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REPORT

GEOTECHNICAL INVESTIGATION
MILLS LANE COMMERCIAL PROJECT
ST. HELENA, CALIFORNIA

Project Number: 5700.01.00.2

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INTRODUCTION

This report presents the results of our geotechnical investigation for the Mills Lane Commercial Project to be constructed on the north side of Mills Lane in St. Helena, California. The relatively level property extends northeasterly of Highway 29 over an old vineyard. The site location is shown on Plate 1, Appendix A.

We understand the approximately 6½ acre property will be developed for mixed retail, office and restaurant use. We understand that about 15, one- and two-story, wood-frame structures with slab-on-grade floors will be constructed throughout the property. The structures will be situated among landscaped walkways, driveways and parking areas.

Actual foundation loads are not known at this time. We anticipate the loads will be typical for the light to moderately heavy type of construction planned and that wall loads will range from about 1 to 2 kips per lineal foot.

Grading plans are not available, but we anticipate that the planned grading will be the minimum amount needed to construct level building pads and provide paved areas with positive drainage, and could include cuts and fills on the order of 2 to 3 feet.

SCOPE

The purpose of our investigation, as outlined in our Professional Service Agreement dated April 3, 2001, was to generate geotechnical information for the design and construction of the project. Our scope of services included reviewing selected published geologic data pertinent to the site; evaluating subsurface conditions with test borings and laboratory tests; analyzing the field and laboratory data; and presenting this report with the following geotechnical information:

1. A brief description of soil and groundwater conditions observed during our investigation;

2. A discussion of seismic hazards that may affect the proposed development;

3. Conclusions and recommendations regarding:
   a. Primary geotechnical engineering concerns and mitigating measures, as applicable;

   b. Site preparation and grading including remedial grading of weak, porous, compressible and/or expansive, surface soils;

   c. Foundation type(s), design criteria and estimated settlement behavior;

   d. Support of concrete slabs-on-grade;

   e. Preliminary pavement thickness based on our experience with similar soils and projects and the results of one R-Value test on anticipated subgrade soils;

   f. Utility trench backfill;

   g. Geotechnical engineering drainage improvements; and

   h. Supplemental geotechnical engineering services.

INVESTIGATION

Site Exploration

We reviewed our previous geotechnical investigations in the vicinity and selected geologic references pertinent to the site. The geologic literature reviewed is listed in Appendix B.

On April 20 and 26, 2001, we performed a geotechnical reconnaissance of the site and explored the subsurface conditions by drilling 11 test borings to depths ranging from about 8 to 15½ feet. The borings were drilled with a truck-mounted drill rig equipped with 6-inch diameter, solid stem augers, at the approximate locations shown on the Exploration Plan, Plate 2. The test boring locations were determined approximately by pacing their distance from features shown on the Exploration Plan and should be considered accurate only to the degree implied by the method used. Our geologist located and logged the borings, and obtained samples of the materials encountered for visual examination, classification and laboratory testing.

Relatively undisturbed samples were obtained from the borings at selected intervals by driving a 2.43-inch inside diameter, split spoon sampler, containing 6-inch long brass liners, using a 140-pound hammer dropping approximately 30 inches. The sampler was driven 12 to 18 inches. The blows required to drive each 6-inch increment were recorded and the blows required to drive the last 12 inches, or portion thereof, were converted to equivalent Standard Penetration blow counts for correlation with empirical data.

The logs of the borings showing the materials encountered, depth to free water, sample depths, and converted blow counts are presented on Plates 3 through 13. The soils are described in accordance with the Unified Soil Classification System, outlined on Plate 14.

The test boring logs show our interpretation of subsurface soil conditions on the date and at the locations indicated. Subsurface conditions may vary at other locations and times. Our interpretation is based on visual inspection of soil samples, laboratory test results, and interpretation of drilling and sampling resistance. The location of the soil boundaries should be considered approximate. The transition between soil types may be gradual.

Laboratory Testing

The samples obtained from the borings were transported to our office, and re-examined by the project engineer to verify soil classifications, evaluate characteristics, and assign tests pertinent to our analysis. Selected samples were laboratory tested to determine their water content, dry density, classification (Atterberg Limits, percent of silt and clay), unconfined compressive strength, expansion potential (UBC Expansion Index) and R-value. The test results are presented on the test boring logs, with the results of the strength data presented in accordance with the Key to Test Data on Plate 14. Results of the classification, unconfined compression, and R-value tests are presented on Plates 15, 16, and 17, respectively.

SITE CONDITIONS

General

Napa County is located within the California Coast Range geomorphic province. This province is a geologically complex and seismically active region characterized by sub-parallel northwest-trending faults, mountain ranges and valleys. The oldest bedrock units are the Jurassic-Cretaceous Franciscan Complex, and the Upper Cretaceous Great Valley sequence sediments originally deposited in a marine environment. Subsequently, younger rocks such as the Tertiary-age Sonoma Volcanics group, the Plio-Pleistocene-age Clear Lake Volcanics and sedimentary rocks such as the Guinda, Domengine, Petaluma, Wilson Grove, Cache, Huichica and Glen Ellen formations were deposited throughout the province. Extensive folding and thrust faulting during late Cretaceous through early Tertiary geologic time created complex geologic conditions that underlie the highly varied topography of today. In valleys, the bedrock is covered by thick alluvial soils. The site is located near the center of the Napa Valley about ½ mile southeast of the City of St. Helena. The Napa Valley is a long, narrow northwest-trending alluvial plain flanked by northwest-trending mountain ridges.

Geology and Soils

The United States Geological Survey (USGS) geologic maps reviewed, Fox et al. (1973), indicate the property is underlain primarily by Quaternary aged alluvial fan deposits (Qyf) grading headward to terrace deposits, and consist of moderately sorted fine sand and silt, with gravel becoming more abundant toward fan heads.

Mapping by the U. S. Soil Conservation Service (Lambert and Kashiwagi, 1978) has classified soil over the portion of this property proposed for development as belonging primarily to the Pleasanton (170) series. The Pleasanton series is said to comprise nearly level, well drained soils on flood plains and alluvial fans with 0 to 2 percent slopes. These soils are shown to exhibit low to moderate plasticity (LL = 25-40; PI = NP-20) and expansion potential. Runoff over these soils is slow. The hazard of erosion is slight. The risk of corrosion is given as moderate for both uncoated steel and for concrete. Performing corrosivity tests to verify these values was not part of our requested and/or proposed scope of work. Should the need arise, we would be pleased to provide a proposal to evaluate these characteristics.

Surface

The property extends primarily over an old vineyard. The ground surface is cultivated for weed control and as such is soft and spongy. This is a condition generally associated with weak, porous surface soils. A public utility easement bisects the southern corner of the property.

Natural drainage consists of sheet flow over the ground surface that concentrates on drainage ditches and natural drainage elements such as swales, creeks, and ultimately the Napa River.

Subsurface

Our borings and laboratory tests indicate that the portion of the site we investigated is blanketed by about 2 to 4 feet of weak, porous, compressible surface clayey soils (topsoil and/or subsoil). The surface soils exhibit low to moderate plasticity (LL = 39; PI = 18) and low expansion potential (EI = 25-48). A detailed description of subsurface conditions found in our borings is given in Appendix A.

Groundwater

Free groundwater was first detected in boring B-3 at a depth of about 13½ feet below the ground surface at the time of drilling. When the hole was backfilled about 4 hours after drilling was completed, the water level had risen to a depth of about 13 feet. Free water was not encountered in the other boreholes at the time of drilling. Fluctuation in the groundwater level typically occurs because of a variation in rainfall intensity, duration and other factors such as flooding and periodic irrigation.

DISCUSSION AND CONCLUSIONS

Seismic Hazards

General

We did not observe subsurface conditions within the portion of the property we investigated that would suggest the presence of materials that may be susceptible to seismically induced densification, liquefaction, lateral spreading or lurching. Therefore, we judge the potential for occurrence of these phenomena at the Mills Lane site to be low.

Faulting

We did not observe land forms within the area that would indicate the presence of active faults and the site is not within a current Alquist-Priolo Earthquake Fault Zone. Therefore, we believe the risk of fault rupture at the site is low. However, the site is within an area affected by strong seismic activity. Several northwest-trending Earthquake Fault Zones exist in close proximity to, and within several miles of, the site (Brown, 1970; Helley and Herd, 1977; Bortugno, 1982). The shortest distances from the site to these faults are presented below in Table 1.

TABLE 1

ACTIVE FAULT PROXIMITY

Fault	Direction	Distance-Miles
San Andreas	SW	33
Healdsburg - Rodgers Creek	SW	12½
Concord-Green Valley	SE	17½
Cordelia	SE	19½
West Napa	SE	10
Maacama	NW	15½

The 1997 Uniform Building Code (UBC) has identified the locations of known active fault near-source zones in California and along the California/Nevada border. The purpose of these zones is to determine a near-source factor to be used in design for every site located within Seismic Zone 4. The near-source zones have been mapped considering the surface projection of the source using the dip angle of the fault. For nonvertical faults, the dip of the fault is an important parameter because it determines the location of the fault at depth.

Active faults have been classified as A, B, or C in accordance with the criteria specified in the 1997 UBC (Table 16-U). Only faults classified as A or B are shown on the 1997 UBC maps because the UBC assumes faults classified as C do not increase the near-source factor. The distance from the site to the A and/or B faults that have the potential to control the near-source factors are listed in Table 2 below.

TABLE 2

1997 UBC NEAR-SOURCE ZONE DISTANCES

Fault	Direction	Fault Type	Distance-km
Rodgers Creek	W	A	21
West Napa	SE	B	12

Seismicity

Historical earthquake records indicate a potential for strong ground shaking throughout the entire San Francisco Bay and Napa County areas, and future seismic shaking should be anticipated at the site. It will be necessary to design and construct the proposed Mills Lane commercial project in strict adherence with current standards for earthquake-resistant construction.

Flooding

Our review of the Federal Emergency Management Agency (FEMA) Flood Zone Map for Napa County, California, City of St. Helena (NO. 060208 0005C) dated September 4, 1987, indicates that the proposed building site is located within Zone "C", an area of minimal flooding. Evaluation of flooding potential is typically the responsibility of the project civil engineer.

Geotechnical Issues

General

Based on our investigation, we judge the proposed Mills Lane commercial project can be built as planned, provided the recommendations presented in this report are incorporated into its design and construction.

The primary geotechnical concerns during design and construction of the project are:

1. The presence of 2 to 4 feet of weak, porous, compressible, surface clayey soils.

2. The detrimental effects of uncontrolled surface runoff and groundwater seepage on the long-term satisfactory performance of commercial buildings especially those constructed on alluvial plains given the erosion potential and porous nature of the surface soils.

3. The strong ground shaking predicted to impact the site during the life of the project.

Weak, Porous Surface Soils

Weak, porous soils, such as those found at the Mills Lane site, appear hard and strong when dry but will lose strength rapidly and settle under the load of fills, foundations, slabs and pavements as their moisture content increases and approaches saturation. The moisture content of these soils can increase as the result of rainfall, periodic irrigation or when the natural upward migration of water vapor through the soils is impeded by, and condenses under fills, foundations, pavements and slabs. The detrimental effects of such movements can be remediated by strengthening the soils during grading. This can be achieved by excavating the weak soils and replacing them as properly compacted (engineered) fill.

Foundation, Slab and Pavement Support

After remedial grading, satisfactory foundation support for the structures can be obtained from spread footings bottomed on the engineered fill. Slab-on-grade floors and pavements can also be satisfactorily supported on the engineered fill.

On-Site Soil Quality

All fill materials used in the building area must be select, as subsequently described. We anticipate that, with the exception of organic matter and of rocks or lumps larger than 6 inches in diameter, the excavated material will be suitable for re-use as general and select fill.

Settlement

If grading is performed and the spread footings are installed in accordance with the recommendations presented in this report, we estimate that post-construction differential settlements across the buildings will be about 1 inch.

Surface Drainage

Surface runoff typically sheet flows over the ground surface but can be concentrated by the planned site grading, landscaping and drainage. The surface runoff can pond against structures and cause deeper than normal soil heave and/or seep into the slab rock.

Therefore, strict control of surface runoff is necessary to provide long-term satisfactory performance of commercial projects. It will be necessary to divert surface runoff around improvements and provide positive drainage away from structures.

Groundwater

Fluctuations in the groundwater level at the site will probably occur due to variations in rainfall and other factors. Based on our experience in the area, and the observed and measured soil moisture content, it is our opinion that groundwater could rise to near the ground surface, particularly after prolonged periods of rain. Because of the building site proximity to a flood prone area, it will be prudent to construct the building pad with a pronounced gradient to force surface water to flow away from the slab rock.

RECOMMENDATIONS

Seismic Design

The site is within UBC-1997 Edition seismic zone 4; therefore, a Seismic Zone Factor "Z" of 0.4 (Table 16-I), modified as necessary to conform with ordinance(s) adopted by the County of Napa, should be used. The soil profile at the site approximates type S_D (Table 16-J). As presented in Table 2, the site is located within 12 km of the West Napa fault (Type B) and within 21 km of the Rodgers Creek fault (Type A). Using Tables 16-S and 16-T of the 1997 UBC, the near-source factors, N_a and N_v, for the site are 1.0 and 1.0, respectively. The project structural engineer should determine the appropriate seismic response coefficients (C_a and C_v) needed to determine total design lateral force in accordance with the UBC.

Grading

Site Preparation

Areas to be developed should be cleared of vegetation and debris. Trees and shrubs that will not be part of the proposed development should be removed and their primary root systems grubbed. Cleared and grubbed material should be removed from the site and disposed of in accordance with County Health Department guidelines. We did not observe septic tanks, leach lines or underground fuel tanks during our investigation. Any such appurtenances found during grading should be capped and sealed and/or excavated and removed from the site, respectively, in accordance with established guidelines and requirements of the County Health Department. Voids created during clearing should be backfilled with engineered fill as recommended herein.

Stripping

Areas to be graded should be stripped of the upper few inches of soil containing organic matter. Soil containing more than two percent by weight of organic matter should be considered organic. Actual stripping depth should be determined by a representative of the geotechnical engineer in the field at the time of stripping. The strippings should be removed from the site, or if suitable, stockpiled for re-use as topsoil in landscaping.

Excavations

Following initial site preparation, excavation should be performed as planned or recommended herein. Excavations extending below the proposed finished grade should be backfilled with suitable materials compacted to the requirements given below.

Within building areas, the weak, porous, compressible surface soils should be excavated to within 6 inches of their entire depth (about 2 to 4 feet in our borings). The excavation of weak, compressible soils should also extend at least 12 inches below exterior slab and/or pavement subgrade.

The excavation of weak, porous, compressible surface soil should extend at least 5 feet beyond the limits of the proposed buildings and 3 feet beyond the edge of exterior slabs and/or pavements. The excavated materials should be stockpiled for later use as compacted fill, or removed from the site, as applicable.

Where evidence of seepage is observed, a subsurface drain should be installed as recommended by the geotechnical engineer, subdrains should also be installed. The subdrain should consist of a 4-inch diameter perforated plastic pipe with SDR 35 or better embedded in Class 2 permeable material. The drain should be at least 12 inches thick and extend at least 4 feet below the ground surface. The depth and extent of subdrains should be determined and approved by the geotechnical engineer in the field during construction.

At all times, temporary construction excavations should conform to the regulations of the State of California, Department of Industrial Relations, Division of Industrial Safety or other stricter governing regulations. The stability of temporary cut slopes, such as those constructed during the installation of underground utilities, should be the responsibility of the contractor. Depending on the time of year when grading is performed, and the surface conditions exposed, temporary cut slopes may need to be excavated to 1¼:1, or flatter. The tops of the temporary cut slopes should be rounded back to 2:1 in weak soil zones.

Fill Quality

All fill materials should be free of perishable matter and rocks or lumps over 6 inches in diameter, and must be approved by the geotechnical engineer prior to use. The upper 30 inches of fill beneath and within 5 feet of building areas and the upper 12 inches of fill beneath and within 3 feet of exterior slabs and/or pavement edges should be select fill. We judge the on-site soils are generally suitable for use as general fill and select fill.

Select Fill

Select fill should be free of organic matter, have a low expansion potential, and conform in general to the following requirements:

SIEVE SIZE	PERCENT PASSING (By Dry Weight)
6 inch	100
4 inch	90 - 100
No. 200	10 - 60

Liquid Limit - 40 Percent Maximum
Plasticity Index - 15 Percent Maximum

In general, imported fill, if needed, should be select. Material not conforming to these requirements may be suitable for use as import fill; however, it shall be the contractor's responsibility to demonstrate that the proposed material will perform in an equivalent manner. The geotechnical engineer should approve imported materials prior to use as compacted fill.

Fill Placement

The surface exposed by stripping and removal of weak, compressible surface soils should be scarified to a depth of at least 6 inches, uniformly moisture-conditioned to near optimum, and compacted to at least 90 percent of the maximum dry density of the materials as determined by the ASTM D-1557 laboratory compaction test procedure. Approved on-site soils or select fill material should then be spread in thin lifts, uniformly moisture-conditioned to near optimum and compacted to at least 90 percent relative compaction. Only approved select materials should be used for fill within the upper 30 inches of building pad subgrades and within the upper 12 inches of exterior slabs and/or pavement subgrades.

Permanent Cut and Fill Slopes

In general, cut and fill slopes should be no steeper than 2:1. Where steeper slopes are required, retaining walls should be used.

Wet Weather Grading

Generally, grading is performed more economically during the summer months when on-site soils are usually dry of optimum moisture content. Delays should be anticipated in site grading performed during the rainy season or early spring due to excessive moisture in on-site soils. Special and relatively expensive construction procedures, including dewatering of excavations and importing granular soils, should be anticipated if grading must be completed during the winter and early spring or if localized areas of soft saturated soils are found during grading in the summer and fall.

Foundation Support

Provided the weak surface soils are removed or strengthened by grading as recommended herein, the proposed structure can be supported on conventional continuous and isolated spread footings that bottom on select engineered fill.

Spread Footings

Spread footings should be at least 12 inches wide and should bottom on select compacted fill, at least 12 inches below pad subgrade. The continuous footings should have sufficient reinforcement to span, as a simple beam, an unsupported distance of approximately 10 feet. At corners, the continuous footings should be designed to cantilever at least 5 feet. In the absence of structural calculations that validate this requirement, perimeter footings, except retaining walls, should be reinforced with two No. 4 bars (top and bottom).

The bottoms of all footing excavations should be thoroughly cleaned out or wetted and compacted using hand-operated tamping equipment prior to placing steel and concrete. This will remove the supporting soils disturbed during footing excavations, or restore their adequate bearing capacity, and reduce post-construction settlements.

Bearing Pressures - Footings installed in accordance with these recommendations may be designed using allowable bearing pressures of 2000, 2500, and 3000 pounds per square foot (psf), for dead loads, dead plus code live loads, and total loads (including wind and seismic), respectively.

Lateral Pressures - The portion of spread footing foundations extending into select engineered fill may impose a passive equivalent fluid pressure and a friction factor of 350 pcf and 0.35, respectively, to resist sliding. Passive pressure should be neglected within the upper 6 inches, unless the soils are confined by concrete slabs or pavements.

Slab-On-Grade

Provided grading is performed in accordance with the recommendations presented herein, slabs should be underlain by firm, select engineered fill.

Slab-on-grade subgrade should be rolled to produce a dense, uniform surface. The future expansion potential of the subgrade soils should be reduced by thoroughly presoaking the slab subgrade prior to concrete placement. The slabs should be underlain with a capillary moisture break consisting of at least 4 inches of clean, free-draining crushed rock or gravel at least ¼-inch and no larger than ¾-inch in size. Interior slabs subject to vehicular traffic should be underlain by crushed rock. Class 2 aggregate base can be used for slab rock under exterior slabs subjected to vehicular traffic. Where migration of moisture vapor through slabs would be detrimental, an impermeable membrane moisture vapor barrier should be provided between the drain rock and the slabs.

Slabs-on-grade should be designed by the project civil or structural engineer to support the anticipated loads. Slabs should be at least 4 inches thick, and should be reinforced to reduce cracking. Slabs subjected to heavy concentrated wheel loads, such as forklift or trailer-trucks, should be designed to carry the anticipated wheel loads. Slabs should be grooved at regular intervals to induce and control cracking.

Utility Trenches

Trench excavations shoring and safety is the sole responsibility of the contractor. Attention is drawn to the State of California Safety Orders dealing with "Excavations and Trenches".

Unless otherwise specified by the City of St. Helena, on-site, inorganic soil may be used as general utility trench backfill. Where utility trenches support pavements, slabs and foundations, trench backfill should consist of aggregate baserock. The baserock should comply with the minimum requirements in Caltrans Standard Specifications, Section 26 for Class 2 Aggregate Base. Trench backfill should be moisture-conditioned as necessary, and placed in horizontal layers not exceeding 8 inches in thickness, before compaction. Each layer should be compacted to at least 90 percent relative compaction as determined by ASTM Test D-1557. The top lift of trench backfill under vehicle pavements should be moisture conditioned as necessary and compacted to at least 95 percent relative compaction. Jetting or ponding of trench backfill to aid in achieving the recommended degree of compaction should not be attempted.

Pavements

Based on our investigation, we believe the near-surface soils will have a low supporting capacity, after proper compaction, when used as a pavement subgrade. An R-value of 12 was measured on a bulk sample of near-surface soil obtained near boring B-11. Because of potential variation in the on-site soils, we selected an R-value of 10 for use in pavement design calculations. The assumed Traffic Indices (TI) are judged to be representative of the anticipated traffic but are not based on actual truck traffic counts or predictions of counts. Actual truck traffic counts may require revision of these traffic indices.

Based on the selected R-Value and our experience with similar projects and soils, we recommend that the pavement section listed on Table 2, below be used.

TABLE 2

PAVEMENT SECTIONS

TRAFFIC TYPE	TI	THICKNESS (inches)		
		ASPHALT CONCRETE	CLASS 2 AGGREGATE BASE	AGGREGATE SUBBASE
Heavy Truck Lanes	6.5	3.5	13.5	---
		3.5	6.5	8.0
Parking Lots	4.5	2.5	8.5	---

Pavement thicknesses were computed using Method 301 F of the Caltrans Highway Design Manual and are based on a pavement life of 20 years.

As previously discussed, pavement performance should be enhanced and the incidence of edge cracking and repairs reduced by installation of a supporting layer of select fill at least 12 inches thick under pavement subgrades.

Prior to placement of aggregate base and subbase materials, the upper 6 inches of the pavement subgrade soils should be scarified, uniformly moisture conditioned to near optimum, and compacted to at least 95 percent relative compaction to form a firm, non-yielding surface. Aggregate subbase and aggregate base materials should be spread in thin layers, uniformly moisture conditioned, and compacted to at least 95 percent relative compaction to form a firm non-yielding surface.

The materials and methods used should conform to the requirements of the City of St. Helena and the current edition of the Caltrans Standard Specifications, except that compaction requirements should be based on ASTM Test Method D-1557. Aggregate used for the base course should comply with the minimum requirements specified in Caltrans Standard Specifications, Section 26 for Class 2 Aggregate Base. Aggregate used for the

subbase course should be non-expansive and should comply with the minimum requirements specified in Section 25 for Class 2 Aggregate Subbase.

These recommendations are intended to provide support for the auto and truck traffic represented by the indicated Traffic Indexes. They are not intended to provide pavement sections for heavy concentrated construction storage or wheel loads such as forklifts, parked truck-trailers and concrete trucks or for post-construction concentrated wheel loads such as self-loading dumpster trucks.

In areas where heavy construction storage and wheel loads are anticipated, the pavements should be designed to support these loads. Support could be provided by increasing pavement sections or by providing reinforced concrete slabs. Alternatively, paving can be deferred until heavy construction storage and wheel loads are no longer present. Loading areas for self loading dumpster trucks should be provided with reinforced concrete slabs at least 6 inches thick, and reinforced with No. 4 bars at 12-inch centers each way. Alternatively, the asphalt concrete section should be increased to at least 8 inches in these areas.

Parking Lot Drainage

Water tends to migrate under pavements and collect in the aggregate courses at low areas on parking lot subgrade soils such as around storm drain inlets and the thread of paved swales leading to inlets. The ponded water will soften subgrade soils and, under repetitive heavy-wheel loads, will induce inordinately high stresses on the subgrade and pavement components that could result in untimely maintenance. Under-pavement drainage can be improved and maintenance reduced by replacing a 12-inch wide strip (extending at least 15 feet on either side of the inlet) of the select subbase layer or subgrade soils with ¾-inch or 1½-inch free-draining Class 2 permeable material. The drain rock should be outletted into the storm drain inlet.

Where pavements will abut landscaped areas, the pavement baserock layer and subgrade soils should be protected against saturation from irrigation and rain water with a subdrain, similar to that previously discussed. The subdrain should extend to a depth of at least 6 inches below the bottom of the baserock layer.

Wet Weather Paving

In general, the pavements should be constructed during the dry season to avoid the saturation of the subgrade and base materials which often occurs during the wet winter months. If pavements are constructed during the winter, a cost increase relative to drier weather construction should be anticipated. Unstable areas may have to be over-excavated to remove soft soils. The excavations will probably require backfilling with imported crushed (ballast) rock. The geotechnical engineer should be consulted for recommendations at the time of construction.

Geotechnical Drainage

Surface water should be diverted away from foundations and edges of pavements. Surface drainage gradients within 10 feet of building foundations should be constructed with a minimum slope of 2 percent for paved areas and 4 percent for unpaved areas. Roofs should be provided with gutters, and the downspouts should empty onto splash blocks that discharge directly onto paved areas or be connected to closed (glued Schedule 40 PVC or better) conduits discharging well away from foundations, preferably onto paved areas or into the storm drainage system.

Where interior slab subgrades are lower than adjacent exterior grade a subdrain should be installed adjacent to perimeter foundations to prevent surface runoff from entering the slab rock. Foundation drains should be installed adjacent to perimeter foundations, except the downhill side. Foundation drains should consist of trenches at least 18 inches deep and sloped to drain by gravity. Three-inch diameter perforated pipe sloped to drain to outlets by gravity should be placed in the bottom of the trenches. The top of subdrain pipes should be at least 6 inches lower than the adjacent slab subgrade. The perimeter subdrain trenches should be backfilled to within 6 inches of the surface with clean, free-draining Class 2 permeable material. The upper 6 inches should be backfilled with compacted soil to exclude surface water. An illustration of this system is shown on Plate 18.

Piped outlets should be provided to allow drainage of water collected in the slab rock through foundations and discharge into the storm drain system. Additional protection against water seepage into slab rock can be obtained by compacting fill placed adjacent to exterior walls to at least 90 percent relative compaction. Roof downspouts and surface drains must be maintained entirely separate from foundation drains.

Water seepage or the spread of extensive root systems into the soil subgrade of footings, slabs or pavements could cause differential movements and consequent distress in these structural elements. Landscaping should be planned with consideration for these potential problems.

Maintenance

Periodic land maintenance will be required. Surface and subsurface drainage facilities should be checked frequently, and cleaned and maintained as necessary. A dense growth of deep-rooted ground cover must be maintained on all slopes to reduce sloughing and erosion. Sloughing and erosion that occurs must be repaired promptly before it can enlarge.

Supplemental Services

RGH Geotechnical and Environmental Consultants (RGH) recommends that we be retained to review the project plans and specifications to determine if they are consistent with our recommendations. In addition, we should be retained to observe construction, particularly site excavations, compaction of fill, foundation and subdrain installations, and perform appropriate laboratory testing.

If, during construction, we observe subsurface conditions different from those encountered during the explorations, we should be allowed to amend our recommendations accordingly. If different conditions are observed by others, or appear to be present beneath excavations, RGH should be advised at once so that these conditions may be evaluated and our recommendations reviewed and updated, if warranted. The validity of recommendations made in this report is contingent upon our being notified and retained to review the changed conditions.

If more than 18 months have elapsed between the submission of this report and the start of work at the site, or if conditions have changed because of natural causes or construction operations at, or adjacent to, the site, the recommendations made in this report may no longer be valid or appropriate. In such case, we recommend that we be retained to review this report and verify the applicability of the conclusions and recommendations or modify the same considering the time lapsed or changed conditions. The validity of recommendations made in this report is contingent upon such review.

These supplemental services are performed on an as-requested basis and are in addition to this geotechnical investigation. We cannot accept responsibility for items that we are not notified to observe or for changed conditions we are not allowed to review.

LIMITATIONS

This report has been prepared by RGH for the exclusive use of Mr. Carl Doumani and his consultants as an aid in the design and construction of the proposed Mills Lane commercial project described in this report.

The validity of the recommendations contained in this report depends upon an adequate testing and monitoring program during the construction phase. Unless the construction monitoring and testing program is provided by our firm, we will not be held responsible for compliance with design recommendations presented in this report and other addendum submitted as part of this report.

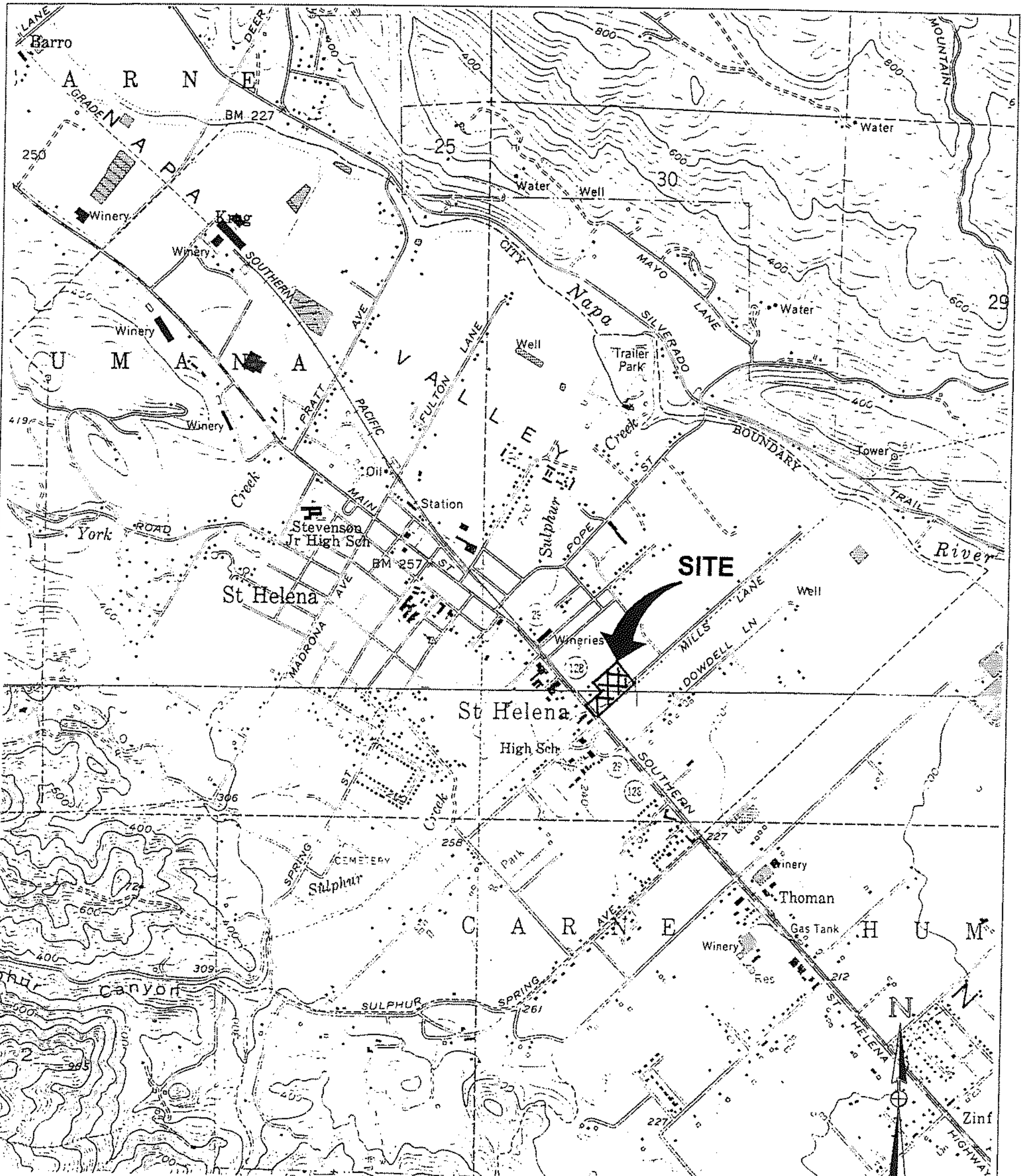
Our services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. We provide no other warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided to us regarding the proposed construction, the results of our field exploration, laboratory testing program, and professional judgement. Verification of our conclusions and recommendations is subject to our review of the project plans and specifications, and our observation of construction.

The test borings represent subsurface conditions at the locations and on the date indicated. It is not warranted that they are representative of such conditions elsewhere or at other times. Site conditions and cultural features described in the text of this report are those existing at the time of our field exploration on April 20 and 26, 2001, and may not necessarily be the same or comparable at other times.

The scope of our services did not include an environmental assessment or an investigation of the presence or absence of hazardous, toxic or corrosive materials in the soil, surface water, groundwater or air (on, below or around this site), nor did it include an evaluation or investigation for the presence or absence of wetlands.

APPENDIX A - PLATES

LIST OF PLATES



Reference: U.S.G.S. Rutherford & St. Helena 7½-Minute Quadrangles

Scale: 1" = 2000'

R G H

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Job No: 5700.01.00.2

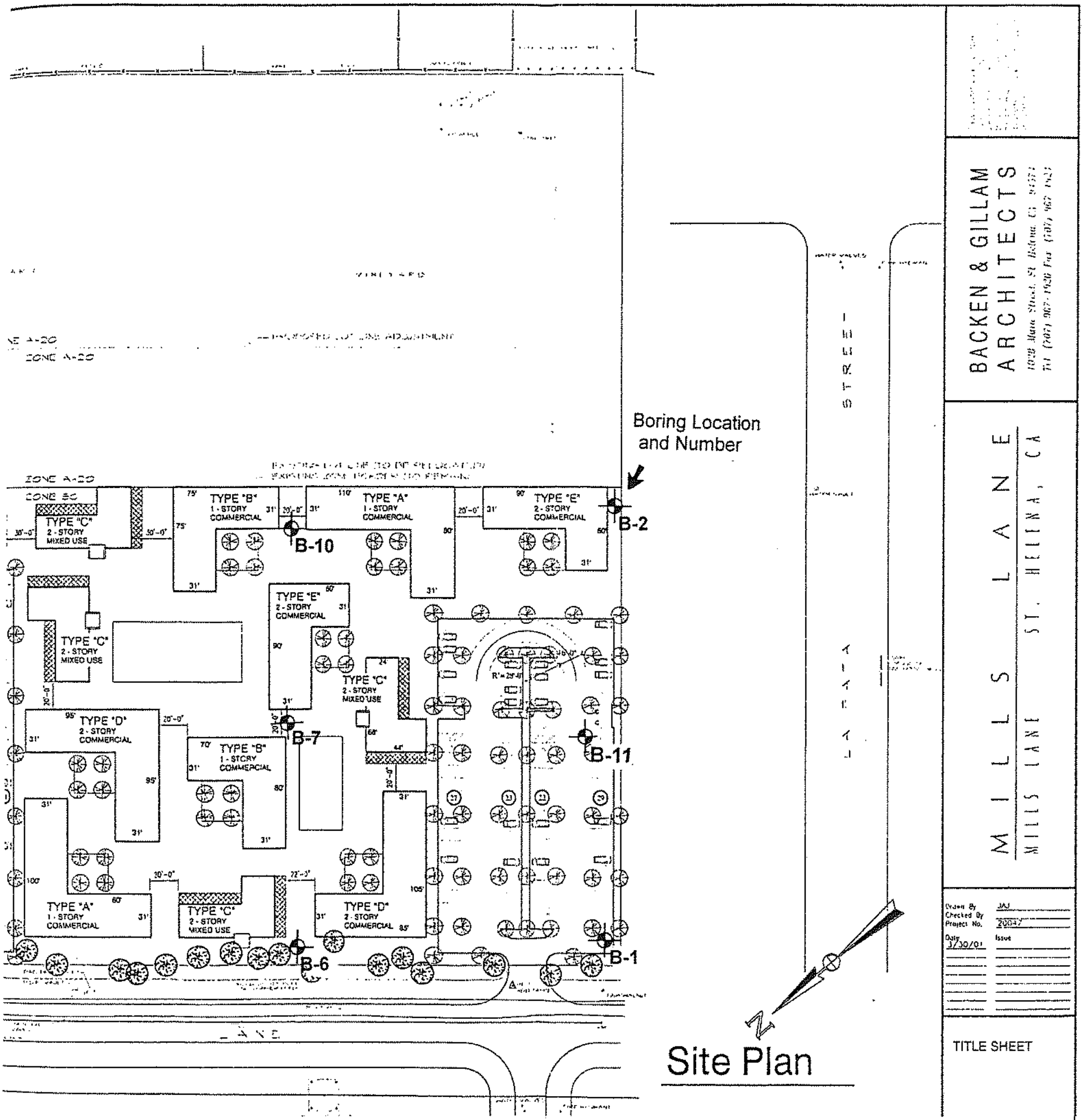
Appr: [signature]

Drwn: kab

Date: Apr. 2001

SITE LOCATION MAP
MILLS LANE COMMERCIAL PROJECT
St. Helena, California

PLATE
1



Reference: Site Plan by Backen & Gillam Architects, dated 03/30/01

Scale: 1" = 100'

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Appr:

Drwn: kab

Date: Apr. 2001

EXPLORATION PLAN
MILLS LANE COMMERCIAL PROJECT
St. Helena, California

PLATE
2

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LOG OF BORING B-1

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
UBC Expansion Index = 30 (low)	91	13.9	10				DARK BROWN SANDY CLAY (CL) medium stiff, moist; porous, disced, w/ gravel (Topsoil)
	104	15.4					
UBC Expansion Index = 45 (low)	111	16.6	10				BROWN SANDY CLAY (CL) medium stiff, wet; w/ gravel (Subsoil)
	107	19.9	22	5			*Becoming stiff to very stiff below 5 feet*
							BROWN CLAYEY GRAVEL (GC) dense, wet;
			36	10			
							NO FREE GROUNDWATER OBSERVED
				15			

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT	Mills Lane Commercial Project	DRILLING COMPANY	Pearson Drilling
LOCATION	St. Helena, California	DATE DRILLED	04/20/01
JOB NUMBER	5700.01.00.2	SURFACE ELEVATION**	Feet
LOGGED BY	LAS	TOTAL DEPTH OF HOLE	10.5 Feet
DRILL RIG	6-inch Solid Stem Auger	APPROVED BY	

PLATE 3

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LOG OF BORING B-2

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
				0–1			DARK BROWN SANDY CLAY (CL) medium stiff, moist; porous, disced, w/ roots and gravel (Topsoil)
Strength Test (See Plate 16)	97	22.8	10		■		BROWN SANDY CLAY (CL) stiff, wet; w/ gravel (Subsoil)
	106	13.0	13		■		
				5			BROWN CLAYEY GRAVEL (GC) dense, wet;
			50+		■		
				9			NO FREE GROUNDWATER OBSERVED
				10			
				15			

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT	Mills Lane Commercial Project	DRILLING COMPANY	Pearson Drilling
LOCATION	St. Helena, California	DATE DRILLED	04/20/01
JOB NUMBER	5700.01.00.2	SURFACE ELEVATION**	Feet
LOGGED BY	LAS	TOTAL DEPTH OF HOLE	9 Feet
DRILL RIG	6-inch Solid Stem Auger	APPROVED BY	[signature]

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LOG OF BORING B-3

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)
	107	12.2	12	
	108	18.0	7	
	109	17.3	12	5
			50+	10
			42	15

MATERIALS DESCRIPTION

DARK BROWN SANDY CLAY (CL)
medium stiff, moist; porous, disced, w/ gravel
(Topsoil)

BROWN SANDY CLAY (CL)
medium stiff to stiff, wet; w/ gravel
(Subsoil)

BROWN CLAYEY GRAVEL (GC)
very dense, wet;

▼ WATER LEVEL AFTER ± 4 HOURS

▽ First Water Encountered

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT: Mills Lane Commercial Project
LOCATION: St. Helena, California
JOB NUMBER: 5700.01.00.2
LOGGED BY: LAS
DRILL RIG: 6-inch Solid Stem Auger

DRILLING COMPANY: Pearson Drilling
DATE DRILLED: 04/26/01
SURFACE ELEVATION**: Feet
TOTAL DEPTH OF HOLE: 15.5 Feet
APPROVED BY: [signature]

PLATE 5

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LOG OF BORING B-4

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	MATERIALS DESCRIPTION
					DARK BROWN SANDY CLAY (CL) medium stiff, wet; porous, disced, w/ gravel (Topsoil)
UBC Expansion Index = 48 (low)	103	19.1	9		
					BROWN SANDY CLAY (CL) medium stiff to stiff, wet; w/ gravel (Subsoil)
Strength Test (See Plate 16)	104	22.4	10		
				5	
			25		BROWN CLAYEY GRAVEL (GC) medium dense, wet;
					NO FREE GROUNDWATER OBSERVED
				10	
				15	

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT Mills Lane Commercial Project
LOCATION St. Helena, California
JOB NUMBER 5700.01.00.2
LOGGED BY LAS
DRILL RIG 6-inch Solid Stem Auger

DRILLING COMPANY Pearson Drilling
DATE DRILLED 04/26/01
SURFACE ELEVATION** Feet
TOTAL DEPTH OF HOLE 9.5 Feet
APPROVED BY [signature]

PLATE 6

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LOG OF BORING B-5

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
			9		■	CL	DARK BROWN SANDY CLAY (CL) medium stiff, moist; porous, disced, w/ gravel (Topsoil)
			12		■	GC	BROWN CLAYEY GRAVEL (GC) medium dense to dense, wet;
			35	5	■	GC	
						GC	*With larger gravels @ ±7-8 feet*
							NO FREE GROUNDWATER OBSERVED
				10			
				15			

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT: Mills Lane Commercial Project
LOCATION: St. Helena, California
JOB NUMBER: 5700.01.00.2
LOGGED BY: LAS
DRILL RIG: 6-inch Solid Stem Auger

DRILLING COMPANY: Pearson Drilling
DATE DRILLED: 04/26/01
SURFACE ELEVATION**: Feet
TOTAL DEPTH OF HOLE: 9.5 Feet
APPROVED BY: [illegible]

PLATE 7

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LOG OF BORING B-6

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
							DARK BROWN SANDY CLAY (CL) medium stiff, moist; porous, disced, w/ gravel (Topsoil)
			8		■		
			8		■		
				5			
							BROWN SANDY CLAY (CL) very stiff, wet; w/ gravel (Subsoil)
			19		■		
				10			
							Becomes gravelly below 12 feet
			25		■		
							NO FREE GROUNDWATER OBSERVED
				15			

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT	Mills Lane Commercial Project	DRILLING COMPANY	Pearson Drilling
LOCATION	St. Helena, California	DATE DRILLED	04/26/01
JOB NUMBER	5700.01.00.2	SURFACE ELEVATION**	Feet
LOGGED BY	LAS	TOTAL DEPTH OF HOLE	13.5 Feet
DRILL RIG	6-inch Solid Stem Auger	APPROVED BY	[signature]

PLATE 8

RGH Geotechnical and Environmental Consultants

LOG OF BORING B-7

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	SAMPLES	SYMBOLS	MATERIALS DESCRIPTION
				0			DARK BROWN SANDY CLAY (CL) medium stiff, moist; porous, disced, w/ gravel (Topsoil)
			6		■		
							Becoming gravelly below 3 feet
			6		■		
				5			
							BROWN CLAYEY GRAVEL (GC) dense, wet;
			40		■		
							NO FREE GROUNDWATER OBSERVED
				10			
				15			

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT Mills Lane Commercial Project
LOCATION St. Helena, California
JOB NUMBER 5700.01.00.2
LOGGED BY LAS
DRILL RIG 6-inch Solid Stem Auger

DRILLING COMPANY Pearson Drilling
DATE DRILLED 04/26/01
SURFACE ELEVATION** Feet
TOTAL DEPTH OF HOLE 9.5 Feet
APPROVED BY [signature]

PLATE 9

RGH Geotechnical and Environmental Consultants

LOG OF BORING B-8

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	MATERIALS DESCRIPTION
UBC Expansion Index = 25 (low)	111	10.0	15		DARK BROWN CLAYEY GRAVELLY SAND (SC) medium dense, moist; porous (Topsoil)
			13		BROWN CLAYEY GRAVEL (GC) medium dense to dense, moist;
				5	
			37		
					NO FREE GROUNDWATER OBSERVED
				10	
				15	

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT Mills Lane Commercial Project
LOCATION St. Helena, California
JOB NUMBER 5700.01.00.2
LOGGED BY LAS
DRILL RIG 6-inch Solid Stem Auger

DRILLING COMPANY Pearson Drilling
DATE DRILLED 04/26/01
SURFACE ELEVATION** Feet
TOTAL DEPTH OF HOLE 8 Feet
APPROVED BY [signature]

PLATE 10

RGH Geotechnical and Environmental Consultants

LOG OF BORING B-9

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	MATERIALS DESCRIPTION
				0	DARK BROWN SANDY CLAY (CL) medium stiff, moist; porous, w/ gravel (Topsoil)
Classification Test (See Plate 15)	96	19.6	7		
Strength Test (See Plate 16)	115	13.6	11		
					Becoming gravelly
				5	
					BROWN CLAYEY GRAVEL (GC) dense, wet;
			37		
				10	NO FREE GROUNDWATER OBSERVED
				15	

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT Mills Lane Commercial Project	DRILLING COMPANY Pearson Drilling
LOCATION St. Helena, California	DATE DRILLED 04/26/01
JOB NUMBER 5700.01.00.2	SURFACE ELEVATION** Feet .
LOGGED BY LAS	TOTAL DEPTH OF HOLE 10 Feet
DRILL RIG 6-inch Solid Stem Auger	APPROVED BY [signature]

PLATE 11

Geotechnical and Environmental Consultants

LOG OF BORING B-10

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	MATERIALS DESCRIPTION
					DARK BROWN SANDY CLAY (CL) medium stiff, moist; porous, disced, w/ gravel (Topsoil)
			8		
			7		
			16	5	BROWN CLAYEY GRAVEL (GC) dense, wet;
			38	10	
					NO FREE GROUNDWATER OBSERVED
				15	

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT: Mills Lane Commercial Project	DRILLING COMPANY: Pearson Drilling
LOCATION: St. Helena, California	DATE DRILLED: 04/26/01
JOB NUMBER: 5700.01.00.2	SURFACE ELEVATION**: Feet
LOGGED BY: LAS	TOTAL DEPTH OF HOLE: 11 Feet
DRILL RIG: 6-inch Solid Stem Auger	APPROVED BY:

PLATE 12

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LOG OF BORING B-11

OTHER LABORATORY TESTS	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS/ FOOT*	DEPTH (ft)	MATERIALS DESCRIPTION
					DARK BROWN SANDY CLAY (CL) medium stiff, moist; porous, w/ gravel (Topsoil)
R-Value Data (See Plate 17)					
			10		
			13		
					BROWN SANDY CLAY (CL) stiff, wet; w/ gravel (Subsoil)
				5	
					BROWN CLAYEY GRAVEL (GC) dense, wet;
			35		
					NO FREE GROUNDWATER OBSERVED
				10	
				15	

*BLOW COUNTS - Converted to Equivalent Standard Penetration Blow Counts
**ELEVATION - Existing Ground Surface

PROJECT Mills Lane Commercial Project
LOCATION St. Helena, California
JOB NUMBER 5700.01.00.2
LOGGED BY LAS
DRILL RIG 6-inch Solid Stem Auger

DRILLING COMPANY Pearson Drilling
DATE DRILLED 04/26/01
SURFACE ELEVATION** Feet
TOTAL DEPTH OF HOLE 9.5 Feet
APPROVED BY [signature]

PLATE 13

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More Than Half is Larger Than #200 Sieve	GRAVELS More Than Half Coarse Fraction Is larger Than No. 4 Sieve Size	Clean Gravels With Little or No Fines	GW	Well Graded Gravels, Gravel - Sand Mixtures
			GP	Poorly Graded Gravels, Gravel - Sand Mixtures
		Gravels With Over 12% Fines	GM	Silty Gravels, Poorly Graded Gravel - Silt - Silt Mixtures
			GC	Clayey Gravels, Poorly Graded Gravel - Sand - Clay Mixtures
	SANDS More Than Half Coarse Fraction Is Smaller Than No. 4 Sieve Size	Clean Sands With Little or No Fines	SW	Well Graded Sands, Gravelly Sands
			SP	Poorly Graded Sands, Gravelly Sands
		Sands With Over 12% Fines	SM	Silty Sands, Poorly Graded Sand - Silt Mixtures
			SC	Clayey Sands, Poorly Graded Sand - Clay Mixtures
FINE GRAINED SOILS More Than Half is Smaller Than #200 Sieve	SILTS AND CLAYS Liquid Limit Less Than 50		ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands, or Clayey Silts with Slight Plasticity
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
			OL	Organic Clays and Organic Silty Clays of Low Plasticity
	SILTS AND CLAYS Liquid Limit Greater Than 50		MH	Organic Silts, Micaceous or Diatomacious Fine Sandy or Silty Soils, Elastic Silts
			CH	Inorganic Clays of High Plasticity, Fat Clays
			OH	Organic Clays of Medium to High Plasticity, Organic Silts
HIGHLY ORGANIC SOILS			Pt	Peat and Other Highly Organic Soils

UNIFIED SOIL CLASSIFICATION SYSTEM

Consol - Consolidation
LL - Liquid Limit (In %)
PL - Plastic Limit (In %)
PI - Plastic Index
G_s - Specific Gravity
SA - Sieve Analysis
■ "Undisturbed" Sample
☒ Bulk or Disturbed Sample
◪ Standard Penetration Test
□ Sample Attempt With No Recovery

	Shear Strength, psf	Confining Pressure, psf	
Tx	320	(2600)	Unconsolidated Undrained Triaxial
Tx CU	320	(2600)	Consolidated Undrained Triaxial
DS	2750	(2000)	Consolidated Drained Direct Shear
FVS	470		Field Vane Shear
UC	2000		Unconfined Compression
LVS	700		Laboratory Vane Shear

SS - Shrink Swell
EXP - Expansion
P - Permeability

Note: All strength tests on 2.8" or 2.4" diameter sample unless otherwise indicated.

KEY TO TEST DATA

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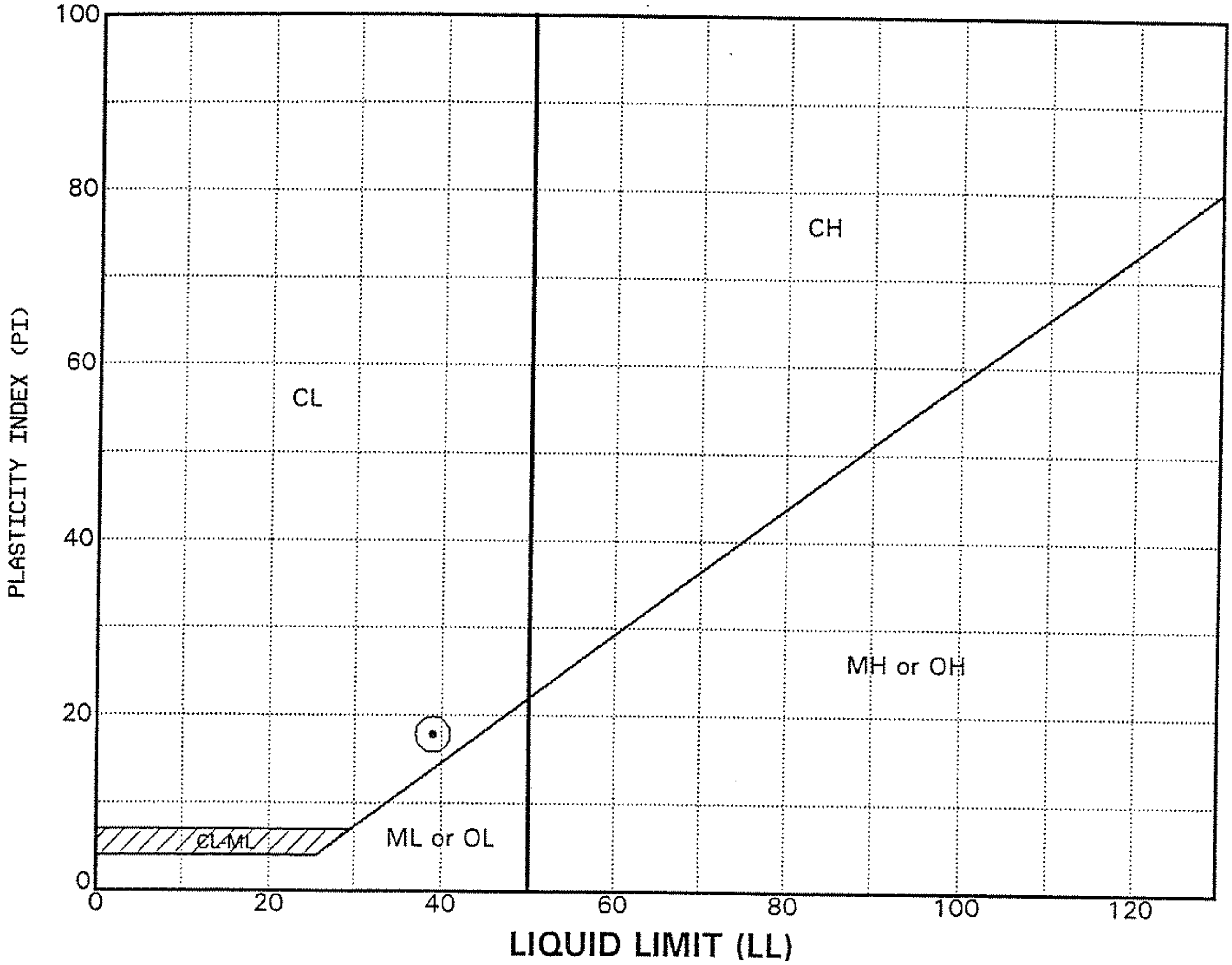
Appr: [signature]
Drwn: kab
Date: Apr. 2001

SOIL CLASSIFICATION CHART
AND KEY TO TEST DATA
MILLS LANE COMMERCIAL PROJECT
St. Helena, California

PLATE
14



SAMPLE SOURCE	CLASSIFICATION	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	% PASSING #200 SIEVE
⊙ B- 9 @ 1.0'	Dark Brown Sandy Clay (CL)	39	21	18	65

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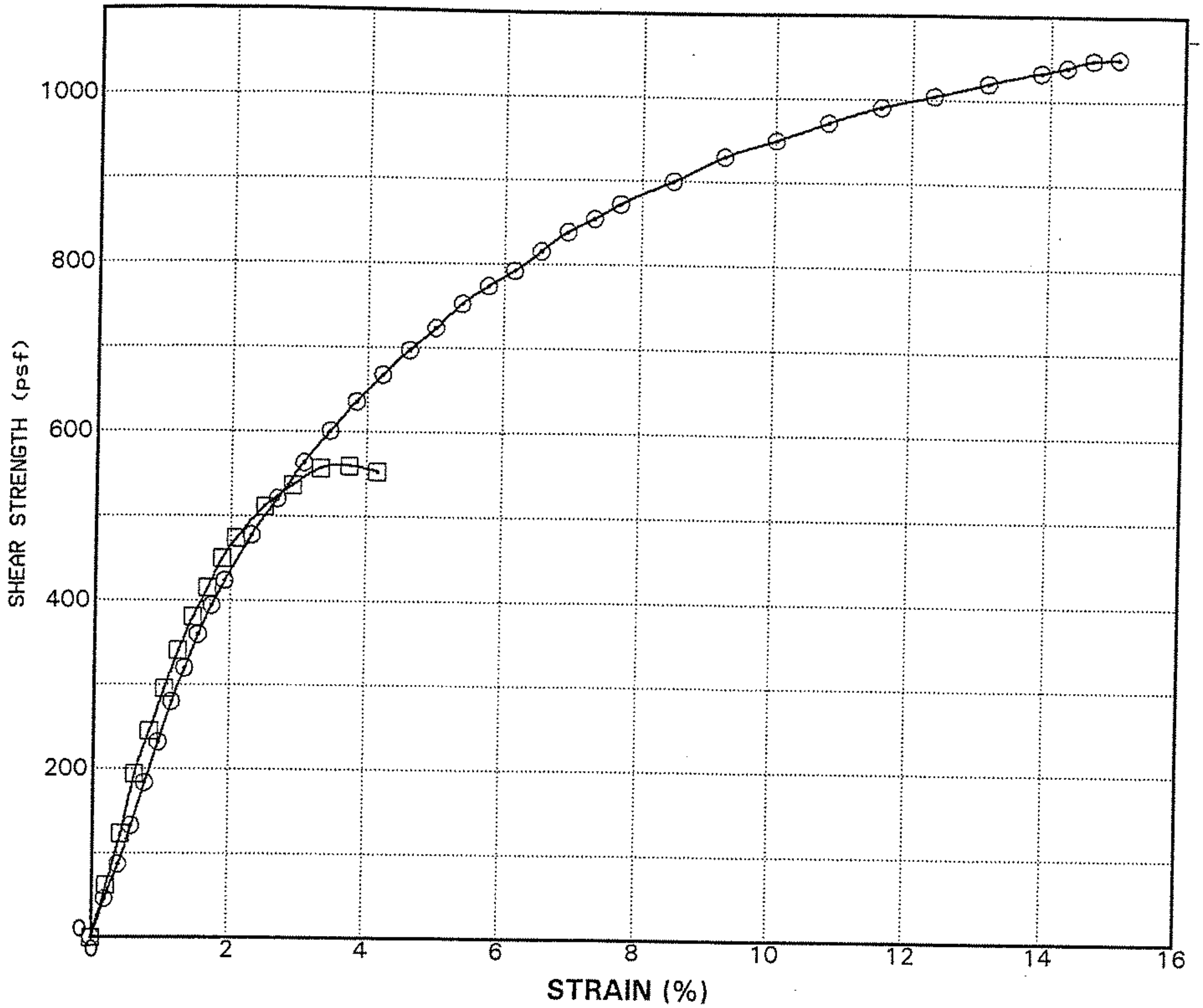
Appr: [signature]

Drwn: kab

Date: Apr. 2001

CLASSIFICATION TEST DATA
MILLS LANE COMMERCIAL PROJECT
St. Helena, California

PLATE
15



Sample Source	Classification	Type of Test	Confinement Pressure (psf)	Ultimate Strength (psf)	Strain (%)	Dry Density (pcf)	Moisture Content (%)
⊙ B- 4 @ 3.5'	Brown Sandy Clay (CL)	UC		1049	15	104	22.4
⊡ B- 9 @ 3.0'	Dark Brown Clayey Sand W/Gravel (SC)	UC		559	4	115	13.6

UC = Unconfined Compression

TX/UU = Unconsolidated Undrained Triaxial

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Appr: [signature]

Drwn: kab

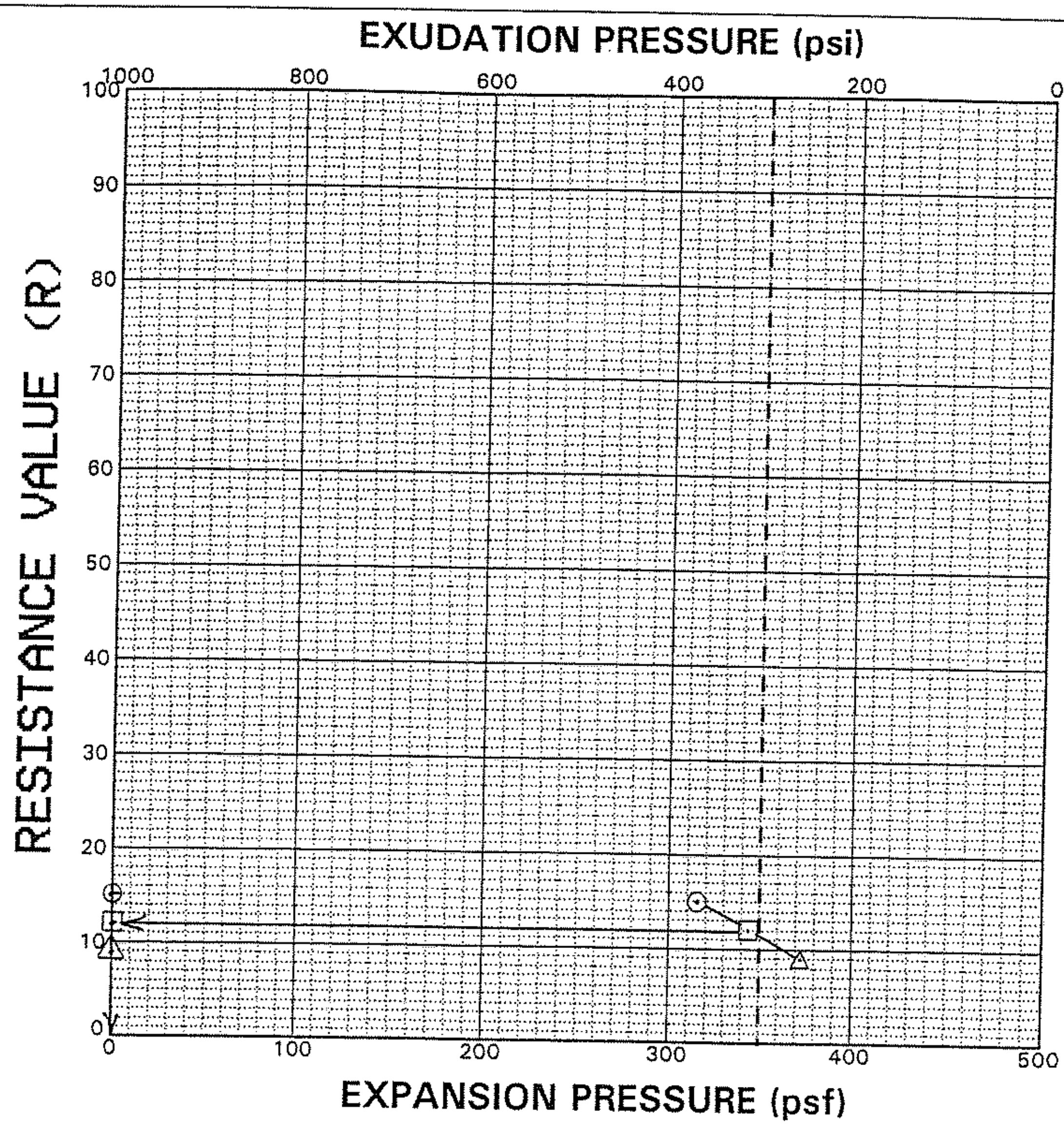
Date: Apr. 2001

STRENGTH TEST DATA

MILLS LANE COMMERCIAL PROJECT

St. Helena, California

PLATE **16**



SPECIMEN NO.	⊙	⊡	△
MOISTURE CONTENT (%)	16.2	17.1	18.0
DRY DENSITY (PCF)	111	111	110
EXUDATION PRESSURE (PSI)	370	313	255
EXPANSION PRESSURE (PSF)	0	0	0
RESISTANCE VALUE (R)	15	12	9

SAMPLE SOURCE	CLASSIFICATION	SAND EQUIVALENT	EXPANSION PRESSURE	R-VALUE
B-11 @ 1.00	Brown Sandy Clay (CL)		0	12

ASTM D 2844, Cal Test 301

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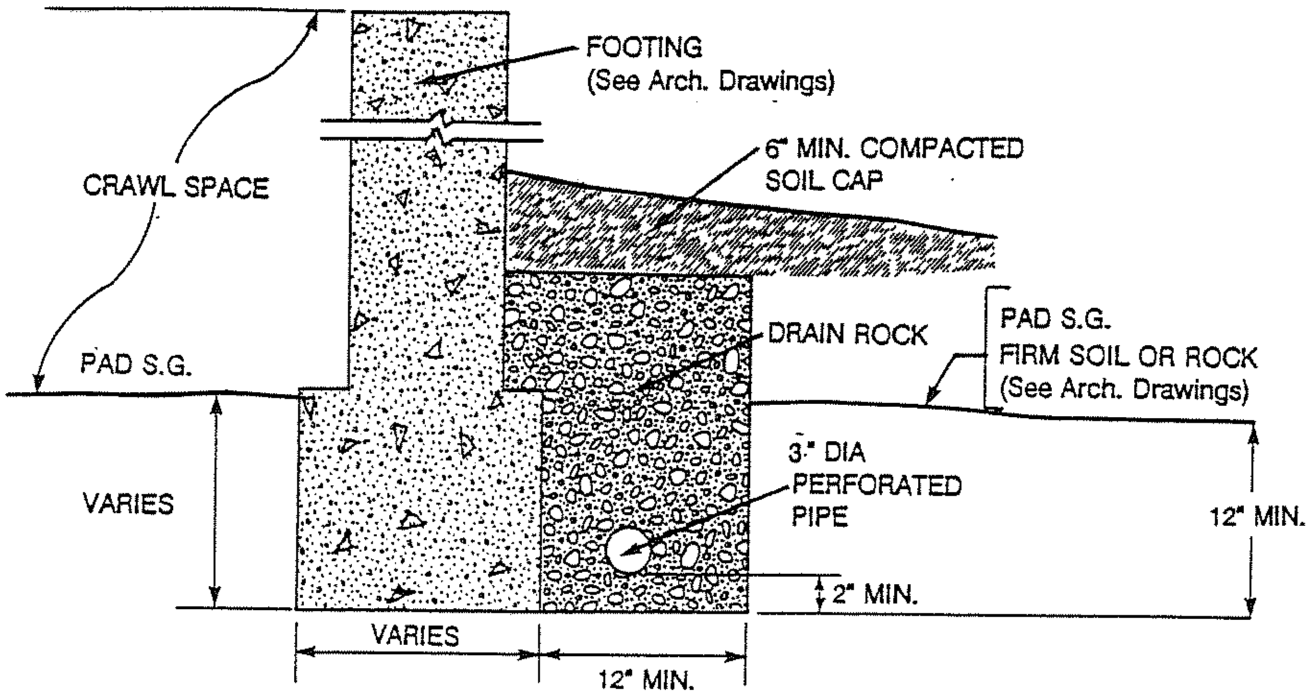
Appr: [signature]
Drwn: kab
Date: Apr. 2001

RESISTANCE (R) VALUE TEST DATA
MILLS LANE COMMERCIAL PROJECT
St. Helena, California

PLATE
17



Notes:

1. Drain rock should meet the requirements for Class 2, Permeable Material, Section 68, State of California "Caltrans" Standard Specification, latest edition.

2. Pipe should conform to the requirements of Section 68 of State of California "Caltrans" Standards, perforations placed down; drain to gravity outlet or storm drain system per plan.

3. On level, graded pads, perimeter subdrains can be deleted if pad surface (S.G.) is graded to at least 12 inches above adjacent exterior surface (at least 12 feet away).

Not to Scale

R G H Geotechnical and Environmental Consultants	Job No: 5700.01.00.2 Appr: Drwn: kab Date: Apr. 2001	**PERIMETER FOUNDATION DRAIN ILLUSTRATION** **MILLS LANE COMMERCIAL PROJECT** St. Helena, California	PLATE **18**

APPENDIX B - REFERENCES

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APPENDIX C - DISTRIBUTION

Mr. Carl Doumani (5,1)
6126 Silverado Trail
Napa, California 94558

Backen and Gillam Architects (2,1)
Attn: J. Jacobson
1028 Main Street
St. Helena, California 94574

LAS:JBH:hs(5700102.Rpt)