Correia Middle School Sports Complex Project
Draft EIR

Attachment J

Hydrology Study

Prepared by Fuscoe Engineering, Inc.

December 1, 2014

Hydrology Study

For

Correia Middle School Athletic Facilities Master Plan

San Diego, CA

Prepared by:

12/1/14

Paul D. Haaland, P.E. RCE 63656 Date: EXP: 9-30-16
Fuscoe Engineering, San Diego, Inc.
6390 Greenwich Dr., Suite 170
San Diego, CA 92122

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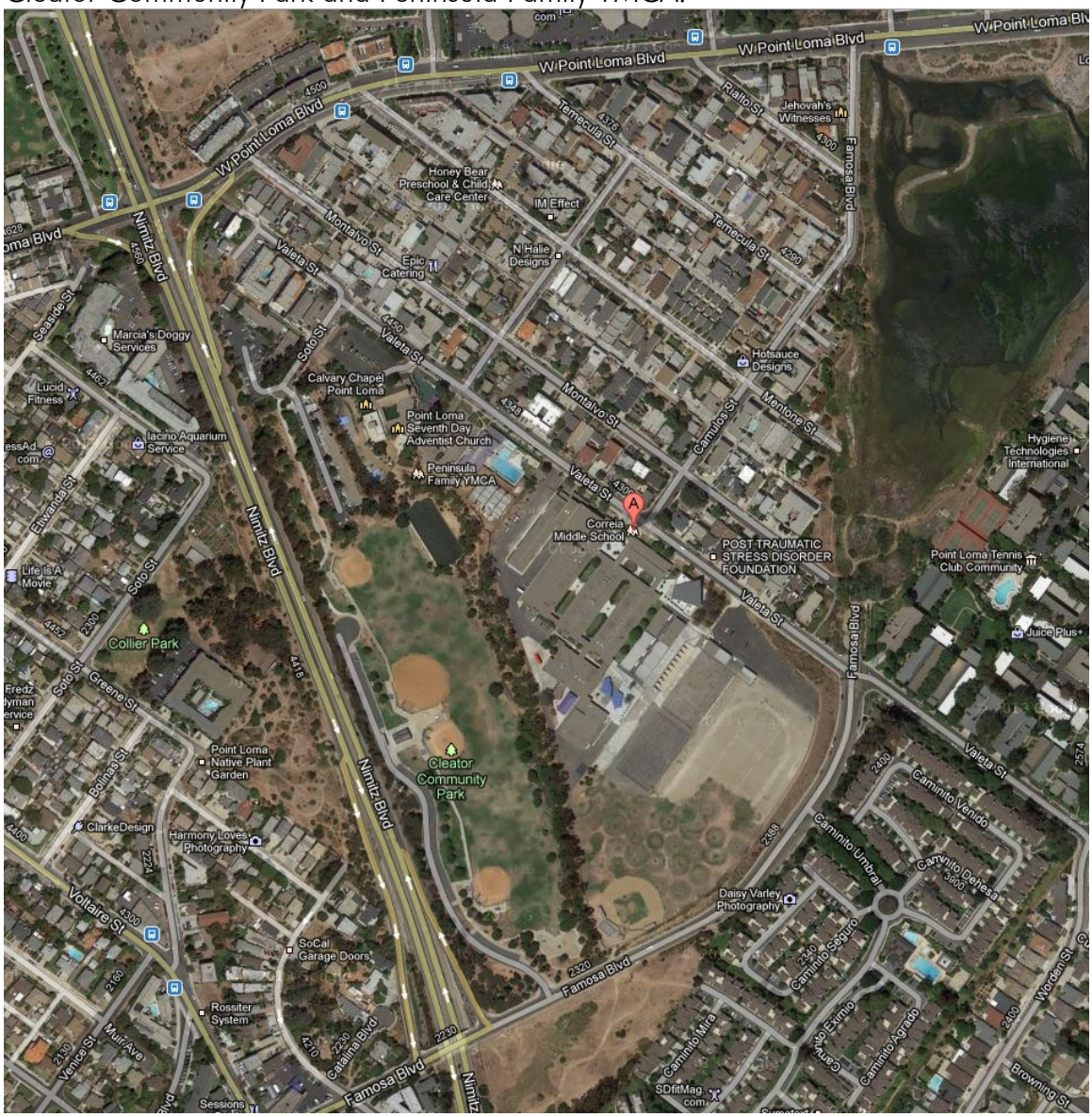
INTRODUCTION

PURPOSE

This Hydrology Study pertains to the Correia Middle School Athletic Facilities Master Plan in San Diego, CA. Its purpose is to analyze the hydrologic impacts of the proposed redevelopment with respect to CEQA guidelines. This study will be performed at an appropriate level of detail for the redevelopment master plan, which is a land use planning document.

PROJECT DESCRIPTION

Correia Middle School is located at the intersection of Valeta Street and Famosa Boulevard in Point Loma Heights, San Diego. It is bordered on its non-street limits by Cleator Community Park and Peninsula Family YMCA.



VICINITY MAP – NOT TO SCALE

The existing site is comprised of school buildings and associated impervious areas, and athletic fields. The proposed site will maintain the existing use, but reduce the impervious area by redeveloping and expanding the "green" athletic fields while demolishing and removing a portion of the impervious athletic area's footprint.

BASIN DESCRIPTIONS

Following is a description of the hydrologic basins analyzed. These basins can be seen graphically on the Existing Conditions and Proposed Conditions maps located in the appendix.

EXISTING BASIN A-1

Basin A-1 consists of 6.4 acres of school buildings and facilities. Runoff drains toward the center of the basin, where it is collected by and existing 18" storm drain system and directed to the northeast area of the site through the athletic fields before joining with adjacent basins and being conveyed offsite. The existing land use is school buildings & facilities (90% impervious); the proposed land use remains the same.

EXISTING BASIN A-2

Basin A-2 is a 2.4 acre basin consisting of basketball courts, walkways and small pervious areas. Runoff drains toward a brow ditch that runs along the southeast side of the existing basketball courts, where it is collected by a grate inlet and piped east in an existing 10" storm drain before joining with adjacent basins and being conveyed offsite. The existing land use is parking lot and landscaping (85% impervious); the proposed basin is modified as a part of Proposed Basin P-1 (see below).

EXISTING BASIN A-3

Basin A-3 is a 4.4 acre basin consisting of a highly compacted crushed rock base (see vicinity map) and pervious areas of existing athletic field. Runoff sheetflows southwest to northeast and is captured in an existing inlet and piped north in an existing 24" pipe before joining with adjacent basins and being conveyed offsite The existing land use is pervious athletic fields (65% impervious to reflect high percentage of impervious area due to highly compacted crushed rock); the proposed basin is modified as a part of Proposed Basin P-1 (see below).

EXISTING BASIN A-4

Basin A-4 is a 0.9 acre basin consisting of a faculty parking lot and landscaped areas. Runoff flows north to south and is captured in an existing inlet, joining with flow from adjacent subareas and piped offsite via existing 24" storm drain. The existing land use is parking lot and landscaping (85% impervious); the proposed land use remains the same.

EXISTING BASIN B-1

Basin B-1 is a 2.4 acre basin consisting of pervious athletic field. Runoff flows north to south where it joins with adjacent Existing Basin OS-3 and leaves the site at POS#2. The existing land use is permanent open space; the proposed basin is modified as a part of Proposed Basin P-1 (see below).

EXISTING BASIN OS-1

Basin OS-1 consists of 0.6 acres of school buildings and facilities. Runoff flows toward Valeta Street and joins with Basin OS-2 where it is conveyed south along Valeta Street before joining the onsite basins at POS #1. The existing land use is school buildings and facilities (90% impervious); the proposed land use remains the same.

EXISTING BASIN OS-2

Basin OS-2 consists of 3.0 acres of street and open space/landscaped areas. Runoff flows south along Valeta Street, and east along Famosa Boulevard where it joins with the onsite basins at POS#1. The existing land use is high density residential (80% impervious); the proposed land use remains the same.

EXISTING BASIN OS-3

Basin OS-3 consists of 1.25 acres of hillside on the southwest side of the site. Runoff flows north to south, where it joins with adjacent Existing Basin B-1 and leaves the site at POS#2. The existing land use is permanent open space; the proposed land use remains the same.

PROPOSED BASIN P-1

Basin P-1 is the combination of Existing Basin A-2, Existing Basin A-3, and Existing Basin B-1. Basin B-1 will no longer flow to POS#2 but will be re-graded to direct flow to POS#1. The impervious area will for the combined areas will be significantly reduced due to the following factors. The impervious areas and basketball/tennis courts for Existing Basin A-2 will be reduced in size. The highly compacted crushed rock in Existing Basin A-3 will be removed completely and replaced with football/soccer/baseball fields and associated improvements. Existing Basin B-1 will have a small increase in impervious area for improvements to the proposed baseball field (sidewalks, restrooms, etc.) Runoff will be conveyed to the existing storm drain system/24" pipe where it will join with adjacent basins and be conveyed to POS#1. The proposed land use is Pervious Athletic Fields (25% impervious).

Note that the multi-use fields proposed in Basin P-1 will be comprised of a combination of both natural and artificial turf. From a perspective of impervious area and runoff coefficient, there will be no significant difference in runoff generated from natural turf versus artificial turf and this study does not distinguish between the two.

METHODOLOGY

RUNOFF CALCULATIONS

The design criteria, as found in the County of San Diego Department of Public Works Flood Control Division Hydrology Manual, specifies the design runoff conditions within the San Diego County Flood Control District will be based on the 100-year storm frequency, as follows:

Runoff produced on the project site will be calculated for the 100-year storm event using the methodology outlined in the San Diego County Hydrology Manual. Runoff will be calculated using the Rational Method, which is given by the following equation:

$Q = C \times I \times A$

Where:
Q = Flow rate in cubic feet per second (cfs)
C = Runoff coefficient
I = Rainfall Intensity in inches per hour (in/hr)
A = Drainage basin area in acres, (ac)

Soil Type – Hydrologic soil groups B is the only soil group present within the project boundary, as shown on the Soil Hydrologic Groups map provided in the appendix. Soil maps developed by the Soil Conservation Service were used to provide additional detail in the delineation of the soil groups. Group B soils have moderate infiltration rates, and consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to coarse texture.

Runoff Coefficient – The runoff coefficients used are in accordance with the County of San Diego standards with respect to percent impervious. Existing and proposed land uses were assigned a runoff coefficient "C" based on Table 3-1 of the Manual. The table below lists the runoff coefficients used for the various land uses, imperviousness, and soil types present within the analysis area.

Land Use	% Impervious	Runoff Coefficient
		Soil Type B
Open Space	0%	0.25
Pervious Athletic Fields	25%	0.41
Athletic Courts, sidewalks/landscaping	65%	0.67
Parking Lot w/ Landscaping	85%	0.80
School Buildings & Facilities	90%	0.84

Rainfall Intensity – Rainfall intensity was calculated using the following equation, which is given in the Manual:
$I = 7.44 \times P_6 \times (Tc^{-0.645})$

Where:
I = Rainfall Intensity in inches per hour (in/hr)
P_6 = Rainfall in inches for the 6-hour storm event
Tc = Time of concentration in minutes

The P_6 value was taken from the isopluvial maps given in the Manual for each of the storm events analyzed, which are listed below. The isopluvial maps are included in the appendix.
P_6(100-year) = 2.2 inches

Time of Concentration – Detailed time of concentration calculations were not performed, as this study is for the Master Plan in a planning level document and no proposed conditions grading or drainage design is available or warranted at this time. Therefore, each basin was assigned a time of concentration of 5 or 10 minutes based on the basin's size and length of flow through the basin.

FEMA Floodplain – The site is not in an existing floodplain per FEMA Flood Insurance Rate Map number 06073C1880G. (Appendix C)

CALCULATIONS/RESULTS

The results of the existing and proposed conditions calculations can be found in the table on the following page. These results can also be found in further detail on the Rational Method Computations and drainage area maps located in the appendix. Total flows at Points of Study (POS) #1 and #2 for the existing and proposed conditions are provided

Basin	Runoff Coefficient	Tc	A	Q(100)
		min.	ac	cfs
EX A-1	0.84	10	6.4	19.8
EX A-2	0.80	10	2.4	7.1
EX A-3	0.67	10	4.4	11.0
EX A-4	0.80	5	0.9	4.2
EX OS-1	0.84	5	0.6	2.9
EX OS-2	0.67	10	3.0	7.4
EXISTING POS#1 TOTAL	-	-	-	52.3
EX B-1	0.25	10	2.3	2.1
EX OS-3	0.25	5	1.3	1.8
EXISTING POS#2 TOTAL	-	-	-	3.9
P-1	0.41	10	9.1	13.8
POS#1TOTAL	-	-	-	48.1
POS#2 TOTAL	-	-	-	1.8

As shown in the table above, the proposed project results in a decrease in peak 100-year flow at POS#1 from 52.3 cfs to 48.1 cfs and a decrease in flow at POS#2 from 3.9 cfs to 1.8 cfs. Therefore, there is no nexus to provide detention of peak 100-year storm flows from the site.

CEQA THRESHOLDS OF SIGNIFICANCE

Following is a discussion of applicable potential impacts from the CEQA Guideline Environmental Checklist Form and a determination of the significance of impacts.

Section VIII. Hydrology and Water Quality
Impact A *Would the Project violate any water quality standards or waste discharge requirements?*

Impact Analysis: The project will not violate water quality standards or waste discharge requirements due to the proposed LID Site Design, Source Control, and Treatment Control BMPs. Refer to the Preliminary WQTR for further discussion.

It is concluded that there is no impact from this issue.

Impact B *Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).*

Impact Analysis: Groundwater recharge in the area will improve as a result of the proposed redevelopment. This is due to the reduction in impervious surface due to the proposed changes in land use and the incorporation of Low Impact Development features, and is reflected in the lower weighted runoff coefficients calculated for the proposed conditions hydrology analysis. Further information on the proposed Low Impact Development features of the redevelopment can be found in the Preliminary WQTR.

It is concluded that there is no impact from this issue.

Impact C *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.*

Impact Analysis: The proposed redevelopment closely mimics the existing drainage pattern of the site. No areas that would greatly increase the risk of erosion or siltation have been added to the design.

It is concluded that there is no impact from this issue.

Impact D *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.*

Impact Analysis: The proposed redevelopment will result in a decrease in runoff from the project site due to the reduced imperviousness of the proposed land uses relative to the existing land uses.

It is concluded that there is no impact from this issue.

Impact E *Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.*

Impact Analysis: As the proposed redevelopment decreases the amount of runoff from the site, existing or planned storm water drainage systems will not be adversely affected or exceed capacity. The project will not provide substantial additional sources of polluted runoff due to the proposed LID Site Design, Source Control, and Treatment Control BMPs. Refer to the Preliminary WQTR for further discussion.

It is concluded that there is no impact from this issue.

Impact F Otherwise substantially degrade water quality

Impact Analysis: The project will not degrade water quality due to the proposed LID Site Design, Source Control, and Treatment Control BMPs. Refer to the Preliminary WQTR for further discussion.

Impact G Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation.

Impact Analysis: As discussed in the methodology section, the project is not located within a FEMA mapped floodplain. It is concluded that no impact associated with this issue will occur.

Impact H Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

Impact Analysis: As discussed in the methodology section, the project is not located within a FEMA mapped floodplain. It is concluded that no impact associated with this issue will occur.

Impact I Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

Impact Analysis: As discussed in the methodology section, the project is not located within a FEMA mapped floodplain. It is concluded that no impact associated with this issue will occur.

Impact J Inundation by seiche, tsunami, or mudflow.

Impact Analysis: The site is not near any significant confined waterbody, therefore inundation by seiche is not a concern. There are no significant steep unstabilized slopes above the project and inundation by mudflow is not a concern. Due to the Project's proximity to the coast, inundation by tsunami is possible. The proposed

project was evaluated against a recently prepared Tsunami inundation map used for emergency preparedness (Point Loma Quadrangle, CA Department of Conservation; March 15, 2009). The proposed project is out of the tsunami inundation area and the project development areas would not be subject to inundation.

It is concluded that there is no impact from this issue.

Section XVI. Utilities and Service Systems

Impact C *Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?*

Impact Analysis: The redevelopment that is proposed within the Master Plan will beneficially impact the receiving waters through improved storm water quality and reduced runoff.

It is concluded that there is no impact from this issue.

CONCLUSION

The proposed Athletic Facilities Master Plan will have a beneficial impact on the hydrology of the existing site as well as downstream areas. The impervious area for the site has been reduced, and groundwater recharge has been improved which has resulted in a net reduction in runoff and pollutants from the site.

APPENDIX A

Excerpts from County Hydrology Manual

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

APPENDIX B

Hydrology Calculations

Map Scale: 1:2,510 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:2,510 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 6, Dec 17, 2007

Date(s) aerial images were photographed: 6/7/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
MIC	Marina loamy coarse sand, 2 to 9 percent slopes	B	21.2	100.0%
Totals for Area of Interest			**21.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

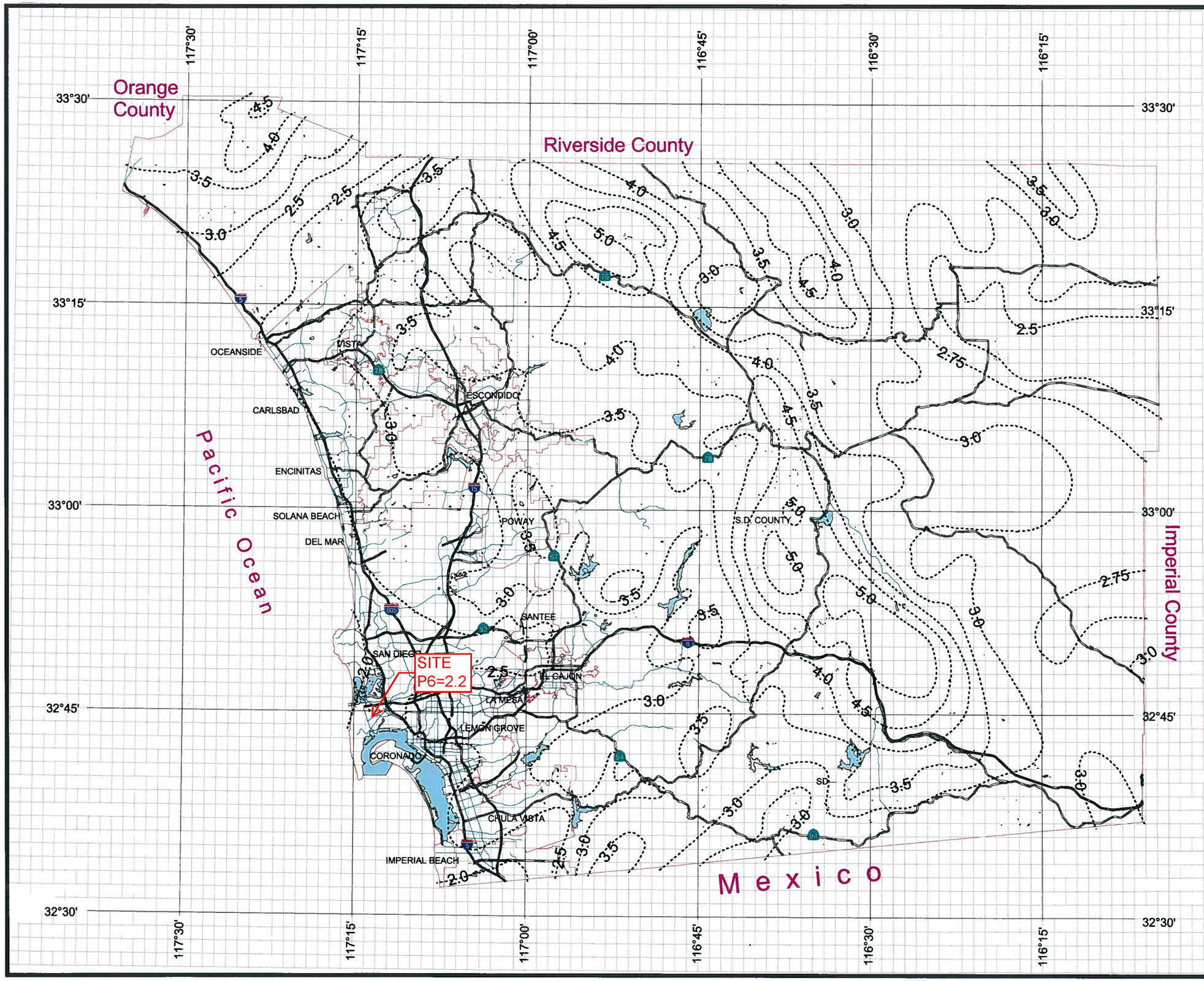
Tie-break Rule: Higher

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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Department of Public Works
Geographic Information Services

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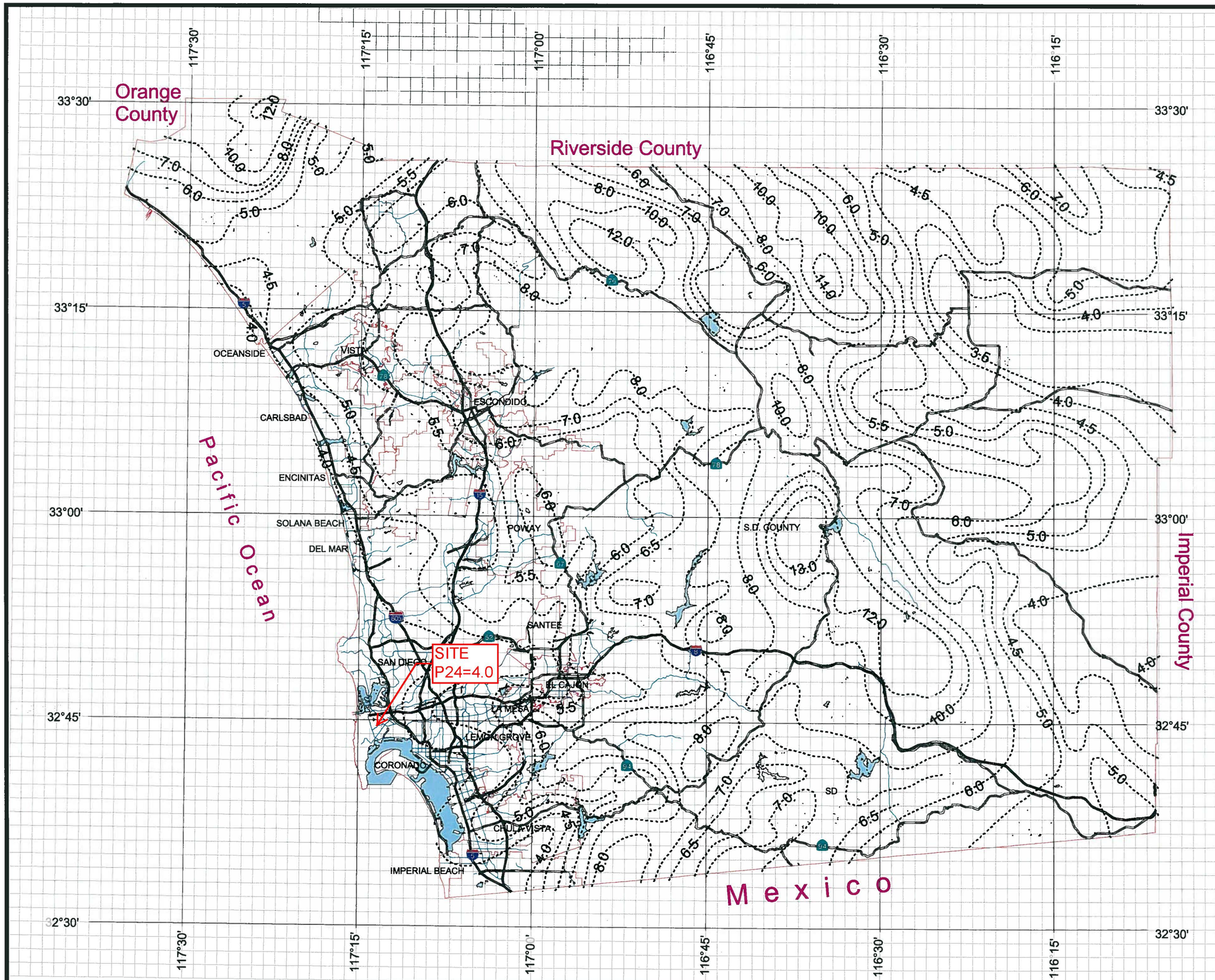
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)



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RATIONAL METHOD COMPUTATIONS FOR:
CORREIA MIDDLE SCHOOL ATHLETIC FIELDS
4302 VALETA STREET
SAN DIEGO, CA 92107
(619)222-0476
FUSCOE PROJECT #: 02457-001

EXISTING CONDITIONS						
Basin	**C**	**Tc**	**P6**	**i**	**A**	**Q100**
EX A-1	0.84	10.0	2.2	3.7	6.4	19.8
EX A-2	0.80	10.0	2.2	3.7	2.4	7.1
EX A-3	0.67	10.0	2.2	3.7	4.4	11.0
EX A-4	0.80	5.0	2.2	5.8	0.9	4.2
EX B-1	0.25	10.0	2.2	3.7	2.3	2.1
EX OS-1	0.84	5.0	2.2	5.8	0.6	2.9
EX OS-2	0.67	10.0	2.2	3.7	3.0	7.4
EX OS-3	0.25	5.0	2.2	5.8	1.3	1.8
					21.2	

TOTAL Q TO POS #1	**52.3**
TOTAL Q TO POS #2	**3.9**
TOTAL SITE RUNOFF - EXISTING	**56.3**

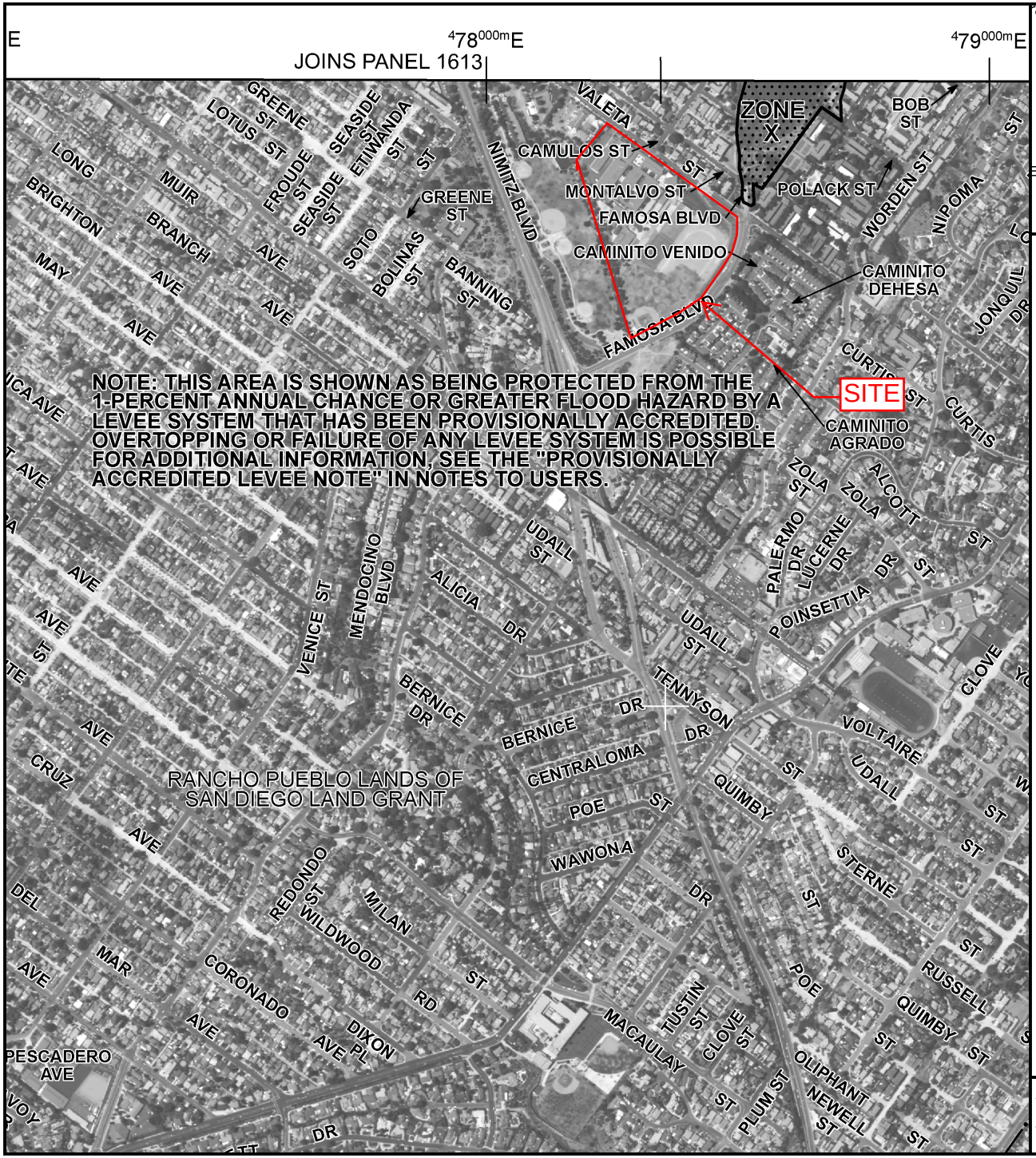
PROPOSED CONDITIONS						
Basin	**C**	**Tc**	**P6**	**i**	**A**	**Q100**
P-1	0.41	10.0	2.2	3.7	9.1	13.8
EX A-1	0.84	10.0	2.2	3.7	6.4	19.8
EX A-4	0.80	5.0	2.2	5.8	0.9	4.2
EX OS-1	0.84	5.0	2.2	5.8	0.6	2.9
EX OS-2	0.67	10.0	2.2	3.7	3.0	7.4
EX OS-3	0.25	5.0	2.2	5.8	1.3	1.8
					21.2	

TOTAL Q TO POS #1	**48.1**
TOTAL Q TO POS #2	**1.8**
TOTAL SITE RUNOFF - PROPOSED	**49.9**

NET RUNOFF - POST DEVELOPMENT	**-6.4**	**cfs**

APPENDIX C

FEMA Firmette



ance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

0 500 1,000 1,500 2,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1880G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 1880 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CORONADO, CITY OF	060287	1880	G
SAN DIEGO, CITY OF	060295	1880	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
06073C1880G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

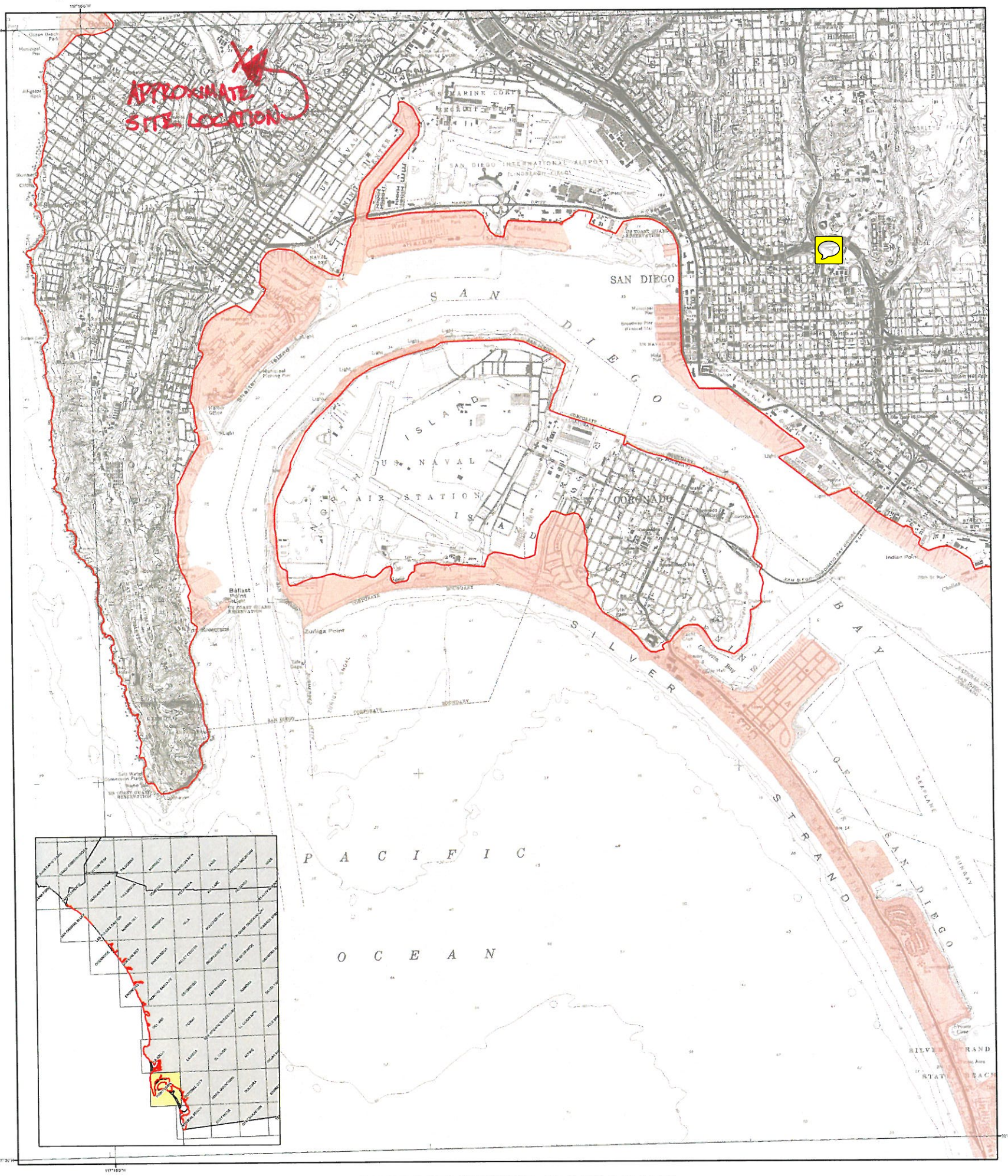
APPENDIX D

Tsunami Inundation Map

California Emergency Management Agency
California Geological Survey
University of Southern California

Tsunami Inundation Map for Emergency Planning
Point Loma Quadrangle

State of California
County of San Diego



METHOD OF PREPARATION

Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CalEMA) by the National Tsunami Hazard Mitigation Program. The tsunami modeling process utilized the MOST (Method of Splitting Tsunamis) computational program (Version 0), which allows for wave evolution over a variable bathymetry and topography used for the inundation mapping (Titov and Gonzalez, 1997; Titov and Synolakis, 1998).

The bathymetric/topographic data that were used in the tsunami models consist of a series of nested grids. Near-shore grids with a 3 arc-second (75- to 90-meters) resolution or higher, were adjusted to "Mean High Water" sea-level conditions, representing a conservative sea level for the intended use of the tsunami modeling and mapping.

A suite of tsunami source events was selected for modeling, representing realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides (Table 1). Local tsunami sources that were considered include offshore reverse-thrust faults, restraining bends on strike-slip fault zones and large submarine landslides capable of significant seafloor displacement and tsunami generation. Distant tsunami sources that were considered include great subduction zone events that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes) and others which can occur around the Pacific Ocean "Ring of Fire."

In order to enhance the result from the 75- to 90-meter inundation grid data, a method was developed utilizing higher-resolution digital topographic data (3- to 10-meters resolution) that better defines the location of the maximum inundation line (U.S. Geological Survey, 1993; Intermap, 2003; NOAA, 2004). The location of the enhanced inundation line was determined by using digital imagery and terrain data on a GIS platform with consideration given to historic inundation information (Lander, et al., 1993). This information was verified, where possible, by field work coordinated with local county personnel.

The accuracy of the inundation line shown on these maps is subject to limitations in the accuracy and completeness of available terrain and tsunami source information, and the current understanding of tsunami generation and propagation phenomena as expressed in the models. Thus, although an attempt has been made to identify a credible upper bound to inundation at any location along the coastline, it remains possible that actual inundation could be greater in a major tsunami event.

This map does not represent inundation from a single scenario event. It was created by combining inundation results for an ensemble of source events affecting a given region (Table 1). For this reason, all of the inundation region in a particular area will not likely be inundated during a single tsunami event.

References:

Intermap Technologies, Inc., 2003, Intermap product handbook and quick start guide: Intermap NEXTmap document on 5-meter resolution data, 112 p.

Lander, J.F., Lockridge, P.A., and Kozuch, M.J., 1993, Tsunamis Affecting the West Coast of the United States 1806-1992: National Geophysical Data Center Key to Geophysical Record Documentation No. 29, NOAA, NESDIS, NGDC, 242 p.

National Atmospheric and Oceanic Administration (NOAA), 2004, Interferometric Synthetic Aperture Radar (IfSAR) Digital Elevation Models from GeoSAR platform (EarthData): 3-meter resolution data.

Titov, V.V., and Gonzalez, F.I., 1997, Implementation and Testing of the Method of Tsunami Splitting (MOST): NOAA Technical Memorandum ERL PMEL – 112, 11 p.

Titov, V.V., and Synolakis, C.E., 1998, Numerical modeling of tidal wave runup: Journal of Waterways, Port, Coastal and Ocean Engineering, ASCE, 124 (4), pp 157-171.

U.S. Geological Survey, 1993, Digital Elevation Models: National Mapping Program, Technical Instructions, Data Users Guide 5, 48 p.

TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

State of California ~ County of San Diego
POINT LOMA QUADRANGLE

June 1, 2009

SCALE 1:24,000

Table 1: Tsunami sources modeled for the San Diego County coastline.

Sources (M = moment magnitude used in modeled event)		Areas of Inundation Map Coverage and Sources Used		
		Dana Point	Oceanside	San Diego
Local Sources	Carlsbad Thrust Fault		X	X
	Catalina Fault	X	X	X
	Coronado Bank Fault			X
	Lasuen Knoll Fault	X		X
	San Clemente Fault Bend Region			X
	San Clemente Island Fault			X
	San Mateo Thrust Fault	X	X	
	Coronado Canyon Landslide #1			X
Distant Sources	Cascadia Subduction Zone #3 (M9.2)	X		X
	Central Aleutians Subduction Zone#1(M8.9)	X	X	X
	Central Aleutians Subduction Zone#2(M8.9)	X		X
	Central Aleutians Subduction Zone#3(M9.2)	X	X	X
	Chile North Subduction Zone (M9.4)	X		X
	1960 Chile Earthquake (M9.3)	X		X
	1952 Kamchatka Earthquake (M9.0)	X		
	1964 Alaska Earthquake (M9.2)	X	X	X
	Japan Subduction Zone #2 (M8.8)	X		X
	Kuril Islands Subduction Zone #2 (M8.8)	X		X
	Kuril Islands Subduction Zone #3 (M8.8)	X		X
	Kuril Islands Subduction Zone #4 (M8.8)	X		X

MAP EXPLANATION

Tsunami Inundation Line

Tsunami Inundation Area

PURPOSE OF THIS MAP

This tsunami inundation map was prepared to assist cities and counties in identifying their tsunami hazard. It is intended for local jurisdictional, coastal evacuation planning uses only. This map, and the information presented herein, is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose.

The inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. Tsunamis are rare events; due to a lack of known occurrences in the historical record, this map includes no information about the probability of any tsunami affecting any area within a specific period of time.

Please refer to the following websites for additional information on the construction and/or intended use of the tsunami inundation map:

State of California Emergency Management Agency, Earthquake and Tsunami Program:
http://www.oes.ca.gov/WebPage/oeswebsite.nsf/Content/B1EC51BA215931768825741F005E8D80?OpenDocument

University of Southern California – Tsunami Research Center:
http://www.usc.edu/dept/tsunamis/2005/index.php

State of California Geological Survey Tsunami Information:
http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/index.htm

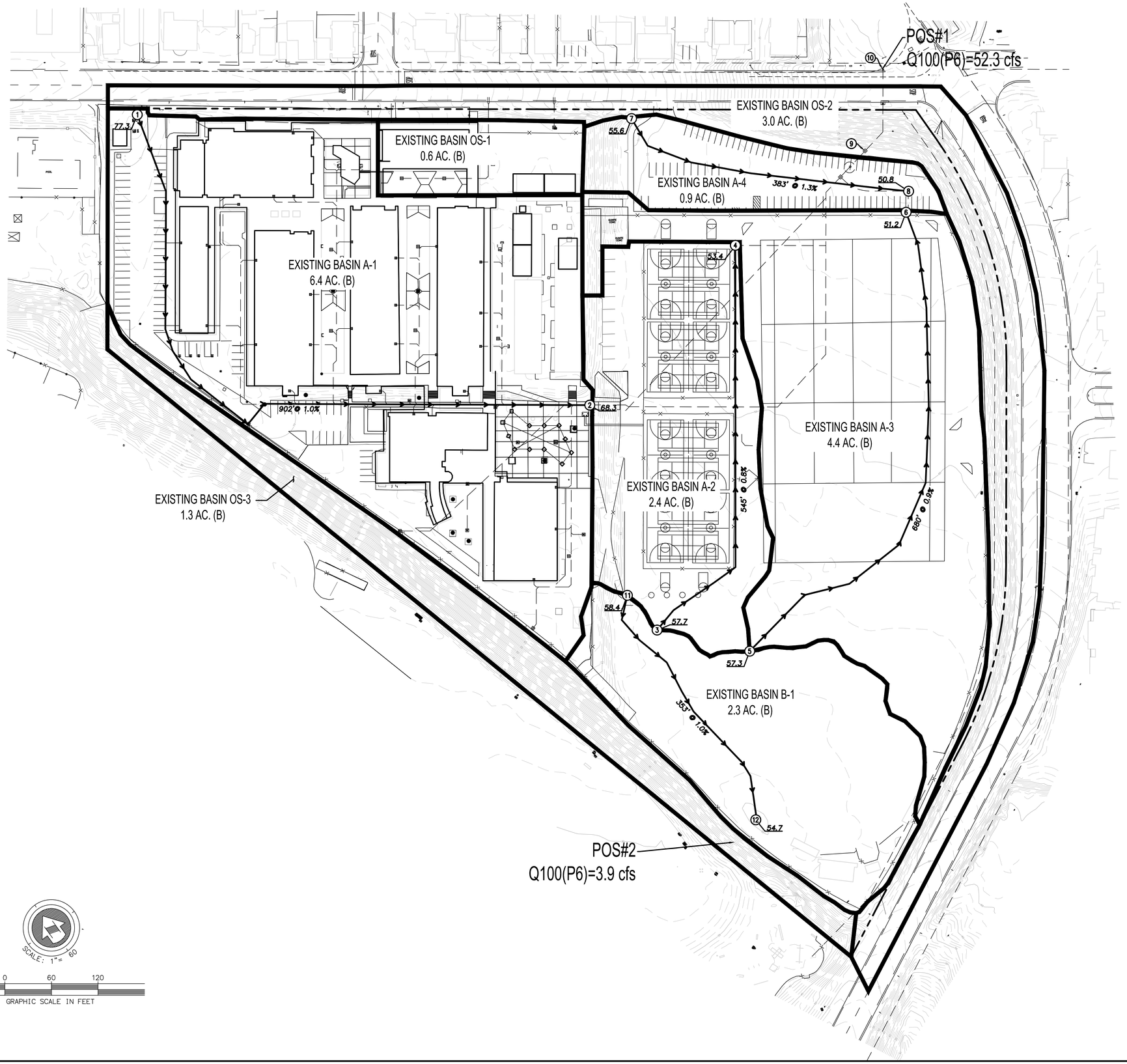
National Oceanic and Atmospheric Agency Center for Tsunami Research (MOST model):
http://nctr.pmel.noaa.gov/time/background/models.html

MAP BASE

Topographic base maps prepared by U.S. Geological Survey as part of the 7.5-minute Quadrangle Map Series (originally 1:24,000 scale). Tsunami inundation line boundaries may reflect updated digital orthophotographic and topographic data that can differ significantly from contours shown on the base map.

DISCLAIMER

The California Emergency Management Agency (CalEMA), the University of Southern California (USC), and the California Geological Survey (CGS) make no representation or warranties regarding the accuracy of this inundation map nor the data from which the map was derived. Neither the State of California nor USC shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this map.



LEGEND

- PROJECT BOUNDARY
- EXISTING CONTOURS
- BASIN LIMITS
- FLOW DIRECTION
- FLOW PATH

EXISTING BASIN MAP

CORREIA MIDDLE SCHOOL ATHLETIC FACILITIES

SAN DIEGO COUNTY
PROJECT NUMBER: 02457-001
SCALE: 1"=60'
DATE: DECEMBER 2014
SHEET 1 OF 1

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6390 Greenwich Drive, Suite 170
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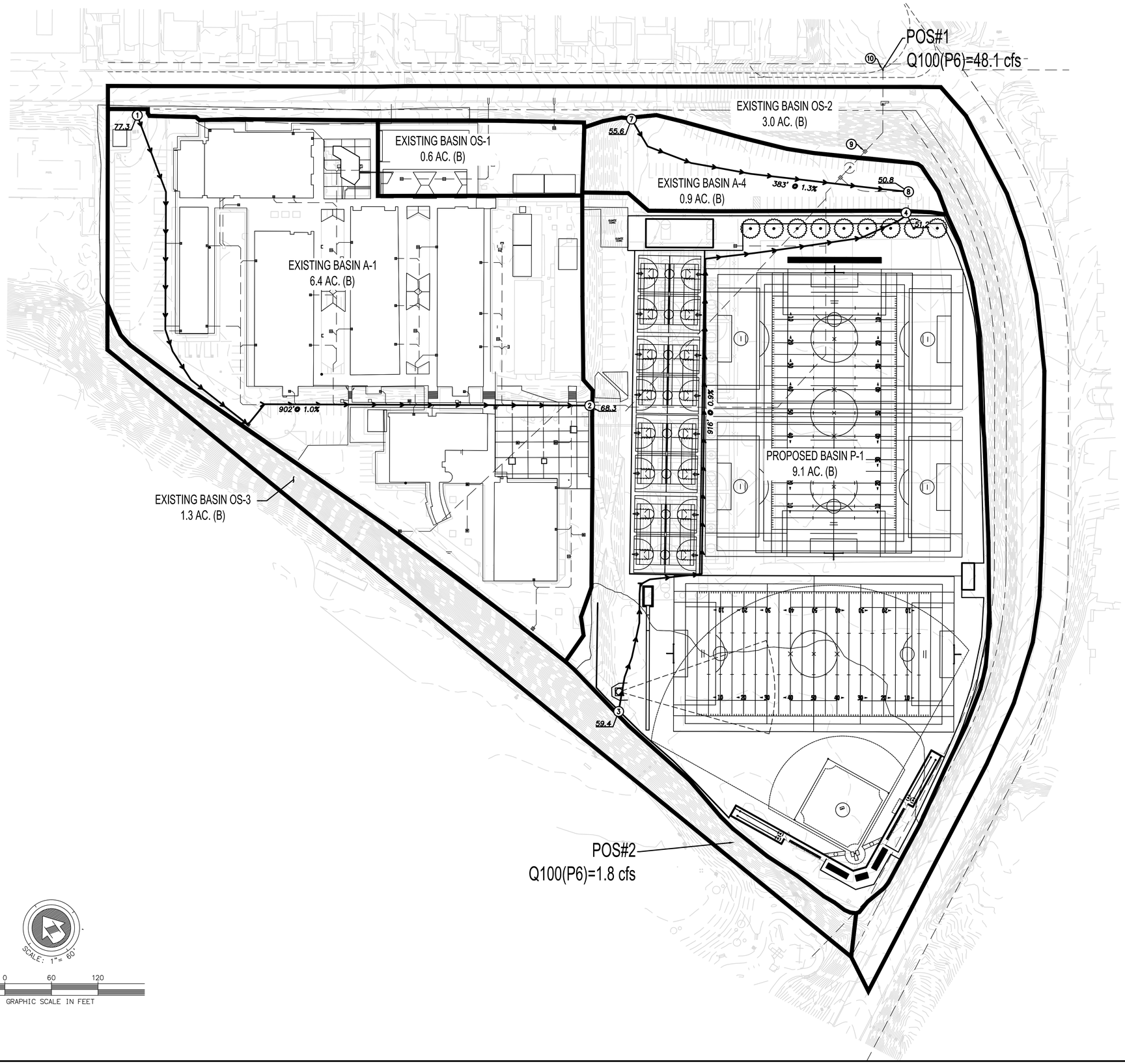

LEGEND

- PROJECT BOUNDARY
- EXISTING CONTOURS
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- FLOW DIRECTION
- FLOW PATH

PROPOSED BASIN MAP

CORREIA MIDDLE SCHOOL ATHLETIC FACILITIES

SAN DIEGO COUNTY
PROJECT NUMBER: 02457-001
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