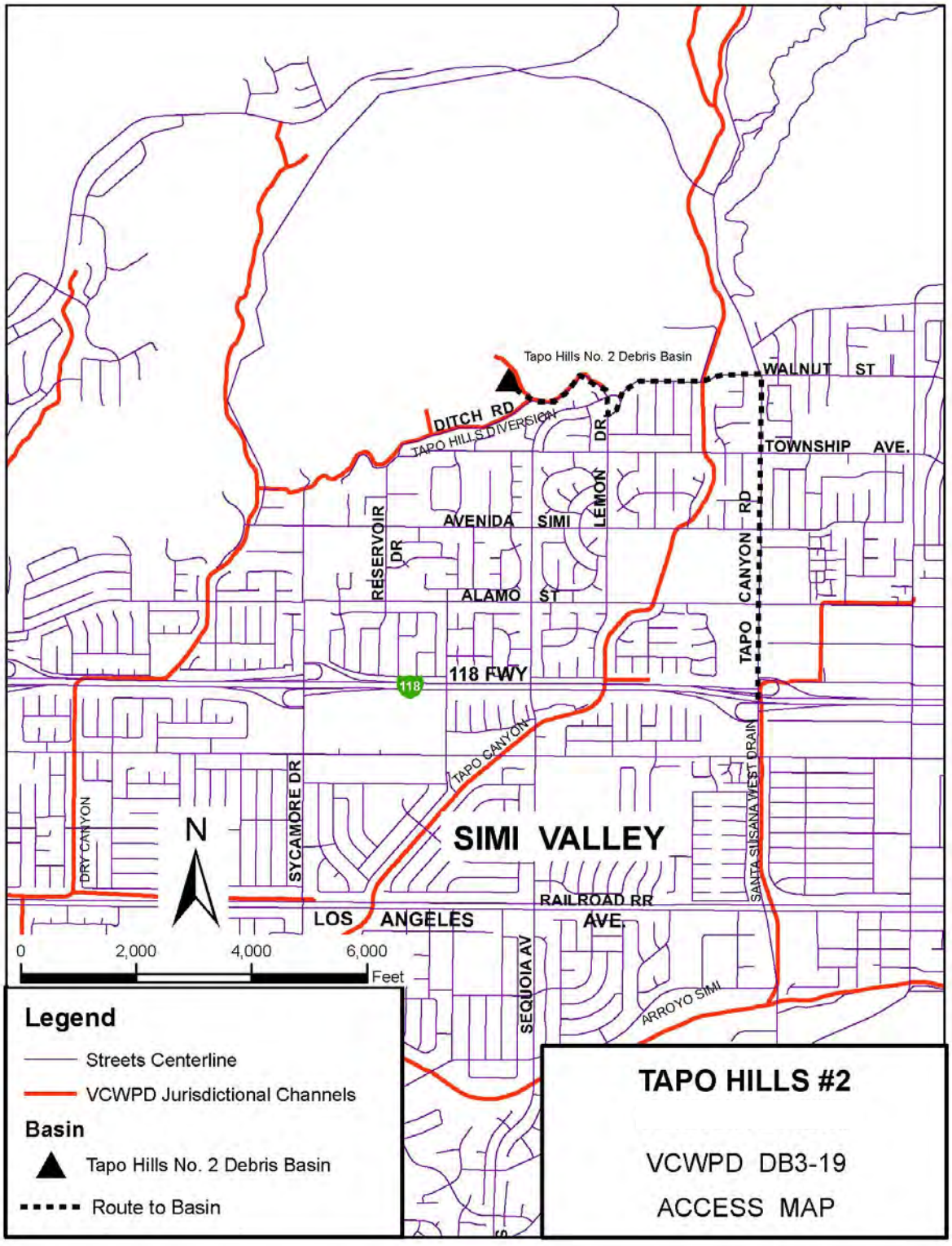
Tapo Hills Basin No. 2 (East)

[Discharge curve superseded due to low flow inlet blocked by silt to elev 1141.9 ft]

Stage-Storage-Discharge Data (Basin Does Not Have Spillway)

Elevation	2005 TIN Vol.	As-Built Vol.	2003 VCRat Vol.	2018 VCRat Vol.	Silted Riser	Spillway	Total
Ft. NGVD29	Ac-Ft	Ac-Ft	Ac-Ft	Ac-Ft	Cfs	Cfs	Cfs
1135	-	-					-
1136	0.011	0.300					
1137	0.061	0.450					
1138	0.200	0.750					
1139	0.488	1.150					
1140	0.962	1.700	-				
1141	1.642	2.350	0.9				
1141.9	NA	NA	NA	-	0.0		-
1142	2.535	3.200	NA	0.101	0.0		-
1143	3.642	4.250	2.7	1.151	0.0		-
1144	4.937	5.400	NA	2.301	0.0		-
1145	6.400	7.000	5.1	3.901	0.0		-
1146	8.012	8.700	NA	5.601	0.0		-
1147	9.753	10.700	8.5	7.601	0.0		-
1148	11.624	12.750	10.6	9.651	0.0	NA	-
1149	13.641	14.750	12.7	11.651	31.0	NA	31.0
1150	15.830	16.900	15.0	13.801	87.7	NA	87.7
1151	18.207	19.000	17.4	15.901	136.5	NA	136.5
1152	20.775	21.800	20.1	18.701	139.0	NA	139.0
1153	23.535	24.300	NA	21.201	141.4	NA	141.4
1154	26.478	27.300	25.8	24.201	143.7	NA	143.7
1155	29.593	31.250	29.0	28.151	146.1	NA	146.1

NA= Not Analyzed; Not Available


Tapo Hills No. 2 Debris Basin
WALNUT ST
DITCH RD
TAPO HILLS DIVERSION
TOWNSHIP AVE.
AVENIDA SIMI
LEMON DR
RESERVOIR DR
TAPO CANYON RD
ALAMO ST
118 FWY
TAPO CANYON
SANTA SUSANA WEST DRAIN
DRY CANYON
SYCAMORE DR
N
SIMI VALLEY
RAILROAD RR
LOS ANGELES AVE.
SEQUOIA AV
ARROYO SIMI
0 2,000 4,000 6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Tapo Hills No. 2 Debris Basin
Route to Basin
TAPO HILLS #2
VCWPD DB3-19
ACCESS MAP

WALNUT CANYON (BASIN 0) DETENTION BASIN DD3-37

LOCATION: Moorpark, Adj. to Walnut Cyn Rd Upstream of Meridian Hills Dr.
N 291,365,E 1,734,875 (Lambert Zone 5 Coordinates);
Moorpark 7 1/2' Quad.

DESIGN DATA	(Elevations ft NGVD29)
Design Agency	Hall & Foreman
Level Capacity	36,950 cy at spillway invert (Y-3-4310)
Maximum Debris Capacity	15,850 cy (125% of 100-yr design) to elev. 663.78 ft
100-Yr Inflow Rate	385 cfs,
Outflow Rate	242 cfs at 673.04 ft NGVD29 on plans, 254 cfs from hydrology model at 677.79 ft
Debris Cleanout Elevation	655 ft, 3,170 cy (25% of 100-yr sediment volume)
EMERGENCY SPILLWAY	
Type	Top of Principal Outlet Tower, 8.5 x 5 ft drop inlet
Crest Elevation	674 ft NGVD29
Spillway Length	27 ft
Capacity w/o Freeboard	900 cfs at elev. 678
PRINCIPAL SPILLWAY	
Type	4.5 ft x 8.5 ft Rect. Tower Opening
Inlet Weir Elevations	663.2 ft NGVD29
Outlet Conduit	60 in RCP
Outflow Rates	242 cfs at 673.04 ft; 385 cfs at 676.25 ft with orifices blocked
Floodwall Crest Elev.	680 ft NGVD29
DEBRIS BLEEDER	
Type	Double 5x9 in orifice inlets in Tower,14 total
Start/End Elevations	650 ft NGVD29/661 ft
Outlet Conduit	Same as Principal Spillway
DAM	
Dam Type	Earthfill topped by roadbed
Dam Crest Elevation	677.26 ft NGVD29
Length	~200 ft
Surface Area of Full Basin	~1.8 ac
Watershed Area	338 ac from Calleguas 2000 VCRat model
Width at Crest	30 ft
CONSTRUCTION DATA	
Construction Agency	Meridian Tract 5187 Basin 0 on Y-drawings
Completion Date	2005
REFERENCE DRAWINGS	
Construction Drawings	Y-3-4305 to 4316a
Right-of-Way and Topo Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	Design Condition	100% Burn
100-YEAR	12,680*	18,390
50-YEAR	8,960	12,990
25-YEAR	6,840	9,920
10-YEAR	4,320	6,265

NA=Not Available

*100-yr debris volume obtained through comparison of net storage data used in hydrologic model to storage data obtained from Y-3-4310. Results do not include effects of orchard areas expected to reduce sediment inflow to basin.

BASIN HISTORY: WALNUT CANYON BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No cleanout data reported by O&M			

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

*** Theoretical Value from Kevin Scott Formula

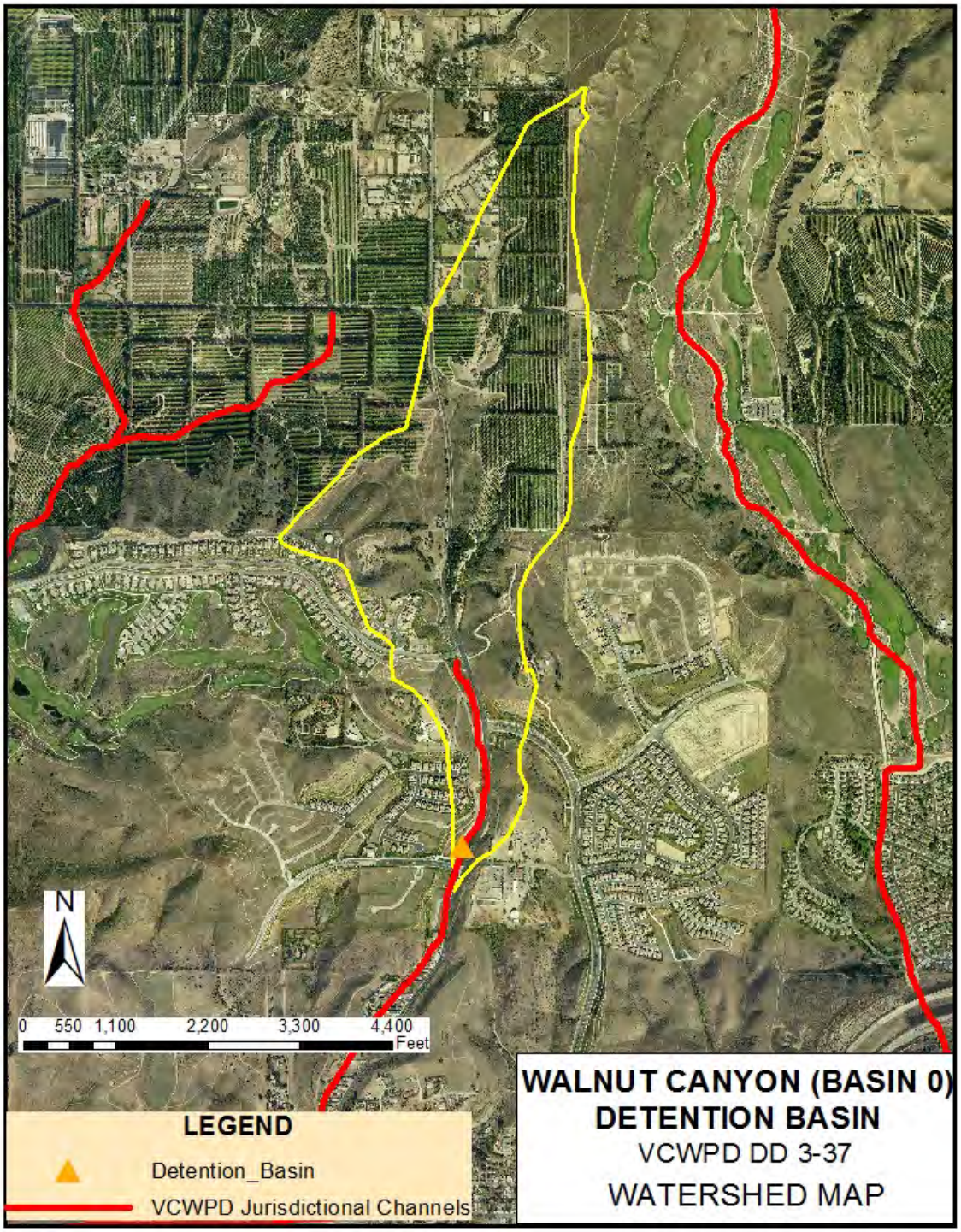
NA= Not Available / Not Applicable

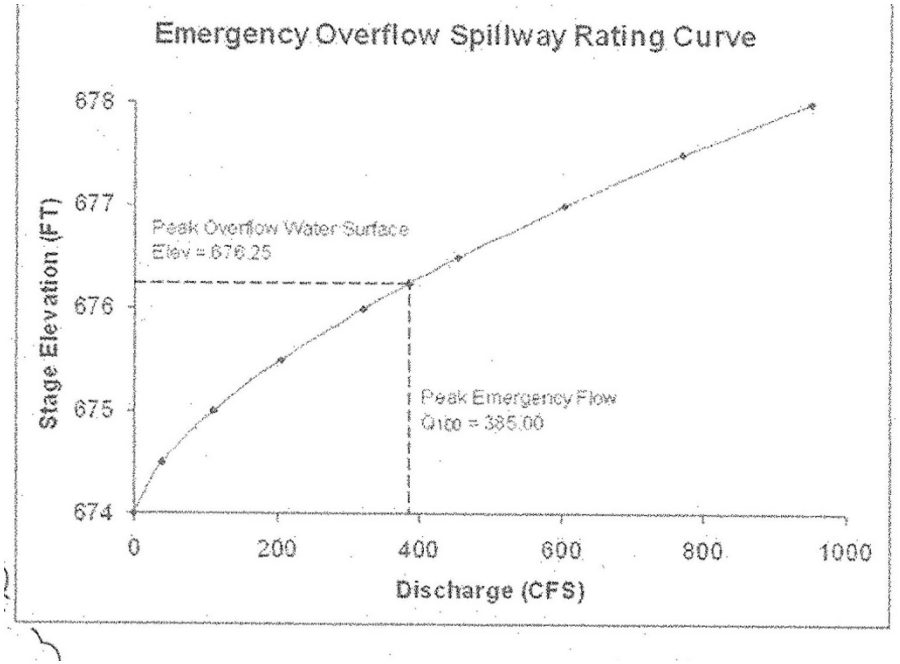
Stage-Storage-Discharge Data used in VCRat model of basin from Hall and Foreman Report.

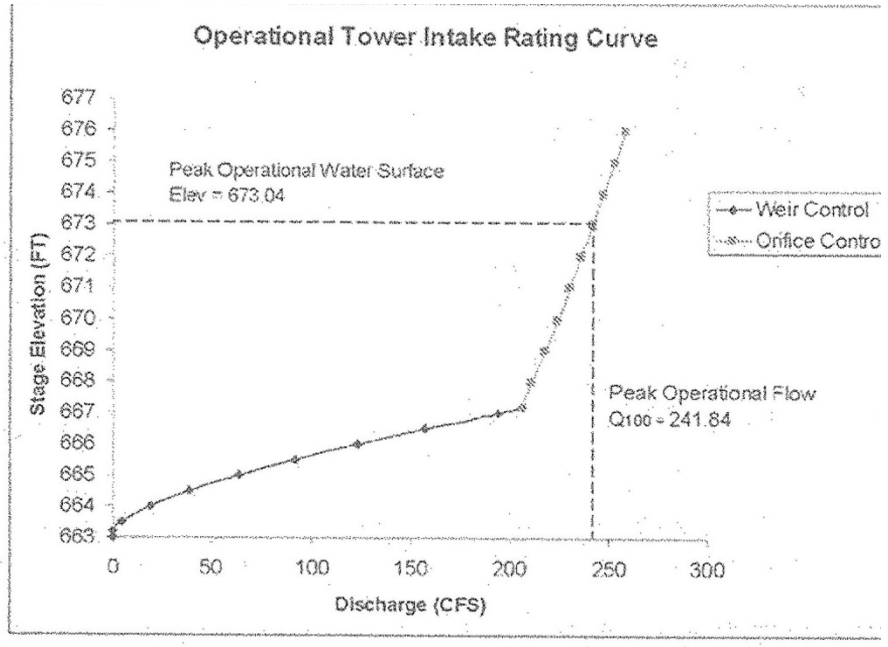
Stage - Storage - Discharge Curve for Reservoir at 5A

STAGE (ft)	STORAGE (ac-ft)	DISCHARGE (cfs)
663.78	0.00	0.00
664.00	0.36	0.26
665.00	1.54	7.60
666.00	2.88	23.50
667.00	4.28	45.67
668.00	5.74	71.69
669.00	7.25	98.81
670.00	8.82	118.64
672.00	12.32	148.37
675.00	17.58	188.54
676.00	19.67	210.58
677.00	21.76	236.61
680.00	28.03	302.67
681.00	30.12	324.69

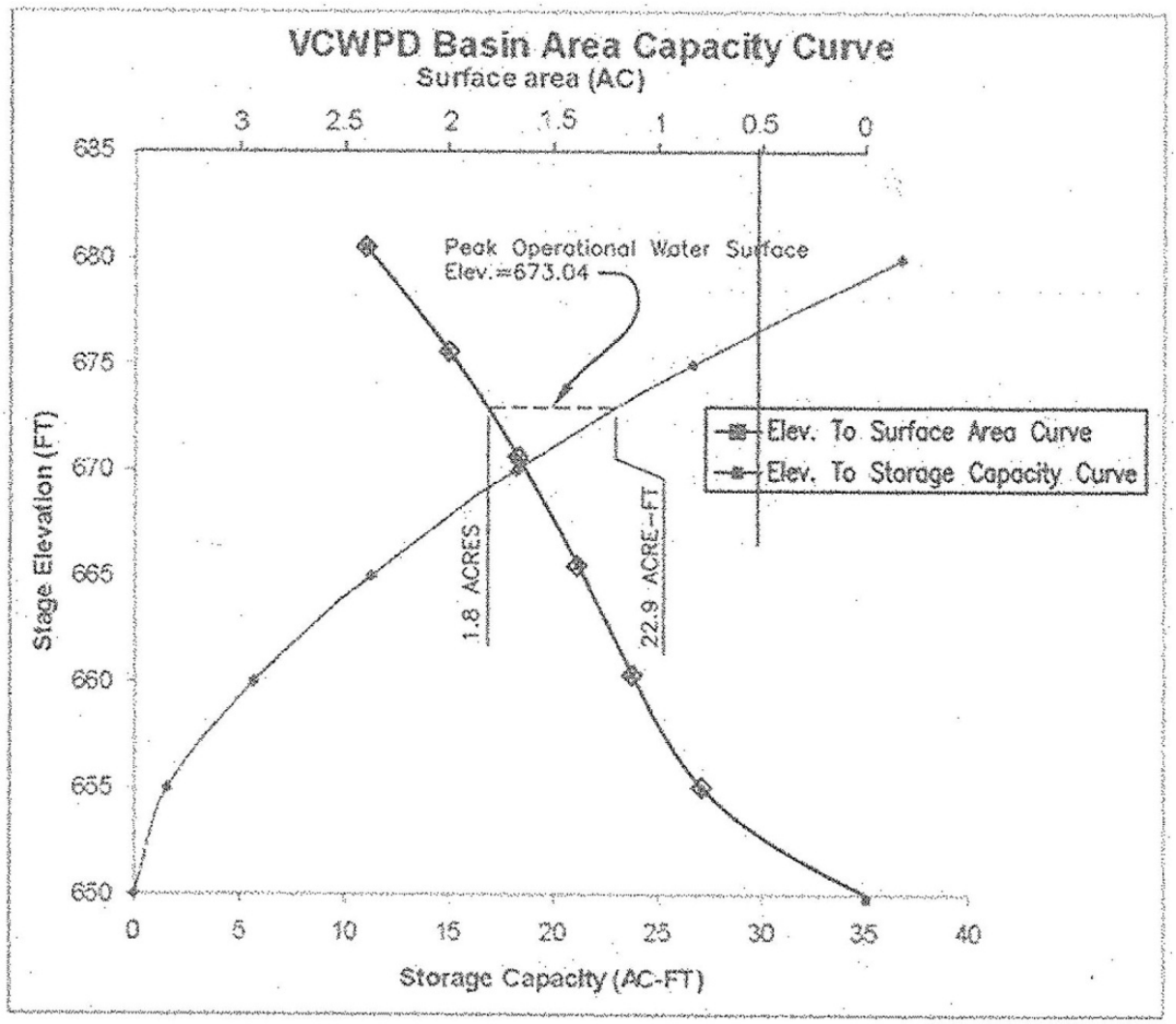
Note: 9.824 af subtracted from stage storage data shown on plans to account for 125% of 100-yr debris volume present in basin when 100-yr peak arrives per VCWPD methods. Because of this assumption, 14 orifice holes below debris volume are blocked and stage discharge curve only has contribution from 8.5ft x 5 ft tower opening. Instead of outflow of 241.84 cfs shown on plans, hydrologic model uses 162.3 cfs at elevation 673. 04 and operating WSE for 100-yr storm is 677.79 ft from hydrology model.

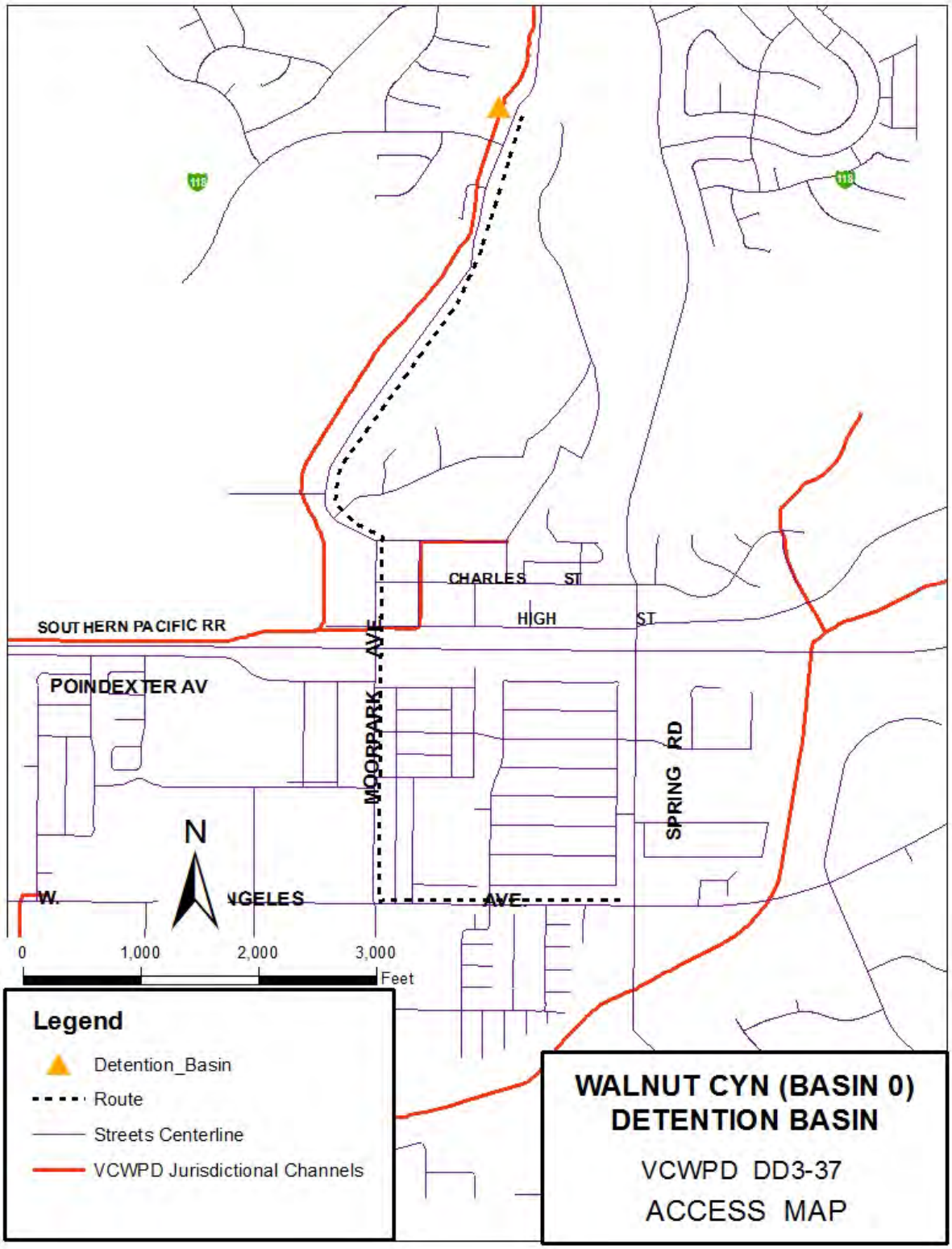

N
0 550 1,100 2,200 3,300 4,400
Feet
LEGEND
Detention_Basin
VCWPD Jurisdictional Channels
WALNUT CANYON (BASIN 0)
DETENTION BASIN
VCWPD DD 3-37
WATERSHED MAP





Walnut Canyon Detention Basin


VCWPD Basin Area Capacity Curve
Surface area (AC)
3
2.5
2
1.5
1
0.5
0
685
680
675
670
665
660
655
650
Stage Elevation (FT)
Peak Operational Water Surface
Elev.=673.04
Elev. To Surface Area Curve
Elev. To Storage Capacity Curve
1.8 ACRES
22.9 ACRE-FT
0
5
10
15
20
25
30
35
40
Storage Capacity (AC-FT)


CHARLES ST
HIGH ST
SOUTHERN PACIFIC RR
POINDEXTER AV
MOORPARK AVE
SPRING RD
N
W.
NGELES
AVE.
0
1,000
2,000
3,000
Feet
Legend
Detention_Basin
Route
Streets Centerline
VCWPD Jurisdictional Channels
WALNUT CYN (BASIN 0)
DETENTION BASIN
VCWPD DD3-37
ACCESS MAP

WEST CAMARILLO HILLS EAST BRANCH DEBRIS BASIN DB3-02 (Obsolete)

LOCATION: Camarillo, 4,000 ft north of Las Posas Road,
near end of Camarillo Drive behind nursery.
N 272,500, E 1,681,400(Lambert Zone 5 Coordinates);
Camarillo 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	Soil Conservation Services
Level Capacity	1,840 cu.yds. (11-8-87 DTM)
Maximum Debris Capacity	4,800 cu.yds. (11-8-87 DTM)
100-Yr Inflow and Outflow Rates	IN=285 cfs (scaled from West Branch DB3-01); OUT=NA
Debris Cleanout Elevation	313 ft (360 cy) [25% of 100-yr debris yield]
EMERGENCY SPILLWAY	
Type	10 ft W X 1 ft H Grouted Trap Channel
Invert Elevation	324.5 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	NA
PRINCIPAL SPILLWAY	
Type	60 in CMP not functional due to landslide
Invert Elevation	318.10 ft NGVD29
Outlet Conduit	60 in CMP
DEBRIS BLEEDER/RISER	
Type	Vertical 36-in CMP 25 ft High
Top Elevation	316 ft NGVD29
Outlet Conduit	36-in RCP
DAM	
Dam Type	Earthfill
Dam Crest Elevation	324.5 ft NGVD29
Length	120 ft
Surface Area of Full Basin	0.5 ac
Watershed Area	92 ac
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	SCS
Completion Date	1955
REFERENCE DRAWINGS	
Construction Drawings	Y-3-7
Right-of-Way Drawings	10,169
Topographic Drawings	T-75-1-(11-12-70), 11-8-87 DTM, 10-16-89 DTM

No easement rights- stopped maintaining after landslide adjacent to basin

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	1,432	2,077
50-YEAR	1,095	1,588
25-YEAR	618	897

BASIN HISTORY: WEST CAMARILLO HILLS EAST BRANCH DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
11-70	Aerial Survey	3,601		
05-71	Aerial Survey	3,351		
05-72	Aerial Survey	3,374		
05-73	Aerial Survey	2,544		
06-75	Cleanout		350	
06-75	Aerial Survey	2,967		
03-78	Disaster Declaration			
09-78	Cleanout		1,360	
09-78	Aerial Survey	2,110		
02-80	Disaster Declaration			
06-80	Aerial Survey	224		
08-80	Cleanout		2,554	310**
10-80	Cleanout		1,450	
10-80	Aerial Survey	3,198		
11-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	3,626		
03-83	Disaster Declaration			
04-83	Aerial Survey	2,735		
01-84	Cleanout		1,668	
01-84	Aerial Survey	4,353		
02-84	Aerial Survey	4,664		
12-85	Aerial Survey	4,524		
07-86	Aerial Survey	4,151		
09-86	Cleanout		420	
10-86	Aerial Survey	4,825		
11-87	Aerial Survey	4,770		
11-88	Aerial Survey	Not Digitized		
10-89	Aerial Survey	4,720		
09-90	Aerial Survey	Not Digitized		
05-91	Aerial Survey			

BASIN HISTORY: WEST CAMARILLO HILLS EAST BRANCH DEBRIS BASIN

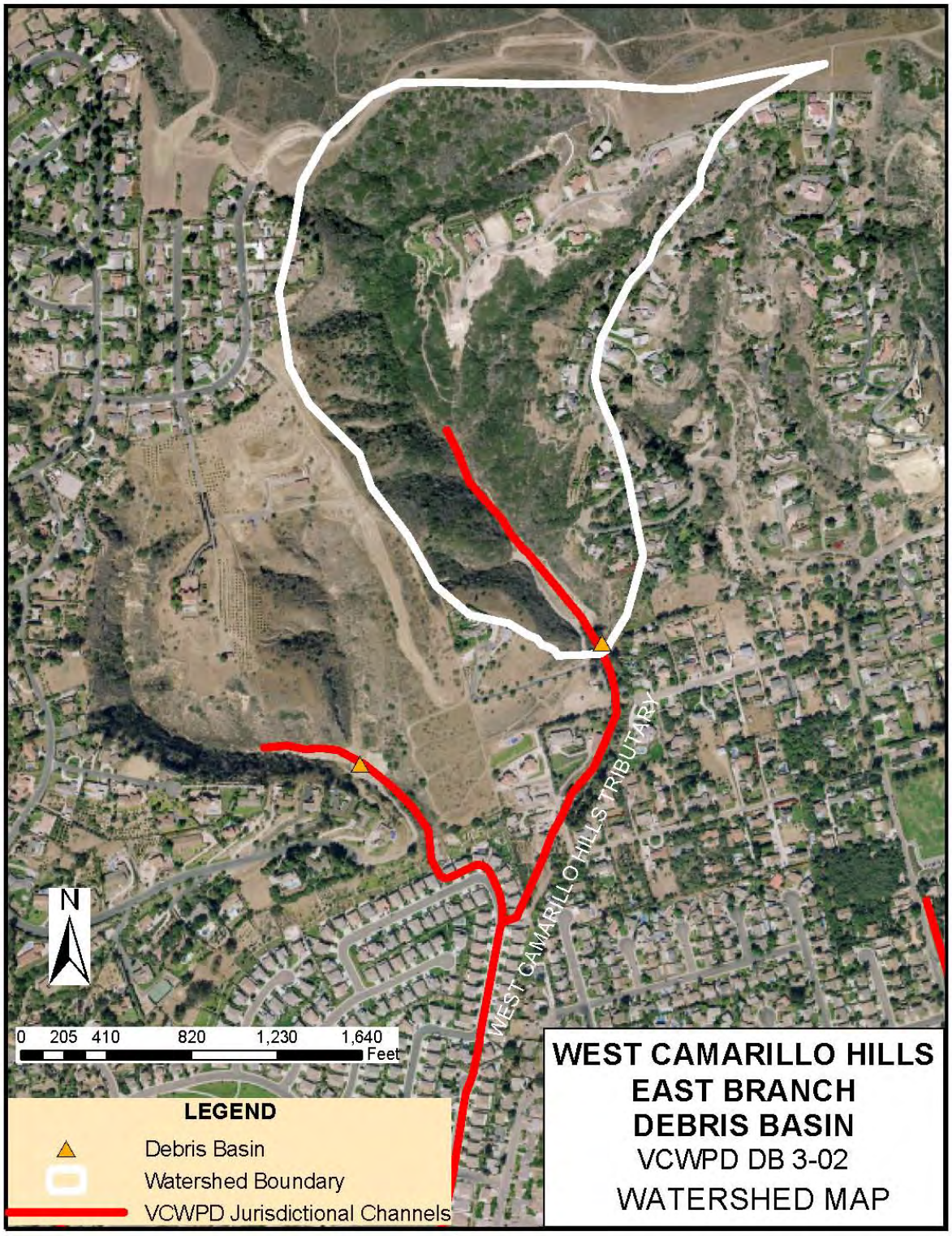
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
06-91	Aerial Survey	4,388		
02-92	Disaster Declaration			183**
05-92	Aerial Survey	3,650		
12-92	Cleanout		1,150	
12-92	Aerial Survey	4,800		
07-93	Aerial Survey	4,590		
01-95	Disaster Declaration			179
08-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey	Not Digitized		
02-98	Disaster Declaration			136
07-98	Aerial Survey	1,900		
12-99	Aerial Survey	Digitized but not evaluated		
03-00	Aerial Survey	4,300		
08-01	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			83

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

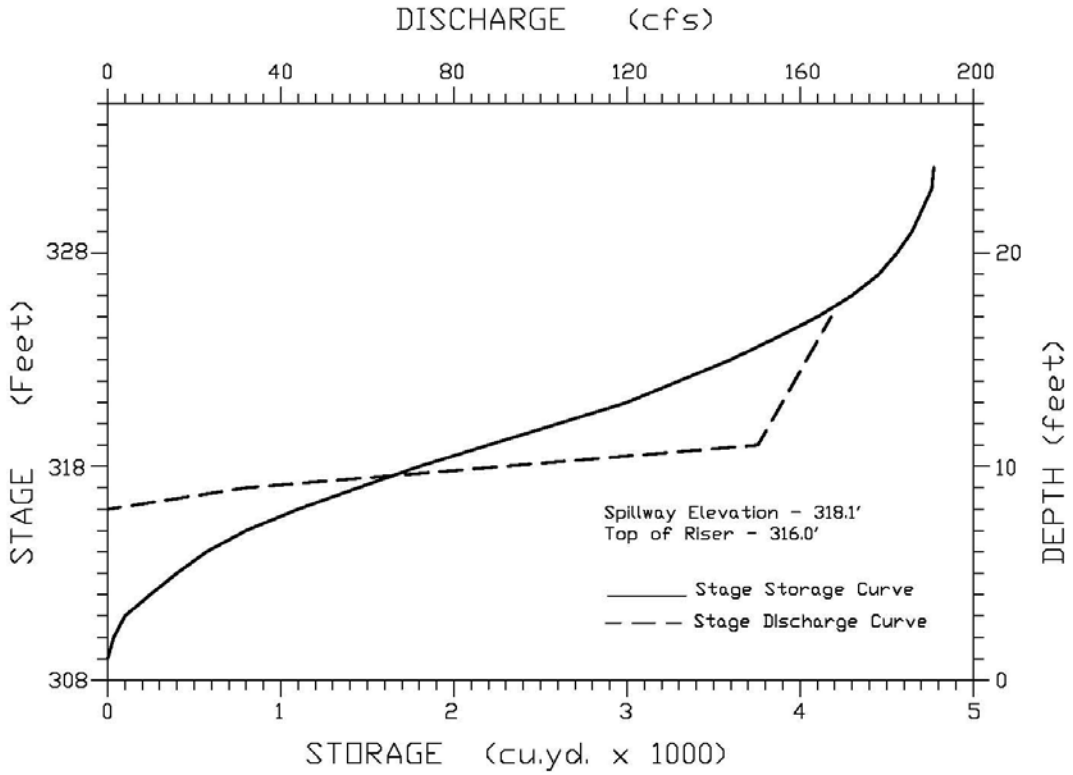
** FEMA Accepted Value for Disaster Declaration

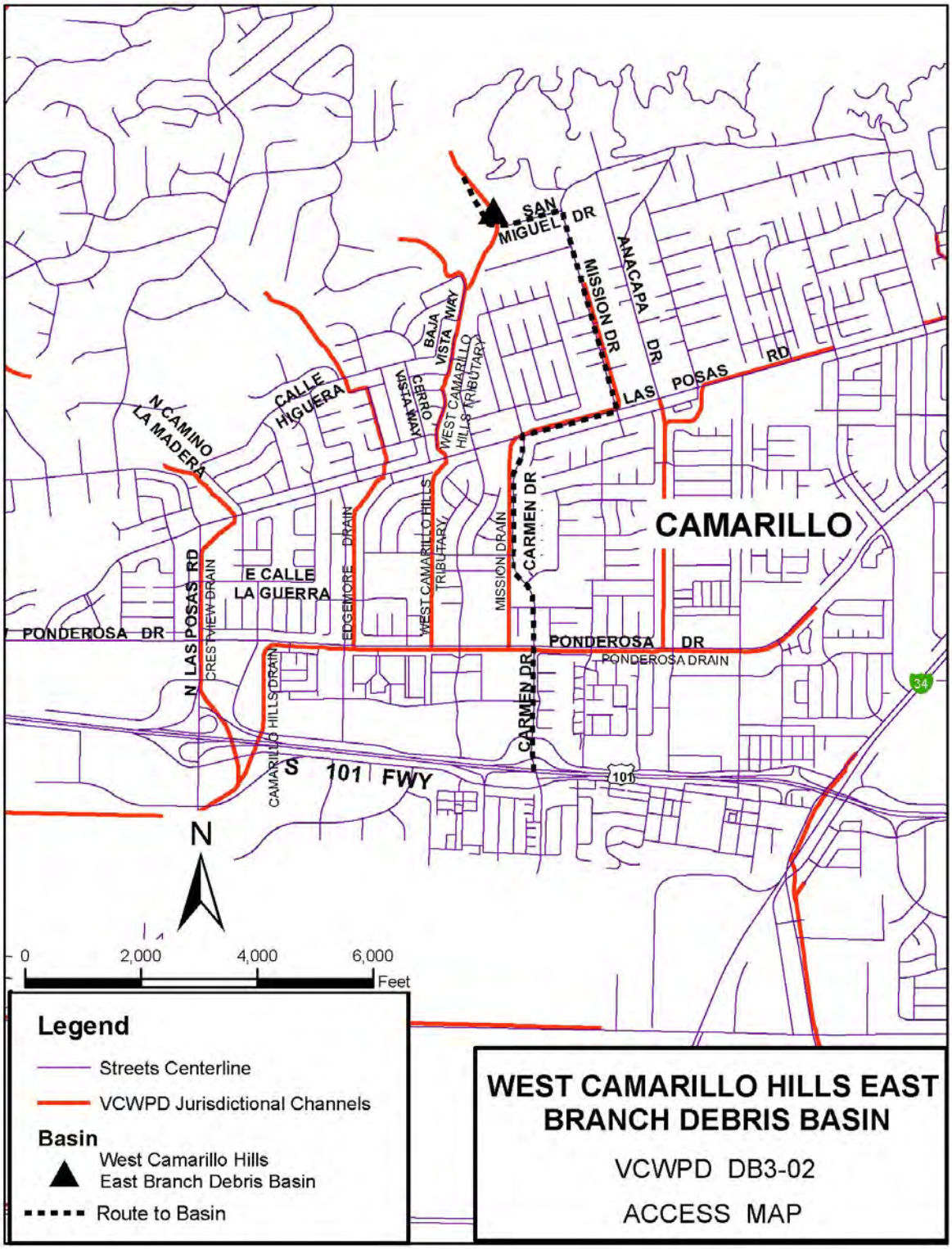
NA= Not Available / Not Applicable


N
0 205 410 820 1,230 1,640
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
WEST CAMARILLO HILLS TRIBUTARY
WEST CAMARILLO HILLS
EAST BRANCH
DEBRIS BASIN
VCWPD DB 3-02
WATERSHED MAP

WEST CAMARILLO HILLS

EAST BRANCH DEBRIS BASIN




SAN MIGUEL DR
MISSION DR
ANACAPA DR
LAS POSAS RD
BAJA VISTA WAY
CERRO VISTA WAY
WEST CAMARILLO HILLS TRIBUTARY
CALLE HIGUERA
N CAMINO LA MADERA
CAMARILLO
CARMEN DR
MISSION DRAIN
WEST CAMARILLO HILLS TRIBUTARY
EDGEMORE DRAIN
E CALLE LA GUERRA
N LAS POSAS RD
CREST VIEW DRAIN
PONDEROSA DR
PONDEROSA DRAIN
CAMARILLO HILLS DRAIN
S 101 FWY
34
101
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
West Camarillo Hills East Branch Debris Basin
Route to Basin
WEST CAMARILLO HILLS EAST BRANCH DEBRIS BASIN
VCWPD DB3-02
ACCESS MAP

WEST CAMARILLO HILLS WEST BRANCH DEBRIS BASIN DB3-01

LOCATION: Camarillo, approximately 500 ft from the end of Esteban Drive along equestrian trail.
N 271, 700, E 1,680,000 (Lambert Zone 5 Coordinates);
Camarillo 7-1/2' Quad.

DESIGN DATA	(Elevations NGVD29)
Design Agency	Soil Conservation Service
Level Capacity	5,250 cy (10-5-89 DTM); 5,300 (06-91 DTM)
Maximum Debris Capacity	21,500 cy (10-5-89 DTM); 22,500 (06-91 DTM)
100-Yr Inflow and Outflow Rates	IN=229 cfs from Pres. Cond. Calleguas Ck VCRAT Model; OUT=NA
Debris Cleanout Elevation	324 ft (4,000 cy) [provides 100-yr debris yield below emergency spillway]
EMERGENCY SPILLWAY	
Type	6 ft x 8 ft Drop Box Inlet and Rectangular RC Channel
Weir Elevation	325 ft NGVD29
Spillway Length	NA
Capacity w/o Freeboard	280 cfs
PRINCIPAL SPILLWAY	
Type	None
Weir Elevation	NA
Outlet Conduit	NA
DEBRIS BLEEDER/RISER	
Type	12-in Perforated CSP 22 ft High
Top Elevation	329 ft NGVD29
Outlet Conduit	10 in steel pipe
DAM	
Dam Type	Earthfill
Dam Crest Elevation	329 ft
Length	140 ft
Surface Area of Full Basin	1.6 ac
Watershed Area	74 ac from Quad Map
Width at Crest	NA
CONSTRUCTION DATA	
Construction Agency	Soil Conservation Service
Completion Date	1955; Spillway Modified 1986
REFERENCE DRAWINGS	
Construction Drawings	Y-3-1031; Y-3-1049; Y-3-2627 to -2630
Right-of-Way Drawings	16372
Topographic Drawings	T-75-2 (11-12-70), T-254 (10-22-80); 11-8-87 DTM 10-5-89 DTM

EXPECTED DEBRIS PRODUCTION (cy):		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	1,268	1,839
50-YEAR	970	1,406
25-YEAR	547	794

BASIN HISTORY: WEST CAMARILLO HILLS WEST BRANCH DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-69	Disaster Declaration			
11-70	Aerial Survey	17,465		
05-71	Aerial Survey	17,150		
05-72	Aerial Survey	15,818		
05-73	Aerial Survey	13,799		
06-75	Aerial Survey	11,823		
12-77	Aerial Survey	10,103		
01-78	Aerial Survey	Not Digitized		
03-78	Disaster Declaration			
06-78	Aerial Survey	9,291		
09-79	Aerial Survey	8,293		
09-79	Cleanout		1,850	
02-80	Disaster Declaration			
06-80	Aerial Survey	1,496		
10-80	Cleanout		12,790	1,103**
10-80	Aerial Survey	15,925		
11-81	Aerial Survey	Not Digitized		
11-82	Aerial Survey	9,620		
03-83	Disaster Declaration			
04-83	Aerial Survey	5,470		
12-83	Cleanout		15,900	
12-83	Aerial Survey	21,349		
07-85	Cleanout		1,018	
12-85	Aerial Survey	17,044		
07-86	Aerial Survey	17,013		
10-86	Cleanout		3,500	
10-86	Aerial Survey	20,530		
11-87	Aerial Survey	21,241		
11-88	Aerial Survey	Not Digitized		
10-89	Aerial Survey	21,519		1,770
06-91	Aerial Survey	22,504		

BASIN HISTORY: WEST CAMARILLO HILLS WEST BRANCH DEBRIS BASIN

DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
02-92	Disaster Declaration			1,384
05-92	Aerial Survey	18,475		
10-92	Cleanout		3,025	
10-92	Aerial Survey	21,500		
01-95	Disaster Declaration			1,048
08-96	Aerial Survey	Not Digitized		
05-97	Aerial Survey			
02-98	Disaster Declaration			702
07-98	Aerial Survey	14,350		
03-99	Aerial Survey	Not Digitized		
06-99	Cleanout		6,875	
06-99	Aerial Survey	21,225		
12-99	Aerial Survey	Not Digitized		
08-01	Aerial Survey	Not Digitized		
11-03	Aerial Survey	Not Digitized		
01-05	Disaster Declaration			

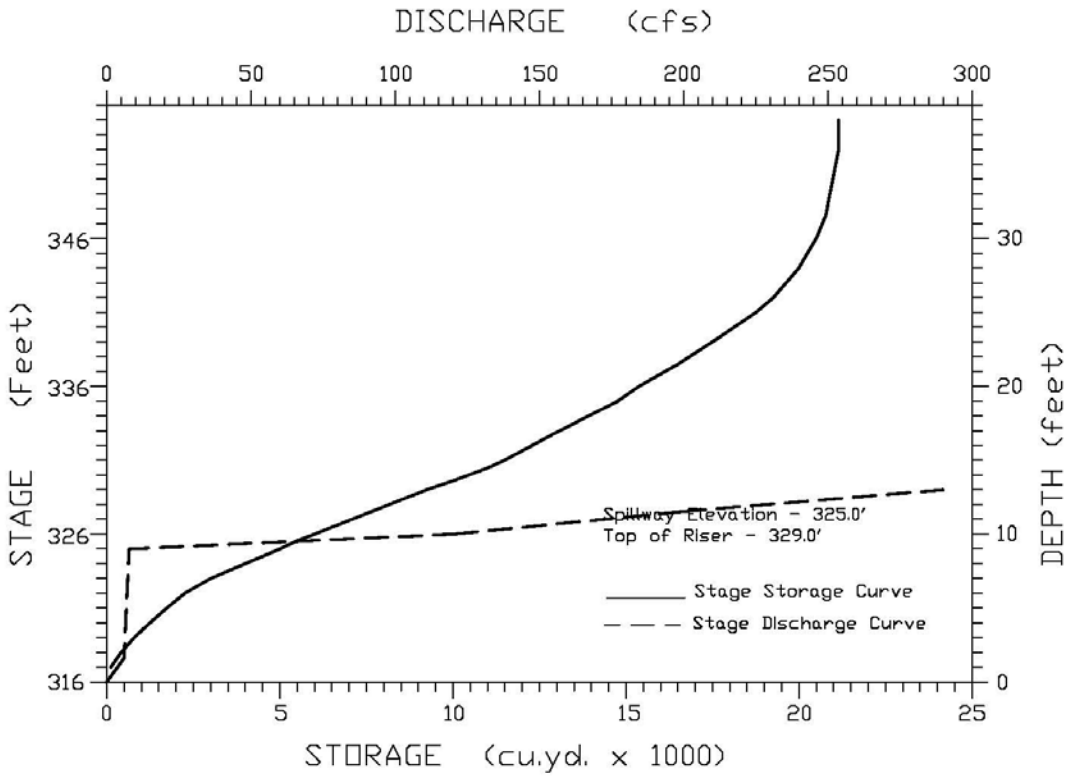
Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

** FEMA Accepted Value for Disaster Declaration

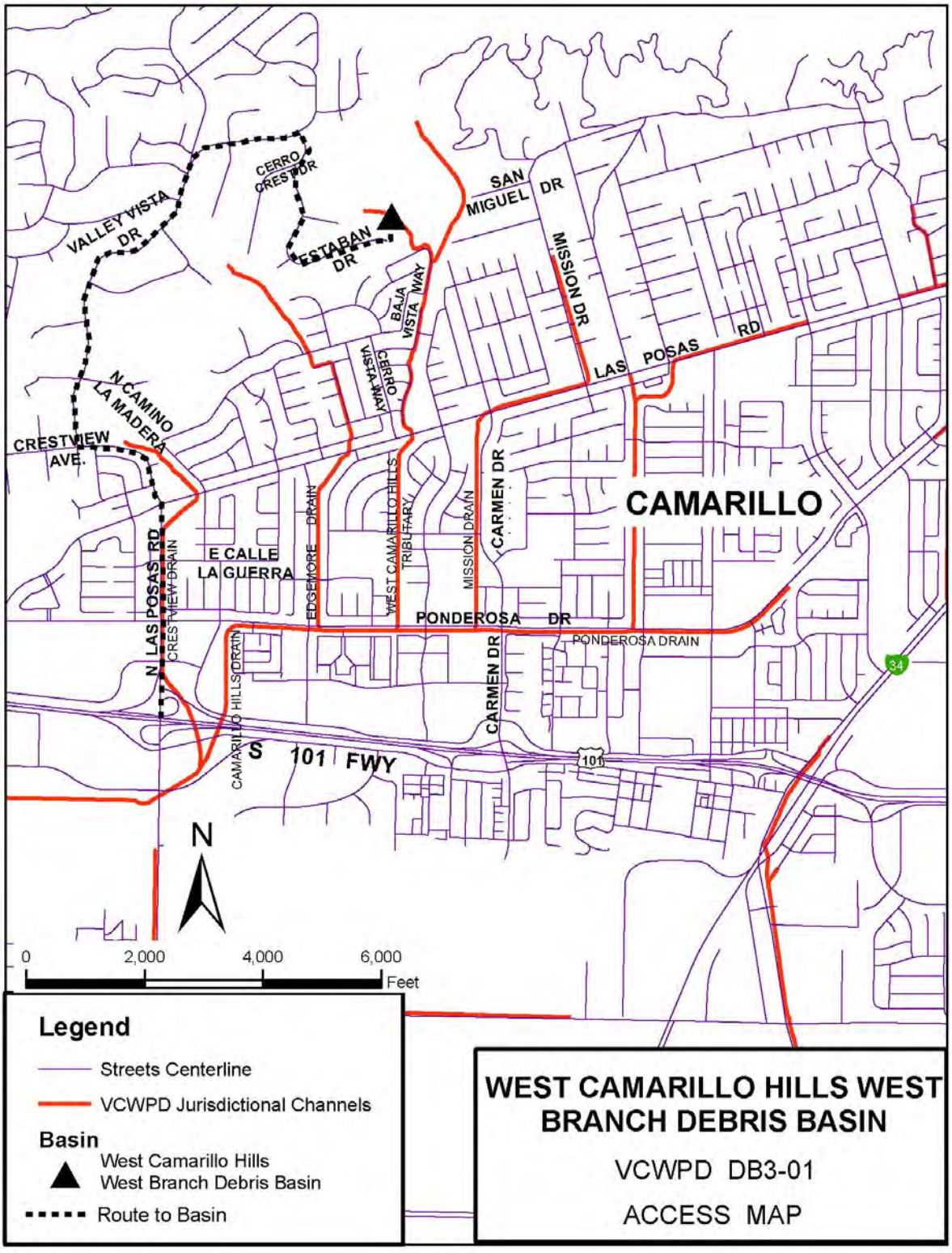
NA= Not Available / Not Applicable

WEST CAMARILLO HILLS TRIBUTARY
N
0 225 450 900 1,350 1,800
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
WEST CAMARILLO HILLS
WEST BRANCH
DEBRIS BASIN
VCWPD DB 3-01
WATERSHED MAP

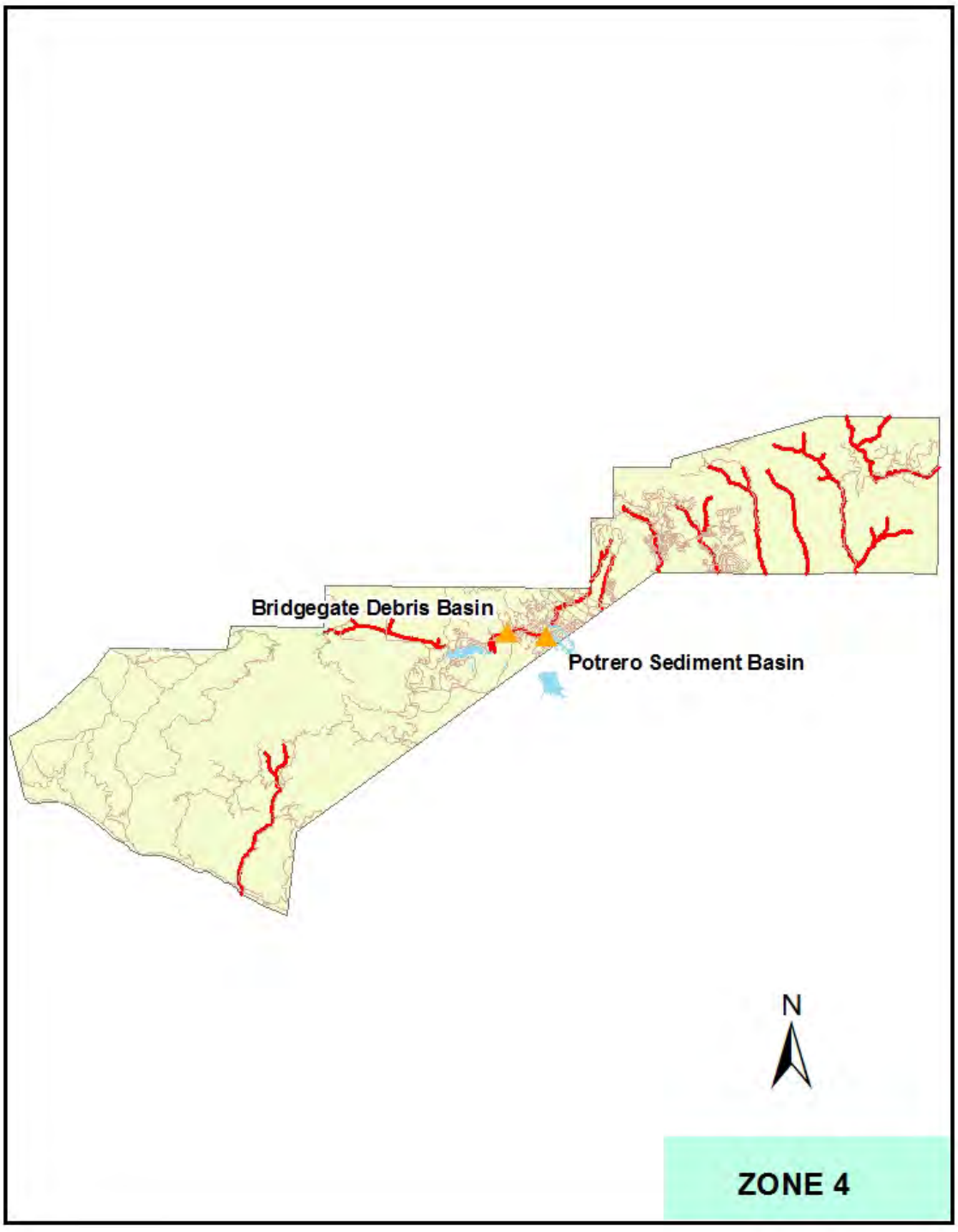


Stage Storage Discharge Data

Elevation	Design Vol.	Riser	Spillway	Total Disch.
Ft NGVD29	CY	CFS	CFS	CFS
315	-	0		
316	250	1.1		-
317	500	3.9		-
318	700	5.4		5.4
319	1,100	5.8		5.8
320	1,700	6		6.0
321	2,350	6.1		6.1
322	3,000	6.3		6.3
323	4,000	6.5		6.5
324	5,000	6.6		6.6
325	5,900	6.8	0	6.8
326	7,000	6.9	109	115.9
327	8,100	7.1	159	166.1
328	9,250	7.2	216	118.5
329	10,400	7.3	279	286.3


CERRO CREST DR
VALLEY VISTA DR
ESTABAN DR
SAN MIGUEL DR
MISSION DR
BAJA VISTA WAY
CERRO VISTA WAY
LAS POSAS RD
N CAMINO LA MADERA
CRESTVIEW AVE.
CAMARILLO
E CALLE LA GUERRA
EDGEMORE DRAIN
WEST CAMARILLO HILLS TRIBUTARY
MISSION DRAIN
CARMEN DR
PONDEROSA DR
PONDEROSA DRAIN
CRESTVIEW DRAIN
CAMARILLO HILLS DRAIN
S 101 FWY
34
101
N
0
2,000
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
West Camarillo Hills
West Branch Debris Basin
Route to Basin
WEST CAMARILLO HILLS WEST BRANCH DEBRIS BASIN
VCWPD DB3-01
ACCESS MAP

Zone 4 Basins



BRIDGEGATE DEBRIS BASIN DB4-02

LOCATION: City of Thousand Oaks- On Chevlot Hills Ct approximately 250 ft SW of Bridgegate Street at end of the Thornhill Ave.
N236,125 E1,742,000 (Lambert Zone 5 Coordinates)
Thousand Oaks Quad 7-1/2' N34˚08'48", W118˚51'06

DESIGN DATA	Elevations NGVD29
Design Agency	CMB Engineering
Level Capacity	8 ac-ft (12,936 cy) fm as-builts
Maximum Debris Capacity	5,645 cy on as-builts, elev 900.16 ft
100-Yr Inflow Rate	525 cfs
100-Yr Outflow Rate	525 cfs at 905.1 ft NGVD29 including Emerg. Spillway
Debris Cleanout Elevation	894 ft, 1,130 cy, (25% of 100-yr vol sediment volume)
EMERGENCY SPILLWAY	
Type	Trapezoidal Concrete Channel 95 ft W, 4 ft H, 50:4 H:V Sideslopes
Invert Elevation	904 ft NGVD29
Spillway Length	NA
100-Yr Spillway Flow w/Freeboard	370 cfs at elev 905, 2,960 cfs at elev 908 ft from weir eqn
PRINCIPAL SPILLWAY	
Type	6 ft X 6 ft RC Rectangular Tower 11 ft high with projecting trash rack on top allowing 4.5 ft X4.5 ft weir flow
Top Elevation	902 ft (1929 NGVD29)
Outlet Conduit and Q100 Flow	48 in RCP; Q100=155 cfs
DEBRIS BLEEDER/RISER	
Type	Slots in principal spillway riser tower to 901 ft NGVD29
Top Elevation	NA
Outlet Conduit	NA
DAM	
Dam Type	Earthfill
Dam Crest Elevation	908 ft NGVD29
Length	265 ft
Surface Area of Full Basin	0.87 ac
Watershed Area	262 ac
Width at Crest	25 ft
CONSTRUCTION DATA	
Construction Agency	SME Construction, INC
Completion Date	2004
REFERENCE DRAWINGS	
Construction Drawings	Y-4-60 – Y-4-68
Right-of-Way Drawings	NA
Topographic Drawings	NA

EXPECTED DEBRIS PRODUCTION (cy): Sediment has to traverse drainage network of v-ditches and pipes, minimal sediment expected t reach basin		
Storm Frequency	**Design Condition**	**100% Burn**
100-YEAR	4,517*	6,550
50-YEAR	3,300	4,790
25-YEAR	2,270	3,290
10-YEAR	1,295	1,875

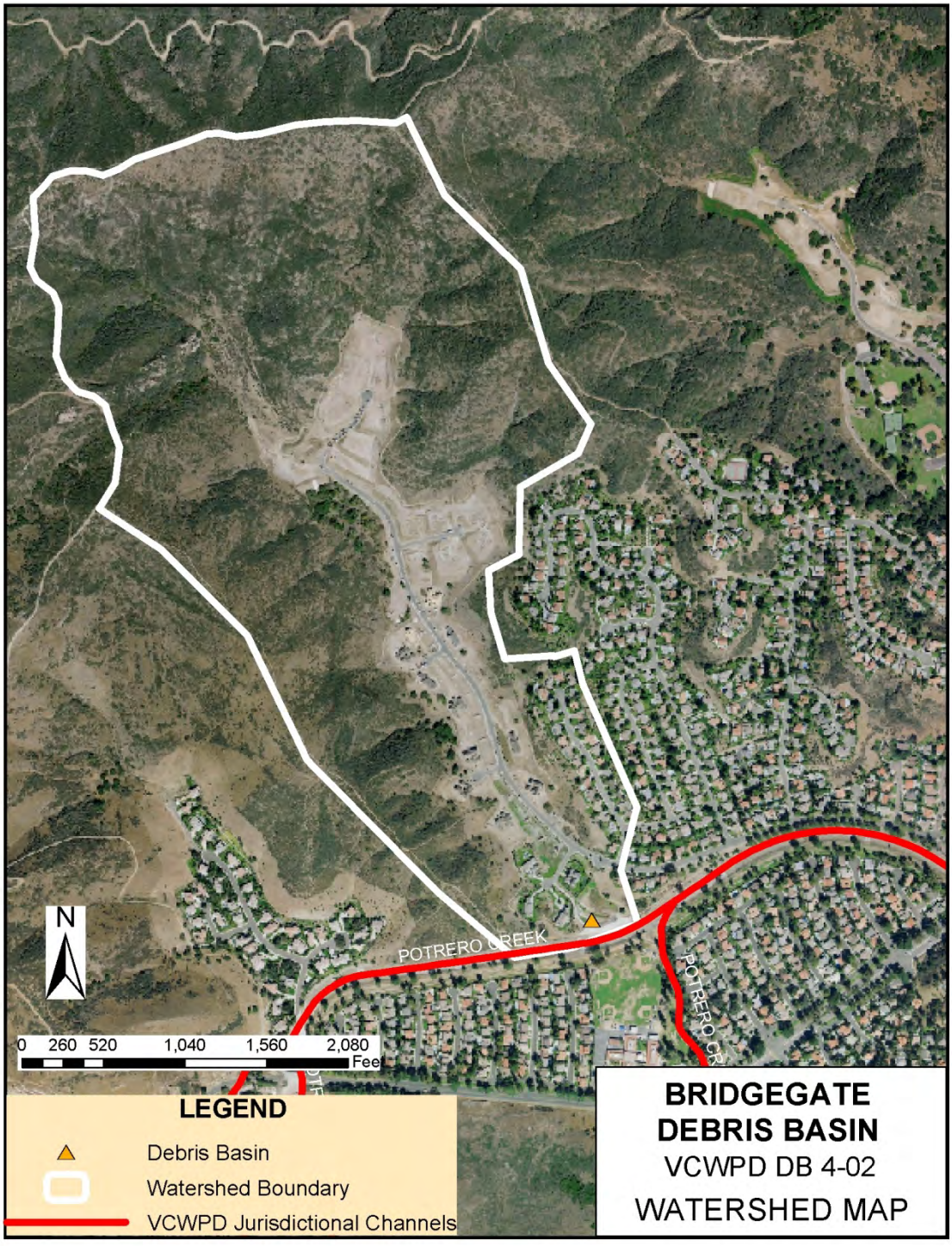
***100-yr value estimated as max debris yield/1.25, design debris elev = 900.16 ft on as-builts = 3.5 af**
Other values estimated from rainfall ratios and fire factors.

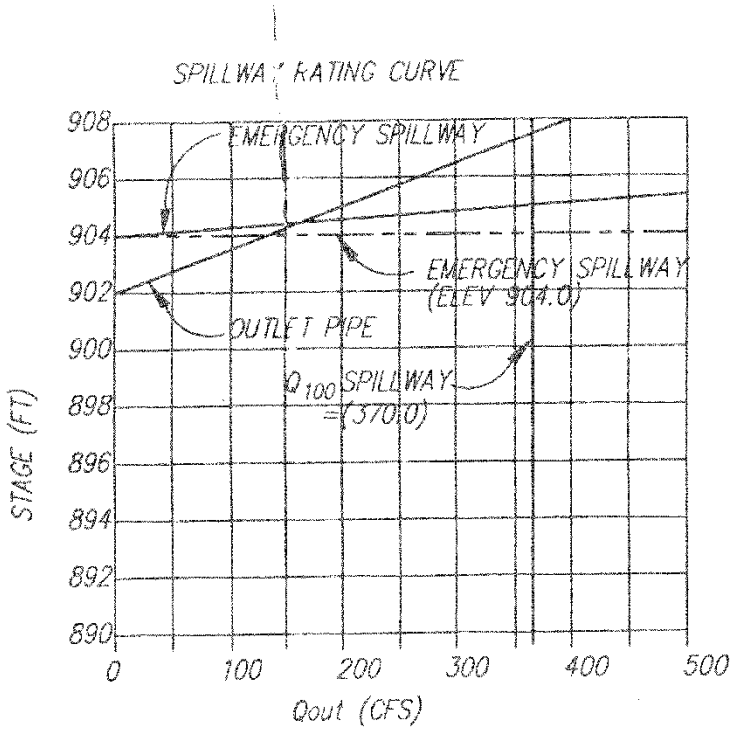
BASIN HISTORY: BRIDGEGATE DEBRIS BASIN

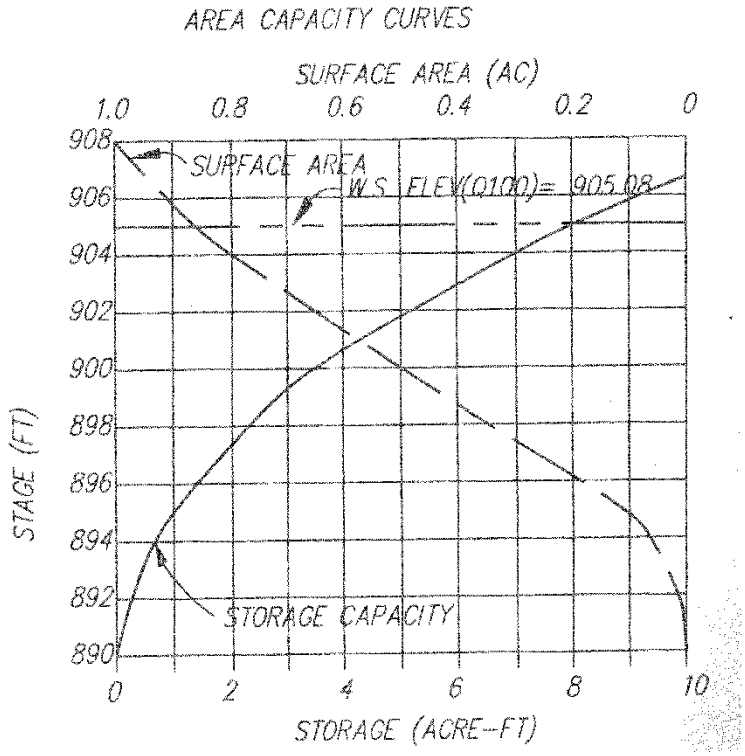
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
	No cleanout data reported by O&M			

Notes

* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris
NA= Not Available / Not Applicable


N
POTRERO CREEK
POTRERO CR
0 260 520 1,040 1,560 2,080
Feet
LEGEND
Debris Basin
Watershed Boundary
VCWPD Jurisdictional Channels
BRIDGEGATE
DEBRIS BASIN
VCWPD DB 4-02
WATERSHED MAP



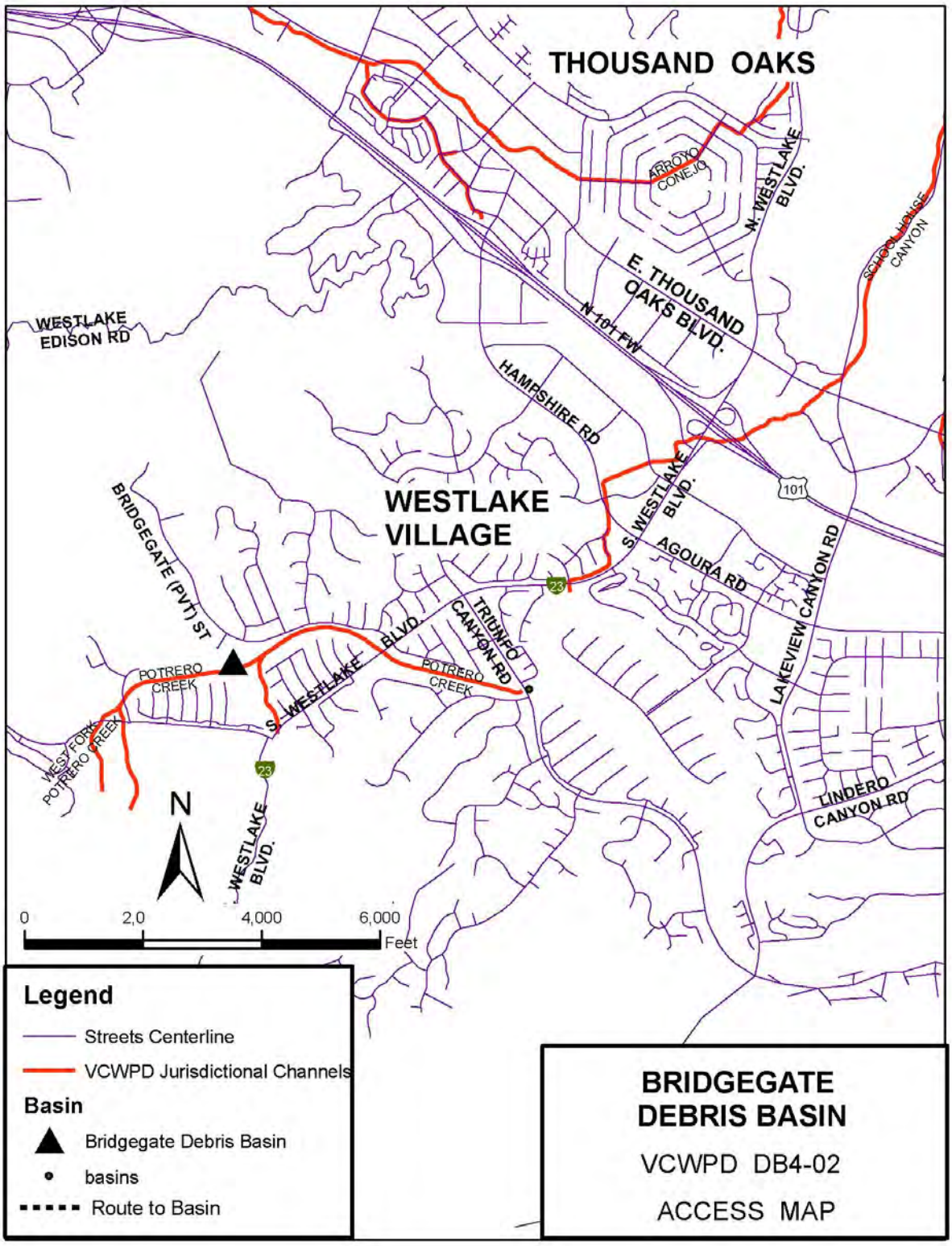


Bridgegate Debris Basin Stage-Storage Curve

Stage Storage Discharge Data from As-Builts

Elevation	Design Vol.	Riser	Spillway	Total Disch.
Ft NGVD29	Ac-Ft	CFS	CFS	CFS
890	-			
891	0.130			-
892	0.260			-
893	0.450			-
894	0.650			-
895	1.000			-
896	1.400			-
897	1.825			-
898	2.325			-
899	2.800			-
900	3.500			-
901	4.275			-
902	5.250	0		-
903	6.000	55		55
904	7.000	130	0	130
905	8.000	186	300	486
906	9.150	270	600	870
907	10.300	330	NA	NA

NA= Not Analyzed


THOUSAND OAKS
ARROYO CONEJO
W. WESTLAKE BLVD.
SCHOOL HOUSE CANYON
E. THOUSAND OAKS BLVD.
N 101 FW
WESTLAKE EDISON RD
HAMPSHIRE RD
WESTLAKE VILLAGE
S. WESTLAKE BLVD.
101
AGOURA RD
LAKEVIEW CANYON RD
BRIDGEGATE (PVT) ST
TRIUNFO CANYON RD
POTRERO CREEK
WEST FORK POTRERO CREEK
LINDERO CANYON RD
WESTLAKE BLVD.
N
0
2,0
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Bridgegate Debris Basin
basins
Route to Basin
BRIDGEGATE DEBRIS BASIN
VCWPD DB4-02
ACCESS MAP

POTRERO CREEK SEDIMENT CONTROL DB4-01

LOCATION: Triunfo Canyon Rd. bridge on Potrero Creek, Thousand Oaks,
N:1,876,229.36 E:6,309,164.75 (CA Lambert Zone 5 Coordinates)

DESIGN DATA	(Elevations NGVD29)
Design Agency	VCWPD
Level Capacity	NA
100-Yr Inflow and Outflow Rates	10,340 cfs
INSTREAM BASIN	1,170 ft long, 40 ft bottom width with 2:1 H:V rip-rap sideslopes, 4 ft below existing channel invert
Spillway	Concrete Weir at Elev. 874.5 ft NGVD29
Length of Weir	80 ft
Instream Basin Bleeders	24-in Perforated CSPs (3), top elev. 875 ft NGVD29
Surface Area of Full Basin	1.7 ac
Maximum Debris Volume	11,245 cy at 874.5 ft NGVD29
Debris Cleanout Elevation	(1,125 cy) [10% of maximum debris volume]
UNDERWATER DIKE	
Dam Type	420 ft long rip-rap covered berm with crest elevation 869 ft NGVD29
Spillway	Broadcrested Earthen Weir 50 ft wide, 200 ft long at 865 ft
Maximum Debris Volume	5,628 cy at elev. 865 ft NGVD29
Debris Cleanout Elevation	(565 cy) [10% of maximum debris volume]
Surface Area of Full Basin	Approx. 1 ac
Watershed Area	1,541 ac downstream of Lake Sherwood
CONSTRUCTION DATA	
Construction Agency	VCWPD
Completion Date	January, 2002
REFERENCE DRAWINGS	
Construction Drawings	Y4-49 – Y4-59
Topographic Drwgs	T-489-06.08,09,10
Right-of-Way Drawings	Y4-59

EXPECTED DEBRIS PRODUCTION (cy): Sediment from undeveloped areas has to traverse drainage network. This will minimize sediment conveyed in Potrero Creek.		
Storm Frequency	**Design Condition**	**100% Burn***
100-YEAR	10,340	15,000
50-YEAR	7,586	11,000
25-YEAR**	5,463	7,900
10-YEAR	2,790	4,000

***100% Burn data not available from design study, estimated by matching design data and changing fire factor to 88. Lakes Sherwood and Eleanor assumed to intercept all sediment from their watersheds. Bridgegate Basin assumed to eliminate sediment inflow from that watershed.**

****25-Yr data not available from design study but estimated along with burn data.**

BASIN HISTORY: POTRERO CREEK SEDIMENT CONTROL/INSTREAM BASIN

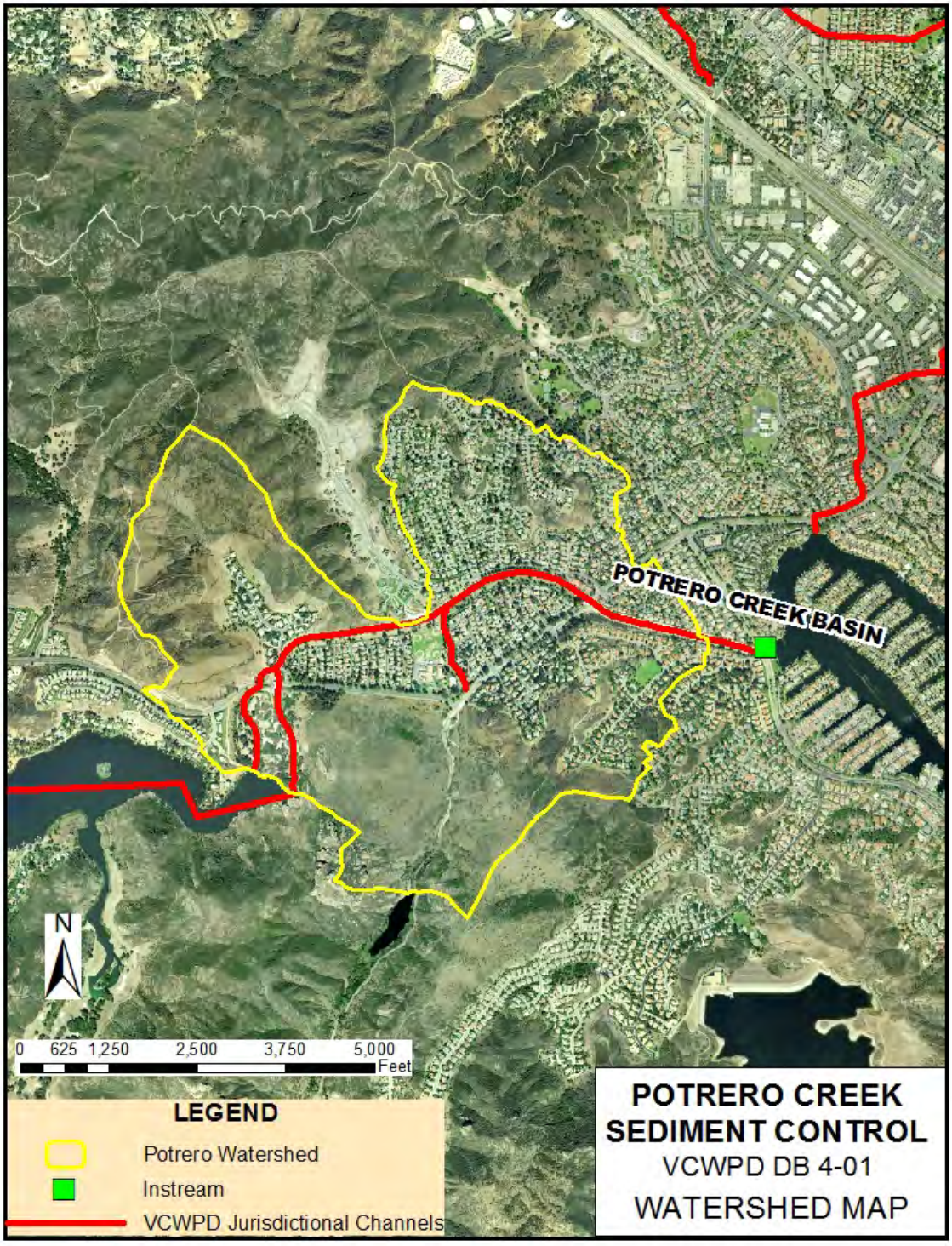
DATE	ACTION	REMAINING CAPACITY (cy)	REMOVED (cy)	AADP* (cy)
2008	No cleanout data from O&M			

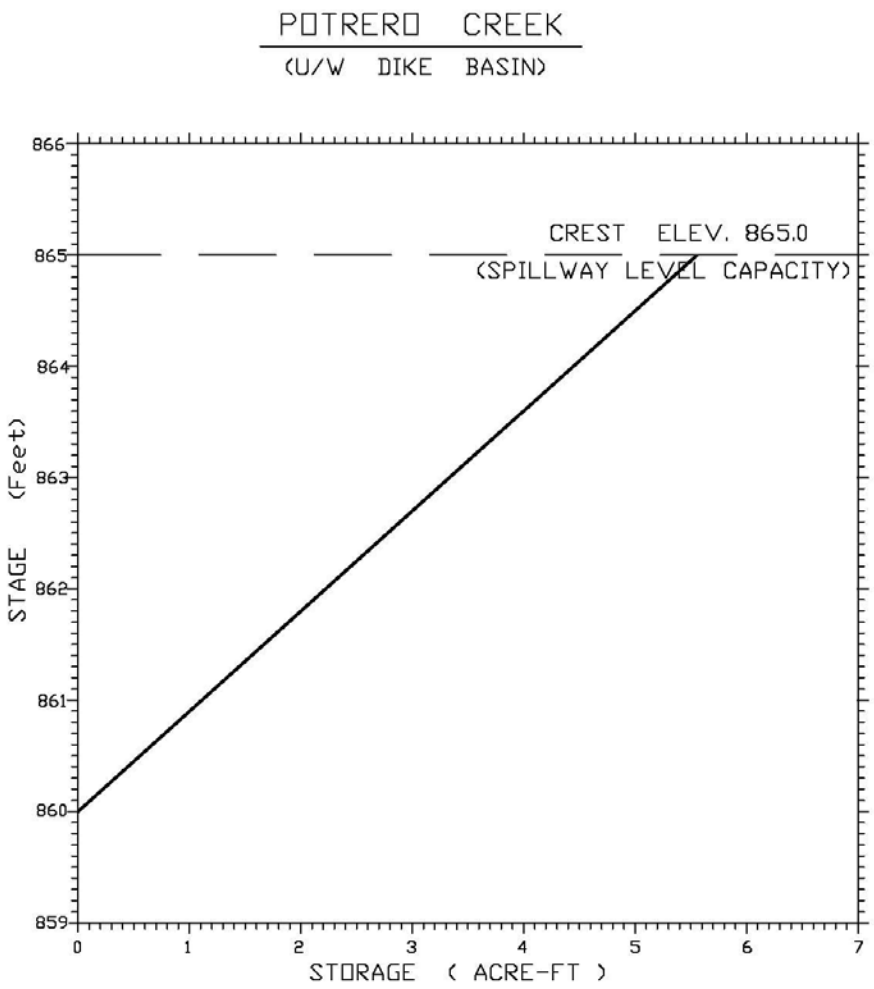
Notes

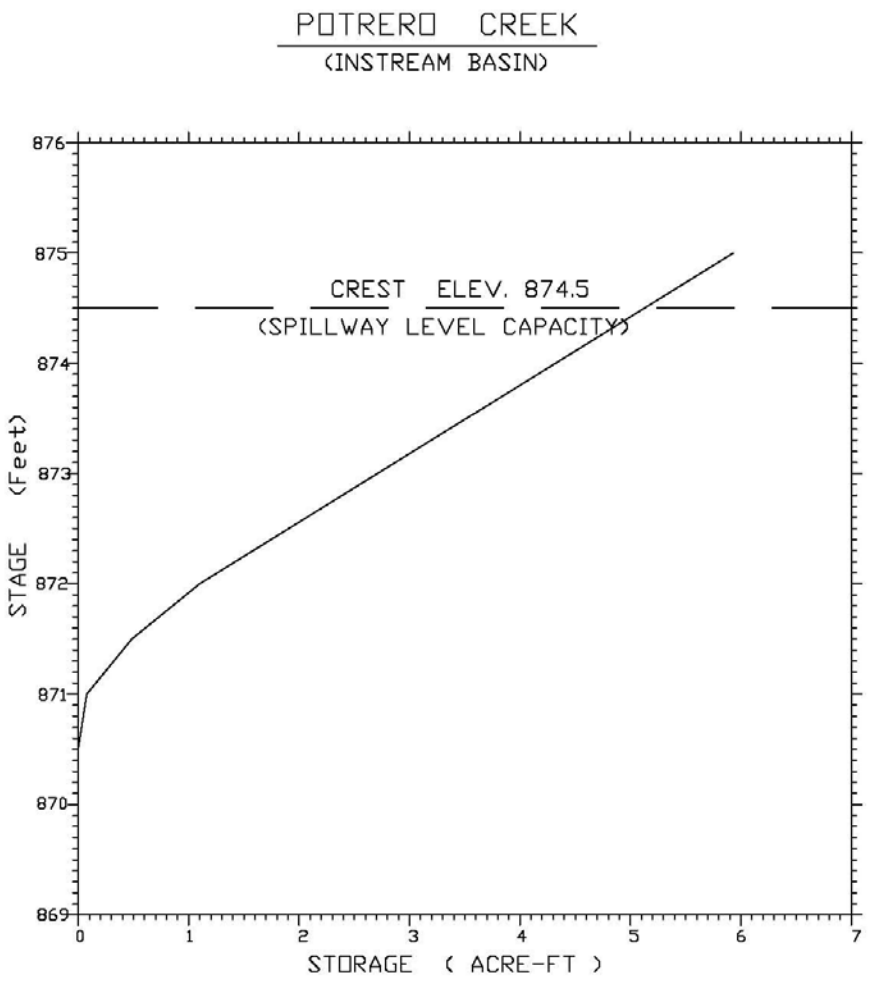
* AADP (Average Annual Debris Production) Computed Excluding Disaster Debris

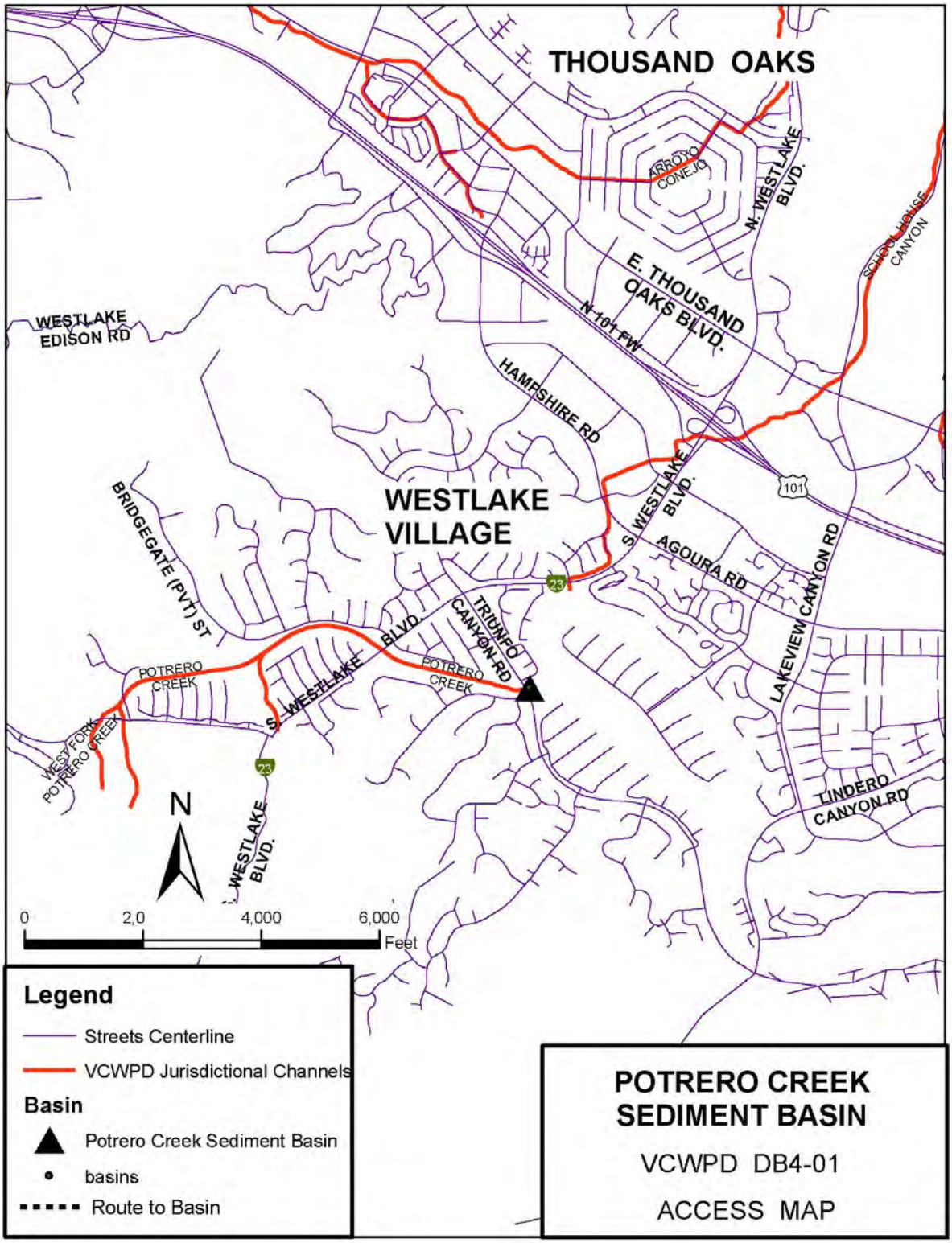
*** Theoretical Value from Scott and Williams (1978); 10% of 50-yr debris yield

NA= Not Available / Not Applicable


POTRERO CREEK BASIN
N
0 625 1,250 2,500 3,750 5,000
Feet
LEGEND
Potrero Watershed
Instream
VCWPD Jurisdictional Channels
POTRERO CREEK
SEDIMENT CONTROL
VCWPD DB 4-01
WATERSHED MAP


POTRERO CREEK
(U/W DIKE BASIN)
CREST ELEV. 865.0
(SPILLWAY LEVEL CAPACITY)
STAGE (Feet)
866
865
864
863
862
861
860
859
0
1
2
3
4
5
6
7
STORAGE (ACRE-FT)


POTRERO CREEK
(INSTREAM BASIN)
CREST ELEV. 874.5
(SPILLWAY LEVEL CAPACITY)
STAGE (Feet)
876
875
874
873
872
871
870
869
0
1
2
3
4
5
6
7
STORAGE (ACRE-FT)


THOUSAND OAKS
WESTLAKE VILLAGE
ARROYO CONEJO
N. WESTLAKE BLVD.
SCHOOLHOUSE CANYON
E. THOUSAND OAKS BLVD.
N-101 FW
WESTLAKE EDISON RD
HAMPSHIRE RD
S. WESTLAKE BLVD.
101
AGOURA RD
LAKEVIEW CANYON RD
BRIDGEGATE (PVT) ST
TRIUNFO CANYON RD
POTRERO CREEK
WEST FORK POTRERO CREEK
LINDERO CANYON RD
N
0
2,0
4,000
6,000
Feet
Legend
Streets Centerline
VCWPD Jurisdictional Channels
Basin
Potrero Creek Sediment Basin
basins
Route to Basin
POTRERO CREEK SEDIMENT BASIN
VCWPD DB4-01
ACCESS MAP

APPENDIX A – Channel Debris Removal Data

Calleguas Creek from Highway 1 to Hueneme Road

CHANNEL HISTORY:

Time Period	Actual Reported Sediment Removal (cy)	Sediment Removal Adjusted for Breakout Flow (cy)	Source
9/69 to 12/69	419,800	419,800	West, 1998
7/75 to 10/75	205,000	205,000	West, 1998
8/78 to 4/79	683,958	683,958	West, 1998
10/80 to 1/81	304,977	506,600	West, 1998
10/83 to 2/84	272,653	854,400	West, 1998
11/88 to 3/89	194,875	194,875	West, 1998
11/92 to 6/93	171,270	171,270	Contractor Invoice, 6/93
11/95 to 5/96	438,997	438,997	West, 1998
2/99 to 6/99	299,800	Not Applicable	Pay Estimate to Calex Eng 6/99
1/1-12/31/05	200,000		O&M

Notes: West Consultants, Inc., 1998. Sediment Transport Modeling of Calleguas Creek and Arroyo Las Posas, Table 4.

Pole Creek (City of Fillmore)

CHANNEL HISTORY: Debris Removal Quantities (cy)

Calendar Year	Reach 43202 (Lined Section to Highway 126)	Reach 43201 (Santa Clara River to Lined Section)	Total
2002	40	0	40
2001	3,500	3,500	7,000
2000	55	0	55
1999	364	0	364
1998	0	40,000	40,000
1997	0	0	0
1996	0	0	0
1995	100,000	40,000	140,000
1994	0	0	0
1993	0	0	0
1992	0	22,000	22,000

Dry Canyon (City of Simi Valley)

CHANNEL HISTORY: Debris Removal Quantities (cy)

Calendar Year	Channel 47386 Avenida Simi to Tapo Hills Diversion	Channel 47387 Upstream of Tapo Hills Diversion	Total
2003	432	0	3,932
2002	0	0	0
2001	1,112	0	1,112
2000	315	0	315
1999	0	0	0
1998	904	0	904
1997	0	0	0
1996	0	0	0
1995	1,243	392	1,635
1994	0	0	0
1993	0	0	0

North Simi Drain (City of Simi Valley)

CHANNEL HISTORY: Debris Removal Quantities (cy)

Calendar Year	Reach 47345 Caldwell St to HWY 118
2003	1,056
2002	2,072
2001	1,830
2000	294
1999	0
1998	4,328
1997	272
1996	0
1995	3,047
1994	0
1993	2,664

Tapo Canyon (City of Simi Valley)

CHANNEL HISTORY: Debris Removal Quantities (cy)

Calendar Year	Reach 47423 Cochran to Avenida Simi	Reach 47424 Avenida Simi to Walnut	Reach 47425 Upstream of Walnut	Total
2003	0	0	0	0
2002	0	0	0	0
2001	0	0	0	0
2000	44	292	0	336
1999	248	136	0	384
1998	2,184	5,528	0	7,712
1997	0	0	0	0
1996	136	1,008	32	1,176
1995	1,342	1,369	379	3,087
1994	216	776	0	992
1993	539	3,309	320	4,168

APPENDIX B – State-Size Dam Emergency Procedures

1. DIVISION OF SAFETY OF DAMS.
   EMERGENCY PROCEDURES FOR DAMS:
   - MATILIJA DAM
   - RUNKLE DAM
   - LAS LLAJAS DAM
   - SYCAMORE CANYON DAM
   - FERRO DEBRIS DAM
   - STEWART CANYON DB DAM
   - ARUNDELL BARRANCA DAM
   - LANG CREEK DETENTION BASIN DAM

STATE OF CALIFORNIA -- THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

RECEIVED
JUN 0 1 2005
WATERSHED PROTECTION DIST.

DIVISION OF SAFETY OF DAMS

- NOTICE -

EMERGENCY PROCEDURES

MATILIJA DAM, NO. 86
VENTURA COUNTY

Section 6101 of Division 3 of the California Water Code requires owners of dams or reservoirs or their agents to advise the Department of Water Resources fully and promptly of any sudden or unprecedented flood or unusual or alarming circumstance or occurrence affecting the dam or reservoir.

In the event of an emergency involving your dam or reservoir (in addition to notifying local authorities) please notify the following:

1. **During Working Hours:**

   Frederick J. Sage
   Field Engineering Branch Chief
   Division of Safety of Dams
   2200 "X" Street, Suite 200
   Sacramento, CA 95818
   (916) 227-4667

2. **After Working Hours and on Weekends and Holidays:**

   Area 9 Engineer:

   Rick Draeger
   (209) 748-5606

   If the engineer is not reachable, contact:

   Southern Regional Engineer:

   Mutaz Mihyar
   (916) 961-2440
   Pager (916) 948-0313
   Cell (916) 799-3055

3. If neither the Area Engineer nor the Regional Engineer can be reached, please call the **Governor's Office of Emergency Services Warning Center at (916) 845-8911.**

THIS NOTICE MUST BE KEPT IN A CONVENIENT PLACE (Preferably near the telephone to be used in case of emergency at or near the dam site).

Revised 5/10/2005

STATE OF CALIFORNIA -- THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor
DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

DIVISION OF SAFETY OF DAMS

- NOTICE -

EMERGENCY PROCEDURES

RUNKLE DAM, NO. 86-3
VENTURA COUNTY

Section 6101 of Division 3 of the California Water Code requires owners of dams or reservoirs or their agents to advise the Department of Water Resources fully and promptly of any sudden or unprecedented flood or unusual or alarming circumstance or occurrence affecting the dam or reservoir.

In the event of an emergency involving your dam or reservoir (in addition to notifying local authorities) please notify the following:

1. **During Working Hours:**

   Frederick J. Sage
   Field Engineering Branch Chief
   Division of Safety of Dams
   2200 "X" Street, Suite 200
   Sacramento, CA 95818
   (916) 227-4667

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   Area 9 Engineer:

   Rick Draeger
   (209) 748-5606

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   Southern Regional Engineer:

   Mutaz Mihyar
   (916) 961-2440
   Pager (916) 948-0313
   Cell (916) 799-3055

3. If neither the Area Engineer nor the Regional Engineer can be reached, please call the **Governor's Office of Emergency Services Warning Center at (916) 845-8911.**

   THIS NOTICE MUST BE KEPT IN A CONVENIENT PLACE (Preferably near the telephone to be used in case of emergency at or near the dam site).

Revised 5/10/2005

STATE OF CALIFORNIA -- THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

DIVISION OF SAFETY OF DAMS

- NOTICE -

EMERGENCY PROCEDURES

LAS LLAJAS DAM, NO. 86-5
VENTURA COUNTY

Section 6101 of Division 3 of the California Water Code requires owners of dams or reservoirs or their agents to advise the Department of Water Resources fully and promptly of any sudden or unprecedented flood or unusual or alarming circumstance or occurrence affecting the dam or reservoir.

In the event of an emergency involving your dam or reservoir (in addition to notifying local authorities) please notify the following:

1. **During Working Hours:**

   Frederick J. Sage
   Field Engineering Branch Chief
   Division of Safety of Dams
   2200 "X" Street, Suite 200
   Sacramento, CA 95818
   (916) 227-4667

2. **After Working Hours and on Weekends and Holidays:**

   Area 9 Engineer:

   Rick Draeger
   (209) 748-5606

   If the engineer is not reachable, contact:

   Southern Regional Engineer:

   Mutaz Mihyar
   (916) 961-2440
   Pager (916) 948-0313
   Cell (916) 799-3055

3. If neither the Area Engineer nor the Regional Engineer can be reached, please call the **Governor's Office of Emergency Services Warning Center at (916) 845-8911.**

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Revised 5/10/2005

STATE OF CALIFORNIA -- THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor
DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

DIVISION OF SAFETY OF DAMS

- NOTICE -

EMERGENCY PROCEDURES

SYCAMORE CANYON DAM, NO. 86-6
VENTURA COUNTY

Section 6101 of Division 3 of the California Water Code requires owners of dams or reservoirs or their agents to advise the Department of Water Resources fully and promptly of any sudden or unprecedented flood or unusual or alarming circumstance or occurrence affecting the dam or reservoir.

In the event of an emergency involving your dam or reservoir (in addition to notifying local authorities) please notify the following:

1. **During Working Hours:**

   Frederick J. Sage
   Field Engineering Branch Chief
   Division of Safety of Dams
   2200 "X" Street, Suite 200
   Sacramento, CA 95818
   (916) 227-4667

2. **After Working Hours and on Weekends and Holidays:**

   Area 9 Engineer:

   Rick Draeger
   (209) 748-5606

   If the engineer is not reachable, contact:

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Revised 5/10/2005

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ARNOLD SCHWARZENEGGER, Governor
DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

DIVISION OF SAFETY OF DAMS

- NOTICE -

EMERGENCY PROCEDURES

FERRO DEBRIS DAM, NO. 86-8
VENTURA COUNTY

Section 6101 of Division 3 of the California Water Code requires owners of dams or reservoirs or their agents to advise the Department of Water Resources fully and promptly of any sudden or unprecedented flood or unusual or alarming circumstance or occurrence affecting the dam or reservoir.

In the event of an emergency involving your dam or reservoir (in addition to notifying local authorities) please notify the following:

1. **During Working Hours:**

   Frederick J. Sage
   Field Engineering Branch Chief
   Division of Safety of Dams
   2200 "X" Street, Suite 200
   Sacramento, CA 95818
   (916) 227-4667

2. **After Working Hours and on Weekends and Holidays:**

   Area 9 Engineer:

   Rick Draeger
   (209) 748-5606

   If the engineer is not reachable, contact:

   Southern Regional Engineer:

   Mutaz Mihyar
   (916) 961-2440
   Pager (916) 948-0313
   Cell (916) 799-3055

3. If neither the Area Engineer nor the Regional Engineer can be reached, please call the **Governor's Office of Emergency Services Warning Center at (916) 845-8911.**

   THIS NOTICE MUST BE KEPT IN A CONVENIENT PLACE (Preferably near the telephone to be used in case of emergency at or near the dam site).

Revised 5/10/2005

STATE OF CALIFORNIA -- THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor
DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236000!
(916) 653-5791

DIVISION OF SAFETY OF DAMS

- NOTICE -

EMERGENCY PROCEDURES

STEWART CAN DB DAM, NO. 86-9
VENTURA COUNTY

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1. **During Working Hours:**

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   Field Engineering Branch Chief
   Division of Safety of Dams
   2200 "X" Street, Suite 200
   Sacramento, CA 95818
   (916) 227-4667

2. **After Working Hours and on Weekends and Holidays:**

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   Rick Draeger
   (209) 748-5606

   If the engineer is not reachable, contact:

   Southern Regional Engineer:

   Mutaz Mihyar
   (916) 961-2440
   Pager (916) 948-0313
   Cell (916) 799-3055

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Revised 5/10/2005

STATE OF CALIFORNIA -- THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor
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1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

DIVISION OF SAFETY OF DAMS

- NOTICE -

EMERGENCY PROCEDURES

ARUNDELL BARRANCA DAM, NO. 86-10
VENTURA COUNTY

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1. **During Working Hours:**

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   Field Engineering Branch Chief
   Division of Safety of Dams
   2200 "X" Street, Suite 200
   Sacramento, CA 95818
   (916) 227-4667

2. **After Working Hours and on Weekends and Holidays:**

   Area 9 Engineer:

   Rick Draeger
   (209) 748-5606

   If the engineer is not reachable, contact:

   Southern Regional Engineer:

   Mutaz Mihyar
   (916) 961-2440
   Pager (916) 948-0313
   Cell (916) 799-3055

3. If neither the Area Engineer nor the Regional Engineer can be reached, please call the **Governor's Office of Emergency Services Warning Center at (916) 845-8911.**

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Revised 5/10/2005

STATE OF CALIFORNIA -- THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, Governor

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1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
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DIVISION OF SAFETY OF DAMS

- NOTICE -

EMERGENCY PROCEDURES

LANG CREEK DETENTION BASIN DAM, NO. 86-11
VENTURA COUNTY

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1. **During Working Hours:**

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   Field Engineering Branch Chief
   Division of Safety of Dams
   2200 "X" Street, Suite 200
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   (916) 227-4667

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3. If neither the Area Engineer nor the Regional Engineer can be reached, please call the **Governor's Office of Emergency Services Warning Center at (916) 845-8911.**

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Revised 5/10/2005

APPENDIX C – VCWPD and USACOE Agreements

1. Adams Canyon Debris Basin Cooperative Agreement
2. Fagan Canyon Debris Basin Cooperative Agreement
3. Live Oak Creek Diversion Dam Cooperative Agreement
4. McDonald Canyon Detention Basin Cooperative Agreement
5. Arundell Barranca Detention Basin Landscape Planting Plan