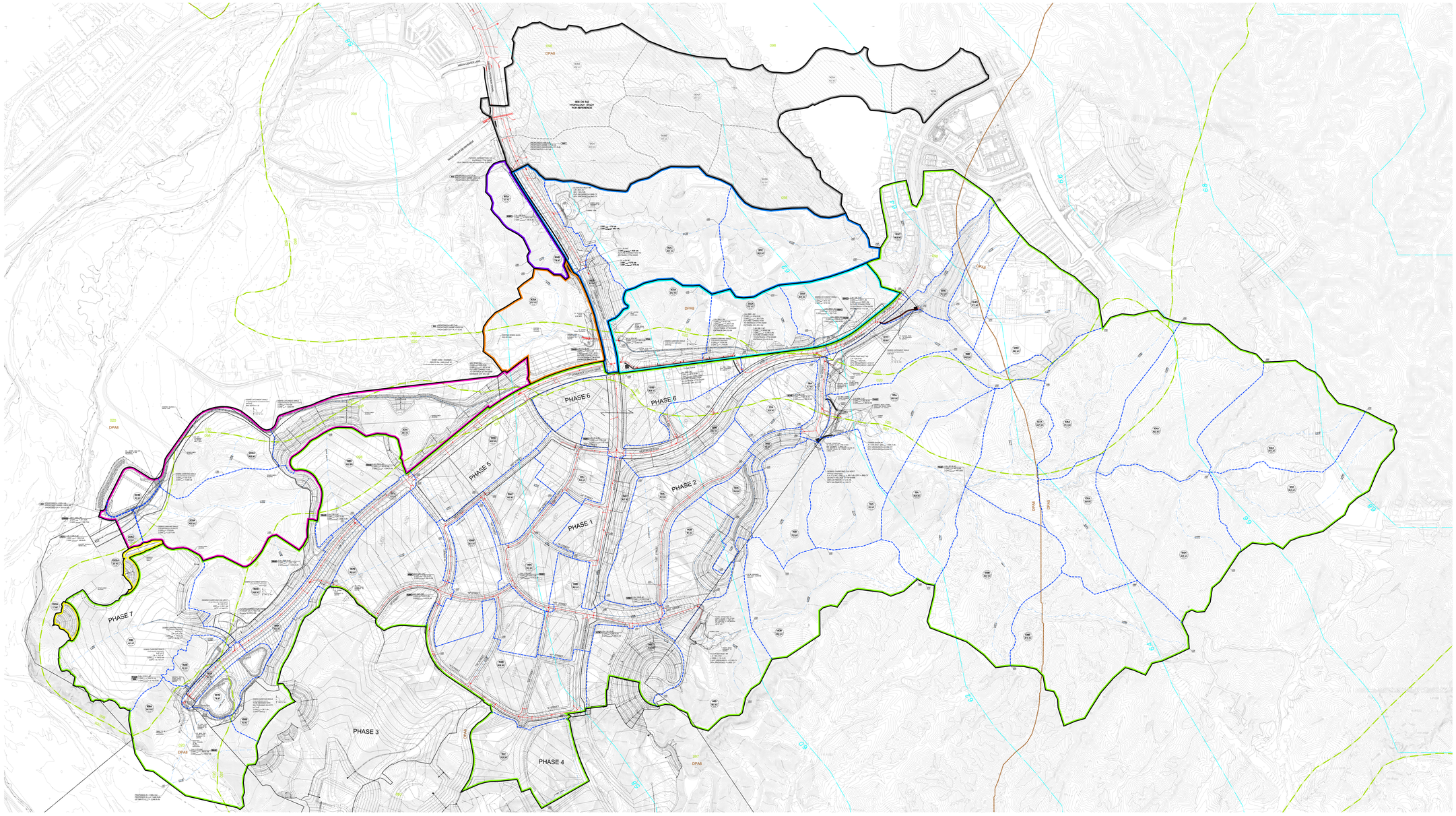
Appendix 5.5 (Continued)

Hydrology (Part 5 of 15)

D-8: AVTTM 61105-01, 02, 05, & 06



Hydrology Subareas Data

Subarea ID	Area (ac)	Area (sq ft)	Area (sq mi)	Tc (min)	Tc (hr)	Runoff Coefficient (C)	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Flow Path Length (ft)	Flow Path Slope (%)	Notes
A1	12.45	542,322	0.0195	18.2	0.30	0.42	2.85	14.9	1,240	3.8	
A2	8.73	380,339	0.0136	14.6	0.24	0.39	3.12	10.6	980	4.5	
A3	5.21	226,948	0.0081	11.3	0.19	0.36	3.48	6.5	760	5.2	
B1	15.02	654,391	0.0235	22.7	0.38	0.45	2.54	17.2	1,610	2.9	
B2	9.88	430,373	0.0154	16.4	0.27	0.41	2.96	12.0	1,120	3.6	
B3	6.34	276,170	0.0099	12.8	0.21	0.38	3.31	8.0	870	4.8	
C1	18.67	813,325	0.0292	25.1	0.42	0.47	2.38	20.9	1,890	2.4	
C2	11.04	480,902	0.0173	17.9	0.30	0.43	2.79	13.2	1,310	3.3	
C3	7.16	311,890	0.0112	13.5	0.23	0.40	3.24	9.3	940	4.6	
D1	4.52	196,891	0.0071	10.2	0.17	0.34	3.62	5.6	690	5.8	
D2	3.18	138,521	0.0050	8.9	0.15	0.32	3.81	3.9	580	6.3	
E1	21.30	927,828	0.0333	28.4	0.47	0.49	2.21	23.1	2,140	2.1	
E2	13.76	599,446	0.0215	20.6	0.34	0.44	2.67	16.2	1,540	3.0	
E3	8.05	350,658	0.0126	15.2	0.25	0.40	3.18	10.2	1,020	4.2	
F1	16.89	735,728	0.0264	23.5	0.39	0.46	2.47	19.2	1,760	2.6	
F2	10.42	453,895	0.0163	17.1	0.28	0.42	2.88	12.6	1,230	3.4	
F3	6.71	292,348	0.0105	13.1	0.22	0.39	3.27	8.6	910	4.7	
G1	19.44	846,806	0.0304	26.3	0.44	0.48	2.31	21.5	1,980	2.2	
G2	12.18	530,561	0.0190	19.0	0.32	0.43	2.74	14.3	1,420	3.1	
G3	7.89	343,688	0.0123	14.8	0.25	0.40	3.21	10.1	1,050	4.0	
H1	14.31	623,344	0.0224	21.4	0.36	0.44	2.61	16.4	1,590	2.8	
H2	9.12	397,267	0.0143	16.0	0.27	0.41	2.99	11.2	1,180	3.5	
H3	5.86	255,262	0.0092	12.4	0.21	0.37	3.36	7.3	830	4.9	
I1	17.55	764,478	0.0274	24.2	0.40	0.46	2.43	19.6	1,810	2.5	
I2	11.27	490,921	0.0176	18.3	0.31	0.42	2.82	13.3	1,340	3.2	
I3	7.42	323,215	0.0116	14.1	0.24	0.39	3.24	9.4	970	4.4	
J1	20.16	878,170	0.0315	27.0	0.45	0.48	2.27	21.9	2,030	2.1	
J2	13.04	568,022	0.0204	19.8	0.33	0.43	2.70	15.1	1,470	3.0	
J3	8.61	375,052	0.0135	15.5	0.26	0.40	3.15	10.8	1,090	4.1	
K1	15.73	685,139	0.0246	22.1	0.37	0.45	2.57	18.2	1,650	2.7	
K2	10.18	443,441	0.0159	16.7	0.28	0.41	2.93	12.2	1,200	3.4	
K3	6.55	285,318	0.0102	13.0	0.22	0.38	3.30	8.2	880	4.8	
L1	18.02	784,951	0.0282	24.8	0.41	0.46	2.40	19.9	1,850	2.5	
L2	11.66	507,910	0.0182	18.6	0.31	0.42	2.80	13.7	1,360	3.2	
L3	7.58	330,185	0.0118	14.3	0.24	0.39	3.22	9.5	980	4.4	
M1	22.41	976,160	0.0350	29.6	0.49	0.50	2.15	24.1	2,230	2.0	
M2	14.49	631,184	0.0226	21.7	0.36	0.44	2.63	16.8	1,620	2.8	
M3	9.34	406,850	0.0146	16.2	0.27	0.41	2.97	11.4	1,190	3.5	
N1	16.12	702,187	0.0252	22.9	0.38	0.45	2.54	18.4	1,680	2.7	
N2	10.47	456,013	0.0164	17.2	0.29	0.42	2.87	12.6	1,240	3.4	
N3	6.78	295,337	0.0106	13.2	0.22	0.38	3.28	8.5	900	4.8	
O1	19.83	863,735	0.0310	26.7	0.44	0.48	2.29	21.8	2,010	2.1	
O2	12.91	562,300	0.0202	19.6	0.33	0.43	2.72	15.1	1,460	3.0	
O3	8.36	364,162	0.0131	15.4	0.26	0.40	3.16	10.6	1,080	4.1	
P1	17.24	750,974	0.0269	24.0	0.40	0.46	2.44	19.3	1,790	2.5	
P2	11.15	485,634	0.0174	18.1	0.30	0.42	2.83	13.2	1,330	3.2	
P3	7.21	314,128	0.0113	13.9	0.23	0.39	3.25	9.1	960	4.5	
Q1	21.68	944,381	0.0339	28.9	0.48	0.49	2.18	23.2	2,180	2.1	
Q2	14.02	610,711	0.0219	21.0	0.35	0.44	2.65	16.3	1,570	2.9	
Q3	9.07	395,089	0.0142	15.9	0.26	0.41	3.00	11.1	1,170	3.6	
R1	15.96	695,218	0.0249	22.5	0.37	0.45	2.56	18.4	1,660	2.7	
R2	10.33	450,035	0.0161	16.9	0.28	0.41	2.91	12.3	1,210	3.4	
R3	6.69	291,476	0.0105	13.1	0.22	0.38	3.29	8.4	890	4.8	
S1	18.84	820,670	0.0294	25.3	0.42	0.47	2.36	20.9	1,900	2.4	
S2	12.21	531,868	0.0191	19.1	0.32	0.43	2.73	14.3	1,430	3.1	
S3	7.91	344,560	0.0124	14.9	0.25	0.40	3.20	10.1	1,060	4.0	
T1	20.37	887,257	0.0318	27.2	0.45	0.48	2.26	22.1	2,050	2.1	
T2	13.18	574,121	0.0206	19.9	0.33	0.43	2.69	15.2	1,480	3.0	
T3	8.54	372,002	0.0133	15.6	0.26	0.40	3.14	10.7	1,100	4.1	
U1	15.89	692,168	0.0248	22.4	0.37	0.45	2.57	18.3	1,670	2.7	
U2	10.27	447,301	0.0160	16.8	0.28	0.41	2.92	12.3	1,220	3.4	
U3	6.64	289,238	0.0104	13.0	0.22	0.38	3.29	8.3	900	4.8	
V1	18.71	814,948	0.0292	25.2	0.42	0.47	2.37	20.8	1,910	2.4	
V2	12.13	528,263	0.0190	19.0	0.32	0.43	2.74	14.3	1,440	3.1	
V3	7.86	342,382	0.0123	14.8	0.25	0.40	3.21	10.1	1,070	4.0	
W1	20.22	880,783	0.0316	27.1	0.45	0.48	2.27	22.0	2,060	2.1	
W2	13.09	570,140	0.0205	19.8	0.33	0.43	2.70	15.2	1,490	3.0	
W3	8.49	369,824	0.0133	15.6	0.26	0.40	3.15	10.7	1,110	4.1	
X1	15.84	689,990	0.0248	22.4	0.37	0.45	2.57	18.3	1,680	2.7	
X2	10.24	446,054	0.0160	16.8	0.28	0.41	2.92	12.3	1,230	3.4	
X3	6.62	288,367	0.0103	13.0	0.22	0.38	3.29	8.3	910	4.8	
Y1	18.65	812,574	0.0292	25.2	0.42	0.47	2.37	20.8	1,920	2.4	
Y2	12.09	526,520	0.0189	19.0	0.32	0.43	2.74	14.2	1,450	3.1	
Y3	7.83	341,075	0.0122	14.8	0.25	0.40	3.21	10.1	1,080	4.0	
Z1	20.15	877,734	0.0315	27.1	0.45	0.48	2.27	21.9	2,070	2.1	
Z2	13.05	568,458	0.0204	19.8	0.33	0.43	2.70	15.1	1,500	3.0	
Z3	8.46	368,518	0.0132	15.6	0.26	0.40	3.15	10.7	1,120	4.1	

NOTES:
1. ALL SUBAREA DATA SHOWN ABOVE IS FOR THE MISSION VALLEY PHASE 1 HYDROLOGY STUDY, DATED 3/28/2018.
2. SUBAREA ID CORRESPONDS TO THE DELINEATION SHOWN ON THE HYDROLOGY STUDY EXHIBIT.
3. TIME OF CONCENTRATION (Tc) AND PEAK RUNOFF VALUES ARE FOR THE 100-YEAR, 6-HOUR STORM EVENT UNLESS OTHERWISE NOTED.
4. RUNOFF COEFFICIENTS (C) ARE BASED ON THE CITY OF SAN DIEGO'S DEVELOPMENT REGULATIONS AND THE HYDROLOGY STUDY'S LAND USE ASSUMPTIONS.
5. FLOW PATH LENGTH AND SLOPE ARE MEASURED FROM THE MOST HYDRAULICALLY REMOTE POINT OF THE SUBAREA TO THE DESIGN POINT.
6. SUBAREAS WITH "OFFSITE" IN THE NOTES COLUMN INCLUDE FLOW FROM UPSTREAM OFFSITE TRIBUTARY AREAS.
7. REFER TO THE HYDROLOGY STUDY APPENDIX FOR DETAILED CALCULATIONS, INCLUDING TIME OF CONCENTRATION PATH DELINEATIONS AND RAINFALL INTENSITY-DURATION-FREQUENCY CURVES.

NOTE: FOR EXISTING INFORMATION REFER TO APPROVED MISSION VILLAGE PHASE 1 HYDROLOGY STUDY, DATED 3/28/2018

HYDROLOGY NOTES

1. HYDROLOGY ANALYSIS WAS PERFORMED USING THE 100-YEAR, 6-HOUR STORM EVENT AS REQUIRED BY THE CITY OF SAN DIEGO'S DRAINAGE DESIGN MANUAL.
2. THE RATIONAL METHOD WAS USED TO CALCULATE PEAK RUNOFF FOR SUBAREAS LESS THAN 1 SQUARE MILE IN AREA.
3. TIME OF CONCENTRATION (Tc) WAS CALCULATED USING THE KIRPICH EQUATION FOR NATURAL FLOW PATHS AND THE FAA METHOD FOR DEVELOPED FLOW PATHS.
4. RUNOFF COEFFICIENTS (C) WERE SELECTED BASED ON THE SOIL TYPE, SLOPE, AND IMPERVIOUSNESS OF EACH SUBAREA, CONSISTENT WITH THE CITY'S GUIDELINES.
5. RAINFALL INTENSITY VALUES WERE OBTAINED FROM THE NOAA ATLAS 14 DATA FOR THE PROJECT LOCATION.
6. A MINIMUM TIME OF CONCENTRATION OF 5 MINUTES WAS USED FOR ALL SUBAREAS.
7. THE HYDROLOGY MODEL WAS CALIBRATED TO MATCH THE RESULTS OF THE EXISTING MISSION VILLAGE PHASE 1 HYDROLOGY STUDY WHERE APPLICABLE.

DRAINAGE DESIGN CRITERIA

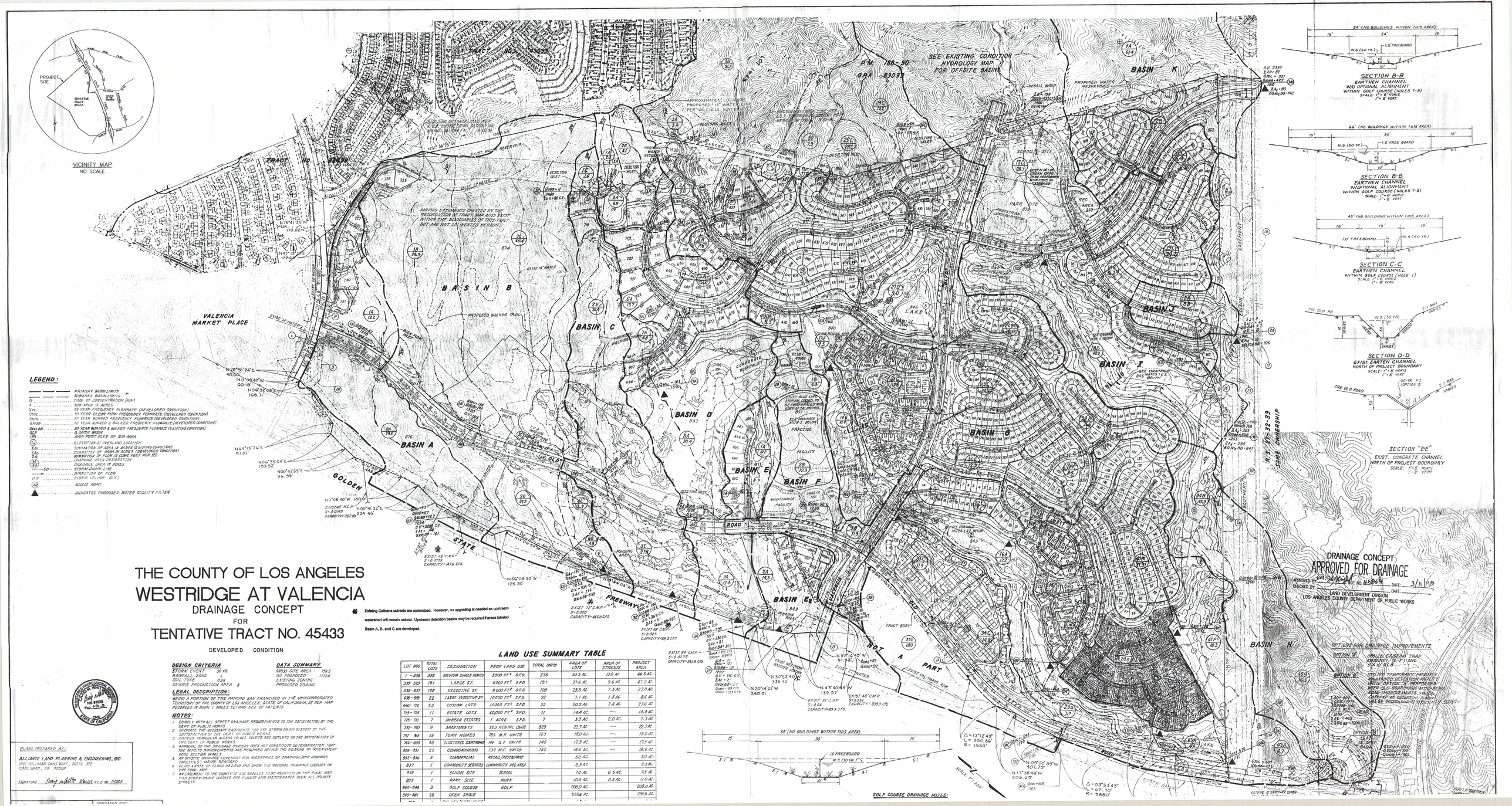
- 100-YEAR, 6-HOUR STORM EVENT
- RATIONAL METHOD FOR AREAS < 1 SQ MI
- MINIMUM TIME OF CONCENTRATION: 5 MIN
- RUNOFF COEFFICIENTS: PER CITY OF SAN DIEGO GUIDELINES
- RAINFALL DATA: NOAA ATLAS 14
- SOIL TYPE: PER GEOTECHNICAL REPORT
- SLOPE: PER GRADING PLAN
- IMPERVIOUSNESS: PER LAND USE

Q = CIA, WHERE:
Q = PEAK RUNOFF (CFS)
C = RUNOFF COEFFICIENT
I = RAINFALL INTENSITY (IN/HR)
A = DRAINAGE AREA (ACRES)

LEGEND

- 470 — 470 ELEVATION
- EXISTING STORM DRAIN
- EXISTING STORM DRAIN TO BE REMOVED
- PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN TO BE ABANDONED
- TIME OF CONCENTRATION
- TIME TO THE FURTHEST BASIN
- SUBAREA
- SUB AREA BOUNDARY
- DPA8 — DRAINAGE PATTERN AREA
- DRAINAGE AREA BOUNDARY
- 100 — 100 — 100 —

D-9: Westridge Tract 45433



LEGEND:

- PRIMARY BASIN LIMITS
- SUBAREA BASIN LIMITS
- Tc ..... TIME OF CONCENTRATION (MIN)
- A ..... SUB-AREA IN ACRES
- Q25 ..... 25 YEAR FREQUENCY FLOWRATE (DEVELOPED CONDITION)
- Q50C ..... 50 YEAR CLEAR FLOW FREQUENCY FLOWRATE (DEVELOPED CONDITION)
- Q50B ..... 50 YEAR BURNED FREQUENCY FLOWRATE (DEVELOPED CONDITION)
- Q100B ..... 50 YEAR BURNED & BULKED FREQUENCY FLOWRATE (DEVELOPED CONDITION)
- Q50B-EX / Q'B ..... 50 YEAR BURNED & BULKED FREQUENCY FLOWRATE (EXISTING CONDITION)
- (68) ..... HIGH POINT ELEV. OF SUB-AREA
- (E) ..... ELEVATION AT OVERLAND LOCATION
- ΣAc ..... SUMMATION OF AREA IN ACRES (EXISTING CONDITION)
- ΣAd ..... SUMMATION OF AREA IN ACRES (DEVELOPED CONDITION)
- ΣQ ..... SUMMATION OF FLOW IN CUBIC FEET PER SEC
- (1A) ..... DRAINAGE AREA DESIGNATION
- 14.0 ..... DRAINAGE AREA IN ACRES
- SD ..... STORM DRAIN LINE
- ..... DIRECTION OF FLOW
- D.V. ..... DEBRIS VOLUME (C.Y.)
- (40) ..... ACCESS ROAD
- INDICATES PROPOSED WATER QUALITY FILTER

THE COUNTY OF LOS ANGELES
WESTRIDGE AT VALENCIA
DRAINAGE CONCEPT
FOR
TENTATIVE TRACT NO. 45433

DEVELOPED CONDITION

DESIGN CRITERIA

STORM EVENT ..... 50 YR.
RAINFALL ZONE
SOIL TYPE D38
DEBRIS PRODUCTION AREA ..... B

DATA SUMMARY

GROSS SITE AREA 178.5
DU PROPOSED 1713.0
EXISTING ZONING
PROPOSED ZONING

LEGAL DESCRIPTION:

BEING A PORTION OF THE RANCHO SAN FRANCISCO IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 1, PAGES 521 AND 522 OF PATENTS

NOTES:

1. COMPLY WITH ALL STREET DRAINAGE REQUIREMENTS TO THE SATISFACTION OF THE DEPT. OF PUBLIC WORKS.
2. DEDICATE THE NECESSARY EASEMENTS FOR THE STORM DRAIN SYSTEM TO THE SATISFACTION OF THE DEPT. OF PUBLIC WORKS.
3. PROVIDE VEHICULAR ACCESS TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF THE DEPT. OF PUBLIC WORKS.
4. APPROVAL OF THE DRAINAGE CONCEPT DOES NOT CONSTITUTE DETERMINATION THAT THE OFFSITE IMPROVEMENTS ARE REQUIRED WITHIN THE MEANING OF GOVERNMENT CODE SECTION 66462.5.
5. AN OFFSITE DRAINAGE COVENANT FOR ACCEPTANCE OF DRAINAGE (AND DRAINAGE FACILITIES) MAY BE REQUIRED.
6. PLACE A NOTE OF FLOOD HAZARD AND SHOW THE NATURAL DRAINAGE COURSES ON THE FINAL MAP.
7. AN EASEMENT TO THE COUNTY OF LOS ANGELES TO BE GRANTED ON THE FINAL MAP FOR STORM DRAIN INGRESS AND EGRESS AND MAINTENANCE OVER ALL PRIVATE STREETS

✱ Existing Caltrans culverts are undersized. However, no upgrading is needed as upstream watershed will remain natural. Upstream detention basins may be required if areas labeled Basin A, B, and C are developed.

LAND USE SUMMARY TABLE

LOT NOS.	TOTAL LOTS	DESIGNATION	PROP. LAND USE	TOTAL UNITS	AREA OF LOTS	AREA OF STREETS	PROJECT AREA
1 - 338	338	MEDIUM SINGLE FAMILY	5000 FT² S.F.D.	338	59.5 AC.	18.0 AC.	66.5 AC.
339- 529	191	LARGE S.F.	6500 FT² S.F.D.	191	37.6 AC.	9.6 AC.	47.2 AC.
530- 637	108	EXECUTIVE S.F.	8000 FT² S.F.D.	108	25.5 AC.	7.5 AC.	33.0 AC.
638- 659	22	LARGE EXECUTIVE S.F.	10000 FT² S.F.D.	22	7.1 AC.	1.5 AC.	8.6 AC.
660- 712	53	CUSTOM LOTS	15000 FT² S.F.D.	53	20.0 AC.	7.6 AC.	27.6 AC.
713- 724	11	ESTATE LOTS	40,000 FT² S.F.D.	11	14.4 AC.	—	14.4 AC.
725- 731	7	McBEAN ESTATES	1 ACRE S.F.D.	7	5.3 AC.	2.0 AC.	7.3 AC.
732- 740	9	APARTMENTS	52.3 RENTAL UNITS	525	22.7 AC.	—	22.7 AC.
741 765	25	TOWN HOMES	18.3 M.F. UNITS	183	15.0 AC.	—	15.0 AC.
766- 805	40	CLUSTERED CONDITIONS	14.6 S.F. UNITS	145	17.5 AC.	—	17.5 AC.
806- 831	25	CONDOMINIUMS	13.2 M.F. UNITS	132	18.6 AC.	—	18.6 AC.
832- 836	5	COMMERCIAL	RETAIL/RESTAURANT		5.0 AC.		5.0 AC.
837	1	COMMUNITY SERVICES	COMMUNITY REC. AREA		2.3 AC.		2.3 AC.
838	1	SCHOOL SITE	SCHOOL		7.0 AC.	0.5 AC.	7.5 AC.
839	1	PARK SITE	PARK		10.5 AC.	0.5 AC.	11.0 AC.
840- 848	9	GOLF COURSE	GOLF		208.0 AC.		208.0 AC.
849- 881	28	OPEN SPACE			235.6 AC.		235.6 AC.

PLANS PREPARED BY:

ALLIANCE LAND PLANNING & ENGINEERING, INC.
2121 PALOMAR OAKS WAY, SUITE 112
CARLSBAD, CA 92008

SIGNATURE: Kent Walter Wright R.C.E. NO. 51929

REGISTERED PROFESSIONAL ENGINEER — Kent Walter Wright — No. 51929 — Exp. 6-30-10 — CIVIL — STATE OF CALIFORNIA

DRAINAGE CONCEPT APPROVED FOR DRAINAGE
APPROVED BY: [signature] DATE: 3/11/08
CHECKED BY: DATE:
LAND DEVELOPMENT DIVISION
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

OPTIONS FOR DRAINAGE IMPROVEMENTS

OPTION 'A': UPSIZE EXISTING TRAP CHANNEL 'E-1' AND 'E-2'

OPTION 'B': UTILIZE TEMPORARY DRAINAGE EASEMENT (SEE NOTE 1) UNTIL OPTION 'A' IS CONSTRUCTED WITH OLD ROAD IMPROVEMENTS. SEE OPTION 'B' DETAIL FOR DRAINAGE DETAILS.

NOTE 1: TEMPORARY DRAINAGE EASEMENT TO BE RELEASED UPON CONSTRUCTION OF OPTION 'A'

OPTION 'B'
100-YR. Q = 1205 CFS
50-YR. Q = 1055 CFS
Q BULKED = 1266 CFS
V = 8.5 FPS
A = 148.9 SQ. FT.
FLOW DEPTH = 3.0'
FREEBOARD = 1.0'
TOTAL DEPTH = 4.0'

SECTION B-B
EARTHEN CHANNEL
W/O OPTIONAL ALIGNMENT
WITHIN GOLF COURSE (HOLES 7-8)
SCALE: 1"=5' HORIZ.
1"=5' VERT.

SECTION B-B
EARTHEN CHANNEL
W/OPTIONAL ALIGNMENT
WITHIN GOLF COURSE (HOLES 7-8)
SCALE: 1"=5' HORIZ.
1"=5' VERT.

SECTION C-C
EARTHEN CHANNEL
WITHIN GOLF COURSE (HOLE 1)
SCALE: 1"=5' HORIZ.
1"=5' VERT.

SECTION D-D
EXIST. EARTEN CHANNEL
NORTH OF PROJECT BOUNDARY
SCALE: 1"=5' HORIZ.
1"=5' VERT.

SECTION "EE"
EXIST. CONCRETE CHANNEL
NORTH OF PROJECT BOUNDARY
SCALE: 1"=5' HORIZ.
1"=5' VERT.

GOLF COURSE DRAINAGE NOTES:

D-10: DS 542

HYDRAULIC SUMMARY

098

DPA - 8

HYDROLOGY SUMMARY

Watershed 800 (Unmanned Concrete V)		2 year	5 year	10 year	25 year	50 year	50 year Burn	Capital
Existing	Q (cfs)	31.0	76.3	108.2	149.9	182.2	188.0	250.0
Area (ac)	q (cfs/ac)	0.31	0.75	1.07	1.48	1.80	1.86	
100.1	Vol (ac-ft)	3.2	5.9	8.0	11.1	13.6		
Proposed	Q (cfs)	31.5	70.4	102.4	144.7	177.8	183.1	243.5
Area (ac)	q (cfs/ac)	0.31	0.70	1.01	1.43	1.76		
101.2	Vol (ac-ft)	3.2	5.9	8.0	11.1	13.7		
Delta	Q (cfs)	0.5	-5.9	-5.8	-5.2	-4.4	-4.9	-6.5
Area (ac)	q (cfs/ac)	0.00	-0.06	-0.06	-0.05	-0.05		
0.1	Vol (ac-ft)	0.0	0.0	0.0	0.0	0.1		

VTTM-71377
ENTRADA NORTH

PM 18654

PM 12337
MAGIC MOUNTAIN
THEME PARK

VTTM 53295
L.S. 27-32-39
PORTION OF
LOTS 15 & 16
(NEWHALL OWNERSHIP)

EX. 7'X 4' R.C. BOX PER LINE "F" PD 1052

EXISTING OPEN TRAP. CHANNEL PER LINE "B" PD 1052 (TO BE MAINTAINED LACFCD)

SIX FLAGS BOUNDARY

44' WIDE STORM DRAIN EASEMENT TO LACFCD FOR OPEN TRAP. CHANNEL AND APPURTENANT STRUCTURES AND INGRESS AND EGRESS PER LINE "B" PD 1052

MAGIC MOUNTAIN ENTRANCE

EXISTING NATURAL SWALE

VTTM PROJECT BOUNDARY

RIP RAP PAD (TO BE PRIVATELY MAINTAINED)

FUTURE CONNECTION FROM MISSION VILLAGE (TR 61105-01) ΣQ_{CAP}=718 cfs

GUNITE CHANNEL

VARIABLE WIDTH EASEMENT TO LACFCD FOR FLOOD CONTROL PURPOSES

54" SD LINE "B" PER PD 2637 (TO BE MAINTAINED BY LACFCD)

VARIABLE WIDTH EASEMENT TO LACFCD FOR FLOOD CONTROL PURPOSES

DEBRIS CONE

DESILTING INLET #7
(TO BE MAINTAINED BY LACFCD)
ΣA = 40.2 cfs
DEBRIS VOL = 1,032 CY
VOL. PROVIDED = 1,221 CY±

DESILTING INLET #5
(TO BE MAINTAINED BY LACFCD)
ΣA = 422.7 AC
ΣQ_{CAP} = 930.1 cfs
DEBRIS VOL = 4,523 CY
VOL. PROVIDED = 4,855 CY±

JOIN EXISTING CONCRETE CHANNEL
EXISTING A = 426.5 AC
EXISTING Q_{100} = 1,024.0 cfs
EXISTING DPV= 4,579 CY.
PD 1052 Q_{DESIGN}= 1,160 cfs
PROPOSED A=444.2 AC
PROPOSED Q_{CAP} = 950.1 cfs
PROPOSED DPV= 0 CY
Q_{DESIGN}= 1,121.9 cfs

EXISTING PARCEL BOUNDARY

EXISTING ΣA = 101.1 AC
EXISTING ΣQ_{100} = 250.0 cfs
EXISTING DPV = 4,640 CY
PROPOSED ΣA =101.2 AC
PROPOSED ΣQ_{100} = 243.5 cfs
PROPOSED DPV = 4,640 CY

SEE DETAIL A

PROPOSED CULVERT BOX (TO BE MAINTAINED BY LACFCD)

MEDIA CENTER LANE

JOIN METROPOINTE SD PLAN MTD 1764

LINE "A" PER PD 2637
PROPOSED 42" SD (TO BE MAINTAINED BY LACFCD)

42" RCP PER CALTRANS PLANS PER THE OLD ROAD RELOCATION BY METROPOINTE (TO BE MAINTAINED BY LACFCD)

OLD ROAD

PARKWAY

MAGIC MOUNTAIN

LINE "C" PER PD 2637

LINE "D" PER PD 2637

FUTURE CONNECTION FROM ENTRADA (VTTM 53295) ΣQ_{CAP} = 38.6 cfs

DEBRIS CATCHMENT AREA, REQUIRES DEBRIS COLLECTION MAINTENANCE AS NEEDED, NOT TO BE MAINTAINED BY LACFCD

DESILTING INLET #8
(TO BE MAINTAINED BY LACFCD)
ΣA = 20.3 cfs
DEBRIS VOL = 501 CY
VOL. PROVIDED = 652 CY±

EXISTING ΣA = 3.0 AC
EXISTING ΣQ_{CAP} = 7.6 cfs
PROPOSED ΣA = 3.0 AC
PROPOSED ΣQ_{CAP} = 7.6 cfs

EXISTING CATCH BASIN
PER MTD 1764 A= 1.2 AC
PER MTD 1764 Q_{50}= .4 cfs
PER MTD 1764 Q_{PM} = 0.48 cfs
PROPOSED A=1.2 AC
PROPOSED Q_{CAP} = 3.5 cfs
PROPOSED Q_{PM}=0.30 cfs

EXISTING ΣA = 17.5 AC
EXISTING ΣQ_{50} = 39.9 cfs (CLEAR)
EXISTING DPV= 0 CY
PROPOSED ΣA= 19.8 AC
PROPOSED ΣQ_{CAP} = 50.3 cfs
Q_{DESIGN}= 59.5 cfs
(PER APPROVED DCR FOR VTTM 53295)
MTD 1764 Q_{50} = 50.0 cfs

EXISTING CATCH BASIN
PER MTD 1764 A= 1.1 AC
PER MTD 1764 Q_{50}= 4 cfs
PER MTD 1764 Q_{PM} = 0.44 cfs
PROPOSED A=1.2 AC
PROPOSED Q_{CAP} = 3.5 cfs
PROPOSED Q_{PM}=0.30 cfs

ΣA = 985.5 AC
ΣQ_{100} = 1,025.0 cfs

NOTE: NODES 900A & 902A WERE ADDED TO THIS RUN BY USING THE APPROVED AREAS AND FLOWS FROM P.D. 2514-04 & P.D. 2514-10, TRACT 45433. (SEE ATTACHED REFERENCE PLANS)

TR 45433

A = 42.5 AC
Q_{50} = 163.5 cfs
EXISTING SD PER PD 2514-10

A = 249.0 AC
Q_{50} = 863.0 cfs
EXISTING SD PER PD 2514-04

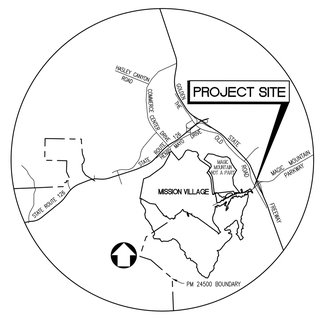
MISSION VILLAGE TR 61105-01

UNNAMED CANYON 1

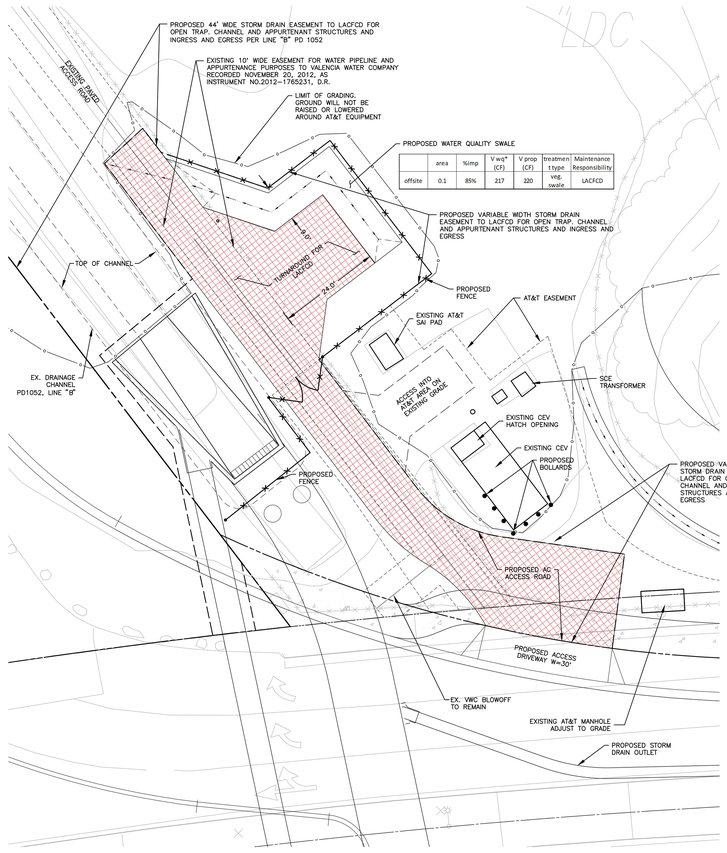
UNNAMED CANYON 2

DEBRIS CONE

DPA - 8
DPA - 5



VICINITY MAP
NOT TO SCALE
THOMAS GUIDE PAGE 4550 B2, B3, C2



	area	%imp	V wq* (CF)	V prop (CF)	treatment type	Maintenance Responsibility
offsite	0.1	85%	217	220	vegetated swale	LACFCD

DETAIL A
AT&T FACILITY AT MAGIC MOUNTAIN PARKWAY
SCALE: 1"=10'

HYDROLOGY STUDY APPROVED
CHECKED BY _____ RCE NO. 76882 DATE 12/26/2017
APPROVED BY _____ DATE 12/26/2017
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

LEGEND:

- PROJECT BOUNDARY
- EXISTING DRAINAGE AREA BOUNDARY
- EXISTING DRAINAGE SUB-AREA BOUNDARY
- FLOW PATH
- SD — PROPOSED STORM DRAIN
- SD — EXISTING STORM DRAIN
- CDFG — CA DEPT. OF FISH AND GAME JURISDICITON
- FP — EXISTING FLOODWAY
- FW — EXISTING FLOODPLAIN
- SEA23 — SEA RIVER CORRIDOR
- FEMA — FEMA ZONE
- TIME OF CONCENTRATION PATH
- 7.6 — 50 YEAR ISOHYET
- DPA - 8 / DPA - 5 — DEBRIS POTENTIAL AREA (DPA)
- 097 / 020 — SOIL CLASSIFICATION BOUNDARY
- SUBAREA NODE
- 201A / 147 AC / Tc=13 — ACREAGE / TIME OF CONCENTRATION
- 800 — WATERSHED OUTLET NODE
- 205A — CONFLUENCE NODE
- PROPOSED AT&T, VWC AND LACFCD ACCESS

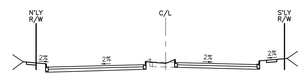
DRAINAGE DESIGN CRITERIA:

1. 50-YR, 24-HR ISOHYETS: 5.9, 6.0, 6.2, 6.4, 6.6
2. SOIL TYPES: 98
3. DESIGN STORMS: 50-YR, 24-HR
4. PERCENT IMPERVIOUS VALUES: UNDEVELOPED – 1%
5. DPA = 8, 35,500 CY PER SQ MI
6. BULK FACTOR = 1.359

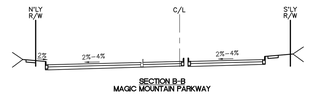
SUMMARY TABLE

Magic Mountain (Divided Street) Proposed condition

Subarea	Node	Soil Type	%Imp	Area (Ac)	ΣAREA (Ac)	50-Yr Isohyet (in)	50-Yr Tc (min)	$Q_{CI}Q_p$ (cfs)	ΣQ_{50} (cfs)	ΣQ_{100} (cfs)	EGDesign (cfs)	Note
801A		98	0.01	32.7	32.7	6.2	11	70.7	70.7	94.0	94.0	
802A		98	0.01	31.5	64.2	6.1	17	54.3	122.8	163.3	163.3	
803B		98	0.01	32.2	32.2	6.0	17	53.3	53.3	70.9	70.9	
804C		98	0.01	4.8	4.8	6.0	12	9.6	9.6	12.8	12.8	
	805BC				37.0				62.1	82.6	82.6	
	806B				37.0				62.1	82.6	82.6	
	807AB				101.2				183.1	243.5	243.5	
	808A				101.2				183.1	243.5	243.5	
900A		98	0.68	249	249	7.2	6	863.0	863.0		863.0	
901A		98	0.01	11.6	260.6	6.4	8	30.3	893.3	41.3	991.6	
902A		98	0.85	42.5	303.1	7.2	5	163.5	880.2		977.0	
903A		98	0.01	16.4	319.5	6.3	12	35.1	915.1	47.7	1006.6	
904A		98	0.01	25.7	345.2	6.2	13	50.9	882.4	69.2	979.5	
905B		98	0.01	23.1	23.1	6.2	10	52.7	52.7			
906B		98	0.01	17.2	40.3	6.2	10	39.3	74.6			
	907AB				385.5				952.5		1025.0	
	908A				385.5				952.5		1025.0	
909A		98	0.01	37.2	422.7	6.2	12	76.8	930.1	104.4	1032.4	
910B		98	0.01	18.6	18.6	6.2	11	40.2	40.2	54.7	54.7	
	911B				18.6				40.2		212.0	future connection from Mission Village (CH171.8cfs)
912B		98	0.79	2.9	21.5	5.9	6		47.5			
	913AB				444.2				950.1		1121.9	
	914A				444.2				961.9	950.1	1046.6 1121.9	
920A		98	0.95	3.4	3.4	6	5	11.0	11.0		49.9	future connection from Entrada (CH38.9cfs)
921B		98	0.01	9.4	9.4	6.1	11	20.3	20.3	27.6	27.6	
923A	923AB				12.8				30.7		51.0	
922A		98	0.7	5.8	18.6	6	6	16.7	46.8		56.2	
924A		98	0.95	1.2	19.8	6	5	3.5	50.3		59.9	per approved DCR for Entrada
930A		98	0.1	1.8	1.8	6	9	4.1	4.1		4.1	
931A		98	0.95	1.2	3	6	6	3.5	7.6		7.6	



SECTION A-A
MAGIC MOUNTAIN PARKWAY



SECTION B-B
MAGIC MOUNTAIN PARKWAY

NORTH

FEET 100' 50' 0 100' 200'
INCHES 1 1/2 0 2

REVISIONS

NO.	DATE

PREPARED BY:
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
30074 Avenue 14th, Suite #203 • Valencia, CA 91355
(661) 799-0310 • FAX (661) 799-0311

OWNER/DEVELOPER:
NEWHALL LAND
25124 SPRINGFIELD CT. #300
SANTA CLARITA, CA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE: BILL SCHMING

MISSION VILLAGE TR. 61105
PROPOSED HYDROLOGY MAP FOR
MAGIC MOUNTAIN DEEDED STREET 542
ROUGH GRADING
LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

PERMIT NO.

SHEET 1
OF 1

12/26/2017
JASON W. HUNSAKER

D-11: PD 1052

N. 4,265,000 | N. 4,266,000 | N. 4,267,000 | N. 4,268,000 | N. 4,269,000

E. 4,106,000 | E. 4,107,000 | E. 4,108,000 | E. 4,109,000

MAGIC MOUNTAIN BOUNDARY

PROP. MINE TRAIN (2)

LINE "A"

LINE "H" (2) SHEET 13

LINE "J" (2) SHEET 14

LINE "L" (4) SHEET 6

LINE "K" (3) SHEET 5

LINE "G" (2) SHEET 13

LINE "E" SHEET 13

LINE "I" (2) SHEET 14

SHEET 4 | SHEET 5 | SHEET 6 | SHEET 7 | SHEET 3

GRADED DRAINAGE CHANNEL PER MAGIC MOUNTAIN GRADING PLAN C-2

DEBRIS BASIN

MAGIC MOUNTAIN PARK

LINE "D" SHEET 13

LINE "C"

SHEET 12 | SHEET 11

CRUSHED ROCK SURFACE PARKING AREA

GRADED DRAINAGE CHANNEL PER MAGIC MOUNTAIN GRADING PLAN C-2

LINE N (5)

LINE M (5)

PAVED PARKING AREA

LINE "B"

LINE "F" SHEET 14

SHEET 9 | SHEET 8 | SHEET 10

GRADED DRAINAGE CHANNEL PER MAGIC MOUNTAIN GRADING PLAN C-3

(FUTURE)

HENRY MAYO DR.

P.D. Nº 1038

P.D. Nº 1038

RIVER

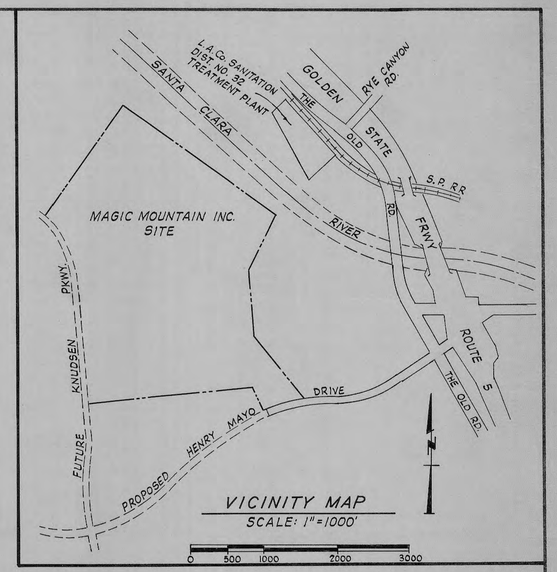
CLARA

SANTA

INDEX MAP

SCALE: 1" = 200'

0 100 200 300 400 600 800



VICINITY MAP

SCALE: 1"=1000'

0 500 1000 2000 3000

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290 . ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

INDEX OF DRAWINGS

SHEET NO.	TITLE
1	VICINITY MAP, INDEX MAP, INDEX OF DRAWINGS.
2	GENERAL NOTES, STANDARD PLANS, HYDRAULIC ELEMENTS.
3	LINE "A STA. 3+45.00 TO STA. 12+00.00 PLAN & PROFILE
4	" STA. 12+00.00 TO STA. 24+00.00 "
5	" STA. 24+00.00 TO STA. 36+00.00 "
6	" STA. 36+00.00 TO STA. 47+23.60 "
7	" STA. 47+23.60 TO STA. 50+00.00 "
8	LINE "B" STA. 2+00.00 TO STA. 11+47.74 "
9	" STA. 11+47.74 TO STA. 23+00.00 "
10	" STA. 23+00.00 TO STA. 32+15.43 "
11	LINE "C" STA. 0+00.00 TO STA. 12+43.96 "
12	" STA. 12+43.96 TO STA. 23+48.00 (1) "
13	LINE "D" STA. 0+00.00 TO STA. 1+61.22 "
	LINE "E" STA. 0+00.00 TO STA 0+45.00 "
14	LINE "F" STA. 0+00.00 TO STA. 2+[illegible].00 (1) "
15	TYPICAL STRUCTURAL SECTIONS AND DETAILS
16	MISCELLANEOUS STRUCTURAL DETAILS

BENCH MARK: L.A.C.R.D. B.M. BL. 1774

Road B.M. tag S. Curb of Traffic Island 15' N. of ℄ S. Roadway Henry Mayo Drive & 70' W. of ℄ Golden State Frwy Bridge B 53-1625 Elev. 1078.072'

Newhall Quad. 1965

Andrew L. Haas R.C.E. Nº 12607

DATE: 8-24-70

P.D. NO. 1052

DATE	REVISION	REVISED BY:	DATE	APPROVED BY:
3-4-77	(3) ADDED LINE "K" ON INDEX MAP REMOVED 91'OF 36" S.D. @ END OF LINE C	Valcon Inc. R.C.E. 13696	3/22/77	H. J. Steinbeck
11-11-76	(2) ADDED LINE "L" ON INDEX MAP	VALCON INC. R.C.E. 13696	11/23/76	Howard C. Blazer
11-1-70	(1) REVISE LOCATION OF LINE "F", STATIONS OF LINE "C" AND "E"	Andrew L. Haas	11/6/70	L. Ignacio
11-12-74	(2) ADDED NINE TRAIN, LINES "G", "H", "I" & "J" ON INDEX MAP	Valcon Inc. RCE13696	11/28/75	Howard C. Blazer
9-23-76	(3) ADDED LINE "K" ON INDEX MAP	Valcon, Inc. R.C.E. 13696	11/8/76	Howard C. Blazer

STORMS & LOWE CONSULTING ENGINEERS

OFFICE OF THE COUNTY ENGINEER DESIGN DIVISION

STORMS & LOWE Consulting Engineers CIVIL ENGINEERS 3329 WEST VERNON AVENUE LOS ANGELES 8, CALIFORNIA PHONE ANDROMEDA 5-6431 LAS VEGAS, NEVADA 384 C. TWAIN 735-1484

R. DUELL & ASSOCIATES PLANNING DESIGN ARCHITECTURE 2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	G.E.R.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

VICINITY MAP, INDEX MAP, INDEX OF DRAWINGS

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

APPROVED BY: Carroll D. Smith DIVISION ENGINEER DATE: 10-7-70

CHECKED BY: L. Ignacio R.C.E. NO 11786 OFFICE OF COUNTY ENGINEER DATE: 10-7-70

SHEET 1 OF 16

HYDRAULIC ELEMENTS

LINE	STATION	TO STATION	* Q 25 (c.f.s.)
"A"	50+00.00	28+12.00	1900
	28+12.00	27+50.00	1946
	27+50.00	16+00.00	2038
	16+00.00	6+30.17	2106
	6+30.17	3+45.00	2233
"B"	32+15.43	22+17.98	1160
	22+17.98 (2)	13+80.00	1540
	13+80.00	4+55.81	1640
	4+55.81	2+00.00	1756
"C"	~~22+57.00~~	~~21+19.00~~	~~21.4~~
	~~21+19.00~~	~~19+40.00~~	~~20.7~~
	19+40.00	16+53.00	67
	16+53.00	15+60.00	89
	15+60.00	11+68.00	103
	11+68.00	0+00.00	131
"D"	1+61.22	0+00.00	155
"E"	0+45.00	0+00.00	6 (4)
"F"	2+67.00 (2)	0+82.00	502
	0+82.00	0+00.00	509
"G"	0+79.00	0+00.00	36 (4)

* Design Flows based on 25 year Storm Frequency.

"H"	0+37.00	0+00.00	7 (4)
"I"	0+38.00	0+00.00	5 (4)
"J"	0+17.00	0+00.00	2.5 (4)

"K"	0+20.00	0+00.00	12.1 (4) (5)
"L"	0+20.00	0+00.00	5.5 (4)
"M"	1+40.00	0+00.00	29.3 (4)
"N"	0+83.00	0+00.00	31.4 (4)

LIST OF STANDARD PLANS

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Bedding Details _____ 2 - D177
Removable Protection Bar _____ 2 - D175
C.B. No. 5 _____ 2 - D164
C.B. No. 5A _____ 2 - D195
M.H. No. 2 _____ 2 - D184
J.S. No. 1 _____ 2 - D189
J.S. No. 2 _____ 2 - D112
T.S. No. 3 _____ 2 - D188
Standard Drop Step _____ 2 - D96
Conc. Rings, Reducer for manhole _____ 2 - D107
Manhole frame and cover _____ 2 - D181
Catch basin reinforcement _____ 2 - D172
Frame & grating for catch basin _____ 2 - D227
J.S. No. 3 _____ 2 D191
R/W Chain link fence & gate details _____ 2 D178
Headwall fence & gate details _____ 2 D-180

LOS ANGELES COUNTY ENGINEER

Pipe bedding for storm drains _____ D-54
Protection barrier No. 4 _____ D-70
Inlet & Outlet protection _____ D-56
Protection barrier No. 1 _____ D-67
Protection barrier No. 2 _____ D-68

LOS ANGELES COUNTY ROAD DEPT.

Driveway details _____ 36-01

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290 . ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

GENERAL NOTES

1. Elevations are in feet above U.S.G.S. mean sea level datum of 1929.
2. All work shall be done in accordance with "Standard Specifications for Public Works Construction", 1970 edition, and shall be prosecuted only in the presence of the County Engineer.
3. Approval of this plan by the County of Los Angeles does not constitute a representation as to the accuracy of the location, or existence or nonexistence of any underground utility, pipe or structure within the limits of this project.
4. All reinforced concrete pipe shall be bedded in accordance with Case Ad bedding per D-54, unless otherwise specified.
5. All manhole covers not in street paving shall be provided with Allen socket set screw locking devices. The Contractor shall drill and tap two holes to a depth of 1 inch at 90 degrees to pick hole and install 3/4 inch by 3/4 Allen socket set screws.
6. All pipe shall be placed in a trench in natural ground and/or compacted fill. The ground level before the trenching shall be at least 3 feet above top of pipe elevation, or at finish surface elevation, whichever is less. All backfill in easements shall be compacted to the density required by the grading plan.
7. A soils engineer shall certify that all fills and backfills over underground storm drains have been compacted or consolidated to a 90% density. This certification shall be submitted to the County Engineer prior to acceptance of the work by the County
8. The contractor's attention is directed to Section 7-10.4.1 of the Standard Specifications for Public Works Construction in regard to safety orders. The contractor shall conform to the "Minimum Public Safety Requirements" as shown on Los Angeles County Engineer Standard S-2.
9. The contractor shall notify the Construction Division by telephone, 629-4747, extension 81551, at least 24 hours before starting any work under this contract.
10. This storm drain will not be accepted for maintenance until the system is cleaned to the satisfaction of the County Engineer.
11. (△) The channel lining shall be concrete or gunite or "shotcrete". If shotcrete is used the following shall apply: (a) The nozzle pressure shall be 80 p.s.i minimum, (b) The minimum 28 day compression strength shall be 3500 p.s.i., (c) The min. thickness shall be 5 inches, (d) Coarse aggregate shall not exceed 28% of the mix and, if used shall be No. 4 crushed aggregate, (e) The finished surface for "shotcrete" shall have the same "n" factor (roughness) as broom finish gunite.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS

The existence and location of any underground utility pipes or structures shown on these plans are obtained by a search of the available records. To the best of our knowledge there are no existing utilities except as shown on this map.
The contractor is required to take due precautionary measures to protect the utility lines shown and any other lines not of record or not shown on this drawing.

Andrew L. Strauss — Registered Civil Engineer No. 12607

August 24, 1970 — Date

CONCRETE & REINFORCEMENT NOTES

1. All concrete shall be Portland cement concrete with an ultimate 28 day compressive strength of 3000 p.s.i.
2. Finish all exposed edges with 3/4" chamfers.
3. Dimensions are from face of concrete to center of reinforcing bars unless otherwise specified.
4. All steel shown adjacent to a face of concrete shall be placed 2-1/2 inches from the concrete face unless otherwise shown.
5. Longitudinal steel shall be continuous and extend through all construction joints except transverse joints in open channels and around all corners unless otherwise shown.
6. All steel that is to be continuous shall have a minimum lap at splices of 30 bar diameters, or 18" whichever is greater.
7. At the beginning and end of all pours a layer of reinforcement shall be placed within 3 inches of the transverse construction joints.
8. Transverse reinforcement and transverse joints shall be placed at right angles (or radial) to conduit center line unless otherwise shown.
9. Unless otherwise shown, concrete dimensions shall be measured vertically or horizontally and parallel or at right angles (or radial) to the center line of construction.
10. Unless otherwise shown, transverse joint keyways in both slabs and walls shall be placed at the end of each pour but the spacing thereof shall not exceed 50 feet nor be less than 10 feet.
11. Transverse construction joints shall not be placed within 30 inches of manhole or junction structure openings.
12. All pipe shall be embedded a minimum of 5 inches into headwalls or other structures, unless specified otherwise.
13. All construction joints in the footing of slabs and walls shall be in the same plane. No staggering of joints will be permitted.
14. No concrete shall be placed until forms and reinforcing steel have been placed, inspected and approved.
15. Reinforcement shall be deformed bars, per A.S.T.M. A-615 Grade 60, and A.S.T.M. A-305-50T.
16. All bar bends and hooks shall conform to the American Concrete Institute "Manual of Standard Practice".

RIP-RAP NOTES

1. Rock for grouted rip-rap shall conform to State of California Division of Highways Standard Specifications as last revised for Grouted Rock Slope Protection. Rock shall be 1/2 ton class and shall be placed in accordance with Method B Placement. The largest dimension shall not exceed 3 times the smallest dimension.
2. There shall be a grout bed of at least 2 inches beneath the first layer of rock. All the voids between the rocks shall be filled with grout. Maximum spacing between rocks shall be 2 inches.
3. Surface rocks shall project 1/3 to 1/4 their diameter above the grout surface.

P.D. NO. 1052

Andrew L. Strauss R.C.E. Nº 12607
DATE: 8-24-70

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE — COUNTY ENGINEER

DESIGN DIVISION

APPROVED BY: _____ DIVISION ENGINEER DATE: _____

CHECKED BY: A. Symes R.C.E. NO. 11786 OFFICE OF COUNTY ENGINEER DATE: 10-7-70

DATE	REVISION	REVISED BY:	DATE	APPROVED BY:
3-4-77	(6) ADDED Qes FOR LINE 'M' & 'N'	Volcon Inc RCE 13696	3/22/77	H. J. Steinbeck
11-11-76	(5) ADDED Qes FOR LINE 'L' & REVISED Qes FOR LINE 'K'	Volcon Inc RCE 13696	11/23/76	Edward C. Harris

STORMS & LOWE CONSULTING ENGINEERS

DATE	REVISION	REVISED BY:	DATE	APPROVED BY:
11-2-70	(2) REVISE STATIONS OF HYDRAULIC ELEMENTS TO CONFORM TO REALIGNMENTS	Andrew L. Strauss R.C.E. 12607	11/6/70	A. Symes
11-12-74	(3) REVISED Qes IN LINE 'E' AND ADDED LINE 'G', 'H', 'I' & 'J'	Volcon Inc RCE 13696	11/08/75	Edward C. Harris
9-23-76	(4) ADDED Qes FOR LINE K	Volcon, Inc R.C.E. 13696	10/1/76	Edward C. Harris

OFFICE OF THE COUNTY ENGINEER DESIGN DIVISION

STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 735-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

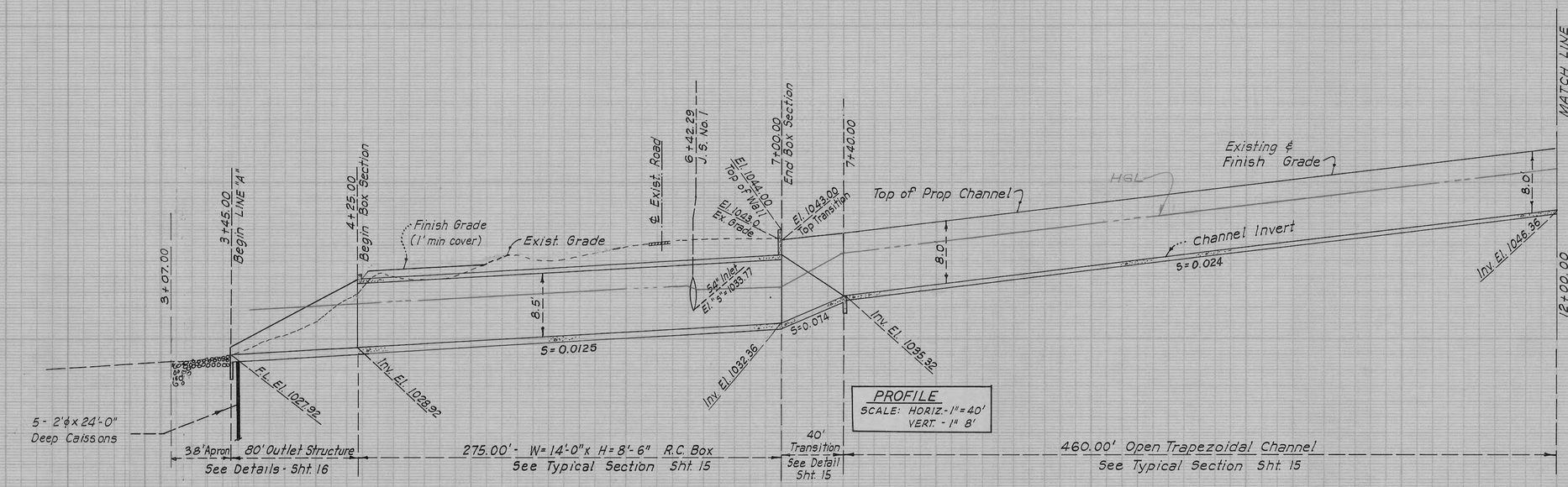
REVISION	DATE:	SCALE:	DRAWN BY:	CHECKED BY:
(△) ADD CONCRETE OR SHOTCRETE ALT. 9-30-70	8-24-70	NONE	G.E.R.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA — CALIFORNIA

GENERAL NOTES, STANDARD PLANS, HYDRAULIC ELEMENTS

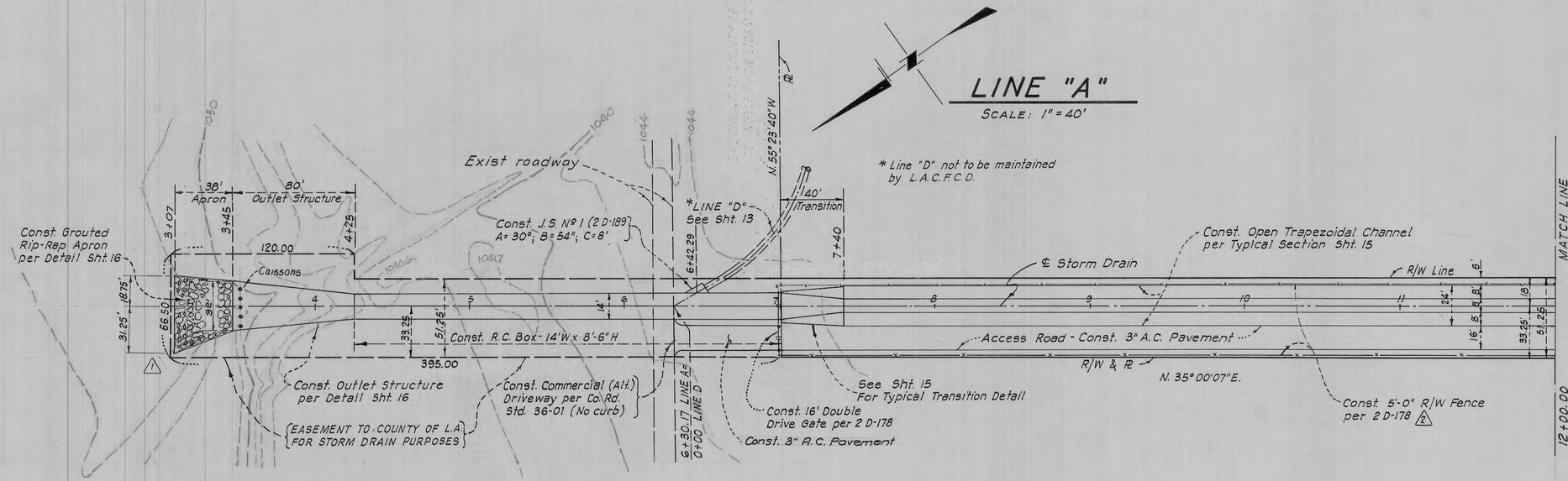
SHEET 2 OF 16

DOUBLE SCALE



PROFILE
SCALE: HORIZ. - 1" = 40'
VERT. - 1" 8'

LINE "A"
SCALE: 1" = 40'



ANTA CLARA RIVER

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

P.D. NO. 1052

Andrew L. Haas R.C.E. Nº 12607
DATE: 8-24-70

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE, COUNTY ENGINEER
DESIGN DIVISION
CHECKED BY: J. Haas R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

STORMS & LOWE
Consulting Engineers
JOB. NO.
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXMINSTER 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 755-4468

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISIONS			
1	REVISE RIP-RAP APRON DIMENSIONS	9-30-70	
2	REVISE FENCE LOCATION ON E-SIDE	9-30-70	

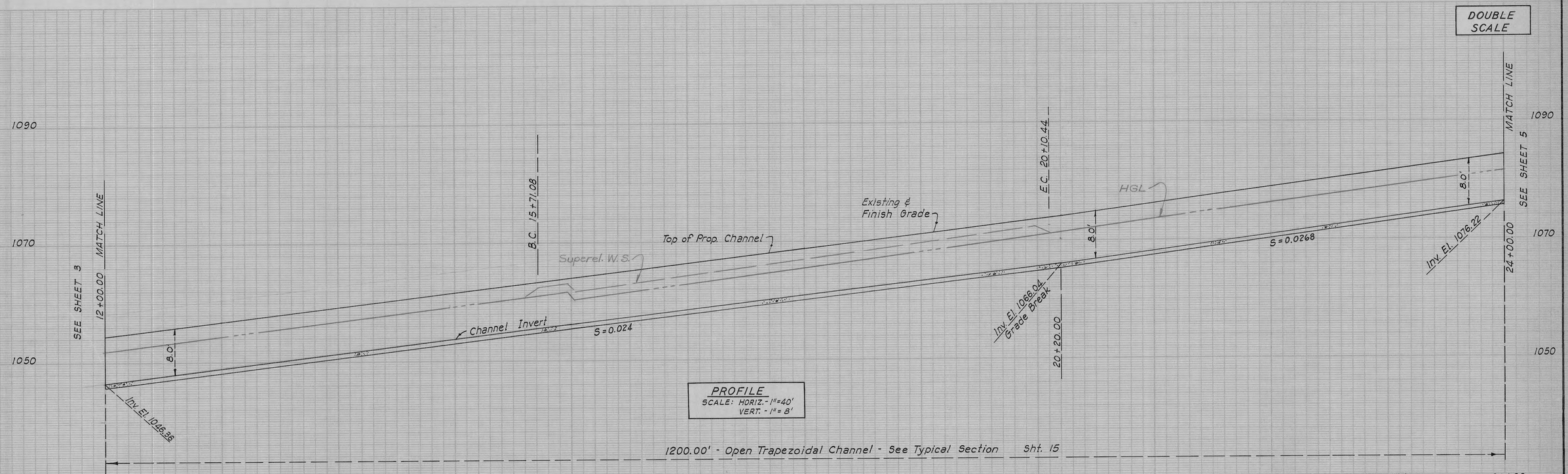
DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	G.E.R.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

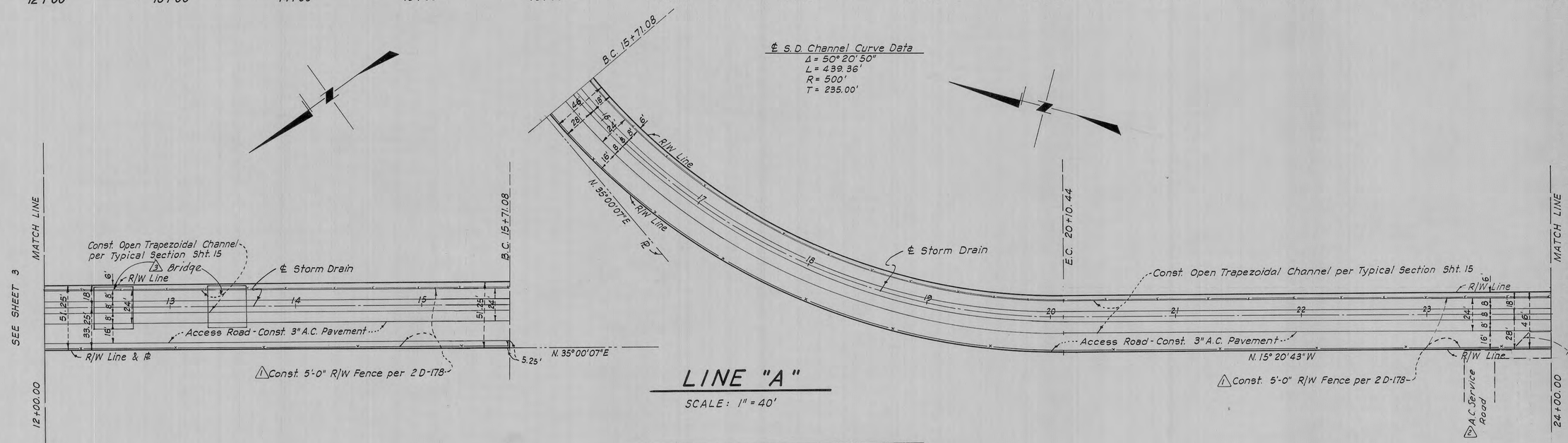
LINE "A"
PLAN AND PROFILE STA. 3+45.00 TO STA. 12+00.00

SHEET 3 OF 16

DOUBLE SCALE



PROFILE
SCALE: HORIZ. - 1"=40'
VERT. - 1"= 8'



LINE "A"
SCALE: 1" = 40'

No.	REVISION	REVISED BY	APPROVED BY	DATE
2	ADDED A.C.	Valcon, Inc. RCE 13636	Howard C. Gray	1/28/75
3	ADDED BRIDGES	Valcon, Inc. RCE 13636		

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Andrew L. Storms R.C.E. N° 12607
DATE: 8-24-70

STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE: AXminster 5-6431
LAS VEGAS, NEVADA
922 E. TWAIN 735-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION: ⚠1 REVISE FENCE LOCATION ON EAST SIDE 9-30-70

DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	G.E.R.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA
LINE "A"
PLAN AND PROFILE STA.12+00.00 TO STA.24+00.00

P.D. NO. 1052

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER
DESIGN DIVISION
CHECKED BY: A. Gomez R.C.E. NO 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

SHEET 4 OF 16

P-6-133

DOUBLE SCALE

1110 / 1090 / 1070

J.S.-Type "A"

MATCH LINE

SEE SHEET 4

B.C. 25+26.63

E.C. 28+04.71 LINE "E"

28+12.21 J.S.-Type "A"

28+64.88 J.S.-Type "A"

Superel. W.S.

Top of Prop. Channel

Existing & Finish Grade

HGL

B.C. 33+20.60

34+80.00 J.S.-Type "A"

E.C. 35+22.89

Superel. W.S.

12" Inlet El. S=1109.50

8.0'

36+00.00

Inv. El. 1108.38

SEE SHEET 6

MATCH LINE

18" Inlet El. S=1077.22

8.0

27" Inlet El. S=1090.76

30" Inlet El. S=1089.56

Channel Invert

S=0.0268

Inv. El. 1076.22

24+00.00

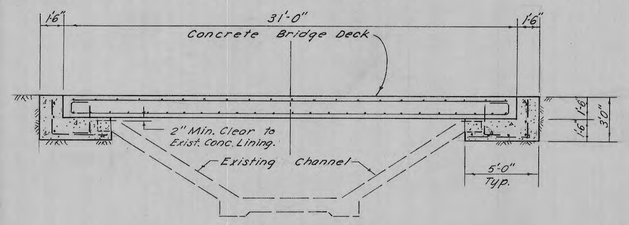
NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

PROFILE

SCALE: HORIZ. - 1"=40'
VERT. - 1"= 8'

1200.00' - Open Trapezoidal Channel - See Typical Section Sht. 15

24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00



BRIDGE SECTION

For Information Only.
Bridge to be Constructed per Bridge Plans.
Not to be Maintained by L.A.C.F.C.D.

LINE "A"

SCALE: 1" = 40'

28+04.71 = 0+00 LINE "E"

Const. J.S.-Type "A" A=45°, See Detail Sht. 16

℄ Storm Drain

LINE "E" See Sht. 13

Line "G" See Sht. 13 (2)

Const. Open Trapezoidal Channel per Typical Section Sht. 15

Const. 16' Double Drive Gate Per 2D-178

B.C. 33+46.25

℄ S.D. Channel Curve Data
Δ = 23°10'49"
L = 202.29'
R = 500'
T = 102.55'

Const. J.S.-Type "A" A=45° See Detail Sht. 16

Access Road (2)

Const. 3" Pvmt

Extension by others to Lake Drain

Const. 12'-12" R.C.P. stub Connection to Lake Drain by others (2)

R.W. Line (2)

35+22.89 E.C.

34+80.00

36+00.00

SEE SHEET 6

MATCH LINE

Const. 5'0" Fence (2) Per 2D-178

Utility Lines

R/W Line

Bridge (2)

Const. 5'0" Fence Per 2D-178 (2)

Const. 16' Double Drive Gate Per 2D-178 (2)

Access Road - Const. 3" A.C. Pavement

N. 16°31'11"E.

Const. 5'-0" R/W Fence per 2D-178 (1)

Const. 16' Double Drive Gate Per 2D-178 (2)

Const. J.S. Type "A" Δ=45° See Detail Sht. 16 (2)

28+04.71 E.C.

28+12.21

28+60.00 = 0+100 Line "G"

28+64.88

Const. 5' Fence Per 2D-178

Bridge (2)

Railroad Tracks

N. 6°39'38" W.

Relocated 5' High Fencing

R/W Line (2)

℄ S.D. Channel Curve Data
Δ = 31°51'54"
L = 278.08'
R = 500'
T = 142.74'

24+00

SEE SHEET 4

MATCH LINE

R/W Line

N. 15°20'43" W.

24+65.00

B.C. 25+26.63

25+78.50

Prop. Retaining Wall (2)
Line "H" See Sht. 13 (2)
Const. 18" R.C.P. - Not to be Maintained by the Los Angeles County Flood Control District

Const. J.S. Type "A" Δ=45° (2)

R/W Line & R.

Relocated fence

Utility Lines

16'

1' Min.

(Const. 3" A.C. Pvmt between (3)

12"

1/4" Per Ft.

2"x4" Redwood Header

24'

8' 8' 8'

Relocated Fence

R/W Line

6'

Remove Exist. 3" A.C. Pvmt. between Approx. Sta. 33+73 And 48+67 (2)

For Channel Construction Data See Typical Trapezoidal Channel Section on Sheet No. 15

Exist. 3" A.C. Pvmt.

(2) TYPICAL CHANNEL SECTION AND ROADWAY REVISED BETWEEN APPROX STA. 33+46 AND STA. 49+11.

No.	REVISION	REVISED BY	APPROVED BY	DATE
(2)	Added R.R. Tracks, Bridge, Gates, Retaining Wall, Lines "G" & "H", Utility Lines Relocated Access Rd, R/W Lines, Fences, and Bridge Section Over Channel	Vahan Tro R.C.E. 13696	Howard C. Hays	10/6/70

Andrew L. Shaw R.C.E. N° 12607
DATE: 8-24-70

P.D. NO. 1052

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE — COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: [signature] R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

STORMS & LOWE
Consulting Engineers
JOB. NO.
2622 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 758-4486

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION: (1) REVISE FENCE LOCATION ON R. SIDE 9-30-70

DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	G.E.R.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA — CALIFORNIA

LINE "A"
PLAN AND PROFILE — STA. 24+00.00 TO STA. 36+00.00

SHEET 5 OF 16

DOUBLE SCALE

1150 / 1130 / 1110

SEE SHEET 5

MATCH LINE

36+00.00

8.0'

Inv. El. 1108.38

37+06 J.S. TYPE "A"

B.C. 40+22.89

Superel. W.S.

41+35 J.S. Type "A" (3)

E.C. 42+23.60

Top of Prop. Channel

Channel Invert S = 0.0268

Existing & Finish Grade

HGL

44+00.00 J.S. Type "A"

12" Inlet Elev. = 1130.82 (2)

46+05.00 J.S. Type "A"

(4) 12" Inlet Elev. = 1136.31

8.0'

B.C. 47+23.60

Inv. El. 1138.49

SEE SHEET 7

MATCH LINE

18" INLET 1117.00 INV. EL. (2)

12" ACP PER GRADING PLAN

EXIST'G CHANNEL INV. 1117.60 E. (1116.68)

N.T.S.

(4) LINE "L" ***

16" Inlet 1124.00 Inv. Elev. (3)

PROFILE
SCALE: HORIZ. - 1" = 40'
VERT. - 1" = 8'

18" A.C.P. Per Grading Plan

Exist. Channel

1130 / 1125 / 1120

1124.00 Inv. (1122.22) F.L.

Line K *** (3)

1123.60' - Open Trapezoidal Channel - See Typical Section Sht. 15

36+00 37+00 38+00 39+00 40+00 41+00 42+00 43+00 44+00 45+00 46+00 47+00 48+00

LINE "A"

SCALE: 1" = 40'

℄ S.D. Channel Curve Data
Δ = 28°00'00"
L = 200.71'
R = 500'
T = 101.73'

42+23.60 E.C.

B.C. 40+22.89

LINE "K" (3) 18" A.C.P.

(3) Const. J.S. Type "A" Modified For A.C.P. Δ = 45° See Detail Sht. No. 16

*** LINE "L" (4) 12" ACP

(4) Const. J.S. Type "A" Modified For A.C.P. Δ = 45° See DETAIL ON SHEET 16

37+06 Line A 4+48 Line L

℄ Storm Drain

(2) R/W Line

Access Road - Const 3" A.C. Pavement (2)

(2) Prop. 36" Train

N. 6° 39' 38" W.

N. 29° 39' 38" W.

Relocated R/W Fencing

44+23.00

(Const. J.S. Type "A" Δ = 45° See Detail Sht. 16 (2))

Const. Open Trapezoidal Channel per Typical Section Sht. 15

Access Road - Const. 3" A.C. Pavement

* Line "I" (2) 12" R.C.P. See Sht. 14

R/W Line (2)

Line "J" * 12" R.C.P. see Sht. 14 (2)

0+00 Line "I" = 43+95.00 Line A

0+00 Line "J" = 46+00 Line A

44+00.00

46+05.00

(1) Const. 5'-0" R/W Fence per 2-D-178

MATCH LINE

SEE SHEET 7

B.C. 47+28.60

R/W Line (2)

* Lines "I" and "J" NOT TO BE MAINTAINED BY LOS ANGELES COUNTY FLOOD CONTROL DISTRICT. (2)

** LINE "K" NOT TO BE MAINTAINED BY LOS ANGELES COUNTY FLOOD CONTROL DISTRICT. (3)

*** LINE "L" NOT TO BE MAINTAINED BY LOS ANGELES COUNTY FLOOD CONTROL DISTRICT. (4)

No.	REVISION	REVISED BY	APPROVED BY	DATE
(2)	Added Train, Lines "I" & "J" Maint. Note. Relocated Access Rd., R/W Lines & Fences	Valcon Inc. [illegible] R.C.E. 13696	Edward C. Hays	1/28/75
(3)	Added Line "K", Maint. Note & Profile for Line "K"	Valcon Inc. [illegible] R.C.E. 13696	Edward C. Hays	10/8/74
(4)	ADDED LINE "L", MAINT. NOTE & PROFILE FOR LINE "L"	[illegible] R.C.E. 13696	Edward C. Hays	11/19/74

Andrew L. Graves R.C.E. No 12607
DATE: 8-24-70

P.D. NO. 1052

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE — COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: [illegible] R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

STORMS & LOWE
Consulting Engineers
JOB NO.
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 735-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	G.E.R.	J.N.O.

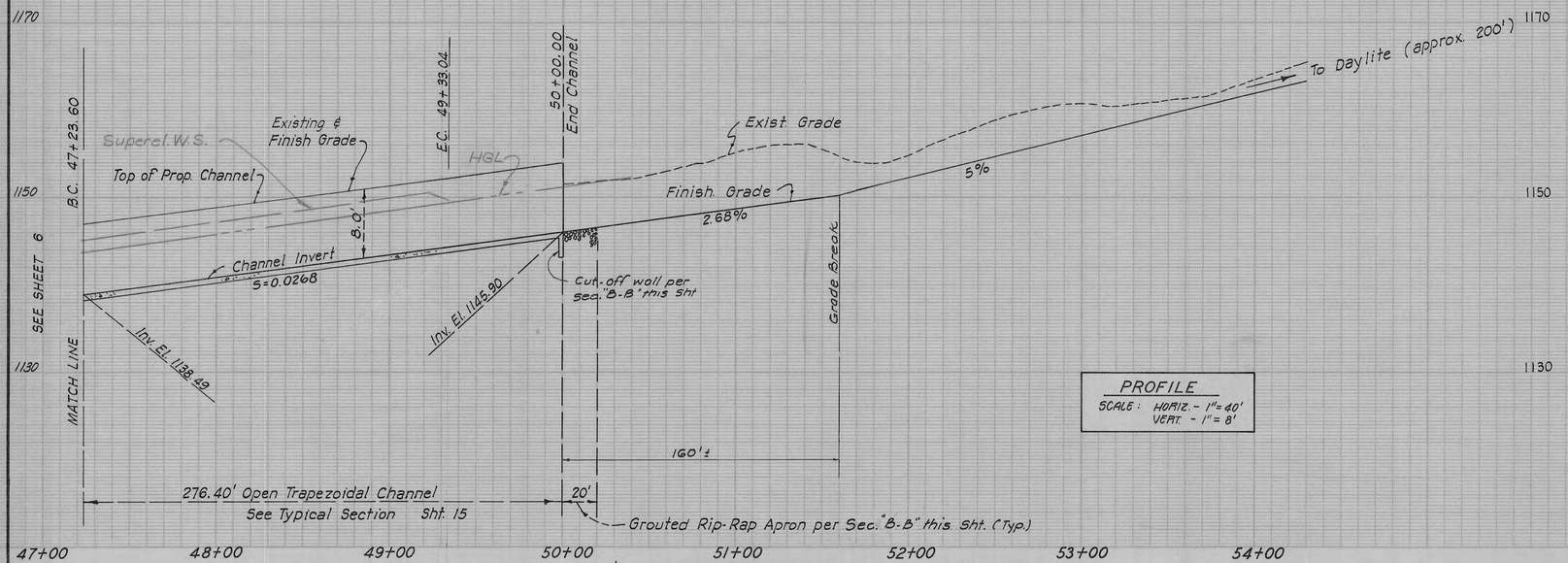
(1) REVISE FENCE LOCATION ON E. SIDE 9-30-70

MAGIC MOUNTAIN STORM DRAIN
VALENCIA — CALIFORNIA

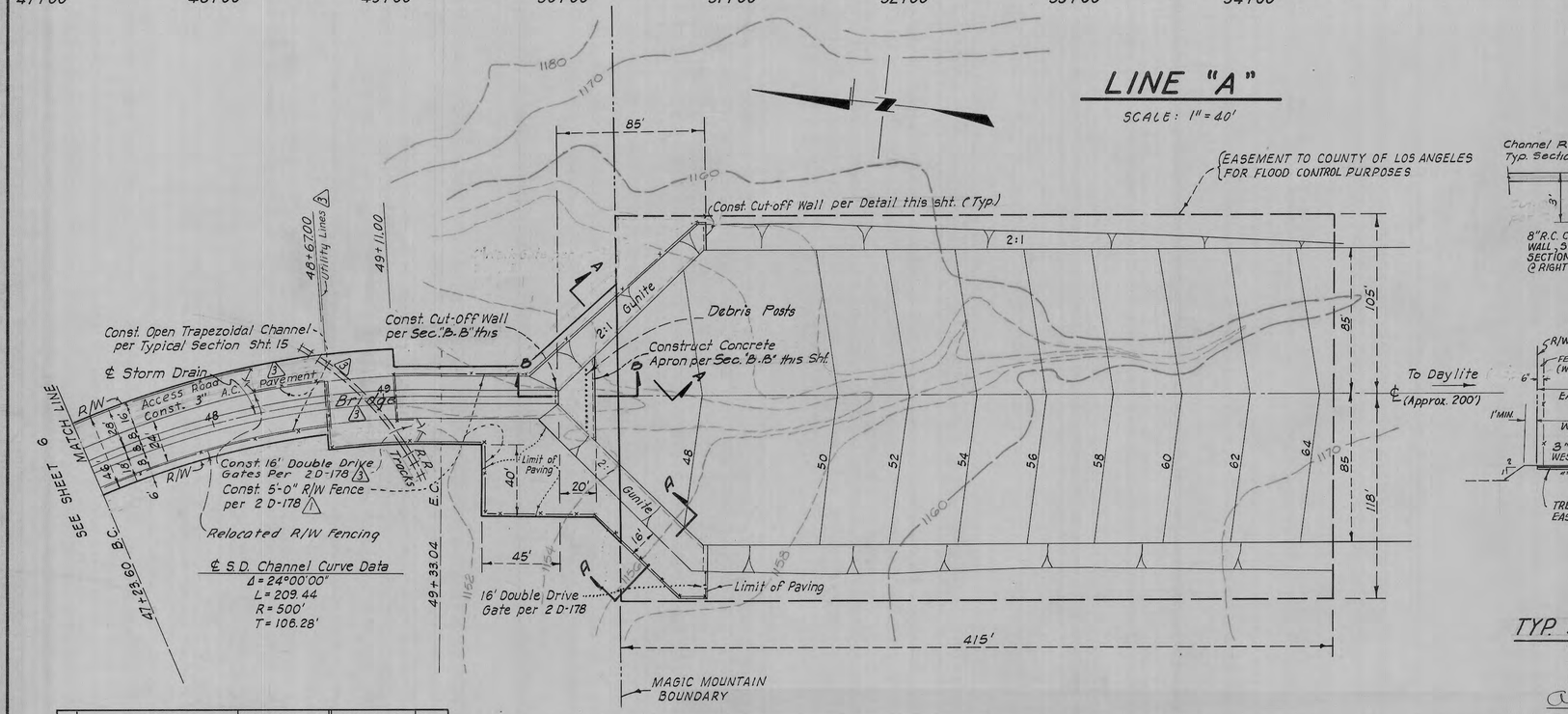
LINE "A"
PLAN AND PROFILE — STA. 36+00.00 TO STA. 47+23.60

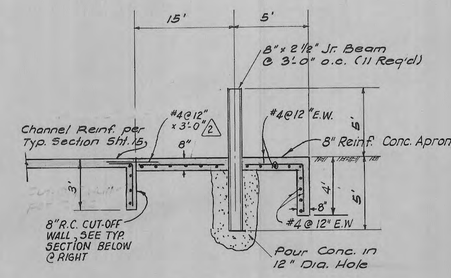
SHEET 6 OF 16

DOUBLE SCALE

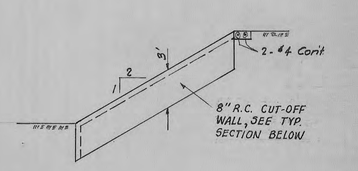


PROFILE
SCALE: HORIZ. - 1"= 40'
VERT. - 1"= 8'

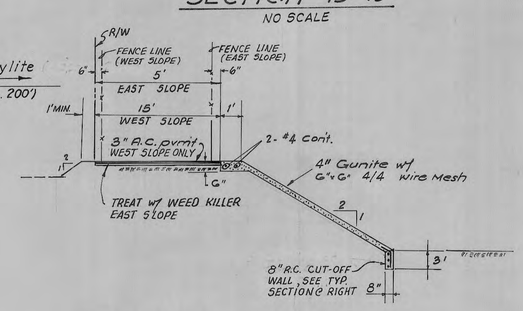




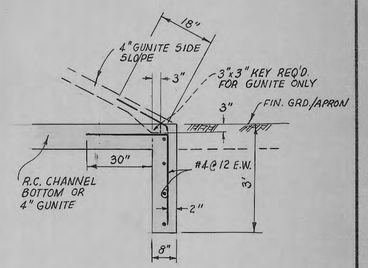
SECTION "B-B"
NO SCALE



CUT-OFF WALL DETAIL
NO SCALE



TYP. SECTION "A-A"
NO SCALE



TYPICAL SECTION
(CUT-OFF WALL)
NO SCALE

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P.D. NO. 1052

No.	REVISION	REVISED BY	APPROVED BY	DATE
3	Added Train, Bridge, Gates, Utility Lines. Relocated Access Rd., R/W Lines, Fence	Valerian Tye, RCE 13696	Howard C. Hays	1/24/75

STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 735-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:			
1	AS WISE FENCE LOCATION ON E. SIDE	9-30-70	
2	ADDED STRUCTURAL DETAIL-N/A	9-30-70	
DATE: 8-24-70	SCALE: AS SHOWN	DRAWN BY: B.C. & G.E.R.	CHECKED BY: J.N.O.

Andrew L. Haas R.C.E. Nº 12607
DATE: 8-24-70

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

LINE "A"
PLAN AND PROFILE STA. 47+23.60 TO STA. 50+00.00

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: J. Spencer R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

SHEET 7 OF 16

P-5-133

DOUBLE SCALE

1090
1070
1050

3+50
4+00
4+30
2+00
2+20
2+45
1+20

El. 1075.00 Top wall
El. 1074.0 ± Ex. Grd.
Ex. Grd.
El. 1074.00 Top Transition
4+74.86 J.& T. I7½" "B"
B.C. 5+21.10
E.C. 6+38.77
Top of Prop Channel
Superel. W.S.
Existing & Finish Grade
HGL
7.0'
Channel Invert
S = 0.032
Inv. El. 1086.00
1147.14
MATCH LINE
SEE SHEET 9

48" Inlet
El. "S" = 1066.46
S = 0.065
S = 0.040
Inv. El. 1063.99
Inv. El. 1060.92±
Inv. El. 1062.04
Inv. El. 1060.02
Inv. El. 1057.1±
4+13 10" C.I.P. Sewer
3+53 18" C.I.P. Sewer
Protect exist sewer per L.A.Co.F.C.D. 2-D 251, case II

20' Outlet Structure
80' Apron
See Details Sht. 16
Begin Line "B"
S = 0.210
Inv. El. 1084.28
Inv. El. 1084.82
Exist. Ground
S = 0.0125
5-2'ϕ x 24' Deep Caissons
W = 12'-0" x D = 8'-0" R.C. Box per typical Section Sht. 15
30'
Transition - See Detail Sht. 15
1147.74' Open Trapezoidal Channel See Typical Section Sht. 15

PROFILE
SCALE: HORIZ. 1"=40'
VERT 1"=8'

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00

LINE "B"

SCALE: 1" = 40'

℄ S.D. Channel Curve Data
Δ = 6°44'31"
L = 117.67'
R = 1000'
T = 58.90'

20' Outlet Structure
80' Apron
Const. 180'-12'W x 8'D R.C. Box
30' Transition
1040
1070
1+20
2+00
2+20
EASEMENT TO COUNTY OF LOS ANGELES FOR STORM DRAIN PURPOSES
282'
Caissons
2:1
Const. 3" A.C. PAVEMENT
Const. 16' Double Drive Gate per 2 D-178 See Sht. 15 for Typical Transition
4+00.00
4+30.00
4+74.86
5+21.10 B.C.
6+38.77 E.C.
R/W ℄ ℘
℄ Storm Drain
1½:1
Const. Open Trapezoidal Channel per Typical Section Sht. 15
R/W Line
Access Road - Const. 3" A.C. Pavement
60'
45'
15'
89'
30'
42'
Const. Outlet Structure and Grouted Rip-Rap Apron per details Sht. 16 ⚠1
Const. Commercial (AH) Dwy. per Co. Rd. Std. 3C-01 (No Curb)
S. 27°54'41"W.
4+55.81 LINE "B" = 0+00 LINE "C"
LINE "C"* See Sht. 11
Const. J.S. - Type "B" A = 30° See Detail Sht. 16
Const. 5'-0" R/W Fence per 2 D-178 ⚠2
S 21°10'10"W
MAGIC MOUNTAIN BOUNDARY
11+47.74 B.C.
MATCH LINE
SEE SHEET 9

* LINE "C" not to be maintained by L.A.C.F.C.D.

P.D. NO. 1052

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

Andrew S. Haar R.C.E. Nº 12607
DATE: 8-24-70

STORMS & LOWE Consulting Engineers
JOB NO.
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 733-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:				
⚠1 REVISE OUTLET APRON DIMENSIONS	9-30-70			
⚠2 REVISE FENCE LOCATION PER N.R.D.R.	9-30-70			
DATE:	SCALE:	DRAWN BY:	CHECKED BY:	
8-24-70	AS SHOWN	R.G.-G.E.R.	J.N.O.	

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

LINE "B"
PLAN AND PROFILE STA. 2+00.00 TO STA. 11+47.74

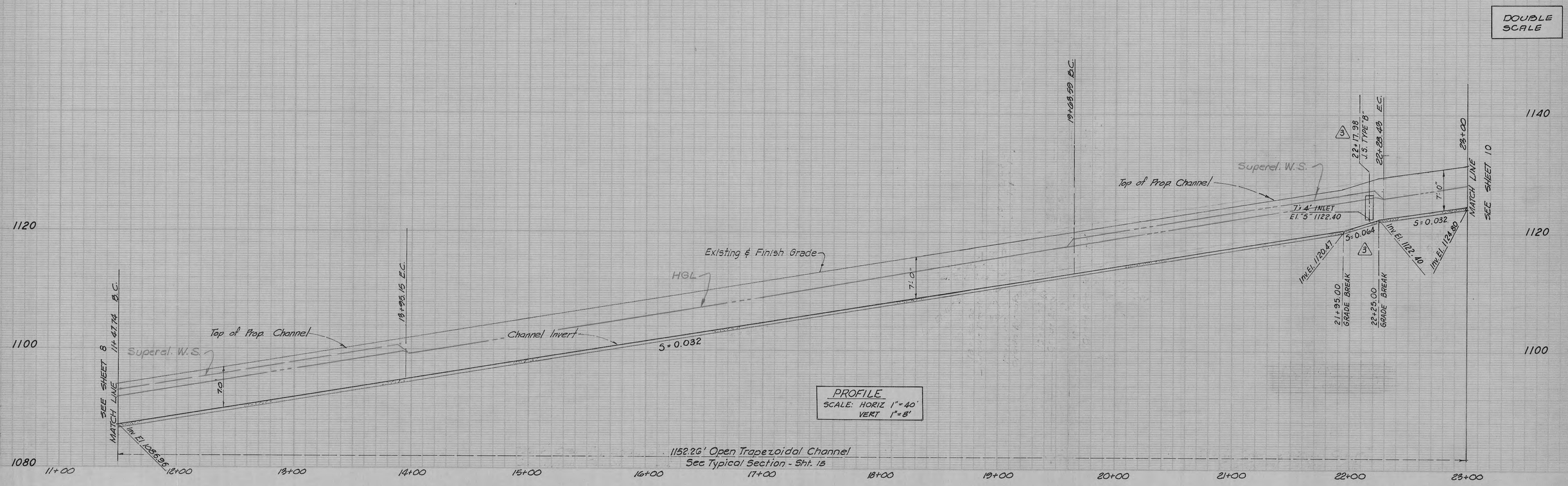
COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: A. Gauch R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

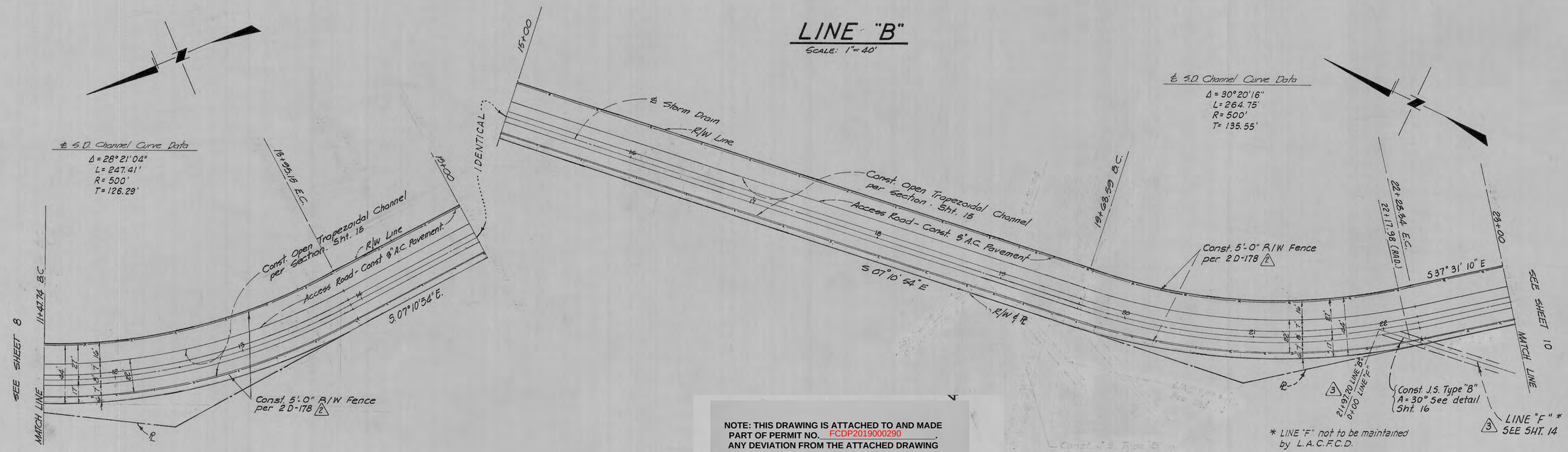
SHEET 8 OF 16

DOUBLE SCALE



PROFILE
SCALE: HORIZ 1"=40'
VERT 1"=8'

LINE "B"
SCALE: 1"=40'



* LINE "F" not to be maintained by L.A.C.F.C.D.

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

P.D. NO. 1052

Andrew L. Jones R.C.E. N° 12607
DATE: 8-24-70

STORMS & LOWE CONSULTING ENGINEERS			OFFICE OF THE COUNTY ENGINEER DESIGN DIVISION	
DATE	REVISION	REVISED BY:	DATE	APPROVED BY:
11-2-70	3 REVISE LOCATION OF GRADE BRK AND JUNCTIONS WITH LINE "F"	Andrew L. Jones RCE 12607	11/6/70	A. Jyuchi

STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXMINSTER 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 755-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:			
1 REVISE LOCATION OF LINE "F" AND J.S. TYPE "B"	9-30-70		
2 REVISE LOCATION OF FENCE ON R. SIDE	9-30-70		
DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	S.W.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

LINE "B"
PLAN AND PROFILE STA. 11+47.74 TO STA. 23+00.00

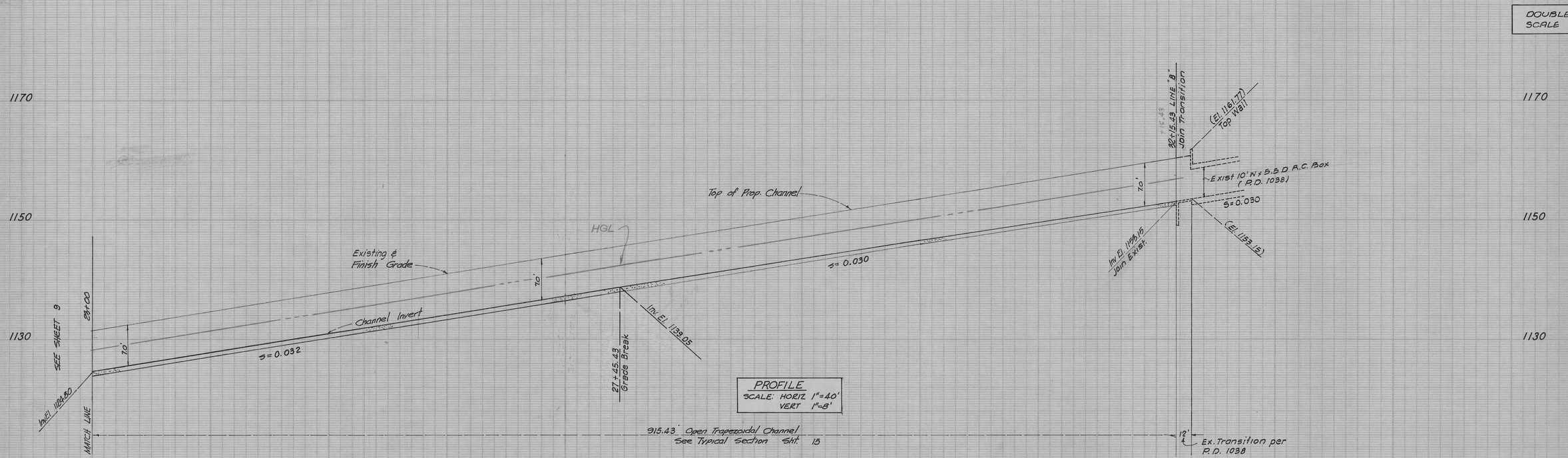
COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: A. Jyuchi R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

SHEET 9 OF 16 (9)
P-5-1133

DOUBLE SCALE

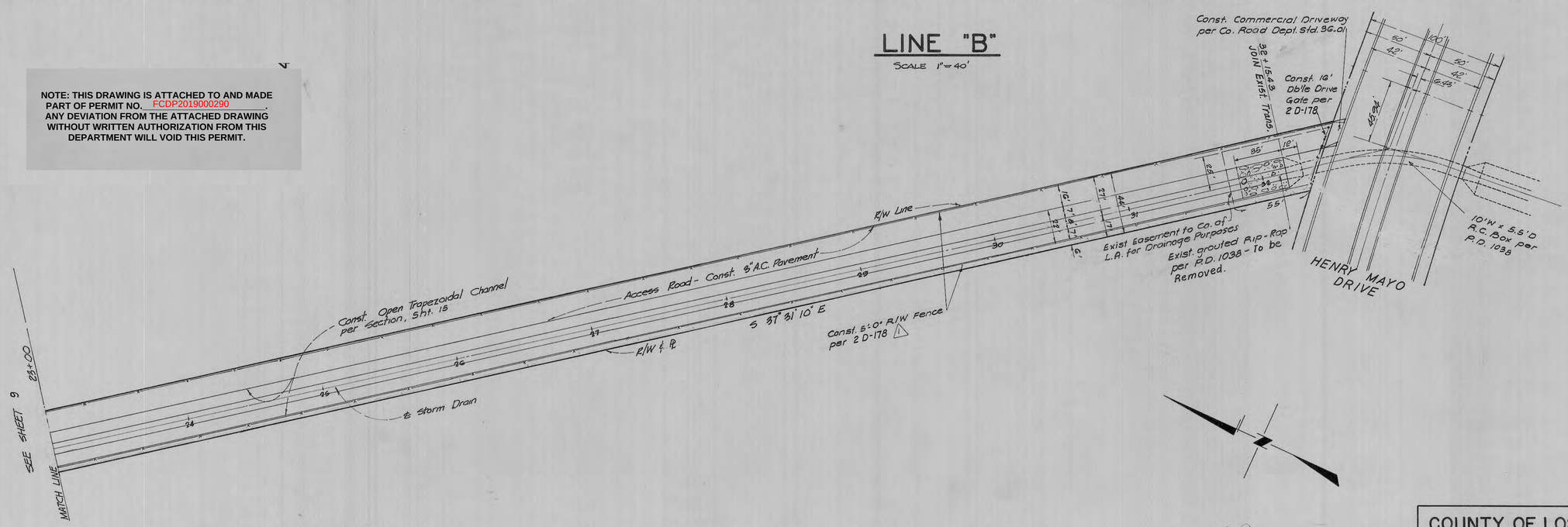


PROFILE

SCALE: HORIZ 1"=40'
VERT 1"=8'

LINE "B"

SCALE 1"=40'



NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

Andrew R. Thomas R.C.E. Nº 12607
DATE: 8-24-70

P.D. NO. 1052

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: A. Lynch R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

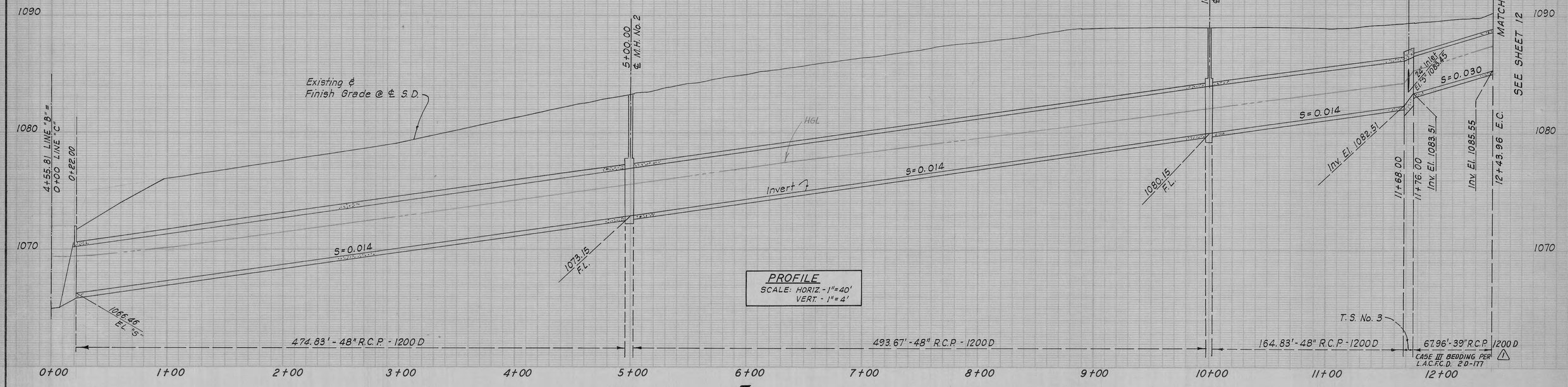
STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 735-4466

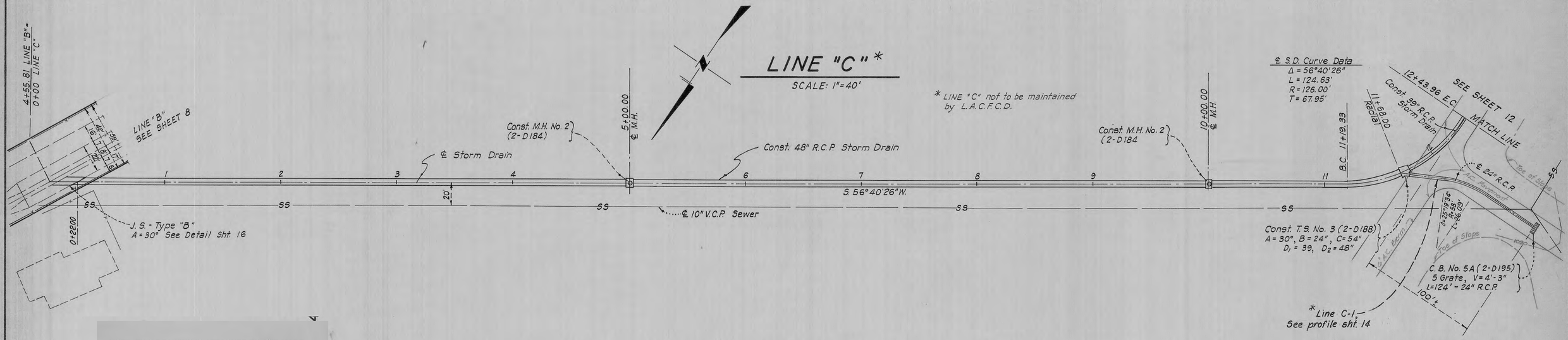
R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:			
⚠ Bring Location of Fence on N. Side 9-30-70			
DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	B.C. & R.G	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

LINE "B"
PLAN AND PROFILE STA. 23+00.00 TO STA. 32+15.43





LINE "C" *

SCALE: 1"=40'

* LINE "C" not to be maintained by L.A.C.F.C.D.

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

P.D. NO. 1052

Andrew C. Graw R.C.E. No 12607
DATE: 8-24-70

STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 735-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:	DATE:	SCALE:	DRAWN BY:	CHECKED BY:
⚠ REVISE BEDDING AND D-LOAD 9-30-70	8-24-70	AS SHOWN	G.E.R.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

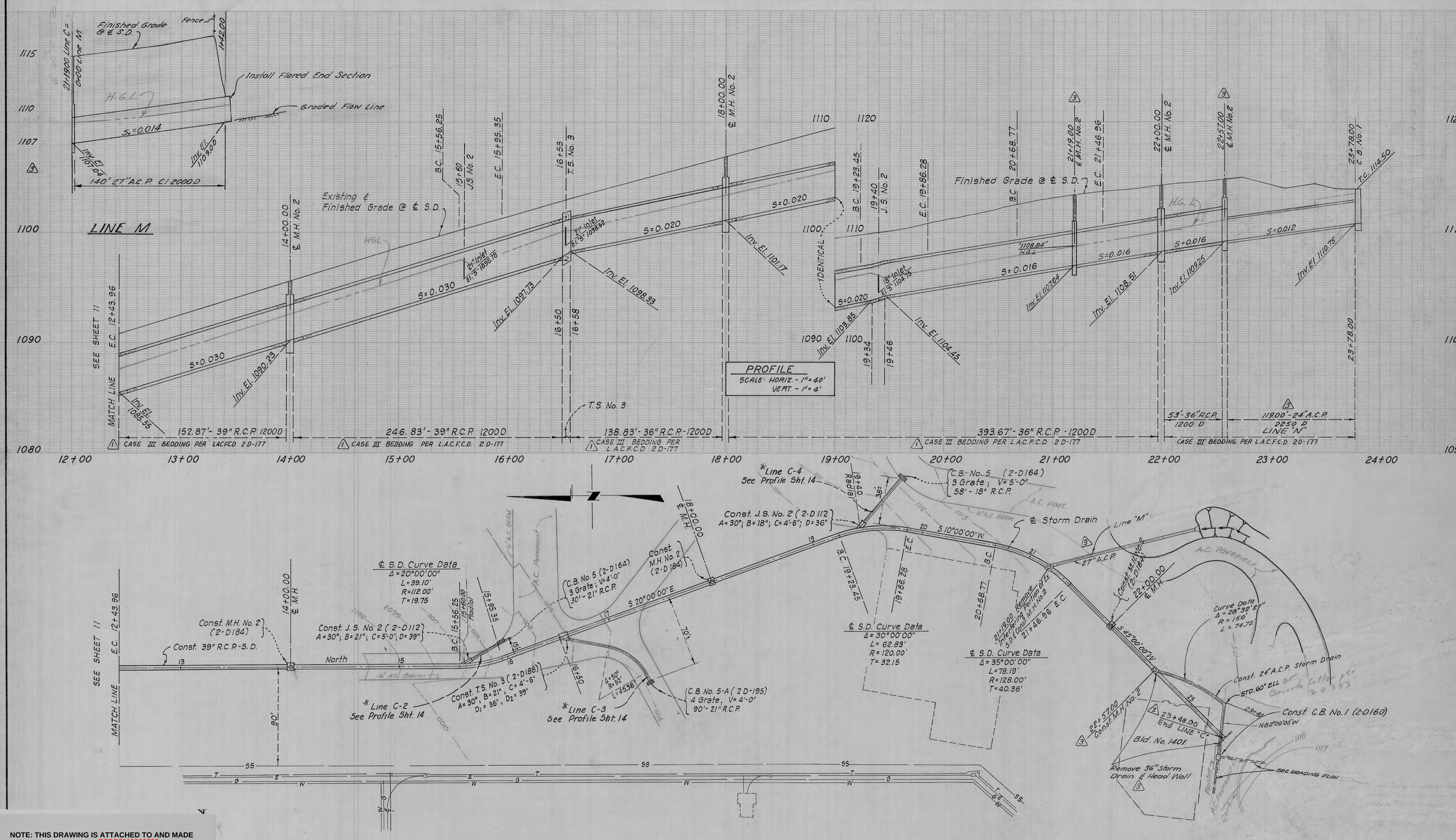
LINE "C"
PLAN AND PROFILE STA. 0+00.00 TO STA. 12+43.96

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: A. Gyuris R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

SHEET 11 OF 16



LINE "C"*

SCALE: 1" = 40'

* LINE "C" not to be maintained by L.A.C.F.C.D.

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

P.D. NO. 1052

Andrew P. Storms R.C.E. N° 12607
DATE: 8-24-70

STORMS & LOWE CONSULTING ENGINEERS

DATE	REVISION	REVISED BY:	OFFICE OF THE COUNTY ENGINEER DESIGN DIVISION DATE	APPROVED BY
11-2-70	(2) REVISE INLET LOCATION OF LINE "C" TO AVOID CONFLICT WITH WATER LINE	Andrew P. Storms RCE 12607	11/6/70	A. Gyuchi
3-4-77	(3) ADD M.H. @ STA 22+50 & 21"x19" REMOVE S.D. & INLET FROM STA 22+57 TO 23+48. ADDED LINE M & E LINE N.	Valcon, Inc. R.C.E. 13696	3/22/77	A. Gyuchi

STORMS & LOWE Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 735-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION: (1) REVISE BEDDING AND D-LOADS PER 36" AND 39" PIPE

DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	G.E.R.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

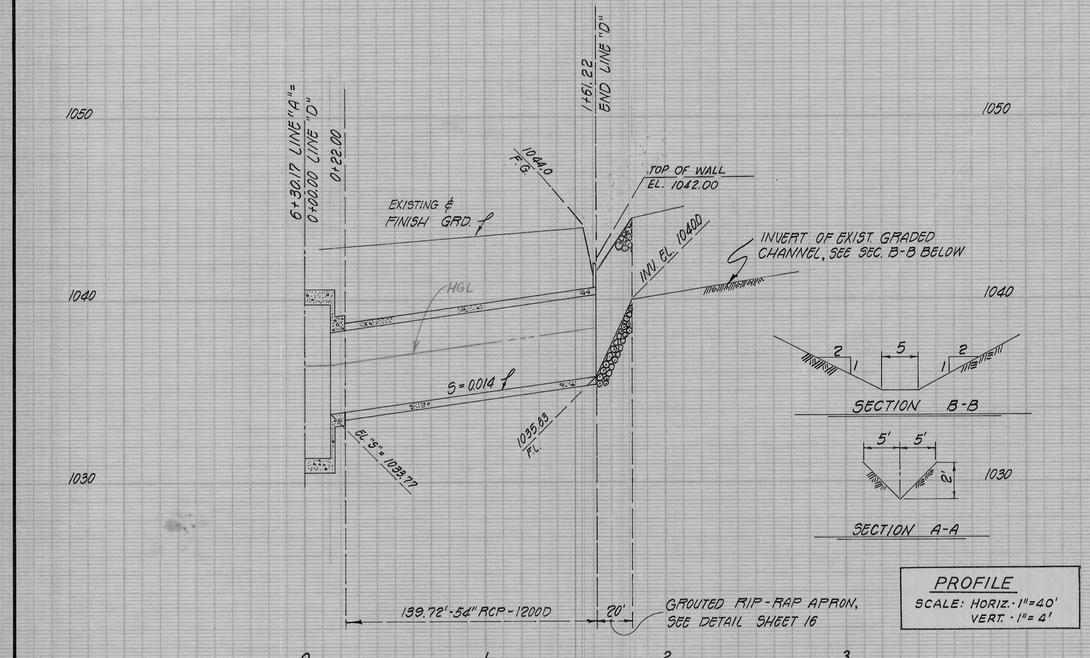
LINE "C"
PLAN AND PROFILE STA. 12+43.96 TO STA. 24+34.13

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: A. Gyuchi R.C.E. NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

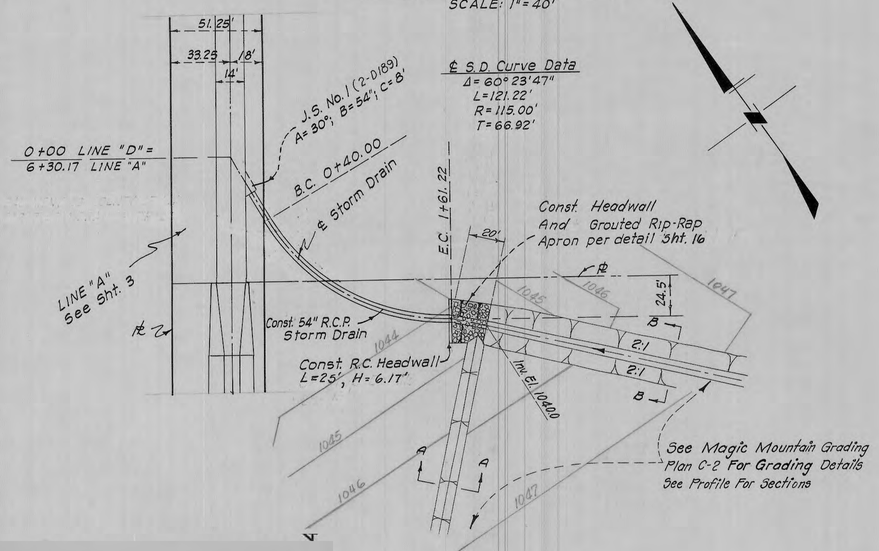
SHEET 12 OF 16



* LINES "D" "E" "G" "H" Not to be maintained by L.A.C.F.C.D.

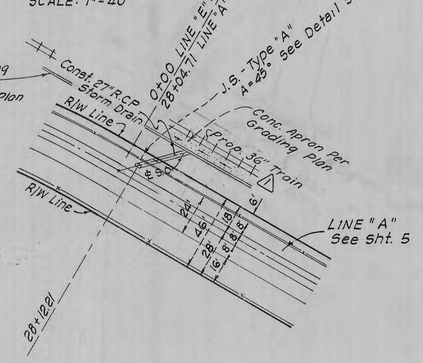
LINE "D" *

SCALE: 1"=40'



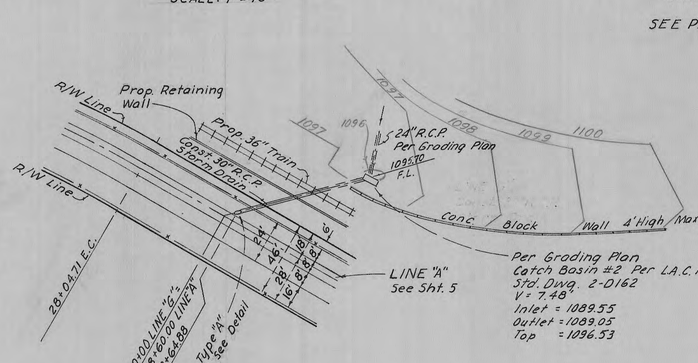
LINE "E" *

SCALE: 1"=40'



LINE "G" *

SCALE: 1"=40'



LINE "H" *

SCALE: 1"=40'

SEE PLAN ON SHT. 5

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

No.	REVISION	REVISED BY	APPROVED BY	DATE
1	Added Train, Retaining Wall, Lines "G" & "H" Revised. Maint. Note, Inlet for Line "E"	Valcon, Inc. Ronald H. Beck RCE 13656	Howard A. Hays	1/21/75

Andrew L. Thom R.C.E. 12607
DATE: 8-24-70

P.D. NO. 1052

STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXminster 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 755-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:			
DATE: 8-24-70	SCALE: AS SHOWN	DRAWN BY: R.G.	CHECKED BY: J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

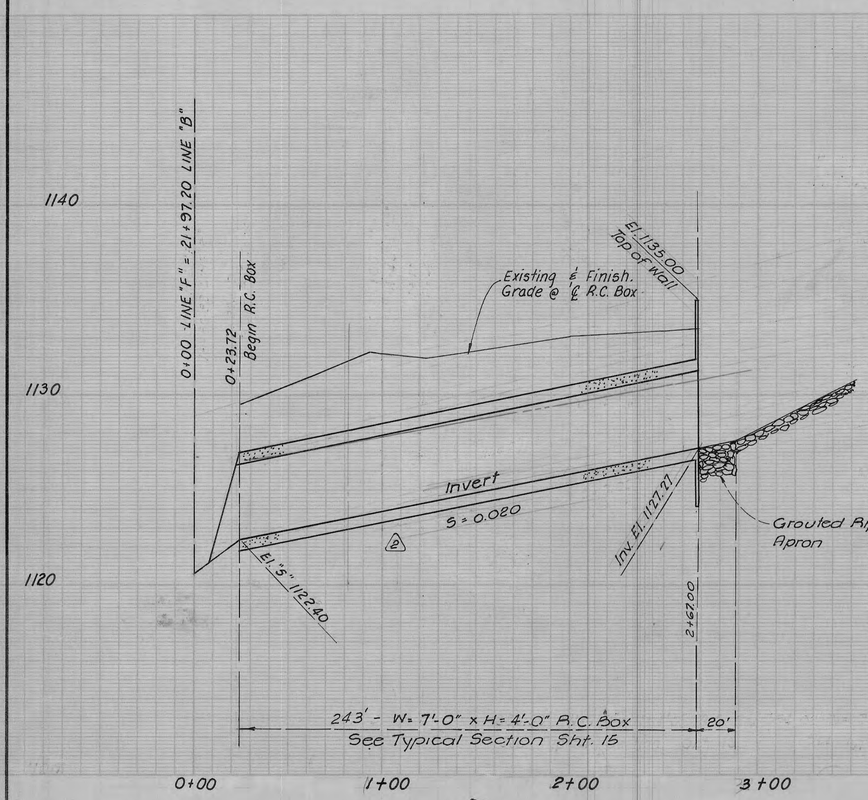
LINE "D, E, G & H
PLAN AND PROFILE

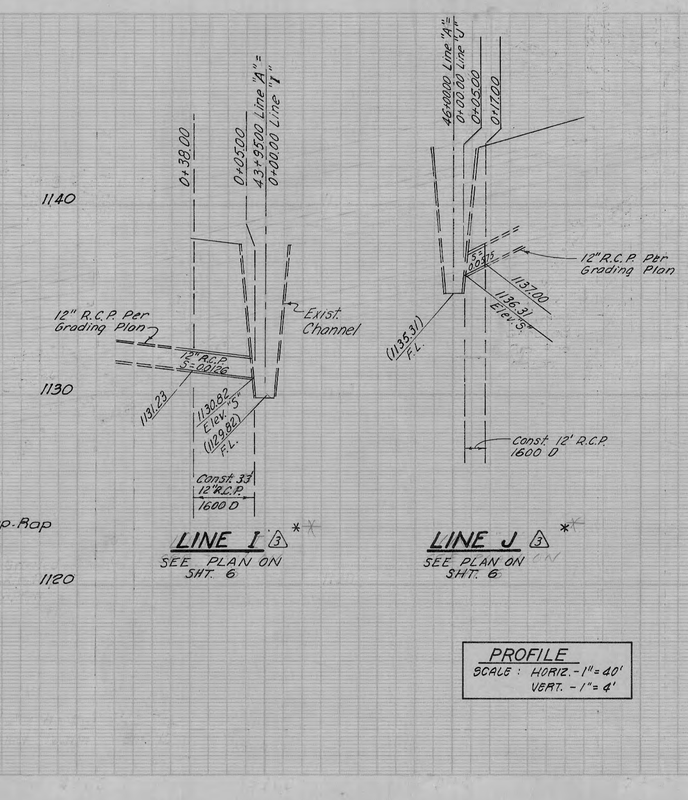
COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

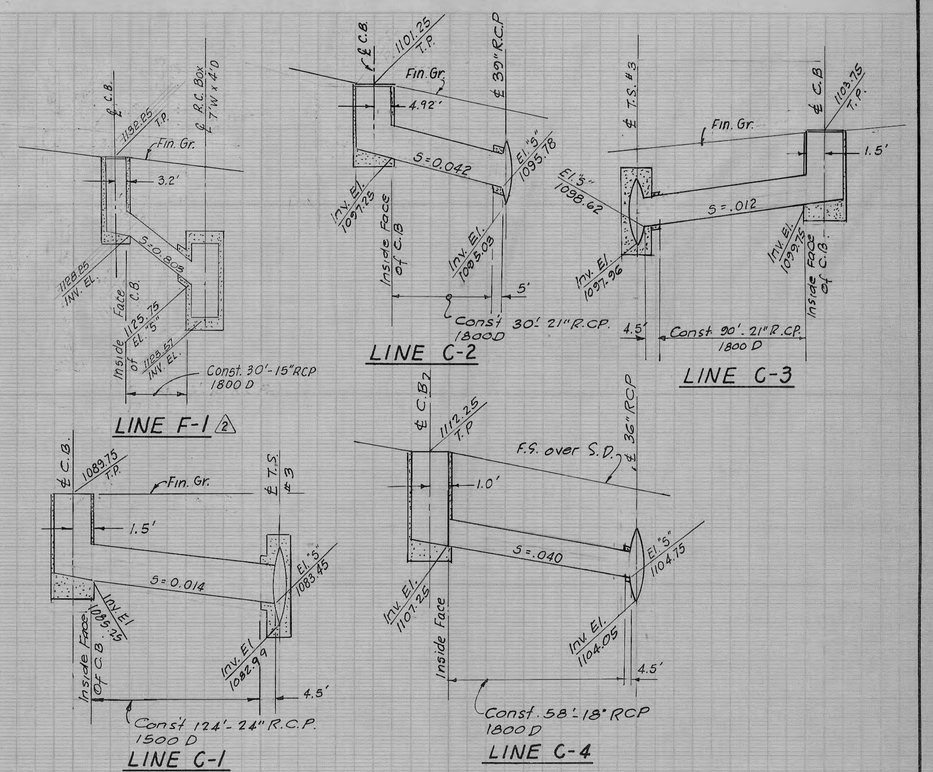
CHECKED BY: A. Hayashi RCE NO. 11786 DATE: 10-7-76
OFFICE OF COUNTY ENGINEER

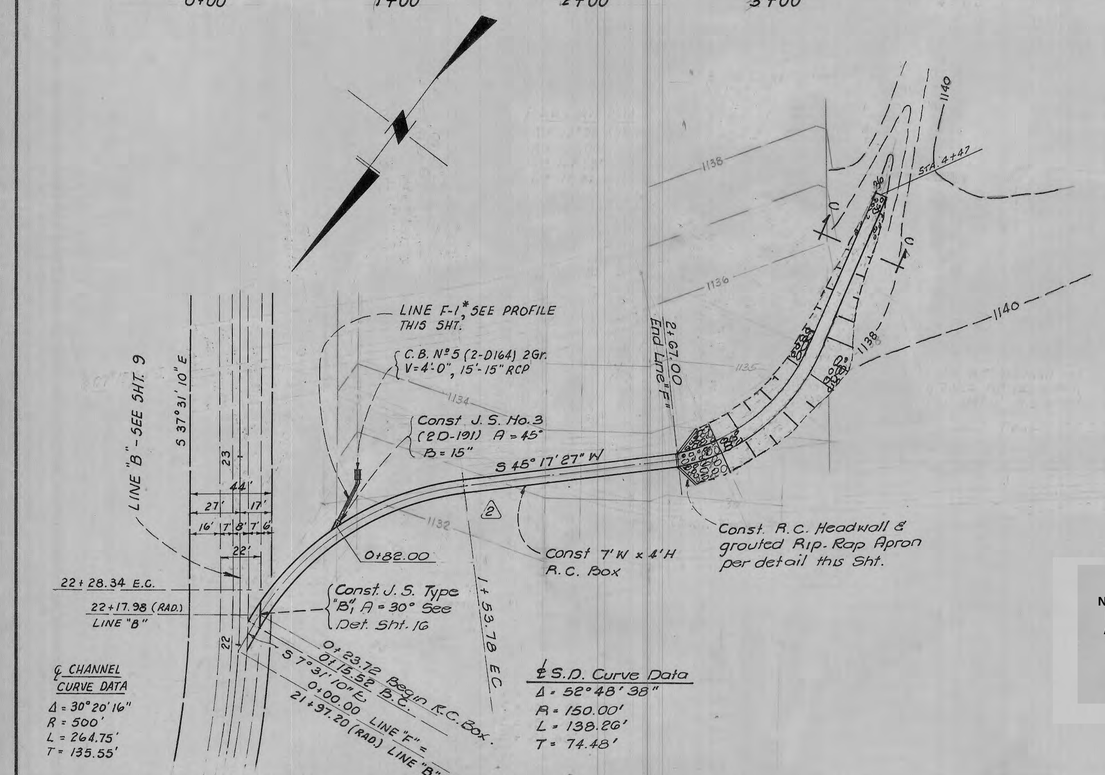
SHEET 13 OF 16





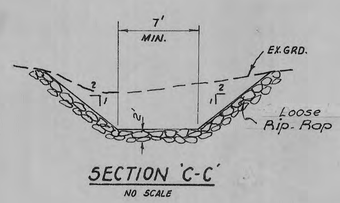
PROFILE
SCALE : HORIZ. - 1" = 40'
VERT. - 1" = 4'



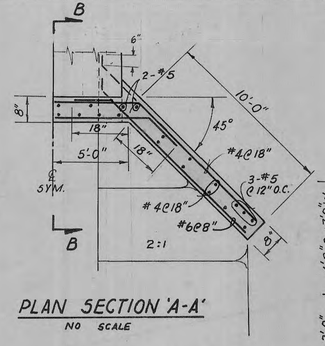


2 LINE "F" *
SCALE : 1" = 40'

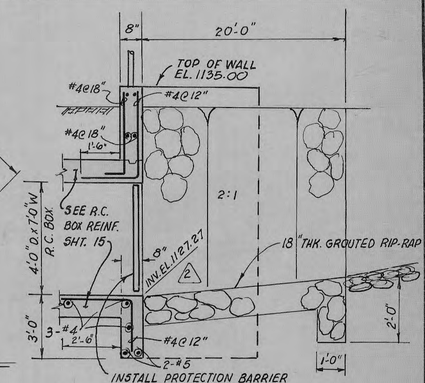
* LINE "F" not to be maintained by L.A.C.F.C.D.
3 * LINES I AND J not to be maintained by L.A.C.F.C.D.

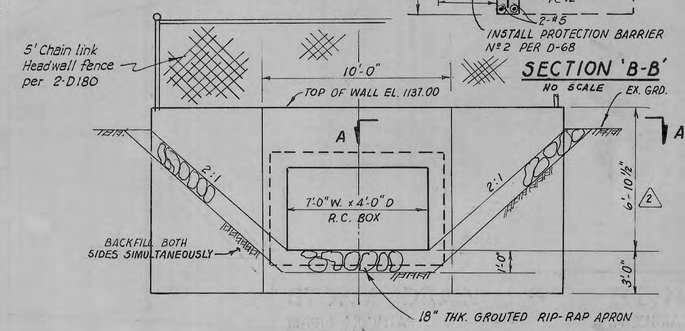


SECTION 'C-C'
NO SCALE



PLAN SECTION 'A-A'
NO SCALE





SECTION 'B-B'
NO SCALE

ELEVATION
NO SCALE

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

P.D. NO. 1052

Andrew C. Hram R.C.E. N° 12607
DATE: 8-24-70

STORMS & LOWE CONSULTING ENGINEERS			OFFICE OF THE COUNTY ENGINEER DESIGN DIVISION	
DATE	REVISION	REVISED BY:	DATE	APPROVED BY
11-2-70	2 RE-ALIGNMENT OF LINE F, REDESIGN TO CONFORM, REVISE LINE F-1, INLET	Andrew C. Hram RCE 12607	11/6/70	M. Iguchi
11-12-74	3 Added Profile For Lines "I" And "J"; Maint. Note	Valcon, Inc. Ronald C. Hargis RCE 13686	11/28/75	Howard C. Hargis

STORMS & LOWE Consulting Engineers
JOB. NO.
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXMINSTER 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 735-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:			
1 RE-ALIGN & REDESIGN LINE	9-30-70		
DATE:	SCALE:	DRAWN BY:	CHECKED BY:
8-24-70	AS SHOWN	S.W.	J.N.O.

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

LINE "F"
PLAN AND PROFILE STA. 0+00.00 TO STA. 6+76.02

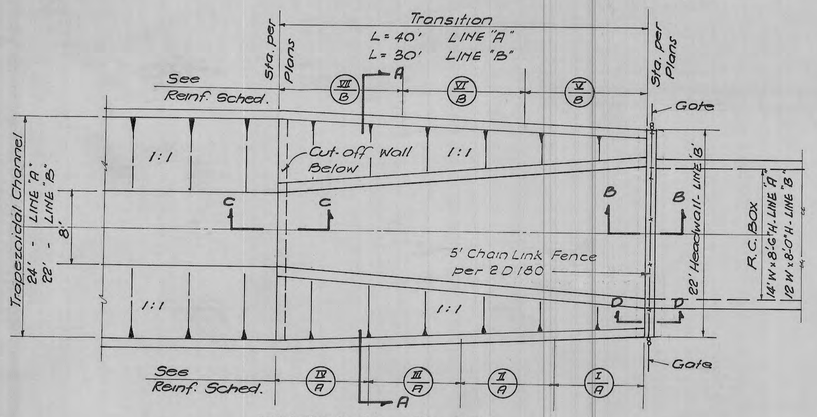
COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: M. Iguchi R.C.E. NO. 11786 DATE 10-7-70
OFFICE OF COUNTY ENGINEER

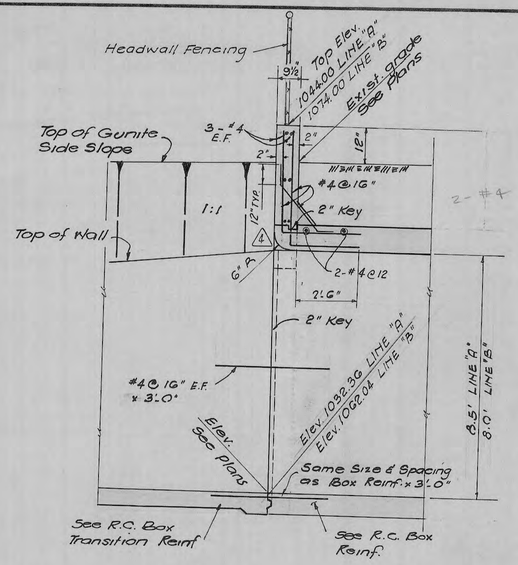
SHEET 14 OF 16

D5-13

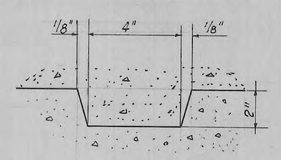


TYPICAL PLAN

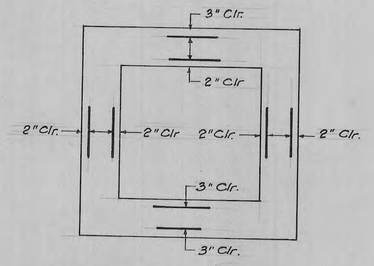
CHANNEL TO R.C. BOX TRANSITION



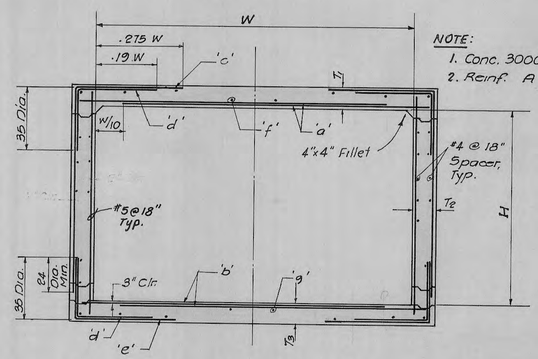
TYPICAL SECTION B-B



TYP. KEY DETAIL



R.C. BOX
TYP. REINF. CLEARANCES

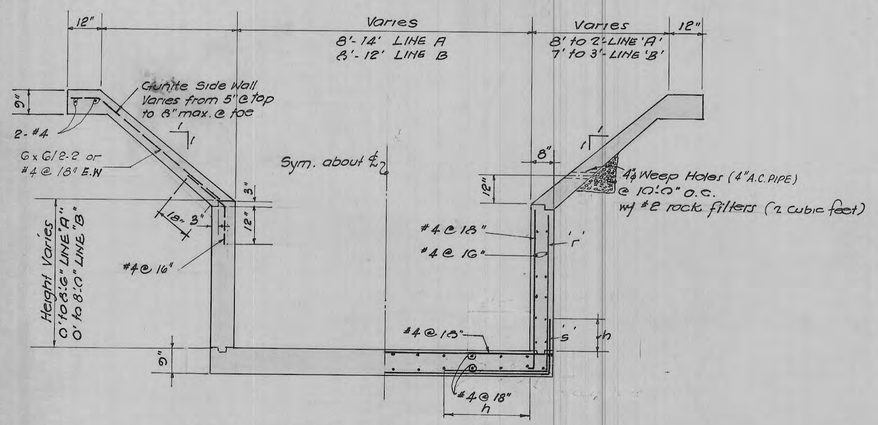


NOTE:
1. Conc. 3000 #/o"
2. Reinf. A 615 Grade 60

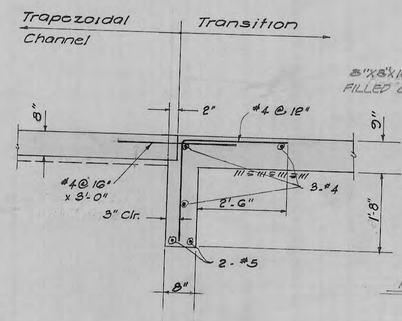
TYPICAL R.C. BOX SECTION

R.C. BOX SCHEDULE					
LINE		A *		B *	F *
SIZE		14'W x 8'-6"H		12'-0" x 8'-0"H	7'-0"W x 4'-0"H
COVER		2'		5'	4'
LOCATION		STA. 4+25 to STA. 7+00		STA 2+20 to STA 4+00	STA 0+23.72 (5) to STA 2+67.00
CONC.	T_1	11"		10"	8 1/2"
	T_2	11"		9 1/4"	7 3/4"
	T_3	11"		10"	8 1/2"
REINF.	a	#6 @ 10"		#6 @ 11"	#5 @ 10"
	b	#6 @ 10"		#6 @ 11"	#5 @ 10"
	c	#6 @ 10"		#6 @ 11"	#5 @ 10"
	d	#6 @ 10"		#6 @ 11"	#5 @ 10"
	e	#6 @ 10"		#6 @ 11"	#5 @ 10"
	f	#4 @ 8"		#4 @ 8"	#4 @ 18"
	g	#4 @ 12"		#4 @ 12"	#4 @ 18"

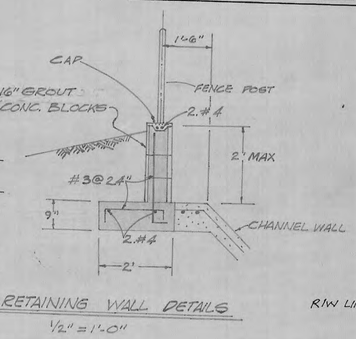
* Designed for H-20 Loading



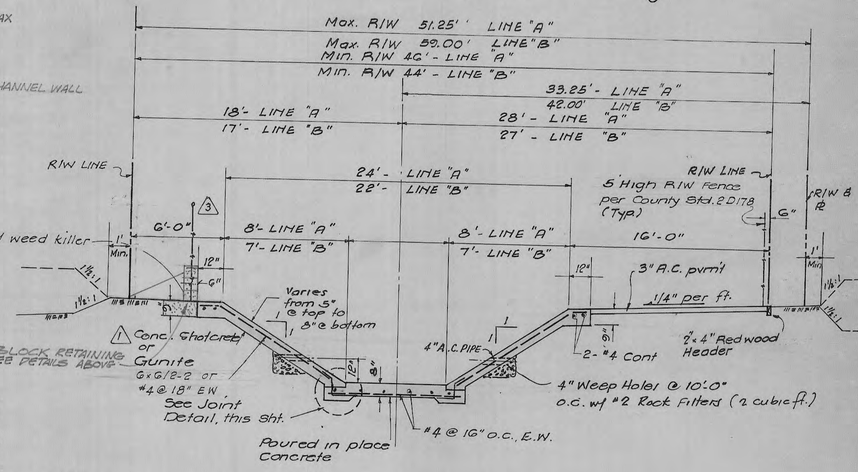
TYPICAL SECTION "A-A"



TYPICAL SECTION "C-C"

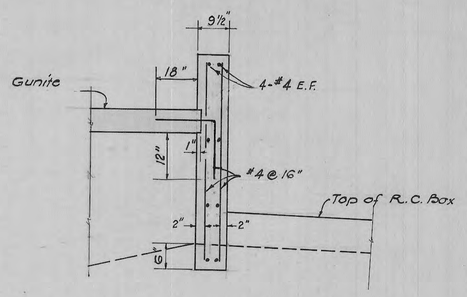


RETAINING WALL DETAILS
1/2" = 1'-0"

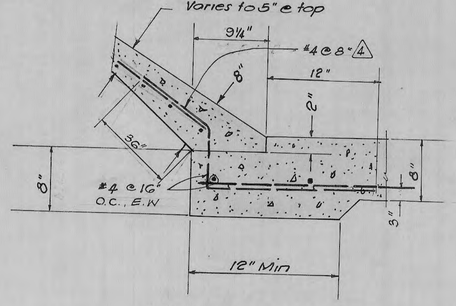


TYPICAL TRAPEZOIDAL CHANNEL SECTION

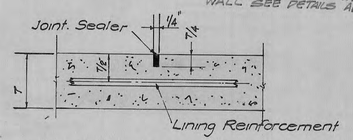
REINF. SCHEDULE								
CHANNEL		A				B		
LOCATION		I	II	III	IV	V	VI	VII
Reinf.	r	#5@11"	#5@12"	#5@12"	#4@11"	#4@10"	#5@12"	#4@11"
	s	#5@11"	#5@12"	——	——	#5@10"	——	——
h		4'-0"	4'-0"	——	——	3'-6"	——	——



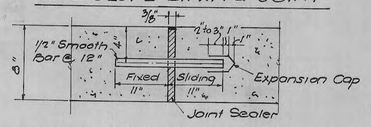
TYPICAL SECTION "D-D"



JOINT DETAIL



SIDE SLOPE LINING JOINT



INVERT LINING JOINT

NOTE: Lining Reinforcement shall not extend through joint.

TRANSVERSE JOINT DETAIL

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290. ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

P.D. NO. 1052

STORMS & LOWE CONSULTING ENGINEERS			OFFICE OF THE COUNTY ENGINEER DESIGN DIVISION	
DATE	REVISIONS	REVISED BY:	DATE	APPROVED BY
11-2-70	(5) REVISE LENGTH TO CONFORM TO REALIGNMENT OF LINE 'A'	Andrew L. Storms RCE 12607	11/6/70	H. Symons

STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXMINSTER 5-6431
LAS VEGAS, NEVADA
522-E, TWAIN 755-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2832 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:			DATE:	SCALE:	DRAWN BY:	CHECKED BY:
(1) REISE TO GIVE CONC. OR SHOTCRETE - GUNITE STR.	9-30-70	(4) REVISE STRUCTURAL DETAILING	8-24-70	NONE	B.C.	J.N.O
(2) REVISE LENGTH OF WING F	9-30-70					
(3) REVISE FENCE SECTION	9-30-70					

Andrew L. Storms R.C.E. N° 12607
DATE: 8-24-70

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

TYPICAL STRUCTURAL SECTIONS AND DETAILS

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

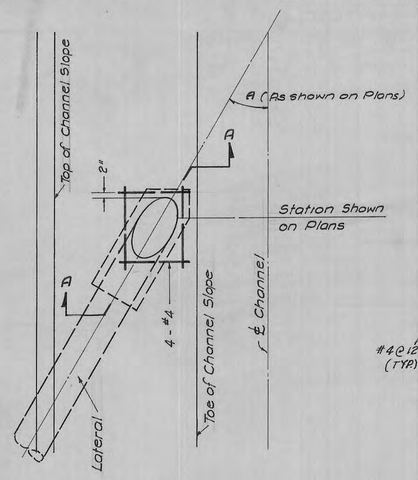
DESIGN DIVISION

CHECKED BY: H. Symons RCE NO. 18786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

SHEET 15 OF 16

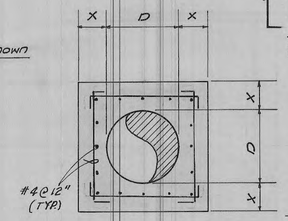
P.S-123

TYP. OUTLET STRUCTURE DETAILS

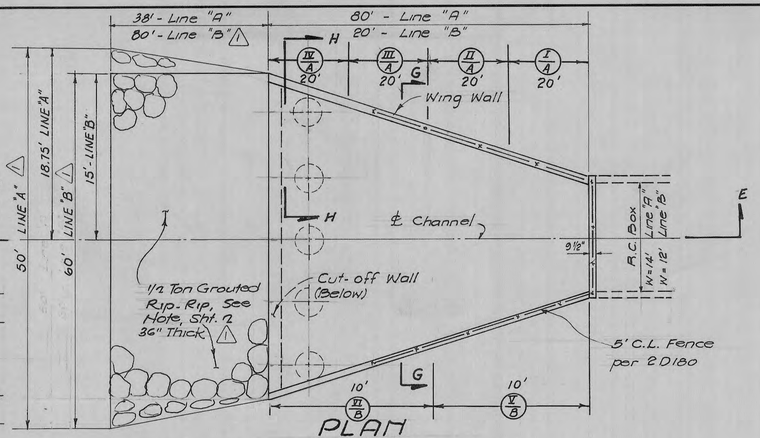


PLAN

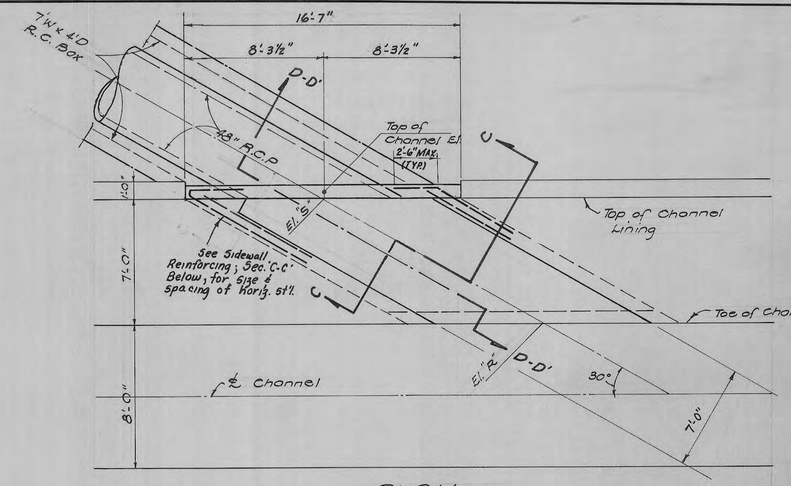
D	X	Y	Z
12"	7"	49"	T+2"
27"	9"	78"	T+2"



SECTION "B-B"

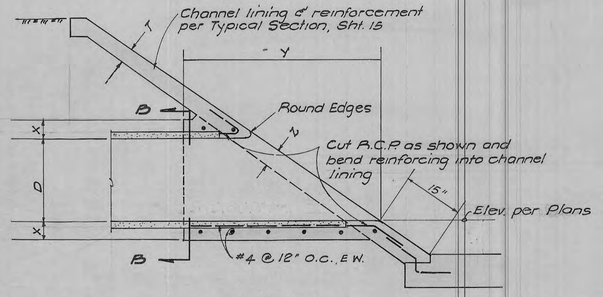


PLAN

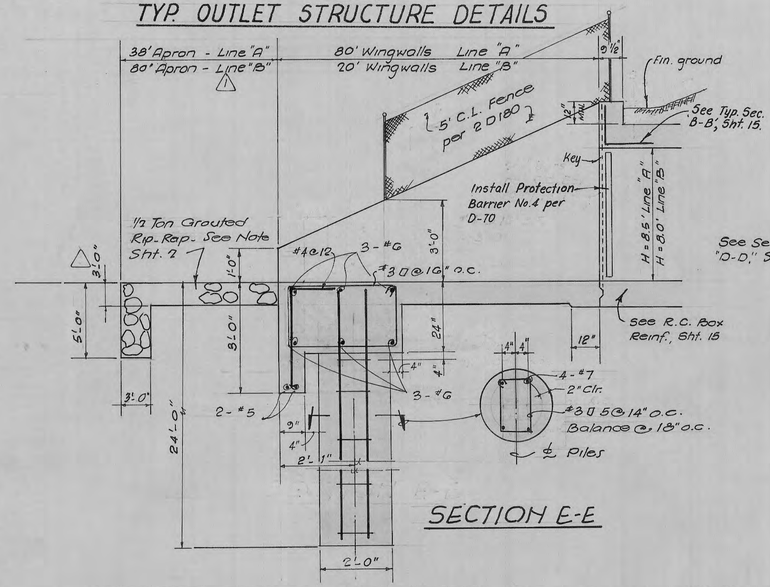


PLAN

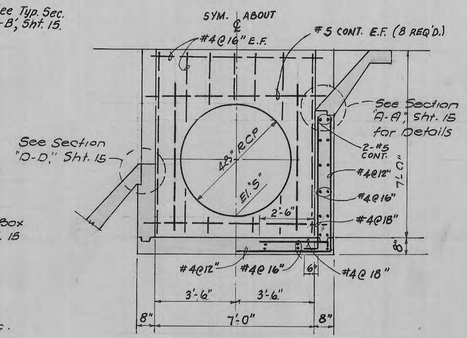
Not to Scale



SECTION "A-A"

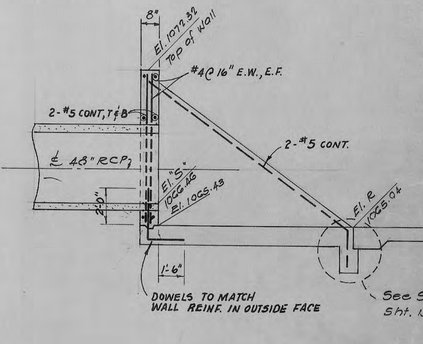


SECTION E-E



SECTION C-C

NOTE: 48" RCP ONLY SHOWN. SIDE WALL AND HEADWALL DETAILS FOR R.C. BOX. IDENTICAL.

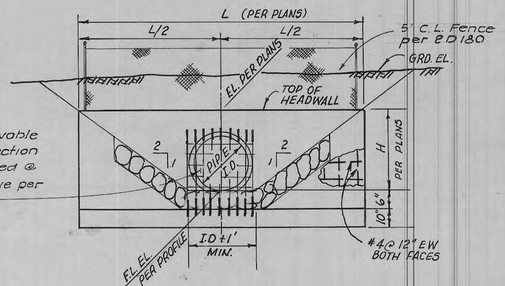


SECTION D-D

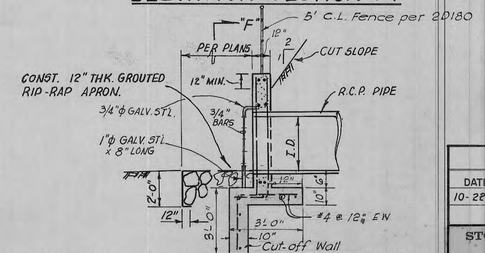
SECTION "A-A"

JUNCTION STRUCTURE TYPE "A"

Not to Scale

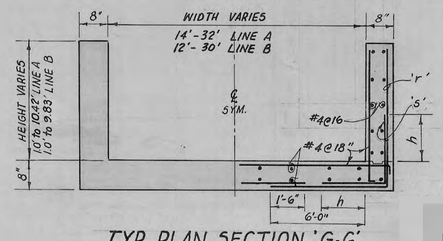


ELEVATION SECTION "F-F"

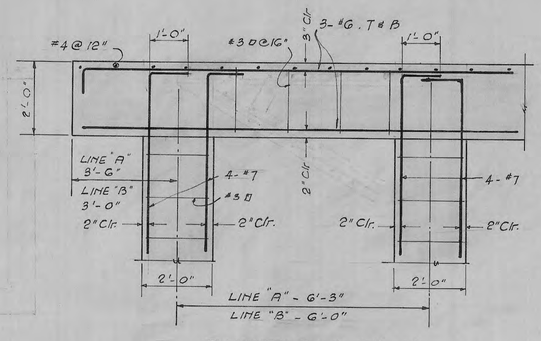


TYPICAL R.C. HEADWALL DETAILS

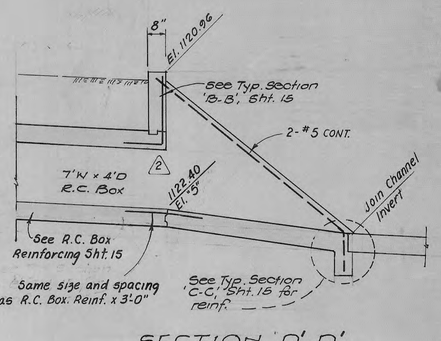
OUTLET STRUCTURE REINFORCING SCHEDULE							
CHANNEL		'A'				'B'	
LOCATION		I	II	III	IV	V	VI
REINF.	r	#5@12"	#4@12"	#4@24"	#4@18"	#4@12"	#4@18"
	s	#5@12"	#4@12"	#4@24"	—	#4@12"	—
h		3'-6"	3'-0"	2'-6"	—	3'-0"	—



TYP. PLAN SECTION 'G-G'



SECTION H-H



SECTION D'-D'

JUNCTION STRUCTURE TYPE "B"

Not to Scale

NOTE: THIS DRAWING IS ATTACHED TO AND MADE PART OF PERMIT NO. FCDP2019000290 ANY DEVIATION FROM THE ATTACHED DRAWING WITHOUT WRITTEN AUTHORIZATION FROM THIS DEPARTMENT WILL VOID THIS PERMIT.

STORMS & LOWE CONSULTING ENGINEERS			OFFICE OF THE COUNTY ENGINEER DESIGN DIVISION	
DATE	REVISION	REVISED BY:	DATE	APPROVED BY:
10-22-70	2 REVISE JUNCTION EL "S" FOR JUNCTION OF LINE "A" AND CHANNEL	CE 12607 11/6/70		A. Gyenes

STORMS & LOWE
Consulting Engineers
2829 WEST VERNON AVENUE
LOS ANGELES 8, CALIFORNIA
PHONE AXMINSTER 5-6431
LAS VEGAS, NEVADA
522 E. TWAIN 735-4466

R. DUELL & ASSOCIATES
PLANNING DESIGN ARCHITECTURE
2932 WILSHIRE BLVD., SANTA MONICA, CALIFORNIA

REVISION:	DATE:	SCALE:	DRAWN BY:	CHECKED BY:
1 REVISE THICKNESS AND DIMENSIONS OF RIP-RAP	9-30-70			
	8-24-70	NONE	B.C.	J.N.O.

Albert L. Thom R.C.E. N° 12607
DATE: 8-24-70

MAGIC MOUNTAIN STORM DRAIN
VALENCIA CALIFORNIA

MISCELLANEOUS STRUCTURAL DETAILS

P.D. NO. 1052

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

DESIGN DIVISION

CHECKED BY: A. Gyenes RCE NO. 11786 DATE: 10-7-70
OFFICE OF COUNTY ENGINEER

SHEET 16 OF 16

D-12: Drainage Concept Hydrology Study LID/Water Quality Report Revision Job No. 0930, By Alliance Land Planning & Engineering, Inc.
Date: 12/2017

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
HYDROLOGY UNIT

TO: Alliance Date: 11/16/17

ATTN: Craig M. Whitteker

REVIEW OF REVISED HYDROLOGY STUDY

TR/PM NO. **53295** **DATE OF REPORT** **October 2017**
PLAN CHECK NO. **3**

We have reviewed your Revised Hydrology Study.

[X] The Hydrology Study has been approved.

[X] Refer to comments below:

COMMENTS:

1. Infiltration rate for the project site has been assumed but must be approved by Geotechnical and Materials Engineering Division prior to the grading plans. Any changes to the assumed infiltration rate may require a revised Hydrology Study and/or Tentative Map.

2. Work within soft bottom drainage areas (which may include but is not limited to soft bottom basins, channels, watercourses, grade to drain) will require maintenance permits from Fish and Game, Army Corps of Engineers, and RWQCB prior to approval of the storm drain, and the permits must be still active prior to acceptance.

3. A Drainage Benefit Assessment Area must be established prior to the recordation of the final map. This DBAA will be to finance the future ongoing maintenance and capital replacement of all water quality devices/systems identified to be maintained by the County of Los Angeles.

REVIEWED BY _____
VILONG TRUONG (626) 458-4921

REGISTERED PROFESSIONAL ENGINEER
VILONG TRUONG
NO. C82680
CIVIL
STATE OF CALIFORNIA

APPROVED BY: _____

HYDROLOGY STUDY APPROVED

CHECKED BY: _____ RCE NO. 82680 DATE 11/16/2017

APPROVED BY: _____ DATE 11/16/2017

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

DRAINAGE CONCEPT
HYDROLOGY STUDY
LID / WATER QUALITY REPORT

— REVISIONS —

County of Los Angeles

Entrada
Tentative Tract No. 53295
Job No. 0930

Prepared For:
Newhall Land & Farming, Co.
25124 Springfield Ct. Suite 300
Valencia, CA 91355

Prepared By:
Alliance Land Planning & Engineering, Inc.
2248 Faraday Ave.
Carlsbad, CA 92008

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. WHITTAKER
NO. 51929
EXP 6-30-18
CIVIL
STATE OF CALIFORNIA

October 2017

mo

ENTRADA SOUTH

DRAINAGE CONCEPT REPORT

DEVELOPED CONDITION

Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN A STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930 1A	284.9	746.00	284.9	746.00	2	1030.	.01000	.00	.00	0.	98	0	A31	.00
930 2A	11.0	22.28	295.9	730.01	4	110.	.01000	7.25	.00	0.	98	12	A31	.10
930 3A	.0	.00	295.9	725.92	4	1.	.01000	7.25	.00	0.	98	99	A31	.00
930 4B	15.7	35.33	15.7	35.33	4	260.	.05000	2.00	.00	0.	98	11	A31	.80
930 5B	1.3	3.41	17.0	38.67	4	110.	.01000	2.50	.00	0.	98	8	A31	.91
930 6B	2.2	4.19	19.2	42.85	4	370.	.01000	2.50	.00	0.	98	16	A31	.91

CONFLUENCE Q'S

930 7A TA 1160 QA 725.88 QAB 764.74 QB 38.86 930 7B TB 1157 QB 42.51 QBA 598.68 QA 556.18

930 7AB TAB 1160 QAB 764.74 QA 725.88 QB 38.86

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930 7AB	19.2	42.51	315.1	764.74	4	20.	.01000	7.50	.00	0.	98	0	A31	.00
930 8C	.0	.00	.0	.00	4	1.	.01000	.00	.00	0.	98	99	A31	.00
930 9C	3.0	6.36	3.0	6.36	4	230.	.04200	2.00	.00	0.	98	12	A31	.60
930 10C	1.6	4.37	4.6	10.68	4	50.	.04200	2.00	.00	0.	98	7	A31	.60
930 11C	7.5	21.19	12.1	31.86	4	380.	.01000	2.25	.00	0.	298	7	A31	.10
930 12C	2.3	5.60	14.4	36.90	4	310.	.05500	2.00	.00	0.	98	9	A31	.60
930 13C	.0	.00	14.4	36.64	4	1.	.01000	2.50	.00	0.	98	99	A31	.00
930 14C	2.0	5.47	16.4	41.73	4	200.	.05500	2.00	.00	0.	98	7	A31	.60
930 15C	2.0	5.47	18.4	46.62	4	480.	.05500	2.00	.00	0.	98	7	A31	.60
930 16C	3.4	8.74	21.8	54.68	4	90.	.02000	2.50	.00	0.	98	8	A31	.60
930 17C	8.8	27.01	30.6	76.93	4	440.	.01000	3.25	.00	0.	298	6	A31	.01
930 18C	1.0	3.28	31.6	78.15	4	320.	.02000	2.75	.00	0.	98	5	A31	.60
930 19D	.0	.00	.0	.00	4	1.	.01000	.00	.00	0.	98	99	A31	.00
930 20D	3.9	9.09	3.9	9.09	4	30.	.01000	2.00	.00	0.	98	10	A31	.60
930 21D	2.1	4.89	6.0	13.97	4	100.	.01000	2.00	.00	0.	98	10	A31	.60
930 22D	1.7	4.65	7.7	18.56	4	520.	.05000	2.00	.00	0.	98	7	A31	.60
930 23D	1.9	6.23	9.6	23.28	4	30.	.01000	2.00	.00	0.	98	5	A31	.60
930 24D	2.2	6.01	11.8	29.25	4	80.	.01000	2.25	.00	0.	98	7	A31	.60
930 25D	1.1	3.61	12.9	32.25	4	200.	.01800	2.00	.00	0.	98	5	A31	.60
930 26D	1.1	2.89	14.0	34.75	4	90.	.01000	2.50	.00	0.	98	8	A31	.91
930 27D	.8	2.65	14.8	36.65	4	750.	.05500	2.00	.00	0.	98	5	A31	.85
930 28D	.0	.00	14.8	36.24	4	1.	.01000	2.50	.00	0.	98	99	A31	.00
930 29D	1.3	3.55	16.1	39.29	4	310.	.04000	2.00	.00	0.	98	7	A31	.60
930 30D	2.9	7.07	19.0	45.83	4	80.	.04000	2.00	.00	0.	98	9	A31	.60

CONFLUENCE Q'S

930 31C TC 1156 QC 77.37 QCD 123.05 QD 45.68 930 31D TD 1156 QD 45.68 QDC 123.05 QC 77.37

930 31CD TCD 1156 QCD 123.05 QC 77.37 QD 45.68

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930 31CD	19.0	45.68	50.6	123.05	4	380.	.01000	3.75	.00	0.	98	0	A31	.00
930 32C	.0	.00	50.6	121.79	4	1.	.01000	3.75	.00	0.	98	99	A31	.00

♀

Program Package Serial Number: 2196
12/10/15 FILE: 201D-A INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 2
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

TENT. TRACT 53295 DRAINAGE CONCEPT - DEV. CONDITION - BASIN A STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	33C	11.1	24.98	61.7	145.66	4	180.	.05500	3.00	.00	0.	98	11	A31	.80
930	34E	.0	.00	.0	.00	4	1.	.01000	.00	.00	0.	98	99	A31	.00
930	35E	2.4	6.56	2.4	6.56	4	700.	.01000	2.00	.00	0.	98	7	A31	.60
930	36E	4.7	12.85	7.1	18.51	4	230.	.01000	2.00	.00	0.	98	7	A31	.60
930	37E	.0	.00	7.1	18.19	4	1.	.01000	2.00	.00	0.	98	99	A31	.00

CONFLUENCE Q'S

930 38C TC 1157 QC 144.98 QCE 161.86 QE 16.87 930 38E TE 1155 QE 18.19 QEC 150.52 QC 132.34

930 38CE TCE 1157 QCE 161.86 QC 144.98 QE 16.87

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	38CE	7.1	18.19	68.8	161.86	4	420.	.01000	4.25	.00	0.	98	0	A31	.00
930	39C	1.5	3.41	70.3	163.83	4	1.	.01000	4.25	.00	0.	98	11	A31	.91
930	40C	1.5	3.56	71.8	167.07	4	10.	.01000	4.25	.00	0.	98	10	A31	.85
930	41C	5.4	14.94	77.2	176.02	4	10.	.01000	4.25	.00	0.	98	7	A31	.80
930	42C	1.0	2.27	78.2	178.12	4	10.	.01000	4.25	.00	0.	98	11	A31	.91
930	43C	.0	.00	78.2	178.11	4	1.	.01000	4.25	.00	0.	98	99	A31	.00
930	44C	8.7	26.03	86.9	192.98	4	330.	.01000	4.50	.00	0.	98	6	A31	.80

CONFLUENCE Q'S

930 45A TA 1160 QA 764.03 QAC 942.22 QC 178.19 930 45C TC 1158 QC 191.87 QCA 864.46 QA 672.59

930 45AC TAC 1160 QAC 942.22 QA 764.03 QC 178.19

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
930	45AC	86.9	191.87	402.0	942.22	4	1100.	.02500	6.75	.00	0.	98	0	A31	.00
930	46A	4.7	11.12	406.7	935.18	4	60.	.02500	6.75	.00	0.	98	10	A31	.80
930	47A	10.0	22.23	416.7	945.92	4	150.	.01000	8.00	.00	0.	98	10	A31	.01
930	48A	.0	.00	416.7	940.77	4	1.	.01000	8.00	.00	0.	98	99	A31	.00
930	49A	62.1	123.00	478.8	1041.73	5	120.	.01000	11.00	.00	0.	98	0	A31	.00

DRAINAGE BASIN A

DEBRIS VOLUME

DPA 8	35,000 CY/MI^2 =	55 CY/AC
AREA 2A	UNDEVELOPED AREA	11.0 AC
	DEBRIS YIELD	605 CY
AREA 11C	UNDEVELOPED AREA	7.5 AC
	DEBRIS YIELD	412.5 CY
AREA 17C	UNDEVELOPED AREA	8.8 AC
	DEBRIS YIELD	484 CY

Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 930 49A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	1.00	100	45.19	200	47.34	300	49.18	400	52.46
500	55.48	600	60.05	700	65.37	800	71.85	900	81.41
1000	104.33	1050	130.00	1100	173.44	1110	195.46	1120	229.79
1130	271.80	1131	276.82	1132	281.73	1133	285.83	1134	290.98
1135	296.17	1136	301.54	1137	307.31	1138	313.48	1139	320.02
1140	327.27	1141	335.28	1142	345.19	1143	356.04	1144	367.80
1145	380.76	1146	395.00	1147	411.05	1148	428.12	1149	450.82
1150	481.86	1151	518.84	1152	563.39	1153	614.45	1154	668.45
1155	722.26	1156	780.87	1157	844.22	1158	911.55	1159	973.86
1160	1020.35	1161	1041.73	1162	1031.29	1163	981.76	1164	897.71
1165	801.85	1166	709.11	1167	625.26	1168	553.12	1169	494.31
1170	444.94	1171	403.82	1172	368.74	1173	338.37	1174	313.40
1175	291.74	1176	273.52	1177	257.63	1178	245.39	1179	233.47
1180	223.02	1181	214.67	1182	206.35	1183	199.86	1184	192.96
1185	187.65	1186	182.97	1187	177.52	1188	173.37	1189	168.54
1190	164.92	1191	161.55	1192	158.36	1193	154.30	1194	151.46
1195	148.80	1196	146.17	1197	142.76	1198	140.51	1199	138.28
1200	136.13	1201	132.99	1202	130.94	1203	129.11	1204	127.46
1205	125.91	1206	124.44	1207	122.04	1208	120.61	1209	119.11
1210	117.54	1211	116.08	1212	114.76	1213	113.54	1214	112.27
1215	110.04	1216	108.92	1217	107.79	1218	106.72	1219	105.65
1220	104.50	1221	103.32	1222	102.24	1223	101.24	1224	99.36
1225	98.52	1226	97.65	1227	96.94	1228	96.26	1229	95.59
1230	94.97	1231	94.33	1232	93.65	1233	93.00	1234	92.33
1235	91.64	1236	90.96	1237	89.20	1238	88.37	1239	87.52
1240	86.65	1241	85.86	1242	85.16	1243	84.56	1244	84.04
1245	83.56	1246	83.06	1247	82.56	1248	82.07	1249	81.63
1250	81.18	1251	80.75	1252	80.38	1253	80.06	1254	79.76
1255	78.45	1256	78.11	1257	77.73	1258	77.35	1259	76.97
1260	76.57	1261	76.16	1262	75.74	1263	75.35	1264	75.05
1265	74.83	1266	74.62	1267	74.43	1268	74.19	1269	73.88
1270	73.58	1271	73.25	1272	72.87	1273	72.53	1274	72.17
1275	71.80	1276	71.44	1277	71.08	1278	70.69	1279	70.31
1280	69.00	1281	68.73	1282	68.43	1283	68.13	1284	67.83
1285	67.56	1286	67.37	1287	67.20	1288	67.04	1289	66.92
1290	66.75	1291	66.52	1292	66.28	1293	66.06	1294	65.88
1295	65.75	1296	65.62	1297	65.51	1298	65.42	1299	65.29
1300	65.08	1310	63.08	1320	60.41	1330	58.93	1340	57.58
1350	56.00	1360	54.29	1370	51.94	1380	51.22	1390	50.46
1400	49.75	1420	48.23	1440	46.75	1460	45.20	1500	45.19

TOTAL VOLUME THIS HYDROGRAPH = 172.87(Ac.Ft)

```
7   930    1A   284.9 441158    746.200  4
8  5   0.      1. 100.     28. 200.     30. 300.     31. 400.     33.
8 10 500.     35. 600.     38. 700.     42. 800.     46. 900.     52.
8 151000.     67.1050.     83.1100.    110.1110.    125.1120.    150.
8 201130.    176.1131.    178.1132.    181.1133.    184.1134.    187.
8 251135.    190.1136.    194.1137.    199.1138.    204.1139.    210.
8 301140.    217.1141.    224.1142.    232.1143.    240.1144.    248.
8 351145.    257.1146.    267.1147.    278.1148.    290.1149.    309.
8 401150.    332.1151.    361.1152.    399.1153.    454.1154.    527.
8 451155.    610.1156.    690.1157.    742.1158.    746.1159.    708.
8 501160.    642.1161.    566.1162.    490.1163.    423.1164.    366.
8 551165.    321.1166.    284.1167.    253.1168.    228.1169.    208.
8 601170.    190.1171.    175.1172.    165.1173.    156.1174.    149.
8 651175.    142.1176.    136.1177.    131.1178.    127.1179.    123.
8 701180.    119.1181.    116.1182.    113.1183.    110.1184.    107.
8 751185.    105.1186.    102.1187.    100.1188.     98.1189.     96.
8 801190.     94.1191.     92.1192.     91.1193.     89.1194.     88.
8 851195.     86.1196.     84.1197.     83.1198.     82.1199.     81.
8 901200.     80.1201.     79.1202.     78.1203.     77.1204.     75.
8 951205.     74.1206.     73.1207.     73.1208.     72.1209.     71.
81001210.     70.1211.     69.1212.     69.1213.     68.1214.     67.
81051215.     66.1216.     65.1217.     64.1218.     64.1219.     63.
81101220.     63.1221.     62.1222.     62.1223.     62.1224.     61.
81151225.     61.1226.     60.1227.     60.1228.     59.1229.     59.
81201230.     58.1231.     58.1232.     57.1233.     56.1234.     55.
81251235.     55.1236.     54.1237.     54.1238.     54.1239.     54.
81301240.     53.1241.     53.1242.     52.1243.     52.1244.     52.
81351245.     51.1246.     51.1247.     51.1248.     51.1249.     51.
81401250.     50.1251.     50.1252.     50.1253.     49.1254.     49.
81451255.     49.1256.     48.1257.     48.1258.     48.1259.     48.
81501260.     48.1261.     48.1262.     48.1263.     47.1264.     47.
81551265.     47.1266.     46.1267.     46.1268.     46.1269.     45.
81601270.     45.1271.     45.1272.     44.1273.     44.1274.     44.
81651275.     44.1276.     44.1277.     43.1278.     43.1279.     43.
81701280.     43.1281.     43.1282.     43.1283.     43.1284.     43.
81751285.     42.1286.     42.1287.     42.1288.     42.1289.     42.
81801290.     42.1291.     42.1292.     42.1293.     42.1294.     41.
81851295.     41.1296.     41.1297.     41.1298.     40.1299.     40.
81901300.     40.1310.     39.1320.     38.1330.     37.1340.     36.
81951350.     34.1360.     33.1370.     33.1380.     32.1390.     32.
82001400.     31.1420.     30.1440.     29.1460.     28.1500.     28.
7   930   49A    62.1 421156    123.200  4
8  5   0.      1. 100.      7. 200.      7. 300.      7. 400.      8.
8 10 500.      8. 600.      9. 700.      9. 800.     10. 900.     11.
8 151000.     14.1050.     17.1100.     23.1110.     27.1120.     31.
8 201130.     36.1131.     37.1132.     38.1133.     38.1134.     39.
8 251135.     40.1136.     41.1137.     42.1138.     43.1139.     44.
8 301140.     45.1141.     46.1142.     48.1143.     50.1144.     52.
8 351145.     54.1146.     56.1147.     59.1148.     62.1149.     67.
8 401150.     76.1151.     86.1152.     97.1153.    108.1154.    117.
8 451155.    121.1156.    123.1157.    122.1158.    119.1159.    115.
8 501160.    109.1161.    101.1162.     93.1163.     85.1164.     74.
8 551165.     64.1166.     56.1167.     48.1168.     41.1169.     37.
8 601170.     34.1171.     32.1172.     30.1173.     28.1174.     27.
8 651175.     26.1176.     25.1177.     24.1178.     24.1179.     23.
8 701180.     22.1181.     22.1182.     21.1183.     21.1184.     20.
8 751185.     20.1186.     20.1187.     19.1188.     19.1189.     18.
8 801190.     18.1191.     18.1192.     18.1193.     17.1194.     17.
8 851195.     17.1196.     17.1197.     16.1198.     16.1199.     16.
8 901200.     16.1201.     15.1202.     15.1203.     15.1204.     15.
8 951205.     15.1206.     15.1207.     14.1208.     14.1209.     14.
81001210.     14.1211.     14.1212.     14.1213.     14.1214.     14.
81051215.     13.1216.     13.1217.     13.1218.     13.1219.     13.
81101220.     13.1221.     13.1222.     13.1223.     13.1224.     12.
81151225.     12.1226.     12.1227.     12.1228.     12.1229.     12.
81201230.     12.1231.     12.1232.     12.1233.     12.1234.     12.
81251235.     12.1236.     12.1237.     11.1238.     11.1239.     11.
81301240.     11.1241.     11.1242.     11.1243.     11.1244.     11.
81351245.     11.1246.     11.1247.     11.1248.     11.1249.     11.
81401250.     11.1251.     11.1252.     11.1253.     11.1254.     11.
81451255.     10.1256.     10.1257.     10.1258.     10.1259.     10.
81501260.     10.1261.     10.1262.     10.1263.     10.1264.     10.
81551265.     10.1266.     10.1267.     10.1268.     10.1269.     10.
81601270.     10.1271.     10.1272.     10.1273.     10.1274.     10.
81651275.     10.1276.     10.1277.     10.1278.     10.1279.     10.
81701280.      9.1281.      9.1282.      9.1283.      9.1284.      9.
81751285.      9.1286.      9.1287.      9.1288.      9.1289.      9.
81801290.      9.1291.      9.1292.      9.1293.      9.1294.      9.
81851295.      9.1296.      9.1297.      9.1298.      9.1299.      9.
81901300.      9.1310.      9.1320.      8.1330.      8.1340.      8.
81951350.      8.1360.      8.1370.      7.1380.      7.1390.      7.
82001400.      7.1420.      7.1440.      7.1460.      7.1500.      7.
```

Basin A

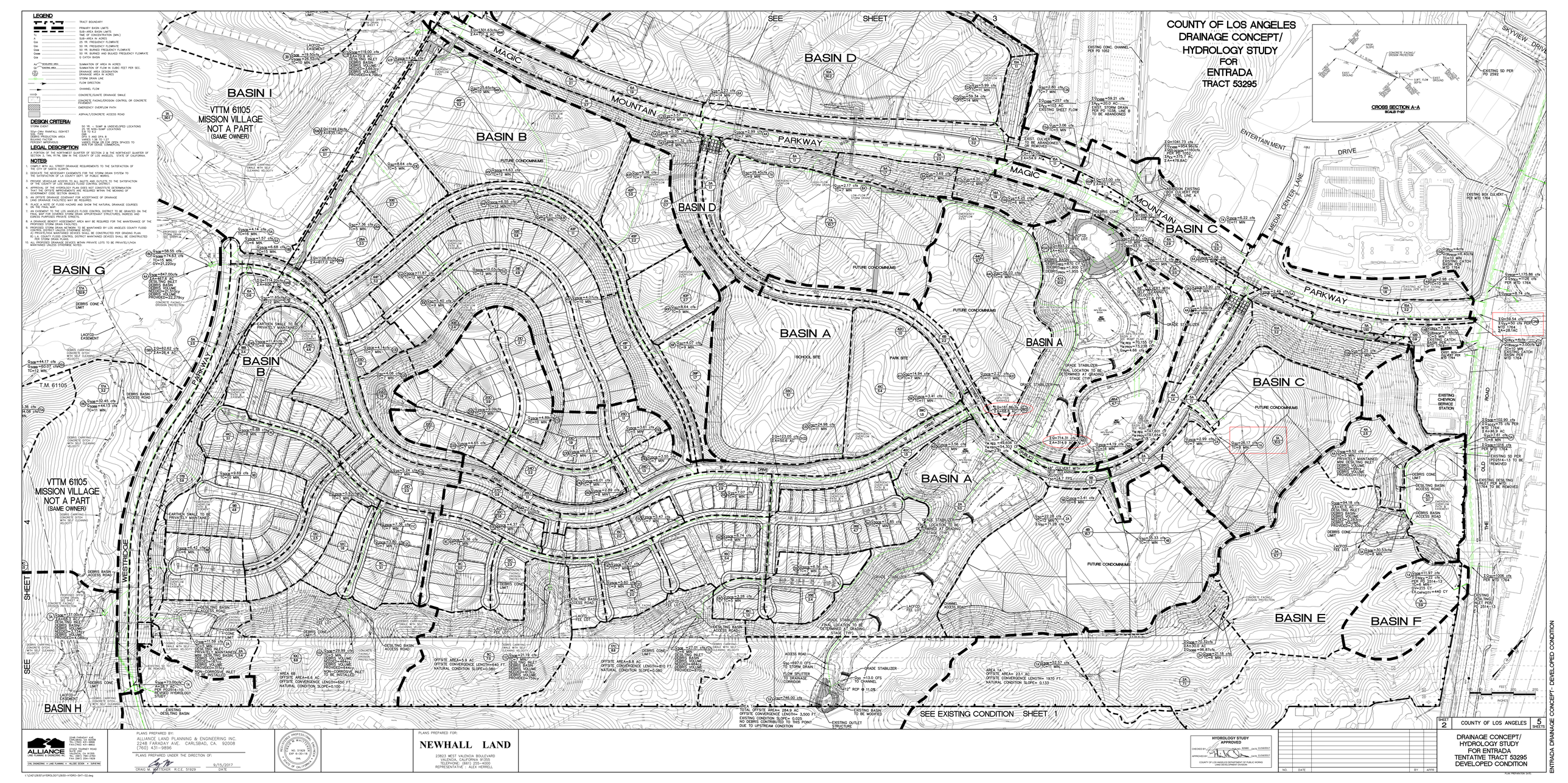
Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
2A	11.0	0.10	98	1230	0.015	6.20	12	2.45	0.82	0.83
4B	15.7	0.80	98	1180	0.020	6.20	11	2.55	0.82	0.88
5B	1.3	0.91	98	820	0.035	5.36	8	2.56	0.82	0.89
6B	2.2	0.91	98	1980	0.020	5.36	16	1.85	0.78	0.89
9C	3.0	0.60	98	820	0.035	5.36	12	2.12	0.80	0.86
10C	1.6	0.60	98	590	0.042	5.36	7	2.73	0.83	0.87
11C	7.5	0.01	98	1000	0.118	6.20	7	3.16	0.84	0.84
12C	2.3	0.60	98	900	0.040	5.36	9	2.43	0.82	0.87
14C	2.0	0.60	98	630	0.034	5.44	7	2.77	0.83	0.87
15C	2.0	0.60	98	730	0.055	5.36	7	2.73	0.83	0.87
16C	3.4	0.60	98	890	0.047	5.44	8	2.60	0.82	0.87
17C	8.8	0.01	98	850	0.129	6.20	6	3.40	0.85	0.85
18C	1.0	0.60	98	350	0.030	5.44	5	3.25	0.85	0.88
20D	3.9	0.60	98	730	0.010	5.36	10	2.31	0.81	0.86
21D	2.1	0.60	98	610	0.005	5.36	10	2.31	0.81	0.86
22D	1.7	0.60	98	530	0.015	5.36	7	2.73	0.83	0.87
23D	1.9	0.60	98	480	0.060	5.36	5	3.20	0.85	0.88
24D	2.2	0.60	98	640	0.060	5.36	7	2.73	0.83	0.87
25D	1.1	0.60	98	370	0.030	5.36	5	3.20	0.85	0.88
26D	1.1	0.91	98	900	0.052	5.36	8	2.51	0.82	0.89
27D	0.8	0.85	98	430	0.050	5.36	5	3.20	0.85	0.89

Note: Skipped No. 3A, 8C, 13C, 19D, 28D

Basin A Continued

Subarea	Area (Ac)	%imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in)	Tc-calculated (min)	Intensity (in/hr)	Cu	Cd
29D	1.3	0.60	98	660	0.041	5.36	7	2.73	0.83	0.87
30D	2.9	0.60	98	980	0.055	5.36	9	2.43	0.82	0.87
33C	11.1	0.80	98	1180	0.020	6.10	11	2.51	0.82	0.88
35E	2.4	0.60	98	740	0.047	6.10	7	3.11	0.84	0.88
36E	4.7	0.60	98	860	0.055	6.10	7	3.11	0.84	0.88
39C	1.5	0.91	98	1280	0.030	5.36	11	2.21	0.81	0.89
40C	1.5	0.85	98	1070	0.030	5.36	10	2.31	0.81	0.89
41C	5.4	0.80	98	600	0.020	6.10	7	3.11	0.84	0.89
42C	1.0	0.91	98	1125	0.020	5.36	11	2.21	0.81	0.89
44C	8.7	0.80	98	530	0.020	6.10	6	3.34	0.85	0.89
46A	4.7	0.80	98	990	0.020	6.10	10	2.63	0.82	0.88
47A	10.0	0.01	98	1060	0.033	6.10	10	2.63	0.82	0.82

Note: Skipped No's: 32C, 34E, 37E, 43C


COUNTY OF LOS ANGELES
DRAINAGE CONCEPT/
HYDROLOGY STUDY
FOR
ENTRADA
TRACT 53295
LEGEND
TRACT BOUNDARY
PRIMARY BASIN LIMITS
SUB-AREA BASIN LIMITS
TIME OF CONCENTRATION (MIN.)
25 YR. FREQUENCY FLOWRATE
25 YR. FREQUENCY FLOWRATE
50 YR. FREQUENCY FLOWRATE
50 YR. BURNED FREQUENCY FLOWRATE
50 YR. BURNED AND BULKED FREQUENCY FLOWRATE
Q CATCH BASIN
SUMMATION OF AREA IN ACRES
SUMMATION OF FLOW IN CUBIC FEET PER SEC.
DRAINAGE AREA DESIGNATION
DRAINAGE AREA IN ACRES
STORM DRAIN LINE
FLOW DIRECTION
CHANNEL FLOW
CONCRETE/GUNITE DRAINAGE SWALE
CONCRETE FACING/EROSION CONTROL OR CONCRETE PAVEMENT
EMERGENCY OVERFLOW PATH
ASPHALT/CONCRETE ACCESS ROAD
DESIGN CRITERIA:
STORM EVENT
50 YR. = SUMP & UNDEVELOPED LOCATIONS
25 YR NON-SUMP LOCATIONS
50yr-24hr RAINFALL ISOHYET
100 YEAR
DEBRIS PRODUCTION AREA
SOIL TYPE
PERVIOUS
IMPERVIOUS
PERCENT IMPERVIOUS
LEGAL DESCRIPTION
NOTES
1. COMPLY WITH ALL STREET DRAINAGE REQUIREMENTS TO THE SATISFACTION OF THE CITY OF SANTA CLARITA.
2. DEDICATE THE NECESSARY EASEMENTS FOR THE STORM DRAIN SYSTEM TO THE SATISFACTION OF LA COUNTY DEPT. OF PUBLIC WORKS.
3. PROVIDE VEHICULAR ACCESS TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF THE COUNTY OF LOS ANGELES FLOOD CONTROL DISTRICT.
4. APPROVAL OF THE HYDROLOGY PLAN DOES NOT CONSTITUTE DETERMINATION OF THE EXTENT OF FLOOD HAZARD AREA AS REQUIRED WITHIN THE MEANING OF GOVERNMENT CODE SECTION 66462.5.
5. AN OFFSITE DRAINAGE COVENANT FOR ACCEPTANCE OF DRAINAGE AND DRAINAGE FACILITIES MAY BE REQUIRED.
6. PLACE A NOTE OF FLOOD HAZARD AND SHOW THE NATURAL DRAINAGE COURSES ON THE FINAL MAP.
7. AN EASEMENT TO THE LOS ANGELES FLOOD CONTROL DISTRICT TO BE GRANTED ON THE FINAL MAP FOR COVERED STORM DRAIN APPURTENANT STRUCTURES, INGRESS AND EGRESS FOR PURPOSES OF MAINTENANCE.
8. A DRAIN AGE EASEMENT/ASSESSMENT AREA MAY BE REQUIRED FOR THE MAINTENANCE OF THE PROPOSED STORM DRAIN FACILITIES.
9. PROPOSED STORM DRAIN INCIDENTAL TO BE MAINTAINED BY LOS ANGELES COUNTY FLOOD CONTROL DISTRICT UNLESS NOTED OTHERWISE.
10 PRIVATE/NON MAINTAINED DEVICES SHALL BE CONSTRUCTED PER GRADING PLAN
11 L.A. COUNTY FLOOD CONTROL DISTRICT MAINTAINED DEVICES SHALL BE CONSTRUCTED PER STORM DRAIN PLANS
12. ALL STORM DRAIN FACILITIES ACCESS WITHIN PRIVATE LOTS TO BE PRIVATELY/HOA MAINTAINED UNLESS OTHERWISE NOTED.
BASIN I
VTTM 61105
MISSION VILLAGE
NOT A PART
(SAME OWNER)
BASIN B
BASIN D
BASIN C
BASIN G
BASIN A
BASIN E
BASIN F
BASIN H
SCHOOL SITE
PARK SITE
FUTURE CONDOMINIUMS
MAGIC MOUNTAIN PARKWAY
ENTERTAINMENT DRIVE
MEDIA CENTER LANE
WESTRIDGE
SKYVIEW DRIVE
CLO THE ROAD
EXISTING CHEVRON SERVICE STATION
T.M. 61105
SEE SHEET 3
SEE SHEET 4
SEE SHEET 1
SEE EXISTING CONDITION SHEET 1
CROSS SECTION A-A
SCALED: 1"=20'
EXISTING SD PER PD 2592
EXISTING BOX CULVERT PER MTD 1764
EXISTING CATCH BASIN PER MTD 1764
EXISTING DESILTING INLET PER MTD 1764 TO BE REMOVED
EXISTING SD PER PD2014-13 TO BE REMOVED
EXISTING DESILTING INLET PER PD 2014-13
EXISTING CONC. CHANNEL PER PD 1052
EXIST. CULVERT TO BE ABANDONED OR REMOVED
EXISTING SD PER PD 1052 TO BE ABANDONED
LACFCD FEE LOT
LACFCD EASEMENT
DEBRIS CONE LIMIT
DEBRIS BASIN ACCESS ROAD
EXISTING DESILTING BASIN ACCESS ROAD
CHANNEL ACCESS ROAD
EARTHEN SWALE TO BE PRIVATELY MAINTAINED
GRADE STABILIZER
FINAL LOCATION TO BE DETERMINED AT GRADING STAGE (TYP.)
FLOW SPLITTER TO DRAINAGE CORRIDOR
OFFSITE AREA=5.9 AC
OFFSITE CONVERGENCE LENGTH=640 FT.
NATURAL CONDITION SLOPE=0.060
OFFSITE AREA=8.8 AC
OFFSITE CONVERGENCE LENGTH=810 FT.
NATURAL CONDITION SLOPE=0.080
OFFSITE AREA=6.6 AC
OFFSITE CONVERGENCE LENGTH=650 FT.
NATURAL CONDITION SLOPE=0.100
AREA 1A
OFFSITE AREA= 23.1 AC
OFFSITE CONVERGENCE LENGTH= 1970 FT.
NATURAL CONDITION SLOPE= 0.133
TOTAL OFFSITE AREA= 284.9 AC
OFFSITE CONVERGENCE LENGTH= 3,500 FT.
EXISTING CONDITION SLOPE= 0.025
NO DEBRIS CONTRIBUTED TO THIS POINT DUE TO UPSTREAM CONDITION
EXISTING OUTLET STRUCTURE
EXISTING BASIN TO BE MODIFIED
ALLIANCE
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CIVIL ENGINEERING • LAND PLANNING • RELATED DESIGN • SURVEYING
PLANS PREPARED BY:
ALLIANCE LAND PLANNING & ENGINEERING INC.
2248 FARADAY AVE. CARLSBAD, CA. 92008
(760) 431-9896
PLANS PREPARED UNDER THE DIRECTION OF:
CRAIG M. WHITTEKER R.C.E. 51929
9/15/2017
DATE
REGISTERED PROFESSIONAL ENGINEER
CRAIG MATTHEW WHITTEKER
NO. 51929
EXP. 6-30-18
CIVIL
STATE OF CALIFORNIA
PLANS PREPARED FOR:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE: ALEX HERRELL
HYDROLOGY STUDY APPROVED
CHECKED BY: [illegible] DATE 11/16/2017
APPROVED BY: [illegible] DATE 11/16/2017
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
NO. DATE BY APP'R
SHEET 2
COUNTY OF LOS ANGELES
5 SHEETS
DRAINAGE CONCEPT/
HYDROLOGY STUDY
FOR ENTRADA
TENTATIVE TRACT 53295
DEVELOPED CONDITION
ENTRADA DRAINAGE CONCEPT - DEVELOPED CONDITION
I:\CAD\13932\HYDROLOGY\13930-HYDRO-SHT-02.dwg
PLAN PREPARATION DATE:

ENTRADA SOUTH - LID
DIVERSION CALCUALTINS FOR 80% LONG TERM CAPTURE (Qpm)

DIVERSION CALCULATIONS - BASIN A

BASIN	DIVERTER	TRIB DA	TRIB AREA	PIPE SIZE	SLOPE	Qpm	Qmax
			ac	in	%	cfs	cfs
A	A1	S	1.3	4	2.0	0.24	0.28
	A2	R	2.1	6	0.5	0.39	0.43
	MAIN	S, R	3.4	6	2.0	0.63	0.86
	A3	C, D, F	21.9	8	13.0	4.03	4.78
TOTAL	OUTLET	ALL	25.3	8	13.0	4.66	4.78

DIVERSION CALCULATIONS - BASIN B

BASIN	DIVERTER	TRIB DA	TRIB AREA	PIPE SIZE	SLOPE	Qpm	Qmax
			ac	in	%	cfs	cfs
B	B1	B1	45.0	10	3.5	10.73	10.84
	B2	P, W	17.9	15	2.4	4.27	4.39
TOTAL	OUTLET	ALL	62.9	18	1.8	15.00	15.27

DIVERSION CALCULATIONS - BASIN C

BASIN	DIVERTER	TRIB DA	TRIB AREA	PIPE SIZE	SLOPE	Qpm	Qmax
			ac	in	%	cfs	cfs
C	C	B2	24.7	8	15.0	4.50	5.14

BASIN A1 - 4" @ 2% = 0.28 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.02000	ft/ft
Normal Depth	0.33	ft
Diameter	0.33	ft

Results

Discharge	0.28	ft^3/s
Flow Area	0.09	ft^2
Wetted Perimeter	1.04	ft
Hydraulic Radius	0.08	ft
Top Width	0.00	ft
Critical Depth	0.29	ft
Percent Full	100.0	%
Critical Slope	0.01779	ft/ft
Velocity	3.32	ft/s
Velocity Head	0.17	ft
Specific Energy	0.50	ft
Froude Number	0.00	
Maximum Discharge	0.31	ft^3/s
Discharge Full	0.28	ft^3/s
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN A1 - 4" @ 2% = 0.28 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.29	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01779	ft/ft

BASIN A2 - 6" @ 0.5% = 0.43 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Normal Depth	0.50	ft
Diameter	0.50	ft

Results

Discharge	0.43	ft^3/s
Flow Area	0.20	ft^2
Wetted Perimeter	1.57	ft
Hydraulic Radius	0.13	ft
Top Width	0.00	ft
Critical Depth	0.33	ft
Percent Full	100.0	%
Critical Slope	0.00809	ft/ft
Velocity	2.19	ft/s
Velocity Head	0.07	ft
Specific Energy	0.57	ft
Froude Number	0.00	
Maximum Discharge	0.46	ft^3/s
Discharge Full	0.43	ft^3/s
Slope Full	0.00500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN A2 - 6" @ 0.5% = 0.43 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.33	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00809	ft/ft

BASIN A1/A2 MAIN - 6" @ 2% = 0.86 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Diameter	0.50	ft

Results

Discharge	0.86	ft^3/s
Flow Area	0.20	ft^2
Wetted Perimeter	1.57	ft
Hydraulic Radius	0.13	ft
Top Width	0.00	ft
Critical Depth	0.45	ft
Percent Full	100.0	%
Critical Slope	0.01747	ft/ft
Velocity	4.38	ft/s
Velocity Head	0.30	ft
Specific Energy	0.80	ft
Froude Number	0.00	
Maximum Discharge	0.92	ft^3/s
Discharge Full	0.86	ft^3/s
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN A1/A2 MAIN - 6" @ 2% = 0.86 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.45	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01747	ft/ft

BASIN A3 - 8" @ 13% = 4.78 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.13000	ft/ft
Normal Depth	0.67	ft
Diameter	0.67	ft

Results

Discharge	4.78	ft^3/s
Flow Area	0.35	ft^2
Wetted Perimeter	2.10	ft
Hydraulic Radius	0.17	ft
Top Width	0.00	ft
Critical Depth	0.67	ft
Percent Full	100.0	%
Critical Slope	0.12501	ft/ft
Velocity	13.57	ft/s
Velocity Head	2.86	ft
Specific Energy	3.53	ft
Froude Number	0.00	
Maximum Discharge	5.15	ft^3/s
Discharge Full	4.78	ft^3/s
Slope Full	0.13000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN A3 - 8" @ 13% = 4.78 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.67	ft
Channel Slope	0.13000	ft/ft
Critical Slope	0.12501	ft/ft

BASIN B1 - 10" @ 3.5% = 4.39 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.03500	ft/ft
Normal Depth	0.83	ft
Diameter	0.83	ft

Results

Discharge	4.39	ft^3/s
Flow Area	0.54	ft^2
Wetted Perimeter	2.61	ft
Hydraulic Radius	0.21	ft
Top Width	0.00	ft
Critical Depth	0.81	ft
Percent Full	100.0	%
Critical Slope	0.03106	ft/ft
Velocity	8.12	ft/s
Velocity Head	1.02	ft
Specific Energy	1.85	ft
Froude Number	0.00	
Maximum Discharge	4.73	ft^3/s
Discharge Full	4.39	ft^3/s
Slope Full	0.03500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN B1 - 10" @ 3.5% = 4.39 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.83	ft
Critical Depth	0.81	ft
Channel Slope	0.03500	ft/ft
Critical Slope	0.03106	ft/ft

BASIN B2 - 15" @ 2.4% = 10.84 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.02400	ft/ft
Normal Depth	1.25	ft
Diameter	1.25	ft

Results

Discharge	10.84	ft^3/s
Flow Area	1.23	ft^2
Wetted Perimeter	3.93	ft
Hydraulic Radius	0.31	ft
Top Width	0.00	ft
Critical Depth	1.20	ft
Percent Full	100.0	%
Critical Slope	0.02092	ft/ft
Velocity	8.83	ft/s
Velocity Head	1.21	ft
Specific Energy	2.46	ft
Froude Number	0.00	
Maximum Discharge	11.66	ft^3/s
Discharge Full	10.84	ft^3/s
Slope Full	0.02400	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN B2 - 15" @ 2.4% = 10.84 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.25	ft
Critical Depth	1.20	ft
Channel Slope	0.02400	ft/ft
Critical Slope	0.02092	ft/ft

BASIN B - OUTLET - 18" @ 1.8% = 15.27 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01800	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft

Results

Discharge	15.27	ft³/s
Flow Area	1.77	ft²
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.38	ft
Top Width	0.00	ft
Critical Depth	1.41	ft
Percent Full	100.0	%
Critical Slope	0.01556	ft/ft
Velocity	8.64	ft/s
Velocity Head	1.16	ft
Specific Energy	2.66	ft
Froude Number	0.00	
Maximum Discharge	16.42	ft³/s
Discharge Full	15.27	ft³/s
Slope Full	0.01800	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN B - OUTLET - 18" @ 1.8% = 15.27 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.41	ft
Channel Slope	0.01800	ft/ft
Critical Slope	0.01556	ft/ft

BASIN C - 8" @ 15% = 5.14 cfs

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.15000	ft/ft
Normal Depth	0.67	ft
Diameter	0.67	ft

Results

Discharge	5.14	ft^3/s
Flow Area	0.35	ft^2
Wetted Perimeter	2.10	ft
Hydraulic Radius	0.17	ft
Top Width	0.00	ft
Critical Depth	0.67	ft
Percent Full	100.0	%
Critical Slope	0.14499	ft/ft
Velocity	14.57	ft/s
Velocity Head	3.30	ft
Specific Energy	3.97	ft
Froude Number	0.00	
Maximum Discharge	5.53	ft^3/s
Discharge Full	5.14	ft^3/s
Slope Full	0.15000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

BASIN C - 8" @ 15% = 5.14 cfs

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.67	ft
Channel Slope	0.15000	ft/ft
Critical Slope	0.14499	ft/ft

DRAINAGE BASIN AT GOLF COURSE
ENTRADA SOUTH

EXISTING 36" RCP FROM GOLF COURSE (LOW/MID LEVEL FLOWS)

LIMITS OF CONSTRUCTION

PROPOSED HIGH FLOW SPILLWAY GROUTED RIPRAP

WSEL=1252.0

PROPOSED TOP OF CONCRETE 1253 FS

(1245.0) IE

EXISTING TO REMAIN

EXISTING ACCESS ROAD

2:1 CONCRETE

1:1

PROPERTY LINE

PRIVATE

LACDPW TO MAINTAIN

LIMITS OF CONSTRUCTION

WARP TO EXISTING

BASIN INVERT 1240.0

PROPOSED RCB INLET
Q_{50B} = 746 CFS

PROPOSED PIPE INLET
$Q_{MID-FLOW}$ = 13 CFS

RCB — TRANSITION — RCP

RCP

15% ACCESS ROAD

12'

2:1

4%

6%

8%

TURN-AROUND PAD

40'

40'

SCE OH

SCE OH

SCE OH

SCE OH

PROPOSED TOP OF BANK 1253 FG

PROPOSED TOP OF CONCRETE 1253 FS

OUTLET

PROPOSED GRADE STABILIZER

1230

1235

1240

1245

1250

1255

1260

SCALE: 1" = 20'

GRAPHIC SCALE

20 10 0 20 40

(IN FEET)

1 inch = 20 ft.

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I:\CAD\0930\$DRAINAGE CORRIDOR REVISION OCTOBER 2015\EXHIBITS\0930-DIVERTER BASIN EXHIBIT.dwg

DRAINAGE BASIN AT GOLF COURSE
ENTRADA SOUTH
10/18/17

EXISTING 36" RCP FROM GOLF COURSE (LOW/MID LEVEL FLOWS)

LIMITS OF CONSTRUCTION

ACCESS ROAD

PROPOSED HIGH FLOW SPILLWAY GROUTED RIPRAP

WSEL=1252.0

PROPOSED TOP OF CONCRETE 1253 FS

(1245.0) TF

EXISTING TO REMAIN

EXISTING

2:1 CONCRETE

1250

1245

1255

12'

15% ACCESS ROAD

PROPERTY LINE

PRIVATE

LACDPW TO MAINTAIN

LIMITS OF CONSTRUCTION

WARP TO EXISTING

BASIN INVERT 1240.0

PROPOSED RCB INLET
Q_{50B} = 746 CFS

PROPOSED PIPE INLET
$Q_{MID-FLOW}$ = 13 CFS

RCB TRANSITION RCP

RCP

8%

12'

4%

6%

TURN-AROUND PAD

40'

40'

1250

SCE OH

SCE OH

WSEL=1252.0

PROPOSED TOP OF BANK 1253 FG

PROPOSED TOP OF CONCRETE 1253 FS

OUTLET

PROPOSED GRADE STABILIZER

SCE OH

SCE OH

SCE OH

SCALE: 1"=20'

GRAPHIC SCALE

20 10 0 20 40

(IN FEET)

1 inch = 20 ft.

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Geosyntec consultants

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Memorandum

Date:	24 October 2017
To:	Miles Helfrich, Newhall Land
From:	Aaron Poresky and Austin Orr, Geosyntec Consultants
Subject:	Entrada South – Evaluation of Conformance with Newhall LID Performance Standard

1. INTRODUCTION

The Entrada South Project (Tentative Tract Map (TTM) No. 53295) (Project) includes low impact development (LID) best management practices (BMPs) as shown in the *LID/SUSMP/Water Quality Maintenance Plan Map for Entrada South* (Water Quality Exhibit, Alliance, 2017). The purpose of this memorandum is to verify that the LID BMPs proposed for the Project have been selected and sized in a manner consistent with the Project LID Performance Standard as defined by the Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit (Order No. R4-2012-0175). The Newhall Waste Discharge Requirements (WDRs) (Order No. R4-2012-0139) and the *Newhall Ranch Sub-Regional Stormwater Mitigation Plan (NRSSMP)* (Geosyntec, 2009) also serve as benchmarks for evaluating conformance.

The Project LID Performance Standard establishes three separate conformance metrics, including BMP selection, sizing of individual BMPs for each drainage area, and sizing of BMPs to provide adequate retention volume or equivalent biofiltration volume at the tract map-scale. In summary, this memorandum demonstrates conformance with these three different conformance metrics, including:

- **BMP selection analysis.** LID BMPs have been selected in a manner consistent with the LID selection criteria (i.e., infiltration feasibility criteria) contained in the LID Performance Standard;

- **BMP sizing analysis.** The combination of parcel-based, regional infiltration/ bioinfiltration facilities, and "green street" facilities provide capture and treatment of at least 80 percent of average annual runoff volume for each drainage area within the Project, consistent with the LID Performance Standard; and

- **Tract map-scale retention analysis.** The Project provides retention plus equivalent biofiltration volume consistent with the retention requirements of the Project LID Performance Standard.

Collectively, these findings, which are supported by the analyses in this memorandum, demonstrate that the improvements proposed as part of the Project conform to the applicable standards for managing stormwater quality.

This memorandum also explains why the requirements of the Los Angeles County Department of Public Works' (LACDPW) *Development Planning for Storm Water Management, A Manual for the Standard Urban Stormwater Mitigation Plan* (SUSMP) (Los Angeles County, 2002) and the Los Angeles County LID Ordinance and Manual (LACDPW, 2008, 2009) are met or exceeded when the Project's LID Performance Standard is met.

Section 2 describes the applicable LID Performance Standards which are used to demonstrate Project conformance. Section 3 describes the Project's water quality project design features (PDFs). Section 4 demonstrates conformance of the water quality PDFs to each of the three conformance metrics identified above.

Chronology note: The Entrada South Drainage Concept was previously approved by LACDPW in January 2014. Updates to the project design have been made to preserve a greater portion of Unnamed Canyon 2. This resulted in reduction in project footprint and relocation of the three regional water quality facilities located in the Unnamed Canyon 2 drainage corridor (referred to as Facilities A, B, and C). This memorandum incorporates updates associated with these relatively isolated changes.

2. LID PERFORMANCE STANDARD

2.1 Newhall WDR LID Performance Standard

The Newhall WDR (Order No. R4-2012-0139)[1] was adopted by the Los Angeles Regional Board on September 14, 2012. The Newhall WDR does not directly apply to the Project; however, it serves as the basis for the Newhall LID Performance Standard and as a benchmark for the Project. The Newhall WDR prescribes the LID Performance Standard for the villages within the Newhall Ranch (General Conditions, Paragraph 10):

> Each development area within the Resource Management and Development Plan (RMDP) shall incorporate the following measures. Development areas within the RMDP site shall

[1] http://www.waterboards.ca.gov/rwqcb4/water_issues/programs/401_water_quality_certification/Newhall/index.shtml

comply with all applicable regulatory requirements of the Los Angeles County MS4 Permit in place at the time of the preparation of the Water Quality Technical Report (WQTR) unless an equivalent requirement in the RMDP Clean Water Act Section 401 Water Quality Certification and Waste Discharge Requirements (WDR) is more stringent. Project design features shall be selected and sized to retain the volume of stormwater runoff produced from a 1.1 inch storm event[2] (LID design volume) to reduce the percentage of Effective Impervious Area (EIA) to 5 percent or less of the total project area within the Newhall Ranch Specific Plan. When it has been demonstrated that 100 percent of the LID design volume cannot be feasibly[3] infiltrated, then biofiltration shall be provided for 1.5 times the portion of the LID design volume that is not retained. Runoff from all EIA shall be treated with effective treatment control measures that are selected to address the pollutants of concern and are sized to capture and treat 80 percent of the average annual runoff volume. Each village-level project shall achieve the LID Performance Standard cumulatively, considering the retention volume and equivalent biofiltration volume[4] provided by the project itself and by all previous development phases within the RMDP area. The LID Performance Standard shall be implemented as follows:

Institutional, commercial, multi-family residential, recreation, and park land use parcels shall implement retention or biofiltration BMPs within the parcel footprint. Runoff from roofs, patios, and walkways in single family residential parcels shall be dispersed over landscaped areas to retain runoff. Runoff from the remaining developed area and that which is not retained within the parcel footprints shall flow through the storm drain system to the regional infiltration/ biofiltration facilities. Based on an assessment of feasibility, one of three BMP strategies shall be applied to each project (i.e., village) as follows:

a. If it is feasible to infiltrate all of the runoff produced from the 1.1 inch storm from the developed area (i.e., soil infiltration rates are at least 0.5 inches per hour, and no other technical infeasibility concerns exist), infiltration BMPs *[Category 1]* shall be used. Infiltration BMPs include bioretention (without an underdrain), permeable pavement, infiltration galleries, infiltration basins or trenches, or an equivalent infiltration BMP.

b. If it has been demonstrated in the Project WQTR and Drainage Concept Report that the BMP strategy of subsection (a), of this condition is infeasible, and if the project has low soil infiltration rates (i.e., the soil infiltration rate is less than 0.5 inches per hour), but no other technical infeasibility concerns exist, bioinfiltration BMPs *[Category 2]* shall be

[2] The 85th percentile, 24-hour storm depth is equal to 1.1 inches as determined from the Los Angeles County 85th Percentile 24-hr Rainfall Isohyetal Map (February 2004).
[3] Feasibility shall be based on the approved Ventura County Technical Guidance Manual for Stormwater Quality Control Measures (7-13-2011)).
[4] Biofiltration volume shall be equated to retention volume at a ratio of 1.5 (biofiltration) to 1.0 (retention).

used. Bioinfiltration facilities are similar to bioretention facilities with an underdrain, but they include storage below the underdrain to maximize the volume infiltrated. These facilities shall retain a portion of the runoff from the 1.1 inch design storm, then biofilter 1.5 times the remaining runoff from the 1.1 inch design storm.

c. If it has been demonstrated in the Project WQTR and Drainage Concept Report that the BMP strategies of subsections (a) and (b) of this condition are infeasible, then biofiltration BMPs *[Category 3]* shall be used. These BMPs shall biofilter the runoff produced from the 1.5 times the 1.1 inch design storm.

Runoff from roadways shall be retained or biofiltered in retention or biofiltration BMPs sized to capture the design storm volume or flow, per the guidance in USEPA's *Managing Wet Weather with Green Infrastructure: Green Streets*.

No more than 5% of the total project area shall be treated using conventional treatment methods that address the pollutants of concern. Media filters (or equivalent BMPs that address the pollutants of concern) shall be sized to capture and treat 80% of the average annual runoff volume from the allowable EIA.

Regional facilities shall be implemented to infiltrate or biofilter the runoff volume from the 1.1 inch design storm volume that has not been retained or biofiltered within parcels, single family lots, or road right of ways. Additionally, regional facilities shall be designed to provide extended detention treatment for the additional runoff volume required to provide 80% capture and treatment of the average annual runoff volume for the tributary area to the regional facility per the Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan treatment performance standard.

[alternative terminology provided in brackets]

The WDR requires that Projects also conform to any aspects of the Los Angeles County MS4 Permit in effect at the time of Project approval that are more stringent than the respective provisions of the WDR.

2.2 Los Angeles MS4 Permit

The Los Angeles County MS4 Permit (Order No. R4-2012-0175) was adopted by the Los Angeles Regional Board on November 8, 2012, and includes an LID Performance Standard that differs slightly from the Newhall WDR LID Performance Standard. Notably, the MS4 Permit varies from the WDR in that:

- The MS4 Permit does not include five percent allowable EIA.

- The MS4 Permit defines biofiltration such that the storage volume provided in such systems cannot be less than the stormwater quality design volume (SWQDv), defined as the runoff from the 1.1 inch precipitation event.

These differences are considered more stringent or equivalently stringent than the Newhall WDR, therefore they replace the respective provisions in the Newhall WDR in the Project LID Performance Standard. In other respects, the Newhall WDR LID Performance Standard is equivalent to that required by the Los Angeles County MS4 Permit, as demonstrated in the subsequent sections. The LID Performance Standard for the project is based on the more stringent provisions of the 2012 MS4 Permit and the Newhall WDR as illustrated in Figure 1.

2.3 Newhall Ranch Sub-Regional Stormwater Mitigation Plan

The approved NRSSMP (Geosyntec, 2008) was developed in 2008 and subsequently amended in November 2010 to include the Project area. The BMP selection and sizing criteria described in the NRSSMP were incorporated into the Newhall WDR LID Performance Standard and made more stringent as part of this incorporation, therefore the NRSSMP does not establish a separate LID Performance Standard for the Project water quality design features proposed as part of this Project.

2.4 Los Angeles County SUSMP

The LACDPW *Development Planning for Storm Water Management, A Manual for the Standard Urban Stormwater Mitigation Plan* (SUSMP) (Los Angeles County, 2002) specifies a design storm volume of 0.75 inches. In comparison, the Newhall WDR LID Performance Standard specifies a design storm of 1.1 inches, with an overlaid requirement of capture and treatment of at least 80 percent of average annual runoff volume. As such, BMPs sized for the Newhall WDR Performance Standard significantly exceed the size of BMPs that would be required for compliance the SUSMP.

2.5 Los Angeles County LID Ordinance

The Los Angeles County LID Manual (LACDPW, 2014) implements the provisions of the 2012 MS4 Permit. This Manual establishes the same standard as the 2012 MS4 Permit.

3. PROPOSED WATER QUALITY PROJECT DESIGN FEATURES

The water quality PDFs include parcel-based LID BMPs, “green streets” BMPs, single family residential hydrologic source controls, and regional infiltration/bioinfiltration facilities. The sections below describe the water quality PDFs that are proposed as part of the Project and how these features have been considered in this conformance analysis.

3.1 Parcel-Based LID BMPs

3.1.1 Parcel-based BMP Commitments

Parcel-based LID BMPs will be implemented within multi-family, commercial, institutional, and park/recreation land uses (see Figure 2) as part of the construction of final parcel improvements. Parcel-based LID BMPs include infiltration (Category 1), bioinfiltration (Category 2), and biofiltration (Category 3) as described in the LID Performance Standard (Section 2.1) and illustrated in Figure 1. Three different applications for parcel-based BMPs occur within the project, depending on the presence and type of downstream regional BMPs:

- Where discharge from parcels drains to a downstream regional infiltration system that is designed to fully infiltrate runoff up to the 80 percent capture sizing standard, specific numeric commitments to parcel-based LID BMPs are not required as part of demonstrating conformance. Regional facilities alone meet the numeric commitments of the LID Performance Standard. This applies to parcels that drain to Regional Facilities A, B, and C.

- Where discharge from parcels drains to a downstream regional biofiltration/bioinfiltration facility that is not a full infiltration facility, parcel-based BMPs are designed for the full SWQDv, and their treated discharge is also treated in the downstream regional facility. The combined effect of parcel-based BMPs and regional LID facilities meets the full LID Performance Standard. This applies to runoff from parcels that drain to Regional Facility D.

- Where discharge from parcels drains to receiving waters without first flowing to a regional LID facility (i.e., "stand alone parcel-based BMPs"), these parcel-based BMPs are designed to: 1) have a minimum storage volume equivalent to the SWQDv, (2) infiltrate to the maximum extent feasible based on parcel-specific infiltration feasibility, (3) biofilter 1.5 times the remaining runoff that cannot be feasibly infiltrated from the 1.1 inch design storm, and (4) achieve 80 percent capture of the average annual runoff. By meeting these criteria, these facilities fully meet the LID Performance Standard as supported by analyses contained in Appendix A.

Parcel-based BMPs have been incorporated into the Project Water Quality Exhibit based on these criteria. See Figure 3 for infeasibility screening results based on analysis by RTF&A (2013, 2017) and Figure 4 for the spatial distribution of the parcel-based treatment categories within the Project. Based on these factors and the estimated impervious cover of each parcel, the Project includes commitments for specific LID volumes for each parcel (see Figure 4). Newhall Land will condition the development of these parcels to require that the volumetric commitments must be provided by

the developers of the parcels (except as adjusted for imperviousness or as part of an approved equivalent approach, as described in Sections 3.1.2 and 3.1.3, below).

3.1.2 Requirements for Imperviousness Different than Planned

The final imperviousness of parcel development plans may deviate from the assumptions made in this submittal, requiring lesser or greater commitments than shown in Figure 4. Developers of parcels shall be required to estimate parcel imperviousness at the final design stage.

- If imperviousness is less than planned, the developer may adjust volume-based commitments downward by the ratio of the final design imperviousness to the planned impervious shown in Figure 4. This will result in lower volume commitments. It will also result in a credit toward overall lower imperviousness within the tributary to the respective regional facility, which will be recorded in a tracking system to be administered by Newhall Land (See Section 3.1.4) and made available to parcels that have higher imperviousness than planned.

- If imperviousness is greater than estimated in Figure 4, the developer shall be required to adjust parcel-based commitments upward by the ratio of actual imperviousness to planned imperviousness. In this case, the parcel-based commitment will be higher. Additionally, the developer will be required to obtain a credit from the tracking system described in Section 3.1.4 to offset the addition of impervious surface tributary to the regional facility.

3.1.3 Equivalent Options for Complying with Parcel-based Commitments

Constraints may be identified in the development of parcel plans that render it infeasible or impracticable to meet the volumetric commitments shown in Figure 4 within the boundaries of the parcel. Alternative approaches may be used that are consistent with applicable requirements and provide equivalent control at the scale of the tributary area to each regional facility:

- As one option, developers of parcels may enter into agreements with adjacent or nearby parcels to provide volume-based commitments in adjacent or nearby parcels. The parcels where volume commitments are provided must be within the regional facility tributary area as the parcel claiming these benefit and shall be constructed prior to occupancy of any parcel that utilizes them for compliance. Parcel-level submittals shall describe how, where, and when commitments will be met and how these BMPs will be maintained.

- Other equivalent options may be considered for approval with demonstration of equivalency and consistency with applicable requirements.

3.1.4 Tracking System for Parcel-based Commitments

Newhall Land shall develop and administer a system for tracking parcel-based commitments within the tributary area to each regional facility. This system shall track adjustments to imperviousness compared to planned imperviousness shown in Figure 4 and shall track implementation of parcel-based BMPs in comparison to commitments. This system shall ensure that:

1) Where parcels have imperviousness greater than shown in Figure 4, other parcels have a reduction in imperviousness such that the overall effect is that the imperviousness to the regional facility does not increase significantly,

2) Where parcels provide a portion of volume on adjacent or nearby parcels, total commitments are met.

3.2 Green Streets

The Project will utilize "green streets" techniques to treat runoff from public right-of-ways in a manner consistent with the USEPA's *Managing Wet Weather with Green Infrastructure: Green Streets* (USEPA, 2008). Two forms of green streets implementation have been incorporated into the Project:

- Where streets are tributary to regional LID facilities, the full requirements of the LID Performance Standard will be met in regional LID facilities. Additionally, the Project will consider the use of swales, biofiltration, and/or bioinfiltration systems where conditions are favorable, however credit for credit for green streets BMPs has not been applied toward sizing the regional LID facilities. In other words, the regional facilities have been sized assuming that no green streets BMPs will be installed, which is considered conservative at this phase of project planning; no specific numeric commitments are made for green streets implementation in these areas.

- For streets that are not tributary to regional LID facilities (i.e., Magic Mountain Parkway and adjacent portions of connecting streets), proprietary flow-based biofiltration BMPs (e.g., Filterra® or equivalent) have been sized per the criteria specified by the LID Performance Standard and the Los Angeles County LID Calculator.

3.3 Single Family Hydrologic Source Controls

Single family residential hydrologic source controls (HSCs) will be implemented across the single family residential portions of the Project. These controls will consist primarily of disconnecting downspouts to areas of amended soil in the front yards of residences, or an equivalent approach.

Because benefits of single family HSCs may vary depending on lot size and soil conditions, a conservative quantification of effectiveness of HSCs was used as part of sizing regional LID facilities. These approaches were not considered at all as part of areas tributary to Facility A, B, and C. They were evaluated in a conservative manner as part of sizing of Regional Facility D. The covenants, codes, and restrictions (CC&Rs) associated with these land uses will require the implementation of HSCs.

3.4 Regional LID Facilities

There are three regional LID facilities proposed within the Project. Regional Facilities A, B, and C are each proposed as infiltration facilities (Category 1) based on feasibility screening results (RTF&A, 2013, 2017, Figure 3). These facilities have been sized and designed to fully infiltrate 80 percent of average annual runoff from the tributary area. While hydrologic source controls will be applied in the tributary area to these watersheds, the effect of these hydrologic source controls has not been claimed in sizing.

Runoff from subwatersheds in the western portion of the Project are proposed to be directed to Mission Village Regional Facility D (See Figure 4), which is sized for its ultimate conditions in which it will accept runoff from Mission Village, Legacy Village, Entrada South, and portions of the existing Westridge community. The ultimate condition of Regional Facility D is considerably more conservative than the interim condition, in which only the Entrada South Project is constructed and the remainder of the tributary area remains undeveloped. Mission Village Facility D is described and analyzed as part of the Mission Village Phase I Final Hydrology Study and associated conformance memorandum (Geosyntec, 2016).

The detailed designs of regional LID facilities will be developed at a later time, and will be developed to be consistent with design and maintenance standards acceptable to LACDPW.

4. CONFORMANCE TO APPLICABLE LID PERFORMANCE STANDARD

This section summarizes the conformance of the Project's proposed LID design features to each element of the Project LID Performance Standard.

4.1 BMP Selection per LID Hierarchy

The Entrada South LID Performance Standard requires that LID BMPs be selected based on an analysis of infiltration feasibility. The follow paragraphs describe how the Project conforms to this requirement.

4.1.1 Parcel-based LID BMPs

Parcel-based LID BMPs were selected using a Project-wide feasibility screening for applicable lots. Parcel-based infiltration feasibility was estimated based on BMP siting recommendations included in the *Geotechnical Infiltration Evaluation Update for Vesting Tentative Tract Map No. 53295* (Infiltration Feasibility Report, RTF&A, 2013). The categorization of parcel-based LID BMPs included in the report was based upon the infiltration rates of the on-site materials, presence of geotechnical hazards, depth to groundwater, and location of fill materials. Additionally, where downstream regional LID facilities would retain the entire SWQDv and would fully infiltration at least 80 percent of average annual runoff, parcel-based BMPs were not required to fully comply with numeric LID sizing and selection criteria. The results of infeasibility screening are presented in Figure 3.

4.1.2 Regional LID Facilities

The Infiltration Feasibility Report (RTF&A, 2013) included results from site-specific infiltration feasibility investigations of Regional Facilities A, B, and C. RTF&A completed one infiltration test per regional infiltration basin area. The average of testing results was 18 inches per hour, with a low of 3.2 inches per hour and a high of 34 inches per hour. Geological studies for all three facilities show the presence of alluvial deposits in the subsurface that extend at least 15 feet below the proposed invert, which indicates the limited potential for groundwater mounding if the full water quality design volume is infiltrated in this area. Groundwater was not encountered in any of the boring tests and was determined to be at least 10 feet below the proposed facilities. RTF&A updated their geotechnical evaluations in 2017 based on the revised Regional Facility locations and found that the current basin locations also support infiltration of the full SWQDv at a preliminary recommended design infiltration rate of 3 inches per hour. Based on these findings, Facilities A, B, and C are proposed as complete infiltration facilities (Category 1), which is consist with the preferred hierarchy for BMP selection.

For Facility D, Leighton and Associates (2013) completed an investigation of infiltration feasibility as part of the Phase 1 Final Hydrology Study for Mission Village. This investigation found that infiltration into Facility D would result in potential geotechnical concerns that cannot be reasonably mitigated. The report stated that infiltration in the facility would likely migrate laterally towards the active river channel, which could adversely impact the stability of the existing bluffs located along the river channel. Thus, the report concluded that a biofiltration facility, designed with limited incidental infiltration, is recommended for Facility D. Facility D is proposed as a biofiltration facility (Category 3). Therefore Regional Facility D is consistent with the selection hierarchy required as part of the LID Performance Standard.

4.2 BMP Sizing for 80 Percent Capture of Drainage Area Runoff

4.2.1 Regional Facilities

The LID Performance Standard requires that regional facilities provide infiltration, biofiltration, and/or extended detention treatment for runoff volume not already addressed within the watershed, to provide 80 percent capture and treatment of the average annual runoff volume for the tributary area to the regional facility regional facilities. The designs of Facilities A, B, C and Regional Facility D were modeled using the EPA SWMM model for a long term continuous simulation period to demonstrate that this standard is met based on the WQ volume contained in the basin below the overflow elevation. This standard must be met for all areas draining to the facility, therefore, the entire tributary area was modeled. A summary of the facility sizing results is described in Table 1. A detailed description of modeling methodology and assumptions used to evaluate sizing is provided in Attachment A. SWMM model files are provided as Appendix A.1 Regional Facility D was modeled based on the ultimate proposed condition of its drainage area, as described in the memorandum: "Mission Village Phase 1 Final Hydrology Study – Evaluation of Conformance with Newhall LID Performance Standard" (Geosyntec Consultants, May 23, 2016).

Table 1: Catchment Parameters and Regional Facility Sizing Results

BMP ID	Tributary Area (acres)[1]	Impervious Fraction of Catchment (%)[1]	WQ Volume Required (volume below overflow) (ac-ft)[2,3]	WQ Volume Provided (volume below overflow) (ac-ft)[3]
Facility A	25.3	74.9	1.6	1.7
Facility B	62.9	61.6	3.4	3.4
Facility C	24.7	51.0	1.1	1.1
Regional Facility D	720.3[4]	45.6[4]	35.2[4]	35.2[4]

[1]Imperviousness based on area weighted average of land use-based values from LA County Hydrology Manual; calculated for purposes of water quality analysis; see Attachment A.
[2] WQ volumes below overflow elevation needed for 80% capture of annual average runoff volume from tributary area.
[3]WQ volume includes pore volume in gravel and media, as well as ponded volume above the media surface and below the overflow elevation; system controlled at outlet, therefore fills from the bottom.
[4]Regional Facility D analysis includes all areas draining to Regional Facility D in the ultimate build-out condition (i.e., Mission Village, Legacy Village constructed). Regional Facility D sizing demonstrated in Mission Village Conformance Memorandum

As shown in Table 1 the provided WQ volumes equal or exceed the required WQ volumes for all facilities and are considered to satisfy the requirements of the LID Performance Standard. While the LID Performance Standard allows some of the 80 percent capture standard to be met via extended detention, the proposed LID facilities include only retention (for Regional Facilities A, B, and C) and biofiltration (Regional Facility D), which provides a superior level of treatment

treatment compared to extended detention, therefore this aspect of the LID Performance Standard is met and exceeded.

Basins A, B, and C will be offline. Water will be diverted to these basins from a diversion structure. Diversion structure capacity has been calculated to ensure that the total system will capture and infiltrate 80 percent of long term runoff volume. The required diversion structure capacity was calculated using SWMM as explained in Attachment A, to determine the flowrate that would provide 80 percent long term infiltration of runoff volume. This flowrate was compared to the based the peak flowrate for the 1.1-inch storm calculated using LACPDW HydroCalc (See Alliance, 2017). Table 2 shows the required and provided diversion flowrates.

Table 2: Required and Provided Diversion Structure Flowrates

BMP ID	Qpm from HydroCalc for 1.1-inch Storm, cfs (Alliance, 2017)	Required Diversion Q from SWMM Model for 80% Long Term Capture, cfs	Provided Diversion Q, cfs
Facility A	4.7	4.7	4.7
Facility B	8.2	15	15
Facility C	2.8	4.5	4.5

As shown in Table 2, the provided diversion flowrates for regional facilities are equal to the larger of the required flowrate for 80 percent long term capture and the Qpm. Refinement of diversion flowrates may be warranted as part of more detailed hydrologic study and water quality plan development.

4.2.2 Parcel-based LID BMPs

Stand-alone parcel-based LID BMPs within the Project were sized with physical storage equal to the SWQDv as calculated using the Los Angeles County LID Calculator. The SWQDv is the controlling sizing factor for these facilities to meet all aspects of the LID Performance Standard, as discussed below and detailed in Attachment A.

For Category 1 facilities, providing the SWQDv equates to retaining the full SWQDv. Analyses provided in Attachment A demonstrate that when the physical storage volume of the facility is set to the SWQDv and the system infiltrates in no greater than 21 hours, average annual capture efficiency is equal to 80 percent and the entire SWQDv is reliably retained.

If retention is not fully feasible or not feasible (Category 2 and Category 3 facilities), the facility shall be sized to store at least the SWQDv and provide biofiltration for 1.5 times the runoff that

cannot be reliably retained. Analyses provided in Attachment A demonstrate that when the physical storage volume of the facility is set to the SWQDv and the media filtration rate is set to 5 inches per hour (minimum allowed per MS4 Permit Attachment H), these facilities biofilter significantly greater than 1.5 times the SWQDv that is not retained and also achieve significantly greater than 80 percent capture of average annual runoff.

The parcel-based BMPs that drain to Regional Facility D do not have a minimum sizing required by the LID Performance Standard, but must be consistent with the selection hierarchy described in the LID Performance Standard and attempt to achieve the maximum feasible retention. Regional Facility D is sized to capture 80 percent of average annual runoff from the entire area tributary to the facility, accounting for the commitments to parcel-based BMPs. Parcel-based facilities were sized following the same criteria as used for stand-alone parcel-based facilities (Category 2), which meets and exceeds the required standard.

As shown in Table 3, the provided volume commitment for parcel-based BMPs is greater than or equal to the required volume.

Table 3: Catchment Parameters and Parcel-based Facility Sizing Results

Basin	Area, ac	Impervious-ness[1]	SWQDv Required[2] (ac-ft)	SWQDv Provided (ac-ft)
Stand-alone Parcel-based LID BMPs in Basin E	29.2	91	2.13	2.13
Stand-alone Parcel-based LID BMPs in Basin X	10.2	80	0.74	0.74
Stand-alone Parcel-based LID BMPs in Basin Y	2.95	88	0.22	0.22
Parcel-based LID BMPs Draining to Regional Facility D	39.6	84	2.82	2.82

[1] See Attachment A for calculations used to estimate impervious cover.
[2]The SWQDv required refers to the total stormwater quality design volume determined by the LA County LID Volume Calculation; this volume is the required storage volume of the system.

4.2.3 Green Street Biofiltration BMPs

Green Streets biofiltration BMPs within the Project area were sized to treat runoff from roadways and areas draining to roadways that are not treated by regional facilities. The Green Streets biofilters (Filterra® or equivalent) are designed as flow-through treatment. The BMPs are sized to treat a design flow rate equivalent to the runoff from a 0.3 in/hr rainfall intensity, which is equivalent to achieving 80 percent average annual capture efficiency (Geosyntec, 2008). The

design intensity of 0.3 in/hour was entered into the Los Angeles County Flow-based LID Calculator to compute the required design flowrates. As illustrated in Table 4, the provided flowrate equals or exceeds the design flowrate in all cases.

Table 4: Catchment Parameters and Green Street Biofilter Sizing Results

Basin	Area (Acres)	Imperviousness (%)	Q Design (cfs)	Q Provided (cfs)
Basin AA	0.93	90	0.23	0.23
Basin BB	1.36	91	0.34	0.34
Basin CC	3.08	89	0.75	0.75
Basin DD	0.61	89	0.15	0.15
Basin EE	0.71	64	0.13	0.13
Basin G	0.63	89	0.15	0.15
Basin H	1.10	78	0.20	0.20
Basin I	2.31	79	0.50	0.50
Basin J	2.68	91	0.59	0.59
Basin K	2.37	69	0.59	0.59
Basin L	3.71	67	0.72	0.72
Basin M	4.01	39	0.77	0.77
Basin N	1.11	57	0.14	0.14
Basin O	3.33	69	0.56	0.56
Basin T	1.20	84	0.28	0.28
Basin U	2.32	50	0.35	0.35
Basin V	1.22	49	0.18	0.18
Total	**32.68**	**70**	**6.62**	**6.62**

4.3 Project Retention of 85th Percentile, 24-hour Storm Event (SWQDv)

The LID Performance Standard requires that project design features be selected and sized to retain the volume of stormwater runoff produced from a 1.1 inch storm event (i.e., the SWQDv) for the Project site. Where it has been demonstrated that 100 percent of the SWQDv cannot be feasibly infiltrated, biofiltration shall be provided for 1.5 times the portion of the SWQDv that is not retained. For the purpose of demonstrating conformance, this standard has been applied to the overall Entrada South Project as well as the portion of the biofiltration storage in Regional Facility D that is allocated for treatment of runoff from the Entrada South Project. The following stepwise process is used to demonstrate conformance with the LID Performance Standard for the Project.

4.3.1 Step 1: Calculate LID Performance Standard

The equivalent retention plus biofiltration volume required to meet the LID Performance Standard was calculated by calculating the runoff from the Project's impervious area for the first 1.1 inches of precipitation using the LA County LID Volume Calculator. A one acre representative catchment was used to determine the runoff volume for one acre of impervious area. This volume was scaled up to the total impervious area within the project. This resulting retention storage volume is the required equivalent retention volume (performance standard) that applies to the project. The performance standard is expressed in acre-feet.

Step 1 Summary - Entrada South LID Performance Standard

Parameter	Value	Source
Total Project Area, ac	382.4	Tentative Tract Map 53295
Project Impervious Area, ac	186.7	Tentative Tract Map 53295, land use-based Impervious estimation
Required Equivalent Retention Volume, ac-ft	**15.3**	V (ac-ft) = Project Impervious Area (ac) × 3,561 [1] cubic feet × (1 acre/43,560 square feet conversion)

[1] Equivalent to the volume calculated from the LA County LID Volume Calculator for a 1-acre representative catchment (100% imperviousness, flow path length of 250 feet, slope of 5%, LA County Soil #098)

4.3.2 Step 2: Calculate Volume in Parcel-based BMPs and Single Family HSCs

The parcel-based LID BMP commitments described in Section 3.1 and the single family HSC commitments described in Section 3.3 are tabulated to compute the total retention volume and biofiltration volume commitments included in the Project. For parcel-based BMPs, retention volume is calculated as follows:

- *Category 1 – Infiltration Feasible – Infiltration BMPs*: Include all water volume provided in BMPs below the overflow elevation.
- *Category 2 – Infiltration Partially Feasible – Bioinfiltration BMPs*: Include all volume provided below underdrains and retained in soil pores for subsequent evapotranspiration.
- *Category 3 - Infiltration Infeasible – Biofiltration BMPs*: Include all volume retained in soil pores for subsequent evapotranspiration.

For the purpose of this analysis, biofiltration volume was counted as the remaining volume of the BMPs (after subtracting retained volume). Water that is biofiltered during the design storm event (i.e., routed) can also be claimed as biofiltration volume; however, this volume is not claimed at this time as it is not necessary to conform to the LID Performance Standard.

Step 2 Summary - Entrada South Parcel-based BMP Retention Volume and Biofiltration Volume

Parcel-based LID and Single Family HSC Tabulations	Sum of Parcel-based Volume Commitments
Parcel-based Retention Volume, ac-ft	2.2
SFD Disconnection Retention Volume[1], ac-ft	0.5
Total parcel-based and SFD Retention Volume, ac-ft	2.7
Total Parcel-based Biofiltration Volume, ac-ft	4.6

[1]SFD Disconnection will be implemented for the Project consistent with the Project LID Performance Standard; however, retention volume credit from SFD Disconnections was not claimed in this performance standard conformance calculation for areas draining to Facilities A, B or C..

4.3.3 Step 3: Calculate Volume Provided in Regional Facilities

The retention volume provided in regional infiltration/bioinfiltration facilities is calculated as the volume stored below the lowest discharge point. The retention volumes provided in each of the three Entrada regional infiltration facilities and the regional biofiltration facility (Basin D) receiving runoff from Entrada were combined to estimate the total retention volume provided by facilities.

- *Category 1 – Infiltration Feasible – Infiltration BMPs*: Include all water volume provided in BMPs below the overflow elevation.
- *Category 2 – Infiltration Partially Feasible – Bioinfiltration BMPs*: Include all volume provided below underdrains and retained in soil pores for subsequent evapotranspiration.
- *Category 3 - Infiltration Infeasible – Biofiltration BMPs*: Include all volume retained in soil pores for subsequent evapotranspiration.

For the purpose of this analysis, biofiltration volume was counted as the remaining volume of the BMPs (after subtracting retained volume) up to the overflow elevation of the BMP. Water that is biofiltered during the design storm event (i.e., routed) can also be claimed as biofiltration volume; however, this volume is not claimed at this time as it is not necessary to conform to the LID Performance Standard.

Step 3 Summary - Entrada South Regional Facility Retention Volume and Biofiltration Volume

Regional Infiltration/ Biofiltration Facilities	Entrada South Regional Facility WQ Volume[1] (ac-ft)	Entrada South Retention Volume[2] (ac-ft)	Entrada South Biofiltration Volume[4] (ac-ft)
Infiltration Facility A	1.7	1.7	0.0
Infiltration Facility B	3.4	3.4	0.0
Infiltration Facility C	1.1	1.1	0.0
Regional Biofiltration Facility D	6.4[3]	0.0	6.4[3]
Regional Facility Total, ac-ft		**6.2**	**6.4**

[1] Includes volume allocated to managing Entrada South runoff only.
[2]Volume below lowest surface discharge, ac-ft
[3]WQ volume of Facility D is larger than shown, however remainder is allocated to treating off-site runoff from other projects therefore is not claimed for Entrada South conformance calculations.
[4]Volume discharged through media, tabulated as volume above underdrain elevation and below overflow elevation.

4.3.4 Step 4: Final Conformance Calculations

Step 4a: Compare Total Feasible Retention Volume Provided to LID Performance Standard

The sum of the total feasible retention volume provided in parcel-based and regional facilities from Steps 2 and 3, respectively, was compared to the performance standard computed in Step 1. The Project is considered to meet the LID Performance Standard if the total retention storage volume provided is equal to or greater than the LID Performance Standard retention volume.

Step 4b: Compute Required Biofiltration Volume and Compare to Provided Biofiltration Volume

The total retention volume provided in the parcel-based and regional facilities is less than the LID Performance Standard design volume. Therefore, the remaining volume not retained was multiplied by 1.5 to compute the required biofiltration volume. This volume was compared to the biofiltration volume provided. As demonstrated in Line 6 and 7 in the table below, the system provides excess retention and biofiltration volume in comparison to the LID Performance Standard, therefore the Project conforms to the LID Performance Standard.

Step 4 Summary - Comparison with LID Performance Standard

Line	Parameter	Value	Explanation
1	Required Retention Volume[1], ac-ft	15.3	From Step 1
2	Volume Reliably Retained, ac-ft	10.8	From Step 2 plus Step 3
3	Remaining Volume Not Reliably Retained, ac-ft	4.5	Line 1 minus Line 2
4	Required Biofiltration Volume, ac-ft	6.8	Line 3 x 1.5
5	Biofiltration Volume Provided, ac-ft	10.8	From Step 2 plus Step 3
6	Excess Biofiltration Volume, ac-ft	4.0	Line 5 minus Line 4
7	Excess Equivalent Retention Volume, ac-ft (surplus)	2.7	Line 6 / 1.5

4.4 Conformance Summary

In summary, this memorandum demonstrates that:

- LID BMPs have been selected in a manner consistent with the LID selection hierarchy (i.e., infiltration feasibility criteria) contained in the LID Performance Standard (Section 4.1);
- The combination of parcel-based LID BMPs and/or regional LID facilities within each watershed provides capture and retention or biofiltration of at least 80 percent of average annual runoff volume, consistent with the LID Performance Standard (Section 4.2); and
- The LID project design features proposed as part of the Entrada South Project provide retention and biofiltration volume consistent with the SWQDv retention and biofiltration requirements at the tract map scale per the LID Performance Standard (Section 4.3).

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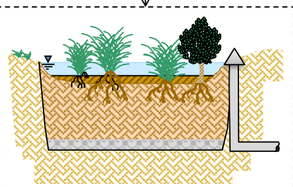
ENTRADA SOUTH LID PERFORMANCE STANDARD

LID project design features (PDFs) shall be selected and sized to retain the volume of stormwater runoff produced from the 1.1-inch design storm event (LID design volume). When it has been demonstrated that 100 percent of the LID design volume cannot be feasibly infiltrated, then biofiltration shall be provided for 1.5 times the portion of the LID design volume that is not retained. Runoff from all impervious area shall be treated with effective treatment control measures that are selected to address the pollutants of concern and are sized to capture and treat 80 percent of the average annual runoff volume.

Institutional, Commercial, Multi-Family Residential, Recreation, and Park Land Uses

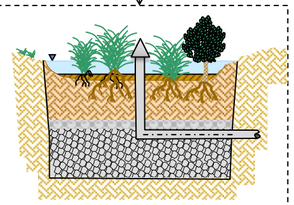
Assess infiltration feasibility

Infiltration Feasible
Category 1: Retain



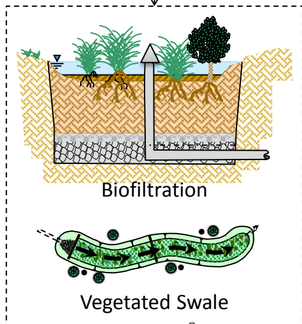
Or equivalent

Infiltration infeasible due to marginal infiltration rate, otherwise feasible
Category 2: Bioinfiltrate
Retain as feasible, then biofilter



Or equivalent

Infiltration infeasible due to hazards (geotechnical, etc.)
Category 3: Biofilter
Or route to regional facility



Or equivalent

Single Family Residential

Roofs, Patios and Walkways

Hydrologic Source Controls
Disconnect Roof Drains;
Disperse Impervious Areas in Landscaped Areas

Remaining Area

Roads

EPA Green Streets Manual

Retain/biofilter as feasible per opportunities and constraints; Retain/biofilter remaining in Regional Facilities

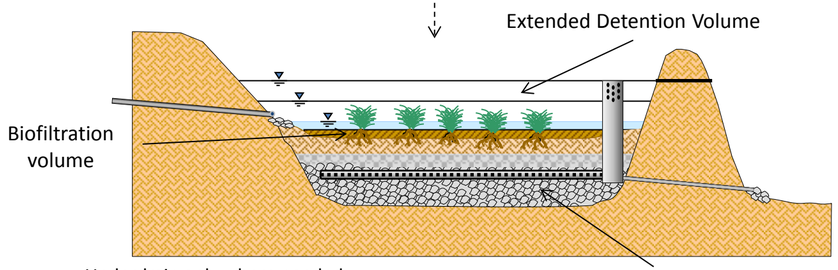
Allowable EIA

Treatment
80% capture of runoff

Media Filters
or equivalent

Underdrain Discharge (Category 2 and 3) and Bypassed Runoff

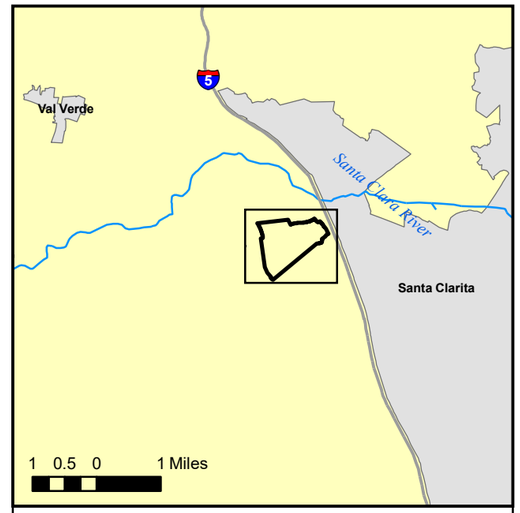
Regional Infiltration / Biofiltration Facility
Retain where feasible and biofilter remainder to provide equivalent retention of the 1.1-inch LID design storm, plus provide additional volume required for extended detention for 80% capture of all runoff.



Entrada South LID Performance Standard	Geosyntec consultants	Figure 1

N

600 300 0 600 Feet



Legend

Entrada South Tract Boundary

Land Use

- Commercial
- Education
- Major Road
- Minor Road
- Multi-Family Residential
- Open Space
- Park
- Recreation
- Single-Family Residential
- Water Quality

Figure 2: Land Use

Entrada South
Conformance Memo

October 2017

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Prepared By: A. Orr

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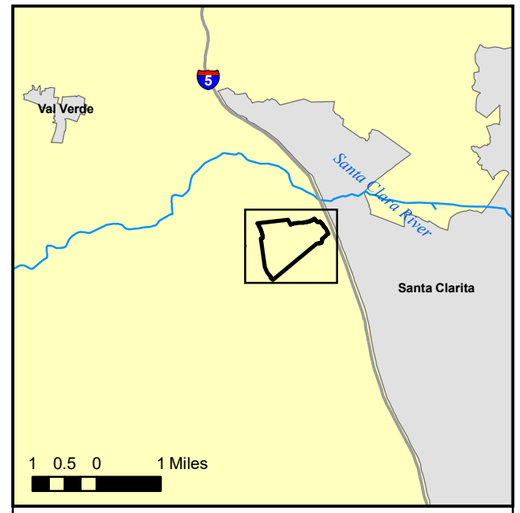

Legend

Entrada South Tract Boundary

Treatment Category

- Open Space; No Category Reported
- Category 1
- Category 2
- Category 3

Figure 3: Infiltration Feasibility Categories

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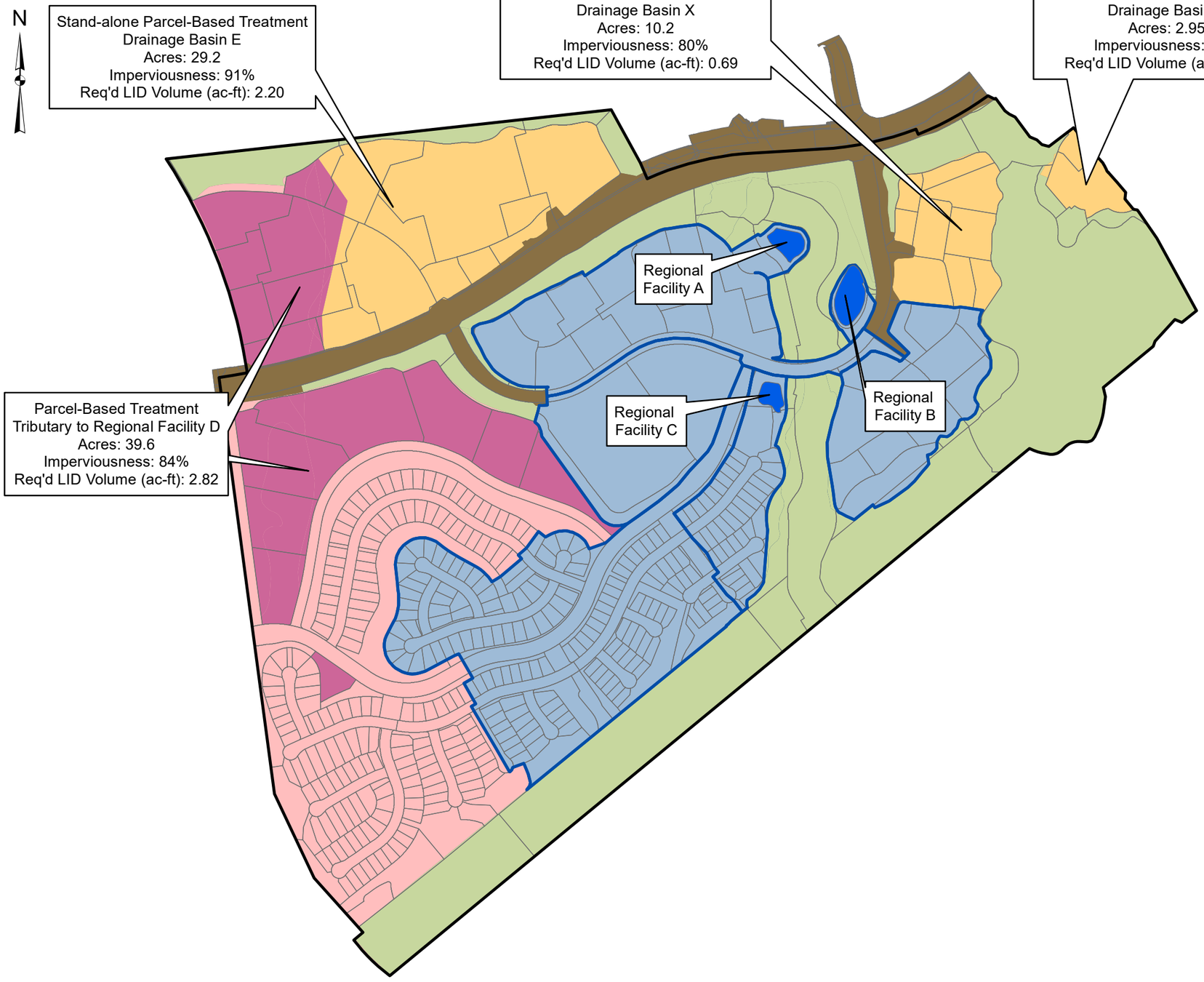

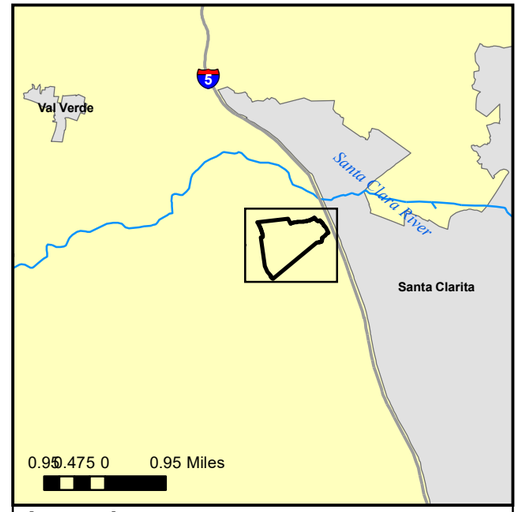

Legend

- Entrada South Tract Boundary
- Parcel-based Treatment Tributary to Regional Facility D

Treatment Category

- Regional Facilities
- Green Street Biofilters
- Tributary to Regional Facility D
- No Treatment Required
- On-Parcel Stand-alone Treatment

Figure 4: Treatment Categories

Entrada South
Conformance Memo

October 2017

Geosyntec consultants

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Prepared By: A. Orr

Attachment A

Modeling Methodology in Support of LID Conformance Analysis

1. INTRODUCTION

The purpose of this attachment is to describe the modeling methodology used to size regional infiltration/bioinfiltration facilities, analyze stand-alone parcel-based LID BMPs, and quantify low impact development (LID) best management practice (BMP) implementation for the Entrada South Project (Project). The model used to size and/or analyze facilities is a nested continuous simulation hydrologic model developed using USEPA Stormwater Management Model (SWMM). The model simulates a continuous runoff hydrograph from watershed tributary to each regional facility using a 40 year rainfall record and conducts continuous hydraulic storage routing to compute the capture efficiency and volume reduction provided in single family, parcel-based, and regional LID BMP. Facilities are sized and evaluated to ensure the that the combined system of water quality project design features (i.e., combination of parcel-based LID, single family hydrologic source controls (HSCs), green streets BMPs, and regional LID facilities) achieves 80 percent capture of watershed runoff per the Project LID Performance Standard. In some cases, the Los Angeles County LID Calculator was used for BMP sizing and SWMM was used to analyze performance to ensure that the 80 percent capture criterion was met.

Subcatchments tributary to each facility were defined based on land use delineations, drainage boundaries, results of infiltration feasibility screening, and soil parameters. The watershed model takes into account commitments to implement parcel-based BMPs and single-family dwelling (SFD) hydrologic source controls (e.g., downspout disconnects). Green Streets are part of the LID Performance Standard, but were not modeled in SWMM in evaluating overall system performance. Regional infiltration facilities within the Project were modeled based on a standard infiltration facility cross section and underlying soil infiltration rates determined by site-specific infiltration testing (R.T Frankian & Associates, 2013, interpreted for new basin locations in 2017). Another regional facility in an adjacent Project (the Mission Village Project), Regional Facility D, receives flows from Entrada South (see Figure 3 of Hydrology Study). The model calculations and inputs associated with sizing of Regional Facility D are provided in the memorandum: "Mission Village Phase 1 Final Hydrology Study – Evaluation of Conformance with Newhall LID Performance Standard" (Geosyntec Consultants, May 23, 2016).

Based on the proposed facility sizes and configurations watershed total LID performance results were evaluated to demonstrate that the combination of Project water quality design features achieves 80 percent capture of average annual subcatchment runoff.

1.1. Project Approval and Revision Chronology

The Entrada South Drainage Concept was previously approved by LACDPW in January 2014. Since that approval, the project design has changed to reduce the footprint of development and preserve a greater portion of Unnamed Canyon 2. This has resulted in changes to the drainage concept and water quality design in the vicinity of Unnamed Canyon 2, particularly water quality treatment basins A, B, and C (regional infiltration facilities). This attachment includes updates to only the portions of the project that have changed.

2. WATERSHED MODELING

The watershed tributary to each regional BMP is modeled as a collection of subcatchments in SWMM. Parameters input into the hydrologic watershed model and the data sources are included in Table 1 below.

Table 2-1: Watershed Model Parameters and Sources

Parameter	Description	Parameter Value/Source
Wet time step	Time step for wet weather runoff calculations	15 min
Dry time step	Time step for dry weather runoff calculations	4 hours
Routing time step	Seconds	30 sec
Routing Option	Method of routing flows through the system	Kinematic Wave method
Infiltration Option	Defines parameters and method used to estimate infiltration in catchment	The Green Ampt method was used; see section 2.3 for more information
Rainfall	Long-term precipitation record	Newhall (NCDC gauge # 046162), 1968-2008
Climate	Evaporation data	CIMIS monthly normal ET data, 60% of Zone 14 (see Table 2); selected based on CIMIS guidance to represent typical drought-tolerant native and non-native/non-invasive landscape.
For subcatchment models:		
Total Area	Area in acres	Land use GIS and CAD layers (see Tables 3 and 4)
Imperviousness	Percent imperviousness of subcatchment area	Determined by area-weighting of land uses in subcatchment (see Tables 3, 4).
Soil parameters	Soil parameters describe how water is infiltrated into soils in pervious areas	Soil types and locations were determined using NRCS Soil Survey and LA County soils data. See section 2.3 for specific soil parameters used in the model.

Parameter	Description	Parameter Value/Source
Depression storage	Surface storage in depressions in pervious or impervious land areas	0.02 inches for impervious areas (James & James, 2000); 0.06 inches for pervious areas (James & James, 2000) In some catchments, depression storage is adjusted to simulate the effects of parcel-based BMPs as discussed in section 4.2.1 and 4.2.2.
Other catchment parameters	Shape and Flowpath	Rectangular; 500 ft flow path length for pervious areas, 250 ft flow path length for impervious area (represents typical overland flow path lengths, a sensitive parameter in regional facility watershed-scale analysis)
	Slope	0.05 ft/ft (represents approximate average of landscaping, streets, and roofs)
	Impervious Manning's n	0.012 (Manning's n for smooth concrete)
	Pervious Manning's n	0.25 (Manning's n for dense grass or shallow flow through decorative bark/rock; either of which is typical of urban landscaping)

2.1. Rainfall & Storm Characteristics

Rainfall analysis was conducted with hourly precipitation data from a 40 year period of record (water year (WY) 1969-2008) recorded at the National Climatic Data Center (NCDC) Newhall rain gauge (station number 046162), located in the town of Newhall, California. Figure 1 shows the location of the Newhall gauge in relation to the Project area. This gauge is located approximately 4 miles from the Project. The gauge elevation of 1,243 ft above mean sea level (AMSL) is comparable to the Project area elevation of approximately 1,000-1,200 ft AMSL.

While the period of record rainfall data collected at the Newhall rain gauge is quite long (40 years), there are some gaps in the record. In order to improve the characterization of rainfall at the project site, estimates of the missing rainfall data were made through correlation of the Newhall rain gauge with the San Fernando rain gauge (NCDC station number 047762) which is located approximately 6 miles away from the Newhall gauge, and 10 miles away from the Project (south and slightly east).

The Castaic Junction gauge monitored by LACDPW is located closer to the Project; however the usable period of record at this gauge is limited to approximately 12 years which is considered too short to produce significant results in long-term simulation. Other gauges in the area report daily rainfall totals only. Hourly data are required to support hydrologic modeling efforts.

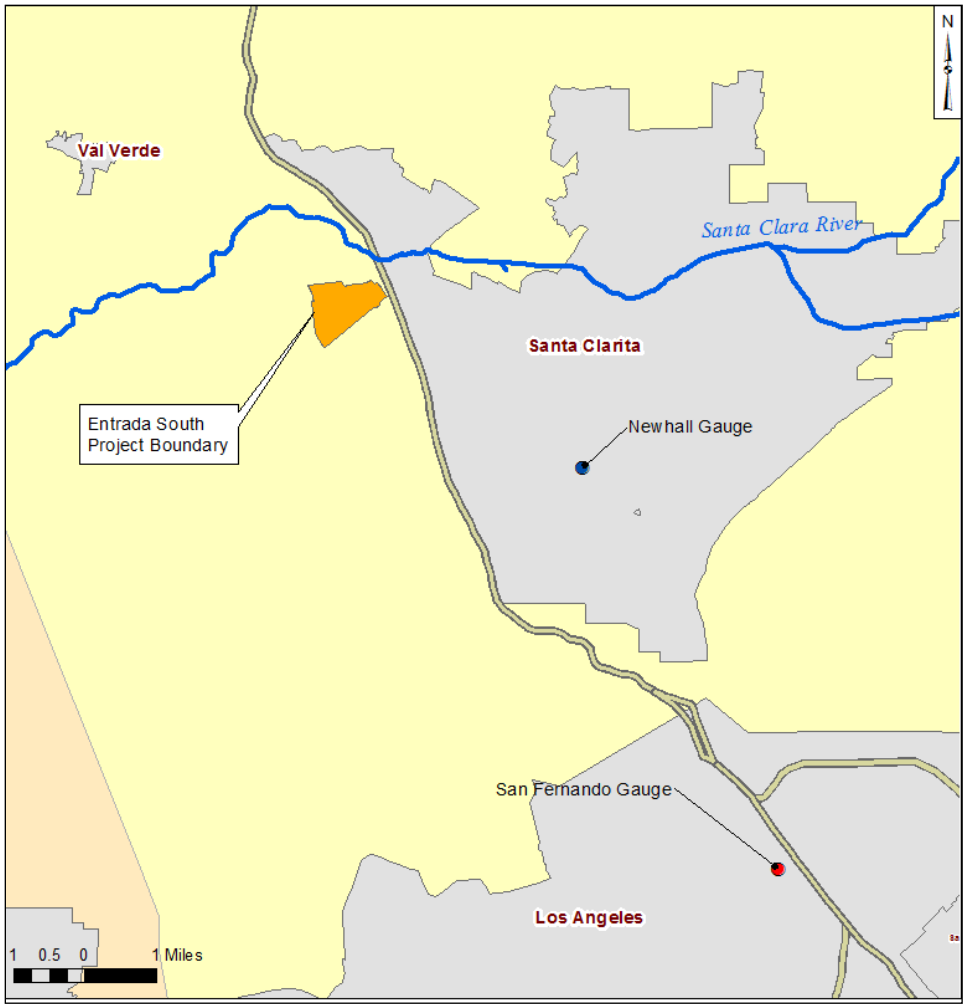


Figure 1: Location of Newhall Rain Gauge in the Vicinity of the Project Area

San Fernando rainfall data was adjusted based on comparison between the two gauges over periods for which they both contained data. A comparison of hourly or daily rainfall totals is not expected to yield a strong correlation as spatial variability is exaggerated on short time scales (i.e. a single storm could result in appreciable rainfall at one gauge and little rainfall at the other). However, monthly correlations are expected to yield meaningful comparison between the gauges when taken over a long period of record. Data from the gauges from WY 1969 to 2008 were screened to keep only the months without missing data and with measured rainfall at both stations. Correlation of the monthly rainfall totals is shown in Figure 2. This monthly correlation indicated slightly higher rainfall amounts at the Newhall gauge compared to the San Fernando gauge.

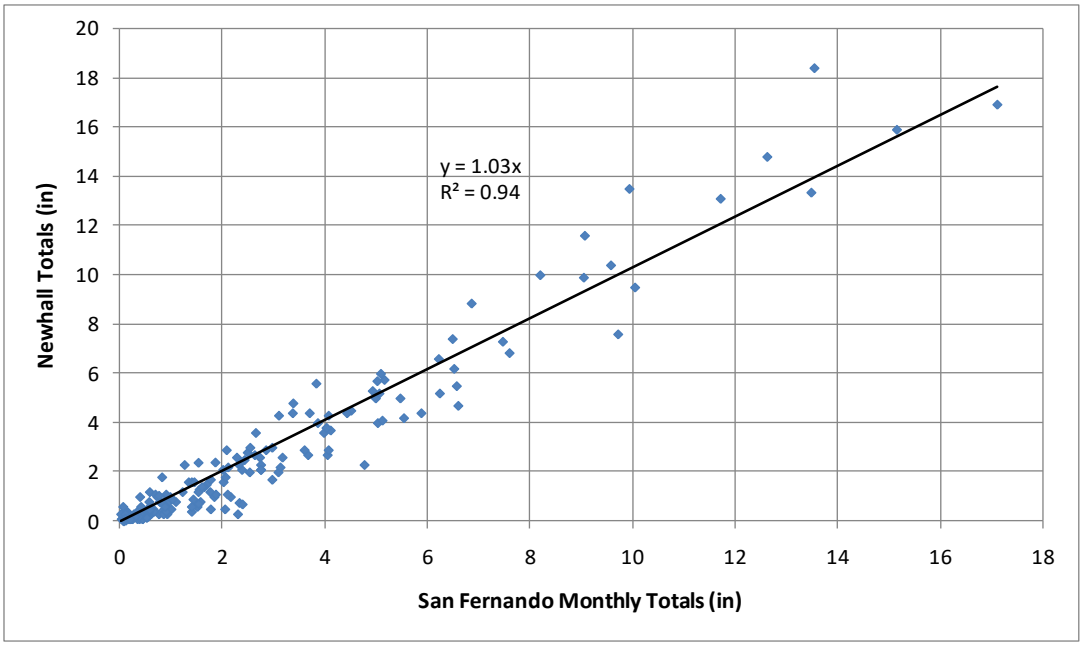


Figure 2: Correlation of Monthly Totals between Newhall & San Fernando Gauges (excluding months with missing data or zero rainfall)

Based on the relationship developed through the monthly comparison, a multiplier of 1.03 was applied to the hourly rainfall data from the San Fernando gauge to fill in the missing periods of rainfall data at the Newhall gauge. Values were rounded to the nearest 1/100 inch after the adjustment.

Summary rainfall analysis was conducted for two data groups: all storm events; and only the storms that were expected to contribute to stormwater runoff (storms >0.1 inches). The rainfall data were analyzed using a code similar in performance to EPA's Synoptic Rainfall Analysis Program (SYNOP). The customized code (GeoSYNOP) facilitates resolving missing periods of data and is more robust when handling the date and time of storms. GeoSYNOP subdivides the rainfall record into discrete events separated by an inter-event dry period, which in this case was set to a minimum of 6 hours. Small rainfall events, which resulted in rainfall of less than or equal to 0.10 inches, were deleted from the record for the purpose of calculating summary statistics. For the Newhall gauge, a total of 609 storm events (>0.1 inches) were segregated from the continuous data from October 1, 1968 to September 30, 2008. Storm statistics for the full (all storms) and the trimmed (storms > 0.1 inch) data sets are shown in Table 2-2. The full rainfall record is used for modeling analysis, however small storm events tend to produce less runoff because of initial abstractions represented in the model.

Table 2-2: Analysis Results for the Actual and Filled Newhall Rainfall Data

Storms	Newhall Gauge WY 1969 – 2008	Patched Record
All Storms	Average annual rainfall (in):	18.4
	Total number of storms:	1011
	Average number of storms per year:	25.3
	Average storm volume (in):	0.73
	Average storm duration (hrs):	7.3
	Average storm intensity (in/hr):	0.097
Storms >0.1 inch	Average annual rainfall (in):	17.4
	Total number of storms:	609
	Average number of storms per year:	15.2
	Average storm volume (in):	1.14
	Average storm duration (hrs):	11.4
	Average storm intensity (in/hr):	0.102

[1] Augmented record includes adjusted data from San Fernando gauge to fill gaps in Newhall gauge record.

2.2. Evapotranspiration

Reference ET values for estimating actual ET rates was taken from the California Irrigation Management Information System (CIMIS) Reference Evapotranspiration Zones map produced by the California Department of Water Resources. The Entrada South Project site is located in zone 14. Reference ET values for zone 14 are reproduced in Table 2-3 below. A model input of 60 percent of reference ET was used per CIMIS guidance to reflect a mix of irrigated and drought tolerant landscape species.

Table 2-3: Evaporation Parameters for Hydrology Model (from CA ET map)

Month	Evapotranspiration Rates			60%
	inch / day	days / month	inch / month	inch / month
January	0.05	31	1.55	0.93
February	0.08	28	2.24	1.34
March	0.12	31	3.72	2.23
April	0.17	30	5.1	3.06
May	0.22	31	6.82	4.09
June	0.26	30	7.8	4.68
July	0.28	31	8.68	5.21
August	0.25	31	7.75	4.65
September	0.19	30	5.7	3.42
October	0.13	31	4.03	2.42
November	0.07	30	2.1	1.26
December	0.05	31	1.55	0.93
Total (year)		**365**	**57.0**	**34.2**

2.3. Regional Facility Tributary Area and Imperviousness

The tributary drainages treated by each of the Project regional facilities were represented per the *LID/SUSMP/Water Quality Maintenance Plan Map for Entrada South* (Water Quality Exhibit, Alliance, 2017) and accompanying *Entrada South Mitigated Flow Table* (Appendix A, Alliance, 2017).

Table 2-4 includes the drainage subbasins and imperviousness values used for areas within the Entrada South boundary for Facilities A, B and C.

Table 2-4: Modeled Developed Conditions Project– Facilities A, B, and C

Facility	Land Use	Acreage	Imperviousness
Facility A	Drainage Basin C	2.0	5
	Drainage Basin D	10.8	80
	Drainage Basin F	9.1	80
	Drainage Basin R	2.1	91
	Drainage Basin S	1.3	80
Facility A Total		**25.3**	**75**
Facility B	Drainage Basin B1	45.0	57
	Drainage Basin P	16.2	80
	Drainage Basin W	1.7	5
Facility B Total		**62.9**	**62**
Facility C	Drainage Basin B2	16.5	45
	Drainage Basin B3	7.2	60
	Drainage Basin Q	1.0	85
Facility C Total		**24.7**	**51**

2.4. Soil Parameters

Drainage basins were divided into sub-catchments based on hydrologic soil group (HSG). The HSGs were identified based on catchment-specific soils distributions obtained from the Natural Resources Conservation Service (NRCS) Soil Survey CA675, and were divided as follows for modeling purposes: HSG A/B, HSG C, and HSG D. Group A soils were grouped with B soils because of the extreme scarcity of soil group A on the Project site and the similarity in infiltration parameters between A and B soils.

Hydrologic soil groups (HSG) and soil texture classes provided in the NRCS soil survey, as well as information provided in the Los Angeles County soils maps, were used to classify soils on the Project site and assign typical ranges of soil parameters to these soil groups. Spatial analyses were used to composite these values by subcatchment. The breakdown by soil type within each subcatchment is included in Table 2-5 below.

Table 2-5: SWMM Modeled Soils Distribution by Drainage Basin – Facilities A, B, and C

Location	Hydrologic Soil Group	Area (acres)	% Total
Facility A	A/B	2.8	11.3%
	C	22.5	88.7%
Facility A Total		**25.3**	
Facility B	A/B	18.4	29.3%
	C	44.5	70.7%
Facility B Total		**62.9**	
Facility C	A/B	0.3	1.1%
	C	24.4	98.9%
Facility C Total		**24.7**	

Green-Ampt suction head and initial moisture deficit values for each HSG were based on the soil texture class reported by the NRCS soil survey for the dominant texture class within the respective HSGs. Green-Ampt saturated hydraulic conductivities (the infiltration capacity of soils in inches of water infiltrated per hour) for each soil group were determined on an area weighted basis as the average of: 1) the low range of saturated hydraulic conductivity (K_{sat}) reported in the NRCS soil survey, 2) infiltration rates by HSG recommended by Musgrave (1955), and 3) characteristics infiltration rates for LACDPW soil classes interpreted from Appendix C of the LA County Hydrology Manual. Spatial analyses were used to composite these infiltration rate values by tributary area. It has been assumed that compaction during construction will reduce the bulk hydraulic conductivity across the development site by approximately 25 percent, on average, in the post-development condition in areas where construction is planned. While localized effects of incidental compaction may be greater, this assumption is believed to represent a reasonable estimate of drainage basin-wide reduction in long term infiltration rate considering that not all pervious areas will be subjected to incidental compaction and vegetation and other natural process tend to restore infiltration rates with time. Infiltration at the location of infiltration BMPs will be avoided to the extent possible. LACDPW soil classes present on the project include soil 020 and 098. Modeled soil parameters are provided in Table 2-6.

Table 2-6: Green-Ampt Soil Parameters – Facilities A, B, and C

Location	Hydrologic Soil Group	Suction Head[1] (in)	IMD[2] (in/in)	Pre- Development Ksat (in/hr)	Post- Development Ksat (in/hr)
Facility A	A/B	8	0.32	0.37	0.28
	C	8	0.29	0.19	0.15
Facility B	A/B	8	0.32	0.37	0.28
	C	8	0.29	0.19	0.15
Facility C	A/B	8	0.32	0.37	0.28
	C	8	0.29	0.19	0.15

[1] Average capillary suction of soils (inches), estimated based on texture class from Rawls, et al., (1983).
[2] Fractional difference between soil porosity and actual moisture content, estimated based on texture class from Rawls, et al., (1983).

2.5. Parcel-based LID BMPs

Parcel-based LID BMPs on the Project include "stand-alone" BMPs, which do not drain to a regional facility, and parcel-based LID BMPs draining to Regional Facility D. Modeling analyses to justify the sizing of parcel-based stand-alone BMPs are stand-alone parcel-based LID BMPs are discussed in this section. Modeling parameters for areas draining to Regional Facility D are discussed in the Mission Village Conformance Memorandum (Geosyntec, 2016).

The controlling sizing factor for parcel-based stand-alone BMPs is the SWQDv, as calculated using the Los Angeles County LID Calculator. Unit area modeling analyses were conducted in SWMM to demonstrate that when parcel-based BMPs are sized for the SWQDv using MS4 Permit requirements to provide minimum 5 inches per hour media filtration rate, they result in greater than 80 percent capture of average annual runoff as well as biofiltration of much greater than 150% of the SWQDv that is not reliably retained.

Table 2-7. Unit Area Model Scenarios to Demonstrate that LA County SWQDv Meets Newhall LID Performance Standard for Parcel-based BMPs

Model Scenario	Category 1 (Infiltration Feasible)	Category 2 (Infiltration Partially Feasible)	Category 3 (Biofiltration, with minor incidental volume reduction)
Tributary Area, Ac	1.0	1.0	1.0
SWQDv, cu-ft	3,561 [1]	3,561 [1]	3,561 [1]
BMP Type	Infiltration (any type); Geometry not relevant; modeling simply assumes SWQDv is reliably infiltrated in 24 hours.	Bioinfiltration (bioretention with elevated underdrain); 18 inches ponding; 18 inches gravel below underdrain	Bioretention with underdrains, negligible incidental infiltration assumed; 18 inches ponding
BMP Volume, cu-ft	3,561	3,561	3,561
Effective Storage Depth Above Underdrain, ft	2 ft depth assumed; no underdrain	1.5	1.5
Effective Storage Depth Below Underdrain, ft		0.6	0
Footprint Area, sq-ft	1,781	1,696	2,374
Media Filtration Rate, controls when underdrain discharges, in/hr	NA	5	5
Underlying Infiltration Rate, in/hr	1.3 in/hr (set based on assumed 18-hour drawdown time)	0.15	0
Head effects on infiltration	Assumed negligible for modeling; conservative	Assumed negligible for modeling; conservative	Assumed negligible for modeling; conservative
Long Term Average Capture Efficiency from SWMM Simulations, %	80%	96%	99%
Percent of SWQDv Retained, %	100%	29%[2]	0%[3]
Percent of Remaining SWQDv Biofiltered, %	NA	267%[2]	267%[3]

[1] Equivalent to the volume calculated from the LA County LID Volume Calculator for a 1-acre representative catchment (100% imperviousness, flow path length of 250 feet, slope of 5%, LA County Soil #098)

[2] See calculations below for Category 2

- 0.6 ft retained × 1,696 sq-ft = 1,018 cu-ft/3,561 = 29%. Remaining SWQDv = 3,561 – 1,018 = 2,543 cu-ft.
- Biofiltration provided as percent of remaining SWQDv = 2,543 cu-ft physical storage + 2.5 ft biofiltration routed during event (6 hours within-storm routing @ 5 in/hr) × 1,696 sq-ft = 6,783 cu-ft. 6783/2,543 = 267%

[3] See calculations below for Category 3

- No retention claimed; remaining SWQDv = 3,561 cu-ft
- Biofiltration provided as percent of remaining SWQDv = 3,561 cu-ft physical storage + 2.5 ft biofiltration routed during event (6 hours within-storm routing @ 5 in/hr) × 2,374 = 9,496 cu-ft. 9,496/3,561 = 267%

A 6 hour routing time in these calculations is considered to be conservative as the design storm duration is 24-hours, by definition, and typical real storm events have durations that typically exceed 6 to 12 hours.

2.6. Single Family Areas

The LID Performance Standard includes hydrologic source controls (HSCs) in single family detached (SFD) land uses, entailing routing of a portion of the impervious area to the pervious area. Single-family HSCs were modeled for parcels that drain to Regional Facility D only; these HSCs were not considered in the sizing of WQ Treatment Basin A, B, or C.

Table 2-8: SFD Disconnect Modeling Parameters for Regional Facility D

Parameter	Input	Source of Parameter Input
Percent of SFD land use disconnected	28%	Analysis of typical 5,000 SF parcels; represents rooftops and sidewalks
Disconnection ratio	4 parts impervious to 1 part pervious receiving flow	Analysis of typical area that can be used for disconnection within typical parcels
Depression storage of receiving pervious area (inches)	0.06	Depression storage set equivalent to pervious area depression storage; this is conservative as these areas are proposed to be amended to provide additional pore space
Infiltration rate of receiving pervious area	Set equivalent to underlying soil infiltration rate used in watershed modeling	Set equivalent to pervious area soil Ksat corresponding to the hydrologic soil group associated with the area

2.7. Summary of BMPs within Watershed Tributary to Each Regional Facility

A summary of the Project areas draining to each of the regional facilities is shown in Table 2-9. Facilities A, B, and C were modeled to receive Project flows directly[1], while Regional Facility D receives flows from areas that are routed through on-parcel and single family areas first.

[1] Note that single family areas draining to Facilities A, B, and C will have HSCs, but they are not modeled for conservatism.

Table 2-9: Areas Draining to Parcel-based BMP Types within Water Quality Facility Drainage Areas

Regional Infiltration/ Biofiltration Facility Drainage Area	Category 2 Parcel-based BMPs		SFD HSC[1]		Directly to Regional Facility		Total	
	Area (Ac)	Imp (%)	Area (Ac)	Imp (%)	Area (Ac)	Imp (%)	Area (Ac)	Imp (%)
Facility A	-	-	-	-	25.3	75	25.3	75
Facility B	-	-	-	-	62.9	62	62.9	62
Facility C	-	-	-	-	24.7	51	24.7	51
Regional Facility D	39.6	84	35.1	60	27.4	21	102.1	59

1 - Includes single-family roofs, patios and sidewalks, draining to a pervious area with an equivalent square-footage.

3. REGIONAL FACILITY MODELING

3.1. Model Representation

Regional infiltration/biofiltration facilities were modeled using a stage-area table to define volume properties and SWMM's built-in hydraulic control elements (e.g., orifices, weirs, outlets) to define discharge from the system (e.g., treated discharge, infiltration, overflow) as a function of the depth of stored water. These facilities were modeled to receive runoff from developed portions of the Project not addressed by stand-alone parcel-based BMPs, including a accounting for diversion structures. Regional Facility D was modeled to receive runoff from tributary areas in Mission Village, Legacy Village, and Entrada South and was simulated to receive runoff not addressed by parcel-based BMPs as well as bypass and treated discharge from parcel-based BMPs and SFD HSCs. Modeling of Mission Village Facility D is described in the Mission Village Phase I Conformance Memo (Geosyntec, 2016).

The continuous inflow hydrograph generated from the subcatchments (accounting for parcel-based retention where applicable) is routed through the regional facilities, accounting for the hydrologic water balance, conceptual diversion structure, hydraulic flow control. The total volumes that are treated, infiltrated, and overflow or bypass over the long term period of record are tabulated and used to evaluate whether the combined LID system achieves 80 percent capture of average annual watershed runoff. Watershed total capture was quantified by comparing the total runoff from the watershed without any BMPs (i.e., the baseline runoff volume) versus the total amount of water that bypasses (at the diversion structure) or overflows (via the overflow structure) the regional LID facilities with BMPs in place. If the total amount bypassing or overflowing is less than or equal to 20 percent of the baseline runoff volume, then the overall system is considered to capture at least 80 percent of watershed runoff volume.

Facility sizing was conducted with model infiltration rates, which incorporate factor(s) of safety on measured infiltration rates to account for the potential for lower infiltration rates in operation due to soil compaction during construction, accumulation of fines in infiltrating surface, and other effects. Measured infiltration rates were obtained via field testing by RTF&A (2013) and are shown in Table 3-1.

Subsequent to Frankian's 2013 investigation, the location of the infiltration facilities changed. The current facility locations were evaluated by Frankian (2017) and found to be in similar geologic formations. Therefore, Frankian (2017) concluded that the results of 2013 testing, with appropriate factors of safety, are considered to be reliable for the current facility locations.

Table 3-1: Measured Infiltration Rates

Location of Sample	Measured Infiltration Rate (in/hr)
Facility A (based on 2013 naming convention)	34
Facility B (based on 2013 naming convention)	17
Facility C (based on 2013 naming convention)	3.2
Vicinity Average Measured Infiltration Rate[1]	***18***
Default Factor of Safety (unitless)	5.0
Default Infiltration Rate (in/hr)	3.6

[1]Variability between samples is believed to represent overall site variability across the discrete points where samples were taken, not necessarily a significant difference between different basin locations. Infiltration testing conducted by Frankian (2013) is still considered to be reliable for the adjusted basin locations (Frankian, 2017).
[2]Based on guidance for selecting factors of safety contained in the Ventura County Technical Guidance Document, and best professional judgments; rates will be confirmed and designs will be adjusted as needed following mass grading.

The default design infiltration rate was further adjusted for modeling to provide for conservatism and an additional margin of safety in designs. Based on recommendations by Frankian (2017), a modeled infiltration rate of 3 inch/hr was used for all facilities. Rates will be confirmed and designs will be adjusted as needed via infiltration testing conducted after the facilities are graded. Design and modeled infiltration rates are included in Table 3-2 below.

Table 3-2: Modeled Infiltration Rates

Location of Sample	Facility WQ Depth, ft	Default Design Infiltration Rate (in/hr) (See Table 3-1	Modeled Infiltration Rate (in/hr)
Facility A	3 ft	3.6	3.0
Facility B	3.75 ft	3.6	3.0
Facility C	3.5 ft	3.6	3.0

Other modeling parameters are provided in Table 3-3 and 3-4 below. A schematic of the regional infiltration facilities A, B, and C is illustrated in Figure 3.

Regional Facility D was modeled and documented as part of the Mission Village Phase 1 Conformance Analysis (Geosyntec 2016).

Table 3-3: Regional Basin Modeling Parameters

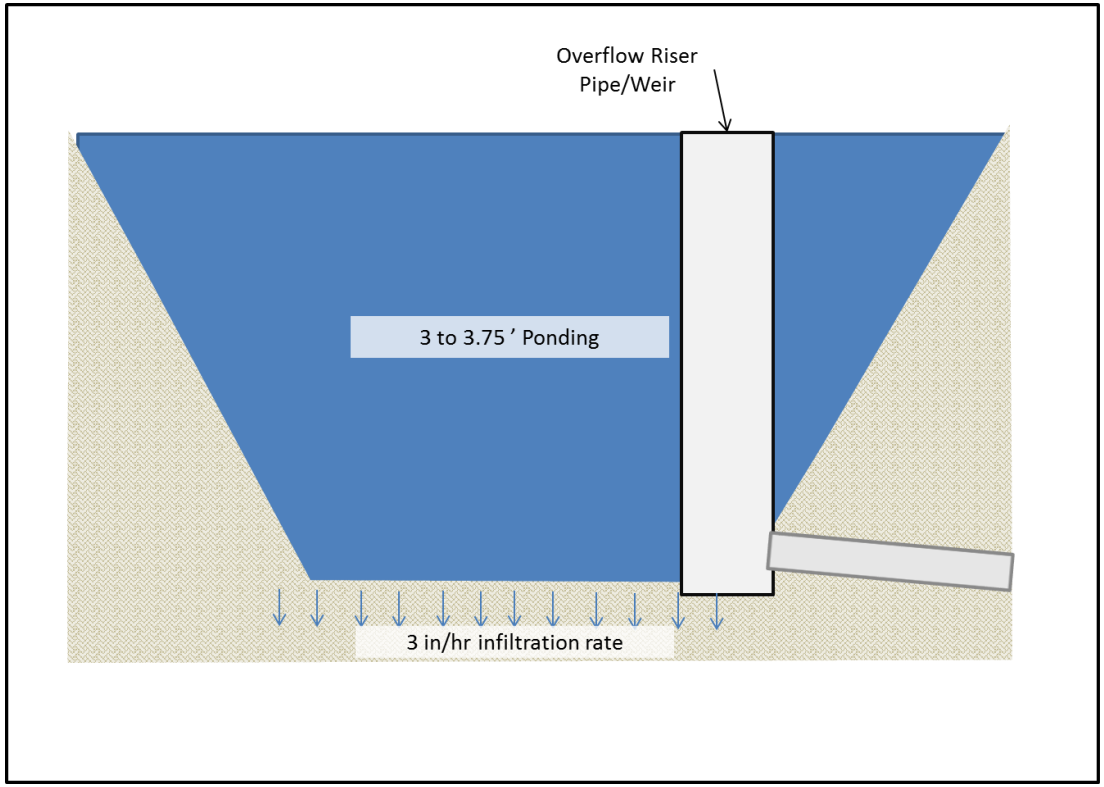
Parameter	Input	Source
Basin volumetric storage	Storage curve of facility	Model representation accounts for ponded water stored above the finished grade.
Basin flow controls	Weir dimensions and elevation to control the overflow elevation of the facility.	Subject to refinement in detailed design of facility. Designs will provide flexibility to adapt control dimensions per operational feedback.
Infiltration	Infiltration losses represented by an "outlet" in SWMM, which is tabular as a function of the wetted surface area and the modeled infiltration rate.	Outflow equals wetted area multiplied by modeled infiltration rate (See Table 3-1 and Table 3-2).
Evapotranspiration	Rate of evaporation from surface ponding and transpiration from amended sand media.	Same as overall watershed (See Table 2-3)
Diversion Structure	A SWMM "divider" was used with a cutoff flow.	Diversion structures have been designed to divert at least this flowrate before bypass.

Each facility's diversion cutoff flowrate is shown in Table 3-4. These rates were iteratively adjusted until the overall long term capture efficiency was at least 80 percent of long term runoff volume.

Table 3-4: Facility Diversion Cutoff Flowrate

LID Facility	Diversion Cutoff Flowrate (cfs)[1]
Facility A	4.7
Facility B	15
Facility C	4.5

[1]Runoff inflow rates greater than the cutoff flowrate bypass the LID facility.



Facility	Ponding Depth (ft)	Infiltration Rate (in/hr)	Facility Volume (acre-ft)
A	3	3	1.6
B	3.75	3	3.4
C	3.5	3	1.1

Figure 3: Schematic and Respective Cross-Section Depths of Entrada South Infiltration Facilities A, B, and C

3.2. Regional Facility Modeling Results

The long-term estimated hydrologic performance of regional facilities (capture efficiency and volume reduction) is reported in Table 3-5, along with the overall watershed capture and volume reduction. The overall watershed capture is inclusive of volume reductions achieved in nested parcel-based BMPs, hydrologic source controls, and regional facilities.

Table 3-5: Regional Facility Performance and Watershed Total Performance

Regional Facility Drainage Area	Tributary Area	Percent Imperviousness of Tributary Area	Regional Facility		Volume Reduction Upstream of Regional Facility[1]	Watershed Capture	Watershed Volume Reduction
			Capture Efficiency of Runoff Volume	Volume Reduction of Captured Water			
A	25.3	74.9%	80%	100%	--	80%	80%
B	62.9	61.6%	80%	100%	--	80%	80%
C	24.7	51.0%	80%	100%	--	80%	80%
Regional Facility D[1]	720.3	45.6%	74%	0.1%	16%	80%	16%

[1] Includes all areas draining to Regional Facility D, including SFD and parcel-based facilities (Source: Geosyntec, 2016)

4. MODEL PARAMETER RELIABILITY AND ASSUMPTIONS

This section discusses the reliability of the model parameters and assumptions that were used as part of this modeling analysis.

4.1. Parcel-based BMP Infiltration Feasibility Screening

The types of parcel-based BMPs applied to commercial, multi-family, institutional, recreation and park land uses was determined based on infiltration feasibility constraints, as described in Section 2. The criteria used to categorize parcel-based treatment based on infiltration constraints are in agreement with the infiltration constraints listed in the *Ventura Technical Guidance Manual* (Ventura County, 2010), the *LA County LID Ordinance and Manual* (LACDPW, 20014), and the *LID BMP Design, Investigation and Reporting Requirements Administrative Manual* (LACDPW, 2014). Constraints were mapped as accurately as possible at this phase of analysis. More detailed site investigation performed at the time of development of parcels may result in somewhat different distributions of parcel-based BMPs, however developers of parcels will obligated to provide the BMP volumes that were assumed in this model analysis. Therefore, the build-out performance of parcel-based BMPs is expected to be reasonably similar to the assumptions used for modeling at this time.

4.2. Parcel-based BMP Infiltration Rates

Infiltration rates beneath parcel-based BMP were assumed based on input from project geotechnical consultant (R.T Franklin & Associates, 2013) based on review of geologic information and proposed sources of fill material. While it is expected that infiltration rates may vary across the Project depending on the source of fill material, the assumed values are believed to be representative of anticipated average conditions and are relatively low. Detailed parcel designs will be supported by site-specific infiltration testing; parcel-based BMP performance is expected to be reasonably similar, on average, to assumptions made for the purpose of this analysis.

4.3. Single Family Hydrologic Source Controls

Single-family hydrologic source controls were not claimed in modeling conducted as part of this analysis. This is a conservative approach that somewhat under predicts the performance of proposed regional LID facilities.

4.4. Regional Facility Infiltration Rates and Model Representations

Infiltration rates in the locations of proposed regional infiltration/biofiltration facilities were estimated based on geologic information, soils data, and testing results available at the time of analysis (R.T Franklin & Associates, 2013, 2017). To account for uncertainty in these estimates, facility sizing was conducted with model infiltration rates, which incorporate factor(s) of safety to account for the potential for lower infiltration rates in operation due to soil compaction during construction, accumulation of fines in infiltrating surface, and other effects. As such, it is believed that infiltration rates are somewhat conservatively selected for the purpose of this analysis and it is anticipated that higher design infiltration rates may be supported through site-specific analysis conducted after bulk grading occurs. Should detailed testing show infiltration rates are lower than assumed, additional design features such as dry wells and/or selectively graded fill material could be used to achieve at least the assumed design infiltration rate.

5. SUMMARY

This attachment describes the modeling methodology used to evaluate the overall performance of water quality/LID design features proposed within the watersheds tributary to Facilities A, B, and C. Modeling of the portion of the Project that drains to Regional Facility D is documented in the Mission Village Phase 1 Conformance Memorandum (Geosyntec, 2016). This approach incorporates, in a conservative manner, the commitments to parcel-based LID and single family HSCs that have been made within the watershed. It also incorporates civil and geotechnical design information that is available at this time for the facilities. This approach results in an estimate of overall performance that is considered to be reliable for evaluating the conformance to the LID Performance Standard applicable to the Project.

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