The Procurement Division of Knox County, Tennessee will receive sealed proposals for the **Cedar Bluff Road Flood Improvement Project** as specified herein. Proposals must be received by **2:00 p.m.** on **July 18, 2024**. Late proposals will neither be considered nor returned.

Deliver Proposal To:

Proposal Number 3572
Knox County Procurement Division
Suite 100
1000 North Central Street
Knoxville, Tennessee 37917

The Proposal Envelope must show the Company Name, Proposal Number, Proposal Name & Proposal Closing Date.

SECTION I GENERAL TERMS AND CONDITIONS

1.1 **ADDITIONAL INFORMATION:** Knox County wants requests for additional information routed to Ben Sharbel, CPPO, CPPB, Supervisor of Property Development and Asset Management, at 865.215.5765. Questions may be emailed to ben.sharbel@knoxcounty.org. Information about the Knox County Procurement Division and current solicitations may be obtained on the internet at www.knoxcounty.org/procurement.

1.2 **ACCEPTANCE:** Vendors shall hold their proposal firm and subject to acceptance by Knox County for a period of one hundred twenty (120) business days from the date of the proposal closing, unless otherwise indicated in their proposal.

1.3 **ALTERNATIVE PROPOSALS:** Knox County will not accept alternate proposals. Proposers must strictly adhere to the proposal format in Section V.

1.4 **AUDIT HOTLINE:** Knox County has established an Audit Hotline to report potential fraud and waste. To report potential fraud, waste or abuse, please call 1-866-858-4443 (toll-free). You can also file a report online by accessing http://www.knoxcounty.org/hotline/index.php.

Vendors are hereby cautioned that this Audit Hotline does not replace the Award Protest Procedures found in Section VI, Item M of the Knox County Procurement Regulations.

1.5 **AWARD:** Award may be made to the most responsive, responsible proposer meeting specifications, who presents the product and/or service that is in the best interest of Knox County. Knox County reserves the right to award this proposal on an all-or-none basis. **Knox County reserves the right to not award this proposal.** Award will be made in accordance with the evaluation criteria specified herein.

1.6 **BUSINESS OUTREACH PROGRAM:** Knox County has established a Business Outreach Program, which has the responsibility of increasing opportunity for small, minority and women owned businesses. This is being accomplished through community education programs, policy edification, active recruitment of interested businesses and process re-engineering.

Knox County is committed to ensuring full and equitable participation for all disadvantaged businesses. Knox County welcomes submittals from those disadvantaged businesses who have an interest in providing goods and/or services listed herein. In addition, Knox County strongly encourages the inclusion of disadvantaged businesses by non-disadvantaged contractors who may wish to partner or subcontract portions of this agreement in order to accomplish the successful delivery of goods and/or services. If you are a disadvantaged business and would like additional information about our Business Outreach Program please contact:

Diane Woods, CPPB, Business Outreach Administrator
Knox County Procurement
Telephone: 865.215.5760
Fax: 865.215.5778
E-Mail: diane.woods@knoxcounty.org

1.7 **CLOSURES:** During periods of closure due to unforeseen circumstances in Knox County or closures at the direction of the Knox County Mayor, the Procurement Division will enact the following procedures in regards to solicitations and closures:

- If the Mayor closes the Administrative offices prior to the time set for solicitation opening of any business day, all solicitations due that same day will be moved to the next operational business day.
- Other unforeseen circumstances shall be at the sole discretion of the Procurement Director.
- Knox County shall not be liable for any commercial carrier's decision regarding deliveries during any unforeseen circumstances.

1.8 **CONFLICT OF INTEREST:** Vendors must have read and complied with the "non-conflict of interest" statement provided in the vendor registration process prior to the closing of this solicitation.

1.9 **COPIES:** Knox County **requires** that all proposals be submitted with one (1) **marked original** and three (3) exact copies. Proposers must also scan their entire response into one (1) .pdf file and submit on a CD/DVD or flash drive.

1.10 **DECLARATIVE STATEMENT:** Any statement or words (e.g.: must, shall, will) are declarative statements and the vendor **must** comply with the condition. Failure to comply with any such condition may result in their proposal being non-responsive and disqualified.

1.11 **DEFAULT:** Knox County reserves the right, in case of Contractor default, to terminate the Contract and hold the defaulting Contractor responsible for any excess costs occasioned thereby. Should the Contractor default be due to a failure to perform Knox County reserves the right to remove the Contractor from the County's bidder's list for twenty-four (24) months.

1.12 **DESTINATION AND DELIVERY:** Proposers must include all destination and delivery charges in their price**. There will be no extra hidden charges. Delivery must be "free on board" to the County department.**

1.13 **ELECTRONIC TRANSMISSION OF PROPOSALS:** Due to the nature of this proposal, Knox County's Procurement Division will **NOT** accept electronically transmitted proposals through the County's On-Line Procurement System. Email and facsimile submission are strictly prohibited. All proposals must be submitted in hard copy format to the address listed in this solicitation.

1.14 **HOW TO DO BUSINESS:** Knox County utilizes a web-based Procurement software system, "KnoxBuys". The system provides our clients (vendors, county departments and the citizens of Knox County) with a more enhanced and end-user friendly means of accessing our services. The system allows for on-line vendor registration and maintenance, electronic receipt of purchase orders, on-line retrieval and submittal of quotes, bids and proposals for our vendor-clients and on-line requisitioning and receiving for our county departments. In order for the County to maximize its investment and minimize the cost associated with office operations we need your help. When doing business with Knox County we are urging you to please go to our website at www.knoxcounty.org/procurement, register as a vendor in our on-line Procurement system, "KnoxBuys", if you have not done so and whenever possible to conduct your business with the County through this site. If you have any questions, please contact the Procurement Division Representative listed in subsection 1.1 of this document.

1.15 **INCURRED COSTS:** Knox County will not be liable in any way for costs incurred by any proposer in the preparation and submission of its proposal in response to this RFP, nor for the presentation of its proposal and/or participation in any required meetings, discussions or negotiations. If any oral presentations are required, Knox County advises vendors to be thorough and complete in submission of information.

1.16 **NO CONTACT POLICY:** After the vendor receives this RFP, any contact initiated by any vendor with anyone, other than the Procurement Division representative listed herein, concerning this Request for Proposal **is strictly prohibited**. Any such unauthorized contact may cause the disqualification of the vendor from this process.

1.17 **NON-COLLUSION:** Vendors, by submitting a signed proposal, certify that the accompanying proposal is not the result of, or affected by, any unlawful act of collusion with any other person or company engaged in the same line of business or commerce, or any other fraudulent act punishable under Tennessee or United States law. Firms must complete and submit with their bid the Non-collusion Affidavit of Prime Bidder form, attached as **Attachment D**.

1.18 **POSSESSION OF WEAPONS:** All vendors and their employees and their agents are prohibited from possessing any weapons on Knox County property without prior written consent from the County. In the case of a vendor whose contract requires possession of firearms or other weapons to successfully complete their contract, vendor must provide personnel who are bonded to bear said weaponry.

1.19 **PROCESSING TIME FOR PAYMENT:** Vendors are advised that a minimum of thirty (30) days may be required to process invoices for payment.

1.20 **PROOF OF FINANCIAL AND BUSINESS CAPABILITY:** Vendors must, upon request, furnish satisfactory evidence of their ability to furnish products or services in accordance with the terms and conditions of these specifications. Knox County will make the final determination as to the vendor's ability.

1.21 **PROPOSAL DELIVERY:** Knox County requires proposers, when hand delivering proposals, to time and date stamp the envelope before depositing it in the bid box. Knox County will not be responsible for any lost or misdirected mail sent by common carrier, nor will Knox County be responsible for proposals delivered to addresses other than the delivery address specified at the top of this solicitation. The time clock in the Procurement Division shall serve as the official record of time.

Solicitations must be in a sealed envelope/box prior to entering the Procurement Division office. Procurement Division personnel are not allowed to see the submittal nor assist in placing documents in an envelope/box. Additionally, the Procurement Division is not responsible for providing materials (e.g.: envelopes, boxes, tape) for submittals.

1.22 **RECYCLING:** Knox County, in its continuing efforts to lessen the amount of landfill waste and to further recycling efforts, requests that proposals being submitted on paper shall:

- Be submitted on recycled paper
- Not include pages of unnecessary advertising
- Be made on both sides of each sheet of paper

1.23 **RESTRICTIVE OR AMBIGUOUS SPECIFICATIONS:** It is the responsibility of the prospective proposer to review the entire Request for Proposal (RFP) packet and to notify the Procurement Division if the specifications are formulated in a manner that would unnecessarily restrict competition. Any such protest or question regarding the specifications or proposal procedures must be received in the Procurement Division by **July 3, 2024 at 4:30 p.m.** local time. These requirements also apply to specifications that are ambiguous.

1.24 **SIGNING OF PROPOSALS:** When submitting your proposal, in order to be considered, all proposals **must** be signed. Please sign the original in blue ink.

1.25 **TAXES:** Knox County purchases are not subject to taxation. Tax exemption certificates will be provided upon request.

1.26 **TITLE VI OF THE 1964 CIVIL RIGHTS ACT:** "Non-discrimination in Federally Assisted Programs" - "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." 42 U.S.C. section 2000 et seq. It is the policy of Knox County Government that all its services and activities be administered in conformance with the requirements of Title VI.

1.27 **VENDOR REGISTRATION:** Prior to the closing of this proposal, ***ALL PROPOSERS MUST*** be registered with the Procurement Division. A vendor application may be submitted online at www.knoxcounty.org/procurement. Select the On-Line Vendor Registration link and complete the forms. Vendors must be registered with the Procurement Division **prior** to submitting their bid. Knox County shall not be responsible for technical difficulties experienced by vendors trying to register less than twenty-four (24) hours prior to the proposal closing time.

1.28 **WAIVING OF INFORMALITIES:** Knox County reserves the right to waive minor informalities or technicalities when it is in the best interest of Knox County.

SECTION II OBLIGATIONS, RIGHTS AND REMEDIES

These terms and conditions shall be part of the contract. Knox County reserves the right to negotiate other terms and conditions it deems appropriate and necessary under the circumstances to protect the public's trust.

2.1 **ALTERATIONS OR AMENDMENTS:** No alterations, amendments, changes, modifications or additions to this Contract shall be binding on Knox County without the prior written approval of the County.

2.2 **APPROPRIATION:** In the event no funds are appropriated by Knox County for the goods or services in any fiscal year or insufficient funds exist to purchase the goods or services, then the Contract shall expire upon the expenditure of previously appropriated funds or the end of the current fiscal year, whichever occurs first, with no further obligations owed to or by either party.

2.3 **ASSIGNMENT:** Contractor shall not assign or sub-contract this agreement, its obligations or rights hereunder to any party, company, partnership, incorporation or person without the prior written specific consent of Knox County.

2.4 **BOOKS AND RECORDS:** Contractor shall maintain all books, documents, accounting records and other evidence pertaining to the goods and services provided under this Contract and make such materials available at its offices at all reasonable times during the contract period and for three (3) years from the date of the final payment under this agreement for inspection by County or by any other governmental entity or agency participating in the funding of this agreement, or any authorized agents thereof; copies of said records to be furnished if requested. Such records shall not include those books, documents and accounting records that represent the Contractor's costs of manufacturing, acquiring or delivering the products and services governed by this agreement.

2.5 **CHILD LABOR:** Contractor agrees that no products or services will be provided or performed under this Contract that have been manufactured or assembled by child labor.

2.6 **COMPLIANCE WITH ALL LAWS:** Contractor is assumed to be familiar with and agrees to observe and comply with all federal, state, and local laws, statutes, ordinances, and regulations in any manner affecting the provision of goods and/or services, and all instructions and prohibitive orders issued regarding this work and shall obtain all necessary permits.

2.7 **DEFAULT:** If Contractor fails to perform or comply with any provision of this Contract or the terms or conditions of any documents referenced and made a part hereof, Knox County may terminate this Contract, in whole or in part, and may consider such failure or noncompliance a breach of contract.

Knox County expressly retains all its rights and remedies provided by law in case of such breach, and no action by Knox County shall constitute a waiver of any such rights or remedies. In the event of termination for default, Knox County reserves the right to purchase its requirements elsewhere, with or without competitive solicitation.

2.8 **GOVERNING LAW; VENUE:** This agreement shall be exclusively construed, governed, and controlled by the Laws of the State of Tennessee without regard to principles of law, including conflicts of law, of any other jurisdiction, territory, country, and/or province. Any dispute arising out of or relating to this agreement shall exclusively be brought in the Chancery Court or the Circuit Court of Knox County, Tennessee. Each party consents to personal jurisdiction thereto and waives any defenses base on personal jurisdiction, venue and inconvenient forum.

2.9 **INCORPORATION:** All specifications, drawings, technical information, Request for Proposal, Proposal, Award and similar items referred to or attached or which are the basis for this Contract are deemed incorporated by reference as if set out fully herein.

2.10 **INDEMNIFICATION/HOLD HARMLESS:** Contractor shall indemnify, defend, save and hold harmless Knox County, its officers, agents and employees from all suits, claims, actions or damages of any nature brought because of, arising out of, or due to breach of the agreement by Contractor, its subcontractors, suppliers, agents, or employees or due to any negligent act or occurrence or any omission or commission of Contractor, its subcontractors, suppliers, agents or employees.

2.11 **INDEPENDENT CONTRACTOR:** Contractor shall acknowledge that it and its employees serve as independent contractors and that Knox County shall not be responsible for any payment, insurance or incurred liability.

2.12 **INSPECTION AND ACCEPTANCE:** Warranty periods shall not commence until Knox County inspects and formally accepts the goods and/or services. The terms, conditions and timing of acceptance shall be determined by Knox County. Knox County reserves the right to reject any or all items or services not in conformance with applicable specifications, and Contractor assumes the costs associated with such nonconformance. Acceptance of goods or services does not constitute a waiver of latent or hidden defects or defects not readily detectable by a reasonable person under the circumstances.

2.13 **IRAN DIVESTMENT ACT:** By submission of this RFP, each respondent and each person signing on behalf of any respondent certifies, and in the case of a joint submittal each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each respondent is not on the list created pursuant to Tennessee Code Annotated § 12-12-106. All respondents must complete and submit with their response the Affidavit of Compliance with Iran Divestment Act/No Boycott of Israel, attached to the RFP as Attachment B.

2.14 **LIMITATIONS OF LIABILITY:** In no event shall Knox County be liable for any indirect, incidental, consequential, special or exemplary damages or lost profits, even if Knox County has been advised of the possibility of such damages.

2.15 **NO BOYCOTT OF ISRAEL:** Pursuant to Tennessee Code Annotated Title 12, Chapter 4, Part 1, by submission of a response to this solicitation, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint response each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not currently engaged in, and will not for the duration of the contract engage in, a boycott of Israel. All respondents must complete and submit with their response the Affidavit of Compliance with Iran Divestment Act/No Boycott of Israel, attached to the RFP as Attachment B.

2.16 **NON-DISCRIMINATION AND NON-CONFLICT STATEMENT:** Contractor agrees that no person on the grounds of handicap, age, race, color, religion, sex or national origin, or any individual trait or characteristic found to be an illegal consideration, shall be excluded from participation in, or be denied benefits of, or be otherwise subjected to discrimination in the performance of this agreement, or in the employment practices of vendor. Contractor shall upon request show proof of such non-discrimination, and shall post in conspicuous places available to all employees and applicants notices of non-discrimination. Contractor covenants that it complies with the Fair Wage and Hour Laws, the National Labor Relations Act, and other federal and state employment laws as applicable. Contractor covenants that it does not engage in any illegal employment practices.

Contractor covenants that it has no public or private interest, and shall not acquire directly or indirectly any interest which would conflict, in any manner, with the provision of its goods or performance of its services. Contractor warrants that no part of the total contract amount provided herein shall be paid directly or indirectly to any officer or employee of Knox County as wages, compensation, or gifts in exchange for acting as officer, agent, employee, subcontractor or consultant to Contractor in connection with any goods provided or work contemplated or performed relative to the agreement.

2.17 **ORDER OF PRECEDENCE:** In the event of inconsistent or conflicting provision of this Contract and referenced documents, the following descending order of precedence shall prevail: (1) Contract, (2) Request for Proposal (3) Contractor's Response, (4) Award, (5) Special Terms and Conditions, (6) General Terms and Conditions, (7) Specifications, (8) Drawings.

2.18 **REMEDIES:** Knox County shall have all rights and remedies afforded under the U.C.C. and Tennessee law in contract and in tort, including but not limited to rejection of goods, rescission, right of offset, refund, incidental, consequential and compensatory damages and reasonable attorney's fees.

2.19 **RECORDS:** Contractor will maintain records of products and/or services provided to Knox County and make them available on request.

2.20 **RIGHT TO INSPECT:** Knox County reserves the right to make periodic inspections of the manner and means the service is performed or the goods are supplied.

2.21 **SEVERABILITY:** If any provision of this Contract is declared illegal, void or unenforceable, the remaining provisions shall not be affected but shall remain in force and in effect.

2.22 **TAX COMPLIANCE:** Pursuant to Resolution R-07-1-903 passed by the Commission of Knox County, Tennessee, Contractor hereby acknowledges by submission of their signed bid or proposal that they are current in its respective Federal, State, County and City taxes of whatever kind or nature and is not delinquent in any way. Delinquent status must be disclosed or risk debarment by the Knox County Procurement Division.

2.23 **TERMINATION:** Knox County may terminate this agreement with or without cause at any time. In the event of termination by either party, fees due for services satisfactorily performed or goods accepted prior to the termination date shall be paid.

2.24 **WARRANTY:** Contractor warrants to Knox County that all items delivered and all services rendered shall conform to the specifications, drawings, proposal and/or other descriptions furnished and/or incorporated by reference, and will be fit for the particular purpose purchased, of merchantable quality, good workmanship, and free from defects. Contractor extends to Knox County all warranties allowed under the U.C.C. Contractor shall provide copies of warranties to the County. Return of merchandise not meeting warranties shall be at contractor's expense.

SECTION III SPECIAL TERMS AND CONDITIONS

3.1 **INTENT:** The intent of this proposal is to set forth and convey to prospective proposers the general requirements for the Cedar Bluff Road Flood Improvement Project for Knox County. Award may be based on Best Value. Best Value means more than low cost. It includes initial cost, service quality, and other factors detailed herein.

3.2 **ACCEPTANCE:** Contractors are advised that neither the signing of delivery receipts nor the payment of invoice necessarily constitutes acceptance of product installations. Acceptance requires a specific written action by Knox County so stating.

3.3 **BID ENVELOPE COVER:** The bid envelope cover sheet, **Attachment E**, must be filled out completely and attached to the outside of your bid. **Failure to do so will result in the rejection of your bid.**

3.4 **CHANGES AFTER AWARD:** It is possible that after award, Knox County might change its needs or requirements. Knox County reserves the right to make such changes after consultation with the vendor. Should additional costs arise, Knox County reserves the right to consider accepting these charges provided the vendor can document the increased costs. Knox County also reserves the right to accept proposed service changes from the vendor if they will lower the cost to Knox County and/or provide improved service.

3.5 **COMMUNICATIONS WITH THE CONTRACTOR:** Upon award, Knox County will communicate extensively and continually with the Contractor. While information may occasionally be transmitted via telephone, it should always be followed up with an email confirmation.

3.6 **COMPLIANCE WITH ALL APPLICABLE REGULATIONS:** Contractor agrees and covenants that the company, its agents and employees will comply with all City, County, State, and Federal codes, laws rules, and regulations.

3.7 **CONTRACT EXECUTION:** The award of this proposal may result in a Contract between Knox County and the successful vendor. The Contract may be voted on by Knox County Commission and receive a majority vote. The successful vendor may be required to be present at the Knox County Commission Meetings to answer questions relating to the services performed. Adequate notification will be given by the Knox County Procurement Division if the vendor will need to attend the meetings. The Knox County Procurement Division will draft the Contract. Knox County **will not** accept any vendor's contract. Vendors are hereby cautioned that the Knox County Mayor is the only individual who can legally bind Knox County to a contractual agreement.

3.8 **CONSTRUCTION PROJECTS:** Any construction undertaking for which the total cost of the project is twenty-five thousand dollars ($25,000) or more is subject to the "Contractors Licensing Act of 1994." In accordance with the Act, no bid will be opened unless the outside of the sealed envelope containing the bid provides the following information: the Contractor's license number, the date of the license's expiration, and a dollar quotation of that part of his classification applying to the bid. In addition, each HVAC, plumbing, electrical and gas utility subcontractor's license number, date of the license expiration and that part of each classification applying to the bid if the value of the work is $25,000 or greater, must be annotated. If the value of the subcontractor's work is less than $25,000, the bid envelope is to be annotated with the phrase "Subcontractor's Bid is Less Than $25,000" after each appropriate heading. In the case of joint ventures, each party submitting the bid must provide this information.

If no subcontractors are being used, the outside of the envelope must state, "No Subcontractors are being used on this project." **All bids must be submitted in one envelope; use the Bid Envelope Cover provided with the Invitation for Bid.**

3.9 **CONTRACTOR'S DUTIES:** All work performed under this Contract shall be performed in accordance with all provisions of these specifications or plans and must be approved in writing by the owner or their representative.

3.10 **DRUG-FREE WORKPLACE:** If the Contractor has five (5) or more employees receiving pay the Contractor shall have a drug-free workplace program that complies with Title 50, Chapter 9 of the Tennessee Code, and **must** provide the affidavit provided herein (Attachment C) as required by Public Acts, 2000, Chapter 918.

3.11 **EVALUATION CRITERIA:** This proposal will be evaluated using the following criteria:

Experience & Qualifications	35 Points
Project Approach	35 Points
Cost	20 Points
Proposed Timeline	10 Points

Knox County may select an Evaluation Committee for this solicitation to thoroughly review and score all submitted responsive and responsible proposals. Each evaluator will have the ability to award up to 100 points, based on the Evaluation Criteria, per submission.

3.12 **EVALUATION REVIEW:** Knox County reserves the right to use all pertinent information that might affect the County's judgment as to the appropriateness of an award to the best evaluated proposer. This information may be appended to the proposal evaluation process results. Information on a service provider from reliable sources, and not within the service provider's proposal, may also be noted and made part of the evaluation file. Knox County shall have sole responsibility for determining a reliable source. Knox County reserves the right to conduct written and/or oral discussions/interviews after the proposal closing. The purpose of such discussions/interviews is to provide clarification and/or additional information to make an award that is in the best interest of Knox County.

3.13 **EXCEPTIONS TO SPECIFICATIONS:** Vendors taking exception to any part or section of these specifications shall indicate such exceptions in their proposal response. Failure to indicate any exceptions shall be interpreted as the vendor's intent to fully comply with the specifications as written. Conditional or qualified offers are subject to rejection in whole or in part. Any exceptions shall be included in Section V, Part VIII of the submittal.

3.14 **GRATUITIES AND KICKBACKS:** It shall be a breach of ethical standards for any person or company to offer, give, or agree to give any employee or former employee, or for any employee or former employee to solicit, demand, accept, or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation of any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim, or controversy or other particular matter, pertaining to any program requirement of a contract or subcontract or to any solicitation or proposal therefore.

3.15 **INSURANCE:** The successful Proposer(s) must carry the insurance as indicated on the Insurance Attachment, Exhibit A. As proof of the vendor's willingness to obtain and maintain the insurance, the proposer must complete, sign and have its insurance agent sign the attachment and submit it with their proposal. Upon receipt of the Notification of Intent to Award, the successful proposer will be required to submit a Certificate of Insurance showing the specified coverage and naming Knox County as additional insured.

3.16 **LICENSING:** All contractors and sub-contractors must be properly licensed by the State of Tennessee and all other authorities having jurisdiction where applicable. ***COPIES OF ALL SUCH LICENSES AND/OR PERMITS ARE TO BE SUBMITTED WITH THE PROPOSAL. FAILURE TO SUBMIT COPIES OF SUCH MAY LEAD TO PROPOSAL REJECTION.***

3.17 **NEGOTIATIONS:** Knox County may select a successful Proposer on the basis of initial offers received without discussions, though Knox County may require/conduct oral interviews. Therefore, each proposal shall contain the Proposer's best terms from a cost or price and service standpoint. Knox County reserves the right to enter into Contract negotiations with the highest-rated Proposer.

If Knox County and the selected Proposer cannot negotiate a successful agreement with terms and conditions the County determines are fair and reasonable, Knox County may terminate said negotiations and begin negotiations with the next highest-rated Proposer. This process will continue until a Contract has been successfully negotiated or all proposals have been rejected. No Proposer shall have any rights against Knox County arising from such negotiations.

3.18 **NEWS RELEASES BY VENDORS:** As a matter of policy, Knox County does not endorse the services of a Contractor. A Contractor will not make news releases concerning any resultant contract from this solicitation without the prior written approval of Knox County.

3.19 **OWNERSHIP OF DOCUMENTS:** Any reports, specifications, drawings, blueprints, negatives, electronic files or other documents prepared by the Proposer and/or sub-contractors in the performance of its obligations under the Contract shall be the exclusive property of Knox County, and all such materials shall be returned to Knox County upon completion, termination, cancellation, or request of this Contract within a reasonable timeframe as determined by the County. The Proposer shall not use, willingly allow, or cause such materials to be used for any purpose other than performance of all contractor's obligations under the resulting Contract without the prior written consent of Knox County.

3.20 **PERFORMANCE AND PAYMENT BONDS:** The Contractor will be required to execute an acceptable performance and payment bond in the amount equal to 100 percent of the Contract price before a Notice to Proceed is issued. As proof of the Contractor's ability to provide a performance and payment bond, the Contractor must submit with the proposal response a letter to the Owner from its bonding company evidencing the ability to provide a Payment Bond and a Performance Bond for the project, each in the full amount of the projected project cost.

All bonding companies must be listed In the Federal Register, Department of the Treasury Fiscal Service, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, Notice. The ratings that the bonding company holds must be acceptable to the County.

3.21 **POSSESSION OF WEAPONS:** All vendors and their employees and their agents are prohibited from possessing any weapons on Knox County property without prior written consent from the County. In the case of a vendor whose contract requires possession of firearms or other weapons to successfully complete their contract, vendor must provide personnel who are bonded to bear said weaponry.

3.22 **PRE-PROPOSAL MEETING:** A non-mandatory pre-proposal meeting will be held **Tuesday**, **June 25, 2024,** beginning at **10:00 a.m. local time**. The meeting will be held at Knox County Procurement, 1000 North Central Street, Suite 100, Knoxville, TN 37917. Subcontractors, if necessary, are encouraged to attend but not required.

3.23 **PROHIBITION AGAINST DISSEMINATING INFORMATION:** Contractor shall not sell, disburse, disseminate or in any other way provide information to any outside party without the expressed written consent of Knox County.

3.24 **PROPOSAL CONTENT:** The Proposer's response must contain a thorough description of the background of the Proposer and sufficient evidence showing that the Proposer is capable of providing the work. The Proposer's response must thoroughly expound on the Proposer's understanding of how the proposed work will meet Knox County's needs. The failure or omission of a proposer to become acquainted with existing conditions shall in no way relieve the proposer of any obligations with respect to this RFP or to the Contract.

3.25 **PROPOSAL EVALUATION:** In evaluating the proposals, Knox County reserves the right to use any or all of the ideas from the proposals submitted without limitation and to accept any part or all, of the successful proposal in selecting an operation which is judged to be in the best interest of the Knox County. All material submitted becomes the property of Knox County.

3.26 **PROPOSAL FORMAT:** This solicitation is in the Request for Proposal (RFP) format. At the specified date and time, each Proposer's name will be publicly read aloud. No further information will be given at that time. Evaluation of the proposals will proceed as expeditiously as possible and successful, as well as unsuccessful, notification will be given.

3.27 **PUBLIC RECORDS ACT:** Knox County is subject to the Tennessee Public Records Act 10-7-503 et seq. Bidders are cautioned that all documents submitted on behalf of this Invitation for Bid shall be open to the public for viewing and inspection and Knox County will comply with all legitimate requests.

3.28 **REJECTION OF PROPOSALS:** Knox County reserves the right to reject any and all proposals received as a result of this request and to waive any informality, technical, defect or clerical error in any proposal, as the interests of the County may require. Non-acceptance of any proposal will be devoid of any criticism of the proposal and of any implication that the proposal is deficient in any manner. Non-acceptance of any proposal shall be construed as meaning simply that the County does not deem the proposal to be acceptable or that another proposal was deemed to be more advantageous to Knox County for the particular services proposed.

3.29 **REMOVAL OF CONTRACTOR'S EMPLOYEES:** The successful Proposer agrees to utilize only experienced, responsible and capable people in the performance of the work. Knox County may require that the Proposer remove from the job covered by this Contract, employees who endanger persons or property or whose continued employment under this Contract is inconsistent with the interest of Knox County.

3.30 **SAFETY, PROTECTION AND TRAINING:** The successful Proposer shall be solely and completely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work to be performed. Furthermore, the successful Proposer is solely responsible for the training of all their employees on all safety issues as required by the Occupational Safety and Health Act (OSHA) and the Environmental Protection Agency (EPA) regulations for the project. The Prime Proposer shall take all necessary precautions for the safety of, and provide the necessary protection to prevent injury to, all employees on the work site and other persons including but not limited to, the general public who may be affected thereby. All work is to be done as required as by OSHA, EPA, and AHERA. Knox County does not assume any responsibility for the protection of or for loss of materials, from the time that the contract operations have commenced until the final acceptance of the work by Knox County.

The successful Proposer is responsible for training their employees in Safety and Health Regulations for the job, assuring compliance with Tennessee Occupational Safety and Health Regulations and any other Regulatory Agency. The successful Proposer shall be required to furnish their employees with the proper personal protective clothing and equipment. The successful Proposer shall also be required to dispose of this clothing and equipment in compliance with all regulatory requirements.

The successful Proposer is responsible for training their employees in Safety and Health Regulations for the job, assuring compliance with Tennessee Occupational Safety and Health Regulations and any other regulatory agency.

3.31 **SAFETY EFFORTS:** The successful Proposer and all sub-contractors must exercise caution at all times for the protection of persons and property. The safety provisions of applicable laws, building and construction codes must be observed. Machinery, equipment and all other hazards must be guarded or eliminated in accordance with the safety provisions of the Manual of Accident Prevention in Construction to the extent that such provisions are not in contravention of applicable laws. This manual is published by the Associated General Contractors of America. The Prime Proposer and all sub-contractors shall also comply with the requirements of the Occupational Safety and Health Act of 1970 and the revisions thereto.

3.32 **SUBMIT QUESTIONS:** Prospective proposers may submit questions concerning this solicitation until **July 3, 2024 @ 4:30 p.m. local time**. Submit questions as noted in Section 1.1.

3.33 **THIRD PARTY CONTRACTORS:** All third-party contractors that may be used for providing services must be listed in the proposal. Contractors and their third party must adhere to all terms and conditions set forth for this proposal. Knox County will not have any contractual liability for any third-party Contractors.

3.34 **WORKMANSHIP:** Where not more specifically described in any of the various sections of these specifications workmanship shall conform to all of the methods and operations of best standards and accepted practices of the trade or trades involved, and shall include all items of fabrication, construction or installation regularly furnished or required for completion of the services. All work shall be executed by personnel skilled in their respective lines of work.

SECTION IV SPECIFICATIONS

4.1 **PROJECT DESCRIPTION:** The Ten Mile Creek watershed is characterized by sinkhole drainage, which is easily overwhelmed by heavy surface stormwater and flood events. Within this watershed, N Cedar Bluff, Fox Lonas and Dutchtown Roads are critical transportation routes and have been repeatedly impacted by heavy storm events, most recently in February 2019. Knox County has acquired property in the Cedar Bluff area and desires to utilize that property to increase flood storage. Knox County would like to obtain proposals to complete grading and drainage work reflected on the attached geotechnical reports and plans, Attachments F through I.

Based on the information obtained through geotechnical explorations, there appears to be a large amount of rock that may be suitable for other uses (see attached geotechnical report) as well as excess topsoil and residual soils. Knox County recognizes the potential value of the material on site and feels the project may be mutually beneficial. The goal of this RFP is to secure a construction contract that will provide a "turn-key" solution to remove the rock and complete the grading and drainage work. Knox County is looking for creative, cost-effective proposals from a Contractor to re-utilize the materials onsite for other purposes that would potentially offer a credit in cost to the County while also completing the flood mitigation project. Knox County would expect lines and grades to be obtained in eighteen (18) months from issuance of notice to proceed, but alternate construction timelines will be considered.

Note: Knox County recognizes there may be a desire for site exploration prior to submitting a proposal. Site Visits will be at the discretion of Knox County Engineering and Public Works and at the expense of the prospective proposer. Prospective proposers must obtain prior written approval from Knox County before visiting the site by contacting Ben Sharbel as directed in Section 1.1.

4.2 SCOPE OF WORK: The project location is 0 Fox Lonas Road (Parcel ID 119 005), 0 North Cedar Bluff Road (Parcel ID 119 017), and 0 Dutchtown Road (Parcel ID 119 00501). The turnkey solution must include the following:

Clear, Grub, and Fence the Site

- Survey and mark a 40-foot buffer around the site as shown on the plans (Attachments F through I).
- Clear and grub the site within the 40-foot buffer.
- Do not disturb the 40-foot buffer shown and maintain the existing vegetation with the buffer.
- Install erosion prevention and sediment control measures through the use of structural and non-structural controls for stormwater runoff.
- Adhere to Tennessee Department of Transportation (TDOT) Standard Specifications for Road and Bridge Construction Section 201 – Clearing and Grubbing.
- Obtain any and all necessary permits.
- Establish construction entrances on Park Village Road. Maintain traffic control as needed.
- Daily hours of operation shall minimize neighborhood disturbance. Knox County reserves the right to modify work hours.
- After the completion of clearing and grubbing activities, install an 8-foot high chain-link fence with two access gates along the site perimeter. The access gates should be double-wide gates along Park Village Road for truck access.

Rock Excavation

- Obtain any and all necessary permits.
- The work area is designated on the Earthwork Plan and within the fenced area.
- Do not disturb the 40-foot buffer shown and maintain the existing vegetation within the buffer.
- Maintain and stabilize steep slopes according to the Tennessee Construction General Permit and all applicable environmental permits. (TDOT 203.04).
- Use the temporary access driveways on Park Village Road. These may be modified upon request to Knox County.
- Daily hours of operation shall minimize neighborhood disturbance. Knox County reserves the right to modify work hours.
- Remove material from Areas A and B as specified in the following table and on the attached drawings. The minimum volume removed from Area A will be 2,217,327 CF below the 924-foot elevation. The minimum volume removed from Area B will be 1,119,118 CF below the 922-foot elevation.
- Scale all loose fragments, projecting points, and debris from rock cuts, and leave in a neat, safe, and workmanlike condition. (TDOT 203.08).
- Temporarily discontinue excavating operations upon encountering remains or prehistoric archeological sites or artifacts of historical or archeological significance. (TDOT 203.04).
- Prepare and submit as-built drawings detailing the volume removed upon completion of the project.
- Maintain drainage to the existing sinkholes during construction.

Area	Top Measured Contour Elevation (ft.)	Pre-Developed Storage (CF)	Post-Developed Storage (CF)	Volume Created (CF)
A	924	2,095,596	4,311,923	2,216,327
B	922	485,155	1,604,273	1,119,118

4.3 **CLEAN-UP:** The Contractor shall keep the job site premises and adjacent areas free from accumulations of waste material or rubbish at all times. At the completion of the work, Contractor shall remove, from and about the premises, including adjacent areas, all rubbish, tools and surplus materials used for work.

4.4 **DAMAGE TO PROPERTY:** The Contractor is responsible for damages to any property, County owned or otherwise, that is a result of Contractor negligence while work is in progress. If the Contractor fails to make repairs or replace damaged materials, as necessary, the County shall deduct the amount of any damages from the Contractor's payment.

4.5 **PROJECT/CONSTRUCTION ADMINISTRATION:** Upon award and prior to the owner issuing a Notice-to-Proceed, the Contractor shall submit a construction schedule showing planned and actual start and finish dates for the project, sequencing, submission dates for required deliverables, and major milestones. The schedule shall begin with Notice-to-Proceed through Final Completion. During construction, the Contractor shall hold regularly scheduled progress meetings including the Owner.

The Contractor or assigned representative (site superintendent) shall be on the site at all times of work to provide construction supervision, including when sub-contractors are performing work under this contract. It is Knox County's belief that the site superintendent drives the project and is the most important individual assigned to the project. The Contractor is expected to provide the site superintendent's cell phone and email address to Knox County so that the owner has the ability to stay in constant contact with the site superintendent.

Public inquiries into the project, onsite or otherwise, must at all times be directed to the Knox County Engineering and Public Works contract administrator.

4.6 **PROJECT COMPLETION:** Prior to Final Completion, the Contractor shall submit any necessary closeout documents. A final payment will not be made until the work is accepted by Knox County.

4.7 **OVERVIEW OF ATTACHMENTS:** To aid firms in their bid response, the following items are attached:

Attachment A: Insurance Checklist

Attachment B: Affidavit of Compliance with Iran Divestment Act/No Boycott of Israel

Attachment C: Drug Free Workplace Certification

Attachment D: Non-collusion Affidavit of Prime Bidder

Attachment E: Bid Envelope Cover Sheet

Attachment F: Report of Limited Geotechnical Exploration by GEOS

Attachment G: Geotechnical Exploration Report by S&ME

Attachment H: Cedar Bluff Flood Improvements Volume Comparison

Attachment I: Grading Plan and Cut/Fill Plan

SECTION V PROPOSAL FORMAT

Proposers shall use the following format for the preparation and submission of their proposals. Failure to follow this format may be just cause for rejection of proposals. Cost of preparation of proposals is the sole responsibility of the proposer. Knox County requires that proposals being submitted be one (1) marked original and three (3) exact copies. An electronic copy on CD/DVD or flash drive, in one complete file, is also required.

Part I **SIGNED (in blue ink) TRANSMITTAL LETTER AUTHORIZING THE PROPOSAL**

Part II **PROPOSER INFORMATION**

- Company Name, Address, and telephone numbers
- Contact name(s), telephone number(s), and current email address
- Proposer's Vendor Number as assigned by Knox County Procurement Division
- Proposer's Knox County Business License (if applicable)
- Proposer's Employer Identification Number (EIN)
- Per Section 3.16, copies of all licenses, permits and professional certifications for company and employees.
- Acknowledgment of Addenda (if applicable)

Part III **EXPERIENCE & QUALIFICATIONS**

Proposers must demonstrate their firm's overall qualifications and experience to complete the project detailed in this RFP. Demonstrate special expertise via similar projects completed by the Proposer and team members. This section should be limited to no more than five (5) pages and include but not be limited to the following:

- A brief description of the firm submitting the proposal including company background, organizational history, and office location(s).
- The number of years providing services (as the submitting entity) similar to those requested in the RFP.
- A detailed narrative of the relevant experience of the personnel providing the work requested in the RFP.
- Resume of the Project Manager (and any other important individuals) including licenses and detailed experience and qualifications of the individual(s) responsible for overseeing the work as stated in Section 4.2.
- List of three to five similar projects which Contractor has completed, including a primary contact with telephone number and email address.
- Any potential subcontractors that may work on this project must be listed along with their experience/qualifications.
- Other information necessary to provide the firm's complete qualifications and experience to complete the work listed in this RFP.

Part IV **PROJECT APPROACH**

Proposers are to demonstrate their understanding of the project and work desired along with a detailed project approach and plan for project completion as detailed in the Scope of Work and Specifications listed in Section IV. Proposers should include a description of the methods to be utilized to perform the work. Proposers shall identify potential impacts to the surrounding neighborhood and a plan to mitigate said impact. Describe in detail the firm's approach to budget control, quality control, quality assurance, and safety. Include detailed information regarding the firm's approach to project/construction administration. Proposer may also include innovative solutions and ideas that would add value to the overall project.

Part V **COST**

Proposers are to provide a detailed cost for all items stated in Section 4.2, Scope of Work. Each task should have a separate line item. Specifically, the Proposer should provide a line-item cost to Clear, Grub, and Fence the Site. Rock Excavation, including potential discounts and/or estimated credit the Proposer will offer Knox County for the materials on-site, must be included also.

Part VI **PROPOSED TIMELINE**

Proposers are to provide a detailed timeline, including major milestones, for the completion of the project. Specifically list, in months, how long each phase of the project will last as well as the entire project from Notice to Proceed through final completion. Include a list of potential delays and challenges that could increase the timeline. Provide a detailed list of current projects in work, projected workload over the next eighteen (18) months, and availability of personnel that are projected to be part of the project. Current and projected workload should include estimated start (if project is not underway at this time) and completion dates, project location, and total contract budget/project size.

Part VII **ADDITIONAL INFORMATION**

Proposers may submit additional information that may add value to their proposal.

Part VIII **ATTACHMENTS**

Include the following completed forms:

- Insurance Checklist (Attachment A)
- Affidavit of Compliance with Iran Divestment Act/No Boycott of Israel (Attachment B)
- Drug Free Workplace Certification (Attachment C)
- Non-collusion Affidavit of Prime Bidder (Attachment D)

Part IX **EXCEPTIONS**

Proposers are to include any and all exceptions taken to this solicitation under this part per Section 3.13. Do not mark through or otherwise alter the language of this RFP in your response.

Failure to include any of the above information or any other information requested may result in the proposer being disqualified.

ATTACHMENT A
KNOX COUNTY PROCUREMENT DIVISION
INSURANCE CHECKLIST
RFP NUMBER 3572

THE CERTIFICATE OF INSURANCE MUST SHOW ALL COVERAGES & ENDORSEMENTS WITH "YES" AND ITEMS 20 TO 23.

REQUIRED:	NUMBER	TYPE OF COVERAGE	COVERAGE LIMITS	
YES	1.	WORKERS COMPENSATION	STATUTORY LIMITS OF TENNESSEE	
YES	2.	EMPLOYERS LIABILITY	$100,000 PER ACCIDENT $100,000 PER DISEASE $500,000 DISEASE POLICY LIMIT	
YES	3.	AUTOMOBILE LIABILITY X ANY AUTO-SYMBOL (1)	COMBINE SINGLE LIMIT (Per -Accident)	$1,000,000
			BODY INJURY (Per –Person)	
			BODY INJURY (Per-Accident)	
			PROPERTY DAMAGE (Per-Accident	
YES	4.	COMMERCIAL GENERAL LIABILITY		LIMITS
		CLAIM MADE / X / OCCUR	EACH OCCURRENCE	$ 2,000,000
			FIRE LEGAL LIABILITY	$ 100,000
			MED EXP (Per person)	$ 5,000
		GEN'L AGGREGATE LIMITS APPLIES PER	PERSONAL & ADV INJURY	$ 1,000,000
		POLICY / PROJECT / LOC	GENERAL AGGREGATE	$ 5,000,000
			PRODUCTS-COMPLETED OPERATIONS/AGGREGATE	$ 2,000,000
YES	5.	PREMISES/OPERATIONS	$1,000,000 CSL BI/PD EACH OCCURRENCE $2,000,000 ANNUAL AGGREGATE	
YES	6.	INDEPENDENT CONTRACTOR	$1,000,000 CSL BI/PD EACH OCCURRENCE $1,000,000 ANNUAL AGGREGATE	
YES	7.	CONTRACTUAL LIABILITY (MUST BE SHOWN ON CERTIFICATE)	$1,000,000 CSL BI/PD EACH OCCURRENCE $1,000,000 ANNUAL AGGREGATE	
YES	8.	XCU COVERAGE	NOT TO BE EXCLUDED	
YES	9.	UMBRELLA LIABILITY COVERAGE	$5,000,000	
		PROFESSIONAL LIABILITY		
NO	10.	ARCHITECTS &ENGINEERS	$1,000,000 PER OCCURRENCE/CLAIM	
NO		ASBESTOS & REMOVAL LIABILITY	$2,000,000 PER OCCURRENCE/CLAIM	
NO		MEDICAL MALPRACTICE	$1,000,000 PER OCCURRENCE/CLAIM	
NO		MEDICAL PROFESSIONAL LIABILITY	$1,000,000 PER OCCURRENCE/CLAIM	
NO	11.	MISCELLANEOUS E & O	$500,000 PER OCCURRENCE/CLAIM	
NO	12.	MOTOR CARRIER ACT ENDORSEMENT	$1,000,000 BI/PD EACH OCCURRENCE UNINSURED MOTORIST (MCS-90)	
NO	13.	MOTOR CARGO INSURANCE		
NO	14.	GARAGE LIABILITY	$1,000,000 BODILY INJURY, PROPERTY DAMAGE PER OCCURRENCE	
NO	15.	GARAGEKEEPER'S DIRECT LIABILITY	$500,000 COMPREHENSIVE $500,000 COLLISION	
NO	16.	INLAND MARINE BAILEE'S INSURANCE	$	
NO	17.	DISHONESTY BOND	$	
NO	18.	BUILDERS RISK	PROVIDE COVERAGE IN THE FULL AMOUNT OF THE CONTRACT UNLESS PROVIDED BY OWNER.	
NO	19.	USL&H	FEDERAL STATUTORY LIMITS	

20. CARRIER RATING SHALL BE BEST'S RATING OF A-VII OR BETTER OR ITS EQUIVALENT.

21. THE COUNTY SHALL BE LISTED AS AN ADDITIONAL INSURED ON ALL POLICIES EXCEPT AUTOMOBILE. ENDORSEMENT PAGE(S) MUST BE PROVIDED FOR EACH CERTIFICATE OF INSURANCE AS LONG AS THE CONTRACT IS IN EFFECT.

22. CERTIFICATE OF INSURANCE SHALL SHOW THE BID NUMBER AND TITLE.

23. OTHER INSURANCE REQUIRED_____.

INSURANCE AGENT'S STATEMENT AND CERTIFICATION: I HAVE REVIEWED THE ABOVE REQUIREMENTS WITH THE PROPOSER NAMED BELOW AND HAVE ADVISED THE BIDDER OF REQUIRED COVERAGE.

Agency Name: _____Authorizing Signature: _____

PROPOSER'S STATEMENT AND CERTIFICATION: IF AWARDED THE CONTRACT, I WILL COMPLY WITH THE CONTRACT INSURANCE REQUIREMENTS.

Proposer Name: _____ Authorizing Signature: _____

ATTACHMENT B

AFFIDAVIT OF COMPLIANCE

IRAN DIVESTMENT ACT / NO BOYCOTT OF ISRAEL

Comes _____, for and on behalf of
(*Printed name of Principal Officer of Company)*

_____, (the "Company") and, after being duly authorized by the Company so to do, makes oath that:

By submission of this solicitation, each person signing on behalf of any offeror certifies, and in the case of a joint partnership, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each offeror is not on the list created pursuant to the Iran Divestment Act, Tenn. Code Ann. § 12-12-106.

Pursuant to Tennessee Code Annotated Title 12, Chapter 4, Part 1, by submission of a response to this solicitation, each proposer and each person signing on behalf of any proposer certifies, and in the case of a joint response each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each proposer is not currently engaged in, and will not for the duration of the contract engage in, a boycott of Israel.

_____
Signature

Title: _____

Sworn to and subscribed before me, a Notary Public, this ____ day of _____, 20___.

_____

Notary Public
My Commission Expires:

_____

ATTACHMENT C
KNOX COUNTY PROCUREMENT DIVISION
RFP NUMBER 3572

AFFIDAVIT OF COMPLIANCE

WITH

DRUG-FREE WORKPLACE REQUIREMENTS OF

TENNESSEE CODE ANNOTATED, § 50-9-113

(To be submitted with bid by construction contractor with 5 or more employees)

I, _____, president or other principal

Officer of _____, swear or affirm that the
Name of Company
Company has a drug-free workplace program that complies with Title 50, Chapter 9, Tennessee Code Annotated, in effect at the time of this bid submission at least to the extent required of governmental entities. I further swear or affirm that the company is in compliance with Tennessee Code Annotated, § 50-9-113.

_____
President or Principal Officer

For:_____
Name of Company

STATE OF TENNESSEE }
COUNTY OF }

Subscribed and sworn before me by _____,

President or principal officer of _____,

On this _____ day of _____ 2_____.

_____
Notary Public

My Commission expires: _____

ATTACHMENT D

NONCOLLUSION AFFIDAVIT

STATE OF _____)

COUNTY OF _____)

_____, being first duly sworn, deposes and says that:

1. He/She is _____ of _____, the Bidder that has submitted the attached Bid;

2. He/She is fully informed respecting the preparation and contents of the attached Proposal and of all pertinent circumstances respecting such Bid;

3. Such Proposal is genuine and is not a collusive or sham Bid;

4. Neither the said Bid nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly with any other Bid, firm or person to submit a collusive or sham Bidder in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other proposer, firm or person to fix the price or prices in the attached Bid or of any other proposer, or to secure through any other proposer, or to fix any overhead, profit or cost element of the bid price or the bid price of any other bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the Knox County, TN, or any person interested in the proposed contract;

5. The price or prices quoted in the attached Bid are fair and proper and are not tainted by a collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

_____
(Signed)

_____
(Title)

Subscribed and sworn to before me this _____ day of _____, 20____

_____
(Signature)

My commission expires_____

ATTACHMENT E

BID ENVELOPE COVER

Name of Project: Cedar Bluff Road Flood Improvement Project
Request for Proposals #3572

SEALED BIDS WILL BE RECEIVED BY: **Knox County Procurement Division**
1000 N. Central Street, Suite 100
Knoxville, Tennessee 37917

UNTIL: **2:00 p.m. Eastern Time** (TIME) **July 18, 2024** (DATE)

COMPLETE ALL BLANKS!

PROPOSER _____

STREET ADDRESS _____

CITY, STATE ZIP CODE _____

TENNESSEE CONTRACTOR'S LICENSE NUMBER _____

LICENSE CLASSIFICATION _____ _____
(if applicable to this project) **Dollar Limit**

PROPOSERS MUST COMPLETE ALL AREAS OF THIS FORM!

ATTACHMENT F
Report of Limited Geotechnical Exploration by GEOS

GEOServices, LLC, Geotechnical and Materials Engineers

November 16, 2020

Knox County Engineering and Public Works
205 West Baxter Avenue
Knoxville, Tennessee 37917

ATTENTION: Mr. Jim Snowden
Jim.Snowden@knoxcounty.org

Subject: **REPORT OF LIMITED GEOTECHNICAL EXPLORATION**
Cedar Bluff Flood Improvements Site Study
Knox County, Tennessee
GEOServices Project No. 21-20848

Dear Mr. Snowden:

We are submitting the results of the geotechnical exploration performed for the subject project. The geotechnical exploration was performed in accordance with GEOServices Proposal No. 11-20495, dated August 20, 2020. The following report presents our findings and recommendations for the proposed construction. Should you have any questions regarding this report, or if we can be of any further assistance, please contact us at your convenience.

Sincerely,

GEOServices, LLC

THOMAS BRIAN WILLIAMSON
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
11-16
No. 118861
STATE OF TENNESSEE

T. Brian Williamson, P.E.
Geotechnical Department Manager
TN 118,861

Matthew B. Haston, P.E.
Senior Geotechnical Engineer

MBH/TBW:tbw

REPORT OF LIMITED GEOTECHNICAL EXPLORATION

Cedar Bluff Flood Improvements Site Study

Knox County, Tennessee

GEOServices Project No. 21-20848

Submitted to:

Knox County Engineering and Public Works
205 West Baxter Avenue
Knoxville, Tennessee 37917

Submitted by:

GEOServices, LLC
2561 Willow Point Way
Knoxville, TN 37931

Phone (865) 539-8242
Fax (865) 539-8252

GEOServices, LLC, Geotechnical and Materials Engineers

TABLE OF CONTENTS

Contents **Page**

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this geotechnical exploration was to characterize the subsurface conditions for the design and construction of Cedar Bluff Flood Improvements to be located in Knox County, Tennessee. This report provides recommendations for general site preparation including excavation and fill requirements for the project.

1.2 PROJECT AND SITE DESCRIPTION

Project information was provided via phone conversations and email correspondence with you in August of 2020. We understand that in recent years a portion of Ced
ar Bluff Road near Dutchtown and Fox Lonas Roads has been experiencing significant flooding leading to closure. As such, it is Knox County's intent to improve the subject property to assist with drainage in this area and prevent future flooding. We have been provided with a proposed grading plan and cut-fill exhibit prepared by Fulghum MacIndoe & Associates, Inc. dated June 1, 2020.

The subject property is bound by N Cedar Bluff Road (to the west) Fox Lonas Road (to the north) Dutchtown Road (to the south) and Park Village Road (to the east). The site totals approximately 30 acres. Based on the provided topographic information, existing site grades generally range between 970 to 910 feet Mean Sea Level (MSL). Based on the provided grading information, earthwork fills of up to 28 feet and cuts of up to 32 feet will be required to reach the proposed finished grades; however, we understand that depending on the findings of this study, the finished grades could be revised.

The site is covered primarily by mature and sapling trees and dense underbrush, with areas of exposed bedrock, rock pinnacles and boulders. The remnants of some former residential structures and access drives were observed in the southern portions of the site. A review of the Knoxville, Knox County, KUB Geographic Information System (KGIS) historical aerial photographs shows the residential structures in the south and western site extents in 1969. By 1985 the structures no longer appear, and the site general appears as overgrown. Aside from some disturbance due to the extension of Dutchtown Road in the south, the site appears relatively unchanged since 1985. A high-voltage power line and associated easement is located in the eastern portion of the site.

During our site visit we observed several closed depressions and active sinkholes. The depression in the western portion of the site was observed to be holding water at the time of our site reconnaissance. The sinkholes and depressions in the eastern portions of the site were not observed to be holding water; however, some of these are near vertically sided and observation of the bottom was not safely possible. Water is shown in some of the eastern sinkholes on the KGIS aerial photos.

1.3 SCOPE OF STUDY

The geotechnical exploration involved a site reconnaissance, field exploration, laboratory testing, and engineering analysis. The following sections of this report present discussions of the field exploration, laboratory testing programs, site conditions, and conclusions and recommendations.

The geotechnical scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air, on, or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

2.0 EXPLORATION AND TESTING PROGRAMS

2.1 FIELD EXPLORATION

The site subsurface conditions were explored by drilling 25 soil test borings. The boring locations were located in the field by GEOServices using the provided drawing and a handheld GPS unit. Prior to the mobilization of the drilling equipment, clearing was performed to provide access paths to the boring locations.

The soil test borings were drilled during the period from October 26 through 31, 2020 by our subcontractor. The soil test borings were advanced using 3¼-inch inside diameter hollow stem augers (HSA) and a Geoprobe 7730 or Diedrich D-25 track-mounted drill rig. Casing installation and rock coring was performed using a CME 550 drill rig. The approximate locations of the test borings are shown on

Figure 2. Detailed logs for the borings can be found in Appendix A of this report. The elevations shown on the boring logs and in this report were obtained by interpolation using the provided drawing and should be considered approximate. The depths in this report reference the ground surface that existed at the time of the exploration.

Standard Penetration Tests (SPT) and split-spoon sampling were performed at approximately 2½-foot intervals in the upper 10 feet and 5 feet intervals thereafter. The drill crew worked in general accordance with ASTM D 6151 for Hollow Stem Auger (HSA) drilling. SPT and split-spoon sampling were performed in accordance with ASTM D 1586. The borings were backfilled with soil cuttings before leaving the site.

In split–spoon sampling, a standard 2-inch O.D. split-spoon sampler is driven into the bottom of the boring with a 140 pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the last 12 inches of the standard 18 inches of total penetration is recorded as the Standard Penetration Resistance (N-value). These N-values are indicated on the boring logs at the testing depth and provide an indication of the relative density of coarse-grained materials and consistency of fine-grained materials. Detailed test boring records are presented in appendices.

Rock coring was performed in offset borings B-5A, B-7A, and B-14A which were drilled a short distance from the original boring location to evaluate the composition and consistency of the refusal materials. Prior to coring, casing was installed to the refusal depth to facilitate the coring. The rock was cored using NQ-sized equipment in general accordance with ASTM D 2113.

2.2 LABORATORY TEST PROGRAM

After completion of the field drilling and sampling phase of this project, the soil and rock samples were returned to our laboratory where they were visually classified in general accordance with the Unified Soil Classification System (USCS – ASTM D 2487) by a GEOServices geotechnical professional. Select samples were then tested for moisture content (ASTM D 2216) and Atterberg limits (ASTM D 4318). The lab test results are discussed in this report and summarized in Appendix B.

3.0 SUBSURFACE CONDITIONS

3.1 GEOLOGIC CONDITIONS

The project site, as most of East Tennessee, is located in the Appalachian Valley and Ridge Physiographic Province. The Province is characterized by elongated, northeasterly-trending ridges formed on more weathering resistant sandstones and limestones. Between ridges, broad valleys and rolling hills are formed primarily on less weathering resistant limestones, dolomites, and shales.

Our review of the "*Geology of the Bearden quadrangle, Tennessee*" geologic map (Cattermole, 1960) indicates that the southern approximately two-thirds of the southern portion of the site is underlain by the bedrock of the Holston Formation. The Holston Formation consists of several different rock units that are largely composed of calcite with varying amounts of hematite. A common lithology of the Holston is a pink to red coarsely crystalline fossiliferous limestone, that was deposited as a sand composed of calcite grains. This lime-sandstone is the source of the "Tennessee Marble". A second rock type typically consists of a dark-red fine-grained limestone matrix of reef fossils lime-sandstone. A third rock type closely resembles the lime-sandstone except that it contains 5 to 30 percent quartz sand. The Holston Formation weathers to produce a thick dark-red silty clay residuum high in iron with varying amounts of quartz sand.

The northern approximately one-third of the project site is mapped to be underlain by the bedrock of the Newala Formation. The Newala is made up of the Mascot Dolomite and Kingsport Formations, which are generally composed of fine-grained, siliceous dolomite inter-bedded with limestone. These formations typically weather to produce a thick reddish or orangish-brown clay overburden soil. Silica in the form of chert is resistant to weathering and typically scattered throughout the residuum.

Since the bedrock underlying the site consists of carbonate rock, the site is susceptible to the typical carbonate hazards of irregular weathering, cave and cavern conditions, and overburden sinkholes. Carbonate rock, while appearing very hard and resistant, is soluble in slightly acidic water. This characteristic, plus differential weathering of the bedrock mass is responsible for the hazards. Of these hazards, the occurrence of sinkholes is potentially the most damaging. In Middle Tennessee, sinkholes occur primarily due to differential weathering of the bedrock and "flushing" or "raveling" of overburden

soils into the cavities in the bedrock. The loss of solids creates a cavity or "dome" in the overburden. Growth of the dome over time or excavation over the dome can create a condition in which rapid, local subsidence or collapse of the roof of the dome occurs. Such a feature is termed a sinkhole.

A certain degree of risk with respect to sinkhole formation and subsidence should be considered for any site located within geologic areas underlain by potentially soluble rock units. While a rigorous effort to assess the potential for sinkhole formation was beyond the scope of this evaluation, we did observe several active sinkholes within the site boundary. Many of the active sinkholes are mapped as closed contour depressions on the USGS topographic quadrangle maps, KGIS maps and on the provided topographic drawing. We also note the presence of numerous other mapped closed contour depression on the USGS maps in the immediate site vicinity.

Based on the observed site conditions, active sinkholes and closed depressions on the site and mapped nearby, it is our opinion there exists a high potential for sinkhole development at this site.

3.2 SUBSURFACE CONDITIONS

The following subsurface description is of a generalized nature to highlight the subsurface stratification features and material characteristics at the boring locations. The boring logs included in Appendix A of this report should be reviewed for specific information at each boring location. Information on actual subsurface conditions exists only at the specific boring locations and is relevant only to the time that this exploration was performed. Variations may occur and should be expected at the site.

Surficial Layer

As discussed previously, clearing was performed to access the borings and some of the surficial materials were removed. Where present at the boring locations, the depth to topsoil ranged from 6 to 12 inches below the existing ground surface. We also note that rock was observed along the ground surface across portions of the site. We recommend the topsoil depth be evaluated by the contractor prior to site grading activities.

Fill Soil

Fill soil was encountered in boring B-1 to a depth of approximately 3 feet below the ground surface. Fill is a material which has been transported and placed by the activities of man. The fill was manually classified as

dark brown lean (lower plasticity) clay. The fill contained wood fragments, gravel and had an organic odor. The SPT N-value within the fill was 6 blows per foot (bpf), indicating a consistency of firm.

Residual Soil

Residual soils were encountered underlying the fill in boring B-1 and below the surficial materials or from the ground surface in the remaining borings. Residual soils are derived from the in-place weathering of the parent bedrock. The residual soils were manually classified as varying shades of brown, tan and gray lean and fat (high plasticity) clay soils. The residual soils contained some roots in the upper approximately 3 feet and varying amounts of chert fragments.

The SPT N-values within the residual soils typically ranged from 6 to 32 bpf. These N-values indicate soil consistencies of firm to hard. The residual soil was most commonly firm to very stiff. N-values of 50 blows for 2 to 4 inches of penetration were encountered in several of the borings in the zone overlying auger refusal which are not representative of the residual soil.

Laboratory testing of selected samples of the residual soil indicated natural moisture contents which ranged from 21.6 to 34.9 percent. Atterberg limits testing of samples of the residuum indicated Liquid Limit (LL) values ranging from 51 to 87 percent and Plasticity Index (PI) values ranging from 31 to 60 percent. The soil tested may be described as fat clay (USCS Group Symbol CH) based on the results of the plasticity testing alone.

Weathered Rock

Weathered rock was encountered at depths ranging from 3 to 12 feet below the existing ground surface in borings B-2, B-4, B-8, B-10 and B-22. These depths correspond to elevations of 913 to 941 feet MSL. The weathered rock was sampled as limestone and dolomite fragments with varying amounts of clay soil. The N-values within the weathered rock were 50 blows for 0 to 4 inches of penetration.

Auger Refusal

Auger refusal was encountered in each of the borings of this exploration at depths ranging from approximately 1 to 18 feet below the existing ground surface. The elevations where auger refusal was encountered ranged from 900 to 940 feet MSL. Table 1 provides the refusal depths and elevations where auger refusal was encountered. Auger refusal is a designation applied to materials that cannot be penetrated

by the power auger. Auger refusal may indicate boulders, rock ledges or pinnacles, or the top of continuous bedrock.

Bedrock

Rock coring was performed to explore the refusal materials in Borings B-5A, B-7A and B-14A. These borings were offset a short distance from the original boring location. The recovered rock core from boring B-5A consisted of limestone and shaley limestone. The recovered rock core from boring B-5A was described as light to dark gray, slightly to highly fractured, slightly to moderately weathered and moderately to very hard. The recovered rock core from boring B-7A consisted of limestone transitioning to dolomite at depth. The recovered rock core from boring B-7A was described as light gray, gray and white, slightly to moderately fractured, slightly weathered and very hard. The recovered rock core from boring B-14A consisted of limestone which contained some sandstone seams. The recovered rock core from boring B-14A was described as light gray and gray, slightly fractured, slightly weathered and very hard. The obtained core samples exhibited a strong reaction to a 10 percent solution of hydrochloric acid. Photographs of the recovered rock core samples are provided in Appendix A.

The percent core recovery is the ratio of the sample length obtained to the depth drilled, expressed as a percentage. The rock quality designation (RQD) is obtained by summing the length of core recovered, including only the pieces of core that are 4 inches or longer (for NQ size core), divided by the total length drilled. The percent core recovery and RQD are related to the soundness and continuity of the bedrock. The recovery values for rock cored in the borings ranged from 25 to 100 percent, while the RQD values ranged from 20 to 100 percent, respectively.

During the coring in boring B-5A a clay-filled void was encountered from a depth of approximately 13.4 to 16.4 feet. In boring B-14A, open voids were encountered from the depths of about 8.4 to 9.9 feet and from 13.4 to 13.7 feet.

Subsurface Water

Groundwater was encountered in boring B-22 at a depth of 16 feet below the existing ground surface at the time of drilling. Groundwater was not encountered in the remaining borings of this exploration at the time of drilling and the borings were backfilled in consideration of safety. Groundwater levels may fluctuate due to seasonal changes in precipitation amounts, construction activities in the area, and/or the level of nearby

water features. The groundwater information presented in this report is the information that was collected at the time of our field activities.

Table 1 – Boring Summary Information

Boring	Ground Surface Elevation	Proposed Finished Grade	Auger Refusal Depth	Auger Refusal Elevation
B-1	906	908	6.0	900.0
B-2	921	910	11.0	910.0
B-3	923	910	5.0	918.0
B-4	930	910	10.0	920.0
B-5	936	910	11.0	925.0
B-5A	936	910	11.2	924.8
B-6	930	910	8.0	922.0
B-7	929	910	3.0	926.0
B-7A	929	910	3.2	925.8
B-8	924	916	2.0	922.0
B-9	916	908	8.5	907.5
B-10	936	931	4.0	932.0
B-11	926	916	6.0	920.0
B-12	927	915	1.0	926.0
B-13	930	910	1.0	929.0
B-14	930	912	8.0	922.0
B-14A	930	912	7.5	922.5
B-15	948	948	13.0	935.0
B-16	934	920	8.0	926.0
B-17	928	912	1.0	927.0
B-18	927	912	8.0	919.0
B-19	925	912	8.0	917.0
B-20	940	924	18.0	922.0
B-21	943	962	3.0	940.0
B-22	953	970	16.0	937.0
B-23	957	974	8.0	949.0
B-24	961	974	13.0	948.0
B-25	920	920	1.0	919.0

Note: Depths in feet below ground surface and elevations in Mean Sea Level. Elevations interpolated from the provided topographic drawing and should be considered approximate.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 SITE ASSESSMENT

The results of the field exploration indicate that the site is adaptable for the proposed flood storage improvements; however, some geotechnical related challenges are present which could affect the project. The primary challenge at this site includes the presence of shallow bedrock which will create excavation difficulty during grading. The remaining challenges are associated with the karst nature of the site and the ability of the existing karst features to drain water.

4.1.1 Excavation Difficulty

Weathered rock was encountered at depths ranging from 3 to 12 feet below the existing ground surface in borings B-2, B-4, B-8, B-10 and B-22. These depths correspond to elevations of 913 to 941 feet MSL. Auger refusal was encountered in each of the borings of this exploration at depths ranging from 1 to 18 feet below the existing ground surface. The elevations where auger refusal was encountered ranged from 900 to 940 feet MSL. Based on our understanding of the project information, several of the borings encountered auger refusal above the proposed finished grade elevation. Table 2 below provides a summary of the borings and depths where refusal was encountered above proposed finished grade.

Table 2 – Finished Grades and Auger Refusal Depths.

Boring	Proposed Finished Grade Elevation (feet MSL)	Auger Refusal Elevation (feet MSL)	Depth of Required Excavation Below Auger Refusal (ft)
B-3	910	918	8
B-4	910	920	10
B-5	910	925	15
B-6	910	922	12
B-7	910	926	16
B-8	916	922	6
B-10	931	932	1
B-11	916	920	4
B-12	915	926	11
B-13	910	929	19
B-14	912	922	10
B-16	920	926	6
B-17	912	927	15
B-18	912	919	7

B-19	912	917	8

Note: Elevations interpolated from provided drawing and should be considered approximate.

Where excavations extend to depths where weathered rock or auger refusal was encountered in the borings, then excavation difficulty should be anticipated. The removal of rock at sites such as this will typically require the use of pneumatic hammers (hoe-ram) or blasting. The removal of weathered rock or rock in confined excavations, such as for foundations or utilities, can often be extremely difficult. Additional recommendations regarding difficult excavation and the placement of rock fill are provided herein.

4.1.2 Karst Geology

While a rigorous effort to assess the potential for sinkhole formation was beyond the scope of this evaluation, the site is in an area having a highly developed karst geology and a relatively high risk of future sinkhole development. Portions of the proposed flood storage system which are supported on bedrock will not be susceptible to sinkhole damage; however, portions of the system which are supported on soil material will be at risk if a sinkhole were to develop. This risk includes earthwork fills which are placed on soil materials.

We understand it is proposed to route stormwater to the site from other areas. During periods of heavy rain stormwater is proposed to be stored at the site where it will then drain into the subsurface over time. While the evaluation of subsurface water flow was beyond our scope of services, we note that the ground water flow in karst areas is highly complex. It is likely that once the project has progressed further additional testing, such a well pump testing, may be required to evaluate the potential flow rate of stormwater into the subsurface. GEOServices would be pleased to help evaluate the scope of services for the pump test study, if requested.

4.2 SITE PREPARATION

4.2.1 Subgrade

Demolition of the remnants of the former structures should include the complete removal of below grade items (including concrete foundations, slabs, and walls) and pavements (including basestone). Existing basements or pits, if present, should be excavated with a 2H:1V side slope and the excavation backfilled using structural soil fill or compacted dense graded aggregate. Additionally, utilities to be abandoned

should be completely removed and their trenches backfilled using structural soil fill. If utilities are to remain in use, they should be rerouted outside of the proposed building areas. Debris fill from the demolition of the former structural remnants should not be reused as new fill.

Site stripping within the proposed construction areas should include the removal of vegetation, topsoil, rock fragments greater than 6 inches, asphalt, gravel, concrete, and other debris. While construction debris was not noted in the borings, the previous development may have buried pockets of these materials in unexplored locations across the site which should be completely undercut and removed. The stripping operations should extend a minimum of 10 feet beyond the limits of proposed development features.

The site also contains large, mature trees. Along with the tree, the respective root system should also be removed. Removal of trees and their root system upturns and loosens the surrounding soils. If the disturbed soils are suitable and are to remain, then they will require additional compactive effort and testing prior to proof-roll testing and fill placement. The client should budget for additional removal of these root systems and replacement with structural soil fill.

After the completion of stripping operations and excavation to reach the planned subgrade elevation, we recommend that the subgrade be proofrolled with a fully-loaded, tandem-axle dump truck or other pneumatic-tired construction equipment of similar weight. The geotechnical engineer or his representative should observe proofrolling. Areas judged to perform unsatisfactorily (e.g., pumping and/or rutting) by the engineer should be undercut and replaced with structural soil fill or remediated at the geotechnical engineer's recommendation. Areas to receive structural soil fill should also be proofrolled prior to the placement of new fill.

4.2.2 Structural Soil Fill

If variably weathered shale or other degradable rock materials are to be used as engineered fill, it is imperative this material be reduced to a soil/gravel gradation during compaction. If the material size is not adequately reduced, it may subsequently degrade when exposed to water causing losses in soil volume and strength that could adversely affect the proposed structures.

Material considered suitable for use as structural fill should be clean soil free of organics, trash, and other deleterious material, containing no rock fragments greater than 6 inches in dimension. Preferably, structural soil fill material should have a standard Proctor maximum dry density of 90 pounds per cubic foot (pcf) or greater and a plasticity index (PI) of 35 percent, or less. Materials to be used as structural fill should be tested by the geotechnical engineer to confirm that it meets the project requirements before being placed.

Structural fill should be placed in loose, horizontal lifts not exceeding 8 inches in thickness. Each lift should be compacted to at least 98 percent of the soil's maximum dry density per the standard Proctor method (ASTM D 698) and within the range of minus (-) 2 percent to plus (+) 3 percent of the optimum moisture content. Each lift should be tested by geotechnical personnel to confirm that the contractors' method is capable of achieving the project requirements before placing subsequent lifts. Areas which have become soft or frozen should be removed before additional structural fill is placed.

The benched placement of engineered structural fill on natural slopes steeper than 4H:1V (Horizontal:Vertical) is recommended. The placement of fill should begin at the base of the natural slope with benches or terraces. The benches or terraces should be a minimum of 8 feet wide laterally and should be cut into the slope every 5 feet of vertical rise. The naturally occurring existing soils should be prepared and fill placed in accordance with the previously described structural fill guidelines. The benching and fill placement operations should be observed and tested by a representative of the geotechnical engineer.

4.2.3 Dense Graded Aggregate

Dense Graded Aggregate (DGA) may be used as backfill in undercut excavations and in utility trench excavations. The DGA used for this section should be Type A and Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) specifications. The DGA fill should be placed in loose, horizontal lifts not exceeding 8 inches in loose thickness. Each lift should be compacted to at least 98 percent of maximum dry density per the standard Proctor method (ASTM D 698). Each lift should be compacted, tested by geotechnical personnel and approved before placing subsequent lifts.

4.3 ROCK FILL

We anticipate that rock excavation for the project will produce mostly non-degradable rock material of limestone or dolomite, although isolated zones of shaley limestone and sandstone were encountered in the borings. The following paragraphs provide the placement and compaction requirements for non-

degradable rock, degradable rock and a mixture of both non-degradable and degradable rock material. Rock fill placement should be accomplished under the full time observation of a representative of the geotechnical engineer.

Care should be taken such that rock fill is not placed in areas where future excavations are proposed as these materials could cause excavation difficulty. Typically, the upper portions of fill in areas where excavations for shallow foundations, utilities or other development features are proposed should consist of a readily excavatable material which will not ravel excessively.

4.3.1 Non-Degradable Rock Fill

We anticipate that mechanical breaking (hoe ramming) or blasting will be required to facilitate excavation of the bedrock. The material, with acceptable gradation, can be used as structural fill. Non-degradable rock utilized as structural fill should be well graded with a maximum rock size of 18 inches and be placed in lifts not to exceed 24 inches thick. Rock fill should have adequate small particles to effectively "choke" the larger rock pieces, filling voids or open spaces.

Non-degradable rock fill should not be dumped into its final position but should be placed by blading or dozing in a manner that will minimize voids, pockets and bridging. Larger rock pieces should lie flat and not overlap each other. The percentage of soil in the fill should be limited to a maximum of 10 percent. Non-degradable rock fill should be compacted using 6 to 8 complete passes of a D-8 class crawler tractor. A pass is defined as a complete coverage of the surface with the D-8 track overlapping 50 percent. Half of the passes should be in each perpendicular direction. Rock fill placement should be accomplished under full time observation of a representative of the Geotechnical Engineer.

Rock fill should be placed apart from soil fill such that it is not surrounded by soil and should be placed in areas that can drain freely. If this is not possible, a drainage system should be installed to provide drainage from the rock fill to prevent saturating the surrounding soils. This may require that the rock fill be "choked" using crushed aggregate of varying particle sizes or an approved geotextile filter fabric be placed at the interface with the soil fill.

4.3.2 Degradable Rock Fill

We anticipate that shale, shaley limestone and sandstone, classified as degradable rock, will be encountered in portions of the excavations to reach finished grade. Degradable rock, with acceptable gradation, can be used as structural fill. Degradable rock fill should be placed in lifts not to exceed 12 inches thick. Degradable rock fill should be compacted using a minimum of 3 passes with a 60,000 pound static tamping-foot roller and 2 passes with a 55,000 pound vibratory tamping-foot roller. The geotechnical engineer or his representative may direct additional coverage with either or both rollers until sufficient breakdown and compaction is achieved.

Degradable rock fill should be placed in loose, horizontal lifts not exceeding 10 inches in loose thickness. Each lift should be compacted to at least 95 percent of the actual maximum dry density per the standard Proctor method (ASTM D 698) and within the range of (-) 3 percent to (+) 3 percent of the optimum moisture content. Each lift should be compacted, tested by the geotechnical personnel and approved before placing any subsequent lifts.

4.3.3 Combination of Degradable and Non-Degradable Rock

Fills constructed of a mixture of degradable and non-degradable rock can be used at this site as general fills but should not be used in areas proposed or structures, within earthwork slopes or in the areas critical to the planned floor improvements. These fills should be placed in lifts not to exceed 10 inches thick. If the mixture is predominantly non-degradable rock with a maximum rock size greater than 10 inches, the lift thickness may be increased accordingly but may not exceed 24 inches thick. The mixture should be placed by blading or dozing in a manner that will minimize voids, pockets, and bridging. The mixture should then be compacted in the same manner as degradable rock fill. The geotechnical engineer or his representative may direct additional coverage until sufficient compaction is accomplished.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 EXCAVATIONS

Weathered rock was encountered at depths ranging from 3 to 12 feet below the existing ground surface in borings B-2, B-4, B-8, B-10 and B-22. These depths correspond to elevations of 913 to 941 feet MSL. Auger refusal was encountered in each of the borings of this exploration at depths ranging from 1 to 18 feet below

the existing ground surface. The elevations where auger refusal was encountered ranged from 900 to 940 feet MSL.

Typically, soils penetrated by augers can be removed with conventional earthmoving equipment. However, excavation equipment varies, and field refusal conditions may vary. Generally, the weathering process is erratic and variations in the rock profile can occur in small lateral distances. It is, therefore, possible that some partially weathered rock, rock boulders, pinnacles or ledges requiring difficult excavation techniques may be encountered at more shallow depths between our boring locations. Given the depths where weathered rock and auger refusal was encountered at this site, we recommend the project budget include an allowance for difficult excavation.

Excavations should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service, and under no circumstances should GEOServices be assumed responsible for construction site safety.

5.2 MOISTURE SENSITIVE SOILS

The fine-grained soils encountered at this site will be sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Construction traffic patterns should be varied to prevent the degradation of previously stable subgrade. In addition, plastic soils which become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities.

We caution if site grading is performed during the wet weather season, methods such as discing and allowing the material to dry will be required to meet the required compaction recommendations. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather. The average amount of precipitation does not vary much throughout the year. However, December through March is typically the difficult grading period due to the limited drying conditions that exist.

5.3 DRAINAGE AND SURFACE AND GROUNDWATER CONCERNS

To reduce the potential for undercutting and construction induced sinkholes, water should not be allowed to collect in on prepared subgrades of the construction area either during or after construction. Excavated areas should be sloped to facilitate the removal of collected rainwater, groundwater, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water. The grades should be sloped, and surface drainage should be collected and discharged such that water is not permitted to infiltrate the site subgrades.

5.4 SINKHOLE RISK REDUCTION AND CORRECTIVE ACTIONS

Based on our experience, corrective actions can also be performed to reduce the potential for sinkhole development at this site. These corrective actions would decrease but not eliminate the potential for sinkhole development. Much can be accomplished to decrease the potential of future sinkhole activity by proper grade selection and positive site drainage.

In general, the portions of a site that are excavated to achieve the desired grades will have a higher risk of sinkhole development than the areas that are filled, because of the exposure of relic fractures in the soil to rainfall and runoff. On the other hand, those portions of a site that receive a modest amount of fill (or that have been filled in the past) will have a decreased risk of sinkhole development caused by rainfall or runoff because the placement of a cohesive soil fill over these areas effectively caps the area with a relatively impervious “blanket” of remolded soil. Therefore, the recommendations that are designed to make the surface of the soil in excavated areas less permeable.

Although it is our opinion that the risk of ground subsidence associated with sinkhole formation cannot be eliminated, however, we have found that several measures are useful in site design and development to reduce this potential risk. These measures include:

- Maintaining positive site drainage to route surface waters to the detention basins both during construction and for the life of the system.
- The scarification and re-compaction of the upper 6 to 10 inches of soil in earthwork cut areas.
- Verifying that subsurface piping is carefully constructed, and pressure tested prior to its placement in service.

- The use of pavement or geosynthetic clay lined ditches, particularly in cut areas, to collect and transport surface water away.

Considerations when building within a sinkhole prone area are to provide positive surface drainage away from subgrade areas both during and after construction. Backfill in utility trenches or other excavations should consist of compacted, well-graded material such as dense graded aggregate or compacted on site soils. The use of an open graded stone (such as No. 57) stone is not recommended unless the stone backfill is provided an exit path and not allowed to pond. If sinkhole conditions are observed, the type of corrective action is most appropriately determined by a geotechnical engineer on a case-by-case basis.

6.0 LIMITATIONS

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. This report is for our geotechnical work only, and no environmental assessment efforts have been performed. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

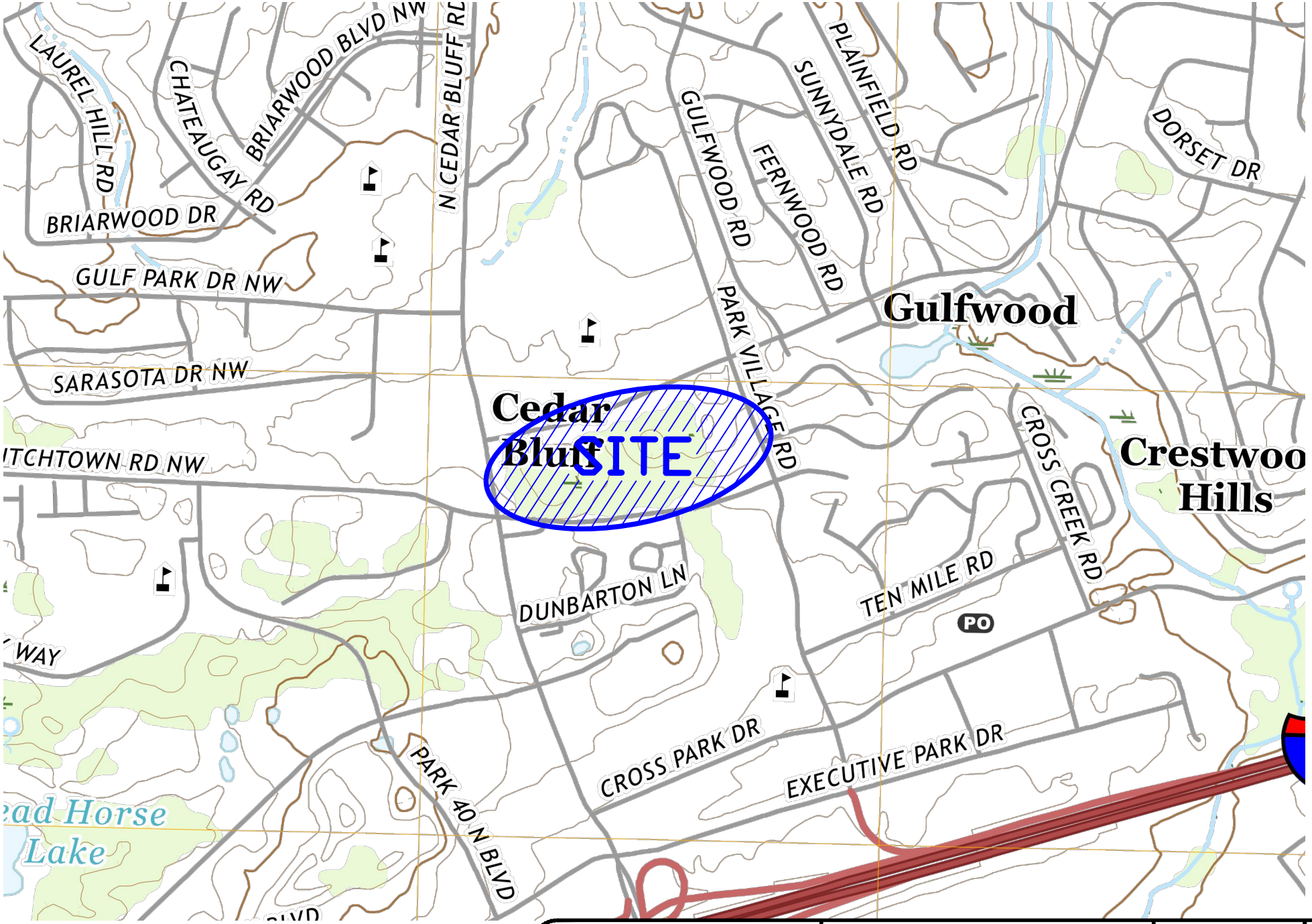
The analyses and recommendations submitted herein are based, in part, upon the data obtained from the exploration. The nature and extent of variations between the borings will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the project features are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed, and conclusions modified or verified in writing.

GEOServices, LLC, Geotechnical and Materials Engineers

APPENDICES

GEOServices, LLC, Geotechnical and Materials Engineers

APPENDIX A



NOTES:

1.) BASE MAP: USGS QUADRANGLE (BEARDEN, TENNESSEE)

GEOServices, LLC, Geotechnical and Materials Engineers
2561 Willow Point Way
Knoxville, Tennessee 37931
Office: 865-539-8242
Fax: 865-539-8252

SITE VICINITY MAP

CEDAR BLUFF FLOOD IMPROVEMENTS

SITE STUDY

KNOX COUNTY, TENNESSEE

DRAWN BY:	KSR
APPROVED BY:	MBH
SCALE:	N.T.S.
JOB NO.:	21-20848
DATE:	10/1/2020

FIGURE 1

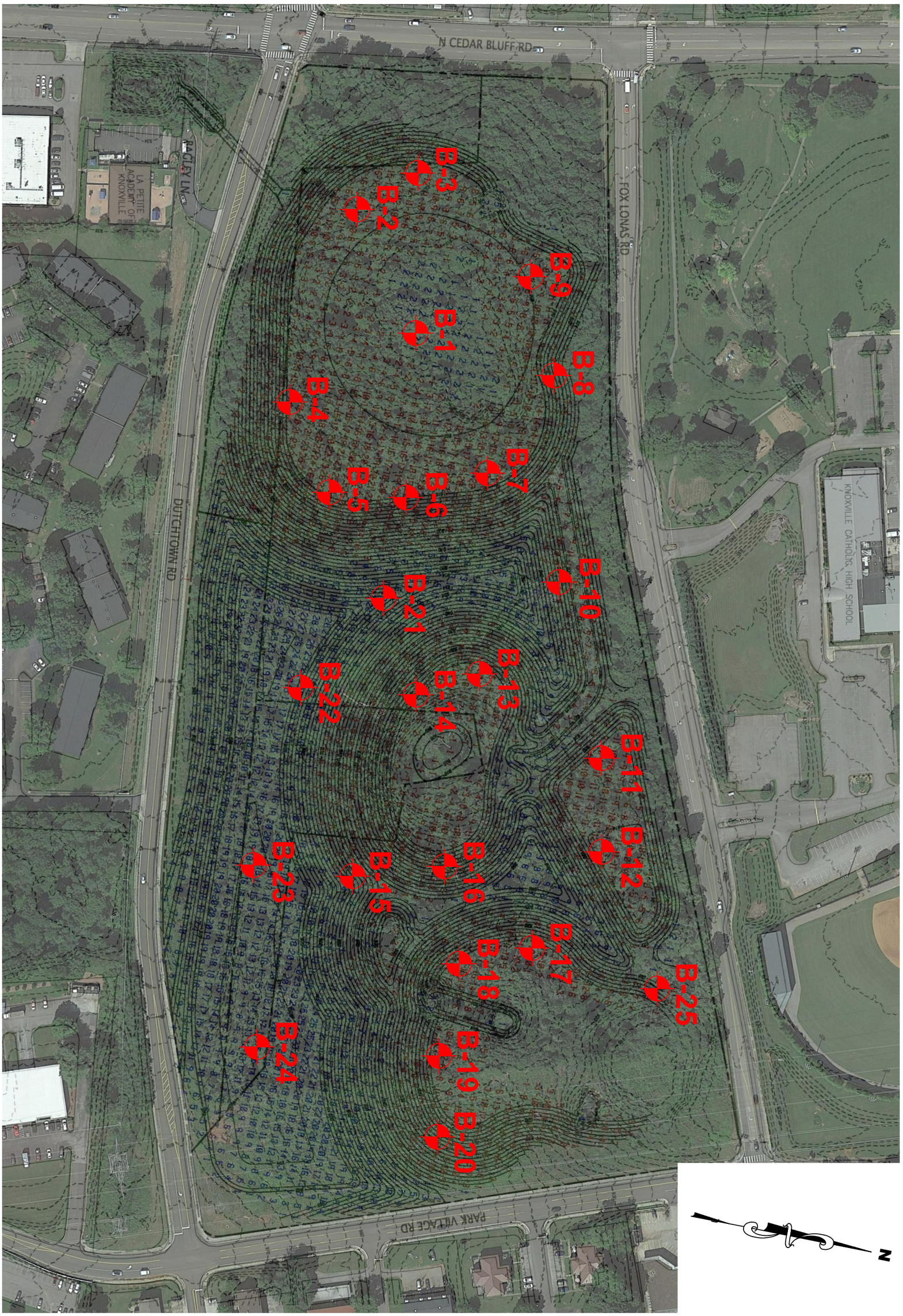


Figure 2

GEOServices, LLC, Geotechnical and Materials Engineers
2561 Willow Point Way
Knoxville, Tennessee 37931
Office: 865-539-8242
Fax: 865-539-8252

DRAWN BY:	KSR
APPROVED BY:	MBH
SCALE:	N.T.S.
JOB NO.:	21-20848
DATE:	10/1/2020

SOIL TEST BORING LOCATION PLAN

CEDAR BLUFF FLOOD IMPROVEMENTS

SITE STUDY

KNOX COUNTY, TENNESSEE

NOTES:

1.) BORING LOCATIONS ARE SHOWN IN GENERAL ARRANGEMENT ONLY.
2.) DO NOT USE BORING LOCATIONS FOR DETERMINATIONS OF DISTANCES OR QUANTITIES.
3.) BASE MAP PROVIDED BY: Fulghum Macindoe & Associates, Inc.

LOCATION OF SOIL TEST BORINGS

GENERAL NOTES

FINE AND COARSE GRAINED SOIL PROPERTIES

PARTICLE SIZE

BOULDERS:	GREATER THAN 300 mm
COBBLES:	75 mm to 300 mm
GRAVEL:	4.74 mm to 75 mm
COARSE SAND:	2 mm to 4.74 mm
MEDIUM SAND:	0.425 mm to 2 mm
FINE SAND:	0.075 mm to 0.425 mm
SILTS & CLAYS:	LESS THAN 0.075 mm

COARSE GRAINED SOILS (SANDS & GRAVELS)

N-VALUE	RELATIVE DENSITY
0 - 4	VERY LOOSE
5 - 10	LOOSE
11 - 30	MEDIUM DENSE
31 - 50	DENSE
OVER 50	VERY DENSE

FINE GRAINED SOILS (SILTS & CLAYS)

N-VALUE	CONSISTENCY	Qu, PSF
0 - 2	VERY SOFT	0-500
3 - 4	SOFT	500 -1000
5 - 8	FIRM	1000 - 2000
9 - 15	STIFF	2000 - 4000
16 - 30	VERY STIFF	4000 - 8000
OVER 31	HARD	8000 +

STANDARD PENETRATION TEST (ASTM D1586)

THE STANDARD PENETRATION TEST AS DEFINED BY ASTM D1586 IS A METHOD TO OBTAIN A DISTURBED SOIL SAMPLE FOR EXAMINATION AND TESTING AND TO OBTAIN RELATIVE DENSITY AND CONSISTENCY INFORMATON. THE 1.4 INCH I.D./2.0 INCH O.D. SAMPLER IS DRIVEN 3-SIX INCH INCREMENTS WITH A 140-LB. HAMMER FALLING 30 INCHES. THE BLOW COUNTS REQUIRED TO DRIVE THE SAMPLER THE FINAL 2 INCREMENTS ARE ADDED TOGETHER AND DESIGNATED THE N-VALUE. AT TIMES, THE SAMPLER CAN NOT BE DRIVEN THE FULL 18 INCHES. THE FOLLOWING REPRESENTS OUR INTERPRETATION OF THE STANDARD PENETRATION TEST WITH VARIATIONS.

BLOWS/FOOT (N-VALUE)	DESCRIPTION
25	25 BLOWS DROVE SAMPLER 12" AFTER INITIAL 6" SEATING
75/10"	75 BLOWS DROVE SAMPLER 10" AFTER INITIAL 6" SEATING
50/PR	PENETRATION REFUSAL OF SAMPLER AFTER INITIAL 6" SEATING

SAMPLING SYMBOLS

ST:	UNDISTURBED SAMPLE
SS:	SPLIT SPOON SAMPLE
CORE:	ROCK CORE SAMPLE
AU:	AUGER OR BAG SAMPLE

SOIL PROPERTY SYMBOLS

N:	STANDARD PENETRATION, BPF
M:	MOISTURE CONTENT %
LL:	LIQUID LIMIT %
PI:	PLASTICITY INDEX%
Qp:	POCKET PENETROMETER VALUE, TSF
Qu:	UNCONFINED COMPRESSIVE STRENGTH, TSF
DUW:	DRY UNIT WEIGHT, PCF

ROCK PROPERTIES

ROCK QUALITY DESIGNATION (RQD)

PERCENT	QUALITY
90 TO 100	EXCELLENT
75 TO 90	GOOD
50 TO 75	FAIR
25 TO 50	POOR
O TO 25	VERY POOR

ROCK HARDNES

VERY SOFT:	ROCK DISINTEGRATES OR EASILY COMPRESSES TO TOUCH: CAN BE HARD TO VERY HARD SOIL.
SOFT:	ROCK IS COHERANT BUT BREAKS EASILY TO THUMB PRESSURE AT SHARP EDGES AND IT CRUMBLES WITH FIRM HAND PRESSURE.
MODERATELY HARD:	SMALL PIECES CAN BE BROKEN OFF ALONG SHARP EDGES BY CONSIDERABLE HARD THUMB PRESSURE: CAN BE BROKEN BY LIGHT HAMMER BLOWS.
HARD:	ROCK CAN NOT BE BROKEN BY THUMB PRESSURE, BUT CAN BE BROKEN BY MODERATE HAMMER BLOWS.
VERY HARD:	ROCK CAN BE BROKEN BY HEAVY HAMMER BLOWS.

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KEY TO SYMBOLS

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- ASPHALT: Asphalt
- CH: USCS High Plasticity Clay
- CL: USCS Low Plasticity Clay
- CL-ML: USCS Low Plasticity Silty Clay
- CONCRETE: Concrete
- DOLOMITE: Dolomite
- GRAVEL: Gravel / Basestone
- LIMESTONE: Limestone
- SANDSTONE: Sandstone
- SC-SM: USCS Silty Clayey Sand
- SHALE: Shale
- SM: USCS Silty Sand
- SW: USCS Well-graded Sand
- TOPSOIL: Topsoil
- WEATHERED ROCK: Bedrock

SAMPLE SYMBOLS

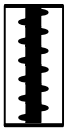

Grab Sample


No Recovery


Rock Core


Shelby Tube


Split Spoon


AUGER: Auger Probe

COLOR CODES FOR LITHOLOGIC SYMBOLS

- RED: Fill
- GREEN: Cultivated
- BLUE: Residuum
- PURPLE: Alluvium
- PINK: Colluvium
- LIGHT GRAY: Weathered Rock
- DARK GRAY: Rock Core
- YELLOW: Void

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

Water Level at Time Drilling, or as Shown


Water Level at End of Drilling, or as Shown


Water Level After 24 Hours, or as Shown

BORING NUMBER B-1

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 906 ft **PROPOSED FFE** 908.0 ft
NORTHING / EASTING N0 ft / E260 ft
REFUSAL Depth 6.0 ft / Elev 900.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 6.0 ft / Elev 900.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	906.0		(CL) Lean CLAY - with wood fragments, roots, trace gravel and strong organic odor - dark brown - moist (Possible FILL)	SS 1		2-3-3 (6)			
			Low Recovery	SS 2		9-5-3 (8)			
5	901.0								

Refusal at 6.0 feet.
Bottom of borehole at 6.0 feet.

NOTES:

BORING NUMBER B-2

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/27/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 921 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E0 ft
REFUSAL Depth 11.0 ft / Elev 910.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 11.0 ft / Elev 910.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	921.0		Topsoil (8 Inches)						
			(CH) Fat CLAY - with trace chert fragments - reddish brown - moist - firm to very stiff (RESIDUUM)	SS 1		2-3-5 (8)	28		
5	916.0			SS 2		3-3-6 (9)	35	69	41
				SS 3		8-10-14 (24)	35		
			Weathered ROCK - limestone with trace clay - tan - dry - hard (RESIDUUM)	SS 4		10-50/1"			
10	911.0								

Refusal at 11.0 feet.
Bottom of borehole at 11.0 feet.

NOTES:

BORING NUMBER B-3

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/27/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 923 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E0 ft
REFUSAL Depth 5.0 ft / Elev 918.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 5.0 ft / Elev 918.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	923.0		Topsoil (6 Inches)						
			(CH) Fat CLAY - with roots in the upper 3.0 feet - tan, orangish brown and gray - moist - firm to hard (RESIDUUM)	SS 1		2-2-3 (5)			
				SS 2		3-6-50/2"			
5	918.0								

Refusal at 5.0 feet.
Bottom of borehole at 5.0 feet.

NOTES: Auger refusal originally at 3.0 feet. Boring was offset 5.0 feet south and refused at 5.0 feet.

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-4

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/27/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 930 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E335 ft
REFUSAL Depth 10.0 ft / Elev 920.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 10.0 ft / Elev 920.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	930.0		Topsoil (8 Inches)						
			(CL) Lean CLAY - with trace roots - dark brown - moist - stiff (RESIDUUM)	SS 1		3-4-5 (9)			
			(CH) Fat CLAY - brown and reddish brown - moist - very stiff to stiff (RESIDUUM)	SS 2		10-15-15 (30)			
5	925.0			SS 3		4-6-9 (15)			
			Weathered ROCK - limestone with trace clay - brown and reddish brown - moist - hard (RESIDUUM)	SS 4		50/4"			
10	920.0								

Refusal at 10.0 feet.
Bottom of borehole at 10.0 feet.

NOTES:

BORING NUMBER B-5

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/27/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 936 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E495 ft
REFUSAL Depth 11.0 ft / Elev 925.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 11.0 ft / Elev 925.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	936.0		Topsoil (10 Inches)						
			(CH) Fat CLAY - reddish brown, orangish brown and tan - moist - firm to very stiff (RESIDUUM)	SS 1		3-3-5 (8)	24		
5	931.0			SS 2		8-10-13 (23)	30	71	42
				SS 3		6-10-13 (23)	28		
10	926.0			SS 4		8-10-12 (22)	29		

Refusal at 11.0 feet.
Bottom of borehole at 11.0 feet.

NOTES:

BORING NUMBER B-5A

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD CME550 & NQ Rock Core
LATITUDE / LONGITUDE ---
GROUND ELEVATION 936 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E575 ft
REFUSAL Depth 11.2 ft / Elev 924.8 ft
TOP OF ROCK Depth 11.2 ft / Elev 924.8 ft
GROUND WATER LEVELS:
BEGAN CORING Depth 11.2 ft / Elev 924.8 ft
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) 15.9 ft
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 27.1 ft / Elev 908.9 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	936.0		Auger to Refusal Depth No Samples Taken						
5	931.0								
10	926.0		Auger Refusal at 11.2 Feet (Began Coring)						
			LIMESTONE - with shale seams, partially healed calcium seams and soil seams - dark gray and gray - slightly weathered and slightly to moderately fractured - no discernible degree dip angle - very hard - strong HCl reaction	RC 1	100 (82)				
15	921.0		Clay Filled Void From 13.4 Feet to 16.4 Feet	RC 2	25 (20)				
20	916.0		LIMESTONE - with sandstone seams, partially healed calcium seams and trace shale seams - light gray, gray and dark gray - slightly weathered and slightly fractured - no discernible degree dip angle - very hard - strong HCl reaction	RC 3	100 (100)				

NOTES: B-5A was offset 2.0 away from B-5.

(Continued Next Page)

BORING NUMBER B-5A

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD CME550 & NQ Rock Core
LATITUDE / LONGITUDE ---
GROUND ELEVATION 936 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E575 ft
REFUSAL Depth 11.2 ft / Elev 924.8 ft
TOP OF ROCK Depth 11.2 ft / Elev 924.8 ft
GROUND WATER LEVELS:
BEGAN CORING Depth 11.2 ft / Elev 924.8 ft
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) 15.9 ft
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 27.1 ft / Elev 908.9 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
20	916.0		LIMESTONE - with sandstone seams, partially healed calcium seams and trace shale seams - light gray, gray and dark gray - slightly weathered and slightly fractured - no discernible degree dip angle - very hard - strong HCl reaction *(continued)*						
25	911.0			RC 4	85 (72)				
			SHALY LIMESTONE - with partially healed calcium seams - dark gray and gray - moderately weathered and highly fractured - no discernible degree dip angle - moderately hard - strong HCl reaction						
			LIMESTONE						

Refusal at 11.2 feet.
Bottom of borehole at 27.1 feet.

NOTES: B-5A was offset 2.0 away from B-5.

BORING NUMBER B-6

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/26/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 930 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E531 ft
REFUSAL Depth 8.0 ft / Elev 922.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 8.0 ft / Elev 922.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	930.0		(CH) Fat CLAY - with roots and trace chert fragments - reddish brown, dark brown and tan - moist - firm (RESIDUUM)	SS 1		3-2-3 (5)			
5	925.0		(CH) Fat CLAY - with trace chert fragments - reddish brown and tan - moist - very stiff to hard (RESIDUUM)	SS 2		4-6-8 (14)			
				SS 3		8-8-50/4"			

Refusal at 8.0 feet.
Bottom of borehole at 8.0 feet.

NOTES: Auger refusal originally at 8.0 feet. Boring was offset 5.0 feet east and refused at 7.0 feet.

BORING NUMBER B-7

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/26/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 929 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E330 ft
REFUSAL Depth 3.0 ft / Elev 926.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 3.0 ft / Elev 926.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	929.0		(CH) Fat CLAY - with trace roots and trace chert fragments - reddish brown and dark brown - moist - hard (RESIDUUM)	SS 1		3-50/2"			

Refusal at 3.0 feet.
Bottom of borehole at 3.0 feet.

NOTES: Auger refusal originally at 3.0 feet. Boring was offset 5.0 feet south and refused at 3.0 feet.

BORING NUMBER B-7A

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD CME550 & NQ Rock Core
LATITUDE / LONGITUDE ---
GROUND ELEVATION 929 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E400 ft
REFUSAL Depth 3.2 ft / Elev 925.8 ft
TOP OF ROCK Depth 3.2 ft / Elev 925.8 ft
GROUND WATER LEVELS:
BEGAN CORING Depth 3.2 ft / Elev 925.8 ft
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) 15.1 ft
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 18.3 ft / Elev 910.7 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	929.0		Auger to Refusal Depth No Samples Taken						
			Auger Refusal at 3.2 Feet (Began Coring)						
5	924.0		LIMESTONE - with sandstone seams, trace shale seams and trace partially healed calcium seams - gray and light gray - slightly weathered and moderately fractured - no discernible degree dip angle - very hard - strong HCl reaction	RC 1	100 (81)				
				RC 2	100 (92)				
10	919.0			RC 3	100 (97)				
15	914.0		DOLOMITE - with large quartz pockets, trace sandstone seams, trace partially healed calcium seams and trace shale seams - light gray, white and gray - slightly weathered and slightly fractured - no discernible degree dip angle - very hard - slight HCl reaction	RC 4	100 (100)				

Refusal at 3.2 feet.
Bottom of borehole at 18.3 feet.

NOTES:

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-8

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/27/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 924 ft **PROPOSED FFE** 916.0 ft
NORTHING / EASTING N0 ft / E0 ft
REFUSAL Depth 2.0 ft / Elev 922.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 2.0 ft / Elev 922.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	924.0		Topsoil (11 Inches)						
			Weathered ROCK - dolomite with clay - reddish brown and tan - moist - hard (RESIDUUM)	SS 1		8-9-50/0"			

Refusal at 2.0 feet.
Bottom of borehole at 2.0 feet.

NOTES: Auger refusal originally at 2.0 feet. Boring was offset 5.0 feet west and refused at 2.0 feet.

BORING NUMBER B-9

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/27/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 916 ft **PROPOSED FFE** 908.0 ft
NORTHING / EASTING N0 ft / E0 ft
REFUSAL Depth 8.5 ft / Elev 907.5 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 8.5 ft / Elev 907.5 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS	
								LIQUID LIMIT	PLASTICITY INDEX
0	916.0		Topsoil (11 Inches)						
			(CH) Fat CLAY - with black manganese and chert fragments at depth - reddish brown, orangish brown and tan - moist - firm to very stiff (RESIDUUM)	SS 1		3-3-5 (8)	32		
5	911.0			SS 2		8-8-8 (16)	22	87	60
				SS 3		7-8-9 (17)	32		

Refusal at 8.5 feet.
Bottom of borehole at 8.5 feet.

NOTES: Auger refusal originally at 8.5 feet. Boring was offset 5.0 feet north and refused at 8.5 feet.

BORING NUMBER B-10

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/27/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 936 ft **PROPOSED FFE** 931.0 ft
NORTHING / EASTING N0 ft / E330 ft
REFUSAL Depth 4.0 ft / Elev 932.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 4.0 ft / Elev 932.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	936.0		Topsoil (10 Inches)						
			(CH) Fat CLAY - with trace roots - reddish brown, brown and tan - moist - stiff (RESIDUUM)	SS 1		3-4-5 (9)			
			Weathered ROCK - dolomite with trace clay - reddish brown and gray - moist - hard (RESIDUUM)	SS 2		10-50/0"			

Refusal at 4.0 feet.
Bottom of borehole at 4.0 feet.

NOTES: Auger refusal originally at 4.0 feet. Boring was offset 5.0 feet southwest and refused at 2.0 feet.

BORING NUMBER B-11

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 926 ft **PROPOSED FFE** 916.0 ft
NORTHING / EASTING N0 ft / E630 ft
REFUSAL Depth 6.0 ft / Elev 920.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 6.0 ft / Elev 920.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS	
								LIQUID LIMIT	PLASTICITY INDEX
0	926.0		(CH) Fat CLAY - with large roots, trace chert fragments and organic odor - dark brown and reddish brown - moist - stiff (RESIDUUM)						
				SS 1		3-4-6 (10)	23		
				SS 2		4-6-8 (14)	27	64	46
5	921.0								

Refusal at 6.0 feet.
Bottom of borehole at 6.0 feet.

NOTES:

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-12

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 927 ft **PROPOSED FFE** 915.0 ft
NORTHING / EASTING N0 ft / E780 ft
REFUSAL Depth 1.0 ft / Elev 926.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 1.0 ft / Elev 926.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS	
								LIQUID LIMIT	PLASTICITY INDEX
0	927.0		Topsoil (6 Inches)						
			No Sample Recovered						

Refusal at 1.0 feet.
Bottom of borehole at 1.0 feet.

NOTES:

BORING NUMBER B-13

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 930 ft **PROPOSED FFE** 910.0 ft
NORTHING / EASTING N0 ft / E660 ft
REFUSAL Depth 1.0 ft / Elev 929.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 1.0 ft / Elev 929.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS	
								LIQUID LIMIT	PLASTICITY INDEX
0	930.0		Exposed Rock on Surface						

Refusal at 1.0 feet.
Bottom of borehole at 1.0 feet.

NOTES:

BORING NUMBER B-14

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/26/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 930 ft **PROPOSED FFE** 912.0 ft
NORTHING / EASTING N0 ft / E866 ft
REFUSAL Depth 8.0 ft / Elev 922.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 8.0 ft / Elev 922.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	930.0		Topsoil (7 Inches)						
			(CH) Fat CLAY - with black manganese, trace chert fragments, trace roots and trace sand - orangish brown - moist - firm to very stiff (RESIDUUM)	SS 1		3-3-4 (7)	33		
5	925.0			SS 2		4-6-8 (14)	34	75	55
				SS 3		4-6-10 (16)	29		

Refusal at 8.0 feet.
Bottom of borehole at 8.0 feet.

NOTES: Auger refusal originally at 8.0 feet. Boring was offset 5.0 feet south and refused at 6.0 feet.

BORING NUMBER B-14A

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/31/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD CME550 & NQ Rock Core
LATITUDE / LONGITUDE ---
GROUND ELEVATION 930 ft **PROPOSED FFE** 912.0 ft
NORTHING / EASTING N0 ft / E930 ft
REFUSAL Depth 7.5 ft / Elev 922.5 ft
TOP OF ROCK Depth 7.5 ft / Elev 922.5 ft
GROUND WATER LEVELS:
BEGAN CORING Depth 7.5 ft / Elev 922.5 ft
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) 15.0 ft
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 22.5 ft / Elev 907.5 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	930.0		Auger to Refusal Depth No Samples Taken						
5	925.0		Auger Refusal at 7.5 Feet (Began Coring)						
			LIMESTONE - with partially healed calcium seams, sandstone seams, trace shale seams and trace soil seams - light gray and gray - slightly weathered and slightly fractured - no discernible degree dip angle - very hard - strong HCl reaction						
10	920.0		Open Void From 8.4 Feet to 9.9 Feet	RC 1	70 (70)				
			LIMESTONE - with partially healed calcium seams, sandstone seams, trace shale seams and trace soil seams - light gray and gray - slightly weathered and slightly fractured - no discernible degree dip angle - very hard - strong HCl reaction						
			Open Void From 13.4 Feet to 13.7 Feet						
15	915.0		LIMESTONE - with quartz seams, trace sandstone seams, trace partially healed calcium seams and trace shale seams - light gray and gray - slightly weathered and slightly fractured - no discernible degree dip angle - very hard - strong HCl reaction	RC 2	92 (88)				

NOTES:

(Continued Next Page)

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-14A

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/31/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD CME550 & NQ Rock Core
LATITUDE / LONGITUDE ---
GROUND ELEVATION 930 ft **PROPOSED FFE** 912.0 ft
NORTHING / EASTING N0 ft / E930 ft
REFUSAL Depth 7.5 ft / Elev 922.5 ft
TOP OF ROCK Depth 7.5 ft / Elev 922.5 ft
GROUND WATER LEVELS:
BEGAN CORING Depth 7.5 ft / Elev 922.5 ft
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) 15.0 ft
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 22.5 ft / Elev 907.5 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
20	910.0		LIMESTONE - with quartz seams, trace sandstone seams, trace partially healed calcium seams and trace shale seams - light gray and gray - slightly weathered and slightly fractured - no discernible degree dip angle - very hard - strong HCl reaction *(continued)*	RC 3	100 (100)				

Refusal at 7.5 feet.
Bottom of borehole at 22.5 feet.

NOTES:

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-15

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 948 ft **PROPOSED FFE** 948.0 ft
NORTHING / EASTING N0 ft / E1183 ft
REFUSAL Depth 13.0 ft / Elev 935.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 13.0 ft / Elev 935.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	948.0		(CH) Fat CLAY - with trace chert fragments and trace black manganese - reddish brown and brown - moist - firm to very stiff (RESIDUUM)						
				SS 1		3-3-6 (9)	25		
				SS 2		2-2-4 (6)	24	51	32
5	943.0								
				SS 3		3-5-9 (14)	23		
				SS 4		6-8-16 (24)	22		
10	938.0								

Refusal at 13.0 feet.
Bottom of borehole at 13.0 feet.

NOTES:

BORING NUMBER B-16

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/31/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 934 ft **PROPOSED FFE** 920.0 ft
NORTHING / EASTING N0 ft / E975 ft
REFUSAL Depth 8.0 ft / Elev 926.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 8.0 ft / Elev 926.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	934.0		Topsoil (6 Inches)						
			(CH) Fat CLAY - with black manganese and large roots - reddish brown, orangish brown and tan - moist - stiff (RESIDUUM)	SS 1		4-4-5 (9)			
				SS 2		3-6-6 (12)			
5	929.0		(CH) Fat CLAY - with black manganese - reddish brown and tan - moist - very stiff (RESIDUUM)	SS 3		6-8-9 (17)			

Refusal at 8.0 feet.
Bottom of borehole at 8.0 feet.

NOTES:

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-17

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 928 ft **PROPOSED FFE** 912.0 ft
NORTHING / EASTING N0 ft / E975 ft
REFUSAL Depth 1.0 ft / Elev 927.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 1.0 ft / Elev 927.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS	
								LIQUID LIMIT	PLASTICITY INDEX
0	928.0		Topsoil (6 Inches)						
			No Sample Recovered						

Refusal at 1.0 feet.
Bottom of borehole at 1.0 feet.

NOTES:

BORING NUMBER B-18

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 927 ft **PROPOSED FFE** 912.0 ft
NORTHING / EASTING N0 ft / E1138 ft
REFUSAL Depth 8.0 ft / Elev 919.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 8.0 ft / Elev 919.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	927.0		Topsoil (6 Inches)						
			(CH) Fat CLAY - with black manganese and trace roots - reddish brown and brown - moist - firm (RESIDUUM)	SS 1		2-2-3 (5)	24		
			(CH) Fat CLAY - with black manganese - reddish brown - moist - stiff to very stiff (RESIDUUM)	SS 2		3-4-5 (9)	27	57	36
5	922.0			SS 3		6-10-15 (25)	26		

Refusal at 8.0 feet.
Bottom of borehole at 8.0 feet.

NOTES:

BORING NUMBER B-19

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/26/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 925 ft **PROPOSED FFE** 912.0 ft
NORTHING / EASTING N0 ft / E1292 ft
REFUSAL Depth 8.0 ft / Elev 917.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 8.0 ft / Elev 917.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	925.0		Topsoil (10 Inches)						
			(CL) Lean CLAY - with sand and trace roots - dark brown - moist - firm (RESIDUUM)	SS 1		3-3-3 (6)			
			(CL) Sandy Lean CLAY - orangish brown - moist to dry - firm to hard (RESIDUUM)	SS 2		4-3-5 (8)			
5	920.0			SS 3		10-14-18 (32)			

Refusal at 8.0 feet.
Bottom of borehole at 8.0 feet.

NOTES: Auger refusal originally at 8.0 feet. Boring was offset 5.0 feet east and refused at 8.0 feet.

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-20

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/26/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 940 ft **PROPOSED FFE** 924.0 ft
NORTHING / EASTING N0 ft / E1425 ft
REFUSAL Depth 18.0 ft / Elev 922.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 18.0 ft / Elev 922.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	940.0		Topsoil (10 Inches)						
			(CH) Fat CLAY - with trace sand and trace chert fragments - orangish brown and tan - moist - firm to stiff (RESIDUUM)	SS 1		3-4-4 (8)	35		
5	935.0			SS 2		4-4-7 (11)	32	60	31
				SS 3		7-6-7 (13)	27		
			(CH) Fat CLAY - with black manganese and chert fragments - reddish brown - moist - very stiff (RESIDUUM)						
10	930.0			SS 4		7-10-13 (23)	26		
15	925.0			SS 5		8-8-10 (18)	30		

Refusal at 18.0 feet.
Bottom of borehole at 18.0 feet.

NOTES:

BORING NUMBER B-21

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/26/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 943 ft **PROPOSED FFE** 962.0 ft
NORTHING / EASTING N0 ft / E701 ft
REFUSAL Depth 3.0 ft / Elev 940.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 3.0 ft / Elev 940.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	943.0		Topsoil (8 Inches)						
			(CH) Fat CLAY - orangish brown and dark brown - moist - hard (RESIDUUM)	SS 1		3-6-50/3"			

Refusal at 3.0 feet.
Bottom of borehole at 3.0 feet.

NOTES: Auger refusal originally at 3.0 feet. Boring was offset 5.0 feet northeast and refused at 1.0 foot.

BORING NUMBER B-22

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/26/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 953 ft **PROPOSED FFE** 970.0 ft
NORTHING / EASTING N0 ft / E814 ft
REFUSAL Depth 16.0 ft / Elev 937.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
▽ **AT END OF DRILLING** 16.00 ft / Elev 937.00 ft
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 16.0 ft / Elev 937.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	953.0		Topsoil (9 Inches)						
			(CH) Fat CLAY - with roots - reddish brown and dark brown - moist - firm (RESIDUUM)	SS 1		2-2-4 (6)	30		
			(CH) Fat CLAY - with trace black manganese - reddish brown - moist - stiff to very stiff (RESIDUUM)	SS 2		6-6-7 (13)	32	78	52
5	948.0			SS 3		6-7-10 (17)	33		
				SS 4		7-9-13 (22)	32		
10	943.0								
			Weathered ROCK - limestone with trace clay - tan - moist - hard (RESIDUUM)	SS 5		50/3"			
15	938.0		▽						

Refusal at 16.0 feet.
Bottom of borehole at 16.0 feet.

NOTES:

BORING NUMBER B-23

GEOServices, LLC, Geotechnical and Materials Engineers

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 957 ft **PROPOSED FFE** 974.0 ft
NORTHING / EASTING N0 ft / E1113 ft
REFUSAL Depth 8.0 ft / Elev 949.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 8.0 ft / Elev 949.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	957.0		(CH) Fat CLAY - with trace sand and trace chert fragments - reddish brown - moist - stiff to very stiff (RESIDUUM)						
				SS 1		4-4-5 (9)			
				SS 2		3-5-8 (13)			
5	952.0			SS 3		6-6-10 (16)			

Refusal at 8.0 feet.
Bottom of borehole at 8.0 feet.

NOTES:

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-24

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/26/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Geoprobe 7730
LATITUDE / LONGITUDE ---
GROUND ELEVATION 961 ft **PROPOSED FFE** 974.0 ft
NORTHING / EASTING N0 ft / E1408 ft
REFUSAL Depth 13.0 ft / Elev 948.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 13.0 ft / Elev 948.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0	961.0		Topsoil (12 Inches)						
			(CL) Lean CLAY - with roots and sand - dark brown and reddish brown - dry - firm (RESIDUUM)	SS 1		2-3-3 (6)	19		
5	956.0		(CH) Fat CLAY - with black manganese and chert fragments - reddish brown - moist to dry - stiff to very stiff (RESIDUUM)	SS 2		6-8-10 (18)	28	79	58
				SS 3		6-6-8 (14)	32		
10	951.0			SS 4		6-7-10 (17)	30		

Refusal at 13.0 feet.
Bottom of borehole at 13.0 feet.

NOTES:

GEOServices, LLC, Geotechnical and Materials Engineers

BORING NUMBER B-25

PROJECT NAME Cedar Bluff Flood Improvements Site Study
GEOServices PROJECT# 21-20848
DATE 10/30/20
PROJECT LOCATION Knox County, Tennessee
DRILLING CONTRACTOR M&W Drilling
LOGGED BY KSR **ON-SITE REP.** ---
DRILLING METHOD Dietrich D-25, 3.25-in H.S.A
LATITUDE / LONGITUDE ---
GROUND ELEVATION 920 ft **PROPOSED FFE** 920.0 ft
NORTHING / EASTING N0 ft / E1190 ft
REFUSAL Depth 1.0 ft / Elev 919.0 ft
TOP OF ROCK ---
GROUND WATER LEVELS:
BEGAN CORING ---
AT END OF DRILLING --- Dry
FOOTAGE CORED (LF) ---
AFTER 1 HOUR --- Backfilled
BOTTOM OF HOLE Depth 1.0 ft / Elev 919.0 ft
AFTER 24 HOURS --- Backfilled

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	ATTERBERG LIMITS	
								LIQUID LIMIT	PLASTICITY INDEX
0	920.0		Exposed Rock on Surface						

Refusal at 1.0 feet.
Bottom of borehole at 1.0 feet.

NOTES:

GEOServices, LLC, Geotechnical and Materials Engineers

Cedar Bluff Flood Improvements
Rock Core Photographs

1	Remarks	B-5 – From 11.2 Feet to 22.1 Feet

2	Remarks	B-5 – From 22.1 Feet to 27.1 Feet

GEOServices, LLC, Geotechnical and Materials Engineers

Cedar Bluff Flood Improvements
Rock Core Photographs

3	**Remarks**	B-7 – From 3.2 Feet to 10.9 Feet

4	**Remarks**	B-7 – From 10.9 Feet to 18.3 Feet

5	Remarks	B-14 – From 7.5 Feet to 17.5 Feet

6	Remarks	B-14 – From 17.5 Feet to 22.5 Feet

SUBSURFACE DIAGRAM
Line 1

GEOServices, LLC, Geotechnical and Materials Engineers

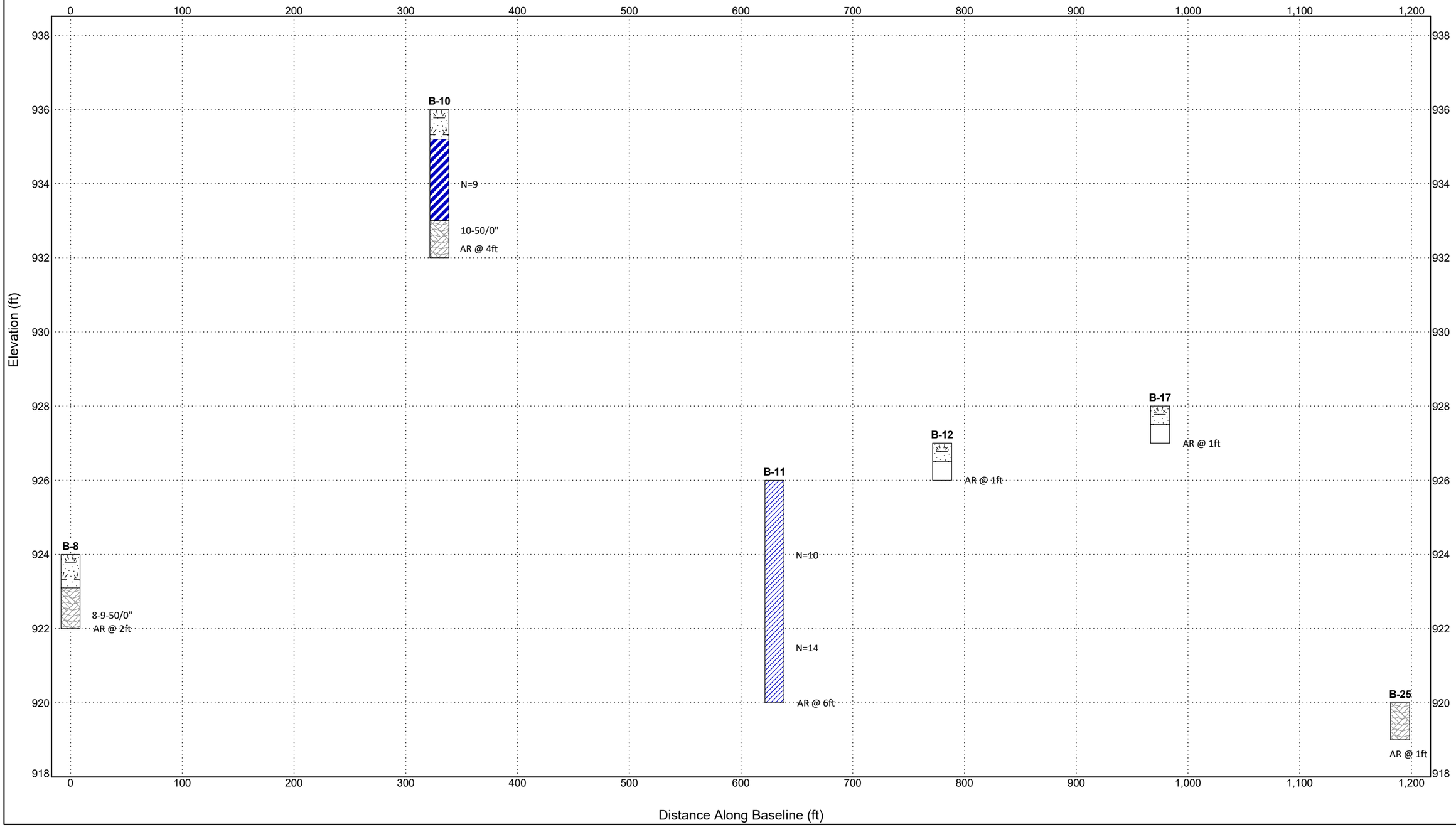
CLIENT Knox County Engineering and Public Works

PROJECT NUMBER 21-20848

PROJECT NAME Cedar Bluff Flood Improvements Site Study

PROJECT LOCATION Knox County, Tennessee

Topsoil
Bedrock
USCS High Plasticity Clay
USCS Low Plasticity Clay



GEOServices, LLC, Geotechnical and Materials Engineers

SUBSURFACE DIAGRAM
Line 2

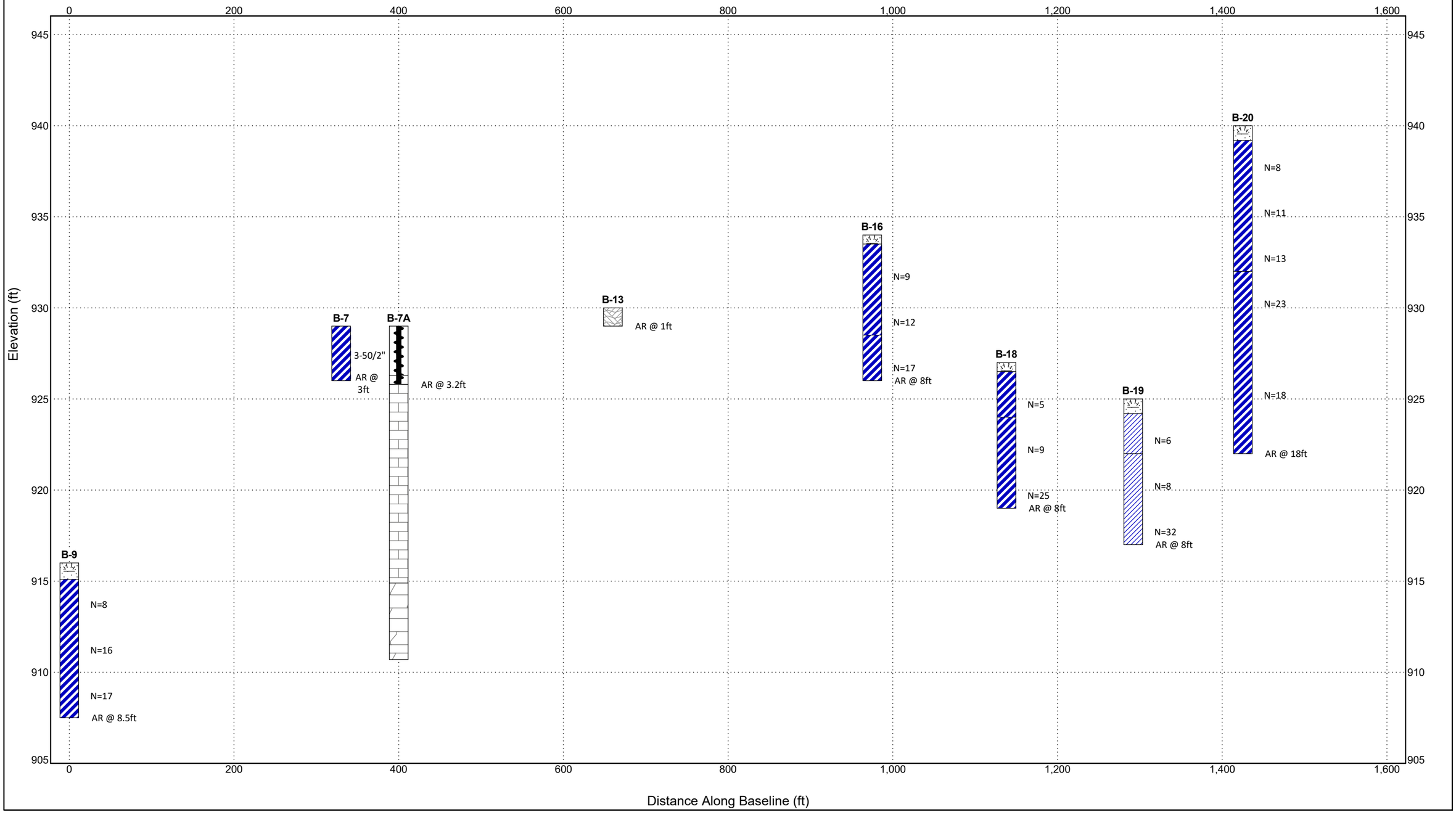
CLIENT Knox County Engineering and Public Works

PROJECT NUMBER 21-20848

PROJECT NAME Cedar Bluff Flood Improvements Site Study

PROJECT LOCATION Knox County, Tennessee

USCS High Plasticity Clay
Auger Probe
Limestone
Dolomite
Topsoil
Bedrock
USCS Low Plasticity Clay



GEOServices, LLC, Geotechnical and Materials Engineers

SUBSURFACE DIAGRAM
Line 3

USCS Low Plasticity Clay | Topsoil | USCS High Plasticity Clay

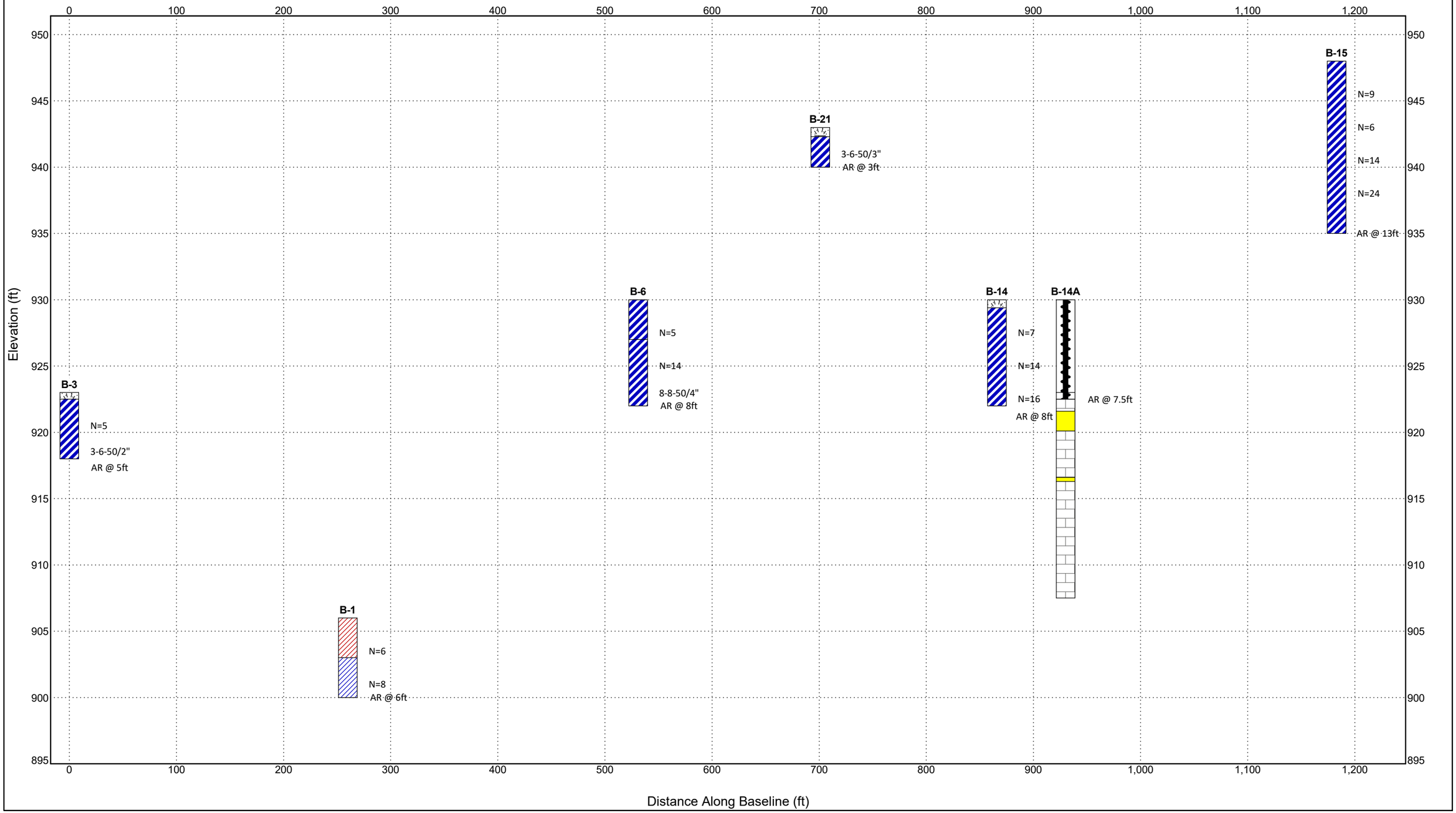
Auger Probe | Limestone | Void

CLIENT Knox County Engineering and Public Works

PROJECT NAME Cedar Bluff Flood Improvements Site Study

PROJECT NUMBER 21-20848

PROJECT LOCATION Knox County, Tennessee



GEOServices, LLC, Geotechnical and Materials Engineers

SUBSURFACE DIAGRAM
Line 4

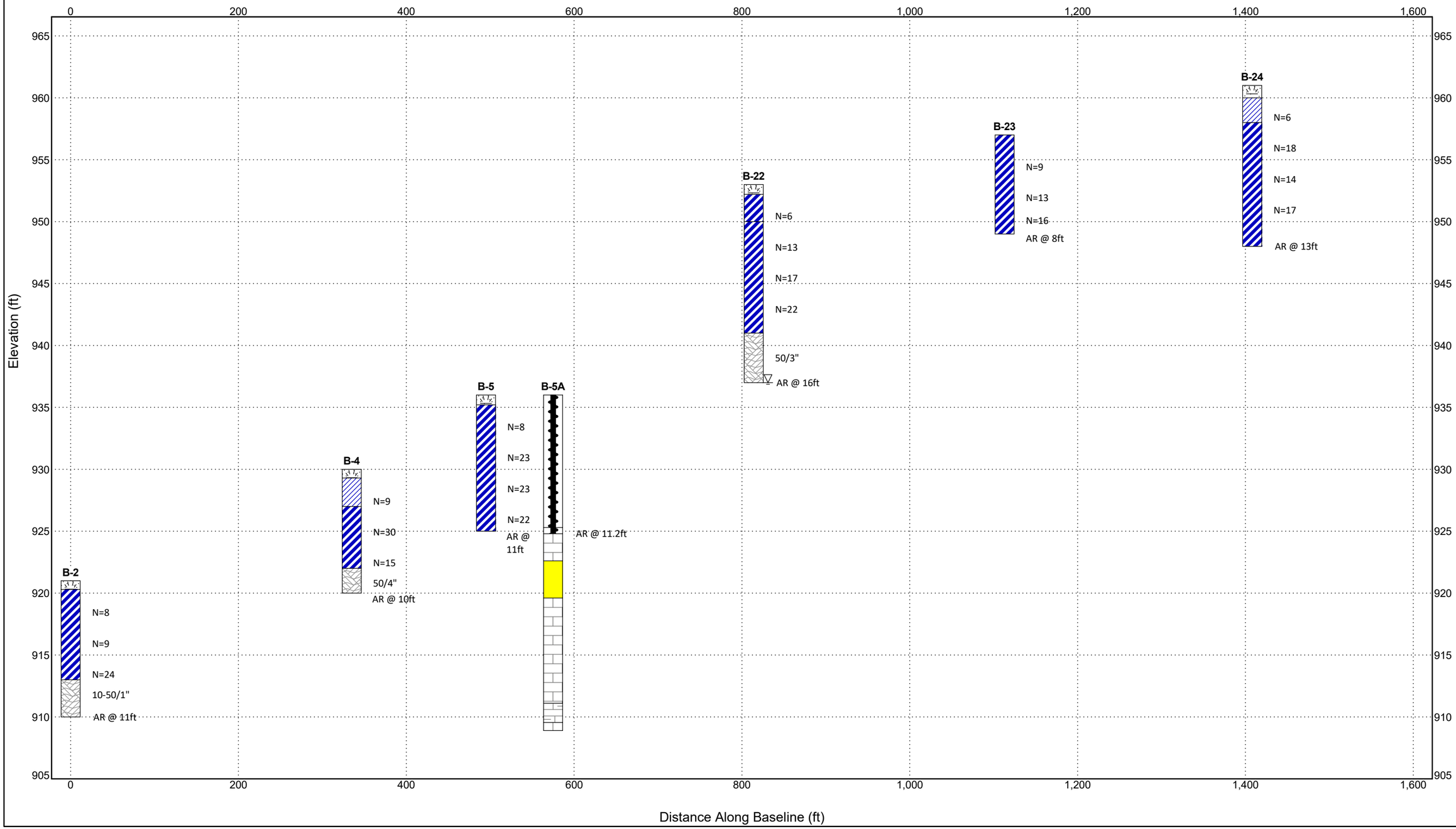
CLIENT Knox County Engineering and Public Works

PROJECT NUMBER 21-20848

PROJECT NAME Cedar Bluff Flood Improvements Site Study

PROJECT LOCATION Knox County, Tennessee

Topsoil
USCS High Plasticity Clay
Bedrock
USCS Low Plasticity Clay
Auger Probe
Limestone
Void



GEOServices, LLC, Geotechnical and Materials Engineers

APPENDIX B

SOIL DATA SUMMARY

Boring Number	Sample Number	Depth (feet)	Natural Moisture Content	Atterberg Limits			Soil Type	Percent Organic Content
				LL	PL	PI		
B-2	1	1.0-2.5'	28.4%					
	2	3.5-5.0'	34.9%	69	28	41	CH	
	3	6.0-7.5'	34.9%					
B-5	1	1.0-2.5'	23.6%					
	2	3.5-5.0'	29.6%	71	29	42	CH	
	3	6.0-7.5'	28.0%					
	4	8.5-10.0'	29.2%					
B-9	1	1.0-2.5'	32.3%					
	2	3.5-5.0'	22.4%	87	27	60	CH	
	3	6.0-7.5'	31.6%					
B-11	1	1.0-2.5'	22.8%					
	2	3.5-5.0'	26.5%	64	18	46	CH	
B-14	1	1.0-2.5'	33.3%					
	2	3.5-5.0'	34.3%	75	20	55	CH	
	3	6.0-7.5'	29.0%					
B-15	1	1.0-2.5'	24.9%					
	2	3.5-5.0'	23.6%	51	19	32	CH	
	3	6.0-7.5'	22.8%					
	4	8.5-10.0'	21.6%					
B-18	1	1.0-2.5'	23.6%					
	2	3.5-5.0'	27.3%	57	21	36	CH	
	3	6.0-7.5'	25.5%					

SOIL DATA SUMMARY

Boring Number	Sample Number	Depth (feet)	Natural Moisture Content	Atterberg Limits			Soil Type	Percent Organic Content
				LL	PL	PI		
B-20	1	1.0-2.5'	34.9%					
	2	3.5-5.0'	31.8%	60	29	31	CH	
	3	6.0-7.5'	26.5%					
	4	8.5-10.0'	25.7%					
	5	13.5-15.0'	29.8%					
B-22	1	1.0-2.5'	29.5%					
	2	3.5-5.0'	32.3%	78	26	52	CH	
	3	6.0-7.5'	32.7%					
	4	8.5-10.0'	31.6%					
B-24	1	1.0-2.5'	19.0%					
	2	3.5-5.0'	27.7%	79	21	58	CH	
	3	6.0-7.5'	32.1%					
	4	8.5-10.0'	30.3%					

ATTACHMENT G
Geotechnical Exploration Report by S&ME

January 21, 2022

Knox County Engineering
205 West Baxter Avenue,
Knoxville, Tennessee 37917

Attention: Mr. Jim Snowden, P.E.

Reference: **Letter Report of Geotechnical Exploration**
Fox Lonas at Dutchtown Property
Knoxville, Tennessee
S&ME Proposal No. 214929

Dear Mr. Snowden:

The following report presents the results of our geotechnical services conducted at the referenced site in Knoxville, Tennessee. The work was performed in general accordance with S&ME Proposal No. 214929, dated September 27, 2021, and was authorized by you on November 29, 2021. The purpose of our geotechnical exploration was to drill probe holes using an air track drill at the subject site to obtain information on rock continuity in proposed cut areas, provide recommendations regarding the potential of the site for use of Class V Injection Wells, and provide comments on GEOServices *Report of Limited Geotechnical Exploration*.

This letter report presents the results of the field exploration and provides recommendations based on the field exploration. Attached to this report are the boring logs.

♦ Project Information

Initial project information was provided by Mr. Jim Snowden with Knox County in a series of emails to Mr. Brad Salsbury and Mr. Dan Boles with S&ME between April 14 and 16, 2021. Appended to the emails were the following documents:

- *Report of Limited Geotechnical Exploration,* dated November 16, 2020, prepared by GEOServices.
- *Grading Plan*, Sheet C1, dated June 1, 2020, prepared by Fulghum MacIndoe.
- *Dutchtown Road Flood Study Report*, dated May 7, 1999 by Ogden Environmental and Energy Services, Inc.

Based on the provided information and our meeting with Mr. Snowden on April 21, 2021, we understand Knox County (County) is studying the feasibility to develop the subject area into green space and use the area to assist with alleviating problematic flooding that occurs periodically along Cedar Bluff Road. As part of the project feasibility Knox County is discussing the potential for contractors to use the bedrock on site as construction material.

The site is located east of North Cedar Bluff Road, north of Dutchtown Road, west of Park Village Road, and south of Fox Lonas Road. The site is mostly wooded and required clearing to permit drill rig access. Site elevations ranged from about 970 feet above mean sea level (amsl) to under 910 feet amsl. Based on the KGIS maps and site reconnaissance there are about seven closed depressions at the site.

The provided grading plan has four retention/detentions areas that roughly correspond with the existing closed depressions at the site. Cuts of up to 20 feet are anticipated at the site and data from the GEOServices report indicated much of the material cut will be rock. The project design is in the feasibility stages and the County is interested in determining if the rock encountered at the site is continuous or contains significant voids. Ultimately this information will be provided to contractors for evaluating the potential to use the rock for construction purposes, provide information for future Class V Injection well permitting, and provide information on the potential for the closed depressions to be Class V Injection wells, if necessary.

We were requested to perform a geotechnical exploration for the subject project using an air track drill to obtain information on rock continuity in planned cut areas. The project information and assumptions detailed in this letter report should be reviewed and confirmed by the appropriate team members. Modifications to our report may be required if the actual conditions vary from the project information and assumptions described herein.

♦ Site Geology

The project site lies within the Appalachian Valley and Ridge Physiographic Province of East Tennessee. This Province is characterized by elongated, northeasterly-trending ridges formed on highly resistant sandstone and shale. Between ridges, broad valleys and rolling hills are formed primarily on less resistant limestone, dolomite, and shale.

The Geology of the Bearden Quadrangle by J. Mark Cattermole (1960) indicates the site is underlain by bedrock from the Lenoir Limestone formation of the Lower and Middle Chickamauga Group, and the Newala Formation of the Knox Group. The Lenoir Limestone formation is typically composed of gray to dark blue argillaceous, silty, and somewhat nodular limestone. The Lenoir Limestone typically weathers to a produce fairly rich silty clay residuum; however, the soil tends to be removed by erosion and the limestone commonly crops out. The Newala is made up of the Mascot Dolomite and Kingsport Formations, which are generally composed of fine-grained, siliceous dolomite inter-bedded with limestone. These formations typically weather to produce a thick reddish or orangish-brown clay overburden soil. Silica in the form of chert is resistant to weathering and typically scattered throughout the residuum. The project site is divided evenly between these two geologic formations with the dividing line starting approximately midway between Dutchtown Road and Fox Lonas Road on North Cedar Bluff Road and continuing due east.

Since the bedrock underlying the site contains carbonate rock (i.e. limestone/dolomite), the site is susceptible to the hazards of irregular weathering, cave and cavern conditions, and overburden sinkholes. Carbonate rock, while appearing very hard and resistant, is soluble in slightly acidic water. This characteristic, plus differential weathering of the bedrock mass is responsible for the hazards. Of these hazards, the occurrence of sinkholes is potentially the most damaging to overlying soil-supported structures. Sinkholes occur primarily due to differential weathering of the bedrock and flushing or raveling of overburden soil into the cavities in the bedrock. The loss of solids creates a cavity or dome in the overburden. Growth of the dome over time or excavation over the dome can create a condition in which rapid, local subsidence or collapse of the roof of the dome occurs.

A certain degree of risk with respect to sinkhole formation and subsidence should be considered with any site located within geologic areas underlain by potentially soluble rock units. While a rigorous effort to assess the potential for

sinkhole formation on this site was beyond the scope of this evaluation, our borings did not encounter obvious indications of sinkhole development. In addition, we did not observe any surface signs of sinkhole activity at the site. However, some closed depressions, which denote past sinkhole activity, are shown on the United States Geological Survey (USGS) topographic map in the area of the site. It is our opinion the risk of sinkhole development at this site is comparable to other sites located within similar geologic settings which have been developed successfully. However, the owner must be willing to accept the risk of future sinkhole development at this site.

♦ Field Exploration

The subsurface conditions were explored on December 6 to 8, 2021, with nine probe holes (designated B-01 through B-08, and B-11) located within the project site. The probe holes were advanced by a skid steer mounted WORD Rock Drill pneumatically hammering a 4-inch button bit into the ground and expelling the cuttings with compressed air. No soil or rock samples were collected due the nature of the drilling process. The drilling operations were continuously monitored by a member of our engineering staff, and any changes in the performance of the drilling were recorded along with the depth at which they occurred. Changes in performance reflected a change in the soil or rock strata encountered. Using this data and the auditory cues of the rig and the visual cues from the cuttings, interpretations were made about underlying strata. Once the drilling reached bedrock, the length of time required to advance each 5-foot drill rod was also recorded. This recorded time interval was later converted to a drilling rate by subtracting the thickness of any voids from the rod length and dividing by the time interval to produce a rate in feet per minute. The drill rate is a method of measuring the relative hardness of the bedrock encountered based on the equipment used to advance the drill tools.

S&ME personnel selected the boring locations and depths. The boring locations were marked in the field with a consumer grade, hand-held-global positioning system (GPS) unit with pre-loaded points established using Google Earth. The general boring locations are shown in Figure 2 Appendix I. The ground surface elevations shown on the boring logs were obtained by plotting the boring locations on the KGIS topographic map. The test boring locations and ground surface elevations should be considered approximate based on the methods used to establish them.

The drill crew documented if subsurface water was encountered in the boring at the time of drilling. Upon completion of drilling and the boring was backfilled with soil and a hole plug was set just below the ground surface before departing the site. Detailed information pertaining to the boring locations can be found on the attached boring logs.

♦ Subsurface Conditions

All borings encountered an initial stratum of likely residual soil varying in thickness from 1.4 feet to greater than 24 feet. Borings B-01, B-03, B-05, and B-07 located in the Newala Formation on the north half of the site had, with the exception of boring B-07, had a substantially thinner stratum of soil overburden. The depth to bedrock for these borings was 8.1 feet, 1.4 feet, 4.0 feet, and greater than 24 feet, respectively. Borings B-02, B-04, B-06, B-08, and B-11, located in the Lenoir Limestone formation, had a depth to bedrock of 9.7 feet, 12.0 feet, 16.8 feet, 16.6 feet, and 15.8 feet, respectively. The voids/soft material percentage and average drill rate for the borings in the Lenoir Limestone Formation were 19.2 percent and 0.391 ft/min, and the voids/soft material percentage and average drill rate for the borings in the Newala Formation were 3.0 percent and 0.349 ft/min. Additional data on individual borings can be seen in Tables 1 and 2 and the boring logs attached to this letter.

Table 1 – Lenoir Formation Borings

Lenoir Limestone Formation (South)						
Boring	Total Depth (ft)	Soil Overburden Thickness (ft)	Bedrock Stratum Thickness (ft)	Voids/Soft Material Cumulative Thickness (ft)	% Voids/Soft Material	Weighted Average Drill Rate (ft/min)
B-02	25.1	9.7	15.4	3.7	24.0%	0.388
B-04	37	12	25.0	7.2	28.8%	0.481
B-06	30	16.8	13.3	0.7	5.3%	0.316
B-08	30	10.5	20.1	3.4	16.9%	0.393
B-11	30	15.8	14.2	1.9	13.4%	0.335
Total	152.1	64.8	88.0	16.9	19.2%	0.391

Table 2 – Newala Formation Borings

Newala Formation (North)						
Boring	Total Depth (ft)	Soil Overburden Thickness (ft)	Bedrock Stratum Thickness (ft)	Voids/Soft Material Cumulative Thickness (ft)	% Voids/Soft Material	Weighted Average Drill Rate (ft/min)
B-01	30	8.1	22.1	0.8	3.6%	0.332
B-03	20	1.4	18.6	1.0	5.4%	0.384
B-05	30	4	26.0	0.2	0.8%	0.340
B-07	24	24	0.0	0.0	0.0%	0.000
Total	104.0	37.5	66.7	2.0	3.0%	0.349

♦ Class V Injection Well Potential

While there are many requirements for designing, developing, and permitting a Class V Injection Well, a primary issue is dependent on the bedrock's ability to receive and infiltrate water into the subsurface as it enters the well. Typically, bedrock with more voids, fractures, fissures, and weathered zones can receive larger amounts of water. At the site, and based on the limited borings drilled within the Lenoir Limestone Formation on the south side of the site had more fractures, voids (clay filled), and weathered zones than the boring located on the north side of the site and in the Newala Formation. Therefore, solely from an infiltration standpoint, an injection well located on the north side of the site may have greater potential to successfully be developed as an injection well. The infiltration potential for each

specific injection well should be confirmed with infiltration testing prior to applying for a Class V Injection Well permit. Depth of the well, sizes of voids, and volume of water all have an impact on constructing a properly functioning well.

♦ Comments Regarding GEOServices Report

We have read and reviewed GEOServices Report of Limited Geotechnical Exploration provided by you. We generally find their report to be accurate and within the standard of care generally practiced in the Knoxville area. We note two expectations. GEOSerivces documented the site is located in the Holston and Newala geologic formations. We believe the site is slightly further north and located in the Lenoir and Newala geologic formations. We note that GEOServices did have the rock core from their coring operations to observe, however; we could not definitely determine the rock origin from the photographs. Also, geologic mapping boundaries can vary significantly in the field. Also, GEOSerivces recommends mixed fills of durable and non-durable rock can be acceptable. While mixed fills may be acceptable in areas that will not be developed, we have found that site planning can be dynamic and often areas that initially are not planned for development may, in fact, need to be developed. Mixed fill can unnecessarily impact future site development and we recommend mixed fills be avoided when possible.

♦ Limitations

This letter has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty either express or implied, is made.

Sincerely,

S&ME, Inc.

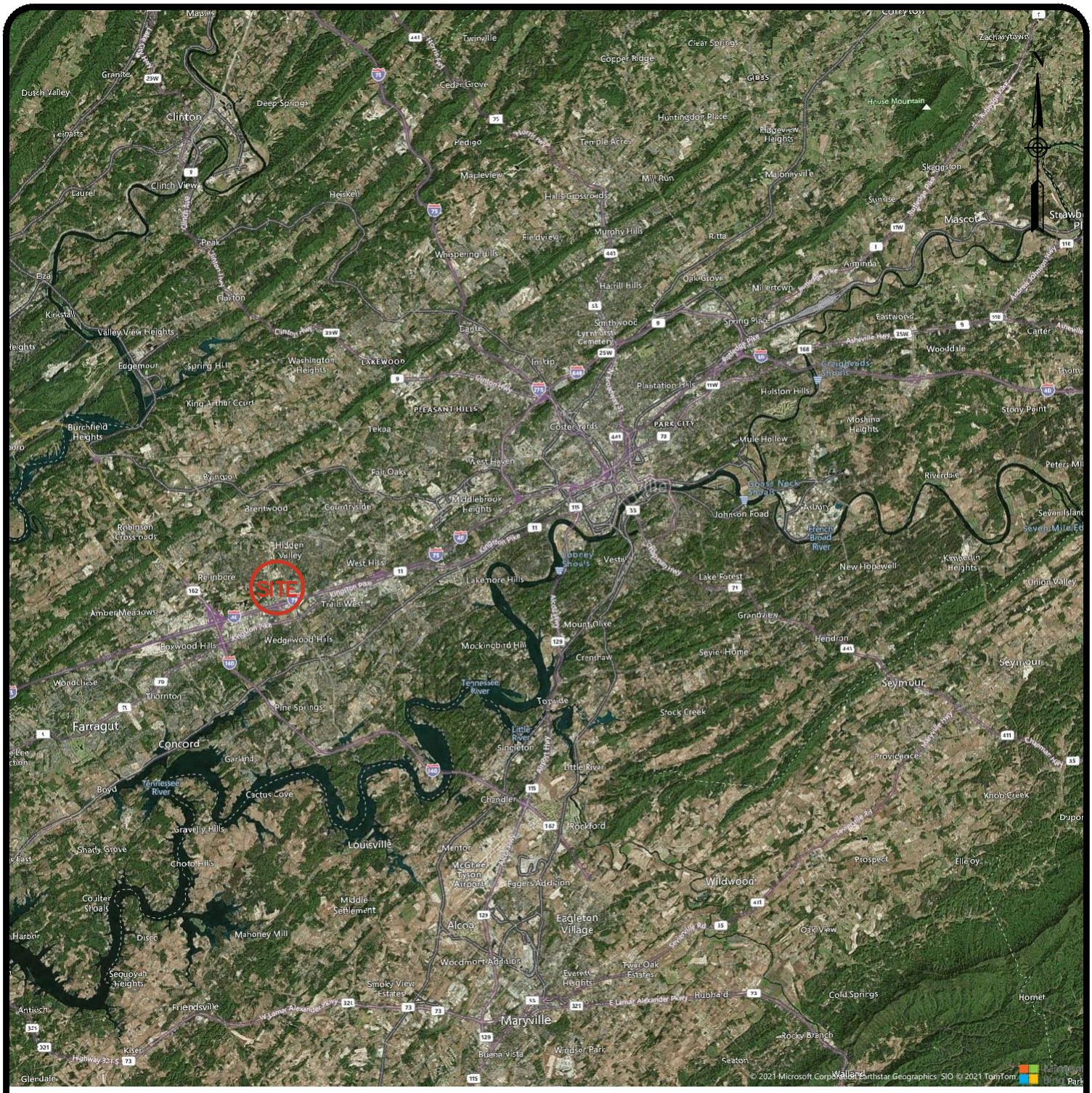
Ken C. Kolesar, E.I.
Staff Professional

Daniel R. Boles, PE
Geotechnical Group Leader

Attachments: Figures 1 & 2
Boring Logs (B-01 through B-08, and B-11)

Appendices

Attachment I – Figures

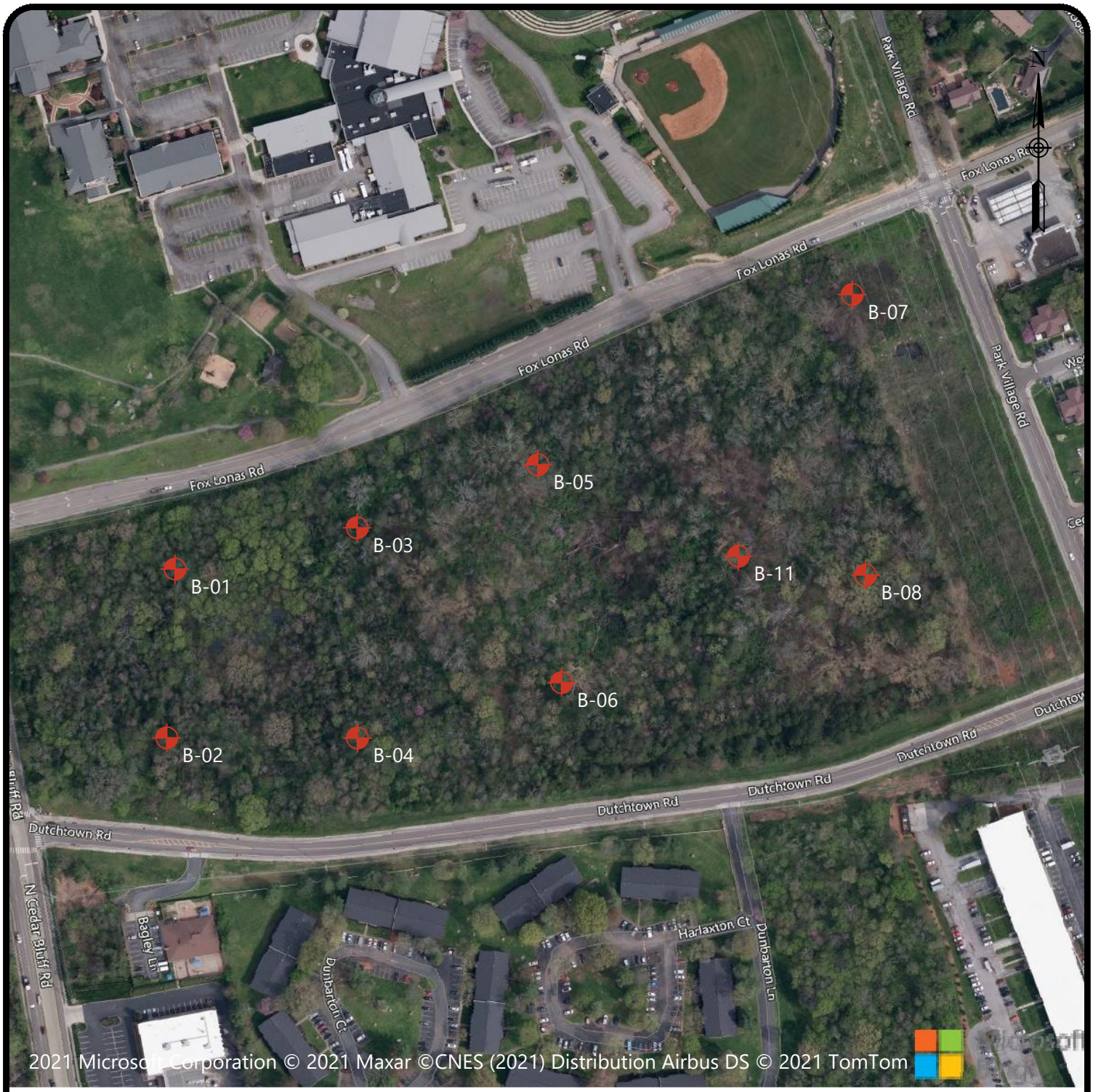


Notes:

1) Base map from Microsoft Corporation Earthstar Geographics accessed on Janurary 7, 2022.

	Site Vicinity Map	SCALE: Not to Scale	FIGURE NO. 1
	Geotechnical Investigation Fox Lonas at Dutchtown Property Knoxville, Tennessee	DATE: 12-07-2022 PROJECT NUMBER 214929	

Drawing Path: T:\GEO\Projects\2021\214929_Knox County_Fox Lona Road Property_Knoxville TN\CAD\214929_Boring Layout.dwg



Legend:

Approximate Location of Probe Hole Borings

Notes:

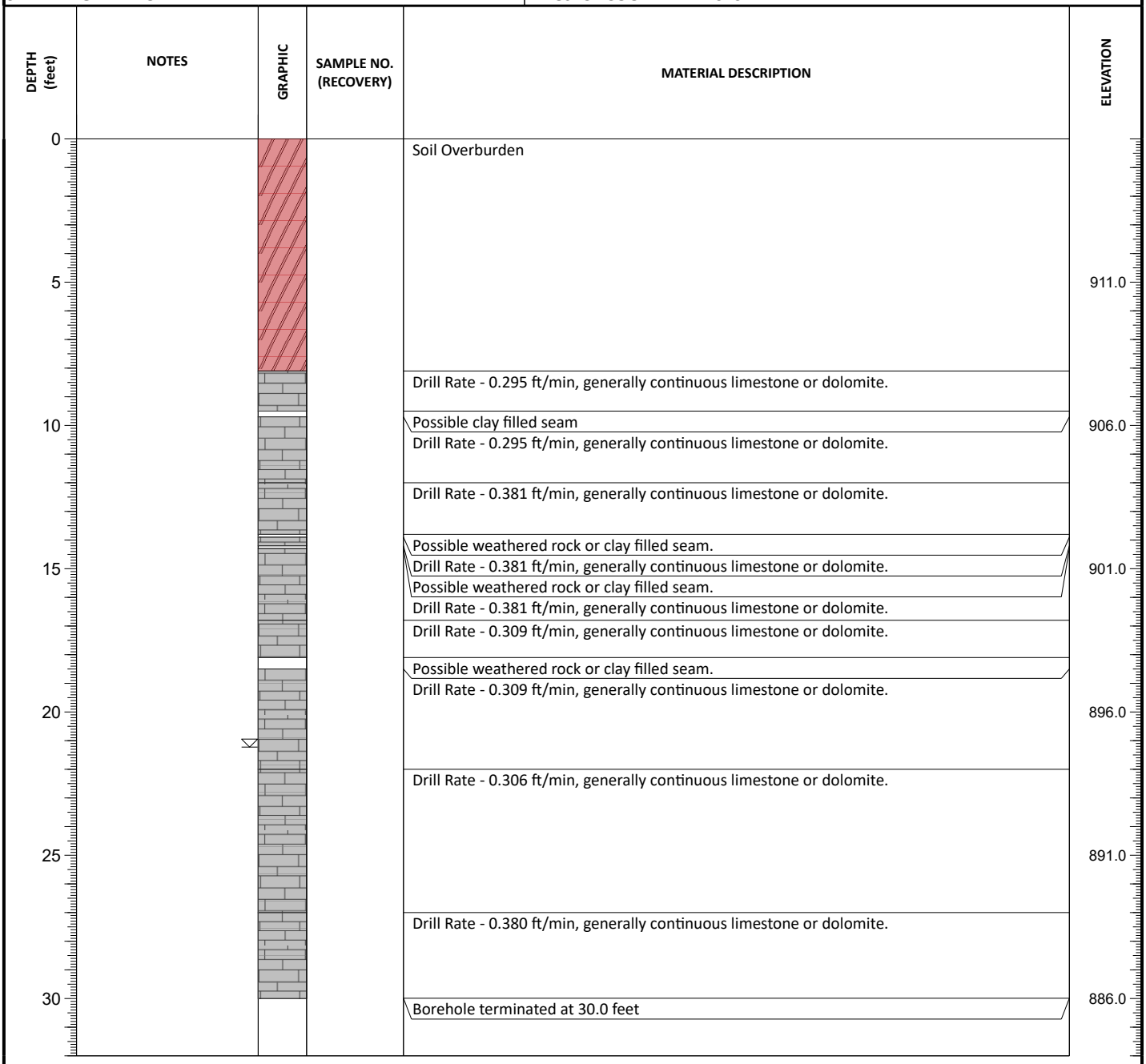
1) Boring locations are shown in general arrangement only.
2) Do not use boring locations for determination of distances or quantities.
3) Base map from Microsoft Corporation Earthstar Geographics accessed on Janurary 7, 2022.

	Boring Location Plan	SCALE: Not to Scale	FIGURE NO. 2
	Geotechnical Investigation Fox Lonas at Dutchtown Property Knoxville, Tennessee	DATE: 12-07-2022 PROJECT NUMBER 214929	

Drawing Path: T:\GEO\Projects\2021\214929_Knox County_Fox Lona Road Property_Knoxville TNCAD\214929_Boring Layout.dwg

Attachment II – Boring Logs

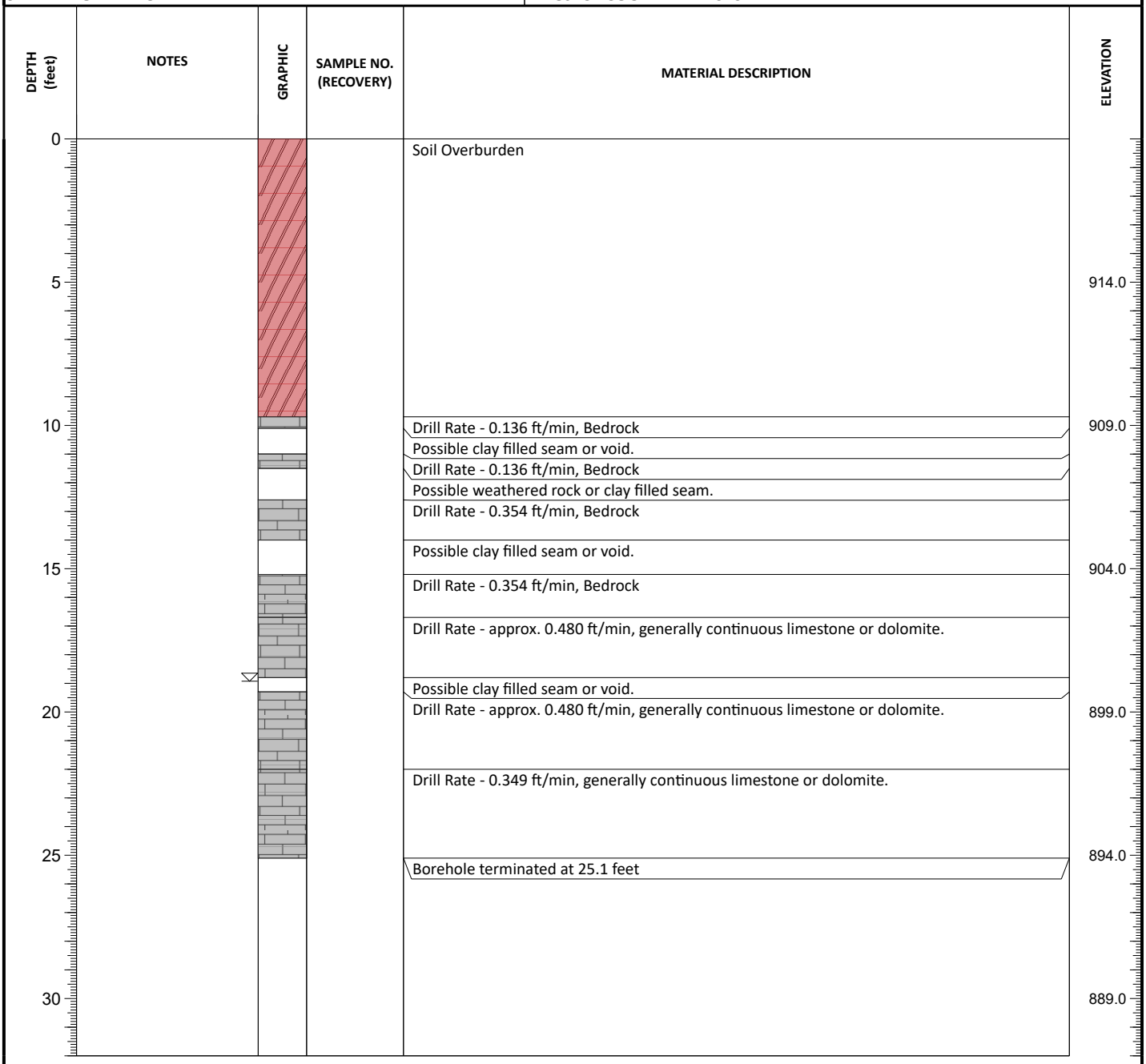
PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-01 *Sheet 1 of 1*
DATE DRILLED: 12/06/2021	**ELEVATION:** 916 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 30.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.927781 **LONGITUDE:** -84.09339
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	



GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽	12/06/2021	21.1	
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

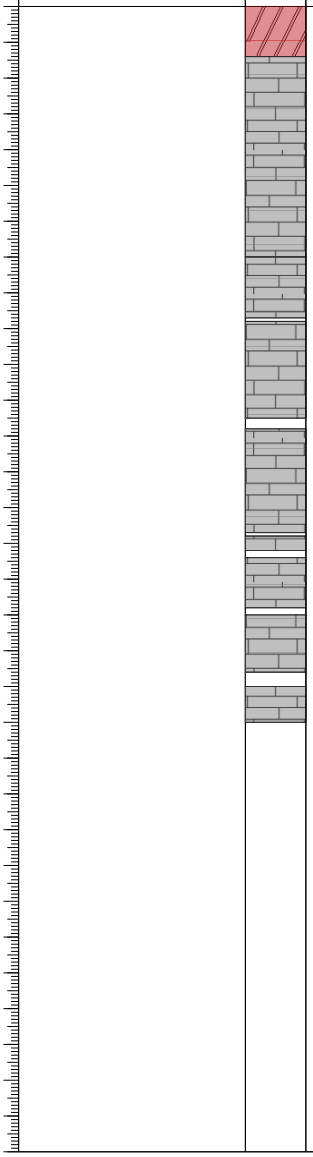
PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-02 *Sheet 1 of 1*
DATE DRILLED: 12/07/2021	**ELEVATION:** 919 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 25.1	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.926951 **LONGITUDE:** -84.09346
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	



GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽	12/07/2021	18.8	
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-03 *Sheet 1 of 1*
DATE DRILLED: 12/06/2021	**ELEVATION:** 928 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 20.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.927967 **LONGITUDE:** -84.09228
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	



DEPTH (feet)	NOTES	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	ELEVATION
0				Soil Overburden	
				Drill Rate - 0.413 ft/min, Bedrock	
5					923.0
				Drill Rate - 0.403 ft/min, Bedrock	
				Possible clay filled seam	
10				Drill Rate - 0.403 ft/min, Bedrock	918.0
				Drill Rate - 0.391 ft/min, Bedrock	
15				Softer material or possible weathered rock or clay-filled seam.	913.0
				Drill Rate - 0.391 ft/min, Bedrock	
				Softer material or possible weathered rock or clay-filled seam.	
				Drill Rate - 0.391 ft/min, Bedrock	
				Possible clay filled seam	
				Drill Rate - 0.274 ft/min, Bedrock	
20				Possible clay filled seam	908.0
				Drill Rate - 0.274 ft/min, Bedrock	
				Borehole terminated at 20.0 feet	
25					903.0
30					898.0

GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽			
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-04 *Sheet 1 of 2*
DATE DRILLED: 12/07/2021	**ELEVATION:** 930 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 37.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.926932 **LONGITUDE:** -84.09230
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	

DEPTH (feet)	NOTES	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	ELEVATION
0				Soil Overburden	
5					925.0
10					920.0
				Void.	
				Drill Rate - 0.519 ft/min, generally continuous limestone or dolomite.	
15					915.0
				Drill Rate - 0.476 ft/min, generally continuous limestone or dolomite.	
				Void.	
				Drill Rate - 0.476 ft/min, generally continuous limestone or dolomite.	
20					910.0
				Drill Rate - 0.392 ft/min, generally continuous limestone or dolomite.	
				Void.	
				Drill Rate - 0.392 ft/min, generally continuous limestone or dolomite.	
25					905.0
				Void.	
				Drill Rate - 0.392 ft/min, generally continuous limestone or dolomite.	
				Drill Rate - 0.576 ft/min, Bedrock	
				Void.	
				Drill Rate - 0.576 ft/min, Bedrock	
30					900.0

GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽			
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-04 *Sheet 2 of 2*
DATE DRILLED: 12/07/2021	**ELEVATION:** 930 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 37.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.926932 **LONGITUDE:** -84.09230
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	

DEPTH (feet)	NOTES	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	ELEVATION
				Drill Rate - 0.424 ft/min, generally continuous limestone or dolomite.	
				Void.	
35				Drill Rate - 0.424 ft/min, generally continuous limestone or dolomite.	895.0
				Borehole terminated at 37.0 feet	
40					890.0
45					885.0
50					880.0
55					875.0
60					870.0

GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽			
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

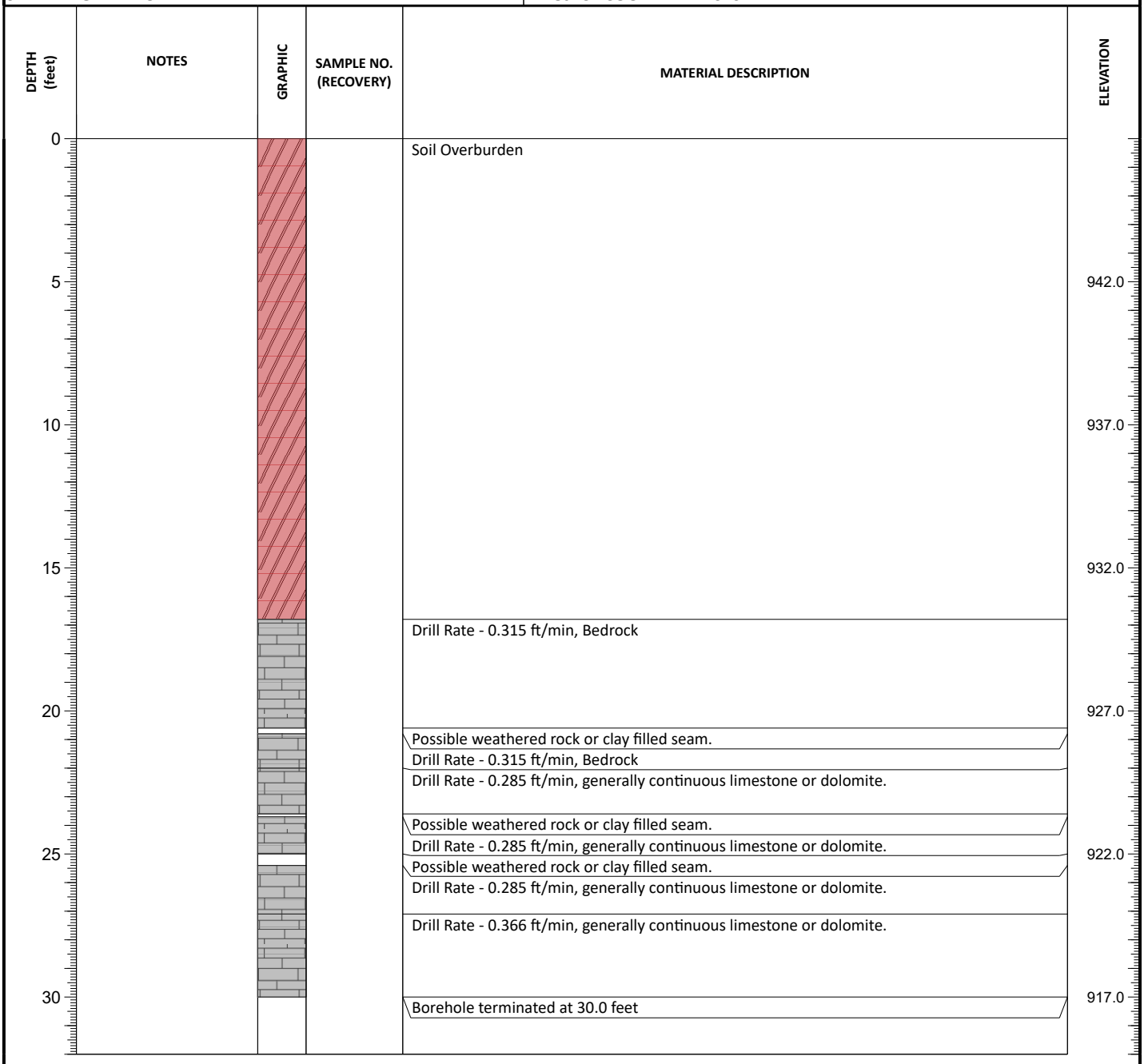
PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-05 *Sheet 1 of 1*
DATE DRILLED: 12/06/2021	**ELEVATION:** 931 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 30.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.928259 **LONGITUDE:** -84.09118
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	

DEPTH (feet)	NOTES	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	ELEVATION
0				Soil Overburden	
5				Bedrock	926.0
				Drill Rate - 0.363 ft/min, generally continuous limestone or dolomite.	
10					921.0
				Drill Rate - 0.318 ft/min, Bedrock	
15				Possible clay filled seam	916.0
				Drill Rate - 0.318 ft/min, Bedrock	
				Drill Rate - 0.339 ft/min, generally continuous limestone or dolomite.	
20					911.0
				Drill Rate - 0.336 ft/min, Bedrock	
25					906.0
				Possible clay filled seam	
				Drill Rate - 0.348 ft/min, Bedrock	
				Drill Rate - 0.348 ft/min, generally continuous limestone or dolomite.	
30				Borehole terminated at 30.0 feet	901.0

GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽			
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-06 *Sheet 1 of 1*
DATE DRILLED: 12/07/2021	**ELEVATION:** 947 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 30.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.927185 **LONGITUDE:** -84.09106
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	



GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽			
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

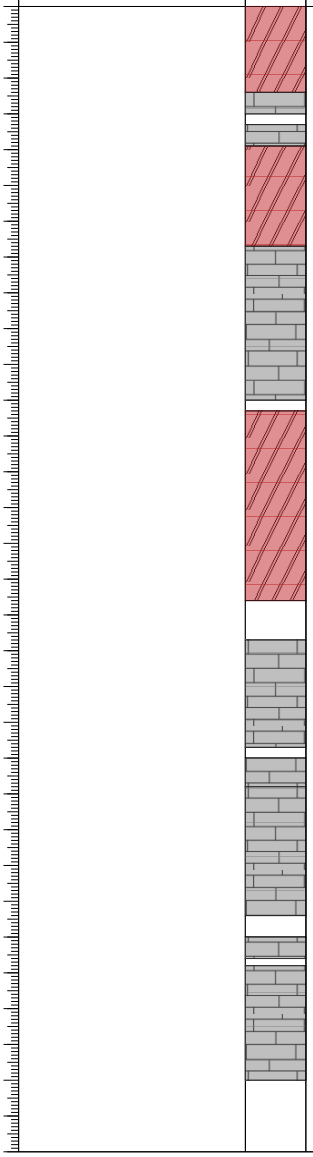
PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-07 *Sheet 1 of 1*
DATE DRILLED: 12/08/2021	**ELEVATION:** 910 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 24.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.929067 **LONGITUDE:** -84.08926
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	

DEPTH (feet)	NOTES	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	ELEVATION
0	Lost air return. Easy advancing.			Soil Overburden	
5					905.0
10					900.0
15					895.0
20					890.0
25				Borehole terminated at 24.0 feet	885.0
30					880.0

GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽			
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-08 *Sheet 1 of 1*
DATE DRILLED: 12/08/2021	**ELEVATION:** 942 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 30.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.927685 **LONGITUDE:** -84.08921
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	

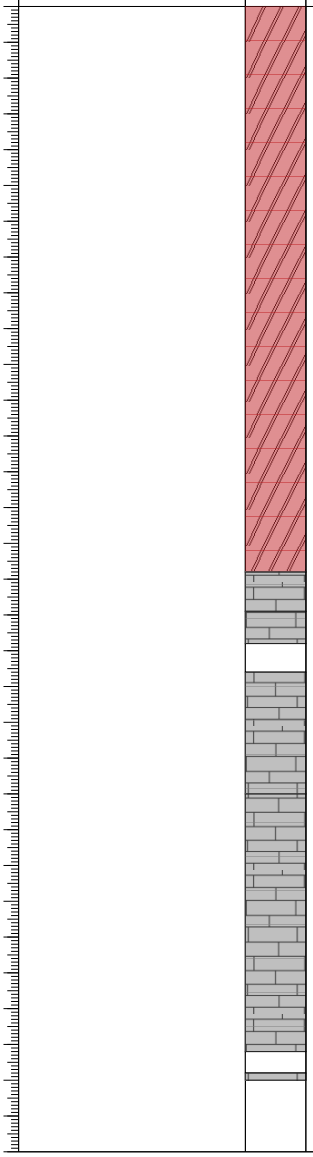


DEPTH (feet)	NOTES	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	ELEVATION
0				Soil Overburden	
				Generally continuous limestone or dolomite.	
				Possible weathered rock or clay filled seam.	
				Generally continuous limestone or dolomite.	
5				Soil Overburden	937.0
				Drill Rate - 0.294 ft/min, Bedrock	
10					932.0
				Softer material or possible weathered rock seam.	
				Soil Overburden	
15					927.0
				Softer material or possible weathered rock seam.	
				Drill Rate - 0.482 ft/min, Bedrock	
20					922.0
				Softer material or possible weathered rock seam.	
				Drill Rate - 0.482 ft/min, Bedrock	
				Drill Rate - 0.386 ft/min, Bedrock	
25					917.0
				Softer material or possible weathered rock seam.	
				Drill Rate - 0.386 ft/min, Bedrock	
				Softer material or possible weathered rock seam.	
				Drill Rate - 0.432 ft/min, generally continuous limestone or dolomite.	
30					912.0
				Borehole terminated at 30.0 feet	

GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽			
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

PROJECT:	Knox County_Fox Lonas Road Property S&ME Project No. 214929	BORING LOG: B-11 *Sheet 1 of 1*
DATE DRILLED: 12/07/2021	**ELEVATION:** 938 ft	**NOTES:**
DRILL RIG: Skid Steer WORD Rock Drill	**DATUM:**	
DRILLER: Frank Crane	**BORING DEPTH:** 30.0	
HAMMER TYPE:	**CLOSURE:**	
DRILLING METHOD: Air Track Drill Rig	**LOGGED BY:** Kenneth Kolesar	**LATITUDE:** 35.927790 **LONGITUDE:** -84.08998
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -**	



DEPTH (feet)	NOTES	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	ELEVATION
0				Soil Overburden	
5					933.0
10					928.0
15					923.0
				Drill Rate - 0.489 ft/min, generally continuous limestone or dolomite.	
				Drill Rate - 0.287 ft/min, generally continuous limestone or dolomite.	
				Possible weathered rock or clay filled seam.	
20				Drill Rate - 0.287 ft/min, generally continuous limestone or dolomite.	918.0
25				Drill Rate - 0.344 ft/min, Bedrock	913.0
				Possible weathered rock or clay filled seam.	
30				Bedrock	908.0
				Borehole terminated at 30.0 feet	

GROUND WATER		DATE/TIME	DEPTH (FT)	REMARKS
ATD	▽			
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING

ATTACHMENT H
Cedar Bluff Flood Improvements Volume Comparison

Cedar Bluff Flood Improvements
Volume Comparison
Dutchtown Road & N Cedar Bluff Road
Knox County, TN

Earthwork Analysis for Pre-Developed / Post-Developed Conditions

Submitted to

Knox County Engineering

Submitted for

Knox County Engineering

Date

June 28, 2023

Ardurra Project No. 207.018

Submitted By:

FOR KNOX COUNTY USE ONLY

2160 LAKESIDE CENTRE WAY SUITE 201 KNOXVILLE, TN 37922 T 865.690.6419 F 865.690.6448 www.ardurra.com

CALCULATION SHEET

Name: Renee Abernathy Date: June 28, 2023 Sheet. No: 1

Project: Cedar Bluff Flood Improvements Project No: 207.018

PURPOSE:

Provide a quantifiable volume creation metric for Knox County to hold proposed contractor accountable for.

CALCULATIONS:

The storage areas for the pre-developed conditions were determined (up to the top measured contour) from available topographic maps and are shown in Attachment 1. The storage areas for the post-developed conditions were determined by using the established top measured contour elevation from the pre-developed conditions along with the grading plan and are shown in Attachment 2.

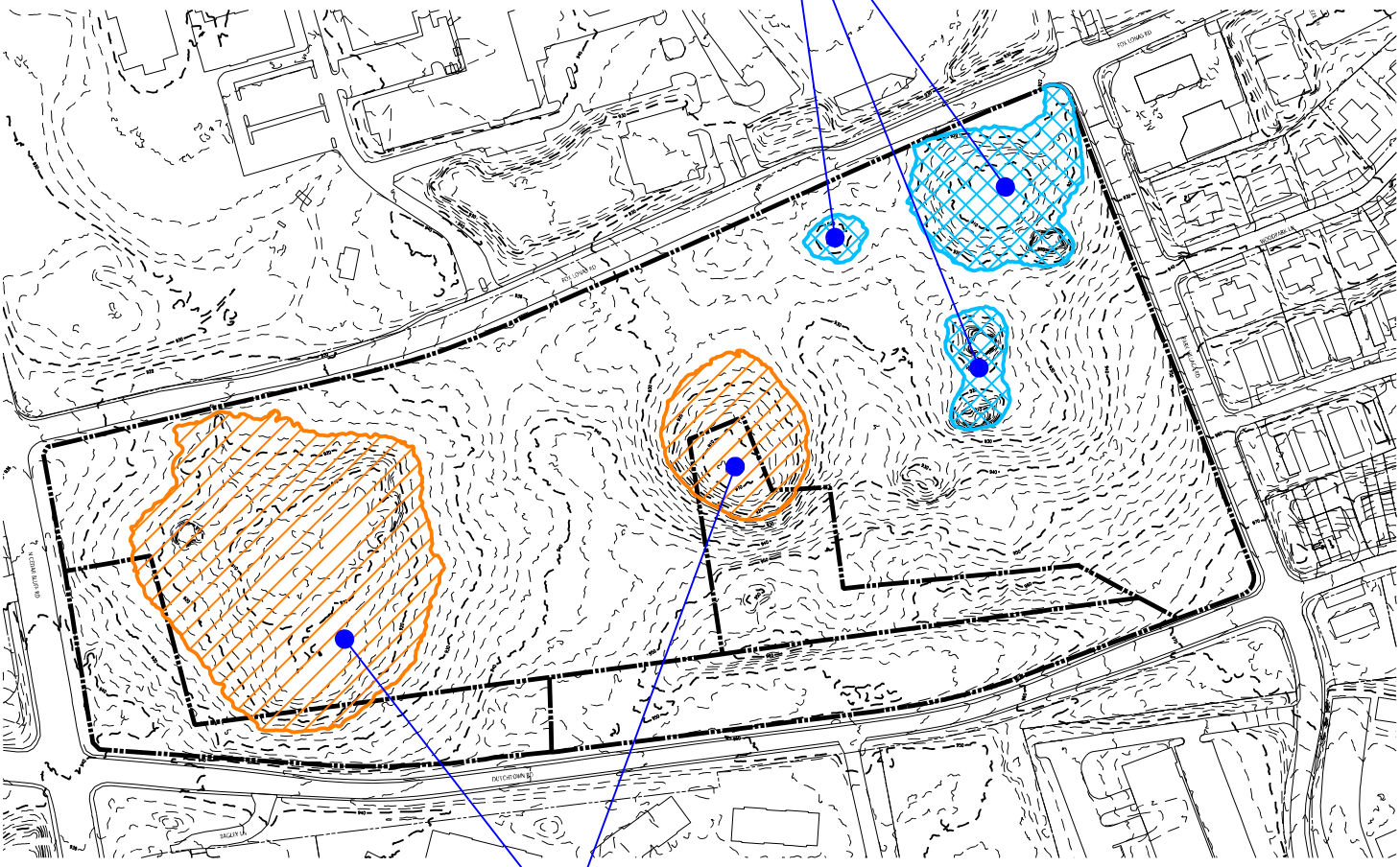
Below is the volume comparison table for pre-developed and post-developed conditions:

Table 1
Volume Comparison

Storage Area	Top Measured Contour Elevation (ft)	Pre-Developed Storage (cf)	Post-Developed Storage (cf)	Volume Created (cf)
A	924.00	2,095,596	4,311,923	2,216,327
B	922.00	485,155	1,604,273	1,119,118
Volumes shown are within the property boundary				

ATTACHMENT 1 - PREDEVELOPED STORAGE MAP

EXISTING STORAGE AREA "B"
FROM 922 AND BELOW

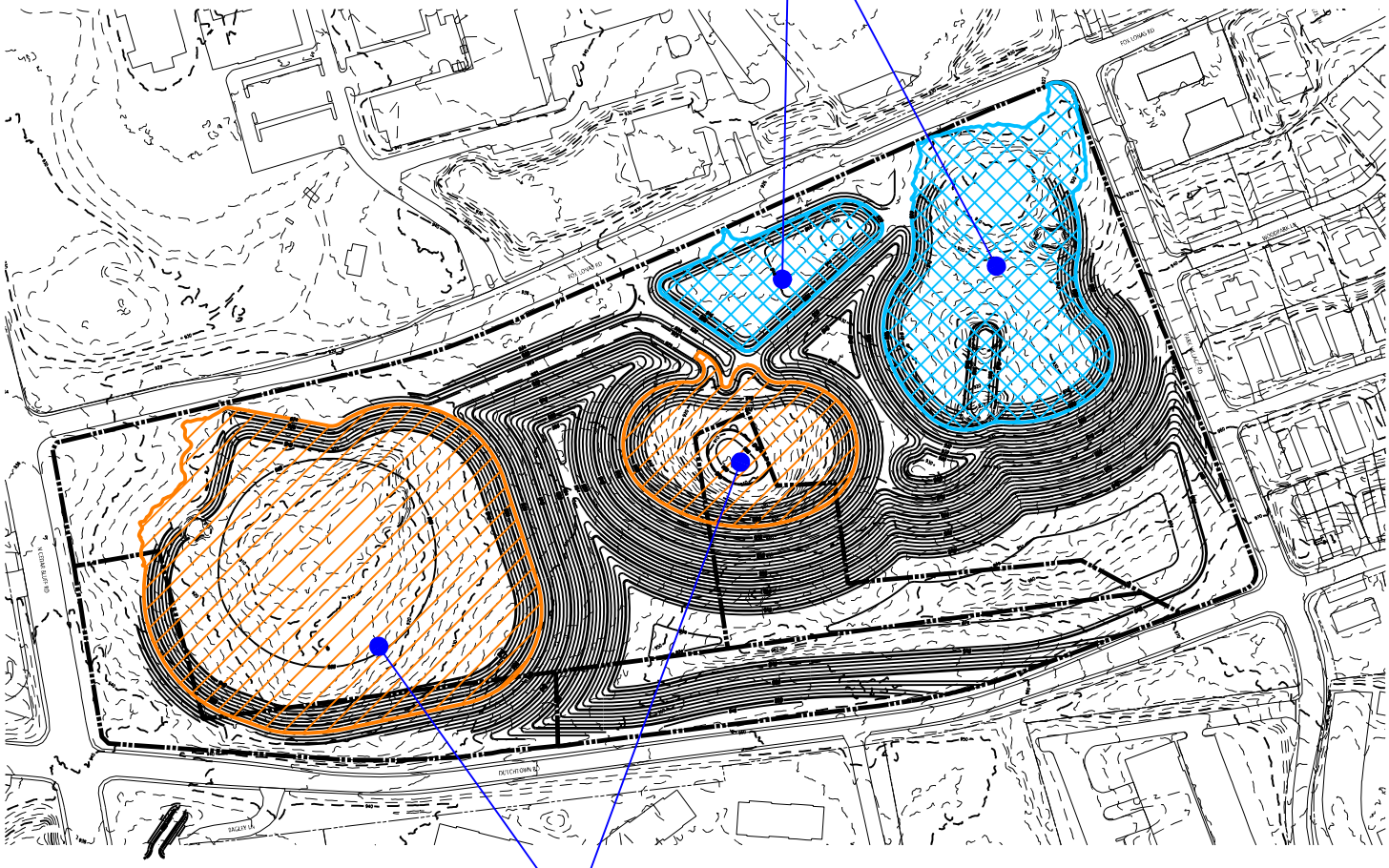


EXISTING STORAGE AREA "A"
FROM 924 AND BELOW

SCALE: 1"=300'

ATTACHMENT 2 - POSTDEVELOPED STORAGE MAP

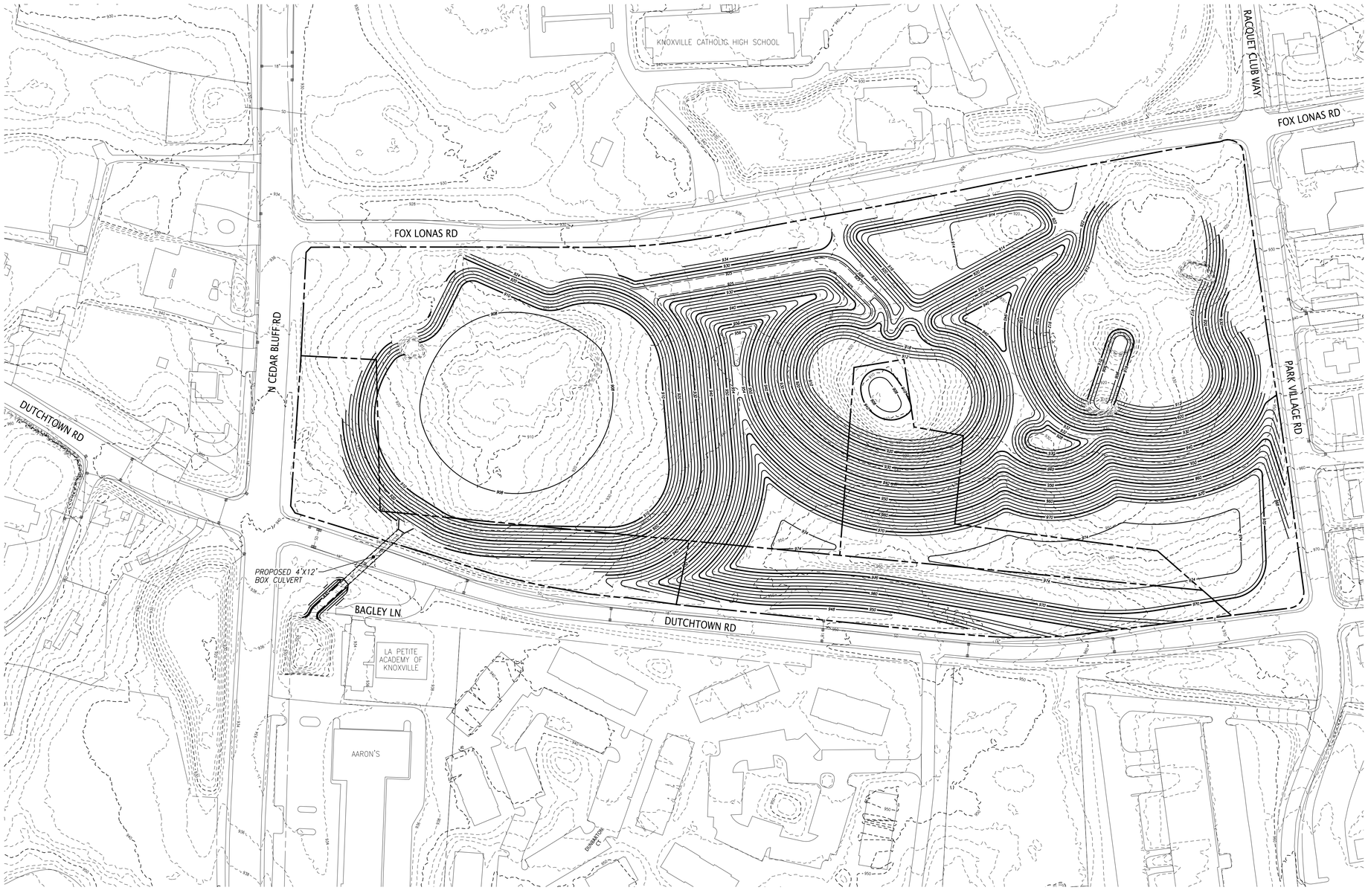
EXCAVATION AREA "B"
FROM 922 AND BELOW



EXCAVATION AREA "A"
FROM 924 AND BELOW

SCALE: 1"=300'

ATTACHMENT I
Grading Plan and Cut/Fill Plan



GRADING NOTES:

1. UNLESS NOTED OTHERWISE, THE PROPOSED GRADES SHOWN ON THESE DRAWINGS ARE FINISHED GRADE. EXISTING AND PROPOSED CONTOURS ARE SHOWN AT 2-FT. INTERVALS.
2. THE ACCURACY OF THE GRADES IS DEPENDANT ON THE DATA PROVIDED BY THE OWNER OR OWNER'S REPRESENTATIVE. FIELD VERIFY AS NECESSARY PRIOR TO CONSTRUCTION.
3. THE SITE SHALL BE CLEARED AND GRUBBED WITHIN THE LIMITS OF EXCAVATION. COMPLETELY DISPOSE OF ALL MATERIALS RESULTING FROM CLEARING AND GRUBBING OFF-SITE. BURNING SHALL NOT BE PERMITTED UNLESS PRIOR APPROVAL IS OBTAINED BY THE LOCAL FIRE DEPARTMENT. THE CONTRACTOR MUST OBTAIN A PERMIT AND MEET ALL OF THE REQUIREMENTS AS SPECIFIED BY THE FIRE DEPARTMENT.
4. ALL TREES STUMPS, BOULDERS, AND OTHER OBSTRUCTIONS SHALL BE REMOVED TO A DEPTH OF 2 FT BELOW THE SUBGRADE. ROCK SHALL BE SCARIFIED TO DEPTH OF 1 FT BELOW SUBGRADE.
5. STRIP TOPSOIL FULL DEPTH (6-IN. MIN.) AND TEMPORARILY STOCKPILE EXCAVATED MATERIALS. INSTALL SILT FENCE OR OTHER APPROPRIATE EROSION CONTROL STRUCTURES ON THE DOWN HILL SIDE OF THE STOCKPILE.
6. PROOF ROLL ALL AREAS TO RECEIVE FILL. PROOF ROLL WITH A FULLY LOADED TANDEM AXLE DUMP TRUCK USING A CRISS-CROSS PATTERN (4 PASSES MIN.) AREAS FAILING THE PROOF ROLLING SHALL BE UNDERCUT AND BACKFILLED USING AN ENGINEERED FILL OR STABILIZED BY A METHOD APPROVED BY THE PROJECT GEOTECHNICAL ENGINEER.
7. AREAS THAT EXHIBIT WEAK SOIL OR OTHERWISE UNSUITABLE CONDITIONS SHALL BE UNDERCUT TO A FIRM LEVEL OF SOIL FOLLOWED BY BACKFILLING THE UNDERCUT AREAS USING AN ENGINEERED FILL. TDOT NO. 57, OR TDOT NO. 67 STONE.
8. FILL MATERIAL SHALL BE SATISFACTORY MATERIAL FREE FROM ROOTS AND OTHER ORGANIC MATERIAL, FROZEN MATERIAL, AND TRASH. FILL MATERIAL SHALL ALSO BE FREE OF STONE OR OTHER MATERIAL LARGER THAN 6 IN. AND LARGER THAN 4 IN. IN THE TOP 6 IN. OF AN EMBANKMENT.
9. FILL SOILS SHALL HAVE A PI LESS THAN 30 & A MAXIMUM DRY DENSITY OF 90 PCF OR GREATER.
10. UNSATISFACTORY SOILS INCLUDE MATERIALS THAT ARE TOO WET OR TOO SOFT, EXPANSIVE SOILS AND SOILS CLASSIFIED PT, OH, AND OL. LEGALLY DISPOSE OF UNSATISFACTORY SOILS OFF-SITE UNLESS OTHERWISE APPROVED BY THE OWNER OR GEOTECHNICAL ENGINEER.
11. FILL MATERIAL SHALL BE PLACED IN LOOSE, HORIZONTAL LIFTS NOT EXCEEDING 8 IN. THICKNESS. UNLESS NOTED OTHERWISE, COMPACT EACH LAYER TO AT LEAST 98% MAXIMUM DRY DENSITY. COMPACT THE UPPER 24 IN. OF FILL BENEATH PAVEMENTS AND THE UPPER 12 IN. BENEATH BUILDING SLABS TO 100% MAXIMUM DRY DENSITY. MAINTAIN THE MOISTURE CONTENT TO WITHIN -1 TO +3 PERCENT OF THE OPTIMUM MOISTURE CONTENT.
12. A 6 IN. (MIN.) LAYER OF TOPSOIL SHALL BE PLACED OVER THE AREAS TO BE SEEDED AND TO THE FINISH GRADE ELEVATIONS AS SHOWN ON THE DRAWINGS.
13. DO NOT ALLOW WATER TO ACCUMULATE IN EXCAVATIONS OR POND ON-SITE. PROVIDE NECESSARY MEASURES TO KEEP THE SITE FREE-DRAINING.
14. PROTECT AND MAINTAIN SUBGRADES UNTIL PLACEMENT OF THE FINAL SURFACE IS ACHIEVED.
15. VERIFY GRADES WHEREVER NECESSARY TO BRING THE PROPOSED LINES, ELEVATIONS, SLOPES, AND CROSS-SECTIONS OF THE GRADING WORK TO WITHIN THE FOLLOWING TOLERANCES ABOVE OR BELOW THAT AS SHOWN ON THE PLANS: SUBGRADE 0.1', UNPAVED AREAS 0.1', SIDEWALKS 0.10', PAVEMENTS 0.04', AND BUILDINGS 0.04'.
16. SLOPES GREATER THAN 4:1 SLOPE AT A HEIGHT GREATER THAN 6-FT SHALL BE TESTED BY THE PROJECT GEOTECHNICAL ENGINEER TO DETERMINE STABILITY.
17. DISTURBED AREAS SHALL BE STABILIZED IN AN EXPEDIENT MANNER TO MINIMIZE TIME OF EXPOSURE TO WEATHER.

FULGHUM MACINDOE & ASSOCIATES, INC.
10330 HARDIN VALLEY ROAD
SUITE 201
KNOXVILLE, TN 37932
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FLOOD IMPROVEMENTS
0 FOX LONAS ROAD
KNOXVILLE, TENNESSEE 37923

KNOX COUNTY ENGINEERING
& PUBLIC WORKS
205 W. BAXTER AVENUE
KNOXVILLE, TN 37917
CONTACT: JIM SNOWDEN
TELEPHONE NO.: 865.215.5800
EMAIL: jim.snowden@knoxcounty.org

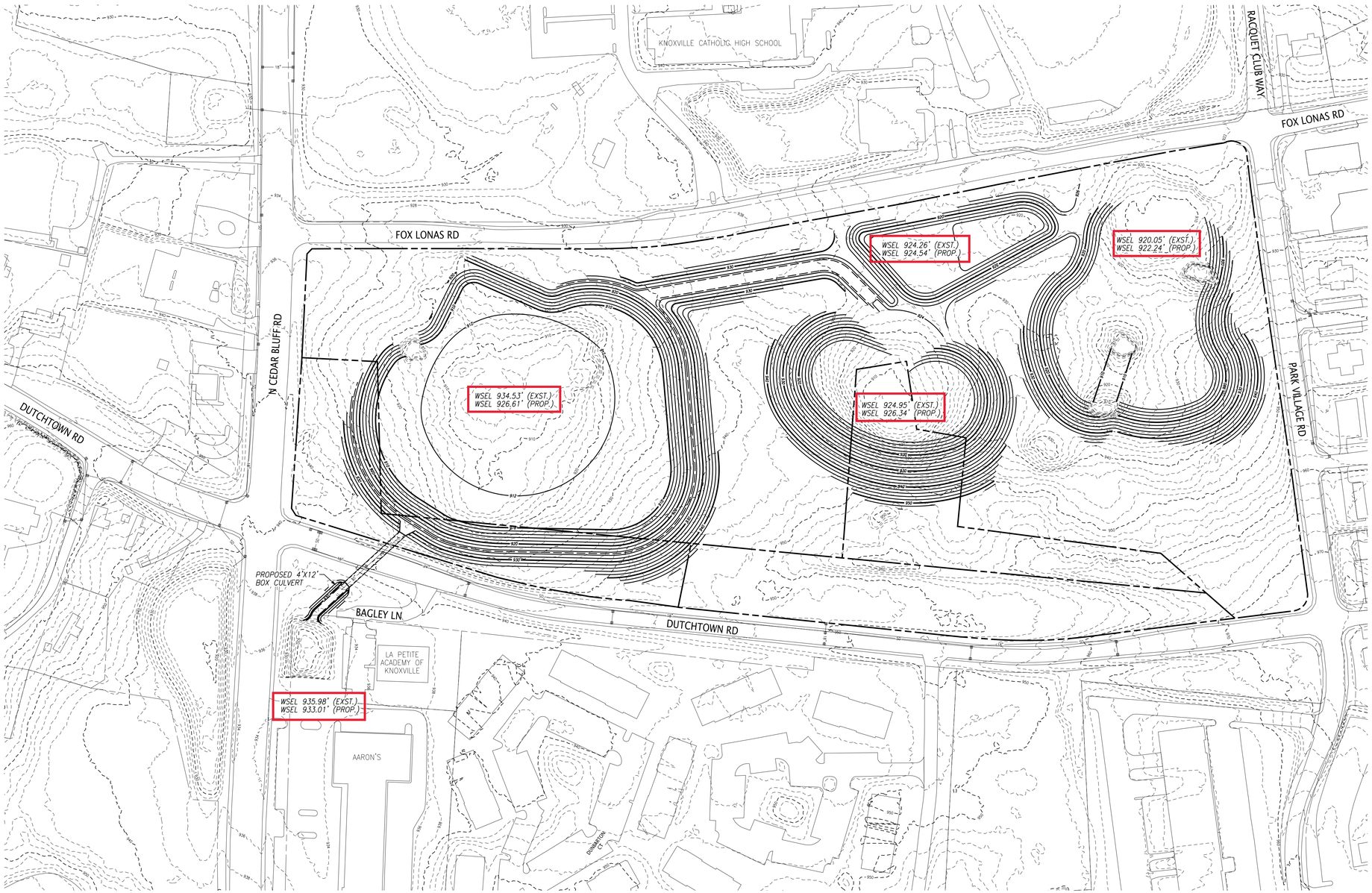
GRADING PLAN

PROJ. MGR.	DESIGNED BY	DRAWN BY
WCF	CHG	HNJ

No.	Revision/Issue	Date
1	ISSUED FOR KNOX COUNTY REVIEW	08/07/20
2	ISSUED FOR REVIEW	06/01/20

Project: 207.018
Date: 06/01/20
Scale: 1"=100'
Sheet: C1

File Name: J:\207\207.018\DWGS\207018c001.dgn
Plot Date: 8/7/2020



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6. PROOF ROLL ALL AREAS TO RECEIVE FILL. PROOF ROLL WITH A FULLY LOADED TANDEM AXLE DUMP TRUCK USING A CRISS-CROSS PATTERN (4 PASSES MIN.) AREAS FAILING THE PROOF ROLLING SHALL BE UNDERCUT AND BACKFILLED USING AN ENGINEERED FILL OR STABILIZED BY A METHOD APPROVED BY THE PROJECT GEOTECHNICAL ENGINEER.
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KNOX COUNTY ENGINEERING
& PUBLIC WORKS
205 W. BAXTER AVENUE
KNOXVILLE, TN 37917
CONTACT: JIM SNOWDEN
TELEPHONE NO.: 865.215.5800
EMAIL: jim.snowden@knoxcounty.org

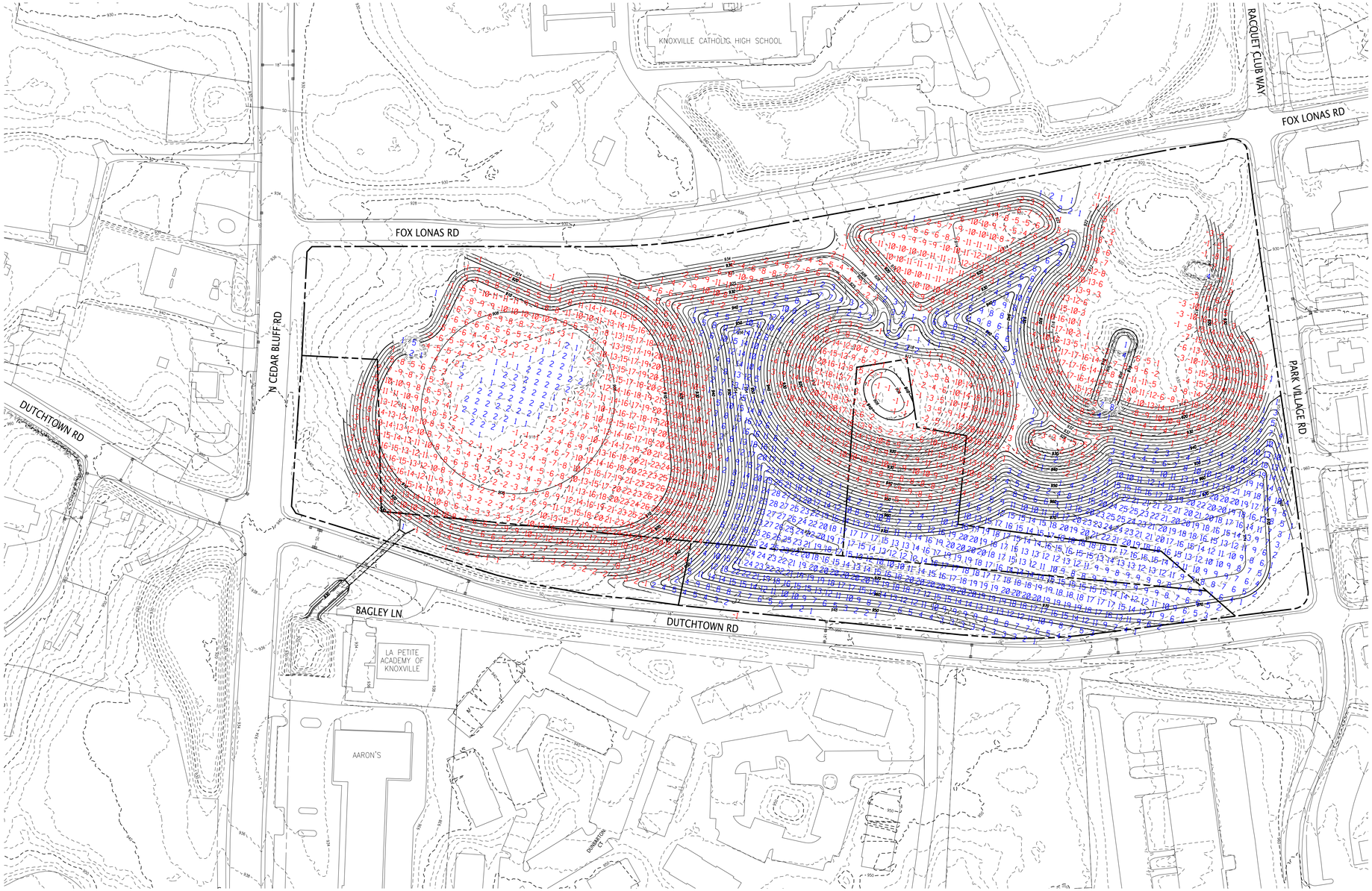
GRADING PLAN

No.	Revision/Issue	Date
1	ISSUED FOR REVIEW	06/01/20

DRAWN BY: HNJ
DESIGNED BY: CHG
PROJ. MGR.: WCF

Project: 207.018
Date: 06/01/20
Scale: 1"=100'
Sheet: C1

File Name: s:\207\207.018\LDWCS\207018c001.dgn
Plot Date: 6/1/2020



INSTRUMENT NORTH

0 100 200

SCALE: 1" = 100'

LEGEND:

17 FILL VALUE

-12 CUT VALUE

FULGHUM MACINDOE & ASSOCIATES, INC.
10330 HARDIN VALLEY ROAD
SUITE 201
KNOXVILLE, TN 37932
OFFICE: 865.690.6419
FAX: 865.690.6448
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PRELIMINARY
NOT FOR
CONSTRUCTION

CEDAR BLUFF
FLOOD IMPROVEMENTS
0 FOX LONAS ROAD
KNOXVILLE, TENNESSEE 37923

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CUT/FILL PLAN

PROJ. MGR.	DESIGNED BY	DRAWN BY	No.	Revision/Issue	Date
WCF	CHG	HNJ	1	ISSUED FOR KNOX COUNTY REVIEW	08/07/20
			2	ISSUED FOR REVIEW	06/01/20

Project 207.018

Date 06/01/20

Scale 1"=100'

Sheet C2

File Name: J:\207\207.018\LDWGS\207018c002.dgn
Plot Date: 8/7/2020