Russ McElroy

PROJECT MANUAL

Specifications - Part A

DIVISIONS 0 - 6

for

HILLTOP MIDDLE SCHOOL
Modernization & Addition

Ilwaco, WA

for

OCEAN BEACH SCHOOL DISTRICT NO. 101

July 13, 2005

BID DOCUMENTS

Ambia Enduring Architecture

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GEOTECHNICAL DATA

PART 1 - GENERAL

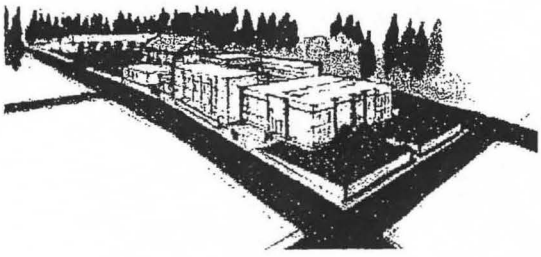
1.01 DESCRIPTION

A. **SOILS INFORMATION**

1. The soils report titled "*Geotechnical Engineering Services Report, Proposed Ilwaco Middle School Additions (Currently Hilltop Elementary School), Ilwaco, Washington*," dated May 16, 2005, as prepared by Professional Service Industries, Inc., is included immediately following this document for Contractor's reference.

2. The results of such investigations is offered in good faith and included herein solely for the purpose of placing the Contractor in receipt of soils borings and other information available. Investigation of subsurface conditions on the site have been made for design purposes; however, all recommendations of these reports shall be included as contract requirements and followed by the Contractor, except where specifically indicated or specified otherwise in these Contract Documents. There is no guarantee, either expressed or implied, that the conditions indicated are representative of those existing throughout the site, or that unforeseen developments may not occur.

3. The Contractor shall be solely responsible for any interpretations of the information or extrapolations beyond the location of each individual boring or test pit and acknowledges that he is not relying upon such data a accurately describing the subsurface conditions which may be found to exist.



GEOTECHNICAL ENGINEERING SERVICES REPORT

Proposed Ilwaco Middle School
Additions
(Currently Hilltop Elementary School)
Ocean Beach School District
405 Northeast School Road
Ilwaco, Washington

Prepared for

CSG/ESD #12
2500 Northeast 65th
Vancouver, Washington 98661

Prepared by

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PSI REPORT NO. 704-55050-1
May 16, 2005

Information To Build On
Engineering • Consulting • Testing

May 16, 2005

Mr. Russ McElroy
CSG/ESD #12
2500 Northeast 65th
Vancouver, Washington 98661

Subject: Geotechnical Engineering Services Report
Proposed Ilwaco Middle School Additions (Currently Hilltop Elementary School)
Ocean Beach School District
405 Northeast School Road, Ilwaco, Washington
PSI Report No. 704-55050-1

Dear Mr. McElroy:

Professional Service Industries, Inc. (PSI) is pleased to submit our Geotechnical Evaluation Report for the above-referenced project. The purpose of these services was to assist you, the architect, and the engineer in designing foundations and pavement, and preparing plans and specifications for construction of the proposed additions. Our evaluation was completed in general accordance with PSI Proposal No. 704-05-015, dated January 19, 2005. You provided written authorization for our services by signing our proposal on February 2, 2005.

Our geotechnical engineering investigation indicates the property is considered to be suitable for the intended additions and renovations, from a geotechnical standpoint, provided the recommendations in the attached report are incorporated into the design and construction of the project. If we can provide additional assistance, or observation and testing services during construction, please do not hesitate to contact Troy Hull at (503) 978-4707.

Sincerely,
Professional Service Industries, Inc.

Tima Carlson
Geologic Associate
Geotechnical Services

Troy Hull, P.E.
Regional Geotechnical Engineer
Geotechnical Services

Attachment: Geotechnical Engineering Services Report

Distribution: Addressee (3 copies)
Curtis Clark, Ambia Enduring Architecture (3 copies)
Pat Barlow, Ambia Enduring Architecture (1 copy)
Jeff Klein, Putnam Collins Scott Associates (1 copy)

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Figure 2, Soil Boring Location Plan
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Geotechnical Engineering Services Report
Proposed Ilwaco Middle School Additions
(Currently Hilltop Elementary School)
Ocean Beach School District
405 Northeast School Road, Ilwaco, Oregon
PSI Report No. 704-55050-1
May 16, 2005

1.0 Introduction

Professional Service Industries, Inc. (PSI) has conducted a geotechnical evaluation for the above-referenced project site in general accordance with the scope of work as outlined in our Proposal Number 704-05-P015 to Mr. Russ McElroy of ESD #112, dated January 3, 2005. Mr. McElroy provided written authorization by signing our proposal on February 2, 2005.

2.0 Project Information and Proposed Construction

Project information was provided by Mr. Nathaniel Hultman and Ms. Pat Barlow (project civil engineer) of Ambia Enduring Architecture (Ambia) and Mr. Jeff Klein with Putnam Collins Scott Associates (project structural engineer). We have also been furnished with a drawing titled 23052 A100 Layout (1), prepared by Ambia Enduring Architecture.

GeoStandards Corporation (GeoStandards)—formerly of Portland, Oregon—had originally submitted a Preliminary Geotechnical Evaluation report for the proposed additions on August 9, 2004 (GeoStandards Project No. L04-0222). In November, GeoStandards closed its Portland office and began referring its clients to PSI. On December 6, 2004, Mr. Hultman contacted PSI's office for additional assistance with geotechnical engineering recommendations originally provided by GeoStandards, at the request of Ms. Barlow and Mr. Klein. They were requesting additional geotechnical engineering information not contained in GeoStandards' August 9, 2004 Preliminary Geotechnical Evaluation Report to complete the civil and structural designs. Ms. Barlow's needs were outlined in a December 2, 2004 e-mail to Mr. Hultman. Mr. Klein's needs were outlined in an undated e-mail to Mr. Hultman that included a list of "Geotechnical Report Requirements for Structural Information (IBC 2003)." After reviewing the requested information from the civil and structural engineer, as well as GeoStandards' preliminary report, we agreed that additional work was needed to address the needs of the Civil and Structural Engineers to complete the project design.

We understand the proposed construction will include:

- A new Gymnasium north of the Commons. The location of the proposed gymnasium currently consists of an asphalt paved and bark covered playground area. The building will be precast concrete with a footprint of about 6,000 square feet. Maximum continuous wall and isolated column foundation loads will be about 4 ksf and 32 to 40 kips, respectively.
- A new 2-story Administration building northwest of the existing Classroom building with a footprint of about 2,000 square feet.
- A new 2 story building addition between the existing Classroom building and Commons. The building footprint will be about 1,300 square feet.
- A new 6,000 to 7,000 square foot courtyard between the existing Auditorium and Commons. Part of the school buildings will need to be demolished to make room for the courtyard.
- Asphalt paving of the staff car parking lot (light duty) to the south of Hemlock Street. The capacity will be 17 parking stalls and a footprint of about 6,000 square feet. This location is currently the site of a small wood frame building, which will be demolished, and a gravel parking lot.
- Heavy duty concrete pavement at the bus drop off area.
- Heavy duty asphalt pavement at the school main entrance off of Brumbach Street.
- Heavy duty asphalt pavement for a through drive from Brumbach Street to Advent Street, north of the new Gymnasium.
- Light duty asphalt pavement for visitor parking just south of west end of the existing bus barn. This area currently consists of an asphalt and bark covered play area. The footprint is about 9,000 to 10,000 square feet.
- Offsite storm pond on a graded (filled) level bench between the existing grandstand and bus barn.
- New basketball court just south of the east end of the bus barn (not part of our scope of work).

According to Ms. Barlow, proposed grading will generally consist of 1 to 2 feet of cut and fill, except at the new Administration Building, which will receive 6 to 8 feet of fill.

3.0 Scope of Work

The purpose of our evaluation was to assess the subsurface soil conditions at the site in order to address the questions raised by the civil and structural engineers pertaining to GeoStandards' Preliminary Geotechnical Evaluation report. In order to complete the transition as Geotechnical Engineer of Record from GeoStandards to PSI for this project, we have issued a complete report that can be relied upon entirely (i.e. at the option of the Owner, it supercedes the preliminary report by GeoStandards). In general, our evaluation included the following authorized scope of work items:

3.1 Subsurface Exploration

In order to observe soil conditions at the site, 14 soil borings (B-1 through B-14) were completed in proposed building and pavement areas using our CME 75 drill rig equipped with hollow-stem auger drilling equipment and an automatic standard penetration test (SPT) hammer. The borings were advanced to depths of 6-1/2 to 31-1/2 feet below existing grade, except for borings B-5, B-6 and B-14, which were drilled less than one foot to determine the pavement and underlying base rock thickness.

Three soil borings (P-1 through P-3) were completed in the proposed stormwater infiltration area just south of the existing high school grandstands and north of the proposed school additions to depths of 3, 5 and 7 feet for the purposes of evaluating the soil's infiltration potential.

The locations of all the borings are shown in Figure 2. Logs of the borings are also attached to this report. The borings were backfilled upon completion of the testing with soil cuttings, bentonite and capped with asphalt concrete, where appropriate to match existing pavement.

The SPT is performed by driving a 2-inch, O.D., split-spoon sampler into the undisturbed formation located at the bottom of the advanced auger with repeated blows of a 140-pound, pin-guided, hammer falling a vertical distance of 30 inches. The number of blows, N-Value, required to drive the sampler one foot, the last 12 inches of an 18-inch sample interval, is used to measure the soil consistency (for cohesive soil) and density (for granular soils). SPT samples for the borings were obtained using an **automatic** hammer which generally produce lower standard penetration test values than those obtained using a traditional safety hammer. Studies have generally indicated that penetration resistances may vary by a factor of 1.5 to 2 between the two methods. We have considered this drilling and testing methodology in our description of soil consistency and density, and in our evaluation of soil strength.

Soil samples in our proposed building and pavement borings were generally taken at 2.5-foot intervals for the first 10 feet, and then at 5-foot intervals to the termination depths of the borings. Samples were identified in the field, placed in sealed containers, and transported to the laboratory for further classification and testing.

3.2 Laboratory Testing

Selected samples of the subsurface soils encountered were returned to our laboratory for further evaluation to aid in classification of the materials, and to help assess their strength characteristics. The laboratory evaluation consisted of visual and textural examinations in accordance with ASTM D2487-00, moisture content tests in accordance with ASTM D2216-98, grain size analysis in accordance with ASTM D422-63, Atterberg Limits testing in accordance with ASTM D4318-00, and Expansion Index testing in accordance with ASTM D4829-95. Results of the tests completed by PSI are shown on the boring logs and in the laboratory test summary in the Appendix.

3.3 Engineering Analyses

Engineering analyses and recommendations regarding general foundation and retaining wall design for the building, including foundation design recommendations, minimum foundation depth requirements, and estimates of foundation settlement are included in this report. In addition, recommendations were developed addressing site preparation, placement and compaction of fill materials.

The geotechnical recommendations presented in this report are based solely on the available project information, the approximate building locations and depths, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform us in writing so that we may amend the recommendations presented in this report, if appropriate and if desired by the client. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

The scope of services did not include a Seismic Site Hazard Investigation in accordance with the 2003 International Building Code. Nor did it include an environmental evaluation for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air, on or below, or around this site. Any statements in this report or on the test pit logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for information purposes.

4.0 Surface and Subsurface Features

4.1 Site Description

The site for the proposed Ilwaco Middle School is located at 405 Northeast School Road in Ilwaco, Pacific County, Washington. According to the Pacific County Tax Assessor's office, the existing school building is approximately 55,375 square feet. It is bordered by the existing middle and high school facility to the north, Hemlock Street to the south, Advent Street to the east, and Brumbach Street to the west. Currently the school is composed of 3 buildings (classroom building, auditorium, and gymnasium), which were constructed in 1936.

Ground surface elevations range from a maximum of approximately 50 feet MSL at the intersection of Advent Street and Hemlock Avenue to approximately 75 feet MSL at the intersection of Advent Street and the northeastern entrance to the playground of the subject property, according to USGS Ilwaco, Washington quadrangle, 1981.

4.2 Geology and Soils

Ilwaco is located in southwestern Washington, on the Long Beach Peninsula, located between the Pacific Ocean and the Columbia River. The structural geology is *composed of anticlines* and synclines. According to the USGS Geologic Map of the Astoria and Ilwaco Quadrangles, Washington and Oregon, an unnamed fault is located to the south of the site, approximately 2,000

feet, running southwest to northeast. The subject property is located in the Siltstone of Shoalwater Bay of Wells (Tsb) of the middle and upper Eocene. The unit is dark-gray, thin-bedded, laminated, indurated tuffaceous siltstone containing thin tuff beds, minor thin-bedded feldspathic sandstone, and calcareous concretions. We did encounter weathered siltstone in our soil boring explorations.

The following is a summary of surface pavement section and subsurface soil conditions encountered in our borings:

Asphalt Concrete Pavement Section – A 2 to 12-inch thick layer of asphalt concrete pavement extended across the playground, which was underlain by 2 to 12 inches of crushed rock base course.

Fill – We observed soft to very stiff clayey silt, which we interpreted to be fill, extending to approximate depths of 4 to 6.5 feet below the ground surface in borings B-3 through B-5 and B-7 through B-12. This area of fill was located in the playground area north of the school building, excluding the depression area where B-1 and B-2 were located. Generally, the material consisted of a brown to dark brown clayey silt matrix with some occasional gravel. The moisture content of the samples tested ranged from 29 to 51 percent. SPT blow counts for the last 12 inches ranged from 3 to 13, indicating soft to very stiff consistency. Pocket penetrometer tests were also performed on selected cohesive samples with measured strengths ranging from 0.5 to 2.0 tsf, indicating soft to stiff consistency. In addition, Atterberg Limits were performed on selected cohesive samples of the fill material, which indicated the soil was classified as low plasticity clay and silt, CL-ML, (liquid limit 47, plasticity index 12). It should be noted that the fill soils may have originally been excavated from other areas of the school property during past construction activities and that what we have called fill, may actually be undisturbed native soil at some boring locations and/or depths. Also note that an apparent buried stump or log was encountered in boring B-13 from 2-1/2 to about 10 feet below existing grade. Only wood pieces were obtained in the SPT samples at 2-1/2, 5 and 7-1/2 foot depths. Based on sandy soil observed in the auger cuttings, we anticipate that the soil conditions at this boring location consist of sand fill. For clarification, it appears that what we are calling "fill," GeoStandards referred to as "topsoil" in their preliminary report.

Siltstone – Underlying the apparent fill, and encountered beneath the surficial pavement section in borings B-1 and B-2, we observed weathered siltstone that extended to the maximum depths of our borings (6-1/2 to 31-1/2 feet below grade). Generally, the material consisted of siltstone with varying amounts of clay. The siltstone color included grayish-white, gray, brown, red, yellow, and black. The moisture content of the samples tested ranged from 36 to 49 percent. SPT blow counts for the last 12 inches ranged from 4 to 39, indicating medium stiff to hard consistency. Pocket penetrometer tests were also performed on selected cohesive samples with measured strengths ranging from 1 to 4 tsf, indicating medium stiff to hard consistency. In addition, Atterberg Limits were performed on selected cohesive samples of the fill material, which indicated the soil was classified as high plasticity silt, ML (liquid limits of 66 and 82, plasticity indices of 35 and 16).

The above subsurface descriptions are of a generalized nature to highlight the major subsurface stratification features, and material characteristics. The attached boring log data should be reviewed for specific information at individual boring locations regarding soil descriptions, stratification lines, penetration resistances, locations of samples, and laboratory test data. The stratification lines shown on the logs are approximate, and the actual transition between materials may be gradual. Variations in stratification depth may occur, and should be expected between boring locations.

4.3 Expansive Soils

Of particular concern on this project is the presence of expansive soils. GeoStandards' Preliminary Geotechnical Evaluation report indicated the native soils appeared to have shrink-swell potential. Their evaluation appeared to be based solely on Atterberg limits testing, where they got relatively high liquid limit values (58 and 61). GeoStandards recommended that footings be overexcavated 2 feet and backfilled with 1-inch minus, free-draining, clean crushed rock compacted fill to mitigate the risk of expansive soils. In addition, they recommended that floor slabs be overexcavated 1 foot. GeoStandards did not provide any mitigative recommendations for pavement areas.

Due to the high construction cost of overexcavating the native soils beneath footings and floor slabs, PSI performed a more extensive laboratory testing program, which included both Atterberg limits and Expansion Index (EI) testing in accordance with ASTM D4829-95. Our Atterberg limits test results were generally similar to GeoStandards' results, indicating a "potential" for expansiveness when subject to moisture content change. **We then performed EI lab tests on two high plasticity silt soil samples with EI test results of 39 and 47, which indicate the soil has a "low" expansion potential.** For reference, expansion potential is classified as follows:

EI Test Result	Expansion Potential
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
131+	Very High

4.4 Groundwater

Groundwater was encountered at 14 feet below existing grade in boring B-7 during our explorations. Given the low permeability of the silt and clay soils on the site, we anticipate that any water encountered within the construction depths would likely be perched, and not the water table. Variations in groundwater levels should be expected seasonally, annually, and from location to location. The contractor for this project should anticipate surface and subsurface seepage into any subsurface excavations.

4.5 Soil Percolation

Three percolation tests (P-1 through P-3) were conducted to the south of the grandstand (see Boring/Percolation Location Plan-Figure 2 in the Appendix). The tests were conducted in a lateral line at 3 foot, 5 foot, and 7 foot depths. At all 3 locations, we encountered a brown to dark brown topsoil ranging in thickness from 5 to 12 inches thick, underlain by a brown to reddish brown clayey silt fill to a depth of 1 to 2 feet, underlain by a grayish-white, gray, mottled, weathered siltstone to the depths of the percolation tests. Following the EPA Falling Head Percolation Test (Design Manual-On-site Wastewater Treatment and Disposal Systems, EPA, 1980) method, the 3 test holes were pre-soaked with water. The water did not percolate through the weathered siltstone layer. The test locations were checked the following day, and the water still had not percolated through the impermeable layer. Based on instructions from the Civil Engineer (Pat Barlow), we terminated the testing because the soil proved to be a poor infiltrator.

4.6 Seismic Considerations

In accordance with Table 1615.1.1 of the 2003 International Building Code (IBC), we recommend a Site Class C (very dense soil and soft rock profile) for this site when considering the average of the upper 100 feet. According to the United States Geological Survey (USGS) Earthquake Hazards website (http://eqhazmaps.usgs.gov/index.html), the Peak Ground Acceleration (PGA) is 0.59g and the maximum considered earthquake (MCE) ground motions for the site are S_S=1.44g and S_1=0.74g, for Site Class B and 5 percent critical damping (printout attached in Appendix). The USGS website values are a more accurate interpolation of the values presented in Figure 1615(8) of the IBC. In accordance with Tables 1615(1) and 1615(2) of the IBC, Site Coefficients F_a and F_v are 1.0 and 1.3, respectively for a Site Class C. Therefore the adjusted MCE ground motions are S_{MS}=1.44g and S_{M1}=0.96g (for Site Class C). The return interval for these ground motions is 2 percent probability of exceedance in 50 years. The site response spectrum can be determined using the above recommended values and Figure 1615.1.4 in the IBC.

Our evaluation of the surface and subsurface conditions, and review of regional geologic literature did not indicate a significant potential for soil liquefaction, seismically induced landslides or surface rupture at the site. It should be noted that the history and location of faults in the Pacific Northwest is still evolving and it is possible that currently unknown active faults in the area could be discovered in the future. Also note that a site-specific seismic hazard study was beyond the present scope of services for this project. Such an evaluation could be performed at an additional fee with your written authorization.

5.0 Conclusions and Recommendations

Based on the results of our field work, laboratory evaluation, and engineering analyses, it is our opinion that the site is suitable for the proposed building and pavement additions provided the following recommendations are incorporated into the design and construction of the project.

The primary geotechnical factors influencing development are:

- Variable density (soft to very stiff) and moisture sensitive clayey silt **fill** soil within the footprint of the proposed building and pavement additions.
- Highly plastic weathered siltstone that is moisture sensitive and may have some expansive potential if allowed to dry out.
- The presence of buried wood in boring B-13 that could also indicate there may be other deleterious material in the fill soils.
- All site soils appear to be over optimum moisture content and will require drying prior to use as structural fill.
- Poorly draining surficial soils that will have to be controlled by the contractor with proper sloping and drains.

To mitigate the above poor bearing soil concerns, especially in the more heavily loaded proposed gymnasium, we recommend that all building footing locations be excavated through the variable density fill and bear on properly compacted structural fill placed on the underlying firm weathered siltstone stratum. Given the high moisture content of the existing fill soils, we anticipate that the existing fill soils cannot be reused as structural fill without moisture conditioning (i.e. by drying or treating with Portland cement). Due to the "low" expansion potential of the site soils, it is not necessary to overexcavate soils 2 feet beneath footings as was recommended in GeoStandards' Preliminary Geotechnical Evaluation report, provided the soils are not allowed to dry out during construction.

Floor slabs that are relatively lightly loaded (i.e. no more than about 150 psf) and are acceptable to minor settlement cracking may be supported on the native or fill soils after they have been proofrolled to confirm their firmness. We also recommend additional control joints and rebar to control any cracking due to settlement of the variable density fill soil. Once again, the native soil should not be allowed to dry out prior to floor slab construction.

In pavement areas, we do not anticipate that it will be cost effective to completely remove the variable density fill soils. As such, we recommend constructing the pavement areas on the fill, provided it passes a proofroll with a loaded rubber tire dump or water truck. Some pavement maintenance to repair cracking and potholes should be anticipated over the life of the pavement.

5.1 Site Preparation

In general, we recommend that all structural improvement areas be drained of surface water, and stripped of surface vegetation, topsoil, highly saturated or disturbed soil, soft fill, and any other deleterious materials encountered at the time of construction (i.e. the wood encountered in boring B-13 at an initial depth of about 2-1/2 feet). Some of the proposed construction area is covered with asphalt or concrete pavement that will require removal. We observed 2 to 12 inches of asphalt concrete pavement at the surface of the site. Refer to our borings for more details on the pavement thickness across the site. The asphalt concrete could be crushed and reused as structural fill if crushed to a well-graded 3-inch minus size material.

Additional site preparation will depend upon the proposed site grades and building features. Prior to backfilling of any excavations with structural fill, the exposed subgrade should be observed by a representative of the Geotechnical Engineer to ensure that it is ready for fill placement.

After subgrade preparation and observation have been completed, fill placement may begin. The first layer of fill material should be placed in a relatively uniform horizontal lift and be adequately keyed into the approved subgrade soils. Fill materials should comply with the recommendations in Section 5.2, Structural Fill. If a fine-grained silty or clayey soil is used for fill, close moisture content control will be required to achieve the recommended degree of compaction.

All required structural fill materials placed in the building and pavement areas should be moisture conditioned to within 2 percent of optimum moisture content and compacted by mechanical means to a minimum of 95 percent of the material's maximum dry density as determined in accordance with ASTM D 1557 (Modified Proctor). If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Fill materials should be placed placed in layers that, when compacted, do not exceed about 8 inches. Each lift of compacted, engineered fill should be tested by a representative of the geotechnical engineer prior to placement of subsequent lifts.

Excavations and construction operations may expose the on-site soils to inclement weather conditions. The exposed soil may rapidly deteriorate due to precipitation and/or the action of heavy construction equipment. The near-surface soils are considered to be susceptible to this problem due to their existing high moisture contents and high plasticity. Accordingly, exposed soil in structural areas should be adequately protected from the elements and from the action of repetitive construction loading. The asphalt concrete could be left in place during phases of the construction to temporarily protect the underlying soils from heavy construction traffic. However, removing pavement as soon as possible during good drying weather should be considered where underlying wet soils will be excavated and reused as structural fill.

While the native high plasticity silt soils were determined to have a low expansion potential, we still recommend that where exposed to the weather, they not be allowed to dry out. This can be

accomplished by performing excavations just before the subgrade will be covered. If these soils are allowed to dry out, they will need to be moisture conditioned by adding water.

Erosion control facilities will be necessary during construction. Clearing for the structural improvements and structures will remove asphalt pavement, and will expose the site soils to potential erosive conditions. Even under optimum conditions, however, some erosion is anticipated and can be controlled by covering with plastic sheeting, grading shallow diversion ditches or providing silt fences. The overall responsibility for erosion control should be left to the contractor.

5.1.1 Site Preparation During Dry Weather Construction

During the dry season, prior to the placement of any fills, all exposed subgrade surfaces should be proofrolled with a fully loaded dump truck or probed with a ½-inch diameter steel probe rod if the area is not accessible to a dump truck. Areas found to be soft, deflecting/rutting more than 1-inch under the weight of the truck, should be overexcavated and replaced with structural fill.

The on-site crushed rock base course and silty gravel fill could be considered for re-use as structural fill provided they are free of organic material and debris. Moisture conditioning of the on-site soils in order to facilitate compaction should be anticipated. We do not recommend the use of the native, high plasticity silt as structural fill.

Selected samples of the materials to be used for structural fill should be submitted to our laboratory in order to evaluate the maximum density, optimum moisture content, and suitability of the soil(s) for use as fill. Should wet weather grading be anticipated, use of the on-site silty soils as structural fill may be difficult.

5.1.2 Site Preparation During Wet Weather Construction

Placement of crushed rock should follow immediately after site grading in order to provide protection of the silty subgrade soils during construction activities. Crushed rock should consist of a well-graded, 1½-inch or ¾-inch-minus, aggregate, having less than 5 percent material passing the No. 200 sieve. In traffic areas, the placement of a one-foot-thick, granular, working base is generally recommended with thicker sections and/or geotextile fabrics (i.e. Mirafi 500X or equivalent) recommended in heavily traveled areas. Generally, three to six inches of crushed rock is sufficient in foot traffic areas.

The silty and clayey soils are highly moisture sensitive, and thus will not be suitable for re-use as structural fill during wet weather construction. Additional fill material, if needed, during wet weather construction should consist of a well-graded 1½-inch or ¾-inch-minus, crushed rock or sand, having less than 5 percent material passing the No. 200 sieve.

During wet weather grading operations, all excavations should be performed using a smooth-bladed, tracked backhoe working from areas where material has yet to be removed, or from the already placed structural fill. Subgrade areas should be cleanly cut to firm undisturbed soil.

Proofrolling of excavation bottoms is likely not appropriate during wet weather grading in order to avoid disturbance of moisture-sensitive soils. Should construction take place during wet weather, we recommend that a PSI representative be present to observe the subgrade in order to evaluate whether additional preparation is indicated.

5.2 Structural Fill

All required structural fill materials should be moisture conditioned to within ± 2 percent of optimum moisture content and compacted to a minimum of 95 percent of the material's maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches.

Fill materials should be free of organic or otherwise deleterious materials, have a maximum particle size less than 3 inches, and have a liquid limit less than 50 percent and plasticity index less than 30. **The on-site low plasticity clayey silt soils (classified as fill in our boring logs) would be suitable for use as a structural fill. However, the high plasticity weathered siltstone encountered in our borings would not be suitable as structural fill unless amended with lime to reduce its plasticity.**

If a fine-grained silty or clayey soil is used for fill, close moisture content control will be required to achieve the recommended degree of compaction. **Based on moisture content testing of soil samples from our borings, the contractor should assume that all on-site soils will be over optimum moisture content and will require drying prior to placing as structural fill.** Drying would typically consist of spreading the soil out in a thin lift (i.e. about 12 inches) during an extended period of dry weather and then frequently turning over the soil with the front blade or rear drag teeth of a dozer. Stockpiled soil to be dried later should be protected from rainfall by covering completely with plastic. We do not anticipate that fine-grained soils would be able to be used in wet weather conditions unless amended with Portland cement.

Excavations for the stormwater pond at the north end of the site are anticipated to generate a large volume of potential fill soil. The upper low plasticity clayey silt soil will be acceptable for structural fill but will likely require drying. The underlying high plasticity weathered siltstone would only be appropriate for use as structural fill if treated with lime to reduce its plasticity.

We understand from Ms. Barlow that locally available sand material is being considered for use as imported structural fill. The sand is likely to contain between 5 and 10 percent fines (material passing no. 200 sieve). It is our opinion that this material would generally be appropriate for use as structural fill on the site during dry weather conditions. During wet weather conditions, a relatively clean (i.e. less than 5 percent fines), coarse sand would likely be necessary to be able to properly compact.

During wet weather grading operations, all excavations should be performed using a smooth-bladed, tracked backhoe working from areas where material has yet to be removed, or from the already placed structural fill. Subgrade areas should be cleanly cut to firm undisturbed soil.

Proofrolling of excavation bottoms is likely not appropriate during wet weather grading in order to avoid disturbance of moisture-sensitive soils. Should construction take place during wet weather, we recommend that a PSI representative be present to observe the subgrade in order to evaluate whether additional preparation is indicated.

5.2 Structural Fill

All required structural fill materials should be moisture conditioned to within ± 2 percent of optimum moisture content and compacted to a minimum of 95 percent of the material's maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches.

Fill materials should be free of organic or otherwise deleterious materials, have a maximum particle size less than 3 inches, and have a liquid limit less than 50 percent and plasticity index less than 30. **The on-site low plasticity clayey silt soils (classified as fill in our boring logs) would be suitable for use as a structural fill. However, the high plasticity weathered siltstone encountered in our borings would not be suitable as structural fill unless amended with lime to reduce its plasticity.**

If a fine-grained silty or clayey soil is used for fill, close moisture content control will be required to achieve the recommended degree of compaction. **Based on moisture content testing of soil samples from our borings, the contractor should assume that all on-site soils will be over optimum moisture content and will require drying prior to placing as structural fill.** Drying would typically consist of spreading the soil out in a thin lift (i.e. about 12 inches) during an extended period of dry weather and then frequently turning over the soil with the front blade or rear drag teeth of a dozer. Stockpiled soil to be dried later should be protected from rainfall by covering completely with plastic. We do not anticipate that fine-grained soils would be able to be used in wet weather conditions unless amended with Portland cement.

Excavations for the stormwater pond at the north end of the site are anticipated to generate a large volume of potential fill soil. The upper low plasticity clayey silt soil will be acceptable for structural fill but will likely require drying. The underlying high plasticity weathered siltstone would only be appropriate for use as structural fill if treated with lime to reduce its plasticity.

We understand from Ms. Barlow that locally available sand material is being considered for use as imported structural fill. The sand is likely to contain between 5 and 10 percent fines (material passing no. 200 sieve). It is our opinion that this material would generally be appropriate for use as structural fill on the site during dry weather conditions. During wet weather conditions, a relatively clean (i.e. less than 5 percent fines), coarse sand would likely be necessary to be able to properly compact.

Where new structural fill is constructed on slopes steeper than 5H to 1V (for example, the new stormwater pond construction), the slope should be horizontally benched prior to fill placement. Benches should be a minimum of 4 feet wide laterally and should be cut into the slope every 4 feet of vertical rise (see Figure 3 attached).

5.3 Excavations

Based on our soil borings, the excavations will encounter clayey silt fill at the surface underlain by weathered siltstone. We anticipate these soils will be easily excavated with conventional equipment.

5.3.1 Excavations/Slopes/Utility Trenches

Excavation and construction operations may expose the on-site soils to inclement weather conditions. The stability of exposed soils may rapidly deteriorate due to precipitation or the action of heavy or repeated construction traffic. Accordingly, foundation and pavement area excavations should be adequately protected from the elements, and from the action of repetitive or heavy construction loadings.

We recommend that temporary excavations and slopes not encroach on a 1.5H to 1V line extended downward from the existing building or other structural elements to reduce the risk of settlement or collapse of existing structures. If these setbacks cannot be maintained, a temporary shoring wall should be installed. Detailed shoring recommendations were not included in our scope of work and can be provided upon request. Alternatively, with the approval of the Geotechical Engineer on site, temporary near-vertical excavations may be made where necessary during demolition and then immediately backfilled with properly compacted structural fill at a minimum slope of 1.5H to 1V and extend vertically at least 1 foot above the bottom of footings (see Figure 4 attached). We anticipate that the firm weathered siltstone can be temporarily excavated vertical adjacent to existing structures without significant risk to the structure, but the upper, variable density clayey silt soil may pose more of a risk and should be evaluated on a case by case basis by the Geotechnical Engineer.

We understand that construction will be separated into two phases. The first phase will consist of demolition and the second phase will consist of new construction. It will be important that all slopes graded during the demolition phase be adequately protected so that they will remain stable until the new construction phase begins.

Temporary earth slopes and trenches may be cut near vertical to heights of 4 feet. Excavations deeper than 4 feet should be performed in accordance with Department of Labor Occupational Safety and Health Administration (OSHA) guidelines. Job site safety is the responsibility of the project contractor.

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction

Standards for Excavations, 29 CFR, Part 1926, Subpart P. This document was issued to better insure the safety of personnel entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations, or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and, if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal state regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state, and federal safety or other regulations.

5.4 Foundation Support

Based on the results of our geotechnical investigation, it is our opinion that the proposed structures can be supported on conventional, shallow spread footings. Shallow foundations should be founded on undisturbed, firm, undisturbed native soil, or on engineered structural fill placed on these materials. Due to its variable density (soft to very still), we do not recommend that foundations be supported on the existing fill.

For foundation bearing surfaces prepared as recommended, an allowable soil bearing pressure of 3,500 psf should be used for foundation design. The allowable soil bearing pressure of 3,500 psf is intended for dead loads and sustained live loads, and can be increased by one-third for the total of all loads, including short-term wind or seismic loads. Continuous footings should extend a minimum depth of 18 inches beneath the lowest, adjacent, exterior grade in order to provide frost protection, with the exterior grade sloping away (minimum 2%) from the exterior footing to drain surface water away from the foundation.

Allowable lateral frictional resistance between the base of footings and the subgrade can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.30. In addition, lateral loads may be resisted by passive earth pressures based on an equivalent fluid pressure of 250 pounds per cubic foot (pcf) for footings poured "neat" against in-situ soils, or properly backfilled with structural fill. This recommended value includes a factor of safety of approximately 1.5, which is appropriate due to the amount of movement required to develop full passive resistance.

We estimate that foundations designed and constructed in accordance with the above recommendations will experience total settlements generally less than 1-inch, with differential settlements generally less than 1/2-inch.

If footings are constructed during wet weather, it may be necessary to protect the foundation excavation bottoms from disturbance during construction activities. In this regard, we recommend that a 3 to 4-inch thickness of crushed rock be placed at the bottom of the footing excavations immediately after the excavation is completed. Crushed rock should consist of a well-graded, 1½-inch or ¾-inch-minus, aggregate, having less than 5 percent material passing the No. 200 sieve. If footings are constructed during the drier summer months, this crushed rock layer should not be required. A representative of the geotechnical engineer should be contacted to approve bearing surfaces prior to placement of forms and reinforcement.

5.4.1 Interaction Between The Additions & Existing Buildings

It is anticipated that, in some areas, new footings will be installed adjacent to existing footings where the additions connect to the existing building. Where possible, new footings should bear at about the same depth as existing footings. Care should be taken not to disturb the bearing soils beneath existing footings. To reduce this risk, excavations below existing footings should not be extended below an imaginary plane extending out and down from the outside, bottom edge of existing footings at a slope of approximately 1.5H to 1V (horizontal to vertical).

Some overlap in stress distribution from new and existing footings may occur, and could cause some minor movements of the existing nearby footings and supported structures. Maintaining a clear distance at least equal to the width of the new footings between the edges of new and existing footings would significantly reduce this risk. This will also help reduce the potential for disturbance of the soils beneath existing footings. The design of the building addition should accommodate for some differential movements between the additions and the existing building.

5.5 Retaining Walls

We make the following general recommendations for retaining walls.

Retaining wall footings should be designed in general accordance with the recommendations contained in *Section 5.4 Foundation Support* above.

Lateral earth pressures on walls which are not restrained at the top may be calculated on the basis of an equivalent fluid pressure of 35 pcf for level backfill, and 60 pcf for sloping backfill with a maximum 2H:1V slope. Lateral earth pressures on walls that are restrained from yielding at the top may be calculated on the basis of an equivalent fluid pressure of 55 pcf for level backfill, and 90 pcf for sloping backfill with a maximum 2H:1V slope. The stated equivalent fluid pressures do not include surcharge loads, such as foundation, vehicle, equipment, etc., adjacent to walls, hydrostatic pressure buildup, or earthquake loading.

We calculated earthquake loading on retaining walls using the Mononobe-Okabe earthquake design methodology. Based on our analysis, an active seismic earth pressure of $22H^2$ (where H equals the unsupported vertical wall height) should be used for the 2% in 50-year return period and a PGA of 0.6g (note only two-thirds of the PGA should be used by the wall designer in the analysis). The recommended earth pressure is based on a yielding wall with a vertical soil-wall interaction, and level backfill behind the retaining wall.

Lateral loads may be resisted by frictional resistance between the base of the retaining wall footing and the subgrade, and can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.30. In addition, lateral loads may be resisted by passive earth pressures based on an equivalent fluid density of 250 pounds per cubic foot (pcf) for footings poured "neat" against in-situ soils, or properly backfilled with structural fill. This recommended value includes a factor of safety of about 1.5, which is appropriate due to the amount of movement required to develop full passive resistance.

All backfill for retaining walls should be select granular material, such as 1½-inch or ¾-inch-minus, crushed rock, having less than 5 percent material passing the No. 200 sieve. We anticipate that the on-site, native soils will not be suitable for this purpose, and that it will be necessary to import material to the project for structure backfill. On-site soils can be used for the last 18 to 24 inches of backfill, thus acting as a seal to the granular backfill.

All backfill behind retaining walls should be moisture conditioned to within ± 2 percent of optimum moisture content, and compacted to a minimum of 90 percent of the material's maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches. Care in the placement and compaction of fill behind retaining walls must be taken in order to insure that undue lateral loads are not placed on the walls.

5.6 Drainage Considerations

Based on the soil conditions observed in our borings, the site soils have a very low permeability. Water will collect at areas that are graded as low points and will be very slow to drain. As such, it will be very important to grade the site properly to drain both during and after construction. Where water can become trapped due to site grades or below grade structures, we recommend subsurface drains be installed. We do not anticipate that permanent interceptor trenches will be necessary, provided the site can be properly sloped to drain or subsurface drains can be installed to adequately handle any perched runoff. Existing underdrains encountered during excavations or demolition should be maintained or repaired if damaged.

Water should not be allowed to collect in the foundation excavation, on the floor slab areas behind retaining walls, or on prepared subgrade on the construction area, either during or after construction. The subgrade beneath structures should be sloped to a low point to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site drainage (i.e. sloping grade) should be provided to reduce infiltration of surface water around the perimeter of

the building and beneath the floor slab area of the building. We anticipate that during construction, where the site is not graded to drain, sump pumps in excavated pits and interceptor trenches can control surface water.

Any areas of the building which are to be developed below the exterior site grade should be provided with a well-designed, permanent drainage system in order to control hydrostatic pressures against walls, seepage of groundwater through basement walls, etc. Under no circumstances should surface runoff water be led into foundation drains. Foundation drains should be placed at the base of footings in order to prevent surface and shallow perched water from migrating beneath the footings. Surface run-off from roofs, parking areas, etc., should be tightlined to approved disposal areas.

We do not anticipate that the subslab drain pipes recommended in GeoStandards' report (second paragraph of "Slab Design" section) will be necessary, provided proper site drainage is maintained by sloping the site to drain away from building areas.

5.7 Floor Slab Support

We do not anticipate that it will be economical to completely remove the variable density fill from beneath floor slab areas. As such, floor slabs that are relatively lightly loaded (i.e. no more than about 150 psf) and are acceptable to minor settlement cracking, may be supported on the native or fill soils after they have been proofrolled to confirm their firmness. Any soft or otherwise unsuitable areas observed should be over-excavated down to firm subgrade and replaced with structural fill. We recommend additional control joints and reinforcing steel to control any cracking due to settlement of the variable density fill soil.

Where concrete slabs are designed as beams on an elastic foundation, the compacted subgrade should be assumed to have a modulus of subgrade reaction of 150 pounds per cubic inch (pci) for firm subgrade soils.

In order to provide uniform subgrade reaction beneath any proposed floor slab-on-grade, we recommend that floor slabs be underlain by a minimum of 6 inches of free-draining (a maximum particle size of ¾ inch with less than 5 percent material passing the no. 200 sieve), well-graded gravel or crushed rock base course. Base course material should be moisture conditioned to within +/- 2 percent of optimum moisture content and compacted by mechanical means to a minimum of 95 percent of the material's maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches.

The crushed rock should provide a capillary break to limit migration of moisture through the slab. If additional protection against moisture vapor is desired, a vapor retarding membrane may also be incorporated into the design. Factors such as cost, special considerations for construction, and the floor coverings suggest that decisions on the use of vapor retarding membranes be made by the architect and owner.

5.8 Pavement Recommendations

In pavement areas, we do not anticipate that it will be cost effective to completely remove the existing variable density fill soils. As such, we recommend constructing the pavement areas on the existing fill, provided it passes a proofroll with a loaded rubber tire dump or water truck. Any areas determined to be soft by proofrolling should be over-excavated down to firm subgrade and replaced with structural fill. Based on our borings, we estimate the average overexcavation depth in pavement areas to replace soft fill soils that are too wet to recompact will be about 1 foot. Some pavement maintenance to repair cracking and potholes should be anticipated over the life of the pavement due to the fact that the existing variable density fill soils will not be removed in their entirety.

The following pavement recommendations are presented as preliminary for your consideration. The civil engineer for the project may have more traffic and project design data available than is presently known, and may wish to modify and refine these pavement sections. We will, upon request, be pleased to provide a more detailed pavement design when definite traffic and building plans are available.

5.8.1 Asphalt Pavement

Our flexible asphalt pavement recommendations are based on the AASHTO 1993 design method, an assumed CBR value of 5 for the silty/clayey subgrade, and a pavement design life of 20 years. We assumed the following pavement loading conditions:

- Car parking – 5 Equivalent 18,000-pound Single Axle Loads (ESALs)/day
- Car drives – 10 ESALs/day
- Bus drives – 30 ESALs/day

If the anticipated traffic exceeds these values, we should be informed so that a specific pavement design is made for the project or the design can be modified by the site civil engineer. A typical asphalt pavement section would be:

Table 1 – Minimum Asphalt Pavement Section Thickness Recommendations

Material	Light Duty Car Parking	Heavy Duty Car Drives	Heavy Duty Bus Drives
Asphalt Pavement	2.5 inches	3 inches	4 inches
Crushed Rock Base Or Asphalt Treated Base	6 inches 4 inches	7 inches 4 inches	12 inches 7 inches

Asphalt pavement base course material should consist of a well-graded, 1½-inch or ¾-inch-minus, crushed rock, having less than 5 percent material passing the No. 200 sieve. The base course and asphaltic concrete materials should conform to the requirements set forth in the latest edition of the State of Washington, Standard Specifications for Highway Construction. Base course material should be moisture conditioned to within ± 2 percent of optimum moisture content, and compacted to a minimum of 95 percent of the material's maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches. Asphaltic concrete material should be compacted to at least 91 percent of the material's theoretical maximum density as determined in accordance ASTM D2041 (Rice Specific Gravity). **To reduce the risk of contaminating the crushed rock base course and to provide some additional pavement section strength, we recommend a geotextile (Mirafi 600X or equivalent) be placed between the subgrade and crushed rock layers.**

5.8.2 Concrete Pavement

We recommend that concrete pavement be designed for a modulus of subgrade reaction of 100 pci. A typical concrete pavement section would be:

Table 2 – Concrete Pavement Thickness

Material	Entrance Road	Car Parking Areas
Concrete (4,000 psi)	8 inches	4 inches
Crushed Rock Leveling Course	2 inches	2 inches

A geotextile, as described in the asphalt pavement section above, is not necessary for concrete pavements.

5.9 Construction Monitoring

It is recommended that PSI be retained to examine and identify soil exposures created during project excavations in order to verify that soil conditions are as anticipated. We further recommend that the site preparation and structural fills be observed and tested by our representative in order to evaluate installation.

Costs for the recommended observations during construction are beyond the scope of this current consultation. Such future services would be at an additional charge.

6.0 General

Our conclusions and recommendations described in this report are subject to the following general conditions:

6.1 Use of Report

This report is for the exclusive use of the addressee, and their representative to use to design the proposed development described herein, and prepare construction documents. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report.

6.2 Level of Care

The recommendations contained in this report are based on the available subsurface information obtained by PSI, and design details furnished for the proposed project. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project.

PSI did not provide any service to investigate or detect the presence of moisture, mold or other biological contaminates in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. Client acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. Client further acknowledges that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or recurrence of mold amplification

Services performed by the geotechnical engineer for this project have been conducted with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area. No warranty, expressed or implied, is made.

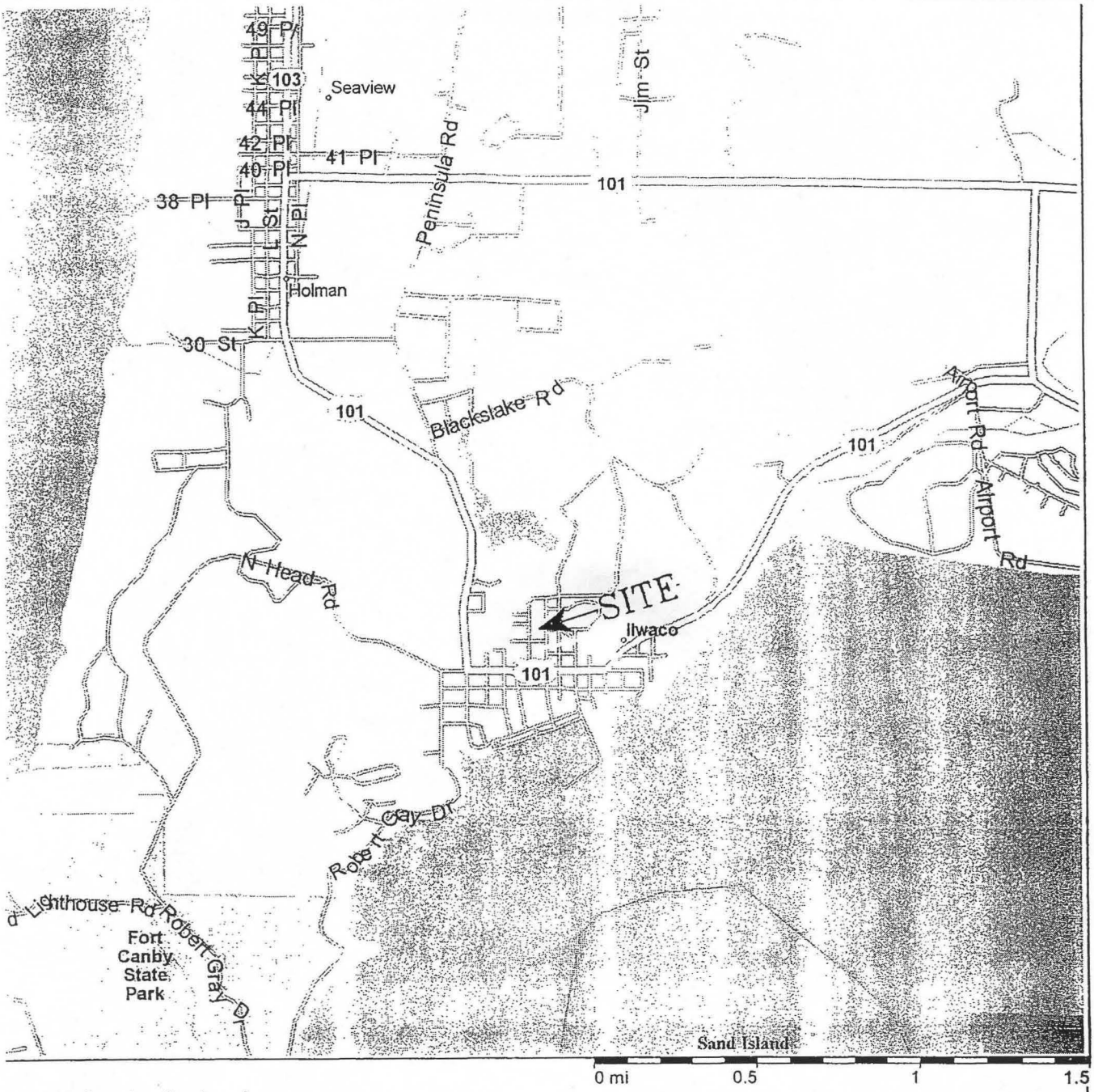
Sincerely,
Professional Service Industries, Inc.

TROY M. HULL
STATE OF WASHINGTON
38707
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES 09/06/05

5/16/05

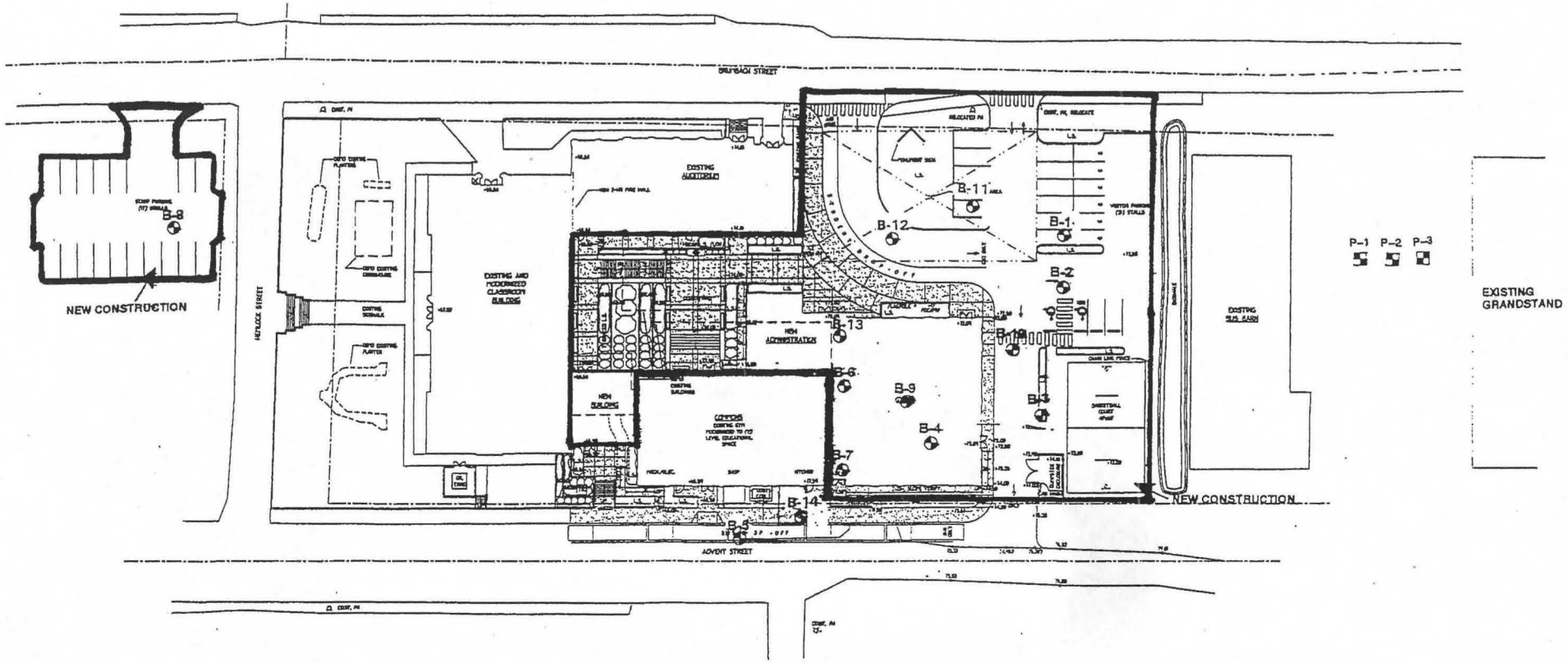
Tima Carlson
Geologic Associate
Geotechnical Services

Troy Hull, P.E.
Regional Geotechnical Engineer
Geotechnical Services



SOURCE: MICROSOFT MAPPOINT: 2003

psi Information To Build On Engineering • Consulting • Testing	DRAWING TITLE: SITE LOCATION PLAN	DATE: 02/24/2005	FIGURE NUMBER: 1
PSI, Inc. 6032 N. Cutter Circle, Suite 480 Portland, Oregon 97217 (503) 289-1778	PROJECT: PROPOSED ILWACO MIDDLE SCHOOL 405 NORTHEAST SCHOOL ROAD ILWACO, WASHINGTON	DRAWN BY: TAC	PSI REPORT NUMBER: 704-55050-1



SYMBOLS
PERCOLATION TEST LOCATION
BORING LOCATION

psi Information To Build On Engineering • Consulting • Testing	GEOTECHNICAL SERVICES 6032 N. CUTTER CIRCLE, SUITE 480 PORTLAND, OREGON 97217 TELEPHONE: (503) 289-1778 FAX: (503) 289-1918	SOURCE: BUILDING LAYOUT PLAN PREPARED BY AMBIA ENDURING ARCHITECTS DATED: 2004 SCALE: N.T.S.	DATE: 02/24/2005	FIGURE NUMBER: 2	DRAWING TITLE: BORING/PERCOLATION TEST LOCATION PLAN
			DRAWN BY: TAC	PSI REPORT NUMBER: 704-55050-1	PROJECT: PROPOSED ILWACO MIDDLE SCHOOL 405 NORTHEAST SCHOOL ROAD ILWACO, WASHINGTON

LOG OF TEST BORING NO. B-1

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions
LOCATION: 405 NE School Rd., Ilwaco, WA
PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/8/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: NW corner of playground, 18'E, 24'N of B-11 (see Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE**- 2 inches thick **BASE ROCK**- 3/4"-minus, 2 inches thick **WEATHERED SILTSTONE**- grayish white, brown, red mottling, wet, stiff to very stiff		MH		2-3-7	2.0		
	SPT 2				47	2-5-7	2.0		
5	SPT 3				48	3-5-6	2.0		
10		Boring was terminated at 6.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/8/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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20									
25									
30									
35									

BL PTLD 704-55050.GPJ PSI CORP.GDT 5/16/05

psi
6032 North Cutter Circle, Suite 480
Portland, Oregon 97217-0126
(800) 783-6985

LOG OF TEST BORING NO. B-2

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions
LOCATION: 405 NE School Rd., Ilwaco, WA
PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/8/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: N corner of playground, 19'E of B-1, 28' N of B-10(See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE-** 2 inches thick **BASE ROCK-** 3/4"-minus, 2 inches thick **WEATHERED SILTSTONE-** grayish white, brown, red mottling, wet, stiff to hard		MH	47	2-3-8			
	SPT 2				40	3-8-13	3.5		
5	SPT 3					5-10-15			
10		Boring was terminated at 6.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/8/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL_PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
6032 North Cutter Circle, Suite 480
Portland, Oregon 97217-0126
(800) 783-6985

LOG OF TEST BORING NO. B-3

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/8/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 18'W, 18'N of B-4 (See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE-** 2 inches thick **BASE ROCK-** 3/4"-minus, 2 inches thick **CLAYEY SILT (FILL)-** reddish brown to brown, mottled, wet, stiff to very stiff		CL-ML		2-2-5	1.5		
	SPT 2				33	1-2-4	3.0		
5	SPT 3	**WEATHERED SILTSTONE-** grayish white, brown, red mottling, wet, stiff to very stiff		MH	40	2-4-12	1.5		
10		Boring was terminated at 6.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/8/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
6032 North Cutter Circle, Suite 480
Portland, Oregon 97217-0126
(800) 783-6985

LOG OF TEST BORING NO. B-4

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/8/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 66'N of Bldg, 30'W of NE corner(See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE**- 2 inches thick **BASE ROCK**- 3/4"-minus, 2 inches thick **CLAYEY SILT (FILL)**- reddish brown to brown, mottled, wet, medium stiff to stiff		CL-ML	38	1-2-2		96	
	SPT 2					1-2-4	2.0		
5	MC 3	**WEATHERED SILTSTONE**- grayish white, brown, red mottling, wet, stiff		MH	41 36	7-20-30	3.5		Torvane value at 1.5 tsf
	SPT 4					3-7-10	4.0		
10	SPT 5					4-8-10	4.0		
15									
20		Boring was terminated at 16.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/8/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
6032 North Cutter Circle, Suite 480
Portland, Oregon 97217-0126
(800) 783-6985

LOG OF TEST BORING NO. B-5

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: E Side of Bldg., 24'E of Bldg., 72'S of NE corner(See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
		ASPHALTIC CONCRETE- 2 inches thick							
		BASE ROCK- 3/4"-minus, 8 inches thick							
		Boring was terminated at 10 inches below ground surface. The boring was backfilled with gravel cuttings and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration.							
5		Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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psi
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LOG OF TEST BORING NO. B-6

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 70' W of NE corner of Bldg., 6'N of E Bldg. (See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
		ASPHALTIC CONCRETE- 3 inches thick							
		BASE ROCK- 3/4"-minus, 8 inches thick							
		Boring was terminated at 11 inches below ground surface. The boring was backfilled with gravel cuttings and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration.							
5		Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL_PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
6032 North Cutter Circle, Suite 480
Portland, Oregon 97217-0126
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LOG OF TEST BORING NO. B-7

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions
LOCATION: 405 NE School Rd., Ilwaco, WA
PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 6'N of Bldg., 8'W of NE corner of Bldg. (See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE**- 2 inches thick **BASE ROCK**- 3/4"-minus, 2 inches thick **CLAYEY SILT (FILL)**- dark brown to brown, wet, soft to medium stiff, some rock fragments		CL-ML		2-2-2			
	SPT 2					1-1-2			
5	MC 3	**WEATHERED SILTSTONE**- mottled gray-orange-brown, wet, medium stiff to hard		MH	44	2-6-8	1.0	59	Torvane value of 0.75 tsf
	SPT 4					5-7-9	1.5		
10	SPT 5					4-7-8	1.5		
15	SPT 6	Becomes dark gray throughout sample (parent rock material?)				8-12-17	4.0		
20	SPT 7					5-10-11	2.5		
25	SPT 8					9-8-13	2.5		
30	SPT 9					10-20-19	3.5		
35		Boring was terminated at 31.5 feet below ground surface. The boring was backfilled with cuttings and bentonite, and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was encountered at 14 feet during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
40									

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psi
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LOG OF TEST BORING NO. B-8

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions
LOCATION: 405 NE School Rd., Ilwaco, WA
PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 18'W of existing gym, 32' S of Hemlock St.(See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**BASE ROCK**- 3/4"-minus, 3 inches thick **CLAYEY SILT (FILL)**- dark brown, mottled, wet, soft to medium stiff		CL-ML	42	1-1-2			
	SPT 2					1-3-4			
5	SPT 3	**WEATHERED SILTSTONE**- grayish white, brown, red mottling, wet, medium stiff to stiff, highly plastic		MH	37	1-3-4	2.0		
10		Boring was terminated at 6.5 feet below ground surface. The boring was backfilled with cuttings and topped with gravels at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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psi
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Portland, Oregon 97217-0126
(800) 783-6985

LOG OF TEST BORING NO. B-9

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions
LOCATION: 405 NE School Rd., Ilwaco, WA
PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 56'N of Bldg., 62'W of NE Corner of Bldg.(See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE-** 2 inches thick **BASE ROCK-** 3/4"-minus, 2 inches thick **CLAYEY SILT (FILL)-** reddish brown to brown, mottled, moist, soft to medium stiff		CL-ML		1-2-3	0.75		
	MC 2				50 40	1-3-4	0.5		Torvane value of 0.75 tsf
5	SPT 3				48	2-3-2	0.75	66	
	SPT 4	**WEATHERED SILTSTONE-** grayish white, brown, red mottling, moist to dry, stiff to very stiff		MH		1-3-6	1.5		
10	SPT 5					2-7-10	2.0		
15	SPT 6				49	2-4-10	3.5		
20		Boring was terminated at 16.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL_PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
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Portland, Oregon 97217-0126
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LOG OF TEST BORING NO. B-10

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions
LOCATION: 405 NE School Rd., Ilwaco, WA
PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 34'W, 26'N of B-9 (See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE-** 2 inches thick **BASE ROCK-** 3/4"-minus, 2 inches thick **CLAYEY SILT (FILL)-** reddish brown to brown, gray, mottled, wet, medium stiff to stiff		CL-ML	51	1-2-2			
	SPT 2					1-2-3	1.5		
5	SPT 3	**WEATHERED SILTSTONE-** grayish white, brown, red mottling, wet, medium stiff to stiff		MH		1-2-2	1.5		

Boring was terminated at 6.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration.

Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.

10 15 20 25 30 35

BL PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
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LOG OF TEST BOR

LOG O. B-13

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DA ATION: 2/9/2005
EQ 5 Hollow Stem Auger w/Auto SPT
L on
F of NE corner of Bldg., 4'N
lso)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	REMARKS
	SPT 1	**ASPHALTIC CONCRETE**- 2 inches thick **BASE ROCK**- 3/4"-minus, 2 inches thick **CLAYEY SILT (FILL)**- reddish brown, mo gray-yellow-red, moist to wet, stiff to very sti	
	SPT 2		
5	SPT 3		
10		Boring was terminated at 6.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.	
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BL_PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
6032 North Cutter Circle, Suite 480
Portland, Oregon 97217-0126
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LOG OF TEST BORING NO. B-12

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 48'N of NW corner of Bldg., 26'E of drive thru in playground (See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE-** 2 inches thick **BASE ROCK-** 3/4"-minus, 10 inches thick			20	1-3-3			
	SPT 2	**CLAYEY SILT (FILL)-** reddish brown, mottled, some black, moist, medium stiff to stiff		CL-ML		2-2-3	1.0		
5	SPT 3	**WEATHERED SILTSTONE-** grayish white, brown, red mottling, moist, meidum stiff to stiff		MH		1-2-3	1.5		
10		Boring was terminated at 6.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL_PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
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Portland, Oregon 97217-0126
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LOG OF TEST BORING NO. B-13

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 20'W of NE corner of Bldg., 4'N of Bldg. (See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
	SPT 1	**ASPHALTIC CONCRETE-** 12 inches thick				1-2-1			
5		**SAND-** dark, medium grained, clean (inferred based on observations of auger cuttings), **possible fill**							Unable to sample at 2.5 feet due to sampler refusal on wood (possible stump?) Wood in sampler Wood in sampler
10	SPT 2	**WEATHERED SILTSTONE-** gray, white, orange, red mottling, wet, soft to very stiff		MH	40	1-2-1	0.5		
15	SPT 3					3-7-9	3.0		
20		Boring was terminated at 16.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL_PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
6032 North Cutter Circle, Suite 480
Portland, Oregon 97217-0126
(800) 783-6985

LOG OF TEST BORING NO. B-14

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/9/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 10'W, 25'S of B-7 (See Figure 2 also)

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
		CONCRETE- 1 inch thick **BASE ROCK**- 3/4"-minus, 4 inches thick							
		Boring was terminated at 0.5 feet below ground surface. The boring was backfilled with cuttings and capped with an asphalt patch at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration.							
5		Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL_PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
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Portland, Oregon 97217-0126
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LOG OF PERCOLATION TEST NO. P-1

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions

LOCATION: 405 NE School Rd., Ilwaco, WA

PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/8/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 52'E of School Rd., 80' S of Grandstand

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
		TOPSOIL- brown to reddish brown, some sand, wet (inferred from observation of auger cuttings)							
		CLAYEY SILT (FILL)- reddish brown, wet (inferred from observation of auger cuttings)							
	SPT 1	**WEATHERED SILTSTONE**- mottled light gray, soft, wet (inferred from observation of auger cuttings)				1-2-2	0.5		
5		Boring was terminated at 4.5 feet below ground surface. The boring was backfilled with cuttings at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration.							
		Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL PTLD 704-55050.GPJ PSI_CORP.GDT 5/16/05

psi
6032 North Cutter Circle, Suite 480
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LOG OF PERCOLATION TEST NO. P-2

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions
LOCATION: 405 NE School Rd., Ilwaco, WA
PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/8/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 52'E of School Road, 70' S of Grandstand

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
		TOPSOIL- brown to reddish brown, some sand, wet (inferred from observation of auger cuttings)							
		CLAYEY SILT (FILL)- brown to reddish brown, wet, stiff (inferred from observation of auger cuttings)							
5	SPT 1	**WEATHERED SILTSTONE**- mottled, red-gray, soft, wet, trace organics (inferred from observation of auger cuttings)				0-1-3	0.5		
10		Boring was terminated at 6.5 feet below ground surface. The boring was backfilled with cuttings at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration. Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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BL_PTLD 704-55050.GPJ PSI CORP.GDT 5/16/05

psi
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LOG OF PERCOLATION TEST NO. P-3

CLIENT: CSG/ESD#112
PROJECT: Proposed Ilwaco Middle School Additions
LOCATION: 405 NE School Rd., Ilwaco, WA
PSI PROJECT NUMBER: 704-55050-1
SURF. ELEV.:

DATE OF EXPLORATION: 2/8/2005
EQUIPMENT: CME-75 Hollow Stem Auger w/Auto SPT Hammer
LOGGED BY: Tima Carlson
BORING LOCATION: 52'E of School Road, 60' S of Grandstand

DEPTH, FT.	SAMPLES	SOIL DESCRIPTION	SYMBOL	U.S.C.S. CLASS	MOISTURE CONTENT(%)	BLOWS/6"	POCKET PEN(tsf)	% PASSING #200 SIEVE	REMARKS
		TOPSOIL- dark brown, rich in organics, wet (inferred from observation of auger cuttings)							
		CLAYEY SILT (FILL)- brown to reddish brown, wet, stiff (inferred from observation of auger cuttings)							
5		**WEATHERED SILTSTONE**- mottled, brown to gray, soft, wet (inferred from observation of auger cuttings)							
	SPT 1					0-1-2	0.5		
10		Boring was terminated at 8.5 feet below ground surface. The boring was backfilled with cuttings at the end of exploration on 2/9/04. Groundwater was not encountered during our exploration.							
		Stratification lines/depths are approximate. Actual soil conditions encountered during construction may vary from those described above.							
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GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. split-spoon.

Qu: Unconfined Compressive Strength, TSF.

Qp: Penetrometer value, unconfined compressive strength, TSF.

Mc: Water Content, %.

LL: Liquid Limit, %.

PI: Plasticity Index, %.

δd: Natural Dry Density, PCF.

▼ Apparent Groundwater Level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

SS: Split-Spoon – 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube – 3" O.D., except where noted.
AU: Auger Sample.
DB: Diamond Bit.
CB: Carbide Bit.
WS: Washed Sample.

TERM (NON-COHESIVE SOILS)	STANDARD PENETRATION RESISTANCE (SAFETY HAMMER)	STANDARD PENETRATION RESISTANCE (AUTOMATIC HAMMER)
Very Loose	0-4	0-3
Loose	4-10	3-7
Medium	10-30	7-20
Dense	30-50	20-33
Very Dense	Over 50	Over 33

TERM (COHESIVE SOILS)	Qu – (TSF)
Very Soft	0-0.25
Soft	0.25-0.50
Firm (Medium)	0.50-1.00
Stiff	1.00-2.00
Very Stiff	2.00-4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

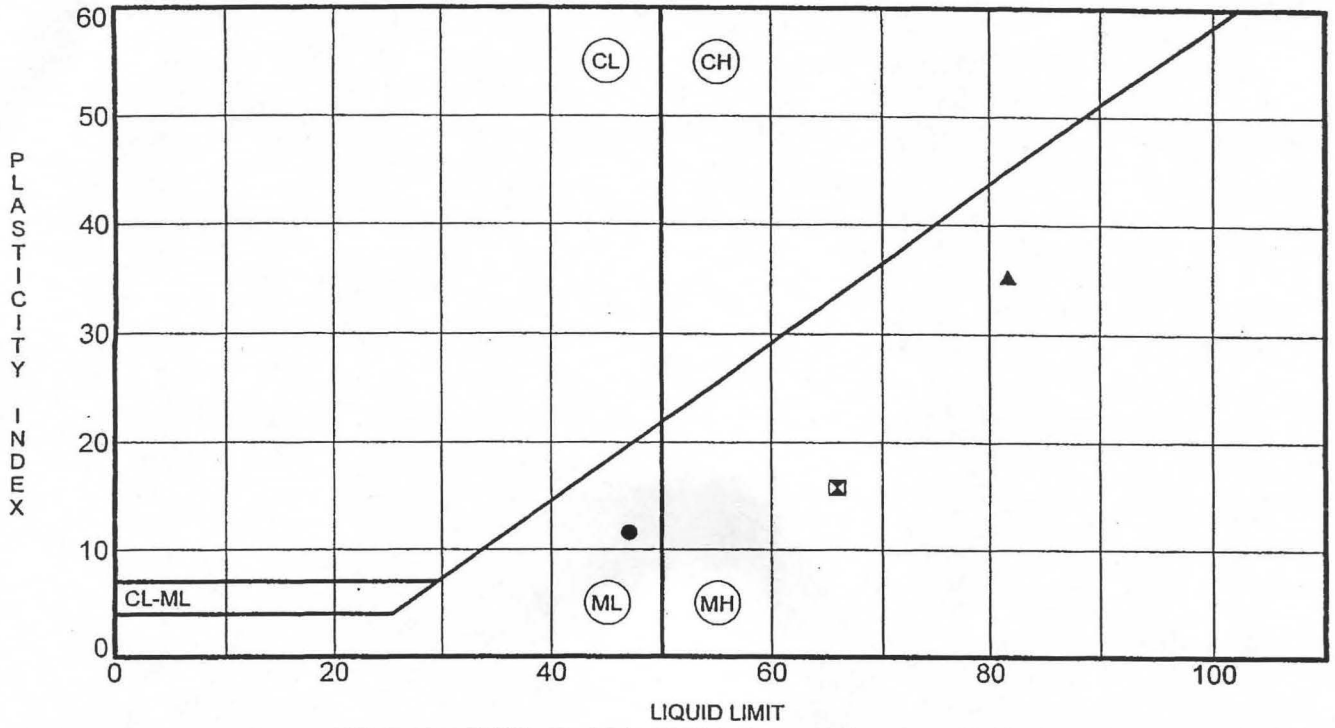
SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

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

psi

LAB TEST RESULTS

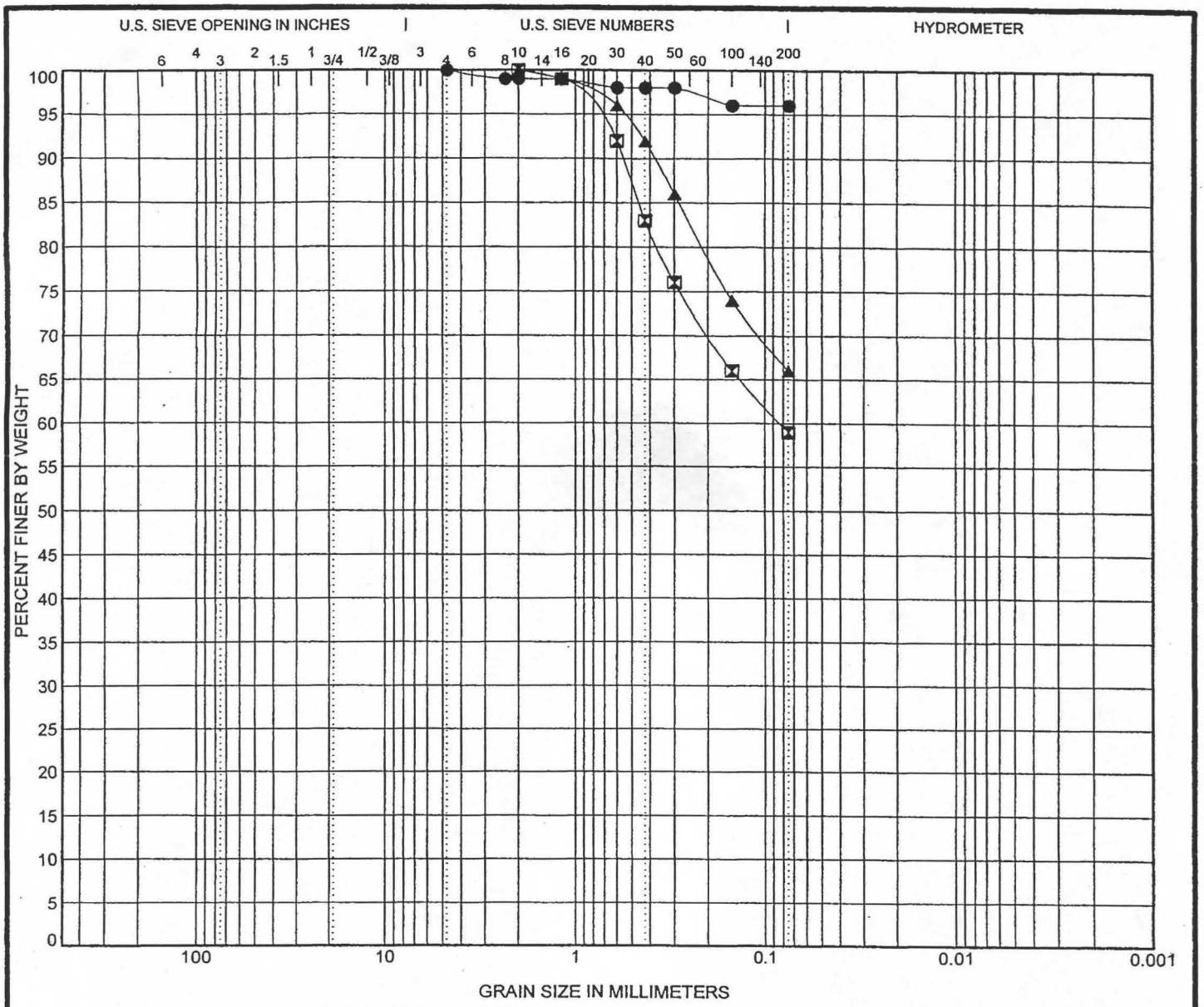


	Specimen Identification		LL	PL	PI	Fines	Classification
●	B-4	at 0.0'	47	35	12	96	SILT(ML)
⊠	B-7	at 5.0'	66	50	16	59	SANDY ELASTIC SILT(MH)
▲	B-9	at 5.0'	82	46	36	66	SANDY ELASTIC SILT(MH)

psi
Engineering Consulting Testing
6032 N. Cutter Circle Suite #480, Portland, Oregon 97217
Phone (503) 289-1778 Fax (503) 289-1918

ATTERBERG LIMITS RESULTS

Client: CSG/ESD#112
Project Name:Proposed Ilwaco Middle School Additions
Project Location: 405 NE School Rd., Ilwaco, WA
Report Number: 704-55050-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	B-4	at 0.0'	SILT(ML)	47	35	12		
⊠	B-7	at 5.0'	SANDY ELASTIC SILT(MH)	66	50	16		
▲	B-9	at 5.0'	SANDY ELASTIC SILT(MH)	82	46	36		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-4	at 0.0'	4.75				0.0	4.0	96.0	
⊠	B-7	at 5.0'	2	0.083			0.0	41.0	59.0	
▲	B-9	at 5.0'	2				0.0	34.0	66.0	

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6032 N. Cutter Circle Suite #480, Portland, Oregon 97217
Phone (503) 289-1778 Fax (503) 289-1918

GRAIN SIZE DISTRIBUTION

Client: CSG/ESD#112
Project Name:Proposed Ilwaco Middle School Additions
Project Location: 405 NE School Rd., Ilwaco, WA
Report Number: 704-55050-1

psi Information To Build On
Engineering • Consulting • Testing

Expansion Index
Uniform Building Code Standard 18-2
(ASTM D4829-95)

Project Name Hilltop Middle School		Project Number	704-55050		
Laboratory Number 05-172		Date Tested 2/19/2005			
Sample Description B-7 in a 5 gallon bucket					
MOISTURE CONTENT	INITIAL	50% Sat	Before Test		After Test
Tare (g) [e]	8.20		8.20		31.96
Wet Weight + Tare (g) [f]	135.70		135.70		377.67
Dry Weight + Tare (g) [g]	110.00		110.00		268.23
Weight of Water (g) [h=f-g]	25.70		25.70		109.44
Weight of Dry Sample (g) [l=g-e]	101.80		101.80		236.27
Moisture Content (%) [j=(h/l)*100]	**25.2**		**25.2**		**46.3**
Moisture @ 50% Saturation m= 50(168.48-k)/(kx2.7)		24.8			
Dry back Moisture should be approx 2% higher than moisture @ 50% sat.					
Weight of ring (g) a	366.56		366.56		
Weight of ring + soil (g) b	665.60		665.60		
Weight of soil (g) c	299.04		299.04		
Weight of soil (lbs) c	0.6593		0.6593		
Volume of mold (ft^3) v	0.0073		0.0073		
Density wet d = c/v	**90.3**		**90.3**		
Dry Density [k=d/(1+(j/100))]	72.1		72.1		
Saturation S= (2.7x j x k)/((62.4x2.7)-k)	51.00		51.00		
Weight Retained #4 Sieve					
Weight Passing #4 Sieve					
% Retained	0.0				
			Time (minutes)	Dial Reading	EI
EI=((Final dial reading-initial dial reading)/Initial Height))x1000			0	0.1969	
			0.5	0.1935	3
			1	0.1902	7
			2	0.185	12
			4	0.177	20
			8	0.1705	26
Expansion Index @ 50% Saturation	47		15	0.169	28
			30	0.1671	30
Hammer: B010			60	0.1659	31
Balance: D016			120	0.1645	32
Mold: G054			240	0.1533	44
Exp. Index Ring: G054			1162	0.1504	47
			1222	0.1504	47

Tested by cps
Date 2/19/2005

Reviewed by MO
Date 2/20/05

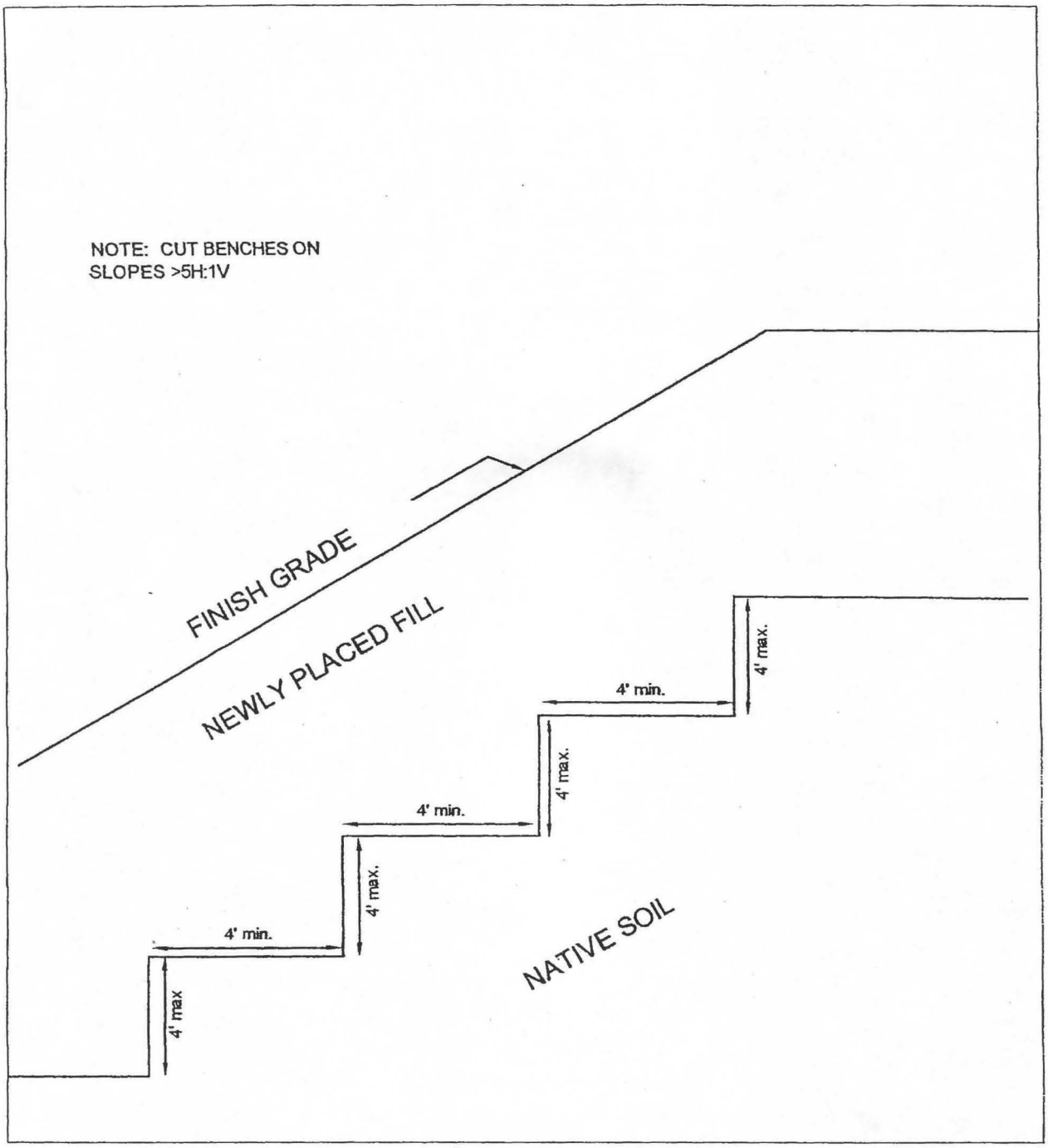
psi Information To Build On
Engineering • Consulting • Testing

Expansion Index
Uniform Building Code Standard 18-2
(ASTM D4829-95)

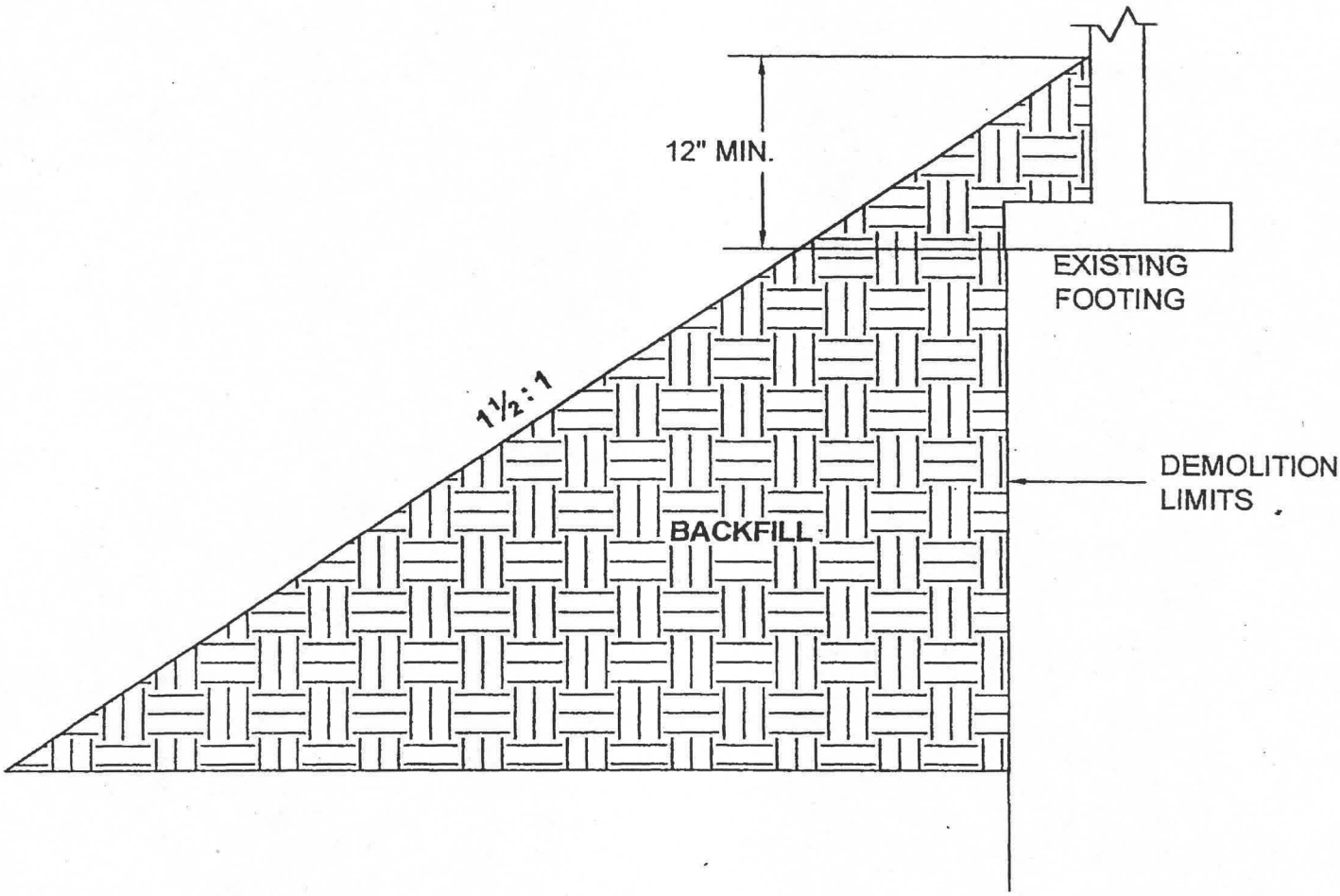
Project Name Hilltop Middle School		Project Number		704-55050	
Laboratory Number 05-172B		Date Tested 2/23/05			
Sample Description Borings (Combined B-7 5.5-6.5' & B-9 3-4')					
MOISTURE CONTENT	INITIAL	50% Sat.	Before Test		After Test
Tare (g) [e]	340.90		340.90		31.94
Wet Weight + Tare (g) [f]	394.90		394.90		382.25
Dry Weight + Tare (g) [g]	383.80		383.80		269.00
Weight of Water (g) [h=f-g]	11.10		11.10		113.25
Weight of Dry Sample (g) [l=g-e]	42.90		42.90		237.06
Moisture Content (%) [j=(h/l)*100]	**25.9**		**25.9**		**47.8**
Moisture @ 50% Saturation m= 50(168.48-k)/(kx2.7)		**25.5**			
Dry back Moisture should be approx 2% higher than moisture @ 50% sat.					
Weight of ring (g) a	366.56		366.56		
Weight of ring + soil (g) b	661.70		661.70		
Weight of soil (g) c	295.14		295.14		
Weight of soil (lbs) c	0.6507		0.6507		
Volume of mold (ft^3) v	0.0073		0.0073		
Density wet d = c/v	**89.1**		**89.1**		
Dry Density [k=d/(1+(j/100))]	70.8		70.8		
Saturation S= (2.7x j x k)/((62.4x2.7)-k)	50.65		50.65		
Weight Retained #4 Sieve					
Weight Passing #4 Sieve					
% Retained	0.0				
			Time (minutes)	Dial Reading	EI
EI=((Final dial reading-initial dial reading)/Initial Height))x1000			0	0.197	
			0.5	0.1872	10
			1	0.1828	14
			2	0.1784	19
			4	0.1713	26
			8	0.1648	32
Expansion Index @ 50% Saturation	39		15	0.1621	35
			30	0.1608	36
Hammer: B010			60	0.16	37
Balance: D016			120	0.1592	38
Mold: G054			240	0.1588	38
Exp. Index Ring: G054			1104	0.1581	39
			1164	0.1581	39

Tested by cps
Date 2/23/2005

Reviewed by MO
Date 2/24/05



[psi] Information To Build On Engineering · Consulting · Testing	DRAWING TITLE: TYPICAL BENCHING OF STRUCTURAL FILL INTO NATIVE SOIL	DATE: 05/16/2005	FIGURE 3
PSI, Inc. 6032 N. Cutter Circle, Suite 480 Portland, Oregon 97217 (503) 289-1778	PROJECT: PROPOSED ILWACO MIDDLE SCHOOL 405 NORTHEAST SCHOOL ROAD ILWACO, WASHINGTON	DRAWN BY: MAD	PSI REPORT NUMBER: 704-55050-1



PSI Information To Build On Engineering · Consulting · Testing	DRAWING TITLE: TYPICAL BACKFILL STABILIZATION AGAINST EXISTING FOUNDATIONS	DATE: 05/16/2005	FIGURE: 4
PSI, Inc. 6032 N. Cutter Circle, Suite 480 Portland, Oregon 97217 (503) 289-1778	PROJECT: PROPOSED ILWACO MIDDLE SCHOOL 405 NORTHEAST SCHOOL ROAD ILWACO, WASHINGTON	DRAWN BY: MAD	PSI REPORT NUMBER: 704-55050-1

Photo 1: Looking northeast towards percolation test location. Note: Existing grandstand is in upper left side of photo.

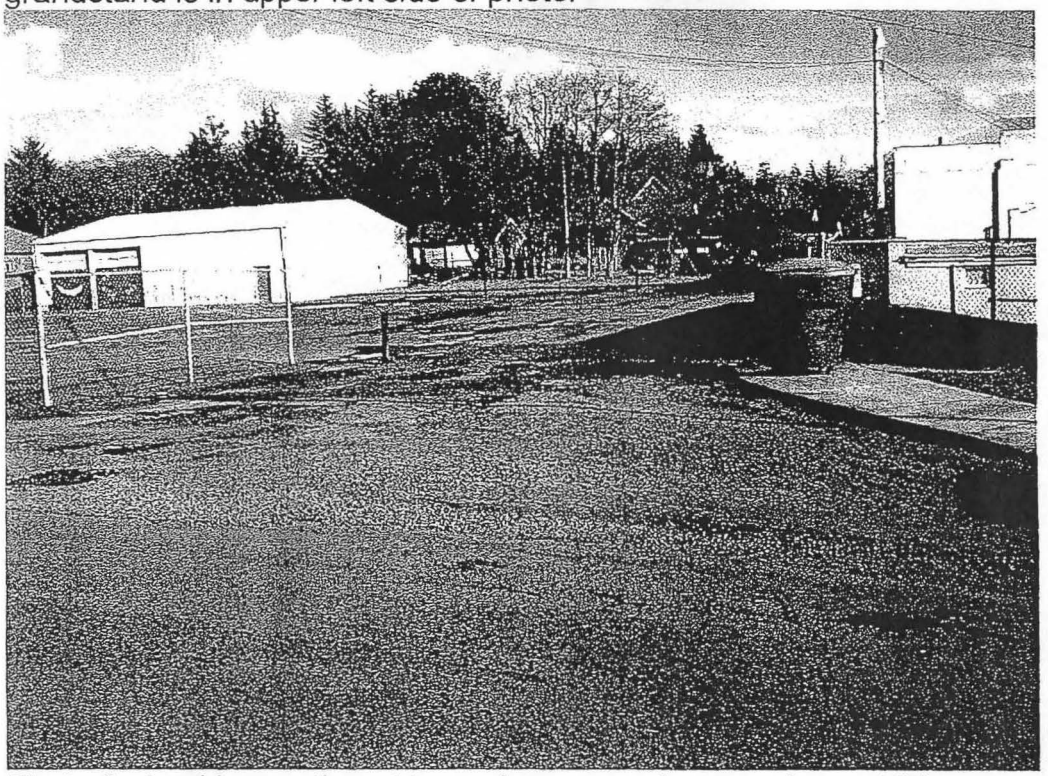


Photo 2: Looking northeast towards proposed gymnasium addition area, currently Hilltop Elementary School playground.

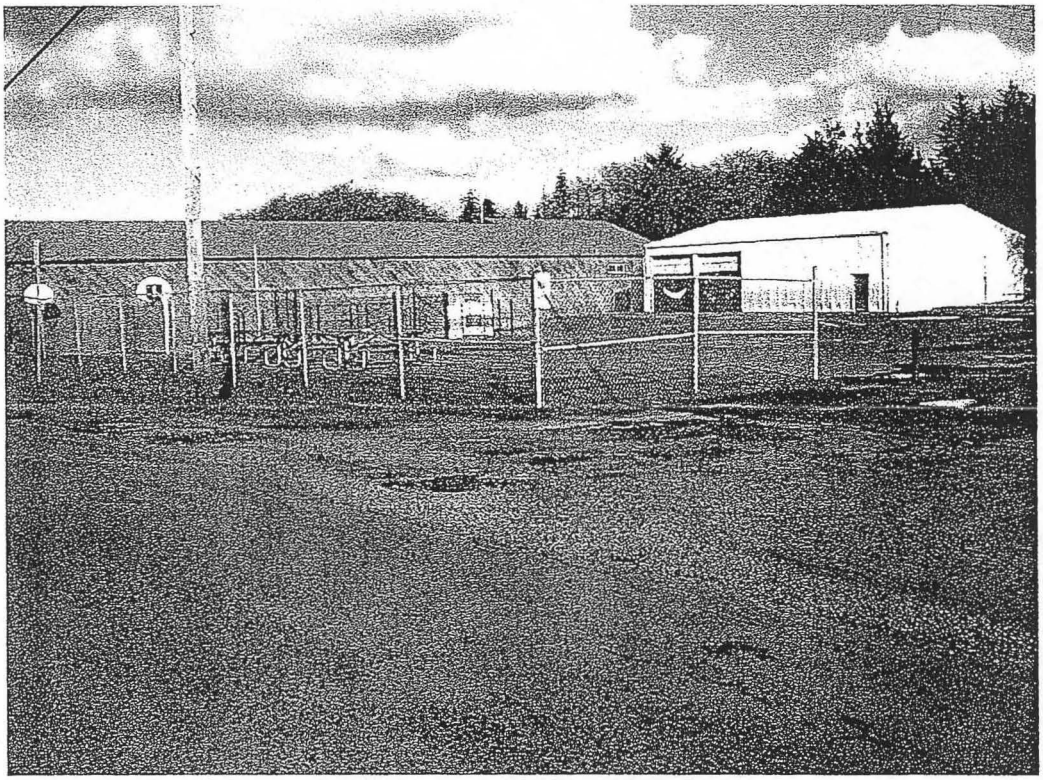


Photo 3: Looking northeast towards playground, existing bus barn, and existing building for maintenance equipment.

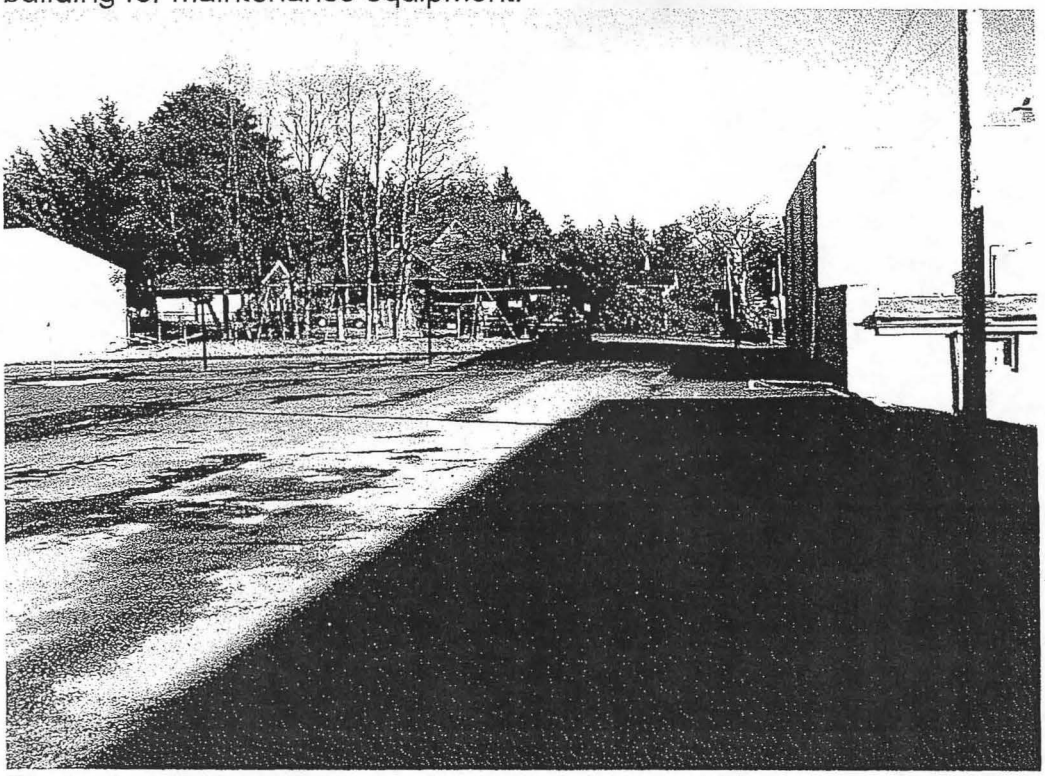


Photo 4: Looking east towards proposed gym addition area, currently playground.

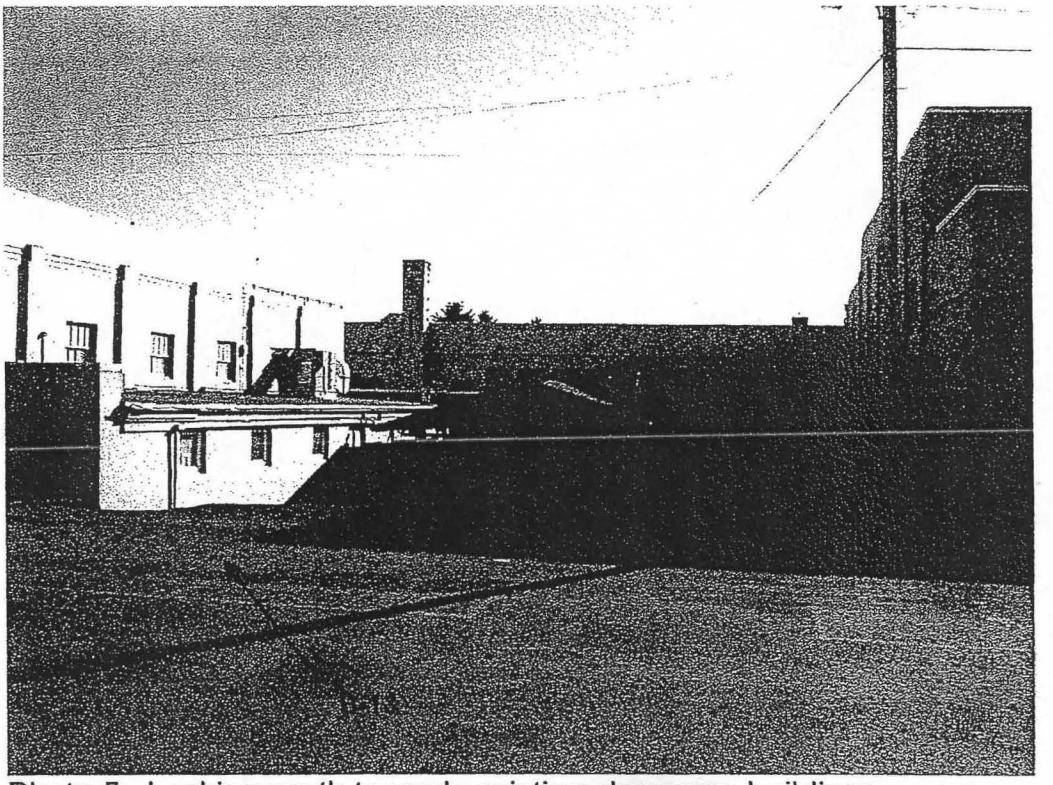


Photo 5: Looking south towards existing classroom buildings.

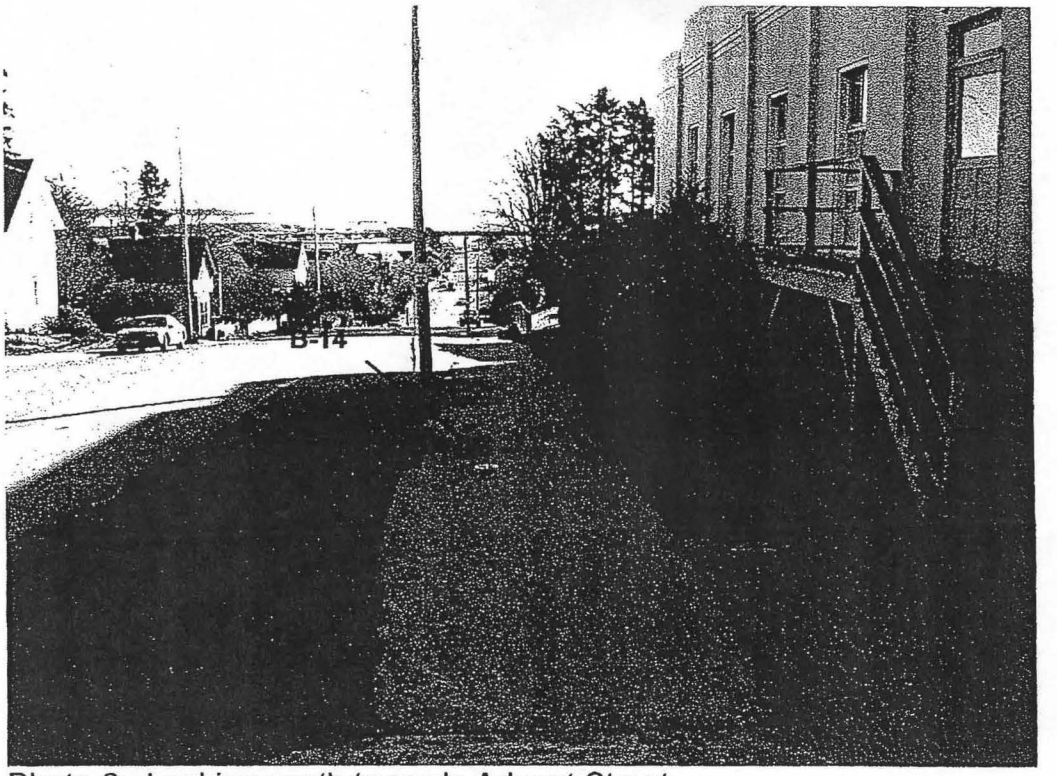


Photo 6: Looking south towards Advent Street.

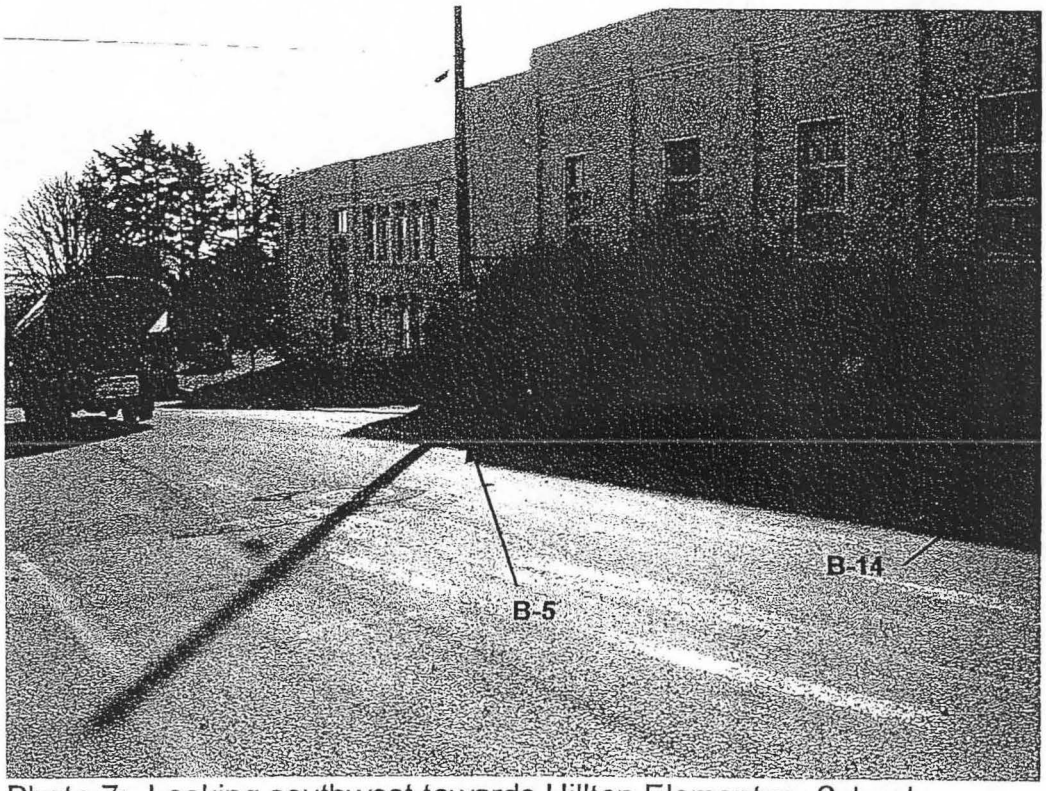


Photo 7: Looking southwest towards Hilltop Elementary School.

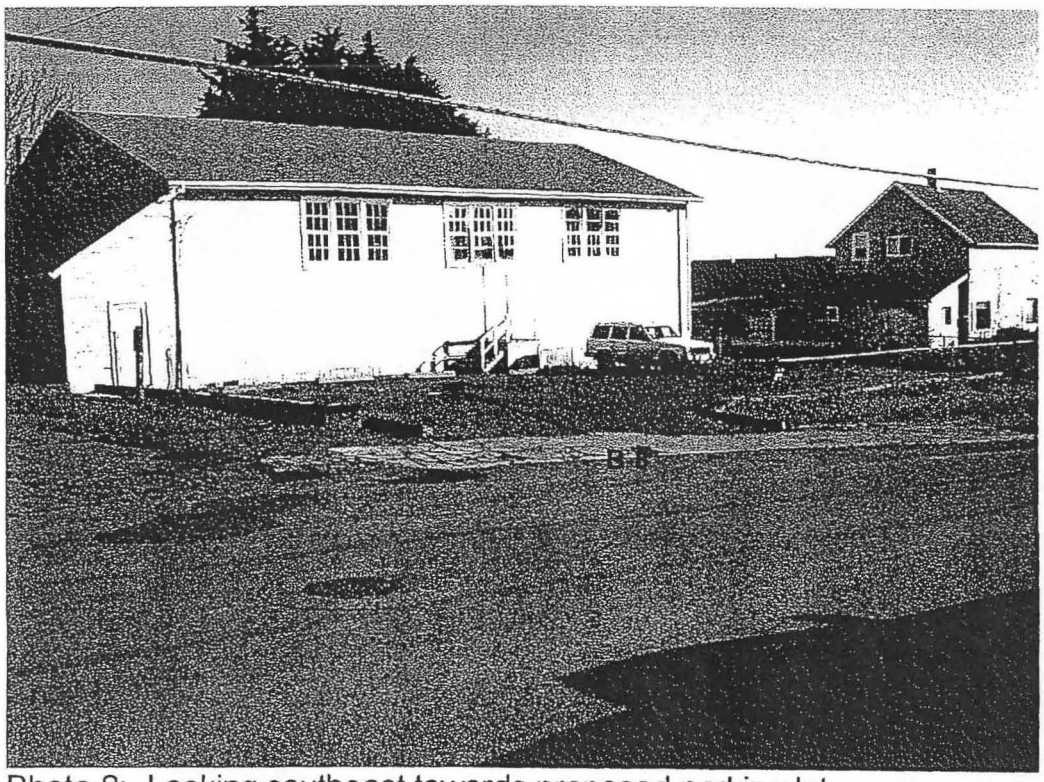


Photo 8: Looking southeast towards proposed parking lot.

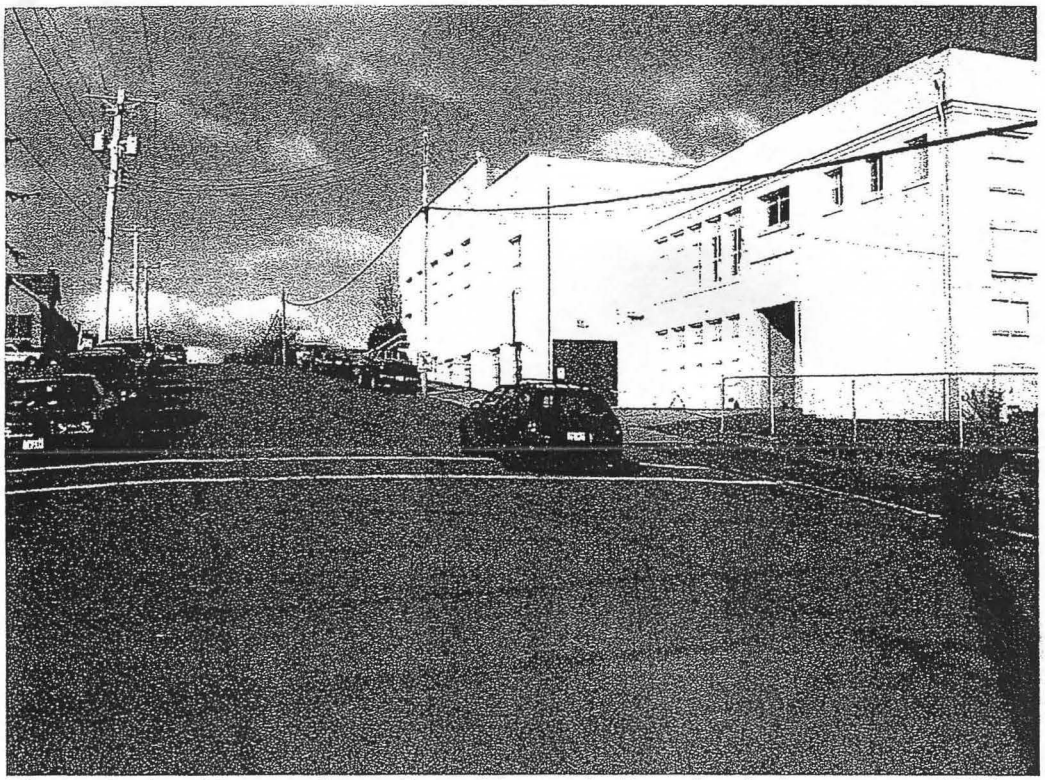


Photo 9: Looking north-northeast towards Brumbach Avenue and Hilltop Elementary School.

USGS INTERPOLATED SITE PROBABLISTIC GROUND MOTIONS
http://eqint.cr.usgs.gov/eq/cgi-bin/find-ll-2002-interp.cgi

LOCATION 46.312383 Lat. -124.04173 Long.

The interpolated Probabilistic ground motion values, in %g, at the requested point are:

	10%PE in 50 yr	2%PE in 50 yr
PGA	26.17	59.26
0.2 sec SA	60.59	144.44
1.0 sec SA	26.00	73.97

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PROJECT INFO: Home Page
SEISMIC HAZARD: Hazard by Lat/Lon, 2002