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File No. S-2094-10
August 18, 1981

Schmitz Development, Inc.
1545 Saint Mark's Plaza, Suite 1
Stockton, CA 95207

Attention: Mr. Jim Everett

Subject: ADDENDUM TO REPORT DATED FEBRUARY 28, 1980
PROPOSED HIGH-RISE COMMERCIAL BUILDING
WEST END REDEVELOPMENT PROJECT
STOCKTON, CALIFORNIA

Gentlemen:

This letter is to document the Writer's discussions with Nick Watry of Watry Engineering regarding pile foundations for the proposed project. Since preparation of the referenced report, we understand that uplift loads have been revised upward to a range of 1,000 to 1,500 kips. Previously, downward loading controlled foundation design and it appeared that the spread foundations would be the most economical. Considering the large uplift loads, however, driven or drilled and cast-in-place piles appear to have some advantage. For this reason, we have reviewed the available information and analyzed the alternative of pile foundations.

As described in the referenced report, the soil conditions encountered beneath the surface fill soils consist primarily of very stiff to hard silty clay and clayey silt soils with interbedded layers of silty sand. The ground water table was encountered at the depths of approximately 19 and 24 feet. There appeared to be some correlation between silty sand deposits and low ground water levels. The depth of ground water would likely affect only the drilled and cast-in-place piles.

Based on the results of our analysis, it is our opinion that a friction value of 1,500 pounds per square foot for dead plus live load, can be used in design. Our analysis actually indicates a slightly curved depth versus capacity chart, however, the above uniform figure is the average friction value for piles embedded the anticipated 40 to 50 feet. The recommended friction value includes a computed Factor of Safety on the order of 2, and can be increased by 33 percent for the total of all loads, including wind or seismic forces. Uplift resistance is 3/4 the downward capacity.

We recommend that the structural capacity of piles be checked by the structural engineer. Assuming that piles are located at an approximate 3-1/2 diameter spacing, and pile groups consist of between 5 and 10 piles, we recommend a group reduction factor of 0.9.

center to center?

According to Mr. Watry, the proposed Phase I building will include an approximate 12 to 13-foot deep basement. Anticipated depths of piles are between 40 and 50 feet below the basement level. We note that the deepest test borings performed to date extended to only 52 feet below the existing ground surface. The borings to this depth provided sufficient information for the analysis of spread foundations or shallow piers. Since piers may extend 10 feet below the deepest boring, we suggest that confirming tests be made of the Phase I building site to verify the assumed soil conditions.

We trust that this letter documents our discussion of August 14 with Mr. Watry. If you have any questions or need additional information, please contact us.

Respectfully submitted,

J. H. KLEINFELDER & ASSOCIATES

Ron Heinzen

Ron Heinzen, C. E.

Spread footings or piles @ columns?

for specific moment what is associated shear?

RTH:jcb

can uplift be increased by 33%

cc: Client (3)

7931

DIRECTORS:
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ROBERT D. HOWELL
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File No. S-2094-10
September 3, 1981

Schmitz Development, Inc.
1545 Saint Mark's Plaza, Suite 1
Stockton, CA 95207

Attention: Mr. Jim Everett

Subject: ADDENDUM NO. 2, REPORT DATED FEBRUARY 28, 1980
DRIVEN PILE RECOMMENDATIONS
WATERFRONT TOWERS, BUILDING 2
WEST END REDEVELOPMENT PROJECT
STOCKTON, CALIFORNIA

Gentlemen:

In accordance with your request, we present in this report a summary of the additional field explorations and laboratory testing and recommendation for driven piles. Reference is made to our report entitled, "Soils Investigation, Proposed High-Rise Commercial Building, West End Redevelopment Project, Stockton, California," dated February 28, 1980, and our recent letter dated August 18, 1981, regarding pile foundations.

Our additional field investigation consisted of drilling and sampling two exploratory borings to a depth of 61-1/2 feet. Laboratory tests performed included Moisture Content and Dry Density Determinations and Unconfined Compressive Strengths on selected core samples. A summary of field and laboratory tests is presented on Plates III, IV and V. Our work was coordinated with representatives of Watry Engineering, Inc.

PLANNED CONSTRUCTION

We understand that Phase I of the project involves the construction of Building 2, which is a five-story structure located in the northwest corner of the site. We understand the type of construction will be reinforced concrete with a concrete block basement approximately 10 feet below existing grade. As a foundation alternative, it has been proposed to resist the earthquake lateral forces with a shear wall and driven pile foundation system. It is still planned to support the exterior and interior column loads on spread footings.

PILE INFORMATION

We understand that preliminary calculations indicate 14-inch square prestressed concrete piles approximately 40 to 50 feet long will be required below the basement level. The prestressed piles have a moment capacity of approximately 460-inch kips. We understand that the connection between the pile cap and piles is considered to be a free-rotating connection. It should be noted the given moment capacity of the pile is the allowable capacity and does not include reduction for axial loads. For design purposes, we have assumed a maximum horizontal pile displacement of 1/4 inch.

FIELD EXPLORATIONS

The two additional test borings were drilled on August 26 and 27, 1981, to an approximately depth of 61-1/2 feet. Our borings were drilled in the building area in an excavation approximately 4 feet deep. The approximate locations of the test borings drilled for our studies is shown on the Plot Plan, Plate I. The borings were drilled with a truck-mounted drill rig equipped with a 6-inch diameter hollow stem auger to extend the borings. The borings were made under the direction of a staff engineer and geologist from our firm who made continuous logs of the soils encountered and assisted in extracting relatively undisturbed soil samples for visual examination and classification.

The logs are presented as Plates III and IV of this report. Relatively undisturbed soil samples were extracted from the borings by driving a 2-inch inside-diameter sampler 18 inches into the soil using a 140-pound hammer falling approximately 30 inches. The number of blows required to advance the sampler 12 inches into the soil is noted on the Logs of Borings at the corresponding sample locations. All samples were sealed, tagged and returned to our laboratory for visual examination and classification.

SOIL CONDITIONS

In general, the soil conditions encountered in the two test borings correlated well with the test borings made for our previous study at the site. In general, the surface soil conditions at the locations explored consist of 5 to 7 feet of silty clay fill. The fill soils are generally underlain by alternating layers of silty clay, clayey silt, and silty sand. These soils are generally very stiff and medium dense.

Ground water was encountered at approximately 17 feet during drilling in both test borings. In Boring 6, the ground water level was remeasured approximately 24 hours later at 13 feet. It is possible, however, that the ground-water conditions at the site could vary at some time in the future due to variations in rainfall, construction activities, tides, or other factors not apparent at the time our borings were made.

The above is a general summary of the soil and ground-water conditions encountered in the borings made for this study. A more detailed description of the soil conditions encountered is noted on the Logs of Borings, Plates III and IV. All soils have been classified according to the Unified Soil Classifications System, which is described on Plate II.

CONCLUSIONS AND RECOMMENDATIONS

Based upon our previous work and the additional field explorations performed at the site, it remains our opinion that the structural and lateral loads can be resisted as planned by a system of shear walls, driven piles, and isolated spread footings. Pile design information was previously presented in our August 18, 1981 letter. Driving criteria for the production piles should be developed when the type of pile, hammer and driving equipment are known. In general, all piles should be driven to at least the design depth provided by the Structural Engineer.

It is recommended that all piles driven on this project be installed under the continuous observation of a representative of J. H. Kleinfelder & Associates. We further recommend that indicator piles be driven in order to aid in determining final driving criteria. We recommend that the indicator piles and the initial production piles be installed close to boring locations so that driving resistance can be correlated with known soil conditions. The final driving criteria should be developed in consultation with J. H. Kleinfelder & Associates. A guide specification for the installation of driven piles can be provided upon request.

Load Tests

In order to verify the design capacities and possibly reduce the number of piles, consideration can be given to performing pile load tests. The load tests should be performed as close as possible to one of our test borings. We would suggest that at least two piles be installed and tested to depths differing by about 5 feet. We recommend that the load tests be performed in accordance with the procedures outlined in the ASTM D-1143-69 as a guide. Pile load tests performed should be made under our observation and the data reviewed by our firm.

The decision whether to run a pile load test is usually based on economics and the amount of risk acceptable to the owner. Should a reduction in piles be warranted, the savings could be substantial considering all four buildings.

Lateral Capacity

We have made estimates of the lateral capacity for the 14-inch square prestressed concrete vertical pile. Based on the preliminary pile selection, the lateral pile capacity is 8,000 pounds per pile for a lateral deflection of 1/4 inch. The lateral pile capacity based on the allowable moment for the pile is 7,300 pounds. This value does not include any reductions that may be required when combined with vertical loads. The approximate point of fixity can be assumed at one-third the length below the ground surface.

Settlement

Some concern has been expressed regarding the differential settlement between the pile foundation and the isolated spread footings. On Page 7 of our February 28, 1980 report, a discussion of anticipated settlements was presented. The estimated post-construction settlement was on the order of 1/2 to 1 inch. Differential settlement is often assumed to be roughly one-half the calculated settlement. With this in mind, we estimate that post-construction differential settlement between the isolated columns and the piles will be on the order of 1/4 to 1/2 inch.

Please note that the "Limitations" and "Additional Services" sections in our referenced reports still apply.

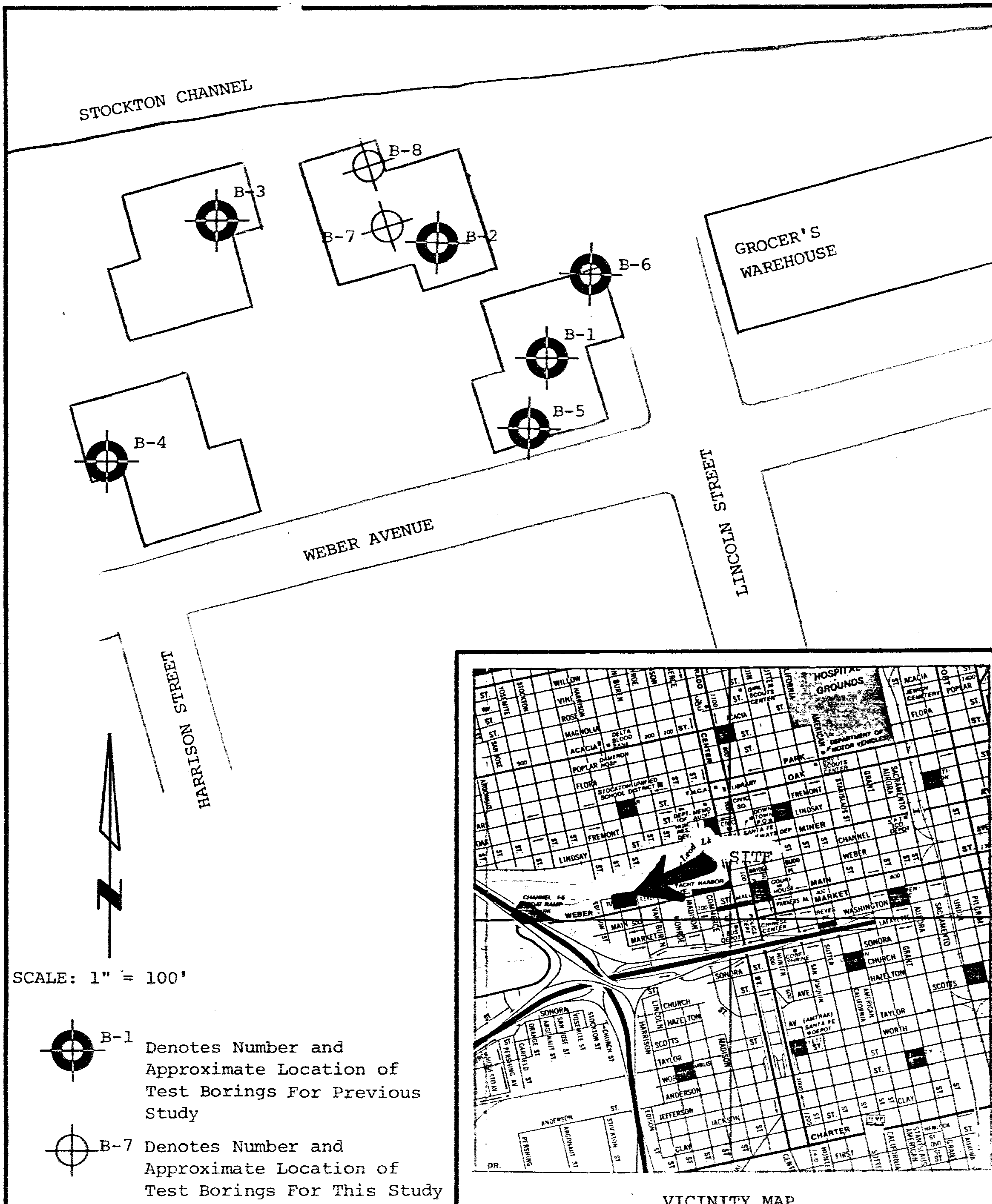
We trust that this provides the information requested. If you have any questions regarding this report, please contact us.

Respectfully submitted,
J. H. KLEINFELDER & ASSOCIATES

Ron Heinzen

Ron Heinzen, C. E.

NAJ:jcb
Attachments
cc w/Attchs.: Client (3)
Watry Engineering



J. H. KLEINFELDER & ASSOCIATES

GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES

PLOT PLAN
WATERFRONT TOWERS, BUILDING 2
WEST END REDEVELOPMENT PROJECT
STOCKTON, CALIFORNIA

PREPARED BY:	SRD	DATE:	9-3-81		
CHECKED BY:	RTH	DATE:	9-3-81	PROJECT NO. S-2094-10	PLATE NO. I

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING
2825 EAST MYRTLE STREET, STOCKTON, CALIFORNIA 95205

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

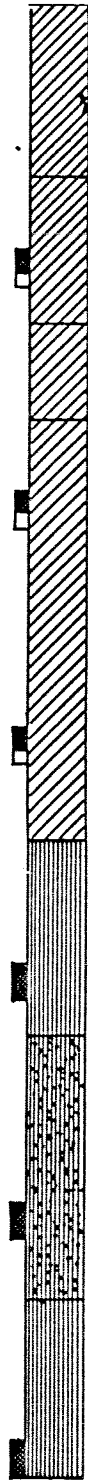
UNIFIED SOIL CLASSIFICATION SYSTEM

File No. S-2094-10
September 3, 1981
PLATE II

BORING 7

Depth In Feet

Depth	Dry Density Lbs. Cu. Ft.	Moisture Content % Dry Weight	Blow Count *	Description
0				CL Mottled Dark Brown to Black Silty Clay with Rock Fragments and Sand. (FILL)
5				
				CL Grey-Green Silty Clay with Slight Petro Odor.
10			25	
				Ground Water Encountered at 13 Feet 24 Hours After Drilling.
15				CL Medium Brown Very Silty Clay.
				Ground Water Encountered at 16 Feet During Drilling.
				CL Dark Blue-Grey Very Silty Clay.
20			19	(Very Stiff)
25				
30			18	
35				ML Dark Blue-Grey Clayey Fine Sandy Silt.
40			42	(Hard)
				SM Dark Grey-Black Silty Fine to Medium Sand with Some Coarse Sand. (Medium Dense)
45				
50			28	
55				ML Dark Blue-Grey Clayey Fine Sandy Silt.
60			54	(Hard)
65				



BORING TERMINATED AT 61.5 FOOT DEPTH

NOTES:

1. Boring Drilled on 8-26-81.
2. No Caving Noted.
3. Ground Water Encountered at 16 Feet During Drilling.
4. Ground Water Encountered at 13 Feet 24 Hours After Drilling.

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS — MATERIALS TESTING

LOG OF BORING 7
WATERFRONT TOWERS, BUILDING 2
WEST END REDEVELOPMENT

PREPARED BY:	DATE:
CHECKED BY: RTH	DATE: 9-3-81
PROJECT NO. S-2094-10	PLATE NO. III

BORING 8

Depth In Feet	Dry Density Lbs. Cu. Ft.	Moisture Content % Dry Weight	Blow Count *	Description
0				CL Mottled Dark Brown Silty Clay. (FILL)
5				CL Mottled Grey-Green Silty Clay.
10				
				CL Tan-Brown Silty Clay. (Very Stiff)
15			17	Ground Water Encountered at 17 Feet During Drilling.
				CL Grey-Blue Silty Clay.
20				SM Grey-Blue Silty Fine Sand. (Medium Dense)
25			21	
30				CL Blue-Grey Silty Clay. (Hard)
35			43	
40				ML/SM Blue-Grey Clayey Sandy Silt/ Silty Sand. (Medium Dense)
45			13	
50				
				ML Blue-Grey Clayey Silt. (Hard)
55			30/3"	ML Blue-Grey Partially Cemented Sandy Silt with Sand Lenses. (Hard)
60			64	
65				

BORING TERMINATED AT 61.5-FOOT DEPTH

NOTES:

1. Boring Drilled on 8-27-81.
2. No Caving Noted.
3. Ground Water Encountered at 17 Feet During Drilling.

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS — MATERIALS TESTING

LOG OF BORING 8
WATERFRONT TOWERS, BUILDING 2
WEST END REDEVELOPMENT

PREPARED BY:		DATE:	
CHECKED BY:	RTH	DATE:	9-3-81
PROJECT NO.	S-2094-10	PLATE NO.	IV

J. H. KLEINFELDER AND ASSOCIATES
CONSULTING ENGINEERS

SUMMARY OF LABORATORY TESTS

PROJECT NO. S-2094-10　　　　DATE 9-3-81

PROJECT and LOCATION Waterfront Towers, Building 2
Stockton West End Redevelopment　　　　PLATE NO. V

BORING NO.	SAMPLE Depth & NO.	DRY UNIT WEIGHT P.C.F.	MOISTURE CONTENT % OF DRY WT.	GRADING ANALYSES SIEVE SIZE – PERCENT PASSING						HYDROMETER ANALYSIS			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH P.S.F.
				1"	3/4"	4	10	40	200	SILT SIZE	CLAY SIZE	COLLOIDS	L.L.	P.I.	
7	10-1	106	21												5,519
7	20-1	95	28												
7	40-1	109	20												
7	50-1	85	21												
8	15-1	96	27												
8	35-1	108	20												2,492
8	45-1	93	29												
8	55-2	107	21												
8	60-1	109	19												
8	25-1	103	23												

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7931

RECEIVED
MAR 07 1980
WATRY ENGINEERING

File No. S-2094-10
February 28, 1980

ROUGH DRAFT

Schmitz Development, Inc.
1545 Saint Marks Plaza, Suite One
Stockton, California 95207

Attention: Mr. Jim Everett

Gentlemen:

REPORT
SOILS INVESTIGATION
PROPOSED HIGH RISE COMMERCIAL BUILDING
WEST END REDEVELOPMENT PROJECT
STOCKTON, CALIFORNIA

INTRODUCTION

In this report are presented the results of a soils investigation for a proposed high rise commercial building to be constructed north of Weber Street between Lincoln and Harrison Streets in the West End Redevelopment. A Plot Plan showing the location of the proposed construction is presented on Plate I. Also included in this report are the results of field and laboratory tests for three adjacent similar buildings.

PROPOSED CONSTRUCTION

We understand that Phase I of the project involves the construction of a five-story structure located at the northwest corner of Weber and Lincoln Streets. Eventually, the proposed construction will consist of four high rise commercial buildings. At this time, we understand that the type of construction will be reinforced concrete with possibly a concrete block basement. The basement is tentatively planned to extend 10 to 11 feet below grade. According to Nr. Nick Waltry, Structural Engineer, we understand that corner column loads may reach approximately 700 Kips dead plus live load. The loads on adjacent columns located approximately 30 feet away may decrease to approximately 300 Kips dead plus live load. The approximate dimensions of the proposed structure are 120 by 120 feet in plan dimensions. The majority of the parking will be provided west of the building site adjacent to what is now the Western Consumers plant. Tentative plans also indicate a small amount of parking directly west of the Phase I construction site. Further details of the planned construction are not known to us at this time.

SCOPE OF INVESTIGATION

Our original scope of work, presented in our proposal dated September 14, 1979, was to perform a preliminary study at all four building sites. Our scope of work was amended during a meeting on November 30, 1979, to include additional test borings at the Phase I construction site. Since our field work was mainly performed at the Phase I site, our recommendations for foundations and lateral earth pressures and settlement estimates, apply specifically to this site. In our opinion, additional test borings should be made at the remaining sites before final recommendations can be provided.

PREVIOUS STUDIES

During the preparation of this report, we have made maximum use of existing soils information which J. H. Kleinfelder & Associates has developed in this area of Stockton during numerous past studies. A summary of these previous reports was presented in our letter dated July 13, 1979. The purpose of this referenced report was to provide information to Environmental Science Associates for preparation of an Environmental Impact Report for the subject project.

SITE CONDITIONS

The site of the proposed commercial building is located south of the Stockton Channel and north of Weber Street. The site is bounded on the east and west by Lincoln and Harrison Streets. At the time of our investigation, the site was an open field void of vegetation. Portions of the site had been previously occupied by old brick buildings with full or partial basements. The voids left by the removal of the buildings were backfilled with relatively loose soil and debris.

FIELD EXPLORATIONS

The field explorations for this project were performed in two phases. The first phase consisted of the drilling and sampling of four borings to the depth of 51-1/2 feet below the existing ground surface. Borings were drilled between September 17 and 22, 1979. On December 27, 1979, two additional borings were drilled at the Phase I building site. The borings varied in depth from approximately 5 feet to 31-1/2 feet. In the vicinity of Boring 6, a concrete slab was encountered at the depth of approximately 5 feet and several probes within a radius of approximately 10 feet, did not penetrate through the slab.

All borings were drilled with 6-inch diameter continuous flight auger drilling equipment. All borings were made under the direction of a field geologist from our firm who supervised the drilling and sampling operations and maintained a continuous log of the soils encountered in the borings. Relatively undisturbed samples were obtained by driving a 2-inch inside diameter sampler into the soil. The blow counts required to advance the sampler are noted on the Logs of Borings, Plates III and IV.

SOIL CONDITIONS

The soil conditions encountered at the building locations consist of an upper zone of 7 to 8 feet of loose fill. In Borings 1, 2, 4, 5 and 6, the fill soils were generally silt and clay soils. In Boring 3, silty sand fill soils were primarily encountered. The fill soils are underlain by a zone of brown and grey-brown soils extending to depths varying from approximately 15 to 25 feet below the existing ground surface. These soils consist of primarily very stiff to hard silty clay and clayey silt soils with thin interbedded layers of silty sand.

These soils are underlain by primarily bluish-grey soils to the maximum depths explored. This zone also consists of alternating layers of silty clay and clayey silt soils with more interbedded sand layers of greater thickness. The silt and clay soils are generally stiff to hard. The silty sand soils vary from medium-dense to dense.

Ground water was encountered in the deeper borings at depths varying from approximately 19 to 34 feet below the existing ground surface. Except in Boring 4, there appeared to be some correlation between the absence of silty sand deposits and low ground water levels. This would suggest that the ground water levels are somewhat dependent on sand strata that might connect with the adjacent Stockton Channel. It is possible that these ground water levels could change at some time in the future due to variations in rainfall, ground water withdrawal, tides, or other factors not apparent at the time our measurements were made.

LABORATORY TESTING

Laboratory tests were performed on selected samples of the soils obtained from the borings to evaluate the strength, density and compressibility characteristics of the soils encountered. Tests included Moisture Content and Dry Density Determinations, Unconfined Compressive Strength Tests, Direct Shear Tests and Consolidation Tests. The results of the Moisture Content and Dry Density Determinations are shown on the Logs of Borings at the appropriate sample locations and also on Plate V. The results of the Unconfined Compressive Strength Tests are summarized on Plate V. The results of the Direct Shear Tests and Consolidation Tests are presented graphically on Plates VI through X.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our test borings and laboratory tests, we conclude that the soils encountered at the Phase I site at the foundation level approximately 12 to 13 feet below the existing grade, consist of very stiff to hard silt and clay soils. In our opinion, these soils would tend to compress elastically under foundation loading.

We understand that differential settlement is a prime consideration on this project since the building loads are large and vary considerably between columns. We have considered various types of foundations such as mat or grid-type foundations and driven or drilled piles, which would tend to minimize differential settlement. For economic reasons, we understand it is preferred to use spread and continuous foundations. Detailed recommendations for spread footing foundations are therefore presented in this report. Recommendations for piles and grid or mat foundations can be prepared if these alternatives are to be given further consideration.

Foundations

It is recommended that spread or continuous footings extend at least 2 feet below basement subgrade and bear on undisturbed native soil. At that depth, the recommended maximum allowable soil bearing pressures are 3,000 pounds per square foot for dead load, 4,500 pounds per square foot for dead plus live load, and 6,000 pounds per square foot for the total of all loads, including wind or seismic forces. The above-stated bearing values are net values and the weight of concrete in the portions of the foundation which extend below grade can be neglected in proportioning foundations.

It is further recommended that all foundations on this project be observed by a representative of our firm prior to placing the concrete. The purpose of this recommendation is to verify that the bearing soils actually encountered in the footing excavations are the same as those in which our recommendations are based and to observe for any loose pockets of soil.

Settlement

We have evaluated the settlement of spread footing foundations based on a bearing pressure of 4,000 pounds per square foot for dead plus permanently applied live load. We have also analyzed the condition of having 700 Kip and 300 Kip column loads, approximately 30 feet apart. Based on the results of our laboratory tests and past experience, the stiff to hard silt and clay soils underlying the site compress in basically an elastic manner. Using elastic settlement equations and our laboratory tests, we estimate a total settlement on the order of 1 to 2 inches. We anticipate that on the order of one-half of this settlement will occur during the period of construction. The estimated post-construction settlement, therefore, is on the order of 1/2 to 1 inch. We estimate that the post-construction differential settlement between adjacent columns supporting loads of 300 to 700 Kips, is on the order of 1/2 inch. This we understand, is within the design settlement criteria.

Active and Passive Soil Pressures

We have assumed that the basement walls would be considered relatively rigid and not free to deflect. With this in mind, it is our opinion that lateral earth pressures against the basement wall will approach the at-rest condition. The recommended at-rest soil pressure is an equivalent fluid pressure of 50 pounds per square foot per foot of depth for granular backfill and 55 pounds per square foot for native silt and clay soils. These values assume a level backfill and do not include any allowance for hydrostatic pressure, surcharge loads, or seismic effects.

Resistance to lateral forces can be provided by either passive pressure of the sides of the footings against the soil or by friction between the base of the footing and the soil. The recommended coefficient of friction between the bottom of the footing and the soil is 0.4. The recommended passive soil pressure is an equivalent fluid pressure of 400 pounds per square foot per foot of depth.

Site Preparation and Grading

Site preparation should consist of excavation of the basement, stripping and removal of any vegetation or obstacles within the project area, and recompaction of the native and loose fill soils in parking areas. The recommended minimum depth of stripping is 2 inches, however, the actual depth required in the field should be evaluated by a representative of J. H. Kleinfelder & Associates at the time of construction. Site preparation should also include scarifying and recompacting the native soils in parking areas to a minimum of 95 percent of the ASTM D-1557-70 maximum test dry density. In parking areas where loose fill is found, we recommend that at least 2 feet of the existing fill beneath pavement subgrade be removed and recompacted. The fill soils should be placed in thin horizontal layers, a maximum of 8 inches in loose thickness and compacted. The recommended minimum degree of compaction of fill beneath pavements is 95 percent of the maximum dry density as determined by ASTM D-1557-70. Beneath exterior concrete, we recommend that the native or existing fill soils be recompacted to a minimum depth of 6 inches to a minimum of 90 percent of the same test dry density. In our opinion, select portions of the on-site fill soils can be reused to backfill behind basement walls, although for ease of placement and lower lateral earth pressures, an imported sandy fill is preferred. As a guide, we recommend that imported fill have a maximum percentage passing the No. 200 Sieve of 40, and a maximum Plasticity Index of 8. We also recommend that samples of proposed fill material be submitted to our laboratory for compliance with these recommendations prior to being brought to the site. Jetting of structural backfill, whether behind basement walls or in utility trenches, is not recommended. We suggest that structural backfill be mechanically compacted in the manner described above, with the minimum degree of compaction in building areas of 90 and 95 percent beneath pavements based on the referenced test density.

Drainage of Walls and Slab

If the basement wall backfills are constructed using on-site soils, it is our opinion that supplemental drains should be provided behind the walls. Drains can consist of minimum 4-inch diameter perforated pipe or drain tile. The fill immediately behind the wall can consist of filter rock conforming to the Specification for Class 2 Permeable Material as specified in Section 68-1.025 of Caltrans Standard Specifications. Alternatively, a clean coarse sand or pea gravel can be used, provided that a layer of filter fabric is placed between the wall backfill and the coarse sand or rock.

Adequate drainage beneath the basement floor is also important, particularly due to the relatively high ground water table and proximity to the Stockton Channel. At this time we are not familiar with the details of the floor construction. We suggest that we review these details with the Architect in final design, and review the need for possible additional drains beneath the floor area.

ADDITIONAL SERVICES

This report completes our present scope of work on this project. As the design is finalized and specifications and working drawings are prepared, your office may consult with us on unanticipated problems or questions. Upon request, our firm can provide guide specifications for items pertaining to our report. We recommend that a review copy of the foundation and grading plans and specifications be provided to our firm prior to issuance of these documents for bidding purposes.

This report is based on the assumption that an adequate program of monitoring and tests will be performed during construction to verify construction compliance with these recommendations. These tests and observations would be additional services provided by our firm. The costs for these services are not included in our present fee arrangements. The recommended tests and observations include, but are not necessarily limited to, the following:

1. Continuous observation and testing during site preparation, grading and placement of Engineered Fill.
2. Observations of footing excavations prior to placement of concrete.
3. Consultation as required during construction.

LIMITATIONS

The recommendations made in this report are based on the results of our field explorations, laboratory tests, and our understanding of the proposed construction. The soils data from which this report was prepared is based on the results of six exploratory borings made for this investigation. It is possible that variations in the soil conditions could exist between or beyond the points of exploration. Therefore, if any soil conditions are encountered during construction which differ from those assumed in preparation of this report, our firm should be notified so that we can review the situation that exists and modify our recommendations if needed.

J. H. Kleinfelder & Associates has prepared this report for the use of Schmitz Development, Inc. for design purposes in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made as to the professional advice included in this report.

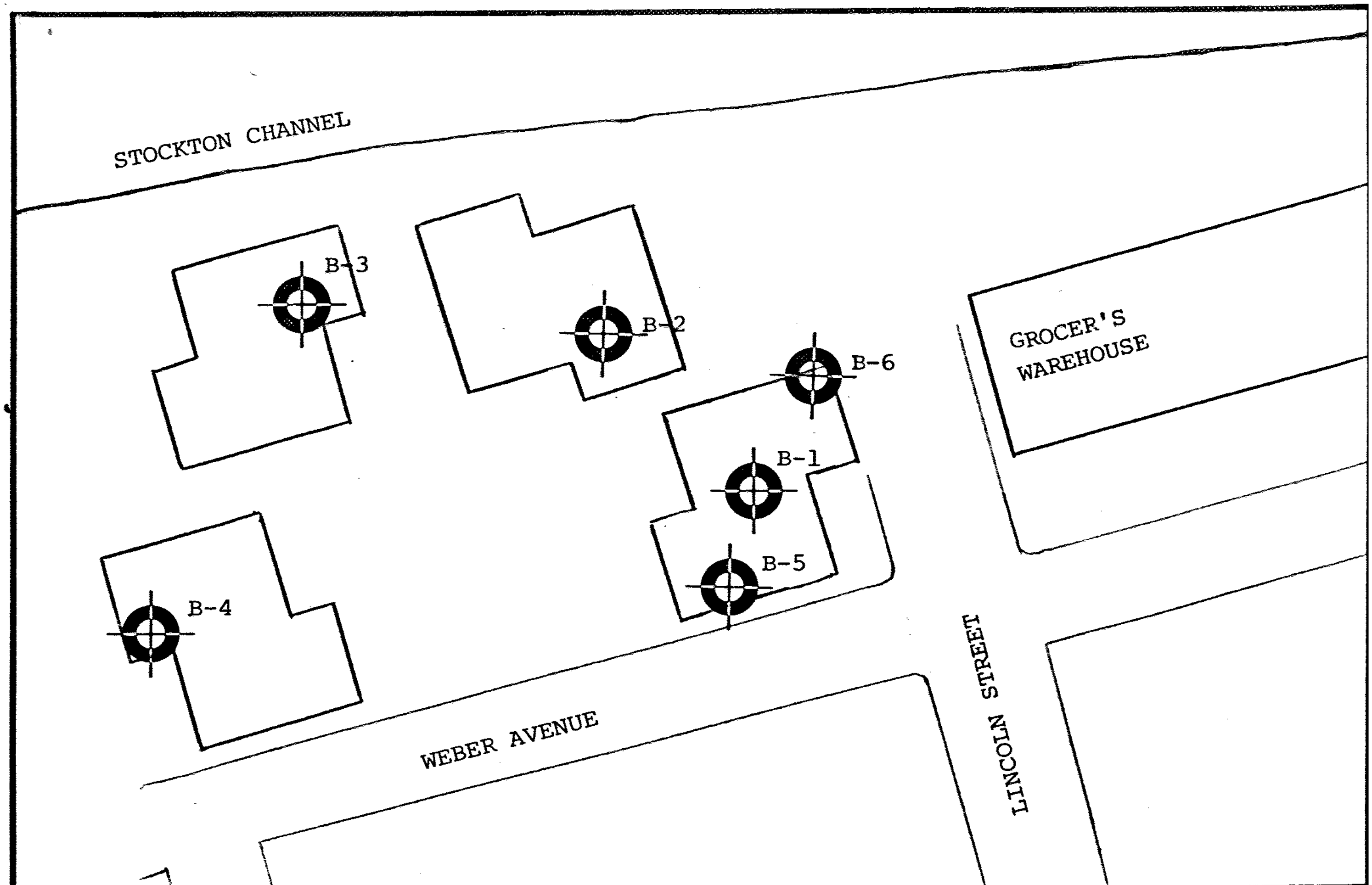
We trust this report presents the information required. If you have any questions, please contact us.

Respectfully submitted,

J. H. KLEINFELDER & ASSOCIATES

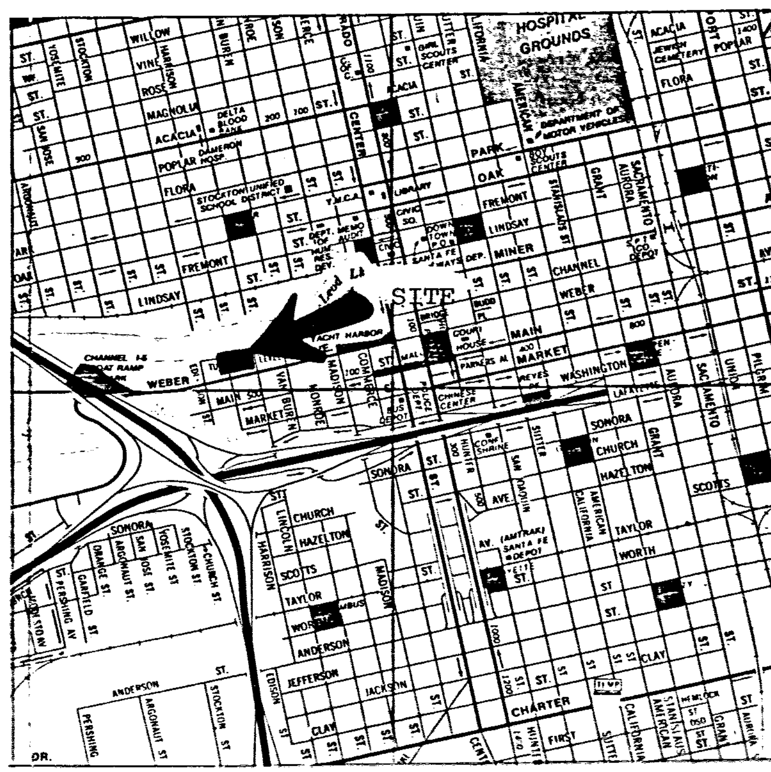
Ron Heinzen, C. E.

RTH:jcb



SCALE: 1" = 100'

B-1 Denotes Number and Approximate Location of Test Borings.



VICINITY MAP

J. H. KLEINFELDER & ASSOCIATES GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES	PLOT PLAN PROPOSED OFFICE BUILDINGS WEST END REDEVELOPMENT PROJECT STOCKTON, CALIFORNIA
PREPARED BY: SRD DATE: 10-31-79	
CHECKED BY: RTH DATE: 3-3-80	PROJECT NO. S-2094-10 PLATE NO. I

J. H. KLEINFELDER & ASSOCIATES
2825 EAST MYRTLE STREET / STOCKTON, CALIFORNIA 95205

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

UNIFIED SOIL CLASSIFICATION SYSTEM

File No. S-2094-10
February 28, 1980
PLATE II

NOTES TO LOGS OF BORINGS

1. *Number of blows required to drive 2-inch inside diameter sampler 12 inches with a 140-pound hammer falling 30 inches $\pm$.

2. Boring depths are referenced to existing ground surface at time of drilling.

3. The lines indicating the transition between different soil types represent approximate boundaries. The transition may be gradual.

4. A correction is necessary in order to correlate the blow counts shown on the logs with Standard Penetration Test Data.

5. ■ = Depth of relatively undisturbed sample.

   ⊠ = Depth of disturbed sample.

   □ = Depth of sampling attempt with no recovery.

BORING 1

Depth In Feet	Dry Density Lbs./Cu. Ft.	Moisture Content % Dry Weight	Blow Count *
~2	105	19	12
~5	91	31	12
~11			52
~15	99	23	31
~20	100		13
~25			16
~30	106	22	36
~35			20
~40			24
~45	107	21	35/6"
~50			31

Description

- ML Brown Very Fine Sandy Silt.
- CL Mottled Brown Silty Clay. (Stiff)
- ML Mottled Brown Clayey Silt. (Stiff)
- CL Mottled Brown Silty Clay. (Stiff)
- Mottled Brown Silty Clay with Very Fine Sand. (Hard)

FILL

- CL Mottled Tan-Brown Silty Very Fine Sandy Clay. (Sluff) (Very Stiff)
- ML Mottled Grey-Brown Very Fine Sandy Silt. (Hard)
- Ground Water Encountered at 19 Feet.
- SM Mottled Brown Silty Clayey Very Fine Sand. (Medium-Dense)
- SM Blue-Grey Slightly Silty Sand. (Medium-Dense)
- CL Blue-Grey Very Fine Sandy Clay. (Hard)
- ML Blue-Grey Very Fine Sandy Silt with Clay. (Very Stiff)
- CL Blue-Grey Silty Clay with Very Fine Sand. (Very Stiff)
- ML Blue-Grey Very Fine Sandy Silt with Clay. (Hard)

BORING TERMINATED AT 51.5-FOOT DEPTH
NOTES:
1. Boring Drilled on 10-17-79.
2. No Caving Noted.
3. Ground Water Encountered at 19 Feet During Drilling.

BORING 5

Depth In Feet	Dry Density Lbs./Cu. Ft.	Moisture Content % Dry Weight	Blow Count *
~11	120	14	45
~16	100	25	14
~21	97	23	27
~26			23
~31	96	27	16

Description

- ML/CL Tan-Brown Very Clayey Silt with Fine Sand and Silty Clay.

FILL

- ML Mottled Grey Brown Very Fine Sandy Silt with Clay.
- SM Grey-Brown Silty Fine Sand. (Partially Cemented, Hard)
- CL Mottled Grey-Brown Very Fine Sandy Clay with Silt. (Stiff)
- SM/ML Mottled Grey Fine Sandy Silt and Very Silty Fine Sand with Clay.
- CL Blue-Grey Silty Very Fine Sandy Clay. (Very Stiff)
- Ground Water Encountered at 27 Feet.

BORING TERMINATED AT 31.5-FOOT DEPTH.
NOTES:
1. Boring Drilled on 12-27-79.
2. No Caving Noted.
3. Ground Water Encountered at 27 Feet During Drilling.

BORING 6

Depth In Feet	Dry Density Lbs./Cu. Ft.	Moisture Content % Dry Weight	Blow Count

Description

- ML/CL Tan-Brown Very Clayey Silt and Silty Sand.

FILL

Concrete Slab at 5 Feet.
BORING TERMINATED AT 5.0-FOOT DEPTH
NOTES:
1. Boring Drilled on 12-26-79.
2. No Caving Noted.
3. No Ground Water Encountered.

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES

DRAWN BY:	SRD	DATE:	3-3-80
CHECKED BY:	RTH	DATE:	3-3-80

LOGS OF BORINGS 1, 5, 6
PROPOSED OFFICE BUILDINGS
WEST END REDEVELOPMENT PROJECT
STOCKTON, CALIFORNIA

PROJECT NO. S-2094-10 | PLATE NO. III

BORING 2

Dry Density Lbs./Cu. Ft.	Moisture Content % Dry Weight	Blow Count *
104	20	36
93	30	18
95	28	22
102	24	22
101	25	21
		20
		29
		15

Depth In Feet: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

Description

- ML Mottled Brown Very Fine Sandy Silt with Clay.
- CL Mottled Brown Silty Clay.
- FILL
- CL Mottled Tan Silty Clay with Minor Gravel.
- Mottled Tan Silty Clay with Minor Gravel and Grey Silt Lenses.
- ML Orange-Brown Clayey Silt with Very Fine Sand. (Hard)
- CL Mottled Grey-Brown Very Silty Clay with Very Fine Sand. (Very Stiff)
- Ground Water Encountered at 23 Feet.
- ML Mottled Grey Very Clayey Silt with Very Fine Sand. (Very Stiff)
- SM Blue-Grey Silty Fine Sand. (Medium-Dense)
- CL Blue-Grey Very Silty Very Fine Sandy Clay. (Very Stiff)
- SM Blue-Grey Very Clayey Fine Sand with Pea Gravel. (Very Stiff)
- ML Blue-Grey Very Fine Sandy Silt with Clay and Pea Gravel.

BORING TERMINATED AT 51.5-FOOT DEPTH

NOTES:
1. Boring Drilled on 10-18-79.
2. No Caving Noted.
3. Ground Water Encountered at 23 Feet During Drilling.

BORING 3

Dry Density Lbs./Cu. Ft.	Moisture Content % Dry Weight	Blow Count *
		4
88	33	35/6"
103	23	21
113	17	27
101	24	30
		12
101	26	14
104	23	26
105		15
97	29	19
		15

Depth In Feet: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

Description

- SM Brown Silty Fine Sand.
- FILL
- CL Mottled Brown Silty Clay with Very Fine Sand and Cemented Layers of Silt. (Hard)
- CL Mottled Grey-Brown Silty Clay. (Partially Cemented, Very Stiff)
- ML Mottled Grey Very Fine to Fine Sandy Silt. (Very Stiff)
- ML Mottled Brown Very Clayey Silt. (Very Stiff)
- CL Grey Very Silty Clay.
- CL Mottled Brown Very Silty Clay. (Stiff)
- Ground Water Encountered at 27 Feet.
- ML Blue-Grey Very Fine Sandy Silt with Clay. (Stiff)
- CL Blue-Grey Very Silty Clay. (Stiff)
- (Grades to Very Stiff)
- SM Blue-Grey Silty Fine Sand with Clay. (Dense)
- ML Blue-Grey Very Fine Sandy Silt with Clay. (Very Stiff)
- SM Blue-Grey Silty Fine Sand. (Dense)

BORING TERMINATED AT 51.5-FOOT DEPTH

NOTES:
1. Boring Drilled on 10-18-79.
2. No Caving Noted.
3. Ground Water Encountered at 27 Feet During Drilling.

BORING 4

Dry Density Lbs./Cu. Ft.	Moisture Content % Dry Weight	Blow Count *
		14
93	29	11
93	19	14
98	25	22
101		29
88	27	40
		24
111	19	35
		26
104	23	26
		29

Depth In Feet: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

Description

- CL Mottled Brown-Black Silty Clay with Organics. (Stiff)
- FILL
- ML Brown Very Clayey Silt.
- ML Mottled Brown-Grey Silt with Very Fine Sand. (Hard)
- CL Blue-Grey Very Silty Clay. (Very Stiff)
- ML Blue-Grey Very Clayey Silt with Very Fine Sand.
- SM Grey-Brown Very Silty Very Fine Sand.
- ML Blue-Grey Very Fine Sandy Silt with Clay. (Hard)
- SM Blue-Grey Silty Very Fine to Fine Sand. (Medium-Dense)
- Ground Water Encountered at 34 Feet.
- ML Blue-Grey Very Clayey Silt with Very Fine Sand.
- SM Blue-Grey Slightly Silty Fine Sand with Coarse Sands. (Medium-Dense)
- ML Blue-Grey Very Clayey Silt.
- SM Blue-Grey Silty Fine Sand. (Medium-Dense)
- CL Grades to Silty Very Fine Sand.
- ML Blue-Grey Clayey Sandy Silt. (Very Stiff)

BORING TERMINATED AT 51.5-FOOT DEPTH

NOTES:
1. Boring Drilled on 10-22-79.
2. No Caving Noted.
3. Ground Water Encountered at 34 Feet During Drilling.

J. H. KLEINFELDER & ASSOCIATES

GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES

LOGS OF BORINGS 2, 3, 4
PROPOSED OFFICE BUILDINGS
WEST END REDEVELOPMENT PROJECT
STOCKTON, CALIFORNIA

DRAWN BY:	SRD	DATE:	3-3-80
CHECKED BY:	RTH	DATE:	3-3-80

PROJECT NO. -2094-10 | PLATE NO. IV

J. H. KLEINFELDER AND ASSOCIATES
CONSULTING ENGINEERS

SUMMARY OF LABORATORY TESTS

PROJECT NO. S-2094-10

DATE 2-28-80

PROJECT and LOCATION West End Redevelopment-Stockton

PLATE NO. V

BORING NO.	SAMPLE Depth & NO.	DRY UNIT WEIGHT P.C.F.	MOISTURE CONTENT % OF DRY WT.	GRADING ANALYSES SIEVE SIZE - PERCENT PASSING						HYDROMETER ANALYSIS SILT SIZE	HYDROMETER ANALYSIS CLAY SIZE	HYDROMETER ANALYSIS COLLOIDS	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	UNCONFINED COMPRESSIVE STRENGTH P.S.F.
1	2-1	105	19												
1	5-1	91	31												
1	15-1	99	23												3,489
1	20-1	100	25												
1	30-1	106	22												
1	45-1	107	21												
2	15-2	104	20												
2	20-1	93	30												
2	25-2	95	28												1,916
2	30-1	102	24												
2	35-1	101	25												987
3	7-2	88	33												
3	12-1	103	23												
3	15-1	113	17												

J. H. KLEINFELDER AND ASSOCIATES
CONSULTING ENGINEERS

SUMMARY OF LABORATORY TESTS

PROJECT NO. S-2094-10

DATE 2-28-80

PROJECT and LOCATION West End Redevelopment-Stockton

PLATE NO. V

BORING NO.	SAMPLE Depth & NO.	DRY UNIT WEIGHT P.C.F.	MOISTURE CONTENT % OF DRY WT.	GRADING ANALYSES SIEVE SIZE - PERCENT PASSING						HYDROMETER ANALYSIS SILT SIZE	HYDROMETER ANALYSIS CLAY SIZE	HYDROMETER ANALYSIS COLLOIDS	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.I.	UNCONFINED COMPRESSIVE STRENGTH P.S.F.
3	20-2	101	24												2,698
3	30-2	101	26												1,355
3	35-1	104	23												
3	40-1	105	18												
3	45-1	97	29												
4	5-1	93	29												2,176
4	10-1	93	19												
4	15-1	98	25												
4	20-1	101	18												
4	25-1	88	27												
4	35-1	111	19												2,888
4	45-2	104	23												
5	10-1	120	14												8,269
5	15-1	100	25												

J. H. KLEINFELDER AND ASSOCIATES
CONSULTING ENGINEERS

SUMMARY OF LABORATORY TESTS

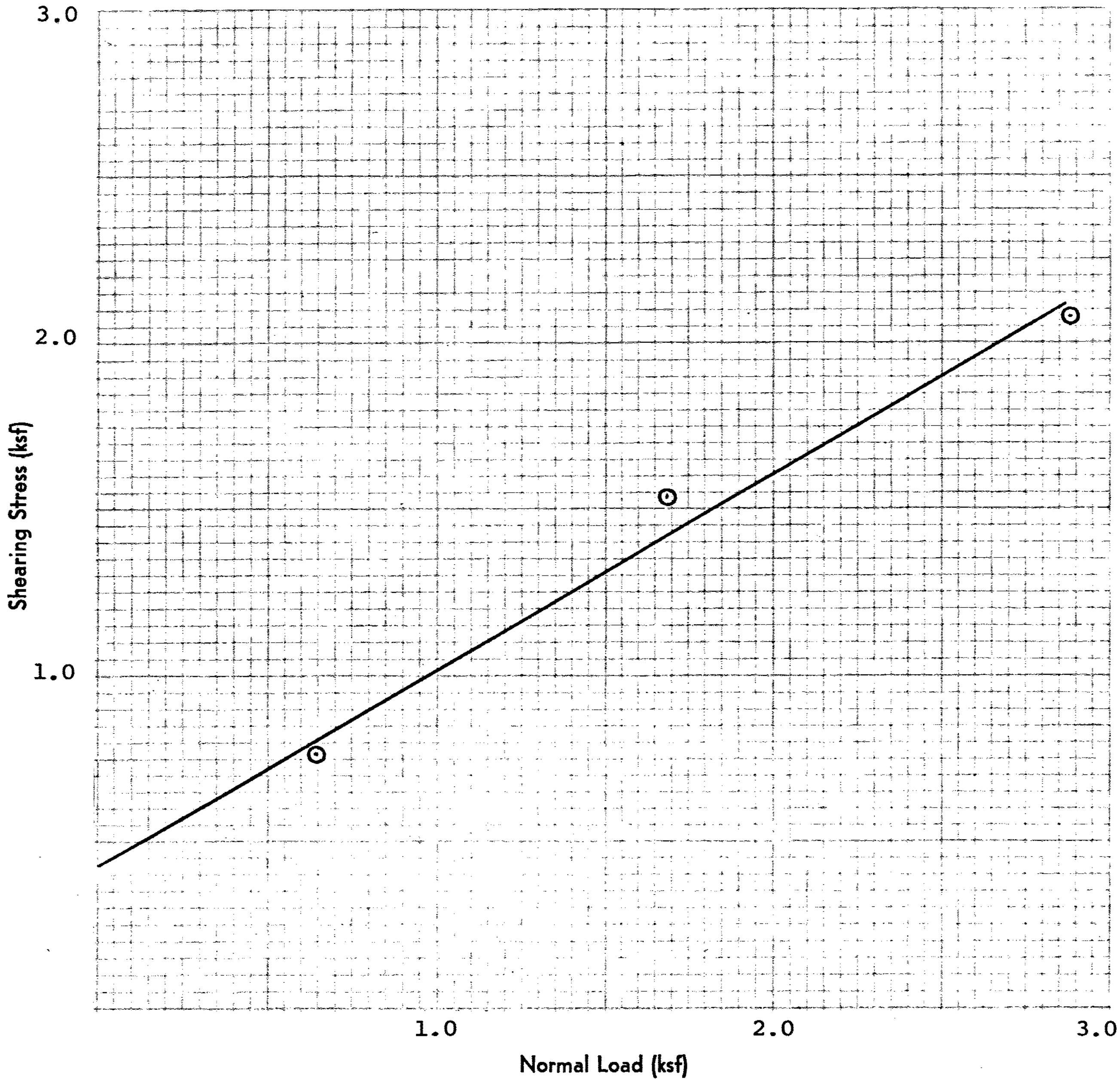
PROJECT NO. S-2094-10

DATE 2-28-80

PROJECT and LOCATION West End Redevelopment-Stockton

PLATE NO. V

BORING NO.	SAMPLE Depth & NO.	DRY UNIT WEIGHT P.C.F.	MOISTURE CONTENT % OF DRY WT.	GRADING ANALYSES						HYDROMETER ANALYSIS			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH P.S.F.
				SIEVE SIZE - PERCENT PASSING						SILT SIZE	CLAY SIZE	COLLOIDS	L. L.	P. I.	
5	20-1	97	23												
5	30-1	96	27												1,441

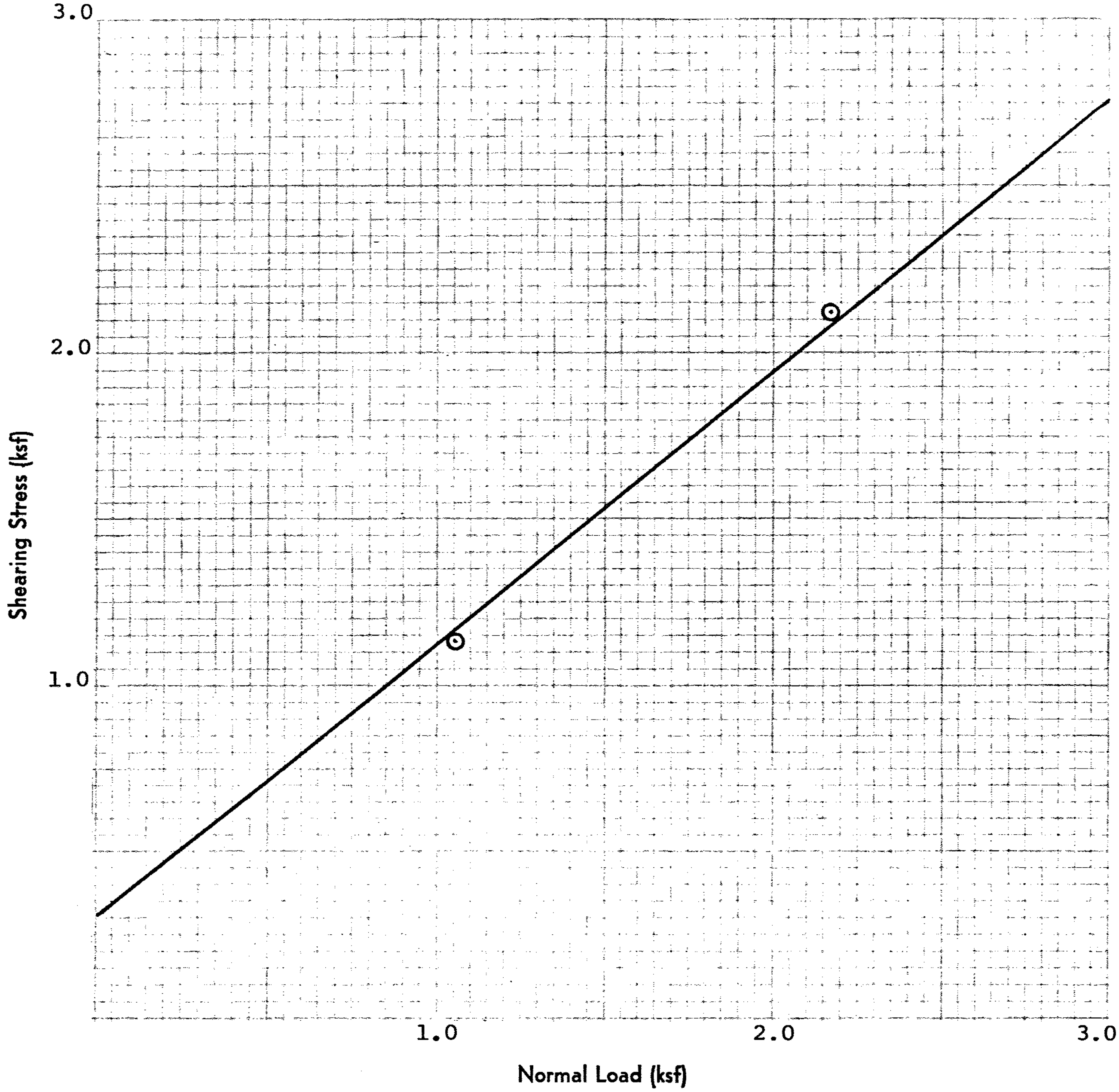


Boring No. 1	Initial Dry Density-pcf 100
Depth 20 Feet	Initial Water Content-% 25
Sample Description Brown Clayey Silty Sand	Cohesion-ksf 0.45
Special Loading Conditions	Angle of Internal Friction ϕ = 29^{o}

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES

WEST END REDEVELOPMENT
STOCKTON, CALIFORNIA

PREPARED BY:	DATE:	DIRECT SHEAR TEST
CHECKED BY: RTH	DATE: 2-28-80	PROJECT NO. S-2094-10 — PLATE NO. VI



Boring No. 3	Initial Dry Density-pcf 105
Depth 40 Feet	Initial Water Content-% 18
Sample Description Grey Silty Sand	Cohesion-ksf 0.35
	Angle of Internal Friction
Special Loading Conditions	∅= 39°

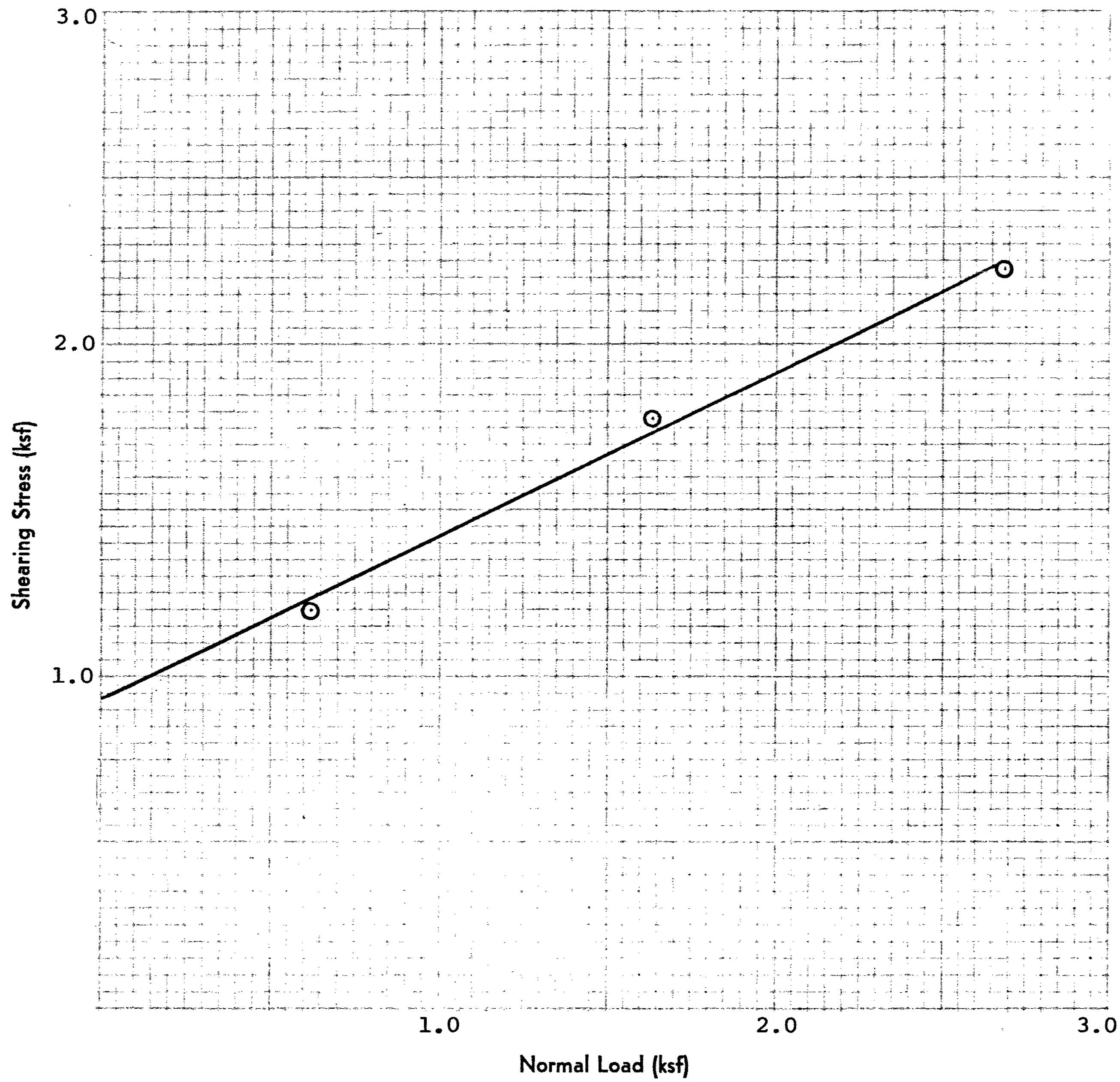
J. H. KLEINFELDER & ASSOCIATES

GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES

WEST END REDEVELOPMENT

STOCKTON, CALIFORNIA

PREPARED BY:	DATE:	DIRECT SHEAR TEST
CHECKED BY: RTH	DATE: 2-28-80	PROJECT NO. S-2094-10 — PLATE NO. VII



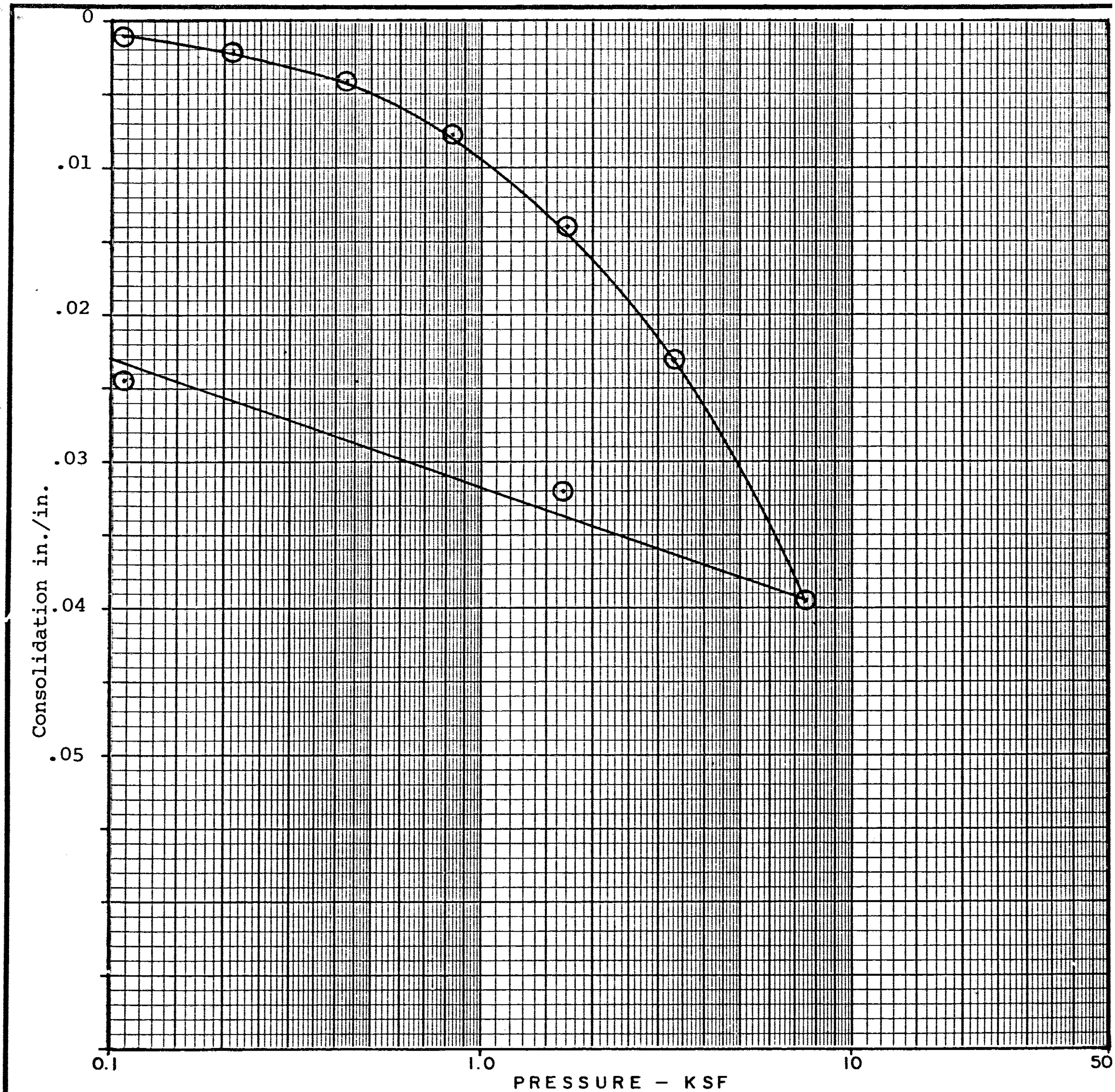
Boring No. 4
Depth 20 Feet
Sample Description Tan Silty Fine Sand
Special Loading Conditions

Initial Dry Density-pcf 101
Initial Water Content-% 18
Cohesion-ksf 0.92
Angle of Internal Friction
Ø= 27°

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES

WEST END REDEVELOPMENT
STOCKTON, CALIFORNIA

PREPARED BY:	DATE:	DIRECT SHEAR TEST
CHECKED BY: RTH	DATE: 2-28-80	PROJECT NO. S-2094-10 | PLATE NO. VIII



BORING NO. 1

DEPTH 10 Feet

SAMPLE DESCRIPTION Grey Brown Silty Clay

SPECIFIC GRAVITY

OVERBURDEN PRESSURE

PRECONSOLIDATION PRESSURE 1,400 psf+

COMPRESSION INDEX, C_c 0.43

RECOMPRESSION INDEX, C_r 0.008

	INITIAL	FINAL
DRY DENSITY – PCF	91	95
WATER CONTENT – %	30	--
VOID RATIO		
DEGREE OF SATURATION, %		
SAMPLE HEIGHT – INCHES	1	0.96

Normally Consolidated

J. H. KLEINFELDER & ASSOCIATES

GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES

WEST END REDEVELOPMENT

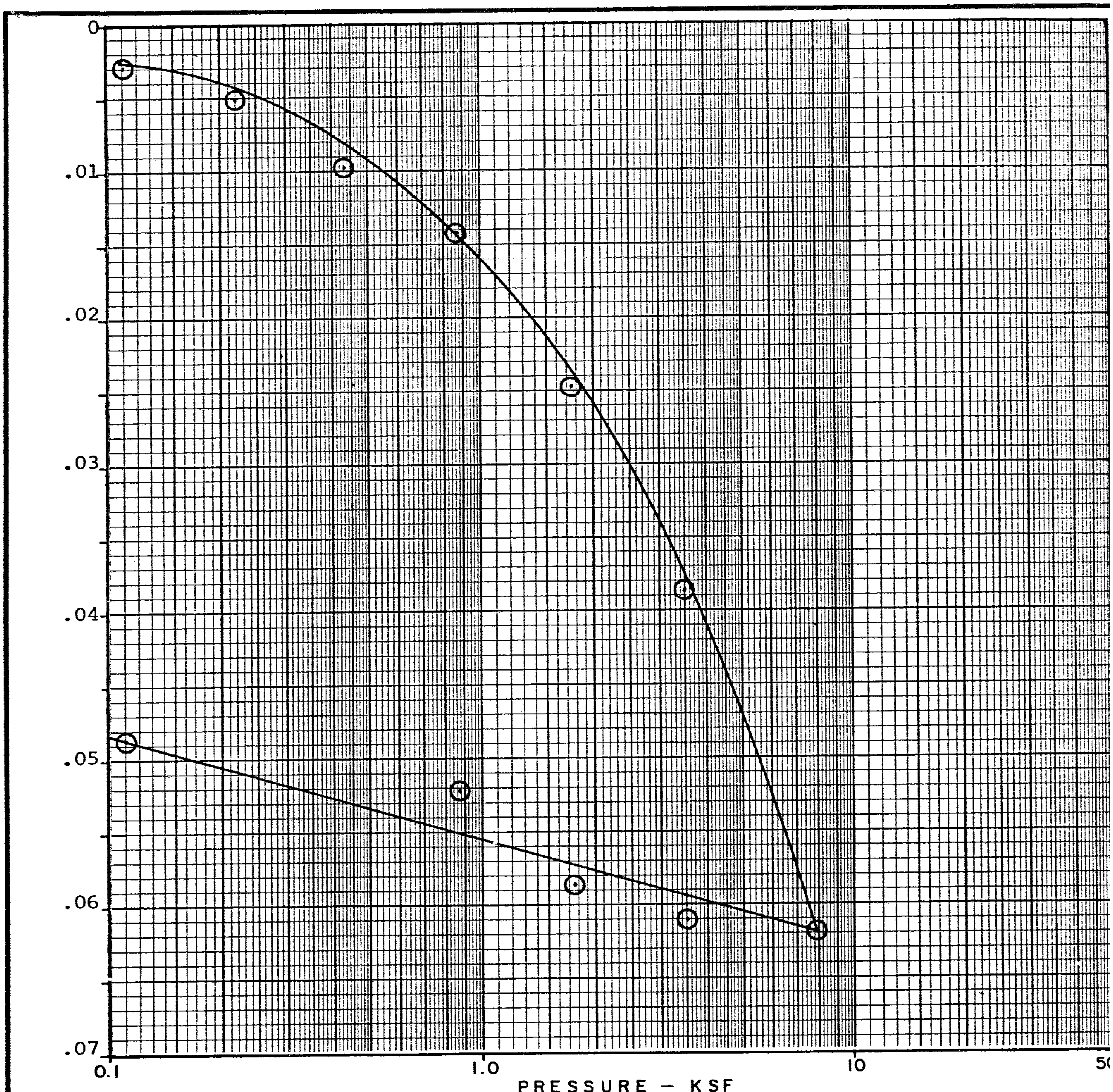
STOCKTON, CALIFORNIA

PREPARED BY: DATE:

CHECKED BY: RTH DATE: 2-28-80

CONSOLIDATION TEST DATA

PROJECT NO. S-2004-10 PLATE NO. IX



BORING NO. 5

DEPTH 15 Feet

SAMPLE DESCRIPTION Brown Very Fine Sandy Clay

SPECIFIC GRAVITY

OVERBURDEN PRESSURE 1,800 psf±

PRECONSOLIDATION PRESSURE

COMPRESSION INDEX, C_c 0.062

RECOMPRESSION INDEX, C_r 0.006

	INITIAL	FINAL
DRY DENSITY – PCF	100	107
WATER CONTENT – %	25	23
VOID RATIO		
DEGREE OF SATURATION, %		
SAMPLE HEIGHT – INCHES	1	0.94

Normally Consolidated

J. H. KLEINFELDER & ASSOCIATES

GEOTECHNICAL CONSULTANTS — ENGINEERING LABORATORIES

WEST END REDEVELOPMENT

STOCKTON, CALIFORNIA

PREPARED BY: DATE:

CONSOLIDATION TEST DATA

CHECKED BY: DATE:

PROJECT NO. PLATE NO.