

IFB #18-272 North Outer Road and I-70 / David Hoekel Parkway Interchange Grading ADDENDUM 1

Addendum issued August 17, 2018

The following information is hereby incorporated into the Invitation for Bids (IFB):

1. Bidder Question: Can you provide the bid form in an excel spreadsheet so I can import into our bidding software?

City Response: An Excel spreadsheet of the line items is provided as a courtesy for bidder use. However, bidder's line item prices must be entered into the City's E-bidding system.

2. Bidder Question: Is there a bid bond form associated with job #18-272 or should we just use the standard one.

City Response: Sample bid bond form from MoDOT EPG 136.9.3, is attached although bidders may use an alternate format that complies with the requirements stated in the IFB document, Bidding Instructions paragraph 4:

4. Bid Bond / Bid Guarantee: Bid bond required if total bid price exceeds \$50,000.00: The bid security (5% of bid amount) submitted with this bid shall be a bid bond from a surety that is authorized to issue bonds in the State of Missouri; or a certified check or cashier's check payable to the City of Wentzville.

Table of Contents, second page, incorrectly lists "Bid Bond, CCA-14 to CCA-15". The correct title of the document is "Contract Bond Form, CCA-14 to CCA-15".

- 3. Performance Bond and Payment Bond: Clarification for bidders that a performance bond and payment bond will not be necessary at time of award. Instead, the successful bidder will be required to complete the Contract Bond Form listed in the IFB, CCA-14 to CCA-15 within ten (10) days of notification of contract award.
- 4. Bidder Question: Please provide the geotechnical report alluded to in the MSE Wall plans.

City Response: Geotechnical Report has been added as an Attachment in the E-bidding system.

5. General Conditions: The General Conditions have been added as an Attachment in the Ebidding system.

All other Terms and Conditions as applicable to this Invitation for Bid shall remain as stated.

This addendum forms a part of the contract documents and modifies the original bidding documents dated August 10, 2018. Contractor shall acknowledge this Addendum through the E-bidding software. Failure to do so may subject bidder to disqualification.

End of Addendum 1

SAMPLE BID BOND

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we

as principal and as surety, are held and firmly bound unto the (Insert LPA Name) in the penal sum of

Dollars (\$) to be paid to the commission to be credited to the state road fund, the principal and surety binding themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

Sealed with our seals and dated this

THE CONDITION OF THIS OBLIGATION is such that

WHEREAS the principal is submitting herewith a bid to the commission on route(s)

County(ies),

project (s) ____

in

for construction or improvement of state highway as set out in said bid;

NOW THEREFORE, if the commission shall accept the bid of the principal and if the principal shall properly execute and deliver to the commission the contract, contract bond, and evidence of insurance coverage in compliance with the requirements of the bid, the specifications, and the provisions of section 227.100 RSMo, to the satisfaction of the commission, then this obligation shall be void and of no effect, otherwise to remain in full force and effect.

In the event the said principal shall, in the judgment of the commission, fail to comply with any requirement as set forth in the preceding paragraph, then the state of Missouri, acting by and through the commission, shall immediately and forthwith be entitled to recover the full penal sum above set out, together with court costs, attorney's fees, and any other expense of recovery.

The principal and surety hereby certify that the document is the original or a verbatim copy of the bid bond form furnished by the Commission, in accordance with Sec 102.9 of the Missouri Standard Specifications for Highway Construction.

SEAL

By		
•	Signature	

Surety

SEAL

By__

Signature of Attorney in Fact

NOTE: This bond must be executed by the principal, and by a corporate surety authorized to conduct surety business in the state of Missouri.

Principal

SUBSURFACE EXPLORATION DAVID HOEKEL PARKWAY PHASE 2A, B & C WENTZVILLE, MISSOURI

Prepared for:

CRAWFORD, MURPHY & TILLY, INC. St. Louis, Missouri

Prepared by:

GEOTECHNOLOGY, INC. St. Louis, Missouri

Geotechnology Project No. J024691.01

February 16, 2018 Revision No. 2

St. Louis, MO Fairview Heights, IL Overland Park, KS Memphis, TN geotechnology.com

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QUALITY. INTEGRITY. PARTNERSHIP. OPPORTUNITY. RESPONSIVENESS. SAFETY



February 16, 2018

J024691.01 Revision No. 2

Mr. Brian Eads, P.E., PTOE Crawford, Murphy & Tilly, Inc. One Memorial Drive, Suite 500 St. Louis, Missouri 63102

SUBSURFACE EXPLORATION DAVID HOEKEL PARKWAY PHASE 2A, B, & C WENTZVILLE, MISSOURI

Dear Mr. Eads:

Presented in this report are the results of a subsurface exploration performed for the referenced project. This report includes our project understanding, observed site conditions, conclusions and/or recommendations, and support data as given in the Table of Contents.

It has been our pleasure to provide these geotechnical services to you, and we would welcome the opportunity to provide other services during the course of the project. Please contact us if you need further information or clarification about this document.

Very truly yours,

GEOTECHNOLOG Brian J. Sanders, P.E Project Manager BJS/CKK/JAW:bjs/ccg Copies submitted: (2) hardcopies + pdf

Craig K. Kaibel, P.E. Specialty Testing Manager

SUBSURFACE EXPLORATION DAVID HOEKEL PARKWAY PHASE 2A, B, & C WENTZVILLE, MISSOURI

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SUBSURFACE EXPLORATION DAVID HOEKEL PARKWAY PHASE 2A, B, & C WENTZVILLE, MISSOURI

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SUBSURFACE EXPLORATION DAVID HOEKEL PARKWAY PHASE 2A, B, & C WENTZVILLE, MISSOURI

SECTION I - EXECUTIVE SUMMARY

The executive summary is provided solely for the purpose of overview, and a number of details are omitted, any one of which could be crucial to the proper application of this report. Any party who relies on this report must read the full report.

- The project includes design and construction of a new interchange from the planned Interstate Drive extension to Goodfellow Road in Wentzville, Missouri as part of the proposed David Hoekel Parkway. The proposed interchange will include four paved lanes, a new bridge over I-70 (A8514) and a new bridge over the Norfolk Southern Railroad (A8512) to the south of I-70, three associated MSE walls (A8513, A8515, and A8516) for grade separation, and other appurtenances.
- Site soil is comprised of overburden consisting of a cap of cohesive soil underlain by alternating layers of sand and silt or silty clay (i.e., glacial till) to the limestone bedrock. Fill is present in Boring B-821 to a depth of approximately 6 feet. The fill consists of brown silty clay with gravel.
- Groundwater was observed in six of the 77 borings during drilling at depths of approximately 32 to 45 feet (i.e. approximately El 630.0¹ to El 624.5).
- The bridges may be supported on rock bearing driven piles and drilled shafts. Geotechnical design recommendations are provided herein and are in accordance with the Missouri Department of Transportation's (MoDOT) Engineering Policy Guide (EPG).
- Settlement estimates for mechanically stabilized earth (MSE) retaining walls and embankments are included herein.

¹ Elevations herein are in feet and refer to the NAVD 88 datum.

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- Global stability analyses were performed on typical sections of the retaining walls based on assumed grid lengths. Results are included herein.
- Based on MoDOT's Table 321.1 Guide for Selection of Slope Inclination for Routine Design, fill side slopes may be as steep as 1V:2.5H for low plasticity clay and 1V:3H for high plasticity clay. Spill slopes less than 20 feet in height may be as steep as 1V:2H for low plasticity clay, spill slopes greater than 20 feet in height may be as steep as 1V:2.5H.
- In accordance with the procedures of the 2012 edition of the AASHTO LRFD Bridge Design Specifications, the bridge site may be seismically classified as Site Class D (Stiff Soil).

SECTION II - PROJECT DATA

AUTHORIZATION

The services documented in this report were provided in general accordance with our proposal P024691.01 and revised cost estimate dated May 26, 2016, and the MoDOT's EPG. The project was authorized by Crawford, Murphy & Tilly's Subcontract agreement dated September 2, 2015.

PURPOSE AND SCOPE OF SERVICES

The purpose of our services was to develop recommendations for geotechnical aspects of the design and construction of the project as described in our proposal. Briefly, services consisted of site reconnaissance, drilling 77 borings, laboratory testing, engineering analyses, and preparation of this report. Important information prepared by The Geotechnical Business Council for studies of this type is presented in Appendix A for your review.

PROJECT AND SITE DESCRIPTION

The project includes design and construction of a new interchange from the planned Interstate Drive extension to Goodfellow Road in Wentzville, Missouri as part of the proposed David Hoekel Parkway. The proposed interchange will include four paved lanes, a new bridge over I-70 (A8514) and a new bridge over the Norfolk Southern Railroad (A8512) to the south of

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I-70, three associated MSE walls (A8513, A8515, and A8516) for grade separation, and other appurtenances. The site is approximately 4.3 miles west of the intersection of Interstates 64 and 70. The site location and general topography of the area as per 2012 U.S.G.S. map of the vicinity are shown on Plate 1. Bridge A8514 will be single-span, approximately 125 feet long, 65 feet wide and will be located over I-70. Bridge A8512 will be three-span, approximately 210 feet long, 76 feet wide, and will be located over the Norfolk Southern Railroad. Approach embankments are anticipated to be approximately 25 to 35 feet high and extend approximately 300 to 1,300 feet in length. In addition, we understand the south embankment, north embankment, and Wall A8546 are planned to be constructed as part of a pregrading package. The pregrading package will allow the embankments to settle prior to the bridge and approach slab construction and paving.

We understand that the intermediate and end bents are planned to be supported on either drilled shafts or driven piles. The load-and-resistance factor design (LRFD) method will be used to design the structures in accordance with AASHTO LRFD Bridge Design Specifications (2012) and MoDOT's EPG.

SECTION III - FIELD EXPLORATION AND LABORATORY TESTING

FIELD EXPLORATION

The field exploration consisted of drilling 77 borings, designated as Borings B-1 through B-20, Borings B-101 through -103 (Bent 1), B-201 through -203 (Bent 2), B-301 through -303 (Bent 3), B-401 through -403 (Bent 4) for Bridge A8512, Borings B-501 through -503 (Bent 1) and B-601 through B-603 (Bent 2) for Bridge A8514, Borings B-701 through B-722 for Wall A8513, Borings B-801 through B-821 for Wall A8515, Borings B-901 and B-902 for Wall A8516 and seven pavement cores designated as PC-1 through PC-7 at the approximate locations shown on Plates 2, 3 and 4. Borings B-102, -202, -203, -302, -502, and -602 were not drilled due to access issues or consistent bedrock elevations and are shown on Plates 2, 3, and 4. The borings were located in the field by the project surveyor and the northing, easting, and surface elevation of each boring were provided to Geotechnology. However, some of the borings were moved slightly due to access and possible utilities. The station and offset for these borings has been adjusted to reflect the as drilled locations and are presented on the boring logs. Geotechnology estimated the surface elevations of the relocated borings. The surveyed or estimated elevations and stationing at the boring locations are shown on the boring logs, which are included in Appendix B.

The borings were drilled to auger refusal using CME 55LC, 55TRK, and 750X rotary drill rigs equipped with hollow stem augers. Borings B-401, -402, -501 were advanced with mud rotary techniques from depths of approximately 40, 40, and 20 feet, respectively. Standard penetration tests (SPTs) were performed using an automatic hammer. Split-spoon samples and relatively undisturbed Shelby tube samples were obtained at the depths indicated on the boring

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logs presented in Appendix B. Rock was cored in six of the bridge bent borings using double-tube NQ2 wireline methods. Rock core photographs are included in Appendix C. A legend of the terms and symbols used on the borings and rock core descriptions are included in Appendix B.

Geologists and engineers from Geotechnology provided direction during field exploration, observed drilling and sampling, assisted in obtaining samples, and prepared logs of the material encountered. The boring logs represent conditions observed at the time of exploration, and have been edited to incorporate results of the laboratory tests.

Unless noted on the boring logs, the lines designating the changes between various strata represent approximate boundaries. The transition between materials could be gradual or could occur between recovered samples. The stratification given on the boring logs, or described herein, is for use by Geotechnology in its analyses and should not be used as the basis of design or construction cost estimates without realizing that there can be variation from that shown or described.

The boring logs and related information depict subsurface conditions only at the specific locations and times where sampling was performed. The passage of time can result in changes in conditions, interpreted to exist, at or between the locations where sampling was conducted.

LABORATORY TESTING

Laboratory testing was performed on the soil samples to estimate engineering and index properties. Moisture content and Atterberg limits tests were performed on selected cohesive soil samples. Unconsolidated undrained and consolidated undrained triaxial compression tests and consolidation tests were performed on selected Shelby tube samples. Grain size analyses and percent passing No. 200 sieve tests were performed on selected samples. Unconfined compression tests were performed on rock core samples from Borings B-201 and B-303. Index laboratory test results are presented on the boring logs in Appendix B. Swell tests were performed on five samples. Rock Core unconfined compression test results are summarized in Table 1, swell test results are summarized in Table 2, and remaining laboratory test results are provided in Appendices E, F, G, H, and I.

SECTION IV - SUBSURFACE CONDITIONS

STRATIGRAPHY

The pavement section consists of approximately 6 to 15 inches of asphalt. Exceptions are pavement cores at PC-4 and PC-6. In Pavement Cores PC-4 and PC-6, 3.5 to 4.5 inches of concrete is present beneath the asphalt pavement. The pavement section thickness at each boring location is summarized in the following table.

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THICKNESS OF PAVEMENT MATERIALS					
Core Location	Asphalt (in.)	Concrete (in)			
PC-1	7	-			
PC-2	8	-			
PC-3	6	-			
PC-4	6	3.5			
PC-5	6	-			
PC-6	7	4.5			
PC-7	15	-			

The soil overburden consists of a cap of cohesive soil underlain by alternating layers of sand and silt or silty clay (i.e., glacial till) to the refusal depths. Fill is present in Boring B-821 to a depth of approximately 6 feet. The fill consists of brown silty clay with gravel. Soft to stiff, occasionally very stiff, brown and gray, silty clay and clay is present in all borings. The thickness of the silty clay and clay stratum varies between approximately 13 to 52 feet. The interbedded layers of sand and silt or silty clay are typically medium dense to dense and medium stiff to stiff, with thicknesses that vary from 5 to 15 feet.

Auger refusal was encountered in all of the bridge bent borings between depths of approximately 81 to 89 feet (El 589.0 to El 574.0). Drill rig augers can often penetrate several feet into soft or broken rock, and therefore these elevations do not necessarily represent top of rock. Rock generally consists of moderately hard to hard, gray, finely crystalline, thin to thick bedded limestone. Core recovery in the bedrock ranges between 0 and 100 percent but are typically above 25 percent. Rock Quality Designation (RQD)² values are between 0 to 87 percent, but are typically above 25 percent, which is indicative of poor quality rock. Poor recovery and RQD were observed in various runs in each boring. The unconfined compressive strength of the representative limestone rock samples ranged between approximately 880 and 3,300 kips per square foot (ksf).

GROUNDWATER

Groundwater was observed in eight of the 77 borings during drilling at depths of approximately 32 to 45 feet (approximately El 630.0 to El 624.5). Borings B-402, -403, and -501 were completed with mud rotary techniques, which introduce drilling fluid into the borehole, and as such mask groundwater depths below the depth mud rotary techniques begin. Groundwater levels shown on the boring logs might not have stabilized before backfilling, which is typical in less permeable cohesive soil. Consequently, the indicated/lack of observed groundwater levels might not represent present or future levels. Groundwater levels can vary significantly over time due to the effects of seasonal variation in precipitation, recharge, or other factors not evident at the time of exploration. Groundwater often occurs near the top of bedrock.

² RQD is the percentage of intact rock core pieces longer than 4-inches in the total length of the core run.

Free water can be trapped in permeable zones of fill and in utility trenches backfilled with clean rock. Excavations that remain open could collect water.

SECTION V - DESIGN CONSIDERATIONS AND RECOMMENDATIONS

We understand that the intermediate and end bents are planned to be supported on either drilled shafts or driven piles. Design recommendations for both foundation systems are provided herein. We have assumed for design purposes that this bridge will be classified as a bridge on a minor road.

High plasticity soil was encountered at roadway subgrade in 17 of the initial 20 borings which focused on the roadways. High plasticity soil should be remediated within 1 foot of pavement subgrade as discussed herein.

DRILLED SHAFTS

<u>Axial Resistance</u>. The nominal unit side resistance (q_s) of rock sockets constructed in slightly weathered to fresh limestone is 22.5 kips per square foot (ksf). A geotechnical side resistance factor (ϕ_{qs}) of 0.46 may be used in the rock socket design. Side resistance in highly weathered rock should be ignored. We also recommend ignoring the resistance for the upper two feet of competent rock for rock socket design. The two feet of rock, however, should be included in the length of the rock socket. The minimum rock socket length should be greater than the diameter of the shaft and shall be measured from the anticipated tip of the casing.

At shaft locations where end-bearing resistance will also be considered, the factored shaft resistance is equal to the summation of the following: (1) the rock socket surface area multiplied by the factored unit side resistance value and (2) the end area of the shaft multiplied by the factored unit tip resistance. The nominal unit tip resistance (q_p) of drilled shafts bearing a minimum 3 feet below the top of rock in competent limestone is 370 ksf. The drilled shaft design may be based on a geotechnical unit tip resistance factor (ϕ_{qp}) of 0.42.

The axial resistance is based on the inherent strength of the intact rock and on the influence of jointing, fracturing, and weathering. In addition, axial resistance greatly depends on the cleanliness of the rock socket and bottom of the drilled shaft prior to concrete placement, and the integrity of the concrete after concrete placement. Drilled shaft construction and testing shall be performed in accordance with Missouri Standard Specifications for Highway Construction Section 701 - Drilled Shafts. We recommend contingency funds to extend the shafts deeper in the event voids (e.g., Boring B-303) are encountered in the foundation inspection holes within 10 feet below the anticipated bottom of the shafts. In accordance with MoDOT EPG 751.37.1.3, permanent casing is required. The casing should be socketed approximately 1 foot into

competent rock. A summary of the elevation ranges for recommended shaft side friction and tip resistance are presented by bent/boring in the following table.

DRILLED SHAFT SUMMARY							
Bent	Relevant Boring	Ground Surface Elevation (msl-ft)	Anticipated Tip of Casing (msl-ft)	Elevation Range for Tip Resistance (msl-ft)	Elevation Range for Side Friction (msl-ft)*		
Bent 2	B-201	674.0	577.0	573.5-561.5	576.0 - 561.5		
Dant 2	B-301	668.2	583.7	**	**		
Bent 3	B-303	665.0	575.5	565.0-556.0	573.5 - 556.0		

* Based on field rock socket inspection, side friction should not be counted in areas where voids are present and/or where rock is only partially present along the sidewall of the shaft.

** Rock Coring not performed

<u>Uplift Resistance</u>. Uplift resistance for drilled shafts bearing in rock may be computed considering the following: (1) buoyant weight of concrete, (2) factored unit side resistance between the concrete and the rock. The nominal unit uplift resistance (q_{sup}) for rock sockets constructed in slightly weathered to fresh limestone is 22.5 ksf. The geotechnical uplift resistance factor (ϕ_{qsup}) may be calculated by reducing the recommended axial unit side resistance factor (i.e., 0.46) by 10 percent (i.e., 0.42). The top two feet of rock should not be included in the uplift resistance calculations.

<u>Settlement</u>. Settlement of drilled shafts may be approximated based on the magnitude of factored loads relative to the magnitude of factored side and tip resistance. MoDOT EPG 751.37.4.1 provides guidance on estimation of drilled shaft settlement based on the shaft diameter, factored load, factored side and end-bearing resistances, and factored elastic compression.

DRIVEN PILES

<u>Axial Resistance</u>. Piles driven to rock must be fitted with a cast steel driving shoe or point. The preliminary nominal axial resistance for piles driven to rock is controlled by the structural limit state of the pile or pile driveability, whichever is less. Therefore, for fully embedded piles, the structural limit state for piles loaded in compression is f_yA_s and the structural resistance factor to calculate the maximum factored resistance is 0.5 (i.e., φ_c).

The nominal axial resistance required for field verification may be calculated by dividing the factored resistance per pile, which equals the factored load per pile, by the appropriate resistance

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factor (i.e., $\varphi dyn=0.65$, 0.5, and 0.4 for high-strain dynamic testing, wave equation analysis, and modified Gates formula, respectively). In general, the required nominal axial resistance should be limited to 0.65 fyAs to reduce pile driving stresses unless a preconstruction wave equation analysis is performed during design. If less than five piles are in the group, the resistance factor should be reduced by 20 percent. We recommend the center-to-center spacing of piles not be less than 30 inches or 2.5 pile diameters, whichever is greater.

<u>Settlement</u>. Based on our experience, settlement of pile foundations, designed and constructed in accordance with MoDOT EPG 751.36 and the recommendations given in this report, is expected to be 0.5-inch or less. However, elastic compression of the piles should be evaluated by the structural engineer.

<u>Uplift Resistance</u>. The nominal uplift resistance (R_s) for a single steel H-pile, based on the SPT-method, is 0.9 ksf applied over the perimeter or "box" area. The factored uplift resistance may be determined using a resistance factor (ϕ_{up}) of 0.25. The upper 3 feet of the pile or predrilled/cased portion, whichever is greater, should be ignored when determining the uplift resistance. If less than five piles are in the group, the resistance factor should be reduced by an additional 20 percent.

<u>Downdrag</u>. Embankment/wall construction at the abutments will result in negative skin friction (i.e., downdrag) on the piles due to the settlement of the underlying cohesive soil. Downdrag occurs as the soil strata move downward relative to the foundations due to settlement of the surrounding soil layers. The AASHTO Bridge Design Specifications suggest that settlement of 0.4-inch or greater could produce downdrag on deep foundations. MoDOT EPG 751.37.1.4 states that downward movements of 0.1- to 0.5-inch are enough to mobilize full downdrag in drilled shafts.

Based on our settlement analysis, this corresponds to downdrag potentially acting on piles down to El 607 based on the AASHTO criteria and ranging from El 611 to 597 based on the MoDOT criteria.

We recommend installing a casing/sleeve around the pile through the wall backfill and backfilling the casing/sleeve with loose sand after pile driving to reduce the downdrag load. Predrilling the piles through the embankment and/or natural soil and backfilling with loose sand after pile driving may also be performed to reduce the downdrag load. The cased or sleeved portion of the pile must subsequently be ignored for uplift resistance. Downdrag loads should be included in the design of piles using a load factor between 0.25 and 1.4, and calculated using a nominal load of 0.9 ksf applied over the perimeter or "box" area of the pile below the casing or sleeve and to El 607.

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<u>Construction Considerations</u>. Based on the provided borings, we anticipate the piles will be driven to refusal on limestone bedrock. A summary of the anticipated pile refusal elevations is presented by boring in the following table.

PILE REFUSAL SUMMARY						
Boring Number	Ground Surface Elevation (msl-ft)	Top of Rock Elevation (msl-ft)	Anticipated Pile Refusal Elevation (msl-ft)			
B-101	674.3	579.8	579.5			
B-103	670.5	582.5	581.0			
B-401	669.9	588.9	588.0			
B-402	666.5	584.5	584.0			
B-403	663.0	574.0	573.5			
B-501	664.9	585.9	585.0			
B-503	662.6	577.6	577.0			
B-601	663.6	575.1	574.5			
B-603	661.9	575.9	573.0			

LATERAL RESISTANCE OF DEEP FOUNDATIONS

The lateral resistance of drilled shafts and driven piles depends on the shaft/pile lengths and diameters, and the near-surface soil types. The lateral resistance of drilled shafts and driven piles may be computed using a computer program, such as LPILE. This program is used to estimate the shaft/pile deflection by varying the shaft/pile size for <u>factored</u> axial and lateral loads. Per MoDOT EPG 751.37.5, design lateral movements of drilled shafts should not exceed approximately 1.5 inches at the top of the shaft. The following tables list soil and rock parameters that may be used in LPILE.

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SOIL PARAMETERS FOR STATIC LATERAL LOAD ANALYSIS								
Soil Type	Soil Model	Cohesion (psf)	Strain Parameter ε50	Soil Modulus Parameter, k (pci)	Effective Unit Weight (pcf)	Internal Angle of Friction, Φ (deg)		
Predrilled/Cased Backfill with Sand	Sand			25	120	30		
Existing Fill/Soft Silty Clay	Soft Clay	500	0.02		115			
Medium Stiff Silty Clay/Clay	Soft Clay	1,000	0.011		58			
Stiff to Very Stiff Silty Clay/Clay	Stiff Clay without Free Water	1,500	0.016		68			
Sand	Sand			125	60	30		

ROCK PARAMETERS FOR STATIC LATERAL LOAD ANALYSIS								
Rock Type	Soil Model	Effective Unit Weight (pcf)	Moist Unit Weight (pcf)	Young's Modulus, Er (psi)	Uniaxial Compressive Strength (psi)	RQD (Percent)	k _{rm}	
Moderately Weathered to Fresh Rock	Strong Rock	98	160	n/a	10,000	n/a	n/a	

The effects of group interaction must be taken into account when evaluating lateral movement of drilled shaft/pile groups. P-multipliers may be used to reduce the lateral resistance of single drilled shaft/pile to account for group effects. P-multipliers should be applied to shaft/pile assemblages with spacings less than five shaft/pile diameters. P-multipliers are provided in Table 10.7.2.4-1 in the AASHTO LRFD Bridge Design Specifications (2012). Alternatively, the lateral resistance of drilled shaft assemblages may be evaluated using the GROUP software.

SITE GRADING

Site grading and fill placement should be performed in accordance with Sections 201 through 213 of the Missouri Standard Specifications for Highway Construction. Soft soils are present to a depth of approximately 3 feet along wall A8513 at Borings B-705, -708, -712, and -720.

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<u>Treatment of High Plasticity Soil</u>. Based on the boring data, high plasticity soil will be encountered at or near roadway subgrade. High plasticity soil below the roadway should be removed and replaced as recommended herein to a minimum depth of 1 foot below the proposed roadway subgrade elevation. The overexcavation may be backfilled with low plasticity soil (liquid limit less than 45 percent), excavated high plasticity material stabilized by incorporating hydrated lime, or well-graded, crushed rock. Funds should be provided in the construction budget for remedial treatment of high plasticity clay.

Should lime stabilization be selected for clay treatment, the appropriate dosage should be determined by laboratory testing. Rates of 4 and 6 percent hydrated lime can be used for budget purposes.

<u>Suitable Fill Materials For Embankment Construction</u>. Fill materials should consist of low plasticity, cohesive soils or well-graded granular materials. Acceptable fill soils include non-organic materials designated CL, ML, CL-ML, and GW by ASTM D 2487.

MSE WALLS

MSE retaining walls are planned for grade separation at Ramps 3 and 4 (A8513 and A8515) and at the north abutment (A8516) of the proposed David Hoekel Parkway. Based on provided data, the height of Walls A8513, A8515, and A8516 will vary from 6 to 37 feet, 6 to 38 feet, and 6 to 26 feet, respectively. It is our understanding that the MSE wall design will be performed by others.

The following geotechnical parameters may be used for design of the MSE walls.

- For the natural soil and compacted fill below the wall, friction angles of 28 and 30 degrees, respectively and cohesion of 20 and 30 psf, respectively, may be used for long term conditions. Undrained shear strengths 1,000 and 1,500 pounds per square foot (psf), respectively, may be used for short term conditions.
- MSE walls may be designed to bear on firm, natural soil or new, compacted fill using a maximum net allowable bearing pressure of 5,500 psf.
- A minimum wall embedment of 2-feet is recommended.
- The geogrid lengths used in the global stability analysis described below to obtain a satisfactory factor of safety should be incorporated into the design.

For Wall A8516, we recommend, that the soil beneath the wall and backfill zone be removed to a depth of 5 feet and replaced with compacted MODOT type 5 aggregate to reduce the differential settlement along the wall.

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Ground improvement (i.e. stone columns) will be required for walls over 15 feet in height for Walls A8513 and A8515.

GLOBAL STABILITY ANALYSIS

Global stability analyses were performed for typical wall sections at the locations shown on Plate 3 (Section AA', BB', and CC'). The typical sections were analyzed assuming 26- to 37-foot high MSE walls. The preliminary grid lengths behind the walls were assumed as 18- to 27-feet (i.e., 0.7H). The backfill within the reinforced zone was assumed to be select granular backfill material. The soil properties used in our analyses are based on the laboratory tests, our experience, and are summarized in the following table. The analyzed sections with critical failure arcs are presented in Appendix D.

SOIL PROPERTIES FOR GLOBAL STABILITY ANALYSIS						
Soil Type	Density (pcf)	Cohesion (psf)	Friction Angle (°)			
Clay	120	30	28			
Improved Soil	125	30	30			
Select Granular Fill	130	30	34			
Silty Clay	115	20	28			
Silt	115	20	26			

The analyses were performed using allowable stress design methods. Selected embankment/wall sections were analyzed for long-term, drained conditions. Groundwater was assumed to be present at a depth of approximately 40 feet, below existing grade. A surcharge load of 240 psf was included in the analysis to account for the traffic load on the approaches as per MoDOT EPG 751.2.1.3. The Morgenstern-Price procedure was used to compute the factor of safety. The computer program SLOPE/W was used to perform the computations. The calculated factors of safety at typical wall sections are summarized in the table below:

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SLOPE STABILITY ANALYSIS RESULTS								
Embankment/ Wall Section	Station	Embankment/ Wall Height (ft)	Grid Length (ft)	Wall Key Depth (ft)	Factor of Safety			
AA'	$\frac{65{+}00.00{-}}{67{+}00.00{-}}$	28	NA	NA	1.5			
BB' A8513	138 + 50.00	30	21	2	1.5			
BB' A8515	138 + 50.00	38	27	2	1.6			
CC' A8516	69+60.00	22	15	2	1.6			

MoDOT requires a minimum factor of safety of 1.5 for long-term stability. Our analyses indicate that the factors of safety for the wall sections with the assumed grid lengths are satisfactory. Therefore, the wall sections as a minimum should include geogrid lengths equal to or greater than that shown in the table above.

SLOPES

The stability of a slope depends on many factors, including slope geometry, slope height, soil type, and surface pressures. Based on MoDOT's Table 321.1 Guide for Selection of Slope Inclination for Routine Design, fill side slopes may be as steep as 1V:2.5H for low plasticity clay and 1V:3H for high plasticity clay. In addition, spill slopes less than 20 feet in height may be 1V:2H. Spill slopes greater than 20 feet in height may be 1V:2.5H.

EMBANKMENT/WALL BACKFILL SETTLEMENT

Settlement estimates were performed for the new embankments and ramps and are provided in the following table. The estimated settlements are presented for unimproved ground and are based on the provided plans, boring logs, limited consolidation testing, correlation with consolidation properties, Settle 3D computer software modeling, and our experience. Settle 3D analysis plots without ground improvement in the model are presented in Appendix J.

In general, compression of the embankment soils could be on the order of 1 to 3% of the embankment height. We anticipate the compression of the embankment soil will occur quickly, however, consolidation of the saturated natural cohesive soils will occur relatively slowly.

We used Settle 3D to estimate the rate and magnitude of settlement for the embankments, walls and ramps. Plots with ground improvement in the model are presented in Appendix K. We estimated a 25 percent reduction in total settlement due to the installation of stone columns beneath Walls A8513 and A8515 in excess of 15 feet in height and the associated grid behind the walls.

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SETTLEMENT SUMMARY										
Embankment/Wall	Unit Weight	Stress	Estimated Settlement* (in)							
Fill Height (ft)	of Backfill (lb/ft ³)	Increase (lb/ft ²)	South Embankment Sta 65+50	Wall A8513 (south)	Wall A8515 (north)	Wall A8516				
5		650	1.7	2.4	1.6	1.7				
10		1,300	3.0	3.1	1.8	3.0				
15		1,950	4.5	3.9	1.9	4.0				
20	120	2,600	6.0	5.1	3.6	6.0				
25	130	3,250	8.3	6.5	4.6	6.0				
30		3,900	11.2	8.3	5.7	NA				
35		4,160	NA	8.5	6.9	NA				
38		5,200	NA	NA	9.2	NA				

* Settlement estimates are based on unimproved ground

<u>Pregrading</u>. The south embankment, north embankment and Wall A8516 will be constructed as part of a pregrading package with the intent to allow the embankments and wall time to settle prior to construction and paving.

The south embankment is planned to be constructed to the railroad right-of-way and sloped at approximately a 1V:2H away from the railroad right-of-way. If the south embankment is allowed to settle for approximately 12-months, we anticipate approximately 7- of the 11-inches of total settlement to occur.

The north embankment Ramps 1 and 2, and Wall A8516 are planned to be constructed. If the north embankment and are constructed per design, and allowed to sit for approximately 12 months, we anticipate approximately 4- of the 6-inches of total settlement along the wall occurring, and approximately 6- of the 9-inches of total settlement for the north embankment occurring over the 12-month time period.

<u>Settlement Monitoring</u>. The magnitude and rate of settlement of the overburden induced by the weight of engineered fill should be monitored. Methods used to monitor settlement include settlement plates and pore pressure measurement devices. We recommend using Section 204-Embankment Monitoring of the Missouri Standard Specifications for Highway Construction for settlement monitoring and construction sequencing. In our professional opinion, vibrating wire pore pressure transducers are an acceptable alternative to the pneumatic devices described in Section 204. In our opinion, pore pressure measuring devices are not needed in areas of ground improvement.

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SEISMICITY AND LIQUEFACTION

In accordance with AASHTO LRFD Bridge Design Specifications, a summary of the seismic site class, mapped peak ground acceleration (PGA), mapped acceleration coefficients (i.e., S_s and S_1), design response spectrum coefficients (i.e., A_s , S_{DS} and S_{D1}), and seismic zone for the bridge are provided in the following table. The accelerations given herein correspond to a seismic event with a seven percent probability of not being exceeded in 75 years.

SEISMIC DESIGN PARAMETER SUMMARY									
Seismic Site Class	PGA (g)	Ss (g)	S ₁ (g)	As (g)	S _{DS} (g)	S _{D1} (g)	Seismic Zone		
D									
(Stiff Soil)	0.102	0.227	0.075	0.163	0.363	0.181	2		

Liquefaction. Sand layers are present at the project site (e.g., Borings B-301, B-404, and B-502). Based on our analyses³, it appears that these zones of sand have a factor-of-safety (FOS) less than 1.3 and should be considered potentially liquefiable per MoDOT's Engineering Policy Guide. The FOS against liquefaction was calculated using the Liquefaction Analysis spreadsheet developed and provided by IDOT. Soil layers with an FOS less than 1.0 and soil layers with a FOS between 1.0 and 1.3 are presented in the table below.

LIQUEFACTION ANALYSIS RESULTS						
Boring Depth Interval with FOS<1.0 Against Liquefaction (feet)		Depth Interval with 1.0 <fos<1.3 against<br="">Liquefaction (feet)</fos<1.3>				
B-101	N/A	47 to 53				
D 401	43 to 47	N/A				
D-401	N/A	47 to 53				
D 502	N/A	37 to 43				
D-303	N/A	47 to 53				
B-603	N/A	37 to 43				

³ Idriss, I. M., and Boulanger, R. W. (2008). "Soil Liquefaction during Earthquakes." Earthquake Engineering Research Institute, MNO- 12.

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SECTION VI – RECOMMENDED ADDITIONAL SERVICES

The conclusions and recommendations given in this report are based on: the understanding of the proposed design and construction outlined in this report; site observations; interpretation of the exploration data; and Geotechnology's experience. The client must recognize that variations may occur from conditions observed in the borings, particularly within existing fills or previously developed areas. Design recommendations are based on data from borings, sampling, and related procedures. Actual subsurface conditions may vary from those encountered in the borings; such variations may be gradual, abrupt, and/or nonlinear. Therefore, design recommendations are subject to adjustment in the field based on subsurface conditions is best understood by Geotechnology, it is imperative to involve Geotechnology in the final design and construction process. Construction observation services are viewed as a continuation of the design process. Geotechnology will not be responsible for improper use of recommendations or failure by others to recognize conditions that may be detrimental to the successful completion of the project or its performance.

We recommend that Geotechnology be retained to review the project plans and specifications to observe that recommendations given in this report have been correctly implemented. We recommend that Geotechnology be retained to participate in prebid and preconstruction conferences to reduce the risk of misinterpretation of the conclusions and recommendations in this report relative to the proposed construction of the subject project.

On-site services are required during site grading since placement techniques can significantly impact performance of the completed project. Foundation and floor slab subgrades should be observed before placing concrete or base course, respectively, to establish that the soil conditions are consistent with conditions encountered during the field exploration. Construction observation is intended to enhance compliance with project plans and specifications. It is not insurance, nor does it constitute a warranty or guarantee of any type. Regardless of construction observation, contractors, suppliers, et al. are solely responsible for the quality of their work and for adhering to plans and specifications.

SECTION VII - LIMITATIONS OF REPORT

This report has been prepared on behalf of and for the exclusive use of the client for specific application to the named project as described herein. If this report is provided to other parties, the report should be provided in its entirety with all supplementary information. In addition, the client should make it clear that the information is provided for factual data only and not as a warranty of subsurface conditions included in this report. Unanticipated soil or rock conditions may require the expenditure of additional funds to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

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Geotechnology has attempted to conduct the services reported herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. The recommendations and conclusions contained in this report are professional opinions. The report is not a bidding document and should not be used for that purpose.

Unless specifically stated in our proposal or this report, the scope of our services for this phase of the project did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors noted or unusual or suspicious items or conditions observed are strictly for the information of our client. Our scope did not include: any services to investigate or detect the presence of mold or any other biological contaminants (such as spores, fungus, bacteria, viruses, and the by-products of such organisms) on and around the site; or any services, designed or intended, to prevent or lower the risk of the occurrence of an infestation of mold or other biological contaminants.

The analyses, conclusions, and recommendations contained in this report are based on the data obtained from the subsurface exploration. The field exploration methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Discrete sampling cannot be relied on to accurately reflect natural variations in stratigraphy that may exist between sample locations and/or intervals. Unless specifically noted, the scope of our services did not include an assessment of the effects of flooding and natural erosion of creeks or rivers adjacent to or on the project site.

The recommendations included in this report have been based in part on assumptions about natural variations in site stratigraphy that may be evaluated further during earthwork and foundation construction. Accordingly, Geotechnology should be retained to perform construction observation and continue its geotechnical engineering service using observational methods. Geotechnology cannot assume liability for the adequacy of its recommendations when they are used in the field without Geotechnology being retained to observe construction.

The conclusions or recommendations presented in this report should not be used without Geotechnology's review and assessment if the nature, design, or location of the facilities is changed, if there is a substantial lapse in time between the submittal of this report and the start of work at the site, or if there is a substantial interruption or delay during work at the site. If changes are contemplated or delays occur, Geotechnology must be allowed to review them to assess their impact on the findings, conclusions, and/or design recommendations given in this report. Geotechnology will not be responsible for any claims, damages, or liability associated with any other party's interpretations of the subsurface data or reuse of the subsurface data or engineering analyses in this report without our express written authorization.

TABLE 1

ROCK UNCONFINED COMPRESSION TEST SUMMARY									
Boring No.	San	nple	Uniax Compre Stren	vial essive gth	Unit Weight	Type of			
	Depth (ft)	Elevation (msl)	(psi)	(ksf)	(pcf)	KOCK			
	96.5	577.5	6,132	883	159	Limestone			
	101.5	572.5	20,686	3,005	168	Limestone			
B-201	103.7	570.3	18,099	2,606	168	Limestone			
	104.7	569.3	22,632	3,259	164	Limestone			
	107.4	557.6	22,911	3,299	169	Limestone			
	93.7	571.3	10,851	1,563	161	Limestone			
D 202	103.4	561.6	10,252	1,476	155	Limestone			
B-303	110	555	10,291	1,482	167	Limestone			
	112.1	552.9	18,050	2,599	166	Limestone			

TABLE 2

SWELL TEST SUMMARY									
Boring No.	Sample Depth (ft)	Soil Type	Liquid Limit	Plastic Limit	Swell Pressure (tsf)	Swell Strain (%)			
В-2	3 to 5	High Plasticity Clay - CH	54	18	0.75	3.54			
B-5	1 to 3	High Plasticity Clay - CH	53	19	0.20	0.89			
B-10	1 to 3	High Plasticity Clay - CH	73	23	0.81	1.63			
B-11	3 to 5	Silty Clay - CL	39	17	0.03	0.17			
B-16	1 to 3	Silty Clay - CL	47	17	0.25	0.78			
B-18	3 to 5	High Plasticity Clay - CH	84	21	1.42	3.9			
B-103	3 to 5	High Plasticity Clay - CH	79	23	1.00	1.00			
B-303	18 to 20	High Plasticity Clay - CH	68	21	1.40	1.50			
B-720	3 to 5	High Plasticity Clay - CH	95	22	0.70	0.50			
B-809	3 to 5	High Plasticity Clay - CH	81	21	1.10	1.90			





NOTES

- Plan adapted from "2015 Aerial Imagery for the St. Louis Region" supplied by East-West Gateway Council of Governments and drawings prepared by CMT.
- 2. Borings were located in the field by the project surveyor.

LEGEND

- Boring Location Completed
- Boring Location Not Completed
- P

Probe Boring Location Pavement Core Location 0





NOTES

- Plan adapted from "2015 Aerial Imagery for the St. Louis Region" supplied by East-West Gateway Council of Governments and drawings prepared by CMT.
- 2. Borings were located in the field by the project surveyor.

P

- Boring Location Completed
- Boring Location Not Completed
- Probe Boring Location

Global Stability Cross-Section Locations









APPENDIX A

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one* — *not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a lightindustrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot* accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmationdependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, but preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/ or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnicalengineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the express purpose of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.



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APPENDIX B

LOGS OF BORINGS BORING LOG: TERMS AND SYMBOLS ROCK CORE DESCRIPTIONS

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	Medium stiff to very stiff, orangish-brow	N CLAY - CH	2-3-4	SS1			
- 5-			2-4-5	SS2			
			2-4-5	SS3			
- 10-			4-5-7	SS4			
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APPR.	- 20-	-									
GRA		-							.		
SENT DUAL.		-							. .		
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PARI			ΔΤΔ	חסוו ו ואכ				Drawn by: AGB	Ch	ecked by: BJS	App'vd. by: CKK
JEKEL						N OTEL		Date: 4/15/2016	Da	te: 1/24/2017	Date: 1/24/2017
/ID HC	ENC		DRILLING	AUGER <u>33/4"</u>					GF	OTECHN	OLOGYZ
- DAV				BLS DRILLER D	WJ LC					- • •• •• • • • • • • F	ROM THE GROUND UP
91.01				<u></u> <u></u> <u></u> <u>CME 55TRK</u> D	RILLR	IG			avid L	lookol Park	wav
J0246				HAMMER TYP	E <u>Auto</u>	<u>)</u>			Phase	e 2A, B, and	
2 WL	HAMMER EFFICI					<u>38_</u> %		\V	Ventz	ville, Misso	Duri
JRING 200	RE	MARKS: Sta 98+00.(JU					L	.0G (OF BORING	: B-2
G OF BC								Pro	oject	No. J024	691.01
Ō									.,		

ſ		659.4	122/2046	÷ D		SH	EAR STRENGTH	l, tsf		
	Surfa	ace Elevation: <u><u><u></u><u></u> Completion Date: <u></u></u></u>	<u>්දු 3/2016</u> 	T (po NTS //RQ		∆ - UU/2	○ - QU/2	🗆 - SV		
		Datum:	ΓŌ	ER/OH	ËS	0.5	1,0 1,5 2	2,0 2,5		
	표표			NIT WE BLOW C RECOV	SAMPL	STANDARD PENETRATION RESISTANCE ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)				
	LEP-	DESCRIPTION OF MATI		Y N T U N E		w.	ATER CONTENT	r, %		
				E S		10	20 30 4	40 50 LL		
		Topsoil - 8 inches								
				0-1-2	SS1		•			
		Stiff to very stiff, brown and gray CLAY - CH								
	- 5-	-		2-4-5	SS2					
		-								
		-			ST3		•			
ES				10						
NLY.	- 10-	-		5-7-10	SS4	· · · · · · ·				
N SOIL		-								
WEEN JRPO						· · · · · · · · · · · ·				
S BET		-		3-5-7	995					
ARIES	— 15-	Boring terminated at 15 feet.		5-5-7	000	· · · · · · · · · · · ·				
DUND		-								
TE BC OR IL		-								
XIMA OG F		-				· · · · · · · · · · · ·				
PPRC HIC L	- 20-	-								
HE AI GRAF		-				· · · · · · · · · · · ·				
JAL. 0		-								
RADU		-								
S REF BE G	- 25-									
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VTION SITION		-				· · · · · · · · · · · ·				
TFICA RANS	20									
STRA	50	-				· · · · · · · · · · ·				
AND2		-								
NC NE.GP										
ONE N	— 35-	-								
00 CT 0		-								
) rdg		1				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		
WAY.		-								
PARK						Drawn by: AGB	Checked by: BJS	App'vd. by: CKK		
EKEL		GROUNDWATER DATA	DRILLING DATA			Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017		
DH DI	ENC	<u>X</u> FREE WATER NOT COUNTERED DURING DRILLING	_AUGER <u>3 3/4"</u> HOLLO	W STEM			GENTECHN	UIUCY∑		
- DAV			BIS DRILLER DW.LLC				GEOTEOINA FI	ROM THE GROUND UP		
91.01		-	<u></u>	RIG			vid Hookol Dork			
J0246			HAMMER TYPE <u>Aut</u>	0_		P	hase 2A, B, and	C.		
2 WL			HAMMER EFFICIENCY	<u>88</u> %		W	/entzville, Misso	uri		
DRING 200	RE	IMAKAS: STA 10/+25.00				LC	og of Boring:	B-3		
) OF B(Dro	No. 1024	501 01		
LOG						FIU	JUCI NO. JU240			
	0f		3/23/2016	Ê. G		SHI	EAR STRENGTH	, tsf		
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	Surra	ace Elevation: Completion Date:		IT (p		∆ - UU/2	○ - QU/2	🗆 - SV		
		Datum: msl		ER/ER	LES	0.5 1	0 1.5 2			
	тĽ		APHIC		SAMPI	STANDARD	LUE (BLOWS PE (ASTM D 1586)	R FOOT)		
	EPT	DESCRIPTION OF M	ATERIAL ⁶			W	ATER CONTENT	.%		
	ΩZ			N N N N		PL 10 2	20 30 4	0 50		
		Topsoil - 12 inches		<u>.</u>						
		Medium stiff to very stiff, brown and gray and gravel - CH	CLAY, trace sand	3-4-5	SS1		•	· · · · · · · · · · · ·		
		-		3-4-5	SS2	· · · · · · · · · · · · · · · · · · ·	•			
	— 5-	-								
		-		2-3-5	SS3			· · · · · · · · · · ·		
PES		-		4-5-7	SS4		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · ·		
SIL TY	— 10-	-			001					
EN SC OSES		-				· · · · · · · · · · ·		· · · · · · · · · · ·		
PURP		-					· · · · · · · · · · ·			
ATION	- 15-			4-8-10	SS5					
USTR		Boring terminated at 15 feet.				· · · · · · · · · · ·	· · · · · · · · · · · ·	· · · · · · · · · · ·		
R BOU										
XIMAT OG FC		-								
PPRO)	— 20-	-								
GRAF		-				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · ·			
UAL.		-				· · · · · · · · · · ·	· · · · · · · · · · ·			
GRAD	25	-								
ES RE		-								
		-								
NSITI		-								
RATIFI 45 TRA	— 30-	-								
ND24		-								
ME.GP		-								
CLONE	— 35-	-								
00 Г		-								
AY.GP		-								
ARKW.		_								
KEL P/		GROUNDWATER DATA	DRILLING DATA	1		Drawn by: AGB Date: 4/15/2016	Checked by: BJS Date: 1/24/2017	App'vd. by: CKK Date: 1/24/2017		
O HOE			AUGER <u>3 3/4"</u> HOLLO	OW STEM			CENTERUN	າເທດທີ		
- DAVIL				_ FEET OGGFR				OM THE GROUND UP		
391.01			<u>CME 55TRK</u> DRILL I	RIG		Dav	/id Hoekel Park	wav		
L J024(to		P	hase 2A, B, and entzville. Misso	Curi		
2002 W.	RE	MARKS: Sta 82+00.00	HAIVIVIER EFFICIENCY	<u>00</u> %			_,			
30RING 2						LC	og of Boring:	B-4		
JG OF F						Pro	ject No. J0246	91.01		
Ľ										

Surface Elevation: 004.1 Completion Date: 3232010 00 10 10 0,5 10 1.5 2.0 Datum: msi DESCRIPTION OF MATERIAL 00 10 10 1.5 10 1.5 0.5 1.0 1.0 0.5 1.0 1.0 0.5 0.0 0.5 1.0 0.5 0.0 0.5 1.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.5 <	- SV 2.5 ANCE)
Datum: msl 0,5 1,0 1,5 2,0 H Ling DESCRIPTION OF MATERIAL DESCRIPTION OF MATERIAL Water content, % Topsoil - 12 inches 22-23 SS2 Interference Medium stiff to very stiff, brown and gray CLAY - (CH) 102 SS1 Interference - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - <t< th=""><th>2.5 ANCE) </th></t<>	2.5 ANCE)
Landin Line Line Standard result Standard result H Line DESCRIPTION OF MATERIAL DESCRIPTION OF MATERIAL Model and the sense of the sen	ANCE)
Human Home Home <th>) </th>)
Law DESCRIPTION OF MATERIAL G Set up 0 Topsoil - 12 inches	
B2 Topsoll - 12 inches Mailer Content, 7, 7 Medium stiff to very stiff, brown and gray CLAY - (CH) 102 ST1 102 SS1 -5 -5 38-9 SS3 4-6-7 SS4 4-6-7 SS4 4-8-10 SS5 4-8-10 SS5 -5 -5 <	
Image: Construction of the construc	
10psol - 12 indies Medium stiff to very stiff, brown and gray CLAY - (CH) 102 S11 4 5 2.2.3 SS2 A 5 3.8.9 SS3 A A 10 4.6.7 SS4 A A 110 4.6.7 SS4 A A 110 4.8.10 SS5 SS5 A 110 4.8.10 SS5 A A 115 Boring terminated at 15 feet. A A A 120 22- 3.0 A A A 120 20- 20- A A A A 120 22- 3.0 A A A A A 120 20- 20- A <td< th=""><th></th></td<>	
3.8-9 SS3 4.6-7 SS4 4.6-7 SS5 4.6-7 SS4 4.6-7 SS5 4.6-7 SS5 4.6-7 SS5 4.6-7 SS6 4.6-7 SS6 4.6-7 SS6 4.6-7 SS7 4.6-7 SS7 5.7 S	
5- 3.8-9 SS3 4.6-7 SS4 4.6-7 SS4 4.8-10 SS5 4.8	
5- 38-9 38-9 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- 4-6-7 5- </th <th></th>	
3 3-8-9 SS3	
38-9 SS3 39	
SBA V1005 How	
446-7 SS4	
- 10- - <td>· · · · · · · ·</td>	· · · · · · · ·
36 3300 4.8-10 SS5 SS5 15 Boring terminated at 15 feet. - - - 20- - - - - 20- - - - - 25- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	· · · · · · · · · · · · · · · · · · ·
Handbard	· · · · · · · · · · · · · · · · · · ·
Lad monopolity 4-8-10 SS5	· · · · · ·
4-0-10 525	
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25- - 25- - 30-	
AWATTERIAL AND	
- 30- - 30-	· · · · · ·
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GROUNDWATER DATA DRILLING DATA Drawn by: AGB Checked by: BJS App'vd.	by: CKK
	4/2017
	ΥZ
S HAMMER LEFE AUTO Prase 2A, B, and C	
ΗΑΜΙΜΕΚ ΕΓΓΙΟΙΕΝΟΥ 88 % No. 119+25 00 ΒΕΜΔΕΚS: Sta 119+25 00	
Project No. J024691.01	

		695.0	2/22/2046	÷Ω		SH	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>003.2</u> Completion Date:	<u></u>	NTS NTS		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum:msl	ΓŎ	ERY ERY	ES	0.5 1	1.0 1.5 2	2.0 2.5
			HIC HIC	NCI NCI	MPL	STANDARD	PENETRATION LUE (BLOWS PE	RESISTANCE R FOOT)
	표		RAF	BLO	SAI		(ASTM D 1586)	,
	. HE N	DESCRIPTION OF MA		N T U RE		w.	ATER CONTENT	r, %
	⊔∠			LE NO		PL 10 2	20 30 4	40 50 ILL
		Topsoil - 12 inches		<u>,1</u>				
		Medium stiff to very stiff, orangish-brown a (CH)	and gray CLAY -	2-3-3	SS1			
	_	-		2-2-4	SS2		•	
	— 5-]						
		-			ST3		· · · · · · · · · · · · · · · · · · ·	
		-						
YPES 		-		3-5-7	SS4			
	— 10-							
OS ES								
URP		-				· · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
ION F		-		7-8-11	SS5			
DARI	— 15-	Boring terminated at 15 feet.						
ILLUS		-						
		-						
		-						
PPR	— 20-							
GRAF		_						
IAL.		-						
RADL		-						
BEG	— 25-	-						
MAY								
		-						
FICA		-						
TRATII 15 TR	— 30-	-						
iii SI		_						
LON GP&I		-						
ШWE		-						
CLON	— 35-	-						
00 0								
ſ.GP,		-						
KWA'		-						
PAR					1	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
EKEL				•		Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
ID HC	ENC		AUGER <u>3 3/4"</u> HOLL(GENTECHN	UIUCAN
- DAV								ROM THE GROUND UP
10.11			CMF 55TRK DRILL	RIG				
02465			HAMMER TYPE AU	to		Dav P	vid Hoekel Park hase 2A. B. and	way ∣C
۲ ML			HAMMER EFFICIENCY	88_%		Ŵ	entzville, Misso	uri
2002	RE	MARKS: Sta 121+85.00						
RING						LC	og of Boring:	B-6
JF BO								
0 90						Pro	ject No. J0246	691.01
_						1		

		699.0 2/32/2016		с Э		SH	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: 600.9 Completion Date: 3/23/2016	0	ATS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl		HUS	ល	0,5 1	.0 1.5 2	0 2,5
					PLE	STANDARD	PENETRATION	RESISTANCE
			APF	× ∧ ∪	AM	▲ N-VA	ALUE (BLOWS PE (ASTM D 1586)	R FOOT)
		DESCRIPTION OF MATERIAL	GR	U L U L B I	0			
	ПП			Y S S S S S S S S S S S S S S S S S S S				, %
		Topsoil 12 inches	1.1.1.	0		10 2	20 30 4	0 50
		Medium stiff to very stiff, orangish-brown and gray CLAY	- ////					
		- CH		2-2-4	SS1			
		-						
	5-			3-4-6	SS2			
	5	_						
		-		2-3-4	SS3		<pre></pre>	
~		-						
YPE9		-		2-3-5	SS4			
OIL T S ONI	— 10-							
EN SI OSE		_						
URP		-				· · · · · · · · · ·		
S BE ON P		-		6-7-12	SS5			· · · · · · · · · · · · · · · · · · ·
RATI	— 15-	Boring terminated at 15 feet.						
LUST		-						
SR IL SR IL								
ZIMA DG Fi		-						
PRO) HC L(— 20-	-						
E AP RAPH		-						
L. G		-						
ESEN								
EPRI GR/	— 25-	-						
ES R VY BE		-						
N LIN		-						
ATIO		-						
RAN	30	-						
TTRA 1		-				· · · · · · · · · · ·		
np21		-						
NO GP		-						
IE ME	0.5	-						
CLON	- 35-	-						
1 00 I		-						
Y.GP,		-						· · · · · · · · · · · · · · · · · · ·
KWA		-						
PAR				l	I	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
EKEL			LLING DATA			Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
ОНО	ENC		<u>3 3/4"</u> HOLLO	W STEM			СЕПТЕСЦИ	UIUĽV≥
DAVI		WASHBOR		FEET				OM THE GROUND UP
- 10		<u>BLS</u> DRILL	ER <u>DWJ</u> LC	JGGER				
24691		<u>_CME 5</u> ;		(IG		Da	vid Hoekel Park	way
'L JO:			EFFICIENCY	<u>,</u> 88 %		W W	inase ZA, B, and entzville, Misso	uri
)02 W	RF	MARKS: Sta 123+00.00		<u>00</u> 70				
NG 20						10	OG OF BORING:	B-7
BORIN								
3 OF I						Pro	iect No	91 01
LO								

		5 1 1 1 684 9 6 1 1 1 1 3 /24/2016		fi D		SHE	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>664.9</u> Completion Date: <u>5/24/2010</u>	U	NTS NTS		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl	Ĕ	H D C H	ES	0.5 1	0 1.5 2	.0 2.5
			HC HC		ЛРL		PENETRATION	RESISTANCE
	포늡		ZAP	SEC VIT	SAN		(ASTM D 1586)	
	ΕΗ	DESCRIPTION OF MATERIAL	5			WA	ATER CONTENT	. %
	ΩZ			RSS		PL 10 2	0 30 4	0 50 LL
		Topsoil - 12 inches	<u>71 1</u> 2 - 71					
		Medium stiff to very stiff, orangish-brown and gray CLAY - CH		2-3-5	SS1			
		-						
		-		3-6-8	SS2			
	— 5-							
		-		3-5-7	SS3			
(0)		-						
-ΥPE8	10	-		4-7-7	SS4	1111141•		
SOIL 7		-						
EEN S		-						
ETWI PURI		-						
RIES B VATION	— 15-	Boring terminated at 15 feet		6-10-12	SS5	· · · · · · · · • ·	▲::::::::	
UND/ USTF								
e Bo R Ili								
KIMAT DG FC		-						
PRO)	— 20-	-						
HE AF		-						
AL. G		-						
RESE		-						
s REP BE Gf	— 25-	-						
LINES								
TION		-						
FICA ⁻		-						
HE TF	— 30-	-						
np2t		-						
FON €GP		-						
NE ME	25	-						
CLO	- 55-	-						
D0 L4		-				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
WAY.G								
EL PARK		GROUNDWATER DATA DRILLING	G DATA	<u> </u>		Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
10EKE		X FREE WATER NOT AUGER 3 3/4"	HOLLO	W STEM			Date. 1/24/2017	Date. 1/24/2017
AVID F	ENC	COUNTERED DURING DRILLING WASHBORING F	ROM	FEET			GEOTECHN	ULOGY롱
11 - D/		<u>BLS</u> DRILLER	<u>DWJ</u> LC	OGGER			FR	UM THE GROUND UP
4691.(CME 55TRK		RIG		Dav	vid Hoekel Park	way
L J02			YPE <u>Aut</u>	0_ 00_0/		P W	hase 2A, B, and entzville, Misso	C uri
002 W	RE	MARKS: Sta 127+00.00	JENCY_	<u>oo</u> %			-,	
JRING 2						LC	g of Boring:	B-8
3 OF BC						Pro	ect No . 10246	91 01
LOC							551 NO. 00240	

ſ		694.6		2/24/2046		с Э		S	HEAR	STRENG	ΓH, ts	f	
	Surfa	ace Elevation: 001.0	Completion Date:	3/24/2016	(7)	NTS /RQ		∆ - UU/2	(O - QU/2		🗆 - SV	
		Datum: msl			Lo Lo	HOGH I	S	0.5	1.0	1,5	2,0	2.5	
-		- ••••••			⊢ ₽		IPLI			ETRATIO			E
	드뉴				SAP	SEC	SAN	_ ▲ IN-	ALOL (A	(BLOWS F STM D 1586)		501)	
	EPT HE	DESCR	IPTION OF MA	TERIAL	1 2				WATEF		NT. %		
	ΩZ					COLOR DR		PL 10	20	30	40		LL
ŀ		Topsoil - 12 inches			<u></u>								
		Medium stiff to very	/ stiff, orangish-brown a	and gray CLAY -	111	1-3-3	SS1		: : : :	· · · · · · ·	: : :		80 ->>
		(CH)				100	001						
		-				256	662						· ·
	- 5-	-				3-5-0	332						• •
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ŀ		-				2-3-5	883	▲					· ·
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۲۲ ۲	_ 10_					4-8-9	SS4						
jo Si		-							· · · ·	· · · · · · ·			· ·
POSE		-								· · · · · · · ·			· · · ·
PUR		-											· · ·
		1				4-8-11	SS5		` ▲ : :		· · ·	· · · · · ·	: :
STRA	- 15-	Boring terminated a	at 15 feet.								: : :		
- FN		-							· · ·				· ·
-OR		-											
8		-											· · ·
HCL	- 20-	-											
GRAP									· · · ·				· · ·
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<u>н</u>	- 25-	-											
IAYE		-							: : :		: : :		••••
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≥ ⊎Z	- 35-												
CLO -		-							· · · ·	· · · · · · ·	· · ·	· · · · ·	
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±.≻		-											
KW4		1							: : :	· · · · · ·		· · · · · ·	: :
LPAF		GROUNDWATER D	ΑΤΑ	DRILLING	DATA			Drawn by: AG	B Che	ecked by: BJ	S App	o'vd. by: CKI	ĸ
JEKE								Date: 4/15/20	l6 ∣Dat	e: 1/24/2017	Dat	e: 1/24/201	/
Π Η	ENC	OUNTERED DURING	DRILLING						i GF1)TFC.HI	NUI I	NGYZ	
- DA\											FROM TH	IE GROUND UP	,
91.01				CMF 55TRK									
02465				HAMMER TYP	PE Aut	0			David H Phase	ioekel Pai 2A. B. ar	rkway nd C		
WL J				HAMMER EFFICI		 <u>88_</u> %			Wentz	ville, Miss	souri		
2002	RE	MARKS: Sta 131+00	.00		-								
ORING									LOG O	FBORIN	G: B-	9	
3 OF B(roject	No 102	4601	01	
ŏ								F	. 0,000			~ .	

	_	6946 - 2/24/2016		÷ D		SH	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>684.6</u> Completion Date: <u>3/24/2016</u>		(pc /TS		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl	۲۵	HUY	ŝ	0,5 1	,0 1,5 2	2,0 2,5
			- P		PLE	STANDARD	PENETRATION	RESISTANCE
			1 H	⊢°Ш	AM	▲ N-VA	LUE (BLOWS PE (ASTM D 1586)	R FOOT)
		DESCRIPTION OF MATERIAL	GR	N L L L L L L L L L L L L L L L L L L L	0			- 0/
	DUE			Y R R R				, %
		Tancal 12 inchas	1.1.1.1.1			10 2	20 30 4	10 50
		Medium stiff to very stiff orangish-brown and gray CLAY -						73
		(CH)		93	ST1		: 	>>
		-						
	- 5-			2-4-6	SS2			
	- 5-							
		-		2-3-4	SS3			
~		-						
YPES		-		4-6-8	SS4		•	
OIL T	— 10-	-						
EN S(
URPO		-						
S BE ON P		-		3-7-9	SS5			
ARIE: RATIO	— 15-	Boring terminated at 15 feet.	_////	0.0		· · · · · · · · · · · · · ·		
UND, UST		-						
E BO R ILI								
G FC								
ROX IC LC	— 20-	-						
E APF 8APH		-						
TTHE		-						
SEN ⁻		-						
EPRE GRA	- 25-							
ES RE Y BE	20	-						
I LINE		-						
TION TION		-						
RICA		-						
ΓRAT 4ΓΕ ΤΕ	- 30-							
ES HD2 ED		-						
NOTI GP∯I		-						
ME.		-						
LONE	— 35-	-						
00 C								
GPJ								
WAY.		-				· · · · · · · · · ·		· · · · · · · · · · ·
PARK						Drawn by: AGB	Checked by: BJS	App'vd. bv: CKK
KEL		GROUNDWATER DATA DRILLIN	<u>g data</u>			Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
НОЕ		<u>X</u> FREE WATER NOT AUGER 3.3/4	'_HOLLO	W STEM			000000	01 0 0V=
DIVA	ENC	COUNTERED DURING DRILLING WASHBORING F	ROM	FEET				
01 - E		<u>BLS</u> DRILLER	<u>DWJ</u> LC	OGGER				IS A THE ANODAD OF
4691.		<u>CME 55TRK</u>	DRILL F	RIG		Dav	vid Hoekel Park	way
- J02		HAMMER T	YPE <u>Aut</u>	0_		P	hase 2A, B, and	C
32 WL	РГ	HAMMER EFFI	CIENCY _	<u>88</u> %		**	UIIZ VIIIC, IVII330	
G 20(KE	IVIARRO: 318 1337UU.UU						R 10
ORIN							g of during:	D-10
OF B						-	la at NI- 100 (204.04
LOG						Pro	Ject No. J0240	591.01

		674.2	6/44/2046		θ			SH	EAR STRENGT	H, tsf
	Surfa	ace Elevation: <u>674.3</u> Completion Date: _	0/11/2010	(ľ)	NTS NTS /RQ		∆ - Ul	J/2	○ - QU/2	🗆 - SV
		Datum: msl		LO	HO UN	S	0.5	1	0 1.5	2,0 2,5
				ЧС	N N N	IPLE	STAND			
	ェ뉴			RAPI		SAN	-	IN-VA	(ASTM D 1586)	
	E E E	DESCRIPTION OF MAT	FERIAL	Ъ	UN T B F B			W	ATER CONTEN	т %
	ΞΞ				COR		PL 10		20 30	$\frac{1}{40}$ 50 LL
		Topsoil - 12 inches		<u>7 1</u> 2 . 7						
		Brown CLAY - CH					· · · · · ·			
						ST1		· · · · ·		
	- 5-									
								· · · · ·		
SHC.										
	- 10-									
N SO										
WEE								· · · · ·		
S BET ON PU							· · · · ·			
ARIE: RATIO	- 15-									
LUND										
IE BC								· · · · ·		
VIMA DG FC										
PRO)	- 20-									
HE AP										
AL. G								· · · · ·		
RESE										
REPF SE GF	- 25-									
INES AAY E							· · · · · ·			
ION										
ICAT							· · · · · ·	· · · · ·		
RTIF 5 TR/	- 30-									
: STF										
NOTE GP Å N										
ME.0										
LONE	- 35-									
00 C										
.GPJ							· · · · · ·	 		
KWAY								· · · · ·	· · · · · · · · · · ·	
PARF						L	Drawn by:	AGB	Checked by: BJS	App'vd. by: CKK
EKEL		GROUNDWATER DATA	DRILLING D				Date: 7/8/	/2016	Date: 1/24/2017	Date: 1/24/2017
10H C			<u>4"</u> AUGER HOI	LLOW	STEM			2	CENTERUN	
DAVII	LINC	OUNTERED DURING DRIELING	WASHBORING FRO	M	FEET			-)	ULUILUNN	ROM THE GROUND UP
- 10			<u>IPD</u> DRILLER <u>TF</u>	<u>'D</u> LC	GGER					
24691				<ill r<="" td=""><th>liG</th><td></td><td></td><td>Day</td><td>vid Hoekel Parl</td><td>way</td></ill>	liG			Day	vid Hoekel Parl	way
/L JO:					<u>,</u> 88 %			Ŵ	entzville, Misso	buri
002 M	REM	MARKS: Sta 65+84.00, Offset 46.75 LT			<u></u> /0					
ING 2								LO	g of Boring:	B-101
BOR										
G OF								Pro	ject No. J024	691.01
Ľ										

	074.0	0/44/0040		θŪ			SH	EAR STRE	NGTH	, tsf
Surf	ace Elevation: <u>674.3</u> Completion Date: _	6/11/2016		ATS ATS		Δ-υ	U/2	0 - QU	/2	🗆 - SV
	Datum: msl		LO LO	H S S S S S S S S S S S S S S S S S S S	ល	0,5	5 1	.0 1.5	2	0 2,5
			₽		PLE	STAN	DARD	PENETRAT		RESISTANCE
			APF		BAM		N-VA	ASTM D 1	/S PEI ⁵⁸⁶⁾	RF001)
	DESCRIPTION OF MAT	TERIAL	R		0,		10/			0/
DE				YN S S S S S S S S S S S S S S S S S S S			VV/			, <u>%</u>
	Brown CLAY - CH (continued)					10) 2	20 30	4	0 50
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	-								· · ·	
- 55 –	Brown, silty SAND - SM									
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00.9	-						· · · · ·		· · · ·	
이 - 60 -	-									
RAP 										
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50 — 65-	_									
AY B	-									
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2 <u>4</u>	_									
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о Гс	4						· · · · ·		· · · · · · ·	
AY.G	1						· · · · ·		 	
RKW.										
EL P/	GROUNDWATER DATA	DRILLING DA	<u>ATA</u>			Drawn by Date: 7/8	r: AGB 3/2016	Checked by	: BJS 2017	App'vd. by: CKK Date: 1/24/2017
НОЕК	X FREE WATER NOT	<u>4"</u> AUGER HOLI	LOW	STEM						
	COUNTERED DURING DRILLING	WASHBORING FROM	MI	FEET				GEOTEC	HN	JLUGYZ
- D		TPD DRILLER TPD	<u>D</u> LO	GGER					FR	JM THE GROUND UP
691.0		CME 55TRK DRI	ILL RI	G			Dav	vid Hoekel	Parkv	vay
J024		HAMMER TYPE	Auto	-			P	hase 2A, B	, and	C
02 WL	MADKO, 04-05-04-00-05-4-40-5-1-5	HAMMER EFFICIEN	ICY <u>8</u>	<u>8</u> %			VV	entzville, N	13501	AT 1
17 KE	:ινιακης: ςτα 65+84.00, UTISET 46.75 LT						C	CONTINUA	TION	OF
BORIN							LO	g of Bori	NG: I	3-101
G OF E							Pro	iect No. J	0246	91.01
9								,		-

	674.2	6/11/2016		÷ O				SHE	AR S	RENGT	H, tsf	
S	Inface Elevation: 074.3 Completion Date: _	0/11/2010	Ċ	r (pc NTS /RQ		Δ.	- UU/2		0	- QU/2	— -	SV
	Datum: msl		Ĕ	ERY ERY	ŝ		0.5	1.	0	1.5	2,0 2,	5
			HIC	M N N N N N N N N N N N N N N N N N N N	MPL	STA	NDAF	-Vai	P ENET _UE (B	TRATION	RESISTA ER FOOT)	NCE
I			BRAF	BLO	SA				(AST	M D 1586)		
DEP		ERIAL	0	SPT SPT ORE		₽⊢		WA	TER (Г, %	
				δŏ		• = •	10	2	0	30	40 50)
	Gray CLAY - CL					· · · · ·	· · · · ·	· · ·	· · · ·	 		· · · · ·
								::	· · · ·			· · · · ·
						· · · · ·	· · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · ·	 		· · · · ·
— 8	5—						· · · ·	•••		· · · · · · ·		
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, PES	_					· · · · ·		· · · ·	· · ·	 		· · · ·
	0-											
	rough drilling from 02 to 04 E foot									· · · · · · ·		
PURP	 Tough anning from 92 to 94.5 feet 					· · · · ·	 	· · · · ·	· · · ·	 		· · · · ·
	Auger refusal at 94.5 feet							 	· · · · · ·			· · · · ·
ISTRA								 	· · ·			· · · ·
	_					· · · · ·		· · · · · · · · · · · · · · · · · · ·	· · · ·	 		
G FOF								· · · ·	· · · ·	· · · · · · ·		· · · · ·
xor ມີ ມີ	D—											
RAPH												
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MAY I						· · · · ·		· · ·	· · ·	 		· · · · ·
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AND21	_					· · · · ·		· · · · ·	· · · ·	 		· · · · ·
VC VC								· · ·		· · · · · · ·		
и И И И И И И И И И И И И И И И И И И И	5-											
00 CT							· · · · ·	· · ·	· · · ·	· · · · · · · ·		· · · · ·
GPJ								· · · · · · · · · · · · · · · · · · ·	· · · ·	 		· · · · ·
						· · · · ·	· · · · ·	· · · · ·	· · · ·	· · · · · · · ·		· · · · ·
PARI			ΔΤΔ			Drawn	n by: A0	GB	Check	ed by: BJS	App'vd. by	: CKK
DEKEL				OTEN4		Date:	7/8/20	16	Date:	1/24/2017	Date: 1/24	/2017
¥ ₽∧ E	NCOUNTERED DURING DRILLING		M	FEFT			#ے		GEOI	FECHN	OLOGY	NC
1 - DA		<u>TPD</u> DRILLER <u>TF</u>		GGER						F	ROM THE GROU	ND UP
691.0		CME 55TRK DF	RILL F	RIG				Dav	id Ho	ekel Park	wav	
J024		HAMMER TYPE	<u>Aut</u>	<u>)</u>				Pł	ase 2	A, B, and		
02 WL	EMARKS: Sta 65+84 00 Offect 46 75 LT	HAMMER EFFICIE	NCY _	<u>88</u> %				vve	, ILZVII	10, 141350		
NG 20	LIMAINO. JIA 03704.00, UIISEL 40./3 LI							C	ONTI		OF	
BORI								LOG	OFE	OKING:	в-101	
JG OF							F	Proj	ect N	o. J024	691.01	
LC												



		070 5		014410040		θ			SHE	AR STREN	GTH,	tsf	
	Surfa	ce Elevation: 670.5	Completion Date: _	6/11/2016	(1)	(pc /TS		∆ - UU	1/2	○ - QU/2		[] - SV
	г	Datum msl			LOO	HOO Y	ŝ	0,5	1	0 1.5	2,0	C	2.5
					₽		IPLE	STAND				ESIS	TANCE
	ᆂᄂ				API		SAM		N-VA	(ASTM D 158	6) 6)	FUC)))
	L H H	DESCR	RIPTION OF MAT	FERIAL	GR	U L B B B B B B B B B B B B B B B B B B			w		=NT	%	
	۵z					K R R R			2		_IVI, //	70	50 LL
		Dense, orange and	tan, fine to coarse SAN	ID with gravel - SP								, 	
		(continued)	,		_				· · ·			· · ·	
				-	¥								
						0.45.05	000						
	— 45—					2-15-25	559				🔺		
						-					· · ·	· · ·	· · · · · · · ·
		Medium stiff, brow	n and gray, sandy CLAY	- CL	1////				· · ·		· ·	· · ·	
ន											::	· · · ·	
TYP.	- 50-					2-1-4	SS10						
SOIL SOIL									· · · · · ·		· ·	· · · · · ·	· · · · · · ·
POSE		Medium dense bro	own_fine_SAND - SP										
PUR													
ES BI						8-14-15	SS11		· · ·		::	· · · · · ·	
DARI	— 55—												
ILUS									· · · · · ·		· ·	· · ·	
CR I									· · · ·		::	· · · ·	
NIMA OG F						7-11-12	SS12					· · · ·	· · · · · · · ·
HICL	- 60 -												
HE AF												· · · ·	
AL D		Stiff, brown SILT w	ith sand - ML										
ADU/						4-5-5	5513		· · · · · ·		· · ·	· · ·	
EGR	- 65 -					400	0010						
NES IAY B									· · ·			· · ·	
NUN									· · · · · ·		::	· · · · · ·	
SATIC						0.4.4.4	0044			· · · · · · · · ·			
TRAN	— 70—	Medium dense, gra	ay, medium SAND - SP			8-14-14	5514			🔺			
STR													
Ë									· · ·		· ·	· · ·	
ы В В В									· · · · · ·		· · ·	· · · · · ·	
≥ NE	- 75-	Medium stiff, gray,	silty CLAY with limestor	ne ledges - CL									
СГО									· · ·	· · · · · · · ·	· ·	· · · · · ·	· · · · · · ·
00 Fo													
₹.GF									· · ·		· ·	· · ·	
3KW/						2-2-4	SS15	114111			· · · ·		
il Paf		GROUNDWATER D		DRILLING	DATA			Drawn by:	AGB	Checked by: E	SJS	App'vo	I. by: CKK
OEKE								Date: 7/2/	2010	Date: 1/24/20	17	Date:	1/24/2017
/ID H	ENI	COUNTERED AT 42	FFFT ☑		OM	FFFT				GEOTECH	INO	LOI	GYZ
- DAV			=	BLS DRILLER F	ER 10	GGER					FRO	M THE G	ROUND UP
31.01		<u>BLS</u> DRILLER <u>I</u> CME 750X D			G			~					
02465		<u>CME 750X</u> I HAMMER T)	HAMMER TYP	PE Aut	0			Dav Pl	hase 2A. B. a	arkw and (ay C		
NL J				HAMMER EFFICIE	ENCY				W	entzville, Mi	ssou	ri	
2002	REN	ARKS: Sta 65+82.	00, Offset 53.25 RT		-	_							
ING													
BOR											J. 1	. 100	
G OF									Proi	ect No. JO	2469	91.01	
С													

	670 5 6/44/2016		÷ D		SH	EAR STRENGTI	l, tsf
Su	rface Elevation: 670.5 Completion Date: 6711/2016	(J)	NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
	Datum: msl	ĽŐ		S	0.5 1	1,0 1,5 2	2,0 2,5
		HC H		APL		PENETRATION	
포냢		ZAP	SEC	SAN		(ASTM D 1586)	
EPT	DESCRIPTION OF MATERIAL	5			w	ATER CONTEN	Г. %
			CO		PLI 10 2	20 30 4	40 50 LL
	Medium stiff, gray, silty CLAY with limestone ledges - CL						
	(continuea)						
	_						
	_						
— 85	-						
	Hard gray finally crystalling this hadded slightly to		11%				
.>-	moderately weathered LIMESTONE with shale seams and		22%	NQ1			
No - 90	Core loss - 8 inches		100%				
OSEG			<u>100%</u> 59%	NQ2			
-URP	shaley - 2 inches		-				
	shaley - 4 inches		-				
- 95 – 11	-		100%				
LLUS			88%	NQ3			
	shaley		-				
LOG	Boring terminated at 99 feet.						
ୁଳ —100 ମୁନ							
GRAF							
-TAL	_						
RADI	_						
© —105							
МА ——	_						
6	-						
RANS	—						
⊢ — I I C							
HZCHNN	_						
<u>н</u> В.С.	_						
≥ ≝115							
00 fc	_						
AY.G	-						
WXKW							
EL P/	GROUNDWATER DATA DRILLIN	<u>G DATA</u>			Drawn by: AGB	Checked by: BJS Date: 1/24/2017	App'vd. by: CKK Date: 1/24/2017
Ч О Е Х	AUGER 3 3/4	HOLLC	W STEM				
I OIN E	ENCOUNTERED AT <u>42</u> FEET ♀ WASHBORING F	ROM	FEET			GEOTECHN	ULOGYZ
1- D	<u>BLS</u> DRILLER	EER LO	OGGER			F	ROM THE GROUND UP
691.0	<u>CME 750X</u>	DRILL R	IG		Da	vid Hoekel Park	way
J024	HAMMER T	YPE <u>Aut</u>	<u>0</u>		P	hase 2A, B, and	
12 ML		CIENCY .	<u>83</u> %		vv	entzvine, wisso	buri
6 20C	EMARKS: Sta 65+82.00, Uffset 53.25 RT				(CONTINUATION	OF
ORIN					LO	g of Boring:	B-103
OF B							CO4 04
LOG					Pro	Ject NO. JU24	091.01

S	face Elevation: 682.0 Completion Date: 3/23/2016		D cf)		SH	EAR STRENGT	H, tsf					
Sur		g	HT (p UNTS Y/RC		∆ - UU/2	○ - QU/2	□ - SV					
	Datum:		VER VER		STANDARD							
포뇨		RAPH		SAMI	▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)							
N FE	DESCRIPTION OF MATERIAL	Ū	SPT I		N W	ATER CONTEN	T, %					
	Tangail 40 inchas	A Le S	50		10 2	20 30	40 50					
	Medium stiff, orangish-brown, silty CLAY - (CL)		224	861	· · · · · · · · · · · · · ·							
			2-3-4	331	· · · · · · · · · · · · ·							
	_		102	ST2	• • • • • • • • • • • •							
— 5												
	Medium stiff to stiff, orangish-brown and gray CLAY - CH		2-3-5	SS3			· · · · · · · · · · · · ·					
n 	_											
	_		2-4-7	SS4	· · · · · A . · · ·	•						
	_											
	with gravel		4-5-7	SS5								
ISTRA	Boring terminated at 15 feet.											
	_				· · · · · · · · · · · ·							
	-				· · · · · · · · · · · · · · · · · · ·							
	_											
GRAP					· · · · · · · · · · · ·							
	_				· · · · · · · · · · ·							
BRAD GRAD - 25	_											
	_				· · · · · · · · · · · ·							
	_											
	_											
al — 30	_											
ND241	-											
	_											
₩ ₩ ₩ 35	_											
	_											
GPJ (_				· · · · · · · · · · · · · · · · · · ·							
KWAY	_				· · · · · · · · · · ·							
L PAR		G DATA	1	1	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK					
JOEKE	X FREE WATER NOT AUGER 3 3/4'		W STFM		Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017					
[⊥] DIN EN	COUNTERED DURING DRILLING WASHBORING F	ROM	FEET			GEOTECHN	IOLOGYZ					
01 - D/	<u>BLS</u> DRILLER	<u>DWJ</u> L0	OGGER				FROM THE GROUND UP					
24691.	<u>CME 55TRK</u>		RIG		Da	vid Hoekel Parl	kway					
VL JOS	HAMMER T HAMMER EFEI	YPE <u>Aut</u> CIENCY	<u>o</u> 88 %		P W	nase 2A, B, an entzville, Miss	a C ouri					
^ Z002 R	EMARKS: Sta 78+00.00		/0									
BORING					LO	g of Boring	: B-11					
OG OF E					Pro	ject No. J024	691.01					
					1							

		669 E 2/22/2016		<u>5</u> 0		SHE	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>666.5</u> Completion Date: <u>572272016</u>	(7)	NTS NTS		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl	ĽÕ	HO HO	ES	0.5 1	0 1.5 2	.0 2.5
			HC H		JPL		PENETRATION	
	포늡		SAP	ALO REC	SAN		(ASTM D 1586)	(1001)
	ΕΗ	DESCRIPTION OF MATERIAL	5			WA	ATER CONTENT	. %
	ΩZ			A S S		PL 10 2	0 30 4	0 50 LL
		Topsoil - 12 inches	<u>71 1</u> 2. 71					
		Medium stiff to very stiff, orangish-brown and gray CLAY - CH		2-2-3	SS1		•	
		-						
		-		3-5-7	SS2		•	
	— 5-							
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YPE9	10	-		3-5-7	SS4	: : : : ▲ : : ●		
S ON	- 10-							
POSE		-						
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RIES B RATION	— 15-	Paring terminated at 15 feet		4-6-7	SS5		•	
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PRO)	— 20-	-						
HE AP		-						
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I NOI		-						
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TRATI 45 TR	— 30-							
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IE ME		-						
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00 f		-						
VAY.GF		-						
PARKV						Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
EKEL				· · · · ·		Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
OH QI	ENC	X FREE WATER NOTAUGER 33/4"		W STEM			GENTECHN	UIUGYZ
- DAV								OM THE GROUND UP
91.01		CME 55TRK	DRILL F	RIG			id Hookst Da 1	
J0246:		HAMMER T	PE <u>Aut</u>	<u>.</u>		P	hase 2A, B, and	way C
2 WL 、		HAMMER EFFIC	IENCY_	<u>88</u> %		W	entzville, Misso	uri
ING 200:	RE	MARKS: Sta 74+00.00				LO	g of Boring:	B-12
F BOR								
LOG OI						Pro	ect No. J0246	91.01
LOG OF BORING						LO Proj	G OF BORING: ect No. J0246	B-12 91.01

		661 7	3/2//2016		ଳ ପ୍		SH	EAR STRENGT	H, tsf					
	Surfa	ace Elevation:	Completion Date:	σ	T (po NTS //RQ		∆ - UU/2	○ - QU/2	🗆 - SV					
		Datum: <u>msl</u>			ER/	LES			2.0 2.5					
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	N FE	DESCR	IPTION OF MATERIAL	0	SPT U SPT ORE		N W	ATER CONTEN	T, %					
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		Topsoil - 12 inches Medium stiff to very	stiff orangish-brown CLAY trace sand											
		and gravel - CH			1-2-4	SS1	▲	I ●						
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л. Т. У.		-			6-11-14	SS4								
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IES B	15	-			6-9-16	SS5	: : : : • : : :							
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EKEL		GROUNDWATER D	<u>AIA</u> <u>DRILLIN</u>	<u>g data</u>			Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017					
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· DAVI			WASHBORING					aluiluiin	FROM THE GROUND UP					
31.01 -			DLS DKILLER		RIG									
102465			HAMMER T	YPE <u>Aut</u>	<u>0</u>		Da P	vid Hoekel Parl Phase 2A, B, an	ƙway d C					
r JW			HAMMER EFFI	CIENCY	<u>88</u> %		W	/entzville, Miss	ouri					
NG 2002	REI Offs	MARKS: Sta 6+50.00 set approximately 20)) feet north due to overhead branch	ies.			LC	og of Boring	: B-13					
DF BORI														
LOG (Pro	ject No. J024	691.01					

[2/24/2040		θ		SHI	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>637.9</u> Completion Date: <u>5/24/2016</u>		,RQ /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl	LOC	HOUN YE	្ល	0,5 1	.0 1.5 2	.0 2.5
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				YN SOR SOR				, %
		Topsoil - 12 inches	A la st				20 30 4	0 50
		Medium stiff to stiff. orangish-brown CLAY - (CH)						74
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г ЧР Е	10			4-5-7	SS4	::::▲:::	•	
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EKEL						Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
DH D	FNC	<u>X</u> FREE WATER NOT <u>AUGER</u>	<u>3 3/4"</u> HOLLO	W STEM			СЕЛТЕСНИ	ບເບເ∧⊇
DAVI		WASHBOR		FEET				OM THE GROUND UP
1.01 -		BLS DRILL	EK <u>DWJ</u> LC	IGGER				
2469			VED TVDE AND			Dav	vid Hoekel Park	way
NL JO			EFFICIENCY	<u>,</u> 38 %		W	entzville, Misso	uri
002 V	RE	MARKS: Sta 11+00.00						
ORING 2						LO	g of Boring:	B-14
OG OF B						Pro	ject No. J0246	91.01
Ľ,						1		

Surface Elevation: Topsol Completion Date: 32220/16 Surface Elevation:		660.9		2/22/2046		с, D			SHE	EAR S	STRENG	STH,	tsf	
Deturn: mel Ogge by and and a second	Surfa	ace Elevation: 609.0	Completion Date:	5/22/2016	0	NTS NTS		Δ - UU	/2	C) - QU/2			- SV
Human Description OF MATERIAL Description OF MATERIAL Standard Peterfation Resistant A N-VALUE BEDWise PE FOOT Human Description OF MATERIAL Peterfation Resistant A N-VALUE BEDWise PE FOOT Peterfation Resistant A N-VALUE BEDWise PE FOOT Topsell - 12 Indee Medium self to stiff, orangeh brown CLAY - (CH) 2.34 SS1 A - </th <th></th> <th>Datum: msl</th> <th></th> <th></th> <th>Ľ</th> <th>HOGH HOL</th> <th>S</th> <th>0.5</th> <th>1</th> <th>0</th> <th>1.5</th> <th>2,0</th> <th>)</th> <th>2.5</th>		Datum: msl			Ľ	HOGH HOL	S	0.5	1	0	1.5	2,0)	2.5
Line DESCRIPTION OF MATERIAL Boord State (Construction) Construction (Construction					⊢ ⊖ E		IPLI	STAND			TRATIC	DN R	ESIS	
Building DESCRIPTION OF MATERIAL Building Strategy Description Matter Content, % Toppol-12 inches 10 23.4 551 A 10 20 30 40 50 Medium stiff to stiff, orangisis-brown CLAY - (CH) 23.4 551 A 1 1 10	드뉴				SAP		SAN	-			STM D 1586		100	.,
0 2 10 23.4 551 A 0 0 60	EPT	DESCR	IPTION OF MA	TERIAL	5				WA	TER	CONTE	NT.	%	
Toppol - 12 inches 2-34 551 A • • Medium stiff to stiff, orangish-brown CLAY - (CH) 2-34 551 A • • 10 3-66 554 A • • • • • 10 3-66 554 A •	ΞZ					COL		PL 10	2	20	30	40		50
Medium stiff to stiff, orangish-brown CLAY - (CH) 2.3.3 SS2 1		Topsoil - 12 inches			<u></u>									
000000000000000000000000000000000000		Medium stiff to stiff,	orangish-brown CLAY	′ - (CH)	111	2-3-4	SS1		· · ·					6
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Boring terminated at 15 feet. - 20- - 20- - 30-	45	1				3-5-7	SS5	<u> : :</u> : : : ▲	· · ·	•				
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35- 35- SROUNDWATER DATA Market R NOT AUGER 3.3/4" HOLLOW STEM WASHBORING FROM FEET BLS DRILLER DWJ LOGGER CME 55TRK DRILL RIG HAMMER TYPE Auto HAMMER EFFICIENCY 88 % REMARKS: Sta 2+35.00	— 30—	-												
35- 35- 35- SCOUNDWATER DATA DRILLING DATA X FREE WATER NOT ENCOUNTERED DURING DRILLING AUGER 33/4" HOLLOW STEM WASHBORING FROM FEET BLS DRILLER DWJ LOGGER CME 55TRK DRILL RIG HAMMER TYPE Auto HAMMER EFFICIENCY 88 % REMARKS: Sta 2+35.00		-							· · ·	 			· · ·	
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ENCOUNTERED DURING DRILLING WASHBORING FROM FEET BLS_DRILLER DWJ_LOGGER CME 55TRK_DRILL RIG HAMMER TYPE Auto HAMMER EFFICIENCY <u>88</u> % REMARKS: Sta 2+35.00 LOG OF BORING: B-15		<u>X</u> FREE WATER N	ОТ	AUGER 3 3/4" I	HOLLO	W STEM								
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CME 55TRK_DRILL RIG David Hoekel Parkway HAMMER TYPE Auto Phase 2A, B, and C HAMMER EFFICIENCY 88 % Wentzville, Missouri REMARKS: Sta 2+35.00 LOG OF BORING: B-15				<u>BLS</u> DRILLER <u>D</u>	WJ LC	OGGER						FROI	A THE GF	OUND UP
HAMMER TYPE <u>Auto</u> HAMMER EFFICIENCY <u>88</u> % REMARKS: Sta 2+35.00 LOG OF BORING: B-15				<u>CME 55TRK</u> D	ORILL F	RIG			Dav	id Ha	oekel Pa	nkw	av	
HAMMER EFFICIENCY <u>88</u> % Wentzville, Missouri REMARKS: Sta 2+35.00 LOG OF BORING: B-15				HAMMER TYP	PE <u>Aut</u>	<u>)</u>			PI	hase	2A, B, a	nd C	;	
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Project No. J024691.01									rroj		NO. JU2	409	1.01	

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	Surfa	ace Elevation: <u>680.1</u> Completion Date: <u>3/22/20</u>	<u>16</u>	TS TS ROI		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: MSI		UN NUN NUN	ŝ	0,5 1	,0 1,5 2	2,0 2,5
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		DESCRIPTION OF MATERIAL	- 5			w	ATER CONTENT	. %
	ΞZ			COL		PL 10 2	20 30 4	10 50
_		Topsoil - 12 inches	<u>71 1</u> 2 <u>11</u>					
		Stiff, orangish-brown, silty CLAY - (CL)		104	ST1			
_		Stiff to very stiff, orangish-brown and gray CLAY - CL	4			· · · · · · · · · · · ·		
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EKEL		GROUNDWATER DATA	URILLING DATA			Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
р НО	FNC	<u>X</u> FREE WATER NOT <u>AUGE</u>	R <u>33/4"</u> HOLLO	W STEM			СЕЛТЕСНИ	UIUĽV≥
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02469		<u>– – – – – – – – – – – – – – – – – – – </u>	AMMER TYPE Auto	5		Dav P	vid Hoekel Park hase 2A. B. and	way C
NL J		HAMN				Ŵ	entzville, Misso	uri
2002	RE	MARKS: Sta 6+75.00						
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PURPO		_						· · · · · · · · · · · ·	
	15	_			7-12-16	SS5			
USTR/	10	Boring terminated at 15	feet.					· · · · · · · · · · · ·	· · · · · · · · · · ·
R BOL		_							
		_						· · · · · · · · · · · ·	
PHIC L	— 20-	_							
GRAI		_							
DUAL.		_							
REPRE E GRA	— 25-								
INES F		_							
		_							
RANSI	20	_							
	_ 30-	_							
PARPS		_							
ME.G		_							
CLONE	— 35-	_							
000 Г		_							
'AY.GF		-							
ARKW								Checked by: BIS	
EKEL F		GROUNDWATER DATA	DRILLING	DATA			Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
IDH DI	ENC	<u>X</u> FREE WATER NOT	LING AUGER <u>3 3/4"</u>	HOLLO	W STEM			GFOTFCHN	UIUGY፷
- DAV			BLS DRILLER	<u>DWJ</u> LC				F	ROM THE GROUND UP
691.01			 CME 55TRK	DRILL R	lG		Dav	/id Hoekel Park	way
J024			HAMMER TY	PE <u>Auto</u>	<u>)</u>		P	hase 2A, B, and	
302 WL	RE	MARKS: Sta 65+00.00	HAMMER EFFICI	ENCY _	<u>88</u> %				~~~
JRING 20	* S	Surface Elevation estimate	ed from preliminary plans.				LO	g of Boring:	B-17
G OF BO							Pro	iect No. J024	691.01
Õ								,	

1				θ		SHE	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>670.8</u> Completion Date: <u>3/25/2016</u>		RQ RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		- mol	0 0	FN2	S	0.5 1	0 15 2	0 25
		Datum:	CL		Ĕ	STANDARD		
			H H	ĨŠ≥Ö	MP	▲ N-VA	LUE (BLOWS PE	R FOOT)
	표텂		RAI	REAL	SA		(ASTM D 1586)	
		DESCRIPTION OF MATERIAL	U U	∠ H K		w/	ATER CONTENT	,%
	⊔∠			RNS		PLI 10 2	20 30 4	1 LL
		Topsoil - 12 inches	7 <u>75</u> 7					
		Stiff to hard, orangish-brown and gray CLAY with sand and		2-5-7	SS1			
		gravel - (CH)						
				104	ST2			
	— 5-	_			0.2		1.*	
		-						
				4-7-11	SS3			
(0		-						
YPE§		-		5-10-11	SS4		A::::::::::	
OIL T	— 10-							
EN SC								
JRPC		4						
S BE'		-		5-12-31	555			
ARIES	— 15-	Boring terminated at 15 feet		0 12 01	000			
USTI USTI								
R ILL		-						
G FO								
SOXII	_ 20-							
APPF	20	_						
GR		-						
LAL.		-						
RESI		-						
REF BE G	- 25	-						
INES JAY								
ONL								
CATI		_						
TRAI	— 30-	-						
STR/		-						
BNB2		-						
N NO		-						
IE ME		-						
CLON	- 35-							
00 (-						
GPJ.		-				· · · · · · · · · · · ·		
WAY		-						
PARK					L	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
KEL		GROUNDWATER DATA DRILLING	DATA			Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
HOE		X FREE WATER NOT AUGER 33/4"	HOLLO	W STEM			οσατσοιινι	01007=
AVID	ENC	COUNTERED DURING DRILLING WASHBORING FR	OM	FEET			GEVIEUHN	
1 - D		<u>BLS</u> DRILLER <u>[</u>	<u>DWJ</u> LC	OGGER			FR	IUM THE GROUND UP
691.0		CME 55TRK	ORILL F	RIG		Dav	/id Hoekel Park	wav
J024		HAMMER TY	PE <u>Aut</u>	0_		P	hase 2A, B, and	c
, WL		HAMMER EFFICI	ENCY_	<u>88</u> %		W	entzville, Misso	uri
2002	RE	MARKS: Sta 61+00.00						
SING						LO	g of Boring:	B-18
1 BOF								
IG OF						Pro	ject No. J0246	691.01
LO								

			с, D		SH	EAR STRENGT	H, tsf
Sur	face Elevation: <u>665.0</u> Completion Date: <u>5/25/2016</u>	U	T (pc NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
	Datum: msl	C LO	ER/OU	В	0.5 1	1.0 1.5 2	2.0 2.5
포뇨		RAPHIC	NIT WE BLOW (RECOV	SAMPL	STANDARD	ALUE (BLOWS PE (ASTM D 1586)	RESISTANCE ER FOOT)
N FE	DESCRIPTION OF MATERIAL	Ū	RT U SPT U		w.	ATER CONTEN	Г, %
			DR CC		10 2	20 30	40 50 LL
	Topsoil - 12 inches	<u> </u>					
				ST1	· · · · · · · · · · ·	+ · · · · · · · · · · · · · · · · · · ·	
	Medium stiff to stiff, orangish-brown and gray CLAY - CH		0.4.5	000	· · · · · · · · · · · · · · · · · · ·		
— 5	_		3-4-5	552	· · ·	· · · · · · · · · · · · ·	
	-		3-3-5	<u>SS3</u>			
≻'	_		3-4-4	SS4		•	
z – 10	_						
OSEG	-						
	_				· · · · · · · · · · · ·		
	-		3-4-6	SS5	<u> </u>	♦ :::::::::::::::	
10 10	Boring terminated at 15 feet.						
	_						
0 2	_				· · · · · · · · · · · ·		
ວ ວຼ — 20	_						
RAPH	-						
AL.	-				· · · · · · · · · · · · · · · · · · ·		
() (ADU	_						
호— 25	_						
5	_				· · · · · · · · · · · · · · · · · · ·		
_ 30	_						
±	_						
-	-						
	-						
5 - 35	_						
5 8	_						
.GPJ							
KWA)	_				· · · · · · · · · · · ·		
L PAR	GROUNDWATER DATA DRIL				Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
IOEKE	X FREE WATER NOT	3/4" HOLLO	W STEM		Date: 4/15/2016	Uate: 1/24/2017	Date: 1/24/2017
EN	COUNTERED DURING DRILLING WASHBORIN		FEET			GEOTECHN	OLOGY롱
01 - D/	BLS DRILLE	R <u>DWJ</u> LC	OGGER			F	ROM THE GROUND UP
4691.(<u>CME 55</u>	<u>FRK</u> DRILL F	RIG		Da	vid Hoekel Park	way
VT 103			<u>)</u> 88 %		P W	hase 2A, B, and entzville, Misso	l C buri
× 2002	EMARKS: Sta 57+00.00		<u></u> 70			-	
30RING					LC	g of Boring:	B-19
C O L					Dro	iect No. 1024	691 01
Ŏ					110	JUNI 10. 0024	

		650.0	2/	25/2046		с Э		SH	EAR STRENGT	H, tsf
	Surfa	ace Elevation: 659.2	Completion Date:	25/2016	0	NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl			LO LO	HOGH NOT	S	0.5 1	1,0 1,5	2,0 2,5
					임		IPLI			
	포뉴				SAP		SAN		(ASTM D 1586)	LKTOOT)
	EPT	DESCR	IPTION OF MATE	RIAL	5			w	ATER CONTEN	Т. %
	ΩZ					COL		PLI 10 2	20 30	40 50 LL
		Topsoil - 12 inches			<u>xa iz</u>				· · · · · · · · · · · · · · · · · · ·	
		Stiff, orangish-brow	n and gray CLAY - CH			2-4-5	SS1		•	
		_								
		_				3-4-5	SS2			
	— 5-	_								
		-				2-4-6	553		• • • • • • • • •	
		_				2.10				
PES .		_				3-5-8	<u>SS4</u>			
IL TYI	— 10-	_				000	004			
N SOI		_								
JRPO								· · · · · · · · · · · · · · · · · · ·		
S BET		_				357	00F	· · · · · · · · · · · ·		
ARIES RATIC	— 15-	Boring terminated a	at 15 feet.			J-J-1	335	· · · · · ▲ · · · •		
e boi R ILL		-								
IMATI G FO		_								
ROX IC LO	— 20-	_								
E APF 8APHI		_								
T THE		_								
DUAL		_								
EPRE GRA	- 25-									
ES RI Y BE		_								
N LIN		_								
ATIOI SITIO		_								
LIFIC/	_ 30_	-								
I RA		_								
NP2		_								
E.GP(_								
NE ME	25	-								
CLOP	- 35-									
00 r		_								
Y.GP		-								
RWA		-								
L PAF		GROUNDWATER D	ATA	DRILLING D	ΑΤΑ			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
DEKE					<u></u>			Date: 4/15/2016	Date: 1/24/2017	Date: 1/24/2017
1D HC	ENC		DRILLING	AUGER <u>33/4"</u> H					GEOTECHN	
- DAV			v D		N.I.I.C					FROM THE GROUND UP
.1.01										
32469				HAMMER TYPE	E Aut	0		Da ^r	vid Hoekel Parl	kway d C
NL J(HAMMER EFFICIE	NCY	 88_ %		Ŵ	entzville, Miss	ouri
002 \	RE	MARKS: Sta 53+00.0	00							
ING 2								LO	G OF BORING	: B-20
BOR										
G OF								Pro	ject No. J024	691.01
LC									-	

	Surface Elevation: <u>674.0</u> Completion Date: <u>6/10/2016</u>			0/40/0040		θ		SHEAR STRENGTH, tsf							
	Surfa	ce Elevation: 674.0	Completion Date: _	6/10/2016	0	ATS /RQ		Δ - UU	/2	0 -	QU/2		🗆 - SV		
	Г	Datum msl			ΓŎ	ENUCH NUCH NUCH NUCH	S	0,5	1	0	1,5 2	0	2,5		
					일	N C C	IPLI	STANDARD PENETRATION RESISTANCE							
	보는				SAPI		SAN	(ASTM D 1586)							
	E E E	DESCR	IPTION OF MA	TERIAL	5				WA		ONTENT	. %			
	ΞZ					COL		PL	2	0 3	3 0 4	, <i>,</i> , , , , , , , , , , , , , , , , ,	50	LL	
		Stiff, brown and gra	y, silty CLAY - (CL)												
														•••	
						2-4-5	SS1		· · ·				· · · · ·	· · · ·	
	- 5-														
									· · · · · ·	· · · · ·			· · · · ·	· · · ·	
		Stiff to very stiff, bro	own and gray CLAY - (C	CH)											
ES .						3-8-10	<u>SS2</u>							60	
ONLY	— 10—					0010	002								
N SOI									::::	· · · · ·		 	· · · · ·	::	
WEE															
N PU						2 6 10	662								
RIES	— 15—					3-6-10	553								
USTF															
E BOI									:::	· · · · ·		 	· · · · ·	::	
G FO										· · · · ·		· · · ·			
ROX C LO	— 20—					3-6-9	554		.▲.●.					• •	
APP															
HT HS									 	 	· · · · · ·	 	· · · ·	· · · ·	
DUAL															
EPRE GRA	— 25—					4-7-8	SS5		.▲. ●						
IES R															
NUN									: : : : : :	· · · · ·		 	· · · · ·	::	
SITIC															
TRAN	— 30—					4-8-8	SS6								
STRA									· · · ·	· · · · ·		· · · ·		· · · ·	
AND2		Hord move	alu anustallina thiste	Idad aliably		4000/			· · · ·		 		· · · · ·	::	
NC AE.GF		weathered LIMEST	ONE (boulder)	uceu, siiyfilly		<u> </u>	NQ1		· · · · ·	· · · · ·	· · · · · ·		· · · · ·		
NE N	- 35-	Tan CLAY with sand	d and gravel - CH												
0 CLC						<u>100%</u>	NO2							· · · ·	
PJ 0						92%	INQZ		· · · ·	· · · · ·			· · · ·		
AY.G									· · ·					· · · ·	
RKW															
EL PA		GROUNDWATER D	ATA	DRILLING [DATA			Drawn by:	AGB	Checke	d by: BJS	App'v	d. by: CKI	K 7	
10EK.		X FREE WATER N	от	AUGER _3 3/4" H	IOLLO	W STEM									
VID F	ENC	OUNTERED DURING	DRILLING	WASHBORING FRO	ОМ	FEET				GEOT	ECHN	ULO	GYZ	;	
1 - D/				BLS DRILLER D	<u>LD</u> LC	GGER					FR	OM THE	GROUND UP	'	
5 91 .0				<u>CME 750X</u> DF	RILL RI	G			Dav	rid Hoe	kel Park	wav			
J024(HAMMER TYP	E <u>Aut</u>	<u>0</u>			Pł	nase 2/	, B, and	Ċ			
2 WL				HAMMER EFFICIE		<u>83_</u> %			We	entzvill	e, MISSO	uri			
3 200.	REN	ARKS: Sta 66+09.0	00, Offset 46.75 LT									n •••			
BORINC									LOG	J OF B	JRING:	B-201	I		
OG OF I									Proj	ect No	. J0246	91.0	1		
	-														

1					θ		SHEAR STRENGTH, tsf							
	Surfa	ace Elevation: <u>6/4.0</u> Completion Date: _	6/10/2016	(J)	, (pc NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV					
		Datum: msl		LOC	GHI	ES	0.5 1	0 1.5 2	.0 2.5					
				HIC	N N N N N N N N N N N N N N N N N N N	MPL	STANDARD I	PENETRATION LUE (BLOWS PE	RESISTANCE R FOOT)					
	ΞШ			RAP	BLO BLO	SAI	(ASTM D 1586)							
	N FE	DESCRIPTION OF MAT	ERIAL	G	XY U SPT SRE		BLI WA	ATER CONTENT	[,] ,%					
					E°.S		10 2	0 30 4	0 50 ILL					
		Tan CLAY with sand and gravel - CH (cont	inued)		67%	NOO								
		Core loss - 1 7 feet			63%	NQ3								
			_					· · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·					
	— 45—	Dense, fine to coarse SAND with gravel - S	P											
PES					15-18-25	SS 8								
ONLY ONLY	— 50—													
EN SC														
URP		Dense, tan, fine SAND - SP												
ES BE TON F					15-21-26	SS9								
DARIE	- 55-													
SOUN									· · · · · · · · · · ·					
IATE I FOR														
SOXIN CLOG	- 60-	with silt			10-15-15	SS10								
APPF														
L THE		Medium stiff, tan to gray, clayey SILT, trace	sand - ML											
ESEN ⁻						0011	· · · · · · · · · · · ·	· · · · · · · · · · ·						
REPRI	- 65-				2-4-4	5511	🛦							
NES F IAY B														
ION LI		Medium dense, tan, fine SAND, trace silt - S	SP				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · ·						
ICAT					5-8-10	SS12								
RATIF 45 TR	— 70—													
E: ST														
NOT GPÅ								· · · · · · · · · · ·	· · · · · · · · · · ·					
NE ME	75	Stiff, gray, sandy SILT - ML												
CLON	- 75-													
00 fe							· · · · · · · · · · ·							
AY.G														
ARKM					4-5-6	SS13								
KEL P		GROUNDWATER DATA	DRILLING D	ATA			Date: 7/8/2016	Date: 1/24/2017	Date: 1/24/2017					
HOE		X FREE WATER NOT	AUGER <u>3 3/4"</u> H	OLLO	W STEM			οσοτσοιικί	01.00V=					
DAVID	ENC	OUNTERED DURING DRILLING	WASHBORING FRO	M	FEET									
.01 - 1			BLS DRILLER DL	<u>.D</u> LC	GGER									
24691			<u>CME 750X</u> DR		G		Dav	vid Hoekel Park	way					
VL JO				<u>NCY</u>	<u>5</u> 83 %		W	entzville, Misso	uri					
2002 V	REI	MARKS: Sta 66+09.00, Offset 46.75 LT			<u></u> ,.									
SING 2								CONTINUATION	OF B-201					
F BOF														
0 90							Proj	ject No. J0246	91.01					
Ľ.							1							

ſ				<u></u>		εo			SH	EAR S	STREN	GTH,	tsf			
	Surfa	ace Elevation: 674.0	Completion Date:	6/10/2016	(7)	RQI RQI		Δ - υι	J/2	C) - QU/2	2		🗆 - SV		
		Datum: msl			l Ö	HUC NUC	ល	0,5	1	.0	1,5	2,0	C	2,5		
					Ξ		PLE	STAND	ARD	PENE	TRATI		ESIS	TANCE		
	тĿ				APF		SAM	▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)								
	山田	DESCR	IPTION OF MA	TERIAL	GR		0)									
	ΠN					Y R R R R R R R R R R R R R R R R R R R			•••				70			
_		Stiff gray sandy SI	IT-ML (continued)					10	2	20	30	40)	50		
-											· · · · · ·					
		-							· · · · · ·			::	· · ·			
	- 85-	Stiff, gray CLAY wit	h sand and gravel - Ch	4												
		-							· · · · · ·							
		-														
, –		-							· · · · · ·	1.1		::				
5	00					3-7-8	SS14		i∎: I							
	90	_							· · ·	· · ·						
SOS –		-							· · · ·			::	· · ·			
-URF		-														
		-									· · · · · ·					
	- 95-	-														
INDO		Hard, tan and gray,	very finely crystalline,	massive, fresh to												
		unconfined compres	ssive strength = 883 ks	sf (6,132 psi)		<u>91%</u>	NO4		· · · · · ·	::		::				
		Core loss - 2 inches	3			50%	NQ4									
	-100-	with shale seams		/												
RAPI		shale seam		//					· · · ·	1.1						
		Core loss - 5 inches	$\frac{3}{2}$	kef (20,868, pei)		<u>95%</u>	NO5				 					
		shale seam	ssive strength – 5,005	ksi (20,000 psi)		72%	NGO		· · · ·	::		::				
	-105-	unconfined compres	ssive strength = $2,606$	ksf (18,099 psi)						· ·						
AY B		Moderately hard, gr	ay, medium bedded SI	HALE with					· · ·	::		::	· · ·			
		limestone seams	ssive strength = 3299	ksf (22 911 psi)		100%	NOC		· · · ·			::	· · ·			
NSITI N			0,200			22%	NQO		· · · ·		 					
TRAN	-110-															
皆		moderately hard, wi	ith chert nodules							· ·						
i de			elow			100%			· · · · · ·	::			· · ·			
Е.G.		-				20%	NQ7		· · · ·			::	· · · · · ·			
≥ – NE	-115-	chert layer - 5 inche	es													
		chert layer - 4 inche	es						· · · · · ·	1.1			· · ·			
00 Fc		chert layer - 4 inche	es	_												
4Y.GI				/		100%			· · · · · ·				· · ·			
RKW/						45%	NQ8					· · · ·				
EL PA		GROUNDWATER D	ATA	DRILLING	DATA			Drawn by:	AGB	Che	cked by: I	BJS	App'v	d. by: CKK		
OEKE			ОТ	ALIGER 3 3/4"		WSTEM		Date: 7/8/	2016	Date	: 1/24/20	17	Date:	1/24/2017		
VID H	ENC	OUNTERED DURING	DRILLING	WASHBORING FR	OM	FFFT				GEO	TECH	INC	LO	GYZ		
- DA				BLS DRILLER)GGFR			1			FRO	MTHE	GROUND UP		
91.01				CMF 750X D		G			-							
0246				HAMMER TYP	PE Aut	0			Dav P	vid He hase	Dekel P 2A. B.	arkw	ay C			
WL J				HAMMER EFFICIE		 <u>83_</u> %			Ŵ	entzv	ville, Mi	ssou	ri			
2002	RE	MARKS: Sta 66+09.0	00, Offset 46.75 LT		-	_										
DNI)F 8-201			
BOR													-201			
G OF									Pro	iect I	No. JO	2469	91.0 [,]	1		
2										,						

Г		674.0	6/10/2016		с G			SHE	AR STRE	NGTH	, tsf		
	Surfa	ace Elevation: 674.0 Completion Date: _	6/10/2016	U	T (pc NTS //RQ		∆ - UU	/2	0 - QL	J/2		- SV	
		Datum: <u>msl</u>		C LO	ER DE	ËS	0.5	1	0 1.5	2	0	2.5	
-	Η			RAPHIC	NIT WE BLOW O RECOV	SAMPL	STANDARD PENETRATION RESISTANCE ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)						
Ĺ		DESCRIPTION OF MA	TERIAL	0	SPT SPT ORE			WA		ITENT	, %		
		×			500		10	2	0 30	4	0	50	
_					-		· · · · · · · · · · · · · · · · · · ·	· · ·		· · · · · · ·			
		Boring terminated at 122.5 feet.						· · · · · ·		· · · ·	· · · · ·		
		-					· · · · · · · · · · · ·	· · ·		· · · ·			
	-125 —												
_		-					· · · · · · · · · · · · · · · · · · ·	· · · ·		· · · ·			
S								· · ·		· · · ·			
L TYP	130-												
IN SOI		-						· · ·		· · · · · ·			
DURPO										· · · · · ·			
ES BE	405							· · · ·		· · · · · · ·			
ISTRA:	-135-							· · ·		· · · ·			
		-					· · · · · · · · · · · · · · · · · · ·	· · · · · ·		· · · · · · ·			
IMATE DG FOI		-					· · · · · · · ·	· · ·		· · · · · · ·	· · · · ·		
PROX HIC LC	140 —												
HE AF							· · · · · · · · · · · · · · · · · · ·	· · · ·	· · · · · · ·	· · · ·	· · · · ·		
UAL							· · · · · · · · · · · · · · · · · · ·	· · ·		· · · ·			
EPRES GRAD	-145							· · ·					
IES RE	145							· · ·		· · · ·			
		-						· · ·		· · · · · ·			
ICATIC										· · · ·			
RATIF IIF TR⊄	150 —												
E: ST		-						· · · ·		· · · · · · ·			
E.GP								· · · · · · ·		· · · · · · ·			
ONE M	-155-	-											
		-						· · · · · ·	· · · · · · ·	· · · · · · ·	· · · · ·		
GPJ		-					· · · · · · · · · · · · · · · · · · ·	· · ·		· · · · · ·			
KWAY								· · · · · ·	· · · · · · ·	· · · ·	· · · · ·	· · · · · ·	
il par		GROUNDWATER DATA	DRILLING D	<u>ATA</u>	1		Drawn by:	AGB	Checked by	/: BJS	App'vd.	by: CKK	
JOEKE		X FREE WATER NOT	AUGER _3 3/4" H	OLLO	W STEM		Date: 7/8/2			2017		24/2017	
AVID H	ENC	OUNTERED DURING DRILLING	WASHBORING FRO	DM	FEET				GEOTEC	CHN	JLOG	Ϋ́́́́	
.01 - D			<u>BLS</u> DRILLER <u>DI</u>	<u>_D</u> LC	GGER					FR	UM IHE GR	UUNU UP	
24691			<u>CME 750X</u> DR		G			Dav	vid Hoekel	Parky	vay		
ML JO			HAMMER EFFICIE	NCY	<u>-</u> 83_%			We	entzville, l	Misso	uri		
2002	REMARKS: Sta 66+09.00, Offset 46.75 LT			-				~			OF		
ORING							LOG OF BORING: B-201						
3 OF B(Proi	oct No	10246	91 01		
Ľ								10		50240	51.01		

[669.2	6/40/2046		с, D		SH	EAR STRENGT	H, tsf				
	Surfa	ace Elevation: Completion Date: _	0/10/2010	U	T (po NTS //RQ		∆ - UU/2	○ - QU/2	🗆 - SV				
		Datum: msl		CLO	ER/OU	В	0.5	1.0 1.5 2	2.0 2.5				
	TH			RAPHIC	NIT WE BLOW (RECOV	SAMPI	STANDARD PENETRATION RESISTANCE ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)						
	. HE	DESCRIPTION OF MA	TERIAL	U U	XY U SPT ORE		BIL W	ATER CONTEN	Г, %				
				.,, ,	800		10	20 30	40 50				
		Topsoil - 18 inches											
		Brown CLAY - CH											
		-					· · · · · · · · · · · · · · · · · · ·						
	— 5-	-											
		-											
		-											
rPES Y.		-					· · · · · · · · · · · · · · · · · · ·						
OIL T	— 10-												
S NES		-											
I PURF		-											
ATION	— 15-												
USTR		 trace sand and gravel 					· · · · · · · · · · · ·						
E BOU		rough drilling from 17 to 20 feet											
KIMAT DG FC		-											
PRO HIC LC	— 20-	trace sand											
HE AF GRAP		-					· · · · · · · · · · · · · · · · · · ·						
LAL. (-											
PRESI		-											
ES RE Y BE (- 25-	-											
N LINE		-					· · · · · · · · · · · ·						
SATIO		-					· · · · · · · · · · · ·						
ATIFIC TRAN	— 30-	-											
STR 24HF		-											
NOTE:		-					· · · · · · · · · · · · · · · · · · ·						
E ME.0		rough drilling from 34 to 36 feet					· · · · · · · · · · · · · · · · · · ·						
CLONI	— 35—												
00 f		-											
AY.GF		-											
ARKW.													
KEL P/		GROUNDWATER DATA	DRILLING D	<u>ATA</u>			Drawn by: AGB Date: 7/8/2016	Checked by: BJS Date: 1/24/2017	App'vd. by: CKK Date: 1/24/2017				
ЮЕ			AUGER <u>33/4"</u> H	ollo	W STEM			оготгоны					
DAVIE	EN	ICOUNTERED AT <u>42</u> FEET ¥	WASHBORING FRC	DM	FEET				ULUGI (C) Rom the ground up				
1.01 -			<u>IPD</u> DRILLER <u>EE</u>	<u>=R</u> LC	DGGER								
02469			HAMMER TYPE	E Aut	5		Da P	vid Hoekel Park hase 2A. B. and	way I C				
r Nr J			HAMMER EFFICIE	NCY_	<u>88</u> %		W	/entzville, Misso	ouri				
G 2002	RE No	MARKS: Sta 67+52.93, Offset 46.75 LT soil sampling performed.							B-301				
BORIN									5-001				
OG OF							Pro	ject No. J024	691.01				
-1							1						

		0//0/00/0		θŪ				SH	EAR	STREN	IGTH	, tsf		
Surfac	ce Elevation: <u>668.2</u> Completion Dat	te: _6/10/2016_	0	/RQ		Δ	- Ul	J/2	() - QU/	2		0 - 5	SV
	Datum: msl		ĽŎ	GH UÖUT	ES		0.5		.0	1.5	2	0	2,5	5
			HIC		MPL	ST		N-VA	PENE	ETRAT (BLOW	ION F S PEI	RESI R FO	STA OT)	NCE
표뇨			RAP	REC REC	SAI				(A	STM D 15	86)			
.ded	DESCRIPTION OF N	IATERIAL	G	KY U SPT DRE				W	ATER		ENT	, %		
				RO		PLF	10	:	20	30	4	0	50	
	Brown CLAY - CH (continued)					· · ·	· ·	 	· · ·	· · · ·	 	· · ·	· · ·	· · · ·
	Brown, fine SAND - SP	<u>⊽</u>							· · ·	· · · · ·	· · · ·			
										· · · ·				
— 45—														
								· · · · ·	· · ·	· · · · ·	· · ·		· · ·	· · · · ·
						· · · ·	: :	 	 		 			
								· · · · ·		· · · · ·	· · · ·			
— 50—									· ·	· · · · ·				· · · ·
						· · · · · · ·	· · · ·	· · · · ·		· · · · ·	· · · ·		· · ·	· · · · ·
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- 55-														
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						· · · ·	: :		· ·					· · · ·
						· · · ·		 		· · · · ·	· · · · · ·			· · · · ·
- 60 -							: :							
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05						· · · ·	· ·				· · ·			· · · · ·
_ 00 _						· · ·		 	· · ·				· · ·	· · · ·
								· · · · ·	· · ·	· · · · ·	· · ·			· · · · ·
						· · · ·	· ·				 			· · · · ·
— 70—														
									· · ·	· · · · ·	· · ·			· · · · ·
						· · ·	· ·	 	 		 			
	Gray SILT - ML							· · · · ·		· · · · ·	· · · · · ·			· · · · ·
— 75—										· · · ·				· · · ·
						· · · ·	::		::	· · · · ·				· · · ·
								· · · · ·		· · · · ·	· · · · · · · ·			· · · · ·
								· · · · ·	· · · ·	· · · · ·	· · ·			· · · · ·
	GROUNDWATER DATA	DRILLING DA				Drav	vn by: : 7/8/	AGB (2016	Che	ecked by: e: 1/24/20	BJS 017	App'v Date:	/d. by: 1/24/	CKK 2017
		AUGER <u>_3 3/4"_</u> HO	LLO	N STEM					0.50			<u> </u>	<u></u>	_
ENC	COUNTERED AT <u>42</u> FEET ⊻	WASHBORING FROM	И	FEET					GEL	IJĘĹ	HN	JLU	GRANN	S
		TPD DRILLER EEF	<u>R</u> LO	GGER							L V.	.m 18C	anuun	U U F
		<u>CME 55TRK</u> DRI	ILL R	IG				Da	vid H	oekel I	Parkv	vay		
			<u>Auto</u>	<u>)</u> 38 %				W W	nase entzv	ville, M	and issoi	uri		
REN	ARKS: Sta 67+52.93, Offset 46.75	LT	01 <u> </u>	<u>, 10</u>										
Nos	soil sampling performed.							LO	CONT G OF	BORI	ion NG: I	OF 3-30 ⁻	1	
								D	io - 1		0040	04 0	4	
								P10	ject	INO. J	UZ40	J1.0	1	

ſ			6/10/2016		ଳ ପ୍		SH	EAR STRENGTH	l, tsf					
	Surfa	ace Elevation: Completion Date: .	0/10/2010	Q	T (po NTS		∆ - UU/2	○ - QU/2	🗆 - SV					
		Datum:		СГО	ER/COU	LES		1.0 1.5 2	2.0 2.5					
	L			PHIC		AMP	SIANDARD PENEIRATION RESISIANCE ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)							
	EETH FEET	DESCRIPTION OF MA	TERIAL	GR/		Ś								
	ΞZ				COF SP COF		PL 10		1, 70 10 50					
		Gray SILT - ML (continued)												
-		Grav CLAY with limestone ledges - CH												
							· · · · · · · · · · ·							
	- 85-	Auger refusal at 84.5 feet.		////										
							· · · · · · · · · · ·							
		-												
LY FE	_ 90-													
SUL SES ON		_												
WEEN JRPOS														
S BE I		_												
TRAT	- 95-	_												
RUUN		-												
MATE G FOR		_												
	—100-	-												
HE API SRAPH		_												
LAL. O		_												
GRADI	105	-												
LS RE	105	_												
		-												
NSITI		-												
HA 存 TR/	—110-	-												
ND24		-												
1E.GP		-												
ONE N	-115-	-												
00 CL		-												
(.GPJ		_												
RWA		-					· · · · · · · · · · · · · · · · · · ·		<u> </u>					
EL PAF		GROUNDWATER DATA	DRILLING D	ATA			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK Date: 1/24/2017					
HOEK			AUGER <u>33/4"</u> H	ollo	W STEM									
DIVAC	EN	NCOUNTERED AT <u>42</u> FEET ⊻	WASHBORING FRC	M	FEET			GEUIECHN	ULUGYS					
1.01 - [TPD DRILLER EE	ER LC	OGGER									
02469			HAMMER TYPE	E_Aut	<u>0</u>		Da F	vid Hoekel Park hase 2A, B. and	way C					
L JW			HAMMER EFFICIE		<u>88</u> %		Ň	/entzville, Misso	uri					
G 2002	RE No	MARKS: Sta 67+52.93, Offset 46.75 LT soil sampling performed.						CONTINUATION	OF					
BORIN							LO	g of Boring:	B-301					
DG OF							Pro	ject No. J024	691.01					
Ц							1							

				<u> </u>		SHE	EAR STRENGTH	l, tsf
	Surfa	ce Elevation: <u>665.0</u> Completion Date: <u>6/9/2016</u>	-	(pc (RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl	100 100	H U U U N N N	S	0,5 1	0 1,5 2	0 2,5
			읮		1PLE			
	포뉴		ZAP	ALD/	SAN		(ASTM D 1586)	K1001)
	FEI	DESCRIPTION OF MATERIAL	5			WA	TER CONTENT	. %
	ΩZ			CON		PL 10 2	0 30 4	0 50 LL
		Topsoil - 18 inches	<u>i</u> <u>i</u> <u>i</u>	-				
		Medium stiff to stiff, brown and gray CLAY with lignite						
		nodules - (CH)						
					HA1			
	- 5-							
6		~						
LYPE\$	10	trace sand and gravel		2-5-6	SS2	: : : : \ : : €●		· · · · · · · · · · · · · · · · · · ·
SOIL S	_ 10_							
POSE								
ETW								
ATION	_ 15_			4-6-7	SS3		•	
NDAR STR ⁴	15							
BOU								
MATE 3 FOF				102	OT4			
C LOC	— 20—			103	514		•••••••	
APP								
T THE								
DUAL						· · · · · · · · · · ·	· · · · · · · · · · · ·	
EPRE GRA	- 25-			2-4-6	555		. •	
NES F AY BE								
CATIC				4-6-9	922			
EATIFI	— 30—			4-0-9	000	· · · · · · • • • • • • •		
STF 2014								
		Medium dense, brown SAND with clay and gravel - SP						
ME.0				3-7-8	S S7			
ONE	- 35-							
00 CI				-				
GPJ		fine to medium						
KWAY			⊻	9-15-10	SS8			· · · · · · · · · · ·
PAR				I	1	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
EKEL						Date: 7/8/2016	Date: 1/24/2017	Date: 1/24/2017
JD HC							GEOTECHNI	
- DAV	EN	UOUNIERED AI <u>39</u> FEEI ¥ WASHBU TDO DD						OM THE GROUND UP
1.01		<u>TFD</u> DRI CMF	55TRK DRILL F	RIG				
02465		HAV	IMER TYPE Aut	- 0_		Dav Pl	hase 2A, B, and	way C
n Jw		HAMME	R EFFICIENCY	<u>88</u> %		We	entzville, Misso	uri
2002	RE	MARKS: Sta 67+49.93, Offset 53.25 RT						
SING	Han	id auger to depth of approximately 5 feet.				LOC	G of Boring:	B-303
F BOI								
0 90						Proj	ject No. J0246	91.01
						1		

[CCE 0		C/0/2010		с С			SF	IEAR S	STRENC	STH, t	sf		
	Surfa	ace Elevation:	Completion Date: _	6/9/2016	0	ATS /RQ		Δ-	UU/2	() - QU/2		🗆 - SV		
		Datum: msl			L00	HOO Y	S	C	0.5	1,0	1.5	2,0	2.5		
					呈	N C C E	APLI	STA				DN RE			
	포뇨				RAP	BLO	SAN	(ASTM D 1586)							
	릅끤	DESCR	IPTION OF MAT	ERIAL	σ	PT I			N	/ATER		ENT, %	, D		
	∠∠					RSS			10	20	30	40	50 LL		
		Medium dense, brow	wn SAND with clay and	gravel - SP		-									
		Stiff brown candy						· · · · ·	· · · · ·				· · · · · · · · ·		
		Still, brown, sailby c							· · · · ·		· · · · · ·	· · · · · ·	· · · · · · · · · · · · · · · · · · ·		
	45					2-5-5	SS9	· · · · ·	A I I I I			.	· · · · · · · · ·		
	— 45—	-						· · · ·	· · · ·						
		Medium dense brov	wn_fine_SAND - SP			-									
S															
IYPE. LY.	- 50-					2-4-8	SS10		1411			· · ·			
SOIL .	50	_				-		· · · · ·	· · · ·				· · · · · · · · ·		
EEN :		-]		· · · · ·					· · · · · · · · · · ·		
BETW I PUR						-			· · · ·				 		
VIES E	_ 55_					5-10-13	SS11					::::			
NDAF ISTR/	55							· · · · ·	· · · · ·				· · · · · · · · ·		
BOU RILLU		Stiff, sandy SILT - N	ЛL						· · · · ·		· · · · · ·	· · · · · ·	· · · · · · · · · · · · · · · · · · ·		
MATE 3 FOF									· · · ·						
ROXII C LOC	— 60—	-				5-5-7	SS12								
APHIC		-											· · · · · · · · ·		
TTHE . GR		Medium dense, gray	y, silty SAND - SP												
DUAL		-											· · · · · · · · · ·		
EPRE GRA	— 65—					6-14-18	SS13				🛦 .				
NES R AY BE								· · · · ·	· · · · ·	· · · ·	· · · · · ·	· · ·	· · · · · · · · · · · ·		
N LIN N M								· · · · ·	· · · · ·			:: :			
CATIC		-				5710	0014			· · · ·	· · · · · ·	· · · ·	· · · · · · · · · · · · · · · · · · ·		
ATIFI TRA	— 70—					5-7-10	3314			· · ·	· · · · ·	· · ·	· · · · · · · · · · ·		
STR		_													
IOTE:		Very stiff, gray, sand	dy SILT - ML		\square				· · · ·			· · ·	· · · · · · · · ·		
N ME.G						4 8 10	9915								
ONE	— 75—	-				4-0-10	3313		· · · · ·	• • •	· · · · · ·	· · ·			
00 CL		-							· · · · ·			.			
GPJ		Medium stiff, gray, s	silty CLAY - CL		////				· · · · ·		· · · · · ·		· · · · · · · · · · · · · · · · · · ·		
WAY		1				2-3-5	SS16		· · · ·				· · · · · · · · ·		
PARK			ATA		<i>\/////</i>	{		Drawn	by: AGB	Che	cked by: B	JS A	p'vd. by: CKK		
EKEL		GROUNDWATER D		<u>DRILLING I</u>	JAIA			Date:	7/8/2016	Date	e: 1/24/201	7 Da	ate: 1/24/2017		
о ноі			-	AUGER <u>3 3/4"</u> H	IOLLO	W STEM				CEU		MUI	UCV∑		
DAVI	EN	COUNTERED AT 39 F	FEET ⊻	WASHBORING FRO		FEET			C	uLU	ILUI	FROM	.VUI 🗂		
1.01 -					<u>ER</u> L(JGGER									
2469				UIVIE DOTKK D	νται μ.μ. Η 19 Γ΄ Δινθ	0			Da	avid He		arkwa	у		
NL JO						<u>-</u> 88 %			v	Ventz	/ille, Mis	souri			
002 V	REI	MARKS: Sta 67+49.9	93, Offset 53.25 RT												
ING 2	Har	nd auger to depth of	approximately 5 fe	et.					10				: 303		
BOR												J. D-			
G OF									Pro	piect	No. JO	24691	.01		
Õ															

	005.0		θ		SHEAR STRENGTH, tsf							
Surfa	ace Elevation: 665.0 Completion Date: 6/9/2016		D LTS NO		∆ - UU/2	○ - QU/2	🗆 - SV					
	Datum: msl	Ŏ	H N N	ŝ	0,5 1	,0 1,5 2,	0 2,5					
		10		L L	STANDARD I	PENETRATION F	RESISTANCE					
		Ηd		AMF	▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)							
ΗH		GRA		S		(
	DESCRIPTION OF MATERIAL		NPT NRE		W/	ATER CONTENT	, %					
			E°S		10 2	0 30 4	0 <u>50</u>					
	Medium stiff, gray, silty CLAY - CL (continued)	////										
	Very stiff, gray CLAY with sand, trace gravel - CH											
	_		1 6 10	0017	· · · · · · · · · · · ·							
- 85-	-		4-0-10	3317								
	limestone ledges, rough drilling											
(0	-											
Щ. Ч.	Hard, gray to tan, finely crystalline, thin bedded, moderately weathered LIMESTONE		<u>73%</u>	NO1								
⊢⊒ — 90- ≓o	Core loss - 7 inches		0%	NQT								
IN SC SES	shale seam - 2 inches	<u> </u>										
RPC	Grav green shale											
	Core loss - 10 inches		6 <u>7%</u> 22%	NQ2								
	unconfined compressive strength = 1,563 ksf (10,851 psi)											
STR	Core loss - 6 inches											
	Core loss - 6 inches		Ī									
ATE FOR	Core loss - 8 inches		<u>32%</u>	NO2								
MIX0	with chert		0%	INQ3								
ନ୍ମୁ <u> </u>	Core loss - 20 inches		-									
RAPI	 Hard, gray and tan, very finely to finely crystalline, medium bedded, slightly to moderately weathered LIMESTONE with 	FT										
10 10	chert nodules and clay seams	<u> </u>	1									
DUA	unconfined compressive strength = 1,476 ksf (10,252 psi)	H	<u>100%</u> 50%	NQ4								
₩₽ ₩ ¹⁰ —105 -												
Y BE	-											
	Core loss 25 inches	╞╧╍	-									
			<u>60%</u>	NOF								
ANSI	-	<u> </u>	13%	INQ5								
≣≝ —110- ≴⊯	unconfined compressive strength = 1,482 ksf (10,291 psi)	F	1									
24H												
D D D D D D D D	unconfined compressive strength = 2,599 ksf (18,050 psi)	<u> </u>	1 10001									
AE.G			100% 75%	NQ6								
	_											
	-	<u>H</u>										
۲ OC	chert nodule		<u>100%</u> 71%	NQ7								
Y.GP	Boring terminated at 118 feet.		7170									
KWA												
PAR			1	1	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK					
EKEL	OROUNDWATER DATA DRILLING				Date: 7/8/2016	Date: 1/24/2017	Date: 1/24/2017					
ЮНО	AUGER <u>3 3/4"</u> H	IOLLO	W STEM			COTCOUN	nunev⇒					
IN EN	ICOUNTERED AT <u>39</u> FEET ♀ WASHBORING FRO	DM	FEET									
- L	<u>TPD</u> DRILLER <u>E</u>	<u>ER</u> LO	DGGER			F K	UM THE GRUUND UP					
691.C	<u>CME 55TRK</u> D	RILL F	RIG		Dav	id Hoekel Parkv	vav					
J024i	HAMMER TYP	E <u>Aut</u>	<u>o_</u>		P	hase 2A, B, and	C					
ML	HAMMER EFFICIE		<u>88</u> %		W	entzville, Missou	uri					
	MARKS: Sta 67+49.93, Offset 53.25 RT											
Ba Ha	nd auger to depth of approximately 5 feet.						OF					
BOR						S OF BURING: 1	5-303					
D OF					Dro	inct No. 10246	91 01					
DOL					Froj	JECT NO. JU240	51.01					



1				<u> </u>		SH	EAR STRENGTH	l, tsf					
	Surfa	ace Elevation: <u>669.9</u> Completion Date: <u>6/7/2016</u>		LTS RQI		∆ - UU/2	○ - QU/2	🗆 - SV					
		Deturn msl	0 0	RYNN NUC	S	0,5 1	.0 1.5 2	.0 2,5					
					PLE	STANDARD	PENETRATION	RESISTANCE					
			APH	⊢°Ш	AMI	▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)							
	EEI TH	DESCRIPTION OF MATERIAL	GR/		S		(,						
	ЦЦЦ	DESCRIPTION OF WATERIAL		SP1 ORE		PL W/	ATER CONTENT	⁻ , % ───────────────────────────────					
						10 2	20 30 4	0 50					
		Loose to medium dense, brown, fine to medium SAND - SP (continued)		-									
		-		•									
		-		3-2-3	SS9								
	— 45-	-	¥										
				-									
		_		-									
, ES		-		367	SS10	· · · · · · · · · · ·							
- TYF	— 50-	-		3-0-7	3310								
I SOII		-											
VEEN RPOS		-											
I PUF		-											
IES E	FF			4-8-10	SS11								
IDAR STRA	- 55-			-									
SOUN		-		-									
TTE E		-											
XIMA OG F		-		12-12-12	SS12								
PRO HC L	— 60-	trace gravel											
E AP RAPI													
L. GI				-									
DUA													
EPRE GRA	- 65-	_		7-11-8	SS13								
ES RI Y BE		-											
N MA		-											
TION TION		-											
FICA		Stiff, gray SILT, interbedded with fine sand and silty clay - ML		8-12-13	SS14								
FRAT ₩F TF	— 70-												
E:ST 和2取													
NOTE GPÅN		-											
ME.0		-		3-5-6	SS15	· · · · · · · · · · · · · ·							
ONE	— 75-	-			0010								
00 CL		-											
PJ (-											
AY.G													
RKM				4-3-7	SS16	<u> </u>							
EL PA		GROUNDWATER DATA DRILLING	DATA			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK					
OEKE			ного				Date. 1/24/2017	Date. 1/24/2017					
H UI				FEET			GEOTECHN	ULUGYZ					
- DAV								IOM THE GROUND UP					
1.01 -													
2469				0		Dav	vid Hoekel Park	way					
or J				<u>0</u> 02 %		w w	entzville, Misso	uri					
02 W	RF	HAMINIER EFFICI MARKS: Sta 67+89.92 Offset 76 751 T		<u>32</u> 70									
IG 20						0	ONTINUATION	OF					
ORIN						LO	g of Boring:	B-401					
OF B						_							
LOG						Pro	ject No. J0246	91.01					

Г					SHEAR STRENGTH, tsf										
	Surfa	ace Elevation: <u>669.9</u> Completion Date:	6/7/2016		RQI RQI		∆ - UU,	/2	○ - QU/2	🗆 - SV					
		Determine msl		0 0	R NUN NUN NUN	S	0.5	1.0) 1.5	2.0 2.5					
						LE	STAND	ARD PI	ENETRATIC	N RESISTANCE					
	- F			APH		AMI	▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)								
		DESCRIPTION OF MA	ΤΕΡΙΔΙ	GR/		S									
	U N B N				Y P S S		PL	WA		NI, %					
_		Otiff, grow OUT, interhedded with fine cone	land site along MI				10	20	30	40 50					
-		(continued)													
-		Hard, gray, finely to medium crystalline, th	in bedded,		0.00/										
-		core loss - 5 inches			<u>90%</u> 10%	NQ1									
_	05														
	- 85-	shale seam													
_		Core loss - 34 inches			47%		· · · · · · ·	· · ·							
_					18%	NQ2									
- YPES															
- N N	- 90 -				100%/100%	NQ3									
N SC SES		Boring terminated at 91 feet.													
NEE JRPO															
N PL		_													
RIES	- 95-	-													
NDA ISTR		_													
BOU		-													
1ATE FOR		-													
NNO LOG	100														
PHIC	-100-	-													
GRAI		_													
AL.		-					· · · · · · ·	· · · ·							
RESE		-													
REP F GF	-105-														
NES IAY E		-													
INC -															
SATIC VSITI															
TRAN	-110-	-													
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⊻-	115														
CLOI	115														
00 Г		-													
,GP		-													
KWA															
PAR							Drawn by:	AGB	Checked by: B.	IS App'vd. by: CKK					
EKEL		GROUNDWATER DATA	DRILLING D				Date: 7/2/2	2016	Date: 1/24/201	7 Date: 1/24/2017					
IOH O			AUGER <u>3 3/4"</u> H	OLLO	W STEM			<u>ا گا</u>	ΓΛΤΕΡΠ	NULUCV⇒					
INAC	EN	COUNTERED AT <u>45</u> FEET ♀	WASHBORING FRC	DM	FEET			, Ju	CUICON						
01 - [<u>MVU</u> DRILLER <u>M</u>	<u>VL</u> LC	DGGER										
4691.			<u>CME 55LC</u> DR	RILL RI	G			Davi	d Hoekel Pa	irkway					
J02			HAMMER TYPE	E <u>Aut</u>	0			Pha	ase 2A, B, a	nd C					
2 WL			HAMMER EFFICIE	NCY _	<u>92_</u> %			vve		Souri					
3 200	REI	MARKS: Sta 67+89.92, Offset 76.75LT						C							
RING								LOG	OF BORING	6: B-401					
PF BC															
000								Proje	ect No. J02	24691.01					
Ц								-							
	CC0 4	0/40/2040		÷Ω				SH	EAR	STRE	NGTH	, tsf			
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Surfa	ace Elevation: <u>669.4</u> Completion Date:	6/10/2016	רי)	LTS NTS NRQ		L 1	1 - UI	J/2		0 - QU	/2		🗆 - S'	V	
	Datum: msl		Ĕ	IGH DOU	ŝ		0.5		1.0	1.5	2	0	2.5		
TH			RAPHIC	NIT WE BLOW C RECOV	SAMPL	ST		N-VA	PENI ALUE (A	ETRAT (BLOW STM D 1	FION I /S PE ⁵⁸⁶⁾	RESI RFO	STAN OT)	CE	
N FE	DESCRIPTION OF MA	TERIAL	Ū	SPT SPT ORE			1	W	ATEF		TENT	, %			
				E°°C		FL	10		20	30	4	0	50		
	l opsoil - 18 inches	-				· · · ·		· · · · ·	· · · ·	· · · · ·	· · ·				
	Stiff, gray CLAY, trace sand and gravel - C	СН				 			· · ·		· · · ·			· · · ·	
								· · · · ·							
— 5—	-							· · · ·		· · · ·					
						· · · ·	· · ·	· · · · ·	· · · ·	· · · · ·	· · · ·			· · · ·	
	-							· · · · ·	· · ·		· · · ·			68	
10	-				ST1	 		::: -						>>	
- 10-	Boring terminated at 10 feet.					· · · ·	· · ·	 	· · · ·	· · · ·	· · · · · ·			· · · ·	
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- 15-	-							· · · · ·		· · · ·					
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- 25-	-							· · · ·		· · · ·					
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20	-							 		· · · · ·	· · · ·			· · ·	
- 30-	-							 		· · · ·	· · ·			· · ·	
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- 35-	-					•••		· · · ·	•••		• • •			• • •	
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	GROUNDWATER DATA	DRILLING D	ΑΤΑ			Drav Date	wn by:	AGB	Che	ecked by	: BJS 2017	App'v	d. by: (CKK 017	
	X FREE WATER NOT	AUGER <u>3 3/4"</u> H0	OLLO	W STEM		Date			054)TFA		<u></u>	0.42	_	
ENC	COUNTERED DURING DRILLING		М	FEET					GEL	JIEU	HN	JLU Om the	GROUND	UP UP	
		<u>CME 55TRK</u> DR		IG				Da	vid L	lookol	Darla	N21/			
		HAMMER TYPE	Auto	<u>)</u>				P V	hase /entz	2A, B	, and	Curi			
RE	MARKS: Sta 67+89.92, Offset 72.75LT	HAMMER EFFICIEN	NCY _	<u>58</u> %						,.		-			
								LOC	g of	BORIN	NG: E	8-401	A		
								Pro	ject	No. J	10246	91.0	1		
<u> </u>										-					

	000 5	0/7/0040	θ		SHI	EAR STRENGTH	, tsf
Sur	face Elevation: 600.5 Completion Date:	<u>6///2016</u> ()	NTS NTS NRQ		∆ - UU/2	○ - QU/2	🗆 - SV
	Datum: msl	ΓŎ	IGH Sour	ES ES	0,5 1	0 1,5 2	0 2.5
			N N N N N N N N N N N N N N N N N N N	MPL	STANDARD	PENETRATION I	RESISTANCE R FOOT)
PTH				SA		(ASTM D 1586)	
N F	DESCRIPTION OF MA		SPT SPT ORE		PL W/	ATER CONTENT	, %
	Topsoil - 18 inches	<u>zł /z</u> , .			10 2	20 30 4	0 50
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	_				· · · · · · · · · · · ·	· · · · · · · · · · · ·	· · · · · · · · · · · ·
— 5	Orangish-brown CLAY, trace sand - CH						
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ν. 	_						
	-						
	brown						· · · · · · · · · ·
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S BET	_						
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	_						· · · · · · · · · · · · · · · · · · ·
FOR I	_				· · · · · · · · · · · ·	· · · · · · · · · · · ·	
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₩89 	_						
					· · · · · · · · · · · ·	· · · · · · · · · · · ·	
	with gravel						
AAY B	rough drilling from 25 to 28 feet						
ANSI7	_				· · · · · · · · · · · ·	· · · · · · · · · · · ·	· · · · · · · · · · · ·
AND24	_				· · · · · · · · · · ·	· · · · · · · · · · · ·	
N D U U U U U U U U U U U U U U U U U U U	_						
[⊿] N — 35							
00 CL(-						
GPJ	-				· · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
KWAY	_						· · · · · · · · · ·
L PAR	GROUNDWATER DATA			1	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
OEKE			-)\// qter/		Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
H EN	COUNTERED DURING DRILLING	WASHBORING FROM 4	<u>)</u> FEET			GEOTECHNI	DLOGY롱
11 - DA		 	OGGER			FR	OM THE GROUND UP
4691.0		<u>CME 55TRK</u> DRILL	RIG		Dav	vid Hoekel Parkv	vay
L J02			to		P W	hase 2A, B, and entzville, Misso	C uri
	EMARKS: Sta 67+89.92, Offset 76.75LT		<u>00</u> %			,	
St St	a 67+91.92, Offset 3.25 RT o soil sampling performed				LO	G of Boring:	B-402
DF BOF							
LOG C					Pro	ject No. J0246	91.01

ſ		000 F		0/7/0040		θŪ			SH	EAR STREN	GTH,	tsf	
	Surfa	ce Elevation: 666.5	Completion Date:	6/7/2016	0	RQ (RQ		Δ-ι	JU/2	0 - QU/2	2	0 - 5	SV
		Datum: msl			Po Po	HUC NUC	ល	0.	.5 1	.0 1.5	2,	0 2,5	5
					l₽	0 VE	IPLE	STAN					NCE
	тШ				API		SAN		▲ N-VA	(ASTM D 158	5 PEF 36)	(FUUT)	
	T III	DESCR	IPTION OF MA	TERIAL	L R				W	ATER CONT	FNT.	%	
	ΞZ					COL			0 2	20 30	4() 50	
		Orangish-brown CL	AY, trace sand - CH (continued)		[]			• • • • •				
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													· · · · ·
	- 45-												
									· · · · · ·				· · · · ·
YPES.													· · · · ·
SOL T	- 50-	rough drilling from 5	50 to 53 feet										
EN S(· · · · ·
PURP								 				· · · · · ·	· · · · ·
ES BE											::		· · · ·
DARI	- 55-												
SULUS												· · · · · ·	· · · ·
ATE E FOR												· · · · · ·	· · · · ·
DOXIM	<u></u>											· · · · · ·	· · · · ·
APPR	- 60 -	Brown, fine SAND -	SP								· · · ·		
GRA													
SENT UAL.												· · · · · ·	· · · · ·
GRAD	65	Gray SILT - ML									· · · ·		
ES RE Y BE (- 05 -												· · · · ·
N MA											· · ·		· · · · ·
ATIO SITIO											•••		· · · · ·
TIFIC,	- 70-												
STRA													
AND2													
NGF ME.GF													
ONE N	- 75-												
)0 CL(· · · · · ·			· · · · · ·	· · · · ·
) [46												· · · · · ·	· · · · ·
WAY.(· · · ·	· · · · · ·	
PARK								Drawn b	y: AGB	Checked by:	BJS	App'vd. bv:	CKK
EKEL		GROUNDWATER D		<u>DRILLING [</u>	JAIA			Date: 7	/2/2016	Date: 1/24/20)17	Date: 1/24/	/2017
DHO	FNC	X FREE WATER N	OT DRILLING	AUGER <u>3 3/4"</u> H	IOLLO	W STEM			آگم	נידטדניי	ниг	ו טכע	Z
DAVI					את <u>40</u> בי בי					ULUILUI	FRO	M THE GROUN	C) ID UP
- 1.01 -						JOGER NG			<u> </u>				
02469				HAMMER TYP	E Auto	5			Dav P	/id Hoekel F hase 2A. B	arkw	/ay C	
NL JI				HAMMER EFFICIE		_ <u>88_</u> %			Ŵ	entzville, M	issou	ıri	
2002	REN	MARKS: Sta 67+89.9	92, Offset 76.75LT		_								
RING	Sta No s	soil sampling perfor	ञ्च स । med.						LOC	G OF BORIN	IG: E	лг 8-402	
F BOI													
0 90									Pro	ject No. J()246	91.01	
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[0/7/00/0		θ			SH	IEAR S	STRENG	ΓH, ts [.]	f
	Surfa	ace Elevation: <u>666.5</u> Completion Date:	6/7/2016		TIS ROI		Δ-	UU/2	C) - QU/2		🗆 - SV
		Datum: msl			HUCK:	ŝ		0,5	1,0	1,5	2,0	2,5
				ļ		PLE	STA	NDARD	PENE	TRATIO	NRES	
	τĿ			APF		BAM		▲ N-V	ALUE (BLOWS F STM D 1586)	PERF	JOT)
		DESCRIPTION OF MA	TERIAL	R.	N B B B	0,		14		CONTER	JT 0/	
	Ξz				YR GR GR GR GR GR GR GR GR GR GR GR GR GR		PLI⊢	10	20		40	
		Grav CLAY with limestone ledges - CH							20		40	
		rough drilling from 80 to 82 feet									: : :	
		Auger refusal at 82 feet.										
										· · · · · · ·		
	— 85—	-										
		-										
		-										
ŝ		-										
TYPE ⊾Y.	_ 90_	_										
SOIL SOIL		-					· · · ·				· · · ·	
POSE		-										
PUR		-										
ES B TION		-									: : :	
DARI STRA	— 95-	-										
30UN		-					· · · · ·				· · · ·	
ATE E FOR		-										
NIX NUX		-										
PPR	—100—	-										
HE A GRAF												
ENT T		-						· · · · · ·			· · · ·	
RESE		-									· · · ·	
REP BE GI	—105—	-										
UNES MAY I												
		-										
ICAT		-								· · · · · · ·	· · · ·	
8ATIF ≩ TRA	—110—	-										
STF 24HE		-					· · · ·				· · · ·	
PANE:												
ME.G		-										
ONE	—115—	-										
0 CL		-										
sPJ C		-										
VAY.0		-								· · · · · · · ·		
ARKV							 Drawa	· · · · ·				
(EL P,		GROUNDWATER DATA	DRILLING D	<u>ATA</u>			Date:	7/2/2016	Date	: 1/24/2017	Dat	e: 1/24/2017
HOEK		X FREE WATER NOT	AUGER <u>3 3/4"</u> H	OLLO	W STEM				0			~~~
AVID	ENC	COUNTERED DURING DRILLING	WASHBORING FRC	0M <u>40</u>	FEET				GEU	IFCHI	VUL	ULIYS
1 - D			TPD DRILLER E	<u>ER</u> LC	OGGER						FROM TH	IE GROUND UP
691.0			CME 55TRK DI	RILL F	RIG			Da	vid Ha	oekel Pai	kwav	
J024			HAMMER TYPI	E <u>Aut</u>	0_			F	Phase	2A, B, ar	nd C	
2 WL			HAMMER EFFICIE	NCY _	<u>88</u> %			V	ventzv	ille, Miss	ouri	
3 2002	RE	MARKS: Sta 67+89.92, Offset 76.75LT							СОИТ	ΙΝΙΙΔΤΙΟ		
JRING	No	soil sampling performed.						LC	G OF	BORING	: B-4	02
OF BC												
LOG (Pro	oject I	No. J02	4691.	01

		0.00	017/0040		θŪ		SHE	EAR STRENGTH	, tsf
	Surfa	ace Elevation: <u>663.0</u> Completion Date: _	0///2010	(D	, (pc TS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl		PO	UN NUN NUN	ŝ	0,5 1	,0 1,5 2,	0 2,5
				⊇₽		PLE	STANDARD	PENETRATION F	RESISTANCE
	- ⊢			APF	× ∧ ∩	AM	I I N-VA	LUE (BLOWS PEF (ASTM D 1586)	R FOOT)
		DESCRIPTION OF MAT	FRIAI	GR,	U L N L BI	0			0/
	ПЛП				SP SP SP				LL
		Tana il 40 inches					10 2		0 50
				1, NI,					
		Brown CLAY - CH							
		-							
		-							
	— 5-								
		trace sand							
		_							
PES		-							
L TY	— 10-	-							
I SOI		-							
VEEN		-							
A PUF		-							
TION	15	1							
NDAR STR ^A	15	with sand and gravel							
SOUN		-							
		-							
MIXIM/		-							
PRO	— 20-	very stiff, brown							
IE AP RAPI									
L T L G									
SEN									
EPRI GR/	- 25-	-							
ES R Y BE		-							
N LIN		-							
TION		-							
IFICA RANS		-							
RATI 45 TF	— 30-								
∷ST HD2≣H									
NOTE SPÅN		_							
ME.0		-							
ONE	— 35-	with gravel to cobbles							
0 CL		rough drilling from 32 to 42 feet							
PJ 0		-							
AY.G		-							
RKW.]							
L PAI		GROUNDWATER DATA	DRILLING D	ATA			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
JEKE				<u> </u>			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
DH D	ENC		_ AUGER <u>3 3/4"</u> H		VVSIEM			GENTECHNO	⊒ענע
DAV				1VI <u>40</u>				GLUILUIIINU FR(IM THE GROUND UP
- 10.				<u>: R</u> L(JGGER				
1691			<u>CME 55TRK</u> DF	<ill f<="" th=""><th>ЧG</th><th></th><th>Dav</th><th>vid Hoekel Parkv</th><th>vay</th></ill>	ЧG		Dav	vid Hoekel Parkv	vay
, JO				= <u>Aut</u>	<u>.</u>		P W	nase 2A, B, and entzville. Missou	uri
J2 WI	DE	MADKS: Sta 67+04 02 Offerst 02 OF DT	HAMMER EFFICIEI	NCY_	<u>88</u> %				
G 20(No	soil sampling performed.							A02
JRING							LOC	JUF BURING: E	5-403
JF B(
00.00							Pro	ect No. J0246	91.01
-1	•								

]		0.000	017/2040		÷Ω			ç	SHEA	AR STRE	NGTH	, tsf		
	Surfa	ace Elevation: 663.0 Completion Date:	6/7/2016	(IJ	LTS NTS /RQ		Δ	- UU/2		0 - QL	I/2	[] - SV	/
		Datum:msl		ΓÕ	GH1 COUI	ES		0.5	1.0	1.5	2	0	2.5	
				HIC		MPL	ST	ANDAF	R D PE -Vali	ENETRA JE (BLOV	FION F VS PEF	RESIS R FOC	TAN (T)	CE
	표뇨			RAP	NIT BLO REC	SA				(ASTM D 1	586)		-,	
	N FE	DESCRIPTION OF MA	ATERIAL	G	KY U SPT SRE				WAT	ER CON	TENT	, %		
					E S		PLF	10	20	30	4	0	50	1 LL
		Brown CLAY - CH (continued)					· · ·	· · · · ·		 	· · · · · ·	· · ·	· · ·	· · ·
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. ES								· · · · ·		· · · · · · ·		· · · ·	· · · ·	· · · ·
L TYF	— 50-	rough drilling from 50 to 52 feet							· · ·					· · · ·
N SOI							· · · ·	· · · · ·			: : : : : :	· · · ·	· · ·	· · · ·
URPC							· · · ·	· · · · ·	· · ·	 	· · · · · · · · · · · · · · · · · · ·	· · · ·	· · · ·	· · · ·
S BET ON PI		-						· · · · ·			· · · ·		· · ·	· · ·
DARIE	— 55-	-												
OUNE							· · · ·	· · · · ·	· · ·	 	· · · · · ·	· · · ·	· · · ·	· · · · · · ·
ATE B FOR II		Grav silty CLAY - Cl											· · ·	· · ·
DXIM/								 			· · · ·	· · · ·	· · · ·	· · · ·
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ES RE V BE	00	-					· · · ·	· · · · ·		 	· · · · · ·	· · ·	· · ·	· · · ·
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ONE	— 75-	-												
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KWA		rough drilling from 79 to 80 feet						· · · · ·	· · ·	· · · · · · · ·	· · · · · · ·	· · · ·	· · · ·	· · · ·
KEL PAR		GROUNDWATER DATA	DRILLING D	ATA			Draw Date	n by: AG	BB 6	Checked by Date: 1/24/2	r: BJS 2017	App'vo Date:	d. by: C 1/24/20	ХКК 017
O HOE	ENC		AUGER <u>3 3/4"</u> HO	DLLO	W STEM				Ēr		ыли	יח ור	cv∋	Z
DAVIE	ENC			M <u>40</u>	FEET				Ju	LUIEU	F rink	JLUI Dm the g	UIZ Round	ا ۱۳
1.01 -				K LC	IGGER				-					
32469			HAMMER TYPE	Auto)			l	Davio Pha	d Hoekel ase 2A P	Parkv 8. and	vay C		
NL JI			HAMMER EFFICIEN						Wer	ntzville, N	lissou	uri		
2002	RE	MARKS: Sta 67+91.92, Offset 83.25 R	т						~~~			OF		_
BORING	NO	son sampling performed.						I	_0G	OF BOR	ING: I	0r 3-403		
LOG OF								F	Proje	ct No. 、	J0246	91.01		

ce Elevation: <u>663.0</u>	Completion Date:	0///2010		gog		Λ_Π	1/2	\sim \sim	1/2	
Datum msl			Ģ	т Е Е Е			J/2	\bigcirc - QU	1/Z	🛛 - SV
			СГО	/ER/	ES	0.5	1	.0 1.5	2	0 2.5
			RAPHIC	NIT WE BLOW (RECOV	SAMPI	STANL	N-VA	LUE (BLOV (ASTM D 1	VS PE 586)	R FOOT)
DESCR	IPTION OF MAT	ERIAL	G	SPT SPT ORE		PI I	W	ATER CON	TENT	, %
	ntinuad			δŬ		10	2	20 30	4	0 50
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Gray, silty CLAY wit	h limestone ledges - CL									
rough unning norm o	5 10 05 1001					· · · · · ·	· · · · ·		· · · ·	
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Auger refusal at 89	feet.						 		· · ·	
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GROUNDWATER DA	ΔΤΔ		ΔΤΔ			Drawn by:	AGB	Checked by	r: BJS	App'vd. by: CKK
X FRFF WATER NO	 DT	AUGER 3 3/4" H	<u></u>	W STEM		Date: 7/2	/2016	Date: 1/24/2	2017	Date: 1/24/2017
OUNTERED DURING	DRILLING	WASHBORING FRO	M <u>40</u>	FEET				GEOTEC	;HN(DLOGY롱
		TPD DRILLER EE	<u>er</u> Lo	OGGER					FR	OM THE GROUND UP
		CME 55TRK DF		RIG			Day	vid Hoekel	Park	vay
			<u>- Auto</u> NCY	<u>u</u> 88 %			Р W	nase 2A, B entzville, N	, and /lisso	uri
MARKS: Sta 67+91.9	2, Offset 83.25 RT			/0						05
soil sampling perfor	med.						LO	G OF BOR	NG:	OF B-403
							Pro	ject No.	J0246	91.01
	Gray SILT - ML (co Gray, silty CLAY wit rough drilling from 8 Auger refusal at 89 Auger refusal at 89 GROUNDWATER D/ X FREE WATER NO DUNTERED DURING I	Gray SILT - ML (continued) Gray, silty CLAY with limestone ledges - CL rough drilling from 85 to 89 feet Auger refusal at 89 feet. GROUNDWATER DATA X FREE WATER NOT DUNTERED DURING DRILLING MARKS: Sta 67+91.92, Offset 83.25 RT soil sampling performed.	Gray SILT - ML (continued) Gray SILT - ML (continued) Gray, sitty CLAY with limestone ledges - CL rough drilling from 85 to 89 feet Auger refusal at 89 feet. Auger refusal at 89 feet.	Gray SILT - ML (continued) Gray sity CLAY with limestone ledges - CL rough drilling from 85 to 89 feet Auger refusal at 89 feet. GROUNDWATER DATA STREE WATER NOT DUNTERED DURING DRILLING AUGER 3.3/4" HOLO WASHBORING FROM 40 TPD DRILLER EER LC CME S5TRK DRILL F HAMMER TYPE Au HAMMER TYPE Au HAMMER EFFICIENCY HARKS: Sta 67+91.92, Offset 83.25 RT soil sampling performed.	Gray SiLT - ML (continued) Gray, silty CLAY with limestone ledges - CL rough drilling from 85 to 89 feet Auger refusal at 89 feet. GROUNDWATER DATA X_FREE WATER NOT DUNTERED DURING DRILLING X_FREE WATER NOT DURING DRILLING X_FREE WATER DATA X_FREE WATER NOT DURING DRILLING X_FREE WATER NOT DURING DRILLING X_FREE WATER DATA X_FREE WATER DATA X_	Gray Silt T - ML (continued) Gray Silt T - ML (continued) Provide drilling from 85 to 89 feet Auger refusal at 89 feet. Auger refusal at 89 feet. Auger refusal at 89 feet. Description Strate State Auger refusal at 89 feet. Description Strate State Auger refusal at 89 feet. Description Strate State Auger refusal at 89 feet. Description Description	Gray SILT - ML (continued) Auger refusal at 89 feet.	Gray SILT - ML (continued) Gr	Gray SILT - ML (continued) Image: Market Continued) Gray, silty CLAY with limestone ledges - CL rough drilling from 85 to 89 feet Image: Market Continued) Auger refusal at 89 feet. Image: Market Continued) Auger refusal at 89 feet. Image: Market Continued) Auger refusal at 89 feet. Image: Market Continued) Image: Market Continued) Image: Market Continued) Auger refusal at 89 feet. Image: Market Continued) Image: Market Continued) Image: Market Continued) Image: Market Continued Continued) Image: Market Continued) Image: Market Continued) Image: Market Continued)<	Crey SILT - ML (continued) Crey SILT - ML (continued) Crey SILT - ML (continued) Crey Silty CLAY with limestone ledges - CL rough drilling from 85 to 89 feet Auger refusal at 89 feet DILLING DATA Auger refusal at 89 feet DILLING DATA Auger Auger August Augus

	0000	C/40/204C		÷Ω			HEA	R STRENG	TH, tsf	
Sur	face Elevation: 603.0 Completion Date: _	6/10/2016	G	T (pc NTS //RQ		∆ - UU/2		O - QU/2	🗆 - SV	
	Datum: msl		C LO	/ER/	ES	0.5	1,0		2.0 2.5	
Ξ			RAPHIC	NIT WE BLOW (RECOV	SAMPI	STANDAR A N-	VALU	E (BLOWS F (ASTM D 1586)	PER FOOT)	
DEP	DESCRIPTION OF MAT	FERIAL	G	RY U SPT ORE		PI I	WAT		NT, %	
	Tanaail 40 inches		AL: A	<u> </u>		10	20	30	40 50	
						· · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
	Brown CLAY, trace sand and gravel - CH					· · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
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	Boring terminated at 10 feet.				011				· · · · · · · · · · · · ·	
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ME.G.	_					· · · · · · · · ·	· · ·	· · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
NOT - 35	-									
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AY.GP	_							· · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
ARKW,						Due 1 1		· · · · · · · · ·		
KEL PJ	GROUNDWATER DATA	DRILLING DA	<u>ATA</u>			Drawn by: AG Date: 7/8/201	<u>з</u> с в (Decked by: BJ Date: 1/24/2017	S App'vd. by: CKK Date: 1/24/2017	
		AUGER <u>3 3/4"</u> HC	DLLO	W STEM						
	COUNTERED DURING DRILLING		M	FEET				LUIEUN	FROM THE GROUND UP	
91.01		<u>CME 55TRK</u> DR	ILL R	IG)əvi4	Hockel Be	rkwav	
J0246		HAMMER TYPE	Auto	<u>)</u>		•	Pha	se 2A, B, ar	nd C	
	EMARKS: Sta 67+01 02 Offect 20 25 PT	HAMMER EFFICIEN	ICY _	<u>88</u> %			vven	uzviile, WilS§	souri	
SORING 20						L	OG O	F BORING:	G: B-403A	
G OF B						P	roier	:t No .102	4691.01	
2						•				

1						SH	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: _664.9 Completion Date: _6/7/20	016	TS TS		∆ - UU/2	○ - QU/2	🗆 - SV
		n mel	00	H NO	S	0.5 1	1.0 1.5 2	.0 2.5
		Datum:	IC I		LE LE	STANDARD	PENETRATION	RESISTANCE
	TH		SRAPH	BLOW	SAMI	▲ N-VA	ALUE (BLOWS PE (ASTM D 1586)	R FOOT)
		DESCRIPTION OF MATERIA		SPT		W/	ATER CONTENT	, %
				500			20 30 4	
		Topsoil - 3 inches	7//					
		Reddish-brown CLAY, trace sand - CH						
		-						
		-						
	— 5-	rough drilling from 5 to 6 feet		2				
		-						
S L		-						
NLYE	— 10-	-						
SOIL ES C		-						
/EEN		-						
I PUF								
IES B TION	15	-						
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ES R √ BE		-						
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VTIO ITIO		-						
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「RAT 情 TI	— 30-							
LS CI		rough drilling from 31 to 32 feet						
R D T O T O T O T O T O T O T O T O T O T		-						
ME		-						
ONE	— 35-	-						
00 CI		-						
GPJ]						
NAY.		-		2				
ARK								
(EL P		GROUNDWATER DATA	DRILLING DATA	<u>\</u>		Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
НОЕ		X FREE WATER NOT AUG	GER <u>3 3/4"</u> HOLL	OW STEM				
dIV	ENC	COUNTERED DURING DRILLING WAS	HBORING FROM <u>2</u>	<u>0</u> FEET			GEUIECHN	ULUGYS
/D - I		<u>_NG</u>	DRILLER <u>DLD</u> L	OGGER			FF	IOM THE GROUND UP
91.0 ⁻		-	CME 550X DRILL F	RIG		Day	vid Hookol Park	wav
J0246			HAMMER TYPE <u>Au</u>	<u>to</u>		P	hase 2A, B, and	C
, WL		HAN	MER EFFICIENCY	<u>88</u> %		W	entzville, Misso	uri
2002	RE	MARKS: Sta 68+35.88, Offset 52.75 LT						
SING	No	soil sampling performed.				LO	g of Boring:	B-501
BOF								
GOF						Pro	ject No. J0246	591.01
P								

ĺ		664.0		0/7/2040		÷Ω			SH	EAR S	TRENG	TH, t	sf	
	Surfa	ace Elevation: <u>664.9</u>	Completion Date: _	0///2010	U	T (pc NTS /RQ		Δ-	UU/2	С) - QU/2		—	SV
		Datum: msl			C LO	ERUCE	В		.5	1,0	1.5	2,0	2	5
					- HIC	M N N N N N N N N N N N N N N N N N N N	MPL	SIA	NDARD	ALUE (BLOWS F	PER I	SISTA FOOT)	NCE
	отн ЕЕТ	DESCR			GRA		SP			(A3	5110 1560)			
	IN F	DESCR				SP1 SORE			W		CONTEN	NT, 9	6	, LL
		Reddish-brown CLA	AY, trace sand - CH (co	ontinued)	////					20	30	40	50)
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ES BE'		-						· · · · ·	· · · · · ·		· · · · · ·	· · ·		· · · · ·
UDARII STRAT	— 55—	Gray, sandy SILT -	ML											
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MATE 3 FOR		-										· · ·		· · · · ·
C LOC	— 60-	-												
E APF RAPHI		-							· · · · · ·					· · · · ·
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TRAN	— 70-	-												
STR/ 24HF		-							· · · · · ·		· · · · · ·	· · ·	· · · · ·	· · · · ·
IOTE:		-						· · · · ·	· · · · · ·		· · · · · ·	· · ·	· · · · ·	· · · · ·
E ME.0		-							· · · · · ·			· · ·		· · · · ·
CLONE	— 75—	-										: :		
00 f		Weathered LIMEST	ΓΟΝΕ 76 to 79 feet									: :		· · · · ·
AY.GF		-						· · · · ·	· · · · · ·				· · · · ·	
ARKW		Auger refusal at 79	feet.							Choo		: :		
KEL P		GROUNDWATER D	ATA	DRILLING	DATA			Date: 7	7/2/2016	Date	: 1/24/2017	5 A D	ate: 1/24	/2017
D HOE				AUGER <u>3 3/4"</u> H	HOLLO	W STEM				նես	TECUI	เกเ	UCV	Z
- DAVI					0M <u>20</u> סייםו					uLU	ILVIII	FROM	.vui The grou	nd up
91.01 -				<u>CME 550X DF</u>	RILL RI	G			<u> </u>	vial II-	okal Da	darre		
J0246				HAMMER TYP	PE <u>Aut</u>	0_			F	hase	2A, B, ar	nd C	У	
12 WL				HAMMER EFFICIE		<u>88</u> %			N	/entzv	ille, Miss	souri		
IG 200	RE No	soil sampling perfor	ьх, Uffset 52.75 LT med.						(CONTI	INUATIO	N OI	•	
BORIN									LO	G OF	BORING	: B-	501	
G OF I									Pro	oiect N	No. J02	4691	.01	
Ō										,				

[000.0		0/0/0040		ĘΟ		S	HEAR	STRENGT	H, tsf
	Surfa	ace Elevation: bb2.b	Completion Date: _	6/2/2016		ATS ATS		∆ - UU/2		O - QU/2	🗆 - SV
		Datum: msl			l Ö	HUCK:	ŝ	0,5	1,0	1,5	2,0 2,5
					l⊇		PLE	STANDARI	D PEN	ETRATION	RESISTANCE
	- F				APF	×>0 EO	AM	▲ N-\	/ALUE ([/]	(BLOWS P ASTM D 1586)	ER FOOT)
	L L L	DESCR	IPTION OF MAT	TERIAL	GR		0				T 0/
	DE	5200.0				Y P S S S S S S S S S S S S S S S S S S			VALE		1, %
		Topsoil 6 inchos			1.1.1.1.1			10	20	30	40 50
		Stiff, orangish-brow	n and gray, CLAY - (CH	H)							
									: : :		
									· · · ·	· · · · · · ·	81
	_ 5_					2-2-4	SS1		: : F	• • • • • •	>>
	5								 		
						2-3-6	SS2				
(0											
YPE8									 		
OIL T S ONI	— 10—										
EN S											
URP									· · · ·	· · · · · · ·	
ES BE						2-6-6	SS3			· · · · · · · ·	
DARIE	— 15—										
-SUNE									· · · ·		
DR II									· · ·		
XIMA OG F						2-5-8	SS4	· · · · · · · · · · ·			
PRO HIC L	— 20—										
HE AF											
AT TF ≜L. G		-							· · ·		
RESE ADU/		trace cand and gray				5-5-8	\$\$5	· · · · · · · · · ·			
REPF E GR	— 25—					000					
NES IAY B									· · ·		
CAT						9.0.13	999		 		
ATIFI TRA	— 30—					0-9-13	330		· • ·		
STR											
OTE: PØNG		Medium dense, brow	wn and gray, fine to me	dium SAND - SP							
NE.G						5044	007				
ONE	— 35—			Σ	z	5-6-14	551				
0 CL(· · · · · · · ·	
PJ 0		-							:		
ΙΑΥ.Θ								· · · · · · · · · ·	· · · ·		
ARKM						4-5-6	558	□▲ □ □	· · · ·	· · · · · · ·	
EL P/		GROUNDWATER D	<u>ATA</u>	DRILLING I	DATA			Drawn by: AGE Date: 7/2/2016	Dat	ескей by: BJS te: 1/24/2017	App vo. by: CKK Date: 1/24/2017
JOEK			-	AUGER <u>33/4"</u> H	IOLLO	W STEM					
VID F	EN	COUNTERED AT <u>35</u> F	- FEET ⊻	WASHBORING FRO	ОМ	FEET			j GE(UTECHN	IULUGY롱
1 - DA				BLS DRILLER D	WJ_LC	OGGER			/		FROM THE GROUND UP
391.0				<u>CME 750X</u> DF	RILL RI	G		п	avid H	loekel Par	kwav
J024				HAMMER TYP	E Aut	0_			Phase	e 2A, B, an	dC
2 WL				HAMMER EFFICIE	NCY	<u>83_</u> %			Wentz	ville, Miss	ouri
3 2002	REI	MARKS: Sta 68+35.8	38, Offset 47.25 LT								
RING								L	og of	BORING:	B-503
JF BC											
106 0								Pr	oject	No. J024	691.01
LOO								FI	Ujeci	NO. 302-	091.01

				<u> </u>		SH	EAR STRENGTH	, tsf
	Surfa	ce Elevation: <u>662.6</u> Completion Date: <u>6/2/2016</u>		RQI RQI		∆ - UU/2	○ - QU/2	🗆 - SV
		mal	0 0	H N N	S	0.5 1	0 15 2	0 25
	1	Datum:	CL	1909 1909	Ĕ	STANDARD		RESISTANCE
			- H	N N N N N N N N N N N N N N N N N N N	MP	▲ N-VA	LUE (BLOWS PE	R FOOT)
	포탒		RA	RENT	SA		(ASTM D 1586)	
		DESCRIPTION OF MATERIAL	0	≻ F H		W	ATER CONTENT	, %
	□≧			Raso		PL 10 2	20 30 4	0 50 LL
		Medium dense, brown and gray, fine to medium SAND - SP						· · · · · · · · · ·
		(continued)						
		Very stiff, orangish-brown, SILT - ML		1				
				5-9-13	SS9			
	- 45-							
		Medium dense, brown, fine SAND - SP						
S								
ILY.	50-			8-10-10	SS10		▲ : : : : : : : : : : : : : : : : : : :	
S ON	50-							
S NE				-		· · · · · · · · · · ·		
JRPC		Medium stiff, brown and gray, SILT, trace sand - ML				· · · · · · · · · ·		
N PL				260	0044	· · · · · · · · · · ·		
ATIC	— 55—			3-0-8	5511			
NDAF STR								
SOU		Madium dance, stay fine CAND trace silt. CD		1				
TE E		Medium dense, gray, fine SAND, trace silt - SP		- - - -				
KIMA DG F				10-13-16	\$\$12			
PRO)	— 60—			10-10-10	0012		_ · · · · . · · · · ·	
APH								
GR		Medium stiff, gray, silty CLAY, trace sand - CL	1////					
ENT UAL.				1				
RES				5-4-8	SS13			
REP 3E GI	- 65 -							
NES IAY E								
NUN								
ATIC SITIC				<u> </u>				
RAN	70			3-6-7	SS14			
-RAT †₽ T	_ 70_							
SS HP24H								
IOTE PØN								
ME.G					0045			
NE I	- 75-			4-6-7	5515			
СГО			\////	1				· · · · · · · · · · ·
00 ſ			\////					
,GP,			\////					
WAY			\////	6-7-9	SS16			
ARK			/////	1 -		Drawn by: AGR	Checked by: B.IS	App'yd by CKK
(EL F		GROUNDWATER DATA DRILLING	DATA			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
10E		AUGER <u>3 3/4"</u>	HOLLC	W STEM				
VID F	EN	COUNTERED AT 35 FEET ♀ WASHBORING FR	OM	FEET			GEUTECHN	JLUGYZ
- DA)W.I I (OGGER			FR	OM THE GROUND UP
1.01								
2469						Dav	vid Hoekel Parky	vay
, JO2		HAMMER I YI	-E <u>Aut</u>	<u>u</u>		l P w	nase ZA, B, and entzville. Missor	uri
12 WL		HAMMER EFFICI	ENCY	<u>83</u> %				
3 200	REN	VIAKNO: STA 68+35.88, UTISET 41.25 LI				c		OF
RING						LO	G OF BORING:	B-503
= BOI								
G OF						Pro	ject No. J0246	91.01
Ō								

				6/2/2016		<u> </u>				SH	EAR	STREM	IGTH	, tsf		
	Surfa	ace Elevation: 002.0	Completion Date: _	0/2/2010	U	T (po NTS		Δ	- UU/	2	() - QU	2		0 - 3	SV
		Datum: msl			CLO	ER US	ES		0.5	1	0	1.5	2	0	2,5	5
					DHIC	N N N N N N N N N N N N N N N N N N N	MPL	ST	ANDA	N-VA	LUE	ETRAT	ION F	RESI R FO	STA OT)	NCE
	EET	DESCO			GRAI	BLO	SA				(A	STM D 15	986)			
	DEF	DESCR		IERIAL		RY L SPT ORE		PLF		W	ATER		FENT	, %		
		Medium stiff, grav	silty CLAX trace sand	CL (continued)					10	2	20	30	4	0	50	
		- Weddin Stin, gray, s							· · ·	· · · ·	· · · · ·	· · · ·	· · · ·			· · · · ·
		-						· · · ·	· · · ·	· · ·	· · ·	· · · · ·	· · · ·	· ·	· · ·	· · · · ·
		Core loss - 6 inches	S		//</th <th><u>61%</u></th> <th>NQ1</th> <th></th> <th>· · ·</th> <th>· · ·</th> <th> · · ·</th> <th>· · · · ·</th> <th>· · · ·</th> <th>· ·</th> <th>· · ·</th> <th>· · · · ·</th>	<u>61%</u>	NQ1		· · ·	· · ·	· · ·	· · · · ·	· · · ·	· ·	· · ·	· · · · ·
	— 85—	Brown CLAY Hard, gray, fine gra	ined, thinly bedded, slig	ahtly weathered		0%										
		LIMESTONE with c	clay seams	, ay neutroneu		770/		· · · ·	· · ·	· · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · ·	· · · · · · ·	 	· · · ·	· · · · ·
		Core loss - 8.5 inch	nes			0%	NQ2		· · ·	· · ·	· · · ·		· · ·	· ·		· · · · ·
'YPES								· · · ·	· · ·	 	· · ·	· · · · ·	· · ·	· ·	· · ·	· · · · ·
SOIL 7	_ 90_	-						· · ·	· · ·	· · ·	· · ·	· · · ·	· · ·	· ·	· · ·	· · · ·
POSE						<u>100%</u>	NO3		· · · ·	· · ·	· · ·	· · · · ·	· · · ·	· · · ·	· · · ·	· · · · ·
BETW N PUR		-				27%	NO20	· · · ·	· · ·	 	· · ·		 	· ·	· · ·	· · · · ·
RIES	— 95—	Boring terminated a	at 95 feet													
UNDA -USTF									· · · ·	· · · ·		· · · · ·	· · · ·		· · · ·	· · · · ·
TE BC OR ILI		-						· · · ·	· · ·	· · ·	· · ·	· · · · ·	· · · ·	· · ·	· · ·	· · · · ·
XIMA OG F		-						 	· · ·	 	· · · · · · · · · · · · · · · · · · ·	· · · · ·	· · · ·	· · · ·	· · ·	· · · · ·
PPRO PHIC L	—100—	-														
THE A GRAF								· · · ·	· · ·	· · ·			· · · · · · ·		· · ·	· · · · ·
ENT -								· · · ·	· · ·	· · ·	· · ·	· · · · ·	· · · ·		· · ·	· · · · ·
PRES	105							· · · ·					· · · · · ·			
ES RE Y BE	105	-						· · · ·	· · ·	 	· · · ·	· · · ·	· · ·		· · ·	· · · · ·
N LIN		-						· · · ·	· · ·	· · ·		· · · · ·	· · · ·	· · ·	· · · ·	· · · · ·
SATIO								· · · ·	· · ·	· · ·	· · · · · · · · · · · · · · · · · · ·	· · · · ·	· · · ·	· ·	· · ·	· · · · ·
ATIFIC TRAN	—110—															
STR/ 24HF									· · · ·	· · · ·		· · · · ·	· · · ·		· · ·	· · · · ·
		-						· · · ·	· · · ·	· · ·	· · ·	· · · · ·	· · · · · · ·	· · ·	· · ·	· · · · ·
ME.0									· · ·	· · ·	· · ·	· · · · ·	· · ·	· ·	· · ·	· · · · ·
CONE	—115—															
0 00 T		-							· · · ·	· · ·		· · · · ·	· · · ·	· ·	· · ·	· · · · ·
Y.GP.		-						· · · ·	· · · ·	· · · · · ·	· · · ·	· · · · ·	· · · · · · ·	· · ·	· · · ·	· · · · ·
RKWA											::		· · ·	::	: : :	
EL PA		GROUNDWATER D	ATA	DRILLING D	<u>ATA</u>			Draw	n by: A	AGB	Che	ecked by:	BJS	App'	vd. by	CKK
HOEK			-	AUGER <u>3 3/4"</u> H	OLLO	W STEM		Duio								
AVID	EN	COUNTERED AT <u>35</u>	FEET ⊻	WASHBORING FRO	DM	FEET			C		GEL	JIFC	HNL	JLL	JGY	S
01 - D				BLS_DRILLER DV	<u>NJ</u> LC	GGER							FKU	umi i Ht		0 0 0 1
24691.				<u>CME 750X</u> DR		G				Da	vid H	oekel	Parkv	vay		
VL J02					E <u>Auto</u> NCY ∮	<u>)</u> 83 %				Ч W	nase entzv	ville, N	, and lissou	uri		
:002 M	RE	MARKS: Sta 68+35.8	88, Offset 47.25 LT			<u></u> /0										
RING 2										(LO	CONT G OF	BORI	rion (Ng: F	OF 3-50	3	
F BOF															-	
000										Pro	ject	No. J	0246	91.0)1	
Ĩ																

		662.6	6/24/2046		θ			SH	EAR S	TRENGTH	l, tsf
	Surfa	ace Elevation: <u>603.0</u> Completion Date:	0/24/2010	Ċ	r (po NTS /RQ		∆ - U	J/2	0	- QU/2	🗆 - SV
		Datum:msl		Õ	GH1 COUI	ES	0.5	1	0	1.5 2	.0 2.5
				HIC	NC NC	ИРL	STANE	DARD	PENE	RATION	RESISTANCE R FOOT)
	표			RAP	NIT BLO REC	SAN			(AST	TM D 1586)	
	LEP-	DESCRIPTION OF MA	TERIAL	Ū	RE RE			W	ATER	CONTENT	,%
					R NO		PL 10	2	20	30 4	0 50 ILL
		Brown CLAY, some gravel - CH						 			
		_						· · · · ·	· · · ·		
		-					· · · · · ·	 	· · · ·		
	- 5-	-									
		Grav CLAY - CH							· · · ·	· · · · · · ·	
								· · · · ·			
S]						· · · · ·		· · · · · · ·	
LTYP	— 10-	-									
V SOI		-						· · · · ·		· · · · · · ·	
WEEN JRPO											
S BET		Tan and gray, silty CLAY - CL									
ARIES	— 15-	-									
DUND LUST		-							· · · ·		
TE B(_									
NIMA OG F		-					· · · · · ·	· · · · ·	· · · · ·	· · · · · · ·	
PPRC PHIC L	— 20-	rough drilling									
CHE A GRAF		-						· · · · ·			
ENT 1 UAL.		-						· · · · ·	· · · ·	· · · · · · ·	· · · · · · · · · · ·
PRES	05	-									
ES RE	- 25-	_									
N MA		_						· · · · ·	· · · ·	· · · · · · ·	
ATIO SITIO		-							· · · ·		
TIFIC	— 30-	_									
STRA		_						· · · · ·	· · · ·	· · · · · · ·	
OTE: ⊸oMD2		-						· · · ·	· · · ·		
NG ME.GI		rough drilling						· · · · ·	· · · ·	· · · · · · · · · · · · · · · · · · ·	
ONEI	— 35-	_									
00 CL		-						· · · ·			
GPJ -		1					· · · · · ·	· · · · ·		· · · · · · ·	· · · · · · · · · · · · · · · · · · ·
WAY.		rough drilling								· · · · · · ·	
PARK				////// • - •			Drawn by:	AGB	Check	ked by: BJS	App'vd. by: CKK
EKEL		GROUNDWATER DATA	DRILLING D	AIA			Date: 7/8	/2016	Date:	1/24/2017	Date: 1/24/2017
рно	ENC		AUGER <u>3 3/4"</u> HC		W STEM				GEU.	TECHN	UIUĽV≥
- DAV				NI					alu	FR	OM THE GROUND UP
91.01 -			CME 55TRK DR					_			
10246			HAMMER TYPE	Aut	<u> </u>			Dav	vid Ho hase 2	ekel Park 2A, B, and	way C
, WL			HAMMER EFFICIEN		<u>88</u> %			W	entzvi	lle, Misso	uri
3 2002	RE	MARKS: Sta 69+67.71, Offset 52.75									
ORING		samping portoniou						LO	OF E و	BORING:	В-601
OF B								D-		0.004	204.04
LOG								P10	Ject N	IU. JU246	1.01

	000.0	0/04/0640		θŪ			SH	EAR ST	RENGT	H, tsi		
Surfa	ace Elevation: <u>663.6</u> Completion Date:	6/24/2016	רי)	L (pc VTS /RQI		∆ - Ul	J/2	\bigcirc	- QU/2		🗆 - S'	V
	Datum: msl		ГŎ	CH UC ERY	ES	0.5	1	.0	1.5	2,0	2.5	
			HIC	WEI W C	MPL	STANE	N-VA	PENET LUE (B	RATION	RES	ISTAN	ICE
ΞШ			RAF	BLO REC	SAI			(AST	M D 1586)		,	
N FE	DESCRIPTION OF MA	ATERIAL	G	RY U SPT ORE		ы	W	ATER O	ONTEN	T, %		
				E S		10	2	20	30	40	50	
	Tan and gray, silty CLAY - CL (continued	d)				· · · · · ·			 			· · · ·
							· · · · ·	· · · ·	· · · · · · ·			
- 45-	Prove alovey SAND SC											
	Brown, dayey SAND - SC						· · · · ·	· · · ·	 			· · · ·
	-											· · · ·
							· · · · ·		· · · · · · · ·			· · · ·
50-												
	-						· · · ·		· · · · · ·			
							· · · · ·	· · · ·	 		· · · · ·	· · · ·
	-										· · · · ·	· · · · · ·
- 55—	-											
						· · · · · ·		· · · ·	 			· · · ·
	-											· · · ·
	-					· · · · · ·	· · · · ·	· · · ·	 		· · · · ·	· · · ·
60-	_	2										
							· · · · ·		 			
	rough drilling								 		· · · · ·	· · · ·
- 65 -												
	-										· · · · ·	· · · ·
	-						· · · · ·		 			
70								· · ·				
10-												
	-					· · · · · ·	· · · · ·		 		· · · · ·	· · · ·
	-											· · · ·
- 75-												
							· · · · ·	· · · ·	 			· · ·
							· · · ·					
						· · · · · ·	 	· · · ·	 		· · · · ·	· · · ·
						Drown by		Chool	ed by: P IC			
	GROUNDWATER DATA	DRILLING DA	<u>ATA</u>			Date: 7/8	/2016	Date:	1/24/2017	Dat	e: 1/24/2	2017
		AUGER <u>3 3/4"</u> HC	DLLO	W STEM				0 E O I	EUIN	יוח	าคง=	₹
ENC	JUINTERED DURING DRILLING	WASHBORING FROM	Μ	FEET			-	uCUI		ROM TH	JUI 2 E GROUND	
		<u>KJB</u> DRILLER <u>KIF</u>	<u>R</u> LO	GGER								
			ILL R	RIG			Dav	/id Hoe	kel Park	way		
			<u>Auto</u>	<u>5</u> 88 %			W	entzvil	н, b, and le, Misso	buri		
RE	MARKS: Sta 69+67.71, Offset 52.75			<u></u> /0								
No	soil sampling performed.									I OF)1	
							-00		511140.	5-00	, I	
							Pro	ject N	o. J024	691.	01	

	662 G	C/04/204C		θŪ			SH	EAR ST	RENGTH	l, tsf
5	Surface Elevation: <u>663.6</u> Completion Date:	6/24/2016	(D	RQ (pc		Δ-	UU/2	0 -	QU/2	🗆 - SV
	Datum: msl		ГÓ	HUC NUC	ល	C).5	1,0 1	.5 2	0 2,5
			₽		IPLE	STA	NDARD	PENET		RESISTANCE
Г	н.		API		SAN		▲ IN-VA	ALUE (BL (ASTN	D 1586)	RFOOT)
L L L	DESCRIPTION OF MA	TERIAL	ц Ц				w	ATER C	ONTENT	. %
D	Z			COL		PL	10	20 3	• 30 4	0 50
	Brown, clayey SAND - SC (continued)		///					<u> </u>		
							· · · · · ·		· · · · · ·	
						· · · · ·	· · · · · ·			
							· · · · · ·		· · · · · ·	
	85—									
							· · · · · · · · · · · · · · · · · · ·		· · · · · ·	
	rough drilling					· · · ·	· · · · · ·		· · · · · ·	
Y.PES	Auger refusal at 88.5 feet.					· · · · ·	· · · · · · · · · · · · · · · · · · ·		· · · · · ·	
	90 —									
									· · · · · ·	
URP.						· · · · ·	· · · · · ·		· · · · · ·	
						· · · · ·	· · · · · · · · · · · · · · · · · · ·		· · · · · ·	
DARIE	95 -									
						· · · · ·	· · · · · ·		· · · · · ·	
4MX 00-100-100-100-100-100-100-100-100-100-									· · · · · ·	
	00-									
GRAP						· · · · ·			· · · · · ·	
IAL. 0						· · · · ·	· · · · · ·		· · · · · ·	
RADL									· · · · · ·	
	05-									
MAY MAY										
ANSI										
F≝ —1 ₩ <u>₽</u>	10-									
LS 在 S 日 S 日 S 日 S 日									· · · · · ·	
TON GP∯I										
E ME										
	15-									
) 00 r										
Y.GP.						 	· · · · · ·		· · · · · ·	
KWA						· · · · ·	· · · · · ·		· · · · · ·	
L PAF	GROUNDWATER DATA	DRILLING D	ΑΤΑ			Drawn	by: AGB	Checke	d by: BJS	App'vd. by: CKK
OEKE			<u> </u>			Date:	//8/2016	Date: 1/	24/2017	Date: 1/24/2017
H UIN	ENCOUNTERED DURING DRILLING		M	FFFT				GEOT	ECHN	OLOGYZ
- DA		KJB DRILLER KI	 R LO	GGER					FR	IOM THE GROUND UP
91.01		<u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u>CME 55TRK</u> DR	nill F	lG						
J0246		HAMMER TYPE	Aut	<u>.</u>			F	hase 24	, B, and	way C
, ML		HAMMER EFFICIEN		<u>88</u> %			V	/entzville	e, Misso	uri
2002	REMARKS: Sta 69+67.71, Offset 52.75							CONTIN		
RING	no son samping performed.						LO	G OF B	DRING:	B-601
DF BC										
000							Pro	oject No	. J0246	691.01
						1				

				ΞD		SHE	EAR STRENGTH	, tsf
	Surfa	ce Elevation: <u>661.9</u> Completion Date: <u>6/23/2016</u>		RQI RQI		∆ - UU/2	○ - QU/2	🗆 - SV
		n mel	0	HUN NUN Y	S	0.5 1	.0 1.5 2	.0 2.5
					L L	STANDARD I	PENETRATION I	RESISTANCE
	구는		APH		SAMF	▲ N-VA	LUE (BLOWS PE (ASTM D 1586)	R FOOT)
		DESCRIPTION OF MATERIAL	GR	NВR	0,	10/0		0/
	ΩĽ			Y ^S SP SSP SSP SSP SSP SSP SSP SSP SSP SSP				, %
		Topsoil - 18 inches	1.1.1.1			10 2	0 30 4	0 50
			1, , , , ,					
		Soft, black, silty CLAY - CL						
	- 5-			2-1-2	SS1	.4 • •		
		Soft, reddish-brown CLAY - (CH)						
				93	ST2		· · · • • · · · · · · ·	
S							<u>.</u>	
ΥΡΕ̈́	40				ST3			>>>>-
S ON	- 10-							
EN S OSE								
URP								
ION F				2-6-9	SS4			
DARIE	— 15—							
TE B(Stiff, brown and gray CLAY - CH						
XIMA.				4-6-7	SS 5	· · · · · · · · · · · · · · ·	•	
PRO)	— 20—				000	· · · · · · · · · · ·	<u> </u>	
E AP RAPH								
H TH								
ESEN ADUA				4 5 7	000			
EPR	— 25—			4-5-7	550		•	
AY BF								
NUN		Medium dense, tan, fine SAND - SP	////					
SATIC								
TRAN	— 30—			12-14-14	SS7		🔺	
STRA 1								
₩P2		Medium dense, fine to medium SAND, trace gravel - SP	7					
В NO		-						
N N N	_ 35_			4-8-7	SS8			
CLOI						· · · · · · · · · · · ·		
00 Fr								
N.GF				-				
3KW/				3-4-3	SS9	::: : ▲::::::::		
EL PAI		GROUNDWATER DATA DRILLING	DATA			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
JOEKI		AUGER <u>3 3/4"</u> H	HOLLO	W STEM				
VID F	EN	COUNTERED AT <u>32</u> FEET ¥ WASHBORING FR	ОМ	FEET			GEUTECHN	JLUGYZ
1 - D/		<u>TPD</u> DRILLER <u>D</u>	WJ LO	OGGER			FR	OM THE GROUND UP
391.0		<u>CME 55TRK</u> D	RILL F	RIG		Dav	vid Hoekel Park	vav
J024(HAMMER TYF	PE <u>Aut</u>	0		PI	hase 2A, B, and	c í
2 WL		HAMMER EFFICIE		<u>88</u> %		W	entzville, Misso	uri
3 2002	REN	MARKS: Sta 69+67.71, Offset 47.25 RT				_		
ORING						LOC	5 of Boring:	B-603
OF B(Deret	act No. 10240	01 01
LOG						Proj	ect no. J0246	91.01

		0.620	0/00/0040		÷Ω		SH	EAR STRENGTH	l, tsf
	Surfa	ce Elevation: <u>601.9</u> Com	pletion Date:	(1)	ATS /RO		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum [.] msl		Lo l	RUN HO	S	0.5	1 _. 0 1 <u>.</u> 5 2	0 2,5
						APLI			
	포늡			SAP	ALO'	SAN	▲ IN-V/	(ASTM D 1586)	(1001)
	FEI	DESCRIPTIC	ON OF MATERIAL	5	N T T T T T T T T T T T T T T T T T T T		w	ATER CONTENT	,%
	ΩZ				N N N N		PLI 10 2	20 30 4	10 50 LL
		Medium dense, fine to med	ium SAND, trace gravel - SP					· · · · · · · · · · · · · · · · · · ·	
		(continued)							
		Medium stiff, brown SILT w	ith sand and gravel - ML						
					3-5-7	SS10			
	— 45—								
		Very dense, reddish-brown	, fine SAND, trace silt - SP						
Υ.Υ.					25-26-28	SS11			
ONL'	— 50—								
IN SC									
URPO		Dense, brown SAND -SP							
S BEI ON PI					10-17-21	SS12			
ARIE: RATIO	— 55—				10 11 21	0012		· · · · · · · · · · · · · ·	
LUST									
TE BC		Very siff, gray SILT with sa	nd - ML						
KIMA DG F(7_8_13	SS13			
PRO) HIC L(— 60—				7-0-10	0010		••••••••••••••••••••••••••••••••••••••	
IE AP RAPI									
AL TH									
RESE ADU/					8-7-8	SS14			
REPF SE GR	- 65-				010		· · · · · · · · · · · · · · · · · · ·		
INES AAY E									
ION L		Medium dense, gray SAND	with silt - SP						
ICAT					6-9-12	SS15			
RATIF 5 TR/	— 70—								
: STI P24H									
NOTE GPÅN		Very stiff, gray, silty CLAY	CL						
ME.0					7-8-9	SS16			
LONE	— 75—								
00 C									
GPJ		Stiff, gray CLAY - CH							
WAY					1-4-7	SS17			
PARK	l						Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
EKEL		GROUNDWATER DATA	DRILLING				Date: 7/8/2016	Date: 1/24/2017	Date: 1/24/2017
D HOI			AUGER <u>3 3/4"</u>	HOLLO	W STEM			СЕЛТЕСНИ	UI UĽV∑
DAVI	EN	COUNTERED AT <u>32</u> FEET		ROM	FEET				ULUUI 🙃
- 10.			<u>IPD</u> DRILLER	DANT T(JGGER				
24691					11G		Da	vid Hoekel Park	way
7L JO:					<u>.</u> 88 %		W W	lentzville, Misso	uri
002 M	RE	MARKS: Sta 69+67.71, Off	set 47.25 RT		<u></u> /u				
NG 2		,							OF B 603
BORI							LO	g of during:	0-003
G OF							Pro	ject No. J0246	691.01
Ō								,	

	661.0	6/22/2016		<u>5</u> 0				SHE	EARS	STRENG	GTH,	tsf		
Su	urface Elevation: <u>Constant</u> Completion Date:	0/23/2010	U	T (pc NTS //RQ		Δ	- UU/	/2	C) - QU/2] - SV	/
	Datum: msl		C CO	ER US	ES		0.5	1	0	1.5	2.0	0	2.5	
는 문 년			RAPHIC	NIT WE BLOW (RECOV	SAMPL	ST		ARD I N-VA	LUE (BLOWS	DN R PEF	RESIS R FOO	TANC T)	CE
		TERIAL	0	XY U SPT ORE				WA	ATER	CONTE	ENT,	%		111
	=			E°O		FLF	10	2	20	30	40)	50	
	Stiff, gray CLAY - CH (continued)					· · · · · ·	· · ·	· · ·	 		: :	· · ·	· · ·	· · ·
	Soft, gray SHALE, with silt seams													
				0 4 4 95	0040	· · · ·	· · · ·	· · · ·		· · · · · ·	· · ·	· · · ·	· · · ·	· · · ·
- 8	5-			9-14-35	3310			· · · ·			•••		· • • •	· · ·
	Core loss - 24 inches						· · ·	· · ·	 		· ·	· · ·	· · ·	· · ·
				<u>40%</u> 12%	NQ1	· · · · · · ·		· · · ·	· · · ·				· · · ·	· · · ·
	Tan and gray, slightly weathered SHALE v	with limestone		1270		· · · ·	· · · ·	· · ·	· · ·		· · ·	· · ·	· · ·	· · ·
9 – 9	0 slightly weathered LIMESTONE													
OSES	Soft tan and gray SHALE and CLAY			<u>58%</u>	NQ2	· · · ·	· · ·	· · · ·	· · · · ·			· · · ·	· · ·	· · · ·
PURP				8%		· · · ·	· · · ·	· · ·					· · ·	· · · ·
	Hard, gray, finely crystalline, thin to mediu weathered LIMESTONE	im bedded, slightly					· · · ·	· · ·	 		::	· · · · · ·	· · ·	
- 9	clay seam - 2.5 inches													
	clay seam - 1/8 inch			<u>100%</u> 87%	NQ3	· · · ·	· · ·	· · ·	· ·				· · ·	· · ·
FOR	clay seam - 1 inch becomes thick bedded			0770				· · ·						· · ·
	Boring terminated at 99.5 feet.													
APHIC						· · · ·	· · · ·	· · ·			::	· · · · · ·		· · ·
						· · · ·	· · · ·	· · · ·				· · · ·	· · · ·	· · · ·
						· · · ·	· · · ·	· · ·	· · · ·			· · · ·		
ິມ 10	5-							· · ·			· ·		· · ·	· · ·
IAY B	—					· · · · · ·	· · ·	· · ·	 		::	· · ·	· · ·	· · ·
						· · · ·	· · · ·	· · · ·	· · · ·			· · · ·	· · · ·	· · · ·
	_					· · · ·	· · · ·	· · ·	· · · ·		· · ·	· · · ·	· · ·	· · · ·
≌ —11 ⊈	0—													
4250						· · · ·	· · · ·	· · · · · · ·	· ·	· · · · · ·	· · ·	· · · ·	· · · ·	· · · ·
::GP&I	_					· · · · · · ·	· · · ·	· · ·	· · · ·			· · ·	· · ·	· · · ·
₩ ₩ ₩						· · · ·	· · ·	· · ·	 			· · ·	· · ·	· · ·
						· · · ·	· · ·	· · ·	· · · ·		· ·	· · ·	· · ·	· · ·
PJ 00	_					· · · · · · ·	· · · ·	· · ·	· · ·			· · · ·	· · ·	· · · ·
AY.G						· · · ·	· · · ·	· · ·				· · ·	· · ·	· · · ·
ARKW						 Drev								
(EL P	GROUNDWATER DATA	DRILLING [DATA			Draw	/n by: . : 7/8/2	AGB 1016	Date	скеа бу: в :: 1/24/201	JS 7	App vo Date: 1	1/24/20)17
ЮH		AUGER <u>3 3/4"</u> H	IOLLO	W STEM					0 - 0	тгон	INIO	יי יי	- יע	=
	ENCOUNTERED AT <u>32</u> FEET ♀	WASHBORING FRO	DM	FEET			(uĽU	IECH		JLUU M THE G	א א ב Round I	5
.01 - [<u>TPD</u> DRILLER <u>D</u>	<u>WJ</u> LC	OGGER										
24691		<u>CME 55TRK</u> D		RIG				Dav	/id H	bekel Pa	arkw	/ay		
NL JO				<u>,</u> 88 %				W	entzv	zn, d, a ille, Mis	SSOU	iri		
7 2002 F	REMARKS: Sta 69+67.71, Offset 47.25 RT	Г		<u></u>										
BORING ;									CONT G OF	INUATIO BORINO	on (G: E	DF 3-603		
LOG OF								Proj	ject l	No. J0	246	91.01		

	Quef	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		Ĵ. D		SHE	AR STRENGTH	l, tsf
	Suna		U	NTS NTS		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum:	C LO	HO HO HO HO HO HO HO HO HO HO HO HO HO H	ES	0.5 1	0 1.5 2	0 2.5
			H	N N N N N N N N N N N N N N N N N N N	MPL	STANDARD I	PENETRATION LUE (BLOWS PE	RESISTANCE R FOOT)
	표		RAF	BLO	SA		(ASTM D 1586)	,
	N FF	DESCRIPTION OF MATERIAL		SPT SPT DRE		WA WA	TER CONTENT	[,] %
				800		10 2	0 30 4	0 50
		Topsoil - 12 inches	<u><u>x</u><u>1</u><u>7</u> <u>x</u></u>					
		Medium stiff, brown and gray CLAY - CH		2-3-4	SS1		$\bullet::::::::::::::::::::::::::::::::::::$	
	~	Medium stiff, brown and gray CLAY, trace gravel - (CH)		2-3-4	SS2	: : 🗚 : : : 	•	
	- 5-							
		Stiff, brown and gray CLAY, trace gravel and sand - CH		94.2	ST3	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · ·	
S								
Ľ∠PE	10				ST4			
SOIL SOIL	- 10-							
POSE		-		3-5-8	SS5	: : : : : : ▲: : :●		
PURI								
TION	45			3-4-6	SS6			
STRA	- 15-	Boring terminated at 15 feet.						
BOUI		-					· · · · · · · · · · ·	
AATE FOR								
	- 20-							
APPF	20	-						
ΗB.								
SENT		-						
GRAU	- 25-							
Y BE	20	-						
N NAN		-						
SITIO								
TIFIC RAN	- 30-							
A 上 上 上		-						
AND2		-						
IE.GP								
NE N	- 35-							
) CLO								
PJ 0								
VAY.G								
ARKV								
ΎΕΓ Ρ		GROUNDWATER DATA DRILLING	DATA			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
HOE	-	X FREE WATER NOTAUGERAUGE	HOLLC	W STEM				01 0 0V=
DIVEC	ENC	OUNTERED DURING DRILLING WASHBORING FR	OM	FEET			LUILLHN	
.01 - L		<u>TPD</u> DRILLER <u>E</u>	EER LO	OGGER			I N	
24691		<u>CME 55TRK</u> [RIG		Dav	vid Hoekel Park	way
'L JO				<u>0</u> 88 %		W	nase 2A, B, and entzville, Misso	uri
002 M	RE	MARKS: Sta 132+64.87, Offset 120.58 RT		<u></u> /0				
ORING 2						LOC	G of Boring:	B-701
G OF B						Pro	ect No. J0246	91.01
Ō								

	677.6	6/2/2010		θŪ		SH	EAR STRENGTH	l, tsf
Sur	face Elevation: 6/1.6 Completion Date	te:6/3/2016	0	- (pc NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
	Datum:msl		Ľ		ES	0.5	1.0 1.5 2	.0 2.5
			HC		MPL	STANDARD	PENETRATION	RESISTANCE R FOOT)
E Li			RAP	NIT BLO REC	SAI		(ASTM D 1586)	
	DESCRIPTION OF M	IATERIAL	G	RY U SPT ORE		W.	ATER CONTENT	,%
				E°O		10	20 30 4	0 50
	Brown, silty CLAY - CL							
	-							
						· · · · · · · · · · · · · · · · · · ·		
— 5	_							
	-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · ·
	Brown CLAY, trace silt - CH					· · · · · · · · · · · ·		
ມ 	_					· · · · · · · · · · ·		
È var — 10	-							
						· · · · · · · · · · · ·		· · · · · · · · · · · ·
URPE	_							
	-					· · · · · · · · · · ·		
TRAL	Boring terminated at 15 feet.							
	_							
AATE	-							
	_							
	_							
но Но Но	-							
						· · · · · · · · · · · ·		· · · · · · · · · · · ·
25 — 25	_							
IAY B	-							
						· · · · · · · · · · · ·		
	_					· · · · · · · · · · ·		
≝≚ — 30 ≇⊈	-							
N AFR								
LON GP∯	-					· · · · · · · · · · · ·		
₩ ₩ Ζ 35								
	_					· · · · · · · · · · ·	· · · · · · · · · ·	
00 rd	-							
VAY.G						· · · · · · · · · · · ·		· · · · · · · · · · ·
ARK						Drawn by: AGR	Checked by: BIS	App'vd by: CKK
EKEL F	GROUNDWATER DATA	DRILLING DA	<u>ATA</u>			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
		AUGER <u>3 3/4"</u> HO	OLLOW	V STEM			СЕЛТЕРЦИ	<u>ມເທະ</u> ∧≥
	DOGITENED DOMING DRILLING	WASHBORING FROM	M F	FEET				ON THE GROUND UP
- 101 -				GREK				
02469		HAMMER TYPE	Auto	5		Da P	vid Hoekel Parky hase 2A. B. and	way C
NL J		HAMMER EFFICIEN	CY 8	<u>8</u> %		Ŵ	entzville, Misso	uri
R 8	EMARKS: Sta 133+14.87, Offset 120.5	58 RT						
	o son sampling performed.					LO	g of Boring:	B-702
OF BC								
000						Pro	ject No. J0246	91.01

[070.0		θ		SHI	EAR STRENGTH	, tsf
	Surfa	ace Elevation: <u>676.8</u> Completion Date: <u>673/20</u>		NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum:msl	LO	ERO E	ES	0.5 1	0 1.5 2	0 2.5
			OH		MPL	STANDARD	PENETRATION I	RESISTANCE R FOOT)
	표텂		RAP	BLO	SAI		(ASTM D 1586)	
		DESCRIPTION OF MATERIA		XY U SPT SRE		W/	ATER CONTENT	, %
				<u></u> Е°°С		10 2	20 30 4	0 50
		Brown, silty CLAY - CL						
	— 5-	-						
		-				· · · · · · · · · · · ·		· · · · · · · · · · ·
		Brown and tan, CLAY, trace silt - CH						
ES .		-						
	— 10-	-						
N SOS		-						
URPC								
S BE		-						
DARIE	— 15-	Boring terminated at 15 feet.						
CUUNE						· · · · · · · · · · · ·		· · · · · · · · · · · ·
		-						
PHIC	— 20-							
GRA GRA		-						
UAL.		-						
BRES	25	-						
S RE Y BE	25	-						
N LINI		-				· · · · · · · · · · · ·		· · · · · · · · · · · ·
SITIO		-						
TRAN	— 30-	-						
		-						
EAND:		-						
ME.G		-						
ONE.	— 35-	-						
00 CL						· · · · · · · · · · · · · · · · · · ·		
GPJ.		-						
۲WAY		-						
. PARI				1	I	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
JEKEL						Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
AD HC	ENC	COUNTERED DURING DRILLING	JER <u>J J/4"</u> HULLC HBORING FROM				GEOTECHNI	JLOGY≅
- DA\		TPD	DRILLER ADP LO				FR	OM THE GROUND UP
391.01		 	CME 55TRK DRILL F	RIG		Day	vid Hookol Park	Nav
J0246			HAMMER TYPE <u>Aut</u>	0_		P	hase 2A, B, and	C .
2 WL	_	HAM	MMER EFFICIENCY	<u>88</u> %		W	entzville, Misso	uri
3 200	RE No	MARKS: Sta 133+64.87, Offset 120.58 RT soil sampling performed.						B 700
ORIN(LO	g of Boring:	B-/U3
OF B								04.04
LOG						Pro	ject No. J0246	91.01

1		075 7	C/2/2040		θ		SH	EAR STRENGTH	, tsf
	Surfa	ace Elevation: 675.7 Completion Da	te:	رى	LTS NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum:		ĽŐ	GH1 COUI	S	0.5 1	.0 1.5 2	0 2.5
				HIC	WEI WC	MPL	STANDARD	PENETRATION I LUE (BLOWS PE	RESISTANCE R FOOT)
	표넖			RAF	BLC	SAI		(ASTM D 1586)	,
	N FE	DESCRIPTION OF N	MATERIAL	0	RY U SPT ORE		DI W/	ATER CONTENT	, %
					E S		10 2	20 30 4	0 50
		Brown, silty CLAY - CL							
		-							
							· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
	— 5—	-							
		-							
		Brown and tan, CLAY - CH							
rpes Y.		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · ·
OIL TY	— 10—								
OSE6									
PURF		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
TION	_ 15_	-							
NDAR JSTRA	15	Boring terminated at 15 feet.							
S ILLL		-							· · · · · · · · · · ·
G FOF		-							
	— 20—	-							
IE APF RAPH		_							
AL. G		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · ·
RADU		-							
BE GF	— 25—								
MAY									· · · · · · · · · · · · · · · · · · ·
TION		-					· · · · · · · · · · ·		· · · · · · · · · · ·
IFICA	20	-							
ENET	_ 30_	-							
AND2		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · ·
AE.GP									· · · · · · · · · · ·
ONE N	— 35—								
DO CLO		-							· · · · · · · · · · ·
GPJ		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · ·
WAY.		-					· · · · · · · · · · ·		· · · · · · · · · ·
PARF				Δ Τ Λ			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
JEKEL					MOTES -		Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
/ID HC	ENC		AUGER <u>33/4"</u> HC	JLLO M	VV SIEM			GEOTECHNI)LOGYZ
- DAV			TPD DRILLER AD	ν <u>—</u> Ρ LC				FR	OM THE GROUND UP
391.01			<u></u>	ILL R	lG		Da	vid Hookol Parka	vav
J0246			HAMMER TYPE	Auto	<u>)</u>		P	hase 2A, B, and	C.
2 WL				ICY _	<u>88</u> %		W	entzville, Missoi	Jri
G 200	REI No	NIARKS: Sta 134+13.87, Offset 120. soil sampling performed.	50 KI						B_704
30RIN									5-7 04
3 OF E							Dro	iect No 102/6	91 01
LOG							FIO	JECT 140. JU240	51.01

[<u> </u>		SH	EAR STRENGT	H, tsf
	Surfa	ace Elevation: <u>674.6</u> Completion Date: <u>6/3/2016</u>		LTS RQI		∆ - UU/2	○ - QU/2	🗆 - SV
		Deturn msl	O	LHNU NU NU NU	S	0,5 1	1,0 1,5 2	2,0 2,5
			Ω		L H	STANDARD	PENETRATION	RESISTANCE
			APF		AM	I A N-VA	ALUE (BLOWS PE (ASTM D 1586)	ER FOOT)
		DESCRIPTION OF MATERIAL	GR	N L H H H H H H H H H H H H H H H H H H	0			F 0/
	DE			Y G S S				I, %
		Tanasil Qiashaa				10 2	20 30 4	40 50
		Soft. reddish-brown CLAY - CH		1				
				1-1-2	SS1		•	
		Stiff, tan and brown CLAY - (CH)						
	-			2-4-6	SS2	::::▲:::	• • • • • • • • •	· · · · · · · · · · · · · · · · · · ·
	- 5-	Stiff. brown and gray CLAY with gravel - CH						
		-		2-4-6	SS3			
								· · · · · · · · · ·
PES ſ.		-		2-2-5	SS4		•	
	— 10—	Medium stiff, brown and gray silty CLAY, trace gravel - CL		-				
N SO SES				105	ST5	: : : : : : : : C	• • • • • • • • • • •	
NEEI RPO:		Brown, silty CLAY - CL	V////	1	070	<u>.</u>		
N PU					516			
ATIO!	— 15—							
NDAF STR/		Boring terminated at 15 feet.						
BOUI								
ATE I FOR		-						
MXIM,								
PRC HIC I	— 20—	-						
HE AF								
L T								
ESEN ADUA								
EPR	— 25—	-						
ES R V BE		-						
N M⊿ N M⊿		-						
110 TIO								
RANS								
TRAT †F TF	— 30—							
IS ST 日2时								
NOTE SPÅN		-						
ME.0								
ONE	— 35—							
0 CL								
0 Lq		4						
AY.G								
RKW							L	L
il PA		GROUNDWATER DATA DRILLING	DATA			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
DEKE							Date: 1/24/2017	Date. 1/24/2017
)H QI	ENC	COUNTERED DURING DRILLING					GEOTECHN	UIUGYZ
DAV							F	ROM THE GROUND UP
1.01 -			<u>יייסר L(</u>	JOGER				
2469						Da	vid Hoekel Park	way
:Or 1				<u>0</u>		W W	nase za, B, and /entzville, Misso	ouri
02 W	REI	HAMMER EFFICI MARKS: Sta 134+64 87 Offect 120 58 PT		<u>00</u> %			,	
1G 20								B-705
ORIN						LU	C OF BURING:	5-103
OF B								
00						Pro	ject No. J024	691.01
-1						·		

	070.4	0/0/0040		θ			SHEAR S	STRENGTH	l, tsf				
Sur	face Elevation: <u>673.4</u> Completion Date: _	6/3/2016	(J)	, (pc NTS /RQ		∆ - UU/2	C) - QU/2	🗆 - SV				
	Datum: msl		Ď	GH OUN	ES	0.5	1.0	1,5 2	.0 2.5				
			HC	NC NC	ЛРLI			TRATION	RESISTANCE				
포뇨			RAP	BLO	SAN	(ASTM D 1586)							
	DESCRIPTION OF MA	TERIAL	0	Y UI			WATER	CONTENT	,%				
⊔≥				R S S S S S S S S S S S S S S S S S S S		PL 10	20	30 4	0 50 ILL				
	Tan, silty CLAY - CL												
	_												
	_												
5	_												
— 5 —													
	I an and brown CLAY - CH												
ა ა	rough drilling												
	_												
	_												
	_												
	Boring terminated at 15 feet.					· · · · · · · · ·							
	_												
ັດ ຊິບ — 20	_												
APP APHI	_												
Ë5 ⊢_i	_												
и адуу — 25	_												
AY BI	_												
						· · · · · · · · ·							
	_					· · · · · · · ·							
HIRA TRA 1000 — 30	_												
	_												
SP&N													
ME	_												
NO 35	_												
00													
/.GPJ	_												
KWA	_												
L PAR						Drawn by: AG	BCheo	ked by: BJS	App'vd. by: CKK				
OEKE			<u></u>			Date: 7/2/201	6 Date	: 1/24/2017	Date: 1/24/2017				
≚ ₽ EN	COUNTERED DURING DRILLING	WASHRORING FROM		FFFT			G FN	TECHN	OLOGYZ				
- DAI			ч <u>—</u> Р I С	GGFR			7	FI	OM THE GROUND UP				
91.01		<u>CME 55TRK DR</u>		IG			201411	akel D					
J0246		HAMMER TYPE	Auto	<u>)</u>			Phase	2A, B, and	way C				
ML		HAMMER EFFICIEN	CY <u>8</u>	<u>38</u> %			Wentzv	ille, Misso	uri				
2002 RI	EMARKS: Sta 135+14.87, Offset 120.58 I	RT											
	o son sampning performed.						.OG OF	BORING:	B-706				
DF BO													
000						F	roject l	No. J0246	691.01				

			0/0/0040		θŪ		S	HEAR STRE	NGTH	l, tsf
	Surfa	ace Elevation: 672.2	Completion Date:6/3/2016	(1)	NTS /RQ		∆ - UU/2	0 - QI	J/2	🗆 - SV
		Datum: msl		LO	ERY ERY	ES	0.5	1.0 1.5	2	.0 2.5
				HIC	N N N N N N N N N N N N N N N N N N N	MPL	STANDAR	D PENETRA VALUE (BLO)	TION NS PE	RESISTANCE R FOOT)
	표넖			RAF	BLO	SAI		(ASTM D	1586)	,
	DEP N FE	DESCR	IPTION OF MATERIAL	0	SPT			NATER CON	ITENT	[•] , %
					<u>a</u> o		10	20 30	4	0 50
		Medium stiπ, brown	CLAY - (CH)				· · · · · · · · · · · ·	· · · · · · ·	· · · · ·	· · · · · · · · · · · · ·
		-			1-2-4	551	≜			· · · · · · · · · · · · · · · ·
		Stiff, brown CLAY, t	race gravel - (CH)		346	662	· · · · · · · · · · · ·		· · · · ·	
	— 5-	-			3-4-0	332	· · · · • • · · ·	· · · · · ·	· · · · ·	
		-			101	070		· · · · · · ·		
		-			101	513				>>>>>>>>
Υ.Υ.		-			102	ST4				
	— 10-	_								
EN SC OSES		-			3-6-7	SS5	: : : : : ` ▲: :		· · · · ·	
URP		-								
ES BE		-			4-5-8	SS6	: : : : : . : : . :		· · · · ·	
DARI	— 15-	Boring terminated a	t 15 feet.							
SOUN		_						· · · · · · ·	· · · ·	
ATE E FOR		-						· · · · · · · · · · · · · · · · · · ·		
DOXIM	20	-						· · · · · ·		
APPR	20	-								
THE / GRA		-								
SENT UAL.		-						· · · · · · ·	· · · · ·	
PRES	25	-								
ES RE Y BE (- 25-	-								
N MA		-						· · · · · · ·		
ATIO SITIO		-						· · · · · · ·		
TIFIC,	— 30-	-								
STRA THF		-						· · · · · · ·		
AND2		_						· · · · · · ·	· · · · ·	
NC 1E.GF		-						: :::::		
NE N	— 35-	_								
0 CLC		-					· · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · ·	· · · · · · · · · · · · ·
0 L de		-								
NAY.C		_							· · · · ·	
ARK							Drawn by: AG	Checked b	v: B.IS	App'vd by CKK
KELF		GROUNDWATER D	ATA DRILLI	NG DATA			Date: 7/2/2016	Date: 1/24	/2017	Date: 1/24/2017
) HOE			OTAUGER	<u>/4"</u> HOLLO	W STEM				ԴԱԽ	
JAVIC	ENC	JUUNTERED DURING I	WASHBORING	FROM	FEET			ULUIE		
.01 - 1			TPD DRILLER	<u>ADP</u> LC	OGGER			•	. "	
24691			CME 55TR	KK DRILL F	RIG		C	avid Hoeke	Park	way
'T 10					<u>v</u> 88 %			Wentzville,	s, and Misso	uri
002 M	RE	MARKS: Sta 135+64	87, Offset 120.58 RT		<u></u> /0					
ING 2							L	og of Bor	ING:	B-707
BOR										
JO DE							Ρ	roject No.	J0246	91.01
LC								-		

ſ		662 7	6/2/2046	4	Ê D		SHI	EAR STRENGT	l, tsf					
	Surfa	ace Elevation: <u>602.7</u> Completion Dat	te: 0/3/2016	ן א כ	NTS NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV					
		Datum:	Ŭ I I		H N N N N N N N N N N N N N N N N N N N	ы В Ц	0.5 1	0 1,5 2	2,0 2,5					
					M NO NO NO NO	MPL	STANDARD	PENETRATION LUE (BLOWS PE	RESISTANCE R FOOT)					
	ΞΞ				BLO	SA	(ASTM D 1586)							
	DEP N FE	DESCRIPTION OF N		- 2	SPT		PI W/	ATER CONTENT	Г, %					
				Ĩ	ΞŬ		10 2	20 30 4	40 50					
		Soft to medium stiff, brown CLAY - (CF	1)				· · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·						
		-			0-2-2	551		I = 1 = 1						
		-					· · · · · · · · · · · ·							
	- 5-	-			97	ST2		• • • • • • • • • • •						
		-			100	0.72								
		-			100	515								
÷		-			3-3-4	SS4		•						
S ONL	- 10-	-												
OSES		stiff, trace gravel			4-5-7	SS5								
PURP		-						· · · · · · · · · · · · · · · · · · ·						
TION	45	-			9-15-8	SS6		•						
STRA	- 15-	Boring terminated at 15 feet.												
S ILLU		-					· · · · · · · · · · ·							
FOF FOF		-												
C C C	- 20-	-												
H H H		-					· · · · · · · · · · · ·							
<u>ל</u> ו		-												
		-												
בצ	- 25-	-												
		-												
		-												
		-												
1	- 30-	-												
1+7.H.		-												
5		-					· · · · · · · · · · ·							
	25							· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · ·					
	- 35-	-												
5		-					· · · · · · · · · · · · · · · · · · ·							
D.														
L L		GROUNDWATER DATA	DRILLING DAT	<u>A</u>			Drawn by: AGB Date: 7/2/2016	Date: 1/24/2017	App vd. by: CKK Date: 1/24/2017					
		X FREE WATER NOT	AUGER <u>3 3/4"</u> HOLL	LOW	STEM			ογοτροιιν						
UINEC	ENC	COUNTERED DURING DRILLING	WASHBORING FROM _	F	EET			ueuiechn						
1 - LO.			TPD DRILLER EER	LOG	GER			r	NOM THE AROUND UP					
18047			CME 55TRK DRILL		3		Dav	vid Hoekel Park	way					
VL JU				<u>+υιο</u> γ ρρ	%		Р W	nase ZA, B, and entzville, Misso	ouri					
002 V	RE	MARKS: Sta 138+14.87, Offset 120.	58 RT	1 <u>00</u>	/0									
NGZ		·					LO	g of Boring:	B-708					
BOR														
0 90							Pro	ject No. J024	691.01					
Ľ														

	000 0	C/2/204 C		÷Ω		SH	EAR STRENGTH	l, tsf				
Surfa	ce Elevation: <u>660.6</u> Completion	Date:	U	T (pc NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV				
[Datum: msl		CLO	ERUCE	В	0.5	1.0 1.5 2	.0 2.5				
Ξ			RAPHIC	INIT WE BLOW (RECOV	SAMPI	SIANDARD PENETRATION RESISTANC ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)						
DEP	DESCRIPTION O	FMATERIAL	0	RY U SPT ORE		PL W		; %				
	Tonsoil 12 inchos		1.1.1.1	δŬ		10	20 30 4	0 50				
	Brown CLAY - CH					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·				
						· · · · · · · · · · · ·						
— 5—												
						· · · · · · · · · · · ·		· · · · · · · · · · · ·				
10												
- 10-	with sand and gravel											
						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · ·				
- 15-	Boring terminated at 15 feet											
	bonng terminateu at 15 leet.											
								· · · · · · · · · · · ·				
- 20-												
						· · · · · · · · · · · ·		· · · · · · · · · · · ·				
- 25-												
- 30-												
						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · ·				
- 35-												
						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				
								· · · · · · · · · · · ·				
			 \^			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK				
						Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017				
ENC	OUNTERED DURING DRILLING	WASHBORING FRO	OLLO DM	FEET			GEOTECHN	OLOGY롱				
		<u>TPD</u> DRILLER <u>EE</u>		OGGER			FR	OM THE GROUND UP				
		<u>CME 55TRK</u> DI	RILL F	RIG		Da	vid Hoekel Park	way				
			E <u>Aut</u>	<u>0</u>		F W	hase 2A, B, and /entzville. Misso	C uri				
REM	MARKS: Sta 138+64.87, Offset 1	HAMMER EFFICIE	NCY_	<u>88</u> %			· ·····, ··········					
No s	soil sampling performed.					LO	g of Boring:	B-709				
						Pro	ject No. J0246	691.01				
							,					

	050.0	0/0/004.0	ĘΟ		SH	EAR STRENG	TH, tsf
Surfac	ce Elevation: <u>658.8</u> Completion Da	te: <u>6/3/2016</u>	RQ /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
Г	Datum: msl	LOO	H20H	ES	0.5	1.0 1.5	2.0 2.5
			N N N N N N N N N N N N N N N N N N N	MPL	STANDARD	PENETRATIO	N RESISTANCE PER FOOT)
Η Η Η Η			BLO	SA		(ASTM D 1586)	
	DESCRIPTION OF		SPT ORE		PL W	ATER CONTE	NT, %
	Topsoil - 12 inches	V. N. F.			10 2	20 30	40 50
	Reddish-brown CLAY - CH						
							· · · · · · · · · · · · · · · · · · ·
- 5-							
							· · · · · · · · · · · · · · · · · · ·
- 10-							
- 15-	Boring terminated at 15 feet.		•				· · · · · · · · · · · · ·
- 20-							
20							
							· · · · · · · · · · · · · · · · · · ·
- 25-							
							· · · · · · · · · · · · · · · · · · ·
- 30-							
							· · · · · · · · · · · · · · · · · · ·
0.5							
- 35-							
					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
						Checked by: P	
	GROUNDWATER DATA	DRILLING DATA			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
ENC		AUGER <u>3 3/4"</u> HOLLO	W STEM			СЕЛТЕРИ	NUIUCV≥
			FEET				FROM THE GROUND UP
		HAMMER TYPE Aut	0_		P	via noekel Pa Phase 2A, B, a	nd C
D			<u>88</u> %		W	/entzville, Mis	souri
KEN No s	אואלאס: סנג 139+14.87, Offset 120. soil sampling performed.	.50 K I			LO	g of Boring	6: B-710
						ingt No. 100	4604.04

Γ			6/3/2016		É D			SH	EAR S	STRENGT	H, tsf	
	Surfa	ace Elevation: <u>650.0</u> Completion Date	2	ŋ	IT (po INTS Y/RC		Δ-ι	JU/2	C) - QU/2	🗆 - SV	
		Datum: msl		CLO	COU COU	LES	0. Stan	5				
- F	Ξ			RAPHIC	INIT WE BLOW RECOV	SAMP	STAN	▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)				
	лс	DESCRIPTION OF M	ATERIAL	0	RY U SPT ORE		PI I	W	ATER	CONTEN	T, %	
		Tonsoil - 24 inches		J. St. K.	ŌŌ		1	0	20	30	40 50	
		-		<u> </u>								
		Brown CLAY - CH						· · · · ·				
_		-						· · · · ·				
	5-	-										
_		-										
S		trace sand and gravel										
DNLY.	10-	-										
N SOII												
		-						· · · · ·				
ION P		-					· · · · ·	· · · ·		· · · · · · · ·		
STRA1	15-	Boring terminated at 15 feet.										
		-					· · · · · ·	· · · · ·		· · · · · · · ·		
G FOF		-										
HC LO	20-	-							· · ·			
HE API		-						· · · · ·				
IAL. –		-						· · · · ·				
PRESI	05											
ES RE	25-	-						· · · · ·				
N LIN		-										
		-						· · · · ·		· · · · · · · · ·		
RATIFI	30-	-										
HIST HIST		-						· · · · ·				
NOT E.GP∯		-					· · · · · ·	· · · · ·				
NE ME	35-	-										
0 CTO		-						· · · · ·				
GPJ (-					· · · · · ·	· · · · ·			· · · · · · · · · · · · · · · · · · ·	
KWAY.		-					 	· · · · ·		· · · · · · · ·		
L PAR		GROUNDWATER DATA			I	I	Drawn b	y: AGB	Cheo	ked by: BJS	App'vd. by: CKK	
JOEKE		X FREE WATER NOT	AUGER 3 3/4" H		W STFM		Date: 7	2/2016	Date	: 1/24/2017	Date: 1/24/2017	
AVID F	ENC	COUNTERED DURING DRILLING	WASHBORING FRC	DM	FEET			C	GEO	TECHN	OLOGY롱	
.01 - D			<u>TPD</u> DRILLER <u>EE</u>	<u>ER</u> LC	OGGER					F	KUM THE GROUND UP	
24691			<u>CME 55TRK</u> DF	RILL F	RIG			Da	vid Ho	oekel Park	way	
WL JO			HAMMER EFFICIE	NCY	<u>-</u> 88_%			<u></u>	/entzv	ille, Misso	buri	
3 2002	RE No	MARKS: Sta 139+64.87, Offset 120.5 soil sampling performed	8 RT									
30RING	110	oon ouniphing henormed.						LO	g of	BORING:	B-711	
JG OF E								Pro	oject N	No. J024	691.01	
									•			

		055.0	6/6/2046		φ. D			SH	EAR	STREN	GTH	, tsf	
S	Surfac	ce Elevation: 655.0 C	Completion Date:	U	r (po NTS //RQ		∆ - UU	1/2	() - QU/2	2	[] - SV
	D	Datum: msl		ΓÕ	ERY ERY	ËS	0.5	1	1.0	1,5	2	0	2.5
					N COV	MPL	STANDARD PENETRATION RES			RESIS R FOC	TANCE		
HT		DESCOID		GRAI	BLO	SA		(ASTM D 1586)					
DEF	LL Z	DESCRIP			SPT			W	ATER		ENT,	, %	
		Topsoil - 18 inches		<u>x 1</u> x . <u>x</u>			10		20	30	4	0	50
		Soft orange and brown	silty CLAY - CL		1-2-2	SS1				• • • • •			
		Stiff, brown and gray Cl	A with sand and gravel - CH										
	_	oun, brown and gray of			101.8	ST2		· · · ·			· · ·	· · · ·	· · · · · · ·
	5-					ST3		· · · ·			· · · ·		
								· · · ·	· · ·	· · · · · ·	· · · · ·	· · · ·	· · · · · · · ·
					0.45	004		· · · ·		· · · · · ·	· · · · ·	· · · ·	· · · · · · ·
NL≺	10-				3-4-5	SS4	· · · • • • •						
					2-4-7	SS 5	: : : : : : _:		· · ·		· · · ·	· · · · · ·	: : : : : :
											· · · · ·	· · · ·	· · · · · · · ·
					3-5-7	SS6	:::::	· · · ·	•		· · · · ·	· · · ·	· · · · · · ·
	15—	Boring terminated at 15	i feet								· · ·		
								· · · ·	 	· · · · · ·	· · ·	· · ·	· · · · · · ·
G FOR								· · ·	· · ·				
	20-												
RAPH								· · · · · · ·	· · · ·	· · · · · ·	· · · · ·		· · · · · · ·
								· · ·	· · ·	· · · · · ·	· · · · ·	· · ·	· · · · · · ·
								· · ·					
ל <u>ב</u>	25-												
											· · ·		
							· · · · · · ·	· · · ·	· · ·	· · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · ·	· · · · · · · ·
	30-										· · ·		
								· · ·	· · · ·		· · ·	· · · ·	· · · · · · ·
								· · · · · ·	 		· · ·	· · ·	
שוב.פ 								· · · ·			· · · · ·	· · · ·	· · · · · · ·
ONE ;	35-										•••		
								· · · ·	· · ·	· · · · · ·	· · · · ·	· · · ·	· · · · · · ·
,≺.GP								· · · ·	· · · ·	· · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · ·	
RKWA								· · · ·			· · · ·	· · · ·	
EL PA	9	GROUNDWATER DAT	<u>A</u> <u>DRILLING</u>	DATA			Drawn by:	AGB 2016	Che	ecked by: I	BJS 17	App'vo	d. by: CKK
HOEK		X FREE WATER NOT	AUGER <u>3 3/4"</u>	HOLLO	W STEM								
	ENCC	OUNTERED DURING DRI	ILLING WASHBORING F	ROM	FEET				GEL	JIECI	IN		Liys
.01 - Г			TPD DRILLER	<u>EER</u> LC	OGGER						FKU	JWIIHEL	INUUNU UP
24691			CME 55TRK		RIG			Da	vid H	oekel F	Parkv	vay	
ML JO					<u>.</u> 88 %			W	entz	ville, Mi	a110 SSOL	ıri	
2002 \	REM	IARKS: Sta 140+14.87	, Offset 120.58 RT		<u></u>								
DRING								LO	g of	BORIN	IG: E	3-712	
OF BC										N	040	04.04	
Q								Pro	ject	NO. JO)246	91.01	l

	050 5	0101004.0		θŪ		SH	EAR STRENG	TH, tsf					
Surfa	ce Elevation: <u>653.5</u> Completion Da	te: 6/6/2016	0	LTS NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV					
[Datum:		ΓÕ	ERVIIGH	ES	0.5	1 _. 0 1 _. 5	2.0 2.5					
ΗŢ			RAPHIC	NIT WE BLOW C RECOV	SAMPL	STANDARD PENETRATION RESISTANCE ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)							
N FE	DESCRIPTION OF N	MATERIAL	5	RY UI SPT E		w.	ATER CONTE	NT, %					
				E S		10	20 30	40 50 LL					
	Topsoil - 24 inches					· · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
	Brown, CLAY - CH							: : : : : : : : : : : : : : : : : : : :					
- 5-	trace sand and gravel												
						· · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
						· · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
10													
- 10-													
						· · · · · · · · · · · ·							
								· · · · · · · · · · · · · · · · · · ·					
- 15-	Boring terminated at 15 feet.							· · · · · · · · · · · ·					
						· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
- 20-								· · · · · · · · · · · ·					
						· · · · · · · · · · · ·							
- 25-													
						· · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
						· · · · · · · · · · · ·							
						· · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
- 30-													
								· · · · · · · · · · ·					
- 35-													
						· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
								· · · · · · · · · · · · · · · · · · ·					
								· · · · · · · · · · · · · · · · · · ·					
	GROUNDWATER DATA	DRILLING [DATA	<u> </u>		Drawn by: AGB	Checked by: BJ	S App'vd. by: CKK 7 Date: 1/24/2017					
	X FREE WATER NOT	AUGER <u>33/4"</u> H	IOLLO	W STEM			000000						
ENC	OUNTERED DURING DRILLING			FEET			GEUIECH	FROM THE GROUND UP					
		<u>CME 55TRK</u> D	RILL F	IG			wid Uppkel D-	rkway					
		HAMMER TYP	E <u>Aut</u>	<u>.</u>			Phase 2A, B, a Ventzville. Mis	nd C souri					
REN	MARKS: Sta 140+64.87, Offset 120.	HAMMER EFFICIE	NCY_	<u>88</u> %									
No s	soil sampling performed.					LO	g of Boring	6: B-713					
						Pro	ject No. J02	4691.01					
						Pro	oject No. J02	4691.01					

	050.0	0/0/2040		÷Ω		SH	EAR STRENC	STH, tsf				
Surfa	ace Elevation: <u>652.2</u> Completion Da	ite: <u>6/6/2016</u>	(")	VTS VTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV				
	Datum: msl		ΓO	ERVI	ES	0.5	1.0 1.5	2,0 2,5				
표표			RAPHIC	NIT WE BLOW C RECOV	SAMPL	STANDARD PENETRATION RESISTANCE ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)						
N FE	DESCRIPTION OF N	MATERIAL	G	XY U SPT ORE		U W	ATER CONTE	INT, %				
				E°S		10	20 30	40 50				
	l opsoli - 24 inches		<u>v.,</u> v.			· · · · · · · · · · ·		· · · · · · · · · · · · · ·				
	Gray CLAY - CH											
- 5-												
	Brown CLAY, trace sand - CH					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · ·				
40												
- 10-												
						· · · · · · · · · · · ·		· · · · · · · · · · · · · ·				
- 15-	Boring terminated at 15 feet											
	Bonng terminated at 15 leet.					· · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·				
						· · · · · · · · · · ·		· · · · · · · · · · · · ·				
- 20-												
								· · · · · · · · · · · · · · · · · · ·				
						· · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·				
- 25 -												
25												
								· · · · · · · · · · · · · · · · · · ·				
						· · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·				
- 30-												
						· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · ·				
05												
- 35-												
						· · · · · · · · · · · · · · · · · · ·						
							· · · · · · · · · · · · · · · · · · ·					
						Drawn by: AGB	Checked by: B	JS App'vd. by: CKK				
	<u>GROUNDWATER DATA</u>	DRILLING D	ATA			Date: 7/2/2016	Date: 1/24/201	7 Date: 1/24/2017				
ENC	<u>X</u> FREE WATER NOT OUNTERED DURING DRILLING			W STEM			GENTECH	NUINGYZ				
			R L0				ALVILUI	FROM THE GROUND UP				
		<u></u>	RILL F	RIG			vid Hoekel P	arkway				
		HAMMER TYPE	<u>Aut</u>	0_		F	hase 2A, B, a	ind C				
RCI	MARKS: Sta 141+14 87 Offect 120	HAMMER EFFICIEN	NCY _	<u>88</u> %		N N		50UII				
No	soil sampling performed.					LO	g of Boring	G: B-714				
						Dro	piect No. 10	24691 01				
							Joor 140. JU					

	054.0	0/0/2040	÷Ω		SH	EAR STRENGT	H, tsf			
Surfac	ce Elevation: 651.6 Completion Da	ite: <u>6/6/2016</u>	VTS VTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV			
С	Datum: msl	LO I	ERVIIGH	ËS	0,5	1 _. 0 1 <u>.</u> 5	2 ₁ 0 2 ₁ 5			
포뇨		RAPHIC	NIT WE BLOW C	SAMPL	STANDARD PENETRATION RESIST ▲ N-VALUE (BLOWS PER FOOT (ASTM D 1586)					
N FE	DESCRIPTION OF		SPT I		w.		T, %			
			E S		10	20 30	40 50 LL			
	Topsoil - 24 inches	$\frac{x^{1}}{x}$								
	Gray CLAY with sand - CH									
- 5-										
	Brown CLAY - CH									
					· · · · · · · · · · · · · · · · · · ·					
- 10-										
_ 15										
10	Boring terminated at 15 feet.									
20-						· · · · · · · · · · · ·				
- 25-										
- 20-										
- 30 -										
- 35-						<u> </u>				
					· · · · · · · · · · · · ·					
					· · · · · · · · · · · ·					
 !	GROUNDWATER DATA	DRILLING DATA	1	I	Drawn by: AGB	Checked by: BJS	App'vd. by: CKK			
	X FREE WATER NOT	AUGER <u>3 3/4"</u> HOLLC	W STEM			AFATEAU				
ENCC	DUNTERED DURING DRILLING	WASHBORING FROM	FEET		C	GEUIECHN				
		TPD DRILLER EER LO	OGGER				NOM THE UNUUND UP			
			RIG		Da	vid Hoekel Park	(way			
			<u></u> 88_%		N N	lentzville, Misso	buri			
REM No s	IARKS: Sta 141+64.87, Offset 120. soil sampling performed.	.58 RT			LO	g of Boring:	B-715			
					n	loot No. 1004	604.04			

	Datum:msl	Completion Date.		900		Δ - UU	1/2	0 - 0	QU/2			
DEPTH N FEET	Datum: <u>msl</u>		0	ĻΞĔ		0.5	·-	<u> </u>		•	⊔-5V	
DEPTH N FEET				VER COL	LES	0.5 STAND	1 ARD I		.5 2 ATION I	i ⁰ RESI		
	DESCRI	IPTION OF MATE	RIAL	UNIT W T BLOW E RECO	SAMF	▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586)						
-				SP SOR SP			2			, 70	50 LL	
	Topsoil - 24 inches		$\frac{1}{2} \frac{1}{\sqrt{2}}$	· <u>X</u> ·								
	Modium stiff brown		$\overline{V} \cdot \overline{z_{I}}$	2-1-2	SS1	:▲: : : : :					· · · · · · · · ·	
		CLAT-CH					· · · ·		· · · · · ·	· · · ·	· · · · · · · · ·	
- 5-					ST2			••••				
	Soft, gray, sandy CL	AY - CL		96.5	ST3	· · · · · · ·	· · ·			- · · · · · · · · · · · · · · · · · · ·		
							· · · ·			 		
	Medium stiff, brown	and gray CLAY, trace gra	vel - CH	3-3-3	SS4		· · · ·			 		
5 – 10 –	Stiff, brown and gray	y CLAY, trace gravel - CH										
				3-5-6	SS5] : : : : 🗚	· · · ·				· · · · · · · ·	
							· · · · · · ·		· · · · · ·		 	
- 15-	D			3-3-6	SS6			::: (
	Boring terminated at	t 15 feet.					· · · ·			 		
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20-												
5						· · · · · · ·	· · · ·			· · ·	· · · · · · · · ·	
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— 35—										· · ·		
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							 ACR	Checked	by: B IS	 		
	GROUNDWATER DA	ATA	DRILLING DAT	<u> </u>		Date: 7/2/2	2016	Date: 1/2	24/2017	Date	: 1/24/2017	
			AUGER <u>3 3/4"</u> HOLL	OW STEM				CEULC	:คมท	ט וט	CV≥	
				_ FEET				uLUIL		OM THE	GROUND UP	
al.0		<u> </u>	<u>CME</u> 55TRK DRILL	RIG			-	(1a) c - '				
			HAMMER TYPE A	<u>uto</u>			Dav P	hase 2A,	B, and	way C		
			HAMMER EFFICIENCY	<u>88</u> %			W	entzville	, Misso	uri		
	MARKS: Sta 142+14.	87, Offset 120.58					LOC	g of Bo	RING:	B-71	6	
-0G OF B							Proj	ject No.	J0246	691.0	1	

	652.4	6/6/2016		<u> </u>			SHE	EAR STRENG	GTH, tsf						
S	urface Elevation: Completion Date:	0/0/2010	U	r (pc NTS /RQ		∆ - UI	J/2	○ - QU/2	🗆 - SV						
	Datum: msl		Õ	ERV ERV	BS	0.5	1	0 1.5	2.0 2.5						
			HIC	NO NO	MPL	STANE	DARD F	PENETRATION	DN RESISTANCE						
픤			RAP	REC	SAN			(ASTM D 1586	3)						
EP		ERIAL	Ū	N T U N T U		D . I	WA	TER CONT	ENT, %						
	É			R NO		PL 10	2	0 30	40 50 LL						
	Topsoil - 12 inches														
	Brown, silty CLAY - CL								· · · · · · · · · · · · ·						
	Yellowish-brown, silty CLAY - CL						· · · · ·		· · · · · · · · · · · · · · · · · · ·						
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									· · · · · · · · · · · · · · · · · · ·						
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۲. ۲	Brown, silty CLAY - CL														
		Ţ							· · · · · · · · · · · · · · · ·						
PURF	very soft						· · · · ·		· · · · · · · · · · · · · · · · · · ·						
					ST1										
STRA	Boring terminated at 15 feet.														
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FOR	_						· · · · ·		· · · · · · · · · · · · · · · · · · ·						
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SENT															
GRAC									· · · · · · · · · · · · · · ·						
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SITIO	—								· · · · · · · · · · · · · · ·						
IRAN SI I	n														
STRA									· · · · · · · · · · · · · · · · · · ·						
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AY.G									· · · · · · · · · · · · · · · · · · ·						
ARKW															
(EL P)	GROUNDWATER DATA	DRILLING D	ATA			Drawn by: Date: 7/2	/2016	Date: 1/24/201	7 Date: 1/24/2017						
HOEK	_	_AUGER <u>3 3/4"</u> H	ollo	W STEM											
AVID	ENCOUNTERED AT <u>12</u> FEET ♀	WASHBORING FRO	M	FEET				GEUIECH	INULUGYS						
- <u>D</u>		<u>NG</u> DRILLER <u>DW</u>	<u>/J_</u> LC	GGER					FRUM THE GROUND UP						
4691.(<u>CME 550X</u> DR	ILL RI	G			Dav	vid Hoekel P	arkway						
- J02.		HAMMER TYPE	E <u>Aut</u>	<u>)</u>			PI W/	hase 2A, B, a	and C						
02 WL	EMADKS: Sta 142+64 87 Offerst 120 59	HAMMER EFFICIEN	NCY _	<u>88</u> %				51112 VIIIC, 14113							
1G 20	NEIVIARING. JIA 142704.07, UTISEE 120.58								G: B-717						
BORIN							200								
JG OF							Proj	ect No. J0	24691.01						
Ĭ															
Γ		653.1		6/6/2016		fi D				SF	IEAF	STR	ENGTH	l, tsf	
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	Surfa	ace Elevation: 000.1	Completion Date:	0/0/2010	ŋ	T (po NTS //RQ		L 1	1 - U	IU/2		0 - Q	U/2	[] - SV
		Datum: <u>msl</u>			CLO	/ER	LES	67	0.						2.5
	ΞШ				RAPHIC	BLOW RECOV	SAMP	51	AN	N-V		E (BLO (ASTM D	WS PE 1586)	R FOC	TANCE (T)
	N FP	DESCR	RIPTION OF MA	TERIAL		RY U SPT ORE		PL	-	V	ATE		NTENT	,%	——————————————————————————————————————
		Tapasil 10 inches			A L: 3	δö		• - •	10)	20	30	4	0	50
_		Brown to yellowish-	-brown, silty CLAY - CL					· · · ·	· · ·	· · ·	· · ·	· · · · ·	· · · · ·	· · · ·	· · · · · · · ·
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		-							· · ·	· · · ·	· · ·	· · · · ·	· · · · ·	· · · ·	· · · · · · · ·
_	- 5-	-								· · · ·	· ·	· · · ·	· · · ·		· · · · · · ·
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SH -		-						· · · ·		· · ·	· · ·	· · · · ·	· · · · ·	· · · ·	
	- 10-														
OSEG		-						· · · ·		· · ·			· · · ·	· · · ·	
		-							· · ·		 	· · · · ·	· · · · ·	· · · ·	· · · · · · · · · · · · · · · · · · ·
TION	- 15-	-									: :				
ISTRA	15	Boring terminated a	at 15 feet.							· · ·	· ·		· · · · ·	 	
		-						· · ·	· · ·	· · · ·	· · ·	· · · · ·	· · · ·	· · · ·	· · · · · · · ·
G FOF		-						· · · ·		· · ·	· · ·	· · · · ·	· · · · ·	· · · ·	· · · · · · ·
	- 20-	-						• • •			· ·	· · · ·	· · · ·	• • •	
IE API RAPH		-													
AL. GH								· · · ·	· · ·	· · · · · · · · · · · · · · · · · · ·	· · ·	· · · · ·	· · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · ·
RESEI		-								· · ·					
BE GF	- 25-	-													
MAY															
		-						· · · ·	· · ·	· · ·	· · ·	· · · · ·	· · · · ·	· · · ·	· · · · · · ·
RANS	_ 30_									· · ·	· ·				
AT 日本 日 日 日 日 日	50	-								· · ·	 				
UN €UN €		-								· · · ·		· · · · ·			· · · · · · ·
ME.GF										· · · ·		· · · · ·	· · · · ·		· · · · · · ·
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00 CL		1								· · · · · ·	: :		· · · · ·		· · · · · · ·
.GPJ]								· · · ·		· · · · ·	· · · · ·		· · · · · · · ·
KWAY 		-						· · · ·	· · ·	· · · ·	· · ·	· · · · ·	· · · · ·	· · · ·	· · · · · · · ·
- PAR			ΑΤΑ		ΔΤΔ	l	I	Drav	wn by	y: AGB	CI	necked b	oy: BJS	App'vo	l. by: CKK
OEKEI								Date	e: 7/:	2/2016	Da	ate: 1/24	/2017	Date:	1/24/2017
AID H	ENC	COUNTERED DURING	DRILLING	WASHBORING FRO		FEET					GE	OTE	CHN	OLO	GYZ
1 - DA				<u>NG</u> DRILLER <u>DV</u>	VJ_LC	GGER							FR	OM THE G	ROUND UP
691.0				<u>CME 550X</u> DR	ILL RI	G				Da	avid	Hoeke	l Park	way	
- J02				HAMMER TYPI	E <u>Aut</u>	<u>)</u>				l V	Phas Nent	e 2A, zville	B, and Misso	C	
)02 WI	RF	MARKS: Sta 143+14	.87. Offset 120 58	HAMMER EFFICIE	NCY _	<u>88</u> %		-							
ORING 20	No	soil sampling perfor							LC)G O	f Bof	RING:	B-718		
3 OF B								-		Dr	niec	t No	.10244	91 01	
ГО											5,00		55270		

ſ				6/6/2016		<u>କ</u> ୍				SH	EAR	STRE	NGTH	l, tsf	
	Surfa	ace Elevation: 004.0	Completion Date:	0/0/2010	Q	T (po		Δ	- Ul	J/2		0 - QU	/2	[] - SV
		Datum: <u>msl</u>			CLO	ER/	LES	ет	0.5			1.5	2		
-	ΗΞ				RAPHIC	BLOW RECOV	SAMP	51		N-V	ALUE (/	(BLOV ASTMD1	VS PE 586)	R FOC	TANCE DT)
	DEP N FE	DESCR	RIPTION OF MA	TERIAL	0	SPT SPT ORE		PL		W	ATEF		TENT	,%	
		Tanaail 10 inahaa			1.1 1.1 3	δö			10		20	30	4	0	50
		Brown to yellowish-	brown, silty CLAY - CL					· · · ·		 		· · · · ·	· · · ·	· · · ·	· · · · · · ·
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	- 5-	_								· · · · ·					
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		-								 					
ΥΡΕS		trace gravel						· · · ·		 		· · · · ·	· · · · · · · · · · · · · · · · · · ·		· · · · · · ·
	- 10-														
OSE SOSE		-						· · ·	: :	 		· · · ·	· · ·	· · · ·	
PURF		_						· · · ·		 			· · · ·		· · · · · · · · · · · · · · · · · · ·
TION	_ 15_	_							::				:::		
NDAR ISTRA	15	Boring terminated a	at 15 feet.					· · · ·	· · · ·	 		· · · · ·	· · ·	· · ·	· · · · · · ·
BOU RILLU		-						· · · · · · ·		· · · · ·			· · · · · · ·	· · · ·	· · · · · · · · · · · · · · · · · · ·
MATE G FOF		_						· · · ·	· · ·	· · · · ·			· · · ·		· · · · · · ·
IC LO	- 20-														
E APF RAPH		-						· · · ·		· · · · ·			· · · ·		· · · · · · ·
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KESEN RADUA		_						· · ·	: :	· · · ·	· · · ·		· · ·	· · ·	
REP B G G F G	- 25-	-								· · · · ·					
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TION		-													
RANSI		_								· · · ·					
H H H	- 30-	-												· · ·	
BND24		-						· · · ·	· · ·	· · · · ·		· · · · ·	· · · ·	· · ·	· · · · · · ·
N C N C		-						 	::	 	· · · ·		· · · · · ·		· · · · · · ·
NE N	- 35-	-													
NO CLC	-	-							· · ·	· · · · ·	· · · · ·	· · · · ·	· · · ·	· · · ·	· · · · · · ·
GPJ C		-						· · · · · ·	· ·	 		· · · · ·	· · ·		
WAY		-						· · · · · ·	· ·		· · ·		· · · ·		· · · · · · ·
PARK			ATA					Drav	vn by:	AGB	Che	ecked by	: BJS	App'vo	d. by: CKK
EKEL		GROUNDWATER D		<u>DKILLING L</u>				Date	: 7/2	/2016	Dat	e: 1/24/2	2017	Date:	1/24/2017
OH QI	ENC	<u>X</u> FREE WATER N COUNTERED DURING	IOT DRILLING	AUGER <u>3 3/4"</u> H		W STEM					GFI	ŊŢĘſ	HN	ו ח ו ר	ſγΞ
- DAV					vvi ۱۷۱								FR	OM THE G	ROUND UP
91.01				<u></u>	LL R	G				 D	vid L	lookal	Darla	N914	
J0246				HAMMER TYPI	E <u>Aut</u>	0_				F	hase	2A, B	, and	C.	
2 WL					NCY _	<u>88</u> %				V	/entz	ville, N	lisso	uri	
JRING 200	RE No	MARKS: Sta 143+64 soil sampling perfor	KI						LO	g of	BOR	NG:	B-719		
OF BC										_		NI -	100.40	04.04	
LOG										Pro	oject	NO. 、	10246	91.01	

Г				÷ D		SHI	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>676/2016</u> Completion Date: <u>6/6/2016</u>		RQI RQI		∆ - UU/2	○ - QU/2	🗆 - SV
		Detune mel	00	L NU NU N	S	0.5 1	.0 1.5 2	.0 2.5
		Datum:	CL		Ë	STANDARD	PENETRATION	RESISTANCE
			H	N N N N N N N N N N N N N N N N N N N	MP	▲ N-VA	LUE (BLOWS PE	R FOOT)
Ī	ΞÜ		RA	RL(BL	SP		(ASTM D 1560)	
l	ËΕ Γ	DESCRIPTION OF MATERIAL	0	Л Ц Ц Ц Ц Ц Ц		w/	ATER CONTENT	,%
	_ ∠			R S S S		PLI 10 2	20 30 4	0 50 ILL
		Topsoil - 10 inches	$\overline{z_{I-1}^{N}}$ $\overline{z_{I}}$					
		Soft, brown CLAY - (CH)		1-1-2	SS1		••••••••••••••••••••••••••••••••••••••	95
		-		101	ST2		••••••••	
	5-	-		-	-			
				117	ST3	· · · · · · · • • · ·		
		Very stiff, brown and gray, silty CLAY, trace gravel - CL						· · · · · · · · · · ·
	10			2-8-13	SS4	.		
	10-							
				2-8-13	SS5			
		-						
		-	<i>\////</i>	5-11-13	556			
	15-	Boring terminated at 15 feet	<i>\/////</i>	0 11-10	550			
		-						
	20-							
	20	-						· · · · · · · · · · ·
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	25-	-						
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		1						
	0.5	-						
	35-							
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		-						
		-						
						Drawn by: AGR	Checked by: B.IS	App'yd. by: CKK
		GROUNDWATER DATA DRILLING I	DATA			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
		<u>X</u> FREE WATER NOT AUGER AUGERAUGERAUGERAUGERAUGERAUGERAUGERAUGERAUGERAUGERAUGER	IOLLO	W STEM			000700000	
	ENC	COUNTERED DURING DRILLING WASHBORING FRO	ОМ	FEET			GEUIECHNI	ULUGYS
		<u>NG</u> DRILLER <u>D</u>	<u>NJ</u> LC	GGER			FR	UM THE GROUND UP
		<u>CME 550X</u> DF	RILL RI	G		Dav	vid Hoekel Park	wav
		HAMMER TYP	E <u>Aut</u>	<u>0</u>		P	hase 2A, B, and	C
		HAMMER EFFICIE		<u>88</u> %		W	entzville, Misso	uri
	RE	MARKS: Sta 144+14.87, Offset 120.58 RT						
						LO	G of Boring:	B-720
					Pro	iect No10246	91.01	
L						110		

		050.0	0/0/004.0		φD				SH	IEAR	STR	INGTH	l, tsf	
	Surfac	ce Elevation: Completion Dat	te: 0/0/2010	ין ני	NTS NTS		L 1	- U	U/2		O - Q	U/2	[] - SV
	C	Datum: msl	Č	Č	ER U S U L S U L S S L I S S H I S S S H S S S S S S S S S S S	S		0.5	5	1.0	1,5	5 2	0	2.5
						MPL	ST	'ANI	DARD	PEN ALUE	ietr/ (Blo	TION WS PE	RESIS R FOC	STANCE
	EET					SA				(ASIMD	1586)		
	IN F	DESCRIPTION OF W			SP1 SP1 BN0		PL		W	ATE		NTENT	,%	
		Topsoil 10 inches		1 1 1				10		20	30	4	0	50
		Brown, silty CLAY - CL					· · · ·				· · · · ·	· · · · ·		· · · · · · · · · · · · · · · · · · ·
							· · ·	: :				· · · · ·		
									· · · · ·		· · · · ·	· · · · ·		· · · · · · · · · · · · · · · · · · ·
	— 5—													
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NLY ONLY	— 10—													
EN SC												· · · · ·		· · · · · · ·
URPO										-				
ION P							· · · ·		· · · · ·		· · · · ·	· · · · ·	· · · ·	· · · · · · ·
DARIE	- 15-	Boring terminated at 15 feet.	///											
ILLUS							· · · ·		· · · · ·		· · · · ·	· · · · ·		· · · · · · · · · · · · · · · · · · ·
ATE B FOR I							· · ·							
NIXC LOG										-		 	· · · ·	
PHR	_ 20_													
GRAI							 		· · · ·			· · · · ·	· · · ·	· · · · · · ·
ENT.							· · · ·		· · · · ·		· · · · ·	· · · · ·	· · · ·	· · · · · · ·
PRES							· · · · · ·	: :	· · · · ·					
ES RE								· ·				· · · ·	· · · ·	
N MA							· · ·					· · · · ·		· · · · · · ·
SITIO							 	· ·				· · · · ·	· · · ·	
TRAN	— 30—													
STRA														
AND2														
AE.GF												· · · · ·		· · · · · · ·
ONE N	- 35-						· · ·	• •						
)0 CF(· · · ·	· · · · ·		· · · · ·	· · · · ·		· · · · · · ·
GPJ (· · · ·	· · · ·	· · · · ·		· · · · ·	· · · · ·		· · · · · · ·
WAY.							 	· · · ·	· · · ·			· · · ·	· · · ·	· · · · · · ·
PARK							Drav	vn by	: AGB	Cr	necked b	ov: BJS	App'vo	d. by: CKK
Ë		<u>GROUNDWATER DATA</u>	DRILLING DAT	<u>TA</u>			Date	e: 7/2	2/2016	Da	ate: 1/24	/2017	Date:	1/24/2017
19H O	ENCO		AUGER <u>3 3/4"</u> HOL	LOW	/ STEM					CE	ΛΤΕ	еци	ດເດ	rvz
DAVIE	ENCC	JONTERED DORING DRILLING	WASHBORING FROM	F	EET				_ /	UL	UIL		ULU Om the G	
1.01 -			<u>NG</u> DRILLER <u>DWJ</u>	LUG	GER									
2469			<u>UNE 550X</u> DRILL		I				Da	ivid l	Hoeke	l Park	way C	
VL JO				Y 88	3 %				v	Ventz	zville,	Misso	uri	
2002 \	REN	MARKS: Sta 144+64.87, Offset 120.	58 RT											
RING 2	No s	soil sampling performed.							LC	G O	f Bof	RING:	B-721	
OF BO									D		. N	10044	04.04	1
DOJ									Pro	Jeci	INO.	JU246	ອ1.01	

		000.4	0/7/0040		£Ο				SH	EAR	STRE	NGTH	l, tsf	
	Surfa	ace Elevation: Completion Dat	e:	رى	LTS NTS /RQ		Δ	- UL	J/2		0 - Q	J/2] - SV
		Datum: msl		ĽŎ	GH COUI ERY	S		0.5		1.0	1.5	2	0	2.5
				HIC	NO NO NO	MPL	ST		ARD N-V/	PEN ALUĘ	(BLO	TION I NS PE	RESIS R FOO	TANCE
	TH			BRAF	BLO	SA				(/	ASTM D	1586)		-
	DEF	DESCRIPTION OF W		0	SPT SPT ORE		PL		W	ATE		ITENT	, %	
		Toppoil 10 inches		1.1.1. 51				10		20	30	4	0	50
		Brown, silty CLAY - CL					· · · ·		· · · ·			 	· · · ·	· · · · · · ·
		-									: : :		· · · ·	
		-					· · · ·		· · · · ·			· · · · ·	· · · ·	· · · · · · · ·
	— 5—	_										· · · ·		
		-					· · · ·			· ·	· · · · · ·		· · · ·	
		-					· · · ·					· · · · ·		· · · · · · · ·
'PES Y.		_					· · · ·				· · ·	· · · · ·	· · · ·	· · · · · · ·
ONLY	— 10—	-												
EN SC OSES							· · · ·		· · · · ·			· · · · ·	· · · ·	
PURP							· · · ·				· · · · · ·	 	· · · · · ·	· · · · · · ·
ES BE									· · · · ·		· · · ·	· · · · ·	· · · ·	· · · · · · ·
DARI	— 15—	Boring terminated at 15 feet.	//											
BOUN							· · · ·			- · ·	· · ·		· · · ·	· · · · · · ·
FOR												· · · · ·	· · · ·	· · · · · · ·
SOXIN CLOG	_ 20_													· · · · · · ·
APPF											· · · ·		· · · ·	
E HE									· · · · ·			· · · · ·		· · · · · · · ·
DUAL											· · · ·	· · · · ·	· · · ·	· · · · · · ·
REPRIE E GR/	— 25—													
NES F IAY BI												· · · · ·		
							· · · ·		· · · · ·		· · · ·	· · · · ·	· · · · · · ·	· · · · · · ·
ICATI							· · · ·				· · · · · ·	· · · ·	· · · · · ·	· · · · · · ·
FATIF F TR/	— 30—													
E: ST		-					· · · · · · ·		· · · · ·		· · · ·	· · · · ·	· · · ·	· · · · · · · · · · · · · · · · · · ·
ILON GP&I		-									· · · ·	· · · · ·		· · · · · · ·
IE ME.	0.5								· · · ·			· · · ·		
CLON	- 35-	-												
00 f.		-							· · · · ·		· · ·	· · · · ·		· · · · · · ·
AY.GF		_					· · · ·				· · ·		· · ·	
RKW														
(EL P/		GROUNDWATER DATA	DRILLING DA	<u>ATA</u>			Drav Date	vn by: e: 7/2/	AGB 2016	Ch Da	ecked b te: 1/24	y: BJS /2017	App'vo Date: 7	l. by: CKK 1/24/2017
HOEK		X FREE WATER NOT	AUGER <u>3 3/4"_</u> HO	LLO	W STEM					0.5	0TF4	311414		•v=
AVID	ENC	OUNTERED DURING DRILLING	WASHBORING FROM	Λ	FEET					GE	UIE	JHN		jis
01 - D			<u>NG</u> DRILLER <u>DWJ</u>	<u>J</u> LO	GGER							r K	om 111E b	NJUNU Uľ
24691.			<u>CME 550X</u> DRIL	L RI	G				Da	vid H	loeke	Park	way	
1L J02				<u>Auto</u>	<u>)</u> 38 %				N N	/entz	e ZA, I ville,	5, and Misso	uri	
002 M	RE	MARKS: Sta 145+14.87, Offset 120.8	58 RT	<u> </u>	<u>,,</u> /0									
ORING 2	No	soil sampling performed.							LO	g of	F BOR	ING:	B-722	
G OF B									Pro	oject	No.	J0246	91.01	
PO														

					<u>с</u> О				SH	EAR S	TRENG	TH, ts	sf	
	Surfa	ce Elevation: <u>675.4</u> Completion Date: <u>6/1/2</u>	2016		TS TS		Δ	- UU/	/2	C) - QU/2		0 -	SV
		- mol		0	HUN KA	S		0.5	1	0	1.5	20	2	5
		Datum:		U U	5	ĽĽ	ST/) PFNF	TRATIO	NRE	SIST	
				H		AMF	•		N-VA	LUE (BLOWS	PER F	OOT))
	ΗË			RA	RE RE	S/					1000)			
	A FF	DESCRIPTION OF MATERI	AL	0	RY L SPT SRE				W	ATER	CONTE	NT, %	D	
	⊔∠				R . S		PLF	10	2	20	30	40	5	0 LL
		Topsoil - 18 inches		<u>, 1^x - 7</u>										
		Medium stiff brown and gray CLAY - (CH)			1-2-3	SS1					••••••••••••••••••••••••••••••••••••••	: :	· · ·	83
							· · ·		· · ·	- · · ·				
					1 2 3	662		· · ·	· · · · · ·			· ·	· · ·	
	- 5-				1-2-3	332								
								· · ·						
ŀ					115	ST3	· · ·		•			: :		· Δ · · · ·
s							· · · · · ·		· · ·			: :	· · ·	
μ Υ Ε	10					ST4				• · · ·				
	- 10-													
EN S OSE					8-7-8	SS5	· · ·					: :		
URP.		Boring terminated at 12.5 feet.					· · ·	· · ·	· · ·	· · ·		· ·	· · ·	
S BE								· · ·	· · · · · ·		· · · · ·		· · ·	
ARIE	- 15-											· ·		
UND/ UST							· · ·		· · ·			· ·		
R ILL							· · · · · ·		: : :			: :	· · ·	
AATE 5 FOI									· · ·			: :		
SOXI	_ 20_													
APPF	20						· · ·		: : :			: :		
GRA							· · ·	· · ·	· · · · · ·					
AL														
RESI														
REP 86 GI	- 25-													
NES AAY E							· · ·		· · ·					
NONN														
SATIC									· · ·					
TRAN	- 30-								• • •					
STRA FHF														
NO							· · ·					: :		
EME							· · ·	· · ·	· · · · · ·			· ·	· · ·	
NOT	- 35-											: .		
00									· · ·					· · · · ·
GPJ							 		· · ·	 		· ·	· · ·	
WAY								· · ·	· · · · · ·		· · · · ·		· · ·	
ARK							Draw	n bv:	AGR	Cher	ked by B	S Ar	by'vd h	W. CKK
ζΕΓ F		GROUNDWATER DATA	DRILLING DA	<u>ATA</u>			Date:	7/2/2	2016	Date	: 1/24/2017	/ Da	ate: 1/2	4/2017
ШOH		X FREE WATER NOT AU	JGER <u>3 3/4"</u> HC	DLLO	W STEM					0 - 0	TEAN		<u> </u>	/=
AVID	ENC	OUNTERED DURING DRILLING WAS	SHBORING FROM	И	FEET			C		uEU	IFCH	NUL	.Սն՝	1S
1 - D		TPD	DRILLER MV	<u>'L</u> LC	GGER							FROM	HE GRO	UND UP
391.0			CME 55TRK DR	ILL R	IG				Dav	id H	nekol Da	rkwa		
J0246			HAMMER TYPE	Auto	<u>)</u>				P	hase	2A, B, a	nd C	,	
, WL		НА	MMER EFFICIEN	ICY <u>8</u>	<u>38_</u> %		L		W	entzv	ille, Mis	souri		
2002	RE	MARKS: Sta 131+88.97, Offset 65.42 RT											_	
SNING									LO	g of	BORING	6: B-8	801	
BOR							L							
0 D									Pro	iect M	lo102	4691	.01	
ΓŎ										,0001				

		074.0	C/4/204C		÷Ω			SHEA	R STRENG	TH, tsf
	Surfa	ace Elevation: <u>674.3</u> Completion Date	0/1/2016	(7)	RQ /RO		∆ - UU/2		O - QU/2	🗆 - SV
		Datum: msl		LOC	HOON Y	ŝ	0.5	1 _. 0	1.5	2,0 2,5
				НС		IPLE				
	포늡			SAP	SEC	SAN			(ASTM D 1586)	ERTOOT)
	EPT	DESCRIPTION OF M	ATERIAL	5				WAT		NT, %
	ΩZ				N N N N N N N N N N N N N N N N N N N		PL 10	20	30	40 50 LL
		Brown and gray, silty CLAY - CL								
									· · · · · · · · · ·	
		-								
	— 5—	Tan, silty CLAY - CL								
		-								
		-					· · · · · · · · ·		· · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
чне» - Х-		-								· · · · · · · · · · · · ·
OIL I S ONI	— 10—									
SOSE(-						· ·		
PURF		Boring terminated at 12.5 feet.					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
TION	4 -	-								:
STRA	- 15-									
ILLUS		-						•••		
FOR									 	
	_ 20_									· · · · · · · · · · · · ·
APPF	20	-								
GR/		-					· · · · · · · · · · · ·	· · · ·	· · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
SENT DUAL.		-					· · · · · · · ·			· · · · · · · · · · · ·
GRA	- 25-									
ES КI Y BE	20	-								
N LIN										
SATIO							· · · · · · · · · · · · · · · · · · ·	· · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
TRAN	— 30—	-								
STR4		-						· · ·	· · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
PAND:		-								
NG.GI									 	· · · · · · · · · · · · · · · · · · ·
ONE	— 35—	-						•••		· · · · · · · · · · · · · · · · · · ·
00 CL		-						:: ;		
GPJ							· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
WAY.		-								· · · · · · · · · · · · · ·
PARK							Drawn by: A0	BB	Checked by: BJ	S App'vd. by: CKK
EKEL		GROUNDWAIER DAIA	<u>DRILLING D</u>	AIA			Date: 7/2/20	6	Date: 1/24/2017	Date: 1/24/2017
D HOI	FNC		AUGER <u>3 3/4"</u> H	OLLO	W STEM			Ēr	ϜͶϒϝϙͷ	
DAVI)M	FEET			Ju	LUILUII	FROM THE GROUND UP
1.01 -				<u>vr</u> L(SII I F	JGGEK			-		
32469				E Aut	0			Davic Pha	d Hoekel Pa ise 2A, B, ai	rkway nd C
NL JC			HAMMER EFFICIE	NCY	<u>-</u> <u>88</u> %			Wer	ntzville, Miss	souri
2002 \	RE	MARKS: Sta 131+88.97, Offset 65.42	RT	-	_					
RING	Sta No	132+38.97, Offset 65.42 soil sampling performed.						LOG	of Boring	: B-802
OF BO										
LOG							F	roje	ct No. J02	4691.01
Ľ								-		

[670.2	6/4/2016		с Э			SHE	AR S	TRENGT	l, tsf
	Surfa	ace Elevation: 672.3 Completion Date	<u>: 0/1/2016</u>	0	NTS /RQ		∆ - UU/2	2	0	- QU/2	🗆 - SV
		Datum [·] msl		L00	ERUN	ŝ	0.5	1	0	1.5 2	2,0 2,5
				E E		IPLE	STANDA				
	ᆂᇤ			RAPI		SAN	▲ r	I-VAI	LUE (E (AST	M D 1586)	R F001)
	ΗH	DESCRIPTION OF M	ATERIAL	Ъ				WA			Γ. %
	Ξz				CO ST		PL	2	0	30	40 50
		Tan, silty CLAY wtih gravel - CL									
								· · ·			
		-						· · · ·	· · ·		
		-						· · ·			
	— 5—										
								· · ·			
		-						· · · ·	· · · ·		
Y PES		-						· · · ·		· · · · · · · ·	
ONLY	— 10—	-									
EN SC							· · · · · · · · · · · · · · · · · · ·		· · · ·	· · · · · · ·	
URPC		Boring terminated at 12 feet.						· · · ·		· · · · · · · · · · · · · · · · · · ·	
ION F		-						· · · ·	· · · ·	· · · · · · ·	
DARIE	— 15—	-									
INNO								· · · ·			
TE B OR I		-						::			
NXIM/		-						· · · ·			
PPRC	— 20—	-									
THE A GRAF		-									
ENT J JAL.		-						•••			
RADU											
S REF BE G	- 25-							· · · ·			
LINE		-					· · · · · · · ·	· · ·	· · ·		
TION		-						· · · ·	· · · ·	· · · · · · ·	
RANS		-						· · · ·	· · ·		
TRAT HIF TF	- 30-							 			
E: S		-						· · · ·	· · · · · ·	· · · · · · ·	
NO1 GP∯		-						· · · ·	· · · ·		
JE ME								· ·		· · · · · · ·	· · · · · · · · · · · ·
CLOF		-						: :	· · ·		
00 fc		-					· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · ·	· · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
AY.GF		-					 	· · ·	· · · ·		
RKW.]					_ · · · · · · · · · · · · · · · · · · ·	•••			· · · · · · · · · · · · · · · · · · ·
EL PA		GROUNDWATER DATA	DRILLING D	<u>ATA</u>			Drawn by: A Date: 7/2/20	GB 16	Check	xed by: BJS 1/24/2017	App'vd. by: CKK Date: 1/24/2017
HOEK		X FREE WATER NOT	AUGER <u>3 3/4"</u> H	OLLO	W STEM				<u> </u>		
AVID	ENC	OUNTERED DURING DRILLING	WASHBORING FRO	DM	FEET		C		iŁU	IFCHN	ULUGYS
11 - D			<u>TPD</u> DRILLER <u>M</u>	<u>VL</u> LC	OGGER					F	KUM IHE GROUND UP
1691.0			CME 55TRK DI	RILL F	RIG			Dav	id Ho	ekel Park	way
- J02			HAMMER TYP	E <u>Aut</u>	<u>0</u>			Pł Wa	nase 2	A, B, and	l C Juri
02 WI	P EI	MARKS: Sta 132+88 97 Offect 65 42	HAMMER EFFICIE	NCY_	<u>88</u> %						· •
RING 20	No	soil sampling performed.						LOG	G OF E	BORING:	B-803
OF BOI								. .			
LOG								Proj	ect N	o. J024	b91.01

ſ		670.0	C/4/204C		φ D		SI	IEAR STRE	ENGTH	l, tsf
	Surfa	ace Elevation: 672.0 Completion Da	ate: 6/1/2016	0	ATS /RQ		∆ - UU/2	O - Q	U/2	🗆 - SV
		Datum [.] msl		ĽŐ	RUN NUN	S	0.5	1,0 1,5	2	0 2.5
				일	N N N	APLE				
	프뉴			SAP		SAN	▲ IN-V	(ASTM D	1586)	K1001)
	FEI	DESCRIPTION OF	MATERIAL	5			v	ATER CO	NTENT	. %
	ΩZ				N N N		PL 10	20 30	2	1 LL
		Tan, silty CLAY with gravel - CL								
		_						· · · · · · · ·	· · · · ·	
		-							 	
	- 5-									
									· · · · ·	
s S										
TYPE	_ 10_								· · · ·	
	10	-							· · · ·	
REN RPOSI		Boring terminated at 12 feet.		<i>\/////</i>	1				· · · · · · · · ·	
S BETV		-					· · · · · · · · · · · · · · · · · · ·		· · · · ·	· · · · · · · · · · · · · · · · · · ·
ARIES RATIC	- 15-	-								
									· · · ·	
DR IL									· · · · ·	
XIMA OG F								. .	· · · · ·	
HICL	- 20-	_								
HE AI GRAP							· · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · ·	
ENT T JAL									· · · · ·	
RESE								· · · · · · ·	· · · · ·	
S REF BE G	- 25-	-								
I LINE										
TIFIC/	- 30-	-								
STRA		-								
AND -		_							 	
ME.GF		-						· · · · · · · ·	· · · · ·	· · · · · · · · · · · ·
ONE I	- 35-	-						· · · · · · ·	 	
00 CT									· · · · ·	
GPJ									· · · · ·	
KWAY							· · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · ·	· · · · · · · · · · · ·
- PAR)∆T∆	1	I	Drawn by: AGB	Checked b	y: BJS	App'vd. by: CKK
JEKEL							Date: 7/2/2016	Date: 1/24	/2017	Date: 1/24/2017
VID H	ENC	OUNTERED DURING DRILLING	WASHBORING FR		FEET			GEOTE	CHN	OLOGY롱
- DA			<u>TPD</u> DRILLER <u>M</u>	<u>VL</u> LC	 DGGER				FF	OM THE GROUND UP
691.0			CME 55TRK D	RILL F	RIG		D	avid Hoeke	l Park	wav
J024			HAMMER TYP	E <u>Aut</u>	<u>0</u>			Phase 2A,	B, and	C
02 WL	REI	MARKS: Sta 133+38 07 Offect 65	HAMMER EFFICIE	NCY _	<u>88</u> %			ventzville,	111330	
RING 20	No	soil sampling performed.	T L				LC	og of Bof	RING:	B-804
OF BO								-:	100 11	204.04
LOG							Pr	oject NO.	JU246	D91.01

		C70 F		C141204C		÷Ω			SHE	EAR S	TRENGT	H, tsf	
	Surfa	ce Elevation: 670.5	Completion Date:	6/1/2016	0	ATS /RQ		Δ - υι	J/2	0	- QU/2		🗆 - SV
		Datum [.] msl			ΓŎ	ERUN H	S	0,5	1	.0	1,5	2,0	2.5
					일		IPLE	STAND					
	포뉴				SAP	SEC	SAN	-	IN-V/A	(AS	TM D 1586)		,01)
	EPT	DESCRI	IPTION OF MA	TERIAL	5			_	WA	ATER	CONTEN	T, %	_
	ΩZ					R S S		PL 10	2	20	30	40	50 LL
		Topsoil - 18 inches			7 <u>7 1</u> 7								· · · · · · · ·
		Soft to stiff, brown ar	nd gray, CLAY - (CH)			0-2-2	SS1				:•:::		
										· · · ·			
						92	ST2		::: !		• • • • •		
	_ 5_												
						114	ST3		• • • •	· · · ·	· · · · · ·		· · · · · · · · ·
S													
ILYPE	_ 10_					3-4-6	SS4			•			
SOIL ES O													· · · · · · · ·
REEN						3-5-9	SS5			•	· · · · · ·		
N PUF		Boring terminated at	t 12.5 feet.							 			· · · · · · · ·
ATION	— 15—												
INDA JSTR											· · · · · ·		· · · · · · · · · · · · · · · · · · ·
G FOI										· · · ·	· · · · · ·		
ROXI IC LO	— 20—												
E APF											· · · · · ·		
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REPR E GR/	— 25—										· · · · · ·		
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ON N										· · · ·			
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ATIF ₽ TR⁄	— 30—												
STI D2EM													
NOTE GP&N										 	· · · · ·		
ME										· · · ·	· · · · · ·		
:LONE	— 35—												
000													
r.gpJ													· · · · · · · ·
KWA'											· · · · · ·		· · · · · · · · ·
. PAR					ΔΤΔ		1	Drawn by:	AGB	Chec	ked by: BJS	Арр	vd. by: CKK
)EKEL			<u></u>					Date: 7/2/	2016	Date:	1/24/2017	Date	e: 1/24/2017
AD HC	ENC		ORILLING	AUGEK <u>3 3/4"</u> F						GEN'	TECHN	010)GYZ
- DAV					1VI I (7	~ = V		FROM TH	E GROUND UP
91.01					RILL F	RIG					akel D- 1	o .	
10246				HAMMER TYP	E <u>Aut</u>	<u>0</u>			Dav P	hase 2	ekel Parl 2A, B, an	kway d C	
r JV				HAMMER EFFICIE	NCY	<u>88</u> %			W	entzvi	lle, Miss	ouri	
2002	REM	MARKS: Sta 133+88.	97, Offset 65.42										
RING									LOO	g of i	BORING:	B-80)5
DF BC													
LOG (Pro	ject N	lo. J024	691.	01

	660.2	6/1/2016		÷ O		SF	IEAR STRENGTH	l, tsf
S	urface Elevation: <u>609.2</u> Completion Date:	0/1/2010	U	r (pc NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
	Datum: msl		Ď	GH COUI	S	0.5	1 _. 0 1 _. 5 2	.0 2.5
			HIC	WEI WC	MPL	STANDARD	PENETRATION ALUE (BLOWS PE	RESISTANCE R FOOT)
E t			RAF	BLC	SAI		(ASTM D 1586)	,
L L L	DESCRIPTION OF MA	TERIAL	0	RFL SPT ORE		DI W	ATER CONTENT	⁻ , %
				E Ö		10	20 30 4	
	Brown, silty CLAY - CL							
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SH .								
	0—							
	Boring termianted at 12.5 feet.		<u>//////</u>					
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IAY B	—							
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≝E2 — 3	0—							
LON GP∯	_							
E ME								
PJ 00								
VAY.G								
ARKV						Drawn by: ACP	Checked by: BIS	Applyd by: CKK
KEL F	GROUNDWATER DATA	DRILLING D	<u>ATA</u>			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
D HOE		AUGER <u>3 3/4"</u> H	ollo	W STEM			СЕПТЕРЦИ	
DAVI	THE DURING DRIELING	WASHBORING FRC	DM	FEET				ULUUI () Rom the ground up
- 10.1			<u>vr</u> r(IG IG				
02469		HAMMER TYPE	E Auto	5		Da	wid Hoekel Park Phase 2A. B. and	way C
NL J		HAMMER EFFICIE	NCY	<u>88</u> %		V	Ventzville, Misso	uri
5 2002	REMARKS: Sta 134+38.97, Offset 65.42							
BORING	to son sampling performed.					LC	g of Boring:	B-806
DG OF I						Pro	oject No. J0246	691.01
ĭ						1		

			6/1/2016		Ĵ,		SH	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>600.2</u> Completion Date:	0/1/2010	Ċ	r (pc NTS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum:		Ď	GH COUI	BS	0.5	1 _. 0 1.5 2	0 2.5
				HIC	WEI WC	MPL	STANDARD	PENETRATION	RESISTANCE R FOOT)
	ΞШ			RAF	NIT BLO REC	SAI	_	(ASTM D 1586)	,
	N FE	DESCRIPTION OF MA	TERIAL	G	XY U SPT ORE		W N	ATER CONTENT	,%
					E°S		10	20 30 4	0 50
		Brown and gray, silty CLAY - CL							
		-							
		-							
	— 5-								
		- Tan, sitty CLAY, trace graver - CL							· · · · · · · · · · · ·
		-							
ËS		-							
L TYF ONLY	— 10-	-							
N SOI		-							
URPC		Boring terminated at 12 feet.					· · · · · · · · · · · ·		· · · · · · · · · · · ·
S BEI		-							· · · · · · · · · · ·
DARIE TRATI	— 15-	-							
UUNE		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
ATE B FOR I		-							
DXIM/		-							
APPR PHIC	- 20-								
THE / GRA		-							
SENT DUAL.		-							
EPRE GRAD	- 25-								
ES RE V BE	20	-							
N LIN		-							
CATIC		-					· · · · · · · · · · · ·		
ATIFI(TRAI	— 30-	-							
STR		-							
IOTE:		-					· · · · · · · · · · · · · · · · · · ·		
ME.G		-							
LONE	— 35-	-							
00 C									
Y.GPJ		-							
RWA		-							
EKEL PAF		GROUNDWATER DATA	DRILLING D	ATA			Drawn by: AGB Date: 7/2/2016	Checked by: BJS Date: 1/24/2017	App'vd. by: CKK Date: 1/24/2017
D HOI	FNC		AUGER <u>3 3/4"</u> H	OLLO	W STEM			СЕЛТЕСНИ	UIUCV≅
DAVI	2.10			M					OM THE GROUND UP
- 10.16					lG				
02465			HAMMER TYPE	E <u>Aut</u>	- <u>2</u>		Da F	vid Hoekel Parky Phase 2A, B, and	way C
r WL J			HAMMER EFFICIE	NCY	<u>88</u> %		N	lentzville, Misso	uri
NG 2002	RE No	MARKS: Sta 134+88.97, Offset 65.42 soil sampling performed.					LO	g of Boring:	B-807
F BORI									
LOG O							Pro	ject No. J0246	91.01

Г			6/1/2016		Ĵ,		S	HEAR STRE	NGTH	, tsf
	Surfa	ace Elevation: <u>600.7</u> Completion Date:	0/1/2010	U	T (pd NTS //RQ		∆ - UU/2	0 - Ql	J/2	🗆 - SV
		Datum:		LO LO	ERUCE	ES.	0.5	1.0 1.5	2	0 2.5
				HIC	NC COV COV	MPL	STANDARI	o Penetra Alue (Blov	VS PE	RESISTANCE R FOOT)
	ΗH			BRAF	BLO	SA		(ASTM D ?	586)	
		DESCRIPTION OF MA			SPT SPT ORE				ITENT	, %
		Prown silty CLAX_CL					10	20 30	4	0 50
										· · · · · · · · · · · ·
		-					· · · · · · · · · · · ·	· · · · · · · ·	· · · ·	
		-							· · · ·	
_	- 5-	Tan, silty CLAY, trace gravel - CL								
		-							· · · ·	
~ ~		-						· · · · · · · ·	· · · ·	· · · · · · · · · ·
TYPE	- 10-									
SOIL -	10	-							· · · · · ·	
NEEN RPOS		Boring terminated at 12 feet.		V/////					· · · · · · ·	
							· · · · · · · · · · · · · · · · · · ·	· · · · · · · ·	· · · · · ·	· · · · · · · · · · · · · · · · · · ·
ARIES RATIC	- 15-	-								
UND TUST									· · ·	
		-							· · ·	
LOG F		-								
APPR PHIC	- 20-	-								
GRA-		-					· · · · · · · · · · · · · · · · · · ·	· · · · · · · ·	· · · ·	
DUAL		-								
REPRE	- 25-	-								
NES F IAY BI		-								
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FICAT		-					· · · · · · · · · · · ·		· · · ·	
HE TRATI	- 30-	-								
ND24		-								
.0 NO. Е. GP		-							· · · ·	
ONE M	- 35-	-								
00 CF(-						· · · · · · · ·	· · · ·	· · · · · · · · · · ·
GPJ							· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · ·	· · · · · · · · · · · · · · · · · · ·
KWAY		-					· · · · · · · · · ·	· · · · · · · ·	· · · ·	· · · · · · · · · ·
L PAR		GROUNDWATER DATA		ΑΤΑ		I	Drawn by: AGE	Checked b	/: BJS	App'vd. by: CKK
OEKE		X FREE WATER NOT					Date: 7/2/2016	Date: 1/24/	2017	Date: 1/24/2017
H UIV	ENC	COUNTERED DURING DRILLING	WASHBORING FRC	DM	FEET			GEOTE	CHN	DLOGY롱
11 - DA			<u>TPD</u> DRILLER <u>M</u>	VL LC	GGER			/	FR	OM THE GROUND UP
4691.C			CME 55TRK DF	RILL F	lG		D	avid Hoekel	Parky	vay
rL J02				E <u>Aut</u>	<u>)</u> 22 0/		,	Phase 2A, E Wentzville, I	8, and Misso	C uri
2002 M	RE	MARKS: Sta 135+38.97, Offset 65.42			<u>00</u> 70					
30RING 2	No	soil sampling performed.					L	og of Bor	ING: I	B-808
GOFE							Pr	oject No.	J0246	91.01
0										

Г	Surface Elevation: <u>665.0</u> Completion Date: <u>6/2/2016</u>				θŪ		SHEAR STRENGTH, tsf				
	Surfa	ace Elevation: <u>665.0</u> Completion Date:	6/2/2016		TS RQI		∆ - UU/2	○ - QU/2	🗆 - SV		
		- mel		00	H N N	S	0.5 1	.0 1.5 2	.0 2.5		
		Datum:		СГ	5 S S S S	Ë	STANDARD	PENETRATION	RESISTANCE		
				ΡНΙ	≥>0	MP	A N-VA	LUE (BLOWS PE	R FOOT)		
	ΞÜ			RA	RE RE	S₽		(ASTM D 1566)			
		DESCRIPTION OF MA	TERIAL	Ċ	УЧК П		w/	ATER CONTENT	,%		
					RSSC		PLI 10 2	20 30 4	1 LL		
		Topsoil - 3 inches									
		Medium stiff to stiff, brown and gray, CLA	Y - (CH)		1-2-4	SS1					
						001	· · · • · · · · · · ·				
					03	CT2			81		
	- 5-				95	312	· · · · · · · · · · · · · · · · · · ·	I •			
		_				ST3					
		-									
-		-									
÷		trace gravel			3-5-6	SS4					
	- 10-	-									
		-			234	995					
		1			∠-0-4	000	· · · · · · · · · · · ·				
	- 15-				3-6-8	SS6		•			
		Boring terminated at 15 feet.									
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	- 20 -	-									
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		1									
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		GROUNDWATER DATA		ΔΤΔ			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK		
							Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017		
	ENC		AUGER <u>3 3/4"</u> HO	ULLO	VV STEM			СЕПТЕСИМ	UIUCV∑		
			WASHBURING FRO	M	FEE				COM THE GROUND UP		
2			<u>IPD</u> DRILLER <u>DL</u>	<u>.U</u> LC	IGGER						
			<u>CME 55TRK</u> DR	RILL R	liG		Dav	vid Hoekel Park	way		
1			HAMMER TYPE	Auto	<u>)</u>		P	nase 2A, B, and	C		
l		MADKO, 04-405-00.07 0/	HAMMER EFFICIEN		<u>88</u> %		~~~~~	5.112 v me, 141330	~		
1	RE	MARKS: Sta 135+88.97, Offset 65.42							D 000		
							LO	G OF BORING:	R-80à		
ר פי							Pro	ject No. J0246	691.01		
Ĭ											

ſ		004.0	0/0/0040		ĘΟ		SHI	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: 661.0 Completion Date:	6/2/2016	(D	(pc TRO		∆ - UU/2	○ - QU/2	🗆 - SV
		Detuny msl		ŏ	RYNN RYNN	S	0.5 1	.0 1.5 2	.0 2.5
				<u></u>		L L	STANDARD	PENETRATION	RESISTANCE
				H	≥>0 2	AMF	A N-VA	LUE (BLOWS PE	R FOOT)
	ΞÜ			Å	RE RE	S/		(ASTIND 1560)	
		DESCRIPTION OF MA	TERIAL	0	Ч Ц Ц Ц Ц Ц Ц		w/	ATER CONTENT	,%
	⊔∠				RSS		PLI 10 2	20 30 4	10 50
-		Topsoil - 3 inches					 		
ŀ		Medium stiff to stiff, brown and gray, CLA	Y - (CH)						
					89	ST1			
		1							
	_				91	ST2		<u> </u>	>>>>
	- 5-	-							
					2-3-5	SS3		•	
2		_			0.5.0	004	· · · · · · · · · · · ·		
∠	- 10-	_			3-5-6	554	· · · ·	•	
0 S		-							
- OSE		_			2-4-5	SS5		•	
- LRF		-							
		-			3-4-7	SS6		•	
FRAT	- 15-	Boring terminated at 15 feet.							
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	- 20-	_							
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- GR		_							
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) Lď		1							
AY.G]							
RKW								· · · · · · · · · · · ·	
EL PA		GROUNDWATER DATA	DRILLING DA	TA			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK
DEKE							Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
Ψ ĮD Į	ENC	COUNTERED DURING DRILLING		1 1				GEOTECHN	NI NGY≥
DAV		-		" <u> </u>					IOM THE GROUND UP
- 10			<u>IPD</u> DRILLER <u>DLD</u>	<u>ר ב</u> בט	IGGER				
:4691			<u>CME 55TRK</u> DRI	LLR	IG		Dav	vid Hoekel Park	way
707 -			HAMMER TYPE	Auto	<u>)</u>		P W	nase 2A, B, and entzville Misso	Curi
32 WI	DC	MADKO, Cto 407:00.07 Offerst 70.40	HAMMER EFFICIENC	CY <u>8</u>	<u>38</u> %				~
3 20(KE	INIARNO: Sta 13/+88.97, UTTSet /0.42							D 040
DRING							LO	G OF BORING:	Б- 810
OF B(
10G (Pro	ject No. J0246	691.01

ſ		000.0	0/0/0040		θŪ		SH	EAR STRENGTH	l, tsf
	Surfa	ace Elevation: <u>660.0</u> Completion Date:	6/2/2016	Ċ	r (pc NTS //RQ		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum:		ĽŐ	IGH NOUI	ES	0.5	1.0 1.5 2	.0 2.5
-	ΗIJ			RAPHIC	NIT WE BLOW C RECOV	SAMPL	STANDARD	ALUE (BLOWS PE (ASTM D 1586)	RESISTANCE R FOOT)
	N FE	DESCRIPTION OF MA	TERIAL	Ū	RY UI SPT I SRE		w.	ATER CONTENT	,%
					E°O		10	20 30 4	0 50 LL
		Topsoil - 3 inches Tan CLAY - CH							
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YPES Y.		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · ·
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TION	_ 15_	-					· · · · · · · · · · ·		
NDAR JSTR#	15	Boring terminated at 15 feet.							
R ILLL		-							
IMATE 0G FOI							· · · · · · · · · · · · · ·		· · · · · · · · · · · ·
PROX HC LC	- 20-	-							
HE AP		-							
AL. G		-							
RADU		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · ·
S REF BE G	- 25-	-							
I LINE		-							
ATION SITION		-							
TRAN	— 30—	-							
STRA 2414		-					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · ·
DTE:							· · · · · · · · · · · ·		
ME.O		-							
LONE	- 35-	-							
1 00 C		1							
Y.GP.		-						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · ·
RKWA		-					· · · · · · · · · · ·		
EL PA		GROUNDWATER DATA	DRILLING D	ATA			Drawn by: AGB Date: 7/2/2016	Checked by: BJS Date: 1/24/2017	App'vd. by: CKK Date: 1/24/2017
HOEK		X FREE WATER NOT	AUGER <u>3 3/4"</u> H	OLLO	W STEM			OFOTEOUL	
AVID	ENC	COUNTERED DURING DRILLING	WASHBORING FRO	м	FEET			GEUIECHN	
.01 - L			TPD DRILLER DL	<u>.D</u> LC	GGER			r.	
24691			<u>CME 55TRK</u> DF	KILL R	liG		Da	vid Hoekel Park	way C
ML JC			HAMMER EFFICIEN		<u>-</u> <u>88</u> %		- v	entzville, Misso	uri
3 2002	RE	MARKS: Sta 138+38.97, Offset 70.42							
BORING	NU	oon sumpling performed.					LO	g of Boring:	B-811
IG OF E							Pro	ject No. J0246	691.01
2									

Surface Elevation: 9990 Completion Date: 60/2010 Datum: msl 0 90/2010		050.0	6/0/004.6		θŪ			SHE	EAR STRENC	STH, tsf	
Deturn:	S	Surface Elevation: 659.0 Completion Date	e:6/2/2016	(1)	(pc RQ		🛛 🗠 - ບເ	J/2	0 - QU/2	🗆 - S	SV
Column Description OF MATERIAL Description OF MATERIAL Used - Sinches WALLE CONFERT + NOT Brown and Ian, CLAY-OH Description OF MATERIAL 10		Datum: msl		Ö	H U N N N N	ŝ	0,5	1	,0 1,5	2,0 2,5	5
Ethe DESCRIPTION OF MATERIAL Material 10 10 20 30 40 50 10 10 20 30 40 50 10 10 10 10 10 10 10 10 20 30 40 50 10 <t< th=""><th></th><th></th><th></th><th>₽</th><th></th><th>PLE</th><th>STAND</th><th>ARD</th><th>PENETRATIC</th><th>N RESISTA</th><th>NCE</th></t<>				₽		PLE	STAND	ARD	PENETRATIC	N RESISTA	NCE
Build State Description of Material State Water Content, % 100501-3 mohes Brown and tan, CLAY-CH 10 <th></th> <th>н</th> <th></th> <th>APF</th> <th></th> <th>SAM</th> <th>▲</th> <th>N-VA</th> <th>ASTM D 1586</th> <th>PERFOOT)</th> <th></th>		н		APF		SAM	▲	N-VA	ASTM D 1586	PERFOOT)	
Boting terminated at 15 feet. Dilling terminated at 15 feet. 10 25 35 35 35 35 35 35 35 35 35 35 36 36 36 36 37 35 38 35 36 36 37 36 38 35 36 36 37 36 38 36 37 37 38 36 39 35 30 35 31 35 32 35 33 35 34 35 35 36 36 37 37 38 38 39 39 36 30 36 35 36 36 37 37 3	II di		ATERIAL	GR	ЛШШ	0,		10//		NT 0/	
Topstoll-3 inches Brown and ten, CLAY-CH Brow	B	Ζ			NA SOF					40 50	- LL
Brown and Ian, CLAY - CH 5 5 6 6 6 6 6 6 6 6 6 6 6		Topsoil - 3 inches								40 50	
		Brown and tan, CLAY - CH									
										· · · · · · · ·	
90-100000000000000000000000000000000000											· · · ·
	_	5-									
SBOUNDWATER DATA SFREE WATER NOT ENCOUNTERED DURING DRILLING HAMMER TYPE AUD								· · · · ·		· · · · · · · · ·	· · · · ·
BOTTONE DE LA										· · · · · · · ·	
10 10 Image: Strate in the strate in th	ល្អ							· · · · ·			· · · · ·
Boring terminated at 15 feet. 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20		10-									· · · ·
Boring terminated at 15 feet. 20 20 20 20 20 20 20 25 Communication of the sector of								· · · · ·		· · · · · · · ·	· · · · ·
15 Boring terminated at 15 feet. 20- 20- 20- 20- 30- 22- 30- 30- 30- 30- 30- 30- 30- Boring terminated at 15 feet. Brown Dy AGB Checked by BJS Approximation of the component of the	RPOS RPOS										· · · · · · · ·
115 Boring terminated at 15 feet. 20- 20- 20- 20- 20- 20- 30- 30- 30- - AUGER 3.342^+ HOLLOW STEM NEW DERING FROM - FEET - 10- DP DRILLER DLD LOGGER 2ME SETK DRILL RIG - HA										· · · · · · · · ·	· · · · ·
Option of entimated at 15 teel. 20 20 20 20 20 20 20 20 20 20 20 21 30 30 31 32 33 35 35 36 21 22 33 34 35 35 36 37 38 39 30 30 31 32 33 34 35 35 36 37 38 39 30 30 30 31 32 32 33 34 1000000000000000000000000000000000000	RIES ATIO	15 Boring terminated at 15 feet									
220- 220- 220- 25- 30- <t< td=""><th>USTR USTR</th><td></td><td></td><td></td><th></th><td></td><td></td><td>· · · · ·</td><td>· · · · · · · · · · · · · · · · · · ·</td><td>· · · · · · · ·</td><td>· · · · ·</td></t<>	USTR USTR							· · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · ·	· · · · ·
1000000000000000000000000000000000000										· · · · · · · ·	
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ଧ୍ର HAMMER TYPE <u>Auto</u> Phase 2A, B, and C	4691.		CME 55TRK DF	RILL R	RIG			Dav	vid Hoekel Pa	arkway	
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24691			<u>CME 55TRK</u> DF	KILL F	αG			Day	vid Hoekel P	arkw	ay
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691.(<u>CME 55TRK</u> DRILL R	lG		Dav	vid Hoekel Park	way	
J024			HAMMER TYPE <u>Auto</u>	<u>)</u>		P	hase 2A, B, and	C	
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3 2002	RE	MARKS: Sta 139+88.97, Offset 70.42				_			
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DF BC									
000						Pro	ject No. J0246	91.01	

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2 WL		HAMMER EFFICIEN		<u>88</u> %		W	entzville, Misso	uri
00 RE 00 00 No	MARKS: Sta 140+38.97, Offset 70.42 soil sampling performed.							D 015
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J0246			HAMMER TYPE	Auto	<u> </u>			Phase 2A, B, an	d C
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L J02				<u>- Auto</u>	<u>)</u>			P W	nase 2A, B, entzville. M	and issou	C Iri	
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	— 5-	Medium stiff to stiff,	, gray silty CLAY - (CL)						
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02469				HAMMER TYP	E <u>Aut</u>	<u></u>		Dav P	vid Hoekel Parl hase 2A, B, an	kway d C
2 WL J				HAMMER EFFICIE	NCY	<u>88</u> %		W	entzville, Miss	ouri
RING 2002	RE	MARKS: Sta 141+88	.97, Offset 70.42					LO	g of Boring:	B-818
OG OF BO								Pro	ject No. J024	691.01
_										

	660.4	C/C/204C		θŪ		SH	EAR STRENGTH	l, tsf
Su	rface Elevation: 600.1 Completion Date:	6/6/2016	(J)	, (pc /TS /RQ		∆ - UU/2	○ - QU/2	🗆 - SV
	Datum: msl		LO	UN CHI	ŝ	0.5 1	0 1,5 2	0 2,5
			НС	N N N	IPLE			
포뉴			SAPI		SAN		(ASTM D 1586)	RFOOT)
EPT	DESCRIPTION OF MA	TERIAL	Ю			w	ATER CONTENT	. %
				COL		PLI 10 2	20 30 4	0 50 LL
	Topsoil - 12 inches		7 <u>7 1</u> 7 7					
	Brown, silty CLAY - CL							
	_							
	-							
- 5	i-1							
	_							
	-							
— 10	Gray, CLAY with sand - CH							
	_							
	-							
— 15	Boring terminated at 15 feet.							
	_							
- 20								
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	-							
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- 25								
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	_							
						Drawn by: AGR	Checked by BIS	App'vd. bv: CKK
	GROUNDWATER DATA	<u>DRILLING D</u>	<u>ATA</u>			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017
		AUGER <u>3 3/4"</u> H	ollo	W STEM			СЕПТЕРЦИ	
ΞŅ	COONTERED DURING DRILLING		DM	FEET				OM THE GROUND UP
		TPD DRILLER EE	<u>=R</u> LC	UGGER				
		UME 551RK DF	≺ILL F = ∧…⊷	ale n		Dav	vid Hoekel Park	way
				<u>,</u> 88 %		W	entzville, Misso	uri
R	EMARKS: Sta 142+38.97, Offset 67.42			/0				
N	o soil sampling performed.					LO	g of Boring:	B-819
						Pro	iect No. J0246	91.01
							,	

				θ		SHEAR STRENGTH, tsf			
Surf	Inface Elevation: 660.8 Completion Date: 6/6/2016	0	RQ /RQ		∆ - UU/2	○ - QU/2	🗆 - SV		
	Datum: msl		ĽŎ	GH OUN	S	0.5	1,0 1,5	2.0 2.5	
			НС	WEI WC	APLI		PENETRATIO		
포뇨			AP	NIT ' BLO'	SAN		(ASTM D 1586)	ERTOOT	
집판	DESCRIPTION OF MA	TERIAL	Ū	PT I RE		w	ATER CONTE	NT, %	
□≥				R C S S S S S S S S S S S S S S S S S S		PL 10	20 30	40 50 LL	
	Topsoil - 6 inches							· · · · · · · · · · · ·	
	Brown and gray, silty CLAY - CL								
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_	_							· · · · · · · · · · ·	
— 5-	_								
	_							· · · · · · · · · · · ·	
	_								
Щ. Д. Д. Д	-								
	Gray, sandy CLAY - CH							:	
	-								
	_							:	
STRAR	Boring terminated at 15 feet.	Ĩ							
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FOR	_								
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00 CL	-								
GPJ						· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	
WAY.	_							:	
PARK						Drawn by: AGB	Checked by: BJ	S App'vd. by: CKK	
EKEL	GROUNDWAIER DAIA	<u>DRILLING DA</u>	<u>AIA</u>			Date: 7/2/2016	Date: 1/24/2017	Date: 1/24/2017	
		AUGER <u>3 3/4"</u> HC	DLLO	W STEM			GEULEUN		
		WASHBORING FROM	M	FEET			ULUILUII	FROM THE GROUND UP	
- 101 -			K LC	IGGER					
02469		HAMMER TYPE		0		Da	vid Hoekel Par Phase 24 B ar	rkway nd C	
ML JC		HAMMER EFFICIEN	ICY 8	<u>-</u> 38_%		Ń	/entzville, Miss	souri	
2002 RE	MARKS: Sta 142+88.97, Offset 67.42		_						
BORING BORING	son sampling performed.					LO	g of Boring	: B-820	
JG OF E						Pro	ject No. J02	4691.01	
2							-		

		664.9	6/7/2046		с G				SHE	AR ST	RENGTH	l, tsf	
	Surfa	urface Elevation: <u>661.8</u> Completion Date: <u>6/7/2016</u>			RQ (pc	LTS ROI	Δ	- UU/	/2	0 -	QU/2	[] - SV
		Datum: MSI		00	HUSE	ល		0.5	1,	0	1,5 2	2,0	2,5
				P		PLE	ST		ARD F	PENET	RATION	RESIS	TANCE
	τĿ			APF		MAS		•	N-VA		OWS PE I D 1586)	RFOC)))
		DESCRIPTION OF MA	TERIAL	R		0)			10/0			- 0/	
	ΠN				Y ^N SOS		PLF	10	VVA			, %	
		Tonsoil - 12 inches		112.3				10	2	0	30 2	+0	50
		FILL: brown. silty clay		\times					 				
					2-2-3	551	≜ . 	· · · ·	• • •	· · · ·			· · · · · · ·
	- 5-				2-4-5	SS2				•:::			
		Stiff, orangish brown and gray CLAX, trac	ce cand CH					· · ·	· · · · · ·	· · · · ·	· · · · ·		· · · · · · ·
					97	ST3			· · · ·				
S		-			10-			· · · · · ·	· · ·				· · · · · · ·
ILY.	10				105	514			::0	• • • •			
SOIL SOIL		-						· · ·	· · ·	· · · ·		· · ·	· · · · · · ·
EEN (-			2-4-6	SS5		141	::: (
PUR		-											
IES B TION	15	1			3-4-6	SS6	· · · ·	141	:: : •	· · · · ·	· · · · · ·		
NDAR STRA	- 15-	Boring terminated at 15 feet.					· · ·		· · ·		· · · · · ·		
BOUI		-						· · · ·					· · · · · · ·
FOR		-											
OXIN LOG	20	1							· · ·		· · · · · ·		· · · · · · ·
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RATII 45 TR	— 30-	-											
E ST							· · · ·		· · · ·				
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ME.0		-							· · · · · ·				
ONE	— 35-	-											
00 CI		-						· · · · · ·	· · · · · ·				
GPJ		_							· · ·				
WAY.		-					· · · ·	· · ·	· · · · · ·	· · · · · · · ·	· · · · · ·	· · · ·	· · · · · · ·
PARK							Draw	/n by:	AGB	Checke	d by: BJS	App'vo	d. by: CKK
KELI		<u>GROUNDWATER DATA</u>	<u>DRILLING D</u>	<u>ATA</u>			Date	: 7/2/2	016	Date: 1	24/2017	Date:	1/24/2017
) HOE			AUGER <u>3 3/4"</u> H	ollo	W STEM				E,	רחד	соли	יט וט	∩v≂
JAVIE	ENC	JUINTERED DURING DRILLING	WASHBORING FRO	DM	FEET			(JUJ		ULUI Rom the G	
.01 - 1			TPD DRILLER EE	<u>ER</u> LC	OGGER								
4691			<u>CME 55TRK</u> DF	RILL F	RIG				Dav	id Hoe	kel Park	way	
30r T.				= <u>Aut</u>	<u>0</u>				Ph We	ase 24 entzvill	ч, в, and e, Misso	uri	
02 W	RF	MARKS: Sta 143+38.97 Offset 70 42		NUY_	<u>00</u> %								
RING 20									LOG	G OF B	DRING:	B-821	
OF BO									Droi	oot No	10244	501 04	1
LOG									FIU		. JUZ40	0.1 פּנ	

						SHEAR STRENGTH, tsf			
	Surfa	Surface Elevation: <u>666.4</u> Completion Date: <u>6/27/2016</u>		ROI (pct	צ	∆ - UU/2	○ - QU/2	🗆 - SV	
		Deturn msl	0	RYNN NUC	S	0,5 1	1,0 1,5	2,0 2,5	
					PLE	STANDARD	PENETRATION	RESISTANCE	
	- F		APH	⊢°Ш	AMI	▲ N-VA	ALUE (BLOWS P (ASTM D 1586)	ER FOOT)	
	ЬТН НЦ	DESCRIPTION OF MATERIAL	GRV		S				
	DE			Y S S S S S S S S S S S S S S S S S S S		PL		11, %	
		Tanaail 20 inchas	AL: S			10 2	20 30	40 50	
		Topsoli - 36 inches		•					
			1.10.1	4-4-3	SS1				
		Medium stiff, brown and gray, silty CLAY, trace gravel - (CL)						· · · · · · · · · · ·	
	- 5-			85	S12		Ⅰ		
					ST3				
0		Medium stiff to stiff, brown and gray CLAY - CH							
, Ч. - Ч.				1-3-5	SS4				
	— 10—								
OSE6				3-4-6	SS5		•		
URP									
ION F		chert fragments		2-5-7	SS6			· · · · · · · · · · · ·	
IRAT	— 15—								
				3-5-7	SS7		•	· · · · · · · · · · · · · · · · · · ·	
IE B(OR IL		Boring terminated at 17.5 feet.							
XIMA OG F									
	— 20—								
IE AF									
AL G									
ESE ADU/									
KEPR E GR	— 25—								
AY BI									
SATIC									
TRAN	— 30—								
STRA THE									
AND2									
E.GP									
NE M	_ 35_								
CLO									
00 f									
V.GF									
3KWP									
L PAF		GROUNDWATER DATA DRILLING	DATA			Drawn by: AGB	Checked by: BJS	App'vd. by: CKK	
DEKE						Date: 7/8/2016	Date: 1/24/2017	Date: 1/24/2017	
/ID H(ENC	COUNTERED DURING DRILLING					GEOTECHN	NULOGYZ	
- DAV							~=~!=V!!!	FROM THE GROUND UP	
31.01		CMF 55TRK D		RIG		_		•	
02465		HAMMER TYP	PE Aut	-		Dav P	vid Hoekel Par hase 2A. B. an	кway d C	
VL J		HAMMER EFFICIE	ENCY	<u></u> %		Ŵ	entzville, Miss	ouri	
2002	RE	MARKS: Sta 135+88.87, Offset 55.42 LT	-	_					
SNIC 2						LO	G OF BORING	B-901	
E BOR									
JG OF						Pro	ject No. J024	4691.01	
Ľ							-		

1				<u> </u>		SHI	EAR STRENGTI	H, tsf
	Surfa	ace Elevation: <u>662.4</u> Completion Date: <u>6/20/2016</u>		TS TS ROI		∆ - UU/2	○ - QU/2	🗆 - SV
		Datum: msl			S	0.5 1	,0 1,5 2	2,0 2,5
			E E	N C C C	IPLE			
	프뉴		SAPI	SEC/	SAN		(ASTM D 1586)	
	EPT FEI	DESCRIPTION OF MATERIAL	Ц Ю			w	ATER CONTEN	Г. %
	ΩZ			N N N		PLI 10 2	20 30 4	40 50 LL
		Topsoil - 3 feet	<u>zł 1</u> z - <u>z</u> ł					
		-	1/ <u>1/</u>	4-3-5	SS1			
		Medium stiff, brown and gray, silty CLAY, trace gravel - CL						
		_		3-1-2	SS2			
	- 5-							
		Medium stiff to stiff, brown and gray CLAY - (CH)		86	ST3		••• • ••••	91 >>-
S		trace gravel						
TYPE NLY.	_ 10-			106	ST4		•	
SOIL ES OF		-						
VEEN		-		2-5-8	SS5	· · · · · · · · · · · · · · •		
BETV N PUF						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · ·	
RIES	— 15-	-		5-8-11	SS6			
UNDA USTF		-				· · · · · · · · · · · · · · · · · · ·		
E BOI		Boring terminated at 17.5 feet		1				
KIMAT DG FC								
PRO)	— 20-	-						
HE AP		-						
AL. G		-						
RESE		-						
S REP BE GI	- 25-	-						
MAY								
TION		-						
IFICA RANS		-						
TRAT HF TF	- 30-							
NP24		-						
-ON E.GP€		-						
NE MI	35							
ICLOI		-						
PJ 00		-						
AY.G								
ARK M								
(EL P/		GROUNDWATER DATA DRILLING	DATA			Drawn by: AGB Date: 7/8/2016	Date: 1/24/2017	App'vd. by: CKK Date: 1/24/2017
HOE		X FREE WATER NOT AUGER AUGERAUGERAUGER AUGER	HOLLC	W STEM			000000	0100/=
DIVA	ENC	COUNTERED DURING DRILLING WASHBORING FR	OM	FEET			GEUIECHN	
01 - D		<u>TPD</u> DRILLER <u>D</u>	<u>WJ</u> LO	OGGER				NOM THE AROUND UP
4691		<u>CME 55TRK</u> D		RIG		Dav	vid Hoekel Park	way
L J02			PE <u>Aut</u>	<u>0</u> 00 0/		P W	hase 2A, B, and entzville, Misso	l C ouri
002 W	RE	MARKS: Sta 137+88.87, Offset 55.42 LT		<u>00</u> 70				
ING 2						LO	g of Boring:	B-902
EOR								
JG OF						Pro	ject No. J024	691.01
Ľ						•		

	B	ORING LOG	: TER	MS AN	D SYMBOL	S		
	LEGE	END			Plasticity Ch	art		
CS	Continuous	Sampler		80 %				
GB	Grab Samp	ble		70 %				
NQ	NQ Rock C	ore		60 %		UTEIL "A"		
PST	Three-Inch	Diameter Piston Tube	Sample	50 %		СН		
SS	Split-Spoor	n Sample (Standard Pe	netration Te	st) ^{40 %}		ticity		
ST	Three-Inch	Diameter Shelby Tube	Sample	30 %		Plas		
*	Sample No	t Recovered		20 %				
PL	Plastic Limi	it (ASTM D4318)		10 %				
LL	Liquid Limit	: (ASTM D4318)		0%	10 % 20 % 30 % 40 % 50 % 60 %	6 70 % 80 % 90 % 100 % 110 %		
SV	Shear Strei	ngth from Field Vane (A	ASTM D2573	3)	Liquid Limit			
UU	Shear Strei	ngth from Unconsolidat	ed-Undraine	ed Triaxial Co	ompression Test (AST	VI D2850)		
QU	Shear Strei	ngth from Unconfined C	Compressior	n Test (ASTN	/I D2166)			
			SOIL GRA	AIN SIZE				
			US STANDA	RD SIEVE				
	13	7" 3" 3	/4"	1 10) 40 20	00		
		GODDI FOL GR	ÁVEL		SAND			
BOULL	JERS	COBBLES	FINE	COARSE	MEDIUM FINE	SILT CLAY		
	30	0 76.2 1	9.1 4.	76 2.0	0 0.42 0.0	74 0.005		
		SOIL	. GRAIN SIZE I	N MILLIMETER	RS			
		UNIFIED SO	IL CLASS	IFICATIO	N SYSTEM			
	Major Di	visions	Symbol		Description	1		
%(Gravel	Clean Gravels	GW	Well-Graded	Gravel, Gravel- Sand Mi	xture		
ed 50 . 20	and	Little or no Fines	GP	Poorly-Grade	ed Gravel, Gravel-Sand M	lixture		
ain Nan Vo.	Gravelly	Gravels with	GM	GM Silty Gravel, Gravel-Sand-Silt Mixture				
Gra Gra Siz Siz	Soil	Appreciable Fines	GC	Clayey-Grav	ture			
se- ore tha	<u> </u>	Clean Sands	ds SW Well-Graded Sand, Gravelly Sand					
ar: (M er †	Sand and	Little or no Fines	SP Poorly-Graded Sand, Gravelly Sand					
Co Ils	Sandy	Sands with		SM Silty Sand, Sand-Silt Mixture				
La So	Solis	Appreciable Fines	SC	Clayey-Sanc	I, Sand-Clay Mixture			
S			ML	Silt, Sandy S	Silt, Clayey Silt, Slight Plas	sticity		
Soil No.	Silts and	Liquid Limit	CL	Lean Clav. S	Sandy Clay, Silty Clay, Lov	w to Medium Plasticity		
d S an I Siz	Clays	Less Than 50	0	Organic Silts	or Lean Clavs. Low Plas	ticity		
ine אמר ve			MH	Silt, High Pla	asticity			
Sra Sie Sie	Silts and	Liquid Limit	СН	Eat Clay Hic	nh Plasticity			
e-G lor Do 30	Clays	ays Greater Than 50		Organic Clay	/ Medium to High Plastici	tv.		
Sr (P	Hiat	Highly Organic Soils		Peat Humus	s Swamp Soil	ity		
	STDENC			r cat, riania				
	STRENG				DENSITI OF GR	Anular SULS		
Consis	tency	Undrained Snear	Uncontin	ea Comp.	Descriptive Term	Approximate		
Vond	Soft	Strength (tst)	Streng	tn(tst)	Vonul oppo	0 to 4		
very	5011 ff	0.125 to 0.25		to 0.5		0 t0 4		
Modium	n Stiff	0.125 to 0.25	0.25	to 0.5	LOUSE Modium Donso	11 to 20		
	1 Suii #	0.25 to 0.5	0.5	to 2.0	Donco	11 to 50		
Voru	Ctiff	0.5 to 1.0	1.0	to 2.0	Vory Donco	51 10 50		
Very .	Sun	1.0 to 2.0	2.0	$\frac{10}{10}$ $\frac{3.0}{10}$	very Dense	>00<		
N_Value (Blov	u v Count) is :	the last two 6-inch driv		$\frac{11}{2}$	$N = 7 \pm 0 = 16$ Value	e are shown as a		
summation of	n the arid nl	ot and shown in the I in	it Dry Weigh	s (i.e. 4/7/9, st/SPT colum	n = r + 3 = 10. Value	s are shown as a		
PFI			It Dry Weigi					
			l over log	lucion gract				
I 120	<u>ус</u>		Layer - Inc	Jusion 1/9	er man o inches mick.			
		20 to 20%	Darting In	alusion loss	than 1/8-inch thick			
3011	4	20 10 30%	Pocket In	clusion of m	atorial that is smaller th	an sample diameter		
All	u	55 10 50%				ian sample uidmetel		
G		DGY THE GROUND UP Relative con visual descri soil, the USC	nposition and iptions and are S designation	Unified Soil Cla approximate of is shown in par	assification System (USCS) only. If laboratory tests wer enthesis.	designations are based on re performed to classify the		

ROCK CORE DESCRIPTIONS							
TERM		REFERENCE					
Strength		STRENGTH					
Color	Description	Uniaxial Compressive Strength (psi)					
Crystallinity	Extremely Weak	less than 150					
Grain Size	Very Weak	150 to 700					
Mass Bedding	Weak	700 to 4,000					
Weathering	Medium Strong	4,000 to 7,000					
Voids	Strong	7,000 to 15,000					
Quality	Very Strong	15,000 to 36,000					
SEDIMENTARY ROCK TYPE	Extremely Strong	greater than 36,000					
Sandstone - Predominantly quartz grains		COLOR					
cemented by silica, iron, clay or carbonate	Common colors are gra	ay, brown, black and white. Exotic colors such					
material. Color depends on cementing	as green, blue,	maroon can be used when necessary.					
agent; porous and pervious; hard and		CRYSTALLINITY					
generally thickly bedded.	Description	Criteria					
Siltstone - Composition similar to sandstone	Aphanitic	Crystals cannot be seen with the naked eye					
but at least 50% grains 0.002 to 0.02	Very Finely Crystalline	Crystals are barely visible with the naked eye					
millimeters in size. Rarely forms thick beds,	Finely Crystalline	Crystals are easily visible with the naked eye					
but often hard.	Madium Crystallina	Crystals are medium size; up to 1/8-inch					
Shale - Predominant particles are less than	Medium Crystalline	diameter					
0.002 millimeters with a well defined fissile	Coarsely Crystalline	Crystals are 1/8- to 1/4-inch in diameter					
fabric. Commonly interbedded with	Very Coarsely	Crystale are larger than 1/4 inch in diameter					
sandstone or limestone and relatively soft.	Crystalline	Crystals are larger than 1/4-inch in diameter					
Limestone - Contains more than 50%		GRAIN SIZE					
calcium carbonate. The calcite can be	Description	Criteria					
precipitated chemically, organically, or it	Very Finely Grained	Grains cannot be seen with the naked eye					
may be detrital in origin. Reacts with dilute	Fine Grained	Grains are barely visible with the naked eye					
HCL.	Medium Grained	Grains up to 2 mm in diameter					
Dolomite - Harder and heavier than	Coarse Grained	Grains are larger than 2 mm in diameter					
limestone. Forms by alteration of limestone		BEDDING					
or by direct precipitation from sea water.	Description	Criteria					
Reacts with dilute HCL only when	Thin	less than 2 inches					
powdered.	Medium	2 to 24 inches					
Coal - Composed of highly altered plant	Thick	24 to 48 inches					
remains and varying amounts of clay,	Massive	greater than 48 inches					
generally black in color.		WEATHERING					
Chert - Formed by silica deposited from	Description	Criteria					
solution in water. May occur as nodules or	Unweathered	No visible alteration of rock mass					
relatively thick beds.	Slightly Weathered	Slight discoloration inward from fractures					
GEOLOGIC DEFINITIONS	Moderately Weathered	Discoloration throughout, slight loss of					
Stylolite - A term applied to parts of certain		strength, texture intact					
limestones which have a column like	Highly Weathered	Entire rock mass appears discolored and dull,					
development that is grooved, sutured or		texture indistinct, fabric intact					
striated and irregular in cross-section.	Severely Weathered	Majority of rock mass reduced to soil-like state					
Fissility - A property of splitting along		with relic rock structure					
closely spaced parallel planes.		VOIDS					
Argillaceous - A term applied to rock or	Description	Criteria					
substances having a notable portion,	Dense	Usually not visible with the naked eye					
greater then 30%, clay in composition.	Pitted	Visible to 1/4-inch					
Oolitic - A spherical or ellipsoidal texture,	Vuggy	1/4-inch to diameter of the core					
0.25 to 2.0 mm in diameter, with concentric	Cavity	Larger than 6 inches in diameter					
or radial structure.		QUALITY					
Brecciated - A rock texture which is	Percent RQD	Description					
composed of angular fragments which	90 to 100	Excellent					
correspond in size to gravel and/or pebbles	75 to 90	Good					
	50 to 75	Fair					
Slickenside - A polished or striated surface	50 to 75 25 to 50	Fair Poor					

APPENDIX C

ROCK CORE PHOTOGRAPHS





J024691.01	Ι	David Hoekel Parkway Wentzville, Missouri	B-201 Box 3 of 5
BIIN-4			
TOP	2		
	RUN-4 BOTTOM RUN-5		anna anna
		n de	and a second
		9 10 11 12 13 14 15 16 17 17 12 13 14 15 16 17 17 17 17 17 17 17 17 17 17 17 17 17	77 22 23 3
RUN 4	<u>DEPTH, FT</u> 96.0-100.5	<u>BORING B-201</u> <u>RECOVERY, %</u> 91	<u>RQD, %</u> 50
5 6	100.5-105.5 105.5-Cont.	95 100	72 22
J024691.01	Ι	David Hoekel Parkway Wentzville, Missouri	B-201 Box 4 of 5
	2	DX	
	Carly a	ALATA	
	PUN 6 DUN 2	A ARK	
Nolamo	BOTTOM TOP	T. Marken	
	403	and the	
			1 22 23 2 **** DOLAND BC
<u>RUN</u>	<u>DEPTH, FT</u>	<u>DUKING B-201</u> <u>RECOVERY, %</u>	<u>RQD, %</u>

<u>DEPTH, FT</u>	<u>RECOVERY, %</u>	<u>RQD,</u>
Cont110.5	100	22
110.5-115.5	100	20
115.5-Cont.	100	45
	DEPTH, FT Cont110.5 110.5-115.5 115.5-Cont.	DEPTH, F1 RECOVERY, % Cont110.5 100 110.5-115.5 100 115.5-Cont. 100



<u>BORING B-201</u>							
RUN	DEPTH, FT	RECOVERY, %	<u>RQD, %</u>				
8	Cont122.5	100	45				



BUKING B-303							
<u>RUN</u>	DEPTH, FT	RECOVERY, %	<u>RQD, %</u>				
1	88.5-91.0	73	0				
2	91.0-96.0	67	22				
3	96.0-Cont.	32	0				



RUN	DEPTH, FT	RECOVERY, %	<u>RQD, %</u>
5	Cont111.0	60	13
6	111.0-116.0	100	75
7	116.0-118.0	100	71




RUN	
3	

ORING B-503	
RECOVERY, %	
100	

<u>RQD, %</u> 27



BORING B-603			
<u>RUN</u>	DEPTH, FT	RECOVERY , %	<u>RQD, %</u>
1	86.0-89.5	40	12
2	89.5-94.5	58	8
3	94.5-Cont.	100	87



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APPENDIX D

SLOPE STABILITY ANALYSIS RESULTS



Distance (ft)







<u>APPENDIX E</u>

CONSOLIDATION TEST RESULTS



ASTM D 2435 Project No.: J024691.01 Boring: B-103 Sample: ST1 - Depth: 3-5





ASTM D 2435 Project No.: J024691.01 Boring: B-303 Sample: ST-4 - Depth: 18-20





ASTM D 2435 Project No.: J024691.01 Boring: B-720 Sample: ST2 - Depth: 3-5



ASTM D 2435 Project No.: J024691.01 Boring: B-809 Sample: ST2 - Depth: 3-5





ASTM D 2435 Project No.: J024691.01 Boring: B-901 Sample: ST-2 - Depth: 3-5

APPENDIX F

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST RESULTS





ASTM D 4767 Project No.: J024691.01 Boring: B-401A Sample: ST1 - Depth: 8-10





CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D 4767 Project No.: J024691.01 Boring: B-707, B-707, B-707 Sample: ST3, ST3, ST4 - Depth: 6-8, 6-8, 8-10

³Normal Stress (tsf)

5

6

0

0

1

2





Project No.: J024691.01 Boring: B-805, B-805, B-805 Sample: ST2, ST3, ST3 - Depth: 3-5, 6-8, 6-8













Project No.: J024691.01 Boring: B-902, B-902, B-603 Sample: ST3, ST2, ST2 - Depth: 6-8, 6-8, 6-8

APPENDIX G

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST RESULTS



Moisture Content (%)	17.9	Wet Density (pcf)	128.5
Shear Strength (tsf)	1.46	Dry Density (pcf)	109.0
Failure Strain (%)	4.0	E 50	0.016



ASTM D 2850 Project No.: J024691.01 Boring: B-103 Sample: ST1 - Depth: 3-5 ft.



Moisture Content (%)	16.0	Wet Density (pcf)	133.0
Shear Strength (tsf)	2.59	Dry Density (pcf)	114.6
Failure Strain (%)	11.4	E 50	0.015



Project No.: J024691.01 Boring: B-801 Sample: ST3 - Depth: 6-8 ft.



Moisture Content (%)	27.7	Wet Density (pcf)	119.3
Shear Strength (tsf)	0.50	Dry Density (pcf)	93.4
Failure Strain (%)	15.0	E 50	0.011



Project No.: J024691.01 Boring: B-809 Sample: ST2 - Depth: 3-5 ft.



Moisture Content (%)	25.5	Wet Density (pcf)	122.4
Shear Strength (tsf)	0.75	Dry Density (pcf)	97.5
Failure Strain (%)	15.0	E 50	0.030



Project No.: J024691.01 Boring: B-814 Sample: ST1 - Depth: 1-3 ft.

<u>APPENDIX H</u>

GRAIN SIZE ANALYSIS RESULTS



GPJ Ŕ 5 S d C HOFKFI



<u>APPENDIX I</u>

SWELL TEST RESULTS





ASTM D 4546 Project No.: J024691.01 Boring: B-2 Sample: ST2 - Depth: 3-5





ASTM D 4546 Project No.: J024691.01 Boring: B-5 Sample: ST1 - Depth: 1-3





ASTM D 4546 Project No.: J024691.01 Boring: B-10 Sample: ST1 - Depth: 1-3





ASTM D 4546 Project No.: J024691.01 Boring: B-11 Sample: ST2 - Depth: 3-5



0.600

0.800

1.000

1.200

0.400

0.0250 -

0.000

0.200

ASTM D 4546 Project No.: J024691.01 Boring: B-16 Sample: ST1 - Depth: 1-3





ASTM D 4546 Project No.: J024691.01 Boring: B-18 Sample: ST2 - Depth: 3-5

<u>APPENDIX J</u>

SETTLEMENT ANALYSIS PLOTS WITHOUT GROUND IMPROVEMENT














Ramp 4



Plan View of Estimated Settlement



			_ , , , , , , , , , , , , , , , , , , ,	_ , , , , , , , , , , , , , , , , , , ,				
-400	-300	-200	-100	0	100	200	300	400













APPENDIX K

SETTLEMENT ANALYSIS PLOTS WITH GROUND IMPROVEMENT







-300

Ramp 4



Plan View of Estimated Settlement



-400	-300	-200	-100	0	100	200	300	400







GENERAL CONDITIONS

SECTION 1 DEFINITIONS

- **1.01** Available for Use (Substantial Completion): The stage in the progress of the Work when the Work is sufficiently complete so that the City can occupy or use the Work for its intended use. The date on which a Project is deemed Available for Use is in the sole discretion of the City.
- **1.02** Change Order: A written order to the Contractor signed by the City, issued after the execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Sum or the Construction Schedule.
- **1.03 City:** City of Wentzville. The City is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term City means the City or its authorized representative. The City may be alternatively referred to as the "Owner."
- **1.04 Contract:** The Contract Documents form the Contract. The Contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations or agreements, both written and oral, including the bidding documents. The Contract may be amended or modified only by a modification as defined in Section 1.02.
- **1.05 Contract Documents:** Contract Documents shall include all those documents identified as the Contract Documents in the City-Contractor Agreement. The Contract Documents shall include any and all modifications as defined as (1) a written amendment to the Contract signed by both parties, or (2) an executed Change Order.
- **1.06 Contract Sum:** The total amount payable by the City to the Contractor for the performance of the Work as stated in the City-Contractor Agreement.
- **1.07 Contract Time/Contract Days:** Period of time allotted in the Contract Documents for substantial completion of the Work.
- **1.08 Contractor:** The Contractor is the successful bidder awarded the work of constructing the project identified as such in the City-Contractor Agreement. The Contractor is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Contractor means the Contractor or his authorized representative(s).
- **1.09** Date of Commencement of the Work: Date established in the written Notice to Proceed on which the Contractor is to begin the Work.
- **1.10 Day:** Calendar day.
- **1.11 Director:** Director of Public Works of the City of Wentzville, or his/her authorized representative(s)
- **1.12 Final Acceptance:** Written notice from the City to the Contractor stating that the Project including all Work, any deficiencies as outlined in inspections, and all Project Closeout items and activities have been completed and the City accepts the Project. Said work shall include all punch list items deemed necessary by the City, exclusive of punch list items generated by any public authority

having jurisdiction other than the City. The date of completion of the Contract shall be the date when all work including City punch list items have been approved in writing by the City.

- **1.13 Final Inspection:** Inspection performed and provided by the City to the Contractor upon the Contractors request and based upon his determination that the Project is ready for final acceptance.
- **1.14 Final Payment:** Last payment made to the Contractor, typically retainage due, upon Final Acceptance of the Project.
- **1.15** Notice to Proceed: Written notice from the City notifying the Contractor of the date on or before which he is to begin the work.
- **1.16 Project:** The total construction of which the Work performed under the Contract Documents may be the whole or a part.
- **1.17 Project Closeout:** The time period of the Work after Available for Use (Substantial Completion) when the Work and all administrative requirements have been or are being completed in their entirety. The Project Closeout period is typically 90 days.
- **1.18 Removal:** Removal of material and disposal of said material off-site.
- **1.19** Request for Information (RFI): Written memo from the Contractor to the Engineer collect written information about a question in regards to the Technical Specifications or Plans for Construction. The RFI shall also be used as a means for the Contractor to seek Engineer approval for minor alterations to Plans for Construction or the Technical Specifications that do not result in a change in the Contract Sum or Project Schedule.
- **1.20** Semi-Final Inspection: Inspection performed and provided by the City to the Contractor upon Contractor's request and based upon his determination that the Project is Available for Use.
- **1.21 Specifications:** City of Wentzville Construction Specifications and Standard Details, latest edition, unless otherwise specified.
- **1.22 Subcontractor:** A Subcontractor is a person or organization who has a direct contract with the Contractor to perform any of the Work. The term Subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Subcontractor or his authorized representative.
- **1.23 Sub-subcontractor:** A Sub-subcontractor is a person or organization who has a direct or indirect contract with a Subcontractor to perform any of the Work. The term Sub-subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Sub-subcontractor or an authorized representative thereof.
- **1.24** Work: All labor necessary to complete the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in such construction.

SECTION 2 CONTRACT DOCUMENTS

2.01 Execution, Correlations, and Intent

2.01.1 The Contract Documents shall be signed by the City and Contractor.

2.01.2 The Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract Documents.

2.01.3 The intention of the Contract Documents is to include all labor, materials, equipment and other items necessary for execution and completion of the Work. Words which have well-known technical or trade meanings are used herein in accordance with such recognized meanings.

2.02 Copies Furnished and Ownership

2.02.1 Unless otherwise provided in the Contract Documents, the Contractor will be furnished a maximum of five (5) copies, free of charge, of the Drawings and Specifications, if any, for the execution of the work.

2.02.2 Any Drawings, Specifications and copies thereof furnished by the City are and shall at all times remain property of the City. Such documents shall not be used on any other project. At the conclusion of the job, the Contractor shall submit one (1) set of drawings and specifications marked up throughout the course of work with any and all field changes.

SECTION 3 CITY

3.01 City's Right to Access and Observation

The City shall have access at all times to the Project for the purpose of observation and inspection. The Contractor shall provide proper and adequate facilities, specialized, tool and equipment for such access and observation.

3.02 City's Right to Stop Work

If the Contractor fails to correct defective Work or fails to supply materials or equipment in accordance with the Contract Documents, the City may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated.

3.03 City's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, or fails to perform any provision of the Contract, the City may, after written notice to the Contractor and without prejudice to any other remedy the City may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or hereafter due the Contractor the cost of correcting such deficiencies. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the City promptly upon request.

3.04 City's Right to Award Separate Contracts

The City's reserves the right to award other contracts on other terms and conditions with other portions of the Project.

3.05 City's Right to Clean Up

If a dispute arises between separate contractors as to their responsibility for cleaning up as required by Section 4.08, the City may clean up and charge the cost thereof to the several contractors.

3.06 Status of the Director

The Work shall be subject at all times to the supervision and direction of the Director. To prevent disputes and litigation, it is mutually agreed that the Director shall, in all cases, determine the amount or quantity of the various kinds of work, and the quality of materials and workmanship to be paid for under this Contract, and the Director shall decide all questions which may arise relative to the performance of the work covered by the Contract. Any doubt as to the meaning of the Contract and any obscurity or discrepancy as to their working and intent will be explained by the Director, and this explanation shall be final and binding by both parties of this Contract. The Director may amend or correct any errors or omissions in the Specifications when such amendments or corrections are necessary to make definite the intent indicated by a reasonable interpretation of the Contract.

3.07 Authority of the Engineer

The Engineer will decide all questions that may arise as to the quality, quantity, and acceptability of material furnished and the work performed, and as to the rate of progress of the work; all questions that may arise as to the interpretation of the plans and specification; all questions of classification; quantities for which payment will be made, performance or breach of the contract; and all claims or controversies of any character whatsoever in connection with or growing out of the construction, whether claimed under the contract, under force account, under quantum merit or otherwise. The engineer's estimates and decisions shall be final, binding and conclusive upon all parties to the Contract. The Engineer may suspend any work that is being improperly performed.

3.08 Authority and Duties of Inspector

As the immediate representative of the City, the Inspector has direct charge of the delivery of work and is delegated commensurate authority for the administration of the project. The Inspector may reject defective material and reject any work that is being improperly performed. The Inspector may also make recommendations to the Engineer to suspend work that is being improperly performed. The Inspector will have no authority to modify the Contract except in accordance with the Contract Documents or when expressly authorized by the Engineer.

SECTION 4 CONTRACTOR

4.01 Supervision and Construction Procedures

4.01.1 The Contractor shall supervise and direct the Work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work.

4.01.2 All Work shall be in accordance with the Contract Document and Specifications.

4.01.3 The contractor shall have at the work site at all times, as the contractor's agent, a competent individual capable of reading and thoroughly understanding the plans and specifications and thoroughly experienced in the type of work being performed, whom shall receive instructions from the engineer. That individual shall have full authority to execute orders or directions of the engineer without delay and to promptly supply material, equipment, tools, labor and incidentals as may be required.

4.02 Labor and Materials

4.02.1 Unless otherwise specifically noted, the Contractor shall provide and pay for all labor, materials, equipment, supplies, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.

4.02.2 The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him. If the City reasonably objects to any person employed by the Contractor, the employee shall be immediately dismissed.

4.02.3 The labor provided by the Contractor shall be directed to be a workman-like character with respect to the methods of construction and quality of completed work; and, shall not encumber the premises or adjacent property or streets with materials and/or equipment.

4.02.4 The Contractor shall comply with, and is bound by, the provisions of Missouri law pertaining to the payment of wages on public works projects contained in Sections 290.210 through 290.340 RSMo., and any amendments thereto, including, but not limited to the following:

4.02.4.1 In accordance with Section 290.250 RSMo., as amended, the Contractor shall not pay less than the prevailing hourly rate of wages specified by the Missouri Department of Labor and Industrial Relations Division of Labor Standards to all workmen performing Work under the Contract.

4.02.4.2 In accordance with. 290.250 RSMo., as amended, the Contractor shall forfeit as a penalty to the City one hundred dollars (\$100.00) for each workman employed for each calendar day, or portion thereof, such workman is paid less than the said stipulated rates for any Work done under the Contract, by him or by any Subcontractor under him and shall include provisions in all bonds guaranteeing the faithful performance of said prevailing hourly wage clause.

4.02.4.3 In accordance with 290.265 RSMo., as amended, the Contractor and each Subcontractor shall post a clearly legible statement of all prevailing hourly wage rates to be paid to all workmen employed to complete the Work in a prominent and easily accessible place at the site of the Work and such notice shall remain posted during the full time that any workmen shall be employed at the Work.

4.02.4.4 Certified payrolls shall also be submitted prior to final payment for all work completed by the Contractor or Subcontractors.

4.02.4.5 In accordance with Section 290.290 RSMo., as amended, before final payment is made an affidavit must be filed by the Contractor stating that he has fully complied with the prevailing wage law. No payment shall be made unless and until this affidavit is filled in proper form and order.

4.02.5 The Contractor shall execute and complete the Work in such a manner that avoids jurisdictional and other disputes among labor unions.

4.02.6 Except as otherwise required by law, during a period of excessive unemployment in the State of Missouri, the Contractor shall employ only Missouri laborers and laborers from nonrestrictive states on the Project, as provided in Sections 290.550 to 290.580 RSMo.

4.02.7 If the Contract Documents have indicated that the Project is financed in whole or in part from Federal funds, then this Contract shall be subject to all applicable federal statutes, rules and regulations, including provisions of the Davis-Bacon Act, 40 U.S.C. §3141 et seq., and the "Federal Labor Standards Provisions," incorporated into this Contract. Where the Missouri Prevailing Wage Law and the Davis-Bacon Act require payment of different wages for work performed under this Contract, the Contractor and all Subcontractors shall pay the greater of the wages required under either law.

4.02.8 The Contractor shall employ only personnel authorized to work in the United States in accordance with applicable federal and state laws. This certification applies to State of Missouri Immigration Alien Laws and statutes required local government(s) to have proof of a person's lawful presence within the United States before distributing "Public Benefits" (contracts, purchase orders, etc.) to that Bidder.

4.03 Warranty

The Contractor warrants to the City that all materials and equipment furnished under the Contract and incorporated in the Work will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All Work not so conforming to these standards shall be considered defective. The Contractor shall furnish satisfactory evidence as to the kind and quality of all materials and equipment and shall guaranty the Work as provided in the City Contractor Agreement after substantial completion of the work.

4.04 Permits, Fees, Easements, Construction Limits and Notices

4.04.1 The Contractor shall secure and pay for all permits, governmental fees, and licenses necessary for the proper execution and completion of the Work, including those required to be obtained from the City, except fees imposed solely by the City shall be waived at the time of application.

4.04.2 For the purposes of operating and maintaining the Project, the City shall acquire the necessary lands, easements and rights-of-way privileges required for the same. The Contractor shall furnish and construct any necessary access roads or facilities.

4.04.3 The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and orders of any public authority bearing on the performance of the Work. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the City in writing and any necessary changes shall be adjusted by appropriate Modification. If the Contractor performs any Work knowing it to be contrary to such laws,

ordinances, rules and regulations and without such notice to the City, the Contractor shall assume full responsibility therefor and shall bear all costs attributable thereto.

4.04.4 The construction limits consist of public areas and acquired easement areas, as shown in the Contract Documents. The Contractor shall limit his operations accordingly. No activity outside the public areas or easement areas shall performed without the express written permission of the property owner.

4.04.5 The Contractor shall notify in writing all residents whose property is affected by the Work at least forty-eight (48) hours prior to commencement of any operation that will affect the residents' property. The City, before commencement of work on the Project, shall review and approve the form of all such notices.

4.05 Superintendent

4.05.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance on the Project site at all times during the progress of all work for the duration of the total project.

4.05.2 This person shall be a non-working superintendent who will be responsible for the satisfactory progression of the work and to ensure that all work is being completed in accordance with the plans and specifications. He is also to relay any conflicts or discrepancies that arise in the plans to the City's representative for resolution or interpretation.

4.05.3 The name of the person selected as superintendent and his qualifications shall be submitted and shall be approved in writing by the City. The superintendent shall not be changed except with the written consent or at the request of the City. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor.

4.05.4 The superintendent shall be the contact person whom the City will contact in the event of after-hours and weekend emergencies and the Contractor shall provide the City with the superintendent's contact information for such purpose.

4.06 Responsibility for Those Performing the Work and for the Work

4.06.1 The Contractor shall be responsible to the City for the acts and omissions of all his employees, all Subcontractors, and suppliers their agents and employees and all other persons performing any of the Work under a contract with the Contractor.

4.06.2 The Contractor shall at all times employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by these specifications. All workmen shall have sufficient skill and experience to perform properly the work assigned to them.

4.06.3 Prior to the completion of the work by the Contractor and the acceptance thereof by the Owner, the work shall remain at the risk of the Contractor; and said Contractor shall be required to repair, replace, renew, and make good, at his own expense, all damages caused by force, vandalism, or violence of the elements or any other cause whatsoever provided; however, that in such cases the Contractor shall be entitled to a reasonable extension of time which to complete said work. In case of suspension of work from any cause whatever, the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project, for normal drainage, and shall erect any necessary warning signs or barricades at his expense. The Contractor shall properly and continuously maintain the roadway for local traffic.

4.07 Drawings and Specifications at the Site

4.07.1 The Contractor shall maintain at the site for the City one copy of any Drawings, Specifications, Addenda, approved Shop Drawings, Requests for Information, Change Orders and other Modifications, in good order and marked to record all changes made during construction.

4.07.2 The Drawings, marked to record all changes made during construction, shall be delivered to the City upon completion of the work. The Contractor shall also maintain on the project site a survey level, legs, and rod at all times, which are deemed adequate by the City.

4.08 Cleaning Up

4.08.1 The Contractor shall at all times keep the premises free from accumulation of waste materials, rubbish, and debris caused by his operations. The Contractor shall not "stockpile" any material on the jobsite and all excavated material shall be hauled off the site at the time of excavation.

4.08.2 Stockpiling of materials delivered and used on the same day will be allowed if all materials are in place or removed at the end of the day. Prior to final payment, Contractor shall restore and replace the surfaces of the project area to match the conditions existing prior to the work.

4.08.3 The Contractor shall be responsible for keeping clean, i.e. free from mud, dirt, rock, and debris at all times all City streets used by the Contractor in connection with the Work and the Project. Should any accumulation be deemed excessive, the City may direct the Contractor to thoroughly wash or remove the debris from the street at no cost to the City.

4.08.4 The Contractor shall make satisfactory arrangements to store material and equipment after delivery and during construction off of the City right-of-way. The City will assume no responsibility for these arrangements.

4.09 Utilities

4.09.1 Interference with Existing Water and Sewer Services and Mains

4.09.1.1 The Contractor shall minimize the outage of water and sewer service to residents. The cutting off of water and sewer service shall be only with the consent of the City. The Contractor shall notify the City and have their approval prior to commencing work on each water or sewer main or connection item.

4.09.1.2 The Contractor shall conduct his work in such a manner as not to endanger existing water or sewer mains, services or appurtenances. Mains and services shall be adequately supported where they cross or are adjacent to the excavation. The Contractor shall bear the cost of all repairs to water or sewer mains or appurtenances damaged because of his own carelessness or neglect.

4.09.1.3 When it becomes necessary to shut down any existing water or sewer main, a representative of the City shall be present during this operation. The total time for the main to be shut down should be held to a minimum and in no case shall any customer be without water or sewer service for more than eight (8) hours. The Contractor shall notify each water or sewer customer whose water or sewer service will be interrupted at least one hour prior to shut down. The Contractor shall assume full responsibility for shutting down the main and notifying the customers.

4.09.2 Coordination with Utilities

The Contractor shall contact and coordinate with all affected utilities prior to commencing any operations. Prior to commencement of any work involving excavation, demolition of facilities or the

erection of posts, it will be the sole responsibility of the Contractor to notify all utilities of the planned work and request that the utilities suitably mark underground installations in the vicinity of the planned work, and arrange for disconnection of any necessary utilities.

4.10 Cash Allowances

The Contractor acknowledges and agrees that the Contract Sum includes all cash allowances as may be specified in the Contract Documents.

4.11 Equal Employment Opportunity

The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, or disability. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment; advertising; layoff or termination; rates of pay or other forms of compensation; and selection of training, including apprenticeship. The Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, or disability. The Contractor shall incorporate the foregoing requirements of this paragraph in all of its subcontracts for work performed under the terms and conditions of this Contract. A breach of this provision may be grounds for Contract termination.

4.12 Accident Prevention: OSHA

4.12.1 In the performance of this Contract, the Contractor shall comply with all applicable Federal, State, county and local laws governing safety health and sanitation. The Contractor and any subcontractor shall not require any worker or mechanic employed in performance of this Contract to work in surroundings or other working conditions which are unsanitary, hazardous, or dangerous to his health or safety, as determined under Construction Safety and Health Hazards, Title 29, Code of Federal Regulations, Part 1926.

4.12.2 The Contractor shall require all on-site employees to complete a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program provided by the contractor which includes a course in construction safety and health approved by OSHA or a similar program approved by MoDOLIR which is at least as stringent as an approved OSHA program, as required under Section 292.675 RSMo. All employees are required to complete the program within sixty days of beginning work under this contract. The successful bidder shall also require all subcontractors under the contractor to provide the ten-hour training program required under Section 292.675 RSMo. to such subcontractors' on-site employees.

SECTION 5 SUBCONTRACTORS

5.01 Award of Subcontracts and other Contracts for Portions of the Work

5.01.1 Unless otherwise specified in the Contract Document, the Contractor shall submit a completed Subcontractor Form, naming each Subcontractor and Supplier the Contractor proposes to employ in performing the Work under this Contract and describing the portions of the Work each proposed Subcontractor shall perform or supply, along with other required Contract documents to the City. Contractor shall complete and submit a Subcontractor Form to the City in the event of any substitution or addition of a Subcontractor by the Contractor.

5.01.2 Prior to the award of the Contract, the City will notify the Bidder in writing if the City, after due investigation, objects to any such person or entity proposed by the Bidder pursuant to Section 5.01.1 above. If the City objects to any such proposed person or entity, the Bidder may, at his option, (1) withdraw his Bid, or (2) submit an acceptable substitute person or entity with no adjustment in his bid price.

5.01.3 The City reserves the right to reject a Subcontractor, if in the City's sole discretion, delays may result in the performance of Work as a result of a Subcontractor's other obligations. The Contractor shall be held responsible, in addition to the submission of the Subcontractor Utilization Form, to apprise the City of any additional work which a Subcontractor accrues throughout the duration of the project. This shall include work for the City under a different Contract, or any other person or entity. If such said additional work shall detrimentally impact the progression of the Work under this Contract, the City retains the right to require the Contractor to submit a substitute Subcontractor for this work at no additional cost to the City.

5.01.4 The Contractor shall not contract with any Subcontractor or any person or organization (including those who are to furnish materials or equipment fabricated to a special design), for proposed proportions of the Work designated in the Contract Documents or, if none is so designated, with any Subcontractor proposed for the principal portions of the Work, who has been rejected by the City.

5.01.5 If the City requires a change of any proposed Subcontractor or person or organization during the execution of the Work approved under the Contract, the Contract Sum shall be increased or decreased by the difference in cost resulting from such change and an appropriate Change Order shall be issued.

5.01.6 The Contractor shall not make any substitution for any proposed Subcontractor or person or organization that has not been accepted by the City prior to the Contract Award, unless the substitution is accepted by the City in writing prior to such substitution.

5.02 Subcontractual Relations

5.02.1 All work performed for the Contractor by a Subcontractor shall be pursuant to an appropriate agreement between the Contractor and Subcontractor (and where appropriate between Subcontractors and Sub-subcontractors) which shall contain provisions that:

5.02.1.1 Require the Work to be performed in accordance with the requirements of the Contract Documents;

5.02.1.2 Require submission to the Contractor of applications for payment under each subcontract to which the Contractor is a party, in reasonable time to enable the Contractor to apply for payment in accordance with Section 9 hereof;

5.02.1.3 Require that all claims for additional costs, extensions of time, damages for delays or otherwise with respect to subcontracted portions of the Work shall be

submitted to the Contractor (via any Subcontractor or Sub-subcontractor where appropriate) in sufficient time so that the Contractor may comply in the manner provided in the Contract Documents for like claims by the Contractor upon the City;

5.02.1.4 Waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance described in Section 11, except such rights as they may have to the proceeds of such insurance held by the City as trustee under said Section 11;

5.02.1.5 Obligate each Subcontractor specifically to consent to the provisions of this Section 4.03;

5.02.1.6 Require the Subcontractor (and the Sub-subcontractor) to indemnify and hold harmless the City against all claims, damages, losses, expenses and attorneys' fees arising out of or resulting from the performance of the Work by Subcontractor, and its agents and employees, unless such claims, damages or losses are caused solely by the negligent act of the City.

5.03 Payment to Subcontractors

5.03.1 The Contractor shall pay each Subcontractor upon receipt of payment from the City, an amount equal to the percentage of completion allowed to the Contractor on account of such Subcontractor's Work, less the percentage retained from payments to the Contractor. The Contractor shall also require each Subcontractor to make similar payments to his Subcontractors.

5.03.2 If the City withholds payment to the Contractor for any cause which is the fault of the Contractor and not the fault of a particular Subcontractor, the Contractor shall pay that Subcontractor on demand for its Work to the extent completed.

5.03.3 The City shall not have any obligation to pay or to see to the payment of any sum to any Subcontractor or Sub-subcontractor.

SECTION 6 SEPARATE CONTRACTS

6.01 Mutual Responsibility of Contractors

6.01.1 The Contractor shall afford other contractors reasonable opportunity for the delivery and storage of their materials and equipment and the execution of their work, and shall properly connect and coordinate the Work with theirs. The Contractor shall employ, insofar as possible, such methods and means in carrying out the Work as will not cause any interruption or any interference with any other contractor.

6.01.2 If any part of the Work depends for proper execution or results upon the work of any other separate contractor, the Contractor shall inspect and promptly report to the City any apparent discrepancies or defects in such work that render it unsuitable for proper execution of the Work. Failure of the Contractor to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper to receive the Work, except as to defects which may develop in the other contractor's work after the execution of the Contractor's Work that could not have been discovered by the Contractor upon reasonable inspection.

6.01.3 If the Contractor causes damage to the work or property of any other contractor on the Project, and such separate contractor sues the City or initiates an arbitration proceeding on account of any damage alleged to have been so sustained, the City shall notify the Contractor who shall defend such proceedings at his own expense, and if any judgment or award against the City arises therefrom the Contractor shall pay or satisfy it and shall reimburse the City for all attorneys' fees and court arbitration costs which the City has incurred.

SECTION 7 MISCELLANEOUS PROVISIONS

7.01.1 Governing Law. The Contract shall be governed by and construed and interpreted in accordance with the internal laws of the State of Missouri, without regard to its principles of conflict of laws, and shall be deemed to be executed and performed in the County of St. Charles, Missouri. Any legal action arising out of, or relating to this agreement, shall be governed by the laws of the State of Missouri, and the parties agree to the exclusive jurisdiction and venue over them by a court of competent jurisdiction located in the County of St. Charles, Missouri, or the U.S. District Court for the Eastern District of Missouri. The Contractor shall at all times observe and comply with all Federal and State laws, all local laws, ordinances, and regulations existing at the time of or enacted subsequent to the execution of the Contract which, if in any manner, affect the Work.

7.01.2 The Contractor and his surety shall indemnity and save harmless the City and all of its representatives, engineers, consultants, and employees against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself, his employees, or his subcontractors.

7.01.3 Changes may be made to this contract as a result of any ordinance, law and/or directive issued by the City and/or the State of Missouri and/or the Federal Government. Should such a change occur the Contract shall be amended reflecting such change and signed by both parties acknowledging the change(s).

7.02 Successors and Assigns

The City and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract without the prior written consent of the other, nor shall the Contractor assign any sums due or to become due to him hereunder, without the prior written consent of the City.

7.03 Notices

Any notice to any party pursuant to or in relation to the Contract shall be in writing and shall be deemed to have been duly given when delivered in person to the individual or member of the firm or to an officer of the corporation for whom it was intended, or when deposited in the United States mail, registered or certified with postage prepaid addressed to the last business address known to the party giving the notice.

7.04 Rights and Remedies

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

7.05 Royalties and Patents

The Contractor shall pay all royalties and license fees payable on all designs, processes or products used in connection with the work or incorporated therein, unless otherwise agreed upon by the City. The Contractor shall defend all suits or claims for infringement of any patent rights and shall indemnify and hold the City harmless from and against any loss on account thereof.

SECTION 8 TIME

8.01 **Progress and Completion**

8.01.1 All time limits stated in the Contract Documents are of the essence of the Contract.

8.01.2 The Contractor shall begin the Work on the date of commencement provided in the Notice to Proceed.

8.01.3 The Contractor shall carry the Work forward expeditiously with adequate forces and shall make the Project Available for Use (Substantially Complete) within the allotted number of Days as provided for in the Contract Documents and in accordance with the construction schedule.

8.01.4 The Contractor shall complete Final Acceptance within 90 days of the Project being deemed Available for Use (Substantially Complete). Delay of Final Closeout can result in liquidated damages.

8.02 Hours of Work

The Contractor shall not perform any work nor move any equipment except between 7:00 A.M. and 6:00 P.M. Monday through Friday without the written consent of the City. No work shall be done on Saturday, Sunday, or City holidays, unless approved by the City in advance.

Unauthorized Work done outside of the working hours stated above is subject to rejection and removal and replacement at the Contractor's expense.

8.03 Overtime

If overtime work is authorized, as per Section 8.02, and the Contractor fails to appear as scheduled, the City shall deduct the cost for the City's assigned personnel from the Contract Sum for the time period schedule.

8.04 City Holidays

No Work by the Contractor or Subcontractors shall be performed on City Holidays. Only Work considered "emergency work" shall be allowed, and shall be approved in advance by the Director. The following is a list of City Holidays:

New Year's Day, Martin Luther King Day, Presidents Day, Good Friday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Friday after Thanksgiving, Christmas Eve, Christmas Day.

8.05 Delays, Extensions of Time

8.05.1 Should the Contractor be delayed at any time during the execution of the Work by changes in the scope of work, or by strikes, lockouts, fire, unusual transportation delays, unavoidable casualties, or other delay beyond the control of and not reasonably foreseeable by the Contractor and such delay is approved by the City, the time for completion shall be extended for a period commensurate with the period of the delay by Change Order.

8.05.2 In such event, the Contractor shall submit a written request for a time extension within seven (7) calendar days of the occurrence of the event causing the delay.

8.05.3 Inclement weather shall not be considered a valid reason for extension of time, unless abnormal for the season and place of work. The Contractor shall make proper allowance for inclement weather in the bid submitted.

8.05.4 In case of continuing delay, a single request for time extension by the Contractor shall be sufficient.

8.06 Liquidated Damages

Time is of the essence with this Project and delay in the project becoming Available for Use and/or in Final Acceptance will inconvenience the public and increase administrative costs of the City, the costs of which are inherently difficult to quantify and which the City is incapable of ascertaining at this time. Should the Contractor, or in the case of Contractor's default, the surety, fail to complete the Work and/or receive Final Acceptance within the times stipulated in this Contract, or within such extensions of time as may be allowed by the City in the manner set forth in the Contract, the Contractor (or surety, as applicable) shall pay to the City liquidated damages, as chargeable per the Contract, not as a penalty, but rather as a reasonable measure of the damages, based on the City's experience and given the nature of the losses that may result from delay.

8.07 Suspension of Work:

The Engineer may suspend the work or any portion thereof by written notice to the contractor, which notice shall fix the date on which work shall be resumed. The Contractor will resume that work on the date so fixed. The Contractor will be allowed an extension of the contract time, directly attributable to any suspension.

SECTION 9 MEASUREMENT OF QUANTITIES, PAYMENTS, AND COMPLETION

9.01 Measurement of Quantities

9.01.1 Unless otherwise directed within the Job Specific Provisions, Technical Specifications and/or Methods of Measurement and Payment, the quantities for which payment will be made shall be those shown in the Contract for the various items, provided the project is constructed as shown on the plans. Contract quantities shall be used for final payment except when:

- **9.01.1.1** Errors are found in the original computations in excess of 5% of the contract quantities.
- **9.01.1.2** An authorized change in grade, slope or typical section is made.
- **9.01.1.3** Unauthorized deviations decrease the quantities on the plans.

9.01.2 When the above conditions are encountered, the correction or revisions will be computed and added to or deducted from the contract quantity.

9.01.3 When the plans have been altered or when disagreement exists between the Contractor and the City as to the accuracy of the plan quantities of any balance, or the entire project, either party shall have the right to request a recomputation of contract quantities within any area, by hand calculation of the average-end-area method for cubic yard quantities, and standard measurement methods for other quantities, by written notice to the other party. The written notice shall contain evidence that an error exists in the original elevation or in the original computations which will affect the final payment quantity in excess of 15%. When such final measurement is required, it will be made from the latest available ground surface and the design section.

9.01.4 By Weight. These specifications require that the Contractor must furnish the representative of the City, on the job site, with original weight certificates on a daily basis signed by a bonded weigh master for all materials supplied by the Contractor that are incorporated into this work, which payment therefore is based on weight.

9.02 Application for Payment

9.02.1 The Contractor shall submit requests for payment not more than once monthly upon substantial completion of various stages of the Work, and upon final completion of the Work.

9.02.2 The request for payment shall be submitted to the City as an itemized Application for Payment pursuant to the City-Contractor Agreement on such forms and supported by such data substantiating the Contractor's right to payment as the City may require.

9.02.3 If payments are to be made on account of materials or equipment to be incorporated into the Work and delivered and suitably stored at the site, such payments shall be conditioned upon submission by the Contractor of bills of sale, waiver of liens, or such other documents satisfactory to the City to establish the City's title to such materials or equipment or to otherwise protect the City's interest.

9.02.4 By submitting an Application for Payment, the Contractor warrants and guarantees that title to all Work, materials and equipment covered by such Application for Payment, whether incorporated into the Work or not, will pass to the City upon the receipt of such payment by the Contractor, free and clear of all liens, claims, security interests or encumbrances (hereinafter referred to as "liens").

9.03 Payment
9.03.1 If the Contractor has made Application for Payment as above, the City will make payment to the Contractor for such amount as it determines to be properly due pursuant to the Contractor's Application for Payment, or state in writing the City's reasons for withholding all or any portion of such payment within 30 days of the latter of:

- **9.03.1.1** Delivery of materials or construction services;
- 9.03.1.2 Date of Request for Payment or date Request for Payment is received; or

9.03.1.3 In those instances in which the Contractor approves the Owner's estimate for payment, the date upon which such notice of approval is duly delivered.

9.03.2 No progress payment, nor any partial or entire use or occupancy of the Work by the City, shall be evidence of the satisfactory performance of the Work, either wholly or in part, or constitute an acceptance of any Work that is defective or improper or not otherwise completed in accordance with the Contract Documents.

9.04 Prompt Payment

9.04.1 All public works contracts shall provide for prompt payment by the City to the Contractor (as well as prompt payment by the Contractor to the subcontractor and material supplier) unless contrary to any federal funding requirements, per RSMo 34.057.

9.04.2 The City shall make progress payments to the Contractor on at least a monthly basis as the work progresses, or, on a lump sum basis according to the terms of the lump sum contract.

9.04.3 If the City determines the work is not substantially completed and accepted, the City must provide written explanation of why the work is not accepted with 14 calendar days of the request for payment of retainage. If a written explanation is not provided, the City is required to release 98% of the retainage withheld within 30 days.

9.04.4 Nothing in this section shall prevent the City from withholding payment or final payment from the Contractor. Reasons for withholding payment or final payment shall include, but not be limited to, the following: liquidated damages; unsatisfactory job progress; defective construction work or material not remedied; disputed work; failure to comply with any material provision of the contract

9.05 Completion and Final Payment

9.05.1 Upon the Contractors determination that the Project is Available for Use, ready for final inspection and acceptance, and upon receipt of a final Application for Payment, the City will promptly make such inspection. Any defects arising out of said inspection will be provided to the Contractor in writing and shall be promptly remedied at no additional cost to the City. When the City finds the Work acceptable under the Contract Documents and the Director has determined the Project is Available for Use, the City will make payment to the Contractor, less the total retainage, any penalties assessed against Contract and authorized by law to be withheld by the City from its payment to the Contractor, and less any moneys which are due and payable to the City as liquidated damages.

9.05.2 Upon the Director's determination that the Project is Available for Use, the Contractor shall complete Project Closeout within 90 days. Retainage payment shall not become due until the Contractor completes the Project Closeout, including addressing any and all deficiencies as noted in the Final Inspection, and submits the following, at a minimum, to the City:

9.05.2.1 An Affidavit that all payrolls, bills for materials and equipment, and other indebtedness incurred in connection with the execution and completion of the Work for

which the City or its property might in any way be responsible, have been paid or otherwise satisfied

9.05.2.2 Consent of the surety, if applicable, to final payment

9.05.2.3 An affidavit stating the Contractor has fully complied with the provisions and requirements of the Prevailing Wage Law, Section 290.210 through 290.340 RSMo., as amended,

9.05.2.4 Other data, as required by the City, establishing payment or satisfaction of all such obligations, such as receipts and releases arising out of the Contract, to the extent and in such form as may be designated by the City

9.05.2.5 Maintenance Bond.

9.05.3 If any Subcontractor refuses to furnish a release or waiver required by the City, the Contractor may furnish a bond or other agreement satisfactory to the Director indemnifying the City against any liability relating to such Subcontractor. If any such claimed liability remains unsatisfied after all payments are made, the Contractor shall refund to the City all moneys that the City incurs or may be compelled to pay in discharging such claimed liability, including all costs and reasonable attorneys' fees.

9.05.4 The acceptance of final payment shall constitute a waiver of all claims by the Contractor, except those previously made in writing and still unsettled.

SECTION 10 PROTECTION OF PERSONS AND PROPERTY

10.01 Safety Precautions and Programs

Public safety is of the utmost importance and is the sole responsibility of the Contractor to provide, erect, and maintain adequate protection throughout the project to protect the public. The Contractor shall initiate, maintain and supervise safety precautions and programs in connection with the performance of the Work.

10.02 Safety of Persons and Property

10.02.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

10.02.1.1 The general public;

10.02.1.2 All employees on the Work and all other persons who may be affected thereby;

10.02.1.3 All the Work, all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his Subcontractors or Sub-subcontractors; and

10.02.1.4 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, sprinkler systems, structures and utilities not designated for removal, relocation or replacement in the course of construction.

10.02.1.5 All survey monuments and property markers which shall be carefully preserved in place by the Contractor who shall be responsible for the correct replacement of all such monuments and markers disturbed during the work.

10.02.1.6 Any and all channels, swales, pipes, culverts, and all drainage structures in the project area; the Contractor shall provide for normal drainage and shall continuously maintain channels, swales, pipes, culverts, and all drainage structures in the project area. The Contractor is responsible for any damage caused by his failure to provide and maintain normal drainage.

10.02.2 The Contractor shall comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority having jurisdiction over the safety of persons or property to protect them from damage, injury or loss. The Contractor shall erect and maintain all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying the City and users of adjacent utilities. The Contractor shall provide signs, barrels, or any other safety devices which the City deems necessary for public safety. No additional payment will be made and this work shall be considered incidental to the Contract. The City will place safety devices as it deems necessary if the Contractor fails to provide the required items within 24 hours of notification. The Contract Sum shall be reduced by the cost of these devices.

10.02.3 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

10.02.4 All damage or loss to any property caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by anyone for whose acts they may be liable, shall be remedied by the Contractor. The City shall document any complaint by any person regarding damage or loss to property caused by Contractor by requesting such complainant to complete a Damage Claim form. A copy of the Damage Claim form shall be

submitted by the City to the Contractor and the Contractor shall correct the problem, repair such damage or otherwise compensate the complainant or file a claim for such damage with Contractor's insurance company within ten (10) days of the receipt of the Damage Claim form from the City. If the City shall have a legitimate basis for believing that such claim is valid, the City shall have the option to withhold payment of funds until (i) such damages are repaired; or (ii) the City has been provided with evidence that that Contractor has made restitution to the complainant.

10.02.5 The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated in writing by the Contractor to the City.

10.02.6 All traffic control devices shall conform to the "Manual on Uniform Traffic Control Devices" for Streets and Highways", Current Edition. At all times until final acceptance of the Work, the Contractor shall provide and maintain at his own expense such signs, lights, watchmen, fences, and barriers as may be necessary to properly protect the work and provide for safe and convenient public travel. The Contractor shall provide the Owner with the name and telephone numbers of an individual who shall be on 24-hour call for erection and maintenance of the protection devices. The cost of any erection or maintenance of the warning or protection devices by City Forces may be filed against the Contractor's monthly or final statement without any notice to the Contractor. The Director shall, in all cases, determine questions which may arise relative to additional traffic control devices. No payment, as such, will be made because of these requirements; but the cost thereof will be considered as fully covered by the prices paid for other items of work. Failure to properly provide traffic control devices in accordance with this section, the City will issue one written warning and a 24-hour grace period for the Contractor to obtain the necessary traffic control devices. The second infraction, the City will place traffic control devices at a cost of thirty-five dollars (\$35) per day per traffic control device. The cost of the traffic control devices will be deducted from the Contractor's monthly invoice.

SECTION 11 INSURANCE

11.01 Contractor's Liability Insurance

11.01.1 The Contractor shall purchase and maintain such insurance required in the Contract Documents to protect him from claims which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

11.01.2 The insurance shall be written for not less than any limits of liability specified in the Contract Documents, or required by law, whichever is greater, and shall include contractual liability insurance as applicable to the Contractor's obligations for indemnification and reimbursement of attorneys' fees and costs under the Contract Documents.

11.01.3 Certificate(s) of Insurance acceptable to the City shall be filed with the City prior to commencement of the Work. Certificate(s) of Insurance must state: "The City of Wentzville, Missouri is additional insured on a primary and non-contributory basis related to the General and Automobile Liability policies, and all insurers have waived their rights to subrogation." These Certificates shall contain a provision that coverages afforded under the policies will not be canceled until at least 30 days prior written notice has been given to the City.

11.01.4 Any certificate or other evidence of insurance, submitted to the City, shall be in a form acceptable to the City. In the case of policies written by companies organized in a state other than Missouri, the certificate of insurance, or other evidence submitted, shall be countersigned by a Missouri resident agent of such company.

Insurance Type	Amount
Workers Compensation	An amount and type in full compliance with statutory requirements of Federal and State of Missouri law and Employees Liability coverage.
Comprehensive General Liability	\$1,000,000 each occurrence \$2,804,000 aggregate
Commercial Auto Liability	\$1,000,000 per occurrence

11.02 Property (Builder's Risk) Insurance

11.02.1 Unless otherwise provided, the Contractor shall purchase and maintain property insurance (Builder's Risk Insurance) upon the entire Work at the site to the full insurable value thereof. This insurance shall include the interests of the City, the Contractor, Subcontractors and Subsubcontractors in the Work and shall insure against the perils of Fire, Extended Coverage, Vandalism and Malicious Mischief.

11.02.2 The Contractor shall purchase and maintain such steam boiler and machinery insurance as may be required by the Contract Documents or by law. This insurance shall include the interests of the City, the Contractor, Subcontractors and Sub-subcontractors in the Work.

11.02.3 Certificate(s) of Insurance acceptable to the City shall be filed with the City prior to commencement of the Work. Certificate(s) of Insurance must state on the Certificate: "The City of Wentzville, Missouri is an additional insured on a primary and non-contributory basis related to the General and Automobile Liability policies, and all insurers have waived their rights to subrogation."

These Certificates shall contain a provision that coverages afforded under the policies will not be canceled until at least 30 days prior written notice has been given to the City.

11.02.4 Any loss insured by property insurance maintained by the City shall be adjusted with the City and made payable to the City as trustee for the insured, as their interests may appear, subject to the requirements of any applicable mortgagee clause.

11.02.5 The City and Contractor waive all rights against each other for damages caused by fire or other perils to the extent covered by insurance provided under this Paragraph 11.02 and the Contract Documents, City-Contractor Agreement, except such rights as they may have to the proceeds of such insurance held by the City as trustee. The Contractor shall require similar waivers by Subcontractors and Sub-subcontractors in accordance with Section 5.02 hereof.

SECTION 12 BOND REQUIREMENTS

12.01 Bid Bond

If the total project bid exceeds \$50,000 a Bid Bond shall be included in the Bid Proposal and shall be to five percent (5%) of the bid value. The Bid Bond will be required for the total project bid.

12.02 Performance Bond:

If the Contract Sum is in excess of \$50,000 the Contractor shall procure and maintain a performance bond (the "Bond") for the benefit of the City of Wentzville ("City") as required by the laws of the State of Missouri and in an amount not less than 100% percent of the aggregate amount of the Contract. The Bond shall serve as security for the faithful performance of this Contract.

12.03 Payment Bond

If the Contract Sum is in excess of \$50,000, the Contractor shall procure and maintain a payment bond (the "Bond") as required by the laws of the State of Missouri and in an amount not less than 100% percent of the aggregate amount of the Contract. The Bond shall serve to ensure the payment of all persons performing labor and furnishing materials in connection with this Contract. The Payment Bond shall meet all requirements of Section 107.170 RSMo.

12.04 Maintenance Bond:

The Contractor shall procure and maintain a Maintenance Bond in the amount of 10% of the final Contract Sum after any and all Change Orders and/or formal contract amendments. The Maintenance Bond shall be in full force for a one (1) year guarantee period from the date of final acceptance. Final payment will not be made until the City receives the Maintenance Bond. The Bond shall serve to ensure required maintenance of the Project will be provided throughout the maintenance period.

12.05 Bond Premiums

The premiums on all the Bonds shall be paid by the Contractor. The Bond shall remain in full force and effect during the life of the Contract (Performance and Payment) and during the term of any warranty (Maintenance) as required by the specifications and shall be held by the City.

12.06 Additional Requirements and Compliance

12.06.1 The Contractor represents, warrants, and guarantees, and Contractor shall also furnish to City a certificate of authority or some other evidence as deemed appropriate by the City establishing that the Bond is from a surety that is: authorized to do business in the State of Missouri, authorized to become surety on the bonds or obligations of persons or corporations, solvent with paid-up capital of not less than the applicable amount provided by the laws of Missouri, and, if organized outside the State of Missouri, in compliance with all the provisions of Missouri law relating to insurance companies other than life insurance companies. If, at any time, City shall become dissatisfied with any surety or sureties, or if for any other reason the Bond shall cease to be adequate security for City, Contractor shall, within ten days after notice from the City, substitute an acceptable bond (the "Additional Bond") in form and sum and signed by other sureties as may be satisfactory to City. The premiums on the Additional Bond shall be paid by contractor. All requirements herein applicable to the bond shall also be applicable to the Additional Bond. No further partial payments to Contractor shall be deemed due, nor shall be made until the sureties on the Additional Bond shall have qualified.

12.06.2 Contractor shall furnish to City such Bond together with insurance or other documents required by the Contract. The current power of attorney for the persons who sign for any surety

company shall be attached to the Bond. The power of attorney shall be sealed and certified with the manual signature of an officer of the surety. A facsimile signature will not be accepted.

12.06.3 The failure of the Contractor to supply the required Bond along with the evidence of the required insurance coverage and other documents required by the Contractor within ten days after the executed acceptance is received by the Contractor, or within such extended period as may be granted by the City, the City may grant, based upon reasons determined sufficient by the City, shall constitute a default and the City may either award the contract to the next responsive bidder or readvertise for bids, and may charge against the Contractor the difference between the amount of his/her bid and the amount for which a contract for the work is subsequently executed. If a more-favorable bid is received by re-advertising, the defaulting Contractor shall have no claim against City for a refund. Because of the difficulty of ascertaining the damages caused to City, said sum shall be considered liquidated damages and shall not constitute a penalty.

12.06.4 The Contractor shall supply the following documents to verify the authenticity of the bonds and bonding company:

12.06.4.1 Provide a certificate of authority from the Secretary of State of Missouri concerning the authority of the bonding company.

12.06.4.2 Provide proof that the bonding company has an "A" rating from BEST'S or Standard and Poor's.

12.06.4.3 Provide written verification from the bonding company that the bond exists and that it is an obligation of the contractor.

SECTION 13 CHANGES IN WORK

13.01 Change Orders

13.01.1 The City, without invalidating the Contract, may order Changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, with the Contract Sum and the Construction Schedule being adjusted in accordance with the City-Contractor Agreement. All such changes in the Work shall be authorized by Change Order, and shall be executed under the applicable conditions of the Contract Documents.

13.01.2 The Contract Sum and the Contract Time may be changed only by Change Order. The Contractor shall make all requests for a Change Order on forms provided by the City upon written request to the City.

13.01.3 The cost or credit to the City resulting from a Change in the Work shall be determined in accordance with the City-Contractor Agreement.

13.01.4 Changes in the Work outside of the general scope of the Contract shall require an amendment to the Contract.

13.02 Claims for Additional Cost

If the Contractor wishes to make a claim for an increase in the Contract Sum, he shall give the City written notice thereof within twenty (20) days after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor and approval granted by the City before proceeding to execute the Work. No such claim shall be valid unless so made. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.

13.03 Minor Changes in the Work

The City shall have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or the Construction Schedule and not inconsistent with the intent of the Contract Documents. Such changes may be effected by Field Order or by other written order. Such changes shall be binding on the City and the Contractor.

13.04 Changes in Excavation Work

During construction, it may become necessary to increase the amount of excavation or to utilize a soil stabilization process if unsuitable subgrade conditions are found. The Contractor shall immediately contact the City if this condition occurs. The City and the Contractor shall agree upon the existence of unsuitable subgrade, the depth in which to remove the unsuitable soil, and the extent of the problem area prior to any additional work. No payment will be made for any area which undergoes additional excavation which is not indicated in the above scope of work and has not been approved by the City prior to the excavation. If provided in the Contract Documents, all additional excavation which becomes necessary shall be paid at the unit bid price for such work. The City reserves the right to contract with a separate contractor for the use of a soil stabilization process. No direct payment will be made for delays incurred due to this process and the Contractor's only compensation will be the allotment of additional days for the delay. The number of days shall be from the time the Contractor initially notifies the City of an unsuitable subgrade condition and until two days after the completion of the soil stabilization process.

13.05 Overhead and Profit from Changes in the Work

The combined overhead and profit included in the total cost to the Owner for a change in the Work shall be based on the following schedule:

13.05.1 For the Contractor, for Work performed by the Contractor's own forces, ten (10) percent of the cost.

13.05.2 For the Contractor, for Work performed by the Contractor's Subcontractors, five (5) percent of the amount due the Subcontractors.

13.05.3 For the Subcontractor involved, for Work performed by that Subcontractors own forces, ten (10) percent of the cost.

13.05.4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractors, five (5) percent of the amount due the Sub-subcontractor.

13.05.5 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by an complete itemization of costs including labor, materials and Subcontracts. Where major cost items are Subcontracts, they shall be itemized also.

13.06 Altered Quantities

13.06.1 The City reserves the right to make changes in plan details which may vary the accepted quantities from those shown on the Bid Line Items.

13.06.2 The Contractor shall accept, as payment in full, payment at the original Contract unit prices bid for the accepted quantities of work done. No allowance will be made for any increase expense or loss of expected profit suffered by the Contractor resulting directly from such altered quantities or indirectly from expense derived by handling small quantities of materials or performing operations within restricted areas. No allowance shall be made for any increased expense or loss of expected profit suffered because of the anticipated use of specific equipment which was not used.

SECTION 14 UNCOVERING AND CORRECTION OF WORK

14.01 Uncovering of Work

14.01.1 If any Work should be covered contrary to the request of the City, it must, if required by the City, be uncovered for his observation and replaced, at the Contractor's expense.

14.01.2 If any Work has been covered which the City has not specifically requested to observe prior to being covered, the City may request to see such Work and it shall be uncovered by the Contractor. If such Work is found to be in accordance with the Contract Documents, the Cost of uncovering and replacement shall, by appropriate Change Order, be charged to the City. If such Work be found not in accordance with the Contract Documents, the Costs of uncovering and replacement.

14.02 Correction of Work

14.02.1 The Contractor shall promptly correct all Work rejected by the City as defective or as failing to conform to the Contract Documents, whether observed before or after substantial completion of the Work, and whether or not fabricated, installed or completed. The Contractor shall bear all cost of correcting such rejected Work.

14.02.2 If, within one year after the date of substantial completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any of the Work is found by the City to be defective or not in accordance with the Contract Documents, the Contractor shall correct it within 5 days after receipt of a written notice from the City. If the Contractor does not correct such deficiencies within that time, the City shall be entitled to specific performance from a court of equity or money damages in the amount of the reasonable cost of repairs, if adequate, provide that nothing shall limit the City's ability to draw upon the Performance and Maintenance Bond to correct such deficiencies. In all situations in which the City is forced to enforce the terms or specifications of the contract documents, the City shall be entitled to its reasonable attorneys' fees for enforcement of any provision of the contract documents.

14.02.3 All such defective or non-conforming Work under Subparagraphs 14.2.1 and 14.2.2 shall be removed from the site if necessary, and the Work shall be corrected to comply with the Contract Documents without additional cost to the City.

14.02.4 The Contractor shall bear the cost of making good all work of separate contractors destroyed or damaged by such removal or correction.

14.02.5 In the alternative to Section 14.02.3, if the Contractor fails to correct such defective or nonconforming Work, the City may correct it in accordance with Section 3.03 hereof.

14.03 Acceptance of Defective or Non-Conforming Work

14.03.1 If the City prefers to accept defective or non-conforming Work, it may do so instead of requiring removal and correction, in which case a Change Order will be issued to reflect an appropriate reduction in the Contract sum, or if the amount is determined after final payment, it shall be paid by the Contractor.

SECTION 15 PURCHASE OF MATERIALS AND EQUIPMENT

15.01 Sales Tax Provisions

This project is exempt from all sales taxes for construction materials and supplies used directly in fulfilling contract requirements. Sales tax shall not be included in the unit costs for this project. The Contractor shall follow the regulation as outlined in RSMo 144.062.1.

The City will issue the Contractor a project exempt certificate which is to be given to the applicable suppliers and used only for the specific project identified and will expire on the date indicated unless renewed by the City.

15.01.1 Contractor shall:

15.01.1.1 Order all necessary materials and equipment to complete the Work and the Project in accordance with the Plans and Specifications.

15.01.1.2 Inspect all delivered materials for conformance to specifications, damage, or breakage and subsequently accept materials if found to be satisfactory.

15.01.1.2.1 Purchase of materials on behalf of the City shall not relieve the Contractor of obligations to order, schedule deliveries, inspect, accept, or reject, store, handle or install materials or perform any other duties required by the Contract Documents or customarily performed in conjunction with providing materials to complete the Work.

15.01.1.2.2 Costs of complying with the foregoing Special Sales Tax Provisions shall be included in the Bid Proposal submitted and the Contractor shall not be entitled to receive additional compensation for such compliance.

15.02 Use of American Made Products.

Any manufactured goods or commodities used or supplied in the performance of the Contract Documents or any subcontract thereto shall be manufactured or produced in the United States as required and in accordance with Section 34.353 RSMo.

15.02.1 This section shall not apply when:

15.02.1.1 The purchase, lease, or contract involves an expenditure of less than twenty-five thousand dollars;

15.02.1.2 Only one line of a particular good or product is manufactured or produced in the United States;

15.02.1.3 The specified products are not manufactured or produced in the United States in sufficient quantities to meet the City's requirements or cannot be manufactured or produced in the United States within the necessary time in sufficient quantities to meet the City's requirements;

15.02.1.4 Obtaining the specified products manufactured or produced in the United States would increase the cost of the contract by more than ten percent.

15.02.2 If the goods or commodities are not exempt due to a circumstance described in Section 15.02.1, then the Contractor shall provide the City with the information necessary to make the certifications required under Section 34.353 RSMo.

15.03 Missouri Products

Contractors are encouraged to purchase commodities and tangible property manufactured, produced, or grown within the local area and in the State of Missouri, and from all firms, corporations, or individuals with licensed businesses in the State of Missouri.

SECTION 16 SPECIAL PROVISIONS

16.01 Scheduling of Work and Interference with Traffic

16.01.1 The Contractor's work must be scheduled and accomplished in stages such that local traffic is maintained during construction. It shall be the Contractor's responsibility to provide a traffic way that is usable in all weather conditions. The Contractor shall construct and maintain in a safe condition temporary pavements and connections for local traffic.

16.01.2 Suitable temporary barriers shall be provided to protect traffic from the Work if necessary. At all times until final acceptance of the Work, the Contractor shall provide and maintain such signs, lights, barriers, cones, watchmen or flaggers as may be necessary to properly protect the Work and provide for safe and convenient public travel. In the case of open excavations or other potentially hazardous conditions existing during non-working periods, the traveling public will be protected and advised by signs and flasher barricades. Parking of equipment or storage of materials on or near the Project site will be permitted only if adequate protective devices are provided and then only for the minimum time required for any specific job.

16.01.3 No additional payment shall be made for temporary guardrail, barriers, signs, lights, or other work as may be necessary to maintain traffic and to protect the Work and the public and all labor, equipment and material necessary to accomplish this task shall be considered incidental.

16.02 Access

16.02.1 Areas of intersections and roadways within the construction limits shall be constructed in phases so that at no time will access be denied.

16.02.2 Access to private driveways may be limited by the nature of the Work. The Contractor shall schedule his work such that at no time during the life of this Contract will any driveway be denied access for any reason other than the curing of concrete. All concrete, including curbs, sidewalks and driveway pavements, shall be formed and poured within a two calendar day period for each and every driveway. Excavation for this work shall be accomplished a maximum of one calendar day prior to forming, however, access shall be provided immediately after excavation. At the end of the curing period, access shall be immediately supplied using asphalt or compacted aggregate.

16.02.3 All temporary materials used for access will be the responsibility of the Contractor and shall be included in his unit bid price for each related item. No separate payment will be made for the placement, maintenance or removal of said access.

16.02.4 If said access is not supplied as set out above, the City will supply said access with its own forces, without notification to the Contractor, and will deduct such costs from the sums due the Contractor, notwithstanding any other provisions given this Contract. Wherever excavation affects pedestrian access to houses or public buildings, plank or other suitable bridges shall be placed at convenient intervals.

16.03 Construction Staking and Layout

The Contractor shall be responsible for providing all labor, equipment and materials necessary for construction staking and layout as required, to the grades, elevations and alignment as determined by the City. No separate payment will be made for construction staking and layout. The Contractor shall make his bid accordingly. No payment shall be made for restaking except as expressly authorized due to changes made by the City during construction.

16.04 **Pre-Construction Conference**

A preconstruction conference may be held prior to the issuance of a notice to proceed with the Work. This meeting will be attended by the Contractor, the City, and representatives of the various utility companies that have facilities in the project area. The meeting date will be established after the taking of bids and at a time convenient to all parties.

16.05 Sequence of Work

16.05.1 A schedule of the Contractor's work shall be submitted to the City for approval. It shall contain a listing of the order in which the Contract items will be constructed and the approximate dates for starting and finishing each Contract item.

16.05.2 The Contractor shall furnish the City his proposed sequence and schedule for the completion of all work for its review and approval prior to the time of the preconstruction conference. The City shall have the right to specify the order of construction as deemed necessary.

16.05.3 The Contractor shall update and provide the City the revised schedule as necessary.

16.06 Control of Materials

16.06.1 The Contractor shall collect all materials tickets to verify the quantity of each item. Material tickets shall be collected and provided to the City in their original form. Photocopy or fax copies will not be accepted. All tickets shall be submitted on the day of delivery, either to the City personnel or the Public Works Department, or they shall not be accepted for payment.

16.06.2 Contractors and subcontractors shall produce letters of certification or certified test reports from materials producers and suppliers in order to determine compliance with specifications for designated materials prior to the incorporation thereof into the work.

16.06.3 The City will determine which materials are to be tested. The form and content of these test reports shall be in accordance with recognized standards and practices for this work or as otherwise determined by the City.

16.07 Termination by the Owner for Cause

16.07.1 In addition to all other remedies available to the Owner, the Owner may terminate the Contract if the Contractor:

16.07.1.1 Refuses or fails to supply enough properly skilled workers or proper materials;

16.07.1.2 Fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

16.07.1.3 Disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

16.07.1.4 Otherwise is guilty of substantial breach of a provision of the Contract Documents.

16.07.2 When any of the above reasons exists, the Owner may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior right of the surety:

16.07.2.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

16.07.2.2 Accept assignment of subcontracts; and

16.07.2.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

16.07.3 When the Owner terminates the Contract for cause, the Contractor shall not be entitled to receive further payment until the Work is finished.

16.07.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for professional services (including architects and engineers) and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the project architect, upon application, and this obligation for payment shall survive termination of the Contract.

16.08 Termination by the Owner for Convenience

16.08.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

16.08.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall:

16.08.2.1 Cease operations as directed by the Owner in the notice;

16.08.2.2 Take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

16.08.2.3 Except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

16.08.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and actual costs incurred by reason of such termination.

SUMMARY OF QUANTITIES				
SPECIFICATION	ITEM NUMBER	ITEM DESCRIPTION	UNIT	TOTAL QUANTITY
MoDOT	2013000	CLEARING AND GRUBBING	ACRE	32
MoDOT	2022010	REMOVAL OF IMPROVEMENTS	L.S.	1
MoDOT, JSP	2031000	CLASS A EXCAVATION	CU.YD.	112,924
MoDOT, JSP	2035500	EMBANKMENT IN PLACE	CU.YD.	83,306
MoDOT	2036000	COMPACTING EMBANKMENT	CU.YD.	90,886
MoDOT	2042010	SETTLEMENT GAUGE	EA.	6
MoDOT	2043010	PORE PRESSURE MEASURING DEVICE	EA.	3
MoDOT, JSP	2051010	MODIFIED SUBGRADE	SQ. YD.	22,287
MoDOT	2063000	CLASS 3 EXCAVATION	CU.YD.	1,668
MoDOT	2063300	CLASS 4 EXCAVATION	CU.YD.	108
MoDOT	3030600	FURNISHING ROCK BASE MATERIAL	SQ.YD.	5,812
MoDOT	3030610A	PLACING ROCK BASE	SQ.YD.	5,812
MoDOT	3040163	TYPE 1 AGGREGATE FOR BASE (6 IN. THICK)	SQ.YD.	1,962
MoDOT	3040183	TYPE 1 AGGREGATE FOR BASE (8 IN. THICK)	SQ.YD.	357
MoDOT	3040504	TYPE 5 AGGREGATE FOR BASE (4 IN. THICK)	SQ.YD.	15,310
MoDOT	3040506	TYPE 5 AGGREGATE FOR BASE (6 IN. THICK)	SQ.YD.	1,104
MoDOT	3105003	GRAVEL (A) OR CRUSHED STONE (B)	SQ.YD.	113
MoDOT	4011207	BITUMINOUS PAVEMENT MIXTURE PG70-22, (BP-1)	TONS	648.7
MoDOT	4013010	BITUMINOUS PAVEMENT MIXTURE PG64-22, (BASE WIDENING)	TONS	1,486.4
MoDOT	4071005	TACK COAT	GAL.	643
MoDOT, JSP	5021308	CONCRETE PAVEMENT (8 IN. NON-REINFORCED, 15 FT. JOINTS)	SQ.YD.	10,448.7
MoDOT, JSP	5021309	CONCRETE PAVEMENT (9 IN. NON-REINFORCED, 15 FT. JOINTS)	SQ.YD.	1,896.7
MoDOT, JSP	5021332	CONCRETE PAVEMENT (8 1/2 IN. NON-REINFORCED, 15 FT. JOINTS)	SQ.YD.	1,692.5
MoDOT, JSP	5021340	TYPE A2 SHOULDER	SQ.YD.	2,092.7
MoDOT	6061060	MGS GUARDRAIL	L.F.	763
MoDOT	6061061	MGS GUARDRAIL, 8 FT. POSTS, 6 FT, - 3 IN. SPACING	L.F.	175
MoDOT	6061070	MGS VERTICAL CONCRETE BARRIER TRANSITION	EA.	1
MoDOT	6063014	TYPE A CRASHWORTHY END TERMINAL (MASH)	EA.	3
MoDOT	6071102	MODIFIED CONCRETE GUTTER TYPE B	L.F.	312
MoDOT, JSP	6079902 (1)	FENCE END POST	EA.	4
MoDOT, JSP	6079903(1)	BLACK CHAIN-LINK FENCE (RETAINING WALLS)	L.F.	224
MoDOT, JSP	6079903(2)	TEMPORARY FENCE	L.F.	64
MoDOT, JSP	6081010	CONCRETE CURB RAMP	SQ. YD.	105.3
MoDOT	6081012	TRUNCATED DOMES	SQ. FT.	123
MoDOT, JSP	6083006	6 IN. CONCRETE MEDIAN STRIP	SQ. YD.	22.4
MoDOT, JSP	6085007	PAVED APPROACH, 7 IN.	SQ. YD.	65.0
MoDOT, JSP	6086004	CONCRETE SIDEWALK, 4 IN.	SQ. YD.	751.9
MoDOT, JSP	6099903(1)	MOUNTABLE CURB AND GUTTER TYPE O	L.F.	250
MoDOT, JSP	6099903(2)	INTEGRAL MOUNTABLE CURB AND GUTTER TYPE O	L.F.	1,820
MoDOT, JSP	6099903(3)	MODIFIED CURB TYPE O	L.F.	160
MoDOT, JSP	6099903(4)	INTEGRAL ROLLED CURB	L.F.	124
MoDOT, JSP	6099903(5)	VALLEY GUTTER	L.F.	163

MoDOT	6096020	FURNISHING TYPE 2 ROCK DITCH LINER	CU.YD.	5
MoDOT	6096042	PLACING TYPE 2 ROCK DITCH LINER	CU.YD.	5
MoDOT	6097000	ROCK LINING	CU.YD.	46
MoDOT	6122019	IMPACT ATTENUATOR (19 SAND BARRELS)	EA.	1
MoDOT	6122020	REPLACEMENT SAND BARREL	EA.	10
MoDOT	6143010	MANHOLE FRAME AND COVER, TYPE 1-A	EA.	1
MoDOT	6141022	GRATE AND BEARING PLATE (3FT. X 3 FT. OR 914 MM X 914 MM)	EA.	3
MoDOT	6141024	GRATE AND BEARING PLATE (5FT. X 3 FT. OR 1524 MM X 914 MM)	EA.	1
MoDOT	6141121	CURVED VANE GRATE AND FRAME (4 FT. X 2 FT. OR 1200 MM X 600 MM)	EA.	3
COW, JSP	6143014	MANHOLE FRAME AND COVER, TYPE 4	EA.	1
MoDOT	6161005	CONSTRUCTION SIGNS	SQ. FT.	1,642
MoDOT	6161008	ADVANCED WARNING RAIL SYSTEM	EA.	8
MoDOT	6161009	FLAG ASSEMBLY	EA.	4
MoDOT	6161025	CHANNELIZER (TRIM LINE)	EA.	150
MoDOT	6161030	TYPE III MOVEABLE BARRICADE	EA.	14
MoDOT	6161040	FLASHING ARROW PANEL	EA.	1
MoDOT, JSP	6169902(1)	CHANNELIZER (TRIM LINE), CONTRACTOR FURNISHED / CITY RETAINED	EA.	20
MoDOT, JSP	6169902(2)	TYPE III MOVEABLE BARRICADE, CONTRACTOR FURNISHED / CITY RETAINED	EA.	18
MoDOT	6173100	CONCRETE TRAFFIC BARRIER, TYPE D	L.F.	312
MoDOT	6173600D	TEMPORARY TRAFFIC BARRIER, CONTRACTOR FURNISHED / RETAINED	L.F.	1,300
MoDOT	6173700B	TEMPORARY TRAFFIC BARRIER ANCHORED, CONTRACTOR FURNISHED / RETAINED	L.F.	2,875
MoDOT	6173706	TEMPORARY TRAFFIC BARRIER STIFFNESS TRANSITION SECTION, CONTRACTOR FURNISHED / RETAINED	L.F.	300
MoDOT	6181000	MOBILIZATION	L.S.	1
MoDOT, JSP	6189902	ADDITIONAL MOBILIZATION FOR SEEDING	EA.	4
MoDOT	6191000	PAVEMENT EDGE TREATMENT	L.F.	1,217
MoDOT	6200007	COLD APPLIED TAPE PAVEMENT MARKING, 6 IN. WHITE	L.F.	118
MoDOT	6200013	COLD APPLIED TAPE PAVEMENT MARKING, 24 IN. WHITE	L.F.	63
MoDOT	6200019	COLD APPLIED TAPE PAVEMENT MARKING, LEFT / RIGHT ARROW	EA.	4
MoDOT	6205301B	TEMPORARY REMOVABLE MARKING TAPE 4 IN., WHITE	L.F.	6,107
MoDOT	6205303B	TEMPORARY REMOVABLE MARKING TAPE 4 IN., YELLOW	L.F.	3,772
MoDOT	6205902A	6 IN. WHITE HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT, TYPE L BEADS	L.F.	3,192
MoDOT	6205906A	12 IN. WHITE HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT, TYPE L BEADS	L.F.	626
MoDOT	6206000C	4 IN. WHITE STANDARD WATERBORNE PAVEMENT MARKING PAINT, TYPE P BEADS	L.F.	6,399
MoDOT	6206001C	4 IN. YELLOW STANDARD WATERBORNE PAVEMENT MARKING PAINT, TYPE P BEADS	L.F.	13,588
MoDOT	6206125A	24 IN. YELLOW STANDARD WATERBORNE PAVEMENT MARKING PAINT, TYPE P BEADS	L.F.	311
MoDOT	6207001	PAVEMENT MARKING REMOVAL	L.F.	4,785
MoDOT, JSP	6221001	COLDMILLING BITUMINOUS PAVEMENT FOR REMOVAL OF SURFACING (3 IN. THICK OR LESS)	SQ. YD.	3,013
MoDOT	6261000A	BITUMINOUS SHOULDER RUMBLE STRIP	STA.	0.7
MoDOT	6262000A	PORTLAND CEMENT CONCRETE SHOULDER RUMBLE STRIP	STA.	2.6
MoDOT	6274000	CONTRACTOR FURNISHED SURVEYING AND STAKING	L.S.	1
MoDOT	7034041	CLASS B-1 CONCRETE (CULVERTS)	CU.YD.	44.3
MoDOT	7061030	REINFORCING STEEL (CULVERTS)	LB.	6,500
MoDOT	7110300	CONCRETE AND MASONRY PROTECTION SYSTEM	L.S.	1
MoDOT	7110400	SACRIFICIAL GRAFFITI PROTECTION SYSTEM	L.S.	1
MoDOT, JSP	7201000	MECHANICALLY STABILIZED EARTH WALL SYSTEMS	SQ. FT.	6,177
MoDOT	7201300	PIPE PILE SPACERS	EA.	16
MoDOT, JSP	7209901	GROUND IMPROVEMENT	L.S.	1

COW, JSP	7261012	12 IN. PIPE GROUP A	L.F.	116
COW, JSP	7261015	15 IN. PIPE GROUP A	L.F.	52
MoDOT, COW, JSP	7261018	18 IN. PIPE GROUP A	L.F.	613
MoDOT, COW, JSP	7261024	24 IN. PIPE GROUP A	L.F.	836
MoDOT, COW, JSP	7261030	30 IN. PIPE GROUP A	L.F.	410
MoDOT	7261042	42 IN. PIPE GROUP A	L.F.	251
MoDOT, COW, JSP	7310048	PRECAST CONCRETE MANHOLE - 48 IN.	FT.	6
MoDOT	7311033	PRECAST CONCRETE DROP INLET 3 FT X 3 FT	FT.	13
MoDOT	7311042	PRECAST CONCRETE DROP INLET 4 FT X 2 FT	FT.	10
MoDOT	7311053	PRECAST CONCRETE DROP INLET 5 FT X 3 FT	FT.	4
MoDOT, JSP	7319902(1)	SPECIAL OVERFLOW STRUCTURE	EA.	1
COW, JSP	7319913(1)	SINGLE STREET INLET	FT.	36
COW, JSP	7320612A	12 IN. OR ALLOWED SUBSTITUTE GROUP A FLARED END SECTION	EA.	1
COW, JSP	7320615A	15 IN. OR ALLOWED SUBSTITUTE GROUP A FLARED END SECTION	EA.	1
MoDOT, COW, JSP	7320618A	18 IN. OR ALLOWED SUBSTITUTE GROUP A FLARED END SECTION	EA.	3
MoDOT, COW, JSP	7320624A	24 IN. OR ALLOWED SUBSTITUTE GROUP A FLARED END SECTION	EA.	9
MoDOT, COW, JSP	7320630A	30 IN. OR ALLOWED SUBSTITUTE GROUP A FLARED END SECTION	EA.	4
MoDOT	7320642A	42 IN. OR ALLOWED SUBSTITUTE GROUP A FLARED END SECTION	EA.	2
MoDOT	8032000A	KENTUCKY BLUEGRASS SODDING	SQ. YD.	151
MoDOT, JSP	8051000A	SEEDING - COOL SEASON MIXTURES	ACRE	29.2
MoDOT	8061005	ROCK DITCH CHECK	L.F.	2,991
MoDOT	8061007A	CURB INLET CHECK	EA.	10
MoDOT	8061016	SEDIMENT REMOVAL	CU. YD.	494
MoDOT	8061017	TEMPORARY SEEDING AND MULCHING	ACRE	7.4
MoDOT	8061019	SILT FENCE	L.F.	2,729
MoDOT	8064122	TYPE 3 EROSION CONTROL BLANKET	SQ. YD.	10,815
MoDOT	8064128	TYPE 1 TURF REINFORCEMENT MAT	SQ. YD.	170
MoDOT, JSP	8069903	FIBER ROLLS	L.F.	29,692
MoDOT, JSP	8069928	WATER POLLUTION CONTROL MANAGER	WK.	48
MoDOT	9013002	CONDUIT, 2 IN. RIGID, IN TRENCH	L.F.	80
MoDOT	9013003	CONDUIT, 3 IN. RIGID, IN TRENCH	L.F.	434
MoDOT	9013004	CONDUIT, 4 IN. RIGID, IN TRENCH	L.F.	28
MoDOT	9016110	PULL BOX, PREFORMED CLASS 1	EA.	3
MoDOT	9016111	PULL BOX, PREFORMED CLASS 2	EA.	1
MoDOT	9016112	PULL BOX, PREFORMED CLASS 3	EA.	1
MoDOT	9017110	CABLE, 10 AWG 1 CONDUCTOR, POLE AND BRACKET	L.F.	270
MoDOT	9017407	CABLE-CONDUIT, 1 IN., 2 CONDUCTORS AND 1 BARE NEUTRAL, 8 AWG	L.F.	620
MoDOT	9018245	POLE FOUNDATION (45 FT. OR 13.5 M MOUNTING HEIGHT)	EA.	3
MoDOT, JSP	9019902(1)	TENON MOUNT 45 FT. TYPE AT POLE	EA.	3
MoDOT, JSP	9019902(2)	LED-B TENON MOUNTED LUMINAIRE	EA.	3
MoDOT, JSP	9019902(3)	DUAL METER, COMBINATION PAD MOUNTED POWER SUPPLY & LIGHTING CONTROL STATION, 120/240V	EA.	1
MoDOT	9031010	CONCRETE FOOTINGS, EMBEDDED	CU. YD.	2.6
MoDOT	9031210	STRUCTURAL STEEL POSTS	LB.	1,690
MoDOT, COW, JSP	9031220	PIPE POSTS	LB.	1,670
MoDOT	9031250A	U-CHANNEL POST, 3 LB	L.F.	45
MoDOT	9031256	7 FT. CHANNEL POST DELINEATOR, WHITE	EACH	13
MoDOT	9031270A	2 IN. PSST POST - 12 GA.	L.F.	37

MoDOT	9031273	POST ANCHOR FOR 2 IN. PSST - 7 GA.	L.F.	9
MoDOT, COW, JSP	9035004A	SH - FLAT SHEET	SQ. FT.	190
MoDOT	9103801	DETECTOR POLE FOUNDATION, 30 FT. OR 9.1 M MOUNTING HEIGHT, INSTALLED	EACH	1
MoDOT	9103822	DETECTOR POLE, 30 FT. OR 9.1 M MOUNTING HEIGHT, INSTALLED	EACH	1
MoDOT	9108202	CABLE, 2 AWG, 1 CONDUCTOR, POWER	L.F.	1,480
MoDOT, JSP	9109901 (1)	ITS ASSET MANAGEMENT TOOL	L.S.	1
MoDOT, JSP	9109901 (2)	MoDOT ITS IN-GROUND FACILITY RELOCATION PER SITE	L.S.	1
MoDOT, JSP	9109902 (1)	BURIED CABLE DRIVABLE DELINEATOR POST	EACH	6
MoDOT, JSP	9109902 (2)	ITS CLASS 1 PULL BOX	EACH	1
MoDOT, JSP	9109902 (3)	ITS CLASS 2 PULL BOX	EACH	1
MoDOT, JSP	9109902 (4)	ITS CLASS 5 PULL BOX	EACH	5
MoDOT, JSP	9109902 (5)	UNDERGROUND SPLICE CLOSURE	EACH	1
MoDOT, JSP	9109902 (6)	POLE MOUNT TYPE 7 CABINET	EACH	1
MoDOT, JSP	9109902 (7)	INSTALL RADAR DETECTOR	EACH	1
MoDOT, JSP	9109902 (8)	RACK-MOUNTED INTERCONNECT CENTER	EACH	1
MoDOT, JSP	9109902 (9)	FIBER OPTIC SPLICE	EACH	34
MoDOT, JSP	9109902 (10)	FIBER OPTIC JUMPER, SM	EACH	4
MoDOT, JSP	9109902 (11)	FIBER OPTIC PIGTAIL, SM	EACH	4
MoDOT, JSP	9109902 (12)	ITS PAD MOUNTED POWER SUPPLY, 120V	EACH	1
MoDOT, JSP	9109903 (1)	FIBER OPTIC CABLE, 24 STRAND, SINGLE MODE	L.F.	400
MoDOT, JSP	9109903 (2)	FIBER OPTIC CABLE, 24 STRAND, SINGLE MODE, (REPULLED)	L.F.	2,250
MoDOT, JSP	9109903 (3)	2 IN., HDPE, IN TRENCH	L.F.	334
MoDOT, JSP	9109903 (4)	2 CONDUITS, 2 IN., HDPE, DIRECTIONAL DRILL	L.F.	330
COW, JSP	W5010207	HDPE WATER MAIN, 8 INCH	L.F.	221
COW, JSP	W5010271	HDPE PIPE FITTING	EACH	3
COW, JSP	W5010273	DUCTILE IRON PIPE FITTING	EACH	3
COW, JSP	W5010304	STEEL CASING PIPE, 12 INCH	L.F.	118
COW, JSP	W5010507	GATE VALVE, 8 INCH	EACH	2
COW, JSP	W5010522	VALVE BOX W/ TOP HAT	EACH	5
COW, JSP	W5021501	WATER MAIN CHLORINIZATION AND TESTING	L.S.	1