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PRELIMINARY SOILS FEASIBILITY STUDY

PROPOSED KULIOUOU 52-CONDOMINIUM
APARTMENT DEVELOPMENT

KULIOUOU, OAHU, HAWAII

T.M.L.-38-08:9

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Dames & Moore Job No. 3048-002-11

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September 22, 1971

Far West Continental, Inc.
c/o Peer Abben, AIA
1520 Ward Avenue
Suite 1401
Honolulu, Hawaii 96822

Attention: Mr. Peer Abben

Gentlemen:

Presented herewith are four copies of our report entitled "Preliminary Soils Feasibility Study, Proposed Kuliouou 52-Condominium Apartment Development, Kuliouou, Oahu, Hawaii." The scope of this study was outlined in our proposal dated September 16, 1971. In preparing this report we have adhered to the aforementioned scope of work.

Our study indicates that the site is feasible for the development as planned. However, the amount of site preparation required and the type of foundations recommended will depend on subsurface conditions yet to be completely established.

We hope that this report satisfies your requirements and those of that section of the comprehensive zoning code which requires a study of this nature. If you have any questions regarding the contents of this report or if any section is unclear, please do not hesitate to contact us.

Yours very truly,

DAMES & MOORE


W.E. Estes

WEE ES mw

PLANNED DEVELOPMENT HOUSING

13. DOCUMENTS

H. SOILS DATA

PRELIMINARY SOILS FEASIBILITY STUDY

PROPOSED KULIOUOU 52-CONDOMINIUM APARTMENT DEVELOPMENT

KULIOUOU, OAHU, HAWAII

INTRODUCTION

This report presents a preliminary soils feasibility study for the proposed development in Kuliouou, Oahu, Hawaii. The site is bounded by Kuliouou Street to the west, Summer Street to the north, Kuliouou Drainage Canal to the east and State Park land to the south. The location of the site with reference to the existing streets and landmarks is more clearly shown on the Map of Area, Plate I.

The purpose of this study was to investigate the feasibility of the proposed development with respect to the existing subsurface soils. In order to accomplish this, the following scope of work was performed:

- 1) Review of the geologic map of this area.
- 2) Review of the subsurface information obtained by Dames & Moore on previous projects nearby.
- 3) Visual reconnaissance of the site.
- 4) Preparation of this written report.

The results of our study indicate that the development as planned is feasible. Discussion is presented on

design aspects such as soil improvement by surcharging, site grading, foundation types, etc. The results are preliminary. A detailed foundation investigation would be necessary before presenting any final design recommendations.

PROJECT CONSIDERATIONS

The site to be developed is approximately rectangular in shape. The maximum plan dimensions are 230 x 422 feet. Fifty-two studio, one-bedroom and two-bedroom condominium apartments are planned for construction. The apartments will be grouped in seven separate two-story units. The largest of these units will contain eight one-bedroom apartments. A pool and pool deck are planned adjacent to the future State Park in the central portion of the site. Sixty-five parking stalls are to be located on the site. As now planned, 27 of these will occupy all the land adjacent to the existing drainage canal. The Site Plan, Plate 2, presents further our understanding of the proposed development.

Grading for the project has not been established. However, we anticipate regrading of the site in view of the elevation and proximity to the ocean, and the large stockpile covering approximately 30 percent of the site.

SITE CONDITIONS

It is our understanding that the site was a previous estate home. Remnants of its former use remain. Fallen into disrepair and no longer apparently used are such structures as the rock garden, the summer house with its pool and rock walled terraces and the greenhouses for which remain only the foundations. The main house located in the northwestern portion of the site, a one-story living quarter behind it, and the boat house located in the southwestern portion of the site and converted into an apartment, are the presently occupied and used remains of the former estate. Two other houses are located on the site. One, a small shack is in the north-central area. The other is located in the southeastern corner near the canal and adjacent to the property line.

The existing boat house apartment is supported over a small man-made lagoon by both piles and large concrete footings. The depths of the piles are unknown and whether or not the concrete footings are supported on piles is also unknown.

An old concrete foundation located in the north-central area of the site has suffered differential settlement and is cracked and separated where walls might once have risen. In the southeastern corner of the site, the garage slab for the existing residence is cracked and separated along at least two major fractures.

The most notable physical feature at the site is the existence of a large fill stockpile. The stockpile material, reportedly dredged two years ago during the construction of Kuliouou Drainage Canal, rises some 15+ feet. The stockpile covers approximately 30 percent of the total area of the site and is located in the eastern half. It appears to consist of coral particles ranging in size from silt to gravel. Also, basalt gravel and boulders to 2½ feet were noted. Debris such as telephone poles seen on top of the stockpile are also anticipated within. A live palm tree penetrating the coral indicates that no grubbing and stripping of the existing vegetation prior to placing the stockpile was done. Old foundations as well as cesspools may be located beneath the stockpile.

SUBSURFACE CONDITIONS

The geologic map of this area indicates that the site is underlain by unconsolidated marine calcareous sediments. In the northwest corner of the site however, some consolidated non-calcareous deposits consisting mostly of older alluvium which in places is cemented with limonite or hematite, may exist.

In previous foundation investigations nearby, as located on the Map of Area, we have in general encountered loose coral silt, sand and gravel overlying denser sand,

stiff clays, tuff or basalt. The loose layer varies in thickness and can be highly compressible.

The proximity to the ocean and old stream, now the drainage channel, indicates that subsurface conditions in this area may be highly variable.

DISCUSSIONS AND PRELIMINARY RECOMMENDATIONS

GENERAL

It is our opinion that the site may be developed as planned. Site improvement is anticipated. The extent of this will depend, however, upon subsurface conditions yet to be fully explored. Site preparation and other aspects of this investigation are more fully discussed below under the appropriate subheadings.

EXISTING STOCKPILE

If soft compressible subsurface soils exist at the site as anticipated, the existing stockpile has acted as an areal surcharge. The effect of this is to consolidate the underlying compressible soils. When the stockpile is removed and if grading lowers the site elevation several feet from the top of the stockpile (considering that grading uses the stockpile material or one of a similar weight), then the building loads anticipated should not cause any consolidation. Settlement of the structure over the surcharged area

will therefore be negligible. The area of the stockpile is considered the best location for the planned units. Depending upon the soil conditions encountered, other areas of the site may require similar treatment in order to improve them sufficiently so that the structures can be built without considering deep foundation systems.

GRADING AND SITE PREPARATION

The existing elevation of most of the site, the large stockpile and the need for drainage indicate that some rise in elevation at the site be planned. To prepare the site following demolition and any surcharge, if required, the procedures below are suggested. These are all preliminary in nature and additional investigation is required prior to finalizing these recommendations. The following list indicate those operations which we deem necessary, albeit the order will be subject to your construction plans. Following demolition and any surcharge program that might be undertaken, all areas to receive fill should be:

- 1) Grubbed and scarified,
- 2) Existing cesspools in all areas (even areas not being filled) should be removed or satisfactorily filled and sealed,
- 3) The existing pond and lagoon should be filled with coarse granular material to above the water level, then filled further, if required, with any suitable fill.

- 4) The on-site stockpile to be used as structural fill should be cleaned of all debris, boulders, gravel larger than six inches or any other deleterious material. The remaining stockpile material should then be removed down to the pre-existing ground surface.
- 5) The area beneath the stockpile should be grubbed, scarified and clean, compacted fill placed to the elevation required.
- 6) All fill should be placed in lifts, generally no larger than six inches, and compacted.

Surcharging of the site in areas not now stockpiled may be required as discussed previously. This should be considered in developing the time table for the project.

LOCATION OF UNITS

If the subsurface soils are compressible, as anticipated, the stockpile area has been preconsolidated. Structures straddling the area where the stockpile was and where it did not exist could suffer from excessive differential settlement. Therefore, if a surcharge program for the rest of the site is not planned and subsurface conditions consist of highly compressible soil layers, we suggest that all structures be located either in the stockpiled area or outside of its limits. Differential settlement takes on

additional significance if fill is required to raise the lower areas. The additional weight of the fill would increase the settlement and magnify any differential movements.

FOUNDATION SUPPORT

Following a foundation investigation, we would be able to give better answers to the type of support required and the allowable bearing capacities. However, at this time, we believe that structures could be supported on spread or continuous wall footings.

Structures built on the properly prepared site should experience negligible settlements. We previously discussed the problem of structures straddling the existing preloaded area and that without the surcharge. As planned now, only a slight amount of differential settlement could be tolerated by the buildings without architectural cracking. However, some total settlement is probably tolerable and areas not now surcharged may be buildable without preloading.

If the pool is constructed from the present grade, it is anticipated that dewatering, sheeting and bracing of the excavation will be required.

FOUNDATION INVESTIGATION

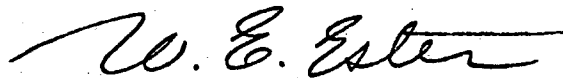
It is strongly recommended that a foundation investigation be performed prior to finalizing your development and design plans to define actual subsurface conditions.

The following Plates are attached and complete this report.

- Plate 1 - Map of Area
- Plate 2 - Site Plan

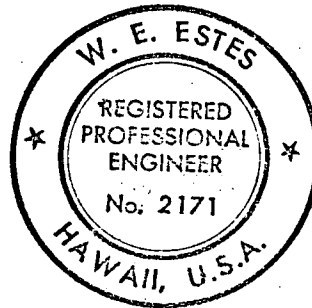
Respectfully submitted,

DAMES & MOORE

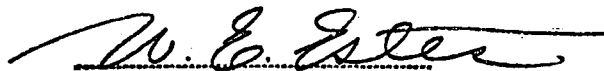


W.E. Estes

WEE ES mw

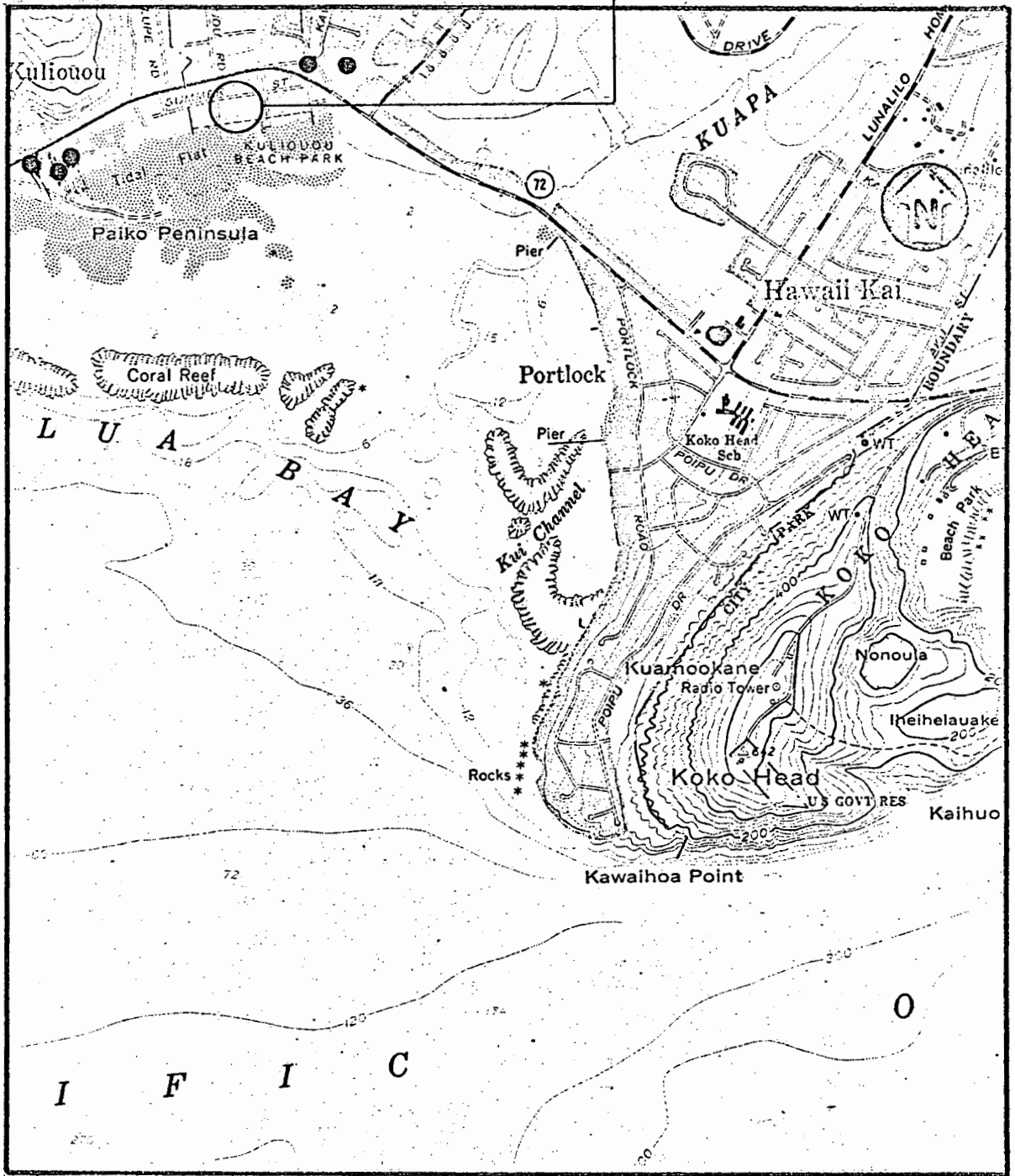


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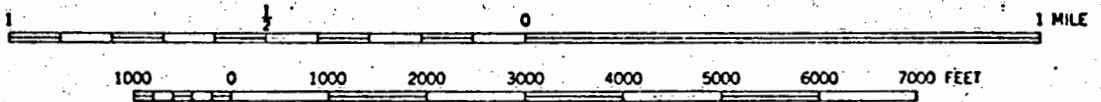
GENERAL AREA AS SHOWN ON SITE PLAN



LEGEND:
 ● PREVIOUS
 DAMES & MOORE
 INVESTIGATION
 SITES

MAP OF AREA

SCALE 1:24000



REFERENCE:
 U.S.G.S. QUADRANGLE MAP
 KOKO HEAD, HAWAII
 DATED 1969



GAMCO & MCGEE

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