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GEO-ETKA, INC.

ESTABLISHED 1965

FOUNDATION SOIL INVESTIGATION ENGINEERING GEOLOGY
PAVEMENT DESIGN SLOPE STABILITY ANALYSIS
COMPACTION CONTROL PERCOLATION STUDIES
MATERIAL INSPECTION AND TESTING

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PRELIMINARY
FOUNDATION SOILS INVESTIGATION

AT

The Southwest Corner of
Slauson Avenue and Santa Fe Springs Road
Santa Fe Springs, California

START

FOR

Lincoln Property Company
2415 Campus Drive, Suite 201
Irvine, California 92715

Date: April 24, 1986
Job No: F-2512-86

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DESCRIPTION

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Scope

This report presents the results of our Foundation Soils Investigation of the site of the proposed construction to be located at the Southwest corner of Slauson Avenue and Santa Fe Springs Road, Santa Fe Springs, California.

The physical location and dimensions of the site are shown on the attached Plot Plan, Plate "A".

Investigation was authorized to determine the existing soil conditions at the site and to provide data and specific recommendations relative to the foundation design for the proposed structure(s).

Please refer to Appendix II for an explanation of the limitations inherent in this field.

Proposed Construction

Existing is an industrial complex. Driveways, planters and landscaping will complete the project.

Wall and Column loads of 3,000 p.l.f. and 40 kips, respectively, may have been utilized in the construction of the existing buildings.

Final design loads should be submitted to this office, if new structures are to be added.

Site Condition

The site of the proposed construction is a fairly level parcel. It is an existing industrial complex with a pump station and underground storage tanks.

With reference to the site investigated, all 4 adjacent properties are at about the same elevation as the subject lot with matching contours.

Asphalt paving forms the ground cover.

Ths site is utilized for industrial use.

Soil Condition

The on site in situ soil comprises of layers of silty clay, clayey sand and silty sand.

For a detail soil classification, please refer to the logs of the borings, Plates "B" through "E".

No ground water was noted.

Man-placed fill was not encountered during the course of the field investigation.

Exploration

The subsurface was explored using a hollow stem auger rig drilling borings, 6 inches in diameter, to a depth of 40 feet below the existing ground surface. The borings were placed in strategic locations where the major structure is to be constructed in a manner to determine the subsurface conditions. Approximate locations of the borings are shown on the attached Plot Plan, Plate "A".

All of the borings were logged by our soils technician. Samples of both undisturbed and disturbed soils encountered were obtained for laboratory testing and observation. Logs of the borings are shown on Plates "B" through "E". The soils are classified in accordance with the Unified Soil Classification System described on an attached Plate. This Plate also shows the type of sampler used in obtaining undisturbed samples.

Laboratory Testing

The field moisture content and dry densities of the soils encountered were determined by performing tests on the undisturbed samples. The results of these tests are shown on the Logs of Borings, Plates "B" through "E". Density and field moisture information is useful as indicators of the nature and quality of the material.

Direct shear tests were performed on selected, undisturbed samples of the soils in order to determine the strengths and supporting capacities of the soils. The method of performing these tests is to saturate the sample, to extrude the sample into the test apparatus, to apply the normal load, and then to allow sufficient time to elapse to dissipate any excess hydrostatic pressure. The sample is then subjected to a strain-controlled single plane shear test. The method of applying the normal and shearing load is such as to allow the sample to change in volume without producing an associated change in the normal stress. The shearing stress is measured at a constant rate of strain of approximately 0.05 inches per minute.

Selected samples of soil were tested at confining pressures similar to those of the materials in-situ. Additional specimens from the same samples were also tested at increased normal pressures in order to determine the increase in shear strengths associated with increased intergranular pressure. The test results are plotted graphically on Plate "F". The resulting values are on the following page.

Laboratory Testing (cont'd)

Soil Type	Angle of Internal Friction (degrees)	Cohesion (p.s.f.)
Silty clay	25	240
Silty sand	28 1/2	180

Consolidation tests were performed on saturated specimens of the typical foundations soils. Consolidometers are designed to receive the undisturbed soil samples and brass rings in the field condition.

Porous stones placed at the top and bottom of each specimen permit free flow of water into or from the specimen during the test.

Successive load increments were applied to the top of the specimen and progressive and final settlements under each increment were recorded to an accuracy of 0.0001 inch. The final settlements so obtained are plotted to determine curves shown on Plates "G" and "H".

Conclusions

Suitability of the Project

The site is suitable for its intended use, namely an industrial complex. In designing the proposed structures, the criteria given in the design section should be adhered to. Added testing and analysis will be required if new construction is to be made.

A) The construction of this project will not affect the stability of the surrounding structures, such as walls, electric poles, etc. .
B) For this particular lot, this Foundation Soils Investigation report will be adequate. A Geologic Investigation or a Seismic statement is not deemed necessary. Please use U.B.C. Table 23.1 latest edition.
C) This report is subject to approval by the governing agencies.

Strength Characteristics

The load bearing soils possess strength parameters adequate to support the proposed construction.

Expansion Potential

The on site surficial soil is classified as moderately expansive with an expansion index of 44 as per U.B.C. 29-2.

Chemical Testing

4 representative samples were obtained, sealed, frozen and taken to the laboratory for chemical testing.

Recommendations

Foundation Design

Continuous footings, isolated pad footings or a combination of both may be utilized for the design of the foundation to support the proposed structures. These values may be used for preliminary design; added testing is recommended.

Bearing Values

Continuous Wall Footings

A bearing value of 1,500 p.s.f. may be used. The footings should be at least 15 inches wide and a minimum of 15 inches deep. The footings must rest on properly recompacted soil that is at least 18 inches thick.

Isolated Column Pad Footings

Isolated pad footings may be designed using a bearing value of 2,000 p.s.f. Isolated footings should be a minimum 15 inches wide and 15 inches deep. The footings should rest on properly recompacted soil that is at least 30 inches thick.

The above bearing values may be increased 1/3 when resisting loads caused by wind or seismic forces, providing the resultant size is not less than that obtained with dead load and live load only.

Settlement - Total and Differential

Based on the design criteria, settlement should not exceed 0.2 inch for the continuous footings and 0.5 inch for the isolated pad footings. Overall differential settlement is expected to be 0.3 inch. Approximately 1/2 of the settlement will occur during the construction period. Once constructed, the differential settlement will be 1/4 inch or less.

Earth Pressures

Lateral loads will be resisted by the friction between the floor slab and subgrade as well as the passive resistance of the soils against footings. A coefficient of friction of 0.4 may be used between slabs, footings and subgrade. The passive resistance of the soil may be taken to be 300 p.c.f. of E.F.D. .

The active lateral soil pressure may taken as 35 p.c.f. of E.F.D. This value may be reduced to 30 p.c.f. of E.F.D. if engineered drainage is provided.

Expansive Soil Criteria

Continuous footings should be reinforced with at least 1, Number 4 bar at the top. Isolated pad footings need not be reinforced for soils reasons; however, they may be reinforced from a structural point of view.

Due to the expansive nature of the foundation soils, it is recommended that the slabs on grade be reinforced with 6 x 6 - 10x10 WWF or Number 3 bars at 24 inches on center. This should be underlain by a moisture barrier.

The moisture barrier should consist of 4 inches of clean, uniform sized, crushed rock or clean medium to coarse sand.

Also, a 6 mil poly vinyl chloride sheet or comparable impervious material on top of it may be utilized as additional protection. All joints shall be made so as to preserve the impervious character. The membrane should be protected from puncture by a cushion of at least 2 inches of sand, above and below the plastic sheet.

The above criteria are based on the assumption that the moisture barrier is installed and the concrete placed before the soil has begun to show significant surface cracks. Should such cracks occur, the soil should be thoroughly wetted to a depth of 18 inches so that all cracks have disappeared. This should occur 24 to 48 hours prior to placement of the concrete itself.

Contaminated Soil Treatment

The chemical test data is presented on Plates "I" through "L". The samples show high hydrocarbon content and other elements. Based on these test results the soil in the area of the storage tanks is contaminated. A more detailed study should be conducted in order to determine the extent of contamination and the methods of treatment.

Demolition (Where applicable)

Special note should be taken during the demolition of the existing buildings so as to locate all underground items, e.g. pipe, conduit, storage tanks, septic tanks, cesspools or leaching lines, water wells, irrigation pipe, etc. .

Any septic tank found should be removed from the site.

Any seepage pit or cesspool found shall be pumped dry and filled with clean sand. The top and sides should be broken and removed if they are within 5 feet of finished grade. The water well shall be cut off and capped, 5 feet below finished grade.

Demolition (cont'd)

Any metal pipe with a diameter greater than 1 inch shall be excavated and cleared from the site. Any vitrified clay leaching lines may be broken in place.

Any tree that has to be removed due to the construction, should be completely removed and the cavity backfilled as described in grading section.

Any root with a diameter greater than 1 inch shall be excavated and cleared from the site or mulched for future landscaping use.

All cavities should be cut in a "V" shape so that compaction equipment will not bridge during grading which should be conducted in the manner noted below.

It is recommended that the demolition be observed so as to prevent debris from remaining on or being buried on site. The demolition of the below grade items such as pipes and tree root systems must be checked by the soil engineer or his representative.

Grading (Building and Parking Areas)

Prior to the controlled grading operations, the construction area should be stripped of all vegetation that is present and the debris removed from the site or stockpiled and mulched for later use in the planter areas. Recompacted soil is required for footing support, see design section for details. This is for new construction. Final recommendations to be made based on added testing.

A moderate amount of grading is anticipated in the development of this site. It is recommended that all surface which is loose that will support floor slabs or asphalt concrete paving, and all surface which will receive fill or backfill, be scarified to a depth of 8 inches, watered or dried to near Optimum Moisture Content and recompacted to a minimum of 90%.

Where fill or backfill is required, it should be placed in a maximum of 6 inch loose layers and each layer compacted at near Optimum Moisture Content to at least 90% compaction. Clean on site soils may be utilized as fill material. Imported fill soil should be predominantly granular, non-expansive and capable of developing the bearing strength required for the project.

All utility trenches backfilled should be tested at a maximum of 2 feet in vertical height.

Grading (cont'd)

In the parking area, the base soil should be placed and compacted to at least 95% of the compaction standard.

The asphalt should be compacted to at least 96% of its maximum density.

The asphalt used should be AR 4000 or AR 8000 or equivalent.

The baserock should be Class II California Specifications or equivalent.

Compaction Standard: A.S.T.M. D-1557-82

If required by the approving agency, Expansion Index Test (U.B.C. 29-2) will be run at the time of rough grading.

A grading and a foundation plan should be submitted to this office prior to starting the grading. A pre-grade meeting is recommended.

In order for us to provide better service, a minimum of 48 hours notice should be provided to schedule or cancel any geotechnical work.

GEO-ETKA, INC. should be retained to observe all grading operations and the required testing for implementing the recommendations of this report.

If conditions are encountered during the design, approval by the governing agencies, and/or the construction period that appear to be contrary to the findings of this report, this office must be notified so that proper modifications may be made.

Respectfully submitted,
Geo-Etka, Inc.

Ghayas A. Khan, P.E.
Civil Engineer, C-38344

Ahmed Ali
President
GAK/AA/pka

PLOT PLAN

B = DENOTES APPROX. BORING LOCATION

GEO-ETKA, Inc.
Job No: F-2512-86

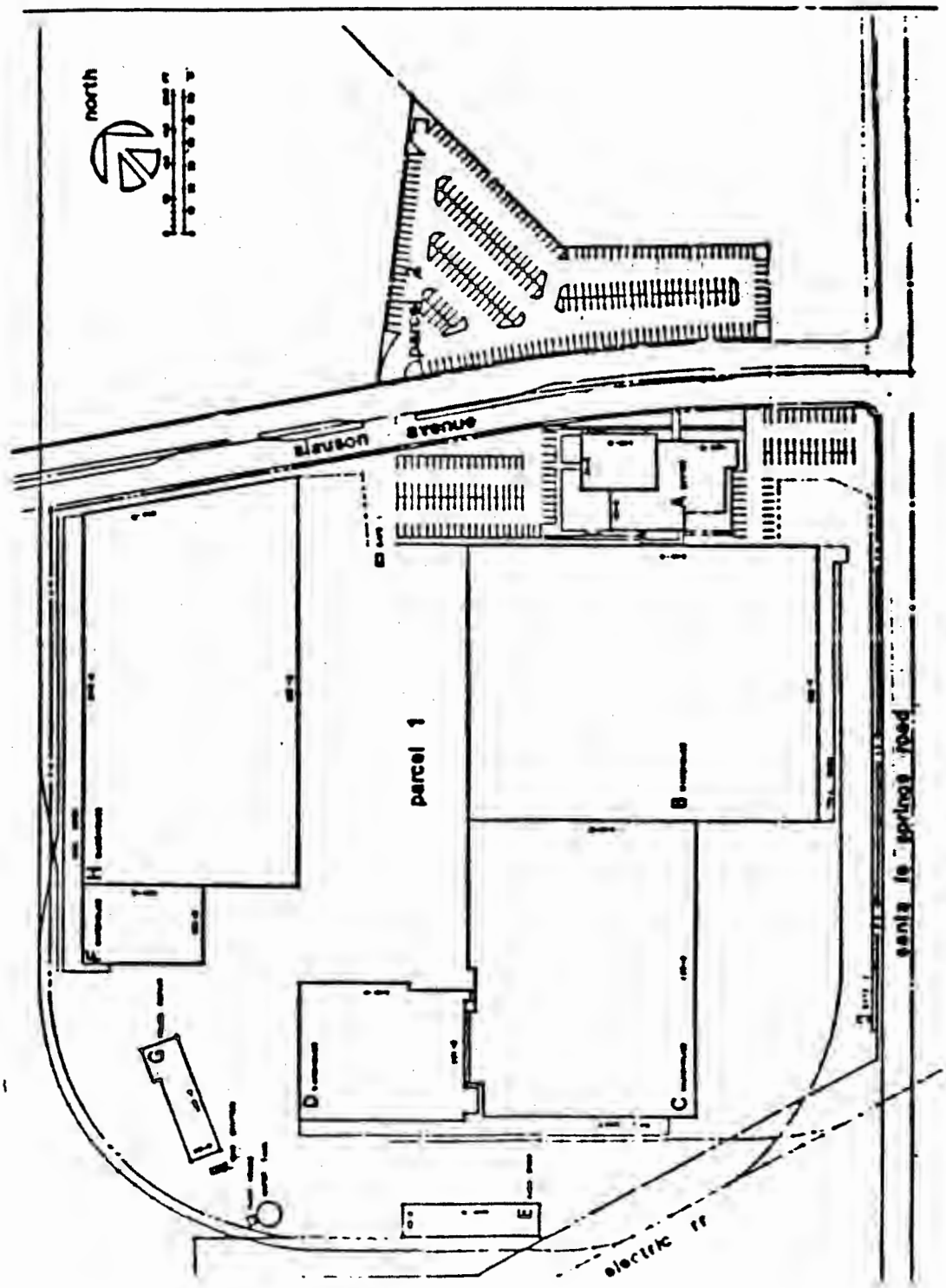

Plate "A"

Job No: F-2512-86

ANAHEIM TEST LABORATORY

3004 S. ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

Geo Etka Inc.

GEO-ETKA, INC.
Fullerton Business Center
2524 East Fender Avenue, Suite C
Fullerton, California 92631

DATE: 4-15-86

P.O. No. Verbal

Shipper No. Job 2512

Lab. No. N-0405-1

Specification:

Material: Soil

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1 1010

Total Hydrocarbons	52 mg/kg
Benzene	ND 0.05 max
Toluene	ND 0.05 max
Xylene	ND 0.1 max
Ethyl Benzene	ND 0.1 max
Total Lead	ND 3.8 max

START

Plate "I"

ANAHEIM TEST LABORATORY

James Kallas (KLN)

James A. Kallas, Chief Chemist

GEO-ETKA, Inc.
Job No: F-2512-86

ANAHEIM TEST LABORATORY

3004 S. ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

TO: Geo Etka Inc.

GEO-ETKA, INC.
Fullerton Business Center
2524 East Fender Avenue, Suite C
Fullerton, California 92631

DATE: 4-15-86

P.O. No. Verbal

Shipper No. Job 2512

Lab. No. N-0405-2

Specification:

Material: Soil

-2 1@15

Total Hydrocarbons	660 mg/kg
Benzene	ND 0.05 max
Toluene	ND 0.05 max
Xylene	ND 0.1 max
Ethyl Benzene	ND 0.1 max
Total Lead	ND 3.8 max

Plate "J"

ANAHEIM TEST LABORATORY

James Kellar (KLA)

James A. Kellar, Chief Chemist

FORM #2

Job No: F-2512-86

ANAHEIM TEST LABORATORY

3004 S. ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

To: Geo Etka Inc.

GEO-ETKA, INC.
Fullerton Business Center
2524 East Fender Avenue, Suite C
Fullerton, California 92631

DATE: 4-15-86
P.O. No. Verbal
Shipper No. Job 2512
Lab. No. N-0405-3
Specification:
Material: Soil

-3 205

Total Hydrocarbons	335 mg/kg
Benzene	ND 0.05 max
Toluene	ND 0.05 max
Xylene	ND 0.1 max
Ethyl Benzene	ND 0.1 max
Total Lead	ND 3.8 max

Plate "K"

ANAHEIM TEST LABORATORY

James J Kallas (KLL)

James A. Kallas, Chief Chemist

FORM #2

Job No: F-2512-86

ANAHEIM TEST LABORATORY

3004 S. ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
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Geo Etka Inc.

GEO-ETKA, INC.
Fullerton Business Center
2524 East Fender Avenue, Suite C
Fullerton, California 92631

DATE: 4-15-86

P.O. No. Verbal

Shipper No. Job 2512

Lab. No. N-0405-4

Specification:

Material: Soil

-4 2012

Total Hydrocarbons	25 mg/kg
Benzene	ND 0.05 max
Toluene	ND 0.05 max
Xylene	ND 0.1 max
Ethyl Benzene	ND 0.1 max
Total Lead	ND 3.8 max

Plate "L"

ANAHEIM TEST LABORATORY

James A. Kalal, Chief Chemist