Appendix E

Subsurface Exploration, Infiltration Feasibility, Geological Hazard, and Preliminary Geotechnical Report, prepared by Associated Earth Sciences, Inc., dated December 19, 2008

Subsurface Soil Evaluation
Thurston County Road Maintenance Facility
9605 Tilly Road SW

Bradley-Noble Geotechnical Services

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22 October 2007

Mr. Bob Wolpert, AIA, Project Architect
KMB Design Group, Inc., P.S.
828 7th Avenue SE
Olympia, Washington 98501

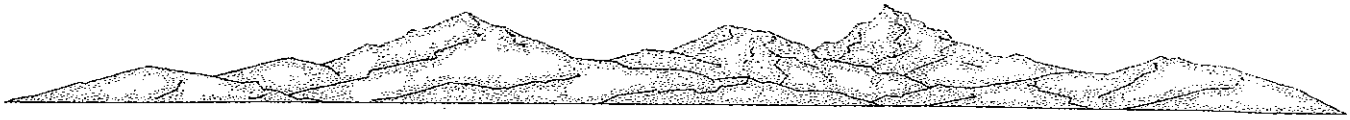
Subject: Subsurface investigation for storm water infiltration potential and preliminary evaluation of soils that would provide support for a new structure at the northeast corner of the property for the Thurston County Roads Maintenance Facility at 9605 Tilley Road Southwest.

Dear Mr. Wolpert:

Bradley-Noble has conducted a limited subsurface investigation in order to obtain preliminary subsurface soil information in selected areas of the above site. The general scope of work was to excavate test pits in order to determine soil profiles in selected areas for evaluation of infiltration potential and for support of foundations of a proposed new structure. Our work has consisted of the excavation and logging of nine test pits using an owner supplied backhoe and operator. With the information obtained from these test pits, we are presenting recommendations on infiltration rates and preliminary evaluation and recommendations for site preparation for the new structure.

The project site is located in a former gravel mining pit. Uncontrolled backfill of the gravel pit is a common reclamation technique using excess soils from off site. Cropping out in the walls of the pit where mining was stopped and in most of the test pits, we find the coarse sands and gravels of the Vashon recessional outwash. These soils were fluvially deposited onto the outwash plain of the retreating Vashon lobe of the Cordilleran glacier as it retreated northward from the Puget Sound Lowland during the Fraser glaciation in late Wisconsinan time. The outwash soils are permeable and porous and offer high infiltration rates as they are for all practical purposes free draining.

Ground water levels fluctuate in this area in response to rainfall. During periods of heavy or prolonged rainfall events, ground water levels rise rapidly in the storm and fire



protection ponds. At the time of our field work, the ground water level is reflected in the water level of these ponds. With rising ground water levels, lateral flow of storm water through the gravels above the water table occurs.

We recommend a design infiltration rate into the coarse sands and gravels of the Vashon outwash of 24 inches per hour. Actual infiltration rates exceed this value as these soils are free draining. The ability of the site soils to infiltrate water is limited by the high ground water levels under the site in the storm water infiltration pond.

Test Pits Eight and Nine were excavated by removal of the asphaltic concrete pavement of the parking and travel lanes on the east and west sides of the Old Shop & Storage Building in the northeast corner of the property. We understand that this existing structure is proposed to be razed and a new larger structure constructed at this site. In Test Pit Nine, we found the typical native soil section less the previously stripped grass and topsoil. The surface is a reddish-brown gravelly silty sand about 2.5 feet thick. Under this soil layer and extending for the depth explored are dense silty to slightly silty sandy gravels of the Vashon recessional outwash. These soils offer excellent support for standard spread footings with design bearing capacities of 4000 p.s.f.

In Test Pit Eight, excavated on the west side of this building, we found a loose fill section of varying quality and density and which contained organic material, concrete and asphalt pieces, and construction debris. We expect that this is the material that forms the west facing steep slope on the east side of the storm water infiltration pond. The transition line between the native outwash sands and gravels and the fill section under the parking lot probably is located just west of the exiting Old Shop and Storage Building. This existing fill section being of varying quality and density makes the evaluation of the safe bearing capacity of these soils along with prediction of settlements impossible.

If the construction of a new structure is required at this location based on site constraints, we recommend the following method to improve the existing fill section and allow for construction. We do not consider it a practical solution to use a partially pile supported foundation system. We recommend that the existing fill section be excavated, unsuitable material removed, and replaced as a controlled structural fill section. The following method to accomplish this work is presented. After removal of the existing building and demolition of footings, slabs, and asphalt paving sections, the existing fill section is to be removed and stockpiled. The excavation and removal is to extend a minimum of five feet outside of building lines or one foot horizontally for each foot of removal to a maximum width of 15 feet to ensure lateral support. Once the native soils are exposed, the native soils adjacent to the excavation on the east side then are rolled into the excavation in lifts and compacted to a minimum density of 90% of ASTM D 1557. Excavation and placement of the native soils is to extend a minimum of

five feet outside of building lines. Once the native soils are depleted to fill the void, then the stockpiled material is placed in lifts and compacted to plan finish grade.

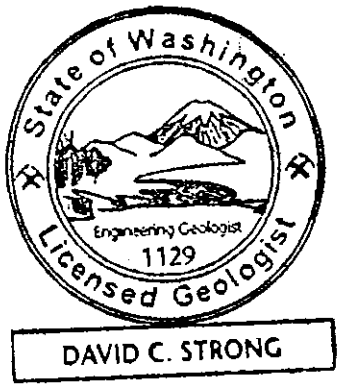
Using this method, we remove the differential settlement and reaction potential under seismic loading of foundations founded on two soil units, one of dense native soils and the other of compacted structural fill. Foundation and slab support is provided by a uniform thickness of compacted structural fill. Good compaction control and conformance to the minimum requirements of Appendix J of the International Building Code will create a soil section capable of safely supporting foundation loads of 3000 p.s.f.

If you have any additional geotechnical questions on this report, please contact us at our Olympia office.

Cordially,

BRADLEY-NOBLE GEOTECHNICAL SERVICES

David C. Strong, L.E.G.



TEST PIT LOGS

Project number: 07.09-06
Thurston County Roads Maintenance Facility
Test pits excavated, logged, and backfilled on 25 September 2007

Test Pit One:

0 to -7.5 feet	Thin topsoil over interbedded sandy gravels and gravelly sands with thin beds of small gravels with few fines. Water table -6.5 feet.

Test Pit Two:

0 to -1,8 feet	Light brown silty sandy gravel with fine roots.
-1.8 to -7.0 feet	Interbedded sandy gravels and gravelly sand with thin beds of small gravels with few fines. Water table -6.5 feet.

Test Pit Three:

0 to -1.0 feet	Light brown silty sandy gravel with fine roots.
-1.0 to -8.7 feet	Interbedded sandy gravels and gravelly sands with few fines Water table -8.1 feet.

Test Pit Four:

0 to -0.4 feet	Topsoil.
-0.4 to -7.0 feet	Interbedded sandy gravels and gravelly sands with few fines. Water table -6.6 feet.

Test Pit Five:

0 to -3.2 feet	Dark brown silty fine sand with scattered small gravels.
-3.2 to -6.5 feet	Reddish-brown silty sandy gravel.

Test Pit Six:

0 to -9.0 feet	Dense silty gravelly sand fill with cobbles and scattered small roots and wood.

Test Pit Seven:

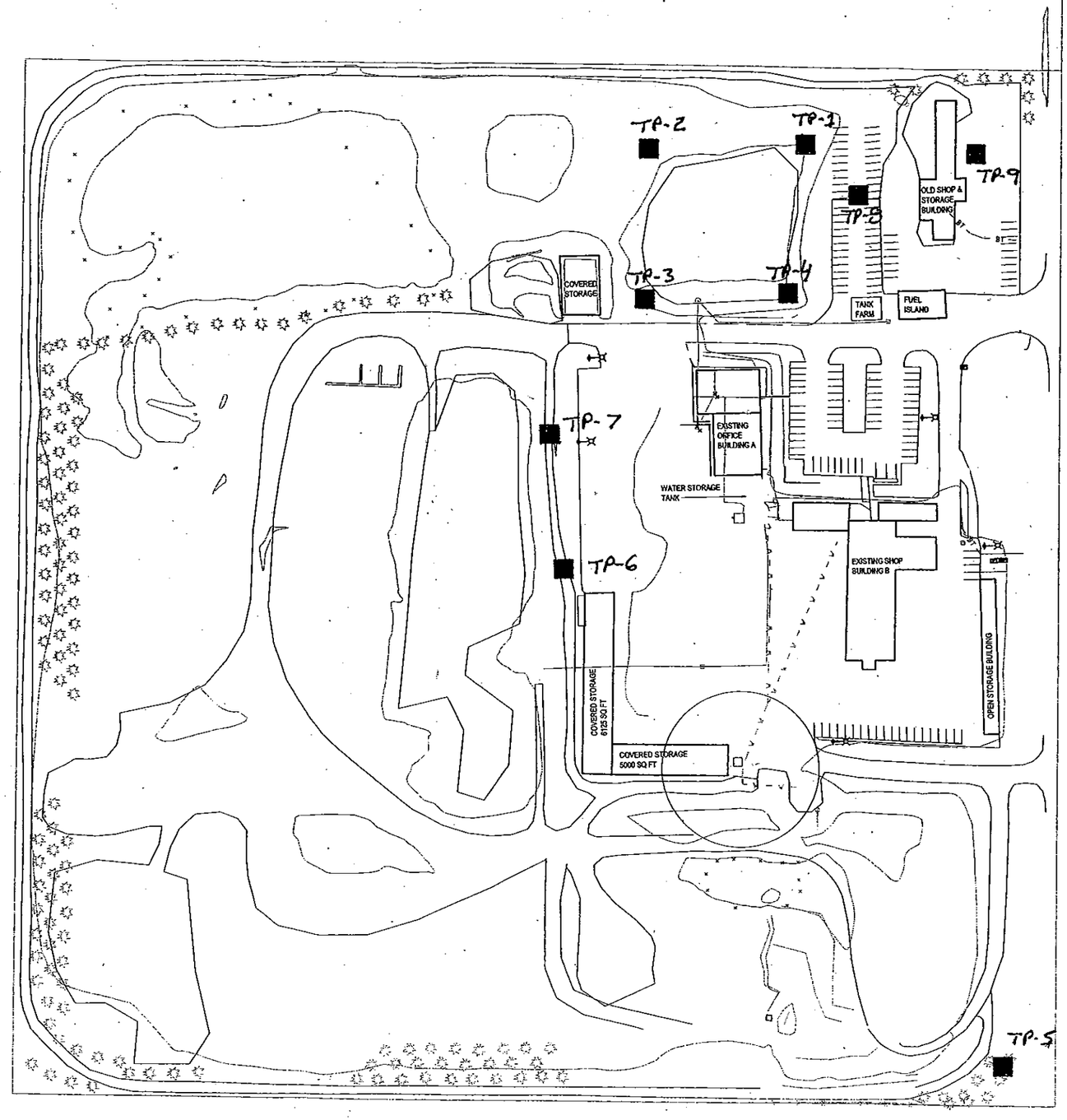
0 to -1.6 feet	Light brown silty gravelly sand fill.
-1.6 to -10 feet	Interbedded sandy gravels and gravelly sands. Water table -9.5 feet.

Test Pit Eight:

0 to -0.3 feet	Asphaltic concrete pavement.
-0.3 to -1.0 feet	5/8-inch minus crushed rock.
-1.0 to -9.0 feet	Mixed fill of silty sands, broken asphalt and concrete, organic soils and construction debris. Bottom of test pit was still in the fill section. Terminated excavation due to sloughing of the trench walls.

Test Pit Nine:

0 to -0.2 feet	Asphaltic concrete pavement.
0.2 to 0.9 feet	5/8-inch minus crushed rock.
0.9 to -3.4 feet	Reddish-brown gravelly silty sand.
-3.4 to -7.0 feet	Yellow-brown silty sandy gravel.



PROJECT NORTH

SITE PLAN

SCALE: 1"=20'-0"

KMB

design groups, inc. p.s.
architecture
education facilities group
justice facilities group
security design group

828-7th Avenue SE
Olympia, WA 98501
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7797 REGISTERED ARCHITECT MICHAEL BEARDSMORE STATE OF WASHINGTON

KMB Project # D0716A

TILLEY MASTER PLAN
THURSTON COUNTY ROADS MAINTENANCE
9605 TILLEY ROAD SOUTHWEST
OLYMPIA, WASHINGTON 98502

ORIGINAL SHEET SIZE = 22 x 34
HALF SIZE REDUCTIONS = 11x17

REVISIONS:

DATE:
9-17-2007
SCHEMATIC DESIGN

SHEET NO.
A1.1