CEQA PRELIMINARY

DRAINAGE STUDY

David Puchta Horse Stall Barns

Prepared By
Mike Smith
Mike Smith Engineering, Inc.
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Lodi, CA. 95240
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For
David Puchta
31910 Aqueduct Road
Bonsall, CA 92003

ER 06-02-021
AD 05-038

05159
12-1-05

REGISTERED PROFESSIONAL ENGINEER
MICHAEL W. SMITH
No. C044590
EXP. 3-31-08
CIVIL
STATE OF CALIFORNIA

MICHAEL W. SMITH **R.C.E. 44590**

RECEIVED
AUG 11 2006
DEPARTMENT OF PLANNING AND LAND USE

8-11-06
DATE

1/17

INTRODUCTION

This site is located at the North West corner of Calle Detalar and Aqueduct road, in the community of Bonsall, California. It presently has a single- family residence and a lemon tree orchard.

The existing drainage is a sheet flow to the South where it is collected in a roadside ditch and directed to culvert pipes, which drain below the road into an existing swale system.

The proposed drainage will use the same drainage pattern, but note that the two large arenas be very beneficial in managing storm water runoff. All storm water collected on site will be directed to these flat areas, where absorption will and evaporation will be the predominant mode of transportation.

Siltation and erosion will not occur during construction because of the silt fences and the fiber rolls. Once construction is complete and the landscaping is matured, siltation and erosion will be controlled by a ground cover on the cut and fill slopes and by grass liners in the drainage swales.

Due to the on site mitigation measures, there should be no adverse effects to the surrounding properties. Refer to the Storm Water Management plan for an in depth discussion of mitigation measures and water quality.

DECLARATION OF RESPONSIBLE CHARGE: [i]

I, HEREBY DECLARE THAT I AM THE CIVIL 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 BUSSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTANT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

ENGINEER OF WORK:

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PROJECT NO. **05159**
David Puchta

REGISTERED PROFESSIONAL ENGINEER
MICHAEL W. SMITH
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EXP. 3-31-08
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STATE OF CALIFORNIA

8-7-00

MICHAEL W. SMITH R.C.E. 44590 DATE
EXP. 3-31-08

Mike Smith Engineering

Preliminary Grading Plan

1. The outlet channel elevation has been revised to eliminate storm water retention.

2. Legend revised to identify flow line symbol.

Preliminary Drainage Study

1. Preliminary grading plan has been revised to show the existing drainage swale located on the property to the north.

2. Hydrology calculations revised to use runoff coefficient found in table 3-1,"runoff coefficients for urban areas".

3. The Hydrologic soil group provided in previous submittal.

4. The actual flow from this site will be reduced as a result of this project due to the detension action of the riding arenas. Therefore, it will enhance the ability of this drainage system to function more efficiently and will enhance the storm water quality.

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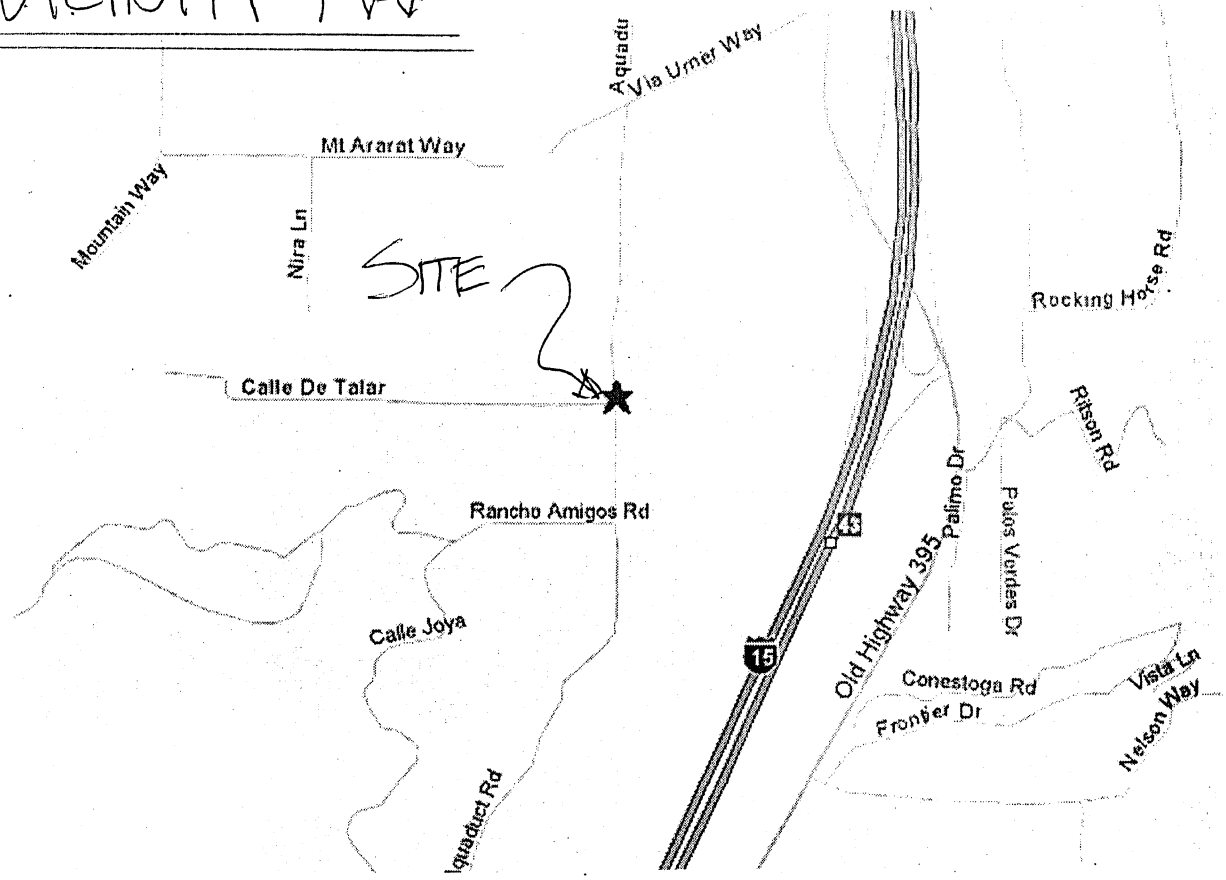
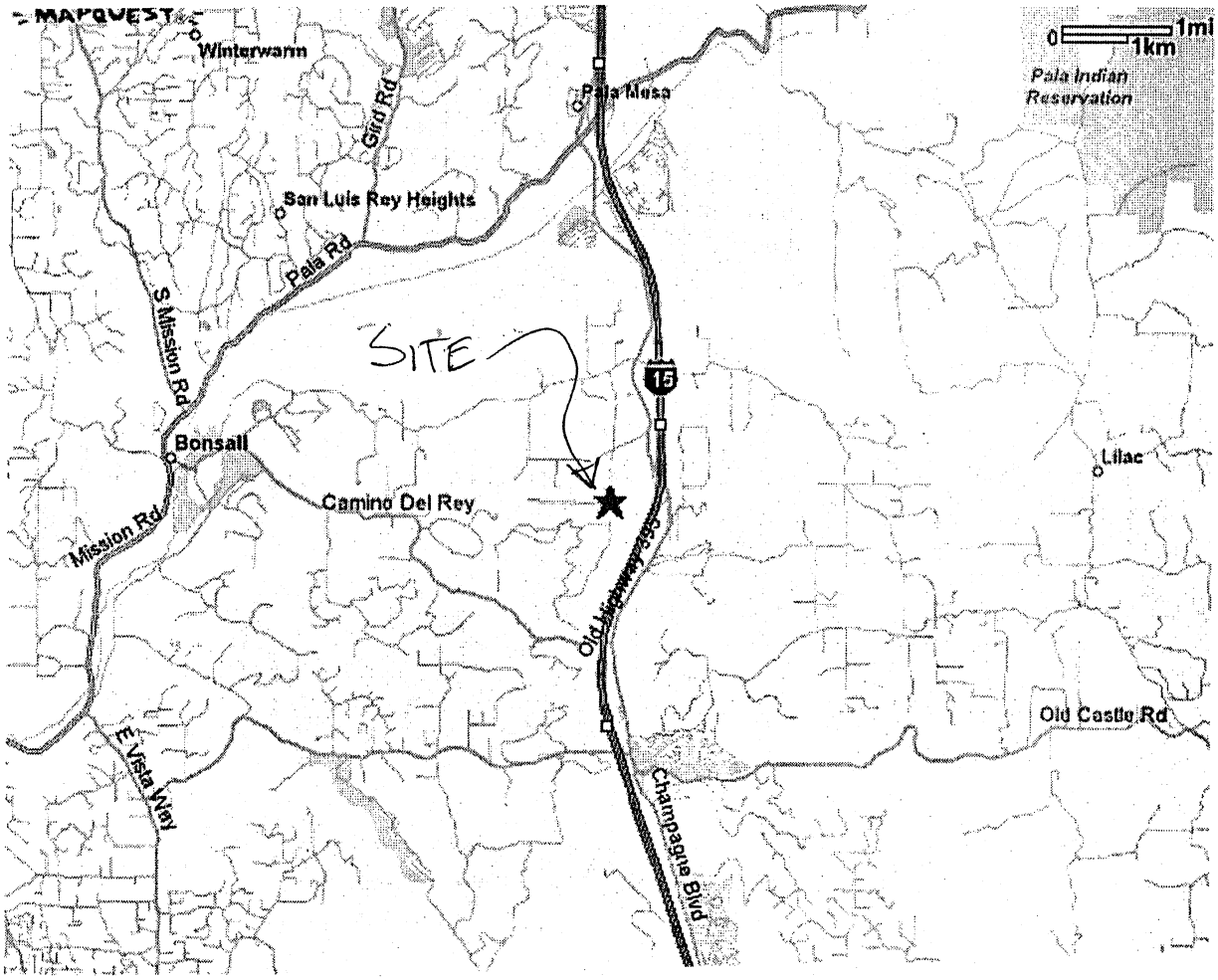
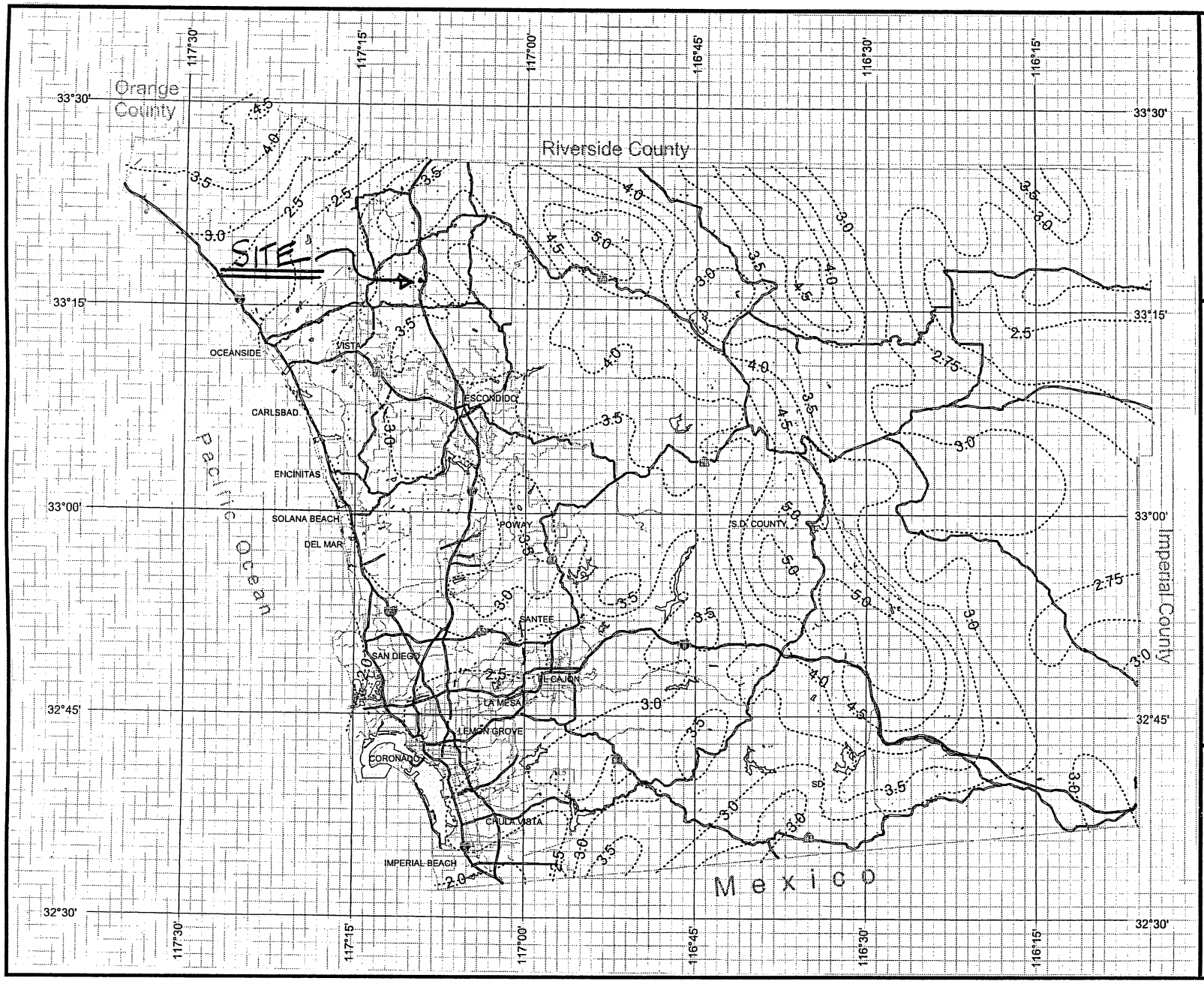
Michael W. Smith
Mike Smith Engineering, Inc.
R.C.E. 44590

VICINITY MAP







County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS

SanGIS

N
W E
S

3 0 3 Miles

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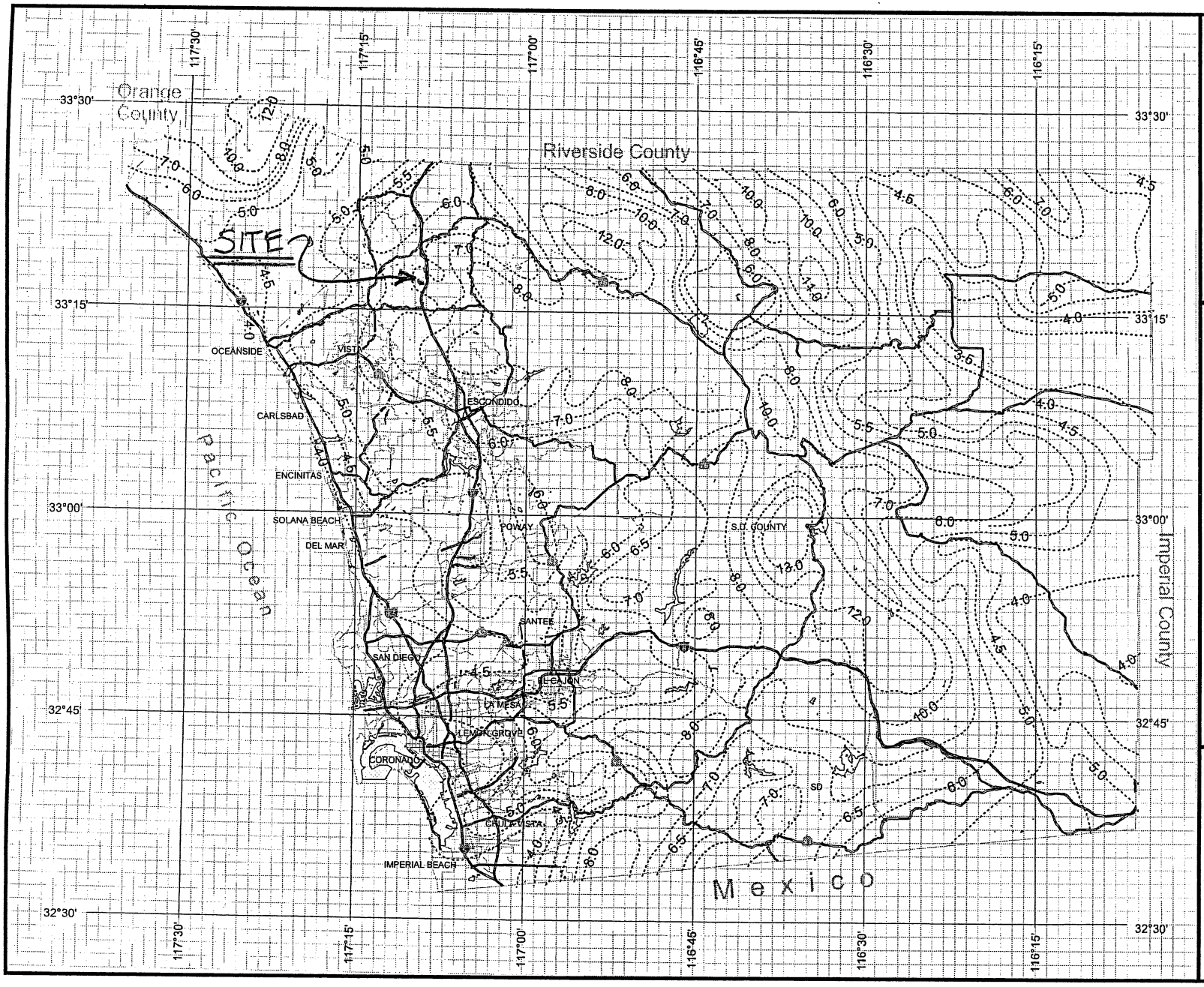

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS

SanGIS We Have San Diego Covered!

N W E S

3 0 3 Miles

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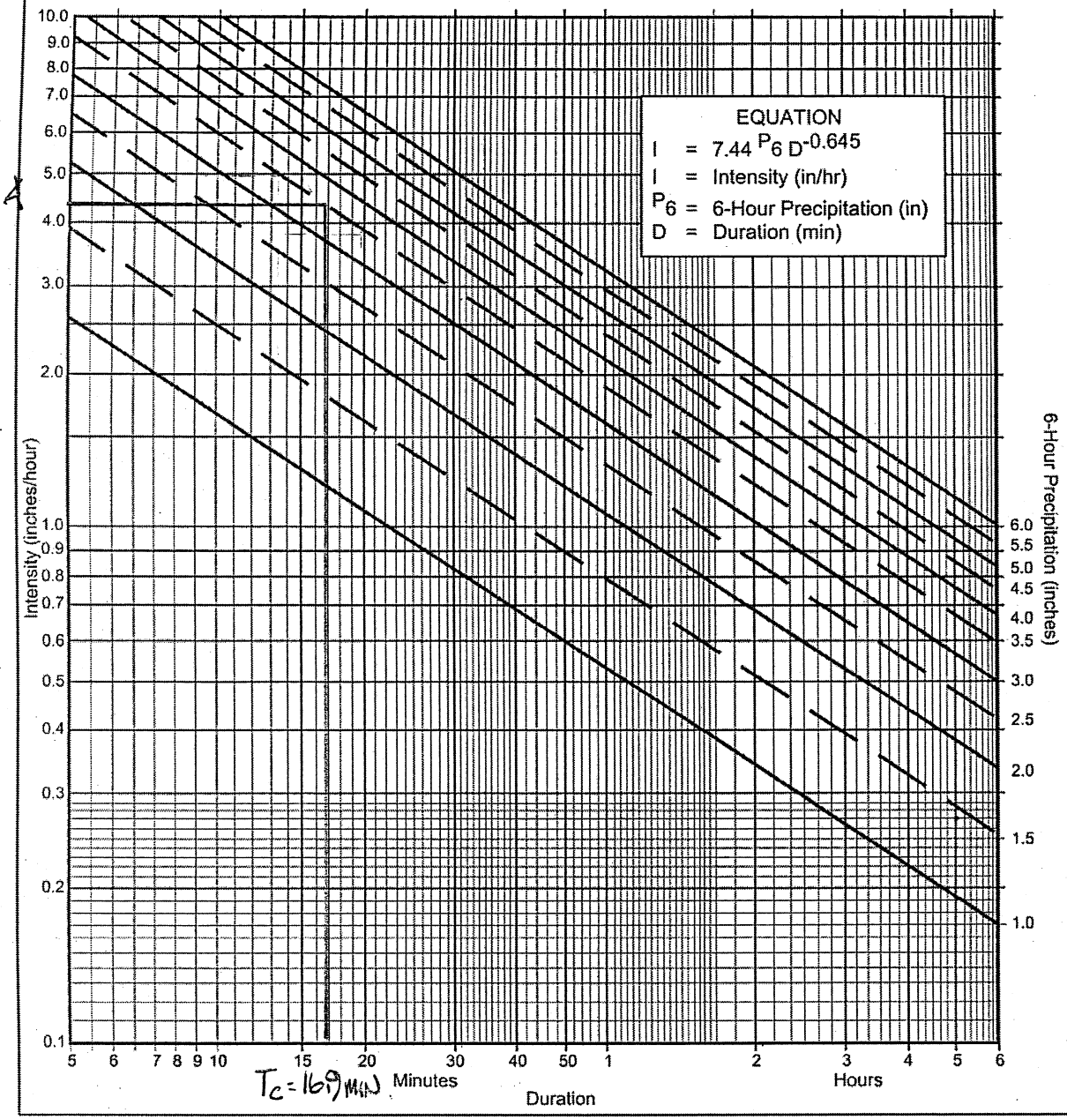
PRE CONSTRUCTION



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 = 3.5 in., P_{24} = 6.0, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 3.5 in.

(d) t_x = 16.9 min.

(e) I = 4.4 in./hr.

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

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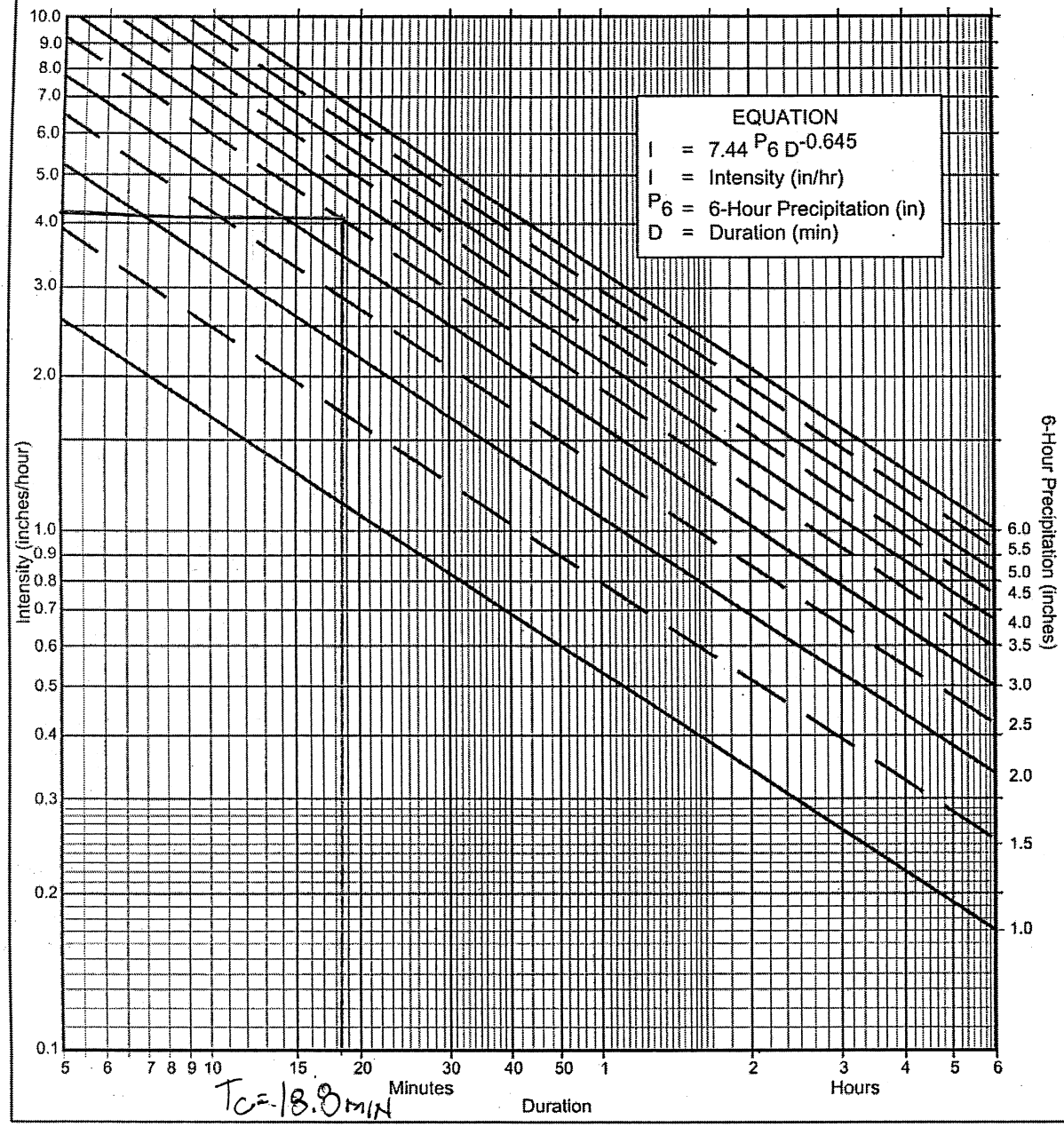
POST CONSTRUCTION

I=4.1



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 = 3.5 in., P_{24} = 6.0, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 3.5 in.

(d) t_x = 18.2 min.

(e) I = 4.1 in./hr.

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

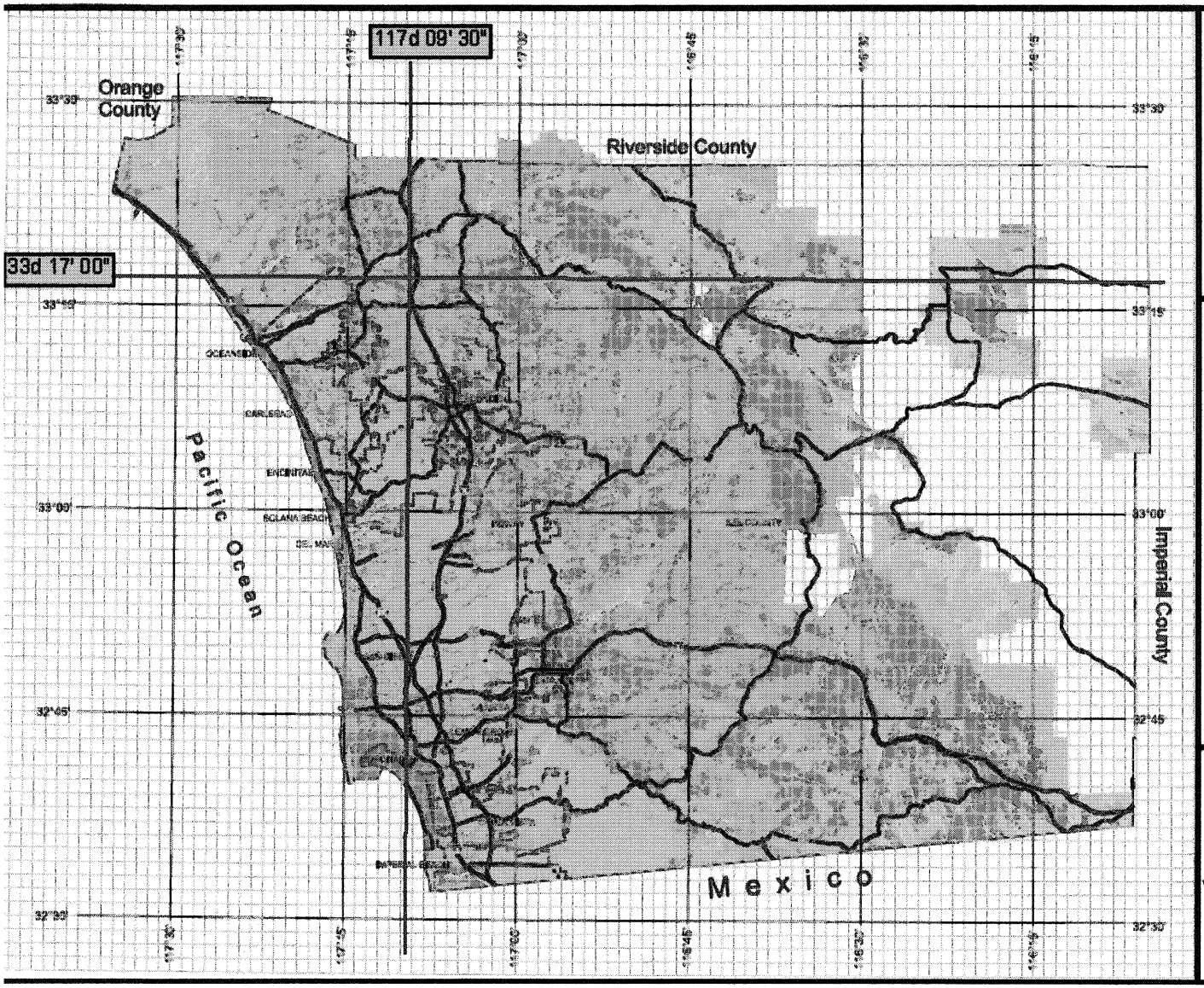
Intensity-Duration Design Chart - Template

FIGURE 3-1

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



County of San Diego Hydrology Manual

Soil Hydrologic Groups

Legend

Soil Groups
- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

AD 05-038
Soil Group 'B'

DPW GIS

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N
W E
S

3 0 3 Miles

A. *DESIGN METHODS*

THE RATIONAL METHOD IS USED IN THIS HYDROLOGY STUDY; THE RATIONAL FORMULA IS AS FOLLOWS:

Q = CIA, WHERE : Q= PEAK DISCHARGE IN CUBIC FEET/SECOND *

C = RUNOFF COEFFICIENT (DIMENSIONLESS)

I = RAINFALL INTENSITY IN INCHES/HOUR

A = TRIBUTARY DRAINAGE AREA IN ACRES

*1 ACRE INCHES/HOUR = 1.008 CUBIC FEET/SEC

THE NATURAL WATERSHED METHOD IS ALSO USED IN THIS HYDROLOGY STUDY; THE NATURAL WATERSHED FLOW FORMULA IS AS FOLLOWS:

$T_C=1.8(1.1-C)(L)^{.5}/[S(100)]^{.333}$

L = OVERLAND TRAVEL DISTANCE IN FEET

S = SLOPE IN FT./FT.

T_C= TIME IN MINUTES

B. *DESIGN CRITERIA*

- FREQUENCY, 100 YEAR STORM.

- LAND USE PER SPECIFIC PLAN AND TENTATIVE MAP.

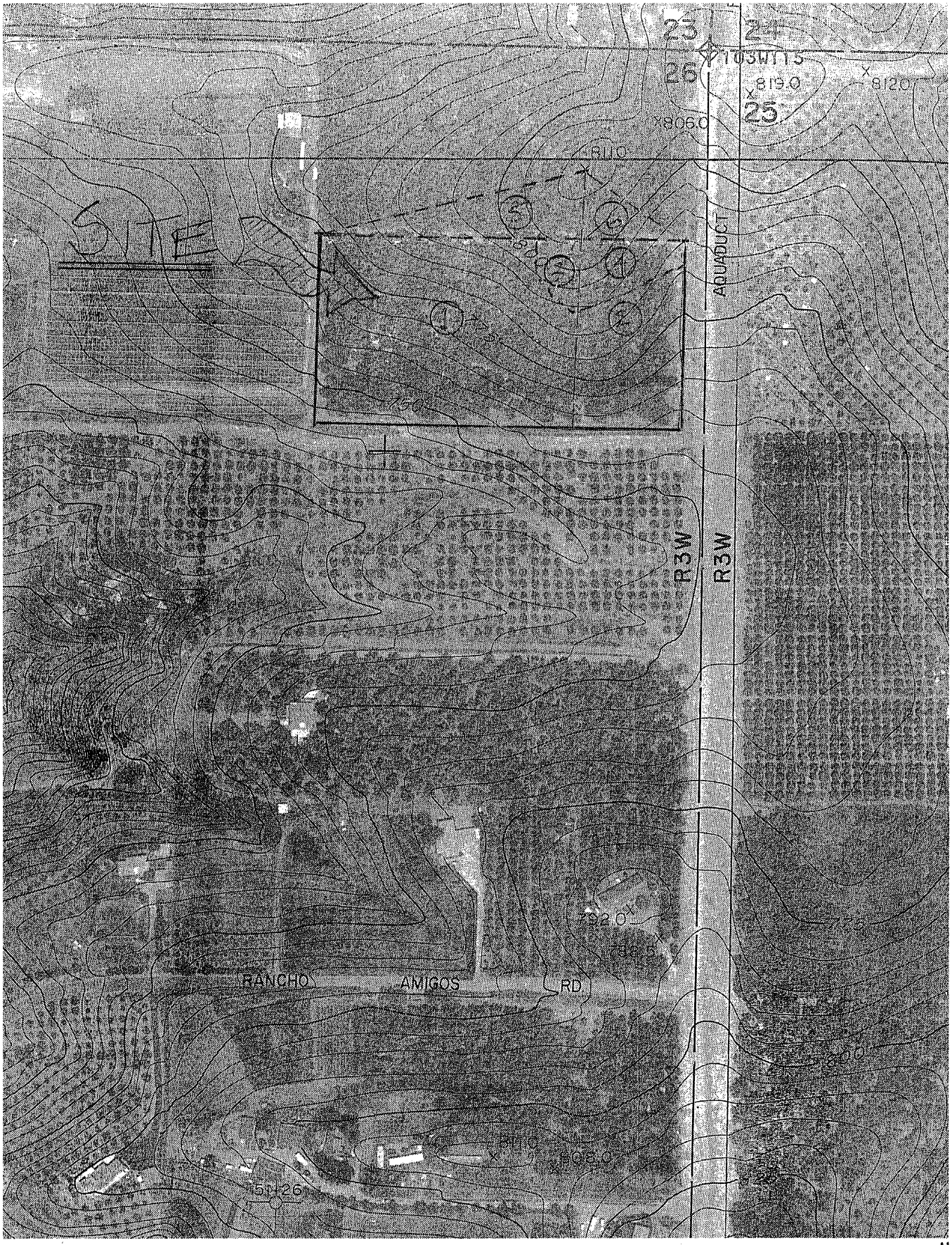
- RAIN FALL INTENSITY PER COUNTY OF SAN DIEGO 1993 HYDROLOGY DESIGN MANUAL.

C. *REFERENCES*

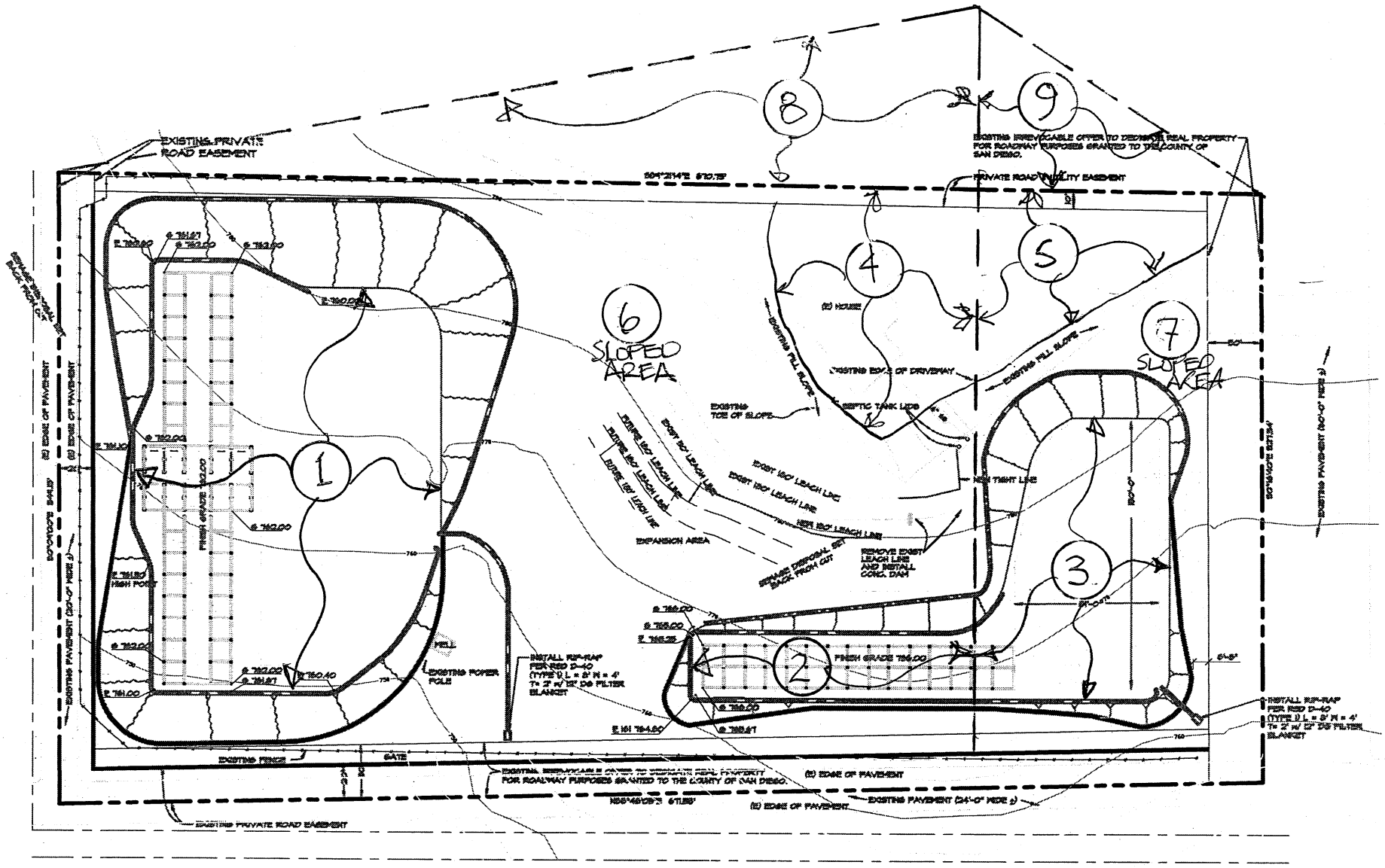
- COUNTY OF SAN DIEGO 1993, HYDROLOGY MANUAL.

- COUNTY OF SAN DIEGO 1992 REGIONAL STANDARD DRAWING.

- HAND BOOK OF HYDRAULICS BY BRATER & KING, SIXTH EDITION.


23
24
26
25
T03W T13S
819.0
820
806.0
810
SITE
AQUADUCT
R3W
R3W
792.0
RANCHO
AMIGOS
RD
800
810
806.0
51126

11/1


EXISTING PRIVATE ROAD EASEMENT
EXISTING IRREVOCABLE OFFER TO DEDICATE REAL PROPERTY FOR ROADWAY PURPOSES GRANTED TO THE COUNTY OF SAN DIEGO.
PRIVATE ROAD & UTILITY EASEMENT
(E) HOUSE
EXISTING EDGE OF DRIVEWAY
SEPTIC TANK LIDS
EXISTING FILL SLOPE
EXISTING TOE OF SLOPE
SLOPED AREA
EXPANSION AREA
REMOVE EXIST. LEACH LINE AND INSTALL CONC. DAM
FINISH GRADE 762.00
FINISH GRADE 766.00
HIGH POINT
WELL
EXISTING POWER POLE
INSTALL RIP-RAP PER RSD D-40 (TYPE I) L = 5' W = 4' T= 2' w/ 12" D6 FILTER BLANKET
EXISTING FENCE
GATE
(E) EDGE OF PAVEMENT
EXISTING PAVEMENT (24'-0" WIDE ±)
EXISTING PRIVATE ROAD EASEMENT
1
2
3
4
5
6
7
8
9

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HYDROLIC CALCULATION

TOTAL ON-SITE DRAINAGE AREA = 217,800 SF

TOTAL OFF-SITE DRAINAGE AREA = 43,000 SF

PRECONSTRUCTION AREAS (EXISTING)

AREA 1 = 149,936 SF

AREA 2 = 41,464 SF

AREA 3 = 12,000 SF

AREA 4 = 14,400 SF

AREA 5 = 30,900 SF

AREA 6 = 12,100 SF

POST CONSTRUCTION AREAS (PROPOSED)

AREA 1 = 36,800 SF

AREA 2 = 8,000 SF

AREA 3 = 10,800 SF

AREA 4 = 12,000 SF

AREA 5 = 14,400 SF

AREA 6 = 111,800 SF

AREA 7 = 24,000 SF

AREA 8 = 12,100 SF

AREA 9 = 30,900 SF

RUNOFF COEFICIENTS (PER TABLE 3-1)

DEVELOPED AREAS C = .32

ORIGINAL GROUND C = .25

TABLE 3-1 RUNOFF COEFICIENTS FOR URBAN AREAS. P # 3-6 IN HYDROLOGY MANUAL.

DETERMINE TIME OF CONCENTRATION

$$T_c = 1.8(1.1-C)(L)^{.5} / S(100)^{.33} + T_i$$

WHERE: T_c = TIME OF CONCENTRATION (MIN)
C = RUNOFF COEFICIENT
L = OVERLAND TRAVEL DISTANCE (FT)
S = SLOPE (FT/FT)
T_i = PER TABLE 3-2 = 6.4 MIN

PRE CONSTRUCTION

T_c #1 & #2 $= 1.8(1.1-.25)(350)^{.5} / [.11(100)]^{.33} + 6.4 = 16.9$ MIN

T_c #3 & #4 $= 1.8(1.1-.32)(200)^{.5} / [.01(100)]^{.33} + 6.4 = 12.7$ MIN

T_c #5 & #6 $= 1.8(1.1-.25)(480)^{.5} / [.08(100)]^{.33} + 6.4 = 23.3$ MIN

POST CONSTRUCTION

T_c AREA #1 $= 1.8(1.1-.32)(240)^{.5} / [.004(100)]^{.33} + 6.4 = 31.2$ MIN

T_c AREA #2 $= 1.8(1.1-.32)(260)^{.5} / [.002(100)]^{.33} + 6.4 = 44.8$ MIN

T_c AREA #3 $= 1.8(1.1-.32)(180)^{.5} / [.004(100)]^{.33} + 6.4 = 27.9$ MIN

T_c AREA #4 $= 1.8(1.1-.32)(200)^{.5} / [.01(100)]^{.33} + 6.4 = 12.7$ MIN

T_c AREA #5 = $= 12.7$ MIN

T_c AREA #6 $= 1.8(1.1-.25)(350)^{.5} / [.11(100)]^{.33} + 6.4 = 16.9$ MIN

T_c AREA #7 = $= 16.9$ MIN

T_c AREA #8 $= 1.8(1.1-.25)(480)^{.5} / [.08(100)]^{.33} + 6.4 = 23.3$ MIN

T_c AREA #9 = $= 23.3$ MIN

05159 DAVID PUCHTA 5-10-06

USING INTENSITY-DURATION CURVE CHART (FIG 3-1)

PRECONSTRUCTION

$I_{\#1 \,\&\, \#2} = 4.4$ IN/HR

$I_{\#3 \,\&\, \#4} = 5.1$ IN/HR

$I_{\#5 \,\&\, \#6} = 3.5$ IN/HR

POST CONSTRUCTION

$I_{\#1} = 2.9$ IN/HR

$I_{\#2} = 2.3$ IN/HR

$I_{\#3} = 3.1$ IN/HR

$I_{\#4 \,\&\, \#5} = 5.1$ IN/HR

$I_{\#6 \,\&\, \#7} = 4.4$ IN/HR

$I_{\#8 \,\&\, \#9} = 3.5$ IN/HR

PRE CONSTRUCTION FLOW

$Q = CIA$

$Q_{\#1} = .25(4.4)\left(\frac{149,936}{43,560}\right) = 3.79$ CFS

$Q_{\#2} = .25(4.4)\left(\frac{41,464}{43,560}\right) = 1.05$ CFS

$Q_{\#3} = .32(5.1)\left(\frac{12,000}{43,560}\right) = 0.45$ CFS

$Q_{\#4} = .32(5.1)\left(\frac{14,400}{43,560}\right) = 0.54$ CFS

$Q_{\#5} = .25(3.5)\left(\frac{30,900}{43,560}\right) = 0.62$ CFS

$Q_{\#6} = .25(3.5)\left(\frac{12,100}{43,560}\right) = 0.24$ CFS

TOTAL 6.69 CFS

FLOW TO CALLE DE TALAR = 4.67 CFS

FLOW TO AQUADUCT = 1.78 CFS

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POST CONSTRUCTION FLOW

$Q_{\#1} = .32(2.9)\left(\frac{36,800}{43,560}\right) = 0.78$ CFS

$Q_{\#2} = .32(2.3)\left(\frac{8,000}{43,560}\right) = 0.14$ CFS

$Q_{\#3} = .32(3.1)\left(\frac{10,800}{43,560}\right) = 0.25$ CFS

$Q_{\#4} = .32(5.1)\left(\frac{12,000}{43,560}\right) = 0.45$ CFS

$Q_{\#5} = .32(5.1)\left(\frac{14,400}{43560}\right) = 0.54$ CFS

$Q_{\#6} = .25(4.4)\left(\frac{111,800}{43,560}\right) = 2.82$ CFS

$Q_{\#7} = .25(4.4)\left(\frac{24,000}{43560}\right) = 0.61$ CFS

$Q_{\#8} = .25(3.5)\left(\frac{30,900}{43,560}\right) = 0.62$ CFS

$Q_{\#9} = .25(3.5)\left(\frac{12,100}{43560}\right) = 0.24$ CFS

TOTAL = 6.45 CFS

FLOW TO CALLE DE TALAR = 4.67 CFS

FLOW TO AQUADUCT = 1.78 CFS

COMPARE $Q_{PRECONST.}$ VS. $Q_{POST\ CONST}$

AREA	Q_{PRE}	Q_{POST}	
TOTAL	6.69 CFS	6.45 CFS	(PROJECT REDUCES FLOW)
CALLE DE TALAR	4.86 CFS	4.67 CFS	" " "
AQUADUCT	1.83 CFS	1.78 CFS	" " "

CURRENTLY STORM WATER TRAVELS WEST ON THE NORTH SIDE OF CALLE DE TALAR AND SOUTH ON THE WEST SIDE OF AQUADUCT TO A CULVERT WHICH DIRECTS WATER TO THE SOUTH SIDE OF CALLE DE TALAR. THIS DRAINAGE PATTERN WILL CONTINUE FOR POST CONSTRUCTION FLOW, ONLY AT A LESSER RATE. THE POST CONSTRUCTION FLOW WILL BE LESS THAN THE PRECONSTRUCTION FLOW DUE TO THE ADDITIONAL OVERLAND FLOW LENGTH OVER ARENAS. IN MY PROFESSIONAL OPINION THE MITIGATED WATER RUNOFF WILL NOT EFFECT THE DOWN STREAM DRAINAGE BASIN IN A NEGATIVE MANNER.

05159 DAVID PUCHTA 5-2-06

CALCULATE SWALE VELOCITY

PER MANNING FORMULA $V = \frac{1.49}{n} R^{2/3} S^{1/2}$

WHERE: $n = .03$ (ROUGHNESS)
R = AREA/WETTED PERIMETER
S = SLOPE

$R = 2.5/5 = .5$

AREA #1 $S = 9\%$

$V = \frac{1.49}{.03}(.5)^{\frac{2}{3}}(.09)^{1/2} = 9.4$ FT/SEC

AREA #2 & 3 $S = 19\%$

$V = \frac{1.49}{.03}(.5)^{\frac{2}{3}}(.19)^{1/2} = 13.6$ FT/SEC

CONCLUSION

DUE TO THE CREATION OF THE RIDING ARENAS, THE TIME-OF-CONCENTRATION WILL OFFSET THE INCREASE OF IMPERVIOUS SURFACE AND THERE WILL BE A SLIGHT REDUCTION IN NET RUNOFF. THE BMP'S AND THE ENERGY DISSAPATORS WILL RESULT IN A SIGNIFICANT CHANGE IN RUNOFF WATER QUALITY BECAUSE THE CURRENT AGRICULTURAL OPERATION HAS NO MITIGATION, OR CONTROL OF STORM WATER RUNOFF. THIS PROJECT WILL HAVE A VERY POSITIVE EFFECT ON STORM WATER RUNOFF FROM THIS PARTICULAR SITE.

Treatment BMP Data

The treatment BMP was designed to best address the site and use conditions found at this location. The site is on the side of a gently sloping hill, located near the top. Because of the need for a riding arena, flat areas will be created and also sloped areas. This results in a tiered formation which will require channels to direct storm water rather than the sheet flow which previously existed. Grassy swales are a natural choice for Treatment BMPs for this project.

The grassy swales will be a modified D75 lined channel. A specific construction specification is provided on the preliminary grading plan which is a part of this submittal.

At the outfall of the grassy swales are Energy Dissipaters constructed per RSD D-40. These will be necessary to address the velocity as the channel reaches a slope of 9% and will also allow for further filtration of particulates.

Operation and Maintenance Program for BMPs

The operation of the Post Construction BMPs is minimal. There are no "working" parts which need maintenance, repair or attention of any kind. The Post Construction BMPs are self perpetuating.

Maintenance will be performed by the property owner, who lives on site. Regular inspections will occur nearly on a daily basis. Repairs will be made on a regular basis as follows, during the rainy season repairs will be made weekly, and during the dry season repairs will be made monthly. Additional inspections will be made during rain events to insure BMPs are functioning properly.

Repairs will be made to grassy swales to replace dead or missing lining, eroded or damaged bermes or channel sides, and removal of debris and silt. Repairs will be made to the energy dissipaters to insure containment of flow, and remove debris and silt. Debris and silt shall be removed from the site via the waste removal program (the animal waste).

The funding for the operation and maintenance of the Post Construction BMPs will be provided by the owner. This project is a large risk for the owners who have invested a significant amount of their personal worth to undertake. If the grounds and the facilities are not maintained, this investment will be lost. The owners have a great incentive to maintain this property.

APPENDIX H Estimated O & M Costs for BMP Project

Estimated vlaues derived from Caltrans Pilot BMP Study. This spreadsheet will change as additional data becomes available.						Labor			Equipment				Materials		Total	Comments
						Per. Hrs	Rate	Cost	Type	Days	rate	Cost	Item	Cost	Cost	
BIOFILTER – STRIPS and SWALES																
Preventive Maintenance and Routine Inspections																
ROUTINE ACTIONS	MAINTENANCE INDICATOR	FIELD MEASUREMENT	MEASUREMENT FREQUENCY	MAINTENANCE ACTIVITY	SITE-SPECIFIC REQUIREMENTS											
Height of vegetation	Average vegetation height exceeds 12 inches, emergence of trees, or woody vegetation	Visual inspection of vegetation throughout strip/swale	Once during wet season, once during dry season.(depending on growth)	Cut vegetation to an average height of 6 inches	Remove any trees, or woody vegetation.	10	43.63	436.3	one-ton truck & hydroseeder	2	26.84	53.68	string trimmer, rake, fork, bags, safety equipment	50	539.98	
Assess adequate vegetative cover	Less than 90 percent coverage in strip invert/swale or less than 70 percent on swale side slope	Visual inspection of strip/swale. Prepare a site schematic to record location and distribution of barren or browning spots to be restored. File the schematic for assessment of persistent problems.	Assess quantity needed in May each year late wet season and late dry season.	Reseed/revegetate barren spots by Nov.		8	43.63	349.04	one-ton truck & hydroseeder	1	48.15	48.15	seed	150	547.19	
				Scarify area to be restored, to a depth of 2-inches. Restore side slope coverage with hydroseed mixture.		0	43.63	0	one-ton truck & hydroseeder	0	26.84	0			0	
				If after 2 applications (2 seasons) of reseeding/revegetating and growth is unsuccessful both times, an erosion blanket or equivalent protection will be installed over eroding areas		0	43.63	0	one-ton truck & hydroseeder	0	26.84	0	blanket	0	0	
Inspect for debris accumulation	Debris or litter present	Visual observation	During routine trashing, per Districts schedule.	Remove litter, and debris.	None	0	0	0	one-ton truck & hydroseeder	0	0	0			0	
Inspect for accumulated sediment	Sediment at or near vegetation height, channeling of flow, inhibited flow due to change in slope.	Visual observation	Annually	Remove sediment. If flow is channeled, determine cause and take corrective action. If sediment becomes deep enough to change the flow gradient, remove sediment during dry season, characterize and properly dispose of sediment, and revegetate.		16	43.63	698.08	one-ton truck & hydroseeder	1	48.15	48.15	seed, testing and disposal of sediment	300	1046.23	once every three years

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APPENDIX H Estimated O & M Costs for BMP Project

Estimated vlaues derived from Caltrans Pilot BMP Study. This spreadsheet will change as additional data becomes available.

						Labor			Equipment				Materials		Total	Comments
						Per. Hrs	Rate	Cost	Type	Days	rate	Cost	Item	Cost	Cost	
				Notify engineer to determine if regrading is necessary. If necessary, regrade to design specification and revegetate swale/strip. If regrading is necessary, the process should start in May. Revegetate strip/swale in Nov. Target completion prior to wet season.	None	2	43.63	87.26				0			87.26	
Inspect for burrows	Burrows, holes, mounds	Visual observation	Annually and after vegetation trimming.	Where burrows cause seepage, erosion and leakage, backfill firmly.		0	0	0	one-ton truck & hydroseeder	0	26.84	0			0	
General Maintenance Inspection	Inlet structures, outlet structures, side slopes or other features damaged, significant erosion,emergence of trees, woody vegetation , fence damage, etc.	Visual observation	Semi-Annually, late wet season and late dry season.	Corrective action prior to wet season. Consult engineer if an immediate solution is not evident.	Remove any trees, or woody vegetation.	16	43.63	698.08	one-ton truck & hydroseeder	2	26.84	53.68			751.76	
TOTAL BIO FILTER AND SWALES						52		2268.76				203.66		500	2972.42	
BIO STRIP WITH SPREADER DITCH					Includes all the above plus the following.			0				0			0	
Inspect for standing water	Water accumulation in spreader ditch	Standing water in spreader ditch	Within 72 hours after a storm event 0.75 inches or greater.	De-water the spreader ditch to a depth of less than 0.25 inches. If sediment impedes the de-watering activity, then move or remove that portion of the sediment. Characterize and properly dispose.		3	43.63	130.89	0	0	0	0			130.89	
				De-water the spreader ditch to a depth of less than 0.25" by removing the bypass plug and allowing the water to drain into the infiltration trench. Use care to prevent sediment from discharging into the infiltration trench. Replace the bypass plug once the de-watering has been completed.		6	43.63	261.78	0	0	0	0			261.78	

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BEST MANAGEMENT PRACTICES OPERATION AND MAINTENCE PROGRAM FOR TREATMENT BMP'S

Treatment BMP's consist of grassy swales using a modified D-75, lined ditch and energy dissapators using a D-40 Rip-Rap structure. The operation of these BMP's will require no physical attention, they are both self-perpetuating. Maintenance will be performed by the property owner who resides on-site.

Maintenance will consist of monthly visual inspections to identify any possible deficiencies, which may include, side slope deterioration, ditch liner deterioration, obstruction to water flow, and any possible impending problems. These inspections and a more rigorous repair program will be necessary at a more frequent schedule during the rainy season in order to avoid major damage to the storm water system. At a minimum these inspections shall be performed immediately prior to and after a rain event. Repairs shall be performed immediately upon discovery.

Estimated cost to maintain swales is $200.00 per month. Average cost of $2400.00 to $2600.00 per year.

REGISTERED PROFESSIONAL ENGINEER
MICHAEL W. SMITH
No. C044590
EXP. 3-31-08
CIVIL
STATE OF CALIFORNIA

MICHAEL W. SMITH R.C.E.44590

County of San Diego

GARY W. ERBECK
DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
COMMUNITY HEALTH DIVISION
VECTOR SURVEILLANCE AND CONTROL
9325 Hazard Way, San Diego, CA 92123
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www.sandiegobugs.org

RICHARD HAAS
ASSISTANT DIRECTOR

STABLE WASTE, FLY AND VECTOR CONTROL PLAN

DATE: December 5, 2005 APN. # 127-530-04-00

Name and Address of Permittee:

David Puchta
31910 Aquaduct Road
Bonsal,CA 92003

Number and description of animals:
Unlimited horses according to David Puchta.

PURPOSE

Introduction

At the request of the County Department of Environmental Health and in the interest of good community health, David and Annette Puchta has prepared a formal outline of the management principles for the abatement of stable wastes, flies and vectors at the above property.

The principles of this plan are to be followed in order to maintain the health and safety of every person who is on the equestrian center, for the horses and for the surrounding property owners.

The components of the Plan include guidelines for manure removal, control of water around the stables, general sanitation and the use of chemicals for insect and rodent control.

DESCRIPTION AND INTENT

This following is to illustrate and explain how we clean out our manure through to when we haul it off the property.

Our horse stalls are filed with two feet of pine or cedar shavings so that the urine and manure is absorbed by the shavings. The stalls are cleaned two times a day, morning after feeding and evening after feeding. If a horse vacates a stall the stall is cleaned and stripped upon the horse vacating.

The stable bedding waste material that is removed from the stalls is put into wheel barrels and deposited into a dumpster bin. This bin is hauled off the property two times a week from May thru October and once a week from November thru April by EDCO Waste Management Center located at 550 W. Aviation Blvd in Fallbrook, California. Please see attached letter from EDCO Waste Management in Fallbrook. My contact is Dan Meyer (760) 744-8100.

The barns will have an organic fly spray system that is on a timer and will mist the barn every twenty minutes. This will help control adult flies.

Our grain and supplemental feed is stored in steel containers for rodent proofing.

The Fly Control Plan described above will be followed on our property as to not result in adult fly emergence on our property.

Water Management Methods

Water troughs, bowls, cups and other water devices will be maintain so as to not to wet feed, stable bedding and animal waste. Insure that water dose not pond for more that 72 hours in order to avoid mosquito breeding.

Any changes in this plan should be made with consultation and approval of the San Diego Department of Environmental Health, Vector Control Program at 858-694-2888.

CONCLUSION

Basic ranch management practices that reduce common pest attractants and conditions favorable to fly, insect and rodent breeding are the key to successful control in the following areas:

David Puchta

Dec 5-05
Date

PERMIT APPROVED BY:

Dec 5, 2005
Date

Robert Murillo, Vector Control Technician III
Vector Surveillance and Control
Department of Environmental Health

David A. Puchta
31910 Aquaduct Road
Bonsall CA 92003
(530) 306-8304

December 5, 2005

Re: Vector Plan

Dear Robert Murillo:

This letter is to illustrate how we clean out our manure through to when we haul it off the property.

Our horse stalls are filed with two feet of pine or cedar shavings so that the urine and manure is absorbed by the shavings. The stalls are cleaned two times a day, morning after feeding and evening after feeding. If a horse vacates a stall the stall is cleaned and stripped upon the horse vacating.

The waste material that is removed from the stalls is put into wheel barrels and deposited into a trailer. The trailer is hauled off the property two times a week to Edco Waste Management Center located at 550 W. Aviation Blvd in Fallbrook California. Please see attached letter from Edco Waste Management in Fallbrook.

Since the stall is lined with shavings and the urine and manure is picked up twice a day, this will eradicate the breeding of adult flies.

The barns will have an organic fly spray system that is on a timer and will mist the barn every twenty minutes. This will reduce adult flies and the breeding of adult flies.

The Fly Control Plan described above will be strictly enforced on our property as to not result in adult fly emergence on our property or elsewhere in the county.

Sincerely,

EDCO

WASTE AND RECYCLING SERVICES, INC.

Dave Puchta
31910 Aquaduct Rd
Bonsall, Ca 92003

RE: Horse manure removal

David.

Yes, we can provide service to remove your manure. You can do it two ways. One way is to rent a 3yd Bin which we can dump once a week and then bill you every month. Or, you can haul it yourself in a trailer to the transfer station in Fallbrook Ca. at 550 W. Aviation. You would be charged by the load. Both ways the manure will be taken to either the Miramar Landfill in San Diego or the Sycamore Landfill in Santee, California. If you have any questions, you can call me at 760-744-5615 Ext 123. Thank you

Don Meyer
Sales Representative.

P.O. Box 6907, San Marcos, California 92079-6907 – www.edco-corp.com

Poway	Rancho Santa Fe/ Solana Beach	Encinitas	Escondido/ San Marcos/Valley Ctr.	Vista/Bonsall	Fax Line
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