

REQUEST FOR PROPOSALS

FOR

CONSTRUCTION AND INSTALLATION SERVICES

Issued by the St. Louis County Port Authority

Bids Due By:

Tuesday, September 19, 2017, at 3:00 PM
St. Louis County Port Authority
c/o St. Louis Economic Development Partnership
ATTN: Dustin Allison, General Counsel
7733 Forsyth Blvd., Suite 2300
St. Louis, Missouri 63105

Introduction

The St. Louis County Port Authority (the “Authority”) was established pursuant to Chapter 68 of the Missouri Revised Statutes for the purposes of promoting the general welfare of and within the Port District, which includes all of St. Louis County, advancing the economic interests of the residents, fostering increased employment opportunities, and promoting trade and industry within St. Louis County. The St. Louis Economic Development Partnership provides staff for the Authority.

In furtherance of its statutory purposes, the Authority is in need of services to construct and install lighting for two soccer fields at the Creve Coeur Park Soccer Complex located at 13236 Streetcar Drive, Maryland Heights, Missouri 63043 (the “Project”).

The Authority issues this Request for Proposals (“RFP”) for a contractor to perform the necessary construction and installation services for the Project. To be considered, proposals must be received no later than **3:00 PM on Tuesday, September 19, 2017**, at which time all bids will be publicly opened and read. No award of contract will be made at the bid opening.

Scope of Work

Pursuant to this RFP, the “Work” shall include, and the successful bidder will provide, all project management, design, permitting, fabrication and installation of lighting, power supply, underground power distribution supply, and lighting controls for athletic fields numbered 12 and 13 at the Creve Coeur Park Soccer Complex. All Work performed for this Project shall comply with the Project Specifications (attached hereto as Exhibit A and incorporated by reference herein). Substantiation of design in construction is required for substantial completion prior to final acceptance.

St Louis County is currently under contract with a design-build contractor (the “Design-Builder”) to design and construct the Creve Coeur Park Soccer Complex, and all Work performed pursuant to this RFP shall be coordinated with the Design-Builder. Coordination with the specifications, schedule, and completion date of the Design-Builder is a condition of the Bid and a requirement for the Work on this Project. This Project will conform to the schedule of the Design-Builder to complete the project by February 8, 2018.

For reference purposes, the Design-Builder’s Site Plan and Site Design Plan are attached hereto as Exhibit D.

This RFP requires a Base Bid and one (1) Alternate to the Base Bid, with expanded scope. The award shall be to one Bidder for either the Base Bid or the Alternate to the Base Bid, whichever is deemed in the best interest of the Authority.

Bid Content

The required Scope of Work and bid content for both the Base Bid and the Alternate to the Base Bid are described below. In order to be considered for this Project, bidders must submit **both** a Base Bid and an Alternate to the Base Bid in the forms attached hereto as Exhibit C.

1. Base Bid. The Scope of Work for the Base Bid for this Project includes all work to provide lighting for athletic fields numbered 12 and 13, including: project management, design, permitting, installation of the 6 new 70 feet tall athletic field poles on a foundation extending to 3 inches above finished grade, installation of lighting and lighting controls, installation of underground conduit and conductors to provide power to each of the 6 new 70 feet tall athletic field poles on a foundation extending to 3 inches above finished grade from the existing underground conduit and from existing metered main switch gear to the new lighting for fields numbered 12 and 13, which currently powers lights for fields numbered 10 and 11, and restoration for the underground work; all per codes and Authorities Having Jurisdiction for this Project. All Work performed for this Project shall comply with the Project Specifications (Exhibit A). The Bidder shall provide a quality assurance/quality management function to affirm the requirements for the Work are satisfied.

The Bidder is to provide the Athletic Field Lighting System as manufactured by Sentry Sports Lighting, or equivalent alternative, for athletic fields numbered 12 and 13, in order to match the lighting being provided by the Design-Builder [no exceptions]. The Bidder is responsible for providing the Work under this Project to avoid negatively impacting the site development in progress, including artificial turf system installation, site grading, and utility installation.

Bidder shall not perform work until it obtains the required permits for the items of Work under this Base Bid.

A staging area for the Work shall be available in a portion of Proposed Parking Lot 1 (see Exhibit D).

The Base Bid shall be a lump sum amount, and the Base Bid shall include a Bid Price Percentage Allocation for these described portions of the Base Bid, stated as a percentage of the total bid:

- a. Project Management;
- b. Design;
- c. Permitting;
- d. Construction; and
- e. Quality Management.

2. Alternate to Base Bid. The Scope of Work for the Alternate to Base Bid includes all work to provide lighting, safety zones, and perimeter walkways for athletic fields numbered 12 and 13 as well as walkway connections to parking lot 1, per specifications dated August 2017, including: project management, design, permitting, fabrication, installation and construction substantiation, conformance with the athletic field and safety zone conditions in the specifications, installation of the 6 new 70 feet tall athletic field poles on a foundation extending to 3 inches above finished grade, installation of lighting and lighting controls,

installation of underground conduit and conductors to provide power to each of the 6 new 70 feet tall athletic field poles on a foundation extending to 3 inches above finished grade from the existing underground conduit and from existing metered main switch gear to the new lighting for fields numbered 12 and 13, which currently powers lights for fields numbered 10 and 11, and restoration for the underground work; all per codes and Authorities Having Jurisdiction for this Project. All Work performed for this Project shall comply with the Project Specifications (Exhibit A). The Bidder shall provide a quality assurance/quality management function to affirm the requirements for the Work are satisfied.

The Bidder is to provide the Athletic Field Lighting System as manufactured by Sentry Sports Lighting, or equivalent alternative, for athletic fields numbered 12 and 13, in order to match the lighting being provided by the Design-Builder [no exceptions]. The Bidder is responsible for providing the Work under this Project to avoid negatively impacting the site development in progress, including artificial turf system installation, site grading, and utility installation.

Bidder shall not perform work until it obtains the required permits for the items of Work under this Alternate to Base Bid.

A staging area for the Work shall be available in a portion of Proposed Parking Lot 1 (see Exhibit D).

The Alternate to Base Bid shall be a lump sum amount, and the Alternate to Base Bid shall include a Bid Price Percentage Allocation for these described portions of the Alternate to Base Bid, stated as a percentage of the total bid:

- a. Project Management;
- b. Design;
- c. Permitting;
- d. Construction; and
- e. Quality Management.

List of Standards

Below is a non-exhaustive list of standards that the Bidder shall utilize in preparing its bid and performing the Work for the Project. It shall be the Bidder's responsibility to ensure that the most current version at the time of the bid due date is used for all applicable standards, including those listed below.

The following standards are part of the bidding documents and will become part of the Contract. All Work shall be in accordance with federal, State of Missouri, St. Louis County, and local codes and standards including requirements of the authority having jurisdiction and particularly the most recent pertinent publications of the following organizations:

Originator	Title	Availability
American Architectural Manufacturers Association (AAMA)	Standards	IS
American Association of State Highway and Transportation Officials (AASHTO)	Standards	IS
American Concrete Institute (ACI)	Standards	IS
American Institute of Steel Construction (AISC)	Standards	IS
American National Standards Institute (ANSI)	Standards	IS
American Society of Civil Engineers (ASCE)	Standards	IS
American Society for Testing and Materials (ASTM)	Standards	IS
American Association of State Highway and Transportation Officials (AASHTO)	Standards	IS
American Welding Society (AWS)	Standards	IS
City of Maryland Heights	International Building Code 2015	W
City of Maryland Heights	Maryland Heights Floodplain Ordinance http://www.marylandheights.com/departments/community-development/floodplain-management/maryland-heights-floodplain-ordinance	IS
City of Maryland Heights	Maryland Heights Zoning Code http://www.marylandheights.com/departments/community-development/zoning-code	IS
Concrete Reinforcing Steel Institute (CRSI)	Manual of Standard Practice	IS

Originator	Title	Availability
International CPTED Association	E-Guidebooks for Professionals http://www.cpted.net/CPTED-JournalsandE-Guidebooks	IS
Federal Emergency Management Agency (FEMA)	Flood Insurance Rate Map (FIRM)	IS
Federal Highways Administration (FHWA)	Manual on Uniform Traffic Control Devices	IS
FIFA	Handbook of Requirements, FIFA Quality Standard http://quality.fifa.com/PageFiles/411/FQC%20Handbook%20of%20Requirements_January%202012.pdf	IS
FIFA	Handbook of Test Methods http://quality.fifa.com/PageFiles/411/FQC%20Handbook%20of%20Test%20Methods_January%202012.pdf	IS
FIFA	Preferred Producers & Licensees http://quality.fifa.com/en/Football-Turf/-Football-Turf-Licensees/#/index	IS
FIFA	Laws of The Games – Law #1: The Field of Play http://www.fifa.com/mm/document/footballdevelopment/refereeing/02/36/01/11/laws_of_the_game_weben_neutral.pdf	IS
Howard Bend Levee District (HBLD)	Floodplain Development Policy	A
Howard Bend Levee District (HBLD)	Guide to Stormwater Management in the Development of Land in the Howard Bend Levee District (Missouri River Bottoms) Maryland Heights, MO	A
Howard Bend Levee District (HBLD)	Plan Review & Construction Inspection Fees	A
International Code Council (ICC)	International Building Code	IS
Instrument Society of America (ISA).	Standards	IS

Originator	Title	Availability
Internet Engineering Task Force	Standards	IS
Institute of Electrical and Electronics Engineers (IEEE)	National Electrical Safety Code	IS
International Organization for Standards	Standards	IS
Irrigation Association	Standards	IS
Metropolitan St. Louis Sewer District (MSD)	Artificial Field Scenarios, Performance and Design Criteria for Storm Water Management	A
Metropolitan St. Louis Sewer District (MSD)	Site Design Guidance http://www.stlmsd.com/sites/default/files/engineering/474685.PDF	W
Metropolitan St. Louis Sewer District (MSD)	Standard Construction Specifications for Sewers and Drainage Facilities http://www.stlmsd.com/msd-work/construction/standard-construction-specs	W
Metropolitan St. Louis Sewer District (MSD)	Rules, Regulations, and Design Requirements http://www.stlmsd.com/what-we-do/stormwater-management/bmp-toolbox/technology-matrix/rules-regulations	W
Missouri Department of Transportation (MoDOT)	Standard Specifications for Road and Bridge Construction http://www.modot.org/business/standards_and_specs/highwayspecs.htm	W
Missouri Youth Soccer Association	Policy on Tournaments, Leagues, and Friendlies http://www.moyouthsoccer.org/downloads_forms/	W
Monarch Fire District	International Fire Code, 2009	IS
National Collegiate Athletic Association (NCAA)	Soccer & Lacrosse Standards	IS

Originator	Title	Availability
National Electrical Safety Code (NESC)	All standards	IS
National Electrical Manufacturers Association (NEMA)	All standards	IS
National Electrical Contractors Association (NECA)	All standards	IS
National Federation of State High School Associations	Soccer & Lacrosse Standards http://www.nfhs.org/activities-sports/soccer/ http://www.nfhs.org/activities-sports/lacrosse-boys/ http://www.nfhs.org/activities-sports/lacrosse-girls/	W
National Fire Protection Association (NFPA)	All standards	IS
National Institute of Standards and Technology (NIST)	800 Series	IS
Pattonville Fire District	International Fire Code, 2009 Pattonville Fire Protection District response to RFI: Notes, Ordinance #3-2006 Ordinance Requirements for Fire Hydrants, International Fire Code; excerpts from Chapter 5 – Fire Lanes, Appendix D – Aerial Fire Apparatus Access Roads (4 pages)	IS
St. Louis County	St. Louis County Land Disturbance Code https://www.municode.com/library/mo/st._louis_county/codes/code_of_ordinances?nodeId=TXIPUWOBURE_CH1114LADICO	W
St. Louis County	St. Louis County Building Codes http://www.stlouisco.com/YourGovernment/CountyDepartments/PublicWorks/Documents/Codes	W
St. Louis County	St. Louis County Code of Ordinances https://www.municode.com/library/mo/st._louis_county/codes/code_of_ordinances	W

Originator	Title	Availability
St. Louis County	Sediment and Erosion Control & SWPPP http://www.stlouisco.com/YourGovernment/CountyDepartments/Transportation/TransportationPublicationsManuals/SedimentandErosionControl	W
St. Louis County	Saint Louis County Health – Food Code 2005 http://www.stlouisco.com/Portals/8/docs/Health/Food%20Center/SLCDOH%20Food%20Code.pdf	W
St. Louis County	Saint Louis County Health – Plan Review Application http://www.stlouisco.com/HealthandWellness/Health/PlanReviewAppInstr	W
St. Louis County	Saint Louis County Health – Plan Review Form http://www.stlouisco.com/Portals/8/docs/Health/Food%20Center/New%20Construction%20Plan%20Review%20Application%20-%202010.pdf	W
St. Louis County	Standard Specification for Road and Bridge Construction https://www.projectsolve2.com/eRoom/PBSLouis4/SoccerCplxCreveCoeurPk/0_4a9 http://www.stlouisco.com/YourGovernment/CountyDepartments/HighwaysandTraffic/TransportationPublicationsManuals/StandardSpecificationsforHighwayConstruction	W
State of Missouri	Rules of Department of Insurance, Financial Institutions and Professional Registration	IS
Steel Deck Institute (SDI)	Standards	IS
Steel Joist Institute (SJI)	Standards	IS
Tile Counsel of America (TCA)	Standards	IS

Originator	Title	Availability
The Lacrosse Foundation	Lacrosse Field Diagram http://www.uslacrosse.org/resources/field-diagrams.aspx	W
Turfgrass Producers International (TPI)	Standards	IS
Underwriters Laboratory (UL)	Standards	IS
United States Access Board	ADA Accessibility Guidelines (ADAAG)	IS
United States Department of Justice Civil Rights Division	ADA Standards for Accessible Design	IS
United States Youth Soccer Association	US Youth Soccer Resource Center http://www.usyouthsoccer.org/USYouthSoccerResourceCenter/	W
US Club Soccer	Resources http://usclubsoccer.org/resources/	W
United States Specialty Sports Association	Soccer and Lacrosse Standards http://usssa.com/landing/usssa_landing	W

Availability Legend:

- A = As Requested of St. Louis County
- IS = Industry Standard, not provided by St. Louis County
- W = Standard is available as a download on the organization’s Web site, Bidder is responsible to download

Construction Contract Overview

The final award under this RFP shall be conditioned and contingent upon the successful execution of a contract between the Authority and Contractor (the “Contract”).

The Contract shall not be modified by exceptions noted in any proposals or bids submitted in response to this RFP. As a result, each bidder should thoroughly review all provisions and requirements of the Contract set forth below, as well as all related plans, drawings, specifications and other information in this RFP. The bids submitted in response to this RFP should cover all of the Work required for the Project pursuant to this RFP, precisely as specified and without deviation or alteration of any kind. Submission of a Proposal or Bid in response to this RFP is a firm representation by the bidder that it is prepared to immediately execute the Contract for the amount set forth in the bid if selected by the Authority.

Please note that the Contract requires the successful bidder to comply with the following requirements, as well as those listed in Exhibit B:

- **Insurance:** The Contractor and all Subcontractors of any tier are required to provide Workers' Compensation, Employers Liability, Commercial General Liability, Automobile Liability and Excess Liability insurance with the limits and terms set forth in the Contract. In addition, the Contractor shall also provide and maintain Contractor's Pollution Liability insurance and 'Builder's Risk' insurance, both with the limits and terms set forth in the Contract. Finally, Contractor shall be required to provide Excess Liability insurance coverage such that the combined limits of Contractor's General Liability and Excess Liability coverage shall be no less than \$2,000,000 per occurrence and \$4,000,000 aggregate. Excess Liability must also include Automobile Liability and Employers Liability in the schedule of underlying coverages. All carriers must maintain a minimum rating of 'A-VIII' by A.M. Best. The costs for all Contractor and Subcontractor required insurance premiums shall be included in the Bid and Contract Price.
- **Performance and Payment Bonds:** The Contractor will be required to provide separate performance and payment bonds in amounts equal to 100% of the Contract Price, issued by a surety authorized to do business in the State of Missouri and with a minimum rating of 'A' by A.M. Best. The costs for Contractor's performance and payment bonds shall be included in the bid.
- **Prevailing Wage:** For this project all workers employed by all contractors and/or subcontractors must be paid prevailing wages and supplemental benefits in accordance with the higher of the Davis Bacon Act (and all amendments thereto) or the Missouri Prevailing Wage Law, as provided in the applicable prevailing wage schedules that will be made a part of the Contract. During construction, the Contractor will be required to submit certified payrolls for its own forces and all subcontractor forces for each week that the work is in progress.
- **Other Applicable Laws:** Without limitation, Contractor shall also comply with the Fair Labor Standard Act, Fair Employment Practices Act, Equal Opportunity Act, Contract Work Hours and Safety Standards Act, Copeland Anti-Kick Back Act, and all other applicable federal, state, and local laws pertaining to employment or labor relations including all equal employment opportunity laws.
- **Goals for MBE/WBE/DBE Participation:** It is the policy of the Authority that businesses owned by socially and economically disadvantaged individuals (DBE's) have the maximum opportunity to participate in the performance of contracts financed by the Authority. In this regard, the Authority has established a goal of 18% participation by MBEs and 5% participation by WBEs in this Project.
- **State Sales Tax Exemption:** The Authority is a political subdivision exempt from sales taxes under Missouri law, and will issue the contractor and subcontractors an exemption certificate, a pro forma copy of which is included in the Contract Documents for your review. Your proposal should be submitted in accordance with the terms of such tax exempt certificate and applicable Missouri law.

The Contract terms and requirements listed above and in Exhibit B are not a complete list of all material terms of the Contract. As noted above, each bidder should thoroughly review and

familiarize themselves with all provisions and requirements of the Contract listed in this RFP. In the event of any conflict or inconsistency between the information presented in this RFP and the terms of the Contract, the terms of the Contract will control.

Selection Criteria

Proposals submitted will be reviewed by the Authority's staff for responsiveness, including but not limited to verifying that:

- The bidder submitted a valid bid bond in the amount of five percent (5%) of the **Base Bid** amount;
- The bidder and any subcontractors are properly licensed as required by this RFP and all applicable laws, rules, or regulations; and
- The bidder satisfied all other requirements as set forth in this RFP.

The Authority shall award the Contract to either the responsible and responsive Bidder with the lowest Base Bid price or the responsible and responsive Bidder with the lowest Alternate to Base Bid price, whichever is in the best interest of the Authority. The Authority shall name the successful Bidder and award the contract within forty-five (45) calendar days from the date of opening of the bids, subject to the Authority's rights as set forth in this RFP.

The St. Louis County Port Authority encourages submission of proposals from disadvantaged business enterprises and companies owned by minorities, women, immigrants, and veterans. The Authority does not discriminate on the basis of race, color, religion, creed, sex, sexual orientation, gender identity, age, ancestry, national origin, disability, or veteran status in consideration of this award. Equal Opportunity Employer.

Terms and Conditions of this RFP

The following terms and conditions, as well as those listed in Exhibit B, apply to all Bids pursuant to this RFP:

1. The Authority reserves the right to reject any and all proposals submitted; to void this RFP and the review process; to select separate responding parties for various components of the scope of services; to select a final party/parties from among the proposals received in response to this RFP. Additionally, any and all RFP project elements, requirements and schedules are subject to change and modification. The Authority also reserves the unqualified right to modify, suspend, or terminate at its sole discretion any and all aspects of this RFP process, to obtain further information from any and all responding parties, and to waive any defects as to form or content of the RFP or any responses by any party.
2. This RFP does not commit the Authority to award a contract, defray any costs incurred in the preparation of a response to this RFP, or contract for any services. All submitted responses to this RFP become the property of the Authority as public records. All

proposals may be subject to public review, on request, unless exempted as discussed elsewhere in this RFP.

3. By accepting this RFP and/or submitting a bid in response thereto, each responding party agrees for itself, its successors and assigns, to hold the Authority, the St. Louis Economic Development Partnership and its affiliated entities, St. Louis County, and all of their various agents, commissioners, directors, consultants, attorneys, officers and employees harmless from and against any and all claims and demands of whatever nature or type, which any such responding company, its representatives, agents, contractors, successors or assigns may have against any of them as a result of issuing this RFP, revising this RFP, conducting the selection process and subsequent negotiations, making a final recommendation, selecting a responding party/parties or negotiating or executing an agreement incorporating the commitments of the selected responding party.
4. By submitting bids, each bidder acknowledges having read this RFP in its entirety and agrees to all terms and conditions set out in this RFP.
5. Bids shall be open and valid for a period of ninety (90) days from the opening of bids on the due date of this RFP.

Submission of Proposals

To be considered, bids must be received no later than Tuesday, September 19, 2017, at 3:00 PM.

Bids should be delivered to:

St. Louis County Port Authority
c/o St. Louis Economic Development Partnership
Attn: Dustin Allison, General Counsel
7733 Forsyth Blvd., Suite 2300
St. Louis, Missouri 63105

Exhibit A

[Project Specifications]

Athletic Field and Safety Zone Performance Specifications

PART 1 – GENERAL

1.1 LIGHTING PERFORMANCE

Lighting for the athletic fields and safety zones shall be to the performance requirements as described in the table titled “Maintained Illuminance” (below), provided by a system of 70 foot pole mounted luminaires consistent with the size and layout of the other athletic fields and safety areas developed by the Design-Builder. Field lighting provided by the Design-Builder is by Sentry Sports Lighting, and field lighting provided pursuant to this RFP shall be the same system or an equivalent alternative. The successful bidder shall design lighting to avoid light trespass escaping the site perimeter, per Authorities Having Jurisdiction.

	Maintained Illuminance		
	E_H (lux)	E_V (lux)	E_{AVE}/E_{MIN}
	Horizontal	Vertical	Uniformity
<i>Outdoor Lighting</i>			
Athletic Field			
Level II	500	250	2.5:1
Parking Lot	20	10	6:1
Roadway	15		3:1
Bus Unloading Area	50	20	3:1
Pedestrian Walkways	30	10	3:1

Lighting design calculations shall be developed and approved by the Authority, with design being demonstrated on a 30 foot by 30 foot grid spacing with the minimum number of grid points to affirm the uniformity required within 95% confidence. Substantiation of lighting levels is required for the athletic field and safety zones in construction and prior to final acceptance.

Evaluation in the design shall also provide that the athletic field and safety zones meet the required lighting levels for the adjacent walkways from fields numbered 12 and 13 to the parking lots. Design shall further include a maintenance factor adequate to account for the depreciation in light output throughout the life of the lamp. A value no greater than 0.70 shall be applied to initial light levels to predict the maintained values.

A guarantee of quality of lighting performance shall be provided prior to final acceptance with field measurements for substantiation requiring a final measured average illumination level to be +/- 10% of predicted mean in accordance with IESNA RP-6-01, and measured at the first 100 hours of operation.

The field dimensions and safety zones are as follows for fields numbered 12 and 13:

- a. 225' width, 360' length; in addition:
- b. 10' safety boundary outside the field on the end lines
- c. 10' safety boundary outside the field along the sideline parallel with sidewalk
- d. 10' safety boundary outside the field plus a recommended additional 15' area along one side for coaching/team areas and drills

1.2 WARRANTY AND GUARANTEE

Product and performance warranty shall be for a twenty (20)-year period, including, light levels, parts, labor, lamp replacements, energy usage, control system, spill light control, and structural integrity. The Bidder is responsible to insure the manufacturer will provide specially-funded reserves to assure fulfillment of the warranty for the full term. It is estimated by the Authority that the athletic fields and safety zones will be operated for up to 600 hours annually.

The warranty and guarantee shall encompass all components of the athletic field and safety zones lighting, including power supply and control, underground power and distribution system, bases and foundations, poles, all ballasts and supporting electrical equipment, lamps, and luminaires.

PART 2 – PRODUCT

2.1 LIGHTING SYSTEM CONSTRUCTION

A lighting system will consist of lighting, electrical, and structural components designed to work together as a system that is durable and provides safety features, as provided by Sentry Sports Lighting or an equivalent alternative.

A. Outdoor lighting systems should consist of the following:

1. Galvanized steel poles and cross arm assembly.
2. Poured-in-place foundation containing reinforcing steel cured a minimum of 28 days before any stress load is applied, per tolerances to provide substantiation of approved design illumination levels and uniformity.
3. All luminaires shall be constructed with a die-cast aluminum housing or external hail shroud to protect the luminaire reflector system.
4. All ballasts and supporting electrical equipment shall be mounted remotely in aluminum enclosures approximately 10 feet above grade. The enclosures shall include ballast, capacitor, and fusing for each luminaire. Safety disconnect per

circuit for each pole structure will be located in the enclosure.

5. Wire harness complete with an abrasion protection sleeve, strain relief, and plug-in connections for fast, trouble-free installation.

B. Manufacturing Requirements

All components should be designed and manufactured as a system. All luminaires, wire harnesses (if provided), ballasts, and other enclosures should be factory assembled, aimed, wired, and tested for reduced installation time and trouble-free operation.

C. Durability

All exposed components should be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed steel should be hot dip galvanized per ASTM A123. All exposed hardware and fasteners should be stainless steel of at least 18-8 grade, passivated and polymer coated to prevent possible galvanic corrosion to adjoining metals. All exposed aluminum should be powder coated with high performance polyester. All exterior reflective inserts shall be anodized, coated with a clear, high gloss, durable fluorocarbon, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All wiring shall be enclosed within the cross arms, conduit, pole, or electrical components enclosure.

D. Lightning Protection

All outdoor structures shall be equipped with lightning protection meeting NFPA 780 standards.

E. Safety

All system components shall be UL Listed for the appropriate application, and meet codes and Authorities Having Jurisdiction.

F. Maximum Total Voltage Drop

Voltage drop to the disconnect switch located on the poles should not exceed three percent (3%) of the rated voltage per IESNA RP-6-01, unless lower by local code.

2.2 STRUCTURAL PARAMETERS

A. Location

Poles layout shall match the layout for other athletic field and safety zone areas in the Project site (outside of fields 2 and 5, fields 3 and 4, fields 6 and 9, and fields 7 and 8). This layout provides for exterior poles to be located outside of fences to avoid causing an obstruction or safety hazard to the participants. Pole layout for the area between field 12 and field 13 shall match the layout of the other athletic field and safety zone areas at the Project site (between fields 2 and 5, fields 3 and 4, fields 6 and 9, and fields 7 and 8).

Underground Power Supply conduit for power supply to pole bases shall be designed, permitted and installed to match the improvements provided in the attached Site Design, Exhibit D.

B. Foundation Strength

Project specific foundation drawings stamped by a licensed structural engineer illustrating that the foundation design is adequate to withstand the forces imposed from the pole, fixtures, and other attachments to prevent the structure from leaning, and meeting the code requirements of the Authorities Having Jurisdiction.

C. Support Structure Wind Load Strength

Poles, brackets, arms, bases, anchorages and foundations shall be designed per the requirements of the Authorities Having Jurisdiction including seismic, wind, and other required loading analysis. Luminaire, visor, and cross-arm shall withstand the code-required wind load to maintain luminaire aiming design.

D. Structural Design

The stress analysis and safety factor of the poles shall conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, and meeting Code requirements of Authorities Having Jurisdiction.

E. Soil Conditions

The design criteria for these specifications are per the Authorities Having Jurisdiction within the code requirements. St. Louis County has provided a limited Geotechnical Investigation for site development. Subsequent geotechnical investigations and structural design for the foundation of the athletic field and safety zone lighting is the responsibility of the lighting designer.

PART 3 – EXECUTION

3.1 FIELD QUALITY CONTROL

A. Illumination Measurements

Upon substantial completion of the project and in the presence of staff for the Authority, staff for St. Louis County, the Contractor, and the Manufacturer’s Representative, and for construction substantiation, illumination measurements shall be taken and verified on the same 30 foot by 30 foot grid as the approved design. The illumination measurements shall be conducted in accordance with IESNA RP-6-01, or other Authority-approved methodology.

B. Correcting Non-Conformance

If, in the opinion of the Authority or its appointed representative, the actual

performance levels including luxes, uniformity ratios and maximum kilowatt consumptions are not in conformance with the requirements of the performance specifications and submitted information, the Contractor shall be liable to any or all of the following:

1. Contractor shall, at his expense, provide and install any necessary additional fixtures to meet the minimum lighting standards. The Contractor shall also either replace the existing poles to meet the new wind load (EPA) requirements or verify by certification by a licensed structural engineer that the existing poles will withstand the additional wind load.
2. Manufacturer shall remove the entire unacceptable lighting system and install a new lighting system to meet the specifications.

3.2 ONGOING QUALITY ASSURANCE

- A.** Visual testing will be performed annually on lamps, lenses, conduit, poles, fuses, ballasts, grounding connections, and breaker boxes to insure integrity and safety of the system.
- B.** Full light and safety audits should be performed every other year and as identified in the accepted Guarantee and Warranty to comply fully with the terms and conditions of the accepted Warranty.

Exhibit B

CONDITIONS OF THE BID AND CONTRACT DOCUMENTS

Reference Informational Documents (“RID”)

RID are for information only and are not a part of the RFP or the Contract to be relied upon by the Bidder. Cross-references in the RFP or the Contract to the RID do not incorporate the RID or portions of the RID as part of the Contract or its requirements.

Referenced Standards, Codes, or Criteria

Except as otherwise specified in the RFP or the Contract, or otherwise directed by the Authority, references to standards, codes, or criteria, or to the latest version of standards, codes, or criteria, shall mean the latest version in effect.

Omission of Details; Clarification by St. Louis County

The Bidder shall not take advantage of any apparent Error in the RFP or the Contract. Should it appear that the Work to be done or any matter relative thereto is not sufficiently detailed or explained in the RFP or the Contract, the Bidder shall apply to the Authority in writing for such further written explanations as may be necessary and shall conform to the explanation provided by the Authority. The Bidder shall promptly notify the Authority of all Errors that it may discover in the RFP or the Contract and shall obtain specific instructions in writing regarding any such Error before proceeding with the Work affected thereby.

Standard for Approvals

In all cases where approvals, acceptances or consents are required to be provided by the Authority or approvals, acceptances or consents are required to be provided by the Bidder, such approvals, acceptances, or consents shall not be withheld unreasonably except in cases where a different standard (such as sole discretion) is specified, and shall not be unreasonably delayed if no response time is specified. In cases where sole discretion is specified, the decision shall not be subject to dispute resolution hereunder.

Completion Deadlines

All references in the RFP or the Contract to Completion Deadlines shall be deemed to mean the Project Completion Deadline included in this RFP, February 8, 2018.

Performance of Work

All materials, services, permits, investigations and efforts necessary to achieve Final Acceptance on or before the Final Acceptance Deadline shall be the Bidder’s sole responsibility, except as otherwise specifically provided in the RFP or the Contract. The costs of all such materials, services and efforts are included in the Bid Price.

Performance Standards

The Bidder shall furnish the design of the Project in accordance with all professional engineering principles and generally accepted standard of care (but at a minimum meeting the terms, conditions and requirements of the RFP and the Contract), and in accordance with the terms and conditions set forth in the RFP and the Contract; and shall construct the Project as designed, in a good and workmanlike manner, free from defects.

Performance as Directed

At all times during the term hereof, including during the course of and notwithstanding the existence of any dispute, the Bidder shall perform as directed by the Authority in a diligent manner and without delay, shall abide by the Authority's decision or order, and shall comply with all applicable provisions of the RFP and the Contract. If a dispute arises regarding such performance or direction, the dispute shall be resolved in accordance with provisions of the Contract.

General Obligations of Bidder

The Bidder, in addition to performing all other requirements outlined in the Contract, shall:

1. Furnish all design, investigations and other services, provide all materials and labor and undertake all efforts necessary or appropriate (excluding only those services, materials and efforts which the Contract specifies will be undertaken by other Persons):
 - i. to construct the Project and maintain it during construction in accordance with the requirements of the Contract, including the Contract Schedule, all Legal Requirements, all Permits, Applicable Standards, Project Management Services to deliver the Project per Contract, and all other applicable safety, environmental, licensing and other requirements, taking into account the boundary survey and other constraints affecting the Project, so as to achieve Project Completion by the applicable Completion Deadlines; and
 - ii. otherwise to do everything required by and in accordance with the Contract.
2. At all times provide a Project Manager of the Bidder, Approved by the Authority. The Bidder Project Manager shall:
 - i. have full responsibility for performing the Work;
 - ii. act as agent and be a single point of contact in all matters on behalf of the Design-Builder;
 - iii. be available at the Site at all times that Work is performed within one (1) hour's notice; and
 - iv. have authority to bind the Bidder on all matters relating to the Project.

3. Obtain all Permits.
4. Comply with all conditions imposed by and undertake all actions required by and all actions necessary to maintain in full force and effect, all Permits, except to the extent that such responsibility is expressly assigned in the Contract to another party.
5. Comply with all requirements of all applicable Legal Requirements, including:
 - i. the environmental laws, including requirements set forth in Book 2, and requirements regarding the handling, generation, treatment, storage, transportation and disposal of Hazardous Substances, if applicable;
 - ii. the Americans with Disabilities Act of 1990 (ADA), 42 U.S.C. § 12101 et seq., including any amendments, as well as all applicable regulations and guidelines;
 - iii. State requirements, and
 - iv. Local requirements.
6. Comply with all Applicable Standards as revised to ensure their enforceability.
7. Cooperate with the Authority, St. Louis County, and their staff in the review and oversight of the Project and other matters relating to the Work.
8. Payments to Third Parties required by the Contract, if any, including but not limited to, payments to Utility Owners.
9. Supervise and be responsible to the Authority for acts and omissions of all Bidder-Related Entities, as though the Bidder directly employed all such Persons.
10. Mitigate delay to the Project and mitigate damages due to delay in all circumstances, to the extent possible, including by re-sequencing, reallocating or redeploying the Design-Builder's forces to other work, as appropriate.
11. Pay all applicable Federal, State, and Local, consumer, use, and similar taxes, property taxes and any other taxes, fees, charges, or levies imposed by a Governmental Person, whether direct or indirect, relating to or incurred in connection with the performance of the Work.
12. Pay for the cost and service use charges for temporary services including telephone, internet, sewer, water, electric and gas service. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the Authority's forces, consultants, testing agencies, and other authorities having jurisdiction.
13. Co-operate with the Schedule and activities of the Design- Builder for the Creve Coeur Park Soccer Complex, to insure the Schedule is met, and not negatively impacted by Bidder's Work.

Representations, Warranties, and Covenants

The Bidder represents, warrants, and covenants for the benefit of the Authority, the St. Louis Economic Development Partnership and its affiliated entities, St. Louis County, and all of their various agents, commissioners, directors, consultants, attorneys, officers and employees as follows:

1. Maintenance of Professional Qualifications
The Bidder and its design Subcontractor(s) shall maintain, throughout the term of the Contract and its design Subcontract(s), all required authority, license status, professional ability, skills and capacity to perform the Work, and shall perform them in accordance with the requirements of the Contract.
2. Evaluation of Constraints
The Bidder has evaluated the constraints affecting delivery of the Project and has reasonable grounds for believing and does believe that the Project can be delivered within such constraints.
3. Feasibility of Performance
The Bidder has evaluated the feasibility of performing the Work within the time specified herein and for the Contract Price, and has reasonable grounds for believing and does believe that such performance (including achievement of Project Completion and Final Acceptance by the applicable Deadlines, for the Contract Price) is feasible and practicable.
4. Review of Site Information
The Bidder has, prior to submitting its Bid, in accordance with prudent and generally accepted design and construction practices, reviewed the boring logs provided by St. Louis County in RID, inspected and examined the Project site and surrounding locations, and undertaken other appropriate activities sufficient to familiarize itself with surface conditions, subsurface conditions and existing facility conditions affecting the Project, to the extent the Bidder deems necessary or advisable for submittal of a Bid. As a result of such review, inspection, examination and other activities, the Bidder is familiar with and accepts the physical requirements of the Work. The Bidder acknowledges and agrees that changes in conditions at the Site may occur after the Bid Due Date, and that the Bidder shall not be entitled to any Change Order in connection therewith. Before commencing any Work on a particular aspect of the Project, the Bidder shall verify all governing dimensions and conditions at the Project site and shall examine all adjoining work, which may have an impact on such Work.
5. Permits
It is the Bidder's responsibility to obtain and pay for all full and partial permits for the project. The Bidder shall pay for all required permits from Authorities Having Jurisdiction (AHJ), including St. Louis County Department of Public Works, the Metropolitan St. Louis Sewer District, City of Maryland Heights, Monarch Fire

Protection District, and Maryland Heights Fire District. Some construction may require permits from multiple jurisdictions.

All questions regarding specific permits must be directed to the appropriate agency. The following information is a general, not all-inclusive guide to the responsible agency for various types of work:

Jurisdiction	Permit Types
Maryland Heights and Monarch Fire Districts	Sprinklers Fire Alarm & Detection (as well as any prerequisite and/or related permits required by City)
City of Maryland Heights	Right-of-Way Flood Plain Development Planning & Zoning Building Permits Land Disturbance
St. Louis County	Mechanical Electrical Plumbing Sprinklers Fire Alarm & Detection Elevators Conveyors Demolition On-Site Storm Sewers
MSD	Storm Sewers Sanitary Sewers
Howard Bend Levee District	Channel Protection

	Storm Water Detention
--	-----------------------

Progression of Work

The Bidder shall at all times schedule and direct its Work to provide an orderly progression of the Work to achieve Project Completion and Final Acceptance by the applicable Deadlines and in accordance with the Contract Schedules, including furnishing such employees, materials, facilities and equipment and working such hours (including extra shifts, overtime operations, Sundays and Holidays) as may be necessary to achieve such goals, all at the Bidder’s own expense.

Employee Performance Requirements

All employees shall have the skill and experience and any licenses or certifications required to perform the Work assigned to them. St. Louis County shall be the licensing authority for all trades and businesses. If St. Louis County determines in its sole discretion that any person employed by the Bidder or by any Subcontractor is not performing the Work properly and skillfully, then, at the written request of the Authority, the Bidder or such Subcontractor shall remove such person per the Authority. If the Bidder or the Subcontractor fail to remove such person(s) or fail to furnish skilled and experienced personnel for the proper performance of the Work, then the Authority may, in its sole discretion, suspend the affected portion of the Work by delivery of written notice of such suspension to the Bidder. Such suspension shall in no way relieve the Bidder of any obligation contained in the Contract or entitle the Bidder to a Change Order. Once compliance is achieved, the Bidder shall be entitled to and shall promptly resume the Work.

Design and Engineering Personnel

All design and engineering Work furnished by the Bidder shall be performed by or under the direct supervision of persons licensed to practice architecture, landscape architecture, engineering or surveying (as applicable) in Missouri, and by personnel who are careful, skilled, experienced and competent in their respective trades or professions, who are professionally qualified to perform the Work in accordance with the Contract, and who shall assume professional responsibility for the accuracy and completeness of the design.

The Bidder shall be responsible to the Authority for acts and omissions of the Bidder’s employees, Architect, Contractors, Subcontractors and their agents and employees, and other persons or entities including the Architect and other design professionals, performing any portion of the Bidder’s obligations under the RFP and the Contract.

Organization

The Bidder shall be duly organized and validly existing under the laws of the Missouri, with all requisite power to own its properties and assets and carry on its business as now conducted or proposed to be conducted. The Bidder shall be duly qualified to do business, and is in good

standing, in the State of Missouri, and shall remain in good standing until Notice of Final Acceptance and for as long thereafter as any obligations remain outstanding under the Contract.

Authorization

The execution, delivery, and performance of the Contract shall be to have been duly authorized by all necessary actions of the Bidder and, if applicable, the Bidder's members and shall not result in a breach or a default under the organizational documents of any such organization or any indenture, loan, credit agreement, or other material agreement or instrument to which any such person is a party or by which its properties and assets may be bound or affected.

Legal, Valid, and Binding Obligation

The Contract as awarded and executed, constitutes the legal, valid, and binding obligation of the Bidder and, if applicable, of each member of the Bidder's team and organization.

False or Fraudulent Statements and Claims

The Bidder recognizes that the requirements of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq. apply to its actions hereunder. Accordingly, by signing the Contract, the Bidder certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, or it may make pertaining to the Contract. In addition to other penalties that may be applicable, the Bidder also acknowledges that if it makes a false, fictitious, or fraudulent claim, statement, submission, or certification, the Authority reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986, as amended, on the Bidder to the extent the federal government deems appropriate.

Information Supplied

The Authority has made available to the Bidder information, which is described in the RFP and the Contract and certain RID regarding the Project.

Responsibility for Design

The Bidder agrees that it has full responsibility for the design of the Project and that the Bidder shall furnish the design of the Project, regardless of the fact that certain design work occurred and is provided to the Bidder prior to the date of Bid. The Bidder specifically acknowledges and agrees that:

1. The Bidder is responsible for providing final design documents signed and sealed by Professional Architects and Engineers licensed in the State of Missouri.
2. The Bidder is not entitled to rely on and has not relied on:
 - i. the RID; or
 - ii. any other documents or information provided by the Authority, unless specifically permitted in the RFP and the Contract.

2. The Bidder's Warranties and indemnities hereunder cover any Errors in the Project even though they may be related to errors in the RID.

No Liability Regarding Informational Documents

The Bidder understands and agrees that the Authority, the St. Louis Economic Development Partnership and its affiliated entities, St. Louis County, and all of their various agents, commissioners, directors, consultants, attorneys, officers and employees shall not be responsible or liable in any respect for any loss, damage, injury, liability, cost or cause of action whatsoever suffered by any Bidder-designer-Builder-Related Entity by reason of any use of any information contained in the RID or any action or forbearance in reliance thereon. The Bidder further acknowledges and agrees that:

1. if and to the extent the Bidder or anyone on the Bidder's behalf uses any of said information in any way, such use is made on the basis that the Design-Builder, not St. Louis County, has approved and is responsible for said information; and
2. the Bidder is capable of conducting and obligated hereunder to conduct any and all studies, analyses and investigations as it deems advisable to change, recreate, verify or supplement said information, and that any use of said information is entirely at the Bidder's own risk and at its own discretion.

No Representation or Warranty Regarding Informational Documents

The Authority does not represent or warrant that the information contained in the informational documents is either complete or accurate or that such information conforms to the requirements of the Contract.

Professional Licensing Laws

The Authority does not intend to contract for, pay for, or receive any design services that are in violation of any State of Missouri professional licensing laws, and by execution of the Contract, Bidder acknowledges that the Authority has no such intent. It is the intent of the parties that the Bidder is fully responsible for furnishing the design of the Project, although the fully licensed design firm(s) or individuals designated herein shall perform the design services required by the Contract. Any references in the RFP or the Contract to the Bidder's responsibilities or to "perform" the design portions of the Work shall be deemed to mean that the Bidder shall "furnish" the design for the Project.

Time of Essence

Time is of the essence in the performance of the Work of this Project.

Project Completion Deadline

The Bidder shall achieve Project Completion by February 8, 2018.

Final Acceptance Deadline

The Bidder shall achieve Final Acceptance within 60 days after achieving Project Completion. The deadline for Final Acceptance is referred to as the “Final Acceptance Deadline.”

No Time Extensions

The Authority shall have no obligation to extend any Completion Deadline, and the Bidder shall not be relieved of its obligation to comply with the Contract Schedule and the applicable Project Completion and Final Acceptance Deadlines for any reason.

Exhibit C

[Bid Forms]

BID FORM

Bid Due Date: _____

BID from _____,
hereinafter called "BIDDER," (a *corporation, organized and existing the laws of State of _____, a *partnership, or an *individual doing business as _____).

The undersigned, having examined and being familiar with the local conditions affecting the Work, the Project, and the contract documents including the RFP as issued by the Authority, hereby propose to furnish all labor, materials, equipment, and services required for the performance and completion of the Work as defined in the RFP as follows:

BASE BID

The Scope of Work for the **Base Bid** for this Project includes all work to provide lighting for athletic fields numbered 12 and 13, including: project management, design, permitting, installation of the 6 new 70 feet tall athletic field poles on a foundation extending to 3 inches above finished grade, installation of lighting and lighting controls, installation of underground conduit and conductors to provide power to each of the 6 new 70 feet tall athletic field poles on a foundation extending to 3 inches above finished grade from the existing underground conduit and from existing metered main switch gear to the new lighting for fields numbered 12 and 13, which currently powers lights for fields numbered 10 and 11, and restoration for the underground work; all per codes and Authorities Having Jurisdiction for this Project. All Work performed for this Project shall comply with the Project Specifications (Exhibit A of the RFP). The Bidder shall provide a quality assurance/quality management function to affirm the requirements for the Work are satisfied.

The Bidder is to provide the Athletic Field Lighting System as manufactured by Sentry Sports Lighting, or equivalent alternative, for athletic fields numbered 12 and 13, in order to match the lighting being provided by the Design-Builder [no exceptions]. The Bidder is responsible for providing the Work under this Project to avoid negatively impacting the site development in progress, including artificial turf system installation, site grading, and utility installation, all at a Lump Sum amount of \$_____Dollars (\$_____).

Base Bid shall be a lump sum amount, and the Base Bid shall include a Bid Price Percentage Allocation for these described portions of the Base Bid, stated as a percentage of the total bid:

- a. Project Management at _____% of the BASE BID AMOUNT
- b. Design at _____% of the BASE BID AMOUNT
- c. Permitting at _____% of the BASE BID AMOUNT

- | | | | | |
|----|--------------------|----|--|--------------------------|
| d. | Construction | at | | % of the BASE BID AMOUNT |
| e. | Quality Management | at | | % of the BASE BID AMOUNT |
| | | | | 100 % |

For the above Base Bid, if submitting a hard copy of the bid, the amount shall be shown in both words and figures. In the case of discrepancy between words and figures, the lowest price shall govern.

In the case of any ambiguity between the drawings and specifications, the specification prevails.

The bidder agrees to honor its bid and will sign all contract documents if awarded the contract. If the bidder fails to honor its bid, the principal and surety are liable on the bond for any additional costs. For failure to honor the bid, the bidder forfeits the bid bond to the Authority. The penal sum of the bid bond is five percent (5%) of the Base Bid amount.

ALTERNATE TO BASE BID

The Scope of Work for the **Alternate to Base Bid** includes all work to provide lighting, safety zones, and perimeter walkways for athletic fields numbered 12 and 13 as well as walkway connections to parking lot 1, per specifications dated August 2017, including: project management, design, permitting, fabrication, installation and construction substantiation, conformance with the athletic field and safety zone conditions in the specifications, installation of the 6 new 70 feet tall athletic field poles on a foundation extending to 3 inches above finished grade, installation of lighting and lighting controls, installation of underground conduit and conductors to provide power to each of the 6 new 70 feet tall athletic field poles on a foundation extending to 3 inches above finished grade from the existing underground conduit and from existing metered main switch gear to the new lighting for fields numbered 12 and 13, which currently powers lights for fields numbered 10 and 11, and restoration for the underground work; all per codes and Authorities Having Jurisdiction for this Project. All Work performed for this Project shall comply with the Project Specifications (Exhibit A of the RFP). The Bidder shall provide a quality assurance/quality management function to affirm the requirements for the Work are satisfied.

The Bidder is to provide the Athletic Field Lighting System as manufactured by Sentry Sports Lighting, or equivalent alternative, for athletic fields numbered 12 and 13, in order to match the lighting being provided by the Design-Builder [no exceptions]. The Bidder is responsible for providing the Work under this Project to avoid negatively impacting the site development in progress, including artificial turf system installation, site grading, and utility installation, all at a Lump Sum amount of \$ _____ Dollars (\$ _____).

Alternate to Base Bid shall be a lump sum amount, and the Alternate to Base Bid shall include a Bid Price Percentage Allocation for these described portions of the Alternate to Base Bid, stated as a percentage of the total bid:

a.	Project Management	at	_____	% of the BASE BID AMOUNT
b.	Design	at	_____	% of the BASE BID AMOUNT
c.	Permitting	at	_____	% of the BASE BID AMOUNT
d.	Construction	at	_____	% of the BASE BID AMOUNT
e.	Quality Management	at	_____	% of the BASE BID AMOUNT

				100 %

For the above Alternate to Base Bid, if submitting a hard copy of the bid, the amount shall be shown in both words and figures. In the case of discrepancy between words and figures, the lowest price shall govern.

In the case of any ambiguity between the drawings and specifications, the specification prevails.

The bidder agrees to honor its bid and will sign all contract documents if awarded the contract. If the bidder fails to honor its bid, the principal and surety are liable on the bond for any additional costs. For failure to honor the bid, the bidder forfeits the bid bond to the Authority. The penal sum of the bid bond is five percent (5%) of the Base Bid amount.

COMPANY NAME (PLEASE PRINT)

SIGNED BY _____

DATE OF BID _____

Exhibit D

[Site Plan & Site Design Plan]

SITE PLAN - FOR REFERENCE
Additional Athletic Field Lighting - Fields Nos. 12 and 13
Creve Coeur County Park Soccer Complex
August 2017

Provide Project Management, Design, Permitting, Fabrication, Installation, and Construction Substantiation for Lighting of Athletic Field and Safety Zones, perimeter walkways, for Fields Nos. 12 and 13, and, walkway connection from Field Nos. 12 and 13 to Parking Lot I; provide power supply, underground power distribution supply, and, lighting controls per Specifications and Conditions - Specifications and Conditions, dated August 10, 2017. See Site Design attached to these Bid Documents for reference. Work shall be completed within the schedule and work by others at this Soccer Complex, per these Specifications and Conditions; A Base Bid and One Alternate Bid are required for this Bid. An Allowance is included in the Bid Documents for a specified portion of the work - See Bid Specifications.

Existing Lighting Control for Field Nos. 10 and 11. Use for Field Nos. 12 and 13 Lighting - See Site Design for Reference.

Parking Lot I - On Site Staging Area for Field Nos. 12 and 13 Athletic Field Lighting, per this Bid.

Parking Lot H

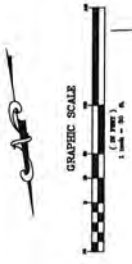


April 2017

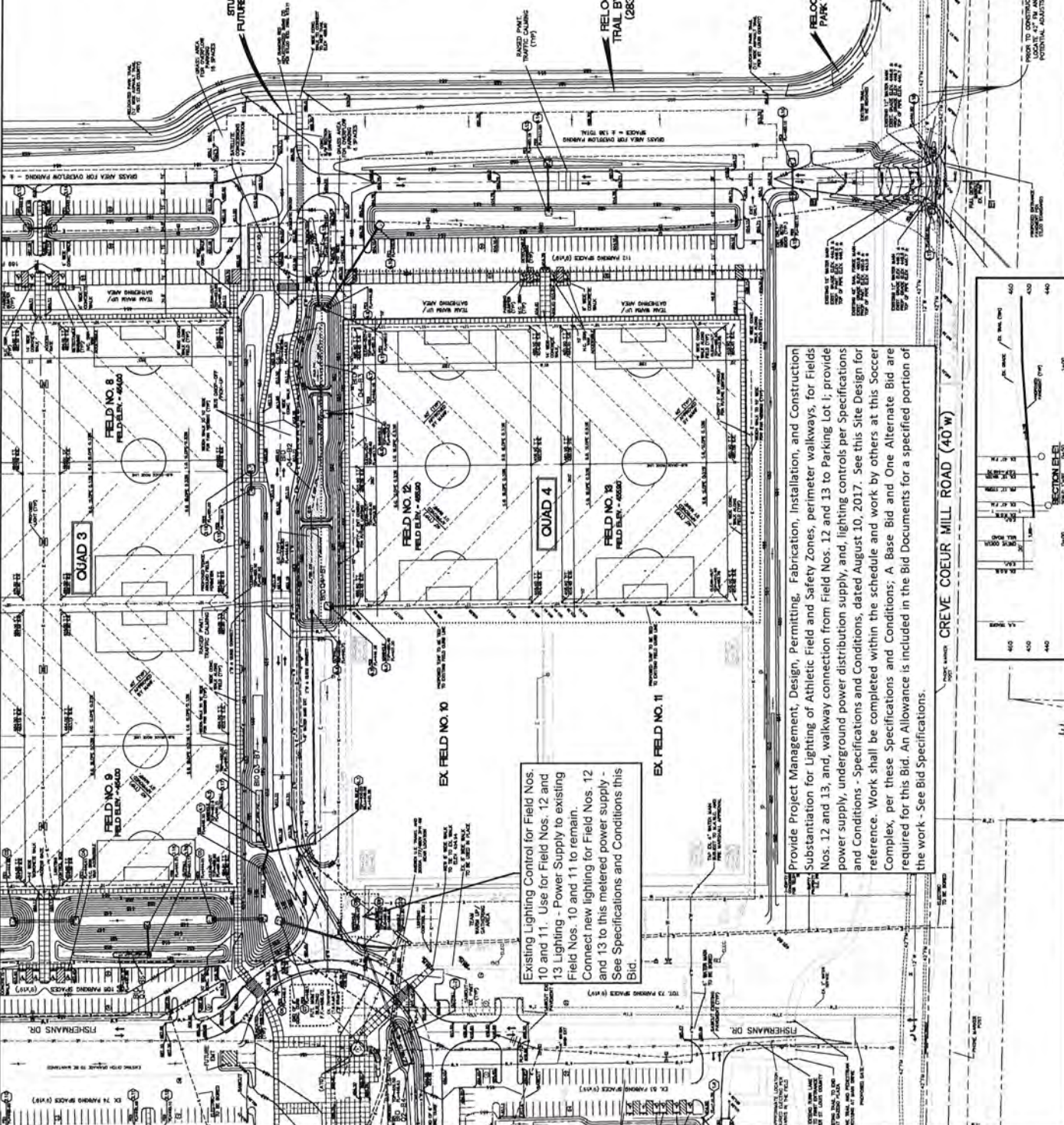
Creve Coeur Soccer Complex

St. Louis County, Missouri





SITE DESIGN - FOR REFERENCE
 Additional Athletic Field Lighting - Fields Nos. 12 and 13
 Creve Coeur Park Soccer Complex
 August 2017



Existing Lighting Control for Field Nos. 10 and 11. Use for Field Nos. 12 and 13 Lighting - Power Supply to existing Field Nos. 10 and 11 to remain. Connect new lighting for Field Nos. 12 and 13 to this metered power supply - See Specifications and Conditions this Bid.

Provide Project Management, Design, Permitting, Fabrication, Installation, and Construction Substantiation for Lighting of Athletic Field and Safety Zones, perimeter walkways, for Fields Nos. 12 and 13, and, walkway connection from Field Nos. 12 and 13 to Parking Lot I; provide power supply, underground power distribution supply, and, lighting controls per Specifications and Conditions - Specifications and Conditions, dated August 10, 2017. See this Site Design for reference. Work shall be completed within the schedule and work by others at this Soccer Complex, per these Specifications and Conditions; A Base Bid and One Alternate Bid are required for this Bid. An Allowance is included in the Bid Documents for a specified portion of the work - See Bid Specifications.

CITY REVIEW NOTE
 THE SUBMITTER'S USE OF THIS DOCUMENT FOR ANY PURPOSES OTHER THAN THAT AUTHORIZED BY THE CITY OF ST. LOUIS IS PROHIBITED. THE CITY OF ST. LOUIS DOES NOT WARRANT THE ACCURACY OF THIS DOCUMENT. APPROVAL OF THIS DOCUMENT BY THE CITY OF ST. LOUIS DOES NOT CONSTITUTE AN ENDORSEMENT OF THE PROJECT OR A GUARANTEE OF THE QUALITY OF THE WORK. THE CITY OF ST. LOUIS IS NOT RESPONSIBLE FOR THE DESIGN OR CONSTRUCTION OF ANY SITE IMPROVEMENTS SHOWN HEREON. THE SUBMITTER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF ST. LOUIS. THE SUBMITTER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF ST. LOUIS. THE SUBMITTER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF ST. LOUIS.

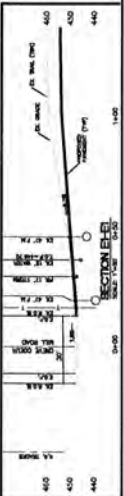


Exhibit E

[Reference Informational Documents]

REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION

CREVE COEUR LAKE SOCCER PARK
MARYLAND HEIGHTS, MISSOURI
TSI PROJECT NO. 20161130.00

WSP – PARSONS BRINCKERHOFF
211 N. Broadway, Suite 2800
St. Louis, Missouri 63102



1340 North Price Road
St. Louis, MO 63132

June 20, 2016



1340 North Price Road
St. Louis, MO 63132
314.373.4000 F
314.227.6572 F

www.tsigeotech.com

June 20, 2016

Mr. Tom Brooks-Pilling, AIA
WSP – PARSONS BRINCKERHOFF
211 N. Broadway, Suite 2800
St. Louis, Missouri 63102

**Re: Report of Subsurface Exploration and Geotechnical Engineering Evaluation
Creve Coeur Lake Soccer Park
Maryland Heights, Missouri
TSi Project No. 20161130.00**

Dear Mr. Brooks-Pilling:

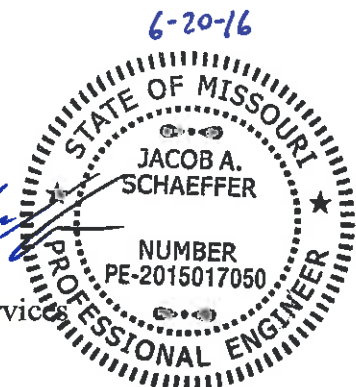
TSi Geotechnical, Inc. (TSi) has completed the authorized Subsurface Exploration and Geotechnical Engineering Evaluation for the referenced project and is pleased to submit this report of our findings to WSP – Parsons Brinckerhoff (WSPPB). The purpose of our work was to determine subsurface conditions at specific test boring locations and to gather data on which to prepare geotechnical recommendations for the design of the 14 new synthetic turf soccer fields at Creve Coeur Park in Maryland Heights, Missouri. This report describes the exploration procedures used, presents the field and laboratory data, and includes our evaluations and recommendations relative to the geotechnical engineering aspects of the project.

We appreciate the opportunity to assist you with this project. If you have any questions, or if we may be of further service to you, please call us.

Respectfully submitted,
TSI GEOTECHNICAL, INC.

Daniel D. Iffrig, EI
Staff Engineer

Jacob A. Schaeffer, PE
Manager, Geotechnical Services



Denise B. Hervey, PE
Principal

PROFESSIONAL SERVICES SINCE 1989

CONTENTS

1.0 SCOPE OF WORK	1
2.0 PROJECT AND SITE DESCRIPTIONS.....	2
3.0 FIELD EXPLORATION AND LABORATORY TESTING.....	3
3.1 Field Exploration.....	3
3.2 Laboratory Testing	3
4.0 SUBSURFACE CONDITIONS	5
4.1 Generalized Subsurface Profile.....	5
4.2 Groundwater.....	5
5.0 ENGINEERING ASSESSMENTS AND RECOMMENDATIONS	6
5.1 Existing Fill	6
5.2 Swelling Soil Considerations	6
5.3 Concessions And Field Area Preparation Considerations.....	7
5.4 Shallow Foundations	7
5.5 Regional Seismicity.....	8
6.0 SITE PREPARATION AND EXCAVATION CONSIDERATIONS	9
6.1 Subgrade Preparation.....	9
6.2 Subgrade Protection.....	9
6.3 Fill and Backfill Materials.....	9
6.4 Fill and Backfill Placement	10
6.5 Groundwater Considerations.....	10
6.6 Shallow Foundation Excavations	10
7.0 CONSTRUCTION OBSERVATION AND TESTING	12
8.0 REPORT LIMITATIONS	13
Appendix A	Vicinity Map, Figure 1 Site and Boring Location Plan, Figure 2
Appendix B	Logs of Boring Boring Log Notes
Appendix C	Laboratory Test Reports

SUBSURFACE EXPLORATION AND
GEOTECHNICAL ENGINEERING EVALUATION
CREVE COEUR LAKE SOCCER PARK
MARYLAND HEIGHTS, MISSOURI

1.0 SCOPE OF WORK

This report summarizes the results of a geotechnical study completed for the design and construction of the new Soccer Park at Creve Coeur Lake in Maryland Heights, Missouri. The study was performed in general accordance with TSi's proposal to WSPPB dated April 27, 2016. Based on TSi's understanding of the project, the following items have been identified for inclusion in this geotechnical study report:

- subsurface conditions, including material types encountered at the borings, and their impact on the proposed construction;
- field and laboratory test results for materials encountered at the borings;
- recommendations for the design of shallow spread footing foundations, including allowable bearing pressure and depth to suitable stratum;
- estimated settlement of the buildings, based on the general character of the soil and anticipated structural loads;
- geotechnical factors for seismic design requirements in accordance with the International Building Code (IBC);
- location and description of any deleterious materials encountered at the boring locations that could impact design or construction;
- impact of groundwater on design and construction;
- site preparation considerations, including recommendations regarding fill and backfill placement; and
- recommendations for observation and testing services during construction.

2.0 PROJECT AND SITE DESCRIPTIONS

The following project understanding is based on a preliminary site plan and other project information provided by WSPPB on May 17, 2016. The project involves the construction of 14 new synthetic turf fields and several lightly loaded single story structures for concessions, restrooms, and seating. Due to the possibility of the site requiring grading during construction, a borrow area just south of the fields is also being investigated. During a site meeting with St. Louis County Parks, it was noted that the proposed borrow area was previously used as a detention basin that was later backfilled with dredging spoils. The project area generally shares a boundary with the existing Scott Gallagher Soccer Complex at Creve Coeur Lake. The general location of the project site is shown on the Vicinity Map, Figure 1 in Appendix A.

No construction plans detailing the exact location of the proposed structures, structural loads, or finished grade elevations have been provided to TSi; however, structural loads and wall loads are not anticipated to exceed 25 kips and 4 kips per lineal foot, respectively. Any grade changes are assumed to be no more than 2 feet of cuts or fills. The general site area and approximate boring locations are shown on the Site and Boring Location Plan, Figure 2 in Appendix A.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION

On May 23, 2016 and June 6, 2016, TSi completed 15 test borings at the project site, designated as Borings B-1 through -15. Borings B-1 through -12 were drilled within the general area of the existing soccer fields. Boring B-13 was performed in proximity to the existing comfort station and within the general area of the proposed structures. Borings B-14 and -15 were drilled within the proposed borrow area. Bulk samples were also collected adjacent to Borings B-14 and -15. The approximate locations of the borings are indicated on the Site and Boring Location Plan, Figure 2.

An engineer from TSi directed and observed the field exploration procedures, collected appropriate samples of soil and rock, and classified the samples in accordance with ASTM D 2488. The borings were drilled with a CME-550x rotary drill rig using either continuous-flight or hollow-stem auger drilling methods. Standard penetration test (SPT) and Shelby tube samples were recovered from the borings. SPT samples were recovered using a 2-inch outside-diameter, split barrel sampler, driven by an automatic hammer, in accordance with ASTM D 1586. Shelby tube samples were obtained in accordance with ASTM D 1587. The Shelby tube samples were preserved by sealing the entire sample in the tube. The split-spoon samples were placed in glass jars for later testing in the laboratory. Each of the borings was backfilled with auger cuttings. The sampling sequence for each boring is summarized on the Logs of Boring in Appendix B of this report.

The results of the field tests and measurements were recorded on field logs and appropriate data sheets. Those data sheets and logs contain information concerning the drilling methods, samples attempted and recovered, indications of the presence of various subsurface materials, and the observation of groundwater. The field logs and data sheets contain the field engineer's interpretations of the conditions between samples, based on the performance of the drilling equipment and the cuttings brought to the surface by the drilling tools.

3.2 LABORATORY TESTING

A laboratory testing program was conducted by TSi to determine selected engineering properties of the obtained soil samples. The results of the individual tests are presented on the Logs of Boring and the laboratory test reports in Appendix C. The following laboratory tests were performed on the samples recovered from the borings:

- visual description by color and texture (ASTM D 2488 and D 2487);
- natural moisture content (ASTM D 2216);
- hand penetrometer determination of the approximate compressive strength of cohesive samples;
- Atterberg limits (ASTM D 4318);
- dry unit weight;
- standard Proctor moisture-density relations tests on selected bulk samples (ASTM D 698); and
- unconfined compressive strength of selected cohesive soil samples (ASTM D 2166).

Data and observations from laboratory tests were recorded on laboratory data sheets during the course of the testing program. The results of laboratory tests are summarized on the Logs of Boring, and on the laboratory reports in Appendix C. The logs represent considered interpretation of the field and laboratory data. The analysis and conclusions contained in this report are based on field and laboratory test results and on the interpretations of the subsurface conditions as reported on the Logs of Boring. Only data pertinent to the objectives of this report have been included on the logs; therefore, the logs should not be used for other purposes.

4.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered at the test borings are presented on the Logs of Boring in Appendix B. The general subsurface conditions encountered and their pertinent engineering characteristics are described in the following paragraphs. Conditions represented by the borings should be considered applicable only at the exploration locations on the dates shown; the reported conditions may be different at other locations or at other times.

4.1 GENERALIZED SUBSURFACE PROFILE

Fill was encountered at the ground surface at Borings B-14 and -15. The fill extends to depths ranging from 9.3 to 11.8 feet at the borings. The fill consists of lean and fat clays (CL and CH, in accordance with the Unified Soil Classification System), with a variable content of organics. The fill varies in stiffness from very soft to soft, based on standard penetration test (N)-values ranging from 0 to 3 blows per foot (bpf). Moisture contents in the fill range from 37 to 54%. The fill is understood to be dredge material.

Underlying the fill at Borings B-14 and -15, and below the ground surface at the remaining boring locations, are natural soil deposits. The natural deposits extend to termination depths of 5 feet in Borings B-1 through -12, and to termination depths of 20 feet in Borings B-13 through -15. The soils at these boring locations consist of lean and fat clays, silts, sands, and silty sands (CL, CH, ML, SP, and SM), with variable contents of sand and/or gravel in cohesive soils (CL, CH, ML) and variable contents of organics, clay, and silt in cohesionless soils (SP and SM). The surficial soils are predominantly fat clays. The stiffness of the soils varies from soft to medium stiff, based on N-values ranging from 2 to 8 bpf, with an N-value of 9 noted in the sand at Boring B-13. Moisture contents vary from 25 to 62%. Unconfined compression tests performed on a selected cohesive sample in the soils yielded an undrained shear strength of 0.42 ton per square foot (tsf). A dry unit weight of 75 pounds per cubic foot (pcf) was recorded on the selected cohesive sample prior to performing the unconfined compression test.

4.2 GROUNDWATER

Groundwater was encountered during drilling at a depth of 3.5 feet in Boring B-11 and at a depth of 13 feet in Boring B-13. The presence or absence of groundwater at a particular location does not necessarily mean that groundwater will be present or absent at that location at other times. Seasonal variations and other unknown considerations could cause fluctuations in the water level and the presence of water in the soils.

5.0 ENGINEERING ASSESSMENTS AND RECOMMENDATIONS

5.1 EXISTING FILL

As previously described, fill was encountered in Borings B-14 and -15 within the proposed borrow area. TSi understands that no structures are planned in the vicinity of these borings. In general, TSi anticipates that the top 5 feet of existing fill soils within the borrow area may later be used as new fill during grading operations for the construction of the proposed new synthetic turf fields. The existing fill is generally comprised of lean and fat clays (CL and CH), with the upper 5 feet typically consisting of high plasticity soils. The fill is relatively high in water content and may require lime stabilization prior to placement if used as new fill for the proposed synthetic turf fields and comfort areas. It is recommended that the borrow area soils consisting of high-plasticity soils should not be used within 3 feet below the base of any floor slab or shallow foundation, and within 18 inches below the base of any proposed synthetic turf cross-section.

5.2 SWELLING SOIL CONSIDERATIONS

Relatively high plasticity (fat) clays were encountered at all of the boring locations. High plasticity clay soils tend to swell when water is absorbed and shrink as the material dries. Potential detrimental effects include heaving, settlement, and differential movements of foundations, floor slabs, and pavements.

In general, the standard of care in the area for foundation construction is to overexcavate high plasticity soil to a depth of 3 feet below footings, floor slabs, and pavements. The fat clay should be replaced with a volume-stable material, such as a low-plasticity silty or lean clay or a well-graded crushed limestone. The new material should be placed and compacted in accordance with the recommendations that appear later in this report. TSi suggests that unit rates for removal and replacement of fat clay in this manner be included in the bid documents so that a comparison of such rates can be part of the selection process.

For paved areas, an alternate approach to overexcavation and replacement would be to lime-modify the upper 2 feet of soil that would underlie the pavement base course. Because of the relatively low severity of consequences for volume change effects upon pavements caused by swelling soils (compared to structure foundations), some owners elect not to overexcavate and replace or otherwise treat fat clay and accept the risk for future maintenance costs in exchange for upfront construction cost savings.

For the synthetic turf fields, TSi recommends overexcavating the upper 1.5 feet of any high plasticity soils encountered at the subgrade level and replacing the material with a volume-stable material.

In addition to the recommendations discussed above, some relatively simple design and construction considerations are recommended that will aid in maintaining the natural moisture content of the clay, and reducing the potential for swell. Avoiding conditions that could result in excessive wetting or drying of the subgrade will reduce the potential for volume instability. The following design and construction precautions are recommended:

1. Positive surface drainage should be provided during and after construction to prevent ponding of water around the buildings and on or adjacent to pavements.
2. Stormwater runoff from the building roofs should be collected by a gutter system, or other means, and carried away from the buildings to avoid saturating the subgrade under and adjacent to the buildings.
3. Deep-rooted trees or shrubs planted for landscaping purposes should be kept a distance of one mature height away from the buildings to prevent their roots from withdrawing excessive moisture from the underlying clay soils.
4. Excessive watering of grass or shrubs adjacent to the buildings or pavements should be avoided.
5. High plasticity, fat clay should be placed and compacted at or above the optimum moisture content of the soil, and subgrades consisting of high plasticity clay (or shale) should not be allowed to dry below the optimum moisture content during construction. It is considered critical that the subgrade be rewetted and reconditioned prior to the placement of floor slabs and pavements if these areas become dry after prolonged exposure.
6. A representative of TSi should be present to observe the extent of any high plasticity clays exposed at the subgrade level during construction. If appropriate, additional testing may be recommended to assess whether or not any mitigation is necessary.

5.3 CONCESSIONS AND FIELD AREA PREPARATION CONSIDERATIONS

It is our understanding that the proposed single-story and lightly-loaded structures for concessions, bathrooms, and seating are in proximity to the existing concessions area and the location of Boring B-13. The proposed fields are in the general vicinity of Borings B-10, -11, and -12. Generally, the southwest corner of the property, which contains Borings B-10 through -13, consists of undeveloped land.

High-plasticity clays (CH) are present within the top 5 feet at all of these boring locations. Any high plasticity soils present at the base of any shallow foundation or synthetic turf cross-section should be overexcavated and replaced with low plasticity fill materials to a minimum of 3 feet below the base of any floor slab or shallow foundation, and to a minimum of 18 inches below the base of any synthetic turf cross-section. Low plasticity fill materials within the footprint of the proposed fields and concession areas may include crushed limestone or lean clays that are free of deleterious materials and organics. Any new fill placed should be compacted as recommended in section 6.4 of this report. The contractor should be aware of any specific subgrade requirements from the synthetic turf manufacturer.

5.4 SHALLOW FOUNDATIONS

TSi understands that the anticipated loads for the concession stands and other miscellaneous structures will be relatively low. Such structures may be supported by shallow spread footing foundations bearing on firm, natural low plasticity soils or new structural fill placed and compacted in accordance with the recommendations provided later in this report. Spread footings may be designed for a net allowable bearing pressure (pressure in excess of adjacent overburden

pressure) of up to 1,500 pounds per square foot (psf) for structural dead load plus maximum live load. Due to the presence of soft zones in the soil strata, TSi recommends that the footing locations be inspected upon excavation.

Footings should be constructed at least 30 inches below the exterior finish grade to provide protection against the detrimental effects of seasonal moisture variations and frost penetration. Strip-type footings should be at least 1.5 feet wide and square footings at least 2.0 feet in dimension, regardless of the applied structural load, in order to provide a bearing area that will account for minor variations in the supporting soil.

The loads imposed by the foundations are expected to result in some compression of the supporting materials. Based on the conditions encountered at the boring locations, and the expected structural loads, maximum settlements are not expected to exceed about 1 inch, with differential settlements of up to approximately half the total. The majority of the settlement should take place during construction, as the loads are applied to the subgrade.

5.5 REGIONAL SEISMICITY

Although several significant areas of seismic activity exist in the central United States, the St. Louis area is most directly affected by the New Madrid Seismic Zone, with its northern limits located in the bootheel area of southeast Missouri and the southern tip of Illinois; and the Wabash Seismic Zone, located in south and east-central Illinois. The New Madrid zone is essentially defined by the Mississippi Embayment, an area where deep sedimentary deposits have accumulated above basement rock. The zone continues to be active, with small tremors (microearthquakes) occurring regularly. The seismic history of the zone is dominated by a series of strong earthquakes that occurred from 1811 through 1812. Studies indicate the major shocks from these events resulted in an energy release equivalent to a body wave Magnitude 7.5 event. Smaller but more frequent events are associated with the Wabash zone, located along the eastern border of Illinois. These events can have an influence on the earthquake loading in the local area.

This site is considered to be Site Class D based on the field and laboratory test data. A detailed evaluation of liquefaction was not included in the scope of work for this study; however, a general assessment of liquefaction was performed. Liquefaction is the loss of shear strength that occurs within a saturated soil mass when a cyclic load is applied. Liquefaction occurs when the pore water pressure in the soil mass increases to a value equaling the overburden pressure, resulting in zero effective stress. Recent developments in evaluating liquefaction potential indicate that any fine-grained soil for which the standard penetration test (N) value is less than or equal to 4 may be susceptible to liquefaction. There are limited thicknesses and extents of cohesive soils at the site that are soft in consistency and that could be susceptible to loss of strength and spreading during a seismic event. However, dense sands or stiffer clays may be present beneath the soils encountered at the boring locations. If the team is concerned about potential for liquefaction, then further studies should be performed.

6.0 SITE PREPARATION AND EXCAVATION CONSIDERATIONS

6.1 SUBGRADE PREPARATION

Prior to construction, the development area should be stripped of any vegetation, organic soil, and any deleterious materials. The exposed subgrade should be proofrolled. Proofrolling is accomplished by passing over the subgrade with appropriate equipment and observing the subgrade for pockets of excessively soft, wet, disturbed, or otherwise unsuitable soils. Appropriate equipment for proofrolling shall include equipment such as a fully loaded, tandem axle dump truck or other equipment providing an equivalent subgrade loading. Any soft, loose, wet, or otherwise unsuitable areas identified by proofrolling should be reworked in accordance with the recommendations presented in this report. After proofrolling and the removal of any unsuitable soils, the subgrade should be scarified to a depth of 6 inches, the moisture content of the soil adjusted to near its optimum moisture content, and the subgrade recompacted to a minimum of 95% of the standard Proctor (ASTM D 698) maximum dry density of the soil. The recommended proofrolling and recompaction of the subgrade may be waived by TSi if it is determined, based on field observations, that it is unnecessary or could be detrimental to the existing subgrade condition.

Any fat clay encountered at subgrade level within the planned structure area should be removed for a thickness of at least 3 feet, and either treated with lime and recompacted, or simply replaced with new low-plasticity compacted fill or compacted granular fill.

6.2 SUBGRADE PROTECTION

Construction areas should be properly drained in order to reduce or prevent surface runoff from collecting on the subgrade. Any ponded water on the exposed subgrade should be removed immediately. To prevent unnecessary disturbance of the subgrade soils, heavy construction vehicles should be restricted from traveling through the finished subgrade. If areas of disturbed subgrade develop, they should be properly repaired in accordance with the recommendations in this report.

Excavations for footing subgrades should be accomplished carefully, with care taken not to excessively disturb the soil. Any loose or soft soil that accumulates at the foundation subgrade should be removed prior to placing structural elements. It is recommended that footings be poured the same day as the subgrade is excavated, cleaned, and prepared, in order to prevent deterioration of the subgrade.

6.3 FILL AND BACKFILL MATERIALS

The soils that will be excavated at the site will be predominately fat clays. Fat clays may be used, if placed 3 feet below final foundation grades at the structures, 2 feet below any paved areas, and 1.5 feet below any field areas, and if placed and maintained wet of the optimum moisture content. In general, off-site fill should consist of low plasticity lean clays or clayey silts with a liquid limit of less than 50 and a plasticity index of less than 25. Alternatively, a well-graded crushed limestone could be used for fill material. Off-site fill should be approved by TSi prior to

being imported to the job site. In general, acceptable fill materials would include predominantly soil with no significant content of inert material such as brick, concrete, or stone pieces. Soil with decayable material such as wood, metal, or vegetation is not acceptable.

Depending on the time and sequence of construction, backfill soils may require the addition of moisture prior to compaction. This should be performed in a controlled manner using a water spray to evenly wet the soil, and then thoroughly blending the moistened soil with a disk or other means to produce a uniform moisture content. Repeated mixing of the soil may be required to achieve the proper moisture content. If lime, Code-L, or similar additives are incorporated into the subgrade, the addition of water may be needed.

If the structures and fields are constructed during the winter season, fill materials should be carefully observed to see that no ice or frozen soils are placed as fill or remain in the base materials upon which fill is placed.

6.4 FILL AND BACKFILL PLACEMENT

Lean clay fill placed for structure support should be compacted to a dry density of at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the soil. Granular material, such as crushed limestone that is placed for structure support, should be compacted to at least 100% of the standard Proctor maximum dry density. The moisture content of fill at the time of compaction should generally be within plus or minus 3% of the optimum moisture content of the material as determined by the standard Proctor compaction test. If fat clay is used as fill, the material should be placed on the wetter range of the optimum. Fill should be placed in loose lifts not in excess of 8 inches thick, and compacted to the aforementioned criterion. However, it may be necessary to place fill in thinner lifts to achieve the recommended compaction when using small hand-operated equipment.

6.5 GROUNDWATER CONSIDERATIONS

Groundwater was encountered during drilling at a depth of 3.5 feet in Boring B-11 and at a depth of 13 feet in Boring B-13. Fluctuation in the groundwater level could occur because of seasonal variations. It is expected that groundwater seepage that would be encountered during excavations could be handled by means of an excavation drainage system consisting of drainage ditches, sumps, and pumps.

6.6 SHALLOW FOUNDATION EXCAVATIONS

Foundations in soil should be excavated with a smooth-edged, clawless excavating bucket to reduce disturbance of the bearing surface. The excavations should be kept dry, and foot traffic should be kept to a minimum to limit disturbance. Any loose or soft material that accumulates or develops at the footing subgrade should be removed prior to the placement of concrete. If zones of soft soils are encountered at the foundation support level, they should be removed and replaced with properly compacted fill, or the footings should be deepened to bear on stiffer soil.

Concrete should be placed as soon as practical after the excavation has been completed to avoid deterioration of the bearing surface due to excessive drying, or excessive wetting caused by precipitation. Alternately, a thin layer of lean concrete could be placed over the excavation floor to protect the bearing surface.

7.0 CONSTRUCTION OBSERVATION AND TESTING

It is recommended that TSi be retained during construction to perform testing and observation services for the following items:

- placement and compaction of fill and backfill;
- observation of the soil subgrades for suitability of the supporting soil and proper preparation prior to placing new fill;
- all phases of foundation construction; and
- quality assurance testing for structural concrete.

These quality assurance services should help to verify the design assumptions and maintain construction procedures in accordance with the project plans, specifications, and good engineering practice.

8.0 REPORT LIMITATIONS

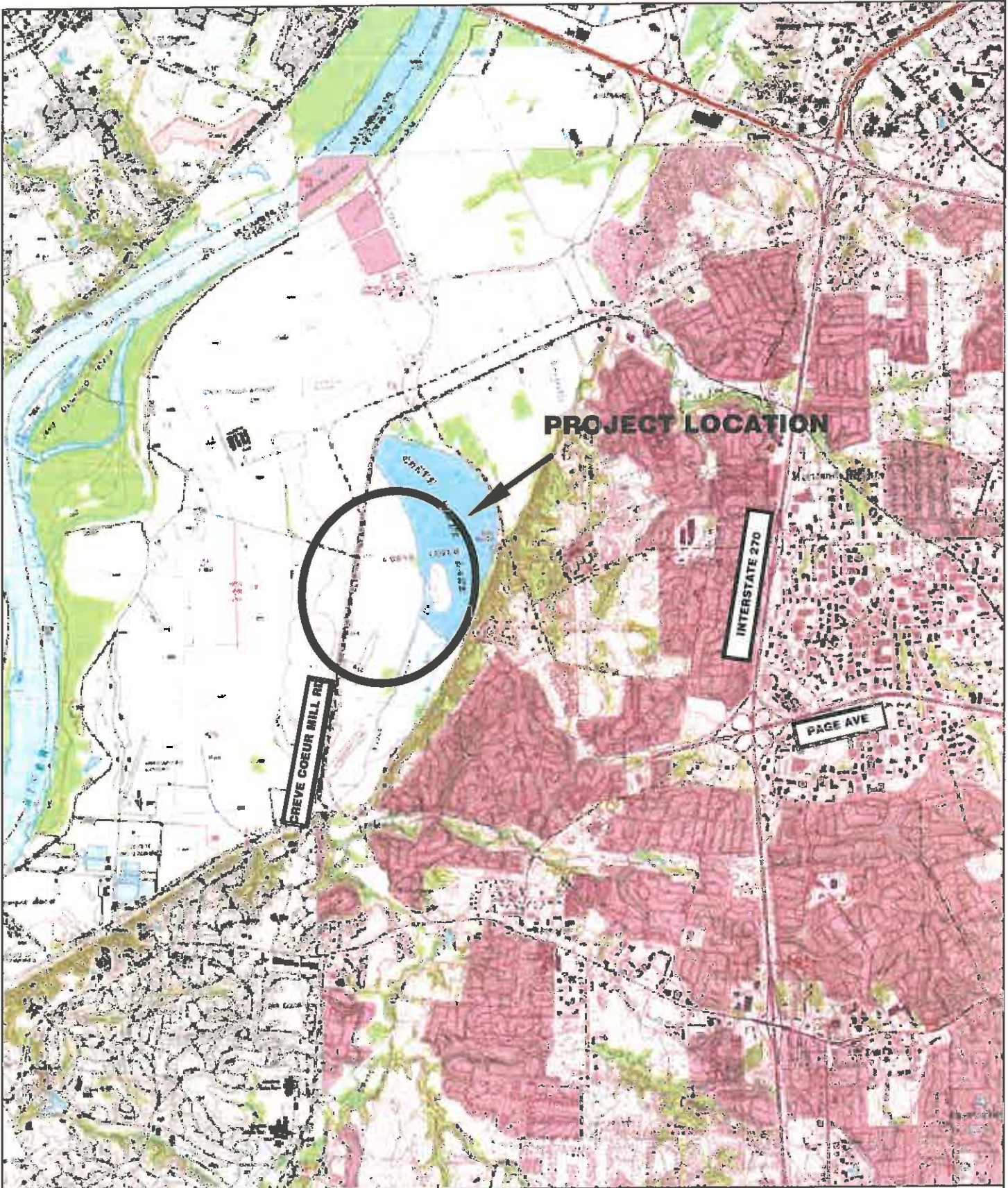
This report has been prepared for the exclusive use of **WSP – PARSONS BRINCKERHOFF** for the specific application to the subject project. The recommendations contained in this report have been made in accordance with generally accepted soil and foundation engineering practices; no other warranties are implied or expressed.

The analyses and recommendations submitted in this report are based in part upon the data obtained from the test borings. The nature and extent of variations between the borings may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

If conditions at the site have changed due to natural causes or construction operations, this report should be reviewed by TSi to determine the applicability of the analyses and recommendations considering the changed conditions. The report should also be reviewed by TSi if changes occur in the building location, size, and type, or in the planned loads, elevations, or project concepts.

TSi requests the opportunity to review the final plans and specifications for the project prior to construction to verify that the recommendations in this report are properly interpreted and incorporated in the design and construction documents. If TSi is not accorded the opportunity to make this recommended review, we can assume no responsibility for the misinterpretation of our recommendations.

APPENDIX A



NOT TO SCALE

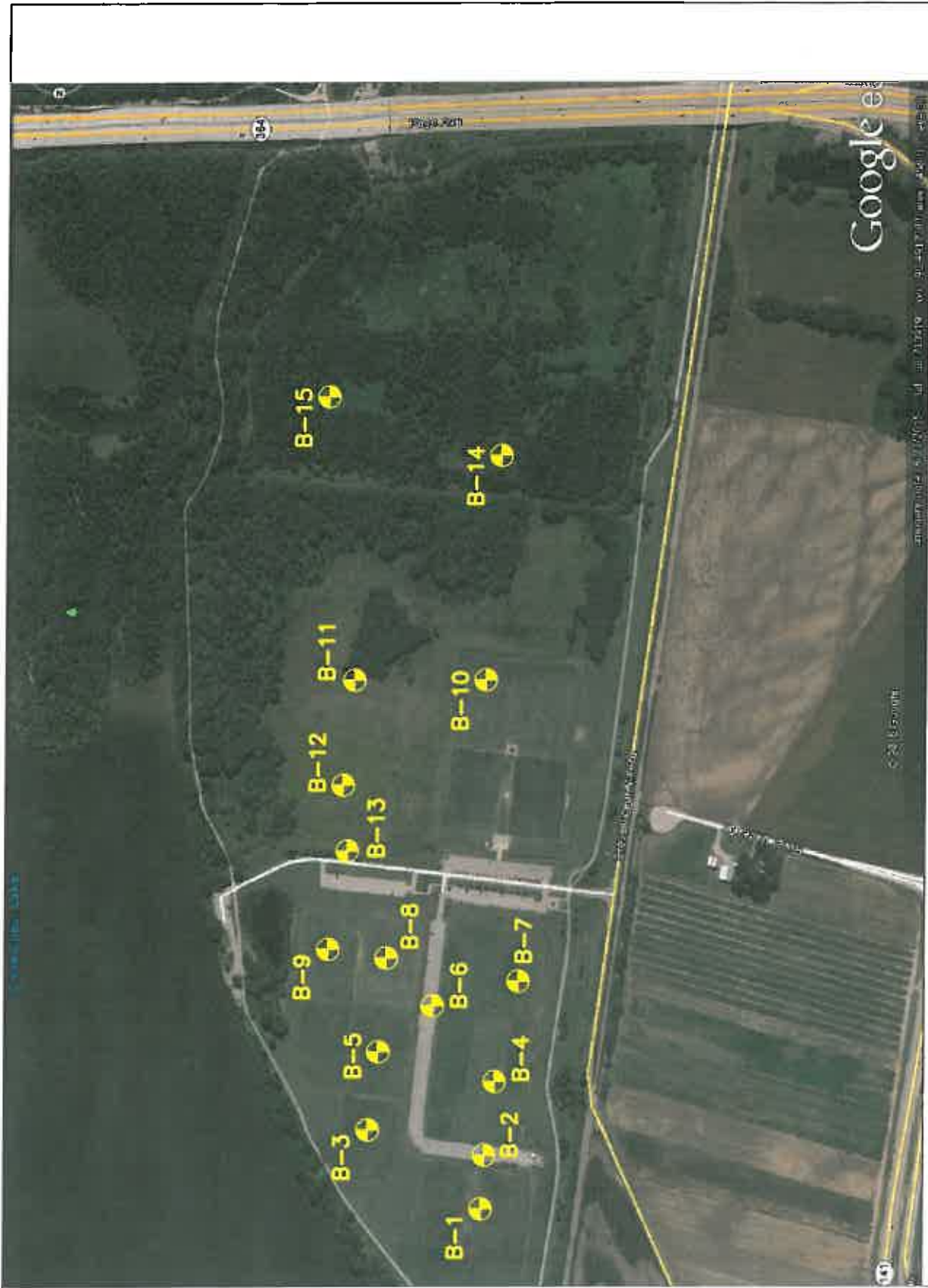
NOTE:
DRAWING PREPARED FROM AN IMAGE
OBTAINED FROM TOPOQUEST.COM
ON 06/15/16



VICINITY MAP

CREVE COEUR LAKE SOCCER PARK
MARYLAND HEIGHTS, MISSOURI

Drawn By: DDII	Checked By: NRL
Project No. 20161130.00	Date: 06/15/16 Figure 1



LEGEND

B-1  APPROXIMATE BORING LOCATION AND NUMBER

NOTE: THIS PLAN WAS PREPARED FROM AN IMAGE OBTAINED FROM GOOGLE EARTH ON 06/15/16.

NOT TO SCALE



SITE AND BORING LOCATION PLAN
CREVE COEUR LAKE SOCCER PARK
MARYLAND HEIGHTS, MISSOURI

Drawn By: DDI

Checked By: NRL

Project No. 20161130.00

Date: 06/16/16 Figure 2

APPENDIX B

GENERAL NOTES

The number of borings is based on: topographic and geologic factors; the magnitude of structure loading; the size, shape, and value of the structure; consequences of failure; and other factors. The type and sequence of sampling are selected to reduce the possibility of undiscovered anomalies and maintain drilling efficiency. Attempts are made to detect and/or identify occurrences during drilling and sampling such as the presence of water, boulders, gas, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation in resistance to driving split-spoon samplers, unusual odors, etc. However, lack of notation regarding these occurrences does not preclude their presence.

Although attempts are made to obtain stabilized groundwater levels, the levels shown on the Logs of Boring may not have stabilized, particularly in more impermeable cohesive soils. Consequently, the indicated groundwater levels may not represent present or future levels. Groundwater levels may vary significantly over time due to the effects of precipitation, infiltration, or other factors not evident at the time indicated.

Unless otherwise noted, soil classifications indicated on the Logs of Boring are based on visual observations and are not the result of classification tests. Although visual classifications are performed by experienced technicians or engineers, classifications so made may not be conclusive.

Generally, variations in texture less than one foot in thickness are described as layers within a stratum, while thicker zones are logged as individual strata. However, minor anomalies and changes of questionable lateral extent may appear only in the verbal description. The lines indicating changes in strata on the Logs of Boring are approximate boundaries only, as the actual material change may be between samples or may be a gradual transition.

Samples chosen for laboratory testing are selected in such a manner as to measure selected physical characteristics of each material encountered. However, as samples are recovered only intermittently and not all samples undergo a complete series of tests, the results of such tests may not conclusively represent the characteristics of all subsurface materials present.

NOTATION USED ON BORING LOGS

APPROXIMATE PROPORTIONS		PARTICLE SIZE	
TRACE	<15%	BOULDERS	>12 Inches
WITH	15-30%	COBBLES	12 Inches – 3 Inches
MODIFIER	>30%	GRAVEL	
		Coarse	3 Inches – ¾ Inch
		Fine	¾ Inch – No. 4 Sieve (4.750 mm)
		SAND	
		Coarse	No. 4 – No. 10 Sieve (2.000 mm)
		Medium	No. 10 – No. 40 Sieve (0.420 mm)
		Fine	No. 40 – No. 200 Sieve (0.074 mm)
Clay or clayey may be used as major material or modifier, regardless of relative proportions, if the clay content is sufficient to dominate the soil properties.		SILT	No. 200 Sieve - 0.002 mm
		CLAY	< 0.002 mm

PENETRATION – BLOWS

Number of impacts of a 140-pound hammer falling a distance of 30 inches to cause a standard split-barrel sampler, 1 3/8 inches I.D., to penetrate a distance of 6 inches. The number of impacts for the first 6 inches of penetration is known as the seating drive. The sum of the impacts for the last 12 inches of penetration is the Standard Penetration Test Resistance or “N” value, blows per foot. For example, if blows = 6-8-9, “N” = 8+9 or 17.

OTHER NOTATIONS

Recovery % – length of recovered soil divided by length of sample attempted.

50/2” Impacts of hammer to cause sampler to penetrate the indicated number of inches

WR Sampler penetrated under the static loading of the weight of the drill rods

WH Sampler penetrated under the static loading the weight of the hammer and drill rods

HSA Hollow stem auger drilling method







FA Flight auger drilling method

RW Rotary wash drilling methods with drilling mud

AH Automatic hammer used for Standard Penetration Test sample

SH Safety hammer with rope and cathead used for Standard Penetration Test sample

GRAPHIC SYMBOLS

-  Depth at which groundwater was encountered during drilling
-  Depth at which groundwater was measured after drilling
-  Standard Penetration Test Sample, ASTM D1586
-  3-inch diameter Shelby Tube Sample, ASTM D1587
-  Sample grabbed from auger
-  NX Size rock core sample

UNIFIED SOIL CLASSIFICATION SYSTEM, (ASTM D-2487)

Major Divisions		Group Symbols	Typical Names	Laboratory Classification Criteria		
Coarse-grained soils (More than half of materials is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 per cent More than 12 per cent 5 to 12 per cent	
		Gravels with fines (Appreciable amount of fines)	GM ^a	d		Silty gravels, gravel-sand-silt mixtures
		Gravels with fines (Appreciable amount of fines)	GM ^a	u		Silty gravels, gravel-sand-silt mixtures
		Clayey gravels (Appreciable amount of fines)	GC	Clayey gravels, gravel-sand-clay mixtures		
		Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines		
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SP	Poorly graded sands, gravelly sands, little or no fines	GW, GP, SW, SP GM, GC, SM, SC Borderline cases requiring dual symbols ^b	
		Sands with fines (Appreciable amount of fines)	SM ^a	d		Silty sands, sand-mix mixtures
		Sands with fines (Appreciable amount of fines)	SM ^a	u		Silty sands, sand-mix mixtures
		Clayey sands (Appreciable amount of fines)	SC	Clayey sands, sand-clay mixtures		
		Clayey sands (Appreciable amount of fines)	SC	Clayey sands, sand-clay mixtures		
Fine-grained soils (More than half of materials is smaller than No. 200 sieve size)	Silts and clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	<p style="font-size: small;">For classification of fine-grained soils and fine-grained fraction of coarse-grained soils: Equation of "A"-line Horizontal at PI=4 to LL=25.5, then PI=0.73(LL-20) Equation of "U"-line Vertical at LL=16 to PI=7, then PI=0.9(LL-8)</p>		
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
		OL	Organic silts and organic silty clays of low plasticity			
	Silts and clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
		CH	Inorganic clays of medium to high plasticity, organic silts			
		OH	Organic clays of medium to high plasticity, organic silts			
	Highly organic soils	Pt	Peat and other highly organic soils			

^aDivision of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 26 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.



^bBorderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

LOG OF BORING NO. B-1

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.:	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Location: See Site and Boring Location Plan										
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Dark brown, fat CLAY (CH)	67		3 3 3	2.50			35			
		ST-2			100			2.00			31			
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ_6/20/16

Completion Depth: 5.0	Remarks: Boring drilled with CME 550x using CFA and auto SPT. Groundwater not encountered during drilling.
Date Boring Started: 5/23/16	
Date Boring Completed: 5/23/16	
Engineer/Geologist: KSW	
Project No.: 20161130.00	



The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-2

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.:	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Location: See Site and Boring Location Plan										
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Dark brown, fat CLAY (CH)	47		3 3 3	3.00			35			
		SS-2			72		2 3 3	2.50			36			
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
 Date Boring Started: **5/23/16**
 Date Boring Completed: **5/23/16**
 Engineer/Geologist: **KSW**
 Project No.: **20161130.00**


Remarks: **Boring drilled with CME 550x using CFA and auto SPT.
Groundwater not encountered during drilling.**



The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-3

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Dark brown, fat CLAY (CH), trace sand	58		3 4 4	3.00			32			
		SS-2			83		2 2 3	2.00			43			
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
 Date Boring Started: **5/23/16**
 Date Boring Completed: **5/23/16**
 Engineer/Geologist: **KSW**
 Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT. Groundwater not encountered during drilling.**



The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-4

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
		SS-1		Brown, lean CLAY (CL), with grass and roots	61		3 3 3	3.00		31				
		ST-2		Dark brown, fat CLAY (CH), trace sand	100			3.00		31				
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
Date Boring Started: **5/23/16**
Date Boring Completed: **5/23/16**
Engineer/Geologist: **KSW**
Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT. Groundwater not encountered during drilling.**

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-5

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.:	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Location: See Site and Boring Location Plan										
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Dark brown, fat CLAY (CH), trace sand	61		2 3 2	2.25			41			
		ST-2			100			2.00			35			
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
Date Boring Started: **5/23/16**
Date Boring Completed: **5/23/16**
Engineer/Geologist: **KSW**
Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT.
Groundwater not encountered during drilling.**



The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-6

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Dark brown, fat CLAY (CH)	89		2 2 2	2.75			31			
		SS-2			100		1 2 2	2.00			45	67	28	39
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
 Date Boring Started: **5/23/16**
 Date Boring Completed: **5/23/16**
 Engineer/Geologist: **KSW**
 Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT. Groundwater not encountered during drilling.**

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-7

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.:	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Location: See Site and Boring Location Plan										
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Dark brown, fat CLAY (CH), trace sand	56		3 4 4	4.00			36			
		SS-2			72		3 3 3	3.00			34			
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
Date Boring Started: **5/23/16**
Date Boring Completed: **5/23/16**
Engineer/Geologist: **KSW**
Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT.
Groundwater not encountered during drilling.**




The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-8

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.:	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Location: See Site and Boring Location Plan										
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Dark brown, fat CLAY (CH), trace sand	69		3 2 3	2.00			31			
		SS-2		- trace silt lenses and organics below 3.5 ft.	89		1 2 2	1.50			31			
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 5/20/16

Completion Depth: **5.0**
Date Boring Started: **5/23/16**
Date Boring Completed: **5/23/16**
Engineer/Geologist: **KSW**
Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT.
Groundwater not encountered during drilling.**



The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-9

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
		SS-1		Brown, lean CLAY (CL), with grass and roots	72		3 3 4	3.00			37			
		ST-2		Dark brown, fat CLAY (CH), trace sand	67			2.00			30			
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
Date Boring Started: **5/23/16**
Date Boring Completed: **5/23/16**
Engineer/Geologist: **KSW**
Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT. Groundwater not encountered during drilling.**




The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-10

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
		SS-1		Brown, lean CLAY (CL), with grass and roots Dark brown, fat CLAY (CH), trace sand	78		2 2 3	2.25		40				
		ST-2		Brown and gray, SILT (ML), trace clay and organics	100					52				
5				Brown and gray, lean CLAY (CL), with silt lenses Boring terminated at 5.0 ft.										

LOG WITH LAB CREVE COEUR SOCCER PARK.GINT.GPJ 6/20/16

Completion Depth: **5.0**
Date Boring Started: **5/23/16**
Date Boring Completed: **5/23/16**
Engineer/Geologist: **KSW**
Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT. Groundwater not encountered during drilling.**



The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-11

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
		SS-1		Brown, lean CLAY (CL), with grass and roots Dark brown, fat CLAY (CH)	58		2 3 3	1.75			38			
		SS-2		Gray, lean CLAY (CL), with silt lenses	89		2 1 1	0.50			31			
5				Boring terminated at 5.0 ft.										
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
Date Boring Started: **5/23/16**
Date Boring Completed: **5/23/16**
Engineer/Geologist: **KSW**
Project No.: **20161130.00**


Remarks: **Boring drilled with CME 550x using CFA and auto SPT. Groundwater encountered at 3.5 ft. during drilling.**



The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-12

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.:	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Location: See Site and Boring Location Plan										
				MATERIAL DESCRIPTION										
		SS-1		Brown, lean CLAY (CL), with grass and roots	67		2	1.75		39				
				Dark brown, fat CLAY (CH) - trace silt lenses from 1.0 to 2.5 ft.			2							
		ST-2					2							
5				Boring terminated at 5.0 ft.	100		1.25			57				
10														
15														
20														
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: **5.0**
 Date Boring Started: **5/23/16**
 Date Boring Completed: **5/23/16**
 Engineer/Geologist: **KSW**
 Project No.: **20161130.00**

Remarks: **Boring drilled with CME 550x using CFA and auto SPT.
Groundwater not encountered during drilling.**









The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-13

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
		SS-1		Brown, lean CLAY (CL), with grass and roots Dark brown, fat CLAY (CH)	75		2 2 3	2.25			31			
5		ST-2			100			1.50	0.42	75	46	83	35	48
		SS-3		- grayish brown below 6.0 ft.	100		1 1 1	0.75			52			
		ST-4			92						62			
10				Brown, fine SAND (SP)										
		SS-5		Brown, sandy lean CLAY (CL) ▽	92		1 1 2	0.50			35			
				Gray and brown, silty SAND (SM)										
20		SS-6			89		3 4 5				25			
				Boring terminated at 20.0 ft.										

LOG WITH LAB. CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: 20.0
Date Boring Started: 5/23/16
Date Boring Completed: 5/23/16
Engineer/Geologist: KSW
Project No.: 20161130.00

Remarks: Boring drilled with CME 550x using CFA and auto SPT. Groundwater encountered at 13.0 ft. during drilling.

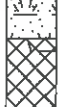





The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-14

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Brown and gray, fat CLAY (CH) (FILL)	56		2 1 2	0.75			41			
5		SS-2			50		WH 1 1	0.75			37			
		SS-3			100		WH WH 1	<0.25			47			
10		SS-4		Gray, clayey SILT (ML)	100		WH WH WH	<0.25			38			
				Brown and gray, fat CLAY (CH), trace sand and gravel										
15		SS-5			67		1 3 3	2.50			39			
				Brown and gray, lean CLAY (CL), trace roots, with silt lenses										
20		SS-6			100		3 3 4	1.50			29			
				Boring terminated at 20.0 ft.										

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: 20.0
Date Boring Started: 6/6/16
Date Boring Completed: 6/6/16
Engineer/Geologist: FHH
Project No.: 20161130.00

Remarks: Boring drilled with CME 550x using HSA and auto SPT. Groundwater not encountered during drilling.







The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-15

Project Description: **Creve Coeur Lake Soccer Park
Maryland Heights, MO**

TSI Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, lean CLAY (CL), with grass and roots										
		SS-1		Brown and gray, fat CLAY (CH) (FILL) - trace roots from 1.0 to 2.5 ft.	89		2 1 2	0.50			37			
5		SS-2			100		WH 1 WH	<0.25			52			
		SS-3		Gray, lean CLAY (CL), trace organics, with layers of fat clay (FILL)	100		WH WH WH	<0.25			54			
10		SS-4			100		WH WH WH	<0.25			42			
		SS-5		Brown and gray, fat CLAY (CH)	100		1 2 3	1.50		45	83	32	51	
15														
		SS-6		Brown, SILT (ML), trace clay	83		2 3 3	0.75			37			
20				Boring terminated at 20.0 ft.										
25														

LOG WITH LAB CREVE COEUR SOCCER PARK GINT.GPJ 6/20/16

Completion Depth: 20.0
Date Boring Started: 6/6/16
Date Boring Completed: 6/6/16
Engineer/Geologist: FHH
Project No.: 20161130.00

Remarks: Boring drilled with CME 550x using HSA and auto SPT. Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

APPENDIX C



COMPACTION TEST

PROJECT NAME: Creve Coeur Soccer Park

PROJECT No.: 20161130.00

SAMPLE NUMBER: Bulk - 1

SAMPLE LOCATION: B-14

DEPTH: 0 to 5.0 ft.

VISUAL CLASS. (USCS): Brown, fat CLAY (CH)

TYPE OF COMPACTION	STD	D698	No. 4	PROCEDURE
SIEVE ANALYSIS RESULTS	3/4	3/8	No. 4	PROCEDURE
% Retained(cumulative)				A

SOIL WEIGHT DATA					
Determination Number	1	2	3	4	5
Weight- Soil + Mold (wet),g	5830.0	5896.9	5936.4	5924.5	
Weight of Mold,g	4160.0	4160.0	4160.0	4160.0	
Weight Wet Soil,g	1670.0	1736.9	1776.4	1764.5	
Volume of Mold (ft ³)	0.0333	0.0333	0.0333	0.0333	

MOISTURE DATA					
Weight- Soil + Tare (wet),g	587.8	620.3	235.2	350.3	
Weight- Soil + Tare (dry),g	501.7	521.7	205.7	293.4	
Weight- Tare,g	84.5	84.0	84.0	82.8	

COMPUTED DATA					
Wet unit weight (pcf)	110.6	115.0	117.6	116.8	
Moisture content (%)	20.6	22.5	24.2	27.0	
Dry unit weight (pcf)	91.6	93.8	94.7	92.0	

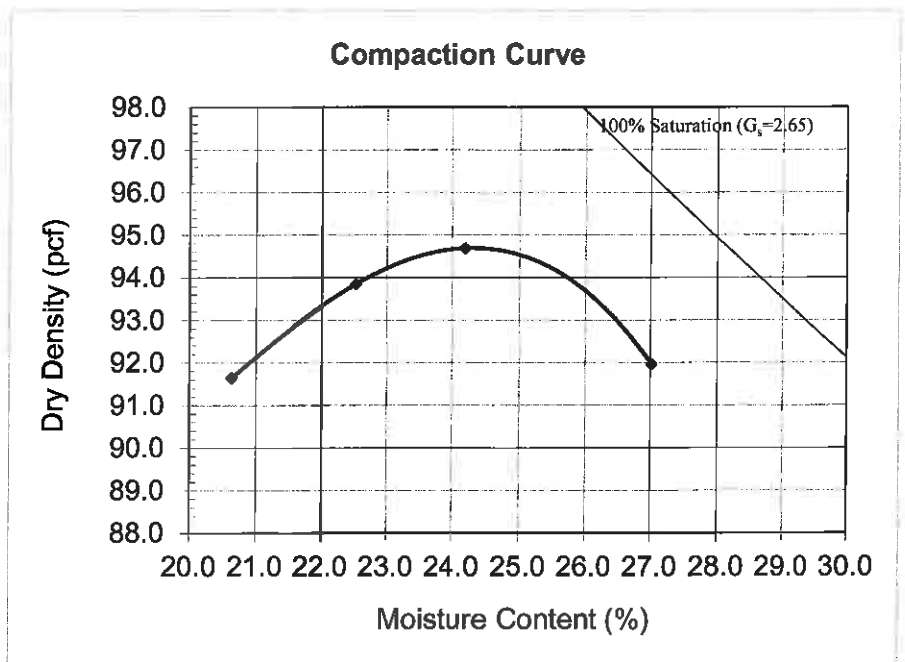
Maximum Dry Density (pcf)	94.8
Optimum Moisture Content (%)	24.2
Natural Moisture Content (%)	43.7

Corr. Max. Dry Density (pcf)	
Corr. Optimum Moist. Cont. (%)	

Liquid Limit	59
Plastic Limit	27
Plasticity Index	32
CLASSIFICATION. (USCS)	CH

	Date
Tested by : SJ	6/15/2016
Calculated by: CAV	6/16/2016
Checked by: CAV	6/16/2016

NOTE:





COMPACTION TEST

PROJECT NAME: Creve Coeur Soccer Park

PROJECT No.: 20161130.00

SAMPLE NUMBER: Bulk - 1

SAMPLE LOCATION: B-15

DEPTH: 0 to 5.0 ft.

VISUAL CLASS. (USCS): Brown, fat CLAY (CH)

TYPE OF COMPACTION	STD	D698			
SIEVE ANALYSIS RESULTS	3/4	3/8	No. 4	PROCEDURE	
% Retained(cumulative)				A	

SOIL WEIGHT DATA					
Determination Number	1	2	3	4	5
Weight- Soil + Mold (wet),g	5719.6	5815.0	5913.1	5886.0	
Weight of Mold,g	4160.0	4160.0	4160.0	4160.0	
Weight Wet Soil,g	1559.6	1655.0	1753.1	1726.0	
Volume of Mold (ft ³)	0.0333	0.0333	0.0333	0.0333	

MOISTURE DATA					
Weight- Soil + Tare (wet),g	365.1	391.1	391.8	354.6	
Weight- Soil + Tare (dry),g	320.1	336.0	330.9	295.2	
Weight- Tare,g	85.3	84.5	83.8	83.0	

COMPUTED DATA					
Wet unit weight (pcf)	103.3	109.6	116.1	114.3	
Moisture content (%)	19.2	21.9	24.6	28.0	
Dry unit weight (pcf)	86.6	89.9	93.1	89.3	

Maximum Dry Density (pcf)	93.4
Optimum Moisture Content (%)	25.2
Natural Moisture Content (%)	

Corr. Max. Dry Density (pcf)	
Corr. Optimum Moist. Cont. (%)	

Liquid Limit	62
Plastic Limit	27
Plasticity Index	35
CLASSIFICATION. (USCS)	CH

	Date
Tested by : SJ	6/15/2016
Calculated by: CAV	6/16/2016
Checked by: CAV	6/16/2016

NOTE:

