DRAINAGE STUDY FOR SCRIPPS MERCY HOSPITAL

CONDITIONAL USE PERMIT
(PTS# 658548)

SAN DIEGO, CALIFORNIA

November 2022

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1. Project Location and Scope

1.1 Project Location

The 17.7-acres Scripps Mercy Memorial Campus is located at the northeasterly corner of Washington Street and Fifth Ave, in the City of San Diego, California. The CUP project site is generally bound by Mercy Canyon to the north, Washington Street to the south, Fourth Avenue to the west, and Sixth Avenue to the east. Access to the project site is provided off of Lewis Street, Fifth Avenue, and Sixth Avenue. A site vicinity map is shown in Figure 1 below.

Figure 1-1: Site Vicinity Map

1.2 Scope of Report

This report will focus on identifying the hydrologic and hydraulic effects of the proposed development, by studying the 10-year and 100-year flow rates for the pre and post development conditions. This report will not discuss water quality measures or best management practices for stormwater mitigation. For information regarding best management practice requirements and implementation, refer to the project Storm Water Quality Management Plan (SWQMP).

No surface waters are present on the project site or nearby, and site runoff is captured and discharged into an onsite private storm drain system. As such, the project is not anticipated to require a separate CA Regional Water Quality Control Board approval under Federal Clean Water Act Section 401/404.

2. Study Objectives

The specific objectives of this drainage study are:

- Calculate the pre and post development peak flow rates for the 10-year and 100-year storm events.
- Determine the capacity of the proposed off-site storm drain infrastructure under post development conditions.
- Calculate the effects of the post development conditions on the existing hydrology and hydraulics for the 50-year storm events.
- Identify pre and post development areas of concern.

3. Project Description

3.1 Project Site Information

The existing site elevation varies from roughly 289 feet along the northern boundary (Lewis Street) to approximately 233 feet along the southeasterly boundary (Sixth Avenue).

The Federal Emergency Management Agency (FEMA) has not mapped any Special Flood Hazard Areas (SFHAs) for the project site. The FEMA Map for the project site is provided in Appendix A.

3.2 Pre-Development Conditions

The existing site infrastructure includes a college building, parking structures, surface parking lots, medical office buildings, emergency department facilities, and the main hospital building. In the pre developed condition, the site consists of approximately of 74% impervious surface, with no expected off-site drainage. The pre development condition is divided into 3 basins per existing grading and site features: Basin 1, Basin 2, & Basin 3.

Basin 1 consists of the drainage produced from the two multi-level parking structure on the northern part of the site along Fourth Avenue, Lewis Street, emergency department, college building, the main hospital building, and Mercy Canyon. Stormwater from Basin 1 is collected within two catch basins on the west end of Lewis Street and connects to a 24” RCP running along Fourth Avenue, then between the two parking structures. The 24” RCP discharges as a surface outfall into Mercy Canyon on the northern part of the project site. Refer to Figure 3-1 for a view of the existing catch basins on Lewis Street.

Basin 2 contains the drainage produced from the behavioral health clinic, central energy plant, 550 MOB parking structure, surface parking lots, and a portion of the main hospital building. Stormwater from Basin 2 is collected in downspouts from buildings and surface area drains in the parking lots and landscape areas. The collected runoff leaves the site via an 18” RCP, which travels north in Sixth Avenue.

Basin 3 consists of the drainage produced from the 550 Medical Office Building (MOB) and surrounding landscape area. Drainage from the building is collected in the building downspouts and northern street gutter on Washington Street. Refer to Figure 3-2 for a view of the catch basin on Washington Street.

Figure 3-1: Site Photo – two catch basins on west end of Lewis Street

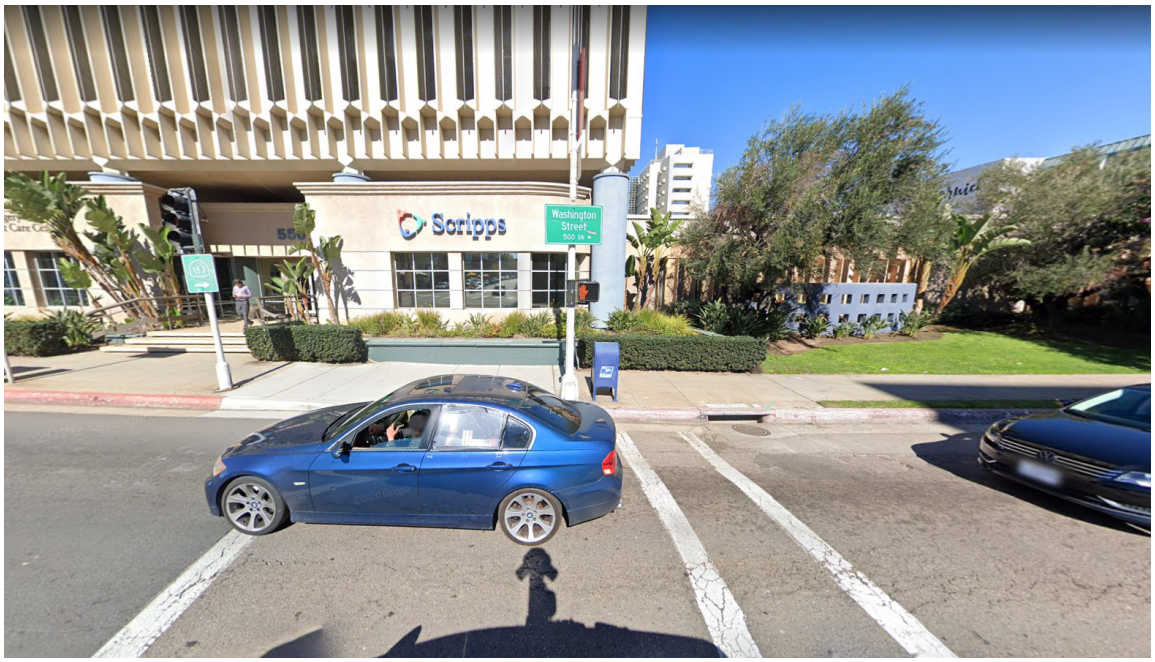


Figure 3-2: Site Photo – catch basin on north side of Washington Street

3.3 Post Development Conditions

The post development will consist of two phases of construction. Phase 1 will commence with the demolition of 550 MOB, the underground parking garage, and the Behavioral Health Unit. Phase 1 demolition will be followed by the construction of MOB, Replacement Hospital 1, and Hospital Support Building (HSB). Phase 2 will commence with the demolition of the existing hospital, and parking structure at the northeast corner of Fourth Avenue and Lewis Street. Phase 2 demolition is then followed by the construction of Replacement Hospital 2. In the post development condition, the site consists of approximately 67% impervious surface; a 7% reduction in imperviousness when compared to the pre development conditions. The post development condition is divided into 2 basins per the proposed grading and site features: Basin 1, Basin 2.

Basin 1 entails the drainage produced from the existing north parking structure, proposed Medical Office Building, west side of Replacement Hospital 2, existing college building, existing Mercy Manor, and surface runoff from Lewis Street. Stormwater from Basin 1 passes through biofiltration planters scattered onsite. Treated stormwater from Basin 1 will discharge to an existing 24" RCP public main on 4th Ave, ultimately leading to a surface outfall to Mercy Canyon in the northern part of the site.

Basin 2 consists of the drainage produced from the proposed Replacement Hospital 1 and 2, HSB & HSB Plaza, and proposed loading dock. Stormwater from Basin 2 passes through biofiltration planter, both traditional and compact form, then discharges into a private 18" storm drain main across Sixth Ave, which will replace an existing public 18" RCP storm drain main.

4. Methodology

4.1 Hydrology

The hydrology calculations are based on the City of San Diego Drainage Design Manual (January 2017). The project site is less than one square mile, and therefore the Rational Method was used to calculate the peak flow rate for the 10-year and 100-year storm events. The Rational Method calculates peak flow rate (Q) as a function of runoff coefficient (C), rainfall intensity (I), and drainage area (A):

$$Q = C * I * A$$

Table A-1: Runoff Coefficients for Rational Method in the Drainage Design Manual is used to compute the runoff coefficients for the development conditions given the site's imperviousness, soil type, and land use. The site's imperviousness was determined by calculating the impervious area in the pre and post development conditions. Per the Drainage Design Manual, all sites are assumed to be made up of Type D soil. The project's land use could be considered Commercial; however Industrial land use was assumed as a conservative approach to calculating the site's peak flow rate.

Rainfall intensities were determined from Figure A-1: Intensity-Duration-Frequency Design Chart in the Drainage Design Manual. The design chart takes into consideration the time of concentration (Tc) and storm event frequency to calculate the rainfall intensity.

Drainage area was determined by inspecting the existing and proposed conditions and delineating areas according to grading and site features. The Pre-Development Drainage Condition and Post Development Drainage Condition maps can be found in Appendix B and C.

4.2 Hydraulics

The hydraulic calculation was conducted using Flowmaster software. Please refer to Appendix D for Hydraulic Calculations. The private storm drain within the project limit are designed to convey the peak runoff rate for a 50-year storm. The hydraulic calculations for 2 segments of storm drain pipes are summarized in Table 4-1.

Pipe ID	Size	Slope	Q_{50} (cfs)	Q_{full} (cfs)
SD 1	24"	2%	17.14	41.59
SD 2	18"	14.5%	20.45	51.99

Table 4-1: Hydraulic Calculation Summary (Based on 50-Year Storm)

5. Results and Conclusions

5.1 Results

Table 5-1 and Table 5-2 summarize the hydrology results of the pre and post development conditions given the 10-year storm event frequency. The proposed development will increase the amount of pervious area and thus reduce the project site peak flow runoff. As seen in Table 5-1 and Table 5-2, the peak flow runoff rate for the 10-year storm event decreased from 37.6 cfs to 33.5 cfs in the pre and post development conditions. This represents a roughly 12% decrease in the peak runoff flow rate.

Pre-Development (10-Year)										
Drainage Area No.	Area (acres)	Runoff Coefficient $(C)_{(1)}$	Time of Concentration (T_c)				Tc (min) (2)	I_{10} (in/hr) (3)	V_{10} (ft/s)	Q_{10} (cfs)
			US Elevation (ft)	DS Elevation (ft)	Length	Slope (%)				
BASIN 1	11.50	0.68	291.4	283.8	475	1.6	14.2	2.2	12.59	17.1
BASIN 2	5.72	0.96	291.3	290.4	120	0.8	5.0	3.4	18.15	18.7
BASIN 3	0.55	0.96	290.5	290.0	100	0.5	5.0	3.4	5.18	1.8
Total	**17.77**	-	-	-	-	-	-	-	-	**37.6**

Table 5-1: Hydrologic Summary for Pre-Development (10-Year)

Post Development (10-Year)										
Drainage Area No.	Area (acres)	Runoff Coefficient $(C)_{(1)}$	Time of Concentration (T_c)				Tc (min) (2)	I_{10} (in/hr) (3)	V_{10} (ft/s)	Q_{10} (cfs)
			US Elevation (ft)	DS Elevation (ft)	Length	Slope (%)				
BASIN 1	12.42	0.62	291.4	283.8	450.0	1.7	15.3	2.2	12.57	17.0
BASIN 2	5.35	0.91	290.0	265.5	160.0	15.3	5.0	3.4	26.11	16.5
Total	**17.77**	-	-	-	-	-	-	-	-	**33.5**

Table 5-2: Hydrologic Summary for Post Development (10-Year)

Notes:

(1) Runoff Coefficient (C) was calculated using Table A-1 Runoff Coefficients for Rational Method of the City of San Diego Drainage Design Manual. Refer to Appendix A for additional information.
(2) Time of Concentration (Tc) was determined by using Figure A-4 Rational Formula - Overland Time of Flow Nomograph
(3) Intensity (I) of rain fall was obtained from the "Rainfall Intensity-Duration-Frequency Curves for County of San Diego" found in Appendix A of the City of San Diego Drain Design Manual

A similar decrease in the peak flow runoff rate is experienced in the 100-year storm event, which can be seen in Table 5-3 and Table 5-4. In the pre and post development conditions, the peak runoff rate decreased from 49.8 cfs to 43.8 cfs. This represents an overall 13% decrease in the peak runoff flow rate.

Pre-Development (100-Year)										
Drainage Area No.	Area (acres)	Runoff Coefficient $(C)_{(1)}$	Time of Concentration (T_c)				Tc (min) (2)	I_{10} (in/hr) (3)	V_{10} (ft/s)	Q_{100} (cfs)
			US Elevation (ft)	DS Elevation (ft)	Length	Slope (%)				
BASIN 1	11.50	0.68	291.4	283.8	475	1.6	14.2	3.0	13.61	23.3
BASIN 2	5.72	0.96	291.3	290.4	120	0.8	5.0	4.4	19.16	24.2
BASIN 3	0.55	0.96	290.5	290.0	100	0.5	5.0	4.4	5.57	2.3
Total	**17.77**	-	-	-	-	-	-	-		**49.8**

Table 5-3: Hydrologic Summary for Pre-Development (100-Year)

Post Development (100-Year)										
Drainage Area No.	Area (acres)	Runoff Coefficient $(C)_{(1)}$	Time of Concentration (T_c)				Tc (min) (2)	I_{10} (in/hr) (3)	V_{10} (ft/s)	Q_{100} (cfs)
			US Elevation (ft)	DS Elevation (ft)	Length	Slope (%)				
BASIN 1	12.42	0.62	291.4	283.8	450.0	1.7	15.3	2.9	13.48	22.4
BASIN 2	5.35	0.91	290.0	265.5	160.0	15.3	5.0	4.4	27.99	21.4
Total	**17.77**	-	-	-	-	-	-	-		**43.8**

Table 5-4: Hydrologic Summary for Post Development (100-Year)

Notes:

(1) Runoff Coefficient (C) was calculated using Table A-1 Runoff Coefficients for Rational Method of the City of San Diego Drainage Design Manual. Refer to Appendix A for additional information.
(2) Time of Concentration (Tc) was determined by using Figure A-4 Rational Formula - Overland Time of Flow Nomograph
(3) Intensity (I) of rain fall was obtained from the "Rainfall Intensity-Duration-Frequency Curves for County of San Diego" found in Appendix A of the City of San Diego Drain Design Manual

5.2 Conclusions

As evidenced by the decreased peak flow values in 10-year and 100-year storm, under the Post Development conditions the project site will not be negatively impacted in terms of hydrology or hydraulics. Proposed landscape area and various post construction BMPs identified in the project SWQMP will further alleviate the effects of additional hydrological or hydraulic demands which is typically expected from development.

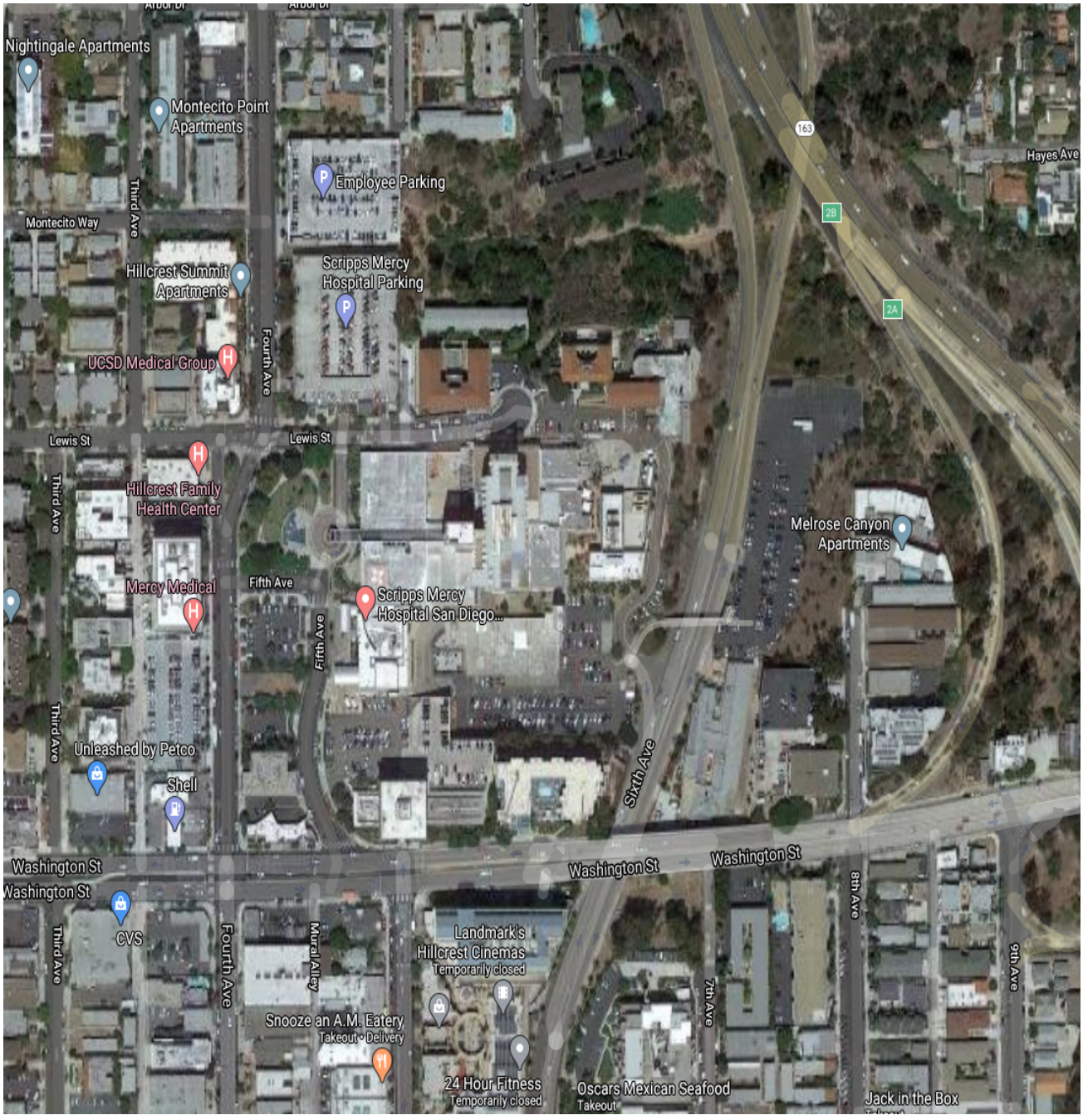
6. References

City of San Diego, 2017. City of San Diego (January 2017). Drainage Design Manual.

Federal Emergency Management Agency (FEMA), 2012. FEMA (May 16, 2012). FEMA Flood Map Service Center. City of San Diego.

Appendix A Project Site Information

Vicinity Map



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 (BFEs) 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, NINGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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 provided in digital format by the USDA National Agriculture Imagery Program (NAIP). this information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2009.

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.

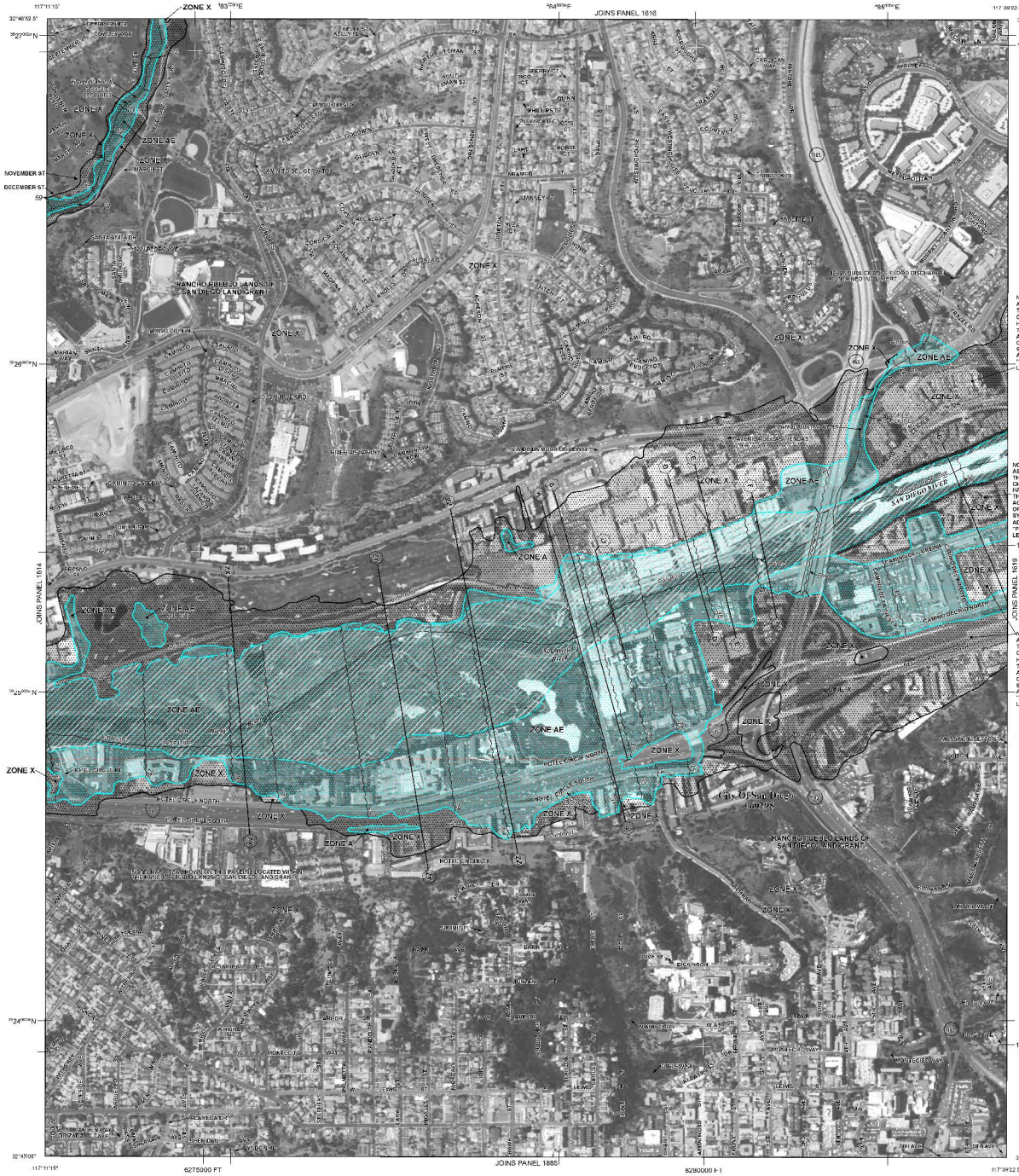
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which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

Contact the **FEMA Map Service Center** at 1-877-FEMA MAP (1-877-336-2627) 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://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/business/nfip/.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Provisionally Accredited Levee Notes to Users: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations by July 23, 2009. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS 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** Areas to be protected from 1% annual chance flood event 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 Area Zones and 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
- 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), Western Hemisphere
- 4°775°m E — 1000-meter Universal Transverse Mercator grid ticks, zone 11
- 6000000 FT — 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
- 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
June 19, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 16, 2012 – to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update map elevations to North American Vertical Datum of 1988.

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" = 500'

250 0 250 500 750 1,000 FEET
150 0 150 300 450 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1618G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1618 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO, CITY OF	060295	1618	G

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
06073C1618G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

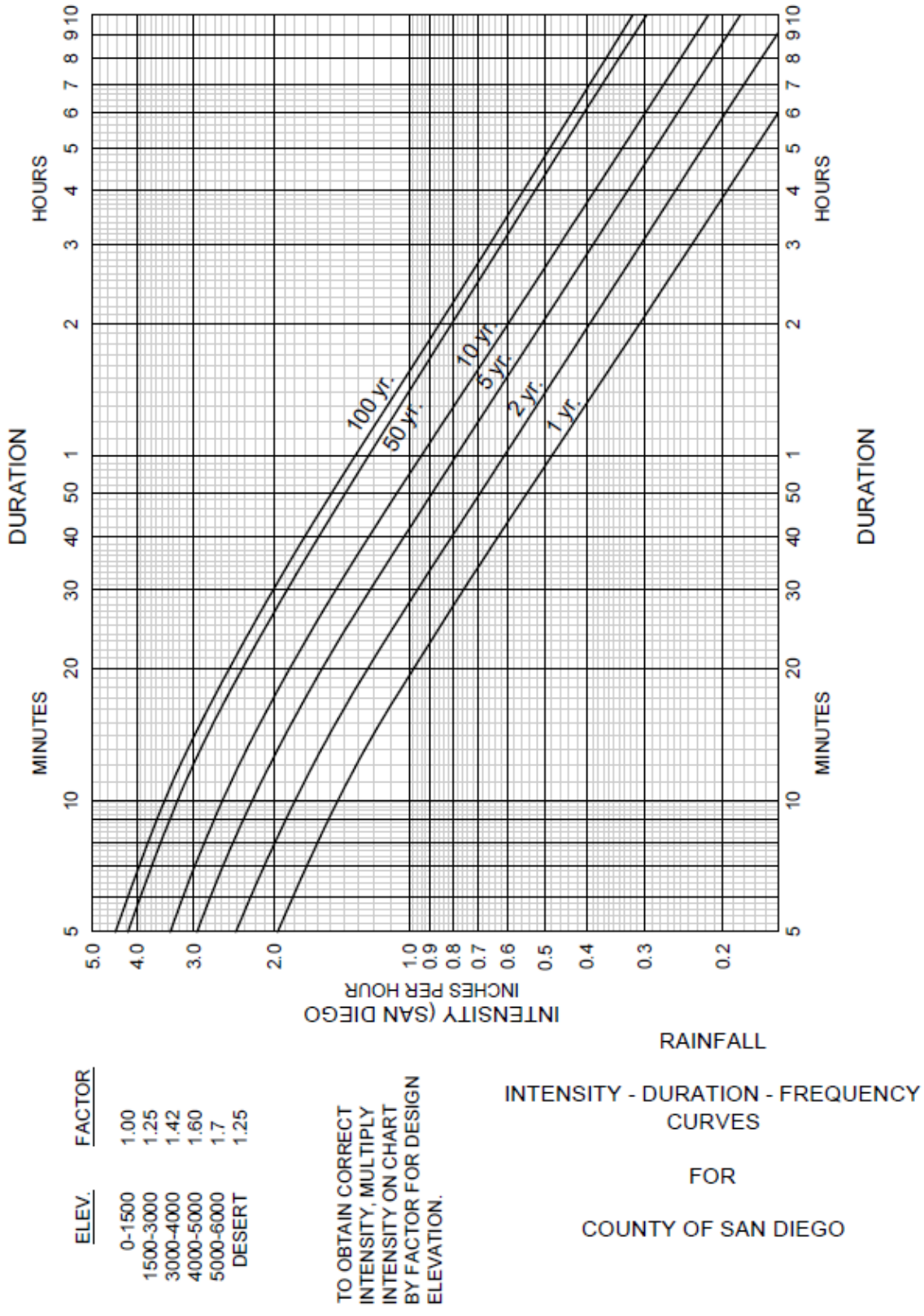


Figure A-1. Intensity-Duration-Frequency Design Chart

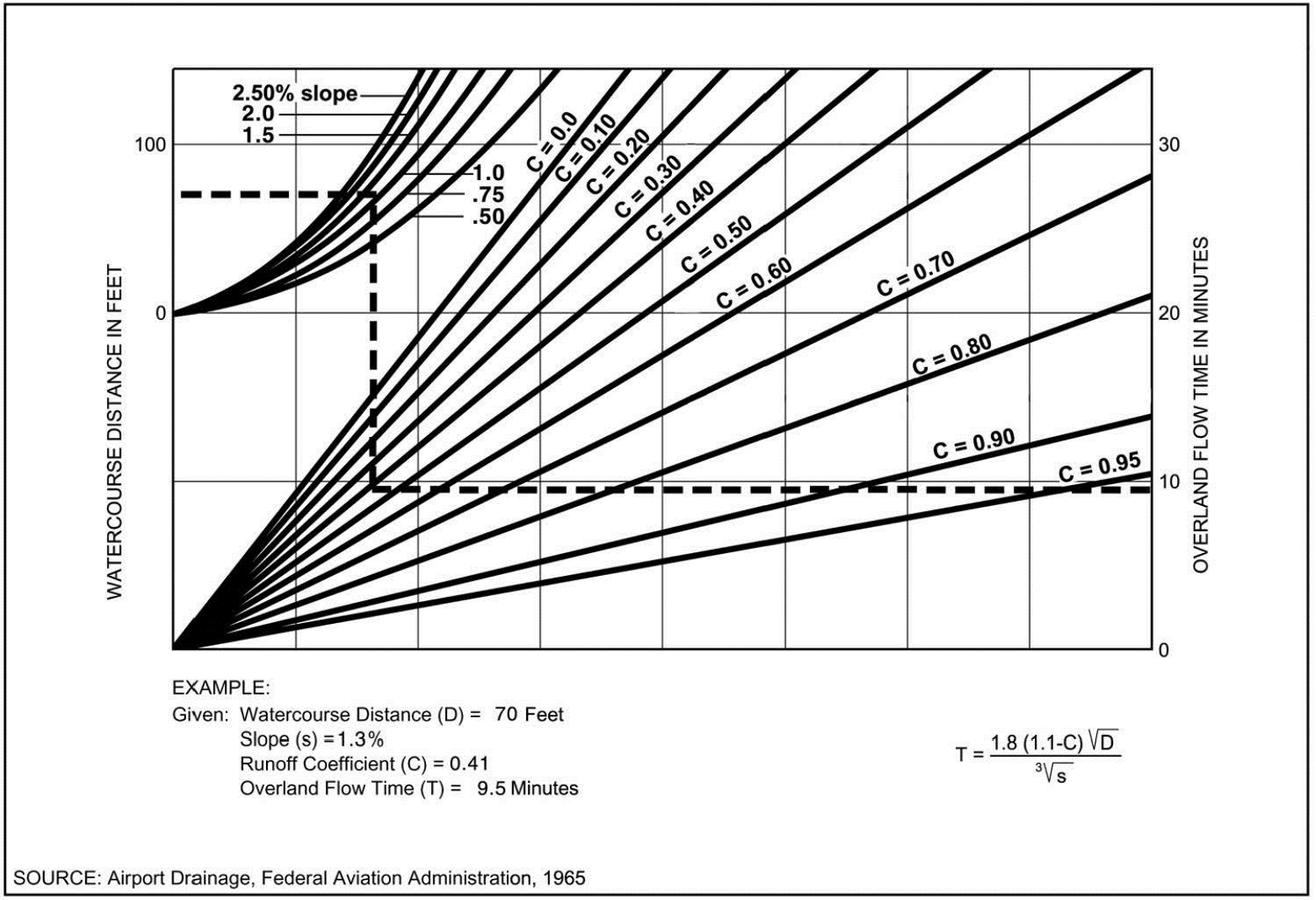


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

The values in Table A–1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_C for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_C calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

Appendix A: Revised C Value Calculation

EXAMPLE From Table A-1:

Actual imperviousness		=	50%
Tabulated imperviousness		=	80%
Revised C	= (50/80) x 0.85	=	0.53

Pre-Development Condition	Post-Development Condition
Basin 1: Area: 11.50 ac Actual Imperviousness: 64% Tabulated Imperviousness: 90% Revised C: (64/90) x 0.95 = **0.68**	**Basin 1:** Area: 12.42 ac Actual Imperviousness: 59% Tabulated Imperviousness: 90% Revised C: (59/90) x 0.95 = **0.62**
Basin 2: Area: 5.72 ac Actual Imperviousness: 91% Tabulated Imperviousness: 90% Revised C: (91/90) x 0.95 = **0.96**	**Basin 2:** Area: 5.35 ac Actual Imperviousness: 86% Tabulated Imperviousness: 90% Revised C: (86/90) x 0.95 = **0.91**
Basin 3: Area: 0.55 ac Actual Imperviousness: 91% Tabulated Imperviousness: 90% Revised C: (91/90) x 0.95 = **0.96**	

Appendix B Pre Development Hydrologic Work Map & Calculations

EXHIBIT A: PRE DEVELOPMENT CONDITION

PRE-DEVELOPMENT
TOTAL AREA: 17.77 AC
IMPERVIOUS AREA: 13.07 AC (73.5%)
PERVIOUS AREA: 4.70 AC (26.5%)

NOTE #10 SHOWS LOCATION OF EXISTING STORM DRAINS

100 ft

DOWNSTREAM ELEV 290.40'

UPSTREAM ELEV 290.50'

UPSTREAM ELEV 291.40'

BASIN 2
Area (A) = 5.72 acres
Runoff Coefficient (C) = 0.96
Time of Concentration (Tc) = 5 min.
Intensity (I_{10}) = 3.4 in./hr.
Intensity (I_{100}) = 4.4 in./hr.
Q_{10} = 18.7 cfs V_{10} = 18.15 fps
Q_{100} = 24.2 cfs V_{100} = 19.16 fps

DISCHARGE POINT TO 24" CITY STORM MAIN (282.28) INV

DISCHARGE POINT TO 18" CITY STORM MAIN (205.44) INV

FOURTH AVE

FIFTH AVE

SIXTH AVE

EIGHTH AVE

PRIVATE DRIVE (LEWIS STREET)

WASHINGTON ST

CALTRANS R/W

MATCH LINE – SEE PLAN

STORM DRAIN EASEMENT (INSTRUMENT NO. 2009-0021619) TO REMAIN

SEWER EASEMENT (INSTRUMENT NO. 2008-0653524) TO REMAIN

STORM DRAIN AND WATER EASEMENT (INSTRUMENT NO. 79-082036) TO REMAIN

STORM DRAIN EASEMENT (INSTRUMENT NO. 2009-0021619) TO REMAIN

EXISTING SEWER EASEMENT TO BE REPLACED WITH NEW EASEMENT PER THE CURRENT SEWER DESIGN GUIDE.

SEWER EASEMENT (INSTRUMENT NO. [illegible]) TO BE QUITCLAIMED

STORM DRAIN EASEMENT (INSTRUMENT NO. 93241) TO REMAIN

UTILITY EASEMENT (INSTRUMENT NO. 118987) TO REMAIN

STORM DRAIN EASEMENT (INSTRUMENT NO. 98242) TO REMAIN

UTILITY EASEMENT (INSTRUMENT NO. 118987 & 80-431051) TO BE QUITCLAIMED

REHABBED UNDER 33937-D

REMOVE EXISTING PUBLIC STORM DRAIN LINE.

RELOCATED 36" SD PER 42008-D

(R) 6TH AVE. PARKING STRUCTURE & BRIDGE PTS #645493

(E) CANCER CENTER AND PARKING STRUCTURE SCR #603766

(E) EMERGENCY DEPARTMENT

(E) BEHAVIORAL HEALTH CLINIC

(E) 550 GARAGE

(E) 550 WASHINGTON

(E) HOSPITAL BUILDING

(E) CENTRAL ENERGY PLANT

(E) GENERATOR BUILDING AND COOLING TOWER

(E) MERCY GARDENS

(E) FACILITY

(E) CHAPEL

(E) PARKING LOT 12

EXISTING BANK

APN: 444-531-34 LOT 7, 8, 9

APN: 444-531-12 LOT 10

APN: 444-531-13 LOT 11

APN: 444-531-31 LOT 12

APN: 444-531-33

APN: 444-531-19 LOTS 15 & 16 BLOCK 3 MAP 1068

APN: 444-533-22 LOT 10 & 11 MAP 4444

APN: 444-560-35 MAP 855

APN: 444-560-34 MAP 855

12" PVC SEWER (35344-D)

24" RCP STORM (6151-D)

24" RCP STORM (6151-D)

6" VC SEWER (24760-5-D) SS

6" VC SEWER (12395-D)

6" VC SEWER (5202-D)

6" VC SEWER (5203-D)

8" VC SEWER (5202-D)

10" VC SEWER (5202-D)

12" VC SEWER (12395-1-D)

SD-18" CMP STORM (12395-D)

ABANDONED 6" VC

10" VC

6" VC

PLAN VIEW A

LEGEND:

- LIMIT LINE OF DEMOLITION
- PROPERTY LINE
- 1 PROTECT-IN-PLACE EXISTING PUBLIC STORM DRAIN LINE.
- 2 PROTECT-IN-PLACE EXISTING PUBLIC STORM DRAIN INLET.
- 3 PROTECT-IN-PLACE EXISTING PUBLIC SEWER LINE.
- 4 PROTECT-IN-PLACE EXISTING PUBLIC SEWER MANHOLE.
- 5 PROTECT-IN-PLACE EXISTING STORM DRAIN MANHOLE.
- 6 REMOVE EXISTING SEWER SERVICE.
- 7 REMOVE EXISTING PUBLIC STORM DRAIN LINE.
- 8 REMOVE EXISTING PUBLIC SEWER LINE.
- 9 REMOVE EXISTING PUBLIC SEWER MANHOLE.
- 10 REMOVE EXISTING PRIVATE STORM INLET/DRAIN.

N
0 20' 40'
SCALE: 1"=40'

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Los Angeles, California 90036
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REVISIONS

1	4/10/20	REV 1
2	8/14/20	REV 2
3	11/18/20	REV 3
4	3/26/21	REV 4
5	6/11/21	REV 5
6	3/4/22	REV 6

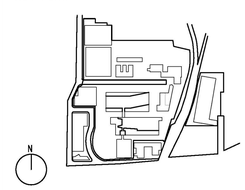
Scripps

CONDITIONAL USE PERMIT MERCY CAMPUS

4077 Fifth Ave, San Diego, CA 92103

SCRIPPS# 35-16060B DESIGN TEAM # 18003.000

KEY PLAN



EXISTING GRAVITY UTILITIES PLAN

SCALE:
DATE OF ISSUE: 1/27/22

CUP-07

Pre Development (10-Year)												
Drainage Area No.	Area (acres)	IMP %	Runoff Coefficient (C) (1)	Time of Concentration, (Tc)				T_c (min) (2)	I10 (in/hr) (3)	V10 (fps)	Q_{10} (cfs)
				US Elevation (ft)	DS Elevation (ft)	Length	Slope (%)				
BASIN 1	11.50	64	0.68	291.4	283.8	475.0	1.6	14.2	2.2	12.6	17.1
BASIN 2	5.72	91	0.96	291.3	290.4	120.0	0.8	5.0	3.4	18.2	18.7
BASIN 3	0.55	91	0.96	290.5	290.0	100.0	0.5	5.0	3.4	5.2	1.8
Total	**17.77**		-	-	-	-	-			-	**37.6**

Pre Development (100-Year)												
Drainage Area No.	Area (acres)	IMP %	Runoff Coefficient (C) (1)	Time of Concentration, (Tc)				T_c (min) (2)	I100 (in/hr) (3)	V100 (fps)	Q_{100} (cfs)
				US Elevation (ft)	DS Elevation (ft)	Length	Slope (%)				
BASIN 1	11.50	64	0.68	291.4	283.8	475.0	1.6	14.2	3.0	13.6	23.3
BASIN 2	5.72	91	0.96	291.3	290.4	120.0	0.8	5.0	4.4	19.2	24.2
BASIN 3	0.55	91	0.96	290.5	290.0	100.0	0.5	5.0	4.4	5.6	2.3
Total	**17.77**		-	-	-	-	-			-	**49.8**

Notes:

(1) Runoff Coeffcient (C) was calculated using Table A-1 Runoff Coefficients for Rational Method

(2) Time of Concentration (Tc) was determined by using Figure A-4 Rational Formula - Overland Time of Flow Nomograph

(3) Intensity (I) of rain fall was obtained from the "Rainfall Intensity-Duration-Frequency Curves for County of San Diego" found in Appendix A of the City of San Diego Drain Design Manual

Appendix C Post Development Hydrologic Work Map & Calculations

EXHIBIT B: POST DEVELOPMENT CONDITION

Post Development (10-Year)												
Drainage Area No.	Area (acres)	IMP %	Runoff Coefficient (C) (1)	Time of Concentration, (Tc)				T_c (min) (2)	I10 (in/hr) (3)	V10 (fps)	Q_{10} (cfs)
				US Elevation (ft)	DS Elevation (ft)	Length	Slope (%)				
BASIN 1	12.42	59	0.62	291.4	283.8	450.0	1.7	15.3	2.2	12.6	17.0
BASIN 2	5.35	86	0.91	290.0	265.5	160.0	15.3	5.0	3.4	26.1	16.5
Total	**17.77**		-	-	-	-	-	-	-	-	**33.5**

Post Development (100-Year)												
Drainage Area No.	Area (acres)	IMP %	Runoff Coefficient (C) (1)	Time of Concentration, (Tc)				T_c (min) (2)	I100 (in/hr) (3)	V100 (fps)	Q_{100} (cfs)
				US Elevation (ft)	DS Elevation (ft)	Length	Slope (%)				
BASIN 1	12.42	59	0.62	291.4	283.8	450.0	1.7	15.3	2.9	13.5	22.4
BASIN 2	5.35	86	0.91	290.0	265.5	160.0	15.3	5.0	4.4	28.0	21.4
Total	**17.77**		-	-	-	-	-	-	-	-	**43.8**

Notes:

(1) Runoff Coeffcient (C) was calculated using Table A-1 Runoff Coefficients for Rational Method

(2) Time of Concentration (Tc) was determined by using Figure A-4 Rational Formula - Overland Time of Flow Nomograph

(3) Intensity (I) of rain fall was obtained from the "Rainfall Intensity-Duration-Frequency Curves for County of San Diego" found in Appendix A of the City of San Diego Drain Design Manual

Post Development: Basin 1_100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	2.00000	%
Diameter	2.00	ft
Discharge	22.40	ft³/s

Results

Normal Depth	1.05	ft
Flow Area	1.66	ft²
Wetted Perimeter	3.23	ft
Hydraulic Radius	0.51	ft
Top Width	2.00	ft
Critical Depth	1.69	ft
Percent Full	52.3	%
Critical Slope	0.00552	ft/ft
Velocity	13.48	ft/s
Velocity Head	2.83	ft
Specific Energy	3.87	ft
Froude Number	2.61	
Maximum Discharge	44.74	ft³/s
Discharge Full	41.59	ft³/s
Slope Full	0.00580	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	52.26	%
Downstream Velocity	Infinity	ft/s

Post Development: Basin 1_100yr

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.05	ft
Critical Depth	1.69	ft
Channel Slope	2.00000	%
Critical Slope	0.00552	ft/ft

Post Development: Basin 2_100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	14.50000	%
Diameter	1.50	ft
Discharge	21.40	ft³/s

Results

Normal Depth	0.67	ft
Flow Area	0.76	ft²
Wetted Perimeter	2.20	ft
Hydraulic Radius	0.35	ft
Top Width	1.49	ft
Critical Depth	1.48	ft
Percent Full	44.7	%
Critical Slope	0.02217	ft/ft
Velocity	27.99	ft/s
Velocity Head	12.17	ft
Specific Energy	12.84	ft
Froude Number	6.89	
Maximum Discharge	55.93	ft³/s
Discharge Full	52.00	ft³/s
Slope Full	0.02456	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	44.70	%
Downstream Velocity	Infinity	ft/s

Post Development: Basin 2_100yr

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	1.48	ft
Channel Slope	14.50000	%
Critical Slope	0.02217	ft/ft

Appendix D Hydraulic Exhibit & Calculations

EXHIBIT C: HYDRAULIC STUDY

NOTES:

1. ALL PUBLIC IMPROVEMENTS ARE TO BE CONSTRUCTED PER CURRENT CITY STANDARDS.
2. THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/APPLICANT TO ENSURE THAT THE CURRENT STORM WATER PERMANENT BMP DESIGN STANDARDS ARE INCORPORATED INTO THE PROJECT.
3. NO OBSTRUCTION INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3 FEET IN HEIGHT. PER SDMC SECTION 142.0409 (b)(2), PLANT MATERIAL, OTHER THAN TREES, LOCATED WITHIN VISIBILITY AREAS OR THE ADJACENT PUBLIC RIGHT-OF-WAY SHALL NOT EXCEED 36 INCHES IN HEIGHT, MEASURED FROM THE LOWEST GRADE ABUTTING THE PLANT MATERIAL TO THE TOP OF THE PLANT MATERIAL.

GRADING QUANTITIES

GRADED AREA	11.08 [ACRES]	MAX. CUT DEPTH:	49 [FT]
CUT QUANTITIES	155,000 [CYD]	MAX CUT SLOPE RATIO (2:1 MAX):	2:1
FILL QUANTITIES	42,500 [CYD]	MAX. FILL DEPTH:	33 [FT]
IMPORT/EXPORT	112,500 [CYD]	MAX FILL SLOPE RATIO (2:1MAX):	2:1

BASIN 2
Area (A) = 5.35 acres
Runoff Coefficient (C) = 0.91
Time of Concentration (Tc) = 5 min.
I50 = 4.2 in./hr
Q50 = 20.45 cfs V50 = 27.65 fps

Runoff Coefficient (C) = 0.87
Time of Concentration (Tc) = 8 min.
I50 = 12.60 fps

PORTION OF BASIN 1 EXCLUDED FROM APPEDIX D: HYDRAULIC CALC

CONSTRUCTION NOTES:

- SD1 PROPOSED STORM DRAIN LINE
- SD2 PROPOSED BUILDING ROOF DRAIN/DECK DRAIN
- SD3 PROPOSED STORM DRAIN MANHOLE
- SD4 PROPOSED CATCH BASIN
- SD5 PROPOSED CURB INLET STRUCTURE
- SD6 PROPOSED BIOFILTRATION PLANTER OVERFLOW
- SD7 CONNECTION TO EXISTING STORM DRAIN LINE
- SD8 PROPOSED STORMWATER CLEANOUT
- SD9 PROPOSED BIOFILTRATION PLANTER PER SAN DIEGO STORMWATER STANDARDS MANUAL.
- SD10 PROPOSED MODULAR WETLAND SYSTEM
- SD11 PROPOSED CISTERN SIZED PER CITY OF SAN DIEGO HYDROMODIFICATION STANDARDS. DIMENSIONS PER PLAN.

LEGEND

- LIMIT OF WORK
- PROPERTY LINE
- FLOW LINE
- GB GRADE BREAK
- R R R RIDGE LINE
- SAWCUT AND JOIN
- TOP / TOE GRADE SLOPE (HORIZONTAL:VERTICAL)
- LIMITS OF GRADING
- GRADING BENCH
- 100 PROPOSED MAJOR CONTOUR
- 102 PROPOSED MINOR CONTOUR
- PROPOSED RETAINING WALL
- SD EXISTING STORM DRAIN
- SD PROPOSED STORM DRAIN
- PROPOSED CATCH BASIN
- PROPOSED STORM DRAIN MANHOLE
- DIRECTION OF FLOW
- BUILDING POINT OF CONNECTION
- POINT OF CONNECTION TO EXISTING STORM DRAIN
- NEW PEDESTRIAN CONCRETE PAVING
- NEW VEHICULAR ASPHALT PAVING
- BIOFILTRATION PLANTER AREA
- PROPOSED BUILDING
- EXISTING BUILDING

MATCH LINE – SEE PLAN VIEW A

FOURTH AVE

FIFTH AVE

SIXTH AVE

EIGHTH AVE

CALTRANS R/W

PRIVATE DRIVE (LEWIS STREET)

WASHINGTON ST

1 (E) COLLEGE BUILDING

2 (E) MERCY GARDENS

3 (E) CHAPEL

4 (E) CENTRAL ENERGY PLANT

5 (E) PARKING LOT 12

6 (E) GENERATOR BUILDING AND COOLING TOWER

7 (E) CANCER CENTER AND PARKING STRUCTURE

8 (R) 6TH AVE PARKING STRUCTURE & BRIDGE
FF=220.00'

9 (N) MEDICAL OFFICE BUILDING
(7 STORIES & ROOFTOP EQUIPMENT)
150' - 0" HEIGHT
200,000 SF
FF=286.50

10 (N) HOSPITAL SUPPORT BUILDING
(3 STORIES OVER 2 STORIES OF PARKING, & ROOFTOP EQUIPMENT)
130' - 0" HEIGHT
67,000 SF
FF=290.66'

11 (N) HOSPITAL I
(15 STORIES, HELIPAD, & ROOFTOP EQUIPMENT)
315' - 0" HEIGHT
631,000 SF
FF=290.66'

12 (N) HOSPITAL II
(15 STORIES & ROOFTOP EQUIPMENT)
252' - 8" HEIGHT
380,000 SF
FF=290.66'

13 (N) UTILITY YARD

14 (N) UTILITY YARD

(N) CENTRAL ENERGY PLANT EXPANSION
40' - 6" HEIGHT
2,400 SF
FF=290.50'

LOADING DOCK (LL3)=242.17'

DISCHARGE POINT TO 18" PRIVATE STORM MAIN PER PTS#666510

PROPOSED CURB RAMP PER CURRENT CITY STANDARDS

PROPOSED STREET LIGHT PER CITY STANDARD, TYP.

PROPOSED SIDEWALK PER CURRENT CITY STANDARDS

PROPOSED DRIVEWAY PER CURRENT CITY STANDARDS

PROPOSED CURB AND GUTTER PER CURRENT CITY STANDARDS

PROPOSED CROSSWALK PER CURRENT CITY STANDARDS

PROPOSED TRAFFIC SIGNAL

EXISTING CONTINENTAL CROSSWALK

EXISTING TRAFFIC SIGNAL

EXISTING CROSSWALK TO BE RE-STRIPED PER CURRENT CITY STANDARDS

PROPOSED CURB RAMP PER CURRENT CITY STANDARDS

PROPOSED DRIVEWAY PER CURRENT CITY STANDARDS

PROPOSED CURB AND GUTTER PER CITY STANDARDS

PROPOSED SIDEWALK PER CURRENT CITY STANDARDS

PROPOSED STREET LIGHT PER CITY STANDARD, TYP.

PROPOSED CROSS GUTTER PER CURRENT CITY STANDARDS

SIGHT VISIBILITY TRIANGLE TYP.

RIGHT OF WAY PERMIT WILL BE OBTAINED FOR ENCROACHMENT FROM 6TH AVE.

PROPOSED CURB AND GUTTER PER CURRENT CITY STANDARDS

PROPOSED CROSS GUTTER PER CURRENT CITY STANDARDS

PROPOSED PROPERTY LINE

PROPOSED CURB AND GUTTER PER CURRENT CITY STANDARDS

PROPOSED STREET LIGHT PER CITY STANDARD, TYP.

PUBLIC STORM DRAIN PER #2008-D

PEDESTRIAN BRIDGE UNDER SCR#645493

PRIVATE 18" STORM DRAIN MAIN PER PTS #666510

PLAN VIEW A

MATCH LINE – SEE CAMPUS PLAN HEREON

SCALE: 1"=40'

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PROFESSIONAL STAMP

REGISTERED PROFESSIONAL ENGINEER JOSEPH E. B. CHOU No. 59894 Exp. 12/31/23 CIVIL STATE OF CALIFORNIA

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www.kpff.com

CUP No. 2410279 PDP No. 2410288
SDP No. 2410289 EV No. 2410321
TM No. 2421177

REVISIONS

1	4/10/20	REV 1
2	8/14/20	REV 2
3	11/18/20	REV 3
4	3/26/21	REV 4
5	6/11/21	REV 5
6	3/4/22	REV 6
7	5/27/22	REV 7
8	11/9/22	REV 8

Scripps

CONDITIONAL USE PERMIT MERCY CAMPUS

4077 Fifth Ave, San Diego, CA 92103

SCRIPPS# 35-16060B DESIGN TEAM # 18003.000

KEY PLAN

PRELIMINARY GRADING AND DRAINAGE PLAN

SCALE:
DATE OF ISSUE: 5/27/22

CUP-10

Hydraulic Calculations (Based on 50-Year Storm)									
Drainage Area No.	**Area (acres)**	**Runoff Coefficient (C)** (1)	**Time of Concentration, (Tc)**				**T_c (min)** (2)	**I50 (in/hr)** (3)	**Q_{50} (cfs)**
			US Elevation (ft)	**DS Elevation (ft)**	**Length**	**Slope (%)**			
BASIN 1	5.63	0.87	291.4	283.8	450.0	1.7	7.4	3.5	17.14
BASIN 2	5.35	0.91	290.0	265.5	160.0	15.3	5.0	4.2	20.45
Total	**10.98**	-	-	-	-	-	-	-	**37.59**

Notes:

(1) Runoff Coeffcient (C) was calculated using Table A-1 Runoff Coefficients for Rational Method

(2) Time of Concentration (Tc) was determined by using Figure A-4 Rational Formula - Overland Time of Flow Nomograph

(3) Intensity (I) of rain fall was obtained from the "Rainfall Intensity-Duration-Frequency Curves for County of San Diego" found in Appendix A of the City of San Diego Drain Design Manual