

GEOTECHNICAL ENGINEERING REPORT

McDonald's – Leavenworth (015-0404)
Leavenworth, Kansas

Prepared for:
McDonald's USA, LLC
Chicago, Illinois



Original Report – September 2025
Revision 1 – November 2025

Olsson Project No. 025-02525

Kansas Certificate
of Authorization #: E-516





November 10, 2025

McDonald's USA, LLC
Attn: Mr. Joshua Gatewood
110 N Carpenter Street
Chicago, Illinois 60607

RE: Geotechnical Engineering Report – Revision 1
McDonald's – Leavenworth (015-0404)
Leavenworth, Kansas
Olsson Project No. 025-02525

Dear Mr. Gatewood,

Olsson, Inc. has completed the geotechnical exploration for the above-referenced project. This report summarizes the project characteristics as we understand them, presents the findings of the exploration and laboratory testing, discusses the observed subsurface conditions, and provides our geotechnical engineering recommendations for design of the proposed McDonald's structure. A boring location map, boring logs, and a description of our exploration program are provided in **Appendix A**. Laboratory test results are presented in **Appendix B**.

We appreciate collaborating with McDonald's and the opportunity to provide our geotechnical engineering services for this project. We are prepared to provide construction phase services at your request as well. If you have any questions or need further assistance, please contact us.

Respectfully submitted,
Olsson, Inc.
Kansas Certificate of Authority No. E-516

A handwritten signature in blue ink, appearing to read "Allison Crawford".

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TABLE OF CONTENTS

1. Project Understanding..... 1

 1.1 Project Information 1

 1.2 Site Description 2

2. Subsurface Conditions 4

 2.1 Subsurface Profile 4

 2.2 Water Level Observations 4

3. Geotechnical Considerations..... 6

4. Structures Design..... 7

 4.1 Shallow Foundations 7

 4.2 Floor Slab Subgrade Preparation 8

 4.3 Lateral Earth Pressures 9

 4.4 Seismic Site Classification 11

5. Pavement Design..... 12

 5.1 Pavement Subgrade Preparation..... 12

 5.2 Recommended Pavement Sections..... 13

6. Earthwork and Construction Considerations..... 15

 6.1 Demolition of Existing Facilities 15

 6.2 Site Preparation..... 15

 6.3 Structural Fill 15

 6.4 Groundwater and Drainage Considerations 17

 6.5 Equipment Mobility 17

7. Report Limitations 19

LIST OF FIGURES

Figure 1. Project Site Layout. 2
Figure 2. 2021 Aerial Photograph/Project Location Plan. 3
Figure 3. Lateral Earth Pressure Calculations. 10

LIST OF TABLES

Table 1. Project Information. 1
Table 2. Water Level Observations. 4
Table 3. Shallow Foundation Design Parameters..... 7
Table 4. Earth Pressure Parameters. 9
Table 5. Recommended Pavement Sections. 13
Table 6. Structural Fill Placement Guidelines. 16

APPENDICES

Appendix A Exploration Maps, Logs, and Information
Appendix B Laboratory Test Results

1. PROJECT UNDERSTANDING

1.1 Project Information

We understand the proposed McDonald's restaurant consists of a single-story slab-on-grade structure. The proposed structure is expected to be of steel frame and concrete masonry unit (CMU) construction. The grading plans were not yet established at the time of this report. We anticipate the finished floor elevation (FFE) of the proposed structure will be within 2 feet of the existing ground surface. A retaining wall with a maximum height of 9.5 feet is planned along the west and south sides of the development. Borings B-1, B-3, B-8, and B-9 were drilled along the planned wall area. The wall type has not yet been determined, but we understand that cast-in-place or soldier pile walls are being considered. Once the wall type is determined, Olsson geotechnical engineers should be contacted for additional geotechnical recommendations as needed.

Table 1 provides our understanding of the project and **Figure 1** presents the proposed site layout at the time of this report. If the project information varies from the information provided, Olsson should be contacted to verify that the recommendations contained in this report remain valid.

Table 1. Project Information.

Project Detail	Value	Notes
Plan Area	3,694 square feet	Provided by Client
Finished Floor Elevation	2 (+/-) feet with existing grade	Assumed
Maximum Column Load	< 50 kips	Assumed
Maximum Wall Load	< 5 kips per linear foot	Assumed
Floor Slab Load	< 500 pounds per square foot	Assumed

Any discussion regarding design recommendations including, but not limited to, lateral earth pressures, allowable soil bearing pressures, or total and differential settlements contained in this report are applicable only to the design of rigid below-grade or retaining walls subject to slight rotation, such as cast-in-place cantilever concrete walls. They are not applicable to the design of modular block geogrid-reinforced backfill and/or gravity block walls. These walls are typically subcontracted as design-build structures since design details are often manufacturer specific. The wall designer is responsible for performing any design associated with these wall types and to determine the final parameters used. Additional borings and/or testing may be required.

Our experience and that of our profession indicates that the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the geotechnical engineer of record to provide additional services during design and construction. Therefore, we recommend Olsson be engaged to design and observe the construction of the walls associated with this project once final wall locations and retained height details are available. If Olsson is not retained to provide these design services, the wall designer will assume the Engineer of Record designation for the wall(s) and any components thereof and Olsson shall not have any responsibility for the design or its review.

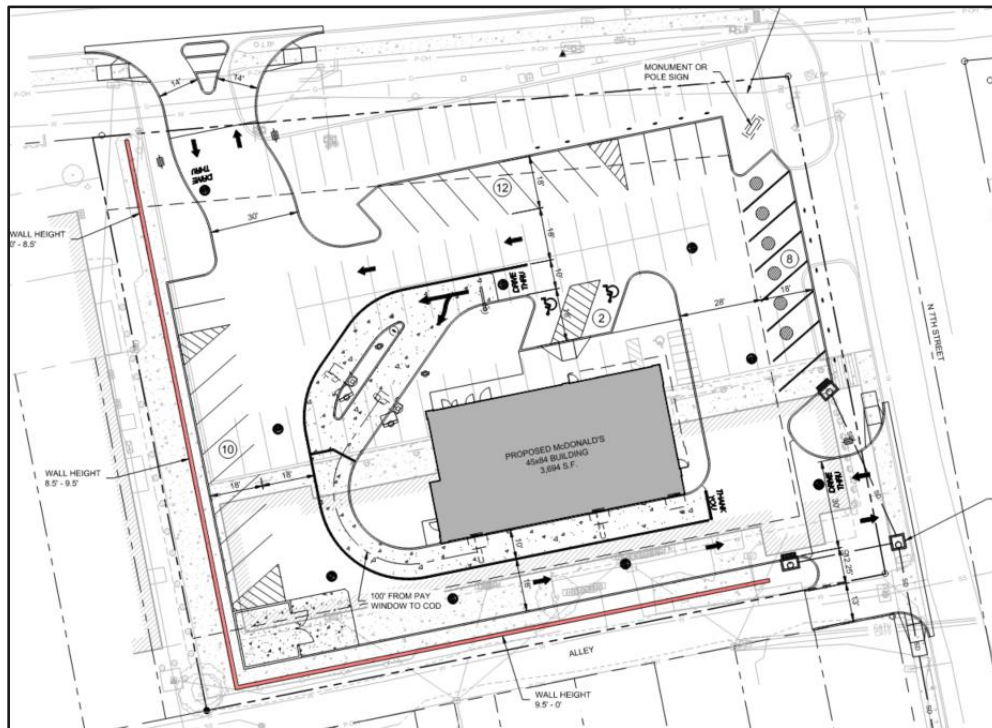


Figure 1. Project Site Layout.

1.2 Site Description

The project site is located on the southwest corner of the intersection of US-73 Highway and N 7th Street in Leavenworth, Kansas. At the time of our field exploration, the site was occupied by a one-story multi-tenant retail building with associated pavements and sidewalks. The site was generally flat, with an average elevation of 858 feet. Based on publicly available aerial images from Google Earth and the limited Phase II Environmental Site Assessment completed by the Olsson Environmental team, the project site has remained the same since the earliest available photographs, dating back to 1991. The project area is shown below in **Figure 2**.



Figure 2. 2021 Aerial Photograph/Project Location Plan.

2. SUBSURFACE CONDITIONS

2.1 Subsurface Profile

The appended borehole reports represent subsurface conditions at the specific boring locations at the time of our field exploration; variations may occur between or beyond the borings. The stratification lines shown on the logs represent the approximate boundary between material types. However, the transition between layers may be gradual. The general characteristics of each soil stratum are summarized below, with more detailed descriptions provided on the borehole reports in [Appendix A](#). Two additional borings are planned on the south side of the property that will be completed at a later date.

We encountered existing concrete, approximately 5 to 7.5 inches thick, in all of our soil borings. The concrete pavements were underlain by approximately 6 inches of crushed aggregates at borings B-2 and B-4 through B-7. Below the aggregate layer, where encountered, cohesive soils consisting of lean clay (CL), fat clay (CH), and lean to fat clay (CL/CH) extended to termination depth in all borings. These soils were generally described as soft to stiff and moist to very moist.

2.2 Water Level Observations

We observed water in our soil borings as summarized in [Table 2](#) and as indicated on the boring logs presented in [Appendix A](#).

Table 2. Water Level Observations.

Boring No.	Water Level Depth While Drilling (feet)	Water Level Depth Immediately After Drilling (feet)
B-1	17.5	16.5
B-2	NE	NE
B-3	19.0	15.5
B-4	NE	NE
B-5	18.5	17.5
B-6	NE	NE
B-7	19.0	15.0
*NE—Not Encountered; NP—Not Performed; NA—Not Applicable		

The above observations provide an indication of the on-site water levels at the time the borings were drilled but should not be construed to represent a permanent or absolute condition.

Variations and uncertainties exist with relatively short-term water level observations in boreholes.

Subsurface water levels will fluctuate over time with variations in precipitation, site grading, drainage, and adjacent land use. Perched water conditions can also develop in seams of loose or granular soil. Any foundation design or global stability analysis must take into consideration changing subsurface water conditions.

Long-term monitoring with piezometers generally provides a more representative indication of the potential range of subsurface water conditions. Such monitoring was not completed as part of this exploration. Olsson can provide additional monitoring upon written request of the Owner and/or Olsson's client. Recommendations for addressing effects of water in design and during construction are presented in **Section 6.4** of this report.

3. GEOTECHNICAL CONSIDERATIONS

The site is currently occupied by a single-story structure that will be demolished prior to the construction of the new building. The new restaurant building is currently planned in the location of the existing structures. Demolition should include removal of existing foundations, utilities, structures, and debris from site. We assume the existing building is supported on a shallow foundation and a slab-on-grade. A similar foundation system is planned for the new building. We have not been informed of any floor slab or foundation related distress in the existing structure. If such distress is present, Olsson should be contacted to review and modify the recommendations in this report as needed.

The conditions encountered at the borings indicate that the bearing materials are soft to firm and, in our opinion, not suitable to directly support shallow foundations. To provide suitable support for the new building, the soils at foundation bearing elevation should be undercut at least 3 feet or one footing width, whichever is greater, from beneath the proposed footing. The overexcavation should extend laterally at least 8 inches for every foot of depth beneath the footings. We recommend the foundations be overexcavated and replaced with suitable structural fill. In our opinion, the existing soils can be reused as structural fill provided it is placed and compacted in accordance with this report.

Silty soils are common for this area and may be susceptible to disturbance from construction activity, particularly if the soil has a high natural moisture content or is wetted by surface water or seepage. Care should be taken during excavation and construction of footings to minimize disturbance of the bearing soils. Heavy equipment traffic directly on bearing surfaces should be avoided in wet silty soils. Walking in the footing excavations should be avoided. If the base of the footing overexcavations become disturbed during construction or if unsuitable bearing conditions are encountered, additional overexcavation may be recommended.

The presence of high plasticity clays at the surface of the site indicates a risk for subgrade volume change with moisture changes, which could impact floor slab or pavement performance if left in place. To mitigate these risks, we recommend that pavements be supported by a minimum of 9 inches of lean clay and that floor slabs be supported by an 18-inch low volume change layer.

4. STRUCTURES DESIGN

4.1 Shallow Foundations

4.1.1 Foundation Subgrade Preparation

Based on the results of our exploration and engineering evaluation, over-excavation and recompaction is required below shallow foundations. The conditions encountered at the borings indicate that the bearing materials are soft to firm and, in our opinion, not suitable to directly support shallow foundations.

We recommend the proposed foundations be supported by a minimum of 3 feet or one footing width, whichever is greater, of structural fill. This structural fill thickness can be achieved through a combination of over-excavation and recompaction of site soils or new structural fill placed to raise site grades. Structural fill soils should extend 8 inches beyond the edge of each footing for each foot of depth beneath the footings and be moisture-conditioned and recompacted in accordance with [Section 6.3](#).

4.1.2 Shallow Foundation Design Parameters

Based on the results of our exploration and engineering evaluation and the understanding that finished floor elevation (FFE) will be within 2 feet of existing grade, if the recommendations in this report are followed, the proposed structure may be supported on a conventional shallow foundation system supported by a minimum of 3 feet (or one-footing width, whichever is greater) of properly placed and compacted structural fill. Design parameters for shallow foundations are tabulated below.

Table 3. Shallow Foundation Design Parameters.

Design Parameter	Recommended Value
Net Allowable Soil Bearing Pressure	2,000 psf
Estimated Total Settlement	1 inch
Estimated Differential Settlement	1/2 inch
Minimum Exterior Foundation Depth	3 feet
Minimum Interior Foundation Depth	2 feet
Minimum Isolated Column Footing Width	30 inches
Minimum Continuous Footing Width	18 inches
Minimum Earth Formed Trench Footing	12 inches

The net allowable bearing pressure is the bearing pressure in excess of the minimum surrounding overburden pressure at the foundation level.

Soft or otherwise unsuitable soils could be encountered at the base of the overexcavation during foundation construction. Therefore, foundation subgrades should be observed by an Olsson representative to identify such soils and provide remediation recommendations as necessary. After foundation subgrades have been observed and any required remedial measures are performed, concrete should be placed as quickly as possible to avoid exposure of the foundation subsoils to wetting, drying, or freezing. If foundation soils are subjected to such conditions, Olsson should be contacted to reevaluate the foundation bearing materials.

Provided shallow foundations are designed and constructed in accordance with the recommendations of this report, total post-construction settlements are anticipated to be less than the values tabulated in **Table 3**. To reduce the effects of differential settlement, floor slabs should be separated from wall and column footings with expansion joints.

4.2 Floor Slab Subgrade Preparation

Our laboratory tests indicate that the on-site soils at the proposed finished floor elevations have a moderate risk for subgrade volume change with fluctuating moisture contents. To reduce this risk, we recommend the placement of a 22-inch zone of low volume change (LVC) material beneath the base of all floor slabs, extending a minimum of 5 feet outside of the building footprint.

The upper 4 inches of the zone should consist of a free draining granular material (e.g., ASTM C-33 No. 57 aggregate). The free draining material should be compacted to 65 percent of the material's relative density, and moisture conditioned to a level that is necessary to obtain the recommended density. Underlying the free draining granular material, 18 inches of additional LVC material should be installed. The additional material should consist of cohesive soils exhibiting a Liquid Limit less than 45 and a Plasticity Index less than 25, or a well graded granular material such as KDOT AB-3 baserock, or equivalent. The additional 18 inches of LVC material should be compacted and moisture conditioned to the levels recommended in **Table 6** of this report.

Upon completion of grading operations in the building area, care should be taken to maintain the recommended subgrade moisture content and density prior to construction of the new floor slabs. If the floor slab subgrade soils should become saturated, desiccated, frozen, disturbed or altered by construction activity, the subgrade should be restored to the conditions recommended in **Table 6**.

The procedures recommended above will reduce future subgrade volume change and resultant floor slab movement. However, depending on many factors—including the size and shape of the floor area, the location of construction joints in the slab, the rigidity of the slab and foundation connection, and the magnitude of movement that occurs—cracks within the floor slab should be anticipated. Leaking utility lines or water allowed to accumulate beneath the slab could lead to significant slab movement.

4.3 Lateral Earth Pressures

The following soil parameters are provided for preliminary design of cast-in-place concrete cantilevered retaining walls and/or foundation walls subject to lateral earth pressures. These parameters are based on the assumption that retained soils will be similar in composition to the on-site soils encountered during this exploration. These recommendations are not applicable to the design of modular block - geogrid reinforced backfill (MSE) or gravity block walls or other contractor-designed retaining walls. Recommendations for these types of wall systems are beyond the scope of this report.

Walls which are rigidly restrained at the top and are essentially unable to deflect or rotate should be designed for at rest earth pressure conditions. Walls that are unrestrained at the top and are free to deflect or rotate slightly may be designed for active earth pressure conditions. The passive earth pressure condition is used to evaluate the resistance of soil to lateral loads. **Table 4** presents recommended values of earth pressure coefficients and equivalent fluid densities based on our experience with soils in the area.

Table 4. Earth Pressure Parameters.

Earth Pressure Coefficient (K)			Equivalent Fluid Density (G)	
			Drained Condition (pcf)	Undrained Condition (pcf)
At Rest (K_0)	Cohesive	0.59	71	97
	Granular*	0.47	56	--
Active (K_a)	Cohesive	0.42	51	87
	Granular*	0.31	37	--
Passive (K_p)	Cohesive	2.37	285	199
	Granular*	3.25	391	--
*Granular values may be used for design only if a drainage system is installed and the granular backfill extends upward from the base of the wall as noted below.				

The above parameters are based on the considerations noted below and are shown in **Figure 3**, below.

- Equivalent fluid densities do not include a factor of safety or consider the effects of hydrostatic pressure, surcharge loading (P_1), point loads, or construction equipment loads.
- Mobilization of active pressure requires the wall rotate about the base, with top-of-wall movements (d) on the order of $0.002*Z$ to $0.004*Z$ (granular) or $0.010*Z$ to $0.020*Z$ (cohesive), where Z is the wall height.
- Mobilization of passive pressure requires a lateral wall movement (d) on the order of $0.020*Z$ to $0.060*Z$ (granular) or $0.020*Z$ to $0.040*Z$ (cohesive), where Z is the wall height.
- Drained earth pressure parameters assume a permanent drainage system is installed behind the wall to prevent the development of hydrostatic pressure.
- Backfill has a maximum unit weight of 110 pcf for granular soils and 120 pcf for cohesive soils.
- The ground surface in front of and behind the wall is horizontal.

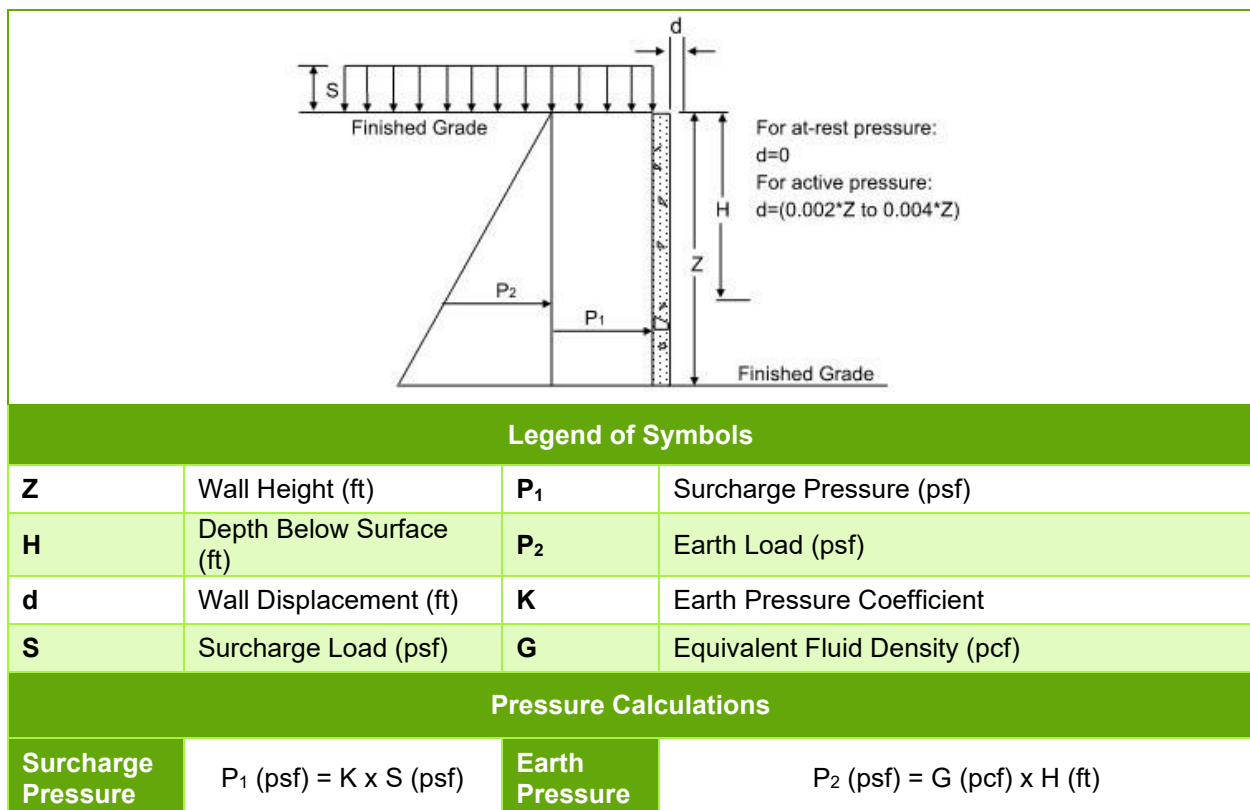


Figure 3. Lateral Earth Pressure Calculations.

Sliding resistance along the base of a wall supported on suitable native soils or properly compacted structural fill may be evaluated using an ultimate sliding friction value of 0.30.

Appropriate factors of safety should be applied to the calculated lateral earth pressures and sliding friction resistance. Passive earth pressure resistance should be neglected within the frost zone (typically 3 feet).

If a foundation key is considered to resist lateral sliding loads using passive earth pressure, the key should be placed below the wall stem or to the toe side of the wall stem. Sliding resistance along the base of the foundation should be neglected within the passive earth pressure zone.

To intercept infiltrating surface water behind the wall, we recommend a perimeter drain be installed at the foundation level. The drain line should be sloped to provide positive gravity drainage. It should be surrounded by free-draining granular material graded to prevent the intrusion of fines or an alternative free-draining granular material encapsulated with suitable filter fabric. At least a 2-foot-wide section of free-draining granular fill should be used for backfill above the drain line and adjacent to the wall and should extend to within 2 feet of final grade. The granular backfill should be capped with compacted cohesive fill to minimize infiltration of surface water into the drain system.

4.4 Seismic Site Classification

For this project site, the soil conditions encountered at the boring are consistent with Site Class "D" as defined by ASCE 7-16.

5. PAVEMENT DESIGN

5.1 Pavement Subgrade Preparation

At-grade parking and drive path areas are planned to surround the proposed structure. At a minimum, all pavements should be supported on 9 inches of recompacted, and moisture conditioned cohesive soils. The soils should be compacted to 95 percent of the material's maximum dry density (ASTM D-698) at a moisture level between 1 percent below and 3 percent above optimum. We recommend that a 4-inch clean rock base consisting of free draining aggregate (ASTM C-33 No.57) be placed directly below the base of the Portland cement concrete pavements.

As a preferred option, and to increase the serviceability life of the pavements, we recommend that the cohesive subgrade below the asphaltic concrete pavements be chemically stabilized with 5 percent soil cement or 5 percent lime (percentages based on dry unit weights). In our opinion, the chemically stabilized subgrade should be compacted to 95 percent of the material's maximum dry density (ASTM D-698) and moisture conditioned to a level between 1 percent below and 3 percent above optimum.

We recommend that the prepared subgrade extend a minimum of 2 feet outside the pavements, where feasible. Olsson should be present during subgrade preparation to observe, document, and test compaction of the materials at the time of placement. As recommended for all prepared soil subgrades, heavy, repetitive construction traffic should be controlled, especially during periods of wet weather, to minimize disturbance. The final prepared subgrade should be proof rolled with a loaded dump truck or similar rubber-tired equipment with a total weight of at least 20-tons, immediately prior to placement of new pavements. Proofrolling operations should be observed and documented by Olsson. Unstable or unsuitable soils revealed by proofrolling should be reworked to provide a stable subgrade or removed and replaced with structural fill.

Construction scheduling often involves grading and paving by separate contractors and can involve a time lapse between the end of grading procedures and the commencement of paving operations. Disturbance, desiccation, or wetting of the subgrade soils between grading and paving operations can result in the deterioration of the previously completed subgrade. If soft and/or wet areas are identified during subgrade preparation or if the subgrade soils have been exposed to adverse weather conditions, frost, excessive construction traffic, standing water, or similar conditions, Olsson should be consulted to determine if corrective action is necessary.

It is important that the pavement subgrade support be relatively uniform, with no abrupt changes in the degree of support. Non-uniform pavement support can occur as a result of varying soil moisture contents or soil types, or where improperly placed utility backfill has been placed

across or through areas to be paved. Improper subgrade preparation such as inadequate vegetation removal, failure to identify soft or unstable areas by proofrolling, and inadequate or improper compaction can also produce non-uniform subgrade support.

5.2 Recommended Pavement Sections

Table 5 summarizes the typical pavement sections for Full Depth Asphaltic Concrete (AC) and Portland Cement Concrete (PCC). The sections represent typical minimum thicknesses. Routine maintenance of the pavement will be required, consisting of periodic seal coats and possible one intermediate mill, in addition to regular crack maintenance.

Table 5. Recommended Pavement Sections.

	Layer	Layer Thickness (inches)		
		Parking Stalls	Drive Lanes	Heavy Vehicle Areas
Full Depth AC	Asphaltic Concrete Surface	2	2	--
	Asphaltic Concrete Base	4	6	--
	Subgrade	9	9	--
Full Depth PCC	Portland Cement Concrete	6	6	8
	Clean Rock Base	4	4	4
	Subgrade	9	9	9

Concrete pavements in areas where heavy vehicles will not be concentrated should have a minimum thickness of 6 inches. In areas where heavy vehicles are concentrated, concrete pavements should have a minimum thickness of 8 inches. PCC pavements are recommended for trash receptacle pads and other areas where heavy wheel loads will be concentrated. The clean rock base for PCC pavements should be uniform and pavement subgrade should be graded to provide positive drainage of the granular base section. The granular section should be graded to adjacent storm sewer inlets and provisions should be made to provide drainage from the granular section into the storm sewers. Drainage of the granular base is particularly important where two different sections of pavements (such as AC and PCC) abut, so that water does not pond beneath the pavements and saturate the subgrade soils. We further recommend that the length of concrete sections be such that no heavy truck wheels are allowed to rest on asphaltic concrete sections during loading/unloading operations.

The performance of the pavements will be dependent upon subgrade conditions at the time of paving, rainwater runoff, and traffic. Rainwater runoff should not be allowed to seep below pavements from adjacent areas. Pavements should be sloped approximately $\frac{1}{4}$ inch per foot to provide for rapid surface drainage.

Proper drainage below the pavement section helps prevent softening of the subgrade and has a significant impact on pavement performance and pavement life. Therefore, we recommend that a granular blanket drain be constructed at all storm sewer inlets within the pavement areas. The blanket drain should consist of clean, crushed rock extending a minimum of 6 inches below pavement subgrade level. The blanket drains should extend radially a minimum of 8 feet from each of the storm sewer inlets. The grade within the blanket drain should be sloped toward the storm sewer inlet, and weep holes should be drilled through the inlet to provide drainage of the granular section into the inlet. Placement of a geotextile filter fabric across the weepholes could be considered to prevent loss of aggregate through the weep holes.

Construction traffic on the pavements has not been considered in the above noted typical sections. If construction scheduling dictates that the pavements will be subjected to traffic by construction equipment, increasing the pavement thickness should be considered to include the effects of additional traffic loading. Construction traffic should not be allowed on partially completed pavements as the pavements will not have adequate structural capacity and could be damaged.

6. EARTHWORK AND CONSTRUCTION CONSIDERATIONS

6.1 Demolition of Existing Facilities

All existing structures and any associated foundations, slabs-on-grade, or pavements within the proposed structure should be removed. We recommend existing utilities within the proposed structure be removed or relocated. All demolition debris should be removed from the site and disposed of in accordance with applicable regulations.

The base of demolition excavations should be observed by an Olsson representative prior to placement of structural fill. Excavations resulting from demolition activities should be backfilled with structural fill in accordance with the recommendations provided in [Section 6.3](#) of this report.

6.2 Site Preparation

6.2.1 General

Pavements, structures, and other deleterious materials deemed unsuitable by an Olsson geotechnical engineer or their authorized field representative should be removed from the proposed construction area. We recommend site clearing be performed during dry weather conditions. Operation of heavy equipment on the site during wet conditions after the pavements are removed could result in excessive rutting. At the base of demolition excavations and prior to the placement of structural fill, we recommend the top 9 inches of the exposed subgrade soils be scarified and recompact in accordance with [Section 6.3](#) of this report.

Soils which cannot be adequately densified in-place should be removed and replaced with approved structural fill or stabilized under the direction of an Olsson representative. The extent of areas requiring removal or stabilization will depend on the conditions observed at the time of construction. Undercut areas should be backfilled with stable fill material similar in composition to the surrounding soils.

6.3 Structural Fill

All structural fill and backfill should consist of the approved materials described in [Table 6](#). In addition to the recommendations in the table, the soils should also be free of organic matter (organic content less than 5 percent), debris, and particles with sizes larger than 3 inches. If imported or on-site soils are planned to be used at the site, representative samples of the proposed fill soils should be submitted to Olsson for laboratory Proctor and classification tests prior to placement on the site. Our observations and laboratory tests indicate that some of the on-site soils may be suitable for use as structural fill, provided all unsuitable materials are

removed prior to placement. However, it may be difficult to differentiate and separate the lean clays from the fat clays on-site.

Proper lift thickness depends on the type of compaction equipment used, but in general, we recommend a maximum lift thickness of 9 inches in loose measurement. Thinner lifts could be required in confined areas such as around manholes, behind retaining walls, or within footing and utility trenches. Soils should be compacted using equipment of appropriate type and size to achieve the recommendations presented in this report. Water flooding is not an acceptable compaction method for any soil type.

Utility trenches, foundation excavations, retaining walls, and pavement curbs should be backfilled as soon as possible to reduce the risk of water infiltration into the subgrade. An Olsson field representative should periodically observe fill placement operations and perform field moisture-density tests to document whether moisture content and compaction requirements are being achieved.

The moisture content of suitable borrow soils should be within the ranges specified in **Table 6**. More stringent moisture limits may be necessary with certain soils. Adjustment of moisture content may be necessary to allow compaction in accordance with project specifications.

Table 6. Structural Fill Placement Guidelines.

Area of Fill Placement	Suitable Material (USCS or Description)	Compaction (ASTM D698 - Standard Proctor)	Moisture Content (Percent of Optimum)
Granular Leveling Course 4 inches below the base of floor slabs	ASTM C-33 No.57 Aggregate	65% Relative Density	As necessary to obtain density
Clean Rock Base 4 inches below PCC pavements			
Low Volume Change 18 inches below base of granular leveling course	Cohesive Soils w/ LL < 45 PI < 25	95%	-1 to +3 percent
	KDOT AB-3 Base rock		
Structural Fill	Cohesive Soils w/ LL < 58 PI < 30	95%	Optimum to +4 percent
Pavement Subgrade 9 inches below the base of AC pavements and PCC clean rock base	Cohesive Soils w/ LL < 50 PI < 30	95%	-1 to +3 percent
Preferred AC Pavement Subgrade 9 inches below the base of AC pavements	Cohesive soils w/ soil cement (5%) / lime (5%)*	95%	-1 to +3 percent
* Percentages are based on dry density			

Controlled low strength material (CLSM) or flowable fill may be considered for utility or other small backfills. We recommend flowable fill have a compressive strength between 100 and 300 pounds per square inch (psi). CLSM with a maximum compressive strength less than 300 psi can be readily excavated with a backhoe. CLSM can be placed in a single lift, without personnel entering the excavation and without the need for compaction equipment.

6.4 Groundwater and Drainage Considerations

The area surrounding the site should be sloped to promote surface drainage away from the foundations. Water should not be allowed to collect at the ground surfaces near foundations, floor slabs, or new pavements, either during or after construction. Provisions should be made to quickly remove accumulating seepage water or storm water runoff from excavations. Undercut or excavated areas should be sloped toward one corner to allow rainwater or surface runoff to be quickly collected and gravity drained or pumped from construction areas. Subgrade soils that are exposed to precipitation or runoff should be evaluated by Olsson prior to the placement of new fill, reinforcing steel, or concrete, to determine if corrective action is required.

To minimize concerns related to improper or inadequate drainage away from foundation bearing subgrades or from cohesive backfill materials used in utility or foundation trenches, we recommend the following:

- Site grading should provide for efficient drainage of rainfall or surface runoff away from new structures and pavements.
- Roof run-off should be collected and transferred directly to the storm sewer system or directed to a location with positive and rapid drainage away from new structures and pavements.
- External hose connections in unpaved areas should incorporate splash blocks to prevent accidental flooding of foundation bearing or backfill soils. External hose connections should have cut-off valves inside the building to prevent accidental or unauthorized use.
- Maintenance personnel should be informed of the potential problems associated with watering near the building.

6.5 Equipment Mobility

The soils encountered at this site may be susceptible to softening under the action of construction equipment traffic in combination with wet weather. Mitigation of equipment mobility problems and management of soft surficial soils will depend on the severity of the problem, the season in which construction is performed, and prevailing weather conditions.

During construction, provisions should be made to quickly remove seepage water or storm water from excavations. Water should not be allowed to collect near foundations, floor slabs,

pavements, or retaining walls either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate the collection and removal of rainwater or surface runoff. Site grading should provide rapid drainage of water away from the structure and pavement areas throughout construction.

Additional guidelines for reducing equipment mobility problems are as follows:

- Optimize surface water drainage at the site.
- Allow for rain days in the construction schedule and wait for dry weather conditions to prevail whenever possible. Avoid operating construction equipment on the site during wet conditions. Rutting the surface will aggravate mobility problems.
- Use construction equipment that is suited for the intended job under the site conditions. Heavy rubber-tired equipment typically requires better site conditions than light, track-mounted equipment.

Ultimately, it may be necessary to take steps to aggressively improve equipment mobility if construction must proceed under unfavorable conditions. More aggressive methods for addressing equipment mobility problems may range from removing several feet of soft wet soils to utilizing crushed stone materials and/or appropriate stabilization fabrics or geogrids. Other methods include chemical stabilization with Portland cement, fly ash, or cement kiln dust (CKD). The stabilization approach should be determined at the time of construction in consultation with an Olsson geotechnical engineer.

The contractor is responsible for creating and maintaining a stable working platform. Soils that are disturbed by construction activity or adverse weather conditions should be corrected by the contractor to conform with project specifications and this report.

7. REPORT LIMITATIONS

The conclusions and recommendations presented in this report are based on the information available regarding the proposed construction, geotechnical information obtained from our field exploration and laboratory testing, as well as our experience with similar projects. Our borings and testing represent a limited statistical sampling of the subsurface. Conditions may be encountered during construction that are substantially different from those encountered in this exploration and adjustments to design and construction may be necessary.

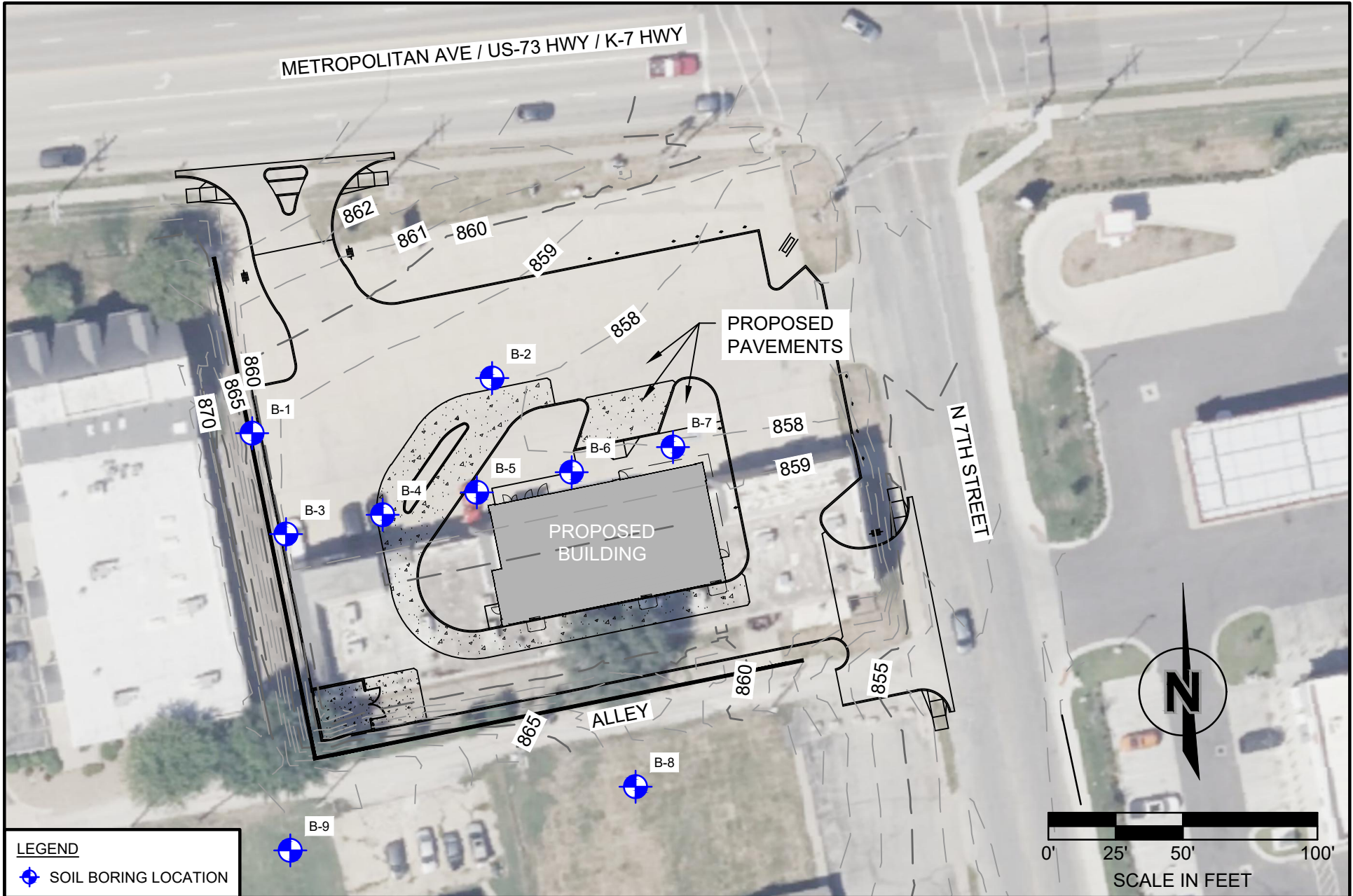
In the event of any changes in the nature of the proposed project as outlined in this report, the opinions in this report cannot be considered valid unless Olsson reviews the changes, and the opinions of this report are modified or affirmed by Olsson.

The scope of this exploration did not include any environmental assessment for the presence of wetlands and/or hazardous or toxic materials in the soil or groundwater on or near the site. Any statements in this report regarding odors, discoloration, or suspicious conditions are strictly for the information of our client.

This report is based on generally accepted professional geotechnical engineering practice at the time of this report, within this geographic area. No warranty, express or implied, is intended or made. This report has been prepared for the exclusive use of McDonald's USA, LLC and their authorized representatives for specific application to the discussed project.

APPENDIX A

Exploration Maps, Logs, and Information



LEGEND	
	SOIL BORING LOCATION
PROJECT NO: 025-02525	
DRAWN BY: RARE	
DATE: 09.11.2025	

BORING LOCATION MAP
MCDONALD'S - LEAVENWORTH
LEAVENWORTH, KANSAS

olsson

BORING LOG NO. B-1							Sheet 1 of 1					
PROJECT NAME McDonalds - Leavenworth				CLIENT McDonalds USA LLC								
PROJECT NUMBER 025-02525				LOCATION Leavenworth, KS								
ELEVATION (ft)	MATERIAL DESCRIPTION		GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.327957 LONG: -94.921554											
	CONCRETE		0.5'									
	LEAN TO FAT CLAY (CL/CH), firm, reddish brown, moist to very moist			1	SPT-1		1-1-2 (3)		25.5			
				2								
				3								
				4	ST-2			0.8*	24.0	99.0		*UU Compressive Strength
-5.0				5								
	grades to stiff			6								
				7	SPT-3		2-4-5 (9)		23.4			
				8								
				9	ST-4			1.6	24.3	101.2		
-10.0				10								
				11								
				12								
				13								
	grades to firm and very moist			14	SPT-5		1-3-3 (6)		29.0			
-15.0				15								
				16								
				17								
				18								
				19	ST-6			0.8	28.4	95.6		
-20.0	BASE OF BORING AT 20.0 FEET		20.0'	20								
				21								
				22								
				23								
				24								
-25.0				25								
				26								
				27								
				28								
				29								
WATER LEVEL OBSERVATIONS						STARTED: Aug 14 2025		FINISHED: Aug 14 2025				
WD	17.5 ft	DRILL CO.: RC Drilling				EQUIPMENT: CME 550X						
IAD	16.5 ft	DRILLER: Ron C.				LOGGED BY: Zach D.						
AD	Not Performed	METHOD: Continuous Flight Auger										

BORING LOG NO. B-2							Sheet 1 of 1					
PROJECT NAME McDonalds - Leavenworth				CLIENT McDonalds USA LLC								
PROJECT NUMBER 025-02525				LOCATION Leavenworth, KS								
ELEVATION (ft)	MATERIAL DESCRIPTION		GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.328005 LONG: -94.921237											
	CONCRETE		0.5'	1	SPT-1		1-1-2 (3)		28.4			
	WELL-GRADED GRAVEL		0.8'	2								
	LEAN TO FAT CLAY (CL/CH), soft, reddish brown, moist to very moist			3								
				4	ST-2				25.6	99.3		
-5.0				5								
				6								
				7	SPT-3		1-2-2 (4)		23.5			
				8								
				9	ST-4				25.0	97.4		
-10.0	BASE OF BORING AT 10.0 FEET		10.0'	10								
				11								
				12								
				13								
-15.0				14								
				15								
				16								
				17								
				18								
				19								
-20.0				20								
				21								
				22								
				23								
				24								
-25.0				25								
				26								
				27								
				28								
				29								
WATER LEVEL OBSERVATIONS							STARTED: Aug 15 2025		FINISHED: Aug 15 2025			
WD	≡	Not Encountered	DRILL CO.: RC Drilling				EQUIPMENT: CME 550X					
IAD	▼	Not Encountered	DRILLER: Ron C.				LOGGED BY: Zach D.					
AD	≡	Not Performed	METHOD: Continuous Flight Auger									

BORING LOG NO. B-3							Sheet 1 of 1				
PROJECT NAME McDonalds - Leavenworth					CLIENT McDonalds USA LLC						
PROJECT NUMBER 025-02525					LOCATION Leavenworth, KS						
ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.327853 LONG: -94.921514										
	CONCRETE	0.6'									
	LEAN TO FAT CLAY (CL/CH), soft, reddish brown, very moist		1	ST-1				27.1	96.1		
			2								
			3								
-5.0			4	SPT-2		1-1-2 (3)		25.4			
			5								
	FAT CLAY (CH), firm, reddish brown, moist	6.0'	6	ST-3	CH			24.2	101.6	58/40	
			7								
			8								
	LEAN TO FAT CLAY (CL/CH), firm, brown, moist to very moist	8.0'	9	SPT-4		1-3-3 (6)		26.1			
-10.0			10								
			11								
	grades to stiff		13	ST-5							
-15.0			14				1.4	27.6	95.6		
			15								
			16								
	grades to soft		18								
-20.0			19	SPT-6		1-1-3 (4)		28.3			
			20								
			21								
	grades to stiff		23								
-25.0			24	SPT-7		4-6-9 (15)		22.8			
	BASE OF BORING AT 25.0 FEET	25.0'	25								
			26								
			27								
			28								
			29								
WATER LEVEL OBSERVATIONS											
WD	19.0 ft						STARTED: Aug 14 2025		FINISHED: Aug 14 2025		
IAD	15.5 ft						DRILL CO.: RC Drilling		EQUIPMENT: CME 550X		
AD	Not Performed						DRILLER: Ron C.		LOGGED BY: Zach D.		
							METHOD: Continuous Flight Auger				

BORING LOG NO. B-4							Sheet 1 of 1				
PROJECT NAME McDonalds - Leavenworth				CLIENT McDonalds USA LLC							
PROJECT NUMBER 025-02525				LOCATION Leavenworth, KS							
ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.327869 LONG: -94.921387										
	CONCRETE	0.6'									
	WELL-GRADED GRAVEL	1.0'	1	SPT-1		2-2-2 (4)		26.7			
	LEAN TO FAT CLAY (CL/CH), soft to firm, reddish brown, moist to very moist		2								
			3								
			4	ST-2				24.2	100.0		
			5								
-5.0			6								
			7	SPT-3		1-2-3 (5)		26.1			
			8								
			9	ST-4				24.5	100.6		
-10.0	BASE OF BORING AT 10.0 FEET	10.0'	10								
			11								
			12								
			13								
			14								
-15.0			15								
			16								
			17								
			18								
			19								
-20.0			20								
			21								
			22								
			23								
			24								
-25.0			25								
			26								
			27								
			28								
			29								
WATER LEVEL OBSERVATIONS						STARTED: Aug 15 2025		FINISHED: Aug 15 2025			
WD	≡	Not Encountered				DRILL CO.: RC Drilling		EQUIPMENT: CME 550X			
IAD	▼	Not Encountered				DRILLER: Ron C.		LOGGED BY: Zach D.			
AD	≡	Not Performed				METHOD: Continuous Flight Auger					

BORING LOG NO. B-5							Sheet 1 of 1				
PROJECT NAME McDonalds - Leavenworth					CLIENT McDonalds USA LLC						
PROJECT NUMBER 025-02525					LOCATION Leavenworth, KS						
ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.327889 LONG: -94.921262										
	CONCRETE	0.5'	1	SPT-1		2-2-2 (4)		27.4			
	WELL-GRADED GRAVEL	1.0'	2								
	LEAN CLAY (CL), soft, brown, very moist		3								
-5.0			4	ST-2	CL			25.5	96.2	39/20	
			5								
			6	SPT-3		1-2-2 (4)		24.1			
			7								
			8								
			9	ST-4	CH		1.6	23.7	101.3	51/34	
			10								
-10.0			11	SPT-5		1-2-2 (4)		25.1			
			12								
			13								
			14	SPT-6		2-2-2 (4)		28.6			
			15								
			16								
			17	SPT-7		1-2-3 (5)		28.2			
			18								
			19								
-20.0			20	SPT-8		3-6-8 (14)		22.6			
			21								
			22								
			23								
			24								
			25								
-25.0			26								
			27								
			28								
	grades to stiff		29								
		30.0'									
BASE OF BORING AT 30.0 FEET											
WATER LEVEL OBSERVATIONS						STARTED: Aug 14 2025		FINISHED: Aug 14 2025			
WD	≡	18.5 ft	DRILL CO.: RC Drilling			EQUIPMENT: CME 550X					
IAD	▼	17.5 ft	DRILLER: Ron C.			LOGGED BY: Zach D.					
AD	≡	Not Performed	METHOD: Continuous Flight Auger								

BORING LOG NO. B-6							Sheet 1 of 1					
PROJECT NAME McDonalds - Leavenworth				CLIENT McDonalds USA LLC								
PROJECT NUMBER 025-02525				LOCATION Leavenworth, KS								
ELEVATION (ft)	MATERIAL DESCRIPTION		GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.327906 LONG: -94.921137											
	CONCRETE		0.6'	1								
	WELL-GRADED GRAVEL		1.0'	2	ST-1			1.3	28.8	95.0		
	LEAN TO FAT CLAY (CL/CH), firm to stiff, reddish brown, very moist			3								
-5.0				4	SPT-2		1-2-3 (5)		27.9			
				5								
				6								
				7	ST-3			1.2	26.0	99.5		
				8								
-10.0				9	SPT-4		1-2-2 (4)		25.6			
				10								
				11								
				12								
				13								
-15.0	BASE OF BORING AT 15.0 FEET		15.0'	14	SPT-5		2-3-5 (8)		25.1			
				15								
				16								
				17								
				18								
-20.0				19								
				20								
				21								
				22								
				23								
				24								
-25.0				25								
				26								
				27								
				28								
				29								
WATER LEVEL OBSERVATIONS						STARTED: Aug 15 2025		FINISHED: Aug 15 2025				
WD	≡	Not Encountered				DRILL CO.: RC Drilling		EQUIPMENT: CME 550X				
IAD	▼	Not Encountered				DRILLER: Ron C.		LOGGED BY: Zach D.				
AD	≡	Not Performed				METHOD: Continuous Flight Auger						

BORING LOG NO. B-7							Sheet 1 of 1				
PROJECT NAME McDonalds - Leavenworth					CLIENT McDonalds USA LLC						
PROJECT NUMBER 025-02525					LOCATION Leavenworth, KS						
ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.327928 LONG: -94.921003										
	CONCRETE 0.5'										
	WELL-GRADED GRAVEL 1.0'										
	LEAN CLAY (CL), stiff, brown, moist to very moist		1	SPT-1		21-10-7 (17)		21.4			
			2								
			3								
			4	ST-2	CL		1.2	29.5	93.2	45/25	
			5								
-5.0			6								
	grades to soft		7	SPT-3		1-2-2 (4)		28.5			
			8								
			9	ST-4	CL			25.0	99.3	38/19	
-10.0			10								
			11								
			12								
			13								
			14	SPT-5		1-2-4 (6)		25.9			
-15.0	LEAN TO FAT CLAY (CL/CH), firm, reddish brown, very moist		15								
			16								
			17								
			18								
			19	SPT-6		2-2-4 (6)		27.2			
-20.0			20								
			21								
			22								
			23								
			24	SPT-7		1-2-3 (5)		26.6			
-25.0			25								
			26								
			27								
	grades to stiff		28								
			29	SPT-8		2-4-6 (10)		25.7			
BASE OF BORING AT 30.0 FEET			30.0'								
WATER LEVEL OBSERVATIONS					olsson STARTED: Aug 15 2025 FINISHED: Aug 15 2025 DRILL CO.: RC Drilling EQUIPMENT: CME 550X DRILLER: Ron C. LOGGED BY: Zach D. METHOD: Continuous Flight Auger						
WD	19.0 ft										
IAD	15.0 ft										
AD	Not Performed										

BORING LOG NO. B-8							Sheet 1 of 1				
PROJECT NAME				CLIENT							
McDonalds - Leavenworth				McDonalds USA LLC							
PROJECT NUMBER				LOCATION							
025-02525				Leavenworth, KS							
ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.327583 LONG: -94.921067										
	ROOT ZONE	0.3'	1	SPT-1				17.7			
	LEAN TO FAT CLAY (CL/CH), firm, brown, moist		2								
		3.0'	3								
	FAT CLAY (CH), firm, dark brown, very moist		4	ST-2	CH			26.0	96.1	55/31	
-5.0		5.0'	5								
	LEAN TO FAT CLAY (CL/CH), stiff to firm, brown, moist to very moist		6								
			7	SPT-3				26.1			
			8								
			9	ST-4			1.6	27.5	97.3		
-10.0			10								
			11								
			12								
			13								
			14	SPT-5				23.8			
-15.0			15								
			16								
			17								
			18								
			19	ST-6				25.3	99.1		
-20.0	BASE OF BORING AT 20.0 FEET	20.0'	20								
			21								
			22								
			23								
			24								
-25.0			25								
			26								
			27								
			28								
			29								
WATER LEVEL OBSERVATIONS						STARTED: Oct 02 2025		FINISHED: Oct 02 2025			
WD	≡	Not Encountered				DRILL CO.: RC Drilling		EQUIPMENT: CME 550X			
IAD	▼	Not Encountered				DRILLER: Ron C.		LOGGED BY: Zach D.			
AD	≡	Not Performed				METHOD: Continuous Flight Auger					

BORING LOG NO. B-9							Sheet 1 of 1				
PROJECT NAME McDonalds - Leavenworth				CLIENT McDonalds USA LLC							
PROJECT NUMBER 025-02525				LOCATION Leavenworth, KS							
ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" (N-VALUE)	UNC STR (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/REMARKS
	LAT: 39.327530 LONG: -94.921523										
	ROOT ZONE	0.3'	1								
	LEAN TO FAT CLAY (CL/CH), firm, brown, slightly moist to very moist		2	ST-1				15.3			
			3								
			4	SPT-2				23.7			
-5.0			5								
			6								
			7	ST-3				29.7	93.9		
			8								
-10.0			9	SPT-4				27.9			
			10								
			11								
			12								
	LEAN CLAY (CL), firm, brown, moist	13.0'	13								
			14	ST-5	CL		0.9	24.4	102.0	39/19	
-15.0			15								
	LEAN TO FAT CLAY (CL/CH), firm, brown, very moist	15.0'	16								
			17								
			18								
			19	SPT-6				25.7			
-20.0			20								
	BASE OF BORING AT 20.0 FEET	20.0'	21								
			22								
			23								
			24								
-25.0			25								
			26								
			27								
			28								
			29								
WATER LEVEL OBSERVATIONS						STARTED: Oct 02 2025		FINISHED: Oct 02 2025			
WD	≡	Not Encountered				DRILL CO.: RC Drilling		EQUIPMENT: CME 550X			
IAD	▼	Not Performed				DRILLER: Ron C.		LOGGED BY: Zach D.			
AD	≡	Not Performed				METHOD: Continuous Flight Auger					

SYMBOLS AND NOMENCLATURE

DRILLING NOTES

DRILLING AND SAMPLING SYMBOLS

SS: Split-Spoon Sample (1.375" ID, 2.0" OD)	HSA: Hollow Stem Auger	NE: Not Encountered
U: Thin-Walled Tube Sample (3.0" OD)	CFA: Continuous Flight Auger	NP: Not Performed
CS: Continuous Sample	HA: Hand Auger	NA: Not Applicable
BS: Bulk Sample	CPT: Cone Penetration Test	% Rec: Percent of Recovery
MC: Modified California Sampler	WB: Wash Bore	WD: While Drilling
GB: Grab Sample	RB: Rock Bit	IAD: Immediately After Drilling
SPT: Standard Penetration Test Blows per 6.0"	PP: Pocket Penetrometer	AD: After Drilling

DRILLING PROCEDURES

Soil samples designated as "U" samples on the boring logs were obtained in using Thin-Walled Tube Sampling techniques. Soil samples designated as "SS" samples were obtained during Penetration Test using a Split-Spoon Barrel sampler. The standard penetration resistance 'N' value is the number of blows of a 140-pound hammer falling 30 inches to drive the Split-Spoon sampler one foot. Soil samples designated as "MC" were obtained in using Thick-Walled, Ring-Lined, Split-Barrel Drive sampling techniques. Recovered samples were sealed in containers, labeled, and protected for transportation to the laboratory for testing.

WATER LEVEL MEASUREMENTS

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In relatively high permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with only short-term observations.

SOIL PROPERTIES & DESCRIPTIONS

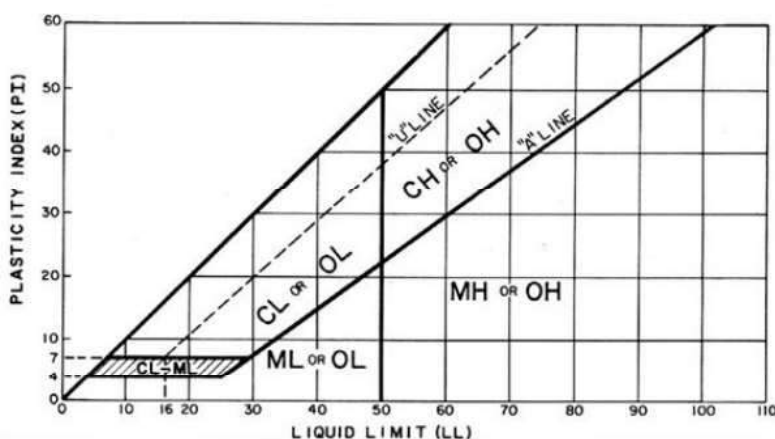
Descriptions of the soils encountered in the soil test borings were prepared using Visual-Manual Procedures for Descriptions and Identification of Soils.

PARTICLE SIZE

Boulders	12 in. +	Coarse Sand	4.75mm-2.0mm	Silt	0.075mm-0.005mm
Cobbles	12 in.-3 in.	Medium Sand	2.0mm-0.425mm	Clay	<0.005mm
Gravel	3 in.-4.75mm	Fine Sand	0.425mm-0.075mm		

COHESIVE SOILS		COHESIONLESS SOILS		COMPONENT %	
Consistency	Unconfined Compressive Strength (Qu) (tsf)	Relative Density	'N' Value	Description	Percent (%)
Very Soft	<0.25	Very Loose	0 - 3	Trace	<5
Soft	0.25 - 0.5	Loose	4 - 9	Few	5 - 10
Firm	0.5 - 1.0	Medium Dense	10 - 29	Little	15 - 25
Stiff	1.0 - 2.0	Dense	30 - 49	Some	30 - 45
Very Stiff	2.0 - 4.0	Very Dense	≥ 50	Mostly	50 - 100
Hard	> 4.0				

PLASTICITY CHART

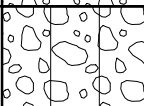
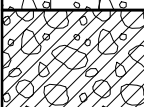
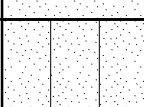
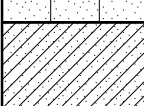
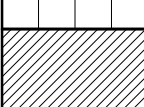
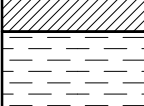
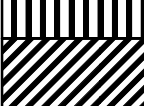
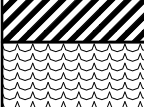
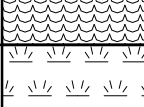


ROCK QUALITY DESIGNATION (RQD)

Description	RQD (%)
Very Poor	0 - 25
Poor	25 - 50
Fair	50 - 75
Good	75 - 90
Excellent	90 - 100

olsson®

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES	
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES	
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
		FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL			ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
			CH	INORGANIC CLAYS OF HIGH PLASTICITY		
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Field Exploration

Our drill crew advanced the borings for this exploration with an ATV-mounted drill rig using continuous-flight augers. Boring locations were located in the field by the drill crew using a hand-held GPS unit. The approximate locations of the borings are shown on the Boring Location Map.

Samples were obtained using the methods and at the depths shown on the logs. Recovered samples were sealed in containers, labeled, and protected for transportation to the laboratory for testing.

We interpolated the ground surface elevation at the boring locations using a topographic map provided by Olsson. The surface elevations at the boring locations, rounded to the nearest half-foot, are presented on the boring logs.

The drill crew prepared field boring logs during drilling operations. The field logs include drilling and sampling methods, sampling intervals, groundwater measurements, and general descriptions of the observed soil conditions. The final boring logs represent our engineering interpretation of the field logs based on visual classification and laboratory testing of the collected samples.

APPENDIX B

Laboratory Test Results



SUMMARY OF LABORATORY RESULTS

PROJECT NAME: McDonalds - Leavenworth
PROJECT NUMBER: 025-02525

CLIENT: McDonalds USA LLC
PROJECT LOCATION: Leavenworth, KS

[illegible]



SUMMARY OF LABORATORY RESULTS

PROJECT NAME:	McDonalds - Leavenworth
PROJECT NUMBER:	025-02525

CLIENT: McDonalds USA LLC

PROJECT LOCATION: Leavenworth, KS

[illegible]



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-1

Site Name

McDonalds - Leavenworth

Sample No.

2

Specimen Description

Lean to Fat Clay (CL/CH) - Reddish brown, moist

Depth

3.00

Sample Type

ST

LAB ID

OLAT202509023

Date of test

8/28/2025

Initial Conditions

Height

in

5.64

Diameter

in

2.85

Bulk Density

pcf

122.8

Water Content

%

24.0

Dry Density

pcf

99.0

Voids Ratio

0.702

Degree of Saturation

%

92.5

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

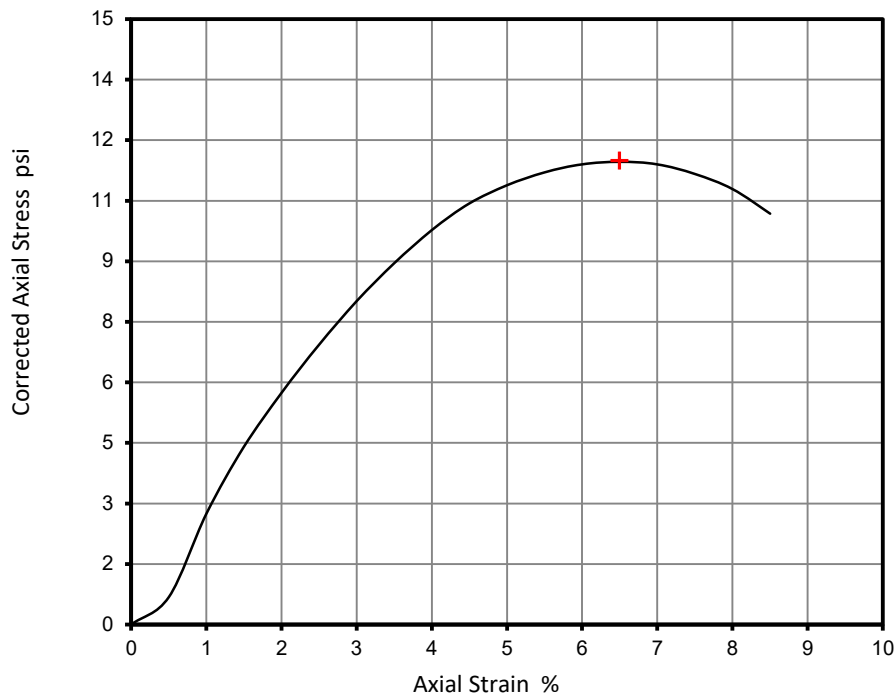
6.5

Maximum Stress

psi

11.5

Stress vs Axial Strain



Failure Picture

**Remarks**

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Fig. No.

1
Sheet
1



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-1

Site Name

McDonalds - Leavenworth

Sample No.

4

Specimen Description

Lean to Fat Clay (CL/CH) - Reddish brown, moist

Depth

8.00

Sample Type

ST

LAB ID

OLAT202509024

Date of test

8/28/2025

Initial Conditions

Height

in 5.65

Diameter

in 2.86

Bulk Density

pcf 125.7

Water Content

% 24.3

Dry Density

pcf 101.2

Voids Ratio

0.665

Degree of Saturation

% 98.6

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

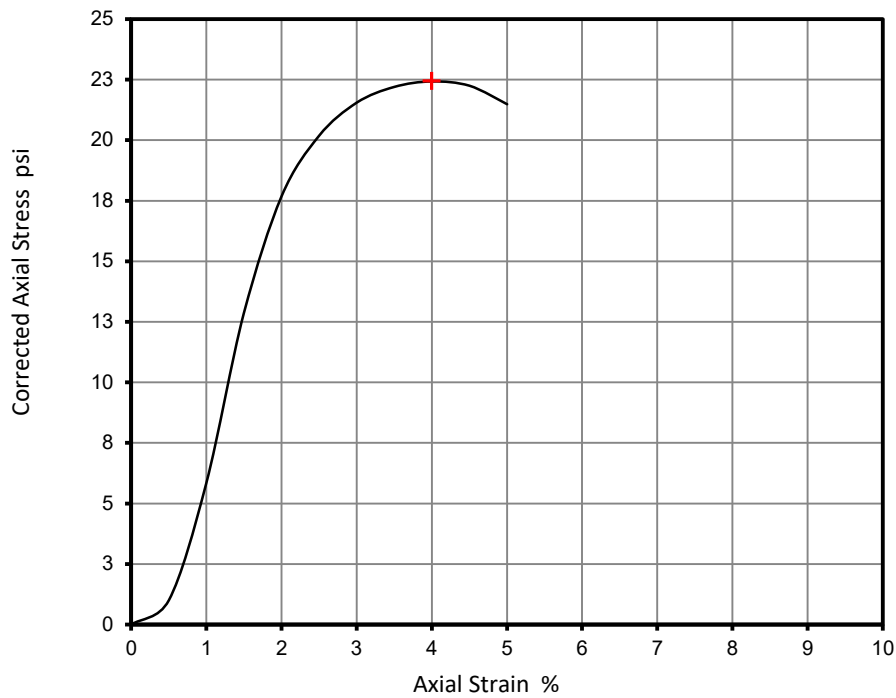
4.0

Maximum Stress

psi

22.4

Stress vs Axial Strain



Failure Picture



Remarks

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Fig. No.

1

Sheet

2



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-1

Site Name

McDonalds - Leavenworth

Sample No.

6

Specimen Description

Lean to Fat Clay (CL/CH) - Brown with dark brown, moist

Depth

18.00

Sample Type

ST

LAB ID

OLAT202509025

Date of test

8/28/2025

Initial Conditions

Height

in

5.65

Diameter

in

2.84

Bulk Density

pcf

122.7

Water Content

%

28.4

Dry Density

pcf

95.6

Voids Ratio

0.762

Degree of Saturation

%

100.5

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

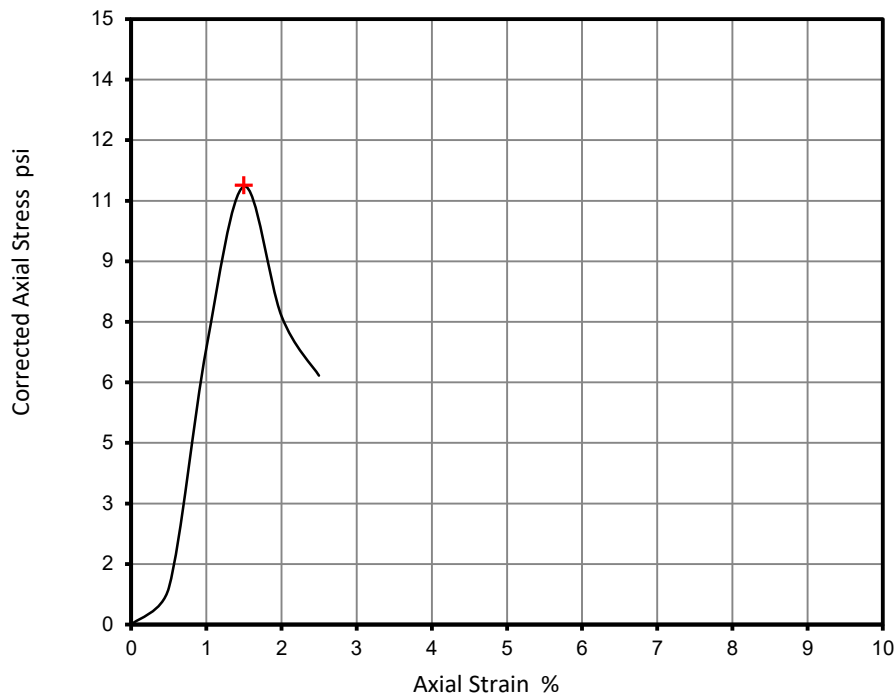
1.5

Maximum Stress

psi

10.9

Stress vs Axial Strain



Failure Picture

**Remarks**

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Fig. No.

1

Sheet

3



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-3

Site Name

McDonalds - Leavenworth

Sample No.

5

Specimen Description

Lean to Fat Clay (CL/CH) - Reddish brown, moist

Depth

13.00

Sample Type

ST

LAB ID

OLAT2025090216

Date of test

8/28/2025

Initial Conditions

Height

in

5.67

Diameter

in

2.85

Bulk Density

pcf

121.9

Water Content

%

27.6

Dry Density

pcf

95.6

Voids Ratio

0.763

Degree of Saturation

%

97.6

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

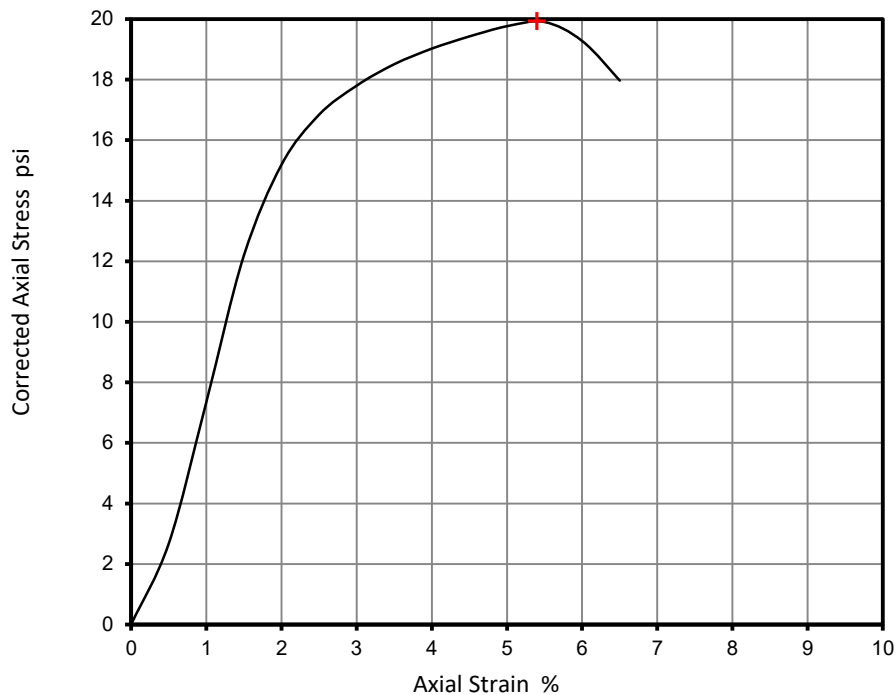
5.4

Maximum Stress

psi

19.9

Stress vs Axial Strain



Failure Picture

**Remarks**

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Fig. No.

1

Sheet

4



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-5

Site Name

McDonalds - Leavenworth

Sample No.

4

Specimen Description

Lean to Fat Clay (CL/CH) - Reddish brown with dark brown, moist

Depth

8.00

Sample Type

ST

LAB ID

OLAT2025090228

Date of test

8/28/2025

Initial Conditions

Height

in

5.65

Diameter

in

2.83

Bulk Density

pcf

125.3

Water Content

%

23.7

Dry Density

pcf

101.3

Voids Ratio

%

0.664

Degree of Saturation

%

96.6

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

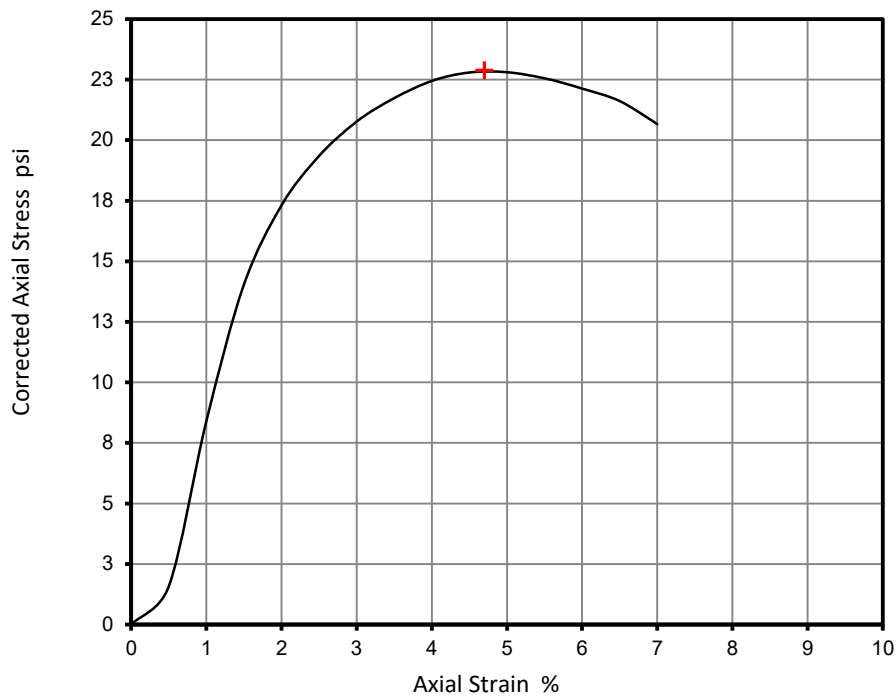
4.7

Maximum Stress

psi

22.9

Stress vs Axial Strain



Failure Picture

**Remarks**

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Fig. No.

1

Sheet

5



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-6

Site Name

McDonalds - Leavenworth

Sample No.

1

Specimen Description

Lean to Fat Clay (CL/CH) - Reddish brown to brown, moist

Depth

1.00

Sample Type

ST

LAB ID

OLAT2025090232

Date of test

8/28/2025

Initial Conditions

Height

in

5.58

Diameter

in

2.82

Bulk Density

pcf

122.4

Water Content

%

28.8

Dry Density

pcf

95.0

Voids Ratio

0.773

Degree of Saturation

%

100.5

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

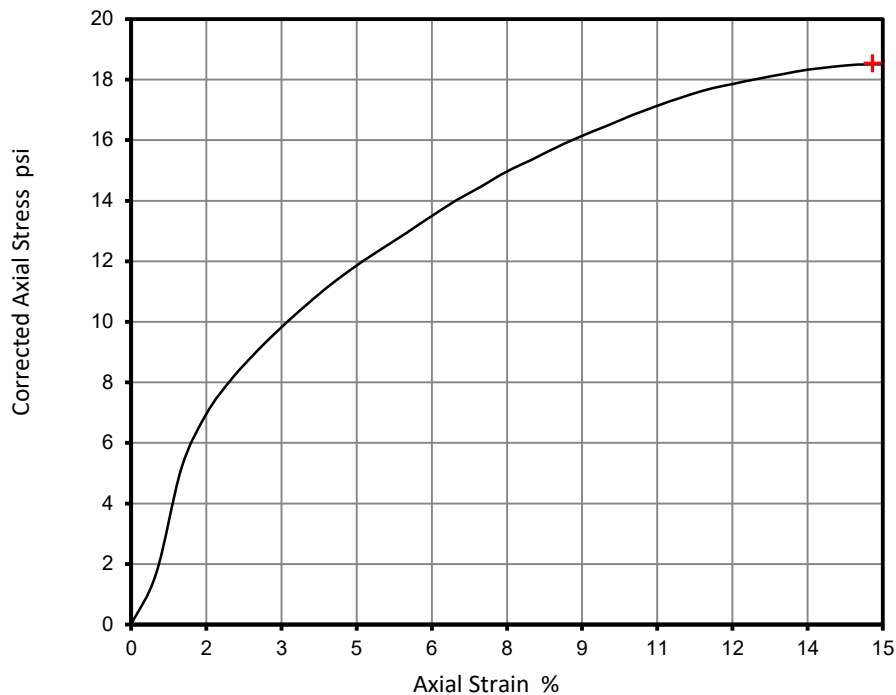
14.8

Maximum Stress

psi

18.5

Stress vs Axial Strain



Failure Picture



Remarks

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Fig. No.

1

Sheet

6



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-6

Site Name

McDonalds - Leavenworth

Sample No.

3

Specimen Description

Lean to Fat Clay (CL/CH) - Brown, moist

Depth

6.00

Sample Type

ST

LAB ID

OLAT2025090233

Date of test

8/28/2025

Initial Conditions

Height

in

5.64

Diameter

in

2.84

Bulk Density

pcf

125.3

Water Content

%

26.0

Dry Density

pcf

99.5

Voids Ratio

0.694

Degree of Saturation

%

101.1

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

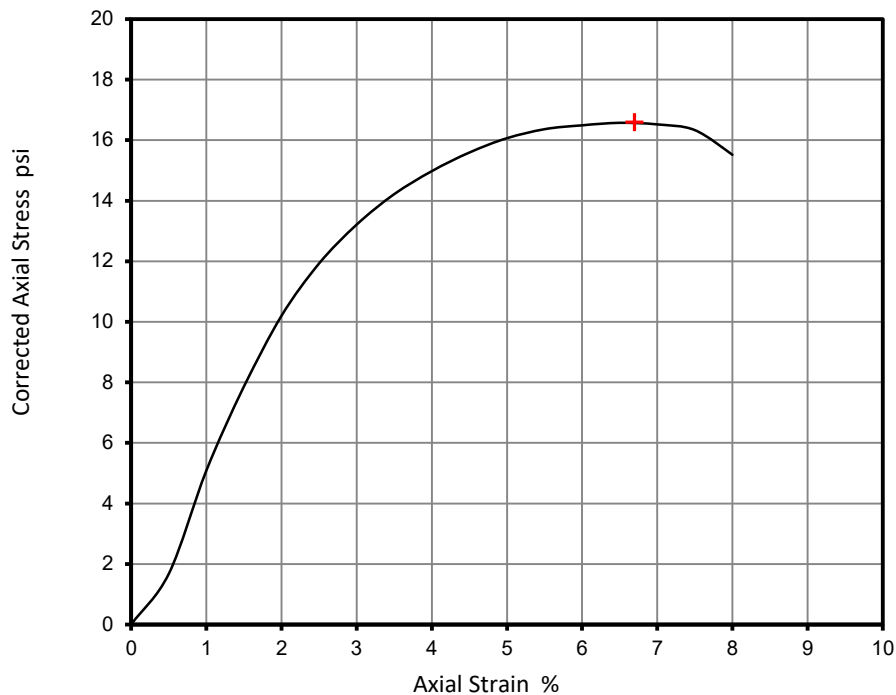
6.7

Maximum Stress

psi

16.6

Stress vs Axial Strain



Failure Picture

**Remarks**

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Fig. No.

1

Sheet

7



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-7

Site Name

McDonalds - Leavenworth

Sample No.

2

Specimen Description

Lean to Fat Clay (CL/CH) - Brown with dark brown, moist

Depth

3.00

Sample Type

ST

LAB ID

OLAT2025090240

Date of test

8/28/2025

Initial Conditions

Height

in 5.65

Diameter

in 2.81

Bulk Density

pcf 120.6

Water Content

% 29.5

Dry Density

pcf 93.2

Voids Ratio

0.808

Degree of Saturation

% 98.5

Trimmings

Rate of Strain applied

1.0

At failure

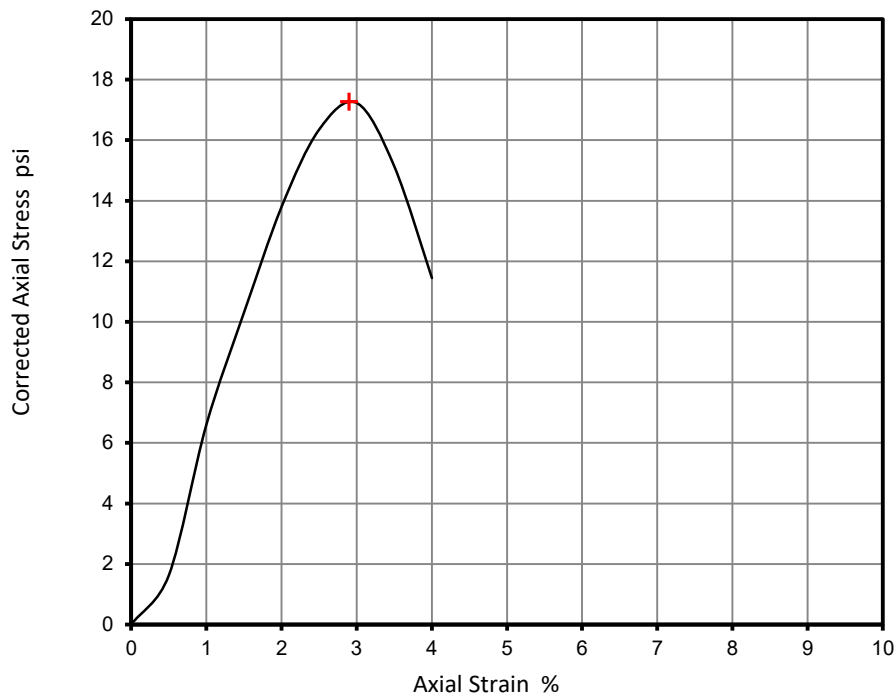
Axial Strain

% 2.9

Maximum Stress

psi 17.3

Stress vs Axial Strain



Failure Picture



Remarks

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Fig. No.

1
Sheet
8



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-8

Site Name

McDonalds - Leavenworth

Sample No.

4

Specimen Description

Lean to Fat Clay (CL/CH), moist, yellowish brown to brown

Depth

8.00

Sample Type

ST

LAB ID

OLAT2025102320

Date of test

10/31/2025

Initial Conditions

Height

in

5.66

Diameter

in

2.80

Bulk Density

pcf

124.0

Water Content

%

27.5

Dry Density

pcf

97.3

Voids Ratio

0.732

Degree of Saturation

%

101.3

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

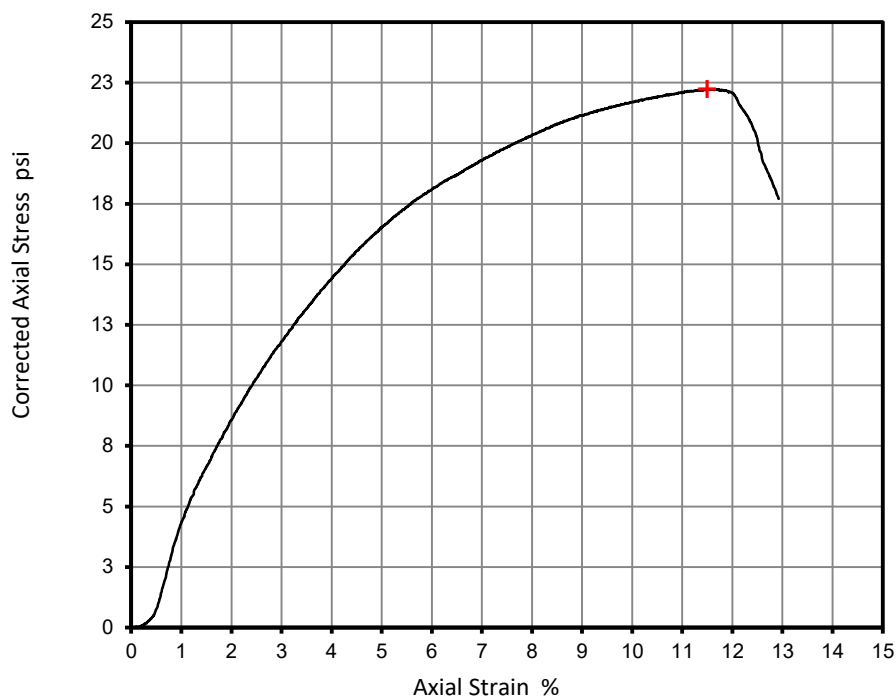
11.5

Maximum Stress

psi

22.2

Stress vs Axial Strain



Failure Picture



Remarks

N/A

Fig. No.

1
Sheet

1



Unconfined Compressive Strength Test

Job Ref

025-02525

Borehole/Pit No.

B-9

Site Name

McDonalds - Leavenworth

Sample No.

5

Specimen Description

Lean to Fat Clay (CL/CH), moist, light yellowish brown and strong brown

Depth

13.00

Sample Type

ST

LAB ID

OLAT2025102317

Date of test

10/31/2025

Initial Conditions

Height

in

5.64

Diameter

in

2.80

Bulk Density

pcf

126.9

Water Content

%

24.4

Dry Density

pcf

102.0

Voids Ratio

0.652

Degree of Saturation

%

101.2

Trimmings

Rate of Strain applied

1.0

At failure

Axial Strain

%

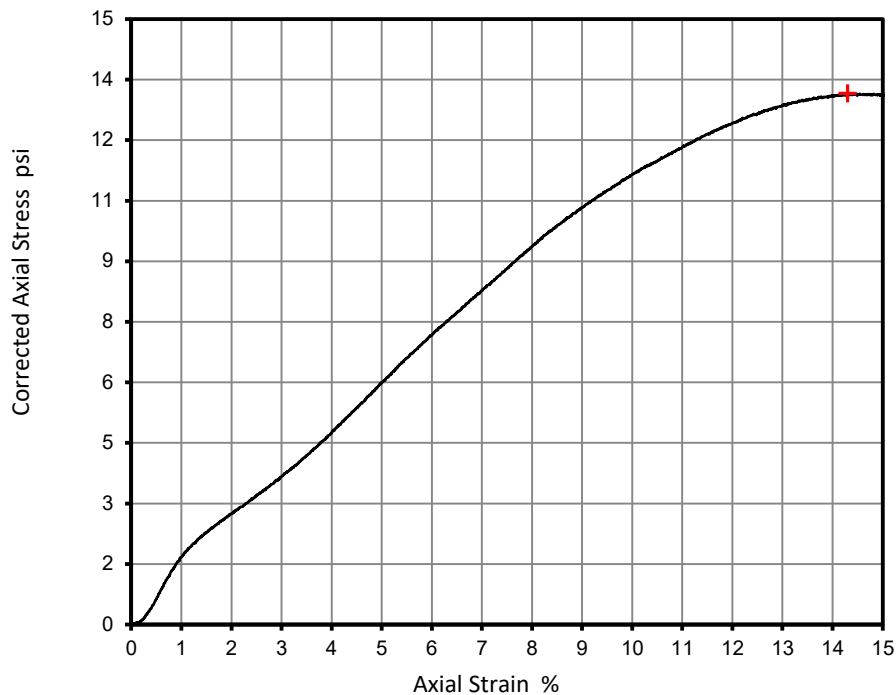
14.3

Maximum Stress

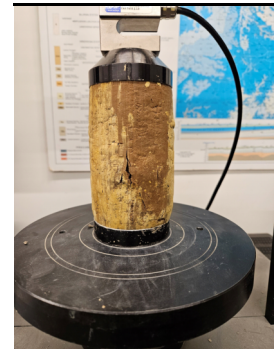
psi

13.2

Stress vs Axial Strain



Failure Picture



Remarks

N/A

Fig. No.

1

Sheet

2

MCDONALD'S – LEAVENWORTH (015-0404)

Leavenworth, Kansas

Revision 1 – November 2025

Olsson Project No. 025-02525

