KLEINFELDER

June 4, 1996
File: 10-3003-26/001

Mr. Stanley Maleski
Albany Unified School District
904 Talbot Avenue
Albany, California 94706

SUBJECT: Geotechnical Investigation Report for the Proposed New Albany Middle School at Brighton Avenue and Spokane Avenue, Albany, California

Dear Mr. Maleski:

Kleinfelder, Inc. is pleased to submit two copies of our geotechnical report for the proposed new Albany Middle School at Brighton Avenue and Spokane Avenue in Albany, California. Additional copies have been distributed as indicated below. The enclosed report provides a description of the investigation performed and our recommendations for design of foundations, earthwork, and pavements.

The proposed project can be constructed at the site from a geotechnical standpoint. Of specific concern at the site is the presence of potentially expansive near-surface soils, and undocumented tank excavation backfills. Placement of the buildings on the expansive material could lead to differential movements of floor slabs and shallow footings. The effects of the expansive soils can be mitigated by deepening footings and by supporting slabs on a layer of "non-expansive" fill. Documentation as to compaction of the backfill for the tank removal was not identified. In addition, pea gravel backfill is not suitable for support of the building loads. Therefore, all tank backfill should be removed and properly back filled. Additional information on our investigative methods, and our specific recommendations for design and construction are contained in the following report.

It should be noted that the conclusions and recommendations presented in this report are predicted upon a limited subsurface investigation and as a result, variations between anticipated and actual soil conditions may be found in localized areas during construction. Therefore, we should be engaged to observe the installation of the foundations, during which time, we may have to make changes in our recommendations. In addition, design plans should also be reviewed by this office prior to their issuance. These additional services are further discussed in the following report.

We appreciate the opportunity of providing our services to you on this project and trust this report meets your needs at this time. If you have any questions concerning the information presented, please contact this office.

Sincerely,

KLEINFELDER, INC.

Anthony Argyriou
Staff Engineer

Michael Majchrzak, C.E., G.E.
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
SCOTT M. LECK
Nº GE002067
Exp. 6/30/96
GEOTECHNICAL
STATE OF CALIFORNIA

Stephen A. Korbay, C.E.G.
Senior Engineering Geologist

AA/SML/SK/mjt

cc: Mr. Ken Kerch, Deems, Lewis, McKinley (3)
Mr. Randy Wylie, R.W. Wylie and Associates (1)

GEOTECHNICAL INVESTIGATION REPORT
NEW ALBANY MIDDLE SCHOOL
BRIGHTON AVENUE AND SPOKANE AVENUE
ALBANY, CALIFORNIA

TABLE OF CONTENTS

Transmittal letter

Page

I. INTRODUCTION 1

A. Project Description 1

B. Purpose and Scope of Services 2

C. Authorization 3

II. GEOLOGY 3

A. Regional 3

B. Faulting and Seismicity 3

III. SITE DESCRIPTION 4

IV. SITE BACKGROUND 5

V. FIELD INVESTIGATION 5

VI. LABORATORY TESTING 7

VI. SUBSURFACE CONDITIONS 7

VIII. GEOLOGIC AND SEISMIC HAZARDS EVALUATION 8

VII. CONCLUSIONS AND RECOMMENDATIONS 12

A. Conclusions 12

B. Recommendations 13

1. Foundations 13
2. Slabs-on-grade 14
   a. Concrete Floor Slab 15

TABLE OF CONTENTS (cont.)

b. Exterior Flatwork 15
3. Retaining Walls 16
4. Earthwork 18
a. General 18
b. Site Clearing and Stripping 19
c. Site Subgrade Preparation and Grading 19
d. Compaction 20
e. Trench Backfill 21
f. Material for Fill 21
g. Excavations 22
5. Surface Drainage 23
6. Pavements 23
7. Site Drainage 25

VIII. ADDITIONAL SERVICES AND LIMITATIONS 25

A. Additional Services 25

B. Limitations 26

GEOTECHNICAL INVESTIGATION REPORT
ALBANY MIDDLE SCHOOL
BRIGHTON AND SPOKANE AVENUES
ALBANY, CALIFORNIA

LIST OF TABLES AND APPENDICES

TABLES

Table No. 1 - Summary of Compaction Recommendations

PLATES

Plate 1 - Site Vicinity Map
Plate 2 - Site Plan

APPENDIX A

Plate A-1 - Boring Log Legend
Plate A-2 through Plate A-7 - Log of Boring B-1 through B-4

APPENDIX B

Plate B-1 - Plasticity Chart
Plate B-2 through Plate B-3 - Unconfined Compression Tests

APPENDIX C - Guide Specifications for Earthwork

APPENDIX D - Application For Authorization To Use

GEOTECHNICAL INVESTIGATION REPORT
NEW ALBANY MIDDLE SCHOOL
BRIGHTON AVENUE AND SPOKANE AVENUE
ALBANY, CALIFORNIA

I. INTRODUCTION

This report presents the results of a geotechnical investigation for the proposed new Albany Middle School to be located at Brighton Avenue and Spokane Avenue in Albany, California. A site vicinity map showing the location of the site is presented on Plate 1. The project architect is Deems, Lewis, McKinley of San Francisco, and our work was coordinated with Mr. Ken Kerch of their office. The civil engineer is Permco Engineering and Management of Clayton, California. The structural engineer is R.W. Wylie and Associates of Encinitas, California.

A. Project Description

The proposed project consists of the construction of a new middle school in the northern part of Albany, California. The buildings will be located along Brighton and Spokane Avenues, with a small parking lot immediately fronting Spokane Avenue, and paved recreational area ("hardcourts") behind the buildings as approximately shown on Plate 2. We understand that the project is in the preliminary planning stages, and building locations, configurations and structural details have not been finalized. Currently, the planned buildings are to include a main school building, a gymnasium, a smaller classroom, and a lunch shelter. The buildings will be single story except for the main school building having a second story over a part of the building, and the gymnasium which will be a high one story. Slab-on-grade floors are anticipated for these structures.

As discussed with the structural engineer for this project, the proposed building will be steel-frame construction with stucco walls and concrete slab-on-grade floors. The gymnasium may have masonry walls. Internal columns for the structures will carry loads up to 100 kips dead plus live loads. The load bearing walls along the perimeter will support building loads up to approximately 2,000 pounds per linear foot (plf), except at the gymnasium, where wall loads are expected to be about 4,000 plf. Floor loads are anticipated to be light. The building will be constructed at various levels, stepping down with the existing site grades. Grading is anticipated to require cuts and fills of up to about 3 feet. Retaining walls will be used for grade separation on the site.

B. Purpose and Scope of Services

The purpose of the geotechnical investigation discussed herein is to evaluate the soil characteristics at the site with respect to the proposed development and to provide geotechnical recommendations for the design and construction of foundations, slab-on-grade, earthwork, and pavements.

The scope of services of the geotechnical investigation consists of, as outlined in our March 26, 1996 proposal, field explorations, laboratory testing, engineering analysis based on field and laboratory data, and preparation of this report. The purposes of this study are to evaluate the surface and subsurface conditions at the school site, to evaluate the potential for geologic hazards, and to provide recommendations for the geotechnical aspects of design and construction of the foundation systems and earthwork. The study will include field explorations, laboratory testing, geologic assessments, engineering analysis, and preparation of a written report.

We explored the subsurface conditions by drilling ten borings to investigate the subsurface soil and groundwater conditions. An environmental investigation was previously performed at the site by Certified Environmental. The boring logs from their report were made available to us. Pertinent information from the boring logs was used to supplement the information from our test borings.

For the geologic hazards investigation, our engineering geologist researched pertinent geologic reports and maps covering the site and vicinity, including the Seismic Safety Element in the General Plan for Albany and for Alameda County. A list of references accompanies this report. He also performed a brief reconnaissance of the site to observe and evaluate surface conditions, and reviewed the boring logs and soil samples obtained during the field exploration for the geotechnical investigation.

C. Authorization

This investigation was authorized by execution of our Engineering Services Agreement by Mr. Stanley Maleski of Albany Unified School District (AUSD), and issuance of AUSD Purchase Order 961252, on April 3, 1996.

II. GEOLOGY

A. Regional

The subject project is located in the East Bay portion of the San Francisco Bay Area, approximately 0.8 miles east-northeast of San Francisco Bay. This area lies within the Coast Range Geomorphic Province of California, which is characterized by northwest trending mountain ranges and elongated narrow valleys. The geology of the area is a complex history of sedimentation, volcanism, folding, faulting, uplift, and erosion. The oldest rocks in the Bay Area portion of the Coastal Range Mountains consist of the Jurassic-Cretaceous age Franciscan Assemblage, composed primarily of sandstones, shales, conglomerates, chert, and altered volcanic rocks deposited approximately 130 million years ago.

B. Site Geology

Geologic maps of the area and our knowledge of local geologic conditions indicate that the school site is underlain by alluvial fan deposits of late Pleistocene age. As shown on the Geologic Map, Plate 3, the alluvium (map symbol Qpa) consists of weakly consolidated interbedded clay, silt, sand, and gravel. Estimated to be generally less than 100 feet thick, the alluvium was derived from erosion of older sedimentary and volcanic rocks in the Berkeley Hills to the east. According to the geotechnical test borings, the alluvium overlies deeply weathered graywacke sandstone and shale of the Franciscan Assemblage at depths of about 25 feet. In this area, the weathered Franciscan rocks are generally sheared and of low hardness and strength as indicated by visual observation of the samples and the blows per foot recorded during sampling in the borings.

B. Faulting and Seismicity

The site and the entire San Francisco Bay Area is seismically dominated by the presence of the active San Andreas fault system. In the theory of plate tectonics, the San Andreas fault system is the general boundary between the northward moving Pacific Plate (west of the fault) and the southward moving North American Plate (east of the fault). In the Bay Area, this movement is distributed across a complex system of generally strike-slip, right lateral parallel and subparallel faults, which include the San Andreas, Hayward, and Calaveras faults, among others.

In the immediate vicinity of the site, the Hayward fault is located approximately 1 mile to the northeast. The San Andreas and Calaveras faults lie about 17.5 miles to the southwest and 14 miles to the east-southeast of the site, respectively. Other active faults in the area include the Concord fault located about 14 miles to the northeast and the Healdsburg-Rodgers Creek fault located about 20.5 miles to the north-northwest.

The seismically active Hayward fault, which is the closest known active fault to the site, is known to have generated several major earthquakes during historic time, the largest being the earthquake of 1868 which resulted in surface rupture along the fault trace from San Leandro to San Jose. Although there was little reported damage in the Albany area since it was mostly uninhabited, there were reports of brick chimney collapse and cracked building walls. The intensity of shaking indicated a Modified Mercalli Intensity (MM) of VII.

III. SITE DESCRIPTION

The project site is located in a predominately residential area in the northern part of Albany. The site is bounded by Brighton Avenue to the south, Spokane Avenue to the east, Cougar Field, the Albany High School football stadium, and the Albany City Limits to the north, and the BART right-of-way to the west. The site is currently surrounded by a chain-link fence. Cerrito Creek runs in a culvert along the northern border of the site.

The site is traversed in the north-south direction by San Gabriel Avenue which dead ends at the north part of the site. To the east of San Gabriel Avenue, most of the site is covered with asphalt pavement and is currently used as an automobile storage lot by Albany Ford-Subaru. There is also an existing one-story wood-frame building immediately east of San Gabriel Avenue at the north part of the site. West of San Gabriel Avenue we understand that a lumber yard existed on the site. Most of the site is paved or covered with concrete slabs; foundation stemwalls from former buildings at the site are also visible at the western part of the site. An abandoned section of railroad track is situated at the southwestern part of the site.

The site ranges in elevation from + 55.5 to +71.5 feet Mean Sea Level Datum (MSLD), gently sloping down towards the west based on topographic information provided by Permco.

IV. SITE BACKGROUND

We understand that the western part of the site was formerly occupied by Hill Lumber Company, while the City of Albany Corporation yard was located on the eastern part of the site. As discussed previously, the buildings from the lumber yard have been removed and one building which was apparently part of the corporation yard remains on site. Information obtained from the Alameda County Health Care Services Agency indicates that two underground fuel storage tanks were removed from the lumber company property, and one from the corporation yard. The approximate locations of these tanks are shown on the Site Plan, Plate 2, which where obtained from the environmental report prepared for the site, entitled "Soil Remediation Report for the Hill Lumber Company, 1259 Brighton Avenue, Albany, California," dated September 15, 1992 and prepared by Certified Environmental Consultants, Inc. The report indicated that the excavation for the 1,000 gallon tank located nearest Brighton Avenue had dimensions 10 feet by 17 feet in plan by 13 feet deep, while the other, a 500 gallon tank excavation had dimensions of about 8 feet by 10 feet in plan by 10 feet deep. The report stated that the excavations were backfilled with pea gravel to within 2 feet of grade, and the upper 2 feet was backfilled with "construction mix", and compacted to "90 percent optimum density." Four groundwater monitoring wells were installed following removal of the tanks at the approximate locations presented on Plate 2. The wells are apparently still in place on the site.

Regarding the tank on the corporation yard property, we understand from the above referenced report that a 250 gallon underground fuel storage tank was removed in April of 1991. No additional information regarding the size of excavation and backfill procedures and materials was available.

V. FIELD INVESTIGATION

Our field investigation was performed on April 11 and 12, 1996, and consisted of drilling ten borings and obtaining two bulk near-surface samples at the approximate locations shown on the Site Plan, Plate 2. The borings were drilled approximately within the footprint of the proposed buildings. The bulk samples (R-1 and R-2) were obtained from the site within the proposed parking and hardcourts area. The borings were drilled using a truck-mounted drill rig equipped with hollow-stem continuous flight augers. The borings were drilled up to a maximum depth of about 41.5 feet below existing surface to collect subsurface data for use in the foundation design of the proposed buildings. All test borings were logged by an engineer of this office and samples of subsurface soils were collected. While drilling boring B-9, an ammonia-like odor was encountered, and the boring was terminated at a depth of 4 feet. Several attempts were made to re-drill this boring at adjacent locations, however, the odor was encountered at all of these locations. All these holes were backfilled with cement grout. This information was provided verbally to the architect and School District, and our environmental group is further studying this condition. The other borings were backfilled with soil cuttings. Excess cuttings were left on site in unpaved areas.

Materials encountered in each soil boring were visually classified in the field, and a continuous log was recorded. Visual classifications were made in accordance with the Boring Log Legend presented on Plate A-1 of Appendix A. Logs of the borings are presented on Plates A-2 through A-11.

From the borings, soil samples were obtained by driving a 2-inch-I.D. and 2-½-inch-O.D. California Sampler, containing thin brass liners, or an unlined Standard Penetration Test sampler (1.4-inch I.D., 2.0-inch O.D.) into the bottom of the boring as it was being advanced. The number of blows required to drive the last 12 inches of an 18-inch drive with a 140 pound hammer dropping 30 inches is recorded as the Penetration Resistance (Blows/foot) on the boring logs. When the sampler was withdrawn from the borings, the brass liners containing the samples were removed, examined for logging, labeled, and sealed to preserve the natural moisture content for laboratory testing.

The locations of the borings were assessed by our engineer based on rough measurements from the limits of existing landmarks. Elevations of the borings are roughly estimated from information from the drawing entitled "Topographic Map - Albany Middle School - Albany, California prepared by Permco Engineering & Management, undated. As such, the locations and elevations of the borings should be considered to be approximate.

VI. LABORATORY TESTING

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory testing program was formulated with emphasis on the evaluation of natural moisture, density, plasticity and strength of the materials encountered.

The laboratory testing program included determination of unit weight and moisture content, Atterberg limits, unconfined compression, and Resistance (R)-Value. Most of the laboratory test results are presented on the individual boring logs. In addition, the results of the Atterberg limits, and triaxial compression tests are graphically presented on Plates B-1 through B-3 in Appendix B.

VI. SUBSURFACE CONDITIONS

As identified in our borings, either pavement sections or fill soils were encountered at the ground surface. The pavement sections were encountered in borings B-2, B-4, B-5, B-7, B-9 and B-10, and consist of about 1 to 3 inches of asphalt concrete over 6 to 7 inches of granular base. Fills consisting of sandy gravel and gravel varying in thickness from about 1/ 2 to 3-1/2 feet were encountered in borings B-1 through B-3 and B-4 through B-8. Below the pavement and fill materials, all of the borings except B-2 encountered a layer of stiff to very stiff black clay of moderate to high plasticity. An Atterberg Limits test performed on a sample of this clay resulted in a Liquid Limit of 51 and a Plasticity Index of 38. These results indicate a high potential for volume changes with changes in moisture content. This layer was found to extend to a depth of about 3.5 to 7 feet below the ground surface. All the borings (except B-9 which was terminated at 4 feet below grade due to the ammonia-like odor) encountered a layer of sandy clays or clayey sands, with occasional gravel. These clays were found to be stiff to very stiff, damp to wet, and of low to moderate plasticity. These clays extend to depths of 11 to 20 feet below grade in our borings. Below the sandy clay layer, our borings encountered a layer of yellow-brown clayey sandy gravel. This layer was generally medium dense to dense, and was saturated near the top, grading to less wet with depth. This stratum was found to extend to the depths explored in borings B-4, B-6, and B-10. In the other borings, this layer was found to be underlain by a layer of medium dense to dense mixed gravel, sand and clay, ranging in color from grayish blue to dark green. The gravels were green sandstone and black claystone fragments. This layer was identified by our Engineering Geologist as highly weathered Franciscan Formation bedrock. This layer extended to the maximum depths explored of about 41-1/2 feet.

We reviewed boring logs prepared by Certified Environmental for previous work at this site. Their logs show similar soils to those our explorations encountered.

Groundwater was encountered in borings B-1, B-2, B-4, B-5, B-6, B-8, and B-10 at depths of about 7 to 16 feet below the existing grades during drilling, and rose to depths of about 7 to 14 feet below grade prior to backfilling the holes. Groundwater elevations range from approximately +50 Mean Sea Level Datum (MSL) at borings B-2 and B-8, to + 60.5 MSL at boring B-4. No groundwater was encountered in borings B-3, B-7, and B-9 during our exploration. The groundwater level may fluctuate depending on factors such as seasonal rainfall, leaking underground utilities, groundwater withdrawal and recharge, and construction activities on this or adjacent sites.

The above is a general description of soil and groundwater conditions encountered in the test borings drilled at the site for this investigation. For a more detailed description of the soil and groundwater conditions encountered, see the Logs of Borings, Plates A-2 through A-12.

Soil and groundwater conditions can deviate from those conditions encountered at the boring locations. If significant variation in the subsurface conditions are encountered during construction, it may be necessary for Kleinfelder to review the recommendations presented herein, and recommend adjustments as necessary.

VIII. GEOLOGIC AND SEISMIC HAZARDS EVALUATION

Our research and geologic evaluation indicates that except for future earthquake-induced ground shaking, there is little or no risk to the site from surface fault rupture, soil liquefaction and lateral spreading, landslides, ground lurching, differential compaction, tsunamis and seiches, or flooding. A discussion of these geologic and seismic hazards is presented below.

Ground Shaking

The entire San Francisco Bay Area is within a region of high seismicity associated primarily with three major active faults and several minor active faults, all of which are related to the San Andreas fault system. This system extends from Baja California in the south to Cape Mendocino in the north. The major faults are the San Andreas along the coast, the Hayward along the base of the Berkeley Hills, and the Calaveras along the east side of the Diablo Range. A major earthquake (magnitude 6 or more) on any of the faults in the region is likely to result in strong ground shaking at the site; however, the intensity will be dependent on the distance to the earthquake epicenter, the magnitude, and the specific soil conditions. Based on recent estimates, it should be anticipated that the site will experience at least one major earthquake during the lifetime of the planned school. The maximum probable earthquake on the nearby Hayward fault is estimated at magnitude 7.5 which could produce a Modified Mercalli intensity of IX which is described as follows:

"Damage considerable in structures (masonry) built especially to withstand earthquakes: threw out-of-plumb some wood-frame houses built especially to withstand earthquakes; great in substantial (masonry) buildings, some collapse in large part; or wholly shifted frame buildings off foundations, racked frames, underground pipes sometimes broken." (California Division of Mines and Geology Special Publication 78).

Surface Fault Rupture

The planned project site is not located within an Alquist-Priolo Earthquake Fault Zone designated by the State of California for active and potentially active faults. The active Hayward fault is located about one mile east of the school site and there are no known active fault traces that underlie or trend towards the site. The potential for surface fault rupture at the site from future earthquakes is low to nil.

Soil Liquefaction and Lateral Spreading

Soil liquefaction is a phenomenon where saturated granular soils near the ground surface undergo a substantial loss of strength due to increased pore pressures resulting from cyclic stress applications induced by earthquakes. In this process, the soil acquires a mobility sufficient to permit both vertical and horizontal movements, and if not confined, may result in significant deformations. Soils most susceptible to liquefaction are loose, uniformly graded, fine-grained sands and silts with very little cohesion. It is generally acknowledged that liquefaction will not occur if such deposits are located at a depth greater than about 50 feet below the ground surface where the greater overburden pressure is sufficient to prevent liquefaction from occurring.

As identified in the borings, the subsurface conditions at the site consist of stiff clays, clayey gravelly sands, and clayey sandy gravels. Although groundwater is relatively shallow (less than 10 feet deep), the soil conditions are judged of sufficient density and cohesion to be non-liquefiable.

Furthermore, weathered bedrock is as shallow as about 25 feet, which would preclude liquefiable material below this depth.

Lateral spreading is a limited type of ground failure associated with liquefaction. Since the potential for liquefaction at the site is nil, it is our opinion that the potential for lateral spreading is also nil.

Landsliding

Based on the absence of landslides and the generally level topography in the site vicinity, the risk of landslides affecting the planned school is nil.

Lurching

Ground lurching is a term used to describe a limited amount of ground surface displacement or slope failure on or adjacent to a free face such as a creek bank or cliff during severe earthquake ground shaking. In the absence of a free face or creek bank at or near the project site, lurching is not a hazard at the site. Although Cerrito Creek borders the north part of the site, the creek has been placed into a culvert and the surface graded level.

Differential Compaction

Differential or dynamic compaction is a term that describes the process of densification and settlement of relatively loose, dry, or partially saturated, granular deposits during earthquake ground shaking. The subsurface soils consist mostly of stiff clays and medium dense clayey sands and gravels. These materials generally have a high resistance to volume change during ground shaking. We believe the soils at the site have a very low potential for differential compaction and resultant settlement.

Tsunamis and Seiches

A tsunami is a seismic sea wave generated by rapid movement of the sea floor during strong earthquakes. These waves can cause considerable damage to low-lying coastal and bay shoreline areas even when the earthquake occurs thousands of miles from the affected coast. Considering that the ground elevation at the project site is about 60 feet above sea level, and that the distance from San Francisco Bay is approximately one mile, the risk of a tsunami affecting the site is nil.

The maximum tsunami run-up elevation in this area has been estimated at about elevation 10 which is near the bay margin.

A seiche is a standing-wave oscillation of the surface of an enclosed or semi-closed body of water that can be generated during and earthquake. In the absence of nearby bodies of water, seiches are not considered a potential hazard to the project site.

Flooding

Since there are no significant reservoirs, lakes, or other major bodies of water nearby or upslope of the site, the potential for seismically-induced flooding at the site is nil. According to current Flood Insurance Rate Maps (FIRM) by the National Flood Insurance Programs, the site is not located within a 100 or 500 year flood zone.

Site Soil Coefficient and Near Fault Factor

The project can be classified, from a seismic standpoint, as being a relatively stiff site with soil depth not exceeding 200 feet. These conditions correspond to a soil profile coefficient factor of S_1 as given in Table 16-J of the 1994 Uniform Building Code.

The relatively proximity of the site to the Hayward fault (about 1 mile) significantly increases the probability of higher and more damaging ground motions than either those experienced during the Loma Prieta event (1989) or those on which the 1994 Uniform Building Code is based. For a code equivalent lateral force design, we recommend consideration be given to incorporating the proposed near source factors for the 1997 UBC, which would increase the Z factor by a multiple of 1.9. Alternatively, consideration should be given to dynamic analyses utilizing site specific ground motions that better account for the types of near surface effects observed in the recent Northridge, California and Kobe, Japan earthquakes.

VII. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

From a geotechnical standpoint, of significant importance to the support of the buildings are the presence of high-plasticity, potentially highly expansive soils near the surface, and the presence of existing undocumented fills from previous site uses and remediation. These conditions will need to be mitigated as discussed below.

The surficial native soils were found to be moderately to highly expansive and may swell or shrink as a result of seasonal or man-made soil moisture content changes. Special measures, including deepened footings and the use of "non-expansive" fill beneath concrete slabs, will be needed where structures will directly overlie these soils. These measures are discussed in detail in the following sections of this report. Additionally, to reduce inducing surface water into the moisture sensitive clayey surface soils, all rain leaders should be connected to the storm drain system proposed for the site.

The building loads may be supported by shallow foundations consisting of continuous and isolated spread footings founded on either the native stiff silty clays or engineered fills.

Existing structures, pavement sections and fills encountered at the site will need to be removed prior to site grading activities, and resulting excavations will have to be backfilled with engineered fill. Excavations resulting from the removal of the underground storage tanks within building footprints will also have to be overexcavated and backfilled with engineered fill, since the gravel backfill is unacceptable to support building loads. Where fills are deeper than 5 feet, the portion below the depth of 5 feet will need to be compacted to a higher relative compaction to reduce fill related settlement.

Groundwater appears to be located below a depth of about 7 feet. Groundwater should have little impact on the construction of the project, except where elevator pits or deep utility trenches are required, or where the tank backfill is to be removed. The local groundwater levels can fluctuate depending on factors such as seasonal rainfall, groundwater withdrawal and construction activities on this or adjacent properties. The influence of these time dependent factors could not be assessed at the time of our investigation.

B. Recommendations

1. Foundations

Based on the data presented herein, building loads can be adequately supported by continuous spread footings along the walls and isolated spread footings for the columns, bearing either in native soils or engineered fills. The recommended soil bearing pressures, depth of embedment, and width of footings are presented below. The bearing values provided have been estimated assuming that all footings uniformly bear on engineered fill or undisturbed firm native soils.

FOUNDATION BEARING CAPACITY RECOMMENDATIONS

Allowable Footing Type	Minimum Bearing Pressure (psf)*	Minimum Embedment (in)**	Width (in)
Continuous Wall	2,500	24	12
Isolated Column	2,500	24	18

* Dead plus live load
** Below lowest adjacent grade, defined as bottom of slab on the interior and finish grade at the exterior.

Allowable soil bearing pressures may be increased by one-third for transient loads such as wind and seismic loads.

Where footings are located near existing footings or near underground utilities, the footings should extend below a plane projected 45 degrees upward from the bottom of the footing or underground utility to avoid surcharging the footing or underground utility with building loads. Where utilities cross perimeter footings line, the trench backfill should consist of a vertical barrier of impervious type material or lean concrete.

Concrete for footings should be placed neat against clean excavations. It is critical that footing excavations not be allowed to dry before placing concrete. If shrinkage cracks appear in the footing excavations, the excavations should be thoroughly moistened to close all cracks prior to concrete placement. The footing excavations should be monitored by a representative of Kleinfelder for compliance with appropriate moisture control and to confirm the adequacy of the bearing materials.

Lateral loads may be resisted by a combination of friction between the foundation bottoms and the supporting subgrade, and by passive resistance acting against the vertical faces of the foundations. An allowable friction coefficient of 0.35 between the foundation and supporting soils may be used. For passive resistance, an allowable equivalent fluid pressure of 350 pounds per cubic foot acting against the footings may be used. The friction coefficient and passive resistance may be used concurrently, and can be increased by one-third for wind and/or seismic loadings.

Settlements of building foundation constructed in accordance with the above recommendations should be primarily elastic with the majority of the settlement occurring upon application of the load, when foundation is constructed as recommended above. Total settlements are estimated to be less than 1 inch and differential settlements should be less than 1/2 inch over a horizontal distance of 50 feet.

2. Slabs-on-grade

Slabs-on-grade for this project will consist of concrete floor slabs and exterior flatwork. As previously discussed, the near-surface soils are highly expansive and will be subject to shrink/swell cycles with fluctuations in moisture content. To reduce these potentially adverse effects, we recommend that concrete floor slabs be underlain by 24 inches of "non-expansive" imported engineered fill placed on subgrade prepared as described in the "Earthwork" section of this report.

The "non-expansive" fill should have properties meeting the criteria listed in the "Earthwork" section of this report. The "non-expansive" fill should extend a minimum horizontal distance of 5 feet beyond all building areas, including the outer edge of perimeter footings and footings extending beyond perimeter walls. It is important that placement of this material be done as soon as possible after compaction of the subgrade to prevent drying of the native subgrade soils and that slabs be constructed as soon as possible after "non-expansive" material is placed, as subgrades dry out even through "non-expansive" fills. A representative of Kleinfelder should be present to observe the condition of the subgrade and observe and test the installation of the "non-expansive" engineered fill prior to slab construction.

KLEINFELDER

Prepared for **Albany Unified School District**

GEOTECHNICAL INVESTIGATION REPORT
NEW ALBANY MIDDLE SCHOOL
BRIGHTON AVE. AND SPOKANE AVE.
ALBANY, CALIFORNIA

June 4, 1996
File No.: 10-3003-26

a. Concrete Floor Slab

Concrete floors should be supported on at least 6 inches of angular gravel or crushed rock to provide a capillary moisture break and uniform support for the slab. This material can be considered as part of the required underlying 24 inches of "non-expansive" engineered fill. The capillary break material should be 3/4-inch maximum size with no more than 10 percent by weight passing the #4 sieve. It is important that placement of this material and concrete be done as soon as possible after compaction of the "non-expansive" subgrade materials to reduce drying of the subgrade.

Floor slabs should have a minimum thickness of 5 inches. Slab thickness and reinforcing should be designed by a Structural Engineer. Because the floor slabs are to be supported on imported "non-expansive" granular material, a modulus of subgrade reaction is difficult to estimate. For estimating purposes, a value of 150 pounds per cubic inch may be used. This number will need to be checked when the source of the imported soil has been determined.

Special care should be taken to insure that reinforcement is placed at the slab mid-height. The floor slab should be separated from footings, structural walls, and utilities, and provisions made to allow for settlement or swelling movements at these interfaces. If this is not possible from a structural or architectural design standpoint, it is recommended that the slab connection to footings be reinforced such that there will be resistance to potential differential movement.

For concrete floors with moisture-sensitive surfacing, we recommend that an impermeable membrane (10 mil or thicker) be placed over the rock to reduce migration of moisture vapor through the concrete slab. In order to promote a more uniform curing of the slab and to provide protection of the impermeable membrane, it is advisable to place 2 inches of fine sand on top of the membrane to protect it prior to placing the slab concrete. The sand should be moistened slightly prior to placing the concrete. The thickness of the sand can replace an equivalent thickness of capillary break material.

b. Exterior Flatwork

Concrete exterior flatwork at grade will be constructed on soils subject to swell/shrink cycles. Some of the adverse effects of swelling and shrinking can be reduced with proper moisture treatment. The intent is to reduce the fluctuations in moisture content by moisture conditioning the soils, sealing the moisture in, and controlling it. Near-surface soils should be moisture conditioned according to the recommendations in Table No. 1. In addition, all exterior concrete slabs should be supported on a minimum of 12 inches of either "non-expansive" soil, Class 2 Aggregate Sub-Base (AS), or Class 2 Aggregate Base (AB). Where concrete flatwork is to be exposed to vehicle traffic, the upper 6 inches of the "non-expansive" fill should consist of Class 2 Aggregate Base as specified in the current California Department of Transportation Standard Specifications. Exterior flatwork will be subjected to edge effects due to the drying out of subgrade soils. To protect against edge effects adjacent to unprotected areas, such as vacant or landscaped areas, lateral cutoffs such as an inverted curb are recommend. Because of the expansive soils, flatwork should have control joints no greater than 10 foot on center. Prior to construction of the flatwork, the 12 inches of "non-expansive" fill, ASB or AB, should be moisture conditioned to between 2 and 5 percent over optimum. If the "non-expansive" fill, ASB or AB is not covered within 30 days after placement, the soils below this material will need to be checked for appropriate moisture of 2 to 5 percent over optimum. If the moisture is found to be below this level, the flatwork areas will need to be soaked until the proper moisture content is reached. Where flatwork is adjacent to curbs, reinforcing bars should be placed between the flatwork and the curbs. Expansion joint material should be used between flatwork and curbs, and flatwork and buildings.

3. Retaining Walls

It is anticipated that retaining walls up to 4 to 5 feet high may be required for the proposed project. These walls must be designed to resist static earth pressures due to the adjacent soil, and any surcharge effects caused by loads adjacent to the exterior walls. It is recommended that the walls be designed for lateral earth pressures as presented below, which are expressed as equivalent fluid pressures.

LATERAL EARTH PRESSURES FOR LOW WALLS (UP TO 10 FEET) WITH MAXIMUM BACKFILL INCLINATION OF 6 HORIZONTAL TO 1 VERTICAL		
	Equivalent Fluid Density, pcf	
Earth Pressures	**"Non-Expansive" Backfill**	**Expansive Native Soil**
Active	40	55
At-rest	55	75
Passive (allowable)	350	350

The above values are provided for on-site soils (expansive) and for imported "non-expansive" backfill. Walls whose tops are not free to deflect should be designed for an at-rest condition while an active case can be applied for walls that are free to deflect at the top. These values apply to horizontal backfill up to a maximum inclination of 6 horizontal to 1 vertical, and do not include hydrostatic pressures that might be caused by groundwater or water trapped behind the structure. Retaining walls should be well-drained to minimize hydrostatic pressures. A typical drainage system consists of a 1 to 2 foot wide zone of Caltrans Class 2 Permeable material immediately adjacent to the structure with a perforated pipe at the base of the structure discharging to a storm drain or other discharge facility. As an alternative, a prefabricated drainage board may be used in lieu of the Class 2 Permeable material. If the permeable material is used, a 12 inch thick native soil cap should be placed on top of the permeable material where the backfill is not covered by slab or paving.

The surcharge effect from loads adjacent to retaining walls should also be included in the design of the walls. A rectangular distribution over the entire depth of the wall with a pressure equal to one-third of the surcharge load is normally used.

In computing allowable passive pressures, a factor of safety of 2.0 has been applied to the value presented above. We recommend that the passive resistance be neglected for the top 12 inches below design grade.

"Non-expansive" backfill should be used in the zone immediately adjacent to the structure. In order to use the recommended values for "non-expansive" backfill, the width of this zone should be equal to or greater than one-half the height of the structure. "Non-expansive" fill should meet the minimum criteria listed in the "Earthwork" section of this report.

Backfill against structures should be compacted as discussed in Table No. 1. Over-compaction should be avoided because increased compactive effort can result in lateral pressures significantly higher than those recommended above.

Base resistance between concrete and native soils can be computed based on an allowable coefficient of sliding friction of 0.35.

We recommend that design drawings of retaining walls showing height of wall, backfill material type, drainage details and the earth pressures used in design be reviewed by Kleinfelder for conformance to the recommendations given. Certain proprietary wall systems, such as Reinforced Earth Walls and Crib Lock Walls, are design-built systems requiring close coordination with the Civil Engineer on drainage outlets and connections. If any proprietary walls are planned, we strongly recommend that we review the type of wall proposed and make alternate appropriate lateral earth pressure recommendations for these walls. Furthermore, we recommend that Kleinfelder be retained to review design plans prior to issuance for construction.

4. Earthwork

a. General

Based on the existing topography and the nature of the proposed development, we anticipate that preparation of the building pad and pavement subgrade areas will require cuts and fills of about 3 feet or less. Final grading plans should be reviewed by Kleinfelder for conformance to our design recommendations prior to construction bidding. Guide specifications for earthwork are presented in Appendix E.

Grading, excavation, and earthwork at the site will generally consist of the following: 1) removal of existing buildings, pavements, structures and their related foundations; 2) removal of all tank backfill; 3) excavation and backfilling for utility lines; 4) overexcavation of expansive soils and replacement with "non-expansive" soils within building areas; 5) excavation for foundations; and 6) preparation of the subgrade and placement of "non-expansive" fill for support of slab-on-grade and exterior flatwork.

Site preparation and grading should be performed in accordance with the recommendations presented below.

b. Site Clearing and Stripping

Prior to the start of construction, all remnants of previous construction, including buried utilities, pavement sections, foundations and floor slabs, and other deleterious matter should be removed. The asphalt pavement and aggregate baserock should be removed, and if properly crushed, may be reused as either general fill, or "non-expansive" fill if it meets the gradation requirements. Concrete from slabs and foundations may be crushed and re-used as general fill, provided that it is crushed to a maximum particle size of three inches, and blended with other soils or aggregates to minimize voids between large particles.

Backfilled excavations from previously removed underground fuel storage tanks should also be overexcavated and the materials stockpiled. If pea gravel was used for backfill, it can be blended with other soils or aggregates and reused on site.

c. Site Subgrade Preparation and Grading

The exposed subgrade should be evaluated by the geotechnical engineer. Soft or loose areas should be overexcavated to firm soils and replaced with engineered fill. If soft soils extend more than two feet, the overexcavation may be extended two feet, a geotextile stabilization fabric (Mirafi 600x or equivalent) placed at the bottom, and engineered fill placed on the fabric. Unit prices during bidding should be obtained for additional overexcavation, if needed. The excavated soils, if properly moisture conditioned and free of deleterious materials, may be replaced as engineered fill. Subgrade soils and fill soils should be moisture conditioned and compacted as discussed in the following subsection of this report.

Grading operations during the wet season or in areas where the soils are saturated may require provisions for drying of the soil prior to compaction. If the project necessitates fill placement and compaction in wet conditions, we could provide alternatives for drying the soil. Conversely, additional moisture may be required during the dry months. Water trucks should be available in sufficient number to provide adequate water during compaction.

All site preparation and fill placement should be observed by a representative of Kleinfelder, Inc. It is important that during the stripping, excavation, and scarification process, a Geotechnical Engineer be present to observe whether any undesirable material is encountered in the construction area and whether exposed soils are similar to those encountered during the geotechnical site exploration.

d. Compaction

Following stripping and over-excavation in building pad and flatwork areas, exposed subgrades should be scarified to a depth of 8 inches and moisture conditioned to between 2 and 5 percent above the optimum moisture content. The subgrade in building pad areas should be compacted to at least 90 percent relative compaction. Subgrade soils in the pavement area should be moisture conditioned to at least 2 percent above the optimum moisture content; care should be taken to prevent excessive moisture content which could impact the ability to achieve the recommended level of compaction. The upper 8 inches of subgrade in pavement areas should be compacted to at least 90 percent relative compaction. Stripping, scarifying and compaction should extend laterally beyond the limits of the building or face of curb a minimum of 5 and 2 feet, respectively. For the purposes of this report, relative compaction is defined by the ASTM D1557 test method.

In general, fill soils consisting of cohesive soils should be moisture conditioned to between 2 and 5 percent above optimum moisture content. "Non-expansive" soils as defined below under "Material for Fill" should be moisture conditioned to near the optimum moisture content. The subgrade soils in the pavement areas should be moisture conditioned to a minimum of 2 percent above the optimum moisture content. Moisture conditioning may include the drying of soils that are found to be wet. With the exception of aggregate base materials and fills within the structural subgrade section of pavements, all fills should be compacted to at least 90 percent relative compaction. Aggregate base, aggregate sub-base (if used), and the upper six inches of pavement subgrades should be compacted to at least 95 percent relative compaction. Fill materials should be placed in lifts not exceeding 8 inches in uncompacted thickness. We recommend that compaction be done by mechanical means only; jetting or flooding should not be permitted. Due to equipment limitations, thinner lifts may be necessary to achieve the recommended level of compaction, especially in trenches and confined spaces.

Where tank backfills are removed and replaced to a depth greater than 5 feet below finished grade, fill placed more than 5 feet below finished grade should be compacted to a minimum of 95 percent relative compaction to reduce settlements.

e. Trench Backfill

All underground utility trenches should be backfilled with compacted engineered fill. If on-site soils are used, the material should be compacted to at least 90 percent relative compaction. Imported sand may also be used for backfilling trenches provided the sand is also compacted to at least 90 percent relative compaction and, where located outside building limits, capped with a minimum 12-inch thick layer of soil similar to that of the adjoining subgrade. Where utilities cross the perimeter footing line, the trench backfill should consist of a vertical barrier of impervious type material or lean concrete. Backfill material should be placed in lifts not exceeding 8 inches in uncompacted thickness. Thinner lifts may be necessary to achieve the recommended level of compaction of the backfill due to equipment limitations. Compaction should be performed by mechanical means only. Water jetting or flooding to attain compaction should not be permitted.

Special care should be taken in the control of utility trench backfilling in the pavement areas. Poor compaction may cause excessive settlements resulting in damage to the pavement structural section.

f. Material for Fill

In general, the site soils with an organic content of less than 3 percent, free of any deleterious materials or hazardous substances, and have a maximum particle size of 3 inches with at least 90 percent by weight passing the 1-inch sieve may be used as engineered fill to achieve project grades, except where "non-expansive" fills are recommended.

"Non-expansive" fill should meet the following requirements:

Maximum particle size	3 inches
Percent passing 1-inch sieve	Minimum 90% by weight
Percent Soil Passing #200 sieve	8% to 40% by weight
Plasticity Index	15% or less
Liquid Limit	less than 30%

If the baserock for the existing paving on the site is selectively harvested such that the material is free of debris and clay soils, the material may be used as "non-expansive" fill or aggregate sub-base. If the removed asphalt is crushed and blended with the recycled aggregate base, and the mixture meets the gradation requirements above, it may be used as either "non-expansive" or aggregate sub-base. This material maybe reused as aggregate base if it meets the requirements for Class II aggregate base in Chapter 29 of Caltrans Standard Specifications. Asphalt and concrete crushed to a maximum particle size of 3 inches may be blended with on-site soils for use as general fill.

In addition to the above, highly pervious materials are not recommended for use as "non-expansive" fill because they would permit transmission of water to the underlying expansive materials. Samples of the "non-expansive" fill, imported or on-site soils to be used as fill or backfill, should be submitted to our laboratory for testing and approval a minimum of one week prior to their use.

g. Excavations

Temporary excavations, defined by OSHA to include trenches, should be treated in accordance with the State of California version of OSHA excavation regulations, "Construction Standards for Excavations," 29 CFR part 1926, subpart P, latest revision. The near-surface soils are judged to be OSHA Type A or Type B soils above the water table.

Excavation for footings and utility trenches can be readily made with either a backhoe or trencher. We expect the walls of trenches less than 4 feet deep to generally stand vertical without support for a period of several days. All trenches should conform to the current OSHA requirements for work safety.

Backfills for trenches or other small excavations within pavement areas and beneath slabs should be compacted as noted in Table No. 1 and in accordance with the Guide Specifications for Earthwork presented in Appendix C. Where utility trenches extend from the exterior to the interior limits of a building, native clayey soils or lean concrete should be used as backfill material for a distance of 2 feet laterally on each side of the exterior building line to reduce the trench from acting as a conduit to exterior surface water. Utility trench located in landscaped areas should also be capped with a minimum 12 inches compacted on-site clayey soils.

Underground utilities should be located above a plane project 45 degrees downward from the bottom of the footings to avoid undermining the footings during the excavation of the utility trench.

Special care should be taken in the control of utility trench backfilling in the pavement areas. Poor compaction may cause excessive settlements resulting in damage to the pavement structural section.

5. Surface Drainage

Final site grading should provide surface drainage away from structures to reduce the percolation of water into the underlying soils. Ponding of surface water should not be allowed adjacent to structures. Grades should be sloped away from the structures a minimum of 4 percent in landscaped areas and 2 percent in paved areas for a horizontal distance of at least 5 feet. Rainwater collected on the roofs of the buildings should be transported through gutters, downspouts, and closed pipes which discharge on the pavement or lead directly to the site storm sewer system.

6. Pavements

Pavement for this project will consist of asphalt concrete access driveways, parking areas and recreational areas ("hardcourts"). We assume vehicle loading for this project will be variable and will consist of passenger vehicles as well as heavy trucks. The project architect has indicated that paved recreational areas should be designed for possible vehicle loading. For this project, we estimate Traffic Indices (T.I.) of 4 to 6. The actual traffic indices should be assigned by the Civil Engineer.

We have performed our pavement designs assuming the pavement subgrade soil will be similar to the near surface soils described in the boring logs. This assumption is based on our understanding that grading and soil removal in the paved areas will be minimal. If site grading exposes soil other than that assumed, or import fill is used to construct pavement subgrades, we should perform additional tests to confirm or revise the recommended pavement sections for actual field conditions. This may result in a savings in construction costs.

A Resistance (R)-value test was performed on a near-surface soil collected from R-1, with a resulting value of less than 5. We used an R-Value of 5 for design of the pavement section using the Caltrans Flexible Pavement Design Method. Pavement sections for different T.I. values are presented below.

ASPHALT CONCRETE PAVEMENT DESIGN
R-VALUE < 5

T.I.	AC	AB
4	2.5	7.5
5	2.5	11.0
6	3.0	13.5

Note: Thicknesses shown are in inches.
AC = Type B Asphalt Concrete
AB = Class 2 Aggregate Base (R-Value = 78)

Each T.I. represents a different level of use. The owner or designer should determine which level of use best reflects the project and select appropriate pavement sections.

We recommend that the subgrade soil over which the pavement sections are to be placed be moisture conditioned and compacted according to the recommendations in Table No. 1. Subgrade preparation should extend a minimum of 2 feet laterally beyond the face of the curb.

Parking areas should be sloped and drainage gradients maintained to carry all surface water off the site. Surface water ponding should not be allowed anywhere on the site during or after construction. We recommend that the pavement section be isolated from non-developed areas and areas of intrusion of irrigation water from landscaped areas. Curbs should extend a minimum of 2 inches below the baserock and into the subgrade to provide a barrier against migration of landscape water into the pavement section.

In addition, we recommend that all pavements conform to the following criteria:

- All trench backfills, including utility and sprinkler lines, should be properly placed and adequately compacted to provide a stable subgrade.

- An adequate drainage system should be provided to prevent surface water or subsurface seepage from saturating the subgrade soil.

- The aggregate base and asphalt concrete materials should conform to ASTM test procedures and work should be performed in accordance with Caltrans Standard Specifications, latest edition.

7. Site Drainage

Proper site drainage is important for the long term performance of the planned structure. The building pad should be graded so as to carry surface water away from the building foundation in accordance with the Uniform Building Code. The ground surface should slope away from the building at a minimum inclination of 2 percent in paved areas and 4 percent in landscaped areas, for a minimum distance of 5 feet. The drainage configuration should not be changed during future landscaping or other improvements. In addition, all rain water leaders should be connected directly into a storm drainage system or drain onto paved areas sloped away from the building, provided this does not create a safety hazard. Landscape watering adjacent to the building should be avoided. Where needed, a drip irrigation system should be used. In addition to having adequate drainage, overwatering should be avoided. Subsurface flows should also be controlled both on-site and from off-site. Utility trenches should be backfilled and compacted to a minimum of 90 percent with native clayey material or lean concrete for a distance of approximately 2 feet on either side of where they enter into the buildings. This backfill will act as a cut-off to help reduce the possibility of water seepage under the building through the utility trench.

VIII. ADDITIONAL SERVICES AND LIMITATIONS

A. Additional Services

As part of our services for this project, Kleinfelder will review the project plans and specifications for conformance with the recommendations presented in this report. Kleinfelder will also provide the field observations and testing services during construction on an on call basis. If Kleinfelder is not retained for these services, the client will be assuming Kleinfelder's responsibility for any potential claims that may arise during or after construction. The required tests, observations, and consultation by Kleinfelder during construction include, but are not limited to:

- observations of site grading,
- observations of foundation construction,
- in-place density testing of fills, backfills, and finished subgrades.

B. Limitations

The services provided under this contract as described in this report include professional opinions and judgments based on the data collected. These services have been performed according to generally accepted geotechnical engineering practices that exist in the San Francisco Bay Area at the time the report was written. No other warranty is expressed or implied. This report is issued with the understanding that the owner chooses the risk he wishes to bear by the expenditures involved with the construction alternatives and scheduling that is chosen.

The conclusions and recommendations of this report are for the Albany Middle School project, as described in the text of this report. The conclusions and recommendations in this report are invalid if:

- the proposed structures, as described, change,
- the structures are relocated,
- the report is used for adjacent or other property,
- the Additional Services section of this report is not followed,
- if changes of grades occur between the issuance of this report and construction, or
- any other change is implemented which materially alters the project from that proposed at the time this report is prepared.

The conclusions and recommendations presented in this report are based on information obtained from the following:

- 10 borings,
- the observations of our engineer,
- the results of laboratory tests, and
- our experience in the area.

The boring logs do not provide a warranty as to the conditions which may exist at the entire site. The extent and nature of subsurface soil and groundwater variations may not become evident until construction begins. It is possible that variations in soil conditions between borings could exist between or beyond the points of exploration or that groundwater elevations may change, both of which may require additional studies, consultation, and possible design revisions. If conditions are encountered in the field during construction which differ from those described in this report, our firm should be contacted immediately to provide any necessary revisions to these recommendations.

It is the client's responsibility to see that all parties to the project including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety, including the Additional Services and Limitations sections.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report for other then the intended purposes shall notify Kleinfelder of such intended use by executing the "Application for Authorization to Use" which follows this document as an Appendix. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

TABLES

TABLE 1

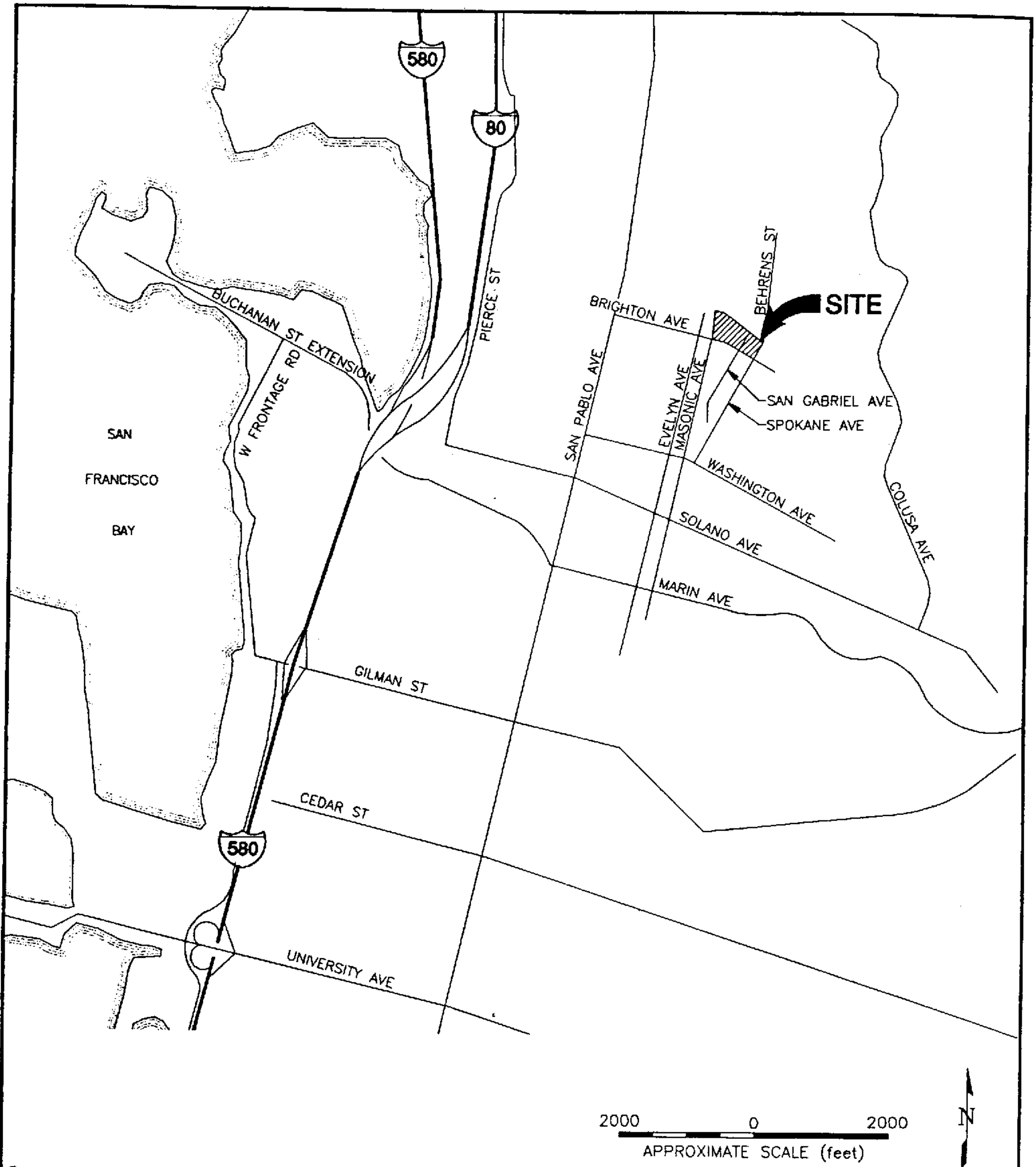
SUMMARY OF COMPACTION RECOMMENDATIONS

Area	Compaction Recommendation (1)
General Engineered Fill	Compact to a minimum of 90 percent compaction at a range of about 2 to 5 percent over optimum moisture content.
Trenches(2)	Compact to a minimum of 90 percent compaction at a range of about 2 to 5 percent over optimum moisture content.
Fill or Backfill Below 5 feet depth(3)	Compact to a minimum of 95 percent compaction at a range of about 2 to 5 percent over optimum moisture content.
Concrete Floor Slabs (3)	Compact upper 12 inches of subgrade to a minimum of 90 percent compaction at a range of about 2 to 5 percent over optimum moisture content.
Exterior Flatwork (3)	Compact upper 8 inches of subgrade to a minimum of 90 percent compaction at a range of about 2 to 5 percent over optimum moisture content.
Parking and Access Driveways (3)	Compact upper 8 inches of subgrade to 95 percent relative compaction at a range of about 2 to 5 percent over optimum moisture content. Compact baserock to a minimum of 95 percent compaction near optimum moisture content.

Notes:

(1) All compaction requirements refer to relative compaction as a percentage of the laboratory standard described by ASTM D-1557.
(2) In landscaping areas only, this percent compaction in trenches may be reduced to 85 percent.
(3) Depths are below finished subgrade elevation.
(4) Fill material should be compacted in lifts not exceeding 8 inches in loose thickness.
(5) All subgrades should be firm and unyielding.

PLATES



KLEINFELDER

SITE VICINITY MAP

NEW ALBANY MIDDLE SCHOOL
BRIGHTON AND SPOKANE AVENUES
ALBANY, CALIFORNIA

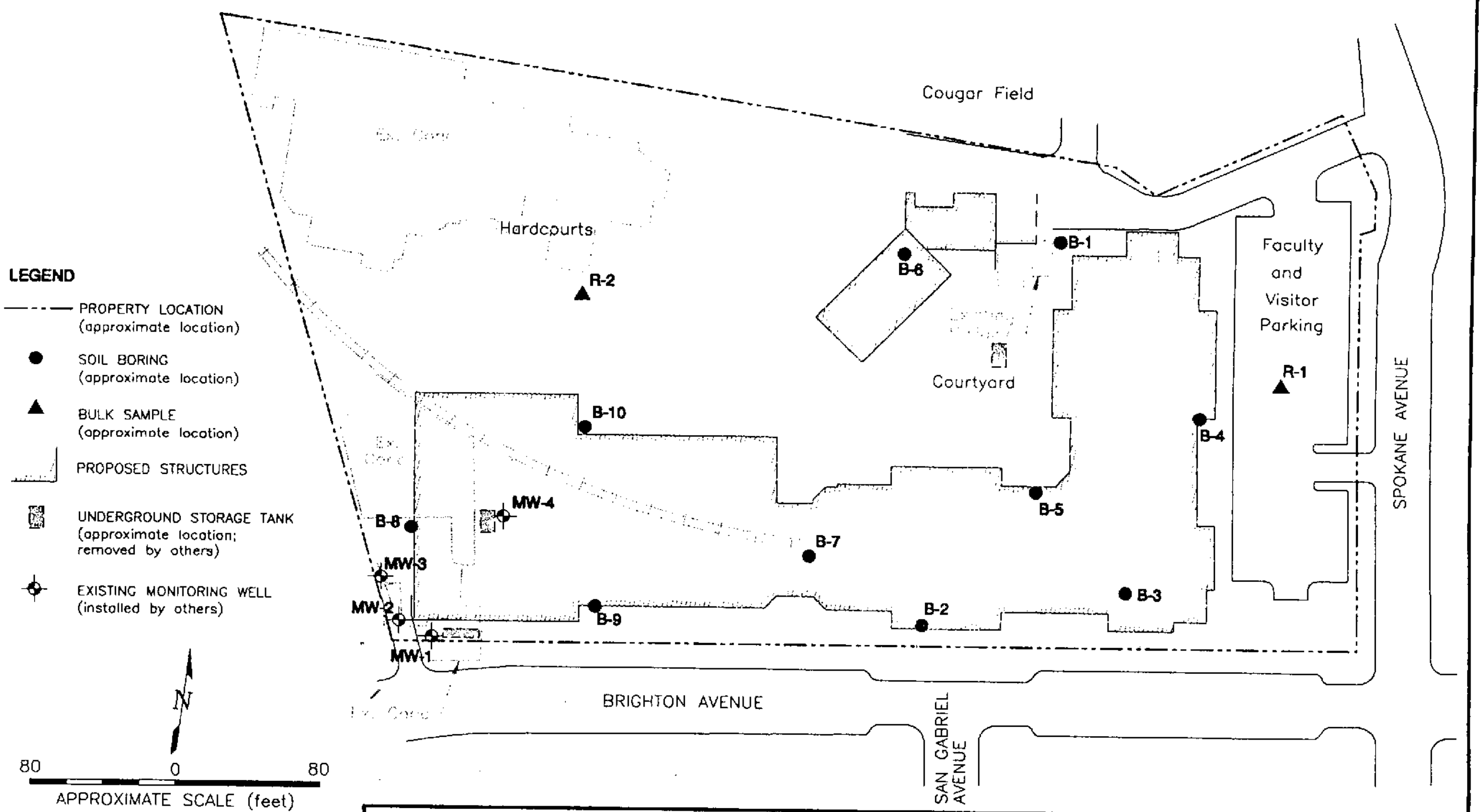
PLATE 1

DRAFTED BY: L. Sue DATE: 4-17-96

CHECKED BY: S. Leck DATE: 4-17-96

PROJECT NO. 10-300326-001

CAD FILE: C:\-KA_PROJ\PLEAS\10300326\SITE-VIC.dwg



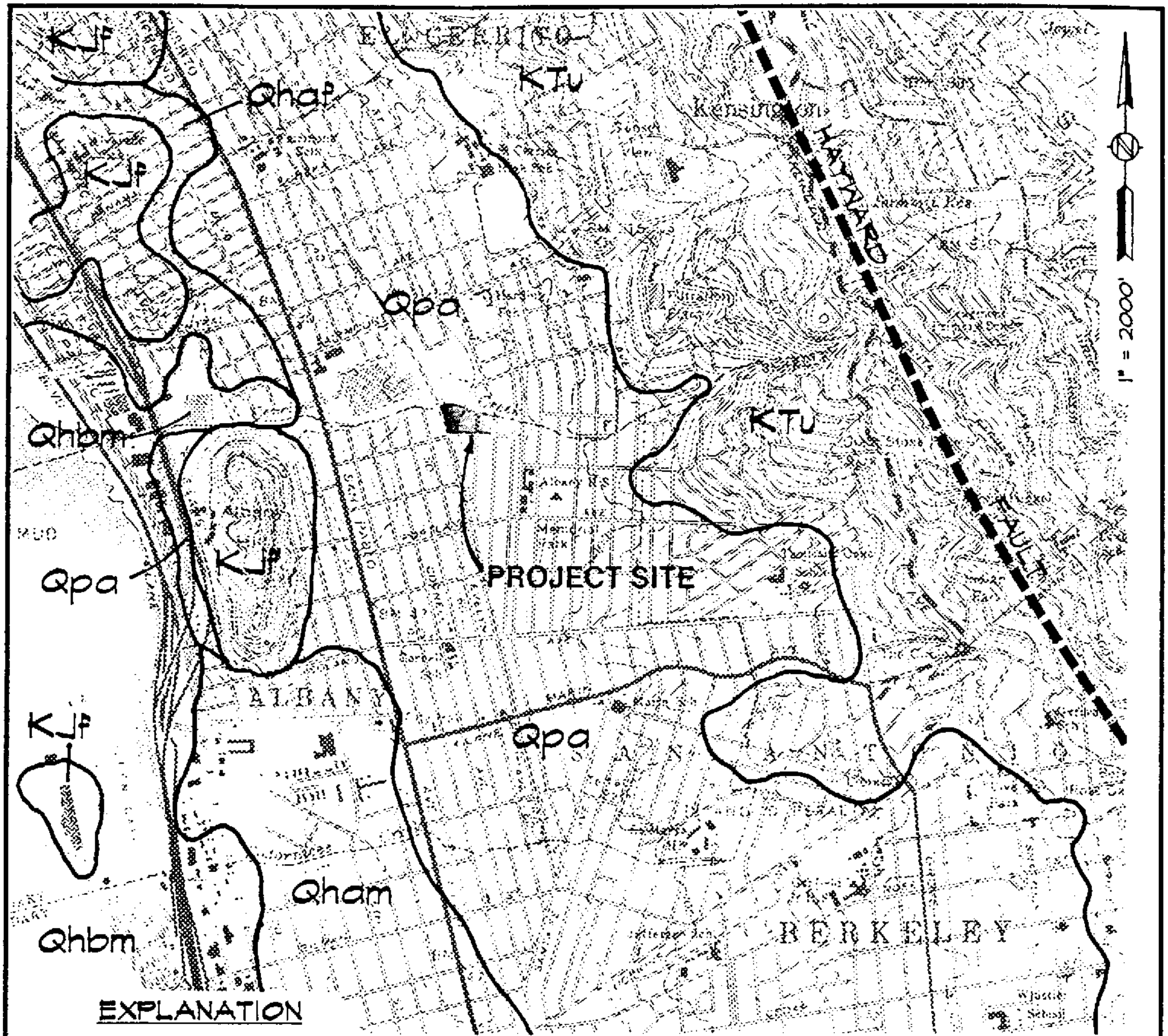
REFERENCES:

Deems Lewis McKinley, "Albany Middle School," dated 4-3-96.

SEACOR, "Soil Boring Location Map, Hill Lumber Company, 1259 Brighton Avenue, Albany, California," dated 11-2-94.

KLEINFELDER

DRAFTED BY: L. Sue	DATE: 4-17-96	**SITE PLAN** NEW ALBANY MIDDLE SCHOOL BRIGHTON AND SPOKANE AVENUES ALBANY, CALIFORNIA	PLATE 2
CHECKED BY: S. Leck	DATE: 6-5-96	PROJECT NO. 10-300326-001	



EXPLANATION

Qhbm	bay mud deposits, frequently covered with man-made fill. Mostly silty, sandy clay and clayey silt, organic
Qhaf	alluvium, fine-grained deposits of unconsolidated silt and clay
Qham	alluvium, medium-grained deposits of unconsolidated sand, silt and clayey silt with occasional coarse sand
Qpa	late Pleistocene alluvium, weakly consolidated sand, silt, clay and gravel, grades progressively from coarse-grained stream deposits near the up-slope fan margins to fine-grained deposits near the bay margins
KTu	Cretaceous-Tertiary bedrock undivided
KJf	Franciscan Assemblage bedrock undivided

KLEINFELDER

GEOLOGIC MAP

NEW ALBANY MIDDLE SCHOOL
BRIGHTON AVE. AND SPOKANE AVE.
ALBANY, CALIFORNIA

PLATE

3

DRAFTED BY: P. Derkos   DATE: 5-16-96

CHECKED BY: S. Korbay   DATE: 5-16-96

PROJECT NO. 10-300326-001

CAD FILE: 30326-1

APPENDIX A

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		LTR	ID	DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	G W		Well-graded gravels or gravel sand mixtures, little or no fines.
		G P		Poorly-graded gravels or gravel sand mixture, little or no fines.
		G M		Silty gravels, gravel-sand-silt mixtures.
		G C		Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	S W		Well-graded sands or gravelly sands, little or no fines.
		S P		Poorly-graded sands or gravelly sands, little or no fines.
		S M		Silty sands, sand, and silt mixtures.
		S C		Clayey sands, and clay mixtures.

MAJOR DIVISIONS		LTR	ID	DESCRIPTION
FINE GRAINED SOILS	SILTS AND CLAYS LL < 50	M L		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		C L		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		O L		Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS LL > 50	M H		Inorganic silts, micaceous or diatomaceous fine or silty soils, elastic silts.
		C H		Inorganic clays of high plasticity, fat clays
		O H		Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		P T		Peat and other highly organic soils.

Standard Penetration Split Spoon Sample 2.0 inch O.D., 1.4 inch I.D.

Modified California Sampler 2.5 inch O.D., 2.0 inch I.D.

Bulk Sample

No Recovery

Approximate water level first observed in boring

Approximate water level observed in boring following drilling

PEN = Pocket penetrometer reading, in tsf

TV:Su = Torvane shear strength, in tsf

NOTES: Blow counts represent the number of blows of a 140-pound hammer falling 30 inches required to drive a sampler through the last 12 inches of an 18-inch penetration, unless otherwise noted.

The lines separating strata on the logs represent approximate boundaries only. The actual transition may be gradual. No warranty is provided as to the continuity of soil strata between borings. Logs represent the soil section observed at the boring location on the date of drilling only.

KLEINFELDER	Albany Middle School Brighton Ave and Spokane Ave Albany, California BORING LOG LEGEND	PLATE A-1
PROJECT NO. 10-3003-26 4/96		

Date Completed: 4/11/96

Logged By: A. Argyriou

Total Depth: 31.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Depth, ft	FIELD Sample	FIELD Blows/ft	LABORATORY Dry Density pcf	LABORATORY Moisture Content %	LABORATORY Compress. Strength tsf	LABORATORY Other Tests	Pen, tsf	DESCRIPTION (Surface Elevation: Estimated 66 feet (MSLD))
								SANDY GRAVEL (GP) - yellow to yellow brown, medium dense to dense, gravel to 1.5 inches, dry (FILL)
	■	10	89	22				
								CLAY WITH TRACE SAND (CH) - black, stiff, medium to high plasticity, fine sand, moist
5	■	19						
								SANDY CLAY (CL) - mottled yellow brown and light olive brown, very stiff, low to medium plasticity, fine with medium and coarse sand, zones of very weak cementation, trace gravel, moist
	■	19						
10	■	12						
								CLAY WITH SAND (CL) - light olive gray with yellow brown and red yellow mottling, very stiff, medium plasticity, fine sand with trace coarse, damp to moist -stiff with black mottling at 10 feet
15	■	27						
								CLAYEY SANDY GRAVEL (GC) - yellow brown, medium dense, medium plasticity clay, fine sand to 1 inch gravel, angular to subangular, saturated
20	■	12						**SANDY CLAY (CL)** - pale yellow to pale olive with occasional strong brown staining, stiff, medium plasticity, fine sand, wet
								SANDY CLAY (CL) - olive yellow with red yellow staining, stiff to very stiff, wet
25	■	31						-with gravel at 26 feet
								GRAVELLY SANDY CLAY (CL) - green to blue, hard, medium to high plasticity, fine sand to 1/2 inch gravel, moist
30	■	51						
								End of Boring
35								
40								

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 1

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE A-2

Date Completed: 4/11/96

Logged By: A. Argyriou

Total Depth: 21.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Surface Elevation: Estimated 64 feet (MSLD)

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Approximately 3 inches asphalt concrete over 6 inches yellow brown crushed gravel to 1.5 inch size
	■	15	81	4				
5	⊠							SANDY GRAVEL (SP) - yellow brown, medium dense, trace of silt, dry to damp (FILL)
	■	14						GRAVEL (GP) - 1 to 2 inches, subrounded, dry (FILL)
								SANDY CLAY (CL) - yellow brown, stiff, medium plasticity, fine to medium sand, damp to moist
10	■	10						SANDY GRAVELLY CLAY (CL) - yellow brown, stiff, fine sand to fine gravel, moist
								SANDY CLAY (CL) - yellow brown, medium stiff, medium plasticity, fine sand, moist to wet
15	■	26						SANDY GRAVELLY CLAY (CL) - yellow brown, fine sand to fine gravel, angular to subrounded, moist to wet
								-very stiff, wet to saturated
20	■	39						CLAYEY SANDY GRAVEL (GC) - yellow brown, fine sand to 1 inch gravel, angular to subrounded, moist to wet
								GRAVELLY SANDY CLAY (CL/CH) - blue green, hard, medium to high plasticity, moist
								End of Boring
25								
30								
35								
40								

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 2

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE A-3

Date Completed: 4/11/96

Logged By: A. Argyriou

Total Depth: 31.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION (Surface Elevation: Estimated 68 feet (MSLD))
								Approximately 1 inch gravel (FILL)
	■	14	93	16				**CLAY WITH SOME SAND (CH)** - dark brown to very dark brown, stiff, medium to high plasticity, fine to medium sand, damp
5	■	32	100	14				**CLAYEY GRAVELLY SAND (SC)** - yellow brown with varicolored mottling, medium dense, low plasticity, fine sand to 1/2 inch gravel, damp
	■	29						**SANDY GRAVELLY CLAY (CL)** - yellow brown with varicolored mottling, very stiff, low to medium plasticity, fine sand to fine gravel, with mottling of high plasticity white clay, damp to moist
10	■	31						**CLAYEY SAND (SC)** - yellow brown to brown, medium dense to dense, fine sand with trace 1 inch gravel, damp
15	■	23						**SANDY CLAY (CL)** - brownish yellow with light olive gray veining, very stiff, low to medium plasticity, fine sand, moist -grades to light olive gray with yellow brown and red yellow veining at 15 feet
20	■	53						**SANDY CLAY/CLAYEY SAND (SC/CL)** - olive with red brown to strong brown staining, very stiff/medium dense, low plasticity, fine to coarse sand, damp
25	■	27						**CLAYEY SAND AND GRAVEL (SC)** - mottled grayish brown, yellow brown and strong brown, dense, fine sand to 1.5 inches gravel, damp to moist
30	■	42						**CLAYEY SAND AND GRAVEL (SC/GC)** - green to gray green, medium dense, medium to high plasticity, fine sand to 3/4 inch gravel, gravel is predominantly claystone/shale, moist
								End of Boring No free water encountered
35								
40								

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 3

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE A-4

Date Completed: 4/11/96

Logged By: A. Argyriou

Total Depth: 21.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION — Surface Elevation: Estimated 69 feet (MSLD)
								Approximately 6 to 8 inches crushed rock, dry
		12	85	29	0.7@ 10%			CLAY (CH) - very dark brown to black, stiff, medium to high plasticity, moist
5		10	93	27				
		10	108	19				SANDY CLAY WITH SOME GRAVEL (CL) - yellow brown, stiff, low plasticity, fine with medium to coarse sand and gravel to 3/4 inch, moist
10		26						-more medium to coarse sand, very stiff, wet
15		28						CLAYEY SANDY GRAVEL (GC) - yellow brown, very strong brown and red mottling, medium dense, fine sand to 1 inch gravel, angular to subangular, moist to wet
20		23						SANDY CLAY WITH SOME GRAVEL - pale olive and yellow brown, very stiff, low plasticity, fine sand with some coarse sand and fine gravel, damp to moist
25								End of Boring
30								
35								
40								

Note: The compressive strength indicated is the maximum achieved from an unconfined compression test with the associated strain noted.

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 4

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE A-5

Date Completed: 4/11/96

Logged By: A. Argyriou

Total Depth: 41.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION — Surface Elevation: Estimated 66 feet (MSLD)
								Approximately 6 inches crushed rock
	■	23				LL = 51 PI = 38		**CLAY WITH SOME SAND (CH)** - black, very stiff, medium to high plasticity, medium sand, damp
5	■	17						-stiff
	■	19						**SANDY CLAY (CL)** - yellow brown and gray brown, stiff, fine to coarse sand, damp to moist
								CLAYEY SAND (SC) - yellow brown/gray brown, medium dense, moist
10	■	20						**CLAYEY GRAVELLY SAND (SC)** - medium dense, fine to coarse sand, fine gravel, wet -less clayey, moist
15	■	22						-wet/saturated
								SANDY CLAY (CL) - yellow brown, very stiff, medium plasticity, fine to medium sand, moist
20	■	33						**CLAYEY SANDY GRAVEL (GC)** - mottled yellow brown to pale olive yellow red and blue
25	■	18						**CLAYEY SANDY GRAVEL (GC)** - grayish blue, medium dense, low plasticity, fine sand to 1 inch gravel, moist to wet
30	■	24						-green with olive gray and black mottling, moist
35	■	20						-blue gray, moist to wet
40								

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 5

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE A-6

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION (Continued from previous plate)
	■	42						-dense, moist
								End of Boring
45								
50								
55								
60								
65								
70								
75								
80								
85								

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 5

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE

A-7

Date Completed: 4/12/96

Logged By: A. Argyriou

Total Depth: 21.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION (Surface Elevation: Estimated 64 feet (MSLD))
								SAND AND GRAVEL WITH TRACE SILT (GP/GW) - angular gravel to ~3 inch size, dry (FILL)
		11	96	23				
		21	106	17				CLAY (CH) - black, stiff, medium to high plasticity, moist -some olive mottling at 3 feet
5								
		13						CLAY WITH TRACE SAND (CL) - olive brown with brownish-yellow mottling, very stiff, medium plasticity, medium grained sand, damp to moist
10		~~10~~						SANDY CLAY - pale olive and brownish-yellow, very stiff, low to medium plasticity fine sand, pockets of medium to coarse sand, moist
								CLAYEY SAND (SC) - dark yellow brown, medium dense, moist to wet
15		17						SANDY CLAY (CL) - yellow brown, stiff, low to medium plasticity, fine with some medium to coarse sand, moist to wet
20		32						SANDY GRAVEL WITH CLAY (GC) - dark yellow brown, medium dense, fine sand to 3/4 inch gravel, angular to subrounded, wet -more clayey
								End of Boring
25								
30								
35								
40								

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 6

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE A-7

Date Completed: 4/12/96

Logged By: A. Argyriou

Total Depth: 31.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Depth, ft	Sample (Field)	Blows/ft (Field)	Dry Density pcf (Laboratory)	Moisture Content % (Laboratory)	Compress. Strength tsf (Laboratory)	Other Tests (Laboratory)	Pen, tsf	DESCRIPTION — Surface Elevation: Estimated 63 feet (MSLD)
0								Approximately 1 inch asphalt concrete, 6 inches crushed rock (sandy gravel, yellow brown)
	■	14	92	23				**SILTY CLAY (CL)** - very dark brown to black with dark red veining, stiff, medium plasticity, trace sand, damp to moist (FILL)
5	■	13						**SILTY CLAY (CH)** - black, stiff, medium to high plasticity, damp to moist
	■	6	97	27				**CLAY WITH SAND (CL)** - olive brown with gray mottling, stiff, medium plasticity, medium sand, damp to moist
10	■	17						**SANDY CLAY (CL)** - light olive brown, medium stiff, low plasticity, fine sand, wet
								CLAYEY SANDY GRAVEL (GC) - olive gray, medium dense, fine sand to 1/2 inch gravel, subrounded to angular, moist to wet
15	■	14						**SANDY CLAY (CL)** - light gray and yellow brown, medium stiff, low plasticity, fine sand, moist
								SANDY CLAY (CL) - stiff, medium plasticity, fine to coarse sand, trace cementation, moist
20	■	52						**SILTY SAND (SM)** - brownish yellow, medium dense, fine grained, dry
25	■	41						**CLAYEY SANDY GRAVEL (GC)** - brown, dense, fine sand to 3/4 inch gravel, subangular to subrounded, dry to damp
30	■	32						**CLAYEY SANDY GRAVEL (GC)** - green with light green and black, dense, angular to subangular, fine sand to 1 inch gravel, gravel predominantly green sandstone, moist -gravel to 2 inch size, angular to subrounded, gravel is sandstone and claystone
								End of Boring No free water encountered
35								
40								

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 7

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE

A-8

Date Completed: 4/12/96

Logged By: A. Argyriou

Total Depth: 31.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION (Surface Elevation: Estimated 58 feet (MSLD))
	■	11	82	31				**CLAY (CH)** - black, some speckling red brown yellow brown, stiff, medium to high plasticity, trace fine to medium sand, moist (FILL)
5	■	11	101	24	1.7@ 14.6%			**SILTY CLAY (CH)** - mottled olive black, stiff, medium plasticity, trace fine sand, moist
	■	19	▼					**SANDY CLAY (CL)** - olive gray with yellow brown mottling, stiff, medium plasticity, fine sand, pockets of fine to coarse sand, moist
10	■	17						-yellow brown with olive gray mottling, fine to medium sand
15	■	29	▽					
								CLAYEY SAND AND GRAVEL (GC) - yellow brown, medium dense, fine sand to fine gravel, wet
20	■	32						
								CLAYEY GRAVEL WITH SAND (GC) - yellow brown, medium dense, medium plasticity clay, fine sand to 1 inch gravel, angular to subrounded, moist
25	■	56						**CLAYEY SAND WITH GRAVEL (SC)** - varicolored, dense to very dense, fine sand to fine gravel, damp to moist
30	■	46						**CLAYEY SANDY GRAVEL (GC)** - green to dark green, dense, medium plasticity clay, fine sand to 1.5 inch gravel, gravel is green sandstone and black claystone, moist
35								End of Boring
40								

Note: The compressive strength indicated is the maximum achieved from an unconfined compression test with the associated strain noted.

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 8

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE A-9

Date Completed: 4/12/96

Logged By: A. Argyriou

Total Depth: 4.0 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION (Surface Elevation: Estimated 61 feet (MSLD))
								Approximately 1 inch asphalt concrete, 7 inches crushed rock
	■	17						**CLAY** - black with yellow brown and green spotting, stiff, high plasticity, ammonia odor, moist
5								End of Boring No free water encountered Terminated due to an ammonia-like odor
10								
15								
20								
25								
30								
35								
40								

KLEINFELDER

PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B- 9

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE

A-10

Date Completed: 4/12/96

Logged By: A. Argyriou

Total Depth: 21.5 ft

Sampler: Modified California Sampler - 2.5 in. O.D. 2.0 in. I.D.

Hammer Wt: 140 lbs., 30" drop

Surface Elevation: Estimated 60 feet (MSLD)

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Approximately 1 inch asphalt concrete, 6 to 7 inches aggregate base
	■	18	101	22				SILTY CLAY (CH) - black with red spotting, stiff, medium to high plasticity, trace sand, moist (FILL)
5	■	15	86	27				CLAY WITH SAND AND GRAVEL (CL) - olive brown to brown, stiff, low to medium plasticity, fine sand to fine gravel, damp to moist
	■	13						
10	■	14						GRAVELLY SANDY CLAY (CL) - brown, stiff, medium plasticity, fine sand to 1/2 inch gravel, wet
								CLAYEY GRAVELLY SAND (SC) - yellow brown, medium dense, low plasticity fine, fine sand to 1.5 inch gravel, wet
15	■	11						SILTY CLAY (CL) - light gray with strong brown staining, medium stiff, medium plasticity, trace sand, moist
20	■	47						CLAYEY SANDY GRAVEL (GC) - brown, medium dense, fine sand to 1/2 inch gravel, angular to subangular, moist -dense, damp
								End of Boring
25								
30								
35								
40								

KLEINFELDER

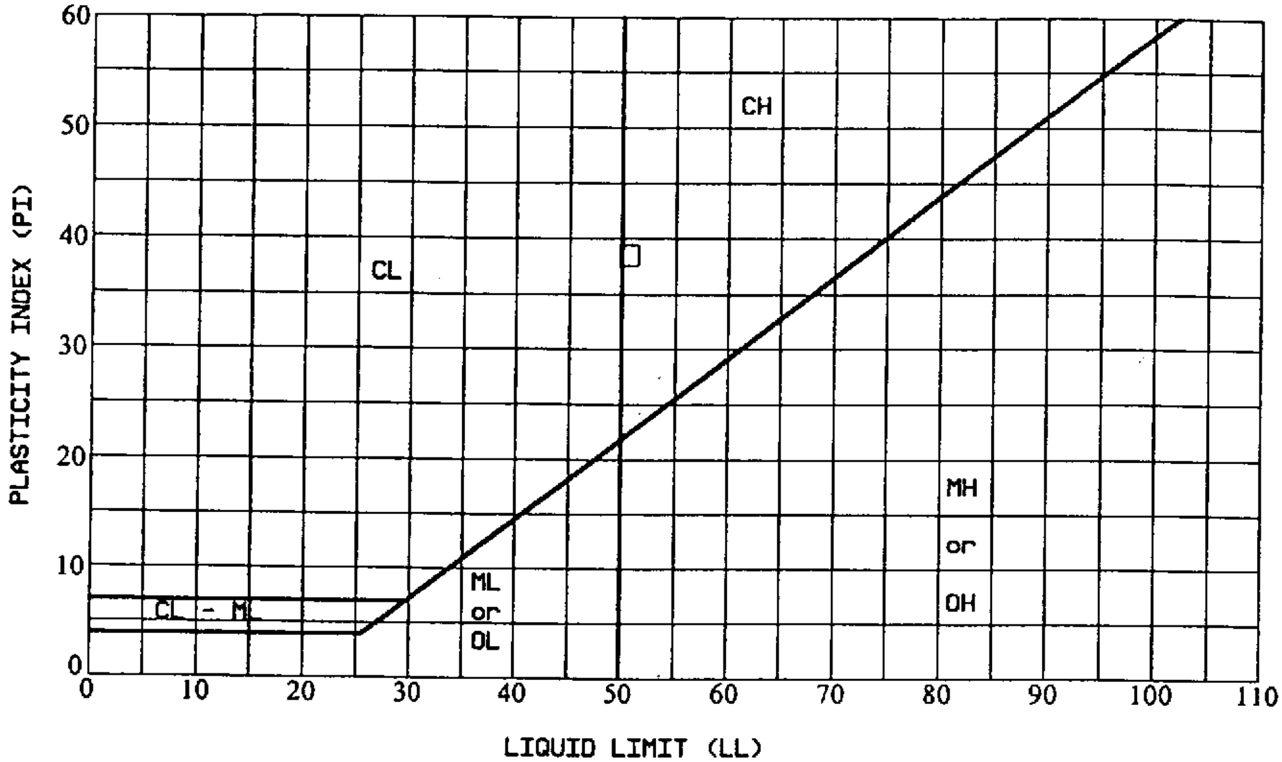
PROJECT NO. 10-3003-26 4/96

LOG OF BORING NO. B-10

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California

PLATE A-11

APPENDIX B



Symbol	Boring	Depth	LL	PL	PI	Sample Description
□	B- 5	1.0	51	12	38	Dark Gray Clay

Unified Soil Classification

Fine Grained Soil Groups

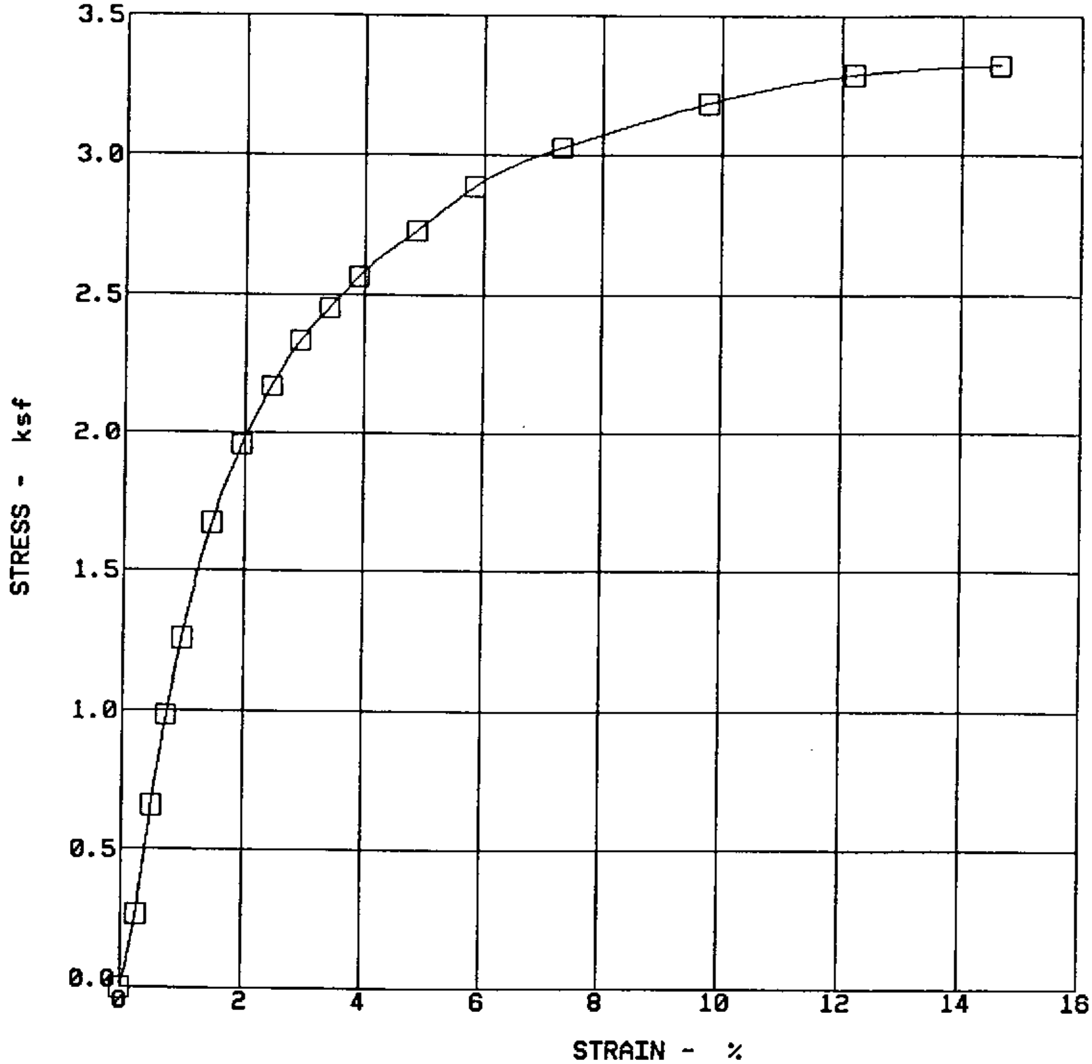
Symbol	LL < 50	Symbol	LL > 50
ML	Inorganic clayey silts to very fine sands of slight plasticity	MH	Inorganic silts and clayey silts of high plasticity
CL	Inorganic clays of low to medium plasticity	CH	Inorganic clays of high plasticity
OL	Organic silts and organic silty clays of low plasticity	OH	Organic clays of medium to high plasticity, organic silts

KLEINFELDER

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California
PLASTICITY CHART

PLATE B-1

PROJECT NO. 10-3003-26 4/96



BORING NO. B- 8
DEPTH - ft 4.0
SOIL DESCRIPTION Dark Brown Silty Clay

DRY DENSITY - pcf 101
WATER CONTENT - % 24

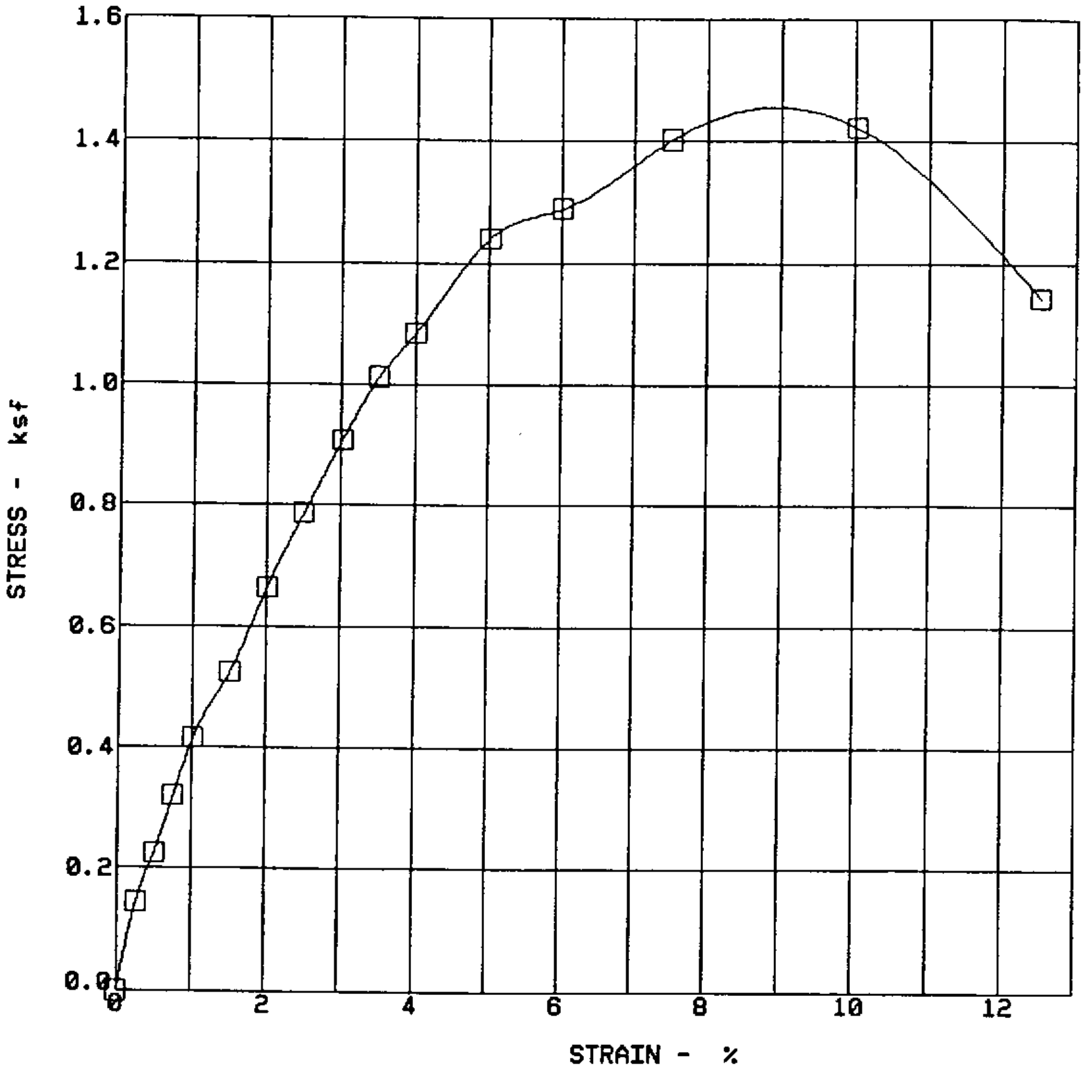
MAX. UC STRENGTH= 3.3 ksf AT 14.6 % STRAIN

KLEINFELDER

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California
UNCONFINED COMPRESSION TEST

PLATE
B-2

PROJECT NO. 10-3003-26 4/96



BORING NO.	B- 4	DRY DENSITY - pcf	85
DEPTH - ft	1.0	WATER CONTENT - %	29
SOIL DESCRIPTION	Dark Brown Clay w/trace Gravel		

MAX. UC STRENGTH= 1.4 ksf AT 10.0 % STRAIN

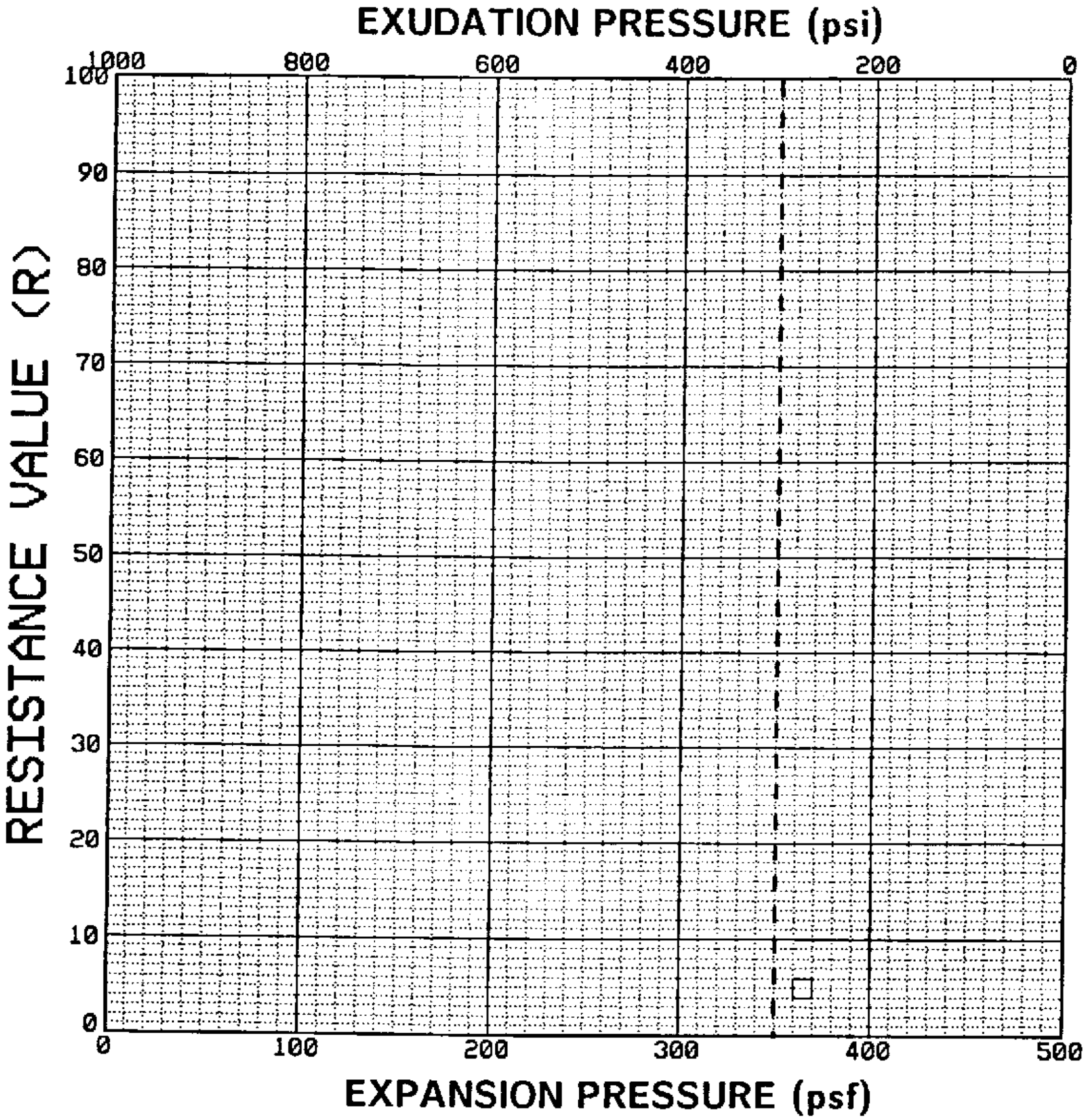
KLEINFELDER

PROJECT NO. 10-3003-26 4/96

Albany Middle School
Brighton Ave and Spokane Ave
Albany, California
UNCONFINED COMPRESSION TEST

PLATE

B-3



SPECIMEN NO.	□		
MOISTURE CONTENT (%)	24.1		
DRY DENSITY (PCF)	114		
EXUDATION PRESSURE (PSI)	270		
EXPANSION PRESSURE (PSF)	0		
RESISTANCE VALUE (R)	5		

SAMPLE SOURCE	CLASSIFICATION	SAND EQUIVALENT	EXPANSION PRESSURE	R-VALUE
7442 @ 1.00	Very Dark Brown (Black) Clay with Some Gravel			<5

ASTM D 2844, Cal Test 301

KLEINFELDER

Albany Middle School
Brighton Ave and Spokane Ave

Resistance Value Test Data

PLATE

B-4

PROJECT NO. 10-3003-26 4/96

APPENDIX

APPENDIX C
GUIDE SPECIFICATIONS FOR EARTHWORK

I. GENERAL CONDITIONS

A. Scope of Work

These specifications and applicable plans pertain to and include all site earthwork including, but not limited to, the furnishing of all labor, tools, and equipment necessary for site clearing and stripping, disposal of excess materials, excavation, preparation of foundation materials for receiving fill, installing of retaining wall drains, and placement and compaction of fill to the lines and grades shown on the project grading plans.

B. Performance

The Contractor shall be responsible for the satisfactory completion of all site earthwork in accordance with the project plans and specifications. This work shall be observed and tested by a representative of Kleinfelder, Inc., hereinafter known as the Geotechnical Engineer. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by the Geotechnical Engineer.

No site earthwork shall be performed without prior notification and approval of the Geotechnical Engineer. The Contractor shall notify the Geotechnical Engineer at least twenty-four hours prior to commencement of any aspect of the site earthwork.

As a continuation of his services, the Geotechnical Engineer shall be the Owner's representative to observe the grading operations during the site preparation work and the placement and compaction of fills. Site visits to monitor progress, perform tests, and observe earthwork operation are necessary to monitor the quality of work. Sufficient number of tests and/or observations will be made to enable him to form an opinion regarding the adequacy of the site preparation, and the acceptability of the fill, as placed, in meeting the specification requirements. Any fill that does not meet the specification requirements shall be removed and/or recompacted until the requirements are satisfied.

In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal work hours.

Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the construction site.

C. Site and Subsurface Conditions

A geotechnical investigation has been performed for this site by Kleinfelder, Inc. The Contractor should familiarize himself with the geotechnical investigation report and subsurface conditions at the site, whether covered in the report or not, and should thoroughly familiarize himself with all recommendations pertaining to earthwork that are part of this report.

The Contractor shall, upon becoming aware of surface and/or subsurface conditions differing from those disclosed by the geotechnical investigation, promptly notify the Owner and the Geotechnical Engineer as to the nature and extent of the differing conditions, first verbally to permit verification of the conditions, and then in writing. No claim by the Contractor for any conditions differing from those anticipated in the plans and specifications and disclosed by the geotechnical investigation will be allowed unless the Contractor has so notified the Owner and Geotechnical Engineer verbally and in writing, as required above, of such changed conditions.

II. DEFINITION OF TERMS

a. FILL - all soil material placed to raise the natural grade of the site or to backfill excavations.

b. ON-SITE FILL - that which is obtained from the required excavation on the site.

c. IMPORT FILL - that which is hauled in from off-site borrow areas and conforms to the requirements set forth in Section V.

d. ENGINEERED FILL - fill upon which the Geotechnical Engineer has made sufficient tests and observations to enable him to issue a written statement that, in his opinion, the fill has been placed and compacted in accordance with the specification requirements.

e. ASTM SPECIFICATIONS - the American Society for Testing and Materials Standards, latest edition.

f. MATERIALS MANUAL - State of California, Business and Transportation Agency, Department of Transportation, latest revision.

g. PERCENT COMPACTION - the ratio, expressed as a percentage, of the dry density of the fill material as compacted in the field, to the maximum dry density of the same material determined by ASTM Test Method D-1557. Field densities shall be determined in accordance with ASTM D-1556 or ASTM D-2922 and ASTM D-3017.

h. OPTIMUM MOISTURE CONTENT - the ratio, expressed as a percentage, of the weight of the water in the soil material to the weight of the solids in the same soil material as determined by ASTM D-2216 and ASTM D-1557.

III. SITE PREPARATION AND GRADING

The Contractor shall accept the site in its present condition and shall remove from the area of the designated project earthwork all obstructions determined by the Geotechnical Engineer to be deleterious. Such material shall be removed from the site. Holes resulting from the removal of underground obstructions that extend below finish grades shall be cleared of all loose material and dished to provide access for compaction equipment.

A. <u>Excavation</u>

All excavations shall be made true to the grades and elevations shown on the plans and observed by the Geotechnical Engineer. The excavated surfaces shall be properly graded to provide good drainage during construction, prevent ponding of water, and aid in dewatering of the excavation if this is required.

All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the specifications. The Contractor shall assume full responsibility for the stability of all temporary construction slopes at the site.

IV. SUBSURFACE PREPARATION

Surfaces to receive compacted fill or paving shall be scarified to a minimum depth of 12 inches, at the building and pavement areas and compacted. The scarified soils must be compacted to the requirements set forth in the report for non-expansive soils. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill material shall be approved by the Geotechnical Engineer prior to the placement of any fill material.

The top 12 inches of subgrade soils underneath all pavement areas should be compacted to the percent compaction and optimum moisture content recommended in the report.

If subgrade soils are allowed to dry out so that shrinkage cracks appear at the surface, the subgrade should be rescarified, moisture conditioned, and recompacted to the specifications given in the report.

V. REQUIREMENTS FOR FILL MATERIALS

All fill material must be approved by the Geotechnical Engineer prior to placement and compaction.

A. <u>Import Fill</u>

Import fill or on-site soil that satisfies these requirements shall be a granular soil or soil-rock mixture which is free of organic matter or other deleterious substances. Import fill shall meet the following requirements:

Maximum Particle Size	3 inches with at least 90% by weight passing 1-inch sieve.
Plasticity Index	15 or less
Liquid Limit	less than 30%

Percent Soil Passing #200 Sieve between 10 and 40% by weight.

B. Granular Backfill for Retaining Wall Drains

Granular backfill used behind retaining walls shall consist of hard, durable, clean sand, gravel, or crushed stone, and shall be free from organic matter, clay balls and other deleterious substances.

The percent composition by weight of the granular material shall conform to the following grading requirements:

Sieve Size	Percentage Passing Sieve
2"	100
3/4"	90 - 100
3/8"	40 - 100
No. 4	25 - 40
No. 30	5 - 15
No. 50	0 - 7
No. 200	0 - 3

VI. PLACING AND COMPACTING FILL MATERIAL

A. General Earthwork Compaction Requirements

All fill material, except for backfill behind retaining walls, trench backfill, and fill which will be subgrade for pavement, shall be compacted to the requirements in the report. Fill shall be compacted in uniform lifts not greater than 8 in. in loose thickness. Fills composed of on-site expansive soils shall be compacted above the optimum moisture content.

Before compaction begins, the fills shall be brought to a water content that will permit proper compaction by either: 1) aerating the material if it is too wet; or 2) spraying the material with water if it is too dry. Each lift shall be thoroughly mixed before compaction to insure a uniform distribution of water content.

Field density tests to determine the compaction of the fill shall be made at the locations determined by the Geotechnical Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work shall be judged by the Geotechnical Engineer.

If compacted fill materials are allowed to dry out prior to placing subsequent lifts, so that shrinkage cracks appear on the surface of the fill, then the compacted fill must be scarified, moisture-conditioned, and recompacted before further construction.

B. Compaction Requirements for Backfill Placed Behind Retaining Walls

Backfill placed behind any retaining walls shall be compacted to 90 percent compaction at the moisture content recommended in the report. In landscaped areas, a minimum of 85 percent compaction is required. Overcompaction should be avoided.

Backfill behind retaining walls shall be placed in thin lifts not greater than 8 inches in loose thickness. Where compaction of backfill by heavy equipment will cause unwanted surcharges on new walls or foundations (as determined by the Structural Engineer), the structures shall be braced to prevent displacement and damage while backfill is being placed. Jetting of backfill will not be permitted.

C. Compaction Requirements for Trench Backfill

Backfill for trenches or other excavations within pavement areas should be compacted in 6 to 8 inch layers with mechanical tampers to assure adequate subgrade support. Jetting and flooding should not be permitted. The backfill shall be compacted to a minimum of 90 percent compaction except for landscape areas where this percent compaction may be reduced to 85 percent.

VII. TREATMENT AFTER COMPLETION OF EARTHWORK

After earthwork operations are completed and the Geotechnical Engineer has finished his observation of the work, no further excavation or filling shall be done except with the approval of and under observation of the Geotechnical Engineer.

It shall be the responsibility of the Contractor to prevent erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

APPENDIX [illegible]

KLEINFELDER

APPLICATION FOR AUTHORIZATION TO USE

GEOTECHNICAL INVESTIGATION REPORT
NEW ALBANY MIDDLE SCHOOL
BRIGHTON AVENUE AND SPOKANE AVENUE
ALBANY, CALIFORNIA

TO: Kleinfelder, Inc.
7133 Koll Center Parkway, Suite 100
Pleasanton, CA 94566

FROM: ____
{Please clearly identify name and address of person/entity applying for permission to use or copy this document}

Gentlemen:

Applicant ____________________ hereby applies for permission to:
{State here the use(s) contemplated}

for the purpose(s) of:
{State here why you wish to do what is contemplated as set forth above}

Applicant understands and agrees that the "**Geotechnical Investigation Report, New Albany Middle School, Brighton Avenue and Spokane Avenue, Albany, California**" is a copyrighted document, that Kleinfelder, Inc. is the copyright owner and that unauthorized use or copying of " **Geotechnical Investigation Report, , New Albany Middle School, Brighton Avenue and Spokane Avenue, Albany, California**" is strictly prohibited without the expressed written permission of Kleinfelder, Inc. Applicant understands that Kleinfelder, Inc. may withhold such permission at its sole discretion, or grant such permission upon such terms and conditions as it deems acceptable, such as the payment of a re-use fee.

Dated: ____________________ ____________________
Applicant

by____________________
Name

its____________________
Title