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GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED MCDONALD'S RESTAURANT (SITE ID 461180)
2902 EAST PIONEER
PUYALLUP, WASHINGTON

PROJECT NO.062-24019
NOVEMBER 06, 2024

Prepared for:

MCDONALD'S USA, LLC
ATTN: MS. SANDRA LONGHOFER
110 N CARPENTER STREET
CHICAGO, IL 60607

Prepared by:

KRAZAN & ASSOCIATES, INC.
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November 6, 2024 KA Project No. 062-24019

McDonald's USA, LLC
110 N Carpenter Street
Chicago, IL 60607

Attn: Mrs. Sandra Longhofer
External Development Coordinator, USRD Real Estate COE
Email: Sandra.longhofer@us.mcd.com
Tel: (281)-731-2948

RE: Proposal for Limited Geotechnical Engineering Investigation
Proposed McDonald's Restaurant (Site ID 461180)
2902 E Pioneer
Puyallup, WA

Dear Ms. Longhofer,

In accordance with your request, we have completed a Limited Geotechnical Engineering Investigation for the referenced site. The results of our investigation are presented in the attached report.

If you have any questions, or if we can be of further assistance, please do not hesitate to contact our office.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

Vijay Chaudhary, P.E.
Project Engineer

KW:VC

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GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
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November 6, 2024 KA Project No. 062-24019

LIMITED GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED MCDONALD'S RESTAURANT (SITE ID 461180)
2902 EAST PIONEER
PUYALLUP, WASHINGTON

INTRODUCTION.

This report presents the results of our Limited Geotechnical Engineering Investigation for the proposed McDonald's Restaurant (Site ID 461180) project located at 2902 East Pioneer in Puyallup, Washington as shown on the Vicinity Map in Figure 1. Discussions regarding site conditions and geological hazards are presented in this report, together with conclusions and recommendations pertaining to site preparation, excavation, foundations, structural fill, utility trench backfill, concrete slabs and exterior flatwork, drainage, erosion control, and pavements.

A site plan showing the approximate locations of the borings is presented following the text of this report in Figure 2. A description of the field investigation and laboratory testing, as well as the boring logs, is presented in Appendix A. Appendix B contains a guide to aid in the development of earthwork specifications. Pavement design guidelines are presented in Appendix C. The recommendations in the main text of the report have precedence over the more general specifications in the appendices.

PURPOSE AND SCOPE.

This investigation was conducted to evaluate the subsurface soil and groundwater conditions at the site, to develop geotechnical engineering recommendations for use in design of specific construction elements, and to provide criteria for site preparation and earthwork construction.

Our scope of services was performed in general accordance with our proposal number G24035WAT for this project dated September 12, 2024 and included the following:

- Review of the Krazan's Geotechnical Engineering Report (Project No. 062-19005), dated April 11, 2019;
- An exploration of the subsurface soil and groundwater conditions by advancing three (3) soil borings to a maximum depth of about 26.5 feet below existing ground surface (bgs);
- A site plan showing the soil boring locations;

- Comprehensive soil boring logs, including soil stratification and classification, and groundwater levels where applicable;
- Shallow foundation recommendations for the proposed structure including allowable bearing pressure, anticipated settlements (both total and differential), coefficient of horizontal friction, and frost penetration depth, if needed;
- Recommendations for seismic design considerations including site coefficient and ground acceleration based on the on the 2021 International Building Code (IBC);
- Recommendations for modulus of subgrade reaction for design of slabs-on-grade, as well as subgrade preparation, slab drainage, capillary break, and moisture barriers;
- Recommendations for lateral earth pressures for below grade and retaining structures, including surcharge loadings;
- Recommendations for structural fill materials, placement, and compaction;
- Recommendations regarding the suitability of onsite soils as structural fill;
- Recommendations for temporary excavations;
- Recommendations for site drainage and erosion control;
- Recommendations for asphalt and concrete pavement sections.

Environmental services, such as chemical analysis of soil and groundwater for possible environmental contaminants, were not included in our scope of services for this project.

PROJECT BACKGROUND/DESCRIPTION

We understand that the McDonald’s site is southern part of a single assessor parcel (No. 0420264021). The parcel covers an area of about 2.19 acres, and the site covers about 0.81-acre. We understand that you were provided with a Krazan’s geotechnical engineering report for the larger property (KA Project No. 062-19005, April 11, 2019) for the McDonald’s parcel and two adjacent parcels. However, the McDonald’s parcel was not a part of proposed development during the original investigation, and explorations were not performed on that parcel. We understand that the site area has been previously graded and recent grading has been performed as well. We were provided with a Daily Field and Density Report, prepared by Migizi Group, dated August 14, 2024. There were no records related to subgrade preparation or amount of fill placement at the site.

We understand that the proposed development will include design and construction of a new restaurant building. The building will be a single-story, likely a wood-framed structure covering a footprint of about

3,671 square feet. Other site developments will include design and construction of a trash enclosure asphalt paved parking areas and access drives, drive-thru lane, site utilities, and landscaped areas.

SITE DESCRIPTION AND SURFACE CONDITIONS

We understand that the site is currently vacant and has been recently cleared and graded. The site is roughly rectangular in shape and relatively level. The site is bordered by vacant lots to the north east and south, and Shaw Road to the west. We did not observe surface water accumulation and significant signs of erosion during our site visit.

GEOLOGIC SETTING

The Washington Division of Geology and Earth Resources, Geologic Map of the South Half of the Tacoma Quadrangle, Washington (Open File Report 87-3) indicates that the property is located in an area that is predominantly underlain by recent alluvium deposited by the Puyallup River. The recent alluvium consists of interbedded silt, sandy silt, silty sand, sand, gravel, local areas of peat and clay. The finer material represents overbank material and local lacustrine deposits, and the coarser materials most likely represent deposits in abandoned channels of the Puyallup River.

FIELD INVESTIGATION

Three (3) geotechnical soil borings were completed to evaluate the subsurface soil and groundwater conditions at the project site. The soil borings, designated as B-1 through B-3 were drilled on October7, 2024, using a subcontracted drill rig and operator. The soil borings were advanced to depths of approximately 6.5 to 26.5 feet bgs.

A field geologist from Krazan and Associates was present during the explorations, continuously examined and visually classified the soils in general accordance with the Unified Soil Classification System (USCS), and maintained logs of the explorations. Representative samples of the soils encountered in the geotechnical explorations were collected and transported to our laboratory for further examination and testing.

A detailed description of the field investigation is presented in Appendix A. The approximate locations of the borings are shown on the Site Plan in Figure 2.

Note: B-2 encountered auger refusal at about 6.5 feet bgs possibly on some obstruction.

SOIL PROFILE AND SUBSURFACE CONDITIONS

This section of the report is intended to provide a general description the subsurface soil and groundwater conditions exposed in our explorations. Detailed descriptions of the soils encountered in our explorations are presented in the boring logs in Appendix A.

Fill: Our explorations generally encountered moist, loose to dense, brown silty sand with gravel extending to the depths of about of 6.5 feet bgs. We interpreted this layer to be recently placed fill. Partial documentation of fill placement was provided.

Native Alluvium Soils: Underlying the fill, our borings generally encountered moist to wet, soft to stiff, gray sandy silt and silty clay extending to about 10 to 11.5 feet bgs. Underlying this layer, our borings encountered wet, medium dense sand with varying amounts of silt extending to the maximum explored depths of about 21.5 to 26.5 feet bgs. We interpreted these soils to be native alluvium deposits.

Groundwater Observations: Groundwater seepage was encountered at about 10 feet bgs in the B-1 and B-2 at the time of drilling. See Groundwater Influence on Structures and Earthwork Construction section of this report for further information.

Native soils encountered in our explorations were consistent with our 2019 findings.

GEOLOGIC HAZARDS

Erosion Concern/Hazard

The Natural Resources Conservation Service (NRCS) map for Pierce County Area, Washington (WA653) classifies the soils in the site area as Briscot loam. The NRCS classifies Briscot loam as hydrologic soil group B/D. Hydrologic group B/D soils have moderate to high runoff potential in a disturbed state.

It has been our experience that soil erosion due to wind can be minimized by limiting the amount of stripped soil areas exposed during construction activities, frequently wetting the surface soils during construction, and with proper landscaping of the site following completion of construction. Typically, erosion of exposed soils will be most noticeable during periods of rainfall. The potential for erosion may be mitigated by the use of temporary erosion control measures, such as silt fences, hay bales, straw wattles, mulching, control ditches or diversion trenching, and contour furrowing. The walls of excavations should be covered with plastic sheeting, or other erosion control surfacing during periods of rainfall. Erosion control measures should be in place before the onset of wet weather.

Seismic Hazard

The 2021 IBC, Section 1613.2.2, refers to Chapter 20 of ASCE 7-16 for Site Class Definitions. It is our opinion that the overall soil profile corresponds to Site Class D as defined by Table 20.3-1 "Site Class Definitions," according to the ASCE 7-16 Standard. Site Class D applies to a "stiff soil" profile. The seismic site class is based on a soil profile extending to a depth of 100 feet. The soil explorations on this site extended to a maximum depth of 26.5 feet and this seismic site class designation is based on the assumption that similar conditions continue below the maximum depth explored.

We referred to the Applied Technology Council (ATC) Hazards website, ASCE 7-16, and the 2021 IBC to obtain values for S_S, S_{MS}, S_{DS}, S_1, S_{M1}, S_{D1}, F_a, and F_v based on a Risk Category II for the proposed structure. The ATC website utilizes the most updated published data on seismic conditions from the United States Geological Survey. The seismic design parameters for this site are presented in the following table:

Seismic Design Parameters*
(Reference: 2021 IBC, ASCE 7-16, and ATC)

Seismic Item	Value
Site Coefficient F_a	1.000
S_s	1.254
S_{MS}	1.254
S_{DS}	0.836
Site Coefficient F_v	1.868
S_1	0.432
S_{M1}	0.807
S_{D1}	0.538
Ts	0.644

*Based on Equivalent Lateral Force (ELF) Design Procedure being used.

Additional seismic considerations include liquefaction potential and amplification of ground motions by loose/soft soil deposits. Liquefaction usually occurs under vibratory conditions such as those induced by seismic events. The liquefaction potential is highest for loose sand with a high groundwater table. Soil liquefaction is a state where soil particles lose contact with each other and become suspended in a viscous fluid. This suspension of the soil grains results in a complete loss of strength as the effective stress drops to zero. Liquefaction normally occurs under saturated conditions in soils such as sand, in which the strength is purely frictional. However, liquefaction has occurred in soils other than clean sand.

We have reviewed "Liquefaction Susceptibility Map of Pierce County, Washington" by Stephen P. Palmer et al., (WA DNR, 2004). The map indicates that the site area is located in a zone of high liquefaction susceptibility.

For the larger property, we have previously performed site-specific liquefactions analyses based on soils encountered in B-2 from March 11, 2019 exploration. Our current explorations were similar to the previous findings. Our previous analyses included maximum earthquake magnitude of 7.11, and peak horizontal acceleration of 0.5g. For the analysis, groundwater depth was assumed to be at 7 feet during the earthquake.

Our previous analysis indicated that a relatively thin layer approximately between 25 to 34 feet bgs were liquefiable under the maximum earthquake magnitude of 7.11. The maximum liquefaction induced <u>total</u>

settlement for this type of seismic event was estimated to be approximately 1.73 inches. The differential seismic settlement is estimated to be about 0.9-inch over a horizontal distance of 50 feet. Based on our explorations and liquefaction analyses, it is our opinion that the liquefaction hazard for this site is low. The liquefaction analysis plot showing the factor of safety and settlement are presented in Appendix A.

Lateral Spreading: Liquefaction-induced lateral spreading is lateral displacement of gently sloping ground as a result of pore pressure build-up or liquefaction in shallow deposits during an earthquake. The conditions conducive to lateral spreading include gently surfaced slope, shallow water table, and liquefiable cohesionless soils. Shallow groundwater was encountered at the site; however, the ground surface is relatively level and the shallow deposits consist of sandy silt, and clayey silt. Therefore, the hazard associated with liquefaction-induced lateral spreading is interpreted to be low.

Surface Deformation/Fault Rupture Hazard: We have reviewed the DOGAMI hazard maps. There are no faults mapped in the site vicinity. Additionally, we did not observe indications of surface faulting during our site visit.

CONCLUSIONS AND RECOMMENDATIONS

General

It is our opinion from a geotechnical standpoint that the site is compatible with the proposed development, provided that our recommendations are incorporated into project plans and are implemented during construction. It is recommended that a geotechnical engineer from Krazan review the geotechnical aspects of the project plans.

Soil Conditions: Our borings generally encountered loose to dense fill material extending to the depths of about of 6.5 feet bgs. The existing fill material is not considered suitable to support the foundation loads. Underlying the fill, native alluvium soils were encountered extending the maximum explored depth of about 26.5 feet bgs. Organic materials or debris were not encountered. **However,** there may be layers of organic materials, debris, or deeper layers of fill in unexplored areas of the site.

The soils encountered at this site are considered moisture-sensitive and will be easily disturbed and difficult to compact when wet. We recommend that construction take place during extended periods of dry weather in the summer months, if possible. If construction is to take place during wet weather, additional expenses and delays should be expected due to the wet conditions. Additional expenses could include the need for placing a layer of rock spalls to protect exposed subgrades and construction traffic areas.

The near surface existing fill soils may be suitable for re-use as structural fill material, provided the moisture content is near optimum and the soil could be suitably compacted to specifications. *This will depend on the moisture content of the soils at the time of construction.* Krazan and Associates should be retained to determine if the on-site soils can be used as structural fill material at the time of construction.

Foundations: Based on our explorations, conventional spread foundations bearing on the medium dense/stiff or firmer native soils or on structural fill extending to the medium dense or firmer native soils should provide adequate support for the planned structures. Detailed geotechnical engineering recommendations for foundation design are presented in this report.

Site Preparation

We understand that the site is already cleared. In the planned footing areas, any fill/loose/soft soils, should be excavated to expose the underlying firm native soils. The resulting excavations should be filled to the planned bottom of the footing subgrade elevations with suitable soils as per the **Structural Fill** section of this report. *Based on our explorations, we interpret the medium dense/stiff or firmer native soils at this site to be about 9 feet bgs.*

Trash Enclosure, Floor Slabs, Exterior Flatworks and Pavement Subgrade Preparation: We recommend that subgrade in these areas be modified by removing any fill/loose/soft soils to *at least 12 inches* below the planned subgrade elevations. We recommend that a high-strength woven geotextile separation fabric then be placed over the entire over excavated area, such as Mirafi 600X or equivalent. After the fabric is placed, the area should be filled to the planned subgrade elevation with suitable soils as recommended in the **Structural Fill** section of this report. Where exterior flatworks (sidewalk and pedestrian pathways) are constructed independent of pavement, the over-excavation may be limited to at least 6 inches and separation fabric will not be needed. *Deeper excavation may be required, if yielding soil conditions, organics, or debris are exposed during over-excavation.*

During wet weather conditions, which typically occur from October through May, subgrade stability problems and grading difficulties may develop due to excess moisture, disturbance of moisture sensitive soils and/or the presence of perched groundwater. Earthwork construction during extended periods of wet weather could create the need to remove wet disturbed soils if they cannot be suitably compacted due to elevated moisture contents. The on-site soils encountered in our borings are considered to be moisture sensitive. If over-excavation is necessary, it should be confirmed through continuous monitoring and testing by our firm or a qualified geotechnical engineer or geologist. Soils that have become unstable may require drying to near their optimal moisture content before compaction is feasible. Selective drying may be accomplished by scarifying or windrowing surficial material during extended periods of dry, warm weather (typically during the summer months). If the soils cannot be dried back to a workable moisture condition, remedial measures may be required. Preparation of the site for wet weather conditions may consist of the placement of a layer of rock spalls for the protection of exposed soils during construction.

It should be understood that even if Best Management Practices (BMPs) for soil protection are implemented for the wet season, there is a significant chance that additional soil mitigation work will be needed.

Any buried structures encountered during construction should be completely removed and backfilled with structural fill. Excavations, depressions, or soft and pliant areas extending below the planned subgrade elevations should be excavated to expose medium dense or firmer soil, and be backfilled with structural fill. In general, any septic tanks, underground storage tanks, debris pits, cesspools, or similar structures and deleterious materials should be completely removed. Any concrete footings encountered in the planned foundation area should be removed to depth of at least 3 feet below proposed footing elevations or as recommended by the geotechnical engineer. The resulting excavations should be backfilled with structural fill.

A representative of our firm should be available on request during all grading operations to observe, test and evaluate earthwork construction. These testing and observation processes are an integral part of our service, as acceptance of earthwork construction is dependent upon compaction and stability of the material. The geotechnical engineer may reject any material that does not meet compaction and stability requirements. Further recommendations, contained in this report, are predicated upon the assumption that earthwork construction will conform to the recommendations set forth in this section and in the Structural Fill section of this report.

Temporary Excavations

The on-site soils have variable cohesion strengths, therefore the safe angles to which these materials may be cut for temporary excavations is limited, as the soils may be prone to caving and slope failures in temporary excavations deeper than 4 feet. Temporary excavations in the existing materials should be sloped no steeper than 1.5H:1V (horizontal to vertical) where room permits. Flatter inclinations or temporary shoring may be necessary where caving conditions, and groundwater seepage are encountered.

All temporary cuts should be in accordance with Washington Administrative Code (WAC) Part N, Excavation, Trenching, and Shoring. The temporary slope cuts should be visually inspected daily by a qualified person during construction work activities and the results of the inspections should be included in daily reports. The contractor is responsible for maintaining the stability of the temporary cut slopes and minimizing slope erosion during construction. The temporary cut slopes should be covered with plastic sheeting to help minimize erosion during wet weather and the slopes should be closely monitored until the permanent retaining systems are complete. Materials should not be stored and equipment operated within 10 feet of the top of any temporary cut slope.

A Krazan & Associates geologist or geotechnical engineer should observe the temporary cut slopes, at least periodically, during the excavation work. The reason for this is that all soil conditions may not be fully delineated by the limited sampling of the site from the geotechnical explorations. In the case of temporary slope cuts, the existing soil conditions may not be fully revealed until the excavation work exposes the soil. Typically, as excavation work progresses the maximum inclination of the temporary slope will need to be evaluated by the geotechnical engineer so that supplemental recommendations can be made. Soil and groundwater conditions can be highly variable. Scheduling for soil work will need to be adjustable, to deal with unanticipated conditions, so that the project can proceed smoothly and required deadlines can be met. If any variations or undesirable conditions are encountered during construction, Krazan & Associates should be notified so that supplemental recommendations can be made.

Structural Fill

Fill placed beneath foundations or other settlement-sensitive structures should be placed as structural fill. Structural fill, by definition, is placed in accordance with prescribed methods and standards, and is monitored by an experienced geotechnical professional. Field monitoring procedures would include the performance of a representative number of in-place density tests to document the attainment of the desired degree of relative compaction. A representative of the geotechnical engineer should evaluate the subgrade prior to structural fill placement.

BMP's should be followed when considering the suitability of the existing materials for use as structural fill. The existing surficial fill soils may be considered suitable for reuse as structural fill, provided the soil is relatively free of organic material, debris, cobbles and boulders, and it is within ± 2 percent of the optimum moisture content during placement. If the on-site soils are stockpiled for later use as structural fill, the stockpiles should be covered to protect the soil from wet weather conditions. We recommend that a representative of Krazan & Associates be on site during the excavation work to determine which soils are suitable for structural fill.

Imported, all weather granular structural fill material should consist of well-graded gravel or a sand and gravel mixture with a maximum grain size of 3 inches and less than 5 percent fines (material passing the U.S. Standard No. 200 Sieve). Structural fill can also consist crushed rock, rock spalls and controlled density fill (CDF). All structural fill material should be submitted for approval to the geotechnical engineer at least 48 hours prior to delivery to the site.

Granular structural fill soils should be placed in horizontal lifts not exceeding 8 inches in thickness prior to compaction, moisture-conditioned as necessary, (moisture content of soil shall not vary by more than ±2 percent of optimum moisture) and the material should be compacted to at least 95 percent of the maximum dry density based on ASTM D1557 Test Method. In-place density tests should be performed on all structural fill (except rock spalls and CDF) to document proper moisture content and adequate compaction. Additional lifts should not be placed if the previous lift did not meet the compaction requirements or if soil conditions are not considered stable. Rocks spalls and CDF placement should be visually inspected/observed, if utilized.

Shallow Foundations

General: The proposed structures may be supported on a conventional spread foundation system bearing on the foundation subgrade be prepared as per the Site Preparation section of this report. For our bearing capacity and settlement analyses, we have assumed following structural loads:

- Floor Loads: 100 pounds per square foot (psf)
- Column Loads: 50,000 pounds
- Wall Loads: 2,000 pounds per lineal foot

Soil Bearing: Footings supported as mentioned-above, may be designed using an allowable soil bearing pressure of **2,500 pounds per square foot (psf)** for dead plus live loads. This value may be increased by 1/3 for short duration loads such as wind or seismic loading. A representative of Krazan and Associates should evaluate the foundation bearing soil.

For frost protection and bearing capacity considerations, exterior footings should have a minimum embedment depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Footing widths should be based on the anticipated loads and allowable soil bearing pressure. Footings should have a minimum width of at least 12 inches regardless of load. Water should not be allowed to accumulate in footing trenches. All loose or disturbed soils should be removed from the foundation excavations prior to placing concrete.

Potential Foundation Settlement: For foundations constructed as recommended, the total <u>static settlement</u> is not expected to exceed 1-inch. <u>Differential static settlement</u> should be less than ½-inch. Most static settlement is expected to occur during construction, as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. The maximum liquefaction induced total <u>dynamic settlement</u> for this type of seismic event was estimated to be approximately 1.73 inches. The <u>differential dynamic settlement</u> is estimated to be about 0.9-inch over a horizontal distance of 50 feet.

Design Parameters – Lateral Resistance: Resistance to lateral displacement can be computed using an allowable friction factor of 0.40 acting between the bases of foundations and the supporting subgrade soil. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglecting the upper 12 inches). The allowable friction factor and allowable equivalent fluid passive pressure values include a factor of safety of 1.5. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance.

Foundation Drainage: Seasonal rainfall, water run-off, and the normal practice of watering trees and landscaping areas around the proposed structures, should not be permitted to flood and/or saturate foundation subgrade soils. To reduce the buildup of water within the footing areas, continuous footing drains (with cleanouts) should be provided at the bases of the footings. The footing drains should consist of a minimum 4-inch diameter rigid perforated PVC pipe, sloped to drain, with perforations placed near the bottom and enveloped in all directions by washed rock and wrapped with filter fabric to limit the migration of silt and clay into the drain.

Floor Slabs and Exterior Flatwork

The floor slab and exterior flatwork subgrade should be prepared in accordance with the recommendations presented in the **Site Preparation** section of this report, and may be designed using a modulus of subgrade reaction value of k = 200 pounds per cubic inch (pci).

In areas where it is desired to reduce floor dampness, such as areas covered with moisture sensitive floor coverings, we recommend that concrete slab-on-grade floors be underlain by a water vapor retardant system. The system should consist of a vapor retardant sheeting underlain by a capillary break consisting of a minimum of 4-inches of compacted clean (less than 5 percent passing the U.S. Standard No. 200 Sieve), open-graded coarse rock of ¾-inch maximum size. The vapor retardant sheeting should be protected from puncture damage.

The exterior flatwork should be placed separately in order to act independently of the walls and foundation system.

Lateral Earth Pressures and Retaining Walls

We have developed criteria for the design of retaining or below grade walls. Our design parameters are based on retention of the structural fill soils. The parameters are also based on level, well-drained wall backfill conditions. If the walls are braced to restrain movement and/or movement is not acceptable, the walls may be designed as "restrained" retaining walls based on "at-rest" earth pressures, plus any surcharge on top of the walls as described below. Unrestrained walls may be designed based on "active" earth pressure, if the walls are not part of the buildings and some movement of the retaining walls is acceptable. Acceptable lateral movement equal to at least 0.2 percent of the wall height would warrant the use of "active" earth pressure values for design. The following table, titled **Wall Design Criteria**, presents the recommended soil related design parameters for retaining walls with well-drained level backfill.

Wall Design Criteria	
"At-rest" Conditions (Lateral Earth Pressure)	60 pcf (Equivalent Fluid Density) (Triangular Distribution)
"Active" Conditions (Lateral Earth Pressure)	40 pcf (Equivalent Fluid Density) (Triangular Distribution)
Seismic Increase for "Active" Conditions (Lateral Earth Pressure)	7 psf x H (Uniform Distribution) Where H is the height of the wall in feet
Passive Earth Pressure on Low Side of Wall (includes factor of safety of 1.5)	Neglect upper 1-foot, then 250 pcf (Equivalent Fluid Density)
Soil-Footing Coefficient of Sliding Friction (includes factor of safety of 1.5)	0.4

If vehicular loads (cars and pick-up trucks) are expected to act behind the wall within a horizontal distance of less than or equal to one-half of the wall height, then a live load surcharge should be applied for the design. In this case, we recommend the addition of vehicle surcharges of 70 psf and 100 psf to the active and at-rest earth pressures, respectively.

The stated lateral earth pressures **do not** include loads imposed by construction equipment, foundations or roadways adjacent to the wall (surcharge loads). Construction equipment, large trucks, and busses near retaining walls should be evaluated as point loads.

The stated lateral earth pressures **do not** include the effects of hydrostatic pressure generated by water accumulation behind the retaining walls. To minimize the lateral earth pressure and reduce the buildup of water pressure against the walls, continuous footing drains (with cleanouts) should be provided at the bases of the walls. The footing drains should consist of a minimum 4-inch diameter rigid PVC perforated pipe, sloped to drain, with perforations placed near the bottom. The drainpipe should be enveloped by 6 inches of washed gravel in all directions wrapped in filter fabric to prevent the migration of silt and clay into the drain.

The wall fills adjacent to and extending a lateral distance of at least 2 feet behind the walls should consist of free-draining granular material. All free-draining backfill should contain less than 3 percent fines (passing the U.S. Standard No. 200 Sieve) based upon the fraction passing the U.S. Standard No. 4 Sieve with at least 30 percent of the material being retained on the U.S. Standard No. 4 Sieve. **Alternatively,** a drainage composite may be used. It should be realized that the primary purpose of the free-draining material is the reduction of hydrostatic pressure. Some potential for the moisture to contact the back face of the wall may exist, even with treatment, which may require that more extensive waterproofing be specified for walls, which require interior moisture sensitive finishes.

We recommend that the wall fill be compacted to at least 95 percent of the maximum dry density based on ASTM D1557 Test Method. In-place density tests should be performed to verify adequate compaction. Soil compactors place transient surcharges on the backfill. Consequently, only light hand operated equipment is recommended for fill compaction within 3 feet of walls so that excessive stress is not imposed on the walls.

Erosion and Sediment Control

Erosion and sediment control (ESC) is used to minimize the transportation of sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be taken and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features of the site:

1) Phase the soil, foundation, utility, and other work, requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMPs), grading activities can be undertaken during the wet season (generally October through April). It should be noted that this typically increases the overall project cost.

2) All site work should be completed and stabilized as quickly as possible.

3) Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a lower Apparent Opening Size (AOS), construction of a berm, or other filtration systems.

4) Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

Groundwater Influence on Structures and Earthwork Construction

Groundwater seepage was encountered at about 10 feet bgs in the B-1 and B-2 at the time of drilling. Additionally, groundwater was estimated to be at about 7 to 8 feet below the existing ground surface during our previous work on the larger property (KA Project No. 062-19005, April 11, 2019). It should be recognized that groundwater elevations may fluctuate with time. The groundwater level will be dependent upon seasonal precipitation, irrigation, land use, and climatic conditions, as well as other factors. Therefore, groundwater levels at the time of the field investigation may be different from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

If groundwater seepage is encountered during construction, we should observe the conditions to determine if dewatering will be needed. Design of temporary dewatering systems to remove groundwater should be the responsibility of the contractor. If earthwork is performed during or soon after periods of precipitation, the subgrade soils may become saturated. These soils may "pump," and the materials may not respond to densification techniques. Typical remedial measures include: disking and aerating the soil during dry weather; mixing the soil with drier materials; removing and replacing the soil with an approved fill material. A qualified geotechnical engineering firm should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

Drainage and Landscape

The ground surface should slope away from building pads and pavement areas, toward appropriate drop inlets or other surface drainage devices. It is recommended that adjacent exterior grades be sloped a minimum of 2 percent for a minimum distance of 5 feet away from structures. Roof drains should be tight lined away from foundations. Roof drains should not be connected to the footing drains, but may use the same outfall piping if connected well away from the structure and with enough fall such that roof water will not back-up into the footing drains.

Subgrade soils in pavement areas should be inclined at a minimum of 1 percent and drainage gradients should be maintained to carry all surface water to collection facilities, and suitable outlets. These grades should be maintained for the life of the project.

Water should not be allowed to collect adjacent to the structures. Excessive irrigation within landscaped areas adjacent to the structure should not be allowed to occur.

Utility Trenches

We recommend that utility trench backfill be placed in general accordance with typical recommendations for structural fill placement. A firm and unyielding subgrade should allow for the proper placement of subsurface utilities. This could include the placement of geotextile and quarry rock in the bottom of utility trenches prior to placement of pipe bedding, utilities and trench backfill.

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards, by a contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the contractor. Traffic and vibration adjacent to trench walls should be minimized; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

All utility trench backfill for this project should follow the recommendation as per the Structural Fill section of this report. Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. The upper 5 feet of utility trench backfill placed in pavement areas should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Below 5 feet, utility trench backfill in pavement areas should be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557.

Pipe bedding should be in accordance with the pipe manufacturer's recommendations. The contractor is responsible for removing all water-sensitive soils from the trenches regardless of the backfill location and compaction requirements. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

Pavement Design

The pavement subgrade should be prepared in accordance with the recommendations presented in the **Site Preparation** section of this report. It should be noted that subgrade soils that have relatively high silt contents may be highly sensitive to moisture conditions. The subgrade strength and performance characteristics of a silty subgrade material may be dramatically reduced if it becomes wet. Therefore, we recommend that the pavement subgrade not be exposed for long periods, especially during wet weather.

Traffic loads were not provided, however, based on our knowledge of the proposed project, we expect the traffic to range from light duty (passenger automobiles) to heavy duty (firetrucks). The following tables show the minimum recommended pavement sections for both light duty and heavy-duty traffic loads.

ASPHALTIC CONCRETE (FLEXIBLE) PAVEMENT
LIGHT DUTY

Asphaltic Concrete	Aggregate Base*
3.0 in.	6.0 in.

HEAVY DUTY

Asphaltic Concrete	Aggregate Base*
4.0 in.	6.0 in.

PORTLAND CEMENT CONCRETE (RIGID) PAVEMENT
LIGHT DUTY

Min. PCC Depth	Aggregate Base*
5.0 in.	6.0 in.

HEAVY DUTY

Min. PCC Depth	Aggregate Base*
6.0 in.	6.0 in.

** 95% compaction based on ASTM Test Method D1557*

The pavement specification in Appendix C provides additional recommendations. The asphaltic concrete depth in the flexible pavement tables should be a surface course type asphalt, such as Washington Department of Transportation (WSDOT) ½ inch HMA. The rigid pavement design is based on a Portland concrete cement mix that has a 28-day compressive strength of 4,000 pounds per square inch (psi) with a *fiber mesh*. The design is also based on a concrete flexural strength or modulus of rupture of 575 psi.

Testing and Inspection

A representative of Krazan & Associates, Inc. should be present at the site during the earthwork activities to confirm that actual subsurface conditions, including foundation bearing soils, are consistent with those exposed during our exploratory field work. This activity is an integral part of our services as acceptance of earthwork construction is dependent upon compaction testing and stability of the material. This representative can also verify that the intent of our recommendations has been incorporated into the project design and construction. Krazan & Associates, Inc. will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor. Furthermore, Krazan & Associates is not responsible for the contractor's procedures, methods, scheduling, or management of the work site.

LIMITATIONS

This report has been prepared for the exclusive use of McDonald's USA, LLC and their assigns, for the specific application to the subject site. Geotechnical engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences improves. Although your site was analyzed using the most appropriate current techniques and methods, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to improvements in the field of geotechnical engineering, physical changes in the site either due to excavation or fill placement, new agency regulations, or possible changes in the proposed structure after the time of completion of the soils report may require the soils report to be professionally reviewed. In light of this, the owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that three years be considered a reasonable time for the usefulness of this report.

Foundation and earthwork construction are characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original geotechnical investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. Our report, design conclusions, and interpretations should not be construed as a warranty of the subsurface conditions. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report.

The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those encountered during our field investigation. The findings and conclusions of this report can be affected by the passage of time, seasonal weather conditions, manmade influences such as construction on or adjacent to the site, and natural events such as earthquakes, slope instability, flooding, or groundwater fluctuations. If any variations or undesirable conditions are encountered during construction, the geotechnical engineer should be notified so that supplemental recommendations can be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed construction is relocated or redesigned, the conclusions in this report may not be valid. The geotechnical engineer should be notif0ied of any changes so that the recommendations can be reviewed and re-evaluated.

Misinterpretations of this report by other design team members can result in project delays and cost over-runs. These risks can be reduced by having Krazan & Associates, Inc. involved in the design team's meetings and discussions prior to and following submission of the geotechnical report. Krazan & Associates, Inc. should also be retained to review pertinent elements of the design team's plans and specifications. To reduce the risk of contractors misinterpreting the recommendations of this report, Krazan & Associates should participate in pre-bid and preconstruction meetings, and provide construction observations and testing during the site work.

This report is a geotechnical engineering investigation with the purpose of evaluating the soil conditions in terms of foundation design. The scope of our geotechnical engineering services did not include any environmental site assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater or atmosphere, or the presence of wetlands. Any statements, or absence of statements, in this report or on any boring log regarding odors, unusual or suspicious items, or conditions observed are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessments.

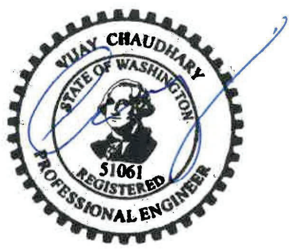
The geotechnical information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical developments. We emphasize that this report is valid for this project as outlined above, and should not be used for any other site. Our report is prepared for the exclusive use of our client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (253) 939-2500.

Respectfully submitted,

KRAZAN & ASSOCIATES, INC.

11/6/24

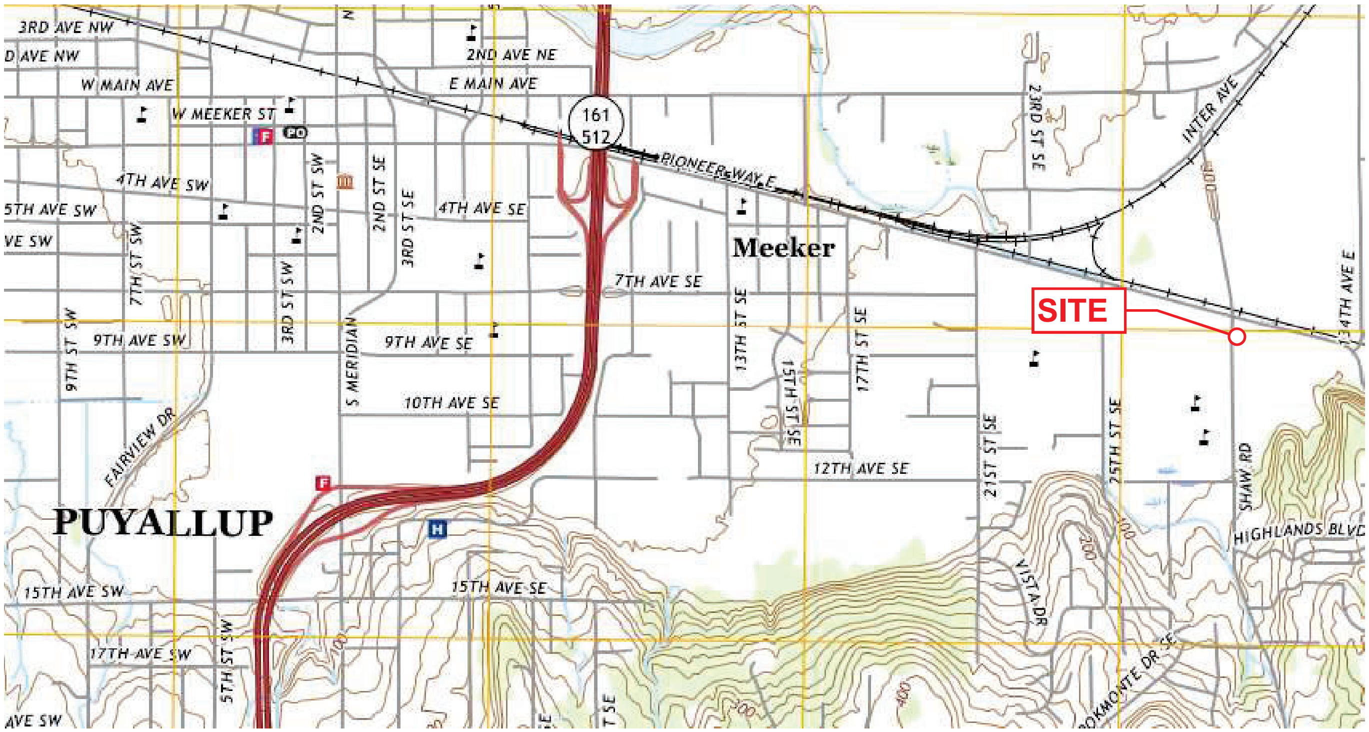


Vijay Chaudhary, P.E.
Project Engineer

KW:VC

Vicinity Map

N

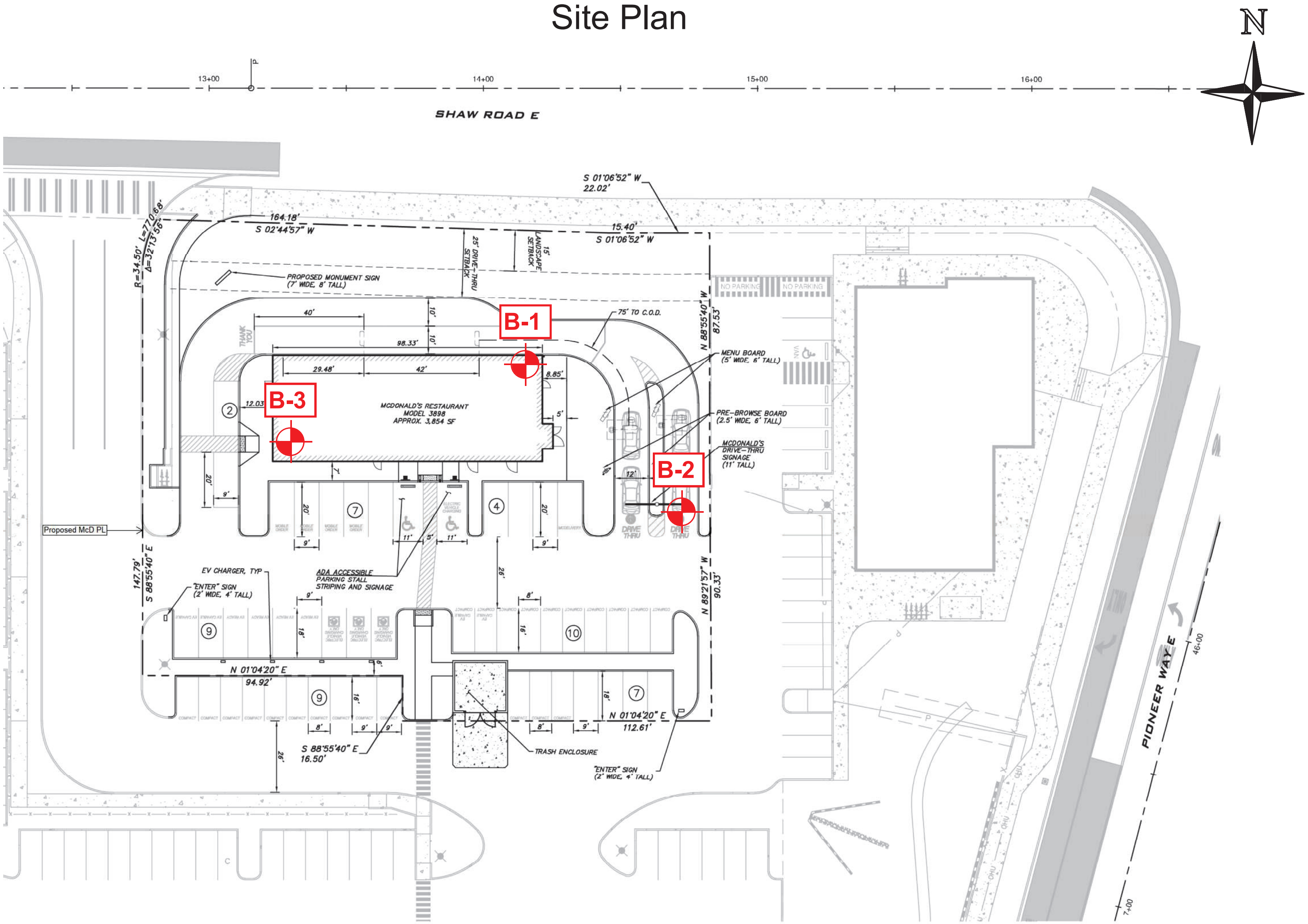


Krazan

Proposed McDonald’s Restaurant (Site ID 461180)		
Date: October 2024	Project Number: 062-24019	
Drawn By: VC	Figure: 1	Not To Scale

Reference: USGS Topographic Map titled, "Puyallup Quadrangle Washington-Pierce County 7.5-minute series", dated 2020

Site Plan



LEGEND

B-1 Number and Approximate Location of Soil Boring

Reference: Plan Sheet SP-01, Prepared by Atwell, dated October 3, 2024

Krazan

Proposed McDonald's Restaurant (Site ID 461180)		
Date: October 2024	Project Number: 062-24019	
Drawn By: VC	Figure: 2	Not To Scale

APPENDIX A

FIELD INVESTIGATION – LABORATORY TESTING – LIQUEFACTION ANALYSIS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploration program. Three (3) geotechnical soil borings were advanced and sampled to evaluate the subsurface soil and groundwater conditions at the project site. The soil borings, designated B-1 through B-3, were drilled on October 7, 2024, using a subcontracted drill rig and operator. The soil borings were advanced to depths of approximately 6.5 to 26.5 feet bgs. The approximate boring locations are shown on the Site Plan (Figure 2). The depths shown on the attached boring logs are from the existing ground surface at the time of our exploration.

Soil samples were obtained from the borings using the Standard Penetration Test (SPT) as described in ASTM Test Method D1586. The Standard Penetration Test and sampling method consists of driving a standard 2-inch outside-diameter, split barrel sampler into the subsoil with a 140-pound hammer free falling a vertical distance of 30 inches. The summation of hammer-blows required to drive the sampler the final 12-inches of an 18-inch sample interval is defined as the Standard Penetration Resistance, or N-value. The blow count is presented graphically on the boring log in this appendix. The resistance, or "N" value, provides a measure of the relative density of granular soils or of the relative consistency of cohesive soils.

A field geologist from Krazan and Associates was present during the explorations, continuously examined and visually classified the soils in general accordance with the Unified Soil Classification System (USCS), and maintained logs of the explorations, which are presented in this appendix. Representative samples of the soils encountered in the geotechnical explorations were collected and transported to our laboratory for further examination and testing.

Laboratory Testing

The laboratory testing program was developed primarily to determine the index properties of the soils. Test results were used for soil classification and as criteria for determining the engineering suitability of the surface and subsurface materials encountered. Sieve analysis, and natural moisture content tests were performed on selected samples. The laboratory test results are included in this appendix.

Liquefaction Analysis

Liquefaction analysis was performed, using information from soil boring B-2 from March 11, 2019 exploration. The analysis was performed using the computer program LiquefyPro, Version 5.8, developed by CivilTech Software. The result of the analysis is included in this appendix.

Soil Classification

USCS Soil Classification				
Major Division			Group Description	
Coarse-Grained Soils < 50% passes #200 sieve	Gravel and Gravelly Soils < 50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well-Graded Gravel
			GP	Poorly Graded Gravel
		Gravel (with > 12% fines)	GM	Silty Gravel
			GC	Clayey Gravel
	Sand and Sandy Soils > 50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well-Graded Sand
			SP	Poorly Graded Sand
		Sand (with > 12% fines)	SM	Silty Sand
			SC	Clayey Sand
Fine-Grained Soils > 50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt
			CL	Lean Clay
			OL	Organic Silt and Clay (Low Plasticity)
	Silt and Clay Liquid Limit > 50		MH	Inorganic Silt
			CH	Inorganic Clay
			OH	Organic Clay and Silt (Med. to High Plasticity)
Highly Organic Soils			PT	Peat

Relative Density with Respect to SPT N-Value			
Coarse-Grained Soils		Fine-Grained Soils	
Density	N-Value (Blows/Ft)	Density	N-Value (Blows/Ft)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	5 -10	Soft	2 - 4
Medium Dense	11 - 30	Medium Stiff	5 - 8
Dense	31 - 50	Stiff	9 - 15
Very Dense	> 50	Very Stiff	16 - 30
		Hard	> 30

Krazan & ASSOCIATES, INC.

Proposed McDonald's Restaurant (Site ID 461180)

Date: October 2024	References: USCS
Drawn By: VC	Project Number: 062-24016

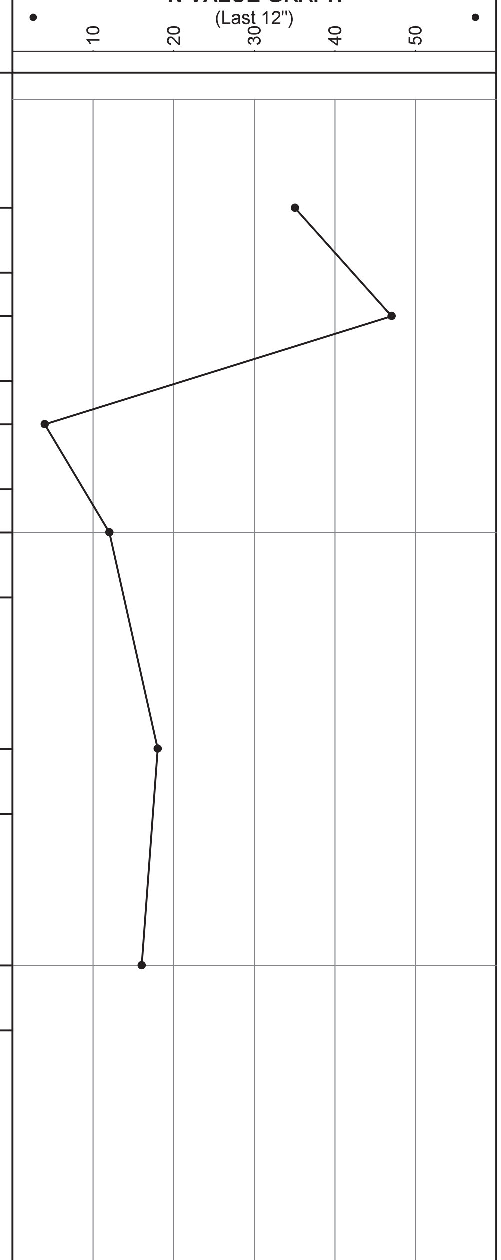
Krazan & Associates, Inc.

LOG OF BORING No. B-1

Date Drilled: 10/7/24	Project: Proposed McDonald's 46-1180	Notes:
Location: Puyallup	Ground Elevation: N/A	Logged By: KEW
Hammer Type: Manual ☐ Automatic ☑ Other ☐		
Water Level: Encountered at 10ft	Drilling Method: HSA	

Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample No. /Type	1st 6"	2nd 6"	3rd 6"	N Value
	Ground Surface						
0	**Fill** Brown silty sand (SM) (moist, dense)						
3			S1/SS	13	14	21	35
5			S2/SS	22	25	22	47
6.5	**Silty Clay (ML)** Gray silty clay (moist, soft)						
8			S3/SS	3	2	2	4
9	**Sandy Silt (ML)** Gray sandy silt (moist to wet, stiff) -Becomes wet						
10			S4/SS	3	5	7	12
11.5	**Sand with Silt (SP-SM)** Black sand with silt (wet, medium dense)						
15			S5/SS	7	8	10	18
20			S6/SS	6	8	8	16
21.5	End of Exploratory Boring						

N VALUE GRAPH
(Last 12")



LEGEND

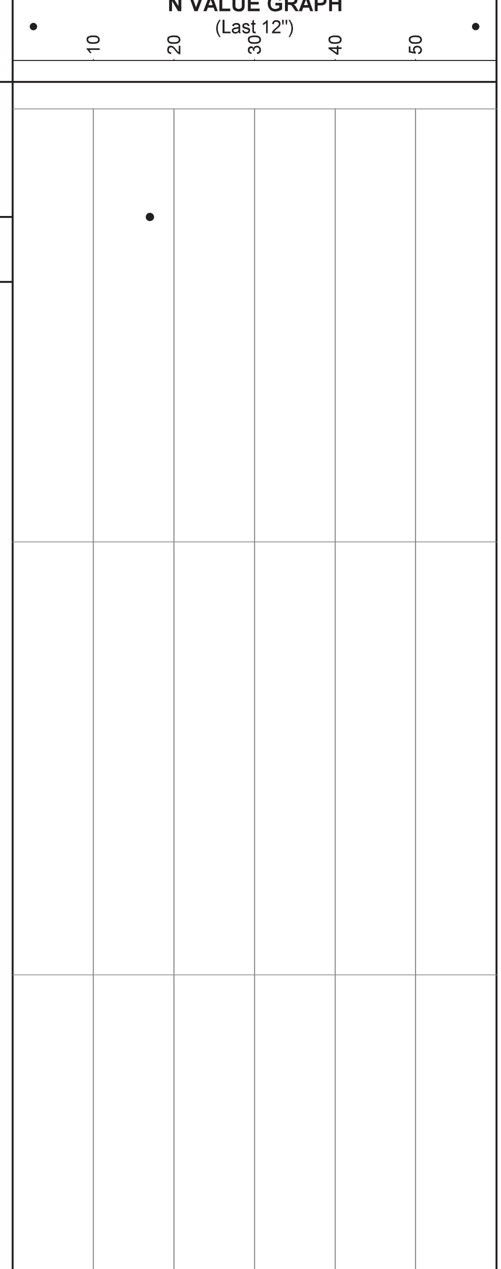
SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings-	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	D C - Driving Casing	

Krazan & Associates, Inc.	LOG OF BORING No. B-2

Date Drilled: 10/7/24	**Project:** Proposed McDonald's 46-1180	**Notes:** Auger refusal encountered at about 6.5 feet.
Location: Puyallup, WA	**Ground Elevation:** N/A / **Logged By:** KEW	
Hammer Type: Manual ☐ Automatic ☑ Other ☐		
Water Level: Not encountered	**Drilling Method:** HSA	

Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample No. /Type	1st 6"	2nd 6"	3rd 6"	N Value
	Ground Surface						
0	**Fill** Brown silty sand (SM) (moist, medium dense)						
3			S1/SS	5	8	9	17
6.5	End of Exploratory Boring						

N VALUE GRAPH (Last 12")



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings-	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	D C - Driving Casing	

Krazan & Associates, Inc.

LOG OF BORING No. B-3

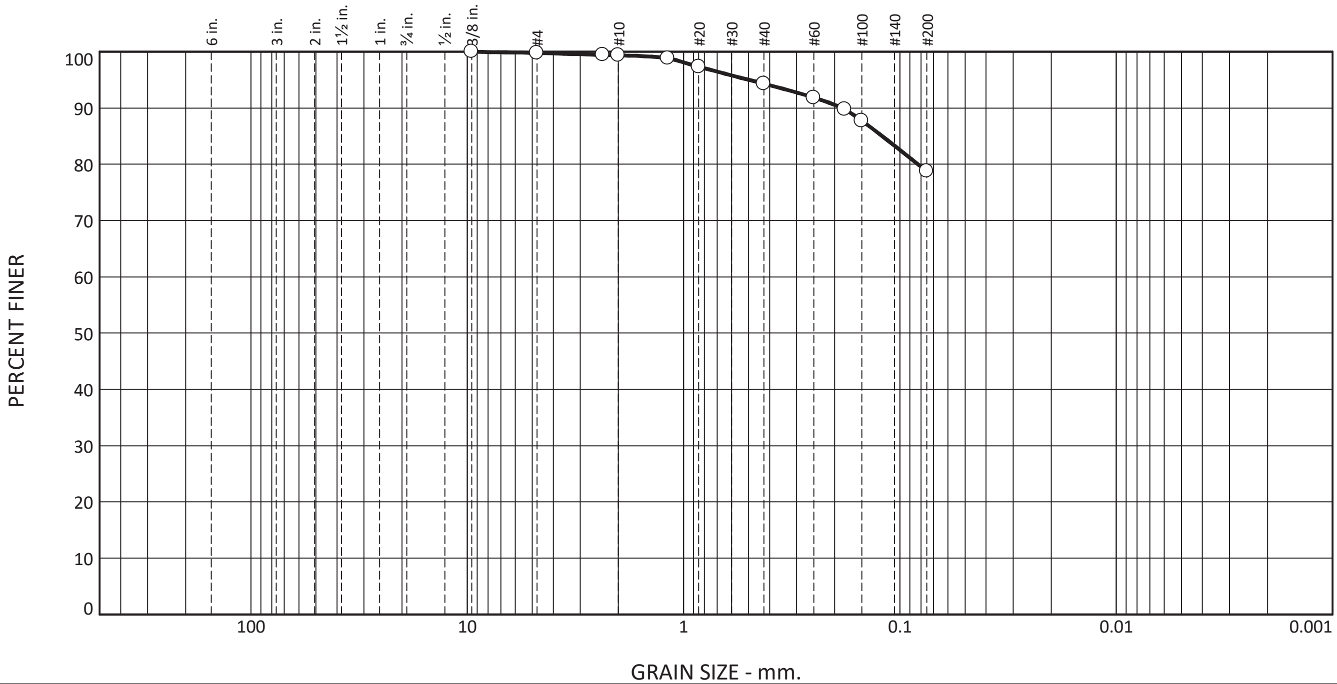
Date Drilled: 10/7/24	Project: Proposed McDonald's 46-1180	Notes:
Location: Puyallup	Ground Elevation: N/A	Logged By: KEW
Hammer Type: Manual ☐ Automatic ☑ Other ☐		
Water Level: Encountered at 10ft	Drilling Method: HSA	

Depth (ft)	MATERIAL DESCRIPTION	Sample No. /Type	1st 6"	2nd 6"	3rd 6"	N Value
	Ground Surface					
0–6.5	**Fill** Brown silty sand (SM) (moist, loose)					
2.5–4		S1/SS	6	6	5	11
5–6.5		S2/SS	5	5	4	9
6.5–9	**Sandy Silt (ML)** Gray sandy silt (moist, soft)					
7.5–9		S3/SS	1	2	2	4
9–10	**Silty Clay (ML)** Gray silty clay (moist, soft)					
10–26.5	**Sand with Silt (SP-SM)** Black sand with silt (wet, loose to medium dense)	S4/SS	3	5	9	14
15–16.5		S5/SS	5	6	5	11
20–21.5		S6/SS	3	4	7	11
25–26.5	-Becomes medium dense	S7/SS	5	10	12	22
26.5	End of Exploratory Boring					

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
ST - Shelby Tube	CU - Cuttings-	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	D C - Driving Casing	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	5	15	79	

Test Results (ASTM C117 & C136)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3/8"	100		
#4	100		
#8	99		
#10	99		
#16	99		
#20	97		
#40	94		
#60	92		
#80	90		
#100	88		
#200	79		

* (no specification provided)

Material Description
Brown sandy silt

Atterberg (ASTM D4318)
PL= NP LL= NV PI= NP

Coefficients
D_{90}= 0.1852 D_{85}= 0.1207
D_{60}= D_{50}=
D_{30}= D_{15}=
D_{10}=
C_u= C_c=

Sieve Test (ASTM C117 & C136)

Test Date: 10/25/24 Technician: Mitchell

Test Notes
Sampled onsite by KW on 10/7/24.
Moisture Content: 48.3%.

Hydrometer Test

Test Date: ____________ Technician: ____________

Test Notes

USCS (ASTM D2487)
ML

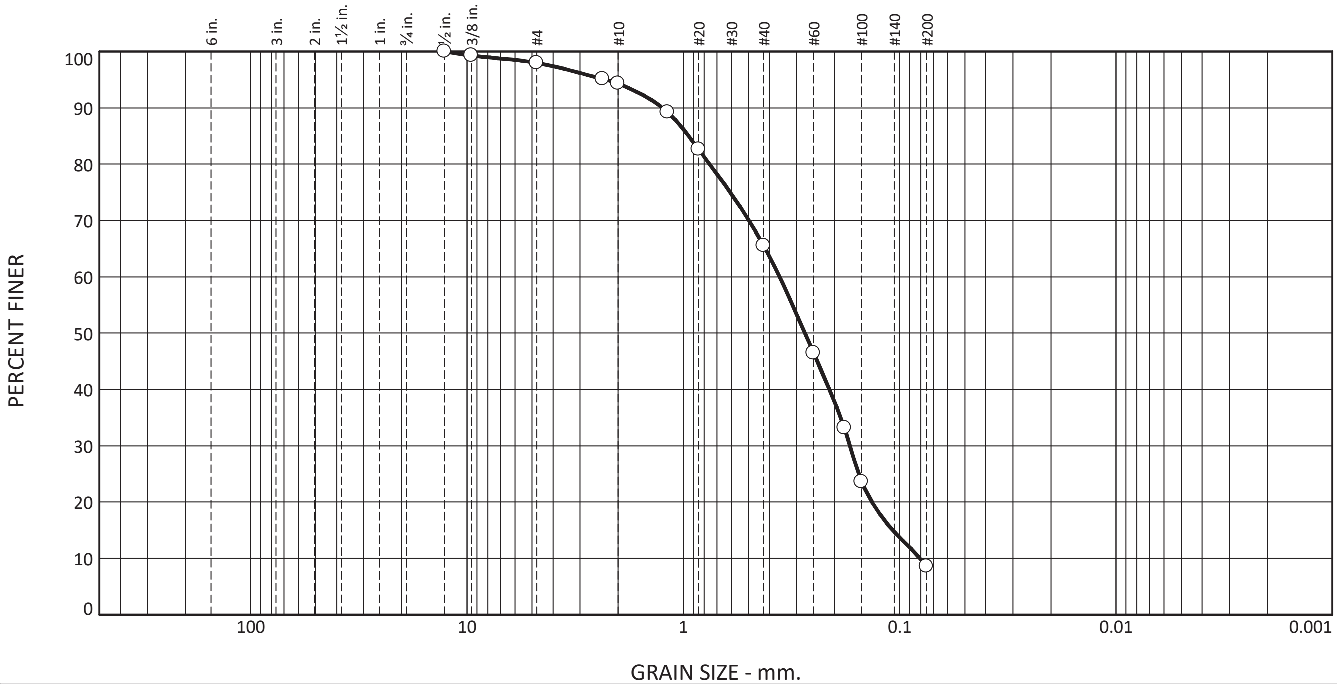
Date Sampled: 10/7/24
Date Received: 10/24/24
Checked By: Cheryl Meredith
Title: Lab Manager

Location: B-3
Sample Number: 24L748 **Depth:** 7.5'

Krazan

Client: McDonalds USA, LLC.
Project: McDonald's #46-1180 Puyallup
Project No: 06224019 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	2	4	28	57	9	

Test Results (ASTM C117 & C136)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
1/2"	100		
3/8"	99		
#4	98		
#8	95		
#10	94		
#16	89		
#20	83		
#40	66		
#60	46		
#80	33		
#100	24		
#200	8.6		

* (no specification provided)

Material Description

Black poorly graded sand with silt

Atterberg (ASTM D4318)

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.2473 D_{85}= 0.9458
D_{60}= 0.3593 D_{50}= 0.2743
D_{30}= 0.1697 D_{15}= 0.1076
D_{10}= 0.0805
C_u= 4.46 C_c= 1.00

Sieve Test (ASTM C117 & C136)

Test Date: 10/25/24 **Technician:** Mitchell

Test Notes

Sampled onsite by KW on 10/7/24.
Moisture Content: 25.9%.

Hydrometer Test

Test Date: ______ **Technician:** ______

Test Notes

USCS (ASTM D2487)

SP-SM

Date Sampled: 10/7/24
Date Received: 10/24/24
Checked By: Cheryl Meredith
Title: Lab Manager

Location: B-3
Sample Number: 24L749 **Depth:** 10'

Krazan

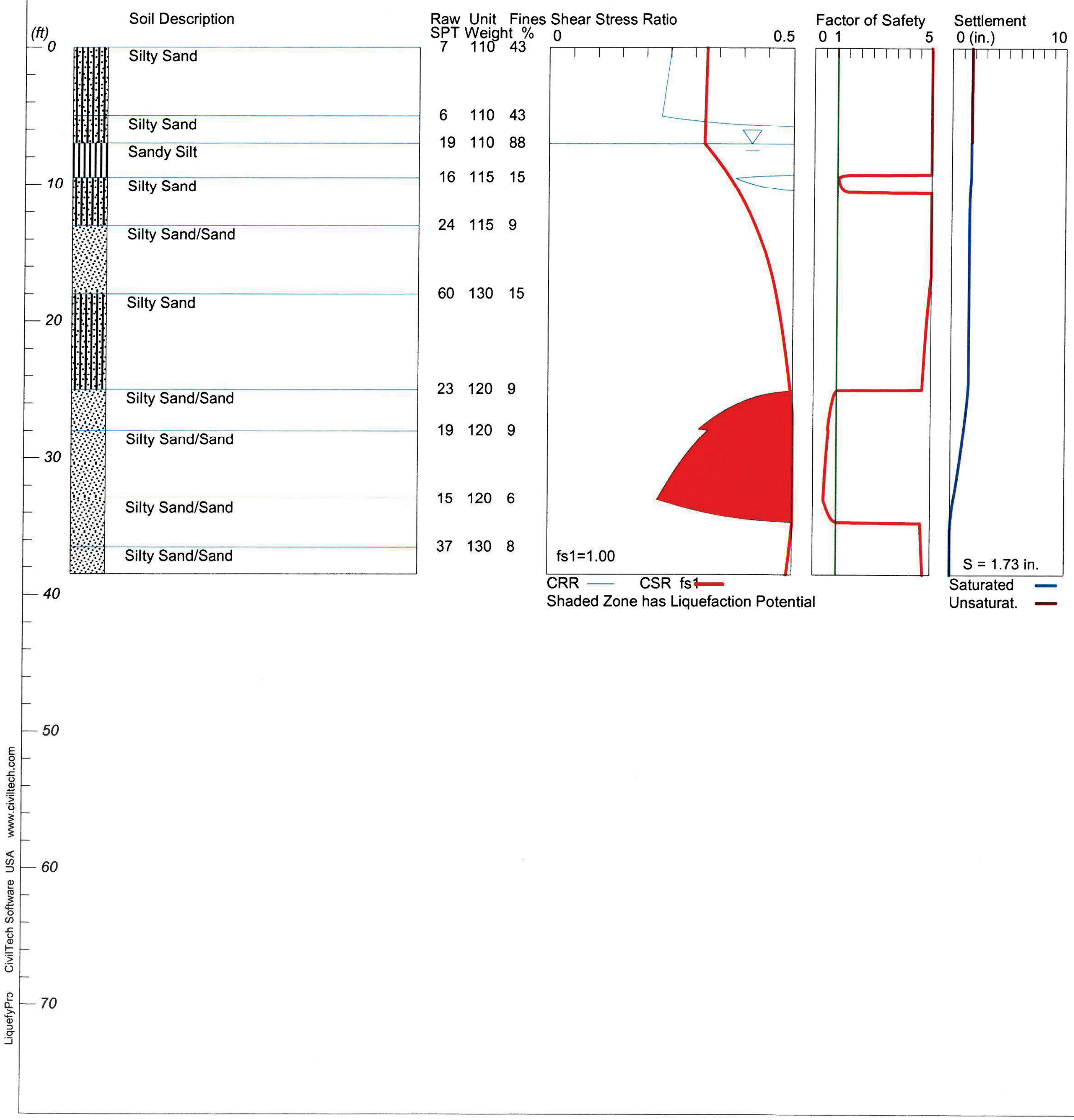
Client: McDonalds USA, LLC.
Project: McDonald's #46-1180 Puyallup
Project No: 06224019 **Figure**

LIQUEFACTION ANALYSIS

East Town Crossing - Puyallup, WA

Hole No.=B2   Water Depth=7 ft

Magnitude=7.11
Acceleration=0.5g



CivilTech Corporation   **Boring B2**   **Plate A-1**

APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including but not limited to the furnishing of all labor, tools, and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans, and disposal of excess materials.

PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Inc., hereinafter known as the Geotechnical Engineer and/or Testing Agency. Attainment of design grades when achieved shall be certified to by the project Civil Engineer. Both the Geotechnical Engineer and Civil Engineer are the Owner's representatives. If the contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by both the Geotechnical Engineer and Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Geotechnical Engineer, Civil Engineer or project Architect.

No earthwork shall be performed without the physical presence or approval of the Geotechnical Engineer. The Contractor shall notify the Geotechnical Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner of the Engineers.

TECHNICAL REQUIREMENTS: All compacted materials shall be densified to a density not less than 95 percent of maximum dry density as determined by ASTM Test Method D1557 as specified in the technical portion of the Geotechnical Engineering Report. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Geotechnical Engineer.

SOIL AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the soil report. The Contractor shall make his own interpretation of the data contained in said report, and the Contractor shall not be relieved of liability under the contractor for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including Court costs of codefendants, for all claims related to dust or windblown materials attributable to his work.

SITE PREPARATION

Site preparation shall consist of site clearing and grubbing and preparations of foundation materials for receiving fill.

CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter, and all other matter determined by the Geotechnical Engineer to be deleterious. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed building areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots larger than 1 inch. Tree root removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill or tree root excavation should not be permitted until all exposed surfaces have been inspected and the Geotechnical Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

SUBGRADE PREPARATION: Subgrade should be prepared as described in our site preparation section of this report.

EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence of the Geotechnical Engineer. Material from the required site excavation may be utilized for construction site fills provided prior approval is given by the Geotechnical Engineer. All materials utilized for constructing site fills shall be free from vegetable or other deleterious matter as determined by the Geotechnical Engineer.

PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. However, compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Geotechnical Engineer.

Both cut and fill shall be surface compacted to the satisfaction of the Geotechnical Engineer prior to final acceptance.

SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Geotechnical Engineer indicates that the moisture content and density of previously placed fill are as specified.

APPENDIX C

PAVEMENT SPECIFICATIONS

1. DEFINITIONS – The term “pavement” shall include asphalt concrete surfacing, untreated aggregate base, and aggregate subbase. The term “subgrade” is that portion of the area on which surfacing, base, or subbase is to be placed.

2. SCOPE OF WORK – This portion of the work shall include all labor, materials, tools and equipment necessary for and reasonable incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically noted as “Work Not Included.”

3. PREPARATION OF THE SUBGRADE – The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans and as per the pavement design section of this report. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum compaction of 95% of maximum dry density as determined by test method ASTM D1557. The finished subgrades shall be tested and approved by the Geotechnical Engineer prior to the placement of additional pavement of additional pavement courses.

4. AGGREGATE BASE – The aggregate base shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base should conform to WSDOT Standard Specification for Crushed Surfacing Base Course or Top Course (Item 9-03.9(3)). The base material shall be compacted to a minimum compaction of 95% as determined by ASTM D1557. Each layer of subbase shall be tested and approved by the Geotechnical Engineer prior to the placement of successive layers.

5. ASPHALTIC CONCRETE SURFACING – Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades, and dimensions shown on the plans. The drying, proportioning, and mixing of the materials shall conform to WSDOT Specifications.

The prime coat, spreading and compacting equipment, and spreading and compacting the mixture shall conform to WSDOT Specifications, with the exception that no surface course shall be placed when the atmospheric temperature is below 50 degrees F. The surfacing shall be rolled with combination steel-wheel and pneumatic rollers, as described in WSDOT Specifications. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

6. TACK COAT – The tack (mixing type asphaltic emulsion) shall conform to and be applied in accordance with the requirements of WSDOT Specifications.