GEOTECHNICAL ENGINEERING REPORT

ARIA APARTMENTS
NE DOUGLAS ROAD & LEE'S SUMMIT ROAD
LEE'S SUMMIT, MISSOURI

PREPARED FOR
REAL EQUITY MANAGEMENT
COLUMBIA, MISSOURI

PREPARED BY
OLSSON, INC.
OLATHE, KANSAS

AUGUST 22, 2019

OLSSON PROJECT NO. 019-0012

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August 22, 2019

Real Equity Management
Attn: David O'Black
4220 Phillips Farm Road
Columbia, Missouri 65201

Re: Geotechnical Engineering Report
Aria Apartments
NE Douglas Road & Lee's Summit Road
Lee's Summit, Missouri
Olsson Project No. 019-0012

Dear Mr. O'Black:

Olsson, Inc. has completed the Geotechnical Engineering Report for the above referenced project. The enclosed report summarizes our understanding of the project, presents the findings of the borings and laboratory tests, and discusses the observed subsurface conditions encountered at the site. Based on this information, this report provides our opinions and geotechnical engineering recommendations for earthwork and foundation support for the new apartment complex and associated pavements.

We appreciate the opportunity to provide our geotechnical engineering services for this project and look forward to providing the recommended material testing services. If you have any questions regarding this report, please contact us.

Respectfully submitted,
Olsson, Inc.

STATE OF MISSOURI
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A. PROJECT UNDERSTANDING

A.1. GEOTECHNICAL SCOPE

Olsson, Inc. ***(Olsson)*** has completed the geotechnical exploration for the new apartment complex planned in Lee's Summit, Missouri. We drilled 48 borings at the site as part of this exploration. This report discusses the subsurface conditions encountered at the borings and, based on this information, provides our opinions and geotechnical recommendations for general site grading, foundation design parameters and floor slab subgrade preparation for the planned apartment buildings. In addition, this report provides pavement subgrade preparation recommendations and minimum pavement thicknesses for associated parking lots and drives.

A.2. SITE DESCRIPTION

Aria will be located south of the intersection of Northeast Douglas Road and Lee's Summit Road in Lee's Summit, Missouri (Figure 1).

Figure 1: Site Location

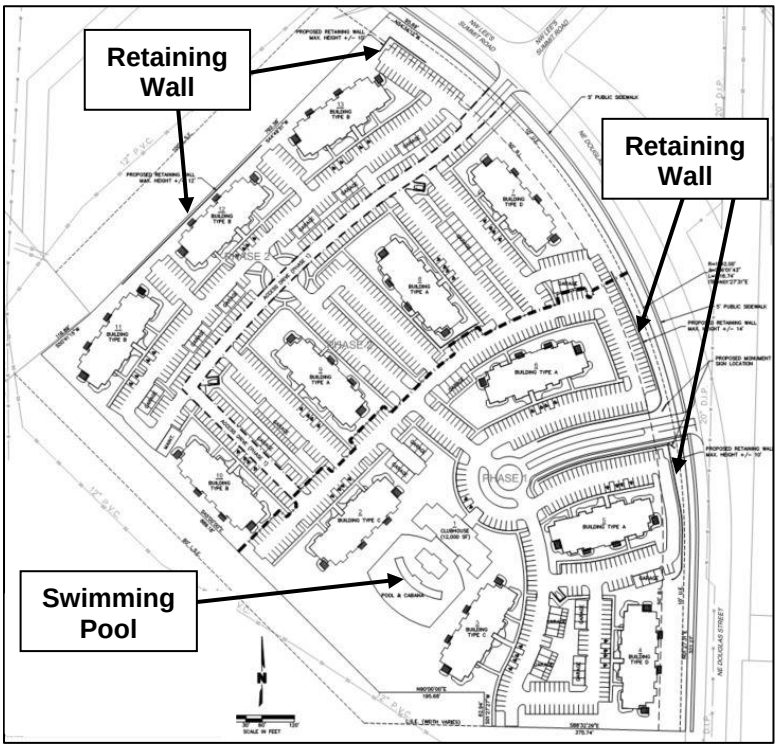
From our review of readily available historical aerial photographs obtained from Google Earth, the south portion of the site was generally used for agricultural purposes in the past. The east border of the site along Northeast Douglas Road was stripped and graded between 2015 and 2016 during widening of the roadway (Figure 2).

Figure 2: Previous Grading

A.3. PROJECT INFORMATION

We understand the apartment complex will consist of multiple 4-story, wood framed apartment buildings, and associated parking and drive areas. The site will also include a single-story clubhouse, pool and garage structures. Multiple retaining walls will be located on the northwest and east borders of the site with heights of up to 14 feet. The site layout is shown in Figure 3.

Figure 3: Site Layout



The finished floor elevations (FFE) for the planned apartment buildings, shown in Table 1, vary between 942 and 964 feet. Based on the existing ground surface elevations and the proposed finished floor elevations, we anticipate that up to 13 feet of fill and 15 feet of cut will be required within the planned building footprints.

Table 1: Finished Floor Elevations

Building	Planned FFE, ft[1]	Associated Borings	Existing Elevations at Borings, ft[1]	Anticipated Cut (-)/Fill (+) ft[1]
1 (Clubhouse)	963	B-34, B-35, B-36	958 – 960	-3 to +5
2	952	B-28, B-29, B-30	943 – 954	-2 to +9
3	957	B-42, B-43, B-44	947 – 958	-1 to +10
4	959	B-46, B-47, B-48	954 – 965	-6 to +5
5	964	B-39, B-40, B-41	969 – 979	-15 to -5
6	958	B-31, B-32, B-33	964 – 971	-13 to -6
7	945	B-24, B-25, B-26	939 – 952	-7 to +6
8	948	B-20, B-21, B-22	942 – 955	-7 to +6
9	950	B-17, B-18, B-19	952 – 955	-5 to -2
10	947	B-13, B-14, B-15	943 – 944	+3 to +4
11	942	B-1, B-2, B-3	939 – 941	+1 to +3
12	946	B-4, B-5, B-6	936 – 938	+8 to +10
13	942	B-7, B-8, B-9	929 – 934	+8 to +13

1) Rounded to the nearest foot

We anticipate the structures will be supported on shallow foundations. Structural loads are anticipated to be less than 6 kips per lineal foot for walls and less than 100 kips for columns. If higher loads are anticipated, ***Olsson*** should be contacted. The new parking and drive areas will be subjected primarily to personal vehicles (cars, light trucks and SUVs) with occasional delivery, moving trucks, and trash trucks.

B. Exploratory and Test Procedures

B.1. Field Exploration

Olsson used an ATV-mounted drill rig to complete the 48 borings. The boring locations were surveyed and staked by others prior to our subsurface exploration. The approximate locations of the borings are shown on the Boring Location Plan in Appendix A.

The borings extended to depths ranging from about 2.5 feet to 24 feet. Samples were obtained using thin walled tubes and split barrel samplers during performance of the Standard Penetration Test (SPT) at the depths shown on the boring logs in Appendix B.

The drill crew prepared a field log of the material encountered at each boring. The field logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the conditions between samples. Water level observations were made in the borings at the times and under the conditions noted on the boring logs. The boring logs in Appendix B represent the engineer's interpretation of the field logs and include modifications based on observation and laboratory tests of the samples. Elevations shown on the boring logs were provided by the survey crew and are rounded to the nearest tenth of an inch.

B.2. Laboratory Testing

At our laboratory, we visually classified the soil samples in accordance with the Unified Soil Classification System (USCS). We measured the moisture content of the samples. In addition, dry density and unconfined compressive strength tests were performed on selected tube samples. A calibrated hand penetrometer was used to estimate the soil consistency on the remaining samples. Atterberg limits tests were also performed on select samples to aid in the classification of the soils. Results of the laboratory tests are provided on the respective boring logs.

C. SUBSURFACE CONDITIONS

C.1. SOIL AND BEDROCK STRATIGRAPHY

The subsurface conditions shown on the boring logs represent soil conditions at the specific boring locations at the times they were drilled. Variations may occur between or beyond the borings. The stratification lines shown on the boring logs represent the approximate location of changes in soil and bedrock types. The actual transition is usually gradual. Based on the borings, the subsurface conditions at this project site can be generalized as follows.

We encountered a rootzone at the surface of each boring that extended to depths of up to 12 inches. Beneath the rootzone materials, we encountered fat clay soils. Trace amounts of organics were noted in some of the upper samples. Although not observed at the borings, a plow zone may be present in the upper 3 feet in areas previously used for agricultural purposes. The clay soils ranged from hard to firm in consistency and were generally moist. The deeper samples near the soil/bedrock interface at borings B-26 and B-43 were very moist to wet. Borings B-12, B-16, B-23, B-27, B-38, B-43, B-45, and B-47 terminated in the clay soils at depths ranging from 5 feet to 15 feet.

The clay soils at the remaining borings were underlain by shale and/or limestone bedrock. Table 2 shows the approximate depths and elevations of bedrock that were encountered at the respective borings. Depths and elevations of bedrock should be considered approximate and may vary across the site as the transition between clay soils and bedrock can be gradual. Elevations provided in the table are rounded to the nearest foot.

Table 2: Approximate Bedrock Depths and Elevations

Boring	Shale Bedrock[1]		Limestone Bedrock[1]		Practical Auger Refusal on Limestone Bedrock	
	Approximate Depth (ft)	Approximate Elevation (ft)[2]	Approximate Depth (ft)	Approximate Elevation (ft)[2]	Approximate Depth (ft)	Approximate Elevation (ft)[2]
B-1	--	--	12	927	12.5	927
B-2	--	--	4.5	936	5.5	935
B-3	--	--	2.5	938	4	936
B-4	--	--	4	934	4.5	934
B-5	--	--	4.5	933	5.5	932
B-6	--	--	5	932	5.5	931
B-7	--	--	4	930	4.5	930
B-8	--	--	1	928	4	926
B-9	--	--	2.5	927	3	927
B-10	--	--	5.5	942	10	937
B-11	--	--	9	936	9	936
B-13	--	--	5	939	6.5	937
B-14	--	--	4	939	7	936
B-15	--	--	7	936	7.5	936

1) Bedrock depths and elevations may vary between borings as the transition between clay soils and bedrock can be gradual. Bedrock elevations may also vary across the site and in areas that were not explored.
2) Approximate elevations are rounded to the nearest foot.

Table 2: Approximate Bedrock Depths and Elevations (Cont'd)

Boring	Shale Bedrock[1]		Limestone Bedrock[1]		Practical Auger Refusal on Limestone Bedrock	
	Approximate Depth (ft)	Approximate Elevation (ft)[2]	Approximate Depth (ft)	Approximate Elevation (ft)[2]	Approximate Depth (ft)	Approximate Elevation (ft)[2]
B-17	--	--	12	940	13.5	938
B-18	--	--	12	942	12.5	941
B-19	13	943	13.5	942	14	942
B-20	--	--	5.5	937	6	936
B-21	--	--	11	937	11.5	937
B-22	--	--	12	943	12	943
B-24	--	--	4	935	6.5	933
B-25	--	--	9	936	13	932
B-26	13	939	15	937	16	936
B-28	--	--	2.5	941	4	939
B-29	--	--	11.5	938	12	938
B-30	--	--	13	941	13.5	941
B-31	13	951	--	--	--	--
B-32	8	959	--	--	--	--
B-33	8	963	--	--	--	--
B-34	13	945	--	--	--	--
B-35	--	--	11.5	948	12.5	947
B-36	--	--	12	948	12.5	947
B-37	7	963	--	--	--	--
B-39	13.5	965	--	--	--	--
B-40	8	965	23	951	24	950
B-41	7	962	--	--	--	--
B-42	--	--	11	948	11.5	947
B-44	--	--	12	941	14	939
B-46	13	952	--	--	--	--
B-48	--	--	3	951	5	949

1) Bedrock depths and elevations may vary between borings as the transition between clay soils and bedrock can be gradual. Bedrock elevations may also vary across the site and in areas that were not explored.
2) Approximate elevations are rounded to the nearest foot.

C.2. GROUNDWATER SUMMARY

The borings were monitored while drilling and immediately after completion for the presence and level of water. Water was observed at borings B-19, B-22, B-30, B-35, and B-43 at depths ranging from 7 feet to 9 feet while drilling. Water was not observed in the remaining borings at either of these times.

Variations and uncertainties exist with relatively short-term water level observations in boreholes. Water levels can and should be anticipated to vary between boring locations, as well as with time within specific borings. Groundwater levels fluctuate with variations in precipitation, site grading, drainage and adjacent land use. Water can be present near the soil and bedrock interface. Water can also accumulate within former plowzones. Long term monitoring with piezometers generally provides a more representative reflection of the potential range of groundwater conditions.

D. GEOTECHNICAL CONSIDERATIONS

Based on the proposed finished floor elevations and existing ground surface elevations, about 13 feet of fill and 15 feet of cut will be required to develop design grades within the proposed building areas. We anticipate the foundations for the new apartment buildings will be supported on a combination of native clay soils, structural fill, and shale bedrock. Foundations founded on different bearing materials may perform differently; footings supported on clays could settle more than footings supported on bedrock, resulting in some differential settlement. In our opinion, support of the proposed building on the different materials would be possible if some differential performance of the footings and slabs can be accepted. Provided that abrupt changes in bearing materials over short distances are avoided, it is our opinion that differential settlement should occur gradually across the building area as the transition from footings supported on bedrock to native soil to fill occurs gradually. If no risk of differential settlement can be tolerated, all footings should bear on similar materials.

The weight of the new fill will cause the underlying clay soils to consolidate. We anticipate some of the settlement will occur during fill placement. Where fill depths exceed 10 feet, settlement plates should be installed in the fill areas prior to fill placement with elevations measured regularly by the project surveyor during and following fill construction. Once the data is reviewed by ***Olsson*** and indicates consolidation is substantially complete, construction of settlement sensitive elements could begin.

Although not encountered at our borings, it is possible that existing fill could be present where previous grading occurred near the existing roadway. Where encountered, all unsuitable existing fill material should be removed and replaced with structural fill. The zone of removal should extend at least 5 feet beyond building footprints and at least 2 feet beyond curblines in planned pavement areas.

Our previous experience on previous agricultural sites similar to this one has shown that it is common practice to push miscellaneous debris/trash directly into old excavations or washouts or into drainage areas to help control erosion. Burn pits and cisterns/wells are also very common. It is difficult to identify and document the specific location of these areas with soil borings only. Although not observed at our boring locations, these areas may be encountered during the grading operations. Due to repeated discing and plowing commonly associated with agricultural fields, the upper layer of cohesive soils at this site may consist of loose, wet or dry, lower consistency material. Where encountered, the unsuitable material would need to be removed and replaced with structural fill. Former plow zones may need to be moisture conditioned and recompacted.

E. SITE PREPARATION

E.1. BUILDING AND PAVEMENT AREAS

Site preparation should commence with the stripping of any existing organic topsoil, root systems, frozen soil, and/or any other deleterious or unsuitable materials from the construction areas. Stripping depths will likely vary and should be adjusted as necessary. Grubbing and stripping should be performed during dry weather conditions. Operation of heavy equipment on the site during wet conditions could result in excessive rutting and mixing of organic debris with the underlying soils.

Any required tree removal should also be accomplished at this time. Care should be taken to thoroughly remove all root systems. Materials disturbed during removal of stumps should be undercut and replaced with structural fill. A zone of desiccated soils may exist in the vicinity of the trees. The desiccated soils should be moisture conditioned and/or undercut and replaced with structural fill prior to placement of new fill.

As previously discussed in the *Geotechnical Considerations* section of this report, any existing fill encountered at the site should be thoroughly evaluated by a representative of ***Olsson***. All unsuitable existing fill material should be removed and replaced with structural fill. The zone of removal should extend at least 5 feet beyond building footprints and at least 2 feet beyond curblines in planned pavement areas.

Following site stripping, but prior to the placement of new fill, the exposed ground surface should be proofrolled with a loaded tandem-axle dump truck with a minimum gross weight of 20 tons or similar equipment. Proofrolling operations should be observed by a representative of ***Olsson***. Unstable and unsuitable soils revealed by proofrolling cannot always be adequately densified in place. These soils should be removed and replaced or stabilized under the direction of ***Olsson***.

Once proofrolling is complete, the upper 9 inches of exposed soil subgrade should be scarified, moisture conditioned and compacted to a minimum of 95 percent of the materials standard Proctor maximum dry density (ASTM Specification D-698) at a moisture content between optimum and 4 percent above optimum.

All slopes steeper than 5(H):1(V) should be benched prior to the placement of fill. Benching of the slope provides interlocking between the fill and natural soils and facilitates compaction of the fill. Benches should be cut as the fill progresses and should have a maximum bench height of 3 feet. Final slopes should be no steeper than 3(H):1(V) to maintain long-term stability, reduce erosion

and to provide ease of maintenance. We recommend that permanent slopes be vegetated as soon as practical to minimize the potential for erosion.

E.2. STRUCTURAL FILL

All structural fill and backfill should consist of approved materials, free of organic matter (organic content less than 5 percent). The soils should not contain particle sizes larger than three inches. In our opinion, the on-site soils are acceptable for use as structural fill beneath structures and pavements with the exception of soil located within the recommended LVC zone below floor slabs. Samples of all proposed fill materials should be submitted to ***Olsson*** prior to use on the site. Laboratory Proctor compaction tests and classification tests should be performed on any fill material placed during mass grading operations. We recommend that structural fill and backfill be compacted in accordance with the criteria provided in Table 3. An ***Olsson*** representative should observe fill placement operations and perform field density tests concurrently to indicate if the specified compaction is being achieved.

Table 3: Fill Placement Guidelines

Area of Fill Placement	Material	Compaction (Standard Proctor)[1]	Moisture Content (Percent of Optimum)
Structural Fill – less than 10 feet below planned ground surface	On-Site Soils or Imported Clay Soils with LL < 60 and PI < 30	95%	-1 to +3 percent
Structural Fill – greater than 10 feet below planned ground surface	On-Site Soils or Imported Clay Soils with LL < 60 and PI < 30	98%	-1 to +3 percent
Granular Leveling Course – Drainage course beneath floor slabs	Clean Rock #57 Stone	65% of Relative Density	As necessary to obtain density
LVC Material Beneath Floor Slabs – 18" below the base of the granular leveling course	Well-Graded Gravel (MoDOT Type 5) or Clay Soils with LL < 50 and PI < 25	95%	Workable Moisture (granular) 0 to +4 percent (cohesive)
Pavement Subgrade[2] – 9 inches compacted subgrade	On-Site Soils or Imported Clay Soils with LL < 60 and PI < 30	95%	-1 to +3 percent

1) According to ASTM D-698 – Standard Proctor
2) Stabilized with approximately 15 percent Class "C" fly ash, 6 percent LKD or 6 percent soil cement (based on dry unit weights)

Suitable fill materials should be placed in thin loose lifts of 9 inches or less. Within small excavations, such as in utility trenches, around manholes, or behind retaining walls, the use of vibrating plate compactors, jumping jack compactors or walk behind sheepsfoot compactors may be used to facilitate compaction in these areas. Loose lift thicknesses of 4 inches or less are recommended where small compaction equipment is used.

E.3. SITE GRADING, DRAINAGE, AND GROUNDWATER CONSIDERATIONS

Water should not be allowed to collect at the ground surfaces near foundations, floor slabs, or areas of new pavement, 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 the geotechnical engineer 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 that site grading provide for efficient drainage of rainfall or surface runoff away from the new structure 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.

E.4. ROCK EXCAVATIONS

Based on the site plans provided at the time of this report, excavations will encounter shale bedrock. Depending on the depths of planned utility lines, it is possible that limestone bedrock could also be encountered. Experience has indicated that conventional heavy-duty excavation equipment such as backhoes equipped with rock teeth or bulldozers equipped with ripping attachments can sometimes excavate bedrock materials which were penetrated with flight augers in the borings. However, below the auger refusal depth or in confined areas, excavation often becomes much more difficult and could require the use of jackhammers, rock splitters, pneumatic breakers, or other hard rock excavation techniques.

F. BUILDINGS AND STRUCTURES

F.1. SHALLOW FOUNDATION DESIGN

In our opinion, the apartment buildings can be supported on shallow foundations bearing on stiff to very stiff native clay soils, structural fill, or shale bedrock provided the total and differential settlements described in this report are acceptable to the owner. Footings supported on the recommended materials may be proportioned for a maximum allowable net bearing pressure of 2,500 pounds per square foot (psf). The net bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation.

Exterior footings should bear at a minimum depth of 3 feet below the lowest adjacent final ground surface. Footings should have a minimum foundation width of 18 inches for continuous footings and 30 inches for isolated column footings. Earth formed trench footings should have a minimum width of 12 inches.

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

The borings encountered occasional softer clay soils that could be present near the bearing elevation of some of the new foundation. ***Olsson*** should observe and test all foundation bearing materials. If unsuitable bearing materials are encountered in footing excavations, the excavations should be extended deeper to suitable soils. The footings could bear directly on these materials at the lower level or on lean concrete backfill placed in the excavations. The base of all foundation excavations should be free of all water and loose material prior to placing concrete. After foundation subgrades have been observed and evaluated by an ***Olsson*** representative, concrete should be placed as soon as possible to avoid subjecting the exposed soils to drying, wetting, or freezing conditions. If foundation subgrade soils are subjected to such conditions, ***Olsson*** should be contacted to reevaluate the foundation bearing materials.

Foundations supported on clay soils (fill or native) could experience total settlements on the order of 1 inch and differential settlements on the order of ½ inch. These estimates do not include consolidation associated with fill placement.

As previously discussed, where fill depths exceed 10 feet, construction of settlement sensitive structures should be delayed until consolidation is substantially complete. Foundations bearing on shale could experience negligible settlements. Settlement of foundation elements supported on shale will be realized as differential settlement between clay supported foundations. Control joints should be used to control cracking where transitions between shale and clay supported foundations occur. If this potential differential settlement cannot be tolerated, foundations would need to bear on similar materials.

F.2. Seismic Site Classification

For this project site, the encountered soil conditions are consistent with the definition of Site Class "C" according to the 2012 IBC and ASCE 7.

F.3. Lateral Earth Pressures

The following soil parameters are provided for use in designing below grade walls subject to lateral earth pressures. The parameters are based on the understanding that retained soils will be similar in composition to the on-site soils encountered during this exploration. These parameters are not intended to be used for design of mechanically stabilized earth (MSE) retaining walls.

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 should be used to evaluate the resistance of soil to lateral loads. The recommended earth pressure coefficients in Table 4 are based on our experience with similar soils. Equivalent fluid densities are frequently used for the calculation of lateral earth pressures for the "at-rest" and "active" conditions and are also provided. The values provided assume that positive drainage is present to prevent hydrostatic forces from developing behind the wall. In addition, the equivalent fluid densities below do not include the effects of surcharge loading.

Table 4: Earth Pressure Parameters

Earth Pressure Coefficient (K)			Equivalent Fluid Density (G)
			Drained Condition
Active (K_a)	Cohesive	0.40	50 pcf
	Granular	0.30	35 pcf
At Rest (K_o)	Cohesive	0.55	65 pcf
	Granular*	0.45	55 pcf
Passive (K_p)	Cohesive	2.5	300 pcf
	Granular*	3.3	390 pcf

The following assumptions were made:

- The equivalent fluid densities in Table 4 do not include the effects of surcharge loading.
- The wall must "move" horizontally to mobilize passive resistance.
- In-situ soil backfill has a maximum weight of 120 pcf
- Horizontal backfill is compacted to 95% of standard Proctor maximum dry density.
- Heavy equipment and other concentrated load components are not included.
- No hydrostatic pressure acting on wall.
- No safety factor is included.
- Passive pressure in the frost zone should be ignored.

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively. To calculate the resistance to sliding, an ultimate coefficient of friction value of 0.35 should be used where the footing bears on soil.

To reduce the potential for hydrostatic loading on freestanding, cantilever retaining walls, we recommend that a perforated drain line be installed at the base of all retaining walls. The drain line should be sloped to provide positive gravity drainage outside the wall area and should be surrounded by 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. The drainage section should extend vertically from the base of the wall 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.

G. Floor Slab Subgrade Preparation

To limit the amount of shrink and swell beneath the floor slabs, a layer of low volume change (LVC) material should be placed beneath all slabs. LVC material should be used to construct at least the top 18 inches of the building floor slab subgrades. Acceptable LVC materials would consist of cohesive soils having a liquid limit less than 50 and a plasticity index less than 25 or well-graded granular materials (MoDOT Type 5 or equivalent). Based on the materials encountered in the borings and the results of the laboratory tests, the on-site cohesive soils do not appear to meet the low volume change criteria.

The low volume change material should be placed and compacted in accordance with the "Structural Fill" section of this report. Upon completion of grading operations in the building areas, care should be taken to maintain the recommended subgrade moisture content and density until the floor slabs are constructed. Areas of the completed subgrade that become desiccated, saturated, frozen or disturbed by construction activity should be reconditioned to meet the recommendations of this report prior to placement of the granular leveling course and construction of the slabs.

A free-draining, compacted granular leveling course (e.g. ASTM C 33 Size No. 57 aggregate) having a minimum thickness of 4 inches should be placed below the floor slabs to provide uniform slab support. The layer of free-draining granular material should be in addition to the minimum 18-inch thick low volume change zone recommended below the building floor slab. If moisture vapor transmission through the concrete slab is a concern (e.g. if moisture sensitive floor coverings will be used), a vapor barrier should be used.

The procedures recommended above may not eliminate all future subgrade volume change and resultant floor slab movement. However, the procedures outlined should significantly 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. Depending on the location of construction joints in the slab, the rigidity of the slab and foundation connection, and the magnitude of actual movement that occurs, some minor cracking within the floor slab could occur and should be anticipated.

H. SWIMMING POOL

We anticipate the swimming pool bottom slabs will be constructed using conventional concrete forming and placement techniques. We also anticipate pool walls will then be constructed by spray-applying gunite either to exposed faces of soil or to forms that would later be removed before walls are backfilled. Low volume change materials are recommended for at least 2 feet laterally behind pool walls and at least 2 feet vertically below pool bottom slabs. In our opinion, it may be more practical to apply gunite to forms and then use granular backfill behind the forms. Pool walls constructed by applying gunite to a form should be backfilled with free-draining granular material such as open-graded crushed limestone (ASTM C 33 Size No. 57 or No. 67 aggregate or similar) or concrete sand (ASTM C 33 fine aggregate). The granular backfill should extend at least 2 feet laterally behind the wall.

I. MSE Retaining Walls

We understand mechanically stabilized earth (MSE) retaining walls are planned to provide grade separation at the site. Retained heights for the walls will generally be less than 14 feet. Established design methods for modular block walls address local and internal stability issues; global stability of the wall system should also be included in the design analyses. Design of this type of wall is beyond the scope of this geotechnical report.

We recommend the following general considerations be included in the project specifications for each wall design. Internal and local stability analyses for each wall design should consider both drained and undrained strength parameters to evaluate the long-term (drained) and end of construction (undrained) conditions. The designer should include in their design documents the material strength parameters assumed for the analysis and design. In addition, global stability of the wall system should be analyzed taking into account slopes adjacent to the wall and the loading conditions above and below the proposed walls. Interaction of nearby structures should be considered in the internal design, and the reinforcement zone should be located away from foundation elements. The designer should be required to provide these analyses, based on the planned final cross sections, including the adjacent topography above and below the wall system, using the generalized subsurface stratigraphy discussed in this report. We recommend ***Olsson*** be retained to review and comment on the wall system design parameters prior to construction.

J. PAVEMENTS

J.1. PAVEMENT SUBGRADE PREPARATION

All pavements should be supported on a minimum of 6 inches of subgrade prepared in accordance with the recommendations presented in the *Site Preparation* section of this report. Construction scheduling often involves grading and paving by separate contractors and can involve a time lapse between the end of grading operations and the commencement of paving. Disturbance, desiccation or wetting of the subgrade soils between grading and paving can result in deterioration of the previously completed subgrade. If soft areas are identified during the subgrade preparation or if the subgrade soils have been exposed to adverse weather conditions, frost, excessive construction traffic, standing water, or similar conditions, the ***Olsson*** should be consulted to determine if corrective action is necessary.

Where bedrock is encountered at subgrade level in pavement areas, we recommend the bedrock be undercut at least 6 inches. The undercut area should be replaced with 4 inches of free draining granular material (e.g. ASTM C 33 Size No. 57) and capped with a baserock such as MoDOT Type 5 or equivalent. A geotextile should be placed between the two layers to provide separation. Drain lines should also be incorporated as part of this subgrade preparation. An interceptor drain should be used near the transition of the pavement subgrade from bedrock to soil.

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 at the transition from cut to fill areas, or 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.

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 carefully evaluated by an ***Olsson*** representative. Unstable or unsuitable soils should be reworked to provide a stable subgrade or removed and replaced with structural fill.

The City of Lee's Summit requires soils located beneath new asphaltic concrete (AC) pavements be supported on a minimum of 6 inches of chemically stabilized subgrade. In our opinion, the existing soils could be stabilized with Class "C" fly ash, soil cement, or lime kiln dust (LKD). We estimate 15 percent Class "C" fly ash, and 6 percent lime kiln dust or soil cement (based on dry weights) would be required. We recommend the stabilized subgrade be at least 9 inches thick.

J.2. PAVEMENT DESIGN

We understand the parking and drive areas will be subjected primarily to personal vehicles (cars, light trucks and SUVs) with occasional delivery, moving trucks, and trash trucks. Table 5 summarizes typical pavement sections for full-depth asphaltic concrete (AC), AC with an aggregate base and Portland cement concrete (PCC) with an aggregate base. The sections represent typical minimum thicknesses. Routine maintenance of the pavement will be required, consisting of periodic seal coats and possibly intermediate millings, in addition to regular crack maintenance.

The performance of pavements will be dependent upon a number of factors, including 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 1/4 inch per foot to provide rapid surface drainage.

Table 5: Minimum Recommended Pavement Sections

Light Duty Vehicles (Personal Cars, SUVs, and Pickup Trucks)		Heavy Vehicle Areas*
Parking Areas	**Drive Areas**	
Full Depth AC: 2" AC Surface 4" AC Base 9" Prepared Subgrade[1]	Full Depth AC: 2" AC Surface 6" AC Base 9" Prepared Subgrade[1]	Full Depth PCC: 8" PCC 4" Clean Rock 9" Prepared Subgrade
AC w/ Granular Base: 2" AC Surface 3" AC Base 6" Well-Graded Gravel 9" Prepared Subgrade[1]	AC w/ Granular Base: 2" AC Surface 4" AC Base 6" Well-Graded Gravel 9" Prepared Subgrade[1]	*Heavy Vehicle Areas Consist of Loading/ Unloading Areas, Trash Receptacle Pads and Approaches, etc.

1) Stabilized with approximately 15 percent Class "C" fly ash, 6 percent LKD or 6 percent soil cement (based on dry unit weights)

PCC pavements are recommended for loading/unloading areas, trash receptacle pads and approaches, and other areas where heavy wheel loads will be concentrated. Concrete pavements in these areas should have a minimum thickness of 8 inches. It is also recommended that a 4-

inch leveling and drainage course of clean rock be placed below all PCC pavements and that appropriate sub-drainage or other connection to a suitable gravity outfall be provided to remove water from the drainage layer. The pavement subgrade should be graded to provide positive drainage below the granular base section. 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 AC sections during loading/unloading operations.

Surface drainage around the pavement and proper maintenance are also important to long-term performance. 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 infiltrating under the pavement. All pavement joints should be caulked and any cracks should be quickly patched or sealed to prevent moisture from reaching and softening the subgrade.

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.

K. CONCLUSIONS AND LIMITATIONS

K.1. CONSTRUCTION OBSERVATION AND TESTING

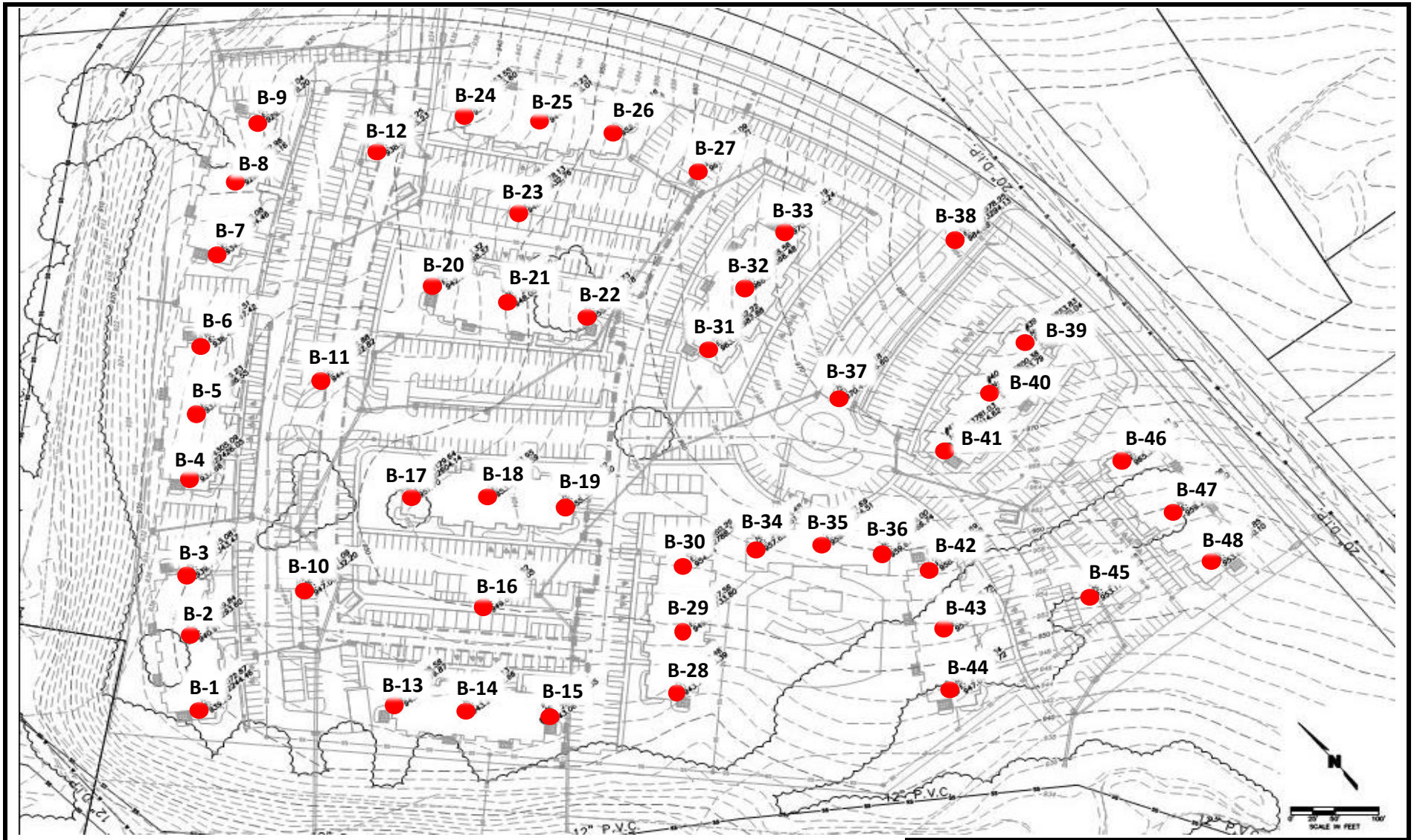
We recommend that all earthwork during construction be monitored by a representative of ***Olsson***, including site preparation, placement of all structural fill and trench backfill, and pavement subgrades. The purpose of these services would be to provide ***Olsson*** the opportunity to observe the soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

K.2. LIMITATIONS

The conclusions and recommendations presented in this report are based on the information available regarding the proposed construction, the results obtained from our borings and sampling procedures, the results of the laboratory testing program, and our experience with similar projects. The borings represent a very small statistical sampling of subsurface soils and it is possible that conditions may be encountered during construction that are substantially different from those indicated by the borings. In these instances, adjustments to design and construction may be necessary. This geotechnical report is based on the site plan and information provided to ***Olsson*** and our understanding of the project as noted in this report. Changes in the location or design of new structures could significantly affect the conclusions and recommendations presented in this geotechnical report. ***Olsson*** should be contacted in the event of such changes to determine if the recommendations of this report remain appropriate for the revised site design.

This report was prepared under the direction and supervision of a Professional Engineer registered in the State of Missouri with the firm of **Olsson, Inc.** The conclusions and recommendations contained herein are based on generally accepted, professional geotechnical engineering practices 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 **Real Equity Management** and their authorized representatives for specific application to the proposed project.

APPENDIX A
Boring Location Plan



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Boring Location Plan

Scale: n.t.s.	**Aria Apartments**
Project No. 019-0012	**Lee's Summit, Missouri**
Approved by: CLW	
Date: 8/20/19	

APPENDIX B
Symbols and Nomenclature
Boring Logs

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	FT:	Fish Tail Bit	IAD:	Immediately After Drilling
SPT:	Standard Penetration Test Blows per 6.0"	RB:	Rock Bit	AD:	After Drilling
				CI:	Cave-In

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

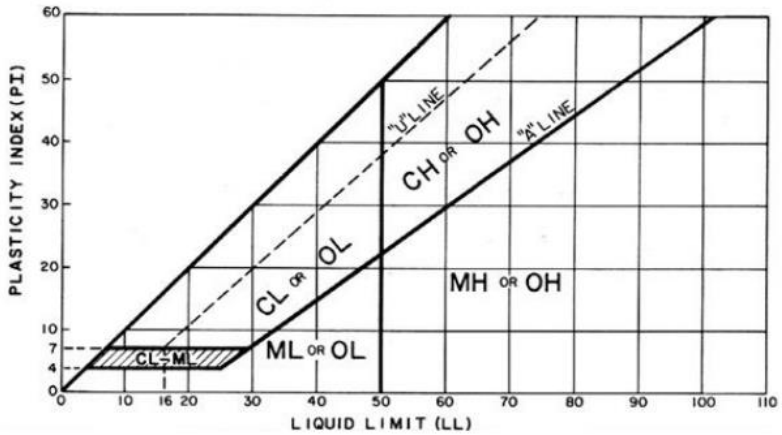
COHESIONLESS SOILS

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

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BOREHOLE REPORT NO. B-1

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

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APPROX. SURFACE ELEV. (ft): 939.3

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								
	1.0'										
	FAT CLAY										
	Stiff, moist, dark brown, trace gravel			U 1				29.9	82.8		P. P. = 1.5
	3.0'										
935	*Hard, moist, reddish brown, with gravel*		5	U 2				41.3			P. P. = 4.5+
930	***10.0'***		10								
	Hard, moist, brown, trace gray, trace gravel			U 3				26.5			P. P. = 4.5+
	12.0'										
	LIMESTONE										
	12.3'										
	Gray										
	REFUSAL AT 12.3 FEET										

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

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

STARTED:	5/14/19	FINISHED:	5/14/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-2

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 940.9

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 *0.5'*		0								
940	***FAT CLAY***										
	Very stiff, moist, brown to reddish brown			U 1				28.8	93.5		P. P. = 3.0
	3.0'										
	Very stiff, moist, brown to light brown			U 2				27.2	97.5		P. P. = 3.75
	4.5'		5								
	LIMESTONE										
	5.5'										

REFUSAL AT 5.5 FEET

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

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DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
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BOREHOLE REPORT NO. B-3

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

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APPROX. SURFACE ELEV. (ft): 939.7

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 *0.5'*		0								
	FAT CLAY *Stiff, moist, reddish brown, trace gravel* *2.3'*			U 1			1.8	28.8	92.1		
	WEATHERED LIMESTONE *3.0'*										
	LIMESTONE *4.0'*										

REFUSAL AT 4.0 FEET

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

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OLATHE, KANSAS 66061

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DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

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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
	APPROX. SURFACE ELEV. (ft): 937.7		0								
	ROOT ZONE 0.5'										
	FAT CLAY										
	Stiff, moist, dark brown, trace reddish brown, trace organics			U 1			1.1	30.5	90.8		
935	3.0'										
	Stiff, moist, dark brown to reddish brown 3.8'			U 2			1.4	31.6	89.3		
	LIMESTONE 4.3'										

REFUSAL AT 4.3 FEET

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

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

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DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-5

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 937.1

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 *0.5'*		0								
935	***FAT CLAY*** *Stiff, moist, brown, trace red, trace organics*			U 1			1.9	28.4	94.0		
	4.5'										
	LIMESTONE		5								
	5.5'										

REFUSAL AT 5.5 FEET

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

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

STARTED:	5/30/19	FINISHED:	5/30/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-6

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 936.5

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 *0.5'*		0								
935	***FAT CLAY*** *Very stiff, moist, brown, trace red, trace organics* *3.0'*			U 1				27.5	95.9		P. P. = 2.75
	Stiff, moist, reddish brown *4.8'*			U 2			1.6	28.9	96.8		
	LIMESTONE *5.5'*		5								

REFUSAL AT 5.5 FEET

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

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

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DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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PROJECT NAME	CLIENT
Aria	**Real Equity Management**
PROJECT NUMBER	**LOCATION**
019-0012	**Lee's Summit, Missouri**

Shelby Tube

APPROX. SURFACE ELEV. (ft): 934.3

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 *0.5'*		0								
	FAT CLAY										
	Very stiff to stiff, moist, brown to reddish brown			U 1				25.9	95.1		P. P. = 3.25
				U 2			1.9	26.0	99.2		
930	*4.2'*										
	LIMESTONE *4.5'*										
	REFUSAL AT 4.5 FEET										

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

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

STARTED:	5/30/19	FINISHED:	5/30/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

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
	APPROX. SURFACE ELEV. (ft): 929.1		0								
	ROOT ZONE 0.5'										
	FAT CLAY 1.0'										
	Brown										
	WEATHERED LIMESTONE										
	3.5'										
	LIMESTONE 3.7'										
	REFUSAL AT 3.7 FEET										

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

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

STARTED:	5/31/19	FINISHED:	5/31/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-9

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

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
	APPROX. SURFACE ELEV. (ft): 929.5		0								
	ROOT ZONE 0.5'										
	FAT CLAY										
	Firm, moist, yellowish brown, trace gravel			U 1			0.9	32.2	92.0		
	2.3'										
	LIMESTONE 2.7'										
	REFUSAL AT 2.7 FEET										

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

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

STARTED:	5/31/19	FINISHED:	3/31/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-10

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

■ Shelby Tube

APPROX. SURFACE ELEV. (ft): 947.0

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 *0.5'*		0								
945	***FAT CLAY*** *Very stiff, moist, brown to dark brown*			U 1				29.0	87.2		P. P. = 3.0
	3.0'										
	Stiff, moist, reddish brown, trace gravel		5	U 2				26.5	99.7	51/31	P. P. = 1.75
	5.5'										
940	***WEATHERED LIMESTONE***										
	9.5'										
	LIMESTONE *10.0'*		10								

REFUSAL AT 10.0 FEET

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

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

STARTED:	5/29/19	FINISHED:	5/29/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-11

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 944.6

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 *0.5'*		0								
	FAT CLAY *Very stiff, moist, brown, trace organics* *3.0'*			U 1				27.6	94.3		P. P. = 3.5
940	*Very stiff to stiff, moist, reddish brown*		5	U 2				25.9	96.8		P. P. = 3.0
				U 3			1.4	32.2	88.6		

REFUSAL AT 8.7 FEET

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

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

STARTED:	6/4/19	FINISHED:	6/4/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-12

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

■ Shelby Tube

APPROX. SURFACE ELEV. (ft): 938.6

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 *0.5'*		0								
	FAT CLAY										
	Stiff to very stiff, moist, reddish brown			U 1				28.9	93.5		P. P. = 2.5
935				U 2				28.2	95.4		P. P. = 1.75
			5								
	8.0'										
930	*Hard, moist, light brown, with gravel and silt*			U 3				32.4			P. P. = 4.5+
	10.0'		10								

BASE OF BORING AT 10.0 FEET

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

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

STARTED:	5/31/19	FINISHED:	5/31/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-13

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 943.5

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 *0.5'*		0								
	FAT CLAY *Very stiff, moist, reddish brown*			U 1				26.6	94.6		P. P. = 3.5
940	*3.5'*										
	Firm, moist, reddish brown, trace gravel *5.0'*		5	U 2			0.6	29.5	96.0		
	LIMESTONE *6.3'*										

REFUSAL AT 6.3 FEET

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

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

STARTED:	5/29/19	FINISHED:	5/29/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-14

Sheet 1 of 1

PROJECT NAME: Aria	CLIENT: Real Equity Management
PROJECT NUMBER: 019-0012	LOCATION: Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 943.2

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 *0.5'*		0								
	FAT CLAY										
	Very stiff, moist, brown to reddish brown			U 1				29.5	91.4		P. P. = 2.5
940				U 2			2.7	25.6	100.0		
	4.0'										
	WEATHERED LIMESTONE		5								
	6.0'										
	LIMESTONE										
	7.1'										

REFUSAL AT 7.1 FEET

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

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

STARTED: 5/29/19		FINISHED: 5/29/19	
DRILL CO.: RC DRILLING		DRILL RIG: RC-550	
DRILLER: LUKE		LOGGED BY: DEREK/ALAN	
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-15

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

■ Shelby Tube

APPROX. SURFACE ELEV. (ft): 943.1

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 *1.0'*		0								
940	***FAT CLAY*** *Stiff, moist, dark brown*			U 1				29.2	86.6		P. P. = 1.75
				U 2			1.8	28.9	94.3		
	5.0'		5								
	Dark brown to reddish brown, with weathered limestone layers *7.0'*										
	LIMESTONE *7.5'*										

REFUSAL AT 7.5 FEET

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

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

STARTED:	5/14/19	FINISHED:	5/14/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-16

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 949.9

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 *0.5'*		0								
	FAT CLAY										
	Very stiff, moist, brown with light brown, trace reddish brown			U 1				30.5	93.4		P. P. = 2.0
				U 2				25.9	100.8		P. P. = 3.0
945	*5.0'*		5								

BASE OF BORING AT 5.0 FEET

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

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

STARTED:	5/29/19	FINISHED:	5/29/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-17

Sheet 1 of 1

PROJECT NAME: **Aria**

CLIENT: **Real Equity Management**

PROJECT NUMBER: **019-0012**

LOCATION: **Lee's Summit, Missouri**

Shelby Tube

APPROX. SURFACE ELEV. (ft): 951.7

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 *0.5'*		0								
950	***FAT CLAY*** *Very stiff, moist, dark brown, trace organics*			U 1				28.2	87.9		P. P. = 2.0
	3.0' *Very stiff, moist, brown*			U 2			2.3	26.8	97.0		
			5								
945	*8.0'* *Stiff, moist, reddish brown*			U 3			1.1	34.9	87.5		
			10								
940	*12.0'* ***LIMESTONE***										
	13.5'										

REFUSAL AT 13.5 FEET

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-18

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 953.2

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 *0.5'*		0								
	FAT CLAY										
	Very stiff, moist, brown to dark brown			U 1				27.2	95.2		P. P. = 2.5
950				U 2				27.0	95.9	53/31	P. P. = 2.75
			5								
945	*8.0'*										
	Stiff, moist, brown to reddish brown			U 3			1.3	28.5	93.8		
			10								
	11.8'										
	LIMESTONE *12.3'*										

REFUSAL AT 12.3 FEET

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-19

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ▮ Split Spoon ⊠

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
	APPROX. SURFACE ELEV. (ft): 955.4		0								
955	***ROOT ZONE*** *0.5'*										
	FAT CLAY										
	Stiff to firm, moist, dark brown to brown			U 1				29.4	92.9		P. P. = 1.5
				U 2			0.8	33.2	91.6		
950			5								
	▽										
	8.0'										
	Stiff, moist, brown			U 3			1.2	35.2	91.1		
			10								
945											
	13.0'										
	WEATHERED SHALE *13.3'*			U 4		50/1"		31.8			
	Brown to gray, with clay and weathered limestone *13.8'*			SS 5				37.9			
	LIMESTONE										
	REFUSAL AT 13.8 FEET										

WATER LEVEL OBSERVATIONS	
WD	▽ 7.0 ft
IAD	▼ Not Encountered
AD	▼ Not Performed

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

STARTED:	5/23/19	FINISHED:	5/23/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-20

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 942.3

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 *0.5'*		0								
940	***FAT CLAY*** *Very stiff, moist, brown*			U 1				29.3	91.0		P. P. = 2.0
	3.0' *Stiff, moist, brown with light brown*		5	U 2			1.9	25.8	97.7		
	5.5' ***LIMESTONE*** *6.2'*										

REFUSAL AT 6.2 FEET

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

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

STARTED:	5/30/19	FINISHED:	5/30/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-21

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 948.1

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 *0.5'*		0								
	FAT CLAY										
	Very stiff, moist, brown, trace organics and silt			U 1				28.9	91.9		P. P. = 2.75
945	*3.0'*										
	Stiff to very stiff, moist, brown			U 2			1.1	26.0	97.6		
			5								
940											
				U 3				31.0	91.4	60/34	P. P. = 2.25
			10								
	11.0'										
	LIMESTONE *11.5'*										

REFUSAL AT 11.5 FEET

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

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

STARTED:	5/30/19	FINISHED:	5/30/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-22

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

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
955	**APPROX. SURFACE ELEV. (ft):** 955.1		0								
	ROOT ZONE 0.5'										
	FAT CLAY										
	Very stiff, moist, dark brown, trace organics			U 1				29.9	90.5		P. P. = 2.5
	3.0'										
	Stiff, moist, brown to dark brown			U 2				29.2	89.8		P. P. = 1.75
950			5								
	▽										
	8.5'										
	Firm to stiff, moist, reddish brown			U 3				31.9			P. P. = 1.0
945			10								
	12.0'										
	LIMESTONE 12.2'										
	REFUSAL AT 12.2 FEET										

WATER LEVEL OBSERVATIONS	
WD	▽ 7.5 ft
IAD	▼ Not Encountered
AD	▼ Not Performed

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

STARTED:	5/23/19	FINISHED:	5/23/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-23

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 948.4

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 ***0.5'***		0								
	FAT CLAY										
	Very stiff, moist, brown, trace organics			U 1				27.9	93.6		P. P. = 2.0
	3.0'										
945	*Very stiff to stiff, moist, brown*			U 2				26.9	97.1		P. P. = 1.75
			5								
940				U 3			2.3	22.7	103.5		
	10.0'		10								

BASE OF BORING AT 10.0 FEET

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

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

STARTED:	5/30/19	FINISHED:	5/30/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-24

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 939.1

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 0.5'		0								
	FAT CLAY *Stiff, moist, dark brown, trace organics* 3.0'			U 1				27.5	94.2		P. P. = 1.75
935	*Very stiff, moist, dark brown, trace red* 4.2'			U 2			2.6	25.1	98.5		
	WEATHERED LIMESTONE 5.5'		5								
	LIMESTONE 6.5'										

REFUSAL AT 6.5 FEET

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

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

STARTED:	6/4/19	FINISHED:	6/4/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-25

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 944.6

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 *0.5'*		0								
	FAT CLAY										
	Very stiff to stiff, moist, brown, trace organics			U 1				26.3	95.7		P. P. = 3.0
	3.0'										
	Stiff, brown to reddish brown			U 2				23.9	102.6		P. P. = 1.5
940			5								
	8.7'			U 3				31.7	84.9		P. P. = 1.25
	WEATHERED LIMESTONE										
935	*Stiff, moist, brown*		10								
	12.0'										
	LIMESTONE										
	13.0'										

REFUSAL AT 13.0 FEET

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-26

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 952.4

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 *0.5'*		0								
950	***FAT CLAY*** *Very stiff to stiff, moist, reddish brown to brown, trace gray*			U 1				26.1	96.9		P. P. = 1.75
				U 2				23.3	103.1		P. P. = 2.0
			5								
945											
	8.0'										
	Stiff, moist, light brown, trace red and gray			U 3			1.9	27.5	99.0		
			10								
940											
	13.0'										
	WEATHERED SHALE *Gray with red*			U 4				23.5			P. P. = 3.0
	15.0'		15								
	LIMESTONE *16.0'*										

REFUSAL AT 16.0 FEET

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-27

Sheet 1 of 1

PROJECT NAME: Aria	CLIENT: Real Equity Management
PROJECT NUMBER: 019-0012	LOCATION: Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 961.9

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 *0.5'*		0								
960	***FAT CLAY*** *Very stiff, moist, brown, trace red*			U 1				24.0	102.2		P. P. = 3.25
	3.0'										
	Stiff, moist, reddish brown, trace gray			U 2			1.9	23.8	101.9		
			5								
955	*8.0'*										
	Very stiff, moist, light brown, trace red and gray			U 3				29.2	96.8		P. P. = 2.0
	10.0'		10								

BASE OF BORING AT 10.0 FEET

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-28

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 943.2

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 *0.5'*		0								
	FAT CLAY *Firm, moist, brown, trace sandstone* *2.3'*			U 1			0.8	32.1	86.6		
940	***LIMESTONE*** *3.8'*										

REFUSAL AT 3.8 FEET

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

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

STARTED:	5/31/19	FINISHED:	5/31/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson

BOREHOLE REPORT NO. B-29

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 949.5

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 *1.0'*		0								
	FAT CLAY *Very stiff, moist, brown, trace organics* *3.0'*			U 1				29.0	94.2		P. P. = 2.5
945	*Stiff, moist, reddish brown, trace gravel*		5	U 2			1.6	25.1	101.5		
940	*10.0'*		10								
	Very moist, dark brown to brown, trace red *11.3'*			U 3				56.0	65.3		
	LIMESTONE *11.8'*										

REFUSAL AT 11.8 FEET

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

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

STARTED:	5/29/19	FINISHED:	5/29/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson

BOREHOLE REPORT NO. B-30

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 954.2

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 *0.5'*		0								
	FAT CLAY										
	Very stiff, moist, dark brown to brown			U 1				29.6	91.0		P. P. = 3.0
	3.0'										
950	*Stiff, moist, brown*		5	U 2			1.2	28.0	95.5		
	▽										
945			10	U 3				31.4	93.9		P. P. = 1.25
	13.0'										
	LIMESTONE *13.3'*										

REFUSAL AT 13.3 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ 7.5 ft
IAD	▼ Not Encountered
AD	▼ Not Performed

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

STARTED:	5/23/19	FINISHED:	5/23/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-31

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ▩ Split Spoon ⊠

APPROX. SURFACE ELEV. (ft): 963.8

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 *0.5'*		0								
	FAT CLAY *Very stiff, moist, dark brown, trace organics* *3.0'*			U 1				30.7	90.4		P. P. = 2.0
960	*Very stiff to stiff, moist, brown*			U 2				26.2	98.6		P. P. = 2.0
			5								
955				U 3			1.4	26.6	99.1	65/38	
			10								
	13.0'										
950	***WEATHERED SHALE*** *Moist, brown to gray, trace red*			U 4				17.4			P. P. = 4.5
			15								
945				SS 5		25-30-50/3"		15.8			
	19.8'										

BASE OF BORING AT 19.8 FEET

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

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

STARTED:	5/28/19	FINISHED:	5/28/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-32

PROJECT NAME: **Aria**	CLIENT: **Real Equity Management**
PROJECT NUMBER: **019-0012**	LOCATION: **Lee's Summit, Missouri**

Shelby Tube ■ Split Spoon ⊠

APPROX. SURFACE ELEV. (ft): 967.0

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 *0.5'*		0								
965	***FAT CLAY*** *Very stiff, moist, reddish brown*			U 1				32.1	88.9		P. P. = 2.25
				U 2				24.3	101.8		P. P. = 2.75
960			5								
	8.0'										
	WEATHERED SHALE *Moist, light brown, trace red and gray*			U 3			1.7	24.2	104.6		
955			10								
				SS 4		16-24-34 N=58		16.7			
950			15								
	19.0'			SS 5		23-35-43 N=78		14.6			
			20								

CONTINUED NEXT PAGE

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-32

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ☒ Split Spoon

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
	SHALE		20								
	Gray (continued)										
945											
	24.0'			SS 6		20-50/0"		11.5			

BASE OF BORING AT 24.0 FEET

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-33

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ▪ Split Spoon

APPROX. SURFACE ELEV. (ft): 970.6

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
970	***ROOT ZONE*** *0.5'*		0								
	FAT CLAY *Very stiff, moist, brown, trace red, trace organics*			U 1				27.5	98.7		P. P. = 2.5
	3.0' *Very stiff, moist, reddish brown*			U 2				26.2	100.4		P. P. = 2.75
965	*8.0'*		5								
	WEATHERED SHALE *Moist, grayish brown, trace red*		10	U 3				17.0			P. P. = 4.5+
960	*14.5'*			SS 4		20-33-50/3"		16.6			
	SHALE *Grayish brown*		15								
955			20								
	CONTINUED NEXT PAGE										

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

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

STARTED:	5/28/19	FINISHED:	5/28/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson	BOREHOLE REPORT NO. B-33	Sheet 2 of 2

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ▩ Split Spoon ⊠

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
			20								
950	***SHALE***			SS 5		30-30-30 N=60		18.6			
	Grayish brown (continued)										
	22.0'										
	Moist, gray										
	24.0'			SS 6		50/6"		17.1			

BASE OF BORING AT 24.0 FEET

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

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

STARTED:	5/28/19	FINISHED:	5/28/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-34

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 957.6

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 *0.5'*		0								
955	***FAT CLAY*** *Very stiff, moist, brown to dark brown, trace gravel* *3.0'*			U 1				28.9			P. P. = 2.5
	Stiff to very stiff, moist, brown to reddish brown		5	U 2			2.0	27.3	97.1		
950			10	U 3				24.1			P. P. = 2.5
945	*13.0'*										
	WEATHERED SHALE *Moist, gray with red* *15.0'*		15	U 4				26.4			P. P. = 2.5

BASE OF BORING AT 15.0 FEET

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

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

STARTED:	5/28/19	FINISHED:	5/28/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-35

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 959.4

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 0.5'		0								
	FAT CLAY										
	Very stiff, moist, dark brown			U 1				30.0	90.7		P. P. = 2.25
	3.0'										
955	*Stiff, moist, brown*		5	U 2			1.9	24.6	98.8		
950	▽		10	U 3				28.4	96.0		
	11.5'										
	LIMESTONE 12.3'										

REFUSAL AT 12.3 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ 9.0 ft
IAD	▼ Not Encountered
AD	▼ Not Performed

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

STARTED:	5/23/19	FINISHED:	5/23/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-36

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 959.7

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 *0.5'*		0								
	FAT CLAY										
	Stiff, moist, brown, trace organics			U 1				30.7			P. P. = 1.5
	3.0'										
	Stiff to very stiff, moist, brown, trace gravel			U 2				24.2	103.1		P. P. = 2.0
955			5								
				U 3				24.2			P. P. = 3.0
950			10								
	11.8'										
	LIMESTONE *12.5'*										

REFUSAL AT 12.5 FEET

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

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

STARTED:	5/29/19	FINISHED:	5/29/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-37

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ▩ Split Spoon ⊠

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
	APPROX. SURFACE ELEV. (ft): 970.4		0								
970	***ROOT ZONE*** 0.5'										
	FAT CLAY *Stiff, moist, brown, trace red and gray, trace gravel*			U 1				30.6	93.2	60/35	P. P. = 1.75
				U 2				23.9	102.9		P. P. = 2.25
			5								
965	7.0'										
	WEATHERED SHALE *Moist, brown, trace red and gray*			U 3				16.1			P. P. = 4.5+
			10								
960	13.5'										
	Moist, light brown, trace gray			SS 4		18-34-50/3"		16.6			
	14.8'										

BASE OF BORING AT 14.8 FEET

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

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

STARTED:	5/31/19	FINISHED:	5/31/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-38

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ▩ Split Spoon ⊠

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
	APPROX. SURFACE ELEV. (ft): 984.7		0								
	ROOT ZONE 0.5'										
	FAT CLAY										
	Very stiff, moist, trace organics			U 1				24.3	97.4		P. P. = 3.25
	3.5'										
980	*Firm, moist, grayish brown, trace red*		5	SS 2		2-3-4 N=7		31.7			
	8.5'										
975	*Stiff, moist, brown, trace gravel*		10	SS 3		4-4-5 N=9		32.1			
	10.0'										

BASE OF BORING AT 10.0 FEET

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson

BOREHOLE REPORT NO. B-39

PROJECT NAME: **Aria**

CLIENT: **Real Equity Management**

PROJECT NUMBER: **019-0012**

LOCATION: **Lee's Summit, Missouri**

Shelby Tube ▮ Split Spoon ⊠

APPROX. SURFACE ELEV. (ft): 978.7

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 *0.5'*		0								
	FAT CLAY *Very stiff, moist, light brown, trace red and gray*			U 1				23.9	103.5		P. P. = 3.75
975	*3.5'*										
	Firm, moist, brown		5	SS 2		2-2-4 N=6		22.8			
	8.0'										
970	*Firm, moist, reddish brown*		10	U 3			0.6	25.3	99.3		
	13.5'										
965	***SHALE*** *Moist, brownish gray to gray*		15	SS 4		16-26-32 N=58		16.3			
960			20	SS 5		50/6"		9.1			
	CONTINUED NEXT PAGE										

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson

BOREHOLE REPORT NO. B-39

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ☒ Split Spoon

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
			20								
	SHALE										
	Moist, brownish gray to gray (continued)										
955	***23.8'***			SS 6		50/3"		8.9			
	BASE OF BORING AT 23.8 FEET										

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-40

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ▪ Split Spoon

APPROX. SURFACE ELEV. (ft): 973.5

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 *0.5'*		0								
	FAT CLAY										
	Very stiff, moist, reddish brown			U 1				30.3	96.2		P. P. = 2.0
	3.0'										
970	*Very stiff, moist, reddish brown, trace gray*			U 2				24.8	103.3		P. P. = 3.0
			5								
	8.0'										
965	***WEATHERED SHALE***			U 3							
	Grayish brown to gray		10								
960	*14.0'*			SS 4		20-34-50/4"		14.0			
	SHALE		15								
	Grayish brown to gray										
955				SS 5		20-34-50/5"		13.1			
			20								

CONTINUED NEXT PAGE

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

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

STARTED:	6/4/19	FINISHED:	6/4/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson	BOREHOLE REPORT NO. B-40	Sheet 2 of 2

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ▩ Split Spoon ☒

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
	SHALE		20								
	Grayish brown to gray (continued)										
	23.0'										
950	***LIMESTONE***										
	24.0'										

REFUSAL AT 24.0 FEET

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

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

STARTED:	6/4/19	FINISHED:	6/4/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-41

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube ■ Split Spoon ⊠

APPROX. SURFACE ELEV. (ft): 968.6

ELEVATION (ft)	MATERIAL DESCRIPTION	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 — ***0.5'***	0								
	FAT CLAY									
	Very stiff, moist, reddish brown, trace gray		U 1				28.2	96.9		P. P. = 2.0
965			U 2				25.0	101.4		P. P. = 2.5
		5								
	7.0'									
	WEATHERED SHALE									
	Grayish brown, trace red		U 3				18.3			
960		10								
955	***14.0'***		SS 4		20-32-50/3"		18.3			
	SHALE	15								
	Grayish brown									
950	***18.5'***		SS 5		34-50/4"		15.0			
	Moist, dark gray — ***19.3'***									

BASE OF BORING AT 19.3 FEET

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

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

STARTED:	5/31/19	FINISHED:	5/31/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson

BOREHOLE REPORT NO. B-42

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 958.5

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 *0.5'*		0								
	FAT CLAY										
	Very stiff, moist, dark brown, trace organics			U 1				29.7	91.0		P. P. = 2.0
	3.0'										
955	*Very stiff, moist, reddish brown to brown*			U 2			2.4	22.4	104.2		
			5								
950				U 3				30.2	94.4		P. P. = 3.5
			10								
	11.0'										
	LIMESTONE *11.5'*										

REFUSAL AT 11.5 FEET

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

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

STARTED:	5/23/19	FINISHED:	5/23/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson

BOREHOLE REPORT NO. B-43

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 953.4

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 ***0.5'***		0								
	FAT CLAY										
	Stiff, moist, brown, trace organics			U 1				31.4	89.7		P. P. = 1.25
	3.0'										
950	*Stiff, moist, brown to dark brown*			U 2			1.3	28.6	95.9		
			5								
945	▽			U 3				27.3	96.3		P. P. = 2.0
			10								
	12.0'										
	Firm to stiff, very moist to wet, brown, with limestone layers										
940	***13.9'***			U 4				61.6	65.7		P. P. = 1.0

BASE OF BORING AT 13.9 FEET

WATER LEVEL OBSERVATIONS	
WD	▽ 8.8 ft
IAD	▼ Not Encountered
AD	▼ Not Performed

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

STARTED:	5/23/19	FINISHED:	5/23/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-44

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

■ Shelby Tube

APPROX. SURFACE ELEV. (ft): 947.0

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 *0.5'*		0								
945	***FAT CLAY*** *Very stiff, moist, dark reddish brown to dark brown*			U 1				28.3	93.0		P. P. = 3.5
	3.9'			U 2			3.1	27.4	97.3		
	Dark brown to reddish brown, with weathered limestone layers		5								
940	*7.5'*										
	LIMESTONE *8.5'*										

REFUSAL AT 8.5 FEET

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

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

STARTED:	6/4/19	FINISHED:	6/4/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-45

Sheet 1 of 1

PROJECT NAME: Aria	CLIENT: Real Equity Management
PROJECT NUMBER: 019-0012	LOCATION: Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 953.2

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 0.5'		0								
	FAT CLAY										
	Very stiff, moist, brown, trace organics			U 1				26.6	94.1		P. P. = 2.75
950	3.0'										
	Very stiff, moist, dark brown with reddish brown			U 2				26.1	98.2		P. P. = 3.0
			5								
945	8.4'			U 3							

BASE OF BORING AT 8.4 FEET

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

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

STARTED:	6/4/19	FINISHED:	6/4/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

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BOREHOLE REPORT NO. B-46

Sheet 1 of 1

PROJECT NAME: **Aria**

CLIENT: **Real Equity Management**

PROJECT NUMBER: **019-0012**

LOCATION: **Lee's Summit, Missouri**

Shelby Tube ▭ Split Spoon ⊠

APPROX. SURFACE ELEV. (ft): 965.4

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
965	***ROOT ZONE*** 0.5'		0								
	FAT CLAY *Soft to firm, moist, brown, trace organics*			U 1				29.6			P. P. = 0.5
	3.0'										
	Stiff, moist, brown, trace gravel			U 2				28.0	96.0		P. P. = 1.25
960			5								
	8.0'										
	Very stiff, moist, reddish brown trace gray			U 3			2.4	23.3	102.7		
955			10								
	13.0'										
	WEATHERED SHALE *Moist, light brown, trace gravel*			U 4			3.5	24.4	106.2		
950			15								
	18.5'										
	SHALE *Light brown, with reddish brown* 20.0'		20	SS 5		8-9-9 N=18		21.1			
	BASE OF BORING AT 20.0 FEET										

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

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

STARTED:	5/31/19	FINISHED:	5/31/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

BOREHOLE REPORT NO. B-47

Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	Real Equity Management
PROJECT NUMBER	**LOCATION**
019-0012	Lee's Summit, Missouri

Shelby Tube

APPROX. SURFACE ELEV. (ft): 959.2

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 ***0.5'***		0								
	FAT CLAY										
	Stiff to very stiff, moist, brown to reddish brown			U 1				30.5	90.8		P. P. = 2.0
955				U 2			1.6	23.4	102.6		
			5								
950				U 3			2.0	26.3	99.0		
			10								
	13.0'										
	Stiff, moist, dark reddish brown with light brown			U 4				32.5	83.7		P. P. = 1.5
945	***15.0'***		15								

BASE OF BORING AT 15.0 FEET

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

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

STARTED:	6/3/19	FINISHED:	6/3/19
DRILL CO.: RC DRILLING		DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			

olsson	BOREHOLE REPORT NO. B-48	Sheet 1 of 1

PROJECT NAME	CLIENT
Aria	**Real Equity Management**
PROJECT NUMBER	**LOCATION**
019-0012	**Lee's Summit, Missouri**

Shelby Tube

APPROX. SURFACE ELEV. (ft): 953.7

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 *0.5'*		0								
	FAT CLAY *Very stiff, moist, dark brown, with gravel* *3.0'*			U 1				29.7	89.6	51/26	P. P. = 2.75
950	***LIMESTONE*** *Gray* *5.0'*		5								

REFUSAL AT 5.0 FEET

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

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

STARTED:	5/31/19	FINISHED:	5/31/19
DRILL CO.:	RC DRILLING	DRILL RIG:	RC-550
DRILLER:	LUKE	LOGGED BY:	DEREK/ALAN
METHOD: CONTINUOUS FLIGHT AUGER			