GEOTECHNICAL REPORT

**Church Property
NE 205th Street and 136th Avenue NE
Woodinville, Washington**

Project No. T-7011

Terra Associates, Inc.

Prepared for:

**Quadrant Homes
Bellevue Washington**

October 31, 2014

TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

October 31, 2014
Project No. T-7011

Mr. Matt Perkins
Quadrant Homes
14725 SE 36th Street, Suite 200
Bellevue, Washington 98006

Subject: Geotechnical Report
Church Property
NE 205th Street and 136th Avenue NE
Woodinville, Washington

Dear Mr. Perkins:

As requested, we have conducted a geotechnical engineering study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

On the existing developed parcel soil conditions we observed in the test pits generally consisted of one to six inches of sod and topsoil overlying medium dense to dense glacial sediments composed mostly of silty sand with gravel and sandy silt (glacial till). Outwash sediments composed of silt and relatively clean sand were also observed below the glacial till in Test Pits TP-1 and TP-2 excavated in the south portion of the site. We did not observe groundwater seepage in the test pits at the time of our exploration.

In our opinion, the native soils on the site will be suitable for support of the proposed development provided the recommendations present in this report are incorporated into project design and construction.

We trust the information presented in this report is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

Ben Schepper

Ben Schepper
Staff Geologist

THEODORE J. SCHEPPER
STATE OF WASHINGTON
PROFESSIONAL ENGINEER

10-31-14

Theodore J. Schepper, P.E.
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1.0 PROJECT DESCRIPTION

The project consists of redeveloping the approximately three-acre property with 15 residential building lots, access roadway, and utilities. Based on review of a preliminary grading and utility plan prepared by Blueline dated October 14, 2014, grading to establish design lot and roadway elevations will consist mainly of excavation below existing site grade in the central and western site areas with minor fill depths in the east/northeastern site areas. Cut depths range from two to ten feet with fill depths on the order of two to six feet. Right-of-way improvements that included widening and sidewalk construction along NE 205th Street and 136th Avenue NE will remove an existing steep cut slope bank created during grading of these existing roadways. The remnant grade transition from the site to the widened road grade will be supported by engineered retaining walls. Wall heights will range from 2 to 12 feet. Development stormwater will be routed for collection and controlled release from a detention vault located in the east-central site area.

We expect that the residential structures constructed on the lots will be two- to three-story, wood-framed buildings with their main floor levels framed over a crawl space. Attached garage floors will be constructed at grade. Structural loading should be relatively light; with bearing walls caring loads of 2 to 3 kips per foot and isolated columns caring maximum loads of 30 to 40 kips.

The recommendations in the following sections of this report are based on our understanding of the preceding design features. We should review final design drawings as they become available to verify that our recommendations have been properly interpreted and to supplement them, if required.

2.0 SCOPE OF WORK

On February 14, 2014, we observed soil conditions at 4 test pits excavated between 9 and 10 feet below existing site grades. Using the information obtained from the subsurface exploration along with laboratory test results, we performed analyses to develop geotechnical recommendations for project design and construction. Specifically, this report addresses the following on a preliminary basis:

- Soil and groundwater conditions
- Seismic design parameters per 2012 International Building Code (IBC)
- Geologic Hazards per current City of Woodinville Municipal Code
- Site preparation and grading
- Excavation
- Foundations
- Floor slabs at grade
- Drainage
- Stormwater vault
- Utilities
- Pavement

It should be noted that recommendations outlined in this report regarding drainage are associated with soil strength, design earth pressures, erosion, and stability. Design and performance issues with respect to moisture as it relates to the structure environment (i.e., humidity, mildew, and mold) are beyond Terra Associates' purview. A building envelope specialist or contractor should be consulted to address these issues, as needed.

3.0 SITE CONDITIONS

3.1 Surface

The project site consists of 2 tax parcels totaling approximately 3 acres located at 13457 NE 205th Street and 20325 – 136th Avenue NE in Woodinville, Washington. The approximate site location is shown on Figure 1.

The site is currently occupied with three single-family residences, a large abandoned barn and detached garage, and several small outbuildings. The majority of the site is covered with grass, dense brush, and mature trees. Site topography is generally flat with the 20325 parcel on 136th Avenue NE sloping from south to north towards NE 205th Street in the northeast corner of the property. The site is bordered by residential homes to the south and west with roadways to the north and east of the parcels.

3.2 Subsurface

Soil conditions we observed in the test pits generally consisted of one to six inches of sod and dark brown silty sand topsoil overlying glacial sediments composed mostly of medium dense to dense silty sand with gravel and sandy silt (glacial till). What appear to be glacial outwash sediments composed of silt and relatively clean sand were observed at depths of six to seven feet below the predominant till soils at Test Pits TP-1 and TP-2, respectively.

The *Geologic Map of King County* by Derek B. Booth, Kathy A. Troost, & Aaron P. Wisher (2007), maps the site as Vashon Till (Qvt) and Vashon Recessional Outwash (Qvr). Soil conditions observed in the test pits are generally consistent with the mapped geology.

The preceding discussion is intended to be a general review of the soil conditions encountered. For more detailed descriptions, please refer to the Test Pit Logs in Appendix A.

3.3 Groundwater

We did not observe any groundwater seepage during our exploration. On glacial till sites groundwater seepage will fluctuate with low volumes of shallow seepage generally present during the wet winter months. This seepage typically diminishes with the onset of the normally drier summer months and often times is absent in the fall time of the year.

4.0 GEOLOGICAL HAZARDS

4.1 Seismic Considerations

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations. Liquefaction mainly affects geologically recent deposits of fine-grained sand that is below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction; thus, eliminating the soil's strength.

The glacial deposits observed at the site are older deposits that have been well consolidated by the glacial ice sheet. This coupled with the absence of an established groundwater table precludes the potential for soil liquefaction to occur. It is our opinion that the hazard for soil liquefaction or settlement during an earthquake and the associated risk or impact is negligible and the site is not a seismic hazard area as defined by the Woodinville Municipal Code (WMC).

Based on soil conditions observed in the test borings and our knowledge of the area geology, per Chapter 16 of the 2012 International Building Code (IBC), site class "C" should be used in structural design. Based on this site class, in accordance with the 2012 IBC, the following parameters should be used in computing seismic forces:

Seismic Design Parameters (IBC 2012)

Spectral response acceleration (Short Period), S_{Ms}	1.292
Spectral response acceleration (1 – Second Period), S_{M1}	0.653
Five percent damped .2 second period, S_{Ds}	0.861
Five percent damped 1.0 second period, S_{D1}	0.435

Values determined using the United States Geological Survey (USGS) Ground Motion Parameter Calculator accessed on October 30, 2014 at the web site http://earthquake.usgs.gov/designmaps/us/application.php

4.2 Erosion Hazard Areas

The soils observed on-site are classified as Everett gravelly sandy loam 5 to 15 percent slopes by the United States Department of Agriculture Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service. With the existing slope gradients, these soils will have a slight to moderate potential for erosion when exposed. Therefore, the site is not an erosion hazard area as defined by the WMC. Regardless, erosion protection measures as required by the City of Woodinville will need to be in place prior to starting grading activities on the site. This would include perimeter silt fencing to contain erosion on-site and cover measures to prevent or reduce soil erosion during and following construction.

4.3 Landslide Hazard Areas

The cut embankments on the north and east perimeters of the site that were made for construction of the NE 205th Street and 136th Avenue NE roadways are steep slopes/landslide hazard areas as defined by WMC. Steep slope areas that fall on the property are shown in plan view on Figure 3. As discussed earlier, right-of-way improvements that will include widening and sidewalk construction will completely remove these slopes with the grade transition from the property to the new widened roadway grade supported by an engineered retaining wall. Figure 4 presents two cross sections depicting this proposed grading.

The proposed grading will eliminate the steep slope/landslide hazard and replace it with an engineered retaining wall. These proposed improvements will improve stability conditions at the site, will not increase surface water discharge or sedimentation to adjacent properties nor will they adversely impact other critical areas. Wall designs will provide minimum safety factors against instability as required by the current building codes which will meet or exceed requirements of Section 21.24.310(1)(c) of the WMC.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

Based on our study, there are no geotechnical considerations that would preclude development of the site as currently planned. Residences can be supported on conventional spread footings bearing on competent native soils observed below the upper six inches of organic surface soil or on structural fill placed and compacted above these native soils. Pavement and floor slabs can be similarly supported.

Most of the native and existing fill soils encountered at the site contain a significant amount of fines and will be difficult to compact as structural fill when too wet. The ability to use native and existing fill soil from site excavations as structural fill will depend on its moisture content and the prevailing weather conditions at the time of construction. If grading activities will take place during winter, the owner should be prepared to import clean granular material for use as structural fill and backfill.

The following sections provide detailed recommendations regarding the preceding issues and other geotechnical design considerations. These recommendations should be incorporated into the final design drawings and construction specifications.

5.2 Site Preparation and Grading

To prepare the site for construction, all vegetation, organic surface soils, and other deleterious material should be stripped and removed from below the building lots and roadway areas. Surface stripping depths of approximately one to six inches should be expected to remove the organic surface soils on the developed parcels with a stripping depth of about 12 inches required in areas outside of the developed areas. Organic topsoil will not be suitable for use as structural fill, but may be used for limited depths in nonstructural areas.

In the developed portions of the site, demolition of existing structures should include removal of existing foundations and abandonment of underground septic systems and other buried utilities. Abandoned utility pipes that fall outside of new building areas can be left in place provided they are sealed to prevent intrusion of groundwater seepage and soil.

Once clearing and stripping operations are complete, cut and fill operations can be initiated to establish desired grades. Prior to placing fill, all exposed bearing surfaces should be observed by a representative of Terra Associates to verify soil conditions are as expected and suitable for support of new fill. Our representative may request a proofroll using heavy rubber-tired equipment to determine if any isolated soft and yielding areas are present. If excessively yielding areas are observed, and they cannot be stabilized in place by compaction, the affected soils should be excavated and removed to firm bearing and grade restored with new structural fill. Beneath embankment fills or roadway subgrade if the depth of excavation to remove unstable soils is excessive, the use of geotextile fabrics, such as Mirafi 500X, or an equivalent fabric, can be used in conjunction with clean granular structural fill. Our experience has shown that, in general, a minimum of 18 inches of a clean, granular structural fill placed and compacted over the geotextile fabric should establish a stable bearing surface.

The native and existing fill soils encountered at the site contain a sufficient amount of soil fines that will make them difficult to compact as structural fill when too wet or too dry. The ability to use native and existing fill soils from site excavations as structural fill will depend on its moisture content and the prevailing weather conditions at the time of construction. When wet soils are encountered, the contractor will need to dry the soils by aeration during dry weather conditions. Alternatively, the use of an additive such as Portland cement or lime to stabilize the soil moisture can be considered. If the soil is amended, additional Best Management Practices (BMPs) addressing the potential for elevated pH levels will need to be included in the Storm Water Pollution Prevention Program (SWPPP) prepared with the Temporary Erosion and Sedimentation Control (TESC) plan.

If grading activities are planned during the wet winter months, or if they are initiated during the summer and extend into fall and winter, the owner should be prepared to import wet weather structural fill. For this purpose, we recommend importing a granular soil that meets the following grading requirements:

U.S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	5 maximum*

* Based on the 3/4-inch fraction.

Prior to use, Terra Associates, Inc. should examine and test all materials imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soil's maximum dry density, as determined by American Society for Testing and Materials (ASTM) Test Designation D-698 (Standard Proctor). The moisture content of the soil at the time of compaction should be within minus one to plus three percent of its optimum, as determined by this ASTM standard. In nonstructural areas, the degree of compaction can be reduced to 90 percent.

5.3 Excavation

All excavations at the site associated with confined spaces, such as utility trenches, must be completed in accordance with local, state, and federal requirements. Based on regulations outlined in the Washington Industrial Safety and Health Act (WISHA), the upper one to four and one-half feet of weathered native soils would be classified as Type C soil. The dense native soils below four and one-half feet would be classified as Type A soil.

Accordingly, temporary excavations in Type C soils should have their slopes laid back at an inclination of 1.5:1 (Horizontal:Vertical) or flatter, from the toe to the crest of the slope. Side slopes in Type A soils can be laid back at a slope inclination of 0.75:1 or flatter. For temporary excavation slopes less than 8 feet in height in Type A soils, the lower 3.5 feet can be cut to a vertical condition, with a 0.75:1 slope graded above. For temporary excavation slopes greater than 8 feet in height, the slope above the 3.5-foot vertical portion will need to be laid back at a minimum slope inclination of 1:1. All exposed temporary slope faces that will remain open for an extended period of time should be covered with a durable reinforced plastic membrane during construction to prevent slope raveling and rutting during periods of precipitation.

The above information is provided solely for the benefit of the owner and other design consultants, and should not be construed to imply that Terra Associates, Inc. assumes responsibility for job site safety. It is understood that job site safety is the sole responsibility of the project general contractor.

5.4 Foundation Support

The residences can be supported on conventional spread footing foundations bearing on competent native soils, competent existing fill soils, or on structural fills placed above competent soils. Foundation subgrade should be prepared as recommended in Section 5.2 of this report.

Perimeter foundations exposed to the weather should bear a minimum depth of 1.5 feet below final exterior grades for frost protection. Interior foundations can be constructed at any convenient depth below the floor slab.

Foundations bearing on competent native soils, competent existing fill soils, or on compacted structural fill can be dimensioned for a net allowable bearing capacity of 2,500 pounds per square foot (psf). For short-term loads, such as wind and seismic, a one-third increase in this allowable capacity can be used. With structural loading as anticipated and this bearing stress applied, estimated total settlements are between one-quarter and one-half inch.

For designing foundations to resist lateral loads, a base friction coefficient of 0.35 can be used. Passive earth pressures acting on the side of the footing and buried portion of the foundation stem wall can also be considered. We recommend calculating this lateral resistance using an equivalent fluid weight of 350 pcf. We recommend not including the upper 12 inches of soil in this computation because they can be affected by weather or disturbed by future grading activity. This value assumes the foundation will be constructed neat against competent native soil or backfilled with structural fill as described in Section 5.2 of this report. The values recommended include a safety factor of 1.5.

5.5 Floor Slab-on-Grade

Slab-on-grade floors may be supported on subgrade prepared as recommended in Section 5.2 of this report. Immediately below the floor slab, we recommend placing a four-inch thick capillary break layer composed of clean, coarse sand or fine gravel that has less than three percent passing the No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab.

The capillary break layer will not prevent moisture intrusion through the slab caused by water vapor transmission. Where moisture by vapor transmission is undesirable, such as covered floor areas, a common practice is to place a durable plastic membrane on the capillary break layer and then cover the membrane with a layer of clean sand or fine gravel to protect it from damage during construction, and to aid in uniform curing of the concrete slab. It should be noted that if the sand or gravel layer overlying the membrane is saturated prior to pouring the slab, it will not be effective in assisting uniform curing of the slab and can actually serve as a water supply for moisture bleeding through the slab, potentially affecting floor coverings. Therefore, in our opinion, covering the membrane with a layer of sand or gravel should be avoided if floor slab construction occurs during the wet winter months and the layer cannot be effectively drained. We recommend floor designers and contractors refer to the 2003 American Concrete Institute (ACI) Manual of Concrete Practice, Part 2, 302.1R-96, for further information regarding vapor barrier installation below slab-on-grade floors.

5.6 Drainage

Surface

Final exterior grades should promote free and positive drainage away from the site at all times. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building areas. We recommend providing a gradient of at least three percent for a minimum distance of ten feet from the building perimeters. If this gradient cannot be provided, surface water should be collected adjacent to the structures and disposed to appropriate storm facilities.

Subsurface

We recommend installing perimeter foundation drains adjacent to shallow foundations. The drains can be laid to grade at an invert elevation equivalent to the bottom of footing grade. The drains can consist of four-inch diameter perforated PVC pipe that is enveloped in washed pea gravel-sized drainage aggregate. The aggregate should extend six inches above and to the sides of the pipe. Roof and foundation drains should be tightlined separately to the storm drains. All drains should be provided with cleanouts at easily accessible locations.

Infiltration

The predominant native silty sand and sandy silt till soils that are present at the site exhibit low permeability and would not be suitable for using retention/infiltration elements or facilities to manage development stormwater runoff. The relatively clean outwash sand observed at a depth of seven feet at Test Pit TP-2 would exhibit permeability that normally would be favorable for infiltration discharge. However this deposit appears isolated and of limited extent and; therefore, would not likely have the volumetric storage capacity to be a suitable receptor soil for infiltration discharge.

5.7 Stormwater Detention Vault

Development stormwater will be routed to a below-grade detention vault for treatment and controlled release to the drainage basin. We anticipate the vault floor grade will be eight to ten feet below current site elevations. At this depth, dense to very dense till or dense outwash silt/sand would be exposed. Vault foundations supported by these dense to very dense native soils may be designed for an allowable bearing capacity of 6,000 pounds per square foot (psf). For short-term loads, such as seismic, a one-third increase in this allowable capacity can be used. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.4.

The magnitude of earth pressures developing on the vault walls will depend in part on the quality and compaction of the wall backfill. We recommend placing and compacting wall backfill as structural fill. To prevent development of hydrostatic pressure and uplift on the vault, wall drainage must be installed. A typical recommended wall drainage detail is shown on Figure 5. If it is not possible to discharge collected water at the footing invert elevation, we recommend setting the invert elevation of the wall drainpipe equivalent to the outfall invert and connecting the drain to the outfall pipe for discharge.

With the recommended wall backfill and drainage, we recommend designing the restrained vault walls for an earth pressure imposed by an equivalent fluid weighing 50 pcf. For any portion of the wall that falls below the invert elevation of the wall drain, an earth pressure equivalent to a fluid weighing 85 pcf should be used. For evaluating walls under seismic loading, an additional uniform earth pressure equivalent to 8H psf, where H is the height of the below-grade wall in feet, can be used. These values assume a horizontal backfill condition.

5.8 Site Retaining Walls

The magnitude of earth pressures developing on retaining walls will depend on the quality and compaction of the wall backfill. We recommend placing and compacting wall backfill as structural fill. Below improved areas, such as pavements or floor slabs, the backfill should be compacted to a minimum of 95 percent of its maximum dry unit weight, as determined by ASTM Test Designation D-698 (Standard Proctor). In unimproved areas, the relative compaction can be reduced to 90 percent. To prevent overstressing the walls during backfilling, heavy construction machinery should not be operated within five feet of the wall. Wall backfill in this zone should be compacted with hand-operated equipment.

To prevent hydrostatic pressure development, wall drainage must also be installed. As discussed earlier, a typical wall drainage detail is shown on Figure 5. All drains should be routed to the storm sewer system or other approved point of controlled discharge.

With wall backfill placed and compacted as recommended and drainage properly installed, we recommend designing unrestrained walls for an active earth pressure equivalent to a fluid weighing 35 pcf. For restrained walls, an additional uniform lateral pressure of 100 psf should be included. An additional loading equivalent to 8H psf, where H is the height of the wall below-grade in feet, can be used to evaluate the wall under seismic loading. These values assume a horizontal backfill condition and that no other surcharge loading, such as traffic, sloping embankments, or adjacent buildings, will act on the wall. If such conditions will exist, then the imposed loading must be included in the wall design.

Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.5 of this report.

5.9 Site Retaining Wall Alternatives

Mechanically stabilized earth (MSE) walls faced with precast segmental block units can be considered as well as gravity cast-in-place concrete, precast concrete block, or gabion basket walls. For reinforced earth walls or gravity walls, the wall backfill must be placed and compacted structurally as recommended in Section 5.2 of this report. Wall drainage must also be provided to prevent hydrostatic loading. With wall backfill composed of suitable on-site granular soils that is compacted structurally, we recommend using the following soil parameters in wall design:

Reinforced Earth Wall Systems Facing Granular Soils

- Soil Unit Weight – 125 pounds per cubic foot (pcf)
- Soil Friction Angle – 36 degrees

Gravity Wall Systems

- Equivalent Fluid Pressure – 35 pcf plus uniform seismic loading equal to 8H psf, where H is the height of the wall in feet. This assumes a level backslope and that no other surcharge loading is imposed on the wall.

Wall foundations can be designed for allowable bearing and lateral resistance values recommended in Section 5.4. Once design is underway, we can prepare MSE and gravity block wall design and construction details for permitting. It should also be noted that soils having a silt content of over 30 percent or aggregate in excess of three inches in diameter cannot be used in the reinforced wall backfill zone. The owner should be prepared to borrow suitable materials from other portions of the site or import soil for use in the reinforced backfill zone.

5.10 Utilities

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) or the City of Woodinville specifications. As a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2 of this report. As noted, depending on the soil moisture when excavated most inorganic native soils on the site should be suitable for use as backfill material during dry weather conditions. However, if utility construction takes place during the wet winter months, it will likely be necessary to import suitable wet weather fill for utility trench backfilling.

5.11 Pavement

Pavement subgrade should be prepared as described in the Section 5.2 of this report. Regardless of the degree of relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proofrolled with heavy rubber-tire construction equipment such as a loaded 10-yard dump truck to verify this condition.

The pavement design section is dependent upon the supporting capability of the subgrade soils and the traffic conditions to which it will be subjected. For residential access, with traffic consisting mainly of light passenger vehicles with only occasional heavy traffic, and with a stable subgrade prepared as recommended, we recommend the following pavement sections:

- Two inches of hot mix asphalt (HMA) over four inches of crushed rock base (CRB)
- Three and one-half inches of full depth HMA.

The paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for ½-inch class HMA and CRB aggregate.

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability. For optimum pavement performance, we recommend surface drainage gradients of at least two percent. Some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

6.0 ADDITIONAL SERVICES

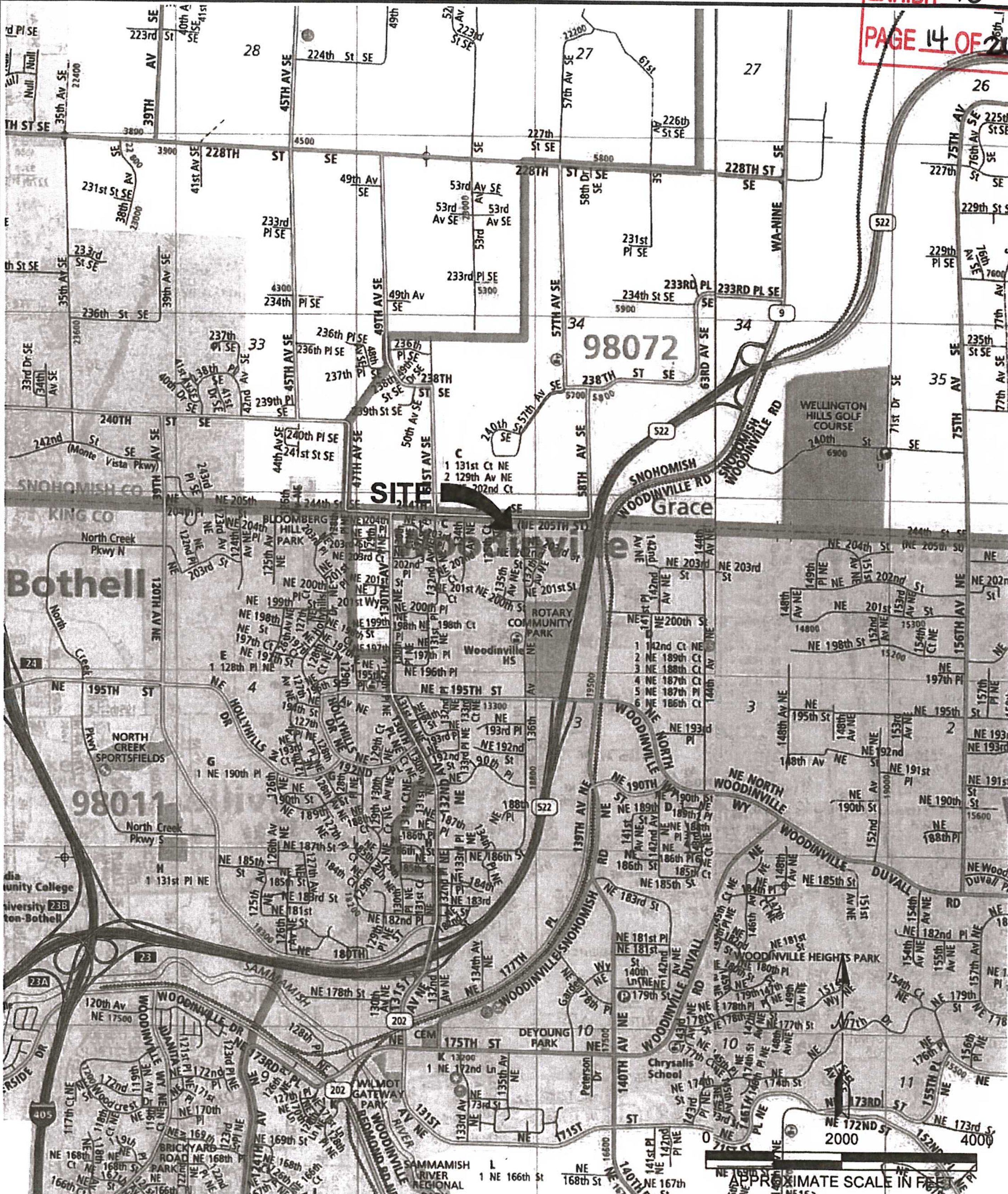
Terra Associates, Inc. should review the final design drawings and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and implemented in project design. We should also provide geotechnical service during construction to observe compliance with our design concepts, specifications, and recommendations. This will allow for design changes if subsurface conditions differ from those anticipated prior to the start of construction.

7.0 LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Terra Associates, Inc. and is intended for specific application to the Church Property project. This report is for the exclusive use of the Quadrant Homes and its authorized representatives.

The analyses and recommendations present in this report are based on data obtained from the test pits done on site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.

EXHIBIT 10
PAGE 14 OF 26



REFERENCE: THOMAS GUIDE 2008

Terra Associates, Inc.
Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

VICINITY MAP
CHURCH PROPERTY
WOODINVILLE, WASHINGTON

Proj. No.T-7011	Date OCT 2014	Figure 1

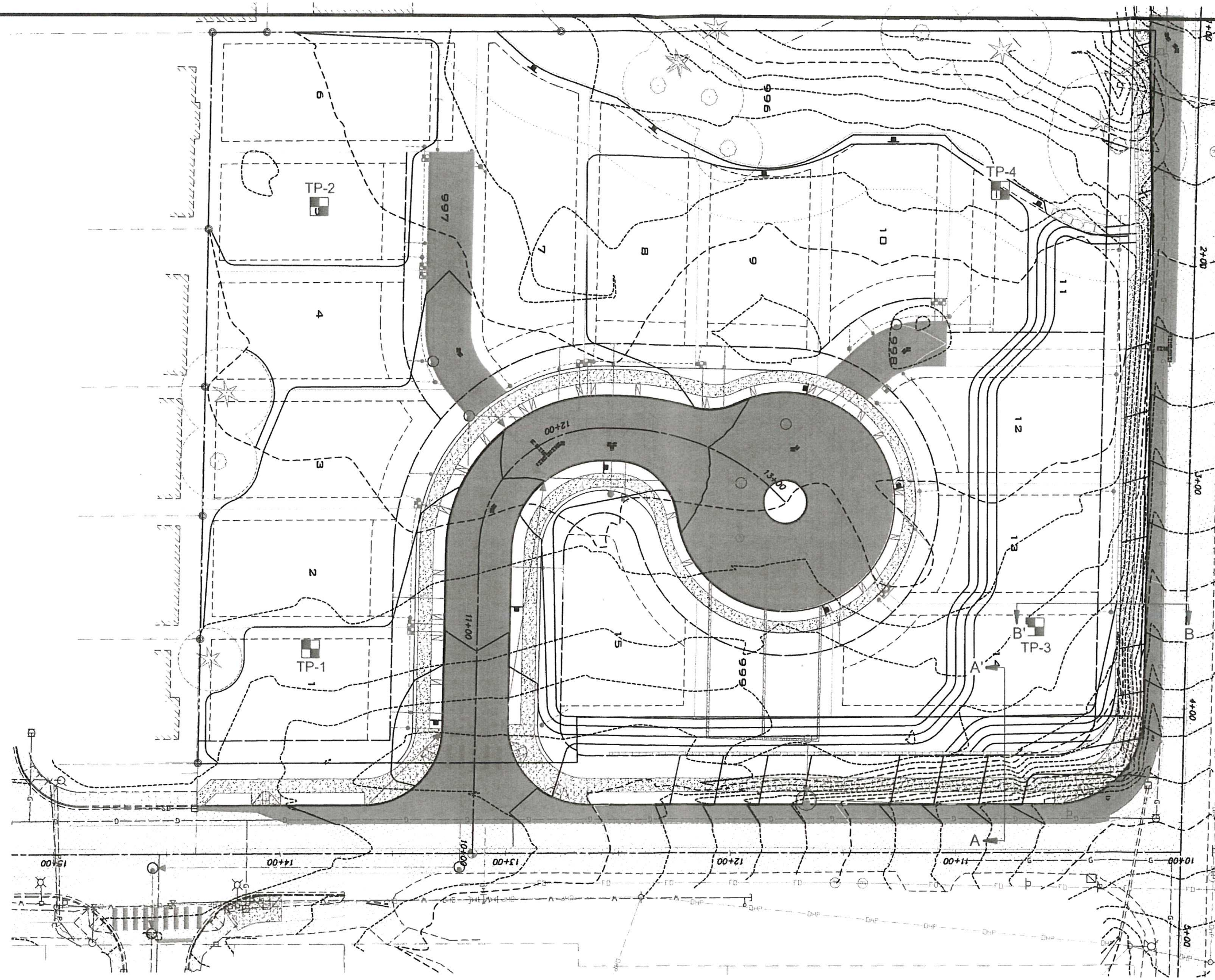


EXHIBIT 10
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NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE: SITE PLAN PROVIDED BY THE BLUELINE GROUP.

LEGEND:

APPROXIMATE TEST PIT LOCATION

0 50 100
APPROXIMATE SCALE IN FEET

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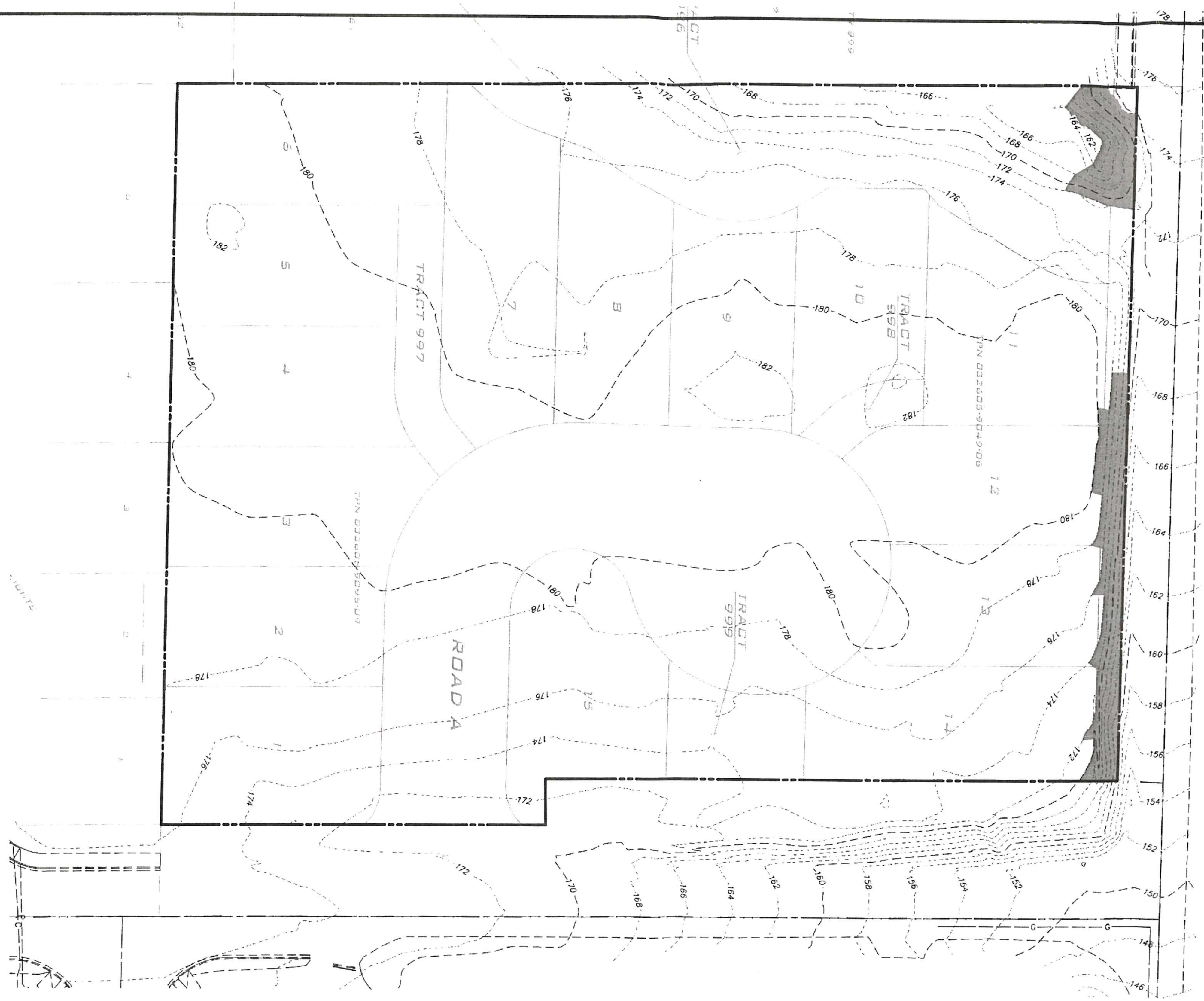
Environmental Earth Sciences

EXPLORATION LOCATION PLAN
CHURCH PROPERTY
WOODINVILLE, WASHINGOTN

Proj. No.T-7011	Date OCT 2014	Figure 2



NOTE:

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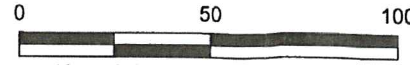
REFERENCE: SITE PLAN PROVIDED BY THE BLUELINE GROUP.

LEGEND:

SLOPE TABLE				
RANGE	COLOR	MIN SLOPE	MAX SLOPE	AREA (SF)
1	■	40% AND GREATER		3,042



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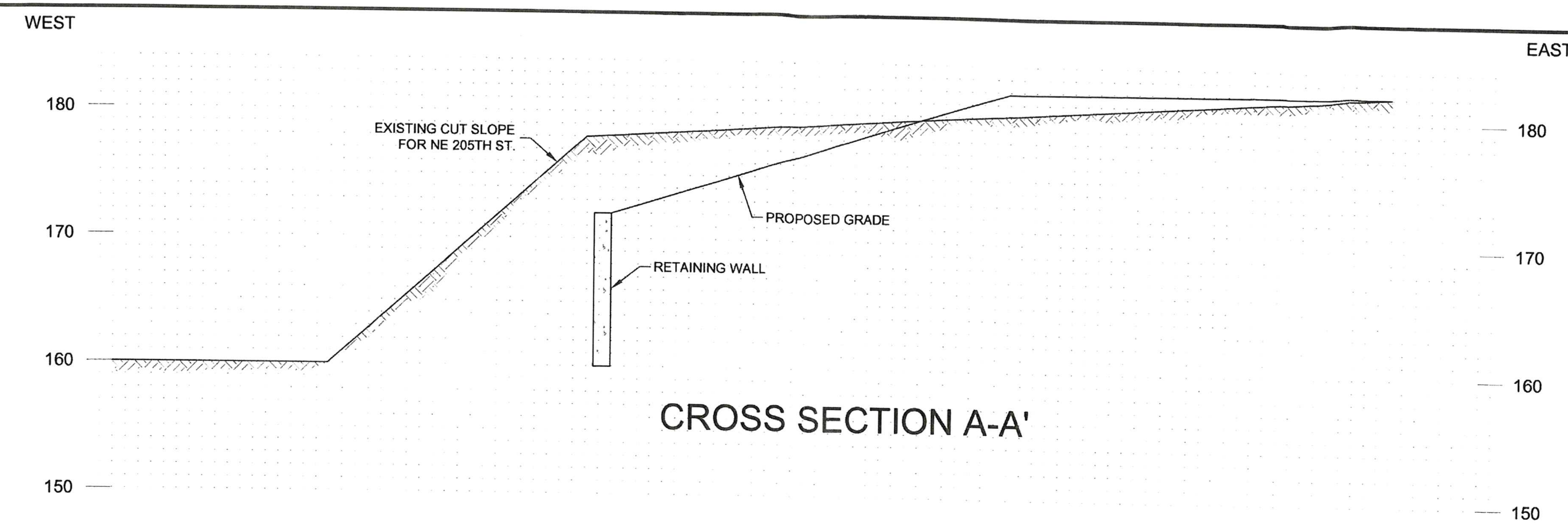
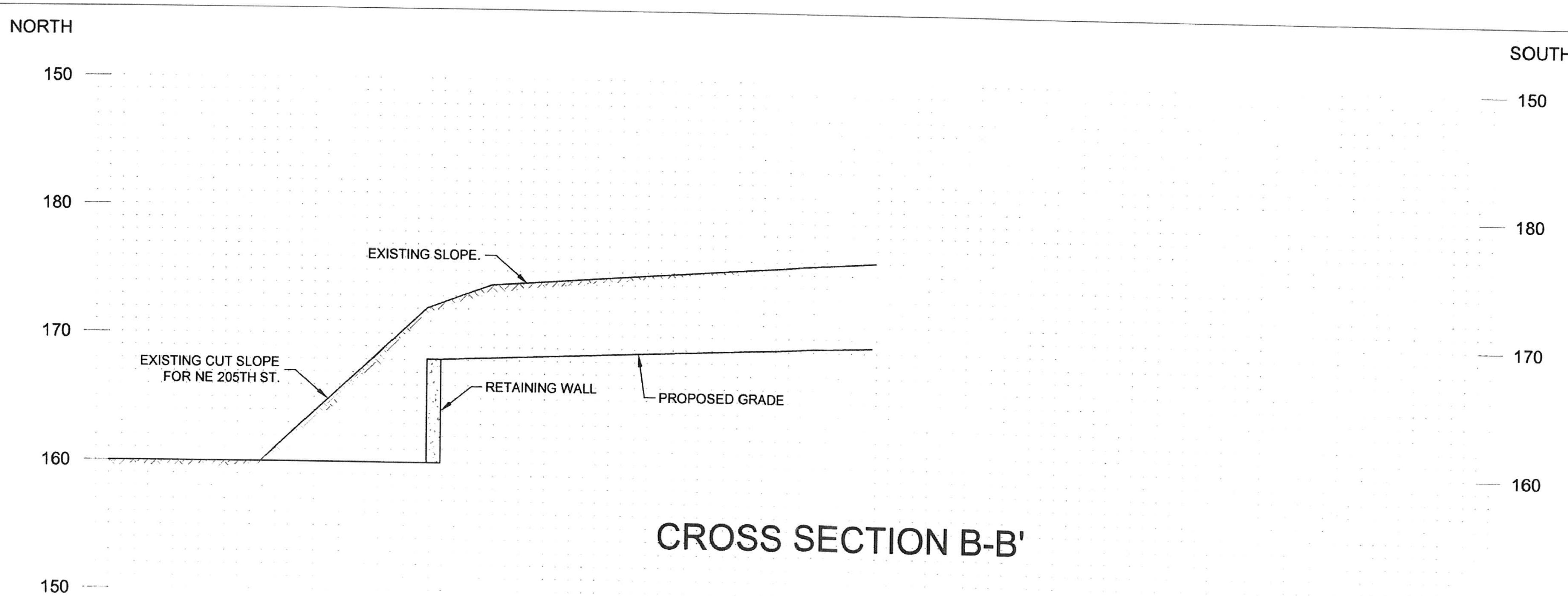
Geology and
Environmental Earth Sciences

STEEP SLOPE LOCATION PLAN
CHURCH PROPERTY
WOODINVILLE, WASHINGOTN

Proj. No.T-7011	Date OCT 2014	Figure 3



CROSS SECTION A-A'



CROSS SECTION B-B'

0 10 20
APPROXIMATE SCALE IN FEET

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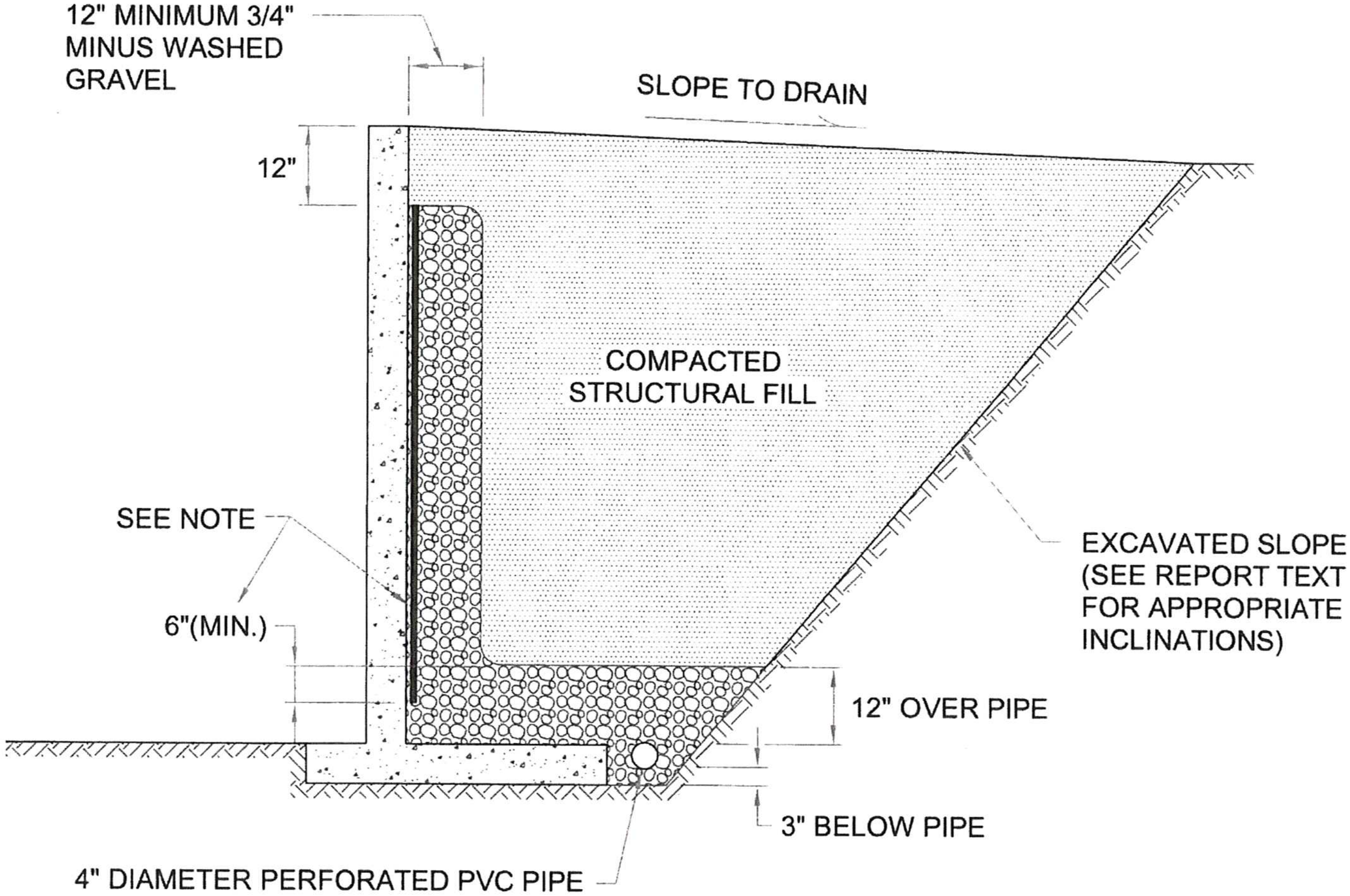
Environmental Earth Sciences

CROSS SECTIONS
CHURCH PROPERTY
WOODINVILLE, WASHINGOTN

Proj. No.T-7011	Date OCT 2014	Figure 4



NOT TO SCALE

NOTE:

MIRADRAIN G100N PREFABRICATED DRAINAGE PANELS OR SIMILAR PRODUCT CAN BE SUBSTITUTED FOR THE 12-INCH WIDE GRAVEL DRAIN BEHIND WALL. DRAINAGE PANELS SHOULD EXTEND A MINIMUM OF SIX INCHES INTO 12-INCH THICK DRAINAGE GRAVEL LAYER OVER PERFORATED DRAIN PIPE.

Terra Associates, Inc. Consultants in Geotechnical Engineering Geology and Environmental Earth Sciences	TYPICAL WALL DRAINAGE DETAIL CHURCH PROPERTY WOODINVILLE, WASHINGTON		
	Proj. No.T-7011	Date OCT 2014	Figure 5

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

Church Property
Woodinville, Washington

On February 14, 2014, we completed our site exploration by observing soil conditions at 4 test pits. The test pits were excavated using a small excavator to a maximum depth of 10 feet below existing site grades. Test pit locations were determined in the field by measurements from existing site features. The approximate location of the recent and previous test pits is shown on the attached Exploration Location Plan, Figure 2. Test Pit Logs are attached as Figures A-2 through A-5.

A geotechnical engineer and geologist from our office conducted the field explorations. Our representatives classified the soil conditions encountered, maintained a log of each test pit, obtained representative soil samples, and recorded water levels observed during excavation. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1.

Representative soil samples obtained from the test pits were placed in closed containers and taken to our laboratory for further examination and testing. The moisture content of each sample was measured and is reported on the individual Test Pit Logs. Grain size analysis was completed on 3 represented samples with results shown on attached Figures A-6 and A-7.

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS (More than 50% material larger than No. 200 sieve size)	**GRAVELS** More than 50% 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, gravel-sand mixtures, little or no fines.
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
			SP	Poorly-graded sands, sands with gravel, 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 50% material smaller than No. 200 sieve size)	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity. (Lean clay)
			OL	Organic silts and organic clays of low plasticity.
	SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
			CH	Inorganic clays of high plasticity. (Fat clay)
			OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

Symbol	Definition
I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
II	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

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UNIFIED SOIL CLASSIFICATION SYSTEM
CHURCH PROPERTY
WOODINVILLE, WASHINGTON

Proj. No.T-7011	Date OCT 2014	Figure A-1

EXHIBIT 10

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LOG OF TEST PIT NO. 1

FIGURE A-2

PROJECT NAME: Church Property **PROJ. NO:** T-7011 **LOGGED BY:** BS

LOCATION: Woodinville, Washington **SURFACE CONDS:** Dense Brush **APPROX. ELEV:**

DATE LOGGED: February 14, 2014 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		Brown/tan silty SAND with gravel, fine to medium grained, moist, trace organics. (SM) (Topsoil)	Loose	13.7		
1, 2		Tan silty SAND with gravel, fine to medium grained, moist, weathered. (SM)	Loose			
3, 4, 5, 6		Tan SAND with silt and gravel, fine to medium grained, moist. (SM)	Medium Dense	4.0		
7, 8		Tan/gray SILT with sand, fine to medium grained, moist. (ML)	Dense	36.6		
9, 10		Gray SILT with sand, fine to medium grained, moist. (ML)	Dense	31.8		
11, 12, 13, 14, 15		Test pit terminated at approximately 10 feet. No groundwater seepage observed. No caving.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 2

FIGURE A-3

PROJECT NAME: Church Property **PROJ. NO:** T-7011 **LOGGED BY:** BS

LOCATION: Woodinville, Washington **SURFACE CONDS:** Dense Brush **APPROX. ELEV:**

DATE LOGGED: February 14, 2014 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
0–0.7		Brown/tan silty SAND with gravel, fine to medium grained, moist, trace organics. (SM) (Topsoil)	Loose			
0.7–3.5		Tan/gray silty SAND, fine to medium grained, moist. (SM)	Medium Dense	17.8		
3.5–7		Tan/gray silty SAND with gravel, fine to medium grained, moist. (SM)	Dense	17.4		
7–9		Tan/gray SAND with trace gravel, fine to medium grained, moist. (SP)	Dense	16.1		
9		Test pit terminated at approximately 9 feet. No groundwater seepage observed. No caving.				

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 3

FIGURE A-4

PROJECT NAME: Church Property **PROJ. NO:** T-7011 **LOGGED BY:** BS

LOCATION: Woodinville, Washington **SURFACE CONDS:** Light Brush/Mature Trees **APPROX. ELEV:** ______

DATE LOGGED: February 14, 2014 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
0–1		Brown/tan silty SAND with gravel, fine to medium grained, moist, trace organics. (SM) (Topsoil)	Loose			
1–2		Tan silty SAND with gravel, fine to medium grained, moist, trace organics. (SM)	Loose	19.6		
2–9		Tan/gray SAND with silt and gravel, fine to medium grained, moist. (SM)	Medium Dense	19.4		
			Dense	13.8		
				16.3		
9–15		Test pit terminated at approximately 9 feet. No groundwater seepage observed. No caving.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 4

FIGURE A-5

PROJECT NAME: Church Property **PROJ. NO:** T-7011 **LOGGED BY:** BS

LOCATION: Woodinville, Washington **SURFACE CONDS:** Short Grass/Driveway **APPROX. ELEV:**

DATE LOGGED: February 14, 2014 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
0–0.5		Brown/tan silty SAND with gravel, fine to medium grained, moist, trace organics. (SM) (Topsoil)	Loose			
0.5–1.5		Tan/brown silty SAND with gravel, fine to medium grained, moist, trace organics. (SM)	Medium Dense	31.2		
1.5–4		Gray/tan SILT with sand, fine to medium grained, moist, 12-inch diameter boulder at 3 feet. (ML)	Dense	28.1		
4–9		Gray/tan silty SAND with gravel, fine to medium grained, moist. (SM)	Dense	11.1 12.5		
9–15		Test pit terminated at approximately 9 feet. No groundwater seepage observed. No caving.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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EXHIBIT 10
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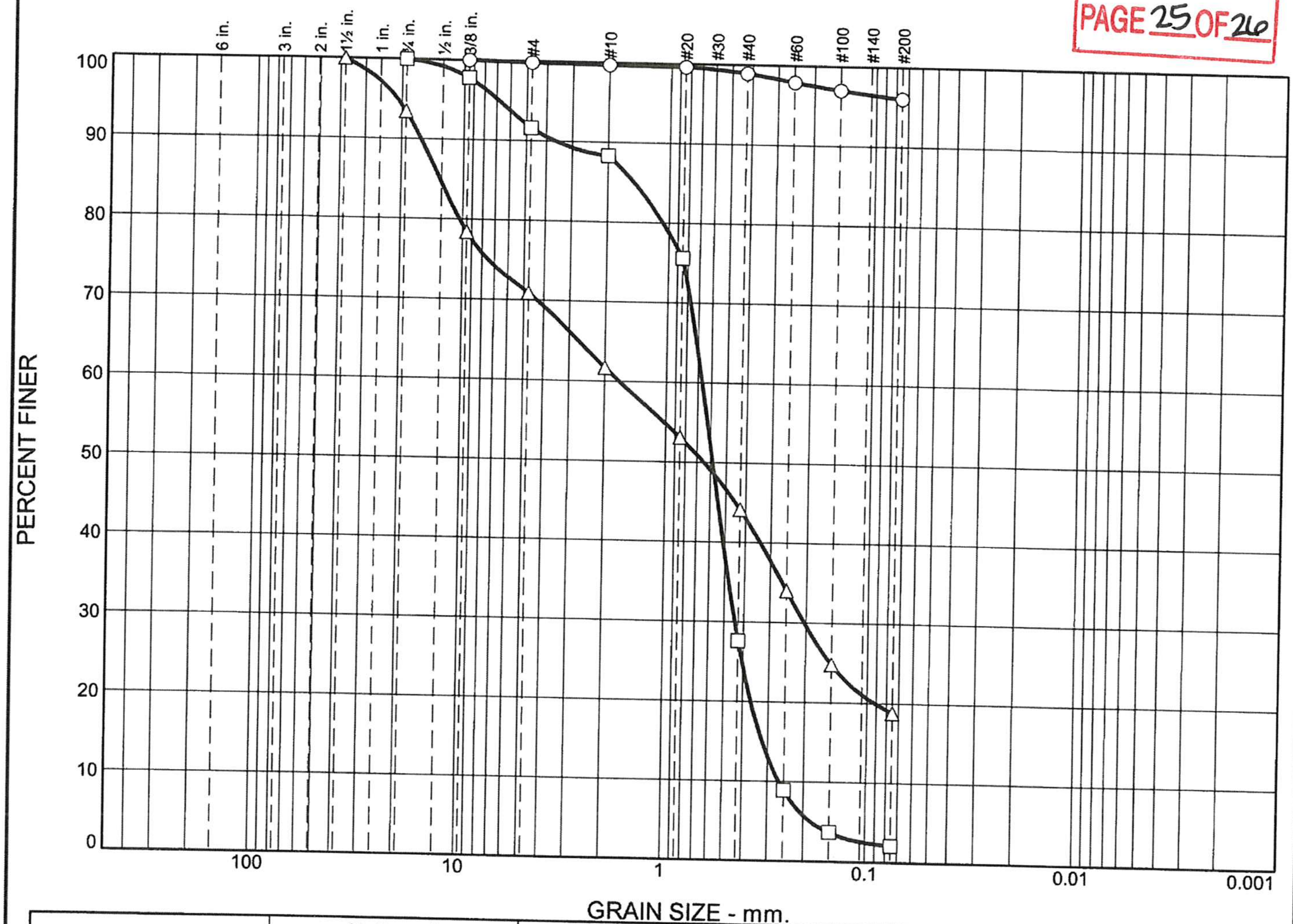
Particle Size Distribution Report



	% +3"	% Gravel Coarse	% Gravel Fine	% Sand Coarse	% Sand Medium	% Sand Fine	% Fines Silt	% Fines Clay
○	0.0	0.0	0.2	0.1	0.8	2.9	96.0	
□	0.0	0.0	8.4	3.3	60.7	25.5	2.1	
△	0.0	6.6	22.5	9.2	17.6	25.3	18.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○										
□			1.4912	0.6664	0.5837	0.4421	0.3205	0.2647	1.11	2.52
△			12.9580	1.6982	0.6448	0.2041				

	Material Description	USCS	AASHTO
○			
□			
△			

Project No. 7011 **Client:** Quadrant Homes
Project: Church-Nutu Property

○ **Location:** TP-1 **Depth:** -8'
□ **Location:** Tp-2 **Depth:** -7'
△ **Location:** Tp-3 **Depth:** -5'

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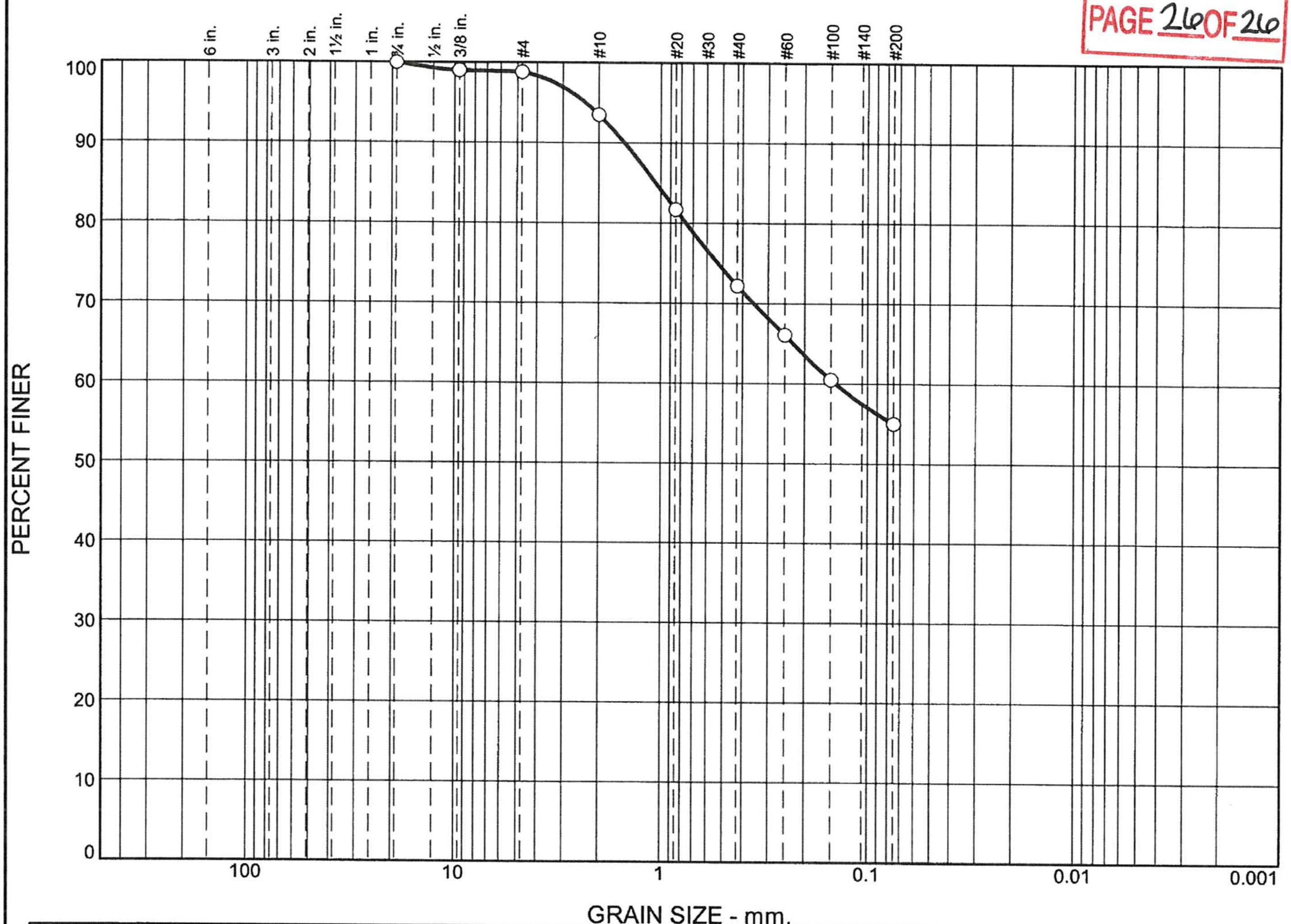
Kirkland, WA

Remarks:

Figure A-6

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.2	5.3	21.3	17.2	55.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.0603	0.1424						

	Material Description	USCS	AASHTO
○			

Project No. 7011 **Client:** Quadrant Homes
Project: Church-Nutu Property

○ **Location:** Tp-4 **Depth:** -3'

Remarks:

Terra Associates, Inc.

Kirkland, WA

Figure A-7