Construction Contracts Administration, Procurement Contracts & Materials Management (PCMM)
Oregon State University
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Corvallis, Oregon 97333

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7/2/2018

Oregon State University
Construction Contract Administration
OSU Presidential Residence Design Builder RFQ

ADDENDUM NO. 1

THIS ADDENDUM IS BEING ISSUED for clarification and/or revisions of the RFQ as noted. This document is hereby made a part of the Contract Documents to the extent as though it was originally included herein.

ADDITIONAL REFERENCE DOCUMENTS

Item 1	OSU Poultry Farm Geotechnical Survey Geotechnical Investigation, developed by Foundation Engineering, Inc., dated May 24, 2018 is attached herein for REFERENCE PURPOSES only.
Item 2	Survey of Poultry Farm is attached herein for REFERENCE PURPOSES only.

QUESTIONS

Item 3	**Q:** Please provide additional information on how OSU arrived at the budget. Please confirm what is included in the budget (hard costs, GC fees, consultant's fees, etc.). **A:** There is no additional information available about how OSU arrived at the budget. The $1.6M includes all costs associated with the design and construction of the residence. It does not include costs associated with the building permit, as OSU will pay that cost.
Item 4	**Q:** On Page 4 (item 4) and Page 8 (last sentence, first paragraph); the RFQ refers to "commissioning". Please clarify. **A:** All references to "commissioning" are hereby removed.
Item 5	**Q:** Are references part of the maximum page count? **A:** Yes

Item 6

Q: On Item 4 on page 4, how detailed does OSU want this of subcontractors and sub-consultants?
A: Please include key sub-consultants (i.e. designer, engineer(s); trade partners are not required.

Item 7

Q: Please clarify “owner” in references section.
A: Owner means the owner (and or end user) of the project, it does not mean the owner of the sub-consultant’s firm.

Item 8

Q: Can the resumes and transmittal letter be included in the spiral notebook, or should they be completely separate?
A: Resumes and transmittal letter can be included in the spiral notebook.

Item 9:

Q: Will someone be present at the 644 SW 13th Avenue address on the deadline date?
A: Yes. The office opens at 8:00 am local time.

<u>END OF ADDENDUM NO. 1</u>

Geotechnical Investigation

OSU Poultry Farm Geotechnical Survey
Geotechnical Investigation
Corvallis, Oregon

Prepared for:

Oregon State University
Capital Planning & Facilities Services
Corvallis, Oregon

May 24, 2018

Foundation Engineering, Inc.
Professional Geotechnical Services

Libby Ramirez, AIA
University Architect/Manager, Capital Resources
OSU Capital Planning and Facility Services
Oak Creek Building, Room 132
Corvallis, Oregon 97333-4238

May 24, 2018

OSU Poultry Farm Geotechnical Survey
Geotechnical Investigation
Corvallis, Oregon

Project 2181023

Dear Ms. Ramirez:

We have completed the requested geotechnical investigation for the above-referenced project. This report includes a description of our work, a discussion of site conditions, a summary of laboratory testing, and recommendations for site preparation, foundation design and construction, and pavements. Based on the soil conditions, the new building may be supported on conventional spread footings with a slab-on-grade floor.

It has been a pleasure assisting you with this phase of your project. Please do not hesitate to call if you have any questions.

Sincerely,

FOUNDATION ENGINEERING, INC.

Marcelo M. Azevedo, Ph.D., E.I.T.
Geotechnical Staff

William L. Nickels Jr., P.E., G.E.
President

MMA/WLN/wg
Enclosure

REGISTERED PROFESSIONAL ENGINEER
60776 PE
OREGON
MAY 17, 1999
WILLIAM L. NICKELS JR.
EXPIRES: 12/31/ 18

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GEOTECHNICAL INVESTIGATION
OSU POULTRY FARM GEOTECHNICAL SURVEY
CORVALLIS, OREGON

1.0 PROJECT DESCRIPTION

Oregon State University (OSU) is planning to construct a new University President's residence on the north side of the OSU Poultry Farm facility located at 4545 NW Harrison Blvd. in Corvallis, Oregon. The site location is shown on Figure 1A (Appendix A).

The design team had not been selected at the time this report was prepared, so very little information was available regarding story height and location on the hill north of the existing Poultry Farm facilities. However, we anticipate the new ±10,000 square-foot residence will be supported on conventional spread footings with a combination of raised floors and slabs-on-grade. The ground surface slopes down from north to south at ±10 percent. Cuts and fills will be required, but the extent of the earthwork is unknown at this time. In addition, we understand no retaining walls or basements are currently planned.

OSU is the owner. The design team had not been selected at the time this report was prepared. Foundation Engineering, Inc. was retained by OSU as the geotechnical consultant. Details of our scope of work were provided in a proposal dated December 4, 2017, and subsequently authorized by Supplement No. OSU-254-P-17-31 dated February 19, 2018.

2.0 LOCAL GEOLOGY

Corvallis is located between the western edge of the central Willamette Valley and the eastern foothills of the Coast Range. The City is set on gently sloping foothills and a broad, flat terrace adjacent to the Willamette River and the Marys River. This setting has created a variety of geologic terrains beneath the City (Bela, 1979; Yeats et al., 1996; O'Connor et al., 2001; Wiley, 2008). Local geologic mapping indicates that Willamette Silt underlies most of downtown Corvallis, younger alluvium is found along Oak Creek and Marys River, and fluvial deposits underlie these deposits with depth (Wiley, 2008). These sediments thin toward exposures of older, well-indurated sedimentary rock (Eocene Spencer and Tyee Formations) in the low hills along the western edge of the City (Wiley, 2008).

At the proposed building site, topsoil is underlain by residual soil and shallow bedrock to an unknown depth. The bedrock at the site consists of sedimentary sandstone and siltstone consistent with descriptions and mapped locations of the Tyee Formation (Wiley, 2008). Therefore, the subsurface conditions encountered in our explorations are consistent with the mapped local geology.

3.0 DISCUSSION OF SITE AND SUBSURFACE CONDITIONS

3.1 Field Exploration

We excavated eight exploratory test pits on April 26, 2018, using a Takeuchi TB290 tracked excavator. The test pits extended to maximum depths ranging from ±5.5 to 12 feet. Disturbed soil samples were obtained for possible laboratory testing. Undrained shear strength measurements were made on the test pit side walls using a Torvane shear device. The soil profile, sampling depths, and strength measurements are summarized on the appended test pit logs.

The test pits were logged in the field at the time of the explorations. The final logs (Appendix B) were prepared based on a review of the field logs and an examination of the soil samples in our laboratory. The approximate test pit locations are shown in Figure 2A, (Appendix A). The subsurface conditions are discussed below.

3.2 Site Topography and Vegetation

The site is located on the foothills along the eastern edge of the Coast Range. The northern portion of the project area gently slopes (approximately ±9° to 10°, based on the site plan) to the south and west while the lower-lying central and southern portion is relatively flat.

The north portion of the property is covered in tall grass with scattered clumps of oak trees and scrub vegetation. These trees range up to 2 to 3 feet in diameter. Blackberry bushes are commonly located along this portion of the site, with some dense patches along the sloping terrain. The flat central and southern portion of the site is cleared with low-lying grass. Smaller trees are also located near the Poultry Farm facility buildings.

3.3 Subsurface Conditions

A general description of the soil and bedrock conditions encountered in the test pits is provided below. More detailed descriptions of the soil and bedrock conditions encountered in individual test pits are summarized in the appended logs.

Subsurface conditions vary across the site depending on location. The general soil profile encountered during our exploration includes:

Topsoil. A topsoil layer was encountered in all of the test pits. The thickness of the topsoil ranges from 10 inches to 2 feet, but is typically 1.5 feet thick. The topsoil consists of dark brown, low plasticity, silt that is loosely structured near the ground surface. We typically encountered abundant fine roots to a depth of ±1 to 1.5 feet. The topsoil was typically moist to wet and soft to medium stiff during our field exploration.

Residual Soil. Residual soil of varying consistency underlies the topsoil. The residual soil represents bedrock that has decomposed to the consistency of clay, silty clay, and clayey silt. The residual soil was typically moist to wet and stiff to very stiff at the time of the exploration. The plasticity of the soil varies with depth and location. High plasticity clay was encountered in TP-1 to depths ranging from ±2 to 5 feet, with a thickness of ±3 feet. Low plasticity silt and silty clay was encountered in TP-1, TP-2 and TP-3, just below the topsoil in ±0.5 to 1-foot thick layers.

Weathered Sandstone/Siltstone. The residual soil transitions to moderately to highly weathered, extremely weak to very weak (R0 to R1) sandstone and siltstone of the Tyee Formation. The weathered bedrock typically resembles very stiff to hard, sandy or clayey silt with relict bedrock structure and is light brown and iron-stained. Manganese-staining was also noted in TP-4, TP-5, TP-6, TP-7, and TP-8. The bedrock was observed in all test pits starting at depths ranging from ±1.5 to 5 feet. Digging extended up to ±10 feet into the bedrock with only moderate difficulty using a small excavator. The excavation of TP-4, TP-5, TP-6, and TP-8 was slower due to the R1 material encountered with the excavator.

3.3 Ground Water

During our field exploration, standing water was noted in some low-lying portions of the site. The soils near the surface of the test pits were typically moist to wet, while the underlying soils were generally damp to moist. We observed ground water infiltration in TP-1 at a depth of ±4 feet below the ground surface. The rate of infiltration into the test pit ranged was slow.

The observed iron-staining of the surficial soils, ponded surface water noted during our investigation, shallow bedrock, and the presence of high plasticity clay suggests that a perched water condition develops within a few feet of the ground surface during the wet portions of the year. In addition, the iron-staining and blocky-structure of the residual soils and bedrock suggest ground water typically rises to within ±4 to 5 feet of the ground surface during the winter, with low lying areas maintaining that ground water level year-round.

4.0 LABORATORY TESTING

The laboratory work included natural water content and Atterberg limits tests to classify the foundation soils according to the Unified Soil Classification System (USCS) and estimate their overall engineering properties. The laboratory test results are summarized in Table 1.

Table 1. Natural Water Content and Atterberg Limits

Sample Number	Sample Depth (feet)	Natural Water Content (percent)	LL	PL	PI	USCS Classification
S-1-2	1.0 – 1.5	29.1	34	24	10	CL-ML
S-1-3	2.5 – 3.0	35.8	69	32	37	CH
S-3-1	1.0 – 1.5	27.8	38	31	7	ML

Results of the Atterberg limits test suggest the residual clay encountered in TP-1 has a liquid limit (LL) of 69, a plastic limit (PL) of 32, a plasticity index (PI) of 37, and a resulting USCS classification of CH (i.e., highly plastic clay). Residual soil and topsoil encountered in all other test pits had a PI of 7 to 10, indicating low plasticity.

5.0 DISCUSSION OF GEOTECHNICAL CONSIDERATIONS

5.1 Slope Stability

We noted no visible movement, instability, or existing scarps along the slopes. The ground surface is vegetated and tree trunks along the upland slopes were generally straight. No seeps or springs were observed on the site besides the previously mentioned ponded areas observed in the low-lying areas.

Based on our observations, we have concluded there is a low hazard for landslides or instability of natural slopes due to the absence of identifiable landslide features, the lack of seeps or springs (except for existing drainages), and the presence of relatively stiff residual soil and shallow bedrock beneath mature slopes.

5.2 High Plasticity Clay

High plasticity clay was encountered below the topsoil in TP-1, which is near the base of the hill and likely outside of the building area. As the terrain steepens the clay pinches out. The actual uphill limits of the high plasticity clay will require confirmation at the time of construction.

The high plasticity clay has high expansion potential and will shrink or swell with seasonal changes in water content. Shrinkage or swelling of the subgrade soils may cause movement (heave or differential displacement) of the foundations, walks, slabs, and other deformation-sensitive structures.

Full mitigation of the risks from plastic clay requires completely removing the soil or siting the building uphill of the material (recommended). However, excavation for construction of the driveway and possibly the parking area will likely encounter clay at the subgrade elevation. For these areas, we recommend a partial mitigation (i.e., partial removal of the clay) as an alternative which attempts to balance risk and cost. For this scenario, we typically recommend providing at least 24 inches of non-expansive material (e.g., compacted Select Fill or Granular Site Fill) between the bottom of the paved surfaces and the surface of the expansive soil. This recommendation is intended to help reduce differential movement by limiting the expansive soil below depths where seasonal fluctuations in moisture content are not as severe.

5.3 Seasonal Issues

The fine-grained soils that underlie the site are moisture-sensitive and will soften considerably when wet and disturbed from construction traffic. The topsoil typically extended to depths of ±1 to 2 feet and is blocky-structured and currently soft to medium stiff. This soil will be particularly susceptible to softening and will not support construction traffic during wet weather. If practical, we recommend completing the site grading and foundation construction during dry weather (typically June through October).

If construction extends through at least one winter, the fine-grained subgrade material near the ground surface will be sensitive and soften as the natural moisture content of the material increases during the winter months. Therefore, a minimum of 24 inches of crushed rock (i.e., Select Fill) is recommended for the building pad if fine-grained soils are exposed within the building footprint. Pavement areas and construction staging areas required to support construction traffic may also require 24-inches of Select Fill.

During wet weather, excavations are also likely to encounter ground water that will collect at the bottom of the excavations or seep along open cuts. As a result, we expect wet weather construction will substantially increase earthwork costs relative to dry weather construction. Therefore, if practical, we recommend completing the earthwork during the dry summer months.

6.0 SEISMIC DESIGN

6.1 Bedrock Acceleration and Site Response

The proposed building site is underlain by predominately medium stiff, fine-grained soils and shallow, weathered bedrock. Based on these conditions, an Oregon Structural Specialty Code (OSSC) 2014 Site Class C (dense soil and soft rock) is recommended for seismic design.

The 2014 OSSC is based on the 2012 International Building Code (IBC). The design maximum considered earthquake ground motion maps provided in the 2014 OSSC are the modified 2008 USGS maps with a 1% probability of exceedence in 50 years (i.e., a ±4,975-year return period) for design spectral accelerations. The modifications include factors to adjust the spectral accelerations to account for directivity and risk. The IBC 2012/OSSC 2014 site response spectrum and seismic design parameters are summarized on Figure 3A (Appendix A).

6.2 Liquefaction

Liquefiable soils typically consist of saturated, loose sand and non-plastic silt. These soils were not encountered in the test pits. Therefore, there is no liquefaction hazard at the site.

7.0 ENGINEERING ANALYSIS AND DESIGN

7.1 Bearing Capacity

The new residence will be located in the upland area where the depth to extremely weak (R0) sandstone is ±1.5 to 2.5 feet below the existing grade. A presumptive, allowable bearing pressure was estimated assuming the Select Fill underlying the footings will extend to the sandstone. Based on that assumption, an allowable bearing pressure of up to 4 $kips/ft^2$ may be assumed for design.

The allowable bearing pressure assumes the footings will consist of strip footings. The use of isolated pad footings for residential construction is not recommended.

7.2 Settlement

A formal settlement analysis was not conducted. However, based on the Select Fill underlying the footings extending to sandstone, we anticipate the total settlement will be less than ½ inch and the differential settlement between footings will be less than ¼ inch. These values are predicated on the foundation design and site preparation being completed as recommended herein.

7.3 Sliding Coefficient and Passive Resistance for Footings

A sliding coefficient of 0.40 is recommended for foundations placed on Select Fill. Per IBC (2012), the sliding resistance may not exceed one-half the dead load.

For passive toe resistance of the spread footings, an equivalent fluid density of 200 pcf may be used for design. A factor of safety has been applied to this value, since it is unlikely the footings will move laterally enough to mobilize the full passive resistance. The recommended value assumes the backfill around the footings will consist of compacted Select Fill.

7.4 Slab-on-Grade

If slab-on-grade floors are utilized, we have assumed a nominal 4-inch thick slab. The slab will be supported on a minimum of 12 inches of compacted Select Fill underlain by sandstone. Therefore, a modulus of subgrade reaction of 300 pci is appropriate for design.

8.0 CONSTRUCTION RECOMMENDATIONS

Construction recommendations provided below assume the earthwork for the building pad and foundation construction will occur during wet weather. Therefore, a 24-inch thick building pad is required. We recommend a preconstruction conference with the contractor to review the recommendations and make any necessary adjustments to the following recommendations prior to the on-set of building pad preparation.

8.1 General Earthwork and Material Specifications

1. Select Fill as defined in this report should consist of 1 or ¾-inch minus, clean (i.e., less than 5% passing the #200 U.S. Sieve), well-graded, crushed gravel or rock. We should be provided a sample of the intended fill or the results of a grain-size analysis for approval, prior to delivery to the site.

2. Granular Site Fill should consist of 3-inch minus, clean, well-graded crushed gravel or rock.

3. Drain Rock should consist of 2-inch minus, clean (less than 2% passing the #200 sieve), open-graded crushed gravel or rock. The actual gradation and maximum aggregate size will depend on availability by local suppliers. We should be provided a sample of the intended fill and gradation curve for approval, prior to delivery to the site.

4. The Separation Geotextile should be a woven geotextile with Mean Average Roll Value (MARV) strength properties meeting the requirements of an AASHTO M 288-17 Class 2 geotextile. The geotextile shall have MARV hydraulic properties meeting the requirements of AASHTO M 288-17 with a permittivity greater than 0.2 $sec.^{-1}$ and an Apparent Opening Size (AOS) less than 0.6 mm (max average roll value). The permittivity is required to reduce the risk of subgrade pumping while constructing the building pad and parking area during wet weather. We should be provided a specification sheet on the selected geotextile for approval prior to delivery to the site.

5. The Subsurface Drainage Geotextile should be a non-woven geotextile with Mean Average Roll Value (MARV) strength properties meeting the requirements of an AASHTO M 288-17 Class 2 geotextile (Subsurface Drainage Geotextile) with a maximum AOS of 0.3 mm (max average roll value) and a permittivity greater than 0.1 sec^{-1}. We should be provided a specification sheet on the selected geotextile for approval prior to delivery to the site.

6. Compact the Select Fill to 95% relative compaction. The maximum dry density of ASTM D698 should be used as the standard for estimating the relative compaction. Efficient compaction of granular fills will require a smooth drum, vibratory roller. Walk-behind plate compactors or hoe-mounted compactors will be required for smaller foundation excavations where access with self-propelled equipment is not feasible, or in vibration sensitive areas. Field density tests should be run frequently to confirm adequate compaction of the Select Fill.

7. Place and compact all Select Fill in loose lifts not exceeding 12 inches to the standard specified above. However, the initial lift of rock for construction of the building pads may need to be thickened to 18 inches to protect the fine-grained subgrade during wet weather.

8. Anticipate ground water infiltration in the footing excavations and in utility trenches. Excavations should be pumped dry prior to placing the backfill.

9. Where temporary slopes are not feasible, provide the required shoring in all trenches and excavations to protect workers from sloughing or caving soils.

10. Shoring for utility trenches should conform to Oregon OSHA regulations. An OSHA Type B soil is appropriate for the stiff to very stiff, fine-grained soils (in the absence of active seepage). Temporary cut slopes in Type B soils should be no steeper than 1(H):1(V).

    An OSHA Type A soil is appropriate for the weathered sandstone (in the absence of active seepage). Temporary cut slopes in Type A soils should be no steeper than 0.5(H):1(V). The slopes should be approved by a Foundation Engineering representative following a site-specific evaluation.

8.2 Site Preparation (Slab-On-Grade Construction)

The recommendations for building pad preparation assume the exposed subgrade for slab-on-grade construction will consist of moderately weathered sandstone.

11. Excavate to the required grade to expose the sandstone and accommodate a 12-inch thick building pad. Do not expose more subgrade than can be covered with a Separation Geotextile and Select Fill the same day.

12. Complete the final excavation using a hoe equipped with a smooth bucket to minimize disturbance to the subgrade. Remove all rock fragments and soil clods and leave a clean, smooth surface. The excavator should operate from outside of the excavation or from a thickened rock section. Do not permit vehicles or construction equipment on the subgrade unless they are supported on a minimum of 12 inches of compacted, Select Fill.

13. Place a Separation Geotextile over the approved subgrade. The geotextile shall be laid smooth without wrinkles or folds in the direction of construction traffic. Adjacent rolls shall be overlapped a minimum of 2 feet. Roll ends shall be overlapped a minimum of 3 feet. Overlaps shall be in the direction of rock placement. Overlaps that have separated will require removal of the rock to establish the required overlap.

14. Do not allow vehicles or construction equipment on the geotextile unless they are supported on a minimum of 12 inches of compacted, non-yielding Select Fill.

15. Construct the building pad using Select Fill. The Select Fill should be placed in a manner that will not disturb the subgrade or require construction equipment to operate directly on the exposed subgrade or Separation Geotextile. Overexcavate any soft areas or areas of subgrade pumping and replace with compacted Select Fill.

8.3 Site Preparation (Framed Floor Construction)

16. Strip the existing ground ±12 inches, or as required to remove roots and sod. Dispose of all strippings outside of construction area.

17. Grade the subgrade to promote drainage away from the new building. The grade should accommodate a 4-inch thick pad (see below). Subgrade compaction is not required.

18. Place a minimum of 4 inches of Select Fill for a working surface. The minimum pad thickness is intended for foot traffic and light vehicles during dry weather, and is not intended to support continuous, heavy construction traffic. The rock should be end-dumped from outside of the building area and spread using a light dozer. Compact the Select Fill as specified above.

19. Provide a vapor barrier over the finished crawl space.

8.4 Foundation Construction

Foundation construction should be in general accordance with the following recommendations.

20. Design the foundations and slabs-on-grade as specified in Section 7. The design criteria assume footings will be supported on a minimum of 6 inches of Select Fill extending to moderately weathered sandstone. Strip footings should have a minimum width of 18 inches. Isolated pier footings are not recommended.

    A Foundation Engineering representative should be on-site to evaluate the exposed foundation subgrade for conformance with the above-referenced criteria. Following approval and placement of Select Fill, the Select Fill should be density tested to confirm adequate compaction prior to placing forms and rebar.

21. Excavate for the foundations using a hoe equipped with a smooth bucket. Grade the bottom of the excavation to drain towards a common low point for dewatering, if required. The excavation should extend a minimum of 6 inches beyond all sides of the foundations, or as required for formwork.

    Neat forming the footings into the weathered sandstone may be considered if conditions permit and approved by a Foundation Engineering representative.

22. The contractor should assume that footing excavations may encounter ground water or collect surface runoff, depending on location and grade. Grading at the base of the excavations should direct ground water to sumps (or equivalent collection points) where it can be pumped out of

the excavations. Dewater the foundation excavations prior to placing Select Fill.

23. Overexcavate any disturbed, wet or soft foundation material to the depth required, as directed by a Foundation Engineering representative. Replace the overexcavated subgrade using Select Fill. We recommend the bid documents include a unit cost for overexcavation and replacement of soft or unsuitable soils.

24. Immediately place and compact the Select Fill in a 6-inch thick loose lift using a vibratory compactor that will not disturb the foundation subgrade. Backfill around the completed foundations should consist of compacted Select Fill, unless neat forming is used.

25. Provide a suitable vapor barrier under the slab that is compatible with the proposed floor covering and the method of slab curing. The proposed vapor barrier and installation plan should be reviewed by the flooring manufacturer and architect.

26. Provide a minimum of 4 inches of compacted Select Fill under all other isolated concrete slabs and walks. This thickness may have to be increased to support equipment if the work occurs during wet weather.

8.5 Foundation Drainage

Foundation drainage for the building should be designed and constructed as follows:

27. Install a foundation drain along the perimeter foundation. The drain should consist of a 4-inch diameter, perforated or slotted, PVC pipe placed within a 12-inch by 12-inch mass of Drain Rock wrapped in a Filter Fabric. The Filter Fabric should lap a minimum of 12 inches at the top. The flowline of the pipe should be set at the base of the perimeter foundation or mat.

28. Provide clean-outs at appropriate locations for future maintenance of the drainage system.

29. Discharge the drains by gravity flow into the nearest storm drain or other appropriate location.

9.0 DESIGN REVIEW/CONSTRUCTION OBSERVATION/TESTING

We should be provided the opportunity to review all drawings and specifications that pertain to site preparation and foundation construction. Foundation preparation will require field confirmation of subgrade conditions in accordance with the recommendations provided herein. We recommend that we be present to confirm the soil and rock conditions in the foundation excavations prior to backfilling with Select Fill. Mitigation of any foundation subgrade pumping or persistent ground water infiltration will also require engineering review and judgment. That judgment should be provided by one of our representatives. Frequent field density tests should be run on the Select Fill. If practical, fills too coarse for density testing should be proof-rolled as recommended above. We recommend that we be retained to provide the necessary construction observation.

9.0 VARIATION OF SUBSURFACE CONDITIONS, USE OF THIS REPORT, AND WARRANTY

The analyses, conclusions and recommendations contained herein assume the soil profiles and the ground water levels encountered in the test pits are representative of the overall site conditions. The above recommendations assume that we will have the opportunity to review final drawings and be present during construction to confirm assumed foundation conditions. No changes in the enclosed recommendations should be made without our approval. We will assume no responsibility or liability for any engineering judgment, inspection or testing performed by others.

This report was prepared for the exclusive use of Oregon State University and their design consultants for the new Oregon State University Presidents residence project in Corvallis, Oregon. Information contained herein should not be used for other sites or for unanticipated construction without our written consent. This report is intended for planning and design purposes. Contractors using this information to estimate construction quantities or costs do so at their own risk. Our services do not include any survey or assessment of potential surface contamination or contamination of the soil or ground water by hazardous or toxic materials. We assume that those services, if needed, have been completed by others.

Climate conditions in western Oregon typically consist of wet weather for almost half of the year (typically between mid-October and late May). It is assumed that adequate drainage will be provided for construction and the build out condition. The recommendations for site preparation and foundation drainage are not intended to represent any warranty (expressed or implied) against the growth of mold, mildew or other organisms that grow in a humid or moist environment.

Our work was done in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

10.0 REFERENCES

Bela, J. L., 1979; *Geologic Hazards of Eastern Benton County, Oregon*: Oregon Department of Geology and Mineral Industries (DOGAMI), Bulletin 98, 122 p.

O'Connor, J., Sarna-Wojcicki, A., Wozniak, K. C., Polette, D. J., and Fleck, R. J., 2001; *Origin, Extent, and Thickness of Quaternary Geologic Units in the Willamette Valley, Oregon*: U.S. Geological Survey (USGS), Professional Paper 1620, 52 p.

OR-OSHA; *Oregon Administrative Rules, Chapter 437, Division 3 - Construction, Subdivision P - Excavations*: Oregon Occupational Safety and Health Division (OR-OSHA).

OSSC, 2014, *Oregon Structural Specialty Code (OSSC):* Based on the International Code Council, Inc., 2012 International Building Code (IBC), Section 1613 and 1803.3.

USGS, 2008, *National Seismic Hazard Mapping Project, Probabilistic Hazard Look-up by Latitude/Longitude*: accessed May 2018, from the U.S. Geological Survey (USGS) web site: http://eqhazmaps.usgs.gov.

Wiley, T. J., 2008, *Preliminary Geologic Maps of the Corvallis, Wren, and Marys Peak 7.5' Quadrangles, Benton, Lincoln and Linn Counties, Oregon:* Oregon Department of Geology and Mineral Industries (DOGAMI), Open-File Report O-08-14, Scale: 1:24,000, 11 p.

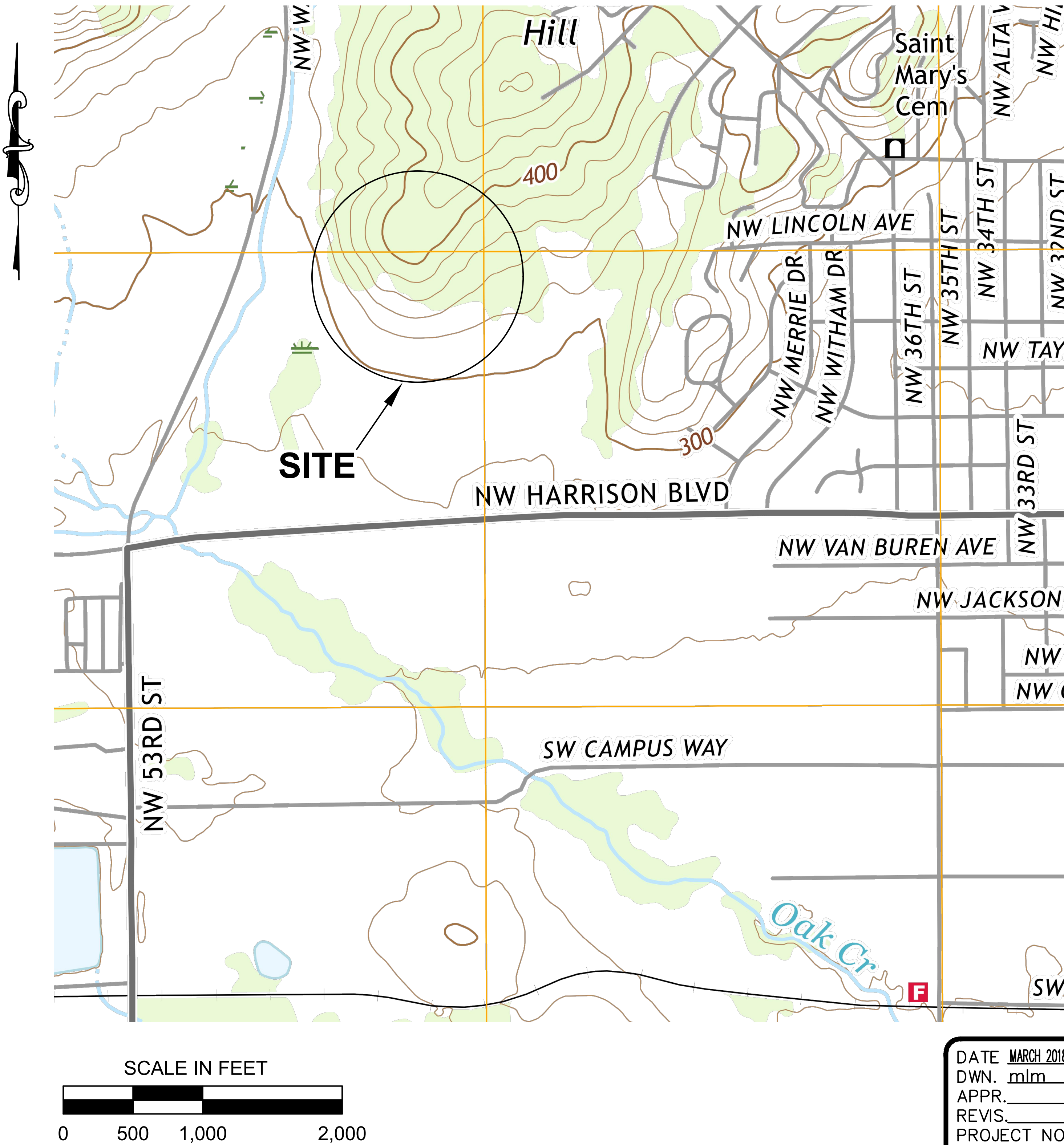
Yeats, R. S., Graven, E. P., Werner, K. S., Goldfinger, C., and Popowski, T. A., 1996; *Tectonics of the Willamette Valley, Oregon*: *in* Roger, A. M., Walsh, T. J., Kockelman, W. J., and Priest, G. R., eds., Assessing Earthquake Hazards and Reducing Risk in the Pacific Northwest: U.S. Geological Survey (USGS), Professional Paper 1560, p. 183-222.

Appendix A

Figures

Professional
Geotechnical
Services

Foundation Engineering, Inc.



DATE MARCH 2018
DWN. mlm
APPR.
REVIS.
PROJECT NO.
2181023

FOUNDATION ENGINEERING INC.
PROFESSIONAL GEOTECHNICAL SERVICES
820 NW CORNELL AVENUE
CORVALLIS, OR 97330-4517
BUS. (541) 757-7645 FAX (541) 757-7650

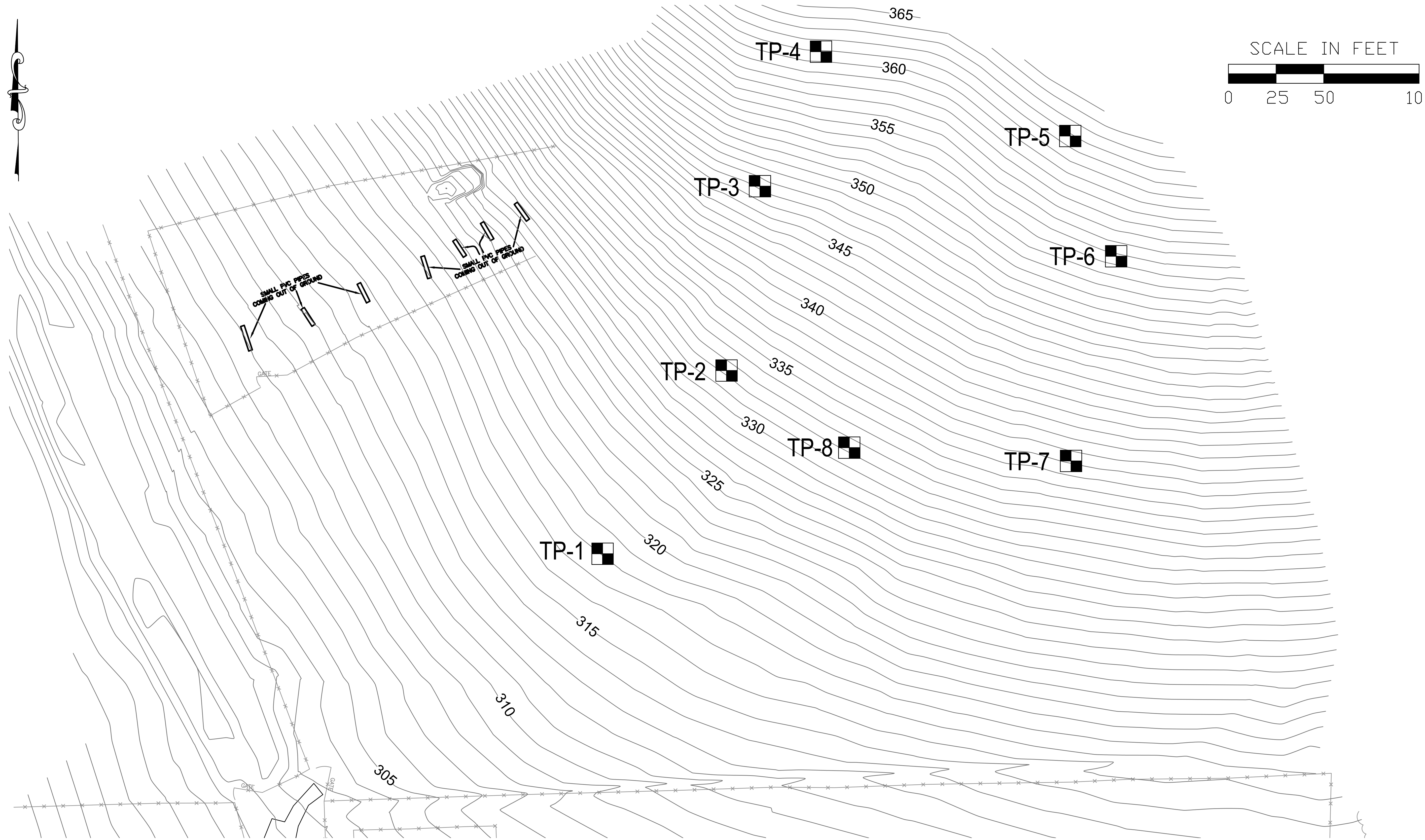
VICINITY MAP

OSU POULTRY FARM
CORVALLIS, OREGON

FIGURE NO.

1A

FILE NAME: FIG 1A – VICINITY MAP



NOTES:
1. TEST PIT LOCATIONS WERE ESTABLISHED BASED ON A SURVEY CONDUCTED BY COLE SURVEYING, LLC ON MAY 21, 2018.
2. BASE IMAGE PROVIDED BY OSU.
3. SEE REPORT FOR A DISCUSSION OF SUBSURFACE CONDITIONS.

FOUNDATION ENGINEERING INC.
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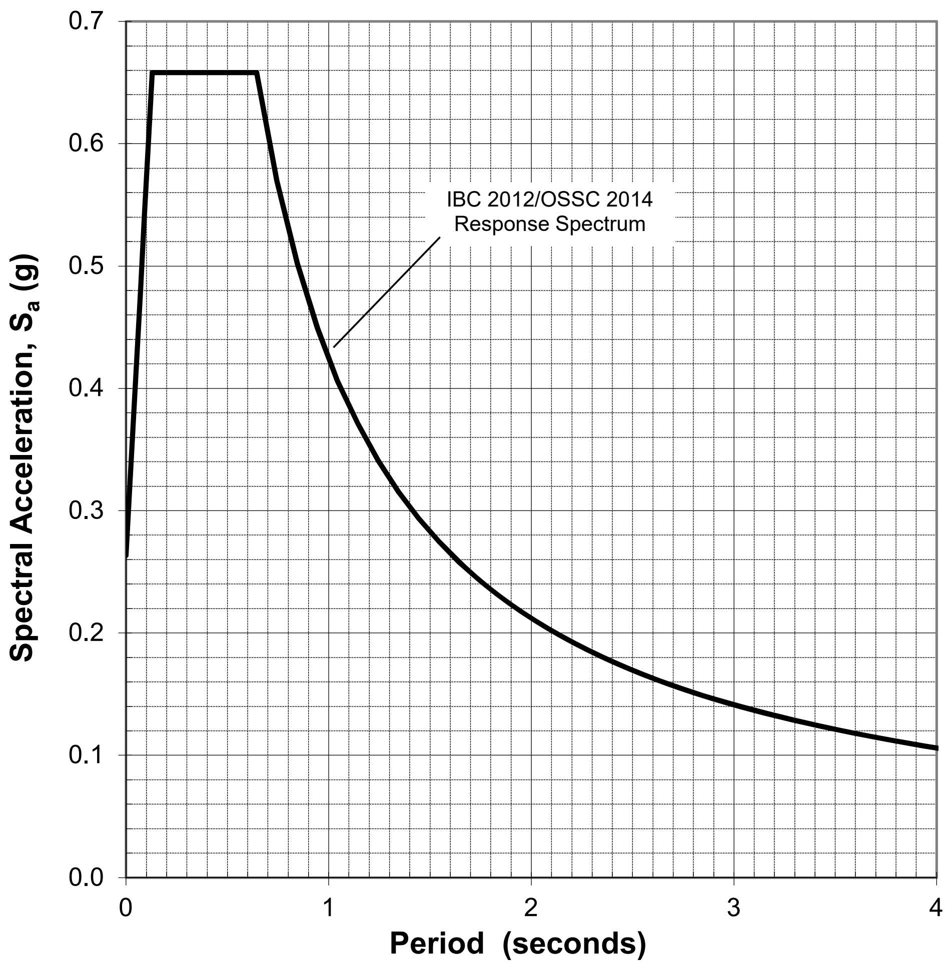
DATE MAY 2018
DWN. MMA
APPR.
REVIS.
PROJECT NO.
2181023

SITE LAYOUT AND TEST PIT LOCATIONS

OSU POULTRY FARM
CORVALLIS, OREGON

FIGURE NO.
2A



Notes:

1. The Design Response Spectrum is based on IBC 2012 Section 1613.
2. The following parameters are based on the modified USGS 2008 maps provided in IBC 2012/OSSC 2014:

Site Class= **C** Damping = 5%

S_S =	0.98	F_a =	1.01	S_{MS} =	0.99	S_{DS} =	0.66
S_1 =	0.48	F_v =	1.32	S_{M1} =	0.64	S_{D1} =	0.42

3. S_S and S_1 values indicated in Note 2 are the mapped, risk-targeted maximum considered earthquake spectral acclerations for 1% probability of exceedence in 50 years.
4. F_a and F_v were established based on IBC 2012, Tables 1613.3.3(1) and 1613.3.3(2) using the selected S_S and S_1 values. S_{DS} and S_{D1} values include a 2/3 reduction on S_{MS} and S_{M1} as discussed in IBC 2012 Section 1613.3.4.
5. Site location is: Latitude 44.57549, Longitude -123.30522.

FIGURE 3A
IBC 2012/OSSC 2014 SITE RESPONSE SPECTRUM
OSU POULTRY FARM
CORVALLIS, OREGON
Project 2181023

Appendix B

Test Pit Logs

Professional Geotechnical Services

Foundation Engineering, Inc.

DISTINCTION BETWEEN FIELD LOGS AND FINAL LOGS

A field log is prepared for each boring or test pit by our field representative. The log contains information concerning sampling depths and the presence of various materials such as gravel, cobbles, and fill, and observations of ground water. It also contains our interpretation of the soil conditions between samples. The final logs presented in this report represent our interpretation of the contents of the field logs and the results of the sample examinations and laboratory test results. Our recommendations are based on the contents of the final logs and the information contained therein and not on the field logs.

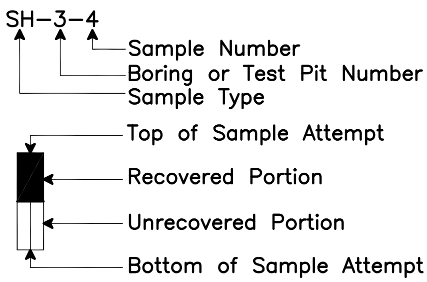
VARIATION IN SOILS BETWEEN TEST PITS AND BORINGS

The final log and related information depict subsurface conditions only at the specific location and on the date indicated. Those using the information contained herein should be aware that soil conditions at other locations or on other dates may differ. Actual foundation or subgrade conditions should be confirmed by us during construction.

TRANSITION BETWEEN SOIL OR ROCK TYPES

The lines designating the interface between soil, fill or rock on the final logs and on subsurface profiles presented in the report are determined by interpolation and are therefore approximate. The transition between the materials may be abrupt or gradual. Only at boring or test pit locations should profiles be considered as reasonably accurate and then only to the degree implied by the notes thereon.

SAMPLE OR TEST SYMBOLS



C – Pavement Core Sample
CS – Rock Core Sample
OS – Oversize Sample (3-inch split-spoon)
S – Grab Sample
SH – Thin-walled Shelby Tube Sample
SS – Standard Penetration Test Sample (split-spoon)

▲ Standard Penetration Test Resistance equals the number of blows a 140 lb. weight falling 30 in. is required to drive a standard split-spoon sampler 1 ft. Practical refusal is equal to 50 or more blows per 6 in. of sampler penetration.

● Water Content (%).

UNIFIED SOIL CLASSIFICATION SYMBOLS

G – Gravel
S – Sand
M – Silt
C – Clay
Pt – Peat

W – Well Graded
P – Poorly Graded
L – Low Plasticity
H – High Plasticity
O – Organic

FIELD SHEAR STRENGTH TEST

Shear strength measurements on test pit side walls, blocks of soil or Shelby tube samples are typically made with Torvane or Field Vane shear devices.

TYPICAL SOIL/ROCK SYMBOLS

Concrete
Sand
Basalt
Organics
Gravel
Sandstone
Clay
Silt
Siltstone

WATER TABLE

▼ Water Table Location

(1/31/16) Date of Measurement

FOUNDATION ENGINEERING INC.
PROFESSIONAL GEOTECHNICAL SERVICES

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7857 SW CIRRUS DRIVE, BUILDING 24
BEAVERTON, OR 97008
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SYMBOL KEY

EXPLORATION LOGS

Explanation of Common Terms Used in Soil Descriptions

Field Identification	Cohesive Soils			Granular Soils	
	SPT*	S_u** (tsf)	Term	SPT*	Term
Easily penetrated several inches by fist.	0 – 2	< 0.125	Very Soft	0 – 4	Very Loose
Easily penetrated several inches by thumb.	2 – 4	0.125–0.25	Soft	4 – 10	Loose
Can be penetrated several inches by thumb with moderate effort.	4 – 8	0.25 – 0.50	Medium Stiff	10 – 30	Medium Dense
Readily indented by thumb but penetrated only with great effort.	8 – 15	0.50 – 1.0	Stiff	30 – 50	Dense
Readily indented by thumbnail.	15 – 30	1.0 – 2.0	Very Stiff	> 50	Very Dense
Indented with difficulty by thumbnail.	>30	> 2.0	Hard		

* SPT N–value in blows per foot (bpf)
** Undrained shear strength

Term	Soil Moisture Field Description
Dry	Absence of moisture. Dusty. Dry to the touch.
Damp	Soil has moisture. Cohesive soils are below plastic limit and usually moldable.
Moist	Grains appear darkened, but no visible water. Silt/clay will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grain surfaces. Sand and cohesionless silt exhibit dilatancy. Cohesive soil can be readily remolded. Soil leaves wetness on the hand when squeezed. Soil is wetter than the optimum moisture content and above the plastic limit.

Term	PI	Plasticity Field Test
Non–plastic	0 – 3	Cannot be rolled into a thread at any moisture.
Low Plasticity	3 – 15	Can be rolled into a thread with some difficulty.
Medium Plasticity	15 – 30	Easily rolled into thread.
High Plasticity	> 30	Easily rolled and re–rolled into thread.

Term	Soil Structure Criteria
Stratified	Alternating layers at least ¼ inch thick.
Laminated	Alternating layers less than ¼ inch thick.
Fissured	Contains shears and partings along planes of weakness.
Slickensided	Partings appear glossy or striated.
Blocky	Breaks into small lumps that resist further breakdown.
Lensed	Contains pockets of different soils.

Term	Soil Cementation Criteria
Weak	Breaks under light finger pressure.
Moderate	Breaks under hard finger pressure.
Strong	Will not break with finger pressure.

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COMMON TERMS

SOIL DESCRIPTIONS

Explanation of Common Terms Used in Rock Descriptions

Field Identification		UCS (psi)	Strength	Hardness (ODOT)
Indented by thumbnail.	R0	< 100	Extremely Weak	Extremely Soft
Crumbles under firm blows with geological hammer, can be peeled by a pocket knife.	R1	100–1,000	Very Weak	Very Soft
Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with geological hammer.	R2	1,000–4,000	Weak	Soft
Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single blow of geological hammer.	R3	4,000–8,000	Medium Strong	Medium Hard
Specimen requires more than one blow of geological hammer to fracture it.	R4	8,000–16,000	Strong	Hard
Specimen requires many blows of geological hammer to fracture it.	R5	>16,000	Very Strong	Very Hard

Term	Weathering Field Identification
Fresh	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly Weathered	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric.
Moderately Weathered	Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Highly Weathered (Predom. Decomp.)	Rock can be excavated with geologist's pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed	Rock mass is completely decomposed. Original rock "fabric" may be evident (relict texture). May be reduced to soil with hand pressure.

Spacing (meters)	Spacing	Spacing Term	Bedding/Foliation
< 0.06	< 2 in.	Very Close	Very Thin (Laminated)
0.06 – 0.30	2 in. – 1 ft.	Close	Thin
0.30 – 0.90	1 ft. – 3 ft.	Moderately Close	Medium
0.90 – 3.0	3 ft. – 10 ft.	Wide	Thick
> 3.0	> 10 ft.	Very Wide	Very Thick (Massive)

Vesicle Term	Volume
Some vesicles	5 – 25%
Highly vesicular	25 – 50%
Scoriaceous	> 50%

Stratification Term	Description
Lamination	<1 cm (0.4 in.) thick beds
Fissile	Preferred break along laminations
Parting	Preferred break parallel to bedding
Foliation	Metamorphic layering and segregation of minerals

RQD %	Designation	RQD %	Designation
0 – 25	Very Poor	75 – 90	Good
25 – 50	Poor	90 – 100	Excellent
50 – 75	Fair		

Rock Quality Designation (RQD) is the cumulative length of intact pieces 4 inches or longer excluding breaks caused by drilling and handling divided by run length, expressed as a percentage.

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COMMON TERMS

ROCK DESCRIPTIONS

Comments	Depth, Feet	Sample #	Location	C, TSF	Elev. Depth	Symbol	Soil and Rock Description
Surface: tall grass and brush.		S-1-1					Soft SILT, some organics (ML); dark brown, wet, low plasticity, organics consist of fine roots, (topsoil).
	1	S-1-2			0.8		Soft silty CLAY, some organics (CL-ML); brown and iron-stained, wet, low plasticity, organics consist of fine roots, (residual soil).
	2			0.25			
		S-1-3		0.55	2.0		Stiff CLAY (CH); brown and grey and iron-stained, wet, high plasticity, (residual soil).
Slow seepage at ±4 feet.	3						
	4						
	5				5.0		Extremely weak (R0) silty SANDSTONE; light brown and grey and iron-stained, moderately weathered, (Tyee Formation).
	6	S-1-4			6.0		BOTTOM OF EXPLORATION
	7						
	8						
	9						
	10						
	11						
	12						

Project No.: 2181023

Surface Elevation: ±318.5 (Approx.)

Date of Test Pit: April 26, 2018

Test Pit Log: TP-1

OSU Poultry Farm

Corvallis, Oregon

Comments	Depth, Feet	Sample #	Location	C, TSF	Elev. Depth	Symbol	Soil and Rock Description
Surface: tall grass and shrubs.							Medium stiff SILT, some organics (ML); dark brown, wet, low plasticity, organics consist of fine roots, (topsoil).
	1	S-2-1		0.50			
	2	S-2-2		0.70	1.5		Stiff silty CLAY, some organics (CL - ML); brown, wet, low plasticity, organics consist of fine roots, (residual soil).
					2.0		Extremely weak (R0) silty SANDSTONE; light brown and iron-stained, moderately weathered, (Tyee Formation).
	3						
	4	S-2-3					
No seepage or ground water encountered to the limit of exploration.	5	S-2-4					
	6				5.5		BOTTOM OF EXPLORATION
	7						
	8						
	9						
	10						
	11						
	12						

Project No.: 2181023

Surface Elevation: ±332.5 (Approx.)

Date of Test Pit: April 26, 2018

Test Pit Log: TP-2

OSU Poultry Farm

Corvallis, Oregon

Comments	Depth, Feet	Sample #	Location	C, TSF	Elev. Depth	Symbol	Soil and Rock Description
Surface: tall grass and shrubs.							Medium stiff SILT, some organics (ML); dark brown, moist, low plasticity, organics consist of fine roots, (topsoil).
	1	S-3-1		0.25			
					1.5		Stiff SILT (ML); dark brown, moist, low plasticity, (residual soil).
	2	S-3-2		0.47			
					2.5		Extremely weak (R0) silty SANDSTONE; orange and iron-stained, moderately to highly weathered, (Tyee Formation).
	3						
	4	S-3-3					
	5	S-3-4					
	6						
	7				7.0		Extremely weak (R0) SILTSTONE; light brown and iron-stained, moderately weathered, (Tyee Formation).
	8						
	9						
No seepage or ground water encountered to the limit of exploration.	10	S-3-5					
					10.0		BOTTOM OF EXPLORATION
	11						
	12						

Project No.: 2181023

Surface Elevation: ±347.5 (Approx.)

Date of Test Pit: April 26, 2018

Test Pit Log: TP-3

OSU Poultry Farm

Corvallis, Oregon

Comments	Depth, Feet	Sample #	Location	C, TSF	Elev. Depth	Symbol	Soil and Rock Description
Surface: tall grass and shrubs.							Stiff SILT, some organics (ML); dark brown, moist, low plasticity, organics consist of fine roots, (topsoil).
	1	S-4-1		0.50			
	2				2.0		Extremely weak (R0) SANDSTONE; light brown and iron-stained, moderately weathered, (Tyee Formation).
	3						
	4	S-4-1					
	5						
	6						
	7	S-4-3			7.0		Very weak (R1) SANDSTONE; light brown and iron- and manganese-stained, highly weathered, (Tyee Formation).
	8						
	9						
	10						
	11						
No seepage or ground water encountered to the limit of exploration.	12	S-4-4			12.0		BOTTOM OF EXPLORATION

Project No.: 2181023

Surface Elevation: ±361.0 (Approx.)

Date of Test Pit: April 26, 2018

Test Pit Log: TP-4

OSU Poultry Farm

Corvallis, Oregon

Comments	Depth, Feet	Sample #	Location	C, TSF	Elev. Depth	Symbol	Soil and Rock Description
Surface: tall grass and shrubs.							Stiff SILT, some organics (ML); dark brown, moist low plasticity, organics consist of fine roots, (topsoil).
	1	S-5-1		0.40			
	2				2.0		Extremely weak (R0) SANDSTONE; light brown and iron-stained, moderately weathered, (Tyee Formation).
	3						
	4	S-5-2					
	5	S-5-3			4.5		Very weak (R1) SANDSTONE; light brown, iron- and manganese-stained, highly weathered, (Tyee Formation).
	6						
	7						
	8						
	9						
	10						
No seepage or ground water encountered to the limit of exploration.	11						
	12	S-5-4			12.0		BOTTOM OF EXPLORATION

Project No.: 2181023

Surface Elevation: ±363.0 (Approx.)

Date of Test Pit: April 26, 2018

Test Pit Log: TP-5

OSU Poultry Farm

Corvallis, Oregon

Comments	Depth, Feet	Sample #	Location	C, TSF	Elev. Depth	Symbol	Soil and Rock Description
Surface: tall grass and shrubs.							Stiff SILT, some organics (ML); dark brown, moist, low plasticity, organics consist of fine roots, (topsoil).
	1	S-6-1		0.43			
	2				1.5		Extremely weak (R0) SANDSTONE; light brown and iron-stained, moderately weathered, (Tyee Formation).
	3						
	4	S-6-2					
	5				4.5		Very weak (R1) SANDSTONE; light brown, iron- and manganese-stained, highly weathered, (Tyee Formation).
	6	S-6-3					
	7						
	8						
No seepage or ground water encountered to the limit of exploration.	9						
	10	S-6-4			10.0		BOTTOM OF EXPLORATION
	11						
	12						

Project No.: 2181023

Surface Elevation: ±354.5 (Approx.)

Date of Test Pit: April 26, 2018

Test Pit Log: TP-6

OSU Poultry Farm

Corvallis, Oregon

Comments	Depth, Feet	Sample #	Location	C, TSF	Elev. Depth	Symbol	Soil and Rock Description
Surface: tall grass and shrubs.							Stiff SILT, some organics (ML); dark brown, wet, low plasticity, organics consist of fine roots, (topsoil).
	1	S-7-1	■	0.44			
					1.5		Extremely weak (R0) SANDSTONE; light brown, iron- and manganese-stained, moderately to highly weathered, (Tyee Formation).
	2						
	3						
	4	S-7-2	■				
	5						
	6						
No seepage or ground water encountered to the limit of exploration.	7						
	8	S-7-3	■				
					8.0		BOTTOM OF EXPLORATION
	9						
	10						
	11						
	12						

Project No.: 2181023

Surface Elevation: ±337.5 (Approx.)

Date of Test Pit: April 26, 2018

Test Pit Log: TP-7

OSU Poultry Farm

Corvallis, Oregon

Comments	Depth, Feet	Sample #	Location	C, TSF	Elev. Depth	Symbol	Soil and Rock Description
Surface: tall grass and shrubs.							Stiff SILT, some organics (ML); dark brown, moist, low plasticity, organics consist of fine roots, (topsoil).
	1	S-8-1	■				
					1.5		Extremely weak (R0) SANDSTONE; light brown and iron-stained, moderately weathered, (Tyee Formation).
	2						
	3						
	4	S-8-2	■				
	5						Very weak (R1) and manganese-stained below ±5 feet.
No seepage or ground water encountered to the limit of exploration.	6						
	7	S-8-3	■				
					7.0		BOTTOM OF EXPLORATION
	8						
	9						
	10						
	11						
	12						

Project No.: 2181023

Surface Elevation: ±332.5 (Approx.)

Date of Test Pit: April 26, 2018

Test Pit Log: TP-8

OSU Poultry Farm

Corvallis, Oregon

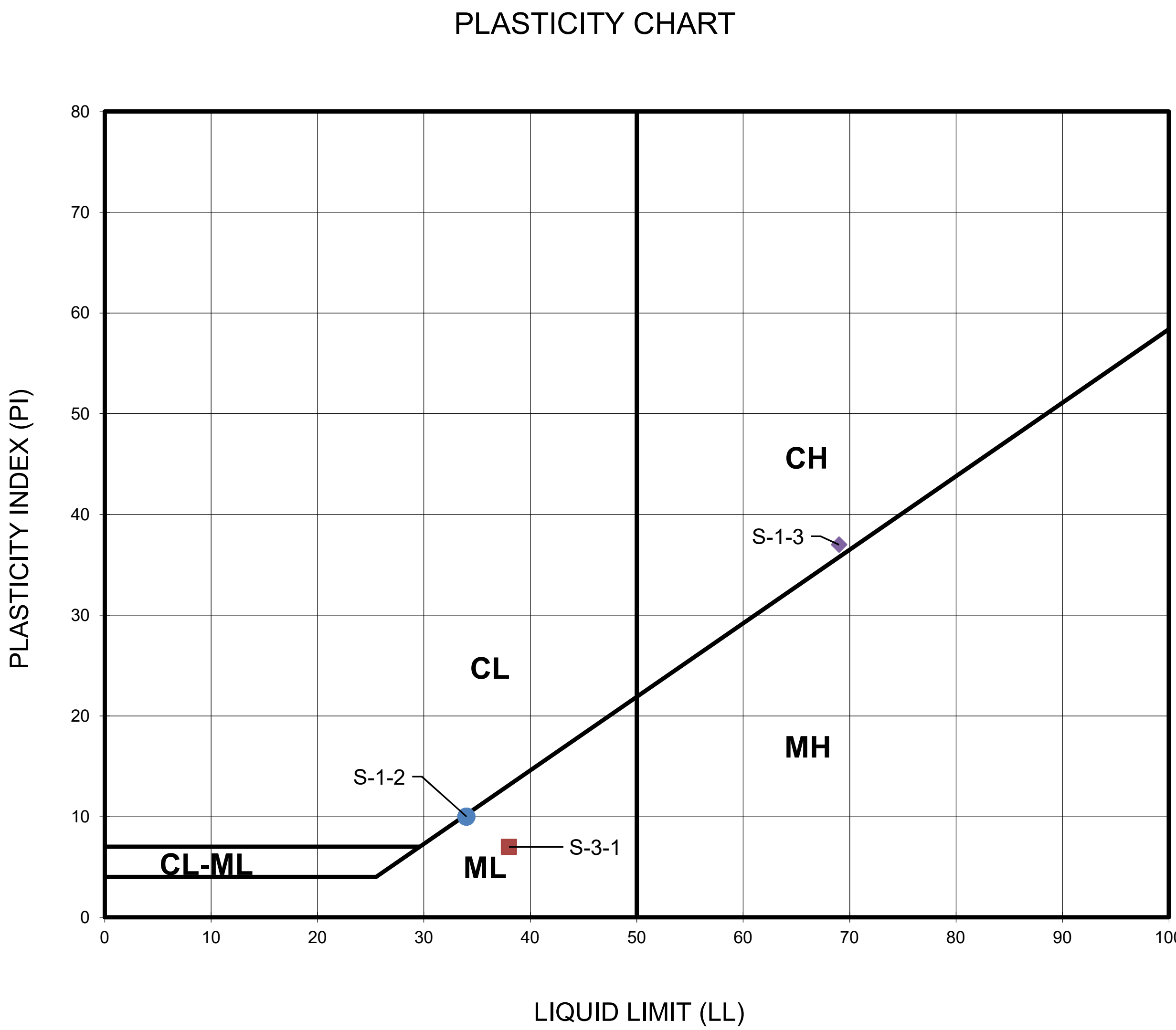
Appendix C

Laboratory Testing

Professional
Geotechnical
Services

Foundation Engineering, Inc.

ATTERBERG LIMITS TEST - ASTM D4318



	Depth	Material Description	USCS	WC%	LL%	PL%	PI%	%Fines
● S-1-2	1.0 to 1.5	Soft Silty CLAY (residual soil)	CL-ML	29.1	34	24	10	-
◆ S-1-3	2.5 to 3.0	Stiff CLAY (residual soil)	CH	35.8	69	32	37	-
■ S-3-1	1.0 to 1.5	Medium stiff SILT (topsoil)	ML	27.8	38	31	7	-

OSU Poultry Farm
Project# 2181023

FOUNDATION ENGINEERING, INC.
Professional Geotechnical Services

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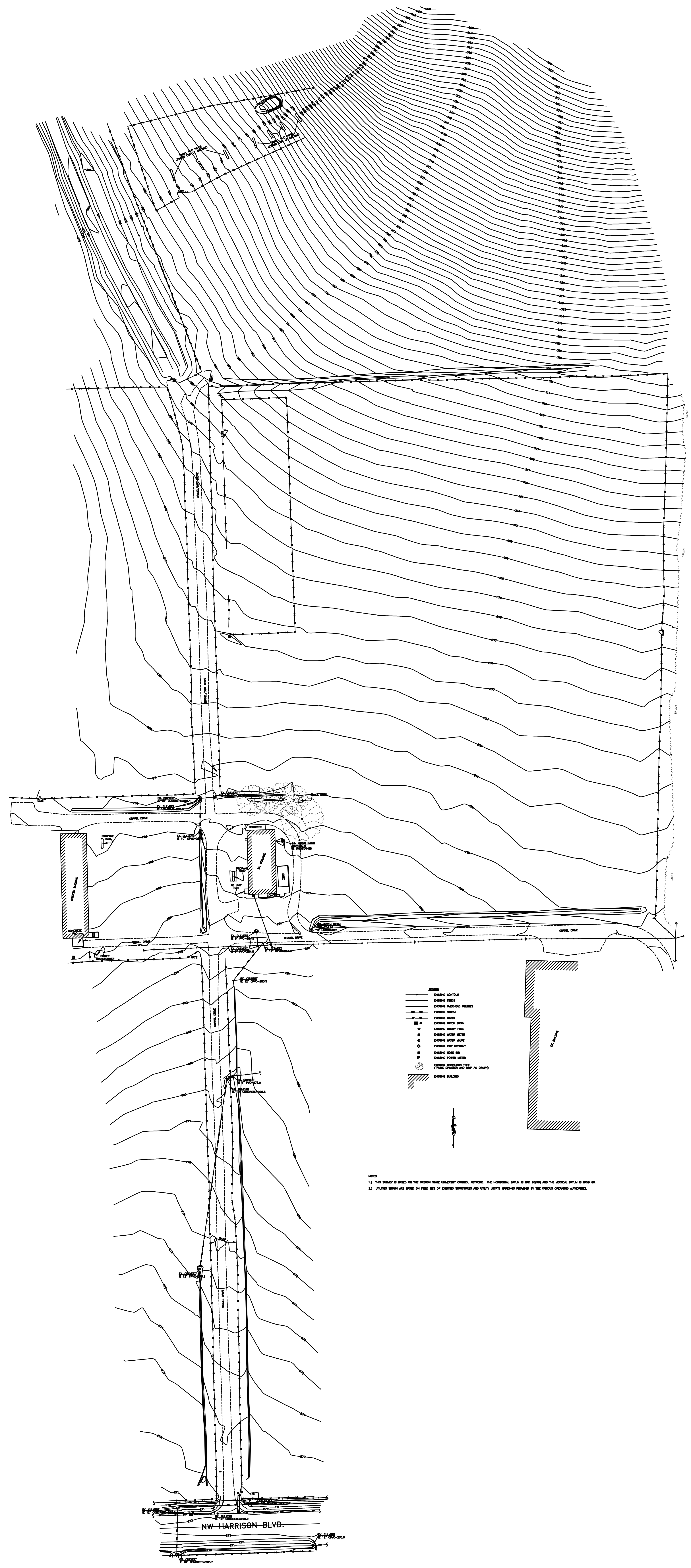
FIGURE 1C


NW HARRISON BLVD.
GRAVEL DRIVE
EX. BUILDING
LEGEND
EXISTING CONTOUR
EXISTING FENCE
EXISTING OVERHEAD UTILITIES
EXISTING STORM
EXISTING WATER
EXISTING CATCH BASIN
EXISTING UTILITY POLE
EXISTING WATER METER
EXISTING WATER VALVE
EXISTING FIRE HYDRANT
EXISTING HOSE BIB
EXISTING POWER METER
EXISTING DECIDUOUS TREE
(TRUNK DIAMETER AND DRIP AS DRAWN)
EXISTING BUILDING
NOTES:
1.) THIS SURVEY IS BASED ON THE OREGON STATE UNIVERSITY CONTROL NETWORK. THE HORIZONTAL DATUM IS NAD 83(98) AND THE VERTICAL DATUM IS NAVD 88.
2.) UTILITIES SHOWN ARE BASED ON FIELD TIES OF EXISITING STRUCTURES AND UTILITY LOCATE MARKINGS PROVIDED BY THE VARIOUS OPERATING AUTHORITIES.