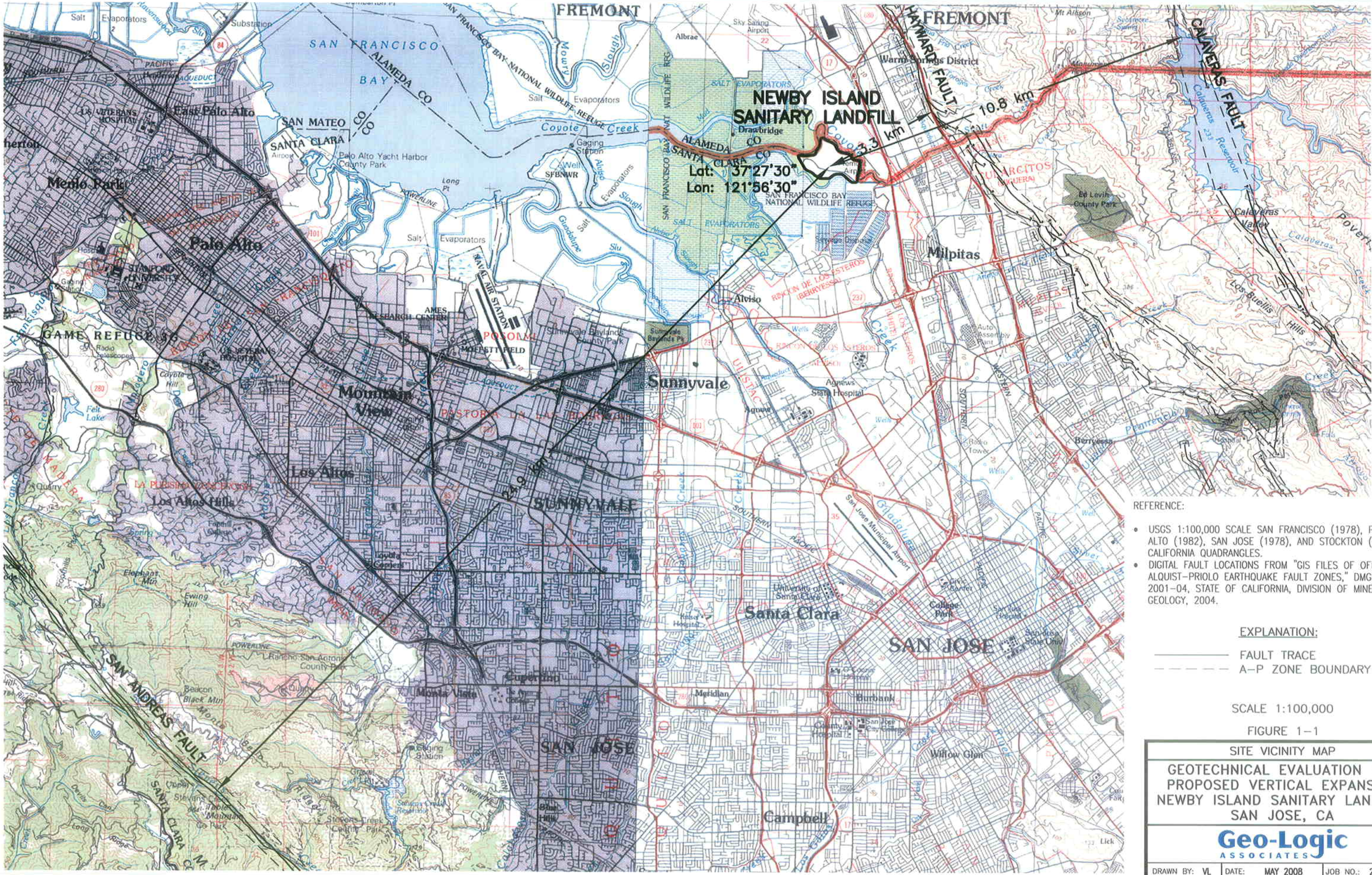
FIGURES



REFERENCE:

- USGS 1:100,000 SCALE SAN FRANCISCO (1978), PALO ALTO (1982), SAN JOSE (1978), AND STOCKTON (1989) CALIFORNIA QUADRANGLES.
- DIGITAL FAULT LOCATIONS FROM "GIS FILES OF OFFICIAL ALQUIST-PRIOLO EARTHQUAKE FAULT ZONES," DMG CD 2001-04, STATE OF CALIFORNIA, DIVISION OF MINES AND GEOLOGY, 2004.

EXPLANATION:

————	FAULT TRACE
— — — —	A-P ZONE BOUNDARY

SCALE 1:100,000

FIGURE 1-1

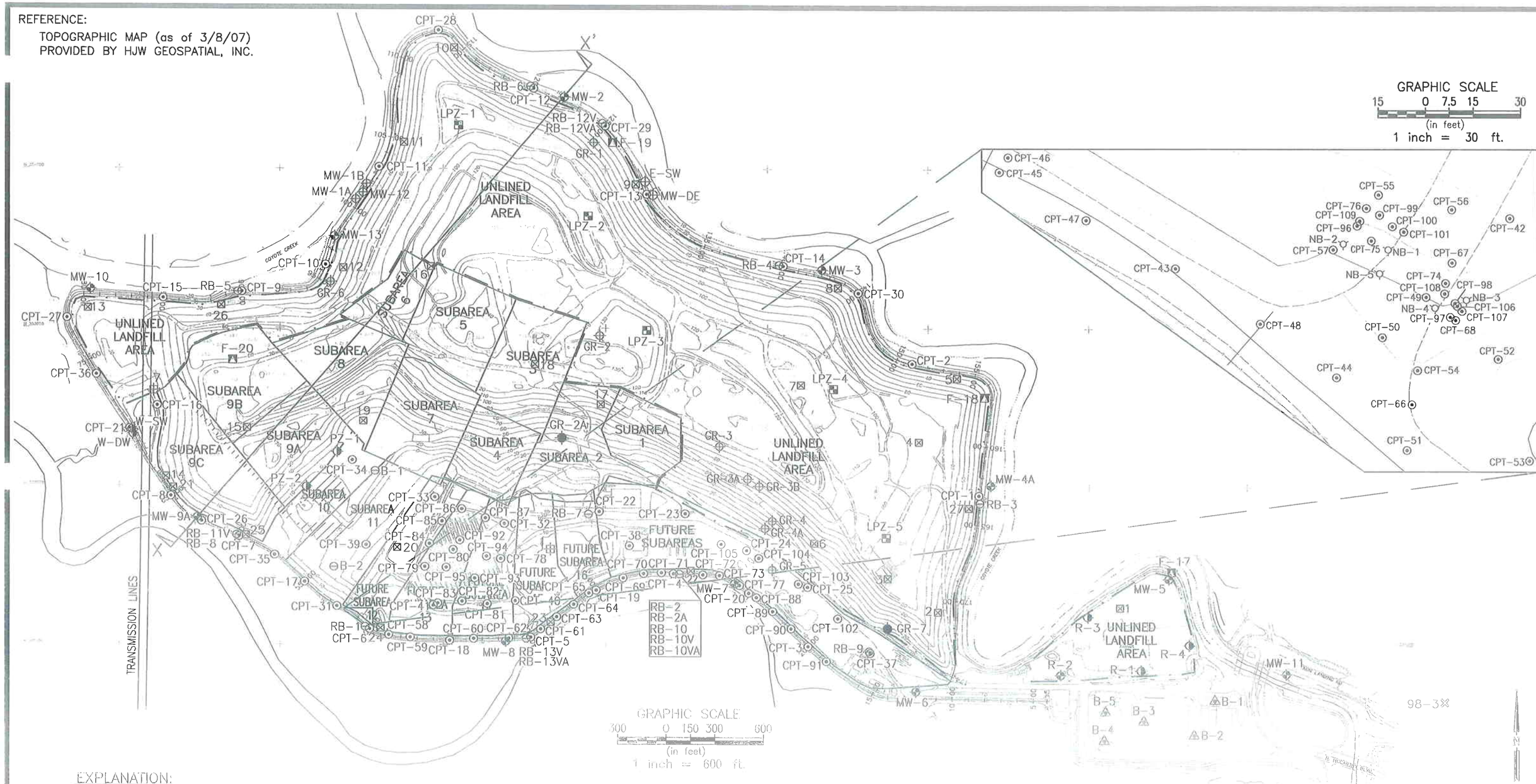
SITE VICINITY MAP

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049

REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.



EXPLANATION:

- GROUNDWATER MONITORING WELL LOCATION
- ABANDONED GROUNDWATER MONITORING WELL LOCATION
- PIEZOMETER LOCATION
- ABANDONED PIEZOMETER LOCATION
- LEACHATE MONITORING WELL LOCATION
- ABANDONED LEACHATE MONITORING WELL LOCATION
- MUD ROTARY BORING LOCATION
- LEACHATE PIEZOMETER LOCATION
- CONE PENETRATION TEST BORING LOCATION (GLA, 2004 & 2007)
- SAMPLED CONE PENETRATION TEST BORING LOCATION (GLA, 2007)
- LOCATION OF GEOTECHNICAL BORING BY OTHERS:
  - CALTRANS (1998)
  - PURCELL, RHOADES & ASSOCIATES (1988)
  - EMCON (1972)
  - WOODWARD-LUNDGREN & ASSOCIATES (1971)
  - US ARMY CORPS OF ENGINEERS (1963)
- LIMIT OF UNLINED LANDFILL AREA
- X X' CROSS-SECTION LOCATION

FIGURE 1-2

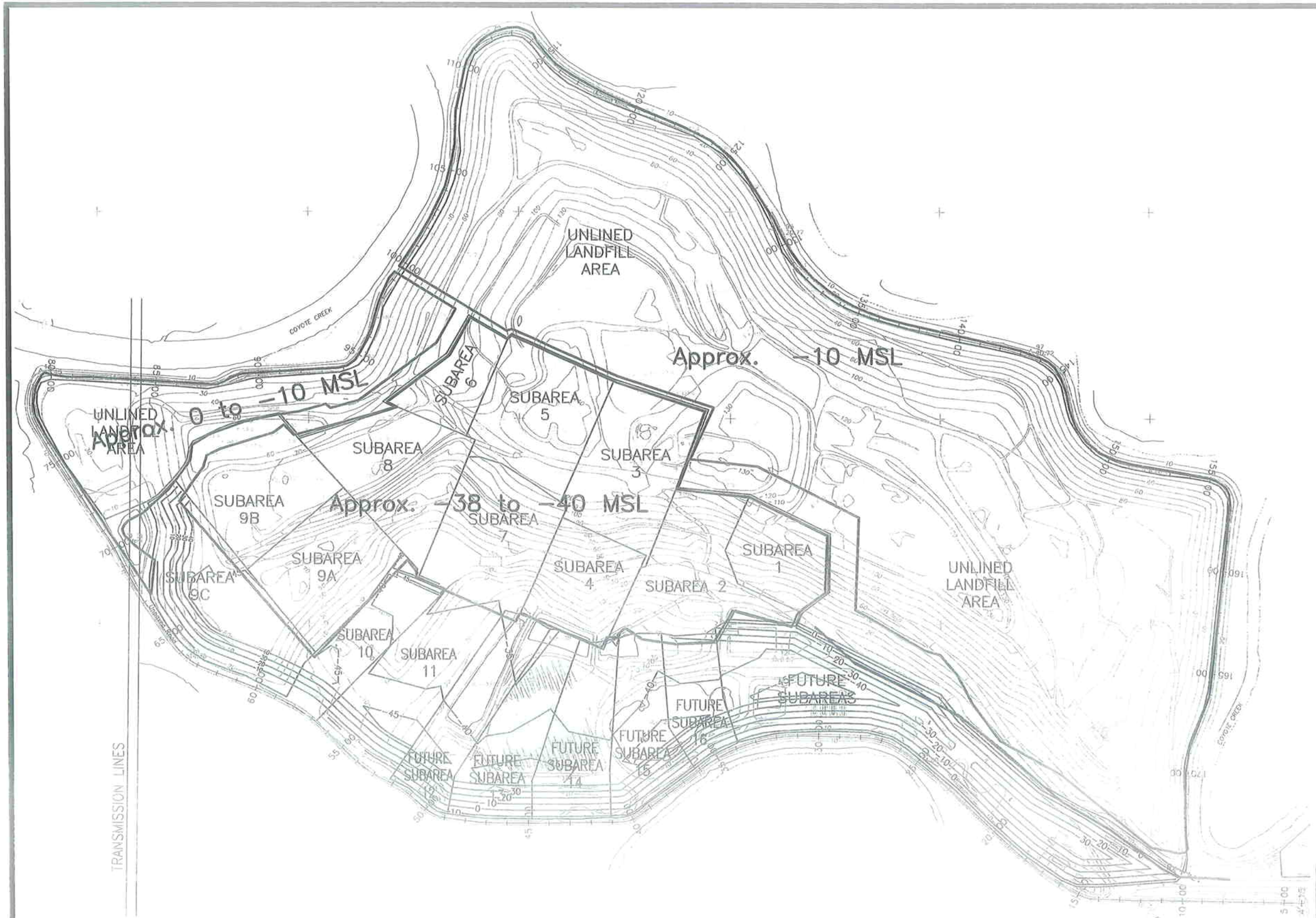
SITE PLAN

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049

REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.



N

GRAPHIC SCALE

500 0 250 500 1000

(IN FEET)

1 inch = 500 ft

FIGURE 1-3

LANDFILL BASE GRADES

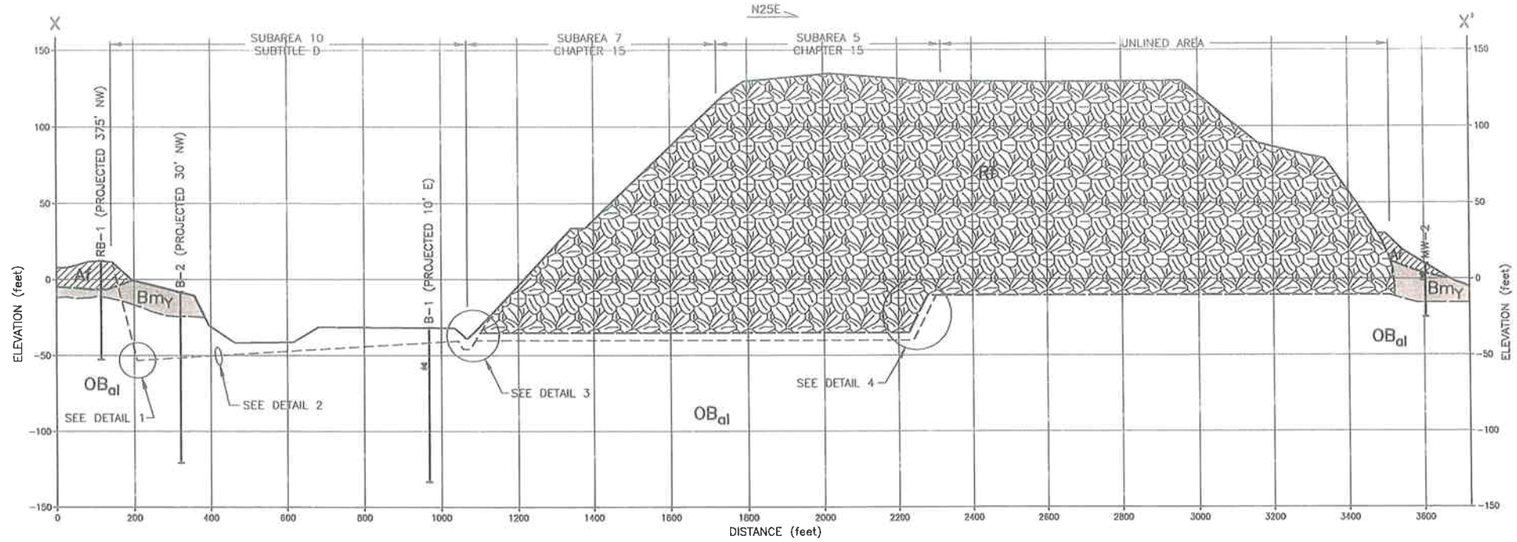
GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049

EXPLANATION:

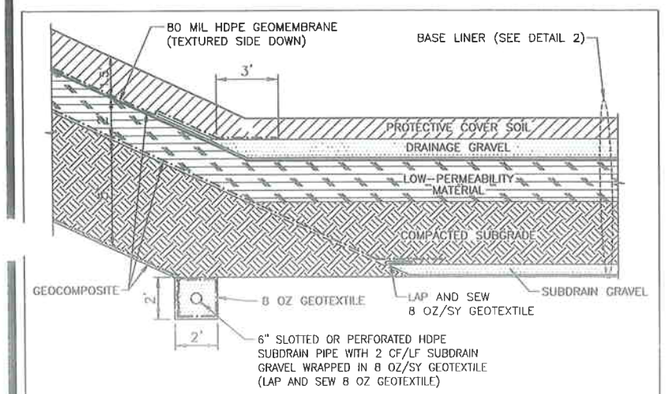
- REFUSE FILL
- ARTIFICIAL FILL
- YOUNG BAY MUD
- OB_{al} OLDER BAY ALLUVIUM
- EXISTING GROUND SURFACE
- APPROXIMATE GEOLOGIC CONTACT
- BOTTOM OF SUBGRADE EXCAVATION
- MONITORING WELL/BOREHOLE
- GROUNDWATER ELEVATION



GEOLOGIC CROSS-SECTION X-X'

HORIZ. SCALE: 1"= 400'

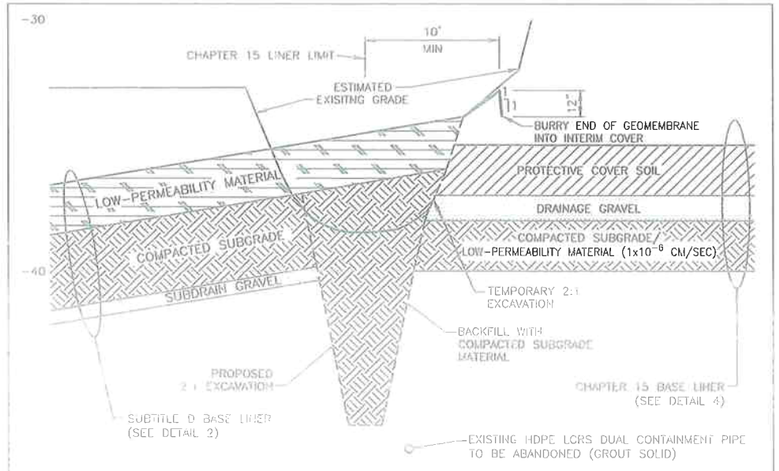
VERT. SCALE: 1"= 100'



DETAIL 1

TOE AND SLOPE LINER CONNECTION

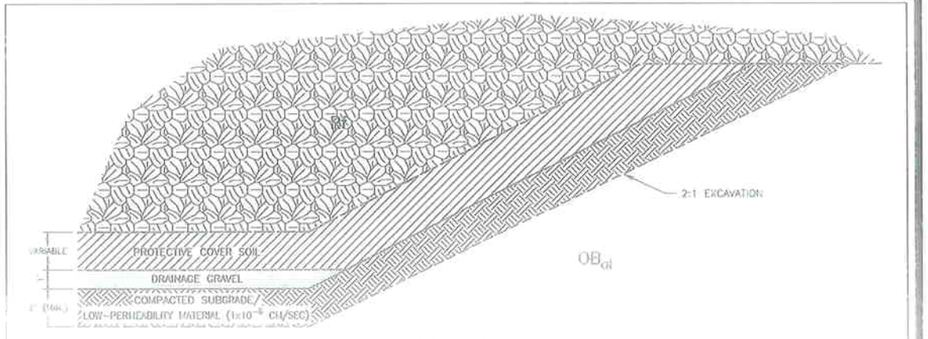
NOT TO SCALE



DETAIL 3

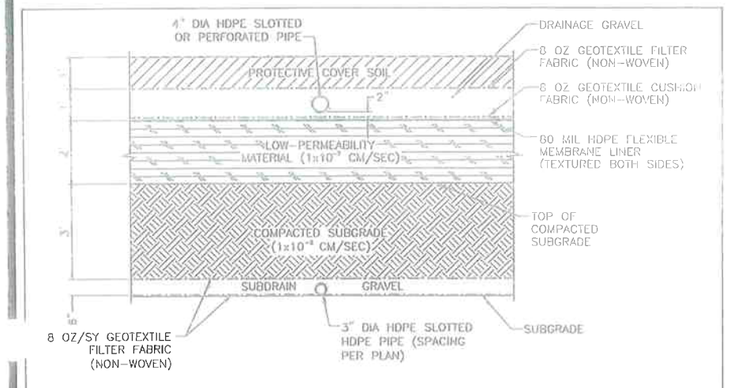
HORIZ. SCALE: 1"= 60'

VERT. SCALE: 1"= 6'



DETAIL 4

SCALE: 1"= 5'



DETAIL 2

BASE LINER/GRAVEL BLANKET SUBDRAIN

NOT TO SCALE

FIGURE 1-4

LINER CROSS-SECTION X-X'

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049

California's Geomorphic Provinces

California's geomorphic provinces are naturally defined geologic regions that display a distinct landscape or landform. Earth scientists recognize eleven provinces in California. Each region displays unique, defining features based on geology, faults, topographic relief and climate.

These geomorphic provinces are remarkably diverse. They provide spectacular vistas and unique opportunities to learn about earth's geologic processes and history.

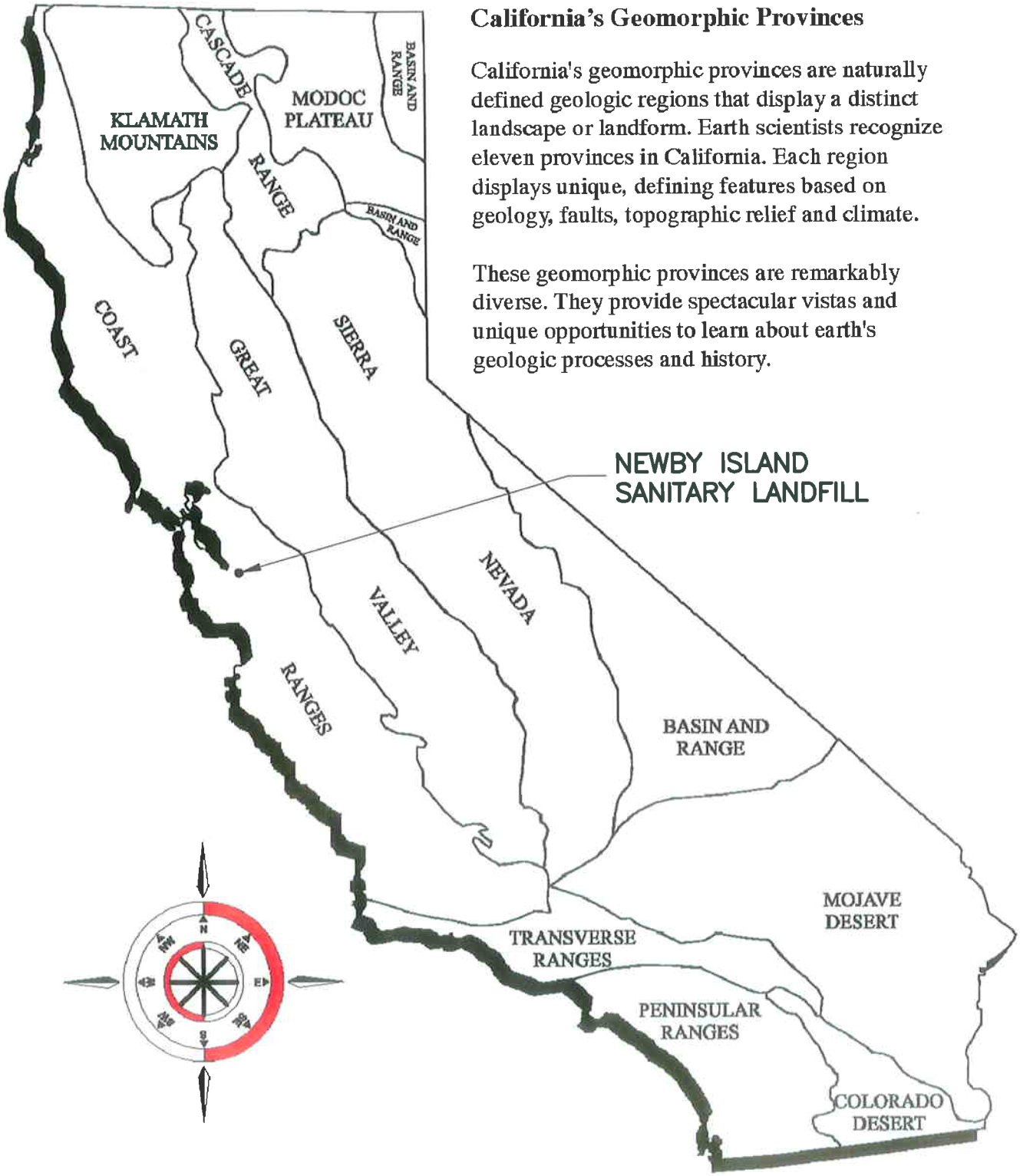


FIGURE 2–1

GEOMORPHIC PROVINCES OF CALIFORNIA

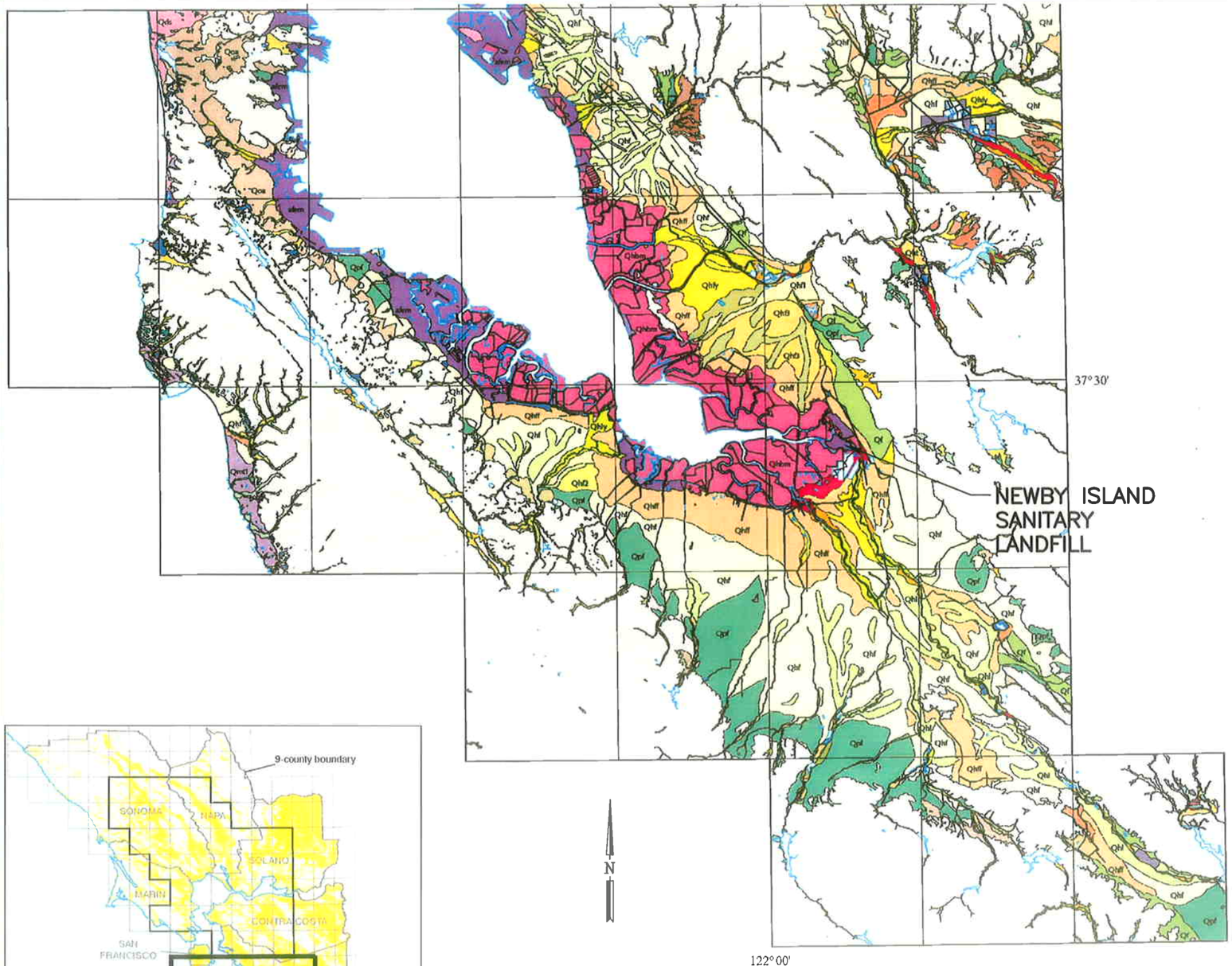
GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

REFERENCE:

NOTE 36, CALIFORNIA GEOLOGICAL SURVEY, DECEMBER 2002.



Scale : 1:200,000

0 25 Km

MAP UNITS

Historical

- af — Artificial fill
- afem — Artificial fill over estuarine mud
- al — Artificial levee fill
- acf — Artificial channel fill
- adf — Artificial dam fill
- gq — Gravel quarries and percolation ponds
- as — Artificial stream channel
- [illegible] — Historical stream channel deposits

Latest Holocene

- Qhfy — Alluvial fan deposits
- Qhly — Alluvial fan levee deposits
- Qhty — Stream terrace deposits
  - Qhty1 — Younger stream terrace deposits
  - Qhty2 — Older stream terrace deposits
- Qhay — Alluvial deposits, undifferentiated
- Qhbs — Beach sand

Holocene

- Qhds — Dune sand
- Qhbm — San Francisco Bay mud
- Qhed — Estuarine delta deposits
- Qhb — Basin deposits
- [illegible] — Alluvial fan-estuarine complex deposits
- Qhf — Alluvial fan deposits
  - Qhf1 — Younger alluvial fan deposits
  - Qhf2 — Intermediate alluvial fan deposits
  - Qhf3 — Older alluvial fan deposits
- Qhff — Alluvial fan deposits, fine facies
- Qhl — Alluvial fan levee deposits
  - Qhl1 — Younger alluvial fan levee deposits
  - Qhl2 — Intermediate alluvial fan levee deposits
  - Qhl3 — Older alluvial fan levee deposits
- Qht — Stream terrace deposits
  - Qht1 — Younger stream terrace deposits
  - Qht2 — Older stream terrace deposits
- Qha — Alluvial deposits, undifferentiated

Holocene to Latest Pleistocene

- Qds — Dune sand
- Qb — Basin deposits
- Qf — Alluvial fan deposits
- Qt — Stream terrace deposits
  - Qt1 — Younger stream terrace deposits
  - Qt2 — Older stream terrace deposits
- Qa — Alluvial deposits, undifferentiated

Latest Pleistocene

- Alluvial fan deposits
  - Younger alluvial fan deposits
  - Older alluvial fan deposits
- Qpt — Stream terrace deposits
- Qpa — Alluvial deposits, undifferentiated

Pleistocene

- Marine terrace deposits
  - Youngest marine terrace deposits
  - Younger marine terrace deposits
  - Older marine terrace deposits
  - Oldest marine terrace deposits
- Bay terrace deposits

Early to Late Pleistocene

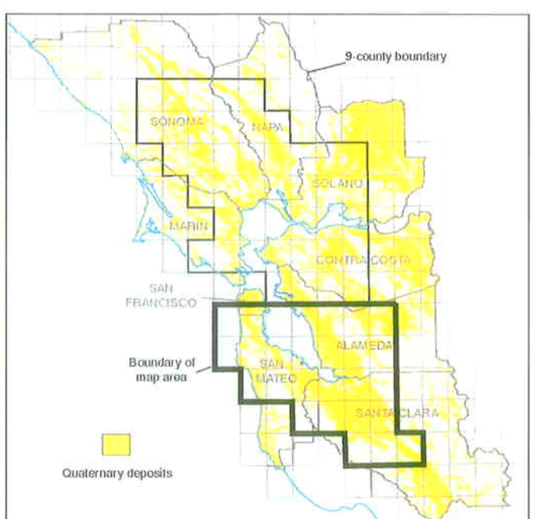
- Qpp — Pediment deposits
- Qpf — Alluvial fan deposits
- Qpt — Stream terrace deposits
  - Younger stream terrace deposits
  - Qpt2 — Older stream terrace deposits
- Qpa — Alluvial deposits, undifferentiated
  - Younger alluvial deposits, undifferentiated
  - Qpa2 — Older alluvial deposits, undifferentiated

Early Quaternary and Older

- Older deposits and bedrock

Lines

Contact, dashed where location uncertainty is greater than about +- 100 m.



Index map showing relation of central area to 9-county region.

This map supercedes the equivalent area of Knudsen and others (2000); that report remains the current source for the remainder of the 9-county region.

REFERENCE:

PORTION OF "MAPS OF QUATERNARY DEPOSITS AND LIQUEFACTION SUSCEPTIBILITY IN THE CENTRAL SAN FRANCISCO BAY REGION, CALIFORNIA," SHEET 1 OF 2, US GEOLOGICAL SURVEY, OPEN FILE REPORT 06-1037, 2006.

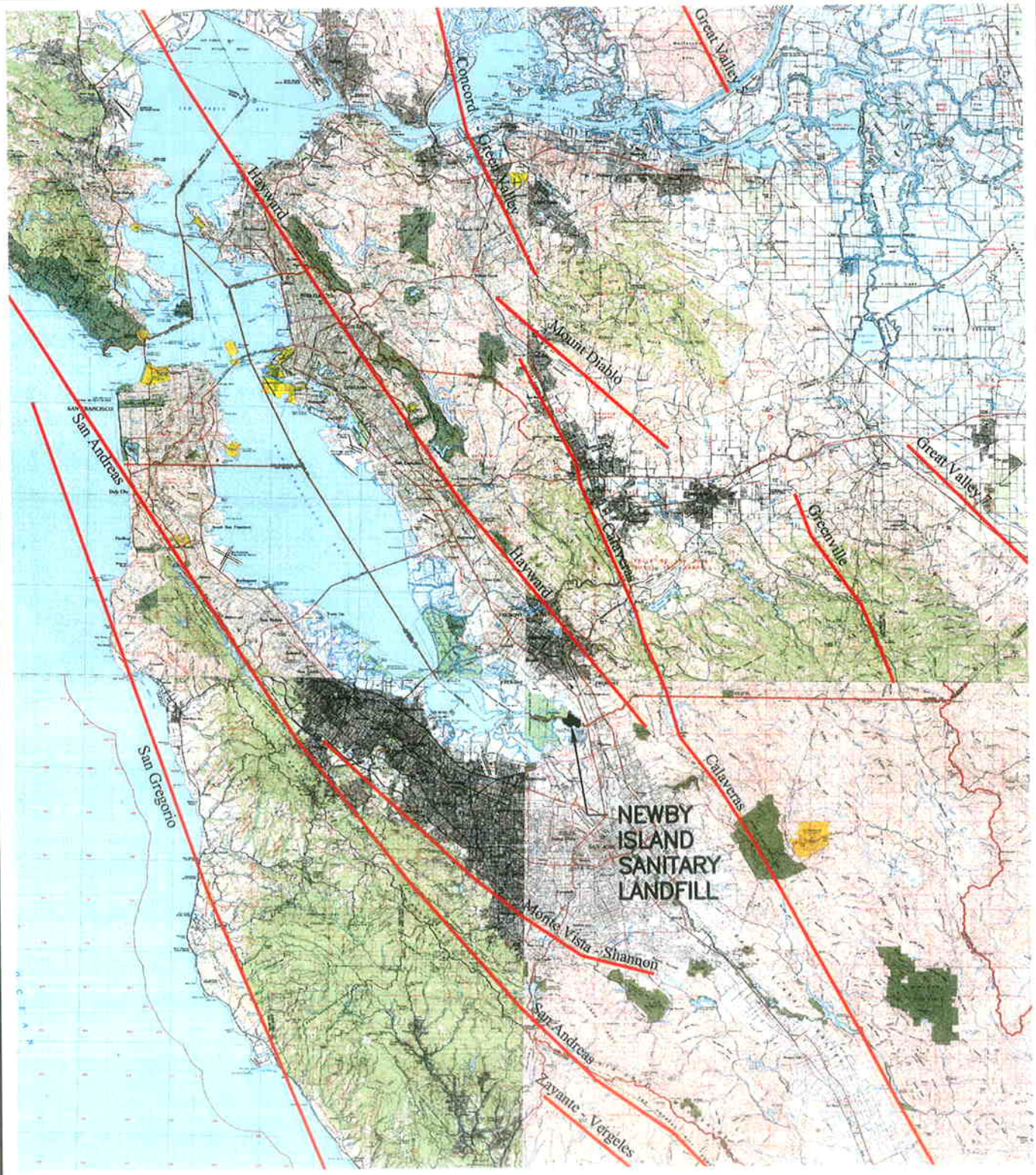
FIGURE 2-2

REGIONAL GEOLOGIC MAP

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



GRAPHIC SCALE

10 0 5 10 20

1 inch = 10 miles

Basemap: USGS 100,000-scale maps of Napa, Lodi, San Francisco, Stockton, Palo Alto, and San Jose Quadrangles. Fault traces based on 2002 USGS/CGS fault database as referenced by EQFAULT software (Thoms F. Blake, 2004) and converted from Lat/Lon to NAD27 SPCS Zone III by CORPSCON software V. 6.0.1 (US Army Corps of Engineers, 2004).

N

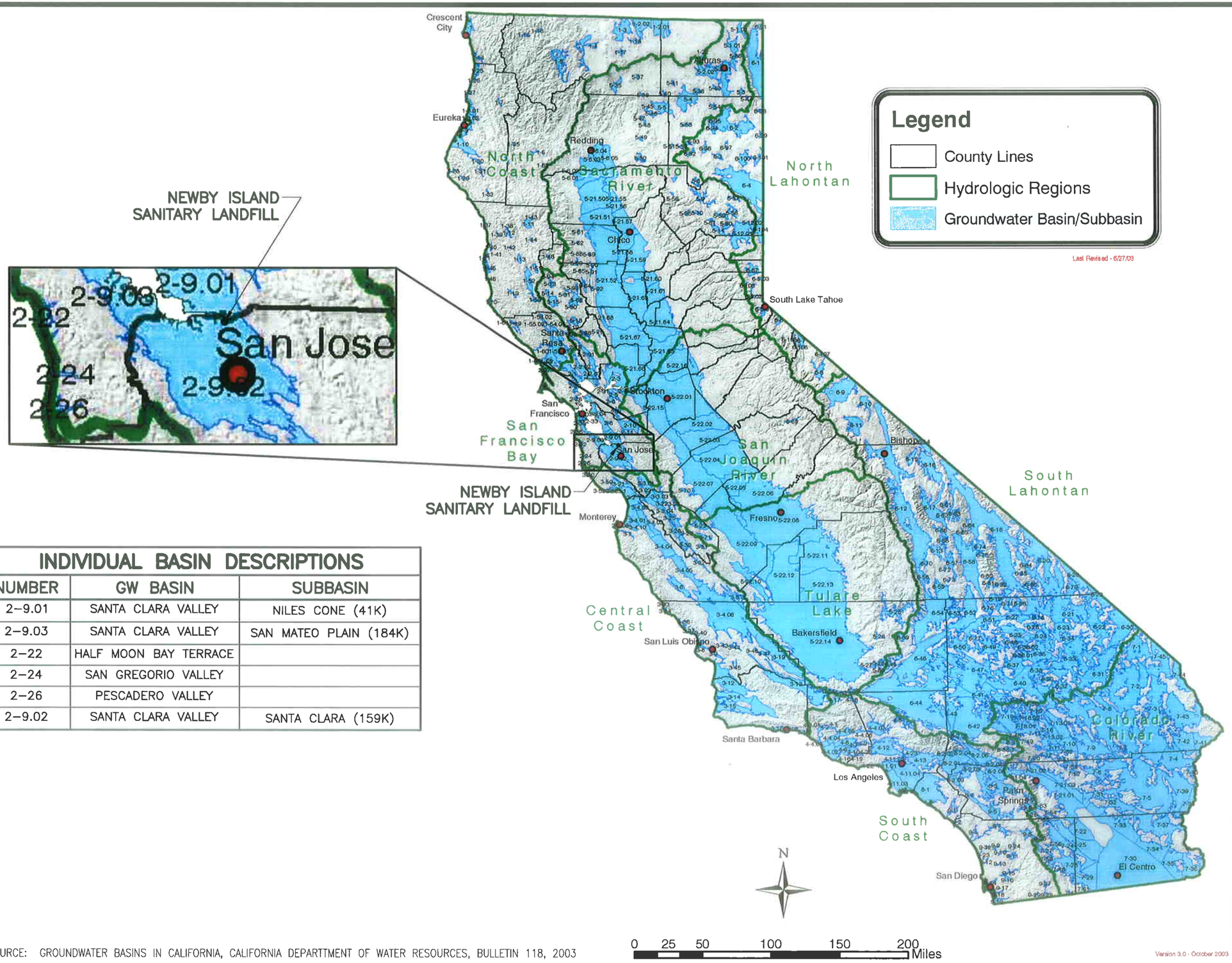
FIGURE 2-3

SAN FRANCISCO BAY AREA FAULT MAP

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



INDIVIDUAL BASIN DESCRIPTIONS

NUMBER	GW BASIN	SUBBASIN
2–9.01	SANTA CLARA VALLEY	NILES CONE (41K)
2–9.03	SANTA CLARA VALLEY	SAN MATEO PLAIN (184K)
2–22	HALF MOON BAY TERRACE	
2–24	SAN GREGORIO VALLEY	
2–26	PESCADERO VALLEY	
2–9.02	SANTA CLARA VALLEY	SANTA CLARA (159K)

SOURCE: GROUNDWATER BASINS IN CALIFORNIA, CALIFORNIA DEPARTTMENT OF WATER RESOURCES, BULLETIN 118, 2003

FIGURE 2–4

SOUTH SAN FRANCISCO BAY GROUNDWATER BASINS

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

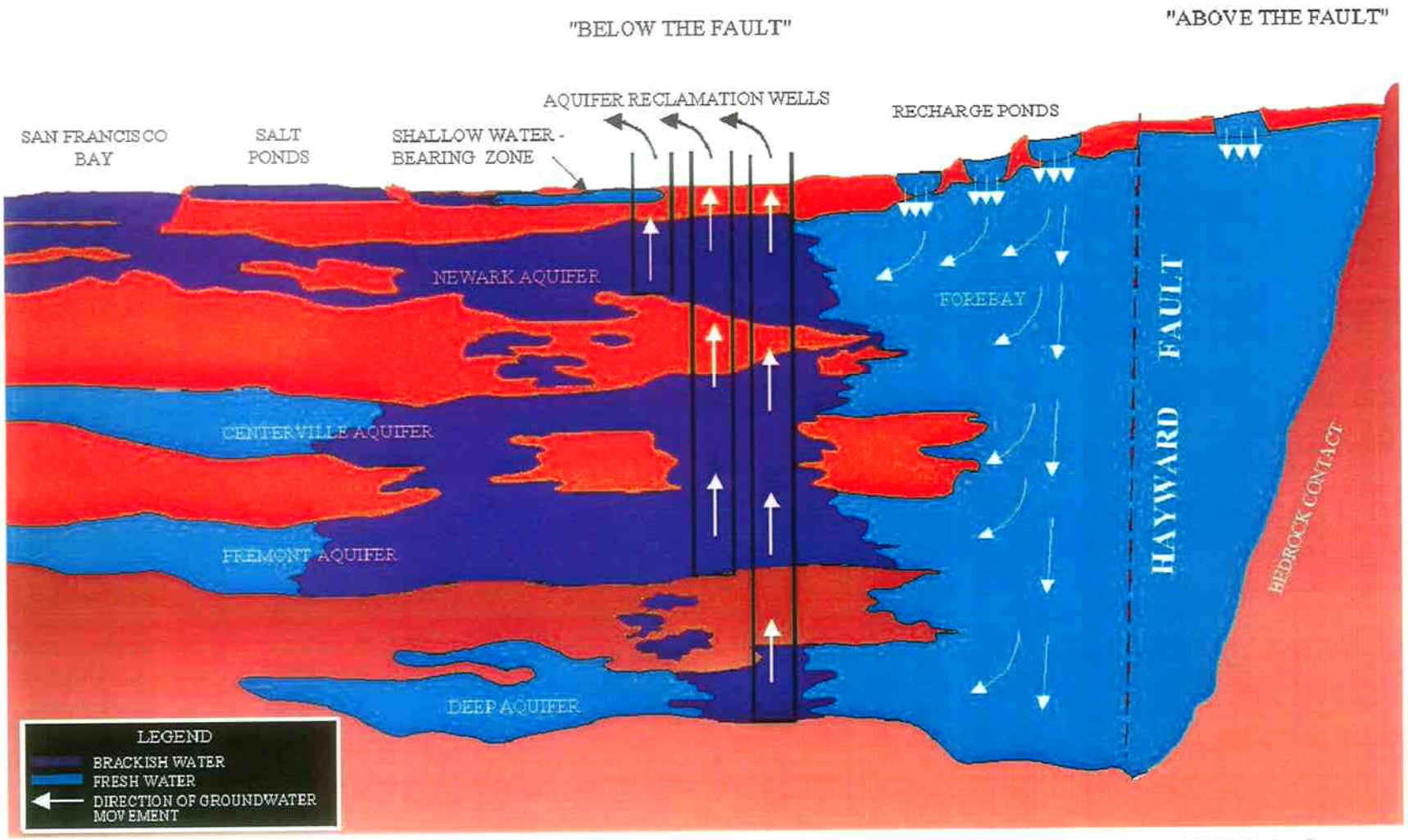


FIGURE 2–5

HYDROGEOLOGIC SCHEMATIC CROSS–SECTION

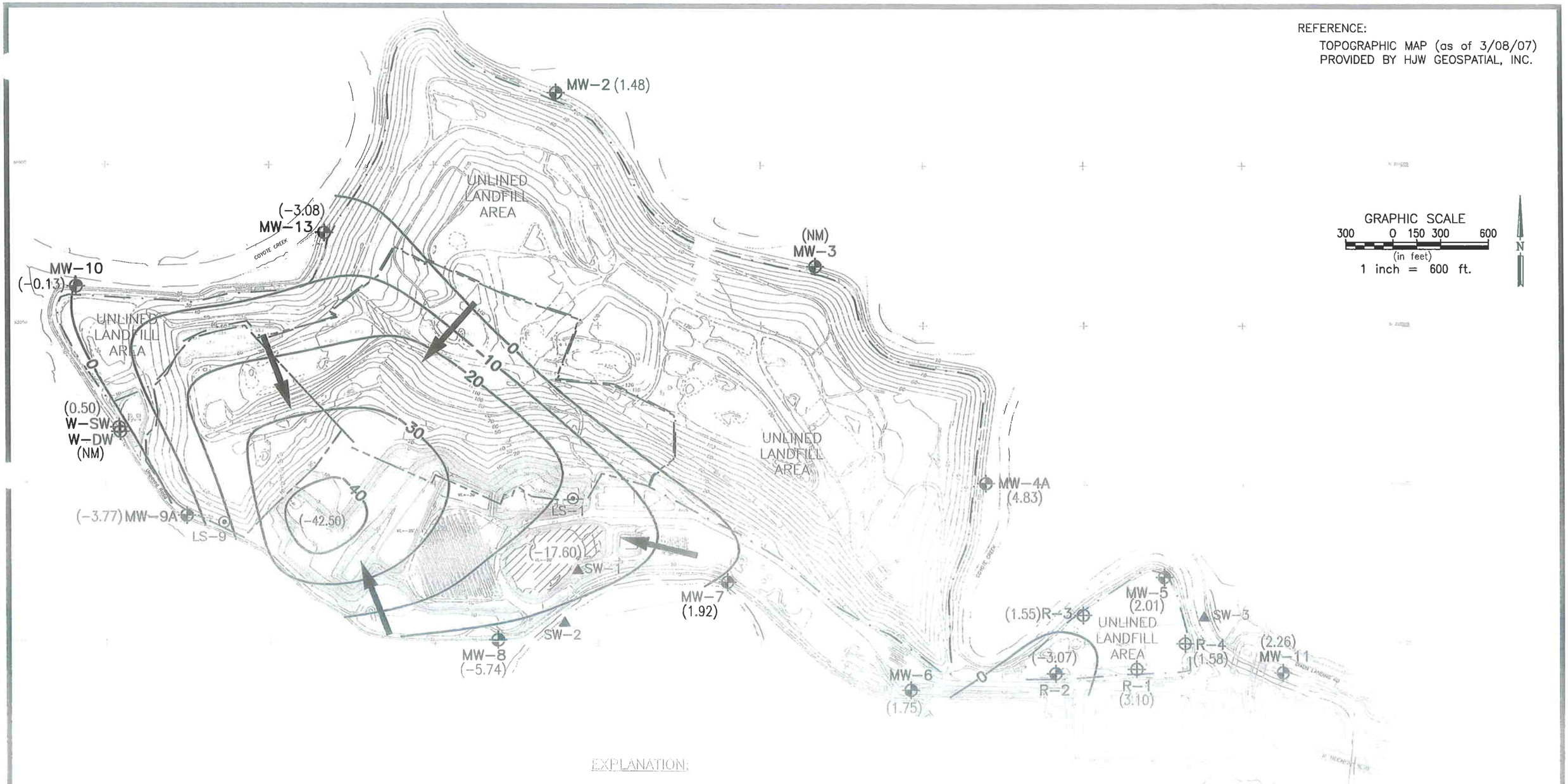
GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

SOURCE: ALAMEDA COUNTY WATER DISTRICT

REFERENCE:
TOPOGRAPHIC MAP (as of 3/08/07)
PROVIDED BY HJW GEOSPATIAL, INC.



EXPLANATION:

- GROUNDWATER MONITORING WELL LOCATION
- PIEZOMETER LOCATION
- TEMPORARY LEACHATE COLLECTION SUMP
- SURFACE WATER SAMPLING LOCATION
- (-3.08) GROUNDWATER ELEVATION (FEET ABOVE MSL)
- 20 CONTOUR LINE SHOWING GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS (CONTOUR INTERVAL = 10 FEET)
- DIRECTION OF GROUNDWATER FLOW
- (NM) GROUNDWATER ELEVATION NOT MEASURED
- CHAPTER 15 AREA LIMIT
- SUBTITLE D AREA LIMIT
- LIMIT OF UNLINED LANDFILL AREA

FIGURE 2-6

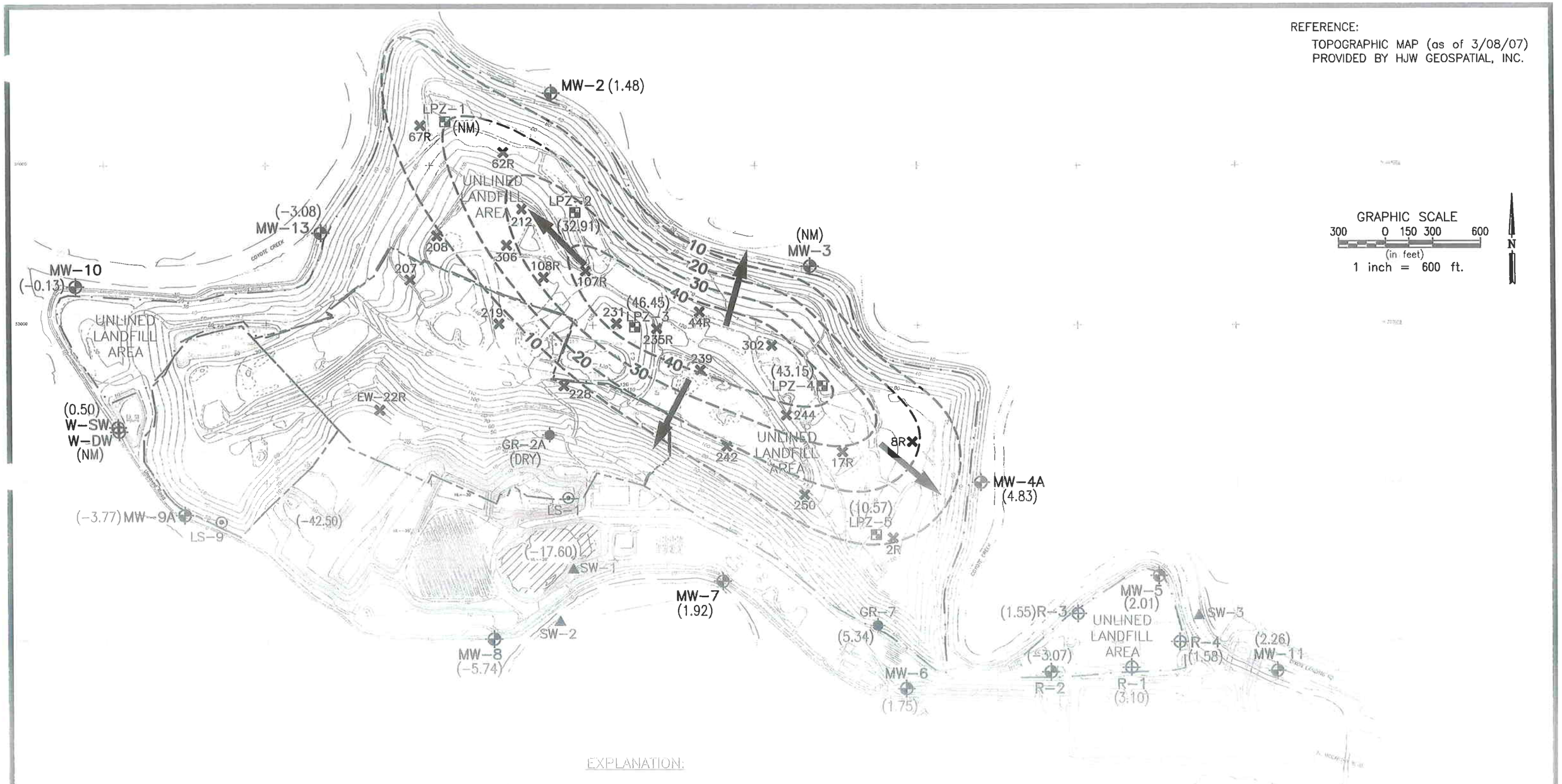
APRIL 2007 GROUNDWATER EQUIPOTENTIAL CONTOURS

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049

REFERENCE:
TOPOGRAPHIC MAP (as of 3/08/07)
PROVIDED BY HJW GEOSPATIAL, INC.



EXPLANATION:

- GROUNDWATER MONITORING WELL LOCATION
- PIEZOMETER LOCATION
- LEACHATE MONITORING WELL LOCATION
- TEMPORARY LEACHATE COLLECTION SUMP
- SURFACE WATER SAMPLING LOCATION
- LEACHATE PIEZOMETER LOCATION
- LEACHATE/LANDFILL GAS EXTRACTION WELL LOCATION

(32.91) LEACHATE OR GW ELEVATION (FEET ABOVE MSL)

20 CONTOUR LINE SHOWING LEACHATE POTENTIOMETRIC SURFACE ELEVATIONS (CONTOUR INTERVAL = 10 FEET)

DIRECTION OF GROUNDWATER FLOW

(NM) NOT MEASURED

CHAPTER 15 AREA LIMIT

SUBTITLE D AREA LIMIT

LIMIT OF UNLINED LANDFILL AREA

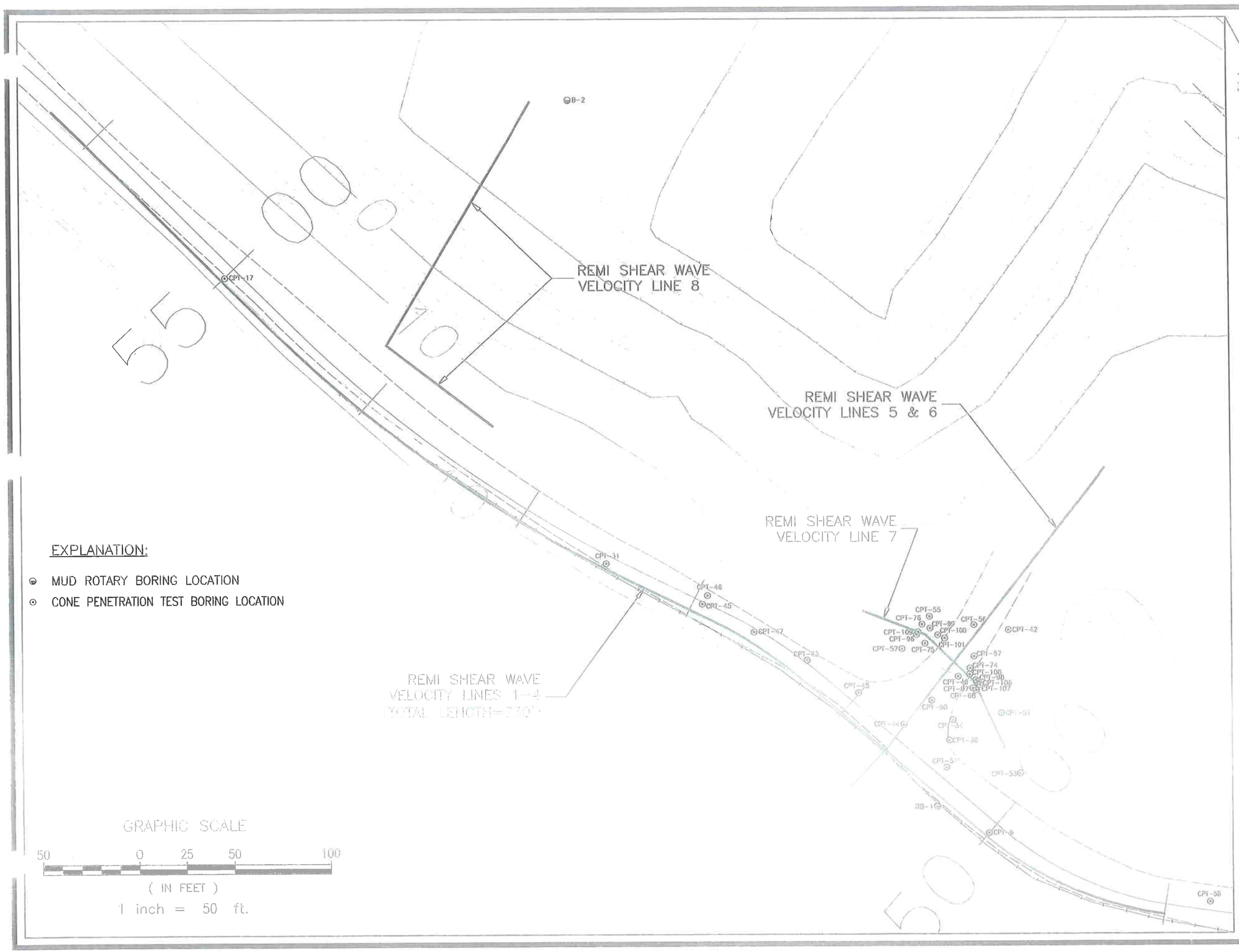
FIGURE 2-7

APRIL 2007 LEACHATE EQUIPOTENTIAL CONTOURS

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

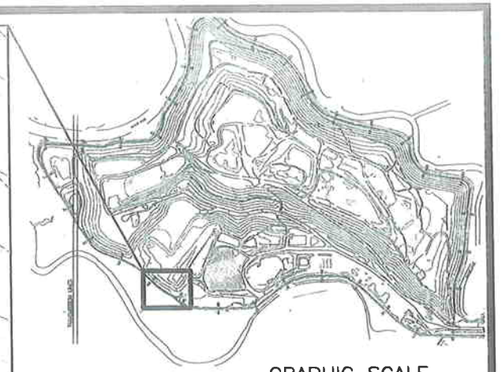
Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



EXPLANATION:

- MUD ROTARY BORING LOCATION
- CONE PENETRATION TEST BORING LOCATION



GRAPHIC SCALE
1000 0 500 1000 2000
(in feet)
1 inch = 2000 ft.

N

REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL INC

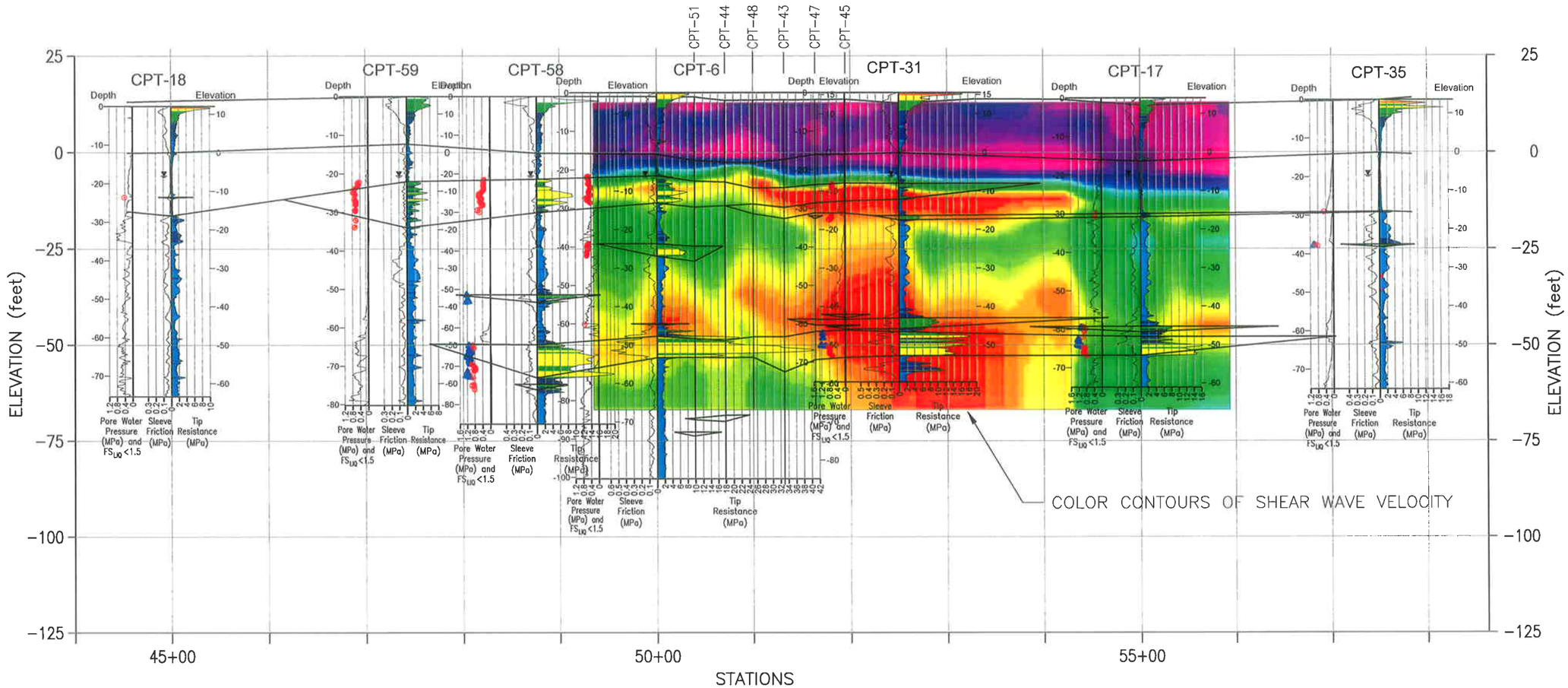
FIGURE 3-1

REMI SHEAR WAVE VELOCITY PLAN

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



SHEAR WAVE VELOCITY CONTOUR SCALE (FEET PER SECOND)

300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300

NOTE: FOR CLARITY, ONLY OUTLINES OF GEOLOGIC STRATA BASED ON GEOTECHNICAL BORINGS ARE SHOWN. SEE PLATE 2 FOR GEOLOGIC STRATA INFORMATION.

EXPLANATION:

CPT 'SOIL BEHAVIOR':

- GRAVELLY TO DENSE SAND
- CLEAN SAND TO SILTY SAND
- SILTY SAND TO SANDY SILT
- CLAYEY SILT TO SILTY CLAY
- SILTY CLAY TO CLAY
- ORGANIC SOIL

APPROXIMATE GEOLOGIC CONTACT

LIQUEFACTION FACTOR OF SAFETY (FS_{LIQ}) BASED ON AVERAGE OF THREE METHODS: YOUD ET AL. (2001), MOSS ET AL. (2006), AND IDRISS & BOULANGER (2007):

$1.0 \leq FS_{LIQ} < 1.3$

$FS_{LIQ} < 1.0$

PROFILE SCALES

HORIZ.: 1"= 120'

VERT.: 1"= 30'

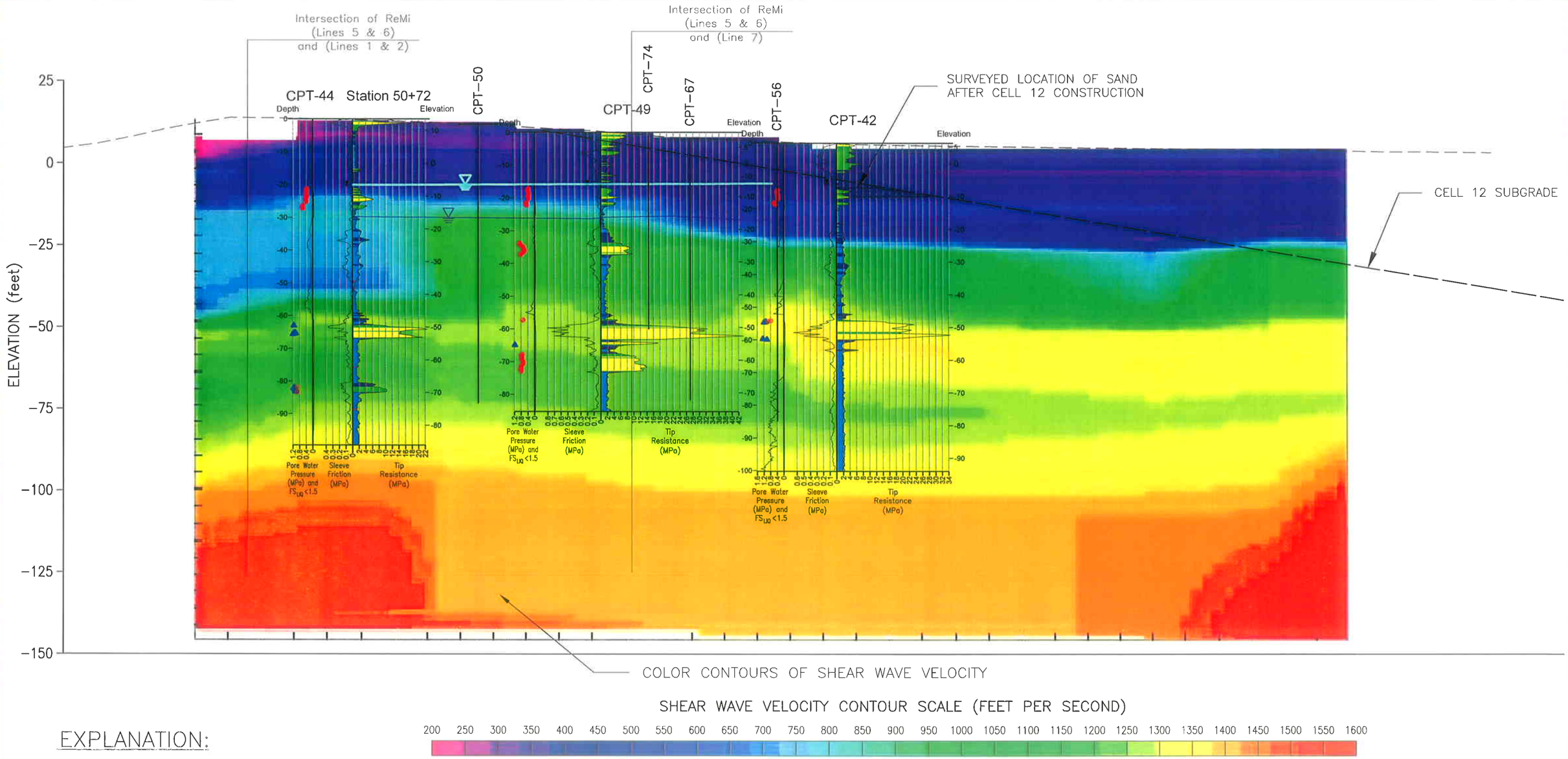
FIGURE 3-2

LINE 1-4 2D SHEAR WAVE VELOCITY SECTION

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



EXPLANATION:

CPT 'SOIL BEHAVIOR':

- GRAVELLY TO DENSE SAND
- CLEAN SAND TO SILTY SAND
- SILTY SAND TO SANDY SILT
- CLAYEY SILT TO SILTY CLAY
- SILTY CLAY TO CLAY
- ORGANIC SOIL

LIQUEFACTION FACTOR OF SAFETY (FS_{LIQ}) BASED ON AVERAGE OF THREE METHODS: YOUD ET AL. (2001), MOSS ET AL. (2006), AND IDRISS & BOULANGER (2007):

$1.0 \leq FS_{LIQ} < 1.3$

$FS_{LIQ} < 1.0$

PROFILE SCALES

HORIZ.: 1"= 15'

VERT.: 1"= 30'

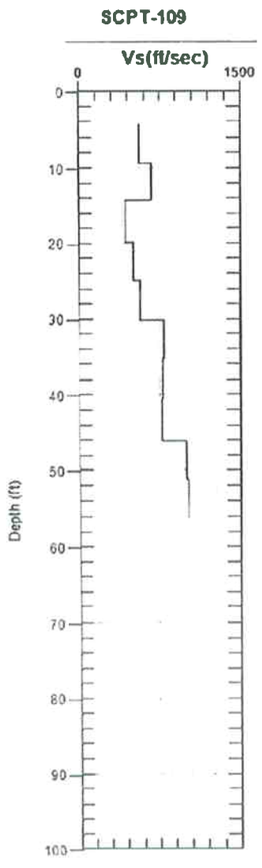
FIGURE 3-3

LINE 5-6 2D SHEAR WAVE VELOCITY SECTION

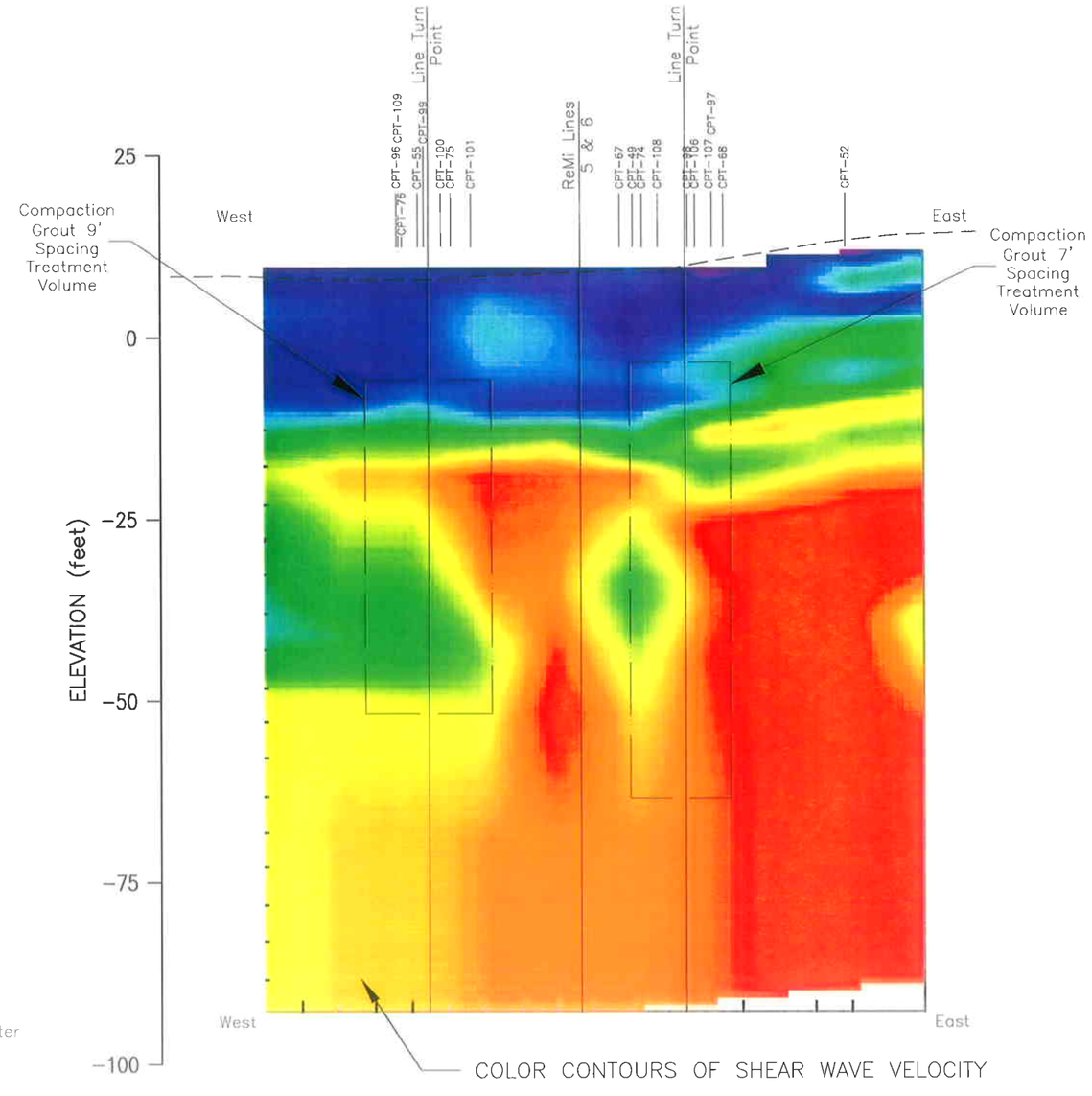
GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

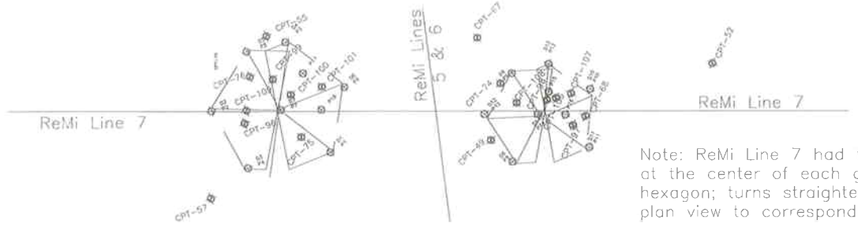
Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



Note: CPT-109 was performed after Secondary Grouting (whereas ReMi Line 7 is Post-Primary Grout)





Note: ReMi Line 7 had turn points at the center of each grout hexagon; turns straightened out in plan view to correspond to profile.

SHEAR WAVE VELOCITY CONTOUR SCALE (FEET PER SECOND)

200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300

GRAPHIC SCALE

10 0 5 10 20

(in feet)

1 inch = 20 ft.

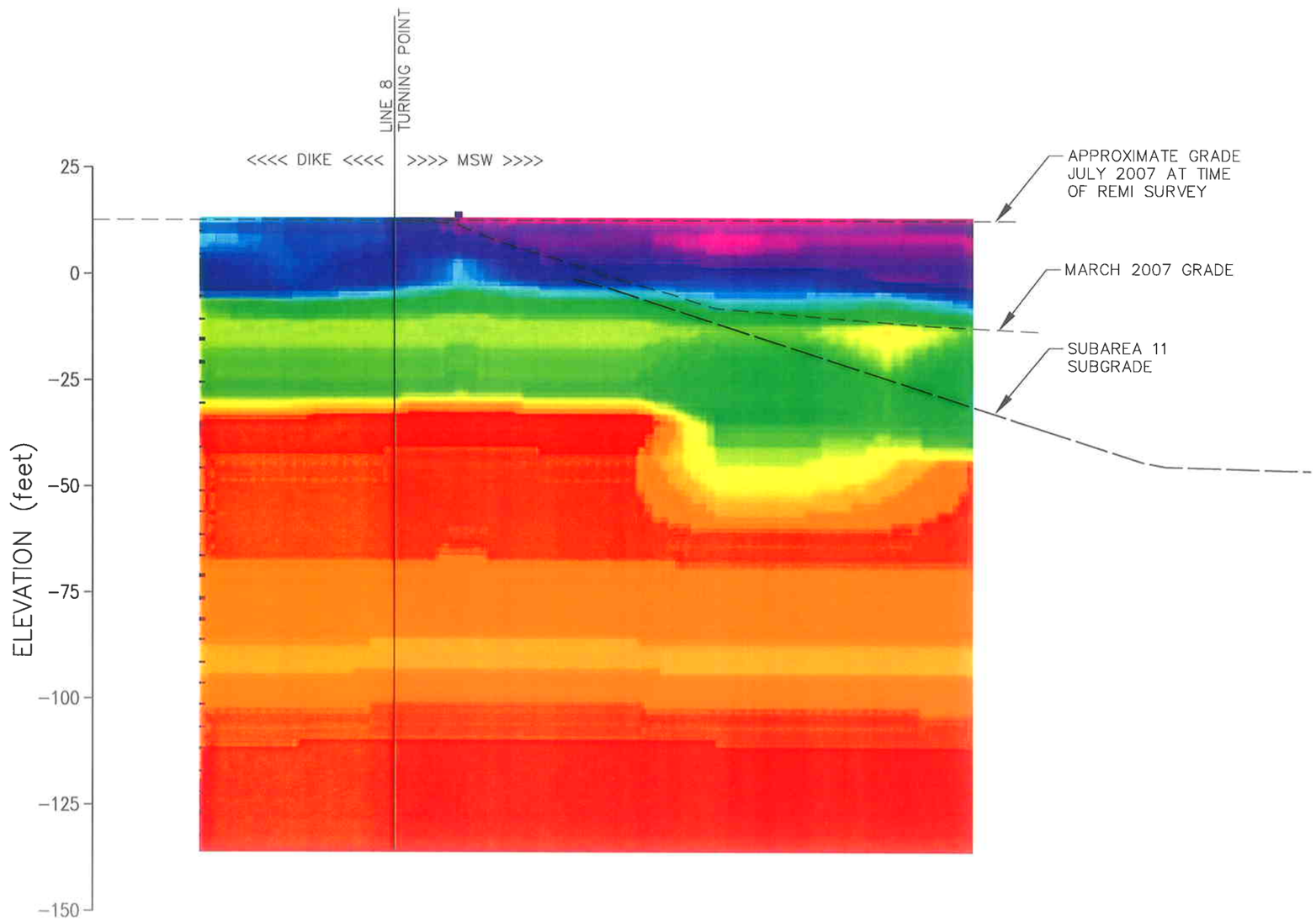
FIGURE 3-4

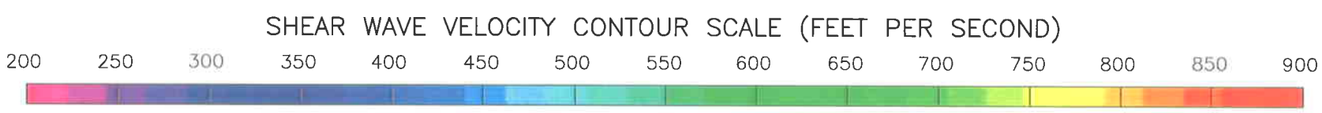
LINE 7 2D SHEAR WAVE VELOCITY SECTION

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049





GRAPHIC SCALE

15 0 7.5 15 30

(in feet)

1 inch = 30 ft.

FIGURE 3–5

LINE 8 2D SHEAR WAVE VELOCITY SECTION

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

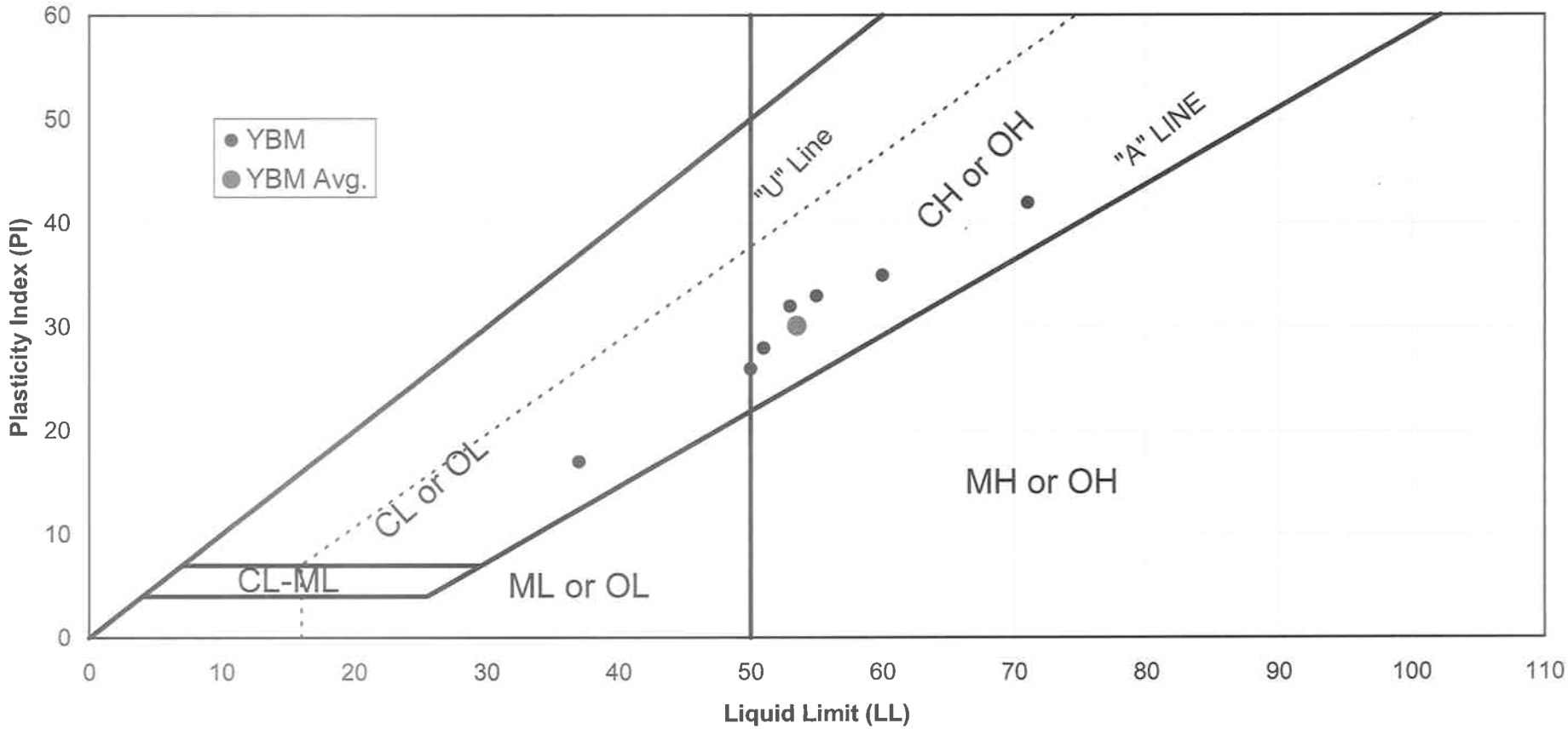


FIGURE 4-1

YOUNG BAY MUD PLASTICITY

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

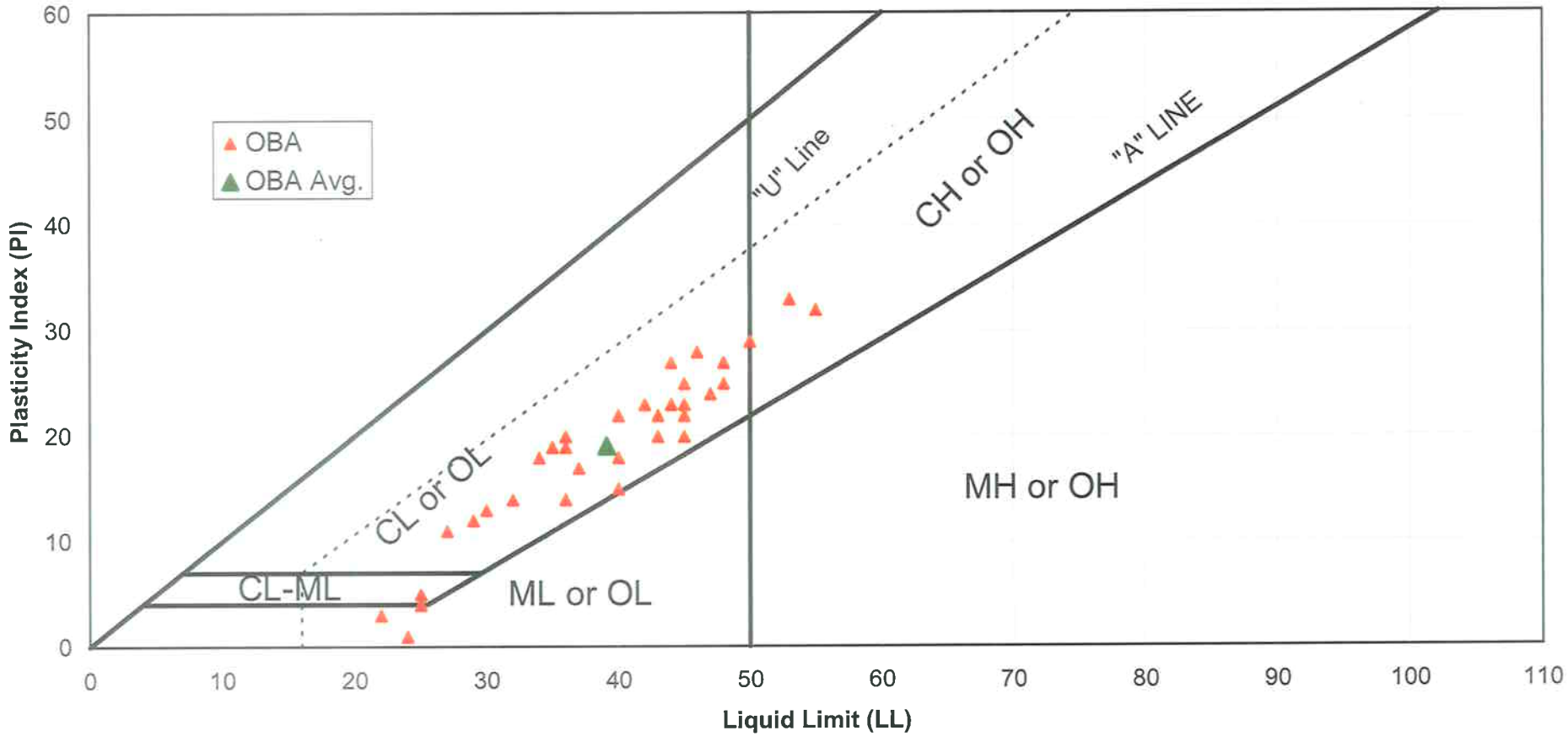


FIGURE 4-2

OLDER BAY ALLUVIUM PLASTICITY

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

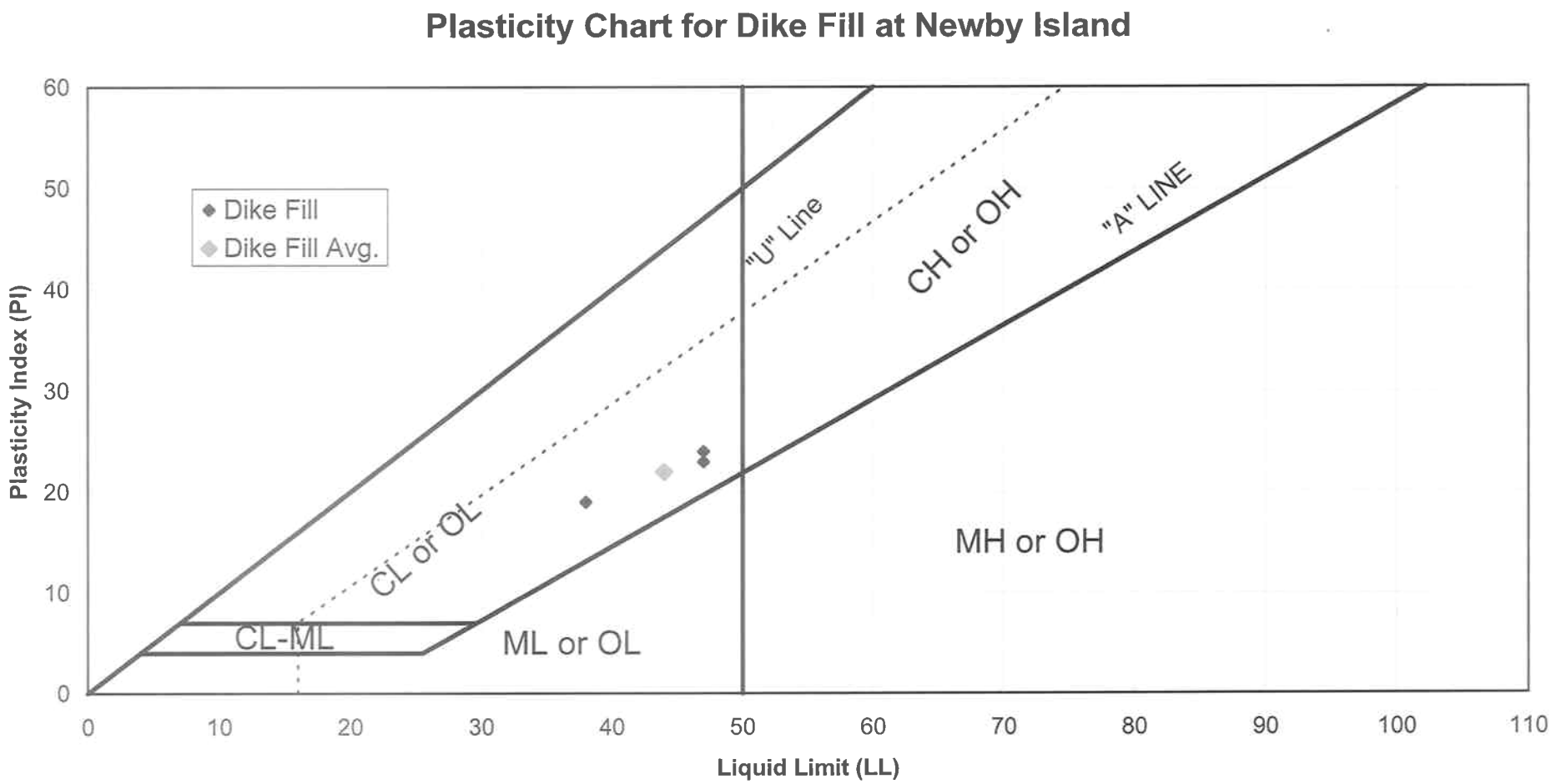


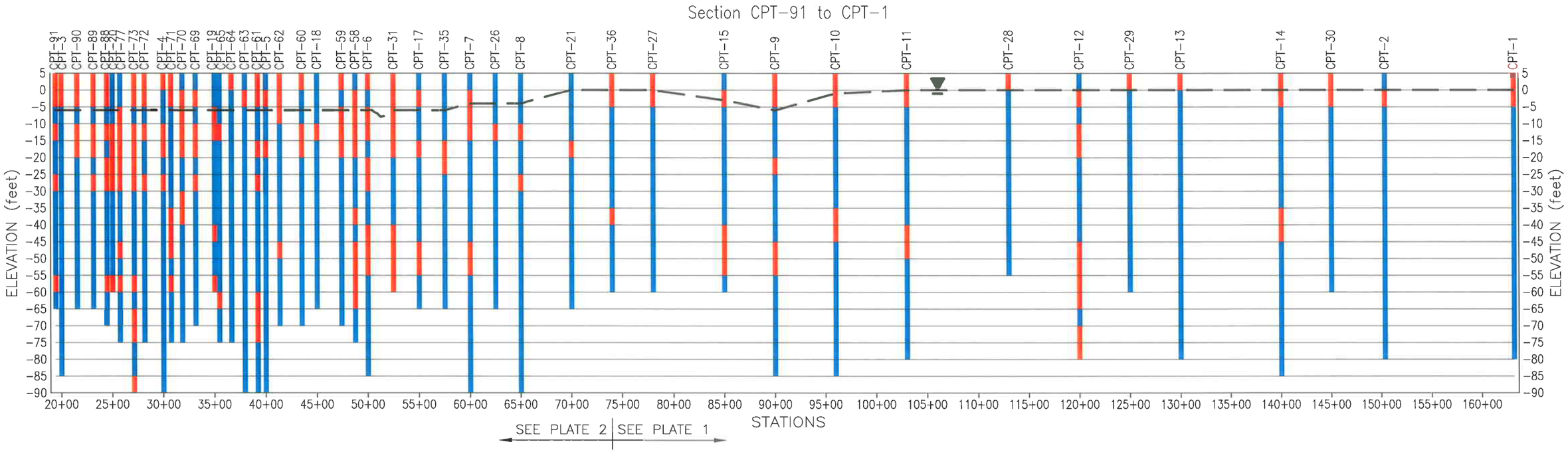
FIGURE 4-3

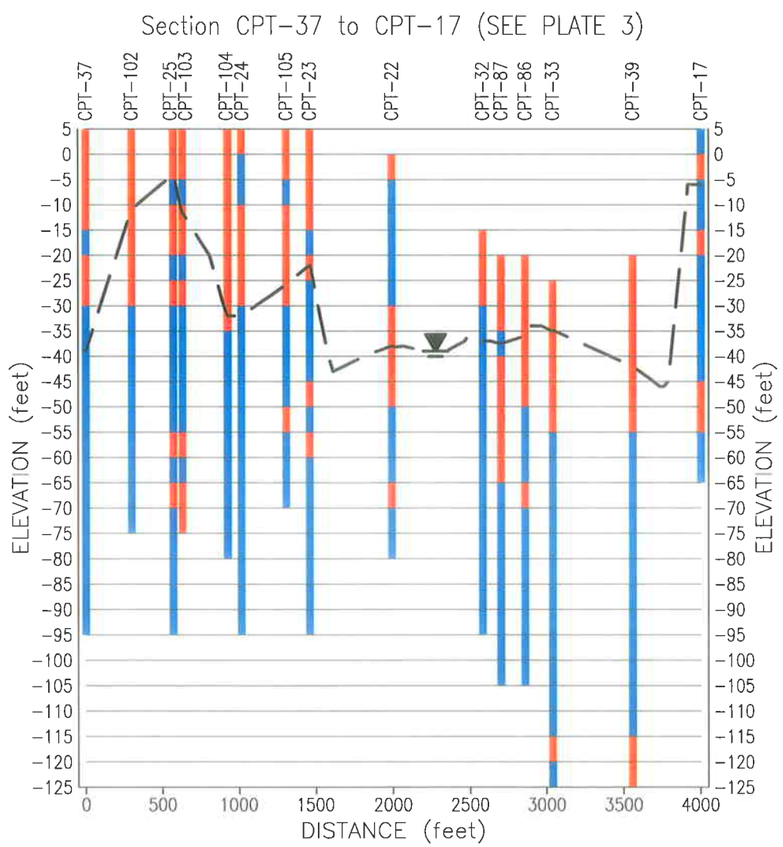
YOUNG BAY MUD PLASTICITY

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049





EXPLANATION:

SAND OR SILTY SAND BEARING INTERVAL

NONLIQUEFIABLE CLAY OR SILT

APPROXIMATE PIEZOMETRIC SURFACE

NOTES:

1. Entire five-foot elevation intervals within which any one or more two-inch CPT sounding indicates the presence of sand or silty sand are colored orange. Intervals within which only clayey silt, silty clay, or clay are indicated are colored blue.

2. Stratigraphy is not shown above elevation 5 feet; materials above this elevation are generally perimeter levee fill.

SCALES:

HORIZ.: 1"= 1000'

VERT.: 1"= 30'

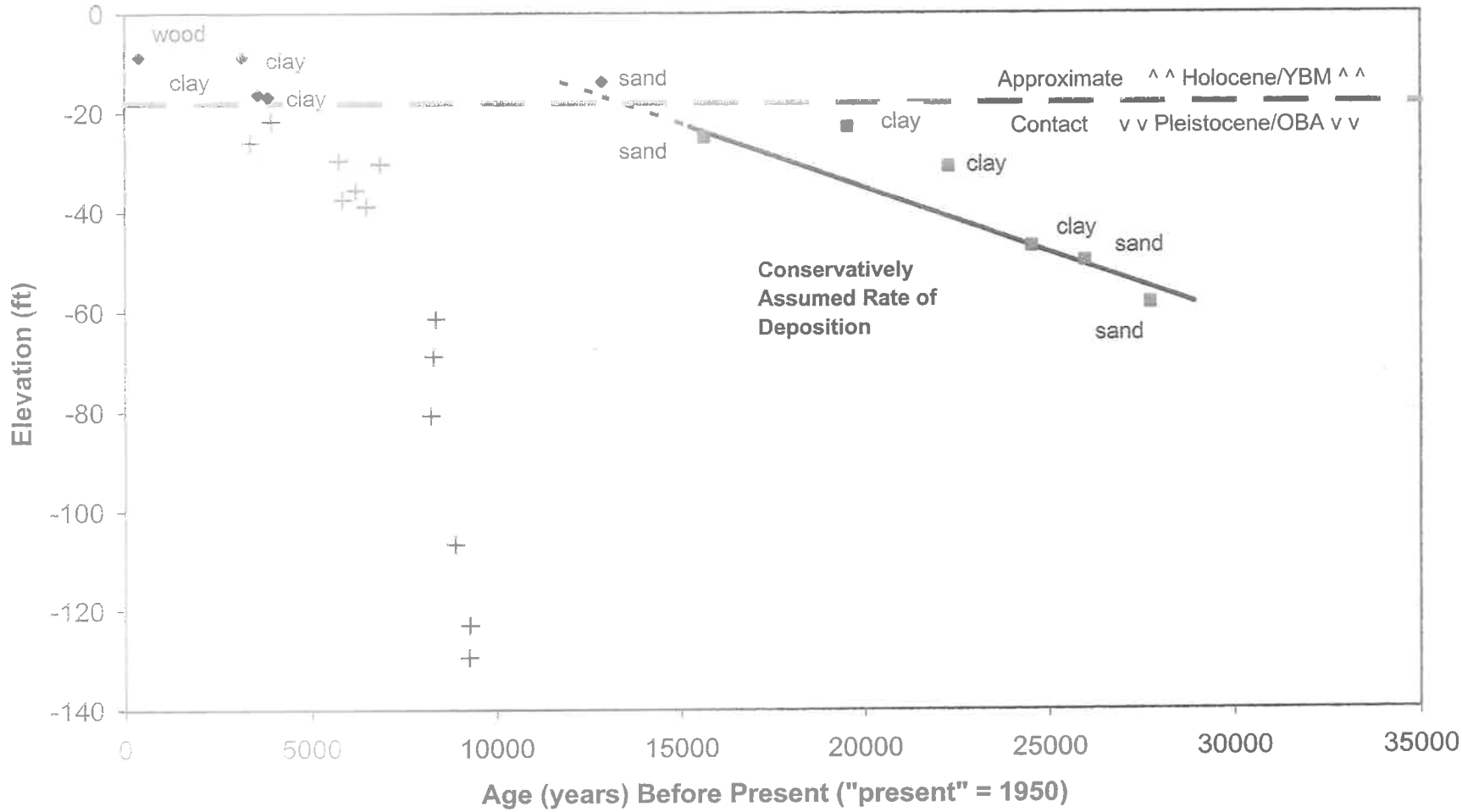
FIGURE 5-1

SIMPLIFIED CPT STRATIGRAPHIC CHARTS

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



YBM & Sands

OBA & Sands

Depth Correlated Age1

Atwater et al. (1977) sea-level change data

Approximate Holocene/Pleistocene & YBM/OBA Contact

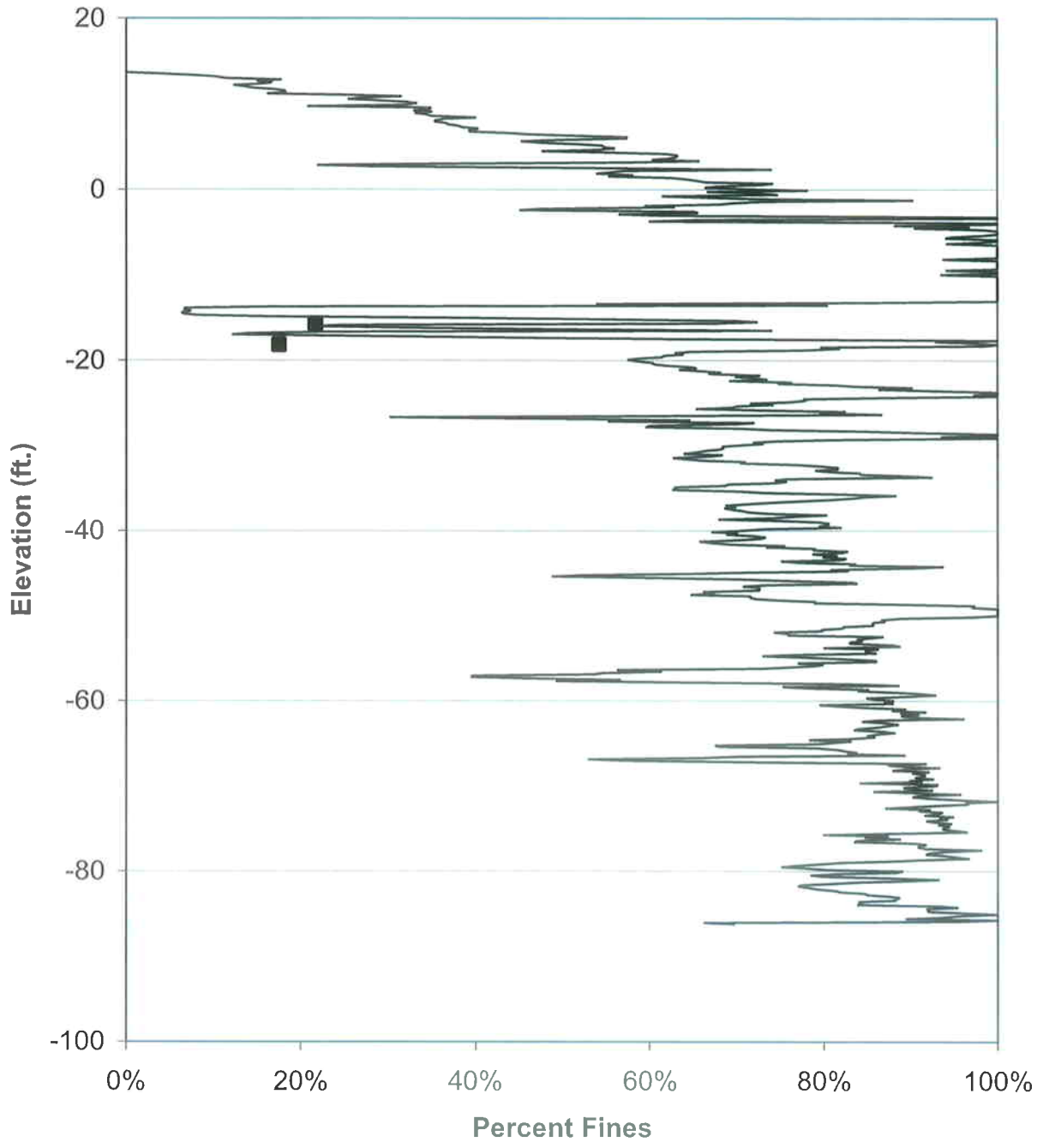
FIGURE 5-2

RADIOCARBON SEDIMENT AGE

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: May 2008	JOB NO.: 2004-049



—— CPT

■ Lab

Notes: 1. Lab values from adjacent Boring RB-2.
2. CPT-based estimates of sand fines content based on Robertson and Wride (1998).

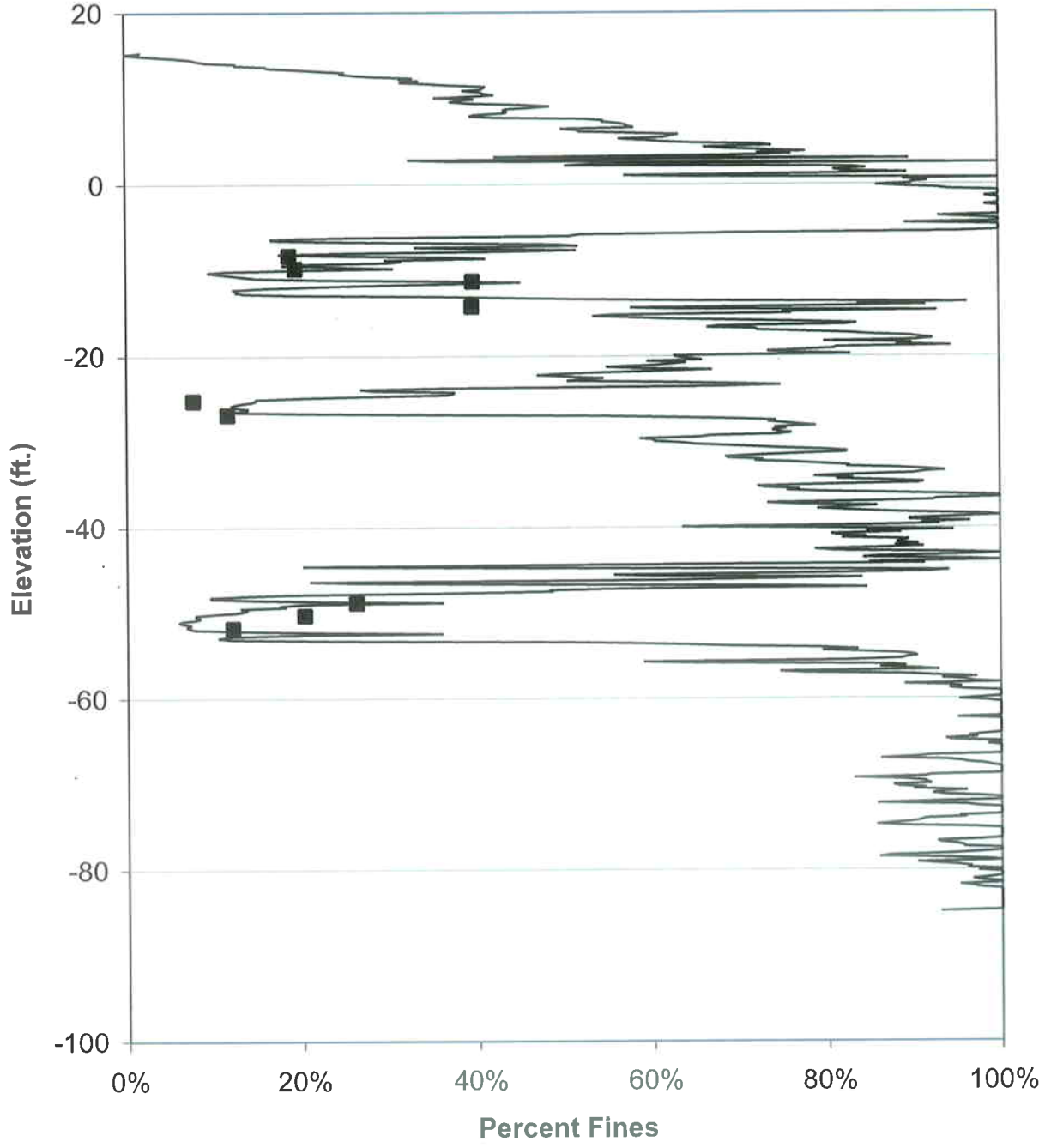
FIGURE 5-3A

LAB VS. CPT FINES: CPT-4

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



—— CPT

■ Lab

Notes: 1. Lab values from adjacent Boring RB-1.
2. CPT-based estimates of sand fines content based on Robertson and Wride (1998).

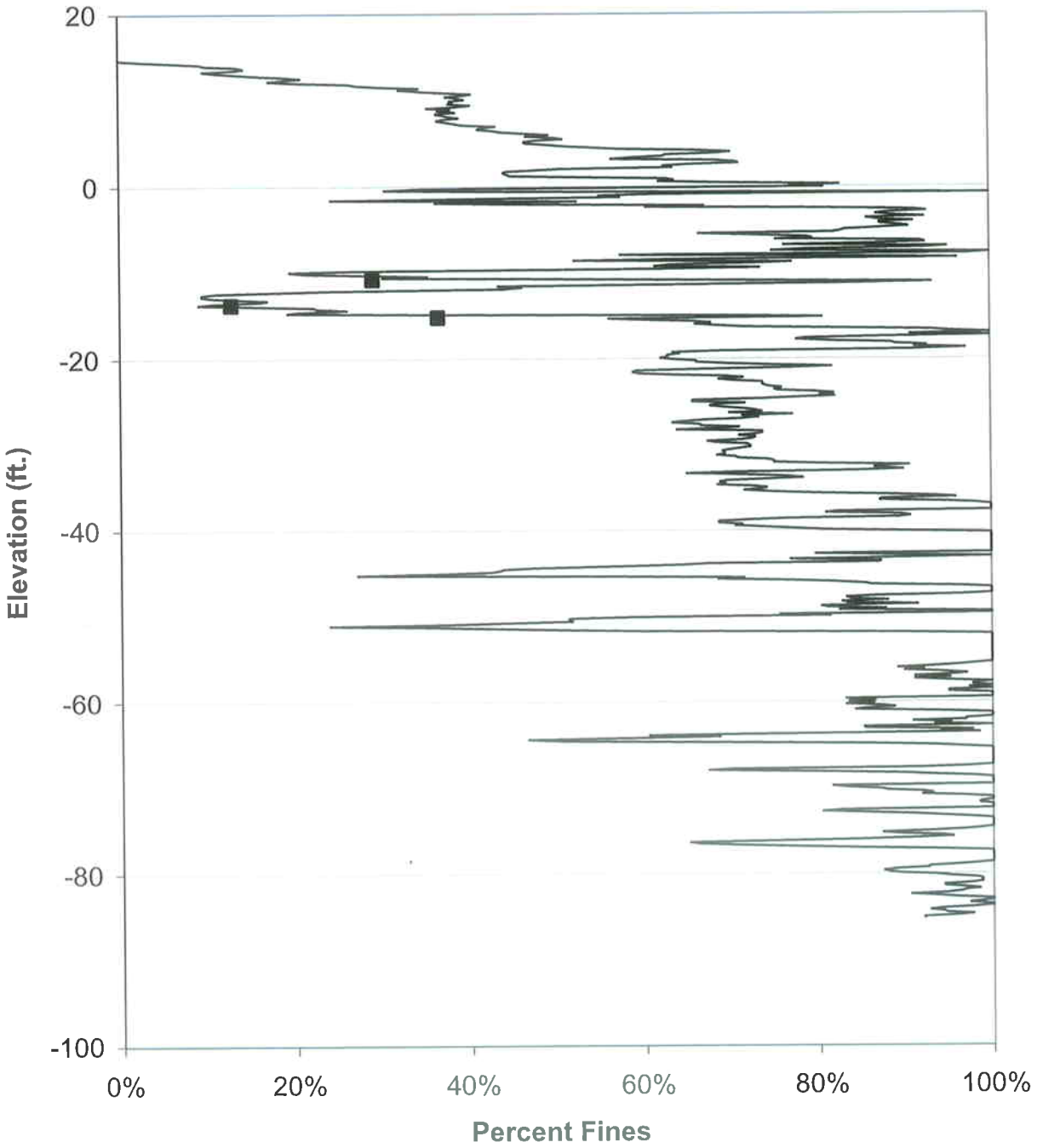
FIGURE 5-3B

LAB VS. CPT FINES: CPT-6

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



—— CPT

■ Lab

Notes: 1. Lab values from adjacent Boring RB-8.
2. CPT-based estimates of sand fines content based on Robertson and Wride (1998).

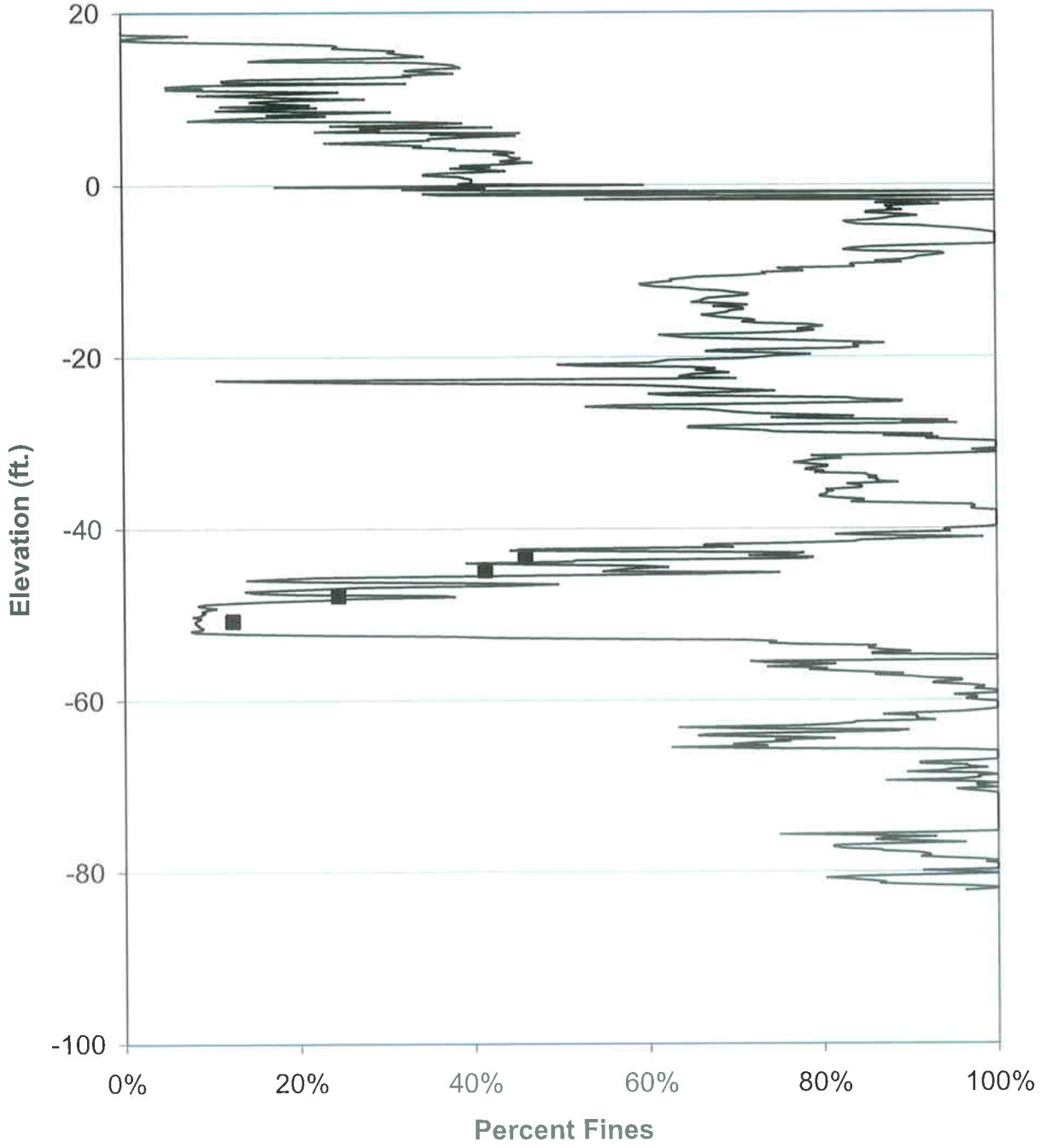
FIGURE 5-3C

LAB VS. CPT FINES: CPT-7

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



—— CPT

■ Lab

Notes: 1. Lab values from adjacent Boring RB-5.
2. CPT-based estimates of sand fines content based on Robertson and Wride (1998).

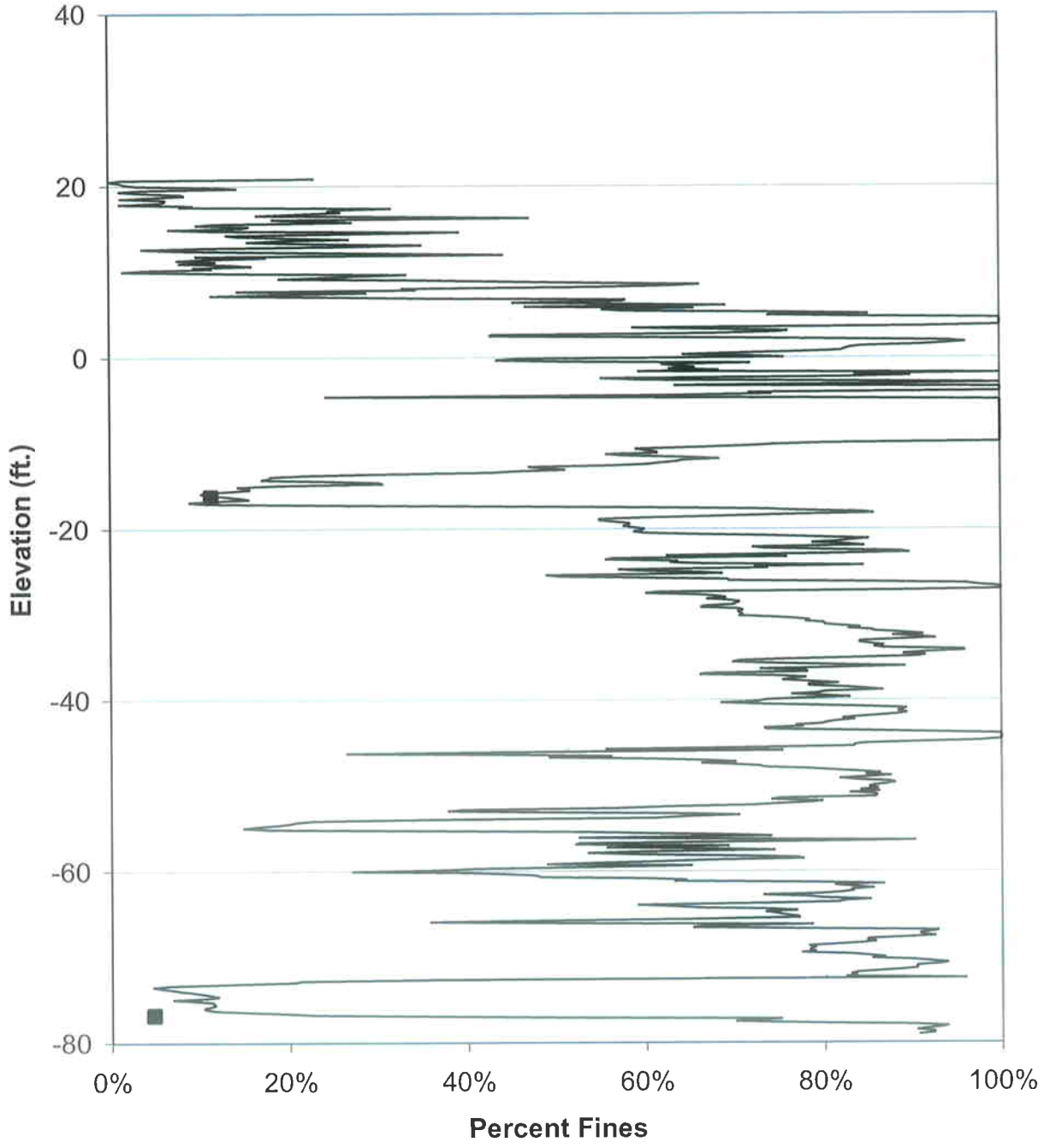
FIGURE 5-3D

LAB VS. CPT FINES: CPT-9

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



—— CPT

■ Lab

Notes: 1. Lab values from adjacent Boring RB-6.
2. CPT-based estimates of sand fines content based on Robertson and Wride (1998).

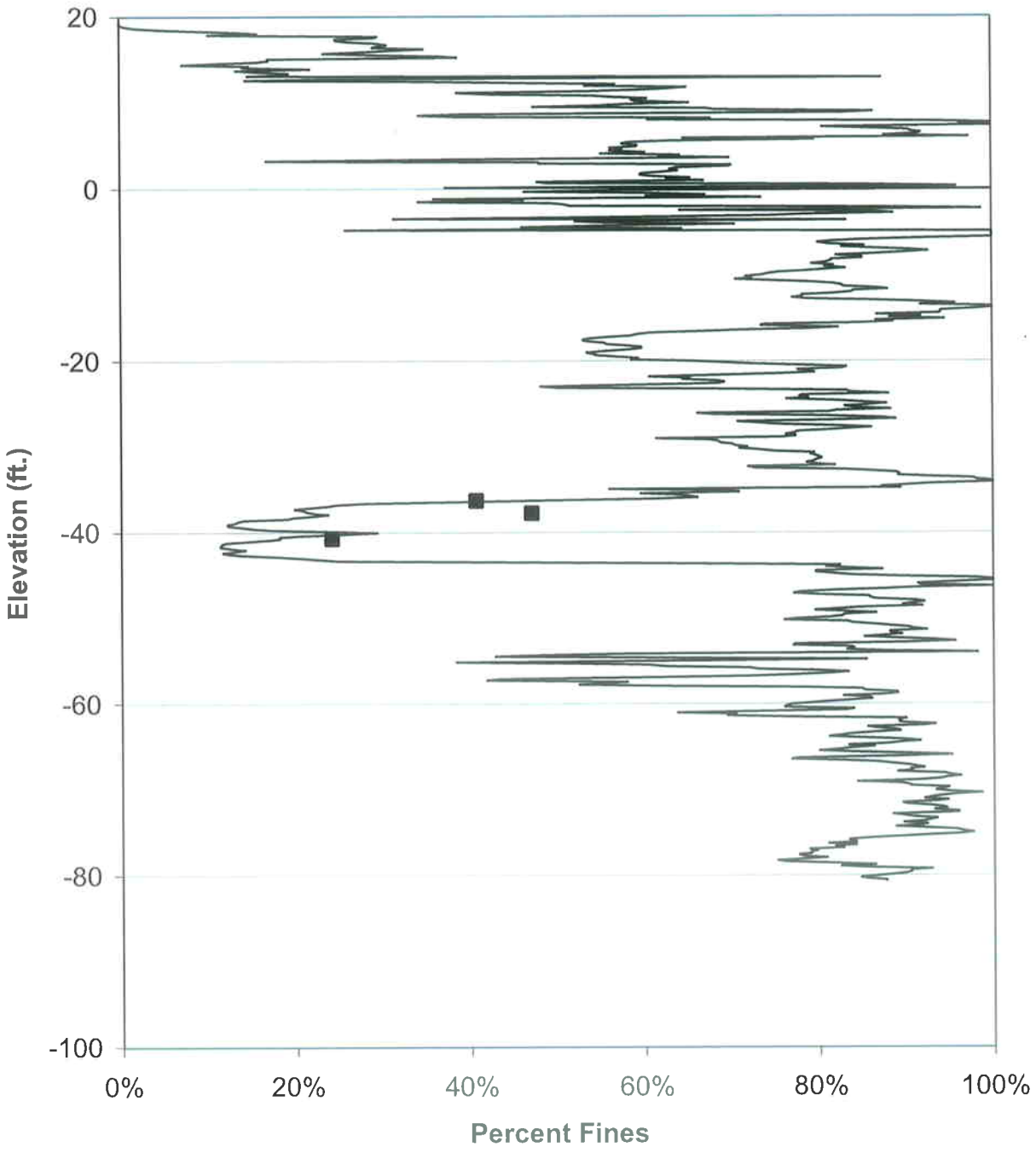
FIGURE 5-3E

LAB VS. CPT FINES: CPT-12

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



—— CPT

■ Lab

Notes: 1. Lab values from adjacent Boring RB-4.
2. CPT-based estimates of sand fines content based on Robertson and Wride (1998).

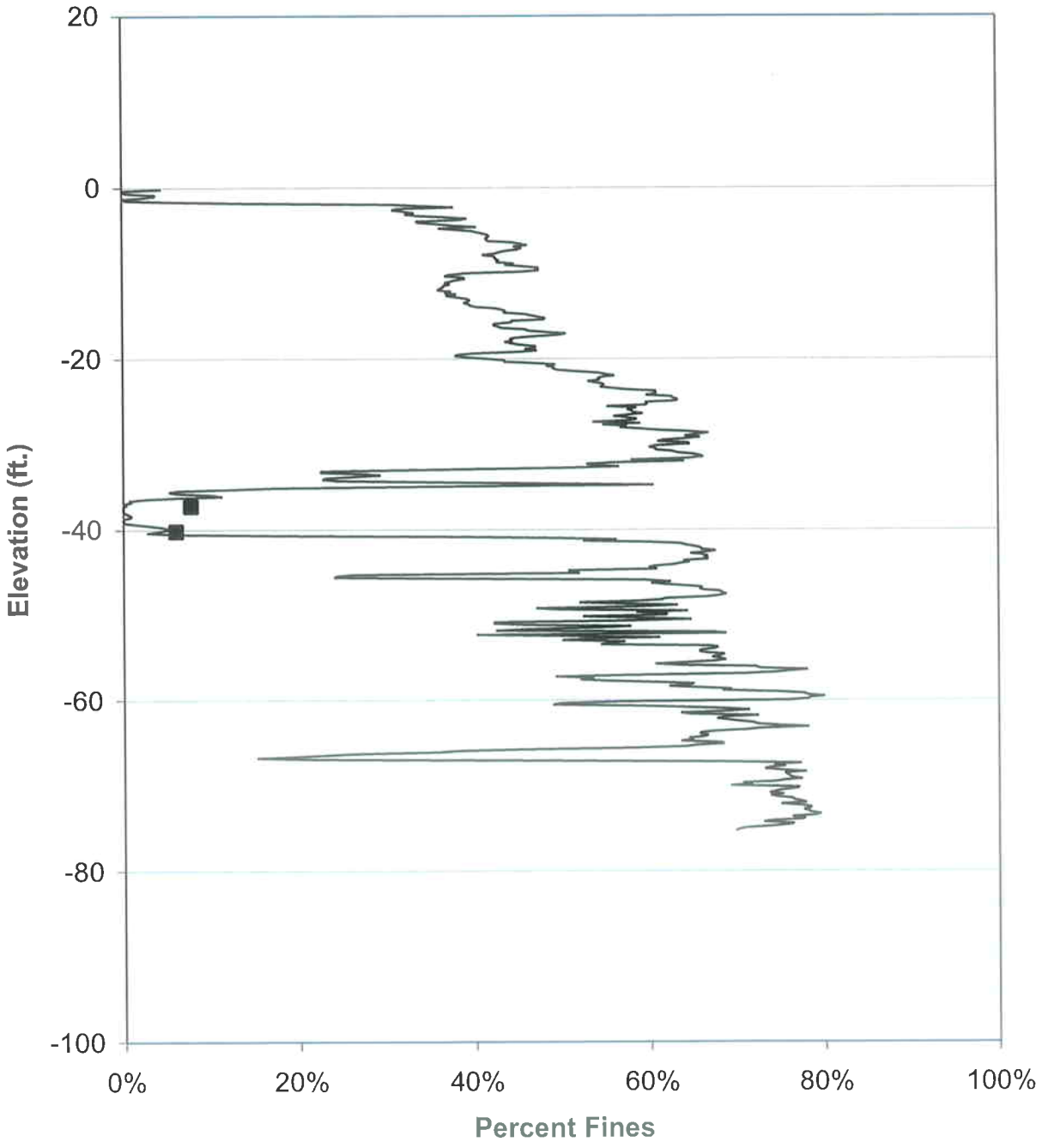
FIGURE 5-3F

LAB VS. CPT FINES: CPT-14

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



—— CPT

■ Lab

Notes: 1. Lab values from adjacent Boring RB-7.
2. CPT-based estimates of sand fines content based on Robertson and Wride (1998).

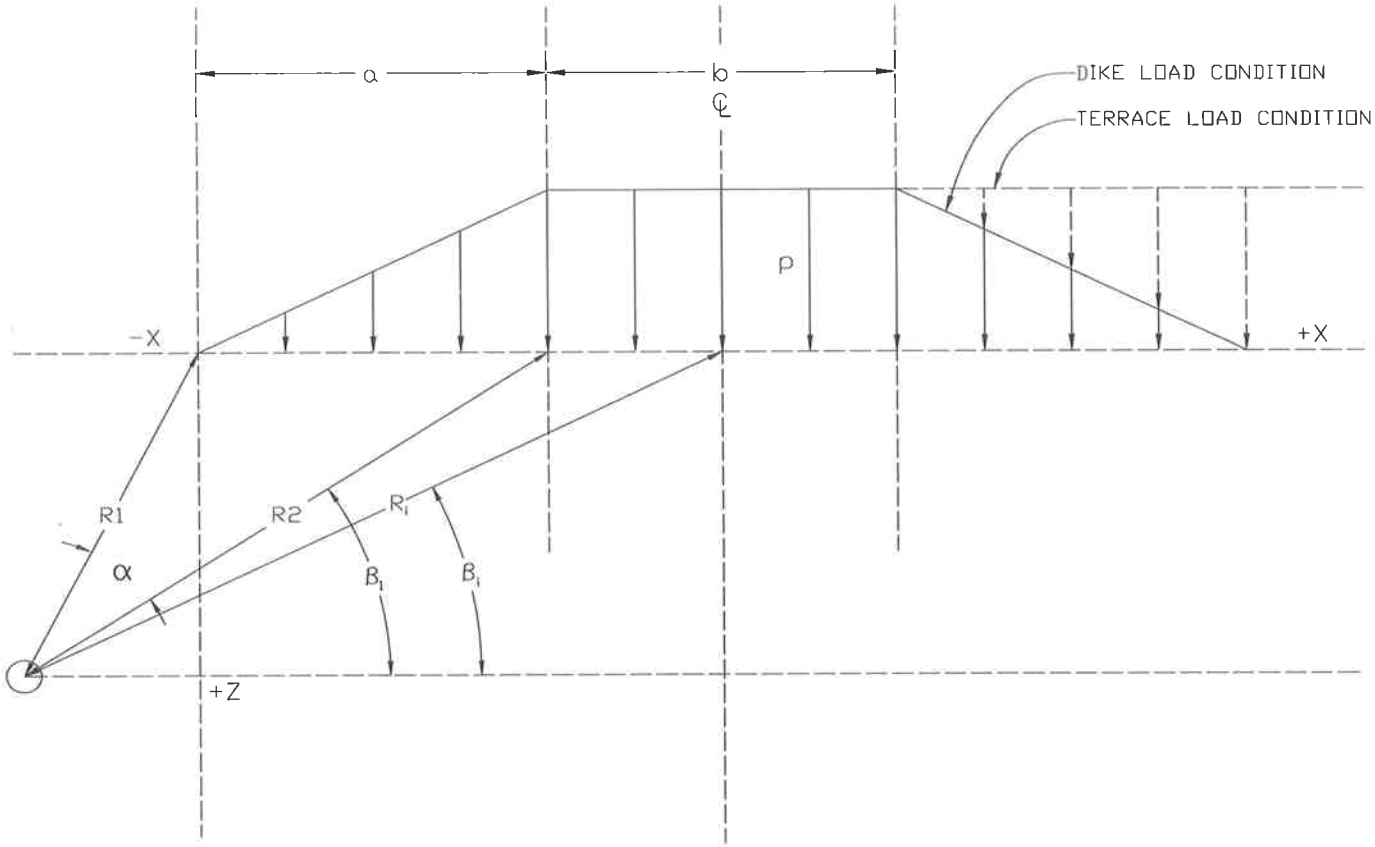
FIGURE 5-3G

LAB VS. CPT FINES: CPT-22

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Z (feet)	σ_z Dike (% of p)	σ_z Terrace Only (% of p)
0.1	100.0%	100.0%
1	100.0%	100.0%
2	99.9%	100.0%
3	99.8%	99.9%
4	99.6%	99.8%
5	99.3%	99.6%
10	95.9%	97.9%
15	90.4%	95.2%
20	84.1%	92.1%
25	77.8%	88.9%
30	71.9%	85.9%
40	61.5%	80.7%
50	53.1%	76.5%
60	46.4%	73.2%
70	41.1%	70.5%
80	36.7%	68.4%
90	33.2%	66.6%
100	30.2%	65.1%

p = 1
a = 30
b = 20
X = 40

Source: NAVFAC DM 7.1, pg. 7.1-166

Not to Scale

FIGURE 5-4

DIKE & TERRACE STRESS CONDITIONS

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

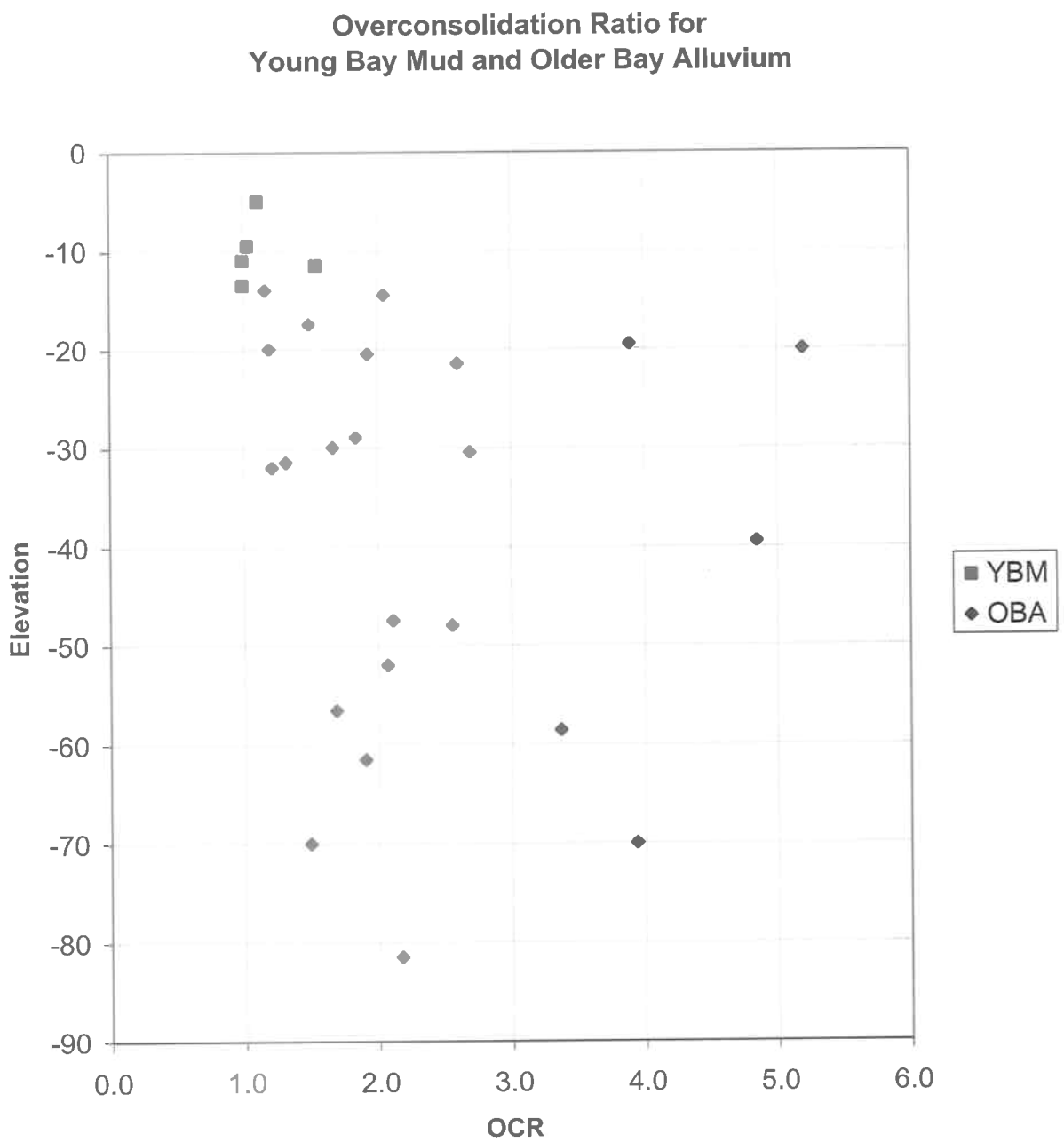


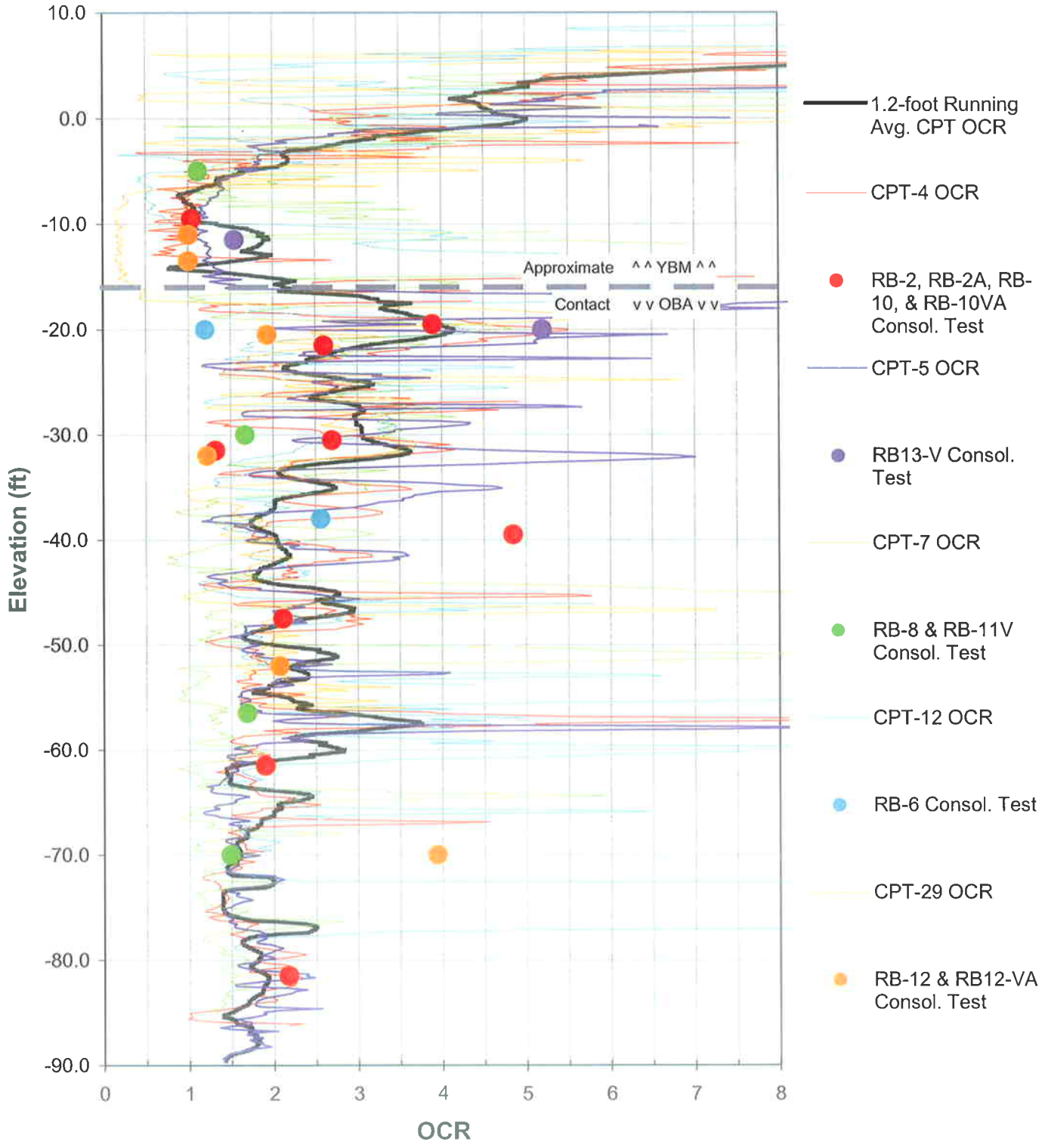
FIGURE 5-5

OCR VS. DEPTH

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Note: CPT-based estimation of OCR was performed by estimating the preconsolidation stress using Mayne and Holtz (1988), i.e. $\sigma_p' = 0.33(q_T - \sigma_{vo})$.

Laboratory consolidation test and CPT OCR data are from pairs of adjacent borings which which are like-colored in the above chart.

FIGURE 5-6

LAB VS. CPT OVERCONSOLIDATION RATIO

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

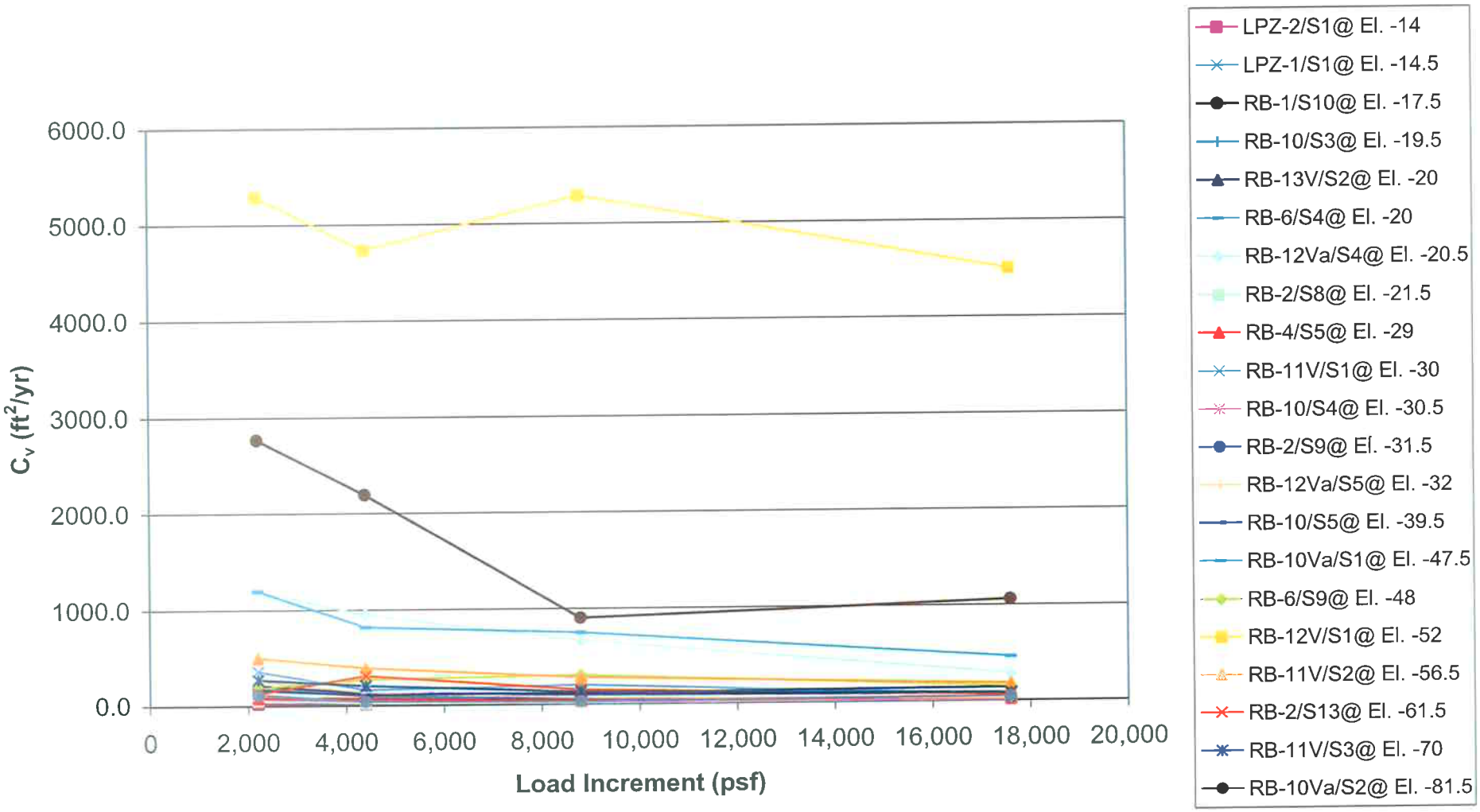


FIGURE 5-7

ALL OBA TIME CONSOLIDATION DATA

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

Not to Scale

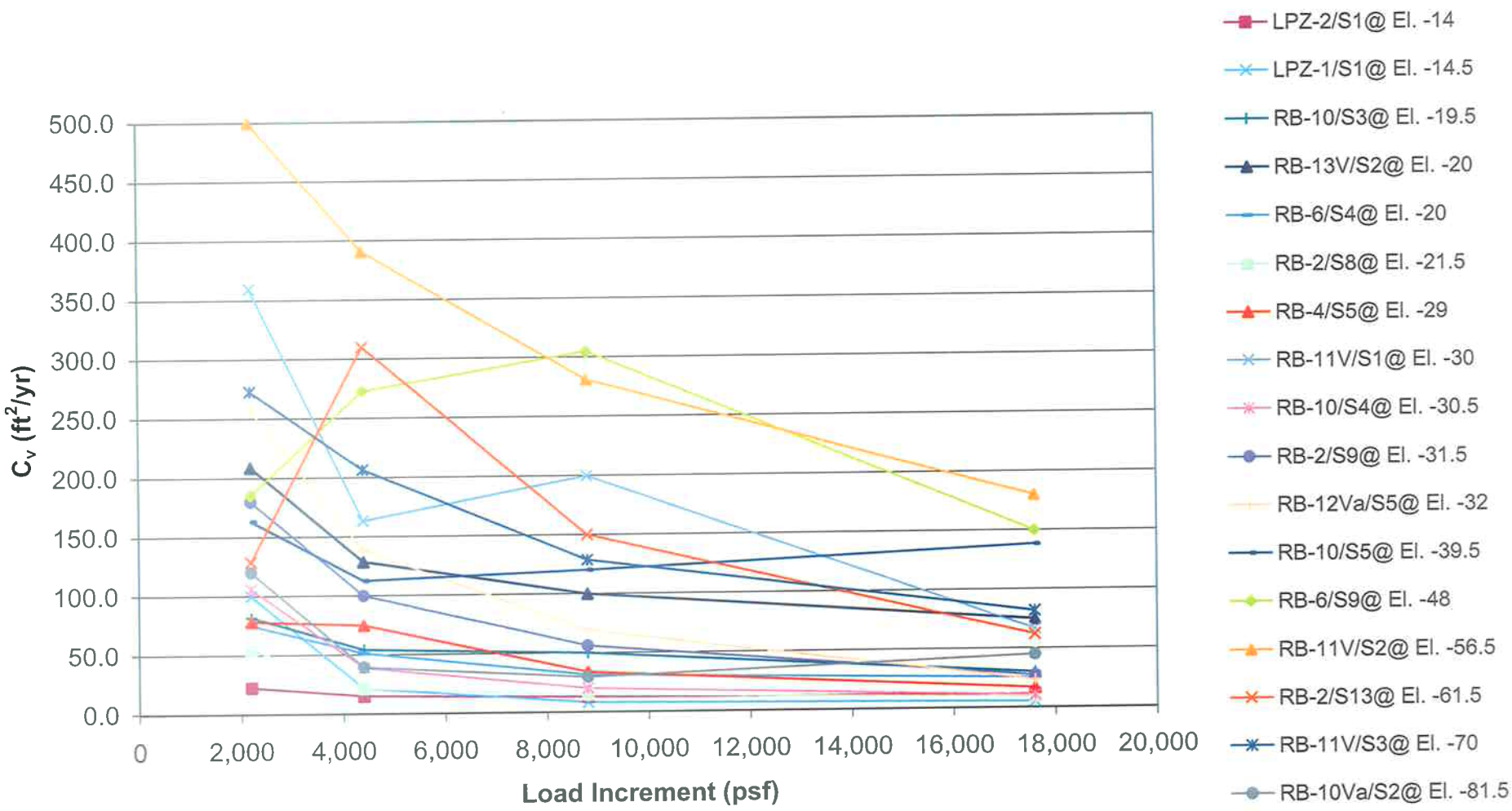


FIGURE 5-8

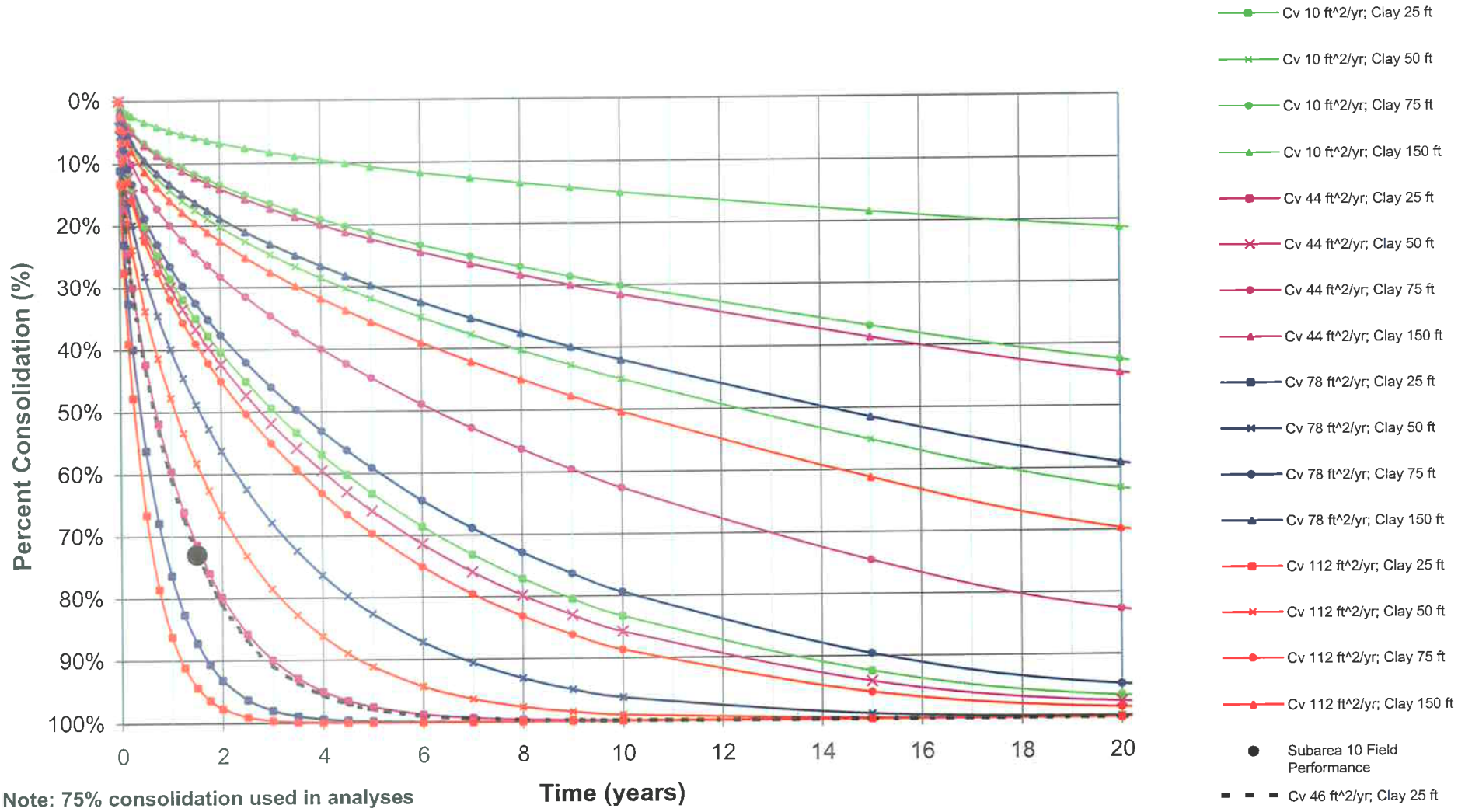
SELECTED OBA TIME CONSOLIDATION DATA

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

Not to Scale



Note: 75% consolidation used in analyses

Note: Each family of curves of same color represents a single value of C_v with for a clay layer that varies in thickness from 25 to 150 feet. The clay layer is assumed to be doubly-drained, i.e. drainage layers exist above and below the given clay layer.

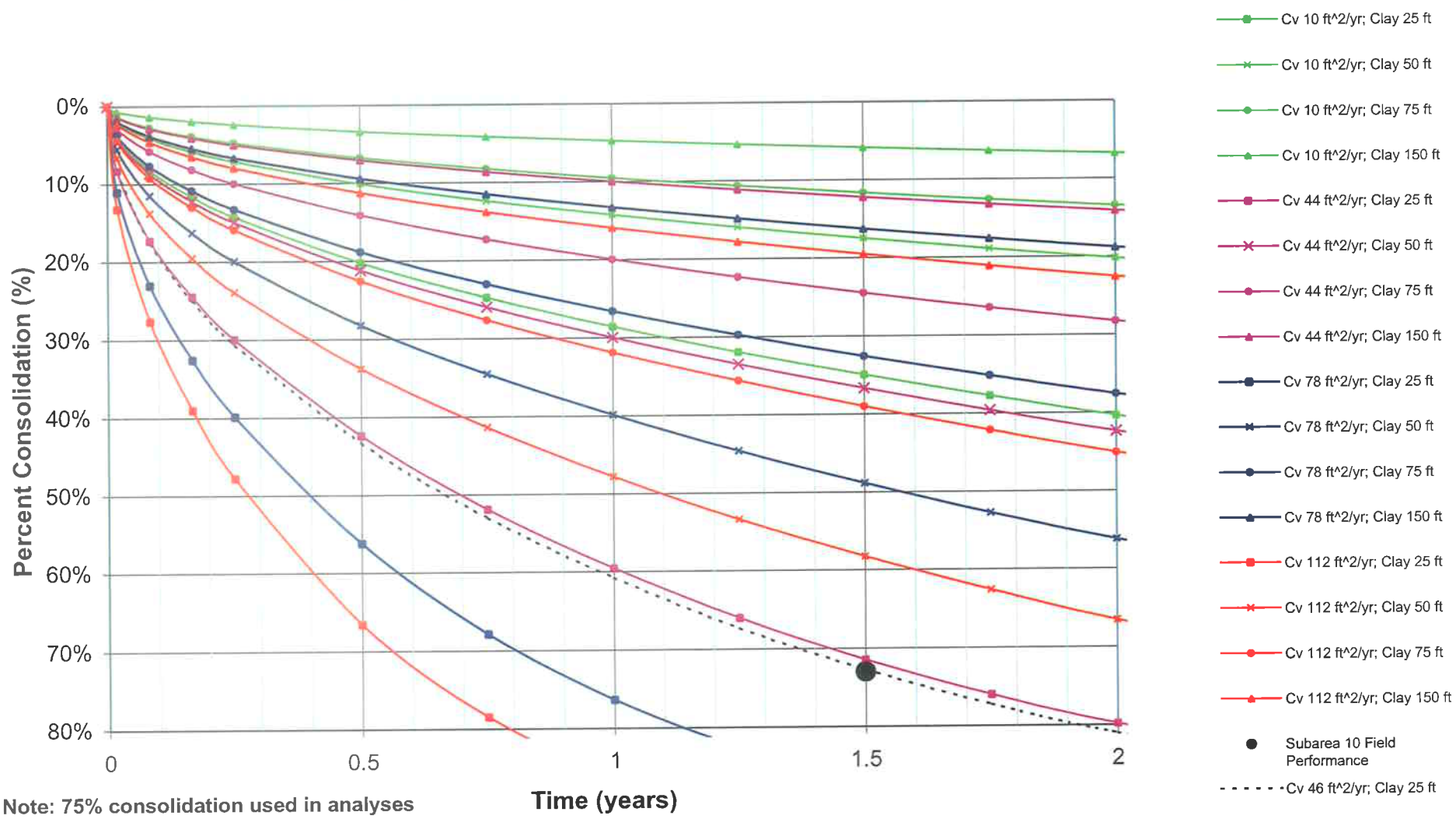
FIGURE 5-9

OBA PERCENT CONSOLIDATION: 20 YEARS

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Note: 75% consolidation used in analyses

Note: Each family of curves of same color represents a single value of C_v with for a clay layer that varies in thickness from 25 to 150 feet. The clay layer is assumed to be doubly-drained, i.e. drainage layers exist above and below the given clay layer.

FIGURE 5-10

OBA PERCENT CONSOLIDATION: 2 YEARS

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

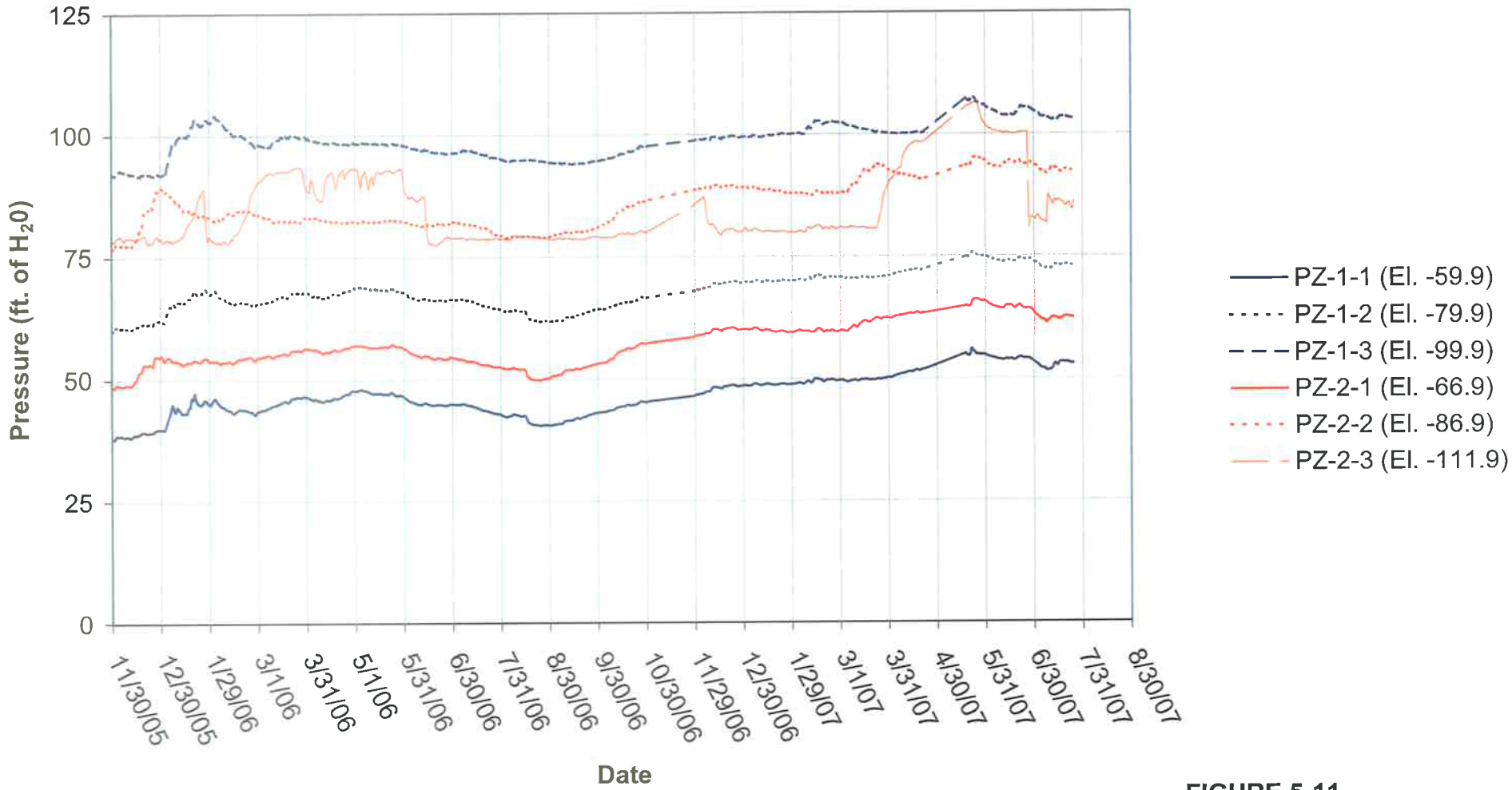


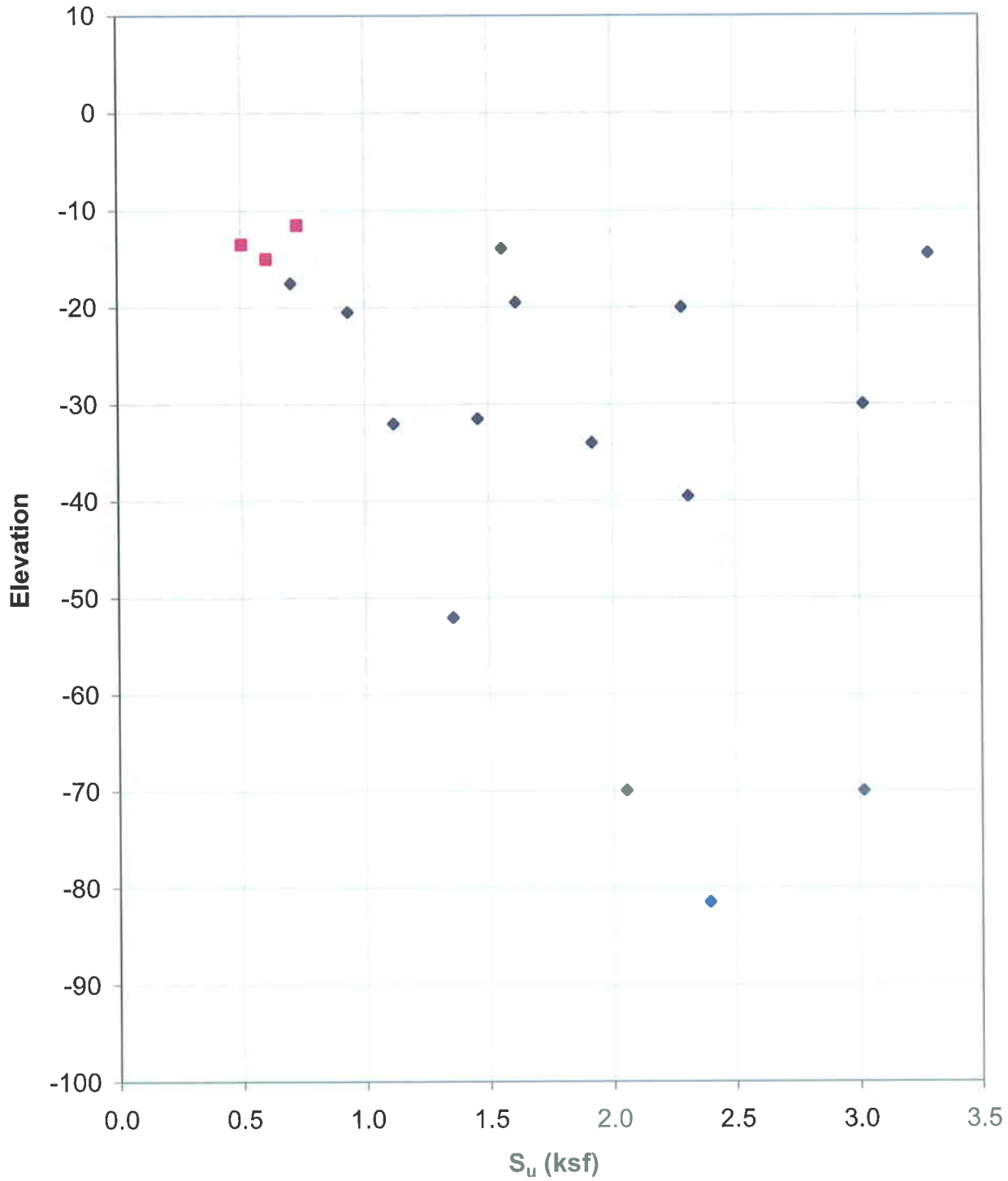
FIGURE 5-11

SUBAREA 10 SUBGRADE PIEZOMETER DATA

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



YBM

OBM

Su/P' YBM/OBA Shear Strength Model

FIGURE 5-12

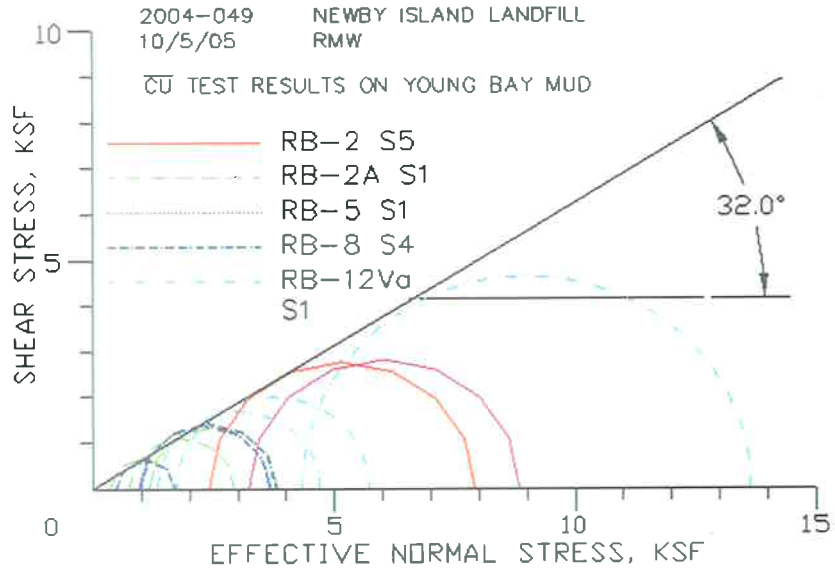
UU TRIAXIAL TEST SUMMARY

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

Clay Strength Summary
Young Bay Mud



Boring	Sample	Depth	P = σ'_{3c} (ksf)	$\sigma'_{1,f}$	$\sigma'_{3,f}$	Failure Strain @ Peak $\sigma'1/\sigma'3$ or $\sigma'1-\sigma'3$ (whichever first)	S_{u1} = $(\sigma'_{1f} - \sigma'_{3f})/2$	S_{u1}/P	p'	q'	tan ψ	d'	c' (ksf)	φ' (deg.)
RB-2A	1a	23	0.994	1.693	0.346	4.9%	0.6735	0.68	1.0195	0.6735	0.4553	0.2258	**0.254**	**27.1**
	1b		2.088	2.924	0.734	9.3%	1.095	0.52	1.829	1.095				
	1c		**3.110**	3.833	1.152	8.3%	1.3405	0.43	2.4925	1.3405				
RB-8	4a	22.5	1.094	1.706	0.475	15.4%	0.6155	0.56	1.0905	0.6155	0.587	0	**0.000**	**35.9**
	4b		2.160	3.672	0.950	8.7%	1.361	0.63	2.311	1.361				
	4c		**3.096**	3.796	0.979	12.3%	1.4085	0.45	2.3875	1.4085				
RB-2	5	26.5	**7.963**	7.910	2.405	12.2%	2.7525	0.35	5.1575	2.7525	0.5337	0	**0.000**	**32.3**
RB-5	1	24	6.178	8.832	3.226	10.8%	2.803	0.45	6.029	2.803	0.4649	0	**0.000**	**27.7**
RB-12Va	1-1	29	**4.05**	4.700	1.333	11.1%	1.6835	0.42	3.0165	1.6835	0.5005	0.1587	**0.183**	**30.0**
	1-2		**8.050**	5.731	1.719	12.8%	2.006	0.25	3.725	2.006				
	1-3		**15.85**	13.645	4.328	11.8%	4.6585	0.29	8.9865	4.6585				

FIGURE 5-13

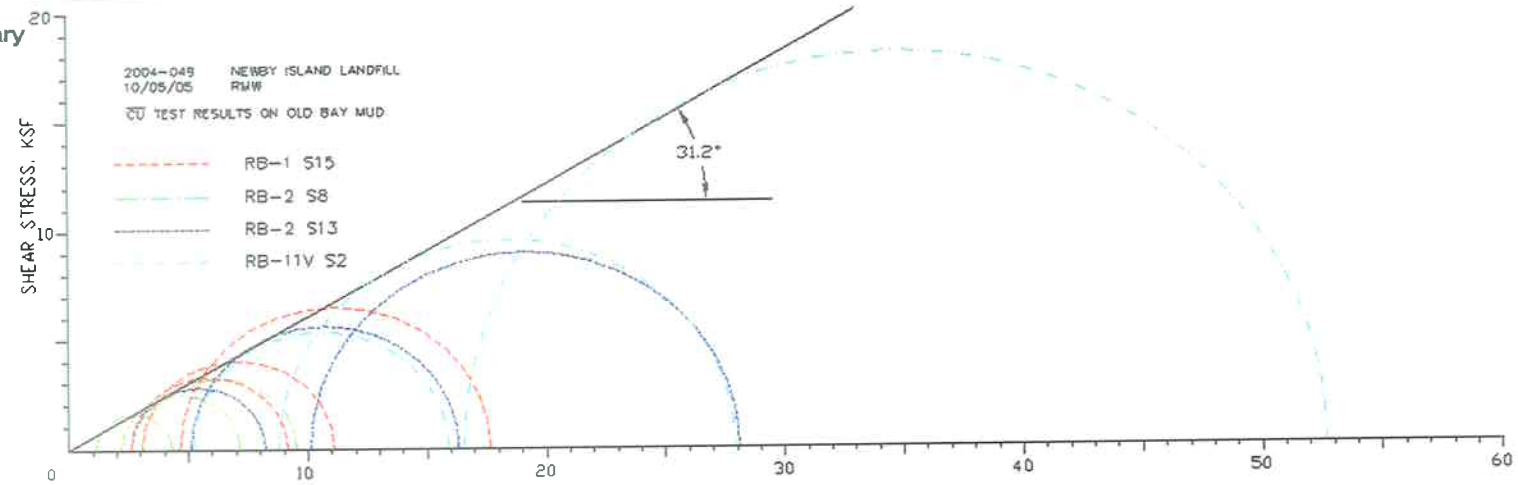
CU TRIAXIAL TEST SUMMARY FOR YBM

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

Clay Strength Summary
Older Bay Alluvium



Boring	Sample	Depth	P = σ'_{3c} (ksf)	$\sigma'_{1,f}$	$\sigma'_{3,f}$	Failure Strain @ Peak $\sigma'1/\sigma'3$ or $\sigma'1-\sigma'3$ (whichever first)	S_{u1} = $(\sigma'_{1f} - \sigma'_{3f})/2$	S_{u1}/P	p'	q'	tan ψ	d'	c' (ksf)	Φ' (deg.)
CU Tests														
RB-1	15a	57.5	5.79	9.150	2.590	9.4%	3.28	0.57	5.87	3.28	0.575	0	**0.000**	**35.1**
	15b		**9.01**	11.090	3.050	8.7%	4.02	0.45	7.07	4.02				
	15c		**17.110**	17.640	4.650	10.9%	6.495	0.38	11.15	6.495				
RB-2	8a	35	2.822	4.337	1.109	4.4%	1.614	0.57	2.723	1.614	0.46	0.358	**0.403**	**27.4**
	8b		5.486	7.165	2.174	8.5%	2.4955	0.45	4.67	2.496				
	8c		**8.107**	9.516	3.024	6.8%	3.246	0.40	6.27	3.246				
RB-2	13a	75	5.05	8.230	2.590	5.3%	2.82	0.56	5.41	2.82	0.446	0.572	**0.639**	**26.5**
	13b		**15.090**	16.330	5.100	7.3%	5.615	0.37	10.72	5.615				
	13c		**24.97**	28.090	10.120	9.0%	8.985	0.36	19.11	8.985				
RB-11V	2-1	71.5	**14.9**	15.890	5.199	8.8%	5.3455	0.36	10.54	5.346	0.521	0	**0.000**	**31.4**
	2-2		**29.800**	27.920	8.785	7.9%	9.5675	0.32	18.35	9.568				
	2-3		**59.8**	52.658	16.551	10.5%	18.0535	0.30	34.6	18.05				

FIGURE 5-14

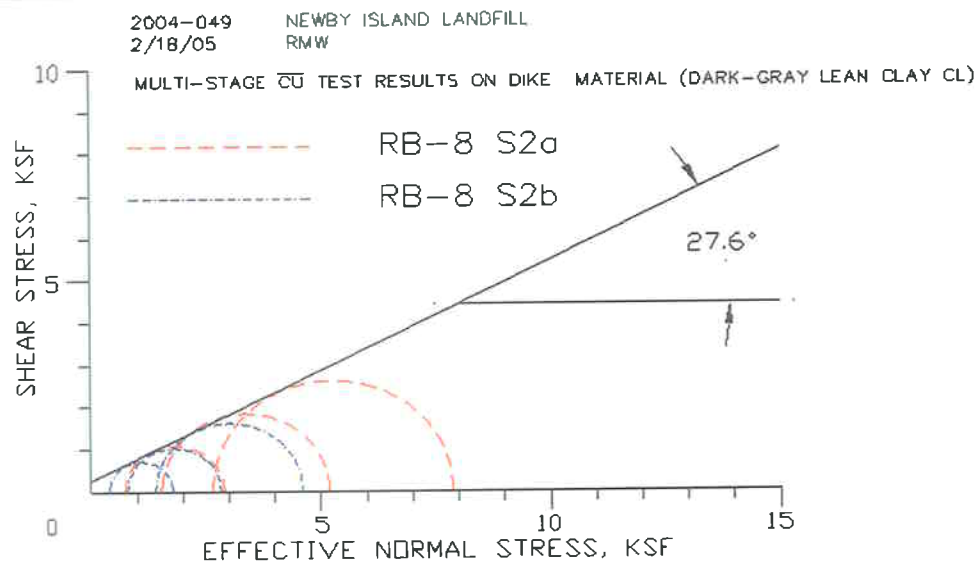
CU TRIAXIAL TEST SUMMARY FOR OBA

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

Clay Strength Summary
Dike Material (CL)



Note: Data represents two multi-stage tests on two individual samples (only)

Boring	Sample	Depth	P = σ'_{3c} (ksf)	σ'_{1f}	σ'_{3f}	S_{u1} = $(\sigma'_{1f} - \sigma'_{3f})/2$	S_{u1}/P	p'	q'	tan ψ	d'	c' (ksf)	φ' (deg.)
RB-8	2a	10	1.339	2.898	0.734	1.082	0.81	1.816	1.082	0.446	0.2934	**0.328**	**26.5**
	2a		2.678	5.192	1.526	1.833	0.68	3.359	1.833				
	2a		**4.651**	7.880	2.635	2.6225	0.56	5.2575	2.6225				
RB-8	2b	10	0.634	1.789	0.389	0.7	1.10	1.089	0.7	0.476	0.1728	**0.196**	**28.4**
	2b		1.267	2.830	0.792	1.019	0.80	1.811	1.019			0.262	27.5
	2b		**2.534**	4.611	1.397	1.607	0.63	3.004	1.607				
								All Tests					
								1.816	1.082	0.464	0.2138	**0.241**	**27.6**
								3.359	1.833				
								5.2575	2.6225				
								1.089	0.7				
								1.811	1.019				
								3.004	1.607				

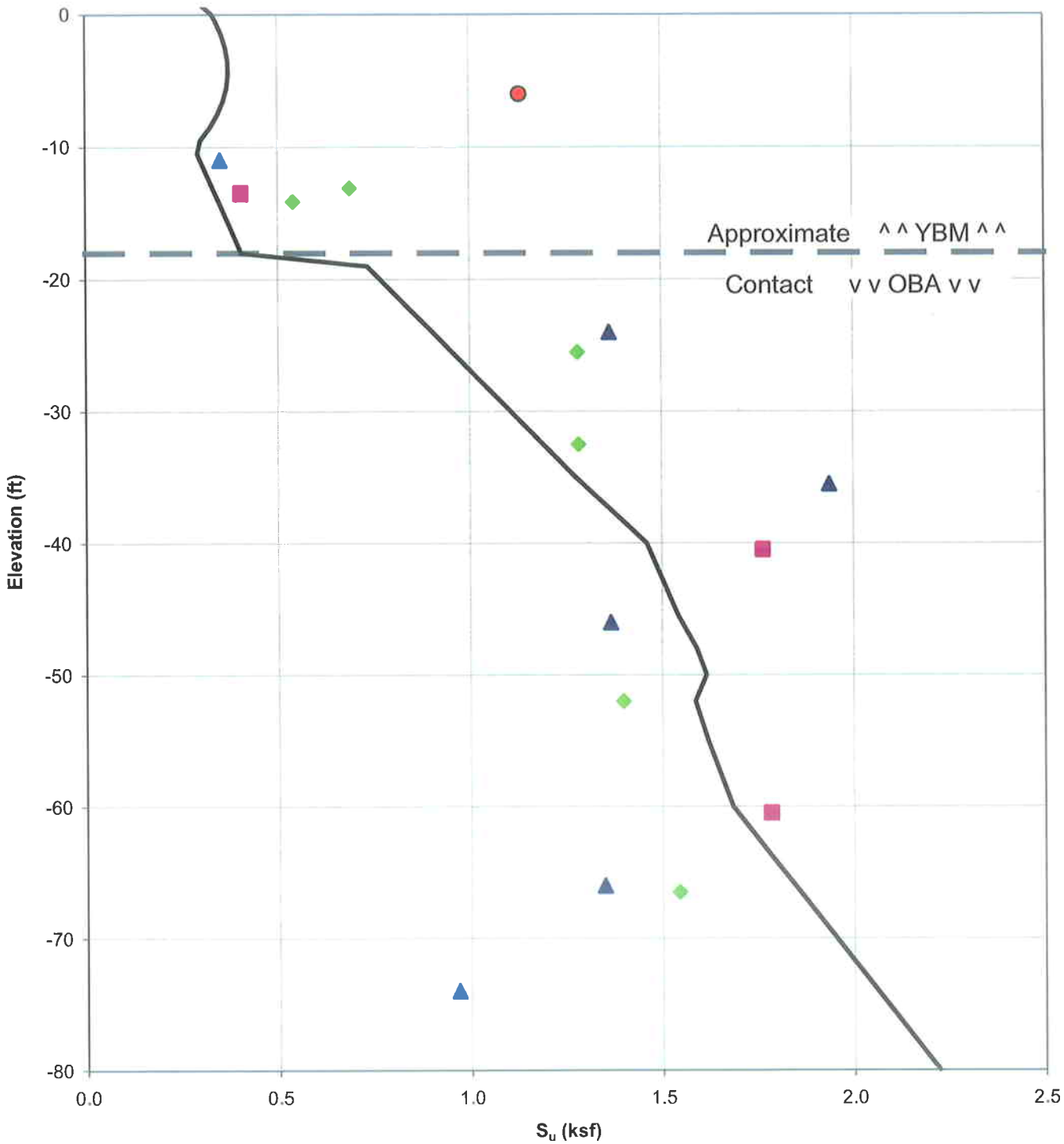
FIGURE 5-15

CU TRIAXIAL TEST SUMMARY FOR DIKE

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Boring RB-10V and RB-10Va; Sta. 30+00

Boring RB-11V; Sta. 60+00

Boring RB-12V and RB-12Va; Sta. 125+00

Boring RB-13Va; Sta. 40+00

'Approximate YBM/OBA Contact

Su/P' YBM/OBA Shear Strength Model

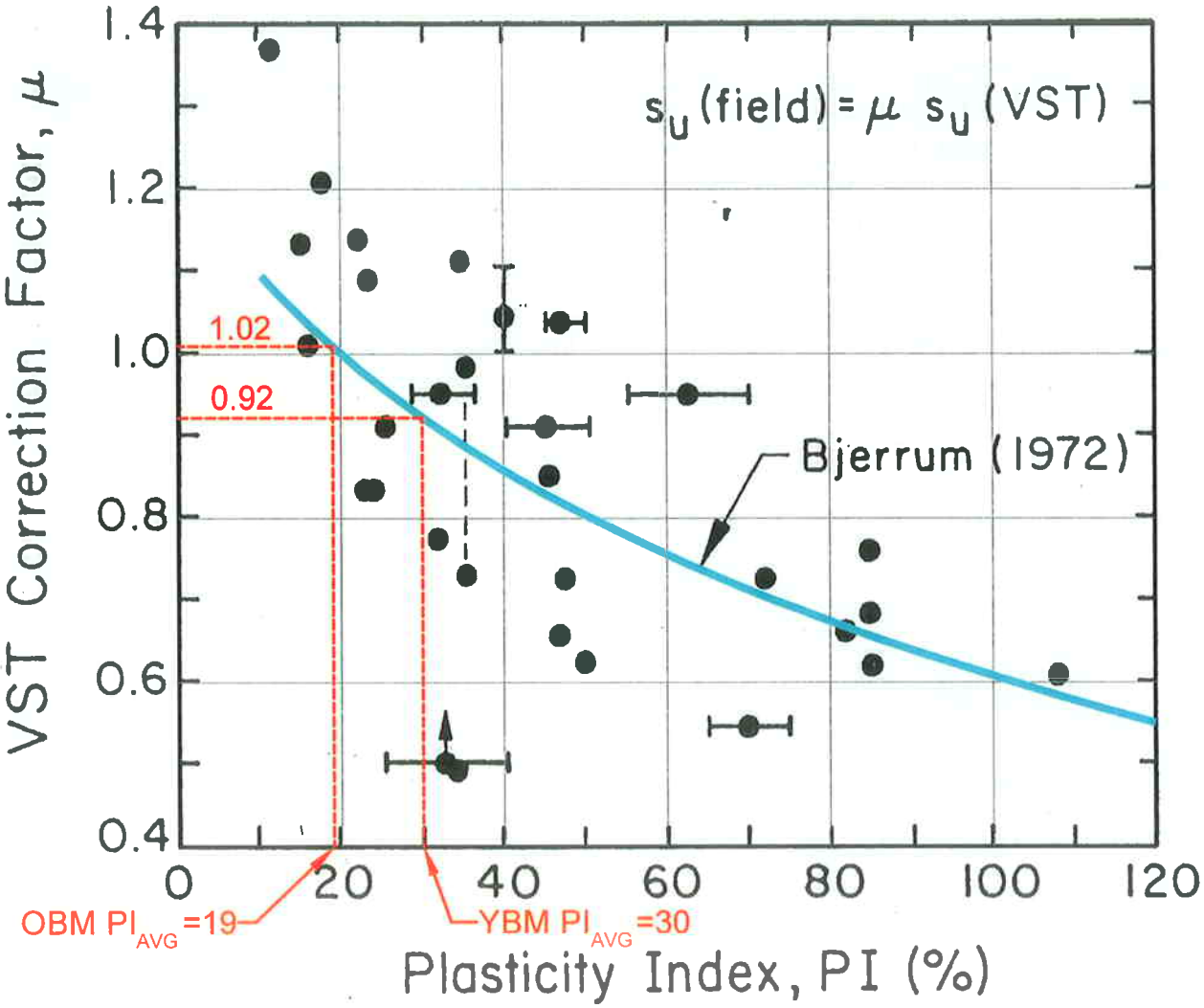
FIGURE 5-16

PEAK VANE SHEAR STRENGTH VS. DEPTH

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Source: (Ladd, et al., 1977) as referenced in Kulhawy and Mayne, 1990.

FIGURE 5–17

VANE SHEAR CORRECTION

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

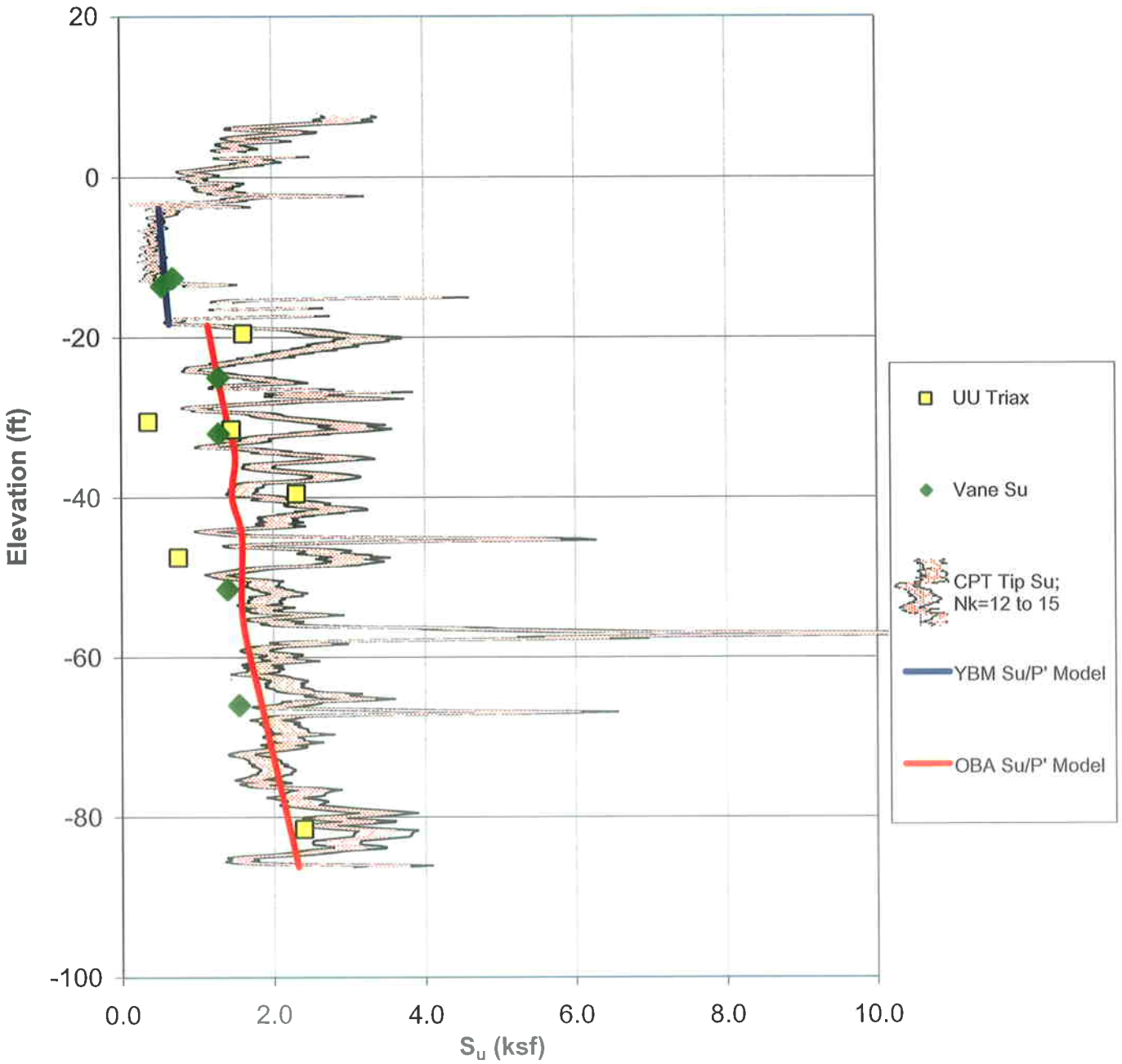
Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

CPT-4
Sta. 30+00

Surf. Elev.
14 ft.

	OCR	Mod. Cam-Clay, Λ = (1-Cr/Cc)	$(Su/P)_{NC}$	$(Su/P)_{OC} = (Su/P)_{NC} \times OCR^{\Lambda}$	CPT Cone Factor N_k
Young Bay Mud	1.0	0.835	0.30	0.300	12 to 15
Older Bay Alluvium	1.5-2	0.805	0.30	0.416 to 0.524	12 to 15



Note: CPT shear strength equals tip resistance minus vertical effective stress, all divided by Cone Factor N_k. Dike unit weight in Su/P model strengths is progressively reduced at greater depths to account for Dike Stress Condition (i.e. stress influence due to elevated dike is lower at greater depths). UU and Shear data from adjacent Borings RB-10V & RB-10Va.

FIGURE 5-18A

LAB/FIELD VS. STRENGTH MODEL: STA. 30+00

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

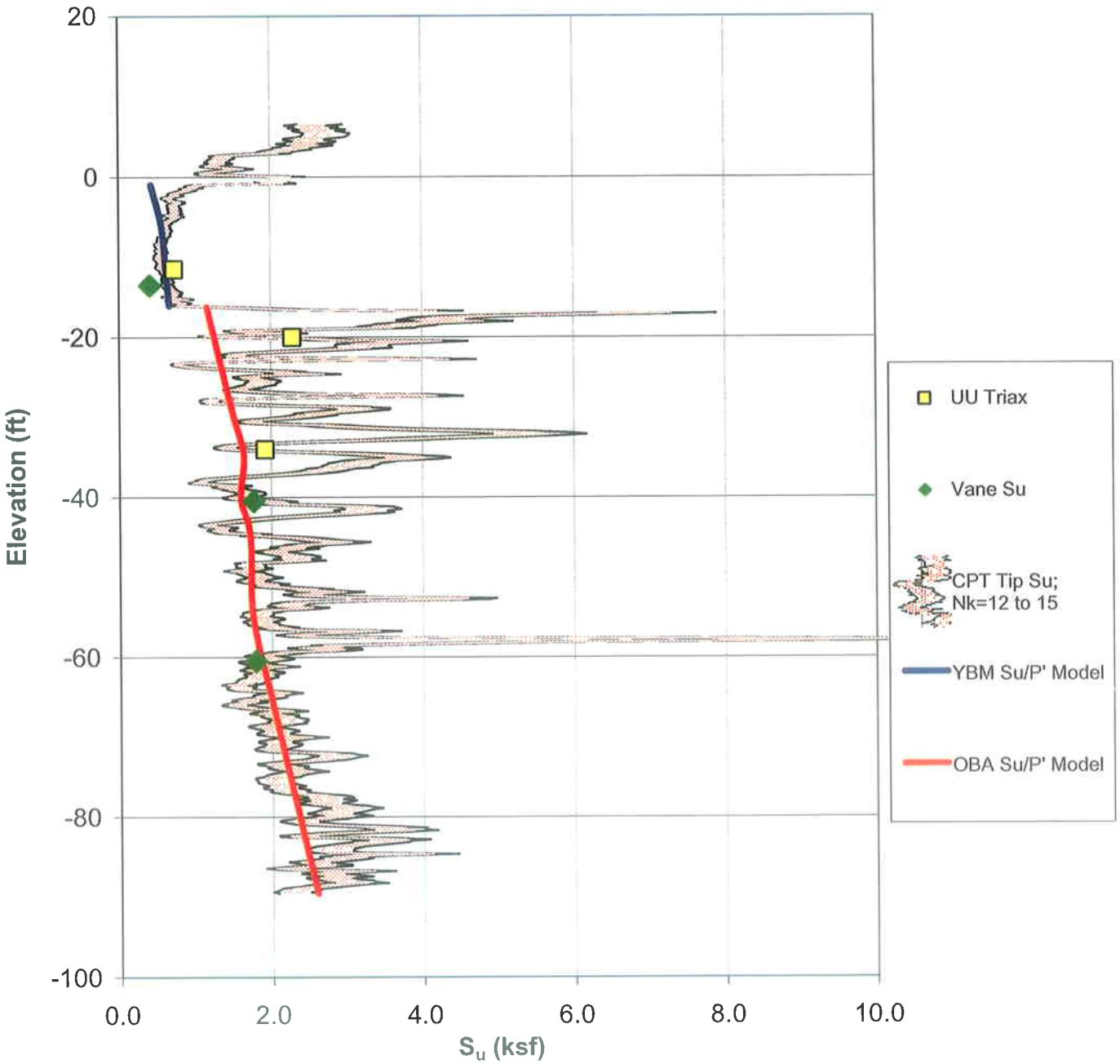
Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

CPT-5
Sta. 40+00

Surf. Elev.
11 ft.

	OCR	Mod. Cam-Clay, Λ = (1-Cr/Cc)	$(Su/P)_{NC}$	$(Su/P)_{OC} = (Su/P)_{NC} \times OCR^{\Lambda}$	CPT Cone Factor N_k
Young Bay Mud	1.0	0.835	0.30	0.300	12 to 15
Older Bay Alluvium	1.5-2	0.805	0.30	0.416 to 0.524	12 to 15



Note: CPT shear strength equals tip resistance minus vertical effective stress, all divided by Cone Factor N_k. Dike unit weight in Su/P model strengths is progressively reduced at greater depths to account for Dike Stress Condition (i.e. stress influence due to elevated dike is lower at greater depths). UU and Shear data from adjacent Borings RB-13V & RB-13Va.

FIGURE 5-18B

LAB/FIELD VS. STRENGTH MODEL: STA. 40+00

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

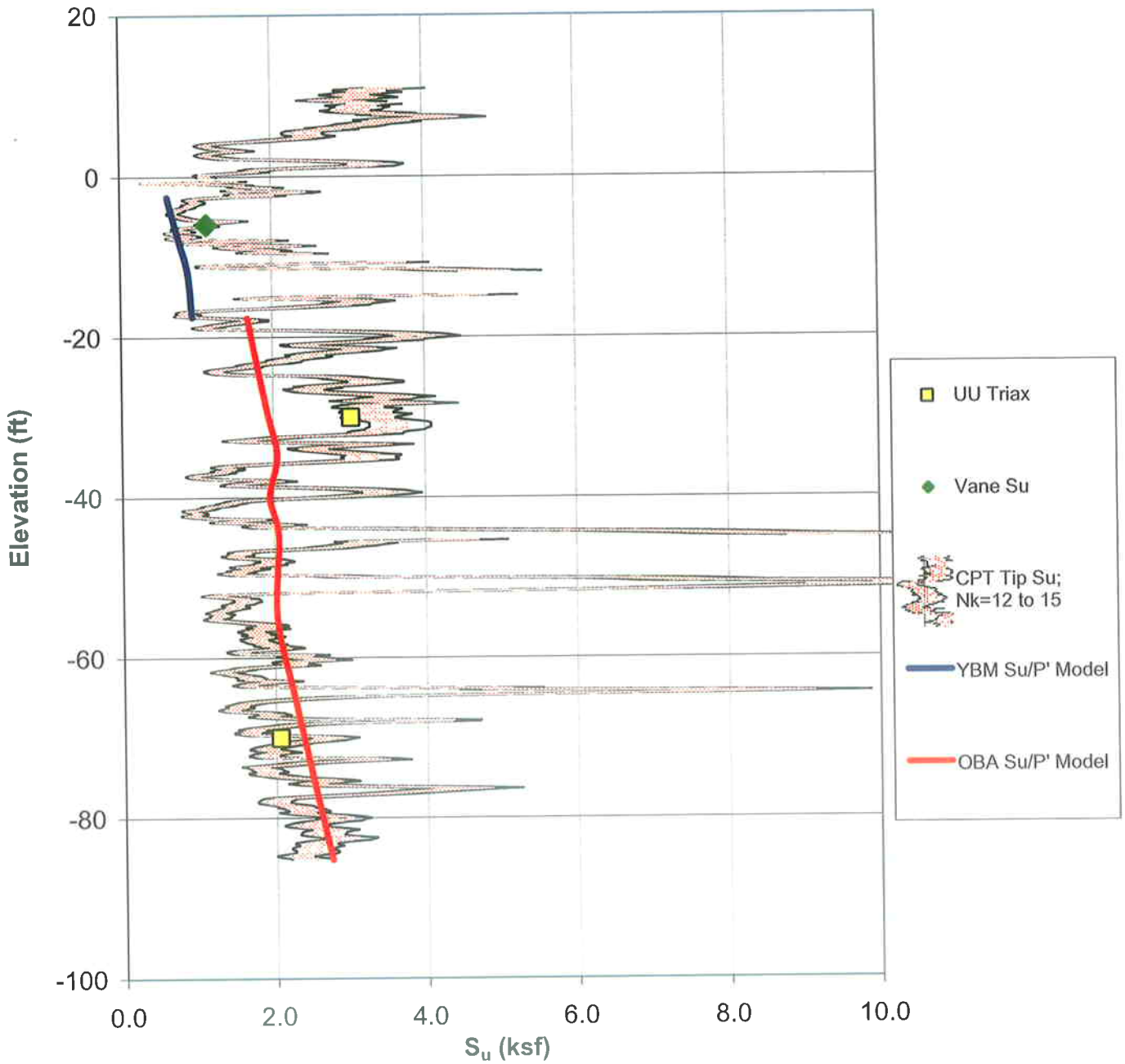
Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

CPT-7
Sta. 60+00

Surf. Elev.
15 ft.

	OCR	Mod. Cam-Clay, Λ = (1-Cr/Cc)	$(Su/P)_{NC}$	$(Su/P)_{OC} = (Su/P)_{NC} \times OCR^{\Lambda}$	CPT Cone Factor N_k
Young Bay Mud	1.0	0.835	0.30	0.300	12 to 15
Older Bay Alluvium	1.5-2	0.805	0.30	0.416 to 0.524	12 to 15



Note: CPT shear strength equals tip resistance minus vertical effective stress, all divided by Cone Factor N_k. Dike unit weight in Su/P model strengths is progressively reduced at greater depths to account for Dike Stress Condition (i.e. stress influence due to elevated dike is lower at greater depths). UU and Shear data from adjacent Boring RB-11V.

FIGURE 5-18C

LAB/FIELD VS. STRENGTH MODEL: STA. 60+00

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

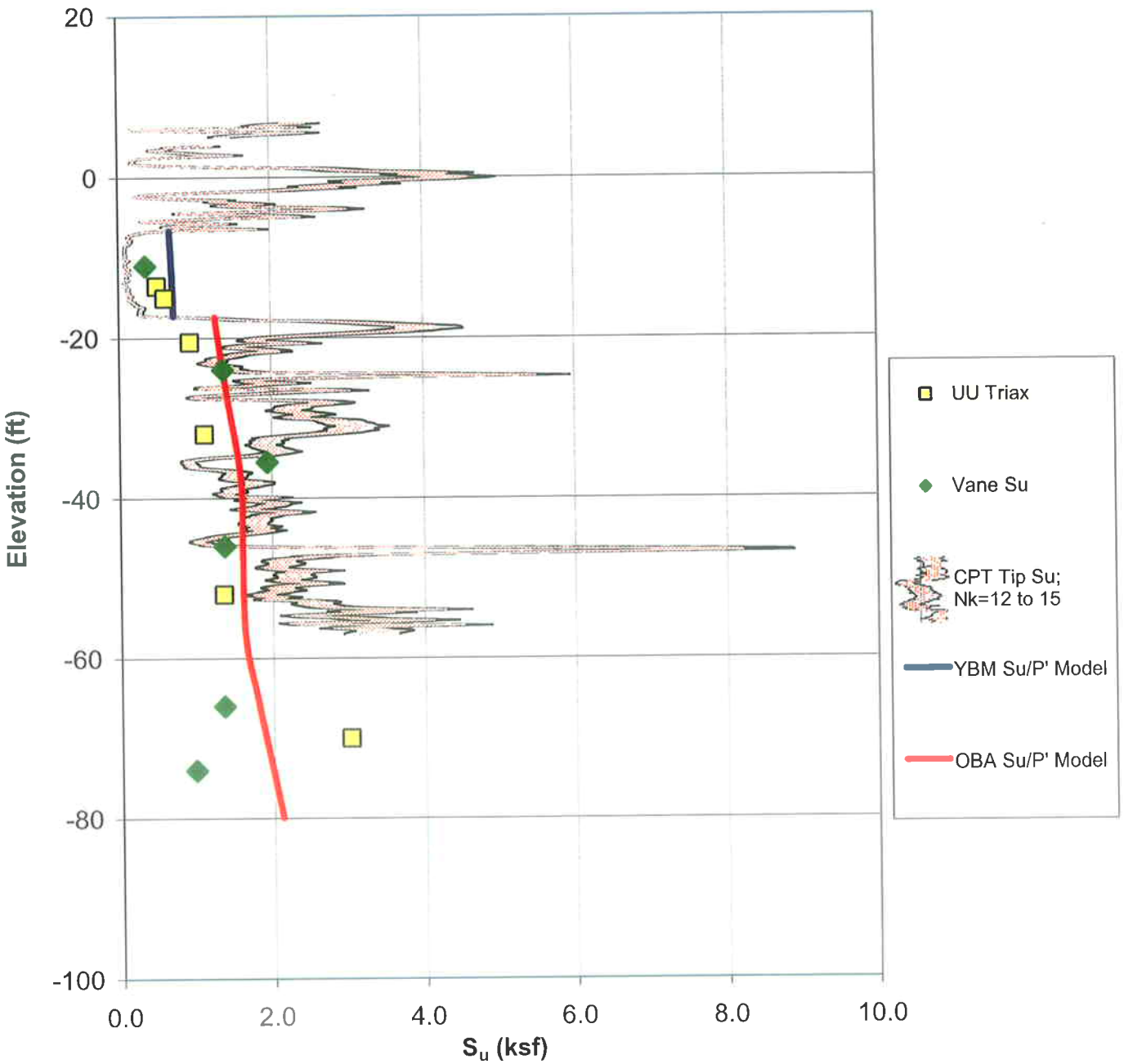
Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

CPT-29
Sta.
125+00

Surf. Elev.
18 ft.

	OCR	Mod. Cam-Clay, Λ = (1-Cr/Cc)	$(Su/P)_{NC}$	$(Su/P)_{OC} = (Su/P)_{NC} \times OCR^{\Lambda}$	CPT Cone Factor N_k
Young Bay Mud	1.0	0.835	0.30	0.300	12 to 15
Older Bay Alluvium	1.5-2	0.805	0.30	0.416 to 0.524	12 to 15



Note: CPT shear strength equals tip resistance minus vertical effective stress, all divided by Cone Factor N_k. Dike unit weight in Su/P model strengths is progressively reduced at greater depths to account for Dike Stress Condition (i.e. stress influence due to elevated dike is lower at greater depths). UU and Shear data from adjacent Borings RB-12V & RB-12Va.

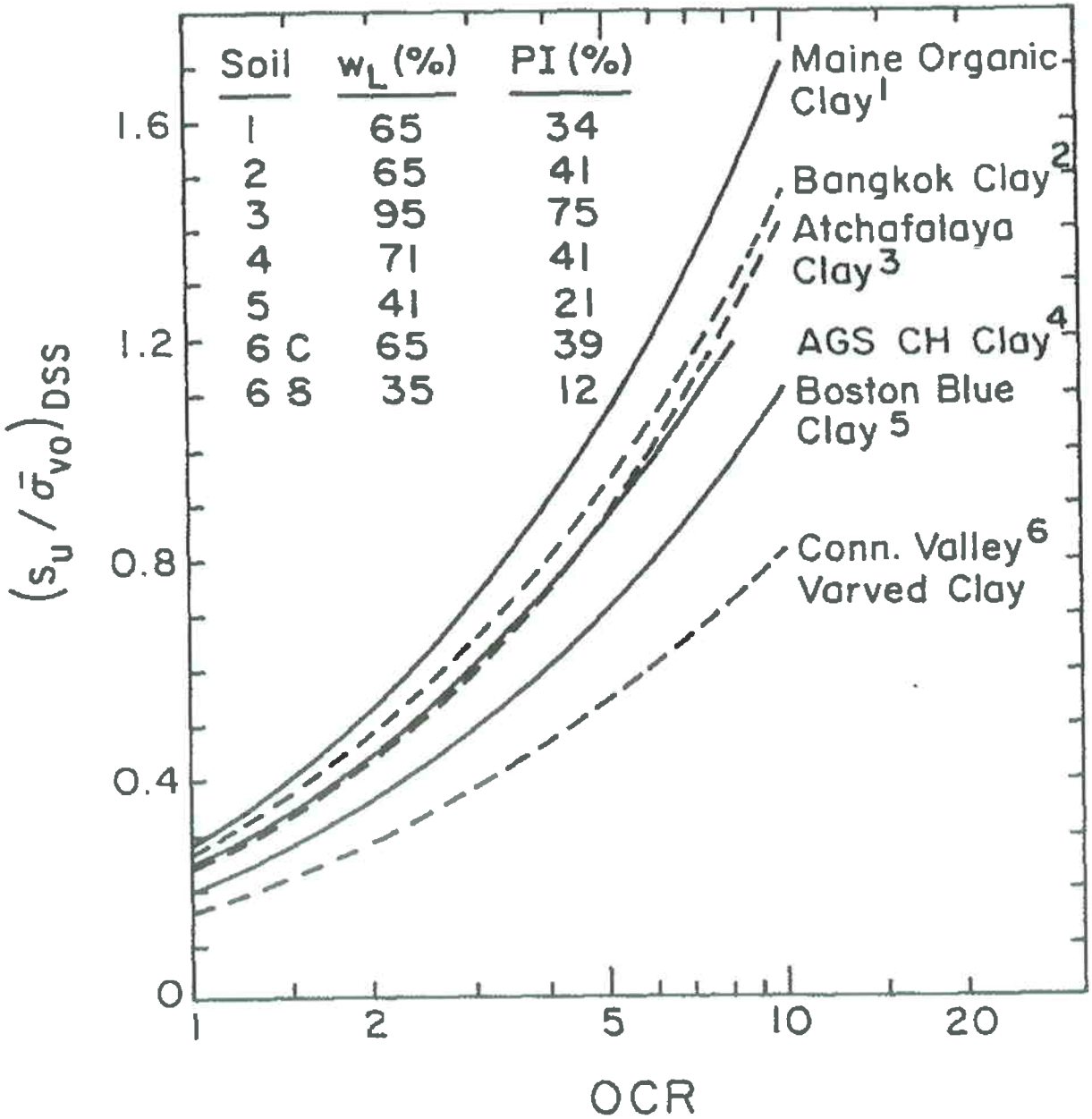
FIGURE 5-18D

LAB/FIELD VS. STRENGTH MODEL: STA. 125+00

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Source: Ladd et al. (1977) as ref'd in Kulhawy and Mayne (1990)

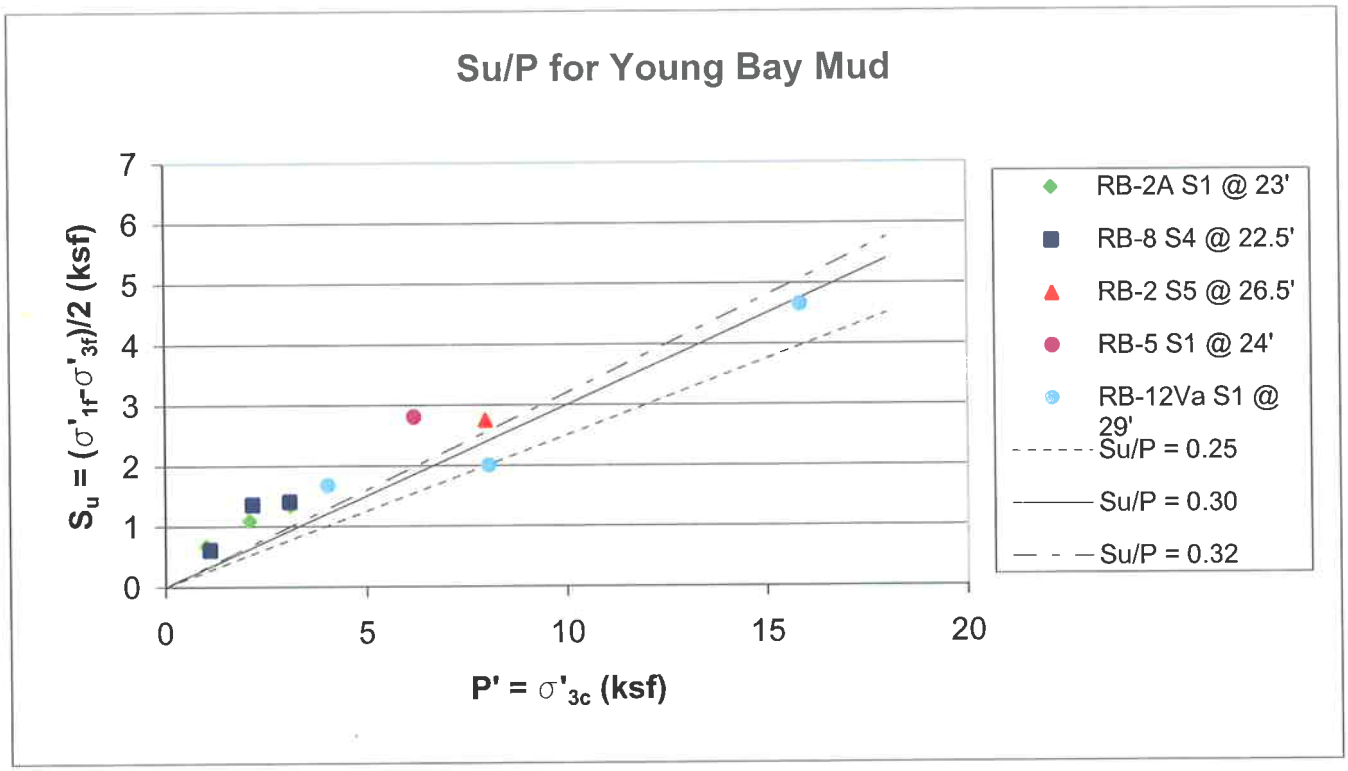
FIGURE 5-19

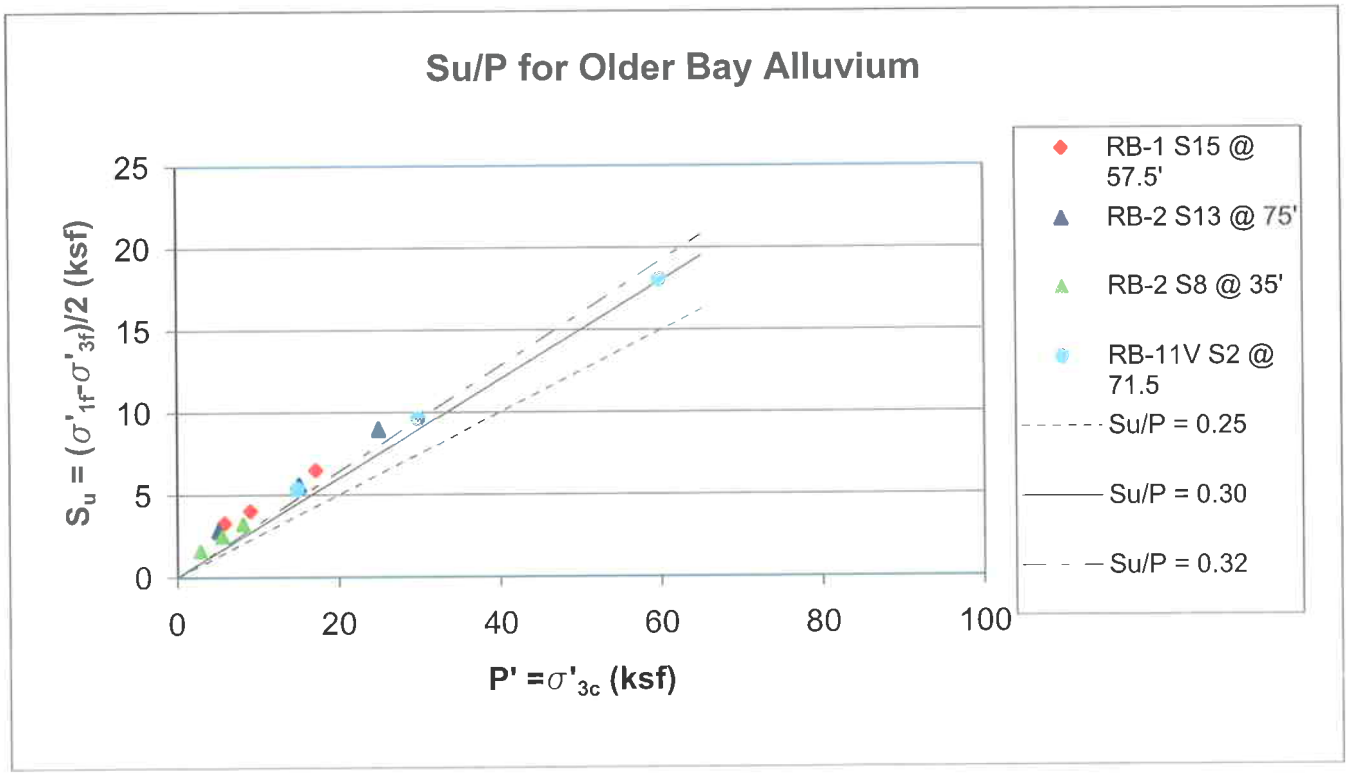
S_u/P VS OCR

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049





Su = Undrained Shear Strength

P' = Preconsolidation Pressure before Shearing

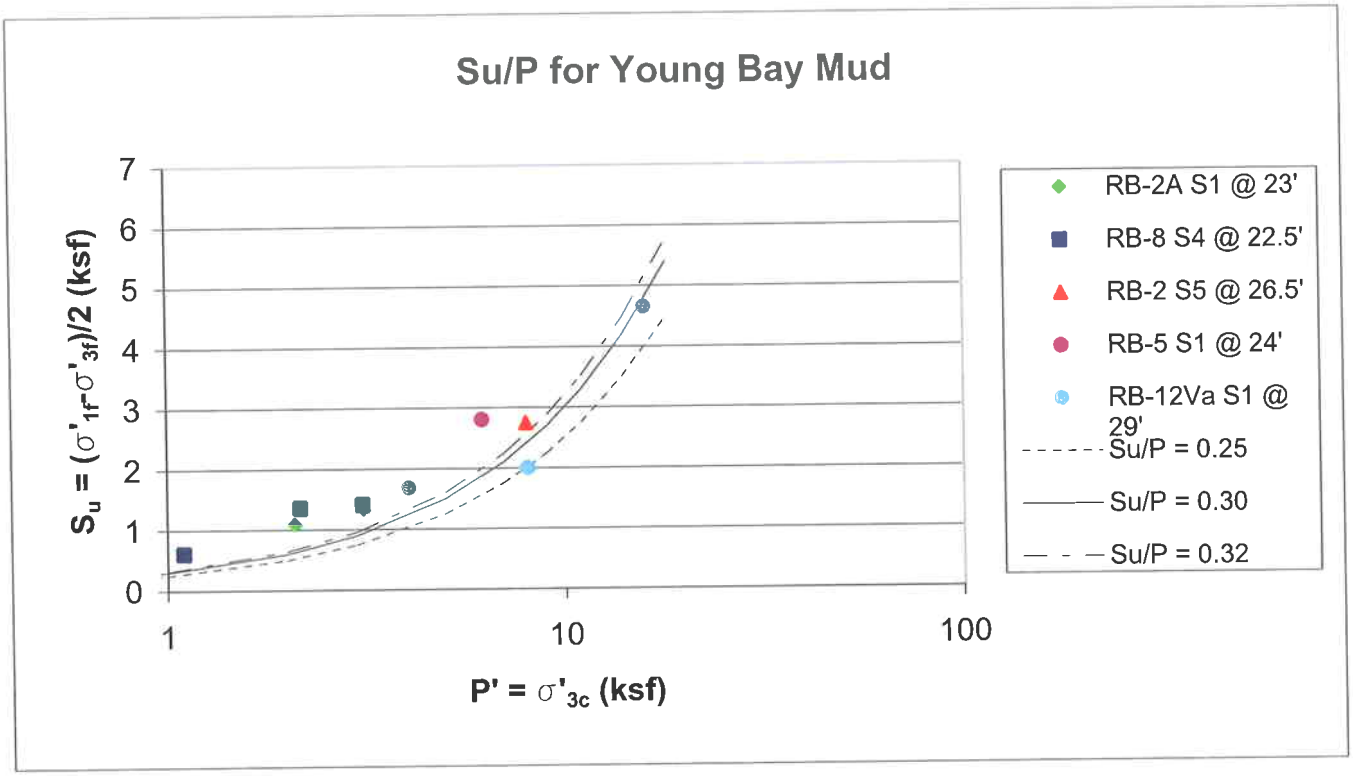
FIGURE 5-20

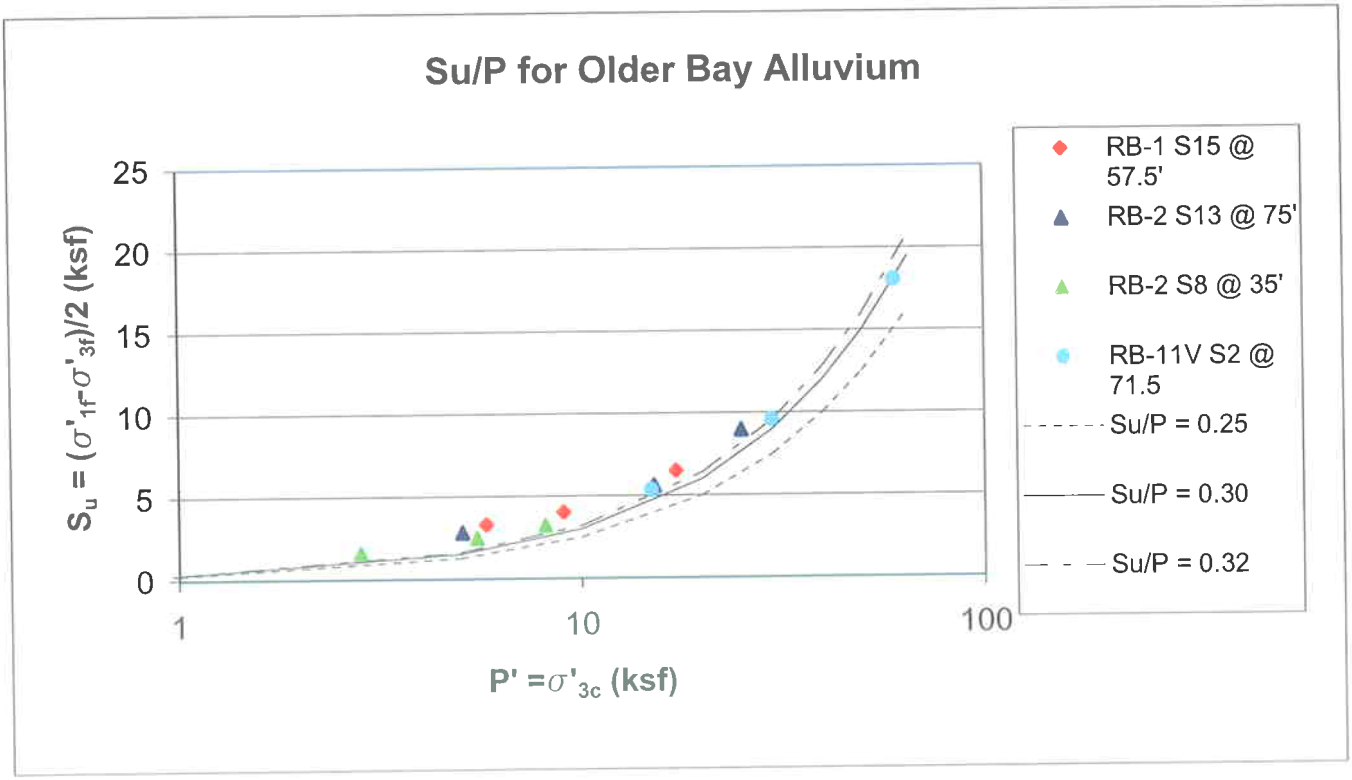
LAB Su/P FOR YBM AND OBA

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049





Su = Undrained Shear Strength

P' = Preconsolidation Pressure before Shearing

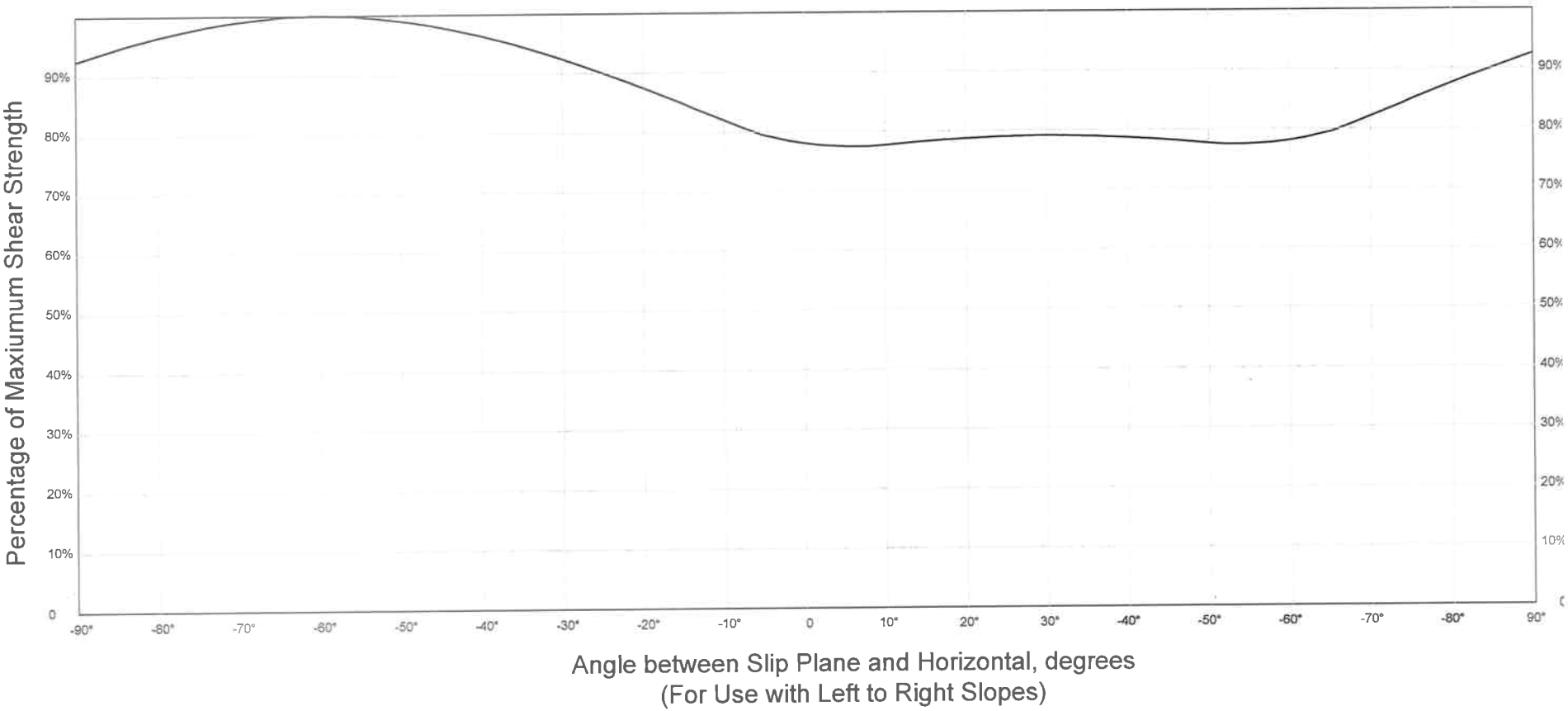
FIGURE 5-21

LAB Su/P FOR YBM AND OBA: LOG SCALE

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



NOTE: THIS ANISOTROPIC RELATIONSHIP HAS BEEN ADAPTED FROM (BONAPARTE AND MITCHELL, 1979) AND IS USED IN STABILITY ANALYSES FOR BOTH YOUNG MUD AND OLDER BAY ALLUVIUM.

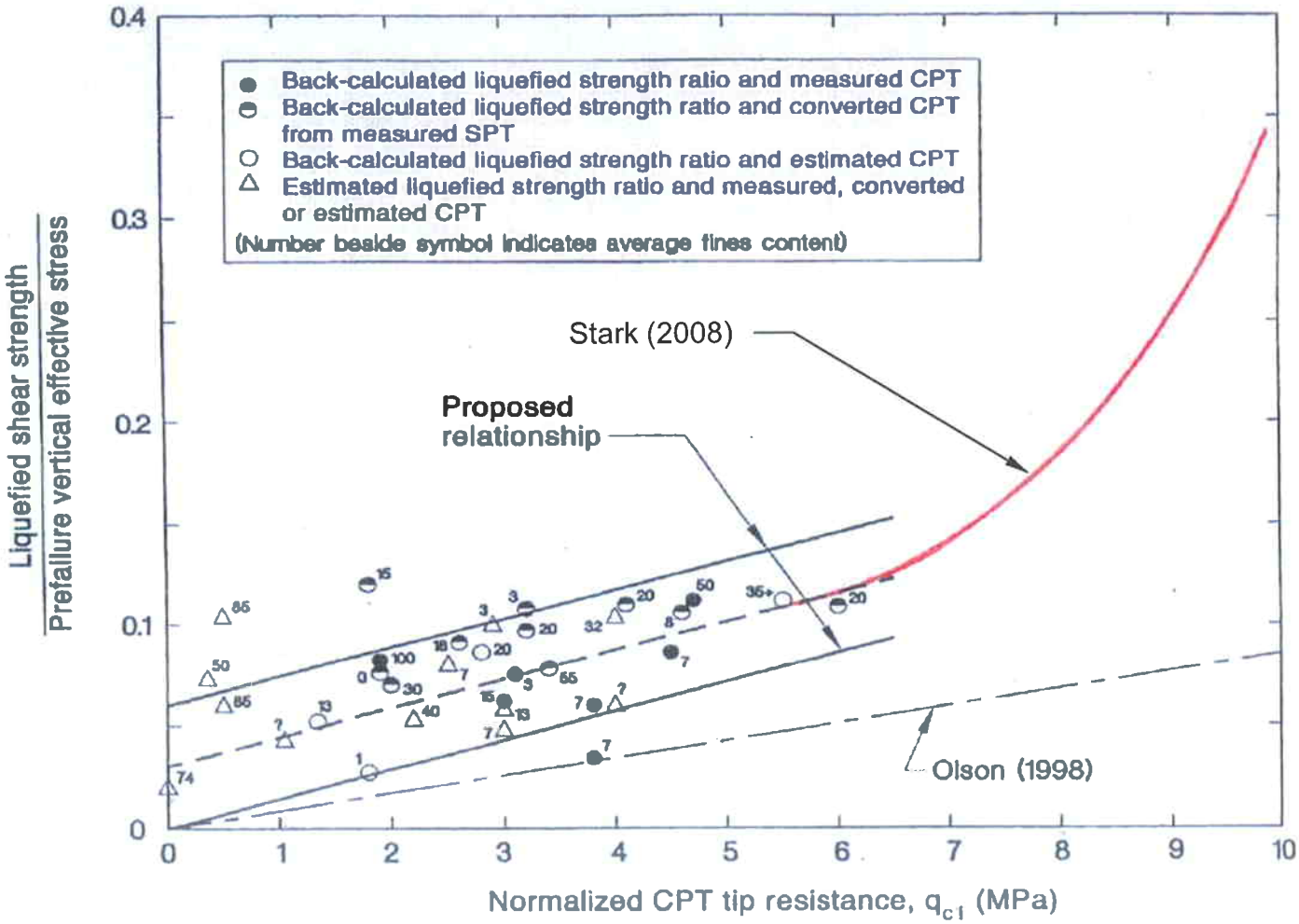
FIGURE 5–22

CLAY SHEAR STRENGTH ANISOTROPY

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049



Reference: Olson and Stark (2002) and Stark (2008)

FIGURE 5-23

LIQUEFIED SAND SHEAR STRENGTH RATIO

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

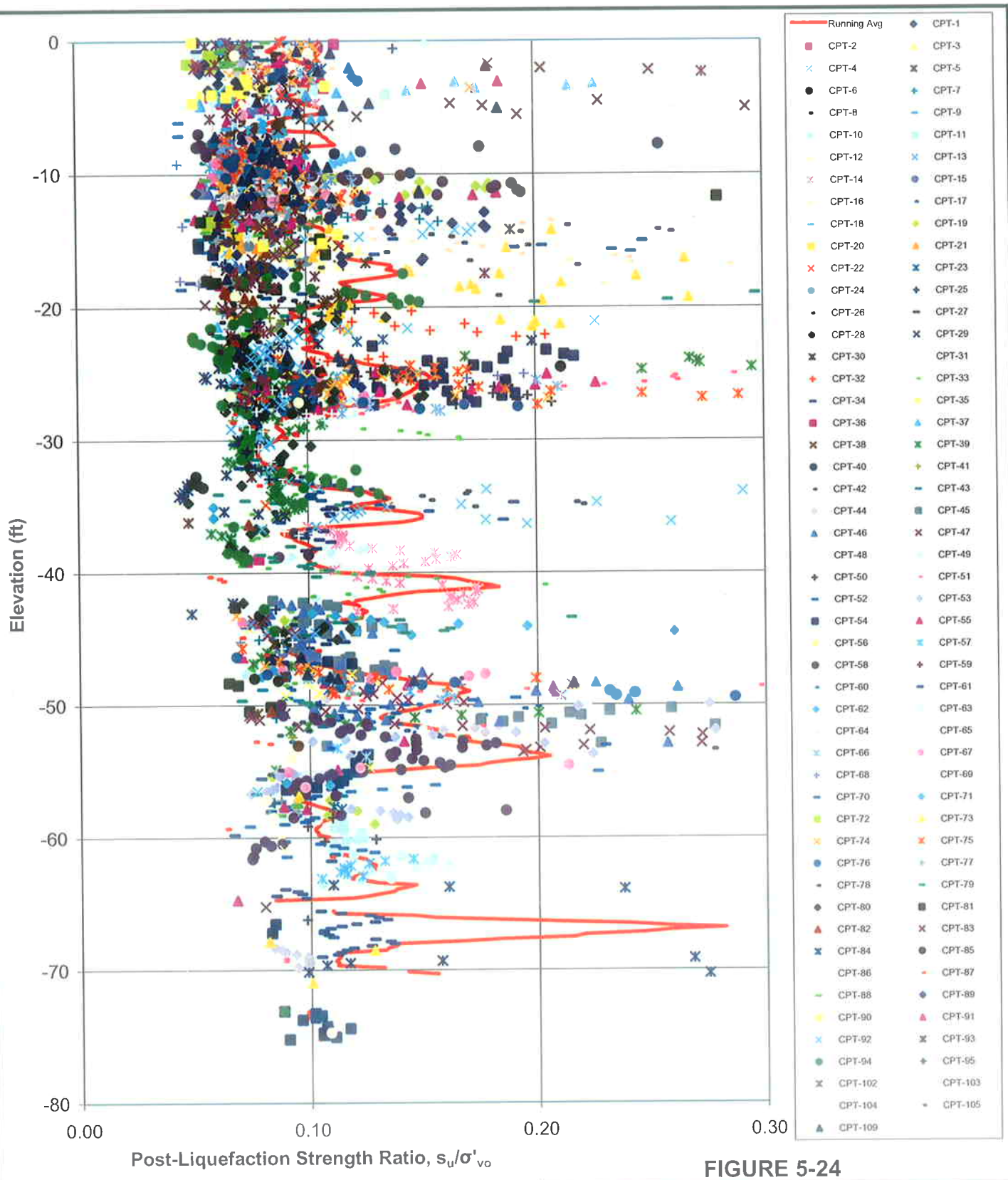


FIGURE 5-24

POST-LIQUEFACTION STRENGTH RATIO: ALL SITE DATA

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

Running Avg. Span = 1.2 ft.

Data shown above represent ratios of post-liquefaction shear strength to effective overburden stress (s_u/σ'_{vo}) for sand/silty sand layers/lenses based on Olson and Stark (2002) as modified by Stark (2008).

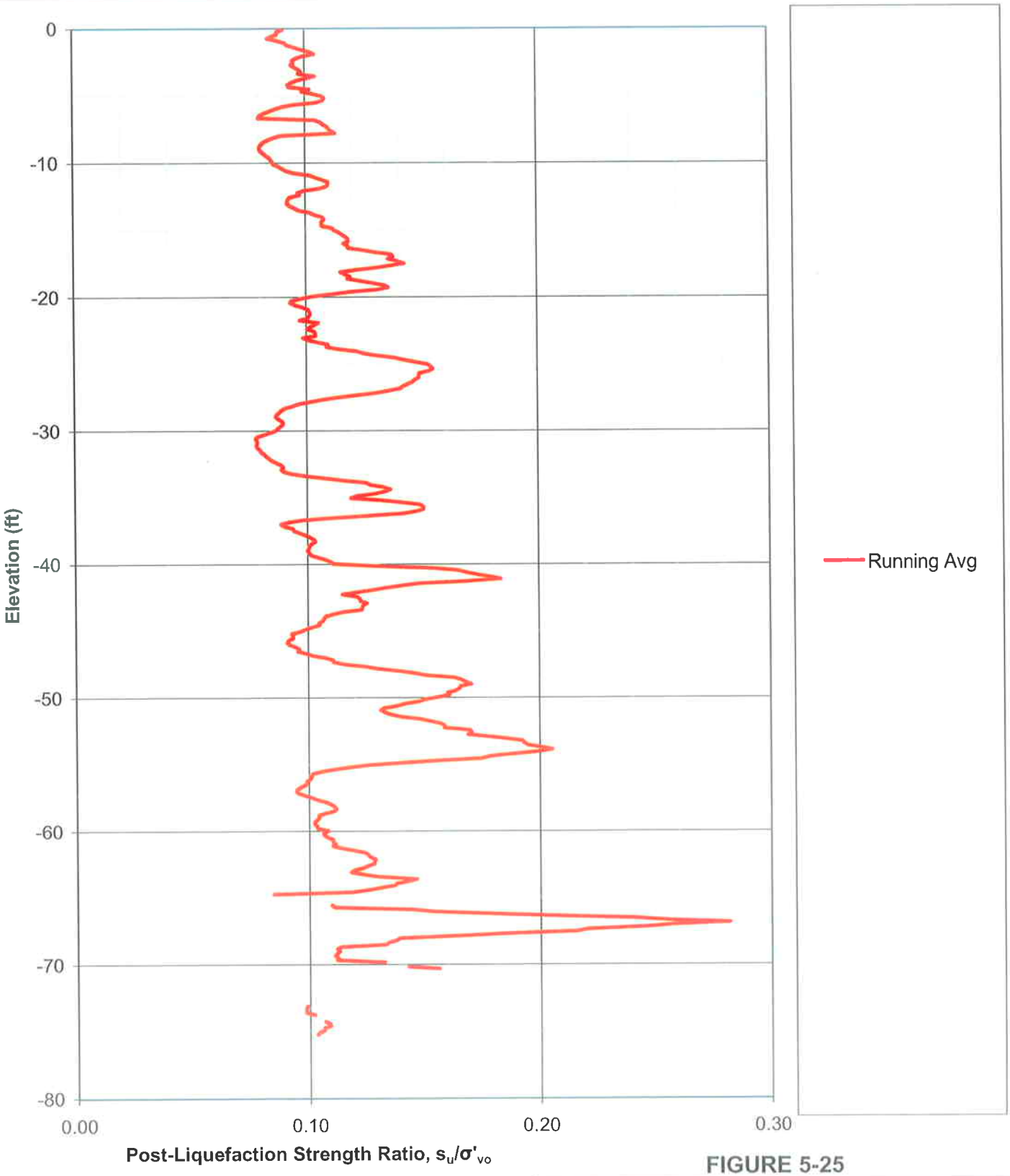


FIGURE 5-25

Running Avg. Span = 1.2 ft.

Data shown above represent ratios of post-liquefaction shear strength to effective overburden stress (s_u/σ_{vo}) for sand/silty sand layers/lenses based on Olson and Stark (2002) as modified by Stark (2008).

POST-LIQUEFACTION STRENGTH RATIO: RUNNING AVERAGE

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

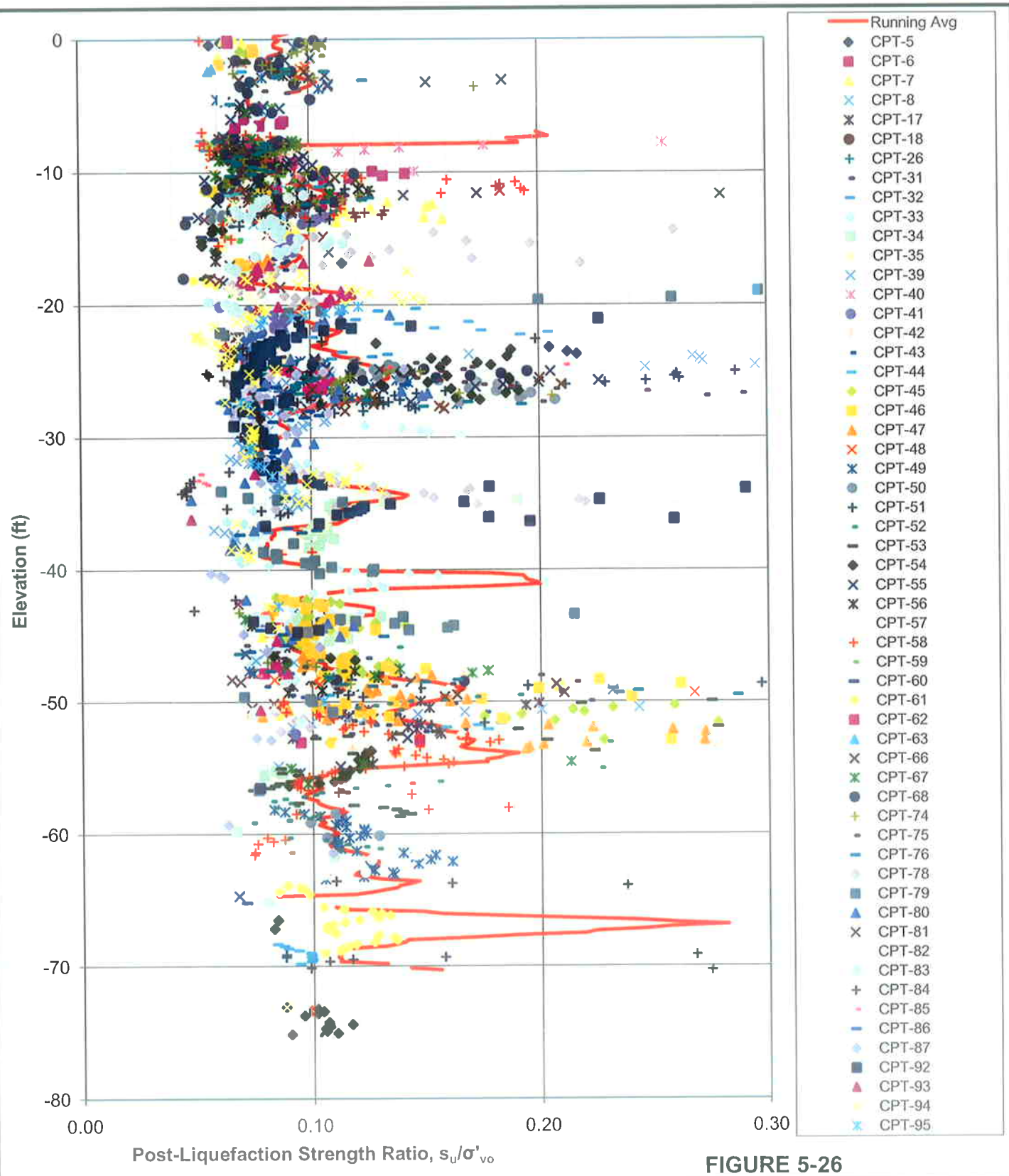


FIGURE 5-26

Running Avg. Span = 1.2 ft.

Data shown above represent ratios of post-liquefaction shear strength to effective overburden stress (s_u/σ'_{vo}) for sand/silty sand layers/lenses based on Olson and Stark (2002) as modified by Stark (2008).

POST-LIQUEFACTION STRENGTH RATIO: SOUTHWEST

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

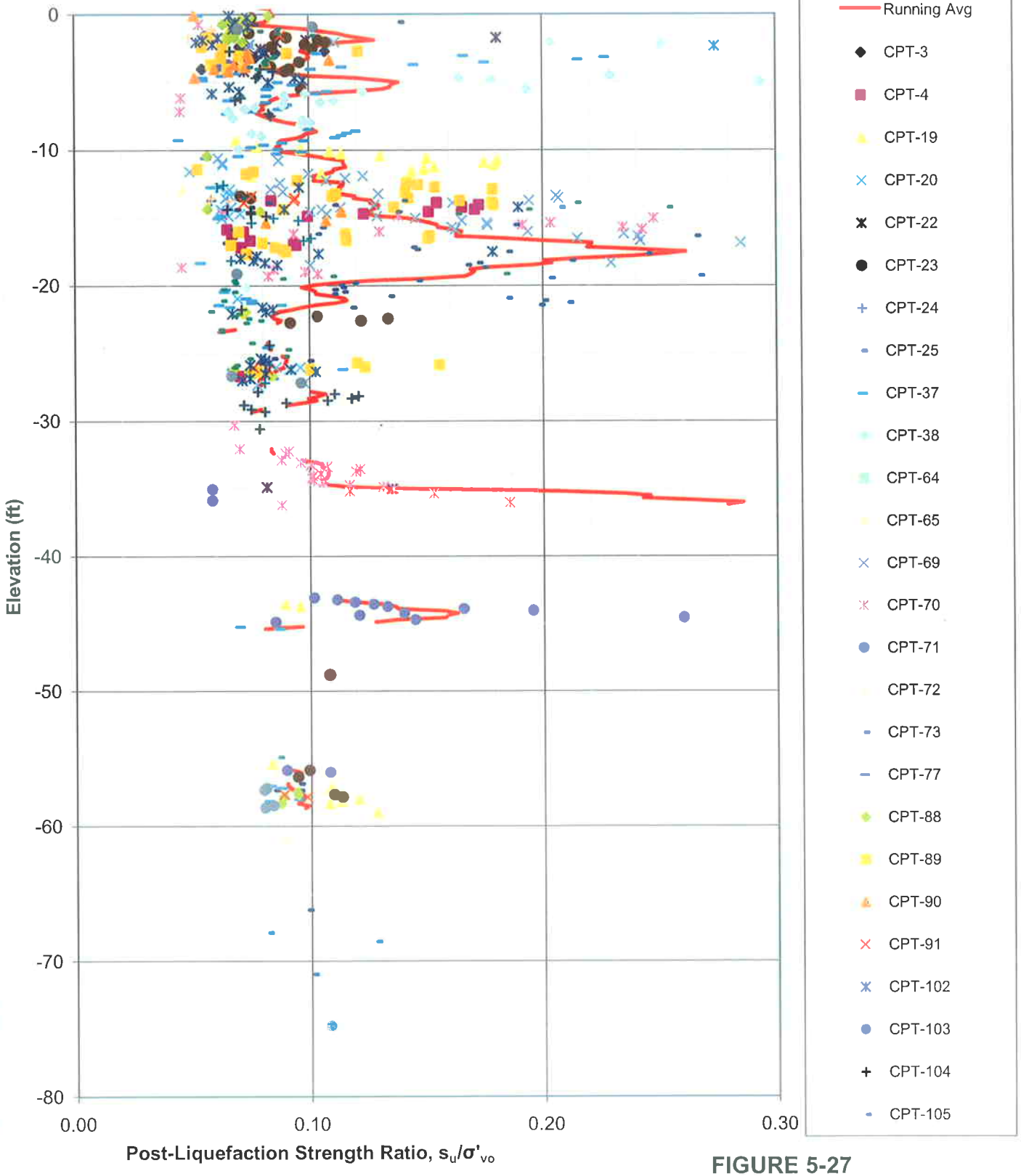


FIGURE 5-27

Running Avg. Span = 1.2 ft.

Data shown above represent ratios of post-liquefaction shear strength to effective overburden stress (s_u/σ'_{vo}) for sand/silty sand layers/lenses based on Olson and Stark (2002) as modified by Stark (2008).

POST-LIQUEFACTION STRENGTH RATIO: SOUTHEAST

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

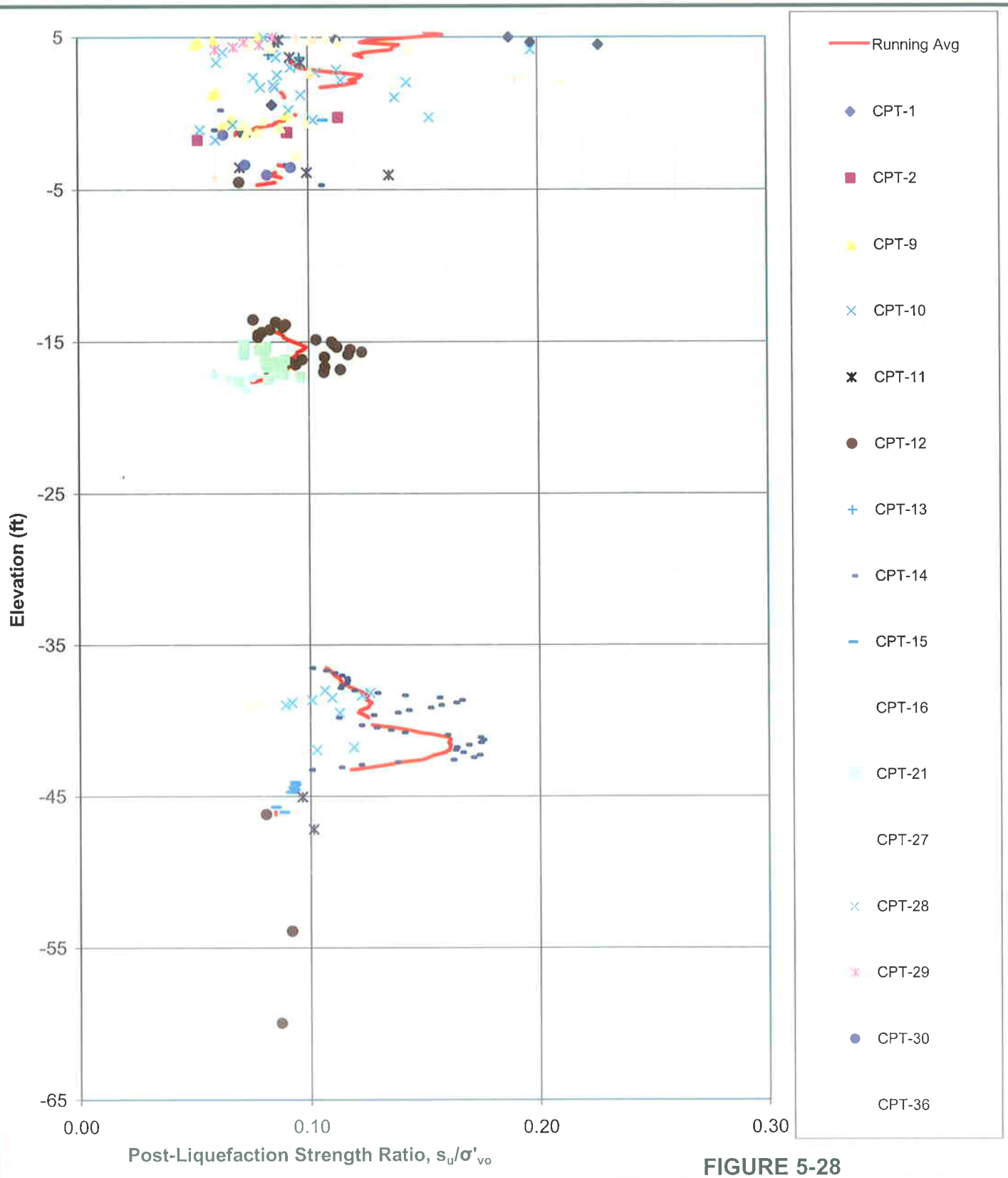


FIGURE 5-28

Running Avg. Span = 1.2 ft.

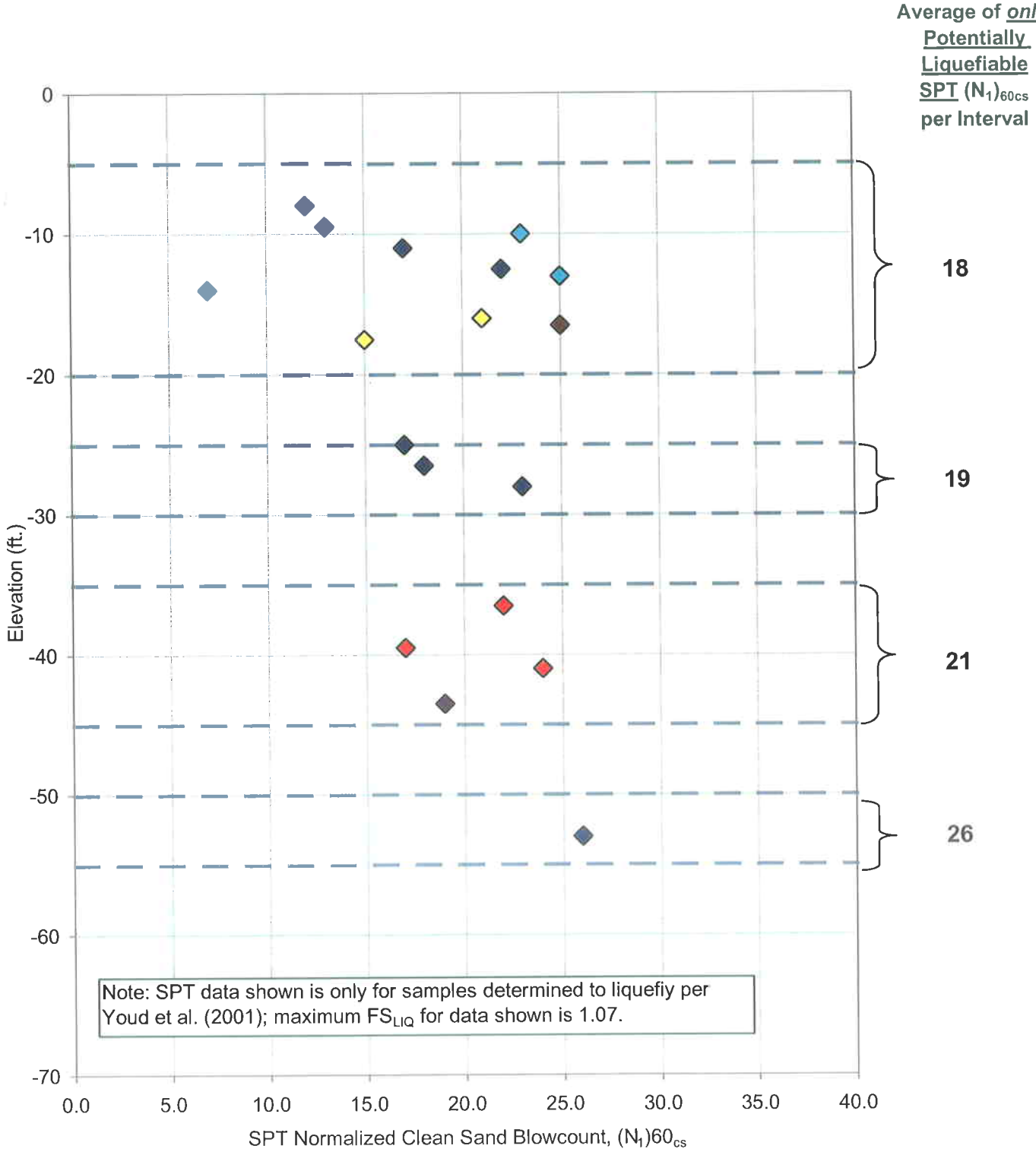
Data shown above represent ratios of post-liquefaction shear strength to effective overburden stress (s_u/σ'_{vo}) for sand/silty sand layers/lenses based on Olson and Stark (2002) as modified by Stark (2008).

POST-LIQUEFACTION STRENGTH RATIO: NORTH

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Boring Designation

◆ RB-1 ◇ RB-2 ◆ RB-4 ◆ RB-5 ◆ RB-6 ◇ RB-8

FIGURE 5-29

$(N_1)_{60cs}$ vs ELEVATION FOR SPT

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

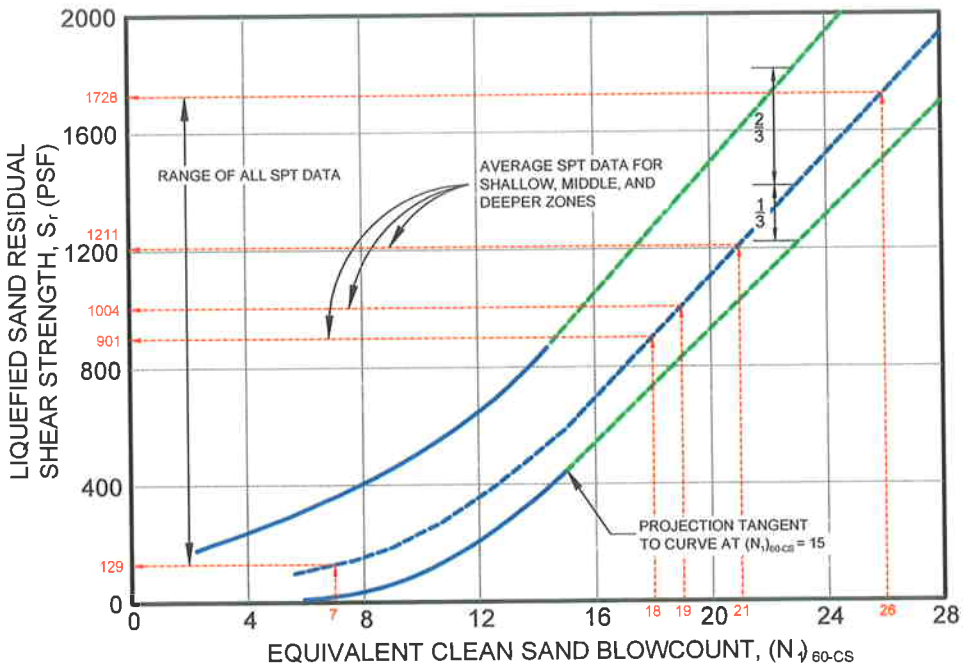


FIGURE A: MODIFIED FROM SEED AND HARDER, 1989.

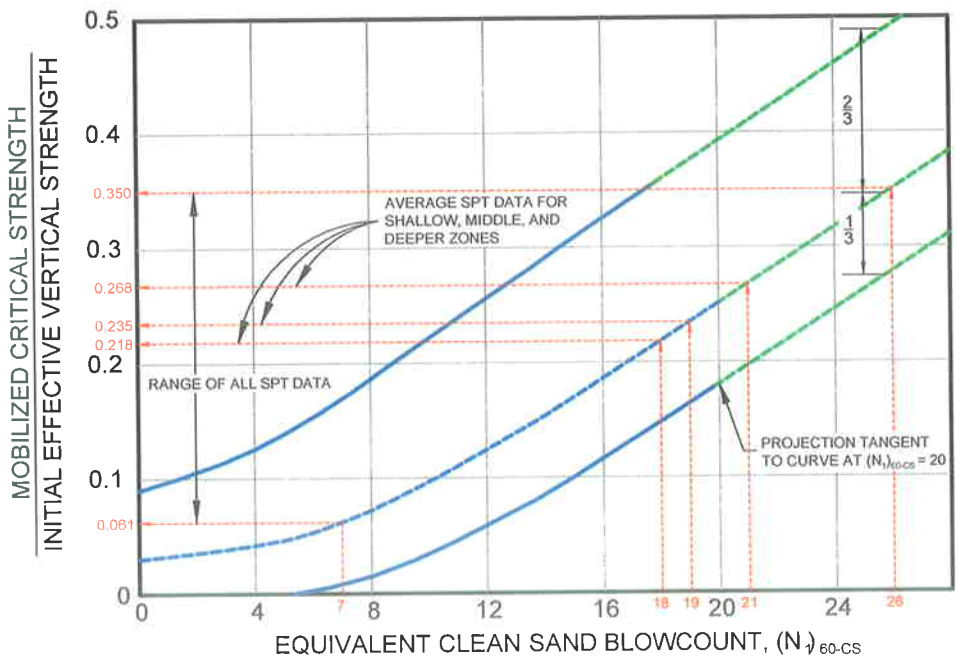


FIGURE B: MODIFIED FROM STARK AND MESRI, 1992.

FIGURE 5–30

LIQUEFIED SAND STRENGTH VS. SPT BLOWCOUNT

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

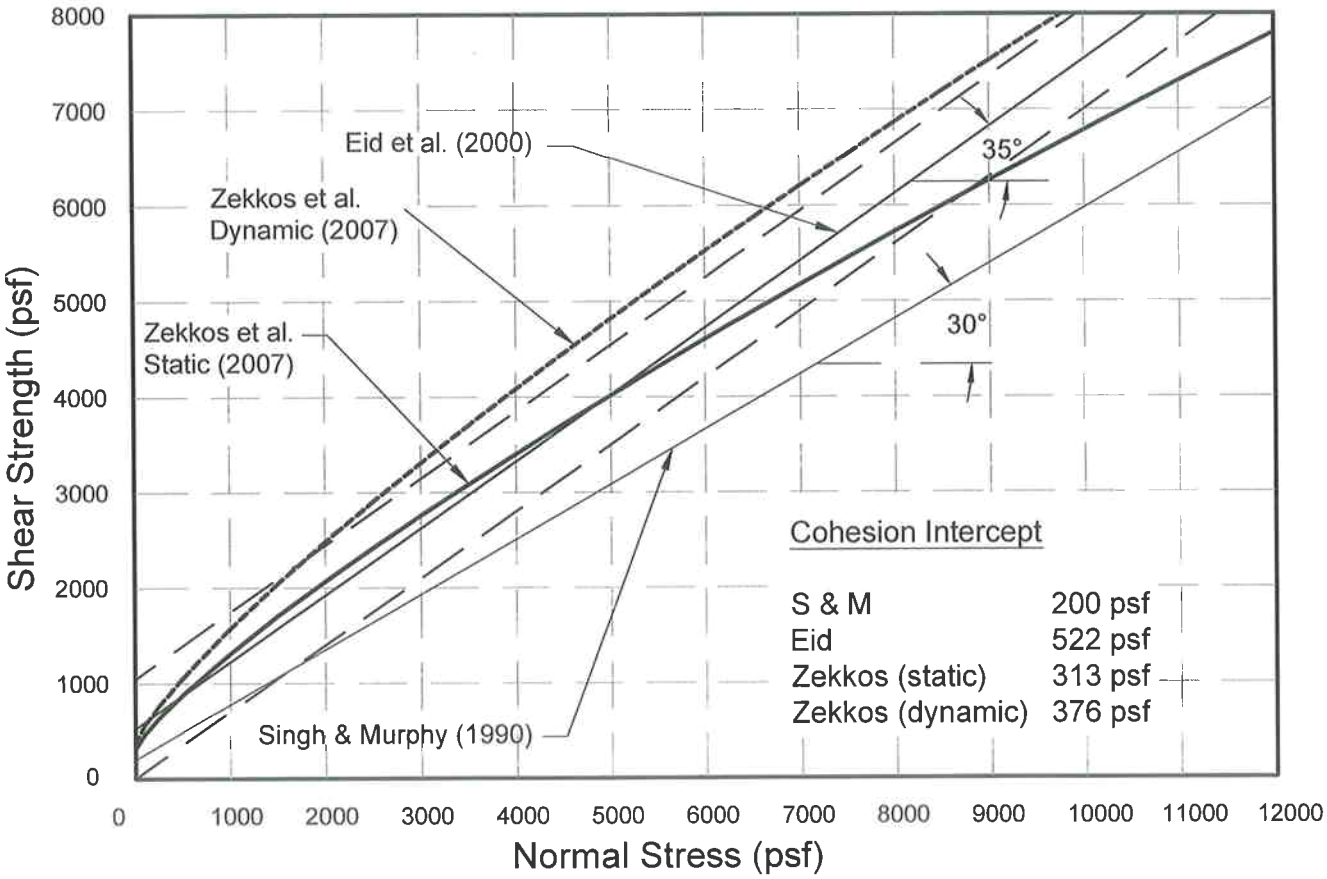


FIGURE 5–31

MSW SHEAR STRENGTH

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

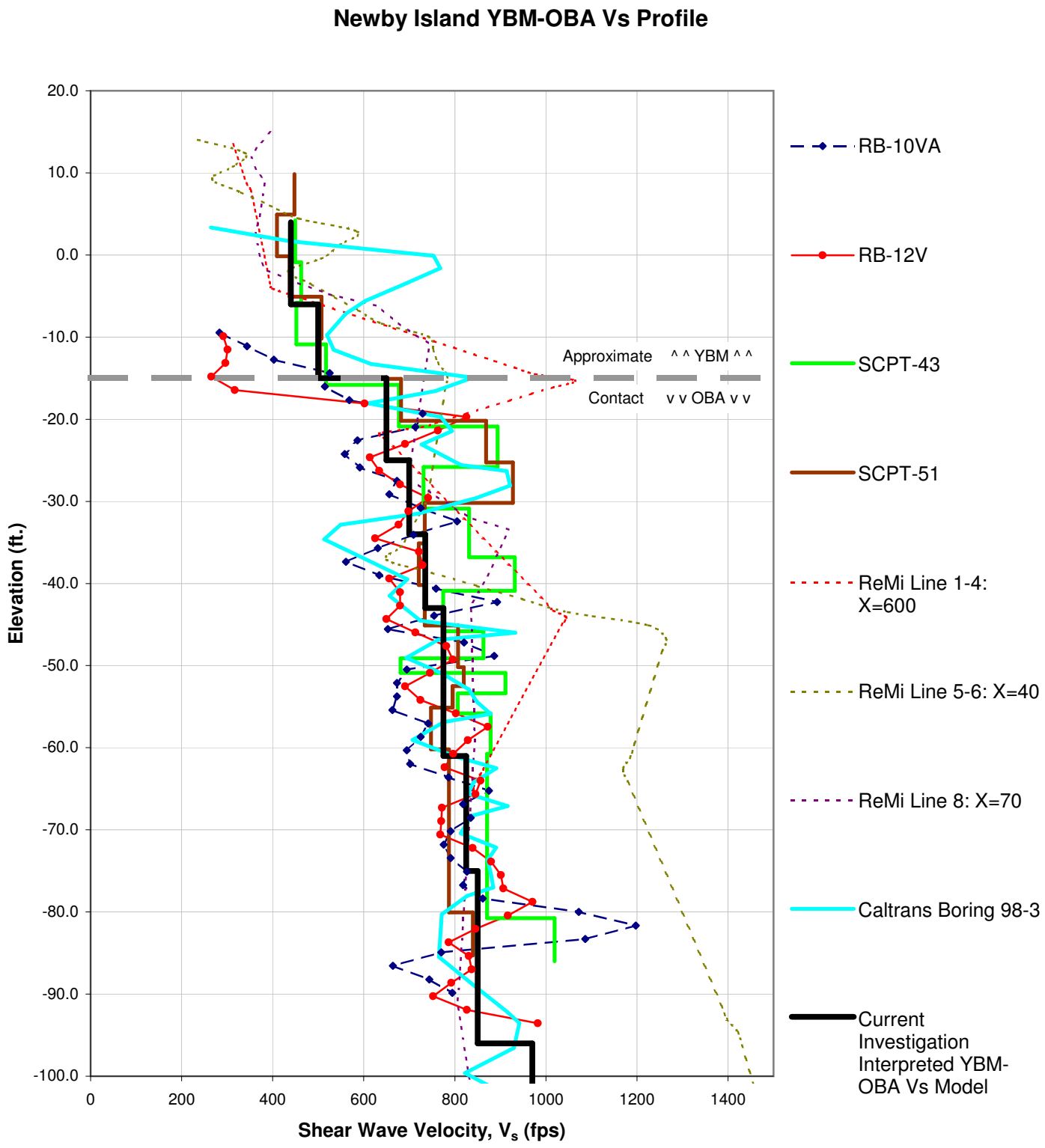


FIGURE 5-32

SHALLOW YBM/OBA SHEAR WAVE VELOCITY MODEL

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

SHEAR WAVE VELOCITY MODEL

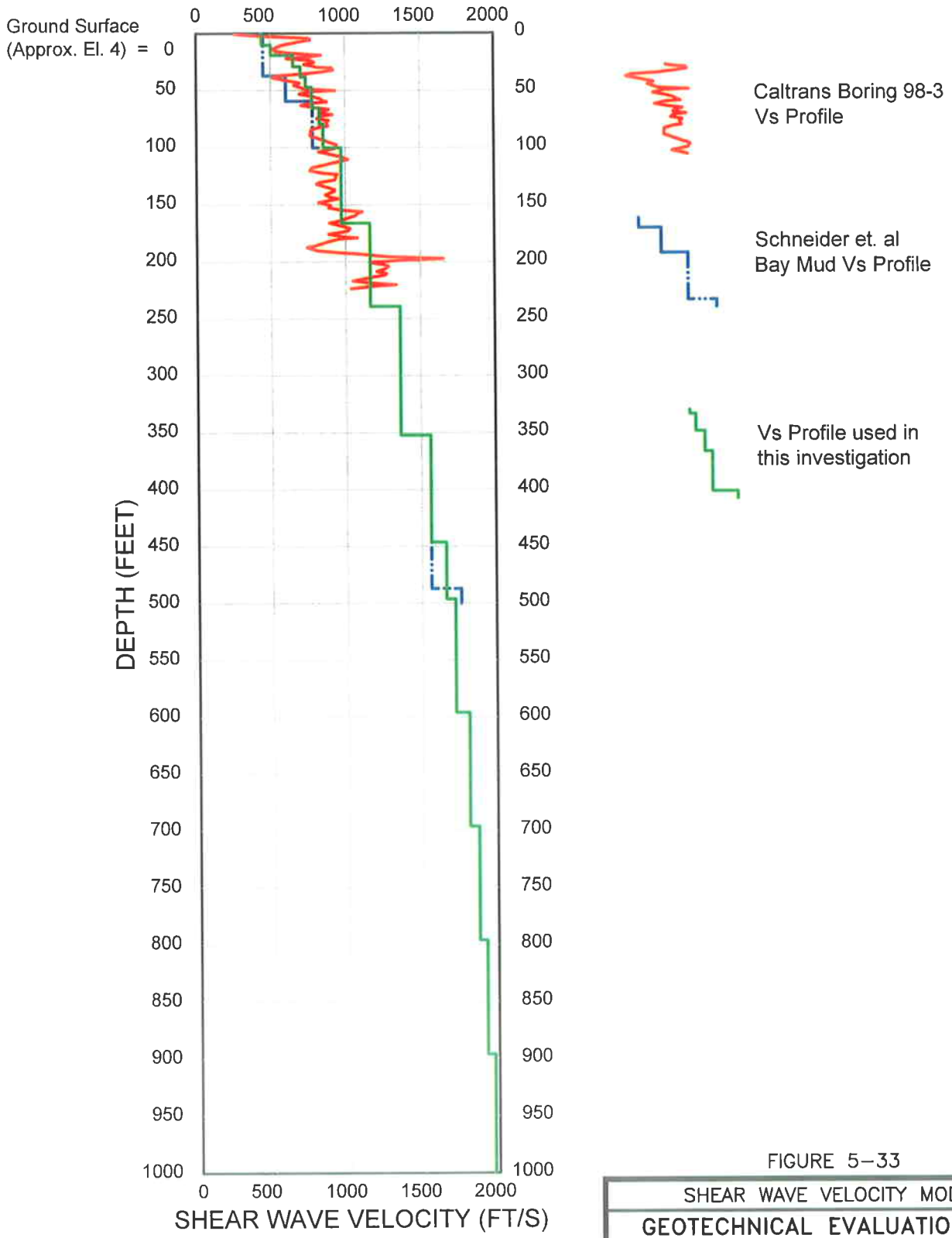


FIGURE 5–33

SHEAR WAVE VELOCITY MODEL		
GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA		
Geo-Logic ASSOCIATES		
DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

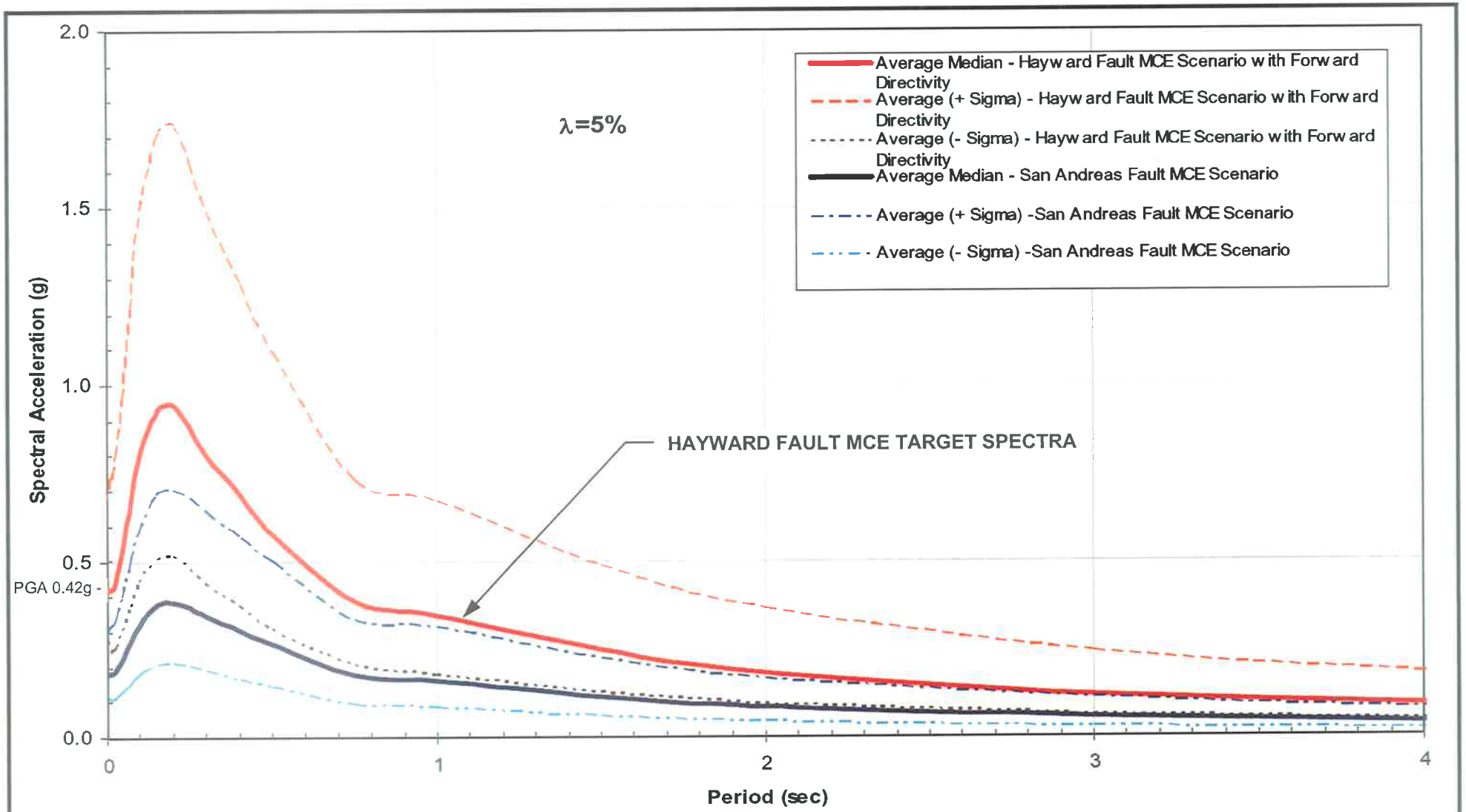


FIGURE 6-1

ARS CURVES: TARGET NGA SPECTRA

WORKPLAN FOR PROPOSED LIQUEFACTION INVESTIGATION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

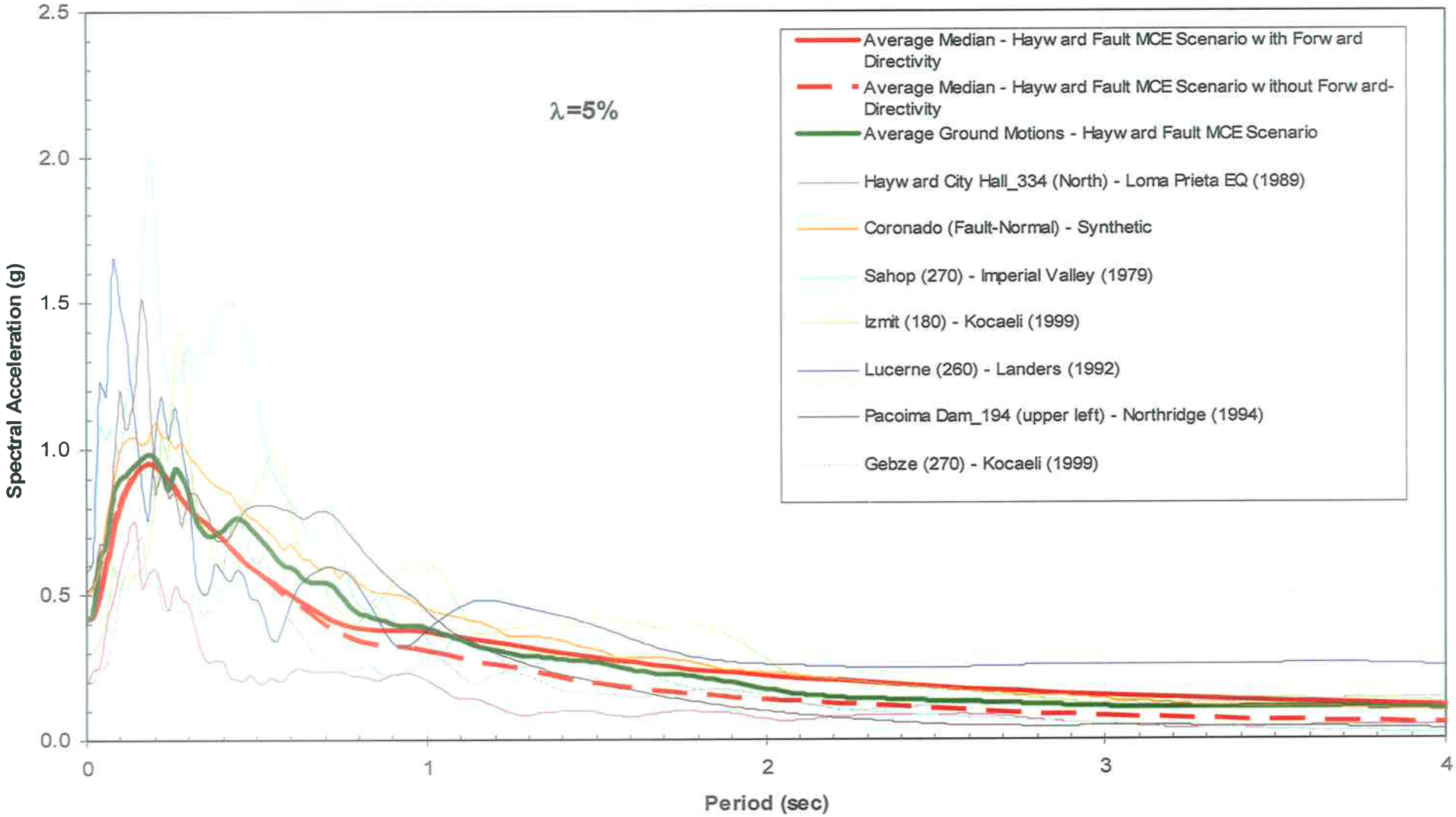
Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

Earthquake Scenarios

Hayward MCE Earthquake Scenario: $M_w = 7.1$; R = 3.3 km

San MCE Andreas Earthquake Scenario: $M_w = 7.9$; R = 24.9 km



Hayward MCE Earthquake Scenario: $M_w = 7.1$; R = 3.3 km

FIGURE 6-2

ARS CURVES: HAYWARD EQ SCENARIO

WORKPLAN FOR PROPOSED LIQUEFACTION INVESTIGATION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

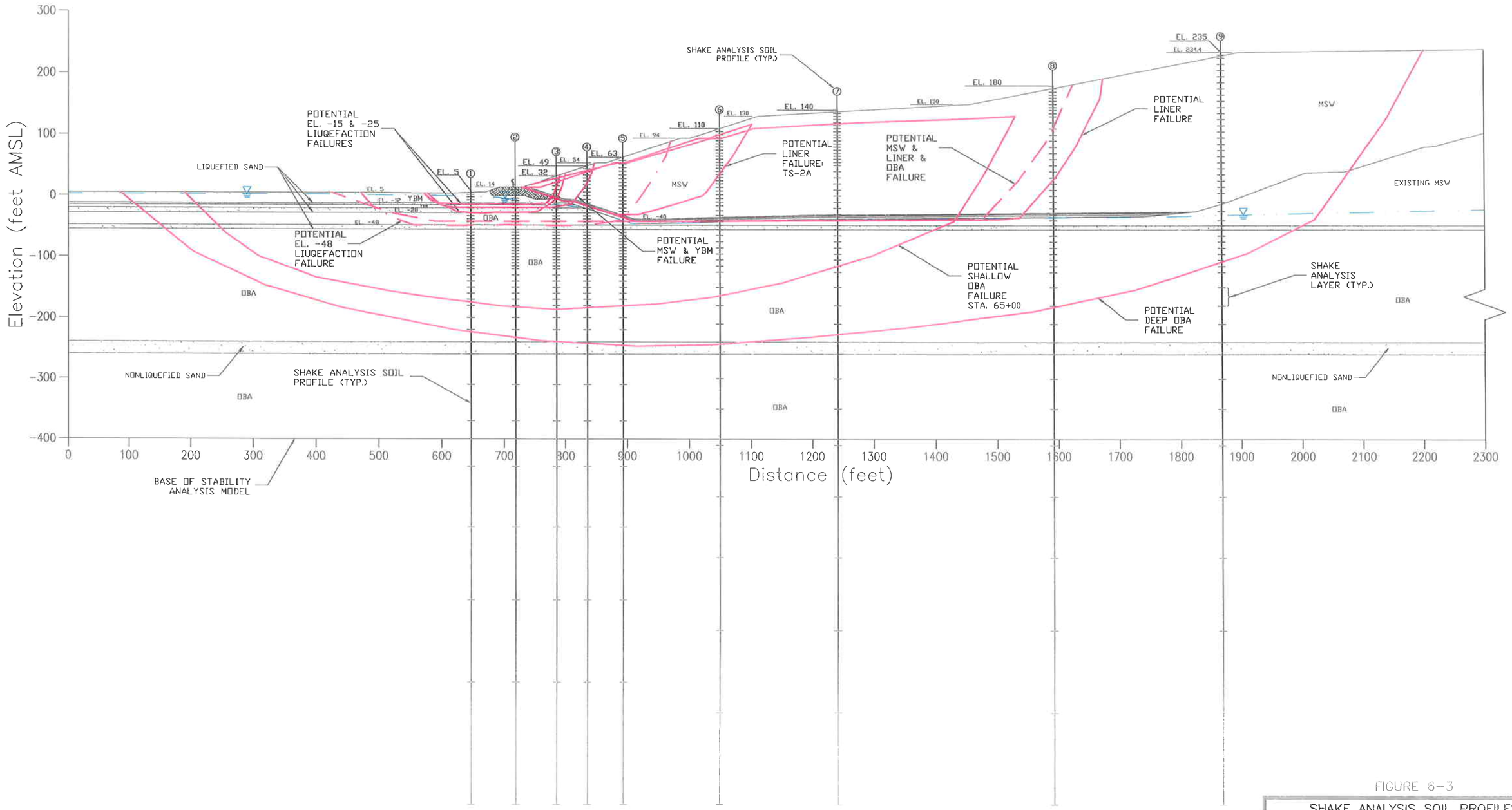


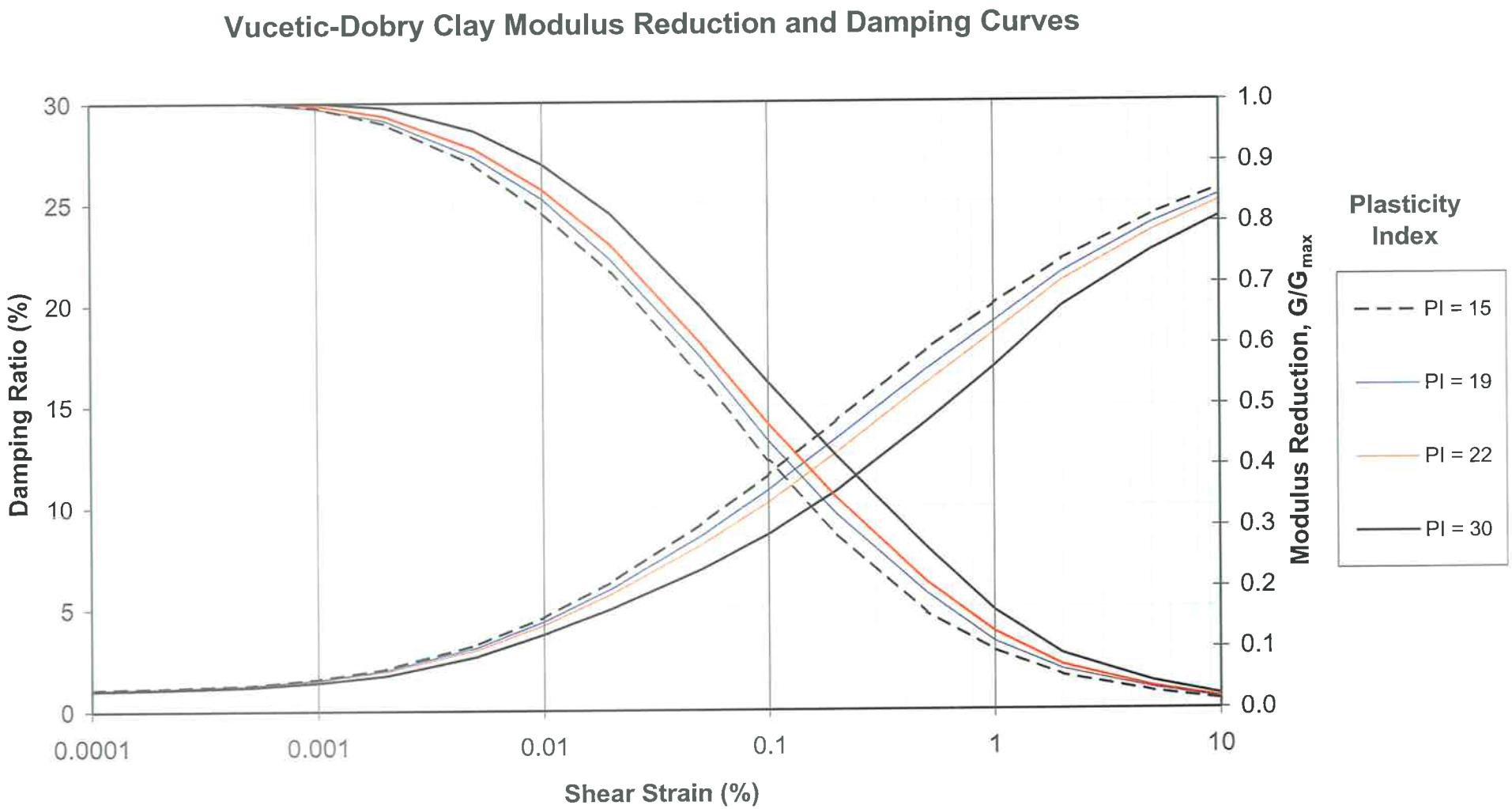
FIGURE 8-3

SHAKE ANALYSIS SOIL PROFILES

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



Material	PI
Dike	22
Young Bay Mud	30
Older Bay Alluvium	19

Source:Vucetic and Dobry, 1991

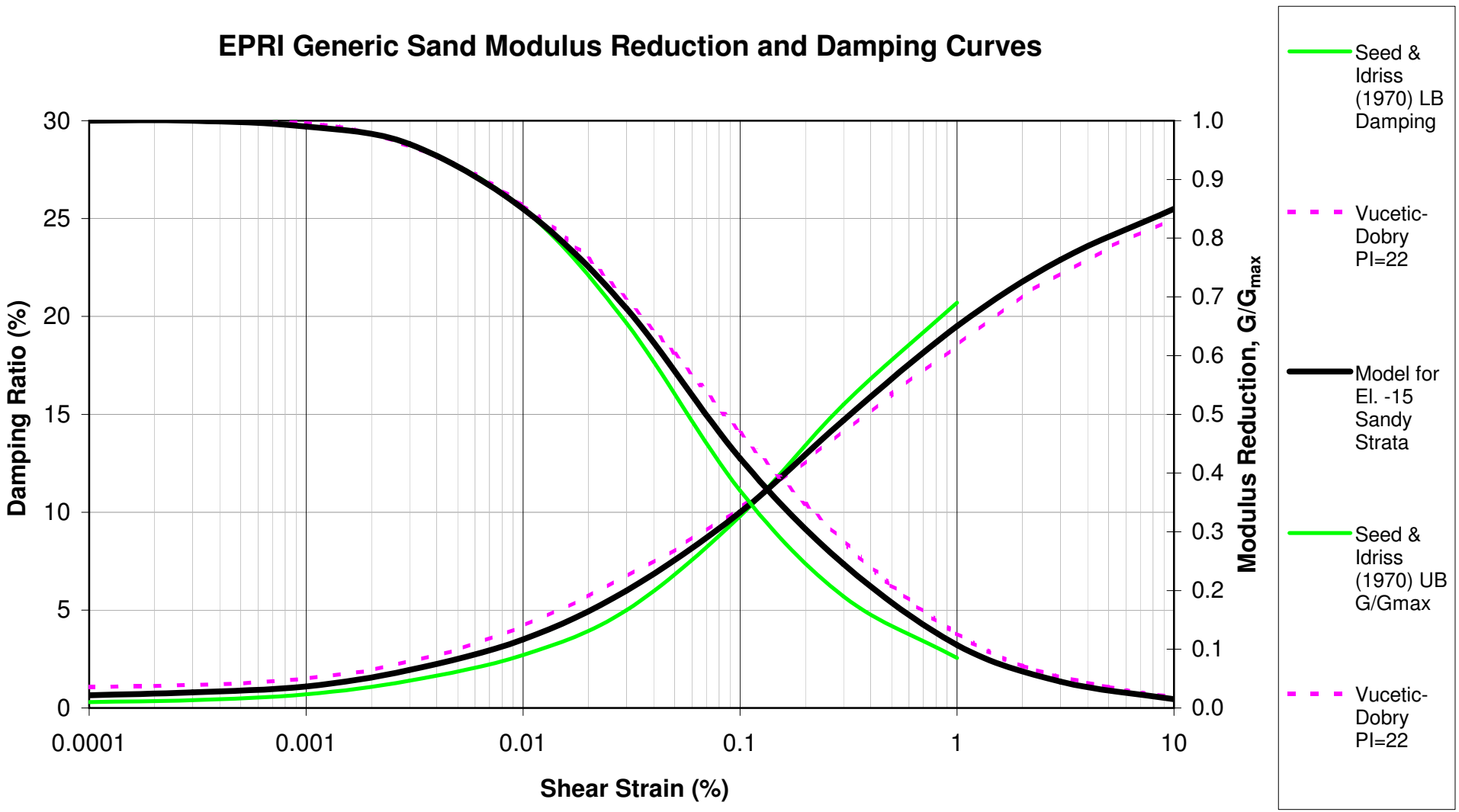
FIGURE 6-4

VUCETIC-DOBRY MODULUS REDUCTION & DAMPING

WORKPLAN FOR PROPOSED LIQUEFACTION INVESTIGATION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Source: Vucetic and Dobry (1991), Seed and Idriss (1970)

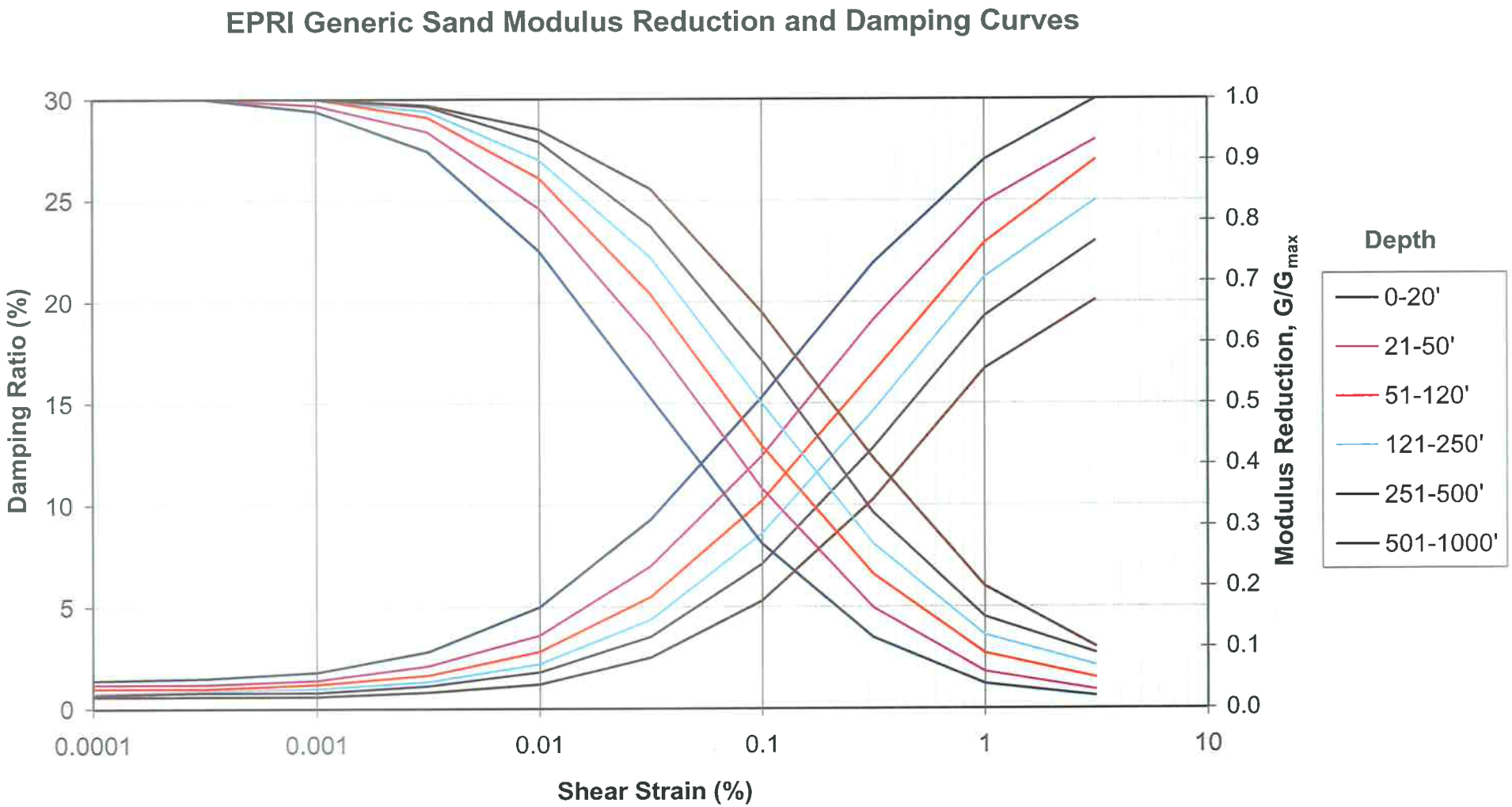
FIGURE 6-5

SHALLOW SAND MODULUS REDUCTION AND DAMPING

WORKPLAN FOR PROPOSED LIQUEFACTION INVESTIGATION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Source: Electric Power Research Institute (1993)

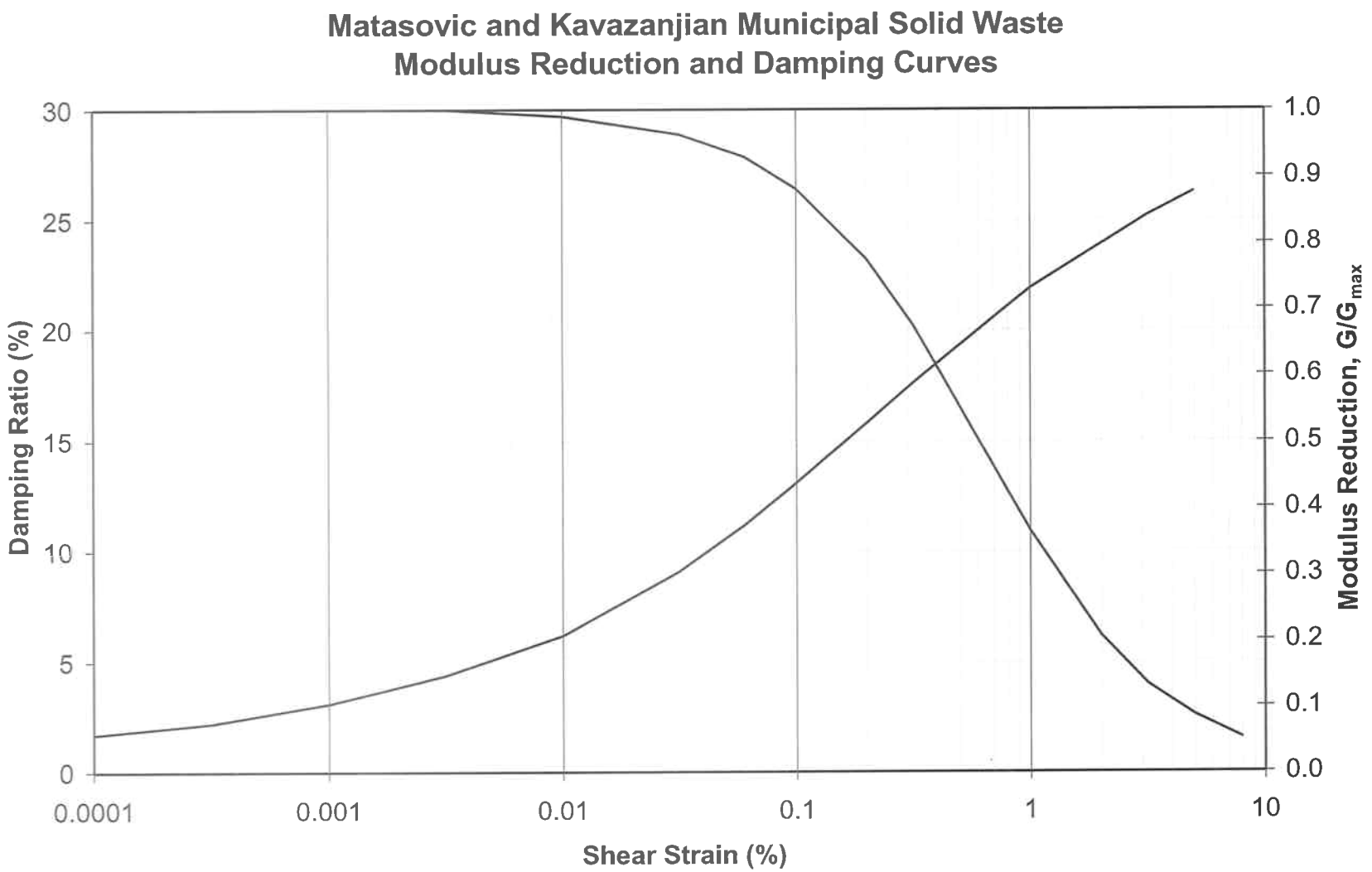
FIGURE 6-6

EPRI MODULUS REDUCTION AND DAMPING

WORKPLAN FOR PROPOSED LIQUEFACTION INVESTIGATION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Source:Matasovic and Kavazanjian (1998)

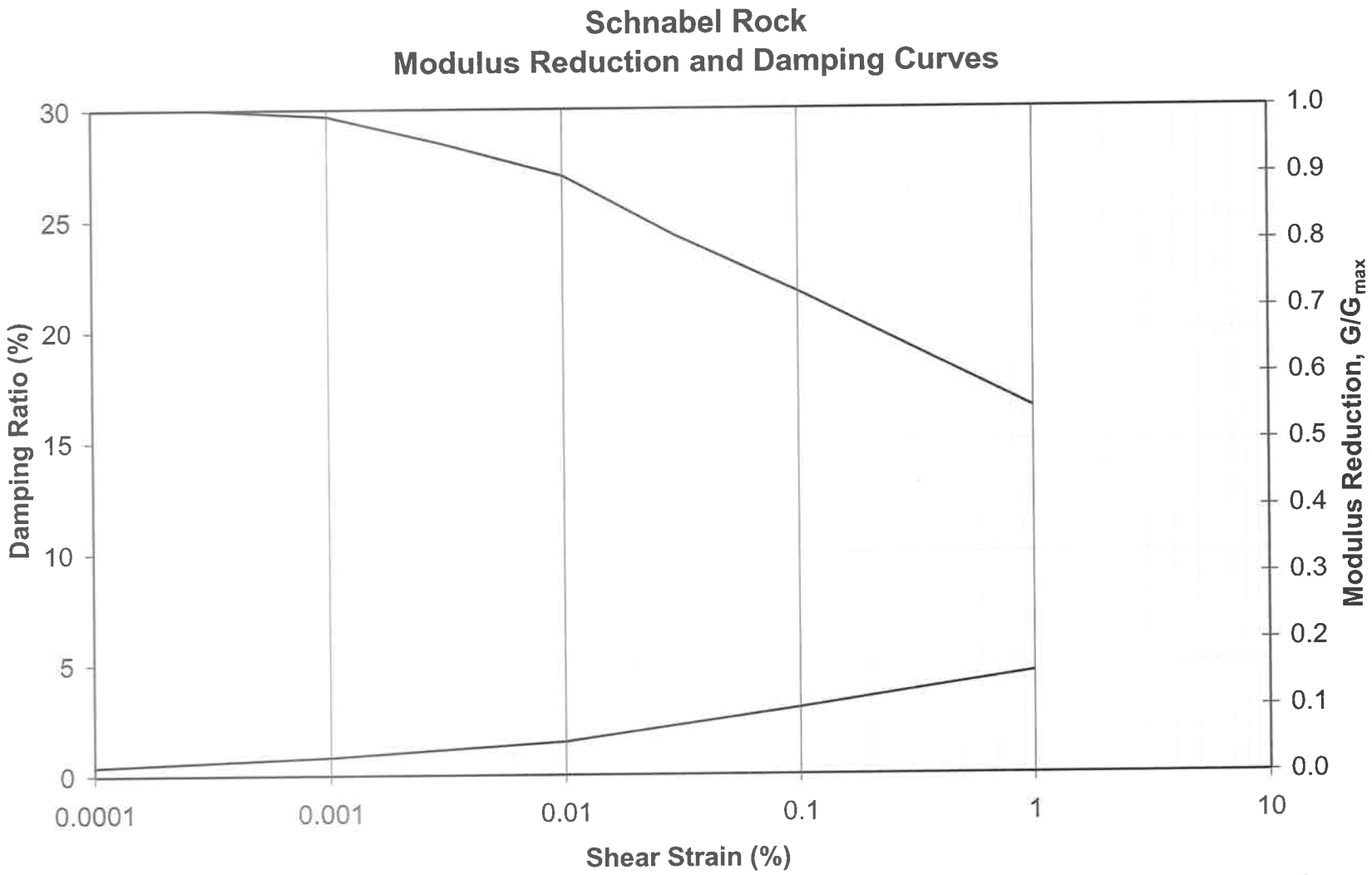
FIGURE 6-7

MATASOVIC & KAVAZANJIAN MODULUS REDUCTION & DAMPING

WORKPLAN FOR PROPOSED LIQUEFACTION INVESTIGATION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



Source:Schnabel (1973)

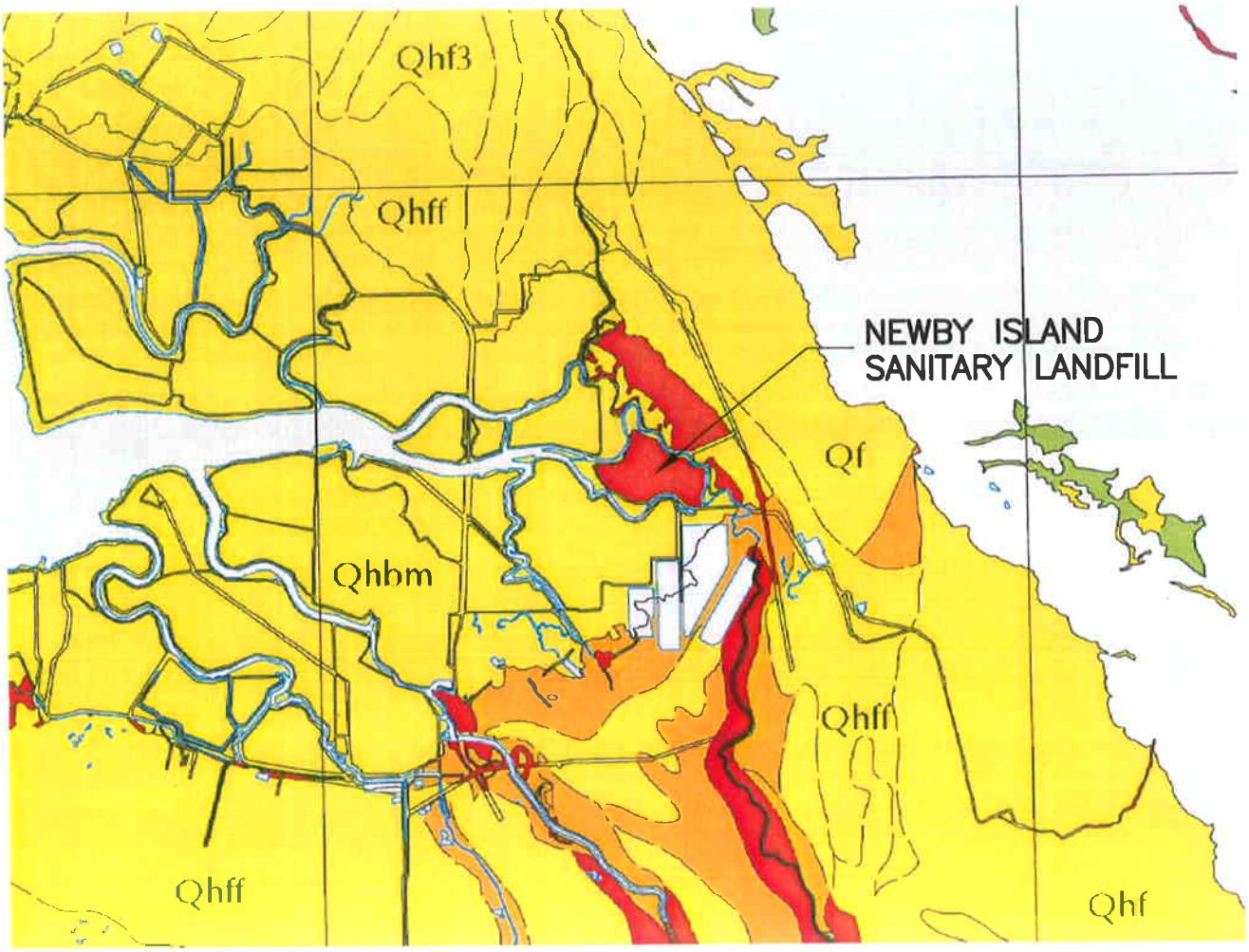
FIGURE 6-8

SCHNABEL MODULUS REDUCTION & DAMPING

WORKPLAN FOR PROPOSED LIQUEFACTION INVESTIGATION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



NOT TO SCALE

LIQUEFACTION SUSCEPTIBILITY

- VERY HIGH
- HIGH
- MODERATE
- LOW
- VERY LOW

Lines

Contact, dashed where location uncertainty is greater than about +-100 m.

REFERENCE:
PORTION OF "MAPS OF QUATERNARY DEPOSITS AND LIQUEFACTION SUSCEPTIBILITY IN THE CENTRAL SAN FRANCISCO BAY REGION, CALIFORNIA," SHEET 2 OF 2, US GEOLOGICAL SURVEY, OPEN FILE REPORT 06-1037, 2006.

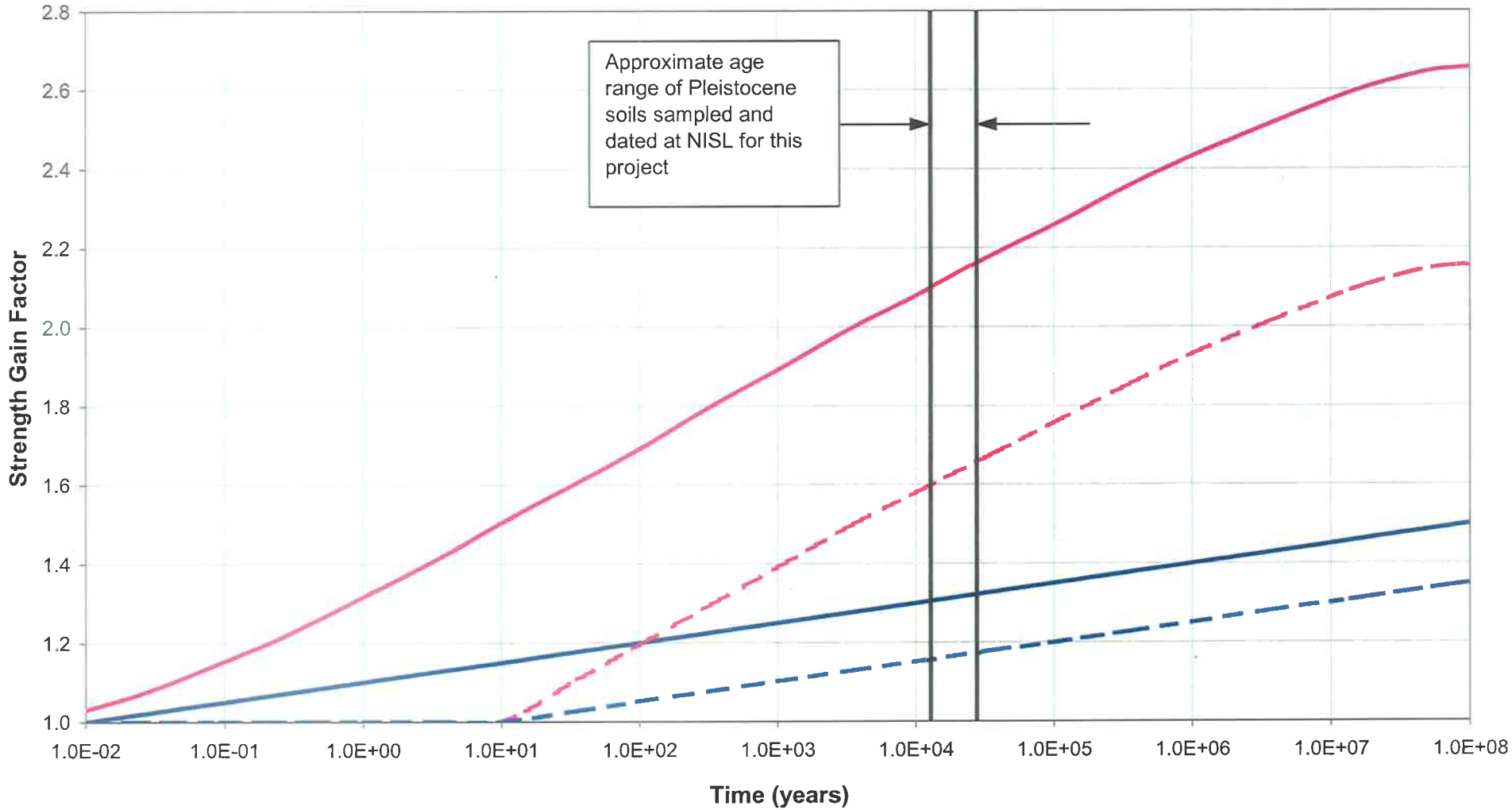
FIGURE 7-1

USGS MAP OF LIQUEFACTION SUSCEPTIBILITY

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



c_{CRR} per Arangeo et al. (2000); Leon et al. (2006)
c_{aging} per Kulhawy & Mayne (1990); Leon et al. (2006)
c_{CRR} normalized to 10 years
c_{aging} normalized to 10 years

Age-dependent cyclic strength gain factors as published and as reduced by normalizing to 10 years; the latter were used in the NISL liquefaction triggering assessment.

FIGURE 7-2

CYCLIC STRENGTH GAIN OF AGED SAND

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049

REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

FIGURE 7–3A

SIMPLIFIED CPT LIQUIFACTION PLAN (+5' TO 0' AMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

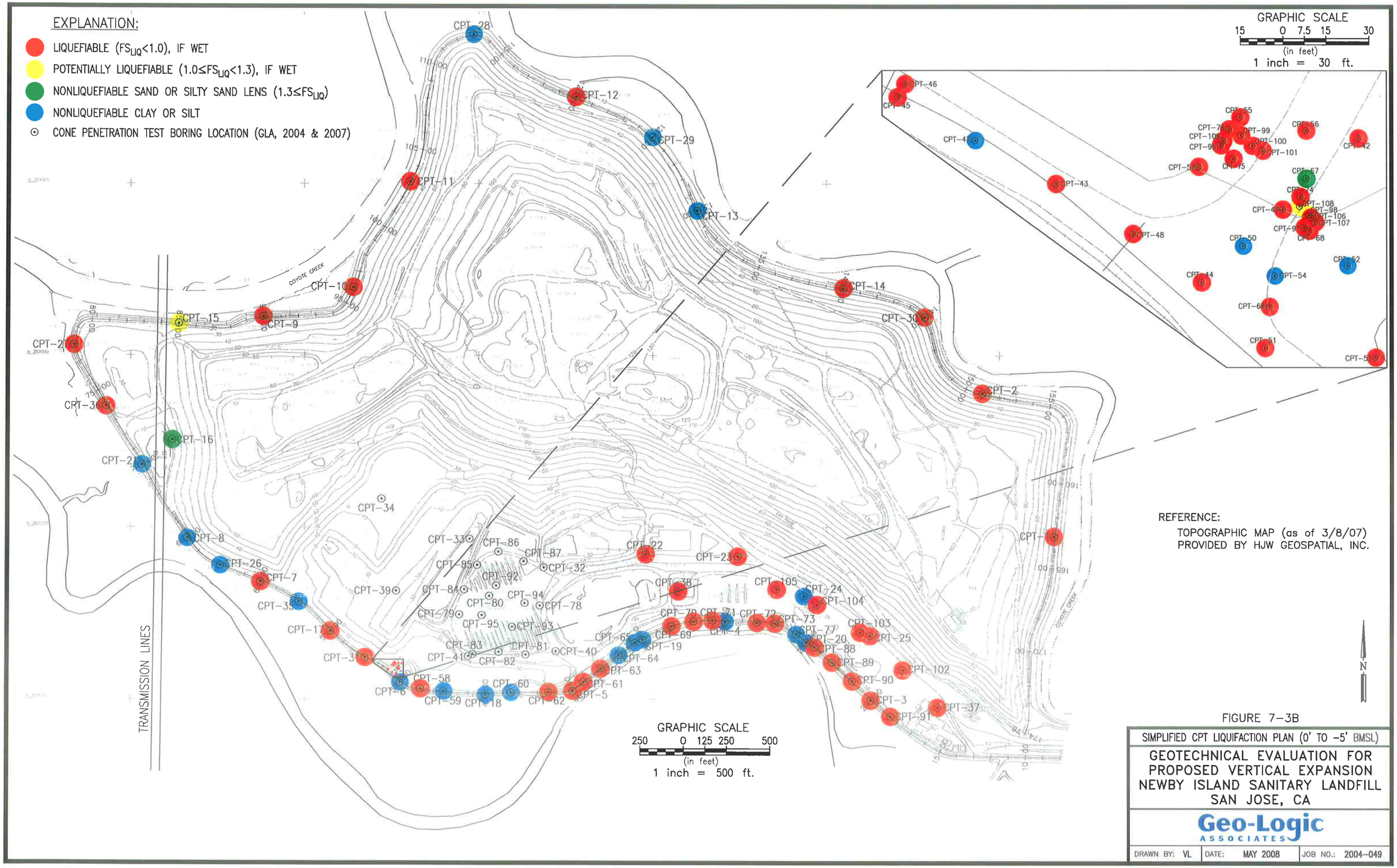


FIGURE 7–3B

SIMPLIFIED CPT LIQUIFACTION PLAN (0' TO –5' BMSL)

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

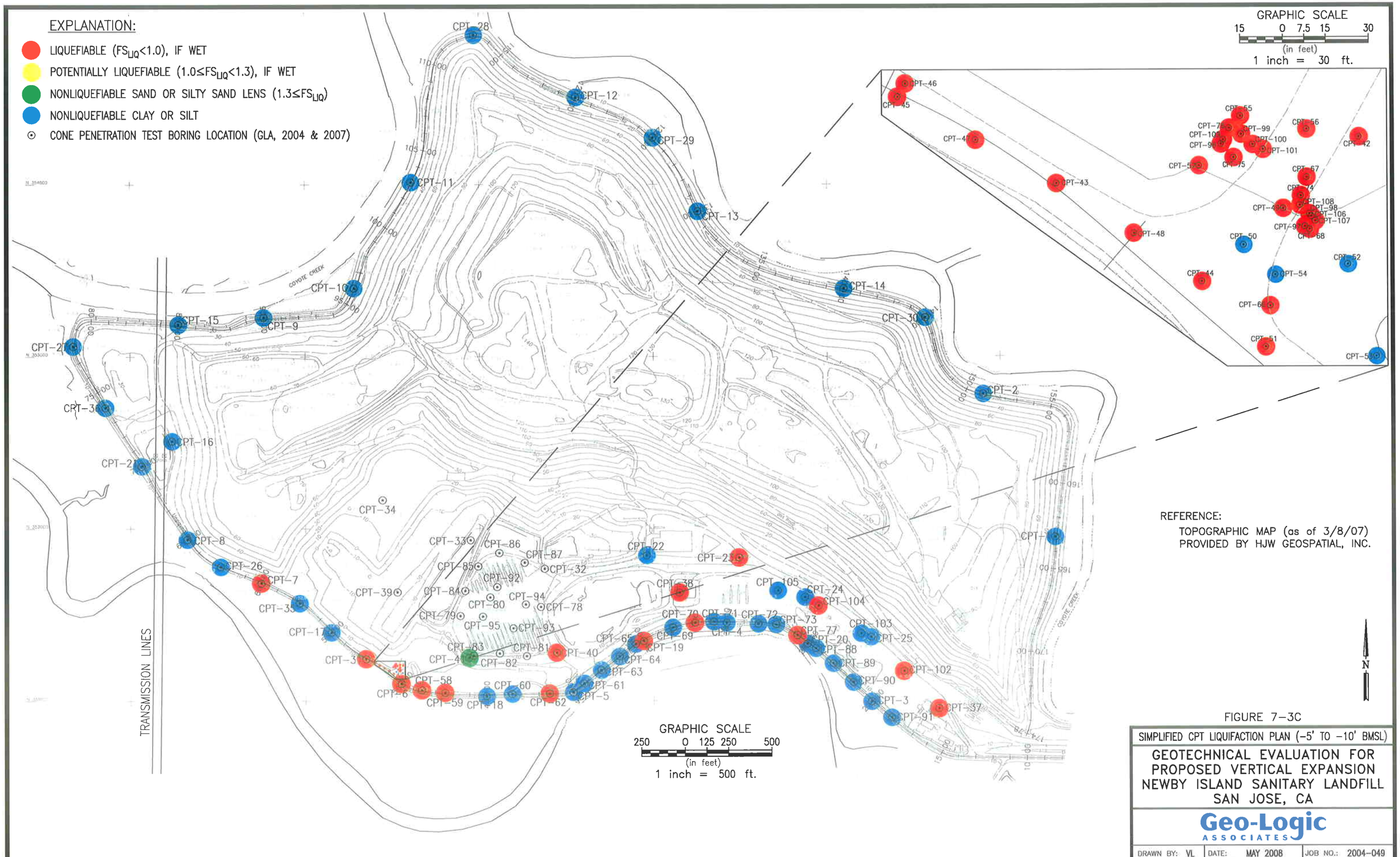


FIGURE 7–3C

SIMPLIFIED CPT LIQUIFACTION PLAN (–5' TO –10' BMSL)

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

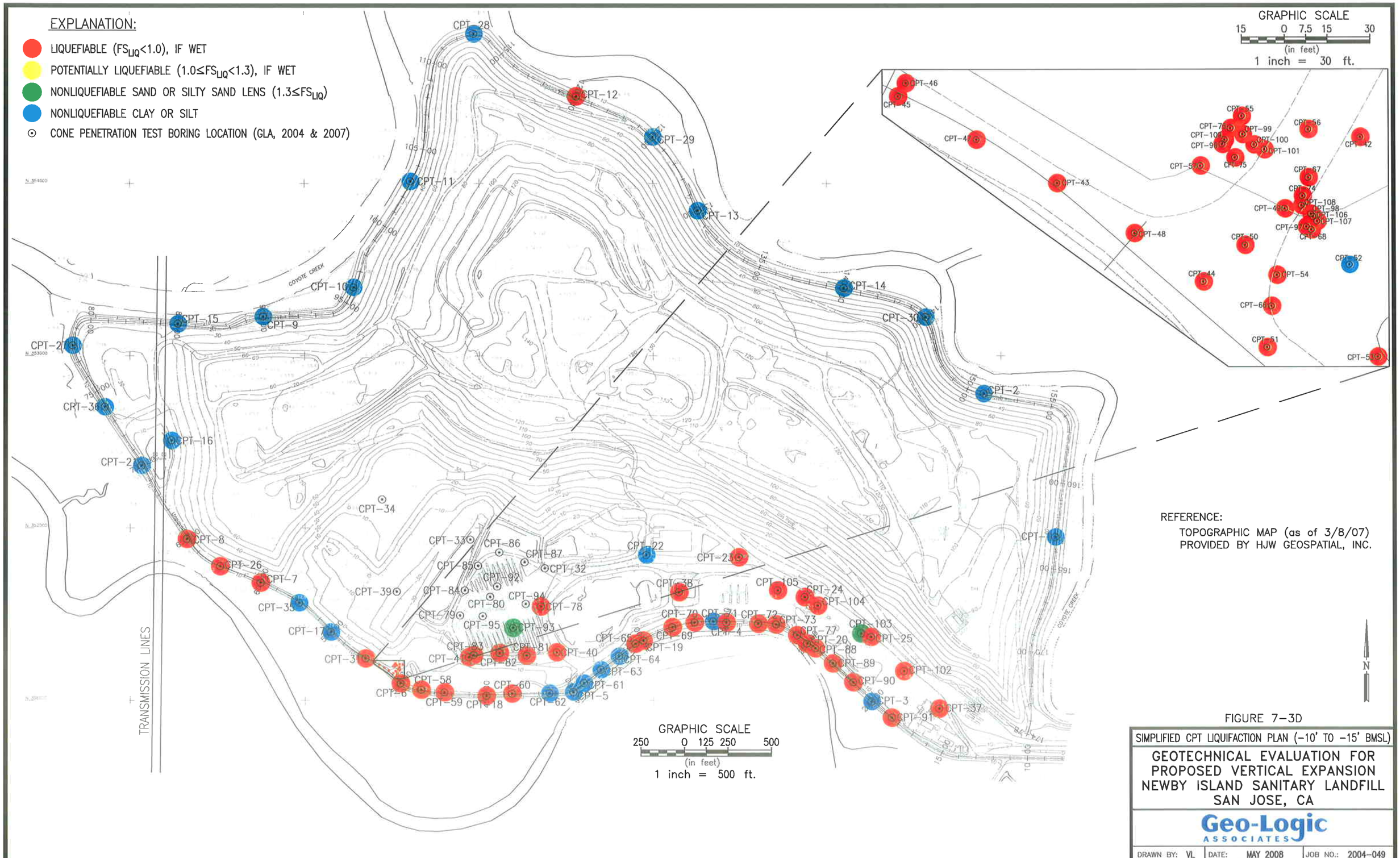


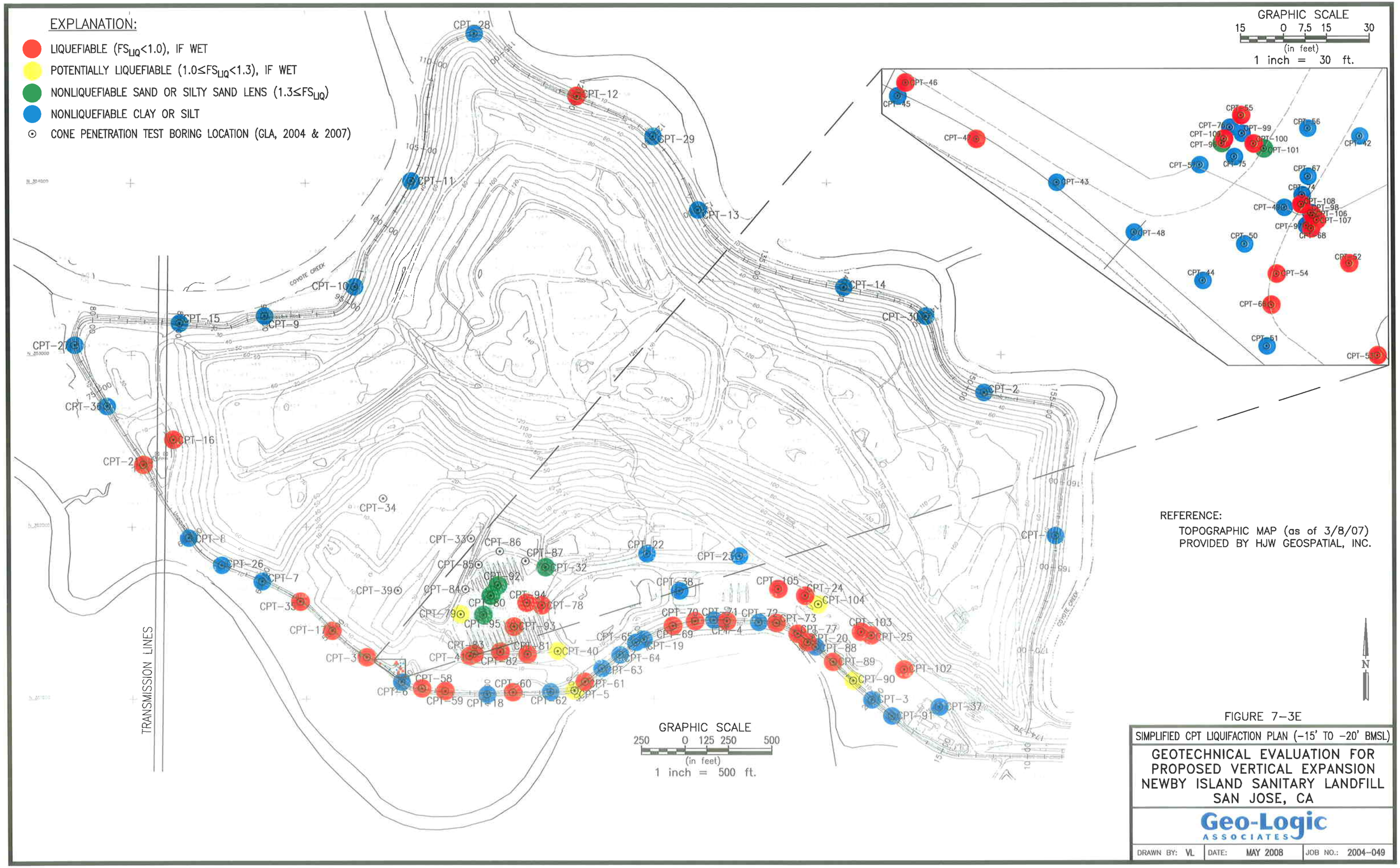
FIGURE 7-3D

SIMPLIFIED CPT LIQUIFACTION PLAN (-10' TO -15' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

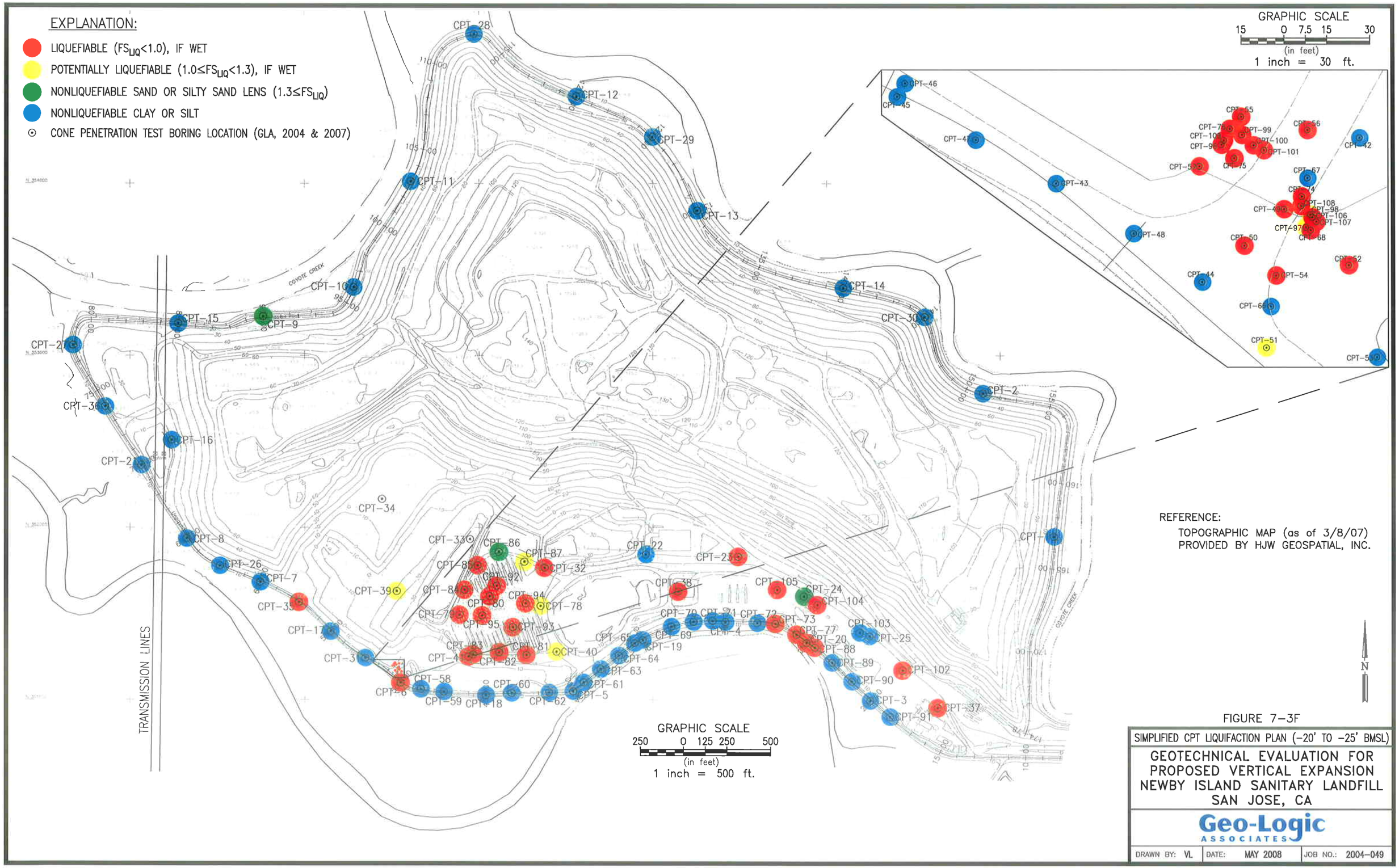
FIGURE 7-3E

SIMPLIFIED CPT LIQUIFACTION PLAN (-15' TO -20' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

FIGURE 7–3F

SIMPLIFIED CPT LIQUIFACTION PLAN (–20' TO –25' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

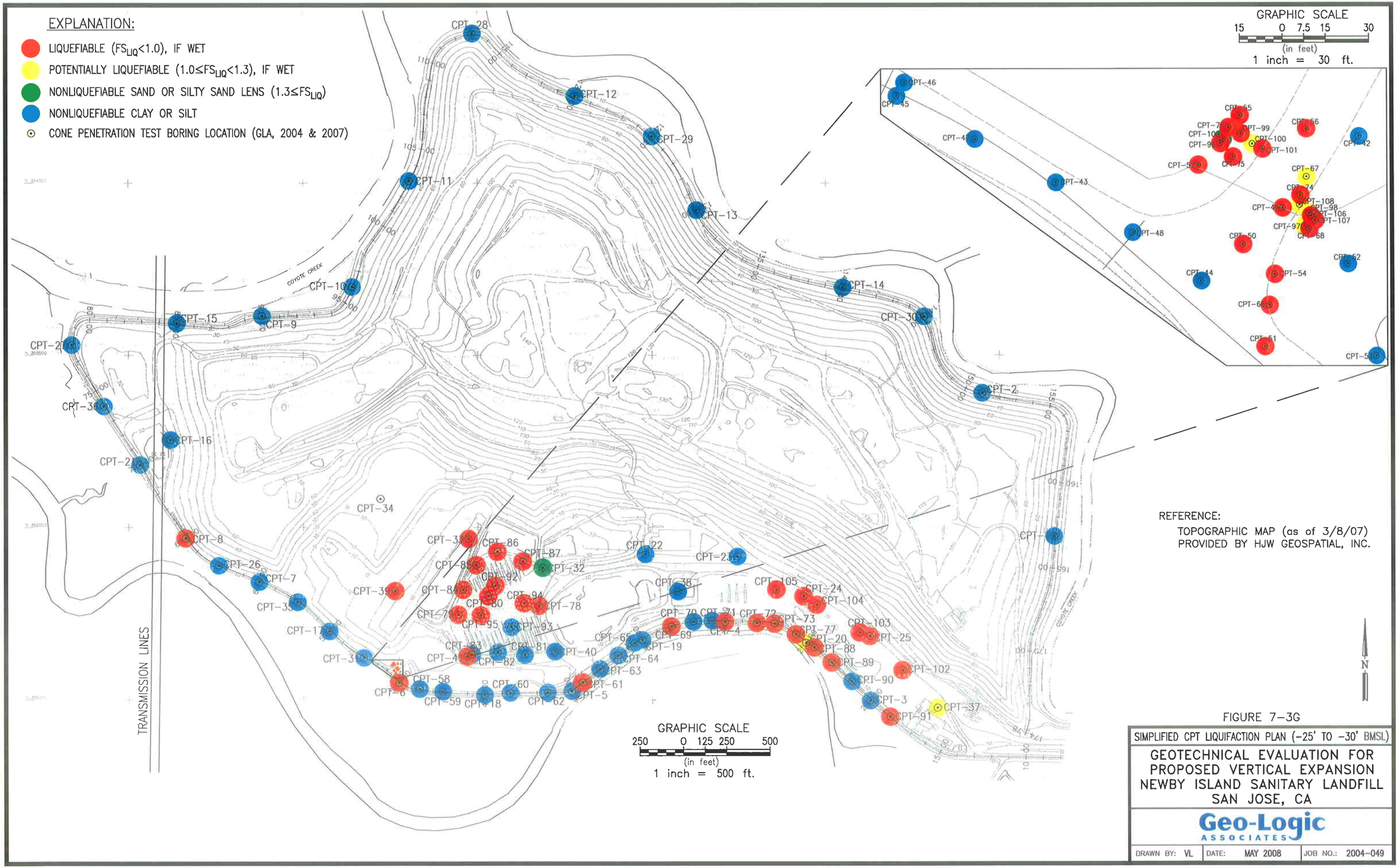


FIGURE 7-3G

SIMPLIFIED CPT LIQUIFACTION PLAN (-25' TO -30' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049

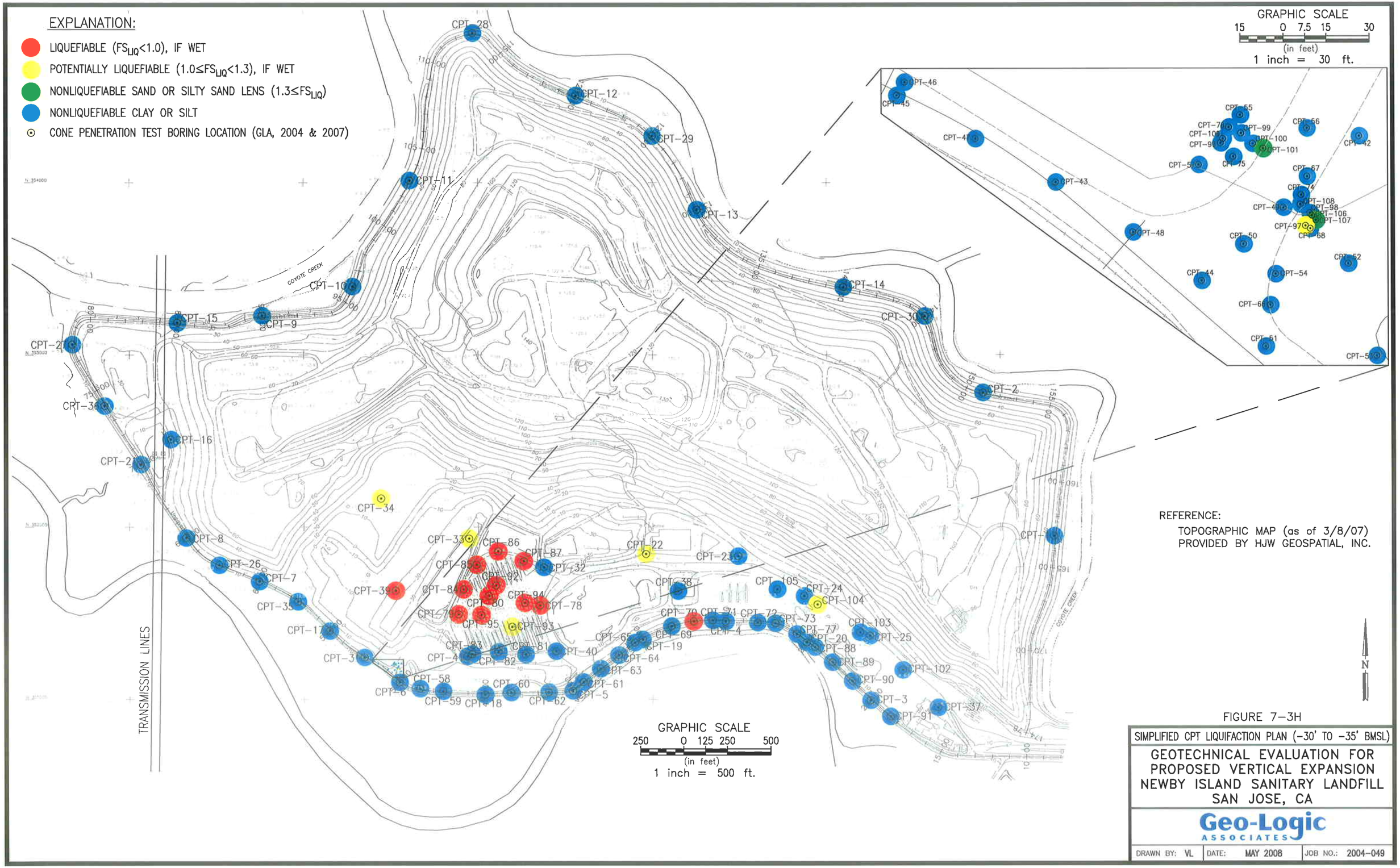


FIGURE 7–3H

SIMPLIFIED CPT LIQUIFACTION PLAN (–30' TO –35' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

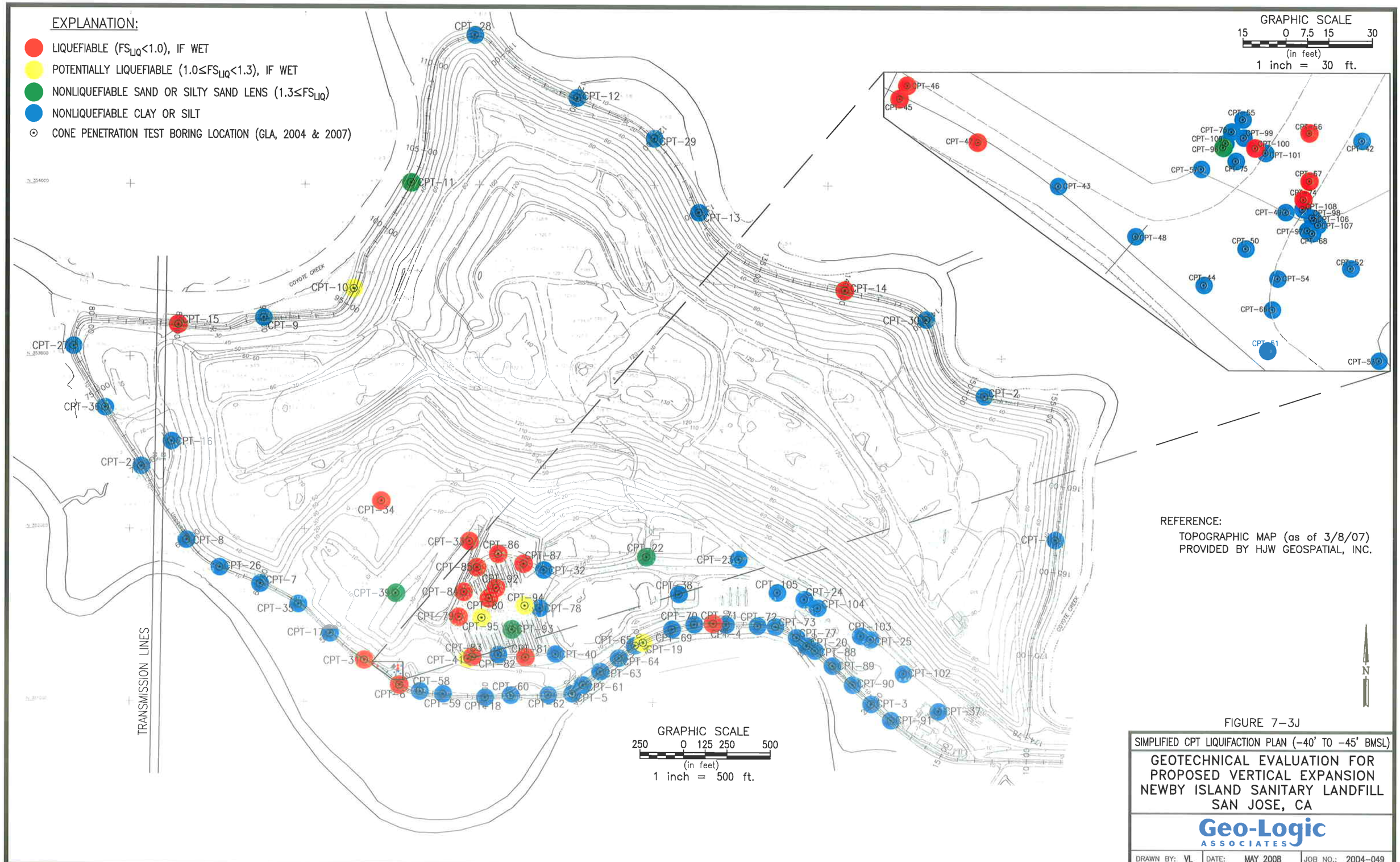
FIGURE 7-3I

SIMPLIFIED CPT LIQUIFACTION PLAN (-35' TO -40' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

FIGURE 7-3J

SIMPLIFIED CPT LIQUIFACTION PLAN (-40' TO -45' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049

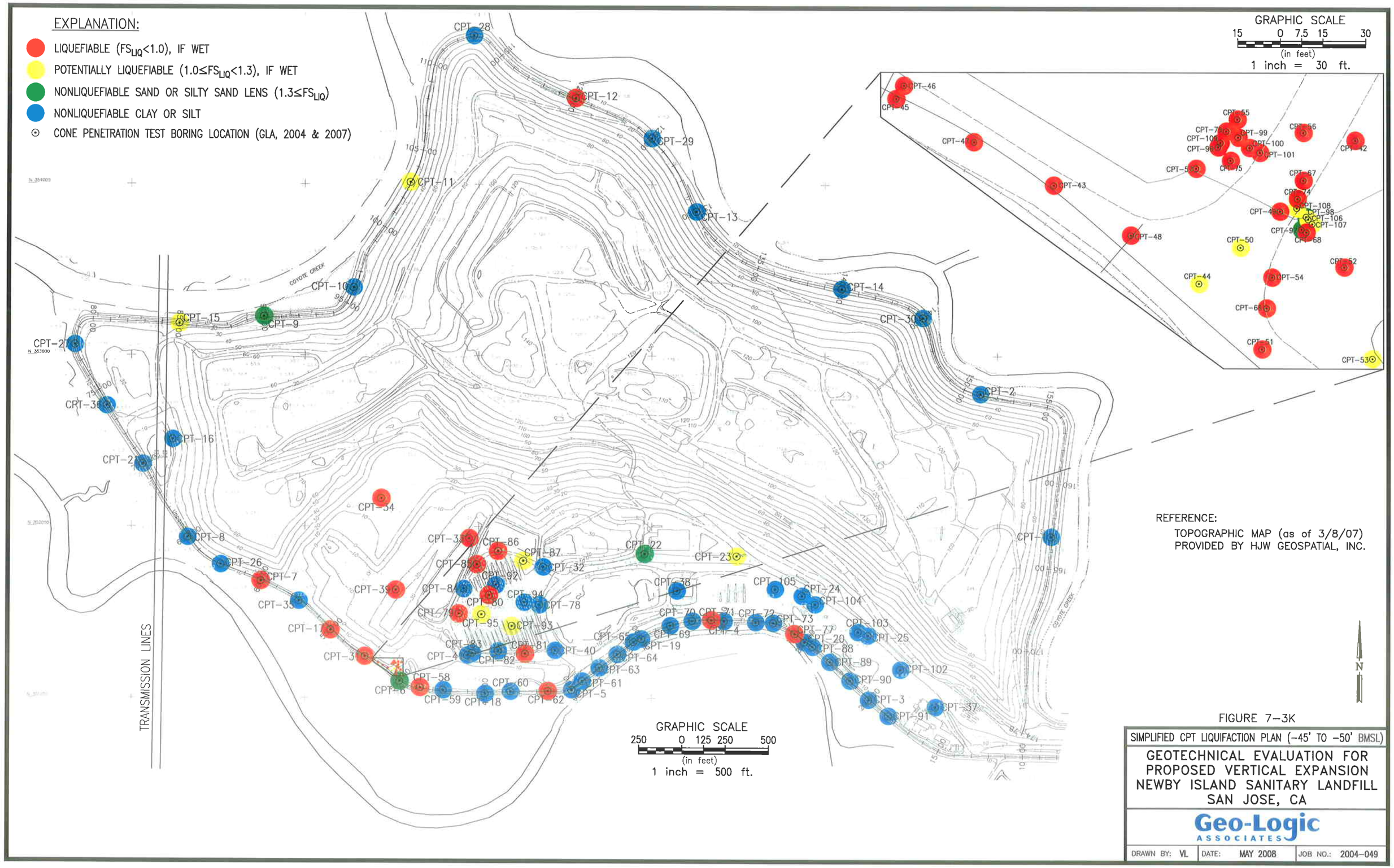


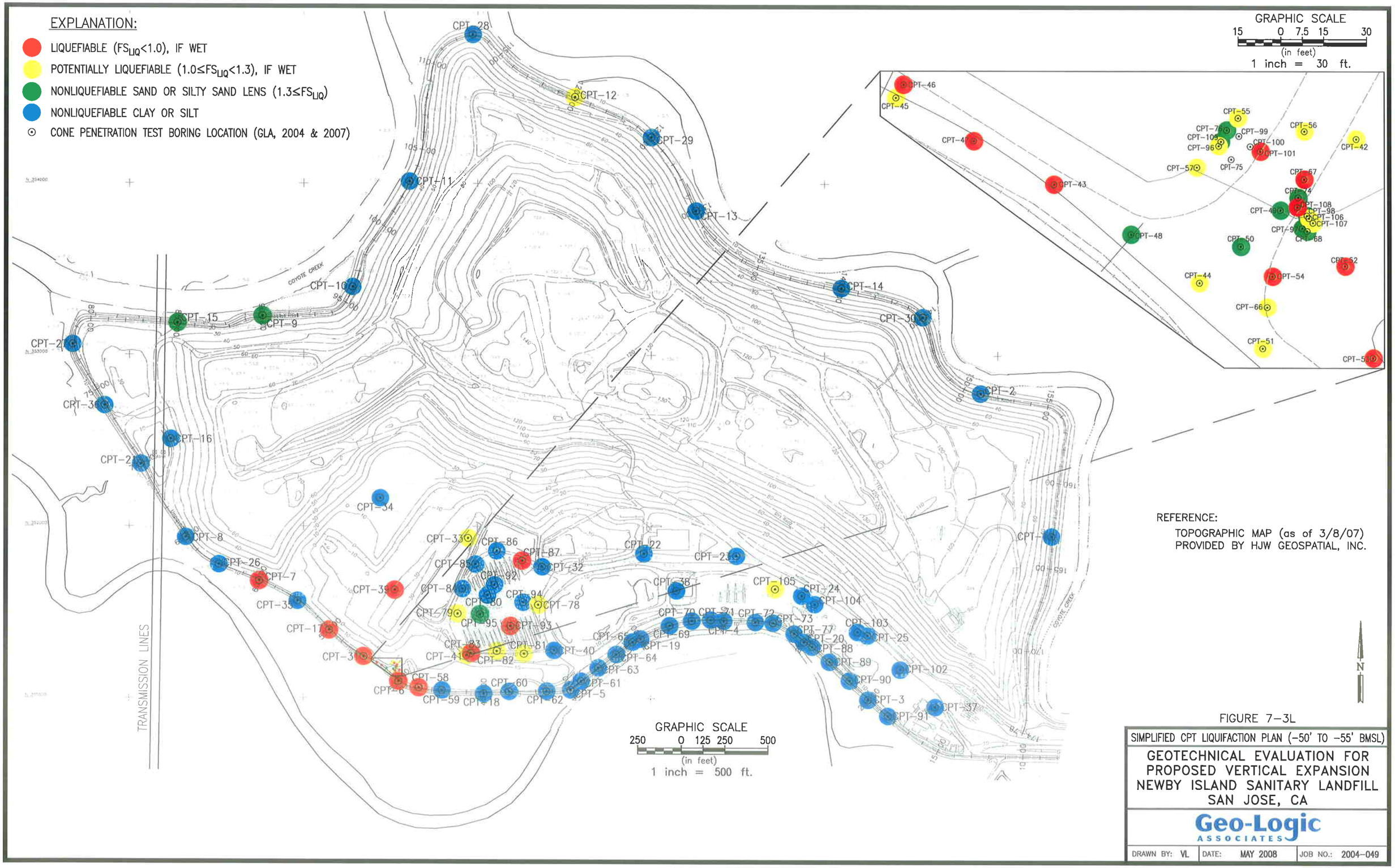
FIGURE 7–3K

SIMPLIFIED CPT LIQUIFACTION PLAN (–45' TO –50' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

FIGURE 7–3L

SIMPLIFIED CPT LIQUIFACTION PLAN (–50' TO –55' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

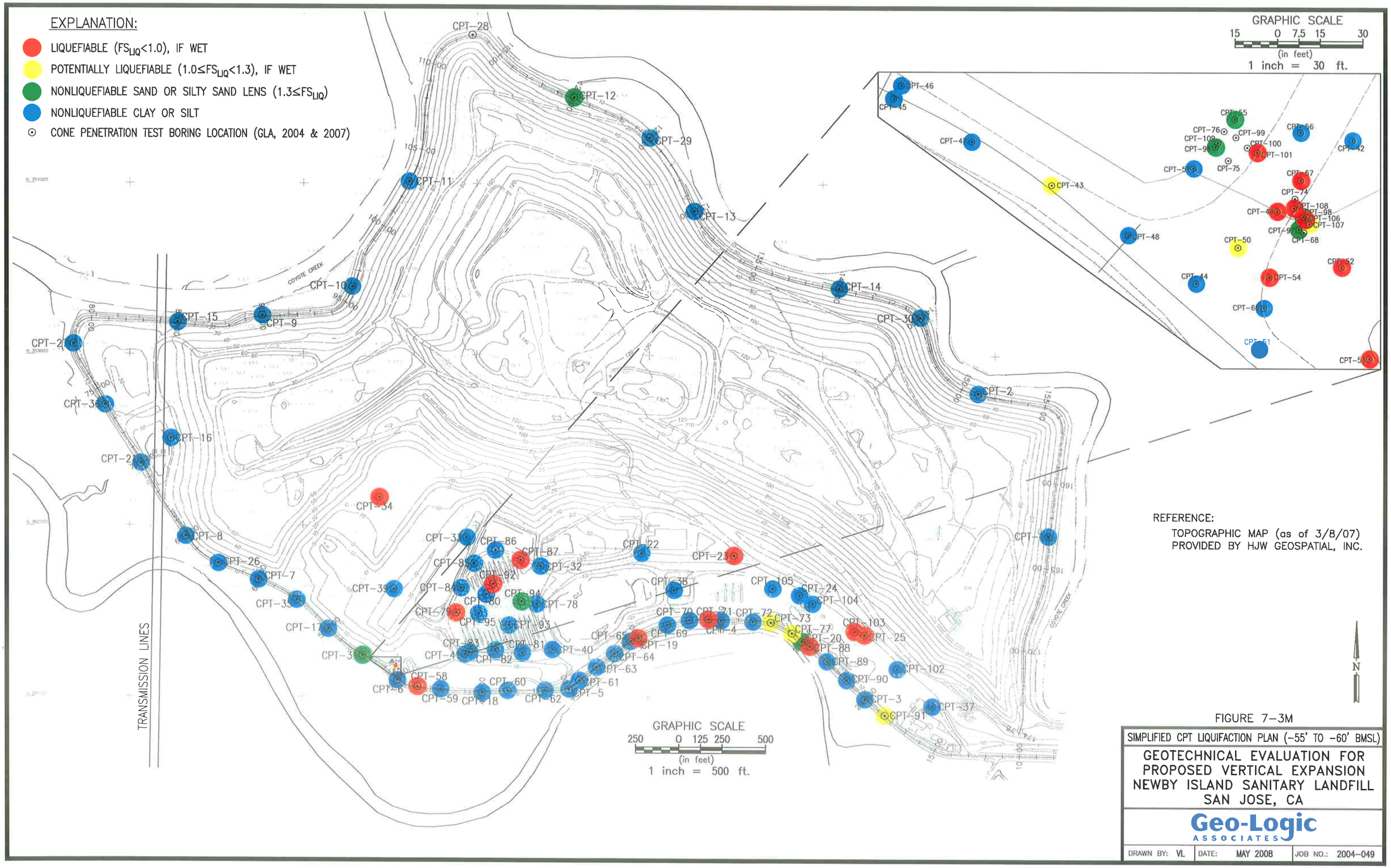


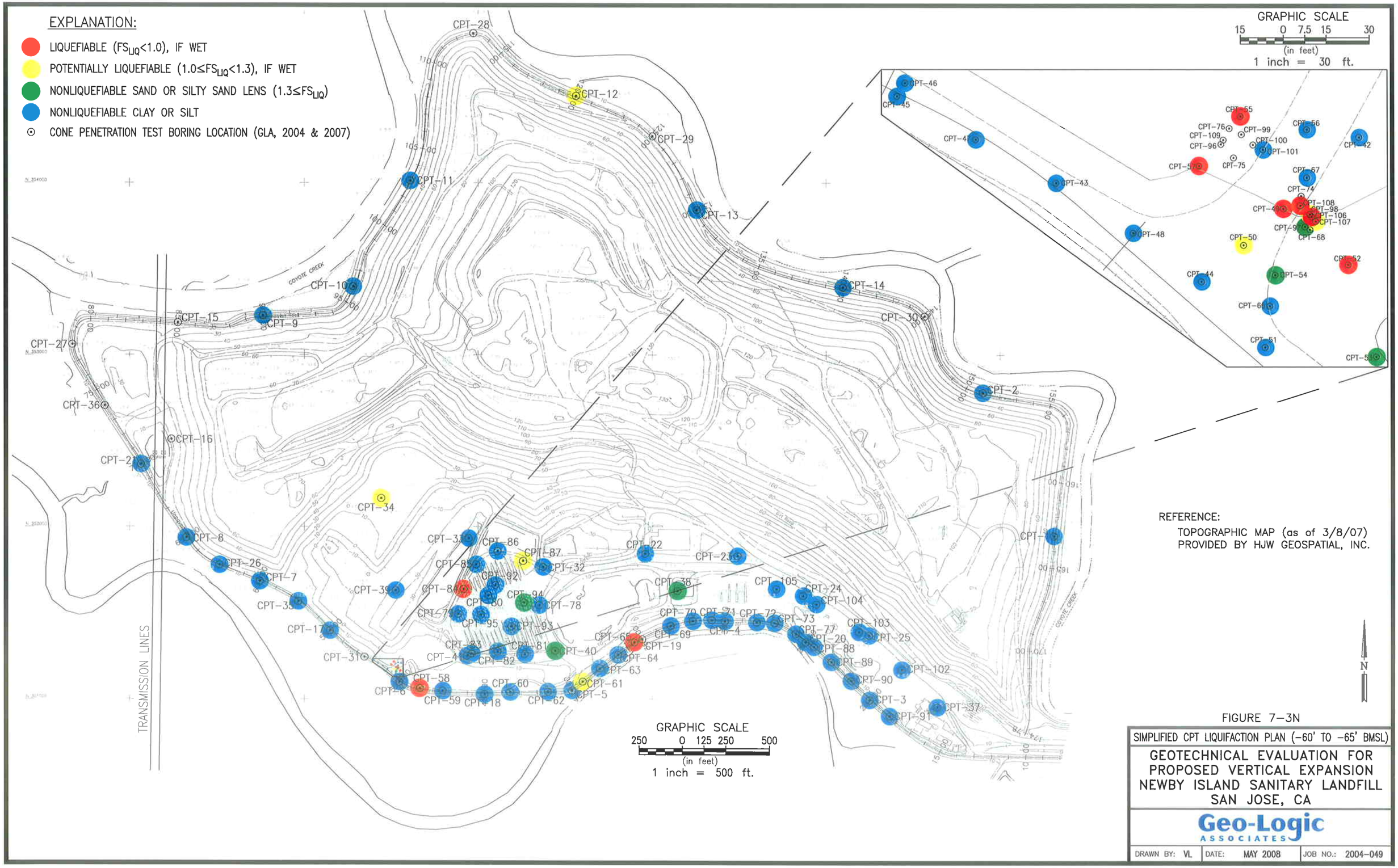
FIGURE 7-3M

SIMPLIFIED CPT LIQUIFACTION PLAN (-55' TO -60' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

FIGURE 7–3N

SIMPLIFIED CPT LIQUIFACTION PLAN (–60' TO –65' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

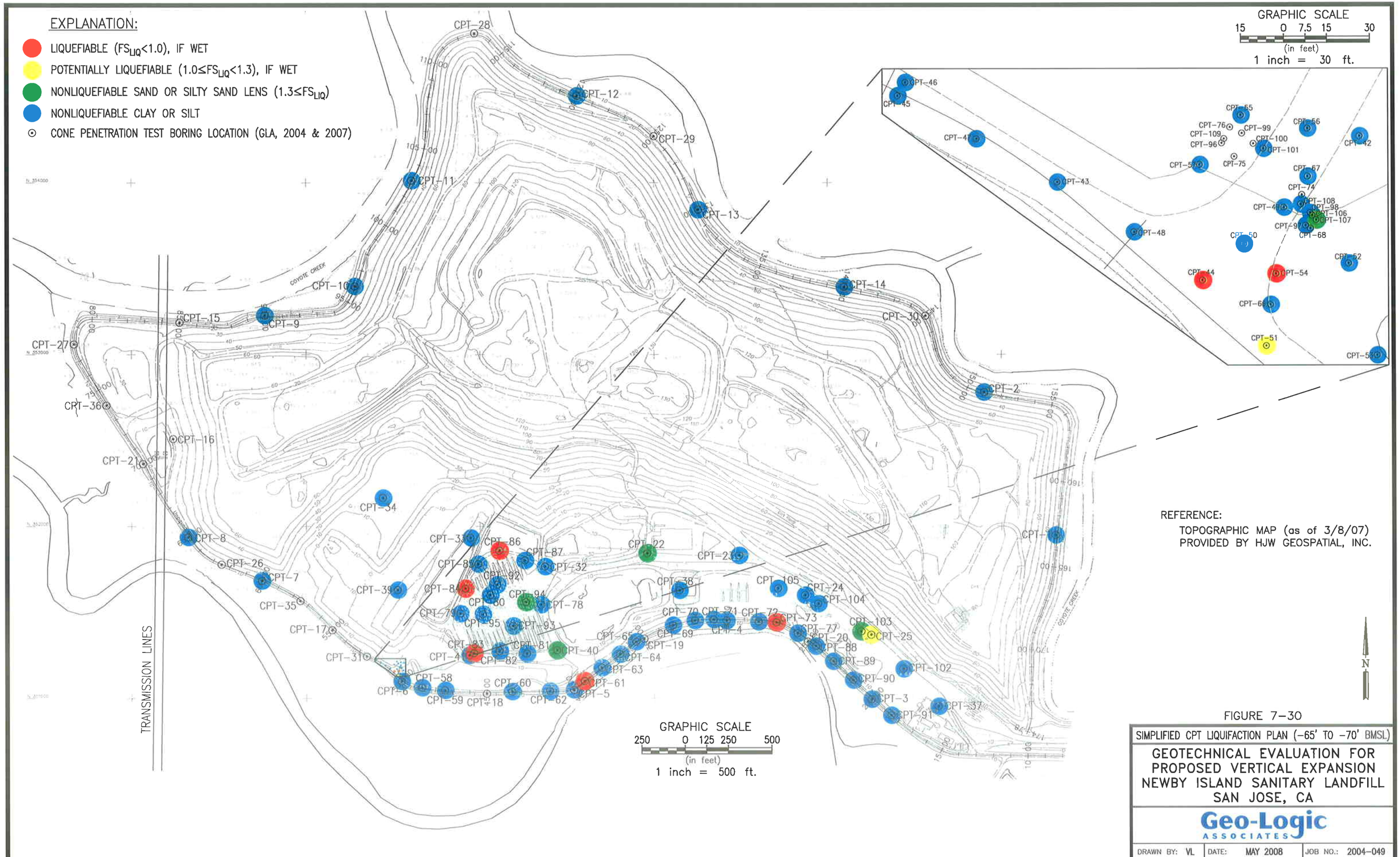


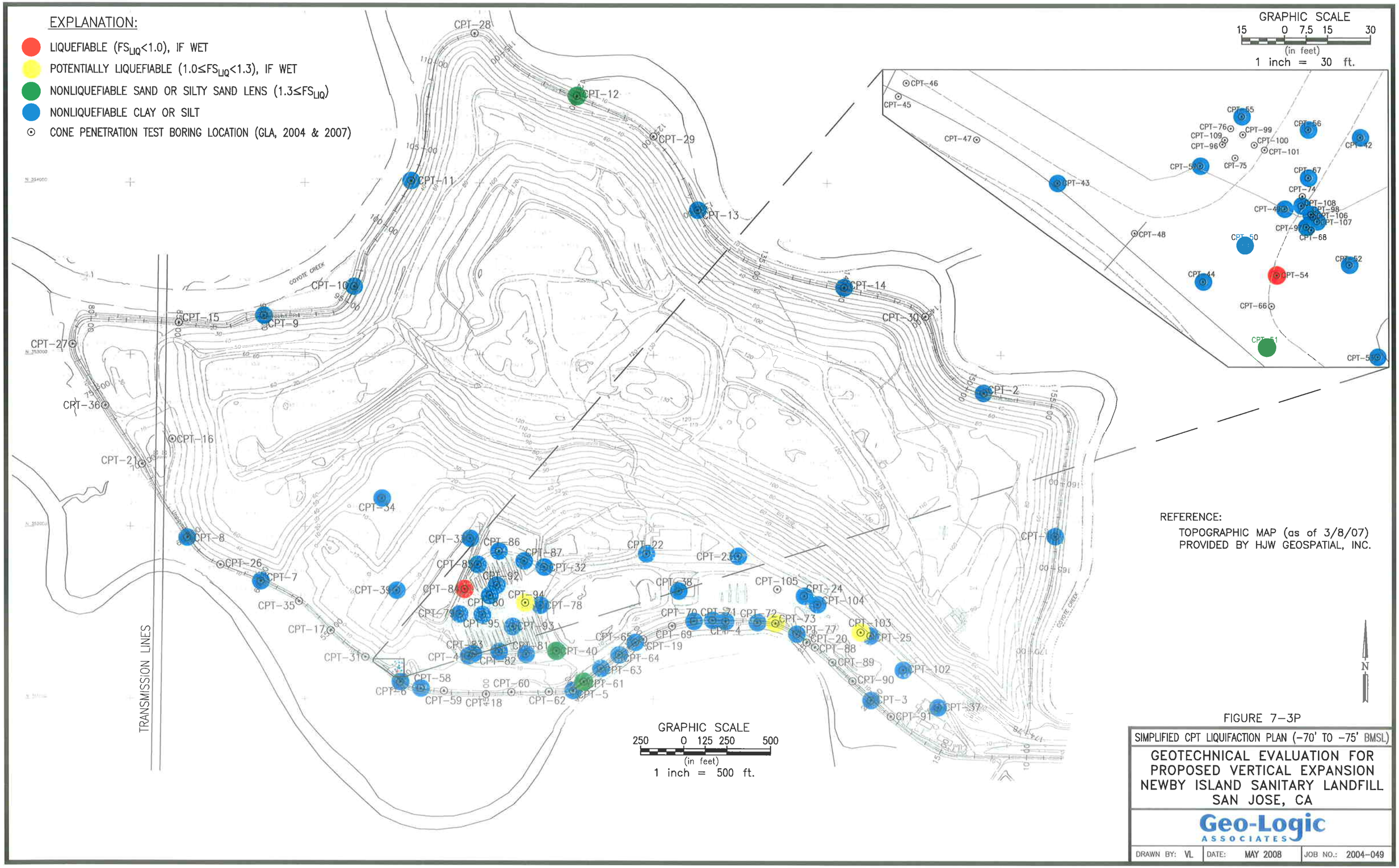
FIGURE 7-30

SIMPLIFIED CPT LIQUIFACTION PLAN (-65' TO -70' BMSL)

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

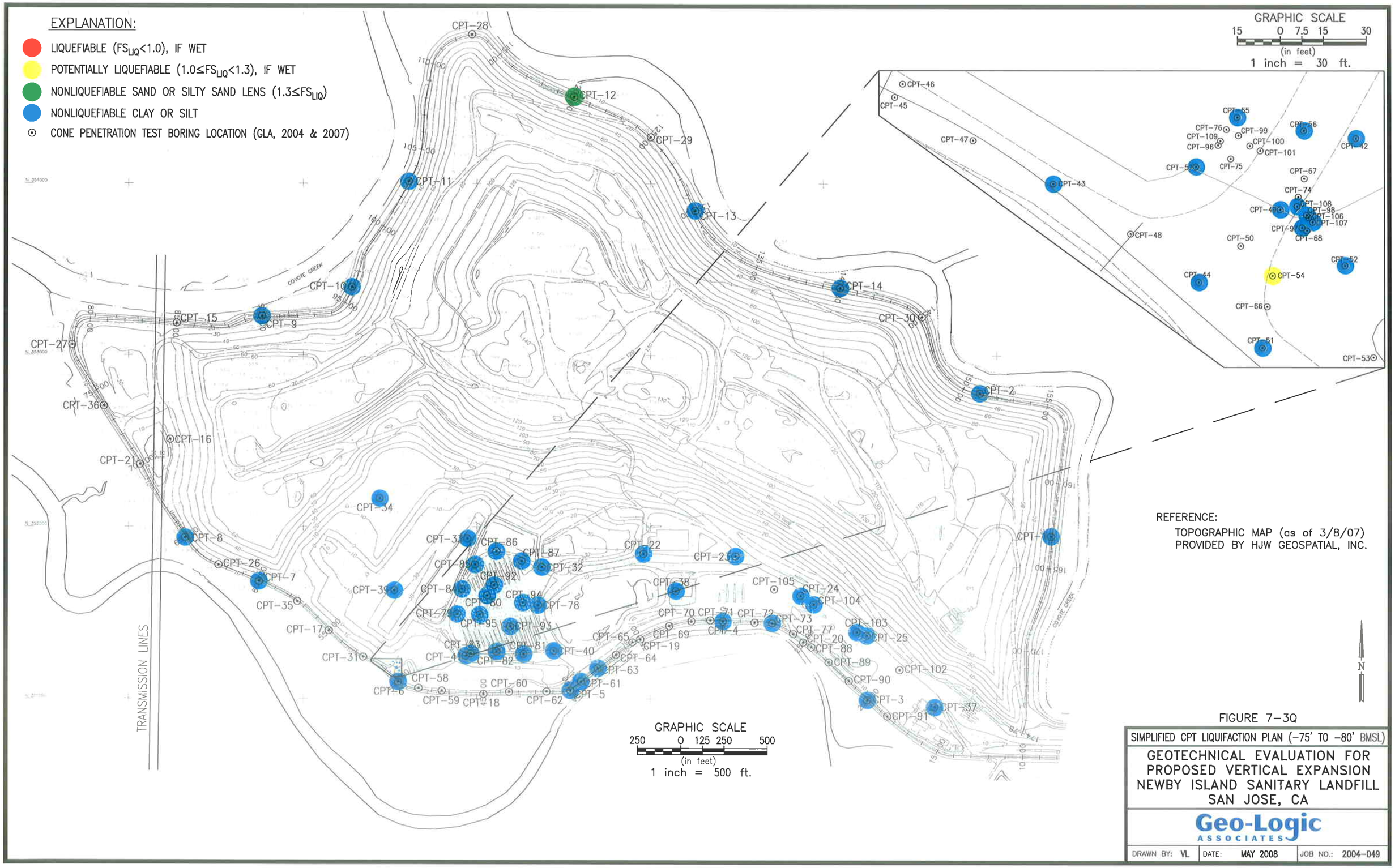
FIGURE 7–3P

SIMPLIFIED CPT LIQUIFACTION PLAN (–70' TO –75' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

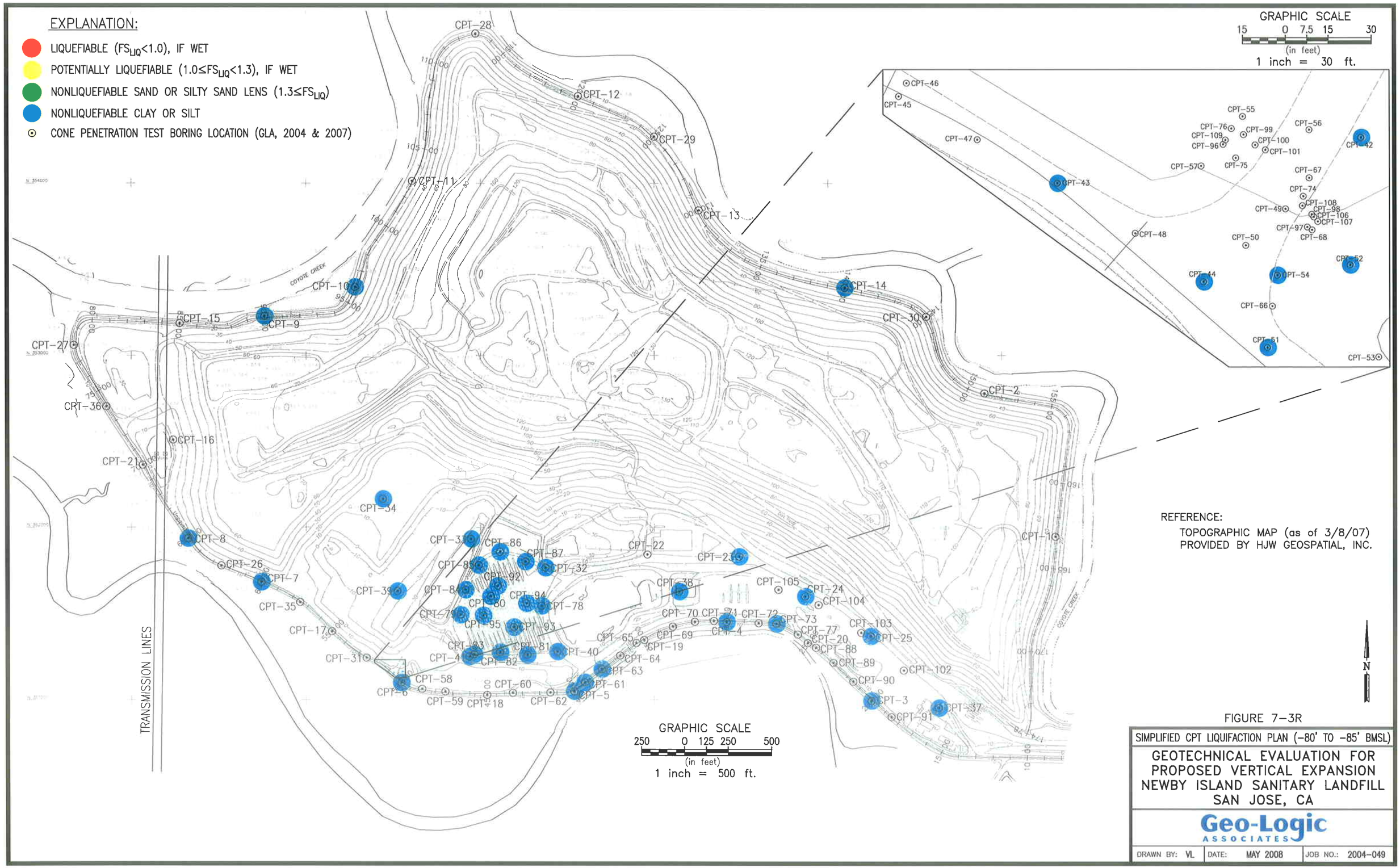
FIGURE 7–3Q

SIMPLIFIED CPT LIQUIFACTION PLAN (–75' TO –80' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

FIGURE 7–3R

SIMPLIFIED CPT LIQUIFACTION PLAN (–80' TO –85' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004–049

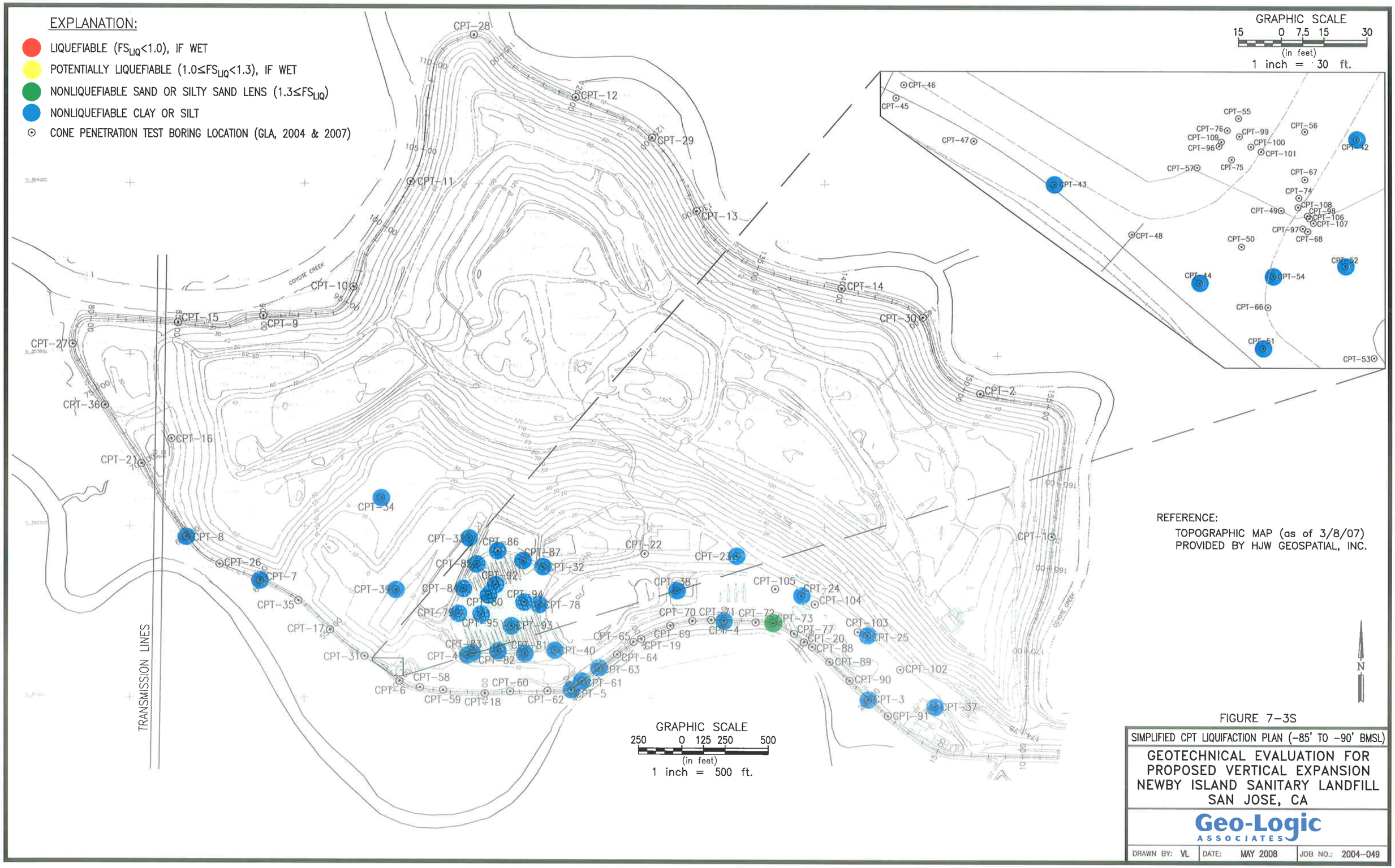


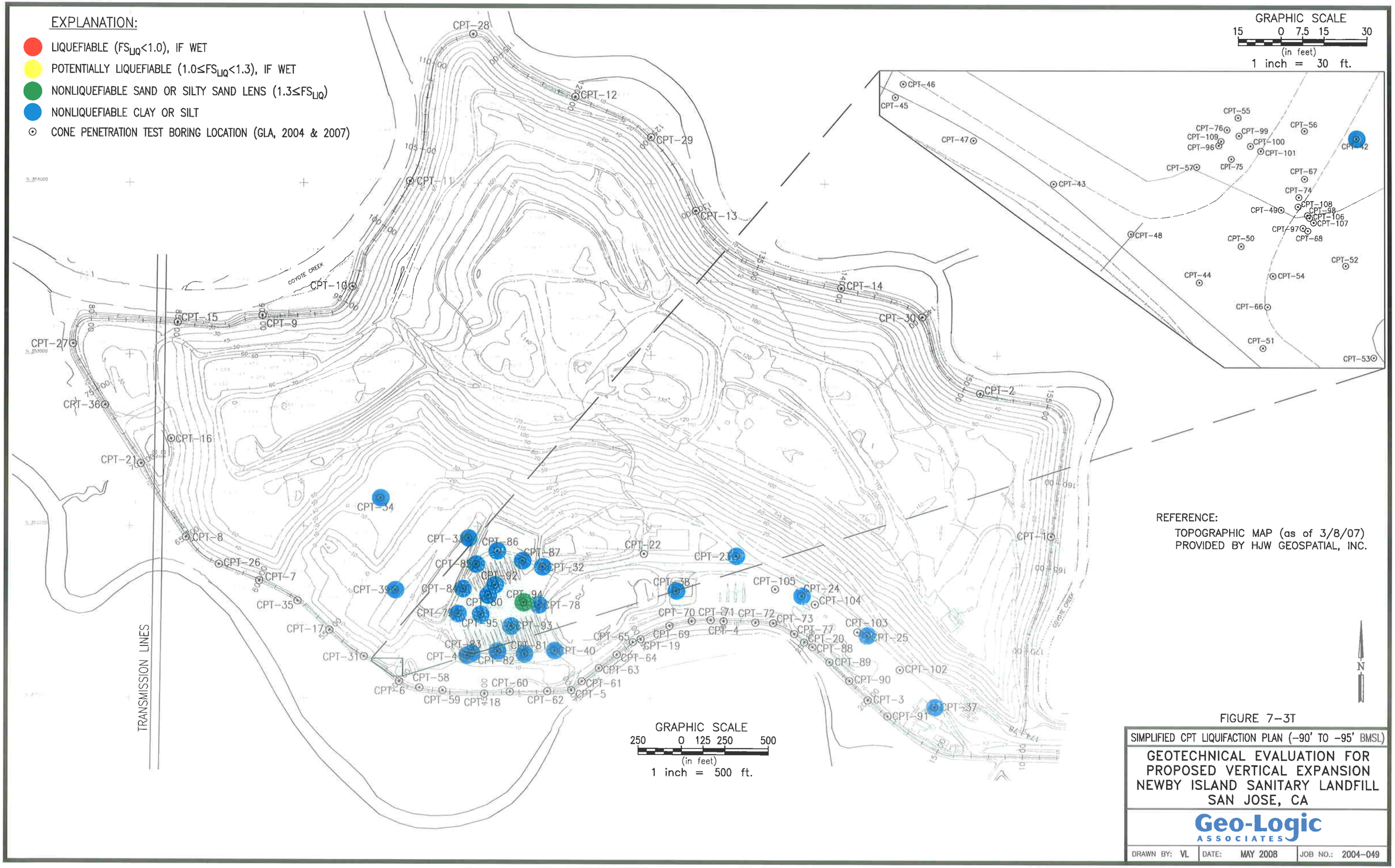
FIGURE 7-3S

SIMPLIFIED CPT LIQUIFACTION PLAN (-85' TO -90' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



REFERENCE:
TOPOGRAPHIC MAP (as of 3/8/07)
PROVIDED BY HJW GEOSPATIAL, INC.

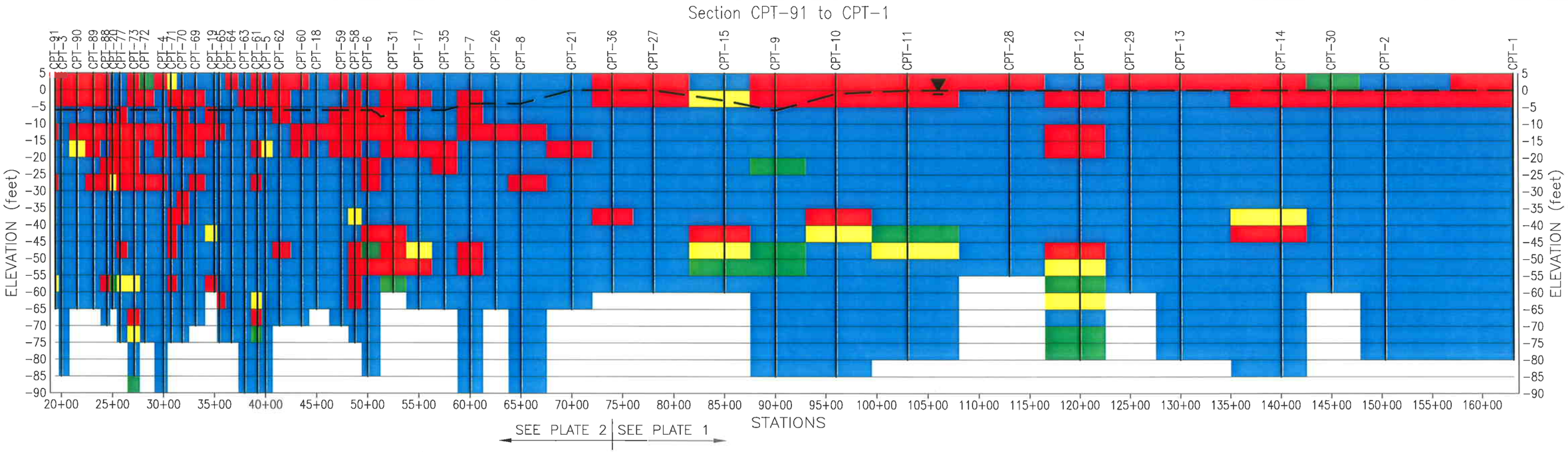
FIGURE 7-3T

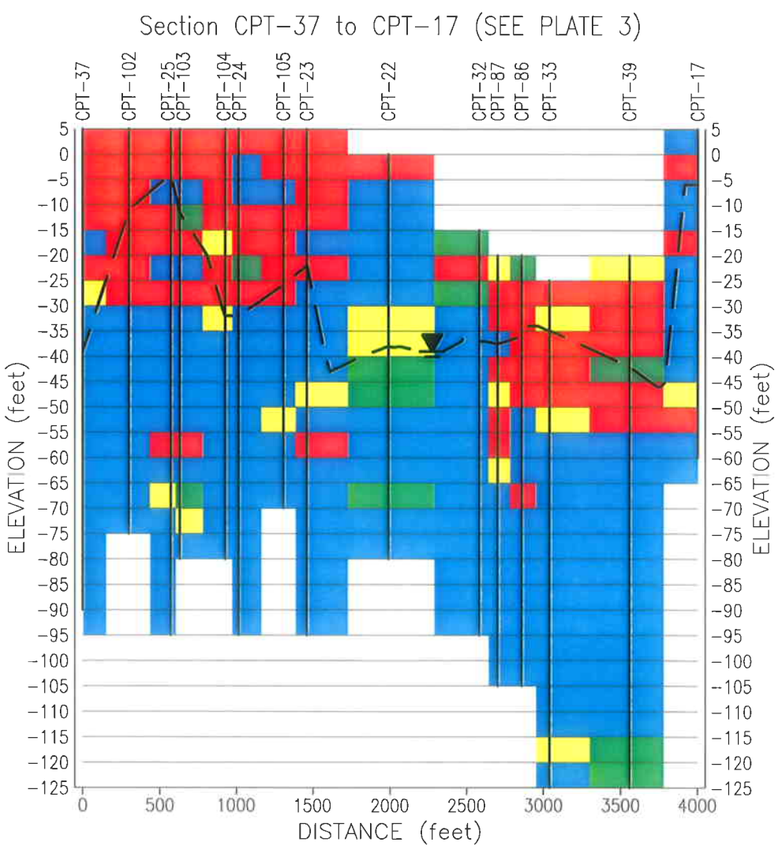
SIMPLIFIED CPT LIQUIFACTION PLAN (-90' TO -95' BMSL)

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049





EXPLANATION:

- LIQUEFIABLE (FS_{LIQ}<1.0), IF WET
- POTENTIALLY LIQUEFIABLE (1.0≤FS_{LIQ}<1.3), IF WET
- NONLIQUEFIABLE SAND OR SILTY SAND LENS (1.3≤FS_{LIQ})
- NONLIQUEFIABLE CLAY OR SILT
- APPROXIMATE PIEZOMETRIC SURFACE

NOTES:

1. Entire five-foot elevation intervals within which any one or more two-inch CPT sounding indicates the presence of sand or silty sand are colored red, yellow, or green, as appropriate, according to the worst-case liquefaction factor of safety in that interval. Intervals within which only clayey silt, silty clay, or clay are indicated are colored blue.
2. Liquefaction factor of safety is calculated based on the average of three CPT-based methods: Youd et al. (2001), Moss et al. (2006), and Idriss and Boulanger (2007).
3. Stratigraphy is not shown above elevation 5 feet; materials above this elevation are generally perimeter levee fill.

SCALES:

HORIZ.: 1"= 1000'
VERT.: 1"= 30'

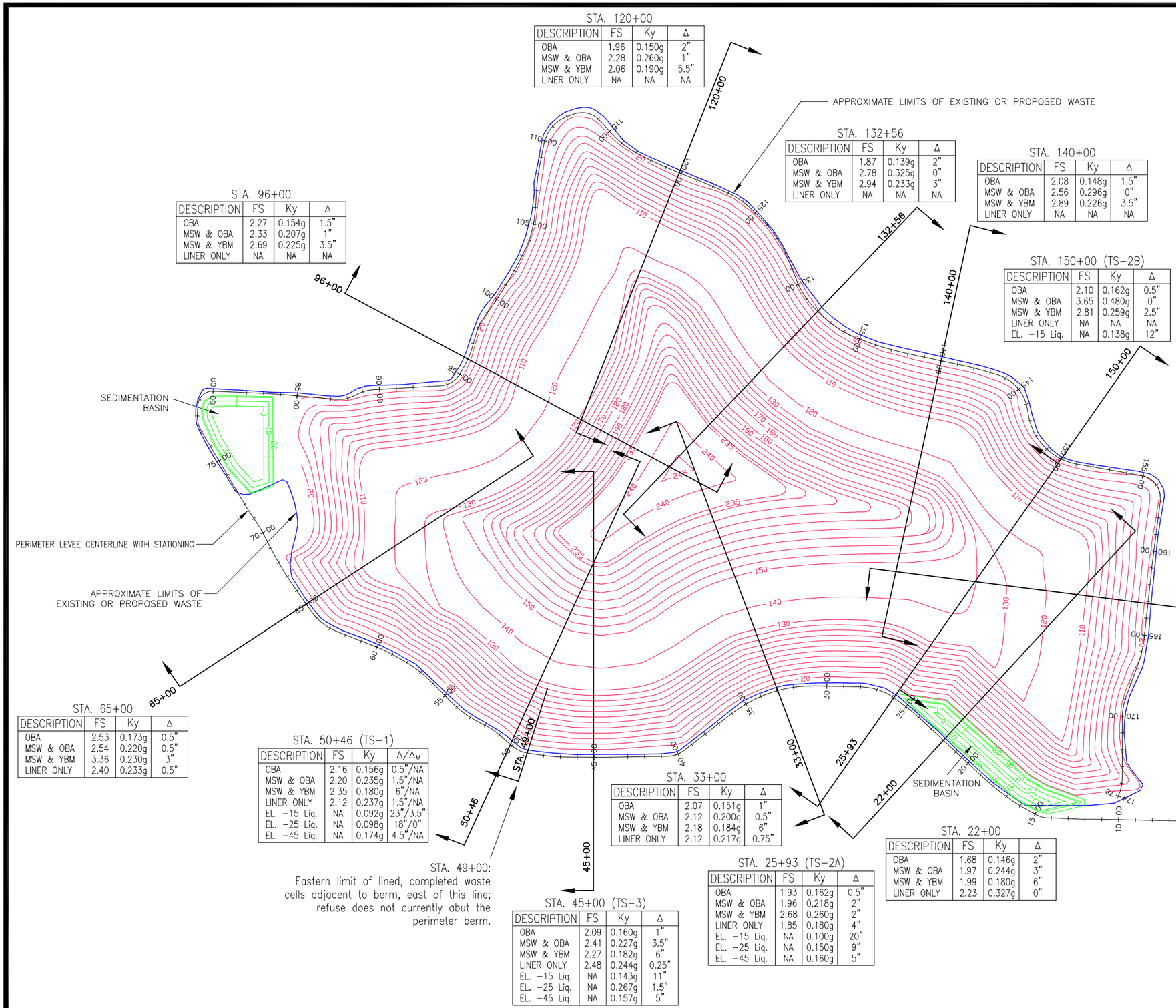
FIGURE 7-4

SIMPLIFIED CPT LIQUIFACTION CHARTS

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



STA. 120+00

DESCRIPTION	FS	Ky	Δ
OBA	1.96	0.150g	2"
MSW & OBA	2.28	0.260g	1"
MSW & YBM	2.06	0.190g	5.5"
LINER ONLY	NA	NA	NA

STA. 132+56

DESCRIPTION	FS	Ky	Δ
OBA	1.87	0.139g	2"
MSW & OBA	2.78	0.325g	0"
MSW & YBM	2.94	0.233g	3"
LINER ONLY	NA	NA	NA

STA. 140+00

DESCRIPTION	FS	Ky	Δ
OBA	2.08	0.148g	1.5"
MSW & OBA	2.56	0.296g	0"
MSW & YBM	2.89	0.226g	3.5"
LINER ONLY	NA	NA	NA

STA. 150+00 (TS-2B)

DESCRIPTION	FS	Ky	Δ
OBA	2.10	0.162g	0.5"
MSW & OBA	3.65	0.480g	0"
MSW & YBM	2.81	0.259g	2.5"
LINER ONLY	NA	NA	NA
EL. -15 Liq.	NA	0.138g	12"

STA. 96+00

DESCRIPTION	FS	Ky	Δ
OBA	2.27	0.154g	1.5"
MSW & OBA	2.33	0.207g	1"
MSW & YBM	2.69	0.225g	3.5"
LINER ONLY	NA	NA	NA

STA. 163+13

DESCRIPTION	FS	Ky	Δ
OBA	2.20	0.160g	1"
MSW & OBA	3.15	0.353g	0"
MSW & YBM	3.14	0.353g	0"
LINER ONLY	NA	NA	NA

STA. 65+00

DESCRIPTION	FS	Ky	Δ
OBA	2.53	0.173g	0.5"
MSW & OBA	2.54	0.220g	0.5"
MSW & YBM	3.36	0.230g	3"
LINER ONLY	2.40	0.233g	0.5"

STA. 50+46 (TS-1)

DESCRIPTION	FS	Ky	Δ/Δ_M
OBA	2.16	0.156g	0.5"/NA
MSW & OBA	2.20	0.235g	1.5"/NA
MSW & YBM	2.35	0.180g	6"/NA
LINER ONLY	2.12	0.237g	1.5"/NA
EL. -15 Liq.	NA	0.092g	23"/3.5"
EL. -25 Liq.	NA	0.098g	18"/0"
EL. -45 Liq.	NA	0.174g	4.5"/NA

STA. 49+00:
Eastern limit of lined, completed waste cells adjacent to berm, east of this line; refuse does not currently abut the perimeter berm.

STA. 33+00

DESCRIPTION	FS	Ky	Δ
OBA	2.07	0.151g	1"
MSW & OBA	2.12	0.200g	0.5"
MSW & YBM	2.18	0.184g	6"
LINER ONLY	2.12	0.217g	0.75"

STA. 45+00 (TS-3)

DESCRIPTION	FS	Ky	Δ
OBA	2.09	0.160g	1"
MSW & OBA	2.41	0.227g	3.5"
MSW & YBM	2.27	0.182g	6"
LINER ONLY	2.48	0.244g	0.25"
EL. -15 Liq.	NA	0.143g	11"
EL. -25 Liq.	NA	0.267g	1.5"
EL. -45 Liq.	NA	0.157g	5"

STA. 25+93 (TS-2A)

DESCRIPTION	FS	Ky	Δ
OBA	1.93	0.162g	0.5"
MSW & OBA	1.96	0.218g	2"
MSW & YBM	2.68	0.260g	2"
LINER ONLY	1.85	0.180g	4"
EL. -15 Liq.	NA	0.100g	20"
EL. -25 Liq.	NA	0.150g	9"
EL. -45 Liq.	NA	0.160g	5"

STA. 22+00

DESCRIPTION	FS	Ky	Δ
OBA	1.68	0.146g	2"
MSW & OBA	1.97	0.244g	3"
MSW & YBM	1.99	0.180g	6"
LINER ONLY	2.23	0.327g	0"

EXPLANATION:

140+00 — APPROXIMATE LOCATION OF SLOPE STABILITY CROSS-SECTION WITH PERIMETER LEVEE CENTERLINE STATION DESIGNATION (ARROWS SHOW DIRECTION OF VIEWING)

STA. 50+46 (TS-1)

DESCRIPTION	FS	Ky	Δ/Δ_M
OBA	2.16	0.156g	0.5"/NA
MSW & OBA	2.20	0.235g	1.5"/NA
MSW & YBM	2.35	0.180g	6"/NA
LINER ONLY	2.12	0.237g	1.5"/NA
EL. -15 Liq.	NA	0.092g	23"/3.5"
EL. -25 Liq.	NA	0.098g	18"/0"
EL. -45 Liq.	NA	0.174g	4.5"/NA

SUMMARY OF SLOPE STABILITY FOR EACH CROSS SECTION INDICATING THE STATIC FACTOR OF SAFETY (FS), THE YIELD ACCELERATION (Ky), AND THE PERMANENT SEISMIC DISPLACEMENT (Δ/Δ_M) IN INCHES.

NOTES:
- FS = STATIC FACTOR OF SAFETY
- Ky = YIELD ACCELERATION (IN g's)
- Δ = ESTIMATED SEISMICALLY-INDUCED PERMANENT DISPLACEMENT (INCHES)
- Δ_M = POST-MITIGATION SEISMICALLY-INDUCED PERMANENT DISPLACEMENT (INCHES); ONLY CALCULATED FOR TYPE SECTION TS-1 (STA. 50+46)
- NA = ANALYSIS NOT APPLICABLE TO SPECIFIC CROSS-SECTION

GRAPHIC SCALE
300 0 150 300 600
(in feet)
1 inch = 600 ft.

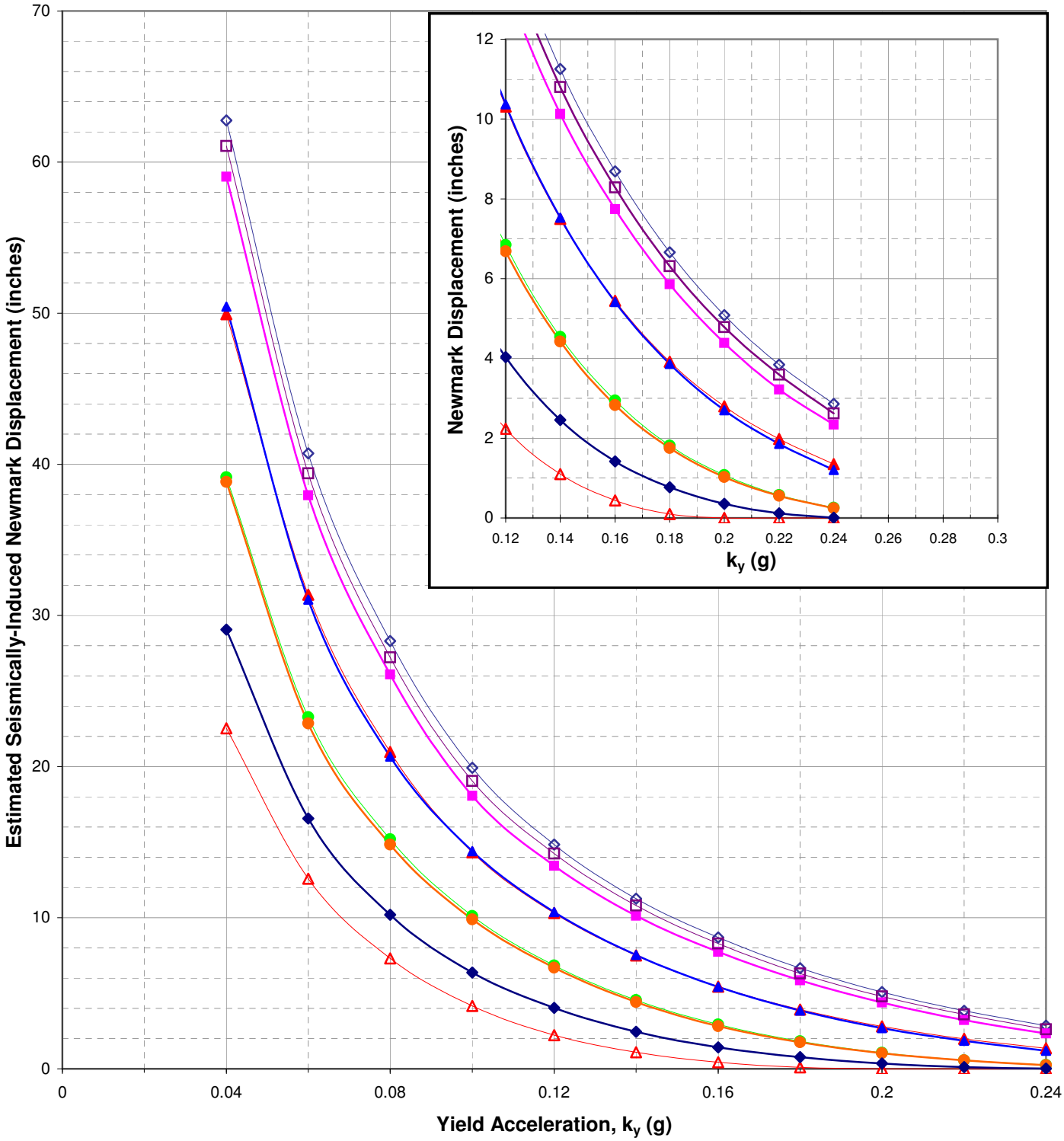
FIGURE 8-1

SLOPE STABILITY CROSS-SECTION LOCATION MAP

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



Estimated seismically induced displacements for indicated potential failure surfaces based on site-specific SHAKE site response analyses and 7 acceleration time histories.

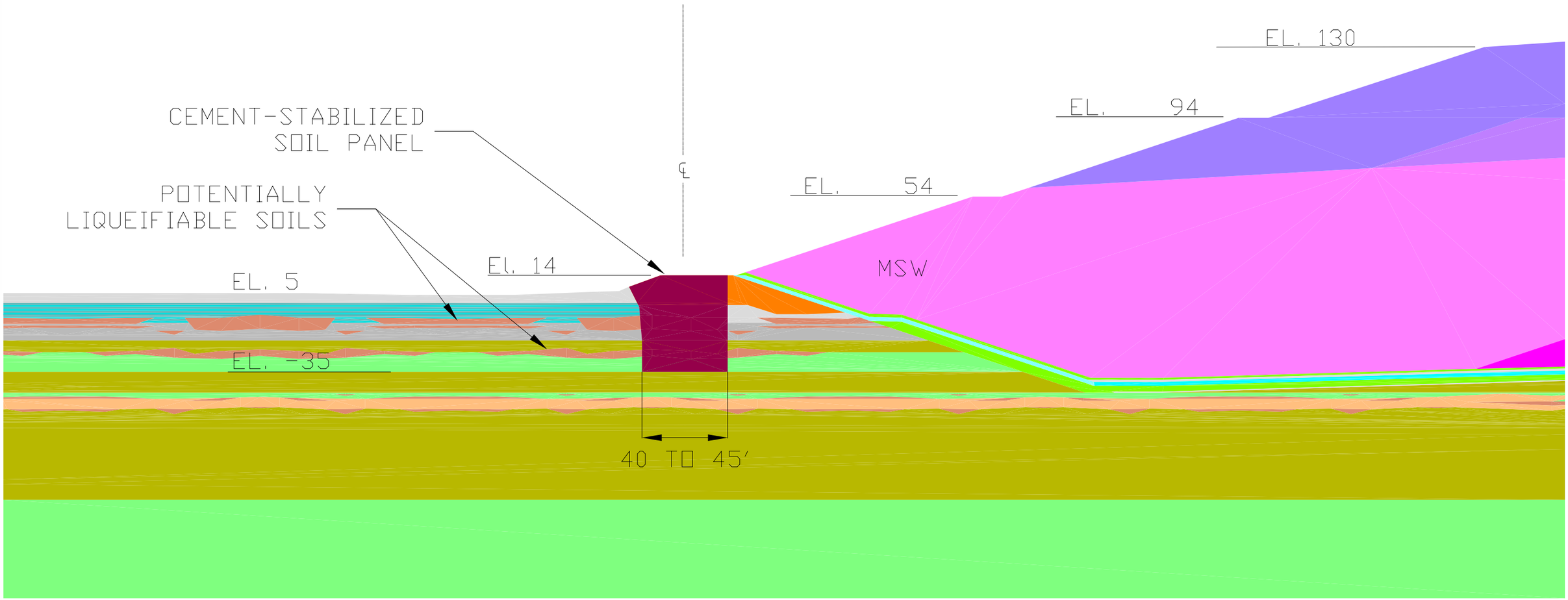
FIGURE 8-2

NEWMARK DISPLACEMENT VS YIELD ACCELERATION

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: RMW	DATE: MAY 2008	JOB NO.: 2004-049



GRAPHIC SCALE

50 0 25 50 100

(IN FEET)

1 inch = 50 ft.

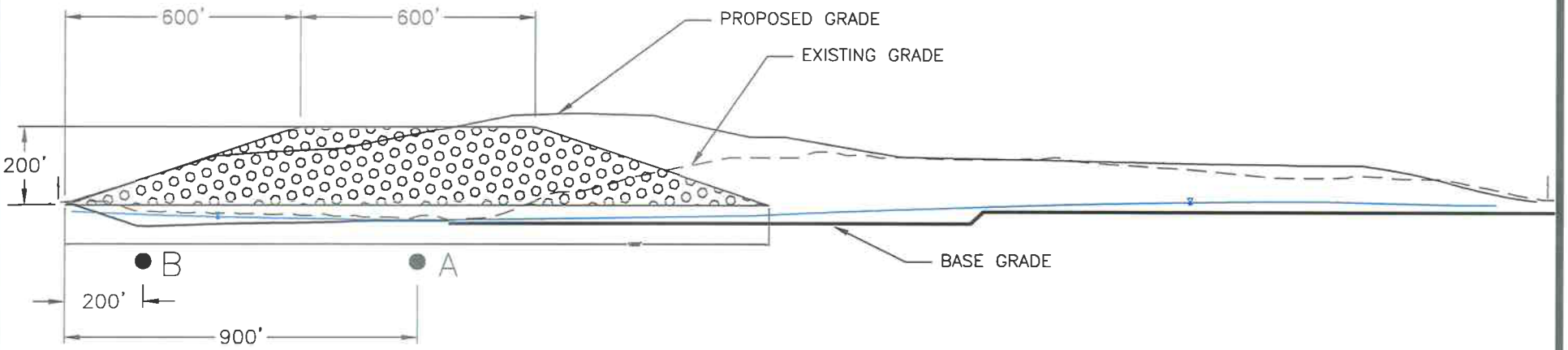
FIGURE 8-3

CONCEPTUAL LIQUEFACTION MITIGATION

GEOTECHNICAL EVALUATION FOR
PROPOSED VERTICAL EXPANSION
NEWBY ISLAND SANITARY LANDFILL
SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049



CROSS SECTION 45+00

GRAPHIC SCALE

400 0 200 400 800

(IN FEET)

1 inch = 400 ft.

FIGURE 9-1

CLAY CONSOLIDATION CROSS-SECTION

GEOTECHNICAL EVALUATION FOR PROPOSED VERTICAL EXPANSION NEWBY ISLAND SANITARY LANDFILL SAN JOSE, CA

Geo-Logic ASSOCIATES

DRAWN BY: VL	DATE: MAY 2008	JOB NO.: 2004-049