April 18, 2023 G-5861

Mr. Ananta Gudipaty
3737 – 77th Avenue SE
Mercer Island, Washington 98040

Subject: Geotechnical Engineering Investigation
Proposed New Residence
3626 – 90th Avenue SE,
Mercer Island, Washington

Dear Mr. Gudipaty:

GEO Group Northwest, Inc. is pleased to present our geotechnical engineering report for a proposed new residence at the above-subject location on Mercer Island, Washington. Our services were completed per our proposal to you dated March 7, 2023.

We reviewed a geotechnical evaluation report for the project site prepared by American Geoservices, dated September 15, 2022[1], and we reviewed comments regarding the report from the City of Mercer Island. Subsequently, we developed a program for supplemental geotechnical investigation and evaluation of the site to address the comments and to prepare this new geotechnical engineering report.

SITE DESCRIPTION

The project site is located in the Gallagher Hill neighborhood of Mercer Island, Washington, as illustrated in Plate 1 – Site Location Map. The project site consists of a rectangular lot that has

1 Geotechnical Evaluation Report, 3632 90th Ave SE, Mercer Island, WA 98040. American Geoservices, September 15, 2022.

general dimensions of approximately 160 feet by 70 feet, encompassing an area of 11,200 square feet. A single-family residence, with a main floor and a finished daylight basement floor, is present on the western to middle part of the site. Most of the property has a gentle downward slope toward the east, except for its eastern portion where the slope steepens to approximately 75 percent grade. The steep slope continues eastward beyond the site into a public greenbelt area. The site configuration and the existing topography and improvements are illustrated in Plate 2 – Site Plan.

PROPOSED PROJECT

We understand that you plan to demolish the existing residence and construct a new residence in approximate same location. We the new residence will have two floors plus a daylight basement level.

GEOLOGIC OVERVIEW

According to published geologic mapping for the area[2], the site is underlain with glacial till deposits from the Vashon Glaciation (the most recent glacial advance through the Seattle area). These soils commonly consist of compact, unsorted mixtures of silt, sand, and gravel with occasional cobbles. They typically are very dense where they have not been affected by weathering or disturbance. A layer of mass wasting or landslide deposits are mapped as overlying the native soils to the east and downslope from the project site, and two scarp features are mapped upslope from these deposits.

PREVIOUS GEOTECHNICAL EVALUATION

A geotechnical evaluation of the site was performed by American Geoservices, and the results from the evaluation were presented in a report dated September 15, 2022. Investigation of the soil conditions at the site involved completing two shallow soil borings, identified as B-1 and B-2, using a manually operated small-diameter soil auger and slide hammer. The reported

[2] Troost, K.G., and A.P. Wisher, Geologic Map of Mercer Island, Washington, October 2006.

boring locations are illustrated in Plate 2 – Site Plan. The soils encountered in the borings were reported to be consist of loose very silty sand to depths of 7.5 feet at boring B-1 on the east side of the residence and 2.5 feet at boring B-2 on the west side of the residence, underlain with very dense silty sand with gravel. Groundwater was reported to not have been encountered.

SITE INVESTIGATION

Site Reconnaissance

A geologist from our firm completed a reconnaissance of the visible soil and topographic conditions at the site. We observed that the topographic conditions and physical improvements on site were consistent with those indicated in the topographic survey of the site we were provided. We served that exposed portions of the exterior concrete footings along the perimeter of the existing residence did not show signs of settlement or structural distress.

We observed no indications of slope instability or soil movement on the site property. Near a break in slope inclination at the bottom of the steep slope, about 20 to 25 feet beyond the southeast limit of the site, we observed an area with water seepage and very soft sandy silt soils. The soils further downslope from this area were observed to typically consist of unsaturated, relatively dense, silt. The approximate location of the observed seepage is beyond the area covered by the topographic survey of the site, and is therefore indicated in Plate 3 - Potential Landslide Hazard Area IGS Mapping. No water seepage or saturated soils were found near the bottom of the steep slope in the area to the north.

Subsurface Exploration

A geologist from our firm oversaw the drilling of three exploratory soil borings (B-3, B-4, and B-5) on the site. The borings were completed by a licensed drilling contractor using a compact excavator-mounted drilling rig equipped with hollow-stem augers. Borings B-3 and B-4 in the eastern part of the site were drilled to depths of approximately 21 and 16 feet below ground surface, respectively, at which depths drilling rig refusal was obtained. Boring B-5 on the south side of the site was drilled to approximately 11 feet below ground surface. The boring locations are illustrated in Plate 2 – Site Plan.

We recorded the soil conditions encountered in the borings, and monitored the borings for the presence of groundwater or seepage during drilling. Soil density and consistency were evaluated by performing Standard Penetration Tests in the borings during drilling. Samples of the soils encountered were collected for examination and for moisture content testing at our office. Logs of the soil conditions encountered in the borings are provided in Attachment A to this report.

Findings

Soils encountered in the borings typically consisted of a surficial layer of loose very silty sand approximately 3 feet thick, underlain with very dense silty sand to the bottom depths of the borings. The very dense soils typically contained low proportions of coarse sand and gravel and exhibited poor to no stratification but some limited cementation between grains. These soils are interpreted to be glacially-consolidated till-like deposits consistent with the Vashon glacial till mapped in the immediate area. No groundwater or water seepage was encountered in the borings during our activities.

SLOPE STABILITY ANALYSIS

We completed an analysis of the potential slope stability impact of the proposed project by using topographic and grading information in project plans and the findings from our soil explorations. The location of the slope profile used for the analysis is shown in Plate 2 – Site Plan, and the profile section is presented in Plate 4 – Site Profile. The analyses were performed using the computer analysis program Slide 7.0 published by Rocscience, Inc. For this study, the analyses were based on Bishop's Method of Slices.

The calculated stability is represented as a factor of safety (FS) against slope failure. The FS value is dimensionless and is defined as the value of the resisting forces mobilized from the soil mass divided by the driving forces toward movement of the soil. An FS value of 1.0 represents a situation where both forces are equivalent, and the potential for soil movement is at or near its threshold. An FS value slightly above 1.0 indicates a slope with minimal stability. For the purposes of this study, an FS value of at least 1.5 is considered to indicate a sufficiently stable condition for the slope under permanent, static conditions. An FS value of at least 1.2 is considered sufficiently stable for a short-term dynamic condition such as seismic loading during an earthquake.

Analysis Parameters

The surface and subsurface soil types encountered in our soil explorations were categorized into discrete soil units, based on soil type classification and relative density or consistency. Analysis parameters for these soil units (unit weight, cohesion, friction angle) were obtained from published correlations with standard penetration test (SPT) data or other density and consistency observations, soil grain-size properties; typical friction angle and cohesion values published in technical literature; and our experience with past stability analyses involving similar soil types. The soil parameters developed from this analysis are summarized in the following table.

Soil Unit Descriptions and Parameters

Unit	Soil Description	Unsaturated Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)
I	Very Dense SILTY SAND with little GRAVEL (GLACIAL TILL)	130	300	42
II	Dense SAND	125	20	38
III	Dense SILT	120	400	30

Analysis Results

Minimum failure surfaces calculated from the analyses are illustrated in the plots provided in Attachment A to this letter. In cases where the minimum failure surface has an FS value at or above 1.5 for the static case or 1.2 for the seismic case, only the minimum surface is illustrated. For cases where failure surfaces having FS values below 1.5 for the static case or 1.2 for the seismic case are calculated, each of those surfaces are illustrated in the plots.

<u>Existing Profile</u>

A minimum FS value of 1.26 was calculated for potential failure surfaces along the profile under static site conditions. The failure surfaces with FS values less than 1.5 are limited to an area extending up to 20 feet beyond the top of the steep slope and 25 feet from the existing residence.

A minimum FS value of 0.90 was calculated for potential failure surfaces during seismic conditions. The failure surfaces with FS values less than 1.2 are limited to an area extending up to 30 feet beyond the top of the steep slope and 15 feet from the existing residence.

Proposed Post-Construction Profile

A proposed post-construction profile based on the proposed location and elevation of the new residence was used for our analysis. A minimum FS value of 1.26 was calculated for potential failure surfaces along the profile under static site conditions. The failure surfaces with FS values less than 1.5 are limited to an area extending up to 20 feet beyond the top of the steep slope and 15 feet from the nearest point of the upper deck for the proposed residence. The locations of these failure surfaces are similar to the analysis results for the existing profile.

A minimum FS value of 0.90 was calculated for potential failure surfaces during seismic conditions. The failure surfaces with FS values less than 1.2 are limited to an area extending up to 30 feet beyond the top of the steep slope 5 feet from the nearest point of the upper deck for the proposed residence. The locations of these failure surfaces are similar to the analysis results for the existing profile.

Conclusions

The analysis results indicate acceptable levels of site stability in the existing residence location and in the proposed residence location, inclusive of the proposed upper deck. The results also indicate that the proposed residence will have minimal impact on the existing level of stability of the site.

GEOLOGIC HAZARD AREAS REVIEW

We reviewed available geologic hazard areas information on the City of Mercer Island Information and Geographic Services (IGS) website. The information indicates that the project site contains potential landslide, soil erosion, and seismic hazard areas. According to the IGS information, no documented landslides are identified on the site or on adjacent properties.

Potential Landslide Hazard Area

Identification of Potential Landslide Hazard Area

The IGS mapping of the potential landslide hazard area on the site and adjacent property to the north, east, and south is illustrated in Plate 3 – Potential Landslide Hazard Area IGS Mapping. One of the two scarp features indicated in the published geologic mapping is shown as having its northern part on the project site in the IGS mapping. The mapped location of the scarp, however, is somewhat discordant with the location of the top of the steep slope on site. We interpret the location of the scarp to be further to the southeast and to not extend into the northeast part of the site.

A topographic survey of the site property provided to us indicates that an area with slopes steeper than 40 percent grade and higher than 10 feet is present on the eastern part of the site. This steep slope area in the area covered by the survey has a maximum height of approximately 32 feet and a maximum inclination of approximately 75 percent grade. This slope area extends onto the adjacent property to the east, south, and north. The extent of the slope area on site and for the nearby parts of the adjacent properties is illustrated in Plate 2 – Site Plan.

During our investigation, we observed no indications of soil instability or erosion on the site, including on the steep slope. As noted above in this report, however, we observed water seepage on a lower and relatively flatter part of the slope beyond the southeast limit of the site.

Based on the conditions described above, the site property meets the criteria to be designated as a potential landslide hazard area because of the presence of slopes steeper than 40 percent grade and 10 feet in height, along with the mapped presence of mass wasting or landslide deposits and observed presence of water seepage on adjacent property downslope.

Evaluation of Potential Landslide Hazard Area

Based on the presence of a substantial thickness of very dense glacial till soils underlying the upper part of the site, the absence of documented landslide events on the site or adjacent property, and the results from our slope stability analysis(which included consideration of the observed water seepage beyond the site limits), it is our conclusion that the proposed residence will have minimal risk of damage due to landslides and will have minimal potential to adversely affect the stability of the site or adjacent property. This conclusion is contingent on maintaining a building setback minimum distance of 20 feet from the top of the steep slope and implementing the design, construction, and mitigation recommendations presented below in this report.

Mitigation of Project Impact to Potential Landslide Hazard Area

Mitigation of impact to the potential landslide hazard area on the site and adjoining property can be achieved via the following measures:

1) maintaining a building setback minimum distance of 20 feet from the top of the steep slope;

2) using engineered retaining walls instead of graded slopes to accommodate signifcany grade changes;

3) collecting drainage behind basement walls and other retaining walls and directing it via tightline to a temporary detention facility and then onward to an approved discharge location away from the steep slope; and

4) avoiding the placement of fills above existing grades in the eastern part of the site.

Soil Erosion Hazard Area

Identification of Soil Erosion Hazard Area

The IGS mapping of the soil erosion hazard area on and in proximity to the site is illustrated in Plate 5 –Erosion Hazard Area IGS Mapping. The surface soils on the site are mapped as Alderwood-Arents Series soils and as Kitsap Series soils in the NRCS soil survey system, and the surficial soils found during our investigation activities have properties consistent with these soil types. Areas where these soils are present on slopes steeper than 15 percent grade are designated NRCS soil survey system as severe soil erosion hazard areas. On this basis, the eastern portion of the site, beyond the proposed development area, meets the criteria for being designated an erosion hazard area.

Evaluation of Soil Erosion Hazard

In our opinion, the potential for soil erosion on the gently-sloping west and middle portions of the site under existing conditions is low because of the existing landscaped conditions and the relatively gently slopes. The potential for soil erosion on the steeper eastern part of the site currently is low because of the existing conditions on the upper part of the site. The potential for soil erosion is significantly increased, however, if concentrated surface water is allowed to flow onto steeper sloped areas, even with the existing vegetative cover in place.

Mitigation of Project Impact to Soil Erosion Hazard

It is our opinion that the recommended temporary and permanent erosion and sediment controls presented in the following mitigation, design, and construction recommendations in this report will reduce the risk of soil erosion during and following construction to minimal levels.

Seismic Hazard Area

The IGS-mapped extent of the seismic hazard area is essentially identical to that of the mapped soil erosion hazard area. In our opinion, however, the site has minimal susceptibility to soil liquefaction, amplified strong shaking, or lateral soil spreading from seismic events.

Subsurface soil conditions found in the borings from our investigation consist of dense, glacially-consolidated soils. Also, the results from our slope stability analyses, which included the consideration of stratum of saturated sandy soil where seepage was observed on the slope, indicate that the proposed residence is located beyond the extent of potential slope failure surfaces associated with a modeled earthquake seismic event. Therefore, it is our opinion that no supplemental engineering measures beyond those contained in our recommendations are needed to mitigate seismic hazard.

Sequence of Geologic Hazard Areas Mitigation Measures

We have reviewed the proposed project with respect to the mitigation sequencing approach described in MICC 19.07.110. In our opinion, the proposed project should include the following sequence of measures to mitigate the potential impact to the potential landslide hazard and soil erosion hazard areas on the site and adjacent property:

- Install temporary erosion and sediment controls prior to the start of clearing and earthwork on the site. These controls also should prevent the concentrated flow of surface water onto the steep slope area.

- Install temporary barrier fencing or other measures to keep heavy construction equipment at least 10 feet from the top of the steep slope area before the beginning of site grading.

- Cover exposed slopes and stockpiled soils with plastic sheeting when not being worked during a period of more than seven days (and at all times when not being worked during the wet weather season).

- Re-stabilize exposed ground surfaces with new vegetation or landscape improvements that inhibit erosion.

- Remove temporary erosion controls after re-stabilization of exposed soils is completed.

SITE SEISMIC DESIGN CLASSIFICATION

In our opinion, the project site can be assigned Seismic Site Class D per the International Building Code 2018 Edition (IBC 2018). Our determination is based upon the findings from our subsurface investigation activities and our knowledge and interpretation of the typical deeper subsurface soil conditions in the site vicinity.

The seismic design parameters applicable for the site based on this site class per IBC 2018 are as follows:

S_s = 1.408g	S_{ms} = 1.408g	S_{ds} = 0.939g
S_1 = 0.490g	S_{m1} = null	S_{d1} = null

The peak ground acceleration for the site, adjusted for site class effects, is = 0.663g

RECOMMENDATIONS

Earthwork

Site Clearing and Erosion Control

The area where construction work will be performed should be cleared of vegetation, topsoil, debris, and any other deleterious materials that are found. These materials should be hauled off site or used for landscaping, as appropriate; they should not be used as structural fill or retaining wall backfill for the project.

Temporary erosion and sedimentation controls (TESCs) should be installed as part of site clearing activities. TESCs for the project can include using silt fences, check dams, straw mulch, hay bales, and a stabilized construction entrance. The silt fences or other barrier controls should be placed along the cross-slope and down-slope boundaries of the disturbed areas to prevent sediment-laden runoff from being discharged off site. Surface water run-on into the construction area should be prevented by using barriers or interceptors to divert the water to other areas. Exposed soils, including stockpiled soils, should be covered with plastic sheeting when they are not being worked.

Surface runoff should not be allowed to flow over the top of slopes into excavations. During wet weather, exposed slopes should be covered with plastic sheeting to prevent erosion or softening.

Excavations and Slopes

Temporary excavation slopes should not be greater than the limits specified in local, state and federal government safety regulations, unless approved on-site by the geotechnical engineer. Temporary cuts in proximity to property lines or to structures should be sloped at inclinations no steeper than 1H:1V (Horizontal: Vertical), with the exception that temporary cuts in the very dense till-like soils can be sloped to 0.5H:1V. In other situations, we recommend that cuts which are greater than 4 feet in height should be sloped at inclinations no steeper than 1H:1V (Horizontal: Vertical), with the exception that temporary cuts in the very dense till-like soils can be sloped to 0.5H:1V. Permanent unreinforced or unsupported slopes on the site should be inclined no steeper than 2.5H:1V.

During our site exploration activities, water seepage was noted at depths of approximately 8 to 10 feet bgs in borings B-1 and B-2. Based on these findings, there is a potential for encountering water seepage in excavations made for the project. In situations where water seepage or other adverse conditions are observed, excavations may need to be sloped to shallower inclinations than those recommended above. We recommend that a representative from our firm visit the site during excavation to verify anticipated geologic conditions and to evaluate slope stability, particularly if water seepage, caving soils, fills, or other adverse conditions are encountered. If adequate space is not available to maintain open cuts per the recommendations in this report, engineered support may be required to provide lateral support to these excavations.

Subgrade Preparation

After the completion of site clearing and excavation, soils in areas to receive structural fill, concrete slabs, sidewalks, or pavements, should be prepared to a firm, unyielding condition. The prepared subgrade should be observed and approved by the geotechnical engineer. Any detected soft spots or disturbed areas should be compacted or excavated and replaced with compacted structural fill or crushed rock as directed by the geotechnical engineer.

Structural Fill

Fill material used to support foundations, floors, sidewalks, driveways, and patios, constitutes structural fill. Material used as structural fill should have the following characteristics:

- Be a predominantly granular material;
- Be free of organic material and other deleterious substances;
- Have a maximum particle size of three (3) inches in diameter.

The material should be placed at or near its optimum moisture content. The optimum moisture content is the water content in the material that enables it to be compacted to the maximum dry density for a given compaction effort. Materials which contain moisture significantly greater or lesser than the optimum content cannot be effectively compacted to an acceptable dense condition.

We anticipate that the site soils which are excavated for the project will probably not be practical to use as structural fill, due to their silty character and elevated moisture content. We recommend that the construction contractor should anticipate needing to use an imported material instead of the site soils for structural fill.

Structural fill material should be placed in horizontal lifts not exceeding 10 inches in loose thickness, and each lift should be compacted to at least 92 percent of the material maximum density, as determined by ASTM Test Designation D-1557-91 (Modified Proctor Test), with the exception that the top one foot of fill below exterior slabs and pavements should be compacted to at least 95 percent of its maximum dry density.

The geotechnical engineer should evaluate in advance the suitability of materials that are proposed for use as structural fill. During wet weather, an imported granular material containing no more than five (5) percent fines (i.e., particles passing a U.S. No. 200 mesh sieve) is recommended for use as structural fill, because it will provide uniformity in character and be relatively easy to compact to structural fill specifications. We recommend that the geotechnical engineer monitor the placement and compaction of structural fill in order to verify conformance with the above recommendations.

Wet Weather Earthwork Considerations

We recommend that the following measures be implemented in supplement to or in replacement to the standard erosion and sediment control recommendations for earthwork performed during the wet weather season.

- Cut and fill slopes exposed during construction should be covered with plastic sheeting when they are not being worked. Soil stockpiles also should be covered when not being worked.

- Structural fill should consist of free-draining material with not more than 5% of the material passing a U.S.#10 sieve.

- Earthwork should not be performed during periods of heavy precipitation, in order to minimize rutting and tracking of soils by construction equipment traffic. Equipment that has lower potential to cause rutting or other soil disturbance should be used.

- Soil subgrades in areas where footings or slabs are to be built should be protected from softening due to standing water or to disturbance if they will be left exposed for a prolonged period. Plastic sheeting can be used for untrafficked areas. A layer of clean crushed 1.25"-size gravel, can be used in areas where light construction traffic may occur.

- Erosion control measures, such as silt fences, straw bales or wattles, etc., should be arranged to control soil erosion and sediment travel as appropriate within the project limits as well as along its downslope and cross-slope perimeter.

- Temporary excavation dewatering measures, consistent with the recommendations provided in the Earthwork section of this report, should be implemented if seepage develops in excavations. The measures should be reviewed and modified as necessary to accommodate changes in the rate of seepage or degree of needed treatment prior to discharge.

- Earthwork should be performed in a sequence of limited areas, where feasible, to limit the extent of exposed soil during the project.

- We recommend that we visit the project site upon completion of the installation of the perimeter erosion controls to verify their suitability. During earthwork for construction, we recommend that we visit the site if precipitation greater than 0.5 inches in a 24-hour period occurs, in order to inspect the performance of the TESC measures and the stability of excavations. We also recommend that we visit the site during backfilling work to observe that materials are being used are appropriate for wet weather conditions and are being properly placed and compacted.

Foundations

Based on the findings from our subsurface investigation activities, it is our opinion that the new residence can be supported on conventional concrete footings which bear on competent undisturbed native soils or structural fill that is placed on competent native soils, per the recommendation provided below.

Foundation Design Parameters

Our recommended design criteria for conventional footing foundations constructed on native soils or structural fill are provided below.

- Allowable bearing pressure, including all dead and live loads:

Undisturbed, dense native soil	= 2,000 psf
Structural fill placed on dense native soil	= 2,000 psf

- Minimum depth to base of perimeter footing below adjacent exterior grade = 18 inches

- Minimum depth to bottom of interior footings below top of floor slab = 12 inches

- Minimum width of wall footings = 16 inches

- Minimum lateral dimension of column footings = 24 inches

- Estimated post-construction settlement = ½ inch

- Estimated post-construction differential settlement across building width = ½ inch

A one-third increase in the above allowable bearing pressures can be used when considering short-term transitory wind or seismic loads.

Lateral loads against the building foundations can be resisted by friction between the foundation and the supporting compacted fill subgrade or by passive earth pressure acting on the buried portions of the foundations. For the latter case, the foundations must be poured "neat" against the existing undisturbed soil or be backfilled with compacted structural fill. Our recommended parameters are as follows:

- Passive Pressure (Lateral Resistance)
  350 pcf, equivalent fluid weight, for structural fill or competent undisturbed native soil

- Coefficient of Friction (Friction Factor)
  0.35 for structural fill or competent undisturbed native soil

Use of Structural Fill below Foundations

For footings that are supported on structural fill, the bottom of the over-excavated area below the footings should extend laterally beyond the footing edges to a distance equal to the depth of the over-excavated area, so that the building loads are properly transferred to the underlying bearing soils. The geotechnical engineer should be on site during excavation work on site to verify that a competent soil subgrade is reached and to verify the placement and compaction of structural fill to reach planned footing elevations. It should be noted that the sides of the over-excavation should be sloped back to stable temporary configurations per the recommendations in this report.

Slab-on-Grade Floors

We recommend that new slab-on-grade floors be supported on compacted medium dense native soils or on structural fill that is placed on a subgrade of compacted medium dense native soils. Alternatively, the floors can be structurally supported by 1) connection to adjacent footings or grade beams and reinforcement with a grid of #4 steel rebar having 12" spacing on center. Structurally supported floors should be designed by a structural engineer.

To avoid moisture build-up on the subgrade, floor slabs should be placed on a capillary break, which is in turn placed on the prepared subgrade. The capillary break should consist of a layer, at least 6 inches thick, of free-draining crushed rock or gravel containing no fines and no more than five percent material finer than a No. 4 sieve. A vapor barrier should be placed over the capillary break to reduce upward transmission of water vapor through the slab, if such transmission is undesirable.

Conventional Concrete Basement and Retaining Walls

We recommend that the following recommendations regarding conventional concrete basement walls and retaining walls be used for design and construction of the proposed project.

Basement walls and conventional retaining walls that are 4 feet or more in height should be supported on conventional footings as discussed in the foundation recommendations presented above in this report and should be designed by a structural engineer. These walls also should be fully drained to prevent the development of hydrostatic pressure against these walls.

Conventional concrete retaining walls which are free to rotate on top (unrestrained) are considered capable of yielding and should be designed using an active earth pressure. Concrete retaining walls which are restrained horizontally at the top (such as basement walls) are considered unyielding and should be designed using an at-rest earth pressure. Our recommended soil engineering parameters for the design of fully-drained retaining walls are as follows:

<u>Active Earth Pressure</u>

- 35 pcf, equivalent fluid pressure, for level ground behind the walls;
- 50 pcf, equivalent fluid pressure, for wall backslope of 2H:1V

<u>At-Rest Earth Pressure</u>

- 45 pcf, equivalent fluid pressure, for level ground behind the walls;
- 60 pcf, equivalent fluid pressure, for wall backslope of 2H:1V

<u>Passive Earth Pressure</u>

- 350 pcf, equivalent fluid pressure, for undisturbed, medium dense native soil or structural fill, and level ground in front of the wall for a distance of two times the wall height;

<u>Base Friction</u>

- 0.35 for competent, native soil or structural fill

Surcharge loads imposed on walls due to driveways and traffic (including that during construction), upward sloping ground, or other conditions that could impose loads against the walls, should be added to the active and at-rest earth pressures stated above. Also, downward sloping ground in proximity to the walls should be evaluated, as it may have the effect of reducing the value of the allowable passive earth pressure stated above.

To prevent the buildup of hydrostatic pressure behind conventional basement or retaining walls, we recommend that a vertical drain mat, such as Miradrain 6000 or similar product, be used to facilitate drainage adjacent to the wall. The drain mat should extend from near the finished surface grade, downward to the bottom of the wall. A drainage collection pipe consisting of rigid 4"-diameter perforated PVC pipe surrounded with gravel and geotextile filter fabric (Mirafi 140NL, or equivalent) should be laid alongside the base of the wall and sloped to an acceptable tightline connection.

In addition to the drain mat, we recommend that a zone of free-draining backfill material at least 12 inches wide should be placed against the back of the wall. This backfill should extend downward to the drainage collection pipe. A layer of non-woven geotextile filter fabric should separate the free-draining backfill material from adjacent soils or fills. These recommendations are schematically illustrated in Plate 6 – Typical Retaining Wall Drainage Detail.

The top 12 inches of the fill behind the wall can consist of topsoil if desired. This material can be separated from the underlying more granular drainage material by a geotextile fabric, if desired. Alternatively, the surface can be sealed with asphalt or concrete paving. Nearby final grades should be sloped to drain away from the wall, or other measures (such as strip or ribbon drains) should be used to intercept surface water that flows over impervious surfaces toward the wall.

The backfill for conventional concrete retaining walls should be compacted to a dense condition to mitigate the potential for later ground settlement or excessive saturation. Wall backfill that also will support structures or slab should be placed and compacted as structural fill. We recommend that restrained walls not be backfilled until their restraint has been completed, unless approved by the project structural engineer. The compacting machinery that is used should be compatible with the wall's resistance capacity against the temporary loading effects produced by operation of the machinery. In this respect, the contractor should exercise care if heavy machinery such as a vibratory roller or hoe pack is used.

Surface Drainage

During construction, water should not be allowed to stand in areas where footings, slabs, or pavements are to be constructed. We recommend that ground surfaces be sealed at the end of the day by tracking over them with a piece of construction equipment or by compacting them, to reduce the potential for moisture infiltration which can degrade soil quality.

We recommend that storm water drainage from building roof areas and driveways be collected into a tightline system that conveys the water to an approved discharge location. Storm water should not be allowed to develop into concentrated flows on the ground surface, because concentrated flow can lead to soil erosion and rutting. Concentrated surface water also should not be allowed to onto the steep slope area on site and should not be directed onto adjacent properties. Final site grades should direct surface water away from buildings.

Subsurface Drainage

We recommend footing drains should be installed alongside new perimeter foundations and basement walls. The drains should consist of a 4-inch minimum diameter, perforated, rigid PVC drain pipe laid at the bottom of the footing or wall with the perforations facing downward. The drain line should be bedded on, surrounded by, and covered with a washed rock or gravel. The drain rock and pipe also should be wrapped with a layer of durable non-woven geotextile fabric. These recommendations are schematically illustrated in Plate 7 – Typical Footing Drain Detail.

The footing drain lines should be sloped at sufficient gradient to generate flow and should be tight-lined to an appropriate stormwater discharge location or collection sump system. The subsurface drainage lines should not be connected to roof downspout or other surface drainage lines.

LIMITATIONS

This report has been prepared for the specific application to this site for the exclusive use of Mr. Ananta Gudipaty and his authorized assignees or agents. Any other use of this report is solely at the user's own risk. We recommend that this report be included in its entirety in the project contract documents for reference during construction.

Our findings and recommendations stated herein are based on field observations, our experience with similar projects, and our professional judgment. The recommendations presented in this letter are our professional opinion derived in a manner consistent with the level of care and skill ordinarily exercised by other members of the profession currently practicing under similar conditions in this area and within the project schedule and budget constraints. No warranty is expressed or implied. If site conditions are found to differ from those described in this report, we should be notified so that the relevant recommendations in this report can be re-evaluated and modified if appropriate.

CLOSING

We appreciate this opportunity to provide you with geotechnical engineering services. Please feel free to contact us if you have any questions regarding this report or desire additional services.

Sincerely,

GEO Group Northwest, Inc.

4/18/2023 4/18/2023

Keith Johnson
Project Geologist

William Chang, PE
Principal Engineer

Plates and Attachments:

- Plate 1 – Site Location Map
- Plate 2 – Site Plan
- Plate 3 – Potential Landslide Hazard Area IGS Mapping
- Plate 4 – Site Profile
- Plate 5 – Erosion Hazard Area IGS Mapping
- Plate 6 – Typical Retaining Wall Drainage Detail
- Plate 7 – Typical Footing Drain Detail

- Attachment A – Boring Logs
- Attachment B – Slope Stability Analysis Results

Source: King County GIS, 2021.

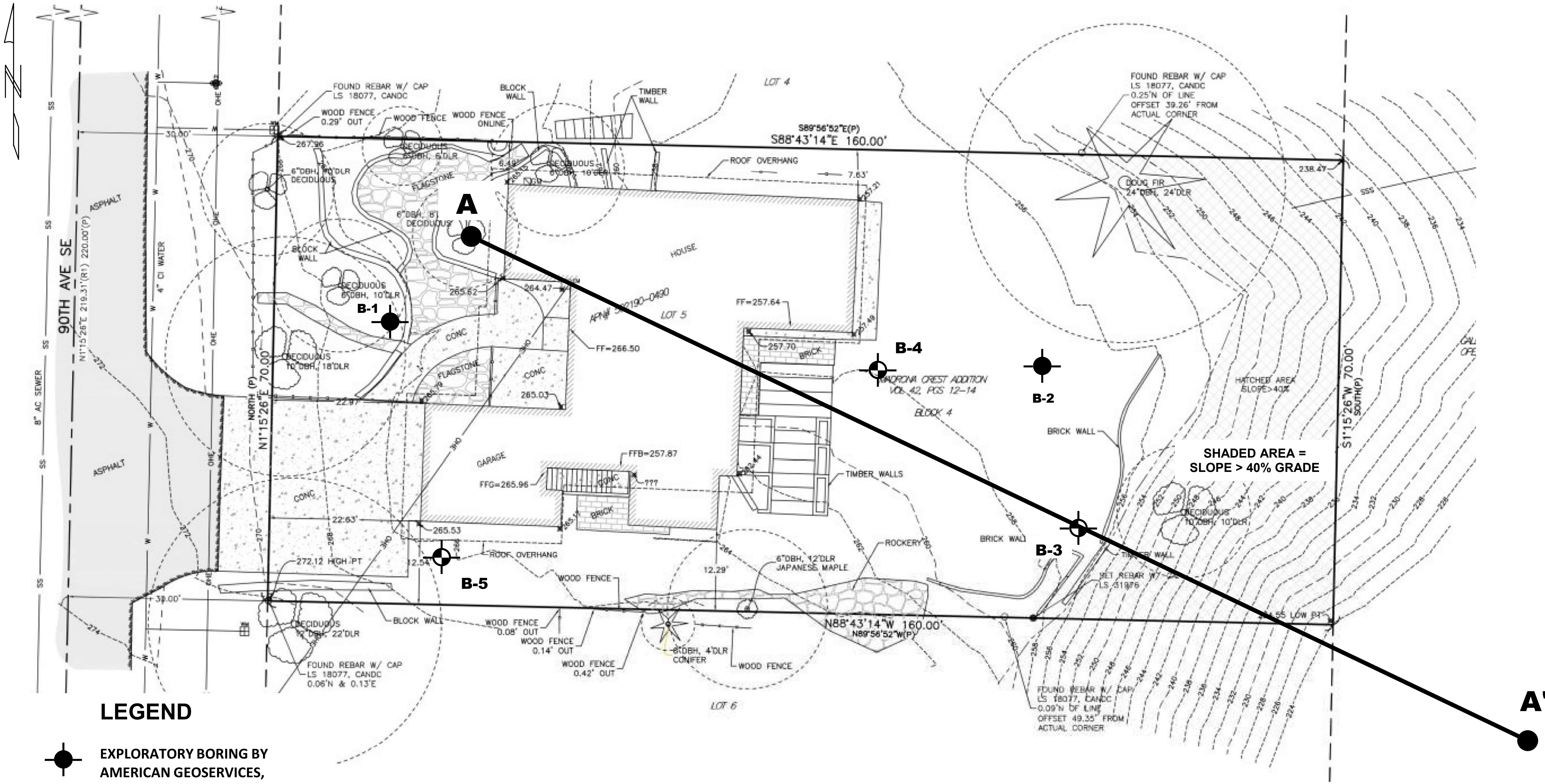
GEO Group Northwest, Inc.

Geotechnical Engineers, Geologists, & Environmental Scientists

SITE LOCATION MAP

PROPOSED RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

SCALE:	1" = 2000'	**DATE:**	4/18/2023	**MADE:**	KJ	**CHKD:**	WC	**JOB NO:**	G-5861	**PLATE**	1



LEGEND

EXPLORATORY BORING BY AMERICAN GEOSERVICES, (APPROXIMATE) — B-1

EXPLORATORY BORING BY AMERICAN GEOSERVICES, (APPROXIMATE) — B-3

A — A'

0 15 30

SCALE: 1 INCH = 15 FEET

Source: Topographic Survey for Elizabeth Tubbs, by Plog Engineering, Inc., dated 12/25/2021.

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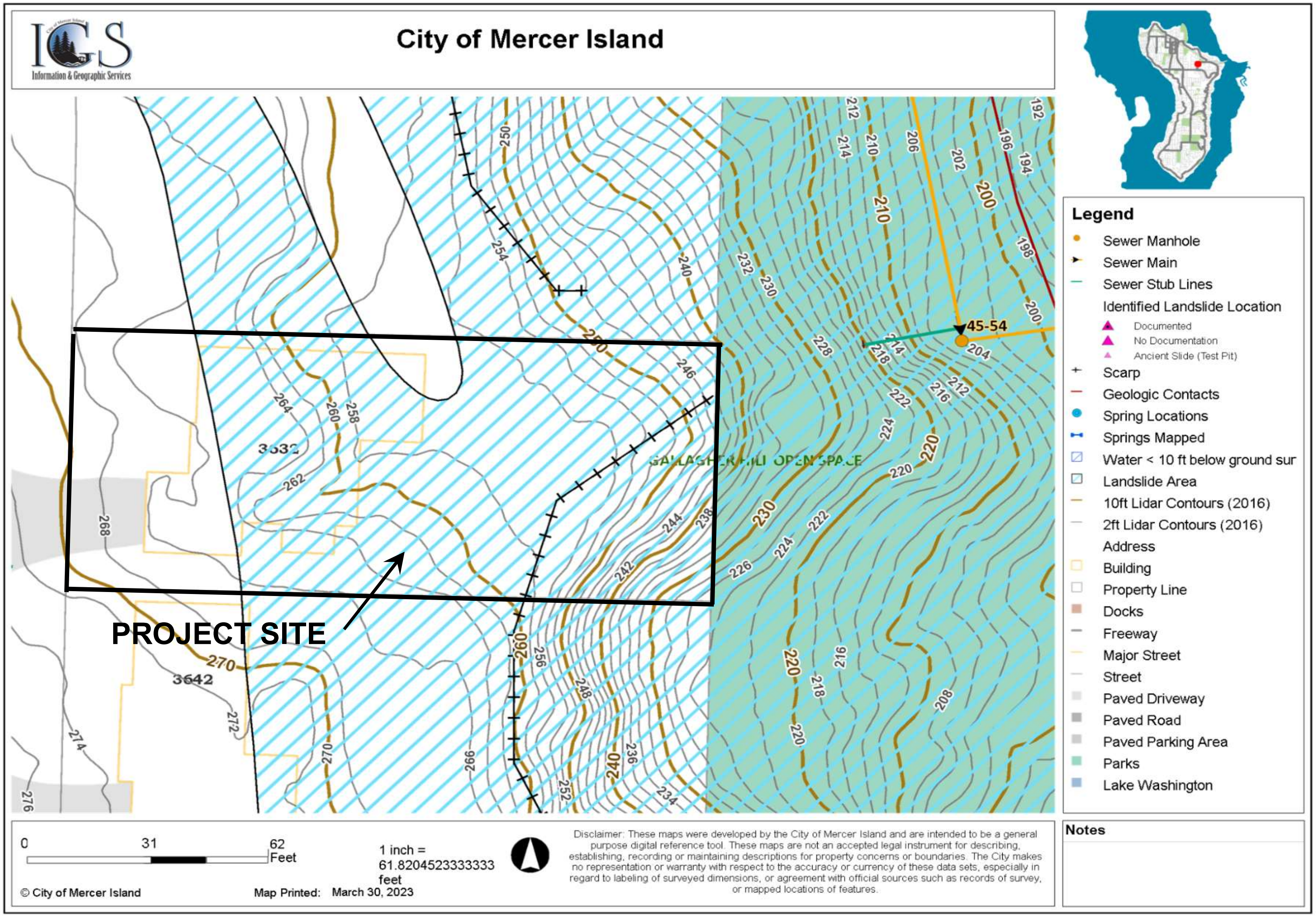
SITE PLAN

PROPOSED RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

SCALE	1" = 15'	DRAWN BY	KJ	CHECKED BY	WC	DATE	4/18/2023	PROJECT NO.	G-5861	PLATE	2



Source: City of Mercer Island IGS, retrieved March 2023.

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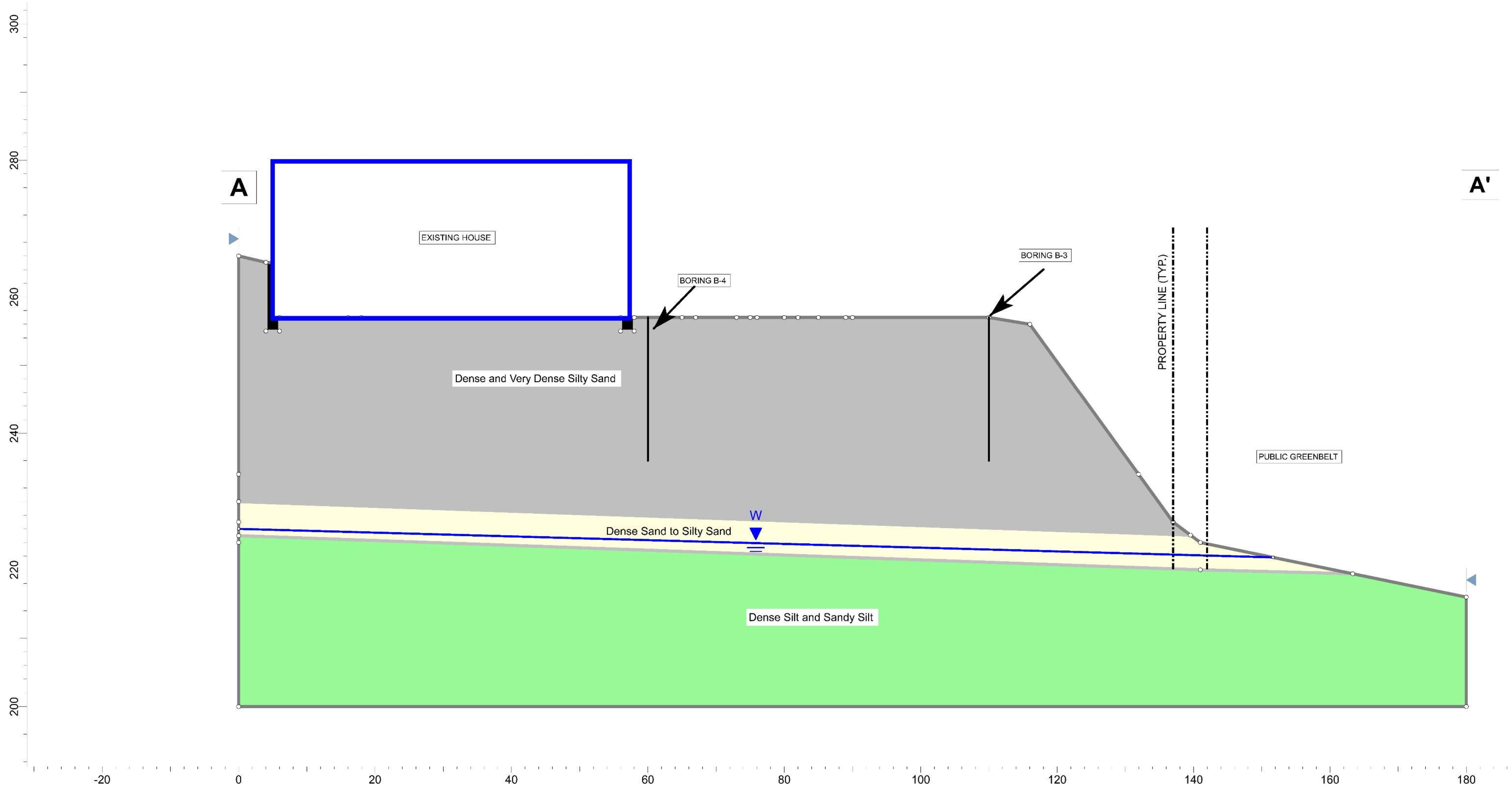
LANDSLIDE HAZARD AREA IGS MAPPING

PROPOSED RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

SCALE:	As Shown	DRAWN:	KJ	CHECKED:	WC	DATE:	4/18/2023	PROJECT NO.:	G-5861	PLATE	3



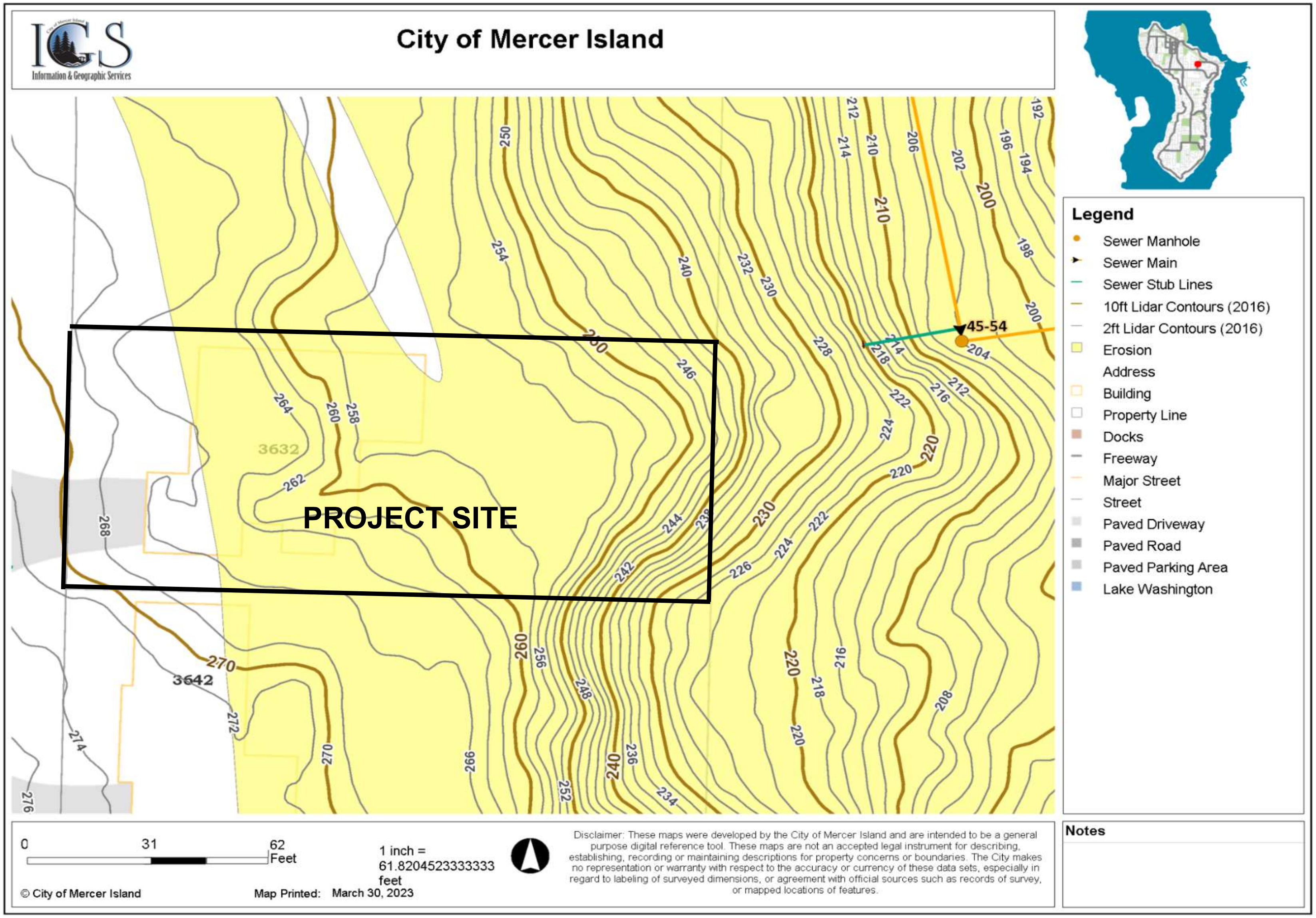
Group Northwest, Inc.

Geotechnical Engineers, Geologists, & Environmental Scientists

SITE PROFILE A - A'

PROPOSED RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

SCALE	1" = 15'	**DRAWN BY**	KJ	**CHECKED BY**	WC	**DATE**	4/18/2023	**PROJECT NO.**	G-5861	**PLATE**	4



Source: City of Mercer Island IGS, retrieved March 2023.

GEO Group Northwest, Inc.

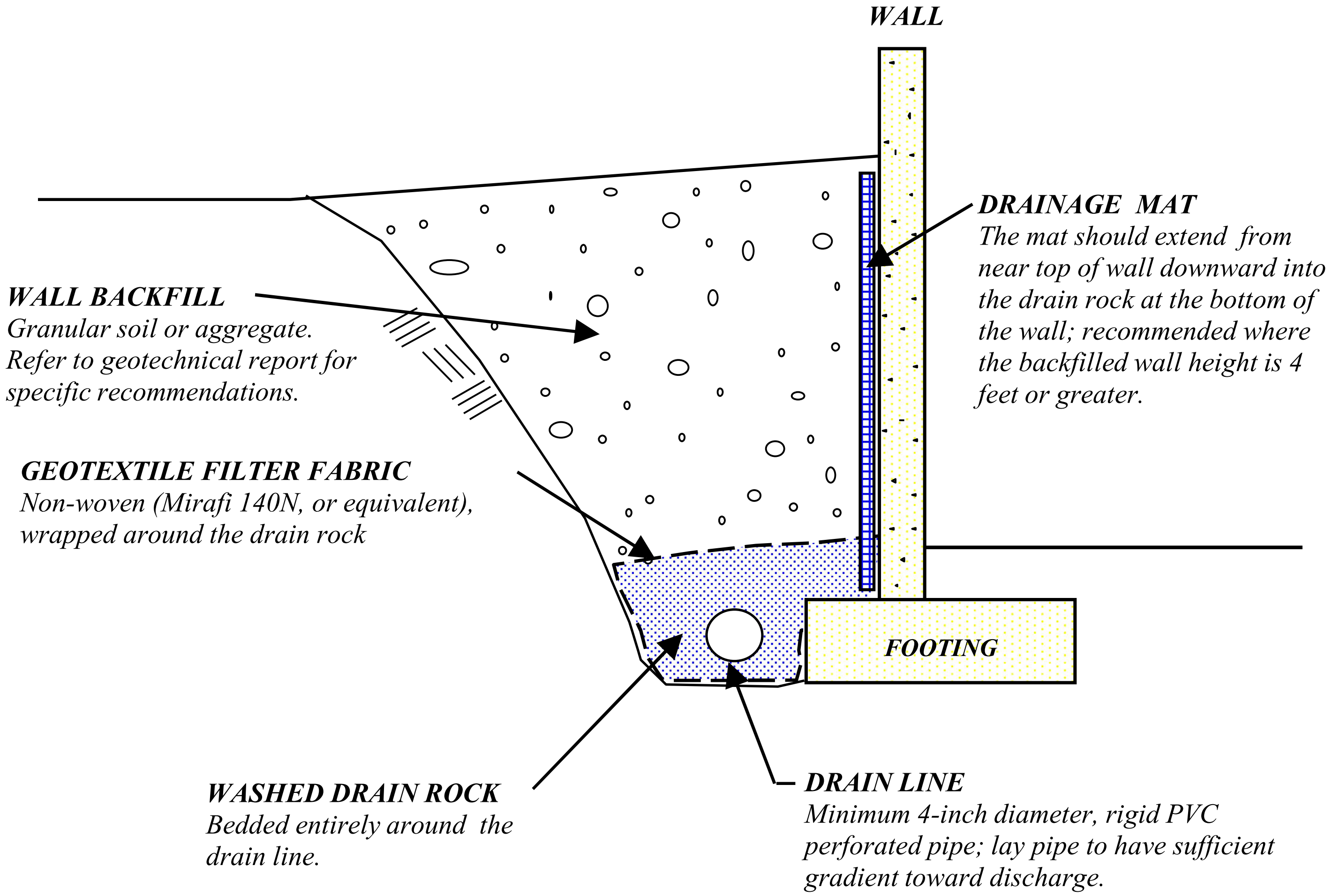
Geotechnical Engineers, Geologists, & Environmental Scientists

EROSION HAZARD AREA IGS MAPPING

PROPOSED RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

SCALE:	As Shown	DRAWN:	KJ	CHECKED:	WC	DATE:	4/18/2023	PROJECT NO.:	G-5861	PLATE	5

TYPICAL RETAINING WALL DRAINAGE DETAIL



NOT TO SCALE

NOTES:

1.) Do not substitute rigid PVC pipe with flexible corrugated pipe.

2.) Perforated PVC pipe should be tight jointed and laid with perforations oriented downward. The pipe should be gently sloped to provide flow toward the tightline or discharge location.

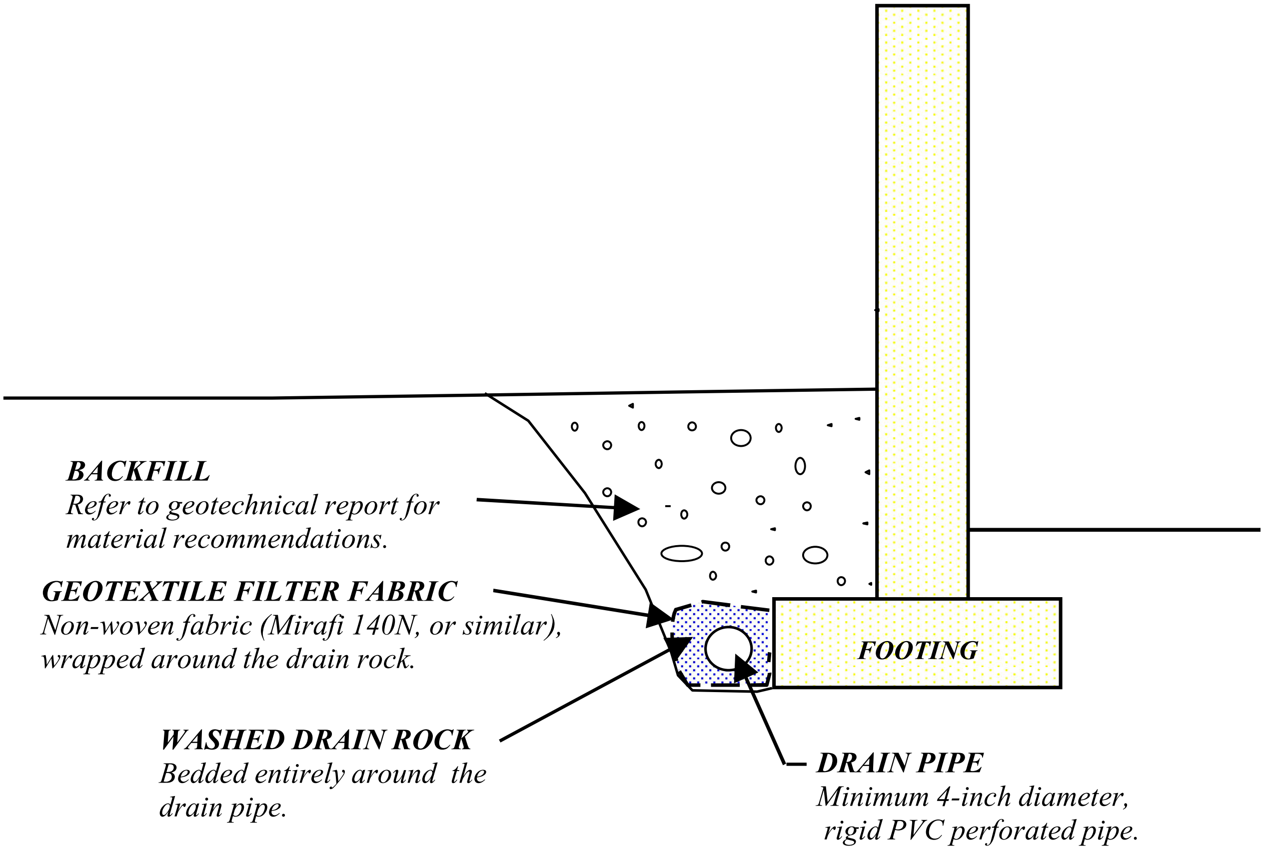
3.) Do not connect other drainage lines into the wall drainage system.

4.) Backfill should meet structural fill specifications if it will support driveways, sidewalks, patios, or other structures. Refer to the geotechnical engineering report for structural fill recommendations.

GEO Group Northwest, Inc. Geotechnical Engineers, Geologists, & Environmental Scientists	TYPICAL RETAINING WALL DRAINAGE DETAIL PROPOSED RESIDENCE 3626 - 90TH AVENUE SE MERCER ISLAND, WASHINGTON

SCALE NONE	**DATE** 4/18/2023	**MADE** KJ	**CHKD** WC	**JOB NO.** G-5861	**PLATE** 6

TYPICAL FOOTING DRAIN DETAIL



NOT TO SCALE

NOTES:

1.) Do not substitute rigid PVC pipe with flexible corrugated pipe.

2.) Perforated PVC pipe should be tight jointed and laid with perforations oriented downward. The pipe should be gently sloped to provide flow toward the tightline or discharge location.

3.) Do not connect other drainage lines into the footing drainage system.

4.) Backfill should meet structural fill specifications if it will support driveways, sidewalks, patios, or other structures. Refer to the geotechnical engineering report for structural fill recommendations.

GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists, & Environmental Scientists

TYPICAL FOOTING DRAIN DETAIL

PROPOSED RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

SCALE	DATE	MADE	CHKD	JOB NO.	PLATE
NONE	4/18/2023	KJ	WC	G-5861	7

ATTACHMENT A

G-5861

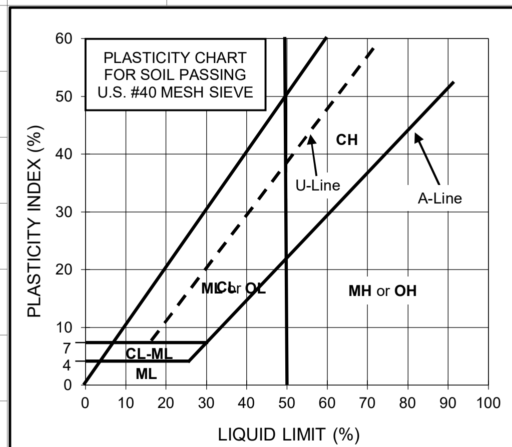
BORING LOGS

GEO Group Northwest, Inc.

SOIL CLASSIFICATION & PENETRATION TEST DATA EXPLANATION

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
COARSE-GRAINED SOILS More Than Half by Weight Larger Than No. 200 Sieve	**GRAVELS** (More Than Half Coarse Fraction is Larger Than No. 4 Sieve)	**CLEAN GRAVELS** (little or no fines)	**GW**	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURE, LITTLE OR NO FINES	CONTENT OF FINES BELOW 5%	Cu = (D60 / D10) greater than 4 $Cc = (D30)^2 / (D10 * D60)$ between 1 and 3
			GP	POORLY GRADED GRAVELS, AND GRAVEL-SAND MIXTURES LITTLE OR NO FINES		CLEAN GRAVELS NOT MEETING ABOVE REQUIREMENTS
		DIRTY GRAVELS (with some fines)	**GM**	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12%	GM: ATTERBERG LIMITS BELOW "A" LINE. or P.I. LESS THAN 4
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES		GC: ATTERBERG LIMITS ABOVE "A" LINE. or P.I. MORE THAN 7
	SANDS (More Than Half Coarse Fraction is Smaller Than No. 4 Sieve)	**CLEAN SANDS** (little or no fines)	**SW**	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	CONTENT OF FINES BELOW 5%	Cu = (D60 / D10) greater than 6 $Cc = (D30)^2 / (D10 * D60)$ between 1 and 3
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES		CLEAN SANDS NOT MEETING ABOVE REQUIREMENTS
		DIRTY SANDS (with some fines)	**SM**	SILTY SANDS, SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12%	ATTERBERG LIMITS BELOW "A" LINE with P.I. LESS THAN 4
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE "A" LINE with P.I. MORE THAN 7
FINE-GRAINED SOILS Less Than Half by Weight Larger Than No. 200 Sieve	**SILTS** (Below A-Line on Plasticity Chart, Negligible Organics)	Liquid Limit < 50%	**ML**	INORGANIC SILTS, ROCK FLOUR, SANDY SILTS OF SLIGHT PLASTICITY		
		Liquid Limit > 50%	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOIL		
	CLAYS (Above A-Line on Plasticity Chart, Negligible Organics)	Liquid Limit < 50%	**CL**	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS		
		Liquid Limit > 50%	**CH**	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
	ORGANIC SILTS & CLAYS (Below A-Line on Plasticity Chart)	Liquid Limit < 50%	**OL**	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
		Liquid Limit > 50%	**OH**	ORGANIC CLAYS OF HIGH PLASTICITY		
HIGHLY ORGANIC SOILS			**Pt**	PEAT AND OTHER HIGHLY ORGANIC SOILS		



SOIL PARTICLE SIZE

FRACTION	U.S. STANDARD SIEVE			
	Passing		Retained	
	Sieve	Size (mm)	Sieve	Size (mm)
SILT / CLAY	#200	0.075		
SAND				
FINE	#40	0.425	#200	0.075
MEDIUM	#10	2.00	#40	0.425
COARSE	#4	4.75	#10	2.00
GRAVEL				
FINE	0.75"	19	#4	4.75
COARSE	3"	76	0.75"	19
COBBLES	76 mm to 203 mm			
BOULDERS	> 203 mm			
ROCK FRAGMENTS	> 76 mm			
ROCK	>0.76 cubic meter in volume			

GENERAL GUIDANCE FOR ENGINEERING PROPERTIES OF SOILS, BASED ON STANDARD PENETRATION TEST (SPT) DATA

SANDY SOILS				SILTY & CLAYEY SOILS		
Blow Counts N	Relative Density, %	Friction Angle φ, degrees	Description	Blow Counts N	Unconfined Strength q_u, tsf	Description
0 - 4	0 -15		Very Loose	< 2	< 0.25	Very soft
4 - 10	15 - 35	26 - 30	Loose	2 - 4	0.25 - 0.50	Soft
10 - 30	35 - 65	28 - 35	Medium Dense	4 - 8	0.50 - 1.00	Medium Stiff
30 - 50	65 - 85	35 - 42	Dense	8 - 15	1.00 - 2.00	Stiff
> 50	85 - 100	38 - 46	Very Dense	15 - 30	2.00 - 4.00	Very Stiff
				> 30	> 4.00	Hard

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Phone: (425) 649-8757 E-mail: info@geogroupnw.com

PLATE A1

B1

Project Number	0531-WA21	Drill Rig: Soil Auger and Williamson Drive Probe (WDP)	
Geologist/Engineer	SMA	Ground Elevation	See Figures
Date Drilled	01-22-2022	Total Depth of Borehole	5.5 Feet
Borehole Diameter	1 OD Inches	Depth to Water	Not encountered

Graphic Log		Description / Lithology	Depth (feet)	Sample	SPT Blows*	Recovery (%)	Moisture (%)	DD (pcf)	LL (%), PL (%)	Swell (%)	Completion
	OL	Surface topsoil 6.0"									
	SM/ ML	SILTY SAND to SANDY SILT, fine grained, very loose to medium dense or soft to medium stiff, moist to very moist			2-2-2						
	SM/ GM	SILTY SAND with some GRAVEL, gray-brown, medium dense to dense, moist (Vashon Till)	2.5		50+						
		End of Borehole at 5.5 feet due to hard drilling/augering on gravel. Perched groundwater was NOT noted during exploration. Stable groundwater table was not encountered during or at the completion of drilling. At completion, borehole was backfilled with soil cuttings.	5.0								
			7.5								
			10.0								

B2

Project Number	0531-WA21	Drill Rig: Soil Auger and Williamson Drive Probe (WDP)	
Geologist/Engineer	SMA	Ground Elevation	See Figures
Date Drilled	01-22-2022	Total Depth of Borehole	10 Feet
Borehole Diameter	1 OD Inches	Depth to Water	Not encountered

Graphic Log		Description / Lithology	Depth (feet)	Sample	SPT Blows*	Recovery (%)	Moisture (%)	DD (pcf)	LL (%), PL (%)	Swell (%)	Completion
	ML/ SM	SILTY SAND to SANDY SILT, fine grained, loose to medium dense or medium stiff	2.5	X	2-3-4						
	SM/ ML	SILTY SAND to SANDY SILT, fine grained, medium stiff to stiff	5.0	X	4-5-46						
			7.5	X	11-12-20						
	SW/ GM	SILTY SAND with some GRAVEL, gray-brown, medium dense to dense, moist (Vashon Till)	10.0	X	50+						
		End of Borehole at 10.0 feet due to hard drilling/augering on gravel. Perched groundwater was noted at 3 feet during exploration. Stable groundwater table was not encountered during or at the completion of drilling. At completion, borehole was backfilled with soil cuttings.									

AMERICAN GEOSERVICES
888.276.4027 - americangeoservices.com

BORING NO. B - 3

Logged By: KJ Date Drilled: 3/20/2023 Surface Elev. 258'

Drilled By: GDP

Depth ft.	Elevation	USCS Code	Description	Sample Loc.	Sample No.	SPT Blow Counts	Water Content %	Other Tests/ Comments
		SM	Grass lawn surface. Brown SILTY SAND, very moist, loose, very silty, some oxide stain and mottling.				21.9	
		SM	Olive gray SILTY SAND, dense, moist, sand is fine to medium grained, 25% fines, trace gravel, some oxide staining at top of sample.	I		12,20,26 (N=46)	13.1	
5		SM	As above, 20% fines, no gravel, no oxide stain.	I		13,18,26 (N=44)	12.6	
		SM	Brownish gray SILTY SAND, moist, very dense, 20% fines, 5% gravel.	I		39,50/6" (N=50+)	9.3	
10		SM	As above, but no gravel, occasional SP-SM lenses,	I		20,40, 50/5" (N=50+)	12.1	
		SM	As above, but with 5% gravel, with some grayish brown and dark grayish brown zones.	I		50/6" (N=50+)	11.4	
15		SM	Gray and grayish brown SILTY SAND, moist, sand is mostly fine and medium grained, 10% gravel, 20% fines, minor oxide staining, occasional SP-SM lenses.	I		33,50/5" (N=50+)	10.7	
20		SM	Gray SILTY SAND, moist, very dense, sand is fine to medium grained, 20-25% fines, no gravel, no oxide stain.	I		50/6" (N=50+)	9.1	
			Depth of boring: 20.5 feet. Drilliing refusal attained. Drilling Method: Hollow-stem auger. Sampling Method: 2"-O.D. standard penetration test sampler driven with 140 lb. hammer and cathead. Groundwater not encountered during drilling.					
25								

LEGEND: I 2" O.D. SPT Sampler; II 2.5" O.D. California Sampler; ▽ Water Level noted during drilling; ▼ Water Level measured at later time, as noted

GEO Group Northwest, Inc.

Geotechnical Engineers, Geologists, & Environmental Scientists

BORING LOG

GUDIPATY RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

JOB NO. G-5861 **DATE** 4/18/2023 **PLATE** A2

BORING NO. B - 4

Logged By: KJ
Drilled By: GDP
Date Drilled: 3/20/2023
Surface Elev. 258'

Depth ft.	Elevation	USCS Code	Description	Sample Loc.	Sample No.	SPT Blow Counts	Water Content %	Other Tests/ Comments
0		ML	Grass lawn surface. Brown SILT, very moist, soft, some oxide stain mottling.					
3.5		SM	Olive gray SILTY SAND, moist, dense to very dense, sand is mostly fine to medium grained, 25-30% fines, 5% gravel, slight oxide staininig.	SPT		12,22,36 (N=58)	13.5	
5		SM	SILTY SAND, as above, with trace coarse sand and trace gravel, 15-20% fines.	SPT		12,25,30 (N=55)	12.7	
7.5		SM	Grayish brown SILTY SAND, moist, very dense, with lighter clean sand lenses, typ. 15-20% fines, 5% gravel, no staining.	SPT		40,50/4" (N=50+)	17.0	
10		SM	As above.	SPT		22,50/5" (N=50+)	12.8	
15		SM	Light gray SILTY SAND, damp to moist, 15-20% fines, 10% gravel.	SPT		35,50/5" (N=50+)	10.6	

Depth of boring: 16 feet.
Drilling Method: Hollow-stem auger.
Sampling Method: 2"-O.D. standard penetration test sampler driven with 140 lb. hammer and cathead.
Groundwater not encountered during drilling.

LEGEND:
- 2" O.D. SPT Sampler
- 2.5" O.D. California Sampler
- ▽ Water Level noted during drilling
- ▼ Water Level measured at later time, as noted

GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists, & Environmental Scientists

BORING LOG

GUDIPATY RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

JOB NO. G-5861 **DATE** 4/18/2023 **PLATE** A3

BORING NO. B - 5

Logged By: KJ
Drilled By: GDP
Date Drilled: 3/20/2023
Surface Elev. 266'

Depth ft.	Elevation	USCS Code	Description	Sample Loc.	Sample No.	SPT Blow Counts	Water Content %	Other Tests/ Comments
		SM	Grass lawn surface.					
		SM	Brown SILTY SAND, very moist, medium dense, sand is mostly fine and medium grained, 25-30% fines, mottled with oxide stain and organics, occasional gravelly zones.	I		5,9,7 (N=16)	18.0	
5				I		7,17,21 (N=38)	17.2	
		SM	Olive gray SILTY SAND, moist, dense, sand is mostly fine grained, 25-30% fines, no gravel, no oxide stain.					
		SM	Olive to olive gray SILTY SAND, moist, very dense, sand is fine grained, 20-25% fines, occas. fine SP-SM lenses, no gravel, no staining.	I		17,35, 50/5" (N=50+)	13.9	
10		SM	As above, with occas. very silty zones.	I		25,50/5" (N=50+)	14.6	
			Depth of boring: 11 feet. Drilling Method: Hollow-stem auger. Sampling Method: 2"-O.D. standard penetration test sampler driven with 140 lb. hammer and cathead. Groundwater not encountered during drilling.					
15								
20								
25								

LEGEND:
- I — 2" O.D. SPT Sampler
- II — 2.5" O.D. California Sampler
- ▽ Water Level noted during drilling
- ▼ Water Level measured at later time, as noted

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Geotechnical Engineers, Geologists, & Environmental Scientists

BORING LOG

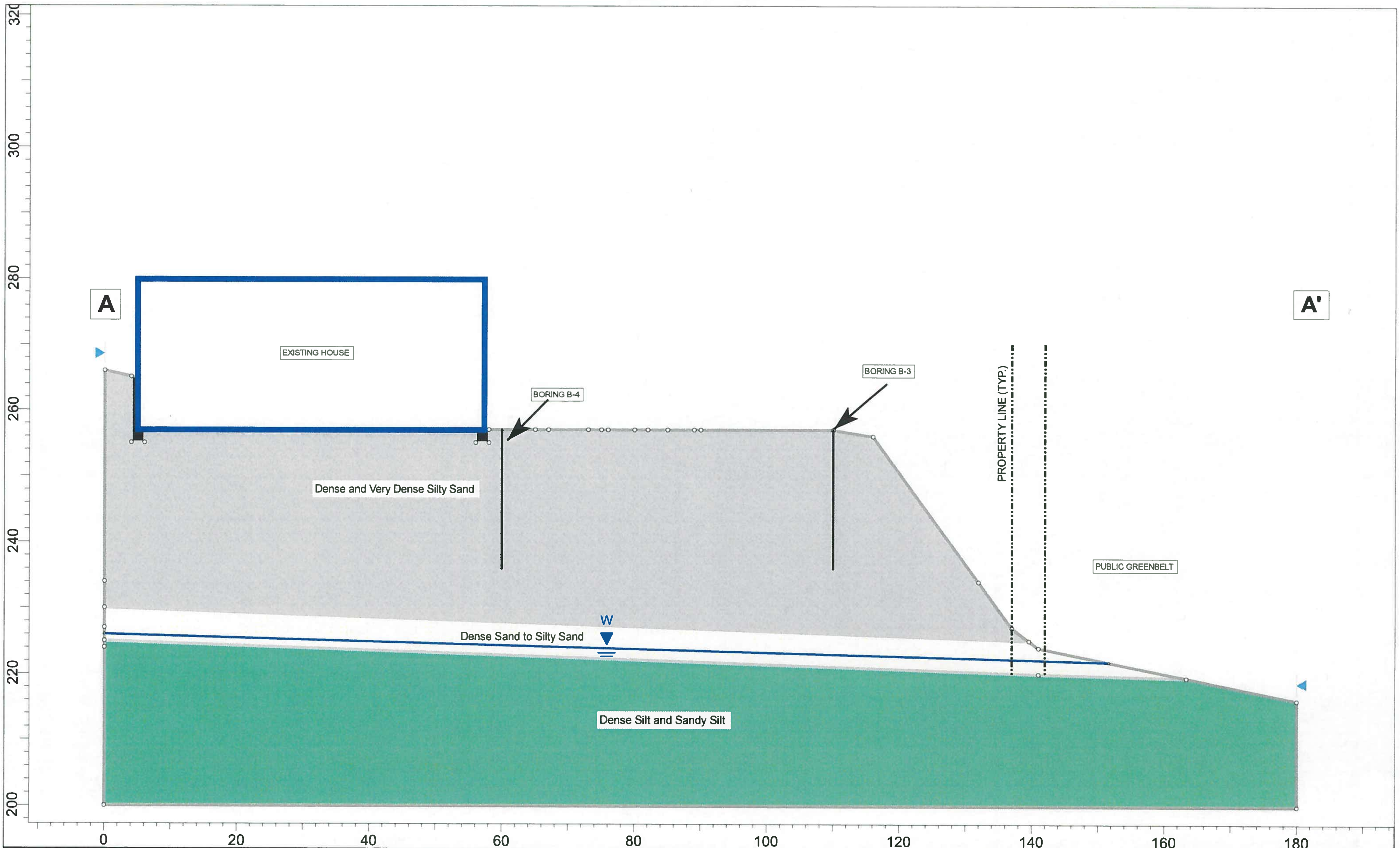
GUDIPATY RESIDENCE
3626 - 90TH AVENUE SE
MERCER ISLAND, WASHINGTON

JOB NO. G-5861 **DATE** 4/18/2023 **PLATE** A4

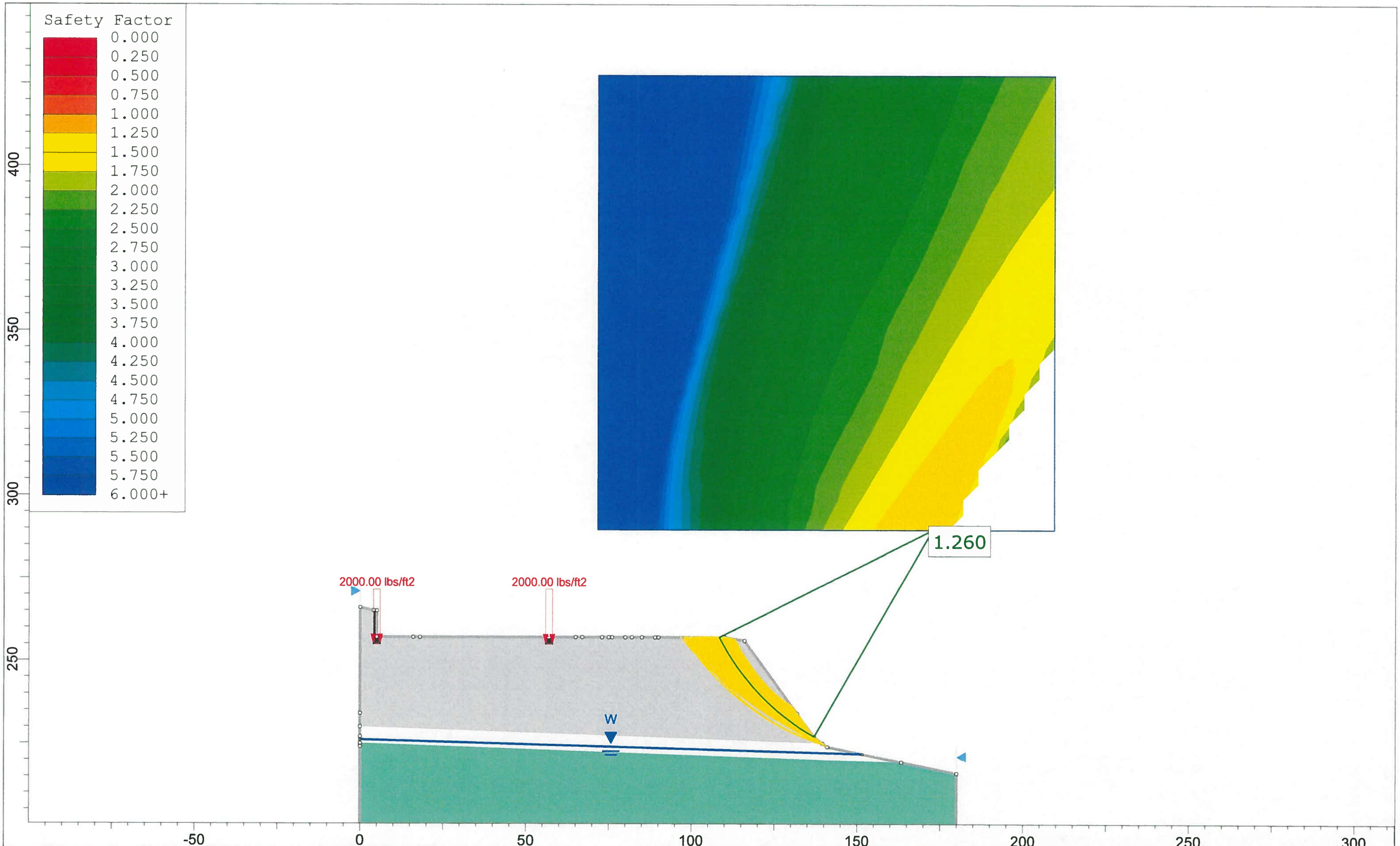
ATTACHMENT B

G-5861

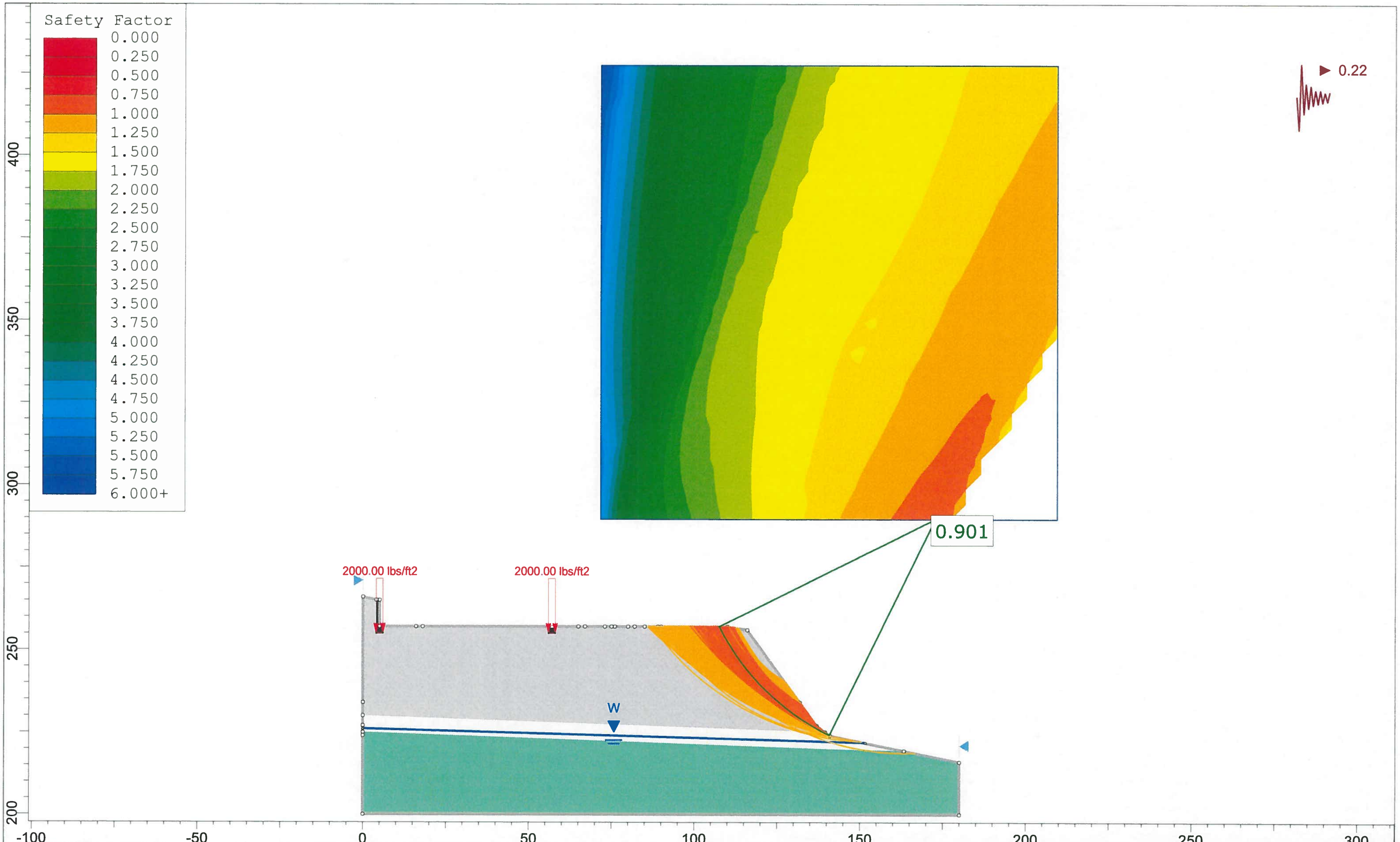
SLOPE STABILITY ANALYSIS RESULTS



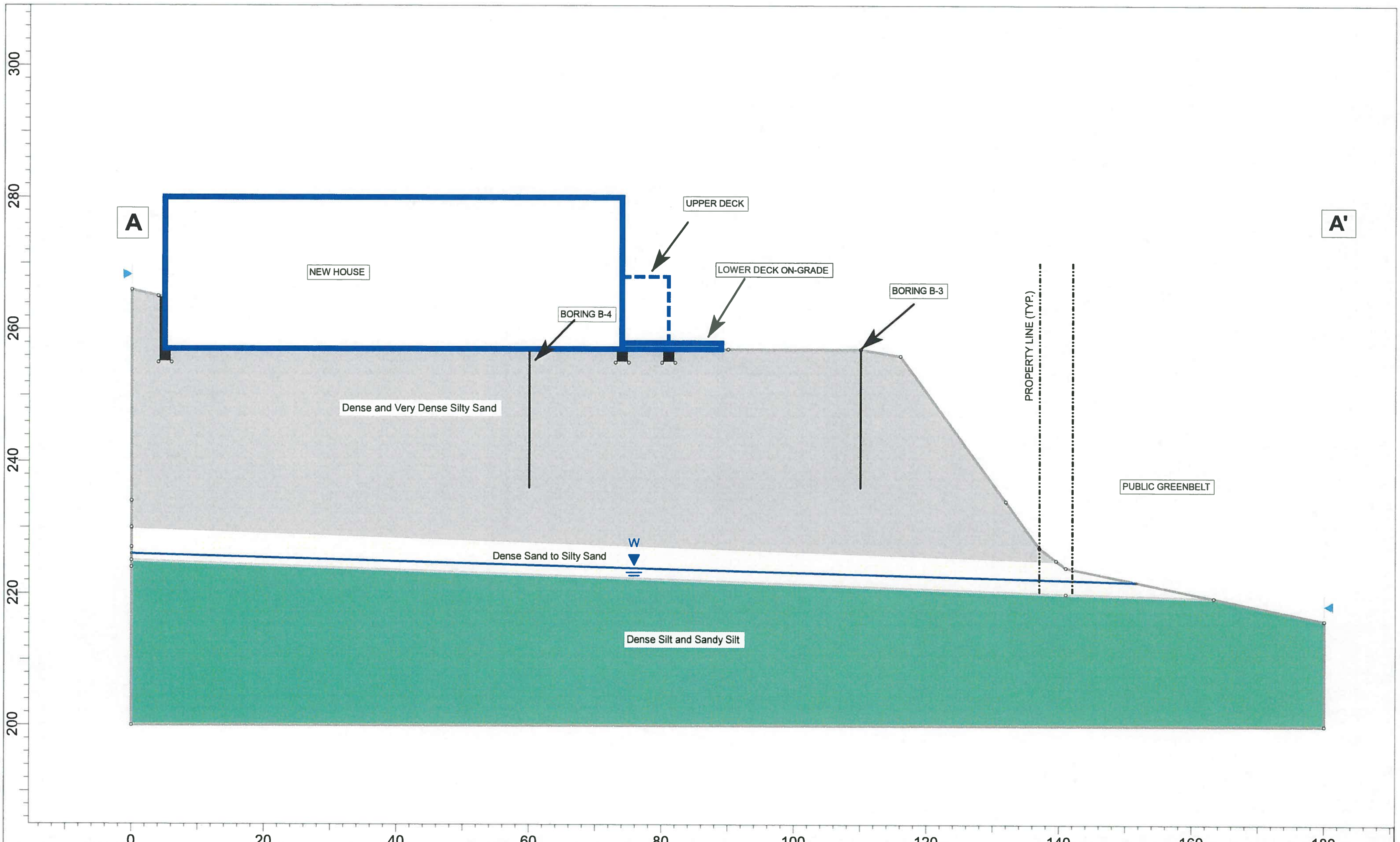
Project	Proposed Residence 3632 90th Ave E Mercer Island WA		
Analysis Description	Profile A A' Existing		
Drawn By		*Scale* 1:240	*Company*
Date			*File Name* Gud 2 existing profile A3.slim



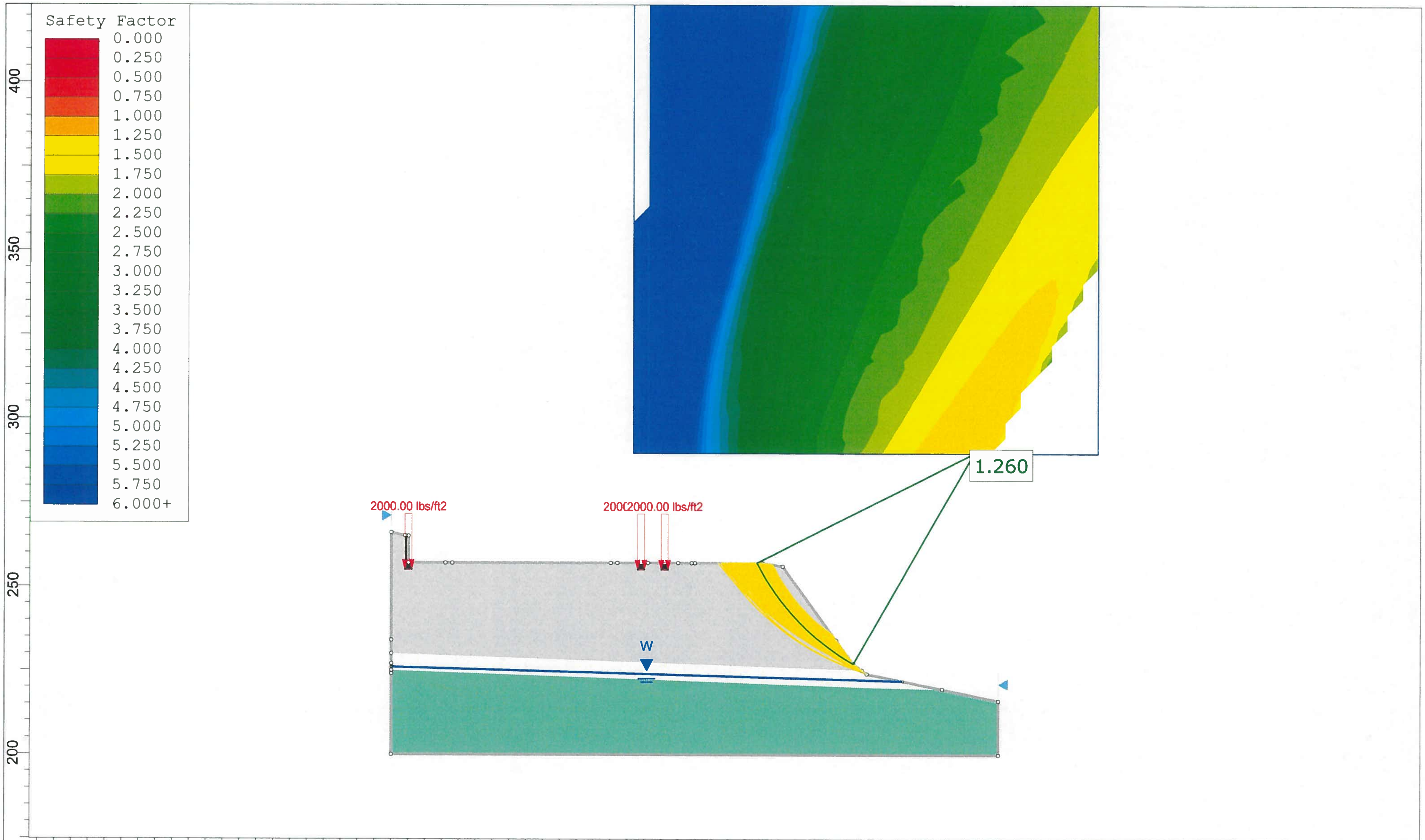
rocscience	*Project* Proposed Residence 3632 90th Ave E Mercer Island WA	
	Analysis Description Profile A A' Existing Condition	
	Drawn By	*Scale* 1:480 | *Company*
SLIDEINTERPRET 7.038	*Date*	*File Name* Gud 2 existing profile A3 static analysis.slim



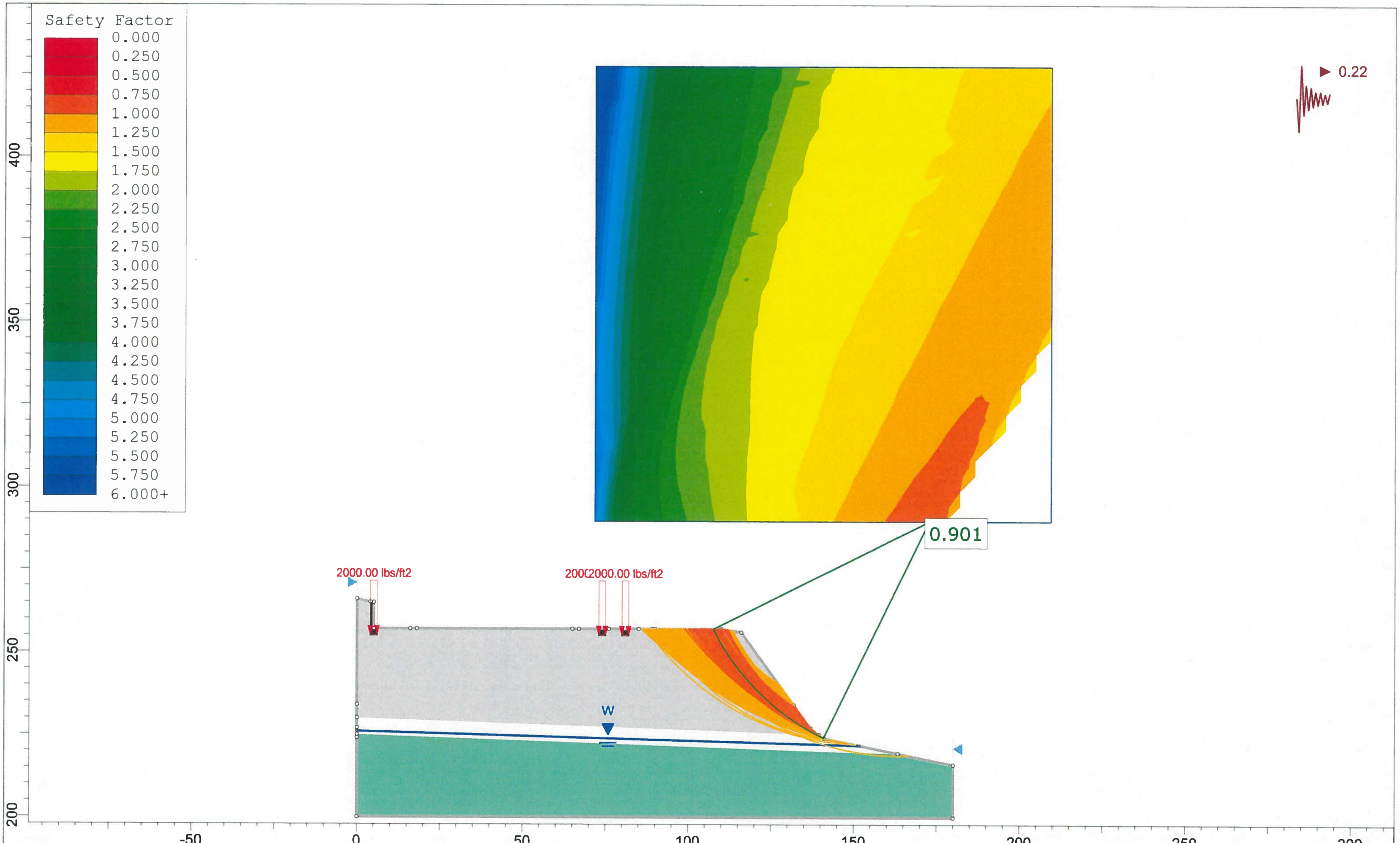
rocscience	Project	Proposed Residence 3632 90th Ave E Mercer Island WA	
	Analysis Description	Profile A A' Existing Condition	
	Drawn By	Scale 1:480	Company
SLIDEINTERPRET 7.038	Date		File Name Gud 2 existing profile A3 seismic analysis.slim



Project	Proposed Residence 3632 90th Ave E Mercer Island WA		
Analysis Description	Profile A A' Post-Construction		
Drawn By	*Scale* 1:240	*Company*	
Date		*File Name*	Gud 2 proposed profile A3.slim



rocscience	Project	Proposed Residence 3632 90th Ave E Mercer Island WA	
	Analysis Description	Profile A - A' Post-Construction	
	Drawn By	Scale 1:480	Company
SLIDEINTERPRET 7.038	Date		File Name Gud 2 proposed profile A3 static analysis.slim



rocscience	Project	Proposed Residence 3632 90th Ave E Mercer Island WA	
	Analysis Description	Profile A - A' Post-Construction	
	Drawn By	Scale 1:480	Company
SLIDEINTERPRET 7.038	Date		File Name Gud 2 proposed profile A3 seismic analysis.slim