APPENDIX C

Geotechnical Investigation of the Tres Pinos Fault

COMBINED GEOTECHNICAL AND FAULT INVESTIGATION
FAIRVIEW ROAD PROPERTY
FAIRVIEW ROAD
SAN BENITO COUNTY, CALIFORNIA

PROJECT 8250

FOR

Dividend Development Corporation
3600 Pruneridge Avenue
Santa Clara, California 95051

BY

TERRATECH, INC.
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INTRODUCTION

This report summarizes the results of our combined geotechnical and fault investigation of a 99($\pm$) acre parcel (APN 25-190-46) located on the east side of Fairview Road, approximately 200 feet north of its intersection with Airline Highway (Highway 25), southeast of the city of Hollister in San Benito County, California. The location of the property is shown on the Vicinity Map, Figure 1.

The property will be developed with one and two story, wood-frame, single-family residences with raised wood floors. The configuration of lots and on-site streets is not known at this time. The objective of our geotechnical investigation was to explore subsurface conditions on the property and to develop geotechnical recommendations for earthwork, foundation design and alternate pavement sections for on-site streets.

A trace of the Tres Pinos fault has been inferred to pass between the southeastern corner and the north-central portion of the property by the California Division of Mines and Geology (CDMG, 1986), as shown on Figure 1. The objective of our fault investigation was to satisfy the requirements of the Alquist-Priolo Special Studies Zones Act of 1972 and the CDMG for determining the presence and location of the Tres Pinos fault trace within the property.

INFORMATION PROVIDED

For this investigation, we were provided with the following.

1. A copy of the County Assessor's Parcel Map of the property.
2. A copy of the environmental assessment report prepared by Steven Raas & Associates, dated June 23, 1989.

SCOPE OF WORK

The following work was performed for this investigation.

1. Research of published and unpublished geologic literature and reports pertaining to the property and its vicinity. Our research included information from our files, San Benito County, and the office of Rogers E. Johnson & Associates who performed a geologic and fault investigation for the southern neighboring property.
2. Study of several sets of stereoscopic aerial photographs of the property and its surroundings to look for evidence of faulting that cannot be seen from the ground surface.

3. Exploration, logging and sampling of subsurface materials by drilling eleven exploration holes, the deepest of which extended to 41 feet below ground surface.

4. A field geologic reconnaissance to look for geologic and topographic features and vegetation patterns that may indicate the presence of fault traces on or near the subject property.

5. Excavation, examination, and logging of seven exploratory backhoe trenches to look for subsurface evidence of faulting.

6. Laboratory testing of selected soil samples to measure their pertinent index and engineering properties.

7. Compilation and analysis of collected field and laboratory test data and formulation of conclusions and geotechnical recommendations for the proposed development.

8. Preparation of an interim report dated October 12, 1989, summarizing our preliminary findings.

9. Preparation of this report summarizing the investigation findings, conclusions and geotechnical recommendations for building setback distance, grading and compaction, inclinations for cut and fill slopes, building foundations, garage and exterior concrete slabs-on-grade, retaining wall design, backfilling of utility trenches, and pavement sections for various traffic indices.

DESCRIPTION OF FIELD INVESTIGATION

Geotechnical Investigation

On September 14 and 15, 1989, eleven exploratory holes were drilled on the property to depths of 11 to 41 feet to explore subsurface conditions. The approximate locations of the drill holes, which were backfilled with native soil, are shown on Figure 2. Materials encountered in the drill holes were logged in the field by a Terratech geologist and described in accordance with the Unified Soil Classification System (ASTM D2487) modified to distinguish fine-grained soils with liquid limit between 35 and 50 as soils of medium plasticity (CI or MI). Logs of the drill holes are appended.

Soil samples were taken from the drill holes at selected depths. Five bulk samples of the surface and near-surface soil were obtained at the approximate locations shown on Figure 2.

Phase I Fault Investigation

On September 20, 21, 22, 25, and 26, 1989, six exploratory backhoe trenches (Trenches 1 through 6), ranging between 45 and 370 feet long and up to about 12 feet deep, were excavated to look for subsurface evidence of faulting. The approximate locations of the trenches are shown on Figure 2. Logs of the trenches are presented in Figures 4 through 8.

The fault was exposed in Trenches 1 and 5 and appeared to diverge to the northeast, away from the previously mapped trace, along a prominent photolineament and through a sag pond. The fault was not exposed in Trench 4 because the backhoe used had a maximum reach of about 12 feet, which was insufficient to penetrate the thick sag pond deposits encountered.

Phase II Fault Investigation

On October 4, 1989, Trench 7 was excavated to a depth of about 16 feet to attempt to locate the fault in the sag pond in the northeastern corner of the property. On October 5, 1989, we extended the length of Trench 3 approximately 150 feet northeastward to attempt to locate the fault trace mapped by the CDMG. The locations of these two trenches are also shown on Figure 2, and the log of Trench 7 is presented in Figure 9.

FINDINGS

Topography and General Site Conditions

Site topography consists of gently rolling hills covered with grasses. Cattle were grazing on the property during our field exploration. According to the San Benito Water District (personal communication, October 89), a San Felipe Pipeline water main runs along the northern and eastern property boundaries. Facilities associated with the pipeline include a pump station in the northwestern corner of the property, an air valve in the southeastern corner, and a manhole in the northeastern corner. Except for these structures, we did not see other signs of past development on the property.

Regional Geology

The geology of the property and its surroundings is shown on published maps (Taliaferro, 1945; Kilburn, 1972; Dibblee, 1975; Robbins, 1982) and unpublished maps (Leighton and Associates, 1974; Rogers E. Johnson and Associates, 1980).

The Calaveras fault, located about 1-3/4 miles southwest of the property, forms the boundary between major bedrock types in the region. Bedrock units in the region south of the property and west of the Calaveras fault consist of Pliocene nonmarine sediments. Bedrock units east of the Calaveras fault consist of Paleocene and Eocene marine sediment, and the Upper Cretaceous Panoche Formation. Surficial units include young alluvium, older alluvium, and terrace deposits.

Tres Pinos Fault and Bolado Park Fault

The generally northwest-trending Tres Pinos and Bolado Park faults have been mapped as separating Eocene shale on the southwest from Upper Cretaceous Panoche Formation on the northeast (Taliaferro, 1945; Kilburn, 1972; Dibblee, 1975; and Robbins, 1982). One fault trace has been mapped across the eastern portion of the property, one has been mapped about 500 feet southwest, and one about 800 feet northeast (see Figure 1). Several segments of these fault traces are mapped as being concealed beneath terrace deposits of Pleistocene age.

The Tres Pinos fault has been interpreted to be a dip slip fault (Kilburn, 1972; and Dibblee, 1975) with the northeast side up in the mountains northeast of the City of Tres Pinos and is generally interpreted to be potentially active.

Location of the Tres Pinos Fault on Adjoining Property

Leighton and Associates excavated and logged four exploratory trenches in 1974 to locate the Tres Pinos fault on the Ridgemark Estates property located between 300 and 600 feet south of the subject property. Subsurface evidence of faulting was found in one trench, approximately 2000 feet southeast of the subject property. According to their report (Leighton and Associates, 1974), "distortion of the sediments was evident throughout the vertical section of the trench in this zone indicating the fault to be active in nature."

Rogers E. Johnson and Associates excavated and logged three exploratory trenches in 1980 to locate the Tres Pinos fault on a 30(±)-acre property directly south of the subject property (see Figure 2 for trench locations). According to their report (Rogers E. Johnson and Associates, 1980) approximately five slickensided rupture surfaces were observed in the eastern portion of their easternmost trench. Because these rupture surfaces truncate bedding, have horizontal striations indicative of lateral fault movement, are roughly concordant with the strike of the fault trace, and are about 2 feet below ground surface, these features were interpreted to be the main trace of the Tres Pinos fault. Based on the location of the fault in the easternmost trench a 300-foot-long segment of the Tres Pinos fault was mapped and a building exclusion zone was designated in the northeastern corner of the property.

In addition, "several slickensided rupture surfaces" were observed in the two westernmost trenches. Because these rupture surfaces have orientations that are discordant with the strike of the fault trace, have vertical striations, do not appear to appreciably offset bedding, and are greater than five feet below ground surface, Rogers E. Johnson and Associates interpreted these features as inactive normal or reverse faults that have not experienced significant movement. On the basis of Rogers E. Johnson & Associates' conclusion that the western fault traces are inactive, the CDMG narrowed the Alquist-Priolo zone to include only the eastern trace. No similar inactive fault traces were found during our investigation.

Site Geology

Topographic and geologic features on the property are shown on the Geologic Map, Figure 2. Our interpretation of the subsurface geologic structure is shown on the Geologic Cross Section, Figure 3. Logs of our seven exploratory trenches are presented in Figures 4 through 9.

Subsurface Conditions

The property is underlain by unconsolidated layers of clay, silt, sand and gravel. The classification and consistency of soils encountered during this investigation are similar to those found during previous investigations of other property in the immediate area (Terratech, Inc., 1976; Terratech, Inc., 1977a; Terratech, Inc., 1977b; Rogers E. Johnson and Associates, 1980; John T. O'Rourke and Associates, 1983). The soils encountered during this investigation are described in detail on the appended drill hole logs and on the trench logs (Figures 4 through 9).

Surface and near-surface soils across the site consist of clays with medium to high plasticity. Consistency of the clays is firm to very stiff in the upper 1 foot and very stiff to hard below. The clays generally have moderate to high expansion potential. Shrinkage cracks were observed in some portions of the property. Below this upper clay layer, medium dense to very dense sand and gravel containing variable amounts of fines were encountered. These soils are underlain by very stiff to hard clays of medium plasticity and locally fat clays with high plasticity to a depth of about 25 feet. Below about 25 feet, dense to very dense silty sand, clayey sand and poorly-graded sand were encountered to the maximum 41-foot depth explored. Sediments below the upper clay layer are generally horizontally bedded and are interpreted to be older alluvial deposits of Pleistocene age.

Relatively thick surface soils consisting of sandy clay with gravel were encountered in Trenches 4, 6, and 7, and Drill Hole 9 in the northeastern corner of the property. These colluvial and lacustrine deposits are thicker than about 15 feet and are interpreted to be basin deposits of Holocene age.

Seismic Considerations

The property is located in the seismically active San Francisco-Monterey Bay region. The eastern third of the property is within the Alquist-Priolo Special Studies Zone for the Tres Pinos fault, a fault generally considered to be potentially active.

Seismic hazards can be divided into two general categories: hazards due to ground rupture and hazards due to ground shaking. The location of the Tres Pinos fault governs the ground rupture hazard on the property.

On-Site Faulting

A northwest-trending trace of the Tres Pinos fault has been mapped through the eastern portion of the property. CDMG geologist Earl Hart (personal communication, September 1989) reports the Tres Pinos fault was mapped through the property based on two previous fault investigations (Leighton and Associates, 1974; Rogers E. Johnson and Associates, 1980) and the presence of "tonal features" evident on aerial photographs.

Surface Evidence of Faulting

Surface evidence of faulting on the property and the vicinity was observed on aerial photographs and during our geologic reconnaissance. A north-south-trending photolineament is present in the eastern portion of the property, and a prominent depression, which we interpret to be a sag pond, is present along the photolineament in the northeastern corner of the property. The photolineament is evident on the property as a relatively steep east-facing slope and north of the property as a series of parallel ridges that trend roughly northward (see Figure 1).

Subsurface Evidence of Faulting

Evidence of faulting was observed in Trenches 1, 5 and 7; slickensided, polished clay surfaces and displaced and terminated bedding were observed in older alluvial deposits along the photolineament in the eastern portion of the property (see Figures 2, 4, 8, and 9).

Where exposed in our trenches, the width of the zone of fault-generated ground displacement varies from about 18 to 40 feet. The zone is characterized by two to five distinct fault traces that have displaced interbedded clay, sand and silt layers within about 3 feet of the ground surface in Trenches 1 and 5, and within about 8 feet of the ground surface in Trench 7. In the northeastern corner of the property the fault trace is concealed beneath colluvial and lacustrine sag pond deposits that appear to be thicker than 15 feet.

Trench 3 was excavated to attempt to determine whether a second fault trace is present along the northwest-trending alignment mapped by the CDMG (1986). No evidence of faulting was observed in Trench 3.

Map Alignment of Fault

Based on aerial photographic evidence and our trench logging, we have reinterpreted the trend of the fault trace mapped previously (CDMG, 1986). The Tres Pinos fault trends approximately N20°W directly southeast of the property (Rogers E. Johnson and Associates, 1980), enters the southeastern corner and bends northward to parallel the eastern property line approximately 200 feet inside the property (see Figure 2).

Age of Faulting

Because the fault traces encountered in Trenches 1 and 5 displace older alluvial deposits judged to be of Pleistocene age (11,000 to 2 million years old), and do not appear to displace younger colluvial and lacustrine deposits judged to be of Holocene age (less than 11,000 years old), we consider the Tres Pinos fault on the property to be potentially active.

Regional Faulting

The active East Branch of the Calaveras fault lies about 1-1/4 miles southwest of the property; the active Calaveras fault lies approximately 1-3/4 miles southwest of the property; and the active San Andreas fault lies approximately 8 miles southwest of the property.

Like the rest of the San Juan Bautista-Hollister area, the property is expected to be subjected to "destructive" ground shaking from a "maximum credible" earthquake on a nearby segment of the San Andreas fault (McCrory and others, 1977). The 1906 "San Francisco" earthquake is generally considered the maximum credible earthquake for the northern portion of the San Andreas fault, with a Richter magnitude of about 8 (Working Group on California Earthquake Probabilities, 1988), and the San Andreas is likely to produce the strongest ground shaking on the property within the life of the project. The estimated average recurrence interval for the maximum credible earthquake on the northern portion of the San Andreas fault is 303 years (Working Group on California Earthquake Probabilities, 1988). Mualchin and Jones (1989) estimate the maximum credible bedrock acceleration in the vicinity of the property from earthquakes on the San Andreas to be greater than 0.6g.

On October 17, 1989, a major earthquake occurred in the Santa Cruz Mountains. It has been given the name "Loma Prieta Earthquake." Preliminary information available from the University of California Seismographic Station at Berkeley indicates the earthquake had a Richter magnitude of 7.1 and resulted from rupture of a 30-mile-long segment of the San Andreas fault. The epicenter was located approximately 35 miles northwest of the property.

Because the property consists of gently rolling hills underlain by stiff to hard clays and medium dense to very dense sands and gravel, the risk of seismically-induced differential settlement, liquefaction and landsliding are judged to be low.

CONCLUSIONS

Based on the findings of our combined geotechnical and fault investigation, it appears the primary geologic and geotechnical consideration for site development is the presence of the Tres Pinos fault in the eastern portion of the site.

The older alluvial deposits within about 3 to 8 feet of the ground surface on the property have been displaced along the Tres Pinos fault. The width of the zone of fault-generated ground deformation varies from about 18 to 40 feet.

The results of our fault investigation indicate the fault trace mapped by the CDMG (1986) is not present on the property. Based on our field data, the map alignment of the fault bends from about N20°W in the southeastern corner of the property to approximately north-south in the northeastern portion of the property.

Future ground displacement probably will be confined to an area very close to the zone of fault-generated ground deformation as mapped in this investigation.

The surface and near-surface soils on the property have moderate to high expansion potential. Expansive soil expands when its water content increases and shrinks when its water content decreases. This shrink-swell characteristic of expansive soil can cause distress and damage to structures that are supported on the soil. Potential impact from expansive soil can be mitigated by proper design and construction. Recommendations are given in the following sections of this report.

RECOMMENDATIONS

Our recommendations are presented as guidelines that may be used by project planners and designers for the geotechnical aspects of site development. These recommendations are prepared assuming Terratech, Inc. will be commissioned to review grading and foundation plans prior to construction and to observe and test during construction. This additional opportunity to examine the site will allow us compare subsurface conditions exposed during construction with those encountered during our exploration.

Proposed site grading has not been determined. Our recommendations are based on the assumption that site grading will be minimal. Depending on the extent of proposed grading, the type of soil that will expose at finish grade may be different than the present surface soil. Grading plans should be reviewed by Terratech to confirm that our recommendations are applicable to the entire project.

Building Setback Distance

We recommend a 50-foot-wide building setback on each side of the fault zone, which results in a building exclusion zone 118 to 140 feet wide. The location of the fault encountered in our trenches has been staked in the field for surveying by Ruth and Going, Inc. Ruth and Going, Inc. will prepare a map showing the surveyed locations of the fault trace and exploration trenches.

Site Preparation, Grading and Compaction

Caution should be exercised when performing grading and other construction activities within or near the San Felipe Pipeline easement to avoid damaging the pipeline.

Prior to grading, the site should be cleared of any deleterious materials. Debris and materials arising from site clearance should be properly disposed of off-site.

The seven exploratory trenches excavated during this investigation were loosely backfilled. The loose backfill should be excavated and recompacted to the requirements for structural fill.

The site should be stripped of surface vegetation and organic topsoil. Soil containing more than 2 percent of organic matter by weight should be considered organic. The actual stripping depth should be determined by a member of our staff in the field when stripping is performed, but for planning purposes, an average stripping depth of 3 inches may be assumed. Strippings should be either hauled off-site or stockpiled for later use in landscape areas.

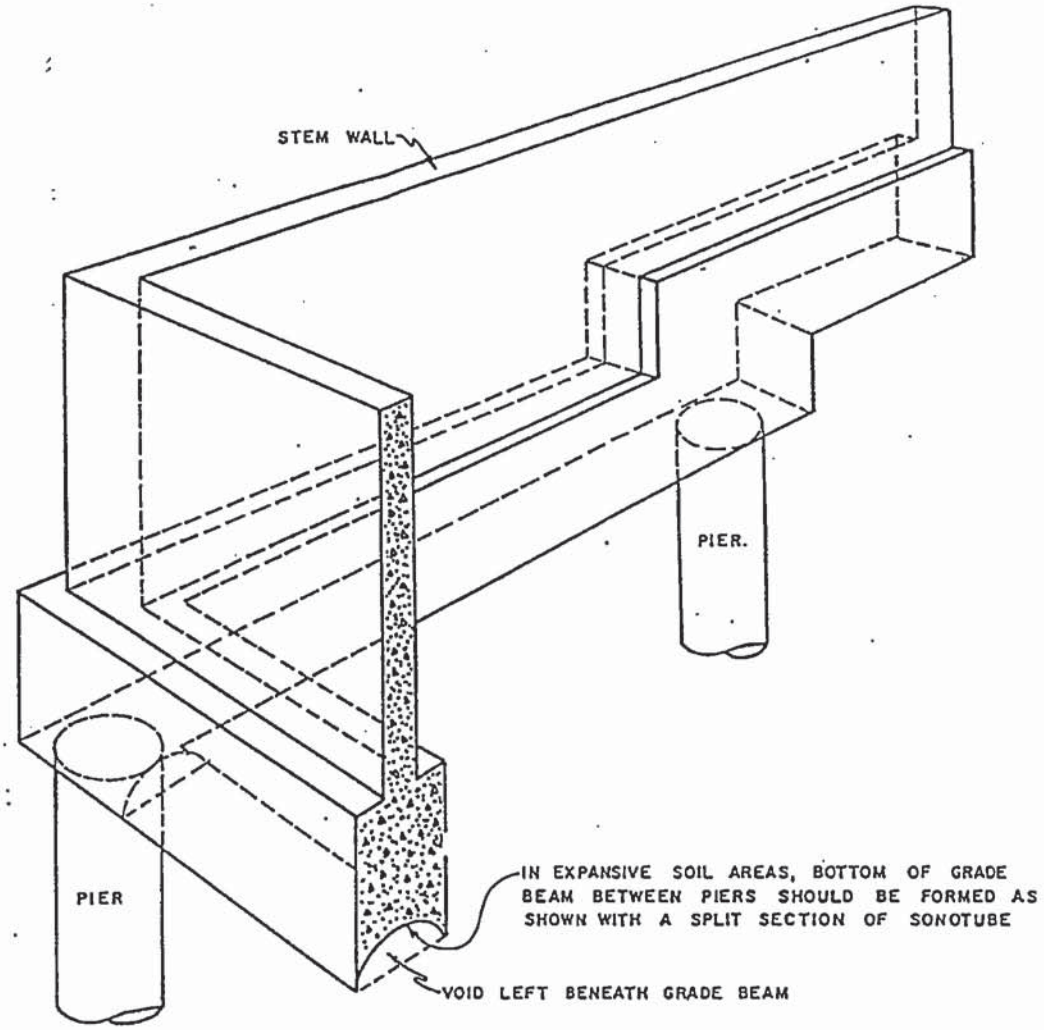
Soil surfaces to receive structural fill should be scarified to a depth of about 6 inches. Expansive clay soil should be conditioned with water (or allowed to dry) to at least 5 percent above laboratory optimum value and compacted to between 83 and 88 percent relative compaction based on ASTM D1557-78. Non-expansive on-site soil should be conditioned with water (or allowed to dry) to about 2 percent above laboratory optimum value and compacted to at least 90 percent relative compaction based on ASTM D1557-78. After the subgrades are properly prepared, these areas may be raised to design grade by placement of structural fill.

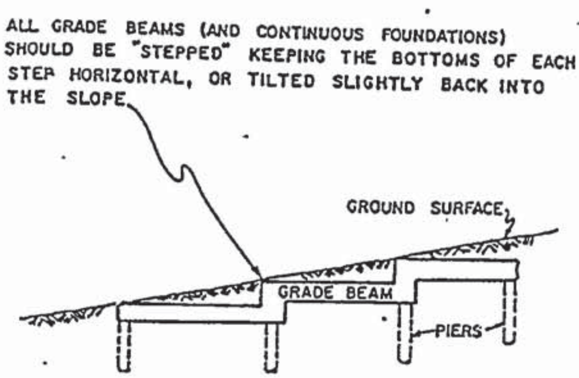
Structural fill should be water conditioned and compacted as recommended in the preceding paragraph in lifts no more than 8 inches in thickness (before compaction).

On-site soil may be used as structural fill. Soil for use as structural fill should be free of organics and deleterious material, should be approved by a member of our staff before placement, should contain no rocks or clods over 6 inches in greatest dimension, and should not contain more than 25 percent by weight of rocks larger than 2.5 inches. Import fill preferably should be granular, have a low expansion potential, and have sufficient binder to allow excavations to be made without caving of side-walls. A sample of the proposed import should be sent to our laboratory for evaluation and testing prior to delivery to the site.

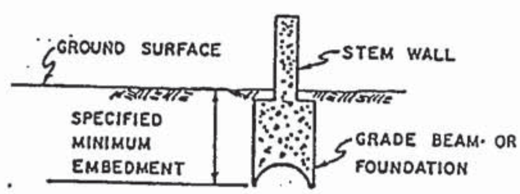
If pavement subgrades consist of expansive clay, the upper 6 inches of the subgrades should be compacted to between 87 and 92 percent relative compaction based on ASTM D1557-78 at a water content of at least 3 percent above laboratory optimum value. Pavement subgrades consisting of granular or non-expansive soils should be compacted to at least 95 percent relative compaction at a water content slightly above the laboratory optimum. If local jurisdiction insists on minimum 95 percent relative compaction on pavement subgrade, the upper 6 inches of the expansive clay subgrade should be either subexcavated and replaced with non-expansive import or treated with lime. Aggregate base for pavements should be compacted to at least 95 percent relative compaction.

Fill to be placed on slopes steeper than 7:1 (horizontal:vertical) should be keyed and benched into the slopes. A toe key at least 2 feet deep and about 8 feet wide should be constructed along the toe of the fill slope. Benches should be constructed by cutting horizontally about 5 feet into the hillside as the fill is brought up in layers. The material cut out from the benches may be blended and compacted with the fill. The actual configuration of the key and benches should be determined in the field by a member of our staff.





(Stem wall not shown)



EMBEDMENT DETAILS

NO SCALE

TERRATECH

GENERALIZED PIER AND GRADE BEAM FOUNDATION DETAILS

PROJECT

SAN JOSE BLUEPRINT CO.
PRINTED ON JR 330

Cut and Fill Slopes

Permanent cut and fill slopes should be constructed at inclinations no steeper than 2:1 (horizontal:vertical). The crests and toes of cut and fill slopes should be rounded to create smooth transitions into adjacent slopes. Slope faces should be planted with erosion-resistant vegetation.

Building Foundations

The proposed one and two story houses with raised wood floors will be constructed on moderately to highly expansive soils. To minimize the potential for foundation movements caused by the expansive native soils, we recommend the buildings be supported on pier and grade beam foundations.

Piers should have a diameter of at least 12 inches and should be spaced at least 3 pier diameters apart, center to center. Piers may be designed to derive their vertical dead plus live load supporting capacity by "skin friction" using a net allowable adhesion value of 500 pounds per square foot between the pier shafts and the surrounding soil. This allowable adhesion value may be increased by one-third when considering additional short-term wind or seismic loading. Support capacity from "end-bearing" of the piers and from the upper 2 feet of soil should be neglected in design calculations. Piers should be at least 5 feet deep.

Perimeter piers should be structurally tied to grade beams. Grade beams should be designed to span between piers and should be embedded at least 12 inches below interior pad grade. Uplift pressure from the underlying expansive soil may be mitigated by providing a void below the grade beams as illustrated on the sketch on the facing page. Interior tie beams should be provided across the width of the buildings to increase lateral rigidity of the foundations.

Concrete should be placed in foundation excavations that have been kept moist, are free from drying cracks, and that contain no loose soil or debris. All foundation excavations should be examined by a member of our staff to verify that they are extended into suitable material.

If a foot or two of non-expansive soil is placed above the expansive clays, or if grading exposes soil of low expansion potential, it may be possible to modify the recommended foundation system. If pier and grade beam foundations are considered too expensive to construct, supplemental exploration could be performed after careful review of proposed grading plans to identify areas where other foundation details could be applied.

Building Floors

We understand the houses will have raised wood floors.

Garage and Exterior Concrete Slabs-on-Grade

Soil subgrades for garage and exterior concrete slabs-on-grade should be prepared as recommended in the "Site Preparation, Grading and Compaction" section of this report. After rough grading, garage slab subgrades should be covered with plastic sheeting to prevent drying and to allow the underlying soils to expand and come to equilibrium. If this is impossible or impractical to do, the slab subgrades may need to be water conditioned and possibly reworked prior to slab construction.

About a week or more prior to slab construction, the subgrades should be examined and tested by a member of our staff to verify the water content of the upper 2(±) feet of subgrade soil is acceptable. If the soil is dry, the water content of the soil should be raised to at least 5 percent above the laboratory optimum value.

In areas where floor dampness must be minimized, a 5-inch minimum section of capillary break material covered with a membrane vapor barrier should be placed between the slab and the compacted soil subgrade. Capillary break material should be free-draining, clean gravel or rock, such as 3/8-inch pea gravel or Class I, Type B Permeable material (Caltrans Standard Specifications, Section 68). Vapor barrier should be a high quality membrane, such as Moistop by St. Regis, or equivalent. The vapor barrier may be covered with a 2 inch cushion of sand or capillary break material to protect the membrane.

Where floor dampness is not objectionable, concrete slabs may be cast directly on the properly water-conditioned and compacted subgrades.

Retaining Walls

Walls that will retain soil should be designed to resist lateral pressures from soils and surcharge loads applied behind the walls. The following parameters may be used.

1. Average bulk density of backfill material = 120 pcf.

2. The vertical plane extending down from the ground surface to the bottom of the heel of the wall will be subject to a pressure that increases linearly with depth at the following rate, starting from zero at ground surface.

Backfill Slope	Active Equivalent Fluid Pressure	At-rest Equivalent Fluid Pressure
Level	40 pcf	60 pcf
3:1 (h:v)	50 pcf	70 pcf
2:1 (h:v)	65 pcf	80 pcf

These values of lateral soil pressure are for non-seismic conditions and assume the wall backfill will consist of lightly compacted and drained non-expansive material. Active soil pressure may be used to design walls that are free to rotate at the top and where resulting settlement of backfill is not crucial. At-rest soil pressure should be used to design walls where movement at the wall top is restrained or undesirable, or resulting settlement of wall backfill is crucial.

Potential lateral pressures generated by a cut face of expansive clay that has been allowed to dry prior to placement of wall backfill can far exceed the values given above. Drying of temporary slopes behind walls should not be allowed.

3. The effects of compaction of the wall backfill by hand-operated equipment may be simulated by applying a 50 psf uniform surcharge of horizontal pressure to the stem of the wall. If heavier equipment will be used for compaction, Terratech should be consulted.

4. The effects of earthquakes may be simulated by applying a horizontal line load surcharge to the stem of the wall at a rate of $10H^2$ lb/horizontal foot of wall, where H is the height of the ground surface above the base of the wall heel. This surcharge should be applied at a height of 0.6H above the base of the wall.

5. A coefficient of "friction" of 0.35 may be used to calculate the <u>ultimate</u> resistance to horizontal sliding of the wall base over the ground beneath the base.

6. An equivalent fluid pressure of 350 psf/ft may be used to calculate the <u>ultimate</u> passive resistance to lateral movement of the ground in front of the toe of the wall and in front of any "key" beneath the wall. This value assumes the ground in front of the wall is level.

7. An allowable bearing pressure of 3,000 psf may be used beneath the toe of walls. This value may be increased by one-third when considering additional seismic loads on the walls.

A zone of drain rock at least 18 inches wide should be placed on the backfill side of the wall. This zone should extend up the back of the wall to about 1 foot down from the proposed ground surface above. The upper 1 foot or so should be backfilled with native, clayey soil. The drain rock and clayey soil cap should be placed in layers about 6 inches thick and should be lightly compacted by hand-operated equipment. Alternatively, drain rock may be densified with a concrete stinger. Heavy compaction should not be applied to the wall backfill; otherwise, the design pressure on the wall may be exceeded.

Drain rock should consist of either Class 2 Permeable material complying with Section 68 of the Caltrans Standard Specifications, latest edition (option 1), or 3/4 by 1-1/2 inch clean, durable, coarse aggregate (option 2). If the coarse aggregate is used, it should be separated from all adjacent soil by a Mirafi 700X filter fabric, or similar, approved by a member of our staff.

Water that may accumulate in the wall drain should be collected and discharged either by a 4-inch minimum diameter, perforated pipe placed "holes down" near the bottom of the drainage material, or by weep holes constructed close to the bottom of the wall. The perforated pipe should have holes no larger than 1/4-inch diameter for option 1 and no larger than 3/4-inch diameter for option 2. Weep holes should be spaced no more than 4 feet apart, and each should be protected by a heavy-gauge, galvanized wire screen with openings no larger than 1/4 inch. These screens should be at least 1 foot square and should be placed over the weep hole entrances on the backfill side of the wall.

Pavements

Three R-value tests were performed on selected bulk samples of near-surface soil. R-Values of 7, 10 and 23 were obtained at an exudation pressure of 300 psi, indicating the soils have a low to moderate pavement supporting capacity. An R-Value of 10 was used to calculate the alternate pavement sections given on Table 1. The results of the R-value tests are appended.

TABLE 1:CHOICE OF PAVEMENT SECTIONS (INCHES)

Design Traffic Index	Asphalt Concrete Surface Course	Asphalt Concrete Base Course	Class 2 Aggregate Base	Class 2 Aggregate Subbase	Total Thickness
4.5	1.0	6.0	- -	- -	7.0
	1.0	1.5	9.0	- -	11.5
	1.0	2.0	8.0	- -	11.0
5.0	1.0	7.0	- -	- -	8.0
	1.0	2.0	9.0	- -	12.0
5.5	1.0	8.0	- -	- -	9.0
	1.0	2.0	11.0	- -	14.0
	1.0	2.0	6.0	6.0	15.0
	1.0	2.5	10.0	- -	13.5
	1.0	2.5	6.0	5.0	14.5
6.0	1.0	9.0	- -	- -	10.0
	1.0	2.5	12.0	- -	15.5
	1.0	2.5	6.0	7.0	16.5
	1.0	3.0	11.0	- -	15.0
	1.0	3.0	6.0	6.0	16.0

Preparation of pavement subgrade should comply with the recommendations given in the "Site Preparation, Grading and Compaction" section of this report. Placement and compaction of aggregate base and asphalt concrete should conform to the requirements of the county of San Benito, except that compaction evaluation should be based on ASTM D1557-78. Aggregate used for asphalt concrete should comply with the minimum requirements specified in Section 39 for Type B aggregate. Aggregate used for asphalt concrete surfacing should conform to the grading specified in Section 39 for 3/8 inch or 1/2 inch maximum, medium grading.

Utility Trenches

Vertical trench excavations up to 5 feet deep should be capable of standing with minimal bracing for short construction periods. Trenches deeper than 5 feet or trenches in granular soil will require more substantial bracing. Project designers should make clear note of this on the project plans and in the project specifications and should draw the attention of the contractors, particularly the underground contractor, to the need for shoring and bracing to comply with the state and local requirements dealing with excavations and trenches.

For purpose of this section of the report, bedding is defined as material placed in a trench up to 1 foot above the pipe, and backfill is material placed above the bedding.

Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand bedding should be densified to at least 70 percent relative density based on ASTM Tests D4253-83 and D4254-83. Sand bedding may be compacted by the combined action of light jetting and mechanical compaction. Jetting, if used, should be closely supervised and provision should be made for removal of excess water.

On-site, inorganic soil or approved import, may be used as utility trench backfill. Backfill in trenches located under and adjacent to structural fill, foundations, concrete slabs and pavements should be placed in horizontal layers no more than 8 inches in thickness. Each layer should be water-conditioned and compacted to the requirements for structural fill. Compaction of backfill by water jetting should not be permitted.

The bottom of utility trenches should not extend below an imaginary plane sloping downward at a 45 degree angle from the bottom edge of the building foundations.

Where utility trenches cross perimeter building foundations, the trenches should be backfilled over their full depth with compacted clay for at least 2 feet on each side of the foundations.

Surface Drainage

Surface gradients should be planned and constructed to direct surface water away from buildings, edges of slabs-on-grade and pavements and towards suitable collection and discharge facilities.

Vehicle pavements should be designed and constructed with adequate surface gradients to ensure proper drainage and to prevent ponding. Proper surface drainage should be maintained during construction in winter.

Water seepage or the spread of extensive root systems into soil subgrade of foundations, slabs or pavements could cause differential movements and consequent distress in these structural elements. Landscape designs should be made accordingly.

Post-Report Geotechnical Services

We recommend TERRATECH be commissioned to provide the following services.

1. Review grading and foundation plans prior to construction.
2. Observe, test and advise during site preparation and grading, particularly during placement of structural fill.
3. Observe, test and advise on condition of slab subgrades prior to slab construction.
4. Observe and advise during foundation and slab construction.
5. Observe and advise during retaining wall construction.
6. Test proposed capillary break material, if used, beneath concrete slabs-on-grade to evaluate its suitability.
7. Observe, test and advice during backfilling of utility trenches.
8. Observe, test and advice during pavement construction.

LIMITATIONS

Changes in development proposals will render our recommendations invalid unless such changes are reviewed by our staff and our specific recommendations modified accordingly.

Our recommendations have been made in accordance with principles and practices generally employed by the engineering geologist and geotechnical engineering professions. This is in lieu of other warranties, express or implied.

Subsurface exploration of any site is necessarily confined to selected locations and conditions may, and often do, vary between and around these locations. If varied conditions are encountered during construction, additional exploration, testing and construction modification may be required. To compare the generalized site conditions assumed in this report with those exposed during construction, all earthwork and associated operations should be observed and tested by our field representative.

Any person concerned with this project who observes conditions or features of the site or its surrounding areas that are different from those described in this report should report them immediately to this office.

Sincerely,

TERRATECH, INC.

James L. Nelson
RG 4638, CEG 1463

Chalerm (Beeson) Liang
CE 35399, GE 2031

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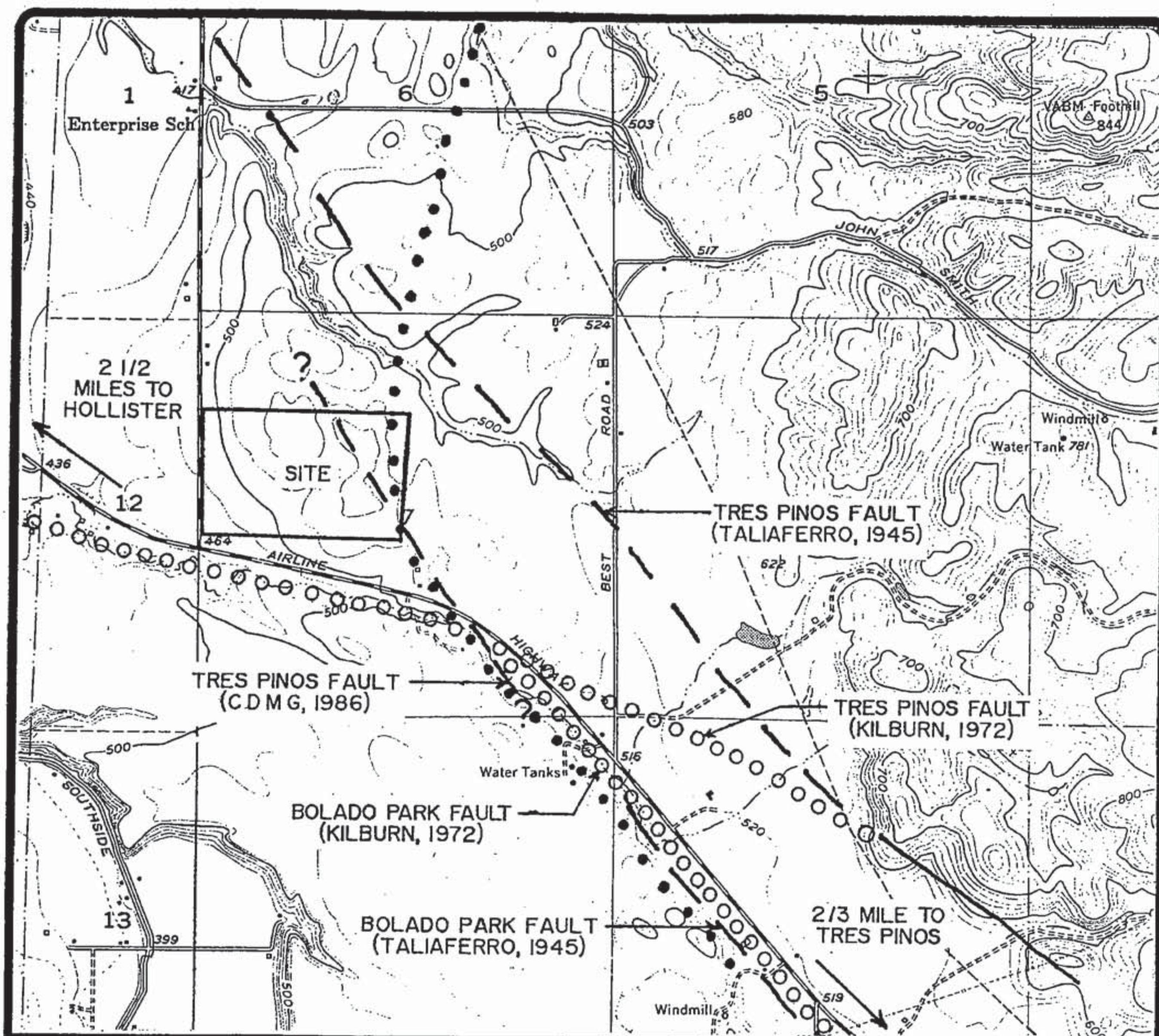
<u>AERIAL PHOTOGRAPHS</u>

Date	Agency	Type	Roll & Frame	Scale
8/1/49	U.S.D.A.	black & white	BUX-11F-199, 200, 201 & 202	1:20,000
6/13/59	U.S.D.A.	black & white	BUX-6V-179, 180, 181, 182 & 183	1:20,000
5/15/67	U.S.D.A.	black & white	BUX-1HH-128, 129, 130, & 131	1:20,000
4/30/70	U.S.G.S.	black & white	GS-VCMI-2-38 & 39	1:40,000
7/12/74	U.S.G.S.	color	1-SFB 12-130, 131, 132 & 133	1:20,000
5/7/80	U.S.D.A.	black & white	06069 379-77, 78 & 79	1:40,000
4/2/85	W.A.C. Corp.	black & white	WAC-85CA 7-247, 248 & 249 and 10-27, 28 & 29	1:31,680
6/14/89	W.A.C. Corp.	black & white	WAC-89CA 32-52 & 53 and 32-140 & 141	1:31,680



BASE MAP: U.S.G.S. 7.5 minute Tres Pinos, California, Quadrangle, dated 1955, photorevised 1971.

EXPLANATION

N

— — — — Tres Pinos fault and Bolado Park fault after Taliaferro, 1945, and C D M G, 1986.

o o o o o o o Tres Pinos fault and Bolado Park fault after Kilburn, 1972.

• • • • • • • Photolineament observed during this investigation.

Scale: 1"=2000'

NOVEMBER 1989

TERRATECH

VICINITY MAP

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE
1

PROJECT
8250

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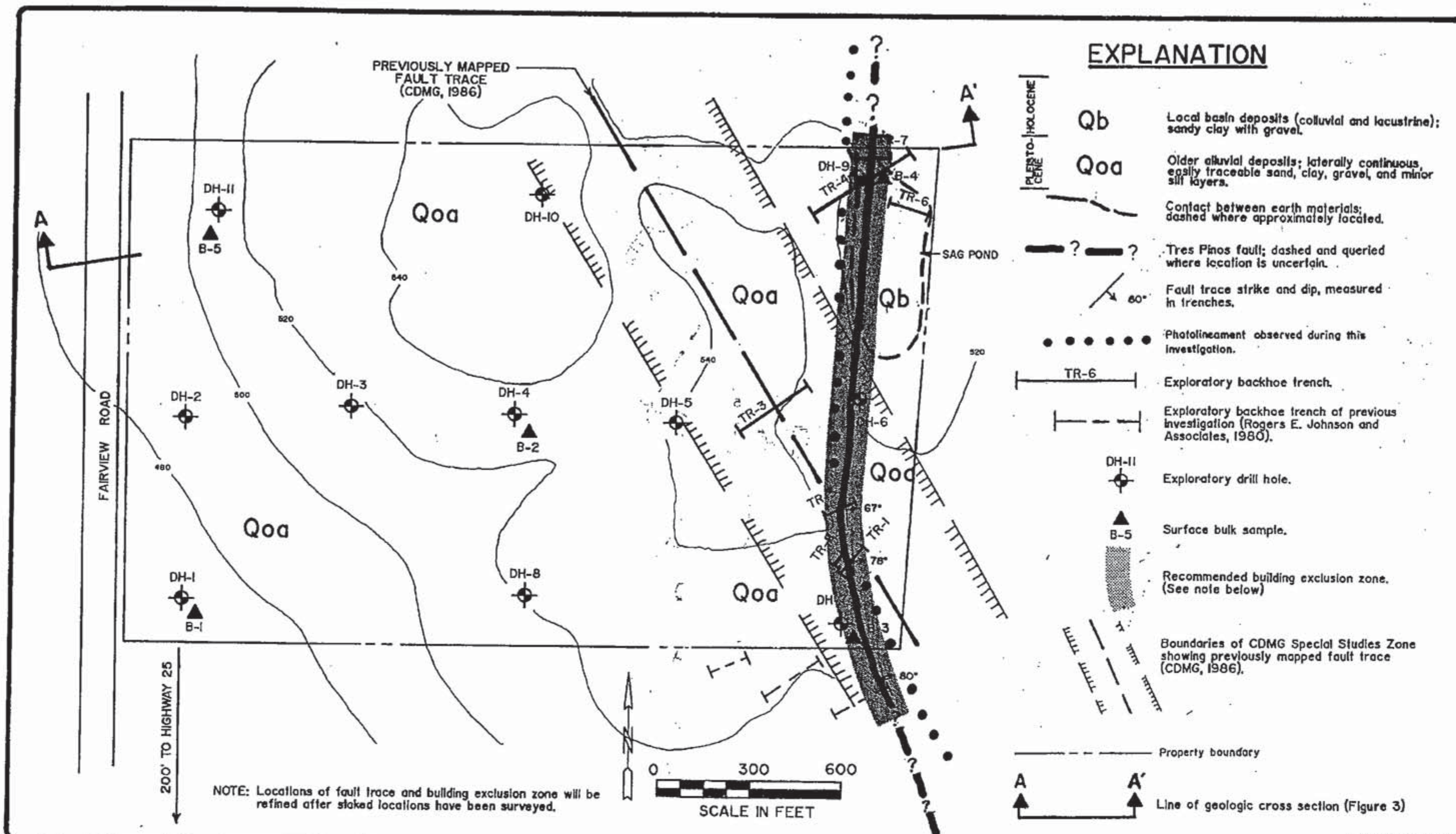


NOVEMBER 1989

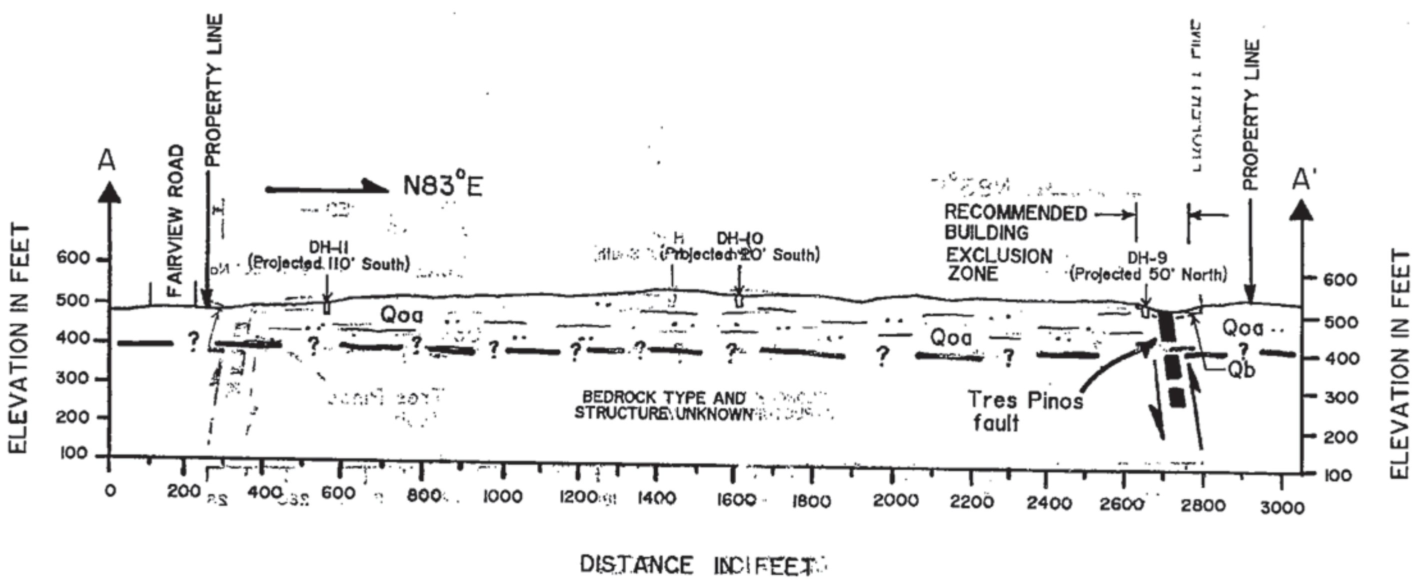
TERRATECH

BASE MAP: U.S.G.S. 7.5 minute Tres Pinos, California, Quadrangle, dated 1955, photorevised 1971.

GEOLOGIC MAP

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 2
PROJECT 8250



NOTE: See Figure 2 for location of section and explanation.

NOVEMBER 1989

TERRATECH

GEOLOGIC CROSS SECTION

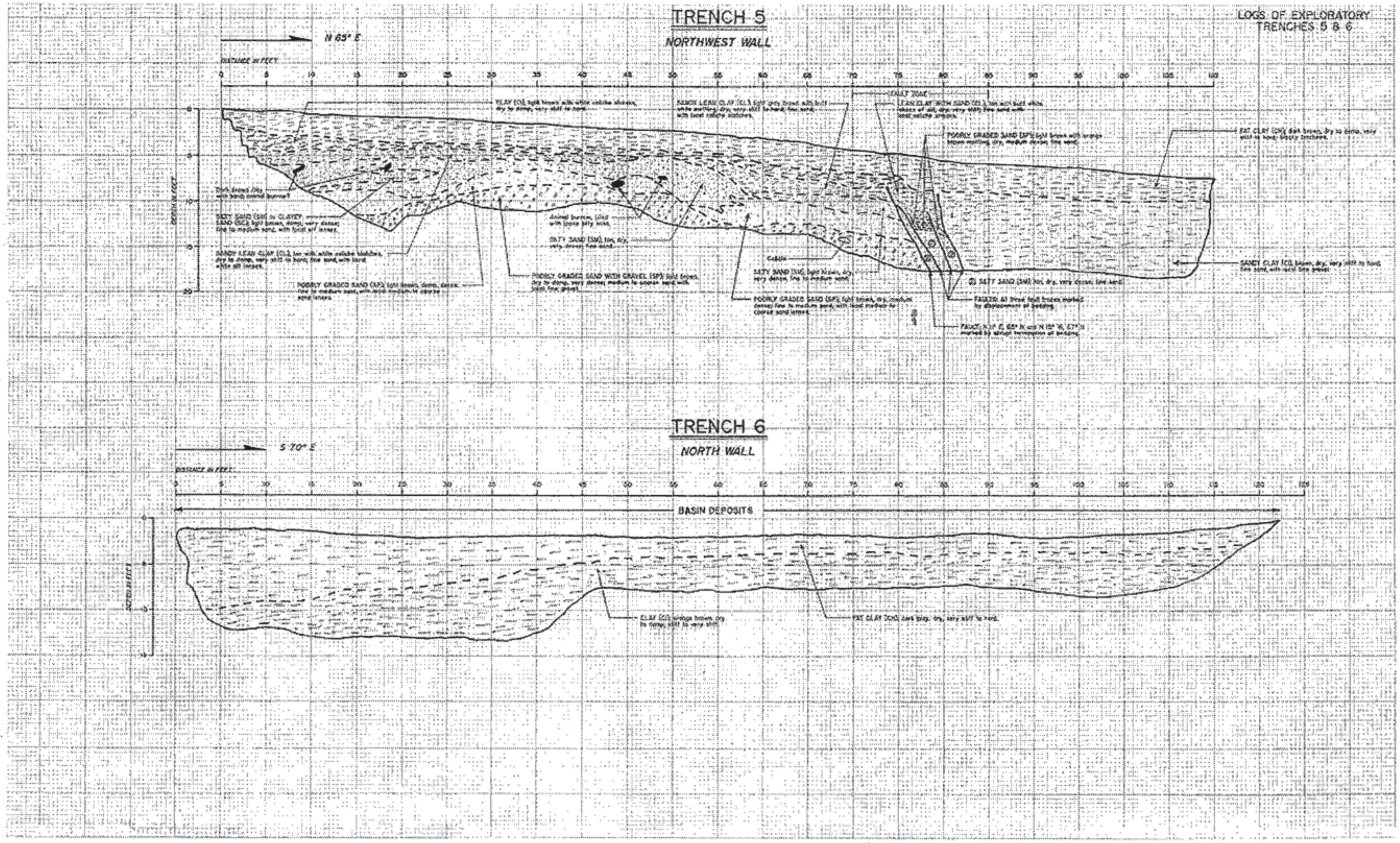
FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 3
PROJECT 8250

HOLLISTER (WINDSONG) 1990 BUDGET FORECAST

1)	Monterey County Surveyors	14.3% of $9,600.00		$ 1,372.80
2)	Wade Associates	14.3% of $81,000.00 (balance)		$11,583.00
3)	Vail Engineering	14.3% of $49,000.00		$ 7,007.00
	* SUB-TOTAL		$ 19,962.80	
4)	David E. Coldoff, Architect	Purchase order not to exceed		$10,000.00
5)	TerraTech			$ 1,500.00
6)	MacKay & Somps, Civil Engineering			$15,000.00
	TOTAL		$ 46,462.80	

* The sub-total of $19,962.80 represents Dividends pro rata share (based on acreage) of the $139,600 that the eight land owners within the Fairview Road Specific Plan have agreed to fund on a monthly (November '89 - April '90) basis per the attached funding schedule.



NOTE: See Figure 2 for locations of trenches.

DATE NOV 1989	DRAWN BY DAC	CHKD	APPR
REVISIONS			

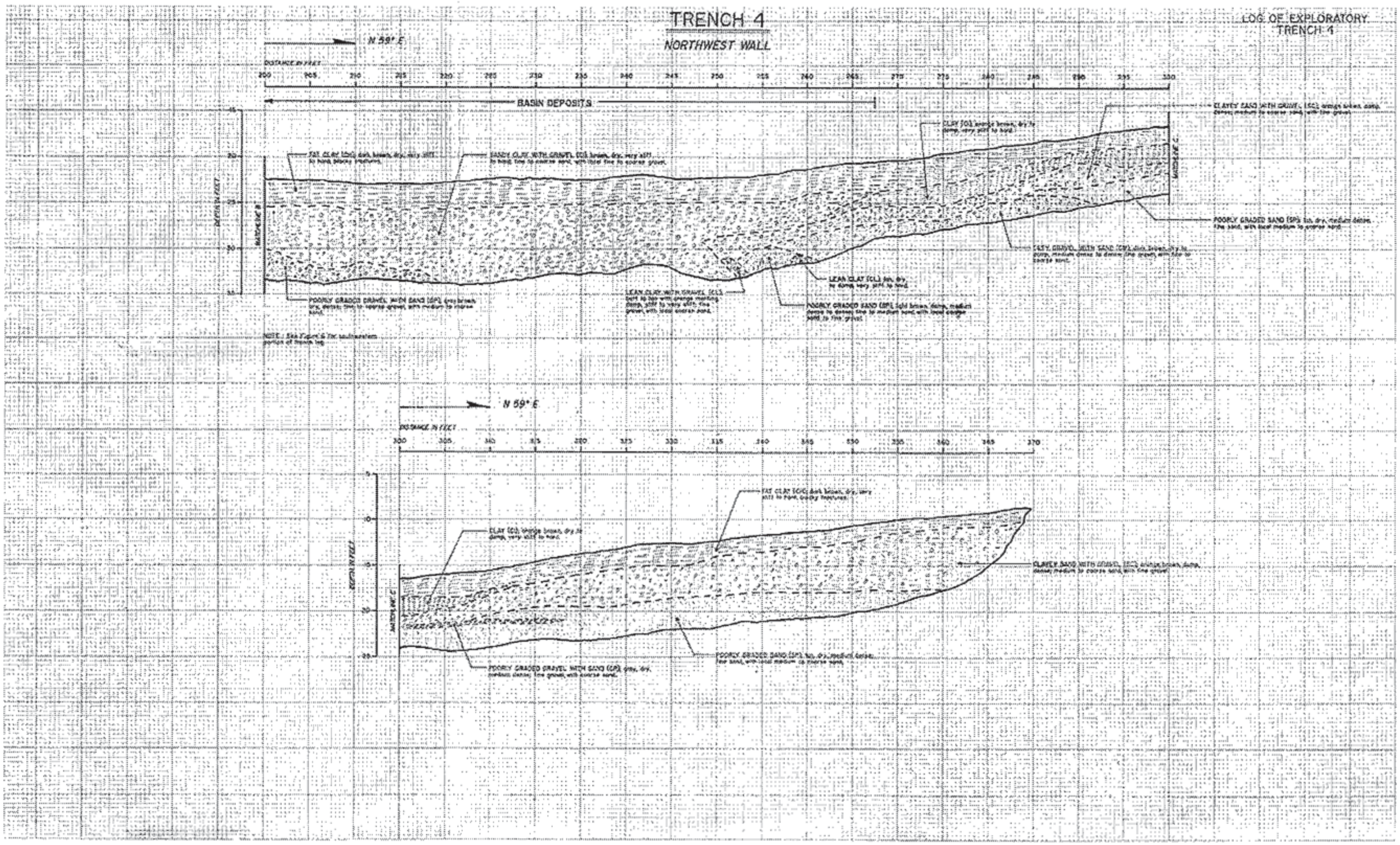
TERRATECH

LOGS OF EXPLORATORY TRENCHES 5 & 6

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 8

PROJECT 8250



NOTE: See Figure 2 for location of trench.

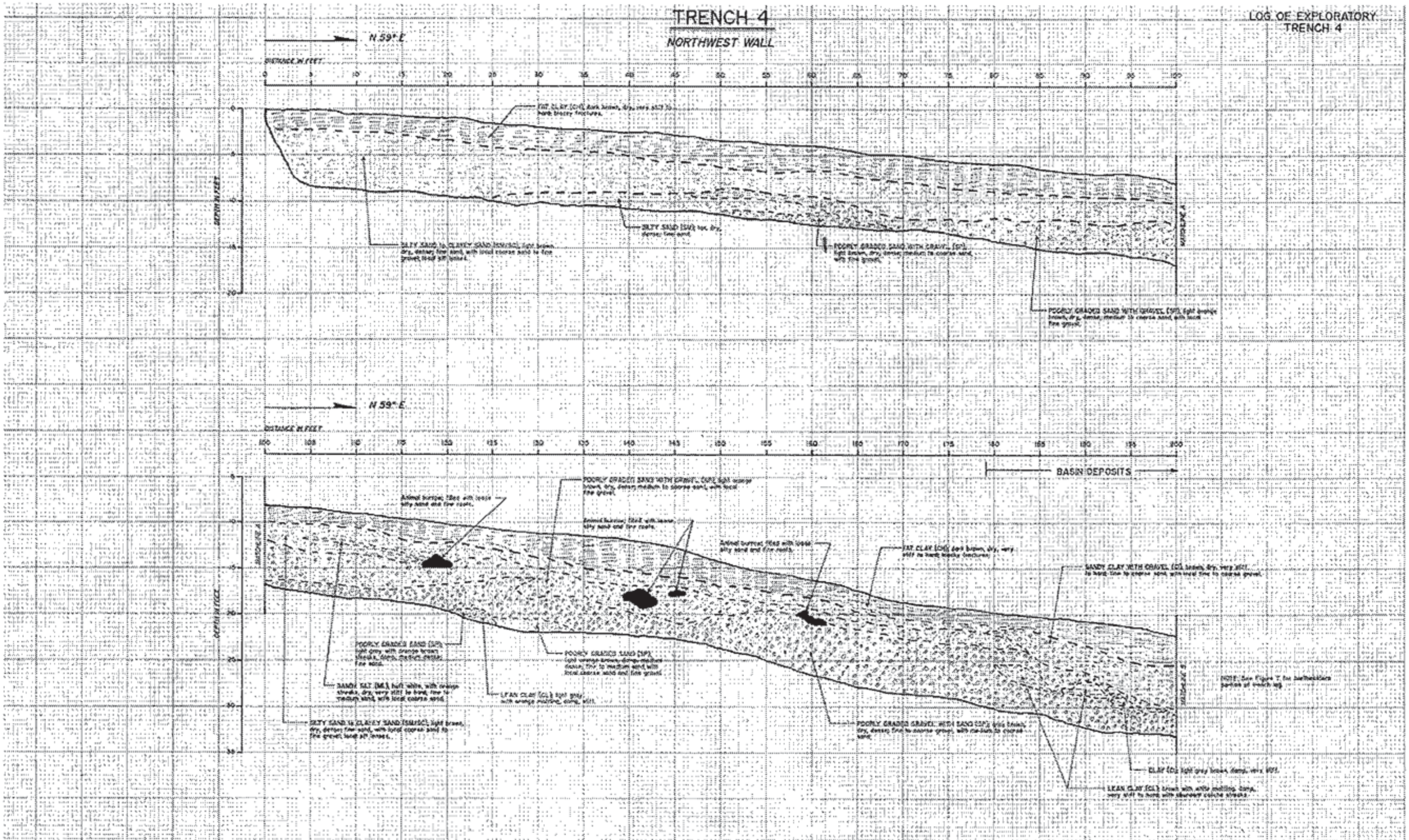
DATE NOV 1989	DWN BY DAC	CHKD	APPD
REVISIONS			

TERRATECH

LOG OF EXPLORATORY TRENCH 4
(SHEET 2 OF 2)

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 7
PROJECT 8250



NOTE: See Figure 2 for location of trench.

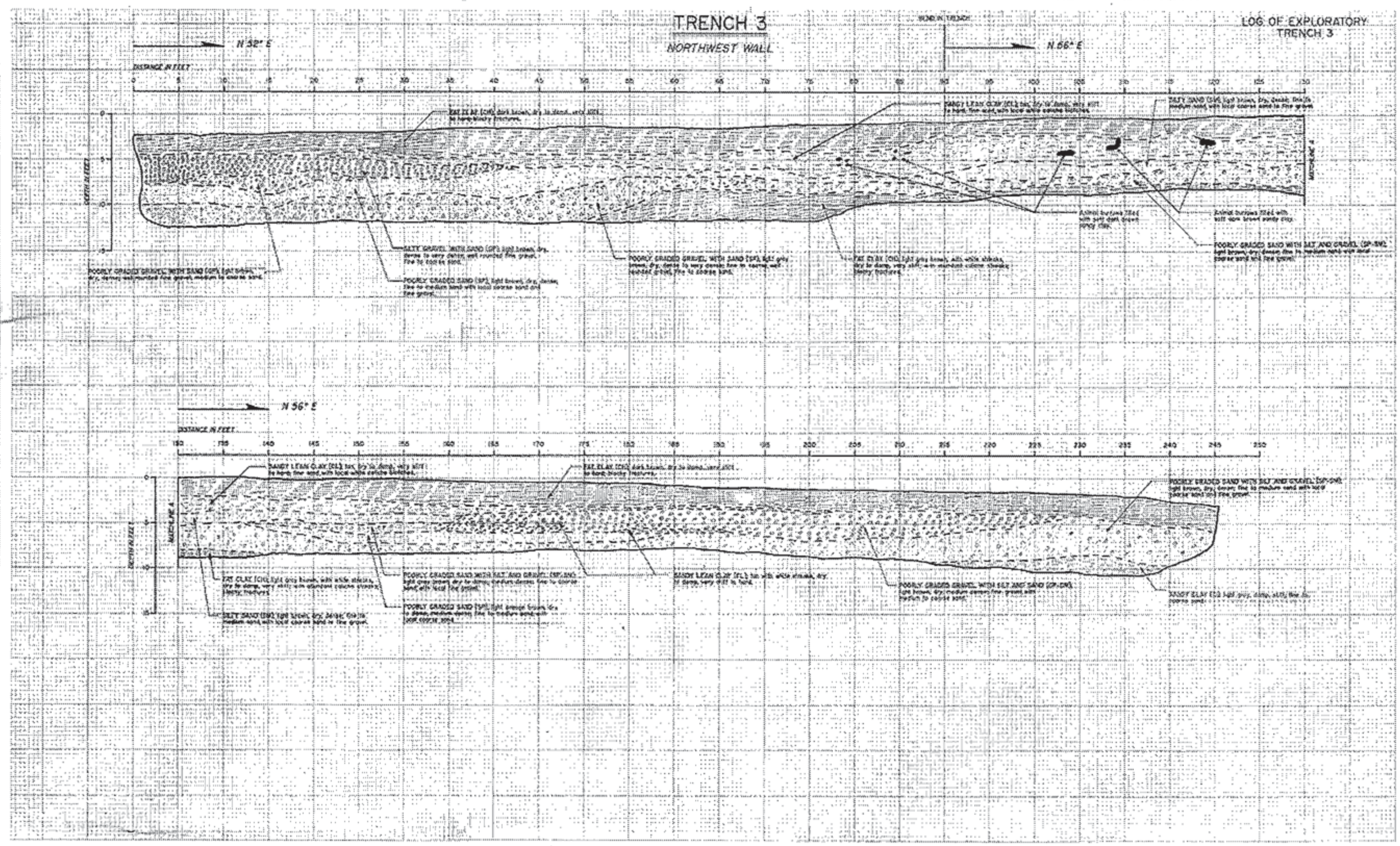
DATE NOV 1989	DRWN BY DOC	CHKD	APPR	
REVISIONS				
NO	DATE	DWN	CHKD	APPR

TERRATECH

LOG OF EXPLORATORY TRENCH 4
(SHEET 1 OF 2)

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 6
PROJECT 8250



NOTE: See Figure 2 for location of trench.

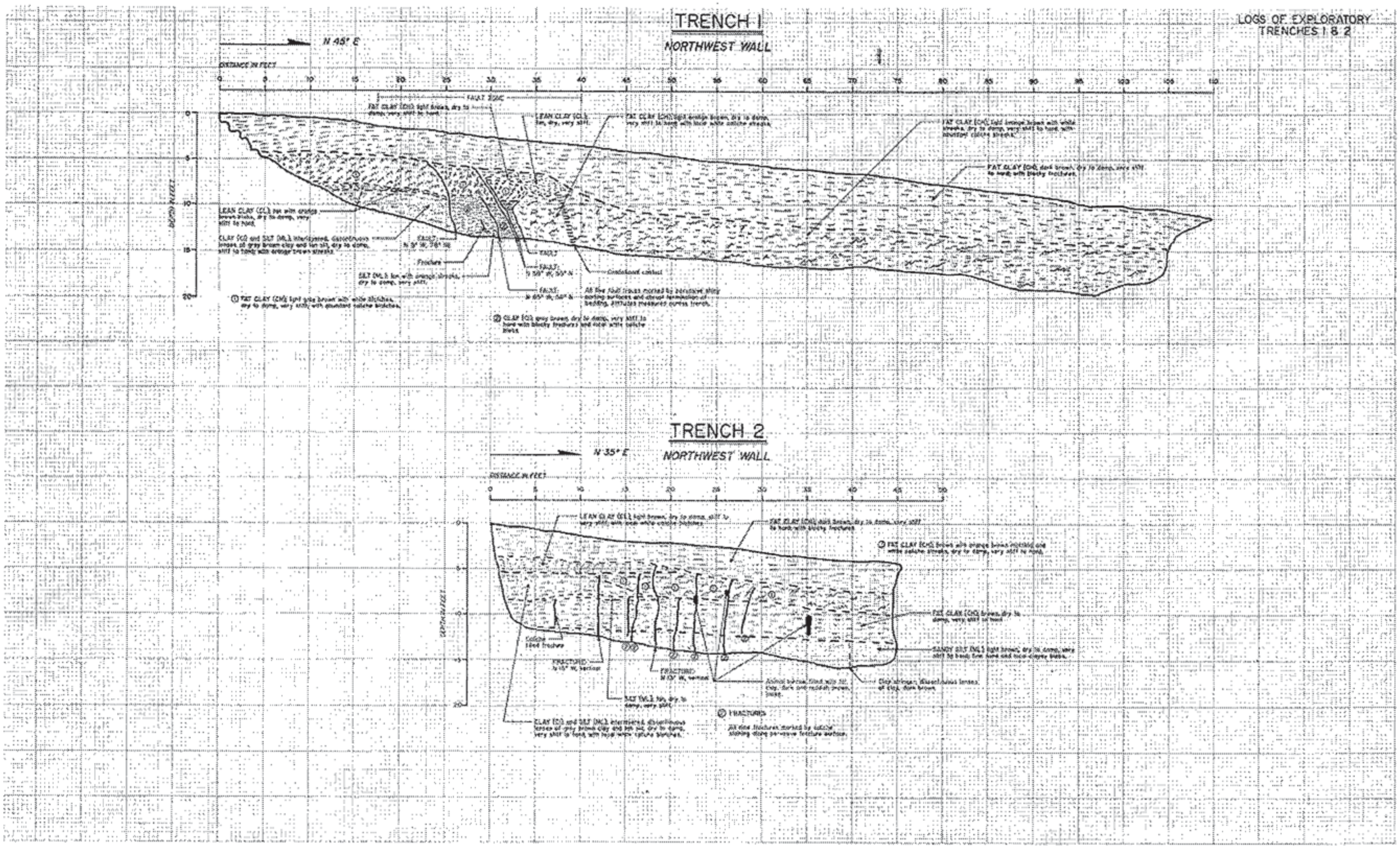
DATE NOV 1989	DRAWN BY DAC	CHKD	APPR	
REVISIONS				
NO.	DATE	DRWN	CHKD	APPR

TERRATECH

LOG OF EXPLORATORY TRENCH 3

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 5
PROJECT 8250



NOTE: See Figure 2 for locations of trenches.

DATE NOV 1989	DWN BY DAC	CHKD	APPR
REVISIONS			
NO / DATE	DWN	CHKD	APPR

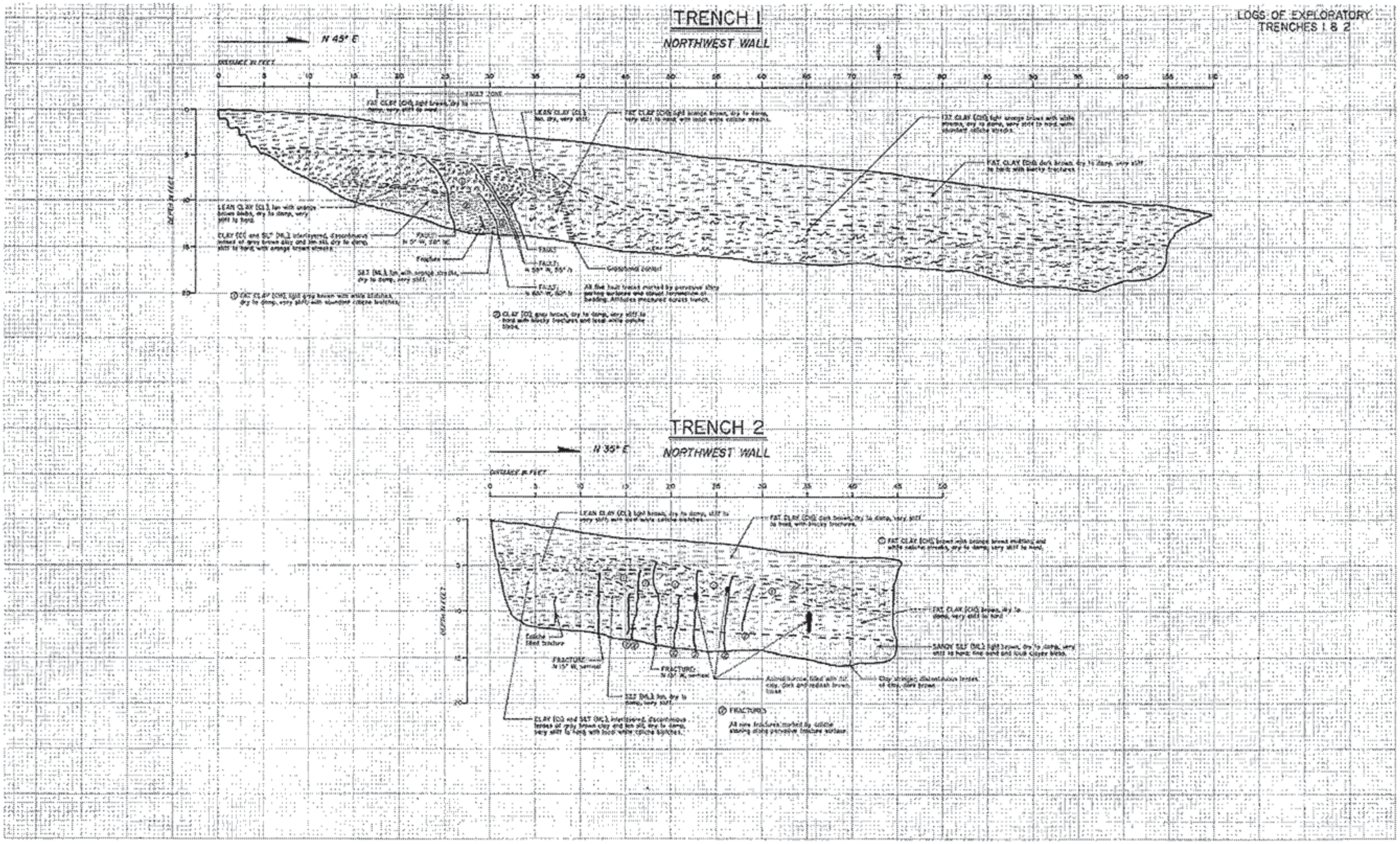
TERRATECH

LOGS OF EXPLORATORY TRENCHES 1 & 2

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 4

PROJECT 8250



NOTE: See Figure 2 for locations of trenches.

DATE NOV 1989	DRWN BY DAC	CHKD	APPR
REVISIONS			
NO. DATE	DRWN	CHKD	APPR

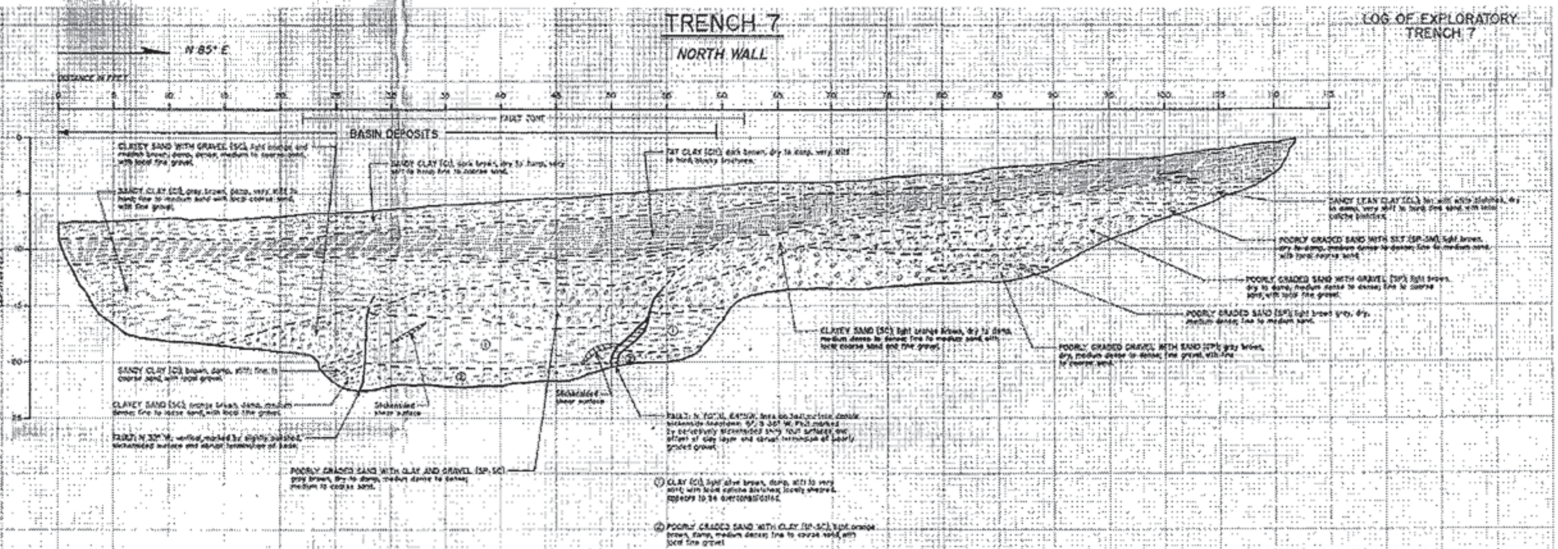
TERRATECH

LOGS OF EXPLORATORY TRENCHES 1 & 2

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 4
PROJECT 8250

LOG OF EXPLORATORY TRENCH 7



NOTE: See Figure 2 for location of trench.

DATE NOV 1989	DRAWN BY GRC
REVISIONS	

TERRATECH

LOG OF EXPLORATORY TRENCH 7

FAIRVIEW ROAD PROPERTY
SAN BENITO COUNTY, CALIFORNIA

FIGURE 9

PROJECT 8250

EXPLORATION DRILL HOLE LOG

HOLE No. 1

PROJECT FAIRVIEW ROAD PROPERTY — DATE 9/14/89 — LOGGED BY JLN

DRILL RIG CME 55, Cont Flight — HOLE DIA. 8" — SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL -- — FINAL -- — HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN. (tsf)	TORVANE (tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)
CLAY; light brown, dry, stiff	CI												
		1											
			S										
hard, with fine sand and local		2	X										
white caliche blotches			X	18					12		107		
		3	S										
CLAY WITH SAND; light brown, dry,	CI		X										
hard; with fine sand		4	X	30					11		112		
		5	S										
FAT CLAY; light brown, dry, hard;	CH		X										
with blocky fractures		6	X	36					18		111		
		7											
CLAY WITH SAND; light brown, dry,	CI												
hard; with fine sand		8											
		9											
LEAN CLAY; light brown with buff	CL												
white blotches (caliche), dry,		10	S										
hard; with local small voids and			X										
silty to sandy laminations		11	X	35									
		12											
		13											
SILTY SAND; light brown, dry,	SM												
dense, fine grained		14											
		15	S										
			X										
		16	X	36									
(break in log)		//											
		19											
CLAY; orange brown, damp, hard;	CI												
with local fine to medium sand and		20	S										
caliche streaks			*										
		21	*	37									

BOTTOM OF HOLE @ 21 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

PROJECT 8250

TERRATECH

EXPLORATION DRILL HOLE LOG

HOLE No. 2

PROJECT FAIRVIEW ROAD PROPERTY **DATE** 9/14/89 **LOGGED BY** JLN

DRILL RIG CME 55, Cont Flight **HOLE DIA.** 8" **SAMPLER** Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL -- **FINAL** -- **HOLE ELEV.**

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN.(tsf)	TORVANE(tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN(%)	UNCONFINED SHEAR STRENGTH(psf)
CLAY WITH SAND; brown, dry, firm to stiff; with fine sand	CI												
		1											
	CI/		S										
CLAY to FAT CLAY; dark brown, damp, very stiff; with local fine gravel and caliche blotches	CH	2	X										
			X	13				50	14	13	110		
		3	S										
			X										
CLAY WITH SAND; light brown, damp, hard; with fine sand and local caliche blotches	CI	4	X	30									
		5	S										
			X										
CLAYEY SAND WITH GRAVEL; light brown, damp, very dense, fine to coarse grained; with local fine gravel	SC	6	X	50/5.5"					7		133		
		7											
		8											
		9											
POORLY-GRADED SAND WITH SILT AND GRAVEL; light brown, dry, medium dense, fine to coarse grained; with fine gravel	SP-SM	10	S										
			*										
		11	*	25					2				
		12											
		13											
		14											
LEAN CLAY; light gray brown with rusty mottling, damp, very stiff; with local caliche blotches	CL	15	S										
			*										
		16	*	13									
		17											
		18											
		19											
		20	S										

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

EXPLORATION DRILL HOLE LOG

HOLE No. 2

PROJECT FAIRVIEW ROAD PROPERTY — DATE 9/14/89 — LOGGED BY JLN

DRILL RIG CME 55, Cont Flight — HOLE DIA. 8" — SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL – – FINAL – – HOLE ELEV. – –

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN.(tsf)	TORVANE(tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN(%)	UNCONFINED SHEAR STRENGTH(psf)
LEAN CLAY; light gray brown with rusty mottling, damp, hard; with local caliche blotches and thin silt lenses	CL		*										
		21	*	19									
		22											
		23											
		24											
		25	S										
			X										
CLAYEY SAND; light gray brown with rusty brown blotches, dry to damp, dense, fine to medium grained	SC	26	X	35									
		27											
		28											
		29											
		30	S										
POORLY-GRADED SAND WITH SILT; multi-color, dry, dense, fine to coarse grained; with fine gravel	SP-SM		X										
		31	X	40									
		32											
(break in log)		//											
		35	S										
			*										
		36	*	39					3				
		37											
POORLY-GRADED SAND WITH GRAVEL; light brown, dry to damp, very dense, fine to coarse grained; with fine gravel	SP	38											
		39											
		40	S										
			*										
		41	*	74									

BOTTOM OF HOLE @ 41 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

PROJECT 8250 — TERRATECH

EXPLORATION DRILL HOLE LOG

HOLE No. 3

PROJECT FAIRVIEW ROAD PROPERTY   DATE 9/14/89   LOGGED BY JLN

DRILL RIG CME 55, Cont Flight   HOLE DIA. 8"   SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL - -   FINAL - -   HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN.(tsf)	TORVANE(tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN(%)	UNCONFINED SHEAR STRENGTH(psf)
CLAY WITH SAND; brown, dry, firm to stiff; with fine sand	CI												
		1											
	CI/		S										
CLAY to FAT CLAY; dark brown, dry, very stiff; with local fine gravel	CH	2	X										
			X	14					16		104		
		3	S										
			X										
SILTY SAND WITH GRAVEL; light brown, dry, medium dense, fine to coarse grained; with fine gravel	SM	4	X	31									
		5	S										
			X										
		6	X	21					4				
		7											
POORLY-GRADED SAND WITH GRAVEL AND SILT; light brown, dry, medium dense, fine to coarse grained; with fine gravel	SP-SM	8											
		9											
		10	S										
			*										
		11	*	22									
		12											
CLAY; light gray brown and rusty rusty brown mottled with black blotches, damp, hard	CI	13											
		14											
		15	S										
			*										
		16	*	21	4.5+								
BOTTOM OF HOLE @ 16 FEET NO GROUND WATER ENCOUNTERED		17											
		18											
		19											
		20											

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

EXPLORATION DRILL HOLE LOG

HOLE No. 4

PROJECT FAIRVIEW ROAD PROPERTY — DATE 9/14/89 — LOGGED BY JLN

DRILL RIG CME 55, Cont Flight — HOLE DIA. 8" — SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL – – — FINAL – – — HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN.(tsf)	TORVANE(tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN(%)	UNCONFINED SHEAR STRENGTH(psf)
FAT CLAY; dark brown, dry, hard	CH												
		1											
			S										
		2	X										
CLAYEY SAND; light brown, dry to	SC		X	17					12		104		
damp, dense, fine grained; with		3	S										
local white caliche blotches			X										
Passing No. 200 Sieve = 41%		4	X	32					10		112		
SANDY LEAN CLAY; tan, dry, very	CL	5	S										
stiff; with fine sand and local			X										
white caliche blotches		6	X	16					9		105		
		7											
FAT CLAY; gray brown with orange	CH												
mottled with dark brown, damp,		8											
hard; with silty laminations													
		9											
		10	S										
			*										
		11	*	23	4.5+			75		19			
		12											
		13											
		14											
		15	S										
			X										
		16	X	17	4.5+								
(break in log)		//											
LEAN CLAY WITH SAND; light brown,	CL	19											
dry, very stiff; with fine sand													
		20	S										
			X										
		21	X	15									

BOTTOM OF HOLE @ 21 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

EXPLORATION DRILL HOLE LOG

HOLE No. 5

PROJECT FAIRVIEW ROAD PROPERTY — DATE 9/14/89 — LOGGED BY JLN

DRILL RIG CME 55, Cont Flight — HOLE DIA. 8" — SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL -- — FINAL -- — HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN. (tsf)	TORVANE (tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)
SANDY CLAY; brown, dry, stiff; with fine sand	CI												
		1											
FAT CLAY; dark brown, dry, hard; with blocky fractures	CH		S										
		2	X										
			X	14					15		104		
		3	S										
CLAYEY SAND; tan, dry, medium dense to dense, fine to medium grained; with sandstone fragments	SC		X										
		4	X	40	*	44			11		106		
		5	S										
* Passing No. 200 Sieve = 44%			X										
		6	X	23									
SILTY SAND; light brown, dry, medium dense, fine sand; with local fine gravel	SM	7											
		8											
		9											
		10	S										
			*										
		11	*	15									
		12											
		13											
WELL-GRADED GRAVEL WITH SAND AND SILT; light brown, dry to damp, medium dense, fine grained; with fine to coarse sand	GW-GM	14											
		15	S										
			*										
		16	*	23					3				
LEAN CLAY WITH SAND; light gray brown, damp, hard; with fine sand	CL												
		17											
(break in log)		//											
		20	S										
			X										
		21	X	43									

BOTTOM OF HOLE @ 21 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

PROJECT 8250 — TERRATECH

EXPLORATION DRILL HOLE LOG

HOLE No. 6

PROJECT FAIRVIEW ROAD PROPERTY DATE 9/14/89 LOGGED BY JLN

DRILL RIG CME 55, Cont Flight HOLE DIA. 8" SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL -- FINAL -- HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN.(tsf)	TORVANE(tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN(%)	UNCONFINED SHEAR STRENGTH(psf)
CLAY WITH SAND; brown, dry, stiff; with fine sand	CI												
		1											
FAT CLAY; dark brown, dry to damp, hard; with some fine to medium sand	CH		S										
		2	X										
			X	14					12		112	2.2	10600
		3	S										
			X										
		4	X	24					13		110		
SANDY LEAN CLAY; light orange brown, dry, hard	CL	5	S										
			X										
		6	X	49				33	9	14	114		
		7											
		8											
		9											
		10	S										
			*										
		11	*	59									
BOTTOM OF HOLE @ 11 FEET NO GROUND WATER ENCOUNTERED													
		12											
		13											
		14											
		15											
		16											
		17											
		18											
		19											
		20											

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

PROJECT 8250 TERRATECH

EXPLORATION DRILL HOLE LOG	HOLE No. 7

PROJECT FAIRVIEW ROAD PROPERTY DATE 9/15/89 LOGGED BY JLN

DRILL RIG CME 55, Cont Flight HOLE DIA. 8" SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL -- FINAL -- HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN.(tsf)	TORVANE(tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN(%)	UNCONFINED SHEAR STRENGTH(psf)
FAT CLAY; dark brown, damp, very stiff	CH												
		1											
			S										
		2	X										
CLAY WITH SAND; light brown, dry to damp, hard; with fine sand and local caliche blotches	CI		X	14					14		98		
		3	S										
			X										
		4	X	31					11		113	2.1	7680
		5	S										
			X										
		6	X	35									
		7											
		8											
		9											
		10	S										
			X										
		11	X	55	4.5+				16		117		
		12											
		13											
		14											
		15	S										
			X										
gray brown		16	X	42				48	24	17	96		
		17											
		18											
		19											
		20	S										

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

EXPLORATION DRILL HOLE LOG

HOLE No. 7

PROJECT FAIRVIEW ROAD PROPERTY — DATE 9/15/89 — LOGGED BY JLN

DRILL RIG CME 55, Cont Flight — HOLE DIA. 8" — SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL -- — FINAL -- — HOLE ELEV. --

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN. (tsf)	TORVANE (tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)
CLAY; brown, dry to damp, hard; with local white caliche blebs	CI		X										
		21	X	40	4.5								
		22											
		23											
		24											
		25	S										
CLAYEY SAND; light brown, damp, dense, fine to coarse grained	SC		X										
		26	X	34									
		27											
		28											
		29											
		30	S										
			*										
Passing No. 200 Sieve = 42%		31	*	23					11				
		32											
		33											
		34											
		35	S										
			X										
		36	X	34									
		37											
		39											
POORLY-GRADED SAND WITH GRAVEL; light brown, dry, very dense, fine to coarse grained; with fine gravel	SP												
		40	S										
			X										
		41	X	30/3"									

BOTTOM OF HOLE @ 41 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

PROJECT 8250 — TERRATECH

EXPLORATION DRILL HOLE LOG

HOLE No. 8

PROJECT FAIRVIEW ROAD PROPERTY — DATE 9/15/89 — LOGGED BY JLN

DRILL RIG CME 55, Cont Flight — HOLE DIA. 8" — SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL - - — FINAL - - — HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN. (tsf)	TORVANE (tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)
SANDY CLAY; brown, dry, stiff;	CI												
with fine sand		1											
	CH		S										
FAT CLAY; dark brown, dry, hard;		2	X										
with blocky fractures			X	12					14		104		
	CI	3	S										
CLAY; light brown, dry, very stiff			X										
to hard; with white caliche		4	X	29					11		102	1.6	3900
blotches													
		5	S										
			X										
hard		6	X	47									
		7											
		8											
		9											
		10	S										
			X										
		11	X	54									
		12											
POORLY-GRADED SAND WITH SILT;	SP-												
light brown, dry to damp, medium	SM	13											
dense, fine grained													
		14											
		15	S										
			*										
		16	*	25									
		17											
(break in log)		//											
very dense		20	S										
			*										
		21	*	71									

BOTTOM OF HOLE @ 21 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

EXPLORATION DRILL HOLE LOG

HOLE No. 9

PROJECT FAIRVIEW ROAD PROPERTY DATE 9/15/89 LOGGED BY JLN

DRILL RIG CME 55, Cont Flight HOLE DIA. 8" SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL – – FINAL – – HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN.(tsf)	TORVANE(tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN(%)	UNCONFINED SHEAR STRENGTH(psf)
SANDY CLAY; brown, dry, stiff to	CI												
very stiff; with fine sand		1											
	CI		S										
SANDY CLAY WITH GRAVEL; dark		2	X										
brown, dry, hard; with fine to			X	24					7		116		
coarse sand and fine gravel		3	S										
			X										
		4	X	32					10		119		
		5	S										
			*										
		6	*	23									
		7											
		8											
damp, more gravel													
		9											
		10	S										
			*										
		11	*	16									
(break in log)		//											
		14											
CLAYEY SAND WITH GRAVEL; purple-	SC												
brown, damp, very dense, fine to		15	S										
coarse grained; with fine gravel			*										
		16	*	55									
		17											
		18											
CLAYEY SAND; yellowish brown,	SC	19											
damp, medium dense to dense,													
fine to medium grained		20	S										
			*										
		21	*	30									

BOTTOM OF HOLE @ 21 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

PROJECT 8250 TERRATECH

EXPLORATION DRILL HOLE LOG

HOLE No. 10

PROJECT FAIRVIEW ROAD PROPERTY **DATE** 9/15/89 **LOGGED BY** JLN

DRILL RIG CME 55, Cont Flight **HOLE DIA.** 8" **SAMPLER** Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL -- **FINAL** -- **HOLE ELEV.**

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN. (tsf)	TORVANE (tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)
FAT CLAY; dark brown, dry, stiff to very stiff	CH												
		1											
			S										
		2	X										
CLAY; light brown, dry, hard; with white caliche blotches and local small voids	CI		X	23					8		101		
		3	S										
			X										
		4	X	29					9		109	2.9	5790
		5	S										
			X										
		6	X	27									
FAT CLAY; light gray brown, damp, hard; with local silty layers	CH												
		7											
		8											
		9											
		10	S										
			X										
		11	X	30				65	23	19	94		
(break in log)		//											
		14											
CLAYEY SAND; light gray brown, dry, medium dense, fine grained	SC	15	S										
			X										
		16	X	24					10		106		
		17											
		18											
CLAYEY SILT; light gray brown, dry, hard	ML/CL	19											
		20	S										
			X										
		21	X	29									

BOTTOM OF HOLE @ 21 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

PROJECT 8250 **TERRATECH**

EXPLORATION DRILL HOLE LOG

HOLE No. 11

PROJECT FAIRVIEW ROAD PROPERTY　　DATE 9/15/89　　LOGGED BY JLN

DRILL RIG CME 55, Cont Flight　　HOLE DIA. 8"　　SAMPLER Mod. Cal. & Std. Pen.

GROUNDWATER DEPTH INITIAL - -　　FINAL - -　　HOLE ELEV.

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN. (tsf)	TORVANE (tsf)		LIQUID LIMIT	WATER CONTENT	PLASTIC LIMIT	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED SHEAR STRENGTH (psf)
FAT CLAY; dark brown, dry, stiff;	CH												
with blocky fractures and white		1											
caliche blotches			S										
		2	X										
very stiff			X	15				52	13	16	93		
		3	S										
			X										
CLAY WITH SAND; brown, dry, very	CI	4	X	12					12		106		
stiff; with fine sand and local													
white caliche blotches		5	S										
			X										
Passing No. 200 sieve = 88%		6	X	19					13		104		
		7											
		8											
		9											
		10	S										
damp, hard			X										
		11	X	38					14		121		
		12											
POORLY-GRADED SAND WITH GRAVEL;	SP												
light gray brown, dry, medium		13											
dense to dense, fine to coarse													
grained; with fine gravel		14	S										
			*										
		15	*	31									
		16											
(break in log)		//											
		19											
		20	S										
			*										
		21	*	29									

BOTTOM OF HOLE @ 21 FEET
NO GROUND WATER ENCOUNTERED

S = Slough, X = Mod. Cal. sample
* = Std. Pen. sample

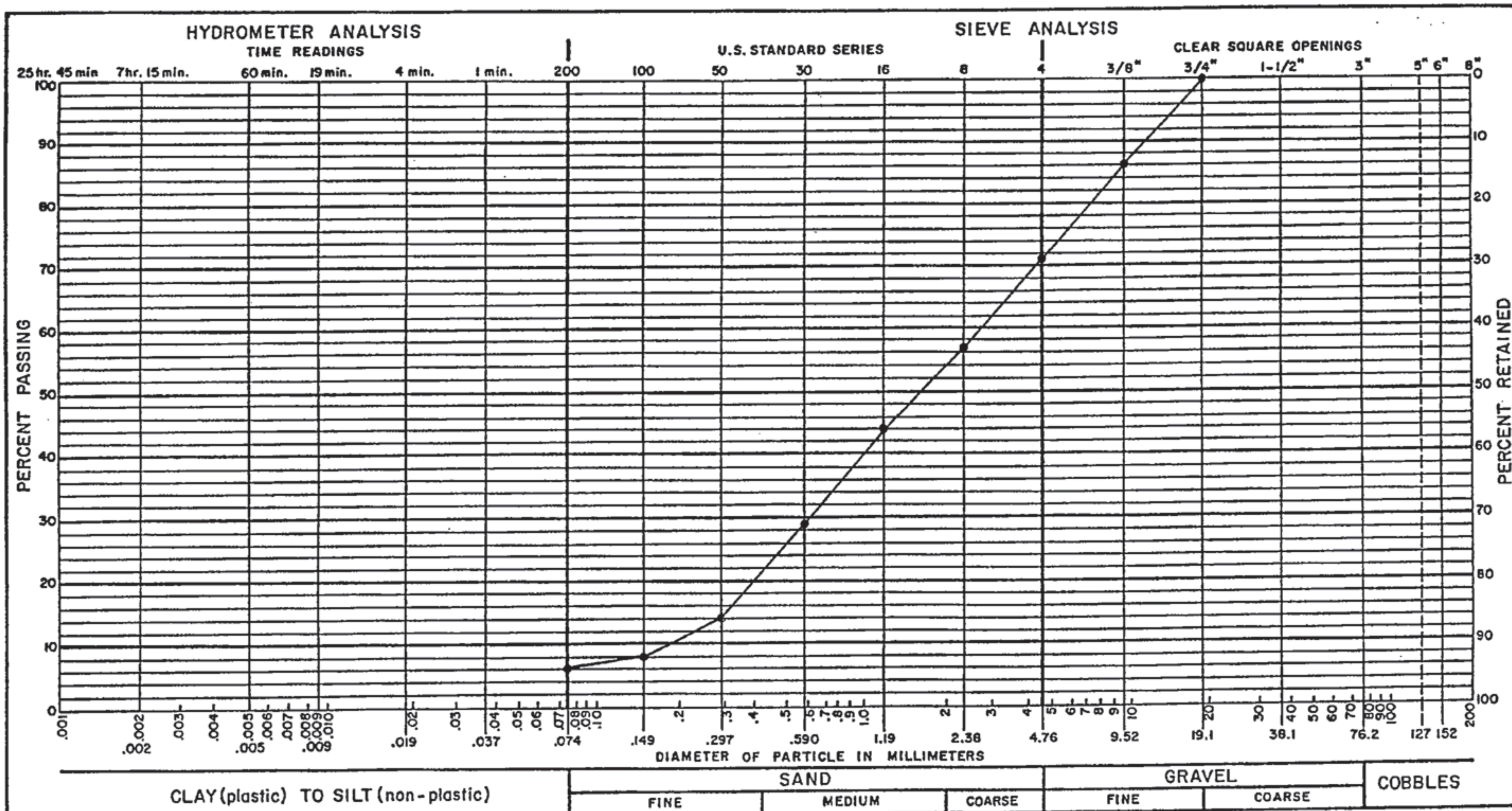
PROJECT 8250　　TERRATECH

GRADATION TEST RESULTS

PROJECT FAIRVIEW ROAD PROPERTY PROJECT NO. 8250

SAMPLE NO. DH-2 DEPTH 10-11

SAMPLE DESCRIPTION Poorly-Graded Sand with Silt and Gravel (SP-SM)



TERRATECH

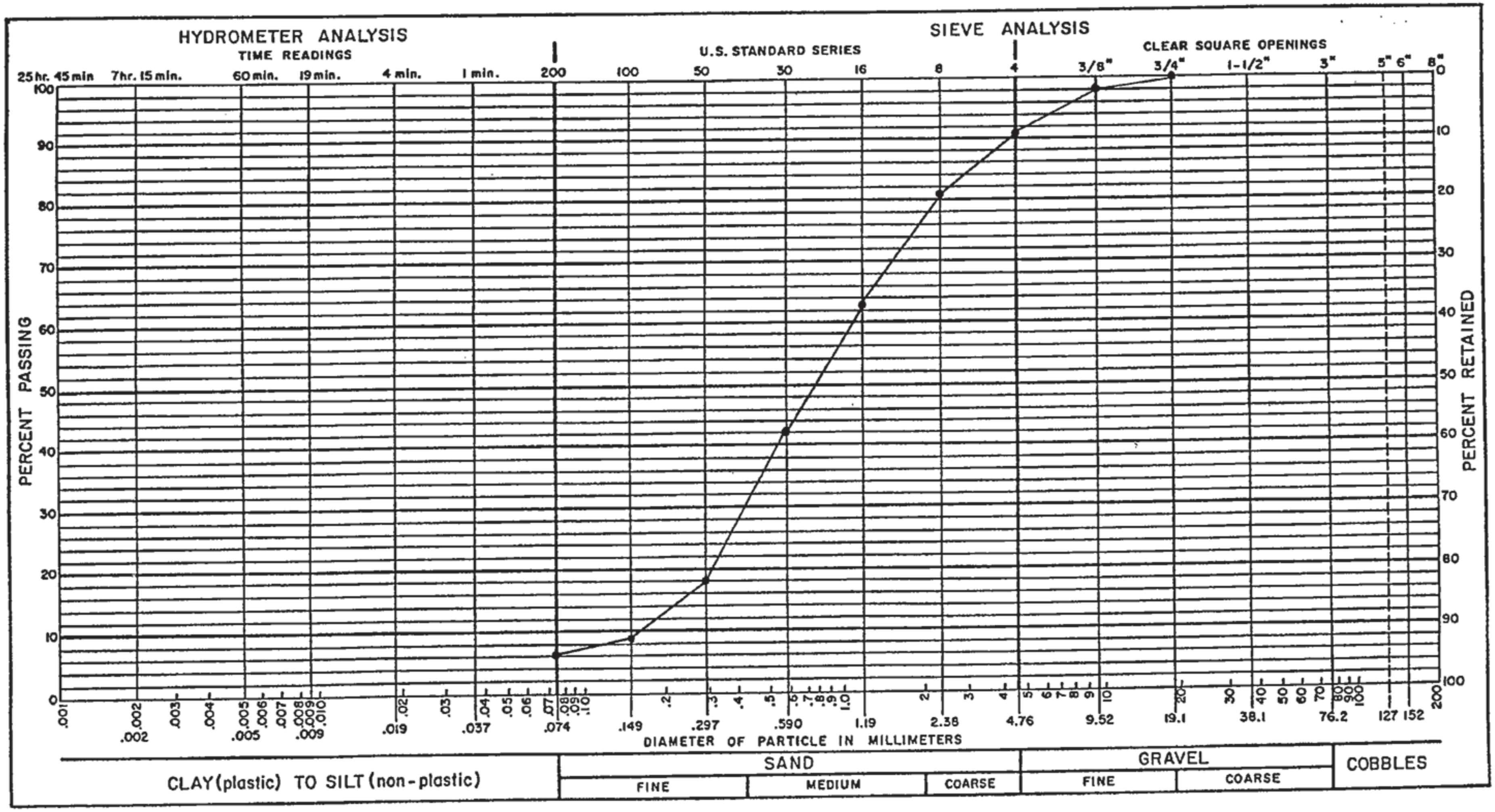
L-0098

GRADATION TEST RESULTS

PROJECT FAIRVIEW ROAD PROPERTY PROJECT NO. 8250

SAMPLE NO. DH-2 DEPTH 35-36

SAMPLE DESCRIPTION Poorly-Graded Sand with Silt (SP-SM)



TERRATECH

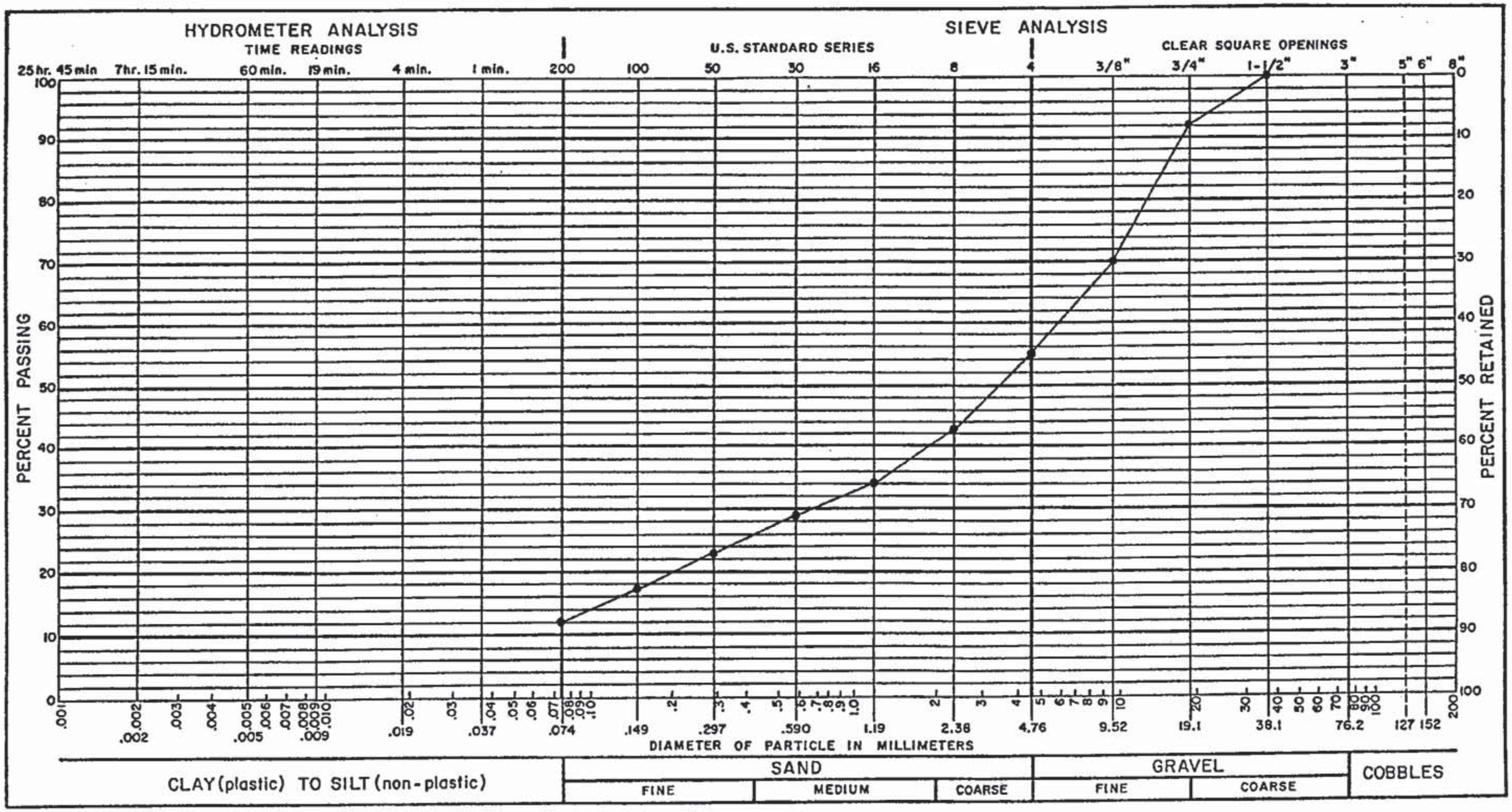
L-0098

GRADATION TEST RESULTS

PROJECT FAIRVIEW ROAD PROPERTY PROJECT NO. 8250

SAMPLE NO. DH-5 DEPTH 15-16

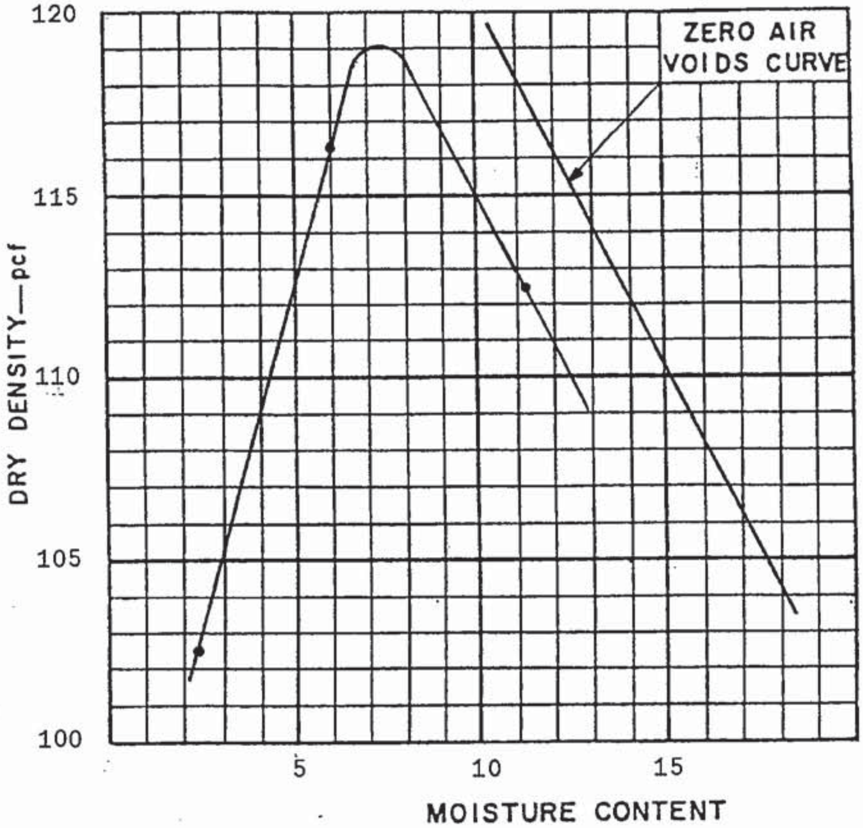
SAMPLE DESCRIPTION Well-Graded gravel with Silt and Sand (GW-GM)



TERRATECH

L-0098

COMPACTION TEST



SAMPLE NO.
B-3

SAMPLE DEPTH
0-1

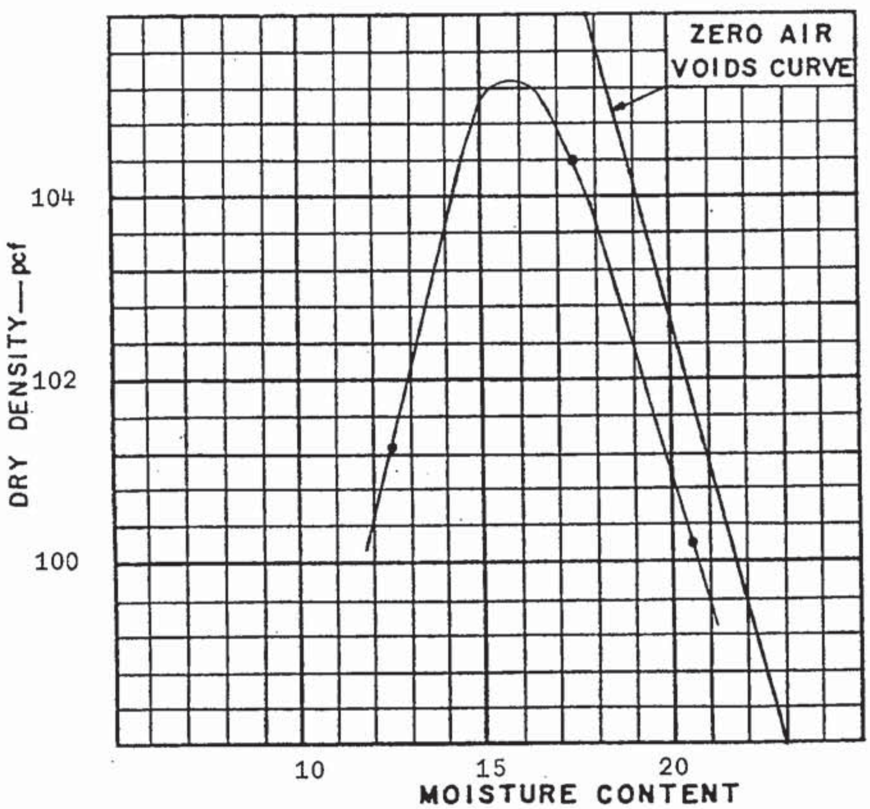
SAMPLE DESCRIPTION
Dark brown fat clay.

SPECIFIC GRAVITY
2.4 (estimated)

TEST DESIGNATION
ASTM D1557-78

MAXIMUM DRY DENSITY (pcf)
119

OPTIMUM MOISTURE CONTENT, %
7.3



SAMPLE NO.
B-5

SAMPLE DEPTH
0-1

SAMPLE DESCRIPTION
Dark brown fat clay.

SPECIFIC GRAVITY
2.45 (estimated)

TEST DESIGNATION
ASTM D1557-78

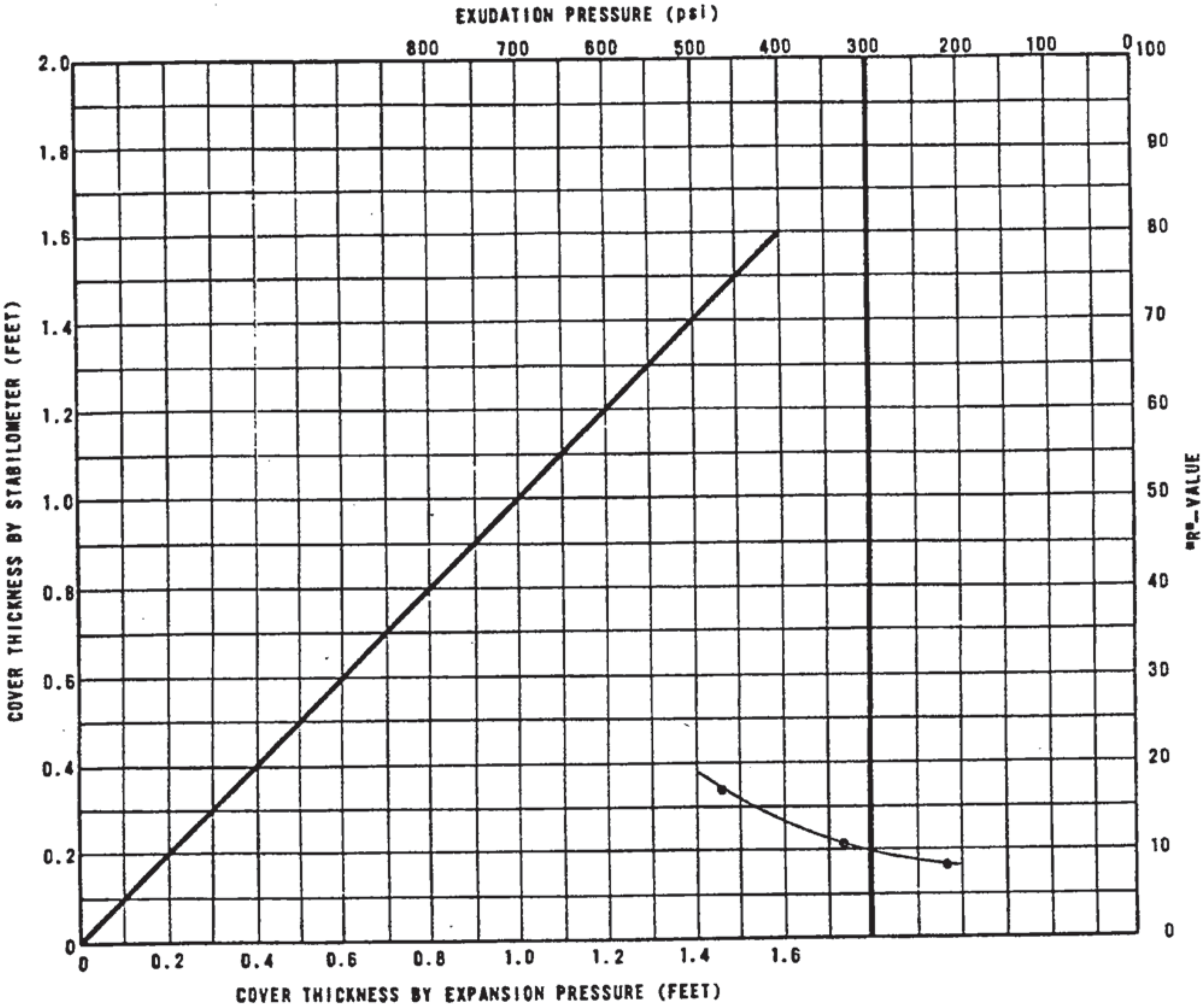
MAXIMUM DRY DENSITY (pcf)
105.3

OPTIMUM MOISTURE CONTENT, %
16

PROJECT NO. 8250

SAMPLE NO. B-4	DEPTH (FT) 0-1	LOCATION FAIRVIEW ROAD PROPERTY

SAMPLE DESCRIPTION Sandy clay; brown



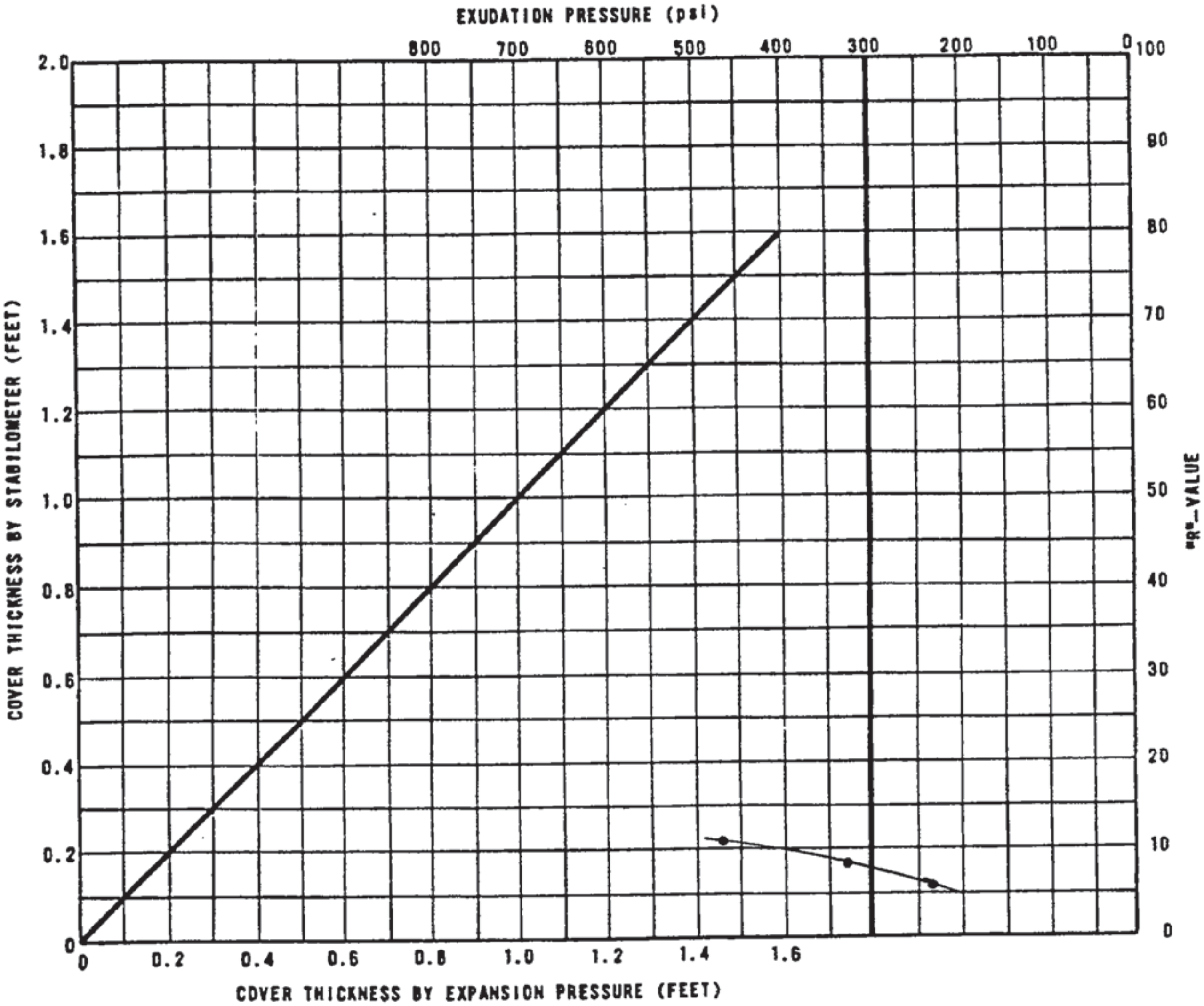
SPECIMEN NO.	A	B	C	
EXUDATION PRESSURE (psi)	215	334	470	
EXPANSION DIAL (0.0001 inch)	0	0	2	
EXPANSION PRESSURE (psf)	0	0	9	
RESISTANCE VALUE "R"	8	11	17	
MOISTURE CONTENT AT TEST (%)	13.6	12.7	11.9	
DRY DENSITY AT TEST (pcf)	118.6	120.6	123.6	

"R"-VALUE AT 300 psi EXUDATION PRESSURE = (10)

"R" VALUE TEST RESULTS

PROJECT NO.	TEST NO.	DRAWING NO.
8250		

SAMPLE NO. B-2	DEPTH (FT) 0-1	LOCATION FAIRVIEW ROAD PROPERTY
SAMPLE DESCRIPTION	Fat clay; dark brown	



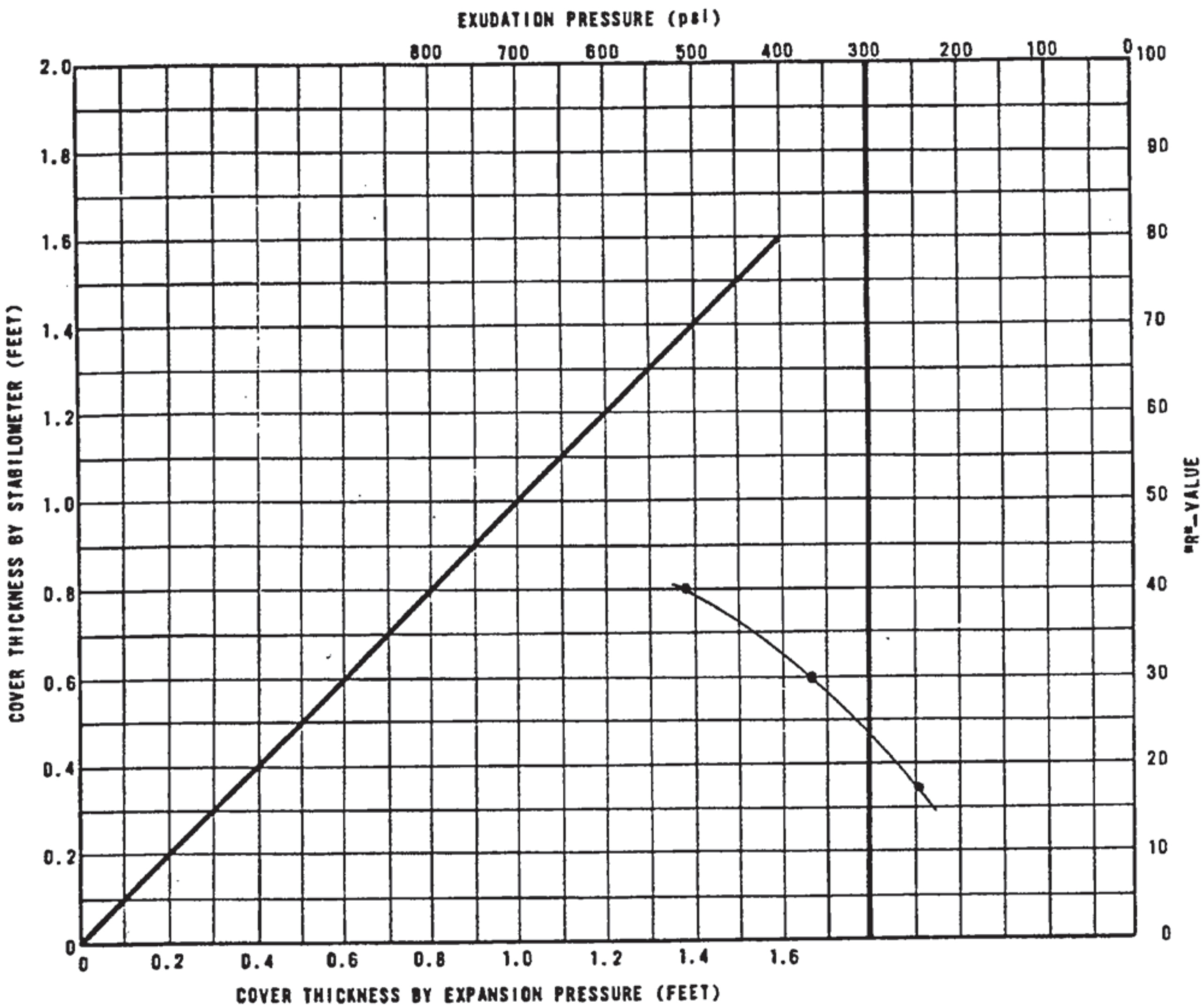
SPECIMEN NO.	A	B	C	
EXUDATION PRESSURE (psi)	231	326	470	
EXPANSION DIAL (0.0001 inch)	0	0	10	
EXPANSION PRESSURE (psf)	0	0	43	
RESISTANCE VALUE "R"	6	8	11	
MOISTURE CONTENT AT TEST (%)	20.5	19.2	17.9	
DRY DENSITY AT TEST (pcf)	103.8	104.4	105.5	

"R"-VALUE AT 300 psi EXUDATION PRESSURE = (7)

"R" VALUE TEST RESULTS

PROJECT NO.	TEST NO.	DRAWING NO.
8250		

SAMPLE NO. B-1	DEPTH (FT) 0-1	LOCATION FAIRVIEW ROAD PROPERTY
SAMPLE DESCRIPTION Clay; light brown		



SPECIMEN NO.	A	B	C	
EXUDATION PRESSURE (psi)	247	366	510	
EXPANSION DIAL (0.0001 inch)	5	11	18	
EXPANSION PRESSURE (psf)	22	48	78	
RESISTANCE VALUE "R"	17	30	40	
MOISTURE CONTENT AT TEST (%)	16.7	16.2	15.8	
DRY DENSITY AT TEST (pcf)	113.4	113.8	114.3	

"R"-VALUE AT 300 psi EXUDATION PRESSURE = (23)

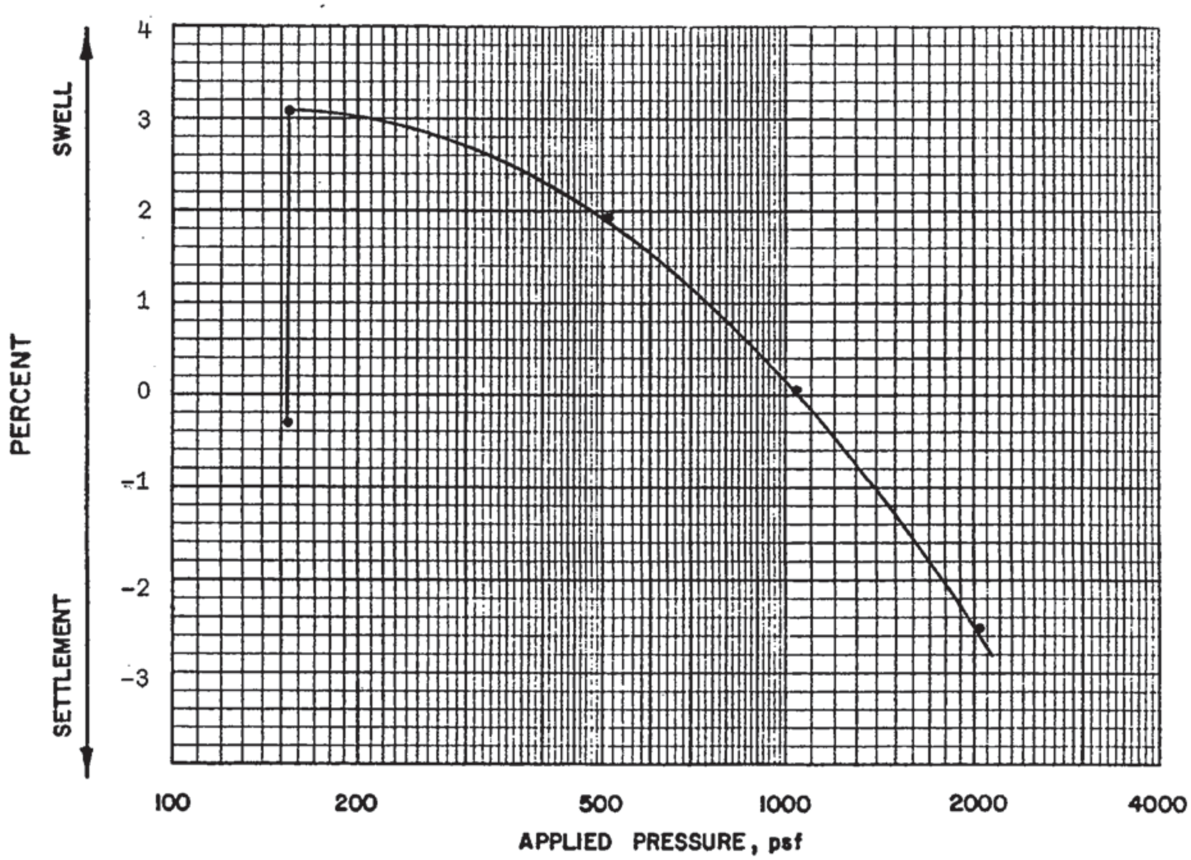
"R" VALUE TEST RESULTS

PROJECT NO.	TEST NO.	DRAWING NO.
8250		

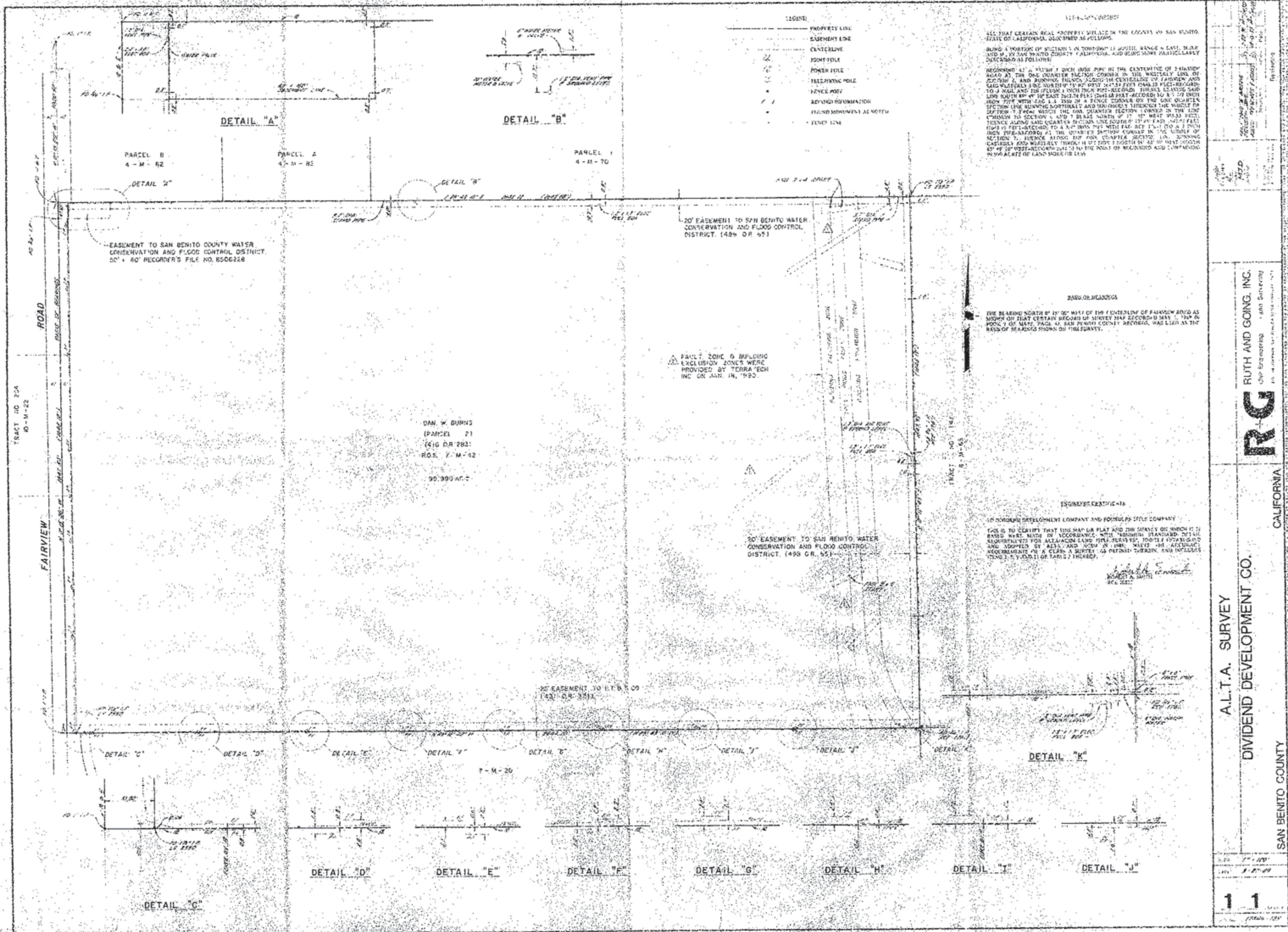
SWELL-COMPRESSION TEST

HOLE NO. 11
DEPTH FT. 2

SPEC. NO.	INITIAL SPECIMEN DATA			FINAL SPECIMEN DATA		
	DRY DENSITY (pcf)	WATER CONTENT (%)	DEGREE OF SATURATION (%)	DRY DENSITY (pcf)	WATER CONTENT (%)	DEGREE OF SATURATION (%)
	93	13	47	96	27	96



PROJECT 8250 TERRATECH, INC.



DETAIL "A"
DETAIL "B"
LEGEND
PROPERTY LINE
EASEMENT LINE
CENTERLINE
JOINT POLE
POWER POLE
TELEPHONE POLE
FENCE POST
RECORD INFORMATION
FOUND MONUMENT AS NOTED
FENCE LINE
PARCEL B
4 - M - 62
PARCEL A
4 - M - 83
PARCEL 1
4 - M - 70
DETAIL "A"
DETAIL "B"
EASEMENT TO SAN BENITO COUNTY WATER CONSERVATION AND FLOOD CONTROL DISTRICT. 50' x 60' RECORDER'S FILE NO. 8506228
20' EASEMENT TO SAN BENITO WATER CONSERVATION AND FLOOD CONTROL DISTRICT. (486 OR 55)
ROAD
FAIRVIEW
TRACT NO. 224
10 - M - 22
FAULT ZONE & BUILDING EXCLUSION ZONES WERE PROVIDED BY TERRA TECH INC ON JAN. 18, 1990.
DAN. W. BURNS
(PARCEL 2)
(416 OR 282)
R.O.S. 7 - M - 42
BASIS OF BEARINGS
ENGINEER'S CERTIFICATE
20' EASEMENT TO SAN BENITO WATER CONSERVATION AND FLOOD CONTROL DISTRICT. (486 OR 55)
20' EASEMENT TO P.T.B. CO
7 - M - 20
DETAIL "C"
DETAIL "D"
DETAIL "E"
DETAIL "F"
DETAIL "G"
DETAIL "H"
DETAIL "I"
DETAIL "J"
DETAIL "K"
A.L.T.A. SURVEY
DIVIDEND DEVELOPMENT CO.
R G RUTH AND GOING, INC.
Civil Engineering · Land Surveying
SAN BENITO COUNTY
CALIFORNIA
1 1