

**BLACK MOUNTAIN CONSULTING LLC**

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April 10, 2023, revised September 27, 2023

Black Mountain Project No. 220031-GHE

**Smartlink**

621 SW Alder Street, Suite 660

Portland, Oregon 97205

Attn: Ms. Sharon Gretch

**Subject: Geologic Hazard Evaluation**

PS25 Camas School Relo

706 NE 14<sup>th</sup> Avenue

Camas, Washington 98607

Black Mountain Consulting LLC (Black Mountain) is pleased to submit this report describing our geologic hazard evaluation for the PS25 Camas School Relo site. The purpose of this study was to evaluate the potential geologic hazards located on or adjacent to the proposed lease area that may affect development of the site, and if necessary, make recommendations for further analysis and mitigation. Our scope of services consisted of a geologic field reconnaissance, literature research, and report preparation.

This geologic hazard evaluation has been conducted in accordance with generally accepted geotechnical engineering and geology practices and has been prepared for the exclusive use of Smartlink and their agents for specific application to the project site. Use or reliance upon this report by a third party is at their own risk. Black Mountain does not make any representation or warranty, expressed or implied, to such other parties as to the accuracy or completeness of this report or the suitability of its use by such other parties for any purpose whatever, known or unknown, to Black Mountain.

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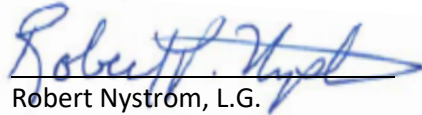
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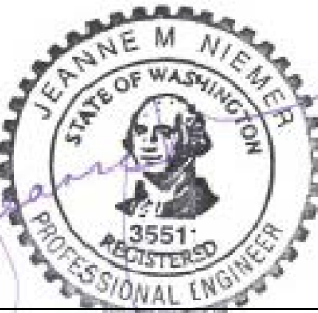
We appreciate the opportunity to be of service to you. If you have any questions, or if we can be of further assistance to you, please contact us at (503) 625.2517.

Respectfully Submitted,

**Black Mountain Consulting LLC**



Robert Nyström, L.G.  
Staff Geologist



EXPIRES 10-02-2023

Jeanne M. Niemer, PE  
Principal Geotechnical Engineer

Attachment A      Figures  
                            Figure 1 - Site Location/Topographic Map  
                            *Figure 2 - Geologic Hazard Map*  
                            Figure 3 - Slope Cross Section  
                            Figure 4 - Steep Slope Hazard Map

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### PROJECT DESCRIPTION

Current development plans consist of constructing a new telecommunication tower compound consisting of an approximately 60-foot tall self-support tower and placing associated equipment within the footprint of the tower. The self-support tower and equipment will be enclosed by a new bell tower façade. The site is located at 706 NE 14<sup>th</sup> Avenue in Camas, Washington, as shown on the *Location/Topographic Map* (Figure 1).

The lease area is located adjacent to a building (United Methodist Church) and is landscaped. The building is located on a level terrace and an asphalt-paved driveway provides access to the lease area. The project site and surrounding area are shown on the attached *Geologic Hazard Map* (Figure 2).

### DOCUMENT REVIEW

We reviewed the following maps and documents pertaining to the property and vicinity:

- *Geologic and soil conditions, Natural Resource Conservation Service (NRCS) web site* (<http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>).  
The Web Soil Survey maps reviewed as a part of this study classifies surficial soils at the subject site as Olympic clay loam, 20 – 30 percent slopes (OIF). The Olympic clay loam soil unit is generally described as 42 inches of clay loam, which is underlain by gravelly clay loam to 60 inches.
- *Geologic Map of Washington: Washington Division of Mines and Geology; Huntting, M. T., Bennett, W. A. G., Livingston, V. E. Jr., Moen, W. S., 1961.*  
The Geologic map of Washington describes soils underlying the site as: “Mostly unconsolidated silt, sand, and gravel valley fill with some clay; includes low-level terrace, marsh, peat, artificial fill, and glacial deposits locally.”
- *Geologic Map of the Camas Quadrangle, Clark County, Washington, and Multnomah County Oregon, 2008, Russell C. Evarts and Jim E. O’Connor.*  
According to the Geologic Map of the Camas Quadrangle, the geology of the lease area consists of Pliocene epoch hyaloclastic sandstone (Ttfh), basalt and conglomerate overlying micaceous arkosic sandstone, siltstone, and claystone of the Sandy River Mudstone (Tsr).
- Clark County MapsOnline (<https://gis.clark.wa.gov/mapsonline/>).
- AT&T PS25 Camas School Relo construction drawings dated *September 26, 2023*, sheet A-2.0.  
Based on our review of the construction drawings, the proposed new development will be located adjacent to an existing building. The building is located on a northeast-southwest trending terrace and the lease area is level.

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- *Well log information* ([https://apps.wrd.state.or.us/apps/gw/well\\_log/](https://apps.wrd.state.or.us/apps/gw/well_log/)).

Based on our review of geotechnical well logs dated between 2010 and 2011 completed by Subsurface Drilling, soils at a property located at a lower elevation near the site reportedly consist of about 55 feet of silt, sand and gravel. Static groundwater was reportedly encountered between about 35 and 40 below ground surface (bgs) during the explorations.

### SITE RECONNAISSANCE

A licensed geologist from Black Mountain conducted a site reconnaissance of the area on March 31, 2023 to assess existing geology, and adjacent slope in the vicinity of the planned tower.

The planned construction site is located on a level terrace north of a vegetated, northeast-southwest trending slope that was created when a concrete-lined canal was constructed in the slope. The excavated slope grades from approximately level to approximately 50 degrees, or 120 percent, beginning approximately 37 feet from the edge of the lease area. Topographic maps of the area indicate that the canal had been constructed prior to 1937.

We did not observe ground cracks, evidence of scarps, fissures or other manifestations of recent slope movement (denuded areas, debris accumulations, chaotic vegetation) on the slope above the canal at the time of our site visit. No spring activity was noted. Vegetation on the slope adjacent to the lease area consists primarily of blackberry bushes. Figure 4, Slope Cross Section, illustrates the topography in the immediate vicinity of the proposed compound.

### GEOLOGIC HAZARD EVALUATION

#### ***Seismic Hazard***

Seismic hazard areas are considered those areas subject to severe risk of earthquake damage as a result of seismically induced settlement or soil liquefaction. Historical records indicate that numerous earthquakes have been produced by the subducting Juan de Fuca plate located along the western edge of the continent. Historical records exist of strong earthquakes in the area.

#### ***Liquefaction***

When shaken by an earthquake, certain soils lose strength and temporarily behave as a liquid. This phenomenon is known as soil liquefaction. Soil liquefaction can result in failure of the ground surface that is most typically expressed as landslides or lateral spreads, surface cracks and settlement, and/or sand boils. Structures can sustain substantial damage during a large seismic event if they are supported in or on a soil susceptible to liquefaction. Seismically induced liquefaction typically occurs in loose, saturated, sandy materials commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can be associated with areas of loose, saturated fill. Based on published records and our observation of silty soils near the site, we anticipate that the site conditions in the upper 100-feet will most closely correspond to a seismic Soil Profile D for stiff soils.

#### ***Fault Hazard***

The area is characterized by a level terrace that is developed with a church building and parking area. We did not observe indications or manifestations of previous surface rupturing, terraces or other visible evidence of existing or potential faulting in the area. There are several mapped faults in the general area including the Lacamas Lake Fault, Prune Hill Fault, Blue Lake Fault and the Sandy River Fault. The closest mapped fault is located approximately one kilometer northeast of the site and is identified as the Lacamas

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Lake Fault. The Lacamas Lake Fault trends northwest and may be a right-lateral slip fault (Personius, S.F., compiler, 2002, Fault number 879, USGS).

### ***Steep Slope and Landslide Hazard***

Steep slope hazard areas are typically considered to be any ground that rises at an inclination of 40 percent or more (a vertical rise of 10 feet or more for every 25 feet of horizontal distance). Based on our site visit and geologic profiling, the man-made slopes in the vicinity of the site are on the order of 84 to 120 percent, and are “steep”. The approximate distance from the edge of the proposed tower foundation to the slope is about 37 feet (horizontal). Exposed soils along the slope indicate that soils underlying this site consist of silt extends to at least 10 feet below the lease area.

### ***Flooding and Erosion Hazard***

The NRCS soil survey of Clark County suggests that the potential erosion hazard for soil underlying the site is moderate to severe if the surface is left bare; we did not observe areas of significant erosion or existing erosion hazard areas.

### ***Grading***

We understand that grading at the site will be limited to the lease area. The lease area is level and the tower foundation will be founded on native soil.

### ***Site Constraints for Human-Occupied Structures***

Personnel will only be required, for maintenance, on site on an intermittent basis.

## **CONCLUSIONS**

### ***Steep Slope and Landslide Hazard***

The site is located adjacent to steep slopes; however, the surrounding slopes appear to be stable at the existing slope gradient, and have been in place since at least 1937. Based on our reconnaissance and review of existing reports, we conclude that the planned construction will not have a significant impact on slope stability or other geologic hazards at the site or on adjacent properties. We did not observe indications of major land movement that may jeopardize the proposed project.

### ***Liquefaction***

Based on the reported depth to groundwater in the area and the consistency of the site soils, the liquefaction potential during a design level earthquake is negligible.

### ***Fault Hazard***

No known faults traverse the site, therefore the fault hazard at the site is negligible.

### ***Flooding and Erosion Hazard***

The potential for flooding is negligible since the site is located on a terrace with 190 or more feet of vertical relief.

Provided that erosion control measures are undertaken as outlined in this report, we conclude that the potential for erosion is limited.

### ***Site Constraints for Human-Occupied Structures***

The planned project does not include human-occupied facilities; therefore, no site constraints exist.

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### RECOMMENDATIONS AND MITIGATION MEASURES

#### ***Slope Setbacks***

We recommend that all structures be located a minimum of 25 feet from the edge of the existing slopes adjacent to the canal.

#### ***Erosion Control***

We recommend that drainage and erosion control measures be provided during construction and that no water be discharged over the moderately steep slope to the northeast of the site.

Ground cover on slopes should be protected during construction and excavated materials should not be sidecast on slopes. Best Management Practices for erosion control should be utilized during construction, including covering stockpiles and preventing water from discharging on slopes. Disturbed areas should be reseeded as soon as possible after construction.

#### ***Grading***

Final site grades should slope downward away from the structure at a minimum of two percent and runoff should be conveyed to a suitable drainage outlet. Additionally, the area surrounding the structure could be capped with concrete, asphalt or compacted, low-permeability soils to reduce surface water infiltration into the subsurface soils near the foundation.

### LIMITATIONS

The conclusions and recommendations contained in this report are based on our understanding of the currently proposed utilization of the project site, as derived from written and verbal information supplied to us by Smartlink. If any changes are made to the project, we recommend that we review the changes and modify our recommendations, if appropriate, to reflect those changes.

The opinions and recommendations contained within this report are not intended to be, nor should they be, construed as a warranty of subsurface conditions, but are forwarded to assist in the planning and design process.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

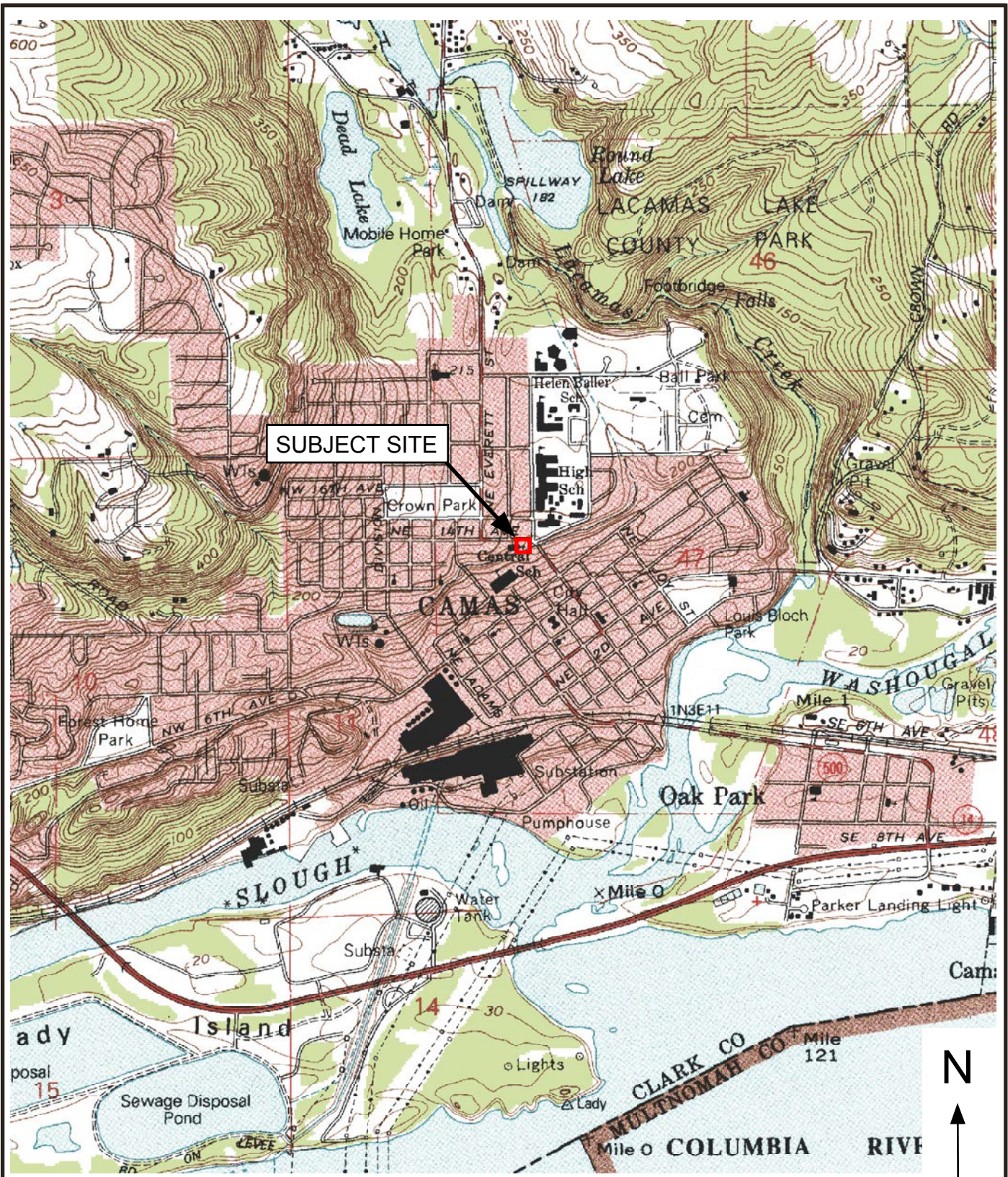
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**ATTACHMENT A**

**FIGURES**



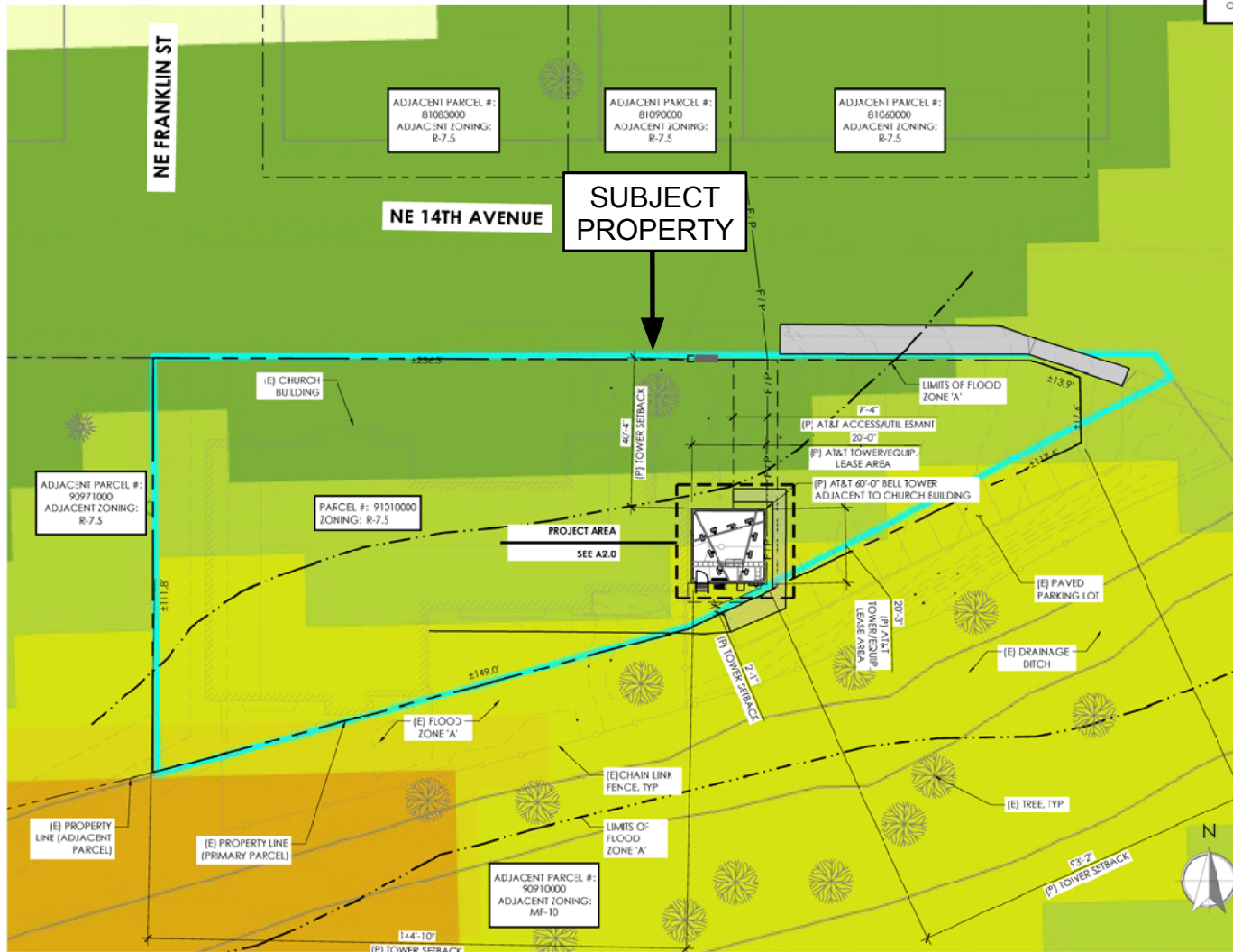


Base Map Courtesy of U.S.G.S. Topographic Map "Camas, WA-OR" (1993) Not to Scale

|   |                                       |   |
|---|---------------------------------------|---|
| <p><b>Black Mountain Consulting LLC</b><br/>                 22566 SW Washington St., Ste. 206<br/>                 Sherwood, OR 97140<br/>                 TEL. 503.625-2517   www.blkmountain.com</p> | <p><b>FIGURE 1 - Location Map</b></p> | <p><b>Location</b><br/>                 PS25 Camas School Relo<br/>                 706 NE 14th Avenue<br/>                 Camas, Washington 98607</p> |
|   | <p><b>Project : 220031</b></p>        |   |
|   | <p><b>Client : Smartlink</b></p>      | <p><b>Date : April 2023</b></p>   |



NOTES:  
 1. THE OVERALL SITE PLAN IS GENERATED FROM MULTIPLE SOURCES INCLUDING, BUT NOT LIMITED TO, GIS MAPS, AERIAL MAPS, PHOTOS, IMAGES AND TOPOGRAPHIC SURVEY (IF PROVIDED).  
 2. FINAL CIVIL DESIGN FOR TWO NEW DRIVEWAY APPROACHES AND SIDEWALK FRONTAGE IMPROVEMENTS TO BE PROVIDED WITH CONSTRUCTION DRAWING PACKAGE AT A FUTURE DATE.



**Legend**

- Taxlots
- Percent Slope
  - 0-5 percent
  - >5-10 percent
  - >10-15 percent
  - >15-25 percent
  - >25-40 percent
  - >40-80 percent
  - >80 percent
- Severe Erosion Hazard Areas
- Steep Slopes and Landslide H.
  - Areas of Historic or Active Landslid
  - Areas of Potential Instability
  - Areas of Older Landslide Debris
  - Slopes > 15%
  - Slopes > 25%
- NEHRP Site Classes
  - Site Class E - Highest Relative Haz
  - Site Class D-E
  - Site Class D
  - Site Class C-D
  - Site Class C
  - Site Class B-C
  - Site Class B - Lowest Relative Haz
  - PEAT
  - WATER
- Liquefaction Susceptibil\*\*
  - Moderate to High
  - Low to Moderate
  - Very Low to Low
  - Very Low
  - Bedrock
  - Peat
  - Water

NORTH

Map Provided by Smartlink

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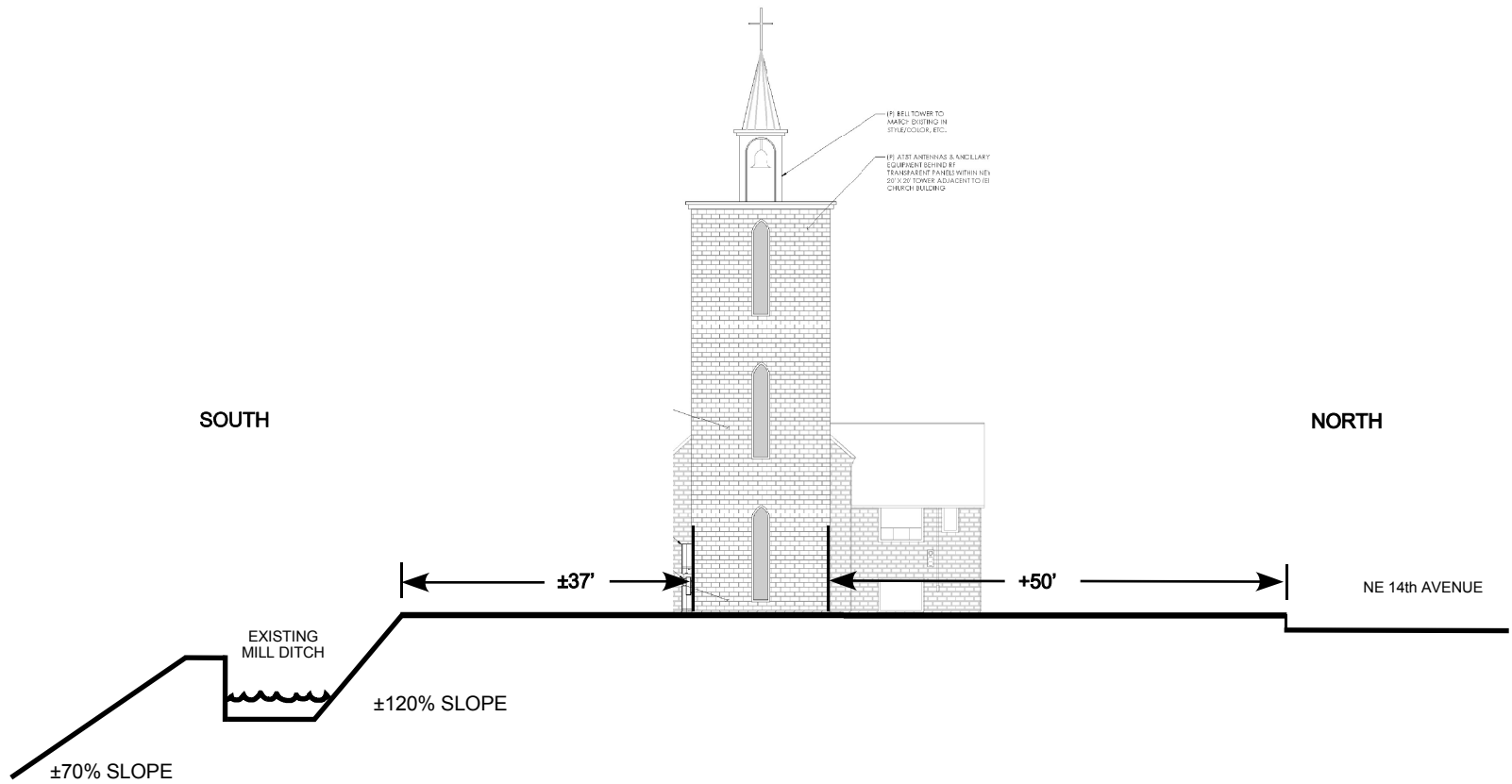
**FIGURE 2 - Geologic Hazard Map**

**Project :** 220031

**Client :** Smartlink

**Location**  
 PS25 Camas School Relo  
 706 NE 14th Avenue  
 Camas, Washington 98607

**Date :** revised September 2023



NOT TO SCALE

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**FIGURE 3 - Slope Cross Section, North-South**

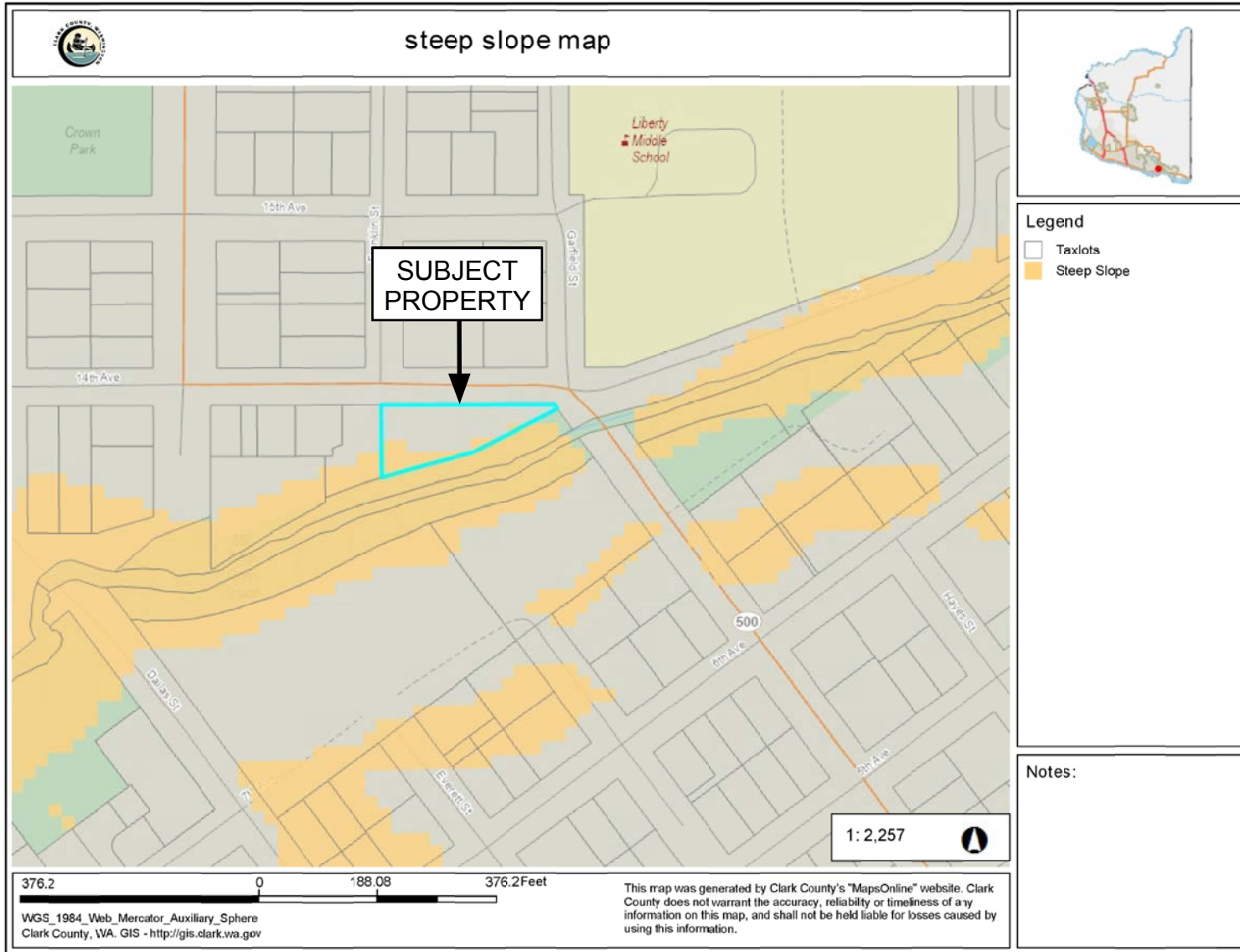
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Map Provided by Clark County GIS

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**FIGURE 4 - Steep Slope Hazard Map**

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**Date :** April 2023