GEOTECH
CONSULTANTS, INC.

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December 20, 2010

JN 10325

Silver Springs Organics
c/o B & T Design and Engineering
PO Box 595
Issaquah, Washington 98027

Attention: Jim Trueblood

via email jim@bntengr.com

Subject: **Foundation and Infiltration Investigation**
Silver Springs Organics Roof Structure
13835 Military Road Southeast
Thurston County, Washington

Dear Mr. Trueblood:

This letter presents our geotechnical findings related to foundation design and subsurface infiltration for your proposed covered facility. On December 15, 2010, the undersigned principal engineer met with you and Greg Schoenbachler of Silver Springs Organics at the site to observe the existing conditions, discuss the proposed construction, and monitor the excavation of test pits.

The existing facility manufactures compost from recycled organic materials. The entire ground surface in the area of the composting operation is currently covered with asphalt. A new roof structure is to be constructed over the composting operation to prevent rainfall from reaching the compost material. This will dramatically reduce the amount of runoff that comes in contact with the compost. The new roof structure will be quite large and will be supported on independent columns. At this time, the enclosure is intended to be open on all four sides.

During our visit to the site, we observed the excavation of nine test pits at the approximate locations shown on the attached copy of the site plan. These test pits were excavated using a trackhoe. Test Pits A through D were excavated as close as possible to the four corners of the proposed roof structure. It was not possible to excavate test pits further inside the building area, as it is entirely covered with thick asphalt. Test Pits 1 through 5 were excavated to assess soil conditions in areas that may be used for stormwater infiltration. The logs of these nine test pits are attached to this report. Test Pit 1 encountered approximately 12 inches of silty sand fill immediately below the ground surface. Underlying this fill was the original topsoil layer. All of the remaining test pits, except for Test Pit 4, found a 12- to 24-inch-thick layer of topsoil. Beneath this topsoil, and immediately underlying the ground surface in Test Pit 4, we consistently observed dense, sandy gravel soil that contained numerous cobbles and several large boulders. This coarse-grained soil appears to be outwash that was deposited by the last glaciers as they receded from the Puget Sound. This soil has been deposited by fast flowing water, resulting in a relatively dense condition. Only one of the explorations, Test Pit 3, revealed differing conditions below a depth of 8 feet. This exploration encountered dense sand that was medium to coarse grained. Groundwater seepage was not observed in any of the explorations. Based on our observations, it appears that the seasonal high ground water level lies beneath the bottom of the deepest test pits.

CONCLUSIONS AND RECOMMENDATIONS

The native soils encountered in the test pits are relatively incompressible and are highly permeable. The proposed roof structure can be supported on conventional footings excavated through any fill or topsoil to reach the dense native soils. The gravels will be somewhat disturbed by the excavation process after each footing is excavated, the soil in the bottom of the footing excavation should be re-compacted using a hoe-pack.

With the exception of the sand encountered in the lower portion of Test Pit 3, all of the explorations encountered coarse-grained gravel soils. We conducted a grain size analysis on a sample of the sand retrieved from the lower portion of Test Pit 3, which would have the lowest permeability of any of the soils encountered in our explorations. A copy of the test results for this sample is attached to this report.

CONVENTIONAL FOUNDATIONS

The proposed structure can be supported on conventional continuous and spread footings bearing on undisturbed, dense, native soil. We recommend that continuous and individual spread footings have minimum widths of 16 and 24 inches, respectively. Footings should also be bottomed at least 18 inches below the lowest adjacent finish ground surface for protection against frost and erosion.

An allowable bearing pressure of 4,000 pounds per square foot (psf) is appropriate for footings supported on competent native soil. A one-third increase in this design bearing pressure may be used when considering short-term wind or seismic loads. For the above design criteria, it is anticipated that the total post-construction settlement of footings founded on competent native soil will be less than one inch.

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

PARAMETER	ULTIMATE VALUE
Coefficient of Friction	0.50
Passive Earth Pressure	300 pcf

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

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

SEISMIC CONSIDERATIONS

In accordance with Table 1613.5.2 of the 2006 or 2009 International Building Code (IBC), the site class within 100 feet of the ground surface is best represented by Site Class Type C (Very Dense Soil and Soft Rock). The site soils are not susceptible to seismic liquefaction because of their dense nature and the absence of near-surface groundwater. As noted in the USGS website, the mapped spectral acceleration value for a 0.2 second (S_s) and 1.0 second period (S_1) equals 1.12g and 0.40g, respectively.

We appreciate this opportunity to be of assistance. Please contact us if we can be of further service.

Respectfully submitted,

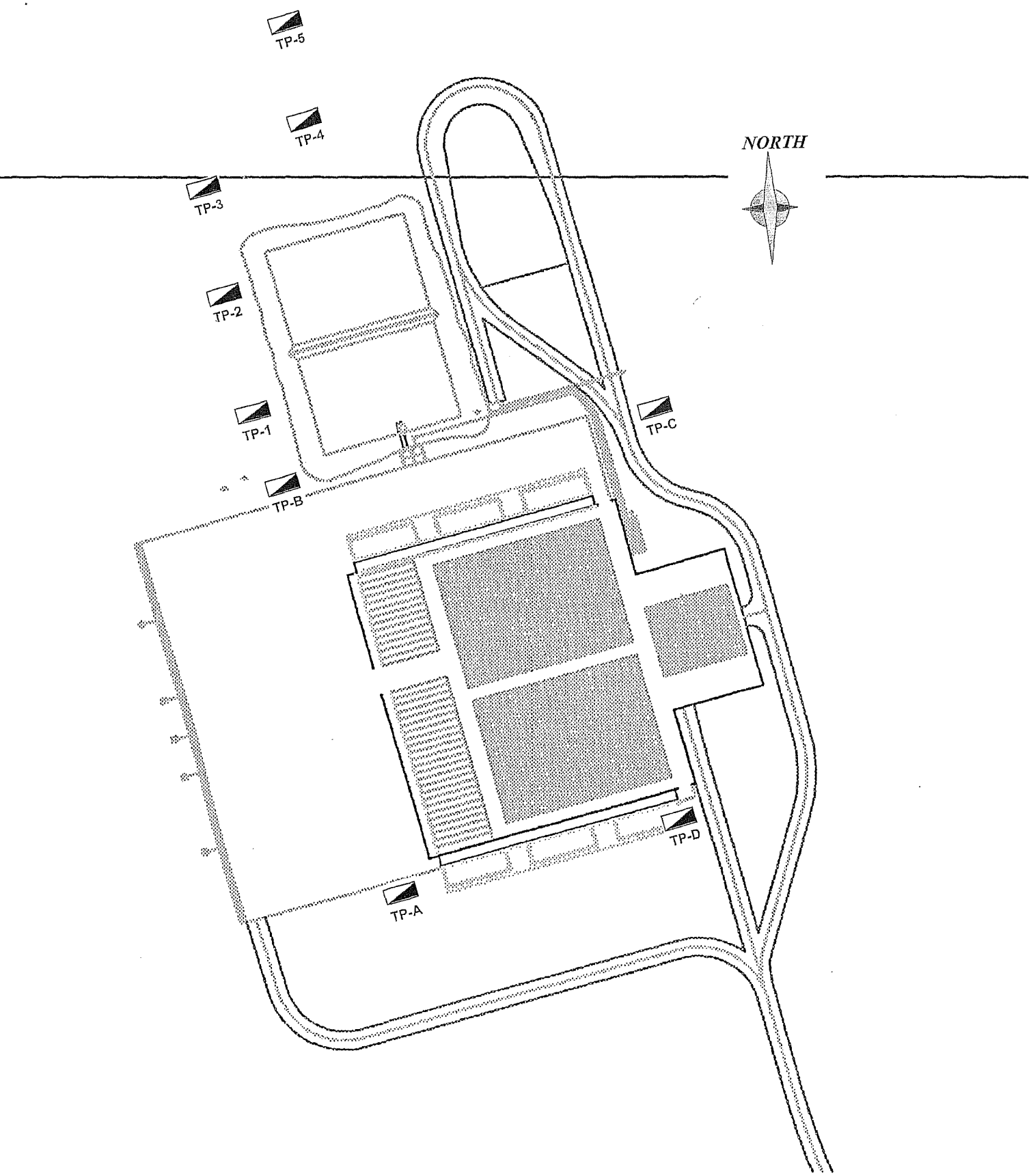
GEOTECH CONSULTANTS, INC.

MARC R. McGINNIS
STATE OF WASHINGTON
27845
REGISTERED
PROFESSIONAL ENGINEER

12/20/10

Marc R. McGinnis, P.E.
Principal

MRM: jyb


TP-5
TP-4
NORTH
TP-3
TP-2
TP-1
TP-C
TP-B
TP-D
TP-A

TEST PIT A

Depth (feet)	USCS Classification	Soil Description
0 - 1.0	**FILL**	Dark brown, gravelly, silty SAND with abundant organics, moist, loose (FILL)
1.0 - 2.0	**SM**	Brown, gravelly, silty SAND, fine-grained, moist, loose (TOPSOIL)
2.0 – 7.5	**GW**	Orangish-brown, sandy GRAVEL with cobbles and boulders, moist, dense -becomes brown at 3.0 feet

Test Pit was terminated at a depth of 7.5 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.

TEST PIT B

Depth (feet)	USCS Classification	Soil Description
0 – 1.0	**SM**	Sod over brown, gravelly, silty SAND, fine-grained, moist, loose (TOPSOIL)
1.0 – 8.0	**GW**	Orangish-brown, sandy GRAVEL with cobbles and boulders, moist, dense -becomes brown at 2.0 feet

Test Pit was terminated at a depth of 8.0 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.

TEST PIT C

Depth (feet)	USCS Classification	Soil Description
0 – 2.0	**SM**	Sod over dark brown, gravelly, silty SAND, fine-grained, moist, loose (TOPSOIL)
2.0 – 7.0	**GW**	Orangish-brown, sandy GRAVEL with cobbles and boulders, moist, dense -becomes brown at 3.0 feet

Test Pit was terminated at a depth of 7.0 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.

TEST PIT D

Depth (feet)	USCS Classification	Soil Description
0 – 6.0	**GW**	Brown, sandy GRAVEL with cobbles and boulders, moist, dense

Test Pit was terminated at a depth of 6.0 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.

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TEST PIT LOGS

13835 Military Road S.E.
Thurston County, Washington

Job No:	*Date:*		*Plate:*
10325	Dec. 2010		

TEST PIT 1

Depth (feet)	USCS Classification	Soil Description
0 – 1.0	**SM**	Sod over dark brown, gravelly, silty SAND, fine-grained, moist, loose (TOPSOIL)
1.0 – 14.0	**GW**	Orangish-brown, sandy GRAVEL with cobbles and boulders, moist, dense -becomes brown at 2.0 feet

Test Pit was terminated at a depth of 14.0 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.
Caving was observed throughout the depth of the test pit.

TEST PIT 2

Depth (feet)	USCS Classification	Soil Description
0 – 1.0	**SM**	Sod over dark brown, gravelly, silty SAND, fine-grained, moist, loose (TOPSOIL)
1.0 – 15.0	**GW**	Orangish-brown, sandy GRAVEL with cobbles and boulders, moist, dense -becomes brown at 2.0 feet

Test Pit was terminated at a depth of 15.0 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.
Caving was observed throughout the depth of the test pit.

TEST PIT 3

Depth (feet)	USCS Classification	Soil Description
0 – 1.0	**SM**	Sod over dark brown, gravelly, silty SAND, fine-grained, moist, loose (TOPSOIL)
1.0 – 8.0	**GW**	Orangish-brown, sandy GRAVEL with cobbles and boulders, moist, dense -becomes brown at 2.0 feet
8.0 – 15.0	**SP**	Grayish-brown SAND with some gravel, medium-grained, moist, dense (Sample 1 taken at depth 14 feet for grain size analysis)

Test Pit was terminated at a depth of 15.0 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.
Slight caving was observed above a depth of 8 feet.

TEST PIT 4

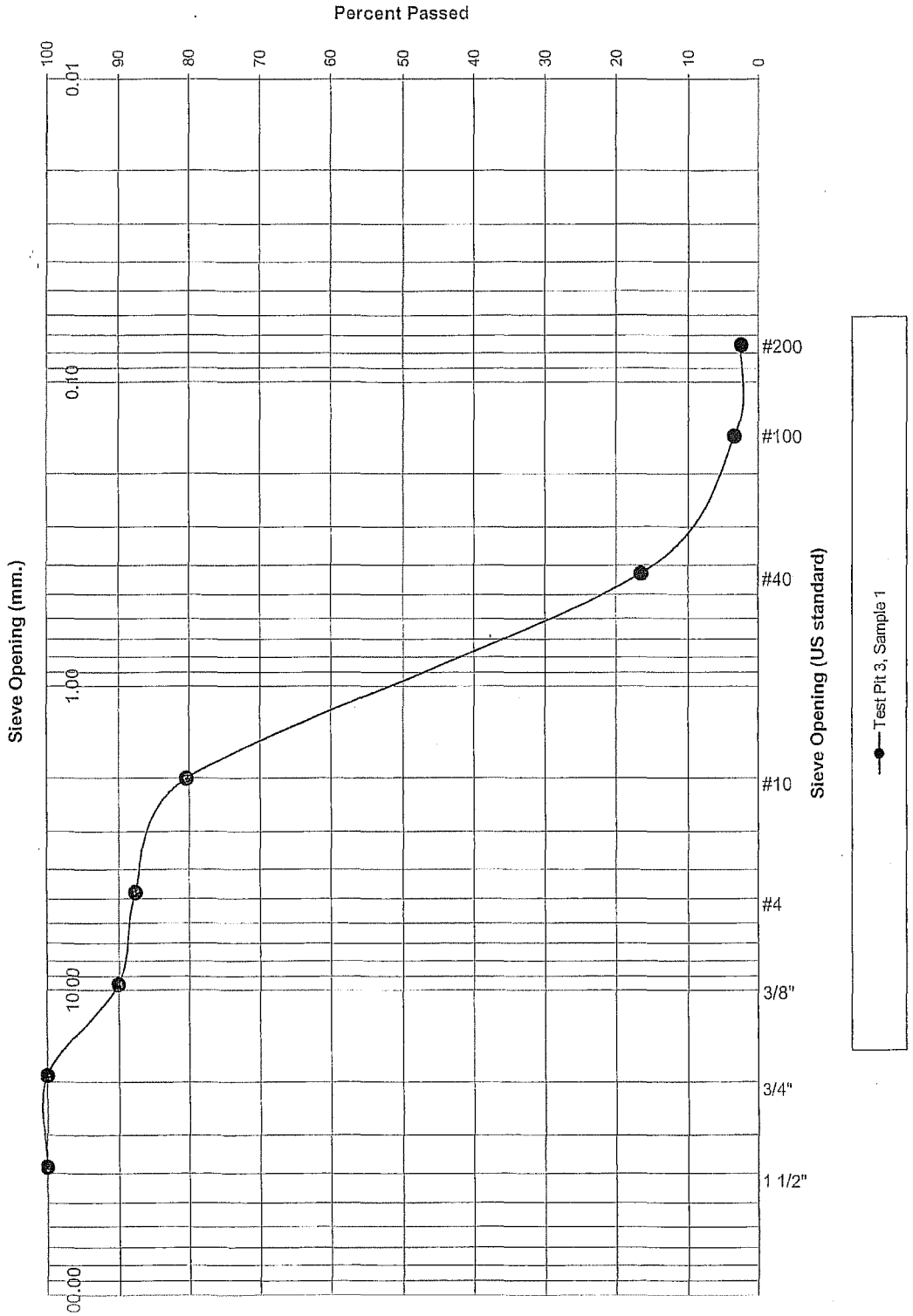
Depth (feet)	USCS Classification	Soil Description
0 – 1.0	**SM**	Sod over dark brown, gravelly, silty SAND, fine-grained, moist, loose (TOPSOIL)
1.0 – 15.0	**GW**	Orangish-brown, sandy GRAVEL with cobbles and boulders, moist, dense -becomes brown at 2.5 feet

Test Pit was terminated at a depth of 15.0 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.
Caving was observed throughout the test pit.

TEST PIT 5

Depth (feet)	USCS Classification	Soil Description
0 – 1.0	**SM**	Sod over dark brown, gravelly, silty SAND, fine-grained, moist, loose (TOPSOIL)
1.0 – 15.0	**GW**	Orangish-brown, sandy GRAVEL with cobbles and boulders, moist, dense -becomes brown at 2.5 feet

Test Pit was terminated at a depth of 15.0 feet on December 15, 2010.
No groundwater seepage was observed in the test pit.
Caving was observed throughout the test pit.



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GRAIN SIZE ANALYSIS

13835 Military Road S.E.
Thurston County, Washington

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