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GEOTECHNICAL EXPLORATION REPORT
PROPOSED WOODFEATHERS' WAREHOUSE
PORTLAND, OREGON
KLEINFELDER PROJECT NO. 60-8513-01

July 24, 2001

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A Report Prepared For:

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GEOTECHNICAL EXPLORATION REPORT
PROPOSED WOODFEATHERS' WAREHOUSE
PORTLAND, OREGON

Kleinfelder Project Number 60-8513-01

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July 24, 2001

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EXECUTIVE SUMMARY

Kleinfelder, Inc. (Kleinfelder) has completed a geotechnical exploration related to the design and construction of a proposed warehouse building at the Woodfeathers Inc. property at 8414 N. Vancouver Avenue in Portland, Oregon. The proposed building is located in what is currently an existing block masonry building with a low dock height floor slab. The general site location is as shown on the Vicinity Map, Figure 1. Based on the results of our investigation, the site is geotechnically suitable for the proposed construction. Key design items are summarized below, and are discussed in greater detail in the body of this report.

Soils: In general, near-surface soils encountered in the borings consisted of surficial pavement underlain by silty gravel, which in turn was underlain by variable, non-engineered fill to depths of approximately 14 to 16 feet below existing surface grade. Native soils consisted of silt to sandy silt, which graded to silty sand and sand with increased depth. See Section 4.2.

Groundwater: Groundwater was encountered at a depth of approximately 26 to 29 feet below existing surface grade at the approximate elevation of the Columbia Slough. See Section 4.2.2.

Foundations: Footings may bear on a layer of compacted crushed rock or Geopiers as discussed in Section 6.2. Design recommendations overexcavation and backfill and Geopier supported footings are discussed in Sections 6.2.2 and 6.2.3, respectively.

Structural Fill Recommendations: Site earthwork is expected to involve removal of existing asphalt pavements and foundation excavation adjacent to the existing dock height floor slab. Structural fill and compaction recommendations are provided in Section 6.3.

Floor Slab Support: Design and construction considerations for floor slab subgrade support are discussed in Section 6.4. We recommend that new floor slab areas be underlain by compacted crushed rock.

Retaining walls: We anticipate that foundation walls will be designed as retaining walls. Design parameters for the anticipated wall conditions are provided in Section 6.5.

Seismic Hazards and Design: Based on our geologic literature review the site is susceptible to elevated risk of seismic liquefaction, Ground motion amplification, and lateral spreading, Section 6.6.1. Based on soils encountered at the site, UBC Soil Profile Type S_D is recommended for use in structural design in accordance the Uniform Building Code. See Sections 6.6.2.

Excavations/Subsurface Structures: We anticipate that excavations for cuts and fills can be accomplished using conventional equipment. In our opinion, the near surface native soils would be considered Type C soils when applying the OSHA Health and Safety Standards for Excavations. See Section 6.7

This summary is intended for introductory and reference use only. A thorough reading of the entire report is essential for understanding the total design concepts and limitations.

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APPENDICES

1.0 INTRODUCTION

1.1 GENERAL

Kleinfelder has completed a geotechnical exploration and report for use in design and construction of a proposed warehouse building at the Woodfeathers Inc. property at 8414 N. Vancouver Avenue in Portland, Oregon. The site is largely developed with existing buildings, and contains large expanses of asphalt pavement. The general site location is as shown on the Site Location Map, Figure 1. The Site Plan, Figure 2, shows the footprint of the proposed building and the approximate locations of the borings conducted for this study. The purpose of the geotechnical exploration was to explore the surface and subsurface conditions at the site, and based on the conditions encountered, provide design recommendations pertaining to geotechnical aspects of the proposed development as outlined below in Section 1.2.

1.2 AUTHORIZATION AND SCOPE OF WORK

This study has been conducted in accordance with our proposal 60YP-8542, dated January 15, 2001, and entitled "Proposed Geotechnical Exploration and Report, Woodfeathers Inc. Building, 8414 N. Vancouver Avenue, Portland, Oregon". Authorization to proceed with this work was granted by Mr. Lee Gotcher with Woodfeathers, Inc. on January 24, 2001.

This report presents the results of the geotechnical exploration, which includes the following tasks:

1) Collect and review readily available geotechnical and geologic data for the project area.

2) Perform a geotechnical site reconnaissance.

3) Plan and conduct a subsurface investigation to provide information relative to soil, groundwater, and other geologic conditions in the vicinity of the proposed development.

4) Conduct limited laboratory testing in general accordance with appropriate American Society for Testing Materials (ASTM) standards to check the visual soil classifications and to provide estimates of engineering parameters necessary for geotechnical design.

5) Based on the field exploration and laboratory testing programs, provide discussions and recommendations regarding the following:

   - Regional geology and seismicity, and potential site specific geologic hazards;
   - General site surface and subsurface conditions;
   - Shallow foundation design including soil contact pressures, embedment depths, resistance to lateral loads, settlement estimates, UBC seismic design criteria;
   - Earthwork construction including site preparation, fill placement and compaction;
   - Anticipated excavation conditions;
   - Retaining wall design parameters and backfill recommendations;
   - Mitigation of deleterious soil conditions, if appropriate.

6) Prepare a report summarizing the results of our subsurface exploration program and our analysis and recommendations.

Environmental sampling and testing of the soil and groundwater was not conducted in conjunction with the geotechnical subsurface exploration program. This Geotechnical Exploration Report does not include an assessment of existing or potential environmental concerns associated with this site.

2.0 SITE AND PROJECT DESCRIPTION

The project site is located at 8414 N. Vancouver Avenue immediately south of the Columbia Slough in Portland, Oregon. Existing development in the site vicinity includes several buildings and paved areas. Topographically, the project area is generally level, but the property is bounded on the north by a moderately steep slope down to the north to Columbia Slough. The maximum vertical relief along the northern edge of the property is estimated at approximately 25 feet.

An existing 60 foot by 100 foot block building, and elevated concrete floor slab approximately 140 feet by 70.5 feet in plan dimension occupies the area being considered for a new warehouse. Kleinfelder understands that the old warehouse building will be removed and a new larger warehouse will be built around the perimeter of the concrete slab. The new building will be constructed using block masonry. Maximum column loads are expected to be 40 kips, and perimeter wall loads are expected to be in the range 1 to 2 kips per lineal foot. The existing floor

slab is approximately 1.5 to 2.5 feet in height above existing pavement areas. We understand that much of the existing slab will be retained, and a narrow closure strip will be installed between the new walls and existing slab. It is anticipated that existing ramps up to the elevated slab will be retained, and pavement areas will be left more or less unchanged.

3.0 REGIONAL GEOLOGY AND SEISMICITY

3.1 GEOLOGIC SETTING

The project site is located in the Portland Basin near the southern margin of the Columbia River flood plain. The Portland Basin is a tectonic depression in the Miocene Age (Approximately 16 million year old) Columbia River Basalt Group bedrock which forms the geologic basement of the project area. The upper surface of the Columbia River Basalt bedrock is approximately 1,100 below sea level near its deepest point in the Portland Basin (Hogenson and Foxworthy, 1965). The Portland Basin has filled with sedimentary deposits from the Columbia River and local tributaries.

The oldest of these sedimentary deposits consists of approximately 800 to 900 feet of mudstone and claystone referred to as Sandy River Mudstone of early Pliocene age (12 to 5 million years old). Review of available geologic maps and report logs from the project vicinity suggests that the upper surface of the Sandy River Mudstone is present at depths of approximately 300 feet.

Overlying and locally interbedded with the Sandy River Mudstone, conglomerate, sandstone, and minor siltstone of the Pliocene age Troutdale Formation (approximately 5 to 2 million years old) is present at depths of approximately 300 to 150 feet below the existing ground surface in the project vicinity.

The Troutdale Formation is covered by approximately 100 to 150 feet of Late Pleistocene glacial flood deposits and Quaternary alluvial deposits. The site is located near the approximate mapped contact between fine-grained Quaternary glacial flood deposits to the south and Quaternary to Holocene alluvium of the Columbia River flood plain to the north. Holocene (Recent) artificial or manmade fill is mapped locally in the project area, and is present on the project site.

3.2 SEISMIC SETTING

(The information provided below, including the relative earthquake hazard information is summarized from Mabey, Meier and Palmer, 1995)

Seismically, the Portland metropolitan area is susceptible to the effects of earthquakes from the following three sources: Crustal Earthquakes (generally within depths of 6-10 miles below the surface); Intraplate Earthquakes which occur within the Juan de Fuca Plate as it is subducted beneath the North America Plate; and Subduction Zone Earthquakes within the zone where the Juan de Fuca Plate begins subduction beneath the western margin of the North America Plate.

Crustal earthquakes are the most common type in the project area and these occur on shallow faults in the earth's crust. Many of the moderate earthquakes that have originated in the Portland area in recorded history are associated with movement on shallow crustal faults. The 1993 spring break earthquake that occurred on a segment of the Mt. Angel Fault in an example of a shallow crustal fault. Although many faults have been mapped in the Portland area, possibly many more are covered with shallow alluvium, and are yet unknown. The potential activity of specific faults in the Portland area has generally not been well defined.

No known Holocene faults (known or suspected activity within the last 10,000 years) cross the site. Therefore, potential for catastrophic effects at the site from fault rupture is judged to be minimal. However, there is still the potential for significant effects from ground motions due to nearby crustal events. The nearest potentially active fault as designated by Geomatrix (1995) is the Portland Hills Fault near the base of the Tualatin Mountains in downtown Portland, approximately 3.8 miles from the subject site. Numerous faults described by Geomatrix (1995) as Quaternary (suspected activity within the last 750,000 years) or Probable Quaternary (suspected activity within the last 1.8 million years) are mapped in the Portland area. However, it should be noted that the potential for the most significant damage due to earthquakes in the project area is not from crustal structures but from Cascadia Subduction Zone events.

Intraplate earthquakes, as mentioned above, occur within the slab of oceanic crust as it is subducted under the North American plate. These earthquakes would be expected to occur under the western margin of North America inland to approximately the Willamette valley. The earthquakes that occurred in the Puget Sound area in 1949 (M 7.1) and 1965 (M 6.5) were intraplate earthquakes. These quakes reportedly were felt throughout the Portland area and caused minor damage. It is now believed that similar earthquakes could be centered within the Portland area.

Subduction Zone Earthquakes are the strongest type of seismic energy release expected in the region. These occur along the Cascadia Subduction Zone between the Juan de Fuca Plate and the western edge of the North American Plate. No subduction zone earthquakes have occurred off the coast of Oregon, Washington or southern British Columbia in recorded history. However,

recent studies have found evidence suggesting the region has been subjected to very large subduction zone earthquakes on an average of every 350-600 years. Geologic research correlated with Japanese Tsunami records suggest that the latest Cascadia Subduction Zone earthquake occurred January 26, 1700. Such a seismic event would have a significant regional impact, causing wide spread damage and disruption.

4.0 SUBSURFACE EXPLORATION AND CONDITIONS

4.1 SUBSURFACE EXPLORATION

The geotechnical subsurface exploration program consisted of advancing five solid stem auger borings to maximum depths ranging from 6 feet to 36.5 feet on February 1, 2001. All borings were advanced to planned depth or to drilling refusal using a trailer-mounted Simco Model 2400 drill rig subcontracted by a local drilling contractor. One small diameter probe hole, P-1, was also drilled through the floor slab to explore near-surface conditions under the concrete slab. The approximate locations of the geotechnical borings, and probe hole are shown on the Site Plan, Figure 2. Boring locations were measured approximately from the outside edges of the existing concrete slab.

The borings were advanced under the full time observation of an experienced engineering geologist from our staff who developed boring logs summarizing the subsurface conditions encountered. The boring logs are attached as Figures A-2 through A-6. Soil samples were obtained at 2.5 to 5.0 foot intervals by driving a 2-inch outside diameter, split spoon sampler in accordance with the Standard Penetration Test, ASTM- D-1586-84 (1992).

The stratigraphic contacts indicated within each boring log represent the approximate boundaries between soil types; actual transitions may be more gradual. The subsurface conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times.

The borings were backfilled with bentonite hole plug, and surface patched with asphalt cold mix upon completion. Excess cuttings from the borings were spread on-site in unpaved areas. Groundwater depths were estimated by measurement of wetted sample rods. Groundwater observations should be considered as approximate representations of groundwater levels because groundwater monitoring wells were not installed.

4.2 SUBSURFACE CONDITIONS

In general, near-surface soils encountered in the borings consisted of surficial pavement underlain by silty gravel, which in turn was underlain by variable, non-engineered fill to depths of approximately 14 to 16 feet below existing surface grade. Native soils consisted of silt to sandy silt, which graded to silty sand and sand with increased depth. Groundwater was encountered at approximately 26 to 29 feet below existing surface grade. More detailed descriptions of soil and groundwater conditions encountered within the borings are presented below.

4.2.1 SOILS

Based on the results of our subsurface exploration, subsurface conditions in the building area can be characterized as follows:

- ***PAVEMENT SECTION:*** An approximately 8-inch thick section of asphalt concrete pavement is present on the west, north, and east sides of the building area. The pavement is underlain by approximately one foot of silty crushed rock base for a total pavement section of approximately 2 feet or less. The pavement has been recently overlaid and appears to be in good condition.

- ***EXISTING CONCRETE FLOOR SLAB:*** The concrete floor slab edge is exposed along the side of the low dock-height floor, and appears to be approximately 6 inches in thickness. A ¾ inch diameter hole was drilled through the slab, and a smooth stainless steel probe was pushed by hand to refusal at a depth of about 30 inches. Based on the probing, the concrete slab is underlain by a thin silty gravel layer of about one or two inches thick, and a soft, moist sandy silt layer down to about 30 inches. The point of refusal was interpreted as pavement or floor slab that appears to be the same elevation as that of the adjacent pavement area. This suggests that the building area may have formerly been used as a paved parking or loading area.

- ***RUBBLE FILL:*** On the south side of the existing building the near-surface fill material consists of rubble fill with broken concrete roofing material, shredded composite roofing material, crushed rock, and silt. This material is about 1.0 to 1.5 feet in thick and covers additional manmade fill described below.

- ***NON-ENGINEERED FILL (ML/GM/GP):*** Underlying the pavement section and/or surficial rubble fill, the borings penetrated highly variable fill that contains silt, sand, and

gravel with some small cobbles (3-4 inch) and possible larger concrete rubble or buried floor slab. Borings B-1 and B-2 both encountered high penetration resistance at a depth of about 4.5 to 5 feet. Boring B-1 could not be advanced through the obstruction and was terminated. This obstruction may be an old floor slab buried under fill. The fill contains loose zones of broken brick and mortar, a trace of scrap metal, and layers of soft organic silt and sandy silt. This fill is present to depths of approximately 14 to 16 feet, and in its present condition does not appear suitable for support of shallow spread footings due to its highly variable consistency.

- ***NATIVE SANDY SILT to SILTY SAND (ML/SM):*** Underlying the non-engineered surficial fills, native sandy silt to silty sand soils were encountered in the borings at depths greater than approximately 14 to 16 feet. Consistency of the silty sand soil varied from loose to medium dense. This soil is interpreted to represent fine-grained over-bank flood deposits of the Columbia River as described in the geologic literature.

- ***FINE-GRAINED SAND (SM/SP):*** At depths greater than approximately 25 feet the borings encountered loose to medium dense saturated fine-grained sand with silt. In general, the sand below the groundwater table contained decreased proportions of silt, and in some cases appeared susceptible to vibration induced liquefaction. This deposit is interpreted as fine-grained Missoula Floods deposits of Late Pleistocene age.

4.2.2 GROUNDWATER

Groundwater was encountered at 26 to 29 feet in depth. This groundwater level is generally consistent with the observed water level in Columbia Slough located on the northern margin of the property. It should be anticipated that groundwater may be present at shallower depths during wet periods of the year, or when the water level in the slough rises.

5.0 LABORATORY TESTING

Recovered soil samples were returned to the Kleinfelder laboratory for further examination to refine the field classifications and to evaluate physical properties of the soils that may affect the geotechnical aspects of project design and construction.

The laboratory testing program included the following:

- Moisture content tests in general accordance with ASTM Test Method-D-2216

- Sieve analyses in accordance with ASTM Test Method-C-117.

The results of the laboratory testing program are included on the boring logs in Appendix A.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL DISCUSSION

The site is underlain by manmade fill that was apparently not placed and compacted with the intent of providing structural support. Although some layers of the fill that we encountered are generally dense and granular in nature, much of the fill is soft to loose and contains organic matter and other compressible materials. In its present condition the fill is considered unsuitable for support of structures. Structures founded upon the non-engineered fill would likely experience excessive building settlement and/or differential settlement between column footings. The performance of the existing building with cracks and separation between masonry block supports our opinion that the soils in the building area are settlement prone.

Based on the results of our exploration, it is our opinion that risk of excessive settlement can be mitigated by removal of approximately 4 feet of non-structural fill and replacement with compacted crushed rock under footings. However, some risk of settlement will remain if non-engineered fills are left under footings. An alternative approach that would further limit settlement would be to install Geopiers as a method of soil improvement and structural support.

Detailed recommendations regarding the geotechnical aspects of project design and construction are provided in the following sections of this report.

6.2 FOUNDATION RECOMMENDATIONS

6.2.1 GENERAL

Based on our interpretation of subsurface conditions it is our opinion that the building may be founded on shallow spread footings bearing on a layer of compacted granular fill or a series of Geopiers installed along footing lines. The method of foundation support will be dictated by settlement tolerance. Spread footings bearing on a layer of compacted fill may experience minor differential settlement as the underlying fills settle. Geo-pier supported spread foundations would not be expected to settle appreciably as a result of the improved soil support accomplished during Geopier installation.

6.2.2 OVER-EXCAVATION AND BACKFILL

Subsurface explorations for this project encountered non-engineered fills in approximate foundation areas. The fill materials are highly compressible and are not suitable for direct

support of building foundations. To achieve adequate bearing, we recommend that footings be underlain by a minimum four foot thick layer of compacted rock installed and compacted in accordance with Section 6.3 of this report. The crushed rock fill should be at least 4.5 feet wide for an 18 inch wide footing, so that the fill extends laterally a minimum of 18 inches beyond the edge of the footing. Kleinfelder should be contacted to observe the excavated subgrade prior to installation of foundation fill. In cases of extremely soft or wet subgrade soil it may be necessary to over-excavate an additional 12 inches of fill to stabilize the base with a layer of coarse aggregate.

6.2.3 GEOPIER SUPPORTED FOUNDATIONS

Geopiers are short crushed rock filled piers installed using a patented process that involves drilling an approximately two to three foot diameter hole and backfilling with individually compacted lifts of crushed rock. Geopiers are designed and installed by a local contractor who develops the design based on site specific structural and geotechnical conditions. Installation of Geopiers results in local ground improvement allowing the use of increased bearing capacity and reduced settlements for shallow spread footings. Geopiers also offer enhanced ground performance during seismic events. Conventional reinforced spread footings may be placed over a row of Geopiers typically installed on 12 to 15 foot centers. For design of Geopiers we recommend using an internal friction angle, Ø, of 28 degrees for the non-engineered fills encountered in the borings. We refer the Geopier designer to boring logs prepared for this project. For more consistent foundation support we recommend that foundation subgrade between Geopiers be covered with a minimum 6 inch thick layer of compacted crushed rock.

6.2.4 BEARING PRESSURE

Spread foundations that are designed and constructed as described above may be designed for bearing pressures up to 2,000 pounds per square foot. This applies to dead plus frequently applied live loads and may be increased by up to one-third for the inclusion of wind or seismic forces. Individual footings should have a minimum width of 18 inches per chapter 18 of the Uniform Building Code. Exterior footings should be founded a minimum of 18 inches below the lowest adjacent exterior grade.

6.2.5 SETTLEMENTS

We estimate that footings founded on a minimum 4 foot thick layer of compacted crushed rock may experience settlements of up to approximately 1 inch with up to ½ inch of differential settlement between individual columns over a distance of 30 feet. Foundations supported on

Geopiers would be expected to settle less than the above estimates. However, settlement calculations for footings supported on Geopiers would best be done by Geopier designers for site specific conditions. Normally, structural settlement tolerance is considered in Geopier design.

6.2.6 LATERAL RESISTANCE

The soil resistance available to withstand lateral foundation loads is a function of the frictional resistance which can develop on the base and the passive resistance which can develop on the face of below-grade elements of the structure as these elements tend to move into the soil. For spread footings founded on granular fill or a granular subgrade underlain by Geopiers, we recommend that allowable frictional resistance be computed using a coefficient of friction of 0.40 applied to vertical dead-load forces. The allowable passive resistance on the face of footings or other embedded foundation elements may be computed using an equivalent fluid density of 220 pounds per cubic foot (pcf) (triangular distribution) for the near surface on-site soils. The above coefficient of friction and passive equivalent fluid density values include a factor of safety of approximately 1.5. If both friction and passive resistance are used together for lateral load resistance one of the values should be reduced by 50%.

6.3 STRUCTURAL FILLS

It is our understanding that site grading will be minimal. However, is it expected that minor structural fills will be needed under new floor slab and/or foundation areas. We recommend that required fill consist of well graded crushed rock that is free of organic material and debris. Granular soils that are used for engineered fill should be uniformly moisture conditioned to within ± 2 percent of the optimum moisture content and compacted in thin lifts using suitable mechanical compaction equipment. We recommend that granular fills intended to support new floor slab, pavements, or spread footings be placed in horizontal lifts not exceeding about 8 inches in thickness and be compacted to at least 95 percent of the maximum dry density as determined by the Modified Proctor Compaction Test method (ASTM-D-1557).

It is not appropriate to estimate the maximum dry density of soils with a significant proportion of coarse aggregate or larger particles (minimum dimension of 1.5 inches) using the Modified Proctor Compaction Test method ASTM-D-1557. We recommend that a representative of Kleinfelder be contacted to observe structural fill placement and compaction methods to evaluate if the structural fill has been placed to an acceptable density and condition.

6.4 FLOOR SLAB SUPPORT

We understand that existing floor slab will be retained in the design of the new building. Based on our discussion with Woodfeathers' representatives we understand that stacked pallets will be stored on the existing and/or new floor slab. Floor slab design will be dependent on floor loads, and the floor slab should be evaluated by a structural engineer for the planned floor loads. Substantial floor loads from stacked pallets of roofing material is anticipated, and it may be necessary to supplement existing floor slab support. Based on our probe hole through the existing slab it appears that the floor slab is underlain by a thin layer of silty gravel, and about 2.5 feet of soft sandy silt fill. It is believed that older pavement underlies at least a part of the existing low dock height floor slab. Another item of concern for slab support is whether the outside edge of the existing dock height slab can support stacked pallet loads. We do not have information on whether the bulkhead is supported on a footing. Additional exploration or coring may be required to address this question.

We recommend that new fills intended for floor slab support be placed in accordance with Section 6.3 of this report. To reduce potential for settlement or cracking along construction joints between existing and new floor slab it is recommended that horizontal reinforcement dowels be installed in the exposed edge of the existing floor slab.

6.5 RETAINING WALLS

6.5.1 GENERAL

As we understand the proposed project, it is expected that new walls will serve as low retaining walls up to the height of the existing dock height floor slab. Existing floor slab elevations do not appear to be greater than approximately 3 feet above adjacent parking lot grades. Retaining walls are expected to be less than 3 feet in height. We have provided typical design parameters for walls that we believe are likely to be constructed.

6.5.2 RETAINING WALL DESIGN PARAMETERS

Lateral soil pressures on retaining walls depend on several factors including retained soil type, amount of wall movement (rotation) that is allowed. Our recommendations are based on the following assumptions:

- Retaining walls will be designed to support new backfill and new floor loads.

- Retaining walls will be backfilled with compacted crushed rock, in accordance with Section 6.5.4 of this report.

- Retaining walls will be less than 3 feet high.

6.5.3 RESTRAINED WALLS

Restrained walls are any walls that are prevented from rotation during backfilling. Most below grade walls and other rigid walls that are restrained by roof, floor slabs, or other perpendicular walls fall into the category of restrained walls. We have tabulated below a typical pressure coefficient for restrained walls with a level backslope. This coefficient assumes that wall friction is zero, ***and does not contain a factor of safety.*** This coefficient should be used in combination with a soil unit weight of 130 pounds per cubic foot when computing equivalent fluid pressures for use in design.

Slope	Coefficient of Active Lateral Pressure (Ka)
Level (at top of wall)	0.5

A 600-psf surcharge load should be applied to the wall backfill if floor loads are transferred to the wall backfill.

6.5.4 RETAINING WALL BACKFILL

Backfill behind retaining walls should consist of crushed rock in accordance with Section 6.3 of this report. However, instead of 95% compaction, we recommend that this fill be compacted to between 90% and 92% of the maximum dry density of the material (ASTM D 1557) within 3 feet (measured horizontally) of walls. In addition, we recommend that any backfill that is placed within 3 feet of the wall (measured horizontally) be compacted with lightweight, hand-operated compaction equipment.

6.6 SEISMIC DESIGN CONSIDERATIONS

6.6.1 RELATIVE EARTHQUAKE HAZARDS

Mabey et. al. (1993) prepared a series of maps for the Portland Quadrangle that depict relative earthquake hazards throughout the area from earthquake induced liquefaction, amplification of

ground motion, and lateral spread displacement and dynamic slope instability triggered by ground shaking. The following paragraphs describe these relative earthquake hazards according to information provided on the Earthquake Hazard Maps of Portland Quadrangle, Multnomah and Washington Counties, Oregon, and Clark County Washington. State of Oregon Department of Geology and Mineral Industries, GMS-79.

SOIL LIQUEFACTION: According to GMS-79, Plate 1, Liquefaction Susceptibility Map, the site is expected to have greater than 30 feet of potentially liquifiable sediments. Groundwater was encountered at approximately 26 to 29 feet in depth, but may rise a few feet during prolonged wet weather. The native soils at or near the groundwater table consist of loose to medium dense silty sand and sand. The overlying fills and native soil consist of silt and sandy silt which is less susceptible to liquefaction than the underlying sandy soils. Detailed liquefaction analyses are outside our current scope of work. We should be contacted if further liquefaction analyses are required

GROUND MOTION AMPLIFICATION: According to GMS-79, Plate 2, Ground Motion Amplification Map, peak ground accelerations are expected to be amplified by 1.8 to 2.2 times for the anticipated soil profile in the project vicinity.

LANDSLIDE/LATERAL SPREADING: According to GMS-79, Plate 3, Lateral Spread Displacement and Dynamic Slope Instability Map, estimated lateral spreading ground displacement from a magnitude 8.5 (Mw) earthquake, 100 km from the site would be in the range of 0.9 to 1.2 meters (3-4 feet). A local crustal earthquake M= 6.5, at a distance of 10 km would induce estimated lateral spreading ground displacement on the order of 0.54 to 0.72 meters (1.8 to 2.4 feet). These lateral spreading estimates are based on a SM soil classification, and should be considered only approximate. Nonetheless, it appears that engineering precautions for lateral spreading are in order.

6.6.2 SEISMIC DESIGN CRITERIA

The Portland area lies within Seismic Zone 3 as defined in the 1998 State of Oregon Structural Specialty Code (Oregon Building Codes Division's amended version of the 1997 Uniform Building Code) which corresponds to designing for a peak ground acceleration (on rock) of 0.3g. Probabilistic analyses conducted by Geomatrix (1995) for the state of Oregon, estimate that the peak ground acceleration (on rock) in the Portland area with a return period of 500 years (approximate return interval specified in the Uniform Building Code) is 0.19-0.20g. Therefore,

structural design utilizing the procedures outlined in the State of Oregon Structural Specialty Code for Seismic Zone 3 is judged to be adequate for this type of project in the Portland area.

Based on the soils encountered during the exploration program and the geologic information reviewed, UBC Soil Profile Type S_D represents the closest approximation to the site conditions and is recommended for use in design. This soil profile type in Seismic Zone 3 corresponds to Seismic Coefficient values of C_a=0.36 (Table 16-Q) and C_v=0.54 (Table 16-R). The design response spectra developed using these Seismic Coefficient values as shown on Figure 16-3 is considered adequate for the project site.

6.7 EXCAVATIONS

Based upon the soils encountered during our subsurface investigation, we anticipate that excavations can be accomplished using conventional excavation or Geopier drilling equipment. However, some rubble fill with cobbles, broken brick, and or concrete may be present. Also, there is a possibility of encountering a buried concrete slab at approximately 4 to 5 feet below existing parking lot grade in the vicinity of borings B-1 and B-2. The near-surface fills may stand at a near vertical slope for short periods of time. However, it should be anticipated that shoring or sloping trench walls will be necessary for excavations more than a few feet deep that must remain open for more than a few hours.

Stability of temporary excavations is the responsibility of the construction contractor, who must maintain safe excavation slopes and/or shoring. Excavations must comply with the current requirements of OSHA and the State of Oregon. We are providing the information below solely as a service to our client. Under no circumstances should the information provided be interpreted to mean that Kleinfelder is assuming responsibility for construction site safety or the contractor's activities.

The contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, and/or federal safety regulations (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations). Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

In our opinion the fill soils encountered at this site would generally be considered Type C soils when applying the OSHA regulations. For these soil types, OSHA recommends maximum slope inclinations of 1-1/2(H):1(V) (Horizontal:Vertical), or flatter, for excavations 20 feet or less in

depth. Flatter slopes and/or trench shields may be required if excessive raveling or instability occurs in excavation sidewalls.

The recommended maximum inclination for temporary slopes assumes that the ground surface behind the cut slopes is level, that surface loads from equipment and materials are kept a sufficient distance away from the top of the slope (typically at least half the slope height), and that utility trench excavations are completed and backfilled prior to the construction of structures adjacent to the excavations. If these assumptions are not valid, we should be contacted for additional recommendations.

7.0 ADDITIONAL SERVICES

7.1 PLANS AND SPECIFICATIONS REVIEW

Because the design details for the proposed project were not available at the time this report was prepared, we strongly recommend that Kleinfelder be given the opportunity to review the geotechnical aspects of the project plans and specifications as the design is being developed to confirm the applicability of our recommendations, or to make approach modifications.

In the event Kleinfelder is not, at a minimum, retained to review the final project plans and specifications to evaluate if our recommendations have been properly interpreted, we will assume no responsibility for misinterpretation of our recommendations.

7.2 CONSTRUCTION OBSERVATION AND TESTING

We recommend that all earthwork during construction be monitored by a representative from Kleinfelder, including site preparation and foundation excavation. The purpose of these services would be to provide Kleinfelder the opportunity to observe the soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

8.0 REFERENCES

Beeson M.H. and others, 1991, Geologic Map of the Portland Quadrangle, State of Oregon Department of Geology and Mineral Industries, GMS-75

Geomatrix Consultants, 1995, Seismic Design Mapping State of Oregon: Final Report, prepared for Oregon Department of Transportation under personal services contract 11688.

Hogenson, G.M. and Foxworthy, B.L., 1965. Ground Water in the East Portland Area Oregon. U.S. Geological Survey, Water Supply Paper 1793.

Mabey, M.A., and others, 1993, Earthquake Hazard Map of Portland Quadrangle, Multnomah and Washington Counties, Oregon, and Clark County Washington. State of Oregon Department of Geology and Mineral Industries, GMS-79.

Mabey, M.A., and Madin I.P., 1995, Downhole and Seismic Cone Penetrometer Shear Wave Velocity Measurements for the Portland Metropolitan Area, 1993, and 1994. State of Oregon Department of Geology and Mineral Industries, Open file report O-95-7.

Madin, Ian P., 1990. Earthquake-Hazard Geology Maps of the Portland Metropolitan Area, Oregon: Open File Report 0-90-2, Oregon Department of Geology and Mineral Industries.

OSHA Health and Safety Administration, Standards for Excavations, 29 CFR Part 1926

State of Oregon Structural Specialty Code, 1998, Based on the Uniform Building Code 1997 Edition.

9.0 UNCERTAINTY AND LIMITATIONS

We have prepared this report for use by MCM Architects, their client, and their authorized agents for specific application to this site and project. The data and report may be provided to prospective contractors for their bidding or estimating purposes, but our report, conclusions, and interpretations should not be considered as warranty of the subsurface conditions. Experience has shown that subsurface soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations and not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, Kleinfelder should be notified for review of the recommendations of this report, and revision of such if necessary. If the scope of the proposed construction changes from that described in this report, including foundation loads outside the limits assumed in this report, our recommendations should also be reviewed.

We recommend that we be retained to provide continuing geotechnical services as the project proceeds through design. We also recommend that we be retained to monitor the geotechnical aspects of construction in order to evaluate compliance with our recommendations, particularly those activities outlined in Section 4.0 of this report.

This report may be used only by the Client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issue. Kleinfelder should be notified if the project is delayed by more than 24 months from the date of this report so that a review of site conditions can be made, and recommendations revised if appropriate.

The scope of work for this Geotechnical Exploration Report did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous substances in the soil, surface water, or groundwater at this site. Environmental assessments are provided in separate reports.

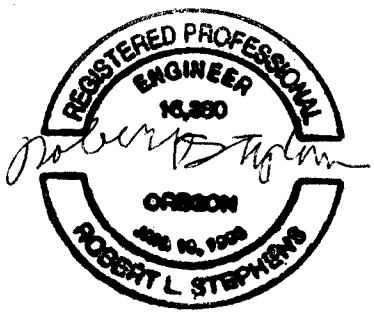
This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for the safety of personnel other than our own on the site; the safety of others is the responsibility of the contractor. The contractor should notify the owner if he considers any of the recommended actions presented herein unsafe.

10.0 PROFESSIONAL AUTHENTICATION

This report has been prepared and reviewed by the undersigned. This report is void if original seal and signature are not present.

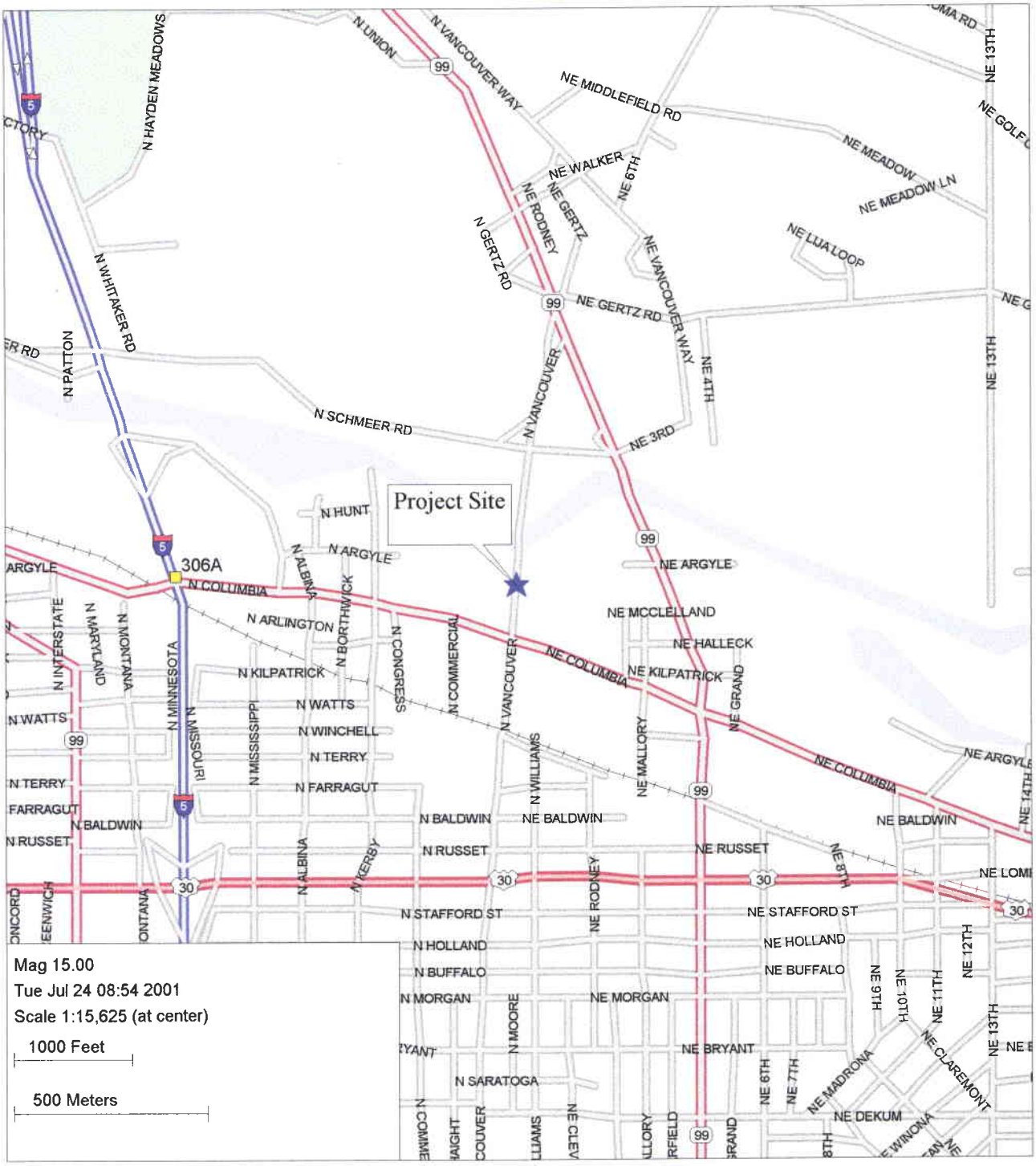
Exp 12-31-01

R. Warren Krager, C.E.G.
Senior Engineering Geologist



exp. 6-30-02

Robert L. Stephens, P.E.
Geotechnical Group Leader



KLEINFELDER

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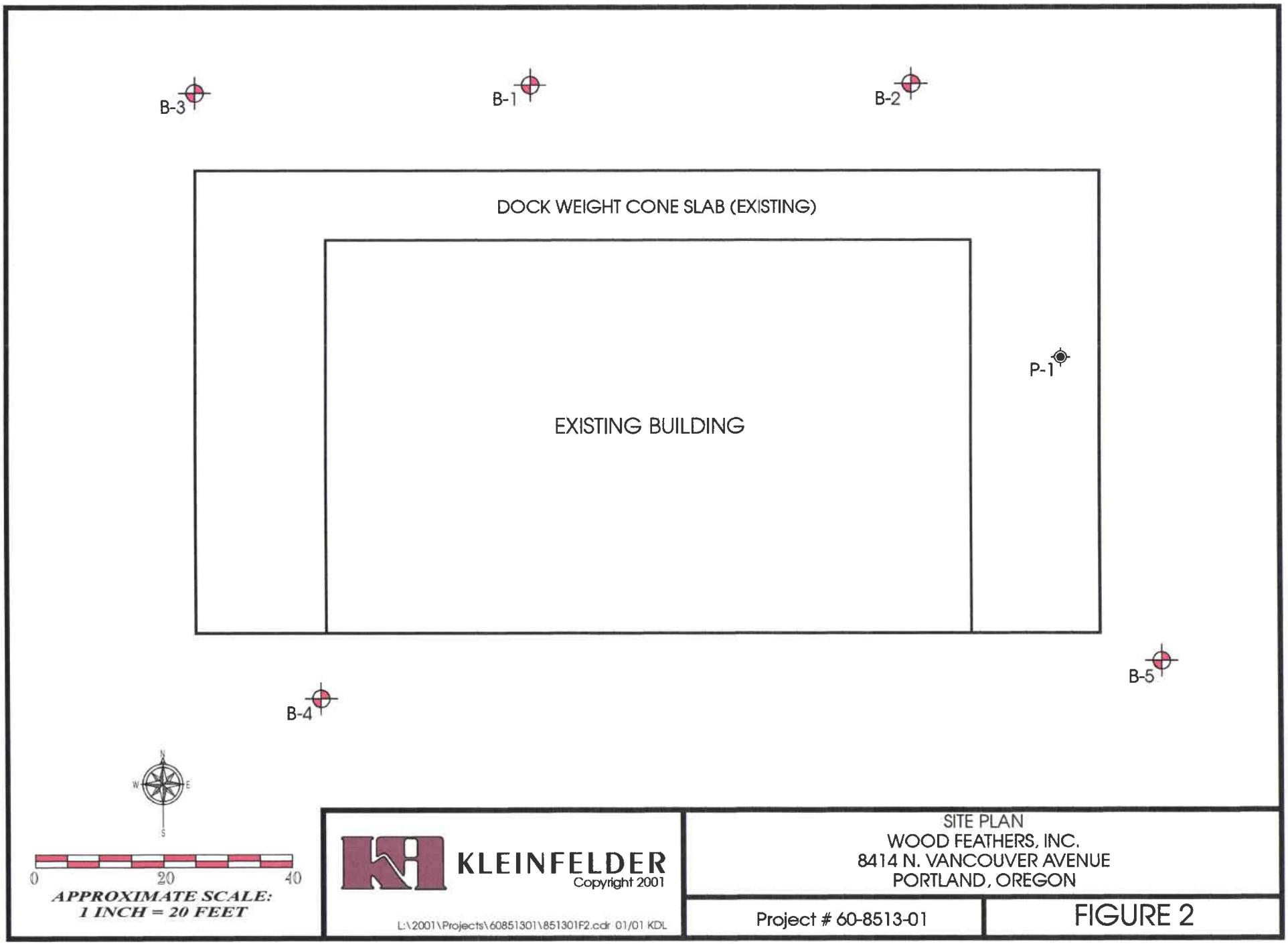
VICINITY MAP
WOODFEATHERS, INC.
8414 N. VANCOUVER AVENUE
PORTLAND, OREGON

PROJECT # 60-8513-01

FIGURE 1


B-3
B-1
B-2
DOCK WEIGHT CONE SLAB (EXISTING)
EXISTING BUILDING
P-1
B-5
B-4
N
W
E
S
0
20
40
APPROXIMATE SCALE:
1 INCH = 20 FEET
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SITE PLAN
WOOD FEATHERS, INC.
8414 N. VANCOUVER AVENUE
PORTLAND, OREGON
Project # 60-8513-01
FIGURE 2

LOG LEGEND

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	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 SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOIL SAMPLES

- Cal. (3" OD) Split Spoon
- Cal. Split Spoon (w/ liners)
- SPT (2" OD) Split Spoon
- Shelby Tube
- Grab
- No Recovery

WELL CONSTRUCTION

- Blank casing
- Screened casing
- Cement grout
- Bentonite
- Sand pack or gravel pack
- Native material mixed with bentonite
- Native backfill or cavings
- Bentonite-cement grout

FIELD MEASUREMENTS

- Water level observed during drilling
- Water level observed after drilling
- PID — Photoionization Detector
- ppmv — Parts Per Million by Volume

LABORATORY TESTS

Consol	Consolidation
GS	Grain Size Analysis Course or Fine Sieve
H	Grain Size Analysis Hydrometer
UC	Unconfined Compression
UW	Unit Weight
% Org.	Organic Content

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

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BORING LEGEND
WOODFEATHERS, INC.
8414 N. VANCOUVER STREET
PORTLAND, OREGON

PROJECT # 60-8513-01

APPENDIX A-1

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	TESTING PROGRAM: LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	U.S.C.S. SYMBOL	SOIL DESCRIPTION
														SURFACE: 6" Asphalt.
0														- asphalt pavement 0-8"
												GM		- gravel with silt
												GP		
									9		S-1			Medium dense to loose gravel with trace to some silt and sand, FILL.
									24					
									7					Gravel with metal and broken concrete, rubble fill.
									12		S-2			
5									2					
6									36					Drilling refused at 4.5'. Can't get past obstruction, possible concrete rubble.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

BY: _____ APPROV: _____

DATE DRILLED: 2-1-01
LOGGED BY: W. Krager
REVIEWED BY: Warren Krager

SURFACE ELEVATION (feet): N/A
TOTAL DEPTH (feet): 6.0
DIAMETER OF BORING (in): 4"

DRILLING METHOD: Solid Stem Auger
DRILLER: G. VanDeHey
CASING SIZE: N/A

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 60-8513-01

Wood Feathers, Inc
8414 N. Vancouver Street
Portland, Oregon
BORING LOG
B-1

FIGURE
A - 2
PAGE 1 of 1

2000 STANDARD IN/OUT 60851301.GPJ 2000REV.GDT 2/9/01

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	TESTING PROGRAM: LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	U.S.C.S. SYMBOL	SOIL DESCRIPTION
														SURFACE: 6" Asphalt.
0														- asphalt pavement 0-8"
												GM		- silty gravel
												OL		Organic silt, soft damp moist, some wood debris, FILL.
									1					
									1		S-1			
									1					
5												GP		4.75' obstruction on possible concrete slab.
									3			ML/GM		Layered fine grained sand, loose, medium gray, FILL.
									2		S-2			
									2					
									2					Stiff, moist, dark gray, sandy silt with trace gravel and broken brick, FILL.
									1		S-3			
									2					
10									5					Very stiff, sandy silt with fine gravel to medium dense silty sand with fine gravel, FILL.
									9		S-4			
									10					
														- driller feels wood debris in hole
15									12					- rock obstruction at 14.9'
									9		S-5			Gravelly silt to gravel at 15-16', FILL.
									8					
												SM		Soft, moist, medium gray sandy silt, native.
20														

DATE DRILLED: 2-1-01
LOGGED BY: W. Krager
REVIEWED BY: Warren Krager

SURFACE ELEVATION (feet): N/A
TOTAL DEPTH (feet): 31.5
DIAMETER OF BORING (in): 4"

DRILLING METHOD: Solid Stem Auger
DRILLER: G. VanDeHey
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

BY: _____ APPROV: _____

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 60-8513-01

Wood Feathers, Inc
8414 N. Vancouver Street
Portland, Oregon
BORING LOG
B-2

FIGURE
A -3a

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	TESTING PROGRAM: LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	U.S.C.S. SYMBOL	SOIL DESCRIPTION
20									3 5 5		S-6			Medium dense, damp, gray silty fine sand, native.
													SM	
25		▽							4 4 7		S-7			Medium dense, moist to wet silty fine sand. - gray to brown at 26'
30									2 2 6		S-8			Saturated, medium gray, loose silty sand.
31.5														Boring termianted at 31.5'.

* SAMPLER TYPE: Cal. (3"OD) Split Spoon; SPT (2" OD) Split Spoon; Core Sample; Shelby Tube; Grab; No Recovery

**HAMMER WEIGHT: 300 lbs (30" Drop); 140 lbs (30" Drop)

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

BY: _____ APPROV: _____

2000 STANDARD IN/OUT 60851301.GPJ 2000REV.GDT 2/9/01

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 60-8513-01

Wood Feathers, Inc
8414 N. Vancouver Street
Portland, Oregon
BORING LOG
B-2

FIGURE
A -3b

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	TESTING PROGRAM: LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	U.S.C.S. SYMBOL	SOIL DESCRIPTION
														SURFACE: 6" Asphalt.
0														- asphalt pavement 0-8"
												GM		- gravel base to about 15-16"
												ML/ GM		
									6 11 11	X	S-1			Stiff gravelly silt, dark gray, moist, FILL.
5									7 10 9	X	S-2			Poor recovery. Probably gravelly silt to silty gravel with broken brick.
									2 4 8	X	S-3			Poor recovery. Broken brick and gravel with gravelly silt.
10									4 8 6	X	S-4			- hole sloughed at 9-10' Stiff gravelly silt, dark gray moist with broken brick and mortar, FILL.
15									2 3 4	X	S-5	ML		Native, soft to medium stiff, moist to damp, medium gray brown sandy silt.
												SM		
20														

DATE DRILLED: 2-1-01 | SURFACE ELEVATION (feet): N/A | DRILLING METHOD: Solid Stem Auger

LOGGED BY: W. Krager | TOTAL DEPTH (feet): 26.5 | DRILLER: G. VanDeHey

REVIEWED BY: Warren Krager | DIAMETER OF BORING (in): 4" | CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

BY: _____ APPROV: _____

KLEINFELDER

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 60-8513-01

Wood Feathers, Inc
8414 N. Vancouver Street
Portland, Oregon
BORING LOG
B-3

FIGURE
A -4a

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	TESTING PROGRAM: LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	U.S.C.S. SYMBOL	SOIL DESCRIPTION
20									4 4 6		S-6			Loose, silty fine sand, medium brown, moist.
													SP	
25		▽							4 4 3		S-7			Loose, moist to wet, find sand, medium brown. - wet at 26', groundwater at 26'
26.5														Boring terminated at 26.5'.

* SAMPLER TYPE: Cal. (3"OD) Split Spoon; SPT (2" OD) Split Spoon; Core Sample; Shelby Tube; Grab; No Recovery

**HAMMER WEIGHT: 300 lbs (30" Drop); 140 lbs (30" Drop)

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

BY: _____ APPROV: _____

2000 STANDARD IN/OUT 60851301.GPJ 2000REV.GDT 2/9/01

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 60-8513-01

Wood Feathers, Inc
8414 N. Vancouver Street
Portland, Oregon
BORING LOG
B-3

FIGURE
A -4b

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	TESTING PROGRAM: LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	U.S.C.S. SYMBOL	SOIL DESCRIPTION
														SURFACE: Rubble Fill.
0												GP		Rubble fill, broken concrete roofing tiles.
												ML		Gravelly silt, moist, dark gray.
			18.5						7 8 10		S-1			- poor recovery
5			22.4						2 1 2		S-2			Soft, moist, dark gray, sandy silt fill with trace fine gravel, FILL.
			22.9						2 1 2		S-3	SM		Soft, moist, medium brown silty fine sand with trace fine gravel, FILL.
10			21.9						2 2 2		S-4	ML		Soft, moist, medium brown and rust mottled silt with fine sand.
												SM		- probable contact with native at 14-15' Loose, damp, medium brown silty fine sand.
15			20.9			26			3 3 4		S-5			
20														

DATE DRILLED: 2-1-01
LOGGED BY: W. Krager
REVIEWED BY: Warren Krager

SURFACE ELEVATION (feet): N/A
TOTAL DEPTH (feet): 36.5
DIAMETER OF BORING (in): 4"

DRILLING METHOD: Solid Stem Auger
DRILLER: G. VanDeHey
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

BY: _____ APPROV: _____

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 60-8513-01

Wood Feathers, Inc
8414 N. Vancouver Street
Portland, Oregon
BORING LOG
B-4

FIGURE
A -5a
PAGE 1 of 2

2000 STANDARD IN/OUT 60851301.GPJ 2000REV.GDT 2/9/01

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	TESTING PROGRAM: LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	U.S.C.S. SYMBOL	SOIL DESCRIPTION
20			24.4			45			4 5 7		S-6			Medium dense, damp, medium brown silty fine sand.
25			26.6			56			5 7 9		S-7			Medium dense, damp to moist, medium gray brown, layered fine sand, silty sand, silt.
		▽												- groundwater at 29'
30			30.7			34			5 6 8		S-8			Medium dense, wet, fine sand with silt.
35			36.4			29			2 2 8		S-9	SP		Medium dense, saturated, gray fine sand with silt.
36.5														Boring terminated at 36.5'.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

BY: _____ APPROV: _____

* SAMPLER TYPE: Cal. (3"OD) Split Spoon; SPT (2" OD) Split Spoon; Core Sample; Shelby Tube; Grab; No Recovery

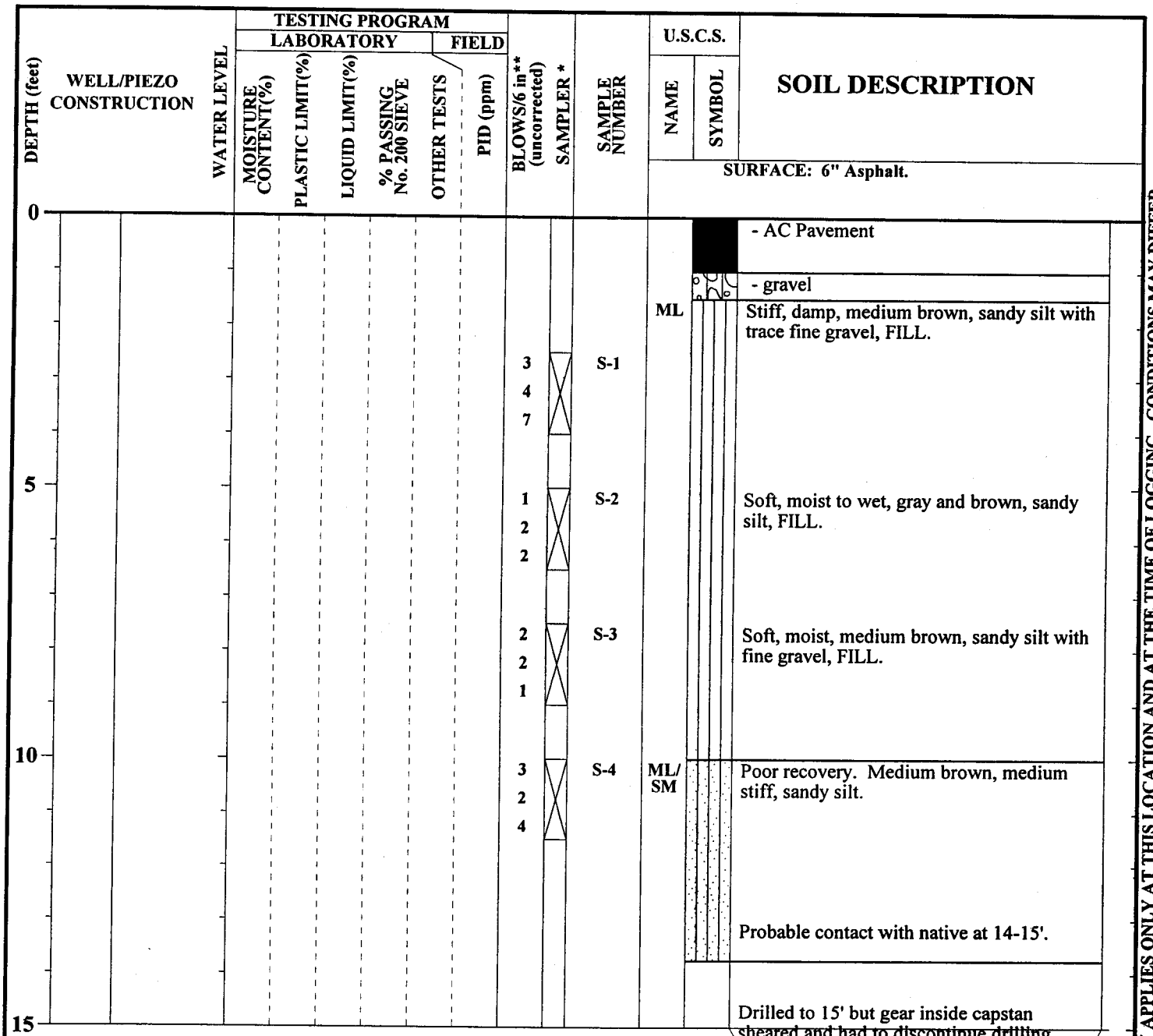
**HAMMER WEIGHT: 300 lbs (30" Drop); 140 lbs (30" Drop)

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 60-8513-01

Wood Feathers, Inc
8414 N. Vancouver Street
Portland, Oregon
BORING LOG
B-4

FIGURE
A -5b



DATE DRILLED: 2-1-01
LOGGED BY: W. Krager
REVIEWED BY: Warren Krager

SURFACE ELEVATION (feet): N/A
TOTAL DEPTH (feet): 15.0
DIAMETER OF BORING (in): 4"

DRILLING METHOD: Solid Stem Auger
DRILLER: G. VanDeHey
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: _____

BY: _____

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 60-8513-01

Wood Feathers, Inc
8414 N. Vancouver Street
Portland, Oregon
BORING LOG
B-5

FIGURE
A - 6

PAGE 1 of 1

2000 STANDARD IN/OUT 60851301.GPJ 2000REV.GDT 2/9/01

APPLICATION FOR AUTHORIZATION TO USE
GEOTECHNICAL EXPLORATION REPORT
PROPOSED WOODFEATHERS' WAREHOUSE
PORTLAND, OREGON
KLEINFELDER PROJECT NO. 60-8513-01
July 24, 2001

Kleinfelder, Inc.
15050 SW Koll Parkway, Suite L
Beaverton, OR 97006-6028
(503)644-9447
Fax (503)643-1905

To whom it may concern:

Applicant understands and agrees that this report for the subject site is a copyrighted document, that Kleinfelder, Inc. is the copyright owner and that unauthorized use or copying of the report for the subject site is strictly prohibited without the express written permission of Kleinfelder, Inc. Applicant understands that Kleinfelder, Inc. may withhold such permission at its sole discretion, or grant permission upon such terms and conditions as it deems acceptable.

Applicant agrees to accept the contractual terms and conditions between Kleinfelder, Inc. and Woodfeathers, Inc. originally negotiated for preparation of this report. Use of this report without permission releases Kleinfelder, Inc. from any liability that may arise from use of this report.

To be Completed by Applicant

_____
(company name)

_____
(address)

_____
(city, state, zip)

_____ _____
(telephone) *(FAX)*

By: _____

Title: _____

Date: _____

For Kleinfelder, Inc.'s use only

_____ approved for re-use with additional fee of $_____

_____ disapproved, report needs to be updated

By: _____
(Kleinfelder, Inc. project manager)

Date: _____