548

FEASIBILITY INVESTIGATION

PROPOSED SUBDIVISION AT

WAOLANI AVENUE AND KAUAI STREET

PUUNUI, HONOLULU, HAWAII

TMK: 1-8-24: 1 and 1-8-25: 25

for

MR. PHILLIP GUM

and

MR. EDWIN CHUN

W.O. 210

August 16, 1973

ERNEST K. HIRATA & ASSOCIATES, INC.

ERNEST K. HIRATA & ASSOCIATES, INC.
Soils and Foundation Engineering
1157 South King Street • Honolulu, Hawaii 96814 • Phone 531-5733

August 16, 1973
W.O. 210

Mr. Phillip Gum and Mr. Edwin Chun
c/o Calvin Kim & Associates, Inc.
Suite 206
1270 Queen Emma Street
Honolulu, Hawaii 96813

Gentlemen:

Our report, "Feasibility Investigation, Proposed Subdivision at Waolani Avenue and Kauai Street, Puunui, Honolulu, Hawaii, TMK: 1-8-24: 1 and 1-8-25: 25", dated August 16, 1973, our Work Order 210 is enclosed. This is the report requested by you, and planned in cooperation with Calvin Kim & Associates, Inc., Civil Engineers.

Although rock exposures were observed along the rear portion of the site, our exploratory borings 1 and 3 encountered fill consisting of a gravelly silt ranging in thickness from 2.0 to 2.5 feet. Underlying the fill was a medium stiff to stiff gray fat clay with numerous cobbles and boulders. Hard basalt was not encountered to the depths drilled.

Based on our subsurface investigation and laboratory testing, it is our opinion that the site is feasible for the proposed development.

We appreciate the opportunity to be of service. Should you have any questions, please feel free to call on us.

Very truly yours,

Ernest K. Hirata & Associates, Inc.

Ernest K. Hirata

Ernest K. Hirata President

EKH:ph

FEASIBILITY INVESTIGATION
PROPOSED SUBDIVISION AT
WAOLANI AVENUE AND KAUAI STREET
PUUNUI, HONOLULU, HAWAII
TMK: 1-8-24: 1 and 1-8-25: 25

INTRODUCTION

This report presents the results of our feasibility investigation performed on the subject property. The purpose of this investigation was to determine the nature of the soils underlying the site, to ascertain their engineering properties, and to provide recommendations for the development of a residential subdivision.

This investigation included drilling three exploratory test borings, obtaining representative soil samples, laboratory testing and analysis, and the preparation of this report. The exploratory boring locations are shown on the enclosed Grading Plan. Also attached is an Appendix which describes the laboratory testing procedures.

PROPOSED DEVELOPMENT

Information concerning the proposed development was furnished by Calvin Kim & Associates, Inc., Civil Engineers.

The proposed development will include 11 residential lots on approximately 4.46 acres. The proposed residences will be of post and beam construction with concrete slab on grade for garages only. Foundation loads will be relatively light.

SITE CONDITIONS

The property is located at the base of a ridge in Nuuanu Valley below Alewa Heights. Portions of the property include the steep ly sloping ridge. Several wood frame structures presently exist on the site. Residential homes adjoin the subject property on the eastern and western boundaries. The site drains from the slopes of the ridge to Waolani Avenue.

FIELD EXPLORATION

The site was explored on August 9, 1973 by drilling three exploratory test borings with a truck-mounted rotary drilling machine. All borings were drilled to a maximum depth of 15 feet. The boring locations are shown on the Grading Plan and the soils encountered are logged on Plates A1 through A3.

SOIL CONDITIONS

Although rock exposure were observed along the rear portion of the site, none of the borings encountered any of the hard rock.

Borings 1 and 3 encountered fill consisting of a gravelly silt ranging in thickness from 2.0 to 2.5 feet. The upper fill material in boring 1 was found to be soft to firm. Underlying the fill was a medium stiff to stiff gray fat clay with numerous cobbles and boulders.

The surface soils are considered to be highly expansive.

CONCLUSIONS AND RECOMMENDATIONS

Based on our subsurface investigation and laboratory testing, it is our opinion that the site is feasible for the proposed development.

Although rock exposures were observed near the unlined ditch at the rear of the site, no basaltic rock was encountered to the depths drilled except for cobbles and boulders. The site is underlain by a medium stiff to stiff gray fat clay which exhibit high expansion potential.

Since the fill in boring 1 was found to be soft, we recommend removal and recompaction of the surface material at this location. The site of the fill encompasses approximately one lot, and we believe the fill is due to demolition and stockpiling of material. The fill encountered in boring 3 was found to be stiff and will not require recompaction.

Since the surface soils are highly expansive, we recommend that post and beam construction of residential homes be utilized.

Concrete garage slabs should be constructed as free floating slabs in order to minimize any potential expansion problems. Approximately 12 inches of non-expansive granular material should be utilized under the concrete garage slabs.

Any fill which is placed on the site should be compacted to a minimum of 90 percent of the maximum laboratory density.

LIMITATIONS

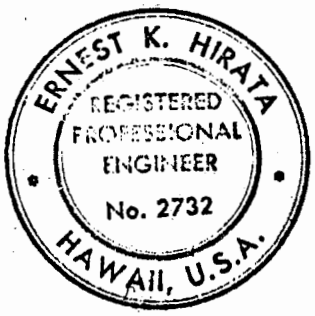
The boring logs indicate the approximate subsurface soil conditions encountered only at those locations where the borings were made, and may not represent conditions at other locations.

During construction, should subsurface conditions differ from those encountered in the borings, we should be advised immediately in order to review and to revise our recommendations.

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.

Respectfully submitted,

Ernest K. Hirata & Associates, Inc.



Ernest K. Hirata P.E. 2732

Enc: Appendix of Laboratory Testing
Boring Logs — Plates A1 through A3
Consolidation Tests — Plates B1 through B3
Maximum Density Curve — Plate C
Grading Plan

EKH:ph

APPENDIX OF LABORATORY TESTING

Classification

The field classification is verified in the laboratory, also in accordance with the Unified Soil Classification System. Laboratory classification is determined by both visual examination and Atterburg Limit Tests according to ASTM D423 and D424. The final classification is shown on the Boring Logs.

Moisture-Density

The field moisture content and dry unit weight are determined for each of the undisturbed soil samples. The information is useful in providing a gross picture of the soil consistency between borings and any local variations. The dry unit weight is determined in pounds per cubic foot while the moisture content is determined as a percentage of the dry unit weight. These samples are obtained from a 3" O.D. split tube sampler.

Consolidation

Settlement predictions of the soil's behavior under load are made on the basis of the consolidation tests. Loads are applied in several increments in a geometric progression, and the resulting deformations are recorded at selected time intervals. Porous stones are placed in contact with the top and bottom of each specimen having an inside diameter of 2.40 inches and a height of 1 inch to permit addition and

release of pore fluid. Results of undisturbed and remolded samples are plotted on the Consolidation Test Report.

Compaction Tests

Compaction tests were performed on bag samples to determine the optimum moisture content at which each type of proposed fill material compacts to 100% density. The tests were performed according to the Modified AASHO T-180.

Swell Tests

Swell tests were performed to determine the expansiveness of the onsite surface soils. The tests were performed on undisturbed ring and remolded samples taking a one inch high specimen under different surcharge loads. A swell of 27.5% was recorded for a sample from B2 at 2' with a surcharge of 70 PSF.

Shear Tests

Shear tests are performed in the Direct Shear Machine which is of the strain control type. The rate of deformation is approximately 0.03 inches per minute. Each sample is sheared under varying confining loads in order to determine the Coulomb shear strength parameters, cohesion and angle of internal friction. Eighty percent of the ultimate value is taken to determine the shear strength parameters.

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BORING LOG

BORING NO. B1 DRIVING WT. 140 lb. DATE OF DRILLING 8-9-73

SURFACE ELEV. 332 ± DROP 30 in. W. O. 210

DEPTH FEET	CORE	BAG	PENETRATION RESIST. BLOWS/6 inches	DRY DENSITY PCF	MOISTURE CONTENT %	RELATIVE COMPACTION %	DIRECT SHEAR STRENGTH PARAMETERS ∅	DIRECT SHEAR STRENGTH PARAMETERS C	CLASSIFICATION (% Sand, % Silt, % Clay)
0									FILL - Gravelly SILT, grayish brown, moist, soft to firm.
	x		4 6 7	68.4	53.4	69.4			Fat CLAY (CH) - Gray, moist, firm to medium stiff.
5	x		6 16 13	76.2	45.2	77.4	37°	1.32 KSF UNCONFINE 5408 PSF	Many cobbles from 6.5 feet. Boulders from 8.5 feet.
10	x		50/0.5"	No Recovery					
	x		11 30 34/1"	80.7	41.4				
15									End boring at 15 feet.
20									
25									
30									

Plate A1

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BORING LOG

BORING NO. B2 DRIVING WT. 140 lb. DATE OF DRILLING 8-9-73

SURFACE ELEV. 341 ± DROP 30 in. W. O. 210

DEPTH FEET	CORE	BAG	PENETRATION RESIST. BLOWS/6 inches	DRY DENSITY PCF	MOISTURE CONTENT %	RELATIVE COMPACTION %	DIRECT SHEAR STRENGTH PARAMETERS Ø	DIRECT SHEAR STRENGTH PARAMETERS C	CLASSIFICATION (% Sand, % Silt, % Clay)
0									Clayey SILT (ML) - Dark brown, moist, stiff.
	x		5 21 29	80.9	36.0	82.1			Fat CLAY (CH) - Grayish brown, moist, stiff with some cobbles.
5	x		8 13 43/3"	79.4	36.6				Many boulders from 6.2 feet.
	x		19 25 42/5.5"		37.6				Begin coring from 11 feet. 56% recovery
15									End boring at 15 feet.
20									
25									
30									

Plate A2

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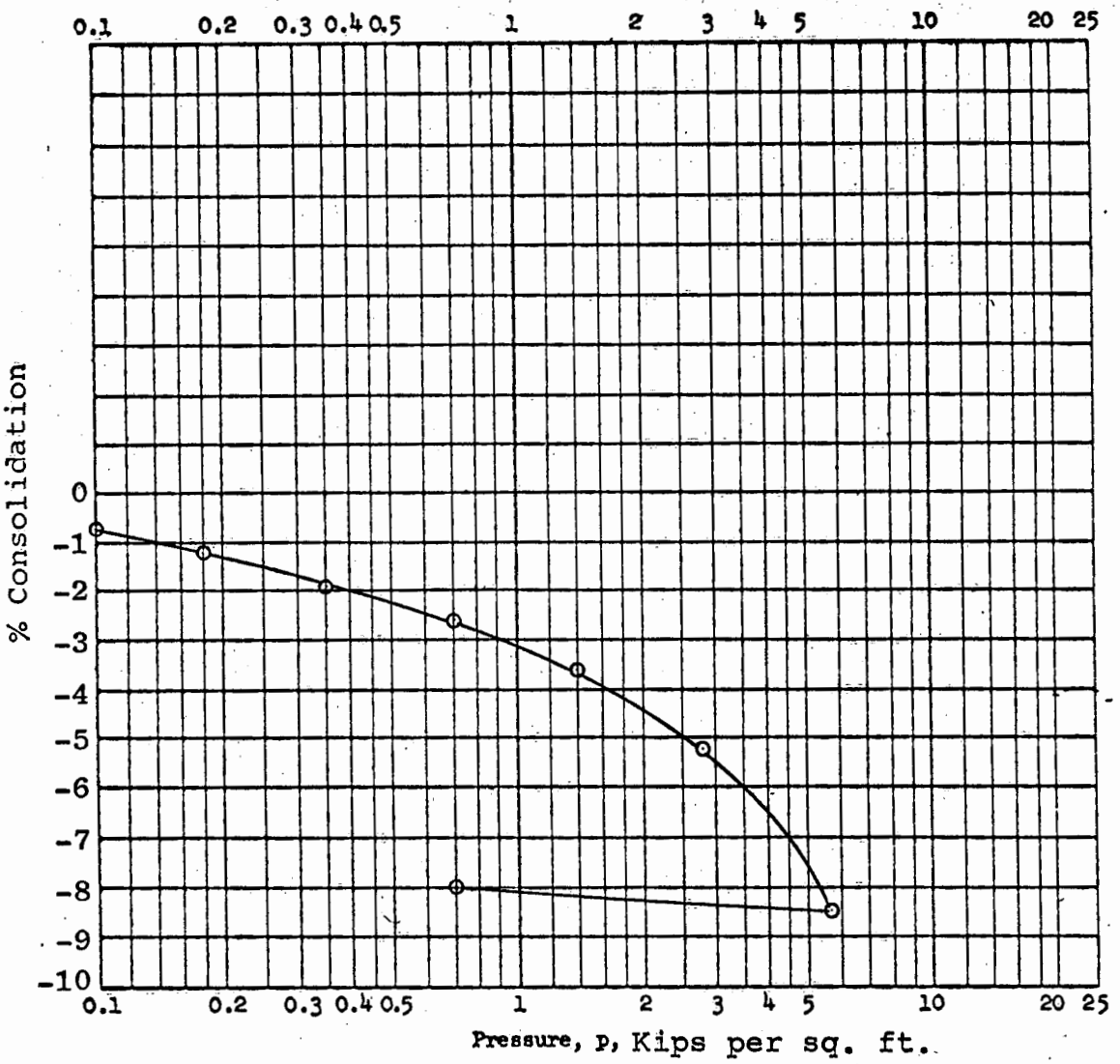
BORING LOG

BORING NO. B3 DRIVING WT. 140 lb. DATE OF DRILLING 8-9-73

SURFACE ELEV. 349 ± DROP 30 in. W. O. 210

DEPTH FEET	CORE	BAG	PENETRATION RESIST. BLOWS/6 inches	DRY DENSITY PCF	MOISTURE CONTENT %	RELATIVE COMPACTION %	DIRECT SHEAR STRENGTH PARAMETERS Ø	DIRECT SHEAR STRENGTH PARAMETERS C	CLASSIFICATION (% Sand, % Silt, % Clay)
0									FILL - Gravelly SILT, brown moist, stiff.
	x		13 27 11		36.2				CLAY (CH) - Gray, moist, stiff with cobbles.
5	x		11 29 97/5"	84.1	32.6				Many boulders from 7 feet.
									Begin coring from 8 feet.
10									47% recovery
15									End boring at 15 feet.
20									
25									
30									

Plate A3



Type of Specimen: Undisturbed		Before Test		After Test	
Diam 2.40 in.	Ht 1.0 in.	Water Content, w_o	53.4 %	w_f	41.3 %
Overburden Pressure, p_o T/sq ft		Void Ratio, e_o		e_f	
Preconsol. Pressure, p_c T/sq ft		Saturation, S_o	%	S_f	%
Compression Index, C_c		Dry Density, γ_d	lb/ft^3		
Classification: CH		k_{20} at e_o =	x 10$^-$ cm/sec		
LL	G_s	Project: Feasibility Investigation			
PL	D_{10}	Puunui, Honolulu, Hawaii			
Remarks		Area: W.O. 210			
		Boring No.: B1		Sample No.	
		Depth / El: 3'		Date: 8-10-73	
		CONSOLIDATION TEST REPORT			

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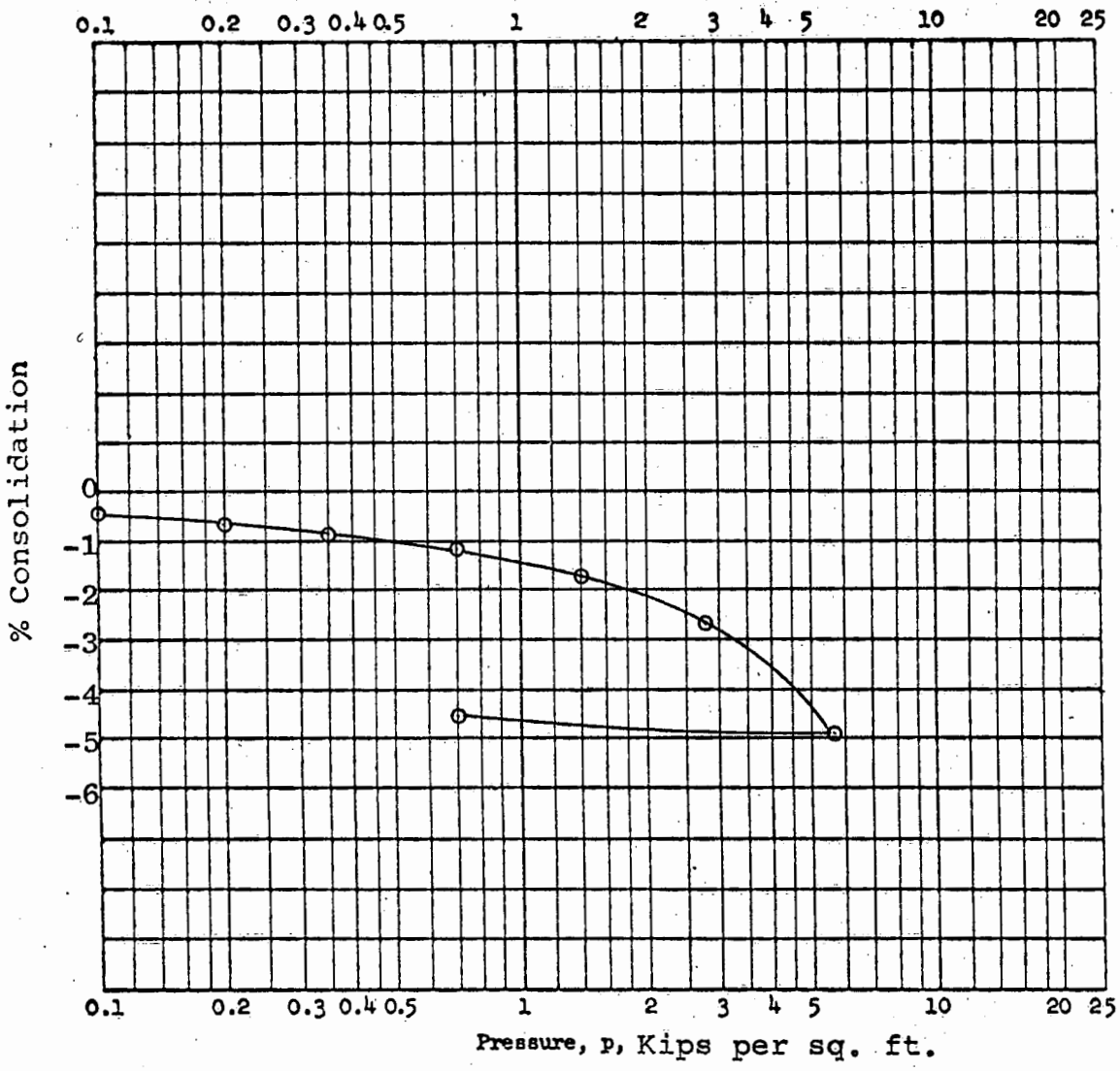
Plate B1



Type of Specimen: Undisturbed		Before Test		After Test	
Diam 4.20 in.	Ht 1.0 in.	Water Content, w_o	45.2 %	w_f	35.4 %
Overburden Pressure, p_o T/sq ft		Void Ratio, e_o		e_f	
Preconsol. Pressure, p_c T/sq ft		Saturation, S_o	%	S_f	%
Compression Index, C_c		Dry Density, γ_d	76.2 lb/ft^3		
Classification: CH		k_{20} at e_o =	× 10$^-$ cm/sec		
LL	G_s	Project: Feasibility Investigation			
PL	D_{10}	Puunui, Honolulu, Hawaii			
Remarks		Area: W.O. 210			
		Boring No. B1		Sample No.	
		Depth 6' / El		Date 8-10-73	
		CONSOLIDATION TEST REPORT			

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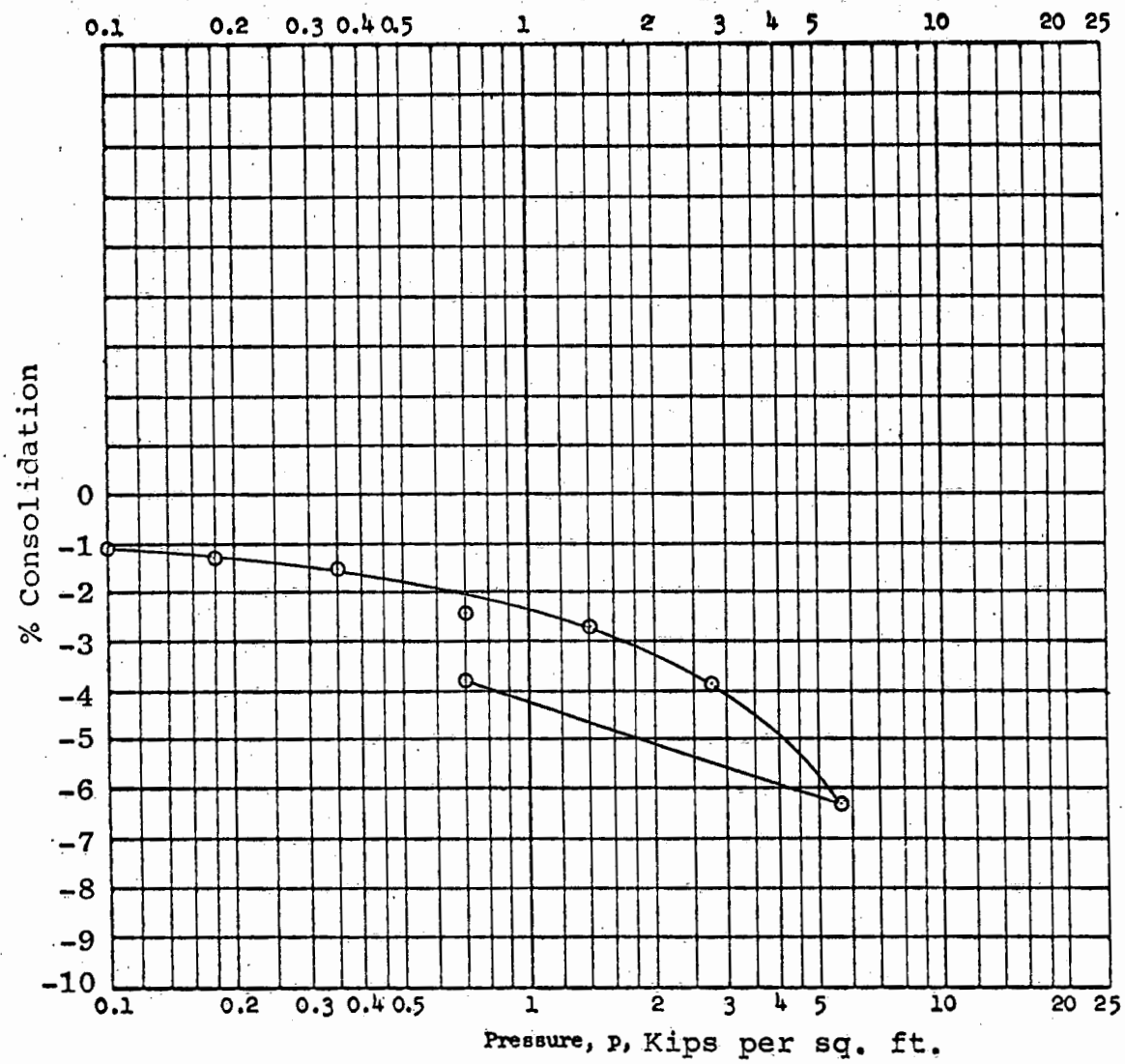
Plate B2 0 3424



Type of Specimen: Undisturbed		Before Test		After Test	
Diam 2.40 in.	Ht 1.0 in.	Water Content, w_o	36.6 %	w_f	34.9 %
Overburden Pressure, p_o T/sq ft		Void Ratio, e_o		e_f	
Preconsol. Pressure, p_c T/sq ft		Saturation, S_o	%	S_f	%
Compression Index, C_c		Dry Density, γ_d	79.4 lb/ft^3		
Classification CH		k_{20} at e_o =	$\times 10^{-}$ cm/sec		
LL	G_s	Project Feasibility Investigation			
PL	D_{10}	Puunui, Honolulu, Hawaii			
Remarks		Area W.O. 210			
		Boring No. B2		Sample No.	
		Depth 5' El		Date 8-10-73	
		CONSOLIDATION TEST REPORT			

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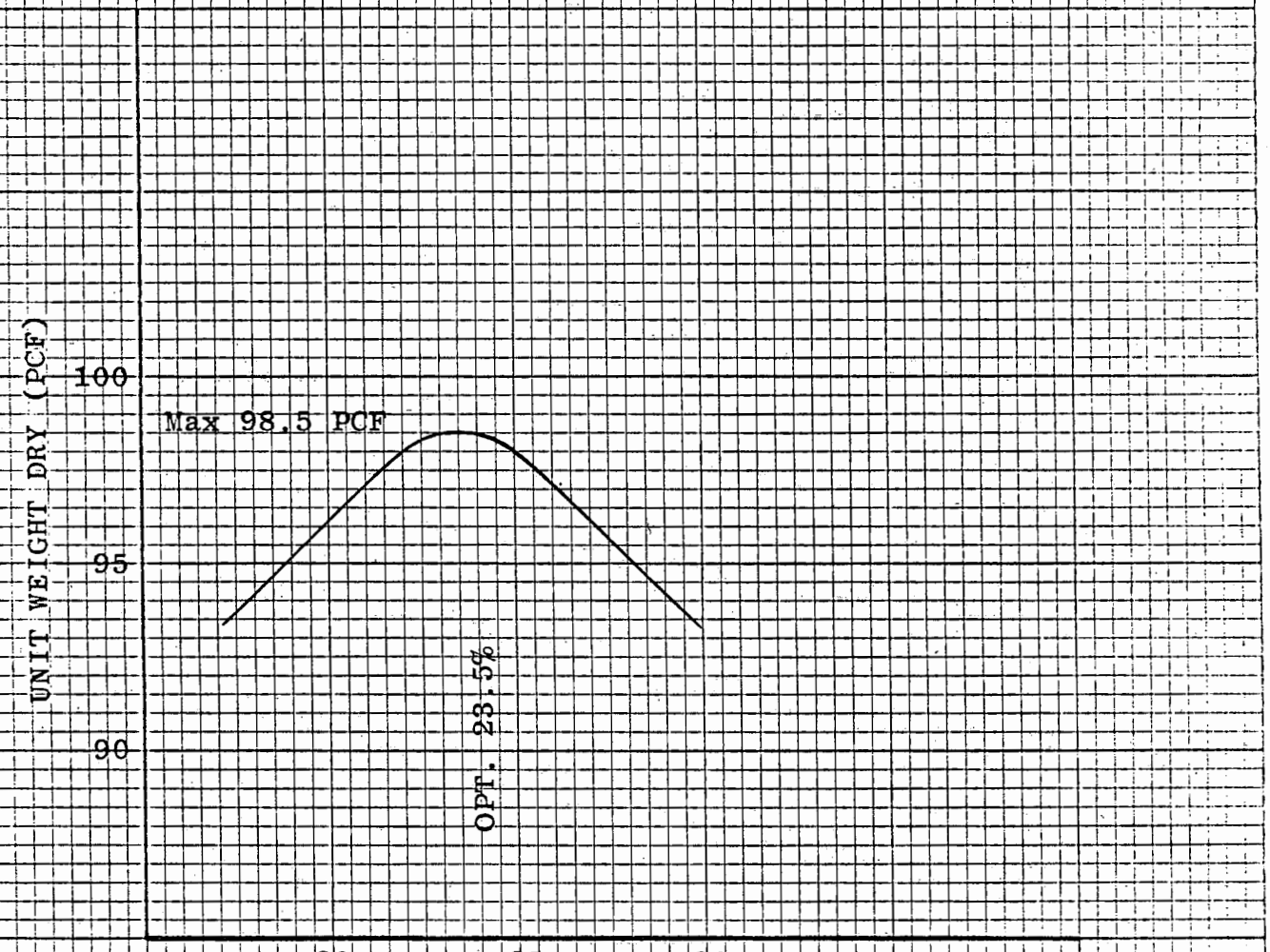
Plate B3

MAXIMUM DENSITY CURVE



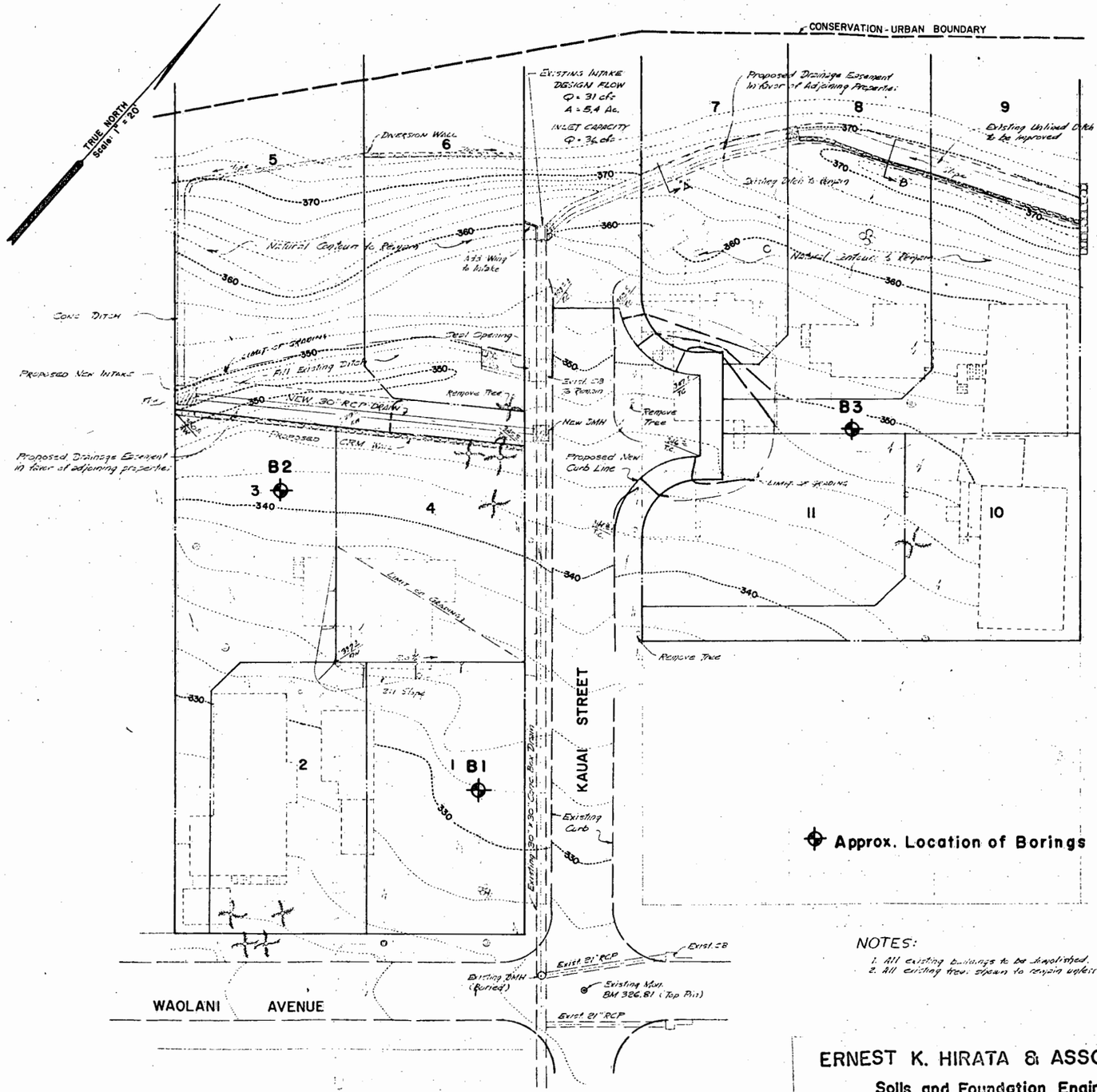
Boring: B3

Depth: 0' - 5'

Classification: Gray Clay

W.O. 210

Plate C

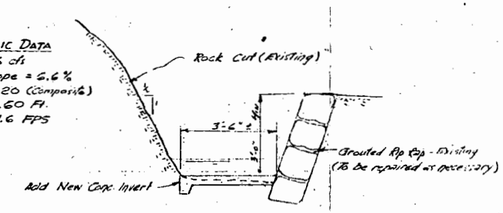


GRADING AND DRAINAGE MASTER PLAN

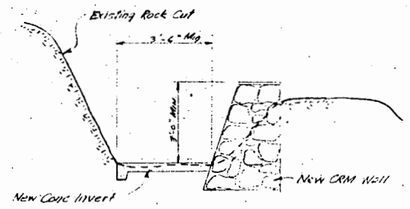
NOTES:

1. All existing buildings to be demolished.
2. All existing trees shown to remain unless otherwise indicated.

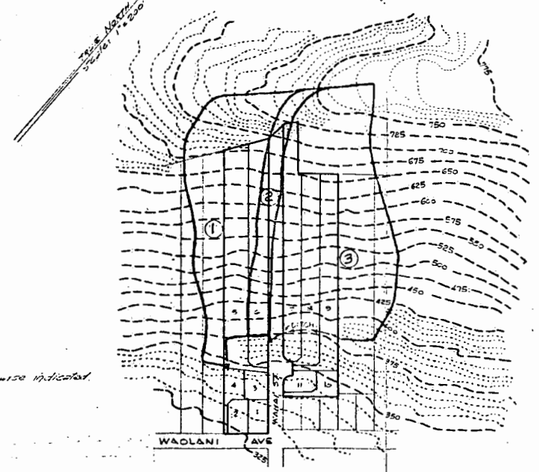
HYDRAULIC DATA
Q = 26 cfs
Min. Slope = 2.6 %
n = 0.20 (Composite)
d_0 = 0.60 Ft.
V = 11.6 FPS



SECTION "A"
EXISTING DITCH
Scale: 3/8" = 1'-0"



SECTION "B"
Scale: 3/8" = 1'-0"



DRAINAGE TRIBUTARY AREA PLAN

RUNOFF DATA

①	②	③
A = 2.93 Ac	A = 0.85 Ac	A = 4.53 Ac
L = 750 Ft	L = 680 Ft	L = 700 Ft
S = 50 %	S = 50 %	S = 50 %
Poor Grass Surface	Poor Grass Surface	Poor Grass Surface
T_c = 11 Min	T_c = 11 Min	T_c = 11 Min
CF = 2.2	CF = 2.2	CF = 2.2
C = 0.85	C = 0.85	C = 0.85
Q = 17 cfs	Q = 5 cfs	Q = 26 cfs

ALL AREAS: T_{rg} = 10 Year. I = 3.0 "/hr

NO.	REVISION	DATE	APPROVED

CALVIN KIM & ASSOCIATES, INC.

PROPOSED SUBDIVISION
TMK: 1-8-24:1 & 1-8-25:25
AT PUUNUI, HONOLULU, OAHU

GRADING & DRAINAGE MASTER PLAN

ERNEST K. HIRATA & ASSOCIATES, INC.
Soils and Foundation Engineering
1157 South King Street Honolulu, Hawaii

Date August 16, 1973 W.O. 210

CALVIN KIM & ASSOCIATES, INC.
SUITE 206 1270 QUEEN EMMA STREET
HONOLULU, HAWAII 96813
TELEPHONE 531-7108

August 14, 1973

Mr. Edward Y. Hirata
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
Honolulu, Hawaii 96813

Subject: Soils Investigation and Preliminary Drainage Study
Proposed Subdivision: Puunui - Kauai Street
TMK 1-8-24:1 and 1-8-25:25
Owners: Philip Gum and Edwin Chun

Dear Mr. Hirata:

We are submitting for your review and comments the preliminary grading and drainage master plans, and the soils investigation by Ernest K. Hirata & Associates, Inc., as required by the Department of Public Works. The request for tentative approval of the subdivision was deferred by the Department of Land Utilization pending your review and approval of the above items.

The proposed subdivision is located in Puunui and fronts Waolani and Kauai Streets. Existing ground slopes range from 5 percent to 60 percent. However much of the steeper areas fall within the conservation district, which will remain untouched in this development. There are existing drainage facilities present which intercept runoff from Alewa Heights.

The subdivision site contains seven dwelling units which are presently occupied. All existing units will be demolished and replaced with eleven new units. The characteristics of the terrain should not be altered significantly by the addition of four units.

Mass grading is not contemplated for this subdivision. Homes will be adapted to the existing terrain. Excavation for basements and garages will be required for lots 5 through 9, but such excavation will be minimal and should not affect adjacent properties.

The existing drainage system will be altered and improved slightly as shown in the enclosed plan. The existing 30in x 30in

box drain along Kauai Street is capable of handling the runoff from this development.

We are satisfied that the area can be suitably developed as a residential subdivision. Your prompt review and favorable comments to the Department of Land Utilization regarding the proposed grading and drainage improvements will be appreciated.

Very truly yours,

Calvin D. S. Kim

CDSK:jk

Encl.