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MEMORANDUM

DATE: July 17, 2019
TO: Ms. Moon Wu
FROM: Khaled M. Shawish, PE
Lee S. Bellah, LG
RE: Supplemental Geotechnical Engineering Memorandum
Wu Residence Slope Stabilization
5660 East Mercer Way
Mercer Island, Washington
NGA File No. 1024718



This memo presents the our updated supplemental geotechnical opinions and recommendations for the proposed Wu Residence slope stabilization project located at 5660 East Mercer Way on Mercer Island, Washington.

We previously prepared a geotechnical evaluation for the project titled **“Geotechnical Engineering Evaluation – East Mercer Way Retaining Walls and Slope Stabilization – 5660 East Mercer Way – Mercer Island, Washington,”** dated April 30, 2018. In general, we concluded that the site retaining walls were not constructed to engineering standards and recommended that they be reconstructed as reinforced-earth retaining walls. We also prepared a supplemental letter dated November 5, 2018 that provided recommendations for replacing the proposed walls with new soldier pile retaining walls. We now understand that proposed reconstruction/replacement of the existing retaining walls has proven to be not feasible due to access constraints within the site. We now understand that you wish to remove the existing walls from the steep slope area and restore the sloping area to previous conditions.

In our opinion, removing the existing block walls and undocumented fill along with drainage improvements as discussed in this memo should be feasible from a geotechnical standpoint and should be considered adequate for stabilizing the steep slope below the residence. We recommend that all of the block walls in their entirety be removed from the steep slope area. Any remaining undocumented fill and/or loose surficial soils should also be removed to expose competent native glacial soils. If loose native soils are exposed at the slope face after the fill soils have been removed, we recommend that these

soils be compacted in place to an unyielding state. The final face inclination of the slope should not be steeper than 2 Horizontal to 1 Vertical (2H:1V). The resulting slope face should then be covered with a heavy duty erosion control matting such as Tensar C350 Turf Reinforcement Mat, or equivalent, and then hydroseeded. The matting should be staked with metal rebar that has a metal "T" welded to the end. The mat should be staked to the exposed soil every five feet. A cross-section detail titled "Schematic Stabilization Cross Section Detail" showing the proposed stabilization measures is presented as Figure 1. NGA should be retained to observe the recommended repairs on a full-time basis.

If the above final slope inclination of 2H:1V cannot be achieved due to property line constraints, we recommend that the steeper slopes be stabilized by constructing a rock spall buttress along the steep slope. As recommended above, the steep slopes should be cleaned of the loose debris and vegetation, exposing the underlying firm native material. The toe of the rock spall buttress should be located along the previous toe of the steep slope area prior to grading activities. The rock spall buttress should be constructed on level benches excavated in medium dense or better native soil. The level benches in the native soil should be at least two feet wide perpendicular to the slope face. The maximum rise between the benches should be four feet. The toe of the rock spall buttress should be a minimum of two feet wide and embedded a minimum of one foot into the competent native soils. The rock spalls should be placed in small lifts on the level benches and tamped in place. The rock spalls should extend up to the existing ground surface. The final face inclination of the rock fill should not be steeper than 1.5 Horizontal to 1 Vertical (1.5H:1V). This is extremely important for maintaining long-term stability of the rock slope. Also, care should be taken as to not contaminate the rock spalls with the native material in order to maintain the rock's free-draining capability. If desired, the rock spalls could then be covered with topsoil and a heavy duty erosion control matting such as Tensar C350 Turf Reinforcement Mat, or equivalent, and then hydroseeded. The matting should be staked with metal rebar that has a metal "T" welded to the end. The mat should be staked to the exposed soil every five feet. A filter fabric such as Mirafi 160N should be placed over the spalls prior to placing the top soil. A cross-section detail titled "Schematic Rock Spall Buttress Cross Section Detail" showing the proposed rock spall buttress is presented as Figure 2. NGA should be retained to observe the recommended repairs on a full-time basis.

A cut-off drain trench should be constructed within the lower bench area along the toe of the steep slope to capture any runoff from the sloping area above before it has a chance to flow onto the neighboring property below. The trench should be a minimum of 18-inches wide and two feet deep. A minimum four-inch diameter, rigid, perforated, PVC drainpipe should be placed near the base of the trench and covered entirely with washed rock up to the ground surface. This pipe should be sloped to drain under gravity and outlet into a permanent stormwater system such as the existing stormwater pipe along the southern portion of the property.

All recommendations presented in the previous geotechnical report and this memo should be followed during construction. A copy of our previous report and this memo should be provided to your contractor prior to work beginning on this project. We recommend that NGA be retained to provide monitoring and consultation services during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities comply with contract plans and specifications.

CLOSURE

Based on our understanding of the proposed plans, and provided that the recommendations in this memo and our previous report are strictly followed during construction, the areas disturbed by construction should remain stable. The geologic hazard area will be modified, or the development has been designed so that the risk to the lot and adjacent property is eliminated or mitigated such that the site is determined to be safe meeting the requirements stated in Mercer Island City Code 19.07.060.D.2.a. Therefore, the risk of damage to the proposed development or to adjacent properties from soil instability should be minimal, and the proposed grading and development should not increase the potential for soil movement.

We recommend that NGA be retained to provide monitoring and consultation services during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities comply with contract plans and specifications.

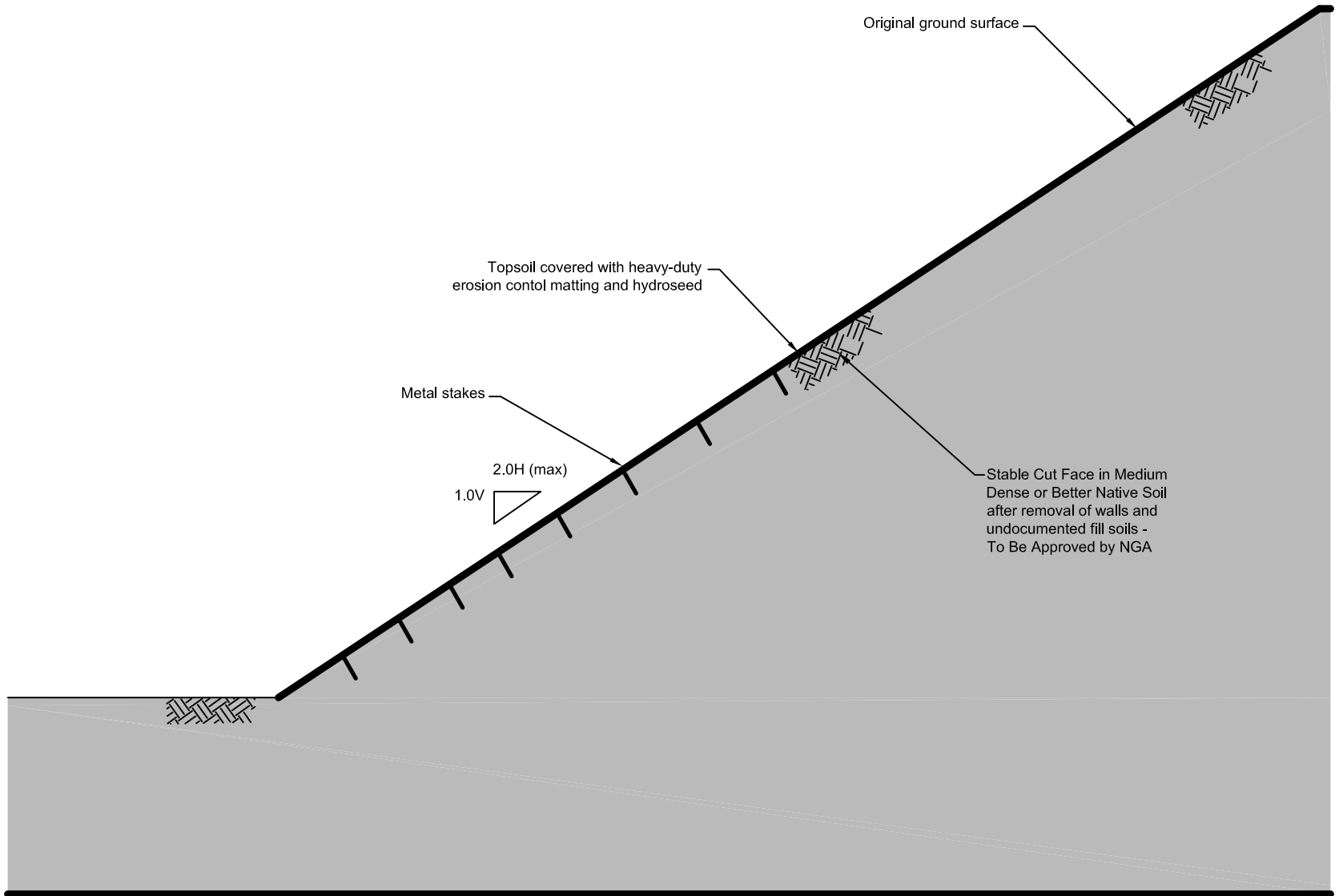
We trust this memorandum should satisfy your needs at this time. Please contact us if you have any questions or require additional services.

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Attachment: Two Figures

Schematic Slope Stabilization Cross Section Detail

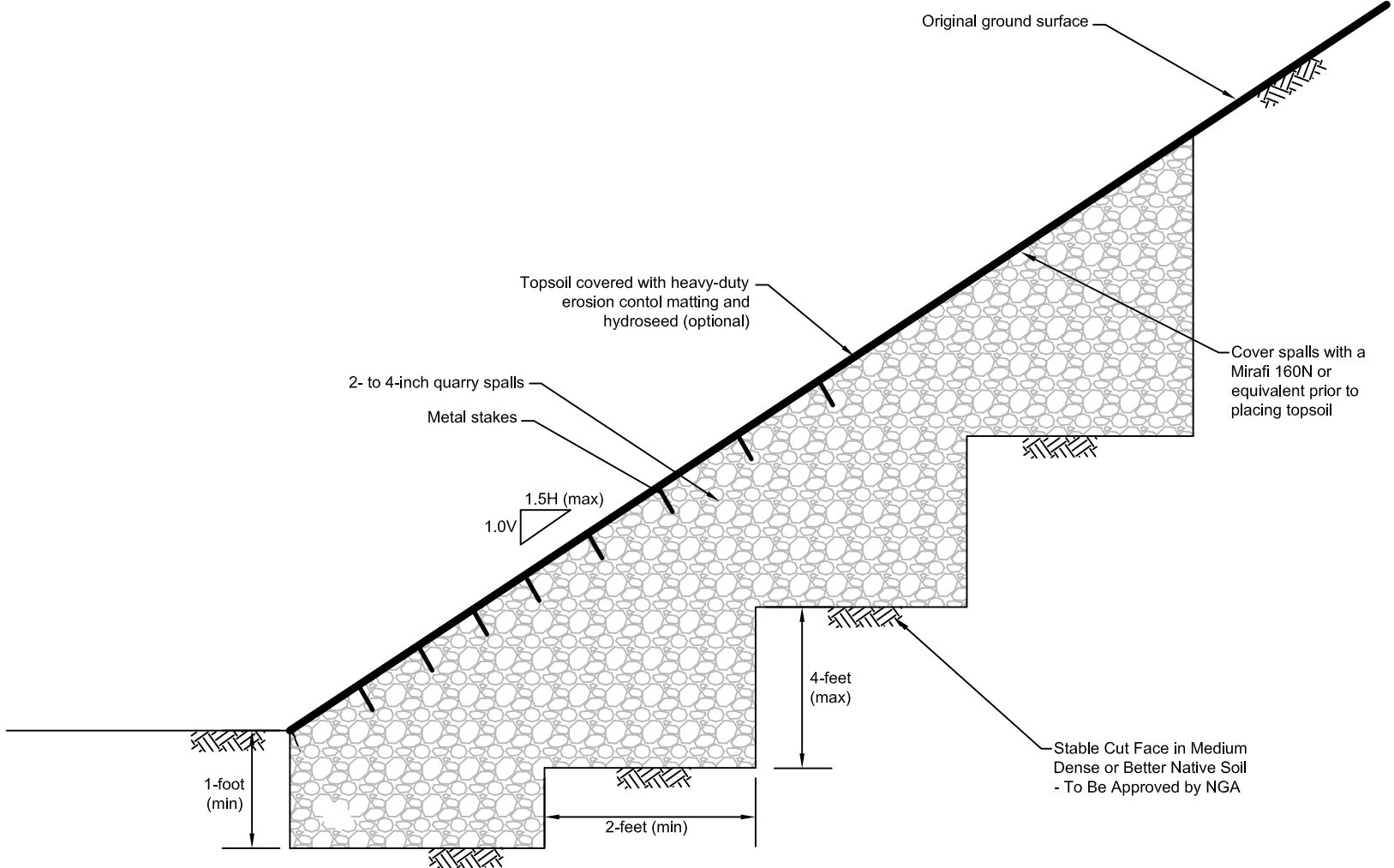
(Not to Scale)



Project Number 1024718	Wu Residence Slope Stabilization Schematic Slope Stabilization Cross Section Detail	 NELSON GEOTECHNICAL ASSOCIATES, INC. GEOTECHNICAL ENGINEERS & GEOLOGISTS 17314-155th Ave, NE, A-500 Shoreline, WA 98148 (425) 886-1689 / Fax 481-2510 Shoreline County (425) 327-1689 (425) 327-1689 www.nelsongeotechnical.com	No.	Date	Revision	By	CK
Figure 1			1	7/15/19	Original	LSB	KMS

Schematic Rock Spall Buttress Cross Section Detail

(Not to Scale)



Project Number 1024718		Wu Residence Slope Stabilization Schematic Rock Spall Buttress Cross Section Detail	
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