GEOTECHNICAL ENGINEERING REPORT

Proposed Rock Creek Industrial Park
Montana and Kingman Roads
Section 13, T17S, R19E
Ottawa, Kansas

Project No. D15G1444

December 23, 2015

Prepared for:

City of Ottawa / Franklin County, Kansas
Professional Engineering Consultants

Prepared by:

GeoSource
Your Source for Geotechnical and Materials Engineering

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December 23, 2015

Mr. W. David Lee, PS
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Topeka, Kansas 66612-1852

Subject: **Geotechnical Engineering Report**
Proposed Rock Creek Industrial Park
Montana and Kingman Roads
Ottawa, Kansas
Project No. D15G1444

Dear Mr. Lee:

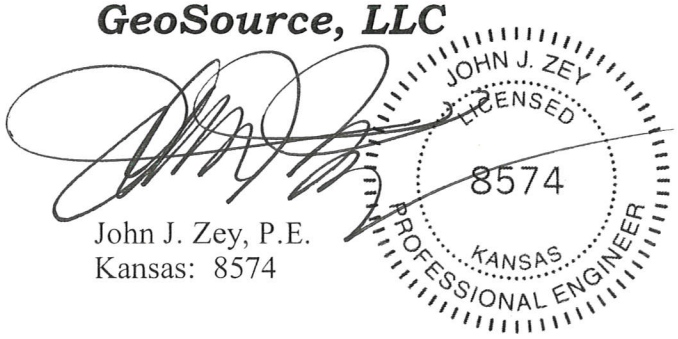
We have completed the subsurface exploration and geotechnical evaluation for the proposed Rock Creek Industrial Park. The purpose of the exploration will be to obtain preliminary information on the general geology and subsurface conditions within the proposed 300 ± acre site. The information would be used to evaluate the general overall suitability of the site for the proposed development and to provide preliminary geotechnical engineering recommendations for foundation design and site development.

In general, the borings encountered undocumented fill and naturally deposited clay soils underlain by interbedded layers of shale and limestone bedrock units that continued to the depths explored. Lightly loaded buildings and other structures can be generally be supported on shallow spread footings that bear in stiff clays and/or on structural fill. More heavily loaded buildings and structures can be supported on drilled piers that are founded in the bedrock units that underlies the site. Preliminary recommendations for design and construction of foundations are presented in the following report.

This report completes our current scope of services for this project. The enclosed report describes our exploration procedures and presents the results of the testing and evaluation along with design and construction recommendations for this project. We appreciate the opportunity to work with you on this project and are prepared to provide the recommended construction services.

Respectfully submitted,

GeoSource, LLC



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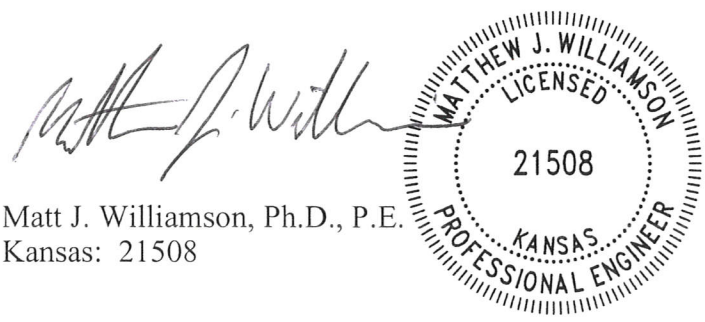

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Cc: Mr. Richard Nienstedt – Ottawa City Manager

GeoSource

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MONTANA AND KINGMAN ROADS
OTTAWA, KANSAS

Project No. D15G1444
December 23, 2015

INTRODUCTION

GeoSource has completed the subsurface exploration and geotechnical evaluation for the proposed Rock Creek Industrial Park, located northwest of the intersection of Montana and Kingman Roads in Ottawa, Kansas. Our services for this project provided were in general accordance with our December 23, 2014 proposal. Mr. Michael W. Berry with Professional Engineering Consultants, P.A. authorized the exploration work on February 17, 2015 by signing our proposal/contract.

The following report summarizes the information obtained from the borings and laboratory test results, describes the subsurface and groundwater conditions that were observed, and presents preliminary geotechnical engineering recommendations for foundation design and site development for the proposed project. The subsurface information obtained along the alignments of the proposed sewer and water lines will be used to evaluate excavation methods and to prepare estimates for construction of these lines.

PROJECT DESCRIPTION

We understand that the City of Ottawa and Franklin County plan to jointly develop the proposed 300 ± acre Rock Creek Industrial Park, located southeast of Ottawa, Kansas. The industrial park site will encompass the East ½ of Section 13, T17S, R19E in Franklin County. Preliminary site development will include the installation of new water and sanitary sewer lines and other infrastructure. Future development will include: three or more industrial building sites with the potential for 500,000 to 1,000,000 square feet of building space, a 500,000 gallon elevated water storage tank, access roadway and other support structures. The preliminary site development drawing that was provided to GeoSource indicated the alignments of the proposed water and sanitary sewer lines, the general

location of the elevated water storage tank near the northeast corner of the site, and preliminary locations of the future industrial building areas.

Foundation loads for the future industrial buildings and elevated water storage tank were not known at the time that our report was prepared. Based on previous experience with similar types of structure, it is estimated that maximum column loads for the industrial building will be on the order of 250 kips. Foundation loads for the future elevated water storage tank are dependent on the style of the water tank that is used. Typical styles include: a fluted base structure; a pedestal type structure; and a conventional elevated tank supported on individual legs and a center riser. The fluted base and pedestal type structures are typically founded on either a ringwall or mat foundation, with contact loads on the foundations that are typically on the order of 3,000 to 5,000 psf, depending on the manufacturer and configuration of the structure. Foundation loads for legged style elevated water tank typically range from about 500 to 560 kips per leg and from about 1,200 to 1,500 kips for the center riser.

The scope of the exploration and engineering evaluation for this study, as well as the conclusions and preliminary recommendations in this report, were based on our understanding of the project as previously described above. The preliminary subsurface information that was obtained during this study is not considered to be sufficient for final design of foundations for individual buildings and other structures within the proposed industrial park. A qualified geotechnical engineer should be retained to perform additional subsurface exploration work, once individual building locations and configurations have been determined.

DRILLING AND SAMPLING PROCEDURES

The field work for this project was performed in phases, beginning on March 3, 2015 and continuing through December 17, 2015, as right-of-entry was obtained from the various parcels of land within the proposed industrial park site. A total of 81 exploratory test borings have been completed as of the date of this report. Figure 1 in Appendix A shows the approximate locations of the borings with reference to the proposed water and sewer line routes, existing county roads, I-35 Highway, and other

site features. The borings that were designated as S-1, S-2, etc. were drilled along the proposed alignments of the gravity sewer lines and borings designated as W-1, W-2, etc. were drilled along the planned alignments of the various water lines. Borings designated as B-1, B-2, etc. were drilled in the areas where the future industrial buildings will likely be located.

The boring locations were selected by Professional Engineering Consultants (PEC). The coordinates and surface elevations shown on the boring logs were provided by PEC. Some of the borings had to be offset a few feet from the originally staked locations, due to conflicts with utility lines or site obstructions. The offset distance and direction are indicated on the individual boring logs. Right-of-entry to the site for the proposed elevated water storage tank had not been obtained at the time our report was prepared. The water tank site is located on the east side of Montana Road near the northeast corner of the site. Additional borings are planned at the water tank site once site access is obtained.

The borings were performed with a CME-45 rotary drill rig mounted on an all-terrain carrier. The boreholes were advanced with 4-inch diameter continuous flight augers equipped with carbide cutting teeth. Representative samples of the overburden soils and weathered bedrock units were obtained at selected intervals using both the Shelby tube and split-barrel sampling procedures as outlined in ASTM Specifications D-1587 and D-1586, respectively. The Shelby tube sampling procedure utilizes a thin-walled, steel tube with a sharp cutting edge that is pushed hydraulically into the bottom of the boring to obtain relatively undisturbed samples of cohesive or moderately cohesive soils.

The split-barrel sampling procedure utilizes a standard 2-inch O.D. split-barrel sampler that is driven into the bottom of the boring with an automatic hammer. The number of blows required to advance the sampler the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Resistance Value (N). These "N" values are indicated on the boring logs at their depth of occurrence and provide an indication of the consistency of clays, the relative density of sands and the relative hardness of weathered bedrock units. A higher efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the Standard Penetration Resistance Values (N). The effect of the

automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report. The samples were sealed and returned to our laboratory for further examination, classification and testing.

Borings located in the future building areas (Borings B-1 through B-24) were continued below the point of auger refusal through use of NQ3 diamond bit coring procedures. This diameter core barrel provides a sample having a diameter that is slightly smaller than 2 inches. Descriptions of the rock core are presented on the respective boring logs in addition to recovery and Rock Quality Designation (RQD) for the core recovered. Recovery is defined as the length of core obtained expressed as a percentage of the total length cored. Rock Quality Designation is defined as the total length of core pieces, 4 inches or greater in length, expressed as a percentage of the total length cored. Rock Quality Designation provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

Boring logs are contained in Appendix A and present such data as soil and bedrock descriptions, consistency and relative hardness evaluations, depths, sampling intervals and observed groundwater conditions. The conditions encountered in each of the borings were monitored and recorded by the drill crew. Field logs were prepared by the drill crew that included visual classifications of the materials encountered during drilling, as well as drilling characteristics.

Our final boring logs represent the geotechnical engineer's interpretation of the field logs combined with laboratory observation and laboratory test results of the soils and bedrock samples. Stratification boundaries indicated on the boring logs were based on observations made during the field work, an extrapolation of the information obtained by examining samples obtained from the borings, along with comparisons of soils and/or bedrock types with similar engineering characteristics. Locations of these boundaries are approximate, and the transitions between soil and bedrock types may be more gradational in nature rather than clearly defined.

GEOSOURCE

LABORATORY TESTING PROGRAM

The laboratory testing program consisted of performing moisture content, dry unit weight and unconfined compression tests on representative portions of undisturbed samples obtained with the Shelby tube sampler. A calibrated hand penetrometer was used to determine the approximate unconfined compressive strength of samples that were unsuitable for unconfined compression testing. The hand penetrometer has been correlated with unconfined compression tests, and provides a better estimate of the consistency and strength than visual observation alone. Moisture content determinations were also performed on samples obtained using the split-barrel sampler. The results of the laboratory tests are presented on the respective boring logs.

In addition, Atterberg Limits tests were conducted on representative samples of the onsite soils. These tests provide information on the plasticity of the soil, which is a basis for soil classification and for evaluating the potential of soil to undergo volume change with variations in the moisture content of the soil. The results of the Atterberg Limits tests are also shown on the respective boring logs.

In addition, unconfined compression tests were performed on selected rock cores to evaluate the compressive strength of the bedrock units encountered in the borings. The results of the unconfined compression tests are shown on the individual boring logs in Appendix A. The unconfined compressive strengths are in psi (pounds per square inch).

As part of the testing program, the soil samples were classified by a geotechnical engineer using visual and manual procedures outlined in ASTM D-2487 and D-2488. The descriptions of the soils indicated on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System. Estimated group symbols according to the Unified Soil Classification System are shown on the boring logs. A brief description of this classification system is included in Appendix A of this report.

The bedrock units encountered in the borings were described in accordance with the enclosed General Notes for Bedrock on the basis of visual classification of disturbed auger cuttings, split-barrel and core samples, as well as on drilling characteristics. Petrographic analysis may reveal other rock types.

REGIONAL AND SITE GEOLOGY

The Rock Creek Industrial Park site is located within the Osage Cuestas Plains Physiographic Region of Kansas. The Osage Cuestas Plains are generally characterized by east-facing escarpments, which trend from north to south across the region. The escarpments were formed by hard, limestone bedrock units, which have a relatively gentle dip of about 10 to 25 feet to the mile trending from southeast to northwest at the industrial park site. Between the escarpments are gently rolling hills, formed on the more erodible shale units.

Published geologic reports indicated that the bedrock units that underlie the industrial park site are comprised of the Pennsylvanian Age Weston Shale and Stanton Limestone Formations, which are part of the Pedee and Lansing Groups, respectively. The Weston Formation was the uppermost bedrock unit encountered in the borings that were drilled in the northern half of the site. The Weston Shale is typically a gray to blueish gray silty to clayey shale that weathers to an olive tan to yellowish tan to gray brown colored shale. The depth of weathering of the shale was as much as 8 to 10 feet in a number of the borings that were drilled at the industrial park site.

The Weston Formation was underlain by the Stanton Limestone Formation. The Stanton Formation is comprised of the South Bend Limestone, Rock Lake Shale, Stoner Limestone, Eudora Shale and Captain Creek Limestone Members. The upper three members of the Stanton Formation were encountered to the depths explored in the borings that were performed at the industrial park site. The upper limestone unit, the South Bend Limestone, ranged from about 3.6 to 4.7 feet in thickness and was described as a light gray, crystalline, thick-bedded, fossiliferous limestone. The underlying Rock Lake Shale was only about 1 to 1.5 feet thick at the boring locations and was generally comprised of gray to greenish gray, silty to clayey shale.

The Stoner Limestone underlies the Rock Lake Shale and is the lowermost bedrock unit encountered in the borings to the depths explored. The Stoner Limestone was generally encountered directly below the overburden soil in the southern half of the site and this bedrock unit is quarried in the Ottawa area. The thickness of the Stoner Limestone ranges from about 11 to 40 feet in Kansas and more than 17 feet of this limestone unit was encountered at Boring B-19. The Stoner Limestone was generally described as light gray to nearly white, crystalline, thick-bedded to massive, fossiliferous limestone. The limestone contained a persistent solution cavity, filled with soft clay and limestone fragments. The solution cavity was encountered at four of the boring locations within the industrial park site and the thickness of the solution cavity ranged from less than a foot to as much as 1.5 feet at the boring locations where the solution cavity was encountered.

SITE AND SUBSURFACE CONDITIONS

The proposed Rock Creek Industrial Park is located northwest of the intersection of Montana and Kingman Roads in Ottawa, Kansas. As previously discussed, the site encompasses about 300 ± acres within the E ½ of Section 13, T17S, R19E in Franklin County, just south east of the City of Ottawa, Kansas. At the time the borings were performed, most of the site was cultivated farm ground. Wooded areas extended along Rock Creek, which forms the western boundary of the site. There was also about 15 ± wooded acres located in the SW ¼ of the SE ¼ of Section 13. There was an existing farmstead located on Montana Road near the northern end of the site and an abandoned farmstead with a barn or agricultural building located near the southern end of the site on Montana Road. The existing ground surface sloped downward from east to west toward Rock Creek at a grade of about 1 percent or less.

The following presents a general summary of the major strata encountered during our subsurface exploration and includes a discussion of the results of field and laboratory tests conducted. Specific subsurface conditions encountered at the boring locations are presented on the individual boring logs in Appendix A of this report. Figure 2 in Appendix A shows a Generalized Subsurface Profile, based on the information obtained from the borings. The stratification lines shown on the boring logs and

profile represent the approximate boundaries between soil and bedrock types; in-situ, the transition between materials may be more gradational in nature rather than clearly defined.

The borings encountered about 10 to 18 inches of dark brown topsoil at the surface at most of the boring locations. Borings W-8 through W-16 were drilled along the west side of Montana Road and encountered about 5 to 6 inches of gravel at the surface. The gravel was underlain by existing fill that continued to depths of about 1.5 to 4.5 feet. The fill was comprised of local clay soils and were visually classified as fat clays (CH) that varied from dark gray brown to brown to gray brown in color.

The topsoil, gravel and fill layers were underlain by naturally deposited clay soils that continued to depths of about 3 to 12 feet below the existing ground surface at the boring locations. The clay soils were visually classified as lean clays, sandy lean clays and shaley clays (CL), lean to fat clays (CL/CH) and fat clays (CH). Laboratory tests performed on samples of the onsite clay soils indicated a relatively wide variation in the engineering properties of these soils, with moisture contents ranging from 14.6 to 32.2 percent, dry densities of 88 to 115 pcf and unconfined compressive strengths of 1,730 to 12,160 psf. Standard Penetration Tests performed in the onsite clay soils indicated "N" values in the range of 5 to 27 blows for one foot of penetration. Atterberg Limits tests performed on selected samples of the natural clay soils indicated Liquid Limits ranging from 48 to 65, with Plasticity Indices of 28 to 41.

As previously discussed, the natural clay soils were underlain by interbedded layers of shale and limestone bedrock that continued to the depth explored. The depth to bedrock varied from about 3 to 12 feet at the boring locations. In general, borings drilled in the northern half of the site encountered weathered shale bedrock below the soil and the borings drilled in the southern half of the site encountered limestone bedrock below the soil mantle. The upper 8 to 10 feet of the shale bedrock units were described as weathered, soft to moderately hard and olive tan to yellowish tan to gray brown in color. Laboratory tests performed on samples of the weathered shale indicated moisture contents in the range of 15.5 to 25.1 percent, with dry densities of 97 to 111 pcf and unconfined

compressive strengths of 1,890 to 5,560 psf. Standard Penetration Tests performed in the weathered shale yielded "N" values in the range of 17 to 79 blows for one foot of penetration.

Core samples of the shale and limestone bedrock units had recovery rates ranging from about 90 to 100 percent, with Rock Quality Designation (RQD) values in the range of 52 to 89 percent, indicating fair to good quality rock. Unconfined tests performed on selected core samples of the limestone and shaley limestone bedrock units indicated compressive strengths ranging from about 2,480 to 13,860 psi. An unconfined test performed on a core sample of the hard, unweathered shale indicated an unconfined compressive strength of about 240 psi.

GROUNDWATER OBSERVATIONS

Groundwater observations were made both during and after completion of drilling operations. Most of the borings were dry prior to coring. The exceptions were at Borings S-6-3, W-5 and W-25, where groundwater seepage was encountered at depths ranging from about 1 to 11 feet at the time the borings were performed. The materials encountered in the test borings have relatively low permeabilities and observations over an extended period of time through use of piezometers or cased borings would be required to better define current groundwater conditions.

At most of the building boring locations (B-1 through B-24), the bedrock encountered below the level of auger refusal was cored. Coring of the bedrock required the introduction of water into the boreholes as a drilling fluid to cool the bit and to flush the cuttings. No noticeable loss of drilling fluid was noted. The water levels indicated on the boring logs where coring procedures were used represent the water level in the borehole after removal of drilling tools and, in general, is not an indication of a true groundwater table.

Perched groundwater is commonly observed near the soil mantle/bedrock contact, following prolonged periods of precipitation. A perched groundwater condition occurs when surface water percolates downward through the more permeable overburden soils to the less permeable shale bedrock units. This

can sometimes create a zone of saturated, lower consistency soils just above the bedrock. Groundwater quantities, where perched conditions exist, are normally small and any dewatering can generally be accomplished with conventional sump pumps and/or area French drains.

Groundwater in the underlying bedrock typically flows through joints and fissures in the limestone bedrock units. The shale bedrock units are relatively impermeable and generally do not transmit significant amounts of groundwater seepage.

Fluctuations of groundwater levels can occur due to seasonal variations in the amount of rainfall, runoff, the level of Rock Creek, and other factors not evident at the time the borings were performed. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our evaluation, it is our professional opinion that the proposed Rock Creek Industrial Park site can be developed for the planned infrastructure, buildings and other structures using conventional grading and foundation construction techniques. The types of foundations that would generally be suitable for the subsurface conditions encountered at this site will largely be dependent on the location and configuration of the proposed buildings, as well as the magnitude of the foundation loads, the thickness of any new fill that will be required to develop the design grades, and other factors.

It is anticipated that lightly loaded buildings and other structures, with column loads less than about 100 kips, can be supported by shallow spread footings that are founded in the stiff, natural clay soils and weathered shale bedrock that underlie the site or in controlled structural fill. Buildings and other structures with moderate to high column loads could be founded on drilled pier foundations that extend through the overburden soils and bear in the shale and/or limestone bedrock units that underlie the industrial park site.

Expansive clay soils pose the most significant problem that must be addressed in the planning phase of the project. Most of the onsite clay soils at this site have moderate to high shrink-swell potential and could undergo significant volume change as the moisture content of the soils change with seasonal variations in precipitation. To reduce the risk associated with expansive clays, we normally recommend that building areas be undercut to allow placement of a minimum of 24 inches of select, low volume change material or stabilized soil below all grade supported floor slabs. Depending on the finished floor elevation of the building, it may be necessary to undercut the planned building areas to allow placement of the recommended select fill layer.

The natural clay soils encountered at this site are generally poor subgrade materials for support of pavements. The pavement design must address the subgrade conditions in conjunction with other factors, such as drainage and expected traffic volumes and loads when evaluating pavement types and thicknesses.

The relatively shallow depth to bedrock could have an impact on excavation costs for basements, foundations and underground utilities. Excavations that extend into the weathered shale bedrock will generally require rock teeth or carbide bits to facilitate removal of the shale. Excavations that extend into unweathered shale and/or limestone bedrock units will be more difficult and will probably require pneumatic breakers or some other method of hard rock removal.

Since the industrial park is still in the planning stage and the available subsurface information is limited, the Owners and Designers should recognize that subsurface and groundwater conditions may be more variable than the data from the preliminary borings indicate. Additional borings should be performed after the locations and floor elevations of the individual buildings and other structures have been established. The information on the subsurface and groundwater conditions that was obtained from the preliminary subsurface exploration is not considered adequate for final design of the foundations.

GEOSOURCE

SITE PREPARATION

Initial site preparation for the proposed industrial park should commence with demolition and removal of existing buildings and other structures that are located within proposed construction areas. Demolition should include complete removal of all grade supported slabs, sidewalks and shallow spread footings. All broken concrete and other debris from demolition of the existing structures should be removed from the site. Any basement walls should be removed to the top of the foundations. Basement footings and floor slabs could be left in place if they would not interfere with the installation of utilities or other construction. If basement floor slabs are not removed, they should be broken to allow for the percolation of groundwater. Areas disturbed during demolition of the existing structures should be thoroughly evaluated by the geotechnical engineer prior to placement of structural fill. All disturbed soils should be undercut prior to placement of structural fill.

Site preparation for building and pavement areas should commence with stripping of all vegetation and topsoil from the proposed construction areas. Based on the preliminary borings, an average stripping depth of approximately 10 to 18 inches would be anticipated for most areas. The stripping depths required will likely vary and should be adjusted to remove all vegetation and root systems.

Any required tree removal should also be accomplished at this time. Care should be taken to thoroughly remove all root systems from the proposed building area. 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 have a higher swell potential and should also be undercut and replaced with structural fill.

Relocation of any existing utility lines within the zone of influence of proposed construction areas should also be completed as part of the initial site development work. The lines should be relocated to areas outside of the proposed construction areas. Excavations created during the removal of the existing lines should be cut wide enough to allow for use of heavy construction equipment to recompact the fill. In addition, the base of the excavations should be thoroughly evaluated by a geotechnical engineer or

engineering technician prior to placement of fill. All fill should be placed in accordance with the recommendations presented in the Structural Fill section of this report.

Site preparation for buildings should include undercutting of the building area to a level that will allow placement of a minimum of 24 inches of select, low volume change fill and/or stabilized soil below the building floor slabs and leveling course. The undercut should extend a minimum of 10 feet beyond the proposed building lines. The purpose of the select, low volume change fill and/or stabilized section is to surcharge and to limit moisture changes in the underlying fat clay soils; thereby reducing the potential for volume changes resulting from moisture changes in these expansive clay soils. For the purposes of this report, low volume change materials are defined as soils having a Liquid Limit of 50 or less.

Following undercutting and prior to placement of structural fill, it is recommended that the exposed grade be scarified to a minimum depth of 8 inches and be moisture conditioned to bring the moisture content of the soils into the range recommended for structural fill. Moisture conditioning is the process of adjusting the moisture content of the scarified materials to a moisture content that is within a range of 0 to 4 percent above the optimum moisture content as determined by the Standard Proctor (ASTM D-698) compaction procedure. Following moisture conditioning, the scarified materials should be recompacted to a minimum of 95 percent of Standard Proctor (ASTM D-698) maximum dry density. Soft or unstable areas that hamper compaction of the subgrade should be undercut and replaced with structural fill.

Following moisture conditioning, it is recommended that the exposed grade be proofrolled. Proofrolling of the subgrade provides a more stable base for placement of structural fill and aids in identifying soft or disturbed areas. Unsuitable areas identified by the proofrolling operation should be undercut and replaced with structural fill. Proofrolling can be accomplished through use of a fully-loaded, tandem-axle dump truck or similar equipment providing an equivalent subgrade loading. Suitable structural fill should then be placed to design grades as soon as practical after reworking the subgrade to avoid moisture changes in the underlying soils.

If soft or unstable conditions are encountered during the proofrolling operation, stabilization of the soils may be required. Clean crushed rock having a particle diameter of 3 to 6 inches could be used to stabilize the subgrade prior to placement of structural fill. After initial undercutting, the large rock would be spread over the unstable subgrade and worked into the soft soils by close tracking with a bulldozer or other suitable construction equipment. Additional rock would be added until the subgrade becomes firm enough to support construction equipment. The use of a geotextile fabric, in conjunction with crushed rock, could also be considered as a means of stabilizing the exposed grade.

In general, subgrade preparation for city streets and parking areas will not need to be as extensive as recommended for building areas. After the pavement areas have been stripped and cut to grade, the exposed subgrade soils should be thoroughly proofrolled. In fill areas, the grade exposed after site stripping of the topsoil should also be proofrolled in preparation for placement of any new structural fill. Any soft or unstable areas observed during proofrolling should be undercut and brought up to planned grade with controlled structural fill.

Some municipalities and public works departments require subgrade stabilization below streets and roadways that are underlain by expansive clay soils, similar to the clay soils encountered at the Rock Creek Industrial Park site. We generally recommend that the upper 8 inches of the subgrade below the new streets and roadways be stabilized with either hydrated lime or Class "C" fly ash. Based on the soil types encountered in the preliminary borings, it is anticipated that the amount of hydrated lime and fly ash that will be required for proper treatment of the subgrade soils will be approximately 5 percent and 15 percent, respectively (dry weight basis). Laboratory tests should be performed to evaluate the actual amount of hydrated lime or fly ash required. Crushed limestone aggregate, such as KDOT AB-1 or other approved crushed rock, could be substituted for the recommended stabilized soil layer below the new pavement section, if desired.

GEOSOURCE

CLIMATIC CONDITIONS

Weather conditions will influence the site preparation required. In spring and late fall, following periods of rainfall, the moisture content of the near surface soils may be significantly above the optimum moisture content. Perched ground water may also develop above impervious bedrock units (such as shale) saturating near surface materials. These conditions could seriously impede grading by causing an unstable subgrade condition. Typical remedial measures include aerating the wet subgrade, removal of the wet materials and replacing them with dry materials or treating the wet material with fly ash.

If site grading commences during summer months, the moisture contents of the onsite fat clay soils may be abnormally low, which can significantly increase the swell potential of these materials. Typically, discing and moisture conditioning of the exposed subgrade materials to the moisture content criteria outlined in the Structural Fill section will reduce this swell potential of the dry materials. As an alternative, the dry materials could be undercut and replaced with structural fill.

EXCAVATIONS

The borings indicated that the excavations for the proposed sanitary sewer and water lines will extend though the clay overburden soils and into the shale and limestone bedrock units that underlie the industrial park site. The overburden soils and the soft, highly weathered shale bedrock with Standard Penetration Resistance (N) values of 25 blows per foot or less can generally be excavated with conventional heavy equipment such as backhoes, track-loaders, and other conventional earth moving equipment. Excavations that extend into the underlying harder, less weathered shale or limestone bedrock units will be more difficult and will probably require the use of rock teeth, pneumatic breakers, or some other method of hard rock removal to complete the excavations.

Temporary construction slopes should be designed in strict compliance with the most recent governing regulations. Most of the naturally deposited clay soils and weathered shale bedrock encountered in the

preliminary borings would be classified as Type B soils (stiff soils), under Part 1926 of the OSHA regulations pertaining to open excavations. For these soils, it is recommended that temporary construction slopes be no steeper than 1(H) to 1(V). It is anticipated that utility excavations near Rock Creek will likely encounter groundwater and lower consistency alluvial soils. Alluvial soils below the water table would generally be classified as Type C soils, under Part 1926 of the OSHA regulations pertaining to open excavations. Temporary shoring and/or bracing and dewatering will probably be required for excavations that extend below the groundwater table.

Construction slopes should be closely observed for signs of mass movement: tension cracks near the crest, bulging at the toe, etc. If potential stability problems are observed, the geotechnical engineer should be immediately contacted. The responsibility for excavation safety and stability of temporary construction slopes should lie solely with the contractor.

STRUCTURAL FILL

All structural fill should consist of approved materials, free of organic matter and debris. Fill placed within 24 inches of building floor slabs and any leveling course should consist of a lower plasticity cohesive soil having a Liquid Limit less than 50. Higher plasticity soils could be used as structural fill in the lower portion of deep fill sections in the building areas and/or as structural fill in pavement and landscaped areas where more movement can be tolerated. Fill should be placed in lifts having a maximum loose lift thickness of 9 inches. All fill should be compacted to a minimum of 95 percent of the material's maximum dry density as determined by ASTM D-698 (standard Proctor compaction). The moisture content of the fill at time of compaction should be within a range of 0 to 4 percent above optimum moisture content as defined by the standard Proctor compaction procedure. Moisture contents should be maintained within this range until completion of the building floor slab.

Based on subsurface conditions encountered in the borings, there does not appear to be a sufficient amount of suitable onsite material available for use in the construction of the select, low volume change

zone that has been recommended below the building floor slabs. Because of this, it is anticipated that it will be necessary to import low volume change material to complete the required sections.

The onsite weathered shale could also be pulverized and used to construct structural fill sections. It is anticipated that most of the weathered shale can be broken down sufficiently with heavy compaction equipment to develop satisfactory fill sections for support of structures and pavements. The shale should be pulverized into pieces having a maximum size of no more than 2 inches. We anticipate that significant amounts of water will have to be added to the shale to increase moisture contents of these materials to levels necessary to achieve the required degree of compaction. Larger size fragments of rock, excavated from the cut areas, should be placed outside planned structure and pavement areas, so that these materials do not hamper the installation of foundations and utilities.

In lieu of importing low plasticity material for use as low plasticity fill beneath the building floor slab areas, the onsite fat clay soils could be stabilized with either hydrated lime or Class "C" fly ash. The amount of lime and fly ash that is typically required to achieve the desired reduction in shrink-swell potential in on the order of 5 percent and 15 percent for lime and fly ash, respectively (dry weight basis). Laboratory tests will be necessary to determine the actual amount required. Recommendations and typical specifications for this method of stabilization could be provided if desired.

PERMANENT SLOPES

Permanent cut or fill slopes should be no steeper than 3(H) to 1(V) to maintain long-term stability and to provide ease of maintenance. Steeper slopes are susceptible to erosion, will be difficult to maintain, and could experience problems with instability. The crest or toe of cut or fill slopes should be no closer than 10 feet from any foundation and no closer than 5 feet from the edge of any pavement.

Drainage should be carefully controlled to prevent migration of surface water into excavations. It is recommended that the contractor develop excavation plans for all new structures that are adjacent to existing structures. As a minimum, the plans should indicate: the proposed method of excavation,

the expected length of time that the excavation will be open, excavation side slopes, locations of stockpiles, as well as any temporary bracing, sheeting and/or dewatering measures that will be used. The plans should be submitted to the owner and engineer well in advance of the start of construction for review and comments regarding the impact of the planned construction on the existing structures and facility operations.

FOUNDATIONS

The types of foundation that would be suitable for support of the buildings and other structures at the industrial park site are dependent on the final location, configuration and finished floor levels of the buildings, as well as the magnitude of the foundation loads, sensitivity to differential settlement, thickness of new fill required for site development and other factors. Lightly loaded buildings and other structures with column loads less than about 100 kips can generally be supported by shallow spread footings founded in the stiff, natural clay soils, weathered shale bedrock and/or in controlled structural fill. Buildings and other structures with moderate to high column loads should be founded on drilled pier foundations that extend through the overburden soils and bear in the shale and/or limestone bedrock units that underlie the industrial park site.

SPREAD FOOTINGS

As previously discussed, lightly loaded buildings and other structures with column loads less than about 100 kips can generally be supported by shallow spread footings that are founded in the stiff, natural clay soils, weathered shale bedrock and/or in controlled structural fill. Support of foundations in undocumented existing fill is not be recommended. Based on the preliminary borings and laboratory test results, it should will be possible to design and proportion shallow spread footings using an allowable bearing pressure in the range of 2,000 to 3,500 psf. The allowable bearing pressure would include a safety factor of at least 3 against a bearing failure.

Formed continuous footings should have a minimum width of 16 inches and isolated spread footings should have a minimum width of 30 inches. Lightly loaded trench footings (bearing pressure less than 1,000 psf) should have a minimum width of 12 inches. All exterior footings and footings founded in the unheated portions of the structures should be supported a minimum of 3 feet below final exterior grade to provide protection against frost penetration. Where possible, footings should be earth-formed, i.e., poured to lines of neat excavation.

Uplift loads acting on the footings can be resisted by the effective dead weight of the footings plus the weight of the soil above the foundation element. For design purposes, soil backfill above the footings should be assumed to have a unit weight of 110 pcf.

Lateral loads acting on shallow footings resulting from short term dynamic loads, such as wind, may be resisted by the passive resistance of the native soils and by friction acting at the base of the foundation. The lateral load capacity of the structure foundation can be determined using an allowable equivalent fluid unit weight of 280 pounds per cubic foot (pcf) for calculating the passive lateral earth pressure acting on the edge of footings. This allowable equivalent fluid pressure includes a factor of safety of about 1.5. The recommended passive pressure parameter is applicable for earth-formed foundations and should be determined from final grade to the bottom of the foundation; however, the passive resistance provided in the upper 3 feet of the profile should be ignored, as this is the zone subject to moisture changes and frost penetration. For sliding friction, an allowable friction coefficient of 0.30 could be assigned to the base of the foundation. The recommended sliding friction value includes a factor of safety of about 1.5.

In areas where spread footings that are founded on controlled structural fill, the structural fill should extend a minimum of 5 feet beyond the footing lines and to a depth of at least one footing width or 3 feet, whichever is greater, below footing bearing elevations.

The base of all footing excavations should be clean and dry and free of all water and loose materials prior to placement of concrete. Concrete should be placed as soon as possible after excavating so that

excessive drying or wetting of bearing materials does not occur. Should the soils at bearing level become excessively dry or wet, it is recommended that the affected material be removed prior to placement of concrete.

It is recommended that all footing excavations be observed and evaluated by the geotechnical engineer or his representative immediately prior to placement of foundation concrete. Unsuitable areas identified at this time should be corrected. Corrective procedures would be dependent upon conditions encountered and may include deepening of foundation elements, or undercutting of unsuitable materials and replacement with lean concrete or flowable fill.

Long-term structural settlement for shallow spread footings designed and constructed as outlined above should be minor; i.e., 1 inch or less. Differential structural settlement of up to ½ inch should be anticipated across the structure, since some footings will be founded on undisturbed soils while other footings are founded on weathered shale or controlled structural fill.

DRILLED PIER FOUNDATIONS

Buildings and other structures with moderate to high column loads should be founded on drilled pier foundations that extend through the overburden soils and bear in the shale and/or limestone bedrock units that underlie the industrial park site. Based on the preliminary borings and laboratory test results, we recommend that drilled pier foundations be designed and proportioned using allowable end bearing pressure in the range of 20,000 to 30,000 psf for drilled piers founded in shale bedrock, depending on the degree of weathering. Drilled piers that are founded in sound limestone bedrock can generally be designed and proportioned using an allowable end bearing pressure in the range of 50,000 to 75,000 psf, depending on the thickness of the limestone and degree of weathering.

All drilled piers should extend through the weathered portion of bedrock and should be founded in hard shale or sound limestone bedrock. Greater penetration into the bedrock may be required at some locations depending on the extent and severity of weathering. Since the depth to bedrock can change

abruptly across an individual building site, it will be necessary to determine final bearing elevations of the drilled piers at the time they are installed.

Uplift loads acting on the drilled pier foundations can be resisted by the effective dead weight of the piers plus an allowable side friction value of 350 psf for the portion of the shaft in stiff, natural clay soils and 1,500 psf for the portion of the shaft in weathered shale or limestone bedrock. Side friction should be neglected in the upper 5 feet of the shaft.

Properly reinforced drilled piers are generally capable of resisting transient lateral loads from wind and/or earthquakes. It has been our experience that drilled piers with a minimum shaft diameter of 30 inches and an embedment length of 10 to 15 feet are typically capable of resisting lateral loads of about 20 to 25 kips, with maximum top of pier deflections of ½ inch or less. A lateral load analysis should be performed to provide specific recommendations, once individual building and structure locations have been identified and actual loads become available.

Drilled shafts should be installed at a minimum center-to-center spacing of three diameters. No reduction in individual shaft capacity for group action is needed for this spacing. Adjacent drilled shafts should not be constructed on the same day.

Drilled piers should have a minimum shaft diameter of 30 inches in order to accommodate dewatering equipment and/or to permit access for proper cleaning and observation of the bearing material. Some groundwater seepage may be encountered during the installation of drilled piers and provisions for the use of temporary casing and dewatering would be advisable. To minimize disturbance to the bearing surfaces caused by ponding of water, it is recommended that concrete be placed the same day that the piers are drilled. It is also recommended that temporary casing be installed when personnel are required to enter a drilled pier excavation to clean or observe the bearing surface.

If temporary casing is required during the installation of the drilled piers, there must be a sufficient head of concrete inside the casing to prevent soil and water from entering the pier excavation as the

casing is pulled. It is recommend that concrete be designed to have a minimum slump of 6 inches to reduce the potential for arching as the casing is removed.

To minimize disturbance to the bearing surfaces caused by ponding of water, it is recommended that concrete be placed the same day that the drilled shafts are completed. The bottom of drilled pier excavation should be clean and dry and free of all water and loose materials prior to placement of the reinforcing steel and concrete. Concrete placement should be continuous from the bottom to the top elevation of the shaft. For dry excavations, concrete may be placed by the free fall method, provided that it can be directed down the center of the shaft without hitting the reinforcing steel or sides of the excavation. Wet excavated shafts will require that the concrete either be pumped from the bottom up or placed using a tremie. The tremie pipe should be clean and have a sufficient inside diameter for use with the specific concrete mix, but not less than 10 inches. The discharge end of the tremie should allow free radial flow of the concrete and be immersed at least 10 feet in concrete and maintain a positive pressure differential during placement to prevent water or spoil intrusion.

We anticipate that the piers can be installed with conventional drilling equipment. Rock augers may be required to remove the weathered shale above the hard, unweathered shale bedrock and/or the loose seamy limestone above the hard intact limestone.

All drilled pier excavations should be observed by the geotechnical engineer or his representative in order to evaluate the suitability of the bearing material. Unsuitable conditions identified at this time should be corrected. Corrective procedures would be dependent upon conditions encountered and would probably involve deepening of the affected foundation elements. Since solution features in the limestone were identified in the borings, it is recommended that small diameter percussion holes be drilled into the bottom of the limestone formations to check for voids and/or solution cavities and to aid in evaluation of the bearing materials. Probe holes should be drilled in at least 25 percent of the pier excavations. Probe holes will not be required where piers are founded on the shale formation.

Long-term structural settlement of drilled piers designed and constructed as outlined above should be minor; i.e., ½ inch or less.

SEISMIC HAZARDS DETERMINATION

Earthquake hazard evaluation is a complex task. Seismic sources must be identified and characterized, path effects must be evaluated (i.e., selection of appropriate attenuation relationships), and ground motions must be completed. Finally, an analysis of the motion with respect to the proposed construction must be made. In addition to the multi-discipline nature of this process, there is substantial parameter and modeling uncertainty associated with each of the steps. Typically, code based approaches are used for seismic hazard analyses. Our seismic hazard evaluation follows the IBC 2009 procedures.

United States Geological Society (USGS) has developed and mapped maximum earthquake response spectra for two design levels: an earthquake having a 10% probability of exceedance in 50 years and an earthquake having a 2% probability of exceedance in 50 years. The motions developed by USGS represent soft rock conditions, which are assumed to be representative of the soil/rock that would be encountered below a depth of approximately 100 feet below existing grades at the site.

The USGS "soft rock" peak ground accelerations for the 10%/50 year and 2%/50 year events are 4.80% g and 12.90% g, respectively. Maximum spectral accelerations at the 0.2 second/1.0 second periods for the 10%/50 year and 2%/50 year events are 4.80% g / 2.20% g and 12.40% g / 5.60% g, respectively. Based on the subsurface information, the project site would be characterized as a Site Class C per the 2009 International Building Code (IBC). In addition, there is no significant risk of liquefaction or mass movement of the on-site soils due to a seismic event.

GEOSOURCE

BUILDING FLOOR SLABS

The recommendations outlined in the Site Preparation and Structural Fill sections of this report are intended to produce subgrades that are suitable for support of building floor slabs. These recommendations include undercutting of building areas to allow placement of a minimum of 24 inches of select, low volume change material or stabilized soil below the floor slabs and leveling course layers. The select fill and/or stabilized soil layer below the floor slabs has been recommended to reduce the potential for subgrade volume change and floor slab movement. The recommended low plasticity structural fill thickness is in addition to any granular section that will be required below the floor slabs. The moisture content of the subgrade soils should be maintained within the recommended range until floor slabs are completed. Depending upon weather conditions, periodic wetting may be required.

Immediately prior to construction of building floor slabs, it is recommended that the exposed subgrade be evaluated to determine whether moisture contents are within the recommended range and to identify areas disturbed by construction operations. Unsuitable or disturbed areas should be reworked prior to placement of the granular leveling course and construction of the floor slab.

Details regarding proper backfill of utility trenches and stem walls below building floor slab areas should be planned. Suitable low to moderate plasticity clays or granular material should be used as backfill materials. The backfill should be placed and compacted in accordance with the recommendations previously discussed.

It is recommended that a granular leveling course, having a minimum thickness of 4 inches, be used below normally loaded floor slabs supported on soil subgrades. The granular section provides a capillary moisture break and acts as a leveling course. Clean crushed limestone gravel, with a nominal size of ½ to ¾ inch, would be recommended for the leveling course. A modulus of subgrade reaction of 100 pci may be used to design floor slabs constructed on an untreated clay subgrade.

In areas where floor loads are greater than 200 psf, it is recommended that a minimum of 12 inches of crushed limestone aggregate be placed below the building floor slabs. The crushed rock may be substituted for a portion of 18 inches of select, low volume change fill layer recommended for normally loaded floor slabs. The purpose of the crushed rock is to provide an improved subgrade for the more heavily loaded floor slab areas. In addition, the crushed rock will also provide a good working surface during construction. It is recommended that the crushed rock have a gradation similar to KDOT AB-1. The crushed rock should be placed in 6 inch lifts and compacted to a minimum of 95 percent of the material's maximum dry density as determined by ASTM D 698. The moisture content of the crushed rock should be between plus and minus 3 percent of the optimum moisture content at the time of compaction. A modulus of subgrade reaction of 250 pci may be used to design floor slabs constructed on 12 inches of compacted crushed limestone aggregate.

Subsurface moisture and moisture vapor naturally migrate upward through the soil and, where the soil is covered by a building or pavement, this moisture will collect. To reduce the impact of this subsurface moisture and the potential impact of future induced moisture (such as landscape irrigation or precipitation), the current industry standard is to place a vapor retarder below the compacted crushed limestone layer. This membrane typically consists of visquene or polyvinyl plastic sheeting, having a thickness of at least 10 mils. It should be noted that although vapor barrier systems are currently the industry standard, this system may not be completely effective in preventing floor slab moisture problems. These systems typically will not necessarily assure that floor slab moisture transmission rates will meet floor covering manufacturer standards and that indoor humidity levels be appropriate to inhibit mold growth. The design and construction of such systems are totally dependent on the proposed use and design of the proposed building and all elements of building design and function should be considered in the slab-on-grade floor design. Building design and construction may have a greater role in perceived moisture problems since sealed buildings/rooms or inadequate ventilation may produce excessive moisture in a building and affect indoor air quality.

Special precautions must be taken during the placement and curing of all concrete slabs. Excessive slump (high water-cement ratio) of the concrete and/or improper curing procedures used during either

hot or cold weather conditions could lead to excessive shrinkage, cracking or curling of the slabs. High water-cement ratio and/or improper curing also greatly increase the water vapor permeability of the concrete. We recommend that all concrete placement and curing operations be performed in accordance with the American Concrete Institute (ACI) Manual.

The above procedures should reduce the potential for subgrade moisture variations and consequently reduce floor slab movement and cracking. However, these procedures will not completely eliminate the volume change characteristics of the natural clay soils and, because of the presence of unaltered clay soils that extend to much greater depths, some long-term volume change may occur along with some floor slab movement and cracking. Isolation of floor slabs from walls and columns should be considered to accommodate minor differential movement of floor slabs. If it is desired to further minimize the potential for subgrade volume change, the use of a greater thickness of low volume change material beneath the floor slabs should be considered.

LATERAL EARTH PRESSURES

Based on our experience with soils similar to those encountered at the site, all dock walls and other below grade walls that are subject to an unbalanced lateral earth pressure should be designed using an equivalent fluid pressure of 55 pounds per cubic foot. This lateral earth pressure assumes an "at rest" stress distribution condition; i.e., no wall rotation is allowed. For retaining walls that are not fixed at the top and able to rotate, the equivalent fluid pressure may be reduced to 45 pounds per cubic foot. Neither of the previous load distributions includes a factor of safety or take into account the influence of any hydrostatic loading of the wall. Also, the stress distributions do not include the influence of any foundations, pavement or other surcharge loads located in or adjacent to wall backfill.

To prevent hydrostatic loading on the dock walls, it is recommended that provisions be made to provide drainage from behind the walls. Dock walls should be backfilled with free draining granular material extending vertically to subgrade level. Weep holes should be constructed through the wall to drain the

granular section. The granular section should extend over the granular backfill to provide drainage from beneath the floor slab.

PAVEMENTS

Parking and drive area subgrades should be prepared in accordance with the recommendations given in the Site Preparation and Structural Fill sections of this report. The site soils are considered poor subgrade materials for support of pavements. Based on the soil types encountered at this site and previous experience with materials of this type, a design CBR value of 3 is recommended for design. This value would correspond to a resilient subgrade modulus of about 5,840 psi, which is used in the design of flexible pavement sections (asphalt pavements). A modulus of subgrade reaction (k) of 100 pci is recommended for design of rigid pavements (concrete pavements).

Service drives and roadways used by semi-trailer and other heavy delivery trucks require thicker pavement sections than for light duty automobile parking lots. Portland cement concrete pavements are normally required for approach slabs, dock aprons, truck drives and parking areas, trash dumpster pads and other areas where heavy wheel loads will be concentrated. The required thickness of heavy duty truck pavement section is dependent on the number of factors that include the number of heavy trucks that will utilize the pavement, the axle loading of the trucks, the design life of the pavement, initial and final serviceability, and other factors.

We recommend that the pavement subgrades be evaluated by proofrolling immediately prior to paving. The moisture content and density of the upper 8 inches of the subgrade should be checked within two days prior to commencement of actual paving operations. If the material is not in compliance with the required ranges of moisture or density, the subgrade should then be moisture conditioned and recompacted. If any significant event, such as precipitation, occurs after the evaluation, the subgrade should be reviewed by qualified personnel immediately prior to placing the pavement. The subgrade should be in its finished form at the time of the final review.

Proper drainage is a key to the long term performance of any pavement section. It is recommended that all pavements be properly sloped to provide rapid runoff of surface water. Water should not be allowed to pond on or adjacent to pavements, since this could result in saturation of the subgrade and cause premature deterioration of pavements. Pavements in Kansas are normally subjected to 30 or more freeze-thaw cycles in any given year. Because of this, periodic maintenance of all of the pavements is essential to long term performance and should be anticipated. This should include sealing of all cracks and joints and by maintaining proper surface drainage next to paved areas.

LIMITATIONS

The analysis and preliminary recommendations submitted in this report are based in part upon the subsurface information obtained from the exploration points performed at the indicated locations and our present knowledge of the proposed future development of the industrial park as outlined in the Project Description. The City of Ottawa, Franklin County, and potential developers should recognize that the subsurface exploration work and preliminary geotechnical engineering recommendations presented in this report are not intended as a substitute for the more detailed subsurface exploration that would normally be required when individual parcels (building sites) are developed within the Rock Creek Industrial Park. Each prospective building site will have a unique set of subsurface and groundwater conditions that must be individually addressed within the context of the foundation loading conditions, site grading requirements, and pavement traffic conditions, when developing geotechnical engineering recommendations for a specific building site.

This report has been prepared in accordance with the generally accepted geotechnical engineering practice as it exists in the area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report are based on the assumption that an adequate program of observation and testing will be conducted during the construction phase in order to evaluate compliance with our recommendations. Our scope of services did not include any environmental assessment or exploration for the presence of hazardous or toxic materials in the soil, surface water, groundwater or air, on, below or around this site.

This report has been prepared for the exclusive use of our client for specific application to the project discussed. Any party other than the client who wishes to use this report shall notify GeoSource in writing of such intended use. Additional work may be required before an updated report can be issued. Non-compliance with any of these requirements will release GeoSource from any liability resulting from the use of this report by any unauthorized party and client agrees to defend, indemnify and hold harmless GeoSource from any claim or liability associated with such unauthorized or non-compliance.

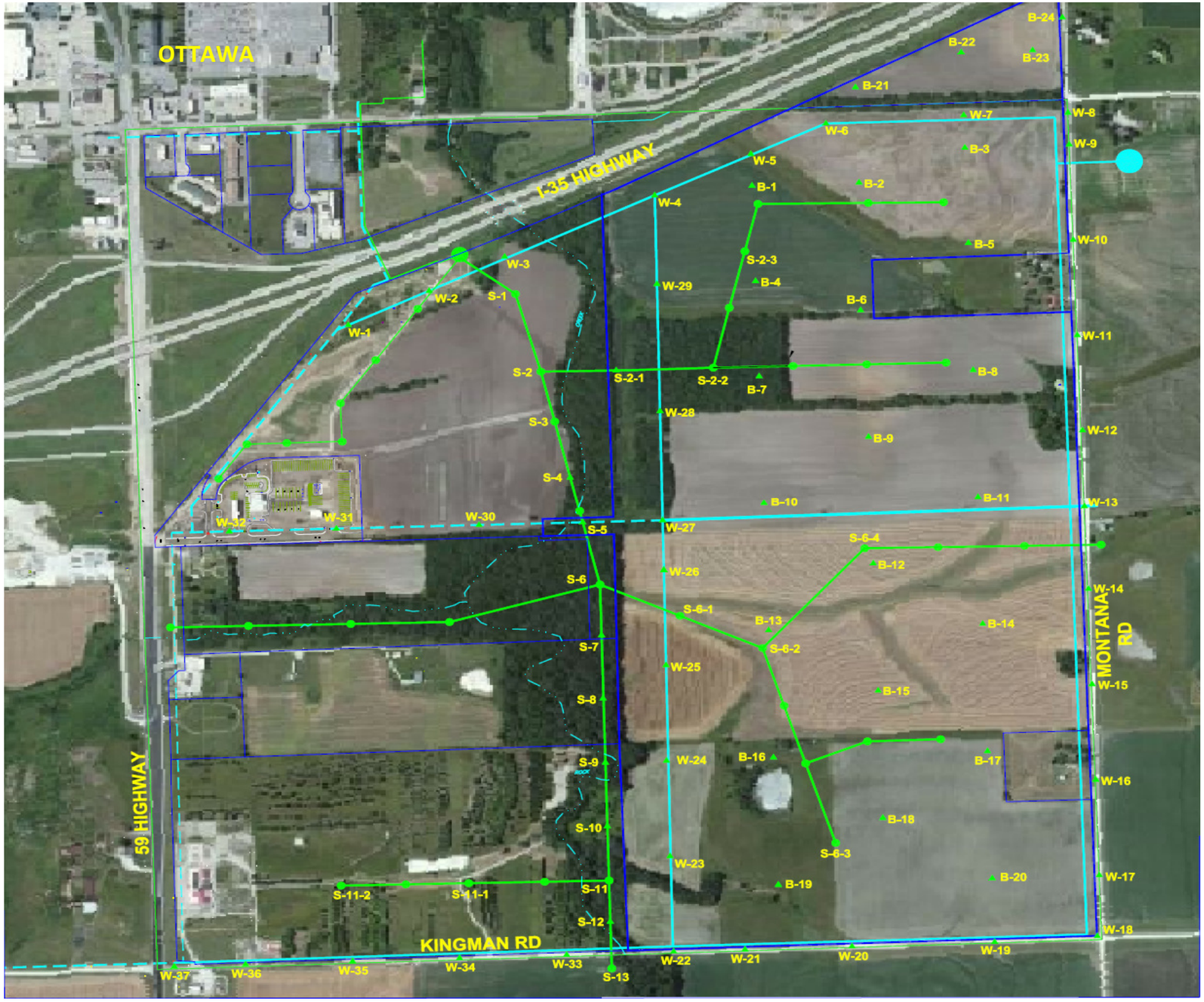
GeoSource

APPENDIX A

FIGURE 1: BORING LOCATION SKETCH
FIGURE 2: GENERALIZED SUBSURFACE PROFILE
BORING LOGS
GENERAL NOTES AND TERMS
BORING LOG SYMBOLS

North

Figure 1: Boring Location Sketch



Legend

S - Sanitary Sewer Line Borings

W - Water Line Borings

B - Future Building Borings

Note: Borings were staked by PEC

Proposed Rock Creek Industrial Park

Montana and Kingman Roads

Ottawa, Franklin County, Kansas

Approved By: JJZ	**Project No. D15G1444**

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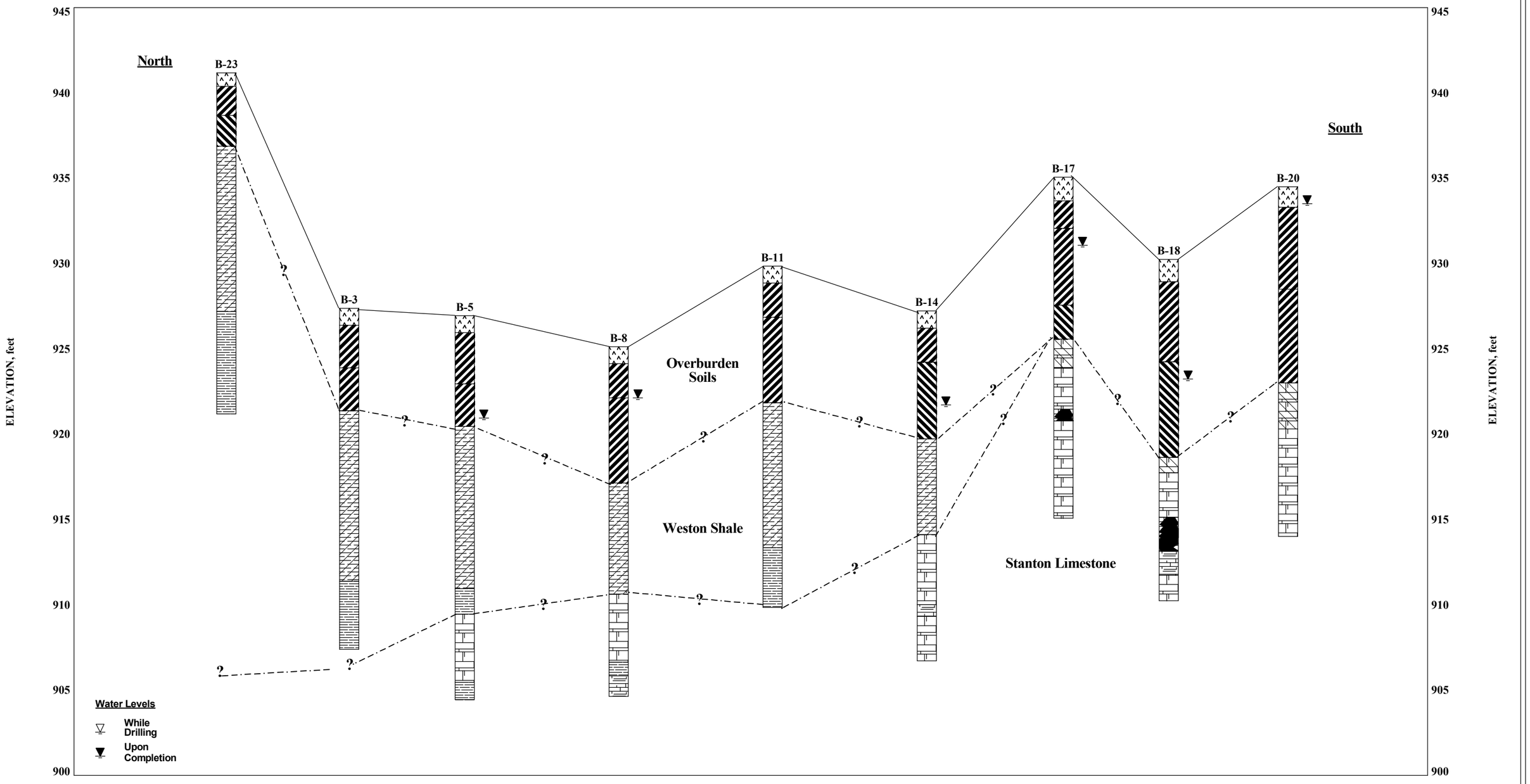

GENERALIZED SUBSURFACE PROFILE

FIGURE 2

Rock Creek Industrial Park
Montana Road & Kingman Road
Ottawa, Kansas

Approved By: JJZ

Project No.: D15G1444

LEGEND

- Asphalt
- Concrete
- Baserock
- Rubble
- Fill
- Silt
- Silty Sand
- Sandy Silt
- Clayey Silt
- Lean to Fat Clay
- Sandy Lean Clay
- Sandy Clay
- Sand (SP)
- Sand (SW)
- Gravel
- Fat Clay
- Lean Clay
- Fat Clay
- Weathered Shale
- Weathered Limestone
- Void / Solution Cavity
- Shale
- Limestone
- Sandstone

Water Levels
- While Drilling
- 24 hrs. A.B.

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BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,024,457.0** EASTING **2,239,686.4**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-1

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 913.4
	PA									**Topsoil**, dark brown
									1.2	912.2
1	ST	8		2030	94	17.7	CH			**FAT CLAY**, stiff, dark brown to brown
2	ST	17		3180	100	23.8	CH			▼
									4.0	909.4
										FAT CLAY, stiff, brown mottled light gray
	PA								5	
									6.5	906.9
										**SHALE, weathered, soft, olive tan
									8.6	904.8
3	SS	3	50/3"			17.6			9.1	**LIMESTONE, weathered, seamy 904.3
R1	NQ3	100%	RQD= 100%	**10580	164	1.4				
										LIMESTONE, hard, crystalline, thick-bedded, fossiliferous, light gray
									10	
R2	NQ3	90%	RQD= 52%	**3370	155	2.0			12.1	901.3
									13.6	**CLAY SEAM**, fat clay, very stiff, brown 899.8
										LIMESTONE, hard, crystalline, thick-bedded, fossiliferous, light gray
									15	
R3	NQ3	100%	RQD= 68%	**7060	164	0.7				
									20	
									20.0	893.4
										BOTTOM OF BORING

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **3.5 feet @ 24 hrs. A.B.**

Backfilled @ Completion

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BORING STARTED	**4-8-15**		
BORING COMPLETED	**4-8-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,024,457.0** EASTING **2,239,686.4**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-1

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS
Sample 2, Depth 3-5 feet

LL	PL	PI
51	22	29

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **3.5 feet @ 24 hrs. A.B.**

Backfilled @ Completion

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BORING STARTED	**4-8-15**		
BORING COMPLETED	**4-8-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,024,478.6** EASTING **2,240,287.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-2

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**915.5**
	PA									**Topsoil**, dark brown	
									1.0		914.5
1	ST	10		2650	93	28.9	CH			**FAT CLAY**, stiff, brown	
									3.5		912.0
2	ST	20		4890	104	23.3				**SHALE**, weathered, soft, olive tan	
	PA								5		
3	SS	18	52			17.0					
	PA								10		
									10.5		905.0
									11.0	**LIMESTONE**, weathered, seamy	904.5
R1	NQ3	100%	RQD= 88%	**9560	164	2.0				**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
				**5760	160	1.2			14.6		900.9
									15		
									15.9	**SHALE**, hard, gray	899.6
R2	NQ3	98%	RQD= 80%	**4800	161	0.7				**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
									20		
									20.0		895.5
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **7.0 feet A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**4-9-15**		
BORING COMPLETED	**4-9-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,024,478.6** EASTING **2,240,287.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-2

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **7.0 feet A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**4-9-15**		
BORING COMPLETED	**4-9-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,024,698.5** EASTING **2,240,881.0**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-3

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**927.4**
	PA								1.0	**Topsoil**, dark brown	926.4
1	ST	14		2570	101	23.5	CH			**FAT CLAY**, stiff, gray brown	
									3.5		923.9
2	ST	9		3380	97	27.1	CH			**FAT CLAY**, stiff, light brown, trace gravel and limestone fragments	
	PA								5 6.0		921.4
										**SHALE, weathered, soft to hard, olive tan to gray brown	
3	SS	18	50			20.0					
	PA								10		
4	SS	18	76			16.4					
	PA								15 16.0		911.4
										**SHALE, hard, gray	
5	SS	18	57			18.3					
									20 20.0		907.4
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**4-8-15**		
BORING COMPLETED	**4-8-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,024,698.5** EASTING **2,240,881.0**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-3

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS

Sample 2, Depth 3-5 feet

LL	PL	PI
62	23	39

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-8-15**		
BORING COMPLETED	**4-8-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,023,859.1** EASTING **2,239,707.8**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-4

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 917.8
	PA									**Topsoil**, dark brown
									1.3	916.5
1	ST	12		3240	96	29.0	CH			**FAT CLAY**, stiff, brown mottled light brown
									3.0	914.8
2	ST	13		12160	105	21.4	CL CH			**LEAN TO FAT CLAY**, very stiff to hard, gray brown to gray
									5	
	PA								7.0	910.8
3	ST	24		2880	114	19.4	CL SC			**SANDY LEAN CLAY**, very stiff, brown mottled light gray
									10	
	PA								12.0	905.8
									13.5	**SHALE, weathered, soft, olive tan 904.3
4	SS	3	50/3"			16.6			14.0	**LIMESTONE, weathered, seamy 903.8
R1	NQ3	100%	RQD= 75%	**13860	164	1.3				
									15	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray
R2	NQ3	93%	RQD= 83%	**5440	163	1.1				
									17.5	900.3
									18.0	**CLAY SEAM**, fat clay, stiff, brown 899.8
R3	NQ3	100%	RQD= 89%	**10530	164	2.0				**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray
									20.0	897.8
									20	**BOTTOM OF BORING**

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **13.7 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-9-15**		
BORING COMPLETED	**4-10-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,023,859.1** EASTING **2,239,707.8**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-4

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **13.7 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-9-15**		
BORING COMPLETED	**4-10-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,024,098.9** EASTING **2,240,901.0**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-5

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 927.0
	PA									**Topsoil**, dark brown
									1.0	926.0
1	ST	14		1730	89	32.2	CH			**FAT CLAY**, medium stiff, light gray mottled light brown
2	ST	24		5920	104	25.5	CH		4.0	923.0
	PA								5	**FAT CLAY**, very stiff, light brown mottled gray, trace gravel and limestone fragments ▼
									6.5	920.5
3	SS	18	31			19.5				**SHALE**, weathered, soft to mod. hard, olive tan to gray brown
	PA								10	
4	SS	18	36			19.7				
	PA								15	
									16.0	911.0
									17.5	**SHALE**, hard, gray 909.5
R1	NQ3	98%	RQD= 80%	**8310 **5320	165 160	0.5 1.6			20	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray
									21.5	905.5

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **6.0 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-9-15**		
BORING COMPLETED	**4-9-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,024,098.9** EASTING **2,240,901.0**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-5

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
									22.5	**SHALE**, hard, gray 904.5

BOTTOM OF BORING

ATTERBERG LIMITS

Sample 1, Depth 1-3 feet

LL	PL	PI
65	24	41

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **6.0 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-9-15**		
BORING COMPLETED	**4-9-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,023,625.0** EASTING **2,240,314.8**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-6

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**922.6**
	PA								1.0	**Topsoil**, dark brown	921.6
1	ST	19		6480	100	25.6	CH			**FAT CLAY**, very stiff, dark gray brown	
2	ST	24		5780	99	19.6	CH		3.5		919.1
	PA								5	**FAT CLAY**, very stiff, light brown mottled gray, ▼ trace gravel and limestone fragments	
3	ST	18		2650	97	23.1			8.3		914.3
	PA								10	**SHALE, weathered, soft to mod. hard, olive tan to gray brown	
4	SS	18	82			16.2			14.0		908.6
	PA								15	**SHALE, hard, gray	
R1	NQ3	95%	RQD= 67%	**8970 **8670	165 161	0.7 1.8			15.5	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	907.1
									19.3		903.3
									20	**SHALE**, hard, grayish green	
									20.5		902.1
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.5 feet A.C.R.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**6-16-15**		
BORING COMPLETED	**6-16-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,023,625.0** EASTING **2,240,314.8**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-6

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.5 feet A.C.R.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**6-16-15**		
BORING COMPLETED	**6-16-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,023,259.2** EASTING **2,239,728.5**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-7

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**920.4**
	PA								1.0	**Topsoil**, dark brown	919.4
1	ST	14		2680	94	27.9	CH			**FAT CLAY**, stiff, dark brown ▼	
									3.0		917.4
2	ST	23		6370	96	18.8	CL CH			**LEAN TO FAT CLAY**, very stiff, light brown mottled gray, trace gravel and limestone fragments	
	PA								5		
									7.0		913.4
3	ST	20		3870	106	27.9	CL CH			**LEAN TO FAT CLAY**, stiff, light brown mottled light gray	
	PA								10		
									12.0		908.4
4	SS	18	61			15.5				**SHALE**, weathered, soft to mod. hard, olive tan to gray brown	
	PA								15		
									16.8		903.6
R1	NQ3	95%	RQD= 73%	**8430	167	0.4				**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
				**3940	149	4.9			20		
				**240	134	11.6			20.6		899.8
									22.0	**SHALE**, hard, gray	898.4
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **1.7 feet A.C.R.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**6-16-15**		
BORING COMPLETED	**6-16-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,023,259.2** EASTING **2,239,728.5**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-7

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS
Sample 2, Depth 3-5 feet

LL	PL	PI
48	20	28

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **1.7 feet A.C.R.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-16-15**		
BORING COMPLETED	**6-16-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,023,299.3** EASTING **2,240,927.7**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-8

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	DEPTH, Feet.	MATERIAL DESCRIPTION	
									Surface Elevation:	**925.1**
	PA							1.0	**Topsoil**, dark brown	924.1
1	ST	22		1810	96	29.3	CH		**FAT CLAY**, medium stiff, dark gray brown	
								3.0	▼	922.1
2	ST	24		2260	97	27.0	CH		**FAT CLAY**, stiff, brown	
	PA							5		
								8.0		917.1
3	ST	22		1890	99	25.1			**SHALE**, weathered, soft to mod. hard, olive tan to gray brown	
	PA							10		
4	SS	9	67/9"			15.5		14.5		910.6
R1	NQ3	100%	RQD= 100%	**8100	166	0.5		15	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
R2	NQ3	90%	RQD= 73%	**7870	163	1.2		18.5		906.6
								19.3	**SHALE**, hard, gray	905.8
				**2900	153	4.3		20	**SHALY LIMESTONE**, hard, solid, light gray	
								20.5		904.6
									BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **3 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**6-15-15**		
BORING COMPLETED	**6-15-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,023,299.3** EASTING **2,240,927.7**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-8

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **3 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-15-15**		
BORING COMPLETED	**6-15-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,022,879.5** EASTING **2,240,341.5**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-9

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**929.6**
	PA								0	**Topsoil**, dark brown	
									1.0		928.6
1	ST	20		1830	102	24.4	CH			**FAT CLAY**, medium stiff, light brown to yellowish tan	
2	ST	24		1990	99	24.9	CH		5		
	PA										
									7.5		922.1
3	SS	18	42			16.8				**SHALE, weathered, soft to mod. hard, yellowish tan to gray brown	
	PA								10		
4	SS	18	55			16.9					
	PA								15		
									16.5		913.1
5	SS	18	47			17.7				**SHALE, hard, gray	
									20		
									20.0		909.6
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**6-15-15**		
BORING COMPLETED	**6-15-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,022,879.5** EASTING **2,240,341.5**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-9

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
52	19	33

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**6-15-15**		
BORING COMPLETED	**6-15-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,022,459.6** EASTING **2,239,755.2**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-10

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**921.7**
	PA								1.0	**Topsoil**, dark brown	920.7
1	ST	22		3300	102	24.6	CH			**FAT CLAY**, stiff, brown	
									3.0		918.7
2	ST	24		4990	112	17.4	CL			**SHALY CLAY**, very stiff, light brown to yellowish tan, trace limestone fragments ▼	
	PA								5		
									7.5		914.2
3	ST	14		*6000	109	17.8				**SHALE**, weathered, soft to mod. hard, olive tan to gray brown	
	PA								10		
4	SS	12	79			19.7			14.6		907.1
R1	NQ3	80%	RQD= 80%	**8630	165	0.6			15	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
R2	NQ3	98%	RQD= 83%	**8160	162	1.9			18.5		903.2
				**2480	147	7.4			19.0	**SHALE**, hard, bluish gray	902.7
									20	**SHALY LIMESTONE**, hard, solid, medium bedded, light gray	
									20.5		901.2
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.5 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-13-15**		
BORING COMPLETED	**6-15-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,022,459.6** EASTING **2,239,755.2**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-10

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.5 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-13-15**		
BORING COMPLETED	**6-15-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,022,499.7** EASTING **2,240,954.5**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-11

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**929.9**
	PA								0	**Topsoil**, dark brown	
									1.0		928.9
1	ST	24		2190	103	21.6	CH			**FAT CLAY**, stiff, gray brown	
									3.0		926.9
2	ST	24		4180	102	18.5	CH			**FAT CLAY**, very stiff, light brown to yellowish tan, trace gravel	
	PA								5		
									8.0		921.9
3	SS	16		2200	108	19.0				**SHALE, weathered, soft to mod. hard, yellowish tan to gray brown	
	PA								10		
4	SS	18	69			17.5					
	PA								15		
									16.5		913.4
5	SS	18	49			17.4				**SHALE, hard, gray	
									20		
									20.0		909.9
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-15-15**		
BORING COMPLETED	**6-15-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,022,499.7** EASTING **2,240,954.5**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-11

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
52	19	33

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry @ 24 hrs. A.B.**

Backfilled @ Completion

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BORING STARTED	**6-15-15**		
BORING COMPLETED	**6-15-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,022,080.0** EASTING **2,240,368.3**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-12

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**923.8**
	PA								1.0	**Topsoil**, dark brown	922.8
1	ST	21		3260	95	29.9	CH			**FAT CLAY**, stiff, brown	
									3.0		920.8
2	ST	20		6960	96	23.2	CH			**FAT CLAY**, very stiff, gray brown ▼	
	PA								5		
									8.0		915.8
3	ST	24		5560	111	17.9				**SHALE**, weathered, soft to mod. hard, olive tan to gray brown	
	PA								10		
4	SS	18	56			16.2					
	PA								15		
									16.3		907.5
R1	NQ3	98%	RQD= 72%	**11800 **10040	167 162	0.6 1.6			20	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
									21.0		902.8
									22.0	**SHALE**, hard, light gray	901.8
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **5.0 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-13-15**		
BORING COMPLETED	**6-13-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,022,080.0** EASTING **2,240,368.3**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-12

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **5.0 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-13-15**		
BORING COMPLETED	**6-13-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,021,660.1** EASTING **2,239,782.0**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-13

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**916.2**
	PA									**Topsoil**, dark brown	
									1.2		915.0
1	ST	9		2200	93	27.4	CH			**FAT CLAY**, stiff, dark brown to brown	
2	ST	13		3890	105	22.8	CH		4.5		911.7
	PA								5	**SHALE, weathered, soft, olive tan	
									8.0	▼	908.2
										**SHALE, hard, gray	
3	SS	10	57/10"			19.4			9.0		907.2
									9.5	**LIMESTONE, weathered, seamy	906.7
R1	NQ3	83%	RQD= 83%	**12770	165	0.5			10	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
R2	NQ3	98%	RQD= 65%	**10450	163	1.3			13.7		902.5
									15.2	**BEDROCK JOINT**, fat clay, stiff, brown	901.0
R3	NQ3	100%	RQD= 95%	**7230	161	2.3			15	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
				**11660	164	0.3			20		
									20.3		895.9

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **8.0 feet A.C.R.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-15-15**		
BORING COMPLETED	**4-16-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,021,660.1** EASTING **2,239,782.0**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-13

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										BOTTOM OF BORING

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
59	23	36

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **8.0 feet A.C.R.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-15-15**		
BORING COMPLETED	**4-16-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,021,700.3** EASTING **2,240,981.4**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-14

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**927.2**
	PA								1.0	**Topsoil**, dark brown	926.2
1	ST	19		3670	100	26.6	CH			**FAT CLAY**, stiff, brown	
									3.0		924.2
2	ST	24		4190	101	23.0	CL CH			**LEAN TO FAT CLAY**, very stiff, light brown	
									5	▼	
	PA								7.5		919.7
3	ST	18	17	*6500		20.2				**SHALE**, weathered, soft to mod. hard, olive tan to gray brown	
	PA								10		
									13.1		914.1
R1	NQ3	100%	RQD= 100%	**7150	167	0.6				**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
									15		
				**10740	161	2.1			17.2		910.0
R2	NQ3	95%	RQD= 48%						17.9	**CALCAREOUS SHALE**, hard, dark gray	909.3
				**5510	158	2.9				**LIMESTONE**, hard, solid, medium bedded, fossiliferous, light gray	
									20		
									20.5		906.7
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **5.5 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-12-15**		
BORING COMPLETED	**6-12-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,021,700.3** EASTING **2,240,981.4**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-14

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **5.5 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**6-12-15**		
BORING COMPLETED	**6-12-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,021,660.1** EASTING **2,239,782.0**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-15

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**927.8**
	PA									**Topsoil**, dark brown	
									1.2		926.6
1	ST	10		3140	94	28.4	CH			**FAT CLAY**, stiff, dark brown to brown	
									3.5		924.3
2	ST	11		8310	107	20.5	CH			**FAT CLAY**, very stiff to hard, light brown mottled light gray ▼	
	PA								5		
									6.5		921.3
3	ST	18		8120	115	19.8	CL SC			**SANDY LEAN CLAY**, very stiff to hard, orange brown mottled light brown and gray, trace gravel	
	PA								10		
									13.0		914.8
									13.6	****LIMESTONE**, weathered, seamy	914.2
R1	NQ3	100%	RQD= 96%	**6630	165	0.7			15	**LIMESTONE**, hard, solid, medium to thick-bedded, fossiliferous, light brown to light gray	
R2	NQ3	100%	RQD= 55%	**5810	160	1.8					
									20		
									20.5		907.3
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **5.0 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-15-15**		
BORING COMPLETED	**6-12-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,021,660.1** EASTING **2,239,782.0**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-15

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **5.0 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**4-15-15**		
BORING COMPLETED	**6-12-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,020,860.5** EASTING **2,239,808.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-16

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	Surface Elevation: 923.1
	PA								0.8	**Topsoil**, dark brown	922.3
1	ST	15		2480	103	23.6	CH			**FAT CLAY**, stiff, dark brown	
2	ST	24		2160	98	23.1	CH		4.5		918.6
	PA								5	**FAT CLAY**, stiff, light brown, with some gravel and rock fragments below 8.5 feet ▼	
3	SS	18	13			19.3	CH				
	PA								10.2		912.9
R1	NQ3	100%	RQD= 100%	**10120	164	0.7			10	11.0 **LIMESTONE**, weathered, seamy	912.1
R2	NQ3	98%	RQD= 83%	**4180	160	2.1				**LIMESTONE**, hard, crystalline, medium to thick-bedded, fossiliferous, light gray	
									15.3		907.8
									15	16.2 **CLAY SEAM**, fat clay. stiff, brown	906.9
R3	NQ3	94%	RQD= 70%	**5780	165	1.2				**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray	
									20.5		902.6
									20	**BOTTOM OF BORING**	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **7.2 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	3-3-15		
BORING COMPLETED	4-14-15		
RIG	ATV-45	DRILLER	MC
APPROVED	JJZ	JOB #	D15G1444

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,020,860.5** EASTING **2,239,808.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-16

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **7.2 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-3-15**		
BORING COMPLETED	**4-14-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,020,900.6** EASTING **2,241,008.1**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-17

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	Surface Elevation: 935.1
	PA										
1	ST	7		2770	91	25.3	CH		1.4	**Topsoil**, dark brown	933.7
2	ST	12		3760	98	29.2	CH		3.0	**FAT CLAY**, stiff, dark gray brown	932.1
	PA								5	**FAT CLAY**, stiff, gray brown ▼	
3	ST	21		2740	103	23.9	CL CH		7.5	**LEAN TO FAT CLAY**, stiff, light yellowish brown	927.6
	PA								9.5		925.6
R1	NQ3	98%	RQD= 35%	**6570	162	2.2			10	**LIMESTONE**, weathered, seamy	
				**50	112	21.2			11.2	**LIMESTONE**, hard, solid, thin to medium-bedded, fossiliferous, buff to white	923.9
R2	NQ3	100%	RQD= 75%	**5910	159	2.3			13.6	**CLAY SEAM**, fat clay, very stiff, brown	921.5
				**9650	163	1.2			14.3		920.8
									15	**LIMESTONE**, hard, crystalline, thick-bedded to massive, fossiliferous, white to light gray	
									20.0		915.1
									20	**BOTTOM OF BORING**	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.0 feet After Coring**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-27-15**		
BORING COMPLETED	**3-27-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,020,900.6** EASTING **2,241,008.1**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-17

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS
Sample 2, Depth 3-5 feet

LL	PL	PI
57	22	35

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.0 feet After Coring**

Backfilled @ Completion

GeoSource
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BORING STARTED	3-27-15		
BORING COMPLETED	3-27-15		
RIG	ATV-45	DRILLER	MC
APPROVED	JJZ	JOB #	D15G1444

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,020,480.8** EASTING **2,240,421.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-18

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION **Surface Elevation: 930.2**
	PA									**Topsoil**, dark brown
									1.3	928.9
1	ST	24		2400	95	28.2	CH			**FAT CLAY**, stiff to very stiff, gray brown
2	ST	15		5090	102	23.9	CH		5	
	PA								6.0	924.2
										LEAN TO FAT CLAY, stiff, light brown, trace ▼ gravel and rock fragments
3	ST	17		3950	105	24.3	CL CH		10	
	PA								11.6	918.6
									12.5	**LIMESTONE**, weathered, seamy, brown 917.7
R1	NQ3	91%	RQD= 18%	**6110	168	2.0				**LIMESTONE**, hard, solid, thin to medium-bedded, fossiliferous, brown to light gray
									15.1	915.1
R2	NQ3	100%	RQD= 27%	**75	116	20.0			15	**BEDROCK JOINT**, fat clay, very stiff, dark gray
									17.1	913.1
									18.5	**SHALY LIMESTONE**, mod. hard, seamy to thin-bedded, light gray 911.7
				**7480	162	1.0			20.0	**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray 910.2
									20	**BOTTOM OF BORING**

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **7.0 feet @ 24 hrs. After Coring**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-3-15**		
BORING COMPLETED	**3-27-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,020,480.8** EASTING **2,240,421.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-18

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **7.0 feet @ 24 hrs. After Coring**

Backfilled @ Completion

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BORING STARTED	**3-3-15**		
BORING COMPLETED	**3-27-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,020,061.0** EASTING **2,239,835.5**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-19

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 917.8
	PA								0.9	**Topsoil**, dark brown — 916.9
1	ST	17		2710	101	22.9	CH			**FAT CLAY**, stiff, dark brown to gray brown
									2.8	— 915.0
2	SS	6	50/6"			41.1			3.5	**JOINT, fat clay and limestone fragments — 914.3
R1	NQ3	100%	RQD= 75%	**3360	163	1.1				**LIMESTONE**, hard, crystalline, thick-bedded, fossiliferous, light gray
R2	NQ3	92%	RQD= 73%	**7660	164	0.8				
R3	NQ3	100%	RQD= 100%	**8310	158	2.0				
R4	NQ3	100%	RQD= 100%	**7920	159	1.6				
				**7390	159	1.4			20.5	— 897.3
										BOTTOM OF BORING

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **3.0 feet A.B.**

Backfilled @ Completion

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BORING STARTED	**3-3-15**		
BORING COMPLETED	**4-15-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,020,061.0** EASTING **2,239,835.5**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-19

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
55	22	33

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **3.0 feet A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-3-15**		
BORING COMPLETED	**4-15-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,020,101.2** EASTING **2,241,034.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-20

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 934.6
	PA									**Topsoil**, dark brown
									1.2	▼ 933.4
1	ST	6		2030	88	27.5	CH			**FAT CLAY**, medium stiff to stiff, dark brown
2	ST	12		2790	93	30.5	CH		5	
	PA								6.0	928.6
										FAT CLAY, very stiff, light yellowish tan, trace sand and gravel
3	ST	15		4080	98	26.9	CH		10	
	PA								11.5	923.1
										LIMESTONE, weathered, seamy, brown
4	SS	1	50/1"			6.5			14.2	920.4
R1	NQ3	90%	RQD= 38%	**7540	161	1.6			15	**LIMESTONE**, hard, solid, medium to thick-bedded, fossiliferous, light gray to white
R2	NQ3	100%	RQD= 86%	**9860	163	1.2				
				**8970	165	0.9				
				**9383	161	1.8			20	
									20.5	914.1
										BOTTOM OF BORING

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **1.0 feet @ 24 hrs. A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	6-12-15		
BORING COMPLETED	6-12-15		
RIG	ATV-45	DRILLER	LS
APPROVED	JJZ	JOB #	D15G1444

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,020,101.2** EASTING **2,241,034.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-20

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **1.0 feet @ 24 hrs. A.B.**

Backfilled @ Completion

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BORING STARTED	**6-12-15**		
BORING COMPLETED	**6-12-15**		
RIG	**ATV-45**	DRILLER	**LS**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,025,078.2** EASTING **2,240,267.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-21

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	DEPTH, Feet.	MATERIAL DESCRIPTION — Surface Elevation: 921.8
	PA							1.0	**Topsoil**, dark brown — 920.8
1	ST	10		4050	96	26.1	CH		**FAT CLAY**, stiff to very stiff, dark gray brown
2	ST	10		10310	100	24.7	CH	3.5	918.3
	PA							5	**FAT CLAY**, hard, desiccated, light gray brown ▼
								7.0	914.8
3	SS	16	11			24.6		10	**SHALE, weathered, soft, yellowish tan to gray brown
	PA							12.0	909.8
4	SS	6	50/6"			18.8		13.7	**SHALE, hard, gray — 908.1
R1	NQ3	96%	RQD= 54%	**7260 **6400 **520	165 161 129	2.2 2.1 12.3		15	**LIMESTONE**, hard, solid, thin to medium bedded, fossiliferous, light gray
								17.2	904.6
								19.5	**SHALE**, hard, very thin bedded to laminated, olive gray to light brown — 902.3
								20	20.0 **LIMESTONE**, hard, solid, light gray — 901.8
									BOTTOM OF BORING

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.0 feet A.C.R.**

Backfilled @ Completion

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BORING STARTED	**11-23-15**		
BORING COMPLETED	**11-23-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,025,078.2** EASTING **2,240,267.9**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-21

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.0 feet A.C.R.**

Backfilled @ Completion

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BORING STARTED	**11-23-15**		
BORING COMPLETED	**11-23-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,025,298.3** EASTING **2,240,860.8**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-22

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**931.3**
	PA								1.0	**Topsoil**, dark brown	930.3
1	ST	10		8610	95	28.7	CL		3.0	**LEAN CLAY**, very stiff, dark gray brown, trace fine sand	928.3
2	ST	12		7360	105	22.7	CH		4.5	**FAT CLAY**, very stiff, light gray brown	926.8
	PA								5	**FAT CLAY**, very stiff to stiff, gray brown to yellowish brown	
3	ST	13		3980	105	23.7	CH				
	PA								10		
									11.5		919.8
	PA									**SHALE, weathered, soft to mod. hard, orange brown to gray brown	
3	SS	18	31			19.0			15		
	PA										
									18.0		913.3
4	SS	18	53			16.3				**SHALE, hard, gray	
									20.0		911.3
									20	**BOTTOM OF BORING**	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-20-15**		
BORING COMPLETED	**11-20-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,025,298.3** EASTING **2,240,860.8**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-22

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS

Sample 1, Depth 1-3 feet

LL	PL	PI
31	18	13

Sample 2, Depth 3-5 feet

LL	PL	PI
56	22	34

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-20-15**
BORING COMPLETED	**11-20-15**
RIG **CME-55**	DRILLER **RN**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,025,311.5** EASTING **2,241,260.6**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-23

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**941.2**
	PA								0.8	**Topsoil**, dark brown	940.4
1	ST	14		8920	97	24.3	CH		2.5	**FAT CLAY**, very stiff to hard, gray brown mottled light brown, trace gravel	938.7
2	ST	9		4390	109	18.0	CL CH		4.3	**LEAN TO FAT CLAY**, very stiff, light brown	936.9
									5	**SHALE, weathered, soft to mod. hard, yellowish tan to gray brown	
3	SS	18	48			18.1					
	PA								10		
4	SS	18	70			17.1			14.0		927.2
	PA								15	**SHALE, hard, gray	
5	SS	18	80			13.8			20.0		921.2
									20	**BOTTOM OF BORING**	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**11-20-15**		
BORING COMPLETED	**11-20-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,025,311.5** EASTING **2,241,260.6**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-23

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
66	24	42

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-20-15**
BORING COMPLETED	**11-20-15**
RIG **CME-55**	DRILLER **RN**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING **2,025,517.3** EASTING **2,241,427.6**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-24

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 35 feet northeast

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	Surface Elevation: 947.1
	PA								1.0	**Topsoil**, dark brown	946.1
1	ST	13		6310	105	27.1	CL			**LEAN CLAY**, very stiff, brown to gray brown, trace fine sand	
2	SS	18	21			19.6	CH		3.0		944.1
	PA								5	**FAT CLAY**, very stiff, reddish brown mottled light brown, trace gravel and limestone fragments	
									6.5		940.6
3	SS	18	17			16.7				**SHALE**, weathered, soft, yellowish tan, with interbedded seams of limestone	
	PA								10		
									13.5		933.6
4	SS	18	66			14.4				**SHALE**, hard, gray	
	PA								15		
5	SS	12	50/6"			12.8					
									20		
									20.0	**BOTTOM OF BORING**	927.1

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-20-15**		
BORING COMPLETED	**11-20-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING **2,025,517.3** EASTING **2,241,427.6**

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-24

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

ATTERBERG LIMITS

Sample 1, Depth 1-3 feet

LL	PL	PI
47	20	27

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-20-15**		
BORING COMPLETED	**11-20-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,023,777.8** EASTING **2,238,362.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-1

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 907.3
	PA								1.0	**Topsoil**, dark brown — 906.3
										LEAN CLAY, stiff, gray brown, trace fine sand
1	SS	18	9	*3500		20.1	CL		5	
	PA									
2	SS	18	9	*4000		25.9	CL		9.9	897.4
	PA								10 10.5	**LIMESTONE**, hard — 896.8
										AUGER REFUSAL @ 10.5 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-25-15**		
BORING COMPLETED	**11-25-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,023,289.0** EASTING **2,238,505.3**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-2

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	Surface Elevation: 907.9
										Topsoil, dark brown	
	PA								1.0		906.9
										LEAN CLAY, dark gray brown	
	PA								2.0		905.9
										LEAN TO FAT CLAY, stiff to very stiff, light brown	
1	SS	18	12	*6000		18.8	CL CH				
									5		
									6.0		901.9
	PA									**FAT CLAY**, stiff, grayish tan	
2	SS	18	7	*2500		24.0	CH				
									10		
	PA										
									12.6		895.3
									13.3	**LIMESTONE**, hard	894.6
										AUGER REFUSAL @ 13.3 FEET	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-25-15**		
BORING COMPLETED	**11-25-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,974.6** EASTING **2,238,582.8**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-3

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 12 feet south due to standing water

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 906.0
	PA									**Topsoil**, dark brown (22")
										1.8 — 904.2
										LEAN TO FAT CLAY, very stiff, gray brown
1	SS	18	22	*9000		17.5	CL CH		5	
										5.5 — 900.5
	PA									**SHALE, weathered, soft, olive tan to gray brown
2	SS	18	13	*7500		23.9			10	
	PA									11.1 — 894.9
										11.6 **LIMESTONE, hard — 894.4
										AUGER REFUSAL @ 11.6 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**12-17-15**		
BORING COMPLETED	**12-17-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,623.4** EASTING **2,238,669.4**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-4

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 907.4
	PA									**Topsoil**, dark brown (20")
									1.7	905.7
1	SS	18	5	*1500		22.6	CL			**LEAN CLAY**, medium stiff, dark brown, trace fine sand
	PA								5	
									7.5	899.9
2	SS	18	8	*3500		38.5	CH			**FAT CLAY**, stiff, reddish brown
	PA								9.9	897.5
									10	
									10.6	**LIMESTONE, hard
										896.8
										AUGER REFUSAL @ 10.6 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-17-15**		
BORING COMPLETED	**12-17-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,337.4** EASTING **2,238,740.1**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-5

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 907.9
	PA									**Topsoil**, dark brown (22")
										1.8 906.1
										LEAN CLAY, stiff, gray brown, trace fine sand
1	SS	18	10	*4500		20.9	CL		5	
	PA									
										7.5 900.4
										**SHALE, weathered, soft, yellowish tan to gray brown
2	SS	18	10	*5000		25.9			10	
	PA									
										11.2 896.7
										11.8 **LIMESTONE, hard 896.1
										AUGER REFUSAL @ 11.8 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-16-15**		
BORING COMPLETED	**12-16-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,021,946.3** EASTING **2,238,836.5**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-6

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**910.1**
	PA									**Topsoil**, dark brown (6")	
										LEAN CLAY, stiff, gray brown, trace fine sand	
									2.5		907.6
1	SS	18	28	*9000		13.9	CL CH			**LEAN TO FAT CLAY**, very stiff to hard, light gray brown	
	PA								5	- becoming light gray mottled light brown below 6 feet	
2	SS	18	17	*7000		9.9	CL CH				
	PA								10.0		900.1
									10	10.5 **LIMESTONE, hard	899.6
										AUGER REFUSAL @ 10.5 FEET	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**11-25-15**		
BORING COMPLETED	**11-25-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,021,628.8** EASTING **2,238,844.9**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-7

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**908.8**
	PA									**Topsoil**, dark brown (6")	
										LEAN CLAY, stiff, gray brown, trace fine sand	
									3.0		905.8
1	SS	18	15	*5500		14.5	CL CH			**LEAN TO FAT CLAY**, very stiff, light gray brown	
									5		
	PA								6.0		902.8
										LEAN TO FAT CLAY, very stiff, light gray mottled brown, with some sand	
2	SS	18	17	*7000		12.5	CL CH				
									10.0		898.8
	PA								10		
									10.5	****LIMESTONE**, hard	898.3
										AUGER REFUSAL @ 10.5 FEET	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**11-25-15**		
BORING COMPLETED	**11-25-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,021,228.9** EASTING **2,238,856.0**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-8

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**909.3**
	PA									**Topsoil**, dark brown (6")	
										LEAN CLAY, medium stiff, brown to dark brown	
1	SS	18	6	*2000		18.3	CL		5		
	PA									- with fine sand and with gravel below 7 feet	
2	SS	12	50/6"			23.6	CL		9.2		900.1
	PA								9.7	**LIMESTONE**, hard	899.6
										AUGER REFUSAL @ 9.7 FEET	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-25-15**		
BORING COMPLETED	**11-25-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,829.0** EASTING **2,238,866.9**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-9

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 910.8
	PA									**Topsoil**, dark brown (6") **LEAN CLAY**, stiff, gray brown, trace fine sand
1	SS	18	9	*3500		16.1	CL		5	
	PA									7.0 903.8
										LEAN TO FAT CLAY, soft to medium stiff, gray brown
2	SS	18	4	*1000		29.8	CH		10	
	PA									11.1 899.7
										11.6 **LIMESTONE, hard 899.2
										AUGER REFUSAL @ 11.6 FEET **Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-25-15**
BORING COMPLETED	**11-25-15**
RIG **ATV-45**	DRILLER **RN**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,429.0** EASTING **2,238,878.0**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-10

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**912.3**
	PA									**Topsoil**, dark brown	
										LEAN CLAY, very stiff to hard, gray brown mottled light gray, trace fine sand	
1	SS	18	23	*9000		15.7	CL		5		
									5.5		906.8
	PA									**LEAN TO FAT CLAY**, stiff to very stiff, light brown to gray brown	
2	SS	18	14	*6500		25.1	CL CH		10		
	PA										
									12.0		900.3
										**SHALE, weathered, soft gray brown	
									13.0		899.3
									13.6	**LIMESTONE, hard	898.7
										AUGER REFUSAL @ 13.6 FEET	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-25-15**		
BORING COMPLETED	**11-25-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,087.2** EASTING **2,238,887.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-11

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**913.2**
	PA									**Topsoil**, dark brown (6")	
										LEAN CLAY, soft to medium stiff, light gray brown, trace fine sand	
1	SS	15	4	*1500		14.2	CL		5		
	PA										
									7.0		906.2
										LEAN TO FAT CLAY, medium stiff, light gray mottled gray brown, trace sand and gravel	
2	SS	16	5	*2000		22.9	CL CH		10		
	PA										
									12.0		901.2
										**SHALE, hard, gray	
3	SS	6	50/6"			16.4			14.7		898.5
	PA								15 15.3	**LIMESTONE, hard	897.9
										AUGER REFUSAL @ 15.3 FEET	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**11-23-15**		
BORING COMPLETED	**11-23-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,829.4** EASTING **2,238,894.3**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-12

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 914.2
	PA									**Topsoil**, dark brown (6") **LEAN CLAY**, dark gray brown
									2.0	912.2
										LEAN TO FAT CLAY, stiff, gray brown
1	SS	16	9	*4000		19.2	CL CH		5	
									5.5	908.7
	PA									**LEAN TO FAT CLAY**, stiff to very stiff, light gray brown mottled gray brown
2	SS	18	13	*6500		19.6	CL CH		10	
									11.0	903.2
	PA									**FAT CLAY**, light brown
									13.0	901.2
										**SHALE, hard, gray
3	SS	18	33			16.8			15	
									16.0	898.2
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-23-15**		
BORING COMPLETED	**11-23-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,534.8** EASTING **2,238,902.4**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-13

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**912.4**
										Topsoil, dark brown	
									1.0		911.4
	PA									**LEAN CLAY**, dark gray brown	
									2.0		910.4
										LEAN CLAY, medium stiff, gray brown, trace fine sand	
1	SS	18	6	*2000		12.7	CL		5		
									5.5		906.9
	PA									**SILTY LEAN CLAY**, soft, gray to gray brown, some sand	
									8.0		904.4
2	SS	18	7	*2500		26.2	CH			**FAT CLAY**, stiff, gray brown	
									9.9		902.5
	PA								10	**SHALE, hard, gray	
									13.0		899.4
									13.6	**LIMESTONE, hard	898.8

AUGER REFUSAL @ 13.6 FEET

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-23-15**		
BORING COMPLETED	**11-23-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,070.5** EASTING **2,238,101.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-11-1

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 25 feet south due to trees

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	DEPTH, Feet.	MATERIAL DESCRIPTION	
									Surface Elevation:	**916.9**
	PA								**Topsoil**, dark brown (6")	
									LEAN CLAY, gray brown, trace sand	
								2.5		914.4
1	SS	16	10	*6000		16.9	CH		**FAT CLAY**, stiff, gray brown mottled yellowish brown	
								5		
	PA							6.5		910.4
									**SHALE, weathered, mod. hard to hard, olive gray to gray brown	
2	SS	18	61			16.2				
	PA							10		
								13.5		903.4
									**SHALE, hard, gray	
3	SS	17	88			15.6		15		
								16.0		900.9
									BOTTOM OF BORING	
									**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-23-15**		
BORING COMPLETED	**11-23-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,055.3** EASTING **2,237,385.9**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-11-2

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 15 feet north due to trees

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 919.6
	PA									**Topsoil**, dark brown (6") **LEAN CLAY**, gray brown, trace sand
									2.5	917.1
1	SS	18	18	*7500		18.5	CH			**FAT CLAY**, very stiff, gray brown
									5	
									5.5	914.1
	PA									**SHALE, weathered, soft to mod. hard, reddish olive tan
									9.0	910.6
2	SS	18	73			14.3				
	PA								10	**SHALE, hard, tan to olive gray
3	SS	17	87			15.7			15	
									16.0	903.6
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-23-15**		
BORING COMPLETED	**11-23-15**		
RIG	**CME-55**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,023,313.6** EASTING **2,239,471.5**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-2-2

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 12 feet east due to standing water

Surface Elevation: 912.3

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	DEPTH, Feet.	MATERIAL DESCRIPTION
									Topsoil, dark brown (14")
								1.2	911.1
	PA								**LEAN TO FAT CLAY**, very stiff, brown to reddish brown, trace fine sand
1	SS	18	19	*8000		14.2	CL CH	5	
								5.5	906.8
	PA								**SHALE, weathered, soft to mod. hard, yellowish tan to gray brown
								8.5	903.8
2	SS	18	65			13.9			**SHALE, hard, maroon to gray
	PA							10	
								11.0	901.3
								11.6	**LIMESTONE, hard 900.7

AUGER REFUSAL @ 11.6 FEET

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**12-16-15**
BORING COMPLETED	**12-16-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,046.4** EASTING **2,239,648.0**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-2-3

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 917.5
	PA									**Topsoil**, dark brown
										1.3 — 916.2
										FAT CLAY, very stiff, gray brown
1	SS	18	15	*5000		24.9	CH		5	
	PA									7.0 — 910.5
										FAT CLAY, stiff, light brown
2	SS	18	11	*4500		21.1	CH		10	
	PA									11.7 — 905.8
										**SHALE, weathered, soft, yellowish tan
										13.4 — 904.1
										14.0 **LIMESTONE, hard — 903.5
										AUGER REFUSAL @ 14.0 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-17-15**		
BORING COMPLETED	**3-17-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,021,750.1** EASTING **2,239,284.5**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-6-1

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 912.0
	PA								1.5	**Topsoil**, dark brown — 910.5
1	SS	18	23	*9000+		18.8	CH		5	**FAT CLAY**, very stiff, gray brown
	PA								7.0	905.0
									7.6	**LIMESTONE**, hard — 904.4

AUGER REFUSAL @ 7.6 FEET

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-16-15**
BORING COMPLETED	**3-16-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,021,547.4** EASTING **2,239,747.6**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-6-2

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**917.8**
	PA								1.5	**Topsoil**, dark brown	916.3
1	SS	18	22	*9000+		22.0	CH		5	**FAT CLAY**, very stiff, gray brown	
	PA								6.5		911.3
2	SS	18	12	*8500		23.4	CH		10	**FAT CLAY**, very stiff, light brown mottled light gray	
	PA								10.2		907.6
									10.8	**LIMESTONE, hard	907.0

AUGER REFUSAL @ 10.8 FEET

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-16-15**		
BORING COMPLETED	**3-16-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,323.6** EASTING **2,240,157.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-6-3

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**928.3**
	PA									**Topsoil**, dark brown	
									1.2		927.1
										FAT CLAY, very stiff, gray brown	
1	SS	18	14	*7000		23.0	CH		5		
									6.0		922.3
	PA									**FAT CLAY**, very stiff, light brown mottled light gray	
2	SS	18	11	*5500		22.4	CH		10		
	PA								10.5		917.8
									11.1	**LIMESTONE**, hard ▼	917.2

AUGER REFUSAL @ 11.1 FEET

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **11.0 feet W.D.**

▼ **11.0 feet A.B.**

Backfilled @ Completion

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BORING STARTED	**3-3-15**		
BORING COMPLETED	**3-3-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,174.5** EASTING **2,240,319.5**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. S-6-4

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 925.0
	PA								1.3	**Topsoil**, dark brown — 923.7
										FAT CLAY, very stiff, gray brown
1	SS	18	16	*9000+		22.9	CH		5	
	PA								6.5	918.5
										FAT CLAY, stiff to very stiff, light brown mottled light gray
2	SS	18	11	*4000		19.0	CH		10	
	PA								12.0	913.0
										**SHALE, weathered, mod. hard, gray brown
3	SS	18	43	*9000+		16.9			15	
									16.0	909.0
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry @ 24 hrs. A.B.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**		
BORING COMPLETED	**3-16-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,023,582.5** EASTING **2,237,426.3**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-1

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 10 feet southwest, due to trees

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 909.6
	PA									**Topsoil**, dark brown (7") **FAT CLAY**, stiff, gray brown
									1.5	908.1
										SHALE, weathered, mod. hard to hard, grayish tan to gray brown
1	SS	18	45			15.5				
	PA								5	
2	SS	18	58			15.8				
									8.0	901.6
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-17-15**
BORING COMPLETED	**12-17-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,023,797.7** EASTING **2,237,879.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-2

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 908.9
										Topsoil, gray brown (12")
									1.0	907.9
	PA									**SHALE, mod. hard to hard, gray brown to gray
1	SS	18	59			15.9				
	PA								5	
2	SS	18	58			16.4				- limestone seam from 7.7 t0 7.9 feet
									8.0	900.9
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-24-15**		
BORING COMPLETED	**11-24-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,011.7** EASTING **2,238,302.4**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-3

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**906.4**
										Topsoil, dark brown	
									1.0		905.4
	PA									**FAT CLAY**, dark gray brown	
									3.0		903.4
1	SS	18	9	*3500		19.9	CH			**FAT CLAY**, stiff, gray brown	
	PA								5		
									5.5		900.9
2	SS	18	4	*1500		22.7	CH			**LEAN TO FAT CLAY**, soft to medium stiff, light gray brown mottled gray brown, some fine sand	
									8.0		898.4
										BOTTOM OF BORING	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**11-25-15**		
BORING COMPLETED	**11-25-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,397.8** EASTING **2,239,142.7**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-4

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 914.9
										Topsoil, dark brown
									1.2	913.7
	PA									**FAT CLAY**, very stiff, gray brown
1	SS	18	19	*5500		21.6	CH		5	
	PA									
2	SS	18	12	*5000		19.9	CH			
									8.0	906.9
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**
BORING COMPLETED	**3-16-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,658.4** EASTING **2,239,681.6**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-5

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 910.7
	PA								1.0	**Topsoil**, dark brown — 909.7 ▼
										FAT CLAY, soft to medium stiff, dark gray brown
1	SS	18	5	*1000		30.1	CH			
	PA								5 — 5.3	905.4
									6.0	**LIMESTONE**, hard — 904.7
										AUGER REFUSAL @ 6.0 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **1.0 feet W.D.**

▼ **1.0 feet A.B.**

Backfilled @ Completion

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BORING STARTED	**3-17-15**		
BORING COMPLETED	**3-17-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,850.3** EASTING **2,240,102.5**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-6

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 917.0
										Topsoil, dark brown
									1.0	916.0
	PA									**FAT CLAY**, medium stiff, gray brown
									3.2	913.8
1	SS	18	23	*9000		20.3				**SHALE**, weathered, soft to mod. hard, olive tan to yellowish tan
	PA								5	
2	SS	18	49	*9000+		16.3				
									8.0	909.0
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-17-15**
BORING COMPLETED	**3-17-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,898.5** EASTING **2,240,874.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-7

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 924.8
										Topsoil, dark brown
									1.2	923.6
	PA									**FAT CLAY**, medium stiff, light brown
1	SS	18	14			23.3	CH			
	PA								5	
									6.4	918.4
2	SS	18	40			21.7				**SHALE**, weathered, mod. hard, olive tan to yellowish tan
									8.0	916.8
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-17-15**
BORING COMPLETED	**3-17-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,918.0** EASTING **2,241,443.8**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-8

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 938.6
										Gravel (5")
	PA								1.5	**FILL**, fat clay, dark gray brown 937.1
										FAT CLAY, stiff to very stiff, light brown mottled light gray
1	SS	18	10	*5500		20.2	CH		5	
	PA									
3	SS	18	9	*4000		28.6	CH		8.0	930.6
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**		
BORING COMPLETED	**3-23-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,718.2** EASTING **2,241,452.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-9

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 939.7
	PA									**Gravel (6")**
									1.5	**FILL**, fat clay, dark gray brown — 938.2
										FAT CLAY, stiff to very stiff, light brown mottled light gray
1	SS	18	10	*7500		22.2	CH		5	
	PA								6.0	— 933.7
										**SHALE, weathered, soft, yellowish tan
3	SS	18	18	*8000		23.2			8.0	— 931.7
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,024,118.7** EASTING **2,241,475.8**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-10

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**943.9**
	PA									**Gravel (7")**	
										FAT CLAY, very stiff, light brown mottled light gray	
1	SS	18	14	*4500		21.0	CH		5		
	PA									5.5	938.4
										**SHALE, weathered, soft, olive tan	
3	SS	18	17	*9000+		24.1				8.0	935.9
										BOTTOM OF BORING	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,023,519.0** EASTING **2,241,499.1**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-11

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 932.8
	PA									**Gravel (7")**
										FILL, fat clay, medium stiff, dark gray brown
										4.0 928.8
1	SS	18	6	*3500		27.8	CH		5	**FAT CLAY**, very stiff, gray brown
	PA									
3	SS	18	10	*6500		29.8	CH			
										8.0 924.8
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,919.7** EASTING **2,241,519.9**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-12

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 932.7
										Gravel (5")
	PA								1.5	**FILL**, fat clay, dark gray brown 931.2
										FAT CLAY, very stiff, light brown mottled light gray
1	SS	18	16	*9000+		24.5	CH		5	
	PA									
3	SS	18	16	*9000		22.6			7.3	925.4
									8.0	**SHALE, weathered, soft, grayish tan 924.7
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,439.3** EASTING **2,241,535.4**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-13

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 930.8
										Gravel (5")
	PA								1.5	**FILL**, fat clay, dark gray brown 929.3
										FAT CLAY, very stiff, gray brown
1	SS	18	13	*8500		25.2	CH		5	
	PA									
3	SS	18	17	*5500		25.1			7.4	923.4
									8.0	**SHALE**, weathered, soft, grayish tan 922.8
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,021,920.2** EASTING **2,241,555.3**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-14

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 927.9
	PA									**Gravel (6")**
										FILL, fat clay, dark gray brown
									1.5	926.4
										FAT CLAY, medium stiff to stiff, gray brown
1	SS	18	7	*5000		29.8	CH			
	PA								5	
3	SS	18	8	*6000		27.8	CH			
									8.0	919.9
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,021,320.5** EASTING **2,241,579.3**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-15

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 934.6
	PA									**Gravel (6")**
									1.5	**FILL**, fat clay, dark gray brown — 933.1
										FAT CLAY, stiff, gray brown
1	SS	18	8	*5000		29.6	CH		5	
	PA								6.0	— 928.6
3	SS	18	11	*6500		27.0	CH			**FAT CLAY**, stiff to very stiff, light brown mottled light gray
									8.0	— 926.6
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,121.2** EASTING **2,241,622.6**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-16

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**939.0**
	PA									**Gravel (5")**	
										FILL, fat clay, medium stiff, brown and gray brown mixed	
1	SS	18	7	*5000		30.2	CH				
									4.5		934.5
	PA								5	**FAT CLAY**, stiff, gray brown	
3	SS	18	58	*4000		33.4					
									7.4		931.6
									8.0	**SHALE**, weathered, soft, grayish tan	931.0
										BOTTOM OF BORING	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**		
BORING COMPLETED	**3-23-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,121.5** EASTING **2,241,634.5**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-17

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**939.8**
									1.0	**FILL**, lean clay, gray brown, with gravel	938.8
	PA								2.5	**LEAN CLAY**, dark gray brown, trace fine sand	937.3
										LEAN TO FAT CLAY, medium stiff, grayish tan	
1	SS	16	6	*2000		29.2	CL CH		5		
	PA										
2	SS	12	23			29.2	CL CH		7.5		932.3
									8.0	**LIMESTONE**, weathered, seamy	931.8
										BOTTOM OF BORING	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**11-24-15**		
BORING COMPLETED	**11-24-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,738.1** EASTING **2,241,623.7**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-18

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 8' northwest due to utilities

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 938.2
										Topsoil, dark brown
									1.0	937.2
	PA									**FAT CLAY**, stiff to very stiff, gray brown
1	SS	18	9	*6500		25.5	CH			
	PA								5	
3	SS	18	11	*5000		27.6	CH			
									8.0	930.2
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,708.4** EASTING **2,241,048.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-19

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 10' north due to utilities

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 933.0
	PA									**Topsoil**, dark brown
										1.3 931.7
										FAT CLAY, medium stiff, gray brown
1	SS	18	6	*3055		32.0	CH		5	
	PA									6.2 926.8
										6.9 **LIMESTONE**, hard 926.1
										AUGER REFUSAL @ 6.9 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**
BORING COMPLETED	**3-23-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,679.6** EASTING **2,240,248.7**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-20

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 12' north due to utilities

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 924.2
										Topsoil, dark brown
									1.0	923.2
	PA									**FAT CLAY**, stiff, gray brown
1	SS	18	8	*3500		25.1	CH			
	PA								5	
									5.5	918.7
										FAT CLAY, stiff, light brown mottled light gray
3	SS	18	9	*3500		27.1	CH			
									8.0	916.2
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-23-15**		
BORING COMPLETED	**3-23-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,659.5** EASTING **2,239,649.1**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-21

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 6' north due to utilities

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	Surface Elevation: 919.5
										0.8 **Topsoil**, dark brown	918.7
	PA									**FAT CLAY**, medium stiff, gray brown	
										3.3	916.2
1	SS	18	19	*9000+		20.6				**SHALE**, weathered, soft, yellowish tan, with rock fragments	
										5.0	914.5
	PA								5	5.6 **LIMESTONE**, hard	913.9

AUGER REFUSAL @ 5.6 FEET

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**		
BORING COMPLETED	**3-16-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,646.1** EASTING **2,239,249.3**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-22

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 3' northeast due to utilities

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 914.8
										Topsoil, dark brown
									1.0	913.8
	PA									**FAT CLAY**, stiff, dark brown, organic odor (Possible Fill)
1	SS	18	10	*7000		23.4	CH		5	
	PA								6.0	908.8
s	SS	18	8	*6000		22.6	CH			**FAT CLAY**, stiff, gray brown, trace gravel
									8.0	906.8
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED **3-16-15**

BORING COMPLETED **3-16-15**

RIG **ATV-45** DRILLER **MC**

APPROVED **JJZ** JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,240.8** EASTING **2,239,229.3**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-23

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 912.2
										Topsoil, dark brown
										1.4 910.8
	PA									**LEAN TO FAT CLAY**, medium stiff to stiff, dark brown
1	SS	18	8	*4500		26.1	CL CH		5	
	PA									
s	SS	18	6	*5000		26.4	CL CH			
										8.0 904.2
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**
BORING COMPLETED	**3-16-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,020,840.4** EASTING **2,239,209.2**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-24

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 911.5
	PA									**Topsoil**, dark brown
										1.4 910.1
										LEAN TO FAT CLAY, stiff to very stiff, dark brown
1	SS	18	12	*8500		15.9	CL CH		5	
	PA									5.5 906.0
										FAT CLAY, stiff, gray brown
s	SS	18	8	*5000		23.3	CH			8.0 903.5
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**
BORING COMPLETED	**3-16-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,021,440.6** EASTING **2,239,206.9**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-25

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 909.8
	PA									**Topsoil**, dark brown
									1.8	908.0
										LEAN TO FAT CLAY, soft to medium stiff, dark brown
1	SS	18	5	*2000		25.8	CL CH			
	PA								5	▼
									6.2	903.6
									7.1	**GRAVELLY FAT CLAY**, stiff, brown 902.7
3	SS	4	50/4"	*8500		22.3			7.7	**LIMESTONE**, hard 902.1
										AUGER REFUSAL @ 7.7 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **5.5 feet @ 24 hrs. A.B.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**		
BORING COMPLETED	**3-16-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,040.6** EASTING **2,239,194.0**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-26

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 914.5
	PA								1.3	**Topsoil**, dark brown — 913.2
										FAT CLAY, very stiff, gray brown
1	SS	18	25	*9000+		14.6	CH		5	
	PA								6.0	— 908.5
										SHALE, weathered, soft, tan
3	SS	18	24	*9000+		16.6			8.5	— 906.0
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry W.C.I.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**		
BORING COMPLETED	**3-16-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,350.2** EASTING **2,239,187.4**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-27

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 916.2
	PA									**Topsoil**, dark brown
									1.5	914.7
										FAT CLAY, very stiff, light brown mottled light gray
1	SS	18	15	*5500		22.6	CH			
	PA								5	
									6.0	910.2
s	SS	18	37	*9000+		20.2				**SHALE, weathered, mod. hard, yellowish tan
									8.0	908.2
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**
BORING COMPLETED	**3-16-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,023,040.4** EASTING **2,239,172.7**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-28

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 15' south due to trees

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 916.6
										Topsoil, dark brown
									1.0	915.6
	PA									**FAT CLAY**, very stiff, gray brown
1	SS	18	27	*9000+		16.8	CH			
	PA								5	
3	SS	18	20	*9000+		18.5	CH			
									8.0	908.6
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**3-16-15**		
BORING COMPLETED	**3-16-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,023,840.3** EASTING **2,239,155.6**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-29

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 912.7
										Topsoil, dark brown
									1.0	911.7
	PA									**FAT CLAY**, very stiff, gray brown
1	SS	18	27	*8500		17.9	CH			
	PA								5	
3	SS	18	20	*7500		21.7	CH			
									8.0	904.7
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry @ 24 hrs. A.B.**

Backfilled @ Completion

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BORING STARTED	**3-16-15**		
BORING COMPLETED	**3-16-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,320.7** EASTING **2,238,159.0**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-30

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 908.9
	PA									**Topsoil**, dark brown (22")
									1.8	907.1
										FAT CLAY, stiff, gray brown
1	SS	18	7	*2500		24.7	CH			
	PA								5	
2	SS	18	9	*4000		22.0	CH			
									8.0	900.9
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-17-15**		
BORING COMPLETED	**12-17-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,274.9** EASTING **2,237,412.4**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-31

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 916.2
									0	**Topsoil**, dark brown (12")
									1.0	915.2
	PA									**FAT CLAY**, very stiff, gray brown, shaley
1	SS	18	10	*5500		23.8	CH			
	PA								5	
									7.0	909.2
2	SS	18	15	*7500		17.4	CH			**SHALE, weathered, soft, grayish tan
									8.0	908.2
										BOTTOM OF BORING
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-17-15**		
BORING COMPLETED	**12-17-15**		
RIG	**ATV-45**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,022,252.5** EASTING **2,236,762.8**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-32

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Surface Elevation:	**925.0**
	PA								1.0	**Topsoil**, dark brown (12")	924.0
										FAT CLAY, stiff, dark gray brown	
1	SS	18	8	*3500		31.7	CH		5		
	PA								6.0		919.0
2	SS	18	6	*2000		22.3	CH			**FAT CLAY**, medium stiff, gray brown	
									8.0		917.0
										BOTTOM OF BORING	

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**12-17-15**
BORING COMPLETED	**12-17-15**
RIG **ATV-45**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,621.7** EASTING **2,238,647.4**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-33

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road Ottawa, Kansas**

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 916.1
	PA									**FILL**, gravel with clay, gray brown
									1.5	914.6
										FILL, lean clay, gray brown
									2.5	913.6
1	SS	14	9	*4000		24.0	CL			**LEAN CLAY**, stiff, dark gray brown, trace fine sand
									5.0	911.1
	PA								5	**LEAN CLAY**, very stiff, gray brown, trace fine sand
2	SS	18	12	*5500		21.5	CL			
									8.0	908.1
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-24-15**		
BORING COMPLETED	**11-24-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,599.2** EASTING **2,238,048.3**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-34

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 919.7
	PA								1.0	**FILL**, gravel with clay, gray brown — 918.7
	PA								3.0	**FILL**, lean clay, dark gray brown, trace fine sand — 916.7
1	SS	16	5	*2000		28.3	CL		5	**LEAN CLAY**, medium stiff, gray brown, trace fine sand
	PA								6.0	— 913.7
2	SS	16	10	*7000		22.5	CH		8.0	**FAT CLAY**, stiff, grayish tan — 911.7
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-24-15**
BORING COMPLETED	**11-24-15**
RIG **ATV-45**	DRILLER **RN**
APPROVED **JJZ**	JOB # **D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,578.5** EASTING **2,237,449.7**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-35

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 922.6
	PA								1.0	**FILL**, gravel with clay, gray brown — 921.6
										FILL, lean clay, dark gray brown, trace fine sand
									3.2	— 919.4
1	SS	16	8	*2500		23.7	CH			**FAT CLAY**, stiff, gray brown
	PA								5	
2	SS	18	10	*4000		26.3	CH			
									8.0	— 914.6
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-24-15**		
BORING COMPLETED	**11-24-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,558.3** EASTING **2,236,850.4**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-36

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 924.9
	PA								1.0	**FILL**, gravel with clay, gray brown — 923.9
	PA								2.0	**FILL**, lean clay, dark gray brown — 922.9
										FAT CLAY, stiff, gray brown mottled gray
1	SS	16	9	*3500		28.0	CH		5	
	PA									
2	SS	18	9	*4000		27.6	CH		8.0	916.9
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**11-24-15**		
BORING COMPLETED	**11-24-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING **2,019,544.2** EASTING **2,236,449.8**

DRILLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. W-37

PROJECT NAME **Rock Creek Industrial Park**

SITE LOCATION **Montana Road & Kingman Road**
Ottawa, Kansas

OWNER / ENGINEER **City of Ottawa & Franklin County / PEC**

Offset 40 feet south due to overhead power lines

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Surface Elevation: 926.5
	PA								1.0	**FILL**, gravel with clay, gray brown — 925.5
									2.8	**FILL**, lean clay, dark gray brown, trace sand — 923.7
1	SS	18	10	*4500		23.6	CH		5	**FAT CLAY**, stiff, gray brown
	PA									
2	SS	18	9	*3500		27.6	CH		8.0	918.5
										BOTTOM OF BORING

WOH - Weight of Hammer * Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be more gradational in nature.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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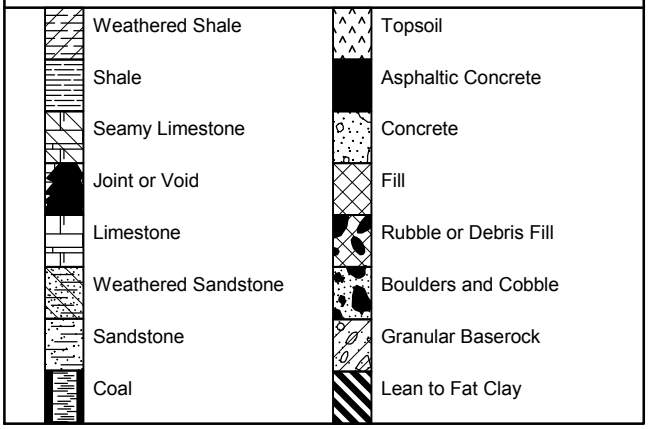
BORING STARTED	**11-24-15**		
BORING COMPLETED	**11-24-15**		
RIG	**ATV-45**	DRILLER	**RN**
APPROVED	**JJZ**	JOB #	**D15G1444**

UNIFIED SOIL CLASSIFICATION (ASTM D-2487-98)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY
			PI>4 AND PLOTS<"A" LINE	ML	SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY
			PI PLOTS <"A" LINE	MH	ELASTIC SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT

BEDROCK AND OTHER MATERIAL SYMBOLS



BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION

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

BEDDING CHARACTERISTICS

TERM	THICKNESS (inches)
Massive	> 60
Very Thick Bedded	36 - 60
Thick Bedded	12 - 36
Medium Bedded	4 - 12
Thin Bedded	1 - 4
Very Thin Bedded	0.4 - 1
Laminated	< 0.4

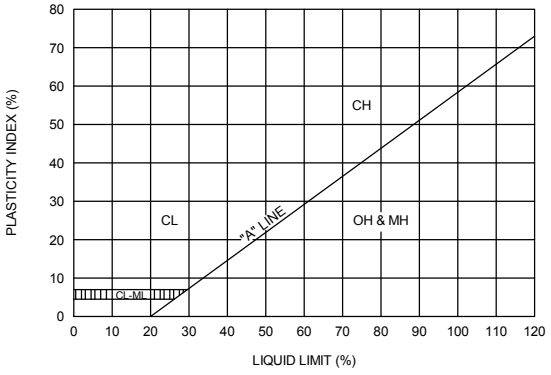
DEGREE OF WEATHERING

Slightly Weathered - Slight decomposition of Parent material in joints and seams.
Weathered - Well-developed and decomposed joints and seams.
Highly Weathered - Rock highly decomposed, may be extreemly broken.

BEDROCK DISCONTINUITIES

Bedding Planes	Planes dividing the individual layers, beds or strata of rocks.
Joints	Fractures in rock, generally more or less vertical to the bedding.
Seams	Applies to bedding planes with an unspecified degree of weathering.

PLASTICITY CHART



PENETRATION RESISTANCE
(RECORDED AS BLOWS / 0.5 FT)

SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	COMPRESSIVE STRENGTH (TSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
MEDIUM DENSE	10 - 30	MEDIUM STIFF	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

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General Notes and Terms

BORING LOG SYMBOLS

SURFACE MATERIALS


TOPSOIL


FILL MATERIAL


ASPHALTIC CONCRETE


CONCRETE


GRANULAR BASE

COHESIVE SOILS


SILT


CLAYEY SILT


LEAN CLAY


LEAN TO FAT CLAY


FAT CLAY

LARGE GRANULAR SOILS


CLAYEY GRAVEL


SILTY GRAVEL


POORLY GRADED GRAVEL


WELL GRADED GRAVEL


COBBLES & BOULDERS

GRANULAR SOILS


SANDY SILT


SILTY SAND


FINE SAND


POORLY GRADED SAND


WELL GRADED SAND


GRAVELLY SAND

BEDROCK UNITS


SHALE


FISSILE SHALE


SANDSTONE


LIMESTONE


COAL

WEATHERED BEDROCK


JOINT OR VOID


WEATHERED SHALE


WEATHERED SANDSTONE


WEATHERED LIMESTONE

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APPENDIX B

SUMMARY OF LABORATORY RESULTS

Summary of Laboratory Results

Boring No.	Depth	Sample Type	Recovery (inches)	Unconfined Strength (psf)	Strain at Failure (%)	Dry Density (pcf)	Water Content (%)	Unified Class	Liquid Limit	Plastic Limit	Plasticity Index
B-1	1.0-3.0	ST	8	2030	12.5	93.8	17.7	CH			
B-1	3.0-5.0	ST	17	3180	12.6	100.2	23.8	CH	51	22	29
B-1	8.5-9.0	SS	3				17.6				
B-1	9.1-10.1	NQ3	100	10580 psi	0.6	163.9	1.4				
B-1	10.1-15.0	NQ3	90	3370 psi	0.6	155.0	2.0				
B-1	15.0-20.0	NQ3	100	7060 psi	0.6	164.2	0.7				
B-2	1.0-3.0	ST	10	2650	12.6	93.4	28.9	CH			
B-2	3.0-5.0	ST	20	4890	3.6	104.4	23.3				
B-2	8.5-10.0	SS	18				17.0				
B-2	11.0-14.0	NQ3	100	9560 psi	0.6	164.0	2.0				
B-2	14.0-15.0	NQ3	98	5760 psi	0.6	160.4	1.2				
B-2	15.0-20.0	NQ3	98	4800 psi	0.6	160.9	0.7				
B-3	1.0-3.0	ST	14	2570	12.5	101.0	23.5	CH			
B-3	3.0-5.0	ST	9	3380	13.5	97.4	27.1	CH	62	23	39
B-3	8.5-10.0	SS	18				20.0				
B-3	13.5-15.0	SS	18				16.4				
B-3	18.5-20.0	SS	18				18.3				
B-4	1.0-3.0	ST	12	3240	15.0	95.6	29.0	CH			
B-4	3.0-5.0	ST	13	12160	8.0	105.4	21.4	CL-CH			
B-4	8.0-10.0	ST	24	2880	3.5	114.4	19.4	CL-SC			
B-4	13.5-14.0	SS	3				16.6				
B-4	14.0-15.0	NQ3	100	13860 psi	0.6	164.0	1.3				
B-4	15.0-18.0	NQ3	93	5440 psi	0.6	162.6	1.1				
B-4	18.0-20.0	NQ3	100	10530 psi	0.6	164.0	2.0				
B-5	1.0-3.0	ST	14	1730	11.7	89.3	32.2	CH	65	24	41
B-5	3.0-5.0	ST	24	5920	4.4	104.0	25.5	CH			
B-5	8.5-10.0	SS	18				19.5				
B-5	13.5-15.0	SS	18				19.7				
B-5	17.5-19.5	NQ3	98	8310 psi	0.6	165.4	0.5				
B-5	19.5-21.5	NQ3	98	5320 psi	0.6	160.1	1.5				
B-6	1.0-3.0	ST	19	6480	8.1	99.9	25.6	CH			
B-6	3.0-5.0	ST	24	5780	1.8	99.0	19.6	CH			
B-6	8.0-9.5	ST	18	2650	2.0	97.0	23.1				
B-6	13.5-15.0	SS	18				16.2				
B-6	15.5-17.5	NQ3	95	8970 psi	0.6	165.5	0.7				
B-6	17.5-20.5	NQ3	95	8670 psi	0.6	161.1	1.8				

Rock Creek Industrial Park
Montana Road & Kingman Road
Ottawa, Kansas

GeoSource
Your Source for Geotechnical and Materials Engineering

Approved By: JJZ

Project No.: D15G1444

Summary of Laboratory Results

Boring No.	Depth	Sample Type	Recovery (inches)	Unconfined Strength (psf)	Strain at Failure (%)	Dry Density (pcf)	Water Content (%)	Unified Class	Liquid Limit	Plastic Limit	Plasticity Index
B-7	1.0-3.0	ST	14	2680	8.9	94.3	27.9	CH			
B-7	3.0-5.0	ST	23	6370	1.8	95.9	18.8	CL-CH	48	20	28
B-7	8.0-10.0	ST	20	3870	2.2	106.0	17.7	CL-CH			
B-7	13.5-15.0	SS	18				15.5				
B-7	16.8-18.0	NQ3	95	8430 psi	0.6	166.6	0.4				
B-7	18.0-20.6	NQ3	95	3940 psi	0.6	148.6	4.9				
B-7	20.6-22.0	NQ3	95	240 psi	5.8	134.3	11.6				
B-8	1.0-3.0	ST	22	1810	11.7	95.9	29.3	CH			
B-8	3.0-5.0	ST	24	2260	10.9	97.0	27.0	CH			
B-8	8.0-9.5	ST	22	1890	9.9	99.3	25.1				
B-8	13.5-14.5	SS	9				15.5				
B-8	14.5-15.5	NQ3	100	8100 psi	0.6	165.9	0.5				
B-8	15.5-18.5	NQ3	90	7870 psi	0.6	163.4	1.2				
B-8	18.5-20.5	NQ3	90	2900 psi	0.6	152.6	4.3				
B-9	1.0-3.0	ST	20	1830	6.3	101.9	24.4	CH	52	19	33
B-9	3.0-5.0	ST	24	2000	6.3	98.5	24.9	CH			
B-9	8.5-10.0	SS	18				16.8				
B-9	13.5-15.0	SS	18				16.9				
B-9	18.5-20.0	SS	18				17.7				
B-10	1.0-3.0	ST	22	3300	8.0	102.3	24.6	CH			
B-10	3.0-5.0	ST	24	4990	1.8	112.1	17.4	CL			
B-10	8.0-9.5	ST	14	6000		109.1	17.8				
B-10	13.5-14.6	SS	12				19.7				
B-10	14.6-15.6	NQ3	80	8630 psi	0.6	165.1	0.6				
B-10	15.6-18.5	NQ3	98	8160 psi	0.6	161.5	1.9				
B-10	18.5-20.5	NQ3	98	2480 psi	0.6	147.3	7.4				
B-11	1.0-3.0	ST	24	2190	3.6	102.7	21.6	CH	52	19	33
B-11	3.0-5.0	ST	24	4180	1.3	102.3	18.5	CH			
B-11	8.0-9.4	SS	16	2200	5.4	107.6	19.0				
B-11	13.5-15.0	SS	18				17.5				
B-11	18.5-20.0	SS	18				17.4				
B-12	1.0-3.0	ST	21	3260	9.9	94.7	29.9	CH			
B-12	3.0-5.0	ST	20	6960	2.2	96.2	23.2	CH			
B-12	8.0-10.0	ST	24	5560	2.7	110.9	17.9				
B-12	13.5-15.0	SS	18				16.2				
B-12	16.3-18.5	NQ3	98	11800 psi	0.6	166.7	0.6				

Rock Creek Industrial Park
Montana Road & Kingman Road
Ottawa, Kansas

GeoSource
Your Source for Geotechnical and Materials Engineering

Approved By: JJZ

Project No.: D15G1444

Summary of Laboratory Results

Boring No.	Depth	Sample Type	Recovery (inches)	Unconfined Strength (psf)	Strain at Failure (%)	Dry Density (pcf)	Water Content (%)	Unified Class	Liquid Limit	Plastic Limit	Plasticity Index
B-12	18.5-22.0	NQ3	98	10040 psi	0.6	162.4	1.6				
B-13	1.0-3.0	ST	9	2200	9.8	93.2	27.4	CH	59	23	36
B-13	3.0-5.0	ST	13	3890	5.4	105.2	22.8	CH			
B-13	8.5-9.5	SS	10				19.4				
B-13	9.8-10.5	NQ3	83	12770 psi	0.6	165.0	0.5				
B-13	10.5-13.7	NQ3	98	12770 psi	0.6	165.0	0.5				
B-13	13.7-17.5	NQ3	100	10450 psi	0.6	161.3	2.3				
B-13	17.5-20.3	NQ3	100	11660 psi	0.6	163.8	0.3				
B-14	1.0-3.0	ST	19	3670	15.0	100.4	26.6	CH			
B-14	3.0-5.0	ST	24	4190	1.3	101.3	23.0	CL-CH			
B-14	8.5-10.0	ST	18				20.2				
B-14	13.1-15.5	NQ3	100	7150 psi	0.6	166.9	0.6				
B-14	15.5-17.2	NQ3	95	10740 psi	0.6	160.5	2.1				
B-14	17.2-20.5	NQ3	95	5510 psi	0.6	157.5	2.9				
B-15	1.0-3.0	ST	10	3140	12.3	93.5	28.4	CH	65	24	41
B-15	3.0-5.0	ST	11	8310	3.1	106.9	20.5	CH			
B-15	8.0-10.0	ST	18	8120	6.2	115.1	19.8	CL-SC			
B-15	13.5-15.5	NQ3	100	6630 psi	0.6	164.9	0.7				
B-15	15.5-20.5	NQ3	100	5810 psi	0.6	159.8	1.8				
B-16	1.0-3.0	ST	15	2480	15.0	102.8	23.7	CH			
B-16	3.0-5.0	ST	24	2160	1.3	98.1	23.1	CH			
B-16	8.5-10.0	SS	18				19.3	CH			
B-16	11.0-12.5	NQ3	100	10120 psi	0.6	164.3	0.7				
B-16	12.5-15.3	NQ3	98	4180 psi	0.6	160.3	2.1				
B-16	16.2-20.5	NQ3	94	5780 psi	0.6	164.5	1.2				
B-17	1.0-3.0	ST	7	2770	13.5	91.1	25.3	CH			
B-17	3.0-5.0	ST	12	3760	11.8	98.0	29.2	CH	57	22	35
B-17	8.0-9.5	ST	21	2740	3.6	103.3	23.9	CL-CH			
B-17	11.2-13.6	NQ3	98	6570 psi	0.6	161.5	2.2				
B-17	13.6-14.3	NQ3	98	50 psi	3.7	111.6	21.2				
B-17	14.3-17.5	NQ3	100	5910 psi	0.6	159.2	2.3				
B-17	17.5-20.0	NQ3	100	9650 psi	0.6	162.9	1.2				
B-18	1.0-3.0	ST	24	2400	11.7	95.1	28.2	CH			
B-18	3.0-5.0	ST	15	5090	9.0	102.0	23.9	CH			
B-18	8.0-10.0	ST	17	3950	3.6	104.7	24.3	CL-CH			
B-18	12.5-15.1	NQ3	91	6110 psi	0.6	167.9	2.0				

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B-18	12.5-15.1	NQ3	91	6110 psi	0.6	167.9	2.0				
B-18	15.1-17.1	NQ3	100	75 psi	3.2	116.4	20.0				
B-18	18.5-20.0	NQ3	100	7480 psi	0.6	162.2	1.0				
B-19	1.0-3.0	ST	17	2710	8.8	100.9	22.9	CH	55	22	33
B-19	3.0-3.5	SS	6				41.1				
B-19	3.5-5.0	NQ3	100	3360 psi	0.6	163.3	1.1				
B-19	5.0-10.0	NQ3	92	7660 psi	0.6	164.3	0.8				
B-19	10.0-15.0	NQ3	100	8310 psi	0.6	158.4	2.0				
B-19	15.0-18.5	NQ3	100	7920 psi	0.6	159.4	1.6				
B-19	18.5-20.5	NQ3	100	7390 psi	0.6	159.5	1.4				
B-20	1.0-3.0	ST	6	2030	9.9	88.0	27.5	CH			
B-20	3.0-5.0	ST	12	2790	12.7	92.8	30.5	CH			
B-20	8.0-10.0	ST	15	4080	8.1	98.3	26.9	CH			
B-20	13.5-14.3	SS	1				6.5				
B-20	14.2-15.5	NQ3	90	7540 psi	0.6	161.3	1.6				
B-20	15.5-17.0	NQ3	100	9860 psi	0.6	163.3	1.2				
B-20	17.0-18.5	NQ3	100	8970 psi	0.6	165.1	0.9				
B-20	18.5-20.5	NQ3	100	9380 psi	0.6	160.9	1.8				
B-21	1.0-3.0	ST	10	4050	11.6	96.4	26.1	CH			
B-21	3.0-5.0	ST	10	10310	7.1	100.1	24.7	CH			
B-21	8.5-10.0	SS	16				24.6				
B-21	13.5-14.2	SS	6				18.8				
B-21	13.7-15.5	NQ3	96	7260 psi	0.6	164.9	2.2				
B-21	15.5-17.2	NQ3	96	6400 psi	0.6	161.3	2.1				
B-21	17.2-20.0	NQ3	96	520 psi	3.9	129.2	12.3				
B-22	1.0-3.0	ST	10	8610	8.0	95.4	28.7	CL	31	18	13
B-22	3.0-5.0	ST	12	7360	5.4	105.2	22.7	CH	56	22	34
B-22	8.0-10.0	ST	13	3980	14.4	104.6	23.7	CH			
B-22	13.5-15.0	SS	18				19.0				
B-22	18.5-20.0	SS	18				16.3				

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B-23	1.0-3.0	ST	14	8920	15.0	97.1	24.3	CH	66	24	42
B-23	3.0-5.0	ST	9	4390	7.2	109.0	18.0	CL-CH			
B-23	8.5-10.0	SS	18				18.1				
B-23	13.5-15.0	SS	18				17.1				
B-23	18.5-20.0	SS	18				13.8				
B-24	1.0-3.0	ST	13	6310	10.8	104.7	27.1	CL	47	20	27
B-24	3.0-4.5	SS	18				19.6	CH			
B-24	8.5-10.0	SS	18				16.7				
B-24	13.5-15.0	SS	18				14.4				
B-24	18.5-20.0	SS	12				12.8				

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S-1	3.5-5.0	SS	18				20.1	CL			
S-1	8.5-10.0	SS	18				25.9	CL			
S-10	3.5-5.0	SS	18				15.7	CL			
S-10	8.5-10.0	SS	18				25.1	CL-CH			
S-11	3.5-5.0	SS	15				14.2	CL			
S-11	8.5-10.0	SS	16				22.9	CL-CH			
S-11	14.0-14.7	SS	6				16.4				
S-11-1	3.5-5.0	SS	16				16.9	CH			
S-11-1	8.5-10.0	SS	18				16.2				
S-11-1	14.5-16.0	SS	17				15.6				
S-11-2	3.5-5.0	SS	18				18.5	CH			
S-11-2	8.5-10.0	SS	18				14.3				
S-11-2	14.5-16.0	SS	17				15.7				
S-12	3.5-5.0	SS	16				19.2	CL-CH			
S-12	8.5-10.0	SS	18				19.6	CL-CH			
S-12	14.5-16.0	SS	18				16.8				
S-13	3.5-5.0	SS	18				12.7	CL			
S-13	8.5-10.0	SS	18				26.2	CH			
S-2	3.5-5.0	SS	18				18.8	CL-CH			
S-2	8.5-10.0	SS	18				24.0	CH			
S-2-2	3.5-5.0	SS	18				14.2	CL-CH			
S-2-2	8.5-10.0	SS	18				13.9				
S-2-3	3.5-5.0	SS	18				24.9	CH			
S-2-3	8.5-10.0	SS	18				21.1	CH			
S-3	3.5-5.0	SS	18				17.5	CL-CH			
S-3	8.5-10.0	SS	18				23.9				
S-4	3.5-5.0	SS	18				22.6	CL			
S-4	8.5-10.0	SS	18				38.5	CH			
S-5	3.5-5.0	SS	18				20.9	CL			
S-5	8.5-10.0	SS	18				25.9				
S-6	3.5-5.0	SS	18				13.9	CL-CH			
S-6	8.5-10.0	SS	18				9.9	CL-CH			
S-6-1	3.5-5.0	SS	18				18.8	CH			
S-6-2	3.5-5.0	SS	18				22.0	CH			
S-6-2	8.5-10.2	SS	18				23.4	CH			
S-6-3	3.5-5.0	SS	18				23.0	CH			

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S-6-3	8.5-10.0	SS	18				22.4	CH			
S-6-4	3.5-5.0	SS	18				22.9	CH			
S-6-4	8.5-10.0	SS	18				19.0	CH			
S-6-4	14.5-16.0	SS	18				16.9				
S-7	3.5-5.0	SS	18				14.5	CL-CH			
S-7	8.5-10.0	SS	18				12.5	CL-CH			
S-8	3.5-5.0	SS	18				18.3	CL			
S-8	8.5-9.5	SS	12				23.6	CL			
S-9	3.5-5.0	SS	18				16.1	CL			
S-9	8.5-10.0	SS	18				29.8	CH			
W-1	3.5-5.0	SS	18				15.5				
W-1	6.5-8.0	SS	18				15.8				
W-10	3.5-5.0	SS	18				21.0	CH			
W-10	6.5-8.0	SS	18				21.4				
W-11	3.5-5.0	SS	18				27.8	CH			
W-11	6.5-8.0	SS	18				29.8	CH			
W-12	3.5-5.0	SS	18				24.5	CH			
W-12	6.5-8.0	SS	18				22.6				
W-13	3.5-5.0	SS	18				25.2	CH			
W-13	6.5-8.0	SS	18				25.1				
W-14	3.5-5.0	SS	18				29.8	CH			
W-14	6.5-8.0	SS	18				27.8	CH			
W-15	3.5-5.0	SS	18				29.6	CH			
W-15	6.5-8.0	SS	18				27.0	CH			
W-16	3.5-5.0	SS	18				30.2	CH			
W-16	6.5-8.0	SS	18				33.4				
W-17	3.5-5.0	SS	16				29.2	CL-CH			
W-17	6.5-8.0	SS	12				29.2	CL-CH			
W-18	3.5-5.0	SS	18				25.5	CH			
W-18	6.5-8.0	SS	18				27.6	CH			
W-19	3.5-5.0	SS	18				32.0	CH			
W-2	3.5-5.0	SS	18				15.9				
W-2	6.5-8.0	SS	18				16.4				
W-20	3.5-5.0	SS	18				25.1	CH			
W-20	6.5-8.0	SS	18				27.1	CH			
W-21	3.5-5.0	SS	18				20.6				

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W-22	3.5-5.0	SS	18				23.4	CH			
W-22	6.5-8.0	SS	18				22.6	CH			
W-23	3.5-5.0	SS	18				26.1	CL-CH			
W-23	6.5-8.0	SS	18				26.4	CL-CH			
W-24	3.5-5.0	SS	18				15.9	CL-CH			
W-24	6.5-8.0	SS	18				23.3	CH			
W-25	3.5-5.0	SS	18				25.8	CL-CH			
W-25	6.5-7.7	SS	4				22.3				
W-26	3.5-5.0	SS	18				14.6	CH			
W-26	7.0-8.5	SS	18				16.6				
W-27	3.5-5.0	SS	18				22.6	CH			
W-27	6.5-8.0	SS	18				20.2				
W-28	3.5-5.0	SS	18				16.8	CH			
W-28	6.5-8.0	SS	18				18.5	CH			
W-29	3.5-5.0	SS	18				17.9	CH			
W-29	6.5-8.0	SS	18				21.7	CH			
W-3	3.5-5.0	SS	18				19.9	CH			
W-3	6.5-8.0	SS	18				22.7	CH			
W-30	3.5-5.0	SS	18				24.7	CH			
W-30	6.5-8.0	SS	18				22.0	CH			
W-31	3.5-5.0	SS	18				23.8	CH			
W-31	6.5-8.0	SS	18				17.4	CH			
W-32	3.5-5.0	SS	18				31.7	CH			
W-32	6.5-8.0	SS	18				22.3	CH			
W-33	3.5-5.0	SS	14				24.0	CL			
W-33	6.5-8.0	SS	18				21.5	CL			
W-34	3.5-5.0	SS	16				28.3	CL			
W-34	6.5-8.0	SS	16				22.5	CH			
W-35	3.5-5.0	SS	16				23.7	CH			
W-35	6.5-8.0	SS	18				26.3	CH			
W-36	3.5-5.0	SS	16				28.0	CH			
W-36	6.5-8.0	SS	18				27.6	CH			
W-37	3.5-5.0	SS	18				23.6	CH			
W-37	6.5-8.0	SS	18				27.6	CH			
W-4	3.5-5.0	SS	18				21.6	CH			
W-4	6.5-8.0	SS	18				19.9	CH			

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W-5	3.5-5.0	SS	18				30.1	CH			
W-6	3.5-5.0	SS	18				20.3				
W-6	6.5-8.0	SS	18				16.3				
W-7	3.5-5.0	SS	18				23.3	CH			
W-7	6.5-8.0	SS	18				21.7				
W-8	3.5-5.0	SS	18				20.2	CH			
W-8	6.5-8.0	SS	18				28.6	CH			
W-9	3.5-5.0	SS	18				22.2	CH			
W-9	6.5-8.0	SS	18				23.2				

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