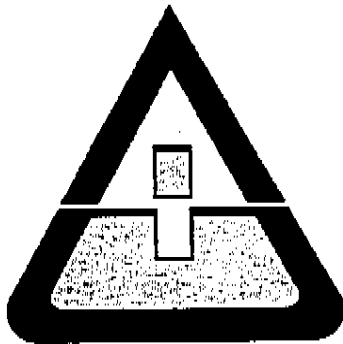


MASTER GEOTECHNICAL REPORT
PROPOSED
SPANISH SPRINGS BUSINESS CENTER
WASHOE COUNTY, NEVADA

Prepared For

HAWCO Investment & Development Co., Inc.
PMB 444
9732 State Route 445
Sparks, Nevada 89436



Pezonella
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October 6, 1999
Job No. 489.53-A

HAWCO Investment & Development Co., Inc.
PMB 444
9732 State Route 445
Sparks, Nevada 89436

Attention: Mr. Gary Hall, Vice President

Master Geotechnical Report
Proposed
Spanish Springs Business Center
Washoe County, Nevada

The attached report presents the results of our Master Geotechnical Report with discussions and conclusions regarding the general suitability of the overall project for its intended use and provides recommendations for the design and construction of dedicated improvements within the public right-of-way..

As discussed in the attached report, based on the results of our investigation, understanding of project development and knowledge of the area, we conclude that the overall project site is suitable for its intended use. Although a detailed geotechnical investigation report will be performed for each building site to determine any site specific geotechnical constraints, we believe that the primary geotechnical engineering considerations affecting project design and construction are the potential presence of expansive clay soils and the potential for flooding to occur as delineated on the referenced FEMA map.

We appreciate having been selected to perform this report and trust that the results will fulfill project design requirements at this time. If you, or any of your design consultants, have any questions, please contact us.

Respectfully

PEZONELLA ASSOCIATES, INC.

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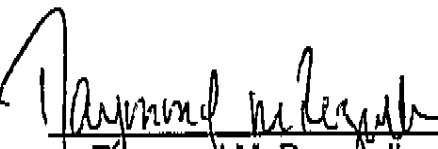
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I INTRODUCTION

This report presents the results of the Master Geotechnical Report we performed for the proposed Spanish Springs Business Center to be located in Washoe County, Nevada. More specifically, the approximate 411 acre project site is situated on the west side of State Highway 445 in the Spanish Springs area and compasses a portion of Assessor's Parcel Number 530-280-04 . We understand that the proposed overall development will include the construction of isolated building pads for industrial and commercial structures to be serviced by community water, sewer and storm drain systems. We anticipate that the proposed structures will be one to two stories with slab-on-grade floors and supported by conventional spread foundations. Dedicated asphaltic covered accessways and private parking areas and Portland cement concrete accessways and loading dock areas will complete project development.

We have not received structural information; however, we anticipate that foundation loads will be normal (light to moderate) for the type of construction proposed, that foundations will bottom at least 24 inches below lowest, exterior ground surface and that structural design will be in accordance with the 1997 edition of the Uniform Building Code.

We have not received grading plans; however, we anticipate that earthwork (cuts and fills) to attain building pad elevations and for proper site drainage will be on the order of 2 to 10 feet. Depth of utility trench excavation is unknown and any proposed slopes will be constructed at maximum inclinations of two horizontal to one vertical (2:1) or flatter. Additionally, we anticipate that any underground utilities existing within proposed structural areas will be relocated.

As stated in our proposal dated June 4, 1999, the scope of our work was to determine the general subsurface soil conditions across the site and to provide opinions and discussions concerning the overall suitability of the site for its intended use. Our scope of work was subsequently amended to include deeper subsurface exploration to assess the Soil Profile Type as defined in Table 16-J of the 1997 Uniform Building Code. Once design parameters, such as building location, finish floor elevation, structural loads and grading information has been established, a detailed geotechnical investigation report should be performed for each building site.

This report is geotechnical in nature and not intended to identify other site constraints such as environmental hazards, wet lands determinations and/or the potential presence of buried utilities.

To aid in our investigation, we reviewed the results of previous geotechnical investigations our firm has conducted within the immediate area such as the Eagle Canyon Subdivision dated November 7, 1996 (located to the south) and the Bridle Path Subdivision dated January 23, 1994 (located to the east).

Previously, in correspondence dated August 4, 1999, we presented the preliminary results of our investigation which was based on our review of the geotechnical engineering services presented in a report we prepared for a portion of the HAWCO Business Park (a.k.a. Spanish Spring Business Center) dated April 28, 1999.

II FIELD EXPLORATION AND LABORATORY TESTS

To attain a general overview of the subsurface conditions, we drilled 15 test borings with truck mounted (CME 55) hollow stem auger equipment and excavated 3 test pits with a rubber tire backhoe to depths of 9-1/2 to 99-1/2 feet. The boring and pit locations, determined in the field using pace and compass and based on a site plan prepared by CFA, Inc. (undated), are depicted (approximate locations) on Plate 1. No greater accuracy is inferred.

Our field geologist recorded the location of each boring utilizing the global positioning system (GPS), logged and visually classified the materials encountered. Relatively undisturbed samples were collected from the borings in a split spoon sampler utilizing a 140 pound hammer with a 30 inch drop. The blows per foot required to advance the sampler were converted and recorded (Standard Penetration Test). Logs of the test borings and test pits are presented on Plates 2 through 15. The materials are classified in accordance with the Unified Soil Classification System which is explained on Plate 16.

The samples were returned to our laboratory and reviewed by our staff engineer to confirm their field classifications, to select representative materials for laboratory testing and to determine general engineering design parameters. Available results of in-situ moisture content and dry density determinations, particle size analysis, Atterberg Limits, triaxial (saturated) compression, Resistance R-Value, sand equivalency and compaction tests are presented on the logs and on Plates 17 through 24. Additional tests, Ec, pH and SO₄, were performed on selected samples by an independent laboratory to evaluate the corrosion potential and are presented on the logs.

III SITE AND SOIL CONDITIONS

The site is undeveloped and bounded by undeveloped land to the south, north and west and State Highway 445 to the east. The overall surface is relatively level with a gentle grade downward toward the central area of the property from west and east. The grade becomes moderate along the western boundaries of the property. The surface is predominantly covered by medium dense to dense sagebrush, minor drainage swales and dirt roads.

Based on studies completed by the United States Department of Agriculture Soil Conservation Service (*Soil Survey of Washoe County, Nevada, South Part* - Sheet # 17) the soils underlying the site consist of the following units:

Doten silty clay, 0 to 2 percent slopes (# 120): This very deep, moderately well drained soil on lake terraces and formed in alluvium from mixed rock. Typically, the surface layer is a grayish brown, silty clay about 7 inches thick. The underlying material to a depth of about 60 inches is a grayish brown clay and silty clay. Typically, the soil cracks open at the surface when dry. The permeability is very slow; available water capacity is high; effective rooting depth is 60 inches or more; runoff is ponded or very slow; the hazard of water erosion and soil blowing is slight; the soil is subject to rare flooding during storms of unusually high intensity; the depth to the seasonal high water table is between 60 and 72 inches in spring; channeling and deposition are common along streambanks and in some areas, the soil is ponded for long periods during spring. The main limitations associated with the use of this unit for urban development, as defined by the Soil Conservation Service, are flooding, high clay content, very slow permeability and low load bearing strength.

Haybourne loamy sand, 2 to 4 percent slopes (# 140): This very deep, well drained soil on alluvial fans and formed in alluvium, derived dominantly from granitic rocks. Typically, the surface layer is a pale brown, loamy sand about 10 inches thick. The subsoil is a brown, sandy loam about 16 inches thick. The substratum to a depth of 63 inches or more is a brown, stratified, fine, sandy loam through coarse sand. Permeability is moderately rapid in the subsoil and moderately rapid to rapid in the substratum; available water capacity is moderate; effective rooting depth is 60 inches or more; runoff is slow; the hazard of water erosion is slight; the hazard for soil blowing is moderate; the soil is subject to flash flooding during storms of unusually high intensity and channeling and deposition are common along streambanks. The main limitations associated with this unit for urban development, as defined by the Soil Conservation Service, are flooding, rapid permeability and susceptibility to frost heave.

Lemm very gravelly coarse sandy loam, 4 to 8 percent slopes (# 370): This very deep, well drained soil is on alluvial fans and formed in alluvium derived from granodiorite. Typically, 40 to 50 percent of the surface is covered with gravel. The surface layer is a grayish brown, very gravelly, coarse sandy loam about 19 inches thick. The subsoil is a pale brown, very gravelly, coarse, sandy loam about 21 inches thick. The substratum to 60 inches or more is very pale brown, very gravelly, loamy, coarse sand. Permeability is moderately rapid; available water capacity is low; effective rooting depth is 60 inches or more; runoff is slow; the hazard of water erosion or soil blowing is slight; the soil is subject to flash flooding during storms of unusually high intensity and channeling and deposition are common along streambanks. The main limitations with this soil for urban development, as defined by the Soil Conservation Service, are flooding, moderately rapid permeability and susceptibility to frost heave.

Sagouspe Sand (#530): This very deep, somewhat poorly drained soil is on flood plains and low terraces and formed in alluvium derived dominantly from mixed rock sources. Typically, the surface layer is a dark grayish brown sand about 21 inches thick. The underlying material to a depth of 60 inches is a stratified, dark grayish brown and brown, coarse sand and silt loam. Permeability is described as rapid; available water capacity is moderate; effective rooting depth 60 inches for water-tolerant plants but is limited to 36 to 60 inches for water-sensitive plants; runoff is slow; the hazard of water erosion is slight; the hazard of soil blowing is high; a seasonal water table is at a depth of 36 to 40 inches in late winter and spring and the soil is subject to brief periods of flash flooding during storms of unusually high intensity. Limitations associated with the use of this soil for urban development, as described by the Soil Conservation Service, are the potential for flooding to occur, the rapid permeability rate and the susceptibility to frost heaving.

Aladshi sandy loam, 2 to 4 percent slopes (# 971): This very deep, well drained soil is on alluvial fans and low stream terraces and is formed in alluvium derived from mixed rock sources. The surface layer is a light brownish gray, sandy loam about 7 inches thick. The subsoil is a brown, sandy, clay loam about 27 inches thick. The substratum to a depth of 60 inches or more is a brown, stratified, very gravelly loam to extremely gravelly, loamy sand. Permeability is described as moderately slow; available water capacity is moderate; effective rooting depth is 60 inches or more; runoff is slow; the hazard of water erosion and soil blowing is slight; and the soil is subject to flash flooding during storms of unusually high intensity. Channeling and deposition are common along streambanks. The main limitations associated with this unit for urban development, as described by the Soil Conservation Service, are the potential for flooding to occur, the moderately slowly permeable subsoil, the susceptibility of the soil to frost heaving and the high clay content.

Jowec silty clay loam (# 1160): This very deep, well drained soil is on low lake terraces and is formed in alluvium from mixed rock sources. Typically, the surface layer is light brownish gray silty clay loam about 2 inches thick. The subsoil is a dark yellowish brown clay loam about 18 inches thick. The upper portion of the substratum is clay loam about 18 inches thick, and the lower part to a depth of 60 inches is a stratified loam and sandy loam. Permeability of the Jowec soil is slow. Permeability is described as slow. available water capacity is high, effective rooting depth is more than 60 inches, runoff is very slow, the hazard of water erosion and soil blowing is slight and the unit is subject to shallow flash flooding during storms of unusually high intensity. The main limitations associated with this unit, as described by the Soil Conservation Service, is the high clay content, potential for flooding and low load-bearing strength for roadway design.

Wedertz sandy loam, 2 to 4 percent slopes (# 1170): This very deep, well drained soil is on alluvial fans and is formed in alluvium derived from mixed rock sources. Typically, the surface layer is a pale brown, sandy loam about 6 inches thick. The subsoil is a brown, sandy, clay loam about 16 inches thick. The upper 12 inches of the substratum is a pale brown, weakly cemented, sandy loam. The lower part, to a depth of 60 inches, is a pale brown, gravelly, loamy sand. Depth to weak silica cementation ranges from 25 to 35 inches. Permeability is described as moderately slow in the subsoil and upper part of the substratum and rapid in the lower part of the substratum; available water capacity is moderate; effective rooting depth is 60 inches or more; runoff is slow; the hazard of water erosion is slight; the hazard of soil blowing is slight and the soil is subject to flash flooding during storms of unusually high intensity. The main limitations associated with the use of this soil for urban development, as defined by the Soil Conservation Service, are the flooding potential, moderately slow permeability and the high clay content and susceptibility to frost heaving for roadways.

Linhart stony coarse sand, 4 to 8 percent slopes (# 1210): This very deep, somewhat excessively drained soil is on alluvial fans and formed in alluvium derived dominantly from granitic rocks. Typically, 1 to 3 percent of the surface is covered with stones. The surface layer is a dark grayish brown, stony coarse sand about 14 inches thick. The underlying material to a depth of 60 inches is a grayish brown to light brownish gray, stratified, very gravelly, coarse sand and very gravelly, loamy coarse sand. Permeability is described as rapid; available water capacity is very low; effective rooting depth is 60 inches or more; runoff is slow; the hazard of water erosion and soil blowing is slight and the soil is subject to flash flooding during storms of unusually high intensity. The main limitations associated with this unit for urban development, as described by the Soil Conservation Service, are flooding and rapid permeability.

Based on geologic mapping completed by Harold F. Bonham (Nevada Bureau of Mines and Geology, Geology and Mineral Deposits of Washoe and Storey Counties, Nevada, Bulletin 70, 1969), the materials underlying the site consist of Quaternary age Stream deposits, talus, slope wash, alluvial fan and eolian deposits (Qal).

A review of the referenced geotechnical investigations reveals that the underlying native soils consist of the following:

Eagle Canyon Subdivision: Stiff, moderately expansive, sandy clays. These upper soils extend, generally, to a maximum depth of about three feet and are underlain by medium dense to very dense silty and clayey sands that contain varying amounts of gravel to the depths explored (15-1/2 feet). Isolated zones of cemented soils and discontinuous layers of very stiff, sandy silts have been encountered during previous explorations. At the time of the exploration (June, 1996) no free ground water was encountered.

Bridle Path Subdivision: Silty and clean (little or no binder) sands to the depths explored (15 feet). Discontinuous layers of moderately to highly expansive, clayey sands and sandy clays were encountered in the upper two feet. Additionally, abundant gravels and cobbles were encountered at various depths. Generally, the soils are loose to medium-dense to about one foot below the existing grade and then become medium-dense to dense with depth. Isolated zones of moderately cemented materials were encountered in some of the test pits. At the time of the exploration (October, 1993) no free ground water was encountered.

With the exception of the excessive gravel content, our exploration confirms, in general, the Soil Conservation Service, geologic mapping and the referenced geotechnical report, with the native soils consisting of alternating layers of medium dense to very dense, silty, clayey and clean (little or no binder) sands that contain varying amounts of gravel to the depths explored. Occasional layers of medium stiff to hard, clay and silt that contain varying amounts of sand and gravel were additionally recorded and a thin layer of dense gravel with clay and sandy was noted.

At the time of our investigation (April, August and September, 1999), no free ground water was recorded in any of our test borings or pits to the depths explored.

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Based on the results of our deep exploration (test boring No. 5), we believe that the average subsurface materials most closely approximate a Soil Profile Type of Sc as defined in Table 16-J of the 1997 Uniform Building Code.

Laboratory test analysis indicate that, in general, the subsurface soils exist in a relatively compact (firm and/or dense) state, exhibit a low to negligible potential for expansion and relatively moderate supporting capability for footings, slabs and pavement; however, areas of moderately expansive clay soils were encountered across portions of the property. Additionally, laboratory test results reveal that, overall, the underlying materials do not exhibit corrosive characteristics for steel, metal or properly prepared Type II Portland cement; however, an elevated acidic pH level was encountered (test boring No. 15).

IV GEOLOGIC AND SEISMIC CONSIDERATIONS

To delineate possible faulting and to evaluate any other geological hazards on the site, our investigation included a review of published geological literature.

A. Geology

The site is located in the north central portion of the Spanish Springs Valley. A complex basin bordered to the east by the Pah Rah Range which is composed of granite and gabbro intrusions, ash flow tuffs, and andesitic and basaltic flows and to the west by primarily granitic rock. The entire valley and accompanying ridges drain to the south. The southern 1/3 of the valley is poorly-drained and numerous small ponds have formed, in part, from the termination of the Orr Ditch. The North Truckee Drain (exiting the valley) partially drains the area, but is only moderately successful.

B. Faulting and Seismicity

Based on the referenced geologic mapping no known fault trace is illustrated as crossing the subject property; however, active faults have been identified in the area which warrants the inclusion of the site within Seismic Zone 3 of the Uniform Building Code.

The Spanish Springs Valley, as well as much of western Nevada, is considered seismically active (Uniform Building Code Zone 3). The Walker Lane Fault Zone, which trends northwest-southeast, borders the Spanish Springs area on the north. Anticipated earthquake magnitudes along the Walker Lane are on the order of 7.0 to 7.5 on the Richter Magnitude Scale. Literature by A. Ryall and B. M. Douglas (Nevada Bureau of Mines and Geology, *Regional Seismicity*, Reno Folio, 1976) states that earthquake recurrence curves predict a return period of 70 to 80 years for an earthquake of Magnitude 7.0 or greater within 62 miles of the Reno area. They also calculate that, on the average, an earthquake of Magnitude 5.3 to 5.4 would be expected to occur within 20 miles of Reno approximately once in 30 years, would have a maximum bedrock acceleration of 0.12 to 0.19g, and would involve about 6 seconds of strong shaking. The expected return period of rock accelerations greater than 0.5g at an average site in western Nevada associated with an earthquake of magnitude greater than 7.0 is on the order of 2000 years.

C. Liquefaction

Liquefaction, a loss of soil shear strength, is a phenomenon associated with loose, saturated deposits subjected to earthquake shaking which can result in unacceptable settlements of foundations and other structural elements supported by these soils. Although not included on the referenced geologic map, a review of earthquake hazards mapping completed within areas of similar geologic settings (basins and valleys) indicates that this site may exist in an area underlain by potentially unstable, unconsolidated materials which may be potentially susceptible to pronounced slumping and ground disturbance along steep cuts or embankments. Additionally, these soils may manifest amplified ground motion during a major seismic event and may be potentially susceptible to moderate to great shaking and, as a result, possibly experience liquefaction when associated with shallow ground water. Based on the results of investigation which reveal that the underlying materials exist, overall, in a relatively compact state and due to the absence of ground water, we judge that the potential for the materials underlying the site to be susceptible to slumping, ground disturbances or liquefaction is remote.

D. Flooding

The property has been delineated by the Federal Emergency Management Agency (FEMA-Map Number 32031C2840 E, effective date September 30, 1994) as being within Flood Hazard Zone X (unshaded) and within Flood Hazard Zone AO. Zone X (unshaded) are areas determined to be outside the 500-year floodplain while Zone AO are special flood hazard areas inundated by 100-year flooding with a flood depth of 1 foot (usually sheet flow on sloping terrain).

E. Radon

Radon, a colorless, odorless, radioactive gas derived from the natural decay of uranium, is found in nearly all rocks and soils. The Environmental Protection Agency suggests that remedial action be taken to reduce radon in any structure with average indoor radon of 4.0 pCi/L or more. Based on studies completed by the Nevada Bureau of Mines and Geology in cooperation with the Nevada Division of Health and the U.S. EPA (Radon In Nevada, Nevada Bureau of Mines and Geology, Bulletin 108, 1994), the project site is delineated as existing in, or in close proximity to, an area with an average indoor measurement equal to or greater than 4.0 pCi/L and, as such, could exceed action levels.

V CONCLUSIONS

Based on the results of our investigation, understanding of project development and knowledge of the area, we conclude that the overall project site is suitable for its intended use. Although a detailed geotechnical investigation report will be performed for each building site to determine any site specific geotechnical constraints, we believe that the primary geotechnical engineering considerations affecting project design and construction are the potential presence of expansive clay soils and the potential for flooding to occur as delineated on the referenced FEMA map.

The expansive native materials are subject to substantial volume changes (shrink and swell) with changes in moisture content. Changes in moisture content can occur as a result of seasonal variations in precipitation, landscape irrigation, broken or leaking water pipes and sewer lines, and/or poor site drainage. These volume changes can cause differential movements (settlement or heave) of foundations, concrete slabs and pavement materials.

One method to reduce the potential for movement of foundation, interior slabs-on-grade, exterior flatwork and flexible pavement sections, is to overexcavate the expansive materials to a sufficient depth and replace them with structural fill, thereby reducing the thickness of the expansive layer, providing surcharge, and maintaining moisture at a suitable and near constant level. In conjunction with overexcavation and filling, moisture conditioning of the remaining exposed materials will be needed. Expansive materials remaining under structural elements should be moisture conditioned to, and maintained at, a slightly over optimum moisture content during and after construction.

Studies and experience have shown that minor movements of the structural elements can be expected, even if the recommended alternatives are followed, whenever underlying expansive materials are present. Therefore, the intent of any recommendation should be to control any potential movement without exceeding economic feasibility; however, the owner or developer should weight the benefits of deeper removal.

In addition to their expansive characteristics, clayey soils also exhibit a lower Resistance R-Value than granular material. To reduce the thickness of aggregate base and to minimize future maintenance, within flexible pavement areas, portions of these soils should be removed and replaced with compacted select fill subbase.

Structural components can gain adequate support on firm, native soils with low to negligible expansion potential or on approved, compacted, structural fill material placed in accordance with our subsequent recommendations. Based on the results of our investigation we believe that foundations which bottom on approved, firm, granular native soils with low to negligible expansion potential and/or structural fill can be designed to impose dead plus long-term live load bearing pressures of at least 2000 pounds per square foot. These

pressures can be increased by one-third when considering total design loads, including wind or seismic forces. Resistance to lateral loads can be obtained from passive earth pressures and soil friction. We recommend, in general, a coefficient of friction of 0.30 and a passive pressure of 250 pounds per cubic foot per foot of depth (equivalent fluid).

For normally loaded foundations supported as recommended by a Geotechnical Engineer, we judge that the maximum post construction settlement for footings, will be approximately 1/2-inch and differential settlement will be approximately 1/4 inch.

A portion of the site has been delineated as existing within Flood Hazard Zone AO which is an area of potential flooding. Consideration should be given to both local and federal regulations which may impose construction constraints (such as requiring minimum finish floor elevations or ordinances banning basements within areas designated as lying in flood zones). Due to the constant revisions associated with flood zoning, the site delineation with respect to flood zoning should be verified with the most current mapping at the time of building permit application.

As previously mentioned, laboratory test results reveal that, overall, the underlying materials do not exhibit corrosive characteristics for steel, metal or properly prepared Type II Portland cement; however, an elevated acidic pH level was encountered (test boring No. 15) and further site specific analysis should be considered.

The Soil Conservation Service suggests that the variable (rapid to very slow) permeable soils, low load bearing strength and susceptibility to frost heave can be additional constraints associated with the use of the underlying soils for urban development. Based on our understanding that project development will utilize community water, sewer and storm drain systems, that foundations will bottom at least 24 inches below lowest, exterior ground surface and on approved (firm) native soils and/or structural fill and that aggregate base material and proper drainage will be provided in roadways we believe that these concerns will not impact project development. Consideration however, should be given to the sizing of any detention/retention basins as permeability rates may affect their design. Infiltration tests should be considered within these areas.

Studies regarding the presence of radon gas suggest that the project site is in an area which could exceed the action levels established by the Environmental Protection Agency. Determinations regarding the presence and concentration of radon gas should be considered prior to site development.

There are no apparent geologic hazards which will impose unusual constraints on the project development, however, the project site is located in a seismically active area, and structures should be designed to withstand ground shaking at least in accordance with the criteria contained in the Uniform Building Code for Zone 3.

VI RECOMMENDATIONS

A. Site Preparation and Grading

As previously discussed, once design parameters, such as building location, finish floor elevation, structural loads and grading information has been established, a detailed geotechnical investigation report, including site specific recommendations for design and construction, should be performed for each building site. Recommendations included in this report relate only to the design and construction for dedicated improvements within the public right-of-way.

Our exploration test pits were backfilled without compaction; therefore, where these pits exist in development areas, the backfill should be removed and replaced. Backfill should be placed in a controlled manner as subsequently recommended.

Areas to be developed should be mowed (broken into relatively small pieces) of all surface vegetation and cleared of any debris or rubbish. Debris and rubbish should be removed from the site; however, mowed vegetation may be stockpiled for possible reuse within relatively level landscape areas. Subsequently, as directed by the Geotechnical Engineer (or representative in the field), any organic laden soils should be stripped and blended (evenly distributed) with mowed vegetation and soil for possible reuse within relatively level landscape areas. Based on our investigation, we estimate that the upper 2 to 3 inches of root systems remaining after clearing can be disked or tilled in-place through the use of a disk harrow or equivalent equipment.

Evenly blended vegetation, organics and soil wasted within relatively level landscape (nonstructural areas) should be moisture conditioned, placed in 8 inch loose lifts and compacted to provide a surface which is firm and capped with an 18 to 24 inch layer of soil cover (mass fill) placed and compacted as subsequently recommended.

Within exterior flatwork and flexible pavement areas and extending laterally beyond their edges a distance equivalent to that vertically removed, any material with a moderate potential for expansion should be removed (overexcavated) a sufficient depth to provide for at least 12 inches of approved, compacted, structural fill below planned subgrade. Similarly (if encountered), any material with a high potential for expansion should be removed a sufficient depth to provide for at least 24 inches of approved, compacted, structural fill below planned subgrade.

Surfaces exposed by clearing, stripping or overexcavation should be observed by the Geotechnical Engineer (or representative in the field) to document that all vegetation, roots and/or organic soils have been removed as specified and that the conditions are as anticipated.

Upon approval by the Geotechnical Engineer, the exposed surface should be scarified at least 6 inches deep, conditioned to near optimum moisture content and compacted to at least 90 percent relative compaction¹. Scarification and compaction may be waived by the Geotechnical Engineer (or representative in the field) if the exposed surface exists at a suitable and uniform moisture content or exists in a relatively undisturbed and firm density state.

¹Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by laboratory procedure ASTM Test Designation: D 1557.

B. Material Quality and Reuse

Where referred to within the text of this report, moderately expansive materials are defined as having a Liquid Limit between 40 and 50, Plasticity Index between 15 and 30, an expansion index between 50 and 91 and in excess of 12 percent passing the No. 200 sieve. Materials with Liquid Limits of 50 or greater, Plasticity Index of 30 or greater, an expansion index greater than 90 and in excess of 12 percent passing the No. 200 sieve are considered to exhibit high potential for expansion. Materials with Liquid Limits of 40 or less and Plasticity Index of 15 or less exhibit low to negligible potential for expansion.

Where fill material is proposed, structural zones are defined as follows: 1.) within the entire building envelope to a depth of at least 36 inches below bottom of foundations and slab subgrade and extending laterally at least five feet beyond exterior wall lines; 2.) within exterior flatwork areas, such as sidewalks and curb and gutter, to a depth of at least 24 inches below subgrade and extending laterally at least 24 inches beyond their edges and 3.) within flexible pavement areas, to a depth of 24 inches below subgrade and extending laterally at least 24 inches beyond their edges. Only approved structural materials should be placed within these zones. Mass zones are defined as any area outside the limits of structural zones.

For structural fill materials to be placed within public improvement areas, import material proposed for use as structural fill should consist of materials free of deleterious and/or organic matter, have low to negligible expansion potential and conform, in general, to the following requirements:

<u>Sieve Size</u>	<u>Percent Passing (by dry weight)</u>
4 Inch	100
3/4 Inch	70 - 100
No. 40	15 - 70
No. 200	5 - 25
<hr/>	
Liquid Limit = 40 Maximum	
Plasticity Index = 12 Maximum	

Based on the results of our investigation, we believe that portions of the native soils will, in general, be suitable for reuse as structural fill although they do not strictly conform to the listed criteria adopted by the governing agency. Materials which do not meet the requirements for structural fill may be used, in general, as mass fill (outside the structural zones) with the approval by the Geotechnical Engineer (or representative in the field).

On-site and any import materials should be tested and approved by the Geotechnical Engineer prior to use. Representative samples shall be made available for testing at least 10 working days prior to hauling.

All structural fill should be conditioned to near optimum moisture content and compacted to at least 90 percent relative compaction. Lift thickness will be restricted to 8 inches (maximum loose lift) unless the contractor can demonstrate his ability to uniformly achieve the required compaction for the entire layer placed. Upper (6 inches) native soils excavated and recompacted to 90 percent relative compaction will experience a volume loss (shrinkage) of approximately 15 percent whereas lower native soils (below 6 inches) will experience a volume loss (shrinkage) of approximately 10 percent.

The recommendations for structural fill are intended as a guideline and define a readily attainable, acceptable material. Adjustments to the specified limits to address the use of other potentially acceptable materials, such as those containing oversize rock or which deviate from the classification requirements, can be made provided: 1) the Contractor can demonstrate his ability to place and compact the material in substantial conformance with industry standards to achieve an equivalent finished product as that specified, 2) all parties understand that the Standard ASTM Compaction Test procedures may be invalid for certain material containing oversize aggregate. Compaction approval could only be achieved based on other criteria, such as a performance specification. Technician time could be increased using the performance procedure which would, in turn, increase the cost of inspection services, and 3) only with the strict approval and observation by the governing agency and Geotechnical Engineer (or representative in the field).

C. Site Drainage and Landscape

Adequate drainage (at least 1 percent) should be provided to restrict infiltration from traveling through the backfill soils or from entering the pavement section. Landscape should consist of native vegetation utilizing drip-type irrigation and designed under the guidance of a Landscape Architect.

D. Slabs-on-Grade

Slabs-on-grade can gain adequate support on the previously specified minimum thickness (see Subsection A) of firm, native soils with low to negligible expansion potential and/or on approved, compacted, structural fill material. In preparation for slab construction, the Earthwork Contractor shall ensure that field density tests have been performed to document that the relative compaction of at least the upper 6 inches of exposed material and any new fill is at least 95 percent. Preparation of these materials shall be documented prior to placement of structural components and/or structural fill.

We understand that fill materials, which do not conform strictly to the gradation requirements² contained in Section 304.03 of the *Standard Specifications for Public Works Construction* (1996) proposed to be placed within public improvement areas will require review and approval by the governing agency prior to use.

²

Sieve Size	Percent Passing (by dry weight)
4 inch	100
3/4 inch	70 - 100
No. 40	15 - 70
No. 200	5 - 25

Liquid Limit 40 maximum
Plasticity Index 12 Maximum

Exterior flatwork, such as sidewalks, curbs and gutters, should conform to standards provided by the governing agency including section composition and any requirements for reinforcing steel. Exterior slabs should consist of Portland Cement Concrete with a minimum 28 day compressive strength of 4000 pounds per square inch (psi) with entrained air.

Concrete mix proportions and construction techniques, including the addition of water and improper curing, can adversely affect the finished quality of the concrete and result in cracking and spalling of the slabs. We recommend that all placement and curing be performed in accordance with procedures outlined by the Portland Cement Association and American Concrete Institute. Special considerations should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcing should be provided to minimize any damage resulting from shrinkage.

E. Trench Excavation and Backfilling

We anticipate that, overall, excavations limited to the upper 15 feet can be accomplished with conventional earthmoving or trenching equipment (215 track-mounted Caterpillar Excavator and/or will be rippable with a D-6 Caterpillar Dozer or equivalent earthmoving equipment).

For safety the sides should be sloped or shoring should be used. The Contractor must comply with the "Safety and Health Regulations for Construction" as directed by the Occupational Safety and Health Act (OSHA Standards, Volume III, Part 1926, Subpart P) while excavating and backfilling. The Contractor is responsible for providing a competent person, as defined by the OSHA standards, to ensure excavation safety.

With the exception of the bedding and structural zones, approved fill material should be used for utility trench backfilling. We recommend the use of less permeable soils within areas where they are naturally occurring, instead of the typical clean backfill material, to minimize the potential for subsurface water migration through the utility trenches.

Native backfill materials should be moisture conditioned and compacted to at least 90 percent relative compaction. Lift thickness shall be restricted to 8 inches (loose) maximum unless the contractor can demonstrate his ability to achieve the required compaction uniformly throughout the entire layer placed.

As previously mentioned, an elevated acidic pH level was encountered (test boring No. 15) and further site specific analysis should be considered where metal conduit is proposed.

F. Permanent Cut and Fill Slopes

We have not received grading information concerning anticipated slope inclinations; however, we anticipate that any proposed slopes will not exceed 10 feet in total height. Based on our anticipation, all permanent cut and fill slopes should be constructed at a maximum inclination of 2 horizontal to one vertical (2:1). Where fill is to be placed on natural slopes of 5:1 or steeper, keying and benching shall be provided along the fill/native soil interface. A keyway, located at the base of the slope, shall be at least one foot in depth and eight feet in width. A concrete or rip rap lined drainage swale with positive drainage, sufficient to divert runoff and suspended material down and away, should be provided at the top of any slope.

The Contractor shall overfill and trim the face of all fill slopes or compact them to provide a firm surface, free of loose soil that would be subject to erosion and sloughing. To further minimize erosion potential and future maintenance, upon completion of grading, all 3:1 slopes should be planted with dense-rooted, rapid growing vegetation while 2:1 slopes should be protected with a minimum 12 inch layer of angular rip rap material with a minimum specific gravity of at least 2.5. All slopes should be evaluated by the Geotechnical Engineer to document that the conditions are as anticipated and that our recommendations concerning bench height and width are appropriate.

G. Flexible Pavement

Flexible pavements will gain adequate support on the previously specified minimum thickness (see Subsection A) of firm, native soils with low to negligible expansion potential or on approved, compacted, structural fill material (subbase). In addition to meeting the requirements for structural fill, we recommend that the upper 6 inches of subgrade be compacted to at least 95 percent relative compaction and have a Resistance R-Value of at least 50. Based on the results of our investigation, portions of the native soils and materials which meet our structural fill requirements will be suitable for use within roadway areas.

We have not received information regarding traffic weights and volumes; however, we anticipate that the proposed access roadways will experience moderate vehicle traffic and heavy truck traffic. Based on this anticipation, we recommend that any proposed street section with a row width of 56 feet or less consist of 4 inches of Type 2 bituminous surface supported on 6 inches of Type 2, Class B aggregate base over the previously specified 6 inches of structural subbase with a minimum Resistance R-Value of at least 50. Street

sections exceeding 56 feet in width should consist of 5 inches of Type 2 bituminous surface supported on 8 inches of Type 2, Class B aggregate base over the previously specified 6 inches of structural subbase with a minimum Resistance R-Value of at least 50. Where emergency access roads are proposed, the flexible pavement section should consist of 2-1/2 inches of Type 2 bituminous surface supported on 4 inches of Type 2, Class B aggregate base over 6 inches of structural subbase with a minimum Resistance R-Value of at least 30. Utility service access roads should consist of at least 4 inches of free draining granular, native soil or equal. When traffic data is available, we should review the flexible pavement section to document that it is adequate for the intended use.

Subgrade materials and aggregate base layers should be moisture conditioned to near optimum and compacted to at least 95 percent relative compaction. All surfaces should be rolled to provide a uniform finish which is firm, smooth, and non-yielding. Prior to placement of the aggregate base and/or structural subbase, subgrade materials should be observed and tested by the Geotechnical Engineer (or representative in the field) to document that they meet the minimum design requirements.

Aggregates should conform to requirements contained in Section 200 of the *Standard Specifications for Public Works Construction* (1996) and compacted to at least 95 percent relative compaction. All prepared surfaces should be finished to provide a uniform surface which is firm, smooth, and non-yielding.

A bituminous concrete mix design should be submitted for approval prior to paving. During paving, the bituminous mixture should be sampled and tested by the Geotechnical Engineer (or representative in the field) to ensure material quality and compaction.

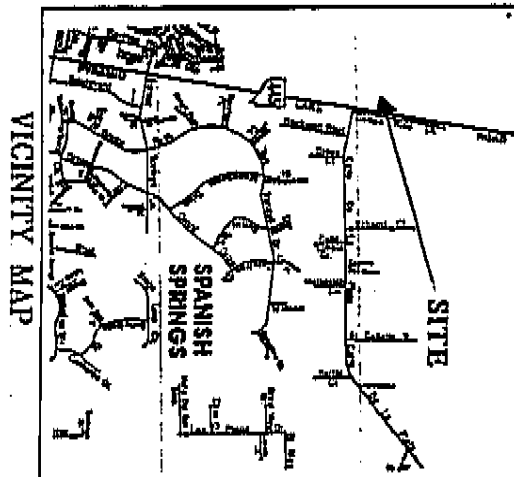
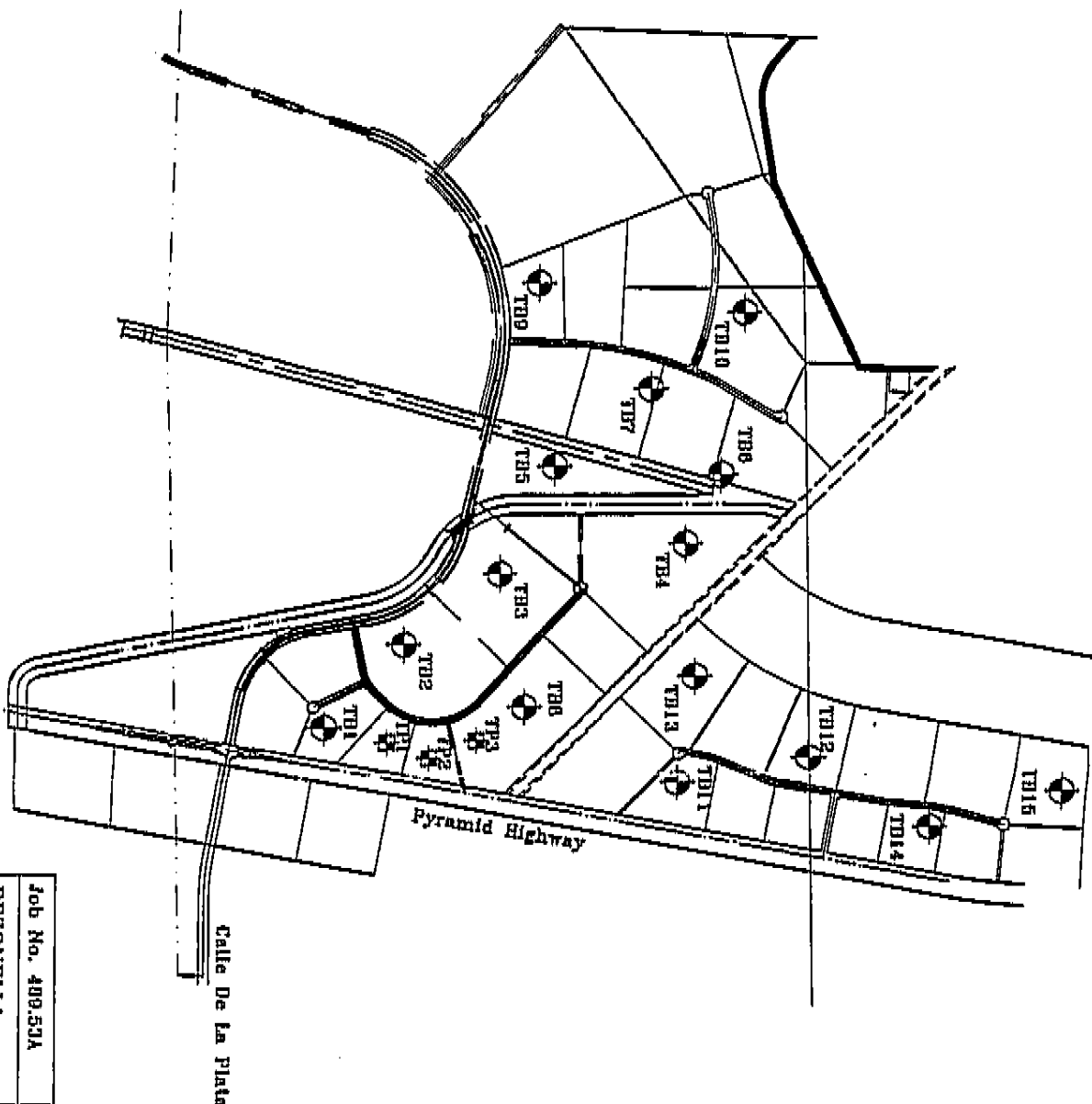
H. Additional Geotechnical Engineering Services

All plans and specifications for projects under the jurisdiction of the Washoe County Building Department should be reviewed for conformance with this geotechnical report and approved by the Geotechnical Engineer prior to submitting to the building department for review.

Prior to construction, a pre-job conference should be scheduled to include, but not be limited to, the Owner, Architect, Civil Engineer, General Contractor, Earthwork and Materials Sub-Contractors, Building Official and Geotechnical Engineer. The conference will allow all parties to review the project plans and specifications and recommendations presented in this report and discuss applicable material quality requirements and mix design reports. All quality reports should be submitted to, and approved by, the Geotechnical Engineer.

The recommendations presented in this report are based on the assumption that sufficient field inspection and construction review will be provided during all phases of construction. During construction, we should provide on-site inspections, together with field and laboratory testing, of the site preparation and grading, overexcavation, fill placement, foundation installation and paving. These observations would allow us to verify that the soil conditions are as anticipated and that the Contractor's work is in conformance with the plans and specifications.

VII ILLUSTRATIONS



⊗ --- Test Boring
⊗ --- Test Pit

Job No. 489.53A	SITE AND EXPLORATION PLAN	/appc./10-5-09
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER	Plate No. 1
	WASHOE COUNTY, NEVADA	

Remarks : Not To Scale

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	LOG OF BORING 1	
				Equipment	CME 55 Hollow Stem Auger
				Elevation	4542 Date 8-18-99
* Grain Size Distribution (See Plate 17) ** Resistance Value (See Plate 22)	22				BROWN SILTY CLAYEY SAND (SC-SM) medium dense, dry
	20	10.4	106		Increasing clay content below 7.5 feet
	17				GRAY GRAVEL (GP-GC) WITH CLAY AND SAND dense, dry
	33				BROWN SAND (SP-SM) WITH SILT AND GRAVEL very dense, dry No Free Water Encountered

Elevation Reference :
Site Plan Provided by CFA, Inc., Undated

GPS: 39°40'06"N
119°42'16"W

LOG OF BORING 2

Equipment CME 55 Hollow Stem Auger

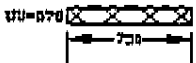
Elevation 4537 Date 8-18-99

	24	9.1	98.1		BROWN CLAYEY SAND (SC) medium dense, dry
	18				BROWN SILTY SAND (SM) medium dense, dry
	39				BROWN SILTY CLAYEY SAND (SC-SM) dense, dry
	29				Increasing clay content and change to medium dense below 12.0 feet No Free Water Encountered

Elevation Reference : See Log of Boring 1

GPS: 39°40'12"N
119°42'23"W

Job No. 489.53A	BORING LOG		/appr./10-5-99
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA		Plate No. 2

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	<div style="text-align: center;">LOG OF BORING 3</div> <div>Equipment <u>CME 55 Hollow Stem Auger</u></div> <div>Elevation <u>4532</u> Date <u>8-19-99</u></div>
 <p>* Percent Passing Sieve #200 = 82.2</p>	20		95.1	0	BROWN SILTY CLAYEY SAND (SC-SM) medium dense, dry
	21			5	DARK BROWN SANDY CLAY (CL) hard, dry
	17			10	
	40			15	increasing sand content below 12.0 Feet
	50/5"			20	BROWN CLAYEY SAND (SC) WITH GRAVEL very dense, dry No Free Water Encountered
				25	
				30	
				35	
				40	
Elevation Reference : See Log of Boring 1					GPS: 39°40'17"N 119°42'28"W
Job No. 489.53A	BORING LOG				/appr./10-5-99
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA				Plate No. 3

LOG OF BORING 4

Equipment CME 55 Hollow Stem Auger

Elevation 4522 Date 8-18-99

Laboratory Tests
and
(Other Information)Driving
Resistance
Blows/Ft.Moisture
Content (%)Dry
Density (pcf)Depth (ft)
SampleBROWN SILTY CLAYEY SAND (SC-SM)
medium dense, dry bagged auger cuttingsBROWN SILTY SAND (SM)
medium dense, dryBROWN CLAYEY SAND (SC)
medium dense, dryIncreasing clay content and becoming
dense below 8.0 feetBROWN SILTY SAND (SM)
dense, dryBROWN CLAYEY SAND (SC-SM)
very dense, dry

No Free Water Encountered

Elevation Reference : See Log of Boring 1

GPS: 39°40'27"N
119°42'27"W

Job No. 489.53A

BORING LOG

/appr./10-5-99

PEZONELLA
ASSOCIATES, INC.SPANISH SPRINGS BUSINESS CENTER
WASHOE COUNTY, NEVADA

Plate No. 4

Laboratory Tests and (Other Information)				LOG OF BORING 5	
	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	Equipment <u>CME 55 Hollow Stem Auger</u> Elevation <u>4522</u> Date <u>8-20-99 & 9-8-99</u>
	48				BROWN SILTY CLAYEY SAND (SC-SM) medium dense, dry bagged auger cuttings
	48				BROWN SANDY CLAY (CL) hard, dry
				5	
	50			10	Increasing sand content below 8.0 feet
	82			15	BROWN CLAYEY SAND (SC) very dense, dry
	75			20	
	24			25	LIGHT BROWN SILTY SAND (SM) medium dense, dry
	27/5"	7.9	107	30	BROWN CLAYEY SAND (SC) very dense, dry sampler refusal at 30.0 feet
	27/3"			35	sampler refusal at 34.5 feet
	48	20.0	110	40	BROWN CLAY (CL) WITH SAND hard, dry
Elevation Reference : See Log of Boring 1					GPS: 39°40'25"N 119°42'42"W
Job No. 489.53A		BORING LOG /appr./10-5-99			
PEZONELLA ASSOCIATES, INC.		SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA			Plate No. 5

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	LOG OF BORING 5
* Percent Passing Sieve # 200 = 46.1	47				Equipment <u>CME 55 Hollow Stem Auger</u>
	27 1/4"	14.8	114		Elevation <u>4522</u> Date <u>8-20-99</u> & <u>9-8-99</u>
	29 5/8"				Continuation From Plate 5
	27 1/4"				BROWN SILTY SAND (SM) very dense, dry sampler refusal at 50.0 feet
	50				BROWN CLAYEY SAND (SC) dense, dry
	44				BROWN SILTY SAND (SM) very dense, dry sampler refusal at 60.0 feet
	27 1/4"				BROWN CLAYEY SAND (SC) very dense, dry sampler refusal at 65.0 feet
					with layers of silty sand (SM) below 70.0 feet
Job No. 489.53A					increasing clay content and change to dense below 74.0 feet
PEZONELLA ASSOCIATES, INC.					becoming very dense below 78.0 feet
					sampler refusal at 80.0 feet
					BORING LOG
					/appr./10-5-99
					SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA
					Plate No. 5A

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	<div style="text-align: right;"> LOG OF BORING 5 Equipment <u>CME 55 Hollow Stem Auger</u> Elevation <u>4522</u> Date <u>8-20-99</u> & <u>9-8-99</u> </div>
	53 27/5" 55 54/11"			<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p style="text-align: center;">Depth (ft) Sample</p> </div> <div style="flex: 1; padding-left: 10px;"> <p>Continuation from Plate 5A</p> <p>sampler refusal at 90.0 feet</p> <p>BROWN SILTY SAND (SM) very dense, dry</p> <p>sampler refusal at 99.5 feet No Free Water Encountered</p> </div> </div>
Job No. 489.53A	BORING LOG /appr./10-5-99			
PEZONELLA ASSOCIATES, INC.	<div style="display: flex; justify-content: space-between;"> SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA Plate No. 5B </div>			

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	LOG OF BORING 6	
				Equipment	CME 55 Hollow Stem Auger
• Plasticity Chart (See Plate 20)				Elevation	4515 Date 8-20-99
	34			•	BROWN SANDY CLAY (CL) medium stiff, dry bugged auger cuttings decreasing sand content and becoming hard below 2.0 feet
	38			5	
	83			10	BROWN CLAYEY SAND (SC) very dense, dry
	82			15	sampler refusal at 15.0 feet No Free Water Encountered

Elevation Reference :

See Log of Boring 1

GPS: 39°40'39"N
119°42'39"W

• Percent Passing Sieve # 200 = 31.3 Atterberg Limits: Non-Plastic	48		
	36		
	31		
	48		

LOG OF BORING 7

Equipment CME 55 Hollow Stem Auger

Elevation 4522 Date 8-20-99

•	BROWN SILTY SAND (SM) dense, dry
5	
10	
15	No Free Water Encountered

Elevation Reference : See Log of Boring 1GPS: 39°40'35"N
119°42'50"W

Job No. 489.53A	BORING LOG		/appr./10-5-99
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA		Plate No. 6

Laboratory Tests and (Other Information)		Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	LOG OF BORING 8	
					Equipment <u>CME 55 Hollow Stem Auger</u>		
					Elevation <u>4542.5</u> Date <u>8-30-99</u>		
• Ec = 13158 ohm-cm pH = 7.18 SO4 = 49.2 ppm	18				0	BROWN SILTY CLAYEY SAND (SC-SM) medium dense, dry	
	21				5	BROWN SILTY SAND (SM) medium dense, dry	
	46				10	BROWN SILTY CLAYEY SAND (SC-SM) dense, dry	
	31				15	Increasing silt and clay content below 12.5 feet	
	44				20	BROWN SILTY SAND (SM) dense, dry	
						No Free Water Encountered	
					25		
					30		
					35		
					40		
Elevation Reference : See Log of Boring 1					GPS: 39°40'22"N 119°42'13"W		
Job No. 489.53A		BORING LOG			/appr./10-5-99		
PEZONELLA ASSOCIATES, INC.		SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA			Plate No. 7		

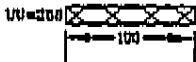
Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	<div style="text-align: right; font-weight: bold; font-size: 1.2em;">LOG OF BORING 9</div> <div style="text-align: right;">Equipment <u>CME 55 Hollow Stem Auger</u></div> <div style="text-align: right;">Elevation <u>4532</u> Date <u>8-30-99</u></div>
* $E_c = 11,111 \text{ ohm-cm}$ $pH = 8.5$ $SO_4 = 79 \text{ ppm}$	40/11"	4.9	123	<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">Depth (ft)</div> <div style="width: 30px; text-align: center;">Sample</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div> <div style="margin-top: 5px;"> BROWN SANDY CLAY (CL) medium stiff, dry bagged auger cuttings </div>
	29/6"			<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">5</div> <div style="width: 30px; text-align: center;">6</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div> <div style="margin-top: 5px;"> BROWN SILTY CLAYEY SAND (SC-SM) very dense, dry sampler refusal at 3.0 feet sampler refusal at 3.0 feet </div>
				<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">10</div> <div style="width: 30px; text-align: center;">11</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div>
				<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">15</div> <div style="width: 30px; text-align: center;">16</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div>
				<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">20</div> <div style="width: 30px; text-align: center;">21</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div> <div style="margin-top: 5px;">No Free Water Encountered</div>
	36			<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">25</div> <div style="width: 30px; text-align: center;">26</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div>
				<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">30</div> <div style="width: 30px; text-align: center;">31</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div>
				<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">35</div> <div style="width: 30px; text-align: center;">36</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div>
				<div style="display: flex; align-items: center;"> <div style="width: 30px; text-align: center;">40</div> <div style="width: 30px; text-align: center;">41</div> <div style="flex-grow: 1;"> <div style="border: 1px solid black; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> </div> </div> </div>
Elevation Reference : See Log of Boring 1				<div style="text-align: right;">GPS: 39°40'24"N 119°43'00"W</div>
Job No. 489.53A	BORING LOG			/appr./10-5-99
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA			Plate No. 8

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	
					LOG OF BORING 10
					Equipment CME 55 Hollow Stem Auger
					Elevation <u>4545</u> Date <u>8-31-99</u>
	19				BROWN SILTY SAND (SM) medium dense, dry with layers of sand (SP-SM) with silt
	27			5	
	18			10	
	31			15	becoming dense below 12.0 feet
	30			20	No Free Water Encountered
				25	
				30	
				35	
				40	
Elevation Reference : See Log of Boring 1					GPS: 39°40'40"N 119°43'00"W
Job No. 489.53A	BORING LOG				/appr./10-5-99
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA				Plate No. 9

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	LOG OF BORING 11	
				Equipment	CME 55 Hollow Stem Auger
				Elevation	4529 Date 8-31-99
* Grain Size Distribution (See Plate 18) ** Compaction Test (See Plate 24)	16			0	DARK BROWN CLAYEY SAND (SC) medium dense, dry
	18	7.0	114	5	Increasing clay content below 4.0 Feet
	50			10	becoming very dense below 7.0 Feet
	24			15	sampler refusal at 10.0 feet
					BROWN SILTY SAND (SM) medium dense, dry
					No Free Water Encountered

Elevation Reference :
See Log of Boring 1

GPS: 39°40'35"N
119°42'10"W

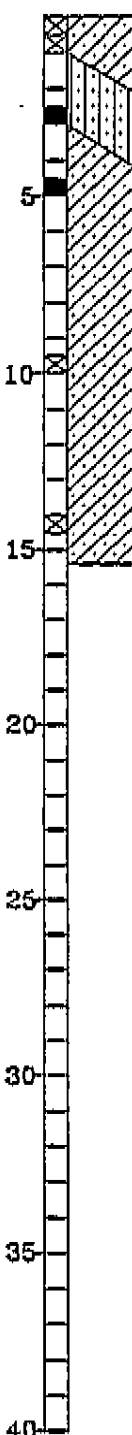
 * Plasticity Chart (See Plate 21)	30	102
	39	
	40	
	85	

LOG OF BORING 12	
Equipment	CME 55 Hollow Stem Auger
Elevation	4520 Date 8-31-99
0	DARK BROWN CLAYEY SAND (SC) medium dense, dry bagged auger cuttings
5	becoming dense below 2.5 Feet
	DARK BROWN SANDY CLAY (CL) hard, dry
10	BROWN SILTY SAND (SM) dense, dry
15	BROWN CLAYEY SAND (SC) very dense, dry
	No Free Water Encountered

Elevation Reference : See Log of Boring 1

GPS: 39°40'47"N
119°42'10"W

Job No. 489.53A	BORING LOG		/appr./10-5-99
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA		Plate No. 10

Laboratory Tests and (Other Information)				Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	LOG OF BORING 13	
								Equipment CME 55 Hollow Stem Auger	
								Elevation 4523 Date 9-1-99	
									BROWN CLAYEY SAND (SC) medium dense, dry bagged auger cuttings
									BROWN SILTY SAND (SM) medium dense, dry
									BROWN CLAYEY SAND (SC) medium dense, dry
									becoming dense below 7.0 feet
									Increasing clay content and becoming very dense below 12.0 feet
								No Free Water Encountered	
								GPS: 39°41'38"N 119°42'18"W	
Elevation Reference : See Log of Boring 1									
Job No. 489.53A				BORING LOG				/appr./10-5-99	
PEZONELLA ASSOCIATES, INC.				SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA				Plate No. 11	

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	LOG OF BORING 14
	22 52/8"	4.9	107	5	Equipment <u>CME 55 Hollow Stem Auger</u> Elevation <u>N/A</u> Date <u>9-1-99</u> BROWN SILTY SAND (SM) medium dense, dry bagged auger cuttings Increasing silt content and becoming very dense below 3.5 feet sampler refusal at 5.3 feet
	30/8"			10	BROWN CLAYEY SAND (SC) very dense, dry sampler refusal at 10.0 feet
	103			15	sampler refusal at 20.0 feet No Free Water Encountered
	91/11"			20	
				25	
				30	
				35	
				40	
Elevation Reference :					GPS: 39°40'54"N 119°42'01"W
Job No. 489.53A	BORING LOG /appr./10-5-99				
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA			Plate No. 12	

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	<p align="center">LOG OF BORING 15</p> <p>Equipment <u>CME 55 Hollow Stem Auger</u></p> <p>Elevation <u>N/A</u> Date <u>9-1-99</u></p>
* Grain Size Distribution (See Plate 12) ** Resistance Value (See Plate 23)	27/8"				BROWN CLAYEY SAND (SC) medium dense, dry becoming very dense below 2.0 feet sampler refusal at 2.5 feet
*** Ec = 3988 ohm-cm pH = 2.41 SO4 = 525 ppm	27/4"				sampler refusal at 5.0 feet
	27/4"				sampler refusal at 10.0 feet
	87				No Free Water Encountered
Elevation Reference :					GPS: 39°41'05"N 119°42'10"W
Job No. 489.53A	BORING LOG /appr./10-5-99				
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA Plate No. 13				

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	LOG OF TEST PIT 1
					<p>Equipment <u>Rubber Tire Backhoe</u></p> <p>Elevation <u>4547</u> Date <u>4-27-99</u></p> <p>BROWN CLAYEY SAND (SC) medium dense, moist with roots to 3 inches</p> <p>BROWN SILTY SAND (SM) medium dense, moist</p> <p>LIGHT BROWN SANDY SILT (ML) hard, dry</p> <p>BROWN SILTY SAND (SM) medium dense, dry</p> <p>No Free Water Encountered</p>

Elevation Reference :
See Log of Boring 1

				Depth (ft) Sample	LOG OF TEST PIT 2
					<p>Equipment <u>Rubber Tire Backhoe</u></p> <p>Elevation <u>4545</u> Date <u>4-27-99</u></p> <p>BROWN SILTY SAND (SM) medium dense, dry with roots to 2 to 3 inches and occasional layers of sandy silt (ML)</p> <p>No Free Water Encountered</p>

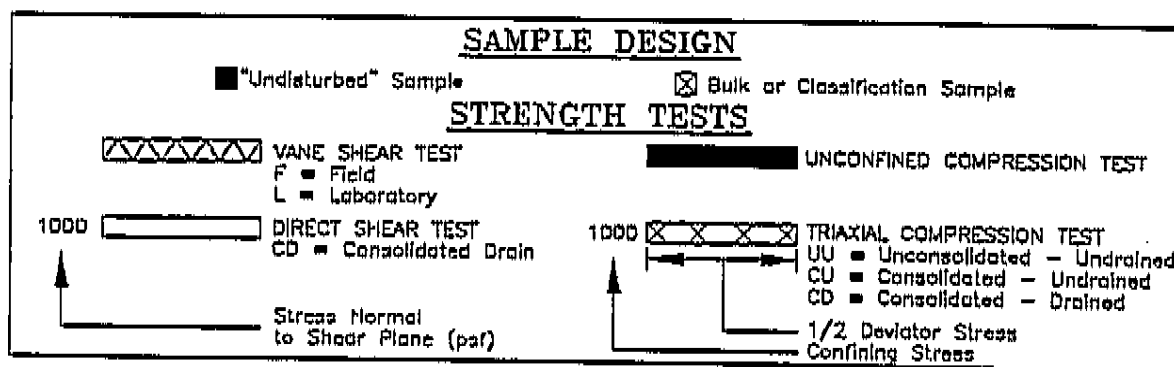
Elevation Reference : See Log of Boring 1

Job No. 489.53A	TEST PIT LOG		/appr./10-5-99
PEZONELLA ASSOCIATES, INC.	SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA		Plate No. 14

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	LOG OF TEST PIT 3
					<p>Equipment <u>CME 55 Hollow Stem Auger</u></p> <p>Elevation <u>4545</u> Date <u>4-27-99</u></p>
					<p>BROWN SILTY SAND (SM) medium dense, dry with roots to 3 to 4 inches and occasional layers of sandy silt (ML)</p> <p>LIGHT BROWN SAND (SP-SM) WITH SILT, GRAVEL AND OCCASIONAL COBBLES medium dense, dry sidewall overbreak</p> <p>BROWN SILTY SAND (SM) medium dense, dry</p> <p>No Free Water Encountered</p>
					<p>Elevation Reference : See Log of Boring 1</p>
Job No. 489.53A		TEST PIT LOG			
PEZONELLA ASSOCIATES, INC.		SPANISH SPRINGS BUSINESS CENTER WASHOE COUNTY, NEVADA		/appr./10-5-99 Plate No. 15	

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS MORE THAN HALF IS LARGER THAN #200 SIEVE	GRAVELS MORE THAN HALF COURSE 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-SAND SILT MIXTURES
			GC		CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COURSE 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 MOST THAN HALF IS SMALLER THAN #200 SIEVE	SILTS AND CLAY 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		INORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS 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	

UNIFIED SOIL CLASSIFICATION SYSTEM

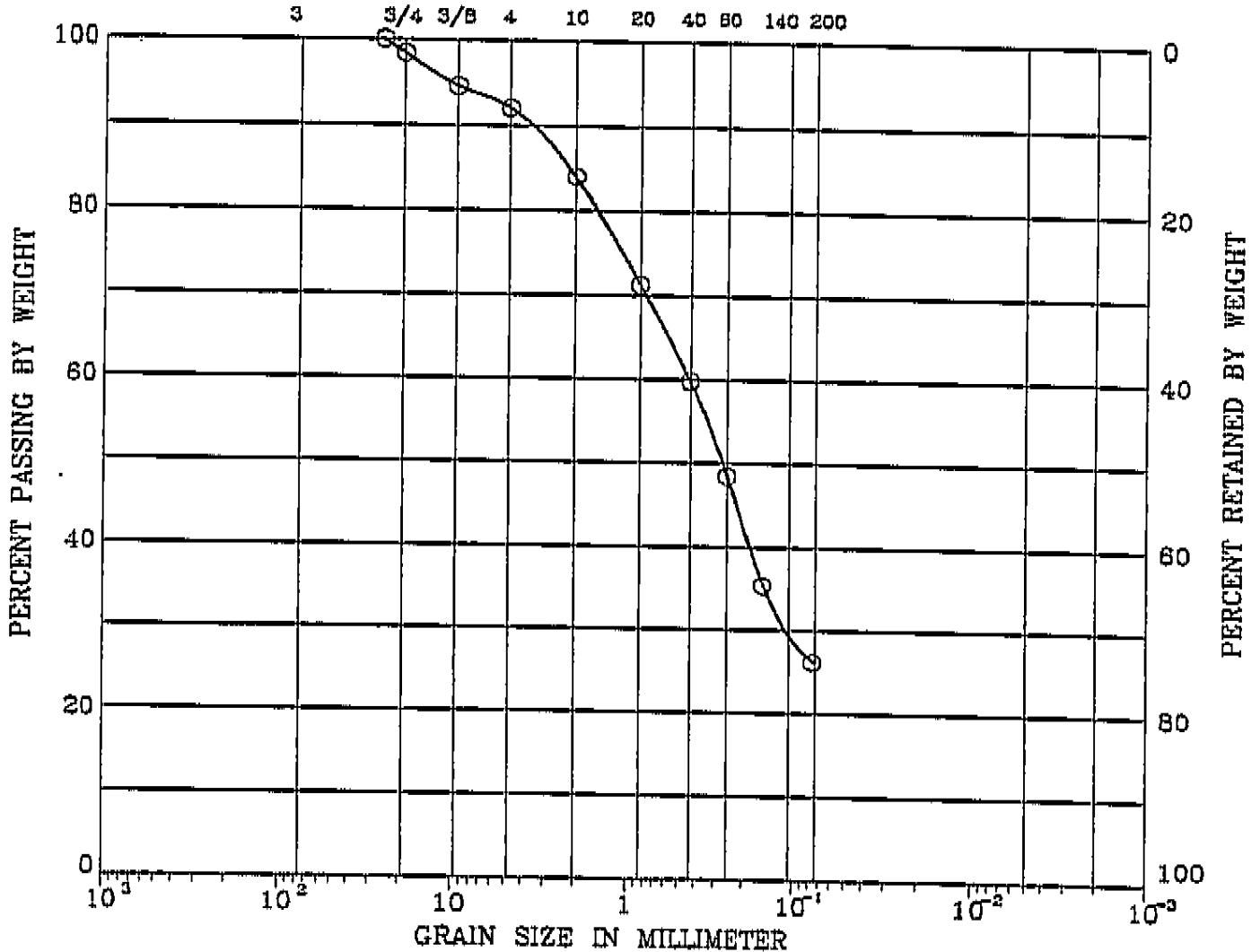


KEY TO TEST DATA

Job No. 489.53A	SPANISH SPRINGS BUSINESS CENTER	/appr./10-5-99
PEZONELLA ASSOCIATES, INC.	SOIL CLASSIFICATION CHART AND KEY TO TEST DATA	Plate No. 16

UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



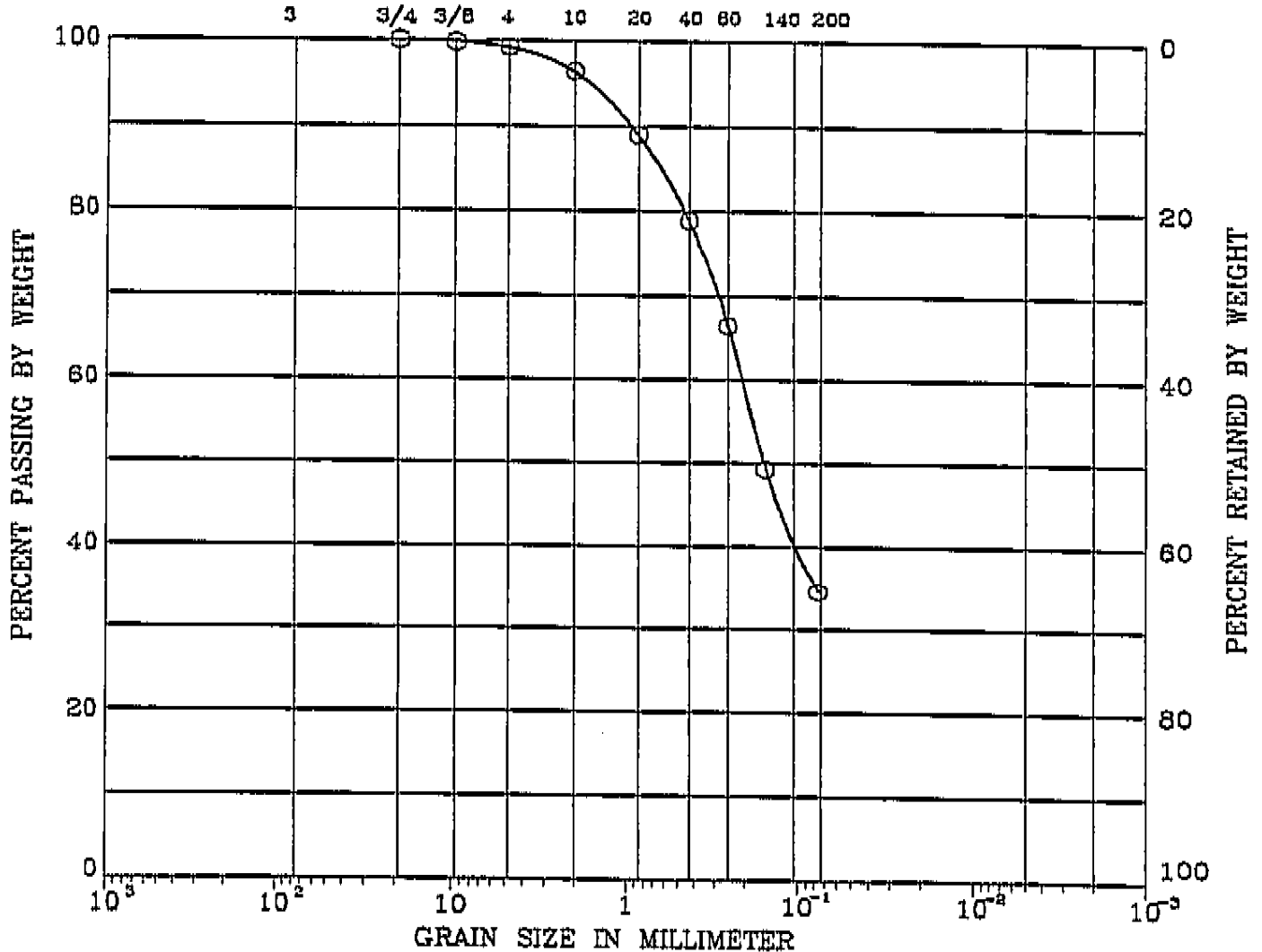
SYMBOL	BORING	DEPTH (ft)	LL (%)	P ₁ (%)	DESCRIPTION
○	Boring 1	0.0-4.0			Brown Silty, Clayey Sand (SC-SM)

Remark :

Job No. 489.53A	SPANISH SPRINGS BUSINESS CENTER	/10-6-99
PEZONELLA ASSOCIATES, INC.	GRAIN SIZE DISTRIBUTION	Plate No. 17

UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



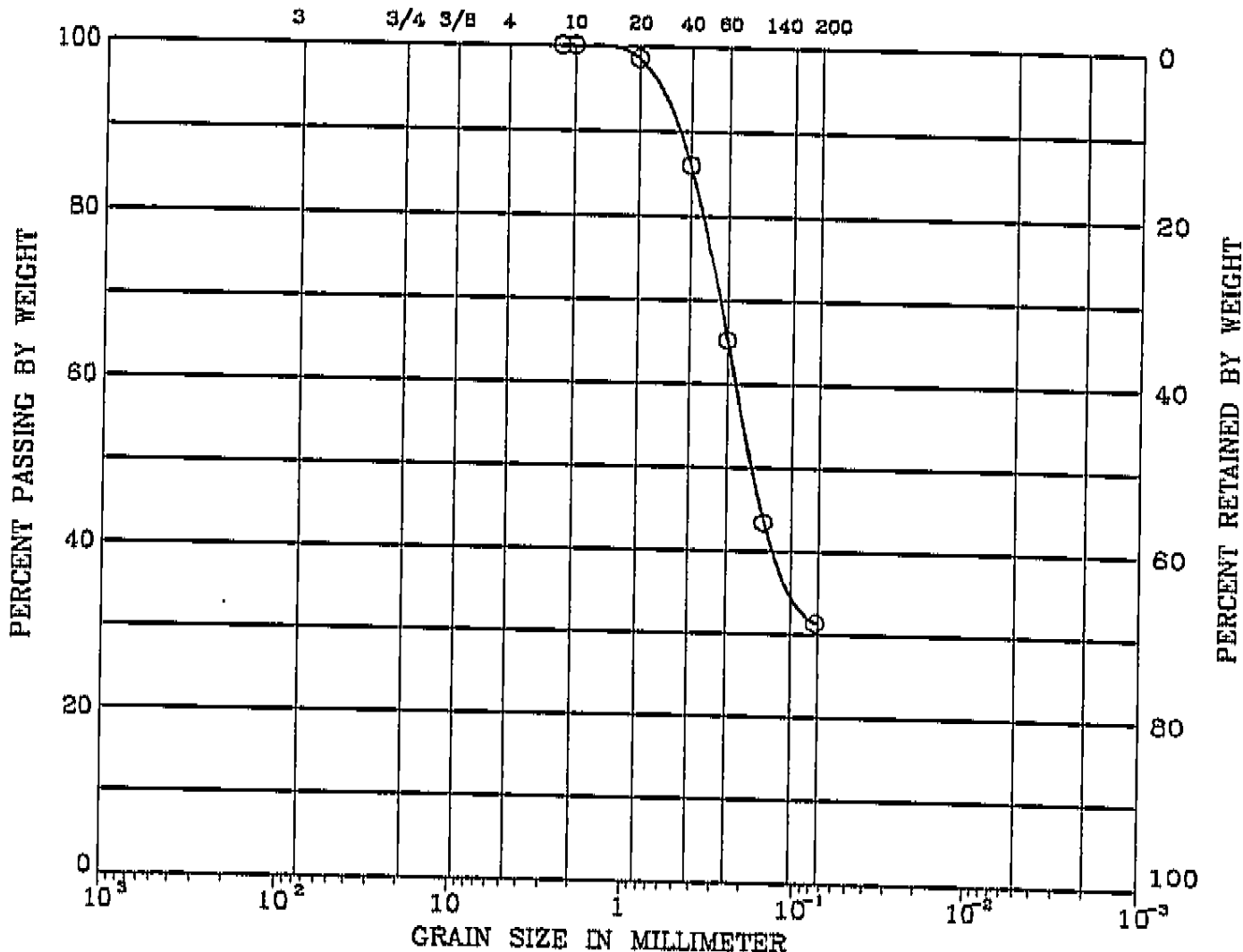
SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	Boring11	0.0-4.0			Dark Brown Clayey Sand (SC)

Remark :

Job No. 489.53A	SPANISH SPRINGS BUSINESS CENTER	/10-6-99
PEZONELLA ASSOCIATES, INC.	GRAIN SIZE DISTRIBUTION	Plate No. 18

UNIFIED SOIL CLASSIFICATION

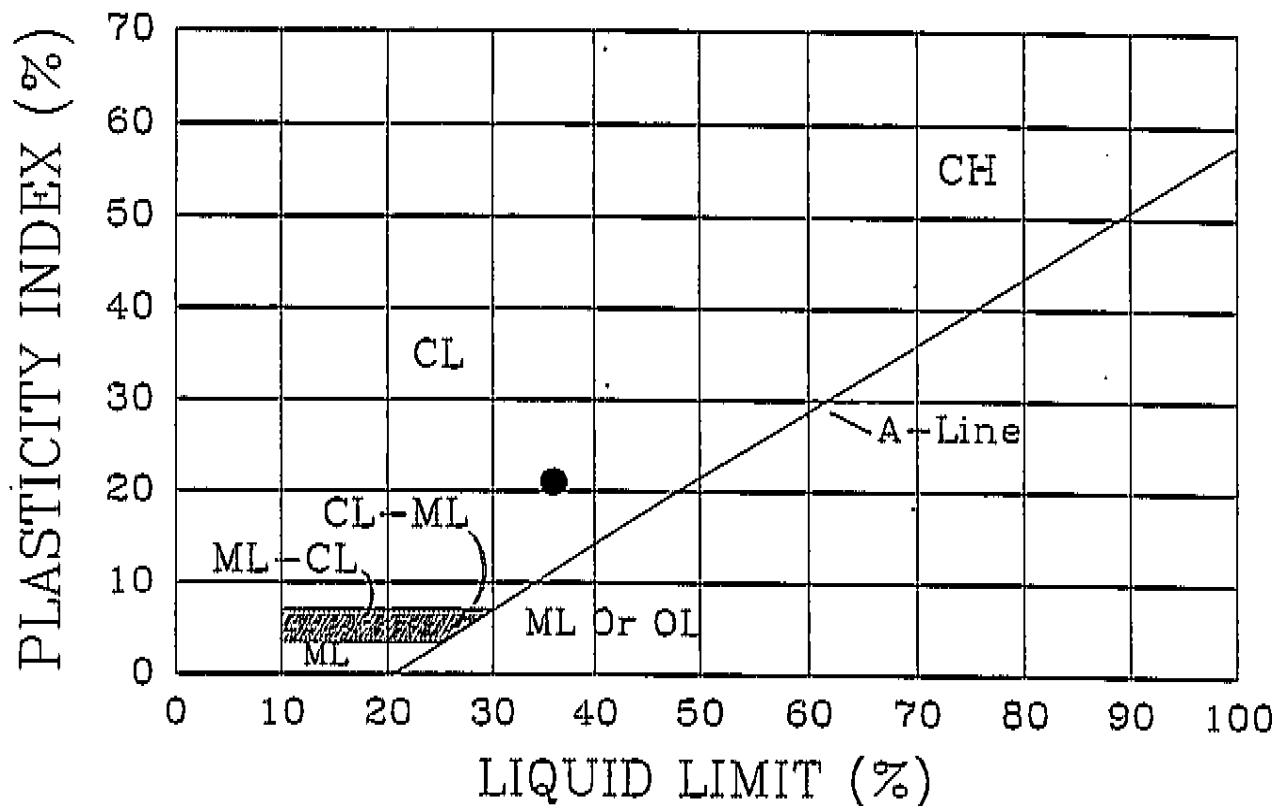
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
O	Boring 15	0.0-4.0			Brown Clayey Sand (SC)

Remark :

Job No. 489.53A	SPANISH SPRINGS BUSINESS CENTER	/10-8-99
PEZONELLA ASSOCIATES, INC.	GRAIN SIZE DISTRIBUTION Plate No. 19	



SYMBOL	SOURCE	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION	PASSING #200 (%)
●	Boring #6	0.0-1.5	36	21	Brown Sandy Clay (CL)	60.3

Job No. 489.53B

ASTM D-4318

/appr./10-15-99

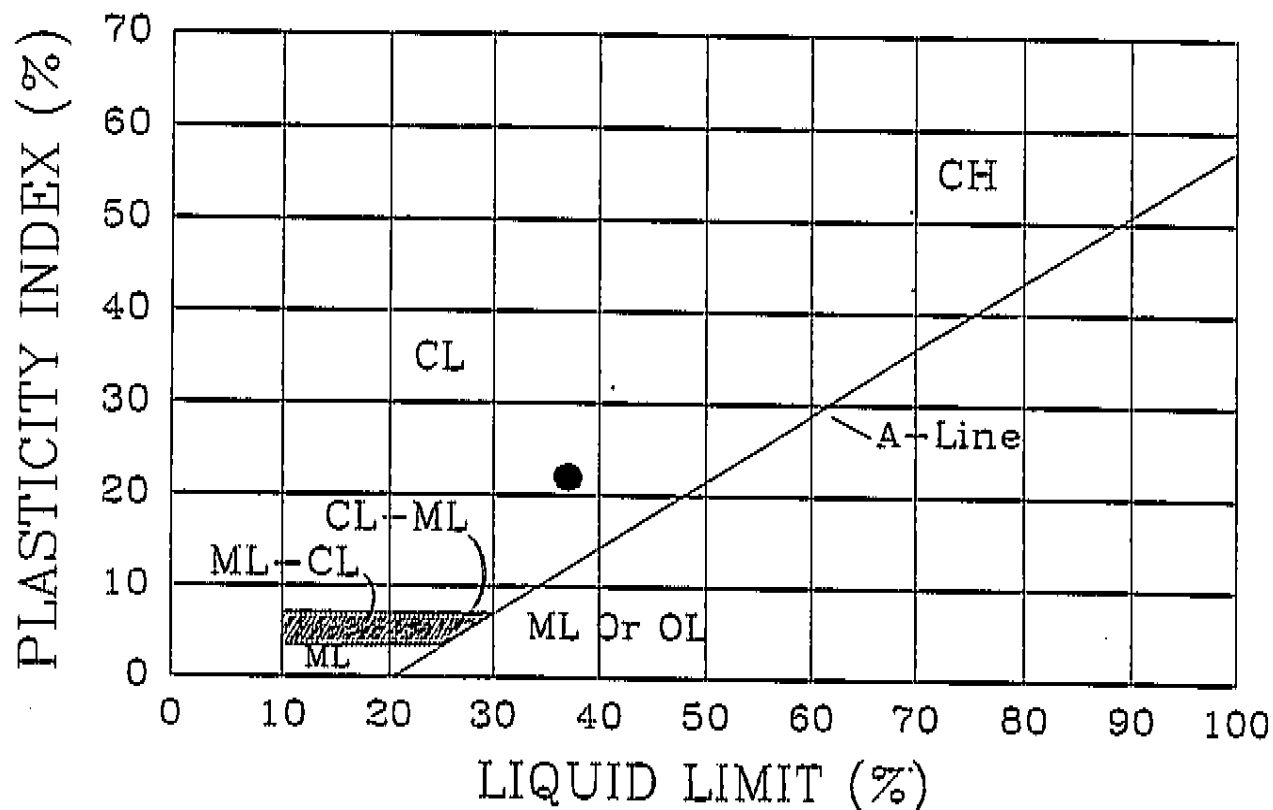


**PEZONELLA
ASSOCIATES, INC.**

PLASTICITY CHART

SPANISH SPRINGS BUSINESS CETER

**Plate No.
20**



SYMBOL	SOURCE	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION	PASSING #200 (%)
•	Boring #12	2.5	37	22	Dark Brown Sandy Clay (CL)	55.5

Job No. 489.53B

ASTM D-4318

/appr./10-15-99

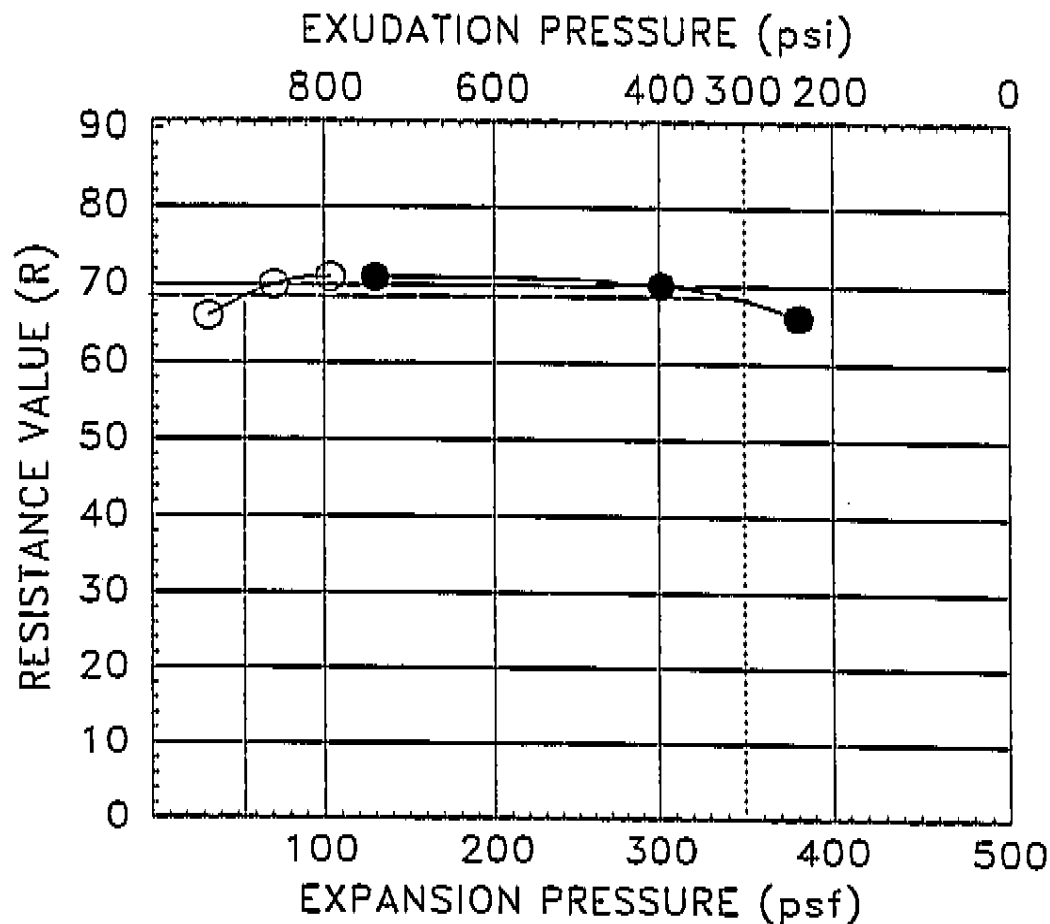


**PEZONELLA
ASSOCIATES, INC.**

PLASTICITY CHART

SPANISH SPRINGS BUSINESS CETER

**Plate No.
21**



Specimen No.	A	B	C
Moisture Content (%)	10.5	11.5	8.5
Dry Density (psf)	125.7	121.8	121.6
Exudation Pressure (psi)	398	239	740
Expansion Pressure (psf)	71	33	792
Resistance Value (R)	70	66	71

TEST DATA

SAMPLE SOURCE	CLASSIFICATION	SAND EQUIVALENT	EXPANSION PRESSURE	R-VALUE
Boring 1 @ 0.0'-4.0'	Brown Clayey Sand (SC)	18	55	68

Job No. 489.53A	Nevada Test Method T-115C	/appr./10-6-99
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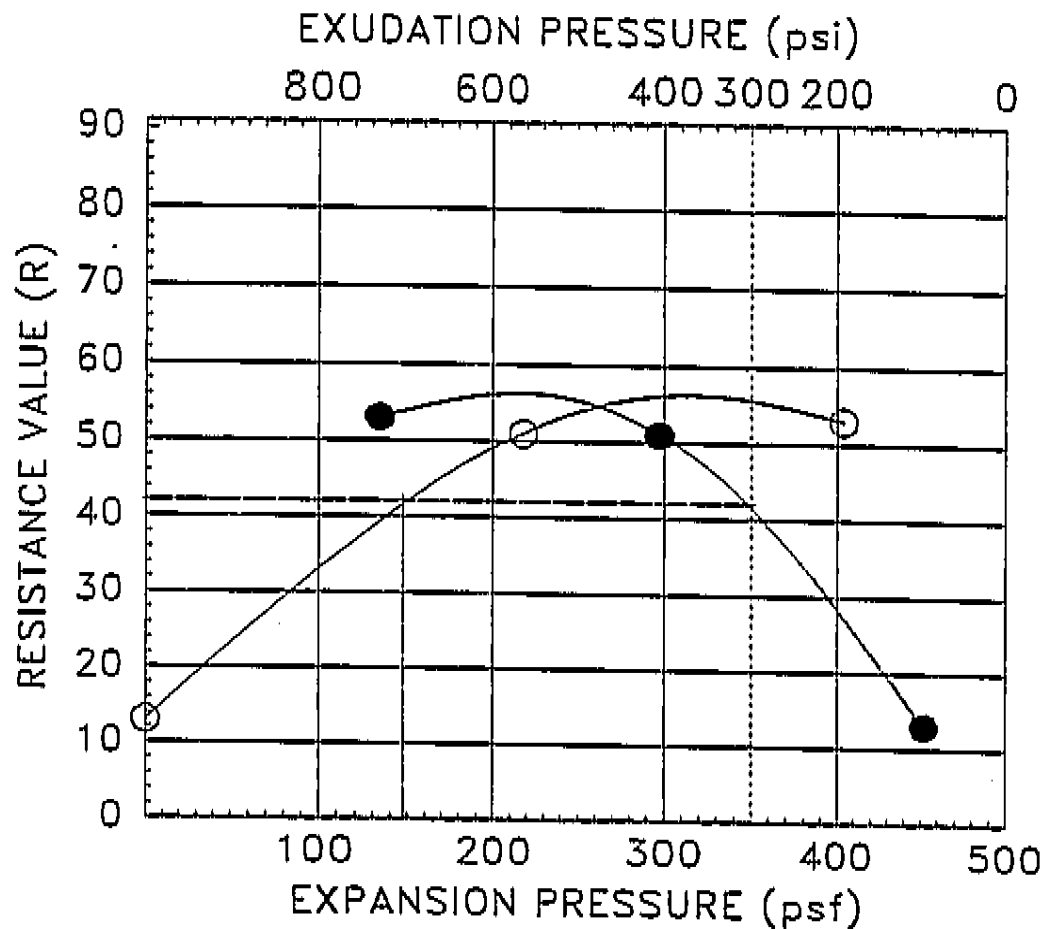


**PEZONELLA
ASSOCIATES, INC.**

RESISTANCE VALUE TEST DATA

SPANISH SPRINGS BUSINESS CENTER

Plate No.
22



Specimen No.	A	B	C
Moisture Content (%)	11.6	13.9	16.0
Dry Density (psf)	111.9	118.	112.6
Exudation Pressure (psi)	732	406	96
Expansion Pressure (psf)	404	218	0
Resistance Value (R)	53	51	13

TEST DATA

SAMPLE SOURCE	CLASSIFICATION	SAND EQUIVALENT	EXPANSION PRESSURE	R-VALUE
Boring 15 @ 0.0'-4.0'	Brown Clayey Sand (SC)	14	150	42

Job No. 489.53A	Nevada Test Method T-115C	/appr./10-6-99
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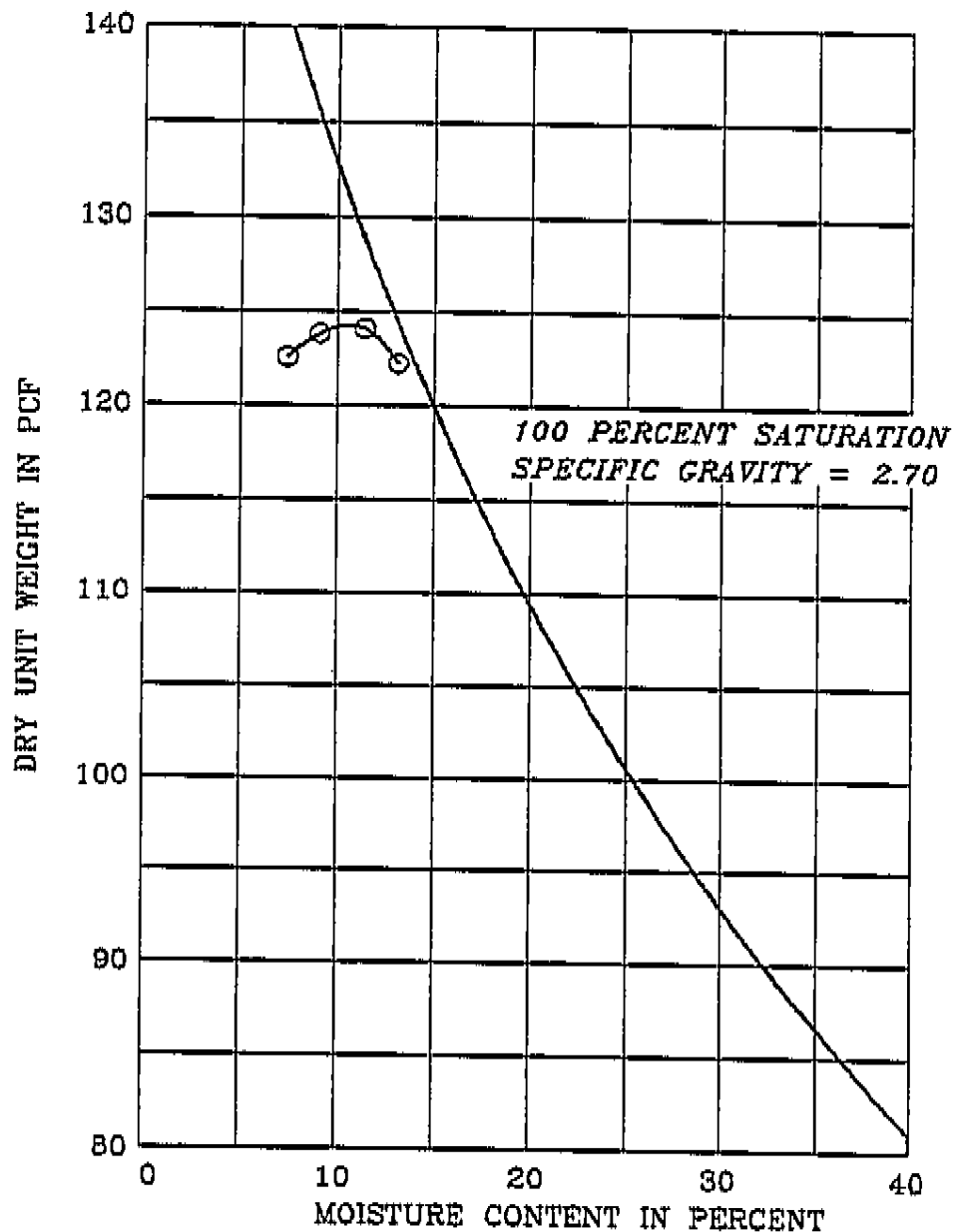


**PEZONELLA
ASSOCIATES, INC.**

RESISTANCE VALUE TEST DATA

SPANISH SPRINGS BUSINESS CENTER

Plate No.
23



SYMBOL	SAMPLE LOCATION	DEPTH (ft)	DESCRIPTION	TEST METHOD	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
Q	Boring 11	0.0-4.0	Dk.Brown Clayey Sand (SC)	ASTM D-1557	10.6	124.3

Remark :

Job No. 489.53A

SPANISH SPRINGS BUSINESS CENTER

/10-6-99

PEZONELLA
ASSOCIATES, INC.

COMPACTION TEST

Plate No. 24

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