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PROPOSED ACCESS DRIVEWAYS
LOT 1452
WAILUPE, HONOLULU, HAWAII
TAX MAP KEY: 3-6-19: 40
SOIL RECONNAISSANCE REPORT

To:
WATSON LEE, INC.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

MARCH 28, 1974

MUNICIPAL REFERENCE & RECORDS CENTER
City & County of Honolulu
City Hall, 358 S. King Street
Honolulu, Hawaii 96813
WITHDRAWN

WALTER LUM ASSOCIATES, INC.

CIVIL, STRUCTURAL, SOILS ENGINEERS

3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO

March 28, 1974

WATSON LEE, INC.
33 South King Street, Room 512
Honolulu, Hawaii 96813

Gentlemen:

Subject: Proposed Access Driveways
Lot 1452
Wailupe, Honolulu, Hawaii
Tax Map Key: 3-6-19: 40
Soil Reconnaissance Report

In accordance with your request, a reconnaissance of soil conditions was made at the proposed site for the Proposed Access Driveways for Lot 1452, Wailupe, Honolulu, Hawaii.

This report does not include recommendations for the grading of house lots.

The reconnaissance consisted of a review of selected air photos, soil and geologic maps and visual observations at the site.

PROJECT SITE

Location

The proposed site is located at the end of Kainoa Place in Wailupe Valley, Honolulu, Hawaii. Access to the site is from this paved road at the northwest boundary of the site.

Topography

In general, the site is located on the east side of Wailupe Valley on the side slopes of the ridge.

The site slopes down towards Wailupe Stream with slopes that vary from 50 to 100% with steeper slopes in localized areas.

A cut near the end of Kainoa Place shows lava rock exposed in about a 20-ft face.

Other rock outcrops were noted along portions of the proposed driveways at the site.

An existing residential subdivision is located directly below the proposed driveway along the northwest boundary. An open playground is located downhill along the southwestern boundary of the site.

A 15-in. water main crosses the driveway alignment near the middle of the site.

A drainage ditch (Kului Gulch) is located along the eastern and southerly boundaries.

The site is covered with grass and brush. Some boulders were scattered over the site.

Annual Rainfall

The average annual rainfall at the proposed site varies from about 40 to 50 inches.

GEOLOGIC AND SOIL DESCRIPTIONS BY OTHERS

Geologic and soil descriptions given by others follow:

Stearns, H. T. and U. S. Geological Survey, "Geologic and Topographic Map of Island of Oahu," 1938:

Near end of Kainoa Place (northwest corner)

Ra - chiefly younger alluvium

Remainder of Site

TKB - Koolau volcanics, lava flows

U. S. Soil Conservation Service, "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii," August 1972:

Near end of Kainoa Place (northwest corner)

Lualualei extremely stony clay, 3 to 35% slopes. (LPE); Unified Soil Classification - CH; shrink-swell potential - high

Remainder of Site

Rock land (rRK)

Outcrops 25 to 90%, soil material associated with rock outcrops is very sticky and plastic. Also has high shrink-swell potential. Building on the steep slopes are susceptible to sliding when the soil is saturated. Foundations and retaining walls are susceptible to cracking.

INTERPRETATION OF SOIL CONDITIONS

From visual observations, the exposed soils in the area may generally be described as thin layers of silty clays over rocky lava flows with isolated pockets of clay (CH) soils. Boulders and rock outcrops were noted along the proposed driveway routes.

Variations to the above soil conditions are to be expected in localized areas.

DISCUSSION AND RECOMMENDATIONS

The present plan is to construct approximately 580 ft of driveways from the end of Kainoa Place along the west slope of the ridge.

Grading work should be done in accordance with the requirements of the Revised Ordinances of Honolulu, 1969 As Amended. Other guidelines and recommendations for preliminary design considerations are given below:

In general, the existing slopes along the alignment vary from about 50 to 100% with almost vertical banks or ledges in localized areas where outcrops are exposed.

Because the site is fairly steep, development of the driveways may be considered if the ground at the site is generally on rocky lava flows as observed in exposed portions along the proposed alignment.

Before construction, the surface vegetation and clayey material should be stripped and removed off the site.

The driveways should be so located or designed so that the roadway will be mostly in cut, if practicable. Where fill is unavoidable in localized areas, it should be kept low, less than about 8 ft. Thin layers of clayey surface soils should be stripped and the new fills may be constructed with fairly well-graded granular material from the excavation.

In general, retaining walls should be avoided on sloping ground. If retaining walls are unavoidable, the walls should be kept as low as practicable and preferably less than about 8 ft in height. The bottom should rest on rock or decomposed rock.

If the material encountered is not rocky, relocation of the driveways or additional exploration and redesigning may be required.

Should blasting be required, it should be done with care because of the close proximity of the existing homes.

Loose boulders that may be a hazard to the lower residences or park area should be removed, particularly near the tops of slopes.

Because of existing residences below portions of the access roadway, removal of boulders should be done with care and with protective devices or barriers.

Cut Slopes

Along the top of the slope in soil and weathered rock formations, a slope ratio of about 1-1/2 horizontal to 1 vertical or flatter should be used.

Below the top of slope in fairly continuous flow lava deposits, ratios of about 1/2 to 3/4 horizontal to 1 vertical or flatter should be used.

Filling on Sloping Ground

The existing surface layer of clayey soils should be stripped and removed. Benches should be cut into the natural ground. Fills should be keyed into the benches by compaction.

The fill should be fairly well-graded granular material from on-site excavation but generally less than about 6-in. sizes.

Retaining Wall

Some guidelines for retaining wall design are as follows:

1. Retaining wall heights should generally be less than 8 ft in height.

2. Wall footings should extend down into rock or decomposed rock.
3. Retaining wall footings should be placed about 2 footing widths horizontally away from the slope face where the bottoms of footings are on decomposed rocklike or rock materials. The distance may be lessened where fairly continuous rock formations are at the bottoms of footing excavations.

For footings closer to the base of slope or on rock outcrops with almost vertical banks, reinforced rock walls, crib walls, rock anchors or reinforced earth walls should be considered.

4. Fairly well-graded granular material from on-site excavations may be used for the construction of fills behind retaining walls with about 15% or less of the material passing the No. 200 sieve. Lateral pressures of about 40 p.c.f. equivalent fluid plus surcharge loads for vehicular traffic may be used.
5. Bearing values of about 4000 p.s.f. may be considered where the bottoms of footings rest on rocky material.

Field Adjustments

Because lava formations are quite erratic and discontinuous, the slope design should be kept flexible. Occasional pockets of weathered clinker may be found between lava flows; some of these pockets will require field adjustments or faced with rock or gunite.

Unforeseen Conditions

Because of the variability of soil deposits, site improvements, designs and construction techniques, conditions may be encountered that cannot be foreseen with even the most exhaustive studies of site and project conditions. These unforeseen conditions should be recognized when encountered and then evaluated so that the designs or the construction methods may be modified accordingly, if necessary.

Unforeseen or undetected conditions such as soft spots, existing utility trenches, structure foundations, voids or cavities, boulders, expansive soil pockets or seepage water, etc., may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.

Site Regrading

After the driveway grading work is done and cuts and fills are made according to the grading plans, regrading at some future date should be avoided unless done under the guidance of a soils engineer.

Pavement Thickness

For residential driveways and drained subgrade conditions, pavement thicknesses of 2-in. asphaltic concrete and 6-in. base course may be used.

If adobe "CH" clays are encountered, a 12-in. subbase is recommended. The subbase may be of selected on-site materials.

Drainage, both surface and subsurface or of the subgrade, should be carefully designed if the pavement is to perform satisfactorily.

WATSON LEE, INC., March 28, 1974

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Liability Insurance Coverage

Watson Lee, Inc. and the soil engineer should be included in the Contractor's general liability insurance to save Watson Lee, Inc. and consultants harmless in case a claim should arise from the construction and/or blasting operations.

Attached is the location sketch and limitations.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

By Ezra Koike
Ezra Koike

JWS/EK:ms

LIMITATIONS

In general, soil formations are commonly erratic and rarely uniform or regular. The location sketch indicates the approximate surface soils generally noticed during on-site field observations. Soil conditions and water levels may change with the passage of time and construction methods or improvements at the site.

If there is a substantial lapse of time between the submission of this report, or if conditions have changed due to natural causes, plan changes, or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the recommendations considering the time lapse and the changed conditions.

Our professional services were performed, findings obtained and recommendations prepared in accordance with generally accepted engineering practices. This warranty is in lieu of all other warranties expressed or implied.

KAINOA PLACE

NORTH
SCALE: 1" = 20'

SITE LOCATION SKETCH
PROPOSED ACCESS DRIVEWAY'S-LOT 1452



