Appendix L:

Geotechnical Report and Fault Investigation (Revised Appendix)

LANDMARK
Geo-Engineers and Geologists

780 N. 4th Street
El Centro, CA 92243
(760) 370-3000
(760) 337-8900 fax

77-948 Wildcat Drive
Palm Desert, CA 92211
(760) 360-0665
(760) 360-0521 fax

June 23, 2008

Mr. Ryan Shatt
Soboba Band of Luiseño Indians
P. O. Box 487
San Jacinto, CA 92883

Subject: Proposed Soboba Hotel and Casino
Soboba Band of Luiseño Indians
San Jacinto, California
LCI Report No.: LP07092

Reference: Preliminary Fault Hazard Evaluation Report for the project site; prepared by Landmark Consultants, Inc., dated June 1, 2007.

Dear Mr. Shatt:

As requested, we are providing a brief summary concerning the site conditions for the proposed Soboba hotel and casino project located on the northwest and southwest corners of Lake Park Drive and Soboba Road in San Jacinto, California

Subsurface exploration was performed on March 19, 2007 using Middle Earth Geo-Testing, Inc. of Orange, California to advance two (2) electric cone penetrometer (CPT) soundings to approximate depths of 50 feet below existing ground surface. The soundings were made at the locations shown on the Site and Exploration Plan (Plate 2). The approximate sounding locations were established in the field and plotted on the site map by sighting to discernable site features.

A fault hazard study was conducted on March 19, 2007 through April 12, 2007 by Landmark Consultants, Inc. Nine trenches were excavated to an approximate depth of eight to fifteen (8 to 15) feet below the ground surface. The trenches totaled approximately 4,375 feet in length, orientated in a northeast-southwest direction and were located to the along the eastern boundary of the site. The trench backfill was loosely placed and was not compacted to the requirements specified for engineered fill.

Preliminary findings of project site indicate the site is underlain by interbedded sands, silts, and clays with near surface silty sands, sandy silts and clayey silts. The near surface soils are expected to have a low expansion rate. The subsurface soils are medium dense to very dense in nature. Groundwater was not encountered in the borings during the time of exploration. Historic groundwater records in the vicinity of the project site indicate that groundwater has fluctuated between 128 to 193 feet below the ground surface within the last 14 years according to the Western Municipal Water District and the San Bernardino Valley Municipal Water District cooperative well measuring program records.

Liquefaction is unlikely to be a potential hazard at the site since the groundwater is deeper than 50 feet (the maximum depth that liquefaction is known to occur).

We have used the computer program FRISKSP (Blake, 2000) to provide a probabilistic estimate of the site PGA using the attenuation relationship NEHRP D 250 of Boore, Joyner, and Fumal (1997). The PGA estimate for the Design Basis Earthquake (DBE) for the project site having a 10% probability of being exceeded in 50 years (return period of 475 years) is **0.84g**. The PGA estimate for the Maximum Considered Earthquake (MCE) for the project site having a 2% probability of being exceeded in 50 years (return period of 2,500 years) is **1.29g**.

2007 CBC (2006 IBC) Seismic Response Parameters: The 2007 California Building Code (CBC) seismic parameters are based on the Maximum Considered Earthquake with a ground motion that has a 2% probability of occurrence in 50 years. This follows the methodology of the 2006 International Building Code (IBC). The attached Table 1 lists seismic and site coefficients given in Chapter 16 of the CBC. The site soils have been classified as Site Class D (stiff soil profile).

Design earthquake ground motions are defined as the earthquake ground motions that are two-thirds (2/3) of the corresponding MCE ground motions. Design earthquake ground motion data are provided in the attached Table 1.

These are preliminary findings and may be subject to change once the field and laboratory testing has been completed for the project site.

We have prepared this letter for your exclusive use in substantial accordance with the generally accepted geotechnical engineering practice as it existed in the site area at the time of our study. No warranty is expressed or implied. It should be noted that the submitted plans were not reviewed for conformance with other clients, governmental or consultant requirements.

We appreciate the opportunity to be of service. Should you have any questions, please call our office at (760)360-0665.

Sincerely Yours,
LandMark Consultants, Inc.

REGISTERED PROFESSIONAL ENGINEER
GREG M. CHANDRA
No. C 34432
EXPIRES 09-30-09
CIVIL
STATE OF CALIFORNIA

Greg M. Chandra, P.E.
Principal Engineer

Attachments:

APPENDIX A:: Vicinity and Site Maps
APPENDIX B: Cone Penetration Test (CPT) Logs and Key to CPT Interpretations
APPENDIX C: Table 1: 2006 IBC Seismic Parameters

APPENDIX A

LANDMARK
Geo-Engineers and Geologists

Project No.: LP07092

Vicinity Map

Plate A-1

2007 Aerial Photograph Courtesy of USGS

Legend

Approximate CPT Sounding Location (typ)

LANDMARK
Geo-Engineers and Geologists

Project No.: LP07092

Site and Exploration Plan

Plate A-2

APPENDIX B

CLIENT: Soboba Band of Luiseno Indians

PROJECT: Proposed Soboba Hotel and Casino

LOCATION: See Site and Exploration Map

CONE PENETROMETER: Fugro Truck Mounted Electric Cone with 23 ton reaction weight

DATE: 6/23/08

LOG OF CONE SOUNDING DATA CPT-1

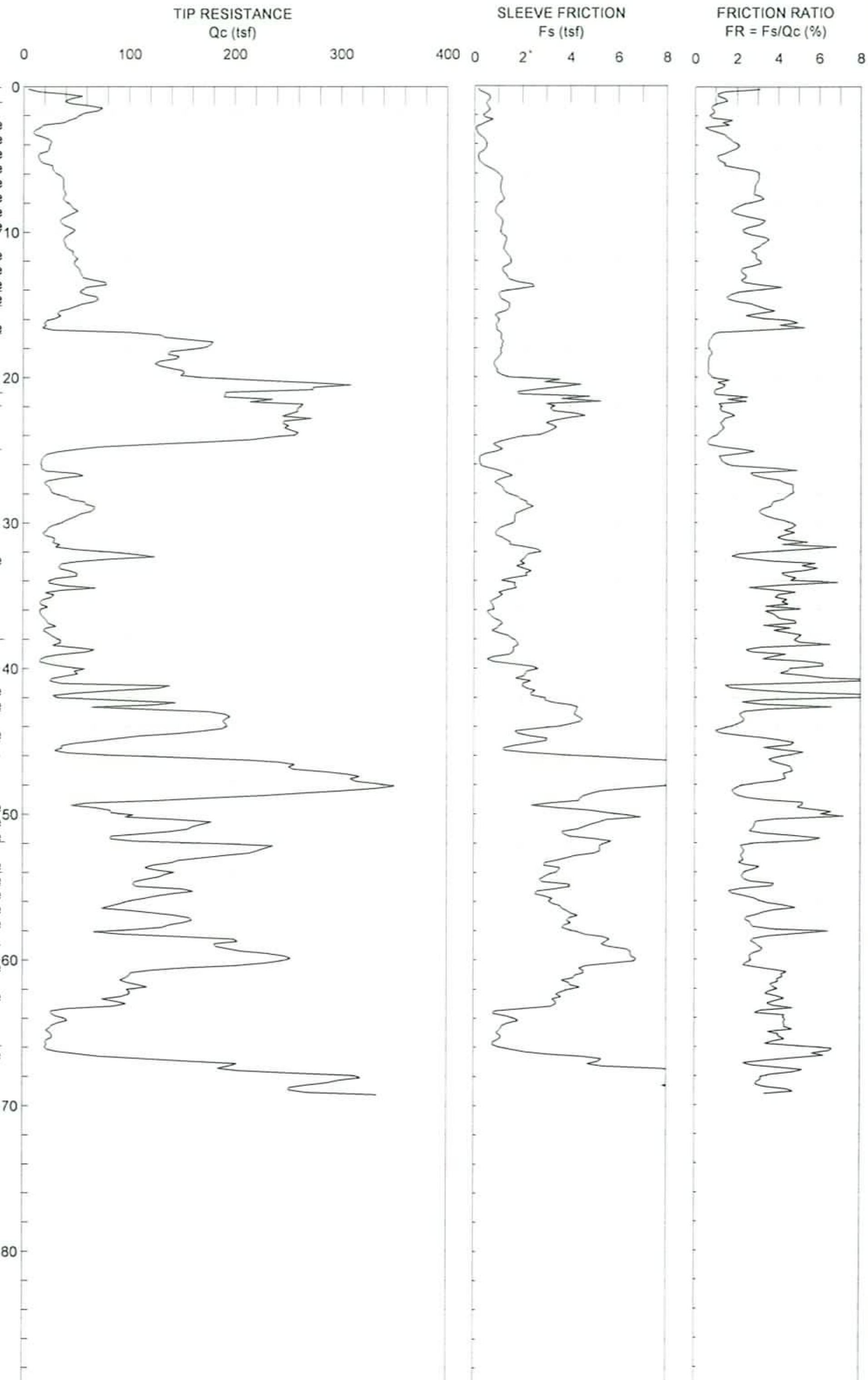
DEPTH (FEET)

INTERPRETED SOIL PROFILE
From Robertson & Campanella (1989)

GROUND EL. +/-

Sandy Silt to Clayey Silt	ML	very dense
Sand to Silty Sand	SP/SM	very dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Sandy Silt to Clayey Silt	ML	medium dense
Sand	SP	dense
Sand	" "	dense
Sand	" "	dense
Sand	" "	very dense
Sand to Silty Sand	SP/SM	very dense
Sand	SP	very dense
Sand	" "	very dense
Sand	" "	dense
Sandy Silt to Clayey Silt	ML	loose
Clayey Silt to Silty Clay	ML/CL	very stiff
Silty Clay to Clay	CL	very stiff
Clayey Silt to Silty Clay	ML/CL	hard
Clayey Silt to Silty Clay	" "	hard
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	hard
Sandy Silt to Clayey Silt	ML	medium dense
Silty Clay to Clay	CL	hard
Silty Clay to Clay	" "	hard
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Clayey Silt to Silty Clay	ML/CL	hard
Clay	CL/CH	very stiff
Clay	" "	hard
Overconsolidated Soil	??	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Silty Sand to Sandy Silt	SM/ML	dense
Silty Sand to Sandy Silt	" "	medium dense
Silty Clay to Clay	CL	hard
Sand to Clayey Sand	SP/SC	dense
Sand to Clayey Sand	" "	very dense
Silty Sand to Sandy Silt	SM/ML	dense
Overconsolidated Soil	??	medium dense
Sand to Clayey Sand	SP/SC	medium dense
Overconsolidated Soil	??	medium dense
Silty Sand to Sandy Silt	SM/ML	dense
Silty Sand to Sandy Silt	" "	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	dense
Silty Sand to Sandy Silt	SM/ML	dense
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	very stiff
Overconsolidated Soil	??	medium dense
Sand to Clayey Sand	SP/SC	dense
Sand to Clayey Sand	" "	dense

End of Sounding @ 69 ft.



Project No: LP07092

LANDMARK
Geo-Engineers and Geologists

Plate B-1

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Proposed Soboba Hotel and Casino   Project No: LP07092   Date: 6/23/08

CONE SOUNDING: CPT-1

Est. GWT (ft): 50.0   Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Proposed Soboba Hotel and Casino   Project No: LP07092   Date: 6/23/08

CONE SOUNDING: CPT-1

Est. GWT (ft): 50.0   Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %		1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: Phi (deg.)	**17.0** Su (tsf)	OCR
0.15	0.5	19.03	1.87	6	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	5	2.00	36.0	60	85	40		
0.30	1.0	46.68	1.35	7	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	10	2.00	88.2	30	96	41		
0.45	1.5	60.25	0.91	8	8	Sand to Silty Sand	SP/SM	very dense	115	5.5	11	2.00	113.9	20	96	41		
0.60	2.0	60.38	0.84	8	8	Sand to Silty Sand	SP/SM	very dense	115	5.5	11	2.00	114.1	20	91	41		
0.75	2.5	43.64	1.30	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	10	2.00	82.5	30	77	39		
0.93	3.0	15.55	0.93	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	4	2.00	29.4	50	44	34		
1.08	3.5	12.76	1.32	6	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	4	2.00	24.1	65	36	33		
1.23	4.0	25.30	1.83	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	7	2.00	47.8	50	54	36		
1.38	4.5	23.75	1.89	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	7	2.00	44.9	55	50	35		
1.53	5.0	14.32	1.20	6	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	4	1.97	26.6	60	33	33		
1.68	5.5	22.29	1.51	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	6	1.87	39.4	50	45	34		
1.83	6.0	30.75	2.94	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	1.79		55			1.79	>10
1.98	6.5	37.47	3.00	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	15	1.71		55			2.18	>10
2.13	7.0	37.80	2.86	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	11	1.65	58.8	50	57	36		
2.28	7.5	39.24	2.90	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	11	1.59	58.9	50	57	36		
2.45	8.0	40.34	2.87	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	12	1.54	58.6	50	57	36		
2.60	8.5	47.98	1.89	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	11	1.49	67.5	35	61	37		
2.75	9.0	42.28	2.31	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	12	1.45	57.8	45	56	36		
2.90	9.5	36.26	3.21	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	15	1.41		55			2.10	>10
3.05	10.0	46.56	2.35	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	13	1.37	60.3	45	58	36		
3.20	10.5	39.82	3.18	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	1.33		60			2.31	>10
3.35	11.0	39.49	3.21	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	1.30		60			2.29	>10
3.50	11.5	45.54	2.78	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	13	1.27	54.8	55	55	36		
3.65	12.0	49.65	2.98	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	14	1.25	58.5	55	57	36		
3.80	12.5	49.89	2.75	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	14	1.22	57.5	55	56	36		
3.95	13.0	54.30	2.28	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	16	1.20	61.4	45	58	36		
4.13	13.5	66.81	2.31	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	19	1.17	74.1	45	64	37		
4.28	14.0	64.73	3.45	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	18	1.15	70.5	55	62	37		
4.43	14.5	60.57	1.77	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	13	1.13	64.8	40	60	36		
4.58	15.0	64.40	2.05	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	14	1.11	67.7	45	61	37		
4.73	15.5	42.14	3.37	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	17	1.09		70			2.43	>10
4.88	16.0	30.31	3.29	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	1.08		80			1.73	>10
5.03	16.5	19.76	4.76	3	3	Clay	CL/CH	very stiff	125	1.3	16	1.06		100			1.11	8.00
5.18	17.0	86.16	1.71	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	19	1.04	84.9	35	68	37		
5.33	17.5	156.53	0.74	9	9	Sand	SP	dense	110	6.5	24	1.03	152.0	15	85	40		
5.48	18.0	170.29	0.66	9	9	Sand	SP	dense	110	6.5	26	1.01	163.1	15	87	40		
5.65	18.5	140.89	0.77	9	9	Sand	SP	dense	110	6.5	22	1.00	133.2	20	81	39		
5.80	19.0	132.68	0.66	9	9	Sand	SP	dense	110	6.5	20	0.99	123.8	15	79	39		
5.95	19.5	140.41	0.64	9	9	Sand	SP	dense	110	6.5	22	0.98	129.4	15	80	39		
6.10	20.0	157.62	0.75	9	9	Sand	SP	dense	110	6.5	24	0.96	143.5	15	83	40		
6.25	20.5	266.47	1.38	9	9	Sand	SP	very dense	110	6.5	41	0.95	239.8	20	98	42		
6.40	21.0	246.08	1.09	9	9	Sand	SP	very dense	110	6.5	38	0.94	218.8	15	96	41		
6.55	21.5	205.50	1.68	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	37	0.93	180.6	25	90	41		
6.70	22.0	246.66	1.62	8	8	Sand to Silty Sand	SP/SM	very dense	115	5.5	45	0.92	214.3	25	95	41		
6.85	22.5	256.62	1.38	9	9	Sand	SP	very dense	110	6.5	39	0.91	220.5	20	96	41		
7.00	23.0	254.21	1.56	8	8	Sand to Silty Sand	SP/SM	very dense	115	5.5	46	0.90	216.1	20	95	41		
7.18	23.5	247.51	1.30	9	9	Sand	SP	very dense	110	6.5	38	0.89	208.2	20	94	41		
7.33	24.0	256.29	1.17	9	9	Sand	SP	very dense	110	6.5	39	0.88	213.4	20	95	41		
7.48	24.5	205.80	0.69	9	9	Sand	SP	dense	110	6.5	32	0.87	169.6	15	88	40		
7.63	25.0	80.78	1.41	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	18	0.86	65.9	45	60	36		
7.78	25.5	25.10	2.03	6	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	7	0.85	20.3	90	25	32		
7.93	26.0	17.32	1.34	6	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	5	0.85	13.9	100	14	30		

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Proposed Soboba Hotel and Casino   Project No: LP07092   Date: 6/23/08

CONE SOUNDING: CPT-1

Est. GWT (ft): 50.0   Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)   Nk: 17.0

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %		1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
8.08	26.5	26.52	3.28	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.84		100			1.47	>10
8.23	27.0	39.68	3.38	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	0.83		90			2.24	>10
8.38	27.5	22.39	4.57	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.82		100			1.22	4.28
8.53	28.0	28.67	4.69	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.81		100			1.59	8.14
8.68	28.5	48.34	4.12	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	19	0.81		90			2.75	>10
8.85	29.0	64.69	3.54	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	26	0.80		75			3.71	>10
9.00	29.5	56.56	3.20	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	16	0.79	42.3	80	47	35		
9.15	30.0	39.67	4.24	4	4	Silty Clay to Clay	CL	hard	125	1.8	23	0.78		100			2.23	>10
9.30	30.5	24.17	4.60	3	3	Clay	CL/CH	very stiff	125	1.3	19	0.78		100			1.32	4.00
9.45	31.0	23.10	4.37	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	0.77		100			1.25	4.68
9.60	31.5	30.87	4.66	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.76		100			1.71	7.41
9.75	32.0	54.30	5.16	3	3	Clay	CL/CH	hard	125	1.3	43	0.76		100			3.09	>10
9.90	32.5	103.43	2.14	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	23	0.75	73.5	55	63	37		
10.05	33.0	40.87	4.87	4	4	Silty Clay to Clay	CL	hard	125	1.8	23	0.75		100			2.29	>10
10.20	33.5	43.91	5.12	3	3	Clay	CL/CH	hard	125	1.3	35	0.74		100			2.47	9.39
10.38	34.0	35.66	4.60	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	20	0.73		100			1.98	8.27
10.53	34.5	44.24	4.59	4	4	Silty Clay to Clay	CL	hard	125	1.8	25	0.73		100			2.48	>10
10.68	35.0	28.74	4.21	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.72		100			1.57	5.42
10.83	35.5	20.55	4.15	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	0.72		100			1.09	3.21
10.98	36.0	18.96	4.33	4	4	Silty Clay to Clay	CL	stiff	125	1.8	11	0.71		100			0.99	2.73
11.13	36.5	18.15	3.76	4	4	Silty Clay to Clay	CL	stiff	125	1.8	10	0.71		100			0.94	2.49
11.28	37.0	26.15	4.33	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	0.70		100			1.41	4.18
11.43	37.5	21.35	4.29	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	0.70		100			1.13	3.07
11.58	38.0	31.61	4.95	3	3	Clay	CL/CH	very stiff	125	1.3	25	0.69		100			1.73	4.28
11.73	38.5	38.31	4.93	4	4	Silty Clay to Clay	CL	hard	125	1.8	22	0.69		100			2.12	7.41
11.88	39.0	53.67	3.18	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	15	0.68	34.6	90	41	34		
12.05	39.5	17.86	4.11	4	4	Silty Clay to Clay	CL	stiff	125	1.8	10	0.68		100			0.91	2.20
12.20	40.0	41.21	5.66	3	3	Clay	CL/CH	hard	125	1.3	33	0.67		100			2.29	6.00
12.35	40.5	46.72	4.63	4	4	Silty Clay to Clay	CL	hard	125	1.8	27	0.67		100			2.61	9.79
12.50	41.0	29.99	7.02	3	3	Clay	CL/CH	very stiff	125	1.3	24	0.66		100			1.62	3.50
12.65	41.5	118.26	2.02	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	26	0.66	73.7	55	63	37		
12.80	42.0	37.41	7.27	3	3	Clay	CL/CH	hard	125	1.3	30	0.66		100			2.06	4.68
12.95	42.5	118.07	2.96	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	34	0.65	72.7	65	63	37		
13.10	43.0	120.05	4.20	11	11	Overconsolidated Soil	??	medium dense	120	1.0	120	0.65	73.5	75	63	37		
13.25	43.5	193.24	2.24	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	43	0.64	117.7	45	77	39		
13.40	44.0	191.46	2.09	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	43	0.64	115.9	45	77	39		
13.58	44.5	168.03	1.21	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	31	0.64	101.2	40	73	38		
13.73	45.0	91.42	3.20	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	26	0.63	54.7	75	55	36		
13.88	45.5	41.48	4.24	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	17	0.63		100			2.28	8.85
14.03	46.0	51.76	4.70	4	4	Silty Clay to Clay	CL	hard	125	1.8	30	0.63		100			2.89	9.19
14.18	46.5	200.83	3.76	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	100	0.62	118.3	60	77	39		
14.33	47.0	262.22	4.53	11	11	Overconsolidated Soil	??	dense	120	1.0	262	0.62	153.6	60	85	40		
14.48	47.5	310.92	4.32	12	12	Sand to Clayey Sand	SP/SC	very dense	115	2.0	155	0.62	181.1	55	90	41		
14.63	48.0	333.76	3.04	12	12	Sand to Clayey Sand	SP/SC	very dense	115	2.0	167	0.61	193.5	45	92	41		
14.78	48.5	297.05	1.86	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	54	0.61	171.3	35	88	40		
14.93	49.0	175.54	2.67	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	39	0.61	100.7	55	73	38		
15.10	49.5	58.38	5.12	4	4	Silty Clay to Clay	CL	hard	125	1.8	33	0.60		100			3.26	>10
15.25	50.0	90.14	6.15	11	11	Overconsolidated Soil	??	medium dense	120	1.0	90	0.60	51.2	100	53	35		
15.40	50.5	138.67	4.68	11	11	Overconsolidated Soil	??	medium dense	120	1.0	139	0.60	78.5	80	65	37		
15.55	51.0	161.95	2.83	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	36	0.60	91.5	60	70	38		
15.70	51.5	111.48	3.57	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	32	0.60	62.9	80	59	36		
15.85	52.0	123.55	4.82	11	11	Overconsolidated Soil	??	medium dense	120	1.0	124	0.60	69.5	85	62	37		
16.00	52.5	228.78	2.29	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	51	0.59	128.4	45	80	39		
16.15	53.0	190.98	2.27	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	42	0.59	107.0	50	74	38		
16.30	53.5	136.87	2.27	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	30	0.59	76.5	60	65	37		
16.45	54.0	128.22	2.76	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	28	0.59	71.5	65	63	37		
16.60	54.5	126.56	2.31	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	28	0.59	70.4	65	62	37		
16.78	55.0	105.62	3.40	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	30	0.59	58.6	80	57	36		
16.93	55.5	151.54	1.88	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	34	0.59	84.0	55	67	37		
17.08	56.0	113.54	2.77	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	32	0.58	62.8	70	59	36		
17.23	56.5	84.22	4.21	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	34	0.58		95			4.77	>10

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Proposed Soboba Hotel and Casino Project No: LP07092 Date: 6/23/08

CONE SOUNDING: CPT-1

Est. GWT (ft): 50.0 Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Nk: **17.0**

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %		1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
17.38	57.0	122.78	3.36	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	35	0.58	67.6	75	61	37		
17.53	57.5	152.14	2.57	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	34	0.58	83.6	60	67	37		
17.68	58.0	101.50	4.32	11	11	Overconsolidated Soil	??	medium dense	120	1.0	102	0.58	55.6	90	55	36		
17.83	58.5	148.45	3.77	12	12	Sand to Clayey Sand	SP/SC	medium dense	115	2.0	74	0.58	81.2	70	66	37		
17.98	59.0	188.97	2.89	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	42	0.58	103.1	60	73	38		
18.13	59.5	210.46	3.09	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	47	0.58	114.6	55	77	39		
18.30	60.0	248.71	2.67	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	55	0.58	135.2	50	81	39		
18.45	60.5	193.58	2.57	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	43	0.57	105.0	55	74	38		
18.60	61.0	107.98	4.13	11	11	Overconsolidated Soil	??	medium dense	120	1.0	108	0.57	58.4	85	57	36		
18.75	61.5	95.77	4.08	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	38	0.57		90			5.44	>10
18.90	62.0	108.67	3.79	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	31	0.57	58.6	85	57	36		
19.05	62.5	98.26	3.63	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	28	0.57	52.8	85	54	36		
19.20	63.0	86.83	3.90	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	35	0.57		95			4.91	>10
19.35	63.5	51.84	3.89	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	21	0.57		100			2.86	9.00
19.50	64.0	32.73	3.83	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	13	0.57		100			1.73	4.09
19.65	64.5	34.17	4.33	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	20	0.56		100			1.81	3.28
19.80	65.0	24.91	4.20	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	0.56		100			1.27	2.06
19.98	65.5	26.09	4.14	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	0.56		100			1.34	2.20
20.13	66.0	21.74	4.05	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	0.56		100			1.08	1.63
20.28	66.5	36.37	6.28	3	3	Clay	CL/CH	very stiff	125	1.3	29	0.56		100			1.94	2.82
20.43	67.0	112.77	4.78	11	11	Overconsolidated Soil	??	medium dense	120	1.0	113	0.56	59.4	90	57	36		
20.58	67.5	194.11	3.09	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	43	0.56	102.1	60	73	38		
20.73	68.0	273.28	4.20	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	137	0.56	143.4	60	83	40		
20.88	68.5	284.71	3.04	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	142	0.55	149.2	50	84	40		
21.03	69.0	257.07	4.18	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	129	0.55	134.4	60	81	39		

CLIENT: Soboba Band of Luiseno Indians

PROJECT: Proposed Soboba Hotel and Casino

LOCATION: See Site and Exploration Map

CONE PENETROMETER: Fugro Truck Mounted Electric Cone with 23 ton reaction weight

DATE: 6/23/08

LOG OF CONE SOUNDING DATA CPT-2

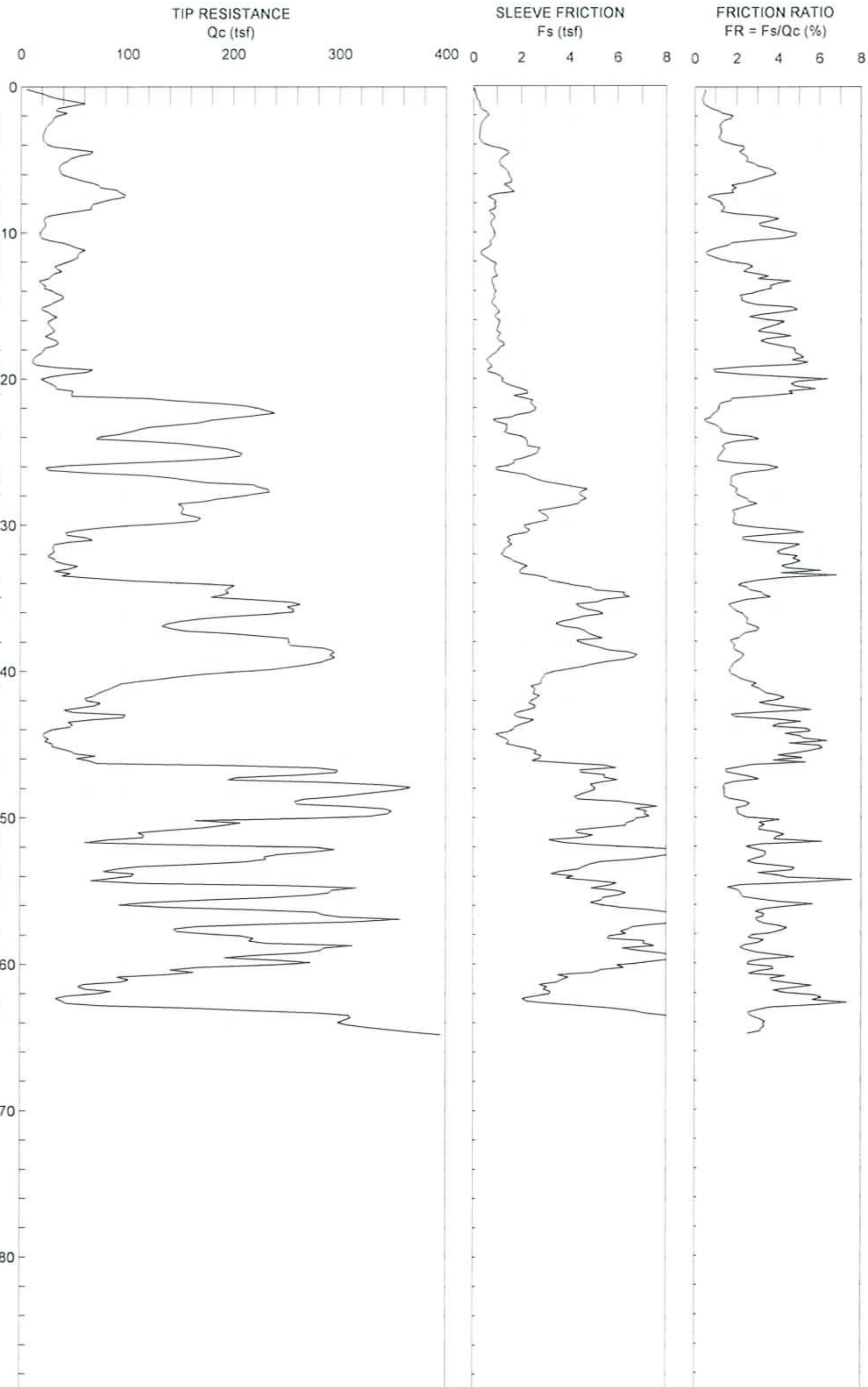
DEPTH (FEET)

INTERPRETED SOIL PROFILE
From Robertson & Campanella (1989)

GROUND EL. +/-

Silty Sand to Sandy Silt	SM/ML	dense
Silty Sand to Sandy Silt	" "	dense
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	dense
Clayey Silt to Silty Clay	ML/CL	hard
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Silty Sand	SP/SM	dense
Sandy Silt to Clayey Silt	ML	medium dense
Silty Clay to Clay	CL	very stiff
Sandy Silt to Clayey Silt	ML	medium dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	very stiff
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clay	CL/CH	stiff
Sandy Silt to Clayey Silt	ML	medium dense
Silty Clay to Clay	CL	hard
Sand to Silty Sand	SP/SM	dense
Sand	SP	dense
Sand to Silty Sand	SP/SM	medium dense
Sand to Silty Sand	" "	dense
Sand to Silty Sand	" "	dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Sand to Silty Sand	SP/SM	dense
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Silty Sand	SP/SM	dense
Clayey Silt to Silty Clay	ML/CL	hard
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	hard
Clayey Silt to Silty Clay	ML/CL	hard
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Silty Sand	SP/SM	dense
Silty Sand to Sandy Silt	SM/ML	dense
Silty Sand to Sandy Silt	" "	dense
Sand to Silty Sand	SP/SM	very dense
Sand to Silty Sand	" "	dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Clayey Silt to Silty Clay	" "	hard
Clayey Silt to Silty Clay	" "	hard
Clay	CL/CH	very stiff
Clay	" "	hard
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Silty Sand	SP/SM	dense
Sand to Silty Sand	" "	dense
Sand to Silty Sand	" "	very dense
Sandy Silt to Clayey Silt	ML	dense
Sand to Clayey Sand	SP/SC	medium dense
Sand to Clayey Sand	" "	dense
Sandy Silt to Clayey Silt	ML	medium dense
Sand to Clayey Sand	SP/SC	dense
Sandy Silt to Clayey Silt	ML	dense
Sand to Clayey Sand	SP/SC	dense
Sand to Clayey Sand	" "	dense
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Clayey Sand	SP/SC	dense
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Overconsolidated Soil	??	medium dense
Sand to Clayey Sand	SP/SC	dense

End of Sounding @ 64 ft.



Project No: LP07092

LANDMARK
Geo-Engineers and Geologists

Plate B-2

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Proposed Soboba Hotel and Casino Project No: LP07092 Date: 6/23/08

CONE SOUNDING: CPT-2

Est. GWT (ft): 50.0 Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth meters | Base Depth feet | Avg Tip Qc, tsf | Avg Friction Ratio, % | 1 Soil Type | Soil Classification | USC | Density or Consistency | Est. Density (pcf) | Qc to N | SPT N(60) | Cn or Cq | Norm. Qc1n | Est. % Fines | Rel. Dens. Dr (%) | Nk: Phi (deg.) | 17.0 Su (tsf) | OCR

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Proposed Soboba Hotel and Casino Project No: LP07092 Date: 6/23/08

CONE SOUNDING: CPT-2

Est. GWT (ft): 50.0

Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %		1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: Phi (deg.)	17.0 Su (tsf)	OCR
0.15	0.5	13.12	0.48	6	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	4	2.00	24.8	45	74	38		
0.30	1.0	36.37	0.41	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	8	2.00	68.8	20	88	40		
0.45	1.5	47.84	0.59	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	9	2.00	90.4	20	89	40		
0.60	2.0	37.31	1.40	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	8	2.00	70.5	35	76	39		
0.75	2.5	29.70	1.47	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	8	2.00	56.1	45	66	37		
0.93	3.0	23.92	1.22	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	7	2.00	45.2	45	57	36		
1.08	3.5	21.18	1.21	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	6	2.00	40.0	45	51	35		
1.23	4.0	22.85	1.48	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	7	2.00	43.2	50	51	35		
1.38	4.5	48.53	2.26	6	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	14	2.00	91.7	40	71	38		
1.53	5.0	55.05	2.41	6	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	16	1.97	102.4	40	73	38		
1.68	5.5	38.96	2.93	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	11	1.87	68.9	50	61	37		
1.83	6.0	38.41	3.74	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	15	1.79		60			2.24	>10
1.98	6.5	57.26	2.76	6	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	16	1.71	92.7	40	70	38		
2.13	7.0	79.20	1.81	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	18	1.65	123.4	30	79	39		
2.28	7.5	96.03	1.11	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	17	1.59	144.4	15	83	40		
2.45	8.0	75.48	1.16	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	14	1.54	109.8	20	75	39		
2.60	8.5	61.67	1.32	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	14	1.49	86.9	25	68	38		
2.75	9.0	28.38	3.11	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	1.45		60			1.64	>10
2.90	9.5	22.84	3.25	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.41		70			1.31	>10
3.05	10.0	19.47	4.34	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	1.37		85			1.11	>10
3.20	10.5	21.51	3.96	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.33		80			1.23	>10
3.35	11.0	45.79	1.52	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	10	1.30	56.2	40	55	36		
3.50	11.5	56.55	0.63	8	8	Sand to Silty Sand	SP/SM	medium dense	115	5.5	10	1.27	67.9	20	61	37		
3.65	12.0	49.20	1.27	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	11	1.24	57.8	35	56	36		
3.80	12.5	35.01	2.58	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	10	1.22	40.3	60	46	34		
3.95	13.0	32.93	2.93	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	13	1.19		65			1.89	>10
4.13	13.5	20.96	3.84	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.17		90			1.19	>10
4.28	14.0	25.08	3.46	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.15		85			1.43	>10
4.43	14.5	37.51	2.38	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	11	1.13	39.9	60	45	34		
4.58	15.0	31.42	2.55	6	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	9	1.11	32.9	70	40	34		
4.73	15.5	22.22	4.59	3	3	Clay	CL/CH	very stiff	125	1.3	18	1.09		100			1.25	>10
4.88	16.0	29.74	3.36	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	1.07		80			1.70	>10
5.03	16.5	28.64	3.61	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	1.05		85			1.63	>10
5.18	17.0	28.01	3.84	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	1.04		90			1.59	>10
5.33	17.5	32.73	3.37	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	13	1.02		80			1.87	>10
5.48	18.0	25.19	4.55	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	1.01		100			1.42	>10
5.65	18.5	16.08	5.02	3	3	Clay	CL/CH	stiff	125	1.3	13	0.99		100			0.88	4.57
5.80	19.0	12.68	4.98	3	3	Clay	CL/CH	stiff	125	1.3	10	0.98		100			0.68	3.14
5.95	19.5	54.88	1.36	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	12	0.97	50.1	45	52	35		
6.10	20.0	29.59	4.21	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	17	0.95		95			1.67	>10
6.25	20.5	28.82	4.78	3	3	Clay	CL/CH	very stiff	125	1.3	23	0.94		100			1.63	>10
6.40	21.0	43.86	5.00	4	4	Silty Clay to Clay	CL	hard	125	1.8	25	0.93		90			2.51	>10
6.55	21.5	104.52	2.30	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	23	0.92	90.6	45	70	38		
6.70	22.0	207.04	1.20	9	9	Sand	SP	dense	110	6.5	32	0.91	177.5	20	89	41		
6.85	22.5	230.12	0.97	9	9	Sand	SP	very dense	110	6.5	35	0.90	195.2	15	92	41		
7.00	23.0	182.60	0.61	9	9	Sand	SP	dense	110	6.5	28	0.89	153.3	15	85	40		
7.18	23.5	125.32	1.13	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	23	0.88	104.1	30	74	38		
7.33	24.0	89.99	1.85	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	20	0.87	74.0	45	64	37		
7.48	24.5	115.50	2.13	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	26	0.86	94.0	45	71	38		
7.63	25.0	189.51	1.35	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	34	0.85	152.7	25	85	40		
7.78	25.5	200.94	1.18	9	9	Sand	SP	dense	110	6.5	31	0.84	160.4	25	86	40		
7.93	26.0	96.33	2.14	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	21	0.84	76.2	50	64	37		

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Proposed Soboba Hotel and Casino   Project No: LP07092   Date: 6/23/08

CONE SOUNDING: CPT-2

Est. GWT (ft): 50.0   Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %		1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: Phi (deg.)	17.0 Su (tsf)	OCR
8.08	26.5	57.96	2.95	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	17	0.83	45.4	70	49	35		
8.23	27.0	156.67	1.72	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	28	0.82	121.6	35	78	39		
8.38	27.5	225.01	1.84	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	41	0.81	173.0	30	89	40		
8.53	28.0	219.09	2.04	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	40	0.81	167.0	35	88	40		
8.68	28.5	168.37	2.69	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	37	0.80	127.2	45	80	39		
8.85	29.0	152.33	2.17	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	34	0.79	114.1	40	76	39		
9.00	29.5	160.32	1.87	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	36	0.79	119.1	40	78	39		
9.15	30.0	137.05	1.90	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	30	0.78	101.0	40	73	38		
9.30	30.5	56.85	4.19	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	23	0.77		90			3.24	>10
9.45	31.0	57.83	2.76	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	17	0.77	41.9	75	47	35		
9.60	31.5	36.10	4.29	4	4	Silty Clay to Clay	CL	hard	125	1.8	21	0.76		100			2.02	9.79
9.75	32.0	30.61	4.08	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	17	0.75		100			1.69	6.88
9.90	32.5	30.74	4.89	3	3	Clay	CL/CH	very stiff	125	1.3	25	0.75		100			1.70	5.21
10.05	33.0	47.44	4.44	4	4	Silty Clay to Clay	CL	hard	125	1.8	27	0.74		100			2.68	>10
10.20	33.5	39.31	5.66	3	3	Clay	CL/CH	hard	125	1.3	31	0.74		100			2.20	7.41
10.38	34.0	111.06	3.21	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	32	0.73	76.6	65	65	37		
10.53	34.5	196.87	2.39	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	44	0.72	134.9	40	81	39		
10.68	35.0	187.98	3.37	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	94	0.72	127.9	50	80	39		
10.83	35.5	246.79	2.03	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	45	0.71	166.7	35	88	40		
10.98	36.0	254.97	1.87	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	46	0.71	171.0	35	88	40		
11.13	36.5	186.73	2.41	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	41	0.70	124.4	45	79	39		
11.28	37.0	138.06	2.78	7	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	31	0.70	91.4	55	70	38		
11.43	37.5	192.21	2.54	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	43	0.70	126.4	45	79	39		
11.58	38.0	252.35	1.86	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	46	0.69	164.8	35	87	40		
11.73	38.5	277.24	1.89	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	50	0.69	179.9	35	90	41		
11.88	39.0	294.03	2.26	7	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	65	0.68	189.6	35	91	41		
12.05	39.5	280.94	1.98	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	51	0.68	180.0	35	90	41		
12.20	40.0	231.22	1.70	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	42	0.67	147.2	35	84	40		
12.35	40.5	151.55	1.95	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	34	0.67	95.9	45	71	38		
12.50	41.0	98.58	2.72	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	28	0.67	62.0	65	58	36		
12.65	41.5	78.79	3.22	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	23	0.66	49.3	80	52	35		
12.80	42.0	64.43	4.03	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	26	0.66		95			3.65	>10
12.95	42.5	66.85	3.80	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	27	0.65		90			3.79	>10
13.10	43.0	63.58	3.63	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	25	0.65		90			3.59	>10
13.25	43.5	69.77	3.59	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	28	0.65		90			3.95	>10
13.40	44.0	42.47	4.36	4	4	Silty Clay to Clay	CL	hard	125	1.8	24	0.64		100			2.35	7.00
13.58	44.5	23.41	4.98	3	3	Clay	CL/CH	very stiff	125	1.3	19	0.64		100			1.22	2.20
13.73	45.0	27.03	5.36	3	3	Clay	CL/CH	very stiff	125	1.3	22	0.63		100			1.44	2.65
13.88	45.5	38.64	5.90	3	3	Clay	CL/CH	hard	125	1.3	31	0.63		100			2.12	4.37
14.03	46.0	58.68	4.67	4	4	Silty Clay to Clay	CL	hard	125	1.8	34	0.63		100			3.29	>10
14.18	46.5	111.66	3.93	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	45	0.62		80			6.41	>10
14.33	47.0	283.46	1.80	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	52	0.62	166.1	35	87	40		
14.48	47.5	227.92	2.54	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	51	0.62	132.9	45	81	39		
14.63	48.0	355.71	1.40	9	9	Sand	SP	very dense	110	6.5	55	0.61	206.3	25	94	41		
14.78	48.5	317.53	1.41	9	9	Sand	SP	very dense	110	6.5	49	0.61	183.3	30	90	41		
14.93	49.0	261.69	2.20	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	48	0.61	150.3	40	85	40		
15.10	49.5	334.21	2.16	8	8	Sand to Silty Sand	SP/SM	very dense	115	5.5	61	0.60	191.0	35	92	41		
15.25	50.0	313.71	2.27	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	57	0.60	178.4	40	90	41		
15.40	50.5	187.06	3.49	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	94	0.60	106.2	60	74	38		
15.55	51.0	140.31	3.35	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	40	0.60	79.4	70	66	37		
15.70	51.5	104.70	4.00	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	42	0.60		85			5.98	>10
15.85	52.0	162.96	3.91	12	12	Sand to Clayey Sand	SP/SC	medium dense	115	2.0	81	0.60	91.8	70	70	38		
16.00	52.5	270.27	3.21	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	135	0.59	152.0	50	85	40		
16.15	53.0	223.76	2.90	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	50	0.59	125.6	55	79	39		
16.30	53.5	123.86	3.92	12	12	Sand to Clayey Sand	SP/SC	medium dense	115	2.0	62	0.59	69.3	75	62	37		
16.45	54.0	96.55	3.87	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	39	0.59		85			5.50	>10
16.60	54.5	88.16	5.78	11	11	Overconsolidated Soil	??	medium dense	120	1.0	88	0.59	49.1	100	51	35		
16.78	55.0	286.38	1.93	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	52	0.59	159.2	40	86	40		
16.93	55.5	265.12	2.23	8	8	Sand to Silty Sand	SP/SM	dense	115	5.5	48	0.59	147.1	45	84	40		
17.08	56.0	128.33	4.28	11	11	Overconsolidated Soil	??	medium dense	120	1.0	128	0.59	71.0	80	62	37		
17.23	56.5	210.76	3.55	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	105	0.58	116.4	60	77	39		

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Proposed Soboba Hotel and Casino Project No: LP07092 Date: 6/23/08

CONE SOUNDING: CPT-2

Est. GWT (ft): 50.0

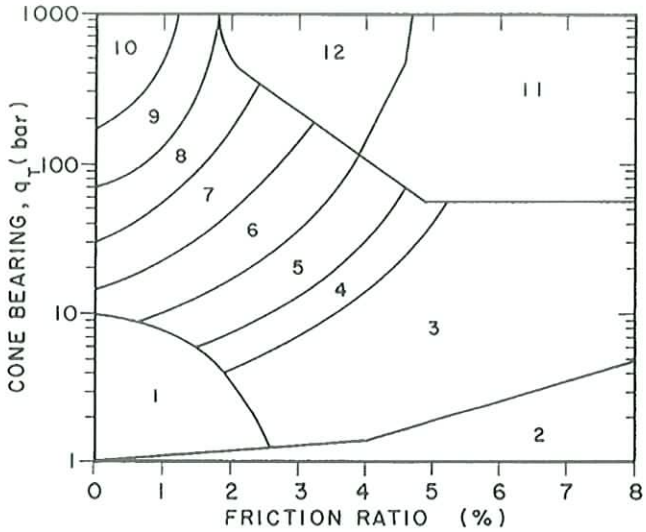
Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Nk: **17.0**

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %		1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
17.38	57.0	313.61	3.17	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	157	0.58	172.9	50	89	40		
17.53	57.5	212.17	3.68	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	106	0.58	116.7	60	77	39		
17.68	58.0	175.79	3.51	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	88	0.58	96.5	65	71	38		
17.83	58.5	221.89	2.96	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	49	0.58	121.5	55	78	39		
17.98	59.0	293.42	2.33	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	65	0.58	160.4	45	86	40		
18.13	59.5	225.99	3.84	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	113	0.58	123.3	60	79	39		
18.30	60.0	250.67	2.78	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	56	0.58	136.4	50	82	39		
18.45	60.5	157.61	3.51	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	45	0.57	85.6	70	68	38		
18.60	61.0	110.04	3.51	6	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	31	0.57	59.7	80	57	36		
18.75	61.5	69.83	4.64	4	4	Silty Clay to Clay	CL	hard	125	1.8	40	0.57		100			3.92	>10
18.90	62.0	73.28	4.27	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	29	0.57		100			4.12	>10
19.05	62.5	39.19	5.84	3	3	Clay	CL/CH	hard	125	1.3	31	0.57		100			2.11	3.35
19.20	63.0	93.31	5.62	11	11	Overconsolidated Soil	??	medium dense	120	1.0	93	0.57	50.1	100	52	35		
19.35	63.5	268.42	2.74	7	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	60	0.57	143.9	50	83	40		
19.50	64.0	304.29	3.10	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	152	0.57	162.8	50	87	40		
19.65	64.5	328.07	3.26	12	12	Sand to Clayey Sand	SP/SC	dense	115	2.0	164	0.56	175.2	50	89	40		

Simplified Soil Classification Chart

After Robertson & Campanella (1989)



Geotechnical Parameters from CPT Data:

Equivalent SPT N(60) blow count = Qc/(Qc/N Ratio)

N1(60) = Cn*N(60) Normalized SPT blow count

Cn = 1/(p'o)^0.5 < 1.6 max. from Liao & Whitman (1986)

p'o = effective overburden pressure (tsf) using unit densities given below and estimated groundwater table.

Dr = Relative density (%) from Jamiolkowski et. al. (1986) relationship = -98 +68*log(Qc/p'o^0.5) where Qc, p'o in tonne/sqm

Note: 1 tonne/sqm = 0.1024 tsf, 1 bar =1.0443 tsf

Phi = Friction Angle estimated from either:

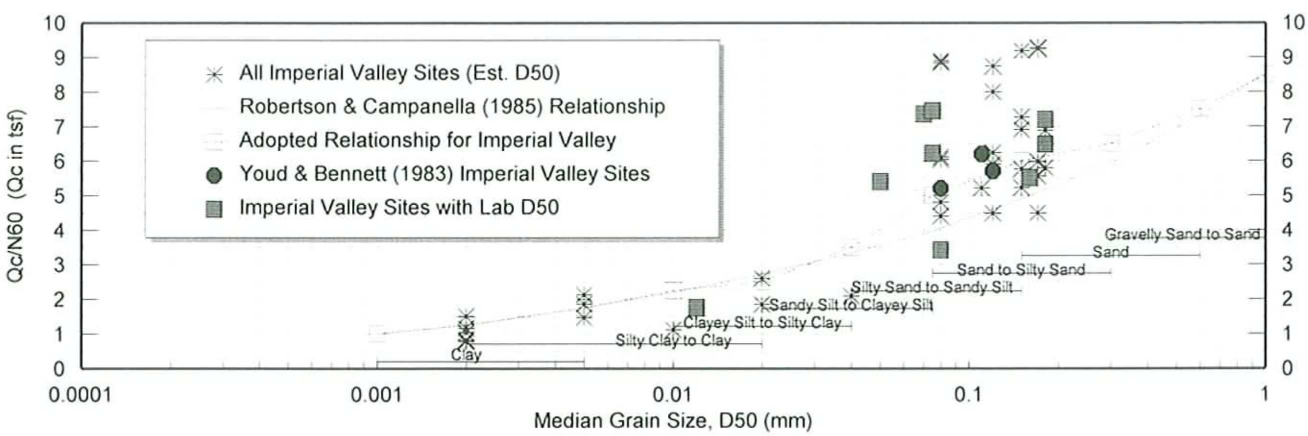
1. Roberton & Campanella (1983) chart: Phi = 5.3 + 24*(log(Qc/p'o))+3(log(Qc/p'o))^2
2. Peck, Hansen & Thornburn (1974) N-Phi Correlation
3. Schmertman (1978) chart [Phi = 28+0.14*Dr for fine uniform sands]

Su = undrained shear strength (tsf)

= (Qc-p'o)/Nk where Nk varies from 10 to 22, 17 for OC clays

OCR = Overconsolidation Ratio estimated from Schmertman (1978) chart using Su/p'o ratio and estimated normal consolidated Su/p'o

Variation of Qc/N Ratio with Grain Size



Note: Assumed Properties and Adopted Qc/N Ratio based on correlations from Imperial Valley, California soils

Table of Soil Types and Assumed Properties

Zone	Soil Classification	UCS	Density (pcf)	R&C Qc/N	Adopted Qc/N	Est. PI	Fines (%)	D50 (mm)	Su (tsf)	Consistency
1	Sensitive fine grained	ML	120	2	2	NP-15	65-100	0.020	0-0.13	very soft
2	Organic Material	OL/OH	120	1	1	--	--	--	0.13-.25	soft
3	Clay	CL/CH	125	1	1.25	25-40+	90-100	0.002	0.25-0.5	firm
4	Silty Clay to Clay	CL	125	1.5	1.75	15-40	90-100	0.005	0.5-1.0	stiff
5	Clayey Silt to Silty Clay	ML/CL	120	2	2.5	5-25	90-100	0.020	1.0-2.0	very stiff
6	Sandy Silt to Clayey Silt	ML	115	2.5	3.5	NP-10	65-100	0.040	>2.0	hard
7	Silty Sand to Sandy Silt	SM/ML	115	3	5	NP	35-75	0.075	Dr (%)	Relative Density
8	Sand to Silty Sand	SP/SM	115	4	6	NP	5-35	0.150	0-20	very loose
9	Sand	SP	110	5	6.5	NP	0-5	0.300	20-40	loose
10	Gravelly Sand to Sand	SW	115	6	7.5	NP	0-5	0.600	40-70	medium dense
11	Overconsolidated Soil	--	120	1	1	NP	90-100	0.010	70-90	dense
12	Sand to Clayey Sand	SP/SC	115	2	2	NP-5	--	---	>90	very dense

LANDMARK Geo-Engineers and Geologists

Project No: LP07092

Key to Interpretation of CPT Logs

Plate B-3

APPENDIX C

Table 1
2006 International Building Code (IBC) and ASCE 7-05 Seismic Parameters

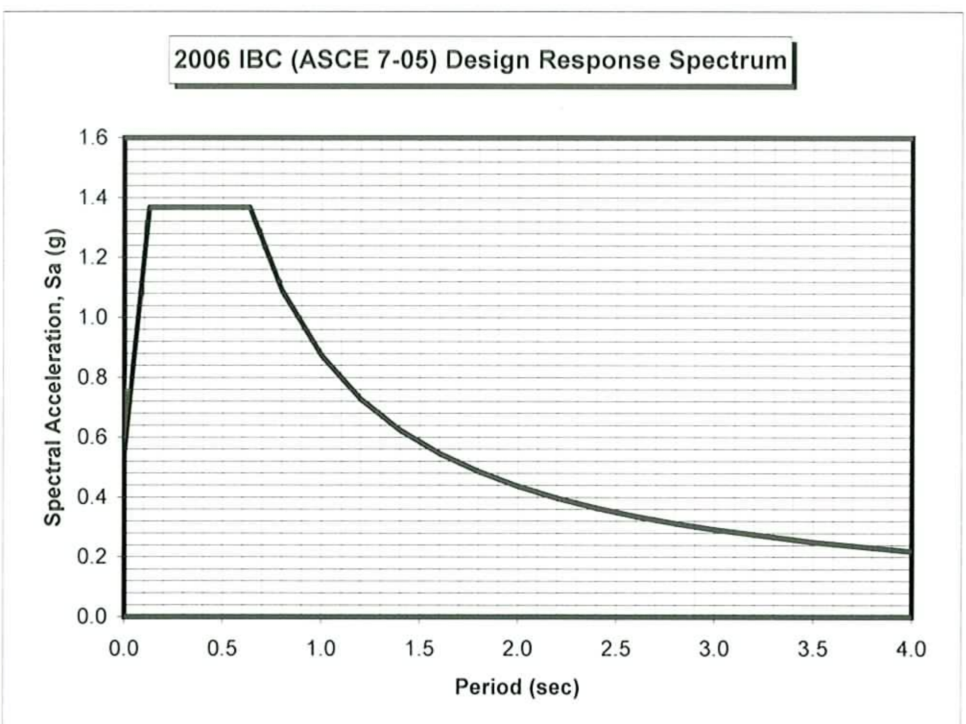
			IBC Reference
Site Class:	**D**		Table 1613.5.2
Latitude:	33.79	N	
Longitude:	-116.928	W	

Maximum Considered Earthquake (MCE) Ground Motion

Short Period Spectral Response	S_s	2.05 g	Figure 1613.5(3)
1 second Spectral Response	S_1	0.87 g	Figure 1613.5(4)
Site Coefficient	F_a	1.00	Table 1613.5.3 (1)
Site Coefficient	F_v	1.50	Table 1613.5.3 (2)
Adjusted Short Period Spectral Response	S_{MS}	2.05 g	$= F_a * S_s$
Adjusted 1 second Spectral Response	S_{M1}	1.31 g	$= F_v * S_1$

Design Earthquake Ground Motion

Short Period Spectral Response	S_{DS}	1.37 g	$= 2/3*S_{MS}$
1 second Spectral Response	S_{D1}	0.87 g	$= 2/3*S_{M1}$
	To	0.13 sec	$=0.2*S_{D1}/S_{DS}$
	Ts	0.64 sec	$=S_{D1}/S_{DS}$



Period T (sec)	Sa (g)
0.00	0.55
0.05	0.87
0.13	1.37
0.20	1.37
0.30	1.37
0.64	1.37
0.80	1.09
1.00	0.87
1.20	0.73
1.40	0.62
1.60	0.55
1.80	0.49
2.00	0.44
2.20	0.40
2.40	0.36
2.60	0.34
2.80	0.31
3.00	0.29
3.50	0.25
4.00	0.22

LANDMARK
Geo-Engineers and Geologists

780 N. 4th Street
El Centro, CA 92243
(760) 370-3000
(760) 337-8900 fax

77-948 Wildcat Drive
Palm Desert, CA 92211
(760) 360-0665
(760) 360-0521 fax

San Jacinto Fault Investigation Measurements
San Jacinto, California
LCI Report No.: LP07070

Project site:

Measurements taken from NWC of Soboba Road and Lake Park Drive:

Location	Measurement Location	Approximate Distance to Faults (Measured East to West)
1	Along northern boundary	**Fault 1:** 313 **Fault 2**: 955 ft.
2	404 ft. north of Soboba Road and Lake Park Drive Intersection	**Fault 1:** 113 **Fault 2:** 294 ft.
3	Along southern boundary	**Fault 1:** 100 **Fault 2:** 74 ft.

Measurements taken from SWC of Soboba Road and Lake Park Drive:

Location	Measurement Location	Approximate Distance to Faults (Measured East to West)
4	Along northern boundary	**Fault 1:** 125 **Fault 2**: 37 ft.
5	551 ft. south of Soboba Road and Lake Park Drive Intersection	**Fault 1:** 75 **Fault 2:** -37 ft.
6	882 ft. north of southern boundary	**Fault 1:** 150 **Fault 2:** -19 ft.
7	404 ft. north of southern boundary	**Fault 1:** 90 **Fault 2:** -37 ft.
8	Along southern boundary	**Fault 1:** -13 **Fault 2:** -74 ft.

Notes:

- Fault 1 measurements are taken from field work done by Landmark Consultants.
- Fault 2 measurements are taken from Riverside County Geographic Information System – Fault Zones.
- Measurements taken from Riverside County Geographic Information System – Fault Zones and Landmark Consultants are applied to Goodman & Associates Site Map and are considered approximate.

LANDMARK
Geo-Engineers and Geologists

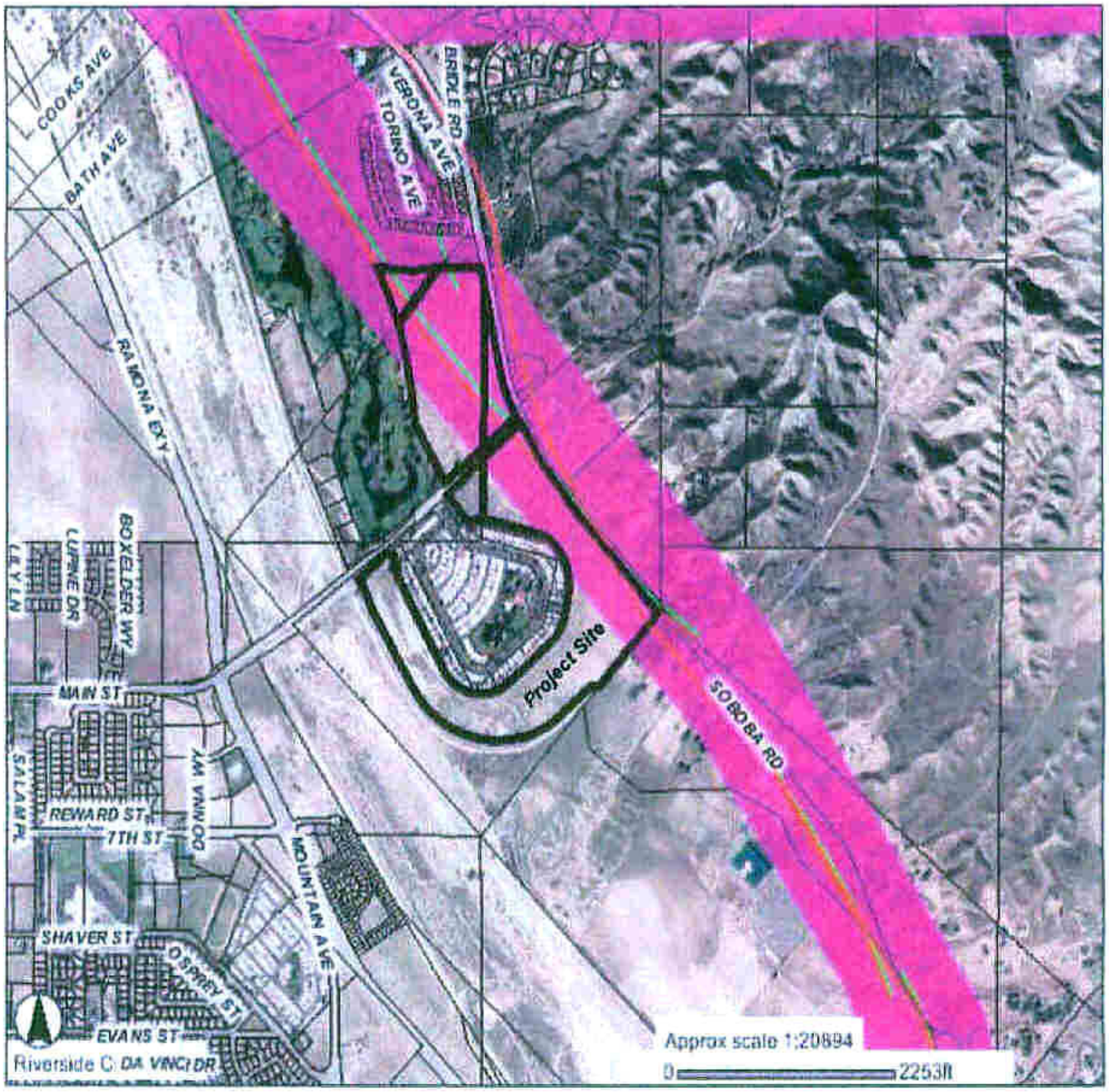
GREG M. CHANDRA, PE

77-948 Wildcat Drive
Palm Desert, CA 92211
E-mail: gchandra@landmark-ca.com

(760) 360-0665
Fax (760) 360-0521
Cell (760) 455-9345

Offices Located in Palm Desert and El Centro, California

RIVERSIDE COUNTY GIS



Selected parcel(s):
433-120-023 433-140-001 433-140-020 433-140-026 433-140-030

FAULT ZONES

SELECTED PARCEL

NOT IN A FAULT ZONE

CIRCULATION ELEMENT ULTIMATE RIGHT-OF-WAY (APPROX)

ALQUIST-PRIOLO

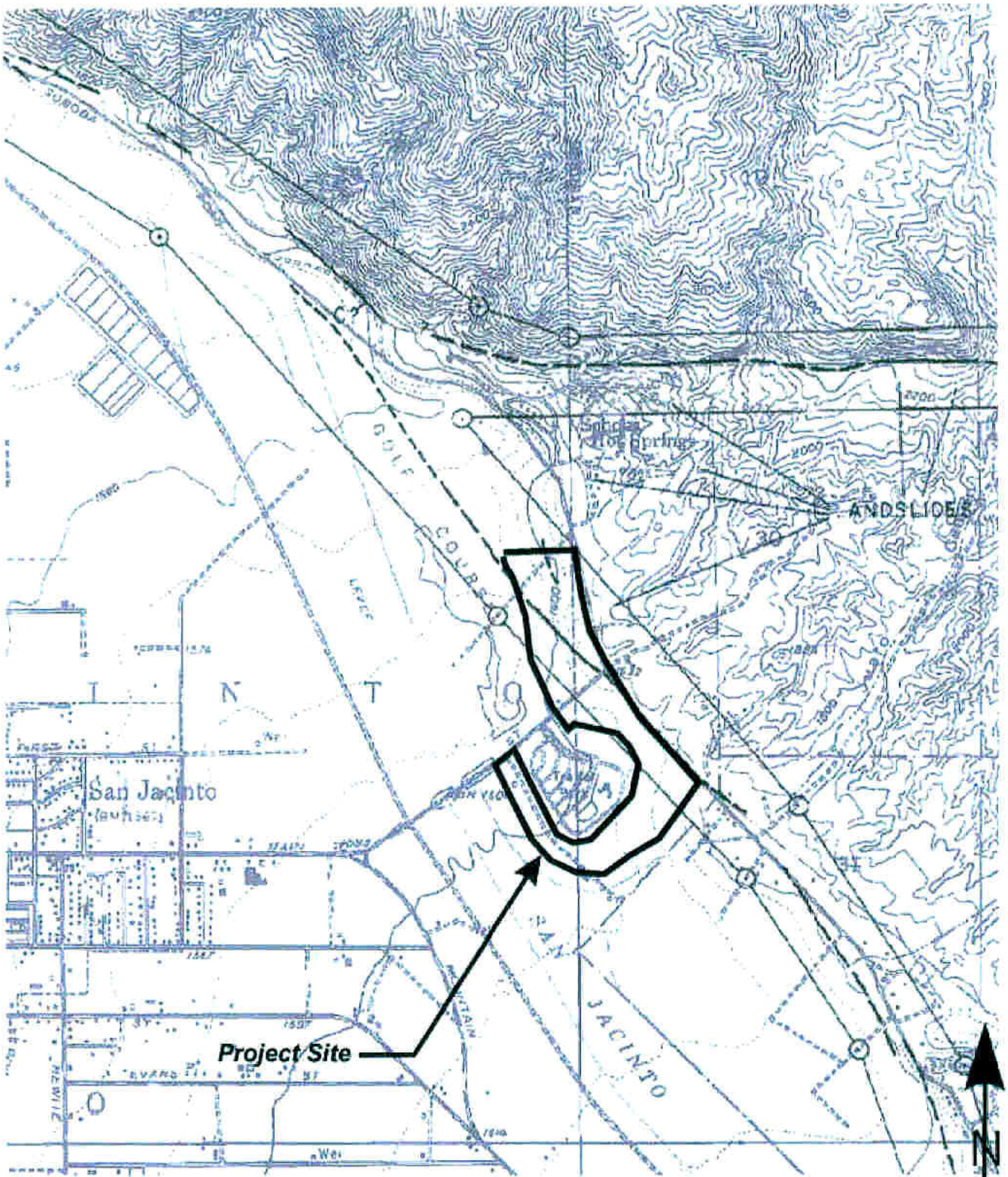
RIVERSIDE COUNTY

SAN JACINTO FAULT ZONE

N

IMPORTANT
This information is made available through the Riverside County Geographic Information System. The information is for reference purposes only. It is intended to be used as base level information only and is not intended to replace any recorded documents or other public records. Contact appropriate County Department or Agency if necessary. Reference to recorded documents and public records may be necessary and is advisable.

LANDMARK Geo-Engineers and Geologists **Project No.: LP07070**	**Riverside County Geographic Information System (GIS) Fault Zones**	**Plate 1**



San Jacinto, CA 7.5 Min. Quadrangle

0 ½ Mile

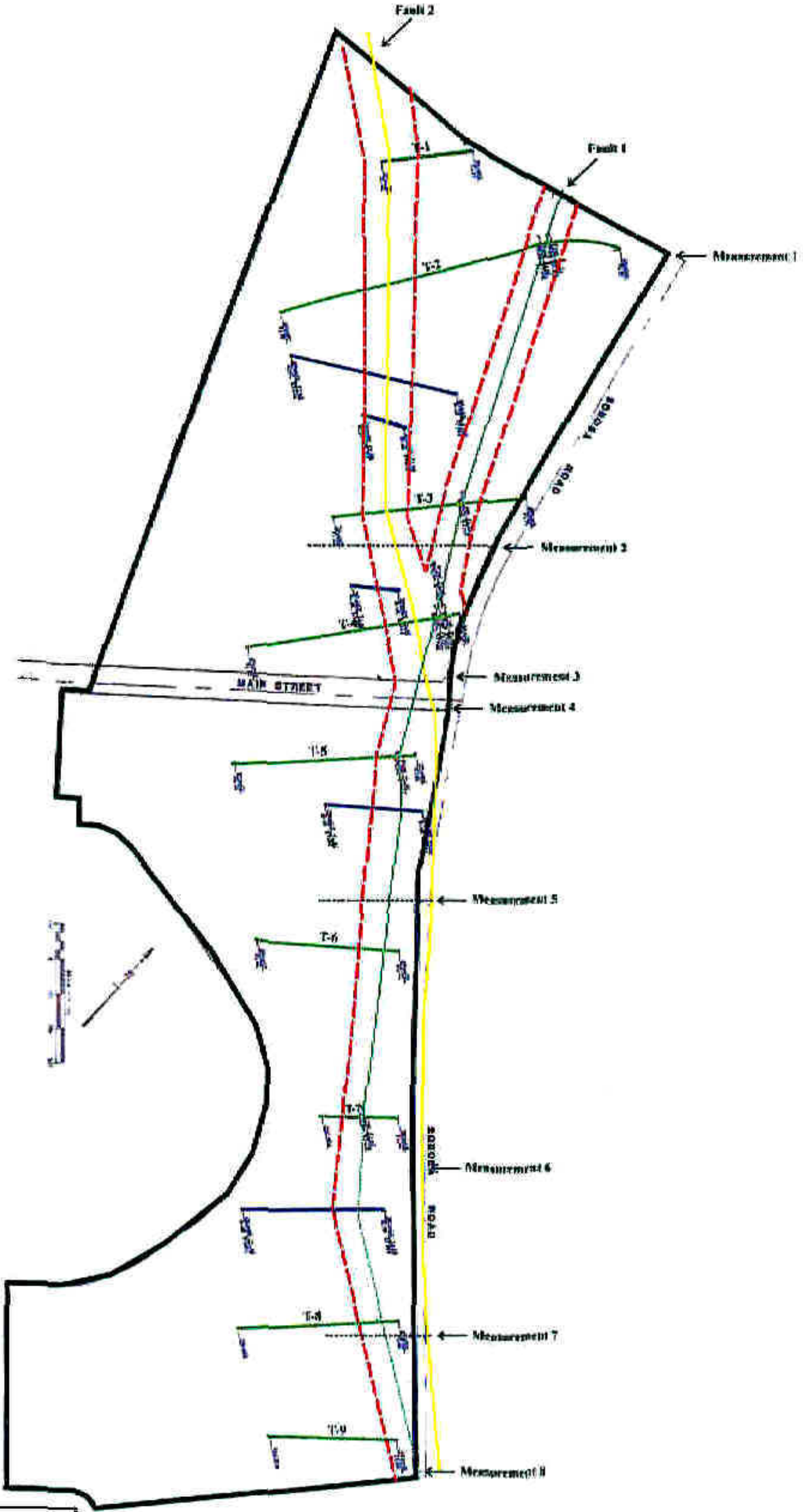
Site: Location: 33.790N 116.928W

LANDMARK
Geo-Engineers and Geologists

Project No.: LP07070

A-P Earthquake Fault Zone Map

Plate 2



LEGEND

- Trench Locations (Landmark, 2007)
- Trench Locations (Envirocom, 1976)
- Project site boundary
- Fault Trace (dashed where inferred; dotted where approximated)
- A-P Fault trace (dashed where inferred; dotted where approximated)
- Fault setback (50 ft. Minimum)

LANDMARK Project No.: LP07070	Site Map	Plate 3

Geotechnical Report

Proposed New Hotel/Casino

San Jacinto, California

Prepared for:

ENTRIX

200 First Avenue West. Suite 500

Seattle, WA 98119

LANDMARK

Geo-Engineers and Geologists

Prepared by:

LandMark Consultants, Inc.

77-948 Wildcat Drive

Palm Desert, CA 92211

(760) 360-0665

February 2010

LANDMARK
Geo-Engineers and Geologists

780 N. 4th Street
El Centro, CA 92243
(760) 370-3000
(760) 337-8900 fax

77-948 Wildcat Drive
Palm Desert, CA 92211
(760) 360-0665
(760) 360-0521 fax

March 19, 2010

Mr. Ryan A. Shatt, L.H.G.
ENTRIX
200 First Avenue West, Suite 500
Seattle, WA 98119

Preliminary Geotechnical Investigation
Proposed New Hotel/Casino
Soboba Band of Luiseno Indians
San Jacinto, California
LCI Report No. LP010001

Dear Mr. Shatt:

This preliminary geotechnical report is provided for design and construction of the proposed new hotel/casino project located on Soboba Road and Lake Park Drive in San Jacinto, California. Our geotechnical investigation was conducted in response to your request for our services. The enclosed report describes our soil engineering investigation and presents our professional opinions regarding geotechnical conditions at the site to be considered in the design and construction of the project.

The findings of this study indicate the site is underlain by interbedded sand, silt, and clay with near surface sandy silt and silty sand. The near surface soils are expected to be non-expansive. The subsurface soils are loose to very dense in nature. Groundwater was not encountered in the borings during the time of exploration. Historic groundwater levels ranged from 128 to 193 feet below the ground surface within the past 14 years in the vicinity of the project site.

Severe sulfate and chloride levels were not encountered in the soil samples tested for this study. However, the soil is moderately corrosive to metal. We recommend a minimum of 2,500 psi concrete of Type II Portland Cement with a maximum water/cement ratio of 0.60 (by weight) should be used for concrete placed in contact with native soils at this project.

Seismic settlements of the dry sands have been calculated to be approximately <¼ to 1¼> inches based on the field exploration data. Total seismic settlements are not expected to exceed <1¼> inches with differential settlements approximately ½ of the total settlement.

We did not encounter soil conditions that would preclude implementation of the proposed project provided the recommendations contained in this report are implemented in the design and construction of this project. Our findings, recommendations, and application options are related ***only through reading the full report***, and are best evaluated with the active participation of the engineer of record who developed them. Additional field work and/or review of these recommendations may be required in the future once the specific and more detail design have been completed.

We appreciate the opportunity to provide our findings and professional opinions regarding geotechnical conditions at the site. If you have any questions or comments regarding our findings, please call our office at (760) 360-0665.

Respectfully Submitted,
LandMark Consultants, Inc.

Todd A. Berney-Ficklin
Staff Geologist

Greg M. Chandra, P.E., M.ASCE
Principal Engineer

Distribution:
Client (4)

TABLE OF CONTENTS

Page

APPENDICES

Section 1
INTRODUCTION

1.1 Project Description

This report presents the findings of our geotechnical investigation for the proposed new hotel/casino project located on Soboba Road and Lake Park Drive in San Jacinto, California (See Vicinity Map, Plate A-1). The proposed development will consist of a multi-story hotel, casino, convention center, commercial stores, and parking structures on approximately 55 acres.

The multi story structures are planned to consist of continuous and spread concrete footing, concrete slabs-on-grade and concrete, masonry, metal, and wood-frame construction. Footing loads at exterior bearing walls are estimated at 1 to 10 kips per lineal foot. Column loads are estimated to range from 5 to 80 kips. If structural loads exceed those stated above, we should be notified so we may evaluate their impact on foundation settlement and bearing capacity. Site development will include building pad preparation, underground utility installation, street and parking lot construction, and concrete driveway placement.

1.2 Purpose and Scope of Work

The purpose of this geotechnical study was to investigate the upper 53.5 feet of subsurface soil at selected locations within the site for evaluation of physical/engineering properties. From the subsequent field and laboratory data, professional opinions were developed and are provided in this report regarding geotechnical conditions at this site and the effect on design and construction. The scope of our services consisted of the following:

< Field exploration and in-situ testing of the site soils at selected locations and depths
< Laboratory testing for physical and/or chemical properties of selected samples
< Review of the available literature and publications pertaining to local geology, faulting, and seismicity
< Engineering analysis and evaluation of the data collected
< Preparation of this report presenting our findings, professional opinions, and recommendations for the geotechnical aspects of project design and construction

This report addresses the following geotechnical issues:

< Subsurface soil and groundwater conditions
< Site geology, regional faulting and seismicity, near source factors, and site seismic accelerations
< Seismic dry settlement analysis
< Aggressive soil conditions to metals and concrete

Professional opinions with regard to the above issues are presented for the following:

< Site grading and earthwork
< Building pad and foundation subgrade preparation
< Allowable soil bearing pressures and expected settlements
< Concrete slabs-on-grade
< Lateral earth pressures
< Excavation conditions and buried utility installations
< Mitigation of the potential effects of salt concentrations in native soil to concrete mixes and steel reinforcement
< Seismic design parameters
< Preliminary Pavement structural sections

Our scope of work for this report did not include an evaluation of the site for the presence of environmentally hazardous materials or conditions.

1.3 Authorization

Mr. Benjamin Pogue of ENTRIX provided authorization by written agreement to proceed with our work on January 5, 2010. We conducted our work according to our written proposal dated December 17, 2009.

Section 2
METHODS OF INVESTIGATION

2.1 Field Exploration

Subsurface exploration was performed on June 23, 2008 using Middle Earth Geo-Testing, Inc. of Orange, California to advance two (2) electric cone penetrometer (CPT) soundings to approximate depths of 64 to 69 feet below the existing ground surface. The soundings were made at the locations shown on the Site and Exploration Plan (Plate A-2). The approximate sounding locations were established in the field and plotted on the site map by sighting to discernable site features.

CPT soundings provide a continuous profile of the soil stratigraphy with readings every 2.5cm (1 inch) in depth. Direct sampling for visual and physical confirmation of soil properties has been used by our firm to establish direct correlations with CPT exploration in this geographical region.

The CPT exploration was conducted by hydraulically advancing an instrumented Hogentogler 10cm^2 conical probe into the ground at a rate of 2cm per second using a 23-ton truck as a reaction mass. An electronic data acquisition system recorded a nearly continuous log of the resistance of the soil against the cone tip (Qc) and soil friction against the cone sleeve (Fs) as the probe was advanced. Empirical relationships (Robertson and Campanella, 1989) were then applied to the data to give a continuous profile of the soil stratigraphy. Interpretation of CPT data provides correlations for SPT blow count, phi (ϕ) angle (soil friction angle), undrained shear strength (S_u) of clays and over-consolidation ratio (OCR). These correlations may then be used to evaluate vertical and lateral soil bearing capacities and consolidation characteristics of the subsurface soil.

Interpretive logs of the CPT soundings are presented on Plates B-1and B-2 in Appendix B. A key to the interpretation of CPT soundings is presented on Plate B-16.

Additional subsurface exploration was performed on January 12 and 13, 2010 using 2R Drilling of Ontario, California to advance ten (10) borings to depths of 16.5to 53.5 feet below the existing ground surface. The borings were advanced with a truck-mounted, CME 55 drill rig using 8-inch diameter, hollow-stem, continuous-flight augers. The approximate boring locations were established in the field and plotted on the site map by sighting to discernable site features. The boring locations are shown on the Site and Exploration Plan (Plate A-2).
A staff geologist observed the drilling operations and maintained a log of the soil encountered and

sampling depths, visually classified the soil encountered during drilling in accordance with the Unified Soil Classification System, and obtained drive tube and bulk samples of the subsurface materials at selected intervals. Relatively undisturbed soil samples were retrieved using a 2-inch outside diameter (OD) split-spoon sampler or a 3-inch OD Modified California Split-Barrel (ring) sampler. The samples were obtained by driving the sampler ahead of the auger tip at selected depths. The drill rig was equipped with a 140-pound CME automatic hammer with a 30-inch drop for conducting Standard Penetration Tests (SPT) in accordance with ASTM D1586. The number of blows required to drive the samplers the last 12 inches of an 18 inch drive length into the soil is recorded on the boring logs as "blows per foot". Blow counts (N values) reported on the boring logs represent the field blow counts. No corrections have been applied for effects of gravel, overburden pressure, automatic hammer drive energy, drill rod lengths, liners, and sampler diameter. Pocket penetrometer readings were also obtained to evaluate the stiffness of cohesive soils retrieved from sampler barrels.

After logging and sampling the soil, the exploratory borings were backfilled with the excavated material. The backfill was loosely placed and was not compacted to the requirements specified for engineered fill.

The subsurface logs are presented on Plates B-3 through B-15 in Appendix B. A key to the log symbols is presented on Plate B-17. The stratification lines shown on the CPT and boring logs represent the approximate boundaries between the various strata. However, the transition from one stratum to another may be gradual over some range of depth.

2.2 Laboratory Testing

Laboratory tests were conducted on selected bulk and relatively undisturbed soil samples to aid in classification and evaluation of selected engineering properties of the site soils. The tests were conducted in general conformance to the procedures of the American Society for Testing and Materials (ASTM) or other standardized methods as referenced below. The laboratory testing program consisted of the following tests:

< Particle Size Analyses (ASTM D422) – used for soil classification

< Unit Dry Densities (ASTM D2937) and Moisture Contents (ASTM D2216) – used for insitu soil parameters.

< Collapse Potential (ASTM D5333) – used for hydro-consolidation potential evaluation

< Moisture-Density Relationship (ASTM D1557) – used for soil compaction determinations

< Direct Shear (ASTM D3080) – used for soil strength determination

< R Value (ASTM D2844) – used for pavement structural section design

< Chemical Analyses (soluble sulfates & chlorides, pH, and resistivity) (Caltrans Methods) – used for concrete mix evaluations and corrosion protection requirements

The laboratory test results are presented on the subsurface logs and on Plates C-1 through C-10 in Appendix C.

Engineering parameters of soil strength, compressibility and relative density utilized for developing design criteria provided within this report were either extrapolated from correlations with the subsurface CPT data or from data obtained from the field and laboratory testing program.

Section 3
DISCUSSION

3.1 Site Conditions

The project site is situated on an alluvial fan complex, along the western foothill slopes of the San Jacinto Mountains. The site consists of two parcels, one located northwest of the intersection of Lake Park Drive and Soboba Road and the other parcel located southwest of the same intersection.

The northern parcel is irregularly shaped in plan view, elongated in the north-south direction, and slopes gently down to the west. The site is currently vacant land covered with moderate vegetation, consisting of grasses, dry brush, and tumbleweeds. Several large soil and rock piles are located near the northeast corner of the site. The northern parcel is bounded by Lake Park Drive and Soboba Road to the south and east, respectively.

The northern parcel is surrounded to the north and west by the Soboba Springs Royal Vista Golf Course. Vacant land is located across Lake Park Drive to the south. The San Jacinto River Channel is located further to the west. The foothills of the San Jacinto Mountains are located across Soboba Road to the east of the site.

The southern parcel is irregularly shaped in plan view, is relatively flat-lying with some gentle slopes, and consists of vacant land. The southern parcel is covered with minimal vegetation, consisting of grasses and dry brush. Lake Park Drive and Soboba Road, located to the north and east, respectively, are both elevated above the site. Previous site development, located near the northeast corner, consisted of building pad preparation and street construction. The development was abandoned in 2005.

Located to the north and south of the southern parcel is vacant land. Single family residences are located to the west. The San Jacinto River Channel is located further to the west and the foothills of the San Jacinto Mountains are located across Soboba Road to the east of the southern parcel.

The northern and southern parcels lie at an elevation between approximately 1,590 and 1,655 feet above mean sea level (AMSL) in the San Jacinto Valley region of California. Average Annual rainfall in this region is 12½ inches per year with average summertime temperatures highs in low to upper 90s. Winter temperatures are mild, seldom reaching freezing.

3.2 Review of Aerial Photographs

Stereoscopic aerial photographs dated 1962, 1974, 1980, 1990, 2000 and 2005 were reviewed as part of this investigation. Reproductions of the historical aerial photographs reviewed are included in Appendix A (Plate A-6 through A-11).

The 1962 aerial photographs shows the project site as vacant land and the surrounding areas as vacant desert with the exception of the area to southwest of the project site which appears to be agricultural use land. Soboba Road is located to the east and Lake Park Drive divides the northern portion of the project from the southern portion. The San Jacinto River Channel is located to the west and the San Jacinto Mountains are located to the east.

The Soboba Springs Royal Vista Golf Course appears in the 1974 aerial photograph to the north and west of the project site's northern parcel. Single family residences appear to the southwest of the project site's southern parcel.

The 1980 aerial photograph is similar to the 1974 aerial photograph, except additional single family residences appear to the southwest of the project site's southern parcel.

The 1990, 2000, and 2005 aerial photographs are similar to the 1980 aerial photograph, except single family residences appear in the 1990 aerial photograph to the north of the project site's northern parcel. Progressive single family residential development is shown in these three aerial photographs to the southwest of the project site.

The project site is located within the State of California, Alquist-Priolo Earthquake Fault Zone for the San Jacinto Fault. A faint lineament was noted in the 1962, 1974 and 1980 aerial photographs (Plate A-6 through A-8) that likely corresponds to the delineated trace of the San Jacinto Fault to the southeast of the project site. A vegetation lineation corresponding to the location of the fault was noted near the center portion of the project site in the 1962 aerial photograph. The 1974 aerial photograph appears to have an active alluvial fan in the northern portion of the project site. Fault trenches can be seen in the 1980 aerial photograph from the 1979 fault study by GeoSoils, Inc.

3.3 Geologic Setting

The site is located in the San Jacinto Valley which is incorporated within the Perris Plain of southern California. The Perris Plain is a major topographic feature between the San Jacinto (northeast) and Elsinore (southwest) fault zones. The plain is an undulating surface eroded on primarily plutonic igneous rocks and lies 7,000 feet below the summits of the San Jacinto Mountains. The San Jacinto Mountains are located to the northeast and are part of the Peninsular Ranges. Figure 1 shows the location of the site in relation to regional faults and physiographic features.

The Peninsular Ranges are a northwest-southeast orientated complex of blocks separated by similarly trending faults. They extend 125 miles (200 km) from the Transverse Ranges and the Los Angeles Basin south to the Mexican border and beyond another 775 miles (1,250 km) to the tip of Baja California, Mexico. Faults dominate the structure of the Peninsular Ranges. Major faults are the San Jacinto Fault and related branches within the San Jacinto Fault Zone. The Peninsular Ranges contain extensive pre-Cretaceous igneous rocks associated with the Nevadan plutonism. Recent evidence of tectonic activity includes epicenter swarms, earthquakes (San Jacinto 1918 and Borrego Valley 1968), and alignment of hot springs (Norris & Webb, 1976). The surrounding geology includes the foothills of the San Jacinto Mountains to the north, east, and south and the San Jacinto Fault Zone and river floodplain are to the west.

3.4 Seismicity and Faulting

Faulting and Seismic Sources: We have performed a computer-aided search of known faults or seismic zones that lie within a 62 mile (100 kilometers) radius of the project site as shown on Figure 1 and Table 1. The search identifies known faults within this distance and computes deterministic ground accelerations at the site based on the maximum credible earthquake expected on each of the faults and the distance from the fault to the site. The Maximum Magnitude Earthquake (Mmax) listed was taken from published geologic information available for each fault (Cao, et. al., 2003 and Jennings, 1994).

Seismic Risk: The project site is located in the seismically active San Jacinto Valley region of southern California and is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. The proposed site structures should be designed in accordance with the California Building Code (CBC) for a "Maximum Considered Earthquake" (MCE) and with the appropriate site coefficients. The MCE is defined as the ground motion having a 2 percent probability of being exceeded in 50 years.

Seismic Hazards.

► **Groundshaking.** The primary seismic hazard at the project site is the potential for moderate to strong groundshaking during earthquakes along the San Jacinto Fault. A further discussion of groundshaking follows in Section 3.4.

► **Surface Rupture.** The project site is located within a State of California, Alquist-Priolo Earthquake Fault Zone. Surface fault rupture may be considered because the project site is crossed by the A-P Earthquake Fault Zone for the San Jacinto Fault (See A-P Earthquake Fault Zone Map Plate A-5). A fault hazard study was conducted by ***LandMark Consultants, Inc.*** for the project site and will be discussed in detail in section 3.5.

► **Liquefaction.** Liquefaction is unlikely to be a potential hazard at the site, since the groundwater is deeper than 50 feet (the maximum depth that liquefaction is known to occur).

Other Secondary Hazards.

► **Landsliding.** Landslides are shown on the A-P earthquake fault zone map (Plate A-5) in the vicinity of the project site and there is the possibility of rockfalls from loose rocks on the San Jacinto Mountians (located across Soboba Road to the east of the site) during strong seismic events or heavy rains. No ancient landslides, within the immediate vicinity of the project site, are shown on the

California Geologic Map, Santa Ana Sheet (See Regional Geologic Map Plate A-3) and no indications of landslides were observed during our site investigation. Therefore, the hazard of landsliding occurring at the project site is considered to be low to moderate.

► **Volcanic hazards.** The site is not located in proximity to any known volcanically active area and the risk of volcanic hazards is considered low.

► **Tsunamis, sieches, and flooding.** The site does not lie near any large bodies of water, so the threat of tsunami, sieches, or other seismically-induced flooding is unlikely. The project site is located within a Federal Emergency Management Agency (FEMA) 500-year flood zone a (0.2 percent annual chance flood) and is located to the north and east of a FEMA 100-year flood zone (1 percent annual chance flood)located within and in the vicinity of the San Jacinto River Channel (See Federal Emergency Management Agency (FEMA) flood map, Plate A-12).

► **Expansive soil.** The near surface soils at the project site consist of silty sand and sandy silt which are non-expansive. We recommend additional testing of soils during the rough grading operations to determine the expansive characteristic of these soils.

3.5 Fault Hazard Study

A fault hazard study (LCI Project No. LP07070) was conducted on March 19, 2007 through April 12, 2007 by ***LandMark Consultants, Inc.*** Nine trenches were excavated to an approximate depth of eight to fifteen (8 to 15) feet below the ground surface. The trenches totaled approximately 4,375 feet in length, and were orientated in a northeast-southwest direction (perpendicular to the mapped trace of the San Jacinto Fault Zone) located along the eastern portion of the project site. Traces of the San Jacinto Fault were found within trench 2, 3, 4, 5, and 7. The fault hazard study report is included in Appendix D of this report.

LandMark Consultants, Inc. has reviewed two previously fault hazard study reports for the project site conducted by Envicom (1974) and GeoSoils, Inc. (1979). Fault traces were encountered in the trenches during both investigations. Review of the previous reports indicate that some fault traces encountered by Envicom during their investigation were not noted by GeoSoils, Inc. in nearby trenches and GeoSoils, Inc. encountered fault traces not noted by Envicom. We made similar observations for fault trace locations.

Based on the review of the previous fault investigations, and our investigation in 2007, the mapped traces of the San Jacinto Fault are parallel to Saboba Road, along the northern portion of the project, and are shown on the A-P Fault Map (Plate A-5) of the referenced report. In order to incorporate potential undocumented fault splays as specified by Section 3603 of the California Code of Regulations Title 24, Division 2, the minimum setback for the project site is 50 feet from the mapped outer fault traces is recommended for human occupancy structures. We suggest that structures for human occupancy be placed outside of the recommended setback zone of 50 feet.

3.6 Site Acceleration and IBC Seismic Coefficients

Site Acceleration: Deterministic horizontal peak ground accelerations (PGA) from maximum probable earthquakes on regional faults have been estimated and are included in Table 1. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone. Accelerations also are dependent upon attenuation by rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area. The deterministic PGA estimate for the project site is based on the ground motion having a 10% probability of being exceeded in 50 years (return period of 475 years).

The computer program FRISKSP (Blake, 2000) was used to obtain the probabilistic estimate of the site PGA using the attenuation relationship SOIL 310 of Boore, Joyner, and Fumal (1997). The PGA estimate for the Design Basis Earthquake (DBE), defined as an event having a 10% probability of being exceeded in 50 years, (return period of 475 years) was estimated to be **0.80g**. The PGA estimate for the Maximum Considered Earthquake (MCE), which was defined as an event having a 2% probability of being exceeded in 50 years (return period of 2,500 years), was estimated to be **1.20g**.

2007 CBC (2006 IBC) Seismic Response Parameters: The 2007 California Building Code (CBC) seismic parameters are based on the Maximum Considered Earthquake (MCE). The CBC defines the MCE as a seismic event with a 2% probability of occurrence in 50 years. This follows the methodology of the 2006 International Building Code (IBC). Based on the results of our field explorations, the site soils have been classified as Site Class D (stiff soil profile). Accordingly, Table 2 lists seismic and site coefficients given in Chapter 16 of the CBC.

Design earthquake ground motions are defined as the earthquake ground motions that are two-thirds (2/3) of the corresponding MCE ground motions. Design earthquake ground motion data are provided in Table 2.

Because the project site is within 10 km of an active fault, a site-specific ground motion hazard analysis was prepared in accordance with the 2007 CBC (Table 3). The determination of the site specific ground motion was performed in conformance with the guidelines outlined in ASCE 7-05 Section 21 (21.2.1, 21.2.2, and 21.3). The probabilistic MCE ground acceleration was calculated to be 1.20g (Section 21.2.1). The deterministic MCE ground acceleration at the site due to an earthquake on the San Jacinto Fault is 1.15g (Section 21.2.2). In accordance with Section 21.2.3, the site specific ground acceleration is taken as 2/3 of the lesser of the probabilistic and deterministic MCE acceleration values. Accordingly, the design PGA used to calculate seismic settlement was determined to be 0.80g as per Section 21.3 of ASCE 7-05.

3.7 Subsurface Soil

Subsurface soils encountered during the field exploration conducted on June 23, 2008 and January 12 and 13, 2010 consist of loose to very dense interbedded sand, silt, and clay with near surface sandy silt and silty sand. The near surface soils are non-expansive in nature. The subsurface logs (Plates B-1 through B-15) depict the stratigraphic relationships of the various soil types.

3.8 Groundwater

Groundwater was not encountered in the borings during the time of exploration. Based on the regional topography, groundwater flow is assumed to be generally towards the west within the site area. Flow directions may vary locally in the vicinity of the site.

Historic groundwater records in the vicinity of the project site indicate that groundwater has fluctuated between 128 to 193 feet below the ground surface within the last 14 years according to the Western Municipal Water District and the San Bernardino Valley Municipal Water District cooperative well measuring program records.

3.9 Seismic Settlement

An evaluation of the non-liquefaction seismic settlement potential was performed using the relationships developed by Tokimatsu and Seed (1984, 1987) for dry sands. This method is an empirical approach to quantify seismic settlement using SPT blow counts and PGA estimates from the probabilistic seismic hazard analysis.

The soils beneath the site consist primarily of loose to very dense interbedded sand, silt, and clay with near surface sandy silt and silty sand. . ***Based on the empirical relationships, total induced settlements are estimated to be on the order of 1/2 to 1¼ inches in the event of a design ground motion magnitude earthquake.*** Should settlement occur, buried utility lines and the buildings may not settle equally. Therefore we recommend that utilities, especially at the points of entry to the buildings, be designed to accommodate differential movement.

3.10 Hydroconsolidation

In arid climatic regions, granular soils have a potential to collapse upon wetting. This collapse (hydro-consolidation) phenomena is the result of the lubrication of soluble cements (carbonates) in the soil matrix causing the soil to densify from its loose configuration during deposition.

Collapse potential tests (Plates C-2 and C-3) performed on soil samples from the site indicated a slight risk of collapse upon saturation. Therefore, development of building foundations is not required to include provisions for mitigating the hydro-consolidation caused by soil saturation from outside sources (such as storm-water or broken utility lines).

Section 4
RECOMMENDATIONS

4.1 Site Preparation

Clearing and Grubbing: All surface improvements, debris or vegetation including grass, trees, and weeds on the site at the time of construction should be removed from the construction area. Root balls should be completely excavated. Organic strippings should be hauled from the site and not used as fill. Any trash, construction debris, concrete slabs, old pavement, landfill, and buried obstructions such as old foundations and utility lines exposed during rough grading should be traced to the limits of the foreign material by the grading contractor and removed under our supervision. Any excavations resulting from site clearing should be dish-shaped to the lowest depth of disturbance and backfilled under the observation of the geotechnical engineer's representative.

Major Building Pad Preparation: The existing surface soil within the building pad areas should be removed to 36 inches below the lowest foundation grade or 60 inches below the original grade (whichever is deeper), extending five feet beyond all exterior wall/column lines (including adjacent concreted areas). The exposed subgrade should be scarified to a depth of 8 inches in loose thickness, uniformly moisture conditioned to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

Minor Building Pad Preparation: The existing surface soil within the building pad areas should be removed to 18 inches below the lowest foundation grade or 36 inches below the original grade (whichever is deeper), extending five feet beyond all exterior wall/column lines (including adjacent concreted areas). The exposed subgrade should be scarified to a depth of 8 inches in loose thickness, uniformly moisture conditioned to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

During this process, the exposed surface will also be observed for any loose or "pumping" areas by wheel-rolling with heavy equipment. The exposed surface will then be tested at the rate of 1 test per 1,000 square foot or at least 2 tests per building pad, to conform to the above compaction requirements.

The on-site soils are suitable for use as compacted fill and utility trench backfill. Imported fill soil (if required) should similar to onsite soil or non-expansive, granular soil meeting the USCS classifications of SM, SP-SM, or SW-SM with a maximum rock size of 3 inches. ***The geotechnical engineer should approve imported fill soil sources before hauling material to the site***. Native and imported materials should be placed in lifts no greater than 8 inches in loose thickness, uniformly moisture conditioned to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

Fill Slope Bench/Key Preparation: Bench/Key should be provided at the bottom of fill slope. The existing surface soil within the width of the Key (at least one (1) equipment width) areas should be removed to 24 inches below the existing grade. The exposed subgrade should be scarified to a depth of 8 inches in loose thickness, uniformly moisture conditioned to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

In areas other than the building pad which are to receive concrete slabs and asphalt concrete pavement, the ground surface should be over-excavated to a depth of 12 inches, uniformly moisture conditioned to ±2% of optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

Trench Backfill: On-site soil free of debris, vegetation, and other deleterious matter may be suitable for use as utility trench backfill. Backfill within roadways should be placed in layers not more that 6 inches in thickness, uniformly moisture conditioned to ±2% of optimum moisture and mechanically compacted to a minimum of 90% of the ASTM D1557 maximum dry density except for the top 12 inches of the trench which shall be compacted to at least 95%. Native backfill should only be placed and compacted after encapsulating buried pipes with suitable bedding and pipe envelope material.

Pipe envelope/bedding should either be clean sand (Sand Equivalent SE>30) or crushed rock when encountering groundwater. A geotextile filter fabric (Mirafi 140N or equivalent) should be used to encapsulate the crushed rock to reduce the potential for in-washing of fines into the gravel void space. Precautions should be taken in the compaction of the backfill to avoid damage to the pipes and structures.

Moisture Control and Drainage: The moisture condition of the building pad should be maintained during trenching and utility installation until concrete is placed or should be rewetted before initiating delayed construction.

Adequate site drainage is essential to future performance of the project. Infiltration of excess irrigation water and stormwaters can adversely affect the performance of the subsurface soil at the site. Positive drainage should be maintained away from all structures (5% for 5 feet minimum across unpaved areas) to prevent ponding and subsequent saturation of the native soil.

Gutters and downspouts may be considered as a means to convey water away from foundations. If landscape irrigation is allowed next to the building, drip irrigation systems or lined planter boxes should be used. The subgrade soil should be maintained in a moist, but not saturated state, and not allowed to dry out. Drainage should be maintained without ponding.

Observation and Density Testing: All site preparation and fill placement should be continuously observed and tested by a representative of a qualified geotechnical engineering firm. Full-time observation services during the excavation and scarification process is necessary to detect undesirable materials or conditions and soft areas that may be encountered in the construction area. The geotechnical firm that provides observation and testing during construction shall assume the responsibility of "*geotechnical engineer of record*" and, as such, shall perform additional tests and investigation as necessary to satisfy themselves as to the site conditions and the recommendations for site development.

Auxiliary Structures Foundation Preparation: Auxiliary structures such as free standing or retaining walls should have the existing soil beneath the structure foundation prepared in the manner recommended for the building pad except the preparation needed only to extend 24 inches below and beyond the footing.

4.2 Foundations and Settlements

Major Structure: Shallow spread footings and continuous wall footings are suitable to support the structures provided they are founded on a layer of properly prepared and compacted soil as described in Section 4.1. The foundations may be designed using an allowable soil bearing pressure of 2,500 psf. The allowable soil pressure may be increased by 20% for each foot of embedment depth in excess of 24 inches and by one-third for short term loads induced by winds or seismic events. The maximum allowable soil pressure at increased embedment depths shall not exceed 4,000 psf.

All exterior and interior foundations should be embedded a minimum of 24 inches below the building support pad or lowest adjacent final grade, whichever is deeper. Continuous wall footings should have a minimum width of 18 inches. Spread footings should have a minimum width of 36 inches and should not be structurally isolated. ***Recommended concrete reinforcement and sizing for all footings should be provided by the structural engineer.***

Minor Structure: Shallow spread footings and continuous wall footings are suitable to support the structures provided they are founded on a layer of properly prepared and compacted soil as described in Section 4.1. The foundations may be designed using an allowable soil bearing pressure of 2,000 psf. The allowable soil pressure may be increased by 20% for each foot of embedment depth in excess of 18 inches and by one-third for short term loads induced by winds or seismic events. The maximum allowable soil pressure at increased embedment depths shall not exceed 3,200 psf.

All exterior and interior foundations should be embedded a minimum of 18 inches below the building support pad or lowest adjacent final grade, whichever is deeper. Continuous wall footings should have a minimum width of 12 inches. Spread footings should have a minimum width of 24 inches and should not be structurally isolated. ***Recommended concrete reinforcement and sizing for all footings should be provided by the structural engineer.***

Resistance to horizontal loads will be developed by passive earth pressure on the sides of footings and frictional resistance developed along the bases of footings and concrete slabs. Passive resistance to lateral earth pressure may be calculated using an equivalent fluid pressure of 355 pcf to resist lateral loadings. The top one foot of embedment should not be considered in computing passive resistance unless the adjacent area is confined by a slab or pavement. An allowable friction coefficient of 0.40 may also be used at the base of the footings to resist lateral loading.

Foundation movement under the estimated static (non-seismic) loadings and static site conditions are estimated to not exceed 1 inch (major structure) and ¾ inch (minor structure), with differential movement of about two-thirds of total movement for the loading assumptions stated above when the subgrade preparation guidelines given above are followed. Foundation movements under the seismic loading due to dry settlement are provided in Section 3.7 of this report.

4.3 Deep Foundations

Major structures may be supported by a deep foundation system like drilled piers. Recommendations for 30 and 48 inch diameter cast-in place drilled piers are provided below.

Vertical Capacity: Vertical capacity for 30 and 48 inch diameter shafts are presented in Figure 2. Capacities for other shaft sizes can be determined in direct proportion to shaft diameters. End bearing and skin friction parameters have been used to determine the allowable shaft capacity. The allowable capacities include a factor of safety of 2.5. The allowable vertical compression capacities may be increased by 33 percent to accommodate temporary loads such as from wind or seismic forces. The allowable vertical shaft capacities are based on the supporting capacity of the soil. The structural capacity of the piers should be verified by the structural engineer.

Lateral Capacity: The allowable lateral capacity for 24 and 48 inch diameter shafts are given in the table shown below. The allowable horizontal deflection at the shaft head has been assumed to be one-half inch (0.50 inch).

Lateral Pier Capacities

Shaft Diameter (in.)	**30**		**48**	
Head Condition	Free	Fixed	Free	Fixed
Allowable Head Deflection (in.)	0.5	0.5	0.5	0.5
Length (ft.)	**20**	**20**	**20**	**20**
Lateral Capacity (kips)	53.5	118	92	285
Maximum Moment (foot-kips)	266.7	-756.7	498.3	-2775
@Depth from Pier Head (ft.)	7.8	0	8.4	0
Length (ft.)	**40**	**40**	**40**	**40**
Lateral Capacity (kips)	57	132	143	335
Maximum Moment (foot-kips)	297.5	-825.8	1000.0	-2833.3
@Depth from Pier Head (ft.)	9.5	0	11.5	0

Uplift Capacity: Pole capacity in tension may be assumed to be 40% of the compression capacity.

Installation: The drilled pier shall be placed in conformance to ACI 336 guidelines. Excavation for piers should be inspected by the geotechnical consultant. The bottom of the excavation for piers should be reasonably free of loose or slough material. A tremie pipe should be used to pour concrete from the bottom up and to ensure less than five feet of free fall. All drilled piers should be cased to prevent caving or lateral deformation due the presence of medium dense sand/silt layers, provided that the structural steel and concrete shall be placed immediately after drilling.

4.4 Slabs-On-Grade

Concrete slabs and flatwork should be a minimum of 5 inches thick. Concrete floor slabs may either be monolithically placed with the foundation or dowelled after footing placement. The concrete slabs may be placed on granular subgrade that has been compacted at least 90% relative compaction (ASTM D1557) and moistened to near optimum moisture just before the concrete placement.

To provide protection against vapor or water transmission through the slabs, we recommend that the slabs-on-grade be underlain by a layer of clean concrete sand at least 4 inches thick. To provide additional protection against water vapor transmission through the slab in areas where vinyl or other moisture-sensitive floor covering is planned, we recommend that a 10-mil thick impermeable plastic membrane (visqueen) be placed at mid-height within the sand layer. The vapor inhibitor should be installed in accordance with the manufacturer's instructions. We recommend that at least a 2-foot lap be provided at the membrane edges or that the edges be sealed.

Concrete slab and flatwork reinforcement should consist of chaired rebar slab reinforcement (minimum of No. 4 bars at 18-inch centers, both horizontal directions) placed at slab mid-height to resist potential swell forces and cracking. ***Slab thickness and steel reinforcement are minimums only and should be verified by the structural engineer/designer knowing the actual project loadings.*** The construction joint between the foundation and any mowstrips/sidewalks placed adjacent to foundations should be sealed with a polyurethane based non-hardening sealant to prevent moisture migration between the joint.

Control joints should be provided in all concrete slabs-on-grade at a maximum spacing (in feet) of 2 to 3 times the slab thickness (in inches) as recommended by American Concrete Institute (ACI) guidelines. All joints should form approximately square patterns to reduce randomly oriented contraction cracks. Contraction joints in the slabs should be tooled at the time of the pour or sawcut (¼ of slab depth) within 6 to 8 hours of concrete placement. Construction (cold) joints in foundations and area flatwork should either be thickened butt-joints with dowels or a thickened keyed-joint designed to resist vertical deflection at the joint. All joints in flatwork should be sealed to prevent moisture, vermin, or foreign material intrusion. Precautions should be taken to prevent curling of slabs in this arid desert region (refer to ACI guidelines).

All independent concrete flatworks should be underlain by 12 inches of moisture conditioned and compacted soils. All flatwork should be jointed in square patterns and at irregularities in shape at a maximum spacing of 10 feet or the least width of the sidewalk.

4.5 Concrete Mixes and Corrosivity

Selected chemical analyses for corrosivity were conducted on bulk samples of the near surface soil from the project site (Plate C-10). The native soils have low levels of sulfate ion concentrations (116-176 ppm), and low levels of chloride ion concentrations (20-50 ppm). Resistivity determinations on the soil indicate moderate potential for metal loss because of electrochemical corrosion processes.

A minimum of 2,500 psi concrete of Type II Portland Cement with a maximum water/cement ratio of 0.60 (by weight) should be used for concrete placed in contact with native soil on this project (sitework including streets, sidewalks, driveways, patios, and foundations).

***LandMark Consultants, Inc.* does not practice corrosion engineering. We recommend that a qualified corrosion engineer evaluate the corrosion potential on metal construction materials and concrete at the site.**

4.6 Excavations

All trench excavations should conform to CalOSHA requirements for Type C soil. The contractor is solely responsible for the safety of workers entering trenches. Temporary excavations with depths of 4 feet or less may be cut nearly vertical for short duration. Temporary slopes should be no steeper than 1.5:1 (horizontal:vertical). Sandy soil slopes should be kept moist, but not saturated, to reduce the potential of raveling or sloughing.

Trench excavations deeper than 4 feet will require shoring or slope inclinations in conformance to CAL/OSHA regulations for Type C soil. Surcharge loads of stockpiled soil or construction materials should be set back from the top of the slope a minimum distance equal to the height of the slope. All permanent slopes should not be steeper than 3:1 to reduce wind and rain erosion. Protected slopes with ground cover may be as steep as 2:1. However, maintenance with motorized equipment may not be possible at this inclination.

4.7 Lateral Earth Pressures

Earth retaining structures, such as retaining walls, should be designed to resist the soil pressure imposed by the retained soil mass. Walls with granular drained backfill may be designed for an assumed static earth pressure equivalent to that exerted by a fluid weighing 37 pcf for unrestrained (active) conditions (able to rotate 0.1% of wall height), and 55 pcf for restrained (at-rest) conditions. These values should be verified at the actual wall locations during construction.

Seismic earth pressure on unrestrained walls retaining more than five (5) feet of soil may be assumed to exert a uniform pressure distribution of 7.5H psf against the back of the wall, where H is the height of the backfill. The total seismic load is assumed to act as a point load at 0.6H above the base of the wall.

Surcharge loads should be considered if loads are applied within a zone between the face of the wall and a plane projected behind the wall 45 degrees upward from the base of the wall. The increase in lateral earth pressure acting uniformly against the back of the wall should be taken as 50% of the surcharge load within this zone. Areas of the retaining wall subjected to traffic loads should be designed for a uniform surcharge load equivalent to two feet of native soil.

Walls should be provided with backdrains to reduce the potential for the buildup of hydrostatic pressure. The drainage system should consist of a composite HDPE drainage panel or a 2-foot wide zone of free draining crushed rock placed adjacent to the wall and extending 2/3 the height of the wall. The gravel should be completely enclosed in an approved filter fabric to separate the gravel and backfill soil. A perforated pipe should be placed perforations down at the base of the permeable material at least six inches below finished floor elevations. The pipe should be sloped to drain to an appropriate outlet that is protected against erosion. Walls should be properly waterproofed. The project geotechnical engineer should approve any alternative drain system.

4.8 Seismic Design

This site is located in the seismically active southern California area and the site structures are subject to moderate to strong ground shaking due to potential fault movements along the San Jacinto Fault. Engineered design and earthquake-resistant construction are the common solutions to increase safety and development of seismic areas. Designs should comply with the latest edition of the CBC for Site Class D using the seismic coefficients given in table 2 of this report. Site Class D represent stiff soil profile with predominantly medium dense to dense soil conditions, where the soil depth exceeds 200 feet.

4.9 Pavements

Pavements should be designed according to CALTRANS or other acceptable methods. Traffic indices were not provided by the project engineer or owner; therefore, we have provided structural sections for several traffic indices for comparative evaluation. The public agency or design engineer should decide the appropriate traffic index for the site. Maintenance of proper drainage is necessary to prolong the service life of the pavements. Based on the current State of California CALTRANS method, R-value of 59 for the subgrade soil and assumed traffic indices, the following table provides our estimates for asphaltic concrete (AC) pavement sections.

RECOMMENDED PAVEMENTS SECTIONS

R-Value of Subgrade Soil - 59 Design Method - CALTRANS 2006

Traffic Index (assumed)	Flexible Pavements	
	Asphaltic Concrete Thickness (in.)	Aggregate Base Thickness (in.)
5.0	3.0	4.0
6.0	3.5	4.0
7.0	4.5	4.0
8.0	5.0	4.0
9.0	6.0	4.0

Notes:

1) Asphaltic concrete shall be Caltrans, Type B, ¾ inch maximum medium grading, (½ inch for parking areas) compacted to a minimum of 95% of the 50-blow Marshall density (ASTM D1559).
2) Aggregate base shall conform to Caltrans Class 2 (¾ in. maximum), compacted to a minimum of 95% of ASTM D1557 maximum dry density.
3) Place pavements on 8 inches of moisture conditioned (at least 2% of over optimum) native soil compacted to a minimum of 90% of the maximum dry density determined by ASTM D1557.

Final recommended pavement sections may need to be based on sampling and R-Value testing during grading operations when actual subgrade soils will be exposed.

Section 5
LIMITATIONS AND ADDITIONAL SERVICES

5.1 Limitations

The recommendations and conclusions within this report are based on current information regarding the proposed new hotel/casino project located on Soboba Road and Lake Park Drive in San Jacinto, California. The conclusions and recommendations of this report are invalid if:

< Structural loads change from those stated or the structures are relocated.
< The Additional Services section of this report is not followed.
< This report is used for adjacent or other property.
< Changes of grade or groundwater occur between the issuance of this report and construction other than those anticipated in this report.
< Any other change that materially alters the project from that proposed at the time this report was prepared.

Findings and recommendations in this report are based on selected points of field exploration, geologic literature, laboratory testing, and our understanding of the proposed project. Our analysis of data and recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil conditions can exist between and beyond the exploration points or groundwater elevations may change. If detected, these conditions may require additional studies, consultation, and possible design revisions.

This report contains information that may be useful in the preparation of contract specifications. However, the report is not worded is such a manner that we recommend its use as a construction specification document without proper modification. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

This report was prepared according to the generally accepted *geotechnical engineering standards of practice* that existed in Riverside County at the time the report was prepared. No express or implied warranties are made in connection with our services. This report should be considered invalid for periods after two years from the report date without a review of the validity of the findings and recommendations by our firm, because of potential changes in the Geotechnical Engineering Standards of Practice.

The client has responsibility to see that all parties to the project including, designer, contractor, and subcontractor are made aware of this entire report. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

5.2 Additional Services

We recommend that Landmark Consultants, Inc. be retained as the geotechnical consultant to provide the tests and observations services during construction. If Landmark Consultants does not provide such services then *the geotechnical engineering firm providing such tests and observations shall become the geotechnical engineer of record and assume responsibility for the project.*

The recommendations presented in this report are based on the assumption that:

< Consultation during development of design and construction documents to check that the geotechnical recommendations are appropriate for the proposed project and that the geotechnical recommendations are properly interpreted and incorporated into the documents.

< LandMark Consultants will have the opportunity to review and comment on the plans and specifications for the project prior to the issuance of such for bidding.

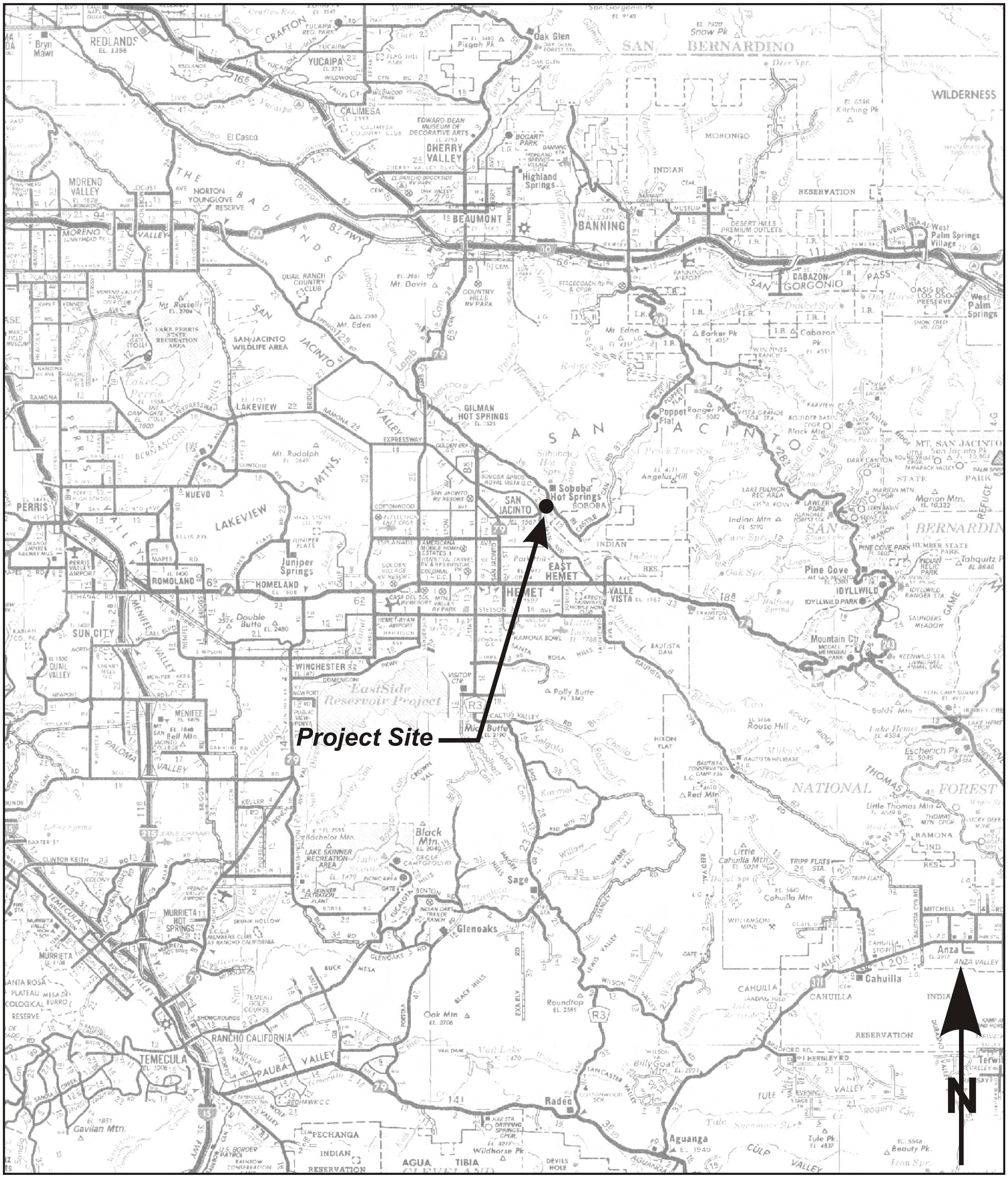
< Continuous observation, inspection, and testing by the geotechnical consultant of record during site clearing, grading, excavation, placement of fills, building pad and subgrade preparation, and backfilling of utility trenches.

< Observation of foundation excavations and reinforcing steel before concrete placement.

< Other consultation as necessary during design and construction.

We emphasize our review of the project plans and specifications to check for compatibility with our recommendations and conclusions. Additional information concerning the scope and cost of these services can be obtained from our office.

APPENDIX A



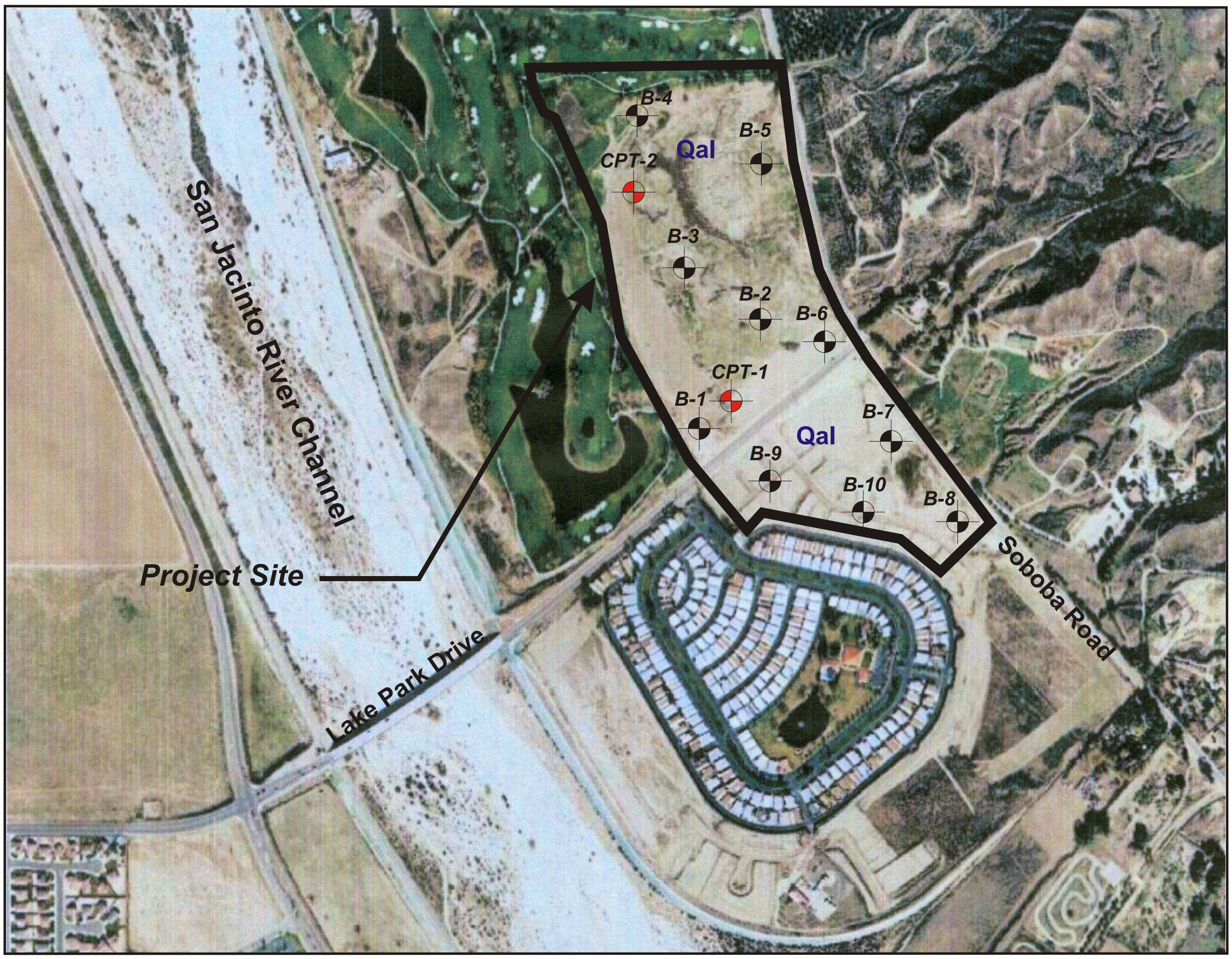
LANDMARK

Geo-Engineers and Geologists

Project No.: LP10001

Vicinity Map

Plate A-1



2007 Aerial Photograph Courtesy of USGS

Legend

- *Approximate CPT Sounding Location (typ)*
- *Approximate Boring Location (typ)*
- **Qal** *Quaternary Alluvium (younger)*

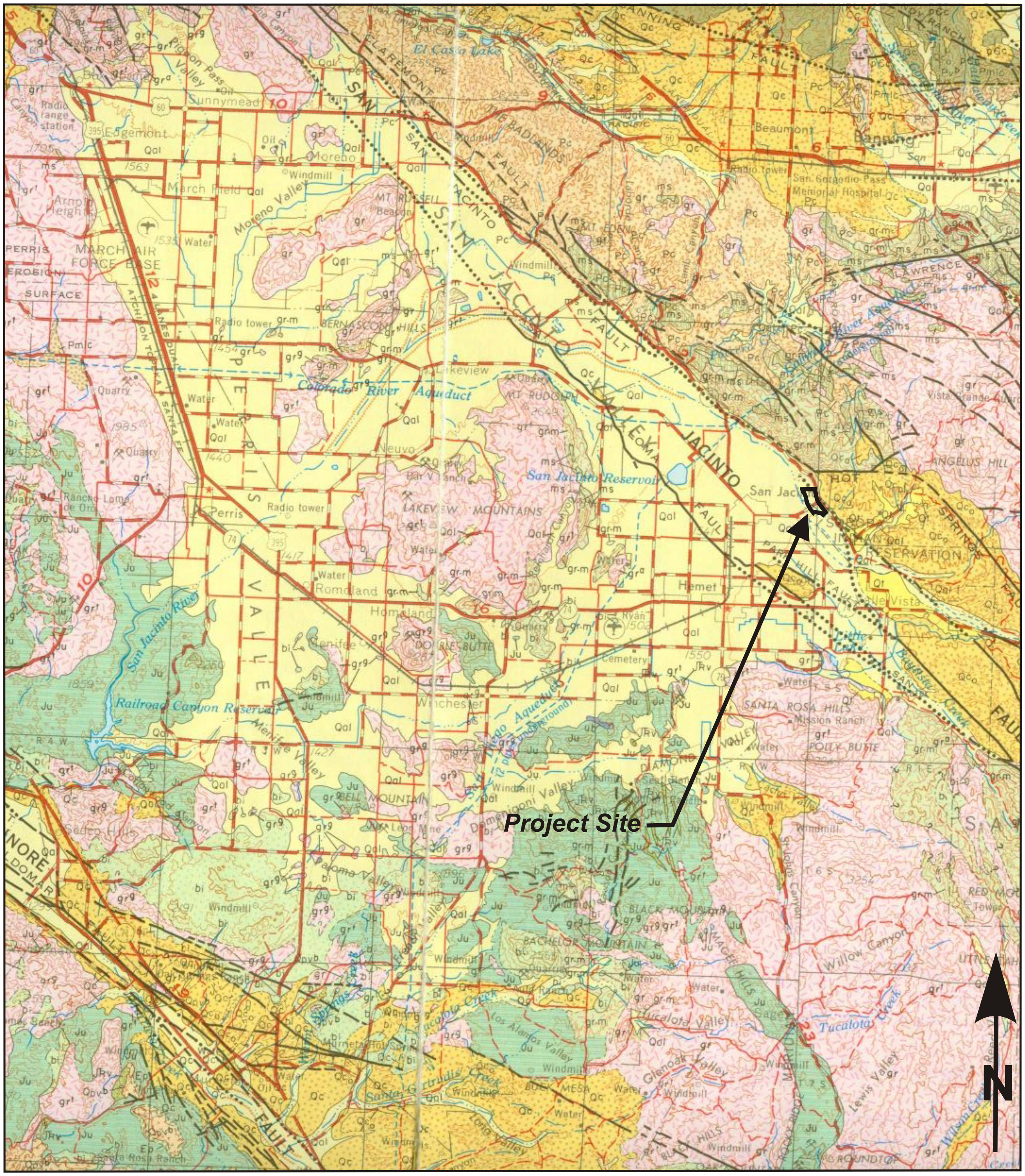
0 500 1,000 1,500 2,000

Scale in Feet

N

Reference Geology Map of California - Santa Ana Sheet (1:250,000)

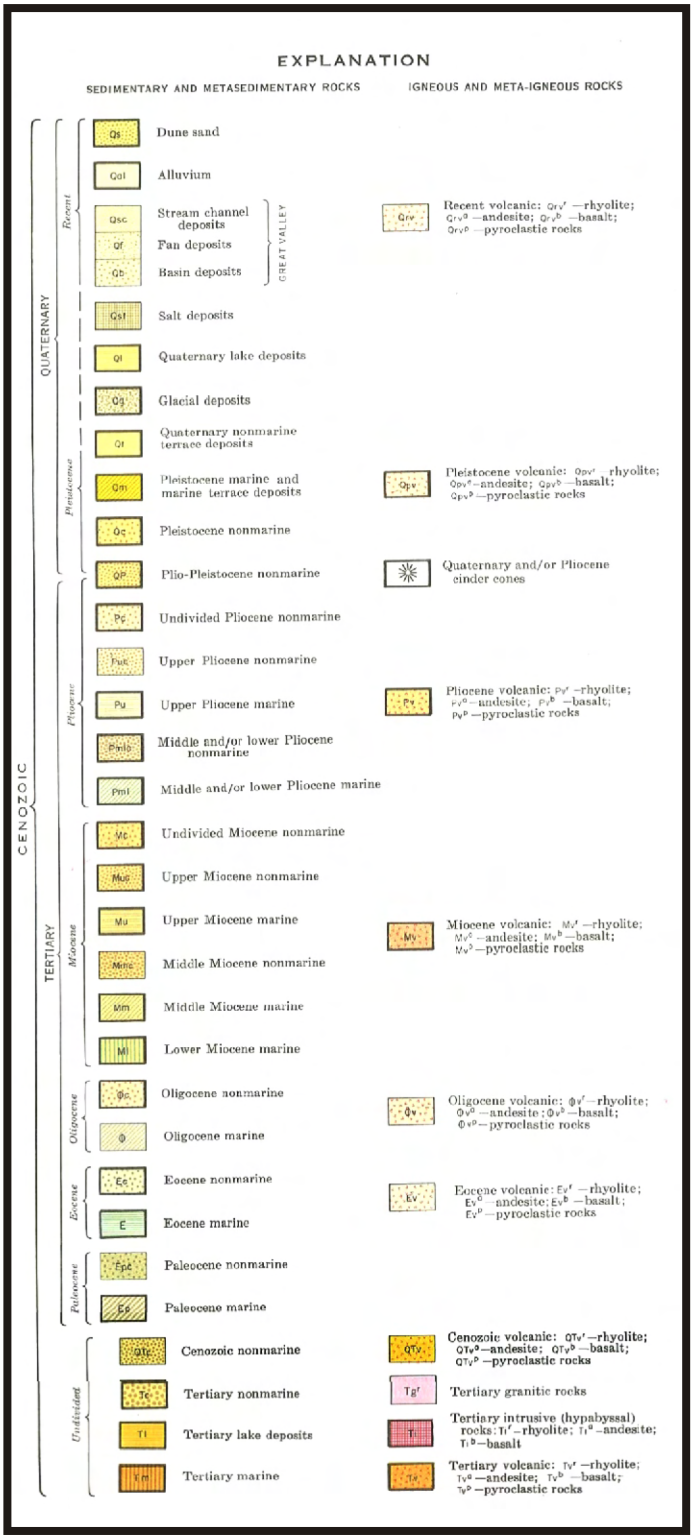
LANDMARK Geo-Engineers and Geologists **Project No.: LP10001**	**Site and Exploration Plan**	**Plate A-2**

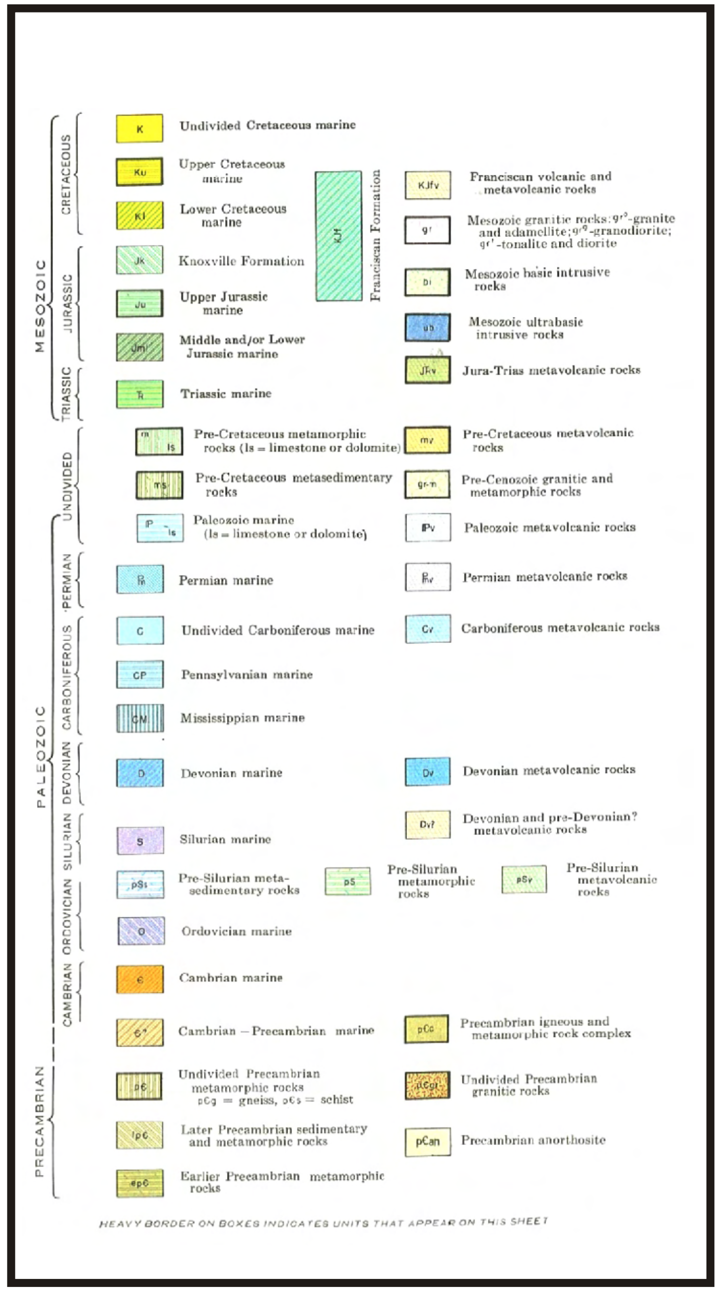


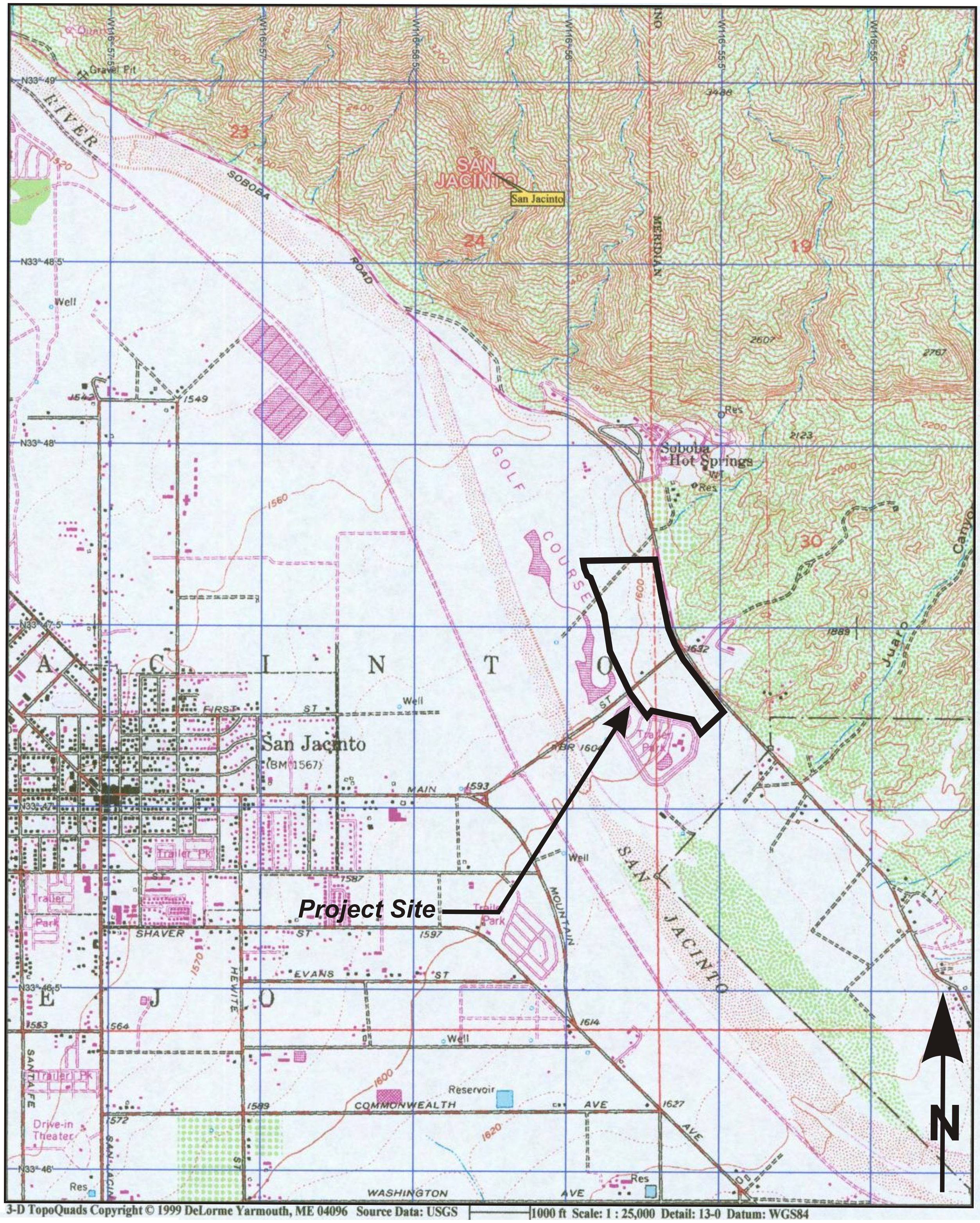
Geology Map of California - Santa Ana Sheet (1:250,000)

LANDMARK Geo-Engineers and Geologists **Project No.: LP10001**	**Regional Geology Map**	**Plate** **A-3**

Geology Legend



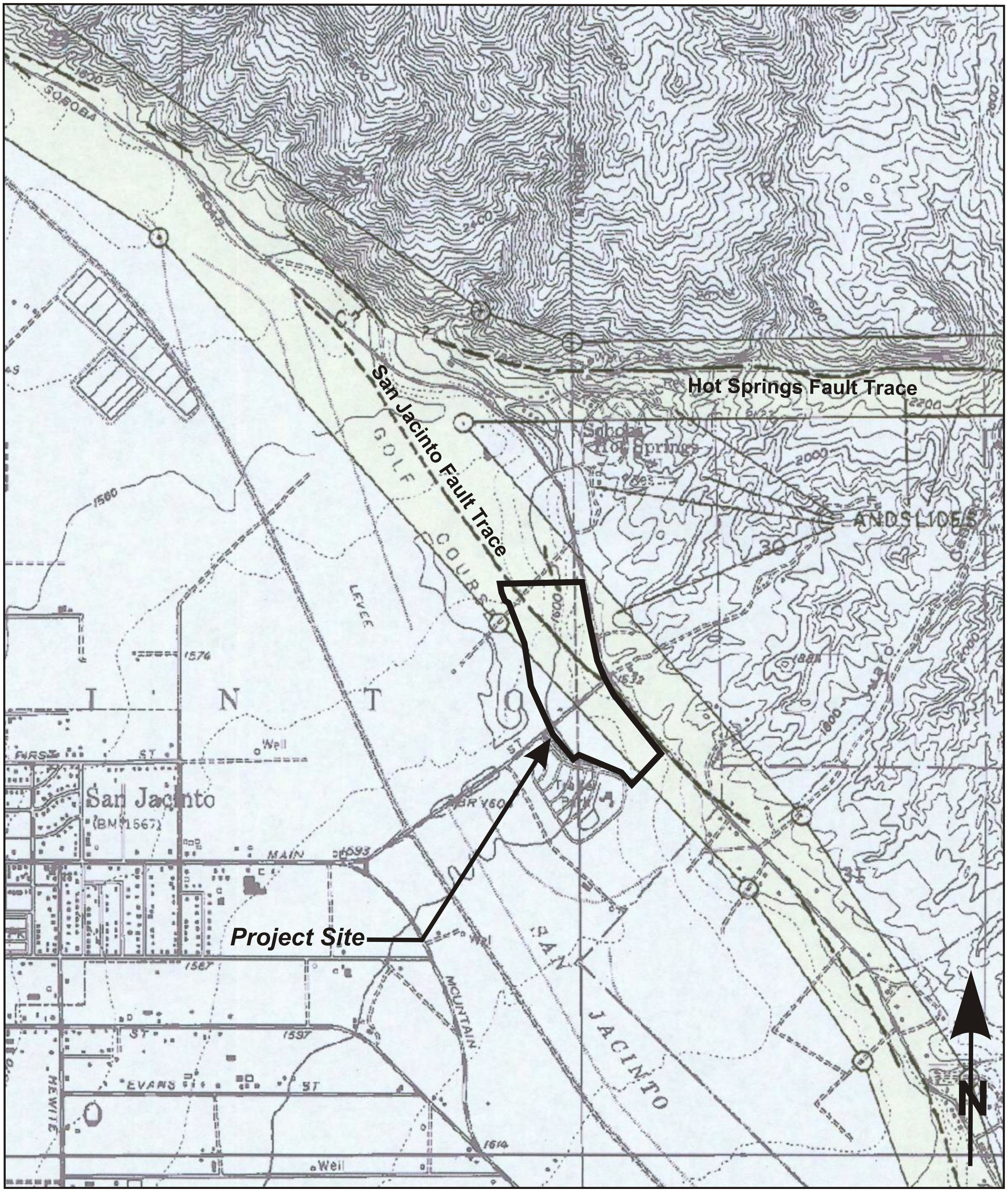




Reference: USGS Topographic Map
San Jacinto, CA Quadrangle
Scale 1:25,000

Site Coordinates
Lat: 33.7910°N
Long: 116.9296°W

LANDMARK Geo-Engineers and Geologists Project No.: LP10001	Topographic Map	Plate A-4



San Jacinto, CA 7.5 Min. Quadrangle

Site: Location: 33.7910°N 116.9296°W

0 ½

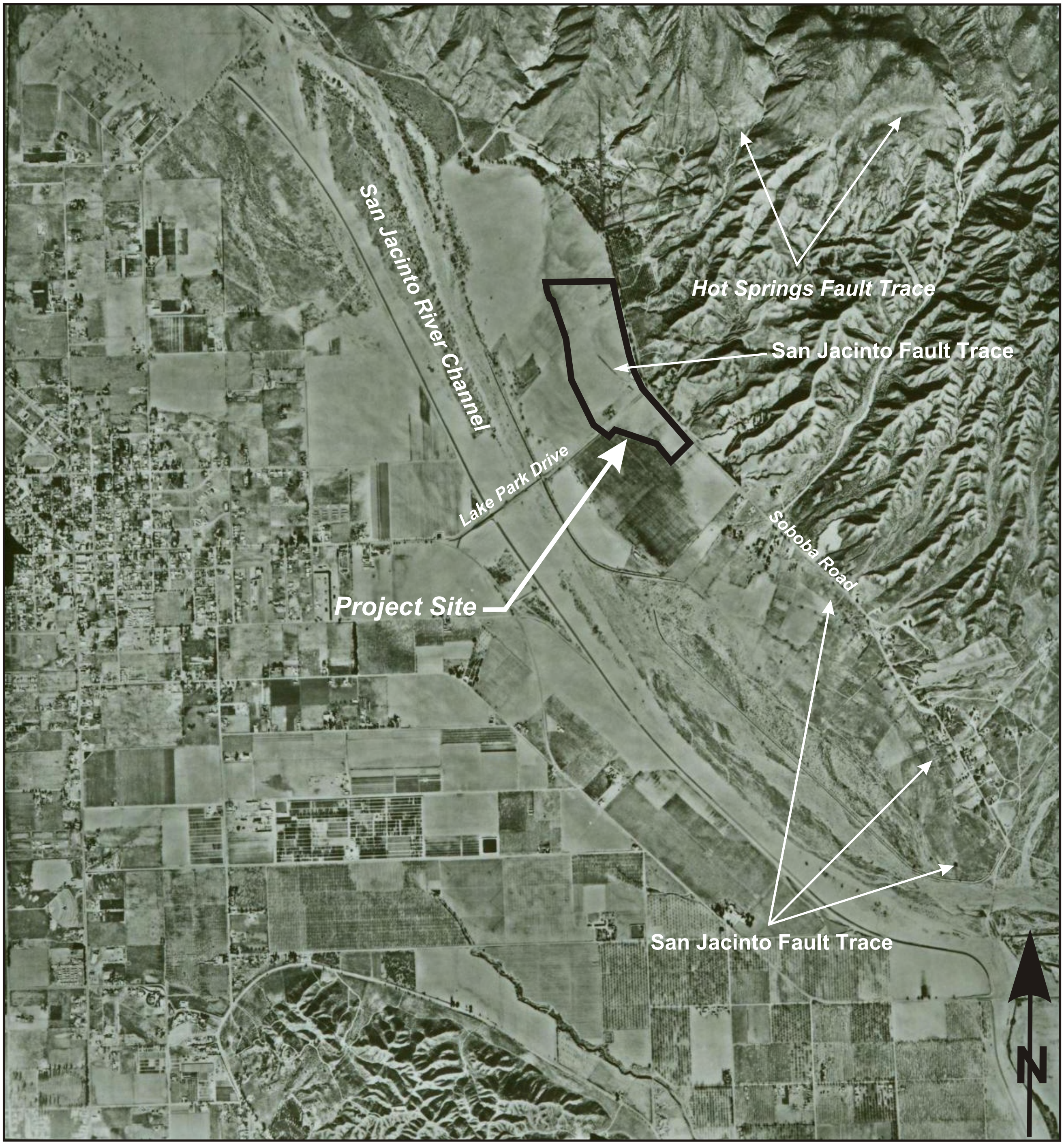
Scale in Miles

LANDMARK Geo-Engineers and Geologists

Project No.: LP10001

A-P Earthquake Fault Zone Map

Plate A-5

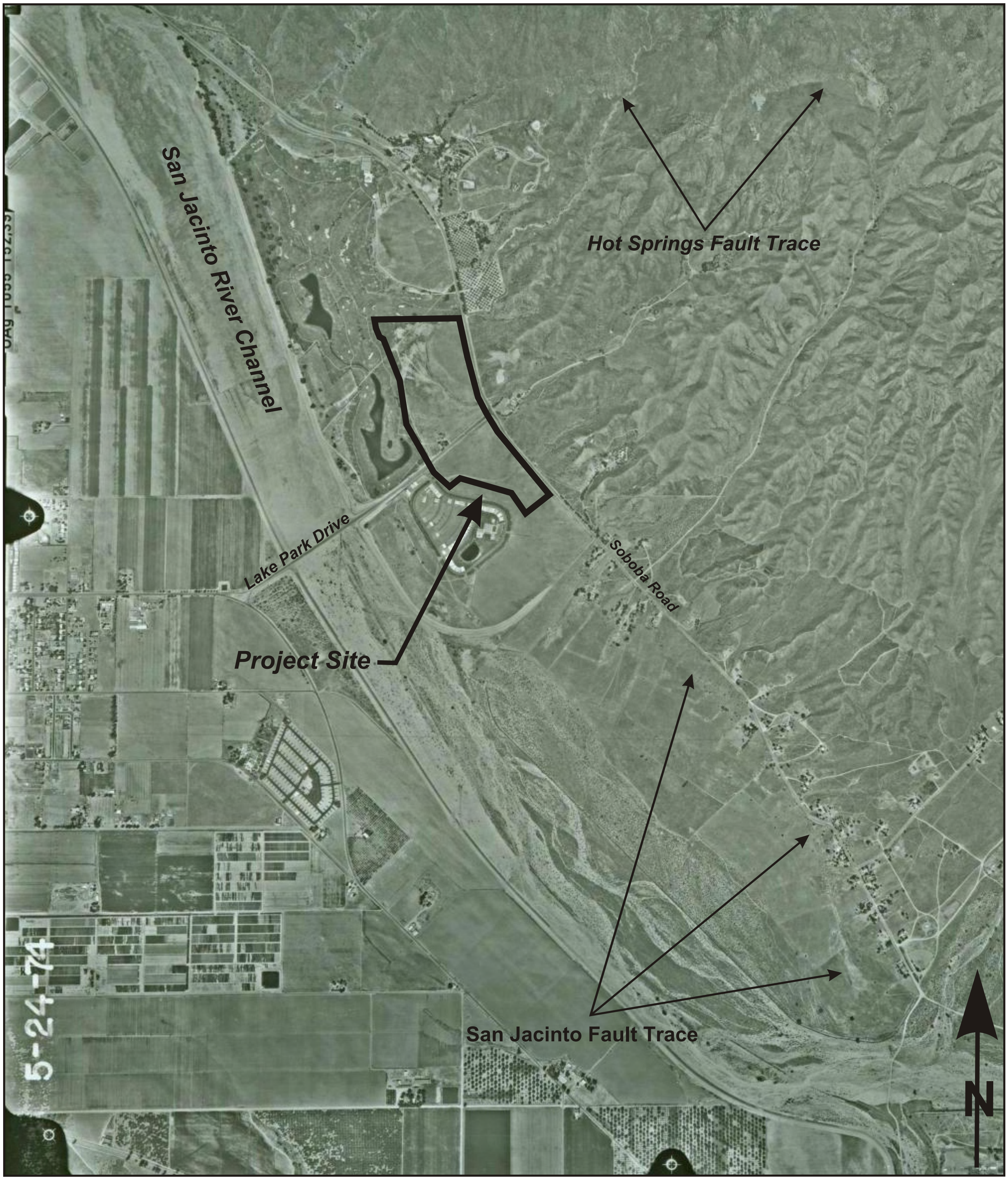


LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

1962 Aerial Photograph

Plate
A-6

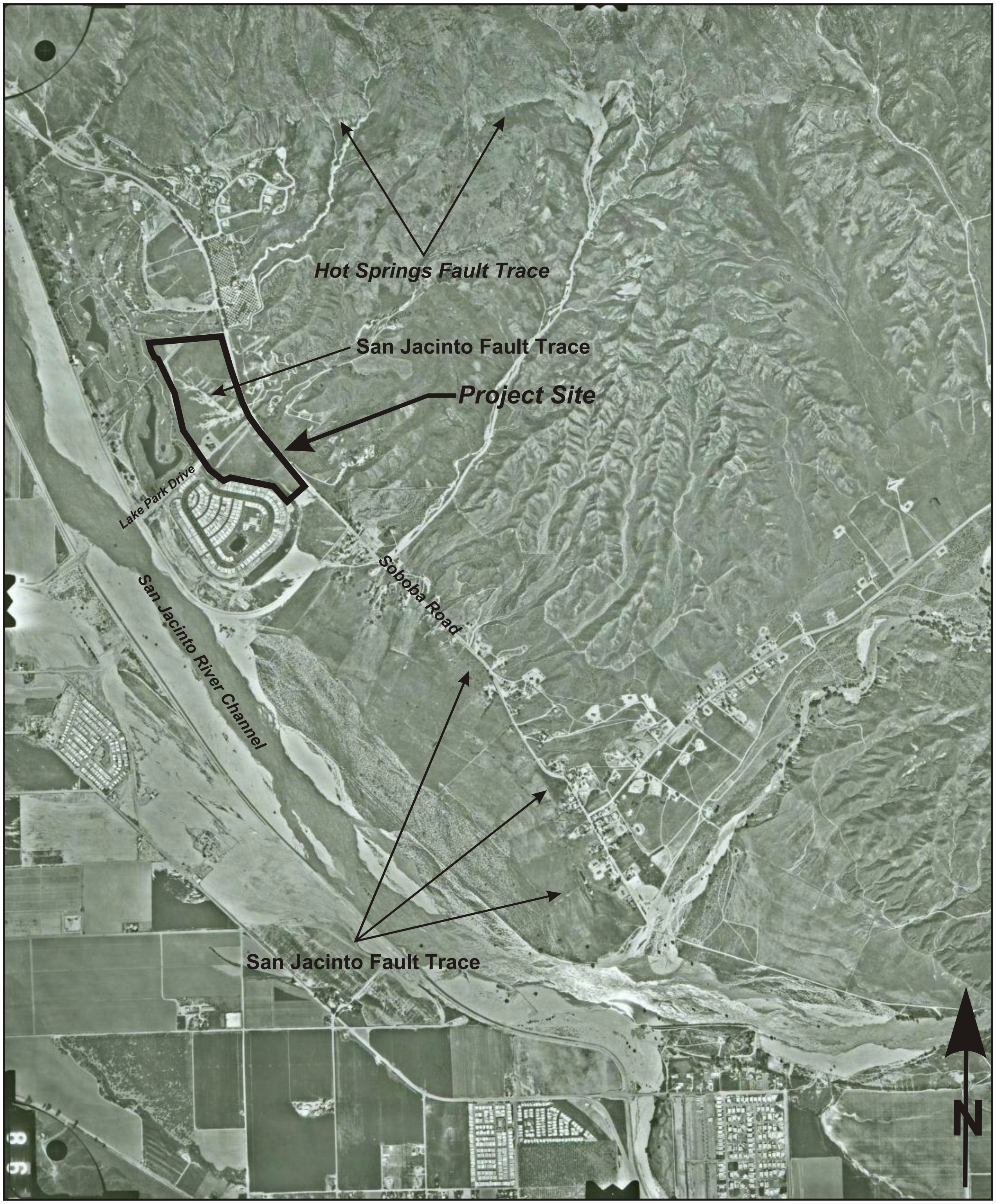


LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

1974 Aerial Photograph

Plate
A-7



LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

1980 Aerial Photograph

Plate
A-8

LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

1990 Aerial Photograph

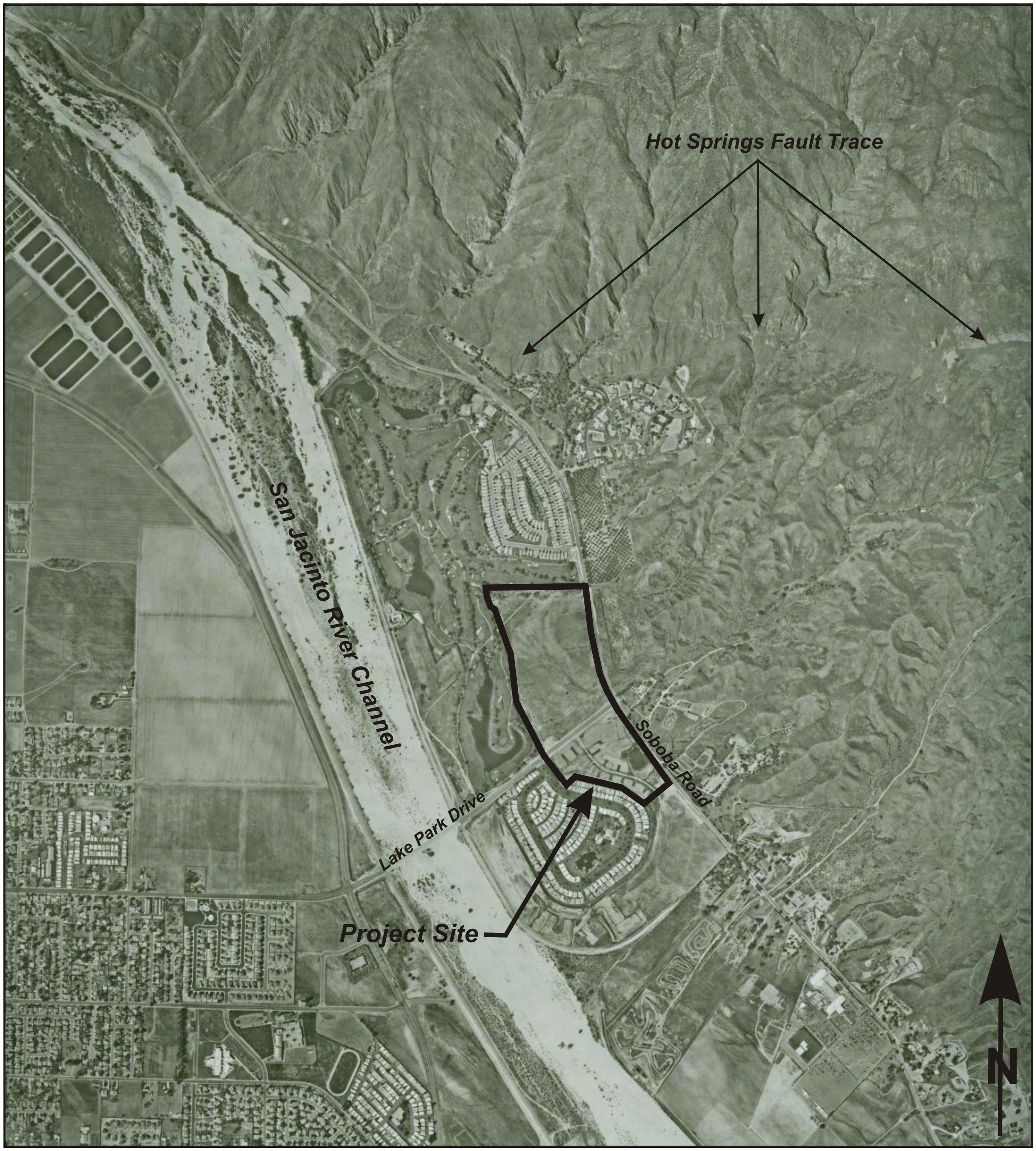
Plate
A-9

LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

2000 Aerial Photograph

Plate
A-10

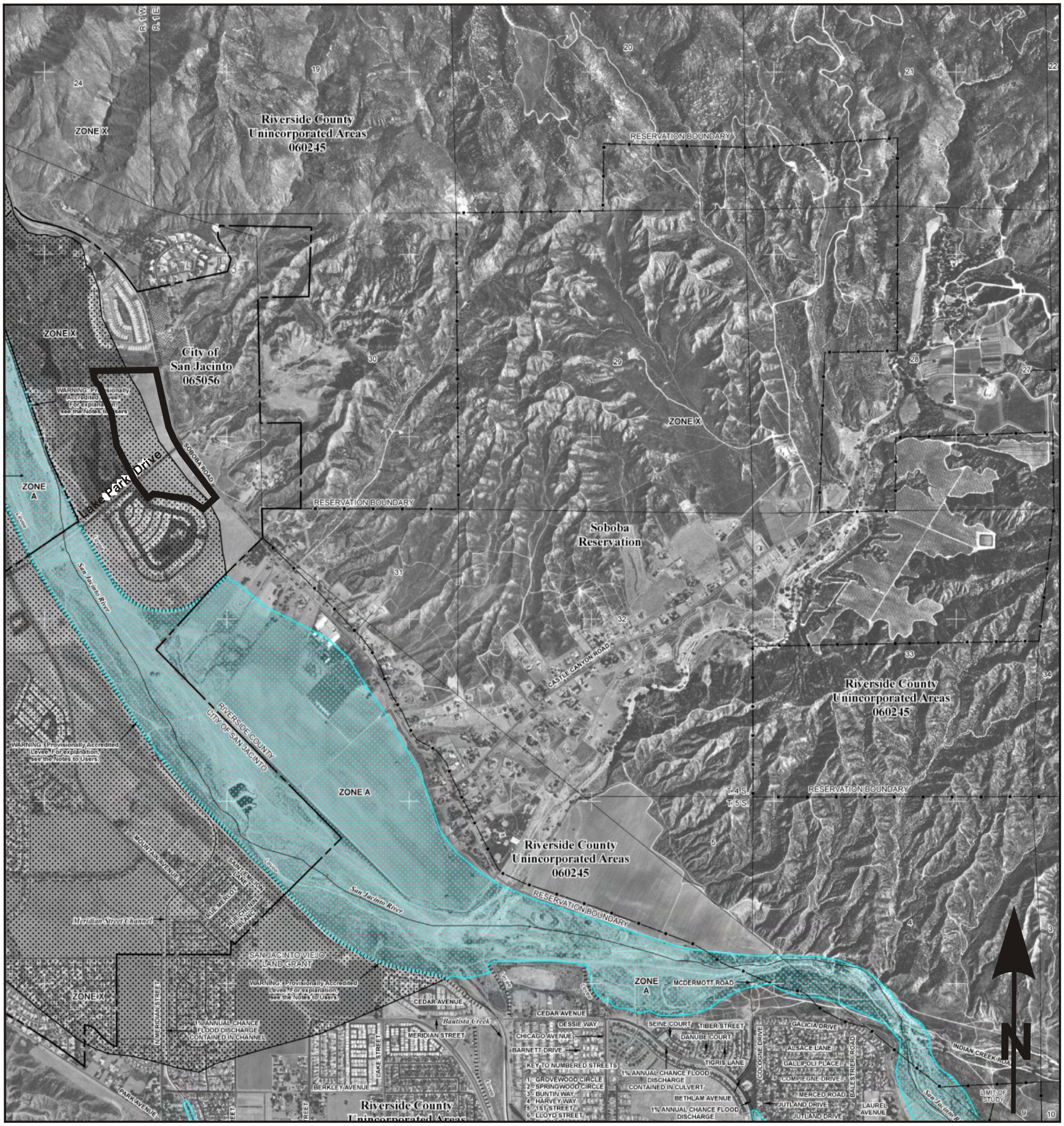


LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

2005 Aerial Photograph

Plate
A-11



Reference: Federal Emergency Management Agency (FEMA)
San Jacinto, California, Riverside County
Community-Panel Number 06065C1495G

LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

Flood Insurance Rate Map (FIRM)

Plate
A-12

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ *513* ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23)- - - - - -(23)	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{24}76^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

APPENDIX B

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
LOCATION: See Site and Exploration Map

CONE PENETROMETER: Fugro Truck Mounted Electric Cone with 23 ton reaction weight
DATE: 6/23/08

LOG OF CONE SOUNDING DATA CPT-1

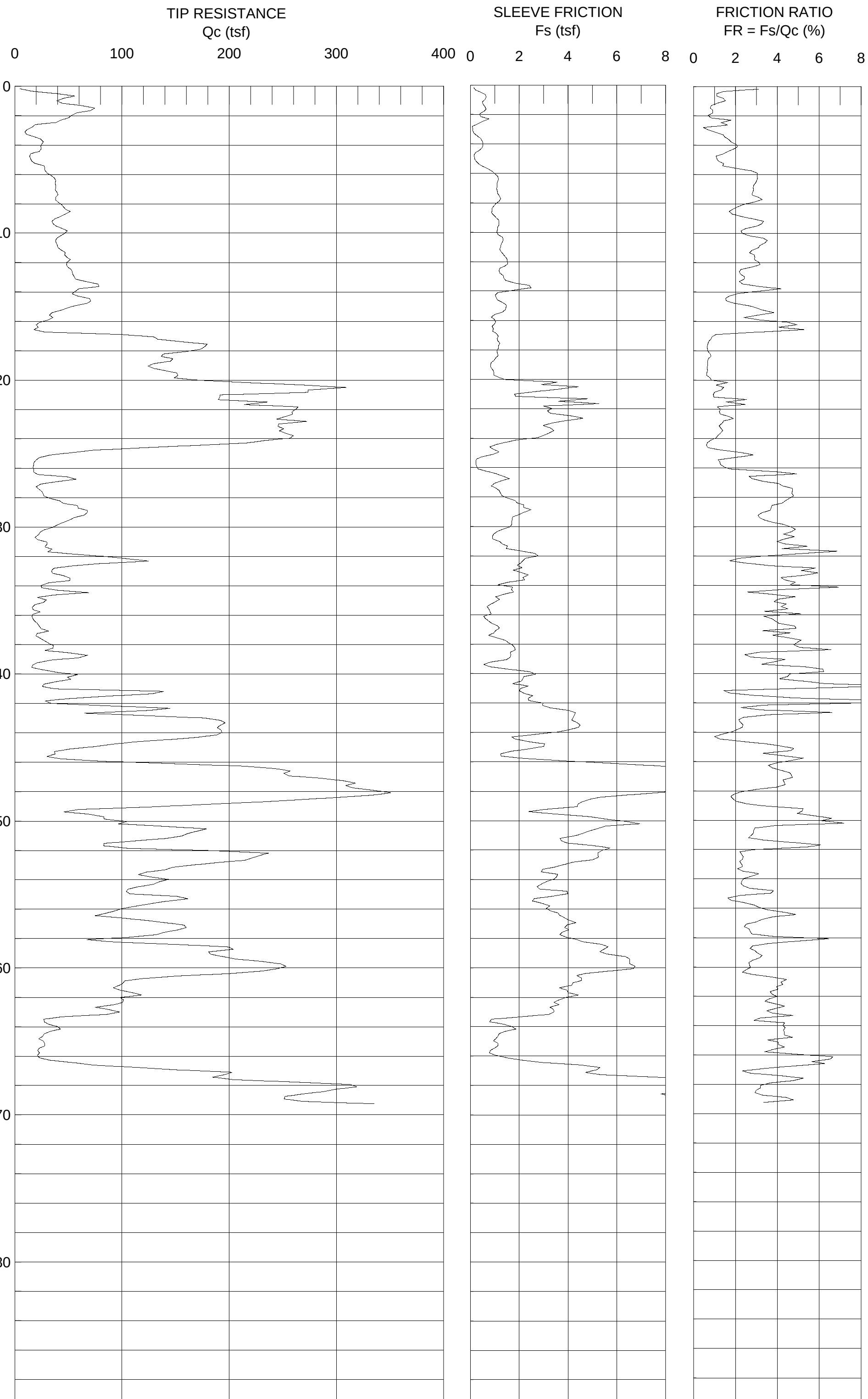
DEPTH (FEET)

INTERPRETED SOIL PROFILE
From Robertson & Campanella (1989)

GROUND EL. +/-

Sandy Silt to Clayey Silt	ML	very dense
Sand to Silty Sand	SP/SM	very dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Sandy Silt to Clayey Silt	ML	medium dense
Sand	SP	dense
Sand	" "	dense
Sand	" "	dense
Sand	" "	very dense
Sand to Silty Sand	SP/SM	very dense
Sand	SP	very dense
Sand	" "	very dense
Sand	" "	dense
Sandy Silt to Clayey Silt	ML	loose
Clayey Silt to Silty Clay	ML/CL	very stiff
Silty Clay to Clay	CL	very stiff
Clayey Silt to Silty Clay	ML/CL	hard
Clayey Silt to Silty Clay	" "	hard
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	hard
Sandy Silt to Clayey Silt	ML	medium dense
Silty Clay to Clay	CL	hard
Silty Clay to Clay	" "	hard
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Clayey Silt to Silty Clay	ML/CL	hard
Clay	CL/CH	very stiff
Clay	" "	hard
Overconsolidated Soil	??	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Silty Sand to Sandy Silt	SM/ML	dense
Silty Sand to Sandy Silt	" "	medium dense
Silty Clay to Clay	CL	hard
Sand to Clayey Sand	SP/SC	dense
Sand to Clayey Sand	" "	very dense
Silty Sand to Sandy Silt	SM/ML	dense
Overconsolidated Soil	??	medium dense
Sand to Clayey Sand	SP/SC	medium dense
Overconsolidated Soil	??	medium dense
Silty Sand to Sandy Silt	SM/ML	dense
Silty Sand to Sandy Silt	" "	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	dense
Silty Sand to Sandy Silt	SM/ML	dense
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	very stiff
Overconsolidated Soil	??	medium dense
Sand to Clayey Sand	SP/SC	dense
Sand to Clayey Sand	" "	dense

End of Sounding @ 69 ft.



Project No: LP10001

LANDMARK Geo-Engineers and Geologists

Plate B-1

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
LOCATION: See Site and Exploration Map

CONE PENETROMETER: Fugro Truck Mounted Electric Cone with 23 ton reaction weight
DATE: 6/23/08

LOG OF CONE SOUNDING DATA CPT-2

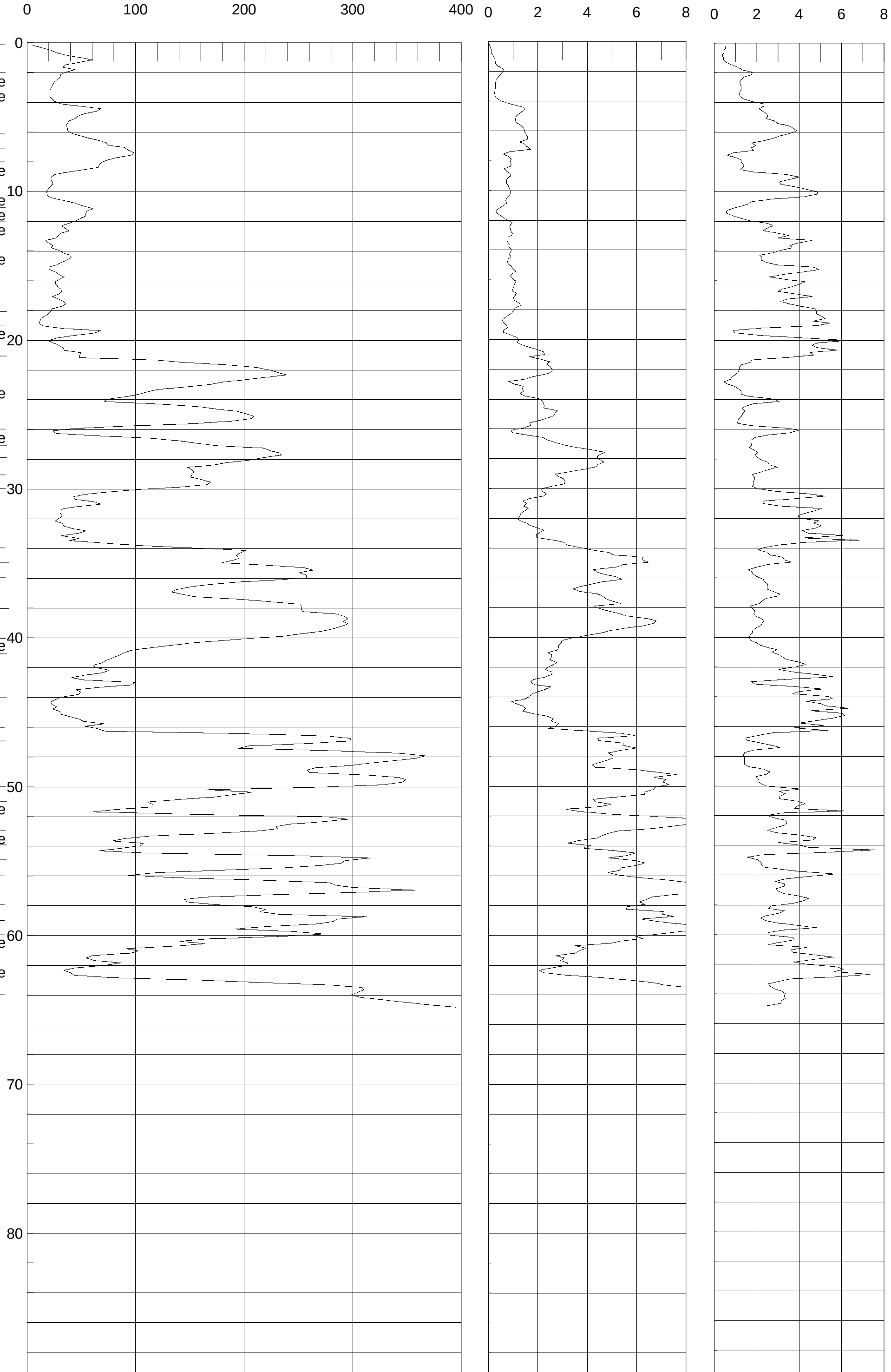
DEPTH (FEET)

INTERPRETED SOIL PROFILE
From Robertson & Campanella (1989)

GROUND EL. +/-

Silty Sand to Sandy Silt	SM/ML	dense
Silty Sand to Sandy Silt	" "	dense
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Sandy Silt to Clayey Silt	" "	dense
Clayey Silt to Silty Clay	ML/CL	hard
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Silty Sand	SP/SM	dense
Sandy Silt to Clayey Silt	ML	medium dense
Silty Clay to Clay	CL	very stiff
Sandy Silt to Clayey Silt	ML	medium dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	very stiff
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clay	CL/CH	stiff
Sandy Silt to Clayey Silt	ML	medium dense
Silty Clay to Clay	CL	hard
Sand to Silty Sand	SP/SM	dense
Sand	SP	dense
Sand to Silty Sand	SP/SM	medium dense
Sand to Silty Sand	" "	dense
Sand to Silty Sand	" "	dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Sand to Silty Sand	SP/SM	dense
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Silty Sand	SP/SM	dense
Clayey Silt to Silty Clay	ML/CL	hard
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	hard
Clayey Silt to Silty Clay	ML/CL	hard
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Silty Sand	SP/SM	dense
Silty Sand to Sandy Silt	SM/ML	dense
Silty Sand to Sandy Silt	" "	dense
Sand to Silty Sand	SP/SM	very dense
Sand to Silty Sand	" "	dense
Silty Sand to Sandy Silt	SM/ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Clayey Silt to Silty Clay	" "	hard
Clayey Silt to Silty Clay	" "	hard
Clay	CL/CH	very stiff
Clay	" "	hard
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Silty Sand	SP/SM	dense
Sand to Silty Sand	" "	dense
Sand to Silty Sand	" "	very dense
Sandy Silt to Clayey Silt	ML	dense
Sand to Clayey Sand	SP/SC	medium dense
Sand to Clayey Sand	" "	dense
Sandy Silt to Clayey Silt	ML	medium dense
Sand to Clayey Sand	SP/SC	dense
Sandy Silt to Clayey Silt	ML	dense
Sand to Clayey Sand	SP/SC	dense
Sand to Clayey Sand	" "	dense
Silty Sand to Sandy Silt	SM/ML	dense
Sand to Clayey Sand	SP/SC	dense
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Overconsolidated Soil	??	medium dense
Sand to Clayey Sand	SP/SC	dense

End of Sounding @ 64 ft.



Project No: LP10001

LANDMARK
Geo-Engineers and Geologists

Plate B-2

CLIENT: ENTRIX — METHOD OF DRILLING: CME 55 w/autohammer

PROJECT: Proposed New Hotel/Casino - San Jacinto, CA — DATE OBSERVED: 01/12/10

LOCATION: 33° 47.395' N, 116° 55.798' W — LOGGED BY: T.B.

LOG OF BORING B-1

SHEET 1 OF 1

DESCRIPTION OF MATERIAL

SURFACE ELEV. +/- 1,593 feet

DEPTH	CLASSIFICATIO	SAMPLE TYPE	BLOWS/FOOT **	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING #200
					SILTY SAND (SM): Brown, moist						22
					SANDY SILT (ML): Light brown, damp to moist, fine grained.						70
5			31		dense	8.2	85.9				
10			29		medium dense	6.3	93.6				55
15			36		SILTY SAND (SM): Brown, dense, damp to moist.	7.6	116.4				19
20			29		SILTY SAND/SAND (SM/SP): Light brown, medium dense, damp to moist.						
25			6	1.0	SANDY SILTY CLAY (CL): Dark brown, medium stiff, moist, fine grained.						78
30			14		CLAYEY SANDY SILT (ML): Dark brown, medium dense, moist, fine grained.						
35											
40					End of Boring at 31.5 feet. No groundwater was encountered at the time of drilling.						

** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.

Project No:
LP10001

LANDMARK
Geo-Engineers and Geologists

Plate
B-3

CLIENT: ENTRIX
METHOD OF DRILLING: CME 55 w/autohammer
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
DATE OBSERVED: 01/12/10
LOCATION: 33° 47.460' N, 116° 55.778' W
LOGGED BY: T.B.

LOG OF BORING B-2

SHEET 1 OF 1

DEPTH (FEET)	CLASSIFICATION	SAMPLE TYPE	BLOWS/ FOOT	POCKET PEN. (TSF)PN	DESCRIPTION OF MATERIAL SURFACE ELEV. +/- 1,628 feet	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING # 200
					SILTY SAND (SM): Brown, damp to moist.						
			9		light brown, loose	7.5	93.3				42
5											
			24		medium dense	4.0	97.5				43
10											
			32		brown, dense	5.3	111.1				31
15											
			21		medium dense	6.3	101.6				21
20											
			32		yellowish brown, dense	5.1	108.6				18
25											
			13		SILTY SAND/SAND (SM/SP): Light brown, medium dense, damp to moist.						
30											
			19								7
35											
			20		SILTY SAND (SM): Light brown, medium dense, moist.						
40											
			33		dense						30
45											
50					End of Boring at 43.5 feet. No groundwater was encountered at the time of drilling.						
55					** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.						

Project No: LP10001

LANDMARK
Geo-Engineers and Geologists

Plate B-4

CLIENT: ENTRIX | METHOD OF DRILLING: CME 55 w/autohammer

PROJECT: Proposed New Hotel/Casino - San Jacinto, CA | DATE OBSERVED: 01/12/10

LOCATION: 33° 47.501' N, 116° 55.837' W | LOGGED BY: T.B.

LOG OF BORING B-3

SHEET 1 OF 2

DESCRIPTION OF MATERIAL

SURFACE ELEV. +/- 1,653 feet

DEPTH	CLASSIFICATIO	SAMPLE TYPE	BLOWS/FOOT **	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING #200
					SILTY SAND (SM): Brown, damp to moist.						
5			57		light brown, very dense	4.4	108.6				42
10			25		medium dense	7.4	101.7				39
15			29		SAND (SP): Light brown, medium dense, dry.	1.5	109.9				4
20			40		dense	2.2	106.9				3
25			45			1.5	113.1				3
30			68		very dense	1.6	113.7				2
					SILTY SAND (SM): Brown, very dense, dry.						
35			26		medium dense, damp to moist						
40			25								32

CLIENT: ENTRIX | METHOD OF DRILLING: CME 55 w/autohammer
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA | DATE OBSERVED: 01/12/10
LOCATION: 33° 47.501' N, 116° 55.837' W | LOGGED BY: T.B.

LOG OF BORING B-3A

DESCRIPTION OF MATERIAL

SURFACE ELEV. +/- 1,653 feet

DEPTH (FEET)	CLASSIFICATION	SAMPLE TYPE	BLOWS/ FOOT	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING # 200
			15		SANDY SILT (ML): Brown, medium dense, moist.						54
50			30		SILTY SAND (SM): Brown, dense, moist.						46
55											
60											
65											
70											
75											
80											
85					End of Boring at 51.5 feet. No groundwater was encountered at the time of drilling.						

** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.

Project No:
LP10001

LANDMARK
Geo-Engineers and Geologists

Plate
B-6

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
LOCATION: 33° 47.621' N, 116° 55.823' W

METHOD OF DRILLING: CME 55 w/autohammer
DATE OBSERVED: 01/12/10
LOGGED BY: T.B.

LOG OF BORING B-4

SHEET 1 OF 1

SURFACE ELEV. +/- 1,596 feet

DEPTH (FEET)	CLASSIFICATION	SAMPLE TYPE	BLOWS/ FOOT	POCKET PEN. (TSF)PN	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING # 200
0–2	SM	Bulk			SILTY SAND/SANDY SILT (SM): Light brown, damp.						
2–9	SM	Ring	54		SILTY SAND (SM): Light brown, very dense, dry.	2.5	98.2				23
		Ring	29		medium dense, damp to moist	4.3	109.8				26
9–15	ML	Ring	12		SANDY SILT (ML): Brown, medium dense, moist, fine grained, traces of clay.	20.4	104.5				53
15–20	SP	Ring	22		SAND (SP): Light brown, medium dense, dry.	1.7	102.0				2
20–30	SM	Ring	19		SILTY SAND (SM): Light brown, medium dense, damp to moist.						
		SPT	25								
30–35.5	ML	SPT	8		SANDY SILT (ML): Light brown, loose, moist, fine grained., traces of clay.						54
35.5–40	SP	SPT	19		SAND (SP): Light brown, medium dense, damp to moist.						6
40–43.5	SM	SPT	16		SILTY SAND (SM): Light brown, medium dense, moist.						37

End of Boring at 43.5 feet.
No groundwater was encountered at the time of drilling.

** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.

CLIENT: ENTRIX | METHOD OF DRILLING: CME 55 w/autohammer
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA | DATE OBSERVED: 01/12/10
LOCATION: 33° 47.610' N, 116° 55.745' W | LOGGED BY: T.B.

LOG OF BORING B-5

DESCRIPTION OF MATERIAL

SURFACE ELEV. +/- 1,625 feet

DEPTH	CLASSIFICATIO	SAMPLE TYPE	BLOWS/FOOT **	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING #200
					SILTY SAND (SM): Light brown, damp to moist.						37
			32		dense	3.2	107.8				
5											
			23		SANDY SILT (ML): Light brown, dense, damp to moist, fine grained.	5.3	96.8				52
10											
			16		SILTY SAND (SM): Brown, medium dense, damp to moist.	8.4	100.6				32
15											
			20		SANDY SILT (ML): Light brown, medium dense, moist, fine grained.	11.1	94.8				51
20											
			26		SILTY SAND/SAND (SM/SP): Light brown, medium dense, damp to moist.	4.2	107.8				10
25											
			22		CLAYEY SILTY SAND (SM): Dark brown, medium dense, moist.	13.4	108.6				47
30											
			13		SILTY SAND (SM): Brown, medium dense, moist.						
35											
			13								38
40											
			20								

Project No: **LP10001**

LANDMARK Geo-Engineers and Geologists

Plate B-8

CLIENT: ENTRIX
METHOD OF DRILLING: CME 55 w/autohammer
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
DATE OBSERVED: 01/12/10
LOCATION: 33° 47.473' N, 116° 55.674' W
LOGGED BY: T.B.

LOG OF BORING B-6

SHEET 1 OF 1

DEPTH	CLASSIFICATIO	SAMPLE TYPE	BLOWS/FOOT **	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL SURFACE ELEV. +/- 1,649 feet	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING #200
					SILTY SAND (SM): Brown, damp to moist.						
5			14		light brown, medium dense	3.3	106.5				23
10			15			7.2	103.7				38
15			5		loose, moist						
20											
25											
30											
35											
40					End of Boring at 16.5 feet. No groundwater was encountered at the time of drilling.						

** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.

Project No: LP10001

LANDMARK
Geo-Engineers and Geologists

Plate B-10

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
LOCATION: 33° 47.367' N, 116° 55.618' W

METHOD OF DRILLING: CME 55 w/autohammer
DATE OBSERVED: 01/13/10
LOGGED BY: T.B.

LOG OF BORING B-7

SHEET 1 OF 2

DESCRIPTION OF MATERIAL

SURFACE ELEV. +/- 1,609 feet

DEPTH	CLASSIFICATIO	SAMPLE TYPE	BLOWS/FOOT **	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING #200
					SILTY SAND (SM): Brown, damp to moist.						34
5			30		dense, dry	2.8	105.0				
10			44		SANDY SILT (ML): Brown, dense, damp to moist, fine grained.	6.3	96.7				54
15			41		SILTY SAND (SM): Light brown, dense, damp to moist.	4.9	117.5				17
20			26	0.0	SILTY CLAY (CL): Light brown, soft, moist, fine grained.	13.4	107.4				
					SILTY SAND (SM): Brown, medium dense, moist.						45
25			22		damp to moist	8.5	112.3				23
30			22	1.5	SILTY CLAY (CL): Olive brown, stiff, moist, fine grained.	27.2	94.9				82
					CLAYEY SILTY SAND (SM): Brown, medium dense, moist, fine grained.						
35			18		CLAYEY SANDY SILT (ML): Olive brown, medium dense moist, fine grained.						
					SILTY SAND (SM): Light brown, medium dense, damp to moist.						36
40			17		brown						48

Project No: LP10001

LANDMARK
Geo-Engineers and Geologists

Plate B-11

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
LOCATION: 33° 47.367' N, 116° 55.618' W

METHOD OF DRILLING: CME 55 w/autohammer
DATE OBSERVED: 01/13/10
LOGGED BY: T.B.

LOG OF BORING B-7A

SURFACE ELEV. +/- 1,609 feet

DEPTH (FEET)	CLASSIFICATION	SAMPLE TYPE	BLOWS/ FOOT	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING # 200
			15		SILTY SAND (SM): Brown, medium dense, damp to moist.						
					CLAYEY SANDY SILT (ML): Olive brown, medium dense, moist, fine grained.						
50			26		SILTY SAND (SM): Light brown, medium dense, damp to moist.						41
55											
60											
65											
70											
75											
80											
85					End of Boring at 51.5 feet. No groundwater was encountered at the time of drilling.						

** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.

CLIENT: ENTRIX | METHOD OF DRILLING: CME 55 w/autohammer
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA | DATE OBSERVED: 01/13/10
LOCATION: 33° 47.307' N, 116° 55.531' W | LOGGED BY: T.B.

LOG OF BORING B-8

SHEET 1 OF 1

DESCRIPTION OF MATERIAL

SURFACE ELEV. +/- 1,625 feet

DEPTH	CLASSIFICATIO	SAMPLE TYPE	BLOWS/FOOT **	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING #200
			31		SILTY SAND (SM): Brown, damp to moist.	5.1	115.3				26
5											
			26		medium dense	8.1	105.4				47
10											
			7		loose						
15											
			11		SANDY SILT (ML): Brown, medium dense, damp to moist, fine grained.						64
20											
25											
30											
35											
40					End of Boring at 18.5 feet. No groundwater was encountered at the time of drilling.						

** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.

Project No: LP10001

LANDMARK Geo-Engineers and Geologists

Plate B-13

CLIENT: ENTRIX
METHOD OF DRILLING: CME 55 w/autohammer
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
DATE OBSERVED: 01/13/10
LOCATION: 33° 47.310' N, 116° 55.730' W
LOGGED BY: T.B.

LOG OF BORING B-9

SHEET 1 OF 1

DESCRIPTION OF MATERIAL

SURFACE ELEV. +/- 1,610 feet

DEPTH (FEET)	CLASSIFICATION	SAMPLE TYPE	BLOWS/ FOOT	POCKET PEN. (TSF)PN	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING # 200
					SANDY SILT (ML): Olive brown, moist, fine grained, traces of clay.						
5			44		CLAYEY SANDY SILT (ML): Brown, dense, moist, fine grained.	16.1	113.1				66
				2.5	SILTY CLAY (CL): Brown, stiff, moist, fine grained.	13.2	100.5				
10			12		SILTY SAND (SM): Yellowish brown, medium dense moist.						48
15			35		SAND (SP): Light brown, dense, dry.	1.3	110.5				3
20			16		SANDY SILT (ML): Olive brown, medium dense, moist, fine grained.	16.5	97.8				51
25			12		brown						52
30			18		SILTY SAND (SM): Light brown, medium dense, damp to moist.						
35			14								
40			9		CLAYEY SANDY SILT (ML): Brown, loose, moist, fine grained.						59
45											
50					End of Boring at 41.5 feet. No groundwater was encountered at the time of drilling.						
55					** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.						

Project No: LP10001

LANDMARK
Geo-Engineers and Geologists

Plate B-14

CLIENT: ENTRIX
METHOD OF DRILLING: CME 55 w/autohammer
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
DATE OBSERVED: 01/13/10
LOCATION: 33° 47.300' N, 116° 55.636' W
LOGGED BY: T.B.

LOG OF BORING B-10

SHEET 1 OF 1

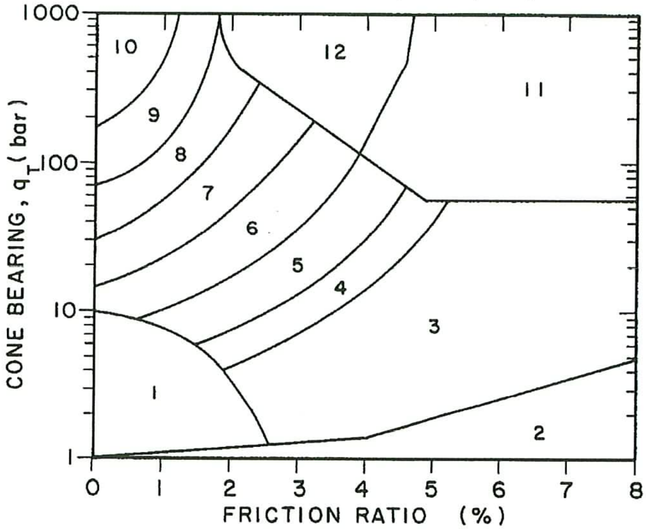
SURFACE ELEV. +/- 1,630 feet

DEPTH	CLASSIFICATIO	SAMPLE TYPE	BLOWS/FOOT **	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	UNCONFINED COMPRESSION (TSF)	LIQUID LIMIT	PLASTICITY INDEX	PASSING #200
					SILTY SAND (SM): Brown, damp to moist.						
			50 @ 6"		light brown, very dense	5.6	105.3				22
5											
			19		SANDY SILT (ML): Dark brown, medium dense, moist, fine grained, traces of clay.	16.0	108.3				52
10											
			21		SILTY SAND (SM): Light brown, medium dense, damp to moist.	4.6	105.1				16
15											
			15								
20											
			16		SAND (SP): Light brown, medium dense, damp to moist.						4
25											
			19		SILTY SAND (SM): Dark brown, medium dense, moist.						40
30											
			12		SILTY SAND/SANDY SILT (SM/ML): Light brown, medium dense, moiist, fine grained, traces of clay.						50
35											
40					End of Boring at 33.5 feet. No groundwater was encountered at the time of drilling.						

** Blows not corrected for the presence of gravel, overburden pressure, sampler size or increase drive energy for automatic hammers.

Simplified Soil Classification Chart

After Robertson & Campanella (1989)



Geotechnical Parameters from CPT Data:

Equivalent SPT N(60) blow count = Qc/(Qc/N Ratio)

N1(60) = Cn*N(60) Normalized SPT blow count

Cn = 1/(p'o)^0.5 < 1.6 max. from Liao & Whitman (1986)

p'o = effective overburden pressure (tsf) using unit densities given below and estimated groundwater table.

Dr = Relative density (%) from Jamiolkowski et. al. (1986) relationship = -98 +68*log(Qc/p'o^0.5) where Qc, p'o in tonne/sqm

Note: 1 tonne/sqm = 0.1024 tsf, 1 bar =1.0443 tsf

Phi = Friction Angle estimated from either:

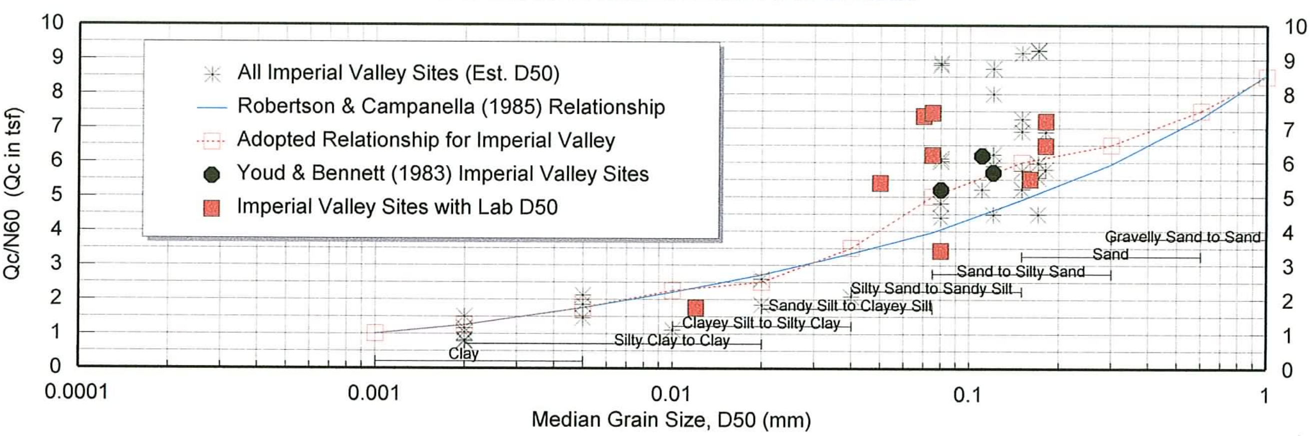
1. Roberton & Campanella (1983) chart:
   Phi = 5.3 + 24*(log(Qc/p'o))+3(log(Qc/p'o))^2
2. Peck, Hansen & Thornburn (1974) N-Phi Correlation
3. Schmertman (1978) chart [Phi = 28+0.14*Dr for fine uniform sands]

Su = undrained shear strength (tsf)

= (Qc-p'o)/Nk where Nk varies from 10 to 22, 17 for OC clays

OCR = Overconsolidation Ratio estimated from Schmertman (1978) chart using Su/p'o ratio and estimated normal consolidated Su/p'o

Variation of Qc/N Ratio with Grain Size



Note: Assumed Properties and Adopted Qc/N Ratio based on correlations from Imperial Valley, California soils

Table of Soil Types and Assumed Properties

Zone	Soil Classification	UCS	Density (pcf)	R&C Qc/N	Adopted Qc/N	Est. PI	Fines (%)	D50 (mm)
1	Sensitive fine grained	ML	120	2	2	NP-15	65-100	0.020
2	Organic Material	OL/OH	120	1	1	--	--	--
3	Clay	CL/CH	125	1	1.25	25-40+	90-100	0.002
4	Silty Clay to Clay	CL	125	1.5	1.75	15-40	90-100	0.005
5	Clayey Silt to Silty Clay	ML/CL	120	2	2.5	5-25	90-100	0.020
6	Sandy Silt to Clayey Silt	ML	115	2.5	3.5	NP-10	65-100	0.040
7	Silty Sand to Sandy Silt	SM/ML	115	3	5	NP	35-75	0.075
8	Sand to Silty Sand	SP/SM	115	4	6	NP	5-35	0.150
9	Sand	SP	110	5	6.5	NP	0-5	0.300
10	Gravelly Sand to Sand	SW	115	6	7.5	NP	0-5	0.600
11	Overconsolidated Soil	--	120	1	1	NP	90-100	0.010
12	Sand to Clayey Sand	SP/SC	115	2	2	NP-5	--	---

Su (tsf)	Consistency
0-0.13	very soft
0.13-.25	soft
0.25-0.5	firm
0.5-1.0	stiff
1.0-2.0	very stiff
>2.0	hard

Dr (%)	Relative Density
0-20	very loose
20-40	loose
40-70	medium dense
70-90	dense
>90	very dense

LANDMARK Geo-Engineers and Geologists

Project No: LP10001

Key to Interpretation of CPT Logs

Plate B-16

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
Coarse grained soils More than half of material is larger than No. 200 sieve	**Gravels** More than half of coarse fraction is larger than No. 4 sieve	Clean gravels (less than 5% fines)	**GW**	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, or gravel-sand mixtures, little or no fines
		Gravel with fines	**GM**	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	Sands More than half of coarse fraction is smaller than No. 4 sieve	Clean sands (less than 5% fines)	**SW**	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines	**SM**	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
Fine grained soils More than half of material is smaller than No. 200 sieve	**Silts and clays** Liquid limit is less than 50%		**ML**	Inorganic silts, clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravely, sandy, or lean clays
			OL	Organic silts and organic clays of low plasticity
	Silts and clays Liquid limit is more than 50%		**MH**	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
Highly organic soils			**PT**	Peat and other highly organic soils

GRAIN SIZES

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

200 4 10 4 3/4" 3" 12"
US Standard Series Sieve — Clear Square Openings

Sands, Gravels, etc.	Blows/ft. *
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Clays & Plastic Silts	Strength **	Blows/ft. *
Very Soft	0-0.25	0-2
Soft	0.25-0.5	2-4
Firm	0.5-1.0	4-8
Stiff	1.0-2.0	8-16
Very Stiff	2.0-4.0	16-32
Hard	Over 4.0	Over 32

* Number of blows of 140 lb. hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 in. I.D.) split spoon (ASTM D1586).
** Unconfined compressive strength in tons/s.f. as determined by laboratory testing or approximated by the Standard Penetration Test (ASTM D1586), Pocket Penetrometer, Torvane, or visual observation.

Type of Samples:
Ring Sample — Standard Penetration Test — Shelby Tube — Bulk (Bag) Sample

Drilling Notes:

1. Sampling and Blow Counts
   Ring Sampler - Number of blows per foot of a 140 lb. hammer falling 30 inches.
   Standard Penetration Test - Number of blows per foot.
   Shelby Tube - Three (3) inch nominal diameter tube hydraulically pushed.
2. P. P. = Pocket Penetrometer (tons/s.f.).
3. NR = No recovery.
4. GWT = Ground Water Table observed @ specified time.

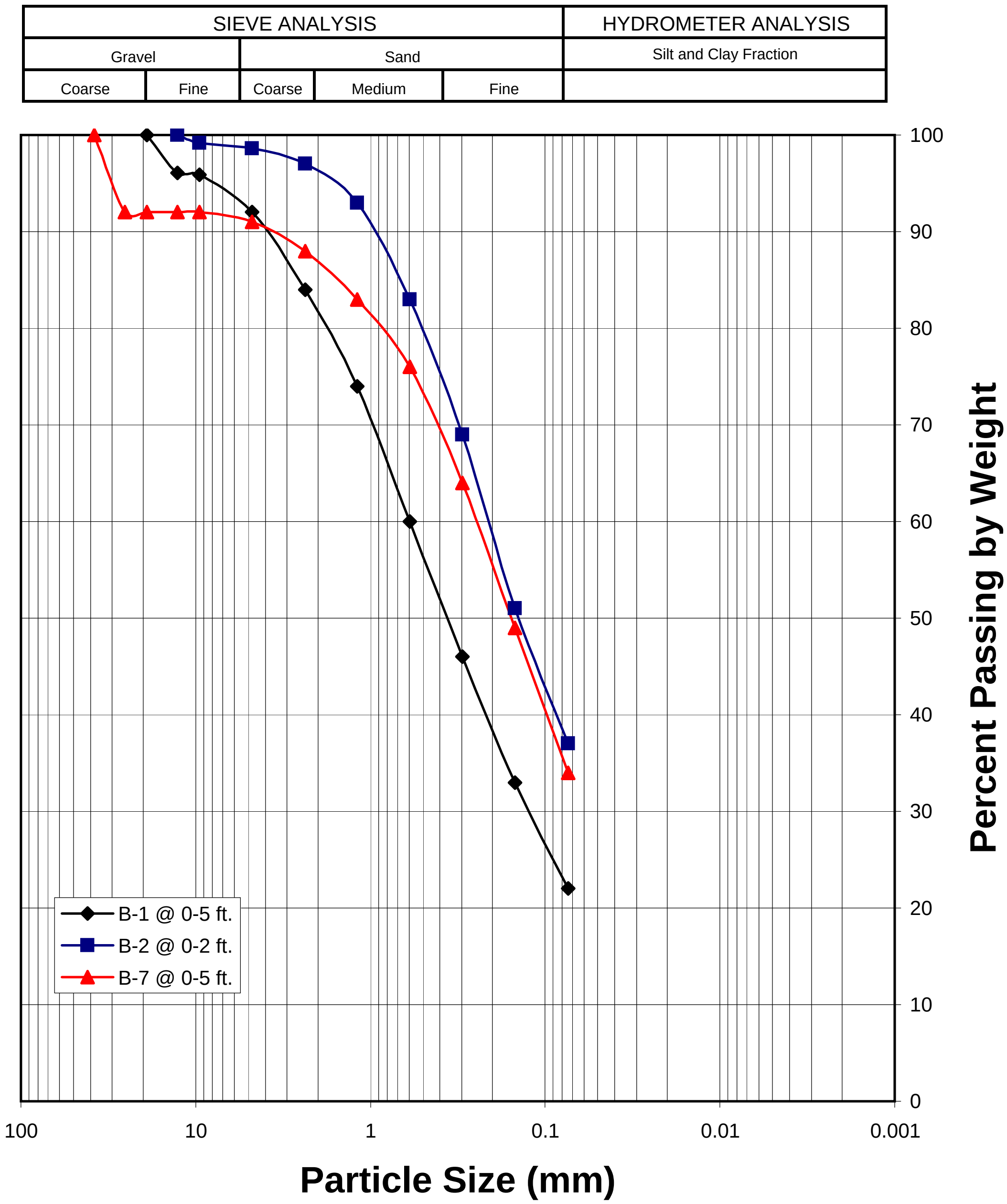
LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

Key to Logs

Plate B-17

APPENDIX C

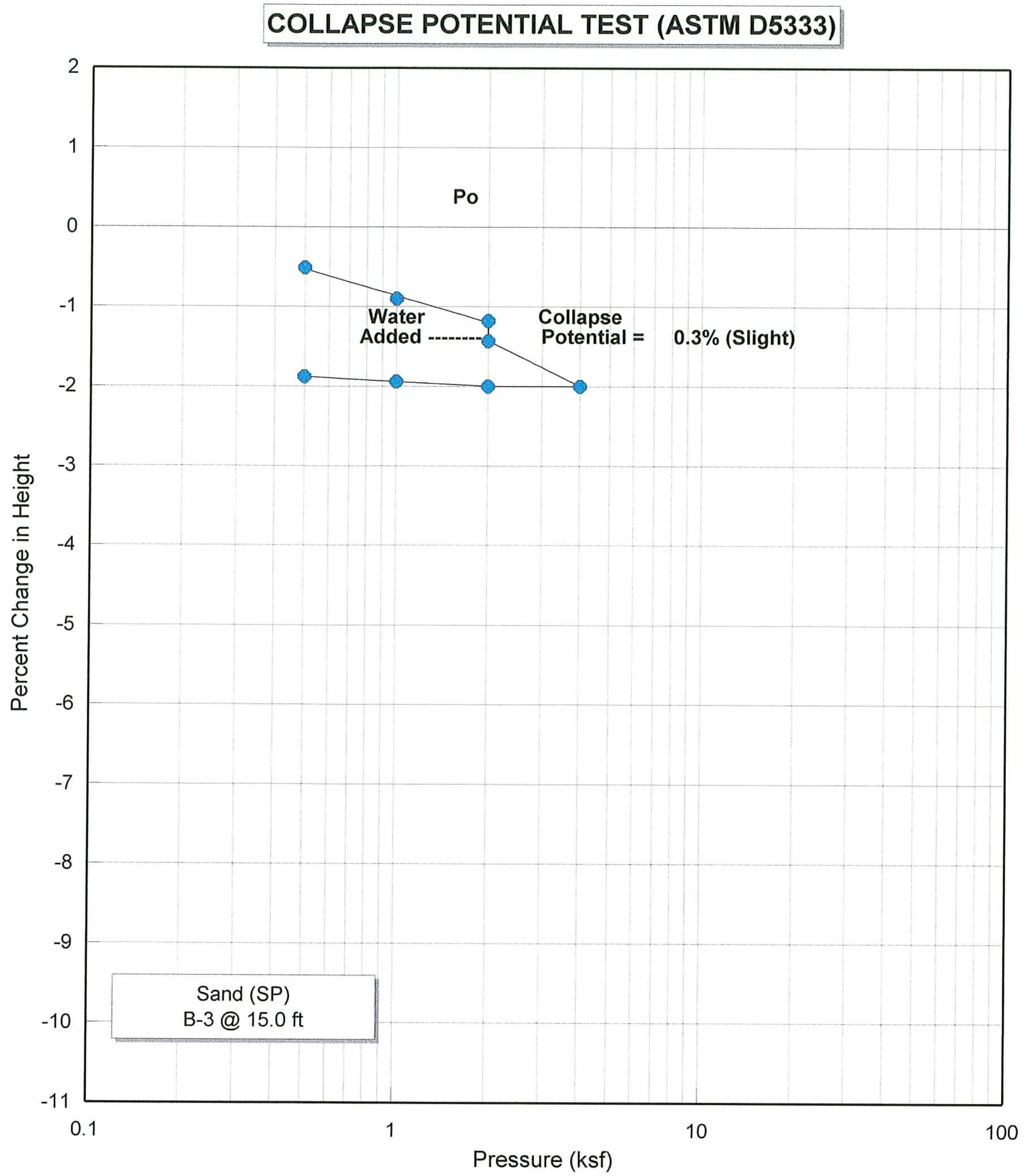


LANDMARK
Geo-Engineers and Geologists

Project No.: LP10001

Grain Size Analysis

Plate C-1



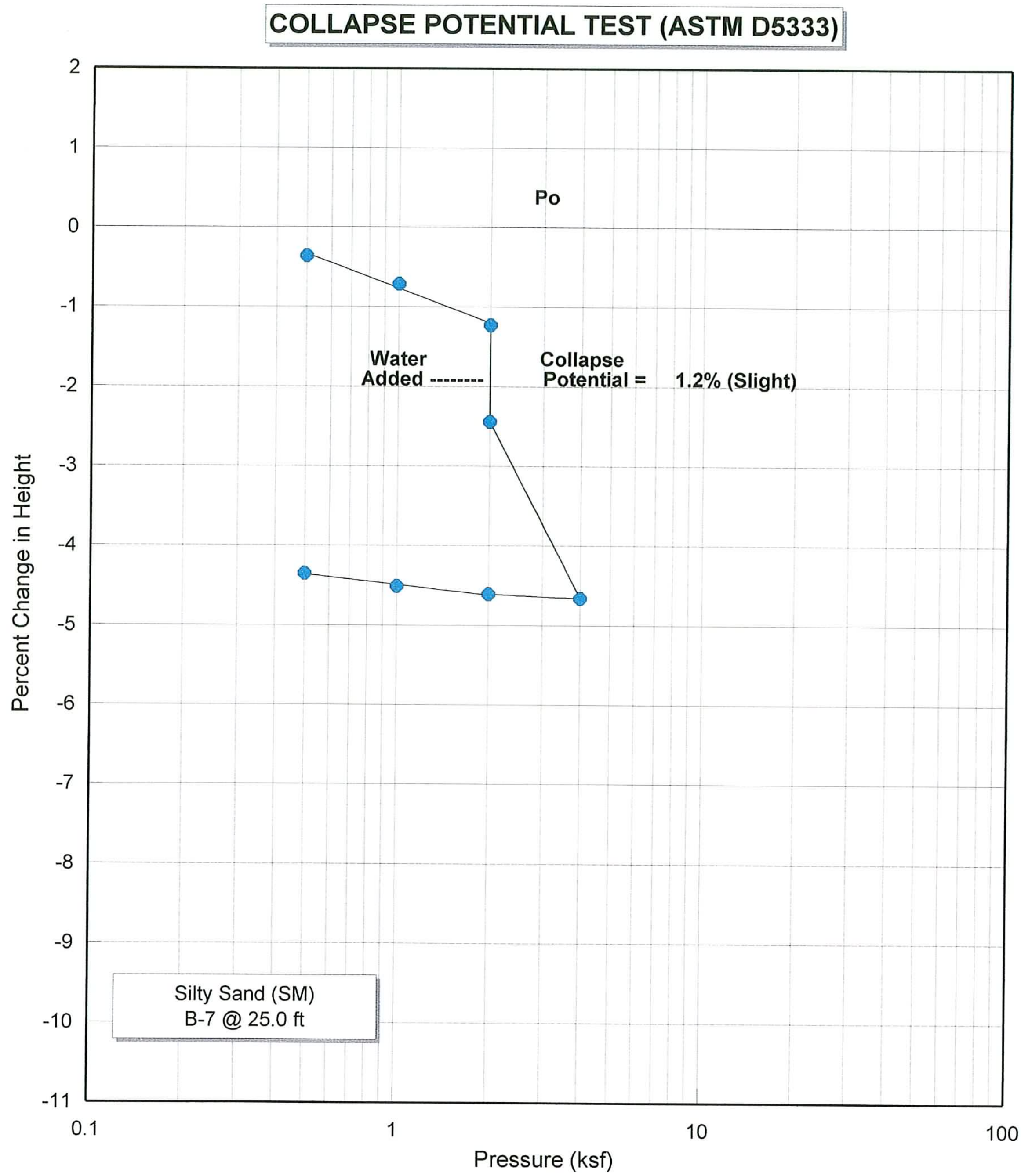
Results of Test:	Initial	Final
Dry Density, pcf:	109.9	112.1
Water Content, %:	1.5	18.0
Void Ratio, e:	0.505	0.476
Saturation, %:	8	100

LANDMARK
Geo-Engineers and Geologists

Project No: LP10001

Collapse Potential Test Results

Plate C-2



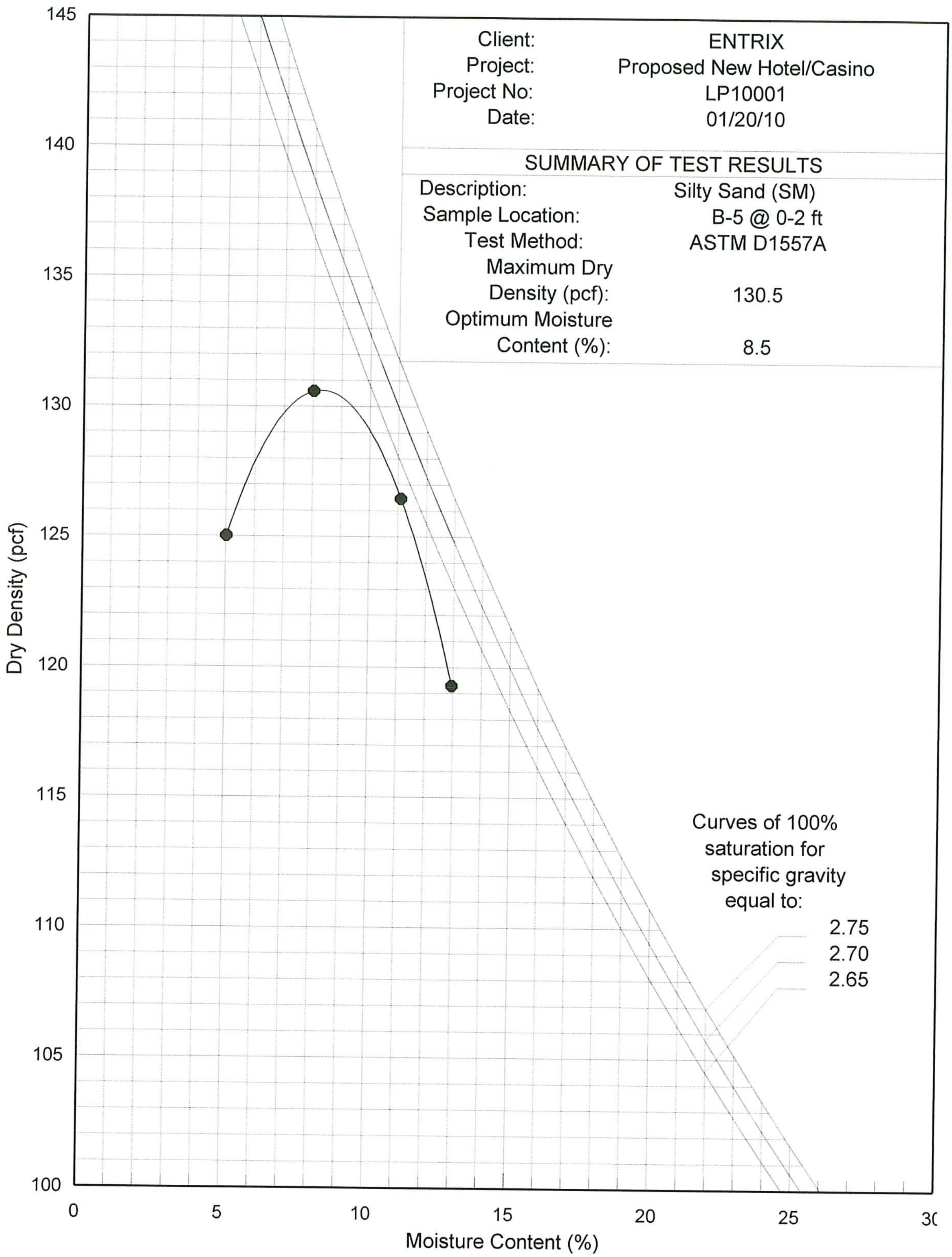
Results of Test:	Initial	Final
Dry Density, pcf:	112.3	117.4
Water Content, %:	8.5	15.4
Void Ratio, e:	0.473	0.409
Saturation, %:	47	100

LANDMARK
Geo-Engineers and Geologists

Project No: LP10001

Collapse Potential Test Results

Plate C-3

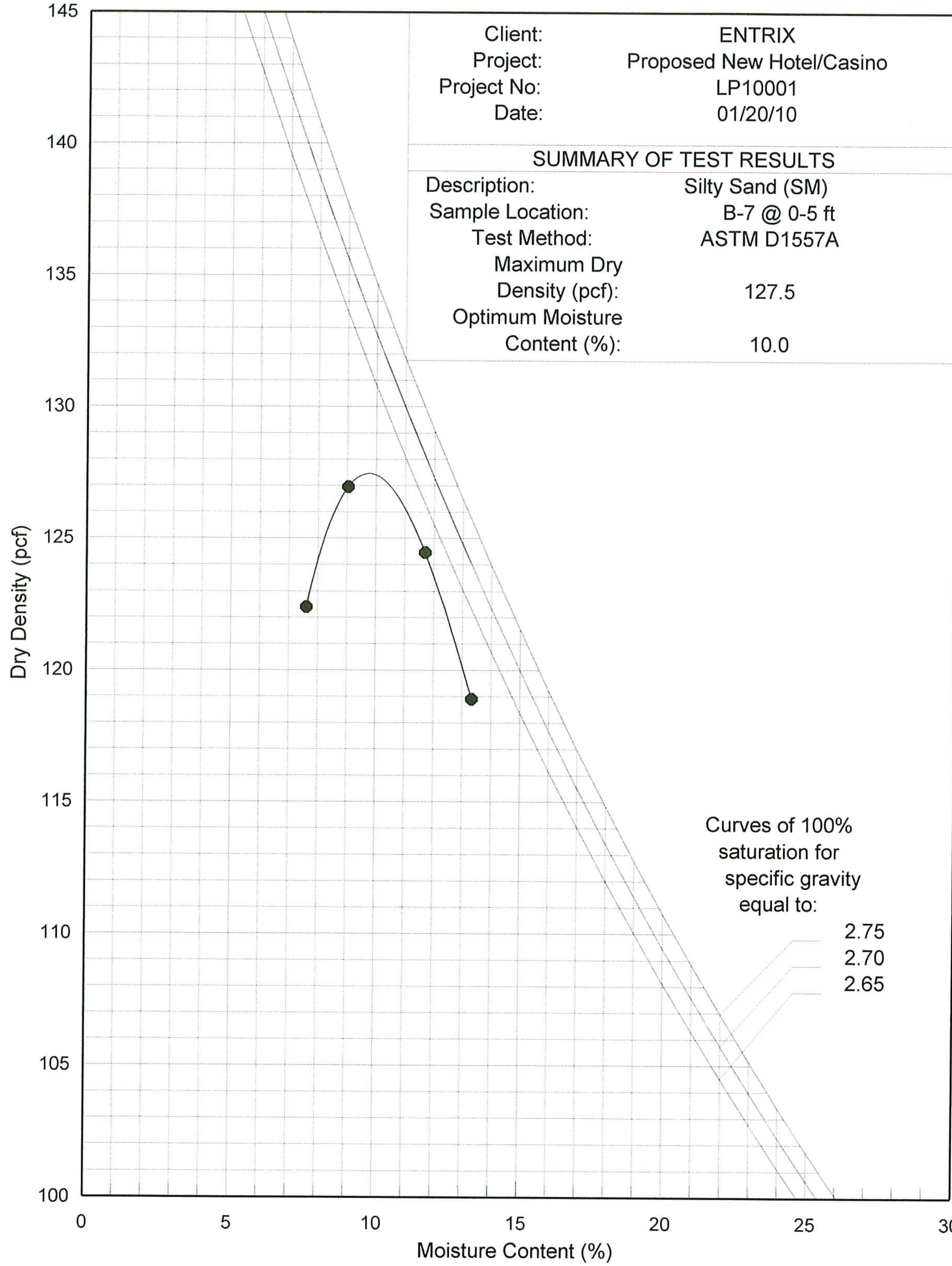


LANDMARK
Geo-Engineers and Geologists

Project No: LP10001

Moisture Density Relationship

Plate C-4



LANDMARK
Geo-Engineers and Geologists

Project No: LP10001

Moisture Density Relationship

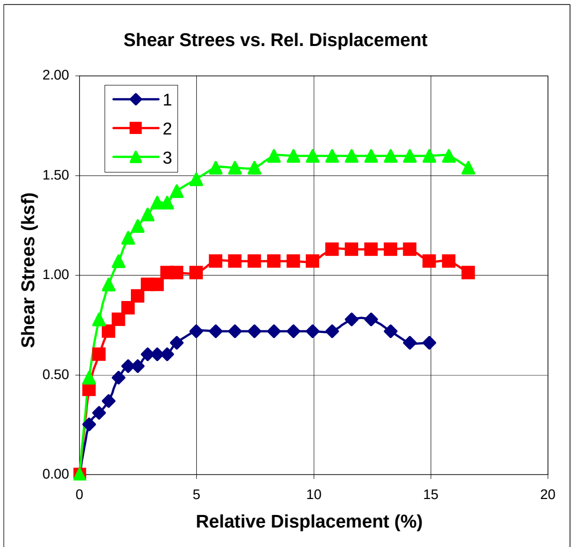
Plate C-5

LANDMARK CONSULTANTS, INC.

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
PROJECT No: LP10001 **DATE:** 2/3/2010

DIRECT SHEAR TEST - INSITU (ASTM D3080)

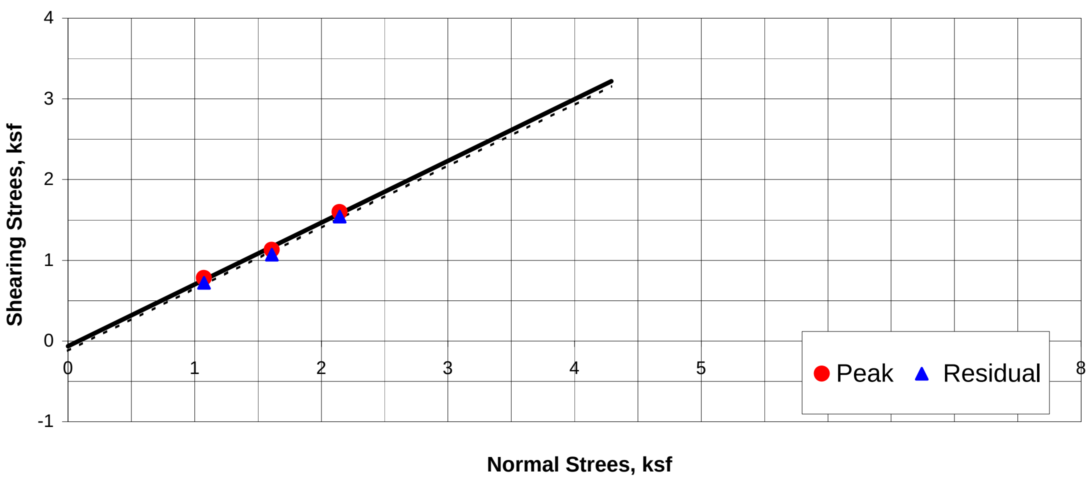
SAMPLE LOCATION: B-5 @ 0-2 ft
SAMPLE DESCRIPTION: Silty Sand (SM)



	Specimen:	1	2	3	Avg.
Initial	Moisture Content, %:	9.6	9.3	9.5	9.5
	Dry Density, pcf:	117.4	117.4	119.3	118.1
	Saturation, %:	62	60	65	
Final	Moisture Content, %:	18.0	18.2	17.8	
	Dry Density, pcf:	115.3	114.1	113.0	
	Saturation, %:	110	107	102	
	Normal Stress, ksf:	1.07	1.61	2.15	
	Peak Shear Stress, ksf:	0.78	1.13	1.60	
	Residual Shear Stress, ksf:	0.72	1.07	1.54	
	Deformation Rate, in./min.	0.01	0.01	0.01	

	Peak	Residual
Angle of Internal Friction, deg.:	37	37
Cohesion, ksf:	0.00	0.00

DIRECT SHEAR TEST RESULTS



LANDMARK
Geo-Engineers and Geologists
PROJECT No: LP10001

Direct Shear Test Results

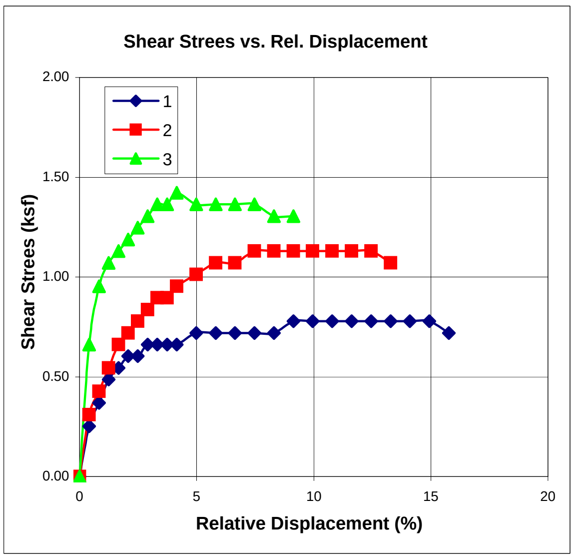
C-6

LANDMARK CONSULTANTS, INC.

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
PROJECT No: LP10001 **DATE:** 2/4/2010

DIRECT SHEAR TEST - INSITU (ASTM D3080)

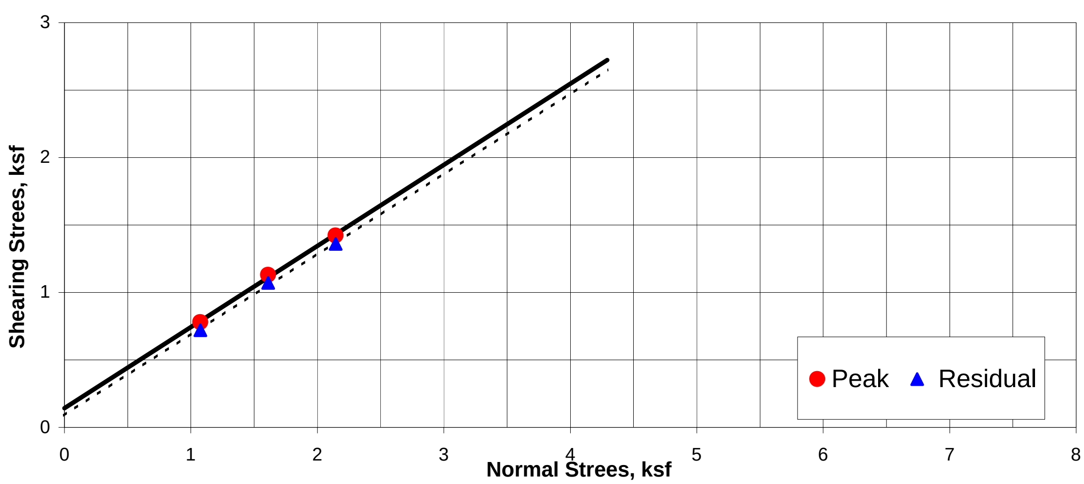
SAMPLE LOCATION: B-7 @ 0-5 ft
SAMPLE DESCRIPTION: Silty Sand (SM)



	Specimen:	1	2	3	Avg.
Initial	**Moisture Content, %:**	**10.2**	**10.0**	**10.2**	**10.1**
	Dry Density, pcf:	**110.3**	**112.7**	**113.5**	**112.2**
	Saturation, %:	54	57	59	
Final	**Moisture Content, %:**	24.2	22.8	21.8	
	Dry Density, pcf:	108.0	112.5	112.6	
	Saturation, %:	120	128	123	
	Normal Stress, ksf:	**1.07**	**1.61**	**2.15**	
	Peak Shear Stress, ksf:	**0.78**	**1.13**	**1.42**	
	Residual Shear Stress, ksf:	0.72	1.07	1.36	
	Deformation Rate, in./min.	0.01	0.01	0.01	

	Peak	Residual	
Angle of Internal Friction, deg.:	**31**	**31**	
Cohesion, ksf:	**0.14**	**0.09**	

DIRECT SHEAR TEST RESULTS



LANDMARK
Geo-Engineers and Geologists
PROJECT No: LP10001

Direct Shear
Test Results

C-7

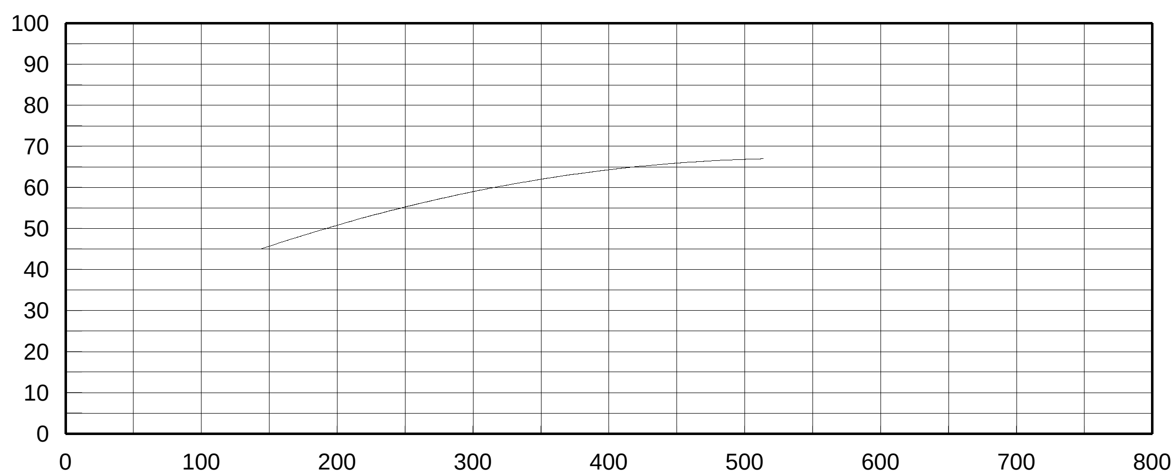
LANDMARK GEOTECHNICAL

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
JOB NO: LP10001
DATE: 01/27/10 **Lab No.:** **51**

R VALUE TEST (CAL TEST 301)

SAMPLE DESCRIPTION: Silty Sand (SM)
SAMPLE LOCATION: B-6 @ 0-5 ft

Specimen ID:	A	B	C
Moisture Content, %:	15.4%	14.8%	13.9%
Dry Density, pcf:	115.5	116.0	116.7
Compaction foot pressure, psi:	350	350	350
Specimen Height, in.:	2.51	2.50	2.50
Stabilometer, Ph @ 1000 lb:	22	20	15
Stabilometer, Ph @ 2000 lb:	42	27	21
Displacement:	5.18	4.52	4.17
Expansion pressure, psf:	13	31	70
Exudation pressure, psi:	144	316	517
Equilibrum R Value:	45	60	67
R Value at 300 psi:		**59**	



LANDMARK
Geo-Engineers and Geologists

Project No: **LP10001**

R Value
Test Results

Plate
C-8

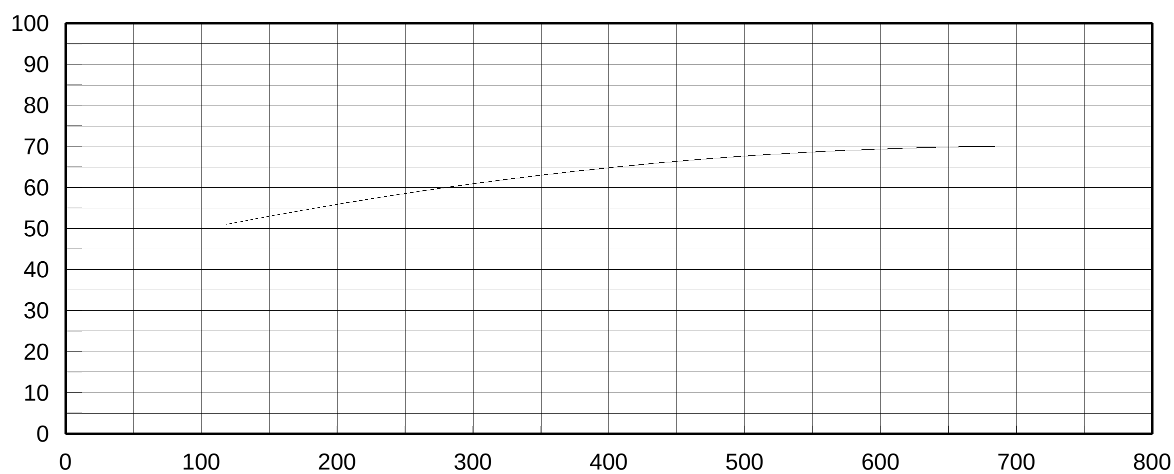
LANDMARK GEOTECHNICAL

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
JOB NO: LP10001
DATE: 01/28/10 **Lab No.:** **52**

R VALUE TEST (CAL TEST 301)

SAMPLE DESCRIPTION: Silty Sand (SM)
SAMPLE LOCATION: B-8 @ 0-2 ft

Specimen ID:	A	B	C
Moisture Content, %:	9.8%	9.3%	8.8%
Dry Density, pcf:	124.3	124.5	124.7
Compaction foot pressure, psi:	350	350	350
Specimen Height, in.:	2.47	2.50	2.50
Stabilometer, Ph @ 1000 lb:	30	23	20
Stabilometer, Ph @ 2000 lb:	52	38	33
Displacement:	5	4.78	4.1
Expansion pressure, psf:	0	0	0
Exudation pressure, psi:	118	351	689
Equilibrum R Value:	51	63	70
R Value at 300 psi:		**61**	



LANDMARK
Geo-Engineers and Geologists

Project No: **LP10001**

R Value
Test Results

Plate
C-9

LANDMARK CONSULTANTS, INC.

CLIENT: ENTRIX
PROJECT: Proposed New Hotel/Casino - San Jacinto, CA
JOB NO: LP10001
DATE: 02/04/10

CHEMICAL ANALYSES

Boring:	B-1	B-5	B-7	**CalTrans**
Sample Depth, ft:	0-5	0-2	0-5	**Method**
pH:	8.03	8.11	8.28	**643**
Resistivity (ohm-cm):	9,600	4,200	4,800	**643**
Chloride (Cl), ppm:	20	20	50	**422**
Sulfate (SO4), ppm:	116	158	176	**417**

General Guidelines for Soil Corrosivity

Material Affected	Chemical Agent	Amount in Soil (ppm)	Degree of Corrosivity
Concrete	Soluble	0 -1000	Low
	Sulfates	1000 - 2000	Moderate
		2000 - 20,000	Severe
		> 20,000	Very Severe
Normal	Soluble	0 - 200	Low
Grade	Chlorides	200 - 700	Moderate
Steel		700 - 1500	Severe
		> 1500	Very Severe
Normal	Resistivity	1-1000	Very Severe
Grade		1000-2000	Severe
Steel		2000-10,000	Moderate
		10,000+	Low

LANDMARK
Geo-Engineers and Geologists

Project No: **LP10001**

Selected Chemical Analyses Results

Plate C-10

APPENDIX D

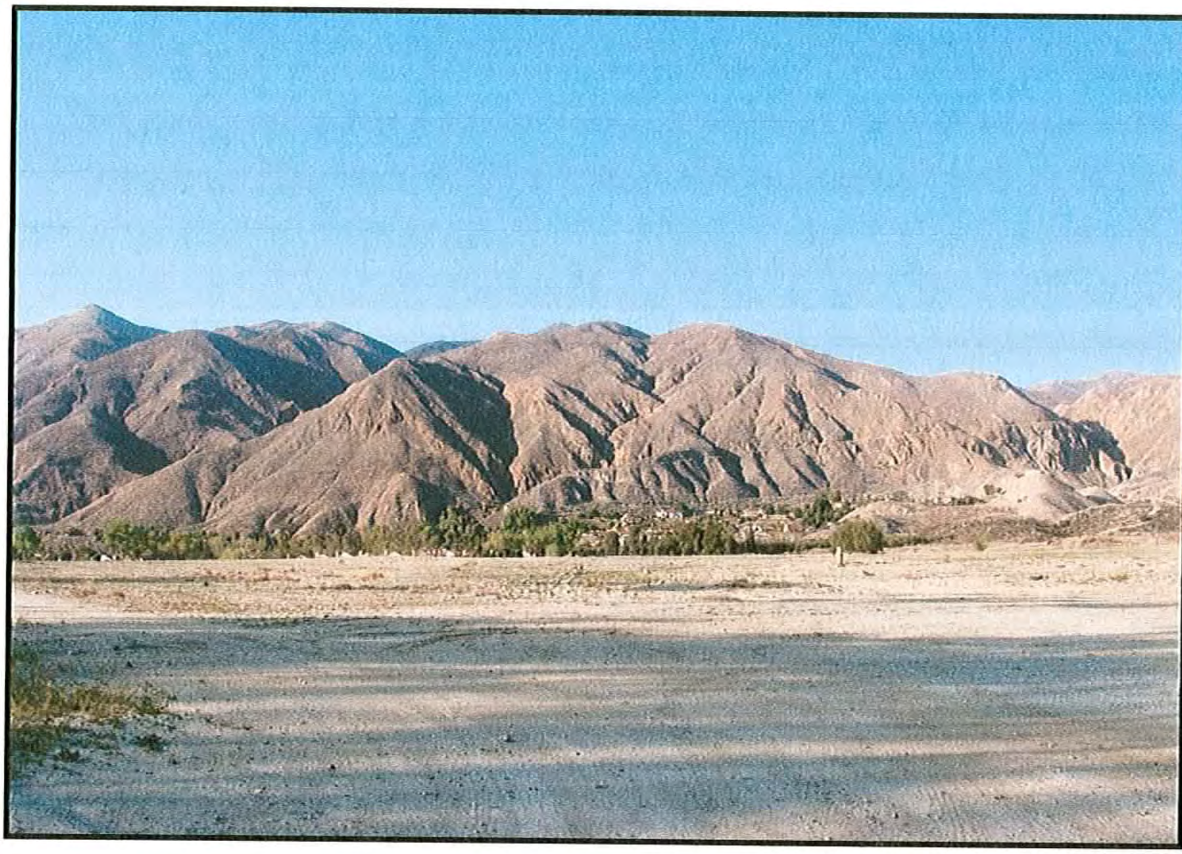
Geological Report

Proposed Hotel & Casino Fault Hazard Study

San Jacinto, California

Prepared for:

Soboba Band of Luiseño Indains
P.O. Box 487
San Jacinto, CA 92883



Prepared by:

LANDMARK
Geo-Engineers and Geologists

Landmark Consultants, Inc.
77-948 Wildcat Drive
Palm Desert, CA 92211
(760) 360-0665

June 2007

LANDMARK
Geo-Engineers and Geologists

780 N. 4th Street
El Centro, CA 92243
(760) 370-3000
(760) 337-8900 fax

77-948 Wildcat Drive
Palm Desert, CA 92211
(760) 360-0665
(760) 360-0521 fax

June 1, 2007

Mr. Al Cervantes
Soboba Band of Luiseño Indians
P. O. Box 487
San Jacinto, CA 92883

Preliminary Fault Hazard Evaluation
Proposed Hotel & Casino
Soboba Band of Luiseño Indians
San Jacinto, California
LCI Report No.: LP07070

Dear Mr. Cervantes:

Landmark Consultants, Inc. has completed a preliminary fault hazard evaluation for the vacant property located on the northwest and southwest corners of Lake Park Drive and Soboba Road in San Jacinto, California. The project site is proposed for future development of a new hotel and casino. The project site is located within the Alquist-Priolo (A-P) Earthquake Fault Zone which encompasses the San Jacinto Fault.

Introduction

The purpose of this preliminary investigation was to evaluate the potential hazard for fault related ground rupture within the project site located within the San Jacinto A-P Earthquake Fault Zone. The scope of the work included the following:

- Review of selected geologic maps and reports
- Review of selected aerial photographs
- Site reconnaissance
- Excavation and logging of a total of approximately 4,375 feet of exploratory trenches
- Geologic analysis of data collected
- Preparation of report detailing field exploration, findings, conclusions, and recommendations.

Site Description

The project site is situated on an alluvial fan complex, along the western foothill slopes of the San Jacinto Mountains. The site consists of two parcels, one located northwest of the intersection of Lake Park Drive and Soboba Road and the other parcel located southwest of the same intersection.

The northern parcel is irregularly shaped in plan view, elongated in the north-south direction, slopes gently down to the west, and consists of approximately 37 acres. The site is currently vacant land covered with very little, if any, vegetation. Several large soil and rock piles are located near the northeast corner of the site. The site appears to have been disced to remove weeds and brush. The site is surrounded to the north and west by the Soboba Springs Royal Vista Golf Course. Lake Park Drive and Soboba Road are located to the south and east, respectively.

The southern parcel is U-shaped in plan view, is relatively flat-lying with some gentle slopes, and consists of approximately 72 acres of vacant land. Lake Park Drive and Soboba Road, located to the north and east, respectively, are both elevated above the site approximately 20 to 50 feet. An earthen levee, approximately 50 feet high, separates the site from the San Jacinto River channel to the west. Previous site development, located near the northeast corner, consisted of building pad preparation and street construction. The development was abandoned in 2005.

Regional Geology

The site is located in the San Jacinto Valley which is incorporated within the Perris Plain of southern California. The Perris Plain is a major topographic feature between the San Jacinto (northeast) and Elsinore (southwest) fault zones. The plain is an undulating surface eroded on primarily plutonic igneous rocks and lies 7,000 feet below the summits of the San Jacinto Mountains. The San Jacinto Mountains are located to the northeast and are part of the Peninsular Ranges. Figure 1 shows the location of the site in relation to regional faults and physiographic features.

The Peninsular Ranges are a northwest-southeast orientated complex of blocks separated by similarly trending faults. They extend 125 miles (200 km) from the Transverse Ranges and the Los Angeles Basin south to the Mexican border and beyond another 775 miles (1,250 km) to the tip of Baja California, Mexico. Faults dominate the structure of the Peninsular Ranges. Major faults are the San Jacinto Fault and related branches within the San Jacinto Fault Zone. The Peninsular Ranges contain extensive pre-Cretaceous igneous rocks associated with the Nevadan plutonism. Recent evidence of tectonic activity includes epicenter swarms, earthquakes (San Jacinto 1918 and Borrego Valley 1968), and alignment of hot springs (Norris & Webb, 1976). The surrounding geology includes the foothills of the San Jacinto Mountains to the north, east and south and the San Jacinto Fault Zone and river floodplain are to the west.

Local Geology

The project site is located on an alluvial fan complex extending westward from the San Jacinto Mountains towards the San Jacinto river floodplain. The geologic units observed at the project site consist of recent Quaternary Alluvial deposits (Qal).

Quaternary (Younger) Alluvial Deposits (Qal): The recent alluvial and fluvial deposits consist of nonbedded granitic cobble, pebbles sand, silts and clays. These sediments were derived from alluvial fan and river deposition from the San Jacinto Mountains and the San Jacinto River to the east and west, respectively.

Fault Hazards

The primary seismic hazard to the project site is the San Jacinto Fault, which consists of a northwest-southeast trending fault located through the center of the northern portion of the site and along the eastern margin of the southern portion of the site as shown on the A-P Earthquake Fault Zone map (Plate A-5).

The characteristic earthquake is estimated to be a magnitude M_w 6.5 to 7.5 for the San Jacinto area. The San Jacinto Fault is an extensive fault system composed of multiple segments, traveling approximately 210 km in length. The interval between seismic events is between 100 to 300 years and the fault is estimated to have a slip rate of about 7 mm to 17 mm per year (SCEC, 2004). The fault zone is composed of several fault strands within the San Jacinto Valley area.

The San Jacinto Valley is a partially filled, northwest-southeast trending graben bounded on the northeast along the San Jacinto Mountains by the Claremont Fault and on the southwest by the Casa Loma Fault (Kahle, 1987). The Claremont Fault is a major strand of the San Jacinto Fault Zone and has a major strike-slip displacement (measured in miles) to the northeast, but it also has an important dip-slip component, down to the southwest a maximum of 8,000 feet or more (CDMG, 1979).

The last known rupture of the San Jacinto Fault within the San Jacinto area was on December 25, 1899 and April 21, 1918, producing earthquakes of magnitude 6.5M_w and 6.8 M_w, resulting in landslides, surface rupture, sand craters and "sinks" (SCEC, 2004).

We have used the computer program FRISKSP (Blake, 2000) to provide a probabilistic estimate of the site PGA using the attenuation relationship of Boore, Joyner, and Fumal (1997) Soil (310). The PGA estimate for the project site having a 10% probability of occurrence in 50 years (return period of 475 years) is **0.88g**.

Review of Aerial Photographs

Stereoscopic aerial photographs dated 1962, 1974, 1980, 1990, 2000 and 2005 were reviewed as part of this investigation. A faint lineament was noted in the 1962, 1974 and 1980 aerial photographs (Plate A-7 through A-9) that likely corresponds to the delineated trace of the San Jacinto Fault to the south of the project site. A vegetation lineation corresponding to the location of the fault was noted near the center portion of the project site in the 1962 aerial photograph. The 1974 aerial photograph appears to have an active alluvial fan in the northern portion of the project site. Fault trenches can be seen in the 1980 aerial photograph from the 1979 fault study by GeoSoils, Inc.

Review of Previous Fault Investigations

Landmark reviewed two fault investigation reports which were previously conducted at the project site. Envicom conducted a fault investigation in 1974 and an update in 1976 at the project site and GeoSoils, Inc. conducted a fault investigation in 1979. Both fault investigations found numerous fault traces of the San Jacinto Fault on the portion of the project site north of Lake Park Drive. Minor fault traces were encountered south of Lake Park Drive during the previous investigations predominantly within approximately 100 feet of Soboba Road.

Envicom conducted six (6) exploration trenches within the project site ranging in length from 90 to 1,095 linear feet. Envicom encountered a 60-foot wide zone they interpreted to represent the main trace of the San Jacinto Fault in two trenches. A zone of numerous joints or small faults were noted extending approximately 160 feet east of the main fault zone.

GeoSoils, Inc. conducted twelve (12) exploration trenches within the project site ranging in length from 50 to 900 linear feet. Fault traces were mapped in one trench (T-3) extending a distance of approximately 345 feet along the trench. These fault traces appear to represent two separate splays of the San Jacinto Fault.

It is interesting to note that several fault traces encountered by Envicom during their investigation were not noted by GeoSoils in nearby trenches and that GeoSoils encountered fault traces not noted by Envicom.

Field Exploration

The field exploration was conducted on March 19, 2007 through April 12, 2007 using a backhoe subcontracted by the client, to excavate nine (9) trenches to an approximate depth of eight to fifteen (8 to 15) feet below the ground surface (Plate A-2). The trenches were located within the A-P Earthquake Fault Zone encompassing the mapped trace of the San Jacinto Fault. Subsurface soils within the trenches consisted mainly of interbedded sands, silts and clays. The soils were consolidated near the surface and were generally massive with very little bedding features readily visible. The logs prepared during the mapping of the fault trenches are provided in Appendix B.

Trench 1 was initiated approximately 522 feet west of Trench 2 and 32 feet south of the north boundary. The trench was approximately 265 feet in length and orientated in a northeast-southwest direction (N36E). No fault traces were encountered in this trench.

Trench 2 was initiated approximately 164 feet west of Soboba Road and 26 feet south of the north boundary. The trench was approximately 1,000 feet in length and orientated in a northeast-southwest direction (N33E) perpendicular to the mapped trace of the San Jacinto Fault. One fault trace was located within the trench at Sta. 1+99 from the eastern end of the trench. The trace was marked by sand and clay lenses along the rupture zone on both the north and south walls of the trench. A ½ inch offset of a sandy silt layer with down side to the east was noted on the north sidewall and a 5 inch horizontal displacement of sand layers was noted on the trench floor.

One possible fault trace was located within the trench at Sta. 2+32 from the eastern end of the trench. No offset was noted.

Trench 3 was initiated approximately 34 feet west of Soboba Road and 583 feet north of Lake Park Drive. The trench was approximately 655 feet in length and orientated in a northeast-southwest direction (N40E) perpendicular to the mapped trace of the San Jacinto Fault. One fault trace was located Sta. 1+83 from the eastern end of the trench. The trace was marked by gravelly sand lenses along the rupture zone on both the north and south walls of the trench. A 5 inch offset of a sand layer with down side to the east was noted on the south sidewall. No fault traces were noted in the trench in the general location of the mapped trace of the San Jacinto Fault.

Trench 4 was initiated approximately 49 feet west of Soboba Road and 206 feet north of the Lake Park Drive. The trench was approximately 610 feet in length and orientated in a northeast-southwest direction (N37E). Three fault traces were located at Sta. 0+44, Sta. 0+51 and Sta. 0+70 from the eastern end of the trench. The traces were marked by 5 to 8 inch offset of sandy silt, silty sand and sand layers on both the north and south sidewalls.

Trench 5 was initiated approximately 107 feet west of Soboba Road and 134 feet south of Lake Park Drive. The trench was approximately 490 feet in length and orientated in a northeast-southwest direction (N40E). Two fault traces were located at Sta. 0+31 and Sta. 0+33 from the eastern end of the trench. The traces were marked by sand lenses along the rupture zone on both the north and south walls of the trench. A 5 inch offset of a sand layer with down side to the east was noted on the north sidewall.

Trench 6 was initiated approximately 81 feet west of Soboba Road and 715 feet south of Lake Park Drive. The trench was approximately 385 feet in length and orientated in a northeast-southwest direction (N55E). No fault traces were encountered in this trench. Trench 6 was located in an area that previously had a water storage pond. The soils encountered in the trench are predominantly silty clays.

Trench 7 was initiated approximately 53 feet west of Soboba Road and 1,197 feet south of Lake Park Drive. The trench was approximately 200 feet in length and orientated in a northeast-southwest direction (N50E). One fault trace was located at Sta. 0+99 feet from the eastern end of the trench. An upthrusted fault block resulting in 4 to 6 inches of offset was noted on the south sidewall.

Trench 8 was initiated approximately 47 feet west of Soboba Road and 444 feet north of the southern property boundary. The trench was approximately 430 feet in length and orientated in a northeast-southwest direction (N48E). No fault traces were encountered in this trench.

Trench 9 was initiated approximately 44 feet west of Soboba Road and 102 feet north of the south boundary. The trench was approximately 340 feet in length and orientated in a northeast-southwest direction (N50E). No fault traces were encountered in this trench.

Trench 1, 2 and 3 were terminated to the west due to underground water and sewer lines. Trenches 3 through 9 were terminated to the east due to steep terrain located along Soboba Road.

Findings and Conclusions

- The project site is located within the A-P Earthquake Fault Zone for the San Jacinto Fault. The mapped trace of the San Jacinto Fault parallels Saboba Road south of Lake Park Drive then crosses the northern portion of the project site from the intersection of Soboba Road and Lake Park Drive northwesterly to the northwest corner of the site.

- Fault traces were encountered in Trenches 2 through 5 and 7 excavated during our investigation at the project site. The fault traces within Trench 2 strike approximately N5W and dip 83 degrees east. The fault traces within Trench 3 strike approximately N-S and dip 84 degrees west. The fault traces within Trench 4 strike approximately between N30W and N45W and dip vertically. The fault traces within Trench 5 strike approximately N20W and dip vertically. The fault traces within Trench 7 strike approximately N50W and dip between 81 degrees west and 81 degrees east. Variations of the strike and dip of the mapped fault traces are a result of the discontinuous nature of the San Jacinto Fault in this area.

- Fault investigations have previously been conducted at the project site by Evicom (1974) and GeoSoils, Inc. (1979). Fault traces were encountered in trenches during both investigations. Review of the previous reports indicate that some fault traces encountered by Envicom during their investigation were not noted by GeoSoils in nearby trenches and GeoSoils encountered fault traces not noted by Envicom. Landmark made similar observations for fault trace locations.

- Based on the review of the previous fault investigations and this investigation, there appears to be two main fault splays in the northern portion of the project (north of Lake Park Drive). One fault splay crosses the northern portion of the project site from the southeast corner to the northwest corner (main fault trace of the San Jacinto Fault). The second splay is located east of the main trace (roughly parallel to Soboba Road) and corresponds to the small fault trace shown on the A-P Fault Map (Plate A-5).

- The San Jacinto Fault is approximately located along the alignment of Soboba Road south of Lake Park Drive. Several fault splays were mapped by Landmark, Envicom, and GeoSoils in the southern portion of the site. The mapped fault splays are located within approximately 150 feet of Soboba Road.

- Strong to moderate ground shaking is expected to occur at the project site during an earthquake on the San Jacinto Fault. Peak ground accelerations of approximately 0.88g may be expected at the site during a strong seismic event on the San Jacinto Fault.

- The potential for fault related ground rupture during the lifetime of the planned development is considered high along the trace of the San Jacinto Fault. ***In order to incorporate potential undocumented fault splays as specified by Section 3603 of the California Code of Regulations Title 24, Division 2, the minimum setback for the project site is 50 feet from the mapped outer fault traces is recommended for human occupancy structures. We suggest that structures for human occupancy be placed outside of the recommended setback zone of 50 feet.***

- A qualified geologist should inspect any excavations (foundation, utility, etc.) on the project site during construction for possible indications of faulting. If unanticipated faulting were encountered in these excavations, further relocation of the site structures may be necessary to maintain the recommended setback from active faults.

Closure

We have based our findings and conclusions in this report on selected points of field exploration, review of geologic literature, site reconnaissance, and our understanding of the proposed project. Our analysis of data and recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil conditions can exist between and beyond the exploration points. The nature and extent of these variations may not become evident until construction. If detected, these variations in soil conditions may require additional studies, consultation, and possible design revisions.

This report was prepared according to the generally accepted *geological standards of practice* that existed in Riverside County at the time the report was prepared. No express or implied warranties are made in connection with our services.

The client has responsibility to see that all parties to the project including project designers and engineers are made aware of this entire report. It is understood that the client or his representative is responsible for submittal of this report to the appropriate governing agencies.

If you should have any questions or comments, please feel free to contact our office at (760) 360-0665.

Respectfully,
Landmark Consultants, Inc.

PROFESSIONAL GEOLOGIST
STEVEN K. WILLIAMS
CERTIFIED ENGINEERING GEOLOGIST
CEG 2261
STATE OF CALIFORNIA

Steven K. Williams, PG, CEG
Senior Engineering Geologist

REGISTERED PROFESSIONAL ENGINEER
GREG M. CHANDRA
No. C 34432
EXPIRES 09-30-07
CIVIL
STATE OF CALIFORNIA

Greg M. Chandra, PE
Principal Engineer

Kelly T. Nordmeyer
Staff Geologist

REFERENCES

Blake, T.F, 2000, FRISKSP - A computer program for the probabilistic estimation of seismic hazard using faults as earthquake sources.

California Division of Mines and Geology (CDMG), 1979 Fault Evaluation Report FER-85 for the San Jacinto and Hemet area: January 23, 1979.

California Division of Mines and Geology (CDMG), 1979 Fault Evaluation Report FER-85, Supplement No. 1, for the San Jacinto and Hemet area: February 21, 1979.

California Division of Mines and Geology (CDMG), 2000, San Jacinto, CA 7.5 min. Quadrangles A-P Earthquake Fault Zone Maps, scale 1:24,000.

DeLorme, 3-D Topographic Quadrangles, California South, 1999, San Jacinto (1:25,000).

Envicom, 1976, Preliminary Geologic Report, Proposed Mobile Home Park, Soboba Springs, California: October 21, 1976.

GeoSoils, Inc., 1979, Geologic/Seismic Study – Parcels B through E, J, and Mobile Home Park, Soboba Springs, California, May 9, 1979.

Kahle, James E., 1987, The San Jacinto Fault Zone (The Claremont, Casa Loma and Related Faults) in the: Lakeview and El Casco Quadrangles, Riverside County, California, California Division of Mines and Geology Fault Evaluation Report FER-179.

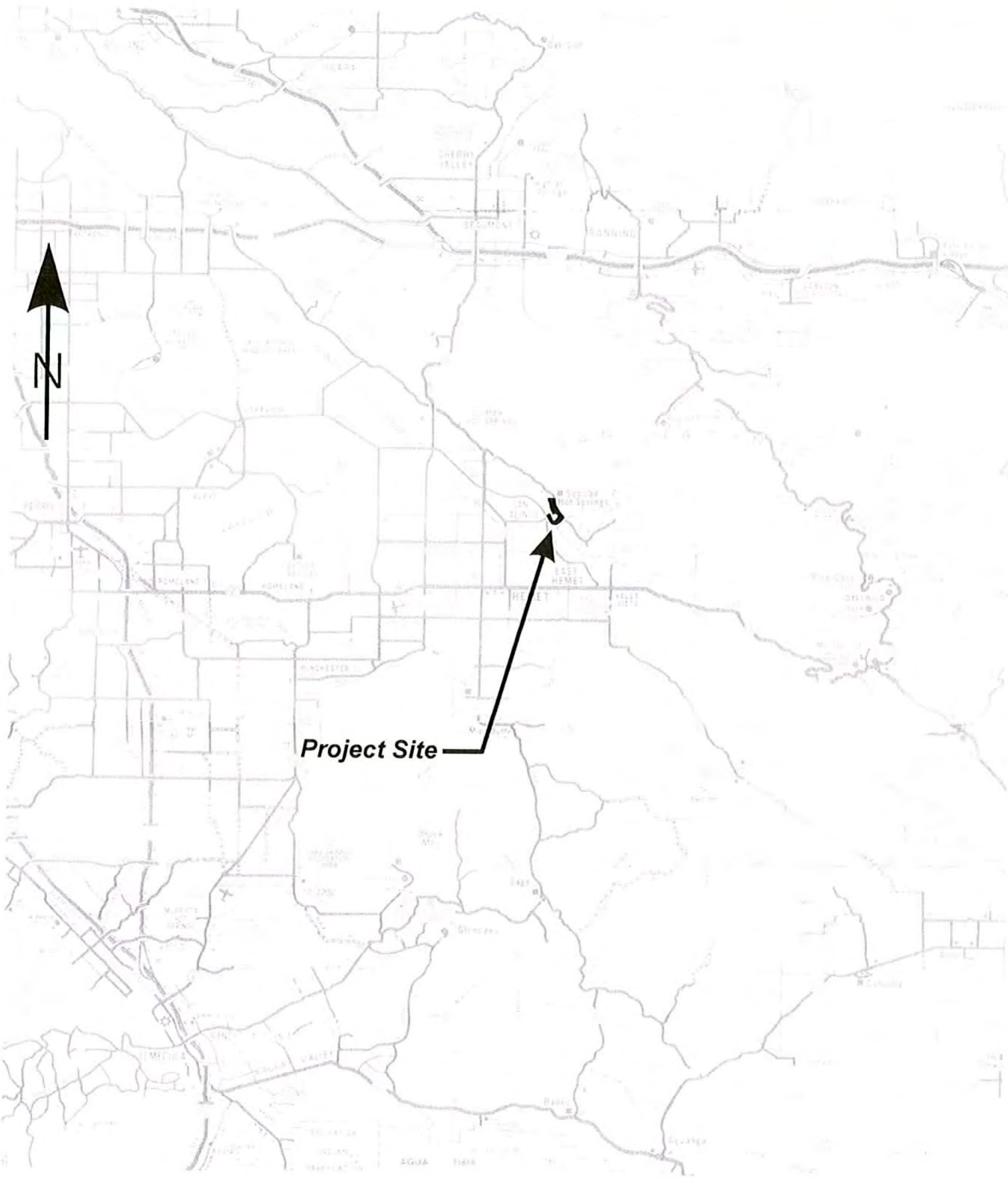
Norris M. Robert and Robert W. Webb, 1976 Geology of California: University of California, Santa Barbara.

Rogers, Thomas. H., 1965, Geologic Map of the Santa Ana Quadrangle, scale 1:250,000.

Santa Ana Regional Water Quality Control District (Region 8), aerial photographs 1962, 1974, 1980, 1990, 2000 and 2005, black and white, vertical, stereoscopic (San Jacinto Valley).

Southern California Earthquake Center (SCEC), 2004, San Jacinto Fault, http://www.data.scec.org/fault_index/sanjacin.html.

APPENDIX A

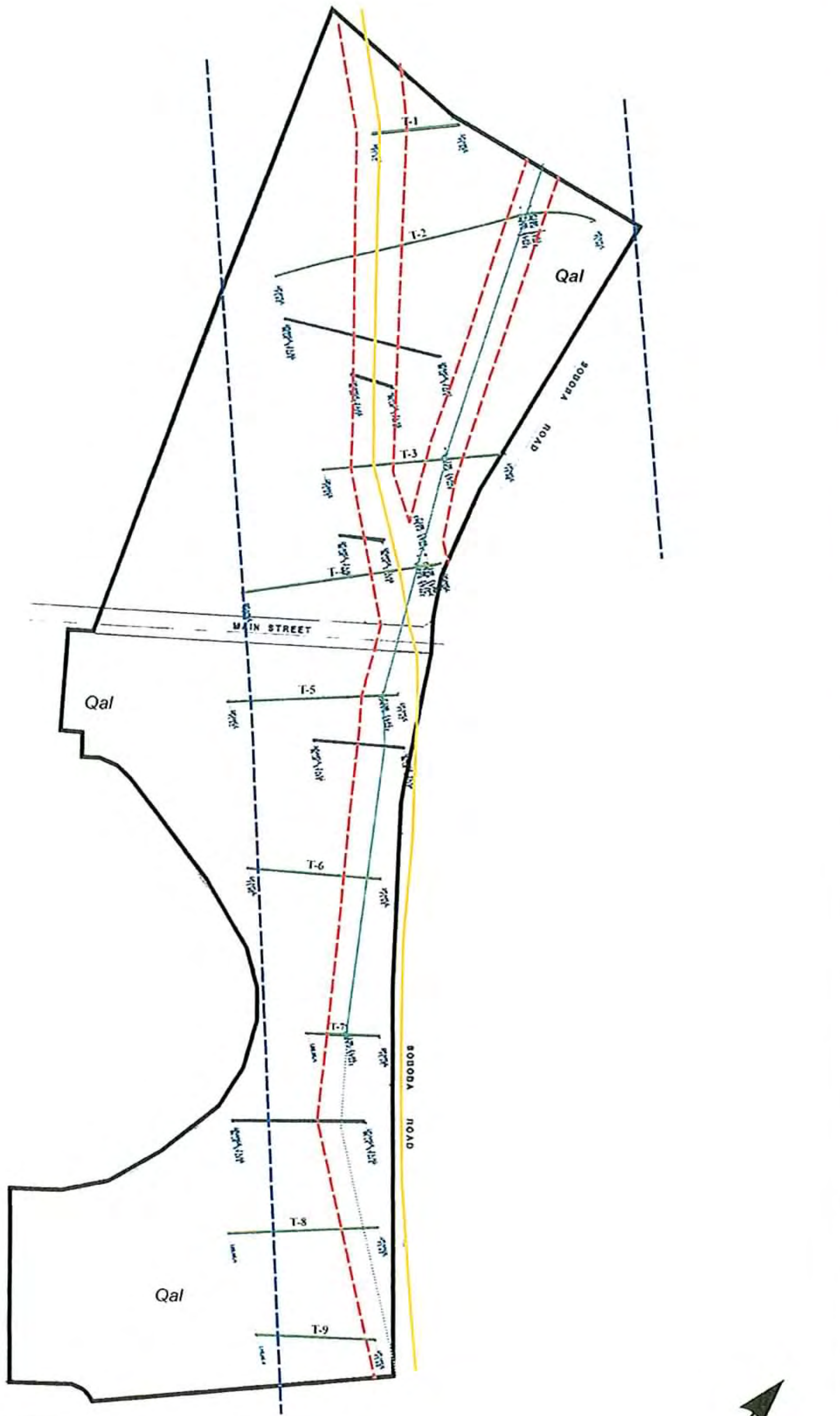


LandMark
Geo-Engineers and Geologists

Project No.: LP07070

Vicinity Map

Plate A-1

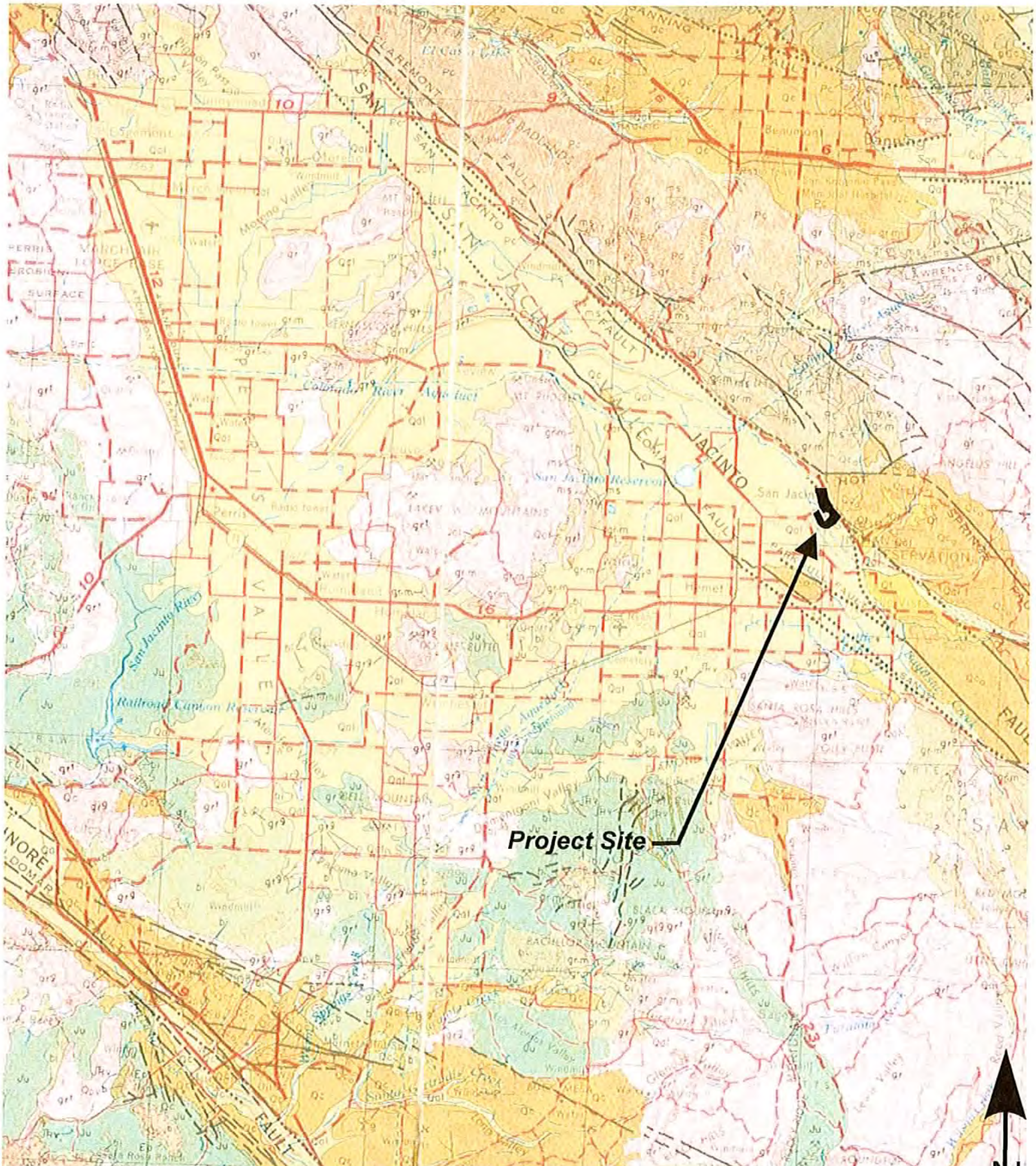


LEGEND

- *Qal – Younger Quaternary alluvium*
- *– Trench Locations (Landmark, 2007)*
- *– Trench Locations (Envicom, 1976)*
- *– Project site boundary*
- *– A-P Earthquake Fault Zone Limits*
- *– Fault setback (50 ft. Minimum)*
- *– Fault Trace (dashed where inferred; dotted where approximated)*
- *– A-P Fault trace (dashed where inferred; dotted where approximated)*

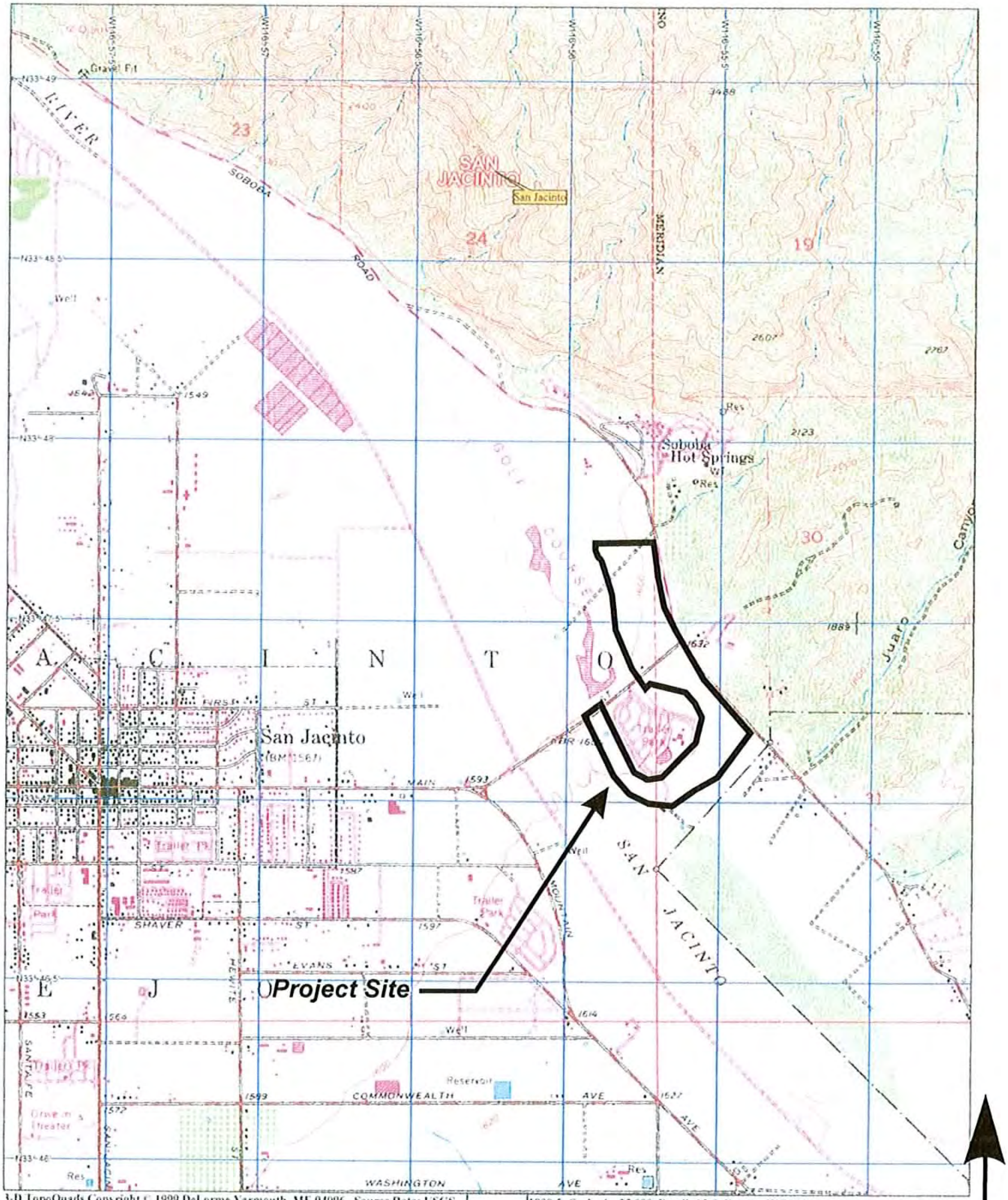
Reference: Goodman & Associates Site Map

LANDMARK Geo-Engineers and Geologists Project No.: LP07070	Site Map	Plate A-2



Geology Map of California - Santa Ana Sheet (1:250,000)

LANDMARK Geo-Engineers and Geologists Project No.: LP07070	Regional Geology Map	Plate A-3

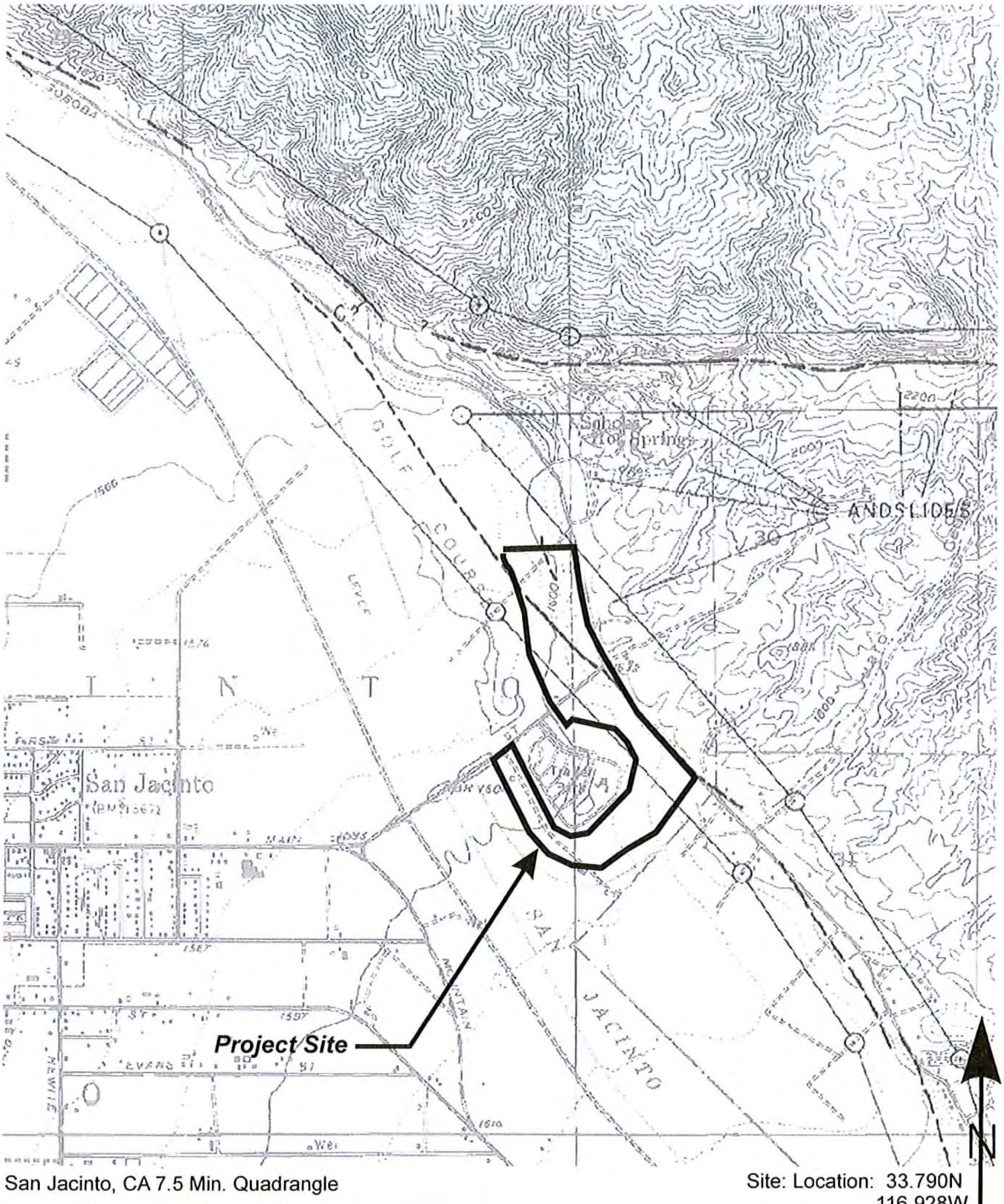


3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 1000 ft Scale: 1 : 25,000 Detail: 13-0 Datum: WGS84

Reference: USGS Topographic Map
San Jacinto, CA Quadrangle
Scale 1:25,000

Site Coordinates
Lat: 33.790N
Long: 116.928W

LANDMARK Geo-Engineers and Geologists Project No.: LP07070	Topographic Map	Plate A-4



San Jacinto, CA 7.5 Min. Quadrangle

0 ½ Mile

Site: Location: 33.790N
116.928W

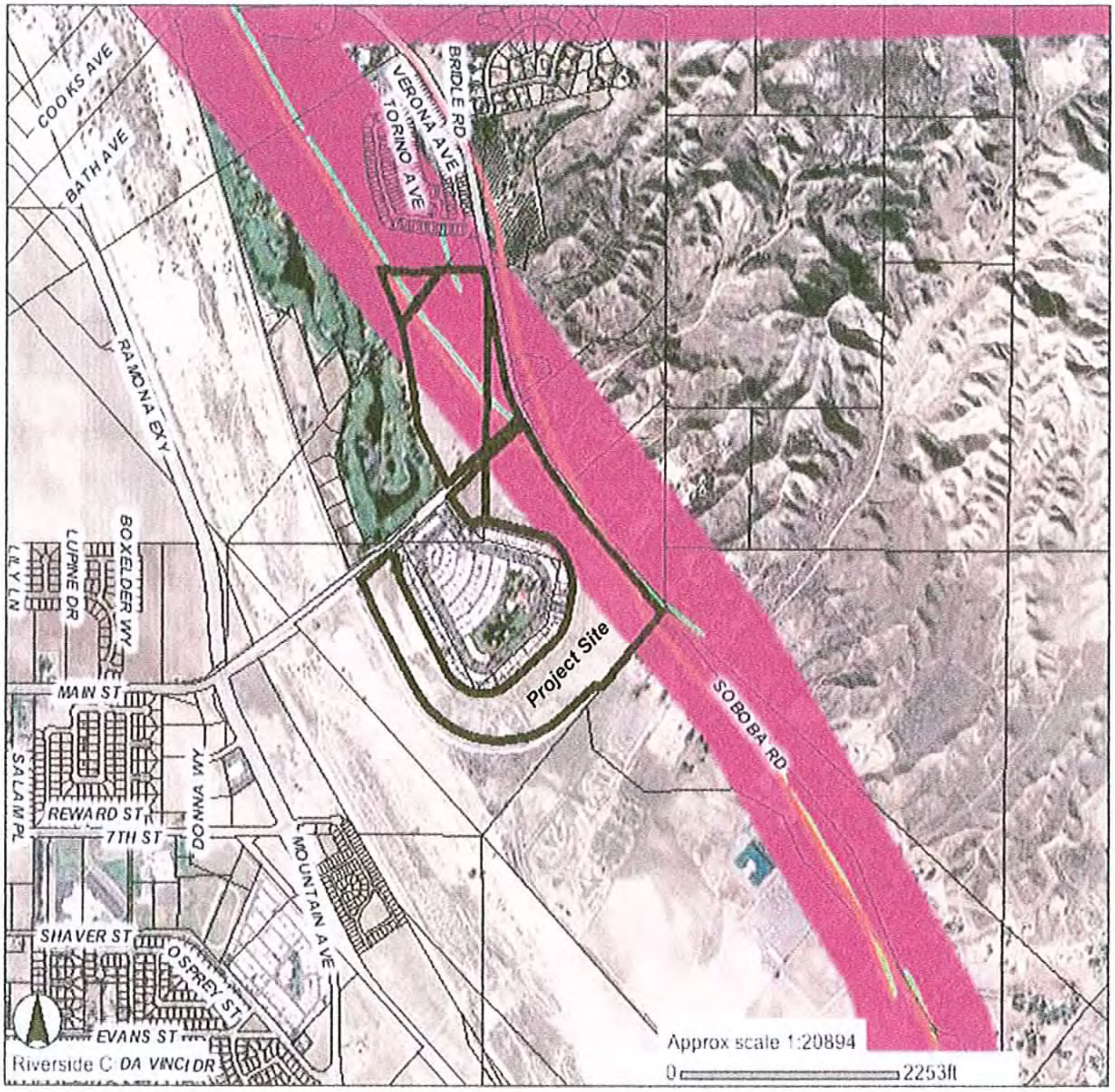
LANDMARK
Geo-Engineers and Geologists

Project No.: LP07070

A-P Earthquake Fault Zone Map

Plate A-5

RIVERSIDE COUNTY GIS



Selected parcel(s):
433-120-023 433-140-001 433-140-020 433-140-026 433-140-030

FAULT ZONES

SELECTED PARCEL
NOT IN A FAULT ZONE
CIRCULATION ELEMENT ULTIMATE RIGHT-OF-WAY (APPROX)
ALQUIST-PRIOLO
RIVERSIDE COUNTY
SAN JACINTO FAULT ZONE

N

IMPORTANT
This information is made available through the Riverside County Geographic Information System. The information is for reference purposes only. It is intended to be used as base level information only and is not intended to replace any recorded documents or other public records. Contact appropriate County Department or Agency if necessary. Reference to recorded documents and public records may be necessary and is advisable.

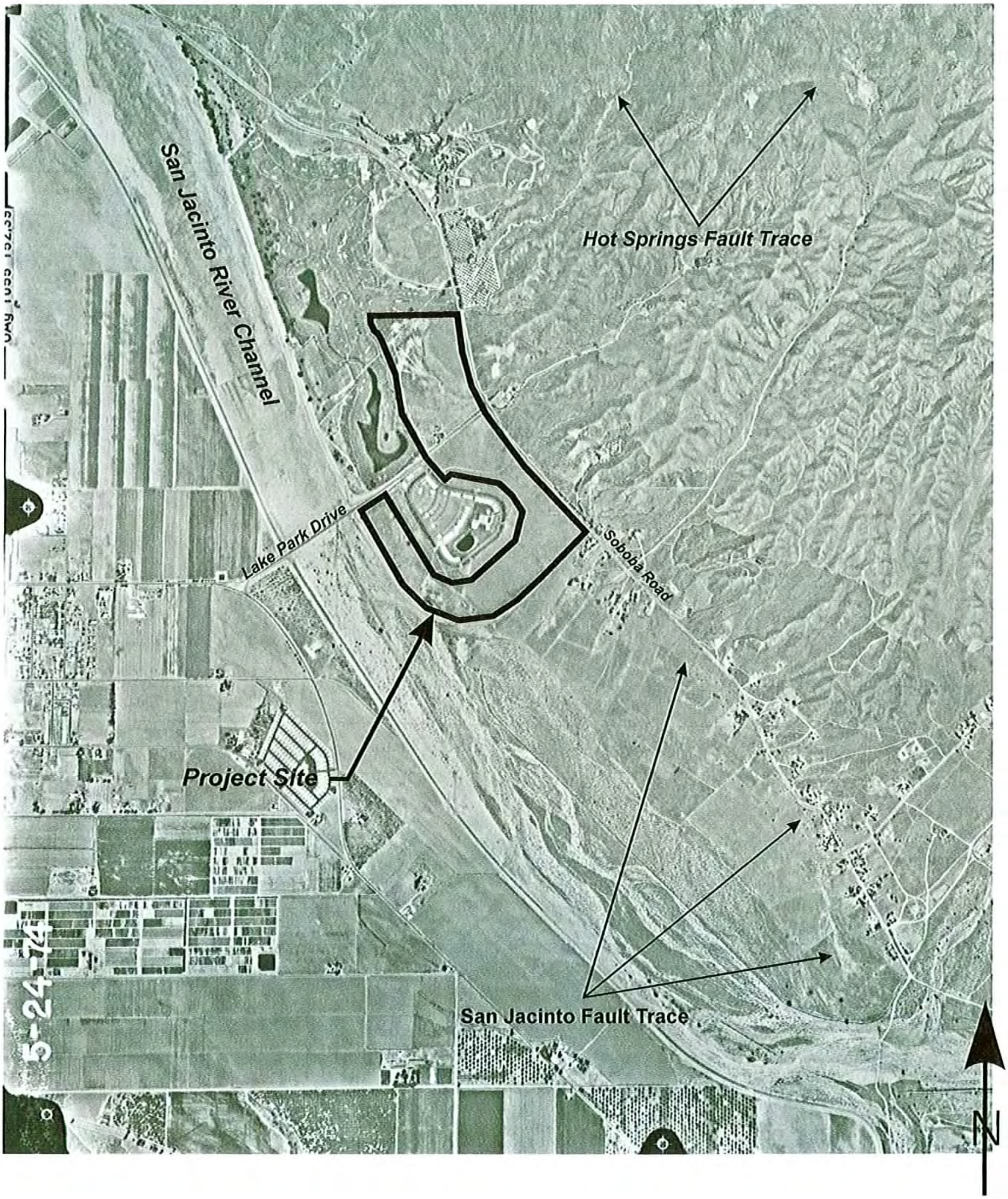
LANDMARK Geo-Engineers and Geologists Project No.: LP07070	**Riverside County Geographic Information System (GIS) Fault Zones**	**Plate A-6**

LANDMARK
Geo-Engineers and Geologists

Project No.: LP07070

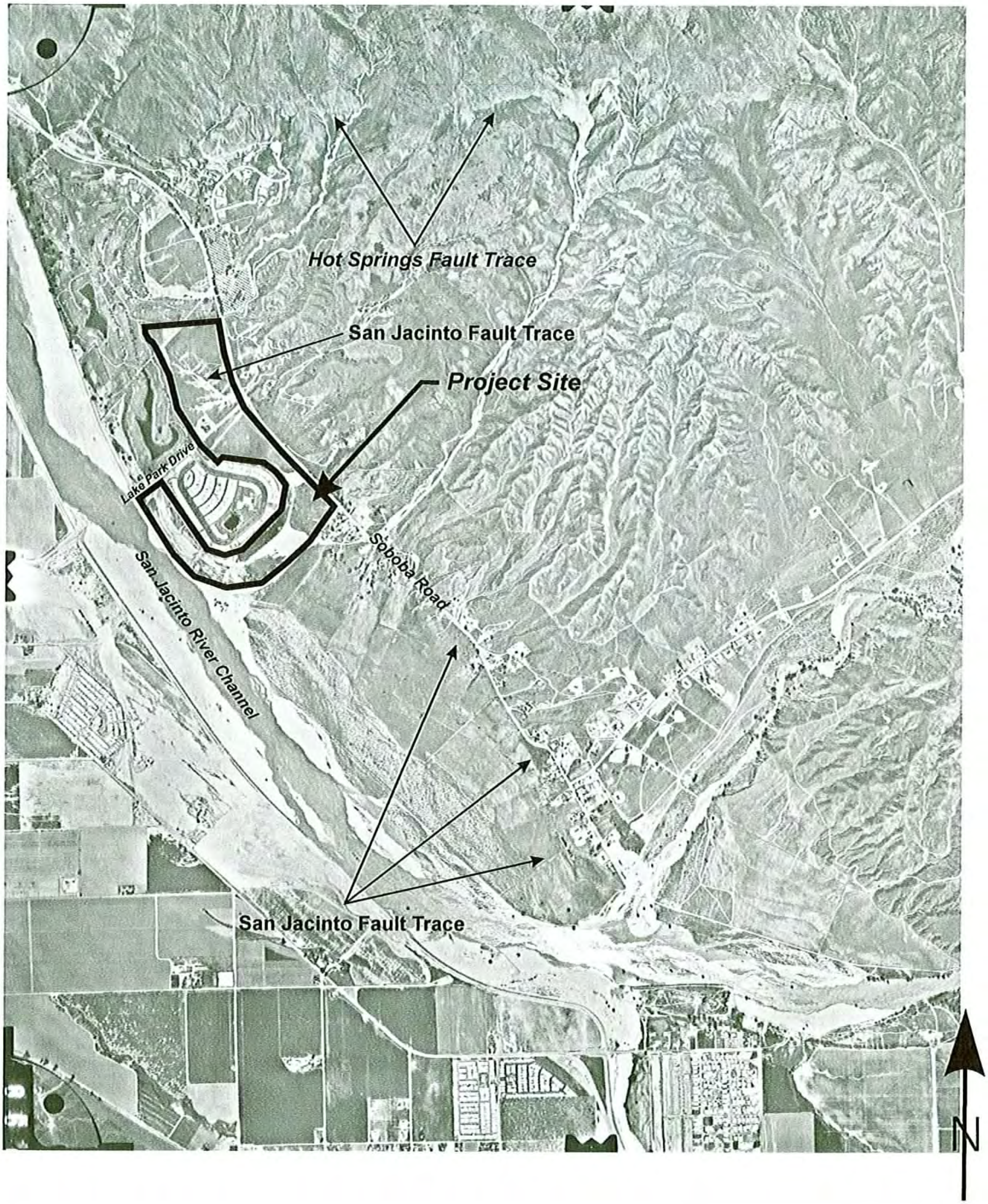
1962 Aerial Photograph

Plate
A-7



LANDMARK
Geo-Engineers and Geologists

Project No.: LP07070	1974 Aerial Photograph	Plate A-8



LANDMARK
Geo-Engineers and Geologists

Project No.: LP07070

1980 Aerial Photograph

Plate
A-9

LANDMARK
Geo-Engineers and Geologists

Project No.: LP07070

1990 Aerial Photograph

Plate A-10

LANDMARK
Geo-Engineers and Geologists

Project No.: LP07070

2000 Aerial Photograph

Plate
A-11

LANDMARK
Geo-Engineers and Geologists

Project No.: LP07070

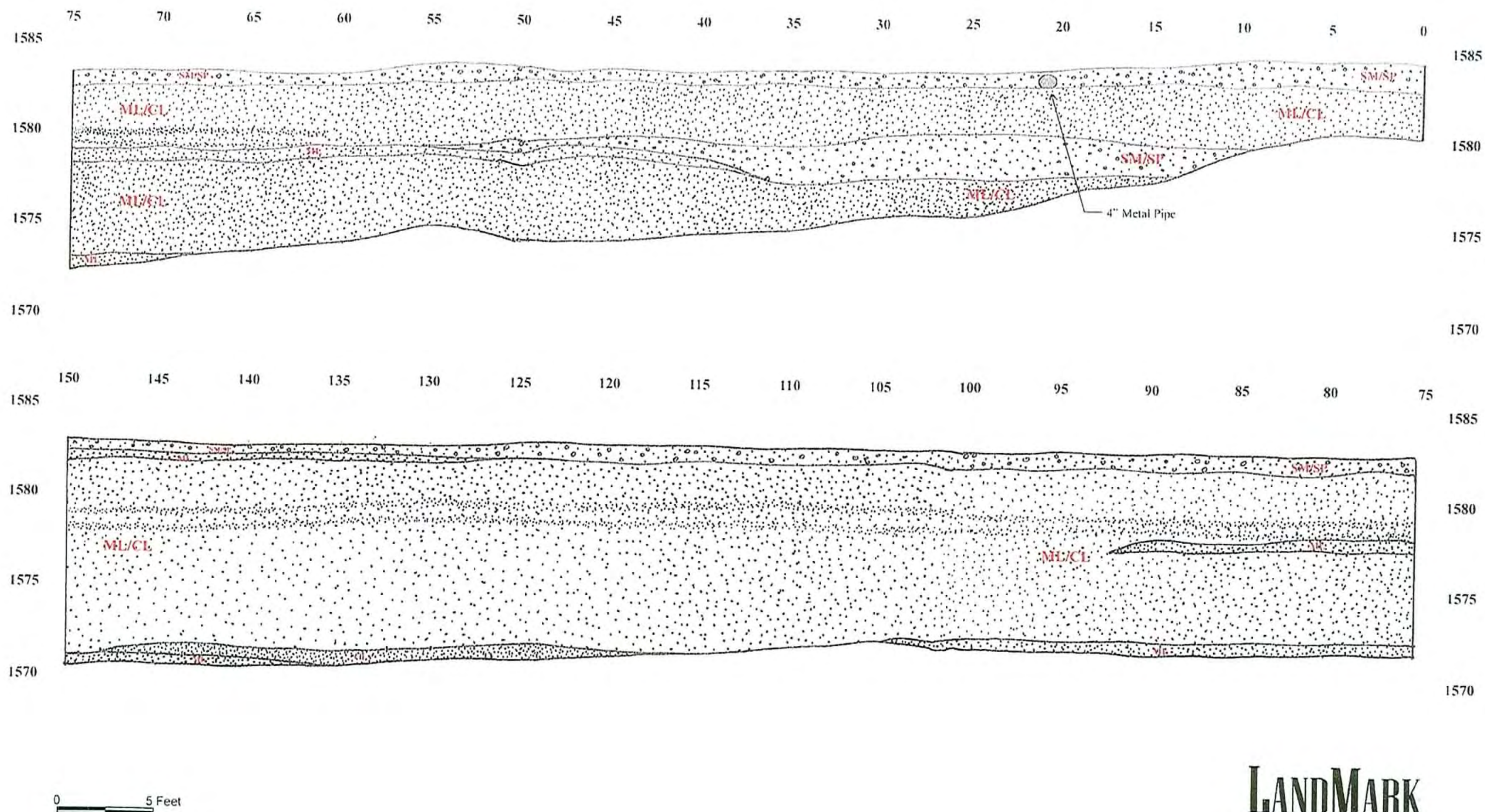
2005 Aerial Photograph

Plate
A-12

APPENDIX B

Trench 1

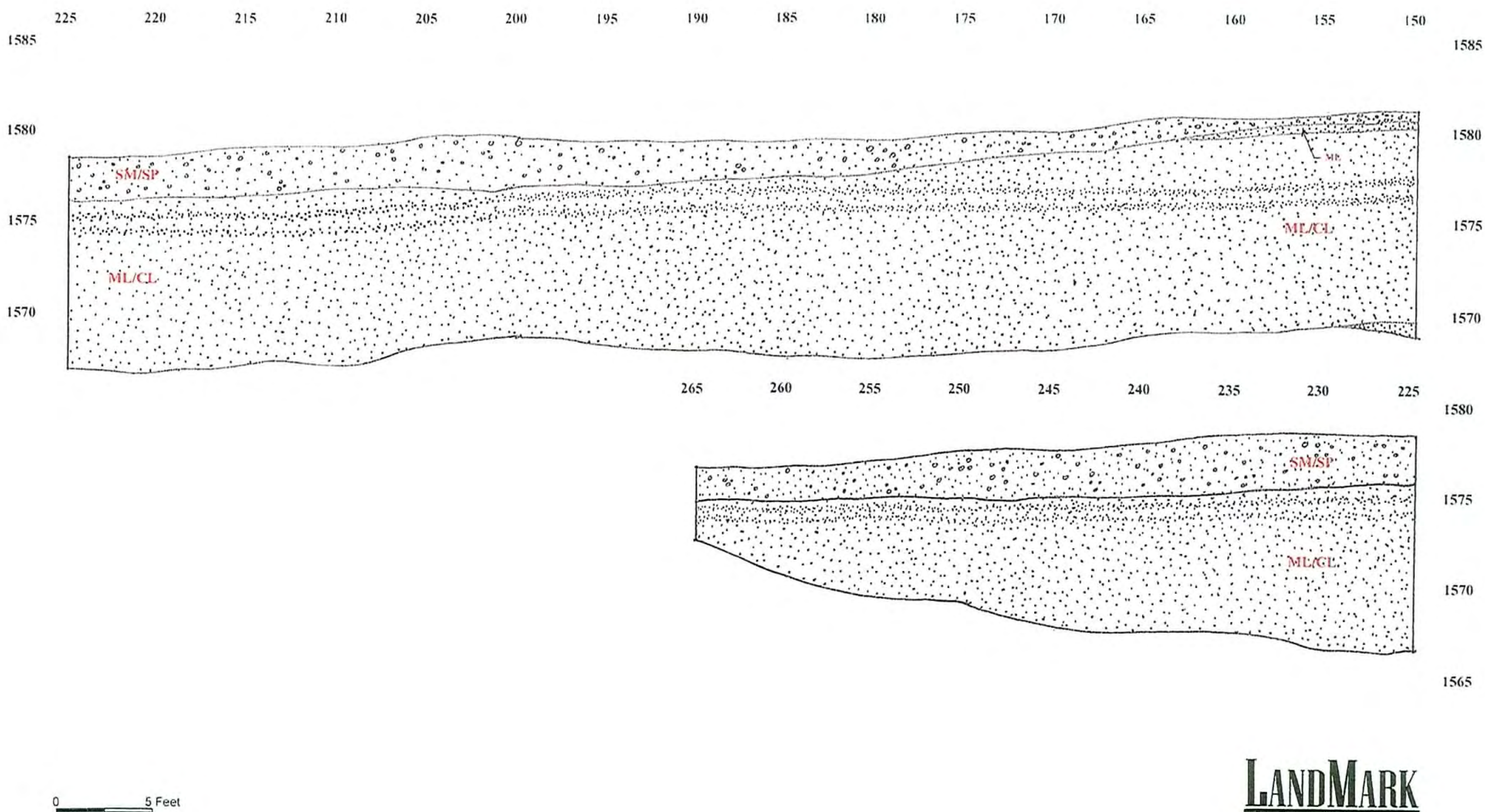
North Wall



LANDMARK Geo-Engineers and Geologists

Trench 1

North Wall



LANDMARK Geo-Engineers and Geologists

Trench 1

Silt/Silty Clay (ML/CL) - Olive brown with greyish green and reddish brown banding, stiff, moist, some soil mottling.

Sandy Silt/Silt (ML) - Olive brown to light grey/green, loose to medium dense, moist.

Silty Sand (SM) - Dark olive brown to light brown, loose to medium dense, damp to moist.

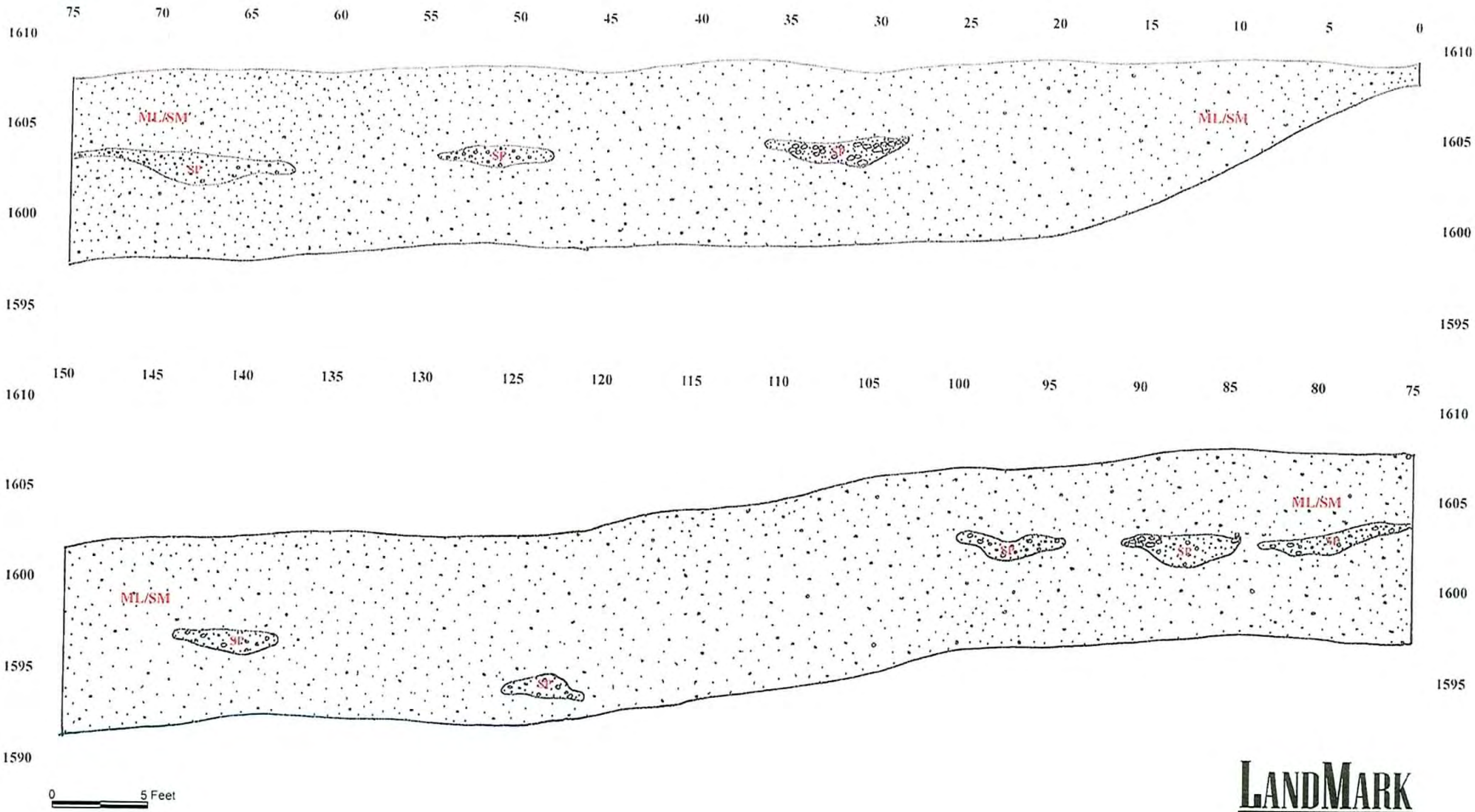
Silty Sand/Sand (SM/SP) - Brown to tan, loose to dense, dry, with some gravel.

Gravelly Sand/Sand (SP) - Light brown, loose, coarse grained, humid to moist.

LANDMARK Geo-Engineers and Geologists Project No.: LP07070	Key to Trench Log	Plate B-1

Trench 2

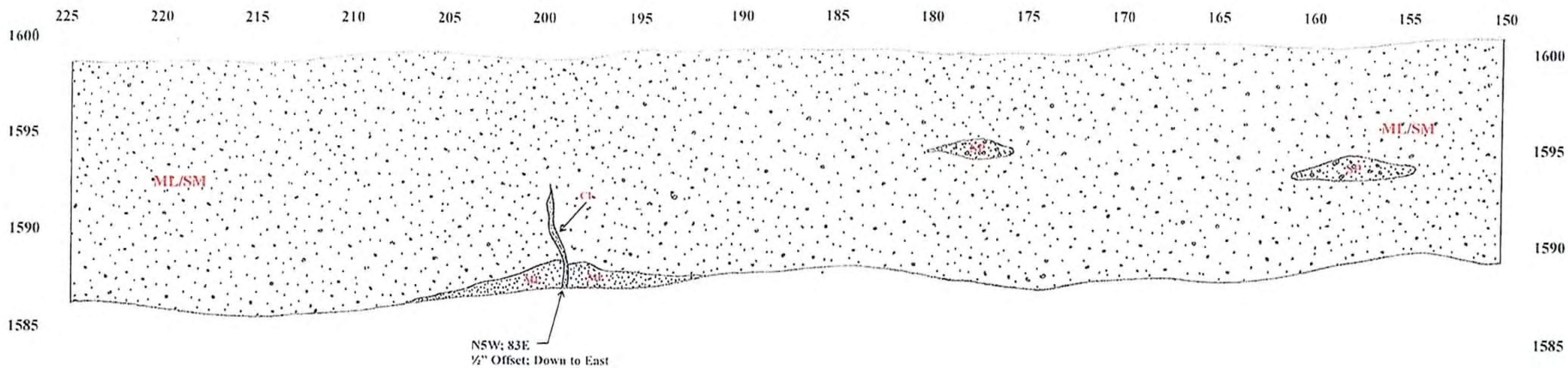
North Wall



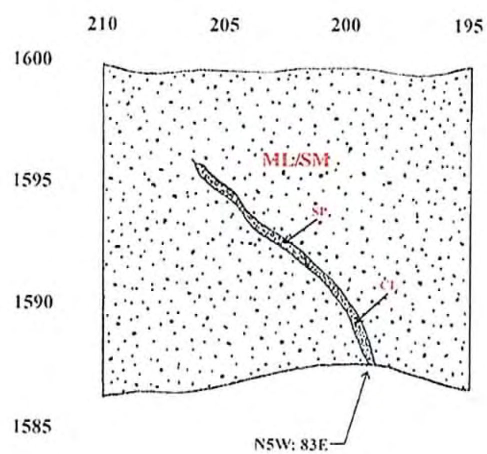
LANDMARK Geo-Engineers and Geologists

Trench 2

North Wall



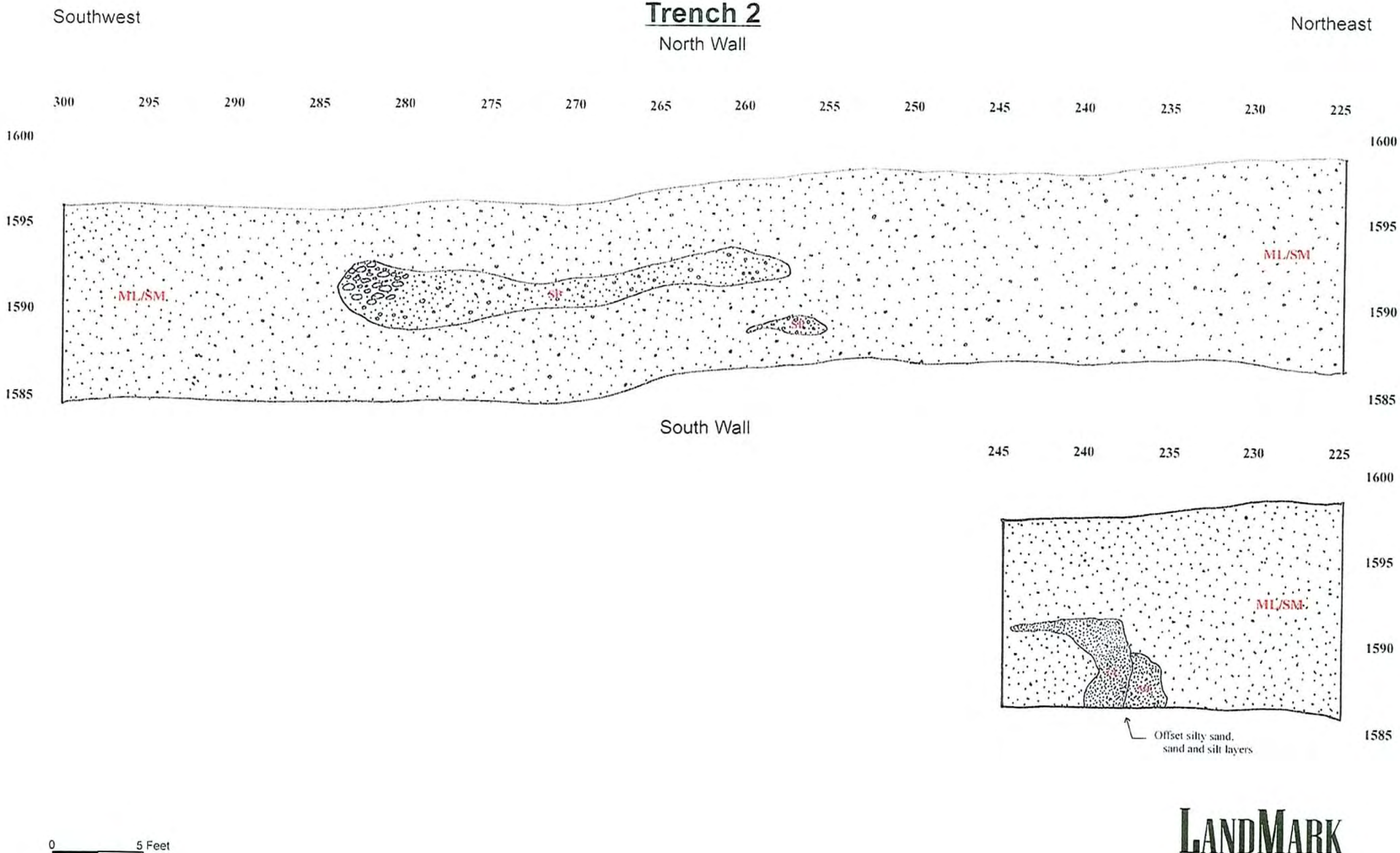
South Wall



0 5 Feet

LANDMARK
Geo-Engineers and Geologists

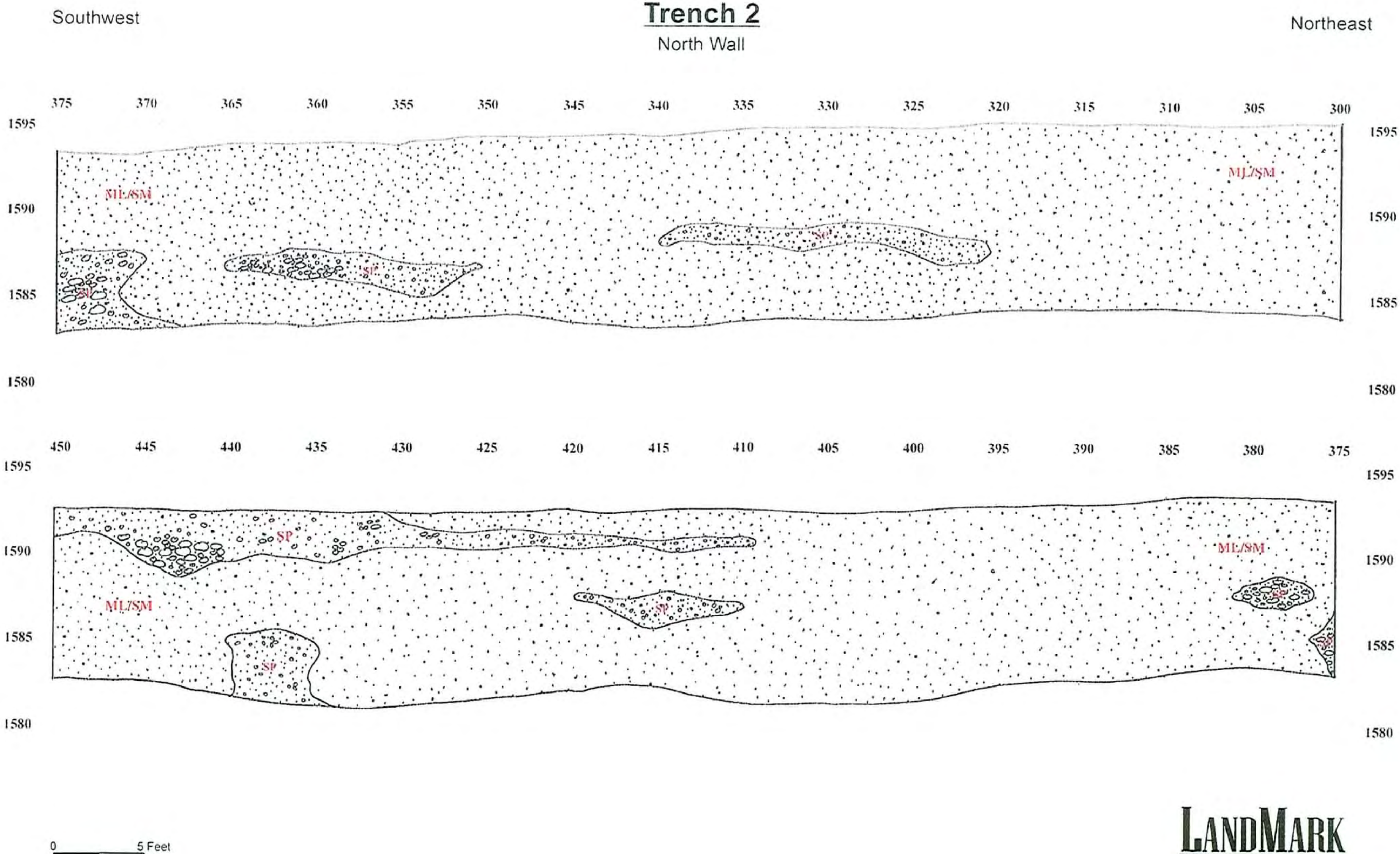
Trench 2



LandMark
Geo-Engineers and Geologists

Trench 2

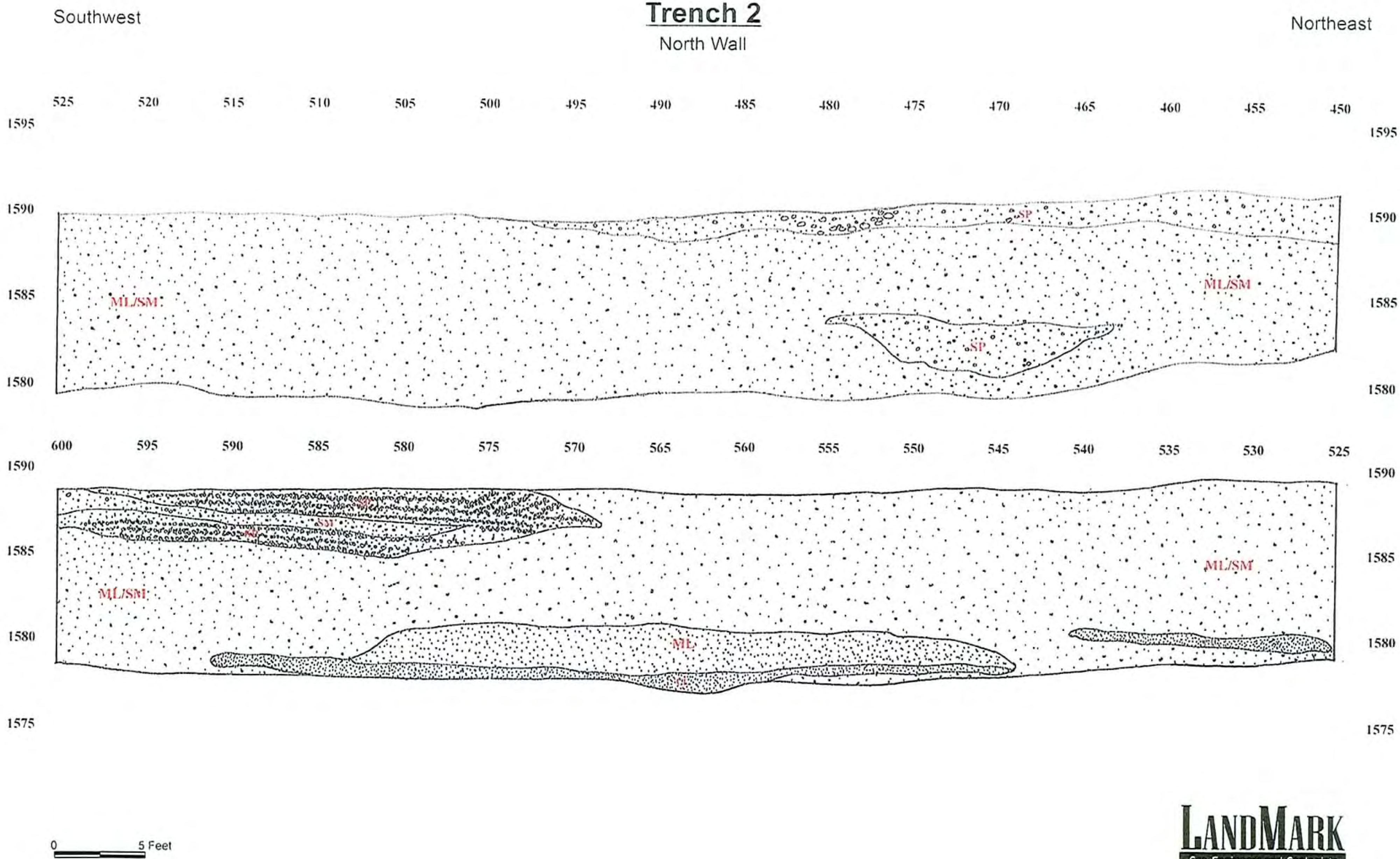
North Wall



LANDMARK
Geo-Engineers and Geologists

Trench 2

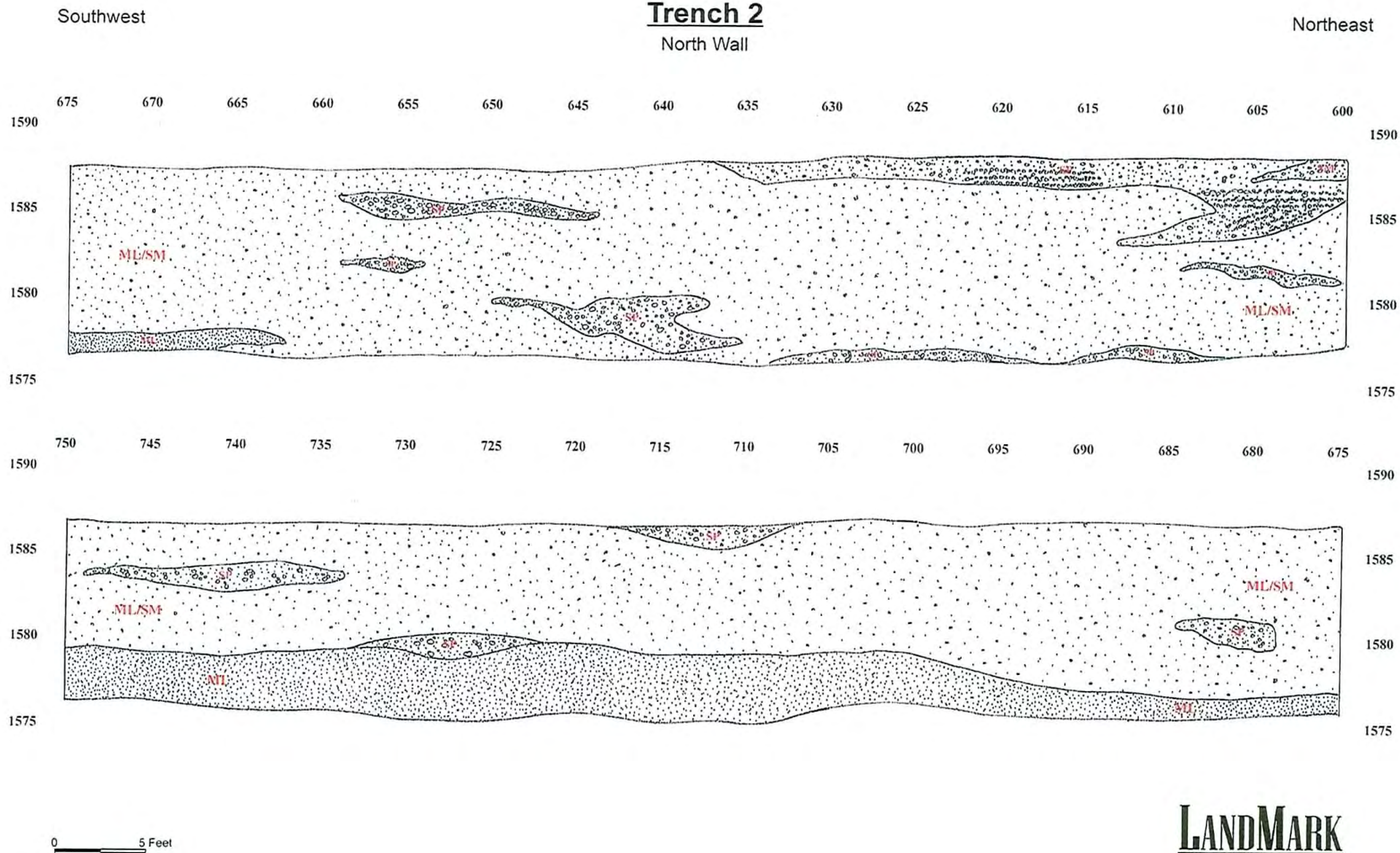
North Wall



LANDMARK
Geo-Engineers and Geologists

Trench 2

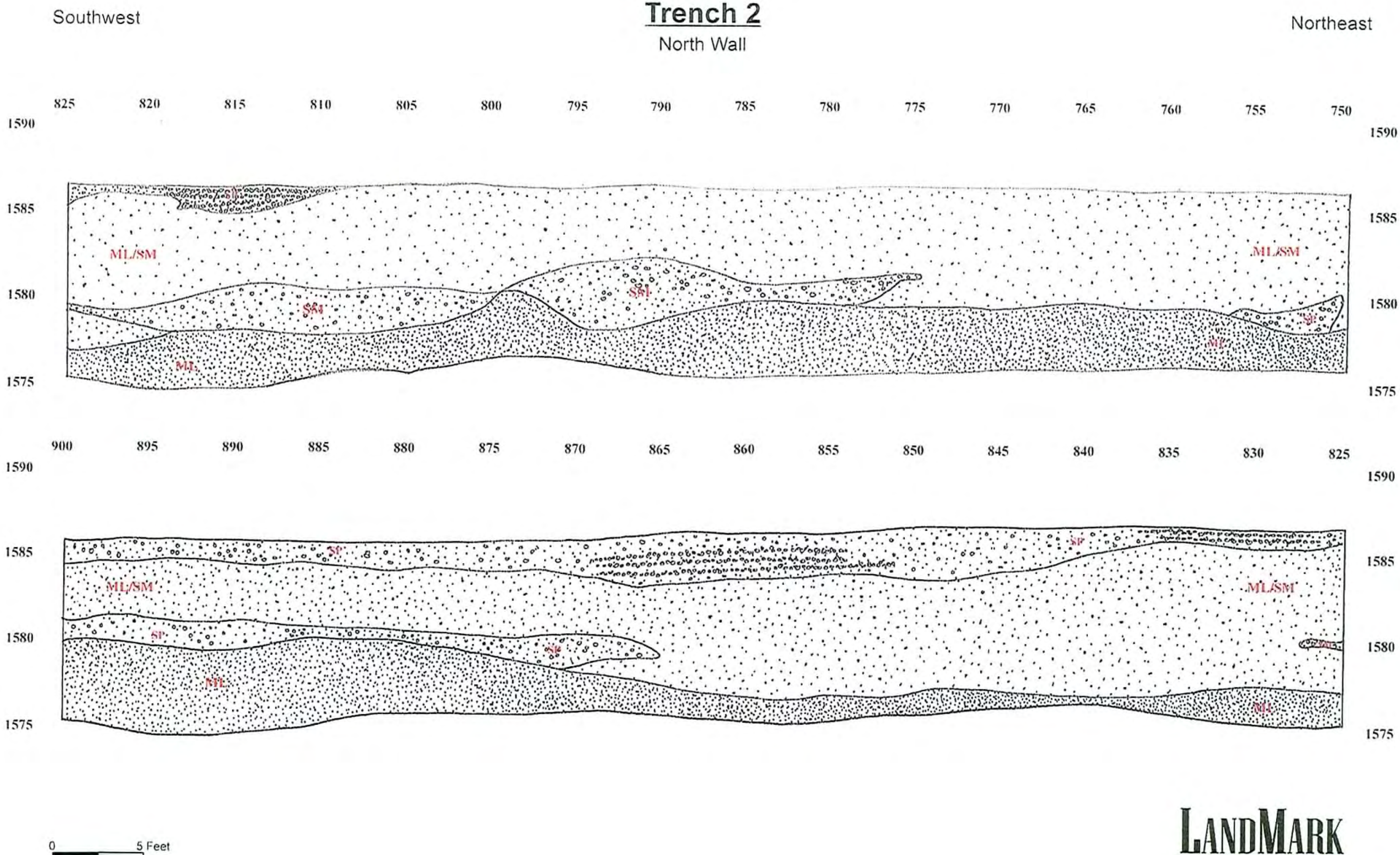
North Wall



LANDMARK
Geo-Engineers and Geologists

Trench 2

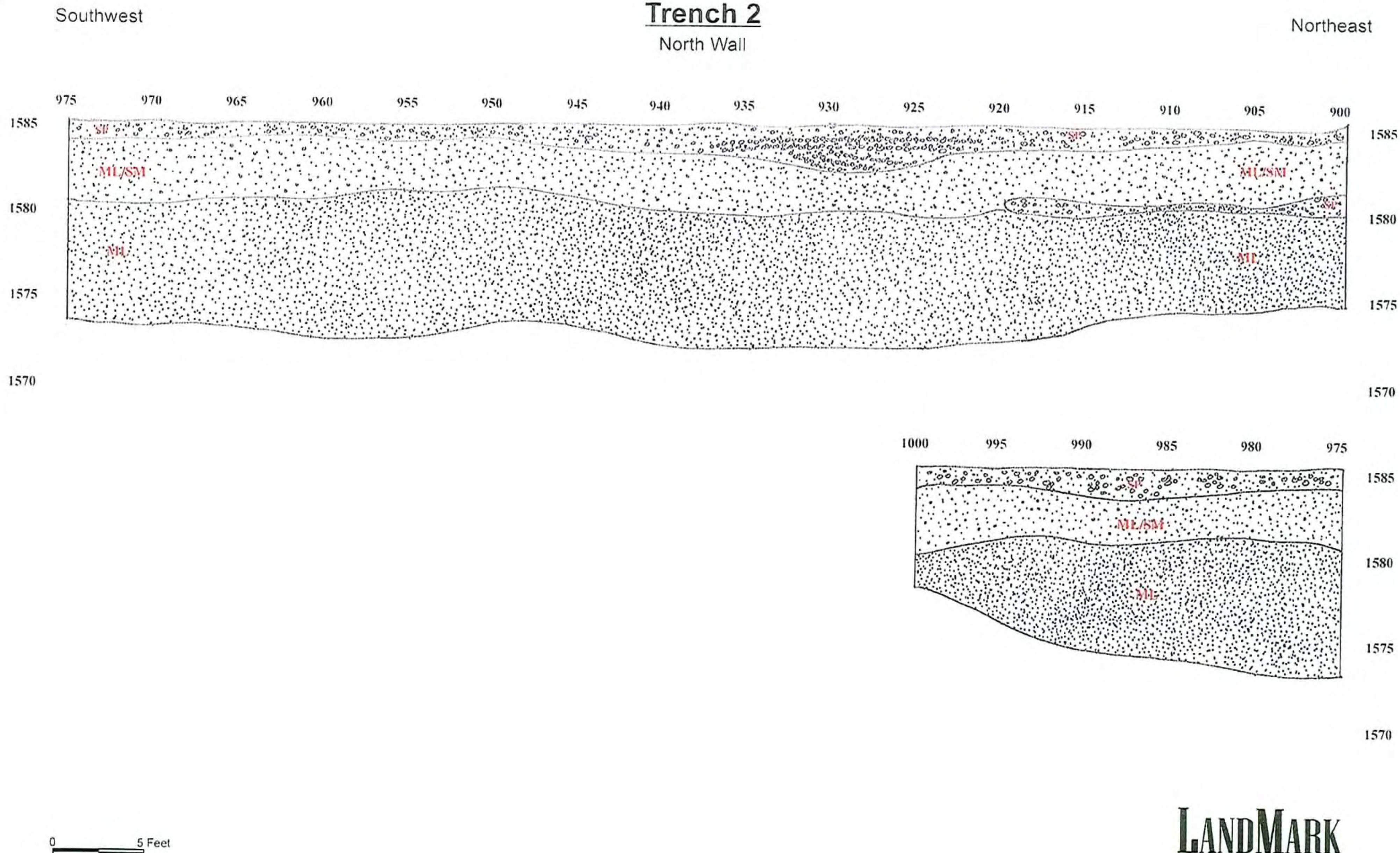
North Wall



LANDMARK
Geo-Engineers and Geologists

Trench 2

North Wall



LandMark
Geo-Engineers and Geologists

Trench 2

Silty Clay (CL) - Dark brown, stiff, moist.

Sandy Silt (ML) - Dark brown, medium dense, humid to moist.

Sandy Silt/Silty Sand (ML/SM) - Brown, medium dense, humid.

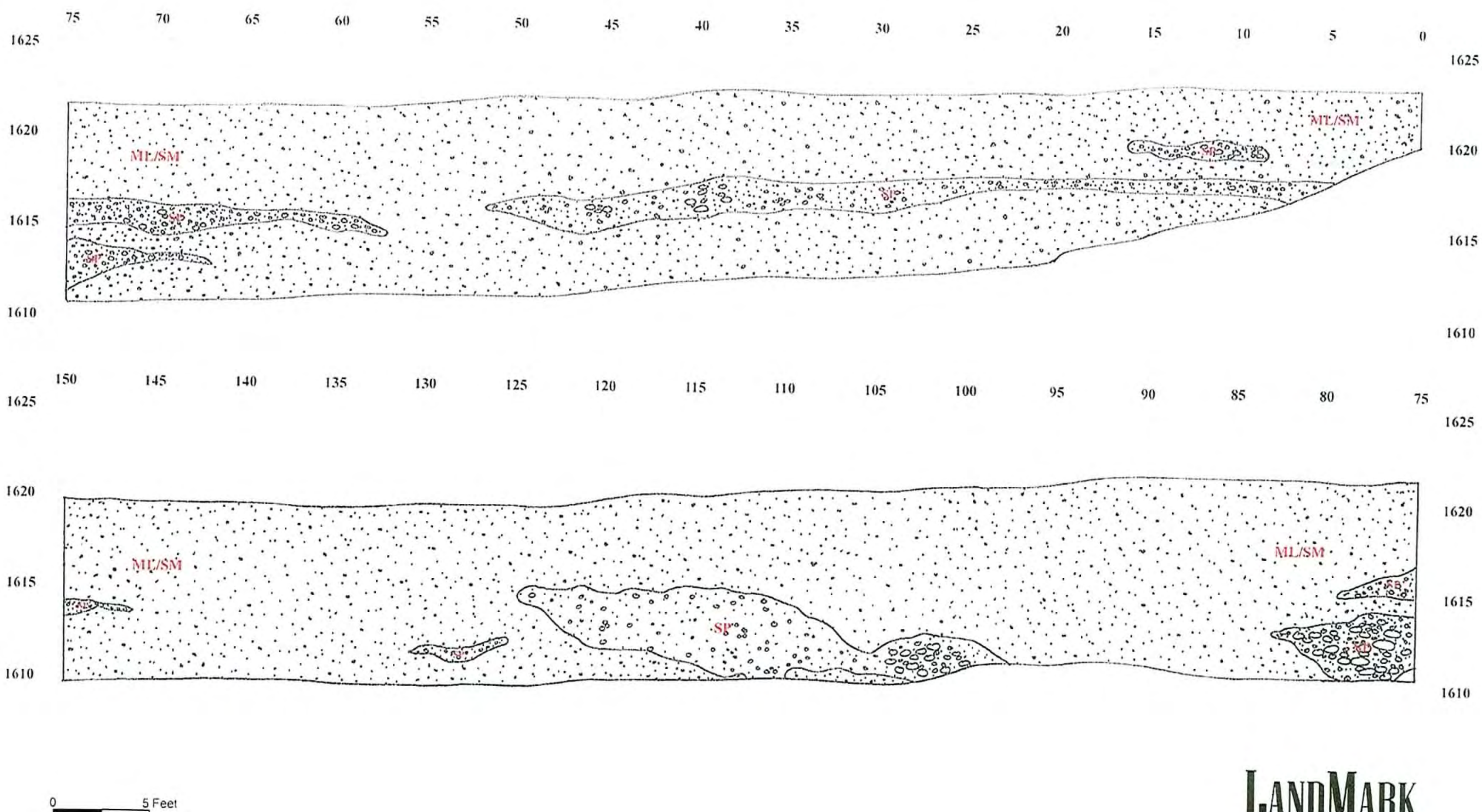
Silty Sand (SM) - Brown, medium dense, fine to coarse grained, humid.

Gravelly Sand/Sand (SP) - Tan, loose, coarse grained, humid, cross bedding noted in the upper 5 feet of trench.

LANDMARK Geo-Engineers and Geologists Project No.: LP07070	Key to Trench Log	Plate B-2

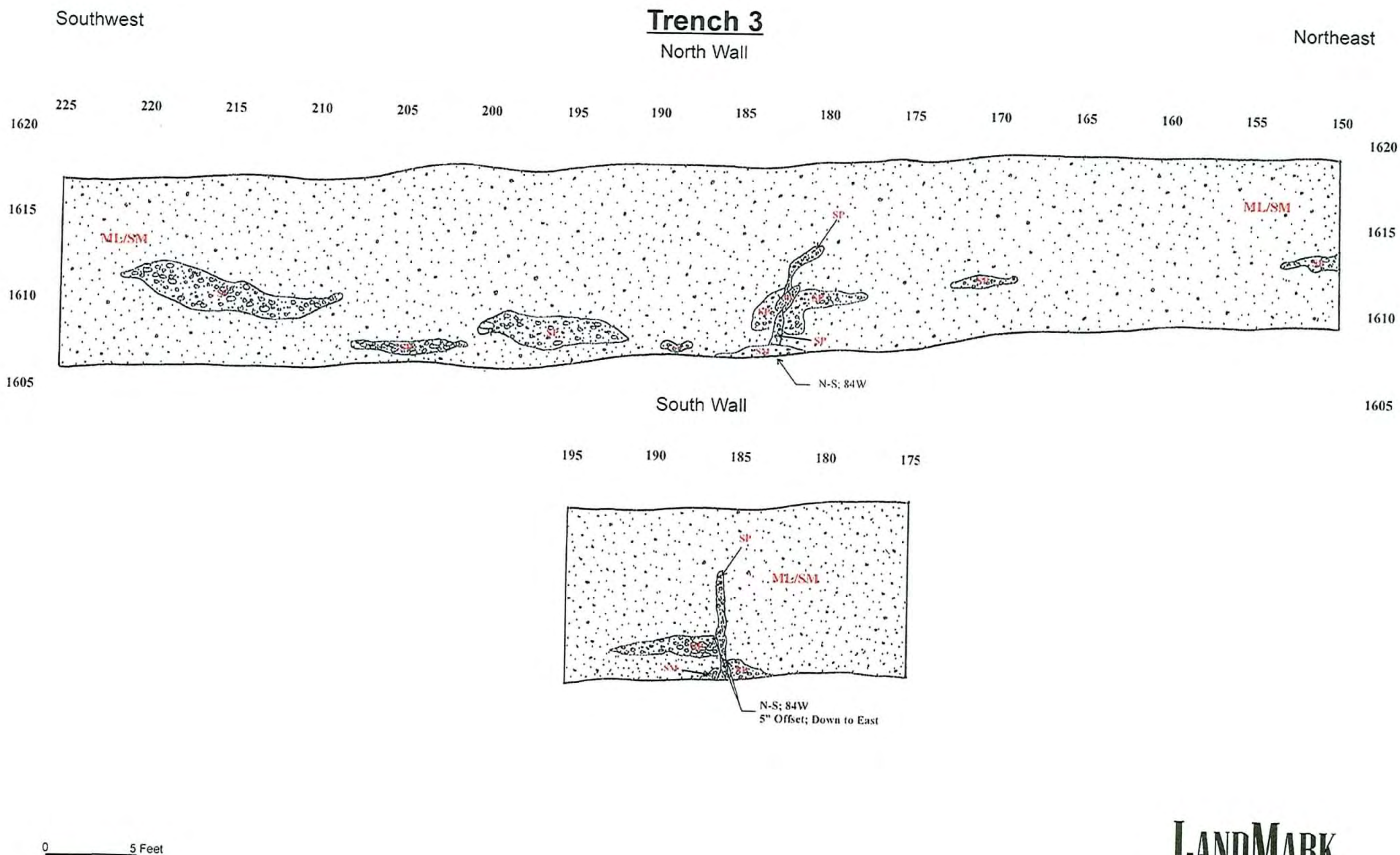
Trench 3

North Wall



LANDMARK
Geo-Engineers and Geologists

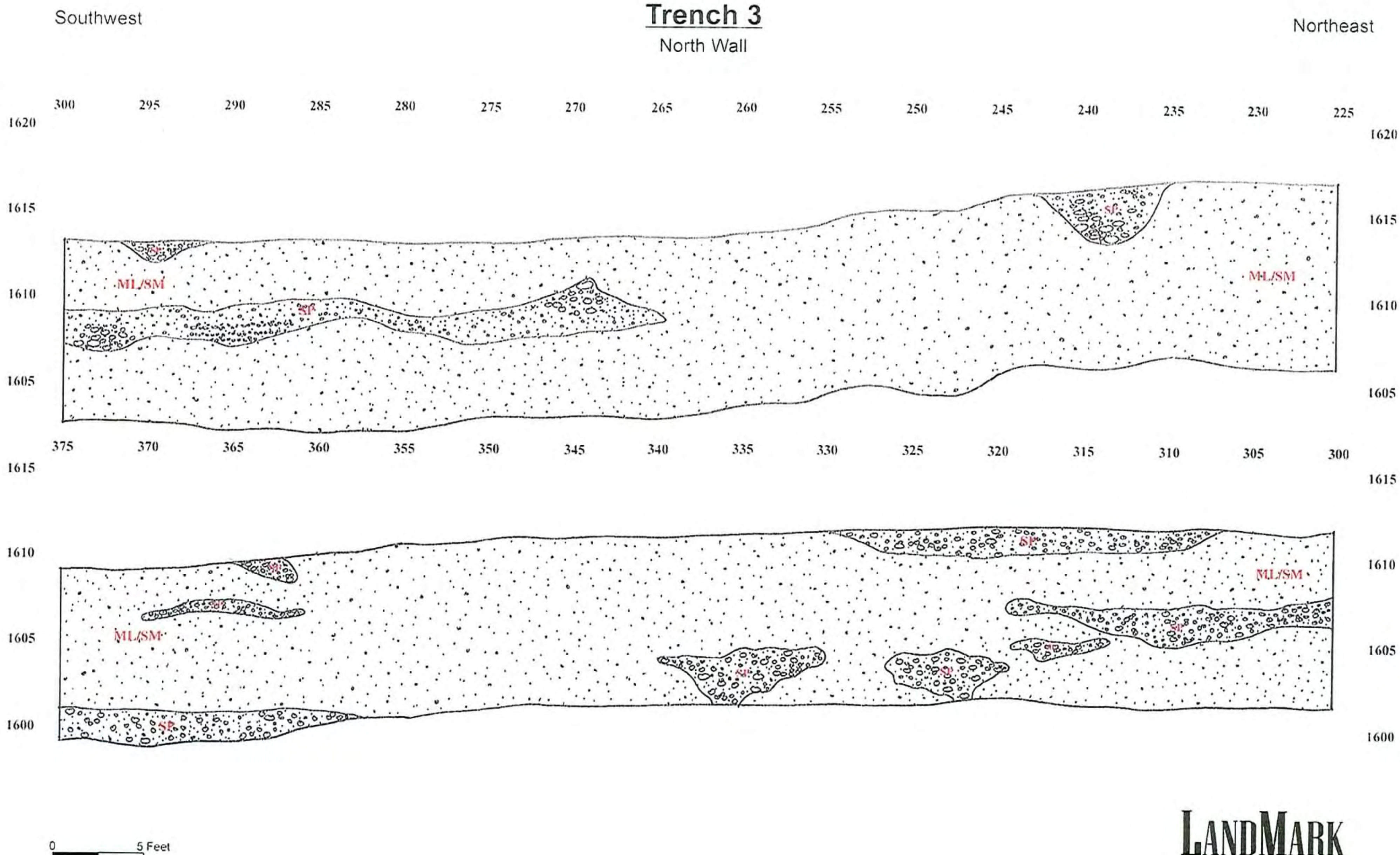
Trench 3



LANDMARK
Geo-Engineers and Geologists

Trench 3

North Wall



APPENDIX E

REFERENCES

Arango I., 1996, Magnitude Scaling Factors for Soil Liquefaction Evaluations: ASCE Geotechnical Journal, Vol. 122, No. 11.

Bartlett, Steven F. and Youd, T. Leslie, 1995, Empirical Prediction of Liquefaction-Induced Lateral Spread: ASCE Geotechnical Journal, Vol. 121, No. 4.

Blake, T. F., 2000, FRISKSP - A computer program for the probabilistic estimation of seismic hazard using faults as earthquake sources.

Bolt, B. A., 1974, Duration of Strong Motion: Proceedings 5th World Conference on Earthquake Engineering, Rome, Italy, June 1974.

Boore, D. M., Joyner, W. B., and Fumal, T. E., 1994, Estimation of response spectra and peak accelerations from western North American earthquakes: U.S. Geological Survey Open File Reports 94-127 and 93-509.

Boore, D. M., Joyner, W. B., and Fumal, T. E., 1997, Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity, and Pseudo-Absolute Acceleration Response Spectra: Seismological Research Letters, Vol. 68, No. 1, p. 154-179.

Bray, J. D., Sancio, R. B., Riemer, M. F. and Durgunoglu, T., (2004) Liquefaction Susceptibility of Fine-Grained Soils: Proc. 11th Inter. Conf. in Soil Dynamics and Earthquake Engineering and 3rd Inter. Conf. on Earthquake Geotechnical Engineering., Doolin, Kammerer, Nogami, Seed, and Towhata, Eds., Berkeley, CA, Jan. 7-9, V.1, pp. 655-662.

Building Seismic Safety Council (BSSC), 1991, NEHRP recommended provisions for the development of seismic regulations of new buildings, Parts 1, 2 and Maps: FEMA 222, January 1992

California Building Standards Commission, 2007, 2007 California Building Code. California Code of Regulations, Title 24, Part 2, Vol. 2 of 2.

California Division of Mines and Geology (CDMG), 1996, California Fault Parameters: available at http://www.consrv.ca.gov/dmg/shezp/fltindex.html

California Division of Mines and Geology (CDMG), 1962, Geologic Map of California – Santa Ana Quadrangle Sheet: California Division of Mines and Geology, Scale 1:250,000.

Cao, T., Bryant, W. A., Rowshandel, B., Branum, D., and Wills, C. J., 2003, The revised 2002 California probabilistic seismic hazards maps: California Geological Survey: http://www.conservation.ca.gov/cgs/rghm/psha.

Department of Water Resources (DWR), 1964, Coachella Valley Investigation: Department of Water Resources, Bulletin No. 108.

Ellsworth, W. L., 1990, Earthquake History, 1769-1989 in: The San Andreas Fault System, California: U.S. Geological Survey Professional Paper 1515, 283 p.

International Conference of Building Officials (ICBO), 1994, Uniform Building Code, 1994 Edition.

International Conference of Building Officials (ICBO), 1997, Uniform Building Code, 1997 Edition.

Ishihara, K. (1985), Stability of natural deposits during earthquakes, Proc. 11th Int. Conf. On Soil Mech. And Found. Engrg., Vol. 1, A. A. Balkema, Rotterdam, The Netherlands, 321-376.

Jennings, C. W., 1994, Fault activity map of California and Adjacent Areas: California Division of Mines and Geology, DMG Geologic Map No. 6.

Jones, L. and Hauksson, E., 1994, Review of potential earthquake sources in Southern California: Applied Technology Council, Proceedings of ATC 35-1.

Joyner, W. B. and Boore, D. M., 1988, Measurements, characterization, and prediction of strong ground motion: ASCE Geotechnical Special Pub. No. 20.

Mualchin, L. and Jones, A. L., 1992, Peak acceleration from maximum credible earthquakes in California (Rock and Stiff Soil Sites): California Division of Mines and Geology, DMG Open File Report 92-01.

Naeim, F. and Anderson, J. C., 1993, Classification and evaluation of earthquake records for design: Earthquake Engineering Research Institute, NEHRP Report.

National Research Council, Committee of Earthquake Engineering, 1985, Liquefaction of Soils during Earthquakes: National Academy Press, Washington, D.C.

Norris, Robert M., Robert W. Webb, 1976, Geology of California: University of California, Santa Barbara.

Porcella, R. L., Matthiesen, R. B., and Maley, R. P., 1982, Strong-motion data recorded in the United States: U.S. Geological Survey Professional Paper 1254, p. 289-318.

Robertson, P. K., 1996, Soil Liquefaction and its evaluation based on SPT and CPT: in unpublished paper presented at 1996 NCEER Liquefaction Workshop

Seed, Harry B., Idriss, I. M., and Arango I., 1983, Evaluation of liquefaction potential using field performance data: ASCE Geotechnical Journal, Vol. 109, No. 3.

Seed, Harry B., et al, 1985, Influence of SPT Procedures in Soil Liquefaction Resistance Evaluations: ASCE Geotechnical Journal, Vol. 113, No. 8.

Sharp, R. V., 1989, Personal communication, USGS, Menlo Park, CA.

Stringer, S. L., 1996, EQFAULT.WK4, A computer program for the estimation of deterministic site acceleration.

Stringer, S. L. 1996, LIQUEFY.WK4, A computer program for the Empirical Prediction of Earthquake-Induced Liquefaction Potential.

Structural Engineers Association of California (SEAOC), 1990, Recommended lateral force requirements and commentary.

Tokimatsu, K. and Seed H. B., 1987, Evaluation of settlements in sands due to earthquake shaking: ASCE Geotechnical Journal, v. 113, no. 8.

U.S. Geological Survey (USGS), 1990, The San Andreas Fault System, California, Professional Paper 1515.

U.S. Geological Survey (USGS), 1996, National Seismic Hazard Maps: available at http://gldage.cr.usgs.gov

Wallace, R. E., 1990, The San Andreas Fault System, California: U.S. Geological Survey Professional Paper 1515, 283 p.

Working Group on California Earthquake Probabilities (WGCEP), 1988, Probabilities of large earthquakes occurring in California on the San Andreas Fault: U.S. Geological Survey Open-File Report 88-398.

Working Group on California Earthquake Probabilities (WGCEP), 1992, Future seismic hazards in southern California, Phase I Report: California Division of Mines and Geology.

Working Group on California Earthquake Probabilities (WGCEP), 1995, Seismic hazards in southern California, Probable Earthquakes, 1994-2014, Phase II Report: Southern California Earthquake Center.

Youd, T. Leslie and Garris, C. T., 1995, Liquefaction induced ground surface disruption: ASCE Geotechnical Journal, Vol. 121, No. 11.