Hawaiian Memorial Park Cemetery Expansion

Final Environmental Impact Statement

Kāne‘ohe, O‘ahu, Hawai‘i

September 2008
Volume 2
Appendices

Hawaiian Memorial Park Cemetery Expansion

Final Environmental Impact Statement

Kāne‘ohe, O‘ahu, Hawai‘i

Prepared for:

Hawaiian Memorial Life Plan Ltd.

Prepared by:

Helber Hastert & Fee, Planners

Accepting Authority:

State of Hawai‘i Land Use Commission

September 2008
Volume 2
Appendices

A. Market Need for Hawaiian Memorial Park Cemetery Expansion

(Clark & Green Associates)

Market Need for Hawaiian Memorial Park Cemetery Expansion Project

Clark & Green Associates

March 2008

Market Need for Cemetery Expansion

Hawaiian Memorial Park (HMP) has developed inventory scattered throughout the park's eighty (80) developed acres. The park currently completes almost 700 interments and 200 inurnments per year on average. As discussed below, this number is expected to increase.

Memorial parks need to maintain a significant inventory of developed inventory, especially ground burial spaces, for many reasons, in order to adequately service the community. Although there are 6,000 to 7,000 ground burial spaces currently developed and available at HMP (with in excess of 30,000 spaces already utilized), these spaces fulfill very different needs for the community are not universally desired. Since the park needs to be able to satisfy all of these different demands, it is necessary to have many more spaces available than a simple mathematical formula or projected rate of use might imply. Some of the different demands are described below.

<u>"Heritage" Gardens</u>: Just as there is a societal tendency for families and friends to settle in the same neighborhood or community, many families desire to have burial space in the same garden area at the cemetery as their parents and other relatives. This is called "heritage" and is an important part of the end of life experience and choices. This places long-term demands on the memorial park to fulfill these important desires. As a result, space management for the cemetery requires that vacant burial plots be scattered throughout the park, to allow families to locate close to other family members as a final resting place.

<u>Religious and Ethnic Gardens</u>: Another form of "Heritage" is the very important desire for religious and ethnic groups in the greater community to have special affinity gardens tailored to their customs, rituals and symbolism. These gardens also need to plan for the inevitable expansion required over time to accommodate these groups and their members. Our melting pot community is constantly changing and new groups or communities often approach the memorial park for their own special garden areas.

<u>Personal Choice and Selection Opportunities:</u> The personal choice of type of interment often includes an intense desire for a place in the memorial park that has a special attribute or meaning to the specific family members, such as a special tree, or view, or location.

<u>Pre-Need Inventory</u>: Many families plan ahead for this inevitable occurrence and will purchase space years in advance of need. This requires inventory to be developed and ready for use in the event of an untimely passing once it has been purchased.

At the current annual rate of ground burial and the expected increase in numbers of burials associated with Hawaii's aging population, Hawaiian Memorial Park will need to expand its inventory in order to meet the increasing demand while maintaining these vital heritage opportunities. The park will have significantly constrained inventory resources over the next 5 years. Given the length of land use entitlement processes, and subsequent construction design and implementation schedules, it is critical for

Hawaiian Memorial Park to begin to ensure adequate space beyond this period. New inventory must be available well in advance of using the last remaining burial spaces within the current inventory.

In addition to addressing the current rate of use, there are a number of demographic factors that will influence the demand for new burial space in the future. A first level of analysis focuses on the change in age cohorts, as the population of Hawai'i gets older. Table 1 presents how these numbers are projected to change between 1990 and 2030.

Table 1
Resident Aging Population Projections

Year	Total Population State of Hawai'i	55+ State of Hawai'i	55+ as % of Total Population	70+ State of Hawai'i	70+ as % of Total Population
1990	1,108,220	219,108	19.8%	79,421	7.1%
2000	1,212,670	266,943	22.0%	117,467	9.7%
2010*	1,346,000	358,600	22.6%	134,000	10.0%
2020*	1,489,550	442,300	29.7%	176,500	11.8%
2030*	1,630,450	**499,550**	30.6%	**239,150**	14.7%

*Projected
Source: 2006 State of Hawai'i Date Book

As can be seen from Table 1, the total of Hawai'i residents that are 55+ years of age is projected to increase from 19.8% of the population in 1990 to 30.6% of the population in 2030. In real numbers, this means the total number of Hawai'i residents over 55 years of age increase from 219,108 in 1990 to 499,550, more than doubling in 40 years. Numbers for cohorts age 70 and over are even more dramatic. As a percentage of the overall population, this group will grow from 7.1% of the population in 1990 to a projected 14.7% of the population in 2030. In real numbers, this translates to a **300% increase**, from 79,421 in 1990 to a projected 239,150 in 2030.

If we examine the actual number of deaths, and the death rate, over time, it is easy to appreciate the future demand for burial space.

Table 2
Resident Deaths in Hawai'i
(Annual average for the period)

Period	# of deaths
1980-1985	5,200
1985-1990	6,100
1990-1995	7,000
1995-2000	8,000
2000-2005	8,400
2005-2010*	9,300
2010-2015*	10,000
2015-2020*	10,900
2020-2025*	11,700
2025-2030*	12,500
2030-2035*	13,600

*Projected
Source: DBEDT 2035 Series, 2008

Table 3
Resident Death Rate in Hawai'i
(Annual average for the period)

Period	Death Rate (per 1,000 population)
1980	5.1
1985	5.5
1990	6.0
1995	6.3
2000	6.7
2004	7.0

Source: State of Hawaii Data Book, 2005

Overall, the annual average number of deaths is projected to increase by 62% between 2000-2005 and 2030-2035.

Even if we factor in a trend to a higher percentage of cremations, the number of casketed burials will still rise dramatically.

Table 4
Deaths by Method of Disposition for Hawai'i

Method	1980	1990	2000	2003	2004	2005
Burial	2,343	2,798	2,767	2,800	2,696	2,667
% of total	45%	40%	33%	31%	29%	29%
Cremation	2,241	3,564	5,092	5,778	5,900	5,964
% of total	43%	51%	60%	63%	64%	64%
Removal*	567	656	591	540	599	634
Other	53	37	21	14	8	9
All methods	5,204	7,055	8,511	9,179	9,252	9,330

*Removed from Hawaii
Source: 2006 State of Hawai'i Date Book

Although the cremation rate in Hawaii has increased to over 60% of all deaths, this growth in cremation has slowed in recent years so, the community desire for casketed ground burial should at least continue at current rates. HMP is currently the cemetery of choice for more than 25% of all interments on Oahu.

In addition to the very real demographic trends which support the need for more burial space, a critical reason for this need for expansion is based on the personal nature of the decisions surrounding the final passage of human life. There are two moments in an individual's life that family, friends, acquaintances and business associates come together to celebrate that life: weddings and funerals. There will continue to be a slow transformation towards more land efficient interment options like cremation, but the community desire for casketed ground burial is a decision based on family tradition and heritage, and religious and cultural beliefs. Demand will remain strong for the foreseeable future. At the base of the Koolau Mountains, HMP provides a convenient location for Windward and Leeward communities for both the initial interment and subsequent visitations to the burial site. Many of these visitors will be elderly, and ease of travel is a vital aspect of their need for this expansion. Also, there is a significant community heritage (i.e., existing interments of family members) with the built-up demand that accrues as a result of families' desire to have a final resting place near other family members, who are already interred at HMP.

If this current and future demand for a full range of interment options is not provided at HMP, some families may choose cremation due to economic or travel constraints but many will travel to further reaches of the island for the personal choice reasons described above. This will, in many cases, require economic hardships and impact the mourning process that is so critical to many members of our community. The need for new interment space will not disappear if HMP cannot expand its facilities. Instead, new facilities will need to be built in other areas of Oahu. Support facilities already exist at HMP, which might have to otherwise be constructed elsewhere. It makes sense to capitalize on the availability of these facilities, in a location already known for its burial facilities with easy and convenient access for the greater Honolulu area.

In summary, the need for the proposed expansion is based on the following items:

- The annual interment demand will amortize the remaining inventory opportunities within HMP in the next few years.

- The interment demand will probably increase to at least approximately 800 per year due to population growth and the aging population, and recognized demand for HMP as a final resting place.

- There is a significant built-up heritage demand that will continue to grow as family members request interment space within the cemetery.

- The proximity and ease of access to the major population centers of Oahu is economically and socially desirable for the major part of the community.

B. Report Assessment of Hazard from Rockfall and Slope Stability

(Shinsato Engineering, Inc.)

REPORT
ASSESSMENT OF HAZARD FROM ROCKFALL AND SLOPE STABILITY

HAWAIIAN MEMORIAL PARK CEMETERY EXPANSION
KANEOHE, HAWAII
TMK: 4-5-033:001

for

CLARK AND GREEN ASSOCIATES

Project No. 08-0043
May 15, 2008

SHINSATO ENGINEERING, INC.
98-747 KUAHAO PLACE, #E
PEARL CITY, HI 96782

SHINSATO ENGINEERING, INC.
CONSULTING GEOTECHNICAL ENGINEERS

98-747 KUAHAO PLACE, SUITE E
PEARL CITY, HAWAII 96782
PHONE: (808) 487-7855
FAX: (808) 487-7854

May 15, 2008
Project No. 08-0043

Clark and Green Associates
Attention: Mike Green
150 Paularino Avenue, Suite 160
Costa Mesa, California 92626

SUBJECT: **GEOTECHNICAL ENGINEERING REPORT**
Hazards Associated with Slope Stability and Rockfall
Hawaiian Memorial Park Cemetery Expansion
Kaneohe, Hawaii
TMK: 4-5-033: 011

Gentlemen:

This report presents the results of a geotechnical investigation for the subject project.

1.0 INTRODUCTION

This report was prepared for the purpose of addressing comments made by the City and County of Honolulu, Department of Planning and Permitting letter dated February 14, 2008 relative to "whether there are any hazards associated with rockfall and/or slope stability that may impact the project site". The comments were made with regard to the Hawaiian Memorial Park Environmental Impact Statement Preparation Notice (EISPN), Kane'ohe, O'ahu, Hawai'i, prepared by Helber, Hastert & Fee, Planners, dated November 2007.

2.0 SCOPE OF WORK

The project is in a preliminary phase and a full soils investigation (including borings and/or test pits) was not deemed necessary at this time. The scope of work was described in our proposal dated March 18, 2008. In general, the services included the following:

a. Perform a site reconnaissance to visually observe soil and geologic features of the property.

b. Review soil and geologic information of the area.

c. Analyze the data to determine the stability of the existing slope and the impact that the proposed development may have on the overall stability of the site, and assess the potential hazards in the area of the site from rockfalls.

3.0 FIELD WORK

The field work consisted of performing a site reconnaissance to observe existing surface features and to map particular points of interest as they relate to soil and geologic conditions. The locations of the site reconnaissance path and points of interest were determined by using a GPS device.

Two site reconnaissance paths were made - one along the lower elevations of the property and the other along the uphill side. At various path points, lateral paths were taken to observe the adjacent surface features. The locations of the reconnaissance path, path points and points of interest are shown on Plate 2.

Samples were taken of the near surface soils for visual observation and laboratory testing.

3.0 SITE CONDITIONS

3.1 Geology

The site is located on the southwesterly flank of the Oneawa Hills that separates Kailua from Kaneohe. The area lies within the caldera of the old Koolau Volcano which is an elongated shield that is believed to have formed during late Tertiary/early Pleistocene time (between 1 and 12 million years ago) by lavas flowing from rift zones along a northwest-trending rift zone.

The caldera of the volcano is presumed to have extended from near Waimanalo at the southeast to beyond Kaneohe at the northwest, at the base of the Pali to the southwest and somewhere between the hills of Lanikai and the Mokulua Islands (offshore) to the east. This eastern side was probably destroyed by erosion.

The Oneawa Hills is capped with coarse breccia that consists of subangular and angular basalt fragments 3 feet or less in diameter that are green, lavender, white, red and brown in color. The formation is part of the Kailua Volcanic Series which consists of eroded rocks of the Koolau caldera that have been altered by hydrothermal action caused by steam rising in the vent area (Stearns and Vaksvik, 1935, pg. 97).

3.2 Soil Conditions

From the USDA Soil Conservation Service "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, dated 1972, and as described in the EISPN, the near surface soils on the property are classified into four soil types from two different soil series (Kaneohe and Alaeloa). The Kaneohe soils generally occur along the west and northwest portion of the property. The Alaeloa soils occur along the east and southeast portions of the site

The four soil types are as follows:

Alaeloa silty clay, 15 to 35 percent slopes, (AeE)
Alaeloa silty clay, 40 to 70 percent slopes (ALF)
Kaneohe silty clay, 8 to 15 percent slopes (KgC)
Kaneohe silty clay, 30 to 65 percent slopes (KHOF)

For engineering purposes, both soil types are described as MH - elastic SILT based on the Unified Soil Classification System (USCS). Estimated properties and engineering interpretations include the following:

Soil Series	Suitability as a source of Road Fill	Shrink-Swell Potential	Depth to Bedrock
Alaeloa	Good	Moderate	>5'
Kaneohe	Good	Moderate	>5'

4.0 LABORATORY TESTING

Laboratory tests were performed on the soil samples to determine the in-situ moisture content and Atterberg Limits.

a. Unit Weight and Moisture Content

The in-place moisture content of the samples were determined by weighing the sample, placing the sample into an oven then weighing to determine the moisture loss. The data is used to determine the in-place moisture content.

b. Classification Tests

The soil materials were visually classified in the field using the Unified Soil Classification System. An Atterberg Limits test was performed in the laboratory to determine the liquid limit, and plasticity index for further soil classification.

c. Results of Laboratory Tests

The results of the laboratory tests are as follows:

Sample Location	Sample Depth	In-situ Moisture Content	Atterberg Limits		
			LL	PL	PI
#1	4'	42.6%	87	48	35
#2	4'	22.4%			
#3	4.5'	40.6%			
#4	3'	30.9%			

5.0 SLOPE STABILITY ANALYSIS

Slope stability analyses of the property were performed using topographic maps, information on the subsurface materials developed from interpretations of the site reconnaissance, and data from nearby test boring logs.

A computer program (SLOPE/W), developed by Geo-Slope International, was used for the analysis. The work consisted of developing a generalized geometric/geologic cross section that is set to scale in a grid pattern (X-Y coordinates). Grid points corresponding to changes in the geometric shape and/or geologic profile are entered into the program to simulate the hand drawn cross section. Estimated soil shear strength parameters for the various soil/rock layers are also entered into the program. The program then calculates the factors of safety using either the ordinary method of slices or modified Bishop Method.

Long term stability analysis was performed using effective stress analysis with pore pressure. Short term analysis was performed using total stress analysis. A seismic coefficient of 0.10g was also used in the analyses.

The lowest factor of safety for each condition was as follows:

Existing Slopes:			
	Section 1	Effective Stress (Plate SE.1)	1.824
		Total Stress (Plate ST.1)	1.552
	Section 2	Effective Stress (Plate SE.2)	1.905
		Total Stress (Plate ST.2)	1.543
	Section 3	Effective Stress (Plate SE.3)	2.207
		Total Stress (Plate ST.3)	3.964
New Cut and Fill Slopes			
	2H:1V Slope with 8' wide Bench		
		Effective Stress (Plate SE.4)	2.762
		Total Stress (Plate ST.4)	6.521
	3H:1V Slope with 8' wide Bench		
		Effective Stress (Plate SE.4)	2.989
		Total Stress (Plate ST.4)	6.386

A factor of safety of 1.0 is considered at the verge of failure. The generally accepted minimum factor of safety is 1.5.

Graphic plots of the analysis showing the slope geometry, soil profile, the center of circle with the lowest factor of safety and the calculated factor of safety are included at the end of this report.

6.0 ROCKFALL HAZARD

6.1 Observation of Site Conditions

Large boulders (up to 6-feet in diameter) were observed on the ground surface along the east and northeast sides of the proposed expansion area. There are also exposed rock outcrops along the easterly perimeter of the proposed expansion area. The boulders were generally more numerous within the existing gullies and ravines (See attached Point of Interest photos).

6.2 Rockfall Hazard Analysis

An analysis of the potential hazard from rockfall was performed using the Colorado Rockfall Simulation Program (CRSP) developed by the Colorado School of Mines and the Colorado Department of Transportation. The program was developed to model rockfall and to provide a statistical analysis of the probable rockfall behavior at a given site.

Various values such as the slope geometry, slope material properties, rock geometry and rock material properties are input into the program which then simulates the rockfall behavior. The information can then be used to determine the need for rockfall mitigation.

Three profiles were drawn across the site for analysis (see Plate 2). The analysis indicates that the limits of the potential rockfall zone is 860 to 1080 feet downhill from the top of the ridge line above the property. This encroaches into the proposed expansion area (see Plates RF.1, RF.2, RF.3).

6.3 Interpretation of Rockfall Hazard Analysis

Based on the results of the site reconnaissance and the rock hazard analysis, there are four (4) areas with the potential for hazard due to rockfall. These areas are located along the east and northeast edges of the property (see Plate 2.1).

Mitigative measures may include one or a combination of the following:

a. Securing the existing boulders using netting or chaining.
b. Removal of the boulders.
c. Installation of fencing uphill from proposed improvements.
d. Constructing a buffer zone between the rockfall hazard source and the proposed improvement.

The choice of mitigative measure will depend on the specific site condition.

7.0 SUMMARY

Based on our site inspection and analyses, it is concluded that

a. There is no apparent potential for hazards to the proposed expansion site that may be associated with slope stability. The factor of safety for the existing slopes and newly graded slopes (up to 2 horizontal to 1 vertical in gradient) exceed 1.5. Therefore, no mitigative measures are deemed necessary to protect the development from slope stability issues.

b. There is a potential for hazards associated with rockfall. These hazards can be mitigated using available technology.

Should you have any questions or require any further information, please do not hesitate to contact us.

Very truly yours,

SHINSATO ENGINEERING, INC.

Lawrence S. Shinsato, P.E.
President

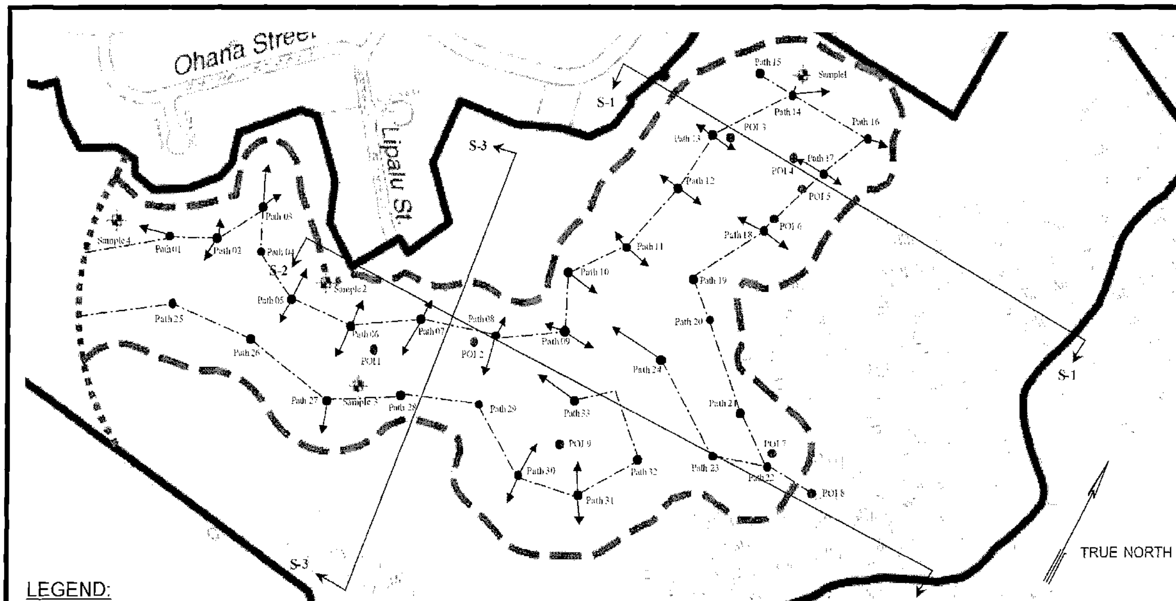
LAWRENCE S. SHINSATO
LICENSED PROFESSIONAL ENGINEER
No. 4169-C
HAWAII, U.S.A.

This work was prepared by me
or under my supervision.
License Expires 04/30/10

LSS:ls

Attachments/

Vicinity Map	Plate 1
Plot Plan	Plate 2
Rockfall Hazard Plan	Plate 2.1
Table 1: Description of Points of Interest	Plate 2.2
Points of Interest	Plates P.1, P.2, P.3
Graphic Plots of the Slope Stability Analysis	Plates SE.1, ST.1, SE.2, ST.2, SE.3, ST.3, SE.4, ST.4, SE.5, ST.5
Rockfall Hazard Analysis	Plates RF.1, RF.2, RF.3



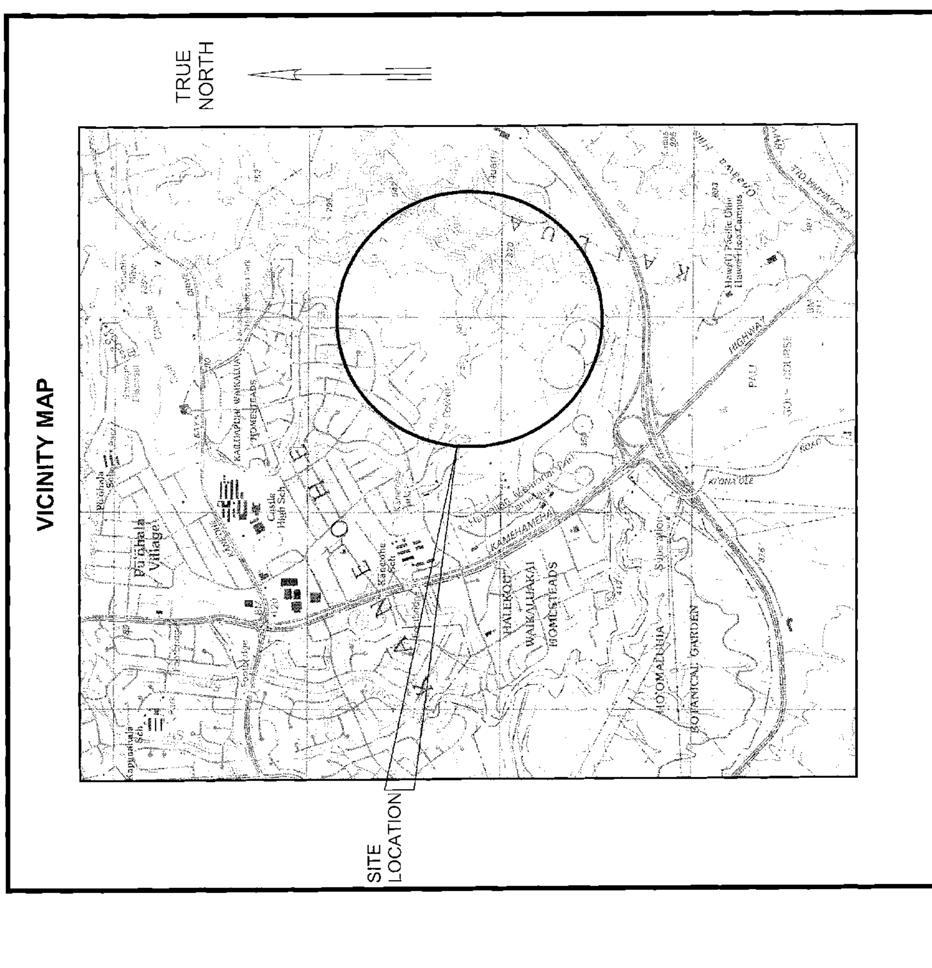
LEGEND:

(symbol)	SITE RECONNAISSANCE PATH
(symbol)	POINTS OF INTEREST (SEE TABLE 1)
(symbol)	SOIL SAMPLE LOCATIONS

PLOT PLAN
SCALE: 1" = 500'

Project:	HAWAIIAN MEMORIAL PARK HAZARD ASSESSMENT	*SHINSATO ENGINEERING, INC.* CONSULTING GEOTECHNICAL ENGINEERS	PLATE
Project No.:	08-0043	98-747 KUAHAO PL. PEARL CITY, HI 96782	2.0

VICINITY MAP



HAWAIIAN MEMORIAL PARK

SHINSATO ENGINEERING, INC.
CONSULTING GEOTECHNICAL ENGINEERS
98-747 KUAHAO PL. PEARL CITY, HI 96782

PROJECT NO 08-0043
DATE: 05/08
SCALE: 1"=2000'
PLATE 1

REFERENCE:
USGS TOPOGRAPHIC MAP
KANEOHE QUADRANGLE
DATED 1998

Point of Interest	Notes
1	Stream with cobbles and boulders
2	Stream with cobbles and boulders
3	Stream with cobbles and boulders
4	Surface boulders up to 4 feet
5	Large surface boulders up to 6 feet
6	Stream with cobbles and boulders
7	Surface boulders up to 5 feet
8	Rock outcrops
9	Large surface boulders up to 6 feet Plus boulders embedded into ground
Path 22	Large surface boulders

TABLE 1

Description at Points of Interest

Project: HAWAIIAN MEMORIAL PARK

Project No.: 08-0043

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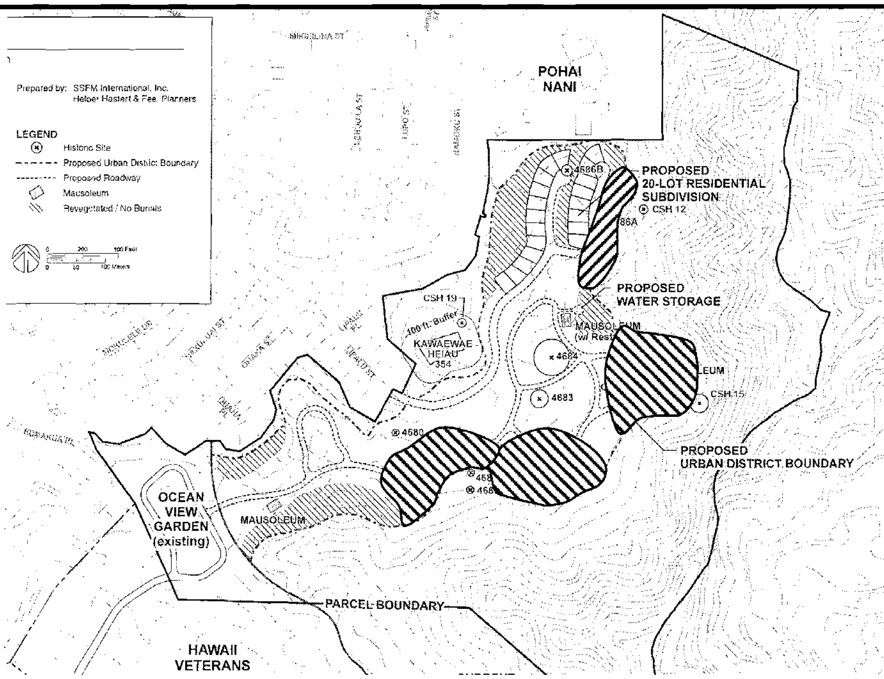
98-747 KUAHAO PL. PEARL CITY, HI 96782

PLATE 2.2



LEGEND:

APPROXIMATE ZONES OF ROCKFALL HAZARD

ROCKFALL HAZARD PLAN

NOT TO SCALE

Project: HAWAIIAN MEMORIAL PARK

Project No.: 08-0043

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PLATE 2.1

POI # 4 BOULDER
SECTION 1

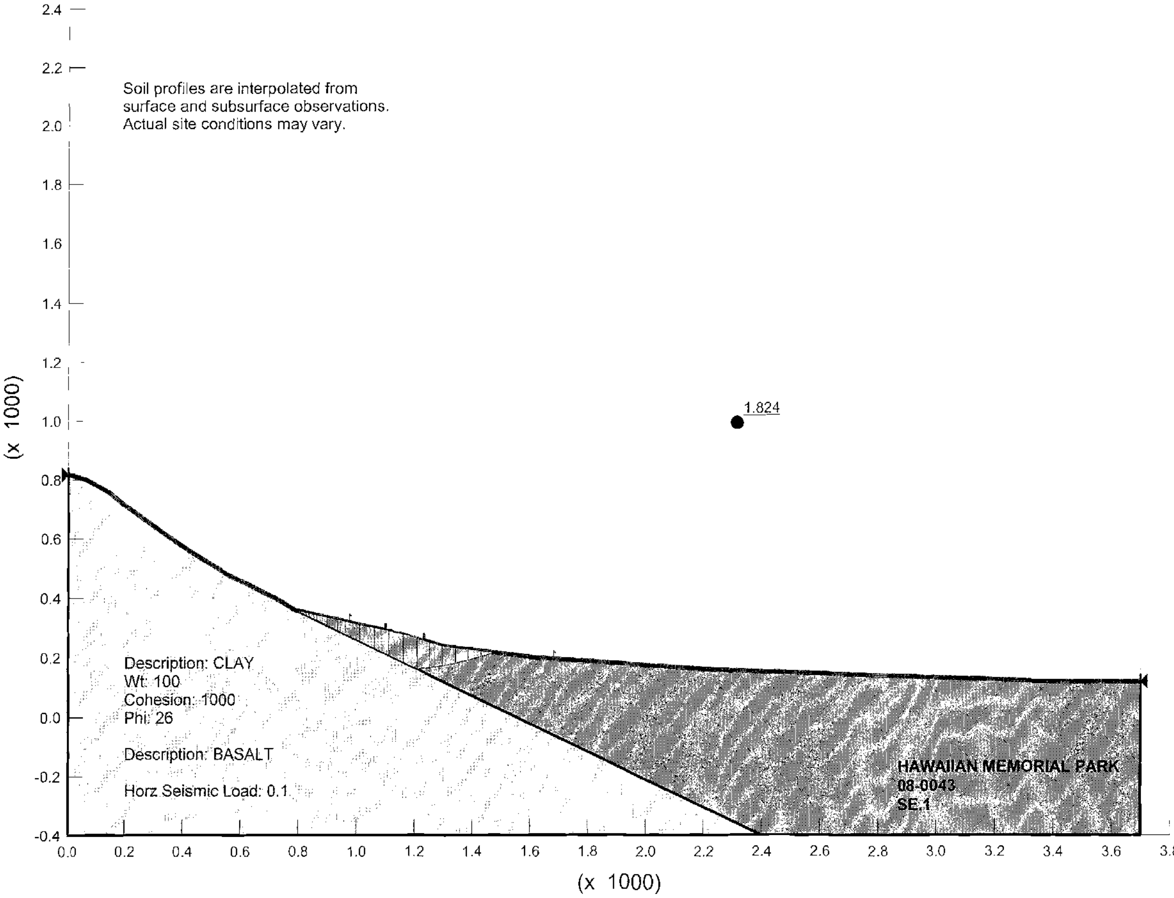
POI # 5 BOULDER
SECTION 1

Project:	HAWAIIAN MEMORIAL PARK HAZARD ASSESSMENT	SHINSATO ENGINEERING, INC. CONSULTING GEOTECHNICAL ENGINEERS 98-747 KUAHAO PL. PEARL CITY, HI 96782	PLATE P.1
Project No.:	08-0043		

POI # 7 BOULDER
SECTION 2

PATH #22 BOULDER
SECTION 2

Project:	HAWAIIAN MEMORIAL PARK HAZARD ASSESSMENT	SHINSATO ENGINEERING, INC. CONSULTING GEOTECHNICAL ENGINEERS 98-747 KUAHAO PL. PEARL CITY, HI 96782	PLATE P.2
Project No.:	08-0043		



POI #8 EXPOSED ROCK
SECTION 2

POI#9 BOULDER
SECTION 2

Project: HAWAIIAN MEMORIAL PARK
HAZARD ASSESSMENT
Project No.: 08-0043

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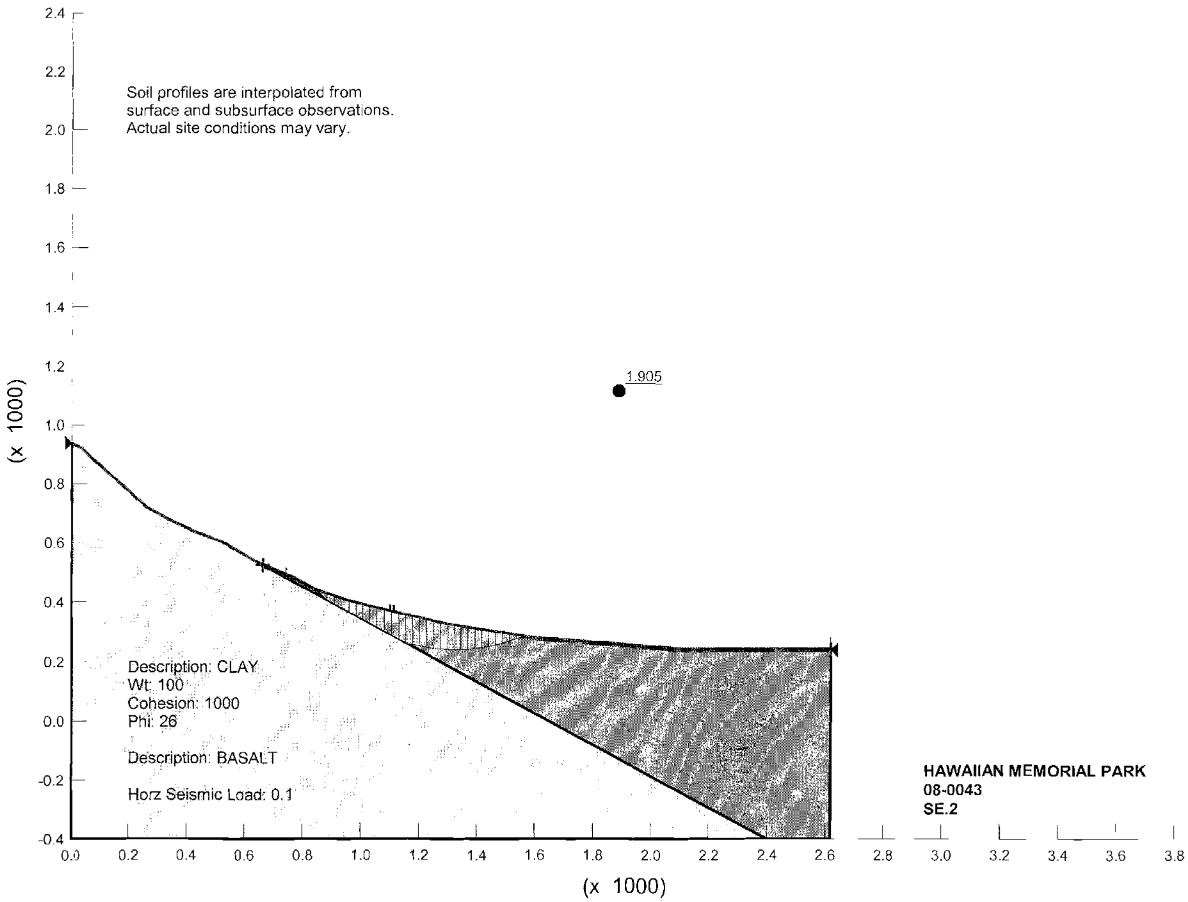
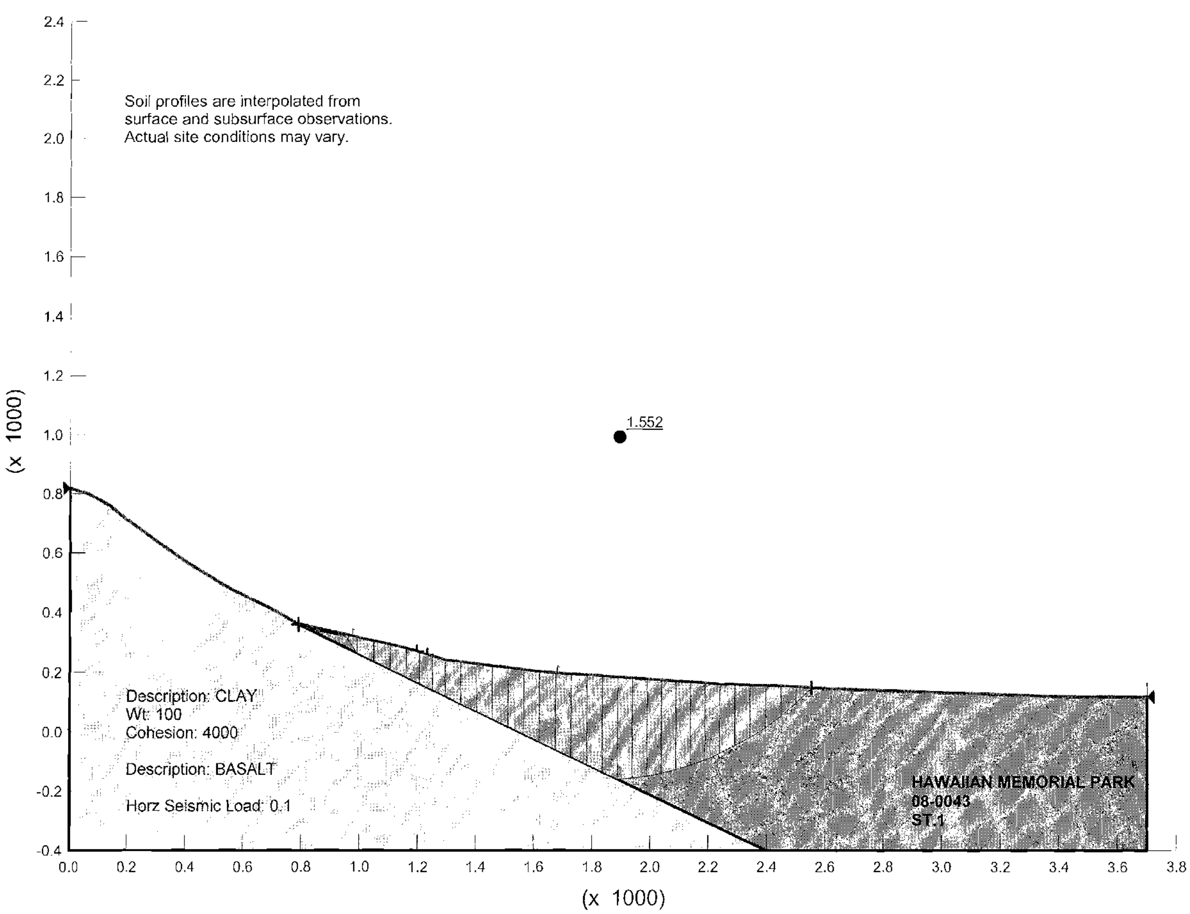
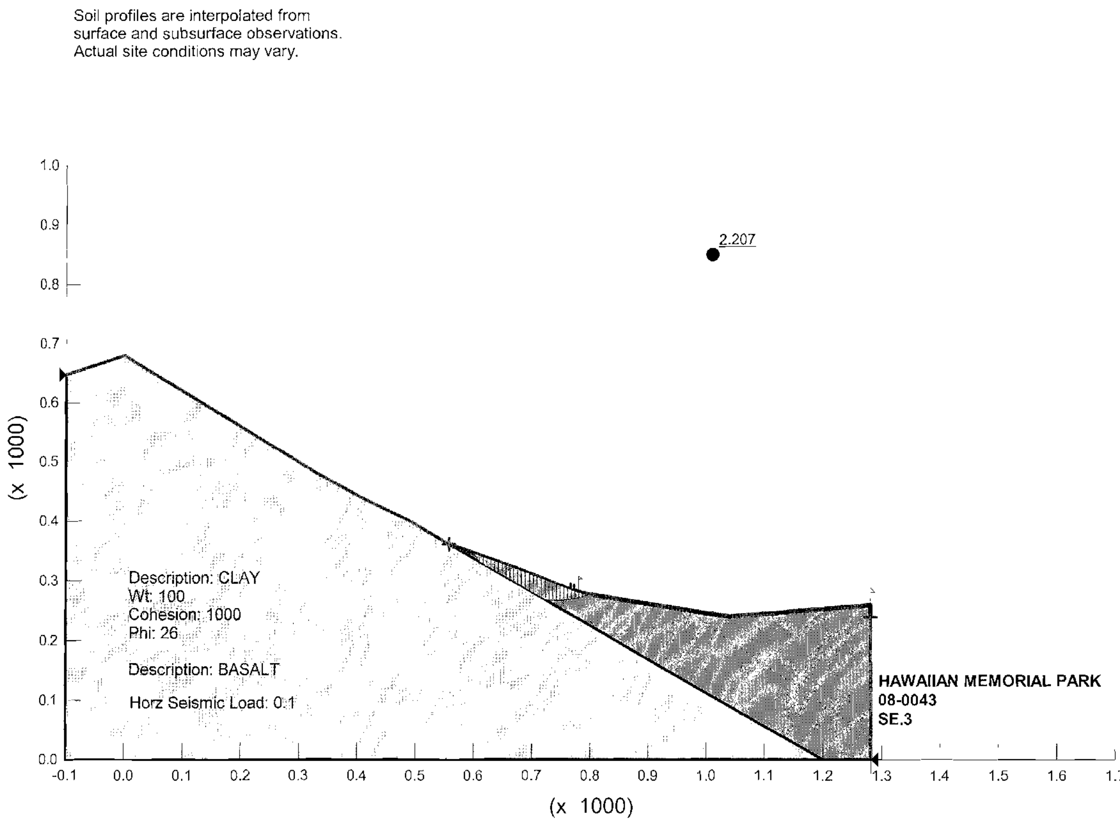
PLATE
P.3

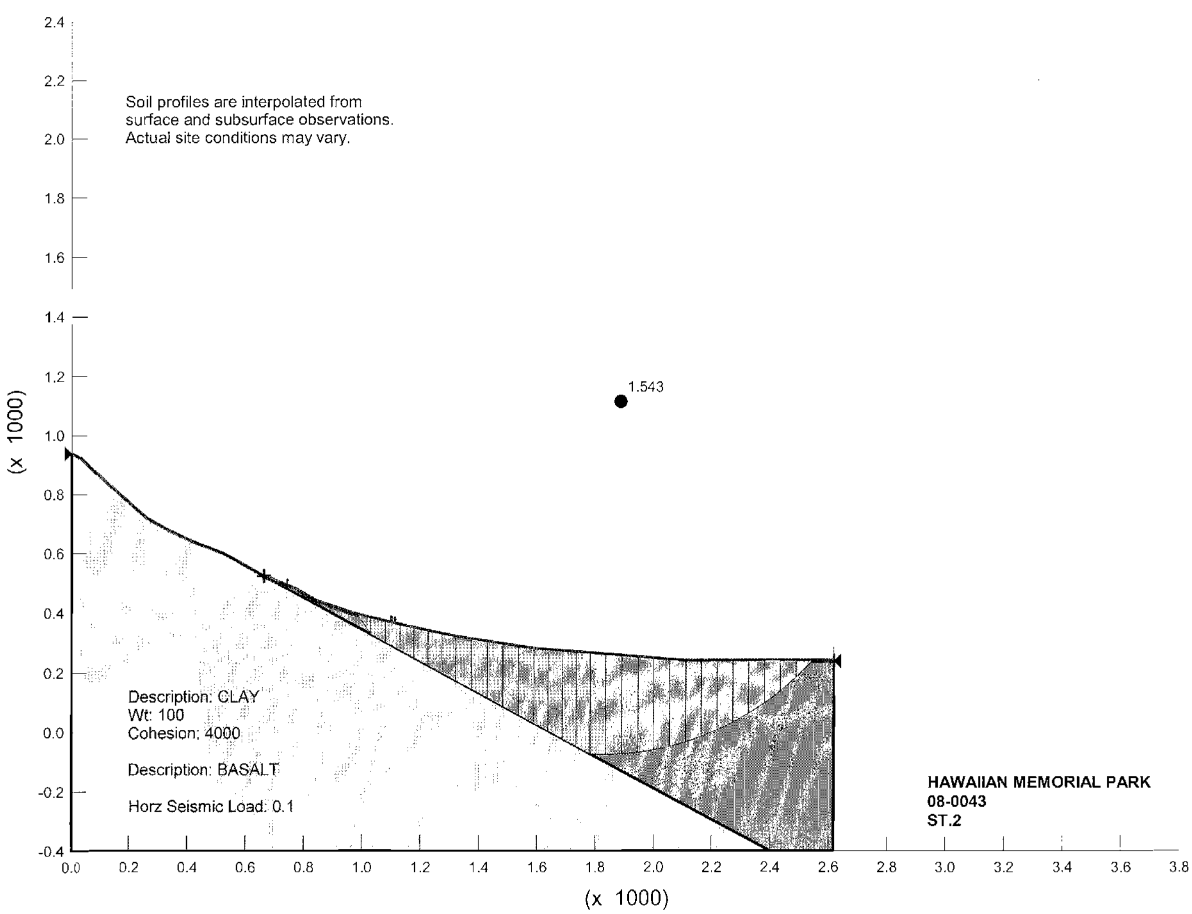


Soil profiles are interpolated from
surface and subsurface observations.
Actual site conditions may vary.
1.905
Description: CLAY
Wt: 100
Cohesion: 1000
Phi: 26
Description: BASALT
Horz Seismic Load: 0.1
HAWAIIAN MEMORIAL PARK
08-0043
SE.2
(x 1000)
(x 1000)



Soil profiles are interpolated from
surface and subsurface observations.
Actual site conditions may vary.
1.552
Description: CLAY
Wt: 100
Cohesion: 4000
Description: BASALT
Horz Seismic Load: 0.1
HAWAIIAN MEMORIAL PARK
08-0043
ST.1
(x 1000)
(x 1000)


Soil profiles are interpolated from
surface and subsurface observations.
Actual site conditions may vary.
2.207
Description: CLAY
Wt: 100
Cohesion: 1000
Phi: 26
Description: BASALT
Horz Seismic Load: 0.1
HAWAIIAN MEMORIAL PARK
08-0043
SE.3
(x 1000)
(x 1000)


Soil profiles are interpolated from
surface and subsurface observations.
Actual site conditions may vary.
1.543
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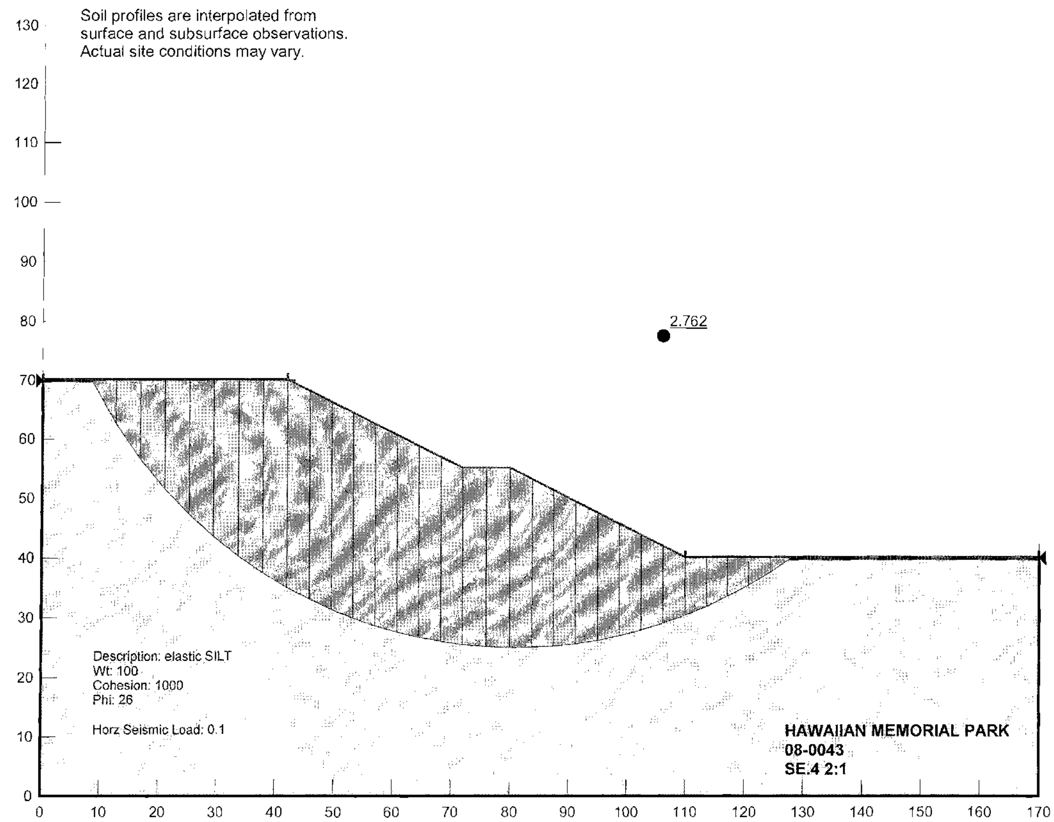
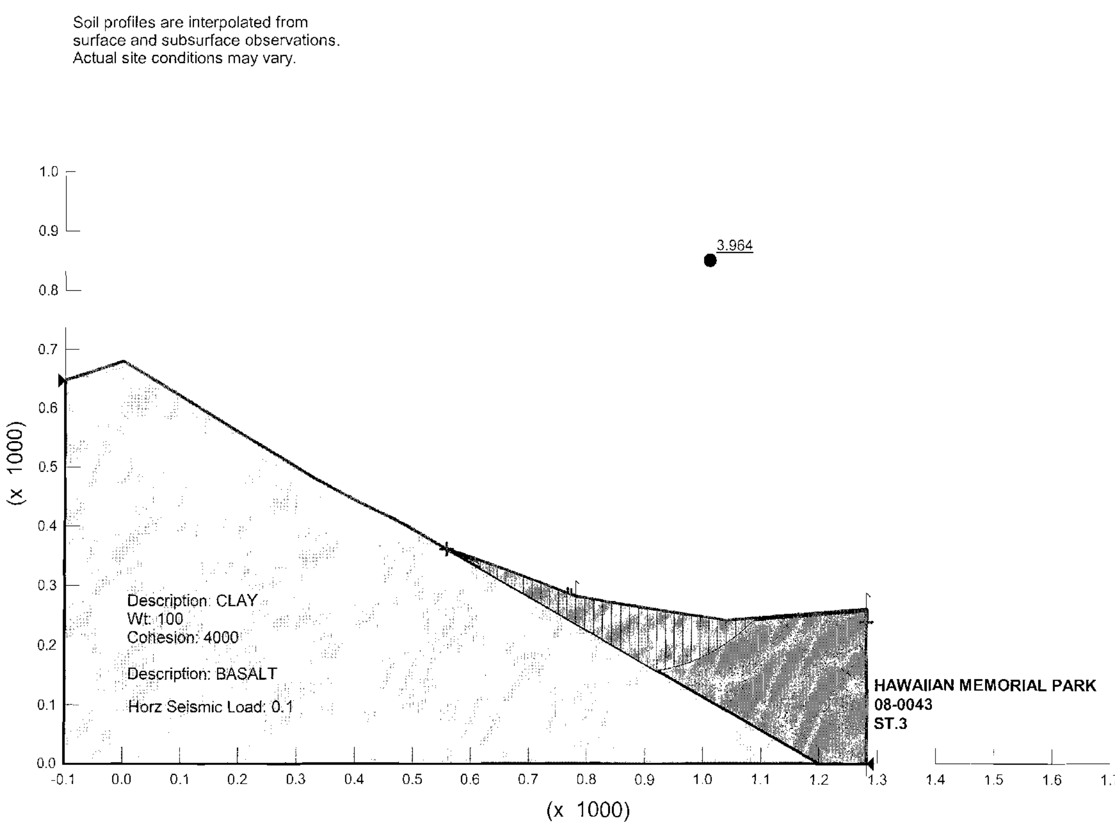
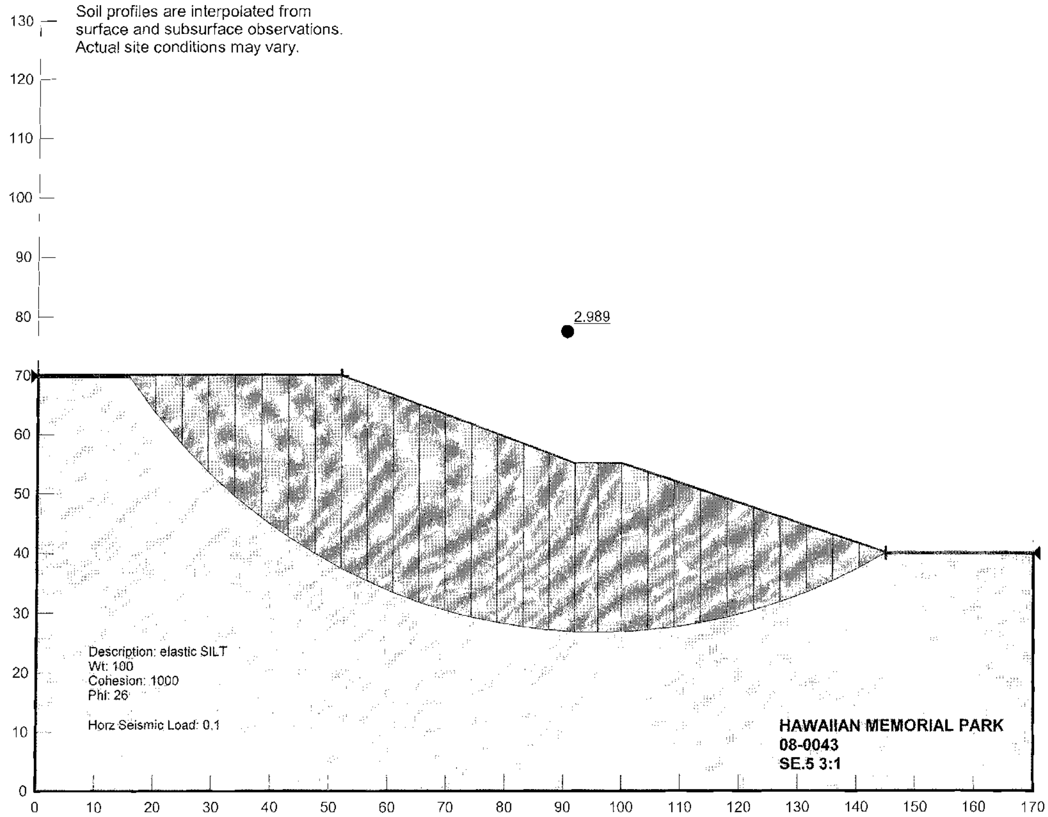
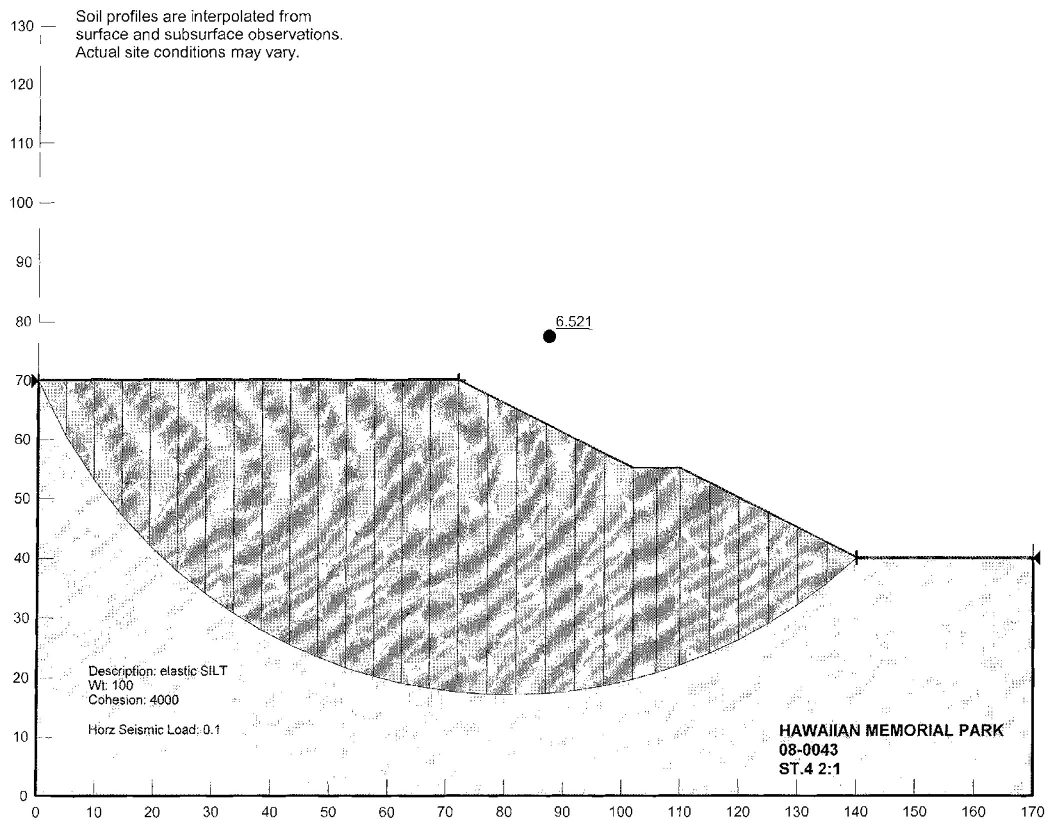
Wt: 100
Cohesion: 4000
Description: BASALT
Horz Seismic Load: 0.1
HAWAIIAN MEMORIAL PARK
08-0043
ST.2
(x 1000)
(x 1000)


Soil profiles are interpolated from
surface and subsurface observations.
Actual site conditions may vary.
2.762
Description: elastic SILT
Wt: 100
Cohesion: 1000
Phi: 26
Horz Seismic Load: 0.1
HAWAIIAN MEMORIAL PARK
08-0043
SE.4 2:1

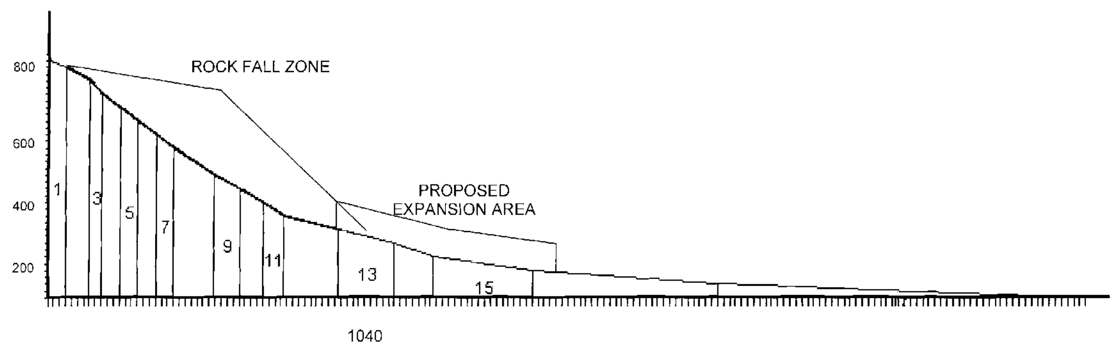

Soil profiles are interpolated from
surface and subsurface observations.
Actual site conditions may vary.
3.964
(x 1000)
Description: CLAY
Wt: 100
Cohesion: 4000
Description: BASALT
Horz Seismic Load: 0.1
HAWAIIAN MEMORIAL PARK
08-0043
ST.3
(x 1000)



Soil profiles are interpolated from
surface and subsurface observations.
Actual site conditions may vary.
2.989
Description: elastic SILT
Wt: 100
Cohesion: 1000
Phi: 26
Horz Seismic Load: 0.1
HAWAIIAN MEMORIAL PARK
08-0043
SE.5 3:1

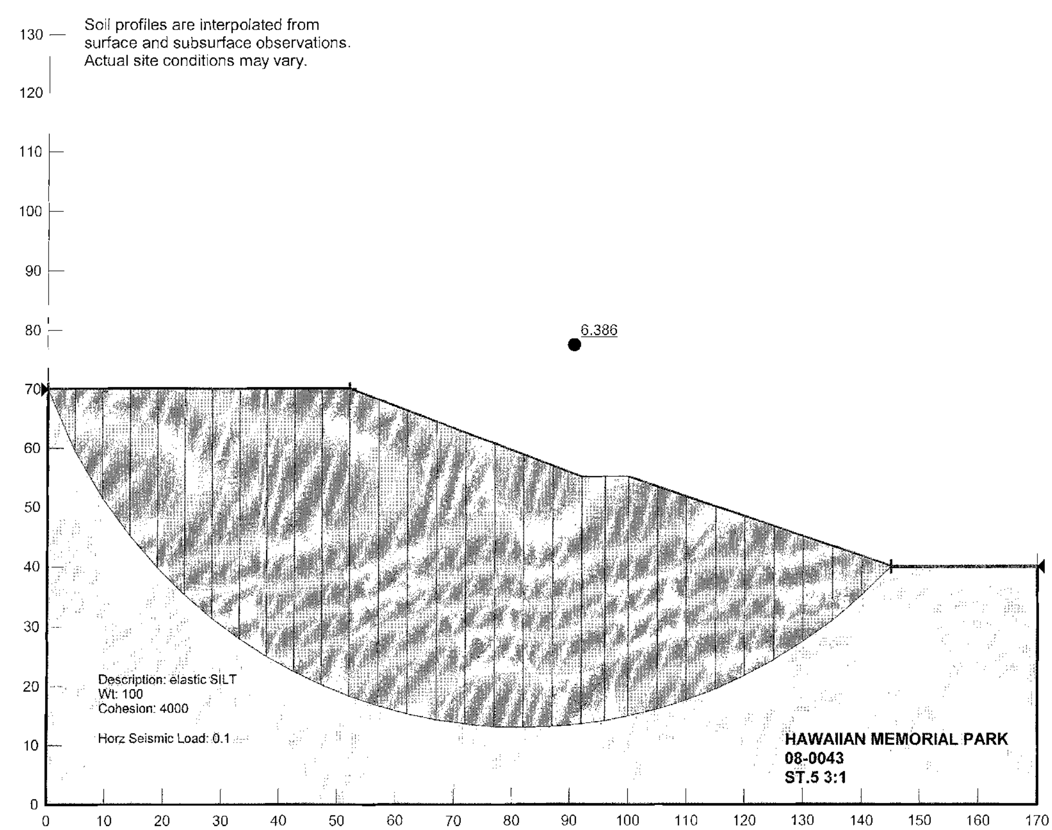


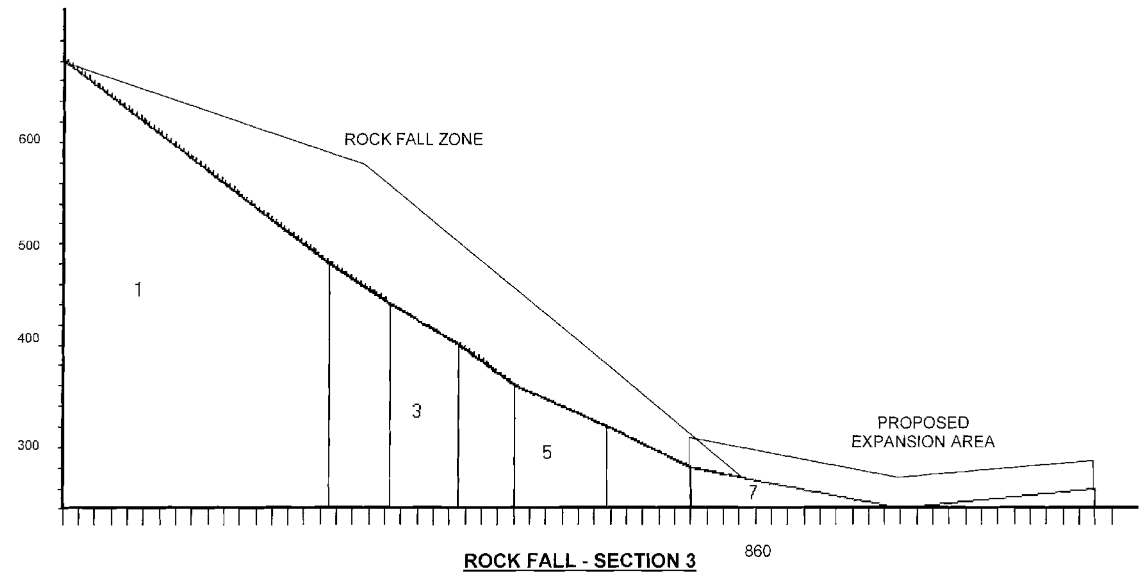
Soil profiles are interpolated from
surface and subsurface observations.
Actual site conditions may vary.
6.521
Description: elastic SILT
Wt: 100
Cohesion: 4000
Horz Seismic Load: 0.1
HAWAIIAN MEMORIAL PARK
08-0043
ST.4 2:1



ROCK FALL -SECTION 1
NOT TO SCALE

Project:	HAWAIIAN MEMORIAL PARK HAZARD ASSESSMENT	*SHINSATO ENGINEERING, INC.* *CONSULTING GEOTECHNICAL ENGINEERS*	PLATE **RF.1**
Project No.:	08-0043	*98-747 KUAHAO PL. PEARL CITY, HI 96782*	





ROCK FALL - SECTION 3
NOT TO SCALE

Project: HAWAIIAN MEMORIAL PARK
HAZARD ASSESSMENT
Project No.: 08-0043

SHINSATO ENGINEERING, INC.
CONSULTING GEOTECHNICAL ENGINEERS
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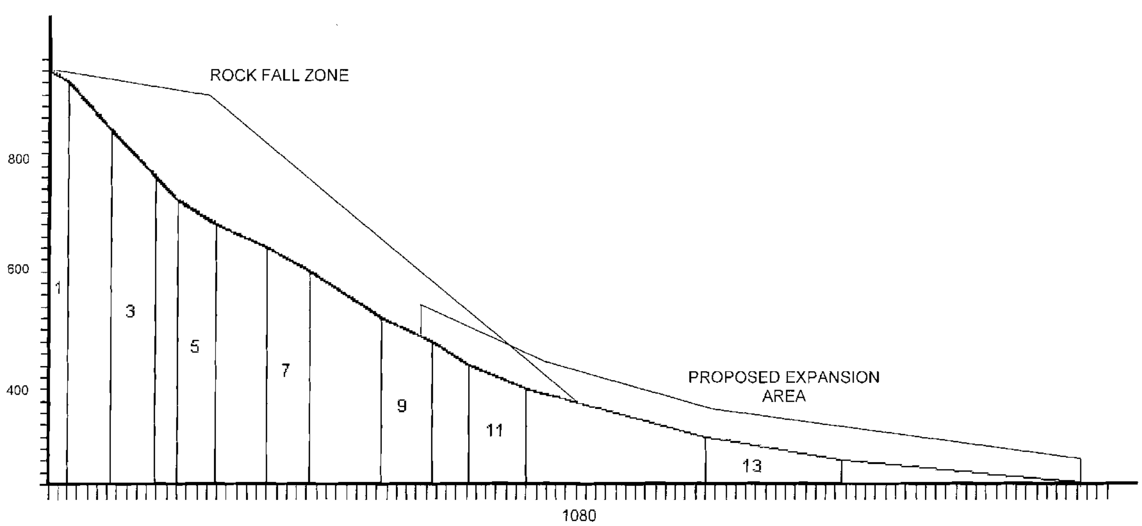
PLATE
RF.3



ROCK FALL -SECTION 2
NOT TO SCALE

Project: HAWAIIAN MEMORIAL PARK
HAZARD ASSESSMENT
Project No.: 08-0043

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PLATE
RF.2