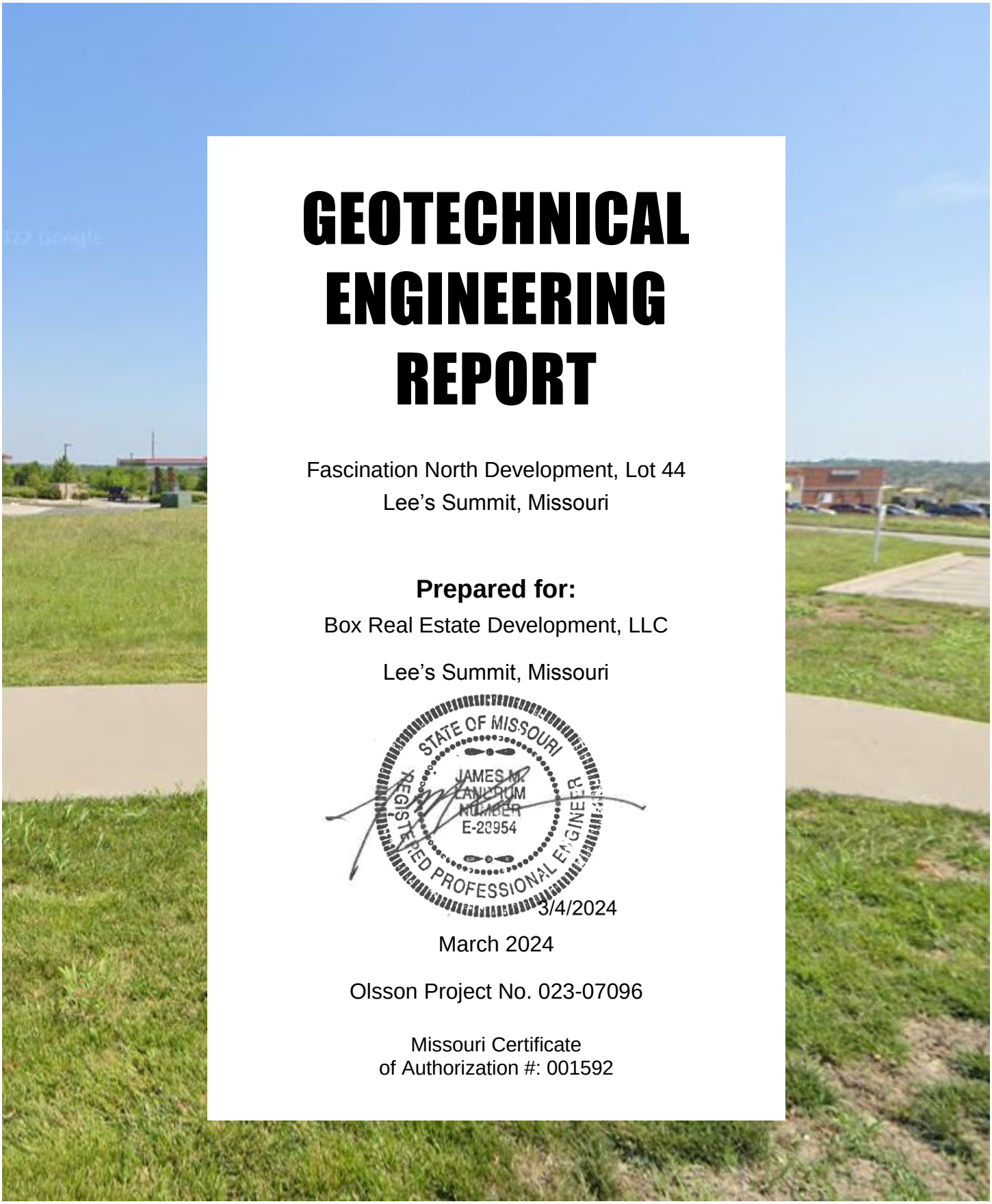

GEOTECHNICAL ENGINEERING REPORT

Fascination North Development, Lot 44
Lee's Summit, Missouri

Prepared for:

Box Real Estate Development, LLC

Lee's Summit, Missouri

STATE OF MISSOURI
JAMES M. CANNUM
NUMBER E-28954
REGISTERED PROFESSIONAL ENGINEER
3/4/2024

March 2024

Olsson Project No. 023-07096

Missouri Certificate
of Authorization #: 001592

olsson®

March 4, 2024

Box Real Estate Development, LLC
Attn: Russell Pearson
3152 SW Grandstand Circle
Lee's Summit, Missouri 64081

RE: Geotechnical Engineering Report
Lot 44
Fascination North Development
Lee's Summit, Missouri
Olsson Project No. 023-07096

Dear Mr. Pearson,

Olsson previously advanced borings and observed test pits within Lot 44 of the Fascination North Development in Lee's Summit, Missouri. Based on our previously completed explorations, and in general accordance with our "Letter Agreement for Professional Services" dated February 13th, 2024, the enclosed report summarizes our project understanding, , summarizes the subsurface conditions encountered at our previous borings, and, based on these conditions, provides our geotechnical engineering recommendations for the structure and associated parking area planned on Lot 44. Our previous explorations indicate that the site contains unsuitable existing fill. In our opinion, portions of the existing fill that are relatively free of unsuitable materials can remain in place provide the client understands and accepts the associated risks, or all existing fill should be removed and replaced with structural fill.

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

Respectfully submitted,
Olsson, Inc.
Missouri Certificate of Authority No. *001592*

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1. PROJECT UNDERSTANDING

1.1 Project Information

The proposed multi-tenant building will be located northeast of the intersection of Southwest Longview Boulevard and Southwest Fascination Drive in Lee's Summit, Missouri as shown in **Figure 1**.

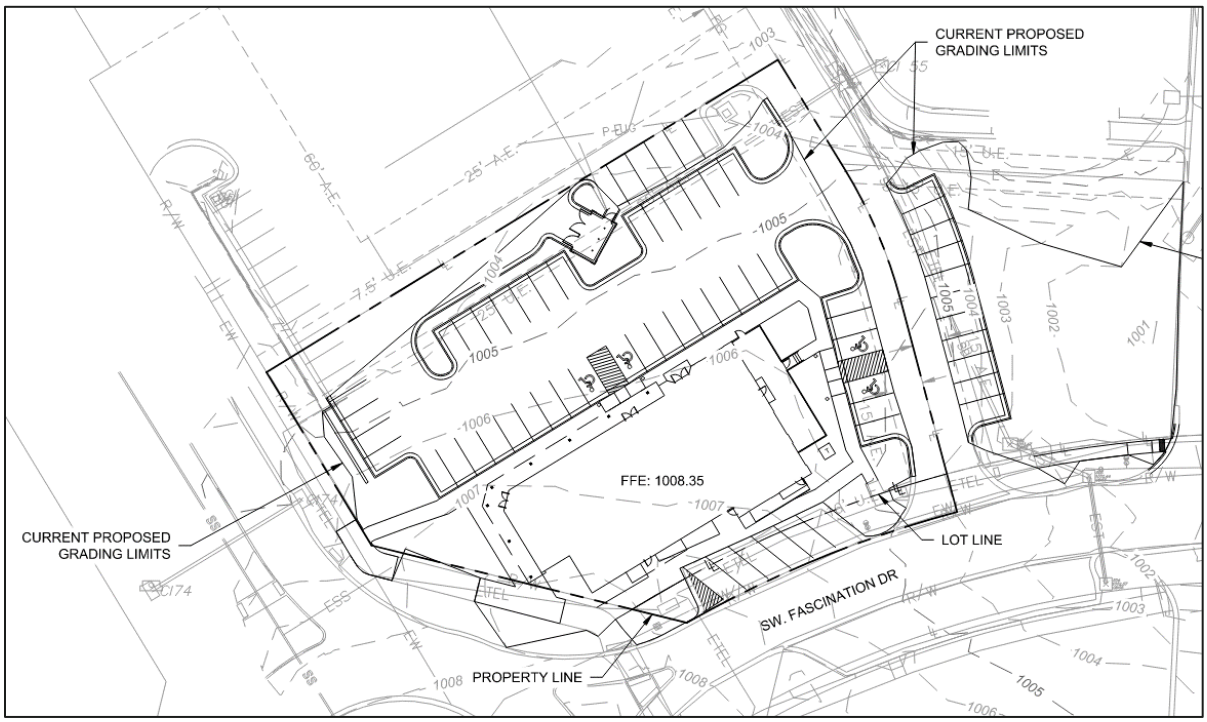


Figure 1. Site Plan Exhibit, prepared by Olsson 02.16.2024

Our understanding of the project is summarized in **Table 1**.

Table 1. Project Information.

Project Summary		Notes
Lot 44 Multi-tenant Building	5,889 SF	Single story, slab on grade, steel frame and concrete masonry unit (CMU) construction as well as fiber-cement panel construction.
Maximum Column Load	120 kips	Assumed
Maximum Wall Load	6 kips per linear foot	Assumed
Floor Slab Load	250 psf	Assumed
Finish Floor Elevation	1008.35 feet	Existing ground surface elevations across the site range from 1003 feet to 1008 feet. We anticipate less than 5 feet of cut and fill above the existing ground surface elevations.
Note: If the structural loads or site grading exceed these values, the geotechnical engineer should be contacted to verify that the recommendations contained in this report remain valid.		

1.2 Site Description

Our review of readily available aerial photographs show that Lot 44 was previously stripped and graded during construction of the surrounding developments beginning in 2004. We have not been provided with any documentation regarding the earthwork (including fill placement) completed on the lots planned for future development. We understand the fill placed at the site was not placed with material, moisture or compaction control. At the time of our exploration, the ground surface at the lots was generally grass covered (**Figure 2**).

Figure 2. 2023 Aerial Photograph/Project Location Plan.

2. SUBSURFACE CONDITIONS

Olsson previously completed borings and test pits at the site in 2017 and 2018. As part of this project, we reviewed boring logs from the "Geotechnical Engineering Report, Fascination North Development, Southwest Fascination Drive, Lee's Summit, Missouri" prepared by Olsson and dated November 22nd, 2017. The boring logs that were located on Lot 44 are provided in **Appendix A**. We also reviewed the test pit photographs within "Geotechnical Report Addendum No. 1, Fascination North Development – Lot 44" prepared by Olsson and dated May 17th, 2018. The test pit photographs are provided in **Appendix B**. The appended borehole reports and test pit logs represent subsurface conditions at the specific boring and test pit locations at the time of our field explorations; variations may occur between or beyond the borings and test pits. The stratification lines shown on the logs represent the approximate boundary between material types. However, the transition between layers may be gradual.

2.1 Subsurface Profile

Borings completed by Olsson in 2017 indicate that the subsurface soils at the site consisted of previously placed fill materials that extended to depths of 15+ feet below the ground surface. The fill generally consisted of a mixture of clay, shale, sand, gravel, and organics. The moisture content and consistency of the fill varied across the site and with depth. Documentation related to the placement of the existing fill was not available at the time of this report. The fill could extend deeper or contain significantly different materials in locations that were not explored.

Test pits observed by Olsson in 2018 indicate that deeper fills are located in the eastern third of the site, and shallow limestone and shale bedrock are located on the west side of the site. Limestone bedrock was encountered at depths of 5 feet, 3 feet, and 3 feet below the existing ground surface at test pit locations TP-1, TP-3, and TP-5, respectively. Weathered gray shale was encountered at an approximate depth of 10 feet at test pit location TP-4. The test pit at location TP-2 terminated in the existing fill at a depth of 9 feet.

2.2 Water Level Observations

Subsurface water was not encountered in the borings or the tests pits at the time of drilling operations and excavation (2017/2018). However, water levels can and should be anticipated to vary between boring locations and to fluctuate over time with variations in precipitation, site grading, drainage, and adjacent land use. Perched subsurface water conditions can also develop in seams of loose or granular soil, within existing fill, and near the soil and bedrock interface. 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. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

3. GEOTECHNICAL CONSIDERATIONS

The existing fill encountered at the site generally consisted of a mixture of clay, shale, sand, gravel, and organics. The variability of the fill we observed at the borings and test pits indicates that the fill was likely not placed with the strict material, moisture and/or density control needed below new structures. While not encountered in the borings or test pits, soft zones, voids, and trapped water could be present within the existing fill.

In our opinion, portions of the existing fill that are relatively free of debris may remain in place beneath the building and pavements provided the owner understands and accepts the associated risks. The risks associated with supporting the new building foundations, floor slabs and pavements over existing fill of variable composition and quality similar to what was encountered at the borings and test pits include, but are not limited to, greater than anticipated settlements, voiding beneath floor slabs, increased levels of distress in pavements, and increased maintenance costs. These movements can result in uneven floor slabs, cracks in walls, racked doorways and other distress that may require future underpinning or pressure grouting operations.

If the owner understands and accepts the associated risks, all existing fill encountered within 3 feet or one footing width (whichever is greater) of planned foundation bearing elevation, within 6 feet of planned bottom of slab elevation, and within 2 feet of the bottom of pavements be undercut and replaced with structural fill. Undercutting of existing fill should extend laterally at least 5 feet beyond footing edges and building wall lines and at least 2 feet beyond the edge of pavements.

The undercutting recommendations presented herein are intended to provide a zone of uniformly compacted structural fill below foundations, slabs, and pavements that should reduce, but not eliminate, the potential for larger than anticipated differential settlement. Even with the recommended construction testing and observation, there is a risk that unsuitable material within or buried by the remaining fill will not be discovered. These risks cannot be eliminated without removing the fill. If the owner is unwilling to assume these risks, we recommend that all existing fill be removed and replaced with structural fill.

4. STRUCTURES DESIGN

4.1 Shallow Foundations

In addition to removing the existing fill beneath the structure as previously discussed, the conditions observed in the test pits indicate that the foundations for the building could bear on newly placed structural fill on the east side of the site transitioning to be on or near limestone bedrock on the west side. Foundations supported on bedrock would be expected to exhibit minimal settlement, while footings supported on clayey soils could experience movements as indicated in **Table 2**. These movements could be exacerbated by the presence of undiscovered unsuitable conditions within existing fill materials that remain in place below the newly placed structural fill. In any case, provided that abrupt changes in bearing materials (soil and bedrock) over short distances are avoided, the differential movement should occur gradually across the building areas. This movement could lead to cracking in the foundation wall near the transition zone. If no risk of differential settlement can be tolerated, the footings would need to bear on similar materials (entirely on bedrock or entirely on structural fill).

Foundations supported on the recommended structural fill and/or limestone bedrock can be designed and proportioned in accordance with the allowable bearing pressures in the following table.

Table 2. Shallow Foundation Design Parameters.

Design Parameter		Recommended Value
Net Allowable Bearing Pressure[1]	Structural Fill (extending 3 feet or one footing width ,whichever is greater, below planned foundation bearing elevations) and/or bedrock	2,500 psf
Estimated Total Settlement[2]		Order of 1 inch or less for soil supported Order of ½ inch or less for rock supported Settlement in existing fill areas could exceed 1 inch[3]
Estimated Differential Settlement[2,4]		1 inch between rock supported and soil supported
Minimum Exterior Foundation Depth (Frost Protection)		3 feet
Minimum Interior Foundation Depth		1 foot
Minimum Foundation Size(s)		12 inches for earth formed trench footings 18 inches for continuous footing 30 inches for isolated column footings

1. The net allowable bearing pressure is the bearing pressure in excess of the minimum surrounding overburden pressure at the foundation level. The net allowable soil bearing pressure may be increased by 1/3 for transient loads such as wind or seismic loads.
2. Foundation settlement estimates are based on the anticipated structural loads as described in the Project Understanding section of this report and our experience. If higher loads are anticipated, Olsson should be contacted to update the recommendations in this report.
3. The risks associated with supporting the new building foundations and floor slabs over existing fill of variable composition and quality similar to what was encountered at the borings and test pits include, but are not limited to, greater than anticipated settlements and voiding beneath floor slabs.

4. Some differential performance of footings and slabs would occur but should occur gradually across the building area provided the transition from footings and slabs supported on bedrock to those supported on structural fill extending to bedrock and structural fill over existing fill occurs gradually. The risk of differential settlement can be reduced by supporting all the foundations and slabs on similar materials.

Lightly loaded interior partition walls (applying less than 0.75 kips per lineal foot) may be supported directly on slab-on-grade floor; although it may be appropriate to increase the floor slab reinforcement or provide a thickened slab cross-section below the interior walls. For interior walls with loads greater than 0.75 klf, we recommend that a footing be installed, independent from the floor slab to properly distribute the wall loads to the underlying soils and reduce the potential for floor slab damage.

As discussed in the geotechnical considerations section of this report, all existing fill encountered within 3 feet or one footing width (whichever is greater) of planned foundation bearing elevations should be removed and replaced with structural fill. Overexcavation of existing fill should extend laterally at least 5 feet beyond building foundation edges. Once the fill is undercut, but prior to placing new structural fill, the exposed subgrade should be evaluated by Olsson. Any loose debris, soft materials, rubble fill or otherwise unsuitable material that are observed should also be removed and replaced with structural fill. Structural fill should be placed in accordance with the Structural Fill section of this report and compacted to at least 95 percent of the material's maximum standard Proctor dry density (ASTM D-698) at the specified moisture contents.

After foundation subgrades have been observed and any required measures are preformed, concrete should be placed as quickly as possible to avoid exposure of the foundation subsoils to wetting, drying, or freezing. If foundation soils are subject to such conditions, Olsson should be contacted to reevaluate the foundation bearing materials.

4.2 Floor Slabs

As discussed in the geotechnical considerations section of this report, all existing fill encountered within 6 feet of planned bottom of slab elevation should be removed and replaced with structural fill. Overexcavation of existing fill should extend laterally at least 5 feet beyond building wall lines. Once the fill is undercut, but prior to placing new structural fill, the exposed subgrade should be evaluated by Olsson. Any loose debris, soft materials, rubble fill or otherwise unsuitable material that are observed should be removed and replaced with structural fill. All structural fill should be placed in accordance with the Structural Fill section of this report.

We recommend that all floor slabs be supported by a minimum of 18 inches of low volume change (LVC) fill material capped with a 4-inch-thick free draining granular leveling course (e.g., ASTM C-33 size No. 57 stone). The LVC fill should extend 2 feet beyond the building perimeter.

The LVC material should consist of a well graded granular material meeting the requirements of MoDOT Type 5 aggregate.

A modulus of subgrade reaction of 150 pounds per cubic inch (pci) can be used for floor slab thickness design.

Care should be taken to maintain the recommended subgrade moisture content and density between site grading operations and placement of the floor slab. Periodic applications of water may be necessary to maintain the proper moisture content of the subgrade.

In many construction projects, floor slab areas are disturbed by construction equipment traffic and are exposed to the elements between completion of grading operations and placement of the floor slab. Therefore, we recommend that the final floor slab subgrade be proofrolled and evaluated for moisture content and density immediately prior to placement of the granular leveling course or floor slab concrete. Unsuitable soils should be moisture conditioned and recompacted in accordance with **Section 6.2**.

If flooring and adhesives sensitive to moisture will be used on flooring, then moisture vapor transfer through the concrete slab may be of concern. A synthetic vapor barrier can be used to mitigate moisture vapor transfer. The vapor barrier should be installed per ACI guidelines. If used, care should be taken to minimize any damages to the barrier during construction, and any visual damage should be repaired prior to aggregate placement (e.g., granular drainage material or concrete).

The procedures recommended above may not eliminate all future subgrade volume change and resultant floor slab movement. However, the outlined procedures should reduce the potential for subgrade volume change. Common construction practice is to tie the slab-on-grade into the foundation elements to limit the impact of differential movement at doorways and windows. Depending on the location of construction joints in the slab, the rigidity of the slab and foundation connections, and the magnitude of actual movement that occurs, some minor cracking within the floor slab could occur and should be anticipated. Leaky utility lines or water allowed to accumulate beneath the slab could lead to significant movements of the slab.

4.3 Seismic Site Classification

For this project site, the soil conditions encountered at the boring are consistent with Site Class "C" (Very Dense Soil and Soft Rock profile) as defined by the International Building Code. Our review of the site class is based on the soil conditions encountered in the borings during the exploration and our assumption that the encountered soil conditions are underlain by similar native materials to those encountered which extend to a depth of 100 feet.

4.4 Utilities and Landscaping

Bedding material below and above for site utilities should be in accordance with local building codes. The remaining utility trench should consist of cohesive structural fill placed in accordance with **Table 4**. We also recommend clay plugs or water stops be installed where utility lines enter the building. Clay plugs should extend a minimum of 5 feet from the building exterior.

To reduce the effects of moisture fluctuations in and around the structure and pavements caused by landscaping and maintenance, we recommend the following:

- Downspout drainage should discharge onto splash blocks extending at least 5 feet away from the building.
- Incorporate splash blocks for external hose connections to prevent localized flooding of foundation or backfill soils. Cutoff valves should be installed inside the building to prevent unauthorized use of external hose connections.
- Restrict the type and location of landscaping vegetation around the proposed structure. Maintain a minimum distance between the structure and trees or shrubs equal to the mature radius of the tree or shrub plus 3 feet. Plant native and decorative grasses at least 5 feet from buildings. Poorly placed vegetation can result in settlement induced by desiccation or uplift caused by root growth. These recommendations may be modified in consultation with a landscape architect.
- Ensure that irrigation near the building is carefully controlled and minimized. Avoid installing sprinklers adjacent to foundation or retaining walls and inform building maintenance personnel of the importance of avoiding excessive watering.

5. PAVEMENT DESIGN

We assumed the planned pavements at this project site will be subject to personal vehicle traffic (cars, pickup trucks, and SUVs) and the occasional delivery or garbage truck.

5.1 Recommended Pavement Sections

As discussed in the geotechnical considerations section of this report, all existing fill encountered within 2 feet of planned bottom of pavements should be removed and replaced with structural fill. Overexcavation of existing fill should extend laterally at least 2 feet beyond the edge of pavements. Once the fill is undercut, but prior to placing new structural fill, the exposed subgrade should be proofrolled and evaluated by Olsson. Any loose debris, soft materials, rubble fill or otherwise unsuitable material that are observed should be removed and

replaced with structural fill. All structural fill should be placed in accordance with the Structural Fill section of this report.

We understand that new pavements will be placed around the planned structure discussed in this report. Pavement section thicknesses are influenced by anticipated traffic loads and volume, site subgrade conditions, pavement materials, and the desired design life. Changes in traffic conditions can have a significant impact on the service life of the pavement. Such changes could include increases in overall traffic counts, increases in truck traffic, or the unanticipated application of static or turning loads. The recommended minimum pavement section thicknesses are based on the site being prepared in accordance with **Section 6.2** of this report and that site drainage minimizes the future wetting of the pavement subgrade.

Our recommended minimum pavement thicknesses for Asphaltic Concrete (AC) and Portland Cement Concrete (PCC) are presented in the following table. These minimum thicknesses are based on our experience with similar pavement applications.

Table 3. Recommended Pavement Sections.

	Layer	Layer Thickness (inches)[1]	
		Personal Vehicle Parking/Drive Areas	Trash Container Pad
AC w/Granular Base	AC Surface Course	2.0	
	AC Base Course	4.0	
	Gravel Base (MoDOT Type 5 Aggregate)	6.0	
	Prepared Subgrade	6.0 (Chemically Stabilized) [3,4]	
Portland Cement Concrete[2]	PCC	6.0	8.0
	Clean Rock Base (ASTM C33 No. 57 Aggregate)	4.0	4.0
	Prepared Subgrade	9.0	9.0 (Chemically Stabilized)[3]

1. In general accordance with the City of Lee's Summit Specifications.
2. We recommend PCC pavements be used in areas with frequent start-stop or turning traffic such as entrance and exit aprons or the parking stalls closest to buildings, as well as areas that support stationary loads such as dumpsters.
3. Chemically stabilized subgrade treated with approximately 5% hydrated lime or cement (dry weight basis).The actual quantity of hydrated lime or cement required to stabilize the subgrade may vary depending on the soil conditions encountered at the site during construction.
4. As an alternate to chemically stabilized subgrade, 4 inches of mechanically stabilized baserock may be used. The baserock should consist of MoDOT Type 5 aggregate and should be reinforced with biaxial geogrid, triangular geogrid, or woven polypropylene geotextiles that are listed in the City of Lee's Summit Public Works Approved Products Lits.

Light duty pavement sections are intended for passenger car parking areas and are not suitable for tractor-trailer traffic. Heavy duty pavement sections are intended for areas that will

experience high traffic volumes or heavy axle loads such as main access drives and delivery or trash truck routes.

Proper pavement performance depends on a subgrade that is relatively uniform, with no abrupt changes in the degree of support. Non-uniform pavement support can result from variations in soil type or moisture content, as well as at the transition from cut to fill areas or where improperly placed utility backfill has been placed across or through pavement areas. Improper subgrade preparation such as inadequate vegetation removal, failure to identify soft or unstable areas by proofrolling, or inadequate compaction can also result in non-uniform subgrade support.

The pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate subdrainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase. Drainage of granular base is particularly important where two different sections of pavement (such as AC and PCC) abut, so that water does not pond beneath the pavements and saturate the subgrade soils.

Surface drainage around the pavement and proper maintenance are also important for long-term performance. All driving surfaces should be sloped approximately ¼ inch per foot to provide rapid drainage of surface water. Water should not be allowed to pond on or adjacent to the pavements because it could saturate the subgrade and contribute to premature pavement deterioration. Any curbs should be backfilled as soon as possible after construction of the pavement. Backfill should be compacted and should be sloped to prevent water from ponding and infiltration under the pavement. All pavement joints should be sealed, and any cracks should be quickly patched or sealed to prevent moisture from leaching into and softening the subgrade.

Routine maintenance of driving surfaces is also important for long-term performance and would consist of periodic seal coats and possibly an intermediate mill and overlay for AC pavements, and regular crack maintenance for AC and PCC pavements.

Construction traffic on the pavements has not been considered in the above noted typical sections. If construction scheduling dictates that the pavements will be subject to traffic by construction equipment/vehicles, 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 Site Preparation

6.1.1 General

Site preparation should commence with stripping of vegetation, organic soils, and any loose, soft or otherwise unsuitable material from the entire construction area. Soft and/or wet soils could also be encountered near the soil and bedrock interface. These materials should be carefully separated to avoid incorporation of organic materials into new fill sections in building or pavement areas. If any existing or abandoned underground utilities are located within proposed construction areas, a representative of ***Olsson*** should evaluate the trench backfill to determine if the backfill should be undercut and replaced.

As discussed in the geotechnical considerations section of this report, all existing fill encountered within 3 feet or one footing width (whichever is greater) of planned foundation bearing elevations, within 6 feet of planned bottom of slab elevation, and within 2 feet of the bottom of pavements should be removed and replaced with structural fill. Overexcavation of existing fill should extend laterally at least 5 feet beyond footing edges and building wall lines and at least 2 feet beyond the edge of pavements.

After stripping and undercutting of existing fill in pavement areas, and where possible where existing fill had been undercut in building areas, the exposed subgrade should be observed and proofrolled with a loaded tandem axel dump truck weighing at least 20 tons(or equivalent soil loading) prior to placement of new fill. Any loose debris, soft materials, rubble fill or otherwise unsuitable material located by visual observation and/or proofrolling should be removed and replaced with structural fill. The extent of areas requiring removal will depend on the conditions observed at the time of construction.

Upon completion of the subgrade evaluation, the upper 9 inches of exposed subgrade should be scarified, moisture conditioned to within optimum and 4 percent above optimum moisture content, and recompacted to at least 95 percent of the materials standard Proctor maximum dry density (ASTM D-698).

6.2 Structural Fill

All structural fill soils should also be relatively free of organic materials (less than about 5 percent by weight), debris, and particles larger than 3 inches in nominal diameter. In our opinion, the existing fill would not be suitable for reuse as structural fill beneath the new building or within 2 feet of pavement subgrade elevations. We anticipate that offsite borrow materials will

need to be imported to develop final site grades. Samples of each borrow source should be submitted to Olsson for testing and approval prior to being hauled to the site.

We recommend that structural fill be compacted in accordance with the criteria listed in the following table. An Olsson field representative should observe fill and backfill placement operations and perform field moisture-density tests to document whether moisture content and compaction requirements are being achieved.

Table 4. Structural Fill Placement Guidelines.

Area of Fill Placement	Suitable Material (USCS or Description)	Compaction (ASTM D698 - Standard Proctor)	Moisture Content (Percent of Optimum)
Cohesive Structural Fill –	Imported Clay soils with LL<50 and PI<30	95%	Optimum to +4 percent
Granular Structural Fill –	Well-graded Gravel (MoDOT Type 5)	95%	As necessary to obtain density
Granular Leveling Course – below floor slabs	ASTM C33 Size No. 57 Stone	70 percent Relative Density[1]	As necessary to obtain density
18" Low Volume Change Fill – below floor slabs	Well-graded Gravel (MoDOT Type 5) or Clay Soils with LL<50 and PI<25	95%	As necessary to obtain density Optimum to +4 percent
Pavement Gravel Base –	MoDOT Type 5	95%	As necessary to obtain density
Pavement Subgrade –	Chemically Stabilized Subgrade[2] (see **Table 3**)	95%	-3 percent to +3 percent

1. ASTM D4253 and ASTM D4254.
2. Chemically stabilized subgrade treated with approximately 5% hydrated lime or cement (dry weight basis).The actual quantity of hydrated lime or cement required to stabilize the subgrade may vary depending on the soil conditions encountered at the site during construction.

Suitable fill material should be placed in loose lifts of 9 inches or less. The soil should be compacted using equipment that is the appropriate type and properly sized for the job. To facilitate compaction within small excavations (i.e., in footing trenches, utility trenches, or around manholes) vibrating plate compactors, walk behind sheepsfoot compactors or jumping jack compactors may be used. Lift thicknesses of 4 inches or less are recommended where small compaction equipment are used.

The moisture content of cohesive fills at the time of compaction should be maintained within the general ranges specified in **Table 4**. More stringent moisture limits and/or adjustment to

moisture contents may be necessary to achieve compaction levels that meet project specifications.

6.3 Drainage Considerations

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

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 Box Real Estate and their authorized representatives for specific application to the discussed project.

APPENDIX A

Boring Exploration Map, Symbols and Nomenclature, and Boring Logs (Olsson, 2017)

Boring Location Plan

OLSSON ASSOCIATES

North

Scale: n.t.s.	**Fascination North**
Project No. 017-3175	**Lee's Summit, Missouri**
Approved by: CLW	
Date: 10/27/17	

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

Consistency	Unconfined Compressive Strength (Qu) (tsf)
Very Soft	<0.25
Soft	0.25 – 0.5
Firm	0.5 – 1.0
Stiff	1.0 – 2.0
Very Stiff	2.0 – 4.0
Hard	> 4.0

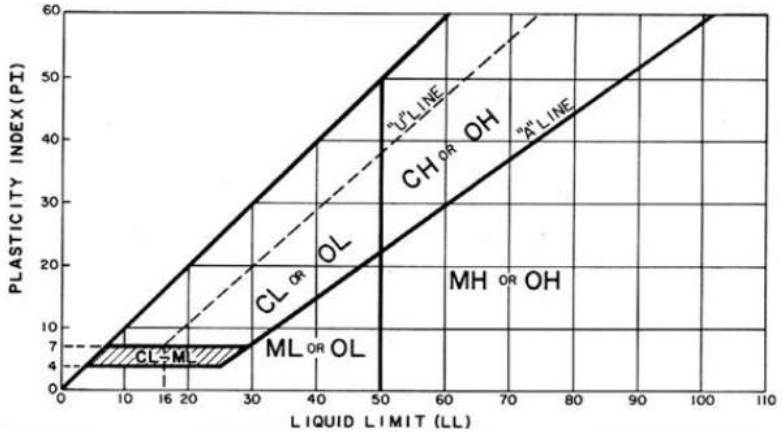
COHESIONLESS SOILS

Relative Density	'N' Value
Very Loose	0 – 3
Loose	4 – 9
Medium Dense	10 – 29
Dense	30 – 49
Very Dense	≥ 50

COMPONENT %

Description	Percent (%)
Trace	<5
Few	5 - 10
Little	15 - 25
Some	30 - 45
Mostly	50 - 100

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 ASSOCIATES

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BOREHOLE REPORT NO. B-1

PROJECT NAME	CLIENT
Fascination North Development	**Platform Ventures**
PROJECT NUMBER	**LOCATION**
017-3175	**Lee's Summit, Missouri**

Split Spoon

APPROX. SURFACE ELEV. (ft): 1006.0

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
	ROOT ZONE ***0.3'***		0								
1005	***FILL***										
	Moist, brown to dark brown, fat clay, trace organics and gravel			SS 1		4-6-13 N=19		21.4		53/38	
	3.0'										
	Dry to moist, dark gray to brown, clay, shale, sand, and gravel			SS 2		6-11-16 N=27		18.4			
	5.0'		5								

BASE OF BORING AT 5.0 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON ASSOCIATES
1700 E. 123RD STREET
OLATHE, KANSAS 66061

STARTED:	10/30/17	FINISHED:	10/30/17
DRILL CO.:	OLSSON	DRILL RIG:	CME 45
DRILLER:	K. KEMPTON	LOGGED BY:	K. KENNEDY
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-2

Sheet 1 of 1

PROJECT NAME: **Fascination North Development**	CLIENT: **Platform Ventures**
PROJECT NUMBER: **017-3175**	LOCATION: **Lee's Summit, Missouri**

Split Spoon

APPROX. SURFACE ELEV. (ft): 1006.5

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
	ROOT ZONE ***0.3'***		0								
1005	***FILL*** *Moist, brown to dark brown with gray, clay, sand, trace organics and gravel*			SS 1		5-6-7 N=13		20.7			
	3.0' *Moist, gray, with yellow and dark brown, clay, sand, shale, and gravel*		5	SS 2		6-8-15 N=23		19.8			
1000											
	10.0' *Dry, gray with brown, shale, clay, and sand*		10	SS 3		7-8-33 N=41		23.4			
995											
	15.0'		15	SS 4		39-50/5"		10.7			

BASE OF BORING AT 15.0 FEET

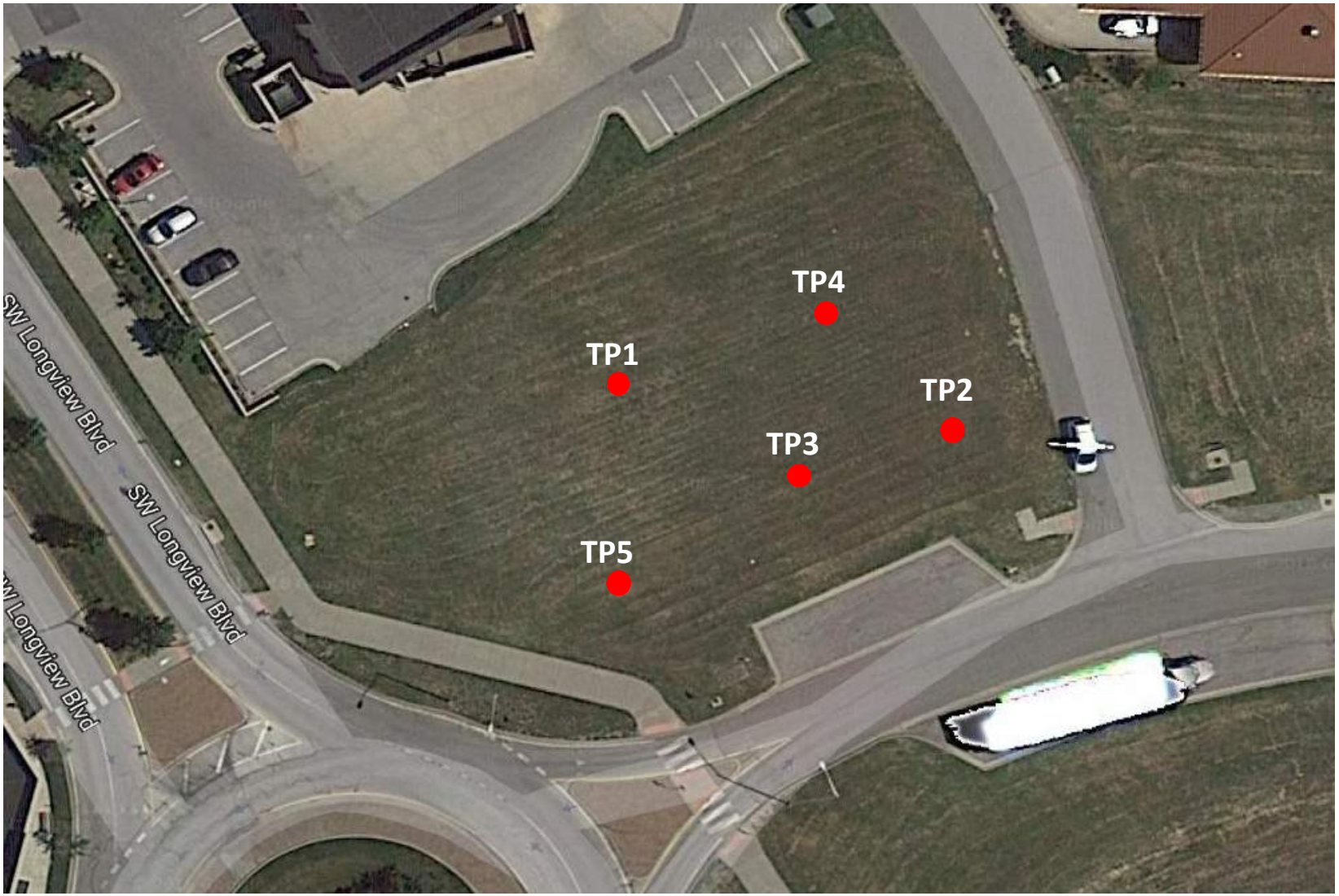
WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
IAD	▼ Not Encountered
AD	▼ Not Performed

OLSSON ASSOCIATES
1700 E. 123RD STREET
OLATHE, KANSAS 66061

STARTED:	10/30/17	FINISHED:	10/30/17
DRILL CO.:	OLSSON	DRILL RIG:	CME 45
DRILLER:	K. KEMPTON	LOGGED BY:	K. KENNEDY
METHOD: CONTINUOUS FLIGHT AUGER			

APPENDIX B

Test Pit Location Map and Test Pit Photographs (Olsson, 2018)



OLSSON ASSOCIATES

North

	Test Pit Location Plan
Scale: n.t.s. Project No. 017-3175 Approved by: CLW Date: 5/15/18	**Fascination North Development - Lot 44** **Lee's Summit, Missouri**

Test Pit - 1

Test Pit - 2

OLSSON ASSOCIATES

	Test Pit Photos
Scale: nts	**Fascination North Development - Lot 44** **Lee's Summit, Missouri**
Project No. 017-3175	
Approved by: CLW	
Date: 5/15/18	

Test Pit - 3

Test Pit - 4

OLSSON ASSOCIATES

	Test Pit Photos
Scale: nts	**Fascination North Development - Lot 44** **Lee's Summit, Missouri**
Project No. 017-3175	
Approved by: CLW	
Date: 5/15/18	

Test Pit - 5

	Test Pit Photos
Scale: nts	**Fascination North Development - Lot 44** **Lee's Summit, Missouri**
Project No. 017-3175	
Approved by: CLW	
Date: 5/15/18	

OLSSON ASSOCIATES

FASINATION NORTH LOT 44

Lee’s Summit, Missouri

March 2024

Olsson Project No. 023-07096