REDMOND GEOTECHNICAL SERVICES

April 23, 2024

Mr. Jerry Ambris
Habitat for Humanity of the Mid-Willamette Valley
1220 12th Street SE
Salem, Oregon 97302

Dear Mr. Ambris:

**RE: Geotechnical Consultation and Field Infiltration Testing Services,
Proposed Habitat for Humanity Development Site,
Tax Lot No. 14100, 860 Park Avenue NE, Salem (Marion County), Oregon**

INTRODUCTION

In accordance with the request of Mr. Jerry Ambris of Habitat for Humanity of the Mid-Willamette Valley, we have completed our Geotechnical Consultation and Field Infiltration Testing Services with regard to the proposed new Habitat for Humanity project at the above subject existing single-family residential home site. The subject existing residential property (Tax Lot No. 14100) is generally sited to the east of Park Avenue NE and to the south of the intersection with Know Avenue NE in Salem (Marion County), Oregon (see Site Vicinity Map, Figure No. 1).

PROJECT DESCRIPTION

We understand that present plans for the project are to construct four (4) new residential homes and/or building sites at the subject property. Specifically, we understand that the project will consist of the construction of four (4) new single- and/or two-story wood-frame residential structures which will have a base and/or ground floor footprint of approximately 1,000 to 2,000 square feet. Additionally, we understand that the project will also include the construction of new stormwater detention and/or infiltration systems.

Support for the new residential structures is anticipated to consist primarily of conventional shallow continuous (strip) footings although some individual (spread) column footings may also be required. Structural loading information is presently not available for the project. However, based on our past experience with similar single-family residential projects, we anticipate that the structural loads for the new residential homes will be fairly typical and light for this type of single- and/or two-story, wood-frame construction and should produce maximum dead plus live continuous (strip) footing and individual (spread) column footing loads on the order of about 1.5 to 2.5 kips per lineal foot (kpf) and 10 to 25 kips, respectively.

SITE DESCRIPTION

The proposed new Habitat for Humanity development site is located within Section 24, Township 7 South, Range 3 West, of the Willamette Meridian. The project site is generally sited to the east of Park Avenue NE and south of the intersection with Knox Avenue NE in Salem (Marion County), Oregon. The subject property proposed for development at this time is roughly rectangular in shape and encompasses approximately 0.47 total acres. The proposed new Habitat for Humanity development site is presently improved and consists of an existing single-family residential home site.

Topographically, the area proposed for development at this time is generally characterized as relatively flat-lying to gently sloping terrain (i.e., less than 5 percent) with overall topographic relief across the subject building site estimated at about one (1) to two (2) feet with site elevations at about Elevation 210 feet. Additionally, existing site features suggest that the proposed new home site has not been previously graded (cut and filled) to its present grade and/or elevation. Vegetation currently across the site generally consists of a light to moderate growth of grass, weeds and brush as well as several small to large sized trees.

SCOPE OF WORK

The purpose of our Geotechnical Consultation and Field Infiltration Testing Services is to evaluate the existing site subsurface soil and groundwater characteristics and provide appropriate design and construction recommendations with regard to the planned new residential home construction and possible stormwater disposal at the site. Specifically, our Geotechnical Consultation Services included the following scope of work items:

1. A site reconnaissance of the subject property and/or surrounding area as well as a review of available and relevant geotechnical reports and/or geologic maps of the area.

2. Site exploration by means of three (3) exploratory test hole excavations. The exploratory test holes were advanced in the area of the proposed new stormwater detention and/or infiltration facilities to depth of approximately five (5) to eight (8) feet beneath existing site grades. Additionally, three (3) field infiltration tests were performed in accordance with current City of Salem standards.

3. Recommendations and our final written report presenting the results of our investigation. Our report includes recommendations for site preparation and grading including any over excavation of unsuitable materials revealed by the explorations, placement and compaction of any required structural fill(s), suitability of the on-site soils for use as structural fill as well as criteria for import fill materials, and preparation of foundation areas.

4. Recommendations for foundation support and design including allowable contact bearing pressures for proportioning footings, minimum footing width and embedment depths, estimates of foundation settlement as well as lateral earth pressures for any below grade and/or retaining walls.

REGIONAL AND LOCAL GEOLOGIC SETTING

The area of the proposed residential home site is underlain at fairly shallow depth by older alluvial soil deposits (Qoal) of Pleistocene age. Characteristics include poorly to moderately indurated siltstones, sandstones and conglomerates that comprise older alluvial terrace/fan deposits and poorly indurated glaciofluvial clays and silts deposited by the catastrophic Lake Missoula floods. The older alluvial soil deposits extend to depths of approximately 90 feet.

There are no known faults which underlie the subject site. The closest known and/or inferred fault is located approximately 1-mile to the southwest of the subject site.

SUBSURFACE CONDITIONS

Our understanding of the subsurface soil and/or groundwater conditions which underlie the site was developed by means of three (3) exploratory test holes excavated on March 14, 2024 with tracked excavation equipment at the approximate locations shown on the Site Exploration Plan, Figure No. 2. The exploratory test hole revealed that the site is generally underlain at depth by native soil deposits.

Specifically, the subject site was found to be underlain by about 8 to 12 inches of topsoil which was inturn found to be underlain by native soil materials comprised of medium to olive-brown, very moist, medium stiff to stiff, sandy, clayey silt to the maximum depth explored of about eight (8) feet beneath existing site grades. These underlying sandy, clayey silt subgrade soil deposits become stiff to very stiff at a depth of about five (5) to six (6) feet and are best characterized by relatively low to moderate strength and moderate compressibility. All soils encountered at the site were classified in accordance with the Unified Soil Classification System (USCS) which is outlined on Figure No. 4.

Groundwater was generally not encountered at the site during our field exploration work although seasonal fluctuations of the groundwater table in the area and/or across the subject site should be expected. In this regard, we anticipate that seasonal groundwater elevations should be expected to fluctuate in the area and/or across the site and will vary depending on seasonal conditions, local subsurface conditions as well as changes in site utilization.

GEOLOGIC AND SEISMIC SETTING

A seismic site-specific hazard study was not part of the scope of work for this project. However, we have provided seismic design parameters in the recommendations section (Table 1) of this report in the event that this information is required by others. The liquefaction potential of the foundation subgrade soils is considered negligible due to the cohesive and/or medium stiff to stiff characteristics of the fine-grained clayey silt subgrade soil deposits which underlie the site. As previously noted, there is no indication of potentially active faulting beneath the site. However, hidden and/or deep-seated active faults could remain undetected. In addition, recent crustal seismic activity cannot always be tied to observed faults. In the event of a catastrophic earthquake with a large seismic moment, inactive faults could potentially be reactivated.

INFILTRATION TESTING

We performed three (3) field infiltration tests at the site on March 14, 2024. The infiltration tests were performed in test holes FITH-#1 through FITH-#3 at depths of between three (3) and four (4) feet beneath the existing site and/or surface grades. The subgrade soils encountered in the infiltration test holes consisted of very moist, medium stiff to stiff, sandy, clayey silt. The infiltration testing was performed in general conformance with current EPA and/or the City of Salem Encased Falling Head test method which consisted of advancing a 6-inch diameter PVC pipe approximately 6 inches into the exposed soil horizon at each test location. Using a steady water flow, water was discharged into the pipe and allowed to penetrate and saturate the subgrade soils. The water level was adjusted over a two (2) hour period and allowed to achieve a saturated subgrade soil condition consistent with the bottom elevation of the surrounding test pit excavation. Following the required saturating period, water was again added into the PVC pipe and the time and/or rate at which the water level dropped was monitored and recorded. Each measurable drop in the water level was recorded until a consistent infiltration rate was observed and/or repeated.

Based on the results of the field infiltration testing at the site, we have found that the native sandy, clayey silt subgrade soil deposits possess an ultimate infiltration rate on the order of about 0.8 to 1.6 inches per hour (in/hr).

CONCLUSIONS AND RECOMMENDATIONS

From a Geotechnical Engineering and constructability standpoint, we are of the opinion that the site is suitable for the proposed new Habitat for Humanity residential development provided that the recommendations contained within this report are properly incorporated into the design and construction of the project. Additionally, the following recommendations assume that the proposed new residential structures planned for the project will be constructed with a conventional shallow foundation system. However, if other structures and/or site improvements are planned which are significantly different than those which are described herein, **Redmond Geotechnical Services, LLC** should be contacted for additional recommendations.

The primary features of concern at the site are 1) the moisture sensitivity of the native sandy, clayey silt subgrade soil materials located beneath the site and 2) the presence of old and/or abandoned foundation remnants across the westerly portion of the site.

In regard to the moisture sensitivity of the native sandy, clayey silt subgrade soils beneath the site, we are of the opinion that all site grading and/or foundation construction activities across the subject site be performed and/or completed during the drier summer months which is typically June through September. Additionally, we are of the opinion that construction activity and/or heavy construction equipment traffic should be limited across the new building pad and/or foundation areas following the grading work and/or during wet or inclement weather conditions.

With regard to the presence of old and/or abandoned foundation remnants across the westerly portion of the site area, we recommend that all old and/or abandoned foundation remnants as well as other abandoned utility services, be properly removed in the area of the proposed new residential home areas.

The following sections of this report present specific recommendations for site preparation and grading as well as foundation design and construction for the proposed new Habitat for Humanity single-family residential development project.

SITE PREPARATION

In general, we recommend that all planned structural improvement areas for the new single-family residential home foundations be stripped and cleared of any existing surface vegetation, topsoil materials, and any deleterious materials present at the time of construction. In general, outside of any existing fill areas, we envision that about 8 to 12 inches of stripping may be required to remove existing topsoil materials. Areas resulting in deeper stripping and/or removals, such as the existing unsuitable fill materials and/or tree stumps as well as old and/or abandoned foundation remnants, should be evaluated at the time of construction by a representative of Redmond Geotechnical Services, LLC. The stripped and cleared materials should be properly disposed of as they are generally not considered suitable for use/reuse as structural fill.

Following the stripping and clearing operations, and prior to the placement of any required structural fills and/or structural improvements, the exposed subgrade soils be inspected and approved by a representative of Redmond Geotechnical Services, LLC. Areas found to be soft or otherwise unsuitable for support of structural loads or improvements should be over-excavated and/or replaced with suitable structural fill.

The on-site existing native sandy, clayey silt subgrade soils are considered suitable for use/reuse as structural fill provided that they are free of organic materials, debris, and rock fragments in excess of 6 inches in dimension. If grading is conducted during wet and/or inclement weather conditions, the use of the on-site native clayey, silt subgrade soils will be difficult at best and the use of an import granular fill material will likely be required. In general, we recommend that a free-draining (clean) granular fill (sand & gravel) containing no more than about 5 percent fines be used during wet weather grading.

Representative samples of the material(s) to be used as structural fill should be submitted to our laboratory for approval and to determine the maximum dry density and optimum moisture content for compaction. In general, we do not recommend that site grading and earthwork construction be performed during wet or inclement weather conditions due to the moisture sensitivity of the near surface clayey, sandy silt subgrade soils at the site.

All required structural fill materials placed within the single-family residential home building (structural) area(s) should be moistened or dried as necessary to near (within 3 percent) optimum moisture conditions and compacted by mechanical means to a minimum of 92 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedure. Additionally, due to the moisture sensitivity of the existing clayey silt subgrade soils across the site as well as the need to properly monitor and document the grading contractor's operations, we recommend that a representative of **Redmond Geotechnical Services, LLC** be present at the site during all site grading activities and/or foundation preparation work.

EXPANSIVE SOILS

The results of our site exploration and laboratory testing program for the project indicates that the native sandy, clayey silt subgrade soils are classified as ML soils and possess low plasticity and expansion index characteristics (i.e., liquid limit and expansion index less than 50). As such, the native sandy, clayey silt subgrade soils are not expected to shrink and/or swell significantly with seasonal fluctuations (changes) in moisture (water) content. In this regard, we do not envision the need for any special subgrade preparation of building foundations, pavements, sidewalks, and/or any deformation sensitive structures against expansive soils. However, a re-evaluation may be required following the site grading work for the project.

FOUNDATION SUPPORT

Based on the results of our field work as well as our understanding that the proposed site development will result in the construction of new single- and/or two-story wood-frame single-family residential homes, it is our opinion that the lightly loaded and/or conventional shallow continuous (strip) and individual (spread) footings proposed for the new single-family residential homes may be supported directly on the existing medium to olive-brown, medium stiff, sandy, clayey silt subgrade soil materials based on an allowable contact bearing pressure of 2,000 pounds per square foot (psf). This allowable contact bearing pressure is intended for dead loads and sustained live loads and may be increased by one-third for the total of all loads including short-term wind or seismic loads.

In general, continuous (strip) footings should have a minimum width of at least 16 inches and be embedded at least 18 inches below the lowest adjacent finish grade (includes frost protection). Individual spread (column) footings (if required) should be embedded at least 16 inches below grade and have a minimum width of about 24 inches.

Total and differential settlements of residential and/or retaining wall foundations constructed as recommended above and supported directly by approved native subgrade soils and/or on properly placed and/or compacted structural fill materials are expected to be within tolerable limits for this type of lightly loaded structure and should generally be less than about 1-inch and 1/2-inch, respectively.

Allowable lateral frictional resistance between the base of the footings and the sandy, clayey silt and/or a granular subgrade soil can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.30 and 0.45, respectively. In addition, lateral loads may be resisted by passive pressures on footings poured "neat" against in-situ native soils or properly compacted structural fill materials. For passive earth pressure resistance, we recommend that an equivalent fluid density of 250 pounds per cubic foot (pcf) be used for design.

FLOOR SLAB SUPPORT

In order to provide uniform subgrade reaction beneath concrete slab-on-grade floors, we recommend that the floor slab area be underlain by a minimum of 6 inches of free-draining (less than 5 percent passing the No. 200 sieve), well-graded, crushed rock. The crushed rock should help provide a capillary break to prevent migration of moisture through the slab. However, additional moisture protection can be provided by using a 10-mil polyolefin geo-membrane sheet such as StegoWrap.

The base course materials should be compacted to at least 95 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. Where floor slab subgrade materials are undisturbed, firm and stable and where the underslab aggregate base rock section has been prepared and compacted as recommended above, we recommend that a modulus of subgrade reaction of 150 pci be used for design.

BELOW GRADE/RETAINING WALLS

Below grade and/or retaining walls should be designed to resist lateral earth pressures imposed by native soils and/or granular backfill materials as well as any adjacent surcharge loads. For walls which are restrained from rotation at the top and supporting level backfill, we recommend that at-rest earth pressures be computed on the basis of an equivalent fluid density of 45 pounds per cubic foot (pcf) and 35 pcf for clayey silt or granular backfill materials, respectively. For walls which are free to rotate at the top and retaining level backfill, we recommend that active earth pressures be computed on the basis of an equivalent fluid density of 35 pcf and 30 pcf for clayey silt or granular backfill materials, respectively. The above recommended lateral earth pressure values assume that the walls will be adequately drained to prevent the buildup of hydrostatic pressures. Where wall drainage will not be present and/or if adjacent surcharge loading is present, the above recommended values will be significantly higher. For seismic loading, we recommend an additional uniform pressure of 6H where H is the height of the wall in feet.

Backfill materials behind below grade and/or retaining walls should be compacted to 90 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. Special care should be taken to avoid over-compaction near the walls which could result in higher lateral earth pressures than those indicated herein. In areas within about three (3) to five (5) feet behind walls, we recommend the use of hand-operated compaction equipment.

EXCAVATIONS

Temporary excavations within the native sandy, clayey silt subgrade soils of up to four (4) feet in depth are expected to remain fairly stable at near vertical inclinations. Excavations to depths of between four (4) feet to eight (8) feet should be properly braced and shored or back cut to inclinations of about 1/2 to 1 (horizontal to Vertical). Where excavations are planned to exceed eight (8) feet, this office should be consulted. Additionally, at present levels, we do not anticipate that groundwater will be a factor during construction except perhaps during periods of extreme heavy and/or prolonged rainfall.

DESIGN INFILTRATION RATES

Based on the results of our field infiltration testing, we recommend using the following infiltration rate to design any on-site near surface storm water infiltration and/or disposal systems for the project:

Subgrade Soil Type	Recommended Infiltration Rate
sandy, clayey SILT (ML)	0.4 to 0.8 inches per hour (in/hr)

Note: A safety factor of two (2) was used to calculate the above recommended design infiltration rate. Additionally, given the gradational variability of the on-site sandy, clayey sit subgrade soils beneath the site as well as the anticipation of some site grading for the project, it is generally recommended that field testing be performed during and/or following construction of any on-site storm water infiltration system(s) in order to confirm that the above recommended design infiltration rates are appropriate.

SURFACE DRAINAGE/GROUNDWATER

We recommend that positive measures be taken to properly finish grade the site so that drainage waters from the new single-family residential and/or any retaining wall structure(s) as well as landscaping and/or adjacent properties and pavement areas are directed away from the new structure(s). All roof drainage should be directed into conduits that carry runoff water away from the structure(s) to a suitable outfall. Roof downspouts should not be connected to any foundation drains. A minimum ground slope of about 2 percent away from the structure(s) is generally recommended in landscaping areas around the structure(s). Specific recommendations for the use of footing drains should be made at the completion of the mass grading for the project based on observations made during site grading and construction and the type of structural fill selected for the project. A suitable perimeter foundation and/or below grade retaining wall drain detail is shown on Figure No. 3.

SEISMIC DESIGN CONSIDERATIONS

Structures at the site should be designed to resist earthquake loading in accordance with the methodology described in the 2019 and/or latest edition of the State of Oregon Structural Specialty Code (OSSC), ASCE 7-16 and/or Amendments to the 2018 International Building Code (IBC). The maximum considered earthquake ground motion for short period and 1.0 second period spectral response may be determined from the State of Oregon Structural Specialty Code (OSSC), ASCE 7-16 or the 2015 National Earthquake Hazard Reduction Program (NEHRP) "Recommended Provisions for Seismic Regulations for New Buildings and Other Structures" published by the Building Seismic Safety Council. We recommend Site Class "D" be used for design. Using this information, the structural engineer can select the appropriate site coefficient values (F_a and F_v) from ASCE 7-16 or the 2018 IBC to determine the maximum considered earthquake spectral response acceleration for design of the project. However, we have assumed the following response spectrum for the project:

Table 1. ASCE 7-16 Seismic Design Parameters

Site Class	S_S	S_1	Fa	Fv	S_{MS}	S_{M1}	S_{DS}	S_{D1}
D	0.812	0.407	1.175	1.893	0.954	0.770	0.636	0.513

Notes: 1. S_S and S_1 were established based on the USGS 2015 mapped maximum considered earthquake spectral acceleration maps for 2% probability of exceedence in 50 years.

2. Fa and Fv were established based on ASCE 7-16 using the selected Ss and S_1 values.

Liquefaction is a phenomenon in which loose, granular soils and some silty soils located below the water table develop high pore water pressures and loose strength. Soils located above the ground water table will not liquefy.

Our review of exploratory test pit data for the site indicates that the site is underlain by medium stiff, sandy, clayey silt. Additionally, groundwater was generally encountered at the site below a depth of about five (5) to six (6) feet. As such, we are of the opinion that the potential for seismic-induced liquefaction to occur at the site is very low.

EROSION CONTROL

During our field exploration program, we observed some soil types that would generally be considered susceptible to erosion. In our opinion, the primary concern regarding erosion potential will occur during construction, in areas that have recently been stripped and cleared of surface vegetation. Erosion at the site during construction can be minimized by implementing a project erosion control plan which should include the judicious use of straw bales and silt fences. If used, these erosion control devices should be in place and remain in place throughout all of the site grading and construction operations.

Erosion and sedimentation of exposed subgrade soils can also be minimized by quickly re-vegetating exposed areas of soil and by staging construction such that large areas of the subject site are not denuded and exposed at the same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture or hydroseeded with an approved seed-mulch-fertilizer mixture.

USE OF REPORT

This report is intended for the exclusive use of the addressee and/or their representative(s) to use to design and construct the proposed new Habitat for Humanity single-family residential homes as well as the associated site improvements described herein and to prepare any related construction documents. The conclusions and recommendations contained in this report are based on the site conditions as they presently exist and assume that the explorations performed as part of this investigation are representative of the subsurface conditions at other areas across the site and/or study area. The data, analyses, and recommendations herein may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures and/or purposes contact our office. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report. Additionally, the above recommendations are contingent on Redmond Geotechnical Services, LLC being retained to provide all site inspection and construction monitoring services for the project. Redmond Geotechnical Services, LLC will not assume any responsibility and/or liability for any engineering judgment, inspection, or testing services performed by others.

It is the owners/developer's responsibility for ensuring that the project designers and/or contractors involved with this project implement our recommendations into the final design plans, specifications and/or construction activities for the project. Further, in order to avoid delays during construction, we recommend that the final design plans and specifications for the project be reviewed by our office to evaluate as to whether our recommendations have been properly interpreted and incorporated into the project.

If during any future site grading and construction, subsurface conditions different from those encountered in the exploration are observed or appear to be present beneath excavations, we should be advised immediately so that we may review these conditions and evaluate whether modifications of the design criteria are required. We should also be advised if significant modifications of the proposed site development are planned so that we may review our conclusions and recommendations.

LEVEL OF CARE

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 the area under similar budget and time restraints. No warranty, either expressed or implied, is made.

ADDITIONAL SERVICES

We recommend that Redmond Geotechnical Services, LLC be allowed to review the proposed foundation and site grading plans for the proposed new Habitat for Humanity single-family residential homes to determine whether our recommendations presented herein have been properly interpreted and incorporated into the design and construction of the project.

CONSTRUCTION MONITORING AND TESTING

We recommend that **REDMOND GEOTECHNICAL SERVICES, LLC** be retained to provide construction monitoring and testing services during all earthwork operations. The purpose of our monitoring services would be to confirm that the site conditions which are encountered are as anticipated, provide field recommendations as necessary based on the actual conditions encountered, and document the activities of the contractor and assess his/her compliance with the project specifications and recommendations. It is important that we meet with the grading contractor prior to any site grading work to establish a plan that will minimize costly over-excavation and site preparation work. Of primary importance will be observations made during the site preparation, structural fill placement, footing preparation and construction and retaining wall backfilling.

We will be pleased to provide such additional assistance or information as you may require in the balance of the design phase of this project and to aid in construction control or solution of unforeseen conditions which may arise during the construction period.

Sincerely,

Daniel M. Redmond P.E., G.E.
President/Principal Engineer

Cc: Mr. Lyle Misbach
AKS Engineering & Forestry, LLC

Attachments:

Figure No. 1 – Site Vicinity Map
Figure No. 2 – Site Exploration Plan
Figure No. 3 – Typical Perimeter Footing/Retaining Wall Drain Detail
Figure No. 4 – Key to Exploratory Test Pit Logs
Figure No's. 5 through 7 – Log of Test Holes
Figure No's. 8 through 10 – Field Infiltration Test Results

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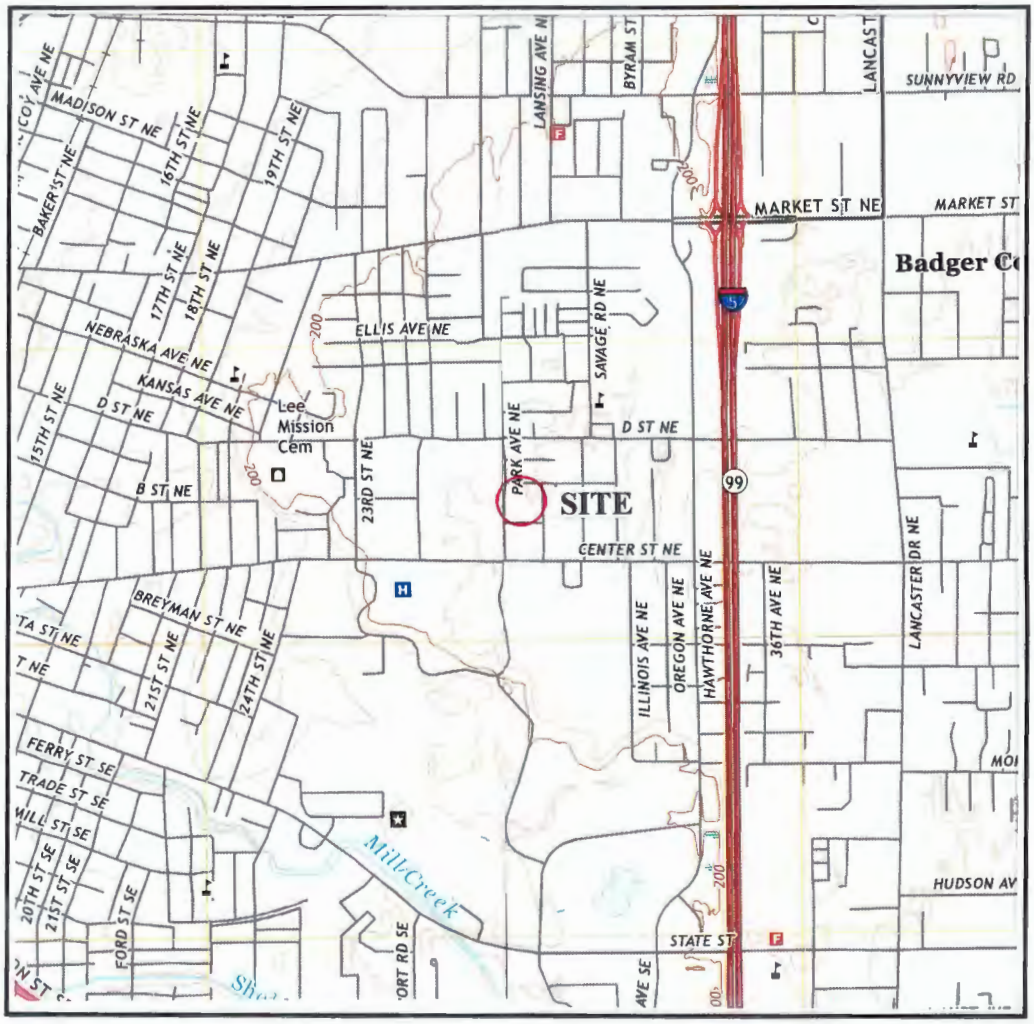


SALEM EAST QUADRANGLE
OREGON - MARION COUNTY
7.5-MINUTE SERIES

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

SITE VICINITY MAP

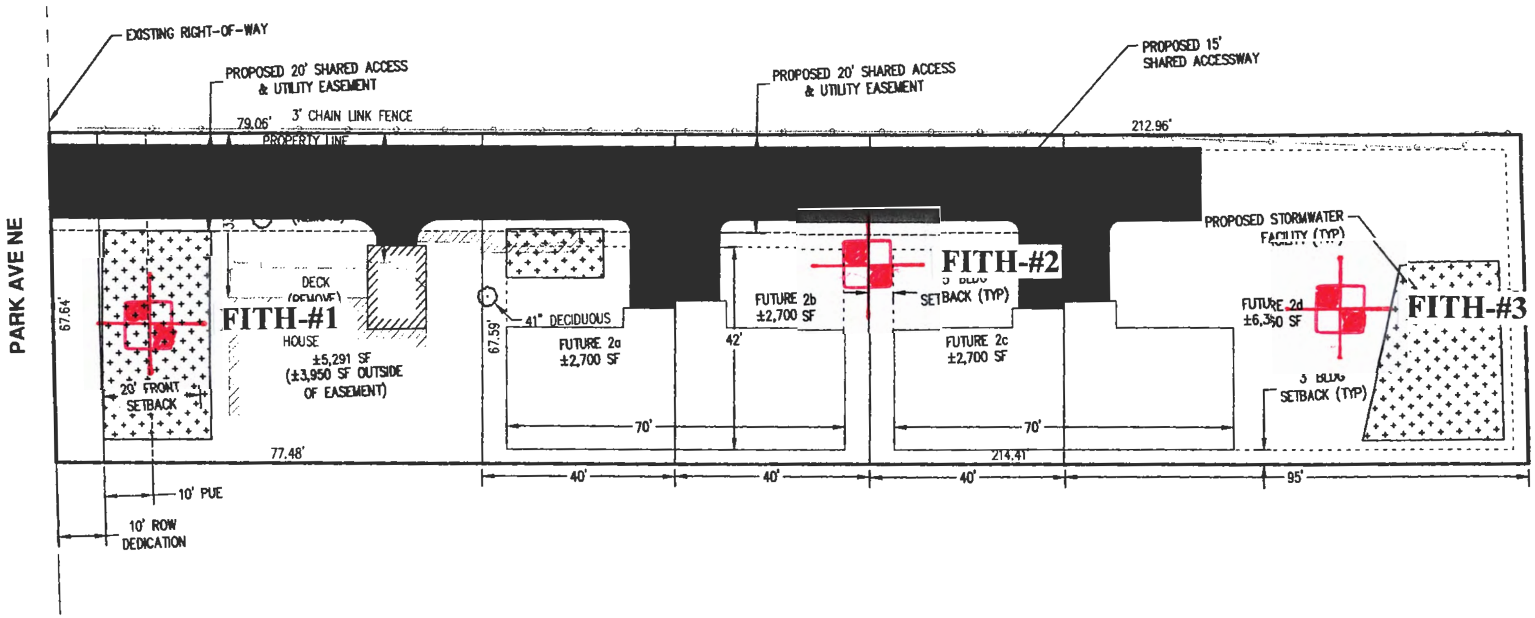
Project No. 2022.001.G	**HABITAT FOR HUMANITY** **TL 14100, 860 PARK AVENUE NE**	Figure No. 1

Project No. 2022.001.G

TL 14100, 860 PARK AVENUE NE

HABITAT FOR HUMANITY

SITE EXPLORATION PLAN



LEGEND

FITH-#3 Indicates approximate location of field infiltration test hole

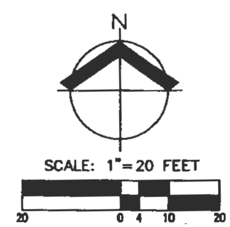
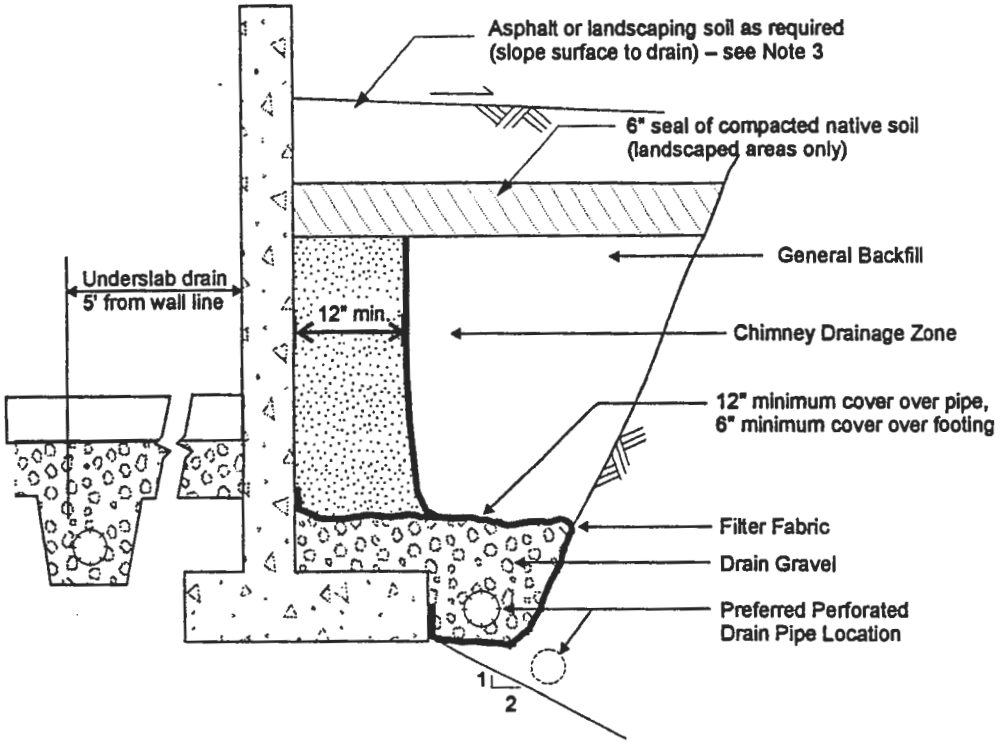


Figure No. 2



SCHEMATIC - NOT TO SCALE

NOTES:

1. Filter Fabric to be non-woven geotextile (Amoco 4545, Mirafi 140N, or equivalent)
2. Lay perforated drain pipe on minimum 0.5% gradient, widening excavation as required. Maintain pipe above 2:1 slope, as shown.
3. All-granular backfill is recommended for support of slabs, pavements, etc. (see text for structural fill).
4. Drain gravel to be clean, washed ¾" to 1½" gravel.
5. General backfill to be on-site gravels, or ¾""-0 or 1½"-0 crushed rock compacted to 92% Modified Proctor (AASHTO T-180).
6. Chimney drainage zone to be 12" wide (minimum) zone of clean washed, medium to coarse sand or drain gravel if protected with filter fabric. Alternatively, prefabricated drainage structures (Miradrain 6000 or similar) may be used.

TYPICAL PERIMETER FOOTITAINING WALL DRAIN DETAIL

Project No. 2022.001.G	**HABITAT FOR HUMANITY** **TL 14100, 860 PARK AVENUE NE**	Figure No. 3

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS — MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS — MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS — MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS — MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS — LIQUID LIMIT IS 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 IS GREATER THAN 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

DEFINITION OF TERMS

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS				
200	40	10	4	3/4"	3"	12"		
SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS	
	FINE	MEDIUM	COARSE	FINE	COARSE			

GRAIN SIZES

SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS/FOOT†
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

RELATIVE DENSITY

CLAYS AND PLASTIC SILTS	STRENGTH‡	BLOWS/FOOT†
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

CONSISTENCY

†Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) split spoon (ASTM D-1586).

‡Unconfined compressive strength in tons/sq. ft. as determined by laboratory testing or approximated by the standard penetration test (ASTM D-1586), pocket penetrometer, torvane, or visual observation.

REDMOND GEOTECHNICAL SERVICES
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KEY TO EXPLORATORY TEST PIT LOGS
Unified Soil Classification System (ASTM D-2487)

HABITAT FOR HUMANITY
TAX LOT NO. 14100, 860 PARK AVENUE NE

PROJECT NO.	DATE	
2022.001.G	4/23/24	Figure 4

BACKHOE COMPANY: Ole Bergman BUCKET SIZE: 12 inches DATE: 3/14/24

DEPTH (FEET)	BAG SAMPLE	DENSITY TEST	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	SOIL CLASS. (U.S.C.S.)	SOIL DESCRIPTION
						TEST PIT NO. FITH-#1 ELEVATION 210'±
0					ML	Dark brown, wet, soft, organic, sandy, clayey SILT (Topsoil)
					ML	Medium brown, very moist, medium stiff to stiff, sandy, clayey SILT
5						Total Depth = 5.0 feet No groundwater encountered at time of exploration
10						
15						
						TEST PIT NO. FITH-#2 ELEVATION 210'±
0					ML	Dark brown, wet, soft, organic, sandy, clayey SILT (Topsoil)
					ML	Medium brown, very moist, medium stiff to stiff, sandy, clayey SILT
5						Becomes stiff to very stiff
10						Total Depth = 8.0 feet No groundwater encountered at time of exploration
15						

LOG OF TEST PITS

PROJECT NO. 2022.001.G | HABITAT FOR HUMANITY | FIGURE NO. 5

BACKHOE COMPANY: Ole Bergman BUCKET SIZE: 12 inches DATE: 3/14/24

DEPTH (FEET)	BAG SAMPLE	DENSITY TEST	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	SOIL CLASS. (U.S.C.S.)	SOIL DESCRIPTION
						TEST PIT NO. FITH-#3 ELEVATION 210'±
0					ML	Dark brown, wet, soft, organic, sandy, clayey SILT (Topsoil)
					ML	Medium brown, very moist, medium stiff to stiff, sandy, clayey SILT
5						Total Depth = 5.0 feet No groundwater encountered at time of exploration
10						
15						

DEPTH (FEET)	BAG SAMPLE	DENSITY TEST	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	SOIL CLASS. (U.S.C.S.)	SOIL DESCRIPTION
						TEST PIT NO. ELEVATION
0						
5						
10						
15						

LOG OF TEST PITS

PROJECT NO. 2022.001.G | HABITAT FOR HUMANITY | FIGURE NO. 6

Field Infiltration Test Results

Location: TL 14100, 860 Park Avenue NE	**Date:** March 14, 2024	**Test Hole:** FITH-#1
Depth to Bottom of Hole: 4.0 feet	**Hole Diameter:** 6 inches	**Test Method:** Encased Falling Head
Tester's Name: Daniel M. Redmond, P.E., G.E. **Tester's Company:** Redmond Geotechnical Services, LLC		**Tester's Contact Number:** 503-285-0598

Depth (feet)	Soil Characteristics
0.0-1.0	Dark brown, sandy, clayey SILT (TOPSOIL)
1.0-4.0	Medium brown, sandy, clayey SILT (ML)

Time	Time Interval (Minutes)	Measurement (inches)	Drop in Water (inches)	Infiltration Rate (inches/hour)	Remarks
11:00	0	36.00	----		Filled w/12" water
11:10	10	36.20	0.20	1.20	
11:20	10	36.37	0.17	1.02	
11:30	10	36.52	0.15	0.90	
11:40	10	36.66	0.14	0.84	
11:50	10	36.80	0.14	0.84	
12:00	10	36.93	0.13	0.78	
12:10	10	37.06	0.13	0.78	
12:20	10	37.19	0.13	0.78	

Infiltration Test Data Table

Figure No. A-8

Field Infiltration Test Results

Location: TL 14100, 860 Park Avenue NE	**Date:** March 14, 2024	**Test Hole:** FITH-#2
Depth to Bottom of Hole: 3.0 feet	**Hole Diameter:** 6 inches	**Test Method:** Encased Falling Head
Tester's Name: Daniel M. Redmond, P.E., G.E. **Tester's Company:** Redmond Geotechnical Services, LLC		**Tester's Contact Number:** 503-285-0598

Depth (feet)	Soil Characteristics
0.0-1.0	Dark brown, sandy, clayey SILT (TOPSOIL)
1.0-3.0	Medium brown, sandy, clayey SILT (ML)

Time	Time Interval (Minutes)	Measurement (inches)	Drop in Water (inches)	Infiltration Rate (inches/hour)	Remarks
11:05	0	24.00	----		Filled w/12" water
11:15	10	24.30	0.30	1.80	
11:25	10	24.57	0.27	1.62	
11:35	10	24.82	0.25	1.50	
11:45	10	25.06	0.24	1.44	
11:55	10	25.30	0.24	1.44	
12:05	10	25.53	0.23	1.38	
12:15	10	25.76	0.23	1.38	
12:25	10	25.99	0.23	1.38	

Infiltration Test Data Table

Figure No. A-9

Field Infiltration Test Results

Location: TL 14100, 860 Park Avenue NE	**Date:** March 14, 2024	**Test Hole:** FITH-#3
Depth to Bottom of Hole: 3.0 feet	**Hole Diameter:** 6 inches	**Test Method:** Encased Falling Head
Tester's Name: Daniel M. Redmond, P.E., G.E. **Tester's Company:** Redmond Geotechnical Services, LLC		**Tester's Contact Number:** 503-285-0598

Depth (feet)	Soil Characteristics
0.0-1.0	Dark brown, sandy, clayey SILT (TOPSOIL)
1.0-3.0	Medium brown, sandy, clayey SILT (ML)

Time	Time Interval (Minutes)	Measurement (inches)	Drop in Water (inches)	Infiltration Rate (inches/hour)	Remarks
11:10	0	24.00	----		Filled w/12" water
11:20	10	24.40	0.40	2.40	
11:30	10	24.77	0.34	2.04	
11:40	10	25.07	0.30	1.80	
11:50	10	25.35	0.28	1.68	
12:00	10	25.63	0.28	1.68	
12:10	10	25.90	0.27	1.62	
12:20	10	26.17	0.27	1.62	
12:30	10	26.44	0.27	1.62	

Infiltration Test Data Table