GEOTECHNICAL ENGINEERING STUDY
Proposed Plat
Northeast 43rd Street at Burlington Northern Railroad
Kirkland, Washington

This report presents the findings and recommendations of our geotechnical engineering study for the site of the proposed plat in Kirkland, Washington. The Vicinity Map, Plate 1, illustrates the general location of the site.

Development of the property is in the planning stage, and detailed plans were not made available to us. The site plan provided to us showed lot lines and the proposed access road.

SITE CONDITIONS

Surface

The proposed plat, consisting of nine residential lots, is an irregular-shaped tract located at the end of Northeast 43rd Street, immediately west of the Burlington Northern Railroad. In general, the ground surface slopes gently to moderately downward to the west. At the south property line, however, the ground surface slopes steeply to the bottom of an existing drainage course. A house presently occupies the northwest corner of the property. The remainder of the site is undeveloped and heavily wooded. The steep slope to the south is generally undeveloped. We did not observe any evidence of instability on the site.

Subsurface

The subsurface conditions were explored by excavating seven test pits at the approximate locations shown on the Site Exploration Plan, Plate 2. The field exploration program was based upon the proposed construction and required design criteria, the site topography and access, the subsurface conditions revealed during excavation, the scope of work outlined in our proposal, and the time and budget constraints.

The test pits were excavated on June 20, 1997, with a rubber-tired backhoe. A geotechnical engineer from our staff observed the excavation process, logged the test pits, and obtained representative samples of the soils encountered. "Grab" samples of selected subsurface soils were collected from the backhoe bucket. The Test Pit Logs are attached to this report as Plates 3 through 9.

Dense to very dense glacial till soils, generally consisting of silty sand with gravel, underlie the site at a depth of about 4 to 6 feet below existing grade. The till is overlain by occasional fill, topsoil, and weathered sandy soils.

The final logs represent our interpretations of the field logs and laboratory tests. The stratification lines on the logs represent the approximate boundaries between soil types at the exploration locations. The actual transition between soil types may be gradual, and subsurface conditions can vary between exploration locations. The logs provide specific subsurface information only at the loca-

ATTACHMENT 5
SS-03-12

tions tested. The relative densities and moisture descriptions indicated on the test pit logs are interpretive descriptions based on the conditions observed during excavation.

The compaction of backfill was not within the scope of our services. Loose soil will therefore be found in the area of the test pits. If this presents a problem, the backfill will need to be removed and replaced with structural fill during construction.

Groundwater

No groundwater seepage was observed in any of the test pits. However, the test pits were left open for only a short time period. It should be noted that groundwater levels vary seasonally with rainfall and other factors. We anticipate that groundwater could be found between the near-surface, weathered soil and the underlying glacial till and in more permeable soil layers or pockets within the till soils in wet weather.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on the observations made during our site visit and on laboratory test of soil samples taken from the site, it is our opinion that construction of single family residences at the planned locations are feasible from a geotechnical engineering standpoint. The houses may be constructed using conventional spread footing foundations bearing on the native, medium-dense to very dense sandy soils which underlie the site, or on structural fill placed on these competent native soils. It is also our opinion that the steep slope is stable and that houses may be constructed to within 15 feet of the top break of the slope. Houses so constructed should be keyed into the slope with daylight basements or, alternatively, the downslope footings should extend at least three feet into bearing soil. No special excavation or foundation construction is needed if the houses are to be at least 25 feet from the slope. Under no circumstances should excess soil from excavations or site grading be placed on or near the steep slope. Insofar as possible, vegetation on the steep slope should be left undisturbed.

Geotech Consultants, Inc. should be allowed to review the final development plans to verify that the recommendations presented in this report are adequately addressed in the design. Such a plan review would be additional work beyond the current scope of work for this study, and it may include revisions to our recommendations to accommodate site, development, and geotechnical constraints that become more evident during the review process.

Conventional Foundations

The proposed structure can be supported on conventional continuous and spread footings bearing on undisturbed, medium- to very dense, native soil, or on structural fill placed above this competent, native soil. See the later sub-section entitled **General Earthwork and Structural Fill** for recommendations regarding the placement and compaction of structural fill beneath structures. We recommend that continuous and individual spread footings have minimum widths of 12 and 16 inches, respectively. They should be bottomed at least 12 inches below the lowest adjacent finish ground surface for frost protection. The local building codes should be reviewed to determine if different footing widths or embedment depths are required.

Depending on the final site grades, some overexcavation may be required below the footings to expose competent, native soils. Unless lean concrete is used to fill an overexcavated hole, the overexcavation must be at least as wide at the bottom as the sum of the depth of the overexcavation and the footing width. For example, an overexcavation extending 2 feet below the bottom of a 3-foot-wide footing must be at least 5 feet wide at the base of the excavation. If lean concrete is used, the overexcavation need only extend 6 inches beyond the edges of the footing.

The following allowable bearing pressure is appropriate for footings constructed according to the above recommendations.

Bearing Condition	Allowable Bearing Pressure
Placed directly on competent native soil	2,000 psf
Supported on structural fill placed above competent native soil	2,000 psf

Where: (i) psf is pounds per square foot,

A one-third increase in the above design bearing pressure may be used when considering short-term wind or seismic loads. For the above design criteria, it is anticipated that the total post-construction settlement of footings founded on competent, native soils, or on structural fill up to 5 feet in thickness, will be about one inch, with differential settlements on the order of one-half inch in a distance of 50 feet along a continuous footing.

Lateral loads due to wind or seismic forces may be resisted by friction between the foundation and the bearing soil, or by passive earth pressure acting on the vertical, embedded portions of the foundation. For the latter condition, the foundation must be either poured directly against relatively level, undisturbed soil, or surrounded by level, structural fill. We recommend using the following design values for the foundation's resistance to lateral loading:

Parameter	Design Value
Coefficient of Friction	0.40
Passive Earth Pressure	300 pcf

Where: (i) pcf is pounds per cubic foot, and (ii) passive earth pressure is computed using the equivalent fluid density.

If the ground in front of a foundation is loose or sloping, the passive earth pressure given above will not be appropriate. We recommend a safety factor of at least 1.5 for the foundation's resistance to lateral loading, when using the above design values.

Seismic Considerations

The site is located within Seismic Zone 3 as illustrated on Figure No. 16-2 of the 1994 Uniform Building Code (UBC). In accordance with Table 16-J of the 1994 UBC, the site soil profile is best represented by Profile Type S1. The soils are not subject to seismic liquefaction.

Slabs-on-Grade

The building floors may be constructed as slabs-on-grade atop the competent native soils or structural fill above competent native soils. The subgrade soil must be in a firm, non-yielding condition at the time of slab construction or underslab fill placement. Any soft areas encountered should be excavated and replaced with select, imported, structural fill.

All slabs-on-grade should be underlain by a capillary break or drainage layer consisting of a minimum 4-inch thickness of coarse, free-draining, structural fill with a gradation similar to that discussed later in Permanent Foundation and Retaining Walls. In areas where the passage of moisture through the slab is undesirable, a vapor barrier, such as a 6-mil plastic membrane, should be placed beneath the slab. Additionally, sand should be used in the fine-grading process to reduce damage to the vapor barrier, to provide uniform support under the slab, and to reduce shrinkage cracking by improving the concrete curing process.

We recommend proof-rolling the slab areas with a heavy truck or large piece of construction equipment prior to slab construction. Any soft areas encountered during proof-rolling should be excavated and replaced with select, imported, structural fill.

Permanent Foundation and Retaining Walls

Retaining walls backfilled on only one side should be designed to resist the lateral earth pressures imposed by the soil they retain. The following recommended design parameters are for walls that restrain level backfill:

Parameter	Design Value
Active Earth Pressure *	35 pcf
Passive Earth Pressure	300 pcf
Coefficient of Friction	0.40
Soil Unit Weight	130 pcf

Where: (i) pcf is pounds per cubic foot, and (ii) active and passive earth pressures are computed using the equivalent fluid pressures.

*** For a restrained wall that cannot deflect at least 0.002 times its height, a uniform lateral pressure equal to 10 psf times the height of the wall should be added to the above active equivalent fluid pressure.**

The values given above are to be used to design permanent foundation and retaining walls only. We recommend a safety factor of at least 1.5 for overturning and sliding, when using the above recommended values to design the walls.

The design values given above do not include the effects of any hydrostatic pressures behind the walls and assume that no surcharge slopes or loads, such as vehicles, will be placed behind the walls. If these conditions exist, those pressures should be added to the above lateral soil pressures. Also, if sloping backfill is desired behind the walls, we will need to be given the wall dimensions and the slope of the backfill in order to provide the appropriate design earth pressures.

Heavy construction equipment should not be operated behind retaining and foundation walls within a distance equal to the height of a wall, unless the walls are designed for the additional lateral pressures resulting from the equipment. The wall design criteria assumes that the backfill will be well-compacted in lifts no thicker than 12 inches. The compaction of backfill near the walls should be accomplished with hand-operated equipment to prevent the walls from being overloaded by the higher soil forces that occur during compaction.

Retaining Wall Backfill

Backfill placed behind retaining or foundation walls should be coarse, free-draining, structural fill containing no organics. This backfill should contain no more than 5 percent silt or clay particles and have no gravel greater than 4 inches in diameter. The percentage of particles passing the No. 4 sieve should be between 25 and 70 percent. If the native sand soil is used as backfill, a drainage composite similar to Miradrain 6000 should be placed against the backfilled retaining walls. The drainage composites should be hydraulically connected to the foundation drain system. For increased protection, drainage composites should be placed along cut slope faces, and the walls should be backfilled with pervious soil.

The purpose of these backfill requirements is to ensure that the design criteria for a retaining wall are not exceeded because of a build-up of hydrostatic pressure behind the wall. The top 12 to 18 inches of the backfill should consist of a compacted, relatively impermeable soil or topsoil, or the surface should be paved. The ground surface must also slope away from backfilled walls to reduce the potential for surface water to percolate into the backfill. The sub-section entitled **General Earthwork and Structural Fill** contains recommendations regarding the placement and compaction of structural fill behind retaining and foundation walls. The above recommendations are not intended to waterproof the below-grade walls. If moist conditions or some seepage through the walls are not acceptable, damp-proofing or waterproofing should be provided. This could include limiting cold-joints and wall penetrations, and possibly using bentonite panels or membranes on the outside of the walls. Applying a thin coat of asphalt emulsion is not considered waterproofing, but it will help to prevent moisture, generated from water vapor or capillary action, from seeping through the concrete.

Excavations and Slopes

Excavation slopes should not exceed the limits specified in local, state, and national government safety regulations. Temporary cuts to a depth of about 4 feet may be attempted vertically in unsaturated soil, if there are no indications of slope instability. Based upon Washington Administrative Code (WAC) 296, Part N, the uppermost soil type at the subject site would be classified as Type B. Therefore, temporary cut slopes greater than 4 feet in height cannot be excavated at an inclination steeper than 1:1 (Horizontal:Vertical), extending continuously between the top and the bottom of a cut.

The above recommended temporary slope inclination is based on what has been successful at other sites with similar soil conditions. Temporary cuts are those that will remain unsupported for a relatively short duration to allow for the construction of foundations, retaining walls, or utilities. Temporary cut slopes should be protected with plastic sheeting during wet weather. The cut slopes should also be backfilled or retained as soon as possible to reduce the potential for instability.

Please note that sand can cave suddenly and without warning. Utility contractors should be made especially aware of this potential danger.

All permanent cuts into native soil should be inclined no steeper than 2:1 (H:V). Depending upon the requirements of the local sensitive areas ordinances, any completed slopes greater than 10 feet in height with inclinations of 40 percent or steeper may be classified as "steep slopes," which could affect future construction next to the slopes. Water should not be allowed to flow uncontrolled over the top of any temporary or permanent slope. Also, all permanently exposed slopes should be seeded with an appropriate species of vegetation to reduce erosion and improve the stability of the surficial layer of soil.

Any disturbance to the existing steep slope outside of the building limits may reduce the stability of the slope. Damage to the existing vegetation and ground should be minimized, and any disturbed areas should be revegetated as soon as possible. Soil from the excavation should not be placed on the slope.

Drainage Considerations

We recommend the use of footing drains at the base of footings, where (1) crawl spaces or basements will be below a structure, (2) a slab is below the outside grade, or (3) the outside grade does not slope downwards from a building. Drains should also be placed at the base of all backfilled, earth-retaining walls. These drains should be surrounded by at least 6 inches of 1-inch-minus, washed rock and then wrapped in non-woven, geotextile filter fabric (Mirafi 140N, Supac 4NP, or similar material). At its highest point, a perforated pipe invert should be at least as low as the bottom of the footing, and it should be sloped for drainage. Drainage should also be provided inside the footprint of a structure, where (1) a crawl space will slope or be lower than the surrounding ground surface, (2) an excavation encounters significant seepage, or (3) an excavation for a building will be close to the expected high groundwater elevations. We can provide recommendations for interior drains, should they become necessary, during excavation and foundation construction.

All roof and surface water drains must be kept separate from the foundation drain system. A typical drain detail is attached to this report as Plate 10. For the best long-term performance, perforated PVC pipe is recommended for all subsurface drains.

No groundwater was observed during our field work. However, if seepage is encountered in an excavation, it should be drained from the site by directing it through drainage ditches, perforated pipe, or French drains, or by pumping it from sumps interconnected by shallow connector trenches at the bottom of the excavation.

The excavation and site should be graded so that surface water is directed off the site and away from the tops of slopes. Water should not be allowed to stand in any area where foundations, slabs, or pavements are to be constructed. Final site grading in areas adjacent to buildings should slope away at least 2 percent, except where the area is paved. Water from roof, storm water, and foundation drains should not be discharged onto slopes; it should be tightlined to an approved discharge facility or to a suitable outfall located away from any slopes.

Pavement Areas

All pavement sections may be supported on competent, native soil or structural fill, provided these soils can be compacted to a 95 percent density and is in a stable, non-yielding condition at the time of paving. Structural fill or fabric may be needed to stabilize soft, wet, or unstable areas. We recommend using Supac 5NP, manufactured by Phillips Petroleum Company, or a non-woven fabric with equivalent strength and permeability characteristics. In most instances where unstable subgrade conditions are encountered, 12 inches of granular, structural fill will stabilize the subgrade, except for very soft areas where additional fill could be required. The subgrade should be evaluated by Geotech Consultants, Inc., after the site is stripped and cut to grade. Recommendations for the compaction of structural fill beneath pavements are given in a later sub-section entitled General Earthwork and Structural Fill. The performance of site pavements is directly related to the strength and stability of the underlying subgrade.

The pavement for lightly loaded traffic and parking areas should consist of 2 inches of asphalt concrete (AC) over 4 inches of crushed rock base (CRB) or 3 inches of asphalt-treated base (ATB). We recommend providing heavily loaded areas with 3 inches of AC over 6 inches of CRB or 4 inches of ATB. Heavily loaded areas are typically streets receiving truck traffic. For a subdivision, the heaviest traffic loads occur during house construction.

The pavement section recommendations and guidelines presented in this report are based on our experience in the area and on what has been successful in similar situations. Some maintenance and repair of limited areas can be expected. To provide for a design without the need for any repair would be uneconomical.

General Earthwork and Structural Fill

All building and pavement areas should be stripped of surface vegetation, topsoil, organic soil, and other deleterious material. It is extremely important if the existing house is to be removed that the foundations and slabs also be removed. The stripped or removed materials should not be mixed with any materials to be used as structural fill, but they could be used in non-structural areas, such as landscape beds.

Structural fill is defined as any fill placed under a building, behind permanent retaining or foundation walls, or in other areas where the underlying soil needs to support loads. All structural fill should be placed in horizontal lifts with a moisture content at, or near, the optimum moisture content. The optimum moisture content is that moisture content that results in the greatest compacted dry density. The moisture content of fill is very important and must be closely controlled during the filling and compaction process.

The allowable thickness of the fill lift will depend on the material type selected, the compaction equipment used, and the number of passes made to compact the lift. The loose lift thickness should not exceed 12 inches. We recommend testing the fill as it is placed. If the fill is not compacted to specifications, it can be recompacted before another lift is placed. This eliminates the need to remove the fill to achieve the required compaction. The following table presents recommended relative compactions for structural fill:

Location of Fill Placement	Minimum Relative Compaction
Beneath footings, slabs or walkways	95%
Behind retaining walls	90%
Beneath pavements	95% for upper 12 inches of subgrade; 90% below that level

Where; Minimum Relative Compaction is the ratio, expressed in percentages, of the compacted dry density to the maximum dry density, as determined in accordance with ASTM Test Designation D 1557-78 (Modified Proctor).

Use of On-Site Soil

If grading activities take place during wet weather, or when the silty, on-site soil is wet, site preparation costs may be higher because of delays due to rain and the potential need to import granular fill. The on-site soil is generally silty and therefore moisture-sensitive. Grading operations will be difficult during wet weather, or when the moisture content of this soil exceeds the optimum moisture content.

The moisture content of the silty, on-site soil must be at, or near, the optimum moisture content, as the soil cannot be consistently compacted to the required density when the moisture content is significantly greater than optimum. The moisture content of the on-site soil was generally above the estimated optimum moisture content at the time of our explorations, as the explorations occurred in early summer in a generally wet year. The on-site sand underlying the topsoil could be used as structural fill, if grading operations are conducted during hot, dry weather, when drying the wetter soil by aeration is possible. During excessively dry weather, however, it may be necessary to add water to achieve the optimum moisture content.

Moisture-sensitive soil may also be susceptible to excessive softening and "pumping" from construction equipment, or even foot traffic, when the moisture content is greater than the optimum moisture content. It may be beneficial to protect subgrades with a layer of imported sand or crushed rock to limit disturbance from traffic.

Ideally, structural fill that will be placed in wet weather should consist of a coarse, granular soil with a silt or clay content of no more than 5 percent. The percentage of particles passing the No. 200 sieve should be measured from that portion of soil passing the three-quarter-inch sieve.

LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based on site conditions as they existed at the time of our exploration and assume that the soil encountered in the test pits is representative of subsurface conditions on the site. If the subsurface conditions encountered during construction are significantly different from those observed in our explorations, (or assumed to exist in the excavations), we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. Unanticipated soil conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking soil samples in test pits. Subsurface conditions can also vary between exploration locations. Such unexpected conditions frequently require making additional expenditures to attain a properly constructed project. It is recommended that the owner consider providing a contingency fund to accommodate such potential extra costs and risks. This is a standard recommendation for all projects.

This report has been prepared for the exclusive use of L D & D Construction and its representatives for specific application to this project and site. Our recommendations and conclusions are based on observed site materials, and selective laboratory testing and engineering analyses. Our conclusions and recommendations are professional opinions derived in accordance with current standards of practice within the scope of our services and within budget and time constraints. No warranty is expressed or implied. The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. We recommend including this report, in its entirety, in the project contract documents so the contractor may be aware of our findings.

ADDITIONAL SERVICES

In addition to reviewing the final plans, Geotech Consultants, Inc. should be retained to provide geotechnical consultation, testing, and observation services during construction. This is to confirm that subsurface conditions are consistent with those indicated by our exploration, to evaluate whether earthwork and foundation construction activities comply with the intent of contract plans and specifications, and to provide recommendations for design changes in the event subsurface conditions differ from those anticipated prior to the start of construction. However, our work would not include the supervision or direction of the actual work of the contractor and its employees or agents. Also, job and site safety, and dimensional measurements, will be the responsibility of the contractor.

The scope of our work did not include an environmental assessment, but we can provide this service, if requested.

The following plates are attached and complete this report:

Plate 1	Vicinity Map
Plate 2	Site Exploration Plan
Plates 3 - 6	Test Pit Logs
Plate 7	Footing Drain Detail

We appreciate the opportunity to be of service on this project. If you have any questions, or if we may be of further service, please do not hesitate to contact us.

Respectfully submitted,

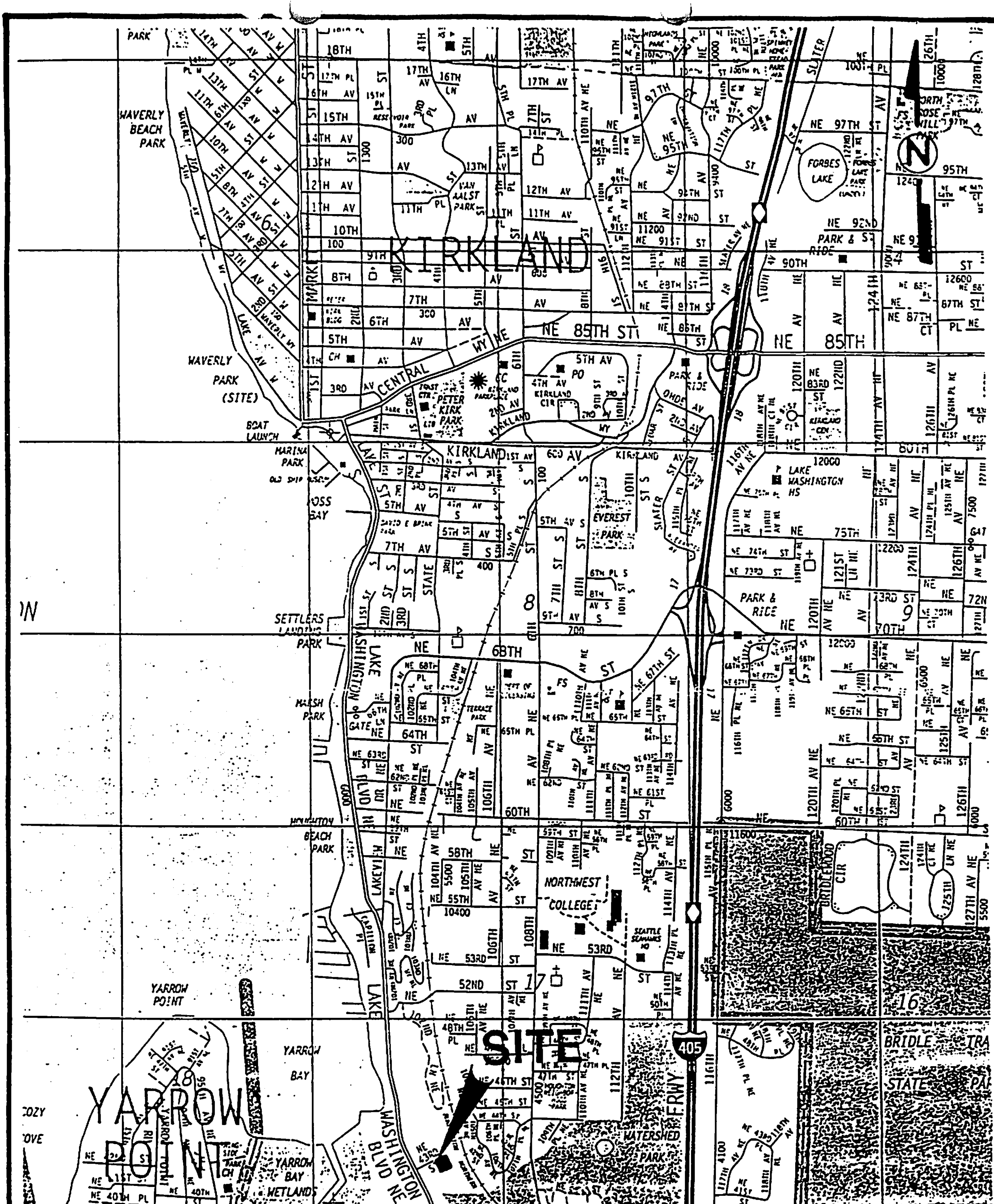
GEOTECH CONSULTANTS, INC.

7-28-97

EXPIRES 8/17/97

James R. Finley, Jr., P.E.
Principal

DBG/MRM/JRF:cpc



VICINITY MAP

NE 43rd STREET
KIRKLAND, WA

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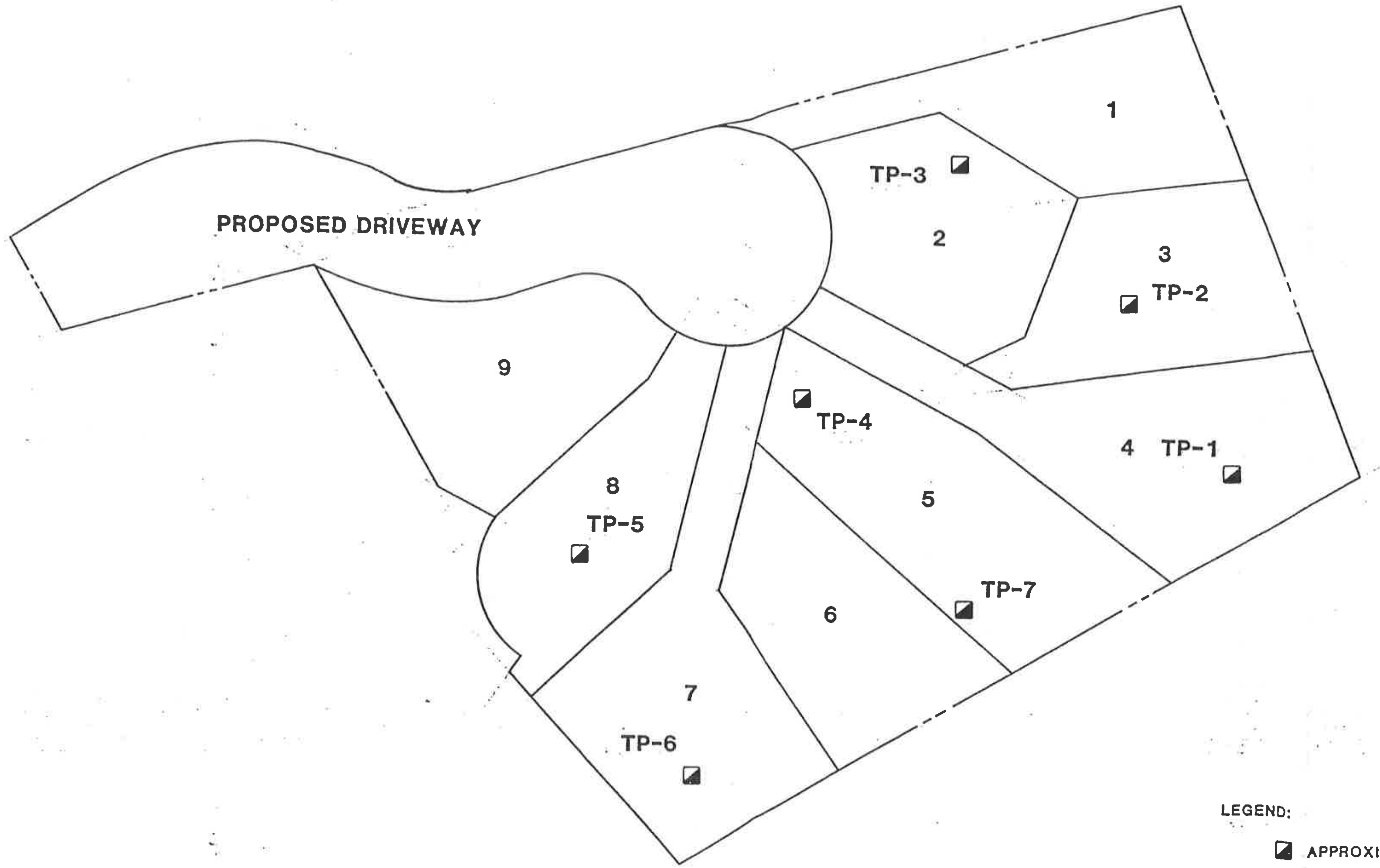

LEGEND:

◪ APPROXIMATE TEST PIT LOCATIONS

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SITE EXPLORATION PLAN

NE 43rd STREET

KIRKLAND, WA

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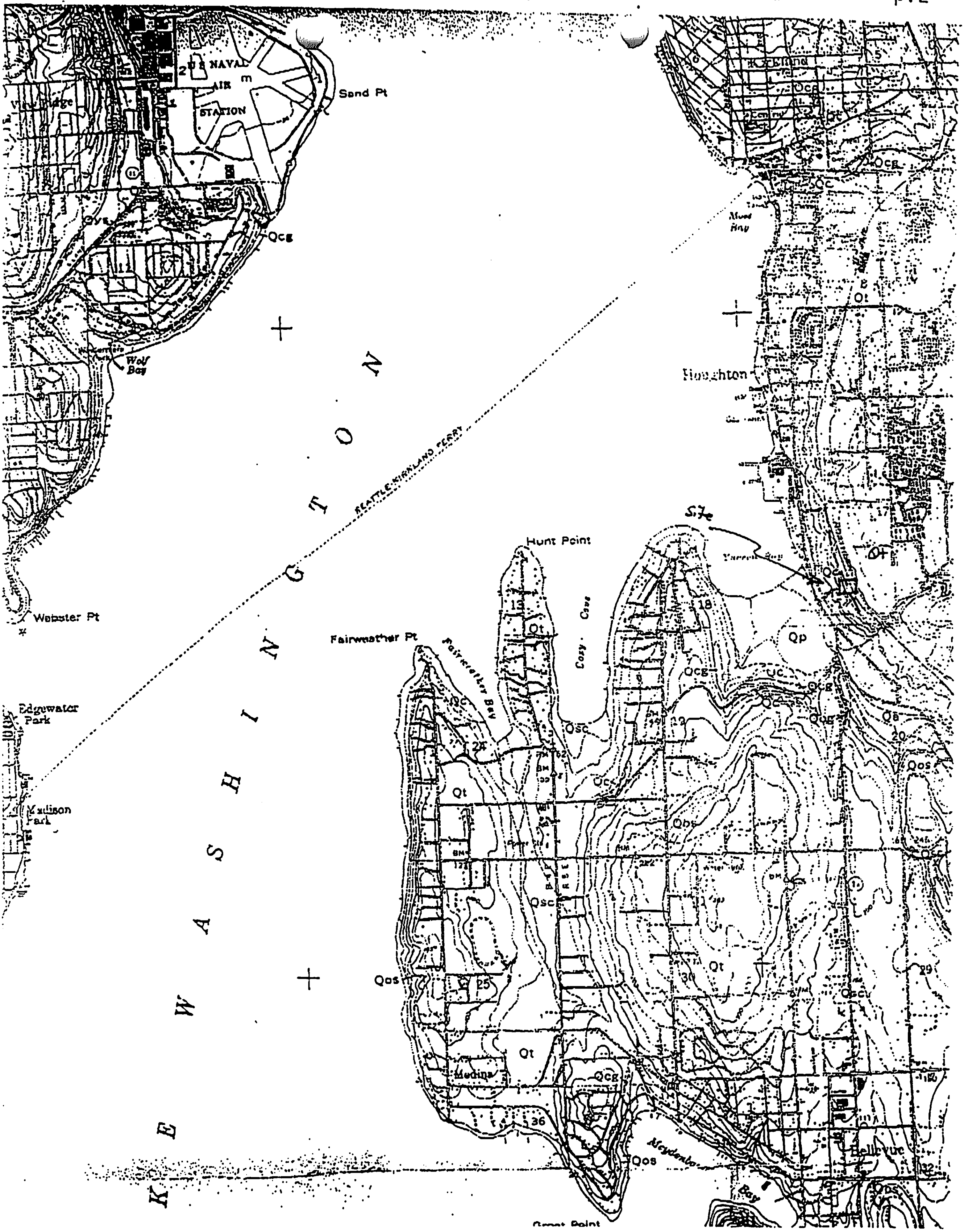

U S NAVAL
AIR
STATION
Sand Pt
Qcg
Wolf Bay
Webster Pt
Edgewater Park
Madison Park
K E W A S H I N G T O N
SEATTLE-KIRKLAND FERRY
Houghton
Site
Hunt Point
Fairweather Pt
Fairweather Bay
Cozy Cove
Qt
Qp
Qc
Qsc
Qos
Medina
Bellevue
Meydenbauer Bay

GEOTECH
CONSULTANTS INC

MEMORANDUM

13256 N.E. 20th St. (Northup Way)
Suite 16
Bellevue, WA 98005
(~~206~~ 425) 747-5618

To: Bob Rux
Via Fax # 425-889-8723

Attn.

From: Jim Finley

Project: Proposed Plat, NE 43rd @ BNRR, Kirkland

Subject: Geologic Conditions

Page 1 of 2

Date 12/17/99

Job Number 97219

Fax Number

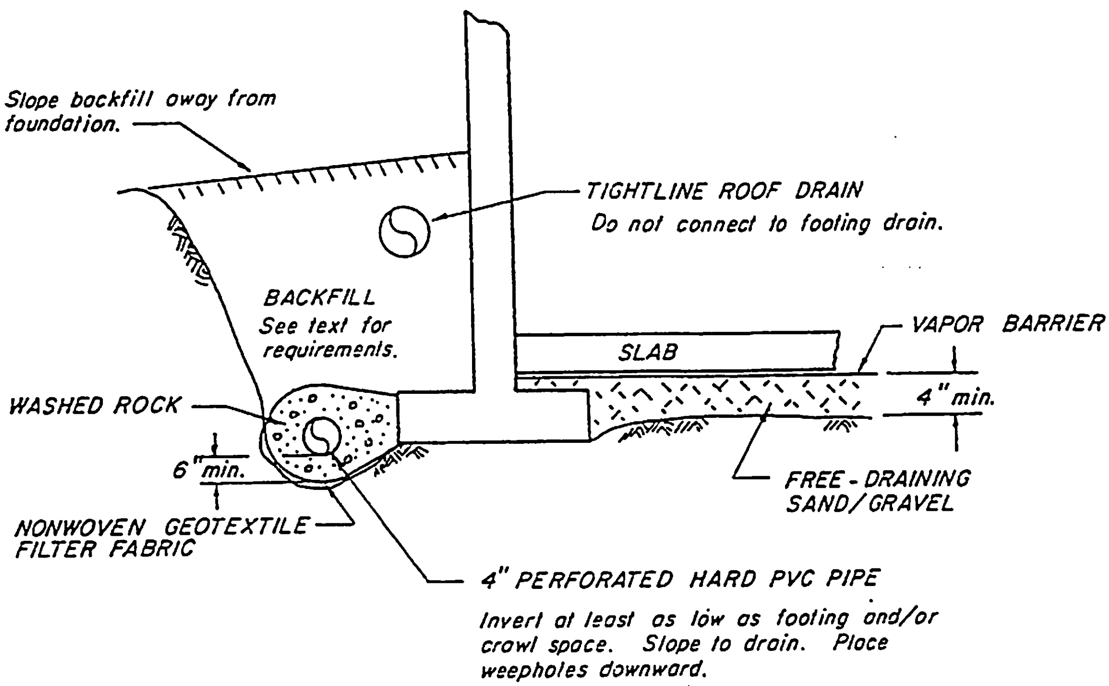
This memo is in response to your request for information concerning soils conditions on adjacent parcels. The USGS map of the area "Preliminary Geologic Map of Seattle & Vicinity, Wa", 1962 (Portion attached to this memo indicates that the property is close to the line between Qc (Older Clay till & gravel) and Q: (glacial till) Our test pits encountered sands over glacial till. Test pits done on 4500 Lk Wa. Blvd on another project found clays near Lake Wa Blvd. Tests pits above the subject job have encountered sands, and tills.

Based on the test pit results, it appears that the soils we encountered are consistent with the geologic map although the line between the till & clays is a little farther to the west. The subject site is in a very stable soil formation (glacial till) The clays which are more subjective to landslides are located to the west of the subject site.

Attachment.

cc:

James Finley PE.



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FOOTING DRAIN DETAIL

NE 43rd STREET
KIRKLAND, WA

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TEST PIT 7

Depth(ft.)	Moisture Content	USCS	Description
0			Forest duff and topsoil
		SM	Red-brown to tan silty SAND, fine-grained, moist, loose to medium-dense
5		SM	Gray silty SAND with some gravel, moist, dense (Glacial Till)
10			
15			

Test pit terminated at 10 feet below grade on 6-20-97.
No groundwater seepage encountered during excavation.
No caving.

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TEST PIT LOGS
NORTHEAST 43RD STREET
KIRKLAND, WA

Job No:	Date:	Logged by:	Plate:
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TEST PIT 5

Depth (ft.)	Moisture Content	USCS	Description
0			Forest duff and topsoil
		SM	Red-brown silty SAND with trace gravel, fine-grained, moist, medium-dense - becomes tan
5		SM	Gray silty SAND with gravel, moist, dense to very dense (Glacial Till)

Test pit terminated at 9 feet below grade on 6-20-97.
No groundwater seepage encountered during excavation.
No caving.

TEST PIT 6

Depth (ft.)	Moisture Content	USCS	Description
0			Forest duff and topsoil
		SM	Tan, very silty SAND, fine-grained, moist to very moist, medium-dense - becomes cobbley
5		SM	Tan to gray silty SAND with gravel, moist, dense, some cobbles (Glacial Till)

Test pit terminated at 9 feet below grade on 6-20-97.
No groundwater seepage encountered during excavation.
No caving.

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TEST PIT LOGS
NORTHEAST 43RD STREET
KIRKLAND, WA

Job No:	Date:	Logged by:	Plate:
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TEST PIT 3

Depth (ft.)	Moisture Content	USCS	Description
0			Forest duff and topsoil
		SM	Red-brown silty SAND with trace gravel, fine-grained, dry to moist, medium-dense
5		SM	Gray silty, gravelly SAND, moist, dense to very dense (Glacial Till)
10			Test pit terminated at 9 feet below grade on 6-20-97. No groundwater seepage encountered during excavation. No caving.
15			

TEST PIT 4

Depth (ft.)	Moisture Content	USCS	Description
0			Forest duff and topsoil
		SM	Red-brown to tan silty SAND with some gravel, fine-grained, moist, medium-dense
5		SM	Gray silty SAND with some gravel, moist, dense to very dense (Glacial Till)
10			Test pit terminated at 10 feet below grade on 6-20-97. No groundwater seepage encountered during excavation. No caving.
15			

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TEST PIT LOGS
NORTHEAST 43RD STREET
KIRKLAND, WA

Job No:	Date:	Logged by:	Plate:
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TEST PIT 1

USCS	Description
FILL	Tan silty SAND with trace gravel, moist, medium-dense (FILL)
SM	Brown silty SAND with some organics, moist, loose (Topsoil)
SM	Red-brown silty SAND, fine-grained, moist, medium-dense
SM	Tan-gray silty SAND with some gravel, very moist, dense
ML	- becomes sandy SILT, very moist, dense

Depth(ft.): 0, 5, 10, 15 — Moisture Content

Test pit terminated at 11 feet below grade on 6-20-97.
No groundwater seepage encountered during excavation.
No caving.

TEST PIT 2

USCS	Description
	Forest duff and topsoil
SM	Red-brown silty SAND, fine-grained, dry to moist, medium-dense
SP	Tan-brown gravelly SAND, fine to medium-grained, dry to moist, medium-dense (occasional cobbles and one boulder 2' diameter)
SM	Gray silty SAND with gravel, moist, dense to very dense (Glacial Till)

Depth(ft.): 0, 5, 10, 15 — Moisture Content

Test pit terminated at 10 feet below grade on 6-20-97.
No groundwater seepage encountered during excavation.
No caving.

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CONSULTANTS, INC.

TEST PIT LOGS
NORTHEAST 43RD STREET
KIRKLAND, WA

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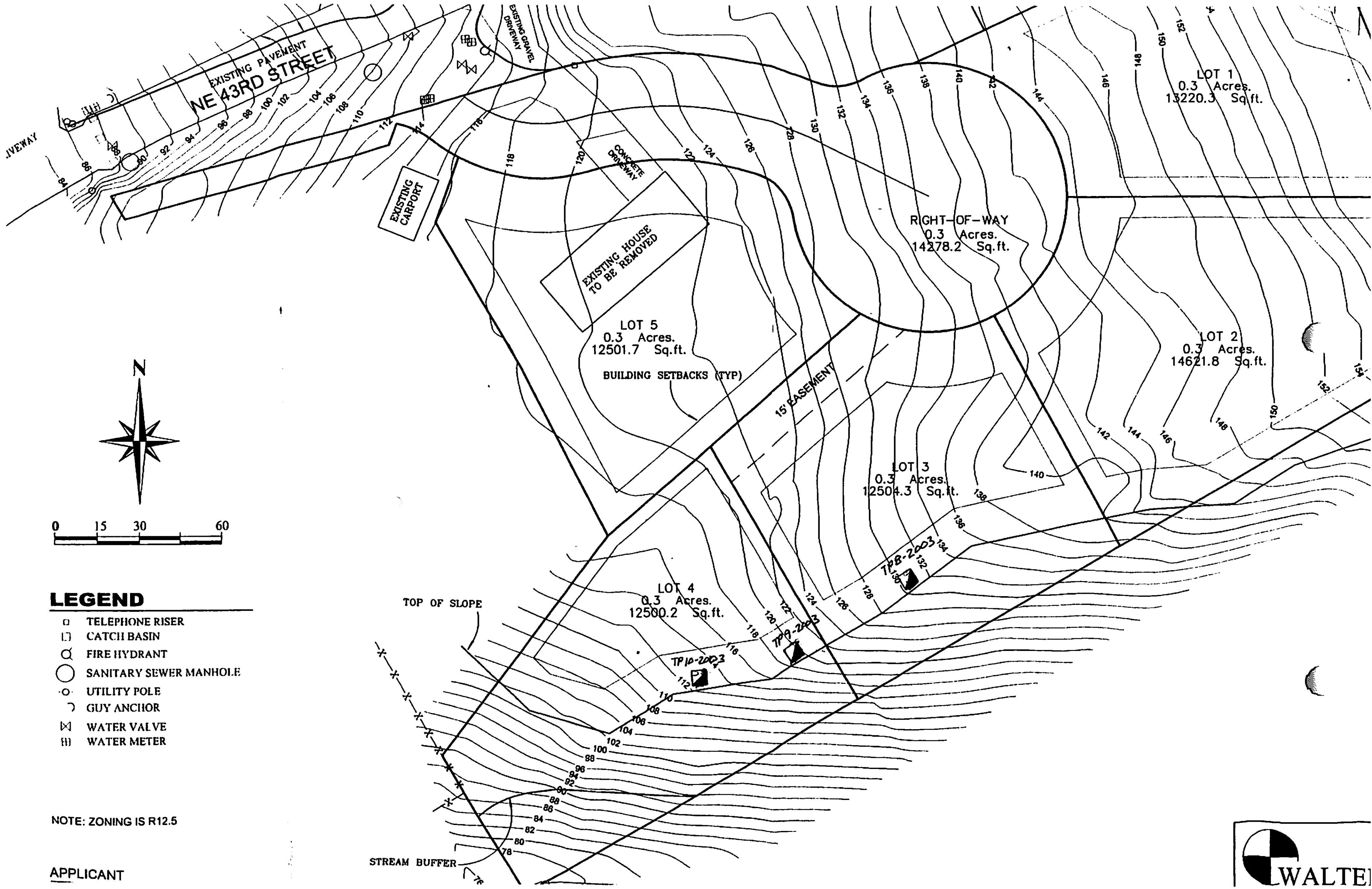


LEGEND

- TELEPHONE RISER
- CATCH BASIN
- FIRE HYDRANT
- SANITARY SEWER MANHOLE
- UTILITY POLE
- GUY ANCHOR
- WATER VALVE
- WATER METER

NOTE: ZONING IS R12.5

APPLICANT

WALTE

1/6
JN03286

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

Static Case

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	10.00	10.00	10.00	1
2	10.00	10.00	60.00	30.00	1
3	60.00	30.00	110.00	35.00	1
4	0.00	5.00	11.00	5.00	2
5	11.00	5.00	61.00	25.00	2
6	61.00	25.00	110.00	30.00	2

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

2/6
JN03286

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	0.0	30.0	0.00	0.0	0
2	115.0	125.0	0.0	38.0	0.00	0.0	0

Trial Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	10.00	10.00
2	25.00	12.00
3	60.00	24.00
4	63.00	30.30

Circle Center At X = 0.1 ; Y = 141.8 and Radius, 132.1

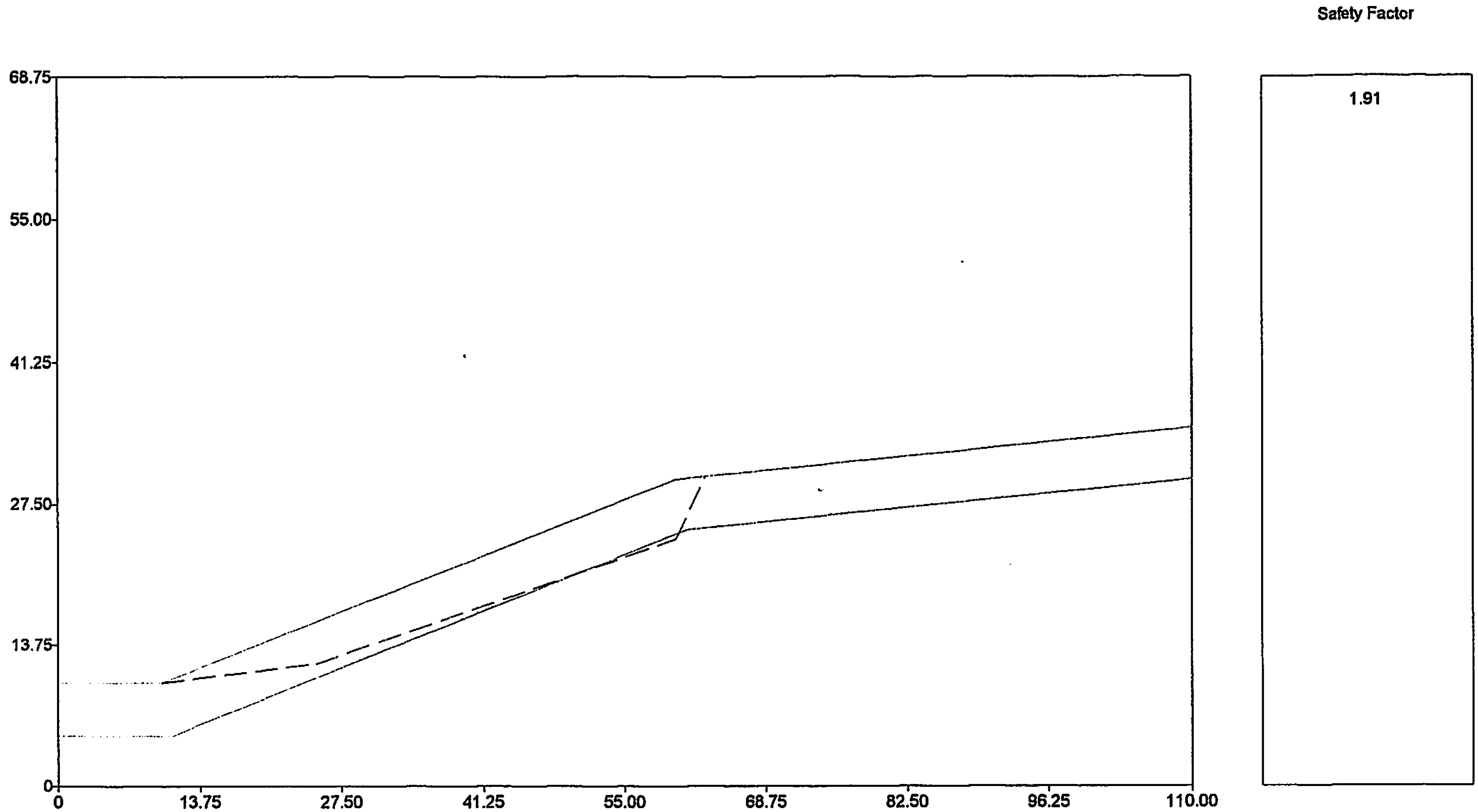
Factor Of Safety For The Preceding Specified Surface = 1.911

WARNING - Factor Of Safety Is Calculated By The Modified Bishop
Method. This Method Is Valid Only If The Failure Surface
Approximates A Circle.

```
        Y      A   X   I   S       F   T

       0.00    13.75    27.50    41.25    55.00    68.75

X     0.00 +---*--*--+---------+---------+---------+---------+
           -
           -
           -
           -    *
           -  *
     13.75 +
           -
           -
           -
           -
           -      S
A    27.50 +
           -
           -
```


Safety Factor
1.91
68.75
55.00
41.25
27.50
13.75
0
0
13.75
27.50
41.25
55.00
68.75
82.50
96.25
110.00

JN03286
76

4/

JN03286

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

Seismic Condition

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	10.00	10.00	10.00	1
2	10.00	10.00	60.00	30.00	1
3	60.00	30.00	110.00	35.00	1
4	0.00	5.00	11.00	5.00	2
5	11.00	5.00	61.00	25.00	2
6	61.00	25.00	110.00	30.00	2

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

3/6

JN03286

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	0.0	30.0	0.00	0.0	0
2	115.0	125.0	0.0	38.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

Trial Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	10.00	10.00
2	25.00	12.00
3	60.00	24.00
4	63.00	30.30

Circle Center At X = 0.1 ; Y = 141.8 and Radius, 132.1

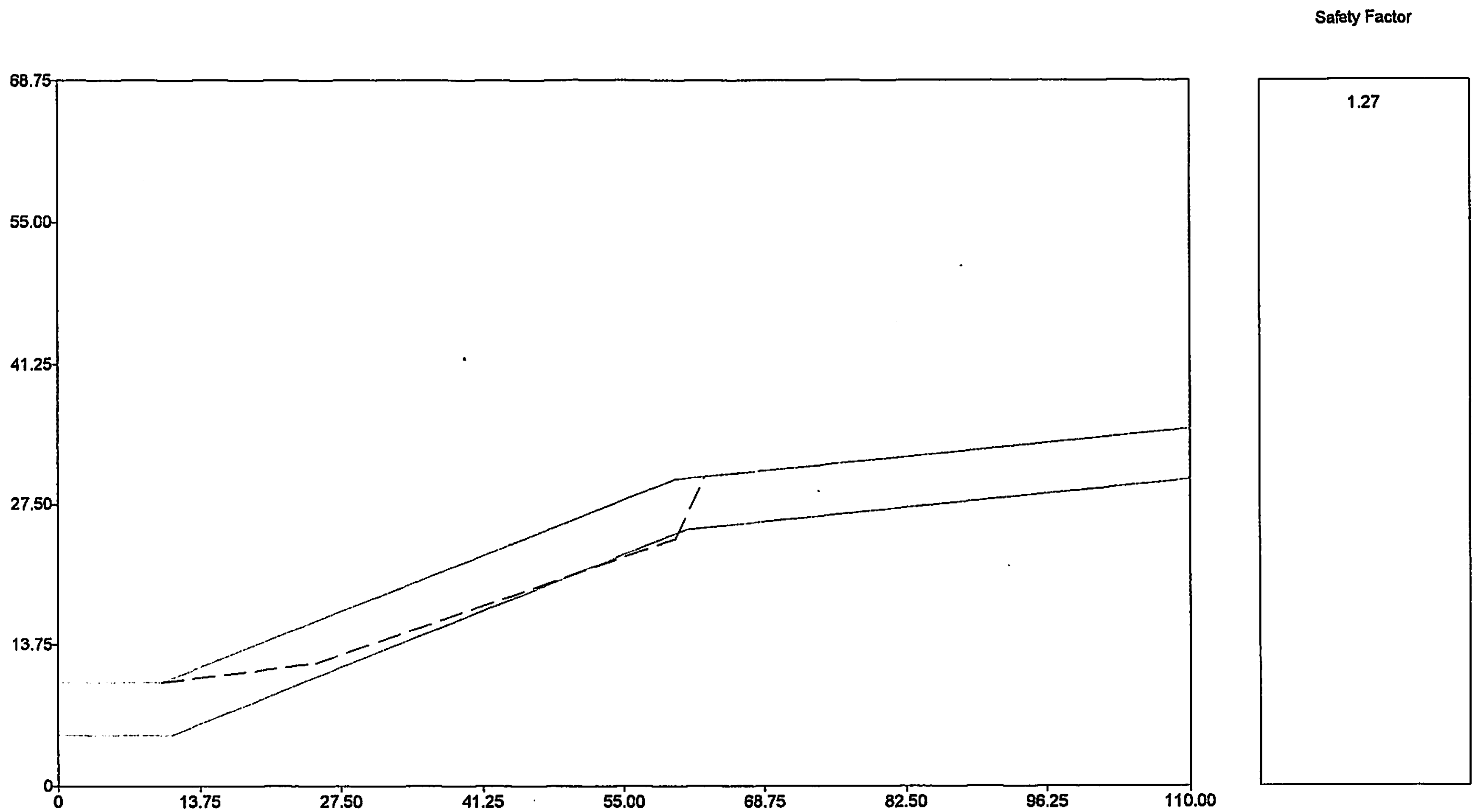
Factor Of Safety For The Preceding Specified Surface = 1.269

WARNING - Factor Of Safety Is Calculated By The Modified Bishop
Method. This Method Is Valid Only If The Failure Surface
Approximates A Circle.

```
        Y      A  X  I  S      F  T

        0.00   13.75   27.50   41.25   55.00   68.75

X    0.00 +---*--*--+---------+---------+---------+---------+
          -
          -
          -
          -   *
```



Safety Factor
1.27
68.75
55.00
41.25
27.50
13.75
0
0
13.75
27.50
41.25
55.00
68.75
82.50
96.25
110.00

TEST PIT 8 - 2003

Depth (ft.)	Moisture Content (%)	Water Table	USCS	Description
			SM	Duff over brown, silty SAND with roots, fine-grained, dry, loose
			SP SM	Brown, slightly silty SAND with occasional gravel, fine-grained, damp, medium-dense - becomes tan mottled with gray, dense - becomes tan SAND with lenses of silty sand, fine to medium-grained
			SW	Tan SAND, medium to coarse-grained, damp, very dense

Depth scale: 5, 10, 15

- **Test Pit was terminated at 11 feet on June 27, 2003.**
- **No groundwater seepage was observed during excavation.**
- **No caving was observed during excavation.**

TEST PIT 9 - 2003

Depth (ft.)	Moisture Content (%)	Water Table	USCS	Description
			SM	Duff over brown, silty SAND with roots, fine-grained, dry, loose
			SW	Tan, gravelly SAND, medium to fine-grained, damp, very dense - becomes moist
			SP SM	Brown, slightly silty, gravelly SAND, medium to fine-grained, moist, very dense

Depth scale: 5, 10, 15

- **Test Pit was terminated at 6 feet on June 27, 2003.**
- **No groundwater seepage was observed during excavation.**
- **No caving was observed during excavation.**

GEOTECH CONSULTANTS, INC.

TEST PIT LOG

Northeast 43rd Street
Kirkland, Washington

Job No:	Date:	Logged by:	Plate:
03286	July 2003	MRM	3

TEST PIT 10 - 2003

Depth (ft.)	Moisture Content (%)	Water Table	USCS	Description
			SM	Duff over brown, silty SAND with roots, fine-grained, damp, loose
			SP SM	Brown, slightly silty SAND, fine-grained, damp, medium-dense
5			SM	Orangish-brown, silty, gravelly SAND, fine-grained, moist, very dense
10				
15				

* Test Pit was terminated at 6 feet on June 27, 2003.
* No groundwater seepage was observed during excavation.
* No caving was observed during excavation.

GEOTECH CONSULTANTS, INC.

TEST PIT LOG

Northeast 43rd Street
Kirkland, Washington

Job No:	Date:	Logged by:	Plate:
03286	July 2003	MRM	4