SPECIAL MANAGEMENT AREA ORDINANCE
CHAPTER 33, ROH
Environmental Assessment/Determination
Negative Declaration

Recorded Owner : F.T. Opperman, E. Reinhart, W. Horack
Applicant : (same)
Agent : Stanley Yim and Associates, Inc.
Location : Waialua, Oahu
Tax Map Key : 6-07-07:37
Request : Subdivision of subject parcel into 16 residential lots and one roadway lot
Determination : Environmental Impact Statement (EIS)
Not Required

Attached and incorporated by reference is the environmental assessment prepared by the applicant for the project.

On the basis of the environmental assessment, we have determined that an Environmental Impact Statement is not required.

APPROVED

DONALD A. CLEGG
Director of Land Utilization
City and County of Honolulu
State of Hawaii

DAC: the
ENVIRONMENTAL ASSESSMENT

Special Management Area Use Permit

for the

COPRA VILLAGE SUBDIVISION

at

Waialua, Oahu, Hawaii

TMK: 6-07-07-37

June 1990

Prepared By:
STANLEY YIM & ASSOCIATES, INC
770 Kapiolani Blvd, Suite 703
Honolulu, Hawaii 96813

OFFICE OF ENVIRONMENTAL QUALITY CONTROL
465 S. King Street, #104
Honolulu, HI 96813
I. GENERAL INFORMATION

A. APPLICANT: F.T. Opperman, E. Reinhart, W. Horack
   700 Bishop Street, Suite 1000
   Amfac Building  (Phase: 523-2431)
   Honolulu, Hawaii  96813

B. RECORDED FEE OWNER: (same)

C. AGENT: Stanley Yim & Associates, Inc.
   770 Kapiolani Boulevard, Suite 703
   Honolulu, Hawaii  96813
   Telephone: 537-3790  Fax: 537-4264

D. TAX MAP KEY:  6-07-07-37

E. LOT AREA: 2.854 Acres

F. AGENCIES CONSULTED IN MAKING ASSESSMENT:
   Department of Health, State
   Department of Public Works, City
   Department of Transportation Services, City
   Board of Water Supply, City
   Department of Land Utilization, City

II. DESCRIPTION OF PROPOSED ACTION

A. GENERAL: Subdivision of subject parcel into 16 residential lots and one
   roadway lot. The new residential lots vary in area with the largest being 8065
   sq ft and the smallest being 6033 sq ft, more or less. The new road is 32 ft
   wide and about 300 ft long and connects to the existing Waialua Beach Road. A
   preliminary site plan showing the new lot layout, the new lot areas, and the
   location map, is attached as Exhibit AA.

   The subject parcel is situated entirely within the SMA area, see Exhibit BB,
   attached.

   This proposed subdivision will need a Special Management Area use permit as
   well as subdivision approval. The various agency approvals will also be
   obtained at the time the construction plans are routed for agency reviews.

B. TECHNICAL: The new lots in the subdivision will comply with R5 zoning
   requirements in terms of minimum lot area, width, etc. The original property is
   zoned R5.

   The subject property does not front along the shoreline and therefore, no
   certification of shoreline is needed. A print showing the existing features of the
   lot and the ground elevations is attached as Exhibit CC. There are 13 wood
   frame dwellings randomly located on the existing site. These wood frame
   structures are old and in various stages of disrepair. They will be demolished
   and removed upon commencement of the sitework for the new subdivision.
The existing site is located between Waialua Beach Road and Kispoko Street. The ground along both roads is generally higher than the site itself especially at the north-northwest part of the site. Due to this condition, the grading for the project will include some filling of the depressed areas. It is anticipated that the fills will be between 12 to 18 inches thick for most of the areas but not greater than 24 inches. The project's grading plan showing the existing and the proposed finished elevations is attached as Exhibit DD. This same exhibit also shows the ultimate runoff pattern with runoff areas and flows computed.

Drainage will be by way of a new underground pipe system that will connect to an existing drain inlet behind the existing lots fronting Kahaone Place. The runoff from the site will be conveyed in this new system to the existing drain system and eventually to the ocean. Further information and related computations pertaining to the drainage and erosion control for the proposed subdivision is contained in the Drainage and Erosion Control Reports, attached as Exhibits EE & GG, respectively.

Water service for 12 of the 16 new lots will be by way of a watermain to be installed in the new road. The new water system will include a fire hydrant to provide fire protection for the new lots. The water service for the other 4 lots will be off of the existing main located in Waialua Beach Road. Since there are already 13 existing houses on the site and each has its own water meter, only 3 new water meters will be needed. The 13 existing meters will be relocated and reused to serve the new lots.

Sewer service will be a septic tank and seepage pit layout for each of the 16 lots. The septic tank and seepage pit layout, along with the computations for the system for each of the lots is shown on Exhibit HH, attached. A print of the layout has been reviewed by the State Health Department and they have already approved it concept. The Health Department will review each of the lots again when the building permits for the individual houses are processed. The soil percolation test results, upon which the computations are based, is attached as Exhibit II.

Electric and telephone services for the new lots will be furnished by Hawaiian Electric Company and Hawaiian Telephone Company, respectively. These systems will be off of the existing overhead systems located in Waialua Beach Road. The new electric and telephone services will be taken underground at the source of service and remain underground for the new subdivision with the exception of the 4 lots fronting directly onto Waialua Beach Road. These lots will have their electrical and telephone services overhead since they will be connecting directly to the existing overhead services in Waialua Beach Road. A complete overhead system for the subdivision is presently being considered. While the present rules may require that the electrical and telephone systems be underground for new subdivisions, there exists a possibility that, because the surrounding neighborhoods all have overhead systems, a variance may be possible allowing the new systems to remain overhead.

C. ECONOMIC AND SOCIAL CHARACTERISTICS: The proposed subdivision is anticipated to cost about $550,000, more or less, based on an efficiency factor of 70% and a unit cost of about $5.25 per square foot for the improvements.

Infrastructure work can possibly commence sometime late this year or early next year pending approvals and weather conditions.
D. ENVIRONMENTAL CHARACTERISTICS: The soils on the site, erosion hazards, and erosion control measures for the proposed subdivision are described in Exhibit GG (Erosion Control Report).

The site's topography is relatively flat with no severe slopes. It is depressed relative to the adjacent roadways on both sides and therefore, will need some filling. The site is more or less, triangular in shape with a perpetual roadway easement bounding it along the east boundaries.

The project's surface runoff, drainage, etc. based on before and after conditions are analyzed in Exhibit EE (Drainage Report). The site is located in the AE and VE zones of the Special Flood Hazard Areas as designated on Panel 20 of the Flood Insurance Rate Map for the City and County of Honolulu (Panel Number 150001- 0020 B) dated September 4, 1987. The applicable portion of Panel 20 is shown as Exhibit FF. The AE zones for the parcel are located closer towards Waialua Beach Road and have base flood elevations ranging from 8 to 10 feet. The VE zones, located further to the north on the site and closer towards Kilapoko Street have base flood elevations ranging from 10 to 12 feet. The finish floor elevations for the new houses will have to be higher than the base flood elevations noted for the respective zones. An enlarged drawing showing the base flood elevation lines as it applies to the site is shown as Exhibit F1.

III. AFFECTED ENVIRONMENT

A. The existing site already has 13 wood frame dwellings that house families of various sizes. Unimproved dirt roads and driveways presently provide the access to these houses. Most of these houses are old and in various stages of disrepair. The existing houses will eventually be demolished and removed upon commencement of site work construction for the proposed subdivision.

The site, being triangular in shape, is surrounded on two sides by roadways. Across the roads are existing residential lots that were created many years ago. These lots are accessed by improved roadways and have overhead electric and telephone facilities as well as underground drain and water systems. As for sewers, most of these homes are still using cesspools that were installed at the time the houses were built. A perpetual roadway easement with an unimproved dirt road borders the third side of the site and an existing sugar cane field is located across this roadway easement.

B. The site is within walking distance to an existing beach. There are no parks located near to the site.

The site is already occupied by the 13 old houses, and the surrounding areas are already built up and have residential homes that have been there for many years. As a result, most of the native flora in the area has since been destroyed. Vegetation on the site consists of Opiuma, Plumeria, Banyan, Rubber, Monkeypod, Lime, Northern Pine, Mango, Klae, Palm, Coconut and some Ironwood trees as well as Oleander, Panax, and Hibiscus hedges and other miscellaneous scrub growth. The flora is almost entirely introduced with the only native species being the coconut trees. No rare or endangered plant species were noticed at the site.
Terrestrial fauna known to exist on the site and in the adjacent cane field are the mongoose, rats, and field mice, all introduced species. Introduced birds are the Spotted Dove, Cardinal, Sparrows, and Mynah. No rare or endangered fauna species were found at the site.

C. No historic, cultural, and/or archaeological resources were noted that applied to the site.

D. There are no coastal views from any viewpoint on the site because there exists a major subdivision between the site and the ocean which blocks any views that may exist.

E. The quality of the receiving waters offshore is AA (near to Kahaka Bay). This factor is considered in the Erosion Control calculations for the project. See Exhibit GG, attached. The effect of the runoff from this project on the receiving waters is negligible as suggested by the severity rating of 267 versus the 50,000 index.

The subdivision is also located below the UIC line and in the "pass" zone which allows the use of individual wastewater systems for each of the lots. This location and the use of individual wastewater systems has been discussed with the State Department of Health and confirmed by them on May 25, 1990.

IV. PROJECT IMPACTS

A. The short term, or construction related impacts will be temporary and localized. The long term impact is the use of the parcel for a subdivision will close the options for future use for this land. However, the site is already being occupied by thirteen old run-down wood frame dwellings and the subdivision will upgrade the infrastructure on the site as well a provide for sixteen new homes. Considering the shortage of housing on Oahu, these tangible benefits are deemed to be a betterment for the surrounding area and therefore outweigh the short term impacts and closure of the land to future uses.

V. MITIGATION MEASURES

A. The following describe mitigation measures pertaining to impacts associated with the construction of the project. No long term impacts are anticipated and, therefore, no mitigation measures for long term impacts are discussed.

1. Noise - An increase in noise level will be experienced during construction. Sources of noise will be equipment needed for construction activities, including heavy vehicles for excavation and removal of spoil material, import construction materials, and other power equipment.

To mitigate any adverse impacts, the contractor shall be responsible for properly maintaining all construction equipment to minimize noise during construction operations. If noise levels are expected to exceed allowable noise levels specified under Title 11, Administrative Rules,
Department of Health, Chapter 43, the contractor will be required to obtain a noise permit. Any heavy vehicle required for construction work must comply with Title 11, Administrative Rules, Department of Health, Chapter 42, Vehicular Noise Control for Hawaii.

2. Air Quality - Ambient air quality is expected to be temporarily impacted due to dust generated during construction activities. In keeping with the State Health Department regulations, and County ordinances, the contractor will be required to take measures to minimize airborne pollutants. These measures are defined in the approved erosion control plans. Use of such measures will reduce the potential for adverse air quality impacts during site work.

Emissions from construction equipment could also affect ambient air quality. However, with the proper equipment and maintenance by the contractor, the adverse impacts of emissions from equipment can be minimized.

3. Water Quality - Construction of the proposed subdivision should not adversely affect the water quality of the area. Appropriate erosion control measures could be implemented during site work, in accordance with State and County erosion control standards, to minimize adverse water quality impacts.

4. Erosion Control - Sedimentation and erosion control potential will increase during the short term grading and construction phases of the work. The measures in the approved Erosion Control Report shall be implemented as needed to mitigate adverse impacts caused by sedimentation and/or erosion.

5. Traffic - During construction, trucks, heavy equipment, and other construction related vehicles will use existing roads to haul away and import material. Local traffic along construction accessways may occasionally encounter minor delays. Such delays will, however, be of short duration. The contractor shall be responsible for providing the necessary traffic controls and precautions to maintain traffic safety on roadways bordering and near to the construction site.

6. Flora and Fauna - There are no known rare or endangered species of flora or fauna in or around the site.

7. Economic - The short term impact from the construction include the provision of jobs to local construction personnel. Local material suppliers and retail businesses may also benefit through a multiplier effect from the increased construction activity.

8. Public Health and Safety - Necessary measures to assure public health and safety will be provided through all phases of construction by the contractor. During non working hours, the construction areas will be secured by adequate safety signs and other safety devices as required by the State and City regulations.
PLAN

Scale in Feet

COPRA SUBDIVISION DATA

Designer: FT Opperman, V Hart, L Balthard
1000 Jones Building, 200 Bishop Street
Nashville, Tenn. 37201

The Rep: 2-07-07-77 (2,434 Acres)

Development Plan: Residential
Zoning: R2 (lots: all new lots: east end: all new lots: approximately 50'.)

Proposed Lot: 18 residential, 1 roadway (180') R2

Drainage: Proposed connection to existing sewer system located at east of lot 11, south of lot 12.

Flood Designation: SE & SW. SE designation established finish floor at east portion of parcel at R1 and R2. SW designation established finish floor at west portion of parcel at R1 and R2. Elevation of proposed SE and SW located at 200+000 (level elevation 100+000).

General: No county sewer system available. SEW will be used for each of the lots.

Water: Existing water system located at north of parcel at SW corner. None are already 15 existing water meters. Application for these water meters will be necessary.

ADA: Project subject to ADA. ADA application to be filed concurrently with application for subdivision.

Parts Dedication: To be based on 30ft. x 100ft. (SW of landlot).

Road Dedication: New SE 50' wide roadway will be dedicated to the City & County of Honolulu.
EXHIBIT CC

Existing Features & Elevations

TOPOGRAPHIC SURVEY

Lot 190 and 191 of Land Court Application 1082
2nd Excision lot 8 A.C.E. A.K.A. Eastment Street portion as
At Kamehameha, Waialua, Oahu, Hawaii

Topo Map Key: 6-7-01 & 6-7-07
DRAINAGE REPORT
for
COPRA VILLAGE SUBDIVISION
Kamananui, Waialua, Oahu, Hawaii
TMK: 6-7-7:37
EXHIBIT EE

PROJECT DESCRIPTION

The proposed project involves subdividing the existing parcel into 16 residential lots and constructing a 32 ft. wide access road into the development. The project site consisting of approximately 2.85 acres is located between the Kiapoko Street and Waialua Beach Road fork in Waialua on the island of Oahu.

EXISTING CONDITIONS

There are currently 13 houses on the site. The site is generally covered with grass, trees, shrubs and bushes. A small dirt road provides access to the existing houses. Currently, drainage of the project site is entirely by surface runoff. Based on information provided by the topographic survey map prepared for this project, it appears that runoff ponds at various low spots within the site. During large storms, the standing water will over top these low spots and surface flow towards Waialua Beach Road and Kiapoko Street.

<table>
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<th>Q = CiA</th>
<th>Discharge</th>
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PROPOSED DRAINAGE SYSTEM AND RUNOFF AREAS

The proposed development will subdivide the existing parcel into 16 residential lots. A 32 ft. wide access road will also be installed. The existing houses on the site will be demolished and new houses will be constructed. Grading of the project site will primarily consist of leveling of the project site and filling low areas to accommodate the new development.

Drainage of the new development will be accomplished by a combination of new underground drain lines and overland flow. The new underground drainage system will consist of a drain line connecting to the City’s existing drainage system within an existing residential development North of the site. Catch basins will be installed within the new road to collect storm runoff from a portion of the new development. Runoff from the remainder of the project site will be discharged via surface flow towards Waialua Beach Road and Klapoko Street as it currently does.

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CONCLUSION

The additional runoff generated by the proposed new development will be taken care of by the new drainage system. Surface runoff discharged onto Klapoko Street and Waialua Beach Road will actually be less than it is currently. The proposed development should not have a drastic negative impact on the existing drainage conditions in the area.
HYDROLOGY-EXISTING CONDITIONS

To = 20 years 1 = 2.0 inches/hour  0 = CIA

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### Runoff Map

#### Hydrology - Proposed New Development

**To = 10 years 1 = 2.0 inches/hour 0 = CIA**

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**To = 50 years 1 = 2.0 inches/hour 0 = CIA**

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EXHIBIT FF

Portion of
FLOOD INSURANCE RATE MAP
Panel Number 150001-0020 B

September 4, 1987

KEY TO NUMBERED STREETS
ALANI STREET ........................................... 8
AWAI LANE ............................................... 9
FRESH AIR CAMP ROAD ................................ 9
HALEIWA ROAD ........................................ 10
KAILUA PLACE .......................................... 12
KEHI PLACE ........................................... 13
KALIHI ROAD .......................................... 13
NAEOI LANE ........................................... 14
NIUULA ROAD ........................................... 14
PIHAI STREET .......................................... 17
SMILEY PLACE .......................................... 18
WAIA PLACE ........................................... 11

NOTE:
COASTAL BASE FLOOD ELEVATIONS APPLY ONLY
LANDWARD OF THE SHORELINE SHOWN ON THIS MAP.
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
EXHIBIT FF

Portion of
FLOOD INSURANCE RATE MAP
Panel Number 150001-0020 B

September 4, 1987

KEY TO NUMBERED STREETS
ALAPAH STREET ........................................ 1
AWALIKA STREET ...................................... 2
FRESH AIR CAMP ROAD ............................... 3
HALEIWA ROAD ........................................ 5
KAIKA PLACE ........................................... 6
KEHI PLACE ............................................ 7
NAHMI ROAD ........................................... 8
NAWILI LANE ............................................ 9
NIUULA ROAD ............................................ 10
PIHALI STREET ......................................... 11
SMILEY PLACE .......................................... 12
WANA PLACE ............................................ 13

NOTE:
COASTAL BASE FLOOD ELEVATIONS APPLY ONLY
LANDWARD OF THE SHORELINE SHOWN ON THIS MAP.
EROSION CONTROL PLAN
June 1990
EXHIBIT GG

Project:
COPRA VILLAGE SUBDIVISION
Wai'alea, Oahu, Hawaii
TMK: 6-7-7:37

Developers:
Frank Opperman,
Ed Reinhart,
Michael Horack
700 Bishop Street, Suite 1000
Honolulu, Hawaii 96813

On-Site Soils

Two soil types occur on the project site. These include Jaucus sand (JaC) and Wai'alua silty clay (WkA).

Jaucus sands (JaC) occur on the Northern portion of the project site. The slope range of this soil is 0 to 15 percent, but in most areas the slope does not exceed 15 percent. In a representative profile the soil is single grain, pale brown to very pale brown, sandy, and more than 60 inches deep. In many areas the surface layer is dark brown resulting from accumulations of organic matter and alluvium. Permeability is rapid, and runoff is very slow to slow. The hazard of water erosion is slight, but wind erosion hazard is high where vegetation is removed.

Wai'alua silty clays (WkA) occur on the Southern portion of the site. The slope range of this soil is 0 to 3 percent. In a representative profile the surface layer is dark reddish-brown silty clay about 12 inches thick. The subsoil, about 26 inches thick, is dark reddish-brown and reddish-brown silty clay that has a subangular blocky structure. The substratum is dark reddish-brown, mottled silty clay. Permeability is moderate, runoff is slow, and the erosion hazard is slight.

Erosion Hazard

Except for an existing slope bank along its Northern boundary, the project site is relatively flat with slopes ranging from 1 to 5 percent. Site grading for the project will generally consist of levelling of the existing ground and filling low-lying portions to accommodate the proposed development.

A soil erodibility factor "K" of 0.15 (JaC, K=0.10 and WkA, K=0.20) is used in the following computations. Since the project site is relatively flat, the erosion hazard should be slight.
Calculation of Severity Rating Number "H" = (2FT + 3D)AE

Where: F = 4 (Waialua Beach Road and Klapoko Street bound the project site)
T = 0.5 years (based on 6 months construction from December 1, 1990 to May 31, 1991)
D = 4 (based on Class "AA" waters within Kaiaka Bay)
A = 2.85 acres (total lot area)
E = RK(LS)(CP) where:
   R = 275(1-0.85)+275(0.52) = 184.25 (based on construction from December 1, 1990 to May 31, 1991)
   K = 0.15 (Jaucus sand (JaC, K = 0.10) and Waialua silty clay (WkA, K = 0.20))
   LS = 0.40
   Average site slope = 2 percent
   Max uncontrolled length = 750 (+/-) feet
C = 0.75 (grading in winter, 1/2 the area seeded)
P = 0.70 (area to be graded less than 15 acres)
CP = 0.75(0.70) = 0.53
E = 184.25(0.15)(0.40)(0.53) = 5.86
H = (2(4)(0.5) + 3(4))(2.85)(5.86) = 267

The severity rating number "H" computed for this project is 267, which is considerably below the 50,000 index. Based on this low rating number, the following erosion control measures should be adequate and observed.

Permanent erosion control measures:

a. Install permanent drainage system to include swales and underground drain lines.

b. Plant permanent ground cover at all areas not covered by buildings, pavements and walks as soon as the finish grades are attained.

Temporary erosion control measures:

a. Plant temporary ground cover as needed immediately after the clearing, grubbing and grading work for all exposed areas that are not used for storage or parking. A temporary irrigation system need not be installed provided the Contractor maintains and cares for the growth of the temporary plantings.

b. Install temporary drainage system to include temporary drainage swales and berms as needed.
The following is the anticipated construction schedule:

Dec 1990 1. Clear and grub the site.
   2. Begin site grading.

   2. Begin road construction.
   3. Complete site grading.

Feb to
   2. Begin construction of houses.
   3. Complete road construction.
   4. Complete utility installation.

   2. Complete all site work.

   2. Cleanup.
   3. New tenants begin moving in.

APPROVED:

Director and Chief Engineer
Department of Public Works

[Signature]

Date

Chief, Division of Engineering
Department of Public Works

[Signature]

Date
SYSTEM NOTES

1. The soil for each of the lots shall be included as shown by the plan lines on site. The average tank shall be placed approximately 5 feet away from each lot line. The septic tank and seepage tank shall be 20 feet minimum. The septic tank and seepage tank shall be positioned on the lot line where the line is closest to the property line. The sewer line shall be installed as shown on the plan. All of the above must be within the 100-foot buffer zone.

2. Septic tanks have been specified on the plan. They are to be awarded by the Authority. All tanks are to be approved by the County Health Department. The Authority shall supply all necessary parts and accessories. All work is to be completed by the contractor.

3. Septic tanks are to be furnished by the contractor. All work is to be completed by the contractor. The Authority shall provide all necessary parts and accessories.

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10. Septic tanks are to be furnished by the contractor. All work is to be completed by the contractor. The Authority shall provide all necessary parts and accessories.

TYPICAL PLAN

- Septic Tank
- Seepage Pit Layout

TYPICAL ELEVATION

- Septic Tank
- Seepage Pit Layout

OPERATIONS & MAINTENANCE

1. Operations and maintenance of the septic tank and seepage areas shall be performed in accordance with the Authorities, Health Department, Education, & Housing, US Public Health Service, permits 23 to 25. Buffers.

EXHIBIT HH

Septic Tank and Seepage Pit Layout

<table>
<thead>
<tr>
<th>REVISION</th>
<th>DATE</th>
<th>DESCRIPTION</th>
<th>DRAWN BY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>07-07-37</td>
<td>STANLEY YIM &amp; ASSOCIATES, INC.</td>
<td>STANLEY YIM</td>
</tr>
<tr>
<td>2</td>
<td>07-07-37</td>
<td>CORDRA VILLAGE SUBDIVISION</td>
<td>B. YIM</td>
</tr>
<tr>
<td>3</td>
<td>07-07-37</td>
<td>INDIVIDUAL WASTEWATER SYSTEM (IWS)</td>
<td>B. YIM</td>
</tr>
</tbody>
</table>

APPROVED BY:

SIGNED, DIRECTOR OF ENGINEERING, 1991
April 20, 1990
Project No. H-1712-P

Hawaii California Investments
ca/p Stanley Yim and Associates
770 Kapiolani Boulevard, Suite 703
Honolulu, Hawaii 96813

Subject: Field Percolation Test Results
16-Lot Subdivision
Waialua, Oahu, Hawaii
TNK: 6-7-07: 37

Gentlemen:

Submitted herewith are the results of field percolation tests performed at the subject property.

Field Work

The field work consisted of performing percolation tests at 5 locations on the site. The locations of the tests are shown on the attached Plot Plan.

In general the test consisted of drilling a shallow and a deep hole at each of the test locations. The deep holes was drilled to determine depth to groundwater and percolation rate at the deeper depth. The shallow hole was used to test the upper soil strata.

Percolation tests were performed in accordance with the Robert A. Taft Sanitary Engineering Center Percolation Test procedure. In general, this consists of excavating the test hole, filling the bottom with 2 inches of coarse sand and then saturating the hole with water (over-night for clayey soils). The test is conducted by filling the hole with clear water and then measuring the drop in water level with time. The results of the measurements are used to determine the percolation rate.

Conclusions and Recommendations

The site is generally overlain by a shallow layer of brown silty SAND and sandy SILT. Below the surface layer, tan SAND was found. Groundwater was found at depths of 5 to 7 feet below grade.
The results of the percolation tests are as follows:

<table>
<thead>
<tr>
<th>Test Area No.</th>
<th>Test Depth</th>
<th>Groundwater Level</th>
<th>Percolation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (deep)</td>
<td>7'</td>
<td>7'-0&quot;</td>
<td>1&quot;/2.9 minutes</td>
</tr>
<tr>
<td>1 (shallow)</td>
<td>3'</td>
<td></td>
<td>1&quot;/0.64 minutes</td>
</tr>
<tr>
<td>2 (shallow)</td>
<td>3.5'</td>
<td></td>
<td>1&quot;/2.53 minutes</td>
</tr>
<tr>
<td>2 (deep)</td>
<td></td>
<td>hardpan could not penetrate</td>
<td></td>
</tr>
<tr>
<td>3 (deep)</td>
<td>6'</td>
<td>7'-4&quot;</td>
<td>1&quot;/2.70 minutes</td>
</tr>
<tr>
<td>3 (shallow)</td>
<td>2'</td>
<td>6'-0&quot;</td>
<td>1&quot;/0.41 minutes (hole caved)</td>
</tr>
<tr>
<td>4 (shallow)</td>
<td>2'</td>
<td></td>
<td>1&quot;/0.38 minutes</td>
</tr>
<tr>
<td>5 (deep)</td>
<td>5'</td>
<td>5'-0&quot;</td>
<td>1&quot;/3.21 minutes</td>
</tr>
<tr>
<td>5 (shallow)</td>
<td>3'</td>
<td></td>
<td>1&quot;/2.5 minutes</td>
</tr>
</tbody>
</table>

The percolation rates indicate that the subsurface soils are suitable for sewage disposal.

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

Very truly yours,

SOILS INTERNATIONAL

[Signature]

Lawrence S. Shinsato, P.E.
Vice-President

LSS:1s

Attachment/