PRELIMINARY
DRAINAGE STUDY
(HYDROLOGY AND HYDRAULICS)
FOR
US STORAGE CENTER
(529 CUTTER WAY)

CITY CASE #: CUP 23-08 & SPR 23-268

Prepared for:

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Date: December 4, 2023
Date: February 12, 2024

Project Title: US Storage Center (529 Cutter Way)
Preliminary Drainage Study

PREPARER'S CERTIFICATION

This report has been prepared by or under the oversight of the following registered civil engineer who attests to the technical information contained herein and has judged the qualifications of reference data upon which recommendations, conclusions, and decisions are based.

Preparer's Signature	2/12/2024 **Date**
Nobu Murakami **Preparer's Printed Name**	Water Resources Engineer **Preparer's Title/Position**
R.C.E. #78149 / Exp. 09/30/2025 **Registration # / Expiration**	SDH & Associates, Inc. **Company Name**

Preparer's Licensure:



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1.0 INTRODUCTION

1.1 Project Location

This Low Impact Development (LID) Plan is for the proposed Westport-Covina project (herein referred to as "the project"). The project is located on 529 Cutter Way in the City of Covina, the Los Angeles County, California. Refer to Appendix A for a vicinity map of the project. Applicable APNs are 8434-013-010 and 8434-012-091.

1.2 Project Description

The overall project parcel gross area is approximately 2.55 acres and the project net area is approximately 2.25 acres. The project will redevelop the site from an existing manufacturing land use to a proposed self-storage land use (allowed with a CUP). The project will consist of proposed 3-story self-storage building with rental office along with surface improvements such as secured parking areas, walkways, and landscaping. Existing building and associated improvements are to be demolished. Based on the conceptual site plan prepared/revised by KSP Studio (dated February 2024), the proposed self-storage building footprint is expected to be approximately 183,584 square feet. There will be a total of approximately 13 auto parking spaces to be provided (including standard, ADA, and EV capable spaces). The overall drainage management area is approximately 2.25 acres. For the purpose of on-site mitigation design (i.e. – underground infiltration facility design), the drainage management area is approximately 1.97 acres and the proposed impervious and pervious footprints are approximately 78,327 square feet (~91%) and 7,404 square feet (~9%), respectively. The remaining portion of the site (~0.28 acre) consists of landscape areas and is considered "self-treating landscape" areas that drain. There is a sliver of walkway ramp near the southerly edge that would be directed to the self-treating landscape areas and would be challenging to drain towards the proposed infiltration facility. As such, the proposed underground infiltration facility is being upsized to account for the impervious walkway ramp. In order to comply with the Los Angeles County Low Impact Development (LID) standards, the project provides a LID Plan (prepared separately) and documents the design of the aforementioned permanent stormwater BMPs.

1.3 Drainage Characteristics

The project site lies within the eastern-central portion of the San Gabriel River Watershed. The central and lower portions of the watershed is urbanized with the lower part of the river flowing through a fully improved concrete-lined channels (including the Big Dalton Wash, Walnut Creek, and San Gabriel River) that would not be susceptible to hydromodification impacts.

In the existing condition, the site consists of an existing residential building and associated surface improvements such as driveway, parking and landscape areas. The drainage management area is approximately 2.25 acres with approximately 21 percent of impervious footprint. On-site runoff generally drains in a southerly direction towards W San Bernardino Road to an existing catch basin (curb inlet). This catch basin drains into an existing 18-inch lateral reinforced concrete pipe (RCP) that connects into an existing mainline box culvert along Cutter Way (maintained by Los Angeles County Public Works). This existing mainline storm drain drains in a southeasterly direction and eventually discharges into the Big Dalton Wash. The Big Dalton Wash drains to the Walnut Creek, San Gabriel River, and eventually drains to the San Pedro Bay near Long Beach and then to Pacific Ocean.

In the post-project condition, the post-project drainage management area is approximately 2.25 acres with approximately 79 percent of impervious footprint. The drainage management area to the proposed storm water best management practice (BMP) is approximately 1.97 acres. The post-project drainage characteristics will be maintained as similar to the pre-project condition. Runoff from the site will be collected via a proposed on-site private storm drain system (including catch basins and storm drain pipes) towards the BMP in the southeasterly area of the project. The proposed BMP will be an underground infiltration facility (including a pre-treatment facility), which provides adequate mitigation capacity to retain the low-flow water quality volume and address the storm water quality management requirements. Overflow from the proposed underground infiltration facility is anticipated to be conveyed via a storm drain pipe and connect into the aforementioned existing catch basin along W San Bernardino Road.

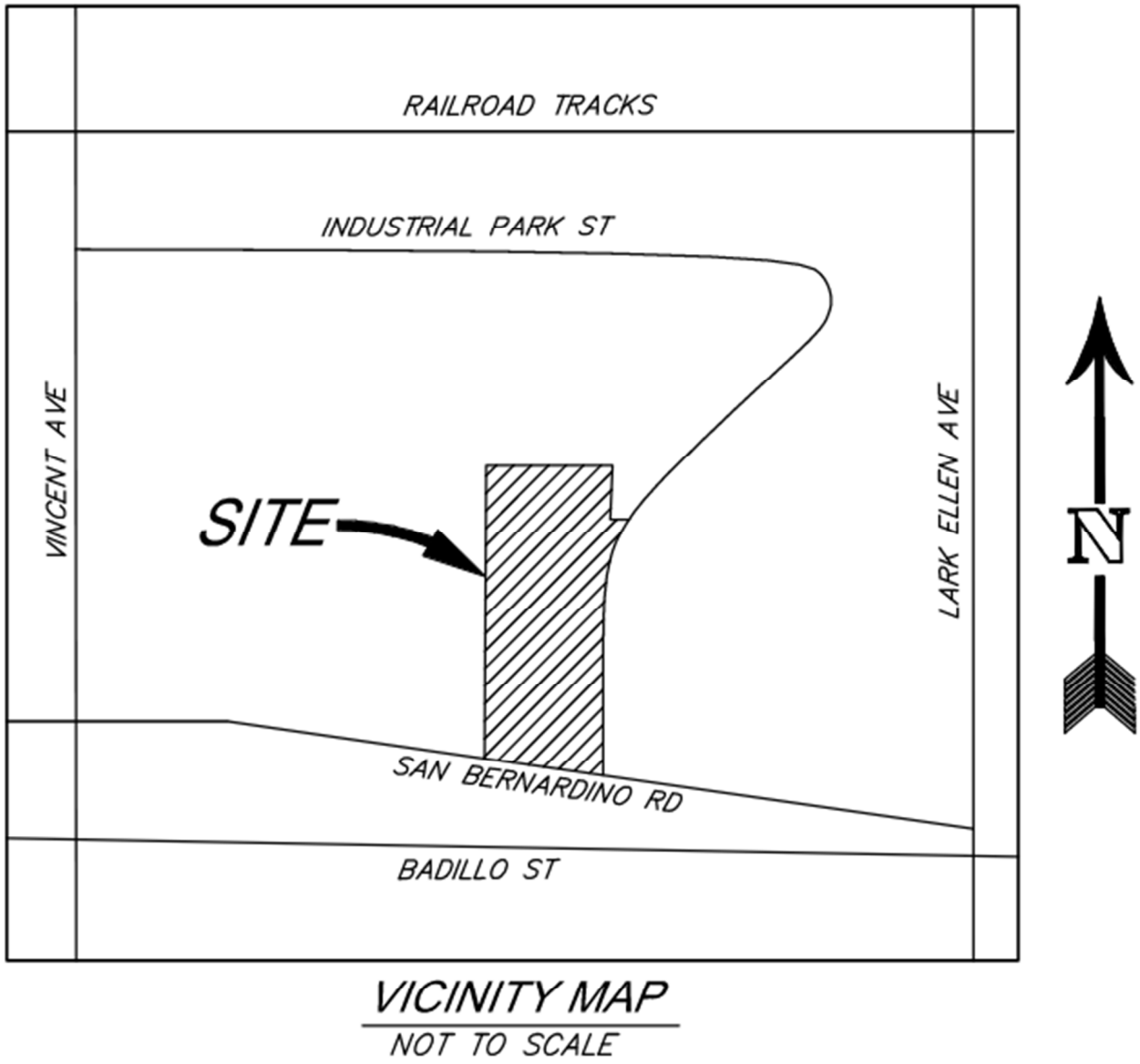
1.4 FEMA Flood Hazard Zone Information

The water courses around the project have been identified by the Federal Emergency Management Agency (FEMA) as 'Zone X', more specifically within the unshaded area of Zone X. Based on the FEMA Flood Insurance Rate Map Zone definitions, Zone X (unshaded) is the area determined to be outside the 0.2% annual chance floodplain. The project is shown on the FEMA Flood Insurance Rate Map (FIRM) number 06037C1700F, with an effective date of September 26, 2008. The proposed project is entirely situated within Zone X (unshaded). Therefore, processing through FEMA is not anticipated to be required for this project. For reference purpose, a copy of the FIRMette (reduced size) is included at the end of Appendix A.

1.5 Low Impact Development (LID) Plan

In support of the preliminary site plan, a preliminary Low Impact Development (LID) Plan has been prepared for the project (in a separate document), in accordance with the County of Los Angeles Department of Public Works Low Impact Development Standards Manual, dated February 2014. The report is titled, "Preliminary Low Impact Development (LID) Plan for Westport-Covina," with a revised date of February 12, 2024, prepared by SDH & Associates, Inc. (Job Number 2307). The LID Plan documents how the project addresses the requirements regarding permanent stormwater quality management.

Figure 1: Vicinity Map



2.0 HYDROLOGY

Hydrologic calculations were prepared in accordance with the Los Angeles County Public Works Hydrology Manual, dated January 2006, for on-site storm drain sizing purpose. The Los Angeles County's HydroCalc software (Version 1.0.3) was used to perform the hydrologic analysis in this study to determine the peak flow rates for the 50-year, 24-hour storm event.

In order to perform the hydrologic analysis; base information for the study area is required. This information includes the drainage facility locations and sizes, land uses, flow patterns, drainage basin boundaries, and topographic elevations. Compiled Hydrologic backup is included as Appendix A to this report.

Area

Drainage boundaries were delineated (subdivided) to distinguish areas with similar flow characteristics and hydrologic properties in order to determine peak flows at relevant confluence points and to facilitate hydraulic analyses for the on-site storm drain facilities. Drainage basin boundaries, flow patterns, and topographic elevations are shown on the hydrology maps.

Time of Concentration / Intensity

The time of concentration and rainfall intensity for individual sub-drainage basin boundaries have been calculated via the HydroCalc software.

Runoff Coefficient

The runoff coefficients used for each sub-drainage basin were calculated by the HydroCalc software based on the user-specified information of the hydrologic soil group and impervious fraction.

Hydrologic soil group data based on the Los Angeles County Hydrology Manual Appendix C (Soil Identification Table) indicates the project primarily consists of soil classification number 6 (Hanford fine sandy loam, HF-1). This soil classification was selected in the HydroCalc software.

Topography

The onsite project specific topography consists of 1-foot contours on the NAVD-88 vertical datum, provided by Arrowhead Mapping Corp.

2.1 Hydrologic Results

The hydrologic results for applicable subareas are summarized in Table 2.1. The summary shows the overall hydrologic results at the project discharge (outlet) location near the southerly are of the project. The detailed hydrologic calculation results are located in Appendix B of this report. As shown from the summary, the post-project peak flow rate from the site will be similar with minimal change as compared to the pre-project condition. Runoff from the project will continue to drain to the same existing storm drain system in W. San Bernardino Road and maintain the existing drainage pattern. Therefore, no adverse impacts are anticipated to the downstream existing drainage facilities and no additional mitigation would be necessary.

Table 2.1 – Hydrologic Data Summary

Subarea ID	Drainage Area (acres)	Storm Event	Peak Flow Rate (cfs [2])		
			Pre-development	Post-development (un-detained)	Difference
1	2.25	50-yr, 24-hr (Q_{50})	7.7	7.8	0.1

Note:

1: Refer to Appendix A for supporting information and Appendix B for drainage node locations.

2: "cfs"= cubic feet per second.

3.0 HYDRAULICS

3.1 Hydraulic Methodology and Criteria

The 50-year, 24-hour proposed peak flow rates determined using the HydroCalc outputs are used to determine preliminary sizes for the on-site storm drain system.

3.2 Inlet Sizing

Inlet design calculation specific to the proposed on-site private catch basins will be conducted during final engineering and supporting calculation will be incorporated in Appendix C. In the post-project condition, the proposed on-site storm drain catch basins (inlets) will be designed to intercept the local 50-year flow rates. Where necessary, the overall 50-year peak flow rate from the project would be prorated based on the tributary area to size individual storm drain catch basin.

3.3 Storm Drain Sizing

On-site Storm Drain

Preliminary storm drain sizing based on a normal depth calculation (per Manning's equation) was conducted in order to determine the estimated sizes for the proposed on-site private storm drain pipes. The calculations were prepared to ensure the proposed on-site private storm drain pipes could convey the anticipated 50-year flow rates. Where necessary, the overall 50-year peak flow rate from the project would be prorated based on the tributary area to size individual storm drain segment. The normal depth calculation (per Manning's equation) was conducted using a 30% sizing bump-up factor in an effort to account for potential hydraulic losses. The summary of the normal depth calculation is provided in Appendix D. Typically, this calculation approach is adequate for on-site privately-maintained storm drain pipe sizing.

4.0 CONCLUSION

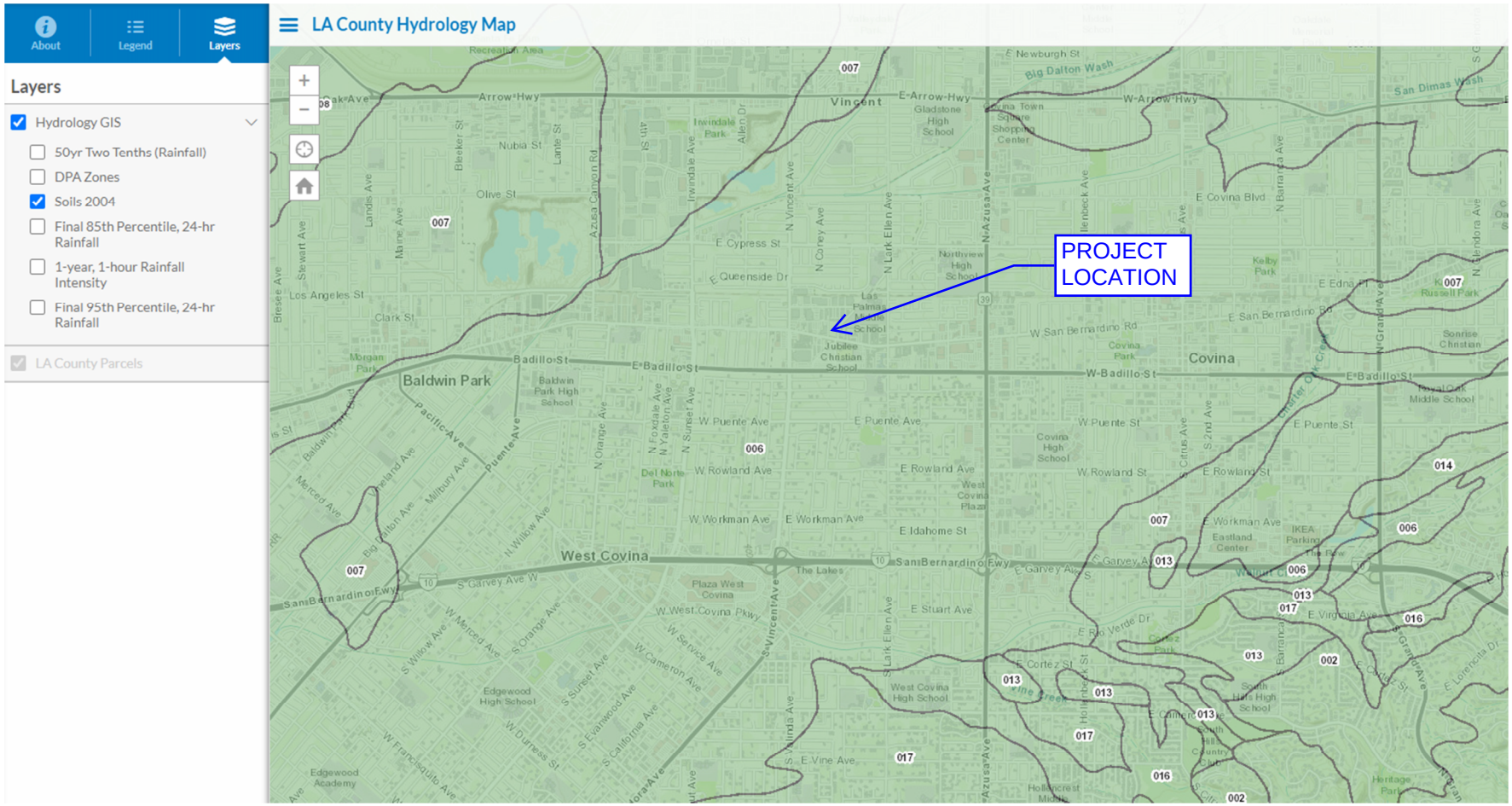
This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Westport-Covina project in the City of Covina, Los Angeles County, California. Hydrologic calculations were computed in accordance with the Los Angeles County Hydrology Manual, dated January 2006. The peak discharge rates for the 50-year, 24-hour storm events have been determined for the project using the Los Angeles County's HydroCalc (Version 1.0.3). The 50-year peak flow rate is prorated based on the local tributary area to determine the preliminary sizes for the individual storm drain segments on-site (based on the normal depth calculations). The project proposes one (1) underground infiltration facility in the southerly area to address the storm water quality management (LID Plan) requirements. Based on the comparison of the existing and proposed condition drainage characteristics and peak flow rate, the peak flow rates are similar with minimal difference. As such, no additional mitigation is anticipated to be required for the project. In summary, with proposed improvements, no adverse impacts are anticipated to the downstream existing drainage facilities as a result of the project.

Appendix A
Hydrologic Backup Information

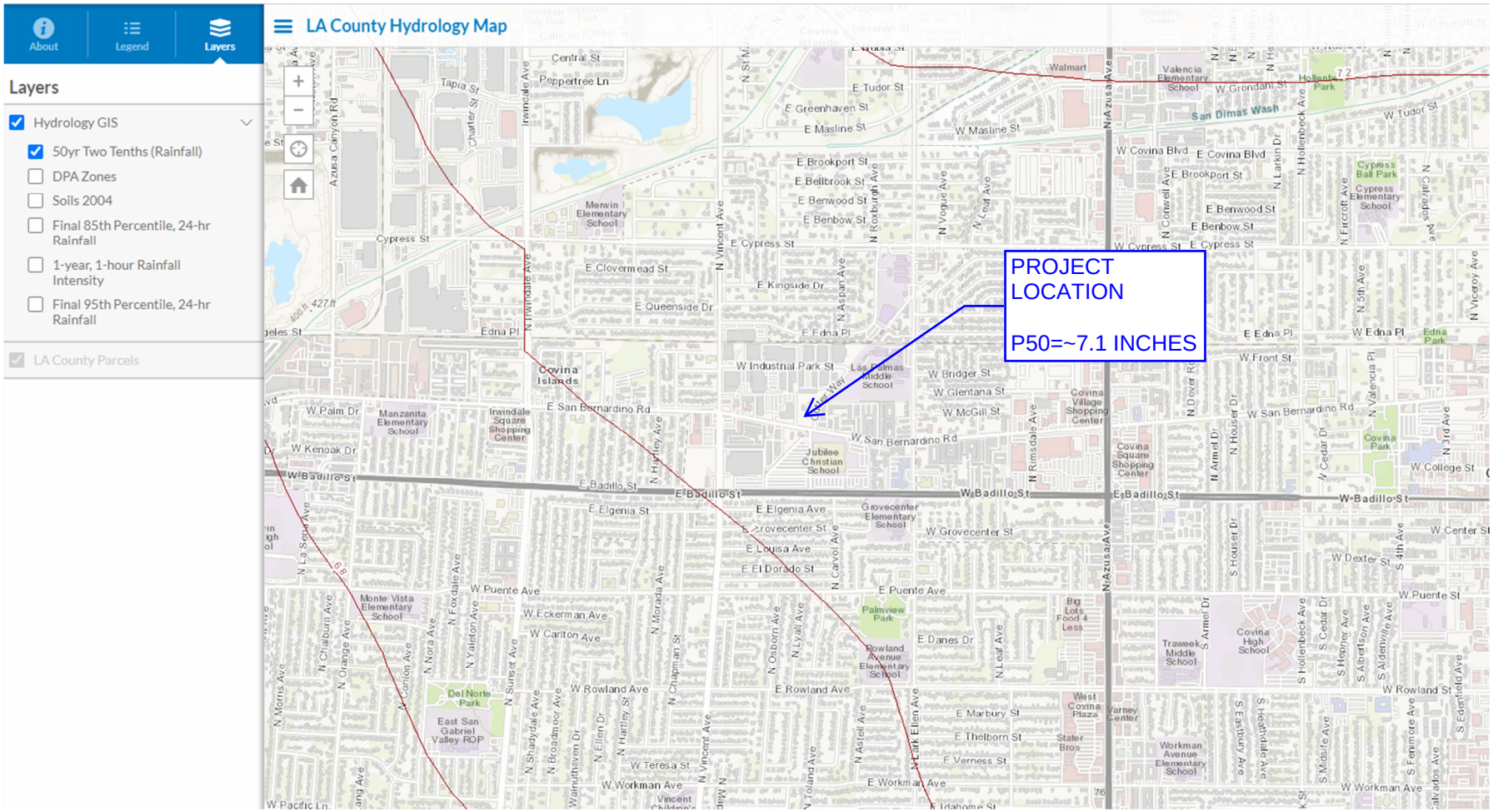
Includes:

1. LA County Hydrologic Soil Identification (Excerpts)
2. Supporting Precipitation Data
3. FEMA FIRMette

SUPPORTING SOILS DATA



SUPPORTING PRECIPITATION DATA



NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later and from National Geospatial Intelligence Agency imagery produced at a scale of 1:4,000 from photography dated 2003 or later.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

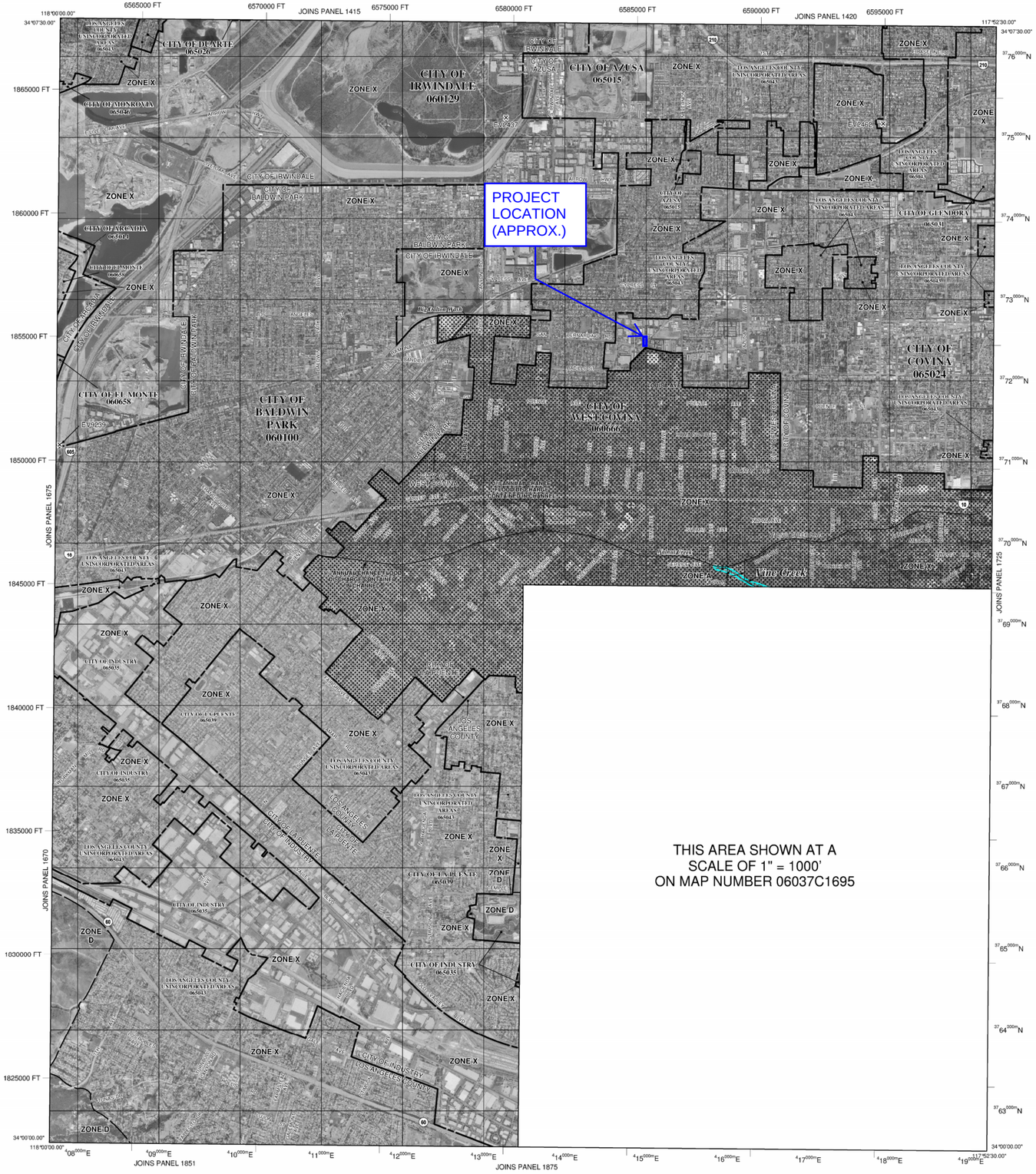
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report,* and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

NOTE:
THE PROJECT IS SITUATED WITHIN FEMA ZONE X; THEREFORE, NO PROCESSING SHOULD BE REQUIRED THROUGH FEMA.



LEGEND

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

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid values, zone 11
- 6000000 FT — 5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'
1000 0 2000 4000 FEET
600 0 600 1200 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1700F

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1700 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	1700	F
ARCADIA, CITY OF	065014	1700	F
AZUSA, CITY OF	065015	1700	F
BALDWIN PARK, CITY OF	060100	1700	F
COVINA, CITY OF	065024	1700	F
DUARTE, CITY OF	065026	1700	F
EL MONTE, CITY OF	060658	1700	F
GLENDORA, CITY OF	065031	1700	F
INDUSTRY, CITY OF	065035	1700	F
IRWINDALE, CITY OF	060129	1700	F
LA PUENTE, CITY OF	065039	1700	F
MONROVIA, CITY OF	065046	1700	F
WEST COVINA, CITY OF	060666	1700	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C1700F

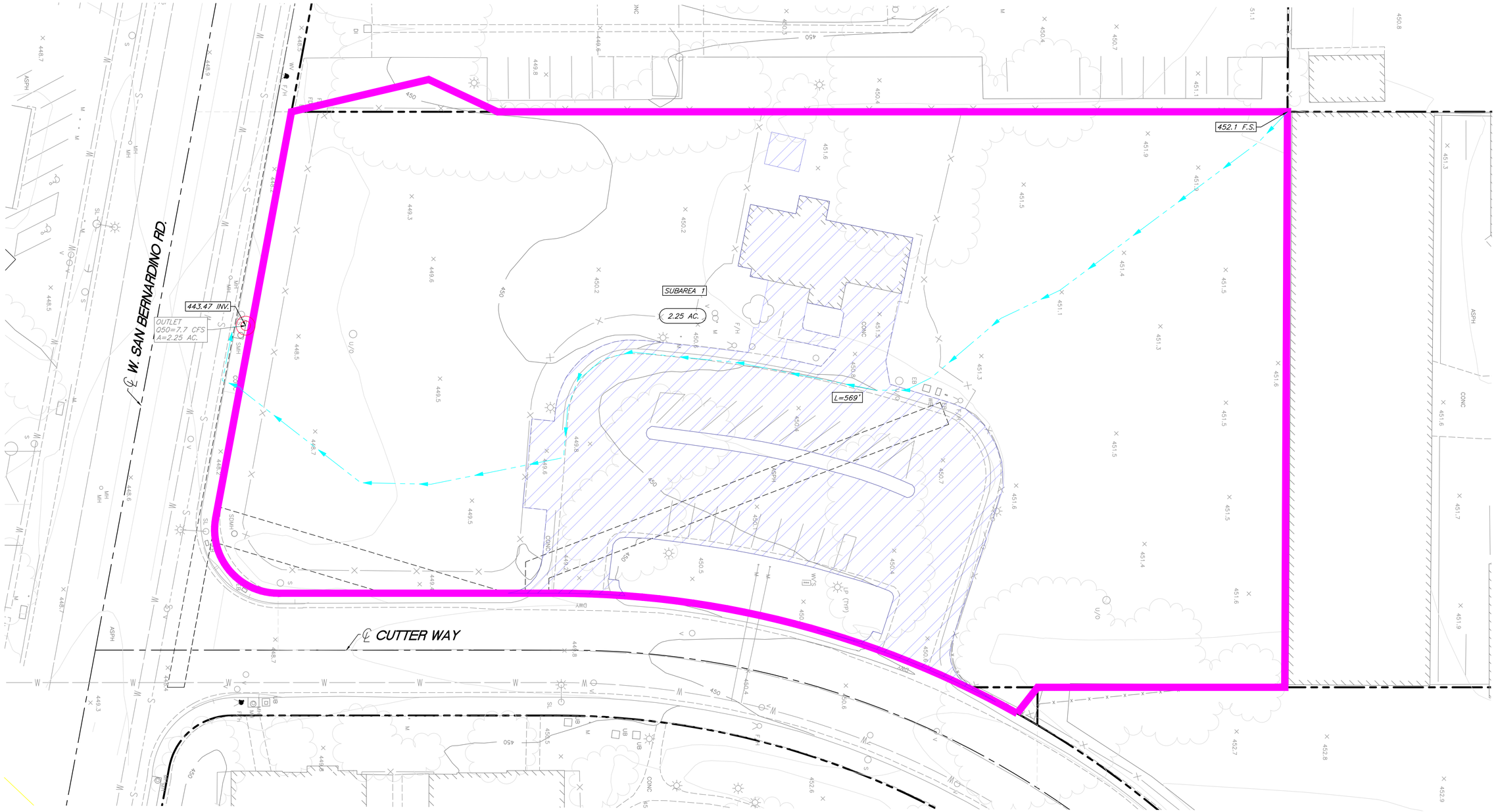
EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

Appendix B
Drainage Study Maps and Hydrologic Results

Includes:

1. Drainage Study Maps (Pre & Post)
2. HydroCalc Results (50-year – Pre & Post)



NOTES:

1. BASED ON THE LOS ANGELES COUNTY HYDROLOGY MANUAL APPENDIX C (SOIL IDENTIFICATION TABLE), THE SITE PRIMARILY CONSISTS OF SOIL CLASSIFICATION NUMBER 6 (HANDFORD FINE SANDY LOAM, HF-1). THIS SOIL CLASSIFICATION WAS SELECTED IN THE HYDROCALC SOFTWARE.
2. THE PROJECT SITE LIES WITHIN THE EASTERN-CENTRAL PORTION OF THE SAN GABRIEL RIVER WATERSHED. IN THE EXISTING CONDITION THE SITE CONSISTS OF AN EXISTING RESIDENTIAL BUILDING AND ASSOCIATED SURFACE IMPROVEMENTS SUCH AS DRIVEWAY, PARKING AND LANDSCAPE AREAS. THE DRAINAGE MANAGEMENT AREA IS APPROXIMATELY 2.25 ACRES WITH APPROXIMATELY 21 PERCENT OF IMPERVIOUS FOOTPRINT. RUNOFF FROM THE SITE GENERALLY DRAINS IN SOUTHERLY DIRECTION TOWARDS W. SAN BERNARDINO ROAD TO AN EXISTING CATCH BASIN (CURB INLET).
3. THE PROJECT IS SITUATED WITHIN THE FEMA DESIGNATED "ZONE X" AND FEMA PROCESSING IS NOT ANTICIPATED TO BE REQUIRED FOR THIS PROJECT.

LEGEND

- TRACT BOUNDARY
- MAJOR DRAINAGE BOUNDARY
- SUB BASIN BOUNDARY
- SURFACE FLOW PATH
- DRAINAGE ACREAGE — X.X AC.
- SUBAREA ID — SUBAREA X
- DISCHARGE LOCATION
- IMPERVIOUS AREA (~21%)

0 10 20 40 60 80
SCALE 1"=20'

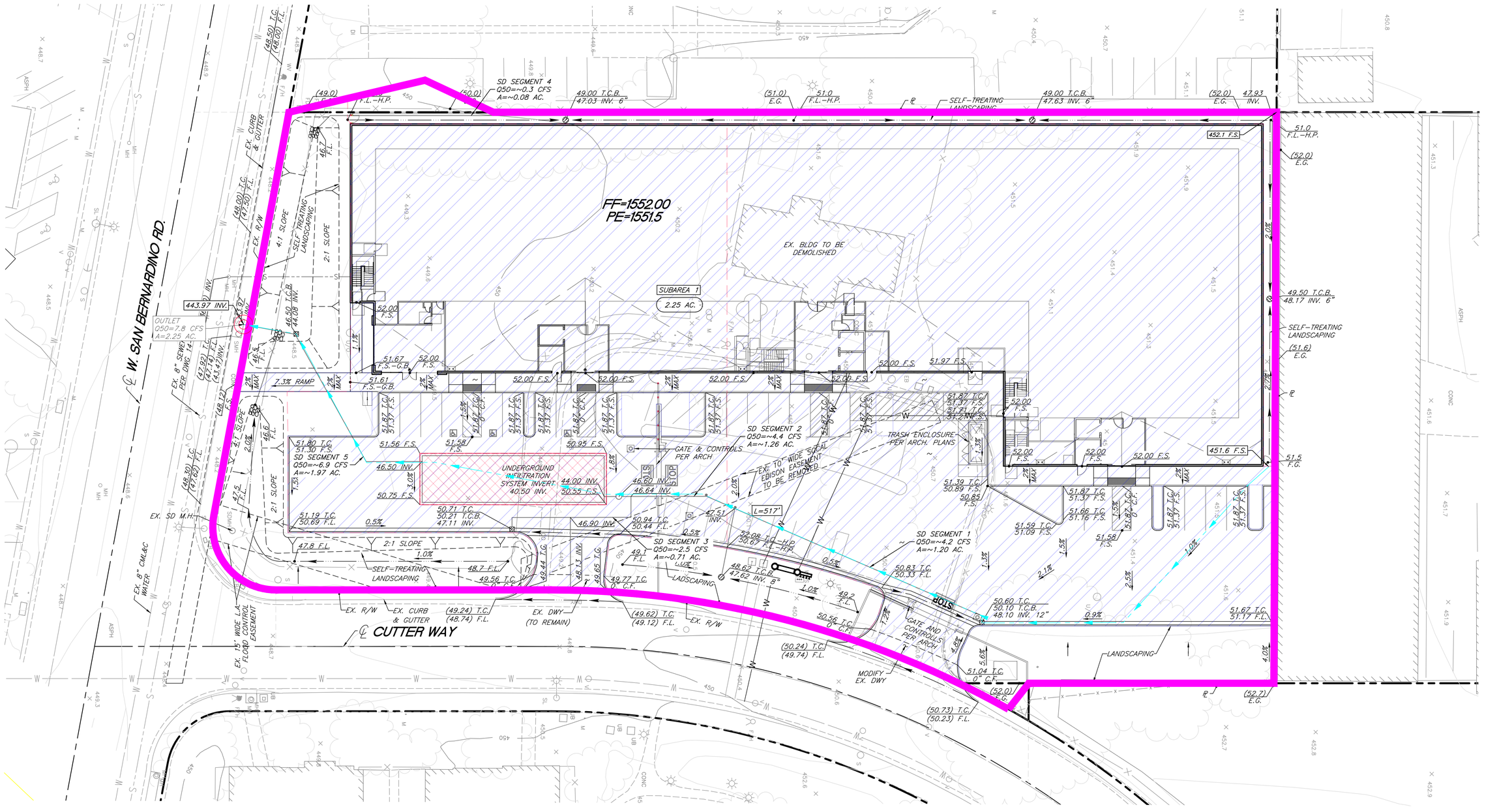
DRAINAGE STUDY MAP FOR US STORAGE CENTER 529 CUTTER WAY (PRE-PROJECT)

JN 2307 REVISED: 2/12/2024

NOT FOR CONSTRUCTION – EXHIBIT FOR PRELIMINARY DRAINAGE STUDY ONLY

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NOTES:

1. BASED ON THE LOS ANGELES COUNTY HYDROLOGY MANUAL APPENDIX C (SOIL IDENTIFICATION TABLE), THE SITE PRIMARILY CONSISTS OF SOIL CLASSIFICATION NUMBER 6 (HANDFORD FINE SANDY LOAM, HF-1). THIS SOIL CLASSIFICATION WAS SELECTED IN THE HYDROCALC SOFTWARE.
2. THE PROJECT SITE LIES WITHIN THE EASTERN-CENTRAL PORTION OF THE SAN GABRIEL RIVER WATERSHED. IN THE EXISTING CONDITION THE SITE CONSISTS OF AN EXISTING RESIDENTIAL BUILDING AND ASSOCIATED SURFACE IMPROVEMENTS SUCH AS DRIVEWAY, PARKING AND LANDSCAPE AREAS. THE DRAINAGE MANAGEMENT AREA IS APPROXIMATELY 2.3 ACRES WITH APPROXIMATELY 21 PERCENT OF IMPERVIOUS FOOTPRINT. RUNOFF FROM THE SITE GENERALLY DRAINS IN SOUTHERLY DIRECTION TOWARDS W. SAN BERNARDINO ROAD TO AN EXISTING CATCH BASIN (CURB INLET).
3. IN THE POST-PROJECT CONDITION, THE PROJECT WILL CONSISTS OF A 3-STORY SELF-STORAGE BUILDING WITH RENTAL OFFICE ALONG WITH SURFACE IMPROVEMENTS. THE POST-PROJECT DRAINAGE MANAGEMENT AREA IS APPROXIMATELY 2.25 ACRES WITH APPROXIMATELY 79 PERCENT OF IMPERVIOUS FOOTPRINT. THE DRAINAGE AREA TO THE PROPOSED BMP IS APPROXIMATELY 1.97 ACRES AND THE REMAINING 0.28 ACRE CONSISTS OF PERVIOUS SELF-TREATING LANDSCAPE AREAS. THE POST-PROJECT DRAINAGE CHARACTERISTICS WILL BE MAINTAINED AS SIMILAR TO THE PRE-PROJECT CONDITION.
4. FOR PRELIMINARY STORM DRAIN SIZING, THE PEAK FLOW RATE TO RELEVANT STORM DRAIN SEGMENTS HAS BEEN ESTIMATED (PRORATED) BASED ON THE TRIBUTARY AREA. BASED ON THE OVERALL PEAK FLOW RATE AND DRAINAGE AREA, THE RATIO OF ~3.47 CFS/ACRE HAS BEEN APPLIED.
5. THE PROJECT IS SITUATED WITHIN THE FEMA DESIGNATED "ZONE X" AND FEMA PROCESSING IS NOT ANTICIPATED TO BE REQUIRED FOR THIS PROJECT.

LEGEND

- TRACT BOUNDARY
- MAJOR DRAINAGE BOUNDARY
- SUB BASIN BOUNDARY
- SURFACE FLOW PATH
- DRAINAGE ACREAGE — X.X AC.
- SUBAREA ID — SUBAREA X
- DISCHARGE LOCATION
- PROPOSED STORM DRAIN
- PROPOSED UNDERGROUND INFILTRATION FACILITY
- IMPERVIOUS AREA (~79%)

0 10 20 40 60 80
SCALE 1"=20'

DRAINAGE STUDY MAP FOR US STORAGE CENTER 529 CUTTER WAY (POST-PROJECT)

JN 2307 REVISED: 2/12/2024

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NOT FOR CONSTRUCTION – EXHIBIT FOR PRELIMINARY DRAINAGE STUDY ONLY

Peak Flow Hydrologic Analysis

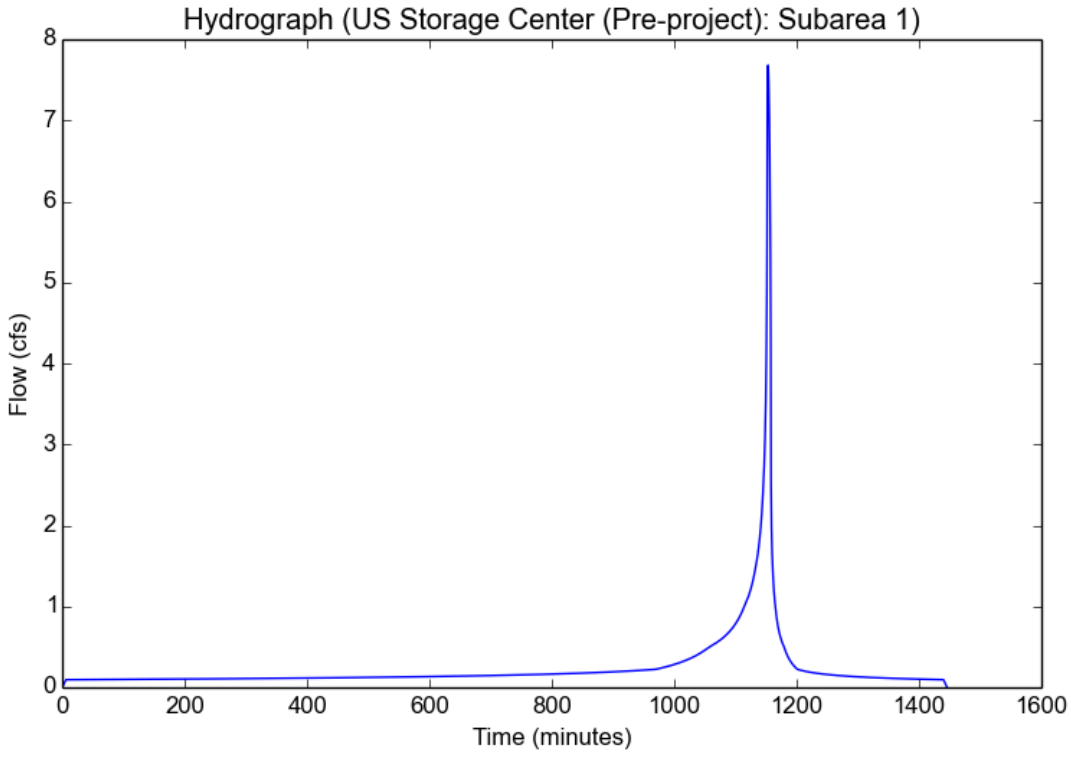
File location: S:/SDH OFFICE/2307 WESTPORT-COVINA/REPORTS/Drainage/Calculations/Hydrology/RM/US Storage Center (Pre-project) - Subarea 1
Version: HydroCalc 1.0.3

Input Parameters

Project Name	US Storage Center (Pre-project)
Subarea ID	Subarea 1
Area (ac)	2.25
Flow Path Length (ft)	569.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	7.1
Percent Impervious	0.21
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.1
Peak Intensity (in/hr)	3.8882
Undeveloped Runoff Coefficient (Cu)	0.8722
Developed Runoff Coefficient (Cd)	0.8781
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	7.6816
Burned Peak Flow Rate (cfs)	7.6816
24-Hr Clear Runoff Volume (ac-ft)	0.5011
24-Hr Clear Runoff Volume (cu-ft)	21828.6795



Peak Flow Hydrologic Analysis

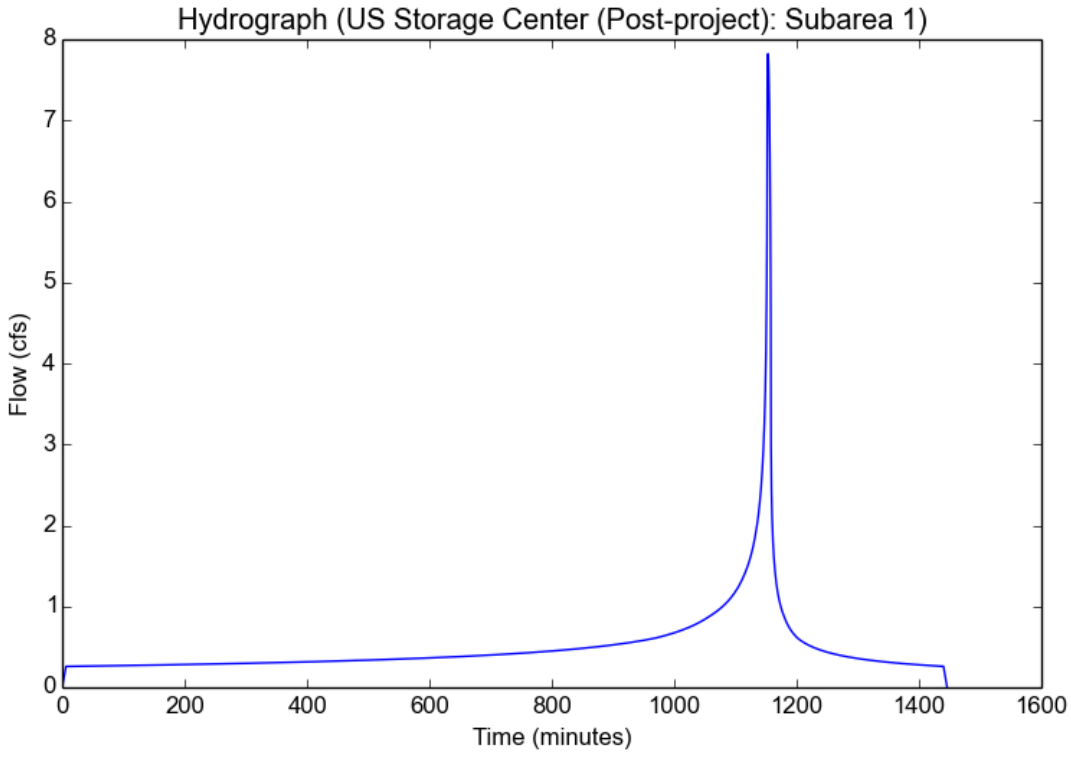
File location: S:/SDH OFFICE/2307 WESTPORT-COVINA/REPORTS/Drainage/Calculations/Hydrology/RM/US Storage Center (Post-project) - Subarea
Version: HydroCalc 1.0.3

Input Parameters

Project Name	US Storage Center (Post-project)
Subarea ID	Subarea 1
Area (ac)	2.25
Flow Path Length (ft)	517.0
Flow Path Slope (vft/hft)	0.017
50-yr Rainfall Depth (in)	7.1
Percent Impervious	0.79
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.1
Peak Intensity (in/hr)	3.8882
Undeveloped Runoff Coefficient (Cu)	0.8722
Developed Runoff Coefficient (Cd)	0.8942
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	7.8225
Burned Peak Flow Rate (cfs)	7.8225
24-Hr Clear Runoff Volume (ac-ft)	1.0056
24-Hr Clear Runoff Volume (cu-ft)	43802.856



Appendix C
Inlet Sizing

Note: Detailed onsite inlet calculations will be conducted at the time of the final drainage study and will be incorporated in this Appendix.

Appendix D
Preliminary Storm Drain Sizing

Includes:

1. Preliminary on-site storm drain sizing summary (normal depth)

US Storage Center
Job # 2307
2/12/2024

On-site Storm Drain Sizes

The purpose of this table is to provide an estimated on-site private storm drain pipe sizes (based on normal depth using Manning's equation) to convey the anticipated 50-year peak flow rates (prorated based on the local tributary area), with a sizing bump-up factor to account for potential head losses through the pipes.

Manning's n: 0.012 HDPE or equivalent

Sizing Bump-up (%): 30

			Storm Drain Sizes per Varying Slopes						
		Slope at:	0.5%		3.0%		5.0%		
Segment ID	**Q_{50} (cfs[1])**	**Q with Sizing Factor (cfs[1])**	**Minimum Pipe Size[2] (feet)**	**Suggested Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Suggested Pipe Size (inches)**	**Minimum Pipe Size [2] (feet)**	**Suggested Pipe Size (inches)**	**RECOMMENDATIONS[3]**
1	4.2	5.5	1.30	18"	0.93	12"	0.84	10"	**Use 12" HDPE @ 0.5% MIN.**
2	4.4	5.7	1.32	18"	0.94	12"	0.86	12"	**Use 12" HDPEs @ 5.0% MIN.**
3	2.5	3.3	1.07	18"	0.76	10"	0.69	10"	**Use 12" HDPEs @ 3.0% MIN.**
4	0.3	0.4	0.48	6"	0.34	4"	0.31	4"	**Use 6" HDPEs @ 0.3% MIN.**
5	6.9	9.0	1.56	24"	1.12	18"	1.01	12"	**Use 18" HDPEs @ 3.0% MIN.**

Note:

1. "cfs" = cubic feet per second.
2. Minimum pipe sizes are calculated using the Manning's equation (normal depth) and are based on the flow rates with "bump up factor" to account for potential head losses through the storm drain pipes.
3. The on-site storm drain systems are private and the normal depth calculations should suffice for pipe sizing purpose.
   The recommendations may differ slightly for some pipes from what the pipe sizing summary table indicate above but it should provide enough capacity for the on-site storm drain segments.