RECORD ID: PDS2015-STP-14-034
ENVIRON LOG: PDS2014-ER-06-09-006A

Preliminary

Drainage Report

For 16th and Main Street, Valley Park Apartments

Ramona, CA

March 5, 2015

Prepared By:
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Project # 30071

SDC PDS RCVD 08-28-15
STP14-034

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1 INTRODUCTION

1.1. SITE DESCRIPTION

1.1.1. LOCATION

The 16th & Main property is 2.87 acres located approximately 600 feet southeast of the intersection of 16th Street and Main Street/Hwy 67 in the City of Ramona, County of San Diego, California. Legally, it is parcel 282-262-75.

1.1.2. EXISTING FEATURES

The site consists of 2.87 acres of vacant land. The site drains northeast to southwest at a slope of roughly 0.5 percent. The site is surrounded by development, and has one constructed channel that outlets into the northeast corner of the subject site.

1.1.3. PROPOSED CONDITION

It is proposed that the subject property be developed as a high density development of 62 units. Access to the site will be from 16th Street.

1.2. PURPOSE OF REPORT

The following report is prepared in support of the SWMP and the Conceptual Grading Plan for the project. As the project is primarily infill, this report analyzes the contributing runoff to ensure that it can be accepted and conveyed through the site, and discusses the onsite project drainage design.

2. EXISTING DRAINAGE PATTERNS

2.1. OFFSITE

The primary contributing areas are north of the subject property. There are two small contributing areas that originate north of the site and enter along the northwestern and northeastern property lines. The largest contributing area, identified as Area C, is roughly 12.9 acres of developed land. It enters the site through a constructed concrete open box channel. The other contributing area, identified as area B, is 4.4 acres of mostly developed land. It enters the site along the northwestern property line after crossing an undeveloped parcel of land. Because of the natural state of the adjacent property the flow is in a sheet flow condition. The contributing areas have peak flows of 42 cfs (Area A) and 16 cfs (Area B) for the 100 year storm. These flows are identified and analyzed in more detail in appendix A.

2.2. ONSITE

The site is in an undeveloped state, and slopes generally to the southern corner at roughly 0.5%. The only concentration of flow is the continuation of the offsite channel (Area C) that outlets into an earthen channel. There is an existing 10' drainage easement along the southeastern property line. The channel from the north (Area C) outlets outside of this easement. The earthen ditch carries the offsite and onsite runoff to two (2) 18" culverts with headwall at the southern corner of the site. The culverts outlet on the south side of 16th street, where the runoff continues south in an earthen channel approximately 600 feet before entering a pond along the north side of Ramona Street.

3. PROPOSED DRAINAGE PATTERNS

3.1. OFFSITE

Offsite flows will be collected at the exiting points of interception with the projects development limits. There are two concentration points along the northern edge of the project (B and C). The Area C flows will be routed through the project via an open box channel and eventually discharged through the existing culverts under 16th Street. The Area B flows will be accepted into the onsite facilities, and routed through the water quality basins and eventually discharge to the same culverts in 16th Street. It is assumed that the project will reconstruct a portion of the offsite channel (Area C) to allow for a straight channel to continue through the subject site within the 10' Easement.

3.2. ONSITE

The project will provide water quality basins of sufficient size to treat the volume required to meet water quality standards. Runoff from the buildings and parking areas will be routed to three water quality basins. Any runoff that exceeds the capacity of the basins will continue to the concrete channel. Refer to the SWMP and the Grading Plan (Figure 2) for additional detail.

4. HYDROLOGIC CONDITIONS

The Rationale Method has been employed to determine peak runoff amounts. The NRCS Hydrologic Method was employed to determine the predevelopment and post development runoff volume. The The San Diego County Hydrology Manual (reference 1) was used to develop the hydrological parameters for the 100 year storm event. Additional background information was obtained through site visits and from obtained engineering

drawings from the developed parcels. The following design inputs were determined using the Sand Diego County Hydrology Manual;

Soil Group D
6hr – 100yr rainfall depth – 3.3”
24hr – 100yr rainfall depth – 6.0”

Refer to appendix A for detail.

4.1. Existing Conditions

Peak runoff calculations using the San Diego County Hydrology Manual identified the below values. Refer to Appendix A for detailed calculations.

Concentration Point	Time of Concentration	100 yr Peak Runoff
A	18 min	16 cfs
B	12 min	16 cfs
C	16 min	42 cfs
Onsite	9.5 min	6 cfs

Contributing areas B and C are added to the onsite flows to identify the existing peak flow at the storm drain inlet and headwall. The peak runoff is determined to be 44 cfs. This is a small increase (less than 5%) from the Area C runoff alone. This is due to the large variation in time of concentration of the three areas. The 44 cfs is used in further channel sizing calculations. The onsite 100 year 24 hour existing runoff is 58,071 cubic feet. Refer to Appendix A for more detailed calculations and supporting input data developed with the Hydrology Manual.

4.2. Proposed Conditions

The site will be designed to discharge at or below the 44 cfs identified as the existing peak runoff at the southern corner of the site. This will be achieved through a combination of storage volume in the water quality basins and outlet orifice design to avoid adding to peak runoff based on the times of concentration. The post development 100-year 24 hour runoff is 60,175 cf for a net storage need of 2,104 cf. The water quality basins far exceed that volume (5,775 cf). As such, hydro modification calculations should be provided at time of final design, but based on preliminary review, the site can be designed to mimic existing flow patterns.

5. HYDRAULIC CONDITIONS

5.1. Existing Conditions

The existing 6' wide box channel carrying runoff from contributing Area C was analyzed and determined to be carrying 42 cfs, at roughly 4.6 fps, in the channel with a depth of 1.6'. As the channel is only 2' deep, it does not meet current fee board requirements (1' for flows greater than 10 cfs). As the runoff continues to the southern corner of the site, it combines with runoff form the site and contributing area B before entering the existing culverts and headwall (as discussed in section 4.1). The culverts do not pass the 100 year peak runoff in the existing condition. It appears that any exceedance flows overtop the headwalls (elevation 1417.3) and flows into the street towards the existing inlet. With the storm drain full, it is likely that the water temporarily ponds to up to a depth of roughly 1416.88 before overtopping the crown at the sump and draining to the south. At time of final design additional review will be required before protecting and setting the building finished floors (preliminarily identified as 1420.02). Refer to Appendix B for more detailed calculations and Figure 2 Grading Plan.

5.2. Proposed Conditions

The project proposes to straighten out the existing channel from contributing Area C and also transition to a slightly deeper channel to provide for the 1' of freeboard. The new channel will be constructed along the southeastern edge at a depth of 2.3' with the same width (6') and with 1' of freeboard and a 4' access area. For contributing Area B the sheet flow will routed to the south by protecting the western property line and buildings by raising the finished floors and grading away from the building. As the Area B flows continue south and enter the property they will accepted and routed through the onsite facilities. Refer to Appendix B for more detailed calculations and Figure 2 Grading Plan.

REFERENCES

1. San Diego County Hydrology Manual, June 2003.

2. San Diego Hydraulic Design Manual, September 2014.

I hereby declare that I am the engineer of work for this project, that I have exercised reasonable 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 the project drawings and specifications by the city of San Diego is confined to a review only and does relieve me, as engineer of work, of my responsibilities for project design.

3-5-15

Christopher F. Lenz, PE 63001 Date
Registration Expires 06/30/2016

Figure 1
Drainage Map

16TH & MAIN - DRAINAGE MAP

IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA

UNITED ENGINEERING GROUP CA., INC MARCH 2015

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE RAMONA AREA OF THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA , MORE PARTICULARLY DESCRIBED AS FOLLOWS:

ALL OF BLOCK 80 OF RAMONA, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF, NO. 644, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, OCTOBER 15, 1890.

EXCEPTING THEREFROM THE NORTHWESTERLY 132.00 FEET OF THE SOUTHWESTERLY 300.00 FEET THEREOF.

ALSO EXCEPTING THEREFROM THAT PORTION OF THE NORTHWESTERLY 176.56 FEET OF SAID BLOCK 80 LYING NORTHEASTERLY OF THE SOUTHWESTERLY 300.00 FEET OF SAID BLOCK 80.

APN: 282-262-75

EASEMENT NOTES:

1. A GRANT OF LICENSE TO RAMONA WEST, A JOINT VENTURE, BY RAYMOND B. SCHOOLEY, FOR DISCHARGE OF WATER ACROSS THE HEREIN DESCRIBED LAND, RECORDED MARCH 8, 1983 AS FILE NO. 83-073687 OF OFFICIAL RECORDS.

2. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:

   GRANTED TO: RAMONA WEST, A JOINT VENTURE PURPOSE: FLOOD DRAINAGE CHANNEL AND INCIDENTAL PURPOSES RECORDING DATE: JANUARY 1, 1983 RECORDING NO.: AS INSTRUMENT NO. 83-073690, OF OFFICIAL RECORDS AFFECTS: SAID LAND

   REFERENCE IS HEREBY MADE TO SAID DOCUMENT FOR FULL PARTICULARS.

3. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:

   GRANTED TO: RAMONA MEDICAL CENTER, A GENERAL PARTNERSHIP PURPOSE: UNDERGROUND UTILITY PURPOSES FOR WATER, SEWER, ELECTRIC, TELEPHONE, VIDEO CABLE AND INCIDENTALS THERETO RECORDING DATE: JANUARY 17, 1991 RECORDING NO.: AS INSTRUMENT NO. 91-0024800, OF OFFICIAL RECORDS AFFECTS: SAID LAND

   REFERENCE IS HEREBY MADE TO SAID DOCUMENT FOR FULL PARTICULARS.

4. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:

   GRANTED TO: RAMONA MEDICAL CENTER, A GENERAL PARTNERSHIP PURPOSE: ROAD PURPOSES RECORDING DATE: JANUARY 17, 1991 RECORDING NO.: AS INSTRUMENT NO. 91-0024800, OF OFFICIAL RECORDS AFFECTS: SAID LAND

   REFERENCE IS HEREBY MADE TO SAID DOCUMENT FOR FULL PARTICULARS.

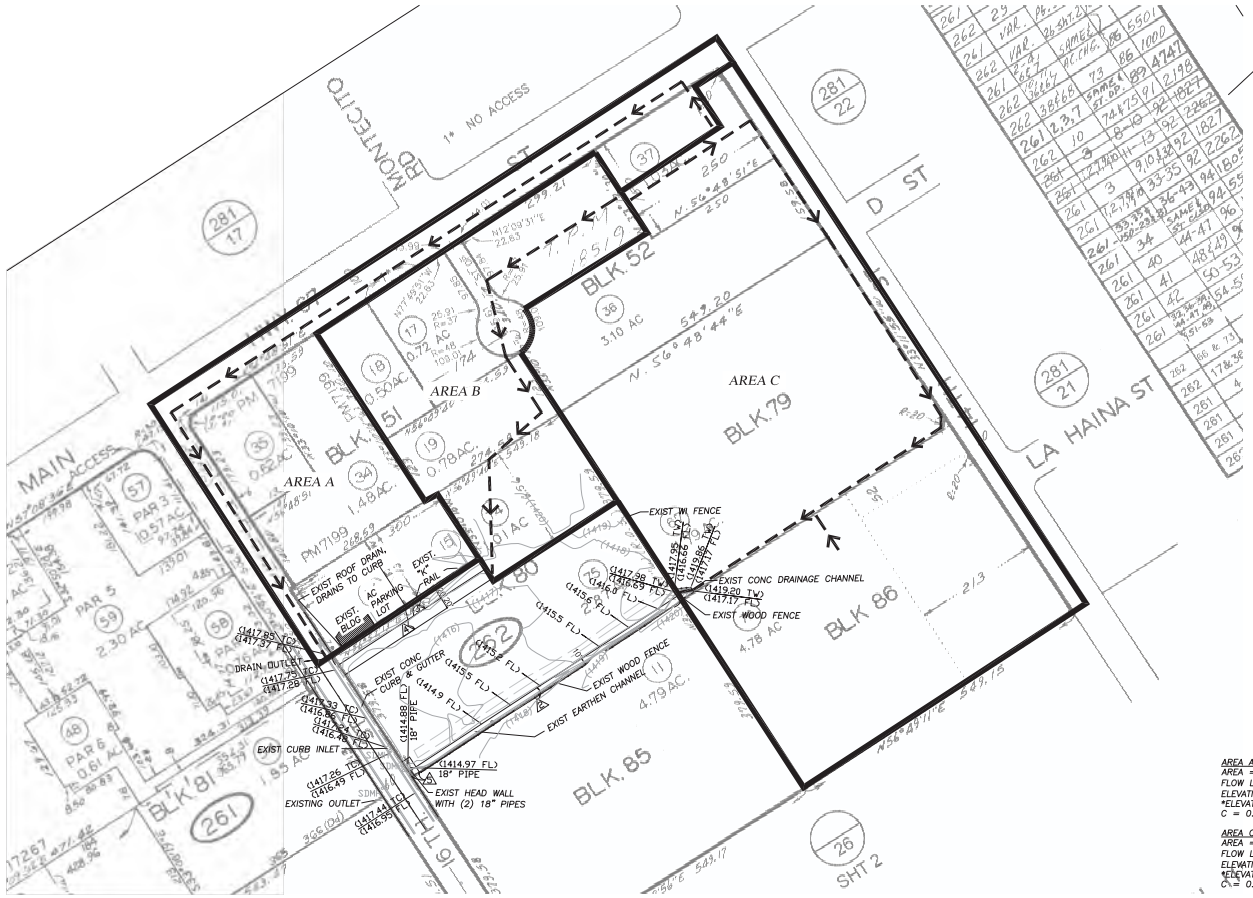
5. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:

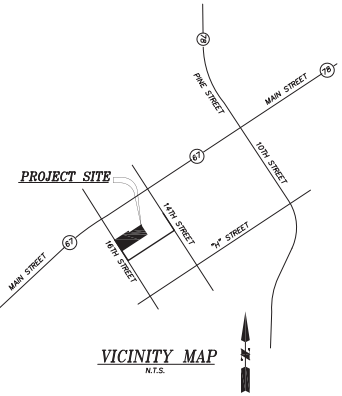
   GRANTED TO: COUNTY OF SAN DIEGO PURPOSE: DRAINAGE RECORDING DATE: JUNE 13, 2005 RECORDING NO.: AS INSTRUMENT NO. 2005-0491570, OF OFFICIAL RECORDS AFFECTS: SAID LAND

   REFERENCE IS HEREBY MADE TO SAID DOCUMENT FOR FULL PARTICULARS.

SURVEYOR'S NOTE:

THIS TOPOGRAPHIC SURVEY MAP HAS BEEN PREPARED AND COMPILED FROM RECORD DATA. THE TITLE INFORMATION HAS BEEN PROVIDED BY CHICAGO TITLE COMPANY TITLE ORDER NO: 121300070, EFFECTIVE DATE OF FEBRUARY 26, 2013. THE SUBJECT BOUNDARY HAS BEEN COMPILED FROM THE BEST AVAILABLE RECORDED INFORMATION AND NOT TO BE CONTSTRUED AS A SURVEY IN ANY WAY. THE ECUMBRANCES HAVE BEEN SHOWN FOR INFORMATION PURPOSES ONLY AND UNITED ENGINEERING GROUP CALIFORNIA, INC., IMPLIES NO WARRANTY, OR CERTIFICATION, AS TO THE ACCURACY OF THE RECORD INFORMATION UTILIZED IN THE PREPARATION OF THIS MAP.





VICINITY MAP
N.T.S.

PROPERTY OWNER:

16th & MAIN PARTNERS, LLC

PROPERTY ADDRESS:

PROPERTY IS A VACANT SITE WITH NO ADDRESS.

GENERAL NOTES:

1. AS TO THE TITLE MATTERS SHOWN HEREON, UNITED ENGINEERING GROUP HAS RELIED SOLELY ON THE TITLE REPORT ISSUED AS OF FEBRUARY 26 2013, AS PREPARED BY CHICAGO TITLE COMPANY, ORDER NO. 121300070; UNITED ENGINEERING GROUP MAKES NO STATEMENT AS TO THE ACCURACY OR COMPLETENESS OF THE SUBJECT TITLE REPORT.
2. GROSS SITE AREA: 2.87 ACRES.
3. ASSESSOR'S PARCEL NO. 282-262-75, SAN DIEGO COUNTY.
4. EXCEPT AS NOTED, THE SURVEYOR HAS MADE NO INDEPENDANT INVESTIGATION OR SEARCH FOR EASEMENTS OF RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER MATTER THAT AN ACCURATE AND CURRENT TITLE REPORT MAY DISCLOSE.
5. PROPERTY MAY BE SUBJECT TO EASEMENTS (RECORDED OR UNRECORDED) NOT KNOWN TO THE SURVEYOR, AND NOT SHOWN HEREON.

LEGEND:

▬▬▬	CONTRIBUTING AREA BOUNDARY
- - → - -	FLOW PATH
SDMH	STORM DRAIN MANHOLE
TC	TOP OF CURB
FL	FLOW LINE
(1419)	EXISTING CONTOUR

CONTRIBUTING AREA DETAILS

AREA A
AREA = 5.09 ACRES
FLOW LENGTH = 1,630'
ELEVATION CHANGE = 1425*-1417 = 8'
*ELEVATION TAKEN FROM AVAILABLE PLANS
C = 0.80

AREA B
AREA = 4.38 ACRES
FLOW LENGTH = 1,055'
ELEVATION CHANGE = 1423*-1418 = 5'
*ELEVATION TAKEN FROM AVAILABLE PLANS
C = 0.70

AREA C
AREA = 12.93 ACRES
FLOW LENGTH = 1,520'
ELEVATION CHANGE = 1425*-1417 = 8'
*ELEVATION TAKEN FROM AVAILABLE PLANS
C = 0.77

ONSITE-EXISTING
AREA = 2.87 ACRES
FLOW LENGTH = 752'
ELEVATION CHANGE = 1419-1415 = 4'
C = 0.70

40' 30' 20' 10' 0' 40' 80'
GRAPHIC SCALE: 1"=40'

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SUBMITTALS:

DESIGNED BY: CSM
DRAWN BY: CSM
CHECKED BY: CFL

REVISIONS

NO.	DESCRIPTION	DATE

BENCHMARK:
COUNTY OF SAN DIEGO BENCHMARK, OBJECT ID 1477, STD 2 INCH CADT BRASS DISK STAMPED 63-23.7, SET IN SIDEWALK, 0.7 MI SW OF INT HWY 67 & MAIN ST. ELEV= 1416.86

BASIS OF BEARING:
BASIS OF BEARING IS THE SOUTH LINE OF RECORD OF SURVEY, MAP NO. 13352, BEING NORTH 56°49'41" EAST.

PREPARED FOR:
LANSING COMPANIES
12871 HIGH BLUFF DRIVE, SUITE 150
SAN DIEGO, CA 92130
PHONE: 858-523-0719

united engineering group
3595 Inland Empire Blvd.
Suite 2200
Ontario, CA 91764
Phone: 909.466.9240
Fax: 909.989.8401
www.unitedeng.com

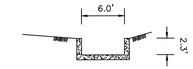
DRAINAGE MAP
16TH STREET & MAIN STREET
RAMONA, CALIFORNIA
APN 282-262-75

DATE: MARCH 2015
SCALE: 1" = 100'
SHEET 1 OF 1 SHEETS
PROJECT NUMBER: CA-30071

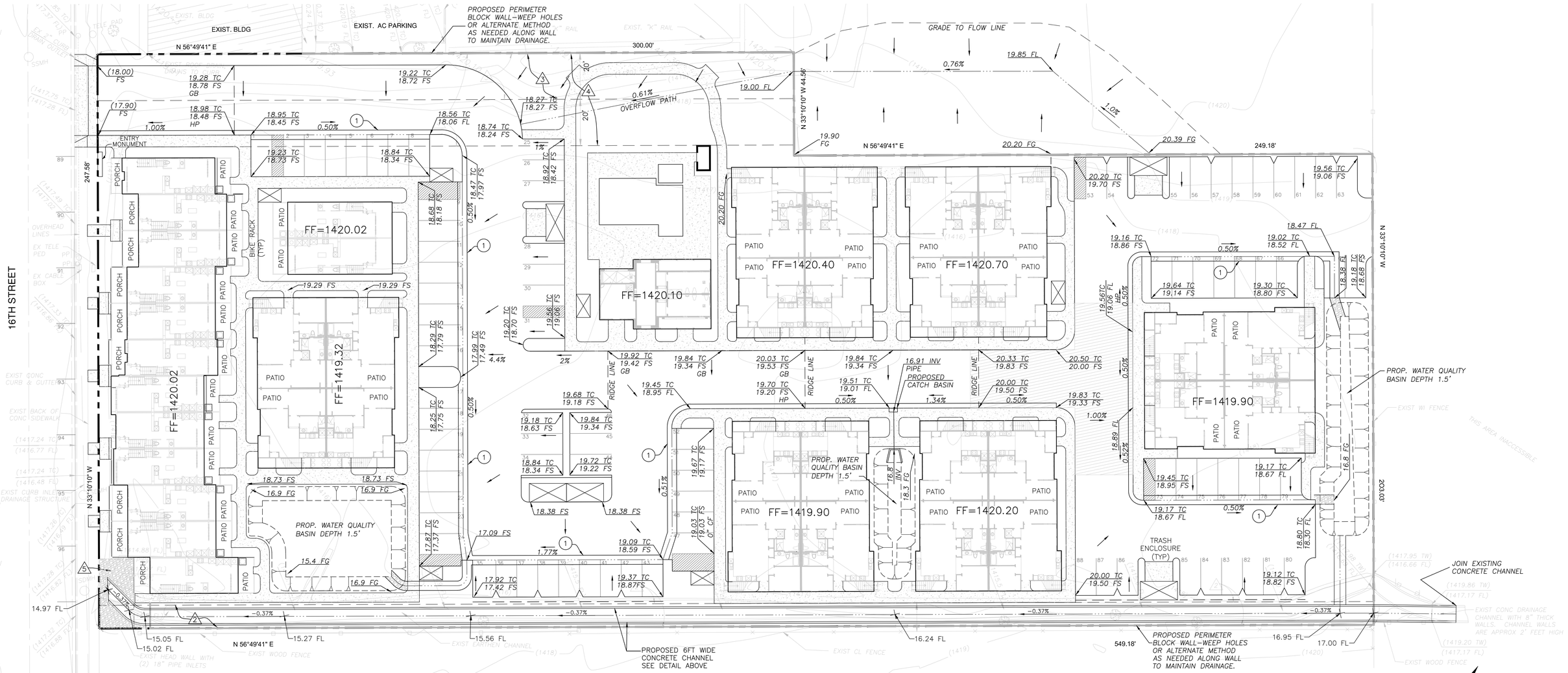
Figure 2

Conceptual Grading Plan

CONCEPTUAL GRADING PLAN



PROPOSED CONCRETE CHANNEL
CONCRETE CHANNEL DETAIL



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ALSO EXCEPTING THEREFROM THAT PORTION OF THE NORTHWESTERLY 176.56 FEET OF SAID BLOCK 80 LYING NORTHEASTERLY OF THE SOUTHWESTERLY 300.00 FEET OF SAID BLOCK 80.

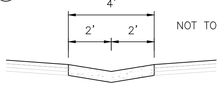
APN: 282–262–75

GENERAL NOTES

INTLETS AND DRAIN PIPE WILL BE USED TO CONVEY DRAINAGE
FROM LANDSCAPE POCKETS AROUND BUILDINGS INTO THE WATER
QUALITY BASINS

CONSTRUCTION NOTES:

1 CONSTRUCT CONCRETE GUTTER PER DETAIL HEREON



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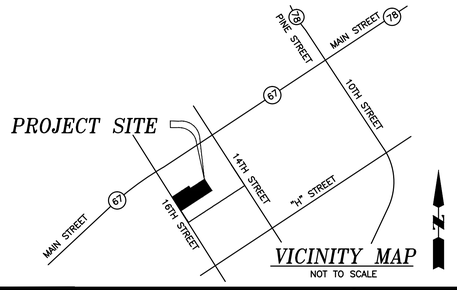

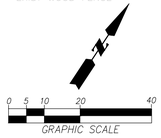

OWNER:

LANSING COMPANIES
12671 HIGH BLUFF DRIVE, SUITE 150
SAN DIEGO, CA. 92130

ADDRESS:

PROPERTY IS A VACANT SITE WITH NO ADDRESS.
16th STREET & MAIN STREET

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SUBMITTALS:

DESIGNED BY: DCP
DRAWN BY: DCP
CHECKED BY:

REVISIONS		
NO.	DESCRIPTION	DATE

BENCHMARK:
COUNTY OF SAN DIEGO BENCHMARK, OBJECT ID 1477, STD 2 INCH CADT BRASS DISK STAMPED 63–23.7, SET IN SIDEWALK, 0.7 MI SW OF INT HWY 67 & MAIN ST. ELEV= 1416.86

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BASIS OF BEARING IS THE SOUTH LINE OF RECORD OF SURVEY, MAP NO. 13352, BEING NORTH 56°49'41" EAST.

PREPARED FOR:
LANSING COMPANIES
12671 HIGH BLUFF DRIVE, SUITE 150
SAN DIEGO, CA 92130
PHONE: 858–523–0719

PREPARED UNDER THE DIRECT SUPERVISION OF:
3-23-2015
CHRISTOPHER F. LENZ
P.E. NO. 63001
EXPIRES 6/30/2016

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER F. LENZ NO. 63001 EXP. 6/30/2016 CIVIL STATE OF CALIFORNIA

ueg
united engineering group
10602 Trademark Pkwy.
Suite 509
Rancho Cucamonga, CA 91730
Phone: 909.466.9240
www.unitedeng.com

CONCEPTUAL GRADING PLAN
16TH STREET & MAIN STREET
RAMONA, CALIFORNIA
APN 282-262-75

DATE: MARCH 20, 2015
SCALE: 1" = 20'
SHEET 1 OF 1 SHEETS
PROJECT NUMBER:
CA-30071

Appendix A

Watershed Rationale Runoff

Watershed C

Area = 12.93
Flow Length = 1,520’
Elevation Change = 1425-1417 = 8’
Slope = 0.5%
Tc = 16 min (Figure 3-4)
Soil Type D
C = 0.77 (See soils map and weighted coefficient calculation in Appendix A)
6hr-100yr – 3.3”
24hr-100yr – 6.0”
i = 4.2 in/hr

Q = 0.77 * 4.2 * 12.93 = 42 cfs

Watershed B

Area = 4.38
Flow Length = 1,055’
Elevation Change = 1423-1418 = 5’
Slope = 0.5%
Tc = 12 min (Figure 3-4)
Soil Type D
C = 0.70 (See soils map and weighted coefficient calculation in Appendix A)
6hr-100yr – 3.3”
24hr-100yr – 6.0”
i = 5.2 in/hr

Q = 0.70 * 5.2 * 4.38 = 16 cfs

Watershed A

Area = 5.09
Flow Length = 1,630’
Elevation Change = 1425-1417 = 8’
Slope = 0.5%
Tc = 18 min (Figure 3-4)
Soil Type D
C = 0.80 (See soils map and weighted coefficient calculation in Appendix A)

6hr-100yr – 3.3”
24hr-100yr – 6.0”
i = 4.0 in/hr

Q = 0.80 * 4.0 * 5.09 = 16 cfs

Watershed Onsite – Existing

Area = 2.87
Flow Length = 752’
Elevation Change = 1419-1415 = 4’
Slope = 0.5%
Tc = 9.5 min (Figure 3-4)
Soil Type D
C = 0.35 (Natural Ground)
6hr-100yr – 3.3”
24hr-100yr – 6.0”
i = 5.8 in/hr

Q = 0.35 * 5.8 * 2.87 = 6 cfs

Existing Outlet Summation (existing pipes in 16th street at south corner of subject site)
For outlet and channel sizing, and preliminary assessment of hydro modification.

Q_1 = Onsite = 6fs	T_{c1} = 9.5 min	I_1 = 5.8 in/hr
Q_2 = Watershed B = 16fs	T_{c2} = 12 min	I_2 = 5.2 in/hr
Q_3 = Watershed A = 42fs	T_{c1} = 16 min	I_3 = 4.2 in/hr

Q_{T1} = 6 + (9.5/12) * 16 + (9.5/16) * 42
Q_{T1} = 43.6 – Less than 5% increase

Watershed Weighted Runoff Coefficients

Watershed C

Portion of Parcel 37 – 0.6 acres – Neighborhood Commercial – Soil D – 0.79
Portion of Parcel 36 – 2.0 acres - Neighborhood Commercial – Soil D – 0.79
Parcel 67 – 4.79 acres – High Density Residential >24 du/ac – Soil D – 0.79
Parcel 76 – 4.78 acres – High Density Residential <24 du/ac – Soil D – 0.71
14th Street – 0.76 acres – Paved – 0.95

Weighted C – [(0.6 + 2.0 + 4.79)*(0.79) + (4.78 * 0.71) + (0.76 * 0.95)]/ 12.93 = **0.77**

Watershed B

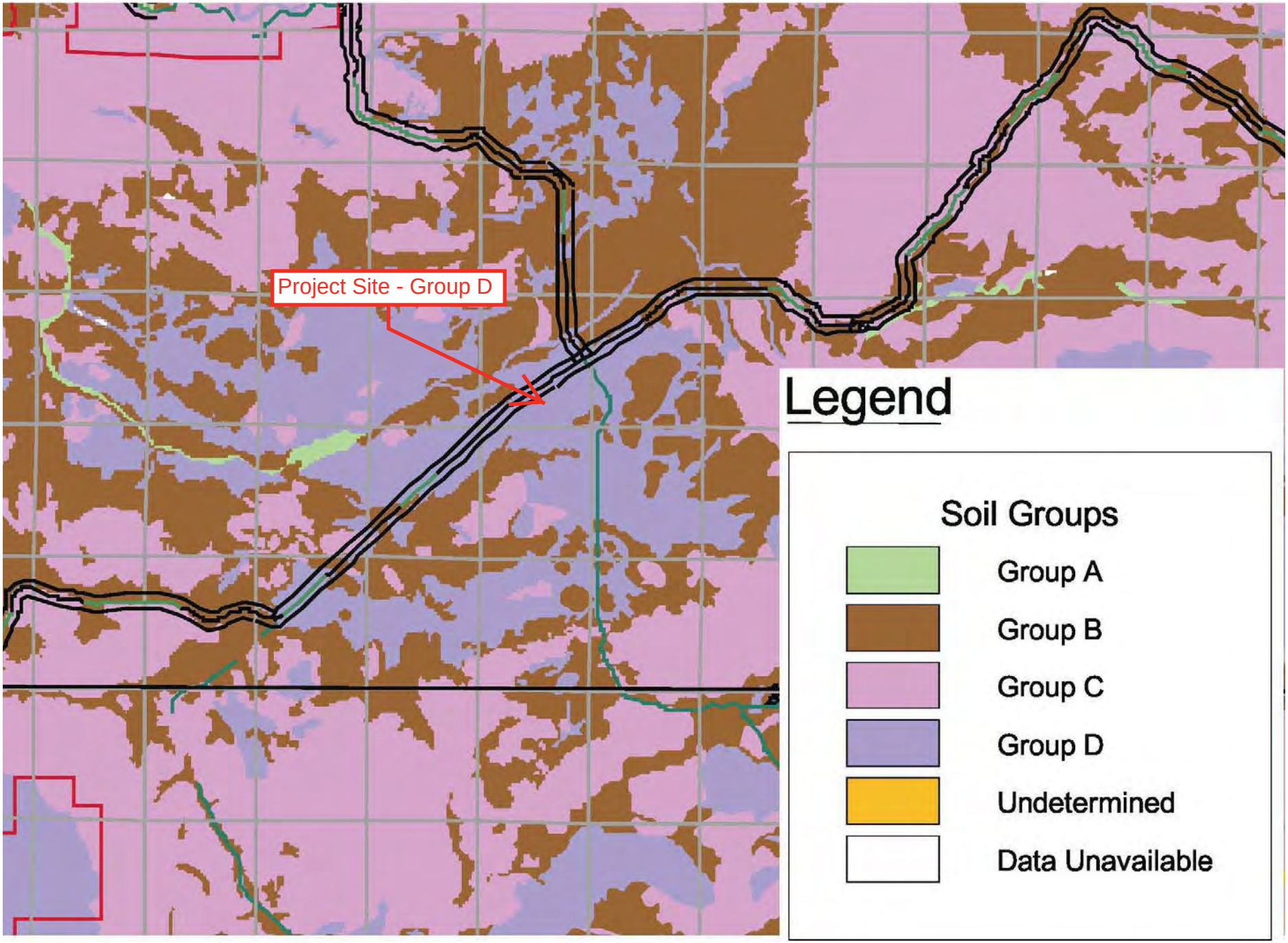
Portion of Parcel 36 – 1.1 acres - Neighborhood Commercial – Soil D – 0.79
Parcel 17 – 0.72 acres – Neighborhood Commercial – Soil D – 0.79
Parcel 18 – 0.50 acres – Neighborhood Commercial – Soil D – 0.79
Parcel 19 – 0.78 acres – Neighborhood Commercial – Soil D – 0.79
Parcel 74 – 1.01 acres – Natural Ground – Soil D – 0.35
Cul-de-Sac – 0.27 acres – Paved – 0.95

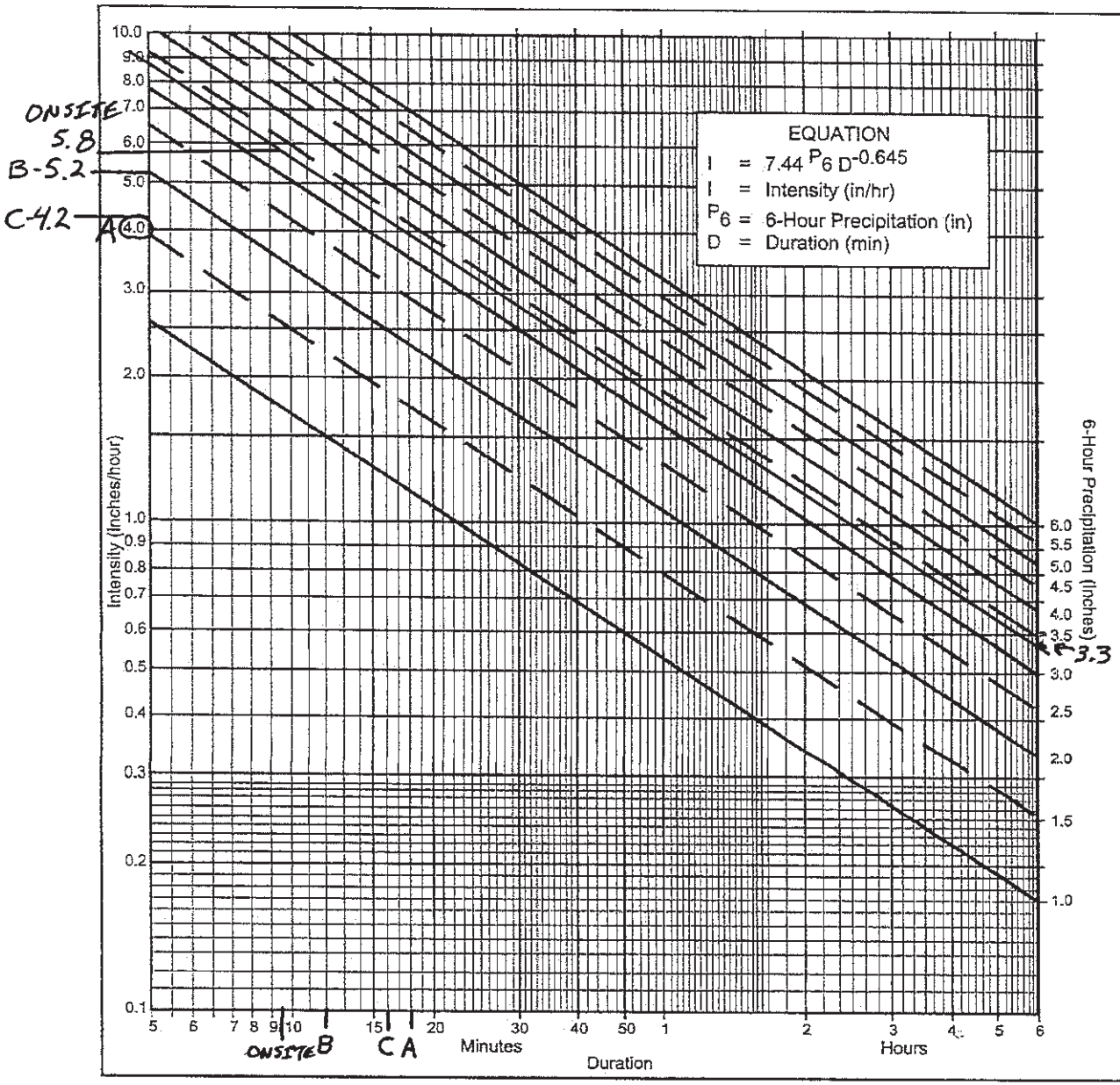
Weighted C – [(1.1 + 0.72 + 0.50 + 0.78)*(0.79) + (1.01 * 0.35) + (0.27 * 0.95)]/ 4.38 = **0.70**

Watershed A

Portion of Parcel 37 – 0.43 acres – Neighborhood Commercial – Soil D – 0.79
Parcel 34 – 1.48 acres – Neighborhood Commercial – Soil D – 0.79
Parcel 35 – 0.62 acres - Neighborhood Commercial – Soil D – 0.79
Parcel 14 – 0.45 acres - Neighborhood Commercial – Soil D – 0.79
Parcel 15 – 0.45 acres – Natural Ground – Soil D – 0.35
Main and 16th Streets – 1.66 acres – Paved – 0.95

Weighted C – [(0.43 + 1.48+ 0.62 + 0.45)*(0.79) + (0.45 * 0.35) + (1.66 * 0.95)]/ 5.09 = **0.80**


Project Site - Group D
Legend
Soil Groups
Group A
Group B
Group C
Group D
Undetermined
Data Unavailable



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} = 6.0, $\frac{P_6}{P_{24}}$ = 55 %(2)

(c) Adjusted P_6(2) = 3.3 in.

(d) t_x = VARIES min. 18 (A), 12 (B), 16 (C), 9.5 (ONSITE)

(e) I = VARIES in./hr. 4.0, 5.2, 4.2, 5.8

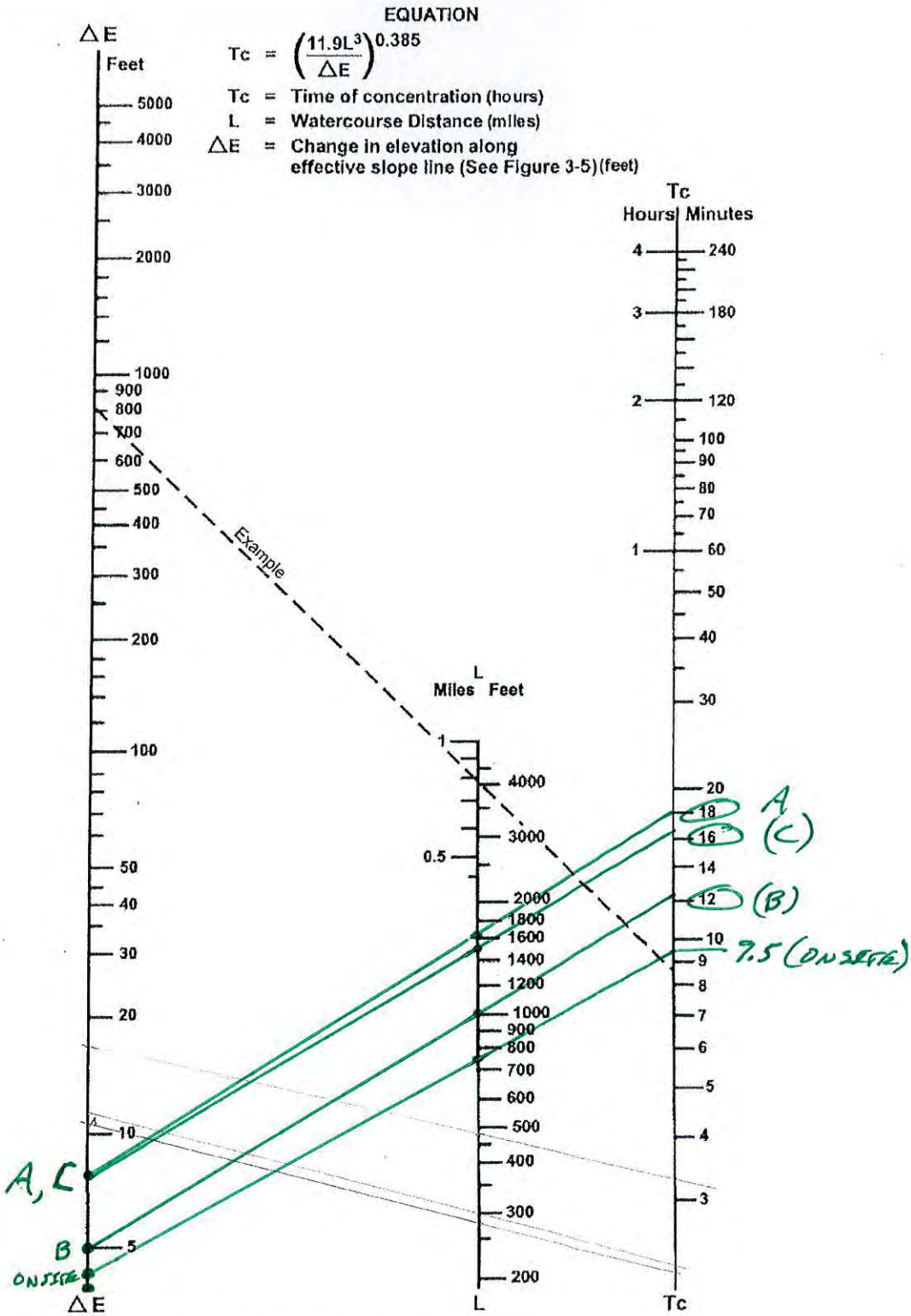
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
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	2.45
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

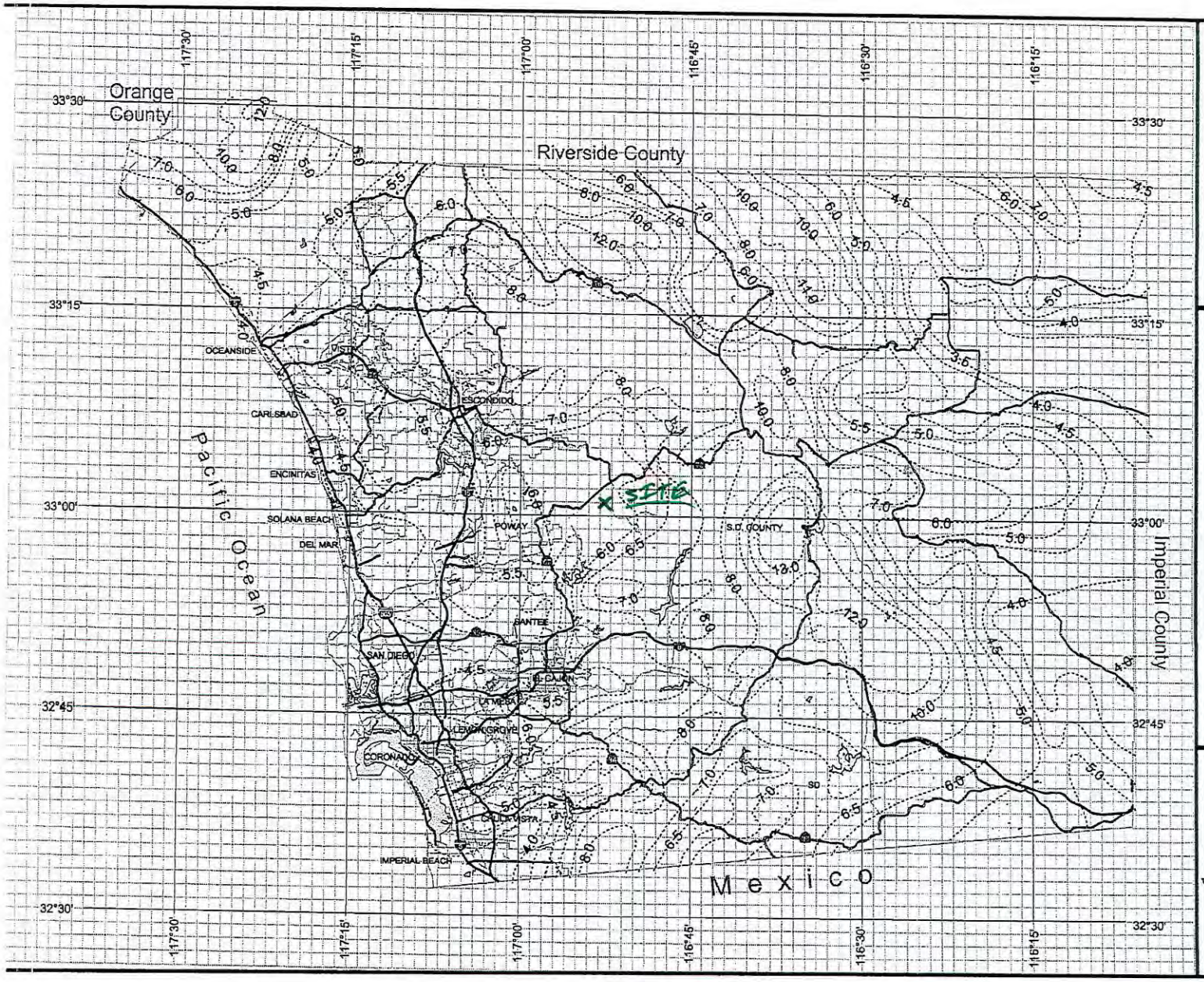


SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE

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

3-4



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

-------- Isopluvial (inches)

SSFE = 6.0"

DPW GIS
Department of Public Works Geographic Information Services

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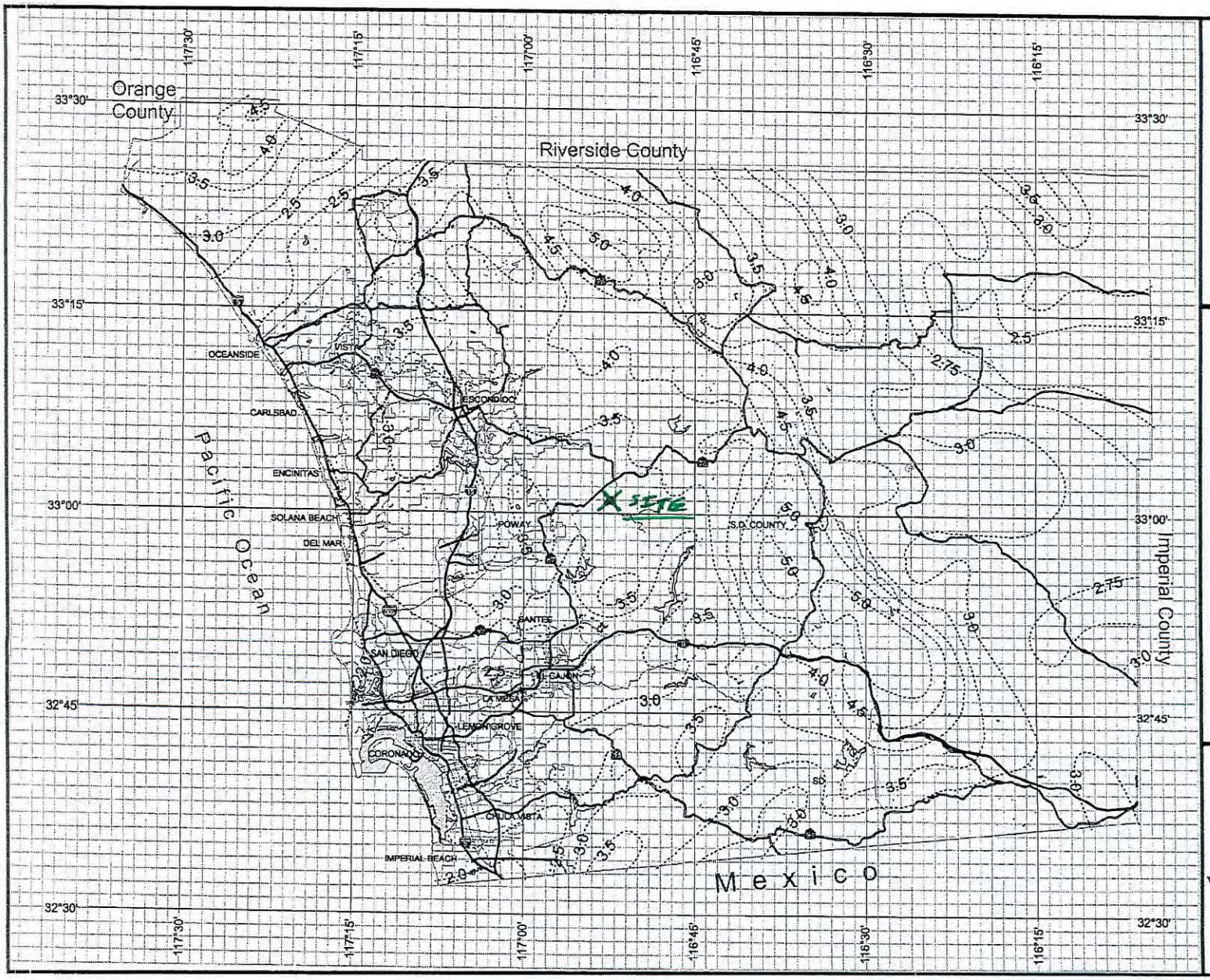
N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

SITE = 3.3"

DPW GIS

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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
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

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

```
       U N I T  H Y D R O G R A P H  A N A L Y S I S

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               Study date  03/11/15  File: RAMONAP.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++


Program License Serial Number 6269

---------------------------------------------------------------------
RAMONA POST-PROJECT CONDITION HYDROLOGY
UNIT HDYROGRAPH ANALYSIS, 100-YEAR, 24-HOUR STORM DURATION
FILENAME: RAMONAP
                    PROPOSED CONDITION
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Storm Event Year = 100

Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:
       Sub-Area(Ac.)       Rainfall (In)
            2.87             6.00

Rainfall Distribution pattern used in study:
Type B for San Diego area of California
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

********* Area-Averaged SCS Curve Number and Fm *********

Area       Area          SCS CN    SCS CN    Fm      Soil
(Ac.)      fract         (AMC2)    (AMC3)   (In/Hr)  Group
     0.29   0.100         96.0      99.2     0.000    D
     2.58   0.900         98.0      98.0

Area-averaged catchment SCS Curve Number AMC(3) = 98.120
Area-averaged Fm value using values listed =  0.000(In/Hr)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Using SCS formula for calculating lag time
        lag = L(Ft)^0.8 (S+1)^0.7 / 1900 Slope(%)^0.5
Length to the watershed divide (L) =     225.00(Ft.)
Average watershed slope in % =      0.005
S = (1000 / CN(98.12) - 10) =   0.19
Watershed area =       2.87(Ac.)
Catchment Lag time =   0.611 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 13.6369
Hydrograph baseflow =     0.00(CFS)
Minimum watershed loss rate(Fm) =  0.000(In/Hr)
Average adjusted SCS Curve Number = 98.120

Rainfall depth area reduction factors:
Using a total area of       2.87(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =    6.000(In)
Adjusted rainfall =    6.000(In)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

The following unit hydrograph was developed using an S-Graph
```

interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

VALLEY DEVELOPED S-Graph

U N I T H Y D R O G R A P H

(K = 34.73 (CFS))

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)
0.14	0.083	0.063	0.271	0.008
0.27	0.167	0.152	0.654	0.027
0.41	0.250	0.272	1.170	0.060
0.55	0.333	0.498	2.139	0.122
0.68	0.417	0.637	2.735	0.201
0.82	0.500	0.726	3.119	0.290
0.95	0.583	0.838	3.600	0.394
1.09	0.667	0.978	4.203	0.515
1.23	0.750	1.000	4.296	0.639
1.36	0.833	0.769	3.303	0.734
1.50	0.917	0.481	2.066	0.793
1.64	1.000	0.504	2.166	0.856
1.77	1.083	0.304	1.305	0.893
1.91	1.167	0.222	0.954	0.921
2.05	1.250	0.189	0.811	0.944
2.18	1.333	0.133	0.572	0.961
2.32	1.417	0.091	0.390	0.972
2.45	1.500	0.066	0.284	0.980
2.59	1.583	0.026	0.114	0.983
2.73	1.667	0.020	0.085	0.986
2.86	1.750	0.020	0.085	0.988
3.00	1.833	0.020	0.085	0.991
3.14	1.917	0.020	0.085	0.993
3.27	2.000	0.020	0.085	0.996
3.41	2.083	0.020	0.085	0.998
3.55	2.167	0.015	0.065	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\,S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0090	0.0000	0.0090	0.0000	0.0090	--------
0.17	0.0180	0.0000	0.0090	0.0000	0.0090	--------
0.25	0.0270	0.0000	0.0090	0.0000	0.0090	--------
0.33	0.0360	0.0000	0.0090	0.0000	0.0090	--------
0.42	0.0450	0.0002	0.0090	0.0002	0.0088	--------
0.50	0.0540	0.0012	0.0090	0.0010	0.0080	--------
0.58	0.0610	0.0024	0.0070	0.0012	0.0058	--------
0.67	0.0680	0.0040	0.0070	0.0016	0.0054	--------
0.75	0.0750	0.0059	0.0070	0.0019	0.0051	--------
0.83	0.0820	0.0081	0.0070	0.0022	0.0048	--------
0.92	0.0890	0.0106	0.0070	0.0025	0.0045	--------
1.00	0.0960	0.0133	0.0070	0.0027	0.0043	--------
1.08	0.1050	0.0172	0.0090	0.0039	0.0051	--------
1.17	0.1140	0.0214	0.0090	0.0042	0.0048	--------
1.25	0.1230	0.0260	0.0090	0.0045	0.0045	--------
1.33	0.1320	0.0308	0.0090	0.0048	0.0042	--------
1.42	0.1410	0.0358	0.0090	0.0051	0.0039	--------
1.50	0.1500	0.0411	0.0090	0.0053	0.0037	--------
1.58	0.1590	0.0466	0.0090	0.0055	0.0035	--------
1.67	0.1680	0.0523	0.0090	0.0057	0.0033	--------
1.75	0.1770	0.0582	0.0090	0.0059	0.0031	--------
1.83	0.1860	0.0643	0.0090	0.0061	0.0029	--------
1.92	0.1950	0.0705	0.0090	0.0062	0.0028	--------
2.00	0.2040	0.0768	0.0090	0.0063	0.0027	--------
2.08	0.2150	0.0848	0.0110	0.0079	0.0031	--------
2.17	0.2260	0.0929	0.0110	0.0081	0.0029	--------
2.25	0.2370	0.1011	0.0110	0.0083	0.0027	--------
2.33	0.2480	0.1096	0.0110	0.0084	0.0026	--------
2.42	0.2590	0.1181	0.0110	0.0086	0.0024	--------
2.50	0.2700	0.1268	0.0110	0.0087	0.0023	--------
2.58	0.2790	0.1340	0.0090	0.0072	0.0018	--------
2.67	0.2880	0.1413	0.0090	0.0073	0.0017	--------
2.75	0.2970	0.1486	0.0090	0.0073	0.0017	--------
2.83	0.3060	0.1560	0.0090	0.0074	0.0016	--------
2.92	0.3150	0.1635	0.0090	0.0075	0.0015	--------
3.00	0.3240	0.1710	0.0090	0.0075	0.0015	--------
3.08	0.3350	0.1803	0.0110	0.0093	0.0017	--------
3.17	0.3460	0.1896	0.0110	0.0093	0.0017	--------
3.25	0.3570	0.1990	0.0110	0.0094	0.0016	--------
3.33	0.3680	0.2085	0.0110	0.0095	0.0015	--------

3.42	0.3790	0.2180	0.0110	0.0095	0.0015	--------
3.50	0.3900	0.2277	0.0110	0.0096	0.0014	--------
3.58	0.4020	0.2382	0.0120	0.0105	0.0015	--------
3.67	0.4140	0.2488	0.0120	0.0106	0.0014	--------
3.75	0.4260	0.2595	0.0120	0.0107	0.0013	--------
3.83	0.4380	0.2702	0.0120	0.0107	0.0013	--------
3.92	0.4500	0.2809	0.0120	0.0108	0.0012	--------
4.00	0.4620	0.2917	0.0120	0.0108	0.0012	--------
4.08	0.4750	0.3035	0.0130	0.0118	0.0012	--------
4.17	0.4880	0.3153	0.0130	0.0118	0.0012	--------
4.25	0.5010	0.3272	0.0130	0.0119	0.0011	--------
4.33	0.5140	0.3391	0.0130	0.0119	0.0011	--------
4.42	0.5270	0.3510	0.0130	0.0119	0.0011	--------
4.50	0.5400	0.3630	0.0130	0.0120	0.0010	--------
4.58	0.5540	0.3760	0.0140	0.0130	0.0010	--------
4.67	0.5680	0.3890	0.0140	0.0130	0.0010	--------
4.75	0.5820	0.4020	0.0140	0.0130	0.0010	--------
4.83	0.5960	0.4151	0.0140	0.0131	0.0009	--------
4.92	0.6100	0.4282	0.0140	0.0131	0.0009	--------
5.00	0.6240	0.4413	0.0140	0.0131	0.0009	--------
5.08	0.6400	0.4564	0.0160	0.0150	0.0010	--------
5.17	0.6560	0.4714	0.0160	0.0151	0.0009	--------
5.25	0.6720	0.4866	0.0160	0.0151	0.0009	--------
5.33	0.6880	0.5017	0.0160	0.0152	0.0008	--------
5.42	0.7040	0.5169	0.0160	0.0152	0.0008	--------
5.50	0.7200	0.5321	0.0160	0.0152	0.0008	--------
5.58	0.7370	0.5483	0.0170	0.0162	0.0008	--------
5.67	0.7540	0.5645	0.0170	0.0162	0.0008	--------
5.75	0.7710	0.5808	0.0170	0.0163	0.0007	--------
5.83	0.7880	0.5971	0.0170	0.0163	0.0007	--------
5.92	0.8050	0.6134	0.0170	0.0163	0.0007	--------
6.00	0.8220	0.6297	0.0170	0.0163	0.0007	--------
6.08	0.8420	0.6490	0.0200	0.0192	0.0008	--------
6.17	0.8620	0.6682	0.0200	0.0193	0.0007	--------
6.25	0.8820	0.6875	0.0200	0.0193	0.0007	--------
6.33	0.9020	0.7069	0.0200	0.0193	0.0007	--------
6.42	0.9220	0.7262	0.0200	0.0194	0.0006	--------
6.50	0.9420	0.7456	0.0200	0.0194	0.0006	--------
6.58	0.9650	0.7679	0.0230	0.0223	0.0007	--------
6.67	0.9880	0.7902	0.0230	0.0223	0.0007	--------
6.75	1.0110	0.8126	0.0230	0.0224	0.0006	--------
6.83	1.0340	0.8350	0.0230	0.0224	0.0006	--------
6.92	1.0570	0.8574	0.0230	0.0224	0.0006	--------
7.00	1.0800	0.8798	0.0230	0.0224	0.0006	--------
7.08	1.1100	0.9091	0.0300	0.0293	0.0007	--------
7.17	1.1400	0.9385	0.0300	0.0293	0.0007	--------
7.25	1.1700	0.9678	0.0300	0.0294	0.0006	--------
7.33	1.2000	0.9972	0.0300	0.0294	0.0006	--------
7.42	1.2300	1.0266	0.0300	0.0294	0.0006	--------
7.50	1.2600	1.0561	0.0300	0.0294	0.0006	--------
7.58	1.3050	1.1003	0.0450	0.0442	0.0008	--------
7.67	1.3500	1.1445	0.0450	0.0442	0.0008	--------
7.75	1.3950	1.1888	0.0450	0.0443	0.0007	--------
7.83	1.4400	1.2331	0.0450	0.0443	0.0007	--------
7.92	1.4850	1.2775	0.0450	0.0444	0.0006	--------
8.00	1.5300	1.3219	0.0450	0.0444	0.0006	--------
8.08	1.5970	1.3881	0.0670	0.0662	0.0008	--------
8.17	1.6640	1.4543	0.0670	0.0662	0.0008	--------
8.25	1.7310	1.5206	0.0670	0.0663	0.0007	--------
8.33	1.7980	1.5869	0.0670	0.0663	0.0007	--------
8.42	1.8650	1.6533	0.0670	0.0664	0.0006	--------
8.50	1.9320	1.7197	0.0670	0.0664	0.0006	--------
8.58	2.0200	1.8070	0.0880	0.0873	0.0007	--------
8.67	2.1080	1.8943	0.0880	0.0873	0.0007	--------
8.75	2.1960	1.9817	0.0880	0.0874	0.0006	--------
8.83	2.2840	2.0691	0.0880	0.0874	0.0006	--------
8.92	2.3720	2.1566	0.0880	0.0875	0.0005	--------
9.00	2.4600	2.2441	0.0880	0.0875	0.0005	--------
9.08	2.5560	2.3396	0.0960	0.0955	0.0005	--------
9.17	2.6520	2.4352	0.0960	0.0955	0.0005	--------
9.25	2.7480	2.5307	0.0960	0.0956	0.0004	--------

9.33	2.8440	2.6263	0.0960	0.0956	0.0004	--------
9.42	2.9400	2.7219	0.0960	0.0956	0.0004	--------
9.50	3.0360	2.8176	0.0960	0.0956	0.0004	--------
9.58	3.1180	2.8993	0.0820	0.0817	0.0003	--------
9.67	3.2000	2.9810	0.0820	0.0817	0.0003	--------
9.75	3.2820	3.0628	0.0820	0.0817	0.0003	--------
9.83	3.3640	3.1445	0.0820	0.0818	0.0002	--------
9.92	3.4460	3.2263	0.0820	0.0818	0.0002	--------
10.00	3.5280	3.3080	0.0820	0.0818	0.0002	--------
10.08	3.5690	3.3489	0.0410	0.0409	0.0001	--------
10.17	3.6100	3.3898	0.0410	0.0409	0.0001	--------
10.25	3.6510	3.4307	0.0410	0.0409	0.0001	--------
10.33	3.6920	3.4716	0.0410	0.0409	0.0001	--------
10.42	3.7330	3.5125	0.0410	0.0409	0.0001	--------
10.50	3.7740	3.5534	0.0410	0.0409	0.0001	--------
10.58	3.8010	3.5804	0.0270	0.0269	0.0001	--------
10.67	3.8280	3.6073	0.0270	0.0269	0.0001	--------
10.75	3.8550	3.6342	0.0270	0.0269	0.0001	--------
10.83	3.8820	3.6612	0.0270	0.0269	0.0001	--------
10.92	3.9090	3.6881	0.0270	0.0269	0.0001	--------
11.00	3.9360	3.7151	0.0270	0.0269	0.0001	--------
11.08	3.9590	3.7380	0.0230	0.0229	0.0001	--------
11.17	3.9820	3.7610	0.0230	0.0230	0.0000	--------
11.25	4.0050	3.7839	0.0230	0.0230	0.0000	--------
11.33	4.0280	3.8069	0.0230	0.0230	0.0000	--------
11.42	4.0510	3.8298	0.0230	0.0230	0.0000	--------
11.50	4.0740	3.8528	0.0230	0.0230	0.0000	--------
11.58	4.0950	3.8737	0.0210	0.0210	0.0000	--------
11.67	4.1160	3.8947	0.0210	0.0210	0.0000	--------
11.75	4.1370	3.9156	0.0210	0.0210	0.0000	--------
11.83	4.1580	3.9366	0.0210	0.0210	0.0000	--------
11.92	4.1790	3.9576	0.0210	0.0210	0.0000	--------
12.00	4.2000	3.9785	0.0210	0.0210	0.0000	--------
12.08	4.2200	3.9985	0.0200	0.0200	0.0000	--------
12.17	4.2400	4.0184	0.0200	0.0200	0.0000	--------
12.25	4.2600	4.0384	0.0200	0.0200	0.0000	--------
12.33	4.2800	4.0584	0.0200	0.0200	0.0000	--------
12.42	4.3000	4.0783	0.0200	0.0200	0.0000	--------
12.50	4.3200	4.0983	0.0200	0.0200	0.0000	--------
12.58	4.3390	4.1172	0.0190	0.0190	0.0000	--------
12.67	4.3580	4.1362	0.0190	0.0190	0.0000	--------
12.75	4.3770	4.1552	0.0190	0.0190	0.0000	--------
12.83	4.3960	4.1741	0.0190	0.0190	0.0000	--------
12.92	4.4150	4.1931	0.0190	0.0190	0.0000	--------
13.00	4.4340	4.2121	0.0190	0.0190	0.0000	--------
13.08	4.4510	4.2291	0.0170	0.0170	0.0000	--------
13.17	4.4680	4.2460	0.0170	0.0170	0.0000	--------
13.25	4.4850	4.2630	0.0170	0.0170	0.0000	--------
13.33	4.5020	4.2800	0.0170	0.0170	0.0000	--------
13.42	4.5190	4.2969	0.0170	0.0170	0.0000	--------
13.50	4.5360	4.3139	0.0170	0.0170	0.0000	--------
13.58	4.5520	4.3299	0.0160	0.0160	0.0000	--------
13.67	4.5680	4.3459	0.0160	0.0160	0.0000	--------
13.75	4.5840	4.3618	0.0160	0.0160	0.0000	--------
13.83	4.6000	4.3778	0.0160	0.0160	0.0000	--------
13.92	4.6160	4.3938	0.0160	0.0160	0.0000	--------
14.00	4.6320	4.4097	0.0160	0.0160	0.0000	--------
14.08	4.6500	4.4277	0.0180	0.0180	0.0000	--------
14.17	4.6680	4.4457	0.0180	0.0180	0.0000	--------
14.25	4.6860	4.4637	0.0180	0.0180	0.0000	--------
14.33	4.7040	4.4816	0.0180	0.0180	0.0000	--------
14.42	4.7220	4.4996	0.0180	0.0180	0.0000	--------
14.50	4.7400	4.5176	0.0180	0.0180	0.0000	--------
14.58	4.7500	4.5276	0.0100	0.0100	0.0000	--------
14.67	4.7600	4.5375	0.0100	0.0100	0.0000	--------
14.75	4.7700	4.5475	0.0100	0.0100	0.0000	--------
14.83	4.7800	4.5575	0.0100	0.0100	0.0000	--------
14.92	4.7900	4.5675	0.0100	0.0100	0.0000	--------
15.00	4.8000	4.5775	0.0100	0.0100	0.0000	--------
15.08	4.8160	4.5935	0.0160	0.0160	0.0000	--------
15.17	4.8320	4.6094	0.0160	0.0160	0.0000	--------

15.25	4.8480	4.6254	0.0160	0.0160	0.0000	--------
15.33	4.8640	4.6414	0.0160	0.0160	0.0000	--------
15.42	4.8800	4.6574	0.0160	0.0160	0.0000	--------
15.50	4.8960	4.6733	0.0160	0.0160	0.0000	--------
15.58	4.9110	4.6883	0.0150	0.0150	0.0000	--------
15.67	4.9260	4.7033	0.0150	0.0150	0.0000	--------
15.75	4.9410	4.7183	0.0150	0.0150	0.0000	--------
15.83	4.9560	4.7333	0.0150	0.0150	0.0000	--------
15.92	4.9710	4.7482	0.0150	0.0150	0.0000	--------
16.00	4.9860	4.7632	0.0150	0.0150	0.0000	--------
16.08	5.0000	4.7772	0.0140	0.0140	0.0000	--------
16.17	5.0140	4.7912	0.0140	0.0140	0.0000	--------
16.25	5.0280	4.8052	0.0140	0.0140	0.0000	--------
16.33	5.0420	4.8191	0.0140	0.0140	0.0000	--------
16.42	5.0560	4.8331	0.0140	0.0140	0.0000	--------
16.50	5.0700	4.8471	0.0140	0.0140	0.0000	--------
16.58	5.0850	4.8621	0.0150	0.0150	0.0000	--------
16.67	5.1000	4.8771	0.0150	0.0150	0.0000	--------
16.75	5.1150	4.8920	0.0150	0.0150	0.0000	--------
16.83	5.1300	4.9070	0.0150	0.0150	0.0000	--------
16.92	5.1450	4.9220	0.0150	0.0150	0.0000	--------
17.00	5.1600	4.9370	0.0150	0.0150	0.0000	--------
17.08	5.1720	4.9490	0.0120	0.0120	0.0000	--------
17.17	5.1840	4.9610	0.0120	0.0120	0.0000	--------
17.25	5.1960	4.9729	0.0120	0.0120	0.0000	--------
17.33	5.2080	4.9849	0.0120	0.0120	0.0000	--------
17.42	5.2200	4.9969	0.0120	0.0120	0.0000	--------
17.50	5.2320	5.0089	0.0120	0.0120	0.0000	--------
17.58	5.2450	5.0219	0.0130	0.0130	0.0000	--------
17.67	5.2580	5.0349	0.0130	0.0130	0.0000	--------
17.75	5.2710	5.0478	0.0130	0.0130	0.0000	--------
17.83	5.2840	5.0608	0.0130	0.0130	0.0000	--------
17.92	5.2970	5.0738	0.0130	0.0130	0.0000	--------
18.00	5.3100	5.0868	0.0130	0.0130	0.0000	--------
18.08	5.3200	5.0968	0.0100	0.0100	0.0000	--------
18.17	5.3300	5.1068	0.0100	0.0100	0.0000	--------
18.25	5.3400	5.1168	0.0100	0.0100	0.0000	--------
18.33	5.3500	5.1267	0.0100	0.0100	0.0000	--------
18.42	5.3600	5.1367	0.0100	0.0100	0.0000	--------
18.50	5.3700	5.1467	0.0100	0.0100	0.0000	--------
18.58	5.3800	5.1567	0.0100	0.0100	0.0000	--------
18.67	5.3900	5.1667	0.0100	0.0100	0.0000	--------
18.75	5.4000	5.1767	0.0100	0.0100	0.0000	--------
18.83	5.4100	5.1867	0.0100	0.0100	0.0000	--------
18.92	5.4200	5.1967	0.0100	0.0100	0.0000	--------
19.00	5.4300	5.2067	0.0100	0.0100	0.0000	--------
19.08	5.4390	5.2156	0.0090	0.0090	0.0000	--------
19.17	5.4480	5.2246	0.0090	0.0090	0.0000	--------
19.25	5.4570	5.2336	0.0090	0.0090	0.0000	--------
19.33	5.4660	5.2426	0.0090	0.0090	0.0000	--------
19.42	5.4750	5.2516	0.0090	0.0090	0.0000	--------
19.50	5.4840	5.2606	0.0090	0.0090	0.0000	--------
19.58	5.4940	5.2706	0.0100	0.0100	0.0000	--------
19.67	5.5040	5.2806	0.0100	0.0100	0.0000	--------
19.75	5.5140	5.2906	0.0100	0.0100	0.0000	--------
19.83	5.5240	5.3005	0.0100	0.0100	0.0000	--------
19.92	5.5340	5.3105	0.0100	0.0100	0.0000	--------
20.00	5.5440	5.3205	0.0100	0.0100	0.0000	--------
20.08	5.5550	5.3315	0.0110	0.0110	0.0000	--------
20.17	5.5660	5.3425	0.0110	0.0110	0.0000	--------
20.25	5.5770	5.3535	0.0110	0.0110	0.0000	--------
20.33	5.5880	5.3645	0.0110	0.0110	0.0000	--------
20.42	5.5990	5.3755	0.0110	0.0110	0.0000	--------
20.50	5.6100	5.3864	0.0110	0.0110	0.0000	--------
20.58	5.6200	5.3964	0.0100	0.0100	0.0000	--------
20.67	5.6300	5.4064	0.0100	0.0100	0.0000	--------
20.75	5.6400	5.4164	0.0100	0.0100	0.0000	--------
20.83	5.6500	5.4264	0.0100	0.0100	0.0000	--------
20.92	5.6600	5.4364	0.0100	0.0100	0.0000	--------
21.00	5.6700	5.4464	0.0100	0.0100	0.0000	--------
21.08	5.6790	5.4554	0.0090	0.0090	0.0000	--------

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 21.17   5.6880    5.4644    0.0090    0.0090    0.0000 --------
 21.25   5.6970    5.4734    0.0090    0.0090    0.0000 --------
 21.33   5.7060    5.4823    0.0090    0.0090    0.0000 --------
 21.42   5.7150    5.4913    0.0090    0.0090    0.0000 --------
 21.50   5.7240    5.5003    0.0090    0.0090    0.0000 --------
 21.58   5.7330    5.5093    0.0090    0.0090    0.0000 --------
 21.67   5.7420    5.5183    0.0090    0.0090    0.0000 --------
 21.75   5.7510    5.5273    0.0090    0.0090    0.0000 --------
 21.83   5.7600    5.5363    0.0090    0.0090    0.0000 --------
 21.92   5.7690    5.5453    0.0090    0.0090    0.0000 --------
 22.00   5.7780    5.5543    0.0090    0.0090    0.0000 --------
 22.08   5.7870    5.5633    0.0090    0.0090    0.0000 --------
 22.17   5.7960    5.5722    0.0090    0.0090    0.0000 --------
 22.25   5.8050    5.5812    0.0090    0.0090    0.0000 --------
 22.33   5.8140    5.5902    0.0090    0.0090    0.0000 --------
 22.42   5.8230    5.5992    0.0090    0.0090    0.0000 --------
 22.50   5.8320    5.6082    0.0090    0.0090    0.0000 --------
 22.58   5.8410    5.6172    0.0090    0.0090    0.0000 --------
 22.67   5.8500    5.6262    0.0090    0.0090    0.0000 --------
 22.75   5.8590    5.6352    0.0090    0.0090    0.0000 --------
 22.83   5.8680    5.6442    0.0090    0.0090    0.0000 --------
 22.92   5.8770    5.6532    0.0090    0.0090    0.0000 --------
 23.00   5.8860    5.6622    0.0090    0.0090    0.0000 --------
 23.08   5.8960    5.6721    0.0100    0.0100    0.0000 --------
 23.17   5.9060    5.6821    0.0100    0.0100    0.0000 --------
 23.25   5.9160    5.6921    0.0100    0.0100    0.0000 --------
 23.33   5.9260    5.7021    0.0100    0.0100    0.0000 --------
 23.42   5.9360    5.7121    0.0100    0.0100    0.0000 --------
 23.50   5.9460    5.7221    0.0100    0.0100    0.0000 --------
 23.58   5.9550    5.7311    0.0090    0.0090    0.0000 --------
 23.67   5.9640    5.7401    0.0090    0.0090    0.0000 --------
 23.75   5.9730    5.7491    0.0090    0.0090    0.0000 --------
 23.83   5.9820    5.7581    0.0090    0.0090    0.0000 --------
 23.92   5.9910    5.7671    0.0090    0.0090    0.0000 --------
 24.00   6.0000    5.7760    0.0090    0.0090    0.0000 --------
-----------------------------------------------------------------
-----------------------------------------------------------------
Total soil rain loss =      0.22(In)
Total effective runoff =      5.78(In)
-----------------------------------------------------------------
Peak flow rate this hydrograph =           3.15(CFS)
Total runoff volume this hydrograph =          60175.4(Ft3)
-----------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                R u n o f f      H y d r o g r a p h
-----------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

-----------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0000      0.00  Q         |         |         |         |
  0+15       0.0000      0.00  Q         |         |         |         |
  0+20       0.0000      0.00  Q         |         |         |         |
  0+25       0.0000      0.00  Q         |         |         |         |
  0+30       0.0000      0.00  Q         |         |         |         |
  0+35       0.0000      0.00  Q         |         |         |         |
  0+40       0.0000      0.00  Q         |         |         |         |
  0+45       0.0001      0.01  Q         |         |         |         |
  0+50       0.0001      0.01  Q         |         |         |         |
  0+55       0.0002      0.01  Q         |         |         |         |
  1+ 0       0.0004      0.02  Q         |         |         |         |
  1+ 5       0.0006      0.03  Q         |         |         |         |
  1+10       0.0009      0.04  Q         |         |         |         |
  1+15       0.0012      0.05  Q         |         |         |         |
  1+20       0.0016      0.06  Q         |         |         |         |
  1+25       0.0022      0.07  Q         |         |         |         |
  1+30       0.0028      0.09  Q         |         |         |         |
  1+35       0.0034      0.10  Q         |         |         |         |
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1+40       0.0042      0.11  Q         |         |         |         |
1+45       0.0051      0.13  Q         |         |         |         |
1+50       0.0061      0.14  Q         |         |         |         |
1+55       0.0071      0.15  Q         |         |         |         |
2+ 0       0.0082      0.16  Q         |         |         |         |
2+ 5       0.0094      0.17  Q         |         |         |         |
2+10       0.0106      0.18  Q         |         |         |         |
2+15       0.0119      0.19  Q         |         |         |         |
2+20       0.0133      0.20  Q         |         |         |         |
2+25       0.0148      0.21  Q         |         |         |         |
2+30       0.0163      0.22  Q         |         |         |         |
2+35       0.0179      0.23  Q         |         |         |         |
2+40       0.0196      0.24  Q         |         |         |         |
2+45       0.0214      0.25  VQ        |         |         |         |
2+50       0.0232      0.26  VQ        |         |         |         |
2+55       0.0250      0.26  VQ        |         |         |         |
3+ 0       0.0268      0.27  VQ        |         |         |         |
3+ 5       0.0287      0.27  VQ        |         |         |         |
3+10       0.0305      0.27  VQ        |         |         |         |
3+15       0.0324      0.27  VQ        |         |         |         |
3+20       0.0342      0.27  VQ        |         |         |         |
3+25       0.0361      0.28  |Q        |         |         |         |
3+30       0.0381      0.28  |Q        |         |         |         |
3+35       0.0400      0.29  |Q        |         |         |         |
3+40       0.0421      0.30  |Q        |         |         |         |
3+45       0.0442      0.31  |Q        |         |         |         |
3+50       0.0463      0.31  |Q        |         |         |         |
3+55       0.0486      0.32  |Q        |         |         |         |
4+ 0       0.0508      0.33  |Q        |         |         |         |
4+ 5       0.0532      0.34  |Q        |         |         |         |
4+10       0.0555      0.35  |Q        |         |         |         |
4+15       0.0580      0.35  |Q        |         |         |         |
4+20       0.0605      0.36  |Q        |         |         |         |
4+25       0.0630      0.37  |Q        |         |         |         |
4+30       0.0656      0.38  |Q        |         |         |         |
4+35       0.0682      0.38  |Q        |         |         |         |
4+40       0.0709      0.39  |QV       |         |         |         |
4+45       0.0737      0.40  |QV       |         |         |         |
4+50       0.0764      0.40  |QV       |         |         |         |
4+55       0.0793      0.41  |QV       |         |         |         |
5+ 0       0.0821      0.42  |QV       |         |         |         |
5+ 5       0.0851      0.42  |QV       |         |         |         |
5+10       0.0880      0.43  |QV       |         |         |         |
5+15       0.0911      0.44  |QV       |         |         |         |
5+20       0.0942      0.45  |QV       |         |         |         |
5+25       0.0973      0.46  |QV       |         |         |         |
5+30       0.1005      0.47  |QV       |         |         |         |
5+35       0.1038      0.48  |Q V      |         |         |         |
5+40       0.1072      0.49  |Q V      |         |         |         |
5+45       0.1106      0.50  |Q V      |         |         |         |
5+50       0.1141      0.51  | QV      |         |         |         |
5+55       0.1177      0.52  | QV      |         |         |         |
6+ 0       0.1213      0.53  | QV      |         |         |         |
6+ 5       0.1250      0.53  | QV      |         |         |         |
6+10       0.1287      0.54  | QV      |         |         |         |
6+15       0.1325      0.55  | QV      |         |         |         |
6+20       0.1364      0.56  | QV      |         |         |         |
6+25       0.1404      0.58  | Q V     |         |         |         |
6+30       0.1444      0.59  | Q V     |         |         |         |
6+35       0.1486      0.60  | Q V     |         |         |         |
6+40       0.1528      0.62  | Q V     |         |         |         |
6+45       0.1572      0.64  | Q V     |         |         |         |
6+50       0.1617      0.65  | Q V     |         |         |         |
6+55       0.1663      0.67  | Q V     |         |         |         |
7+ 0       0.1710      0.69  | Q V     |         |         |         |
7+ 5       0.1759      0.70  | Q  V    |         |         |         |
7+10       0.1808      0.72  | Q  V    |         |         |         |
7+15       0.1860      0.75  | Q  V    |         |         |         |
7+20       0.1913      0.77  |  Q V    |         |         |         |
7+25       0.1968      0.80  |  Q V    |         |         |         |
7+30       0.2025      0.83  |  Q V    |         |         |         |
```

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 7+35       0.2085      0.86  |  Q  V   |         |         |         |
 7+40       0.2147      0.91  |  Q  V   |         |         |         |
 7+45       0.2213      0.96  |  Q  V   |         |         |         |
 7+50       0.2283      1.01  |   Q V   |         |         |         |
 7+55       0.2357      1.07  |   Q V   |         |         |         |
 8+ 0       0.2435      1.13  |   Q  V  |         |         |         |
 8+ 5       0.2517      1.20  |   Q  V  |         |         |         |
 8+10       0.2606      1.29  |    Q V  |         |         |         |
 8+15       0.2701      1.38  |    Q V  |         |         |         |
 8+20       0.2803      1.48  |    Q  V |         |         |         |
 8+25       0.2912      1.58  |     Q V |         |         |         |
 8+30       0.3028      1.68  |     Q V |         |         |         |
 8+35       0.3151      1.79  |      Q V|         |         |         |
 8+40       0.3282      1.91  |      Q V|         |         |         |
 8+45       0.3422      2.04  |       QV|         |         |         |
 8+50       0.3572      2.17  |       Q V         |         |         |
 8+55       0.3728      2.28  |        QV         |         |         |
 9+ 0       0.3893      2.39  |        Q|V        |         |         |
 9+ 5       0.4066      2.50  |         QV        |         |         |
 9+10       0.4246      2.62  |         Q V       |         |         |
 9+15       0.4435      2.74  |         Q V       |         |         |
 9+20       0.4630      2.84  |         |Q V      |         |         |
 9+25       0.4831      2.92  |         |Q V      |         |         |
 9+30       0.5037      2.99  |         |Q  V     |         |         |
 9+35       0.5248      3.05  |         | Q  V    |         |         |
 9+40       0.5461      3.10  |         | Q  V    |         |         |
 9+45       0.5677      3.14  |         | Q   V   |         |         |
 9+50       0.5894      3.15  |         | Q    V  |         |         |
 9+55       0.6110      3.14  |         | Q    V  |         |         |
10+ 0       0.6325      3.12  |         | Q     V |         |         |
10+ 5       0.6537      3.08  |         | Q     V |         |         |
10+10       0.6744      3.00  |         | Q      V|         |         |
10+15       0.6944      2.90  |         |Q        V         |         |
10+20       0.7135      2.78  |         |Q        V         |         |
10+25       0.7317      2.64  |         Q         |V        |         |
10+30       0.7488      2.49  |        Q|         |V        |         |
10+35       0.7648      2.32  |        Q|         | V       |         |
10+40       0.7794      2.13  |       Q |         | V       |         |
10+45       0.7927      1.93  |      Q  |         | V       |         |
10+50       0.8048      1.75  |      Q  |         |  V      |         |
10+55       0.8160      1.63  |     Q   |         |  V      |         |
11+ 0       0.8263      1.49  |    Q    |         |  V      |         |
11+ 5       0.8358      1.39  |    Q    |         |   V     |         |
11+10       0.8447      1.29  |    Q    |         |   V     |         |
11+15       0.8529      1.19  |   Q     |         |   V     |         |
11+20       0.8605      1.11  |   Q     |         |   V     |         |
11+25       0.8677      1.05  |   Q     |         |    V    |         |
11+30       0.8746      1.00  |  Q      |         |    V    |         |
11+35       0.8812      0.96  |  Q      |         |    V    |         |
11+40       0.8875      0.92  |  Q      |         |    V    |         |
11+45       0.8936      0.89  |  Q      |         |    V    |         |
11+50       0.8995      0.86  |  Q      |         |     V   |         |
11+55       0.9053      0.83  |  Q      |         |     V   |         |
12+ 0       0.9109      0.81  |  Q      |         |     V   |         |
12+ 5       0.9164      0.79  |  Q      |         |     V   |         |
12+10       0.9217      0.78  |  Q      |         |     V   |         |
12+15       0.9270      0.76  |  Q      |         |     V   |         |
12+20       0.9322      0.75  |  Q      |         |     V   |         |
12+25       0.9373      0.74  | Q       |         |      V  |         |
12+30       0.9423      0.73  | Q       |         |      V  |         |
12+35       0.9473      0.72  | Q       |         |      V  |         |
12+40       0.9522      0.72  | Q       |         |      V  |         |
12+45       0.9571      0.71  | Q       |         |      V  |         |
12+50       0.9620      0.70  | Q       |         |      V  |         |
12+55       0.9668      0.70  | Q       |         |      V  |         |
13+ 0       0.9715      0.69  | Q       |         |       V |         |
13+ 5       0.9762      0.68  | Q       |         |       V |         |
13+10       0.9809      0.68  | Q       |         |       V |         |
13+15       0.9855      0.67  | Q       |         |       V |         |
13+20       0.9900      0.66  | Q       |         |       V |         |
13+25       0.9945      0.65  | Q       |         |       V |         |
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13+30       0.9990      0.64  | Q       |         |       V |         |
13+35       1.0034      0.64  | Q       |         |        V|         |
13+40       1.0077      0.63  | Q       |         |        V|         |
13+45       1.0119      0.61  | Q       |         |        V|         |
13+50       1.0161      0.61  | Q       |         |        V|         |
13+55       1.0202      0.60  | Q       |         |        V|         |
14+ 0       1.0243      0.59  | Q       |         |        V|         |
14+ 5       1.0283      0.58  | Q       |         |        V|         |
14+10       1.0323      0.58  | Q       |         |        V|         |
14+15       1.0362      0.58  | Q       |         |         V         |
14+20       1.0402      0.58  | Q       |         |         V         |
14+25       1.0442      0.58  | Q       |         |         V         |
14+30       1.0482      0.58  | Q       |         |         V         |
14+35       1.0522      0.58  | Q       |         |         V         |
14+40       1.0562      0.59  | Q       |         |         V         |
14+45       1.0603      0.59  | Q       |         |         V         |
14+50       1.0642      0.57  | Q       |         |         V         |
14+55       1.0681      0.56  | Q       |         |         V         |
15+ 0       1.0717      0.53  | Q       |         |         |V        |
15+ 5       1.0752      0.51  | Q       |         |         |V        |
15+10       1.0786      0.48  |Q        |         |         |V        |
15+15       1.0817      0.46  |Q        |         |         |V        |
15+20       1.0848      0.44  |Q        |         |         |V        |
15+25       1.0878      0.44  |Q        |         |         |V        |
15+30       1.0909      0.45  |Q        |         |         |V        |
15+35       1.0940      0.46  |Q        |         |         |V        |
15+40       1.0973      0.47  |Q        |         |         |V        |
15+45       1.1007      0.49  |Q        |         |         |V        |
15+50       1.1042      0.51  | Q       |         |         |V        |
15+55       1.1077      0.51  | Q       |         |         | V       |
16+ 0       1.1113      0.52  | Q       |         |         | V       |
16+ 5       1.1149      0.52  | Q       |         |         | V       |
16+10       1.1185      0.52  | Q       |         |         | V       |
16+15       1.1221      0.52  | Q       |         |         | V       |
16+20       1.1257      0.52  | Q       |         |         | V       |
16+25       1.1292      0.52  | Q       |         |         | V       |
16+30       1.1327      0.51  | Q       |         |         | V       |
16+35       1.1362      0.51  | Q       |         |         | V       |
16+40       1.1397      0.50  | Q       |         |         |  V      |
16+45       1.1431      0.50  |Q        |         |         |  V      |
16+50       1.1466      0.50  |Q        |         |         |  V      |
16+55       1.1500      0.50  |Q        |         |         |  V      |
17+ 0       1.1535      0.50  | Q       |         |         |  V      |
17+ 5       1.1569      0.50  | Q       |         |         |  V      |
17+10       1.1604      0.50  | Q       |         |         |  V      |
17+15       1.1639      0.50  | Q       |         |         |  V      |
17+20       1.1673      0.50  |Q        |         |         |  V      |
17+25       1.1707      0.49  |Q        |         |         |  V      |
17+30       1.1740      0.49  |Q        |         |         |  V      |
17+35       1.1773      0.48  |Q        |         |         |   V     |
17+40       1.1805      0.47  |Q        |         |         |   V     |
17+45       1.1837      0.45  |Q        |         |         |   V     |
17+50       1.1867      0.45  |Q        |         |         |   V     |
17+55       1.1898      0.44  |Q        |         |         |   V     |
18+ 0       1.1928      0.44  |Q        |         |         |   V     |
18+ 5       1.1959      0.44  |Q        |         |         |   V     |
18+10       1.1989      0.44  |Q        |         |         |   V     |
18+15       1.2019      0.44  |Q        |         |         |   V     |
18+20       1.2049      0.43  |Q        |         |         |   V     |
18+25       1.2078      0.43  |Q        |         |         |   V     |
18+30       1.2107      0.42  |Q        |         |         |    V    |
18+35       1.2135      0.41  |Q        |         |         |    V    |
18+40       1.2162      0.40  |Q        |         |         |    V    |
18+45       1.2189      0.38  |Q        |         |         |    V    |
18+50       1.2214      0.37  |Q        |         |         |    V    |
18+55       1.2240      0.37  |Q        |         |         |    V    |
19+ 0       1.2265      0.36  |Q        |         |         |    V    |
19+ 5       1.2289      0.36  |Q        |         |         |    V    |
19+10       1.2314      0.35  |Q        |         |         |    V    |
19+15       1.2338      0.35  |Q        |         |         |    V    |
19+20       1.2362      0.35  |Q        |         |         |    V    |
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19+25       1.2385      0.34  |Q         |          |          |    V    |
19+30       1.2409      0.34  |Q         |          |          |    V    |
19+35       1.2432      0.34  |Q         |          |          |    V    |
19+40       1.2454      0.33  |Q         |          |          |     V   |
19+45       1.2477      0.33  |Q         |          |          |     V   |
19+50       1.2500      0.33  |Q         |          |          |     V   |
19+55       1.2522      0.33  |Q         |          |          |     V   |
20+ 0       1.2545      0.33  |Q         |          |          |     V   |
20+ 5       1.2567      0.33  |Q         |          |          |     V   |
20+10       1.2590      0.33  |Q         |          |          |     V   |
20+15       1.2614      0.34  |Q         |          |          |     V   |
20+20       1.2637      0.34  |Q         |          |          |     V   |
20+25       1.2661      0.35  |Q         |          |          |     V   |
20+30       1.2685      0.35  |Q         |          |          |     V   |
20+35       1.2710      0.36  |Q         |          |          |     V   |
20+40       1.2735      0.36  |Q         |          |          |     V   |
20+45       1.2760      0.37  |Q         |          |          |     V   |
20+50       1.2785      0.37  |Q         |          |          |      V  |
20+55       1.2811      0.37  |Q         |          |          |      V  |
21+ 0       1.2836      0.37  |Q         |          |          |      V  |
21+ 5       1.2861      0.36  |Q         |          |          |      V  |
21+10       1.2886      0.36  |Q         |          |          |      V  |
21+15       1.2910      0.35  |Q         |          |          |      V  |
21+20       1.2934      0.35  |Q         |          |          |      V  |
21+25       1.2958      0.35  |Q         |          |          |      V  |
21+30       1.2982      0.34  |Q         |          |          |      V  |
21+35       1.3005      0.34  |Q         |          |          |      V  |
21+40       1.3028      0.33  |Q         |          |          |      V  |
21+45       1.3050      0.33  |Q         |          |          |      V  |
21+50       1.3072      0.32  |Q         |          |          |      V  |
21+55       1.3094      0.32  |Q         |          |          |      V  |
22+ 0       1.3116      0.32  |Q         |          |          |      V  |
22+ 5       1.3138      0.32  |Q         |          |          |       V |
22+10       1.3160      0.32  |Q         |          |          |       V |
22+15       1.3181      0.31  |Q         |          |          |       V |
22+20       1.3203      0.31  |Q         |          |          |       V |
22+25       1.3225      0.31  |Q         |          |          |       V |
22+30       1.3246      0.31  |Q         |          |          |       V |
22+35       1.3268      0.31  |Q         |          |          |       V |
22+40       1.3289      0.31  |Q         |          |          |       V |
22+45       1.3311      0.31  |Q         |          |          |       V |
22+50       1.3332      0.31  |Q         |          |          |       V |
22+55       1.3354      0.31  |Q         |          |          |       V |
23+ 0       1.3375      0.31  |Q         |          |          |       V |
23+ 5       1.3397      0.31  |Q         |          |          |       V |
23+10       1.3418      0.31  |Q         |          |          |       V |
23+15       1.3440      0.31  |Q         |          |          |       V |
23+20       1.3462      0.32  |Q         |          |          |       V |
23+25       1.3484      0.32  |Q         |          |          |        V|
23+30       1.3506      0.32  |Q         |          |          |        V|
23+35       1.3528      0.33  |Q         |          |          |        V|
23+40       1.3551      0.33  |Q         |          |          |        V|
23+45       1.3574      0.33  |Q         |          |          |        V|
23+50       1.3597      0.33  |Q         |          |          |        V|
23+55       1.3620      0.33  |Q         |          |          |        V|
24+ 0       1.3643      0.33  |Q         |          |          |        V|
24+ 5       1.3665      0.33  |Q         |          |          |        V|
24+10       1.3687      0.32  |Q         |          |          |        V|
24+15       1.3708      0.30  |Q         |          |          |        V|
24+20       1.3727      0.28  |Q         |          |          |        V|
24+25       1.3745      0.26  |Q         |          |          |        V|
24+30       1.3761      0.23  Q          |          |          |        V|
24+35       1.3774      0.19  Q          |          |          |        V|
24+40       1.3784      0.15  Q          |          |          |        V|
24+45       1.3792      0.11  Q          |          |          |        V|
24+50       1.3798      0.08  Q          |          |          |        V|
24+55       1.3803      0.07  Q          |          |          |        V|
25+ 0       1.3806      0.05  Q          |          |          |        V|
25+ 5       1.3808      0.03  Q          |          |          |        V|
25+10       1.3810      0.03  Q          |          |          |        V|
25+15       1.3811      0.02  Q          |          |          |        V|
```

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  25+20       1.3812      0.01  Q         |         |         |        V|
  25+25       1.3813      0.01  Q         |         |         |        V|
  25+30       1.3813      0.01  Q         |         |         |        V|
  25+35       1.3813      0.01  Q         |         |         |        V|
  25+40       1.3814      0.00  Q         |         |         |        V|
  25+45       1.3814      0.00  Q         |         |         |        V|
  25+50       1.3814      0.00  Q         |         |         |        V|
  25+55       1.3814      0.00  Q         |         |         |        V|
  26+ 0       1.3814      0.00  Q         |         |         |        V|
  26+ 5       1.3814      0.00  Q         |         |         |         V
----------------------------------------------------------------------
```

```
       U N I T  H Y D R O G R A P H  A N A L Y S I S

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               Study date  03/11/15  File: RAMONAEX.out


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Program License Serial Number 6269

---------------------------------------------------------------------
RAMONA PRE-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 24-HOUR STORM DURATION
FILENAME: RAMONAEX
                    EXISTING CONDITION
---------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Storm Event Year = 100

Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:
       Sub-Area(Ac.)       Rainfall (In)
            2.87             6.00

Rainfall Distribution pattern used in study:
Type B for San Diego area of California
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

********* Area-Averaged SCS Curve Number and Fm *********

Area       Area          SCS CN    SCS CN    Fm      Soil
(Ac.)      fract         (AMC2)    (AMC3)   (In/Hr)  Group
     2.87   1.000         84.0      96.4     0.000    D

Area-averaged catchment SCS Curve Number AMC(3) = 96.400
Area-averaged Fm value using values listed =  0.000(In/Hr)
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Using SCS formula for calculating lag time
       lag = L(Ft)^0.8 (S+1)^0.7 / 1900 Slope(%)^0.5
Length to the watershed divide (L) =     230.00(Ft.)
Average watershed slope in % =      0.007
S = (1000 / CN(96.40) - 10) =   0.37
Watershed area =       2.87(Ac.)
Catchment Lag time =   0.609 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 13.6858
Hydrograph baseflow =     0.00(CFS)
Minimum watershed loss rate(Fm) =  0.000(In/Hr)
Average adjusted SCS Curve Number = 96.400

Rainfall depth area reduction factors:
Using a total area of       2.87(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =    6.000(In)
Adjusted rainfall =    6.000(In)
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

The following unit hydrograph was developed using an S-Graph
interpolated by time percentage of lag time vs. percentage of peak flow.
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The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

VALLEY UN-DEVELOPED S-Graph

U N I T H Y D R O G R A P H

(K = 34.73 (CFS))

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)
0.14	0.083	0.121	0.412	0.012
0.27	0.167	0.282	0.962	0.040
0.41	0.250	0.458	1.561	0.085
0.55	0.333	0.634	2.162	0.147
0.68	0.417	0.834	2.844	0.229
0.82	0.500	0.953	3.251	0.322
0.96	0.583	1.000	3.411	0.420
1.09	0.667	0.938	3.201	0.513
1.23	0.750	0.718	2.447	0.583
1.37	0.833	0.537	1.833	0.636
1.51	0.917	0.426	1.454	0.678
1.64	1.000	0.330	1.127	0.710
1.78	1.083	0.265	0.902	0.736
1.92	1.167	0.216	0.736	0.757
2.05	1.250	0.203	0.693	0.777
2.19	1.333	0.175	0.595	0.795
2.33	1.417	0.163	0.555	0.811
2.46	1.500	0.142	0.484	0.825
2.60	1.583	0.135	0.460	0.838
2.74	1.667	0.123	0.420	0.850
2.87	1.750	0.113	0.387	0.861
3.01	1.833	0.100	0.342	0.871
3.15	1.917	0.091	0.309	0.880
3.28	2.000	0.084	0.285	0.888
3.42	2.083	0.084	0.285	0.896
3.56	2.167	0.082	0.278	0.904
3.70	2.250	0.065	0.222	0.911
3.83	2.333	0.061	0.209	0.917
3.97	2.417	0.061	0.209	0.923
4.11	2.500	0.056	0.192	0.928
4.24	2.583	0.045	0.154	0.933
4.38	2.667	0.045	0.152	0.937
4.52	2.750	0.045	0.152	0.941
4.65	2.833	0.043	0.146	0.946

4.79	2.917	0.042	0.143	0.950
4.93	3.000	0.042	0.143	0.954
5.06	3.083	0.041	0.138	0.958
5.20	3.167	0.032	0.110	0.961
5.34	3.250	0.031	0.105	0.964
5.47	3.333	0.031	0.105	0.967
5.61	3.417	0.029	0.098	0.970
5.75	3.500	0.025	0.086	0.972
5.88	3.583	0.025	0.086	0.975
6.02	3.667	0.025	0.085	0.977
6.16	3.750	0.021	0.073	0.979
6.30	3.833	0.020	0.067	0.981
6.43	3.917	0.020	0.067	0.983
6.57	4.000	0.019	0.064	0.985
6.71	4.083	0.015	0.050	0.986
6.84	4.167	0.014	0.048	0.988
6.98	4.250	0.014	0.048	0.989
7.12	4.333	0.014	0.048	0.990
7.25	4.417	0.014	0.048	0.992
7.39	4.500	0.014	0.048	0.993
7.53	4.583	0.014	0.048	0.995
7.66	4.667	0.014	0.048	0.996
7.80	4.750	0.014	0.048	0.997
7.94	4.833	0.014	0.048	0.999
8.07	4.917	0.013	0.045	1.000

++

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\,S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0090	0.0000	0.0090	0.0000	0.0090	--------
0.17	0.0180	0.0000	0.0090	0.0000	0.0090	--------
0.25	0.0270	0.0000	0.0090	0.0000	0.0090	--------
0.33	0.0360	0.0000	0.0090	0.0000	0.0090	--------
0.42	0.0450	0.0000	0.0090	0.0000	0.0090	--------
0.50	0.0540	0.0000	0.0090	0.0000	0.0090	--------
0.58	0.0610	0.0000	0.0070	0.0000	0.0070	--------
0.67	0.0680	0.0000	0.0070	0.0000	0.0070	--------

0.75	0.0750	0.0000	0.0070	0.0000	0.0070	--------
0.83	0.0820	0.0001	0.0070	0.0001	0.0069	--------
0.92	0.0890	0.0005	0.0070	0.0004	0.0066	--------
1.00	0.0960	0.0012	0.0070	0.0006	0.0064	--------
1.08	0.1050	0.0023	0.0090	0.0011	0.0079	--------
1.17	0.1140	0.0037	0.0090	0.0015	0.0075	--------
1.25	0.1230	0.0055	0.0090	0.0018	0.0072	--------
1.33	0.1320	0.0076	0.0090	0.0021	0.0069	--------
1.42	0.1410	0.0100	0.0090	0.0024	0.0066	--------
1.50	0.1500	0.0126	0.0090	0.0026	0.0064	--------
1.58	0.1590	0.0155	0.0090	0.0029	0.0061	--------
1.67	0.1680	0.0187	0.0090	0.0031	0.0059	--------
1.75	0.1770	0.0220	0.0090	0.0033	0.0057	--------
1.83	0.1860	0.0256	0.0090	0.0036	0.0054	--------
1.92	0.1950	0.0293	0.0090	0.0038	0.0052	--------
2.00	0.2040	0.0333	0.0090	0.0039	0.0051	--------
2.08	0.2150	0.0383	0.0110	0.0051	0.0059	--------
2.17	0.2260	0.0436	0.0110	0.0053	0.0057	--------
2.25	0.2370	0.0492	0.0110	0.0055	0.0055	--------
2.33	0.2480	0.0549	0.0110	0.0058	0.0052	--------
2.42	0.2590	0.0609	0.0110	0.0060	0.0050	--------
2.50	0.2700	0.0671	0.0110	0.0062	0.0048	--------
2.58	0.2790	0.0723	0.0090	0.0052	0.0038	--------
2.67	0.2880	0.0775	0.0090	0.0053	0.0037	--------
2.75	0.2970	0.0830	0.0090	0.0054	0.0036	--------
2.83	0.3060	0.0885	0.0090	0.0055	0.0035	--------
2.92	0.3150	0.0941	0.0090	0.0056	0.0034	--------
3.00	0.3240	0.0998	0.0090	0.0057	0.0033	--------
3.08	0.3350	0.1069	0.0110	0.0071	0.0039	--------
3.17	0.3460	0.1142	0.0110	0.0072	0.0038	--------
3.25	0.3570	0.1215	0.0110	0.0074	0.0036	--------
3.33	0.3680	0.1290	0.0110	0.0075	0.0035	--------
3.42	0.3790	0.1366	0.0110	0.0076	0.0034	--------
3.50	0.3900	0.1443	0.0110	0.0077	0.0033	--------
3.58	0.4020	0.1529	0.0120	0.0085	0.0035	--------
3.67	0.4140	0.1615	0.0120	0.0086	0.0034	--------
3.75	0.4260	0.1703	0.0120	0.0088	0.0032	--------
3.83	0.4380	0.1792	0.0120	0.0089	0.0031	--------
3.92	0.4500	0.1881	0.0120	0.0090	0.0030	--------
4.00	0.4620	0.1972	0.0120	0.0091	0.0029	--------
4.08	0.4750	0.2071	0.0130	0.0099	0.0031	--------
4.17	0.4880	0.2171	0.0130	0.0100	0.0030	--------
4.25	0.5010	0.2272	0.0130	0.0101	0.0029	--------
4.33	0.5140	0.2375	0.0130	0.0102	0.0028	--------
4.42	0.5270	0.2478	0.0130	0.0103	0.0027	--------
4.50	0.5400	0.2581	0.0130	0.0104	0.0026	--------
4.58	0.5540	0.2694	0.0140	0.0113	0.0027	--------
4.67	0.5680	0.2808	0.0140	0.0114	0.0026	--------
4.75	0.5820	0.2922	0.0140	0.0114	0.0026	--------
4.83	0.5960	0.3037	0.0140	0.0115	0.0025	--------
4.92	0.6100	0.3153	0.0140	0.0116	0.0024	--------
5.00	0.6240	0.3270	0.0140	0.0117	0.0023	--------
5.08	0.6400	0.3404	0.0160	0.0134	0.0026	--------
5.17	0.6560	0.3539	0.0160	0.0135	0.0025	--------
5.25	0.6720	0.3675	0.0160	0.0136	0.0024	--------
5.33	0.6880	0.3812	0.0160	0.0137	0.0023	--------
5.42	0.7040	0.3949	0.0160	0.0137	0.0023	--------
5.50	0.7200	0.4088	0.0160	0.0138	0.0022	--------
5.58	0.7370	0.4235	0.0170	0.0148	0.0022	--------
5.67	0.7540	0.4383	0.0170	0.0148	0.0022	--------
5.75	0.7710	0.4532	0.0170	0.0149	0.0021	--------
5.83	0.7880	0.4682	0.0170	0.0150	0.0020	--------
5.92	0.8050	0.4832	0.0170	0.0150	0.0020	--------
6.00	0.8220	0.4983	0.0170	0.0151	0.0019	--------
6.08	0.8420	0.5161	0.0200	0.0178	0.0022	--------
6.17	0.8620	0.5340	0.0200	0.0179	0.0021	--------
6.25	0.8820	0.5520	0.0200	0.0180	0.0020	--------
6.33	0.9020	0.5700	0.0200	0.0180	0.0020	--------
6.42	0.9220	0.5881	0.0200	0.0181	0.0019	--------
6.50	0.9420	0.6063	0.0200	0.0182	0.0018	--------
6.58	0.9650	0.6272	0.0230	0.0210	0.0020	--------

6.67	0.9880	0.6482	0.0230	0.0210	0.0020	--------
6.75	1.0110	0.6693	0.0230	0.0211	0.0019	--------
6.83	1.0340	0.6905	0.0230	0.0212	0.0018	--------
6.92	1.0570	0.7117	0.0230	0.0212	0.0018	--------
7.00	1.0800	0.7330	0.0230	0.0213	0.0017	--------
7.08	1.1100	0.7609	0.0300	0.0278	0.0022	--------
7.17	1.1400	0.7888	0.0300	0.0279	0.0021	--------
7.25	1.1700	0.8168	0.0300	0.0280	0.0020	--------
7.33	1.2000	0.8449	0.0300	0.0281	0.0019	--------
7.42	1.2300	0.8731	0.0300	0.0282	0.0018	--------
7.50	1.2600	0.9013	0.0300	0.0282	0.0018	--------
7.58	1.3050	0.9438	0.0450	0.0425	0.0025	--------
7.67	1.3500	0.9865	0.0450	0.0426	0.0024	--------
7.75	1.3950	1.0292	0.0450	0.0428	0.0022	--------
7.83	1.4400	1.0721	0.0450	0.0429	0.0021	--------
7.92	1.4850	1.1151	0.0450	0.0430	0.0020	--------
8.00	1.5300	1.1581	0.0450	0.0431	0.0019	--------
8.08	1.5970	1.2224	0.0670	0.0643	0.0027	--------
8.17	1.6640	1.2869	0.0670	0.0645	0.0025	--------
8.25	1.7310	1.3516	0.0670	0.0647	0.0023	--------
8.33	1.7980	1.4164	0.0670	0.0648	0.0022	--------
8.42	1.8650	1.4813	0.0670	0.0649	0.0021	--------
8.50	1.9320	1.5464	0.0670	0.0651	0.0019	--------
8.58	2.0200	1.6320	0.0880	0.0856	0.0024	--------
8.67	2.1080	1.7178	0.0880	0.0858	0.0022	--------
8.75	2.1960	1.8038	0.0880	0.0860	0.0020	--------
8.83	2.2840	1.8899	0.0880	0.0861	0.0019	--------
8.92	2.3720	1.9761	0.0880	0.0862	0.0018	--------
9.00	2.4600	2.0624	0.0880	0.0863	0.0017	--------
9.08	2.5560	2.1567	0.0960	0.0943	0.0017	--------
9.17	2.6520	2.2511	0.0960	0.0944	0.0016	--------
9.25	2.7480	2.3456	0.0960	0.0945	0.0015	--------
9.33	2.8440	2.4402	0.0960	0.0946	0.0014	--------
9.42	2.9400	2.5349	0.0960	0.0947	0.0013	--------
9.50	3.0360	2.6297	0.0960	0.0948	0.0012	--------
9.58	3.1180	2.7107	0.0820	0.0810	0.0010	--------
9.67	3.2000	2.7917	0.0820	0.0810	0.0010	--------
9.75	3.2820	2.8728	0.0820	0.0811	0.0009	--------
9.83	3.3640	2.9539	0.0820	0.0811	0.0009	--------
9.92	3.4460	3.0351	0.0820	0.0812	0.0008	--------
10.00	3.5280	3.1163	0.0820	0.0812	0.0008	--------
10.08	3.5690	3.1569	0.0410	0.0406	0.0004	--------
10.17	3.6100	3.1975	0.0410	0.0406	0.0004	--------
10.25	3.6510	3.2382	0.0410	0.0406	0.0004	--------
10.33	3.6920	3.2788	0.0410	0.0406	0.0004	--------
10.42	3.7330	3.3195	0.0410	0.0406	0.0004	--------
10.50	3.7740	3.3601	0.0410	0.0407	0.0003	--------
10.58	3.8010	3.3869	0.0270	0.0268	0.0002	--------
10.67	3.8280	3.4137	0.0270	0.0268	0.0002	--------
10.75	3.8550	3.4404	0.0270	0.0268	0.0002	--------
10.83	3.8820	3.4672	0.0270	0.0268	0.0002	--------
10.92	3.9090	3.4940	0.0270	0.0268	0.0002	--------
11.00	3.9360	3.5208	0.0270	0.0268	0.0002	--------
11.08	3.9590	3.5436	0.0230	0.0228	0.0002	--------
11.17	3.9820	3.5664	0.0230	0.0228	0.0002	--------
11.25	4.0050	3.5893	0.0230	0.0228	0.0002	--------
11.33	4.0280	3.6121	0.0230	0.0228	0.0002	--------
11.42	4.0510	3.6349	0.0230	0.0228	0.0002	--------
11.50	4.0740	3.6578	0.0230	0.0228	0.0002	--------
11.58	4.0950	3.6786	0.0210	0.0208	0.0002	--------
11.67	4.1160	3.6995	0.0210	0.0208	0.0002	--------
11.75	4.1370	3.7203	0.0210	0.0209	0.0001	--------
11.83	4.1580	3.7412	0.0210	0.0209	0.0001	--------
11.92	4.1790	3.7620	0.0210	0.0209	0.0001	--------
12.00	4.2000	3.7829	0.0210	0.0209	0.0001	--------
12.08	4.2200	3.8027	0.0200	0.0199	0.0001	--------
12.17	4.2400	3.8226	0.0200	0.0199	0.0001	--------
12.25	4.2600	3.8425	0.0200	0.0199	0.0001	--------
12.33	4.2800	3.8623	0.0200	0.0199	0.0001	--------
12.42	4.3000	3.8822	0.0200	0.0199	0.0001	--------
12.50	4.3200	3.9021	0.0200	0.0199	0.0001	--------

12.58	4.3390	3.9209	0.0190	0.0189	0.0001	--------
12.67	4.3580	3.9398	0.0190	0.0189	0.0001	--------
12.75	4.3770	3.9587	0.0190	0.0189	0.0001	--------
12.83	4.3960	3.9776	0.0190	0.0189	0.0001	--------
12.92	4.4150	3.9965	0.0190	0.0189	0.0001	--------
13.00	4.4340	4.0153	0.0190	0.0189	0.0001	--------
13.08	4.4510	4.0322	0.0170	0.0169	0.0001	--------
13.17	4.4680	4.0491	0.0170	0.0169	0.0001	--------
13.25	4.4850	4.0660	0.0170	0.0169	0.0001	--------
13.33	4.5020	4.0829	0.0170	0.0169	0.0001	--------
13.42	4.5190	4.0998	0.0170	0.0169	0.0001	--------
13.50	4.5360	4.1167	0.0170	0.0169	0.0001	--------
13.58	4.5520	4.1326	0.0160	0.0159	0.0001	--------
13.67	4.5680	4.1485	0.0160	0.0159	0.0001	--------
13.75	4.5840	4.1644	0.0160	0.0159	0.0001	--------
13.83	4.6000	4.1803	0.0160	0.0159	0.0001	--------
13.92	4.6160	4.1962	0.0160	0.0159	0.0001	--------
14.00	4.6320	4.2122	0.0160	0.0159	0.0001	--------
14.08	4.6500	4.2300	0.0180	0.0179	0.0001	--------
14.17	4.6680	4.2479	0.0180	0.0179	0.0001	--------
14.25	4.6860	4.2658	0.0180	0.0179	0.0001	--------
14.33	4.7040	4.2837	0.0180	0.0179	0.0001	--------
14.42	4.7220	4.3016	0.0180	0.0179	0.0001	--------
14.50	4.7400	4.3195	0.0180	0.0179	0.0001	--------
14.58	4.7500	4.3295	0.0100	0.0099	0.0001	--------
14.67	4.7600	4.3394	0.0100	0.0099	0.0001	--------
14.75	4.7700	4.3494	0.0100	0.0099	0.0001	--------
14.83	4.7800	4.3593	0.0100	0.0099	0.0001	--------
14.92	4.7900	4.3693	0.0100	0.0099	0.0001	--------
15.00	4.8000	4.3792	0.0100	0.0099	0.0001	--------
15.08	4.8160	4.3951	0.0160	0.0159	0.0001	--------
15.17	4.8320	4.4110	0.0160	0.0159	0.0001	--------
15.25	4.8480	4.4270	0.0160	0.0159	0.0001	--------
15.33	4.8640	4.4429	0.0160	0.0159	0.0001	--------
15.42	4.8800	4.4588	0.0160	0.0159	0.0001	--------
15.50	4.8960	4.4747	0.0160	0.0159	0.0001	--------
15.58	4.9110	4.4896	0.0150	0.0149	0.0001	--------
15.67	4.9260	4.5046	0.0150	0.0149	0.0001	--------
15.75	4.9410	4.5195	0.0150	0.0149	0.0001	--------
15.83	4.9560	4.5344	0.0150	0.0149	0.0001	--------
15.92	4.9710	4.5493	0.0150	0.0149	0.0001	--------
16.00	4.9860	4.5643	0.0150	0.0149	0.0001	--------
16.08	5.0000	4.5782	0.0140	0.0139	0.0001	--------
16.17	5.0140	4.5921	0.0140	0.0139	0.0001	--------
16.25	5.0280	4.6060	0.0140	0.0139	0.0001	--------
16.33	5.0420	4.6200	0.0140	0.0139	0.0001	--------
16.42	5.0560	4.6339	0.0140	0.0139	0.0001	--------
16.50	5.0700	4.6478	0.0140	0.0139	0.0001	--------
16.58	5.0850	4.6628	0.0150	0.0149	0.0001	--------
16.67	5.1000	4.6777	0.0150	0.0149	0.0001	--------
16.75	5.1150	4.6926	0.0150	0.0149	0.0001	--------
16.83	5.1300	4.7076	0.0150	0.0149	0.0001	--------
16.92	5.1450	4.7225	0.0150	0.0149	0.0001	--------
17.00	5.1600	4.7374	0.0150	0.0149	0.0001	--------
17.08	5.1720	4.7494	0.0120	0.0119	0.0001	--------
17.17	5.1840	4.7613	0.0120	0.0119	0.0001	--------
17.25	5.1960	4.7732	0.0120	0.0119	0.0001	--------
17.33	5.2080	4.7852	0.0120	0.0119	0.0001	--------
17.42	5.2200	4.7971	0.0120	0.0119	0.0001	--------
17.50	5.2320	4.8091	0.0120	0.0119	0.0001	--------
17.58	5.2450	4.8220	0.0130	0.0129	0.0001	--------
17.67	5.2580	4.8350	0.0130	0.0129	0.0001	--------
17.75	5.2710	4.8479	0.0130	0.0129	0.0001	--------
17.83	5.2840	4.8608	0.0130	0.0129	0.0001	--------
17.92	5.2970	4.8738	0.0130	0.0129	0.0001	--------
18.00	5.3100	4.8867	0.0130	0.0129	0.0001	--------
18.08	5.3200	4.8967	0.0100	0.0100	0.0000	--------
18.17	5.3300	4.9066	0.0100	0.0100	0.0000	--------
18.25	5.3400	4.9166	0.0100	0.0100	0.0000	--------
18.33	5.3500	4.9266	0.0100	0.0100	0.0000	--------
18.42	5.3600	4.9365	0.0100	0.0100	0.0000	--------

18.50	5.3700	4.9465	0.0100	0.0100	0.0000	--------
18.58	5.3800	4.9564	0.0100	0.0100	0.0000	--------
18.67	5.3900	4.9664	0.0100	0.0100	0.0000	--------
18.75	5.4000	4.9763	0.0100	0.0100	0.0000	--------
18.83	5.4100	4.9863	0.0100	0.0100	0.0000	--------
18.92	5.4200	4.9963	0.0100	0.0100	0.0000	--------
19.00	5.4300	5.0062	0.0100	0.0100	0.0000	--------
19.08	5.4390	5.0152	0.0090	0.0090	0.0000	--------
19.17	5.4480	5.0241	0.0090	0.0090	0.0000	--------
19.25	5.4570	5.0331	0.0090	0.0090	0.0000	--------
19.33	5.4660	5.0421	0.0090	0.0090	0.0000	--------
19.42	5.4750	5.0510	0.0090	0.0090	0.0000	--------
19.50	5.4840	5.0600	0.0090	0.0090	0.0000	--------
19.58	5.4940	5.0699	0.0100	0.0100	0.0000	--------
19.67	5.5040	5.0799	0.0100	0.0100	0.0000	--------
19.75	5.5140	5.0899	0.0100	0.0100	0.0000	--------
19.83	5.5240	5.0998	0.0100	0.0100	0.0000	--------
19.92	5.5340	5.1098	0.0100	0.0100	0.0000	--------
20.00	5.5440	5.1197	0.0100	0.0100	0.0000	--------
20.08	5.5550	5.1307	0.0110	0.0110	0.0000	--------
20.17	5.5660	5.1416	0.0110	0.0110	0.0000	--------
20.25	5.5770	5.1526	0.0110	0.0110	0.0000	--------
20.33	5.5880	5.1636	0.0110	0.0110	0.0000	--------
20.42	5.5990	5.1745	0.0110	0.0110	0.0000	--------
20.50	5.6100	5.1855	0.0110	0.0110	0.0000	--------
20.58	5.6200	5.1954	0.0100	0.0100	0.0000	--------
20.67	5.6300	5.2054	0.0100	0.0100	0.0000	--------
20.75	5.6400	5.2154	0.0100	0.0100	0.0000	--------
20.83	5.6500	5.2253	0.0100	0.0100	0.0000	--------
20.92	5.6600	5.2353	0.0100	0.0100	0.0000	--------
21.00	5.6700	5.2452	0.0100	0.0100	0.0000	--------
21.08	5.6790	5.2542	0.0090	0.0090	0.0000	--------
21.17	5.6880	5.2632	0.0090	0.0090	0.0000	--------
21.25	5.6970	5.2721	0.0090	0.0090	0.0000	--------
21.33	5.7060	5.2811	0.0090	0.0090	0.0000	--------
21.42	5.7150	5.2901	0.0090	0.0090	0.0000	--------
21.50	5.7240	5.2990	0.0090	0.0090	0.0000	--------
21.58	5.7330	5.3080	0.0090	0.0090	0.0000	--------
21.67	5.7420	5.3170	0.0090	0.0090	0.0000	--------
21.75	5.7510	5.3259	0.0090	0.0090	0.0000	--------
21.83	5.7600	5.3349	0.0090	0.0090	0.0000	--------
21.92	5.7690	5.3439	0.0090	0.0090	0.0000	--------
22.00	5.7780	5.3528	0.0090	0.0090	0.0000	--------
22.08	5.7870	5.3618	0.0090	0.0090	0.0000	--------
22.17	5.7960	5.3707	0.0090	0.0090	0.0000	--------
22.25	5.8050	5.3797	0.0090	0.0090	0.0000	--------
22.33	5.8140	5.3887	0.0090	0.0090	0.0000	--------
22.42	5.8230	5.3976	0.0090	0.0090	0.0000	--------
22.50	5.8320	5.4066	0.0090	0.0090	0.0000	--------
22.58	5.8410	5.4156	0.0090	0.0090	0.0000	--------
22.67	5.8500	5.4245	0.0090	0.0090	0.0000	--------
22.75	5.8590	5.4335	0.0090	0.0090	0.0000	--------
22.83	5.8680	5.4425	0.0090	0.0090	0.0000	--------
22.92	5.8770	5.4514	0.0090	0.0090	0.0000	--------
23.00	5.8860	5.4604	0.0090	0.0090	0.0000	--------
23.08	5.8960	5.4704	0.0100	0.0100	0.0000	--------
23.17	5.9060	5.4803	0.0100	0.0100	0.0000	--------
23.25	5.9160	5.4903	0.0100	0.0100	0.0000	--------
23.33	5.9260	5.5003	0.0100	0.0100	0.0000	--------
23.42	5.9360	5.5102	0.0100	0.0100	0.0000	--------
23.50	5.9460	5.5202	0.0100	0.0100	0.0000	--------
23.58	5.9550	5.5292	0.0090	0.0090	0.0000	--------
23.67	5.9640	5.5381	0.0090	0.0090	0.0000	--------
23.75	5.9730	5.5471	0.0090	0.0090	0.0000	--------
23.83	5.9820	5.5561	0.0090	0.0090	0.0000	--------
23.92	5.9910	5.5650	0.0090	0.0090	0.0000	--------
24.00	6.0000	5.5740	0.0090	0.0090	0.0000	--------

Total soil rain loss = 0.43(In)
Total effective runoff = 5.57(In)

```
     ----------------------------------------------------------------------
     Peak flow rate this hydrograph =           2.80(CFS)
     Total runoff volume this hydrograph =          58070.6(Ft3)
     ----------------------------------------------------------------------
     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                         24 - H O U R    S T O R M
                    R u n o f f      H y d r o g r a p h
     ----------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

     ----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0000      0.00  Q         |         |         |         |
  0+15       0.0000      0.00  Q         |         |         |         |
  0+20       0.0000      0.00  Q         |         |         |         |
  0+25       0.0000      0.00  Q         |         |         |         |
  0+30       0.0000      0.00  Q         |         |         |         |
  0+35       0.0000      0.00  Q         |         |         |         |
  0+40       0.0000      0.00  Q         |         |         |         |
  0+45       0.0000      0.00  Q         |         |         |         |
  0+50       0.0000      0.00  Q         |         |         |         |
  0+55       0.0000      0.00  Q         |         |         |         |
  1+ 0       0.0000      0.00  Q         |         |         |         |
  1+ 5       0.0000      0.00  Q         |         |         |         |
  1+10       0.0000      0.00  Q         |         |         |         |
  1+15       0.0001      0.01  Q         |         |         |         |
  1+20       0.0002      0.01  Q         |         |         |         |
  1+25       0.0003      0.02  Q         |         |         |         |
  1+30       0.0004      0.02  Q         |         |         |         |
  1+35       0.0006      0.03  Q         |         |         |         |
  1+40       0.0009      0.04  Q         |         |         |         |
  1+45       0.0012      0.04  Q         |         |         |         |
  1+50       0.0015      0.05  Q         |         |         |         |
  1+55       0.0019      0.06  Q         |         |         |         |
  2+ 0       0.0024      0.07  Q         |         |         |         |
  2+ 5       0.0029      0.07  Q         |         |         |         |
  2+10       0.0034      0.08  Q         |         |         |         |
  2+15       0.0041      0.09  Q         |         |         |         |
  2+20       0.0047      0.10  Q         |         |         |         |
  2+25       0.0055      0.11  Q         |         |         |         |
  2+30       0.0063      0.12  Q         |         |         |         |
  2+35       0.0072      0.13  Q         |         |         |         |
  2+40       0.0081      0.14  Q         |         |         |         |
  2+45       0.0091      0.14  Q         |         |         |         |
  2+50       0.0101      0.15  Q         |         |         |         |
  2+55       0.0112      0.15  Q         |         |         |         |
  3+ 0       0.0122      0.16  Q         |         |         |         |
  3+ 5       0.0133      0.16  Q         |         |         |         |
  3+10       0.0145      0.16  Q         |         |         |         |
  3+15       0.0156      0.17  Q         |         |         |         |
  3+20       0.0168      0.17  Q         |         |         |         |
  3+25       0.0181      0.18  Q         |         |         |         |
  3+30       0.0194      0.19  Q         |         |         |         |
  3+35       0.0207      0.20  Q         |         |         |         |
  3+40       0.0222      0.21  Q         |         |         |         |
  3+45       0.0237      0.22  Q         |         |         |         |
  3+50       0.0252      0.22  Q         |         |         |         |
  3+55       0.0268      0.23  Q         |         |         |         |
  4+ 0       0.0284      0.24  Q         |         |         |         |
  4+ 5       0.0301      0.25  Q         |         |         |         |
  4+10       0.0319      0.26  VQ        |         |         |         |
  4+15       0.0337      0.26  |Q        |         |         |         |
  4+20       0.0356      0.27  |Q        |         |         |         |
  4+25       0.0375      0.28  |Q        |         |         |         |
  4+30       0.0395      0.29  |Q        |         |         |         |
  4+35       0.0415      0.29  |Q        |         |         |         |
  4+40       0.0436      0.30  |Q        |         |         |         |
  4+45       0.0457      0.31  |Q        |         |         |         |
  4+50       0.0479      0.32  |Q        |         |         |         |
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 4+55       0.0501      0.33  |Q         |         |         |         |
 5+ 0       0.0524      0.33  |Q         |         |         |         |
 5+ 5       0.0548      0.34  |Q         |         |         |         |
 5+10       0.0572      0.35  |Q         |         |         |         |
 5+15       0.0597      0.36  |Q         |         |         |         |
 5+20       0.0622      0.37  |Q         |         |         |         |
 5+25       0.0648      0.38  |Q         |         |         |         |
 5+30       0.0675      0.39  |QV        |         |         |         |
 5+35       0.0702      0.40  |QV        |         |         |         |
 5+40       0.0730      0.41  |QV        |         |         |         |
 5+45       0.0759      0.42  |QV        |         |         |         |
 5+50       0.0789      0.43  |QV        |         |         |         |
 5+55       0.0819      0.44  |QV        |         |         |         |
 6+ 0       0.0849      0.45  |QV        |         |         |         |
 6+ 5       0.0881      0.45  |QV        |         |         |         |
 6+10       0.0913      0.46  |QV        |         |         |         |
 6+15       0.0945      0.48  |QV        |         |         |         |
 6+20       0.0979      0.49  |QV        |         |         |         |
 6+25       0.1013      0.50  |Q V       |         |         |         |
 6+30       0.1049      0.51  | QV       |         |         |         |
 6+35       0.1085      0.53  | QV       |         |         |         |
 6+40       0.1123      0.54  | QV       |         |         |         |
 6+45       0.1161      0.56  | QV       |         |         |         |
 6+50       0.1201      0.57  | QV       |         |         |         |
 6+55       0.1241      0.59  | QV       |         |         |         |
 7+ 0       0.1283      0.61  | QV       |         |         |         |
 7+ 5       0.1326      0.62  | QV       |         |         |         |
 7+10       0.1370      0.64  | Q V      |         |         |         |
 7+15       0.1416      0.67  | Q V      |         |         |         |
 7+20       0.1463      0.69  | Q V      |         |         |         |
 7+25       0.1513      0.72  | Q V      |         |         |         |
 7+30       0.1564      0.75  | Q V      |         |         |         |
 7+35       0.1618      0.78  |  QV      |         |         |         |
 7+40       0.1675      0.82  |  Q V     |         |         |         |
 7+45       0.1734      0.87  |  Q V     |         |         |         |
 7+50       0.1797      0.91  |  Q V     |         |         |         |
 7+55       0.1864      0.97  |  Q V     |         |         |         |
 8+ 0       0.1935      1.03  |   QV     |         |         |         |
 8+ 5       0.2010      1.10  |   Q V    |         |         |         |
 8+10       0.2091      1.17  |   Q V    |         |         |         |
 8+15       0.2177      1.25  |    QV    |         |         |         |
 8+20       0.2269      1.33  |    QV    |         |         |         |
 8+25       0.2367      1.42  |    Q V   |         |         |         |
 8+30       0.2472      1.52  |     QV   |         |         |         |
 8+35       0.2583      1.62  |     QV   |         |         |         |
 8+40       0.2702      1.72  |     Q V  |         |         |         |
 8+45       0.2827      1.82  |      QV  |         |         |         |
 8+50       0.2960      1.92  |      QV  |         |         |         |
 8+55       0.3100      2.03  |       QV|         |         |         |
 9+ 0       0.3246      2.13  |       QV|         |         |         |
 9+ 5       0.3401      2.24  |       Q V         |         |         |
 9+10       0.3562      2.34  |        QV         |         |         |
 9+15       0.3729      2.43  |        Q|V        |         |         |
 9+20       0.3902      2.51  |         QV        |         |         |
 9+25       0.4080      2.58  |         Q V       |         |         |
 9+30       0.4262      2.65  |         Q V       |         |         |
 9+35       0.4449      2.71  |         Q  V      |         |         |
 9+40       0.4639      2.76  |         |Q V      |         |         |
 9+45       0.4830      2.78  |         |Q  V     |         |         |
 9+50       0.5023      2.80  |         |Q   V    |         |         |
 9+55       0.5215      2.79  |         |Q   V    |         |         |
10+ 0       0.5407      2.78  |         |Q    V   |         |         |
10+ 5       0.5596      2.74  |         Q     V   |         |         |
10+10       0.5781      2.69  |         Q      V  |         |         |
10+15       0.5961      2.61  |         Q      V  |         |         |
10+20       0.6135      2.52  |         Q       V |         |         |
10+25       0.6300      2.41  |        Q|       V |         |         |
10+30       0.6457      2.28  |        Q|        V|         |         |
10+35       0.6604      2.14  |       Q |        V|         |         |
10+40       0.6742      2.00  |      Q  |         V         |         |
10+45       0.6872      1.88  |      Q  |         V         |         |
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10+50       0.6995      1.78  |      Q  |         V         |         |
10+55       0.7111      1.69  |     Q   |         |V        |         |
11+ 0       0.7222      1.61  |     Q   |         |V        |         |
11+ 5       0.7327      1.52  |     Q   |         |V        |         |
11+10       0.7426      1.45  |    Q    |         | V       |         |
11+15       0.7522      1.39  |    Q    |         | V       |         |
11+20       0.7614      1.33  |    Q    |         | V       |         |
11+25       0.7702      1.28  |    Q    |         |  V      |         |
11+30       0.7787      1.24  |   Q     |         |  V      |         |
11+35       0.7870      1.20  |   Q     |         |  V      |         |
11+40       0.7949      1.16  |   Q     |         |  V      |         |
11+45       0.8027      1.12  |   Q     |         |   V     |         |
11+50       0.8102      1.09  |   Q     |         |   V     |         |
11+55       0.8175      1.06  |   Q     |         |   V     |         |
12+ 0       0.8246      1.04  |   Q     |         |   V     |         |
12+ 5       0.8316      1.01  |   Q     |         |   V     |         |
12+10       0.8384      0.99  |  Q      |         |    V    |         |
12+15       0.8450      0.96  |  Q      |         |    V    |         |
12+20       0.8516      0.95  |  Q      |         |    V    |         |
12+25       0.8579      0.93  |  Q      |         |    V    |         |
12+30       0.8642      0.91  |  Q      |         |    V    |         |
12+35       0.8703      0.89  |  Q      |         |     V   |         |
12+40       0.8764      0.88  |  Q      |         |     V   |         |
12+45       0.8823      0.86  |  Q      |         |     V   |         |
12+50       0.8882      0.85  |  Q      |         |     V   |         |
12+55       0.8939      0.83  |  Q      |         |     V   |         |
13+ 0       0.8995      0.82  |  Q      |         |     V   |         |
13+ 5       0.9051      0.80  |  Q      |         |      V  |         |
13+10       0.9105      0.79  |  Q      |         |      V  |         |
13+15       0.9159      0.78  |  Q      |         |      V  |         |
13+20       0.9211      0.76  |  Q      |         |      V  |         |
13+25       0.9263      0.75  | Q       |         |      V  |         |
13+30       0.9313      0.73  | Q       |         |      V  |         |
13+35       0.9363      0.72  | Q       |         |       V |         |
13+40       0.9411      0.70  | Q       |         |       V |         |
13+45       0.9459      0.69  | Q       |         |       V |         |
13+50       0.9505      0.68  | Q       |         |       V |         |
13+55       0.9551      0.67  | Q       |         |       V |         |
14+ 0       0.9596      0.65  | Q       |         |       V |         |
14+ 5       0.9641      0.64  | Q       |         |       V |         |
14+10       0.9685      0.64  | Q       |         |        V|         |
14+15       0.9728      0.63  | Q       |         |        V|         |
14+20       0.9771      0.63  | Q       |         |        V|         |
14+25       0.9814      0.63  | Q       |         |        V|         |
14+30       0.9858      0.63  | Q       |         |        V|         |
14+35       0.9901      0.62  | Q       |         |        V|         |
14+40       0.9943      0.62  | Q       |         |        V|         |
14+45       0.9985      0.61  | Q       |         |        V|         |
14+50       1.0025      0.59  | Q       |         |         V         |
14+55       1.0064      0.56  | Q       |         |         V         |
15+ 0       1.0101      0.54  | Q       |         |         V         |
15+ 5       1.0137      0.51  | Q       |         |         V         |
15+10       1.0170      0.49  |Q        |         |         V         |
15+15       1.0204      0.48  |Q        |         |         V         |
15+20       1.0237      0.48  |Q        |         |         V         |
15+25       1.0270      0.48  |Q        |         |         V         |
15+30       1.0304      0.49  |Q        |         |         V         |
15+35       1.0339      0.51  | Q       |         |         |V        |
15+40       1.0374      0.52  | Q       |         |         |V        |
15+45       1.0411      0.53  | Q       |         |         |V        |
15+50       1.0447      0.53  | Q       |         |         |V        |
15+55       1.0483      0.53  | Q       |         |         |V        |
16+ 0       1.0520      0.53  | Q       |         |         |V        |
16+ 5       1.0556      0.53  | Q       |         |         |V        |
16+10       1.0592      0.52  | Q       |         |         |V        |
16+15       1.0628      0.52  | Q       |         |         |V        |
16+20       1.0664      0.52  | Q       |         |         |V        |
16+25       1.0699      0.51  | Q       |         |         | V       |
16+30       1.0735      0.51  | Q       |         |         | V       |
16+35       1.0770      0.51  | Q       |         |         | V       |
16+40       1.0804      0.50  | Q       |         |         | V       |
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16+45       1.0839      0.50  | Q       |         |         | V       |
16+50       1.0874      0.50  | Q       |         |         | V       |
16+55       1.0909      0.50  | Q       |         |         | V       |
17+ 0       1.0943      0.51  | Q       |         |         | V       |
17+ 5       1.0978      0.51  | Q       |         |         | V       |
17+10       1.1013      0.51  | Q       |         |         |  V      |
17+15       1.1048      0.50  | Q       |         |         |  V      |
17+20       1.1082      0.50  |Q        |         |         |  V      |
17+25       1.1116      0.49  |Q        |         |         |  V      |
17+30       1.1149      0.48  |Q        |         |         |  V      |
17+35       1.1182      0.47  |Q        |         |         |  V      |
17+40       1.1214      0.46  |Q        |         |         |  V      |
17+45       1.1245      0.46  |Q        |         |         |  V      |
17+50       1.1277      0.45  |Q        |         |         |  V      |
17+55       1.1308      0.45  |Q        |         |         |  V      |
18+ 0       1.1339      0.45  |Q        |         |         |   V     |
18+ 5       1.1370      0.45  |Q        |         |         |   V     |
18+10       1.1402      0.45  |Q        |         |         |   V     |
18+15       1.1432      0.45  |Q        |         |         |   V     |
18+20       1.1463      0.44  |Q        |         |         |   V     |
18+25       1.1492      0.43  |Q        |         |         |   V     |
18+30       1.1522      0.42  |Q        |         |         |   V     |
18+35       1.1550      0.41  |Q        |         |         |   V     |
18+40       1.1578      0.40  |Q        |         |         |   V     |
18+45       1.1605      0.39  |Q        |         |         |   V     |
18+50       1.1632      0.39  |Q        |         |         |   V     |
18+55       1.1658      0.38  |Q        |         |         |   V     |
19+ 0       1.1684      0.38  |Q        |         |         |    V    |
19+ 5       1.1710      0.38  |Q        |         |         |    V    |
19+10       1.1736      0.37  |Q        |         |         |    V    |
19+15       1.1761      0.37  |Q        |         |         |    V    |
19+20       1.1786      0.36  |Q        |         |         |    V    |
19+25       1.1811      0.36  |Q        |         |         |    V    |
19+30       1.1835      0.35  |Q        |         |         |    V    |
19+35       1.1860      0.35  |Q        |         |         |    V    |
19+40       1.1884      0.35  |Q        |         |         |    V    |
19+45       1.1907      0.35  |Q        |         |         |    V    |
19+50       1.1931      0.34  |Q        |         |         |    V    |
19+55       1.1955      0.35  |Q        |         |         |    V    |
20+ 0       1.1979      0.35  |Q        |         |         |    V    |
20+ 5       1.2003      0.35  |Q        |         |         |     V   |
20+10       1.2027      0.35  |Q        |         |         |     V   |
20+15       1.2051      0.35  |Q        |         |         |     V   |
20+20       1.2075      0.36  |Q        |         |         |     V   |
20+25       1.2100      0.36  |Q        |         |         |     V   |
20+30       1.2125      0.36  |Q        |         |         |     V   |
20+35       1.2150      0.36  |Q        |         |         |     V   |
20+40       1.2175      0.37  |Q        |         |         |     V   |
20+45       1.2201      0.37  |Q        |         |         |     V   |
20+50       1.2226      0.37  |Q        |         |         |     V   |
20+55       1.2251      0.36  |Q        |         |         |     V   |
21+ 0       1.2276      0.36  |Q        |         |         |     V   |
21+ 5       1.2301      0.36  |Q        |         |         |     V   |
21+10       1.2325      0.36  |Q        |         |         |     V   |
21+15       1.2349      0.35  |Q        |         |         |      V  |
21+20       1.2373      0.35  |Q        |         |         |      V  |
21+25       1.2397      0.34  |Q        |         |         |      V  |
21+30       1.2421      0.34  |Q        |         |         |      V  |
21+35       1.2444      0.34  |Q        |         |         |      V  |
21+40       1.2467      0.33  |Q        |         |         |      V  |
21+45       1.2489      0.33  |Q        |         |         |      V  |
21+50       1.2512      0.33  |Q        |         |         |      V  |
21+55       1.2534      0.33  |Q        |         |         |      V  |
22+ 0       1.2557      0.32  |Q        |         |         |      V  |
22+ 5       1.2579      0.32  |Q        |         |         |      V  |
22+10       1.2601      0.32  |Q        |         |         |      V  |
22+15       1.2623      0.32  |Q        |         |         |      V  |
22+20       1.2645      0.32  |Q        |         |         |      V  |
22+25       1.2667      0.32  |Q        |         |         |       V |
22+30       1.2689      0.32  |Q        |         |         |       V |
22+35       1.2711      0.32  |Q        |         |         |       V |
```

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22+40       1.2733      0.32  |Q         |         |         |       V |
22+45       1.2755      0.32  |Q         |         |         |       V |
22+50       1.2777      0.32  |Q         |         |         |       V |
22+55       1.2798      0.32  |Q         |         |         |       V |
23+ 0       1.2820      0.32  |Q         |         |         |       V |
23+ 5       1.2842      0.32  |Q         |         |         |       V |
23+10       1.2864      0.32  |Q         |         |         |       V |
23+15       1.2885      0.32  |Q         |         |         |       V |
23+20       1.2907      0.32  |Q         |         |         |       V |
23+25       1.2930      0.32  |Q         |         |         |       V |
23+30       1.2952      0.33  |Q         |         |         |       V |
23+35       1.2975      0.33  |Q         |         |         |       V |
23+40       1.2997      0.33  |Q         |         |         |       V |
23+45       1.3020      0.33  |Q         |         |         |        V|
23+50       1.3043      0.33  |Q         |         |         |        V|
23+55       1.3066      0.33  |Q         |         |         |        V|
24+ 0       1.3088      0.33  |Q         |         |         |        V|
24+ 5       1.3110      0.32  |Q         |         |         |        V|
24+10       1.3131      0.31  |Q         |         |         |        V|
24+15       1.3152      0.29  |Q         |         |         |        V|
24+20       1.3170      0.27  |Q         |         |         |        V|
24+25       1.3187      0.25  Q          |         |         |        V|
24+30       1.3202      0.22  Q          |         |         |        V|
24+35       1.3215      0.19  Q          |         |         |        V|
24+40       1.3226      0.16  Q          |         |         |        V|
24+45       1.3235      0.13  Q          |         |         |        V|
24+50       1.3243      0.12  Q          |         |         |        V|
24+55       1.3250      0.10  Q          |         |         |        V|
25+ 0       1.3257      0.09  Q          |         |         |        V|
25+ 5       1.3262      0.08  Q          |         |         |        V|
25+10       1.3268      0.08  Q          |         |         |        V|
25+15       1.3273      0.07  Q          |         |         |        V|
25+20       1.3277      0.07  Q          |         |         |        V|
25+25       1.3281      0.06  Q          |         |         |        V|
25+30       1.3285      0.06  Q          |         |         |        V|
25+35       1.3289      0.05  Q          |         |         |        V|
25+40       1.3292      0.05  Q          |         |         |        V|
25+45       1.3295      0.04  Q          |         |         |        V|
25+50       1.3298      0.04  Q          |         |         |        V|
25+55       1.3301      0.04  Q          |         |         |        V|
26+ 0       1.3303      0.04  Q          |         |         |        V|
26+ 5       1.3306      0.03  Q          |         |         |        V|
26+10       1.3308      0.03  Q          |         |         |        V|
26+15       1.3310      0.03  Q          |         |         |        V|
26+20       1.3311      0.03  Q          |         |         |        V|
26+25       1.3313      0.02  Q          |         |         |        V|
26+30       1.3315      0.02  Q          |         |         |        V|
26+35       1.3316      0.02  Q          |         |         |        V|
26+40       1.3318      0.02  Q          |         |         |        V|
26+45       1.3319      0.02  Q          |         |         |        V|
26+50       1.3320      0.02  Q          |         |         |        V|
26+55       1.3321      0.02  Q          |         |         |        V|
27+ 0       1.3322      0.01  Q          |         |         |        V|
27+ 5       1.3323      0.01  Q          |         |         |        V|
27+10       1.3324      0.01  Q          |         |         |        V|
27+15       1.3325      0.01  Q          |         |         |        V|
27+20       1.3326      0.01  Q          |         |         |        V|
27+25       1.3326      0.01  Q          |         |         |        V|
27+30       1.3327      0.01  Q          |         |         |        V|
27+35       1.3327      0.01  Q          |         |         |        V|
27+40       1.3328      0.01  Q          |         |         |        V|
27+45       1.3328      0.01  Q          |         |         |        V|
27+50       1.3329      0.01  Q          |         |         |        V|
27+55       1.3329      0.01  Q          |         |         |        V|
28+ 0       1.3330      0.00  Q          |         |         |        V|
28+ 5       1.3330      0.00  Q          |         |         |        V|
28+10       1.3330      0.00  Q          |         |         |        V|
28+15       1.3330      0.00  Q          |         |         |        V|
28+20       1.3331      0.00  Q          |         |         |        V|
28+25       1.3331      0.00  Q          |         |         |        V|
28+30       1.3331      0.00  Q          |         |         |        V|
```

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   28+35       1.3331      0.00  Q         |         |         |        V|
   28+40       1.3331      0.00  Q         |         |         |        V|
   28+45       1.3331      0.00  Q         |         |         |        V|
   28+50       1.3331      0.00  Q         |         |         |        V|
-----------------------------------------------------------------------
```

Google earth

feet 1000

meters 300

Appendix B

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Wednesday, Mar 4 2015

Existing Offsite Channel

Rectangular

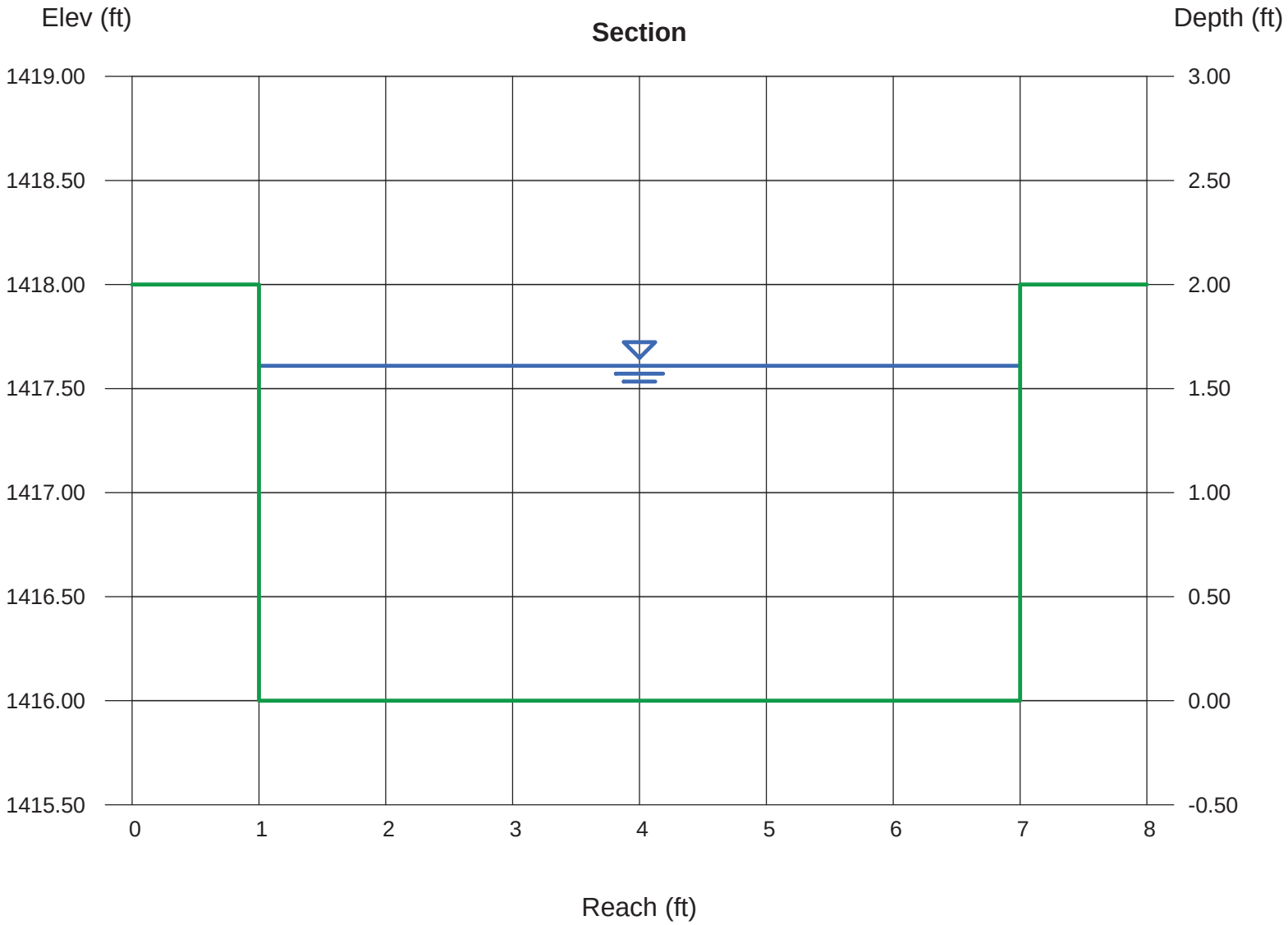
Bottom Width (ft)	=	6.00
Total Depth (ft)	=	2.00
Invert Elev (ft)	=	1416.00
Slope (%)	=	0.20
N-Value	=	0.015

Calculations

Compute by:		Known Q
Known Q (cfs)	=	44.00

Highlighted

Depth (ft)	=	1.61
Q (cfs)	=	44.00
Area (sqft)	=	9.66
Velocity (ft/s)	=	4.55
Wetted Perim (ft)	=	9.22
Crit Depth, Yc (ft)	=	1.19
Top Width (ft)	=	6.00
EGL (ft)	=	1.93



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Mar 5 2015

Proposed Onsite Channel - 1' Freeboard - 10' Easement - 4' access on south

Rectangular

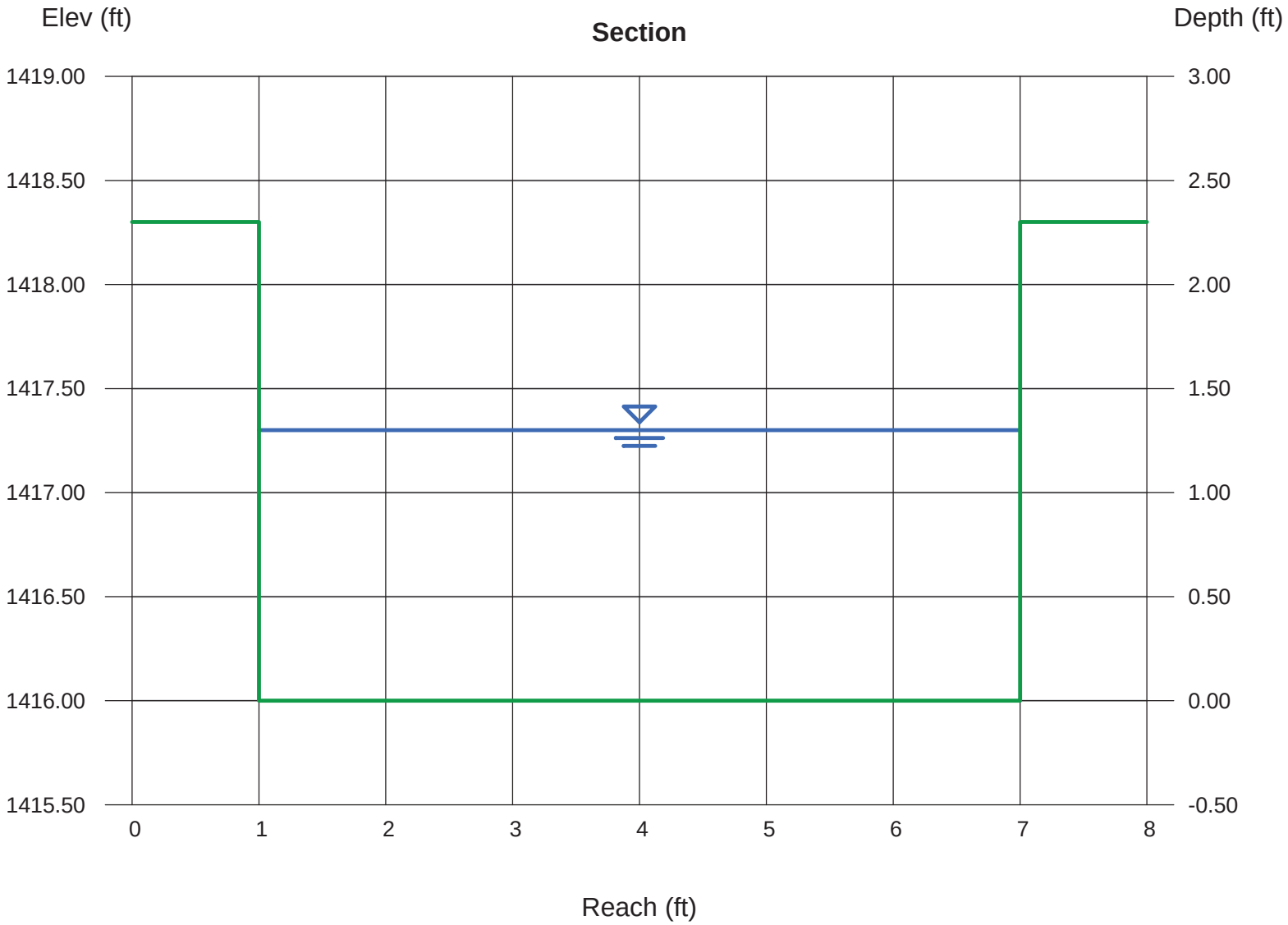
Bottom Width (ft)	=	6.00
Total Depth (ft)	=	2.30
Invert Elev (ft)	=	1416.00
Slope (%)	=	0.37
N-Value	=	0.015

Calculations

Compute by:		Known Q
Known Q (cfs)	=	44.00

Highlighted

Depth (ft)	=	1.30
Q (cfs)	=	44.00
Area (sqft)	=	7.80
Velocity (ft/s)	=	5.64
Wetted Perim (ft)	=	8.60
Crit Depth, Yc (ft)	=	1.19
Top Width (ft)	=	6.00
EGL (ft)	=	1.79



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Mar 12 2015

Offsite Area B as it Crosses PL - post offsite grading

User-defined

Invert Elev (ft)	=	19.00
Slope (%)	=	0.61
N-Value	=	0.035

Calculations

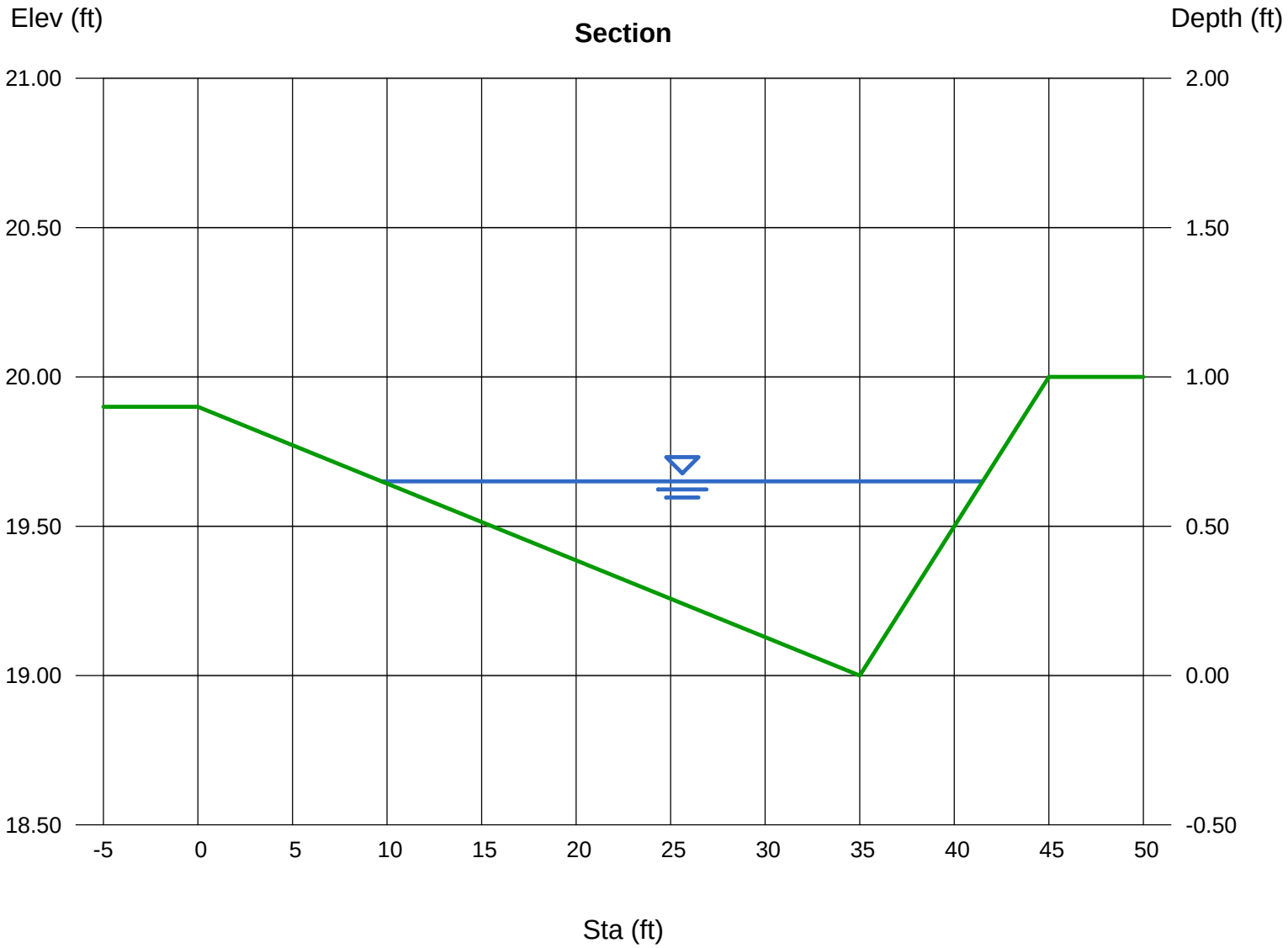
Compute by:		Known Q
Known Q (cfs)	=	16.00

(Sta, El, n)-(Sta, El, n)...

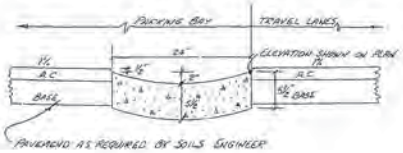
(0.00, 19.90)-(35.00, 19.00, 0.035)-(45.00, 20.00, 0.035)

Highlighted

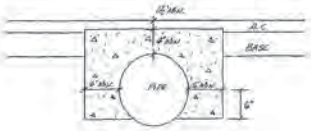
Depth (ft)	=	0.65
Q (cfs)	=	16.00
Area (sqft)	=	10.33
Velocity (ft/s)	=	1.55
Wetted Perim (ft)	=	31.82
Crit Depth, Yc (ft)	=	0.49
Top Width (ft)	=	31.78
EGL (ft)	=	0.69



Appendix C



TYPICAL SECTION
CONCRETE GUTTER
SCALE 1" = 10'



TYPICAL SECTION
CONCRETE ENCASEMENT OF DRAIN
ACCESS PARKING AREA
SCALE 1" = 10'

"AS-BUILT" Delete Pvt. Drain Notes #1-2, 4-9

SPECIAL NOTES:

1. [redacted]
2. [redacted]
3. FINAL DRAINAGE SWALES AND PRIVATE PIPE SYSTEMS IN AND AROUND BUILDINGS, YARDS, WALKS AND WALLS, ETC., ARE TO BE CONSTRUCTED IN ACCORDANCE WITH COUNTY OF SAN DIEGO STANDARDS BY THE DEVELOPER AND LANDSCAPE CONTRACTOR. NO PONDING OF WATER ALLOWED. BUILDING LOCATIONS AND TYPES SHOWN ARE PRELIMINARY ONLY AND SUBJECT TO REVISION. SEE LANDSCAPE ARCHITECT'S PLAN FOR LOCATION OF ABOVE FACILITIES AND SWALES.
4. [redacted]
5. NEITHER THE OWNER NOR THE "ENGINEER OF WORK" WILL ENFORCE SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS, AND REGULATIONS DURING CONSTRUCTION OPERATIONS.
6. CONTRACTOR SHALL NOT BEGIN ANY WORK ON THIS PROJECT UNTIL A PRE-CONSTRUCTION CONFERENCE IS HELD WITH THE "ENGINEER OF WORK", SOILS ENGINEER AND THE DEVELOPER.
7. THE CONTRACTOR SHALL BE RESPONSIBLE THAT ALL SLOPES, PAD SIZES, STREETS, UTILITIES AND STORM DRAINS ARE BUILT IN ACCORDANCE TO THESE PLANS. IF THERE IS ANY MISUNDERSTANDING REGARDING THESE PLANS OR FIELD STAKES, THE CONTRACTOR SHALL REQUEST AN INTERPRETATION BEFORE DOING ANY WORK BY CALLING THE "ENGINEER OF WORK" AT 297-3974. THE CONTRACTOR SHALL ALSO PROTECT FACILITIES HE CONSTRUCTS FROM THE EROSIVE ACTION OF WATER BY WHATEVER MEANS NECESSARY, (SAND BAGS, DIKES, SHORING, ETC.), UNTIL SUCH TIME THE TOTAL PROJECT IS COMPLETED AND ACCEPTED FOR MAINTENANCE BY THE RESPECTIVE GOVERNMENTAL AGENCY INVOLVED.
8. ALL GRADING DETAILS WILL BE IN ACCORDANCE WITH SAN DIEGO COUNTY STANDARD DRAWINGS D-8, D-10, D-11 & D-75.

GENERAL NOTES:

1. APPROVAL OF THIS GRADING PLAN DOES NOT CONSTITUTE APPROVAL OF VERTICAL OR HORIZONTAL ALIGNMENT OF ANY PRIVATE ROAD SHOWN HEREON FOR COUNTY ROAD PURPOSES.
2. FINAL APPROVAL OF THESE GRADING PLANS IS SUBJECT TO FINAL APPROVAL OF THE ASSOCIATED IMPROVEMENT PLANS WHERE APPLICABLE. FINAL CURB GRADE ELEVATIONS MAY REQUIRE CHANGES IN THESE PLANS.
3. IMPORT MATERIAL SHALL BE OBTAINED FROM A LEGAL SITE.
4. A CONSTRUCTION, EXCAVATION OR ENCROACHMENT PERMIT FROM THE DIRECTOR OF TRANSPORTATION WILL BE REQUIRED FOR ANY WORK IN THE COUNTY RIGHT OF WAY.
5. ALL SLOPES OVER 3 FEET IN HEIGHT WILL BE PLANTED IN ACCORDANCE WITH SAN DIEGO COUNTY SPECIFICATIONS.
6. THE CONTRACTOR SHALL VERIFY THE EXISTENCE AND LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK. NOTICE OF THE PROPOSED WORK SHALL BE GIVEN TO THE FOLLOWING AGENCIES:
   SAN DIEGO GAS & ELECTRIC _____
   PACIFIC TELEPHONE _____
   CATV _____
   SEWER _____
   WATER _____
7. A SOILS REPORT MAY BE REQUIRED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.
8. APPROVAL OF THESE PLANS BY DEPARTMENT OF PUBLIC WORKS DOES NOT AUTHORIZE ANY WORK OR GRADING TO BE PERFORMED UNTIL THE PROPERTY OWNER'S PERMISSION HAS BEEN OBTAINED AND A VALID GRADING PERMIT HAS BEEN ISSUED.
9. THE DEPT. OF PUBLIC WORKS APPROVAL OF THESE PLANS DOES NOT CONSTITUTE COUNTY BUILDING OFFICIAL APPROVAL OF ANY FOUNDATIONS FOR STRUCTURES TO BE PLACED ON THE AREA COVERED BY THESE PLANS. NO WAIVER OF THE GRADING ORDINANCE REQUIREMENTS CONCERNING MINIMUM COVER OVER EXPANSIVE SOILS IS MADE OR IMPLIED (SECTIONS 87.403 & 87.410). ANY SUCH WAIVER MUST BE OBTAINED FROM THE DIRECTOR OF LUER.
10. ALL OPERATIONS CONDUCTED ON THE PREMISES, INCLUDING THE WARMING UP, REPAIR, ARRIVAL, DEPARTURE OR RUNNING OF TRUCKS, EARTHMOVING EQUIPMENT, CONSTRUCTION EQUIPMENT AND ANY OTHER ASSOCIATED GRADING EQUIPMENT SHALL BE LIMITED TO THE PERIOD BETWEEN 7:00 a.m. AND 6:00 p.m. EACH DAY, MONDAY THROUGH SATURDAY, AND NO EARTHMOVING OR GRADING OPERATIONS SHALL BE CONDUCTED ON THE PREMISES ON SUNDAYS OR HOLIDAYS.
11. ALL MAJOR SLOPES SHALL BE ROUNDED INTO EXISTING TERRAIN TO PRODUCE A CONTOURED TRANSITION FROM CUT OR FILL FACES TO NATURAL GROUND AND ABUTTING CUT OR FILL SURFACES.
12. NOTWITHSTANDING THE MINIMUM STANDARDS SET FORTH IN THE GRADING ORDINANCE AND NOTWITHSTANDING THE APPROVAL OF THESE GRADING PLANS, THE PERMITTEE IS RESPONSIBLE FOR THE PREVENTION OF DAMAGE TO THE ADJACENT PROPERTY. NO PERSON SHALL EXCAVATE ON LAND SO CLOSE TO THE PROPERTY LINE AS TO ENDANGER ANY ADJOINING PUBLIC STREET, SIDEWALK, ALLEY, FUNCTION OF ANY SEWAGE DISPOSAL SYSTEM OR ANY OTHER PUBLIC OR PRIVATE PROPERTY WITHOUT SUPPORTING AND PROTECTING SUCH PROPERTY FROM SETTLING, CRACKING, EROSION, SILTING, SCOUR OR OTHER DAMAGE WHICH MIGHT RESULT FROM THE GRADING DESCRIBED ON THIS PLAN. THE COUNTY WILL HOLD THE PERMITTEE RESPONSIBLE FOR CORRECTION OF NON-DEDICATED IMPROVEMENTS WHICH DAMAGE ADJACENT PROPERTY.
13. SLOPE RATIOS
   CUT - 1½:1 FOR MINOR SLOPES, 2:1 FOR MAJOR SLOPES
   FILL - 2:1 Slopes Deviating From The Above Will Require Approval Of The Director Of Transportation After Review Of A Report From A Soils Engineer.

EXCAVATION 2,000 C.Y. FILL 13,500 C.Y.
IMPORT 11,500 C.Y. A Separate Permit Must Be Obtained For Waste Or Import Area.

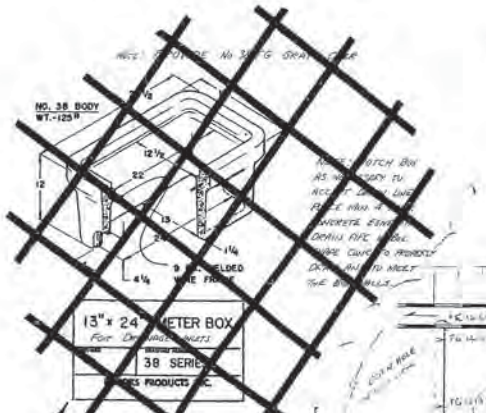
SPECIAL CONDITION: IF ANY ARCHAEOLOGICAL RESOURCES ARE DISCOVERED ON THE SITE OF THIS GRADING DURING GRADING OPERATIONS, SUCH OPERATIONS WILL CEASE IMMEDIATELY, AND THE PERMITTEE WILL NOTIFY THE DIRECTOR OF TRANSPORTATION OF THE DISCOVERY. GRADING OPERATIONS WILL NOT RECOMMENCE UNTIL THE PERMITTEE HAS RECEIVED WRITTEN AUTHORITY FROM THE DIRECTOR OF TRANSPORTATION TO DO SO.

SOILS ENGINEER NOTE

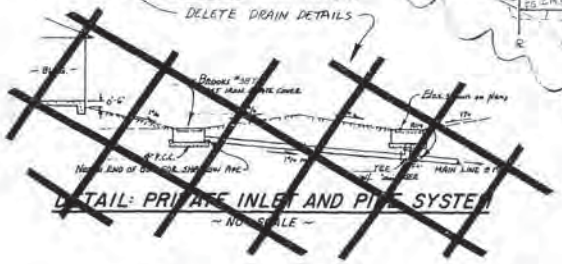
THIS GRADING PLAN HAS BEEN REVIEWED BY THE UNDERSIGNED AND FOUND TO BE IN CONFORMANCE WITH THE RECOMMENDATIONS AS OUTLINED IN OUR SOILS REPORT DATED 4-29-83. THIS SOILS REPORT SHALL BE CONSIDERED AS PART OF THIS PLAN AND ALL GRADING WORK SHALL BE DONE IN ACCORDANCE WITH SAID REPORT.

SOUTHERN CALIF. SOIL & TESTING, INC.
BY: _____ ROC 41646
DATE: 5-26

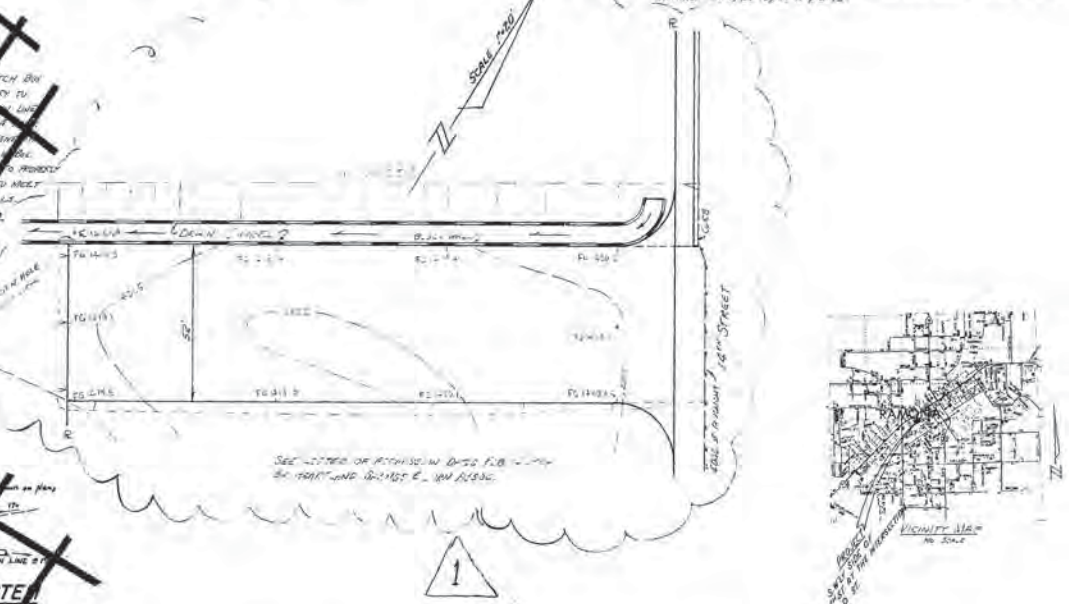
PLANS PREPARED BY
CRAIG, BULTHUIS & NOTHOMB
Civil Engineering - Land Surveying 297-3974
2011 Adams Ave., San Diego, California 92116



"AS-BUILT" C.B.W. Nov 26, 1984
DELETE DRAIN DETAILS



DETAIL: PRIVATE INLET AND PIPE SYSTEM
— NO SCALE —



LEGEND:

EARTH SWALE (1% MIN.)	
CONC. GUTTER (0.5% MIN.)	
FLOW LINE	℄
INLET	☐
PAD ELEVATION	PAD 1417.8
FINISH ELEVATION	17.10
TOP WALL	T.W. 20.2
DRAIN PIPE	
EXISTING CONTOUR	
TOP INLET	TOP 17.30

PRECISION
DEC 11 1984
MICROFILMED

OWNER NT SUBDIVIDER
RAMONA WEST, A JOINT VENTURE
7070 MIRAMAR RD. SUITE 207
SAN DIEGO, CA 92121
PHONE: (619) 578-6565

LEGAL DESCRIPTION

BLOCK 79, RAMONA, MAP 643

ASSESSORS PARCEL NO. 282-262-04

SITE ADDRESS

SOUTHWEST SIDE 14TH STREET, 240' SOUTHEASTERLY OF MAIN STREET, RAMONA

"AS BUILT"

G.L. Bulthuis — Nov 26, 1984
ENGINEER — REVISED — DATE

COUNTY APPROVED CHANGES

No.	Description	Approved by	Date
1	ADDITIONAL GRADING	[illegible]	2-21-84
2	"AS-BUILT" REVISION	[illegible]	11/26/84

PERMITS

CURB GRADE NO. CG 2335
REZONE PERMIT NO. NOT APPLICABLE
SPECIAL USE PERMIT NO. NOT APPLICABLE
TENTATIVE MAP NO. NOT APPLICABLE

BENCH MARK

DESCRIPTION: CMSL ☐
LOCATION: N.E. CENTER CURB OF 18TH STREET & MAIN STREET
ACCESS FROM: SAN DIEGO COUNTY
ELEVATION: 1425.29 DATUM: MSL

PRIVATE CONTRACT

SHEET 1 — COUNTY OF SAN DIEGO — DEPARTMENT OF PUBLIC WORKS — SHEETS

GRADING PLANS FOR: APPARTMENT BLDG COMPLEX
IN BLOCK 79 - RAMONA,
MAP NO. 643

CALIFORNIA COORDINATE INDEX 314-1803

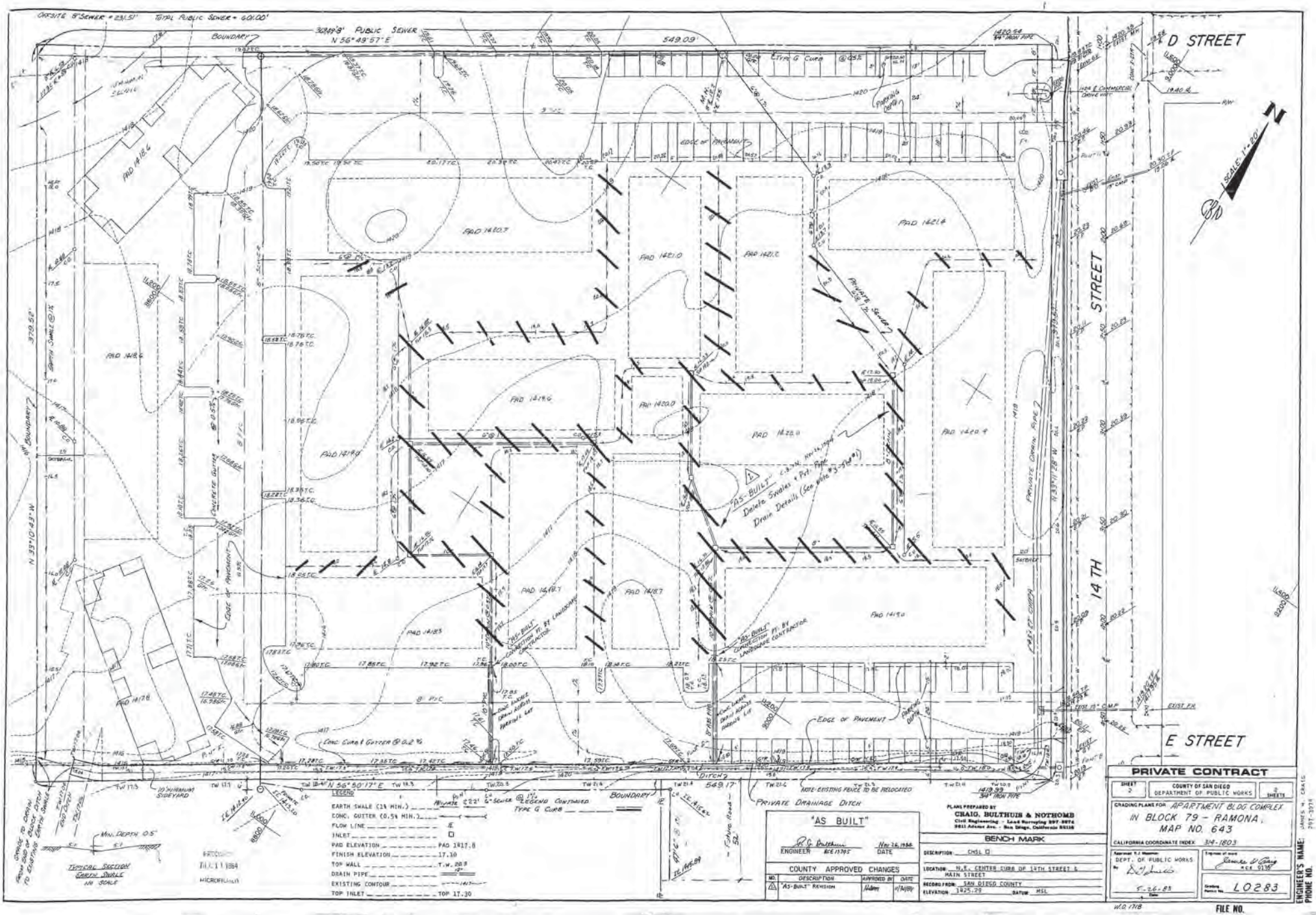
Approved: R.E. Engineer — DEPT. OF PUBLIC WORKS — By: [signature] — 5-26-83 — Date
Engineer of Work: James W. Craig — R.C.E. 9716
Grading Permit No. L0283

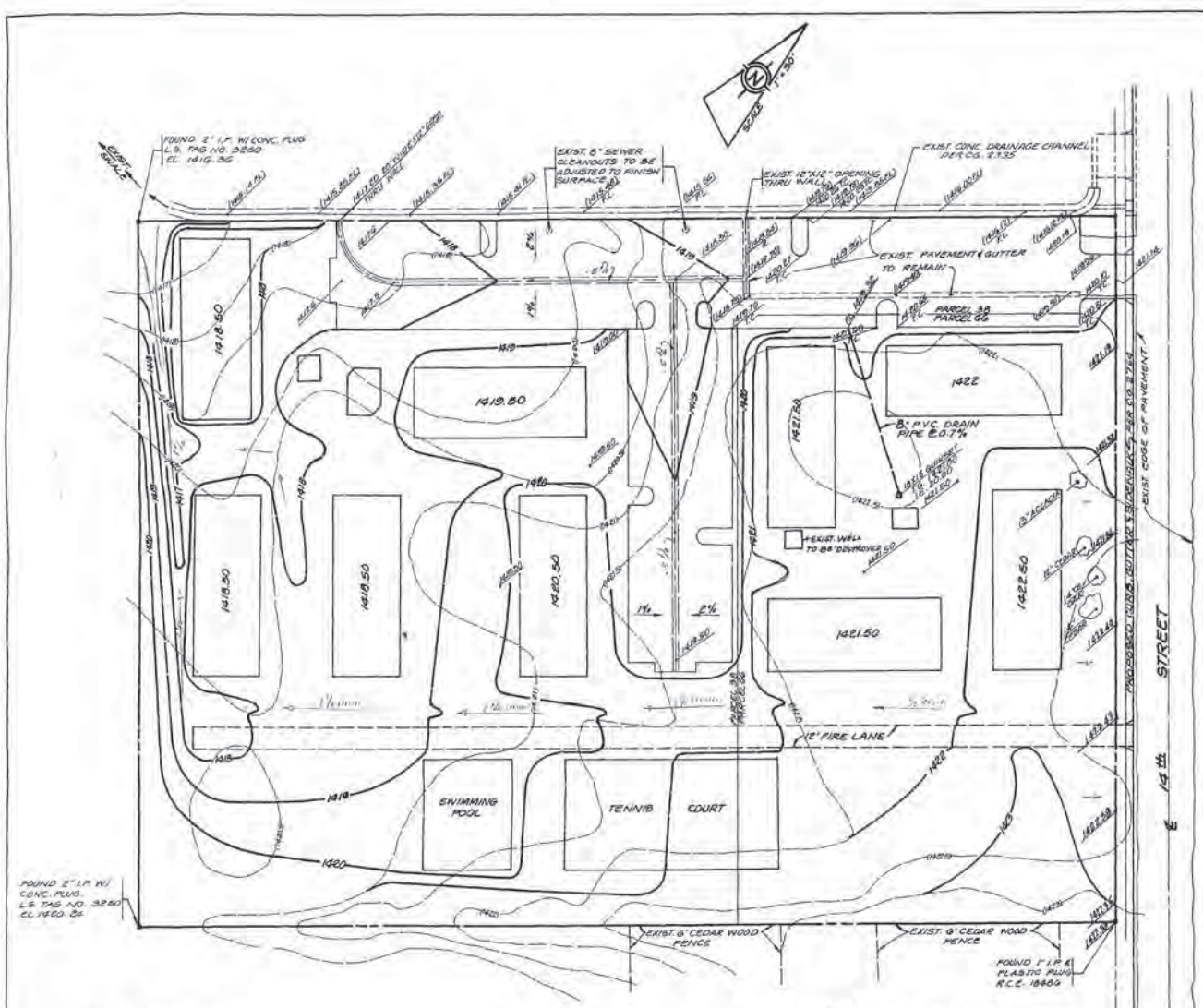
W.O. 1718

FILE NO.

ENGINEER'S NAME: JAMES W. CRAIG
PHONE NO. 297-3974

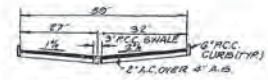
Verified 12/5/84


D STREET
E STREET
14 TH STREET
PUBLIC SEWER
N 56°49'57" E
549.09'
549.17'
N 56°50'17" E
BOUNDARY
PAD 1420.7
PAD 1421.0
PAD 1421.2
PAD 1422.4
PAD 1419.6
PAD 1420.0
PAD 1420.4
PAD 1418.6
PAD 1419.0
PAD 1418.3
PAD 1418.7
PAD 1419.0
PAD 1418.8
PAD 1418.6
PRIVATE DRAINAGE DITCH
NOTE: EXISTING FENCE TO BE RELOCATED
EDGE OF PAVEMENT
Type G Curb
Conc. Curb & Gutter @ 0.2 %
"AS-BUILT" Delete Swales & Pvt. Pipe Drain Details (See note #3-5/84 #1)
"AS-BUILT" CORRECTION PT. BY LANDSCAPE CONTRACTOR
TYPICAL SECTION EARTH SWALE
LEGEND
EARTH SWALE (1% MIN.)
CONC. GUTTER (0.5% MIN.)
FLOW LINE
INLET
PAD ELEVATION
FINISH ELEVATION
TOP WALL
DRAIN PIPE
EXISTING CONTOUR
TOP INLET
"AS BUILT"
ENGINEER
DATE
COUNTY APPROVED CHANGES
DESCRIPTION
APPROVED BY
DATE
"AS-BUILT" REVISION
PLANS PREPARED BY
CRAIG, BULTHUIS & NOTHOMB
Civil Engineering - Land Surveying 297-3974
9811 Adelaide Ave. - San Diego, California 92126
BENCH MARK
DESCRIPTION: CMSL
LOCATION: N.E. CENTER CURB OF 14TH STREET & MAIN STREET
RECORD FROM: SAN DIEGO COUNTY
ELEVATION: 1425.29
DATUM: MSL
PRIVATE CONTRACT
SHEET 3
COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
8 SHEETS
GRADING PLANS FOR: APARTMENT BLDG COMPLEX
IN BLOCK 79 - RAMONA,
MAP NO. 643
CALIFORNIA COORDINATE INDEX: 314-1803
DEPT. OF PUBLIC WORKS
5-26-83
LO283
W.O. 1718
FILE NO.
ENGINEER'S NAME: JAMES H. CRAIG
PHONE NO. 297-3974



LEGEND:

PROPERTY BOUNDARY	
EXIST. CONTOUR	(421)
PROPOSED CONTOUR	421
EXIST SPOT ELEV.	(1418.09)
PROPOSED SPOT ELEV.	1420.00
6" P.C.C. CURB	(6-1)
3' P.C.C. SWALE	
26' DRIVEWAY	(6-1)
BLDG. OUTLINE	
PAD ELEVATION	1421.50



TYPICAL SECTION DRIVEWAY/PARKING
NO SCALE

DETAIL - P.C.C. SWALE
NO SCALE

VICINITY MAP
NO SCALE

GENERAL NOTES:

1. APPROVAL OF THIS GRADING PLAN DOES NOT CONSTITUTE APPROVAL OF VERTICAL OR HORIZONTAL ALIGNMENT OF ANY PRIVATE ROAD SHOWN HEREON FOR COUNTY ROAD PURPOSES.
2. FINAL APPROVAL OF THESE GRADING PLANS IS SUBJECT TO FINAL APPROVAL OF THE ASSOCIATED IMPROVEMENT PLANS WHERE APPLICABLE FINAL CURB GRADE ELEVATIONS MAY REQUIRE CHANGES IN THESE PLANS.
3. IMPORT MATERIAL SHALL BE OBTAINED FROM A LEGAL SITE.
4. A CONSTRUCTION, EXCAVATION OR ENCROACHMENT PERMIT FROM THE DIRECTOR OF PUBLIC WORKS WILL BE REQUIRED FOR ANY WORK IN THE COUNTY RIGHT OF WAY.
5. ALL SLOPES OVER 3 FEET IN HEIGHT WILL BE PLANTED IN ACCORDANCE WITH SAN DIEGO COUNTY SPECIFICATIONS.
6. THE CONTRACTOR SHALL VERIFY THE EXISTENCE AND LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK. NOTICE OF THE PROPOSED WORK SHALL BE GIVEN TO THE FOLLOWING AGENCIES:

SAN DIEGO GAS & ELECTRIC	239-4000
PACIFIC TELEPHONE	298-0393
CATV:	
SEWER	279-3675
WATER	279-3755

7. A SOILS REPORT MAY BE REQUIRED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.
8. APPROVAL OF THESE PLANS BY THE DIRECTOR OF PUBLIC WORKS DOES NOT AUTHORIZE ANY WORK OR GRADING TO BE PERFORMED UNTIL THE PROPERTY OWNER'S PERMISSION HAS BEEN OBTAINED AND A VALID GRADING PERMIT HAS BEEN ISSUED.
9. THE DIRECTOR OF PUBLIC WORKS' APPROVAL OF THESE PLANS DOES NOT CONSTITUTE COUNTY BUILDING OFFICIAL APPROVAL OF ANY FOUNDATIONS FOR STRUCTURES TO BE PLACED ON THE AREA COVERED BY THESE PLANS. NO WAIVER OF THE GRADING ORDINANCE REQUIREMENTS CONCERNING MINIMUM COVER OVER EXPANSIVE SOILS IS MADE OR IMPLIED (SECTIONS 87.403 & 87.410). ANY SUCH WAIVER MUST BE OBTAINED FROM THE DIRECTOR OF DPW.
10. ALL OPERATIONS CONDUCTED ON THE PREMISES, INCLUDING THE WARMING UP, REPAIR, ARRIVAL, DEPARTURE OR RUNNING OF TRUCKS, EARTHMOVING EQUIPMENT, CONSTRUCTION EQUIPMENT AND ANY OTHER ASSOCIATED GRADING EQUIPMENT SHALL BE LIMITED TO THE PERIOD BETWEEN 7:00 a.m. AND 6:00 p.m. EACH DAY, MONDAY THROUGH SATURDAY. AND NO EARTHMOVING OR GRADING OPERATIONS SHALL BE CONDUCTED ON THE PREMISES ON SUNDAYS OR HOLIDAYS.
11. ALL MAJOR SLOPES SHALL BE ROUNDED INTO EXISTING TERRAIN TO PRODUCE A CONTOURED TRANSITION FROM CUT OR FILL FACES TO NATURAL GROUND AND ABUTTING CUT OR FILL SURFACES.
12. NOTWITHSTANDING THE MINIMUM STANDARDS SET FORTH IN THE GRADING ORDINANCE AND NOTWITHSTANDING THE APPROVAL OF THESE GRADING PLANS, THE PERMITTEE IS RESPONSIBLE FOR THE PREVENTION OF DAMAGE TO THE ADJACENT PROPERTY. NO PERSON SHALL EXCAVATE ON LAND SO CLOSE TO THE PROPERTY LINE AS TO ENDANGER ANY ADJOINING PUBLIC STREET, SIDEWALK, ALLEY, FUNCTION OF ANY SEWAGE DISPOSAL SYSTEM OR ANY OTHER PUBLIC OR PRIVATE PROPERTY WITHOUT SUPPORTING AND PROTECTING SUCH PROPERTY FROM SETTLING, CRACKING, EROSION, SILTING, SCOUR OR OTHER DAMAGE WHICH MIGHT RESULT FROM THE GRADING DESCRIBED ON THIS PLAN. THE COUNTY WILL HOLD THE PERMITTEE RESPONSIBLE FOR CORRECTION OF NON DEDICATED IMPROVEMENTS WHICH DAMAGE ADJACENT PROPERTY.
13. SLOPE RATIOS

CUT - 1½:1 FOR MINOR SLOPES; 2:1 FOR MAJOR SLOPES

FILL - 2:1 Slopes Designed From The Above Will Require Approval Of The Director Of Public Works After Review Of A Report From A Soils Engineer

EXCAVATION 1500 C.Y. FILL 1000 C.Y.

WASTE/IMPORT 500 C.Y. A Separate Permit Must Be Obtained For Waste Or Import Area

SPECIAL CONDITION: IF ANY ARCHAEOLOGICAL RESOURCES ARE DISCOVERED ON THE SITE OF THIS GRADING DURING GRADING OPERATIONS, SUCH OPERATIONS WILL CEASE IMMEDIATELY AND THE PERMITTEE WILL NOTIFY THE DIRECTOR OF PUBLIC WORKS OF THE DISCOVERY. GRADING OPERATIONS WILL NOT RESUME HENCE UNTIL THE PERMITTEE HAS RECEIVED WRITTEN AUTHORITY FROM THE DIRECTOR OF PUBLIC WORKS TO DO SO.

14. ALL GRADING DETAILS WILL BE IN ACCORDANCE WITH COUNTY OF SAN DIEGO STD. DRAWINGS D5.8, D5.10, D5.11 AND D75

LEGAL DESCRIPTION

PARCELS "A" & "B" of C83-021 7 BA(C)1

A.P.N. 282-262-38, 66, 68

OWNER/PERMITTEE

RAMONA HIDDEN VALLEY
3636 FIFTH AVE.
SAN DIEGO, CA. 92101

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.

ROBERTO S. DOMINGO
11399 CASCADA WAY
SAN DIEGO, CA 92124 TEL 560-0304
By R. S. Domingo 5/28/85
RCE 29118

COUNTY APPROVED CHANGES			
No.	Description	Approved by	Date

PERMITS

CG. 2766

REZONE PERMIT NO. N.A.

SPECIAL USE PERMIT NO. N.A.

TENTATIVE MAP NO. N.A.

BENCH MARK

DESCRIPTION POST MILE = 23.96 MON. 23.96 CDOT DISC. IN TOP CURB, EAST COR. RT. GT & 14TH ST.

LOCATION SAN DIEGO COUNTY

RECORD FROM DIV. OF HIGHWAYS CONTROL MON DATA

ELEVATION 1425.810 DATUM U.S.C. & G.S.

PRIVATE CONTRACT

SHEET 1 | COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS | 1 SHEETS

GRADING PLANS FOR:

72 UNITS APARTMENT

CALIFORNIA COORDINATE INDEX 310-1809

Approved R.C. Maddox DIRECTOR OF PUBLIC WORKS

By: M. Sam

6-17-85 Date

Engineer of Work R. S. Domingo RCE 29118 Exp. 12-31-86

Grading Permit No. L-0714

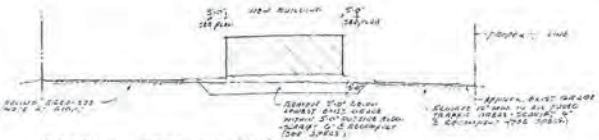
FILE NO.

ENGINEER'S NAME: ROBERTO S. DOMINGO
PHONE NO. (619) 560-0304

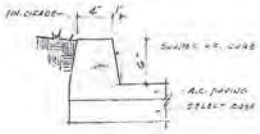
14th MICROFILM & VAULT 11-6-85

PRECISION
NOV 12 1985
MICROFILMED

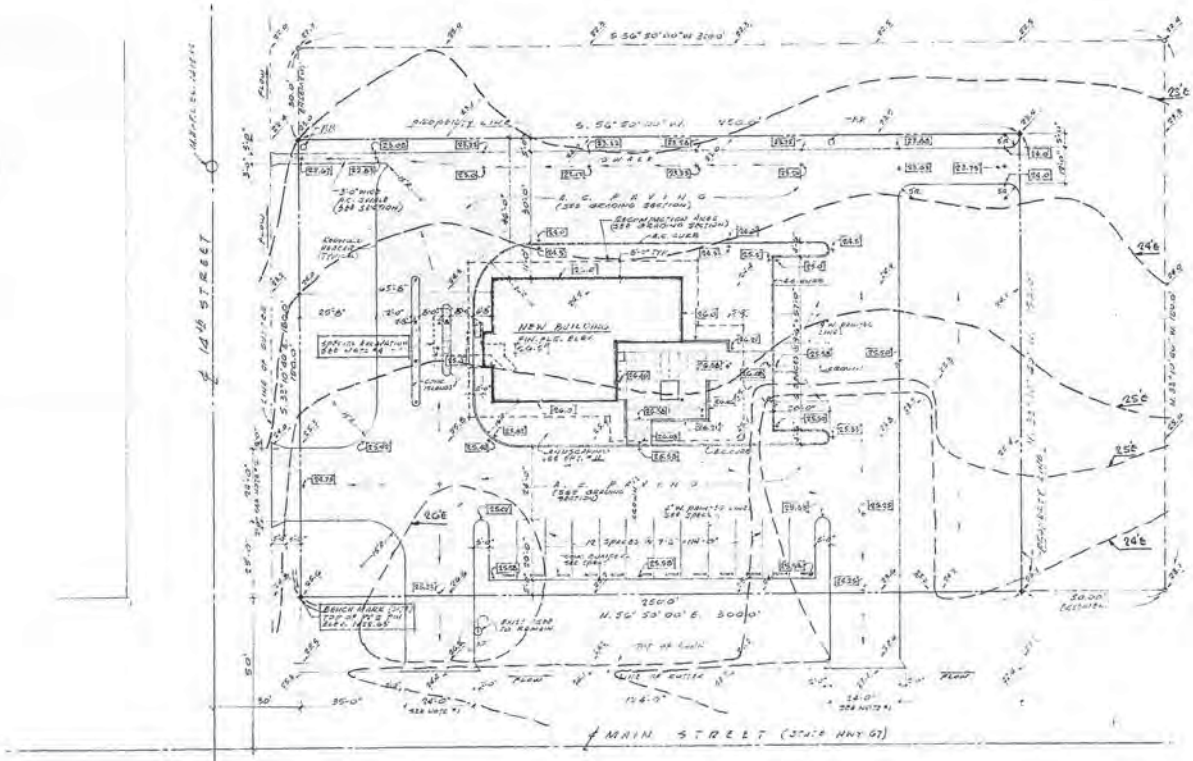
SECTION @ DRAINAGE SWALE
NO SCALE



GRADING SECTION

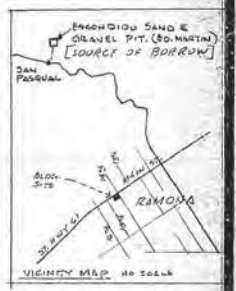


TYP. A.C. CURB



SITE PLAN
SCALE 1" = 20'-0"

GENERAL NOTES:
1. A PERMIT FROM THE COUNTY ENGINEER WILL BE REQUIRED FOR ANY WORK IN THE COUNTY RIGHT OF WAY.
2. ALL SLOPES OVER 3 FEET IN HEIGHT WILL BE PLANTED IN ACCORDANCE WITH THE SAN DIEGO COUNTY GRADING ORDINANCE NO. 1455 (NEW SERIES).
3. THE RESPONSIBILITY FOR RELOCATION OF UTILITIES SHALL BE ASSUMED BY THE DEVELOPER.



BENCH MARK
ELEVATIONS SHOWN ARE BASED ON S.D. CO. BM # 5-62, A 10" OH HB CORE BETWEEN 7TH & MAIN ST. NEAREST - 70'E OF W AT SW CORNER NO. 7 BLDG. IS 1425.63' - ADD 1000' FOR TRUE ELEVATION

ESTIMATED COST : $165,000

LEGAL DESCRIPTION
A PORTION OF BLOCK 52 OF RAMONA, MAP 663.

QUANTITIES
CUT 5870 CY. FILL 400 CY.

SITE ADDRESS:
142 MAIN STR. RAMONA, CALIF.

OWNER:
ESCONDIDO NATIONAL BANK
160 N. ESCONDIDO BLVD.
ESCONDIDO, CALIF. (714) 746-5100

SOILS ENGINEER:
CLOUD & PARKER RCE 11,937

GRADING PLAN BY:
TUCKER SADLER & BENNETT - ARCHITECTS
2411 2ND AVE. SAN DIEGO CALIF.

GENERAL NOTES
1. DRIVEWAYS ENTERING HWY #67 SHALL HAVE MIN. 30' R.C. PAVING & 30' CURB RETURN. THEY SHALL BE ELEV. IN ACCORDANCE WITH STATE HWY. REQ.
2. DRIVEWAY ENTERING HWY #7 SHALL BE IN ACCORDANCE WITH SAN DIEGO COUNTY STDS.
3. DRAINAGE TO PROVIDE ALL DRAINAGE IS ACCOMPLISHED, SLOPES & DRAINAGE AS SHOWN - SEE SECTION
4. DRAINAGE TO INCLUDE ALL BUILDING & DRAINAGE DOWN SLOPE DIRECTLY TO STREET SOON. SEE SHT #2 FOR DRAINAGE PLAN. DRAINAGE WITH FUTURE SYSTEM WITH CURB

LEGEND
EXIST. CONTOURS

PRECISION
MAY 8 1968
MICROFILMED

SHEET 1	COUNTY OF SAN DIEGO	SHEETS 1

DRAWING PLANT FOR:
ESCONDIDO NATIONAL BANK
160 N. ESCONDIDO BLVD -
ESCONDIDO, CALIFORNIA
PHONE : 746-5100

APPROVED: H.M. TAYLOR
COUNTY ENGINEER
BY: [illegible]
DATE: [illegible]

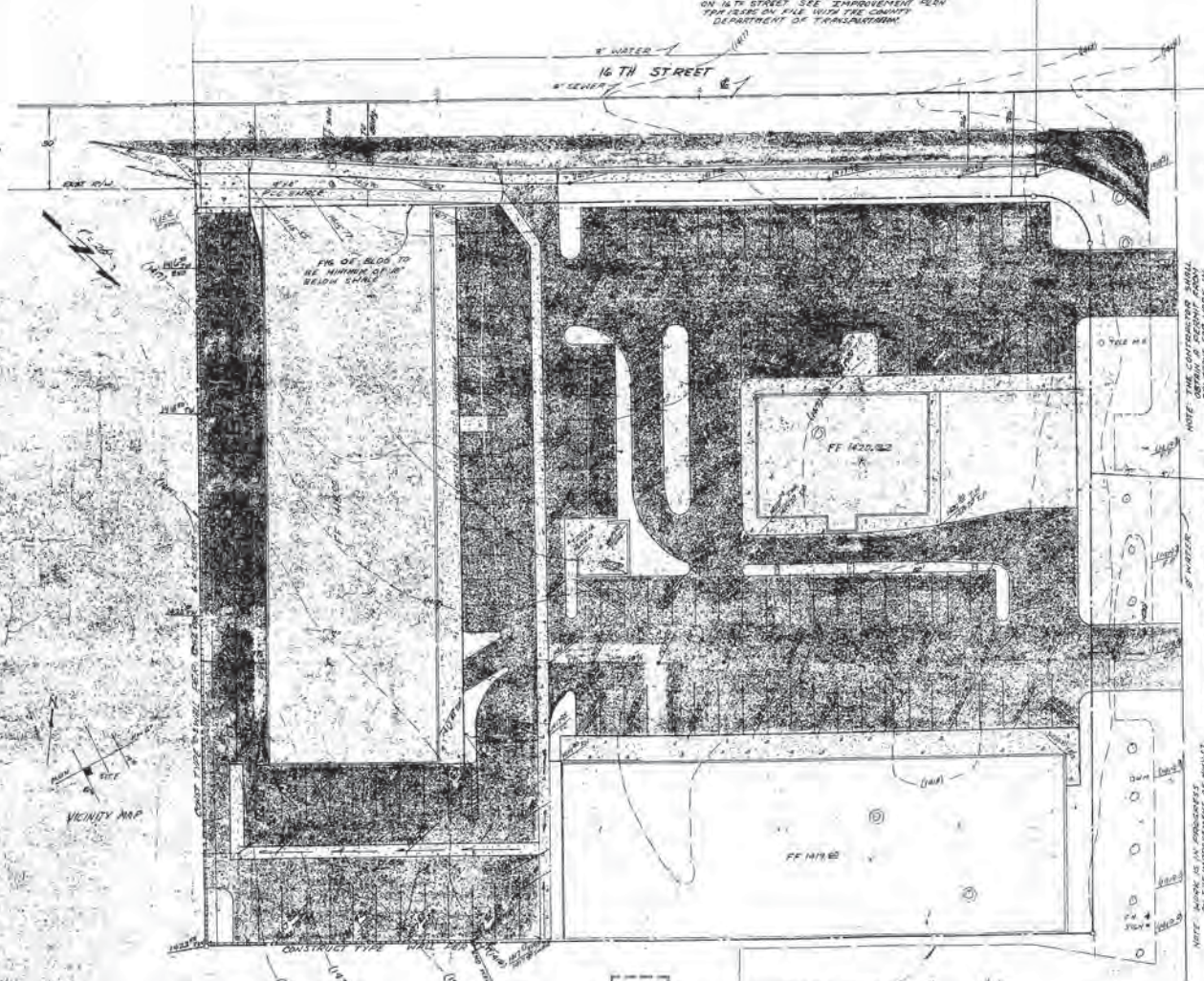
SCALE: 1" = 20'-0"
GRADING PERMIT NO. L5713

TUCKER SADLER AND BENNETT

architecture planning engineering

JOB TITLE:
ESCONDIDO NATIONAL BANK
-RAMONA BRANCH

2411 SECOND AVENUE SAN DIEGO CALIF. 92101



GENERAL NOTES

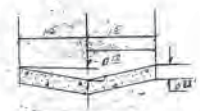
1. APPROVAL OF THIS GRADING PLAN DOES NOT CONSTITUTE APPROVAL OF VERTICAL OR HORIZONTAL ALIGNMENT OF ANY PRIVATE ROAD SHOWN THEREON FOR COUNTY ROAD PURPOSES.
2. FINAL APPROVAL OF THESE GRADING PLANS IS SUBJECT TO FINAL APPROVAL OF THE ASSOCIATED IMPROVEMENT PLANS WHERE ANY FINAL CURB GRADE ELEVATIONS MAY REQUIRE CHANGES IN THESE PLANS.
3. IMPORT MATERIAL SHALL BE OBTAINED FROM A LEGAL SITE.
4. A CONSTRUCTION, EXCAVATION OR ENCROACHMENT PERMIT FROM THE DIRECTOR OF TRANSPORTATION WILL BE REQUIRED FOR ANY WORK IN THE COUNTY RIGHT OF WAY.
5. ALL SLOPES OVER 3 FEET IN HEIGHT WILL BE PLANTED IN ACCORDANCE WITH SAN DIEGO COUNTY SPECIFICATIONS.
6. THE CONTRACTOR SHALL VERIFY THE EXISTENCE AND LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK. NOTICE OF THE PROPOSED WORK SHALL BE GIVEN TO THE FOLLOWING AGENCIES:
   SAN DIEGO GAS & ELECTRIC 232-4252
   PACIFIC TELEPHONE 297-1101
   CATV: 442-2266
   SEWER: 697-3190
   WATER 789-1230
7. A SOILS REPORT MAY BE REQUIRED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.
8. APPROVAL OF THESE PLANS BY THE DIRECTOR OF TRANSPORTATION DOES NOT AUTHORIZE ANY WORK OR GRADING TO BE PERFORMED UNTIL THE PROPERTY OWNER'S PERMISSION HAS BEEN OBTAINED AND A VALID GRADING PERMIT HAS BEEN ISSUED.
9. THE DIRECTOR OF TRANSPORTATION'S APPROVAL OF THESE PLANS DOES NOT CONSTITUTE COUNTY BUILDING OFFICIAL APPROVAL OF ANY STRUCTURE FOR STRUCTURES TO BE PLACED ON THE SITE COVERED BY THESE PLANS. NO WAIVER OF ANY BUILDING ORDINANCE REQUIREMENTS CONCERNING MINIMUM OUTER EXTERIOR DIMENSIONS MADE OR IMPLIED IN SECTIONS 87.403 & 87.405 ANY SUCH WAIVER MUST BE APPROVED BY THE DIRECTOR OF DPW.
10. ALL OPERATIONS CONDUCTED ON THE PREMISES, INCLUDING THE MAINTENANCE, REPAIR, ARRIVAL, DEPARTURE OR RUNNING OF GRADING EQUIPMENT, CONSTRUCTION EQUIPMENT, AND ANY OTHER ASSOCIATED GRADING EQUIPMENT, SHALL BE LIMITED TO THE PERIOD BETWEEN 7:00 A.M. AND 6:00 P.M. EACH DAY, MONDAY THROUGH SATURDAY, AND NO EARTHMOVING OR GRADING OPERATIONS SHALL BE CONDUCTED ON THE PREMISES ON SUNDAYS OR HOLIDAYS.
11. ALL MAJOR SLOPES SHALL BE BLENDED INTO EXISTING TERRAIN TO PROVIDE A SMOOTH CONTOURED TRANSITION FROM CUT OR FILL AREAS TO ORIGINAL GROUND AND ABUTTING CUT OR FILL SLOPES.
12. NOTWITHSTANDING THE MINIMUM STANDARDS SET FORTH IN THE GRADING ORDINANCE AND NOTWITHSTANDING THE APPROVAL OF THE GRADING PLANS, THE PERMITTEE IS RESPONSIBLE FOR THE PROTECTION OF DAMAGE TO THE ADJACENT PROPERTY. NOTWITHSTANDING SHALL EXCAVATE ON LAND SO CLOSE TO THE PROPERTY LINE AS TO ENDANGER ANY ADJOINING PUBLIC STREET, SIDEWALK, ALLEY, FUNCTION OF ANY SEWER DISPOSAL SYSTEM OR ANY OTHER PUBLIC OR PRIVATE PROPERTY WITHOUT SUPPORTING AND PROTECTING SUCH PROPERTY FROM SETTLING, CRACKING, EROSION, SILTING, SCOUR OR OTHER DAMAGE WHICH MIGHT RESULT FROM THE GRADING DESCRIBED ON THIS PLAN. THE COUNTY WILL HOLD THE PERMITTEE RESPONSIBLE FOR CORRECTION OF NEW DEDICATED IMPROVEMENTS WHICH DAMAGE ADJACENT PROPERTY.
13. SLOPE RATIOS:
   CUT – 1:1 FOR MINOR SLOPES; 2:1 FOR MAJOR SLOPES
   FILL – 2:1 Slopes Deviating From The Above Will Require Approval Of The Director Of Transportation After Receipt Of A Report From A Civil Engineer.

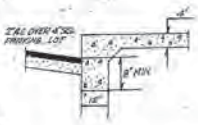
EXCAVATION 1400 C.Y. BY FILL 4000 C.Y.
IMPORT 5000 C.Y. A Separate Permit Must Be Obtained For Import Area.

SPECIAL CONDITIONS: IF ANY ARCHAEOLOGICAL RESOURCES ARE DISCOVERED ON THE SITE OF THIS GRADING DURING GRADING OPERATIONS, SUCH OPERATIONS WILL CEASE IMMEDIATELY AND THE PERMITTEE WILL NOTIFY THE DIRECTOR OF TRANSPORTATION OF THE DISCOVERY. GRADING OPERATIONS WILL NOT RECOMMENCE UNTIL THE PERMITTEE HAS RECEIVED WRITTEN AUTHORITY FROM THE DIRECTOR OF TRANSPORTATION TO DO SO.

LEGEND

EXISTING CONTOURS	(xxxx)
EXISTING ELEVATIONS	xxxx
FINISH ELEVATIONS	xxxx
2" AC OVER SELECT	
PCC SWALE	
PCC SIDEWALK	
THICKENED PCC SIDEWALK	
BLDG FINISHES	
TREES TO BE REMOVED	
TOP OF CURB	TC
TOP OF PAVEMENT	TP
TOP OF WALK	TW
SWALE & RETAINING WALL PER	SWL





TYPICAL SECTION
THICKENED PCC SIDEWALK

LEGAL DESCRIPTION:
PARCELS 1 & 2 OF PM 7199

NOTE: SEE ORIGINAL TOPOGRAPHIC SURVEY PREPARED BY VIEW LEYMING AND ASSOCIATES FOR EXISTING SITE CONDITIONS.

OWNER & PERMITTEE,
RUSSELL T. FOX
1530 MAIN ST. RAMONA, CA 92065
TEL 2110 - 442-3559

ENGINEER OF WORK
CHAMBERLAIN AND ASSOCIATES
1354 MARGVILLA AVE
EL CAJON, CA.
579-0781, 789-0361

UV 1120 ± TPM 12585

PRIVATE CONTRACT

SHEET 1 — COUNTY OF SAN DIEGO DEPARTMENT OF TRANSPORTATION — 1 SHEETS

GRADING PLANS FOR:
COMMERICAL DEVELOPEMENT FOR TPM 12585 RAMONA, CA

CALIFORNIA COORDINATE INDEX: 314-1068

Approved By Authority Of The Director Of Transportation: Thos. Clark, R.C.E. 18894

By: L. R. [illegible] — Date: 7-20-78

Grading Permit No. L-8735

FILE NO.

PERMITS

REZONE PERMIT NO.
SPECIAL USE PERMIT NO.
TENTATIVE MAP NO. 12585 Approved 10-19-77

COUNTY APPROVED CHANGES

No.	Description	Approved By	Date

BENCH MARK

DESCRIPTION: S.D. COUNTY, 3TH, 12585 DISC. 1/8 1/2-1970
LOCATION: 35' N.W. & W.W.E.T. 40.5M of E. TRUMPS RDE
RECORD FROM: COUNTY VERTICAL CONTROL
ELEVATION: 1422.261 DATUM: M.S.L.

ENGINEER'S NAME: DAVID L. CHAMBERLAIN
PHONE NO. 789-0361

PRECISION JUL 28 1978 MICROFILMED

SHEET 2 OF 3