

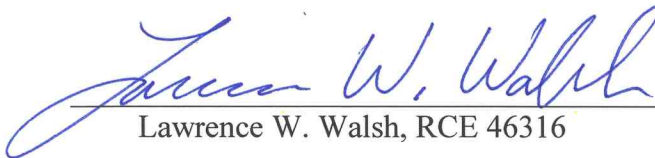


**WALSH ENGINEERING
& SURVEYING, INC.**

**CEQA Preliminary Drainage Study
for
San Diego Freedom Ranch
Major Use Permit P74-011W
1777 Buckman Springs Road
Campo, Ca 91906**

Project No.: PDS2012-3301-74-011-07
Environmental Log No.: PDS2012-3910-122-1002




Lawrence W. Walsh, RCE 46316

7-30-14
Date

Prepared for:
San Diego Freedom Ranch
1777 Buckman Springs Road
Campo, Ca 91906

Walsh Engineering Job No. 06553

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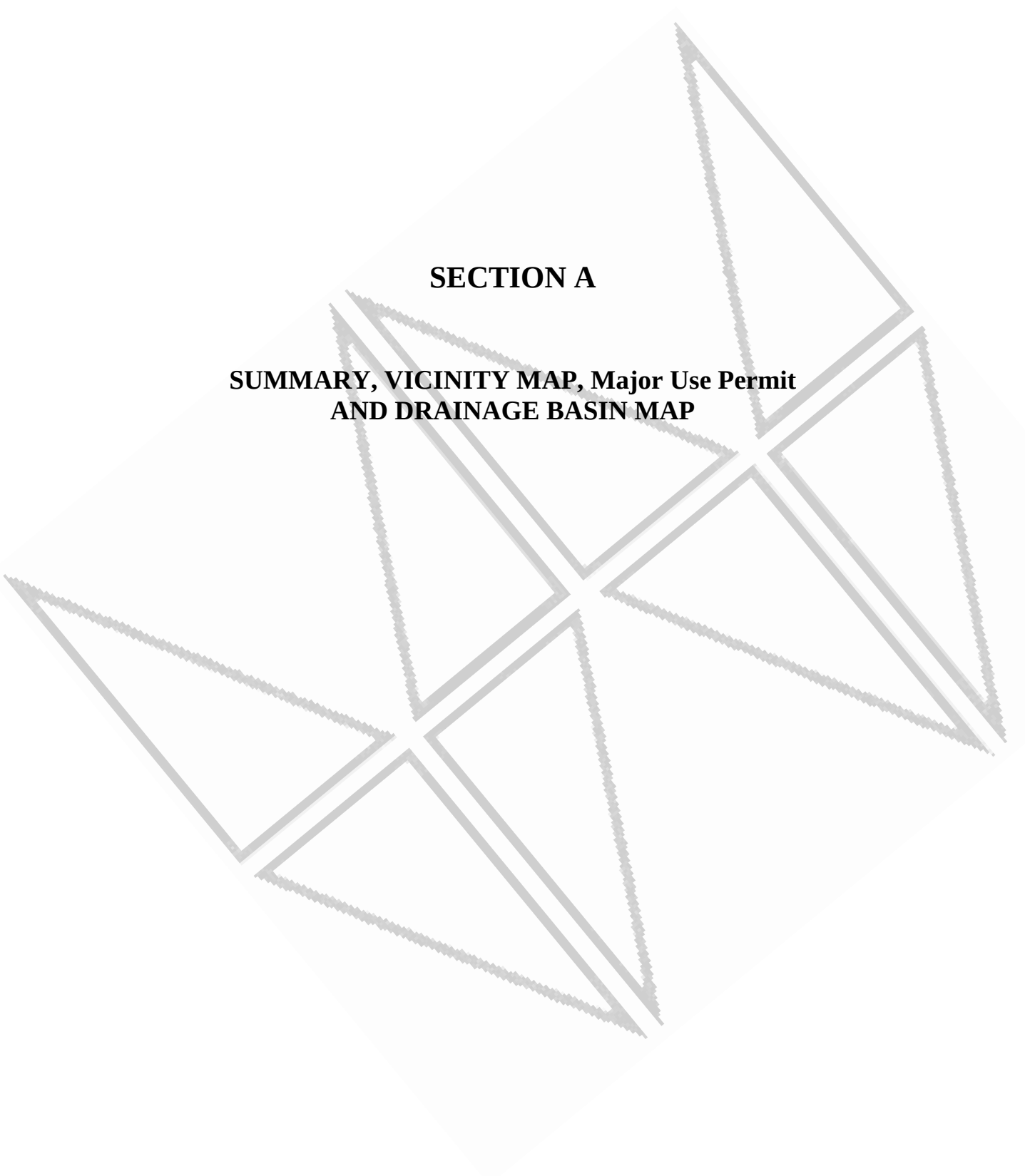
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SECTION A

**SUMMARY, VICINITY MAP, Major Use Permit
AND DRAINAGE BASIN MAP**

Summary

This CEQA preliminary drainage study is prepared for the Major Use Permit Modification for the San Diego Freedom Ranch, MUP P74-011W. The site is located at 1777 Buckman Springs Road in Campo and encompasses 112.6 acres (see Vicinity Map attached).

Existing Condition

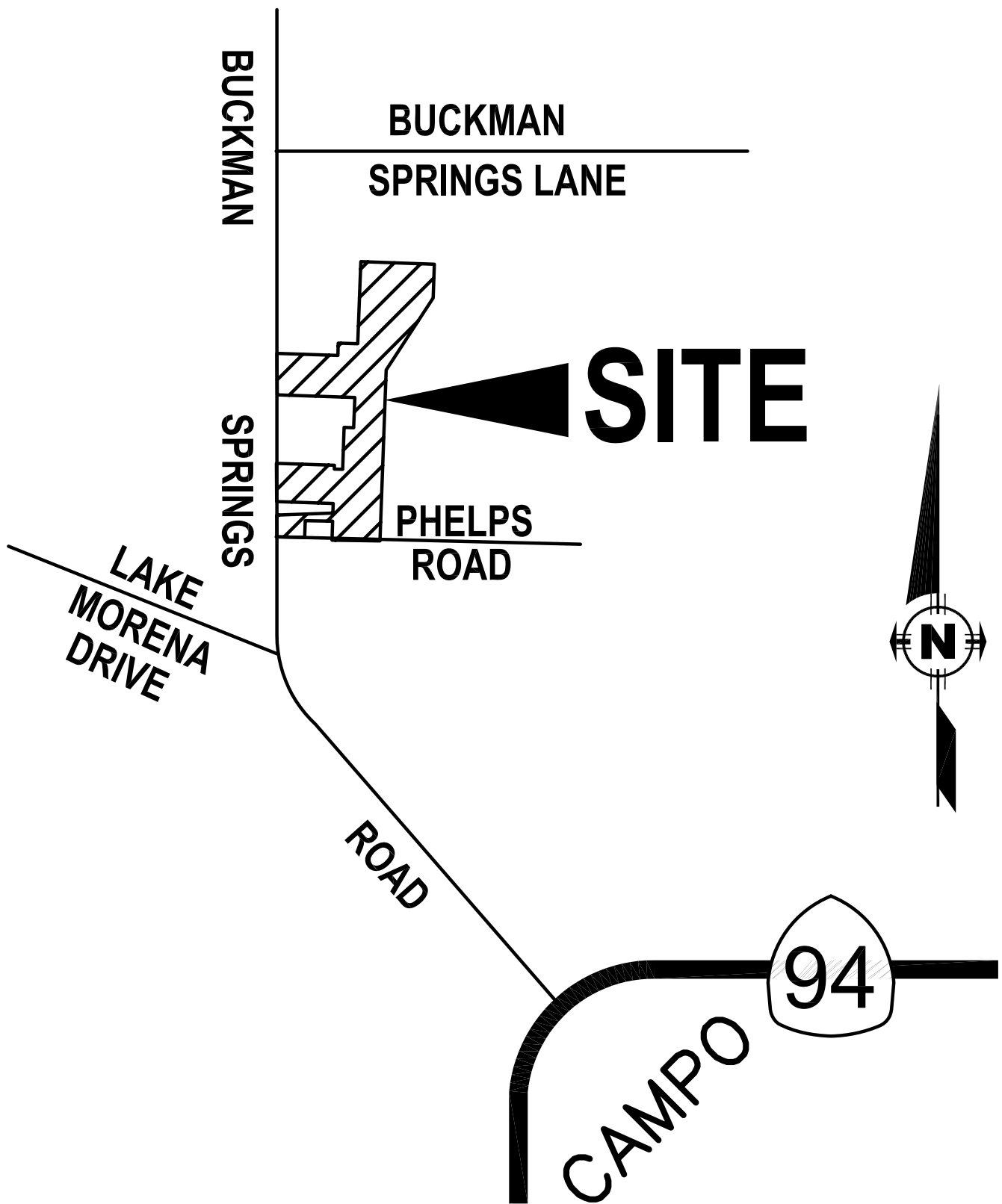
Currently the site has existing facilities including an Administration Building, residence trailers, parking area, recreation areas, and animal enclosures. The majority of the site drains to a natural shallow swale that flows southerly through the middle of the site. There is one watershed Basin that is analysed herein. Basin A is approximately 1990 Acres (3.1 Sq. Miles). Since the Basin is over 1 square mile, it is analysed herein using the NRCS Method outlined in Section 4 of the County of San Diego Hydrology Manual. The lines of inundation by the 100 year flood have been calculated and are shown on the "100 Year Flood Map" (see Section C).

Proposed Condition

The Major Use Permit Modification is proposing to add a total of 5 dormitory buildings and a new multi-purpose building. The drainage basin will remain the same as in the existing condition, i.e. there is no diversion. The new structures will be accessed by a proposed private driveway located off Buckman Springs Road. A new parking area is also proposed. Development is constrained to a small portion of the overall site and will not have a measurable affect on the drainage characteristics exiting the site.

Conclusion

The drainage patterns and flow rates will not be substantially altered from those which occur in the existing condition. The development of this project will not result in substantial erosion, siltation, or runoff which would result in flooding on or off site. Furthermore, there is an insignificant change to the flowrate and velocity of the stormwater flow exiting the site. No people or structure will be placed within a mapped 100-year flood to impede or redirect flow.



VICINITY MAP

THOMAS BRO. PAGE 1317-H3

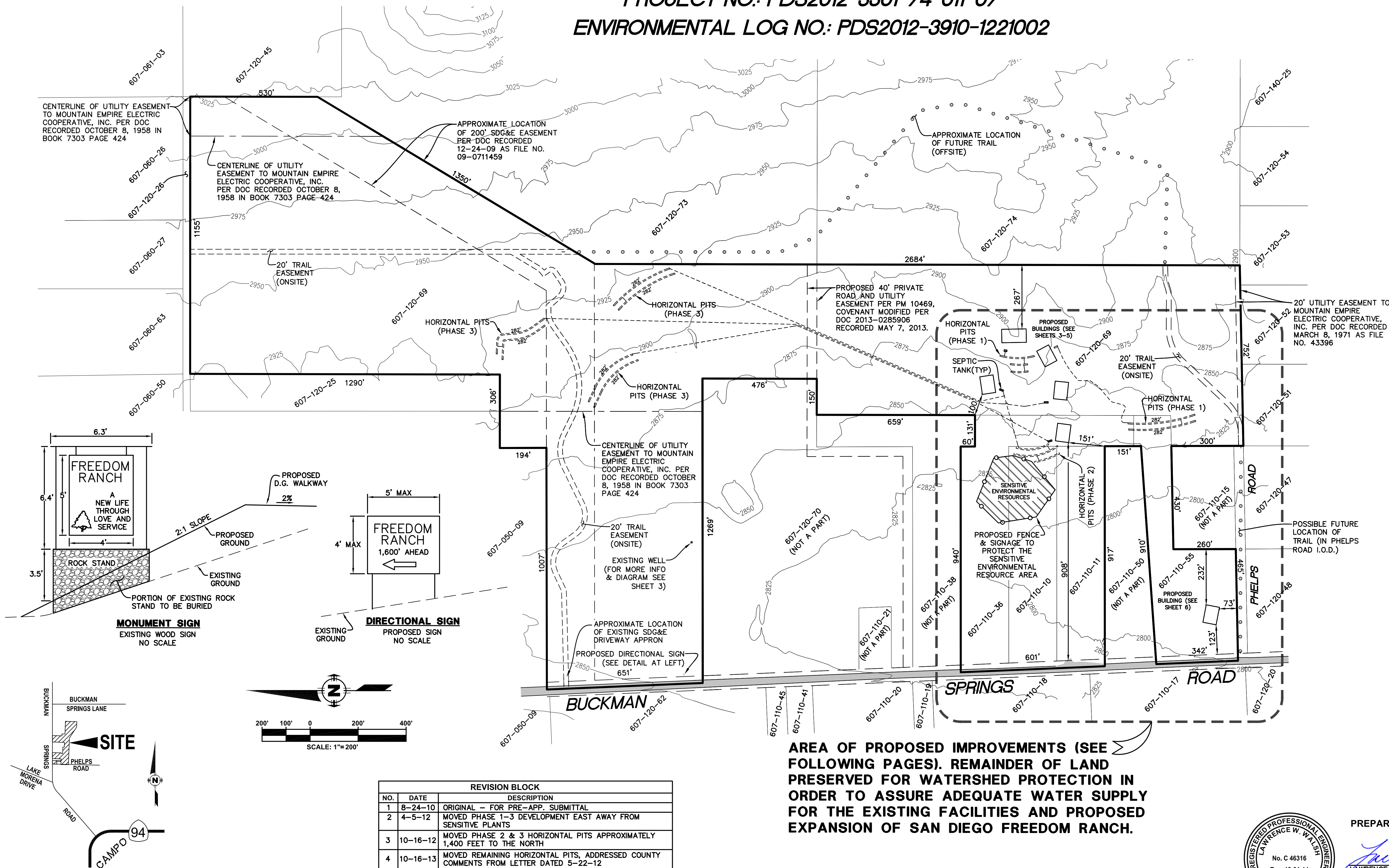
NO SCALE

MAJOR USE PERMIT P74-011W - MODIFICATION

SAN DIEGO FREEDOM RANCH

SHEET 1 OF 8

PROJECT NO.: PDS2012-3301-74-011-07
ENVIRONMENTAL LOG NO.: PDS2012-3910-1221002



ABBREVIATED LEGAL DESCRIPTION

PARCEL "B" OF BOUNDARY ADJUSTMENT B/C 10-0034 RECORDED SEPTEMBER 2, 2010 AS DOC. NO. 2010-0462297.

TOGETHER WITH THE SOUTH HALF OF LOT 3, SEC 33, T17E, R5E, SAN BERNARDINO MERIDIAN, ACCORDING TO THE INDEPENDENT RESURVEY OF SAID TOWNSHIP

TOGETHER WITH THE SOUTH 600 FEET OF THE NORTH 4670.28 FEET OF TRACT 58 AS SHOWN ON MAP OF THE UNITED STATES GOVERNMENT INDEPENDENT RESURVEY OF TOWNSHIP 17 SOUTH, R5E, SAN BERNARDINO MERIDIAN APPROVED MAY 23, 1921

TOTAL GROSS ACREAGE = 112.6 AC

EASEMENT NOTE

ALL EASEMENTS HAVE BEEN PLOTTED PER CHICAGO TITLE REPORT ORDER NUMBERS 608025037-P05 AND 980002470-P01 DATED 10-24-08 AND 12-24-09, RESPECTIVELY.

MOUNTAIN EMPIRE ELECTRIC COOPERATIVE, INC. EASEMENT FOR TRANSMISSION OR DISTRIBUTION LINES RECORDED 3-8-71 AS FILE NO. 43397 IS NOT PLOTTABLE, I.E. NO SPECIFIC LOCATION WITHIN THE PROPERTY IS GIVEN

ASSESSOR PARCEL NUMBERS:

607-110-10, 11, 36 & 55
AND 607-120-69

OWNER:

SAN DIEGO FREEDOM RANCH, INC.
1777 BUCKMAN SPRINGS ROAD
CAMPO, CA 91906
619-478-5696

PREPARED BY:

Lawrence W. Walsh
RCE 46316
DATE 7-30-14

Walsh Engineering & Surveying, Inc.
607 Aldwych Road, El Cajon, CA 92020
(619) 588-6747 (619) 792-1232 Fax

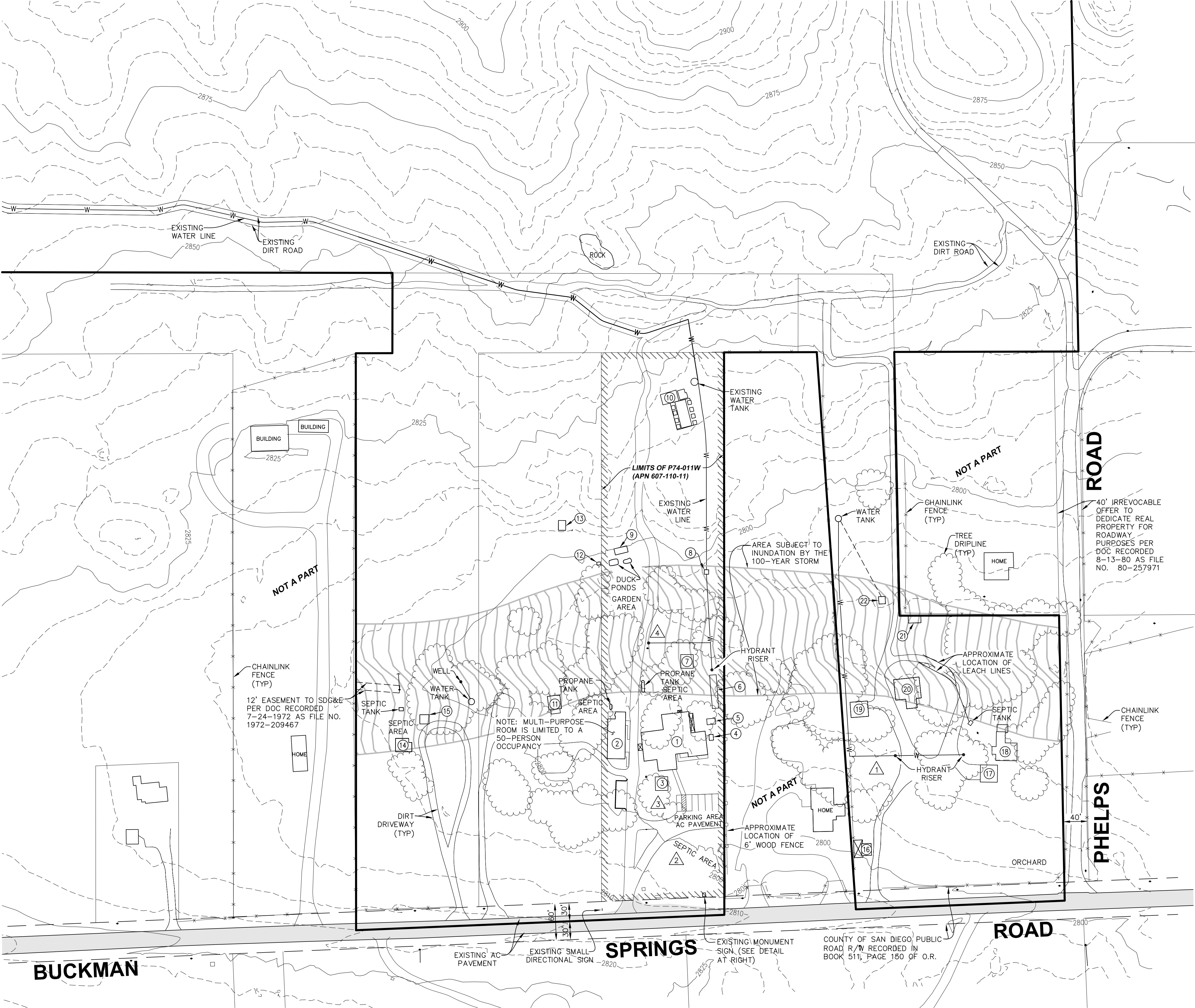
REVISION BLOCK		
NO.	DATE	DESCRIPTION
1	8-24-10	ORIGINAL - FOR PRE-APP. SUBMITTAL
2	4-5-12	MOVED PHASE 1-3 DEVELOPMENT EAST AWAY FROM SENSITIVE PLANTS
3	10-16-12	MOVED PHASE 2 & 3 HORIZONTAL PITS APPROXIMATELY 1,400 FEET TO THE NORTH
4	10-16-13	MOVED REMAINING HORIZONTAL PITS, ADDRESSED COUNTY COMMENTS FROM LETTER DATED 5-22-12
5	1-16-14	ADDRESSED COUNTY COMMENTS FROM LETTER DATED 12-11-13
6	7-30-14	ADDRESSED COUNTY COMMENTS FROM LETTER DATED 3-28-14. SWITCHED PHASES 1 AND 2.

AREA OF PROPOSED IMPROVEMENTS (SEE FOLLOWING PAGES). REMAINDER OF LAND PRESERVED FOR WATERSHED PROTECTION IN ORDER TO ASSURE ADEQUATE WATER SUPPLY FOR THE EXISTING FACILITIES AND PROPOSED EXPANSION OF SAN DIEGO FREEDOM RANCH.



VICINITY MAP
THOMAS BRO. PAGE 1317-H3
NO SCALE

EXISTING CONDITIONS



STRUCTURE LEGEND:

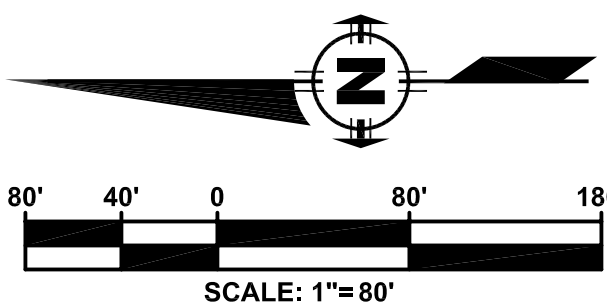
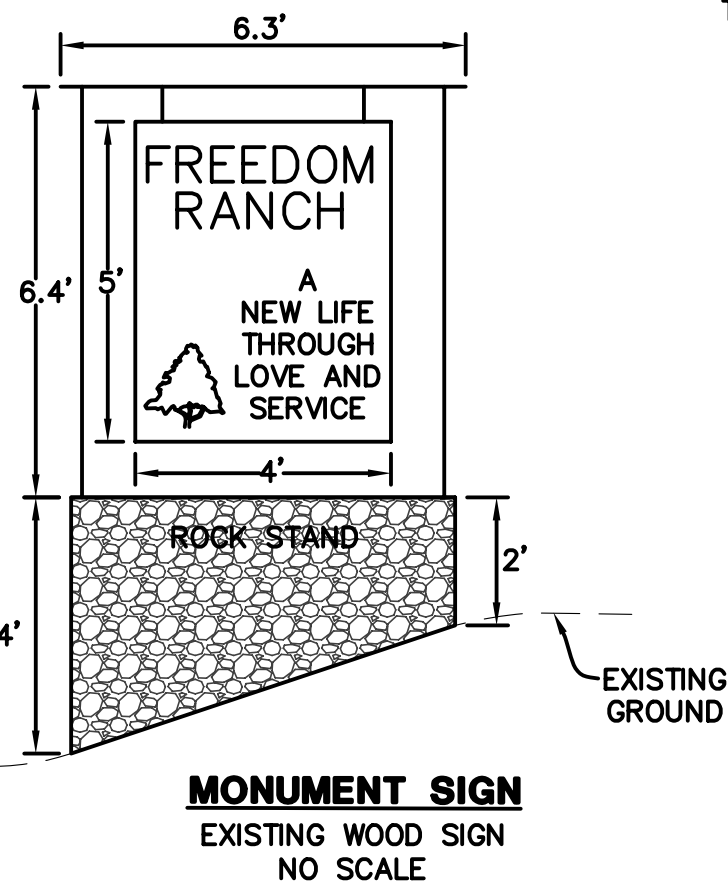
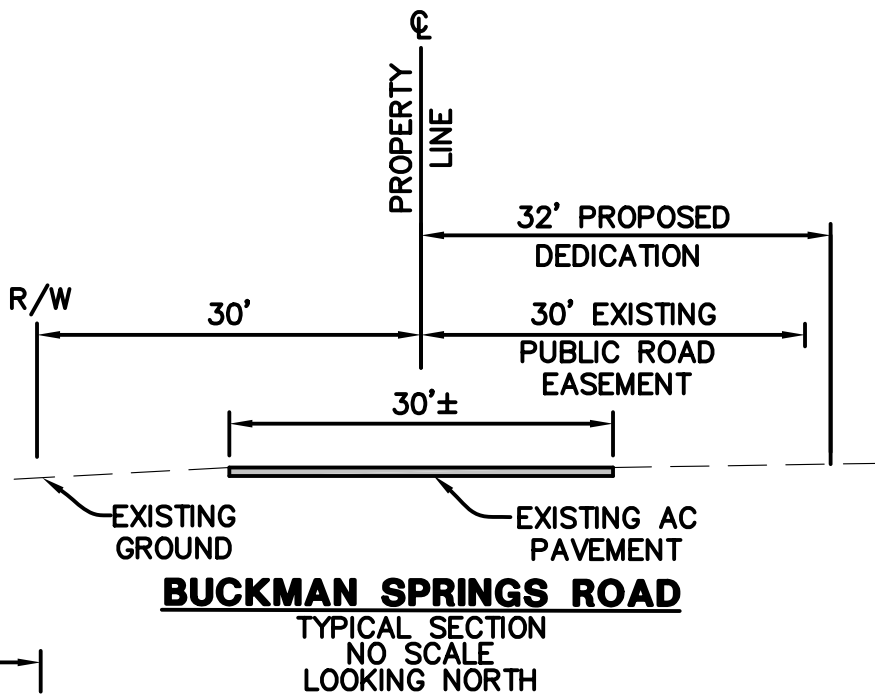
#	DESCRIPTION	AREA	HEIGHT
(1)	MAIN FACILITY (50 BEDS)	5,926 SF	15 FT 2 IN
(2)	MULTI-PURPOSE ROOM	1,800 SF	12 FT 10 IN
(3)	STORAGE ROOM	368 SF	9 FT
(4)	STORAGE SHED	83 SF	10 FT 6 IN
(5)	WALK-IN COOLER	304 SF	13 FT
(6)	DRY STORAGE	510 SF	10 FT 6 IN
(7)	OUTDOOR KITCHEN	300 SF	12 FT 8 IN
(8)	WELL SHED	48 SF	11 FT 3 IN
(9)	DUCK SHED	180 SF	7 FT 8 IN
(10)	ABANDONED PIG SHED	528 SF	15 FT
(11)	STAFF QUARTERS	320 SF	14 FT 8 IN
(12)	GARDENING SHED	64 SF	7 FT
(13)	GAZEBO	224 SF	10 FT
(14)	TRAILER (TRANSITIONAL LIVING)	690 SF	9 FT 6 IN
(15)	COTTAGE	140 SF	11 FT
(16)	FRUIT STAND	96 SF	11 FT
(17)	GARAGE	576 SF	12 FT 6 IN
(18)	HOUSE (6-BED RESIDENTIAL FACILITY)	1,192 SF	13 FT
(19)	WORKSHOP	576 SF	15 FT
(20)	BARN	900 SF	24 FT
(21)	GARDENING SHED	200 SF	7 FT 7 IN
(22)	WELL SHED	64 SF	12 FT

BED LEGEND:

	EXISTING MAIN
CLIENTS	50
STAFF	5
6-BED RESIDENTIAL	6
TRANSITIONAL LIVING	5
TOTAL	66

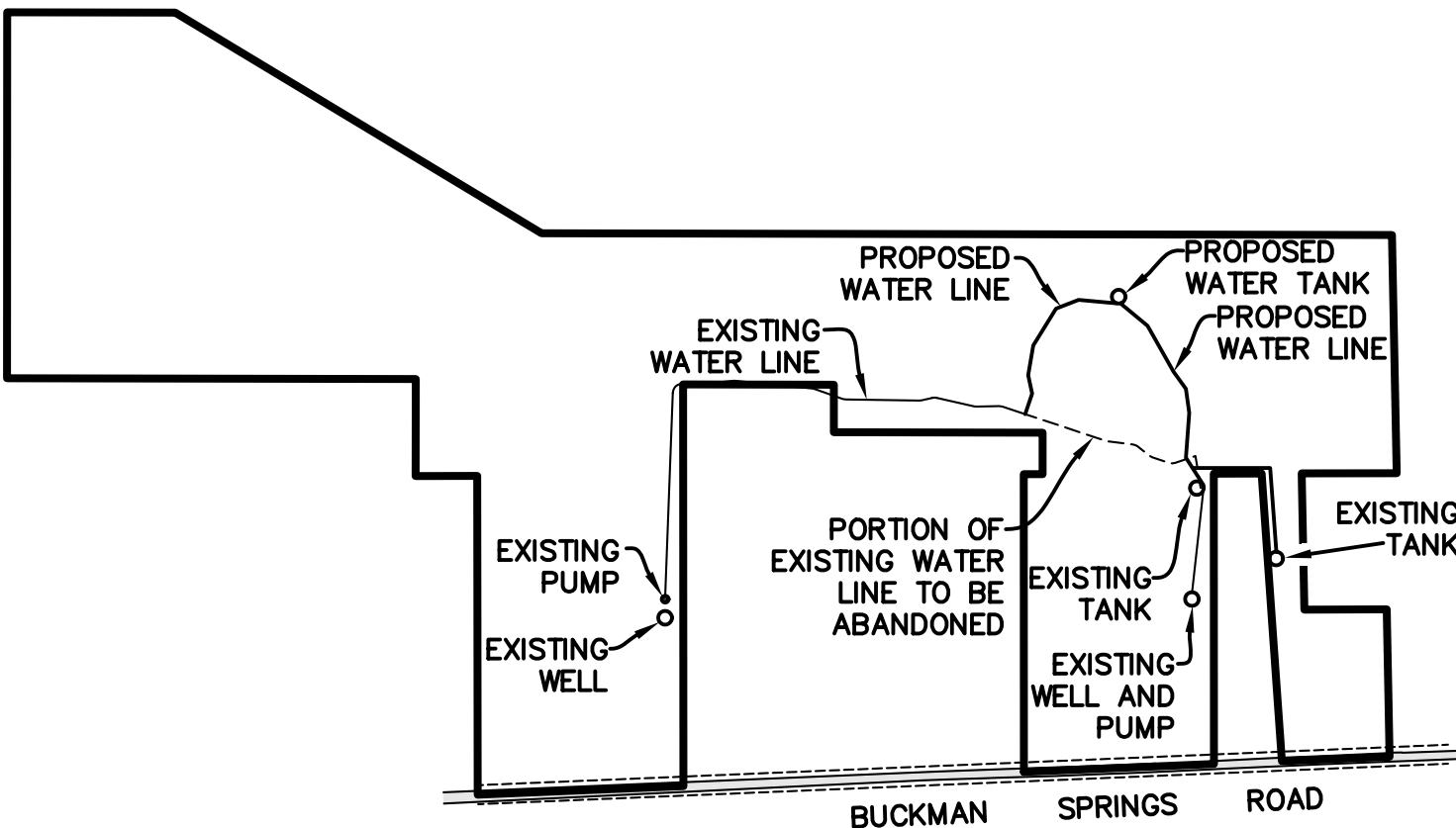
RECREATIONAL FACILITIES LEGEND:

- GARDEN
- GOLF COURSE
- HORSESHOE PIT
- WEIGHTS



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PHASE 1



CONCEPTUAL WATER SYSTEM

SCALE: 1"=600'

STRUCTURE LEGEND:

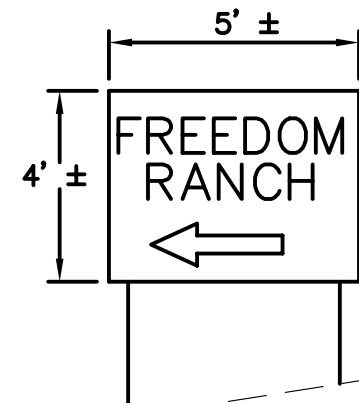
#	USE	AREA	HEIGHT	DESCRIPTION
(1)	MAIN FACILITY (50 BEDS)	5,926 SF	15 FT 2 IN	EXTERIOR ROOM (MUD ROOM) (64 S.F.) REMOVED END OF PHASE 1.
(2)	MULTI-PURPOSE ROOM	1,800 SF	12 FT 10 IN	RELOCATE ADA ACCESSES END OF PHASE 1
(3)	STORAGE ROOM	368 SF	9 FT	REMOVED END OF PHASE 1
(4)	STORAGE SHED	83 SF	10 FT 6 IN	
(5)	WALK-IN COOLER	304 SF	13 FT	REMOVED END OF PHASE 1
(6)	DRY STORAGE	510 SF	10 FT 6 IN	REMOVED END OF PHASE 1
(7)	OUTDOOR KITCHEN	300 SF	12 FT 8 IN	
(8)	WELL SHED	48 SF	11 FT 3 IN	
(9)	DUCK SHED	180 SF	7 FT 8 IN	
(10)	ABANDONED PIG SHED	528 SF	15 FT	REMOVED DURING PHASE 1
(11)	STAFF QUARTERS	320 SF	14 FT 8 IN	
(12)	GARDENING SHED	64 SF	7 FT	
(13)	GAZEBO	224 SF	10 FT	
(14)	TRAILER (TRANSITIONAL LIVING)	690 SF	9 FT 6 IN	
(15)	COTTAGE	140 SF	11 FT	
(16)	FRUIT STAND	96 SF	11 FT	
(17)	GARAGE	576 SF	12 FT 6 IN	
(18)	HOUSE (6-BED RESIDENTIAL FACILITY)	1,192 SF	13 FT	
(19)	WORKSHOP	576 SF	15 FT	
(20)	BARN	900 SF	24 FT	
(21)	GARDENING SHED	200 SF	7 FT 7 IN	
(22)	WELL SHED	64 SF	12 FT	
(23)	DINING HALL	5,712 SF	24 FT 8 IN	CONSTRUCTED DURING PHASE 1
(24)	DORMATORY	4,144 SF	22 FT	CONSTRUCTED DURING PHASE 1

LIGHTING NOTE:
WALKWAYS: WALKWAYS MAY BE LIGHTED WITH SOLAR POWERED PATHWAY LIGHTS FACING DOWNWARD. LIGHT FIXTURES WILL BE NO CLOSER THAN 8 FEET APART AND MAYBE FURTHER APART AS APPROPRIATE.

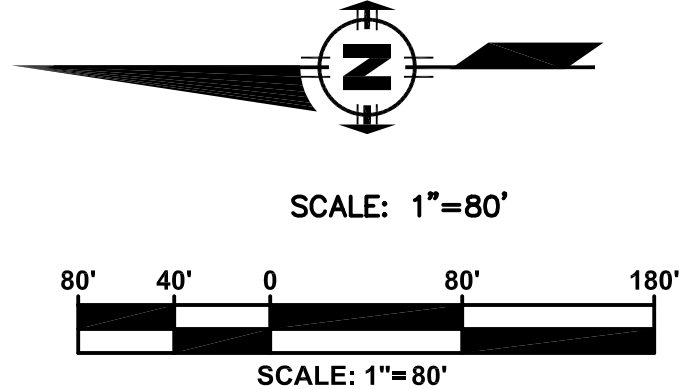
PARKING LOT: EACH PROPOSED PARKING LOT (TWO TOTAL) WILL BE ILLUMINATED WITH ONE STANDARD STREET LIGHTING FACING DOWNWARD.

BED LEGEND:

	EXISTING MAIN	PHASE 1 DORMATORY
CLIENTS	50	50
STAFF	5	5
6-BED RESIDENTIAL	6	6
TRANSITIONAL LIVING	5	5
TOTAL	66	66



ENTRANCE SIGN
PROPOSED SIGN
NO SCALE



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SHEET 4 OF 8

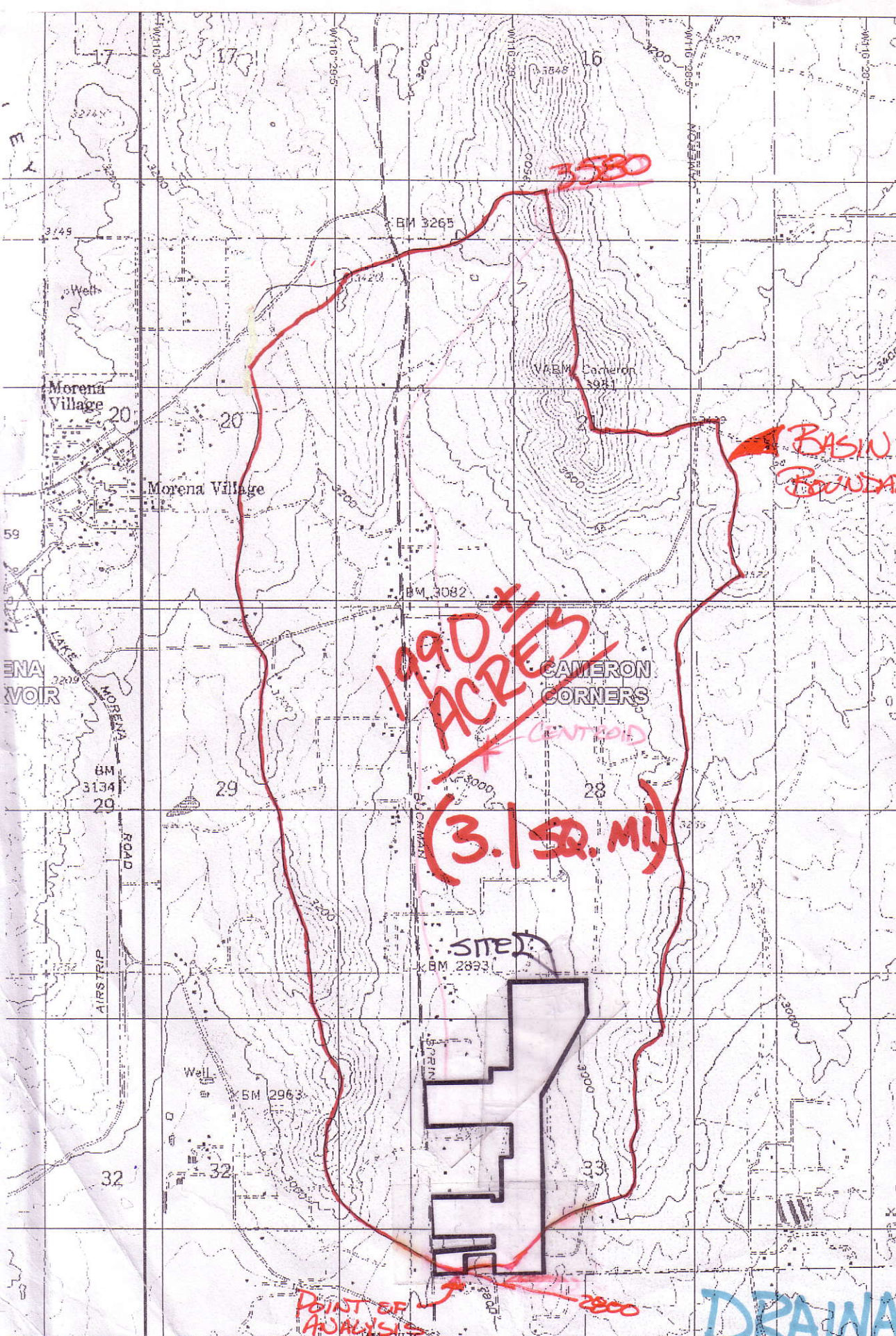


SHEET 5 OF 8



SHEET 6 OF 8

*STAFF INCREASES ARE ESTIMATES. EXISTING SEPARATE HOUSING FOR STAFF IS REMOVED IN PHASE 4 AND STAFF IS RELOCATED TO REMODELED LIVING QUARTERS IN THE MAIN BUILDING AND/OR TO THE DORMITORIES. EXISTING TRANSITIONAL LIVING FACILITY IS REMOVED IN PHASE 4 AND TEMPORARILY LOCATED IN THE REMODELED QUARTERS OF THE MAIN BUILDING.



USGS MAP

↑
N
1"=2000'

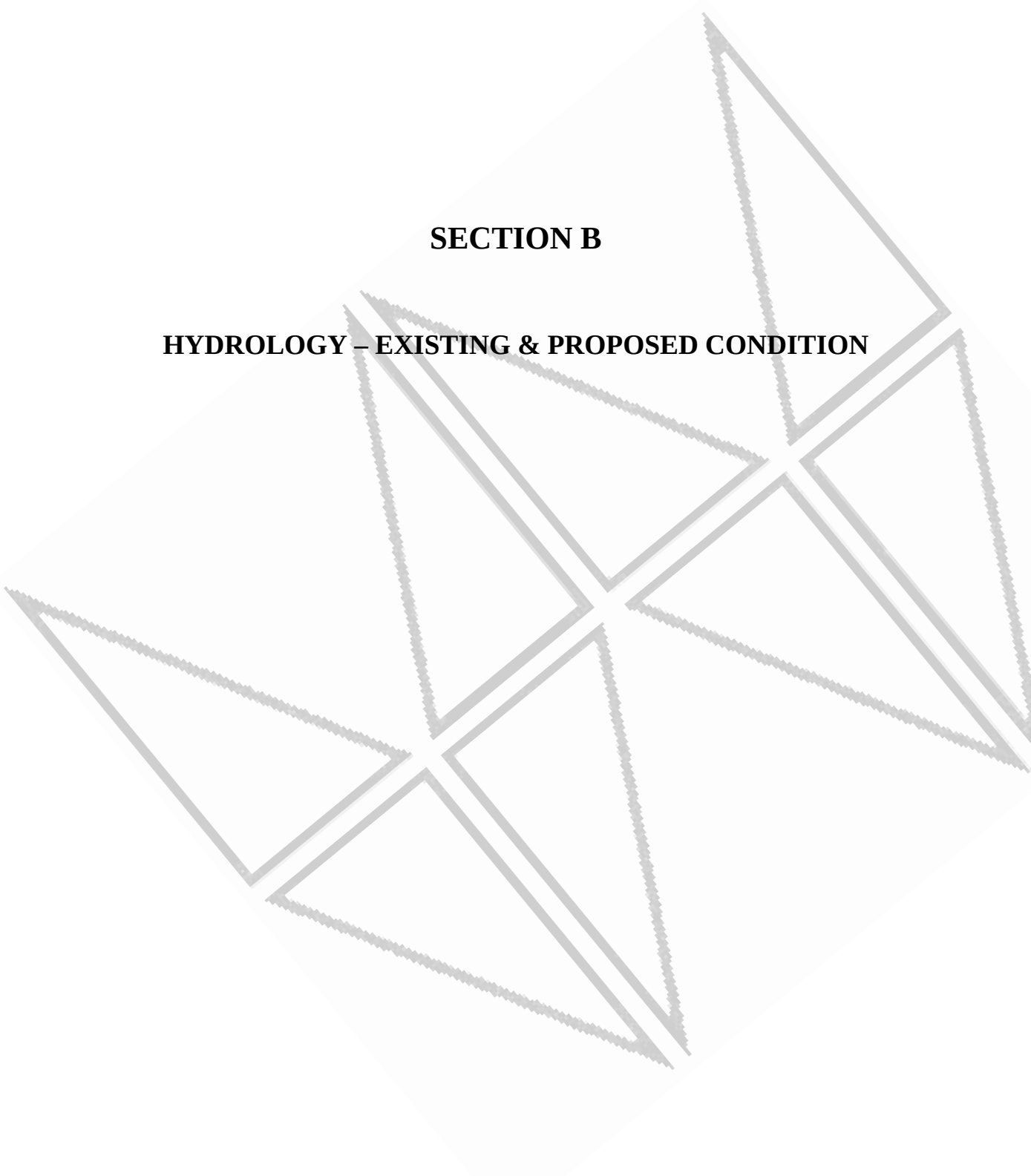
BASIN A
BOUNDARY

1090+
ACRES
(3.1 SQ. MI.)

POINT OF
ANALYSIS

DRAINAGE
BASIN MAP

1"=2000'



SECTION B

HYDROLOGY – EXISTING & PROPOSED CONDITION

NRCS HYDROLOGIC METHOD

Project: San Diego Freedom Ranch

Geographic Location: Lat – 32°39' Long- 116°29'

Drainage Area: 3.1 Square Miles

Storm Frequency: 100-Year

6-Hour Storm Duration Precipitation (See Isopluvial): 3.0 inches

24-Hour Storm Duration Precipitation (See Isopluvial): 6.1 inches

Soil Group: D – use for entire basin to be conservative

PZN: 3.0 **CN:** 70 **CN Adjusted:** 85

Watershed Length (L): 3.2 miles

Length to Centroid (Lc): 1.4 miles

Slope: 3580-2800 = 780 / 3.2 = 244 ft/mile

Basin n Factor: 0.03

Corps Lag (T_L): $24n((L \times L_c)/S^{0.5})^m = 24(0.03)((3.2 \times 1.4)/244^{0.5})^{0.38} = 0.45$ hours

Time to Peak (T_p): $0.862 (T_L) = 0.862(0.45) = 0.4$

Duration D: $D=0.2(T_p) = 0.2(0.4)(60\text{min}) = 4.8$ min – use 5 minutes

Intensity: $I=7.44P_6D^{-0.645} = 7.44(3.0)(5)^{-0.645} = 7.9$ in/hr

Rainfall Depth: $P=I (D/60) = 7.9(5/60) = 0.66$ in/hr

S (potential maximum soil retention): $S=1000/CN-10 = 1000/85-10 = 1.76$

Evaluation of Existing vs. Proposed Condition

In the existing condition, an adjusted CN value of 85 is used for the entire 3.1 square mile basin.

The project proposes to add roughly 2 acres of impervious surface. If a CN value of 100 (conservative) is applied to the 2 acres, the weighted CN value is shown here:

$$100 \times (2 \text{ acres} / 1990 \text{ acres}) + 85 (1988 \text{ acres} / 1990 \text{ acres}) = 85.01$$

The following two pages show the existing and proposed flowraes. An increase from 3947.8 to 3948.4 is only an increase of 0.6 cfs or 0.01%. This will result in no measurable increase in flow depth, width or velocity.


```

*****
* The San Diego Unit Hydrograph (SDUH) Peak Discharge Program uses the      *
* procedures described in Section 4 of the San Diego County Hydrology        *
* Manual for NRCS Hydrologic Method calculations. The SDUH Peak Discharge   *
* Program may be used only for determination of peak flow rate, and may not  *
* be used for detention basin design or other routing purposes for which a  *
* hydrograph is required. To generate a hydrograph, the calculation method   *
* described in Section 4 of the San Diego County Hydrology Manual may be     *
* used, or a computer program that includes good documentation of the        *
* calculations (see Section 1.7 of the San Diego County Hydrology manual).    *
* Note: the RATHYDRO computer program is not based on the calculation method *
* described in Section 4 of the San Diego County Hydrology Manual and may    *
* not be used to generate a hydrograph based on the SDUH Peak Discharge     *
* Program output.                                                            *
*****

```

Project Identification: FREEDOM RANCH (Existing Condition)

Storm Frequency (years) = 100

Drainage Area (square miles) = 3.100

6-Hour Rainfall (inches) = 3.00

6-Hour Depth-Area Factor = 0.991

24-Hour Rainfall (inches) = 6.10

24-Hour Depth-Area Factor = 0.994

Adjusted Curve Number = 85

Unit Interval (minutes) = 5

Watershed Lag Time (hours) = 0.450

Peak Flow Rate (cfs) = 3947.8


```

*****
* The San Diego Unit Hydrograph (SDUH) Peak Discharge Program uses the      *
* procedures described in Section 4 of the San Diego County Hydrology        *
* Manual for NRCS Hydrologic Method calculations.  The SDUH Peak Discharge  *
* Program may be used only for determination of peak flow rate, and may not  *
* be used for detention basin design or other routing purposes for which a  *
* hydrograph is required.  To generate a hydrograph, the calculation method  *
* described in Section 4 of the San Diego County Hydrology Manual may be    *
* used, or a computer program that includes good documentation of the       *
* calculations (see Section 1.7 of the San Diego County Hydrology manual).   *
* Note: the RATHYDRO computer program is not based on the calculation method *
* described in Section 4 of the San Diego County Hydrology Manual and may   *
* not be used to generate a hydrograph based on the SDUH Peak Discharge     *
* Program output.                                                            *
*****

```

Project Identification: FREEDOM RANCH (Proposed Condition)

Storm Frequency (years) = 100

Drainage Area (square miles) = 3.100

6-Hour Rainfall (inches) = 3.00

6-Hour Depth-Area Factor = 0.991

24-Hour Rainfall (inches) = 6.10

24-Hour Depth-Area Factor = 0.994

Adjusted Curve Number = 85.01

Unit Interval (minutes) = 5

Watershed Lag Time (hours) = 0.450

Peak Flow Rate (cfs) = 3948.4

The adjustment for PZN Condition may be made to the composite CN for the watershed. It is not necessary to make the PZN Condition adjustment to each of the CNs for the different combinations of ground cover and soil group within the watershed before calculating the composite CN.

Table 4-6

PZN ADJUSTMENT FACTORS FOR FLOW COMPUTATIONS
(San Diego County)

Storm Frequency	Coast (PZN = 1.0)	Foothills (PZN = 2.0)	Mountains (PZN = 3.0)	Desert (PZN = 4.0)
Less than 35-year return period	1.5	2.5	2.0	1.5
Greater than or equal to 35-year return period	2.0	3.0	3.0	2.0

Notes: PZN is the precipitation zone number (see Map, Appendix C). The PZN adjustment factor represents the PZN Condition that the CN for the watershed should be adjusted to.

4.1.3 Rainfall-Runoff Relationship

A relationship between accumulated rainfall and accumulated runoff was derived by NRCS from experimental plots for numerous soils and vegetative cover conditions. The following NRCS runoff equation is used to estimate direct runoff from 24-hour or 6-hour storm rainfall. The equation is:

$$Q_a = \frac{(P - I_a)^2}{(P - I_a) + S} \quad (\text{Eq. 4-1})$$

where: Q_a = accumulated direct runoff (in)
 P = accumulated rainfall (potential maximum runoff) (in)
 I_a = initial abstraction including surface storage, interception, evaporation, and infiltration prior to runoff (in)
 S = potential maximum soil retention (in)

Table 4-2 (Continued)
RUNOFF CURVE NUMBERS¹ FOR PZN CONDITION = 2.0

Cover Description	Cover Treatment or Practice ²	Hydrologic Condition ³	Average Percent Impervious Area ⁴	Curve Numbers for Hydrologic Soil Groups:			
				A	B	C	D
Pinyon-juniper-pinyon, juniper, or both; grass understory		Poor.....	9	75	85	89	
		Fair.....		58	73	80	
		Good.....		41	61	71	
Sagebrush with grass understory		Poor.....	9	67	80	85	
		Fair.....		51	63	70	
		Good.....		35	47	55	
Wood or forest land.....		Thin stand, poor cover	45	66	77	83	
		Good cover.....		25	55	70	77
Woods (woodland).....		Poor.....	45	66	77	83	
		Fair.....		36	60	73	79
		Good.....		28	55	70	77
Woodland-grass combination.....		Poor.....	57	73	82	86	
		Fair.....		44	65	77	82
		Good.....		33	58	72	79

¹ Average runoff condition, and $I_a = 0.2S$.

² Hydrologic practices described as "straight row" and "contoured" are defined in the glossary.

³ For definition of hydrologic condition, see Tables 4-3, 4-4, and 4-5.

⁴ The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. If the impervious area is not directly connected, the NRCS method has an adjustment to reduce the effect.

⁵ Composite CNs for natural desert landscaping should be computed based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.

⁶ See glossary.

⁷ CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space cover type.

⁸ Includes lawns, cemeteries, golf courses and parks with ground cover of mowed and irrigated perennial grass.

⁹ CNs for Group A have not been developed.

Table 4-10

RUNOFF CURVE NUMBERS FOR PZN CONDITIONS 1.0, 2.0, AND 3.0

CN For:			CN For:		
PZN Condition = 1.0	PZN Condition = 2.0	PZN Condition = 3.0	PZN Condition = 1.0	PZN Condition = 2.0	PZN Condition = 3.0
100	100	100	40	60	78
97	99	100	39	59	77
94	98	99	38	58	76
91	97	99	37	57	75
89	96	99	37	56	75
87	95	98	34	55	73
85	94	98	34	54	73
83	93	98	33	53	72
81	92	97	32	52	71
80	91	97	31	51	70
78	90	96	31	50	70
76	89	96	30	49	69
75	88	95	29	48	68
73	87	95	28	47	67
72	86	94	27	46	66
70	85	94	26	45	65
68	84	93	25	44	64
67	83	93	25	43	63
66	82	92	24	42	62
64	81	92	23	41	61
63	80	91	22	40	60
62	79	91	21	39	59
60	78	90	21	38	58
59	77	89	20	37	57
58	76	89	19	36	56
57	75	88	18	35	55
55	74	88	18	34	54
54	73	87	17	33	53
53	72	86	16	32	52
52	71	86	16	31	51
51	70	85	15	30	50
50	69	84			
48	68	84	12	25	43
47	67	83	9	20	37
46	66	82	6	15	30
45	65	82	4	10	22
44	64	81	2	5	13
43	63	80	0	0	0
42	62	79			
41	61	78			

Table 4-1
RAINFALL DEPTH-AREA ADJUSTMENT DATA POINTS

Watershed Area (square miles)	Rainfall Depth-Area Adjustment for Duration				
	30-Minute	1-Hour	3-Hour	6-Hour	24-Hour
0	1.000	1.000	1.000	1.000	1.000
5	0.942	0.970	0.980	0.985	0.990
10	0.900	0.947	0.970	0.980	0.985
20	0.834	0.900	0.952	0.963	0.975
30	0.768	0.858	0.932	0.950	0.964
40	0.730	0.830	0.915	0.940	0.958
50	0.692	0.800	0.900	0.928	0.952
60	0.663	0.778	0.883	0.920	0.948
70	0.645	0.760	0.872	0.912	0.945
80	0.630	0.746	0.862	0.904	0.942
90	0.620	0.735	0.853	0.896	0.938
100	0.610	0.722	0.845	0.890	0.935
125	0.588	0.700	0.830	0.878	0.930
150	0.572	0.685	0.818	0.865	0.925
175	0.572	0.672	0.808	0.858	0.922
200	0.572	0.666	0.798	0.851	0.918
225	0.572	0.660	0.790	0.845	0.915
250	0.572	0.655	0.787	0.842	0.914
300	0.572	0.652	0.782	0.838	0.912
350	0.572	0.652	0.780	0.830	0.910
400	0.572	0.652	0.780	0.828	0.908
3.1	0.964	0.981	0.988	0.991	0.994

Table 4-11

RUNOFF CURVE NUMBERS AND CONSTANTS FOR THE CASE $I_A=0.2S$

CN	S (inches)	Curve Starts Where P = (inches)	CN	S (inches)	Curve Starts Where P = (inches)
100	0	0	60	6.67	1.33
99	.101	.02	59	9.95	1.39
98	.204	.04	58	7.24	1.45
97	.309	.06	57	7.54	1.51
96	.417	.08	56	7.86	1.57
95	.526	.11	55	8.18	1.64
94	.638	.13	54	8.52	1.70
93	.753	.15	53	8.87	1.77
92	.870	.17	52	9.23	1.85
91	.989	.20	51	9.61	1.92
90	1.11	.22	50	10.0	2.00
89	1.24	.25	49	10.4	2.08
88	1.36	.27	48	10.8	2.16
87	1.49	.30	47	11.3	2.26
86	1.63	.33	46	11.7	2.34
85	1.76	.35	45	12.2	2.44
84	1.90	.38	44	12.7	2.54
83	2.05	.41	43	13.2	2.64
82	2.20	.44	42	13.8	2.76
81	2.34	.47	41	14.4	2.88
80	2.50	.50	40	15.0	3.00
79	2.66	.53	39	15.6	3.12
78	2.82	.56	38	16.3	3.26
77	2.99	.60	37	17.0	3.40
76	3.16	.63	36	17.8	3.56
75	3.33	.67	35	18.6	3.72
74	3.51	.70	34	19.4	3.88
73	3.70	.74	33	20.3	4.06
72	3.89	.78	32	21.2	4.24
71	4.08	.82	31	22.2	4.44
70	4.28	.86	30	23.3	4.66
69	4.49	.90			
68	4.70	.94	25	30.0	6.00
67	4.92	.98	20	40.0	8.00
66	5.15	1.03	15	56.7	11.34
65	5.38	1.08	10	90.0	18.00
64	5.62	1.12	5	190.0	38.0
63	5.87	1.17	0	infinity	infinity
62	6.13	1.23			
61	6.39	1.28			

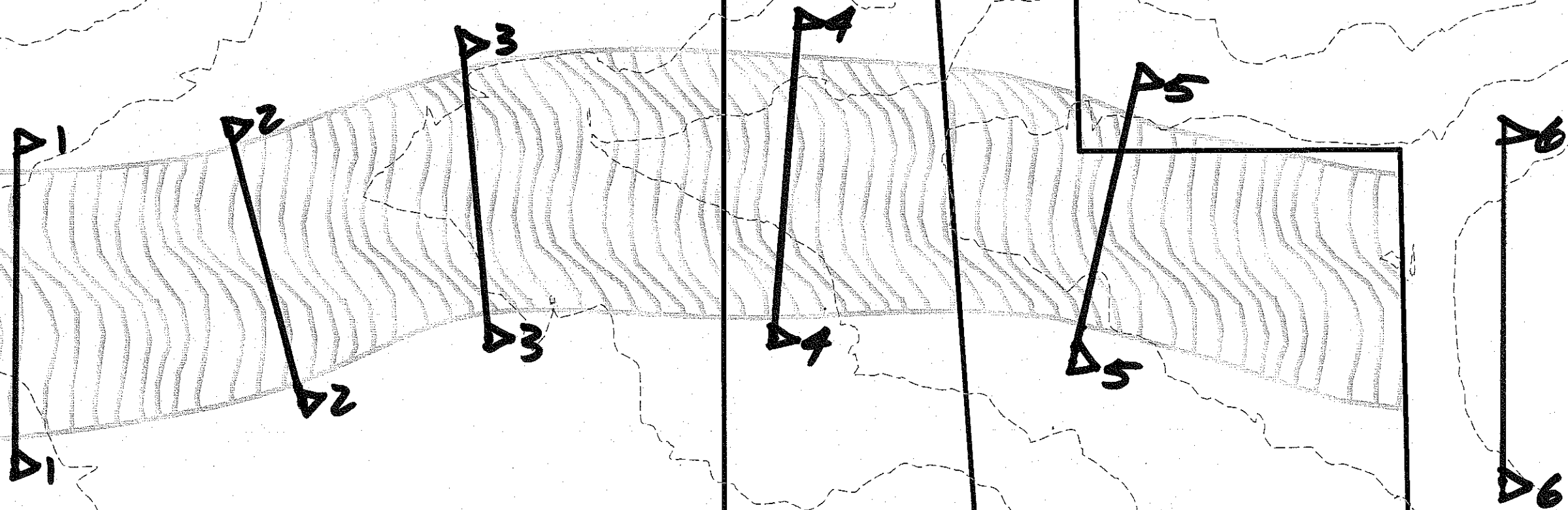
SECTION C

HYDRAULIC CALCULATIONS



PROJECT BOUNDARY

100-YEAR
FLOOD MAP



1"=100'

100 Year Flood Cross Sections and Calculations

Section 1

Channel Calculator

Given Input Data:

Shape Trapezoidal
Flowrate 3948 cfs
Slope 0.0330 ft/ft
Manning's n 0.0300
Bottom width 5 ft
Left slope 0.042 ft/ft (V/H)
Right slope 0.021 ft/ft (V/H)

Computed Results:

Depth 35.7 in
Velocity 11.9 fps
Top width 218 ft

Section 2

Channel Calculator

Given Input Data:

Shape Trapezoidal
Flowrate 3948 cfs
Slope 0.023 ft/ft
Manning's n 0.030
Bottom width 5 ft
Left slope 0.067 ft/ft (V/H)
Right slope 0.025 ft/ft (V/H)

Computed Results:

Depth 42.1 in
Velocity 11.1 fps
Top width 198 ft

Section 3

Channel Calculator

Given Input Data:

Shape Trapezoidal
Flowrate 3948 cfs
Slope 0.028 ft/ft
Manning's n 0.0300
Bottom width 5 ft
Left slope 0.083 ft/ft (V/H)
Right slope 0.021 ft/ft (V/H)

Computed Results:

Depth 39.3 in
Velocity 11.7 fps
Top width 201 ft

Section 4

Channel Calculator

Given Input Data:

Shape Trapezoidal
Flowrate 3948 cfs
Slope 0.018 ft/ft
Manning's n 0.030
Bottom width 5 ft
Left slope 0.071 ft/ft (V/H)
Right slope 0.023 ft/ft (V/H)

Computed Results:

Depth 43.4 in
Velocity 10.0 fps
Top width 213 ft

Section 5

Channel Calculator

Given Input Data:

Shape Trapezoidal
Flowrate 3948 cfs
Slope 0.013 ft/ft
Manning's n 0.030
Bottom width 70 ft
Left slope 0.052 ft/ft (V/H)
Right slope 0.045 ft/ft (V/H)

Computed Results:

Depth 37.7 in
Velocity 9.3 fps
Top width 200 ft

Section 6

Channel Calculator

Given Input Data:

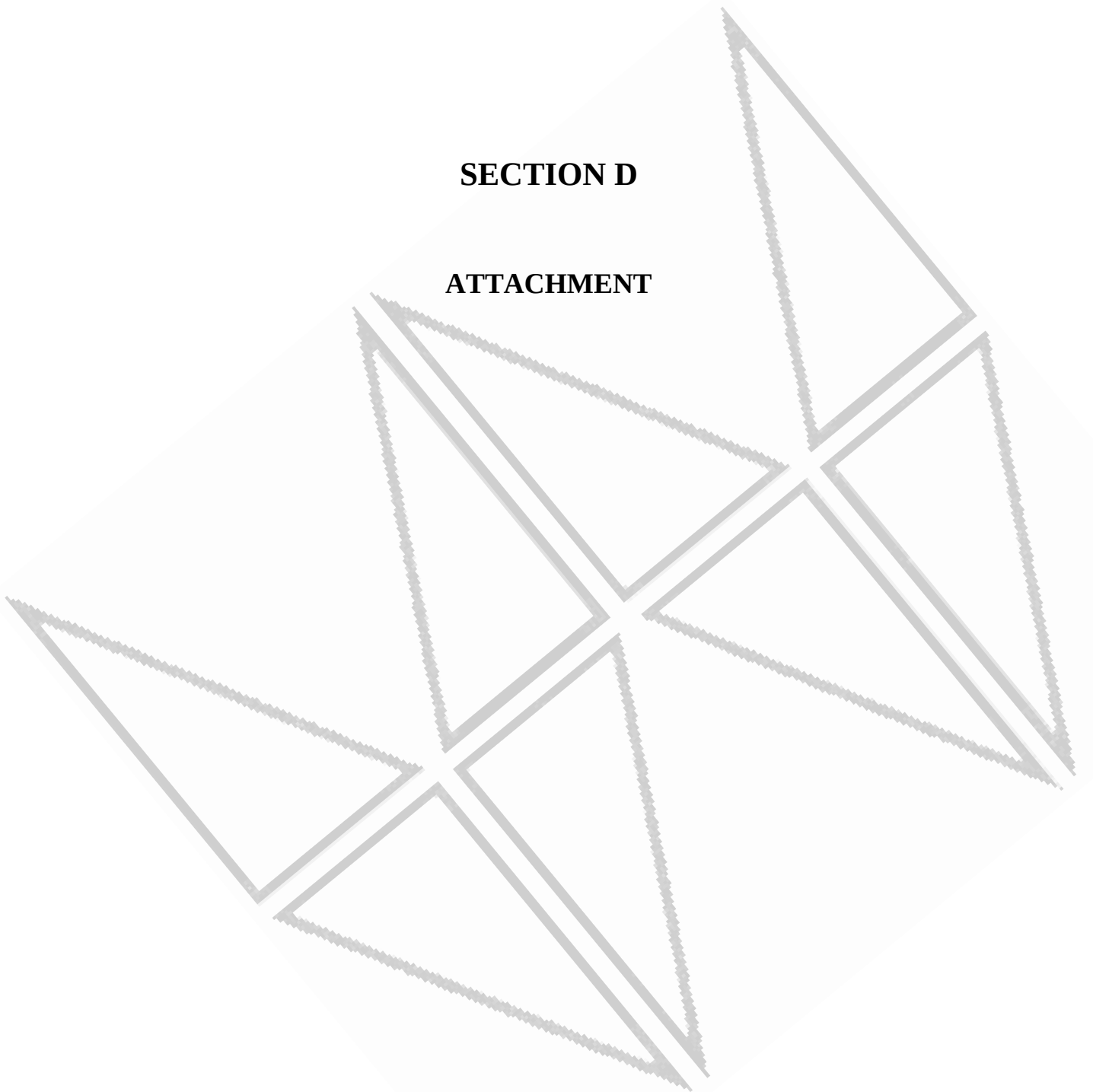
Shape Trapezoidal
Solving for Depth of Flow
Flowrate 3948 cfs
Slope 0.013 ft/ft
Manning's n 0.030
Bottom width 100 ft
Left slope 0.063 ft/ft (V/H)
Right slope 0.063 ft/ft (V/H)

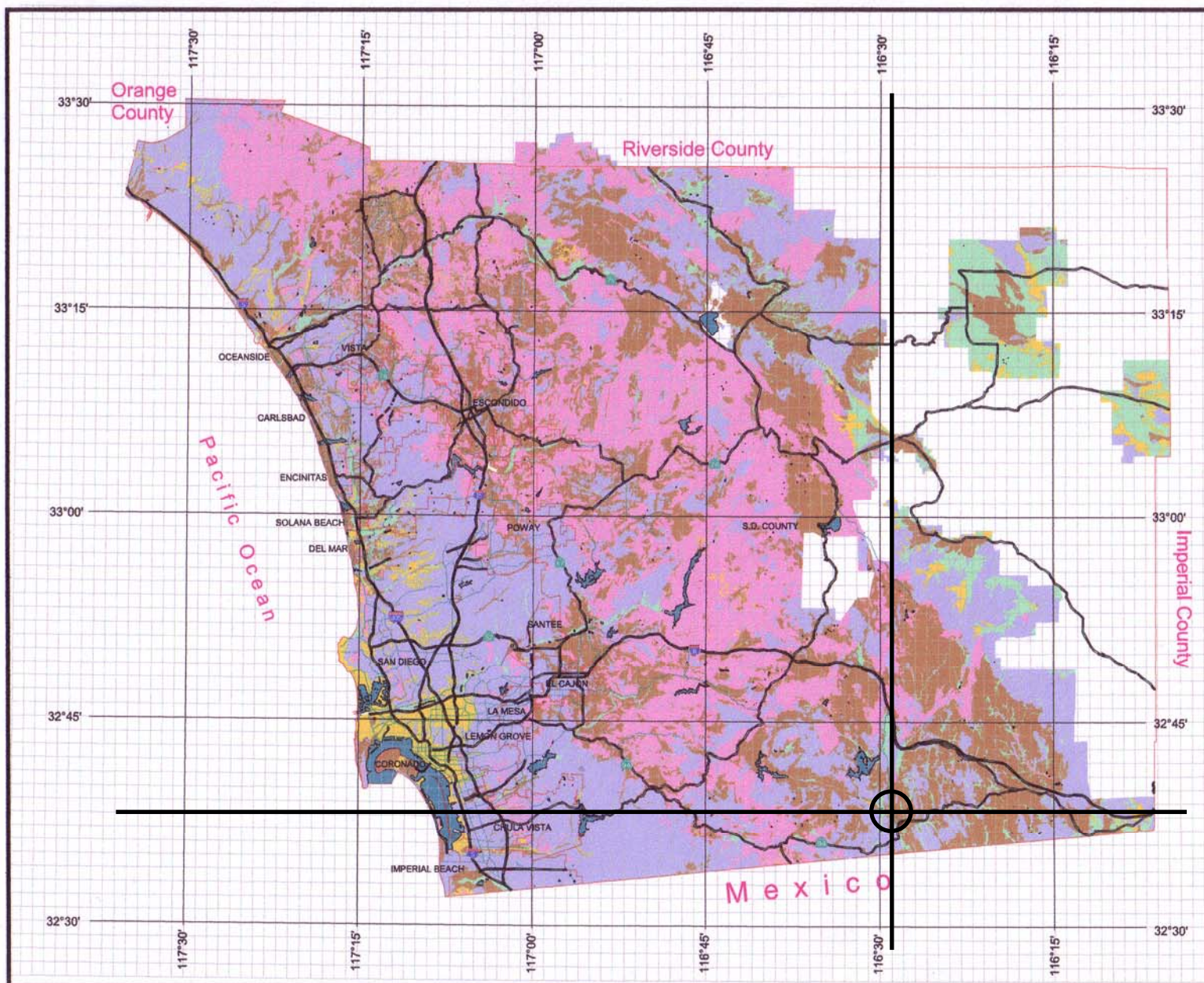
Computed Results:

Depth 34.3 in
Velocity 9.5 ft
Top width 191 ft

SECTION D

ATTACHMENT





County of San Diego Hydrology Manual



Soil Hydrologic Groups

Legend

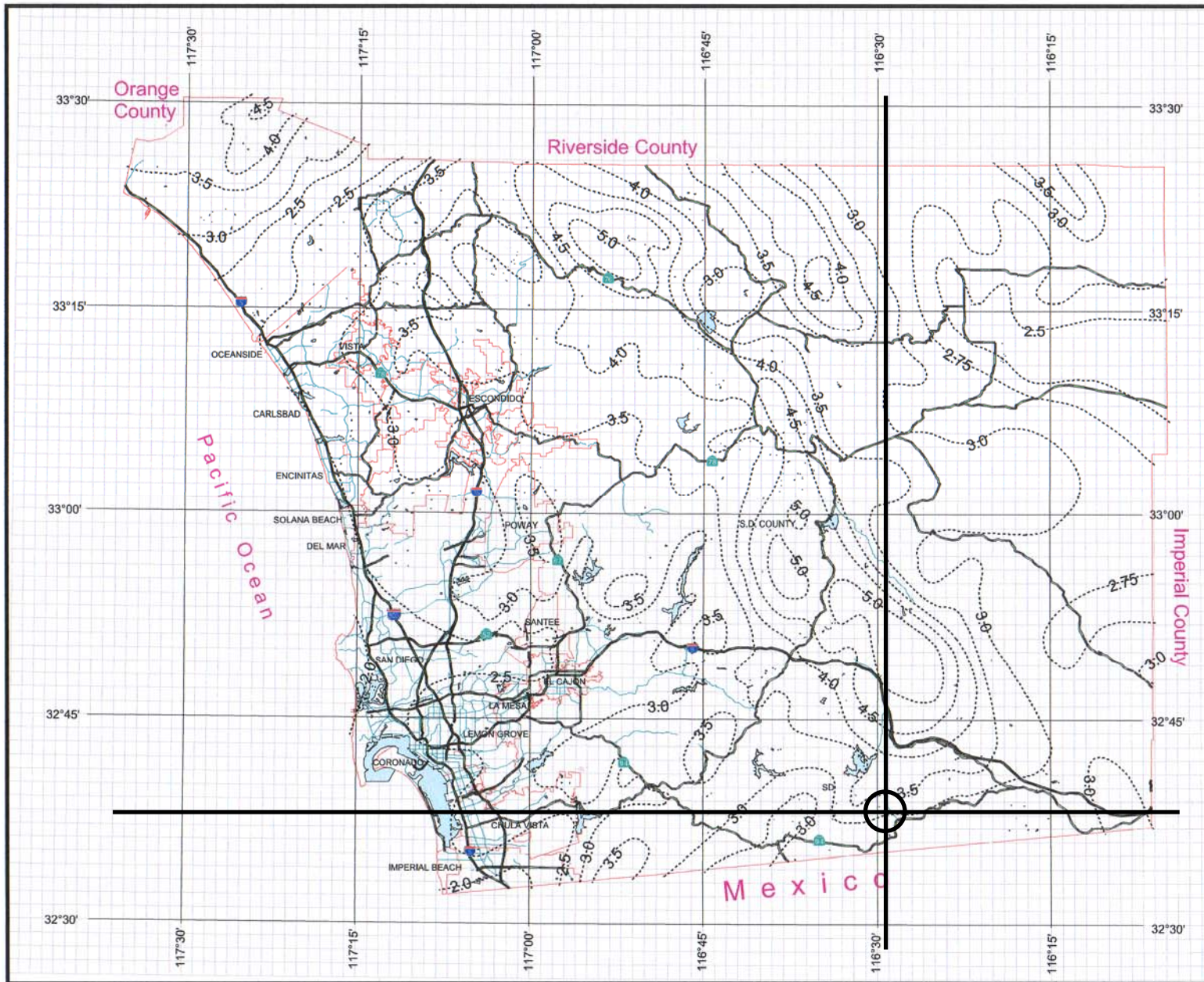
Soil Groups	
	Group A
	Group B
	Group C
	Group D
	Undetermined
	Data Unavailable



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County of San Diego Hydrology Manual



Rainfall Isoplethials

100 Year Rainfall Event - 6 Hours

----- Isoplethial (inches)

3.0 in

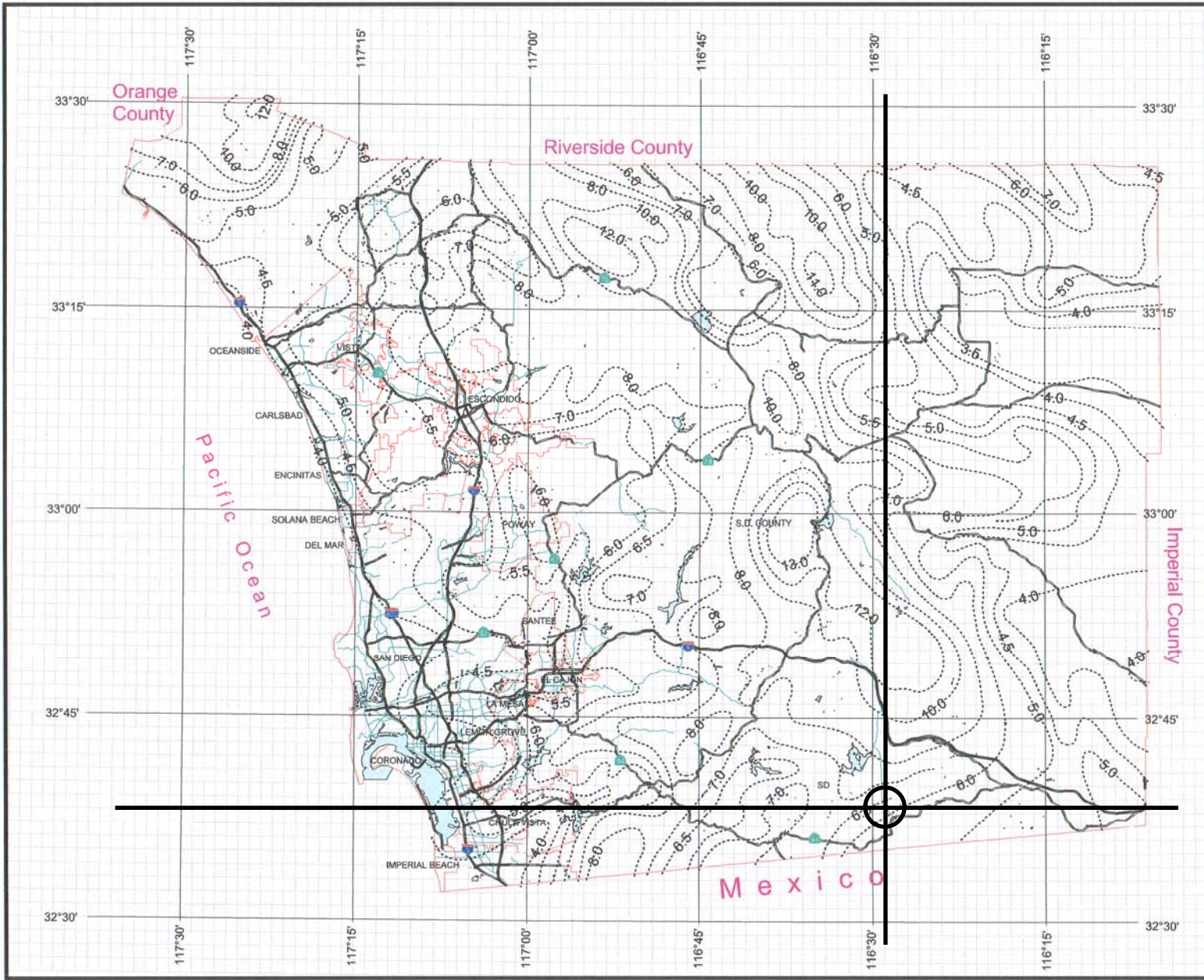


3 0 3 Miles

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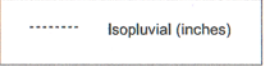


County of San Diego
Hydrology Manual



Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours



6.1 in



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