STEVENS · CRESTO ENGINEERING, INC.

CEQA PRELIMINARY HYDROLOGY/ DRAINAGE STUDY

FOR:

OTAY CROSSINGS COMMERCE PARK
TM 5405R

OTAY MESA, CA

Prepared for:
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SCE Project: 03043.08

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SDC PDS RCVD 02-13-13
TM5405R

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FOR:

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OTAY MESA, CA

Declaration Of Responsible Charge

I hereby declare that I am the Engineer of Work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the Business and Professions Code, and that the design is consistent with current standards.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as Engineer of Work, of my responsibilities for project design.

STEVENS CRESTO ENGINEERING, INC.
9665 Chesapeake Drive
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San Diego, CA 92123
Tel: (858) 694-5660



1/30/13

Mark E. Stevens Date
R.C.E. 35502

TABLE OF CONTENTS

TOPIC **SECTION**

INTRODUCTION / PROJECT DESCRIPTION 1

VICINITY MAP & SITE MAP 2

HYDROLOGY 3

PRE-PROJECT HYDROLOGY 3-1
Exhibit D-E1 Pre-Project Condition Drainage Basins
BASIN A 3-1A
BASIN B 3-1B
BASIN C 3-1C
BASIN D 3-1D

DEVELOPED HYDROLOGY 3-2
Exhibit D-P1 Developed Condition Drainage Basins
BASIN A 3-2A
BASIN B 3-2B
BASIN C 3-2C
BASIN D 3-2D

HYDRAULICS - DETENTION 4

PROPOSED ON LOT DETENTION 4-1

BASIN A, B, & C – DETENTION CALCULATIONS 4-2
Detention Pond Inflow Calculations

"NO CHANNEL" OPTION 5

APPENDIX A (County Hydrology Figures/Tables) 6

DRAINAGE EXHIBITS 7

1. Exhibit D-E1 (Pre-Project Condition Drainage Basins)
2. Exhibit D-P1 (Developed Condition Drainage Basins)
3. County 200 Scale Ortho-Topo overlay/project plotting

SECTION 1

PROJECT DESCRIPTION

Project Description

OTAY CROSSINGS COMMERCE PARK (OCCP) is a 311.5 acre industrial/commercial subdivision located within the southwest quadrant of the East Otay Mesa Specific Plan Area. The project proposes a total of 47 lots; 139.6 acres will be future commercial/ light industrial land use, 47.7 acres will be dedicated open space, 25.4 acres will be public right-of-way, and the remaining 98.8 acres will be a future point of entry border crossing and SR-11. The project is located south of Otay Mesa Road and east of Alta Road in the Otay Mesa area within the County of San Diego, California; County of San Diego Tract 5405. Developable lots for future industrial commercial use account for 42 of the total lots.

This report accompanies the Tentative Map for "Otay Crossings Commerce Park" and analyzes runoff generated from four distinct contributing upstream basins, Basins "A", "B", "C", and "D" as well as runoff generated on site. The peak rates of runoff were determined for a 100-year frequency storm using the Rational Method, per the County of San Diego Hydrology Manual, June 2003 and San Diego County Drainage Design Manual; May 2005.

The 311.5-acre project site, in the pre-project condition, is undeveloped property consisting of natural terrain that is situated within four distinct regional drainage basins, draining north to south. Runoff passing through the site flows south across the border into Mexico and ultimately to the Tijuana River. (See Exhibit "D-E1", in Section 7, for a graphic depicting the pre-project condition and drainage basins). Per agreement with County of San Diego "Flood Control Division" the County will adopt the City of San Diego, "Drainage Requirements for Developments in Otay Mesa", the agreement limits runoff from projects tributary to Mexico. Resultantly, with increased flow due to development this project is required to integrate peak flow detention facilities; limiting post-development flowrates to pre-project levels. The project has been designed to honor pre-project drainage courses within the pre-project landform. An open channel has been incorporated to limit velocity and maintain pre-project flow characteristics to the maximum extent practicable. Considering the limitations which result from Subdivision layout and design, minor exchanges in watershed areas are avoided to the maximum extent practicable and minimized. The location of discharge from drainage facilities proposed by the project is consistent with the pre-project condition; discharging south of future Airway Road. Riprap energy dissipation is employed to mitigate for any increase in velocity; thus allowing flows from off-site terrain north of the project to pass through the project with as little disturbance as possible and be released in the same location as runoff has historically. Combining this effort with detention and release rate attenuation to match pre-project flowrates at each discharge location fully mitigates the impact of development and, thus, no significant hydraulic impact to the watershed is realized. Hydrology Section 3 provides detailed hydrologic analysis. Exhibit D-E1 within Section 7 identifies historic basins. Exhibit D-P1 within Section 7 depicts the proposed project build out.

Project completion and permanent post construction Best Management Practices (BMPs) will be implemented in two steps. Initially, completion of construction will yield rough graded

pads stabilized for erosion and water quality (to be referred to as: Intermediate Post Construction, "**IPC**"- within the remainder of this report). Ultimately, rough graded pads will be purchased and occupied by industrial/commercial facilities (to be referred to as: Ultimate Development, "**UD**"- within the remainder of this report). Detention basins and water quality devices will be required at **UD** of each lot. **IPC** and **UD** storm runoff collection and conveyance systems for OCCP are designed to limit runoff rates to pre-project levels. Section 3 of this report contains detailed calculations for pre-project and post-project drainage discharges. Though proposed storm drain facilities will be designed and constructed to address the **UD** condition, OCCP proposes only to complete the initial **IPC** phase of development, creating completed public roads and stabilized rough graded pads.

1. At **IPC** stabilization of rough graded pads will be assured through the use of linear sediment controls and hydroseeding per the requirements of the NPDES Construction General Permit, Order No. 2009-0009-DWQ. Additionally, the pads will have storm water collection basins that will serve as detention structures, limiting rough graded pad runoff to pre-project rates; final design and sizing of storm water collection basins to occur at the Final Engineering stage. Additionally, at **IPC** public streets and infrastructure storm drain construction will be completed. Streets will be protected from sediment transportation via County erosion protection requirements. As construction of streets will be completed at **IPC,** water quality devices will be installed for removal of vehicular pollutants (see Storm Water Maintenance Plan for more detail). The site will be mass graded into 47 separate lots ranging from 1.4 to 71.0 acres in size. Developable lots for future industrial/commercial use account for 42 of the total lots. The remaining five lots are designated for open space, future CalTrans SR-11 and a point of entry for the international border with Mexico. The proposed drainage facilities located within these lots, including the storm drain and detention basins, have been oriented to accommodate the future SR-11 as best as possible based on the current anticipated design. During final engineering, or during construction of the SR-11, design changes could require that certain facilities be expanded, reduced in size, or relocated. Additionally, it is anticipated that a portion of the proposed open channel that's within the future CalTrans right-of-way will potentially need to be undergrounded.

   Developed Basins A, B, C and D will generally maintain pre-project drainage patterns and outfall points. Each graded lot will be stabilized with linear sediment controls and hydroseeding, and will contain a storm water collection basin that will help control the release of sediments and limit runoff to pre-development discharge rates during the 100-year storm event. Proposed storm drain systems will be designed to collect and convey runoff generated on-site as well as runoff passing through the site from the upstream watersheds during the 100-year storm event. Furthermore, Lots 43 - 45 are designated for future CalTrans SR-11 and will be graded with the subdivision into rough graded pads, and used for temporary parking and storage or will remain vacant until the future build-out of SR-11. Acquisition of the right-of-way by CalTrans will include acceptance of run-on from the subdivision. Additionally, CalTrans will need to provide detention facilities to mitigate for development within the aquired right-of-way.

2. At **UD,** future industrial/commercial occupants will be required to provide methods to assure water quality of stormwater runoff from each lot; as specified within the, "County of San Diego: Stormwater Standards; Ordinance Numbers 9426, 9518, and 9589 (N.S.)". Detention structures will be installed to address hydromodification criteria, per the Countywide Hydromodification Management Plan, and limit the **UD** peak discharge to

pre-project runoff rates in accordance with the requirements of the Specific Plan; final design and sizing of detention basins to occur during processing of the construction permits for the future developments. To accomplish final detention pond creation, the Final Engineering Plans and reports will contain limitations (restrictions) on each lot for detention volumes and release flowrates. Combined water quality / detention facilities may be utilized.

Hydromodification Requirements

OCCP is a Priority Development Project and, as such, is subject to the hydromodification mitigation requirements detailed in the San Diego Countywide Hydromodification Plan, dated March 25, 2011, and required per the Regional Water Quality Control Board Order No. R9-2007-0001, Provision D.1.g (6). All detention facilities proposed at OCCP will be designed to satisfy hydromodification detention requirements, in addition to peak flow detention requirements. Hydromodification BMP facilities ensure that runoff flow rates generated by the project match, as closely as possible, pre-project flow rates generated by the project during design storms ranging from 0.5Q2 to Q10. See additional discussion and calculations within the project Hydromodification Management Plan and Storm Water Management Plan.

Developed Hydrology Summary:

The following table summarizes the changes in project runoff due to development of the project. Basin delineations are graphically depicted on the "Pre-Project Condition Drainage Basins Map" and "Proposed Drainage Basins Map" within Section 7.

Proposed Detention Release Rate Summary

	Existing Condition		Developed Condition		
	Area	Q_{100}	Area	Q_{100} (cfs)	
Basin	(acres)	(cfs)	(acres)	Undetained	Detained
A	138.1	166.2	127.8	382.6	166.2
B	652.1	492.9	658.7	614.3	492.9
C	258.3	239.7	251.2	339.6	239.7
D	364.8	332.3	364.8	332.3	N/A

NOTE: TM 5405R provides a "no channel" design option to remove the proposed vegetated open channel and replace it with a box culvert in Lone Star Road; see Section 5 for further discussion.

CEQA Issues of Concern:

- The project will not 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 on- or off-site. The project proposes to convey up-stream watershed flows through the project in open channels and storm drain in approximately the same locations as the existing flow paths. Additionally, discharge points (outlets) from the channels are designed in the existing flow path. Finally, channels are designed to reduce velocities, and energy dissipation has been employed at each outlet.

- The project will not 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. As discussed in the previous bulleted item, open channels and storm drain convey off-site runoff through the site, in approximately the same locations as the existing flow paths. Proposed storm drain facilities will be designed to collect and convey runoff generated by a 100 year design storm. Additionally, the proposed project will implement hydromodification management and peak flow mitigation to ensure that pre-project discharge rates are not exceeded.

- The project will not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems. See discussion in the previous two bulleted items.

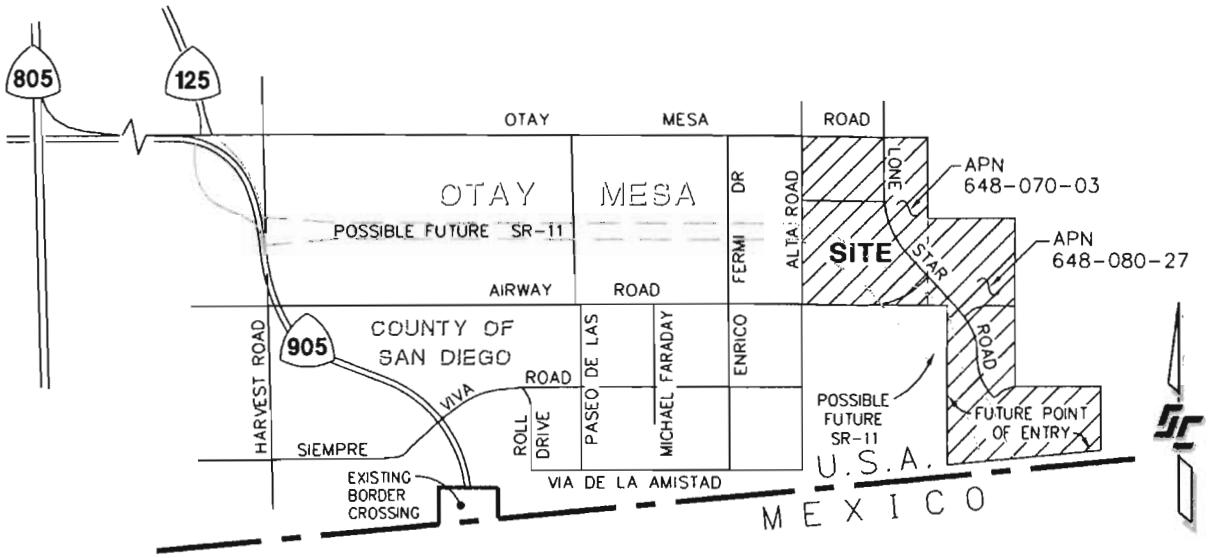
- The project will not place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps. The project is located on FEMA, FIRM PANEL 2183 OF 2375 (MAP No. 06073C2183) and is not located within a floodplain or floodway; resultantly no County Floodplain Map exists for the project location.

- The project will not place, within a 100-year flood hazard area, structures which would impede or redirect flood flows. See previous bulleted item for further details.

- The project will not 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 on-site or off-site. No levee or dam exists onsite or up-stream of the site.

SECTION 2

VICINITY MAP & SITE MAP



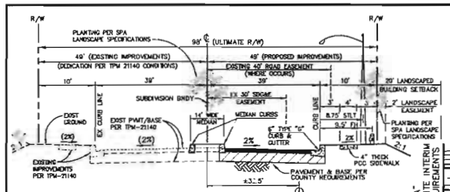
VICINITY MAP

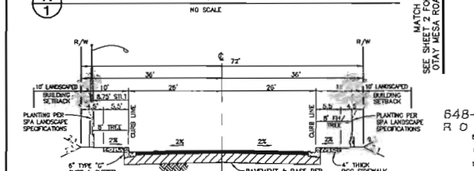
NO SCALE

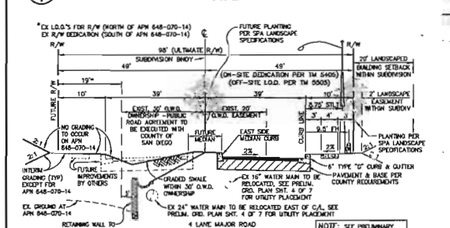
COUNTY OF SAN DIEGO TRACT 5405R

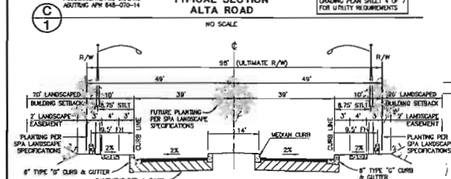
OTAY CROSSINGS COMMERCE PARK

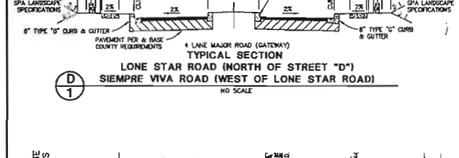
TENTATIVE MAP

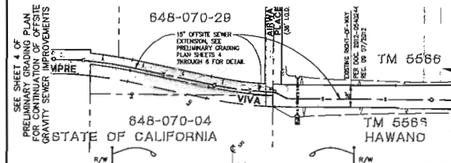


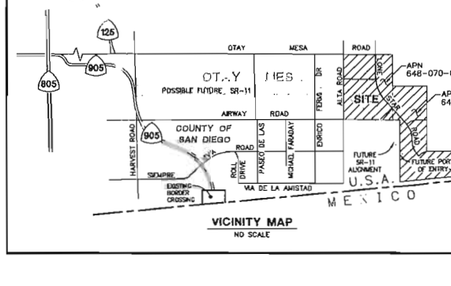


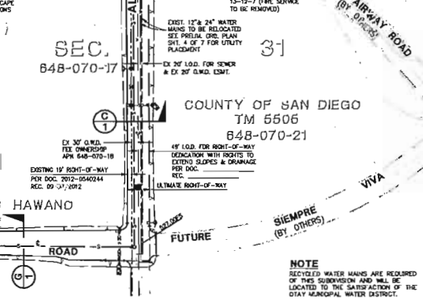


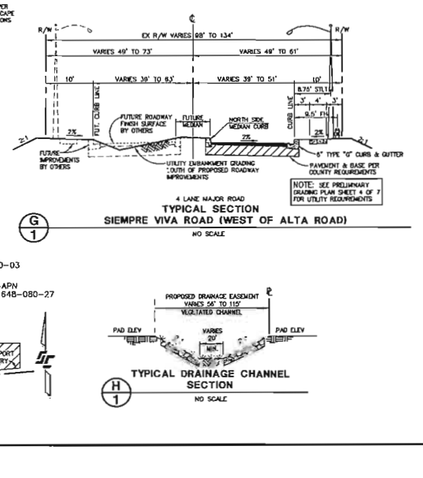








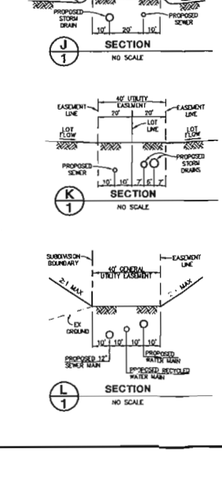






NOTE

RECYCLED WATER MAINS ARE REQUIRED OF THIS SUBDIVISION AND WILL BE LOCATED TO THE SATISFACTION OF THE OTAY MUNICIPAL WATER DISTRICT.



ZONING

EAST OTAY MESA BUSINESS PARK SPECIFIC PLAN

		MIXED INDUSTRIAL	RURAL RESIDENTIAL
ZONE		S-88	S-88
USE REGULATIONS		---	A
ANIMAL REGULATIONS		---	0.05
DEVELOPMENT REGULATIONS	LOT SIZE	30,000 S.F.	20 AC.
	BUILDING TYPE	M	R
	FLOOR AREA	---	---
	FLOOR AREA RATIO	0.4	---
	BUILDING HEIGHT	R[3]	C (25')
	BUILDING COVERAGE	0.40	---
	SETBACKS	V	C
	PRIME ARTERIAL RD.	35'	--- [3]
	MAJOR RD.	35'	--- [3]
	COLLECTOR OR LESS	25'	--- [3]
	INTERIOR YARD	---[2]	15'
	FRONT YARD	---[2]	60'[3]
	EXTERIOR YARD	---[2]	30'[3]
	REAR YARD	---[2]	25'
SPECIAL AREA REGULATIONS		B, POR. C[1]	G[4]

FOOTNOTES:
[1] COMMUNITY DESIGN REVIEW AREA REGULATIONS/SENSITIVE AREA RESOURCE REGULATIONS.
[2] SETBACKS TO BE ESTABLISHED DURING PLANNED DEVELOPMENT, USE PERMIT, OR SITE PLAN REVIEW PROCEDURE.
[3] LOT 52 (RURAL RESIDENTIAL ZONE) IS OPEN SPACE AND DOES NOT ABUT ANY ROADS.
[4] SENSITIVE AREA RESOURCE REGULATIONS.
[5] GREATER THAN 60'. ANY HEIGHT IN EXCESS OF 60 FEET REQUIRES A MAJOR USE PERMIT.

LOT AREAS (ACRES)

NO.	GROSS	HYDRO BASIN	MET	NO.	GROSS	OPEN SPACE	MET	NO.	GROSS	OPEN SPACE	MET
1	2.3	--	--	19	4.2	--	--	37	3.2	1.1	2.1
2	2.2	--	--	20	4.4	--	--	38	2.1	--	--
3	2.2	--	--	21	6.1	0.9	3.2	39	3.2	--	--
4	2.2	--	--	22	2.9	--	--	40	3.8	--	--
5	4.4	--	--	23	3.9	0.5	3.4	41	2.6	--	--
6	4.6	--	--	24	5.0	--	--	42	2.8	--	--
7	1.8	--	--	25	5.3	2.8	3.9	43	27.8	--	--
8	2.4	--	--	26	4.5	--	--	44	71.0	--	--
9	1.8	--	--	27	3.4	--	--	45	36.3	--	--
10	1.4	--	--	28	3.3	--	--	46	8.7	--	--
11	2.0	--	--	29	2.6	--	--	47	4.7	--	--
12	2.3	--	--	30	3.7	--	--				
13	2.1	--	--	31	3.4	--	--				
14	2.9	--	--	32	3.3	--	--				
15	2.1	--	--	33	2.5	--	--				
16	5.1	--	--	34	3.9	1.1	2.8				
17	3.6	--	--	35	3.3	1.0	2.3				
18	3.9	--	--	36	4.8	--	--				

DEVELOPABLE LOT AREA*	132.4 AC.
HYDRO BASIN	7.2 AC.
OPEN SPACE AREA (LOTS 45, 46 & 47)	47.7 AC.
NO PERMANENT STRUCTURES (LOTS 43 & 44)**	98.8 AC.
INTERNAL ROAD DEDICATIONS	19.8 AC.
OTAY MESA ROAD	2.3 AC.
ALTA ROAD	2.9 AC.
AIRWAY ROAD	0.4 AC.
TOTAL ROAD DEDICATIONS	25.4 AC.
TOTAL PROJECT BOUNDARY AREA	311.5 AC.

* DEVELOPABLE AREA = GROSS SITE AREA - (STREETS) - (OPEN SPACE) - (HYDRO BASINS) - (FUTURE SR-11 & BORDER CROSSING)
** LOTS ARE SET ASIDE FOR FUTURE SR-11 & 3RD BORDER CROSSING. TRUCK PARKING ALLOWED AS AN INTERIM USE UPON APPROVAL OF A MAJOR USE PERMIT.

NOTE: SEE "PRELIMINARY ROUTE STUDIES FOR CIRCULATION ELEMENT ROADWAY ALIGNMENT AND GRADES CORRESPONDING TO THE DESIGN REPRESENTED HEREON"

ASSESSOR'S PARCEL NUMBERS & TAX RATE AREA TABLE

PARCEL NUMBER	TAX RATE AREA
648-070-03	84035
648-080-27	84035

OTAY SUBREGIONAL PLAN

EXISTING & PROPOSED: SPA 22 (SPA 92-04)
EAST OTAY MESA BUSINESS PARK SPECIFIC PLAN

REGIONAL CATEGORY

VILLAGE/RURAL

PARK LAND DEDICATION

NOT REQUIRED IN INDUSTRIAL ZONE.

BENCH MARK

BRASS DISK STAMPED "LM 154 1987" LOCATED 3.06 MILES EAST ALONG OTAY MESA ROAD FROM INTERSECTION OF OTAY VALLEY ROAD, 20.5' SOUTH OF CENTERLINE OF OTAY MESA ROAD AND ABOUT 170' EAST OF CENTERLINE INTERSECTION OF HARVEST ROAD. STEEL FENCEPOST MARKED LBC5 1' SOUTH OF DISK. RECORDS FROM COUNTY OF SAN DIEGO VERTICAL CONTROL RECORDS. ELEVATION: 541.10 DATUM: U.S.C.& G.S., M.S.L.

LEGAL DESCRIPTION

THE NORTHWEST QUARTER OF SECTION 31, TOWNSHIP 18 SOUTH, RANGE 1 EAST, SAN BERNARDINO BASE AND MERIDIAN IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT, TOGETHER WITH THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER, THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER, THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER, AND THE SOUTH-EAST QUARTER OF THE SOUTHWEST QUARTER, ALL IN SECTION 32, TOWNSHIP 18 SOUTH, RANGE 1 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

SLOPE ANALYSIS TABLE

0-15% SLOPES	299.04 AC.
15-25% SLOPES	10.43 AC.
25-50% SLOPES	1.86 AC.
50% OR GREATER SLOPES	0.093 AC.
TOTAL	311.34 AC.

GRADING QUANTITIES

CUT: 2,100,000 CUBIC YARDS
FILL: 2,100,000 CUBIC YARDS
EXPORT: 0

GENERAL NOTES

1. EXISTING ZONING – S-88
2. PROPOSED ZONING – S-88
3. GROSS ACREAGE WITHIN SUBDIVISION BOUNDARY: 311.5 ACRES. GROSS AREA WITHIN ROAD EASEMENTS: 286.0 ACRES. PROPOSED ON-SITE STREETS: 23.5 ACRES
4. TOTAL NUMBER OF LOTS: 47 MIXED INDUSTRIAL LOTS, OPEN SPACE LOTS AND FUTURE SR-11. MINIMUM INDUSTRIAL LOT SIZE IS 1.40 ACRES.
5. CONTOUR INTERVAL OF 2 FEET (MEAN SEA LEVEL DATUM).
6. SPECIAL ASSESSMENT ACT PROCEEDINGS – MAY BE REQUESTED FOR THIS PROJECT.
7. IMPROVEMENTS, EASEMENTS AND DEDICATIONS ARE AS REQUIRED BY THE COUNTY ENGINEER.
8. UTILITIES:
   A. SEWER – SAN DIEGO COUNTY SANITATION DISTRICT
   B. WATER – OTAY WATER DISTRICT
   C. GAS & ELECTRIC – SAN DIEGO GAS & ELECTRIC COMPANY
   D. TELEPHONE – AT&T CALIFORNIA PUBLIC WORKS
9. FIRE PROTECTION – SAN DIEGO COUNTY RURAL FIRE DISTRICT
10. SCHOOLS : SAN YSIDRO SCHOOL DISTRICT
    SWEETWATER UNION HIGH SCHOOL DISTRICT
11. ALL PROPOSED UTILITIES TO BE UNDERGROUND.
12. ALL EXISTING EASEMENTS NOT REMAINING IN USE SHALL BE VACATED PRIOR TO RECORDATION OF THE FINAL MAP(S) SUBJECT TO THE SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS.
13. GENERAL PLAN REGIONAL CATEGORY: VILLAGE/RURAL.
14. EXISTING TOPOGRAPHY WAS COMPILED USING PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY, BY PHOTO GEODETIC CORP., DATED: 12-24-03.
15. THE FOLLOWING WAIVERS FROM THE SUBDIVISION ORDINANCE DESIGN STANDARDS ARE REQUESTED: DESIGN EXCEPTION FOR DRIVEWAYS ALONG LONE STAR ROAD (A GATEWAY ROAD THROUGH THE SUBDIVISION)
16. LAMBERT COORDINATES: 138-1785
17. DRAINAGE: STREETS & STORM DRAIN AS REQUIRED.
18. ALL ON-SITE STREETS WILL BE PUBLIC.
19. THIS IS A SOLAR SUBDIVISION AS REQUIRED BY SECTION 81.401 (a), OF THE SUBDIVISION ORDINANCE. ALL LOTS HAVE AT LEAST 100 SQ. FT. OF UNOBSTRUCTED ACCESS TO SUNLIGHT ON THE BUILDABLE PORTION OF THE LOT.
20. THIS PROJECT IS A MULTI-UNIT SUBDIVISION, (5 UNITS) MULTIPLE FINAL MAPS MAY BE FILED PURSUANT TO SECTION 66456.1 OF THE SUBDIVISION MAP ACT.
21. STREET LIGHTS WILL BE INSTALLED TO COMPLY WITH THE REQUIREMENTS AS SPECIFIED BY THE COUNTY STANDARDS.
22. STORM WATER DETENTION WILL BE PROVIDED IN ACCORDANCE COUNTY REQUIREMENTS.
23. THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN A VALID GRADING PERMIT AND PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

LEGEND

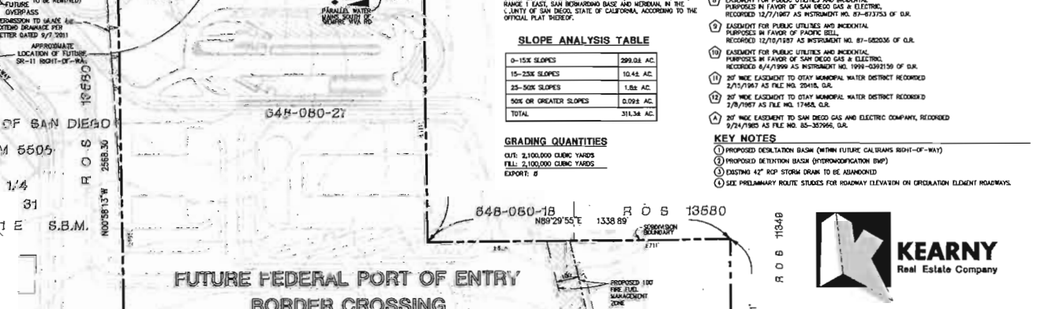
DESCRIPTION	SYMBOL
PROPOSED LOT NUMBER	1 (THRU 47)
SUBDIVISION BOUNDARY	
UNIT BOUNDARY	UNIT 1 / UNIT 2
PROPOSED LOT LINE	
FUTURE ULTIMATE RIGHT-OF-WAY	
EASEMENT LINE	
PROPOSED PVC WATER MAIN (12" SCH40W)	W
PROPOSED SEWER MAIN W/MANHOLE	S
PROPOSED STORM DRAIN	SD
PROPOSED STORM DRAIN INLET/CATCH BASIN	SD
PROPOSED STORM DRAIN CLEANOUT	SD
PROPOSED INTERIM STORM WATER COLLECTION BASIN, STAGE OUTLET RISER AND OVERFLOW (WHERE OCCURS)	
PROPOSED STORM DRAIN HEADWALL/ENERGY DISSIPATOR	SD
EXISTING CONTOUR	

EXISTING EASEMENT TABLE

1. HIGHWAY EMBANKMENT, SLOPES, ELECTRICAL AND COMMUNICATIONS FACILITIES EASEMENT TO COUNTY OF SAN DIEGO RECORDED 11/5/1987 AS FILE NO. 87-624327, O.R. AND EXTENSION AGREEMENT WITH SAN DIEGO GAS & ELECTRIC COMPANY RECORDED 8/20/1993 AS FILE NO. 93-382880, O.R.
2. 20' WIDE EASEMENT TO OTAY MUNICIPAL WATER DISTRICT RECORDED 2/8/1967 AS FILE NO. 17466, O.R.
3. LINE EASEMENT TO SAN DIEGO GAS AND ELECTRIC CO. RECORDED 10/19/1948 IN BOOK 2985, PAGE 183, O.R.
4. 40' WIDE EASEMENT FOR COUNTY HIGHWAY (ROAD SURVEY 793) RECORDED 1/31/1936 IN BOOK 886, PAGE 177, O.R.
5. 30' WIDE EASEMENT TO SAN DIEGO GAS AND ELECTRIC COMPANY (OR WIDER IF REQUIRED BY NECESSARY CUTS AND FILLS) RECORDED 1/4/1983 AS FILE NO. 83-002842, O.R. AND RE-RECORDED 2/4/1983 AS FILE NO. 83-037684, O.R.
6. 20' WIDE EASEMENT TO OTAY MUNICIPAL WATER DISTRICT RECORDED 2/8/1967 AS FILE NO. 17470, O.R.
7. EASEMENT FOR PUBLIC ROAD AND INCIDENTAL PURPOSES, RECORDED 2/8/1900 IN BOOK 237, PAGE 500 OF DEEDS.
8. EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SAN DIEGO GAS & ELECTRIC, RECORDED 12/7/1967 AS INSTRUMENT NO. 83-673753 OF O.R.
9. EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF PACIFIC BELL, RECORDED 12/15/1987 AS INSTRUMENT NO. 87-682036 OF O.R.
10. EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SAN DIEGO GAS & ELECTRIC, RECORDED 8/4/1998 AS INSTRUMENT NO. 1998-0392159 OF O.R.
11. 20' WIDE EASEMENT TO OTAY MUNICIPAL WATER DISTRICT RECORDED 2/15/1967 AS FILE NO. 17465, O.R.
12. 20' WIDE EASEMENT TO OTAY MUNICIPAL WATER DISTRICT RECORDED 2/8/1967 AS FILE NO. 17468, O.R.
A. 20' WIDE EASEMENT TO SAN DIEGO GAS AND ELECTRIC COMPANY, RECORDED 9/24/1980 AS FILE NO. 80-307966, O.R.

KEY NOTES

1. PROPOSED DESILTATION BASIN (WITHIN FUTURE CALTRANS RIGHT-OF-WAY)
2. PROPOSED DETENTION BASIN (HYDROMODIFICATION BMP)
3. EXISTING 42" RCP STORM DRAIN TO BE ABANDONED
4. SEE PRELIMINARY ROUTE STUDIES FOR ROADWAY ELEVATION ON CIRCULATION ELEMENT ROADWAYS.



MEXICO

MINIMUM ON-LOT BMPS REQUIRED TO SATISFY HYDROMODIFICATION CRITERIA

LOT NUMBER	LOT ACREAGE (Ac)	MINIMUM REQUIRED BIORETENTION AREA[1,2] (SF)	MINIMUM REQUIRED VOLUME OF UNDERGROUND DETENTION[1,2] (CF)	MAXIMUM OUTLET ORIFICE SIZE[1,2] (IN)
LOT 1	2.3	3,500	7,000	2.0
LOT 2	2.2	3,500	7,000	2.0
LOT 3	2.2	3,500	7,000	2.0
LOT 4	2.2	3,500	7,000	2.0
LOT 5	4.4	7,000	14,000	2.0
LOT 6	4.6	7,000	14,000	2.0
LOT 7	1.8	3,000	6,000	1.0
LOT 8	2.4	3,500	7,000	2.0
LOT 9	1.8	3,000	6,000	1.0
LOT 10	1.4	2,000	4,000	1.0
LOT 11	2.0	3,000	6,000	1.0
LOT 12	2.3	3,500	7,000	2.0
LOT 13	2.1	3,000	6,000	1.0
LOT 14	2.9	4,500	9,000	2.0
LOT 15	2.1	3,000	6,000	1.0
LOT 16	5.1	7,500	15,000	2.0
LOT 17	3.6	5,500	11,000	2.0
LOT 18	3.9	6,000	12,000	2.0
LOT 19	4.2	6,500	13,000	2.0
LOT 20	4.4	7,000	14,000	2.0
LOT 21	6.1	9,500	19,000	2.0
LOT 22	2.9	4,500	9,000	2.0
LOT 23	3.9	6,000	12,000	2.0
LOT 24	5.0	7,500	15,000	2.0
LOT 25	5.3	8,000	16,000	2.0
LOT 26	4.5	7,000	14,000	2.0
LOT 27	3.4	5,000	10,000	2.0
LOT 28	3.3	5,000	10,000	2.0
LOT 29	2.6	4,000	8,000	2.0
LOT 30	3.7	5,500	11,000	2.0
LOT 31	3.4	5,000	10,000	2.0
LOT 32	3.3	5,000	10,000	2.0
LOT 33	2.5	4,000	8,000	2.0
LOT 34	3.9	6,000	12,000	2.0
LOT 35	3.3	5,000	10,000	2.0
LOT 36	4.8	7,000	14,000	2.0
LOT 37	3.2	5,000	10,000	2.0
LOT 38	2.1	3,000	6,000	1.0
LOT 39	3.2	5,000	10,000	2.0
LOT 40	3.8	5,500	11,000	2.0
LOT 41	2.6	4,000	8,000	2.0
LOT 42	2.8	4,000	8,000	2.0
LOT 43	27.8	40,000	80,000	2.0
LOT 44	71.0	100,000	200,000	2.0
LOT 45	36.3	52,000	104,000	2.0
LOT 46	8.7	12,500	25,000	2.0
LOT 47	4.7	6,500	13,000	2.0

[1] BIORETENTION AREA AND UNDERGROUND DETENTION CRITERIA CALCULATED USING THE SAN DIEGO BMP SIZING CALCULATOR
[2] ON-LOT BMPS MUST BE PLACED IN A LOCATION ON THE INDIVIDUAL LOT THAT MAXIMIZES THE CAPTURE OF THE ON-SITE RUNOFF.
[3] DURING DEVELOPMENT OF EACH LOT, THIS PROVIDED MINIMUM VALUES ARE NOT USED. ADDITIONAL ANALYSIS WILL NEED TO BE PROVIDED TO DEMONSTRATE THAT THE CHOSEN ALTERNATIVE BMPS SATISFY THE HYDROMODIFICATION CRITERIA. THIS ANALYSIS WILL BE PROVIDED DURING THE SITE PLAN REVIEW PROCESS MANDATED BY THE EAST OTAY MESA SPECIFIC PLAN FOR THE DEVELOPMENT OF EACH LOT.

KEARNY Real Estate Company

OWNER/SUBDIVIDER

KEARNY REAL ESTATE COMPANY
530 B STREET, SUITE 1800
SAN DIEGO, CA 92101
PHONE: 619-702-8130
FAX: 619-702-7812

KEARNY MESA OTAY 311, LLC.

BY:
JOHN V. BRAGG JR.
VICE PRESIDENT
DATE:

ENGINEER OF WORK

MARK E. STEVENS
R.C.E. 35502
DATE:

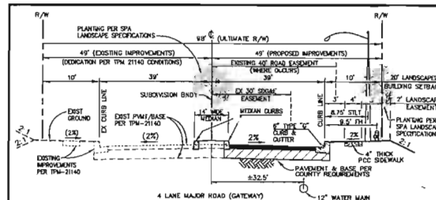
PROFESSIONAL ENGINEER
MARK E. STEVENS
No. 35502
Exp. 9-30-13
CIVIL
STATE OF CALIFORNIA

STEVENS-CRESTO ENGINEERING, INC.
CIVIL ENGINEERS • LAND PLANNERS SURVEYORS
9665 CHESAPEAKE DRIVE
SUITE 320
SAN DIEGO, CA 92123-1352
PHONE: 858.694.5660
FAX: 858.694.5661
www.scengr.com

COUNTY OF SAN DIEGO TRACT 5405R

OTAY CROSSINGS COMMERCE PARK

PRELIMINARY GRADING PLAN

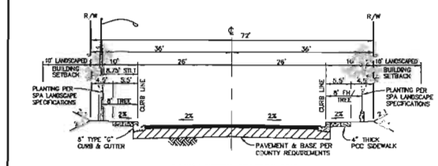


4 LANE MAJOR ROAD (GATEWAY)

TYPICAL SECTION

OTAY MESA ROAD (EAST OF ALTA ROAD)

A/1 NO SCALE



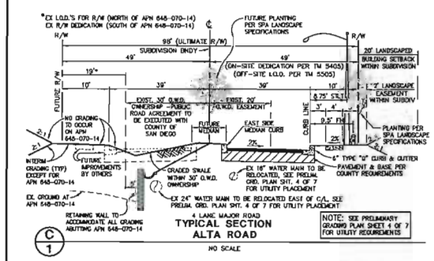
2 LANE INDUSTRIAL/COMMERCIAL ROAD

TYPICAL SECTION

CALLE VENTNER

STREETS "A", "B", "C" AND "D"

B/1 NO SCALE

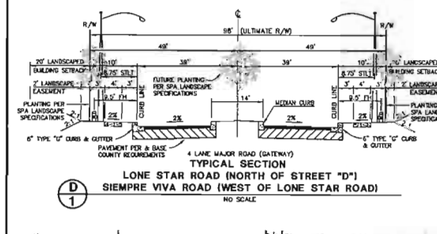


4 LANE MAJOR ROAD

TYPICAL SECTION

ALTA ROAD

C/1 NO SCALE

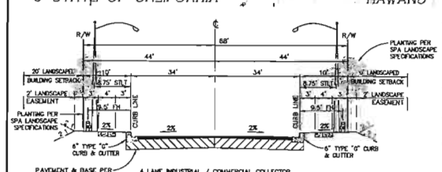


TYPICAL SECTION

LONE STAR ROAD (NORTH OF STREET "D")

SIEMPRE VIVA ROAD (WEST OF LONE STAR ROAD)

D/1 NO SCALE

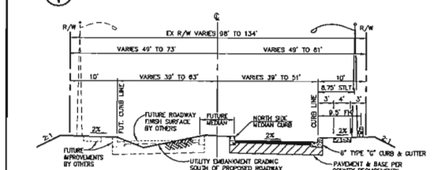


TYPICAL SECTION

SIEMPRE VIVA ROAD (EAST OF LONE STAR ROAD)

LONE STAR ROAD (SOUTH OF STREET "D")

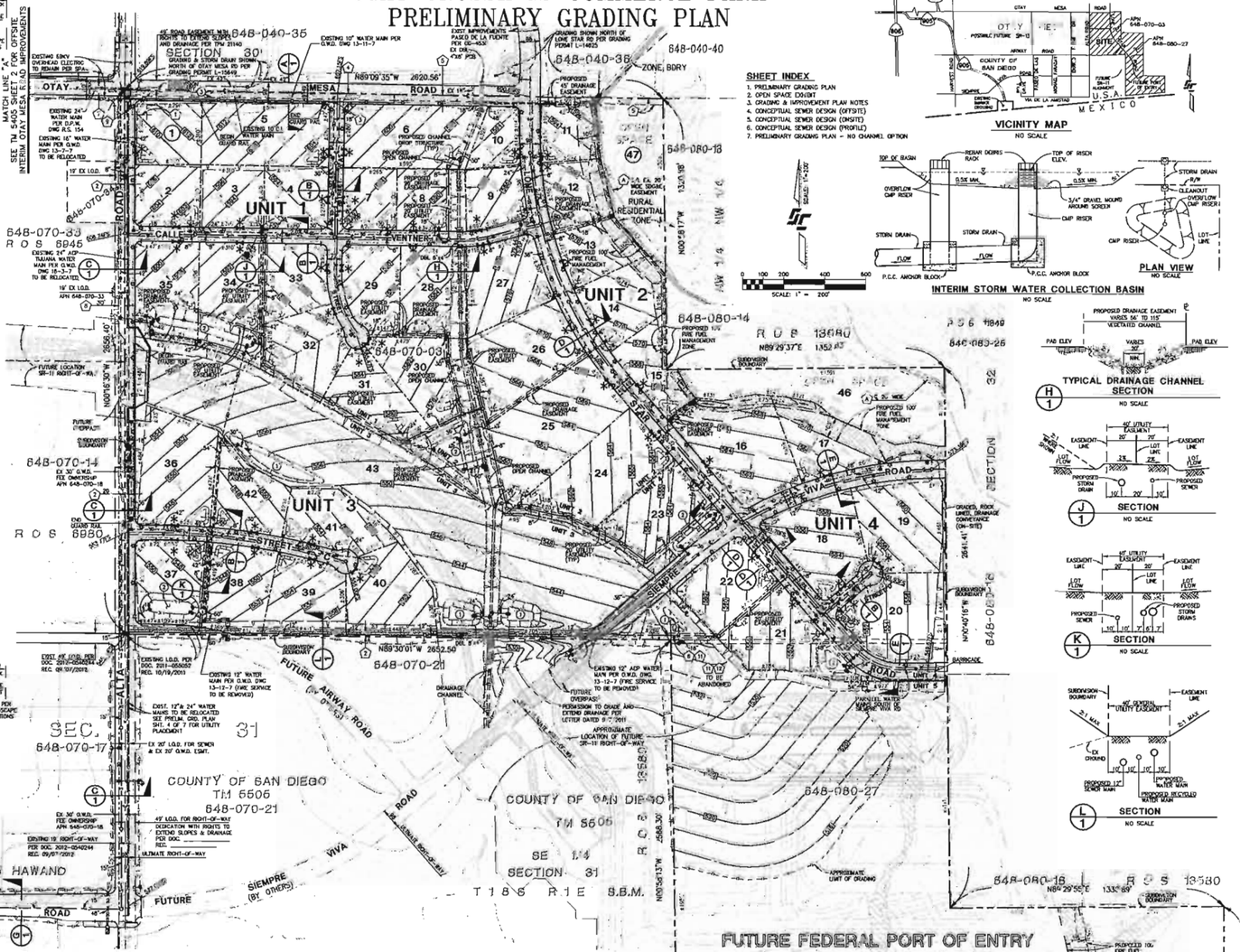
E/1 NO SCALE



TYPICAL SECTION

SIEMPRE VIVA ROAD (WEST OF ALTA ROAD)

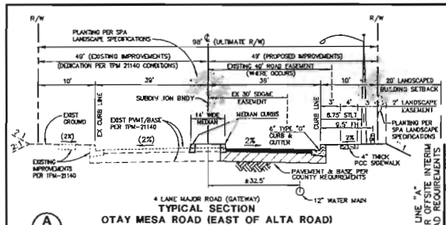
G/1 NO SCALE

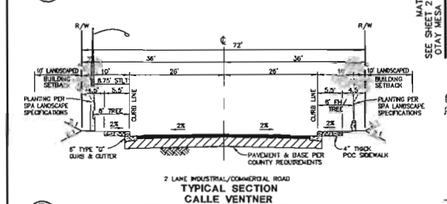

SEE SHEET 5 FOR OFFSITE INTERIM OTAY MESA IMPROVEMENTS
MATCH LINE "A" SEE SHEET 2 FOR CONTINUATION
648-040-35
648-040-36
648-040-40
ZONE, BDRY
SECTION 30
T18S R1E S.B.M.
N89°09'35"W 2620.56'
OTAY MESA ROAD
EXISTING 10" WATER MAIN PER G.W.D. DWG 13-11-7
EXISTING EBKY OVERHEAD ELEC/TEL TO REMAIN PER SDG&E
EXISTING 24" WATER MAIN PER O.P.R. DWG R.S. 154
EXISTING 16" WATER MAIN PER G.W.D. DWG 13-7-7 TO BE RELOCATED
15' EX L.O.D.
648-070-33
R O S 5945
EXISTING 24" AC TIJUANA WATER MAIN PER G.W.D. DWG 18-7-7 TO BE RELOCATED
16' EX L.O.D.
APN 648-070-33
CALLE VENTNER
UNIT 1
UNIT 2
UNIT 3
UNIT 4
UNIT 5
RURAL RESIDENTIAL ZONE
PROPOSED 100' FIRE FUEL MANAGEMENT ZONE
PROPOSED 150' FIRE FUEL MANAGEMENT ZONE
PROPOSED DRAINAGE EASEMENT
PROPOSED STORM DRAIN
PROPOSED DRAINAGE CHANNEL
PROPOSED DESILTING BASIN
PROPOSED DETENTION BASIN
PROPOSED DRAINAGE CHANNEL
PROPOSED DRAINAGE EASEMENT

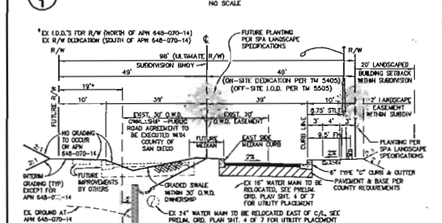
COUNTY OF SAN DIEGO TRACT 5405R

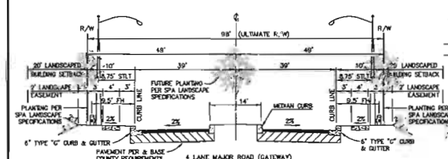
OTAY CROSSINGS COMMERCE PARK – NO CHANNEL OPTION

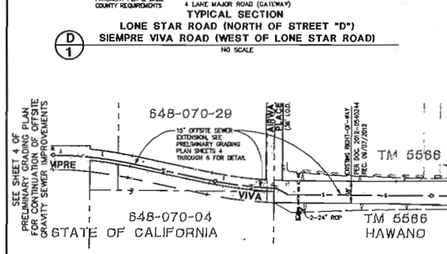
TENTATIVE MAP

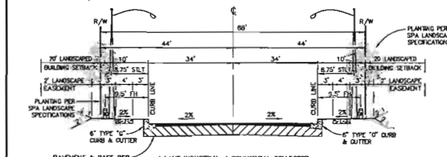


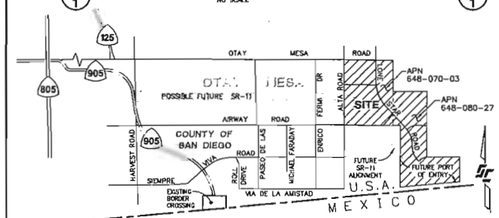


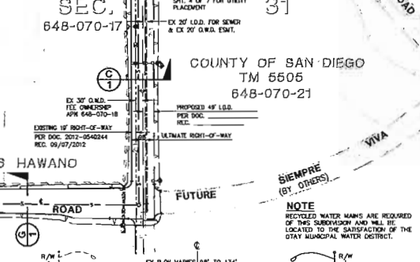




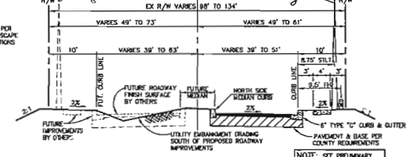


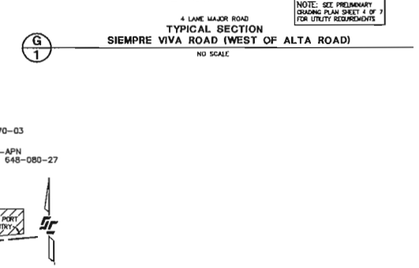












ZONING

EAST OTAY MESA BUSINESS PARK SPECIFIC PLAN

		MIXED INDUSTRIAL	RURAL RESIDENTIAL
ZONE		S-88	S-88
USE REGULATIONS		--	A
ANIMAL REGULATIONS		--	D
DEVELOPMENT REGULATIONS	DENSITY	---	0.05
	LOT SIZE	30,000 S.F.	20 AC.
	BUILDING TYPE	M	E
	FLOOR AREA	---	---
	FLOOR AREA RATIO	0.4	---
	BUILDING HEIGHT	8[5]	C (25')
	BUILDING COVERAGE	0.60	---
	SETBACKS	V	C
	PRIME ARTERIAL RD.	35'	--- 3
	MAJOR RD.	35'	--- 3
	COLLECTOR OR LESS	25'	--- 3
	INTERIOR YARD	---[7]	15'
	FRONT YARD	---[7]	60'[3]
	EXTERIOR YARD	---[7]	35'[3]
	REAR YARD	---[7]	25'
SPECIAL AREA REGULATIONS		B, POR. G[1]	G[4]

FOOTNOTES:
[1] COMMUNITY DESIGN REVIEW AREA REGULATIONS/SENSITIVE AREA RESOURCE REGULATIONS.
[2] SETBACKS TO BE ESTABLISHED DURING PLANNED DEVELOPMENT, USE PERMIT, OR SITE PLAN REVIEW PROCEDURE.
[3] LOT 52 (RURAL RESIDENTIAL ZONE) IS OPEN SPACE AND DOES NOT ABUT ANY ROADS.
[4] SENSITIVE AREA RESOURCE REGULATIONS.
[5] GREATER THAN 50'. ANY HEIGHT IN EXCESS OF 60 FEET REQUIRES A MAJOR USE PERMIT.

LOT AREAS (ACRES)

NO.	GROSS	HYDRO BASIN	NET	NO.	GROSS	HYDRO BASIN	NET	NO.	GROSS	HYDRO BASIN	NET
1	2.3	--	--	19	4.2	--	--	37	3.2	1.3	2.4
2	2.2	--	--	20	4.2	--	--	38	3.1	--	--
3	2.2	--	--	21	4.1	0.8	3.2	39	3.2	--	--
4	2.2	--	--	22	2.9	--	--	40	3.8	--	--
5	4.4	--	--	23	3.9	0.5	3.4	41	2.8	--	--
6	4.3	--	--	24	5.0	--	--	42	2.8	--	--
7	1.8	--	--	25	7.6	1.8	5.8	43	27.8	--	--
8	2.5	--	--	26	6.8	--	--	44	71.0	--	--
9	1.8	--	--	27	3.4	--	--	45	36.3	--	--
10	1.8	--	--	28	3.3	--	--	46	6.7	--	--
11	2.0	--	--	29	2.8	--	--	47	4.7	--	--
12	2.7	--	--	30	4.2	--	--				
13	2.1	--	--	31	3.5	--	--				
14	2.9	--	--	32	3.3	--	--				
15	2.1	--	--	33	2.5	--	--				
16	5.1	--	--	34	3.9	1.1	2.8				
17	3.6	--	--	35	3.3	1.0	2.3				
18	3.8	--	--	36	4.8	--	--				

DEVELOPABLE LOT AREA*	133.2 AC.
HYDRO BASIN	8.4 AC.
OPEN SPACE AREA (LOTS 45, 46 & 47)	47.7 AC.
NO PERMANENT STRUCTURES (LOTS 43 & 44)**	38.8 AC.
INTERNAL ROAD DEDICATIONS	19.8 AC.
OTAY MESA ROAD	2.3 AC.
ALTA ROAD	2.9 AC.
AIRWAY ROAD	0.4 AC.
TOTAL ROAD DEDICATIONS	25.4 AC.
TOTAL PROJECT BOUNDARY AREA	311.5 AC.

* DEVELOPABLE AREA = GROSS SITE AREA – (5198213) – (OPEN SPACE) – (HYDRO BASIN) — (FUTURE SR-11 & BORDER CROSSING)
** LOTS ARE SET ASIDE FOR FUTURE SR-11 & 3RD BORDER CROSSING. TRUCK PARKING ALLOWED AS AN INTERIM USE UPON APPROVAL OF A MAJOR USE PERMIT.

NOTE: SEE "PRELIMINARY ROUTE STUDIES FOR CIRCULATION ELEMENT ROADWAY ALIGNMENT AND GRADES CORRESPONDING TO THE DESIGN REPRESENTED HEREON"

ASSESSOR'S PARCEL NUMBERS & TAX RATE AREA TABLE

PARCEL NUMBER	TAX RATE AREA
648-070-03	84035
648-080-27	84035

OTAY SUBREGIONAL PLAN

EXISTING & PROPOSED: SPA 22 (SPA 92-04)
EAST OTAY MESA BUSINESS PARK SPECIFIC PLAN

REGIONAL CATEGORY

VILLAGE/RURAL

PARK LAND DEDICATION

NOT REQUIRED IN INDUSTRIAL ZONE

BENCH MARK

BRASS DISK STAMPED "SM 154 1969" LOCATED 3.09 MILES EAST ALONG OTAY MESA ROAD FROM INTERSECTION OF OTAY VALLEY ROAD, 20.5' SOUTH OF CENTERLINE OF OTAY MESA ROAD AND ABOUT 170' EAST OF CENTERLINE INTERSECTION OF HARVEST ROAD. STEEL FENCEPOST MARKED LIES 1' SOUTH OF DISK. RECORD FROM COUNTY OF SAN DIEGO VERTICAL CONTROL RECORDS. ELEVATION: 341.00 DATUM: U.S.C.& G.S., M.S.L.

LEGAL DESCRIPTION

THE NORTHWEST QUARTER OF SECTION 31, TOWNSHIP 18 SOUTH, RANGE 1 EAST, SAN BERNARDINO BASE AND MERIDIAN IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF; TOGETHER WITH THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER, THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER, THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER, AND THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER, ALL IN SECTION 32, TOWNSHIP 18 SOUTH, RANGE 1 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

SLOPE ANALYSIS TABLE

0-15% SLOPES	299.04 AC.
15-25% SLOPES	10.46 AC.
25-50% SLOPES	1.68 AC.
50% OR GREATER SLOPES	0.096 AC.
TOTAL	311.34 AC.

GRADING QUANTITIES

CUT: 2,100,000 CUBIC YARDS
FILL: 2,100,000 CUBIC YARDS
EXPORT: 0

GENERAL NOTES

1. EXISTING ZONING – S-88
2. PROPOSED ZONING – S-88
3. GROSS ACREAGE WITHIN SUBDIVISION BOUNDARY: 311.5 ACRES. GROSS AREA MINUS ROAD EASEMENTS: 298.0 ACRES. PROPOSED ON-SITE STREETS: 25.5 ACRES
4. TOTAL NUMBER OF LOTS: 47 MIXED INDUSTRIAL LOTS, OPEN SPACE LOTS AND FUTURE SR-11. MINIMUM INDUSTRIAL LOT SIZE IS 1.40 ACRES.
5. CONTOUR INTERVAL OF 2 FEET (MEAN SEA LEVEL DATUM).
6. SPECIAL ASSESSMENT ACT PROCEEDINGS – MAY BE REQUESTED FOR THIS PROJECT.
7. IMPROVEMENTS, EASEMENTS AND DEDICATIONS ARE AS REQUIRED BY THE COUNTY ENGINEER.
8. UTILITIES:
   A. SEWER – SAN DIEGO COUNTY SANITATION DISTRICT
   B. WATER – OTAY WATER DISTRICT
   C. GAS & ELECTRIC – SAN DIEGO GAS & ELECTRIC COMPANY
   D. TELEPHONE – AT&T CALIFORNIA PUBLIC WORKS
9. FIRE PROTECTION – SAN DIEGO COUNTY RURAL FIRE DISTRICT
10. SCHOOLS : SAN YSIDRO SCHOOL DISTRICT
    SWEETWATER UNION HIGH SCHOOL DISTRICT
11. ALL PROPOSED UTILITIES TO BE UNDERGROUND.
12. ALL EXISTING EASEMENTS NOT REMAINING IN USE SHALL BE VACATED PRIOR TO RECORDATION OF THE FINAL MAP(S) SUBJECT TO THE SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS.
13. GENERAL PLAN REGIONAL CATEGORY: VILLAGE/RURAL.
14. EXISTING TOPOGRAPHY WAS COMPILED USING PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY, BY PHOTO GEODETIC CORP. DATED: 12-24-03
15. THE FOLLOWING WAIVERS FROM THE SUBDIVISION ORDINANCE DESIGN STANDARDS ARE REQUESTED. DESIGN EXCEPTION FOR DRIVEWAYS ALONG LONE STAR ROAD (A GATEWAY ROAD THROUGH THE SUBDIVISION)
16. LAMBERT COORDINATES: 138-1785
17. DRAINAGE: STREETS & STORM DRAIN AS REQUIRED.
18. ALL ON-SITE STREETS WILL BE PUBLIC.
19. THIS IS A SOLAR SUBDIVISION AS REQUIRED BY SECTION 81.401 (a), OF THE SUBDIVISION ORDINANCE. ALL LOTS HAVE AT LEAST 100 SQ. FT. OF UNOBSTRUCTED ACCESS TO SUNLIGHT ON THE BUILDABLE PORTION OF EACH LOT.
20. THIS PROJECT IS A MULTI-UNIT SUBDIVISION. (5 UNITS) MULTIPLE FINAL MAPS MAY BE FILED PURSUANT TO SECTION 66456.1 OF THE SUBDIVISION MAP ACT.
21. STREET LIGHTS WILL BE INSTALLED TO COMPLY WITH THE REQUIREMENTS AS SPECIFIED BY THE COUNTY STANDARDS.
22. STORM WATER DETENTION WILL BE PROVIDED IN ACCORDANCE COUNTY REQUIREMENTS.
23. THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN A VALID GRADING PERMIT AND PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

LEGEND

DESCRIPTION	SYMBOL
PROPOSED LOT NUMBER	1 THRU 47
SUBDIVISION BOUNDARY	
UNIT BOUNDARY	UNIT 1 / UNIT 2
PROPOSED LOT LINE	
FUTURE ULTIMATE RIGHT-OF-WAY	
EASEMENT LINE	
PROPOSED PVC WATER MAIN (12" MINIMUM)	W W
PROPOSED SEWER MAIN W/MANHOLE	S S
PROPOSED STORM DRAIN	SD SD
PROPOSED STORM DRAIN INLET *WITH BASIN	
PROPOSED STORM DRAIN CLEANOUT	
PROPOSED INTERIM STORM WATER COLLECTION BASIN, STAGE OUTLET RISER AND OVERFLOW (WHERE OCCURS)	
PROPOSED STORM DRAIN HEADWALL/ENERGY DISSIPATOR	
EXISTING CONTOUR	650

EXISTING EASEMENT TABLE

1. HIGHWAY EMBANKMENT, SLOPES, ELECTRICAL AND COMMUNICATIONS FACILITIES EASEMENT TO COUNTY OF SAN DIEGO RECORDED 11/3/1987 AS FILE NO. 87-621337, O.R. AND EXTENSION AGREEMENT WITH SAN DIEGO GAS & ELECTRIC COMPANY RECORDED 8/30/1988 AS FILE NO. 88-361189, O.R.
2. 25' WIDE EASEMENT TO OTAY MUNICIPAL WATER DISTRICT RECORDED 2/9/1967 AS FILE NO. 17495, O.R.
3. LINE EASEMENT TO SAN DIEGO GAS AND ELECTRIC CO. RECORDED 10/19/1948 IN BOOK 3965, PAGE 183, O.R.
4. 40' WIDE EASEMENT FOR COUNTY HIGHWAY (ROAD SURVEY 793) RECORDED 1/31/1939 IN BOOK 868, PAGE 177, O.R.
5. 30' WIDE EASEMENT TO SAN DIEGO GAS AND ELECTRIC COMPANY (OR WIDER IF REQUIRED BY NECESSARY CUTS AND FILLS) RECORDED 2/4/1983 AS FILE NO. 83-052842, O.R. AND RE-RECORDED 2/4/1983 AS FILE NO. 83-037564, O.R.
6. 25' WIDE EASEMENT TO OTAY MUNICIPAL WATER DISTRICT RECORDED 2/9/1967 AS FILE NO. 17495, O.R.
7. EASEMENT FOR PUBLIC ROAD AND INCIDENTAL PURPOSES, RECORDED 3/8/1900 IN BOOK 337, PAGE 500 OF DEEDS.
8. EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SAN DIEGO GAS & ELECTRIC, RECORDED 12/1/1967 AS INSTRUMENT NO. 69-273753 OF O.R.
9. EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF PACIFIC BELL, RECORDED 12/10/1987 AS INSTRUMENT NO. 87-682038 OF O.R.
10. EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SAN DIEGO GAS & ELECTRIC RECORDED 6/4/1999 AS INSTRUMENT NO. 1999-0392158 OF O.R.
11. 25' WIDE EASEMENT TO OTAY MUNICIPAL WATER DISTRICT RECORDED 2/15/1967 AS FILE NO. 20418, O.R.
12. 30' WIDE EASEMENT TO OTAY MUNICIPAL WATER DISTRICT RECORDED 2/9/1967 AS FILE NO. 17466, O.R.
A. 20' WIDE EASEMENT TO SAN DIEGO GAS AND ELECTRIC COMPANY, RECORDED 8/24/1965 AS FILE NO. 80-352968, O.R.

KEY NOTES

1. PROPOSED DESILTATION BASIN (WITHIN FUTURE CALTRANS RIGHT-OF-WAY)
2. PROPOSED DETENTION BASIN (HYDROMODIFICATION BMP)
3. EXISTING 42" RCP STORM DRAIN TO BE ABANDONED
4. SEE PRELIMINARY ROUTE STUDIES FOR ROADWAY ELEVATION ON CIRCULATION ELEMENT ROADWAYS.

KEARNY Real Estate Company

OWNER/SUBDIVIDER

KEARNY REAL ESTATE COMPANY
530 B STREET, SUITE 1600
SAN DIEGO, CA 92101
PHONE: 619-702-5130
FAX: 619-702-7512

KEARNY POOP OTAY 311, LLC.

BY: _____ DATE:
JOHN V. BRAGO JR.
VICE PRESIDENT

ENGINEER OF WORK

STEVENS CRESTO ENGINEERING, INC.
9665 CHESAPEAKE DRIVE, SUITE 320
SAN DIEGO, CA 92123-1352
PHONE: (858) 694-5660
FAX: (858) 694-5661

REGISTERED PROFESSIONAL ENGINEER MARK L. STEVENS No. 35502 Exp. 6-30-13 CIVIL STATE OF CALIFORNIA

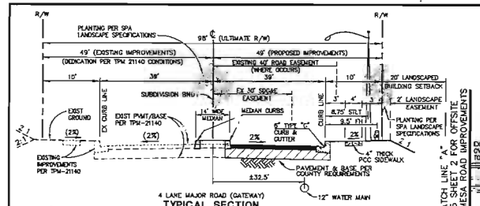
MARK E. STEVENS DATE
R.C.E. 35502

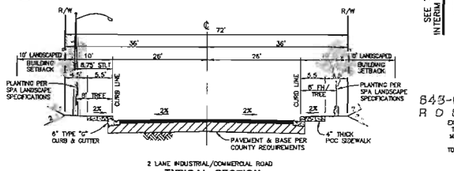
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PHONE: 858.694.5660 FAX: 858.694.5661
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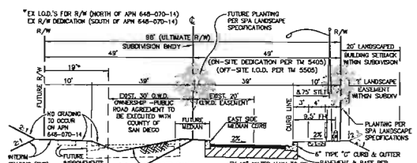
COUNTY OF SAN DIEGO TRACT 5405R

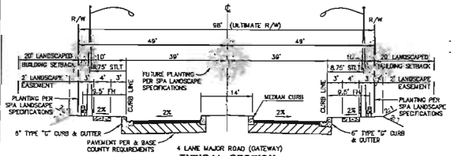
OTAY CROSSINGS COMMERCE PARK – NO CHANNEL OPTION

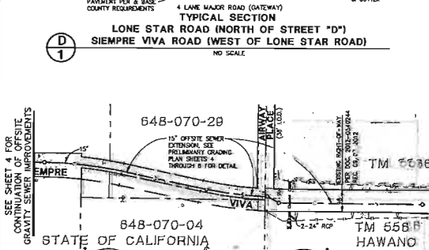
PRELIMINARY GRADING PLAN

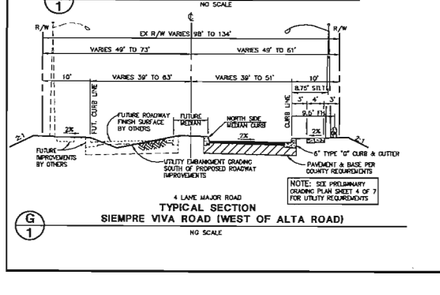


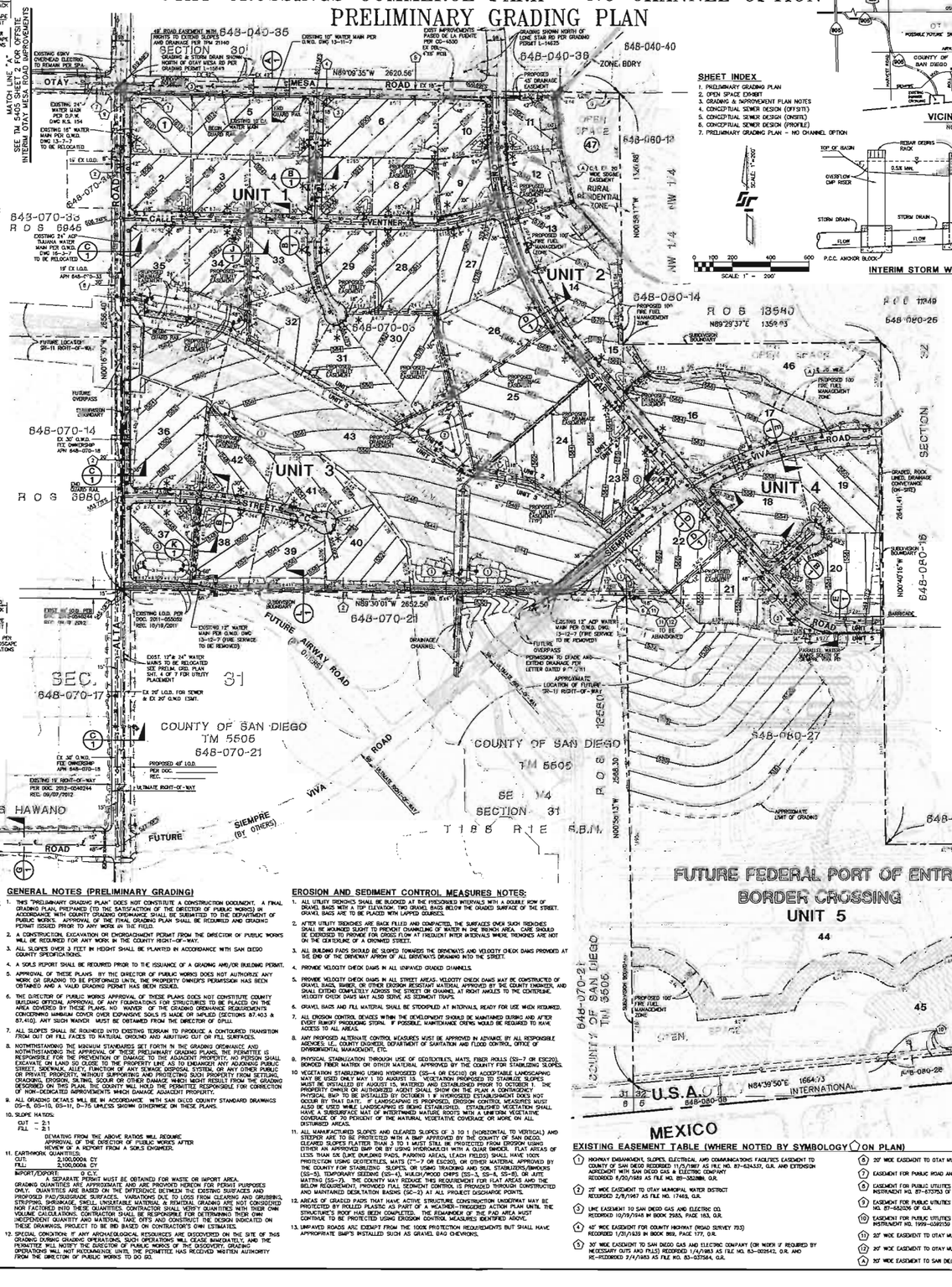











SEE SHEET 5 FOR MATCH LINE "A" CONTINUATION OF OFFSITE GRADING AND ROAD IMPROVEMENTS
SEE SHEET 4 FOR CONTINUATION OF OFFSITE GRAVITY SEWER IMPROVEMENTS
648-040-35
648-040-36
648-040-38
648-040-40
ZONE B0RY
SECTION 30
N89°09'35"W 2620.56'
OTAY MESA ROAD
EXISTING 60' ROAD EASEMENT WITH RIGHTS TO EXTEND SLOPES AND DRAINAGE PER TPM 21140
EXISTING ESMV OVERHEAD ELECTRIC TO REMAIN PER SPA
EXIST IMPROVEMENTS PASEO DE LA FUENTE PER DG-4000
EX PROP. 7'SD MESA
GRADING SHOWN NORTH OF LONE STAR RD PER GRADING PERMIT 1-10623
PROPOSED 45' DRAINAGE EASEMENT
OPEN SPACE LOT 47
EXISTING 24" WATER MAIN PER D.P.W. DWG W.S. 154
EXISTING 16" WATER MAIN P.O.C. W.O. DWG. 13-7-7 TO BE RELOCATED
15' EX L.O.D.
8" SEWER
UNIT 1
CALLE VENTNER
EXISTING 24" ACP TRAVANA WATER MAIN PER D.W.G. DWG 16-2-7 TO BE RELOCATED
10' EX L.O.D.
APH 648-070-33
648-070-35
R O S 6946
648-070-03
R O S 13540
N89°29'37"E 1359.83'
648-080-14
648-080-26
UNIT 2
UNIT 3
UNIT 4
UNIT 5
SUBDIVISION BOUNDARY
PROPOSED 100' FIRE FUEL MANAGEMENT ZONE
PROPOSED EASEMENT
PROPOSED RIGHT-OF-WAY
PROPOSED LOT LINE
PROPOSED 45' DRAINAGE EASEMENT
PROPOSED 30' DRAINAGE EASEMENT
PROPOSED 20' SEWER EASEMENT
PROPOSED 20' WATER EASEMENT
PROPOSED 10' PUBLIC UTILITY EASEMENT
PROPOSED 10' PRIVATE DRAINAGE EASEMENT
PROPOSED 10' PRIVATE SEWER EASEMENT
PROPOSED 10' PRIVATE WATER EASEMENT
PROPOSED 10' PRIVATE UTILITY EASEMENT
PROPOSED 10' PRIVATE ACCESS EASEMENT
PROPOSED 10' PRIVATE ACCESS & UTILITY EASEMENT
PROPOSED 10' PRIVATE ACCESS & DRAINAGE EASEMENT
PROPOSED 10' PRIVATE ACCESS, UTILITY & DRAINAGE EASEMENT
PROPOSED 10' PRIVATE ACCESS, UTILITY & SEWER EASEMENT
PROPOSED 10' PRIVATE ACCESS, UTILITY & WATER EASEMENT
PROPOSED 10' PRIVATE ACCESS, UTILITY, DRAINAGE & SEWER EASEMENT
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PROPOSED 10' PRIVATE SEWER & WATER EASEMENT
PROPOSED 10' PRIVATE DRAINAGE, SEWER & WATER EASEMENT
PROPOSED 10' PRIVATE ACCESS & SEWER EASEMENT
PROPOSED 10' PRIVATE ACCESS & WATER EASEMENT
PROPOSED 10' PRIVATE ACCESS, SEWER & WATER EASEMENT
PROPOSED 10' PRIVATE ACCESS, DRAINAGE & SEWER EASEMENT
PROPOSED 10' PRIVATE ACCESS, DRAINAGE & WATER EASEMENT
PROPOSED 10' PRIVATE ACCESS, DRAINAGE, SEWER & WATER EASEMENT
PROPOSED 10' PRIVATE ACCESS, UTILITY, SEWER & WATER EASEMENT
PROPOSED 10' PRIVATE ACCESS, UTILITY, DRAINAGE, SEWER & WATER

SECTION 3

HYDROLOGY

PRE-PROJECT HYDROLOGY 3-1

Exhibit D-E1, Pre-Project Condition Drainage Basins

BASIN A 3-1A
BASIN B 3-1B
BASIN C 3-1C
BASIN D 3-1D

DEVELOPED HYDROLOGY 3-2

Exhibit D-P1, Developed Condition Drainage Basins

BASIN A 3-2A
BASIN B 3-2B
BASIN C 3-2C
BASIN D 3-2D

SECTION 3-1

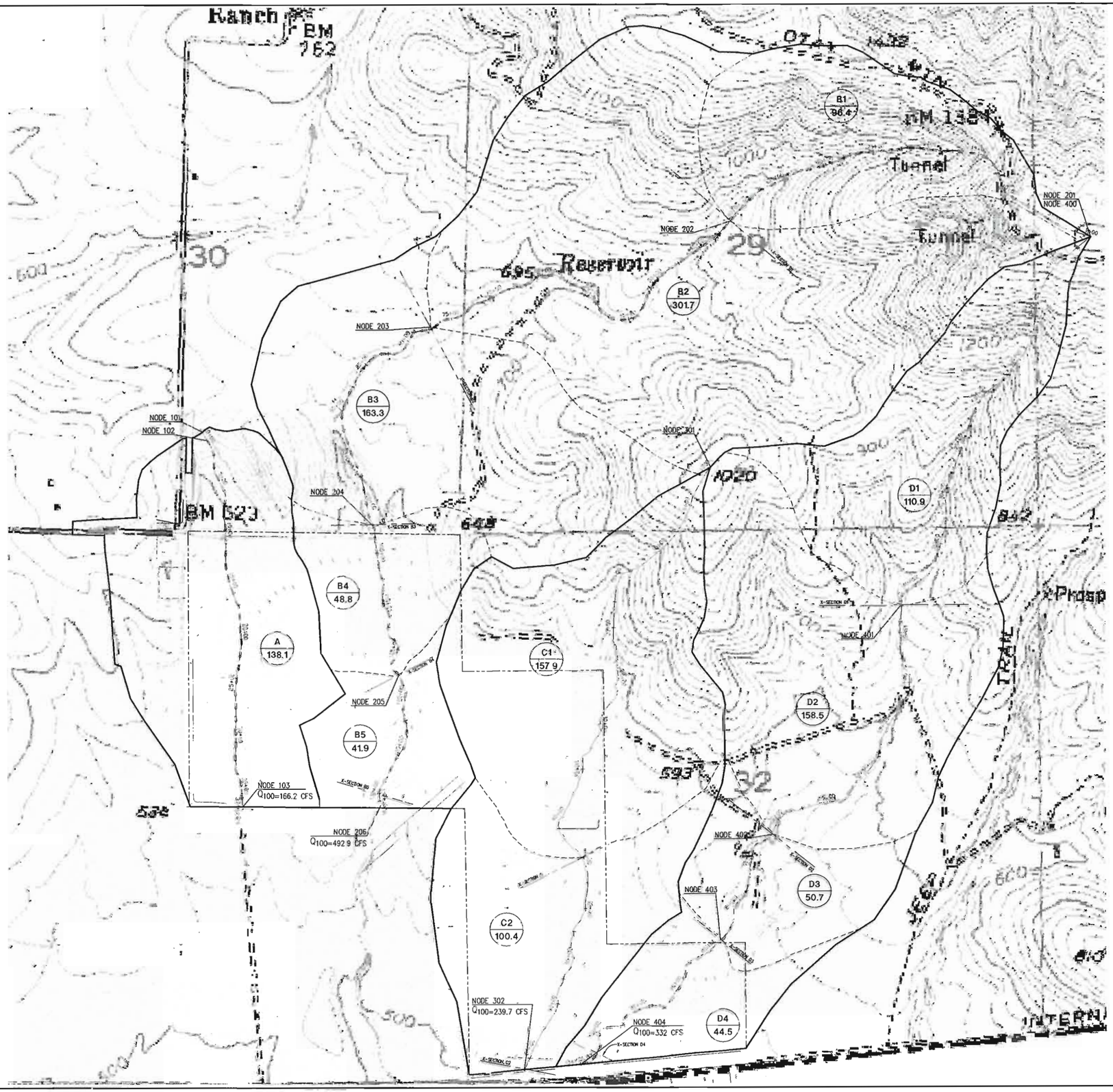
PRE-PROJECT HYDROLOGY

HYDROLOGY PROCEDURE:

Processing and review of the OCCP Tentative Map began in 2004. Since that time, development has occurred north of OCCP, in drainage Basins A and B. These developments, as with all recent development in the Otay Mesa area, are required to implement detention or other means to ensure that post-development runoff rates do not exceed pre-project runoff rates, thus mimicking the pre-project condition to the maximum extent practicable. As a result, the pre-project condition, or what was the existing condition in 2004, is utilized in this study as the "baseline" analysis for the project.

Hydrologic analysis of the Regional Basin was prepared using the "San Diego County Hydrology Manual; June 2003 (the "Manual").

The project site, in the pre-project condition, is undeveloped property consisting of natural terrain that is situated within four distinct regional drainage basins, draining north to south. Runoff passing through the site flows south across the border into Mexico and ultimately to the Tijuana River. This study analyzes historic Basins A, B, C, and D. Drainage Exhibit "D-E1" within Section 7 depicts the pre-project basin limits being studied; a reduced copy follows. The site is located within Hydrologic Soil Groups D. A runoff coefficient study was performed for the pre-project condition and is included in this section as Exhibit "D-R1". The study takes into account existing roads, developments, and dirt trails in the project area. The study calculated a runoff coefficient of 0.41 for Basin A and 0.36 for Basins B, and C. A runoff coefficient of 0.36 is also used for Basin D due to its similarity to Basin B and C; no development occurs within Basin D. A Mannings roughness coefficient of 0.050 was used for channel flow due to the dense low lying brush found throughout the watersheds. Time of Concentration calculations utilize Maximum Overland Flow Length from Table 3-2 for initial Tc and Lm, and six hour precipitation taken from the County of San Diego isopluvial maps (isopluvial maps are included in Section 6 for reference). A County 200 Scale Ortho Topo is provided in Section 7 with the site location and tributary basins delineated. Descriptions and calculations for each historic basin follow in Sections 3-1A to 3-1D.



LEGEND

EXISTING GROUND CONTOURS
INDEX
INTERMEDIATE

DRAINAGE BASIN DESIGNATION
A / 0.57 — BASIN DESIGNATION (ALPHA CHARACTER: DEVELOPED, REGIONAL RUNOFF AREAS)
BASIN AREA (Acres)

EXISTING BASIN BOUNDARY

PROPERTY LINE

FLOW PATH

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OTAY CROSSINGS COMMERCE PARK
TM 5405R
OTAY MESA, CALIFORNIA

EXHIBIT "D-E1"
PRE-PROJECT CONDITION DRAINAGE BASINS

DATE: 08/14/12
SCE NO. 03043.00
SHEET
D-E1
1 OF 1 SHEETS

* REDUCED - SEE SECTION 7 FOR FULL SIZE *

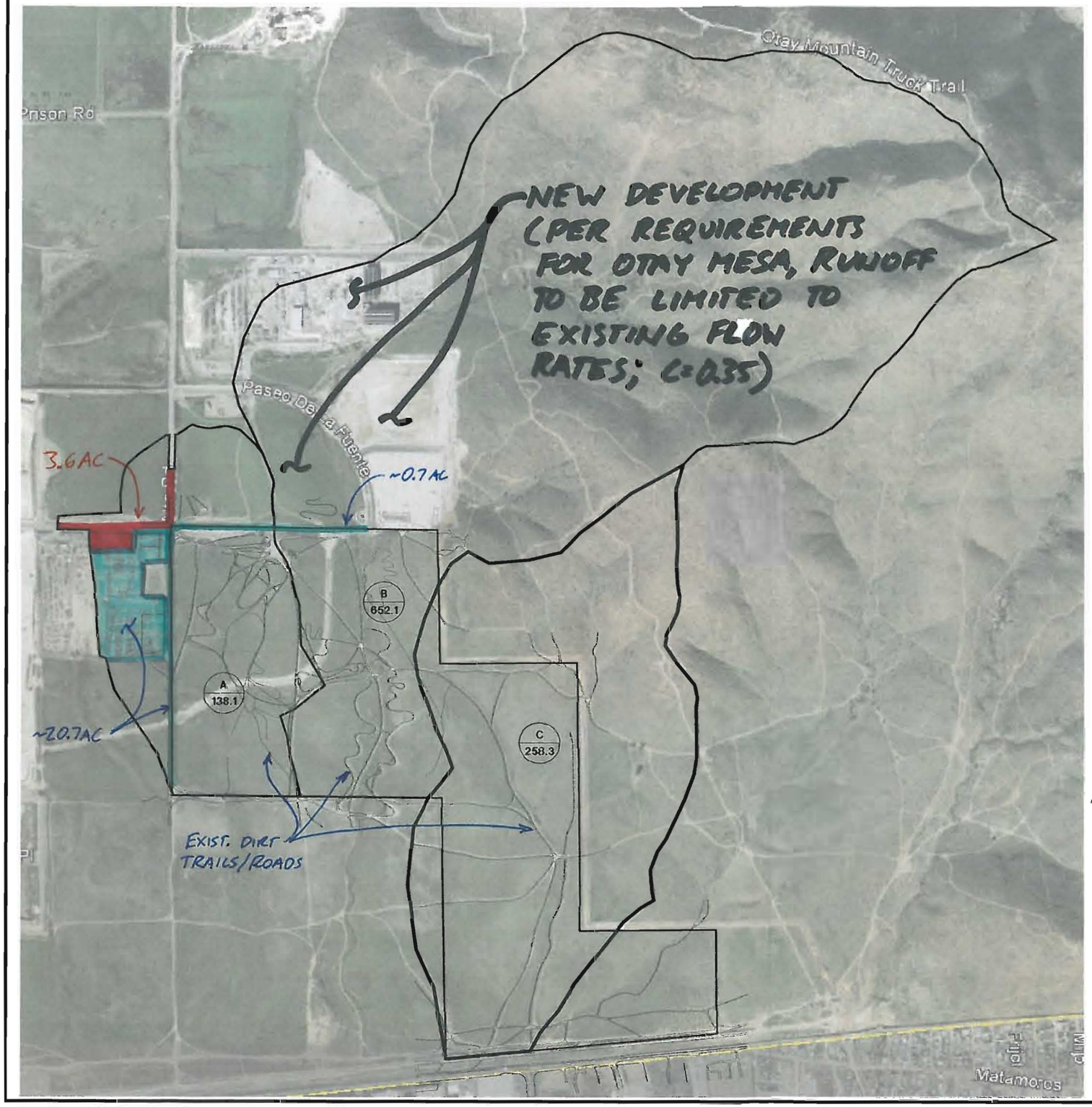
OTAY CROSSINGS COMMERCE PARK

EXISTING CONDITION

(Rational Method Procedure)

Otay Mesa, CA P6 = 3.4 in. RUN: 8/13/12 5:29 PM

BASIN INFORMATION							FOR REFERENCE ONLY
DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_C min	C x A	I_{100} in/hr	Q_{100} cfs	
A	138.1	0.41	28.2	56.62	2.94	166.2	
B	652.1	0.36	47.4	234.76	2.10	492 9	
C	258.3	0.36	34.5	92.99	2.58	239.7	
D	364.8	0.36	35.5	131.3	2.53	332.3	



LEGEND

PROPOSED GROUND CONTOURS
360

EXISTING GROUND CONTOURS
360 INDEX
360 INTERMEDIATE

DRAINAGE BASIN DESIGNATOR

A
0.57

– BASIN DESIGNATION (ALPHA CHARACTERS DESIGNATE REGIONAL RUNOFF AREAS)

– BASIN AREA (Acres)

DRAINAGE BASIN BOUNDARY

PROPERTY LINE

IMPERVIOUS SURFACE

DG SURFACE

EXIST. TRAIL AREA CALCS

BASIN A:

TRAIL AREA ~ 15644 LF × 11 FT/43560

~ 4.0 AC

BASIN B:

TRAIL AREA ~ 18505 LF × 10FT/43560

~ 4.25 AC IN 97 AC

TOTAL AREA ~ $\frac{4.25\,AC}{97\,AC} \times 652.1\,AC$

= 28.6 AC

BASIN C:

TRAIL AREA ~ 20580 FT × 10FT/43560

~ 4.72 AC IN 89 AC

TOTAL AREA ~ $\frac{4.72\,AC}{89\,AC} \times 258.3\,AC$

= 13.7 AC

RUNOFF COEFFICIENT CALCULATIONS

A: $C_A = \frac{0.95(3.6\,AC) + 0.58(24.7\,AC) + 0.35(109.8\,AC)}{138.1\,AC}$

$C_A = 0.41$

B: $C_B = \frac{0.58(29.3\,AC) + 0.35(622.8\,AC)}{652.1\,AC}$

$C_B = 0.36$

C: $C_C = \frac{0.58(13.7\,AC) + 0.35(244.6\,AC)}{258.3\,AC}$

$C_C = 0.36$

STEVENS · CERETO ENGINEERING, INC.
CIVIL ENGINEERS · LAND PLANNERS · SURVEYORS
1661 CHAMPAGNE COURT, SUITE 320, SAN DIEGO, CA 92173-1352
PHONE: 858-499-0660
FAX: 858-499-0661
www.scengineers.com

OTAY CROSSINGS COMMERCE PARK
OTAY MESA, CALIFORNIA

EXHIBIT "D-R1"
EXISTING CONDITION RUNOFF COEFFICIENT STUDY

DATE: 05/03/12
JOB NO. 0304.3.08
SHEET D-R1
1 OF 1 SHEETS

SECTION 3-1A

PRE-PROJECT HYDROLOGY, BASIN A

Basin "A" topography falls gently from North to South from a ridge on the northern boundary of the watershed (design point 101 on Exhibit D-E1). Runoff is conveyed via overland sheet flow through the center of the watershed until ultimately being discharged to the natural watercourse (Node 103). From there, the watercourse continues south into Mexico. See Exhibit "D-E1", in this section, which depicts existing drainage conditions. The Basin "A" watershed is comprised of 138.1 acres and generates a peak runoff rate of approximately 166.2 cfs during the 100-year storm event. A runoff coefficient of 0.41 was utilized in the runoff calculations, per the Existing Condition Runoff Coefficient Study, Exhibit "D-R1", included in this section.

PRE-PROJECT BASIN A
TIME OF CONCENTRATION CALCULATIONS

NODE 101-102:
OVERLAND FLOW
PER COUNTY
HYDROLOGY MANUAL,
TABLE 3-2
$S \sim 3.8\%$
$L_m = 100$ FT

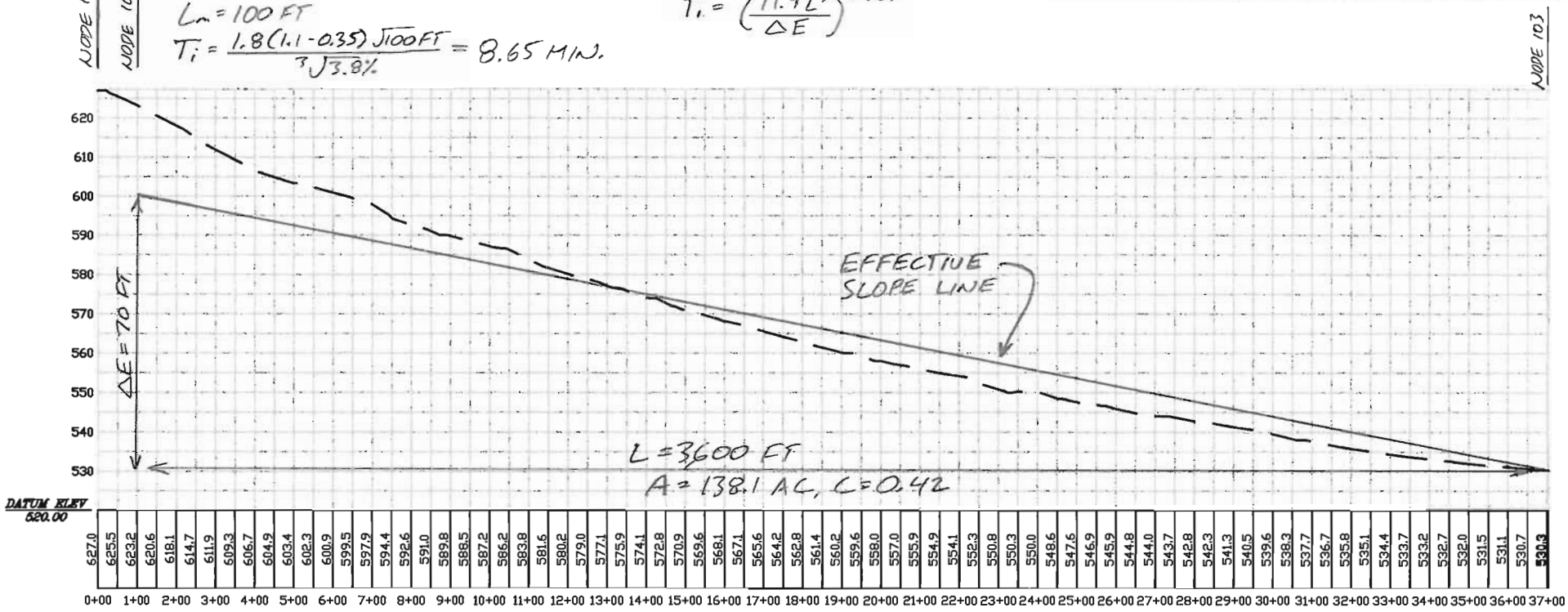
$$T_i = \frac{1.8(1.1-0.35)\sqrt{100\,FT}}{\sqrt[3]{3.8\%}} = 8.65 \text{ MIN.}$$

NODE 102-103:
FLOW THROUGH NATURAL
WATERSHED PER COUNTY
HYDROLOGY MANUAL,
FIG. 3-5:

$$T_i = \left(\frac{11.9L^3}{\Delta E}\right)^{0.385}$$

$$T_i = \left(\frac{11.9\left(\frac{3600\,FT}{5280}\right)^3}{70\,FT}\right)^{0.385} \times 60 = 19.5 \text{ MIN}$$

$$T_c = 8.65 \text{ MIN.} + 19.5 \text{ MIN} = 28.2 \text{ MIN.}$$



1" = 400' HORIZ.
1" = 40' VERT.

SECTION 3-1B

PRE-PROJECT HYDROLOGY, BASIN B

Basin "B" topography generally falls gently to the southwest from a highpoint in the northeast corner of the watershed (design point 201 on Exhibit D-E1). Runoff is conveyed via overland sheet flow through the center of the watershed until ultimately being discharged to the natural watercourse (Node 206). From there, the watercourse continues south into Mexico. See Exhibit "D-E1", in this section, which depicts existing drainage conditions. The Basin "B" watershed is comprised of 652.1 acres and generates a peak runoff rate of approximately 492.9 cfs during the 100-year storm event. A runoff coefficient of 0.36 was utilized in the runoff calculations, per the Existing Condition Runoff Coefficient Study, Exhibit "D-R1", included in this section.

PRE-PROJECT BASIN "B"
$P_6 = 3.4$, $C = 0.36$

$$T_1 = \left(\frac{11.9\,L^3}{\Delta E}\right)^{.385} \times 60 + T_i$$

$$T_1 = \left[\frac{11.9\left(\frac{4,000}{5280}\right)^3}{698}\right]^{.385} \times 60 + 10.3$$

$T_1 = 19.38$ min

S = 3%
Lm = 100'
T_i = 10.3 min

$\Delta E = 698'$

$I_{100} = 7.44(P_6)\,D^{-.645}$
$I_{100} = 7.44(3.4)(19.38)^{-.645}$
$I_{100} = 3.73$ in/hr

$Q_{100} = C\,I_{100}\,A$
$Q_{100} = (0.36)(3.73)(96.4)$
$Q_{100} = 129.4$ cfs

BASIN B-1
L = 4,000ft
A = 96.4AC
C = 0.36

AREA TOTAL = 96.4 AC

6.2%

BASIN B-2
L = 3456'
A = 301.7 AC
n = 0.05
C = 0.36

2.0%

AREA TOTAL = 398.1 AC

2.0%

BASIN B-3, L = 2454'
A = 164.1 AC

AREA TOTAL = 562.2 AC

BASIN B-4
L = 1563'
A = 48.8 AC

AREA TOTAL = 611.0 AC, NODE 205

BASIN B-5
L = 1523
A = 41.9 AC

2%

CALCULATIONS CONTINUE NEXT PAGE

1" = 800' HORIZ
1" = 160' VERT

(1) NODE 202

X-SECTION (1)
$Q_{100} = 129.4$, $V_1 = 7.0$ fps
$T_2 = \frac{L}{V} \times \frac{1}{60} + T_1 = \frac{3456}{7.0\,(60)} + 19.4$
$T_2 = 27.6$ min

$I_{100} = 7.44\,(3.4)(27.6)^{-.645}$
$I_{100} = 2.98$ in/hr

$Q_{100} = (0.36)(2.98)(398.1)$
$Q_{100} = 427.1$ cfs

(2) NODE 203

X-SECTION (2)
$Q_{100} = 427.1$ cfs , $V_2 = 6.5$ fps
$V_{AVG_2} = \frac{7.0+6.5}{2} = 6.75$ fps

$T_2 = \frac{3456}{6.75\,(60)} + 19.4 = 27.9$ min
$I_{100} = 7.44\,(3.4)(27.9)^{-.645}$
$I_{100} = 2.96$ in/hr
$Q_{100} = (0.36)(2.96(398.1)$
$Q_{100} = 424.2$ cfs → $V_2 = 6.4$

$V_{AVE} = \frac{7.0+6.4}{2} =$
$T_2 = \frac{3454}{(6.7)(60)} + 19.4 = 28.0$ min
$I_{100} = 2.95$ in/hr
$Q_{100} = 422.8$ → 6.4 fps

$T_2 = 28.0$ min

(3) NODE 204

X-SECTION (3)
$Q_{100} = 422.8$ cfs , $V_3 = 3.9$ fps
$V_{AVG} = \frac{3.9+6.4}{2} = 5.15$ fps

$T_3 = \frac{2454}{5.15\,(60)} + 28.0 = 35.9$ min
$I_{100} = 7.44\,(3.4)(35.9)^{-.645}$
$I_{100} = 2.57$ in/hr
$Q_{100} = (0.36)(2.51)(562.2)$
$Q_{100} = 508.0$ cfs → $V_3 = 4.07$ fps

$T_3 = \frac{1563}{(4.07)(60)} + 28.0 = 34.4$ min
$I_{100} = 2.58$ in/hr
$Q_{100} = 522.2$ cfs → $V_3 = 4.1$ fps

$T_3 = 34.4$ min

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SHEET _____ OF _____
PROJECT NO. _____
PROJECT _____
BY _____ CHK _____
DATE

PRE-PROJECT BASIN B
TIME OF CONCENTRATION CALCULATIONS CONTINUED

BASIN B-4 ($L = 1563$, $A = 48.8$ AC, $A_T = 611.0$ AC)

$Q_{100} = 522.2$ cfs, $V_4 = 4.4$ fps

V_{AVG_4} ($V_3 + V_4$) $= \frac{4.1 + 4.4}{2} = 4.3$ fps

$T_4 = \frac{L}{V} \times \frac{1}{60} + T_3 = \frac{1563}{4.3 \cdot (60)} + 34.4$

$T_4 = 40.5$ min

$I_{100} = 7.44 (3.4)(40.5)^{-.645} = 2.32$ in/hr

$Q_{100} = (0.36)(2.32)(611.0)$

$Q_{100} = 510.3$ cfs $\rightsquigarrow$ $V_4 = 4.4$ fps

$T_4 = 40.3$ min

BASIN B-5 ($L = 1523'$, $A = 41.9$ AC, $A_T = 652.1$ AC)

$Q_{100} = 510.3$ cfs, $V_5 = 3.6$ fps

V_{AVG_4} ($V_4 + V_5$) $= \frac{4.4 + 3.6}{2} = 4.0$ fps

$T_5 = \frac{1523}{4.0 \cdot (60)} + 40.3 = 46.6$ min

$I_{100} = 7.44 (3.4)(46.6)^{-.645} = 2.12$ in/hr

$Q_{100} = (0.36)(2.12)(652.1)$

$Q_{100} = 497.7$ cfs $\rightsquigarrow$ $V_5 = 3.57$ fps

$T_5 = 47.4$ min, $I_{100} \sim 2.10$

PRE-PROJECT BASIN "B" SUMMARY
$A = 652.1$ AC, $T_C = 47.4$ min

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PRE-PROJECT BASIN "B" SECTION 1
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	.062000	ft/ft
Discharg	129.40	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	821.88	ft
Elevation Range	.00 to 860.00	
Flow Area	18.5	ft²
Wetted Perimeter	20.08	ft
Top Width	19.70	ft
Actual Depth	1.88	ft
Critical Elevation	822.07	ft
Critical Slope	0.036950	ft/ft
Velocity	7.00	ft/s
Velocity Head	0.76	ft
Specific Energy	822.64	ft
Froude Number	1.27	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-1+81	1+87	0.050

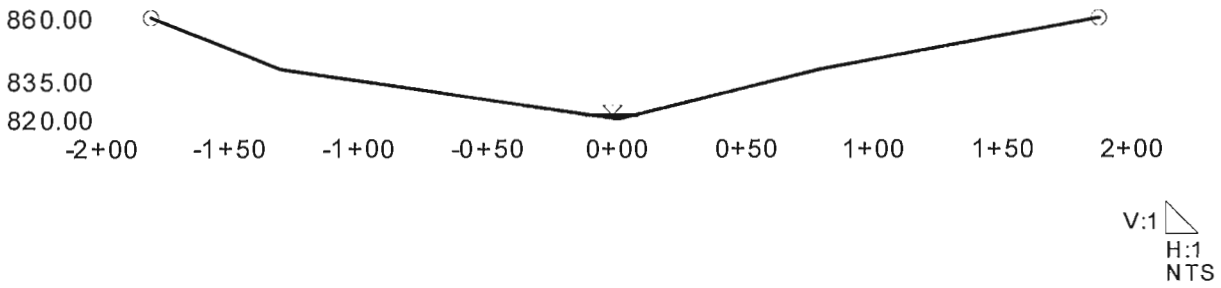
Natural Channel Points

Station (ft)	Elevation (ft)
-1+81	860.00
-1+31	840.00
0+00	820.00
0+79	840.00
1+87	860.00

PRE-PROJECT BASIN B, SECTION 1
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.062000	ft/ft
Water Surface Elev	821.88	ft
Elevation Range	).00 to 860.00	
Discharge	129.40	cfs



PRE-PROJECT BASIN "B" SECTION 2
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data	
Slope	.030000 ft/ft
Discharg	422.80 cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	642.82	ft
Elevation Range	.00 to 680.00	
Flow Area	65.7	ft²
Wetted Perimeter	46.97	ft
Top Width	46.63	ft
Actual Depth	2.82	ft
Critical Elevation	642.77	ft
Critical Slope	0.033010	ft/ft
Velocity	6.44	ft/s
Velocity Head	0.64	ft
Specific Energy	643.46	ft
Froude Number	0.96	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-4+20	1+70	0.050

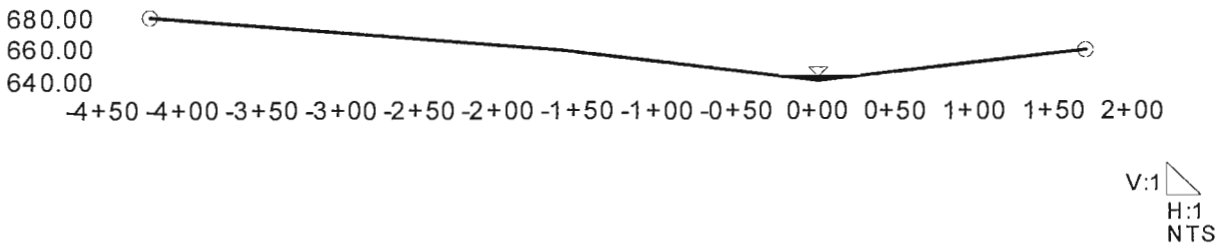
Natural Channel Points

Station (ft)	Elevation (ft)
-4+20	680.00
-1+61	660.00
0+00	640.00
1+70	660.00

PRE-PROJECT BASIN B, SECTION 2
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chani
Method	Manning's Forr
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.030000	ft/ft
Water Surface Elev	642.82	ft
Elevation Range	).00 to 680.00	
Discharge	422.80	cfs



PRE-PROJECT BASIN "B" SECTION 3
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	.020000	ft/ft
Discharg	522.20	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	589.48	ft
Elevation Range	3.00 to 594.00	
Flow Area	127.3	ft²
Wetted Perimeter	131.91	ft
Top Width	131.83	ft
Actual Depth	1.48	ft
Critical Elevation	589.26	ft
Critical Slope	0.038551	ft/ft
Velocity	4.10	ft/s
Velocity Head	0.26	ft
Specific Energy	589.74	ft
Froude Number	0.74	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-1+82	1+13	0.050

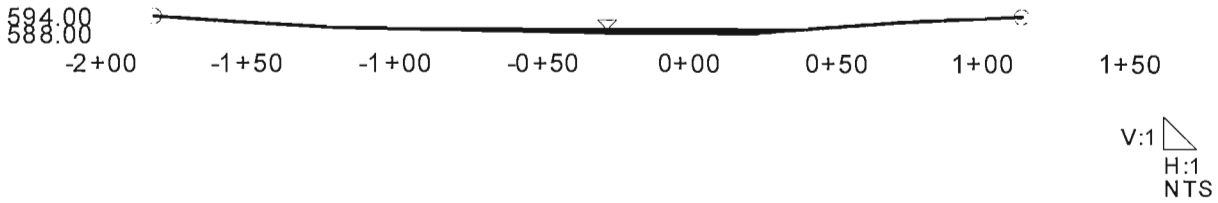
Natural Channel Points

Station (ft)	Elevation (ft)
-1+82	594.00
-1+54	592.00
-1+20	590.00
-0+20	588.00
0+00	588.00
0+20	588.00
0+44	590.00
0+71	592.00
1+13	594.00

PRE-PROJECT BASIN B, SECTION 3
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.020000	ft/ft
Water Surface Elev	589.48	ft
Elevation Range	3.00 to 594.00	
Discharge	522.20	cfs



PRE-PROJECT BASIN "B" SECTION 4
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	.020000	ft/ft
Discharg	510.30	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	557.55	ft
Elevation Range	3.00 to 562.00	
Flow Area	115.8	ft²
Wetted Perimeter	107.80	ft
Top Width	107.73	ft
Actual Depth	1.55	ft
Critical Elevation	557.32	ft
Critical Slope	0.037175	ft/ft
Velocity	4.41	ft/s
Velocity Head	0.30	ft
Specific Energy	557.85	ft
Froude Number	0.75	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-1+82	1+08	0.050

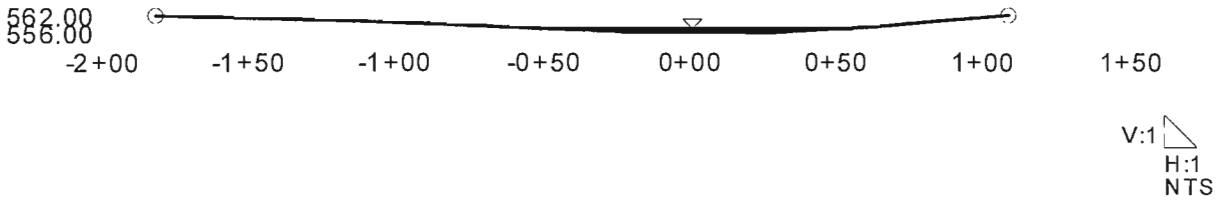
Natural Channel Points

Station (ft)	Elevation (ft)
-1+82	562.00
-1+12	560.00
-0+64	558.00
-0+15	556.00
0+00	556.00
0+27	556.00
0+63	558.00
0+84	560.00
1+08	562.00

PRE-PROJECT BASIN B, SECTION 4
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chanı
Method	Manning's Forı
Solve For	Channel Depth

Section Data		
Mannings Coefficiei	0.050	
Slope	0.020000	ft/ft
Water Surface Elev	557.55	ft
Elevation Range	3.00 to 562.00	
Discharge	510.30	cfs



PRE-PROJECT BASIN "B" SECTION 5
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	.015000	ft/ft
Discharg	498.30	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	534.93	ft
Elevation Range	3.00 to 538.00	
Flow Area	139.4	ft²
Wetted Perimeter	143.25	ft
Top Width	143.19	ft
Actual Depth	1.93	ft
Critical Elevation	534.62	ft
Critical Slope	0.039058	ft/ft
Velocity	3.57	ft/s
Velocity Head	0.20	ft
Specific Energy	535.13	ft
Froude Number	0.64	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-1+05	1+96	0.050

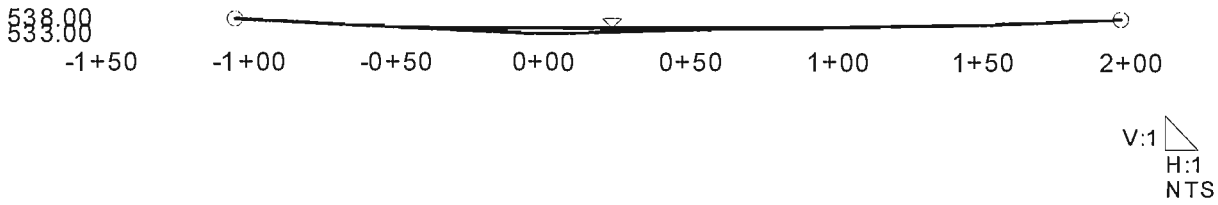
Natural Channel Points

Station (ft)	Elevation (ft)
-1+05	538.00
-0+70	536.00
-0+30	534.00
0+00	533.00
0+45	534.00
1+51	536.00
1+96	538.00

PRE-PROJECT BASIN B, SECTION 5
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN B SEC
Flow Element	Irregular Chanı
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.015000	ft/ft
Water Surface Elev	534.93	ft
Elevation Range	3.00 to 538.00	
Discharge	498.30	cfs



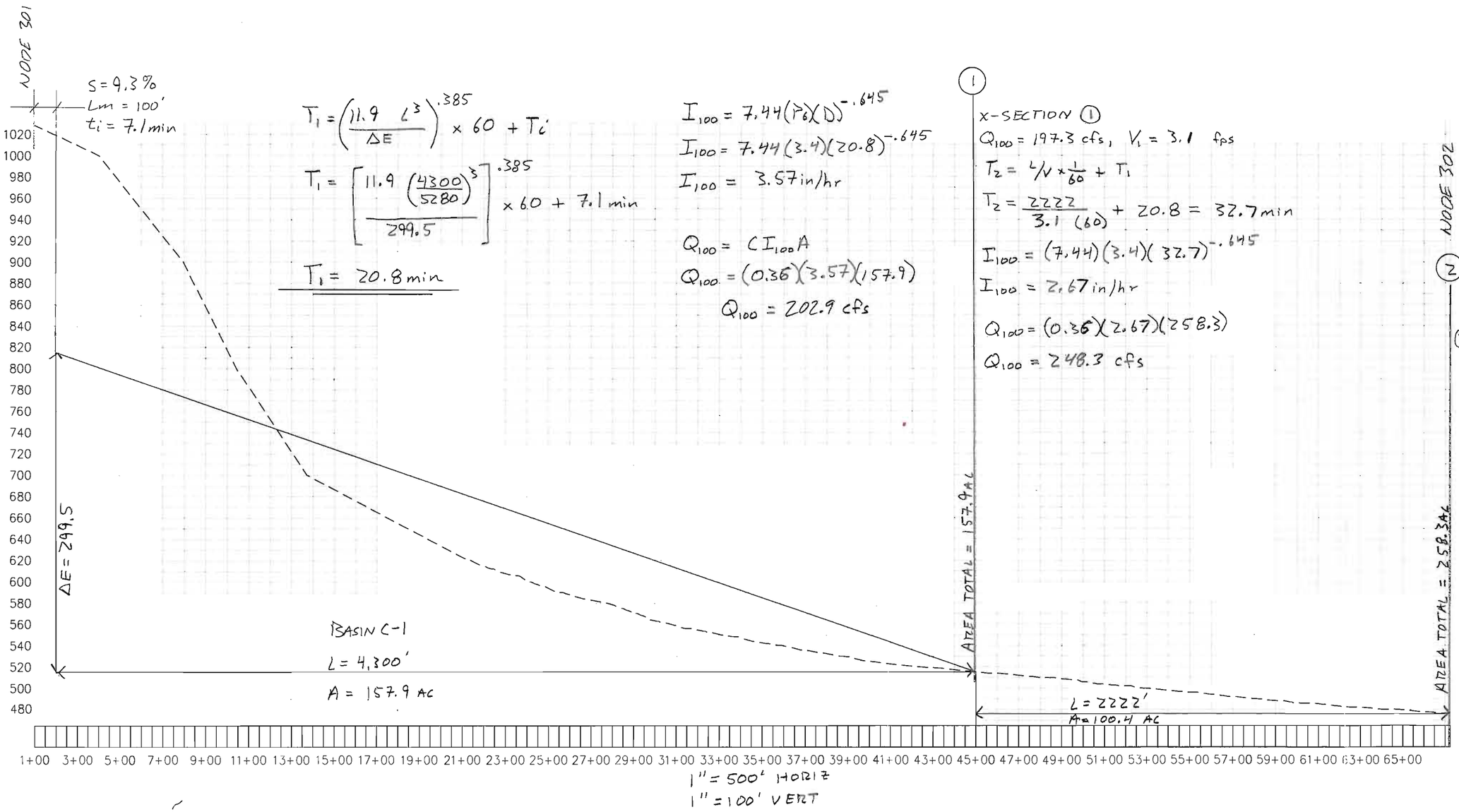
SECTION 3-1C

PRE-PROJECT HYDROLOGY, BASIN C

Basin "C" topography falls gently to the south from a highpoint in the Northeast corner of the watershed (design point 301 on Exhibit D-E1). Runoff is conveyed via overland sheet flow through the center of the watershed until ultimately being discharged to the natural watercourse (Node 302). From there, the watercourse continues south into Mexico. See Exhibit "D-E1", in this section, which depicts existing drainage conditions. The Basin "C" watershed is comprised of 258.3 acres and generates a peak runoff rate of approximately 239.7 cfs during the 100-year storm event. A runoff coefficient of 0.36 was utilized in the runoff calculations, per the Existing Condition Runoff Coefficient Study, Exhibit "D-R1", included in this section.

PRE-PROJECT BASIN C
$P_6 = 3.4$, $C = 0.36$

PRE-PROJECT BASIN C
TIME OF CONCENTRATION CALCULATIONS



$$T_1 = \left(\frac{11.9\ L^3}{\Delta E}\right)^{.385} \times 60 + T_i'$$

$$T_1 = \left[\frac{11.9\ \left(\frac{4300}{5280}\right)^3}{299.5}\right]^{.385} \times 60 + 7.1\ \text{min}$$

$$T_1 = 20.8\ \text{min}$$

$$I_{100} = 7.44(P_6)(D)^{-.645}$$

$$I_{100} = 7.44(3.4)(20.8)^{-.645}$$

$$I_{100} = 3.57\ \text{in/hr}$$

$$Q_{100} = CI_{100}A$$

$$Q_{100} = (0.36)(3.57)(157.9)$$

$$Q_{100} = 202.9\ \text{cfs}$$

(1)

x-SECTION (1)

$Q_{100} = 197.3$ cfs, $V_1 = 3.1$ fps

$$T_2 = L/V \times \frac{1}{60} + T_1$$

$$T_2 = \frac{2222}{3.1\ (60)} + 20.8 = 32.7\ \text{min}$$

$$I_{100} = (7.44)(3.4)(32.7)^{-.645}$$

$$I_{100} = 2.67\ \text{in/hr}$$

$$Q_{100} = (0.36)(2.67)(258.3)$$

$$Q_{100} = 248.3\ \text{cfs}$$

(2)

$Q_{100} = 248.3$ cfs, $V_2 = 2.7$ fps

$$V_{AVG\ (V_1 - V_2)} = \frac{2.7 + 3.1}{2} = 2.9\ \text{fps}$$

$$T_2 = \frac{2222}{2.9\ (60)} + 20.8 = 33.6\ \text{min}$$

$$I_{100} = 7.44\ (3.4)(33.6)^{-.645} = 2.62\ \text{in/hr}$$

$$Q_{100} = (0.36)(2.62)(258.3)$$

$Q_{100} = 243.6$ cfs $\rightsquigarrow V_2 = 2.7$ fps

$$T_2 = \frac{2222}{2.7\ (60)} + 20.8 = 34.5\ \text{min}$$

I_{100} 2.58 in/hr

$Q_{100} = 239.9$ cfs $\rightsquigarrow V_2 = 2.7$ fps

$$T_c = 34.5\ \text{min}$$

EXISTING BASIN "C" SECTION 1
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN C SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.020000	ft/ft
Discharg	202.90	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	516.19	ft
Elevation Range	5.00 to 520.00	
Flow Area	65.8	ft²
Wetted Perimeter	104.83	ft
Top Width	104.80	ft
Actual Depth	1.19	ft
Critical Elevation	516.03	ft
Critical Slope	0.045337	ft/ft
Velocity	3.08	ft/s
Velocity Head	0.15	ft
Specific Energy	516.34	ft
Froude Number	0.69	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-1+31	1+10	0.050

Natural Channel Points

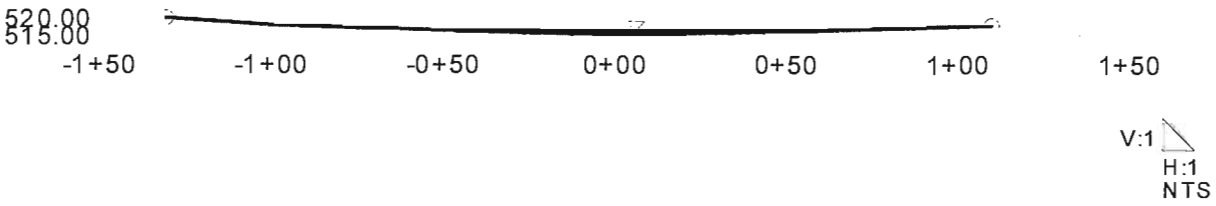
Station (ft)	Elevation (ft)
-1+31	520.00
-0+98	518.00
-0+41	516.00
0+00	515.00
0+53	516.00
1+10	518.00

Cross Section
Cross Section for Irregular Channel

BASIN C, SECTION 1

Project Description	
Worksheet	BASIN C SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.020000	ft/ft
Water Surface Elev	516.19	ft
Elevation Range	5.00 to 520.00	
Discharge	202.90	cfs



EXISTING BASIN "C" SECTION 2
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN C SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.015000	ft/ft
Discharge	239.90	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	477.46	ft
Elevation Range	3.20 to 480.00	
Flow Area	89.8	ft²
Wetted Perimeter	142.66	ft
Top Width	142.64	ft
Actual Depth	1.26	ft
Critical Elevation	477.22	ft
Critical Slope	0.045579	ft/ft
Velocity	2.67	ft/s
Velocity Head	0.11	ft
Specific Energy	477.57	ft
Froude Number	0.59	
Flow Type	Subcritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
-1+36	2+19	0.050

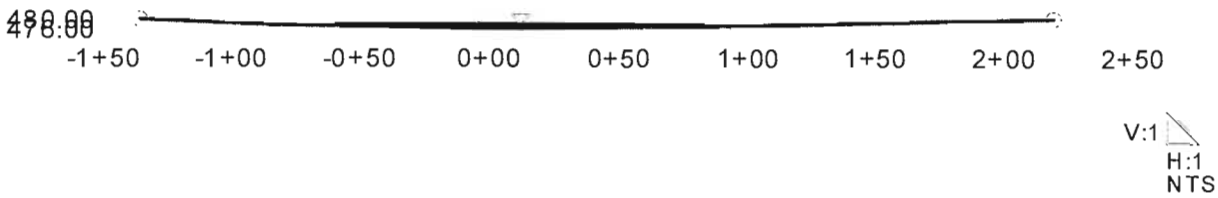
Natural Channel Points	
Station (ft)	Elevation (ft)
-1+36	480.00
-0+86	478.00
0+00	476.20
1+18	478.00
2+19	480.00

Cross Section
Cross Section for Irregular Channel

BASIN C, SECTION 2

Project Description	
Worksheet	BASIN C SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Dept

Section Data		
Mannings Coefficie	0.050	
Slope	0.015000	ft/ft
Water Surface Elev	477.46	ft
Elevation Range	3.20 to 480.00	
Discharge	239.90	cfs

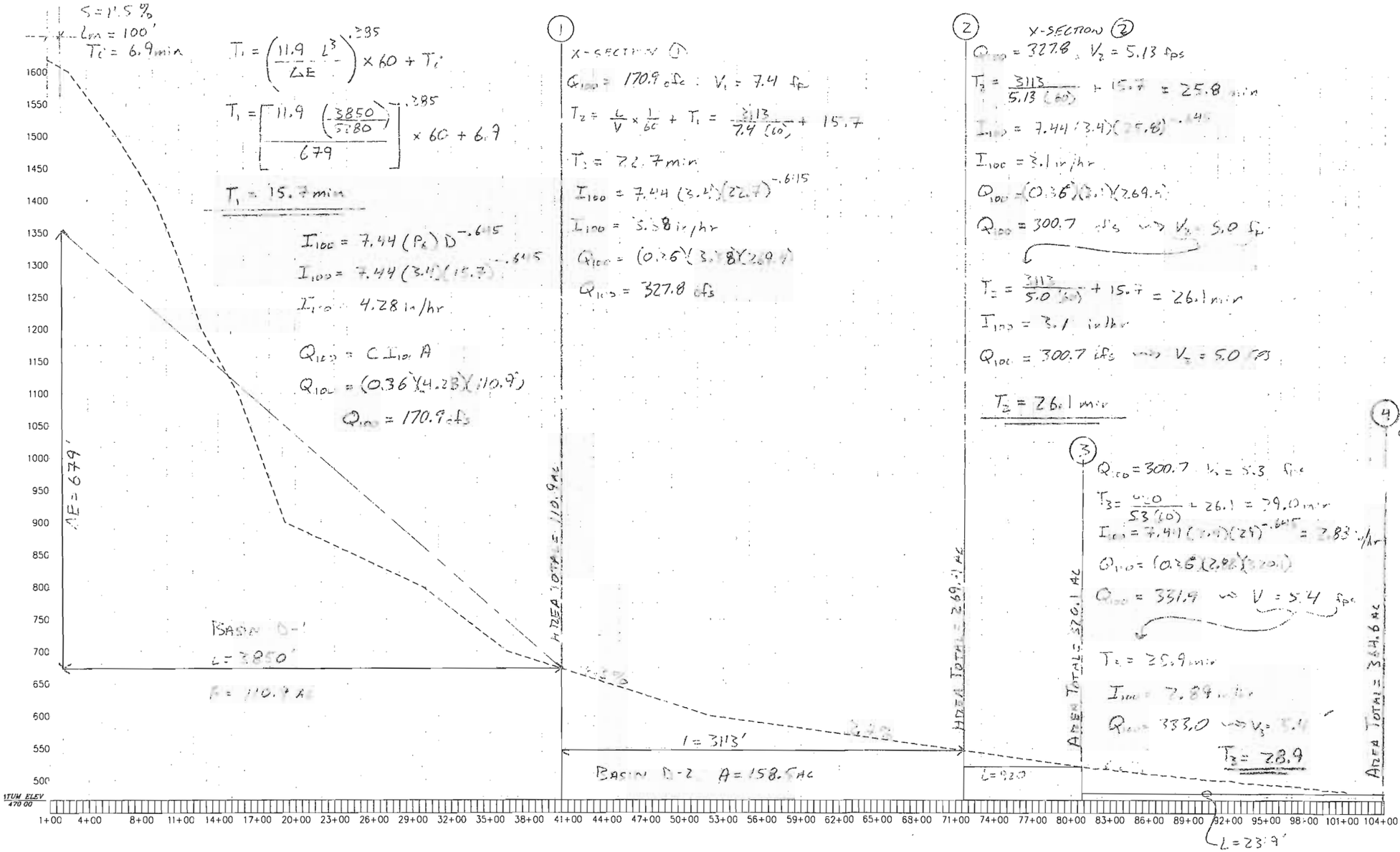


SECTION 3-1D

PRE-PROJECT HYDROLOGY, BASIN D

Basin "D" topography falls gently to the south from a highpoint in the Northwest corner of the watershed (design point 400 on Exhibit D-E1; a reduced copy follows). Runoff is conveyed via overland sheet flow and natural channel flow through the center of the watershed until ultimately being discharged to the natural watercourse (Node 404). From there, the watercourse continues south into Mexico. See Exhibit "D-E1", in this section, which depicts existing drainage conditions. The Basin "D" watershed is comprised of 364.8 acres and generates a peak runoff rate of approximately 332.3 cfs during the 100-year storm event. No development is proposed within Basin D.

EXISTING BASIN "D"
P_6 2.4, C = 0.36



$$T_i = \left(\frac{11.9\ L^3}{\Delta E}\right)^{.385} \times 60 + T_c$$

$$T_i = \left[\frac{11.9\ \left(\frac{3850}{5280}\right)^3}{679}\right]^{.385} \times 60 + 6.9$$

$T_i = 15.7$ min

$I_{100} = 7.44\,(P_6)\,D^{-.645}$

$I_{100} = 7.44\,(3.4)\,(15.7)^{-.645}$

$I_{100} = 4.28$ in/hr

$Q_{100} = C\,I_{100}\,A$

$Q_{100} = (0.36)(4.28)(110.9)$

$Q_{100} = 170.9$ cfs

(1) X-SECTION (1)

$Q_{100} = 170.9$ cfs ; $V_1 = 7.4$ fps

$T_2 = \frac{L}{V} \times \frac{1}{60} + T_i = \frac{3113}{7.4\,(60)} + 15.7$

$T_2 = 22.7$ min

$I_{100} = 7.44\,(3.4)\,(22.7)^{-.645}$

$I_{100} = 3.58$ in/hr

$Q_{100} = (0.36)(3.58)(269.4)$

$Q_{100} = 327.8$ cfs

(2) X-SECTION (2)

$Q_{100} = 327.8$, $V_2 = 5.13$ fps

$T_2 = \frac{3113}{5.13\,(60)} + 15.7 = 25.8$ min

$I_{100} = 7.44\,(3.4)\,(25.8)^{-.645}$

$I_{100} = 3.1$ in/hr

$Q_{100} = (0.36)(3.1)(269.4)$

$Q_{100} = 300.7$ cfs $\Rightarrow V_2 = 5.0$ fps

$T_2 = \frac{3113}{5.0\,(60)} + 15.7 = 26.1$ min

$I_{100} = 3.1$ in/hr

$Q_{100} = 300.7$ cfs $\Rightarrow V_2 = 5.0$ fps

$T_2 = 26.1$ min

(3)

$Q_{100} = 300.7$ $V_3 = 5.3$ fps

$T_3 = \frac{490}{5.3\,(60)} + 26.1 = 29.0$ min

$I_{100} = 7.44\,(3.4)\,(29)^{-.645} = 2.83$ in/hr

$Q_{100} = (0.36)(2.83)(320.1)$

$Q_{100} = 331.9$ cfs $\Rightarrow V = 5.4$ fps

$T_3 = 28.9$ min

$I_{100} = 2.84$ in/hr

$Q_{100} = 333.0$ cfs $\Rightarrow V_3 = 5.4$ fps

$T_3 = 28.9$

(4)

$Q_{100} = 333.0$ cfs , $V_4 = 5.9$ fps

$T_4 = \frac{2329}{(5.9)(60)} + 28.9$

$T_4 = 35.5$ min

$I_{100} = 7.44\,(3.4)\,(35.5)^{-.645}$

$I_{100} = 2.53$ in/hr

$Q_{100} = (0.36)(2.53)(364.6)$

$Q_{100} = 332.1$ cfs $\Rightarrow V_4 = 5.4$ fps

$T_c = 35.5$ min

$Q_{100} = 332.1$ cfs

EXISTING BASIN "D"

EXISTING BASIN "D" SECTION 1
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.063000	ft/ft
Discharg	170.90	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	652.01	ft
Elevation Range	).00 to 680.00	
Flow Area	23.1	ft²
Wetted Perimeter	23.28	ft
Top Width	22.93	ft
Actual Depth	2.01	ft
Critical Elevation	652.24	ft
Critical Slope	0.035825	ft/ft
Velocity	7.41	ft/s
Velocity Head	0.85	ft
Specific Energy	652.86	ft
Froude Number	1.30	
Flow Type	Supercritical	

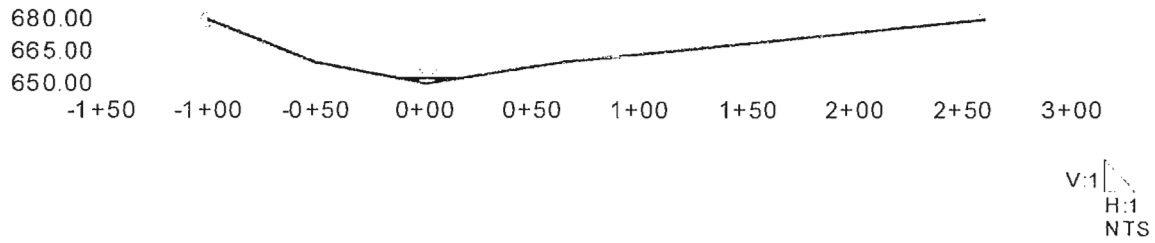
Roughness Segments		
Start Station	End Station	Mannings Coefficient
-1+01	2+60	0.050

Natural Channel Points	
Station (ft)	Elevation (ft)
-1+01	680.00
-0+51	660.00
0+00	650.00
0+63	660.00
2+60	680.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.063000	ft/ft
Water Surface Elev	652.01	ft
Elevation Range	).00 to 680.00	
Discharge	170.90	cfs



EXISTING BASIN "D" SECTION 2
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.027000	ft/ft
Discharge	300.70	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	542.09	ft
Elevation Range	).00 to 560.00	
Flow Area	59.9	ft²
Wetted Perimeter	57.46	ft
Top Width	57.24	ft
Actual Depth	2.09	ft
Critical Elevation	541.98	ft
Critical Slope	0.036770	ft/ft
Velocity	5.02	ft/s
Velocity Head	0.39	ft
Specific Energy	542.48	ft
Froude Number	0.87	
Flow Type	Subcritical	

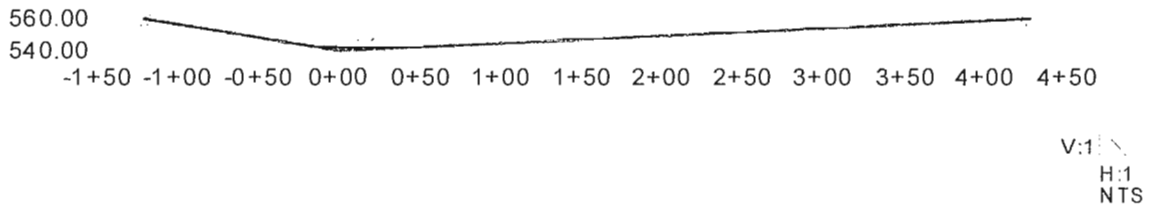
Roughness Segments		
Start Station	End Station	Mannings Coefficient
-1+21	4+26	0.050

Natural Channel Points	
Station (ft)	Elevation (ft)
-1+21	560.00
0+00	540.00
4+26	560.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.027000	ft/ft
Water Surface Elev	542.09	ft
Elevation Range	).00 to 560.00	
Discharge	300.70	cfs



EXISTING BASIN "D" SECTION 3
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.022000	ft/ft
Discharg	333.00	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	516.74	ft
Elevation Range	1.00 to 522.00	
Flow Area	61.9	ft²
Wetted Perimeter	45.88	ft
Top Width	45.51	ft
Actual Depth	2.74	ft
Critical Elevation	516.52	ft
Critical Slope	0.034162	ft/ft
Velocity	5.38	ft/s
Velocity Head	0.45	ft
Specific Energy	517.19	ft
Froude Number	0 81	
Flow Type	Subcritical	

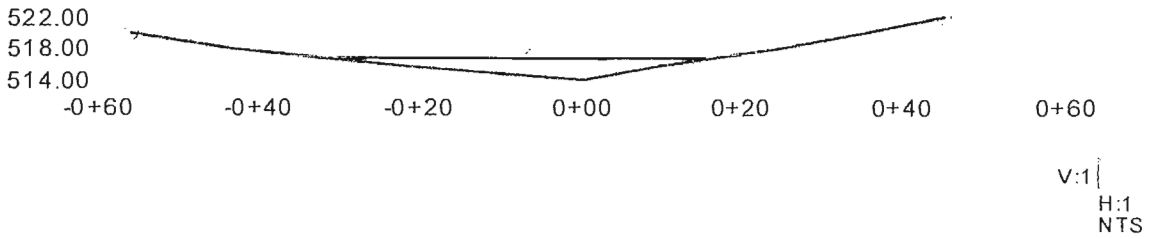
Roughness Segments		
Start Station	End Station	Mannings Coefficient
-0+56	0+45	0.050

Natural Channel Points	
Station (ft)	Elevation (ft)
-0+56	520.00
-0+43	518.00
-0+23	516.00
0+00	514.00
0+10	516.00
0+24	518.00
0+35	520.00
0+45	522.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.022000	ft/ft
Water Surface Elev	516.74	ft
Elevation Range	1.00 to 522.00	
Discharge	333.00	cfs



V:1
H:1
NTS

EXISTING BASIN "D" SECTION 4
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.022000	ft/ft
Discharge	332.10	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	482.89	ft
Elevation Range	).00 to 484.00	
Flow Area	56.8	ft²
Wetted Perimeter	37 15	ft
Top Width	36 48	ft
Actual Depth	2.89	ft
Critical Elevation	482.67	ft
Critical Slope	0.033153	ft/ft
Velocity	5.85	ft/s
Velocity Head	0.53	ft
Specific Energy	483.42	ft
Froude Number	0.83	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-0+17	0+30	0.050

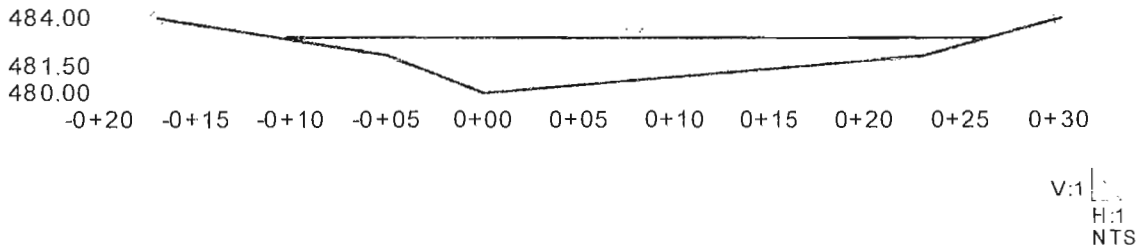
Natural Channel Points

Station (ft)	Elevation (ft)
-0+17	484.00
-0+05	482.00
0+00	480.00
0+23	482.00
0+30	484.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.022000	ft/ft
Water Surface Elev	482.89	ft
Elevation Range	).00 to 484.00	
Discharge	332.10	cfs



SECTION 3-2

DEVELOPED HYDROLOGY

DEVELOPED HYDROLOGY

At **UD,** developed Basins A, B, C, and D will generally maintain existing drainage patterns and outfall points. Basin D does not change in the developed condition; no development is proposed within the basin. Each graded lot within Basins A, B, and C will contain its own detention facility to limit runoff to the pre-development discharge rate during the 100-year storm event (see Section 4). Storm water collection basins will provide detention in the rough graded condition. Five Regional detention facilities will be located throughout the project to mitigate for the increase in runoff due to development of public roads. Proposed storm drain systems within each basin will be designed to collect and convey undetained runoff generated on-site as well as runoff passing through the site from the upstream watersheds during the 100-year storm event. Furthermore, Lots 43, 44, and 45 are designated for future CalTrans SR-11 and will be used for temporary parking and storage or will remain vacant. A runoff coefficient of 0.58 is utilized for the rough graded condition of the future CalTrans right-of-way. Runoff coefficient calculations were performed for off-site basins tributary to the project, and are provided in this section as Exhibit "D-R2". Acquisition of Lots 43 - 45 by CalTrans will include acceptance of run-on from the subdivision. Additionally, design of the future CalTrans SR-11 will need to ensure that runoff generated within the CalTrans lots is collected and conveyed to the appropriate detention facility, maintaining the delineated basins and outfall points designated within this report. Ultimate development runoff rates from the CalTrans lots will need to be limited to pre-development peak runoff flow rates. A runoff coefficient of 0.85 was utilized in the runoff calculations for the industrial/commercial subdivision. See Exhibit "D-P1", in Section 7, for proposed basin areas and drainage patterns (a reduced copy follows).

LEGEND

PROPOSED GROUND CONTOURS

EXISTING GROUND CONTOUR
INDEX
INTERMEDIATE

DRAINAGE BASIN DESIGNATION
A / 0.57
BASIN DESIGNATION (ALPHA CHARACTERS DESIGNATE REGIONAL RIVER AREAS)
BASIN AREA (ac.)

DRAINAGE BASIN BOUNDARY

PROPERTY LINE

STORM DRAIN PIPE

STORM DRAIN CLEANOUT

STORM DRAIN CATCH BASIN

STORM DRAIN CURB INLET

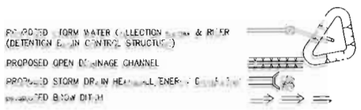
TIME OF CONCENTRATION FLOW PATH

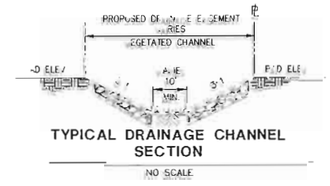
PROPOSED STORM WATER COLLECTION SYSTEM & RIVER (DETENTION BASIN CONTROL STRUCTURE)

PROPOSED OPEN DRAINAGE CHANNEL

PROPOSED STORM DRAIN HEADWALL ENERGY DISSIPATOR

PROPOSED FLOW DIRECTION





TYPICAL DRAINAGE CHANNEL SECTION

NO SCALE

REDUCED - SEE FULL SIZE IN SECTION 7 FOR EXTENT OF OFF-SITE BASINS

STEVENS CRESTO ENGINEERING, INC.
CIVIL ENGINEERS · LAND PLANNERS · SURVEYORS
7645 CONVOY COURT, SUITE 201
SAN DIEGO, CA 92111-1302
PHONE (858) 614-5445
FAX (858) 614-5448
www.scengr.com

OTAY CROSSINGS COMMERCE PARK

OTAY MESA, CALIFORNIA

EXHIBIT "D-P1"

DEVELOPED CONDITION DRAINAGE BASINS

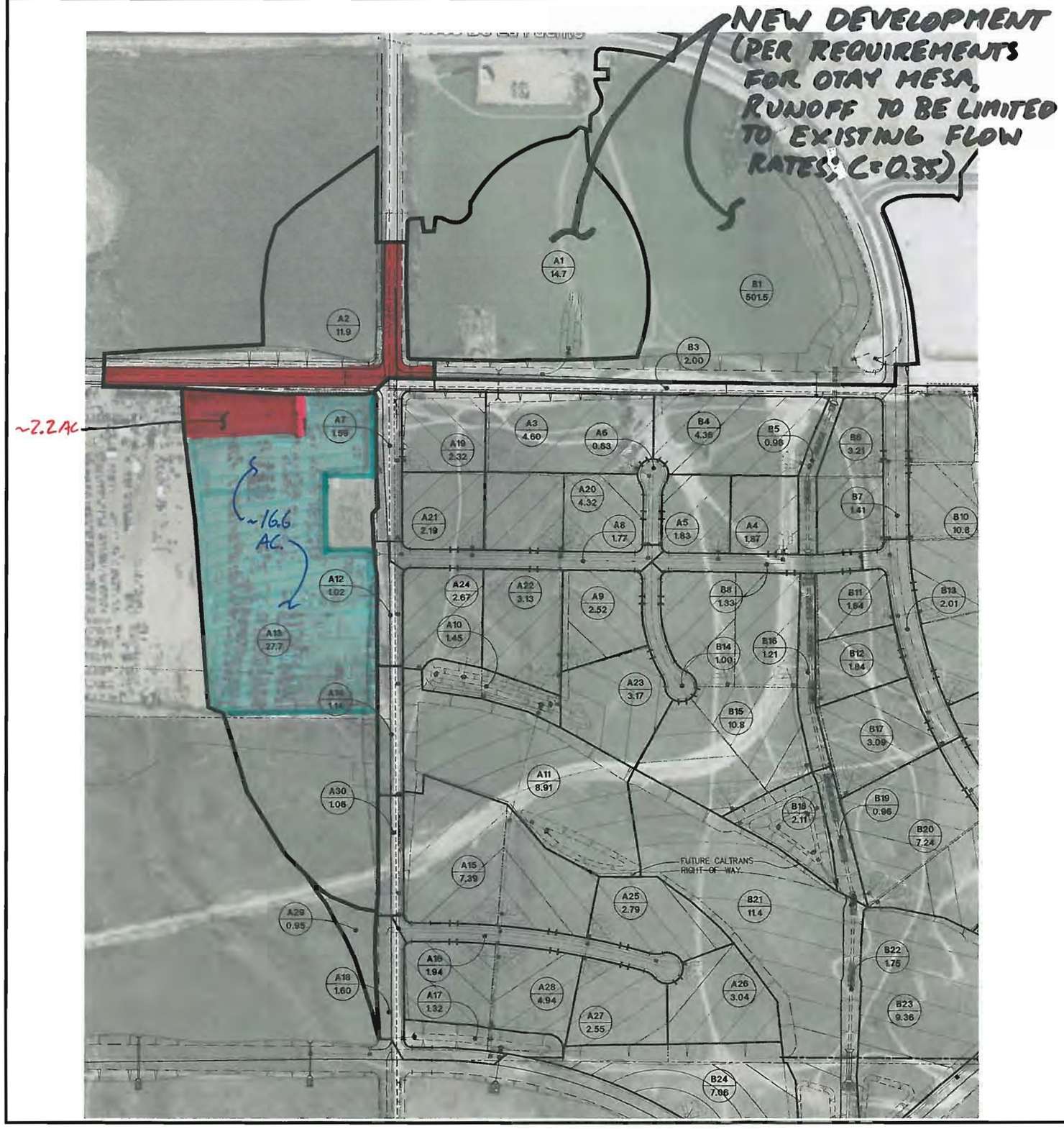
DATE: 1-02-12

SCE NO. 0043-19

SHEET

D-P1

1 OF 1 SHEETS



LEGEND

PROPOSED GROUND CONTOURS
360 ———

EXISTING GROUND CONTOURS
360 INDEX
360 INTERMEDIATE

DRAINAGE BASIN DESIGNATOR

A / 0.57 — A = BASIN DESIGNATION (ALPHA CHARACTERS DESIGNATE REGIONAL RUNOFF AREAS); 0.57 = BASIN AREA (Acres)

DRAINAGE BASIN BOUNDARY

PROPERTY LINE

IMPERVIOUS SURFACE

DG SURFACE

RUNOFF COEFFICIENT CALCULATIONS

BASIN A2:

$$C = \frac{0.35(9.3\,AC) + 0.95(2.6\,AC)}{11.9\,AC}$$

$C = 0.48$

BASIN A13:

$$C = \frac{0.35(8.9\,Ac) + 0.58(16.6\,Ac) + 0.95(2.2\,AC)}{27.7\,AC}$$

$C = 0.54$

STEVENS CRESTO ENGINEERING, INC.
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OTAY CROSSINGS COMMERCE PARK
OTAY MESA, CALIFORNIA

EXHIBIT "D-R2"
DEVELOPED CONDITION RUNOFF COEFFICIENT STUDY

DATE: 05/03/12
JOB NO. 03043.08
SHEET **D-R2**
1 OF 1 SHEETS

SECTION 3-2A

PROPOSED HYDROLOGY, BASIN A

Developed Basin A conveys runoff through the use of a proposed public storm drain system within proposed streets to the historic discharge point at the southern boundary of the basin (design point 111 on Exhibit D-P1; see Section 7). Basin "A" is comprised of 127.8 acres and generates a peak runoff rate of approximately 382.6 cfs during the 100-year storm event. To limit runoff generated within Basin A to pre-development rates, detention is required within each lot; private storm water collection basins will be constructed with the Rough Grading phase. The storm water collection basins will serve as detention structures limiting rough graded pad runoff to pre-development flow rates. Final detention of the on lot basins will be accomplished through permanent on-lot detention structures during build out of each lot for its ultimate use. To accomplish final detention facilities, the County of San Diego "Storm Water Facilities Maintenance Agreement, with Easements and Covenants" will create Easements, to the County, on each lot for regulation and monitoring of detention facilities for the ultimate development(s). Off site run-on to the project is conveyed un-detained through the storm drain system before discharging at the historic outfall point (design point 111). A runoff coefficient study was performed for the upstream basins generating project run-on; calculations are included in this section as Exhibit "D-R2".

OTAY CROSSINGS COMMERCE PARK

DEVELOPED HYDROLOGY - BASIN A

(Rational Method Procedure)

Otay Mesa, CA DESIGN STORM **100 YR** RUN: 11/6/12 2:26 PM

P6 = 3.4 in.

BASIN INFORMATION

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Detained Q_{100} cfs	REMARKS	TRBUTARY TO
A1	14.7	0.35	14.1	5.15	4.59	23.6	23.6	Off-site (TPM 21140) - Undetained	BYPASS
A2	11.9	0.48	14.1	5.71	4.59	26.2	26.2	Off-site - Undetained	BYPASS
A3	4.4	0.85	14.1	3.74	4.59	17.2	0.9	Lot 5 - On-lot Detention	POND A1
A4	1.9	0.85	14.1	1.59	4.59	7.3	0.4	Lot 8 - On-lot Detention	POND A1
A5	1.9	0.85	14.1	1.57	4.59	7.2	0.4	Lot 7 - On-lot Detention	POND A1
A6	1.0	0.85	14.1	0.85	4.59	3.9	0.2	Street "A"	POND A1
A7	1.1	0.85	14.1	0.97	4.59	4.4	0.2	Alta Road	POND A1
A8	1.8	0.85	14.1	1.51	4.59	6.9	0.4	Calle Ventner	POND A1
A9	2.5	0.85	14.1	2.14	4.59	9.8	0.5	Lot 33 - On-lot Detention	POND A1
A10	1.5	0.35	14.1	0.52	4.59	2.4	0.3	HYDROMODIFICATION BASIN - POND A1	POND A1
A11	9.1	0.58	14.1	5.28	4.59	24.2	24.2	Future Caltrans R/W - Undetained	BYPASS
A12	0.4	0.85	14.1	0.32	4.59	1.5	0.1	Alta Road	POND A1
A13	29.9	0.54	14.1	16.15	4.59	74.1	74.1	Off-site - Undetained	POND A2
A14	0.5	0.85	14.1	0.43	4.59	2.0	0.1	Alta Road	POND A2
A15	7.7	0.85	14.1	6.56	4.59	30.1	1.5	Lot 36 & 42 - On-lot Detention	BYPASS
A16	1.9	0.85	14.1	1.65	4.59	7.6	0.4	Street "C"	POND A2
A17	0.9	0.35	14.1	0.33	4.59	1.5	0.2	HYDROMODIFICATION BASIN - POND A2	POND A2
A18	0.5	0.85	14.1	0.43	4.59	2.0	0.1	Alta Road	POND A2
A19	2.3	0.85	14.1	1.97	4.59	9.1	0.5	Lot 1 - On-lot Detention	BYPASS
A20	4.3	0.85	14.1	3.69	4.59	16.9	0.9	Lot 3 & 4 - On-lot Detention	POND A1
A21	2.2	0.85	14.1	1.86	4.59	8.5	0.4	Lot 2 - On-lot Detention	POND A1
A22	2.9	0.85	14.1	2.42	4.59	11.1	0.6	Lot 34 - On-lot Detention	POND A1
A23	3.2	0.85	14.1	2.69	4.59	12.4	0.6	Lot 32 - On-lot Detention	POND A1
A24	2.4	0.85	14.1	2.04	4.59	9.4	0.5	Lot 35 - On-lot Detention	POND A1
A25	2.8	0.85	14.1	2.37	4.59	10.9	0.6	Lot 41 - On-lot Detention	BYPASS
A26	3.2	0.85	14.1	2.69	4.59	12.4	0.6	Lot 40 - On-lot Detention	BYPASS
A27	2.5	0.85	14.1	2.14	4.59	9.8	0.5	Lot 39 - On-lot Detention	BYPASS
A28	4.9	0.85	14.1	4.14	4.59	19.0	1.0	Lot 37 & 38 - On-lot Detention	BYPASS
A29	2.2	0.58	14.1	1.30	4.59	6.0	6.0	Graded Utility Corridor - Undetained	BYPASS
A30	0.5	0.85	14.1	0.38	4.59	1.8	0.1	Alta Road	POND A2
A31	0.9	0.85	14.1	0.72	4.59	3.3	0.2	Otay Mesa Road	POND A1
BASIN A Area=	127.8			83.32	Q_{100}=	382.6	166.2	MAX. ALLOWABLE RELEASE RATE: 166.2 CFS	

BASIN A DETENTION CALCULATIONS

UNDETAINED BASINS	AREA ac.	Q100 cfs
A1	14.7	23.6
A2	11.9	26.2
A11	9.1	24.2
A13	29.9	74.1
A29	2.2	6.0
TOTAL:	67.8	154.2

BASIN A TOTAL AREA: 127.8 AC.
SUBTRACT UNDETAINED AREA: -67.8 AC.
TOTAL DETAINED AREA: 60.0 AC.

BASIN A AVE. ALLOWABLE RELEASE RATE (CFS/AC): 0.20

BASIN A MAX. ALLOWABLE Q_{100} (PRE-PROJECT Q_{100}): 166.2
SUBTRACT UNDETAINED Q_{100}: -154.2
MAX. ALLOWABLE DETAINED Q_{100}: 12.0

POST-PROJECT BASIN A
TIME OF CONCENTRATION CALCULATIONS

NODE 101-102:
OVERLAND FLOW PER COUNTY HYDROLOGY MANUAL, TABLE 3-2:

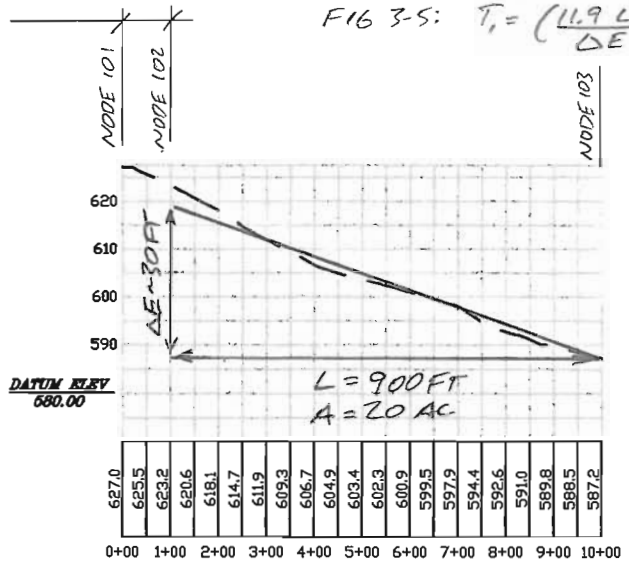
$S \sim 3.8\%$

$L_m = 100\ FT$

$T_i = \frac{1.8(1.1-0.35)\sqrt{100\ FT}}{\sqrt[3]{3.8\%}}$

$T_i = 8.65\ MIN.$

NODE 102-103:
FLOW THROUGH NATURAL WATERSHED PER COUNTY HYDROLOGY MANUAL, FIG 3-5: $T_t = \left(\frac{11.9\,L^3}{\Delta E}\right)^{0.385}$



$T_t = \left(\frac{11.9\left(\frac{900}{5280}\right)^3}{30\ FT}\right)^{0.385} \times 60 = 5.44\ MIN$

$T_c = 8.65\ MIN + 5.44\ MIN = 14.1\ MIN$

$I = 7.44(3.4)14.1^{-0.645} = 4.59\ IN/HR$

$Q = 0.35(4.59\ IN/HR)20\ AC = 32.13\ CFS$

$Q_{100} = 32.13\ CFS \Rightarrow$ APPROXIMATELY 20 ACRES IS TRIBUTARY TO NODE 103 IN THE EXISTING CONDITION

Otay Crossings Commerce Park - Otay 310 (Historic Basins A)
Time of Concentration - UNDETAINED FLOW RATES
Design Storm *100 Year (Proposed)* [1]

RUN: 11/6/12 2:16 PM
COUNTY PRECIP. (APP. B)= 3.4 in/hr

LOT/BASIN	NODE	SUB-BASIN DATA: DRAIN BASIN	AREA sf	AREA ac.	C	INITIAL Ti: INITIAL / OVERLAND TIME (Figure 3-3, Table 3-2): Lm ft.	Slope %	Ti_1 min	INITIAL / TRAVEL TIME (Figure 3-4): Lt ft.	Delta E	Tt_2 min	Ti min: Ti_1+Ti_2 min	TRAVEL TIME T(t) Gutter / Pipe V): Length ft.	Slope %	Pipe Size in.	Velocity fps	T(t) min.	FINAL T(c) min.	REMARKS
BASIN A																			
OFFSITE BYPASS																			
OFFSITE A-1	103	A1		14.7	0.35	100	3.8	8.7	900	30.0	5.4	14.1						14.1	
OFFSITE A-2	104	A2		11.9	0.48								390	0.5	42	8	0.8	15.0	
LOT 1	105	A19		2.3	0.85								190	1.5	42	13	0.2	15.2	
	106												1,430	1.5	42	13	1.8	17.0	
SUBTOTAL=>	106			28.92	Ac.													17.0	
TRIBUTARY TO POND A1																			
LOT 8	123	A4		1.9	0.85	70	2.0	3.1	250	5.0	2.5	5.6	325	0.5	24	6	0.9	6.5	
LOT 7	124	A5		1.9	0.85								270	0.5	30	7	0.6	7.1	
LOT 5, STREET A, OTAY MESARD	125	A3, A6, A31		6.3	0.85								340	0.5	36	8	0.7	7.8	
ALTA RD, CALLE VENTNER, LOTS 2-4	126	A7, A8, A20, A21		9.5	0.85								385	1.5	42	14	0.5	8.3	
LOT 33	127	A9		2.5	0.85								80	1.5	42	15	0.1	8.4	
ALTA RD, LOT 32, 34, 35	106	A12, A22, A23, A24		8.8	0.85								135	1.5	42	15	0.2	8.5	
POND A1	106	A10		1.5	0.35													8.5	
SUBTOTAL=>	106			32.23	Ac.													8.5	
JUNCTION 106 COMBINATION																			
JUNCTION=>	106			61.15	Ac.													12.5	
BASIN A BYPASS TO OUTFALL																			
	107												420	1.5	54	15	0.5	13.0	
CALTRANS R/W	108	A11		9.1	0.58								375	1.5	54	15	0.4	13.4	
LOT 36 & 42	109	A15		7.7	0.85								70	1.0	60	13	0.1	13.5	
LOT 39, 40 & 41	110	A25, A26, A27		8.5	0.85								100	1.0	60	15	0.1	13.6	
LOT 37, 38	111	A28		4.9	0.85								425	1.0	60	15	0.5	14.1	
UTILITY CORRIDOR	111	A29		2.2	0.58													14.1	
SUBTOTAL=>	111			32.41	Ac.													14.1	
TRIBUTARY TO POND A2																			
ALTA RD	130	A14		0.5	0.85			5.0					390	5.0	18	12	0.5	5.5	
OFFSITE	131	A13		29.9	0.54								80	5.0	36	15	0.1	5.6	
ALTA RD	132	A30		0.5	0.85								440	2.0	42	17	0.4	6.1	
STREET C	111	A16		1.9	0.85								420	1.5	42	15	0.5	6.5	
ALTA RD	111	A18		0.5	0.85													6.5	
POND A2	111	A17		0.9	0.35													6.5	
SUBTOTAL=>	111			34.21	Ac.													6.5	
JUNCTION 111 COMBINATION																			
JUNCTION=>	111			66.62	Ac.													14.1	
BASIN A TOTAL=>	111			127.77	Ac.													14.1	

Otay Crossings Commerce Park - Otay 310 (Historic Basins A)
Runoff Calculations - UNDETAINED FLOW RATES
(Modified Rational Method Procedure)

RUN: 11/6/12 2:16 PM
Design Storm 100 Year COUNTY PRECIP 3.4 in/hr

NODE	LOT/BASIN	BASIN INFORMATION: DRAIN BASIN	AREA ac.	RUNOFF COEFF	DIRECT RUNOFF: T(c) min	C x A	I [2] in/hr	Q cfs	TOTAL RUNOFF: T(c) min	SUM C x A	I [2] in/hr	Q cfs	REMARKS
BASIN A													
	OFFSITE BYPASS												
103	OFFSITE A-1	A1	14.70	0.35	14.1	5.1	4.58	23.6	14.1	5.1	4.58	23.6	
104	OFFSITE A-2	A2	11.90	0.48	15.0	5.7	4.42	25.2	15.0	10.9	4.42	48.0	
105	LOT 1	A19	2.32	0.85	15.2	2.0	4.37	8.6	15.2	12.8	4.37	56.1	
106	0								17.0	12.8	4.06	52.1	
106	SUBTOTAL=>			SUBTOTAL=>					17.0		4.1	52.1	cfs
	TRIBUTARY TO POND A1												
123	LOT 8	A4	1.87	0.85	6.5	1.6	7.58	12.1	6.5	1.6	7.58	12.1	
124	LOT 7	A5	1.85	0.85	7.1	1.6	7.13	11.2	7.1	3.2	7.13	22.6	
125	LOT 5, STREET A, OTAY MESARD	A3, A6, A31	6.25	0.85	7.8	5.3	6.71	35.6	7.8	8.5	6.71	56.9	
126	ALTA RD, CALLE VENTNER, LOTS 2-4	A7, A8, A20, A21	9.45	0.85	8.3	8.0	6.47	52.0	8.3	16.5	6.47	106.8	
127	LOT 33	A9	2.52	0.85	8.4	2.1	6.42	13.8	8.4	18.6	6.42	119.8	
106	ALTA RD, LOT 32, 34, 35	A12, A22, A23, A24	8.80	0.85	8.5	7.5	6.35	47.5	8.5	26.1	6.35	165.9	
106	POND A1	A10	1.49	0.35	8.5	0.5	6.35	3.3	8.5	26.7	6.35	169.2	
106	SUBTOTAL=>			SUBTOTAL=>					8.5		6.4	169.2	cfs
	JUNCTION 106 COMBINATION												
	JUNCTION 106 COMBINATION												TRIBUTARY TO POND A1
												$Q_{1(cfs)}$= 169.2	
												$T_{1(min)}$= 8.5	
												$I_{1(in/hr)}$= 6.4	
												$Q_{2(cfs)}$= 52.1	OFFSITE BYPASS
												$T_{2(min)}$= 17.0	
												$I_{2(in/hr)}$= 4.1	
												$Q_{T1(cfs)}$ 195.3	
												$Q_{T2(cfs)}$ 160.4	
												Therefore use: T1(min)= 12.5	
												and: QT1(cfs)= 195.3	
												and: I1(in/hr)= 4.95	
106	JUNCTION=>			JUNCTION=>					12.5	39.5	4.9	195.3	cfs
	BASIN A BYPASS TO OUTFALL												
107	0								13.0	39.5	4.83	190.9	
108	CALTRANS R/W	A11	9.10	0.58	13.4	5.3	4.74	25.0	13.4	44.8	4.74	212.0	
109	LOT 36 & 42	A15	7.72	0.85	13.5	6.6	4.72	31.0	13.5	51.3	4.72	242.1	
110	LOT 39, 40 & 41	A25, A26, A27	8.48	0.85	13.6	7.2	4.69	33.6	13.6	58.5	4.69	274.6	
111	LOT 37, 38	A28	4.87	0.85	14.1	4.1	4.59	19.0	14.1	62.7	4.59	287.6	
111	UTILITY CORRIDOR	A29	2.24	0.58	14.1	1.3	4.59	6.0	14.1	64.0	4.59	293.6	
111	SUBTOTAL=>			SUBTOTAL=>					14.1		4.6	293.6	cfs
	TRIBUTARY TO POND A2												
130	ALTA RD	A14	0.50	0.85	5.5	0.4	8.38	3.6	5.5	0.4	8.38	3.6	
131	OFFSITE	A13	29.90	0.54	5.6	16.1	8.30	134.0	5.6	16.6	8.30	137.5	
132	ALTA RD	A30	0.45	0.85	6.1	0.4	7.91	3.0	6.1	17.0	7.91	134.1	
111	STREET C	A16	1.93	0.85	6.5	1.6	7.54	12.4	6.5	18.6	7.54	140.2	
111	ALTA RD	A18	0.50	0.85	6.5	0.4	7.54	3.2	6.5	19.0	7.54	143.4	
111	POND A2	A17	0.93	0.35	6.5	0.3	7.54	2.5	6.5	19.3	7.54	145.9	
111	SUBTOTAL=>			SUBTOTAL=>					6.5		7.5	145.9	cfs
	JUNCTION 111 COMBINATION												
	JUNCTION 111 COMBINATION												TRIBUTARY TO POND A2
												$Q_{1(cfs)}$= 145.9	
												$T_{1(min)}$= 6.5	
												$I_{1(in/hr)}$= 7.5	
												$Q_{2(cfs)}$= 293.6	BASIN A BYPASS TO OUTFALL
												$T_{2(min)}$= 14.1	
												$I_{2(in/hr)}$= 4.6	
												$Q_{T1(cfs)}$ 281.8	
												$Q_{T2(cfs)}$ 382.4	
												Therefore use: T2(min)= 14.1	
												and: Q T2(cfs)= 382.4	
												and: I2(in/hr)= 4.59	
111	JUNCTION=>			JUNCTION=>					14.1	83.3	4.6	382.4	cfs
111	BASIN A TOTAL=>			JUNCTION=>					14.1		4.6	382.4	cfs

SECTION 3-2B

PROPOSED HYDROLOGY, BASIN B

Basin "B" is comprised of 658.7 acres and generates a peak runoff rate of approximately 614.3 cfs during the 100-year storm event. To limit runoff generated within Basin B to pre-development rates, detention is required within each lot; private storm water collection basins will be constructed with the Rough Grading phase. The storm water collection basins will serve as detention structures limiting rough graded pad runoff to pre-development flow rates. Final detention of the on lot basins will be accomplished through permanent on-lot detention structures during build out of each lot for its ultimate use. To accomplish final detention facilities, the County of San Diego "Storm Water Facilities Maintenance Agreement, with Easements and Covenants" will create Easements, to the County, on each lot for regulation and future monitoring of detention facilities for the ultimate development(s). Offsite runoff generated from Basins B1 and B2 (as shown in Exhibit "D-P1"; see Section 7) is conveyed un-detained through the project via a proposed vegetated lined trapezoidal channel, which conveys runoff in a southerly direction to node 212 (See Exhibit "D-P1", in Section 7). The detention facilities within Basin B discharge into the channel, combining with the run-on from Basins B1 and B2, and the total runoff from the basin is discharged south of the project, as in the historical condition.

> NOTE: TM 5405R provides a "no channel" design option to remove the proposed vegetated open channel and replace it with a box culvert in Lone Star Road; see Section 5 for further discussion.

OTAY CROSSINGS COMMERCE PARK

DEVELOPED HYDROLOGY - BASIN B

(Rational Method Procedure)

Otay Mesa, CA | DESIGN STORM **100 YR** | RUN: 11/4/12 8:12 AM

P6 = 3.4 in.

BASIN INFORMATION

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Detained Q_{100} cfs	REMARKS	TRBUTARY TO
B1	501.5	0.36	42.0	180.54	2.27	409.7	409.7	Off-site (TPM 21140) - Undetained	BYPASS
B2	70.4	0.36	42.0	25.34	2.27	57.5	57.5	Off-site (L-14625) - Undetained	BYPASS
B3	1.1	0.85	42.0	0.96	2.27	2.2	2.2	Otay Mesa Road - Undetained	BYPASS
B4	4.2	0.85	42.0	3.53	2.27	8.0	1.0	Lot 6 - On-lot Detention	BYPASS
B5	1.0	0.35	42.0	0.34	2.27	0.8	0.8	Open Channel - Undetained	BYPASS
B6	3.3	0.85	42.0	2.79	2.27	6.3	0.8	Lot 10 - On-lot Detention	POND B1
B7	1.3	0.85	42.0	1.12	2.27	2.5	0.3	Lone Star Road	POND B1
B8	1.5	0.85	42.0	1.28	2.27	2.9	0.4	Calle Ventner	POND B1
B9	1.6	0.36	42.0	0.59	2.27	1.3	0.4	Open Space	POND B1
B10	9.3	0.85	42.0	7.90	2.27	17.9	2.3	Lot 11 to 14 - On-lot Detention	POND B1
B11	3.4	0.85	42.0	2.92	2.27	6.6	0.8	Lot 27 - On-lot Detention	POND B1
B12	4.7	0.85	42.0	3.96	2.27	9.0	1.2	Lot 26 - On-lot Detention	POND B1
B13	1.8	0.85	42.0	1.50	2.27	3.4	0.4	Lone Star Road	POND B1
B14	1.0	0.85	42.0	0.85	2.27	1.9	0.2	Street "B"	POND B1
B15	2.6	0.85	42.0	2.24	2.27	5.1	0.6	Lot 29 - On-lot Detention	POND B1
B16	2.3	0.35	42.0	0.80	2.27	1.8	1.8	Open Channel - Undetained	BYPASS
B17	11.7	0.85	42.0	9.95	2.27	22.6	2.9	Lot 23, 24, 25 - On-lot Detention	BYPASS
B18	1.7	0.35	42.0	0.60	2.27	1.4	0.4	HYDROMODIFICATION BASIN - POND B1	POND B1
B19	1.0	0.35	42.0	0.36	2.27	0.8	0.8	Open Channel - Undetained	BYPASS
B20	3.0	0.85	42.0	2.58	2.27	5.9	0.8	Lot 31 - On-lot Detention	POND B1
B21	10.0	0.58	42.0	5.77	2.27	13.1	2.5	Future Caltrans R/W - Detained	BYPASS
B22	0.5	0.35	42.0	0.19	2.27	0.4	0.1	HYDROMODIFICATION BASIN - POND B2	POND B2
B23	8.1	0.58	42.0	4.72	2.27	10.7	2.0	Future Caltrans R/W - Detained	BYPASS
B24	2.6	0.85	42.0	2.18	2.27	4.9	0.6	Lone Star Road	POND B2
B25	0.8	0.85	42.0	0.68	2.27	1.5	0.2	Siempre Viva Road	POND B2
B26	1.0	0.85	42.0	0.88	2.27	2.0	0.3	Lot 24 - On-lot Detention	POND B2
B27	1.7	0.85	42.0	1.48	2.27	3.4	0.4	Lot 23 - On-lot Detention	POND B2
B28	2.6	0.85	42.0	2.18	2.27	4.9	0.6	Lot 28 - On-lot Detention	POND B1
B29	3.0	0.85	42.0	2.51	2.27	5.7	0.7	Lot 30 - On-lot Detention	POND B1
BASIN B Area=	658.7			270.7	Q_{100}=	614.3	492.9	MAX. ALLOWABLE RELEASE RATE: 492.9 CFS	

BASIN B DETENTION CALCULATIONS

UNDETAINED BASINS	AREA ac.	Q100 cfs
B1	501.5	409.7
B2	70.4	57.5
B3	1.1	2.2
B5	1.0	0.8
B16	2.3	1.8
B19	1.0	0.8
TOTAL:	577.3	472.8

BASIN B TOTAL AREA: 658.7 AC.
SUBTRACT UNDETAINED AREA: -577.3 AC.
TOTAL DETAINED AREA: 81.4 AC.

BASIN B MAX. ALLOWABLE Q_{100} (PRE-PROJECT Q_{100}): 492.9
SUBTRACT UNDETAINED Q_{100}: -472.8
MAX. ALLOWABLE DETAINED Q_{100}: 20.1

BASIN B AVE. ALLOWABLE RELEASE RATE (CFS/AC): 0.25

Otay Crossings Commerce Park - Otay 310 (Historic Basin B)
Time of Concentration - UNDETAINED FLOW RATES
Design Storm *100 Year (Proposed)* [1]

RUN: 11/2/12 11:34 AM

COUNTY PRECIP. (APP. B)= 3.4 in/hr

LOT/BASIN	NODE	SUB-BASIN DATA: DRAIN BASIN	AREA sf	AREA ac.	C	INITIAL Ti: INITIAL / OVERLAND TIME (Figure 3-3, Table 3-2): Lm ft.	Slope %	Ti_1 min	INITIAL / TRAVEL TIME (Figure 3-4): Lt ft.	Delta E	Ti_2 min	Ti min Ti_1+Ti_2	TRAVEL TIME T(t) Gutter / Pipe V): Length ft.	Slope %	Pipe Size in.	Velocity fps	T(t) min.	FINAL T(c) min.	REMARKS
BASIN B																			
OFFSITE BASIN B, OPEN CHANNEL																			
OFFSITE B-1	205	B1		501.50	0.36	100	3.0	10.3				34.8	133	1.9	DBL 6'x4'	20	0.1	34.9	
OFFSITE B-2	206	B2		70.40	0.36								270	0.5		6	0.8	35.7	Open Channel
OTAY MESA RD	206	B3		1.13	0.85													35.7	
LOT 6	207	B4		4.15	0.85								335	0.5		6	0.9	36.6	Open Channel
OPEN CHANNEL	207	B5		0.98	0.35													36.6	
	208												85	0.5	DBL 6'x4'	13	0.1	36.7	
	209												485	0.5		6	1.3	38.0	Open Channel
	210												800	0.5		6	2.2	40.3	Open Channel
OPEN CHANNEL	210	B16		2.29	0.35													40.3	
SUBTOTAL=>	210			580.45	Ac.													40.3	
TRIBUTARY TO POND B1																			
LOT 29	222	B15		2.63	0.85	70	2.0	3.1	400	8.0	3.6	6.7						6.7	
STREET "B"	223	B14		1.00	0.85								255	1.5	24	10	0.4	7.1	
LOT 28	224	B28		2.56	0.85								315	1.5	30	11	0.5	7.6	
LOT 30	225	B29		2.95	0.85								210	1.5	36	13	0.3	7.8	
LOTS 9-14, LOT 26, LOT 27	225	B6, B10, B11, B12		20.66	0.85													7.8	
CALLE VENTNER, LONE STAR	225	B7, B8, B13		4.58	0.85													7.8	
OPEN SPACE	225	B9		1.64	0.36													7.8	
LOT 31	225	B20		3.04	0.85													7.8	
POND B1	210	B18		1.70	0.35								250	1.0	60	15	0.3	8.1	
SUBTOTAL=>	210			40.76	Ac.													8.1	
JUNCTION 210 COMBINATION																			
JUNCTION=>	210			621.21	Ac.													40.2	
POND B1 OUTFLOW, OPEN CHANNEL																			
LOTS 28 & 29	211	B17		11.70	0.85								580	0.5		6	1.6	41.9	Open Channel
OPEN CHANNEL	211	B19		1.04	0.35													41.9	
CALTRANS R/W	211	B21&B23		18.08	0.58													41.8	
	212												270	0.9	DBL 8'x4'	16	0.3	42.1	
	212																	42.1	
SUBTOTAL=>	212			652.03	Ac.													42.1	
TRIBUTARY TO POND B2																			
LOT 27	235	B26		2.78	0.85	70	2.0	3.1	110	2.2	1.3	4.4	85	1.5	18	8	0.2	4.6	
LONE STAR & SIEMPRE VIVA	235	B24 & B25		3.36	0.85													4.6	
POND B2	236	B22		0.53	0.35													4.6	
	212												820	2.0	24	11	1.2	5.8	
	212				0.58													5.8	
SUBTOTAL=>	212			6.67	Ac.													5.8	
JUNCTION 214 COMBINATION																			
JUNCTION=>	212			658.70	Ac.													42.033	

Otay Crossings Commerce Park - Otay 310 (Historic Basin B)
Runoff Calculations - UNDETAINED FLOW RATES
(Modified Rational Method Procedure)

RUN: 11/2/12 11:34 AM

Design Storm 100 Year — COUNTY PRECIP 3.4 in/hr

NODE	LOT/BASIN	BASIN INFORMATION: DRAIN BASIN	AREA ac.	RUNOFF COEFF	DIRECT RUNOFF: T(c) min	C x A	I [2] in/hr	Q cfs	TOTAL RUNOFF: T(c) min	SUM C x A	I [2] in/hr	Q cfs	REMARKS
BASIN B													
	OFFSITE BASIN B, OPEN CHANNEL												
205	OFFSITE B-1	B1	501.50	0.36	34.9	180.5	2.56	461.8	34.9	180.5	2.56	461.8	
206	OFFSITE B-2	B2	70.40	0.36	35.7	25.3	2.52	63.9	35.7	205.9	2.52	519.4	
206	OTAY MESA RD	B3	1.13	0.85	35.7	1.0	2.52	2.4	35.7	206.8	2.52	521.8	
207	LOT 6	B4	4.15	0.85	36.6	3.5	2.48	8.8	36.6	210.4	2.48	522.0	
207	OPEN CHANNEL	B5	0.98	0.35	36.6	0.3	2.48	0.9	36.6	210.7	2.48	522.8	
208	0								36.7	210.7	2.48	521.8	
209	0								38.0	210.7	2.42	509.8	
210	0								40.3	210.7	2.33	491.5	
210	OPEN CHANNEL	B16	2.29	0.35	40.3	0.8	2.33	1.9	40.3	211.5	2.33	493.4	
210	SUBTOTAL=>			SUBTOTAL=>					40.3		2.33	493.4	cfs
	TRIBUTARY TO POND B1												
222	LOT 29	B15	2.63	0.85	6.7	2.2	7.45	16.7	6.7	2.2	7.45	16.7	
223	STREET "B"	B14	1.00	0.85	7.1	0.9	7.16	6.1	7.1	3.1	7.16	22.1	
224	LOT 28	B28	2.56	0.85	7.6	2.2	6.87	14.9	7.6	5.3	6.87	36.1	
225	LOT 30	B29	2.95	0.85	7.8	2.5	6.71	16.8	7.8	7.8	6.71	52.1	
225	LOTS 9-14, LOT 26, LOT 27	B6, B10, B11, B12	20.66	0.85	7.8	17.6	6.71	117.9	7.8	25.3	6.71	170.0	
225	CALLE VENTNER, LONE STAR	B7, B8, B13	4.58	0.85	7.8	3.9	6.71	26.1	7.8	29.2	6.71	196.1	
225	OPEN SPACE	B9	1.64	0.36	7.8	0.6	6.71	4.0	7.8	29.8	6.71	200.1	
225	LOT 31	B20	3.04	0.85	7.8	2.6	6.71	17.3	7.8	32.4	6.71	217.5	
210	POND B1	B18	1.70	0.35	8.1	0.6	6.56	3.9	8.1	33.0	6.56	216.5	
210	SUBTOTAL=>			SUBTOTAL=>					8.1		6.56	216.5	cfs

JUNCTION 210 COMBINATION

	JUNCTION 210 COMBINATION	
$Q_{1(cfs)}$=	216.5	TRIBUTARY TO POND B1
$T_{1(min)}$=	8.1	
$I_{1(in/hr)}$=	6.6	
$Q_{2(cfs)}$=	493.4	OFFSITE BASIN B, OPEN CHANNEL
$T_{2(min)}$=	40.3	
$I_{2(in/hr)}$=	2.3	
$Q_{T1(cfs)}$	315.8	
$Q_{T2(cfs)}$	570.3	
Therefore use:	T2(min)= 40.2	
and:	QT2(cfs)= 570.3	
and:	I2(in/hr)= 2.33	

NODE	LOT/BASIN	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I [2] in/hr	Q cfs	T(c) min	SUM C x A	I [2] in/hr	Q cfs	REMARKS
210	JUNCTION=>			JUNCTION=>					40.2	244.5	2.33	570.3	cfs
	POND B1 OUTFLOW, OPEN CHANNEL												
211	LOTS 28 & 29	B17	11.70	0.85	41.8	9.9	2.28	22.6	41.8	254.5	2.28	579.5	
211	OPEN CHANNEL	B19	1.04	0.35	41.8	0.4	2.28	0.8	41.8	254.8	2.28	580.3	
211	CALTRANS R/W	B21&B23	18.08	0.58	41.8	10.5	2.28	23.9	41.8	265.3	2.28	604.2	
212	0								42.1	265.3	2.27	601.6	
212	0								42.1	265.3	2.27	601.6	
212	SUBTOTAL=>			SUBTOTAL=>					42.1		2.27	601.6	cfs
	TRIBUTARY TO POND B2												
235	LOT 27	B26	2.78	0.85	4.6	2.4	9.47	22.4	4.6	2.4	9.47	22.4	
235	LONE STAR & SIEMPRE VIVA	B24 & B25	3.36	0.85	4.6	2.9	9.47	27.0	4.6	5.2	9.47	49.4	
236	POND B2	B22	0.53	0.35	4.6	0.2	9.47	1.8	4.6	5.4	9.47	51.2	
212	0								5.8	5.4	8.11	43.8	
212	0			0.58	5.8	0.0	8.11	0.0	5.8	5.4	8.11	43.8	
212	SUBTOTAL=>			SUBTOTAL=>					5.8		8.11	43.8	cfs

JUNCTION 214 COMBINATION

	JUNCTION 214 COMBINATION	
$Q_{1(cfs)}$=	43.8	TRIBUTARY TO POND B2
$T_{1(min)}$=	5.8	
$I_{1(in/hr)}$=	8.1	
$Q_{2(cfs)}$=	601.6	POND B1 OUTFLOW, OPEN CHANNEL
$T_{2(min)}$=	42.1	
$I_{2(in/hr)}$=	2.3	
$Q_{T1(cfs)}$	127.2	
$Q_{T2(cfs)}$	613.9	
Therefore use:	T2(min)= 42.0	
and:	QT2(cfs)= 613.9	
and:	I2(in/hr)= 2.27	

NODE	LOT/BASIN	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I [2] in/hr	Q cfs	T(c) min	SUM C x A	I [2] in/hr	Q cfs	REMARKS
212	JUNCTION=>			JUNCTION=>					42.0	270.7	2.27	613.9	cfs

PROPOSED BASIN "B"
$P_6 = 3.4$, $C = 0.36$

$$T_1 = \left(\frac{11.9\ L^3}{\Delta E}\right)^{.385} \times 60 + T_c$$

$$T_1 = \left[\frac{11.9\left(\frac{4,000}{5280}\right)^3}{698}\right]^{.385} \times 60 + 10.3$$

$T_1 = 19.38 \text{ min}$

$S = 3\%$
$L_m = 100'$
$T_c = 10.3 \text{ min}$

$\Delta E = 698'$

$I_{100} = 7.44(P_6)\ D^{-.645}$
$I_{100} = 7.44(3.4)(19.38)^{-.645}$
$I_{100} = 3.73 \text{ in/hr}$

$Q_{100} = C\ I_{100}\ A$
$Q_{100} = (0.36)(3.73)(91.6)$
$Q_{100} = 123.0 \text{ cfs}$

BASIN B-1
$L = 4,000 ft$
$A = 91.6 AC$
$C = 0.36$

AREA TOTAL = 91.6 AC

6.2%

BASIN B-2
$L = 3456'$
$A = 301.7 AC$
$n = 0.05$
$C = 0.36$

AREA TOTAL = 393.3 AC

3.0%

BASIN B-3, $L = 2454'$
$A = 164.1 AC$

AREA TOTAL = 557.4 AC

2.0%

1 NODE 202

X-SECTION (1)
$Q_{100} = 123.0$, $V_1 = 6.9$ fps
$T_2 = \frac{L}{V} \times \frac{1}{60} + T_1 = \frac{3456}{6.9(60)} + 19.4$
$T_2 = 27.7 \text{ min}$

$I_{100} = 7.44(3.4)(27.7)^{-.645}$
$I_{100} = 2.96 \text{ in/hr}$

$Q_{100} = (0.36)(2.96)(393.3)$
$Q_{100} = 419.1 \text{ cfs}$

2 NODE 203

X-SECTION (2)
$Q_{100} = 419.1$ cfs , $V_2 = 6.4$ fps
$V_{AVG_2} = \frac{6.9+6.4}{2} = 6.65$ fps
$T_2 = \frac{3456}{6.65(60)} + 19.4 = 28.1 \text{ min}$
$I_{100} = 7.44(3.4)(28.1)^{-.645}$
$I_{100} = 2.94 \text{ in/hr}$
$Q_{100} = (0.36)(2.94)(393.3)$
$Q_{100} = 416.3 \text{ cfs} \rightarrow V_2 = 6.4$

$T_2 = \frac{3454}{(6.4)(60)} + 19.4 = 28.4 \text{ min}$
$I_{100} = 2.92 \text{ in/hr}$
$Q_{100} = 413.4 \rightarrow 6.4 \text{ fps}$

$T_2 = 28.4 \text{ min}$

3 NODE 204

X-SECTION (3)
$Q_{100} = 413.4$ cfs , $V_3 = 3.9$ fps
$V_{AVG} = \frac{3.9+6.4}{2} = 5.15$ fps

$T_3 = \frac{2454}{5.15(60)} + 28.4 = 36.3 \text{ min}$
$I_{100} = 7.44(3.4)(36.3)^{-.645}$
$I_{100} = 2.49 \text{ in/hr}$
$Q_{100} = (0.36)(2.49)(557.4)$
$Q_{100} = 499.65 \text{ cfs} \rightarrow V_3 = 4.06 \text{ fps}$

$T_3 = \frac{1563}{4.06(60)} + 28.4 = 34.8 \text{ min}$
$I_{100} = 2.56 \text{ in/hr}$
$Q_{100} = 513.7 \text{ cfs} \rightarrow V_3 = 4.1 \text{ fps}$

$T_3 = 34.8 \text{ min}$

1+00 5+00 10+00 15+00 20+00 25+00 30+00 35+00 40+00 45+00 50+00 55+00 60+00 65+00 70+00 75+00 80+00 85+00 90+00 95+00 00+00

1" = 800' HORIZ
1" = 160' VERT

NODE 204 TO 205 - DBL 6' x 4' RCB
Worksheet for Rectangular Channel

Project Description	
Worksheet	NODE 204 TO 205 - DBL 6'
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	0.018800	ft/ft
Bottom Width	12.00	ft
Discharge	462.00	cfs

Results		
Depth	1.92	ft
Flow Area	23.0	ft²
Wetted Perim	15.83	ft
Top Width	12.00	ft
Critical Depth	3.58	ft
Critical Slope	0.003005	ft/ft
Velocity	20.10	ft/s
Velocity Head	6.28	ft
Specific Energ	8.19	ft
Froude Numb	2.56	
Flow Type	Supercritical	

NODE 205 TO 206 - OPEN CHANNEL
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	NODE 205 TO 206 - OPE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

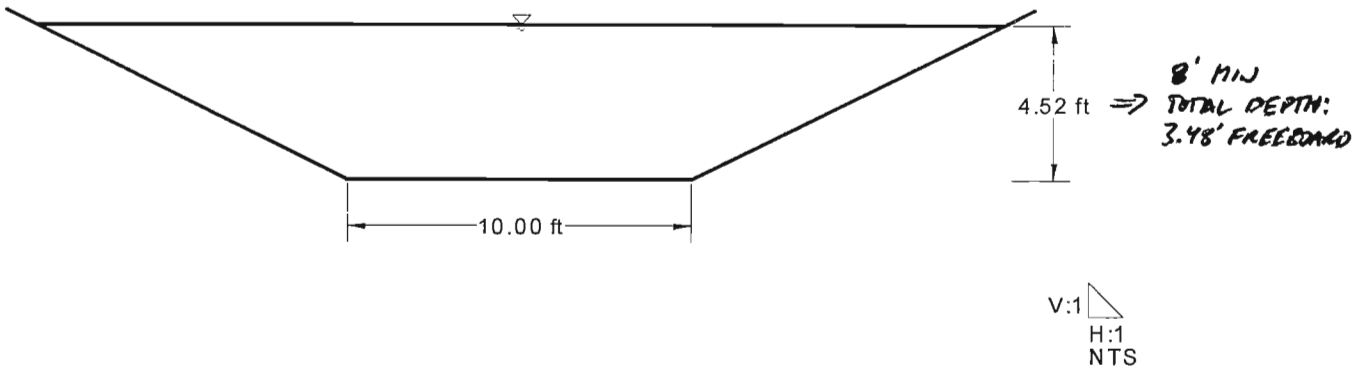
Input Data		
Mannings Coeffic	0.035	
Slope	0.005000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	10.00	ft
Discharge	520.00	cfs

Results		
Depth	4.52	ft
Flow Area	86.2	ft²
Wetted Perim	30.23	ft
Top Width	28.09	ft
Critical Depth	3.46	ft
Critical Slope	0.014455	ft/ft
Velocity	6.03	ft/s
Velocity Head	0.57	ft
Specific Energ	5.09	ft
Froude Numb	0.61	
Flow Type	Subcritical	

NODE 205 TO 206 - OPEN CHANNEL
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	NODE 205 TO 206 - OPE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.035	
Slope	.005000	ft/ft
Depth	4.52	ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	10.00	ft
Discharge	520.00	cfs



NODE 206 TO 207 - OPEN CHANNEL
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	NODE 206 TO 207 - OPE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

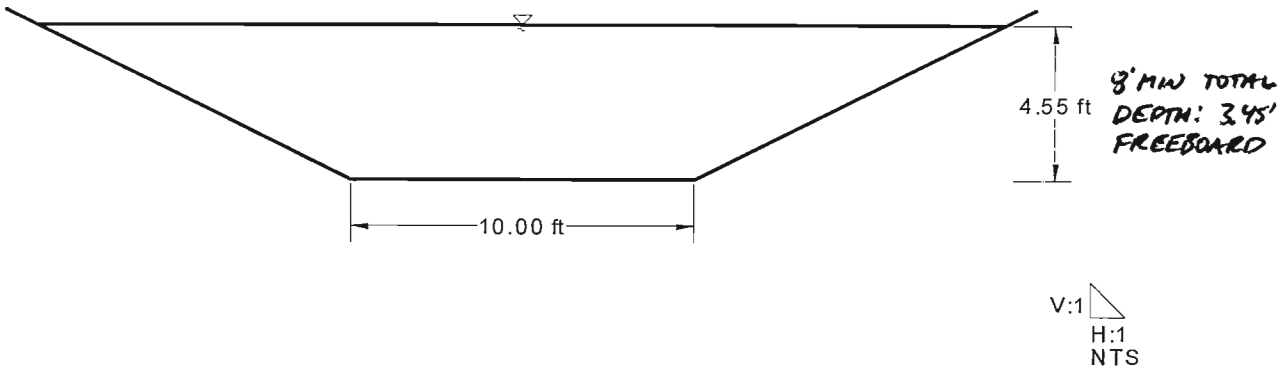
Input Data		
Mannings Coeffic	0.035	
Slope	0.005000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	10.00	ft
Discharge	526.00	cfs

Results		
Depth	4.55	ft
Flow Area	86.9	ft²
Wetted Perim	30.35	ft
Top Width	28.20	ft
Critical Depth	3.48	ft
Critical Slope	0.014433	ft/ft
Velocity	6.05	ft/s
Velocity Head	0.57	ft
Specific Energ	5.12	ft
Froude Numb	0.61	
Flow Type	Subcritical	

NODE 206 TO 207 - OPEN CHANNEL
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	NODE 206 TO 207 - OPE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.035	
Slope	0.005000	ft/ft
Depth	4.55	ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	10.00	ft
Discharge	526.00	cfs



NODE 207 TO 208 - DBL 6' x 4' RCB
Worksheet for Rectangular Channel

Project Description	
Worksheet	NODE 207 TO 208 - DBL 6'
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	0.005000	ft/ft
Bottom Width	12.00	ft
Discharge	522.00	cfs

Results		
Depth	3.27	ft
Flow Area	39.2	ft²
Wetted Perim	18.53	ft
Top Width	12.00	ft
Critical Depth	3.89	ft
Critical Slope	0.003049	ft/ft
Velocity	13.32	ft/s
Velocity Head	2.76	ft
Specific Energ	6.02	ft
Froude Numb	1.30	
Flow Type	Supercritical	

NODE 208 TO 209 - OPEN CHANNEL
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	NODE 208 TO 209 - OPE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

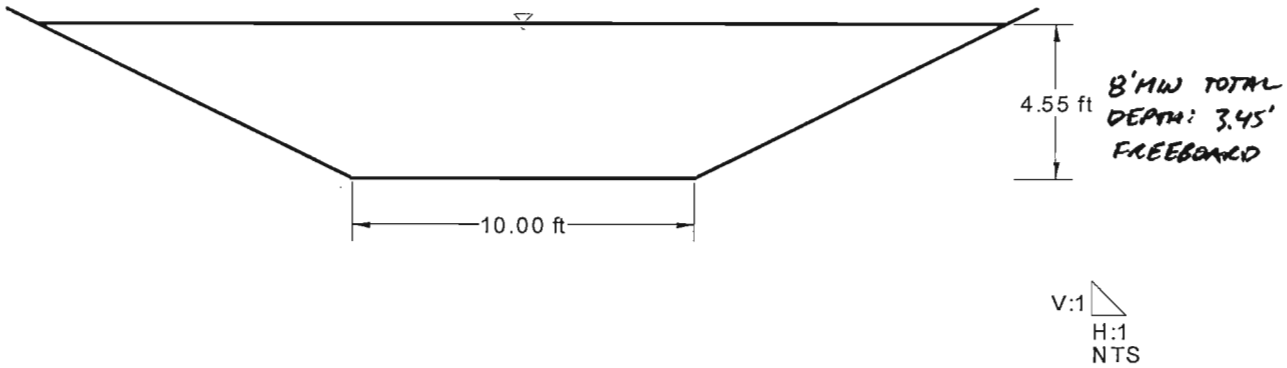
Input Data		
Mannings Coeffic	0.035	
Slope	0.005000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	10.00	ft
Discharge	525.00	cfs

Results		
Depth	4.55	ft
Flow Area	86.8	ft²
Wetted Perim	30.33	ft
Top Width	28.18	ft
Critical Depth	3.48	ft
Critical Slope	0.014437	ft/ft
Velocity	6.05	ft/s
Velocity Head	0.57	ft
Specific Ener	5.11	ft
Froude Numb	0.61	
Flow Type	Subcritical	

NODE 208 TO 209 - OPEN CHANNEL
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	NODE 208 TO 209 - OPE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.035	
Slope	0.005000	ft/ft
Depth	4.55	ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	10.00	ft
Discharge	525.00	cfs



NODE 210 TO 211 - OPEN CHANNEL
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	NODE 210 TO 211 - OPE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

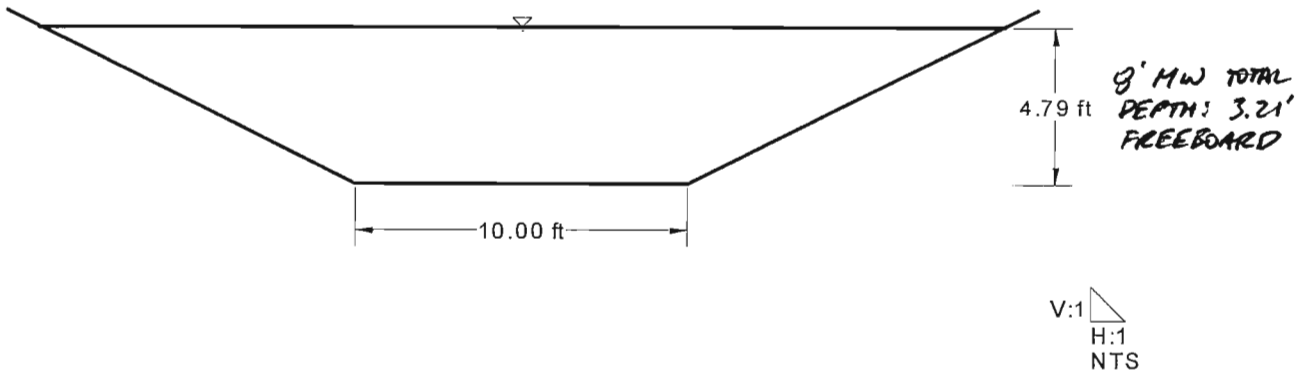
Input Data		
Mannings Coeffic	0.035	
Slope	.005000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	10.00	ft
Discharge	583.00	cfs

Results		
Depth	4.79	ft
Flow Area	93.7	ft²
Wetted Perim	31.41	ft
Top Width	29.15	ft
Critical Depth	3.68	ft
Critical Slope	0.014239	ft/ft
Velocity	6.22	ft/s
Velocity Head	0.60	ft
Specific Energ	5.39	ft
Froude Numb	0.61	
Flow Type	Subcritical	

NODE 210 TO 211 - OPEN CHANNEL
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	NODE 210 TO 211 - OPE
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coeffic	0.035	
Slope	0.005000	ft/ft
Depth	4.79	ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	10.00	ft
Discharge	583.00	cfs



NODE 211 TO 212 - DBL 8' x 4' RCB
Worksheet for Rectangular Channel

Project Description	
Worksheet	NODE 211 TO 212 - DBL 8'
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	0.008500	ft/ft
Bottom Width	16.00	ft
Discharge	601.60	cfs

Results		
Depth	2.38	ft
Flow Area	38.1	ft²
Wetted Perim	20.76	ft
Top Width	16.00	ft
Critical Depth	3.53	ft
Critical Slope	0.002633	ft/ft
Velocity	15.79	ft/s
Velocity Head	3.88	ft
Specific Energ	6.26	ft
Froude Numb	1.80	
Flow Type	Supercritical	

SECTION 3-2C

PROPOSED HYDROLOGY, BASIN C

Developed Basin "C" conveys runoff through the use of a proposed public storm drain system within proposed streets to the historic discharge point at the southern boundary of the basin (design point 311 on Exhibit D-P1; see Section 7). The proposed storm drain system discharges runoff to a natural storm water conveyance, which conveys runoff to the southern project boundary (See Exhibit "D-P1", in Section 7). Basin "C" is comprised of 251.2 acres and generates a peak runoff rate of approximately 339.6 cfs during the 100-year storm event. To limit runoff generated within Basin C to pre-development rates, detention is required within each lot; private storm water collection basins will be constructed with the Rough Grading phase. The storm water collection basins will serve as detention structures limiting rough graded pad runoff to pre-development flow rates. Final detention of the on lot basins will be accomplished through permanent on-lot detention structures during build out of each lot for its ultimate use. To accomplish final detention facilities, the County of San Diego "Storm Water Facilities Maintenance Agreement, with Easements and Covenants" will create Easements, to the County, on each lot for regulation and monitoring of detention facilities for the ultimate development(s). Off site run-on from Basin C2 is conveyed through the public storm drain system and is collected in detention Pond C1 before being discharged at the historic outfall point (design point 309). Offsite run on from Basin C13 and C14 is conveyed un-detained within vegetated and rock lined channels, along the eastern project boundary, to the historic discharge point.

OTAY CROSSINGS COMMERCE PARK

DEVELOPED HYDROLOGY - BASIN C

(Rational Method Procedure)

Otay Mesa, CA DESIGN STORM **100 YR** RUN: 11/4/12 8:12 AM

P6 = 3.4 in.

BASIN INFORMATION

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Detained Q_{100} cfs	REMARKS	TRBUTARY TO
C1	4.2	0.36	24.8	1.51	3.19	4.8	1.9	Off-site	POND C1
C2	31.4	0.36	24.8	11.30	3.19	36.1	13.9	Off-site	POND C1
C3	7.2	0.85	24.8	6.11	3.19	19.5	3.2	Lot 16, 17 - On-lot Detention	POND C1
C4	2.2	0.85	24.8	1.83	3.19	5.8	0.9	Siempre Viva Road	POND C1
C5	3.0	0.85	24.8	2.52	3.19	8.0	1.3	Lone Star Road	POND C1
C6	3.9	0.85	24.8	3.32	3.19	10.6	1.7	Lot 18 - On-lot Detention	POND C1
C7	4.0	0.85	24.8	3.36	3.19	10.7	1.7	Lot 19 - On-lot Detention	POND C1
C8	3.0	0.85	24.8	2.53	3.19	8.1	1.3	Lot 22 - On-lot Detention	POND C1
C9	3.3	0.85	24.8	2.81	3.19	9.0	1.5	Lot 21 - On-lot Detention	POND C1
C10	3.7	0.85	24.8	3.10	3.19	9.9	1.6	Lot 20 - On-lot Detention	POND C1
C11	0.8	0.35	24.8	0.29	3.19	0.9	0.4	HYDROMODIFICATION BASIN - POND C1	POND C1
C12	94.9	0.36	24.8	34.16	3.19	109.0	109.0	Off-site - Undetained	BYPASS
C13	47.7	0.36	24.8	17.17	3.19	54.8	54.8	Off-site - Undetained	BYPASS
C14	39.5	0.36	24.8	14.22	3.19	45.4	45.4	Off-site - Undetained	BYPASS
C15	2.0	0.85	24.8	1.70	3.19	5.4	0.9	Lot 15 - On-lot Detention	POND C1
C16	0.6	0.85	24.8	0.48	3.19	1.5	0.2	Street "D"	POND C1
BASIN C Area=	251.2			106.4	Q_{100}=	339.6	239.7	MAX. ALLOWABLE RELEASE RATE: 239.7 CFS	

BASIN C DETENTION CALCULATIONS

UNDETAINED BASINS	AREA ac.	Q100 cfs
C12	94.9	109.0
C13	47.7	54.8
C14	39.5	45.4
TOTAL:	182.1	209.2

BASIN C TOTAL AREA: 251.2 AC.
SUBTRACT UNDETAINED AREA: -182.1 AC.
TOTAL DETAINED AREA: 69.1 AC.

BASIN C MAX. ALLOWABLE Q_{100} (PRE-PROJECT Q_{100}): 239.7
SUBTRACT UNDETAINED Q_{100}: -209.2
MAX. ALLOWABLE DETAINED Q_{100}: 30.5

BASIN C AVE. ALLOWABLE RELEASE RATE (CFS/AC): 0.44

Otay Crossings Commerce Park - Otay 310 (Historic Basins C)

Time of Concentration - UNDETAINED FLOW RATES

RUN: ###############

Design Storm *100 Year (Proposed)* [1]

COUNTY PRECIP. (APP. B)= 3.4 in/hr

LOT/BASIN	NODE	SUB-BASIN DATA: DRAIN BASIN	AREA sf	AREA ac.	C	INITIAL Ti: INITIAL / OVERLAND TIME (Figure 3-3, Table 3-2): Lm ft.	Slope %	Ti_1 min	INITIAL / TRAVEL TIME (Figure 3-4): Lt ft.	Delta E	Ti_2 min	Ti min: Ti_1+Ti_2 min	TRAVEL TIME T(t) Gutter / Pipe V): Length ft.	Slope %	Pipe Size in.	Velocity fps	T(t) min.	FINAL T(c) min.	REMARKS
BASIN C																			
OFFSITE C2 AND POND C1 OUTFLOW																			
OFFSITE C2	302	C2		31.40	0.36	100	10.0	6.9	1530	140.0	5.6	12.5	140	1.0	36	11.0	0.2	12.7	
LOTS 15	303	C15		2.00	0.85								655	1.2	36	9.5	1.1	13 8	
LOTS 16, 17, SIEMPRE VIVA	304	C3 & C4		9.34	0.85								355	2.5	42	18.0	0.3	14.1	
OFFSITE C1	304	C1		4.19	0.36													14 1	
LOT 22	305	C8		2.98	0.85								255	2.5	42	18.5	0.2	14.4	
LOT 18-20, STREET D	306	C6, C7, C10, C16		12.1	0.85								90	2.0	48	18.2	0.1	14.5	
LOT 21	307	C9		3.3	0.85								180	2.0	48	18.3	0.2	14.6	
LONE STAR	307	C5		3.0	0.85													14.6	
POND C1	308	C11		0.8	0.35								120	0.5	60	10.6	0.2	14.8	
	309												70	0.5	60	10.6	0.1	14.9	
	310												280	3.0		6.3	0.7	15.7	Overland Flow
SUBTOTAL=>	310			69.06	Ac.													15.7	
OFFSITE C13 & C14																			
OFFSITE C13 & C14	310	C13 & C14		87.20	0.36	100	3.0					17.8						17.8	
SUBTOTAL=>	310			87.20	Ac.													17.8	
JUNCTION 310 COMBINATION																			
JUNCTION=>	310			156.26	Ac.													17.8	
OFFSITE C15	311	C12		94.9	0.36								2,210	1.8		5.3	6.9	24 8	
BASIN C TOTAL=>	311			251.16	Ac.													24.8	

Otay Crossings Commerce Park - Otay 310 (Historic Basins C)

Runoff Calculations - UNDETAINED FLOW RATES

(Modified Rational Method Procedure)

RUN: 11/2/12 11:34 AM

Design Storm 100 Year

COUNTY PRECIP. 3.4 in/hr

NODE	LOT/BASIN	BASIN INFORMATION: DRAIN BASIN	AREA ac.	RUNOFF COEFF	DIRECT RUNOFF: T(c) min	C x A	$I^{(2)}$ in/hr	Q cfs	TOTAL RUNOFF: T(c) min	SUM C x A	$I^{(2)}$ in/hr	Q cfs	REMARKS
BASIN C													
OFFSITE C2 AND POND C1 OUTFLOW													
302	OFFSITE C2	C2	31.40	0.36	12.7	11.3	4.92	55 6	12.7	11.3	4.92	55 6	
303	LOTS 15	C15	2.00	0.85	13.8	1.7	4.65	7 9	13.8	13.0	4.65	60.5	
304	LOTS 16, 17, SIEMPRE VIVA	C3 & C4	9.34	0.85	14.1	7.9	4.58	36.4	14.1	20.9	4.58	95.9	
304	OFFSITE C1	C1	4.19	0.36	14.1	1.5	4.58	6.9	14.1	22.5	4.58	102 8	
305	LOT 22	C8	2.98	0.85	14.4	2.5	4.53	11.5	14.4	25.0	4.53	113 3	
306	LOT 18-20, STREET D	, C7, C10, C	12.06	0.85	14.5	10.3	4.52	46 3	14.5	35.2	4.52	159 1	
307	LOT 21	C9	3.31	0.85	14.6	2.8	4.48	12.6	14.6	38.0	4.48	170 6	
307	LONE STAR	C5	2.96	0.85	14.6	2.5	4.48	11 3	14.6	40.6	4.48	181 9	
308	POND C1	C11	0.82	0.35	14.8	0.3	4.45	1 3	14.8	40.9	4.45	181 7	
309	0								14.9	40.9	4.43	180 8	
310	0								15.7	40.9	4.29	175 2	
310	SUBTOTAL=>			SUBTOTAL=>					15.7		4.3	175.2	cfs
OFFSITE C13 & C14													
310	OFFSITE C13 & C14	C13 & C14	87.20	0.36	17.8	31.4	3.95	123.8	17.8	31.4	3.95	123 8	
310	SUBTOTAL=>			SUBTOTAL=>					17.8		3.9	123.8	cfs

JUNCTION 310 COMBINATION

JUNCTION 310 COMBINATION

OFFSITE C2 AND POND C1 OUTFLOW

$Q_{1(cfs)}$= **175.2**
$T_{1(min)}$= **15.7**
$I_{1(in/hr)}$= **4.3**

OFFSITE C13 & C14

$Q_{2(cfs)}$= **123.8**
$T_{2(min)}$= **17.8**
$I_{2(in/hr)}$= **3.9**

$Q_{T1(cfs)}$= **284.0**
$Q_{T2(cfs)}$= **285.0**

Therefore use: T2(min)= 17.8
and: QT2(cfs)= 285.0
and: I2(in/hr)= 3.95

310	JUNCTION=>		JUNCTION=>										17.8	72.2	3.9	285.0	cfs		
311	OFFSITE C15	C12	94.90	0.36	24.8	34.2	3.19	109.0	24.8	106.4	3.19	339.6							
311	BASIN C TOTAL=>												24.8		3.2	339.6	cfs		

NODE 309 TO 310 - OVERLAND FLOW
Worksheet for Irregular Channel

Project Description	
Worksheet	NODE 309 TO 310 - OVE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.030000	ft/ft
Discharge	198.00	cfs

Options	
Current Roughness Method	Lotter's Method
Open Channel Weighting	Lotter's Method
Closed Channel Weighting	Horton's Method

Results		
Mannings Coefficient	0.035	
Water Surface Elev	517.59	ft
Elevation Range	3.00 to 530.00	
Flow Area	31.5	ft²
Wetted Perimeter	39.80	ft
Top Width	39.68	ft
Actual Depth	1.59	ft
Critical Elevation	517.73	ft
Critical Slope	0.018806	ft/ft
Velocity	6.29	ft/s
Velocity Head	0.61	ft
Specific Energy	518.20	ft
Froude Number	1.24	
Flow Type	Supercritical	

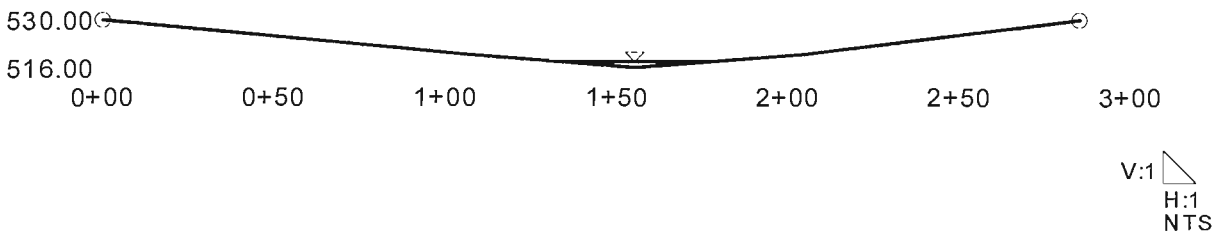
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	2+85	0.035

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	530.00
1+05	520.00
1+55	516.00
2+05	520.00
2+85	530.00

NODE 309 TO 310 - OVERLAND FLOW X-SEC
Cross Section for Irregular Channel

Project Description	
Worksheet	NODE 309 TO 310 - OVE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.035	
Slope	0.030000	ft/ft
Water Surface Elev	517.59	ft
Elevation Range	3.00 to 530.00	
Discharge	198.00	cfs



NODE 310 TO 311 - OVERLAND FLOW
Worksheet for Irregular Channel

Project Description	
Worksheet	NODE 310 TO 311 - OVE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	0.018000 ft/ft
Discharge	355.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting	Improved Lotter's Method
Closed Channel Weighting	Horton's Method

Results		
Mannings Coefficient	0.035	
Water Surface Elev	513.01	ft
Elevation Range	1.80 to 516.00	
Flow Area	67.1	ft²
Wetted Perimeter	74.83	ft
Top Width	74.72	ft
Actual Depth	1.21	ft
Critical Elevation	513.00	ft
Critical Slope	0.018592	ft/ft
Velocity	5.29	ft/s
Velocity Head	0.44	ft
Specific Energy	513.45	ft
Froude Number	0.99	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	1+65	0.035

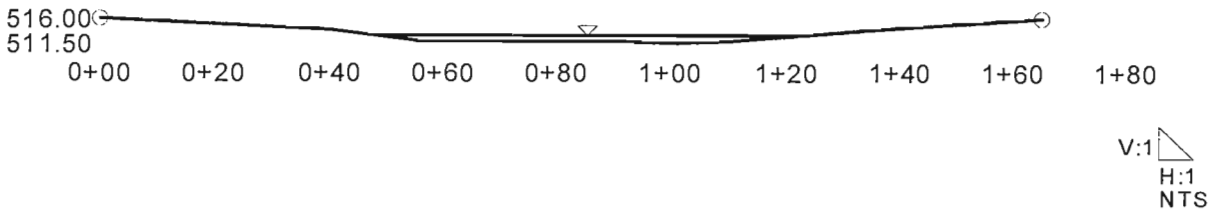
Natural Channel Points

Station (ft)	Elevation (ft)
0+00	516.00
0+40	514.00
0+56	512.00
0+90	512.00
1+00	511.80
1+10	512.00
1+35	514.00
1+65	516.00

NODE 310 TO 311 - OVERLAND FLOW X-SEC
Cross Section for Irregular Channel

Project Description	
Worksheet	NODE 310 TO 311 - OVE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.035	
Slope	0.018000	ft/ft
Water Surface Elev	513.01	ft
Elevation Range	1.80 to 516.00	
Discharge	355.00	cfs



BASIN C13+C14

NODE 320

NODE 321

NODE 310

$S = 3.0\%$
$L_m = 100'$, $T_i = 7.1$ min

$$T_1 = \left(\frac{11.9\,L^3}{\Delta E}\right)^{.385} \times 60 + T_i$$

$$T_1 = \left[\frac{11.9\left(\frac{2700}{5280}\right)^3}{297}\right]^{.385} \times 60 + 7.1$$

$T_1 = 15.1$ min

$$I_{100} = 7.44\,(P_6)\,D^{-.645}$$
$$I_{100} = 7.44\,(3.4)(15.1)^{-.645}$$
$I_{100} = 4.39$ in/hr

$Q_{100} = C\,I_{100}\,A$
$Q_{100} = (0.36)(4.39)(47.7)$
$Q_{100} = 75.4$ cfs

$\Delta E = 297'$

BASIN C-2A, $C = 0.36$, $A = 47.7$ AC

$L = 2700'$

SECTION C-1

$Q = 75.4$ cfs, $V_1 = 7.4$ FT/s

$T_2 = L/V + T_1 = \frac{1300}{7.4\,(60)} + 15.1$

$T_2 = 18.03$ min

$I_{100} = 7.44\,(3.4)(18.03)^{-.645}$
$I_{100} = 3.92$ in/hr

$Q_{100} = (0.36)(3.92)(86.3)$
$Q_{100} = 121.8$ cfs
@ 121.8 CFS, $V = 8.5$ FT/s

$V_{AVE} = (7.4$ FT/s $+ 8.5$ FT/s$)/2 = 7.95$ FT/s

$T_2 = \frac{1300}{7.95(60)} + 15.1$

$T_2 = 17.83$ MIN.

AREA TOTAL = 47.7 AC

AREA TOTAL = 86.3

C-2B, $L = 1300'$, $A = 86.3$

1000 960 920 880 840 800 760 720 680 640 600 560 520

1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+

NODE 321 TO 310 - OVERLAND FLOW
Worksheet for Irregular Channel

Project Description	
Worksheet	NODE 321 TO 310 - OPE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	.042000 ft/ft
Discharg	121.80 cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.035	
Water Surface Elev	561.90	ft
Elevation Range	.50 to 564.00	
Flow Area	14.3	ft²
Wetted Perimeter	14.88	ft
Top Width	14.43	ft
Actual Depth	1.40	ft
Critical Elevation	562.23	ft
Critical Slope	0.017705	ft/ft
Velocity	8.49	ft/s
Velocity Head	1.12	ft
Specific Energy	563.02	ft
Froude Number	1.50	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+19	0.035

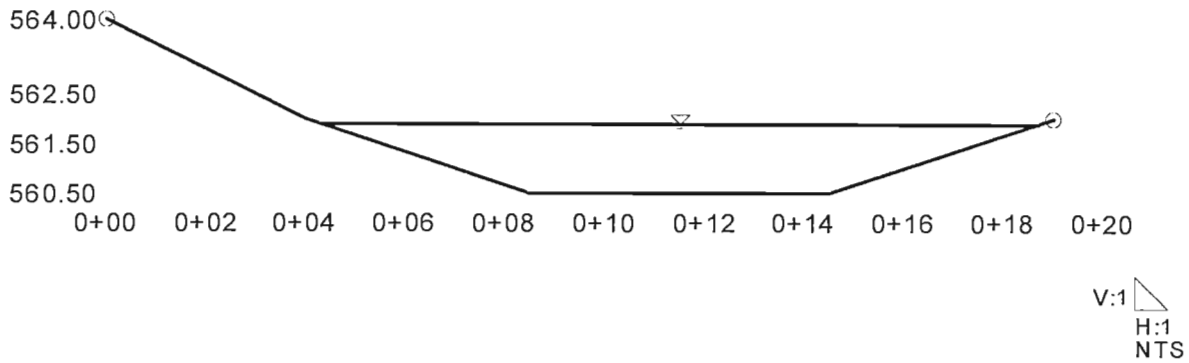
Natural Channel Points

Station (ft)	Elevation (ft)
0+00	564.00
0+04	562.00
0+09	560.50
0+15	560.50
0+19	562.00

NODE 321 TO 310 - OVERLAND FLOW X-SEC
Cross Section for Irregular Channel

Project Description	
Worksheet	NODE 321 TO 310 - OPE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.035	
Slope	0.042000	ft/ft
Water Surface Elev	561.90	ft
Elevation Range	).50 to 564.00	
Discharge	121.80	cfs



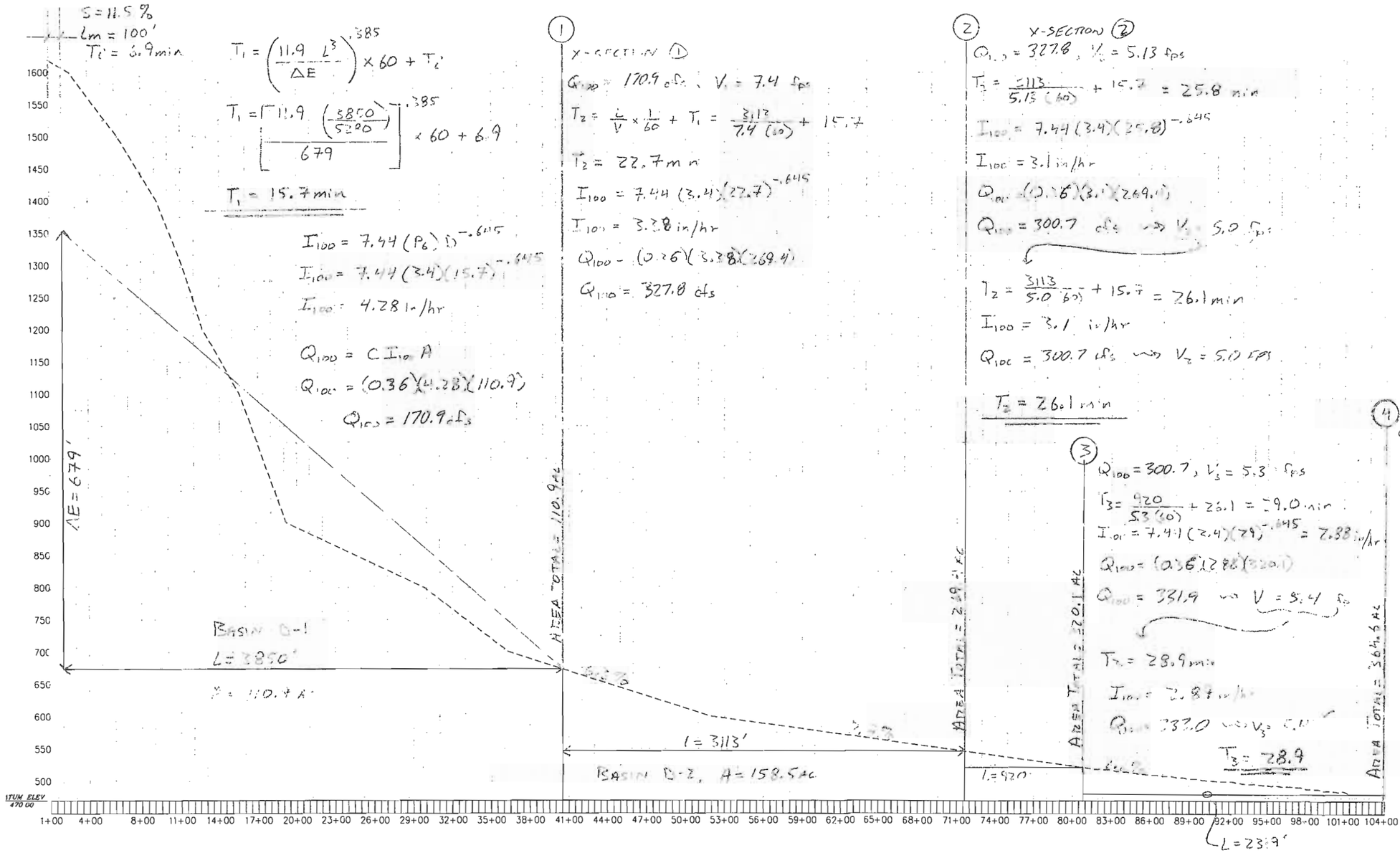
SECTION 3-2D

PROPOSED HYDROLOGY, BASIN D (NO CHANGE PROPOSED)

Basin "D" topography falls gently to the south from a highpoint in the Northwest corner of the watershed (design point 400 on Exhibit D-E1). Runoff is conveyed via overland sheet flow and natural channel flow through the center of the watershed until ultimately being discharged to the natural watercourse (Node 404). From there, the watercourse continues south into Mexico. See Exhibit "D-E1", which depicts existing drainage conditions. The Basin "D" watershed is comprised of 364.8 acres and generates a peak runoff rate of approximately 332.3 cfs during the 100-year storm event. No development is proposed within Basin D.

EXISTING BASIN "D"

$P_6 = 3.4$, $C = 0.36$



EXISTING BASIN "D"
(NO CHANGE PROPOSED)

EXISTING BASIN "D" SECTION 1
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.063000	ft/ft
Discharg	170.90	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	652.01	ft
Elevation Range	).00 to 680.00	
Flow Area	23.1	ft²
Wetted Perimeter	23.28	ft
Top Width	22.93	ft
Actual Depth	2.01	ft
Critical Elevation	652.24	ft
Critical Slope	0.035825	ft/ft
Velocity	7.41	ft/s
Velocity Head	0.85	ft
Specific Energy	652.86	ft
Froude Number	1.30	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-1+01	2+60	0.050

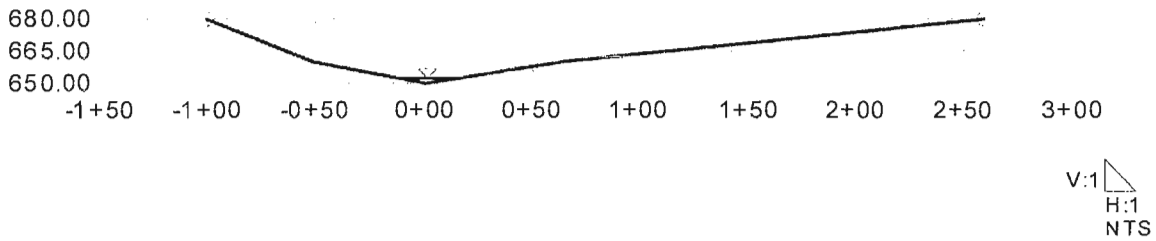
Natural Channel Points

Station (ft)	Elevation (ft)
-1+01	680.00
-0+51	660.00
0+00	650.00
0+63	660.00
2+60	680.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.063000	ft/ft
Water Surface Elev	652.01	ft
Elevation Range	).00 to 680.00	
Discharge	170.90	cfs



EXISTING BASIN "D" SECTION 2
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data	
Slope	0.027000 ft/ft
Discharg	300.70 cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	542.09	ft
Elevation Range	.00 to 560.00	
Flow Area	59.9	ft²
Wetted Perimeter	57.46	ft
Top Width	57.24	ft
Actual Depth	2.09	ft
Critical Elevation	541.98	ft
Critical Slope	0.036770	ft/ft
Velocity	5.02	ft/s
Velocity Head	0.39	ft
Specific Energy	542.48	ft
Froude Number	0.87	
Flow Type	Subcritical	

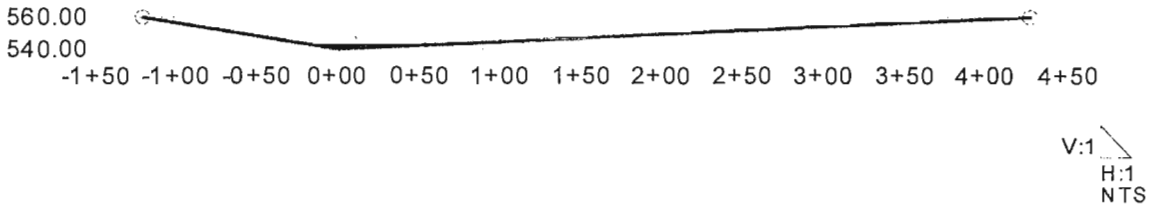
Roughness Segments		
Start Station	End Station	Mannings Coefficient
-1+21	4+26	0.050

Natural Channel Points	
Station (ft)	Elevation (ft)
-1+21	560.00
0+00	540.00
4+26	560.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.027000	ft/ft
Water Surface Elev	542.09	ft
Elevation Range	).00 to 560.00	
Discharge	300.70	cfs



EXISTING BASIN "D" SECTION 3
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.022000	ft/ft
Discharg	333.00	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	516.74	ft
Elevation Range	1.00 to 522.00	
Flow Area	61.9	ft²
Wetted Perimeter	45.88	ft
Top Width	45.51	ft
Actual Depth	2.74	ft
Critical Elevation	516.52	ft
Critical Slope	0.034162	ft/ft
Velocity	5.38	ft/s
Velocity Head	0.45	ft
Specific Energy	517.19	ft
Froude Number	0.81	
Flow Type	Subcritical	

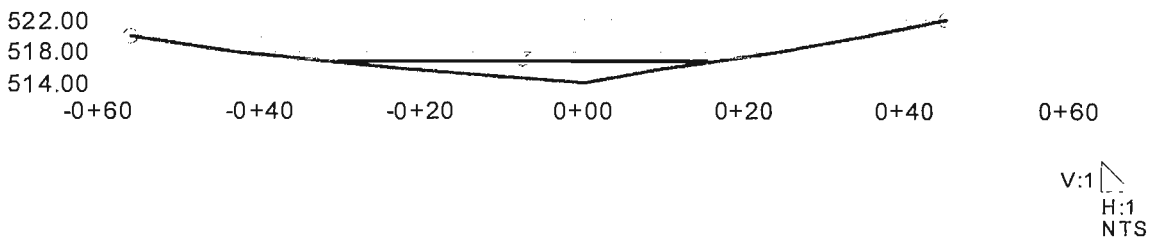
Roughness Segments		
Start Station	End Station	Mannings Coefficient
-0+56	0+45	0.050

Natural Channel Points	
Station (ft)	Elevation (ft)
-0+56	520.00
-0+43	518.00
-0+23	516.00
0+00	514.00
0+10	516.00
0+24	518.00
0+35	520.00
0+45	522.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.022000	ft/ft
Water Surface Elev	516.74	ft
Elevation Range	1.00 to 522.00	
Discharge	333.00	cfs



EXISTING BASIN "D" SECTION 4
Worksheet for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	0.022000	ft/ft
Discharge	332.10	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.050	
Water Surface Elev	482.89	ft
Elevation Range	.00 to 484.00	
Flow Area	56.8	ft²
Wetted Perimeter	37.15	ft
Top Width	36.48	ft
Actual Depth	2.89	ft
Critical Elevation	482.67	ft
Critical Slope	0.033153	ft/ft
Velocity	5.85	ft/s
Velocity Head	0.53	ft
Specific Energy	483.42	ft
Froude Number	0.83	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-0+17	0+30	0.050

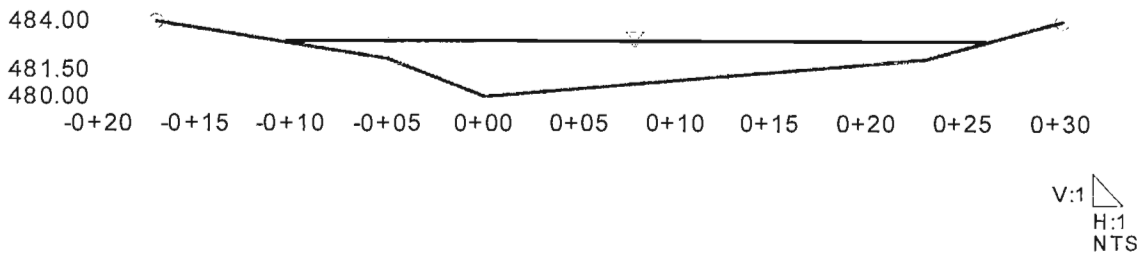
Natural Channel Points

Station (ft)	Elevation (ft)
-0+17	484.00
-0+05	482.00
0+00	480.00
0+23	482.00
0+30	484.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	BASIN D SEC
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.050	
Slope	0.022000	ft/ft
Water Surface Elev	482.89	ft
Elevation Range	.00 to 484.00	
Discharge	332.10	cfs



SECTION 4

HYDRAULICS - PROPOSED DETENTION

PROPOSED ON LOT DETENTION 4-1

BASIN A, B, & C – DETENTION CALCULATIONS.....4-2A, B & C
Detention Pond Inflow Calculations

Table 4-1
Proposed Detention Release Rate Summary

	Existing Condition		Developed Condition		
	Area	Q_{100}	Area	Q_{100} (cfs)	
Basin	(acres)	(cfs)	(acres)	Undetained	Detained
A	138.1	166.2	127.8	382.6	166.2
B	652.1	492.9	658.7	614.3	492.9
C	258.3	239.7	251.2	339.6	239.7
D	364.8	332.3	364.8	332.3	N/A

SECTION 4-1

PROPOSED ON LOT DETENTION

Description

The development of the OCCP project increases runoff at the points of study for Basins A, B, and C by 216.4 cfs, 121.4 cfs, and 99.9 cfs respectively. Per agreement with County of San Diego, County Flood Control Division has adopted the City of San Diego, "Drainage Requirements for Developments in Otay Mesa" (NOTICE from City of San Diego dated: 08/07/1987 included at the end of this Section). Paragraph 1 indicates that detention will be required for proposed developments, and paragraph 2 requires, "The detention facilities shall be designed so that the rate of runoff from the property will not be greater after development than it was before development...". Additionally, paragraph three of the memo states, "All drainage facilities...shall be designed for a Q_{100} (existing)." The OCCP project will construct regional detention facilities to mitigate for increases in runoff generated by the proposed public roads. Detention for each lot will be handled on-lot; initially by above ground ponds in the rough graded condition, and then by ultimate future facilities constructed at build out of each lot.

Considering this study is a "CEQA Preliminary Hydrology/Drainage Study" in support of the Tentative Map at a discretionary level, final detention calculations are not appropriate at this time. Further, the detention design for development of the lots in Basins A, B, and C in this subdivision is a non-regional lot by lot detention approach. Considering final choice of detention device/method will be made by ultimate development owners at a future date (subject to County approval), no specific on-lot detention basins are detailed at this time. Resultantly, final detention basin routing will occur at final engineering, this study provides preliminary routing for required detention.

In addition to the above referenced detention criteria, the project is required to comply with the Countywide Hydromodification Management Plan (HMP); see the "Hydromodification Management Plan for Otay Crossings Commerce Park" for details. OCCP will utilize a combination of on-lot detention facilities and regional detention facilities to satisfy the HMP. The HMP criteria is considered the minimum detention criteria for the project, and facility sizes modeled in this section will be at least as large as those required for hydromodification mitigation. Additionally, outlet orifices for the facilities will be no larger than the sizes specified in the project Hydromodification Management Plan. Calculations within this section route peak runoff flow rates from a 100 year design storm through each of the proposed detention facilities to confirm that existing peak runoff flow rates will not be exceeded at the points of study. Design and calculations of detention pond sizing follow in Sections 4-1A through 4-1C.

Calculations:

1. GENERATE RATIONAL METHOD PEAK FLOW (see Section 3)

2. GENERATE INFLOW HYDROGRAPH UTILIZING "RATHYDRO":

The "Rational Method Hydrograph Program" by Rick Engineering Company, supplied by the County of San Diego, has been utilized to determine the developed "inflow" hydrograph, utilizing parameters at the outfall points for each of the regional detention facilities. The parameters for the inflow hydrograph are the Rational Method weighted runoff coefficient, time of concentration, peak flow, six hour precipitation and overall basin area; all calculated for the ultimate developed condition **UD.**

Since each of the regional drainage basins at the project contain multiple detention facilities, the time of concentration utilized in generating the inflow hydrographs is the overall time of concentration for the drainage basin, not the time of concentration for the area tributary to each facility. This method calculates the runoff flow rate contributed by the detention facility to the drainage basin's overall peak flow rate, thus ensuring that the existing peak flow rate is not exceeded at any of the points of study along the project's boundary. During final engineering, the peak 100 year design storm tributary to each detention facility will be calculated and routed through each facility to ensure that the facilities and their outlet structures are hydraulically sound.

Basins A, B, and C contain on-lot drainage facilities that outflow to regional drainage facilities. Total lot outflow generated in each basin is approximated by routing the 100 year design storm through the proposed on-lot detention facility on the largest lot in the basin, and then proportionally multiplying the resulting outflow hydrograph to generate a hydrograph representing the outflow from all on-lot facilities. This outflow hydrograph is then combined with the hydrograph generated by the undetained sub-basins to create the total inflow hydrograph for the proposed regional detention facility.

3. ROUTE INFLOW HYDROGRAPHS THROUGH DETENTION FACILITIES:

The software utilized to route each of the inflow hydrographs through the detention facilities is Hydraflow Hydrographs 2007. Each facility is modeled in the software using contour areas and outlet structure parameters calculated in the Hydromodification Management Plan. The software routes the hydrograph through each facility and generates an outflow hydrograph for the facility and a graphic output that depicts the hydraulic operation of the outlet structure; Hydrograph Reports and Pond Reports for each facility follow in this section. The facilities are incrementally increased in size, as needed, in order to satisfy each basin's detention criteria.

Detention Conclusion:

As shown in the routing calculations within this section, and summarized in Table 4-1 at the beginning of this section, the proposed detention facilities at OCCP will mitigate for the increase in runoff generated during a 100 year design storm, reducing peak runoff flow rates at the points of study to levels below existing runoff flow rates.

an elevation of 3.5 feet above the bottom of the cistern. The overflow weir would be sized to pass the peak design flow based on the tributary drainage area.

- **Bioretention configuration:** The bioretention needs only a small depression/ponding area to settle inflows prior to infiltration (for Type A soils). For water quality treatment (Type B, C, and D soils), the bioretention area should be 1.5 feet deep and contain the soil mixture specified in the *Countywide Model SUSMP* that allows a continuous infiltration rate of 5 inches per hour. The bioretention basin should be sized to pass the cistern outlet flows.

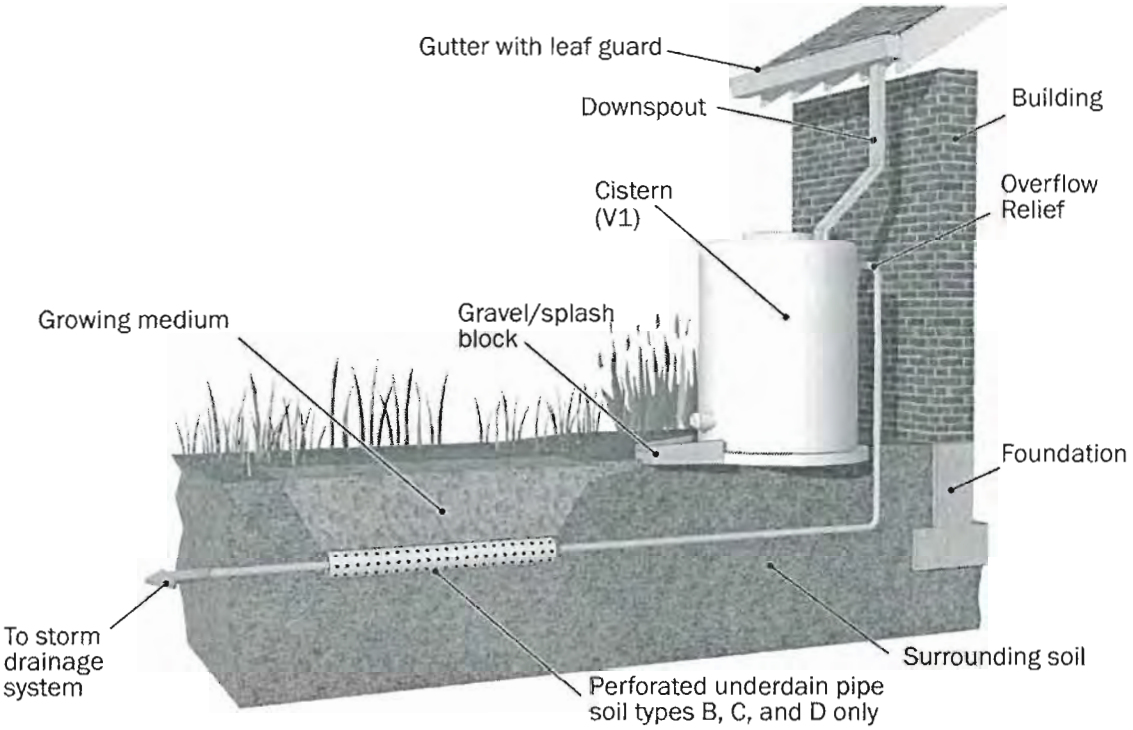


Figure 1-6. Cistern with Bioretention BMP Example Illustration

DESIGN CRITERIA FOR FUTURE ONLOT DETENTION

1.4.3 Bioretention with Vault

This BMP configuration routes stormwater through a bioretention basin for water quality treatment, and then discharges water to a nearby vault for detention and release (see Figure 1-7). The bioretention facility sizing is based on a surface area sizing factor of 0.04 and ponding depths as detailed in the Countywide Model SUSMP for water quality BMPs.

The vault contains a lower orifice to restrict outflows to meet the HMP's flow control requirements. The vault portion of the BMP could be located below, adjacent or farther away from the bioretention portion of the BMP. This BMP is particularly effective in commercial applications where distributed water quality treatment outflows could be collected into a single vault for flow control underneath a parking lot. There is no water quality treatment-only option.

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San Diego BMP Sizing Calculator Report January 2012.docx

For the HMP, the performance of the bioretention with vault BMP was simulated using the following key assumptions:

- **Bioretention configuration:** The bioretention portion of this BMP is designed similarly to the bioretention BMP, except that the storage layer would be only deep enough to contain a perforated underdrain pipe to convey treated runoff to the vault portion of the BMP.
- **Vault configuration:** The vault contains concrete side walls and top, as well as an access hatch for inspection and maintenance. The bottom of the vault is open to allow infiltration to the surrounding soils. The vault was simulated as a 4-foot deep chamber, but the designer could select other configurations that were similar or lesser depths.
- **Vault outlets:** The vault contains two outlets. The lower outlet is a flow control orifice that releases water at a maximum rate equal to the lower flow control limit ($0.1Q_2$, $0.3Q_2$, $0.5Q_2$). The upper outlet from the vault is an overflow pipe or weir with an invert located at 80 percent of the water height associated with required volume of the cistern – V1 (see Figure 1-7). For the assumed 4-foot water depth in the vault associated with the sizing factor analysis, the overflow invert is assumed to be located at an elevation of 3.2 feet above the bottom of the vault and the overflow outlet should be designed for a capacity equal to the design flow rate (as calculated from a single-event model based upon criteria set forth in the County of San Diego Hydrology Manual). The overflow relief should be located no lower than the elevation of the vault's inlet pipe.

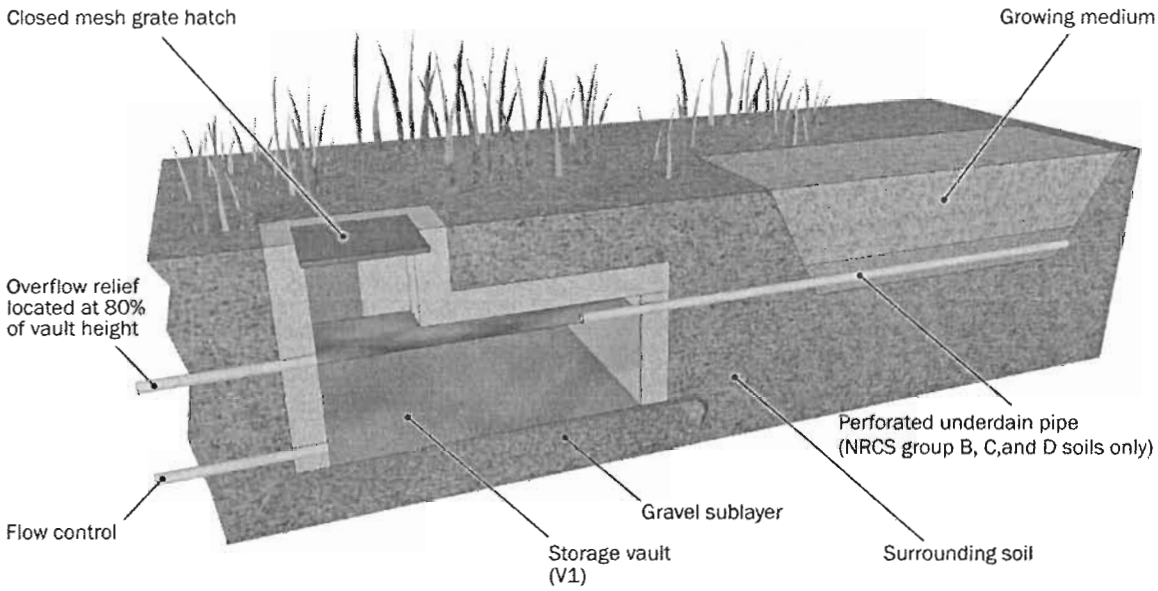


Figure 1-7. Bioretention with Vault BMP Example Illustration

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SECTION 4-2A

BASIN A – DETENTION CALCULATIONS

On-lot runoff generated within Basin A will be detained within on-lot detention facilities in the ultimate condition. Discharge from those detention facilities, along with undetained runoff from the public right-of-way, will be collected within public storm drain systems and conveyed to one of two regional detention facilities. The calculations within this section route a 100 year design storm through the proposed facilities to demonstrate that the project will not exceed pre-project discharge rates.

Note: Symbols shown on Tentative Map are storm water collection basins for rough graded pads only. Final sizing of the basins will be performed at the time of Final Engineering (Per understandings with County DPW Staff).

OTAY CROSSINGS COMMERCE PARK

DETENTION POND A1 INFLOW CALCULATIONS

(Rational Method Procedure)

Otay Mesa, CA | DESIGN STORM **100 YR** | RUN: 11/6/12 2:30 PM

P6 = 3.4 in.

UNDETAINED BASINS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
A6	1.0	0.85	14.1	0.85	4.59	3.9	3.9	0.2	Street "A"
A7	1.1	0.85	14.1	0.97	4.59	4.4	4.4	0.2	Alta Road
A8	1.8	0.85	14.1	1.51	4.59	6.9	6.9	0.4	Calle Ventner
A10	1.5	0.35	14.1	0.52	4.59	2.4	2.4	0.3	HYDROMODIFICATION BASIN - POND A1
A12	0.4	0.85	14.1	0.32	4.59	1.5	1.5	0.1	Alta Road
A31	0.9	0.85	14.1	0.72	4.59	3.3	3.3	0.2	Alta Road
BASIN A Area=	6.6	0.74		4.899	Q_{100}=	22.5	22.5	1.3	TOTAL UNDETAINED INFLOW

DETAINED BASINS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
A3	4.4	0.85	14.1	3.74	4.59	17.2	0.9	0.9	Lot 5 - On-lot Detention
A4	1.9	0.85	14.1	1.59	4.59	7.3	0.4	0.4	Lot 8 - On-lot Detention
A5	1.9	0.85	14.1	1.57	4.59	7.2	0.4	0.4	Lot 7 - On-lot Detention
A9	2.5	0.85	14.1	2.14	4.59	9.8	0.5	0.5	Lot 33 - On-lot Detention
A20	4.3	0.85	14.1	3.69	4.59	16.9	0.9	0.9	Lot 3 & 4 - On-lot Detention
A21	2.2	0.85	14.1	1.86	4.59	8.5	0.4	0.4	Lot 2 - On-lot Detention
A22	2.9	0.85	14.1	2.42	4.59	11.1	0.6	0.6	Lot 34 - On-lot Detention
A23	3.2	0.85	14.1	2.69	4.59	12.4	0.6	0.6	Lot 32 - On-lot Detention
A24	2.4	0.85	14.1	2.04	4.59	9.4	0.5	0.5	Lot 35 - On-lot Detention
BASIN A Area=	25.6	0.85		21.75	Q_{100}=	99.9	5.1	5.1	TOTAL DETAINED INFLOW
BASIN A Area=	32.2	0.83		26.65	Q_{100}=	122.4	27.6	6.4	TOTAL

DETENTION POND A2 INFLOW CALCULATIONS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
A13	29.9	0.54	14.1	16.15	4.59	74.1	74.1	74.1	Off-site
A14	0.5	0.85	14.1	0.43	4.59	2.0	2.0	0.1	Alta Road
A16	1.9	0.85	14.1	1.64	4.59	7.5	7.5	0.4	Street "C"
A17	0.9	0.35	14.1	0.33	4.59	1.5	1.5	0.2	HYDROMODIFICATION BASIN - POND A2
A18	0.5	0.85	14.1	0.43	4.59	2.0	2.0	0.1	Alta Road
A30	0.5	0.85	14.1	0.38	4.59	1.8	1.8	0.1	Alta Road
BASIN A Area=	34.2	0.57		19.34	Q_{100}=	88.8	88.8	75.0	TOTAL

OTAY CROSSINGS COMMERCE PARK

DEVELOPED HYDROLOGY - BASIN A

(Rational Method Procedure)

Otay Mesa, CA DESIGN STORM **100 YR** RUN: 11/6/12 2:30 PM

P6 = 3.4 in.

BASIN INFORMATION

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Detained Q_{100} cfs	REMARKS	TRBUTARY TO
A1	14.7	0.35	14.1	5.15	4.59	23.6	23.6	Off-site (TPM 21140) - Undetained	BYPASS
A2	11.9	0.48	14.1	5.71	4.59	26.2	26.2	Off-site - Undetained	BYPASS
A3	4.4	0.85	14.1	3.74	4.59	17.2	0.9	Lot 5 - On-lot Detention	POND A1
A4	1.9	0.85	14.1	1.59	4.59	7.3	0.4	Lot 8 - On-lot Detention	POND A1
A5	1.9	0.85	14.1	1.57	4.59	7.2	0.4	Lot 7 - On-lot Detention	POND A1
A6	1.0	0.85	14.1	0.85	4.59	3.9	0.2	Street "A"	POND A1
A7	1.1	0.85	14.1	0.97	4.59	4.4	0.2	Alta Road	POND A1
A8	1.8	0.85	14.1	1.51	4.59	6.9	0.4	Calle Ventner	POND A1
A9	2.5	0.85	14.1	2.14	4.59	9.8	0.5	Lot 33 - On-lot Detention	POND A1
A10	1.5	0.35	14.1	0.52	4.59	2.4	0.3	HYDROMODIFICATION BASIN - POND A1	POND A1
A11	9.1	0.58	14.1	5.28	4.59	24.2	24.2	Future Caltrans R/W - Undetained	BYPASS
A12	0.4	0.85	14.1	0.32	4.59	1.5	0.1	Alta Road	POND A1
A13	29.9	0.54	14.1	16.15	4.59	74.1	74.1	Off-site - Undetained	POND A2
A14	0.5	0.85	14.1	0.43	4.59	2.0	0.1	Alta Road	POND A2
A15	7.7	0.85	14.1	6.56	4.59	30.1	1.5	Lot 36 & 42 - On-lot Detention	BYPASS
A16	1.9	0.85	14.1	1.65	4.59	7.6	0.4	Street "C"	POND A2
A17	0.9	0.35	14.1	0.33	4.59	1.5	0.2	HYDROMODIFICATION BASIN - POND A2	POND A2
A18	0.5	0.85	14.1	0.43	4.59	2.0	0.1	Alta Road	POND A2
A19	2.3	0.85	14.1	1.97	4.59	9.1	0.5	Lot 1 - On-lot Detention	BYPASS
A20	4.3	0.85	14.1	3.69	4.59	16.9	0.9	Lot 3 & 4 - On-lot Detention	POND A1
A21	2.2	0.85	14.1	1.86	4.59	8.5	0.4	Lot 2 - On-lot Detention	POND A1
A22	2.9	0.85	14.1	2.42	4.59	11.1	0.6	Lot 34 - On-lot Detention	POND A1
A23	3.2	0.85	14.1	2.69	4.59	12.4	0.6	Lot 32 - On-lot Detention	POND A1
A24	2.4	0.85	14.1	2.04	4.59	9.4	0.5	Lot 35 - On-lot Detention	POND A1
A25	2.8	0.85	14.1	2.37	4.59	10.9	0.6	Lot 41 - On-lot Detention	BYPASS
A26	3.2	0.85	14.1	2.69	4.59	12.4	0.6	Lot 40 - On-lot Detention	BYPASS
A27	2.5	0.85	14.1	2.14	4.59	9.8	0.5	Lot 39 - On-lot Detention	BYPASS
A28	4.9	0.85	14.1	4.14	4.59	19.0	1.0	Lot 37 & 38 - On-lot Detention	BYPASS
A29	2.2	0.58	14.1	1.30	4.59	6.0	6.0	Graded Utility Corridor - Undetained	BYPASS
A30	0.5	0.85	14.1	0.38	4.59	1.8	0.1	Alta Road	POND A2
A31	0.9	0.85	14.1	0.72	4.59	3.3	0.2	Otay Mesa Road	POND A1
BASIN A Area=	127.8			83.32	Q_{100}=	382.6	166.2	MAX. ALLOWABLE RELEASE RATE: 166.2 CFS	

BASIN A DETENTION CALCULATIONS

UNDETAINED BASINS	AREA ac.	Q100 cfs
A1	14.7	23.6
A2	11.9	26.2
A11	9.1	24.2
A13	29.9	74.1
A29	2.2	6.0
TOTAL:	67.8	154.2

BASIN A TOTAL AREA: 127.8 AC.
SUBTRACT UNDETAINED AREA: -67.8 AC.
TOTAL DETAINED AREA: 60.0 AC.

BASIN A AVE. ALLOWABLE RELEASE RATE (CFS/AC): 0.20

BASIN A MAX. ALLOWABLE Q_{100}
(PRE-PROJECT Q_{100}): 166.2
SUBTRACT UNDETAINED Q_{100}: -154.2
MAX. ALLOWABLE DETAINED Q_{100}: 12.0

Hydrograph Report

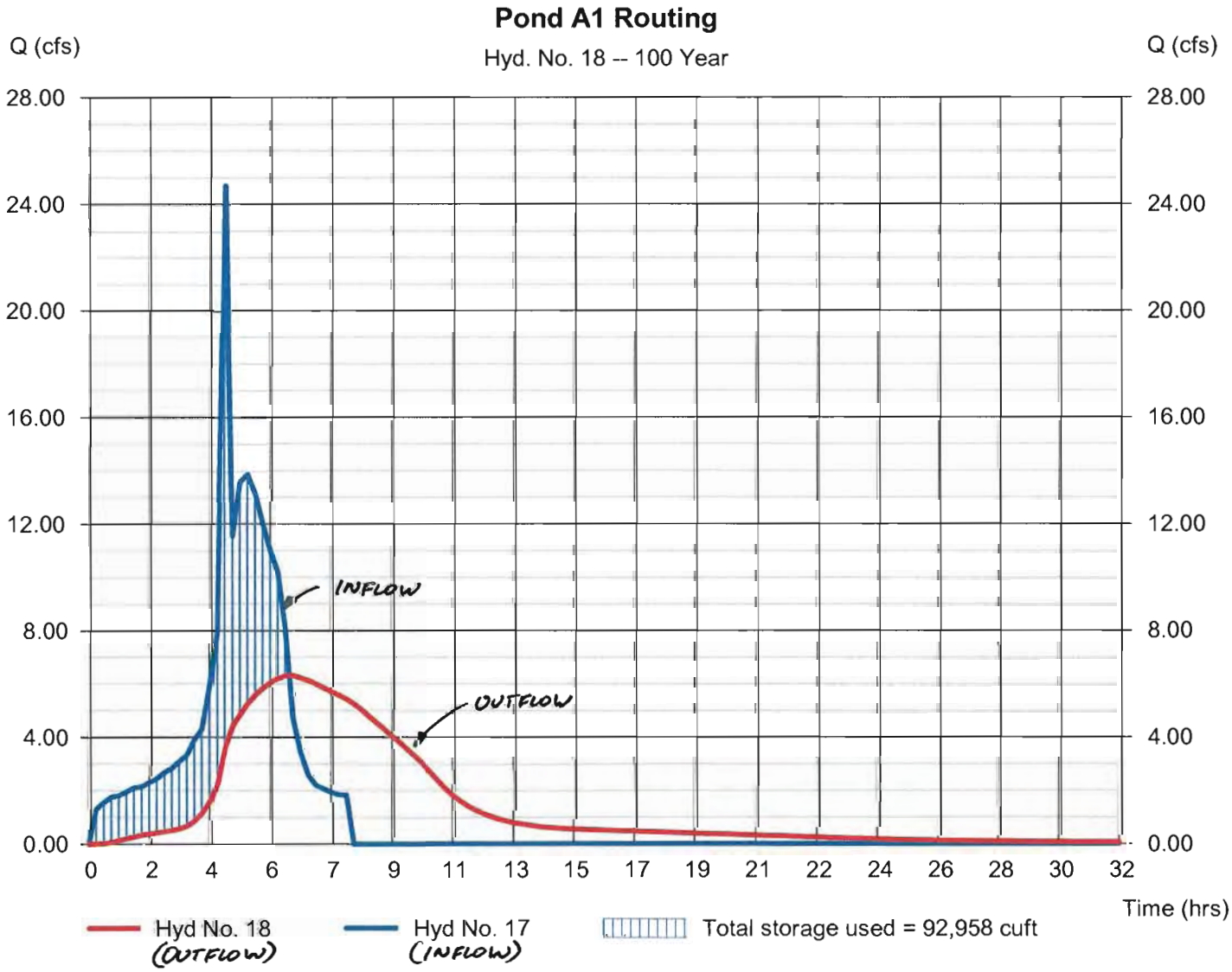
Hydraflow Hydrographs by Intelisolve v9.23 — Tuesday, Nov 6, 2012

Hyd. No. 18

Pond A1 Routing

Hydrograph type	= Reservoir	Peak discharge	= 6.312 cfs ← MAX. ALLOWED = 6.4 CFS
Storm frequency	= 100 yrs	Time to peak	= 6.30 hrs
Time interval	= 14 min	Hyd. volume	= 159,739 cuft
Inflow hyd. No.	= 17 - Pond A1 Inflow	Max. Elevation	= 578.91 ft
Reservoir name	= Pond A1	Max. Storage	= 92,958 cuft

Storage Indication method used.



Pond No. 6 - Pond A1

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 575.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	575.00	17,890	0	0
1.00	576.00	20,930	19,388	19,388
2.00	577.00	24,024	22,457	41,845
3.00	578.00	27,178	25,582	67,427
4.00	579.00	30,388	28,765	96,193
5.00	580.00	33,656	32,005	128,198

MIN. REQUIRED FOR HYDROMODIFICATION: 43,869 CF

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 5.00	11.00	0.00	0.00
Span (in)	= 5.00	11.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 575.00	575.90	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

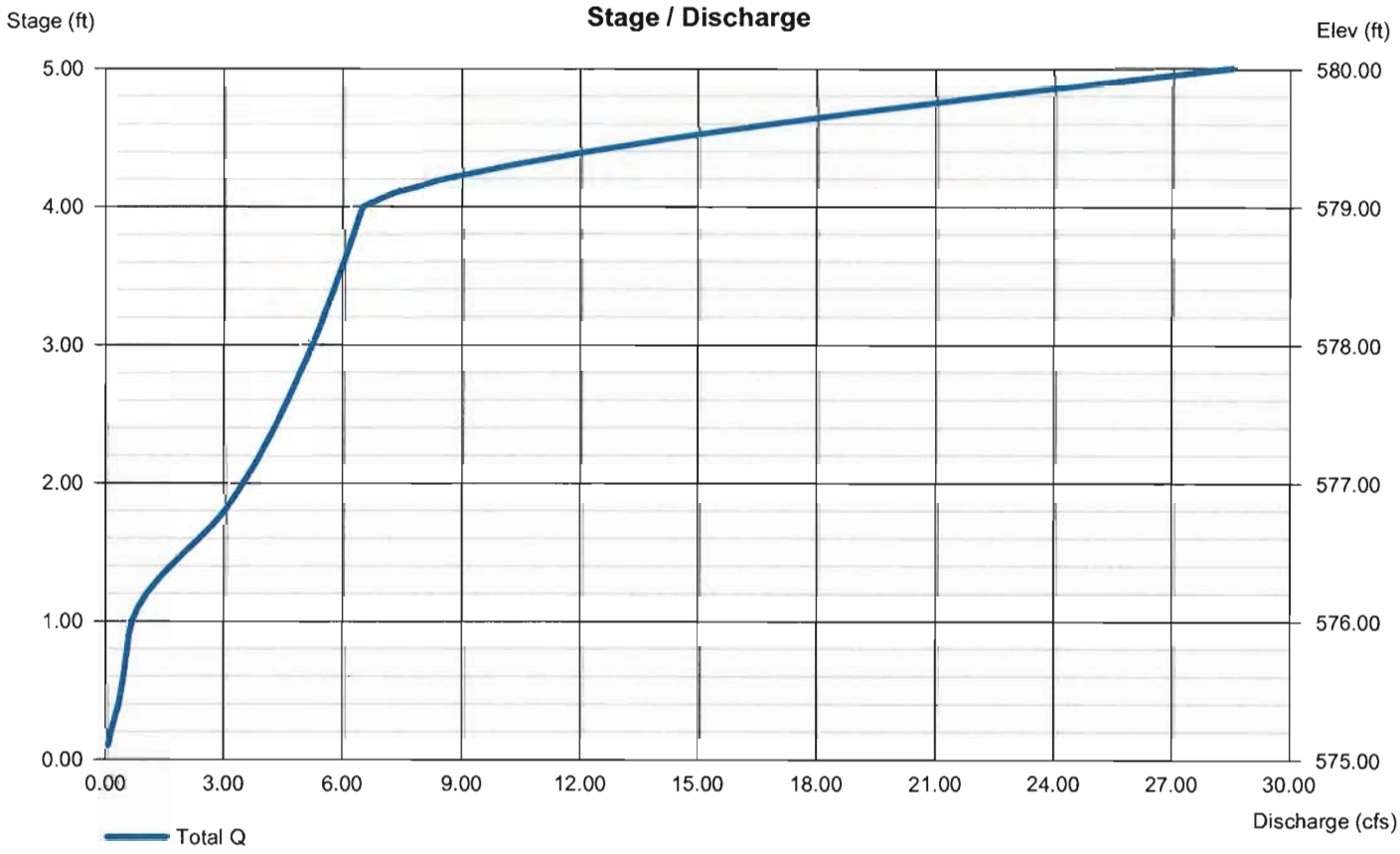
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.30	0.00	0.00	0.00
Crest El. (ft)	= 579.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

PER HYDROMODIFICATION CRITERIA

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 11/6/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 14 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 6.6 ACRES
RUNOFF COEFFICIENT 0.74
PEAK DISCHARGE 22.5 CFS

POND A1 INFLOW HYDROGRAPH

		UNDETAINED INFLOW	DETAINED LOT INFLOW	TOTAL INFLOW	
TIME (MIN) = 0	DISCHARGE (CFS) = 0	0	0	0	
TIME (MIN) = 14	DISCHARGE (CFS) = 1	1	0.31	1.31	
TIME (MIN) = 28	DISCHARGE (CFS) = 1	1	0.55	1.55	
TIME (MIN) = 42	DISCHARGE (CFS) = 1.1	1.1	0.66	1.76	
TIME (MIN) = 56	DISCHARGE (CFS) = 1.1	1.1	0.71	1.81	
TIME (MIN) = 70	DISCHARGE (CFS) = 1.2	1.2	0.76	1.96	
TIME (MIN) = 84	DISCHARGE (CFS) = 1.3	1.3	0.80	2.10	
TIME (MIN) = 98	DISCHARGE (CFS) = 1.3	1.3	0.85	2.15	
TIME (MIN) = 112	DISCHARGE (CFS) = 1.4	1.4	0.90	2.3	
TIME (MIN) = 126	DISCHARGE (CFS) = 1.5	1.5	0.94	2.44	
TIME (MIN) = 140	DISCHARGE (CFS) = 1.7	1.7	0.99	2.69	
TIME (MIN) = 154	DISCHARGE (CFS) = 1.8	1.8	1.04	2.84	
TIME (MIN) = 168	DISCHARGE (CFS) = 2	2	1.09	3.09	
TIME (MIN) = 182	DISCHARGE (CFS) = 2.2	2.2	1.14	3.34	
TIME (MIN) = 196	DISCHARGE (CFS) = 2.7	2.7	1.21	3.91	
TIME (MIN) = 210	DISCHARGE (CFS) = 3	3	1.29	4.29	
TIME (MIN) = 224	DISCHARGE (CFS) = 4.5	4.5	1.40	5.90	
TIME (MIN) = 238	DISCHARGE (CFS) = 6.3	6.3	1.66	7.96	
TIME (MIN) = 252	DISCHARGE (CFS) = 22.5	22.5	2.20	24.70	← PEAK
TIME (MIN) = 266	DISCHARGE (CFS) = 3.6	3.6	7.94	11.54	
TIME (MIN) = 280	DISCHARGE (CFS) = 2.4	2.4	11.19	13.59	
TIME (MIN) = 294	DISCHARGE (CFS) = 1.9	1.9	11.99	13.89	
TIME (MIN) = 308	DISCHARGE (CFS) = 1.6	1.6	11.55	13.15	
TIME (MIN) = 322	DISCHARGE (CFS) = 1.4	1.4	10.64	12.04	
TIME (MIN) = 336	DISCHARGE (CFS) = 1.2	1.2	9.79	10.99	
TIME (MIN) = 350	DISCHARGE (CFS) = 1.1	1.1	9.08	10.18	
TIME (MIN) = 364	DISCHARGE (CFS) = 1	1	7.08	8.08	
TIME (MIN) = 378	DISCHARGE (CFS) = 0	0	4.72	4.72	
			3.44	3.44	
			2.60	2.60	
			2.21	2.21	
			2.08	2.08	
			1.95	1.95	
			1.85	1.85	
			1.84	1.84	

Hydrograph Report

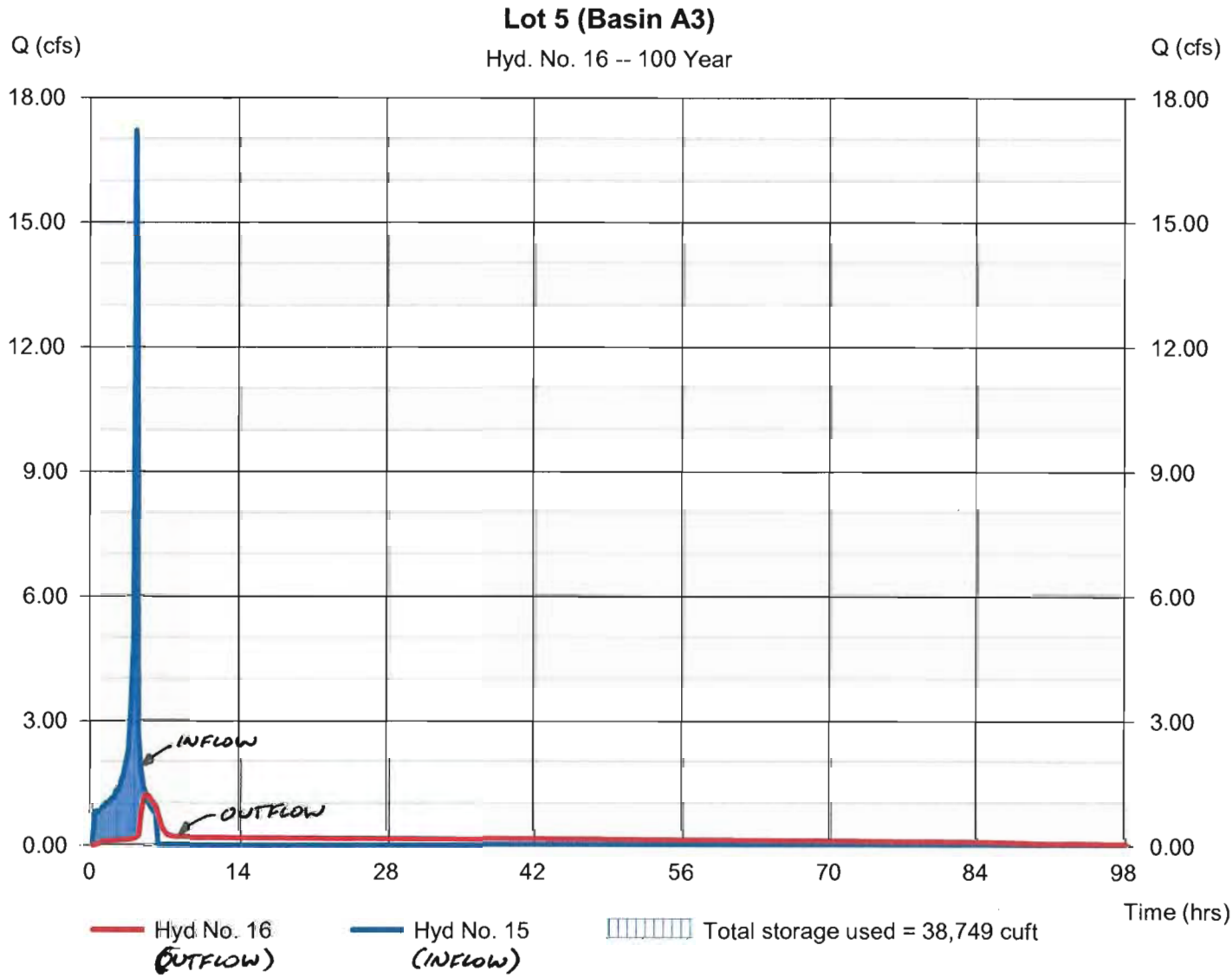
Hydraflow Hydrographs by Intelisolve v9.23 — Tuesday, Nov 6, 2012

Hyd. No. 16

Lot 5 (Basin A3)

Hydrograph type	=	Reservoir	Peak discharge	=	1.199 cfs
Storm frequency	=	100 yrs	Time to peak	=	5.13 hrs
Time interval	=	14 min	Hyd. volume	=	45,807 cuft
Inflow hyd. No.	=	15 - Lot 5 (Basin A3) Inflow	Max. Elevation	=	598.38 ft
Reservoir name	=	Lot 5 (Basin A3) - Underground Det * (FUTURE ON-LOT FACILITY) *	Max. Storage	=	38,749 cuft

Storage Indication method used.



Pond No. 9 - Lot 5 (Basin A3) - Underground Det *(FUTURE ON-LOT FACILITY)*

Pond Data

UG Chambers - Invert elev. = 595.00 ft, Rise x Span = 4.00 x 95.00 ft, Barrel Len = 134.00 ft, No. Barrels = 1, Slope = 0.50%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	595.00	n/a	0	0
0.47	595.47	n/a	2,111	2,111
0.93	595.93	n/a	5,515	7,627
1.40	596.40	n/a	5,946	13,573
1.87	596.87	n/a	5,946	19,519
2.34	597.34	n/a	5,946	25,465
2.80	597.80	n/a	5,946	31,411
3.27	598.27	n/a	5,946	37,357
3.74	598.74	n/a	5,946	43,303
4.20	599.20	n/a	5,515	48,819
4.67	599.67	n/a	2,111	50,930

MIN. VOLUME REQUIRED FOR HYDROMODIFICATION: 20,796

Culvert / Orifice Structures

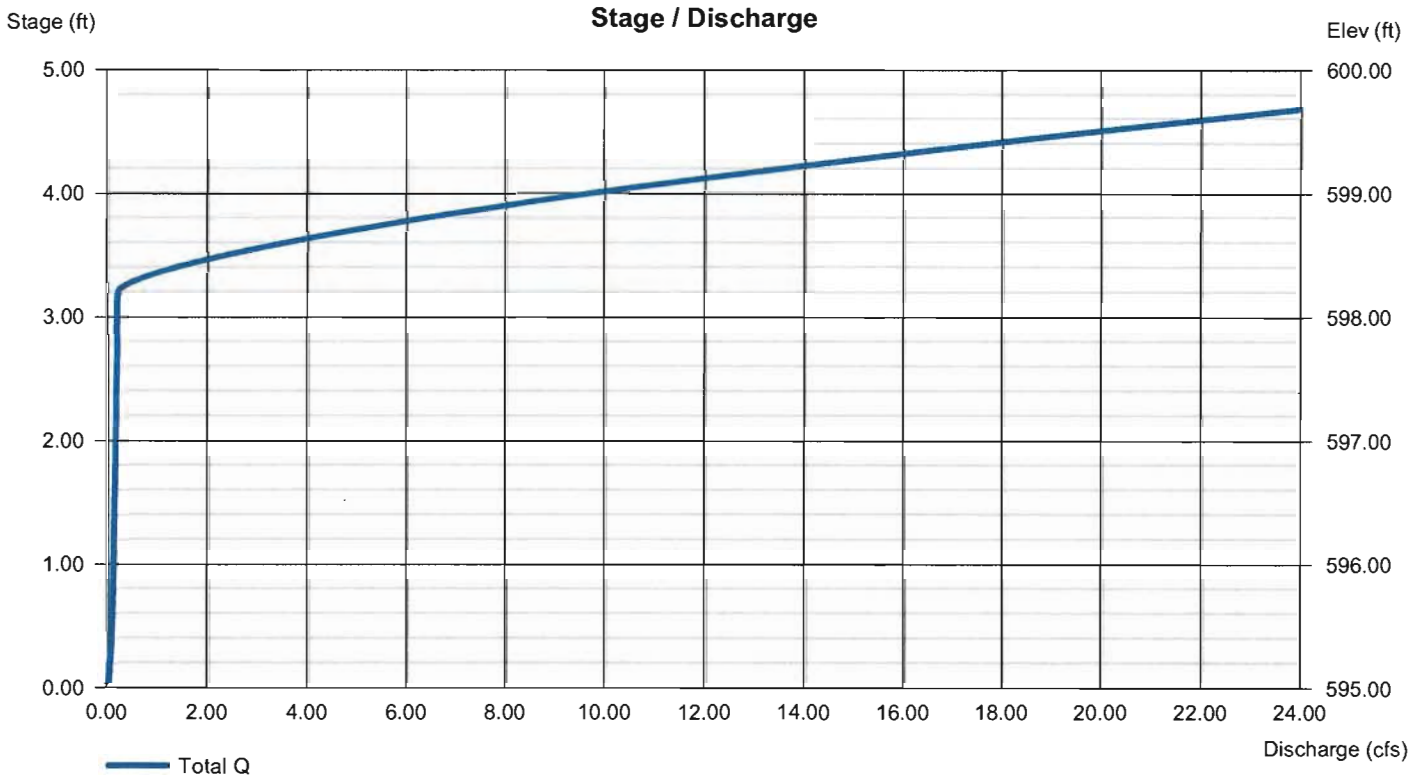
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 2.00	0.00	0.00	0.00
Span (in)	= 2.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 595.00	0.00	0.00	0.00
Length (ft)	= 0.10	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 598.20	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

PER HYDROMODIFICATION CRITERIA

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

* FUTURE ON-LOT FACILITY *

Hydraflow Hydrographs by Intelisolve v9.23 — Tuesday, Nov 6, 2012

Hyd. No. 16

Lot 5 (Basin A3)

Hydrograph type	= Reservoir	Peak discharge	= 1.199 cfs
Storm frequency	= 100 yrs	Time to peak	= 5.13 hrs
Time interval	= 14 min	Hyd. volume	= 45,807 cuft
Inflow hyd. No.	= 15 - Lot 5 (Basin A3) Inflow	Reservoir name	= Lot 5 (Basin A3)
Max. Elevation	= 598.38 ft	Max. Storage	= 38,749 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs	X10 LOTS TRIBUTARY TO POND A1 ↓
0.47	0.800	595.22	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031	0.31
0.70	0.800	595.36	0.055	-----	-----	-----	-----	-----	-----	-----	-----	0.055	0.55
0.93	0.900	595.48	0.066	-----	-----	-----	-----	-----	-----	-----	-----	0.066	0.66
1.17	0.900	595.54	0.071	-----	-----	-----	-----	-----	-----	-----	-----	0.071	0.71
1.40	1.000	595.60	0.076	-----	-----	-----	-----	-----	-----	-----	-----	0.076	0.76
1.63	1.000	595.67	0.080	-----	-----	-----	-----	-----	-----	-----	-----	0.080	0.80
1.87	1.100	595.74	0.085	-----	-----	-----	-----	-----	-----	-----	-----	0.085	0.85
2.10	1.100	595.81	0.089	-----	-----	-----	-----	-----	-----	-----	-----	0.090	0.90
2.33	1.300	595.89	0.094	-----	-----	-----	-----	-----	-----	-----	-----	0.094	0.94
2.57	1.300	595.97	0.099	-----	-----	-----	-----	-----	-----	-----	-----	0.099	0.99
2.80	1.500	596.06	0.104	-----	-----	-----	-----	-----	-----	-----	-----	0.104	1.04
3.03	1.700	596.16	0.109	-----	-----	-----	-----	-----	-----	-----	-----	0.109	1.09
3.27	2.000	596.27	0.114	-----	-----	-----	-----	-----	-----	-----	-----	0.114	1.14
3.50	2.300	596.40	0.121	-----	-----	-----	-----	-----	-----	-----	-----	0.121	1.21
3.73	3.400	596.58	0.129	-----	-----	-----	-----	-----	-----	-----	-----	0.129	1.29
3.97	4.900	596.85	0.140	-----	-----	-----	-----	-----	-----	-----	-----	0.140	1.40
4.20	17.20 <<	597.57	0.166	-----	-----	-----	-----	-----	-----	-----	-----	0.166	1.66
4.43	2.700	598.21	0.186	-----	-----	-----	0.034	-----	-----	-----	-----	0.220	2.20
4.67	1.800	598.33	0.189	-----	-----	-----	0.605	-----	-----	-----	-----	0.794	7.94
4.90	1.400	598.37	0.190	-----	-----	-----	0.929	-----	-----	-----	-----	1.119	11.19
5.13	1.200	598.38 <<	0.191	-----	-----	-----	1.008	-----	-----	-----	-----	1.199 <<	11.99
5.37	1.000	598.37	0.191	-----	-----	-----	0.965	-----	-----	-----	-----	1.155	11.55
5.60	0.900	598.36	0.190	-----	-----	-----	0.874	-----	-----	-----	-----	1.064	10.64
5.83	0.800	598.35	0.190	-----	-----	-----	0.789	-----	-----	-----	-----	0.979	9.79
6.07	0.800	598.34	0.190	-----	-----	-----	0.719	-----	-----	-----	-----	0.908	9.08
6.30	0.000	598.31	0.189	-----	-----	-----	0.520	-----	-----	-----	-----	0.708	7.08
6.53	0.000	598.28	0.188	-----	-----	-----	0.284	-----	-----	-----	-----	0.472	4.72
6.77	0.000	598.25	0.187	-----	-----	-----	0.157	-----	-----	-----	-----	0.344	3.44
7.00	0.000	598.23	0.186	-----	-----	-----	0.073	-----	-----	-----	-----	0.260	2.60
7.23	0.000	598.21	0.186	-----	-----	-----	0.036	-----	-----	-----	-----	0.221	2.21
7.47	0.000	598.20	0.185	-----	-----	-----	0.022	-----	-----	-----	-----	0.208	2.08
7.70	0.000	598.19	0.185	-----	-----	-----	0.010	-----	-----	-----	-----	0.195	1.95
7.93	0.000	598.17	0.185	-----	-----	-----	-----	-----	-----	-----	-----	0.185	1.85
8.17	0.000	598.16	0.184	-----	-----	-----	-----	-----	-----	-----	-----	0.184	1.84
8.40	0.000	598.15	0.184	-----	-----	-----	-----	-----	-----	-----	-----	0.184	1.84
8.63	0.000	598.14	0.184	-----	-----	-----	-----	-----	-----	-----	-----	0.184	1.84
8.87	0.000	598.12	0.183	-----	-----	-----	-----	-----	-----	-----	-----	0.183	1.83
9.10	0.000	598.11	0.183	-----	-----	-----	-----	-----	-----	-----	-----	0.183	1.83
9.33	0.000	598.10	0.182	-----	-----	-----	-----	-----	-----	-----	-----	0.182	1.82
9.57	0.000	598.09	0.182	-----	-----	-----	-----	-----	-----	-----	-----	0.182	1.82

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Lot 5 (Basin A3)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
9.80	0.000	598.08	0.182	-----	-----	-----	-----	-----	-----	-----	-----	0.182
10.03	0.000	598.06	0.181	-----	-----	-----	-----	-----	-----	-----	-----	0.181
10.27	0.000	598.05	0.181	-----	-----	-----	-----	-----	-----	-----	-----	0.181
10.50	0.000	598.04	0.181	-----	-----	-----	-----	-----	-----	-----	-----	0.181
10.73	0.000	598.03	0.180	-----	-----	-----	-----	-----	-----	-----	-----	0.180
10.97	0.000	598.02	0.180	-----	-----	-----	-----	-----	-----	-----	-----	0.180
11.20	0.000	598.01	0.180	-----	-----	-----	-----	-----	-----	-----	-----	0.180
11.43	0.000	597.99	0.179	-----	-----	-----	-----	-----	-----	-----	-----	0.179
11.67	0.000	597.98	0.179	-----	-----	-----	-----	-----	-----	-----	-----	0.179
11.90	0.000	597.97	0.178	-----	-----	-----	-----	-----	-----	-----	-----	0.178
12.13	0.000	597.96	0.178	-----	-----	-----	-----	-----	-----	-----	-----	0.178
12.37	0.000	597.95	0.178	-----	-----	-----	-----	-----	-----	-----	-----	0.178
12.60	0.000	597.93	0.177	-----	-----	-----	-----	-----	-----	-----	-----	0.177
12.83	0.000	597.92	0.177	-----	-----	-----	-----	-----	-----	-----	-----	0.177
13.07	0.000	597.91	0.177	-----	-----	-----	-----	-----	-----	-----	-----	0.177
13.30	0.000	597.90	0.176	-----	-----	-----	-----	-----	-----	-----	-----	0.176
13.53	0.000	597.89	0.176	-----	-----	-----	-----	-----	-----	-----	-----	0.176
13.77	0.000	597.88	0.176	-----	-----	-----	-----	-----	-----	-----	-----	0.176
14.00	0.000	597.86	0.175	-----	-----	-----	-----	-----	-----	-----	-----	0.175
14.23	0.000	597.85	0.175	-----	-----	-----	-----	-----	-----	-----	-----	0.175
14.47	0.000	597.84	0.174	-----	-----	-----	-----	-----	-----	-----	-----	0.174
14.70	0.000	597.83	0.174	-----	-----	-----	-----	-----	-----	-----	-----	0.174
14.93	0.000	597.82	0.174	-----	-----	-----	-----	-----	-----	-----	-----	0.174
15.17	0.000	597.81	0.173	-----	-----	-----	-----	-----	-----	-----	-----	0.173
15.40	0.000	597.80	0.173	-----	-----	-----	-----	-----	-----	-----	-----	0.173
15.63	0.000	597.78	0.173	-----	-----	-----	-----	-----	-----	-----	-----	0.173
15.87	0.000	597.77	0.172	-----	-----	-----	-----	-----	-----	-----	-----	0.172
16.10	0.000	597.76	0.172	-----	-----	-----	-----	-----	-----	-----	-----	0.172
16.33	0.000	597.75	0.172	-----	-----	-----	-----	-----	-----	-----	-----	0.172
16.57	0.000	597.74	0.171	-----	-----	-----	-----	-----	-----	-----	-----	0.171
16.80	0.000	597.73	0.171	-----	-----	-----	-----	-----	-----	-----	-----	0.171
17.03	0.000	597.72	0.170	-----	-----	-----	-----	-----	-----	-----	-----	0.170
17.27	0.000	597.71	0.170	-----	-----	-----	-----	-----	-----	-----	-----	0.170
17.50	0.000	597.69	0.170	-----	-----	-----	-----	-----	-----	-----	-----	0.170
17.73	0.000	597.68	0.169	-----	-----	-----	-----	-----	-----	-----	-----	0.169
17.97	0.000	597.67	0.169	-----	-----	-----	-----	-----	-----	-----	-----	0.169
18.20	0.000	597.66	0.169	-----	-----	-----	-----	-----	-----	-----	-----	0.169
18.43	0.000	597.65	0.168	-----	-----	-----	-----	-----	-----	-----	-----	0.168
18.67	0.000	597.64	0.168	-----	-----	-----	-----	-----	-----	-----	-----	0.168
18.90	0.000	597.63	0.168	-----	-----	-----	-----	-----	-----	-----	-----	0.168
19.13	0.000	597.62	0.167	-----	-----	-----	-----	-----	-----	-----	-----	0.167
19.37	0.000	597.61	0.167	-----	-----	-----	-----	-----	-----	-----	-----	0.167
19.60	0.000	597.59	0.166	-----	-----	-----	-----	-----	-----	-----	-----	0.166
19.83	0.000	597.58	0.166	-----	-----	-----	-----	-----	-----	-----	-----	0.166
20.07	0.000	597.57	0.166	-----	-----	-----	-----	-----	-----	-----	-----	0.166
20.30	0.000	597.56	0.165	-----	-----	-----	-----	-----	-----	-----	-----	0.165
20.53	0.000	597.55	0.165	-----	-----	-----	-----	-----	-----	-----	-----	0.165
20.77	0.000	597.54	0.165	-----	-----	-----	-----	-----	-----	-----	-----	0.165
21.00	0.000	597.53	0.164	-----	-----	-----	-----	-----	-----	-----	-----	0.164
21.23	0.000	597.52	0.164	-----	-----	-----	-----	-----	-----	-----	-----	0.164
21.47	0.000	597.51	0.164	-----	-----	-----	-----	-----	-----	-----	-----	0.164
21.70	0.000	597.50	0.163	-----	-----	-----	-----	-----	-----	-----	-----	0.163
21.93	0.000	597.49	0.163	-----	-----	-----	-----	-----	-----	-----	-----	0.163
22.17	0.000	597.48	0.162	-----	-----	-----	-----	-----	-----	-----	-----	0.162

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Lot 5 (Basin A3)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
22.40	0.000	597.46	0.162	-----	-----	-----	-----	-----	-----	-----	-----	0.162
22.63	0.000	597.45	0.162	-----	-----	-----	-----	-----	-----	-----	-----	0.162
22.87	0.000	597.44	0.161	-----	-----	-----	-----	-----	-----	-----	-----	0.161
23.10	0.000	597.43	0.161	-----	-----	-----	-----	-----	-----	-----	-----	0.161
23.33	0.000	597.42	0.161	-----	-----	-----	-----	-----	-----	-----	-----	0.161
23.57	0.000	597.41	0.160	-----	-----	-----	-----	-----	-----	-----	-----	0.160
23.80	0.000	597.40	0.160	-----	-----	-----	-----	-----	-----	-----	-----	0.160
24.03	0.000	597.39	0.160	-----	-----	-----	-----	-----	-----	-----	-----	0.160
24.27	0.000	597.38	0.159	-----	-----	-----	-----	-----	-----	-----	-----	0.159
24.50	0.000	597.37	0.159	-----	-----	-----	-----	-----	-----	-----	-----	0.159
24.73	0.000	597.36	0.158	-----	-----	-----	-----	-----	-----	-----	-----	0.158
24.97	0.000	597.35	0.158	-----	-----	-----	-----	-----	-----	-----	-----	0.158
25.20	0.000	597.34	0.158	-----	-----	-----	-----	-----	-----	-----	-----	0.158
25.43	0.000	597.33	0.157	-----	-----	-----	-----	-----	-----	-----	-----	0.157
25.67	0.000	597.32	0.157	-----	-----	-----	-----	-----	-----	-----	-----	0.157
25.90	0.000	597.31	0.157	-----	-----	-----	-----	-----	-----	-----	-----	0.157
26.13	0.000	597.30	0.156	-----	-----	-----	-----	-----	-----	-----	-----	0.156
26.37	0.000	597.29	0.156	-----	-----	-----	-----	-----	-----	-----	-----	0.156
26.60	0.000	597.28	0.156	-----	-----	-----	-----	-----	-----	-----	-----	0.156
26.83	0.000	597.27	0.155	-----	-----	-----	-----	-----	-----	-----	-----	0.155
27.07	0.000	597.26	0.155	-----	-----	-----	-----	-----	-----	-----	-----	0.155
27.30	0.000	597.25	0.154	-----	-----	-----	-----	-----	-----	-----	-----	0.154
27.53	0.000	597.23	0.154	-----	-----	-----	-----	-----	-----	-----	-----	0.154
27.77	0.000	597.22	0.154	-----	-----	-----	-----	-----	-----	-----	-----	0.154
28.00	0.000	597.21	0.153	-----	-----	-----	-----	-----	-----	-----	-----	0.153
28.23	0.000	597.20	0.153	-----	-----	-----	-----	-----	-----	-----	-----	0.153
28.47	0.000	597.19	0.153	-----	-----	-----	-----	-----	-----	-----	-----	0.153
28.70	0.000	597.18	0.152	-----	-----	-----	-----	-----	-----	-----	-----	0.152
28.93	0.000	597.17	0.152	-----	-----	-----	-----	-----	-----	-----	-----	0.152
29.17	0.000	597.16	0.152	-----	-----	-----	-----	-----	-----	-----	-----	0.152
29.40	0.000	597.15	0.151	-----	-----	-----	-----	-----	-----	-----	-----	0.151
29.63	0.000	597.14	0.151	-----	-----	-----	-----	-----	-----	-----	-----	0.151
29.87	0.000	597.13	0.150	-----	-----	-----	-----	-----	-----	-----	-----	0.150
30.10	0.000	597.12	0.150	-----	-----	-----	-----	-----	-----	-----	-----	0.150
30.33	0.000	597.11	0.150	-----	-----	-----	-----	-----	-----	-----	-----	0.150
30.57	0.000	597.10	0.149	-----	-----	-----	-----	-----	-----	-----	-----	0.149
30.80	0.000	597.09	0.149	-----	-----	-----	-----	-----	-----	-----	-----	0.149
31.03	0.000	597.09	0.149	-----	-----	-----	-----	-----	-----	-----	-----	0.149
31.27	0.000	597.08	0.148	-----	-----	-----	-----	-----	-----	-----	-----	0.148
31.50	0.000	597.07	0.148	-----	-----	-----	-----	-----	-----	-----	-----	0.148
31.73	0.000	597.06	0.148	-----	-----	-----	-----	-----	-----	-----	-----	0.148
31.97	0.000	597.05	0.147	-----	-----	-----	-----	-----	-----	-----	-----	0.147
32.20	0.000	597.04	0.147	-----	-----	-----	-----	-----	-----	-----	-----	0.147
32.43	0.000	597.03	0.146	-----	-----	-----	-----	-----	-----	-----	-----	0.146
32.67	0.000	597.02	0.146	-----	-----	-----	-----	-----	-----	-----	-----	0.146
32.90	0.000	597.01	0.146	-----	-----	-----	-----	-----	-----	-----	-----	0.146
33.13	0.000	597.00	0.145	-----	-----	-----	-----	-----	-----	-----	-----	0.145
33.37	0.000	596.99	0.145	-----	-----	-----	-----	-----	-----	-----	-----	0.145
33.60	0.000	596.98	0.145	-----	-----	-----	-----	-----	-----	-----	-----	0.145
33.83	0.000	596.97	0.144	-----	-----	-----	-----	-----	-----	-----	-----	0.144
34.07	0.000	596.96	0.144	-----	-----	-----	-----	-----	-----	-----	-----	0.144
34.30	0.000	596.95	0.144	-----	-----	-----	-----	-----	-----	-----	-----	0.144
34.53	0.000	596.94	0.143	-----	-----	-----	-----	-----	-----	-----	-----	0.143
34.77	0.000	596.93	0.143	-----	-----	-----	-----	-----	-----	-----	-----	0.143

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Lot 5 (Basin A3)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
35.00	0.000	596.92	0.142	-----	-----	-----	-----	-----	-----	-----	-----	0.142
35.23	0.000	596.91	0.142	-----	-----	-----	-----	-----	-----	-----	-----	0.142
35.47	0.000	596.90	0.142	-----	-----	-----	-----	-----	-----	-----	-----	0.142
35.70	0.000	596.89	0.141	-----	-----	-----	-----	-----	-----	-----	-----	0.141
35.93	0.000	596.88	0.141	-----	-----	-----	-----	-----	-----	-----	-----	0.141
36.17	0.000	596.88	0.141	-----	-----	-----	-----	-----	-----	-----	-----	0.141
36.40	0.000	596.87	0.140	-----	-----	-----	-----	-----	-----	-----	-----	0.140
36.63	0.000	596.86	0.140	-----	-----	-----	-----	-----	-----	-----	-----	0.140
36.87	0.000	596.85	0.140	-----	-----	-----	-----	-----	-----	-----	-----	0.140
37.10	0.000	596.84	0.139	-----	-----	-----	-----	-----	-----	-----	-----	0.139
37.33	0.000	596.83	0.139	-----	-----	-----	-----	-----	-----	-----	-----	0.139
37.57	0.000	596.82	0.138	-----	-----	-----	-----	-----	-----	-----	-----	0.138
37.80	0.000	596.81	0.138	-----	-----	-----	-----	-----	-----	-----	-----	0.138
38.03	0.000	596.80	0.138	-----	-----	-----	-----	-----	-----	-----	-----	0.138
38.27	0.000	596.79	0.137	-----	-----	-----	-----	-----	-----	-----	-----	0.137
38.50	0.000	596.78	0.137	-----	-----	-----	-----	-----	-----	-----	-----	0.137
38.73	0.000	596.77	0.137	-----	-----	-----	-----	-----	-----	-----	-----	0.137
38.97	0.000	596.77	0.136	-----	-----	-----	-----	-----	-----	-----	-----	0.136
39.20	0.000	596.76	0.136	-----	-----	-----	-----	-----	-----	-----	-----	0.136
39.43	0.000	596.75	0.136	-----	-----	-----	-----	-----	-----	-----	-----	0.136
39.67	0.000	596.74	0.135	-----	-----	-----	-----	-----	-----	-----	-----	0.135
39.90	0.000	596.73	0.135	-----	-----	-----	-----	-----	-----	-----	-----	0.135
40.13	0.000	596.72	0.134	-----	-----	-----	-----	-----	-----	-----	-----	0.134
40.37	0.000	596.71	0.134	-----	-----	-----	-----	-----	-----	-----	-----	0.134
40.60	0.000	596.70	0.134	-----	-----	-----	-----	-----	-----	-----	-----	0.134
40.83	0.000	596.69	0.133	-----	-----	-----	-----	-----	-----	-----	-----	0.133
41.07	0.000	596.69	0.133	-----	-----	-----	-----	-----	-----	-----	-----	0.133
41.30	0.000	596.68	0.133	-----	-----	-----	-----	-----	-----	-----	-----	0.133
41.53	0.000	596.67	0.132	-----	-----	-----	-----	-----	-----	-----	-----	0.132
41.77	0.000	596.66	0.132	-----	-----	-----	-----	-----	-----	-----	-----	0.132
42.00	0.000	596.65	0.132	-----	-----	-----	-----	-----	-----	-----	-----	0.131
42.23	0.000	596.64	0.131	-----	-----	-----	-----	-----	-----	-----	-----	0.131
42.47	0.000	596.63	0.131	-----	-----	-----	-----	-----	-----	-----	-----	0.131
42.70	0.000	596.63	0.130	-----	-----	-----	-----	-----	-----	-----	-----	0.130
42.93	0.000	596.62	0.130	-----	-----	-----	-----	-----	-----	-----	-----	0.130
43.17	0.000	596.61	0.130	-----	-----	-----	-----	-----	-----	-----	-----	0.130
43.40	0.000	596.60	0.129	-----	-----	-----	-----	-----	-----	-----	-----	0.129
43.63	0.000	596.59	0.129	-----	-----	-----	-----	-----	-----	-----	-----	0.129
43.87	0.000	596.58	0.129	-----	-----	-----	-----	-----	-----	-----	-----	0.129
44.10	0.000	596.57	0.128	-----	-----	-----	-----	-----	-----	-----	-----	0.128
44.33	0.000	596.57	0.128	-----	-----	-----	-----	-----	-----	-----	-----	0.128
44.57	0.000	596.56	0.127	-----	-----	-----	-----	-----	-----	-----	-----	0.127
44.80	0.000	596.55	0.127	-----	-----	-----	-----	-----	-----	-----	-----	0.127
45.03	0.000	596.54	0.127	-----	-----	-----	-----	-----	-----	-----	-----	0.127
45.27	0.000	596.53	0.126	-----	-----	-----	-----	-----	-----	-----	-----	0.126
45.50	0.000	596.52	0.126	-----	-----	-----	-----	-----	-----	-----	-----	0.126
45.73	0.000	596.52	0.126	-----	-----	-----	-----	-----	-----	-----	-----	0.126
45.97	0.000	596.51	0.125	-----	-----	-----	-----	-----	-----	-----	-----	0.125
46.20	0.000	596.50	0.125	-----	-----	-----	-----	-----	-----	-----	-----	0.125
46.43	0.000	596.49	0.125	-----	-----	-----	-----	-----	-----	-----	-----	0.125
46.67	0.000	596.48	0.124	-----	-----	-----	-----	-----	-----	-----	-----	0.124
46.90	0.000	596.47	0.124	-----	-----	-----	-----	-----	-----	-----	-----	0.124
47.13	0.000	596.47	0.123	-----	-----	-----	-----	-----	-----	-----	-----	0.123
47.37	0.000	596.46	0.123	-----	-----	-----	-----	-----	-----	-----	-----	0.123

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Lot 5 (Basin A3)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
47.60	0.000	596.45	0.123	-----	-----	-----	-----	-----	-----	-----	-----	0.123
47.83	0.000	596.44	0.122	-----	-----	-----	-----	-----	-----	-----	-----	0.122
48.07	0.000	596.43	0.122	-----	-----	-----	-----	-----	-----	-----	-----	0.122
48.30	0.000	596.43	0.122	-----	-----	-----	-----	-----	-----	-----	-----	0.122
48.53	0.000	596.42	0.121	-----	-----	-----	-----	-----	-----	-----	-----	0.121
48.77	0.000	596.41	0.121	-----	-----	-----	-----	-----	-----	-----	-----	0.121
49.00	0.000	596.40	0.121	-----	-----	-----	-----	-----	-----	-----	-----	0.121
49.23	0.000	596.39	0.120	-----	-----	-----	-----	-----	-----	-----	-----	0.120
49.47	0.000	596.39	0.120	-----	-----	-----	-----	-----	-----	-----	-----	0.120
49.70	0.000	596.38	0.119	-----	-----	-----	-----	-----	-----	-----	-----	0.119
49.93	0.000	596.37	0.119	-----	-----	-----	-----	-----	-----	-----	-----	0.119
50.17	0.000	596.36	0.119	-----	-----	-----	-----	-----	-----	-----	-----	0.119
50.40	0.000	596.35	0.118	-----	-----	-----	-----	-----	-----	-----	-----	0.118
50.63	0.000	596.35	0.118	-----	-----	-----	-----	-----	-----	-----	-----	0.118
50.87	0.000	596.34	0.118	-----	-----	-----	-----	-----	-----	-----	-----	0.118
51.10	0.000	596.33	0.117	-----	-----	-----	-----	-----	-----	-----	-----	0.117
51.33	0.000	596.32	0.117	-----	-----	-----	-----	-----	-----	-----	-----	0.117
51.57	0.000	596.32	0.117	-----	-----	-----	-----	-----	-----	-----	-----	0.117
51.80	0.000	596.31	0.116	-----	-----	-----	-----	-----	-----	-----	-----	0.116
52.03	0.000	596.30	0.116	-----	-----	-----	-----	-----	-----	-----	-----	0.116
52.27	0.000	596.29	0.115	-----	-----	-----	-----	-----	-----	-----	-----	0.115
52.50	0.000	596.28	0.115	-----	-----	-----	-----	-----	-----	-----	-----	0.115
52.73	0.000	596.28	0.115	-----	-----	-----	-----	-----	-----	-----	-----	0.115
52.97	0.000	596.27	0.114	-----	-----	-----	-----	-----	-----	-----	-----	0.114
53.20	0.000	596.26	0.114	-----	-----	-----	-----	-----	-----	-----	-----	0.114
53.43	0.000	596.25	0.114	-----	-----	-----	-----	-----	-----	-----	-----	0.114
53.67	0.000	596.25	0.113	-----	-----	-----	-----	-----	-----	-----	-----	0.113
53.90	0.000	596.24	0.113	-----	-----	-----	-----	-----	-----	-----	-----	0.113
54.13	0.000	596.23	0.113	-----	-----	-----	-----	-----	-----	-----	-----	0.113
54.37	0.000	596.22	0.112	-----	-----	-----	-----	-----	-----	-----	-----	0.112
54.60	0.000	596.22	0.112	-----	-----	-----	-----	-----	-----	-----	-----	0.112
54.83	0.000	596.21	0.111	-----	-----	-----	-----	-----	-----	-----	-----	0.111
55.07	0.000	596.20	0.111	-----	-----	-----	-----	-----	-----	-----	-----	0.111
55.30	0.000	596.20	0.111	-----	-----	-----	-----	-----	-----	-----	-----	0.111
55.53	0.000	596.19	0.110	-----	-----	-----	-----	-----	-----	-----	-----	0.110
55.77	0.000	596.18	0.110	-----	-----	-----	-----	-----	-----	-----	-----	0.110
56.00	0.000	596.17	0.110	-----	-----	-----	-----	-----	-----	-----	-----	0.110
56.23	0.000	596.17	0.109	-----	-----	-----	-----	-----	-----	-----	-----	0.109
56.47	0.000	596.16	0.109	-----	-----	-----	-----	-----	-----	-----	-----	0.109
56.70	0.000	596.15	0.109	-----	-----	-----	-----	-----	-----	-----	-----	0.109
56.93	0.000	596.14	0.108	-----	-----	-----	-----	-----	-----	-----	-----	0.108
57.17	0.000	596.14	0.108	-----	-----	-----	-----	-----	-----	-----	-----	0.108
57.40	0.000	596.13	0.107	-----	-----	-----	-----	-----	-----	-----	-----	0.107
57.63	0.000	596.12	0.107	-----	-----	-----	-----	-----	-----	-----	-----	0.107
57.87	0.000	596.12	0.107	-----	-----	-----	-----	-----	-----	-----	-----	0.107
58.10	0.000	596.11	0.106	-----	-----	-----	-----	-----	-----	-----	-----	0.106
58.33	0.000	596.10	0.106	-----	-----	-----	-----	-----	-----	-----	-----	0.106
58.57	0.000	596.10	0.106	-----	-----	-----	-----	-----	-----	-----	-----	0.106
58.80	0.000	596.09	0.105	-----	-----	-----	-----	-----	-----	-----	-----	0.105
59.03	0.000	596.08	0.105	-----	-----	-----	-----	-----	-----	-----	-----	0.105
59.27	0.000	596.07	0.105	-----	-----	-----	-----	-----	-----	-----	-----	0.105
59.50	0.000	596.07	0.104	-----	-----	-----	-----	-----	-----	-----	-----	0.104
59.73	0.000	596.06	0.104	-----	-----	-----	-----	-----	-----	-----	-----	0.104
59.97	0.000	596.05	0.103	-----	-----	-----	-----	-----	-----	-----	-----	0.103

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Lot 5 (Basin A3)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
60.20	0.000	596.05	0.103	-----	-----	-----	-----	-----	-----	-----	-----	0.103
60.43	0.000	596.04	0.103	-----	-----	-----	-----	-----	-----	-----	-----	0.103
60.67	0.000	596.03	0.102	-----	-----	-----	-----	-----	-----	-----	-----	0.102
60.90	0.000	596.03	0.102	-----	-----	-----	-----	-----	-----	-----	-----	0.102
61.13	0.000	596.02	0.102	-----	-----	-----	-----	-----	-----	-----	-----	0.102
61.37	0.000	596.01	0.101	-----	-----	-----	-----	-----	-----	-----	-----	0.101
61.60	0.000	596.01	0.101	-----	-----	-----	-----	-----	-----	-----	-----	0.101
61.83	0.000	596.00	0.101	-----	-----	-----	-----	-----	-----	-----	-----	0.101
62.07	0.000	595.99	0.100	-----	-----	-----	-----	-----	-----	-----	-----	0.100
62.30	0.000	595.99	0.100	-----	-----	-----	-----	-----	-----	-----	-----	0.100
62.53	0.000	595.98	0.099	-----	-----	-----	-----	-----	-----	-----	-----	0.099
62.77	0.000	595.97	0.099	-----	-----	-----	-----	-----	-----	-----	-----	0.099
63.00	0.000	595.97	0.099	-----	-----	-----	-----	-----	-----	-----	-----	0.099
63.23	0.000	595.96	0.098	-----	-----	-----	-----	-----	-----	-----	-----	0.098
63.47	0.000	595.95	0.098	-----	-----	-----	-----	-----	-----	-----	-----	0.098
63.70	0.000	595.95	0.098	-----	-----	-----	-----	-----	-----	-----	-----	0.098
63.93	0.000	595.94	0.097	-----	-----	-----	-----	-----	-----	-----	-----	0.097
64.17	0.000	595.94	0.097	-----	-----	-----	-----	-----	-----	-----	-----	0.097
64.40	0.000	595.93	0.097	-----	-----	-----	-----	-----	-----	-----	-----	0.097
64.63	0.000	595.92	0.096	-----	-----	-----	-----	-----	-----	-----	-----	0.096
64.87	0.000	595.91	0.096	-----	-----	-----	-----	-----	-----	-----	-----	0.096
65.10	0.000	595.91	0.095	-----	-----	-----	-----	-----	-----	-----	-----	0.095
65.33	0.000	595.90	0.095	-----	-----	-----	-----	-----	-----	-----	-----	0.095
65.57	0.000	595.89	0.095	-----	-----	-----	-----	-----	-----	-----	-----	0.095
65.80	0.000	595.89	0.094	-----	-----	-----	-----	-----	-----	-----	-----	0.094
66.03	0.000	595.88	0.094	-----	-----	-----	-----	-----	-----	-----	-----	0.094
66.27	0.000	595.87	0.093	-----	-----	-----	-----	-----	-----	-----	-----	0.093
66.50	0.000	595.87	0.093	-----	-----	-----	-----	-----	-----	-----	-----	0.093
66.73	0.000	595.86	0.093	-----	-----	-----	-----	-----	-----	-----	-----	0.093
66.97	0.000	595.85	0.092	-----	-----	-----	-----	-----	-----	-----	-----	0.092
67.20	0.000	595.85	0.092	-----	-----	-----	-----	-----	-----	-----	-----	0.092
67.43	0.000	595.84	0.091	-----	-----	-----	-----	-----	-----	-----	-----	0.091
67.67	0.000	595.83	0.091	-----	-----	-----	-----	-----	-----	-----	-----	0.091
67.90	0.000	595.83	0.091	-----	-----	-----	-----	-----	-----	-----	-----	0.091
68.13	0.000	595.82	0.090	-----	-----	-----	-----	-----	-----	-----	-----	0.090
68.37	0.000	595.82	0.090	-----	-----	-----	-----	-----	-----	-----	-----	0.090
68.60	0.000	595.81	0.089	-----	-----	-----	-----	-----	-----	-----	-----	0.089
68.83	0.000	595.80	0.089	-----	-----	-----	-----	-----	-----	-----	-----	0.089
69.07	0.000	595.80	0.089	-----	-----	-----	-----	-----	-----	-----	-----	0.089
69.30	0.000	595.79	0.088	-----	-----	-----	-----	-----	-----	-----	-----	0.088
69.53	0.000	595.78	0.088	-----	-----	-----	-----	-----	-----	-----	-----	0.088
69.77	0.000	595.78	0.088	-----	-----	-----	-----	-----	-----	-----	-----	0.088
70.00	0.000	595.77	0.087	-----	-----	-----	-----	-----	-----	-----	-----	0.087
70.23	0.000	595.77	0.087	-----	-----	-----	-----	-----	-----	-----	-----	0.087
70.47	0.000	595.76	0.086	-----	-----	-----	-----	-----	-----	-----	-----	0.086
70.70	0.000	595.75	0.086	-----	-----	-----	-----	-----	-----	-----	-----	0.086
70.93	0.000	595.75	0.086	-----	-----	-----	-----	-----	-----	-----	-----	0.086
71.17	0.000	595.74	0.085	-----	-----	-----	-----	-----	-----	-----	-----	0.085
71.40	0.000	595.73	0.085	-----	-----	-----	-----	-----	-----	-----	-----	0.085
71.63	0.000	595.73	0.084	-----	-----	-----	-----	-----	-----	-----	-----	0.084
71.87	0.000	595.72	0.084	-----	-----	-----	-----	-----	-----	-----	-----	0.084
72.10	0.000	595.72	0.084	-----	-----	-----	-----	-----	-----	-----	-----	0.084
72.33	0.000	595.71	0.083	-----	-----	-----	-----	-----	-----	-----	-----	0.083
72.57	0.000	595.71	0.083	-----	-----	-----	-----	-----	-----	-----	-----	0.083

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Lot 5 (Basin A3)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
72.80	0.000	595.70	0.082	-----	-----	-----	-----	-----	-----	-----	-----	0.082
73.03	0.000	595.69	0.082	-----	-----	-----	-----	-----	-----	-----	-----	0.082
73.27	0.000	595.69	0.082	-----	-----	-----	-----	-----	-----	-----	-----	0.082
73.50	0.000	595.68	0.081	-----	-----	-----	-----	-----	-----	-----	-----	0.081
73.73	0.000	595.68	0.081	-----	-----	-----	-----	-----	-----	-----	-----	0.081
73.97	0.000	595.67	0.080	-----	-----	-----	-----	-----	-----	-----	-----	0.080
74.20	0.000	595.66	0.080	-----	-----	-----	-----	-----	-----	-----	-----	0.080
74.43	0.000	595.66	0.080	-----	-----	-----	-----	-----	-----	-----	-----	0.080
74.67	0.000	595.65	0.079	-----	-----	-----	-----	-----	-----	-----	-----	0.079
74.90	0.000	595.65	0.079	-----	-----	-----	-----	-----	-----	-----	-----	0.079
75.13	0.000	595.64	0.078	-----	-----	-----	-----	-----	-----	-----	-----	0.078
75.37	0.000	595.64	0.078	-----	-----	-----	-----	-----	-----	-----	-----	0.078
75.60	0.000	595.63	0.078	-----	-----	-----	-----	-----	-----	-----	-----	0.078
75.83	0.000	595.63	0.077	-----	-----	-----	-----	-----	-----	-----	-----	0.077
76.07	0.000	595.62	0.077	-----	-----	-----	-----	-----	-----	-----	-----	0.077
76.30	0.000	595.61	0.077	-----	-----	-----	-----	-----	-----	-----	-----	0.077
76.53	0.000	595.61	0.076	-----	-----	-----	-----	-----	-----	-----	-----	0.076
76.77	0.000	595.60	0.076	-----	-----	-----	-----	-----	-----	-----	-----	0.076
77.00	0.000	595.60	0.075	-----	-----	-----	-----	-----	-----	-----	-----	0.075
77.23	0.000	595.59	0.075	-----	-----	-----	-----	-----	-----	-----	-----	0.075
77.47	0.000	595.59	0.075	-----	-----	-----	-----	-----	-----	-----	-----	0.075
77.70	0.000	595.58	0.074	-----	-----	-----	-----	-----	-----	-----	-----	0.074
77.93	0.000	595.58	0.074	-----	-----	-----	-----	-----	-----	-----	-----	0.074
78.17	0.000	595.57	0.073	-----	-----	-----	-----	-----	-----	-----	-----	0.073
78.40	0.000	595.57	0.073	-----	-----	-----	-----	-----	-----	-----	-----	0.073
78.63	0.000	595.56	0.073	-----	-----	-----	-----	-----	-----	-----	-----	0.073
78.87	0.000	595.56	0.072	-----	-----	-----	-----	-----	-----	-----	-----	0.072
79.10	0.000	595.55	0.072	-----	-----	-----	-----	-----	-----	-----	-----	0.072
79.33	0.000	595.55	0.071	-----	-----	-----	-----	-----	-----	-----	-----	0.071
79.57	0.000	595.54	0.071	-----	-----	-----	-----	-----	-----	-----	-----	0.071
79.80	0.000	595.54	0.071	-----	-----	-----	-----	-----	-----	-----	-----	0.071
80.03	0.000	595.53	0.070	-----	-----	-----	-----	-----	-----	-----	-----	0.070
80.27	0.000	595.53	0.070	-----	-----	-----	-----	-----	-----	-----	-----	0.070
80.50	0.000	595.52	0.069	-----	-----	-----	-----	-----	-----	-----	-----	0.069
80.73	0.000	595.52	0.069	-----	-----	-----	-----	-----	-----	-----	-----	0.069
80.97	0.000	595.51	0.069	-----	-----	-----	-----	-----	-----	-----	-----	0.069
81.20	0.000	595.51	0.068	-----	-----	-----	-----	-----	-----	-----	-----	0.068
81.43	0.000	595.50	0.068	-----	-----	-----	-----	-----	-----	-----	-----	0.068
81.67	0.000	595.50	0.067	-----	-----	-----	-----	-----	-----	-----	-----	0.067
81.90	0.000	595.49	0.067	-----	-----	-----	-----	-----	-----	-----	-----	0.067
82.13	0.000	595.49	0.067	-----	-----	-----	-----	-----	-----	-----	-----	0.067
82.37	0.000	595.48	0.066	-----	-----	-----	-----	-----	-----	-----	-----	0.066
82.60	0.000	595.48	0.066	-----	-----	-----	-----	-----	-----	-----	-----	0.066
82.83	0.000	595.47	0.066	-----	-----	-----	-----	-----	-----	-----	-----	0.066
83.07	0.000	595.47	0.065	-----	-----	-----	-----	-----	-----	-----	-----	0.065
83.30	0.000	595.46	0.064	-----	-----	-----	-----	-----	-----	-----	-----	0.064
83.53	0.000	595.45	0.063	-----	-----	-----	-----	-----	-----	-----	-----	0.063
83.77	0.000	595.43	0.062	-----	-----	-----	-----	-----	-----	-----	-----	0.062
84.00	0.000	595.42	0.061	-----	-----	-----	-----	-----	-----	-----	-----	0.061
84.23	0.000	595.41	0.060	-----	-----	-----	-----	-----	-----	-----	-----	0.060
84.47	0.000	595.40	0.059	-----	-----	-----	-----	-----	-----	-----	-----	0.059
84.70	0.000	595.39	0.058	-----	-----	-----	-----	-----	-----	-----	-----	0.058
84.93	0.000	595.38	0.057	-----	-----	-----	-----	-----	-----	-----	-----	0.057
85.17	0.000	595.37	0.056	-----	-----	-----	-----	-----	-----	-----	-----	0.056

Continues on next page...

Lot 5 (Basin A3)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
85.40	0.000	595.36	0.055	-----	-----	-----	-----	-----	-----	-----	-----	0.055
85.63	0.000	595.35	0.054	-----	-----	-----	-----	-----	-----	-----	-----	0.054
85.87	0.000	595.34	0.053	-----	-----	-----	-----	-----	-----	-----	-----	0.053
86.10	0.000	595.33	0.052	-----	-----	-----	-----	-----	-----	-----	-----	0.052
86.33	0.000	595.32	0.051	-----	-----	-----	-----	-----	-----	-----	-----	0.051
86.57	0.000	595.31	0.050	-----	-----	-----	-----	-----	-----	-----	-----	0.050
86.80	0.000	595.30	0.049	-----	-----	-----	-----	-----	-----	-----	-----	0.049
87.03	0.000	595.29	0.048	-----	-----	-----	-----	-----	-----	-----	-----	0.048
87.27	0.000	595.28	0.047	-----	-----	-----	-----	-----	-----	-----	-----	0.047
87.50	0.000	595.27	0.045	-----	-----	-----	-----	-----	-----	-----	-----	0.045
87.73	0.000	595.27	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044
87.97	0.000	595.26	0.042	-----	-----	-----	-----	-----	-----	-----	-----	0.042
88.20	0.000	595.25	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
88.43	0.000	595.24	0.039	-----	-----	-----	-----	-----	-----	-----	-----	0.039
88.67	0.000	595.24	0.037	-----	-----	-----	-----	-----	-----	-----	-----	0.037
88.90	0.000	595.23	0.035	-----	-----	-----	-----	-----	-----	-----	-----	0.035
89.13	0.000	595.22	0.033	-----	-----	-----	-----	-----	-----	-----	-----	0.033
89.37	0.000	595.22	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031
89.60	0.000	595.21	0.029	-----	-----	-----	-----	-----	-----	-----	-----	0.029
89.83	0.000	595.21	0.027	-----	-----	-----	-----	-----	-----	-----	-----	0.027
90.07	0.000	595.20	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
90.30	0.000	595.14	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
90.53	0.000	595.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
90.77	0.000	595.12	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
91.00	0.000	595.12	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
91.23	0.000	595.12	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
91.47	0.000	595.12	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
91.70	0.000	595.13	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
91.93	0.000	595.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
92.17	0.000	595.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
92.40	0.000	595.13	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
92.63	0.000	595.13	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
92.87	0.000	595.13	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
93.10	0.000	595.14	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
93.33	0.000	595.14	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
93.57	0.000	595.14	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
93.80	0.000	595.13	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
94.03	0.000	595.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
94.27	0.000	595.13	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
94.50	0.000	595.12	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
94.73	0.000	595.12	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
94.97	0.000	595.12	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
95.20	0.000	595.11	0.018	-----	-----	-----	-----	-----	-----	-----	-----	0.018
95.43	0.000	595.11	0.017	-----	-----	-----	-----	-----	-----	-----	-----	0.017
95.67	0.000	595.11	0.016	-----	-----	-----	-----	-----	-----	-----	-----	0.016
95.90	0.000	595.10	0.015	-----	-----	-----	-----	-----	-----	-----	-----	0.015
96.13	0.000	595.10	0.015	-----	-----	-----	-----	-----	-----	-----	-----	0.015
96.37	0.000	595.10	0.014	-----	-----	-----	-----	-----	-----	-----	-----	0.014
96.60	0.000	595.09	0.013	-----	-----	-----	-----	-----	-----	-----	-----	0.013
96.83	0.000	595.09	0.013	-----	-----	-----	-----	-----	-----	-----	-----	0.013
97.07	0.000	595.09	0.012	-----	-----	-----	-----	-----	-----	-----	-----	0.012

...End

RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 11/6/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 14 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 4.4 ACRES
RUNOFF COEFFICIENT 0.85
PEAK DISCHARGE 17.2 CFS

LOT 5 (BASIN A3) INFLOW HYDROGRAPH
ON-LOT DETENTION

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 14	DISCHARGE (CFS) = 0.8
TIME (MIN) = 28	DISCHARGE (CFS) = 0.8
TIME (MIN) = 42	DISCHARGE (CFS) = 0.8
TIME (MIN) = 56	DISCHARGE (CFS) = 0.9
TIME (MIN) = 70	DISCHARGE (CFS) = 0.9
TIME (MIN) = 84	DISCHARGE (CFS) = 1
TIME (MIN) = 98	DISCHARGE (CFS) = 1
TIME (MIN) = 112	DISCHARGE (CFS) = 1.1
TIME (MIN) = 126	DISCHARGE (CFS) = 1.1
TIME (MIN) = 140	DISCHARGE (CFS) = 1.3
TIME (MIN) = 154	DISCHARGE (CFS) = 1.3
TIME (MIN) = 168	DISCHARGE (CFS) = 1.5
TIME (MIN) = 182	DISCHARGE (CFS) = 1.7
TIME (MIN) = 196	DISCHARGE (CFS) = 2
TIME (MIN) = 210	DISCHARGE (CFS) = 2.3
TIME (MIN) = 224	DISCHARGE (CFS) = 3.4
TIME (MIN) = 238	DISCHARGE (CFS) = 4.9
TIME (MIN) = 252	DISCHARGE (CFS) = 17.2 ← PEAK
TIME (MIN) = 266	DISCHARGE (CFS) = 2.7
TIME (MIN) = 280	DISCHARGE (CFS) = 1.8
TIME (MIN) = 294	DISCHARGE (CFS) = 1.4
TIME (MIN) = 308	DISCHARGE (CFS) = 1.2
TIME (MIN) = 322	DISCHARGE (CFS) = 1
TIME (MIN) = 336	DISCHARGE (CFS) = 0.9
TIME (MIN) = 350	DISCHARGE (CFS) = 0.8
TIME (MIN) = 364	DISCHARGE (CFS) = 0.8
TIME (MIN) = 378	DISCHARGE (CFS) = 0

Hydrograph Report

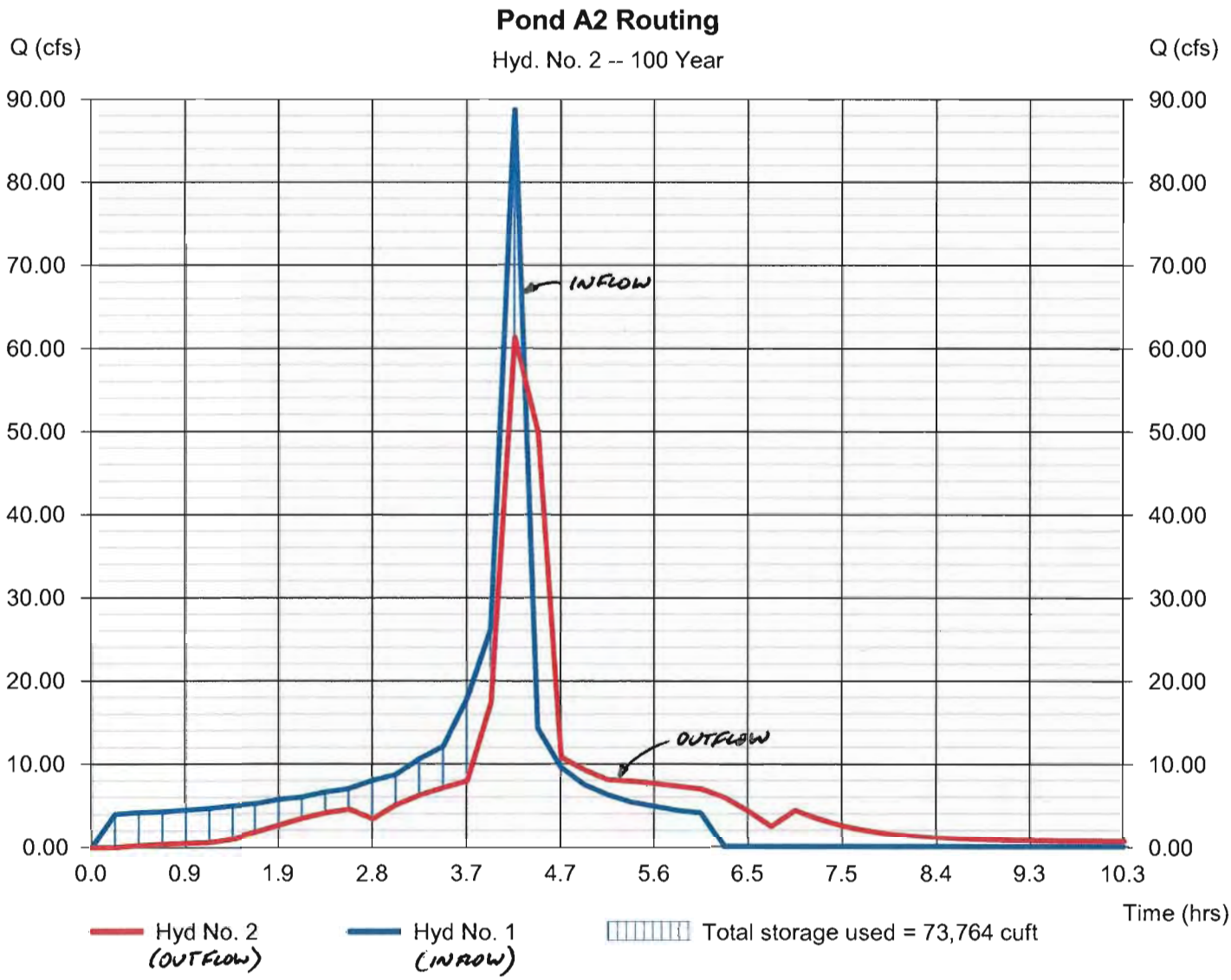
Hydraflow Hydrographs by Intelisolve v9.23 — Tuesday, Nov 6, 2012

Hyd. No. 2

Pond A2 Routing

Hydrograph type	= Reservoir	Peak discharge	= 61.34 cfs ← MAX ALLOWED = 75.0 CFS
Storm frequency	= 100 yrs	Time to peak	= 4.20 hrs
Time interval	= 14 min	Hyd. volume	= 240,108 cuft
Inflow hyd. No.	= 1 - Pond A2 Inflow (100 yr)	Max. Elevation	= 547.64 ft
Reservoir name	= POND A2	Max. Storage	= 73,764 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - POND A2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 543.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	543.00	12,198	0	0
1.00	544.00	13,710	12,945	12,945
2.00	545.00	15,280	14,486	27,432
3.00	546.00	16,910	16,087	43,518
4.00	547.00	18,595	17,744	61,262
5.00	548.00	20,335	19,457	80,719 ← MIN. REQUIRED FOR HYDROMODIFICATION: 39,371 CF

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 5.00	14.00	0.00	0.00
Span (in)	= 5.00	14.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 543.00	544.10	0.00	0.00
Length (ft)	= 0.10	0.10	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

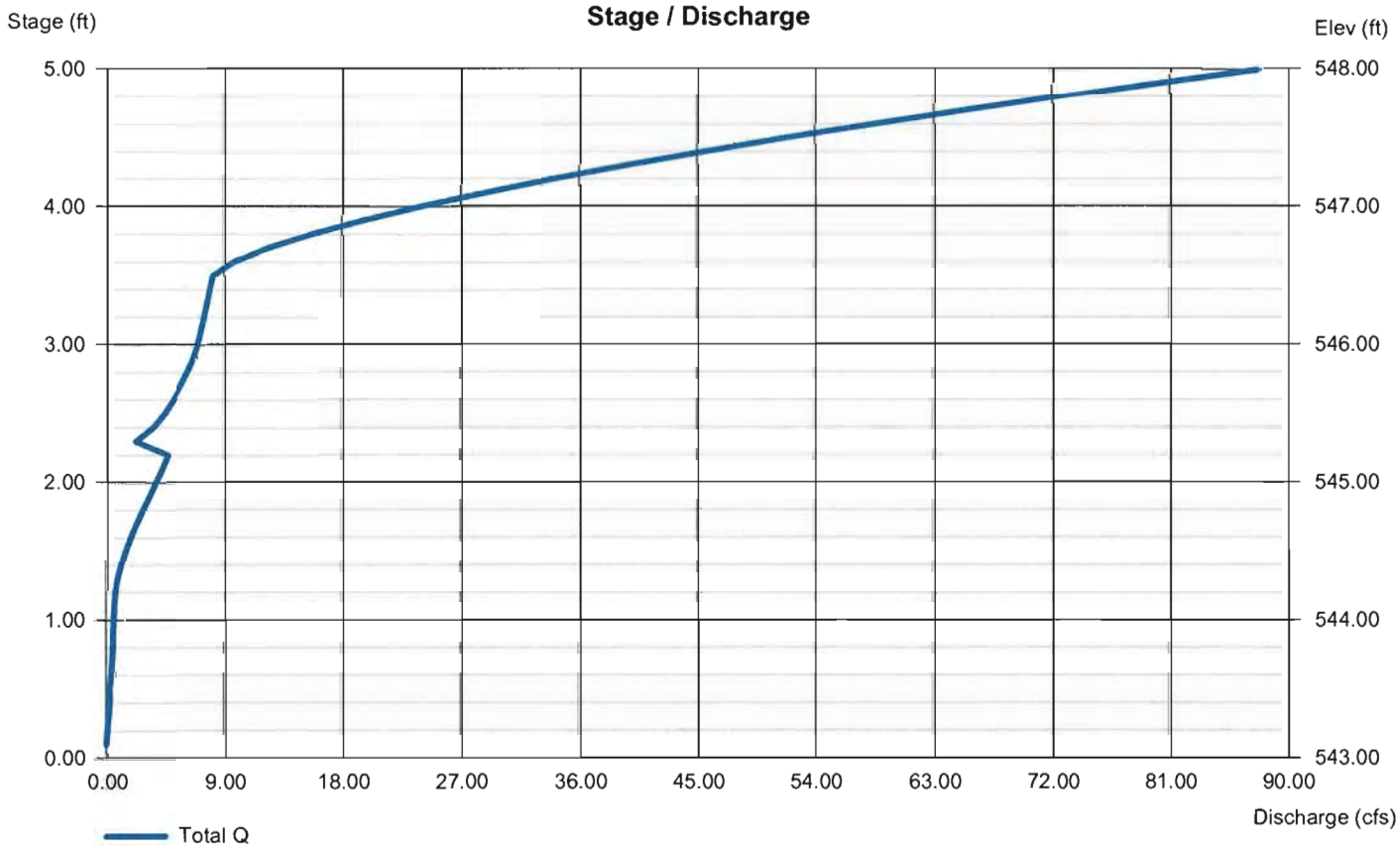
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	0.00	0.00	0.00
Crest El. (ft)	= 546.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

PER HYDROMODIFICATION CRITERIA

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/6/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 14 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 34.2 ACRES
RUNOFF COEFFICIENT 0.57
PEAK DISCHARGE 88.8 CFS

POND A2 INFLOW HYDROGRAPH
(FUTURE ON-LOT DETENTION)

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 14	DISCHARGE (CFS) = 4
TIME (MIN) = 28	DISCHARGE (CFS) = 4.2
TIME (MIN) = 42	DISCHARGE (CFS) = 4.3
TIME (MIN) = 56	DISCHARGE (CFS) = 4.5
TIME (MIN) = 70	DISCHARGE (CFS) = 4.7
TIME (MIN) = 84	DISCHARGE (CFS) = 5
TIME (MIN) = 98	DISCHARGE (CFS) = 5.2
TIME (MIN) = 112	DISCHARGE (CFS) = 5.7
TIME (MIN) = 126	DISCHARGE (CFS) = 6
TIME (MIN) = 140	DISCHARGE (CFS) = 6.6
TIME (MIN) = 154	DISCHARGE (CFS) = 7
TIME (MIN) = 168	DISCHARGE (CFS) = 8
TIME (MIN) = 182	DISCHARGE (CFS) = 8.7
TIME (MIN) = 196	DISCHARGE (CFS) = 10.6
TIME (MIN) = 210	DISCHARGE (CFS) = 12.1
TIME (MIN) = 224	DISCHARGE (CFS) = 17.8
TIME (MIN) = 238	DISCHARGE (CFS) = 26.2
TIME (MIN) = 252	DISCHARGE (CFS) = 88.8 ← PEAK INFLOW
TIME (MIN) = 266	DISCHARGE (CFS) = 14.3
TIME (MIN) = 280	DISCHARGE (CFS) = 9.6
TIME (MIN) = 294	DISCHARGE (CFS) = 7.5
TIME (MIN) = 308	DISCHARGE (CFS) = 6.3
TIME (MIN) = 322	DISCHARGE (CFS) = 5.4
TIME (MIN) = 336	DISCHARGE (CFS) = 4.9
TIME (MIN) = 350	DISCHARGE (CFS) = 4.4
TIME (MIN) = 364	DISCHARGE (CFS) = 4.1
TIME (MIN) = 378	DISCHARGE (CFS) = 0

SECTION 4-2B

BASIN B – DETENTION CALCULATIONS

On-lot runoff generated within Basin B will be detained within on-lot detention facilities in the ultimate condition. Discharge from those detention facilities, along with undetained runoff from the public right-of-way, will be collected within public storm drain systems and conveyed to one of two regional detention facilities. The calculations within this section route a 100 year design storm through the proposed facilities to demonstrate that the project will not exceed pre-project discharge rates.

Note: Symbols shown on Tentative Map are storm water collection basins for rough graded pads only. Final sizing of the basins will be performed at the time of Final Engineering (Per understandings with County DPW Staff).

OTAY CROSSINGS COMMERCE PARK

DETENTION POND B1 INFLOW CALCULATIONS

(Rational Method Procedure)

Otay Mesa, CA | DESIGN STORM **100 YR** | RUN: 11/6/12 2:30 PM

P6 = 3.4 in.

UNDETAINED BASINS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_C min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
B7	1.3	0.85	42.0	1.12	2.27	2.5	2.5	0.3	Lone Star Road
B8	1.5	0.85	42.0	1.28	2.27	2.9	2.9	0.4	Calle Ventner
B9	1.6	0.35	42.0	0.57	2.27	1.3	1.3	0.4	Open Space
B13	1.8	0.85	42.0	1.50	2.27	3.4	3.4	0.4	Lone Star Road
B14	1.0	0.85	42.0	0.85	2.27	1.9	1.9	0.2	Street "B"
B18	1.7	0.35	42.0	0.60	2.27	1.4	1.4	0.4	HYDROMODIFICATION BASIN - POND B1
BASIN B Area=	8.9	0.66		5.912	Q_{100}=	13.4	13.4	2.2	TOTAL UNDETAINED INFLOW

DETAINED BASINS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_C min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
B6	3.3	0.85	42.0	2.79	2.27	6.3	0.8	0.8	Lot 10 - On-lot Detention
B10	9.3	0.85	42.0	7.90	2.27	17.9	2.3	2.3	Lot 11 to 14 - On-lot Detention
B11	3.4	0.85	42.0	2.92	2.27	6.6	0.8	0.8	Lot 27 - On-lot Detention
B12	4.7	0.85	42.0	3.96	2.27	9.0	1.2	1.2	Lot 26 - On-lot Detention
B15	2.6	0.85	42.0	2.24	2.27	5.1	0.6	0.6	Lot 29 - On-lot Detention
B20	3.0	0.85	42.0	2.58	2.27	5.9	0.8	0.8	Lot 31 - On-lot Detention
B28	2.6	0.85	42.0	2.18	2.27	4.9	0.6	0.6	Lot 28 - On-lot Detention
B29	3.0	0.85	42.0	2.51	2.27	5.7	0.6	0.7	Lot 30 - On-lot Detention
BASIN B Area=	31.8	0.85		27.06	Q_{100}=	61.4	7.7	7.9	TOTAL DETAINED INFLOW
BASIN B Area=	40.8	0.81		32.98	Q_{100}=	74.8	21.1	10.1	TOTAL

DETENTION POND B2 INFLOW CALCULATIONS

UNDETAINED BASINS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_C min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
B22	0.5	0.35	42.0	0.19	2.27	0.4	0.4	0.1	HYDROMODIFICATION BASIN - POND B2
B24	2.6	0.85	42.0	2.18	2.27	4.9	4.9	0.6	Lone Star Road
B25	0.8	0.85	42.0	0.68	2.27	1.5	1.5	0.2	Siempre Viva Road
BASIN B Area=	3.9	0.78		3.04	Q_{100}=	6.9	6.9	1.0	TOTAL UNDETAINED INFLOW

DETAINED BASINS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_C min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
B26	1.0	0.85	42.0	0.88	2.27	2.0	0.3	0.3	Lot 24 - On-lot Detention
B27	1.7	0.85	42.0	1.48	2.27	3.4	0.4	0.4	Lot 23 - On-lot Detention
BASIN B Area=	2.8	0.85		2.36	Q_{100}=	5.4	0.7	0.7	TOTAL DETAINED INFLOW
BASIN B Area=	6.7	0.81		5.40	Q_{100}=	12.3	7.6	1.6	TOTAL

OTAY CROSSINGS COMMERCE PARK

DEVELOPED HYDROLOGY - BASIN B

(Rational Method Procedure)

Otay Mesa, CA DESIGN STORM **100 YR** RUN: 11/6/12 2:30 PM

P6 = 3.4 in.

BASIN INFORMATION

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Detained Q_{100} cfs	REMARKS	TRBUTARY TO
B1	501.5	0.36	42.0	180.54	2.27	409.7	409.7	Off-site (TPM 21140) - Undetained	BYPASS
B2	70.4	0.36	42.0	25.34	2.27	57.5	57.5	Off-site (L-14625) - Undetained	BYPASS
B3	1.1	0.85	42.0	0.96	2.27	2.2	2.2	Otay Mesa Road - Undetained	BYPASS
B4	4.2	0.85	42.0	3.53	2.27	8.0	1.0	Lot 6 - On-lot Detention	BYPASS
B5	1.0	0.35	42.0	0.34	2.27	0.8	0.8	Open Channel - Undetained	BYPASS
B6	3.3	0.85	42.0	2.79	2.27	6.3	0.8	Lot 10 - On-lot Detention	POND B1
B7	1.3	0.85	42.0	1.12	2.27	2.5	0.3	Lone Star Road	POND B1
B8	1.5	0.85	42.0	1.28	2.27	2.9	0.4	Calle Ventner	POND B1
B9	1.6	0.36	42.0	0.59	2.27	1.3	0.4	Open Space	POND B1
B10	9.3	0.85	42.0	7.90	2.27	17.9	2.3	Lot 11 to 14 - On-lot Detention	POND B1
B11	3.4	0.85	42.0	2.92	2.27	6.6	0.8	Lot 27 - On-lot Detention	POND B1
B12	4.7	0.85	42.0	3.96	2.27	9.0	1.2	Lot 26 - On-lot Detention	POND B1
B13	1.8	0.85	42.0	1.50	2.27	3.4	0.4	Lone Star Road	POND B1
B14	1.0	0.85	42.0	0.85	2.27	1.9	0.2	Street "B"	POND B1
B15	2.6	0.85	42.0	2.24	2.27	5.1	0.6	Lot 29 - On-lot Detention	POND B1
B16	2.3	0.35	42.0	0.80	2.27	1.8	1.8	Open Channel - Undetained	BYPASS
B17	11.7	0.85	42.0	9.95	2.27	22.6	2.9	Lot 23, 24, 25 - On-lot Detention	BYPASS
B18	1.7	0.35	42.0	0.60	2.27	1.4	0.4	HYDROMODIFICATION BASIN - POND B1	POND B1
B19	1.0	0.35	42.0	0.36	2.27	0.8	0.8	Open Channel - Undetained	BYPASS
B20	3.0	0.85	42.0	2.58	2.27	5.9	0.8	Lot 31 - On-lot Detention	POND B1
B21	10.0	0.58	42.0	5.77	2.27	13.1	2.5	Future Caltrans R/W - Detained	BYPASS
B22	0.5	0.35	42.0	0.19	2.27	0.4	0.1	HYDROMODIFICATION BASIN - POND B2	POND B2
B23	8.1	0.58	42.0	4.72	2.27	10.7	2.0	Future Caltrans R/W - Detained	BYPASS
B24	2.6	0.85	42.0	2.18	2.27	4.9	0.6	Lone Star Road	POND B2
B25	0.8	0.85	42.0	0.68	2.27	1.5	0.2	Siempre Viva Road	POND B2
B26	1.0	0.85	42.0	0.88	2.27	2.0	0.3	Lot 24 - On-lot Detention	POND B2
B27	1.7	0.85	42.0	1.48	2.27	3.4	0.4	Lot 23 - On-lot Detention	POND B2
B28	2.6	0.85	42.0	2.18	2.27	4.9	0.6	Lot 28 - On-lot Detention	POND B1
B29	3.0	0.85	42.0	2.51	2.27	5.7	0.7	Lot 30 - On-lot Detention	POND B1
BASIN B Area=	658.7			270.7	Q_{100}=	614.3	492.9	MAX. ALLOWABLE RELEASE RATE: 492.9 CFS	

BASIN B DETENTION CALCULATIONS

UNDETAINED BASINS	AREA ac.	Q100 cfs
B1	501.5	409.7
B2	70.4	57.5
B3	1.1	2.2
B5	1.0	0.8
B16	2.3	1.8
B19	1.0	0.8
TOTAL:	577.3	472.8

BASIN B TOTAL AREA: 658.7 AC.
SUBTRACT UNDETAINED AREA: -577.3 AC.
TOTAL DETAINED AREA: 81.4 AC.

BASIN B AVE. ALLOWABLE RELEASE RATE (CFS/AC): 0.25

BASIN B MAX. ALLOWABLE Q_{100} (PRE-PROJECT Q_{100}): 492.9
SUBTRACT UNDETAINED Q_{100}: -472.8
MAX. ALLOWABLE DETAINED Q_{100}: 20.1

Hydrograph Report

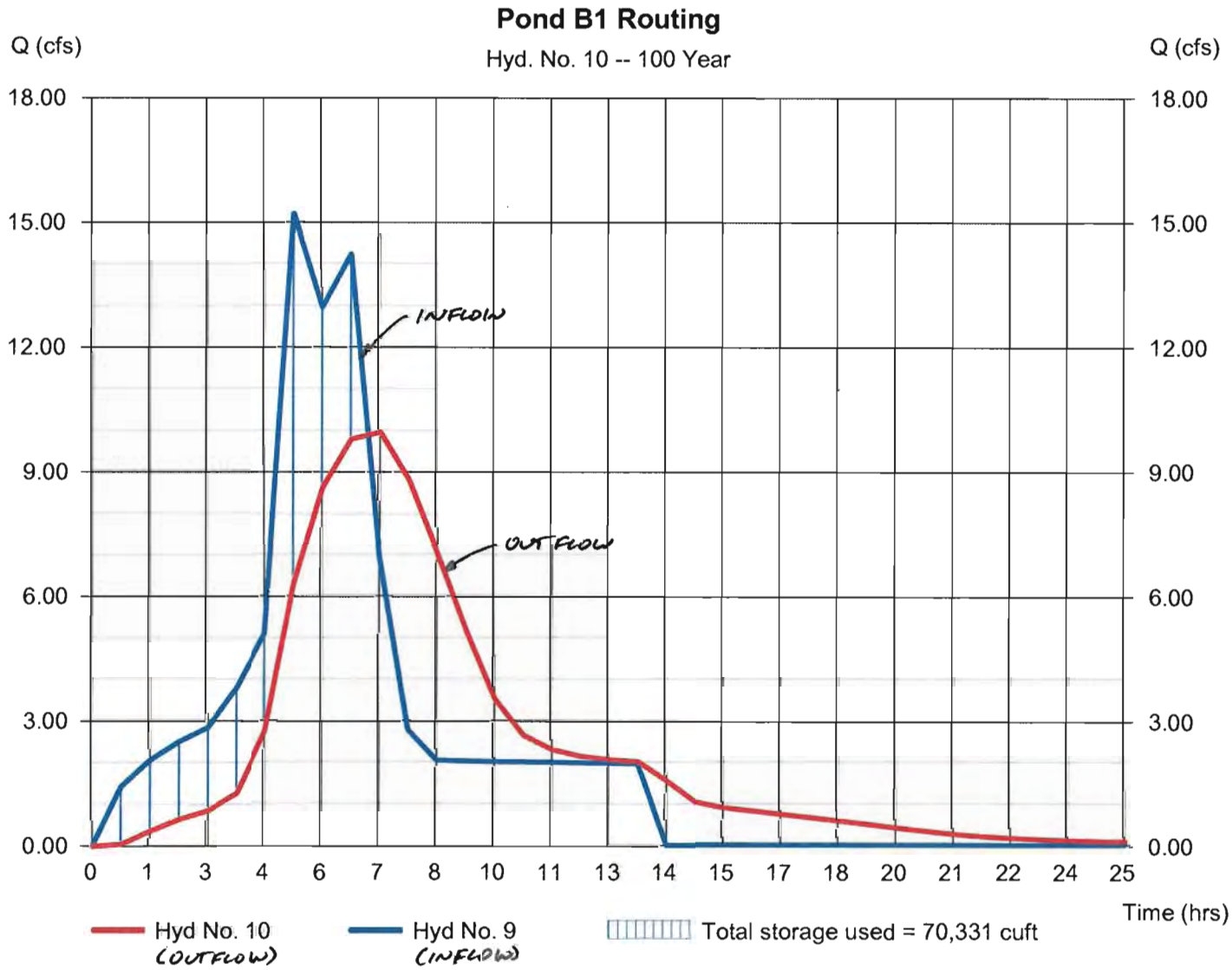
Hydraflow Hydrographs by Intelisolve v9.23 — Wednesday, Nov 7, 2012

Hyd. No. 10

Pond B1 Routing

Hydrograph type	= Reservoir	Peak discharge	= 9.958 cfs ← MAX. ALLOWED: 10.1 CFS
Storm frequency	= 100 yrs	Time to peak	= 7.00 hrs
Time interval	= 42 min	Hyd. volume	= 216,070 cuft
Inflow hyd. No.	= 9 - Pond B1 Inflow	Max. Elevation	= 542.43 ft
Reservoir name	= Pond B1	Max. Storage	= 70,331 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.23 — Wednesday, Nov 7, 2012

Pond No. 4 - Pond B1

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 538.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	538.00	13,140	0	0
1.00	539.00	14,700	13,911	13,911
2.00	540.00	16,300	15,492	29,403
3.00	541.00	17,970	17,127	46,529
4.00	542.00	19,700	18,826	65,356
5.00	543.00	21,480	20,582	85,937 ← MIN. REQUIRED FOR HYDROMODIFICATION: 43,869 CF

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	14.00	0.00	0.00
Span (in)	= 6.00	14.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 538.00	539.20	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

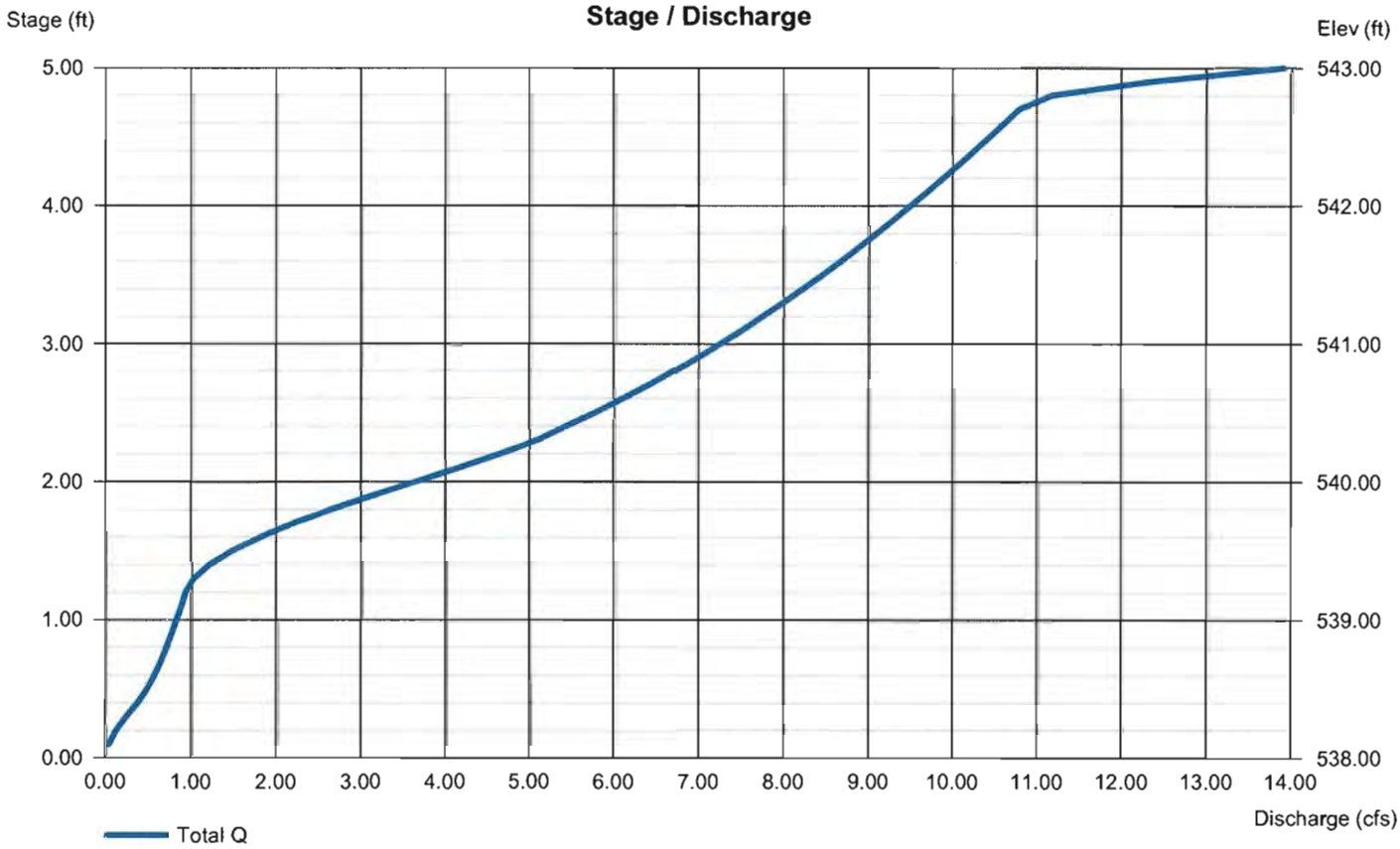
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	0.00	0.00	0.00
Crest El. (ft)	= 542.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

PER HYDROMODIFICATION CRITERIA

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/7/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 42 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 8.9 ACRES
RUNOFF COEFFICIENT 0.66
PEAK DISCHARGE 13.4 CFS

POND B1 INFLOW HYDROGRAPH

TIME (MIN) =	UNDETAINED FLOW DISCHARGE (CFS) =	DETAINED LOT INFLOW	TOTAL INFLOW	
0	0	0	0	
42	1.2	0.22	1.42	
84	1.3	0.75	2.05	
126	1.6	0.89	2.49	
168	1.8	1.03	2.83	
210	2.6	1.19	3.79	
252	3.7	1.39	5.09	
294	13.4	1.80	15.2	← PEAK
336	2.1	10.85	12.95	
378	1.4	12.83	14.23	
420	0	6.96	6.96	
		2.78	2.78	
		2.09	2.09	
		2.02	2.02	
		2.01	2.01	
		2.00	2.00	
		1.99	1.99	
		1.98	1.98	
		1.97	1.97	
		1.96	1.96	

Hydrograph Report

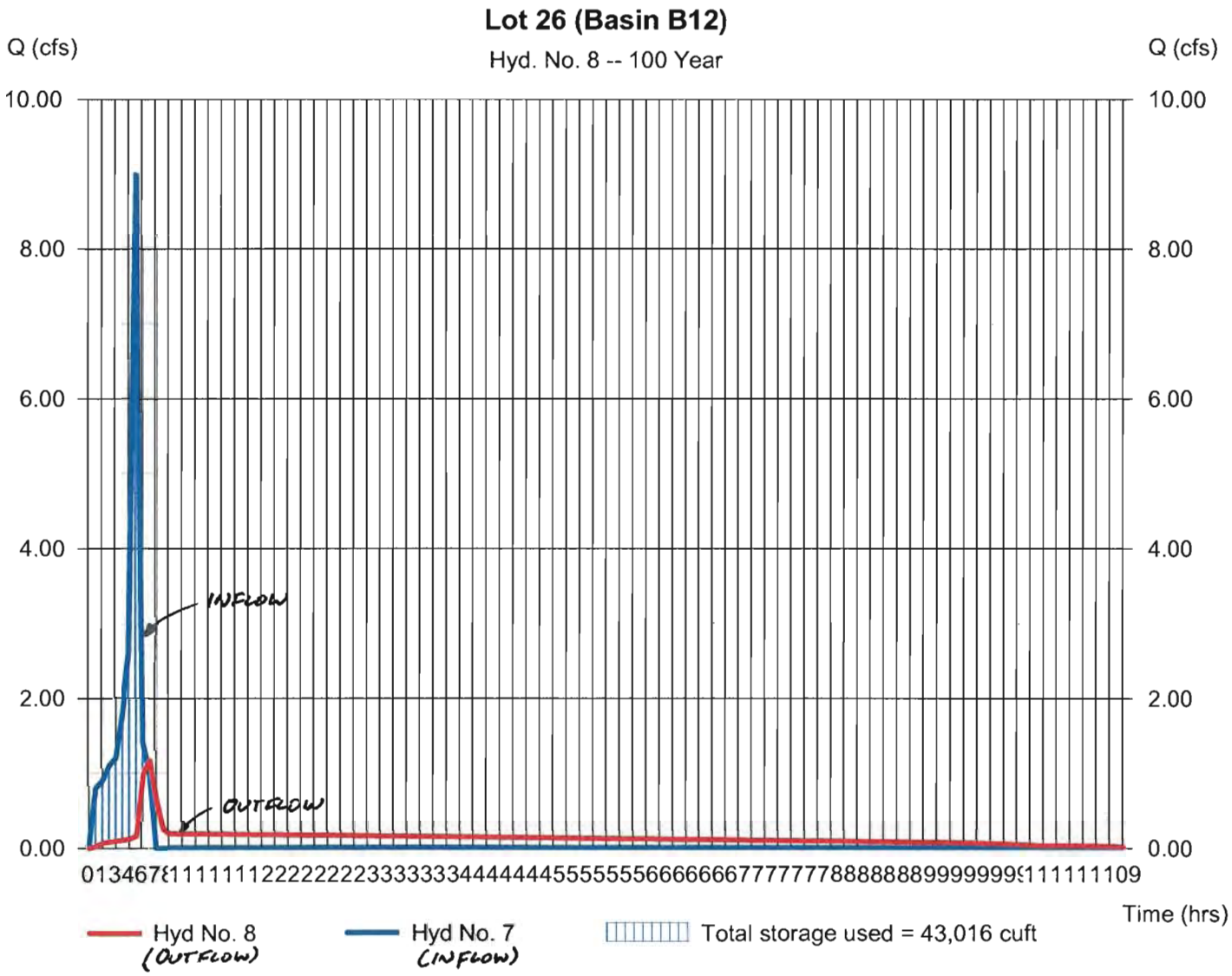
Hydraflow Hydrographs by Intelisolve v9.23 — Tuesday, Nov 6, 2012

Hyd. No. 8

Lot 26 (Basin B12)

Hydrograph type	=	Reservoir	Peak discharge	=	1.166 cfs ← MAX. ALLOWED: 1.2 cfs
Storm frequency	=	100 yrs	Time to peak	=	6.30 hrs
Time interval	=	42 min	Hyd. volume	=	49,828 cuft
Inflow hyd. No.	=	7 - Lot 26 (Basin B12)	Max. Elevation	=	578.39 ft
Reservoir name	=	Lot 26 (Basin B12) - Underground Det * (FUTURE ON-LOT FACILITY) *	Max. Storage	=	43,016 cuft

Storage Indication method used.



Pond Report

Pond No. 5 - Lot 26 (Basin B12) - Underground Det

Pond Data

* (FUTURE ON-LOT FACILITY)*

UG Chambers - Invert elev. = 575.00 ft, Rise x Span = 4.00 x 110.00 ft, Barrel Len = 128.00 ft, No. Barrels = 1, Slope = 0.50%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	575.00	n/a	0	0
0.46	575.46	n/a	2,441	2,441
0.93	575.93	n/a	6,121	8,562
1.39	576.39	n/a	6,534	15,097
1.86	576.86	n/a	6,534	21,631
2.32	577.32	n/a	6,534	28,166
2.78	577.78	n/a	6,534	34,700
3.25	578.25	n/a	6,534	41,234
3.71	578.71	n/a	6,534	47,769
4.18	579.18	n/a	6,121	53,890
4.64	579.64	n/a	2,441	56,331

← MIN. REQUIRED FOR HYDROMODIFICATION: 21,741 CF

Culvert / Orifice Structures

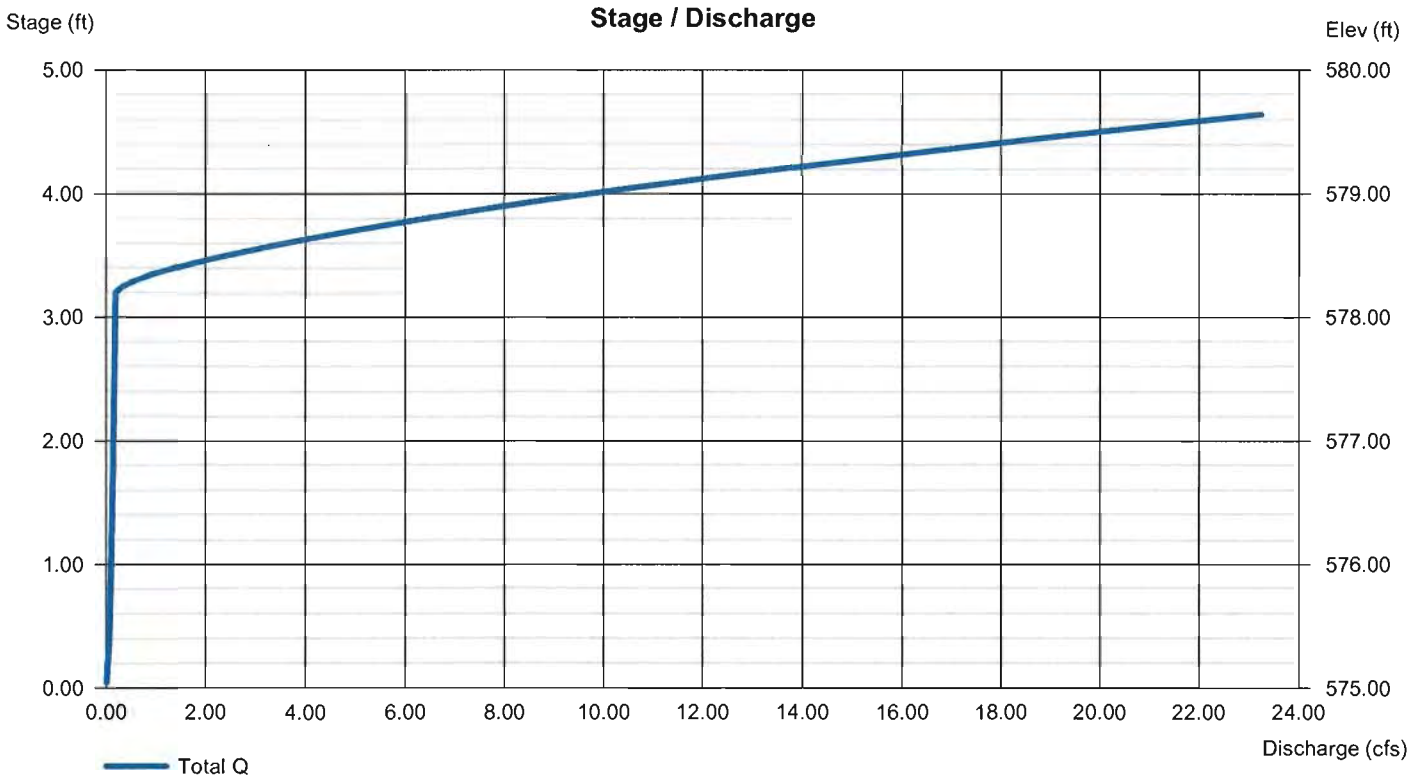
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 2.00	0.00	0.00	0.00
Span (in)	= 2.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 575.00	0.00	0.00	0.00
Length (ft)	= 0.10	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 578.20	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

PER HYDROMODIFICATION CRITERIA

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

* FUTURE ON-LOT FACILITY *

Hydraflow Hydrographs by Intelisolve v9.23

Tuesday, Nov 6, 2012

Hyd. No. 8

Lot 26 (Basin B12)

Hydrograph type	= Reservoir	Peak discharge	= 1.166 cfs
Storm frequency	= 100 yrs	Time to peak	= 6.30 hrs
Time interval	= 42 min	Hyd. volume	= 49,828 cuft
Inflow hyd. No.	= 7 - Lot 26 (Basin B12)	Reservoir name	= Lot 26 (Basin B12
Max. Elevation	= 578.39 ft	Max. Storage	= 43,016 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

x 11 LOTS TRIBUTARY TO POND B1

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs	
0.70	0.800	575.12	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020	0.22
1.40	0.900	575.51	0.068	-----	-----	-----	-----	-----	-----	-----	-----	0.068	0.75
2.10	1.100	575.68	0.081	-----	-----	-----	-----	-----	-----	-----	-----	0.081	0.89
2.80	1.200	575.89	0.094	-----	-----	-----	-----	-----	-----	-----	-----	0.094	1.03
3.50	1.800	576.14	0.108	-----	-----	-----	-----	-----	-----	-----	-----	0.108	1.19
4.20	2.600	576.51	0.126	-----	-----	-----	-----	-----	-----	-----	-----	0.126	1.39
4.90	9.000 <<	577.52	0.164	-----	-----	-----	-----	-----	-----	-----	-----	0.164	1.80
5.60	1.400	578.35	0.190	-----	-----	-----	0.796	-----	-----	-----	-----	0.986	10.85
6.30	1.000	578.37 <<	0.191	-----	-----	-----	0.975	-----	-----	-----	-----	1.166 <<	12.83
7.00	0.000	578.30	0.188	-----	-----	-----	0.445	-----	-----	-----	-----	0.633	6.96
7.70	0.000	578.22	0.186	-----	-----	-----	0.067	-----	-----	-----	-----	0.253	2.78
8.40	0.000	578.18	0.185	-----	-----	-----	0.000	-----	-----	-----	-----	0.185	2.04
9.10	0.000	578.15	0.184	-----	-----	-----	-----	-----	-----	-----	-----	0.184	2.02
9.80	0.000	578.12	0.183	-----	-----	-----	-----	-----	-----	-----	-----	0.183	2.01
10.50	0.000	578.09	0.182	-----	-----	-----	-----	-----	-----	-----	-----	0.182	2.00
11.20	0.000	578.05	0.181	-----	-----	-----	-----	-----	-----	-----	-----	0.181	1.99
11.90	0.000	578.02	0.180	-----	-----	-----	-----	-----	-----	-----	-----	0.180	1.98
12.60	0.000	577.99	0.179	-----	-----	-----	-----	-----	-----	-----	-----	0.179	1.97
13.30	0.000	577.96	0.178	-----	-----	-----	-----	-----	-----	-----	-----	0.178	1.96
14.00	0.000	577.93	0.177	-----	-----	-----	-----	-----	-----	-----	-----	0.177	
14.70	0.000	577.89	0.176	-----	-----	-----	-----	-----	-----	-----	-----	0.176	
15.40	0.000	577.86	0.175	-----	-----	-----	-----	-----	-----	-----	-----	0.175	
16.10	0.000	577.83	0.174	-----	-----	-----	-----	-----	-----	-----	-----	0.174	
16.80	0.000	577.80	0.173	-----	-----	-----	-----	-----	-----	-----	-----	0.173	
17.50	0.000	577.77	0.172	-----	-----	-----	-----	-----	-----	-----	-----	0.172	
18.20	0.000	577.74	0.171	-----	-----	-----	-----	-----	-----	-----	-----	0.171	
18.90	0.000	577.71	0.170	-----	-----	-----	-----	-----	-----	-----	-----	0.170	
19.60	0.000	577.68	0.169	-----	-----	-----	-----	-----	-----	-----	-----	0.169	
20.30	0.000	577.65	0.168	-----	-----	-----	-----	-----	-----	-----	-----	0.168	
21.00	0.000	577.62	0.167	-----	-----	-----	-----	-----	-----	-----	-----	0.167	
21.70	0.000	577.59	0.166	-----	-----	-----	-----	-----	-----	-----	-----	0.166	
22.40	0.000	577.56	0.165	-----	-----	-----	-----	-----	-----	-----	-----	0.165	
23.10	0.000	577.53	0.164	-----	-----	-----	-----	-----	-----	-----	-----	0.164	
23.80	0.000	577.50	0.163	-----	-----	-----	-----	-----	-----	-----	-----	0.163	
24.50	0.000	577.47	0.162	-----	-----	-----	-----	-----	-----	-----	-----	0.162	
25.20	0.000	577.44	0.161	-----	-----	-----	-----	-----	-----	-----	-----	0.161	
25.90	0.000	577.41	0.160	-----	-----	-----	-----	-----	-----	-----	-----	0.160	
26.60	0.000	577.38	0.159	-----	-----	-----	-----	-----	-----	-----	-----	0.159	
27.30	0.000	577.36	0.158	-----	-----	-----	-----	-----	-----	-----	-----	0.158	
28.00	0.000	577.33	0.157	-----	-----	-----	-----	-----	-----	-----	-----	0.157	

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Lot 26 (Basin B12)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
28.70	0.000	577.30	0.156	-----	-----	-----	-----	-----	-----	-----	-----	0.156
29.40	0.000	577.27	0.155	-----	-----	-----	-----	-----	-----	-----	-----	0.155
30.10	0.000	577.24	0.154	-----	-----	-----	-----	-----	-----	-----	-----	0.154
30.80	0.000	577.22	0.153	-----	-----	-----	-----	-----	-----	-----	-----	0.153
31.50	0.000	577.19	0.152	-----	-----	-----	-----	-----	-----	-----	-----	0.152
32.20	0.000	577.16	0.151	-----	-----	-----	-----	-----	-----	-----	-----	0.151
32.90	0.000	577.13	0.150	-----	-----	-----	-----	-----	-----	-----	-----	0.150
33.60	0.000	577.11	0.149	-----	-----	-----	-----	-----	-----	-----	-----	0.149
34.30	0.000	577.08	0.148	-----	-----	-----	-----	-----	-----	-----	-----	0.148
35.00	0.000	577.05	0.147	-----	-----	-----	-----	-----	-----	-----	-----	0.147
35.70	0.000	577.03	0.146	-----	-----	-----	-----	-----	-----	-----	-----	0.146
36.40	0.000	577.00	0.145	-----	-----	-----	-----	-----	-----	-----	-----	0.145
37.10	0.000	576.98	0.144	-----	-----	-----	-----	-----	-----	-----	-----	0.144
37.80	0.000	576.95	0.144	-----	-----	-----	-----	-----	-----	-----	-----	0.144
38.50	0.000	576.92	0.143	-----	-----	-----	-----	-----	-----	-----	-----	0.143
39.20	0.000	576.90	0.142	-----	-----	-----	-----	-----	-----	-----	-----	0.142
39.90	0.000	576.87	0.141	-----	-----	-----	-----	-----	-----	-----	-----	0.141
40.60	0.000	576.85	0.140	-----	-----	-----	-----	-----	-----	-----	-----	0.140
41.30	0.000	576.82	0.139	-----	-----	-----	-----	-----	-----	-----	-----	0.139
42.00	0.000	576.80	0.138	-----	-----	-----	-----	-----	-----	-----	-----	0.138
42.70	0.000	576.77	0.137	-----	-----	-----	-----	-----	-----	-----	-----	0.137
43.40	0.000	576.75	0.136	-----	-----	-----	-----	-----	-----	-----	-----	0.136
44.10	0.000	576.73	0.135	-----	-----	-----	-----	-----	-----	-----	-----	0.135
44.80	0.000	576.70	0.134	-----	-----	-----	-----	-----	-----	-----	-----	0.134
45.50	0.000	576.68	0.133	-----	-----	-----	-----	-----	-----	-----	-----	0.133
46.20	0.000	576.65	0.132	-----	-----	-----	-----	-----	-----	-----	-----	0.132
46.90	0.000	576.63	0.131	-----	-----	-----	-----	-----	-----	-----	-----	0.131
47.60	0.000	576.61	0.130	-----	-----	-----	-----	-----	-----	-----	-----	0.130
48.30	0.000	576.58	0.129	-----	-----	-----	-----	-----	-----	-----	-----	0.129
49.00	0.000	576.56	0.128	-----	-----	-----	-----	-----	-----	-----	-----	0.128
49.70	0.000	576.54	0.127	-----	-----	-----	-----	-----	-----	-----	-----	0.127
50.40	0.000	576.52	0.126	-----	-----	-----	-----	-----	-----	-----	-----	0.126
51.10	0.000	576.49	0.125	-----	-----	-----	-----	-----	-----	-----	-----	0.125
51.80	0.000	576.47	0.124	-----	-----	-----	-----	-----	-----	-----	-----	0.124
52.50	0.000	576.45	0.123	-----	-----	-----	-----	-----	-----	-----	-----	0.123
53.20	0.000	576.43	0.122	-----	-----	-----	-----	-----	-----	-----	-----	0.122
53.90	0.000	576.41	0.121	-----	-----	-----	-----	-----	-----	-----	-----	0.121
54.60	0.000	576.38	0.120	-----	-----	-----	-----	-----	-----	-----	-----	0.120
55.30	0.000	576.36	0.119	-----	-----	-----	-----	-----	-----	-----	-----	0.119
56.00	0.000	576.34	0.118	-----	-----	-----	-----	-----	-----	-----	-----	0.118
56.70	0.000	576.32	0.117	-----	-----	-----	-----	-----	-----	-----	-----	0.117
57.40	0.000	576.30	0.116	-----	-----	-----	-----	-----	-----	-----	-----	0.116
58.10	0.000	576.28	0.115	-----	-----	-----	-----	-----	-----	-----	-----	0.115
58.80	0.000	576.26	0.114	-----	-----	-----	-----	-----	-----	-----	-----	0.114
59.50	0.000	576.24	0.113	-----	-----	-----	-----	-----	-----	-----	-----	0.113
60.20	0.000	576.22	0.112	-----	-----	-----	-----	-----	-----	-----	-----	0.112
60.90	0.000	576.20	0.111	-----	-----	-----	-----	-----	-----	-----	-----	0.111
61.60	0.000	576.18	0.110	-----	-----	-----	-----	-----	-----	-----	-----	0.110
62.30	0.000	576.16	0.109	-----	-----	-----	-----	-----	-----	-----	-----	0.109
63.00	0.000	576.14	0.108	-----	-----	-----	-----	-----	-----	-----	-----	0.108
63.70	0.000	576.12	0.107	-----	-----	-----	-----	-----	-----	-----	-----	0.107
64.40	0.000	576.10	0.106	-----	-----	-----	-----	-----	-----	-----	-----	0.106
65.10	0.000	576.08	0.105	-----	-----	-----	-----	-----	-----	-----	-----	0.105
65.80	0.000	576.06	0.104	-----	-----	-----	-----	-----	-----	-----	-----	0.104

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Lot 26 (Basin B12)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
66.50	0.000	576.05	0.103	-----	-----	-----	-----	-----	-----	-----	-----	0.103
67.20	0.000	576.03	0.102	-----	-----	-----	-----	-----	-----	-----	-----	0.102
67.90	0.000	576.01	0.101	-----	-----	-----	-----	-----	-----	-----	-----	0.101
68.60	0.000	575.99	0.100	-----	-----	-----	-----	-----	-----	-----	-----	0.100
69.30	0.000	575.97	0.099	-----	-----	-----	-----	-----	-----	-----	-----	0.099
70.00	0.000	575.96	0.098	-----	-----	-----	-----	-----	-----	-----	-----	0.098
70.70	0.000	575.94	0.097	-----	-----	-----	-----	-----	-----	-----	-----	0.097
71.40	0.000	575.92	0.096	-----	-----	-----	-----	-----	-----	-----	-----	0.096
72.10	0.000	575.90	0.095	-----	-----	-----	-----	-----	-----	-----	-----	0.095
72.80	0.000	575.88	0.094	-----	-----	-----	-----	-----	-----	-----	-----	0.094
73.50	0.000	575.87	0.093	-----	-----	-----	-----	-----	-----	-----	-----	0.093
74.20	0.000	575.85	0.092	-----	-----	-----	-----	-----	-----	-----	-----	0.092
74.90	0.000	575.83	0.091	-----	-----	-----	-----	-----	-----	-----	-----	0.091
75.60	0.000	575.81	0.090	-----	-----	-----	-----	-----	-----	-----	-----	0.090
76.30	0.000	575.80	0.089	-----	-----	-----	-----	-----	-----	-----	-----	0.089
77.00	0.000	575.78	0.088	-----	-----	-----	-----	-----	-----	-----	-----	0.088
77.70	0.000	575.76	0.087	-----	-----	-----	-----	-----	-----	-----	-----	0.087
78.40	0.000	575.75	0.086	-----	-----	-----	-----	-----	-----	-----	-----	0.086
79.10	0.000	575.73	0.084	-----	-----	-----	-----	-----	-----	-----	-----	0.085
79.80	0.000	575.71	0.083	-----	-----	-----	-----	-----	-----	-----	-----	0.083
80.50	0.000	575.70	0.082	-----	-----	-----	-----	-----	-----	-----	-----	0.082
81.20	0.000	575.68	0.081	-----	-----	-----	-----	-----	-----	-----	-----	0.081
81.90	0.000	575.67	0.080	-----	-----	-----	-----	-----	-----	-----	-----	0.080
82.60	0.000	575.65	0.079	-----	-----	-----	-----	-----	-----	-----	-----	0.079
83.30	0.000	575.64	0.078	-----	-----	-----	-----	-----	-----	-----	-----	0.078
84.00	0.000	575.62	0.077	-----	-----	-----	-----	-----	-----	-----	-----	0.077
84.70	0.000	575.61	0.076	-----	-----	-----	-----	-----	-----	-----	-----	0.076
85.40	0.000	575.59	0.075	-----	-----	-----	-----	-----	-----	-----	-----	0.075
86.10	0.000	575.58	0.074	-----	-----	-----	-----	-----	-----	-----	-----	0.074
86.80	0.000	575.57	0.073	-----	-----	-----	-----	-----	-----	-----	-----	0.073
87.50	0.000	575.55	0.072	-----	-----	-----	-----	-----	-----	-----	-----	0.072
88.20	0.000	575.54	0.071	-----	-----	-----	-----	-----	-----	-----	-----	0.071
88.90	0.000	575.52	0.070	-----	-----	-----	-----	-----	-----	-----	-----	0.070
89.60	0.000	575.51	0.069	-----	-----	-----	-----	-----	-----	-----	-----	0.069
90.30	0.000	575.50	0.068	-----	-----	-----	-----	-----	-----	-----	-----	0.068
91.00	0.000	575.49	0.067	-----	-----	-----	-----	-----	-----	-----	-----	0.067
91.70	0.000	575.47	0.066	-----	-----	-----	-----	-----	-----	-----	-----	0.066
92.40	0.000	575.46	0.064	-----	-----	-----	-----	-----	-----	-----	-----	0.064
93.10	0.000	575.43	0.061	-----	-----	-----	-----	-----	-----	-----	-----	0.061
93.80	0.000	575.40	0.059	-----	-----	-----	-----	-----	-----	-----	-----	0.059
94.50	0.000	575.37	0.056	-----	-----	-----	-----	-----	-----	-----	-----	0.056
95.20	0.000	575.34	0.053	-----	-----	-----	-----	-----	-----	-----	-----	0.053
95.90	0.000	575.32	0.051	-----	-----	-----	-----	-----	-----	-----	-----	0.051
96.60	0.000	575.29	0.048	-----	-----	-----	-----	-----	-----	-----	-----	0.048
97.30	0.000	575.27	0.045	-----	-----	-----	-----	-----	-----	-----	-----	0.045
98.00	0.000	575.25	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
98.70	0.000	575.23	0.036	-----	-----	-----	-----	-----	-----	-----	-----	0.036
99.40	0.000	575.22	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031
100.10	0.000	575.20	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026
100.80	0.000	575.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
101.50	0.000	575.12	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
102.20	0.000	575.12	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
102.90	0.000	575.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
103.60	0.000	575.13	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023

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Lot 26 (Basin B12)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
104.30	0.000	575.14	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
105.00	0.000	575.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
105.70	0.000	575.12	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
106.40	0.000	575.11	0.017	-----	-----	-----	-----	-----	-----	-----	-----	0.017
107.10	0.000	575.10	0.015	-----	-----	-----	-----	-----	-----	-----	-----	0.015
107.80	0.000	575.10	0.014	-----	-----	-----	-----	-----	-----	-----	-----	0.014
108.50	0.000	575.09	0.012	-----	-----	-----	-----	-----	-----	-----	-----	0.012

...End

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/6/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 42 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 4.7 ACRES
RUNOFF COEFFICIENT 0.85
PEAK DISCHARGE 9 CFS

LOT 26 (BASIN B12) INFLOW HYDROGRAPH
ON-LOT DETENTION
(FUTURE)

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 42	DISCHARGE (CFS) = 0.8
TIME (MIN) = 84	DISCHARGE (CFS) = 0.9
TIME (MIN) = 126	DISCHARGE (CFS) = 1.1
TIME (MIN) = 168	DISCHARGE (CFS) = 1.2
TIME (MIN) = 210	DISCHARGE (CFS) = 1.8
TIME (MIN) = 252	DISCHARGE (CFS) = 2.6
TIME (MIN) = 294	DISCHARGE (CFS) = 9 ← PEAK
TIME (MIN) = 336	DISCHARGE (CFS) = 1.4
TIME (MIN) = 378	DISCHARGE (CFS) = 1
TIME (MIN) = 420	DISCHARGE (CFS) = 0

Hydrograph Report

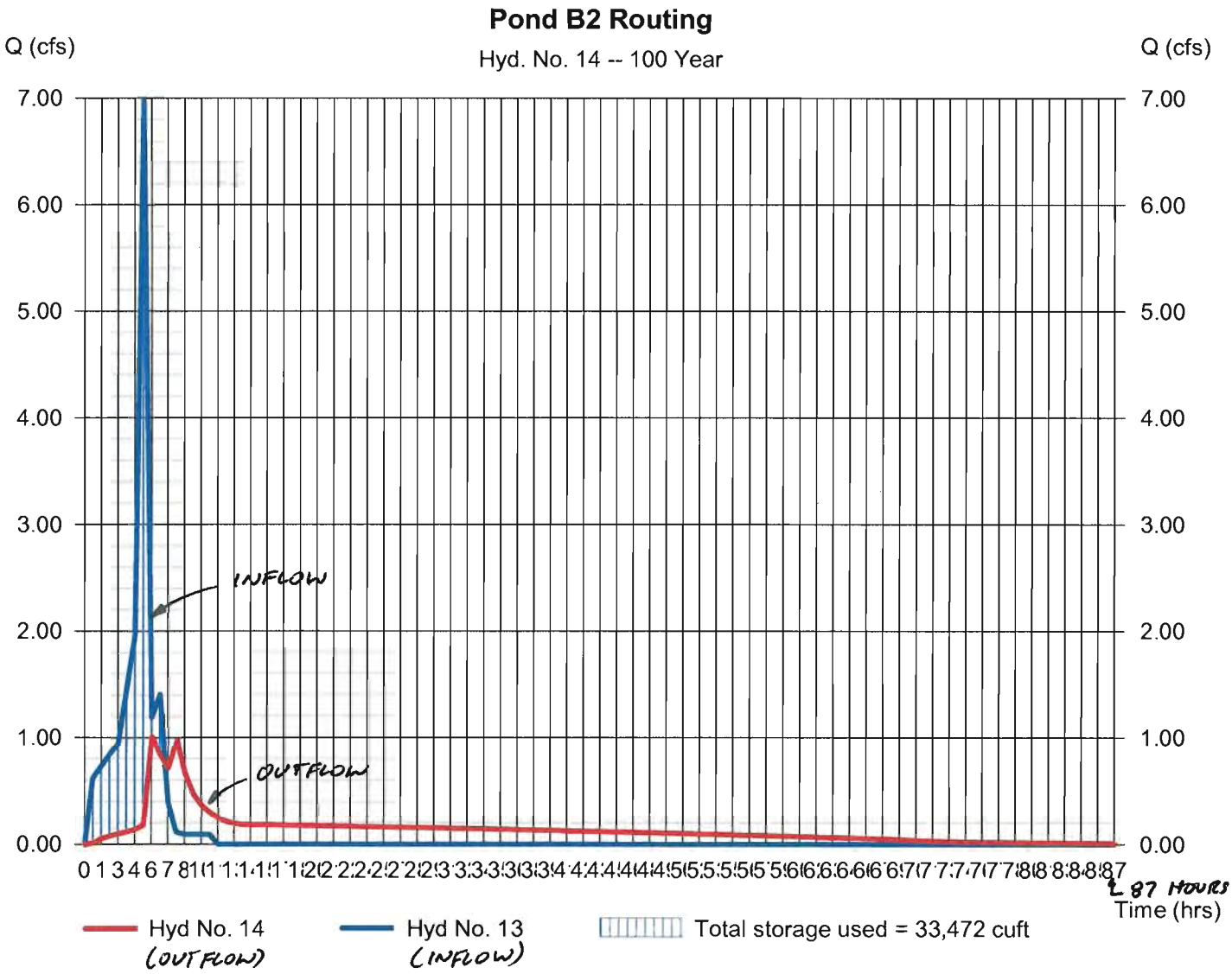
Hydraflow Hydrographs by Intelisolve v9.23 — Wednesday, Nov 7, 2012

Hyd. No. 14

Pond B2 Routing

Hydrograph type	= Reservoir	Peak discharge	= 1.014 cfs ← MAX. ALLOWED: 1.6 CFS
Storm frequency	= 100 yrs	Time to peak	= 5.60 hrs
Time interval	= 42 min	Hyd. volume	= 42,745 cuft
Inflow hyd. No.	= 13 - Pond B2 Inflow	Max. Elevation	= 552.81 ft
Reservoir name	= Pond B2	Max. Storage	= 33,472 cuft

Storage Indication method used.



Pond Report

Pond No. 8 - Pond B2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 549.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)	
0.00	549.00	5,827	0	0	
1.00	550.00	7,425	6,609	6,609	
2.00	551.00	9,080	8,238	14,847	
3.00	552.00	10,790	9,922	24,769	
4.00	553.00	12,560	11,663	36,431	
5.00	554.00	14,380	13,458	49,890	← MIN. REQUIRED FOR HYDROMODIFICATION: 23,060 CF

Culvert / Orifice Structures

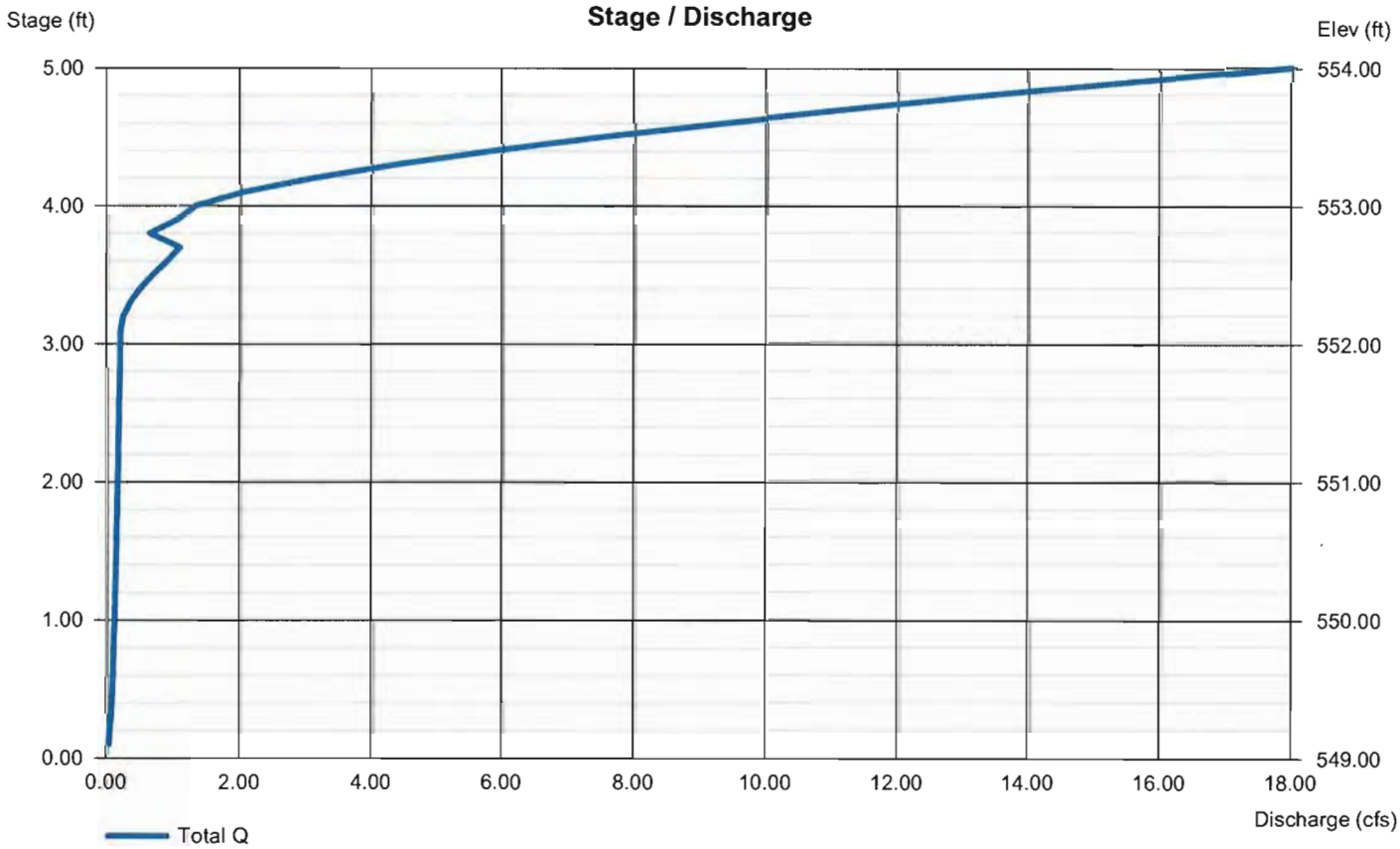
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 2.00	8.00	0.00	0.00
Span (in)	= 2.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 549.00	552.10	0.00	0.00
Length (ft)	= 0.10	0.10	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.70	0.00	0.00	0.00
Crest El. (ft)	= 553.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

PER HYDROMODIFICATION CRITERIA

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/7/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 42 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 3.9 ACRES
RUNOFF COEFFICIENT 0.78
PEAK DISCHARGE 6.9 CFS

POND B2 INFLOW HYDROGRAPH

TIME (MIN) =	UNDETAINED INFLOW ↓ DISCHARGE (CFS) =	DETAINED LOT INFLOW ↓	TOTAL INFLOW ↓
0	0	0	0
42	0.6	0.02	0.62
84	0.7	0.03	0.73
126	0.8	0.04	0.84
168	0.9	0.04	0.94
210	1.4	0.05	1.45
252	1.9	0.06	1.96
294	6.9	0.08	6.98 ← PEAK
336	1.1	0.09	1.19
378	0.7	0.71	1.41
420	0	0.39	0.39
		0.11	0.11
		0.09	0.09
		0.09	0.09
		0.09	0.09
		0.09	0.09

Hydrograph Report

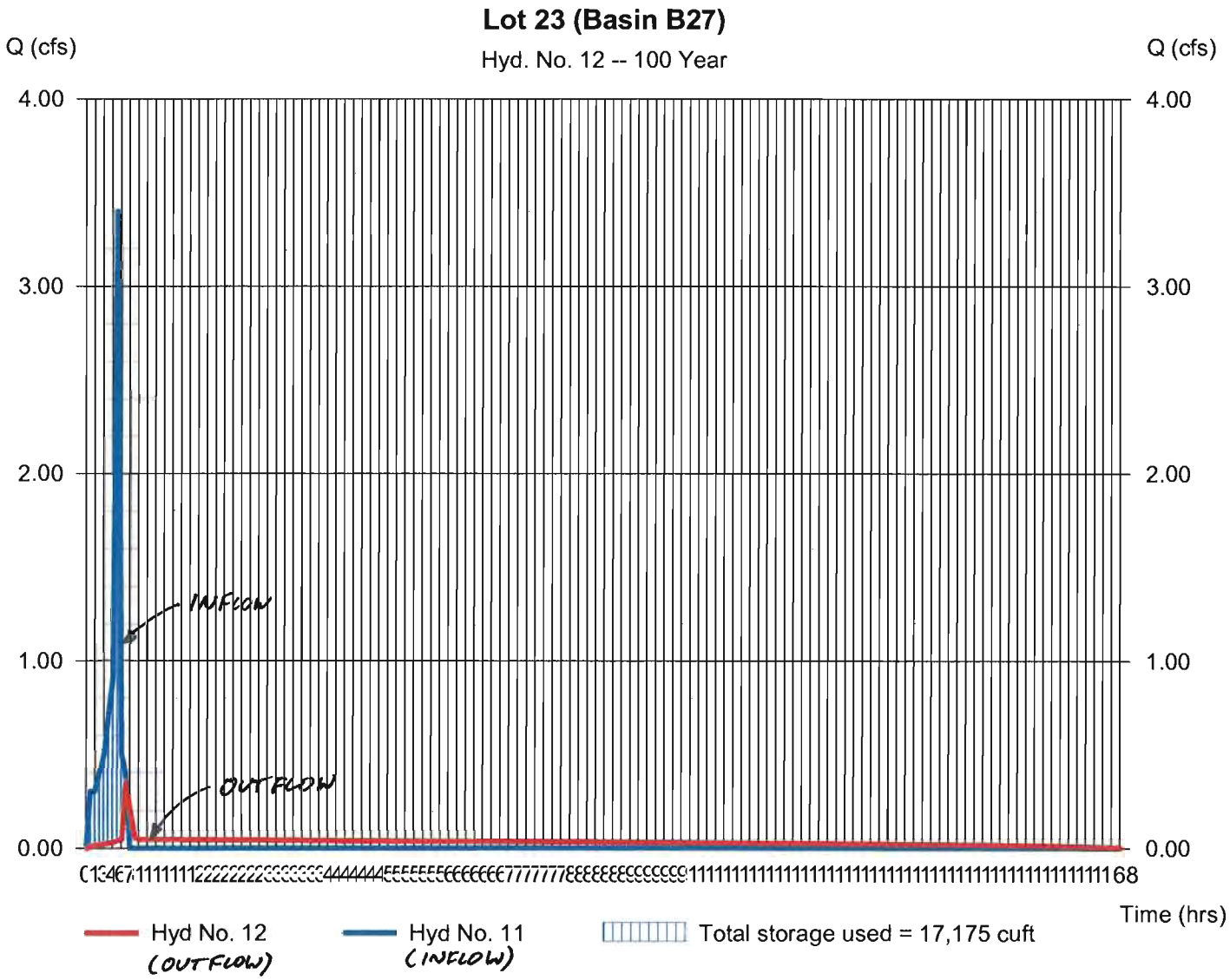
Hydraflow Hydrographs by Intelisolve v9.23 — Wednesday, Nov 7, 2012

Hyd. No. 12

Lot 23 (Basin B27)

Hydrograph type	=	Reservoir	Peak discharge	=	0.353 cfs ← MAX. ALLOWED: 0.4 CFS
Storm frequency	=	100 yrs	Time to peak	=	6.30 hrs
Time interval	=	42 min	Hyd. volume	=	18,593 cuft
Inflow hyd. No.	=	11 - Lot 23 (Basin B27) Inflow	Max. Elevation	=	558.29 ft
Reservoir name	=	Lot 23 (Basin B27) - Underground Det * (FUTURE ONLOT FACILITY) *	Max. Storage	=	17,175 cuft

Storage Indication method used.



Pond Report

Pond No. 7 - Lot 23 (Basin B27) - Underground Det

Pond Data

(FUTURE ON-LOT FACILITY)

UG Chambers - Invert elev. = 555.00 ft, Rise x Span = 4.00 x 58.00 ft, Barrel Len = 97.50 ft, No. Barrels = 1, Slope = 0.50%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	555.00	n/a	0	0
0.45	555.45	n/a	1,196	1,196
0.90	555.90	n/a	2,502	3,698
1.35	556.35	n/a	2,538	6,236
1.80	556.80	n/a	2,538	8,774
2.24	557.24	n/a	2,538	11,312
2.69	557.69	n/a	2,538	13,850
3.14	558.14	n/a	2,538	16,389
3.59	558.59	n/a	2,538	18,927
4.04	559.04	n/a	2,502	21,428
4.49	559.49	n/a	1,196	22,625

*MIN. REQUIRED FOR HYDROMODIFICATION: 8,035 CF (~½ OF TOTAL LOT REQUIREMENT)

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 1.00	0.00	0.00	0.00
Span (in)	= 1.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 555.00	0.00	0.00	0.00
Length (ft)	= 0.10	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

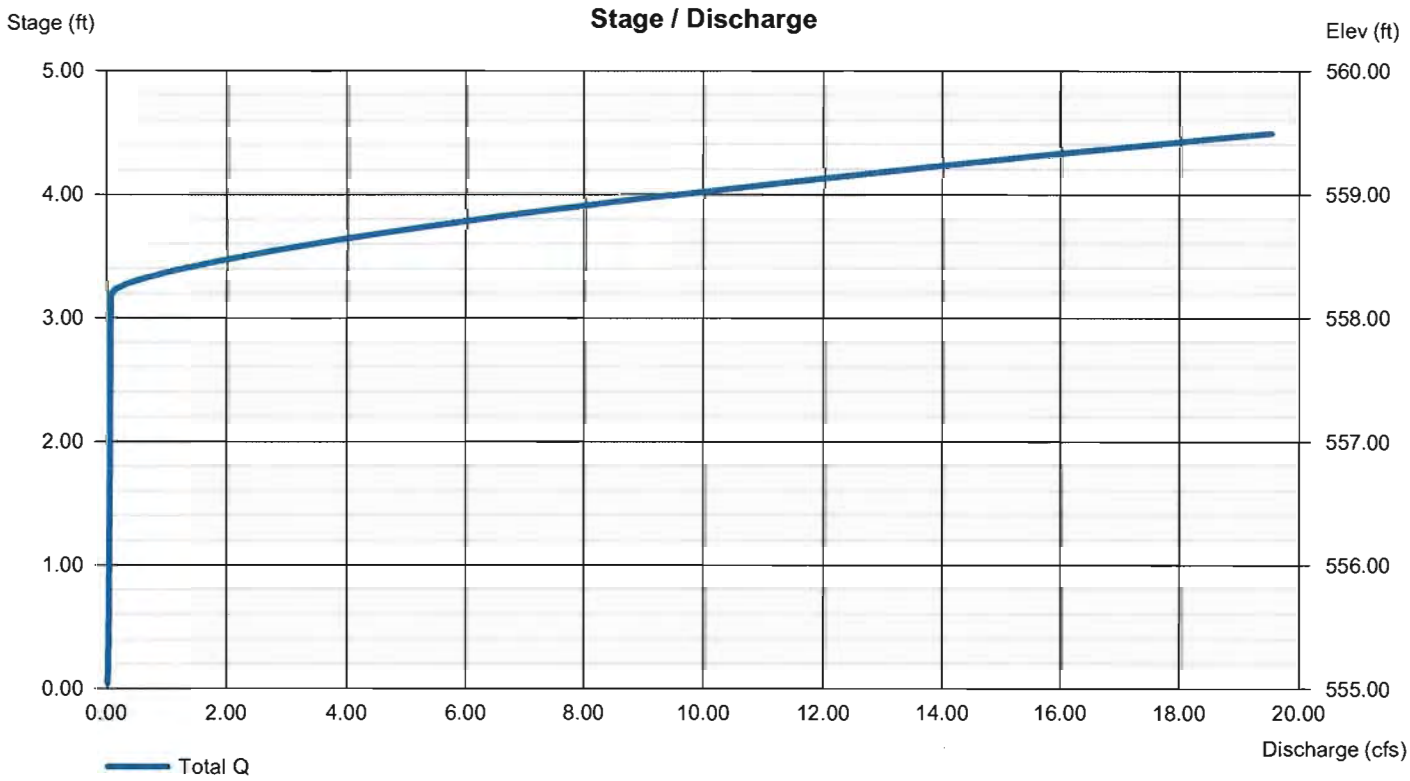
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 558.20	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

* FUTURE ON-LOT FACILITY *

Hydraflow Hydrographs by Intelisolve v9.23

Wednesday, Nov 7, 2012

Hyd. No. 12

Lot 23 (Basin B27)

Hydrograph type	= Reservoir	Peak discharge	= 0.353 cfs
Storm frequency	= 100 yrs	Time to peak	= 6.30 hrs
Time interval	= 42 min	Hyd. volume	= 18,593 cuft
Inflow hyd. No.	= 11 - Lot 23 (Basin B27) Inflow	Reservoir name	= Lot 23 (Basin B27
Max. Elevation	= 558.29 ft	Max. Storage	= 17,175 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs	x2 LOTS TRIBUTARY TO POND B2 ↓
0.70	0.300	555.14	0.008	-----	-----	-----	-----	-----	-----	-----	-----	0.008	0.016
1.40	0.300	555.41	0.016	-----	-----	-----	-----	-----	-----	-----	-----	0.016	0.032
2.10	0.400	555.58	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019	0.038
2.80	0.500	555.77	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022	0.044
3.50	0.700	556.03	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026	0.052
4.20	0.900	556.38	0.030	-----	-----	-----	-----	-----	-----	-----	-----	0.030	0.06
4.90	3.400 <<	557.32	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040	0.08
5.60	0.500	558.17	0.046	-----	-----	-----	-----	-----	-----	-----	-----	0.046	0.092
6.30	0.400	558.28 <<	0.047	-----	-----	-----	0.305	-----	-----	-----	-----	0.353 <<	0.706
7.00	0.000	558.25	0.047	-----	-----	-----	0.148	-----	-----	-----	-----	0.195	0.39
7.70	0.000	558.19	0.047	-----	-----	-----	0.009	-----	-----	-----	-----	0.056	0.11
8.40	0.000	558.17	0.046	-----	-----	-----	-----	-----	-----	-----	-----	0.046	0.09
9.10	0.000	558.15	0.046	-----	-----	-----	-----	-----	-----	-----	-----	0.046	0.09
9.80	0.000	558.13	0.046	-----	-----	-----	-----	-----	-----	-----	-----	0.046	0.09
10.50	0.000	558.11	0.046	-----	-----	-----	-----	-----	-----	-----	-----	0.046	0.09
11.20	0.000	558.09	0.046	-----	-----	-----	-----	-----	-----	-----	-----	0.046	0.09
11.90	0.000	558.07	0.046	-----	-----	-----	-----	-----	-----	-----	-----	0.046	
12.60	0.000	558.05	0.046	-----	-----	-----	-----	-----	-----	-----	-----	0.046	
13.30	0.000	558.03	0.045	-----	-----	-----	-----	-----	-----	-----	-----	0.045	
14.00	0.000	558.01	0.045	-----	-----	-----	-----	-----	-----	-----	-----	0.045	
14.70	0.000	557.99	0.045	-----	-----	-----	-----	-----	-----	-----	-----	0.045	
15.40	0.000	557.97	0.045	-----	-----	-----	-----	-----	-----	-----	-----	0.045	
16.10	0.000	557.95	0.045	-----	-----	-----	-----	-----	-----	-----	-----	0.045	
16.80	0.000	557.93	0.045	-----	-----	-----	-----	-----	-----	-----	-----	0.045	
17.50	0.000	557.91	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044	
18.20	0.000	557.89	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044	
18.90	0.000	557.87	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044	
19.60	0.000	557.85	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044	
20.30	0.000	557.83	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044	
21.00	0.000	557.81	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044	
21.70	0.000	557.79	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044	
22.40	0.000	557.77	0.043	-----	-----	-----	-----	-----	-----	-----	-----	0.043	
23.10	0.000	557.75	0.043	-----	-----	-----	-----	-----	-----	-----	-----	0.043	
23.80	0.000	557.73	0.043	-----	-----	-----	-----	-----	-----	-----	-----	0.043	
24.50	0.000	557.71	0.043	-----	-----	-----	-----	-----	-----	-----	-----	0.043	
25.20	0.000	557.69	0.043	-----	-----	-----	-----	-----	-----	-----	-----	0.043	
25.90	0.000	557.67	0.043	-----	-----	-----	-----	-----	-----	-----	-----	0.043	
26.60	0.000	557.65	0.042	-----	-----	-----	-----	-----	-----	-----	-----	0.042	
27.30	0.000	557.64	0.042	-----	-----	-----	-----	-----	-----	-----	-----	0.042	
28.00	0.000	557.62	0.042	-----	-----	-----	-----	-----	-----	-----	-----	0.042	

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Lot 23 (Basin B27)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
28.70	0.000	557.60	0.042	-----	-----	-----	-----	-----	-----	-----	-----	0.042
29.40	0.000	557.58	0.042	-----	-----	-----	-----	-----	-----	-----	-----	0.042
30.10	0.000	557.56	0.042	-----	-----	-----	-----	-----	-----	-----	-----	0.042
30.80	0.000	557.54	0.042	-----	-----	-----	-----	-----	-----	-----	-----	0.042
31.50	0.000	557.52	0.041	-----	-----	-----	-----	-----	-----	-----	-----	0.041
32.20	0.000	557.51	0.041	-----	-----	-----	-----	-----	-----	-----	-----	0.041
32.90	0.000	557.49	0.041	-----	-----	-----	-----	-----	-----	-----	-----	0.041
33.60	0.000	557.47	0.041	-----	-----	-----	-----	-----	-----	-----	-----	0.041
34.30	0.000	557.45	0.041	-----	-----	-----	-----	-----	-----	-----	-----	0.041
35.00	0.000	557.43	0.041	-----	-----	-----	-----	-----	-----	-----	-----	0.041
35.70	0.000	557.41	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
36.40	0.000	557.40	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
37.10	0.000	557.38	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
37.80	0.000	557.36	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
38.50	0.000	557.34	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
39.20	0.000	557.32	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
39.90	0.000	557.31	0.040	-----	-----	-----	-----	-----	-----	-----	-----	0.040
40.60	0.000	557.29	0.039	-----	-----	-----	-----	-----	-----	-----	-----	0.039
41.30	0.000	557.27	0.039	-----	-----	-----	-----	-----	-----	-----	-----	0.039
42.00	0.000	557.25	0.039	-----	-----	-----	-----	-----	-----	-----	-----	0.039
42.70	0.000	557.24	0.039	-----	-----	-----	-----	-----	-----	-----	-----	0.039
43.40	0.000	557.22	0.039	-----	-----	-----	-----	-----	-----	-----	-----	0.039
44.10	0.000	557.20	0.039	-----	-----	-----	-----	-----	-----	-----	-----	0.039
44.80	0.000	557.19	0.038	-----	-----	-----	-----	-----	-----	-----	-----	0.038
45.50	0.000	557.17	0.038	-----	-----	-----	-----	-----	-----	-----	-----	0.038
46.20	0.000	557.15	0.038	-----	-----	-----	-----	-----	-----	-----	-----	0.038
46.90	0.000	557.13	0.038	-----	-----	-----	-----	-----	-----	-----	-----	0.038
47.60	0.000	557.12	0.038	-----	-----	-----	-----	-----	-----	-----	-----	0.038
48.30	0.000	557.10	0.038	-----	-----	-----	-----	-----	-----	-----	-----	0.038
49.00	0.000	557.08	0.038	-----	-----	-----	-----	-----	-----	-----	-----	0.038
49.70	0.000	557.07	0.037	-----	-----	-----	-----	-----	-----	-----	-----	0.037
50.40	0.000	557.05	0.037	-----	-----	-----	-----	-----	-----	-----	-----	0.037
51.10	0.000	557.03	0.037	-----	-----	-----	-----	-----	-----	-----	-----	0.037
51.80	0.000	557.02	0.037	-----	-----	-----	-----	-----	-----	-----	-----	0.037
52.50	0.000	557.00	0.037	-----	-----	-----	-----	-----	-----	-----	-----	0.037
53.20	0.000	556.99	0.037	-----	-----	-----	-----	-----	-----	-----	-----	0.037
53.90	0.000	556.97	0.036	-----	-----	-----	-----	-----	-----	-----	-----	0.036
54.60	0.000	556.95	0.036	-----	-----	-----	-----	-----	-----	-----	-----	0.036
55.30	0.000	556.94	0.036	-----	-----	-----	-----	-----	-----	-----	-----	0.036
56.00	0.000	556.92	0.036	-----	-----	-----	-----	-----	-----	-----	-----	0.036
56.70	0.000	556.90	0.036	-----	-----	-----	-----	-----	-----	-----	-----	0.036
57.40	0.000	556.89	0.036	-----	-----	-----	-----	-----	-----	-----	-----	0.036
58.10	0.000	556.87	0.036	-----	-----	-----	-----	-----	-----	-----	-----	0.036
58.80	0.000	556.86	0.035	-----	-----	-----	-----	-----	-----	-----	-----	0.035
59.50	0.000	556.84	0.035	-----	-----	-----	-----	-----	-----	-----	-----	0.035
60.20	0.000	556.83	0.035	-----	-----	-----	-----	-----	-----	-----	-----	0.035
60.90	0.000	556.81	0.035	-----	-----	-----	-----	-----	-----	-----	-----	0.035
61.60	0.000	556.79	0.035	-----	-----	-----	-----	-----	-----	-----	-----	0.035
62.30	0.000	556.78	0.035	-----	-----	-----	-----	-----	-----	-----	-----	0.035
63.00	0.000	556.76	0.034	-----	-----	-----	-----	-----	-----	-----	-----	0.034
63.70	0.000	556.75	0.034	-----	-----	-----	-----	-----	-----	-----	-----	0.034
64.40	0.000	556.73	0.034	-----	-----	-----	-----	-----	-----	-----	-----	0.034
65.10	0.000	556.72	0.034	-----	-----	-----	-----	-----	-----	-----	-----	0.034
65.80	0.000	556.70	0.034	-----	-----	-----	-----	-----	-----	-----	-----	0.034

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Lot 23 (Basin B27)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
66.50	0.000	556.69	0.034	-----	-----	-----	-----	-----	-----	-----	-----	0.034
67.20	0.000	556.67	0.034	-----	-----	-----	-----	-----	-----	-----	-----	0.034
67.90	0.000	556.66	0.033	-----	-----	-----	-----	-----	-----	-----	-----	0.033
68.60	0.000	556.64	0.033	-----	-----	-----	-----	-----	-----	-----	-----	0.033
69.30	0.000	556.63	0.033	-----	-----	-----	-----	-----	-----	-----	-----	0.033
70.00	0.000	556.61	0.033	-----	-----	-----	-----	-----	-----	-----	-----	0.033
70.70	0.000	556.60	0.033	-----	-----	-----	-----	-----	-----	-----	-----	0.033
71.40	0.000	556.58	0.033	-----	-----	-----	-----	-----	-----	-----	-----	0.033
72.10	0.000	556.57	0.032	-----	-----	-----	-----	-----	-----	-----	-----	0.032
72.80	0.000	556.56	0.032	-----	-----	-----	-----	-----	-----	-----	-----	0.032
73.50	0.000	556.54	0.032	-----	-----	-----	-----	-----	-----	-----	-----	0.032
74.20	0.000	556.53	0.032	-----	-----	-----	-----	-----	-----	-----	-----	0.032
74.90	0.000	556.51	0.032	-----	-----	-----	-----	-----	-----	-----	-----	0.032
75.60	0.000	556.50	0.032	-----	-----	-----	-----	-----	-----	-----	-----	0.032
76.30	0.000	556.48	0.032	-----	-----	-----	-----	-----	-----	-----	-----	0.032
77.00	0.000	556.47	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031
77.70	0.000	556.46	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031
78.40	0.000	556.44	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031
79.10	0.000	556.43	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031
79.80	0.000	556.41	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031
80.50	0.000	556.40	0.031	-----	-----	-----	-----	-----	-----	-----	-----	0.031
81.20	0.000	556.39	0.030	-----	-----	-----	-----	-----	-----	-----	-----	0.030
81.90	0.000	556.37	0.030	-----	-----	-----	-----	-----	-----	-----	-----	0.030
82.60	0.000	556.36	0.030	-----	-----	-----	-----	-----	-----	-----	-----	0.030
83.30	0.000	556.35	0.030	-----	-----	-----	-----	-----	-----	-----	-----	0.030
84.00	0.000	556.33	0.030	-----	-----	-----	-----	-----	-----	-----	-----	0.030
84.70	0.000	556.32	0.030	-----	-----	-----	-----	-----	-----	-----	-----	0.030
85.40	0.000	556.31	0.030	-----	-----	-----	-----	-----	-----	-----	-----	0.030
86.10	0.000	556.29	0.029	-----	-----	-----	-----	-----	-----	-----	-----	0.029
86.80	0.000	556.28	0.029	-----	-----	-----	-----	-----	-----	-----	-----	0.029
87.50	0.000	556.27	0.029	-----	-----	-----	-----	-----	-----	-----	-----	0.029
88.20	0.000	556.26	0.029	-----	-----	-----	-----	-----	-----	-----	-----	0.029
88.90	0.000	556.24	0.029	-----	-----	-----	-----	-----	-----	-----	-----	0.029
89.60	0.000	556.23	0.029	-----	-----	-----	-----	-----	-----	-----	-----	0.029
90.30	0.000	556.22	0.028	-----	-----	-----	-----	-----	-----	-----	-----	0.028
91.00	0.000	556.20	0.028	-----	-----	-----	-----	-----	-----	-----	-----	0.028
91.70	0.000	556.19	0.028	-----	-----	-----	-----	-----	-----	-----	-----	0.028
92.40	0.000	556.18	0.028	-----	-----	-----	-----	-----	-----	-----	-----	0.028
93.10	0.000	556.17	0.028	-----	-----	-----	-----	-----	-----	-----	-----	0.028
93.80	0.000	556.15	0.028	-----	-----	-----	-----	-----	-----	-----	-----	0.028
94.50	0.000	556.14	0.028	-----	-----	-----	-----	-----	-----	-----	-----	0.028
95.20	0.000	556.13	0.027	-----	-----	-----	-----	-----	-----	-----	-----	0.027
95.90	0.000	556.12	0.027	-----	-----	-----	-----	-----	-----	-----	-----	0.027
96.60	0.000	556.11	0.027	-----	-----	-----	-----	-----	-----	-----	-----	0.027
97.30	0.000	556.09	0.027	-----	-----	-----	-----	-----	-----	-----	-----	0.027
98.00	0.000	556.08	0.027	-----	-----	-----	-----	-----	-----	-----	-----	0.027
98.70	0.000	556.07	0.027	-----	-----	-----	-----	-----	-----	-----	-----	0.027
99.40	0.000	556.06	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026
100.10	0.000	556.05	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026
100.80	0.000	556.03	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026
101.50	0.000	556.02	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026
102.20	0.000	556.01	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026
102.90	0.000	556.00	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026
103.60	0.000	555.99	0.026	-----	-----	-----	-----	-----	-----	-----	-----	0.026

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Lot 23 (Basin B27)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
104.30	0.000	555.98	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
105.00	0.000	555.97	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
105.70	0.000	555.95	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
106.40	0.000	555.94	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
107.10	0.000	555.93	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
107.80	0.000	555.92	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
108.50	0.000	555.91	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
109.20	0.000	555.90	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
109.90	0.000	555.89	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
110.60	0.000	555.88	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
111.30	0.000	555.87	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
112.00	0.000	555.86	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
112.70	0.000	555.85	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
113.40	0.000	555.83	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
114.10	0.000	555.82	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
114.80	0.000	555.81	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
115.50	0.000	555.80	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
116.20	0.000	555.79	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
116.90	0.000	555.78	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
117.60	0.000	555.77	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
118.30	0.000	555.76	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
119.00	0.000	555.75	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
119.70	0.000	555.74	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
120.40	0.000	555.73	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
121.10	0.000	555.72	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
121.80	0.000	555.71	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
122.50	0.000	555.70	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
123.20	0.000	555.69	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
123.90	0.000	555.68	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
124.60	0.000	555.67	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
125.30	0.000	555.67	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
126.00	0.000	555.66	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
126.70	0.000	555.65	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
127.40	0.000	555.64	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
128.10	0.000	555.63	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
128.80	0.000	555.62	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
129.50	0.000	555.61	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
130.20	0.000	555.60	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
130.90	0.000	555.59	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
131.60	0.000	555.58	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
132.30	0.000	555.58	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
133.00	0.000	555.57	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
133.70	0.000	555.56	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
134.40	0.000	555.55	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
135.10	0.000	555.54	0.019	-----	-----	-----	-----	-----	-----	-----	-----	0.019
135.80	0.000	555.53	0.018	-----	-----	-----	-----	-----	-----	-----	-----	0.018
136.50	0.000	555.52	0.018	-----	-----	-----	-----	-----	-----	-----	-----	0.018
137.20	0.000	555.52	0.018	-----	-----	-----	-----	-----	-----	-----	-----	0.018
137.90	0.000	555.51	0.018	-----	-----	-----	-----	-----	-----	-----	-----	0.018
138.60	0.000	555.50	0.018	-----	-----	-----	-----	-----	-----	-----	-----	0.018
139.30	0.000	555.49	0.018	-----	-----	-----	-----	-----	-----	-----	-----	0.018
140.00	0.000	555.48	0.017	-----	-----	-----	-----	-----	-----	-----	-----	0.017
140.70	0.000	555.48	0.017	-----	-----	-----	-----	-----	-----	-----	-----	0.017
141.40	0.000	555.47	0.017	-----	-----	-----	-----	-----	-----	-----	-----	0.017

Continues on next page...

Lot 23 (Basin B27)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
142.10	0.000	555.46	0.017	-----	-----	-----	-----	-----	-----	-----	-----	0.017
142.80	0.000	555.45	0.017	-----	-----	-----	-----	-----	-----	-----	-----	0.017
143.50	0.000	555.44	0.017	-----	-----	-----	-----	-----	-----	-----	-----	0.017
144.20	0.000	555.43	0.016	-----	-----	-----	-----	-----	-----	-----	-----	0.016
144.90	0.000	555.41	0.016	-----	-----	-----	-----	-----	-----	-----	-----	0.016
145.60	0.000	555.40	0.016	-----	-----	-----	-----	-----	-----	-----	-----	0.016
146.30	0.000	555.38	0.015	-----	-----	-----	-----	-----	-----	-----	-----	0.015
147.00	0.000	555.37	0.015	-----	-----	-----	-----	-----	-----	-----	-----	0.015
147.70	0.000	555.35	0.015	-----	-----	-----	-----	-----	-----	-----	-----	0.015
148.40	0.000	555.34	0.014	-----	-----	-----	-----	-----	-----	-----	-----	0.014
149.10	0.000	555.33	0.014	-----	-----	-----	-----	-----	-----	-----	-----	0.014
149.80	0.000	555.31	0.014	-----	-----	-----	-----	-----	-----	-----	-----	0.014
150.50	0.000	555.30	0.013	-----	-----	-----	-----	-----	-----	-----	-----	0.013
151.20	0.000	555.29	0.013	-----	-----	-----	-----	-----	-----	-----	-----	0.013
151.90	0.000	555.28	0.013	-----	-----	-----	-----	-----	-----	-----	-----	0.013
152.60	0.000	555.26	0.012	-----	-----	-----	-----	-----	-----	-----	-----	0.012
153.30	0.000	555.25	0.012	-----	-----	-----	-----	-----	-----	-----	-----	0.012
154.00	0.000	555.24	0.012	-----	-----	-----	-----	-----	-----	-----	-----	0.012
154.70	0.000	555.23	0.011	-----	-----	-----	-----	-----	-----	-----	-----	0.011
155.40	0.000	555.22	0.011	-----	-----	-----	-----	-----	-----	-----	-----	0.011
156.10	0.000	555.21	0.011	-----	-----	-----	-----	-----	-----	-----	-----	0.011
156.80	0.000	555.20	0.010	-----	-----	-----	-----	-----	-----	-----	-----	0.010
157.50	0.000	555.19	0.010	-----	-----	-----	-----	-----	-----	-----	-----	0.010
158.20	0.000	555.18	0.010	-----	-----	-----	-----	-----	-----	-----	-----	0.010
158.90	0.000	555.17	0.009	-----	-----	-----	-----	-----	-----	-----	-----	0.009
159.60	0.000	555.16	0.009	-----	-----	-----	-----	-----	-----	-----	-----	0.009
160.30	0.000	555.15	0.009	-----	-----	-----	-----	-----	-----	-----	-----	0.009
161.00	0.000	555.15	0.008	-----	-----	-----	-----	-----	-----	-----	-----	0.008
161.70	0.000	555.14	0.008	-----	-----	-----	-----	-----	-----	-----	-----	0.008
162.40	0.000	555.13	0.007	-----	-----	-----	-----	-----	-----	-----	-----	0.007
163.10	0.000	555.12	0.007	-----	-----	-----	-----	-----	-----	-----	-----	0.007
163.80	0.000	555.12	0.006	-----	-----	-----	-----	-----	-----	-----	-----	0.006
164.50	0.000	555.11	0.005	-----	-----	-----	-----	-----	-----	-----	-----	0.005
165.20	0.000	555.11	0.005	-----	-----	-----	-----	-----	-----	-----	-----	0.005
165.90	0.000	555.10	0.004	-----	-----	-----	-----	-----	-----	-----	-----	0.004
166.60	0.000	555.10	0.004	-----	-----	-----	-----	-----	-----	-----	-----	0.004

...End

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/7/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 42 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 1.74 ACRES
RUNOFF COEFFICIENT 0.85
PEAK DISCHARGE 3.4 CFS

LOT 23 (BASIN B27) INFLOW HYDROGRAPH
FUTURE ON-LOT DETENTION

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 42	DISCHARGE (CFS) = 0.3
TIME (MIN) = 84	DISCHARGE (CFS) = 0.3
TIME (MIN) = 126	DISCHARGE (CFS) = 0.4
TIME (MIN) = 168	DISCHARGE (CFS) = 0.5
TIME (MIN) = 210	DISCHARGE (CFS) = 0.7
TIME (MIN) = 252	DISCHARGE (CFS) = 0.9
TIME (MIN) = 294	DISCHARGE (CFS) = 3.4
TIME (MIN) = 336	DISCHARGE (CFS) = 0.5
TIME (MIN) = 378	DISCHARGE (CFS) = 0.4
TIME (MIN) = 420	DISCHARGE (CFS) = 0

SECTION 4-2C

BASIN C – DETENTION CALCULATIONS

On-lot runoff generated within Basin C will be detained within on-lot detention facilities in the ultimate condition. Discharge from those detention facilities, along with undetained runoff from the public right-of-way, will be collected within public storm drain systems and conveyed to a regional detention facility. The calculations within this section route a 100 year design storm through the proposed facilities to demonstrate that the project will not exceed pre-project discharge rates.

Note: Symbols shown on Tentative Map are storm water collection basins for rough graded pads only. Final sizing of the basins will be performed at the time of Final Engineering (Per understandings with County DPW Staff).

OTAY CROSSINGS COMMERCE PARK

DETENTION POND C1 INFLOW CALCULATIONS

(Rational Method Procedure)

Otay Mesa, CA | DESIGN STORM **100 YR** | RUN: 11/6/12 2:30 PM

P6 = 3.4 in.

UNDETAINED BASINS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_C min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
C1	4.2	0.36	24.8	1.51	3.19	4.8	4.8	1.9	Off-site
C2	31.4	0.36	24.8	11.30	3.19	36.1	36.1	13.9	Off-site
C4	2.2	0.85	24.8	1.83	3.19	5.8	5.8	0.9	Siempre Viva Road
C5	3.0	0.85	24.8	2.52	3.19	8.0	8.0	1.3	Lone Star Road
C11	0.8	0.35	24.8	0.29	1100	0.0	0.0	0.4	HYDROMODIFICATION BASIN - POND C1
C16	0.6	0.85	24.8	0.48	3.19	1.5	1.5	0.2	Street "D"
BASIN C Area=	42.1	0.43		17.92	Q_{100}=	56.3	56.3	18.6	TOTAL UNDETAINED INFLOW

DETAINED BASINS

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_C min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Inflow Q_{100} cfs	Max. Outflow Q_{100} cfs	REMARKS
C3	7.2	0.85	24.8	6.11	3.19	19.5	3.2	3.2	Lot 16, 17 - On-lot Detention
C6	3.9	0.85	24.8	3.32	3.19	10.6	1.7	1.7	Lot 18 - On-lot Detention
C7	4.0	0.85	24.8	3.36	3.19	10.7	1.7	1.7	Lot 19 - On-lot Detention
C8	3.0	0.85	24.8	2.53	3.19	8.1	1.3	1.3	Lot 22 - On-lot Detention
C9	3.3	0.85	24.8	2.81	3.19	9.0	1.5	1.5	Lot 21 - On-lot Detention
C10	3.7	0.85	24.8	3.10	3.19	9.9	1.6	1.6	Lot 20 - On-lot Detention
C15	2.0	0.85	24.8	1.70	3.19	5.4	0.9	0.9	Lot 15 - On-lot Detention
BASIN C Area=	27.0	0.85		22.93	Q_{100}=	73.2	11.9	11.9	TOTAL DETAINED INFLOW
BASIN C Area	**69.1**	**0.59**		**40.85**	Q_{100}=	**129.5**	**68.2**	**30.5**	**TOTAL**

OTAY CROSSINGS COMMERCE PARK

DEVELOPED HYDROLOGY - BASIN C

(Rational Method Procedure)

Otay Mesa, CA DESIGN STORM **100 YR** RUN: 11/6/12 2:30 PM

P6 = 3.4 in.

BASIN INFORMATION

DRAINAGE BASIN	AREA ac.	RUNOFF COEFF	T_c min	C x A	I_{100} in/hr	Q_{100} cfs	Approx. Detained Q_{100} cfs	REMARKS	TRBUTARY TO
C1	4.2	0.36	24.8	1.51	3.19	4.8	1.9	Off-site	POND C1
C2	31.4	0.36	24.8	11.30	3.19	36.1	13.9	Off-site	POND C1
C3	7.2	0.85	24.8	6.11	3.19	19.5	3.2	Lot 16, 17 - On-lot Detention	POND C1
C4	2.2	0.85	24.8	1.83	3.19	5.8	0.9	Siempre Viva Road	POND C1
C5	3.0	0.85	24.8	2.52	3.19	8.0	1.3	Lone Star Road	POND C1
C6	3.9	0.85	24.8	3.32	3.19	10.6	1.7	Lot 18 - On-lot Detention	POND C1
C7	4.0	0.85	24.8	3.36	3.19	10.7	1.7	Lot 19 - On-lot Detention	POND C1
C8	3.0	0.85	24.8	2.53	3.19	8.1	1.3	Lot 22 - On-lot Detention	POND C1
C9	3.3	0.85	24.8	2.81	3.19	9.0	1.5	Lot 21 - On-lot Detention	POND C1
C10	3.7	0.85	24.8	3.10	3.19	9.9	1.6	Lot 20 - On-lot Detention	POND C1
C11	0.8	0.35	24.8	0.29	3.19	0.9	0.4	HYDROMODIFICATION BASIN - POND C1	POND C1
C12	94.9	0.36	24.8	34.16	3.19	109.0	109.0	Off-site - Undetained	BYPASS
C13	47.7	0.36	24.8	17.17	3.19	54.8	54.8	Off-site - Undetained	BYPASS
C14	39.5	0.36	24.8	14.22	3.19	45.4	45.4	Off-site - Undetained	BYPASS
C15	2.0	0.85	24.8	1.70	3.19	5.4	0.9	Lot 15 - On-lot Detention	POND C1
C16	0.6	0.85	24.8	0.48	3.19	1.5	0.2	Street "D"	POND C1
BASIN C Area=	251.2			106.4	Q_{100}=	339.6	239.7	MAX. ALLOWABLE RELEASE RATE: 239.7 CFS	

BASIN C DETENTION CALCULATIONS

UNDETAINED BASINS	AREA ac.	Q100 cfs
C12	94.9	109.0
C13	47.7	54.8
C14	39.5	45.4
TOTAL:	182.1	209.2

BASIN C TOTAL AREA:	251.2	AC.
SUBTRACT UNDETAINED AREA:	-182.1	AC.
TOTAL DETAINED AREA:	69.1	AC.

BASIN C AVE. ALLOWABLE RELEASE RATE (CFS/AC): 0.44

BASIN C MAX. ALLOWABLE Q_{100} (PRE-PROJECT Q_{100}):	239.7
SUBTRACT UNDETAINED Q_{100}:	-209.2
MAX. ALLOWABLE DETAINED Q_{100}:	30.5

Hydrograph Report

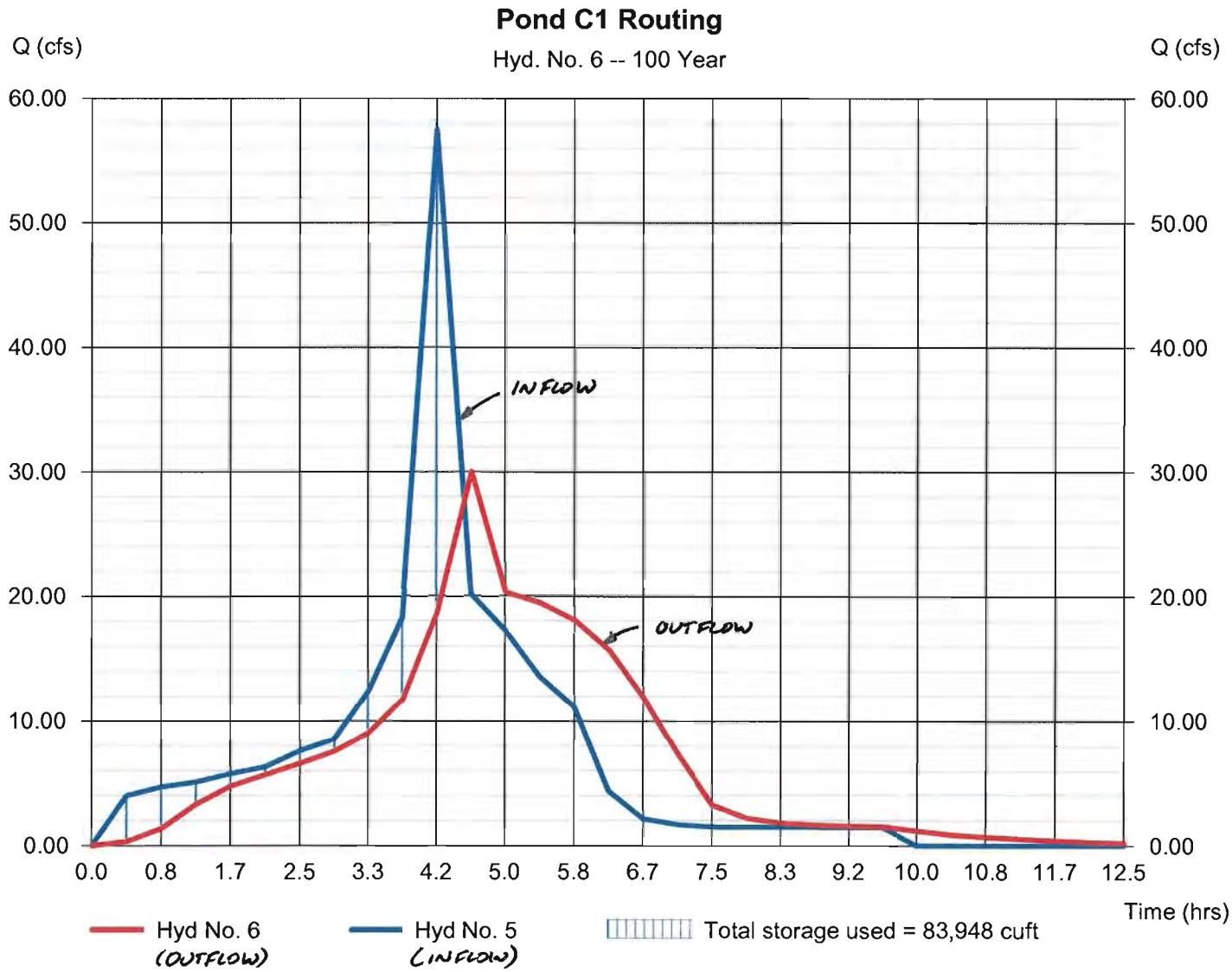
Hydraflow Hydrographs by Intelisolve v9.23 — Wednesday, Nov 7, 2012

Hyd. No. 6

Pond C1 Routing

Hydrograph type	= Reservoir	Peak discharge	= 30.02 cfs ← MAX. ALLOWED: 30.5 CFS
Storm frequency	= 100 yrs	Time to peak	= 4.58 hrs
Time interval	= 25 min	Hyd. volume	= 313,625 cuft
Inflow hyd. No.	= 5 - Pond C1 Inflow	Max. Elevation	= 541.55 ft
Reservoir name	= Pond C1	Max. Storage	= 83,948 cuft

Storage Indication method used.



Pond No. 3 - Pond C1

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 534.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	534.00	7,475	0	0
1.00	535.00	8,578	8,019	8,019
2.00	536.00	9,738	9,151	17,170
3.00	537.00	10,950	10,337	27,507
4.00	538.00	12,220	11,578	39,085
5.00	539.00	13,555	12,880	51,966
6.00	540.00	14,940	14,240	66,206
7.00	541.00	16,386	15,656	81,862
8.00	542.00	17,885	17,128	98,991

← MIN. REQUIRED FOR HYDROMODIFICATION: 93,633 CF

Culvert / Orifice Structures

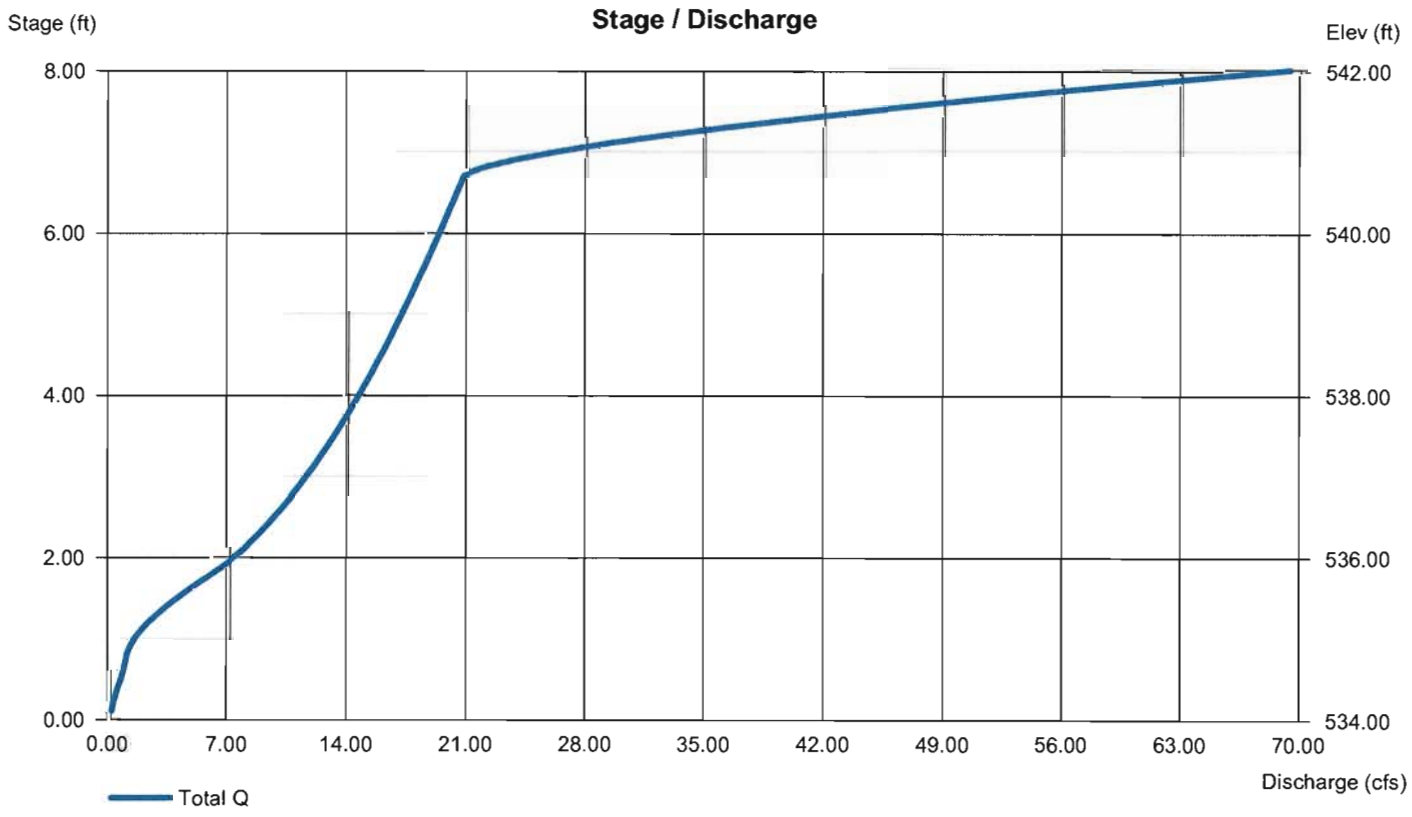
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 7.00	17.00	0.00	0.00
Span (in)	= 7.00	17.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 534.00	534.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 9.40	0.00	0.00	0.00
Crest El. (ft)	= 540.70	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

PER HYDROMODIFICATION CRITERIA

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/7/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 25 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 42.1 ACRES
RUNOFF COEFFICIENT 0.43
PEAK DISCHARGE 56.3 CFS

POND C1 INFLOW HYDROGRAPH

	UNDETAINED INFLOW	DETAINED LOT INFLOW	TOTAL INFLOW	
TIME (MIN) = 0	DISCHARGE (CFS) = 0	0	0	
TIME (MIN) = 25	DISCHARGE (CFS) = 3.8	0.18	3.98	
TIME (MIN) = 50	DISCHARGE (CFS) = 4.2	0.48	4.68	
TIME (MIN) = 75	DISCHARGE (CFS) = 4.5	0.58	5.08	
TIME (MIN) = 100	DISCHARGE (CFS) = 5.1	0.65	5.75	
TIME (MIN) = 125	DISCHARGE (CFS) = 5.6	0.72	6.32	
TIME (MIN) = 150	DISCHARGE (CFS) = 6.8	0.79	7.59	
TIME (MIN) = 175	DISCHARGE (CFS) = 7.7	0.86	8.56	
TIME (MIN) = 200	DISCHARGE (CFS) = 11.4	0.96	12.36	
TIME (MIN) = 225	DISCHARGE (CFS) = 17.2	1.07	18.27	
TIME (MIN) = 250	DISCHARGE (CFS) = 56.3	1.18	57.48	← PEAK
TIME (MIN) = 275	DISCHARGE (CFS) = 9.1	11.04	20.14	
TIME (MIN) = 300	DISCHARGE (CFS) = 6.1	11.16	17.26	
TIME (MIN) = 325	DISCHARGE (CFS) = 4.8	8.78	13.58	
TIME (MIN) = 350	DISCHARGE (CFS) = 4	7.12	11.12	
TIME (MIN) = 375	DISCHARGE (CFS) = 0	4.36	4.36	
		2.14	2.14	
		1.66	1.66	
		1.48	1.48	
		1.47	1.47	
		1.46	1.46	
		1.46	1.46	
		1.45	1.45	
		1.45	1.45	

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 — Wednesday, Nov 7, 2012

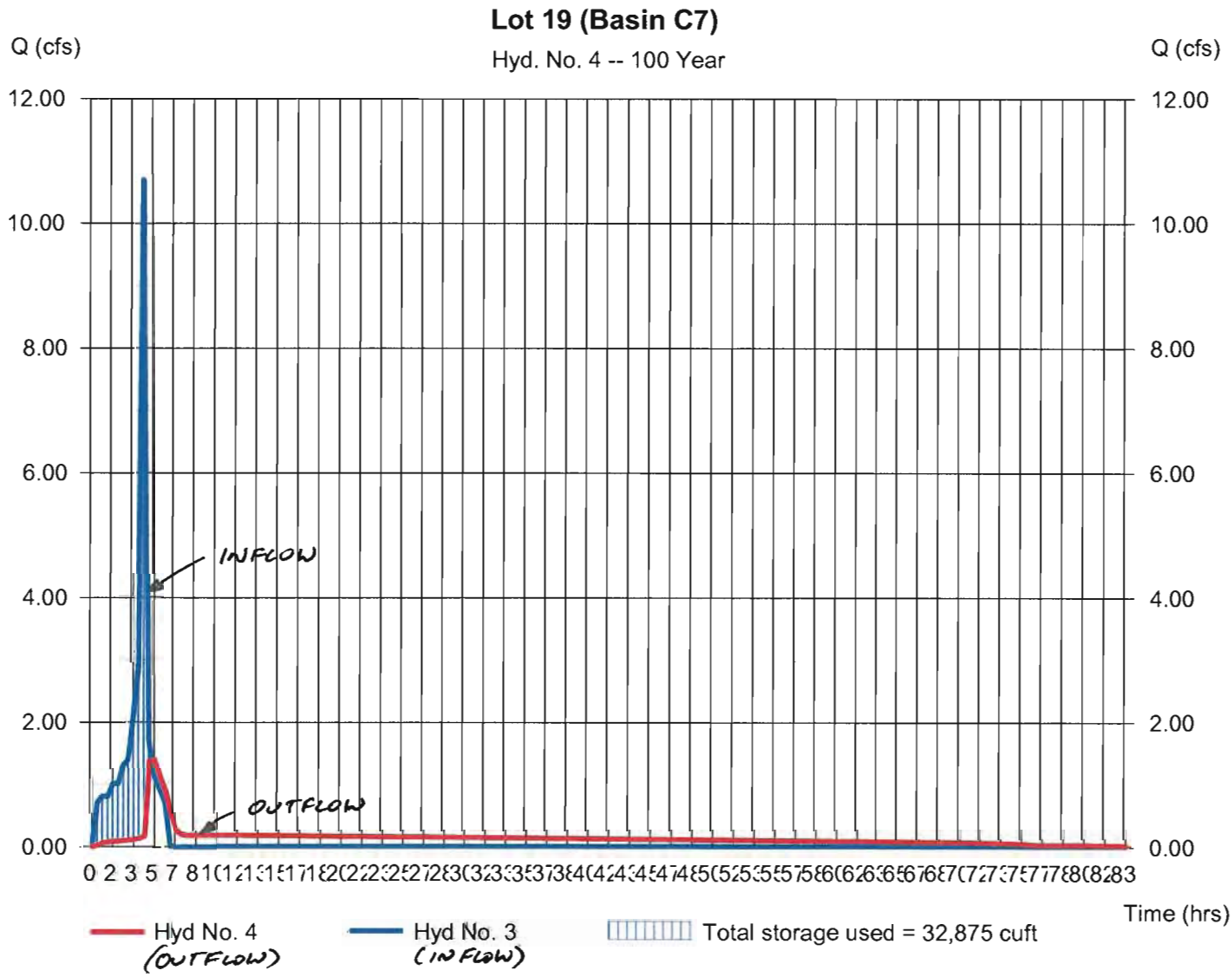
Hyd. No. 4

Lot 19 (Basin C7)

Hydrograph type	= Reservoir	Peak discharge	= 1.395 cfs
Storm frequency	= 100 yrs	Time to peak	= 5.00 hrs
Time interval	= 25 min	Hyd. volume	= 40,602 cuft
Inflow hyd. No.	= 3 - Lot 19 (Basin C7) On-lot Undergrou	Max. Elevation	= 553.42 ft
Reservoir name	= Lot 19 (Basin C7) - Underground Det	Max. Storage	= 32,875 cuft

* (FUTURE ON-LOT FACILITY) *

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.23 — Wednesday, Nov 7, 2012

Pond No. 2 - Lot 19 (Basin C7) - Underground Det

Pond Data

(FUTURE ON-LOT FACILITY)

UG Chambers - Invert elev. = 550.00 ft, Rise x Span = 4.00 x 80.00 ft, Barrel Len = 134.00 ft, No. Barrels = 1, Slope = 0.50%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	550.00	n/a	0	0
0.47	550.47	n/a	1,778	1,778
0.93	550.93	n/a	4,644	6,423
1.40	551.40	n/a	5,007	11,430
1.87	551.87	n/a	5,007	16,437
2.34	552.34	n/a	5,007	21,444
2.80	552.80	n/a	5,007	26,452
3.27	553.27	n/a	5,007	31,459
3.74	553.74	n/a	5,007	36,466
4.20	554.20	n/a	4,644	41,110
4.67	554.67	n/a	1,778	42,889

← MIN REQUIRED FOR HYDROMODIFICATION: 19851 CF

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 2.00	0.00	0.00	0.00
Span (in)	= 2.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 550.00	0.00	0.00	0.00
Length (ft)	= 0.10	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

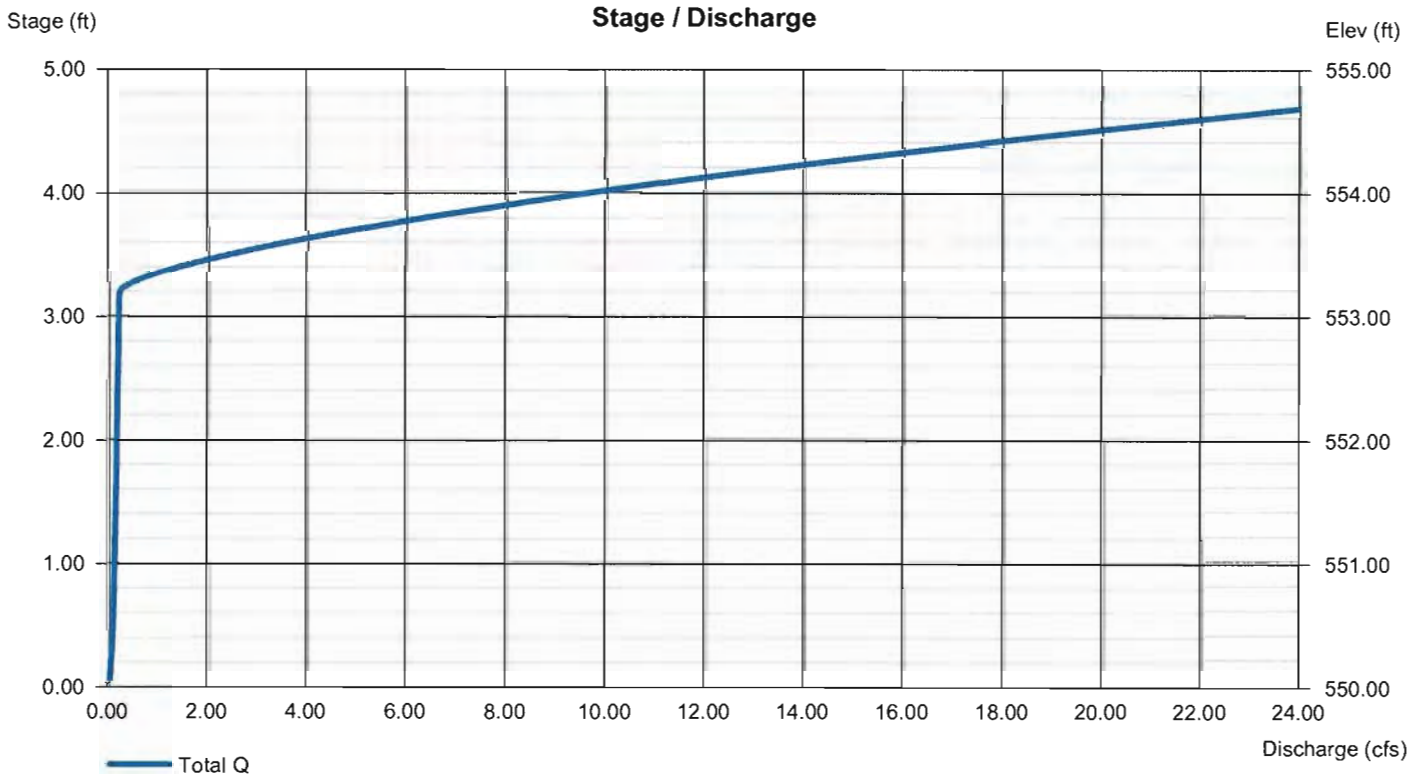
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 553.20	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

PER HYDROMODIFICATION CRITERIA

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

* FUTURE ON-LOT FACILITY *

Hydraflow Hydrographs by Intelisolve v9.23

Wednesday, Nov 7, 2012

Hyd. No. 4

Lot 19 (Basin C7)

Hydrograph type	= Reservoir	Peak discharge	= 1.395 cfs
Storm frequency	= 100 yrs	Time to peak	= 5.00 hrs
Time interval	= 25 min	Hyd. volume	= 40,602 cuft
Inflow hyd. No.	= 3 - Lot 19 (Basin C7) On-lot Un	Reservoir namentic	= Lot 19 (Basin C7)
Max. Elevation	= 553.42 ft	Max. Storage	= 32,875 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs	x 8 LOTS TRIBUTARY TO POND C1
0.42	0.700	550.13	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023	0.18
0.83	0.800	550.41	0.060	-----	-----	-----	-----	-----	-----	-----	-----	0.060	0.48
1.25	0.800	550.56	0.072	-----	-----	-----	-----	-----	-----	-----	-----	0.072	0.58
1.67	1.000	550.68	0.081	-----	-----	-----	-----	-----	-----	-----	-----	0.081	0.65
2.08	1.000	550.82	0.090	-----	-----	-----	-----	-----	-----	-----	-----	0.090	0.72
2.50	1.300	550.97	0.099	-----	-----	-----	-----	-----	-----	-----	-----	0.099	0.79
2.92	1.400	551.15	0.108	-----	-----	-----	-----	-----	-----	-----	-----	0.108	0.86
3.33	2.100	551.38	0.120	-----	-----	-----	-----	-----	-----	-----	-----	0.120	0.96
3.75	2.900	551.71	0.134	-----	-----	-----	-----	-----	-----	-----	-----	0.134	1.07
4.17	10.70 <<	552.64	0.168	-----	-----	-----	-----	-----	-----	-----	-----	0.168	1.18
4.58	1.700	553.40	0.191	-----	-----	-----	1.189	-----	-----	-----	-----	1.380	11.04
5.00	1.100	553.40 <<	0.191	-----	-----	-----	1.204	-----	-----	-----	-----	1.395 <<	11.16
5.42	0.900	553.37	0.190	-----	-----	-----	0.907	-----	-----	-----	-----	1.098	8.78
5.83	0.700	553.34	0.190	-----	-----	-----	0.701	-----	-----	-----	-----	0.890	7.12
6.25	0.000	553.29	0.188	-----	-----	-----	0.357	-----	-----	-----	-----	0.545	4.36
6.67	0.000	553.23	0.186	-----	-----	-----	0.082	-----	-----	-----	-----	0.268	2.14
7.08	0.000	553.20	0.185	-----	-----	-----	0.021	-----	-----	-----	-----	0.207	1.66
7.50	0.000	553.17	0.185	-----	-----	-----	-----	-----	-----	-----	-----	0.185	1.48
7.92	0.000	553.14	0.184	-----	-----	-----	-----	-----	-----	-----	-----	0.184	1.47
8.33	0.000	553.12	0.183	-----	-----	-----	-----	-----	-----	-----	-----	0.183	1.46
8.75	0.000	553.09	0.182	-----	-----	-----	-----	-----	-----	-----	-----	0.182	1.46
9.17	0.000	553.07	0.181	-----	-----	-----	-----	-----	-----	-----	-----	0.181	1.45
9.58	0.000	553.04	0.181	-----	-----	-----	-----	-----	-----	-----	-----	0.181	1.45
10.00	0.000	553.02	0.180	-----	-----	-----	-----	-----	-----	-----	-----	0.180	
10.42	0.000	552.99	0.179	-----	-----	-----	-----	-----	-----	-----	-----	0.179	
10.83	0.000	552.97	0.178	-----	-----	-----	-----	-----	-----	-----	-----	0.178	
11.25	0.000	552.94	0.178	-----	-----	-----	-----	-----	-----	-----	-----	0.178	
11.67	0.000	552.92	0.177	-----	-----	-----	-----	-----	-----	-----	-----	0.177	
12.08	0.000	552.89	0.176	-----	-----	-----	-----	-----	-----	-----	-----	0.176	
12.50	0.000	552.87	0.175	-----	-----	-----	-----	-----	-----	-----	-----	0.175	
12.92	0.000	552.84	0.175	-----	-----	-----	-----	-----	-----	-----	-----	0.175	
13.33	0.000	552.82	0.174	-----	-----	-----	-----	-----	-----	-----	-----	0.174	
13.75	0.000	552.80	0.173	-----	-----	-----	-----	-----	-----	-----	-----	0.173	
14.17	0.000	552.77	0.172	-----	-----	-----	-----	-----	-----	-----	-----	0.172	
14.58	0.000	552.75	0.171	-----	-----	-----	-----	-----	-----	-----	-----	0.171	
15.00	0.000	552.72	0.171	-----	-----	-----	-----	-----	-----	-----	-----	0.171	
15.42	0.000	552.70	0.170	-----	-----	-----	-----	-----	-----	-----	-----	0.170	
15.83	0.000	552.68	0.169	-----	-----	-----	-----	-----	-----	-----	-----	0.169	
16.25	0.000	552.65	0.168	-----	-----	-----	-----	-----	-----	-----	-----	0.168	
16.67	0.000	552.63	0.168	-----	-----	-----	-----	-----	-----	-----	-----	0.168	

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Lot 19 (Basin C7)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
17.08	0.000	552.61	0.167	-----	-----	-----	-----	-----	-----	-----	-----	0.167
17.50	0.000	552.58	0.166	-----	-----	-----	-----	-----	-----	-----	-----	0.166
17.92	0.000	552.56	0.165	-----	-----	-----	-----	-----	-----	-----	-----	0.165
18.33	0.000	552.54	0.164	-----	-----	-----	-----	-----	-----	-----	-----	0.164
18.75	0.000	552.51	0.164	-----	-----	-----	-----	-----	-----	-----	-----	0.164
19.17	0.000	552.49	0.163	-----	-----	-----	-----	-----	-----	-----	-----	0.163
19.58	0.000	552.47	0.162	-----	-----	-----	-----	-----	-----	-----	-----	0.162
20.00	0.000	552.44	0.161	-----	-----	-----	-----	-----	-----	-----	-----	0.161
20.42	0.000	552.42	0.161	-----	-----	-----	-----	-----	-----	-----	-----	0.161
20.83	0.000	552.40	0.160	-----	-----	-----	-----	-----	-----	-----	-----	0.160
21.25	0.000	552.38	0.159	-----	-----	-----	-----	-----	-----	-----	-----	0.159
21.67	0.000	552.36	0.158	-----	-----	-----	-----	-----	-----	-----	-----	0.158
22.08	0.000	552.33	0.158	-----	-----	-----	-----	-----	-----	-----	-----	0.158
22.50	0.000	552.31	0.157	-----	-----	-----	-----	-----	-----	-----	-----	0.157
22.92	0.000	552.29	0.156	-----	-----	-----	-----	-----	-----	-----	-----	0.156
23.33	0.000	552.27	0.155	-----	-----	-----	-----	-----	-----	-----	-----	0.155
23.75	0.000	552.25	0.154	-----	-----	-----	-----	-----	-----	-----	-----	0.154
24.17	0.000	552.22	0.154	-----	-----	-----	-----	-----	-----	-----	-----	0.154
24.58	0.000	552.20	0.153	-----	-----	-----	-----	-----	-----	-----	-----	0.153
25.00	0.000	552.18	0.152	-----	-----	-----	-----	-----	-----	-----	-----	0.152
25.42	0.000	552.16	0.151	-----	-----	-----	-----	-----	-----	-----	-----	0.151
25.83	0.000	552.14	0.151	-----	-----	-----	-----	-----	-----	-----	-----	0.151
26.25	0.000	552.12	0.150	-----	-----	-----	-----	-----	-----	-----	-----	0.150
26.67	0.000	552.10	0.149	-----	-----	-----	-----	-----	-----	-----	-----	0.149
27.08	0.000	552.08	0.148	-----	-----	-----	-----	-----	-----	-----	-----	0.148
27.50	0.000	552.06	0.148	-----	-----	-----	-----	-----	-----	-----	-----	0.148
27.92	0.000	552.04	0.147	-----	-----	-----	-----	-----	-----	-----	-----	0.147
28.33	0.000	552.01	0.146	-----	-----	-----	-----	-----	-----	-----	-----	0.146
28.75	0.000	551.99	0.145	-----	-----	-----	-----	-----	-----	-----	-----	0.145
29.17	0.000	551.97	0.144	-----	-----	-----	-----	-----	-----	-----	-----	0.144
29.58	0.000	551.95	0.144	-----	-----	-----	-----	-----	-----	-----	-----	0.144
30.00	0.000	551.93	0.143	-----	-----	-----	-----	-----	-----	-----	-----	0.143
30.42	0.000	551.91	0.142	-----	-----	-----	-----	-----	-----	-----	-----	0.142
30.83	0.000	551.89	0.141	-----	-----	-----	-----	-----	-----	-----	-----	0.141
31.25	0.000	551.87	0.141	-----	-----	-----	-----	-----	-----	-----	-----	0.141
31.67	0.000	551.85	0.140	-----	-----	-----	-----	-----	-----	-----	-----	0.140
32.08	0.000	551.84	0.139	-----	-----	-----	-----	-----	-----	-----	-----	0.139
32.50	0.000	551.82	0.138	-----	-----	-----	-----	-----	-----	-----	-----	0.138
32.92	0.000	551.80	0.137	-----	-----	-----	-----	-----	-----	-----	-----	0.137
33.33	0.000	551.78	0.137	-----	-----	-----	-----	-----	-----	-----	-----	0.137
33.75	0.000	551.76	0.136	-----	-----	-----	-----	-----	-----	-----	-----	0.136
34.17	0.000	551.74	0.135	-----	-----	-----	-----	-----	-----	-----	-----	0.135
34.58	0.000	551.72	0.134	-----	-----	-----	-----	-----	-----	-----	-----	0.134
35.00	0.000	551.70	0.134	-----	-----	-----	-----	-----	-----	-----	-----	0.134
35.42	0.000	551.68	0.133	-----	-----	-----	-----	-----	-----	-----	-----	0.133
35.83	0.000	551.66	0.132	-----	-----	-----	-----	-----	-----	-----	-----	0.132
36.25	0.000	551.65	0.131	-----	-----	-----	-----	-----	-----	-----	-----	0.131
36.67	0.000	551.63	0.131	-----	-----	-----	-----	-----	-----	-----	-----	0.131
37.08	0.000	551.61	0.130	-----	-----	-----	-----	-----	-----	-----	-----	0.130
37.50	0.000	551.59	0.129	-----	-----	-----	-----	-----	-----	-----	-----	0.129
37.92	0.000	551.57	0.128	-----	-----	-----	-----	-----	-----	-----	-----	0.128
38.33	0.000	551.56	0.127	-----	-----	-----	-----	-----	-----	-----	-----	0.127
38.75	0.000	551.54	0.127	-----	-----	-----	-----	-----	-----	-----	-----	0.127
39.17	0.000	551.52	0.126	-----	-----	-----	-----	-----	-----	-----	-----	0.126

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Lot 19 (Basin C7)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
39.58	0.000	551.50	0.125	-----	-----	-----	-----	-----	-----	-----	-----	0.125
40.00	0.000	551.49	0.124	-----	-----	-----	-----	-----	-----	-----	-----	0.124
40.42	0.000	551.47	0.124	-----	-----	-----	-----	-----	-----	-----	-----	0.124
40.83	0.000	551.45	0.123	-----	-----	-----	-----	-----	-----	-----	-----	0.123
41.25	0.000	551.43	0.122	-----	-----	-----	-----	-----	-----	-----	-----	0.122
41.67	0.000	551.42	0.121	-----	-----	-----	-----	-----	-----	-----	-----	0.121
42.08	0.000	551.40	0.121	-----	-----	-----	-----	-----	-----	-----	-----	0.121
42.50	0.000	551.38	0.120	-----	-----	-----	-----	-----	-----	-----	-----	0.120
42.92	0.000	551.37	0.119	-----	-----	-----	-----	-----	-----	-----	-----	0.119
43.33	0.000	551.35	0.118	-----	-----	-----	-----	-----	-----	-----	-----	0.118
43.75	0.000	551.33	0.117	-----	-----	-----	-----	-----	-----	-----	-----	0.117
44.17	0.000	551.32	0.117	-----	-----	-----	-----	-----	-----	-----	-----	0.117
44.58	0.000	551.30	0.116	-----	-----	-----	-----	-----	-----	-----	-----	0.116
45.00	0.000	551.28	0.115	-----	-----	-----	-----	-----	-----	-----	-----	0.115
45.42	0.000	551.27	0.114	-----	-----	-----	-----	-----	-----	-----	-----	0.114
45.83	0.000	551.25	0.114	-----	-----	-----	-----	-----	-----	-----	-----	0.114
46.25	0.000	551.24	0.113	-----	-----	-----	-----	-----	-----	-----	-----	0.113
46.67	0.000	551.22	0.112	-----	-----	-----	-----	-----	-----	-----	-----	0.112
47.08	0.000	551.21	0.111	-----	-----	-----	-----	-----	-----	-----	-----	0.111
47.50	0.000	551.19	0.110	-----	-----	-----	-----	-----	-----	-----	-----	0.110
47.92	0.000	551.17	0.110	-----	-----	-----	-----	-----	-----	-----	-----	0.110
48.33	0.000	551.16	0.109	-----	-----	-----	-----	-----	-----	-----	-----	0.109
48.75	0.000	551.14	0.108	-----	-----	-----	-----	-----	-----	-----	-----	0.108
49.17	0.000	551.13	0.107	-----	-----	-----	-----	-----	-----	-----	-----	0.107
49.58	0.000	551.11	0.107	-----	-----	-----	-----	-----	-----	-----	-----	0.107
50.00	0.000	551.10	0.106	-----	-----	-----	-----	-----	-----	-----	-----	0.106
50.42	0.000	551.08	0.105	-----	-----	-----	-----	-----	-----	-----	-----	0.105
50.83	0.000	551.07	0.104	-----	-----	-----	-----	-----	-----	-----	-----	0.104
51.25	0.000	551.05	0.104	-----	-----	-----	-----	-----	-----	-----	-----	0.104
51.67	0.000	551.04	0.103	-----	-----	-----	-----	-----	-----	-----	-----	0.103
52.08	0.000	551.03	0.102	-----	-----	-----	-----	-----	-----	-----	-----	0.102
52.50	0.000	551.01	0.101	-----	-----	-----	-----	-----	-----	-----	-----	0.101
52.92	0.000	551.00	0.100	-----	-----	-----	-----	-----	-----	-----	-----	0.100
53.33	0.000	550.98	0.100	-----	-----	-----	-----	-----	-----	-----	-----	0.100
53.75	0.000	550.97	0.099	-----	-----	-----	-----	-----	-----	-----	-----	0.099
54.17	0.000	550.96	0.098	-----	-----	-----	-----	-----	-----	-----	-----	0.098
54.58	0.000	550.94	0.097	-----	-----	-----	-----	-----	-----	-----	-----	0.097
55.00	0.000	550.93	0.097	-----	-----	-----	-----	-----	-----	-----	-----	0.097
55.42	0.000	550.91	0.096	-----	-----	-----	-----	-----	-----	-----	-----	0.096
55.83	0.000	550.90	0.095	-----	-----	-----	-----	-----	-----	-----	-----	0.095
56.25	0.000	550.89	0.094	-----	-----	-----	-----	-----	-----	-----	-----	0.094
56.67	0.000	550.87	0.093	-----	-----	-----	-----	-----	-----	-----	-----	0.093
57.08	0.000	550.86	0.092	-----	-----	-----	-----	-----	-----	-----	-----	0.092
57.50	0.000	550.84	0.092	-----	-----	-----	-----	-----	-----	-----	-----	0.092
57.92	0.000	550.83	0.091	-----	-----	-----	-----	-----	-----	-----	-----	0.091
58.33	0.000	550.82	0.090	-----	-----	-----	-----	-----	-----	-----	-----	0.090
58.75	0.000	550.80	0.089	-----	-----	-----	-----	-----	-----	-----	-----	0.089
59.17	0.000	550.79	0.088	-----	-----	-----	-----	-----	-----	-----	-----	0.088
59.58	0.000	550.78	0.087	-----	-----	-----	-----	-----	-----	-----	-----	0.087
60.00	0.000	550.76	0.087	-----	-----	-----	-----	-----	-----	-----	-----	0.087
60.42	0.000	550.75	0.086	-----	-----	-----	-----	-----	-----	-----	-----	0.086
60.83	0.000	550.74	0.085	-----	-----	-----	-----	-----	-----	-----	-----	0.085
61.25	0.000	550.72	0.084	-----	-----	-----	-----	-----	-----	-----	-----	0.084
61.67	0.000	550.71	0.083	-----	-----	-----	-----	-----	-----	-----	-----	0.083

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Lot 19 (Basin C7)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
62.08	0.000	550.70	0.082	-----	-----	-----	-----	-----	-----	-----	-----	0.082
62.50	0.000	550.69	0.082	-----	-----	-----	-----	-----	-----	-----	-----	0.082
62.92	0.000	550.67	0.081	-----	-----	-----	-----	-----	-----	-----	-----	0.081
63.33	0.000	550.66	0.080	-----	-----	-----	-----	-----	-----	-----	-----	0.080
63.75	0.000	550.65	0.079	-----	-----	-----	-----	-----	-----	-----	-----	0.079
64.17	0.000	550.64	0.078	-----	-----	-----	-----	-----	-----	-----	-----	0.078
64.58	0.000	550.63	0.077	-----	-----	-----	-----	-----	-----	-----	-----	0.077
65.00	0.000	550.62	0.077	-----	-----	-----	-----	-----	-----	-----	-----	0.077
65.42	0.000	550.60	0.076	-----	-----	-----	-----	-----	-----	-----	-----	0.076
65.83	0.000	550.59	0.075	-----	-----	-----	-----	-----	-----	-----	-----	0.075
66.25	0.000	550.58	0.074	-----	-----	-----	-----	-----	-----	-----	-----	0.074
66.67	0.000	550.57	0.073	-----	-----	-----	-----	-----	-----	-----	-----	0.073
67.08	0.000	550.56	0.072	-----	-----	-----	-----	-----	-----	-----	-----	0.072
67.50	0.000	550.55	0.072	-----	-----	-----	-----	-----	-----	-----	-----	0.072
67.92	0.000	550.54	0.071	-----	-----	-----	-----	-----	-----	-----	-----	0.071
68.33	0.000	550.53	0.070	-----	-----	-----	-----	-----	-----	-----	-----	0.070
68.75	0.000	550.52	0.069	-----	-----	-----	-----	-----	-----	-----	-----	0.069
69.17	0.000	550.51	0.068	-----	-----	-----	-----	-----	-----	-----	-----	0.068
69.58	0.000	550.50	0.067	-----	-----	-----	-----	-----	-----	-----	-----	0.067
70.00	0.000	550.49	0.067	-----	-----	-----	-----	-----	-----	-----	-----	0.067
70.42	0.000	550.48	0.066	-----	-----	-----	-----	-----	-----	-----	-----	0.066
70.83	0.000	550.46	0.065	-----	-----	-----	-----	-----	-----	-----	-----	0.065
71.25	0.000	550.44	0.063	-----	-----	-----	-----	-----	-----	-----	-----	0.063
71.67	0.000	550.41	0.060	-----	-----	-----	-----	-----	-----	-----	-----	0.060
72.08	0.000	550.39	0.058	-----	-----	-----	-----	-----	-----	-----	-----	0.058
72.50	0.000	550.37	0.056	-----	-----	-----	-----	-----	-----	-----	-----	0.056
72.92	0.000	550.35	0.054	-----	-----	-----	-----	-----	-----	-----	-----	0.054
73.33	0.000	550.33	0.052	-----	-----	-----	-----	-----	-----	-----	-----	0.052
73.75	0.000	550.31	0.050	-----	-----	-----	-----	-----	-----	-----	-----	0.050
74.17	0.000	550.29	0.047	-----	-----	-----	-----	-----	-----	-----	-----	0.047
74.58	0.000	550.27	0.044	-----	-----	-----	-----	-----	-----	-----	-----	0.044
75.00	0.000	550.25	0.041	-----	-----	-----	-----	-----	-----	-----	-----	0.041
75.42	0.000	550.24	0.037	-----	-----	-----	-----	-----	-----	-----	-----	0.037
75.83	0.000	550.22	0.033	-----	-----	-----	-----	-----	-----	-----	-----	0.033
76.25	0.000	550.21	0.029	-----	-----	-----	-----	-----	-----	-----	-----	0.029
76.67	0.000	550.14	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
77.08	0.000	550.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
77.50	0.000	550.12	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
77.92	0.000	550.13	0.021	-----	-----	-----	-----	-----	-----	-----	-----	0.021
78.33	0.000	550.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
78.75	0.000	550.13	0.023	-----	-----	-----	-----	-----	-----	-----	-----	0.023
79.17	0.000	550.14	0.024	-----	-----	-----	-----	-----	-----	-----	-----	0.024
79.58	0.000	550.14	0.025	-----	-----	-----	-----	-----	-----	-----	-----	0.025
80.00	0.000	550.13	0.022	-----	-----	-----	-----	-----	-----	-----	-----	0.022
80.42	0.000	550.12	0.020	-----	-----	-----	-----	-----	-----	-----	-----	0.020
80.83	0.000	550.11	0.018	-----	-----	-----	-----	-----	-----	-----	-----	0.018
81.25	0.000	550.11	0.016	-----	-----	-----	-----	-----	-----	-----	-----	0.016
81.67	0.000	550.10	0.015	-----	-----	-----	-----	-----	-----	-----	-----	0.015

...End

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/7/2012
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 25 MIN.
6 HOUR RAINFALL 3.4 INCHES
BASIN AREA 3.95 ACRES
RUNOFF COEFFICIENT 0.85
PEAK DISCHARGE 10.7 CFS

LOT 19 (BASIN C7) INFLOW HYDROGRAPH
FUTURE ON-LOT FACILITY

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 25	DISCHARGE (CFS) = 0.7
TIME (MIN) = 50	DISCHARGE (CFS) = 0.8
TIME (MIN) = 75	DISCHARGE (CFS) = 0.8
TIME (MIN) = 100	DISCHARGE (CFS) = 1
TIME (MIN) = 125	DISCHARGE (CFS) = 1
TIME (MIN) = 150	DISCHARGE (CFS) = 1.3
TIME (MIN) = 175	DISCHARGE (CFS) = 1.4
TIME (MIN) = 200	DISCHARGE (CFS) = 2.1
TIME (MIN) = 225	DISCHARGE (CFS) = 2.9
TIME (MIN) = 250	DISCHARGE (CFS) = 10.7 ← PEAK
TIME (MIN) = 275	DISCHARGE (CFS) = 1.7
TIME (MIN) = 300	DISCHARGE (CFS) = 1.1
TIME (MIN) = 325	DISCHARGE (CFS) = 0.9
TIME (MIN) = 350	DISCHARGE (CFS) = 0.7
TIME (MIN) = 375	DISCHARGE (CFS) = 0

ENGINEERING & DEVELOPMENT department

NOTICE

CITY OF SAN DIEGO • 1222 FIRST AVENUE, SAN DIEGO, CALIFORNIA 92101

DATE: August 7, 1987

TO: All Private Engineers

FROM: Subdivision Engineer

SUBJECT: DRAINAGE REQUIREMENTS FOR DEVELOPMENTS IN OTAY MESA

In order to minimize the effects of increased storm water runoff in Mexico, due to development of property in Otay Mesa, all property in Otay Mesa that is within the water shed that drains into Mexico, shall be developed with the following requirements:

1. Each property owner shall provide storm water detention facilities so that there will be no increase in the rate of runoff due to development of the property.

2. The detention facilities shall be designed so that the rate of runoff from the property will not be greater after development than it was before development for a 5 year, 10 year, 25 year and 50 year storm.

3. All drainage facilities crossing four-lane major or higher classification streets shall be designed for a Q100 (existing). Other facilities, except the major channel referred to in paragraph 5, may be designed for Q50 (existing).

4. The Drainage Design Manual shall be used as guidelines for design of drainage facilities and computing design discharges.

5. The City Engineer's Office, Flood Control Section, is preparing a preliminary plan for the main north-south channel from Otay Mesa Road near La Media to the Mexican Border. The preliminary design will include the design "Q" (Q100 existing), the invert grade, and the water surface elevation at the major road crossings.

C. R. LOCHHEAD
Subdivision Engineer

SECTION 5

"NO CHANNEL" OPTION

TM 5405R provides a design option for eliminating the vegetated open channel within Basin B of the project and replacing it with a box culvert in Lone Star Road (see Section 2 for a reduced copy of the tentative map). Storm water routing will not change with the proposed configuration, only the location and type of storm water conveyance will change. Per the calculations within this section, conveying storm water runoff through a box culvert rather than a vegetated channel will slightly decrease the time of concentration through the basin. The decrease in time of concentration will increase the peak runoff generated by the basin from approximately 614.3 cfs to approximately 642.6 cfs, an increase of less than 5%. This minimal increase is not anticipated to significantly alter the findings and conclusions of this Preliminary Drainage Study.

"NO CHANNEL" OPTION
8'x4' RCB

NODE 103
Q100=172 CFS
(EXISTING)

NODE 205
Q100=461.8 CFS
(EXISTING)

Q100=63.9 CFS
(EXISTING)

OTAY MESA ROAD

PASEO DE LA FUENTE

OPEN SPACE 47

OPEN SPACE 46

OPEN SPACE 45

DETENTION BASIN "A-1"

DETENTION BASIN "A-2"

DETENTION BASIN "B-1"

DETENTION BASIN "B-2"

DETENTION BASIN "C"

STREET "A"

STREET "B"

STREET "C"

STREET "D"

CALLE VENTNER

SIEMPRE VIVA ROAD

ALTA ROAD

FUTURE CALTRANS RIGHT-OF-WAY

FUTURE AIRWAY ROAD

FUTURE SIEMPRE VIVA ROAD (BY OTHERS)

FUTURE POINT OF ENTRY
BORDER CROSSING

NODE 111
Q100=382.6 CFS (UNDETAINED)
Q100=102.2 CFS MAX. (DETAINED)

NODE 212
Q100=402.9 CFS MAX. (DETAINED)

NODE 311
Q100=239.6 CFS (UNDETAINED)
Q100=239.7 CFS MAX. (DETAINED)

NODE 402

NODE 403

NODE 404
Q100=332 CFS

D4
44.5

X-SECTION D4

LEGEND

PROPOSED GROUND CONTOUR
360

EXISTING GROUND CONTOUR
360 INDEX
350 INTERMEDIATE

DRAINAGE BASIN DESIGNATOR
A — BASIN DESIGNATION (ALPHA CHARACTER DESIGNATE REGIONAL RUNOFF AREAS)
0.57 — BASIN AREA (Acres)

DRAINAGE BASIN BOUNDARY

PROPERTY LINE

STORM DRAIN PIPE

STORM DRAIN CLEANOUT

STORM DRAIN CATCH BASIN

STORM DRAIN CURB INLET

TIME OF CONCENTRATION FLOW PATH

PROPOSED STORM WATER COLLECTION BASIN & RISER (DETENTION BASIN CONTROL STRUCTURE)

PROPOSED OPEN DRAINAGE CHANNEL

PROPOSED STORM DRAIN HEADWALL, ENERGY DISSIPATOR

PROPOSED BROW DITCH

PROPOSED DRAINAGE EASEMENT VARIES
VEGETATED CHANNEL
PAD ELEV
VARIES 10' MIN.
PAD ELEV

TYPICAL DRAINAGE CHANNEL SECTION
NO SCALE

NO SCALE

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OTAY CROSSINGS COMMERCE PARK
OTAY MESA, CALIFORNIA

EXHIBIT "D-P1b"
DEVELOPED CONDITION DRAINAGE BASINS
"NO CHANNEL" OPTION

DATE: 1/31/12
SCE NO. 03043-15
SHEET
D-P1b
1 OF 1 SHEETS

Otay Crossings Commerce Park - Otay 310 (Historic Basin B)
Time of Concentration - UNDETAINED FLOW RATES
Design Storm *100 Year (Proposed)* [1]

RUN: 11/7/12 4:42 PM

COUNTY PRECIP. (APP. B)= 3.4 in/hr

LOT/BASIN	NODE	SUB-BASIN DATA: DRAIN BASIN	AREA sf	AREA ac.	C	INITIAL Ti: INITIAL / OVERLAND TIME (Figure 3-3, Table 3-2): Lm ft.	Slope %	Ti_1 min	INITIAL / TRAVEL TIME (Figure 3-4): Lt ft.	Delta E	Ti_2 min	Ti min	TRAVEL TIME T(t) Gutter / Pipe V): Length ft.	Slope %	Pipe Size in.	Velocity fps	T(t) min.	FINAL T(c) min.	REMARKS
BASIN B																			
OFFSITE BASIN B, OPEN CHANNEL																			
OFFSITE B-1	205	B1		501.50	0.36	100	3.0	10.3				34.8	133	1.9	DBL 6'x4'	20	0.1	34.9	
OFFSITE B-2	206	B2		70.40	0.36								270	1.5		18	0.3	35.2	8' x 4' RCB
OTAY MESA RD	206	B3		1.13	0.85													35.2	
LOT 6	207	B4		4.15	0.85								335	1.5		18	0.3	35.5	8' x 4' RCB
OPEN CHANNEL	207	B5		0.98	0.35													35.5	
	208												85	1.5		18	0.1	35.5	8' x 4' RCB
	209												485	1.5		18	0.4	36.0	8' x 4' RCB
	210												1,500	1.5		18	1.4	37.4	8' x 4' RCB
OPEN CHANNEL	210	B16		2.29	0.35													37.4	
SUBTOTAL=>	210			580.45	Ac.													37.4	
TRIBUTARY TO POND B1																			
LOT 29	222	B15		2.63	0.85	70	2.0	3.1	400	8.0	3.6	6.7						6.7	
STREET "B"	223	B14		1.00	0.85								255	1.5	24	10	0.4	7.1	
LOT 28	224	B28		2.56	0.85								315	1.5	30	11	0.5	7.6	
LOT 30	225	B29		2.95	0.85								210	1.5	36	13	0.3	7.8	
LOTS 9-14, LOT 26, LOT 27	225	B6, B10, B11, B12		20.66	0.85													7.8	
CALLE VENTNER, LONE STAR	225	B7, B8, B13		4.58	0.85													7.8	
OPEN SPACE	225	B9		1.64	0.36													7.8	
LOT 31	225	B20		3.04	0.85													7.8	
POND B1	210	B18		1.70	0.35								250	1.0	60	15	0.3	8.1	
SUBTOTAL=>	210			40.76	Ac.													8.1	
JUNCTION 210 COMBINATION																			
JUNCTION=>	210			621.21	Ac.													37.4	
POND B1 OUTFLOW, OPEN CHANNEL																			
LOTS 28 & 29	211	B17		11.70	0.85								580	0.5		6	1.6	38.9	Open Channel
OPEN CHANNEL	211	B19		1.04	0.35													38.9	
CALTRANS R/W	211	B21&B23		18.08	0.58													38.9	
	212												270	0.9	DBL 8'x4'	16	0.3	39.2	
	212																	39.2	
SUBTOTAL=>	212			652.03	Ac.													39.2	
TRIBUTARY TO POND B2																			
LOT 27	235	B26		2.78	0.85	70	2.0	3.1	110	2.2	1.3	4.4	85	1.5	18	8	0.2	4.6	
LONE STAR & SIEMPRE VIVA	235	B24 & B25		3.36	0.85													4.6	
POND B2	236	B22		0.53	0.35													4.6	
	212												820	2.0	24	11	1.2	5.8	
	212				0.58													5.8	
SUBTOTAL=>	212			6.67	Ac.													5.8	
JUNCTION 214 COMBINATION																			
JUNCTION=>	212			658.70	Ac.													39.158	

Otay Crossings Commerce Park - Otay 310 (Historic Basin B)
Runoff Calculations - UNDETAINED FLOW RATES
(Modified Rational Method Procedure)

Design Storm 100 Year

RUN: 11/7/12 4:42 PM

COUNTY PRECIP 3.4 in/hr

NODE	LOT/BASIN	BASIN INFORMATION: DRAIN BASIN	AREA ac.	RUNOFF COEFF	DIRECT RUNOFF: T(c) min	C x A	$I^{(2)}$ in/hr	Q cfs	TOTAL RUNOFF: T(c) min	SUM C x A	$I^{(2)}$ in/hr	Q cfs	REMARKS
BASIN B													
OFFSITE BASIN B, OPEN CHANNEL													
205	OFFSITE B-1	B1	501.50	0.36	34.9	180.5	2.56	461.8	34.9	180.5	2.56	461.8	
206	OFFSITE B-2	B2	70.40	0.36	35.2	25.3	2.55	64.5	35.2	205.9	2.55	524.2	
206	OTAY MESA RD	B3	1.13	0.85	35.2	1.0	2.55	2.4	35.2	206.8	2.55	526.6	
207	LOT 6	B4	4.15	0.85	35.5	3.5	2.53	8.9	35.5	210.4	2.53	532.6	
207	OPEN CHANNEL	B5	0.98	0.35	35.5	0.3	2.53	0.9	35.5	210.7	2.53	533.4	
208	0								35.5	210.7	2.53	532.7	
209	0								36.0	210.7	2.51	528.4	
210	0								37.4	210.7	2.45	515.6	
210	OPEN CHANNEL	B16	2.29	0.35	37.4	0.8	2.45	2.0	37.4	211.5	2.45	517.6	
210	SUBTOTAL=			SUBTOTAL=>					37.4		2.45	517.6	cfs
TRIBUTARY TO POND B1													
222	LOT 29	B15	2.63	0.85	6.7	2.2	7.45	16.7	6.7	2.2	7.45	16.7	
223	STREET "B"	B14	1.00	0.85	7.1	0.9	7.16	6.1	7.1	3.1	7.16	22.1	
224	LOT 28	B28	2.56	0.85	7.6	2.2	6.87	14.9	7.6	5.3	6.87	36.1	
225	LOT 30	B29	2.95	0.85	7.8	2.5	6.71	16.8	7.8	7.8	6.71	52.1	
225	LOTS 9-14, LOT 26, LOT 27	B6, B10, B11, B12	20.66	0.85	7.8	17.6	6.71	117.9	7.8	25.3	6.71	170.0	
225	CALLE VENTNER, LONE STAR	B7, B8, B13	4.58	0.85	7.8	3.9	6.71	26.1	7.8	29.2	6.71	196.1	
225	OPEN SPACE	B9	1.64	0.36	7.8	0.6	6.71	4.0	7.8	29.8	6.71	200.1	
225	LOT 31	B20	3.04	0.85	7.8	2.6	6.71	17.3	7.8	32.4	6.71	217.5	
210	POND B1	B18	1.70	0.35	8.1	0.6	6.56	3.9	8.1	33.0	6.56	216.5	
210	SUBTOTAL=>			SUBTOTAL=					8.1		6.56	216.5	cfs

JUNCTION 210 COMBINATION

$Q_{1(cfs)}$=	216.5
$T_{1(min)}$=	8.1
$I_{1(in/hr)}$=	6.6
$Q_{2(cfs)}$=	517.6
$T_{2(min)}$=	37.4
$I_{2(in/hr)}$=	2.4
$Q_{T1(cfs)}$=	328.7
$Q_{T2(cfs)}$=	598.3
Therefore use: T2(min)=	37.4
and: QT2(cfs)=	598.3
and: I2(in/hr)=	2.45

NODE	LOT/BASIN	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	$I^{(2)}$ in/hr	Q cfs	T(c) min	SUM C x A	$I^{(2)}$ in/hr	Q cfs	REMARKS
POND B1 OUTFLOW, OPEN CHANNEL													
211	LOTS 28 & 29	B17	11.70	0.85	38.9	9.9	2.38	23.7	38.9	254.5	2.38	606.8	
211	OPEN CHANNEL	B19	1.04	0.35	38.9	0.4	2.38	0.9	38.9	254.8	2.38	607.7	
211	CALTRANS R/W	B21&B23	18.08	0.58	38.9	10.5	2.38	25.0	38.9	265.3	2.38	632.7	
212	0								39.2	265.3	2.37	629.8	
212	0								39.2	265.3	2.37	629.8	
212	SUBTOTAL=>			SUBTOTAL=>					39.2		2.37	629.8	cfs
TRIBUTARY TO POND B2													
235	LOT 27	B26	2.78	0.85	4.6	2.4	9.47	22.4	4.6	2.4	9.47	22.4	
235	LONE STAR & SIEMPRE VIVA	B24 & B25	3.36	0.85	4.6	2.9	9.47	27.0	4.6	5.2	9.47	49.4	
236	POND B2	B22	0.53	0.35	4.6	0.2	9.47	1.8	4.6	5.4	9.47	51.2	
212	0								5.8	5.4	8.11	43.8	
212	0			0.58	5.8	0.0	8.11	0.0	5.8	5.4	8.11	43.8	
212	SUBTOTAL=			SUBTOTAL=>					5.8		8.11	43.8	cfs

JUNCTION 214 COMBINATION

$Q_{1(cfs)}$=	43.8
$T_{1(min)}$=	5.8
$I_{1(in/hr)}$=	8.1
$Q_{2(cfs)}$=	629.8
$T_{2(min)}$=	39.2
$I_{2(in/hr)}$=	2.4
$Q_{T1(cfs)}$=	137.6
$Q_{T2(cfs)}$=	642.6
Therefore use: T2(min)=	39.2
and: QT2(cfs)=	642.6
and: I2(in/hr)=	2.38

NODE	LOT/BASIN	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	$I^{(2)}$ in/hr	Q cfs	T(c) min	SUM C x A	$I^{(2)}$ in/hr	Q cfs	REMARKS
212	JUNCTION=			JUNCTION=>					39.2	270.7	2.38	642.6	cfs

TRIBUTARY TO POND B1

OFFSITE BASIN B, OPEN CHANNEL

TRIBUTARY TO POND B2

POND B1 OUTFLOW, OPEN CHANNEL

NODE 205 TO 210 - 8' x 4' RCB (NO CHANNEL OPTION)
Worksheet for Rectangular Channel

Project Description	
Worksheet	NODE 205 TO 210 - 8' x 4' RCB (NO CH
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.015000	ft/ft
Bottom Width	8.00	ft
Discharge	520.00	cfs

Results		
Depth	3.52	ft
Flow Area	28.2	ft²
Wetted Perim	15.05	ft
Top Width	8.00	ft
Critical Depth	5.08	ft
Critical Slope	0.005691	ft/ft
Velocity	18.44	ft/s
Velocity Head	5.28	ft
Specific Energ	8.81	ft
Froude Numb	1.73	
Flow Type	Supercritical	

SECTION 6

APPENDIX A (COUNTY HYDROLOGY FIGURES/TABLES)

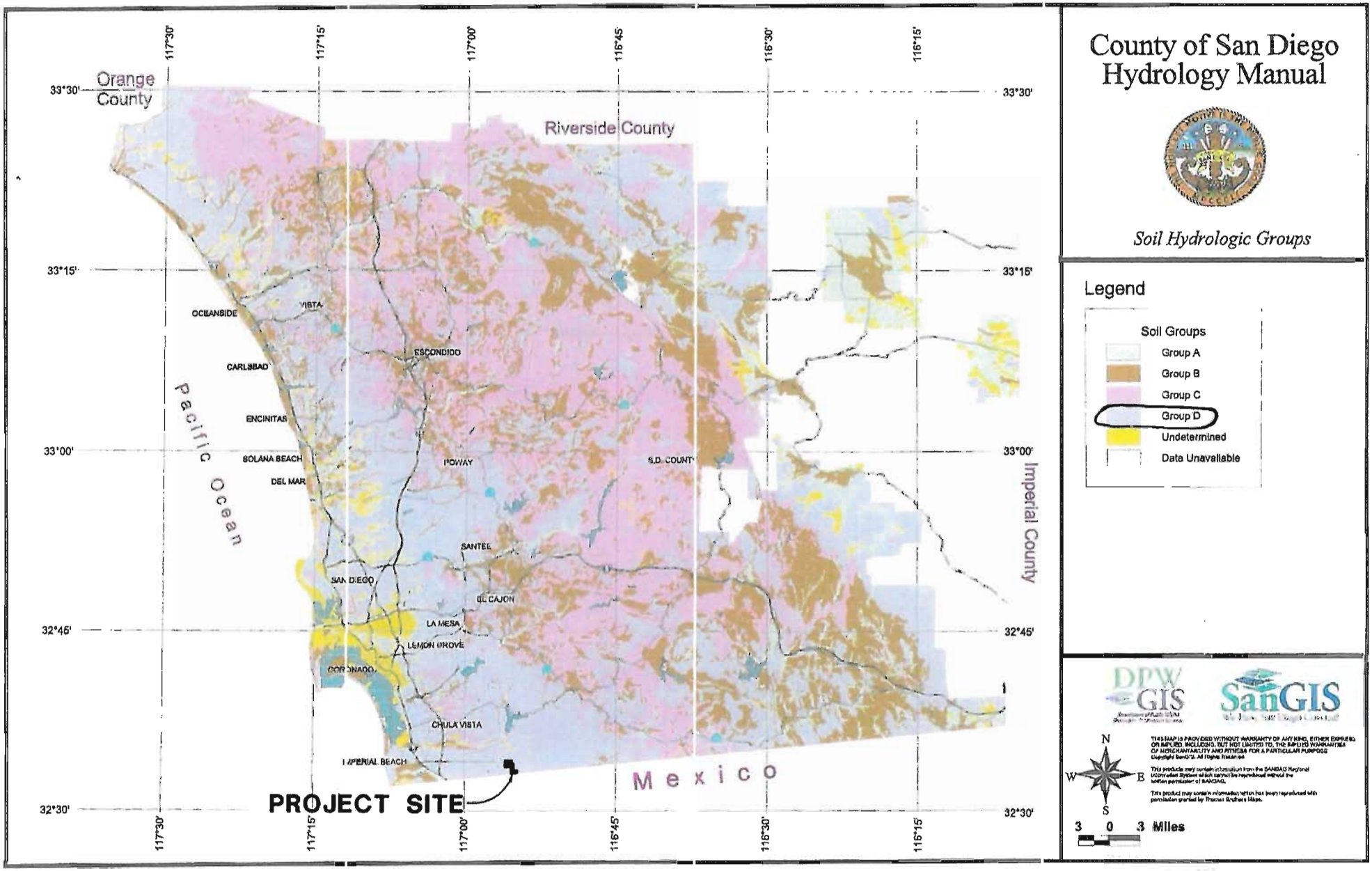

County of San Diego
Hydrology Manual
Soil Hydrologic Groups
Legend
Soil Groups
Group A
Group B
Group C
Group D
Undetermined
Data Unavailable
Orange County
Riverside County
Imperial County
Pacific Ocean
Mexico
OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
PROJECT SITE
117°30'
117°15'
117°00'
116°45'
116°30'
116°15'
33°30'
33°15'
33°00'
32°45'
32°30'
DPW GIS
SanGIS
N
W
E
S
3 0 3 Miles

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) — EXISTING
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) – DEVELOPED
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

Figure 819.2A

Runoff Coefficients for Undeveloped Areas

Watershed Types

	Extreme	High	Normal	Low
Relief	.28 -.35 Steep, rugged terrain with average slopes above 30%	.20 -.28 Hilly, with average slopes of 10 to 30%	.14 -.20 Rolling, with average slopes of 5 to 10%	.08 (.14) Relatively flat land, with average slopes of 0 to 5%
Soil Infiltration	.12 (.16) No effective soil cover, either rock or thin soil mantle of negligible infiltration capacity	.08 -.12 Slow to take up water, clay or shallow loam soils of low infiltration capacity, imperfectly or poorly drained	.06 -.08 Normal; well drained light or medium textured soils, sandy loams, silt and silt loams	.04 -.06 High; deep sand or other soil that takes up water readily, very light well drained soils
Vegetal Cover	.12 (.16) No effective plant cover, bare or very sparse cover	.08 -.12 Poor to fair; clean cultivation crops, or poor natural cover, less than 20% of drainage area over good cover	.06 -.08 Fair to good; about 50% of area in good grassland or woodland, not more than 50% of area in cultivated crops	.04 -.06 Good to excellent; about 90% of drainage area in good grassland, woodland or equivalent cover
Surface Storage	.10 (.12) Negligible surface depression few and shallow; drainageways steep and small, no marshes	.08 -.10 Low; well defined system of small drainageways; no ponds or marshes	.06 -.08 Normal; considerable surface depression storage; lakes and pond marshes	.04 -.06 High; surface storage, high; drainage system not sharply defined; large flood plain storage or large number of ponds or marshes

Given An undeveloped watershed consisting of;
1) rolling terrain with average slopes of 5%,
2) clay type soils,
3) good grassland area, and
4) normal surface depressions.

Solution:

Relief	0.14
Soil Infiltration	0.08
Vegetal Cover	0.04
Surface Storage	0.06
C=	0.32

Find The runoff coefficient, C, for the above watershed.

RUNOFF COEFFICIENT CALCULATION FOR GRADED PADS W/ D6 SURFACE:

RELIEF: 0.14
SOIL INFILTRATION: 0.16
VEGETAL COVER: 0.16
SURFACE STORAGE: 0.12
0.58

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CHOW · Open-channel Hydraulics
DAVIS, TROXELL, AND WISKOCIL · The Testing and Inspection of Engineering Materials
DUNHAM · Advanced Reinforced Concrete
DUNHAM · Foundations of Structures
DUNHAM · The Theory and Practice of Reinforced Concrete
DUNHAM AND YOUNG · Contracts, Specifications, and Law for Engineers
GAYLORD AND GAYLORD · Structural Design
HALLERT · Photogrammetry
HENNES AND EKSE · Fundamentals of Transportation Engineering
KRYNINE AND JUDD · Principles of Engineering Geology and Geotechnics
LEONARDS · Foundation Engineering
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PEURIFOY · Construction Planning, Equipment, and Methods
PEURIFOY · Estimating Construction Costs
TROXELL AND DAVIS · Composition and Properties of Concrete
TSCHEBOTARIOFF · Soil Mechanics, Foundations, and Earth Structures
URQUHART, O'ROURKE, AND WINTER · Design of Concrete Structures
WANG AND ECKEL · Elementary Theory of Structures
WINTER, URQUHART, O'ROURKE, AND NILSON · Design of Concrete Structures

OPEN-CHANNEL HYDRAULICS

VEN TE CHOW, Ph.D.

Professor of Hydraulic Engineering
University of Illinois

McGRAW-HILL BOOK COMPANY, INC.

New York Toronto London

1959

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	**0.022**	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	**0.030**	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

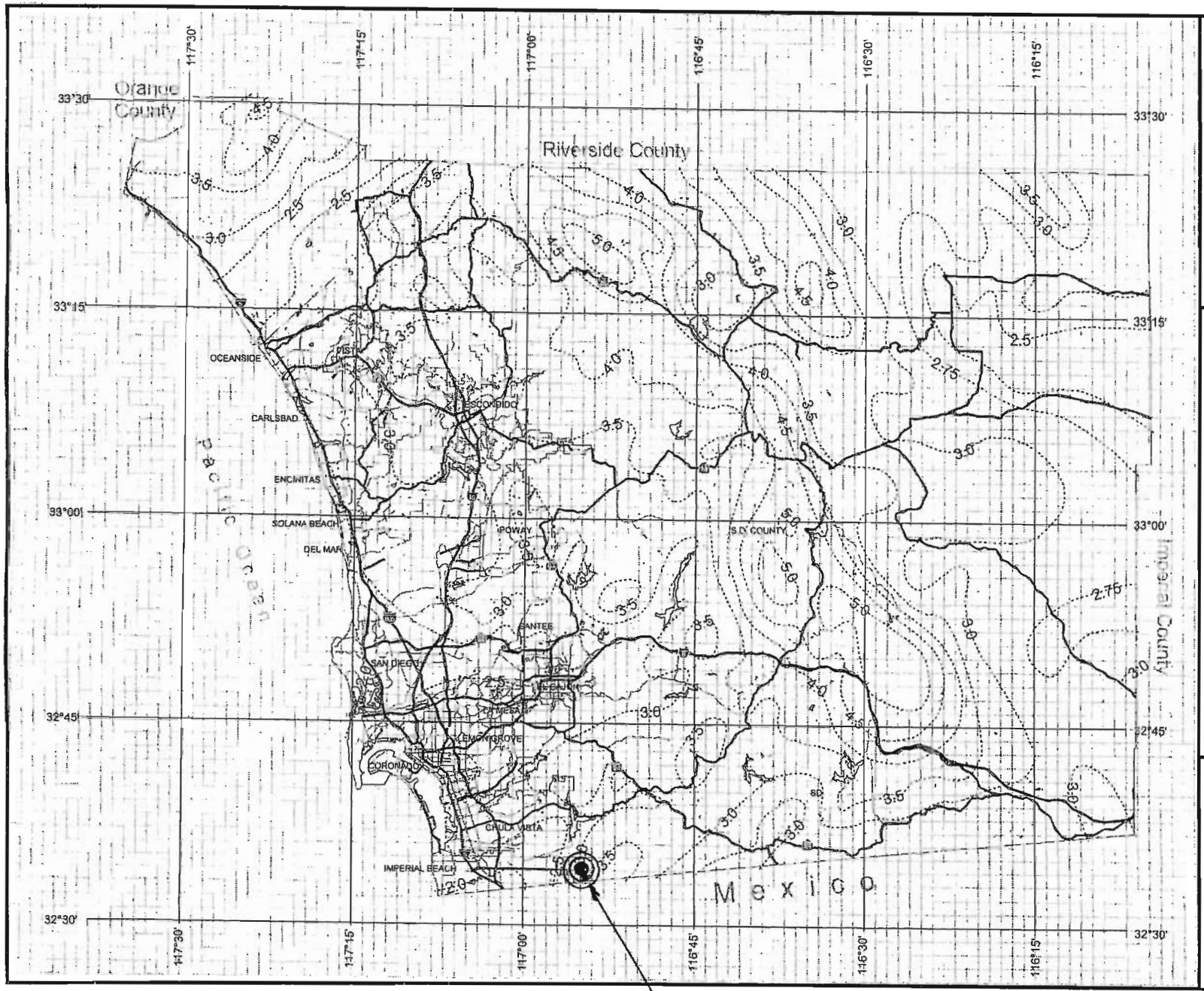
TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The n value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100


OTAY CROSSINGS COMMERCE PARK
EXISTING CONDITION



OTAY CROSSINGS COMMERCE PARK
EXISTING CONDITION



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

$P_6 = 3.3$ IN

DPW GIS

SanGIS

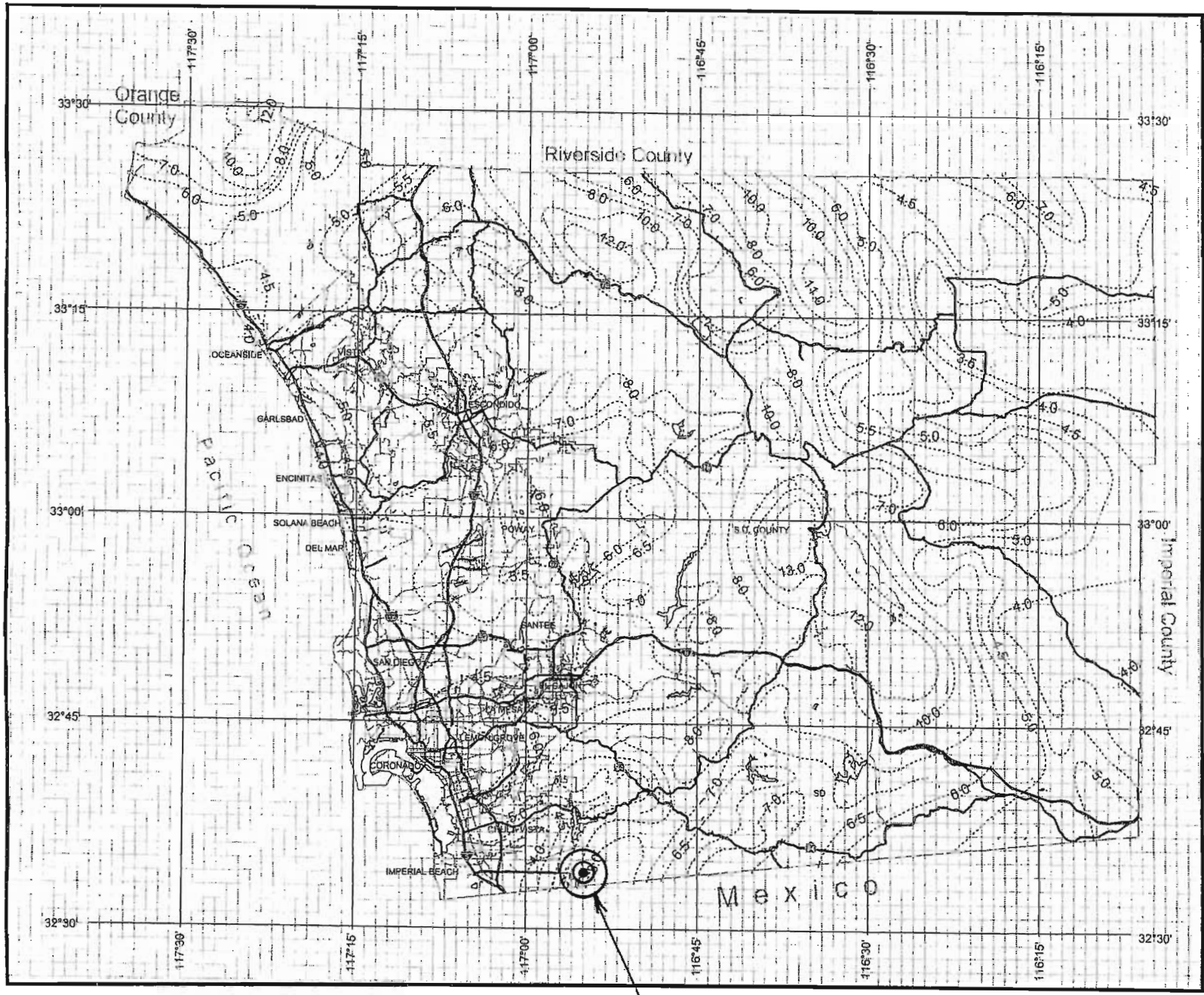
N W E S

3 0 3 Miles

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County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

32° 34' N.

116° 55' W.

$P_{24} = 7.5$ IN.

DPW GIS

SanGIS

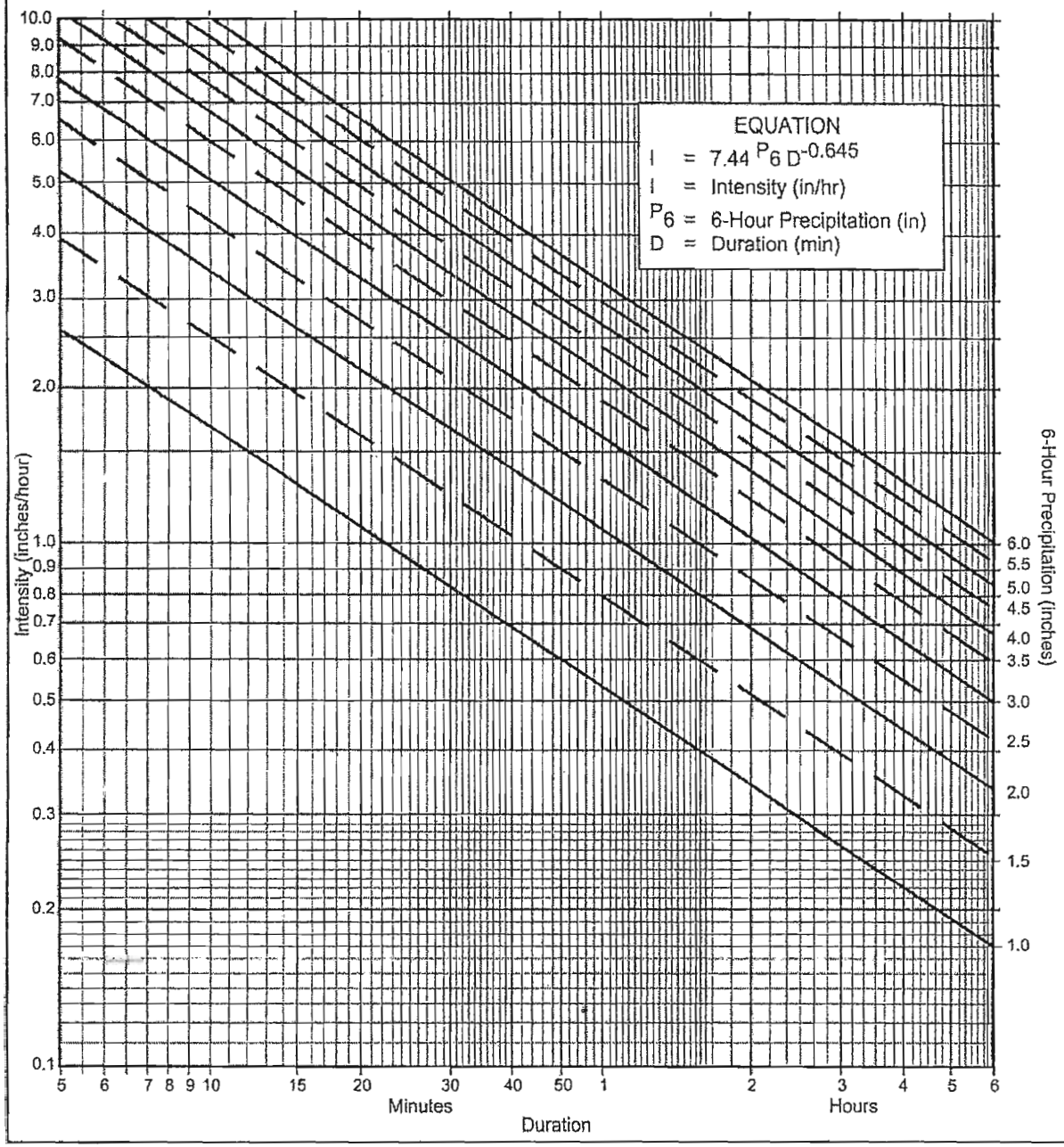
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N W E S

3 0 3 Miles



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the Intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.3 in., P_{24} = 7.5, $\frac{P_6}{P_{24}}$ = 44 %(2)

(c) Adjusted P_6(2) = 3.4 in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.46
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

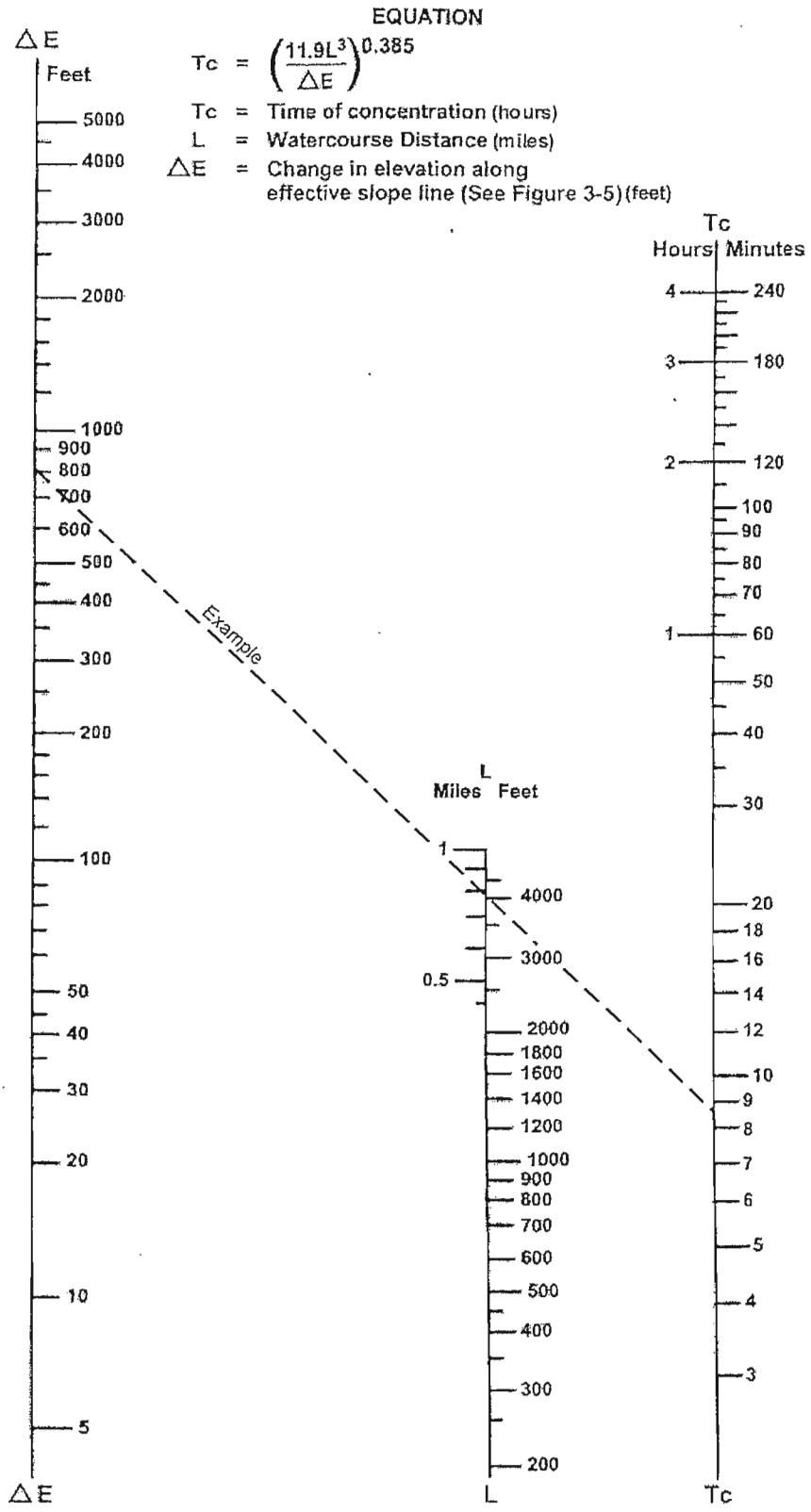
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/	.5%		1%		2%		3%		5%		10%	
	Acre	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

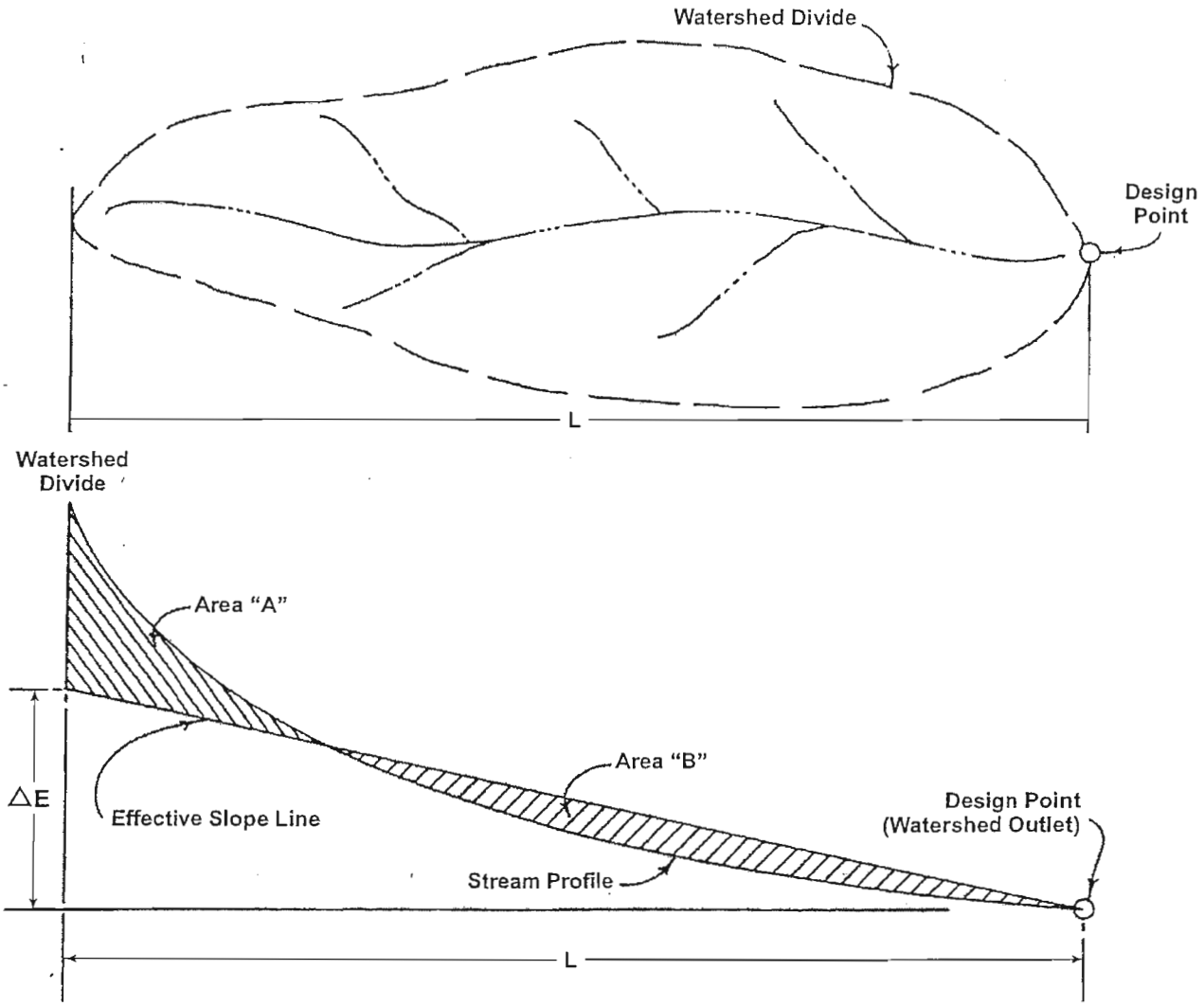
*See Table 3-1 for more detailed description



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE

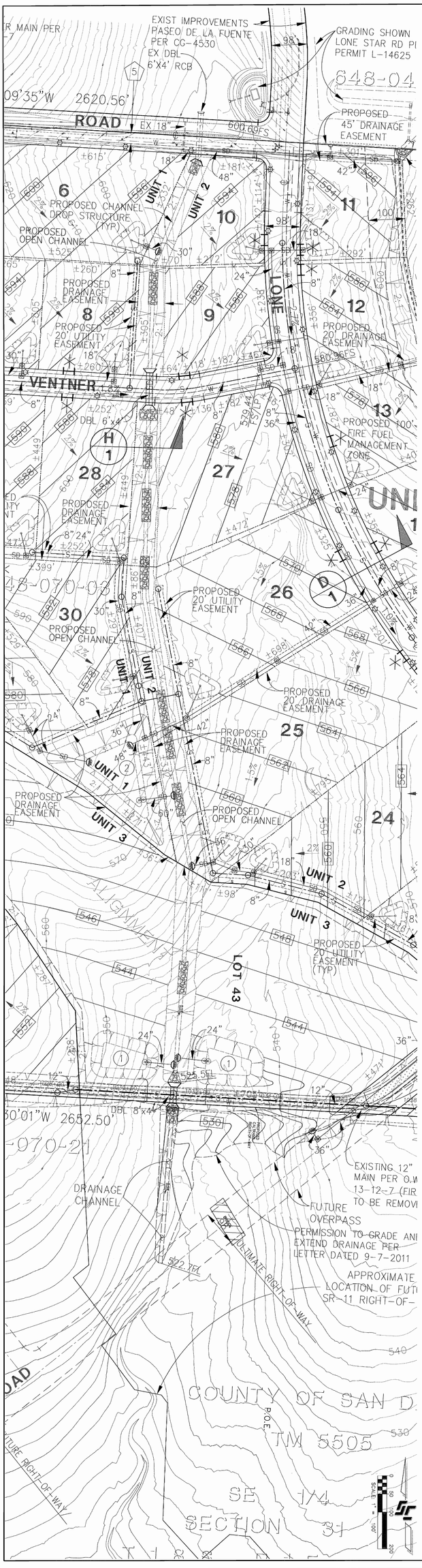
Computation of Effective Slope for Natural Watersheds

3-5

SECTION 7

DRAINAGE EXHIBITS

1. Exhibit D-E1 (Pre-Project Condition Drainage Basins)
2. Exhibit D-P1 (Developed Condition Drainage Basins)
3. County 200 Scale Ortho-Topo overlay/project plotting



DRAINAGE CHANNEL
DESIGN LEVEL STUDY

TM 5405
KEARNY OTAY CROSSINGS
OTAY MESA, CALIFORNIA

SHEET: CH-2 (2 OF 2 SHEETS)
SCE NO.: 03043.07
DATE: 01/2013

REVISIONS

STEVENS·CRESTO ENGINEERING, INC.
CIVIL ENGINEERS · LAND PLANNERS · SURVEYORS
9665 CHESAPEAKE DRIVE
SUITE 320
SAN DIEGO, CA 92123-1352
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X:\SWG\Jobs\2003\03043\XRPLTK\EXHIBITS\030430T CHANNEL-110312.dwg 1/3/2013 9:07:02 AM PST

LEGEND

PROPOSED GROUND CONTOURS
360

EXISTING GROUND CONTOURS
360 ——— INDEX
360 ——— INTERMEDIATE

DRAINAGE BASIN DESIGNATOR
A / 0.57 — BASIN DESIGNATION (ALPHA CHARACTERS DESIGNATE REGIONAL RUNOFF AREAS)
BASIN AREA (Acres)

DRAINAGE BASIN BOUNDARY

PROPERTY LINE

STORM DRAIN PIPE

STORM DRAIN CLEANOUT

STORM DRAIN CATCH BASIN

STORM DRAIN CURB INLET

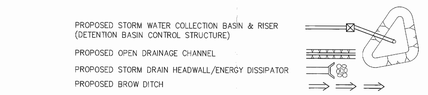
TIME OF CONCENTRATION FLOW PATH

PROPOSED STORM WATER COLLECTION BASIN & RISER (DETENTION BASIN CONTROL STRUCTURE)

PROPOSED OPEN DRAINAGE CHANNEL

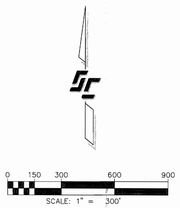
PROPOSED STORM DRAIN HEADWALL/ENERGY DISSIPATOR

PROPOSED BROW DITCH



TYPICAL DRAINAGE CHANNEL SECTION

NO SCALE



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FAX: 858.694.5661
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OTAY CROSSINGS COMMERCE PARK

OTAY MESA, CALIFORNIA

EXHIBIT "D-P1"

DEVELOPED CONDITION DRAINAGE BASINS

DATE: 11/08/12
SCE NO. 03043.08
SHEET
D-P1
1 OF 1 SHEETS

X:\DWG\03043\03043PR\PLOT\DRAINAGE\03043 PR 102912.dwg 11/7/2012 3:48:48 PM PST

LEGEND

EXISTING GROUND CONTOURS
360 ——— INDEX
360 ——— INTERMEDIATE

DRAINAGE BASIN DESIGNATOR

A / 0.57 — BASIN DESIGNATION (ALPHA CHARACTERS DESIGNATE REGIONAL RUNOFF AREAS)
BASIN AREA (Acres)

DRAINAGE BASIN BOUNDARY

PROPERTY LINE

FLOW PATH

B1 96.4
B2 301.7
B3 163.3
B4 48.8
A 138.1
B5 41.9
C1 157.9
C2 100.4
D1 110.9
D2 158.5
D3 50.7
D4 44.5

NODE 101
NODE 102
NODE 103
Q100=166.2 CFS
NODE 201
NODE 202
NODE 203
NODE 204
NODE 205
NODE 206
Q100=492.9 CFS
NODE 301
NODE 302
Q100=239.7 CFS
NODE 401
NODE 402
NODE 403
NODE 404
Q100=332 CFS

Ranch
BM 762
BM 623
BM 1384
Reservoir
Tunnel
Tunnel
TRAIL
JEEP

0 150 300 600 900
SCALE: 1" = 300'

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TM 5405RPL7R
OTAY MESA, CALIFORNIA

EXHIBIT "D-E1"
PRE-PROJECT CONDITION DRAINAGE BASINS

DATE: 08/14/12
SCE NO. 03043.08
SHEET
D-E1
1 OF 1 SHEETS

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COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY

-LEGEND-

- Horizontal Control Monument, *Third Order*
- Vertical Control Monument, *Second Order or Better*
- Horizontal Control Monument, *Second Order or Better*
- Vertical Control Monument, *Third Order*
- Horizontal Control Monument, *Second Order or Better*
- Horizontal Control Monument & Bench Mark, *Second Order or Better*
- Horizontal Control Monument, *Third Order*
- Horizontal Control Monument & Bench Mark, *Third Order*
- Bench Mark, *Second Order or Better*
- Vertical Control Monument, *Third Order*
- Property Corner Found & Coordinated (California Coordinate System, Zone 6)
- 36 31 T 10 S / 1 6 T 11 S / R 2 W R 1 W — Found Section, Grant or Subdivision Corner
- Photograph, Nadir Point
- Geographic Tick

BOUNDARIES IN ORDER OF PRECEDENCE
(Land Lines Shown are Approximate)

- .025" — National
- Name .025" Name — County
- .015" — City
- Name within Bdry. .015" — Reservation
- Name within Bdry. .015" — National, State or County Park
- Name within Bdry. .015" — Land Grant
- T 2 S / T 3 S .015" — Township, Range or Section

PREPARED UNDER THE DIRECTION
of
DEPARTMENT OF PUBLIC WORKS
County of San Diego

CONTROL DATA FURNISHED
by
SURVEY SECTION
Department of Public Works

HORIZONTAL CONTROL BASED
on
NORTH AMERICAN 1927 DATUM

VERTICAL CONTROL BASED
on
U.S.C. & G.S. 1929 SEA LEVEL DATUM

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BARTON WALTERS & ASSOCIATES, INC.

FINAL MAP PREPARED
by
MAPPING SECTION
Department of Public Works

116°54'30" 116°54'15" 116°54'00" 116°53'45" 116°53'30"

150N

148N

146N

32°34'30" 32°34'15" 32°34'00"

1797E 1799E 1801E 1803E

NODE 301

BASIN "B"

BASIN "C"

BASIN "D"

MOUNTAIN

TRUCK TRAIL

T18S T19S

28 29 32 33

This Map Complies with
NATIONAL MAP ACCURACY STANDARDS

200 0 200 400 600 800 1000 (Feet)
100 0 100 200 300 (Meters)

SCALE 1: 2400 (1"= 200')

INDEX CONTOUR INTERVAL: 25 FEET
CONTOUR INTERVAL: 5 FEET

TWO THOUSAND FOOT CALIFORNIA RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
THE RECTANGULAR COORDINATE VALUES ARE SHOWN ON THE SOUTH AND WEST MARGINS
THE GEOGRAPHIC VALUES ARE SHOWN ON THE NORTH AND EAST MARGINS

INDEX TO ADJOINING SHEETS

150-1791	150-1797	150-1803
146-1791	146-1797	146-1803
142-1791	142-1797	142-1803

SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 146-1797

3 OF 7

COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY

-LEGEND-

- Horizontal Control Monument, *Third Order* / Vertical Control Monument, *Second Order or Better*
- Horizontal Control Monument, *Second Order or Better* / Vertical Control Monument, *Third Order*
- Horizontal Control Monument, *Second Order or Better*
- Horizontal Control Monument & Bench Mark, *Second Order or Better*
- Horizontal Control Monument, *Third Order*
- Horizontal Control Monument & Bench Mark, *Third Order*
- Bench Mark, *Second Order or Better*
- Vertical Control Monument, *Third Order*
- Property Corner Found & Coordinated (California Coordinate System, Zone 6)
- 36 31 / 1 6 T 19 S T 11 S R 3 W R 2 W — Found Section, Grant or Subdivision Corner
- Photograph, Nadir Point
- Geographic Tick

BOUNDARIES IN ORDER OF PRECEDENCE
(Land Lines Shown are Approximate)

- .025" — National
- Name .025" / Name — County
- .015" — City
- Name within Bdry. .016" — Reservation
- Name within Bdry. .015" — National, State or County Park
- Name within Bdry. .015" — Land Grant
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HORIZONTAL CONTROL BASED
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VERTICAL CONTROL BASED
on
U.S.C. & G.S. 1929 SEA LEVEL DATUM

ORTHOPHOTO IMAGE PREPARED
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BARTON WALTERS & ASSOCIATES, INC.

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FINAL MAP PREPARED
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Department of Public Works

142N / 140N / 138N

116°54'30" 116°54'15" 116°54'00" 116°53'45" 116°53'30"

32°33'15" 32°33'00" 32°32'45"

1797E 1799E 1801E 1803E



This Map Complies with
NATIONAL MAP ACCURACY STANDARDS

200 0 200 400 600 800 1000 (Feet)
100 0 100 200 300 (Meters)

SCALE 1: 2400 (1"= 200')
INDEX CONTOUR INTERVAL: 25 FEET
CONTOUR INTERVAL: 5 FEET
TWO THOUSAND FOOT CALIFORNIA RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
THE RECTANGULAR COORDINATE VALUES ARE SHOWN ON THE SOUTH AND WEST MARGINS
THE GEOGRAPHIC VALUES ARE SHOWN ON THE NORTH AND EAST MARGINS

INDEX TO ADJOINING SHEETS

142-1791	142-1797	142-1803
138-1791	138-1797	138-1803
134-1791	134-1797	134-1803

SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 138-1797

1 OF 7

COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY

-LEGEND-

- Horizontal Control Monument, *Third Order*
- Vertical Control Monument, *Second Order or Better*
- Horizontal Control Monument, *Second Order or Better*
- Vertical Control Monument, *Third Order*
- Horizontal Control Monument, *Second Order or Better*
- Horizontal Control Monument & Bench Mark, *Second Order or Better*
- Horizontal Control Monument, *Third Order*
- Horizontal Control Monument & Bench Mark, *Third Order*
- Bench Mark, *Second Order or Better*
- Vertical Control Monument, *Third Order*
- Property Corner Found & Coordinated (California Coordinate System, Zone 6)
- 36 31 T 19 S / 16 T 11 S R 4 W / R 3 W — Found Section, Grant or Subdivision Corner
- Photograph, Nadir Point
- Geographic Tick

BOUNDARIES IN ORDER OF PRECEDENCE
(Land Lines Shown are Approximate)

- .025" — National
- Name .025" / Name — County
- .015" — City
- Name within Bdry. .015" — Reservation
- Name within Bdry. .015" — National, State or County Park
- Name within Bdry. .015" — Land Grant
- T 2 S / T 3 S .015" — Township, Range or Section

PREPARED UNDER THE DIRECTION
of
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County of San Diego

CONTROL DATA FURNISHED
by
SURVEY SECTION
Department of Public Works

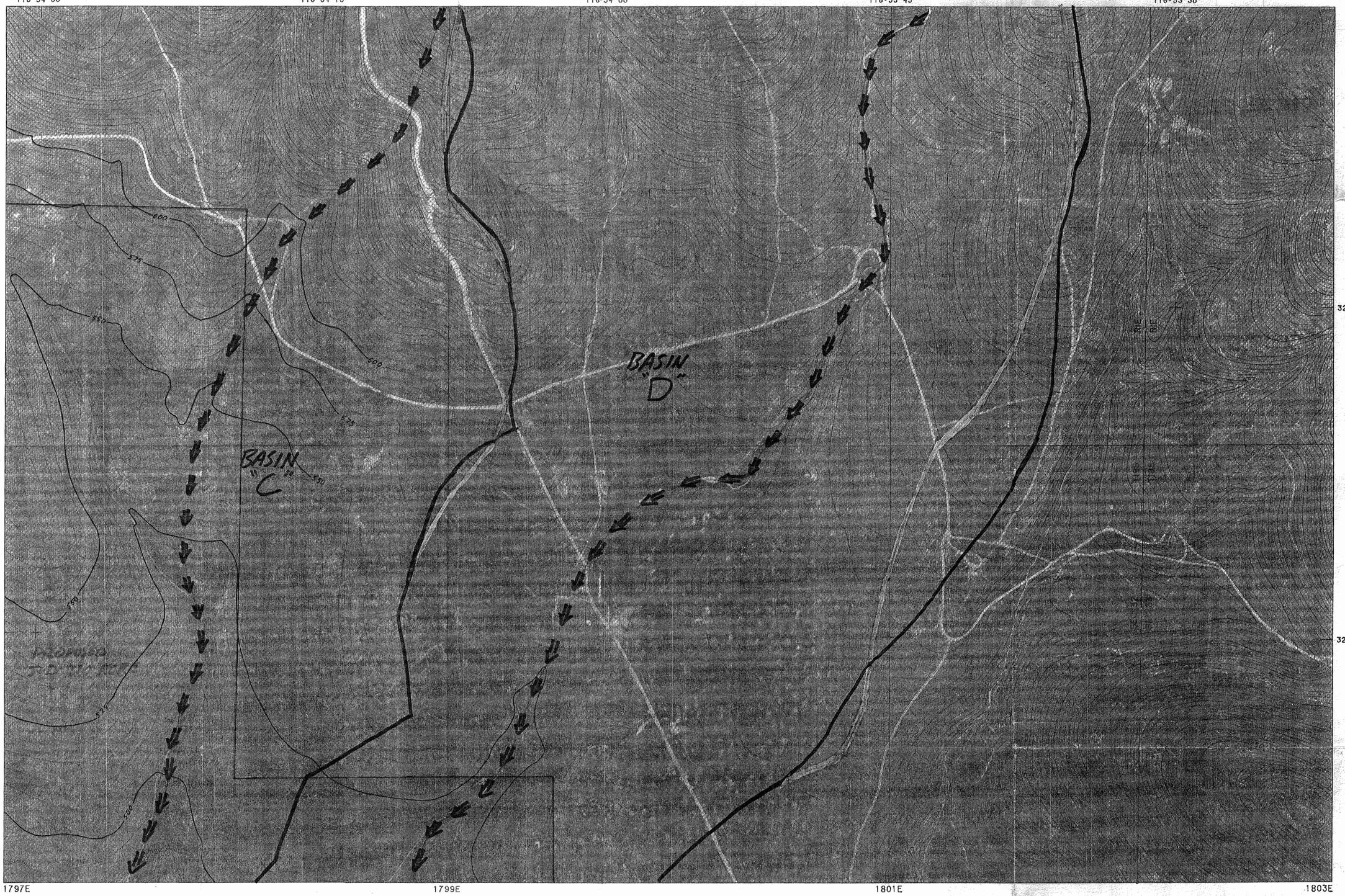
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200 0 200 400 600 800 1000 (Feet)
100 0 100 200 300 (Meters)

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INDEX TO ADJOINING SHEETS

146-1791	146-1797	146-1803
142-1791	142-1797	142-1803
138-1791	138-1797	138-1803

SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 142-1797

2 OF 7

COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY

116°55'30" 116°55'15" 116°55'00" 116°54'45"

32°34'30" 32°34'15" 32°34'00"

150N 148N 146N

1791E 1793E 1795E 1797E

-LEGEND-

- Horizontal Control Monument, *Third Order* / Vertical Control Monument, *Second Order or Better*
- Horizontal Control Monument, *Second Order or Better* / Vertical Control Monument, *Third Order*
- Horizontal Control Monument, *Second Order or Better*
- Horizontal Control Monument & Bench Mark, *Second Order or Better*
- Horizontal Control Monument, *Third Order*
- Horizontal Control Monument & Bench Mark, *Third Order*
- Bench Mark, *Second Order or Better*
- Vertical Control Monument, *Third Order*
- Property Corner Found & Coordinated (California Coordinate System, Zone 6)
- 36 31 T 10 S / 1 6 T 11 S, R 1 W R 1 E — Found Section, Grant or Subdivision Corner
- Photograph, Nadir Point
- Geographic Tick

BOUNDARIES IN ORDER OF PRECEDENCE

(Land Lines Shown are Approximate)

.026" — — — — National

Name .025" — — — County
Name

.018" — — — — City

Name within Bdry. .015" ——— Reservation

Name within Bdry. .015" — — — National, State or County Park

Name within Bdry. .015" ——— Land Grant

T 2 S / T 3 S .015" ——— Township, Range or Section

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200 0 200 400 600 800 1000 (Feet)
100 0 100 200 300 (Meters)

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INDEX TO ADJOINING SHEETS

150-1785	150-1791	150-1797
146-1785	146-1791	146-1797
142-1785	142-1791	142-1797

SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 146-1791

7 OF 7

COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY

-LEGEND-

- Horizontal Control Monument — *Third Order*
- Vertical Control Monument — *Second Order or Better*
- Horizontal Control Monument — *Second Order or Better*
- Vertical Control Monument — *Third Order*
- Horizontal Control Monument — *Second Order or Better*
- Horizontal Control Monument & Bench Mark — *Second Order or Better*
- Horizontal Control Monument — *Third Order*
- Horizontal Control Monument & Bench Mark — *Third Order*
- Bench Mark — *Second Order or Better*
- Vertical Control Monument — *Third Order*
- Property Corner Found & Coordinated (California Coordinate System, Zone 6)
- 36 31 T 10 S / R 2 W R 1 W T 11 S — Found Section, Grant or Subdivision Corner
- Photograph, Nadir Point
- Geographic Tick

BOUNDARIES IN ORDER OF PRECEDENCE
(Land Lines Shown are Approximate)

- .025" — National
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INDEX TO ADJOINING SHEETS

154-1791	154-1797	154-1803
150-1791	150-1797	150-1803
146-1791	146-1797	146-1803

SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 150-1797

4 of 7

COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY

-LEGEND-

- Horizontal Control Monument, *Third Order* / Vertical Control Monument, *Second Order or Better*
- Horizontal Control Monument, *Second Order or Better* / Vertical Control Monument, *Third Order*
- Horizontal Control Monument, *Second Order or Better*
- Horizontal Control Monument & Bench Mark, *Second Order or Better*
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142N
140N
138N

116°55'30" 116°55'15" 116°55'00" 116°54'45"
32°33'15" 32°33'00" 32°32'45"
1791E 1793E 1795E 1797E

T18S T19S
UNITED STATES
MEXICO
INBM 2526
505.85
BASIN "C"
PROPOSED 3.0 ACRE

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200 0 200 400 600 800 1000 (Feet)
100 0 100 200 300 (Meters)

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138-1785	138-1791	138-1797
134-1785	134-1791	134-1797

SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 138-1791

5 of 7

COUNTY OF SAN DIEGO — TOPOGRAPHIC SURVEY

-LEGEND-

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146N
144N
142N

116°55'30" 116°55'15" 116°55'00" 116°54'45"
32°33'45" 32°33'30"
1791E 1793E 1795E 1797E

BASIN "A" BASIN "B" BASIN "C"
NODE 103 NODE 206
PROPOSED 30" RCP
NOTE: SEE DRAINAGE EXHIBIT MAP FOR FURTHER DETAIL OF EXISTING AND PROPOSED DRAINAGE FACILITIES

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100 0 100 200 300 (Meters)

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142-1785	142-1791	142-1797
138-1785	138-1791	138-1797

SAN DIEGO COUNTY CALIFORNIA

SHEET NO. 142-1791

6 OF 7