PROJECT MANUAL FOR

RUSSELL COUNTY INDUSTRIAL DEVELOPMENT AUTHORITY

RUSSELL COUNTY, KENTUCKY

LAKE CUMBERLAND REGIONAL INDUSTRIAL COMPLEX

ACCESS ROAD EXTENSION PROJECT

JANUARY 2024

RUSSELL COUNTY INDUSTRIAL DEVELOPMENT AUTHORITY

RUSSELL COUNTY, KENTUCKY

LAKE CUMBERLAND REGIONAL COMMERCE PARK

LAKE CUMBERLAND REGIONAL INDUSTRIAL COMPLEX
2023 PDI ACCESS ROAD EXTENSION PROJECT

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SECTION 00020 - ADVERTISEMENT FOR BIDS
Russell County Industrial Development Authority
Lake Cumberland Regional Industrial Complex
2023 PDI Access Road Extension Project
Russell County, Kentucky

Sealed bids for the construction of the Lake Cumberland Regional Industrial Complex, Access Road Extension for the Russell County Industrial Development Authority, will be received at the RCIDA office at Duo County Telephone, 2150 N. Main Street, Jamestown, KY, 42629 Attn: Clint Voils, Chairman, until 2:00 p.m., local time (CST), March 19, 2024 and then at said office will be publicly opened and read aloud. Technical questions may be directed to Glen Ross, Project Engineer at (859) 223-5694.

The work includes approximately 2,943 feet of industrial access road, grade and drain construction.

The CONTRACT DOCUMENTS may be reviewed at the following locations:
MSE of Kentucky, Inc., 624 Wellington Way, Lexington, KY 40503
MSE Web Site (viewed or downloaded): mselex.com under Bid Opportunities
Russell County Industrial Development Authority at location stated above.

Printed/Copies of the Contract Documents may be obtained at the office of Lynn Imaging, 328 E. Vine St., Lexington, KY 40507, (859) 226-5850 upon receipt of a check made payable to Lynn Imaging in the amount of $250.00 (non-refundable). All orders must be prepaid. There will be a 24-hour turn-around on all orders.

A certified check or bank draft, payable to the Russell County Industrial Development Authority, government bonds, or a satisfactory bid bond executed by the bidder and acceptable sureties in an amount equal to five percent of the bid shall be submitted with bid. The successful bidder will be required to furnish and pay for a performance and payment bond for 100% of the contract price.

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions of this advertisement and/or the specifications and may waive any informalities or reject any and all Bids. Any proposal received after the time and date specified shall not be considered and will be returned unopened to the proposer.

Sealed bid should be labeled "Bid for LCRIC Access Road Extension Project". If mailed, bid should be enclosed in another envelope and addressed to: Russell County Industrial Development Authority, Attn: Clint Voils, Chairman, P.O. Box 1068, Jamestown, KY 42629. No Bidder may withdraw his Bid for a period of sixty (60) days after the actual date of the opening thereof.

State and Federal Wage Rates **do not** apply to this project. This project is funded with KPDI funds.

Award will be made to the lowest, responsive, responsible bidder. Bidding is for the sole benefit of the Russell County Industrial Development Authority.

SECTION 00200 - INFORMATION FOR BIDDERS

Bids will be received by the Russell County Industrial Development Authority (herein called the "Owner") at the time and place described in the invitation to bid and then at said office publicly opened and read aloud.

Each Bid must be submitted in a sealed envelope, addressed to Clint Voils, Chairman, Russell County Industrial Development Authority, c/o Duo County Telephone, 2150 N. Main Street, Jamestown, KY 42629. Each sealed envelope containing a Bid must be plainly marked on the outside as "Bid for LCRIC Access Road Extension Project", and the envelope should bear on the outside the BIDDER'S name, address and license number if applicable. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed to the Russell County Industrial Development Authority, Attn: Clint Voils, Chairman, P.O. Box 1068, Jamestown, KY 42629.

All Bids must be made on the required Bid Form. All blank spaces for Bid prices must be filled, in, in ink or typewritten, and the Bid Form must be fully completed and executed when submitted. Only one copy of the Bid Form is required.

The OWNER may waive any informalities or minor defects or reject any and all Bids. Any Bid may be withdrawn prior to the above scheduled time for the opening of Bids or authorized postponement thereof. Any Bid received after the time and date specified shall not be considered. No BIDDER may withdraw a Bid within sixty (60) days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the Bid Schedule by examination of the site and a review of the drawings and specifications including Addenda. After Bids have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of Work or of the nature of the Work to be done.

The OWNER shall provide to BIDDERS prior to bidding, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The Contract Documents contain the provisions required for the construction of the project. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve the CONTRACTOR from fulfilling any of the conditions of the contract.

Each Bid must be accompanied by a Bid bond payable to the OWNER for five percent of the total amount of the Bid. As soon as the Bid prices have been compared, the OWNER will return the bonds of all except the three lowest responsible BIDDERS. When the Agreement is executed the bonds of the two remaining unsuccessful BIDDERS will be returned. The Bid Bond of the successful BIDDER will be retained until the Payment Bond and Performance Bond have been executed and approved, after which it will be returned. A certified check may be used in lieu of a Bid Bond.

A Performance Bond and a Payment Bond each in the amount of 100 percent of the Contract Price, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign Bid Bonds or Payment Bonds and Performance Bonds must file with each Bond a certified and effective dated copy of their power of attorney.

The party(s) to whom the contract(s) are awarded will be required to execute the Agreement and obtain the Performance Bond and Payment Bond within ten (10) calendar days from the date when Notice of Award is delivered to the BIDDER. The Notice of Award shall be accompanied by the necessary Agreement and Bond forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may consider the BIDDER in default, in which case the Bid Bond accompanying the proposal shall become the property of the OWNER.

The OWNER within ten (10) days of receipt of acceptable Performance Bond, Payment Bond and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by written notice withdraw the signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The Notice to Proceed shall be issued within ten (10) days of the execution of the Agreement by the OWNER. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the Notice to Proceed has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as deemed necessary to determine the ability of the BIDDER to perform the Work, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any Bid if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the WORK contemplated therein.

A conditional or qualified Bid will not be accepted.

Award will be made to the lowest responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the Contract Documents. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to its Bid.

The low BIDDER shall supply the names and addresses of major material suppliers and subcontractors when required to do so by the OWNER.

End of Section

SECTION 00310 - BID FORM

RUSSELL COUNTY INDUSTRIAL DEVELOPMENT AUTHORITY

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____, doing business as _____ (insert "a corporation", "a partnership", or "an individual" as applicable) to the Russell County Industrial Development Authority, (hereinafter "OWNER").

In compliance with your Invitation to Bid, BIDDER hereby proposes to furnish all equipment, materials, and labor for the work required to construct an Access Road Extension at the Lake Cumberland Regional Commerce Complex, Russell County, Kentucky, in strict accordance with the Contract Documents, within the time set forth therein, and at the prices stated below.

BID SCHEDULE

ITEM & DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	TOTAL
DIVISION A: ACCESS ROAD GRADE AND DRAIN				
1. Erosion Control Measures. Prepare "Best Management Practice" plan for erosion control and send "Notice of Intent" to the Natural Resources and Environmental Protection Cabinet. Implement erosion control measures. Remove erosion control structures after all work completed. Send "Notice of Termination" to the Cabinet upon completion of work.				
A. Erosion Control Measures	1	L.S.		$_____
B. Silt Fence	3,215	L.F.	$_____	$_____
C. Silt Check Dam Type "D"	26	Ea.	$_____	$_____
D. Culvert Inlet Sed. Barrier Type "B"	5	Ea.	$_____	$_____
E. Silt Trap Type "C"	20	Ea.	$_____	$_____
F. Erosion Control Blanket	10,200	S.Y.	$_____	$_____
G. Clean Silt Fence	3,215	L.F.	$_____	$_____
2. Clear and Grub. Furnish all labor, equipment and materials and clear and grub areas prior to earth and rock work.				
A. Clear and Grub	1	L.S.		$_____
3. Strip and Stockpile Topsoil. Furnish all labor, equipment and materials and strip topsoil prior to earth and rock work. Provide silt fence around topsoil stockpiles. All topsoil will be reused or spread upon completion of earthwork. Do not remove topsoil from the site.				
A. Strip and Stockpile Topsoil	1	L.S.		$_____
4. Additional Undercut Excavation. Furnish all labor and equipment and excavate unsuitable soils below the planned grades where so directed, such as in sinkholes or where other weak, wet or unsuitable soils are encountered. This item includes the necessary cost to document the volume excavated with a field survey prepared by a Registered Land Surveyor.				

	A. Additional Undercut Excavation	500	C.Y.	$_____	$_____

5. Additional Fill. Replace excavated material in item 4 with compacted fill suitable to meet compacted earth fill specifications.

	A. Additional Fill	500	C.Y.	$_____	$_____

6. Filter Fabric. Furnish all labor, equipment and materials and install additional filter fabric wrap for undercut in item 4 where required.

	A. Filter Fabric	500	S.Y.	$_____	$_____

7. Stone Backfill. Furnish all labor, equipment and materials and install additional DGA stone backfill to refill undercut in item 4 if required.

	A. Stone Backfill	300	Tons	$_____	$_____

8. Channel Linind. Furnish all labor and equipment and install Class II Channel lining where shown in plans.

	A. Class II Channel Lining	255	Tons	$_____	$_____

9. Storm Drainage Pipe (HDPE). Furnish all labor and equipment and install HDPE storm drainage pipe.

	A. 15” HDPE Pipe	606	L.F.	$_____	$_____
	B. 18” HDPE Pipe	170	L.F.	$_____	$_____
	C. 24” HDPE Pipe	155	L.F.	$_____	$_____

10. Curb Box Inlets. Furnish all labor, equipment, materials and install KYTC Standard Curb Box Inlets.

	A. 15” CBI, Type B	8	Ea.	$_____	$_____
	B. 18” CBI, Type B	2	Ea.	$_____	$_____
	C. 24” CBI, Type B	2	Ea.	$_____	$_____
	D. 15” CBI, Type F	6	Ea.	$_____	$_____

11. Drop Box Inlets. Furnish all labor, equipment, materials and install KYTC Type Drop Box Inlets.

	A. 15” DBI, Type 5	1	Ea.	$_____	$_____
	B. 18” CBI, Type 5	1	Ea.	$_____	$_____

12. Concrete Headwalls. Furnish all labor, equipment, materials and install concrete headwalls (slope and flared).

	A. 15” Headwall	8	Ea.	$_____	$_____
	B. 18” Headwall	4	Ea.	$_____	$_____
	C. 24” Headwall	2	Ea.	$_____	$_____

13. Earth and Rock Work for Access Road. Furnish all labor and equipment and excavate and fill to elevations shown for the access road. Waste areas shall be uniformly graded to drain with no ponding at a site location as designated by owner. Additional material as needed will be obtained on-site

A. Unclassified Earth and Rock Work		L.S.	$_____

14. Topsoil Spreading/Seeding. Utilize topsoil stockpiles to spread, place and compact topsoil on all exposed cut slopes, fill slopes and disturbed areas including behind the curbs as shown on the typical road section. Any leftover stocks of topsoil will be used by spreading over low areas or filling borrow areas on-site by the contractor and seeded. Seed all final roadway slopes and any areas disturbed by topsoil placement activities or other construction activities in this contract.

A. Topsoil Spreading/Seeding		L.S.	$_____

15. Dense Grade Aggregate. Furnish all labor, equipment and materials and place dense grade aggregate (DGA) for road base.

A. DGA	4,212	Tons	$_____	$_____

16. Concrete Curb and Gutter. Furnish all labor, equipment, materials and install concrete curb and gutter.

A. Curb and Gutter	5,886	L.F.	$_____	$_____

17. Allowance for Quality Assurance Testing. A qualified firm designated by the Engineer will provide inspection and testing and inspection services. Payment for these services shall be made by the Contractor to the designated firm from the stated allowance. Any unused portion of the allowance will be retained by the Owner.

A. Quality Assurance Testing Allowance	L.S.	$ 18,000

18. Staking, Other Costs. Mobilization, demobilization, construction staking, traffic control, project sign and other costs.

A. Staking, Other Costs	L.S.	$_____

TOTAL FOR DIVISION A: ACCESS ROAD GRADE AND DRAIN $ _____

The bid prices shall include all labor, materials (unless otherwise indicated), overhead, profit, insurance, and other costs necessary to install the finished work of the several items called for. Changes shall be processed in accordance with the General Conditions.

By submission of this Bid, the BIDDER certifies, and in the case of a joint Bid, each party thereto certifies as to its own organization, that this Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this Bid with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence Work under this contract on or before a date to be specified in the Notice to Proceed and to fully complete the Project within One Hundred Eighty (180) consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of $800 for each consecutive calendar day thereafter as provided in the General Conditions and the Special Conditions.

Accompanying this Proposal is a certified check or standard Bid Bond in the sum of _____ _____ Dollars ($_____), in accordance with the Information for Bidders. The BIDDER, by submittal of this Bid, agrees with the OWNER that the amount of the bid security deposited with this Bid fairly and reasonably represents the amount of damages the OWNER will suffer due to the failure of the BIDDER to fulfill his agreements as provided in this Proposal.

BIDDER acknowledges receipt of the following Addenda:

No. _____	Date: _____	No. _____	Date: _____	No. _____	Date: _____
No. _____	Date: _____	No. _____	Date: _____	No. _____	Date: _____

BIDDER understands that the OWNER reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

BIDDER agrees that this Bid shall be good and may not be withdrawn for a period of ninety (90) calendar days after the actual date of bid opening.

Within ten (10) calendar days after receiving written notice of the acceptance of this Bid by the OWNER, the Bidder will execute and deliver to the OWNER four (4) copies of the Agreement and such other required Contract Documents.

BIDDER: _____
(Name of Company or Partnership)

By: _____
(Signature) (Date)

_____
(Print Name)

_____
(Title)

_____
(Address)

_____
(Phone Number)

_____
(Email Address)

_____
(License Number if applicable)

Attested By: _____
(Signature) (Date)

Seal (If bid is by a corporation)

SECTION 00320 - BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____ as Principal, hereinafter called the Principal, and _____ as Surety, hereinafter called the Surety, are held and firmly bound unto _____, as Obligee, hereinafter called the Obligee, in the sum of _____ Dollars for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents. The Condition of the above obligation is such that whereas the Principal has submitted to _____, a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the construction of _____.

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or contract documents with good and sufficient surety for the faithful performance of said contract, and for the prompt payment of labor and materials furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this _____ day of _____ 2022.

_____
Principal

_____
Witness

By: _____

_____
Surety

_____
Witness

By: _____
Attorney-in-fact

IMPORTANT: SURETY companies executing BONDS must appear on the Treasury Department's most current list (circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

End of Section

SECTION 00480 - NON-COLLUSION AFFIDAVIT

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Non-Collusion Affidavit for the project shall be submitted with the bid proposal, and a copy of this document is bound herewith.

1. When properly executed, this Document shall become a part of the successful bidder's Contract Document.

END OF SECTION

NON-COLLUSION AFFIDAVIT

The undersigned bidder, on behalf of its officers and agents or representatives being duly sworn, states that it has not in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any other person or public officer whereby bidder has paid or is to pay to such other bidder or other person or public officer any sum or money, or has given of is to give to such other bidder or other person or public officer anything of value whatever, or such avant or affiants or either of them has not, directly or indirectly, entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in the letting of the contract sought for by the attached bids; that no inducement of any form or character other than that which appears upon the face of the bid will be suggested, offered, paid or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid.

Subscribed and sworn to before me by _____ this

_____ day of _____, 20____.

My Commission expires:

_____ _____

Notary Public

END OF AFFIDAVIT

SECTION 00490 - NOTICE OF AWARD

To: _____
_____
_____

PROJECT Description: LCRIC Access Road Extension

The OWNER has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids dated _____ and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of $_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR's Performance Bond, Payment Bond and Certificates of Insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER's acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 2024.

Russell County Industrial Development Authority

By: _____

Clint Voils, Chairman
Name/Title

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

by _____

this the _____ day of _____, 2024.

By: _____

Name/Title

SECTION 00500 - **AGREEMENT**

THIS AGREEMENT, made this _____ day of _____, 2024, by and between the Russell County Industrial Development Authority, hereinafter called "OWNER" and _____, doing business as a corporation (insert "a corporation", "a partnership", or "an individual" as applicable) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete all work as specified or indicated in the Contract Documents for the LCRIC Access Road Extension Project.

2. The CONTRACTOR will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the project described herein.

3. The CONTRACTOR will commence the work required by the contract documents within 10 calendar days after the date of the Notice To Proceed and will complete the same within 180 calendar days unless the period for completion is extended otherwise by the Contract Documents. The CONTRACTOR further agrees to pay as liquidated damages, the sum of $800 for each consecutive calendar day thereafter as provided in the Specifications.

4. The CONTRACTOR agrees to perform all of the work described in the Contract Documents and comply with the terms therein for the sum of $_____, or as shown in the Bid Schedule.

5. The term "CONTRACT DOCUMENTS" means and includes the following:
   - A. Invitation to Bid
   - B. Information for Bidders
   - C. Bid Form
   - D. Bid Bond
   - E. Agreement
   - F. Performance Bond
   - G. Payment Bond
   - H. Notice of Award
   - I. Notice to Proceed
   - J. General Conditions
   - K. Administrative Provisions
   - L. Labor Regulations and Wage Rates (If Applicable)
   - M. Technical Specifications
   - N. Drawings and Plan Sheets
   - O. Addenda

6. The project has been designed by MSE of Kentucky, Inc. who will act as ENGINEER in connection with completion of the project in accordance with the Contract Documents.

7. CONTRACTOR shall submit Applications for Payment in accordance with the General Conditions. Applications for Payment will be reviewed by the ENGINEER as provided in the General Conditions.

8. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR'S Application for Payment as approved by the ENGINEER, on or about the _____ of each month during construction as provided in the General Conditions. All progress payments will be on the basis of the progress of work measured by the schedule of values provided for in the General Conditions. Progress Payments, retainage, and withheld payments shall all be done in compliance with the General Conditions. Upon final completion of the work and settlement of all claims, OWNER shall pay the remainder of the Contract Price.

9. Neither OWNER nor CONTRACTOR shall, without the prior written consent of the other, assign or sublet in whole or in part his interest under any of the Contract Documents; and, specifically, CONTRACTOR shall not assign any moneys due or to become due without the prior written consent of the OWNER.

10. OWNER and CONTRACTOR each bind himself, his partners, heirs, executors, administrators, successors, assigns and legal representatives to the other party hereto in respect to all covenants, agreements and obligations contained in the Contract Documents.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, the Agreement in four (4) copies, each of which shall be deemed an original on the date first above written.

Russell Co. Industrial Development Authority (Owner)	_____ (Contractor)
By: _____ (Signature) (Date)	By: _____ (Signature) (Date)
Clint Voils, Chairman (Name, Title)	_____ (Name, Title)
Attest:	Attest:
By: _____ (Signature) (Date)	By: _____ (Signature) (Date)
_____ (Name, Title)	_____ (Name, Title)

End of Section

SECTION 00600 - PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership or Individual)

_____, hereinafter called Surety, are held and firmly bound unto
(Name of Surety)

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____

_____ Dollars, ($_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

The CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20_____, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER, and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each one of which shall be deemed an original , this the _____ day of _____, 20_____.

ATTEST:

_____
Principal

_____
(Principal) Secretary

By: _____

(SEAL)

_____
(Witness as to Principal)

_____
(Address)

_____
(Address)

_____

_____
(Surety)

ATTEST:

_____
(Surety) Secretary

(SEAL)

_____
(Witness as to Surety)

_____
Attorney-in-fact

_____
(Address)

_____
(Address)

_____

_____

Note: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: SURETY companies executing BONDS must appear on the Treasury Department's most current list (circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

End of Section

SECTION 00602 - PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership or Individual)

_____, hereinafter called Surety, are held and firmly bound unto
(Name of Surety)

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____

_____ Dollars, ($_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

The CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20_____, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

NOW, THEREFORE, if the Principal shall promptly make payments to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment, and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER, and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

_____
Principal

_____ By: _____
(Principal) Secretary

(SEAL)

_____ _____
(Witness as to Principal) (Address)

_____ _____
(Address)

_____ _____
(Surety)

ATTEST:

_____
(Surety) Secretary

(SEAL)

_____ _____
(Witness as to Surety) Attorney-in-fact

_____ _____
(Address) (Address)

_____ _____

Note: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: SURETY companies executing BONDS must appear on the Treasury Department's most current list (circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

End of Section

SECTION 00680 - NOTICE TO PROCEED

To: Date:
Project: LCRIC Access Road Extension

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 2024on or before _____ 2024, and you are to complete the WORK within 180 consecutive calendar days thereafter.

The date of completion of all work is therefore, _____, 2024.

By:

Russell County Industrial Development Authority
Owner

_____
Clint Voils, Chairman

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____ this the _____ day of _____, 2024.

By:

_____
(Name/Title)

SECTION 00700 - GENERAL CONDITIONS

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1. Definitions

Wherever used in these General Conditions or in the other Contract Documents, the following terms havethe meanings indicated which are applicable to both the singular and plural thereof:

Addendum - Written or graphic instrument issued to the execution of the agreement which modifies or interprets the Contract Documents, drawings and specifications.

Agreement - The written agreement between Owner and Contractor covering the work to be performed;other Contract Documents are attached to the Agreement.

Application for Payment - the form furnished by Engineer which is to be used by Contractor in requesting progress payments and which is to include the schedule of values required by Article 42.

Engineer - The person, firm or corporation named as such in the Agreement.

Bid - The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for thework to be performed.

Bidder - Any person, firm or corporation submitting a Bid for the work.

Bonds - Bid, performance and payment bonds and other instruments of security, furnished by Contractorand his surety in accordance with the Contract Documents.

Change Order - A written order to Contractor signed by Owner authorizing an addition, deletion or revision in the work, or an adjustment in the Contract Price or the Contract Time issued after execution of the Agreement.

Contract Documents - The Advertisement for Bids, Agreement, Addenda (whether issued prior to the opening of Bids or the execution of the Agreement), Instructions to Bidders, Contractor's Bid, the Bonds, the Notice of Award, these General Conditions, the Supplementary Conditions, the Specifications, Drawings and Modifications.

Contract Price - The total moneys payable to Contractor under the Contract Documents.

Contract Time - The number of days stated in the Agreement for the completion of the work.

Contractor - The person, firm or corporation with whom Owner has executed the Agreement.

Day - A calendar day of twenty-four hours measured from midnight to the next midnight.

Drawings - The drawings which show the character and scope of work to be performed and which have been prepared or approved by Engineer and are referred to in the Contract Documents. Included with the plan sheet drawings are Atmos Energy drawings and standard details.

Field Order - A written order issued by Engineer to the Contractor which clarifies or interprets the Contract Documents or orders minor changes in the work without involving a change in the contract price or time.

Modification - (a) A written amendment of the Contract Documents signed by both parties, (b) a Change Order, (c) a written clarification or interpretation issued by Engineer, or (d) a written order for a minor change or alteration in the work issued by Engineer. A Modification may only be issued after execution ofthe Agreement.

Notice of Award - The written notice by Owner to the apparent successful bidder stating that upon compliance with the conditions precedent to be fulfilled by him within the time specified Owner will executethe Agreement with him.

Notice to Proceed - A written notice given by Owner to Contractor (with a copy to Engineer) fixing the date on which the contract time will commence to run and on which Contractor shall start to perform his obligations under the Contract Documents.

Owner - A public body or authority, corporation, association, partnership, or individual for whom the work is to be performed.

Project - The entire construction to be performed as provided in the Contract Documents.

Resident Project Representative - The authorized representative of Engineer who is assigned to theProject site or any part thereof.

Shop Drawings - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by Contractor, a Subcontractor, manufacturer, supplier or distributor and which illustrate the equipment, material or some portion of the work.

Specifications - Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the work. Included by reference are Atmos Energy gas system construction standards and specifications.

Subcontractor - An individual, firm or corporation having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the work at the site.

Substantial Completion - The date as certified by Engineer when the construction of the project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that theproject or specified part can be utilized for the purposes for which it was intended.

Work - Any and all obligations, duties and responsibilities necessary to the successful completion of the project assigned to or undertaken by Contractor under the Contract Documents, including all labor, materials, equipment and other incidentals, and the furnishing thereof.

Written Notice - A notice in writing to any party of the Agreement and considered delivered and the service thereof completed, when posted by certified or registered mail to said party at his last given address or delivered in person to said party or his authorized representative.

2. Execution, Correlation and Intent of Documents

At least six copies of the Agreement and such other Contract Documents as practicable will be executed and delivered to the Owner by the Contractor within ten days of the Notice of Award. Owner shall execute and deliver one counterpart to Contractor within ten days after receipt of the executed Agreement from Contractor. Engineer will identify those portions of the Contract Document not signed and such identification will be binding on all parties.

Contractor shall also deliver to Owner such Bonds as he may be required to furnish when he delivers the executed agreement to Owner.

It is the intent of the Specifications and Drawings to describe a complete project to be constructed in accordance with the Contract Documents. The Contract Documents comprise the entire Agreement between Owner and Contractor. They may be altered only by a modification.

The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If Contractor finds a conflict, error or discrepancy in the Contract Documents, he shall call it to Engineer's

attention in writing at once and before proceeding with the work affected thereby; however, he shall not be liable to Owner or Engineer for his failure to discover any conflict, error or discrepancy in the Specifications or Drawings. In resolving such conflicts, errors and discrepancies, the documents shall be given precedence in the following order: Agreement, Modifications, Addenda, Special Conditions, Information for Bidders, General Conditions, Specifications and Drawings. Figure dimensions on Drawings shall govern over general Drawings. Any work that may reasonably be inferred from the Specifications or Drawings as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described in words which so applied have a well-known technical or trade meaning shall be deemed to refer to such recognized standards.

3. Starting the Project

Before undertaking each part of the work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. He shall at once report in writing to Engineer any conflict, error or discrepancy which he may discover; however, he shall not be liable to Owner or Engineer for his failure to discover any conflict, error or discrepancy in the Drawings or Specifications.

Within ten days after delivery of the executed Agreement by Owner to Contractor, Contractor shall submit to Engineer for approval, an estimated progress schedule indicating the starting and completion dates to the various stages of the Work, and a preliminary schedule of Shop Drawing submissions.

Before starting the Work at the site, Contractor shall furnish Owner and Engineer certificates of insurance as required by Article 7. Within twenty days after delivery of the executed Agreement by Owner to Contractor, but before starting the work at the site, a conference will be held to review the above schedules to establish procedures for handling Shop Drawings and other submissions and for processing Applications for Payment, and to establish a working understanding between the parties as to the Project. Present at the conference will be Owner or his representative, Engineer, Resident Project Representative, Contractor and his Superintendent.

Contractor shall start to perform his obligations under the Contract Documents on the date when the Contract Time commences to run. No Work shall be done at the site prior to the date on which the contract time commences to run.

4. Contract Documents

Unless otherwise provided in the Special Conditions, the Owner or his representative will furnish the Contractor, free of charge, up to six copies of drawings and specifications and other Contract Documents. Additional copies shall be provided for the cost of reproduction.

5. Contractor's Pre-Start Representations

Contractor represents that he has familiarized himself with, and assumes full responsibility for having familiarized himself with, the nature and extent of the Contract Documents. Work, locality, and with all local conditions and federal, state and local laws, ordinances, rules and regulations that may in any manner affect performance of the work, and represents that he has correlated his study and observations with the requirements of the Contract Documents. Contractor also represents that he has studied all surveys and investigation reports of subsurface and latent physical conditions referred to in the Plans and Specifications and made such additional surveys and investigations as he deems necessary for the performance for the work at the Contract Price in accordance with the requirements of the Contract Documents and that he has correlated the results of all such data with the requirements of the Contract Documents.

6. Indemnity

The Contractor shall indemnify and hold harmless the Owner and the Engineer and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the work, providing that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, diseases or death, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom and (b) is causedin whole or in part by any negligent act or omission of the Contractor and Subcontractor, anyone directly or indirectly employed by any of them or any one for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

In any and all claims against the Owner or the Engineer or any of their agents or employees by any employee of the Contractor, any Subcontractor, any one directly or indirectly employed by any of them orany one for whose acts any of them may be liable, the indemnification obligation under these General Conditions shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

The obligations of the Contractor under these General Conditions shall not extend to the liability of the Engineer, his agents or employees arising out of (a) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications or (b) the giving of or the failure to give instructions or directions by the Engineer, his agents or employees provided such giving or failure to give is the primary cause of injury or damage.

7. Insurance

Contractor shall purchase and maintain such insurance as will protect him from claims under workmen's compensation laws, disability benefit laws or other similar employee benefit laws; from claims for damages because of bodily injury, occupational sickness or disease, or death of his employees, and claims insured by usual personal injury liability coverage; from claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees including claims insured by usual personal injury liability coverage; and from claims for injury to or destruction of tangible property, including loss of use resulting therefrom -- any or all of which arise out of or result from Contractor's operations under the Contract Documents, whether such operations be by himself or by any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them maybe legally liable. This insurance shall include the specific coverages and be written for not less than any limits of liability and maximum deductibles specified in the Special Conditions or required by law, whichever is greater, shall include contractual liability insurance and shall include Owner and Engineer as additional insured parties. Before starting the Work, Contractor shall file with Owner and Engineer certificates of such insurance, acceptable to Owner; these certificates shall contain a provision that the coverage afforded under the policies will not be canceled or materially changed until at least fifteen days'prior written notice has been given to Owner and Engineer.

The Contractor shall procure and maintain, at his own expense, during the contract time, liability insurance as hereinafter specified; and in the amounts listed in the Special Conditions.

a. Compensation Insurance - The Contractor shall take out and maintain during the life of this contract Workmen's Compensation Insurance for all of his employees employed at the site of the project, and, in case any work is sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees unless such employees are covered by the protection afforded by the Contractor.

b. Public Liability and Property Damage Insurance - The Contractor shall take out and maintain during the life of this contract such Public Liability and Property Damage Insurance as shall protect him and any subcontractor performing work covered by this contract, from claims for

damages for personal injury, including accidental death, as well as for claims for property damages which may arise from operations under this contract, whether such operations be by himself or by any subcontractor or by anyone directly or indirectly employed by either of them. The insurance will include as additional named insured: the Owner and Engineer and his Consultants; and each of their officers, agents and employees.

c. Contingent Public Liability and Property Damage Insurance - If any subcontracts are awarded, subparagraph "b" above shall be interpreted to require that the General Contractor shall take out and maintain Contractor's contingent public liability and property damage insurance in the amounts required under the "Special Conditions".

d. Builder's Risk Insurance or Installation Floater - The Contractor shall provide "All Risk" type Builder's Risk Insurance including coverage for fire, lightning, explosion, wind, hail, riot, aircraft, smoke, collapse, extended coverage, vandalism and malicious mischief. Unless specifically authorized by the Owner, the amount of such insurance shall not be less than the contract price totaled in the bid. Deductible amount shall not exceed $250.

In case of pipeline contracts, this coverage shall be provided by an installation floater for the full cash value of materials and accessories on hand to be used in conjunction with the project. Coverage shall include insuring against transportation loss or damage. The policy shall name as the insured the Contractor, the Engineer and the Owner.

e. Railroad Protective Liability Insurance - Where work on railroad rights-of-way is involved, the Contractor shall also be covered by Railroad Protective Liability Insurance with limits of liability as required by the railroad company on whose property the work is being performed.

f. Flood Hazard Insurance - The Contractor will be required to acquire and maintain during the life of the Contract any flood insurance made available under the National Flood Insurance Act of 1968, as amended. The insurance shall be in an amount at least equal to the contract amount costs excluding cost of uninsurable improvements, or to the maximum limit of coverage made available under the National Flood Insurance Act of 1968, as amended, whichever is less.

8. Guaranty Bond

Contractor shall furnish performance and payment bond as security for the faithful performance and payment of all his obligations under the Contract Documents. These Bonds shall be in amounts at least equal to the contract price, and (except as otherwise provided in the Supplementary Conditions) in such form and with such sureties as are licensed to conduct business in the state where the project is located and are named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in theFederal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Department.

If the surety on any Bond furnished by Contractor is declared a bankrupt or becomes insolvent or its rights to do business is terminated in any state where any part of the Project is located is revoked, Contractor shall within five days thereafter substitute another Bond and Surety, both of which shall be acceptable to Owner.

9. Additional Bonds and Insurance

Prior to delivery of the executed Agreement by Owner to Contractor, Owner may require Contractor to furnish such other Bonds and such additional insurance, in such form and with such sureties or insurers as Owner may require. If such other Bonds or such other insurance are specified by written instructions given prior to opening of bids, the premiums shall be paid by Contractor: if subsequent thereto, they shall be paid by Owner (except as otherwise provided in Article 15.)

10. Availability of Lands

Prior to issuance of Notice to Proceed, the Owner shall obtain all land and rights-of-way necessary forcarrying out and for the completion of the work to be performed pursuant to the Contract Documents,unless otherwise mutually agreed.

The Owner shall provide the Contractor information which delineates and describes the land owned and rights-of-way acquired.

The Contractor shall provide at his own expense and without liability to the Owner any additional land and access thereto that the Contractor may desire for temporary construction facilities, or for storage of materials.

11. Unforeseen Physical Conditions

Contractor shall promptly notify Owner and Engineer in writing of any subsurface or latent physical conditions at the site differing materially from those indicated in the Contract Documents. Engineer will promptly investigate those conditions and advise Owner in writing if further surveys or subsurface test are necessary. Promptly thereafter, Owner shall obtain the necessary additional surveys and tests and furnish copies to Engineer and Contractor. If Engineer finds that the results of such surveys or test indicate that there are subsurface or latent physical conditions which differ materially from those intended in the Contract Documents, and which could not reasonably have been anticipated by Contractor, a Change Order shall be issued incorporating the necessary revisions.

12. Reference Points

Owner shall provide engineering surveys for construction to establish reference points which in his judgment are necessary to enable Contractor to proceed with the work. Contractor shall be responsiblefor surveying and laying out the work (unless otherwise provided in the Special Conditions), and shall protect and preserve the established reference points and shall make no changes or relocations withoutthe prior written approval of Owner. He shall report to Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or location. Contractor shall replace and accurately relocate all reference points so lost, destroyed or moved.

13. Superintendence - Supervision

The Contractor shall keep on his work, during its progress, a competent Superintendent and any necessary assistants, all satisfactory to the Engineer. The Superintendent shall not be changed without written notice to the Owner and Engineer except under extraordinary circumstances. The Superintendentshall represent the Contractor in his absence and all directions given to him shall be as binding as if givento the Contractor.

The Contractor shall give efficient supervision to the Work, using his best skill and attention. He shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but he shall not be solely responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents.

The Contractor shall see that for his own Work and for the Work of each subcontractor, proper templates and patterns necessary for the coordination of the various parts of the Work are prepared, and shall furnish, or require subcontractors to fit together and execute fully their respective portions of the Work.

14. Materials, Appliances, Employees

The Contractor shall provide and pay for all materials, labor, water tools, appliances, fuel, heat, sanitary facilities, equipment, light, power, telephone, transportation and other facilities necessary for the execution, testing, initial operation and completion of the Work.

Approval of manufacturer's Shop Drawings of materials and equipment shall not mean final acceptance, but they shall be subject to inspection and test or delivery and installation. The Contractor shall repair, replace, or adjust any materials or equipment found defective or not operating properly, due to improper materials, workmanship, and adjustment on his part, during the correction period.

Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the work. Stored materials and equipment to be incorporated in the work shall be located so as to facilitate prompt inspection.

Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used,cleaned and conditioned as directly by the manufacturer.

The Contractor shall provide competent, suitably qualified personnel to survey and lay out the work and perform construction as required by the Contract Documents. The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him.

15. Substitute Materials or Equipment

Wherever the words "or equal", appear in the Specifications or on the Drawings, they shall be interpretedto mean an item of material or equipment equal in quality to that named and which is suited to the sameuse and capable of performing the same function as that named.

The burden of proof of equal quality or service shall be on the Contractor. Proof of inequality is not implied by the Specifications and is not a burden of the Engineer. His duty shall be to properly weigh the proven facts of equality in fairness to all parties involved.

Inclusion of a certain make or type of materials or equipment in Contractor's bid or estimate shall not obligate the Owner to accept such material or equipment if it does not meet the requirements of the Plans and Specifications.

If the Contract, Specifications, law, ordinance or applicable rules or regulations permit Contractor to furnish or use a substitute that is equal to any material or equipment specified, and if Contractor wishes tofurnish or use a proposed substitute, he shall prior to 30 days before such substitute is required make written application to Engineer for approval of such a substitute certifying in writing that the proposed substitute will perform adequately the functions called for by the general design, be similar and of equal substance to that specified and be suited to the same use and capable of performing the same function asthat specified; stating whether or not its incorporation in or use in connection with the project is subject to the payment of any license fee or royalty; and identifying all variations of the proposed substitute from that specified and indicating available maintenance service. No substitute shall be ordered or installed withoutthe written approval of Engineer who will be the judge of equality and may require Contractor to furnish such other data about the proposed substitute as he considers pertinent. No substitute shall be ordered or installed without such performance guarantee and bonds as Owner may require which shall be furnished at Contractor's expense.

In case where one or more specified brands, makes or manufacturers are named and these names are not qualified by the "or equal" clause, it is intended that the Contractor be restricted to one of those named unless otherwise set out.

16. Subcontracts

Contractor shall not employ any Subcontractor or other person or organization (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection.

The Contractor will not be permitted to sublet any portion of his contract to any individual, co-partnership or corporation without the prior written consent of the Owner and the approval of the Engineer.

The Contractor shall not sublet more than fifty percent (50%) of the work without the written consent of the Owner and approval of the Engineer prior to the receipt of bids.

Contractor shall be fully responsible for all acts and omissions of his Subcontractor and of persons and organizations directly or indirectly employed by them and of persons and organizations for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Nothing in the Contract Documents shall create contractual relationship between Owner or Engineer and any Subcontractor or other person or organization having a direct contract with Contractor, nor shall it create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any Subcontractor or other persons or organization, except as mayotherwise be required by law. Owner or Engineer may furnish to any Subcontractor or other person or organization, to the extent practicable, evidence of amounts paid to Contractor on account of specific Work done in accordance with the schedule of values.

The divisions and sections of the Specifications and the identifications of any drawings shall not control Contractor in dividing the Work among Subcontractors or delineating the Work to be performed by any specific trade.

Contractor agrees to bind specifically every Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of Owner.

All work performed for Contractor by a Subcontractor shall be pursuant to an appropriate agreement between Contractor and the Subcontractor which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered byinsurance provided in accordance with Article 7, except such rights as they may have to the proceeds ofsuch insurance held by Owner as trustee.

17. Patent Fees and Royalties

Contractor shall pay all license fees and royalties and assume all costs incidental to the use in the performance of the work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents. Contractor shall indemnify and hold harmless Owner and Engineer and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses (including attorney's fees) arising out of any infringement of patent rights or copyrights incidental to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

18. Permits, Laws and Regulations

Contractor shall obtain and pay for all construction permits and licenses and shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of

his bid. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses.Contractor shall also pay all public utility charges.

Contractor shall give all notices and comply with all laws, ordinances, rules and regulations applicable tothe Work. If Contractor observes that the specifications or drawings are at variance therewith, he shall give the Engineer prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate modification. If Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to Engineer, he shall bear all costs arising therefrom; however, it shall not be his primary responsibility to make certain that the Specifications and Drawings are in accordance with such laws, ordinances, rules and regulations.

19. Taxes

Contractor shall pay all sales, consumer use and other similar taxes required to be paid by him inaccordance with the law of the place where the Work is to be performed.

20. Safety and Protection

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

a. All employees on the Work and other persons who may be affected thereby.

b. All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site.

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

The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injuryor loss. He shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for its safety and protection. He shall notify owners of adjacent utilities when prosecution of the work may affect them. All damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor or anyone directly or indirectly employed byany of them or anyone for whose acts any of them may be liable, shall be remedied by Contractor; except damage or loss attributable to the fault of Owner or Engineer or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor. Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor that the Work is acceptable.

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

In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, Contractor, without special instruction or authorization from Engineer or Owner, is obligated to act, at his discretion, to prevent threatened damage, injury or loss. He shall give Engineer prompt written notice of injury or loss. He shall give Engineer prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and Change Order shall thereupon be issued covering the changes and deviations involved. If Contractor believes that additional Work done by him inan emergency which arose from causes beyond his control entitles him to an increase in the Contract

Price or an extension of the Contract Time, he may make a claim therefor as provided in these Specifications.

21. Shop Drawings and Samples

After checking and verifying all field measurements, the Contractor shall submit with such promptness as to cause no delay in the Work two (2) copies of all Shop Drawings and schedules required for the Work, and the Engineer will pass upon them with reasonable promptness, making necessary corrections. The Contractor shall then revise the drawings as required by the Engineer and file with him five (5) corrected copies for final approval (or one (1) reproducible copy).

Drawings shall have been checked by and stamped with the approval of Contractor and identified as Engineer may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable Engineer to review the information as required.

The Contractor shall also submit to Engineer for approval with such promptness as to cause no delay in work, all samples required by the Contract Documents. All samples will have been checked by and stamped with the approval of Contractor, identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended.

At the time of each submission, Contractor shall in writing call Engineer's attention to any deviations that the Shop Drawings or sample may have from the requirement of the Contract Documents.

The Engineer will review and approve with reasonable promptness Shop Drawings and samples, but his review and approval shall be only for conformance with the design concept of the project and for compliance with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make any corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and resubmit new samples until approved. Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by Engineer on previous submissions. Contractor’s stamp of approval on any Shop Drawing or sample shall constitute a representation to Owner and Engineer that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with therequirements of the Work and the Contract Documents.

Where a Shop Drawing or sample submission is required by the Specifications, no related Work shall be commenced until the submission has been approved by Engineer. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by Contractor at the site and shall be available to Engineer.

The following items of Work and other such items as required shall have Shop Drawings submitted:

a. All concrete reinforcement, water stops, pre cast concrete and location of construction joints.

b. Structural steel, miscellaneous metal and fencing.

c. Windows and doors.

d. Piping layouts, including small piping layouts.

e. Mechanical equipment.

f. Pumps and related equipment, including pump control equipment.

g. Building service equipment.

h. Control and instrumentation, metering equipment.

i. Electrical equipment and wiring diagrams.

j. Plumbing, heating, ventilating and air conditioning equipment.

No fabrication, erection, installation or construction shall commence until drawings and details have been approved by the Engineer.

Engineer's approval of Shop Drawings or samples shall not relieve the Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless Contractor has in writing called Engineer's attention to such deviation at the time of submission and Engineer has given written approval to the specific deviation, nor shall any approval by Engineer relieve Contractor from responsibilityfor errors or omissions in the Shop Drawings.

22. Record Drawings

The Contractor shall keep an accurate record of the location, size, and material for all piping, both interior and exterior, concealed and exposed; size and routing of conduits, size and location of pull boxes and number and size of conductors installed therein; and changes in equipment dimensions, structural openings, foundations and any other variations between the Work actually provided and that shown on the Contract Drawings. The representation of such variations shall conform to standard drafting practices and shall include such supplementary notes, legends and details as may be necessary for legibility and clear portrayal of the as-built construction. Upon completion, the Contractor shall have these drawings and records certified as to their completeness and correctness by the Resident Inspector and deliver them to the Engineer for incorporation into the tracings. Final As-Built alignment, invert elevations and locations including the location of service connections for water and sewer lines are to be supplied by the Contractor.

As-Built information shall be provided monthly to the Engineer and submitted with the partial pay request.

23. Use of Premises

The Contractor shall confine his apparatus, the storage of materials and the operation of his workmen to limits indicated by law, ordinances, permits or direction of the resident Engineer and shall not unreasonably encumber the premises with his materials.

The Contractor shall not load or permit any part of any structure to be loaded with weights that will endanger the structure, nor shall he subject any part of the Work to stresses or pressures that will endanger it.

The Contractor shall enforce all applicable regulations and any additional requirements of the Owner regarding signs, advertisements, fires and smoking.

24. Cleaning

Contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work, and at the completion of the Work he shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by Owner. Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

25. Work By Others

The Owner reserves the right to perform additional work related to the project by himself or to let other contracts in connection with the Work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shallproperty connect and coordinate his work with theirs.

If any part of the Contractor's Work depends on proper execution or results upon the Work of any other Contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such Work that render it unsuitable for such proper execution and results. His failure to inspect and report shall constitute an acceptance of the other Contractor's Work as fit and proper for the reception of his Work, except as to defect which may develop in the other Contractor's Work after the execution of his Work.

To ensure the proper execution of this subsequent Work, the Contractor shall measure Work already in place and shall at once report to the Engineer any discrepancy between the executed Work and the Drawings.

Whenever Work being done by the Owner's forces or by other Contractors is contiguous to Work covered by this Contract, the respective rights of the various interest involved shall be established by the Engineer, to secure the completion of the various portion of the Work in general harmony.

The Contractor shall do all cutting, fitting and patching of his Work that may be required to make its several parts come together properly and fit it to receive or be received by such other Work. Contractor shall not endanger any Work of others by cutting, excavating or otherwise altering their Work and will onlycut or alter their Work with the written consent of Engineer and of the other Contractors whose Work will be affected.

If the performance of additional Work by other Contractors or Owner is not noted in the Contract Documents prior to the execution of the contract, written notice thereof shall be given to Contractor prior tostarting any such additional Work. If Contractor believes that the performance of such additional Work byOwner or others involves him in additional expense or entitles him to an extension of the Contract Time, he may make a claim thereof as provided in these Specifications.

26. Engineer's Status During Construction

The Engineer will be the Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of the Engineer as Owner's representative during construction as defined in these General Conditions shall not be extended without written consent of theOwner and the Engineer.

The Engineer will make periodic visits to the site to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. He will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity ofthe Work. His efforts will be directed toward providing assurance for Owner that the completed project will conform to the requirements as an experienced and qualified design professional, he will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work of Contractors.

The Engineer will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents (in the form of Drawings or otherwise) as he may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If Contractor believes that a written clarification and interpretation entitles him to an increase in the Contract Price, he may make claim therefore, as provided in these Specifications.

The Engineer will have authority to disapprove or reject Work which is "defective" (which term is hereinafter used to describe Work that is unsatisfactory, faulty or defective, or does not conform to the requirements of the Contract Documents or does not meet the requirements of any inspection, test or approval referred to in these Specifications or has been damaged prior to approval of final payment.) He will also have authority to require special inspection or testing of the Work as provided in these specifications whether or not the Work is fabricated, installed or completed.

The Engineer is responsible for review and approval of Shop Drawings and samples in accordance with Article 21 of these General Conditions.

The Engineer has responsibilities for preparation of Change Orders for execution by the Owner inaccordance with Article 29 of these General Conditions.

In accordance with Article 27 of these General Conditions, the Engineer shall decide claims of the Owner or Contractors and interpret the Contract Documents.

The Engineer shall faithfully discharge his responsibilities with regard to Applications for Payment as described in Articles 42, 43, 44 and 46 of these General Conditions.

If Owner and Engineer agree, the Engineer will furnish a Resident Project Representative and/or inspector to assist the Engineer in carrying out his responsibilities at the site. The duties, responsibilities and authority of any such representative shall be as set forth in Article 28 of these General Conditions.

Neither Engineer's authority to act under this Article 26 or elsewhere in the Contract Documents nor any decision made by him in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of Engineer to Contractor, any Subcontractor, any material man, fabricator, supplier, or any of their agents or employees or any other person performing any of the work.

The Engineer will not be responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, and he will not be responsible for Contractor's failure to perform the work in accordance with the Contract Documents.

The Engineer will not be responsible for the acts or omissions of Contractor, or any Subcontractors, or any of his or their agents or employees, or any other persons at the site or otherwise performing any of the work.

27. Engineer's Decision on Disagreements

Engineer will be the interpreter of the requirements of the Contract Documents and the judge of the performance thereunder. In his capacity as interpreter and judge, he will exercise his best efforts to insure faithful performance by both Owner and Contractor. He will not show partiality to either and will not be liable for the result of any interpretation or decision rendered in good faith. Claims, disputes and other matters relating to the execution and progress of the work or the interpretation of or performance under the Contract Documents shall be referred to Engineer for decision; which he will render in writing within a reasonable time.

Either Owner or Contractor may request arbitration with respect to any such claim, dispute or other matter that has been referred to Engineer, except any which have been waived by the making or acceptance of final payment as provided in Article 46, such arbitration to be in accordance with Article 50. However, no request for arbitration of any such claim, dispute or other matter shall be made until the earlier of (a) the date on which Engineer has rendered his decision, or (b) the tenth day after parties have presented their evidence to Engineer if he has not rendered his written decision before that date. No request for arbitration shall be made later than thirty days after the date on which Engineer rendered his written decision in respect of the claim, dispute or other matter as to which arbitration is sought; and the failure torequest arbitration within said thirty days' period shall result in Engineer's decision being final and bindingupon Owner and Contractor. If Engineer renders a decision after arbitration proceedings have been

initiated, such decision may be entered as evidence but shall not supersede the arbitration proceedings, except where the decision is acceptable to the parties concerned.

28. Status of Engineer's Project Representative

Resident Project Representative is Engineer's Agent and shall act as directed by and under the supervision of Engineer. He shall confer with Engineer regarding his actions. His dealings in matters pertaining to the on-site work will in general be only with Engineer and Contractor. His dealings with Subcontractors will only be through or with the full knowledge of Contractor or his Superintendent. He shall generally communicate with Owner only through or as directed by Engineer.

Resident Project Representative shall:

a. Schedules: Review the progress schedule, schedule of Shop Drawing submissions, schedule of values and other schedules prepared by Contractor and consult with Engineer concerning their acceptability.

b. Conferences: Attend pre construction conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with Engineer and notify in advance those expected to attend. Attend meetings, and maintain and circulate copies of minutes thereof.

c. Liaison:

    1. Serve as Engineer's liaison with Contractor working principally through Contractor's Superintendent and assist him in understanding the intent of the Contract Documents. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-site operations.

    2. As requested by Engineer, assist in obtaining from Owner additional details or information, when required at the job site for proper execution of the work.

    3. In the interest of preserving the proper channels of communication, advise Engineer of any direct communication between Owner and Contractor.

d. Shop Drawings and Samples:

    1. Receive and record date of receipt of Shop Drawings and samples which have been approved by Engineer.

    2. Receive samples which are furnished at the site by Contractor for Engineer's approval, and notify Engineer of their availability for examination.

    3. Advise Engineer and Contractor or his Superintendent immediately of the commencement of any Work requiring a Shop Drawing or sample submission if the submission has not been approved by Engineer.

e. Review of Work, Rejection of Defective Work, Inspections and Tests:

    1. Conduct on-site observations of the Work in progress to assist Engineer in determining that the project is proceeding in accordance with the Contract Documents and that completed Work will conform to the Contract Documents.

    2. Report to Engineer whenever he believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspections, tests or approvals required to be made;

and advise Engineer when he believes Work should be corrected or rejected or should be uncovered for observation, or requires special testing or inspection.

3. Verify that tests, equipment and system's startups and operating and maintenance instructions are conducted as required by the Contract Documents and in presence of the required personnel, and that Contractor maintains adequate records thereof; observe, record and report to Engineer appropriate details relative to the test procedures and startups.

4. Accompany Owner and visiting inspectors representing public or other agencies having jurisdiction over the Project, record the outcome of these inspections and report to Engineer.

f. Interpretation of Contract Documents: Transmit to Contractor clarification and interpretation of the Contract Documents as issued by Engineer.

g. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report them with recommendations to Engineer.

h. Records:

1. Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and sample submissions, reproductions of original Contract Documents including all addenda, change orders, field orders, additional Drawings issued subsequent to the execution of the Contract, Engineer's clarifications and interpretations of the Contract Documents, progress reports and other project-related documents.

2. Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions, list of principal visitors, daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures. Send Copies to Engineer.

3. Record names, address and telephone numbers of all Contractors, Subcontractors and major suppliers of equipment and materials.

4. Advise Engineer whenever Contractor is not currently maintaining an up-to-date copy of Record Drawings at the site.

i. Reports:

1. Furnish Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the approved progress schedule, schedule of Shop Drawing submissions and other schedules.

2. Consult with Engineer in advance of scheduled major tests, inspections or start of important phases of the Work.

j. Payment Requisitions: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward them with recommendations to Engineer, noting particularly their relation to the schedule of values, Work completed and materials and equipment delivered at the site.

k. Guarantees, Certificates, Maintenance and Operation Manuals: During the course of the Work verify that guarantees, certificates, maintenance and operation manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed and

deliver these data to Engineer for his review and forwarding to Owner prior to final acceptance of the Project.

l. Completion:

1. Before Engineer issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring correction.

2. Conduct final inspection in the company of Engineer, Owner and Contractor and prepare a final list of items to be corrected.

3. Verify that all items on final list have been corrected and make recommendations to Engineer concerning acceptance.

Except upon written instructions of Engineer, Resident Project Representative:

a. Shall not authorize any deviation from the Contract Documents or approve any substitute materials or equipment.

b. Shall not undertake any of the responsibilities of Contractor, Subcontractor or Contractor's Superintendent.

c. Shall not expedite Work for the Contractor.

d. Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents.

e. Shall not advise on or issue directions as to safety precautions and programs in connection with the Work.

f. Shall not authorize Owner to occupy the Project in whole or in part.

g. Shall not participate in specialized field or laboratory tests or inspections conducted by others.

h. Shall not assist Contractor in maintaining up-to-date copy of Record Drawings.

29. Changes in the Work

Without invalidating the Agreement, Owner may, at any time or from time to time, order additions, deletions or revisions in the Work; these will be authorized by Change Orders. Upon receipt of a Change Order, Contractor shall proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any Change Order causes an increase or decrease inthe Contract Price or an extension or shortening of the Contract Time, an equitable adjustment will be made as provided in Article 30 on the basis of a claim made by either party.

Engineer may authorize minor changes or alterations in the Work not involving extra cost and not inconsistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order. If Contractor believes that any minor change or alteration authorized by Engineer entitles him to an increase in the Contract Price, he may make a claim therefore, as provided in Article 30.

Additional work performed by Contractor without authorization of a Change Order will not entitle him to an increase in the Contract Sum or an extension of the Contract Time, except in the case of an emergency as provided in Article 20.

Owner shall execute appropriate Change Orders prepared by Engineer covering changes in the Work to be performed, work performed in an emergency and any other claim of the Contractor for a change in the Contract Time or the Contract Sum which is approved by the Engineer.

It is the Contractor's responsibility to notify his surety of any changes affecting the general scope of the Work or change in the Contract Sum and the amount of the applicable bonds shall be adjusted accordingly. Contractor shall furnish proof of such adjustment to Owner.

30. Changes of Contract Price

The Contract Price constitutes the total compensation payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at his expense without change in the Contract Price.

The Contract Price may only be changed by a Change Order. Any claim for an increase in the Contract Price shall be based on written notice delivered to Owner and Engineer within fifteen days of the occurrence of the event giving rise to the claim. Notice of the amount of the claim with supporting data shall be delivered within forty-seven days of such occurrence unless Engineer allows an additional period of time to ascertain accurate cost data. All claims for adjustment in the Contract Price shall be determinedby Engineer if Owner and Contractor cannot otherwise agree on the amount involved. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order.

The value of any Work covered by a Change Order shall be determined in one or more of the followingways:

a. By estimate and mutual acceptance in a lump sum.

b. By unit prices named in the Contract or subsequently agreed upon.

c. On the basis of the cost of the Work plus a Contractor's fee for overhead and profit as provided in this Article.

In Case "c", the Contractor shall keep and present in such form as the Engineer may direct, a correct account of all items comprising the net cost of such work, together with vouchers. The determination ofthe Engineer shall be final upon all questions of the amount and cost of extra work and changes in the work.

The term Cost of the Work means the sum of all costs necessarily incurred and paid by the Contractor in the proper performance of the Work. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 30.6.

30.1 Payroll cost for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include superintendents and foreman at the site. The expenses of performing work after regular working hours, on Sunday or legal holidays shall be included in the above to the extent authorized by Owner.

30.2 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and manufacturer's field service required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and

refunds, and all returns from sale of surplus materials and equipment shall accrue to Owner andContractor shall make provisions so that they may be obtained.

30.3 Payments made by Contractor to the Subcontractors for work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from Subcontractors acceptable to him and shall deliver such bids to Owner who will then determine with the advice of Engineer, which bids will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work, plus a Fee, the Cost of the Work shall be determined in accordance with paragraphs 30.4 and 30.5. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

30.4 Cost of special consultants (including, but not limited to, Engineers, architects, testing laboratories, surveyors, lawyers and accountants) employed for services specifically related to the Work.

30.5 Supplemental costs including the following:

The proportions of necessary transportation, traveling and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

Costs, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workmen, which are consumed in the performance of the work, and cost less market value of such items used but not consumed which remain the property of Contractor.

Rentals of all construction equipment and machinery and the parts thereof whether rented from Contractoror others in accordance with rental agreements approved by Owner with the advice of Engineer and the costs of transportation (shall not exceed 100 miles), loading, unloading, installation, dismantling and removing thereof ; all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

Sales, use or similar taxes related to the Work, and for which Contractor is liable, imposed by any governmental authority.

Deposits lost for causes other than Contractor's negligence, royalty payments and fees for permits and licenses.

Losses, damages and expenses, not compensated by insurance or otherwise, sustained by Contractor in connection with the execution of, and to, the Work, provided they have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's Fee. If, however, any such loss or damage requires reconstruction and Contractor is placed in charge thereof, he shall be paid for his services a fee proportionate to that stated in paragraph 30.6.

The cost of utilities, fuel and sanitary facilities at the site.

Minor expenses such as telegrams, long distance telephone calls, telephone service at the site,expressage and similar petty cash items in connection with the Work.

Cost of premiums for bonds and insurance which Owner is required to pay.

30.6 The term Cost of the Work shall not include any of the following:

Payroll costs and other compensation of Contractor's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, lawyers, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks and other personnel employed by

Contractor whether at the site or in his principal or a branch office for general administration of the workand not specifically included in the schedule referred to in subparagraph 30.1 -- all of which are to be considered administrative costs covered by the Contractor's Fee.

Expenses of Contractor's principal and branch offices other than his office at the site.

Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the work and charges against Contractor for delinquent payments.

Cost of premiums for all bonds and for all insurance policies whether or not Contractor is required by the Contract Documents to purchase and maintain the same (except as otherwise provided in subparagraph 30.5).

Cost due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed byany of them or for whose acts any of them may be liable, including, but not limited to, the correction of defective work, disposal of materials or equipment wrongly supplied and making good any damage to property.

Other overhead or general expense costs of any kind and the costs of any item not specifically andexpressly included in paragraphs 30.1 - 30.5.

30.7 The Contractor's Fee which shall be allowed to Contractor for his overhead and profit shall be determined as follows:

A mutually acceptable fixed fee; or if none can be agreed upon,

A fee based on the following percentages of the various portions of the Cost of the Work:

a. For costs incurred under paragraph 30.1 and 30.2, the Contractor's Fee shall be ten (10%) percent.

b. For costs incurred under paragraph 30.3, the Contractor's Fee shall be five (5%) percent; and if a subcontract is on the basis of Cost Plus a Fee, the maximum allowable to the subcontractor as a fee for overhead and profit shall be ten (10%) percent.

c. No fee shall be payable on the basis of costs itemized under paragraph 30.4, 30.5 and 30.6.

The amount of credit to be allowed by Contractor to Owner for any such change which results in a new decrease in cost will be the amount of the actual net decrease. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the basis of the net increase, if any.

Whenever the cost of any work is to be determined pursuant to Article 30, Contractor will submit in form prescribed by the Engineer an itemized cost breakdown together with supporting data.

In all cases where Extra Work or Changes are covered by unit prices set forth in the Contract, the value of such Extra Work or Changes shall be determined only upon the basis of such unit prices.

Pending final determination of value, payments on accounts of Extra Work or Changes shall be made only upon the estimate of the Engineer.

30.8 All Change Orders to the construction contract (if required) must be negotiated pursuant to 40 CFR 35.938.5.

31. Cash Allowance

The Contractor shall include in the contract sum all allowances named in the Contract Documents and shall cause the Work so covered to be done by such Contractors and for such sums as the Engineer may direct, the contract sum being adjusted in conformity therewith. The Contractor declares that the contract sum includes such sums for expenses and profit on account of cash allowance as he deems proper. No demand for expense or profit other than those included in the contract sum shall be allowed.

32. Delays and Extension of Time

The Contract Time may only be changed by a Change Order. Any claim for an extension in the Contract Time shall be based on written notice delivered to Owner and Engineer within fifteen (15) days of the occurrence of the event giving rise to the claim. Notice of the extent of the claim with supporting data shall be delivered within forty-five (45) days of such occurrence unless Engineer allows an additional period of time to ascertain more accurate data. All claims for adjustment in the Contract Time shall be determined by Engineer if Owner and Contractor cannot otherwise agree. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order.

The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of Contractor if he makes a claim therefore as provided in this Article. Such delays shall include, but not be restricted to, acts or neglect by any separate Contractor employed by Owner, fires, floods, labor disputes, epidemics, abnormal weather conditions, or acts of God.

All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this Article shall not exclude recovery for damages (including compensation for additional professional services) for delay by either party.

33. Warranty and Guarantee

Contractor warrants and guarantees to Owner and Engineer that all materials and equipment will be new unless otherwise specified and that all work will be of good quality and free from faults or defects and in accordance with the requirements of the Contract Documents and of any inspections, tests or approval referred to in Article 34. All unsatisfactory Work, all faculty or defective Work, and all Work not conforming to the requirements of the Contract Documents at the time of acceptance thereof or of such inspection, tests or approvals, shall be considered defective. Prompt notice of all defects shall be given to Contractor. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in these Contract Documents.

34. Tests and Inspections

If the Contract Documents, Laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to specifically be inspected, tested, or approved by some public body, Contractor shall assume full responsibility therefor, pay all costs in connection therewith and furnish Engineer the required certificates of inspection, testing or approval. All other inspections, tests and approvals required by the Contract Documents shall be performed by organizations acceptable to Owner and Contractor and the costs thereof shall be borne by Owner unless otherwise specified.

The Contractor shall give Engineer timely notice of readiness of the Work for all inspections, tests or approvals. If such Work required so to be inspected, tested or approved is covered without written approval of Engineer, it must, if requested by Engineer, be uncovered for observation, and such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of his intention to cover such Work and Engineer has not acted with reasonable promptness in response to such notice.

Neither observations by Engineer nor inspections, tests or approvals by persons other than Contractor shall relieve Contractor from his obligations to perform the Work in accordance with the requirements ofthe Contract Documents.

35. Access to Work

Engineer and his representatives and other representatives of Owner will at reasonable times have access to the work. Contractor shall provide proper and safe facilities for such access and observation ofthe Work and also for any inspection or testing thereof by others.

36. Uncovering Work

If any Work should be covered contrary to the written request of the Engineer, it must, if required by the Engineer be uncovered for examination and replace at the Contractor's expense.

If any Work has been covered which Engineer has not specifically requested to observe prior to its being covered, or if Engineer considers it necessary or advisable that covered Work be inspected or tested by others, Contractor at Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, Contractor shall bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate deductive Change Order shall be issued. If, however, such Work is not found to be defective,Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction if he makes a claim therefore as provided in these Specifications.

37. Stopping the Work

If the Work is defective, or Contractor fails to supply sufficient skilled workmen or suitable materials or equipment, or if Contractor fails to make prompt payments to Subcontractors or for labor, materials or equipment, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor or any other party.

38. Correction of Work Before Final Payment

If required by Engineer prior to approval of final payment, Contractor shall promptly, without cost to Owner and as specified by Engineer, either correct any defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Engineer, remove it from the site and replace it with non-defective Work. If Contractor does not correct such defective Work or remove and replace such rejected Work within a reasonable time, all as specified in a written notice from Engineer, Owner may have the deficiency corrected or the rejected Work removed and replaced. All direct or indirect costs of such correction or removal and replacement, including compensation for additional professional services, shall be paid by Contractor and an appropriate deductive Change Order shall be issued. Contractor shall also bear the expense of making good all Work of others destroyed or damaged by his correction, removal or replacement of his defective Work.

39. One Year Correction Period

If, after the approval of final payment and prior to the expiration of one year after the date of substantial completion or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective Work, or, if it has been rejected by Owner, remove it from the site and replace it with non-defective Work. If Contractor does not promptly comply with the terms of such instructions, Owner may

have the defective Work corrected or the rejected Work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, shall be paid by Contractor.

40. Acceptance of Defective Work

If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to approval of final payment, also Engineer) prefers to accept it, he may do so. In such case, if acceptance occurs prior to approval of final payment, a Change Order shall be issued incorporating the necessary revisions in the Contract Documents, including appropriate reduction in the Contract Price; or, if the acceptance amount shall be approval of final payment, an appropriate amount shall be paid by Contractor to Owner.

41. Neglected Work By Contractor

If Contractor should fail to prosecute the work in accordance with the Contract Documents, including any requirements of the progress schedule, Owner, after seven (7) days' written notice to Contractor may, without prejudice to any other remedy he may have, make good such deficiencies and the cost thereof (including compensation for additional professional services) shall be charged against Contractor if Engineer approved such action, in which case a Change Order shall be issued incorporating an appropriate reduction in the Contract Price. If the payments then or thereafter due Contractor are not sufficient to cover such amount, Contractor shall pay the difference to Owner.

42. Application for Payment

At least ten days prior to submitting the first Application for a progress payment, Contractor shall submit a progress schedule, a final schedule of Shop Drawing submission and a schedule of values of the Work. These schedules shall be satisfactory in form and substance to Engineer. The schedule of values shall include quantities and unit prices aggregating the Contract Price, and shall subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction.
Upon approval of the schedules of values by Engineer, it shall it shall be incorporated into the form of Application for Payment furnished by Engineer.

At least ten days before each progress payment falls due (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such data and schedules as Engineer may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by such data, satisfactory to Owner, as will establish Owner's title to the material and equipment and protect his interesttherein, including applicable insurance. Each subsequent Application for Payment shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied to discharge in full all of Contractor's obligations reflected in prior Applications for Payment.

Retainage shall be an amount equal to 10% of the Work completed until 50% of the Work has been completed. At 50% completion, further partial payments shall be made in full to the Contractor and no additional amounts may be retained unless the Engineer certifies that the job is not proceeding satisfactorily, but amounts previously retained shall not be paid to the Contractor. At 50% completion or any time thereafter when the progress of the Work is not satisfactory, additional amounts may be retained but in no event shall the total retainage be more than 10% of the value of the work completed. Upon substantial completion of the work, any amount retained may be paid to the Contractor. When the Work has been substantially completed except for Work which cannot be completed because of weather conditions, lack of materials or other reasons which in the judgment of the Owner are valid reasons for non-completion, the Owner may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the Work still to be completed.

Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application of Payment, whether incorporated in the Project or not, will pass to Owner at the time ofpayment free and clear of all liens, claims, security interests and encumbrances (hereafter in these General Conditions referred to as "Liens").

43. Approval of Payments

Engineer will, within ten days after receipt of each Application for Payment, either indicate in writing his approval of payment and present the Application to Owner, or return the Application to Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application. Owner shall, within thirty days of presentation to him of an approved Application for Payment, pay Contractor the amount approved by Engineer.

Engineer's approval of any payment requested in an Application for Payment will constitute a representation by him to Owner, based on Engineer's on-site observations of the Work in progress as an experienced and qualified design professional and on his review of the Application for Payment and the accompanying data and schedules that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning Project upon Substantial Completion, tothe results of any subsequent tests called for in the Contract Documents and any qualifications stated in his approval); and that Contractor is entitled to payment of the amount approved. However, by approving any such payment Engineer will not thereby be deemed to have represented that he made exhaustive or continuous on-site inspections to check the quality or the quantity of the Work, or that he has reviewed themeans, methods, techniques, sequences, and procedures of construction, or that he has made any examination to ascertain how or for what purpose Contractor has used the moneys paid or to be paid to him on account of the Contract Price, or that title to any Work, materials or equipment has passed to Owner free and clear of any Liens.

Engineer's approval of final payment will constitute an additional representation by him to Owner that the conditions precedent to Contractor's being entitled to final payment as set forth in Article 46 has been fulfilled.

Engineer may refuse to approve the whole or any part of any payment if, in his opinion, it would be incorrect to make such representation to Owner. He may also refuse to approve any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously approved, to such extent as may be necessary in his opinion to protect Owner from loss because:

a. The Work is defective, or completed Work has been damaged requiring correction or replacement.

b. Claims or Liens have been filed or there is reasonable cause to believe such may be filed.

c. The Contract Price has been reduced because of Modifications.

d. Owner has been required to correct defective Work or complete the Work in accordance with Article 41.

e. Unsatisfactory prosecution of the Work, including failure to furnish acceptable submittals or to clean up.

When the above grounds are removed, payment shall be made for amounts withheld because of them.

44. Substantial Completion

Prior to final payment, Contractor may, in writing to Owner and Engineer, certify that the entire Project is substantially complete and request that the Engineer issue a certificate of Substantial Completion. Within a reasonable time thereafter, Owner, Contractor and Engineer shall make an inspection of the Project to determine the status of completion. If Engineer does not consider the Project substantially complete, he will notify Contractor in writing giving his reasons therefore. If Engineer considers the Project substantially complete, he will prepare and deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion and the responsibilities between Owner and Contractor for maintenance, heat and utilities. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment, and the certificate shall fix the time within which such items shall be completed or corrected, said time to be within the Contract Time. Owner shall have seven (7) days after receipt of the tentative certificate during which he may make written objection to Engineer as toany provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the project is not substantially complete, he will within fourteen days (14) days after submission of the tentative certificate to Owner notify Contractor in writing, stating his reasons therefore. If, after consideration of Owner's objections, Engineer considers the project substantially complete, he will within said fourteen days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as he believes justified after consideration of the objections from Owner.

The Owner may reduce the retainage to five (5%) percent of the total Contract Price after substantial completion. Owner shall have the right to exclude Contractor from the Project after the date of Substantial Completion, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

45. Partial Utilization

Prior to final payment, Owner may request Contractor in writing to permit him to use a specified part of the Project which he believes he may use without significant interference with construction of other parts of the Project. If Contractor agrees, he will certify to Owner and Engineer that said part of the Project is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Project. Within a reasonable time thereafter Owner, Contractor and Engineer shall make an inspection of that part of the Project to determine its status of completion. If Engineer does not consider that it is substantially complete, he will notify Owner and Contractor in writing giving his reasons therefore. If Engineer considers that part of the Project to be substantially complete, he will execute and deliver to Owner and Contractor a certificate to that effect, fixing the date of Substantial Completion as to that part of the Project, attaching thereto a tentative list of items to be completed or corrected before final payment and fixing the responsibility between Owner and Contractor for maintenance, heat and utilities as to that part of the Project. Owner shall have the right to exclude Contractor from any part of the Project which Engineer has so certified to be substantially complete, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

Insurance carrier shall be informed by the Contractor of occupancy and adjustments made so thatcoverage of construction will not be invalidated.

46. Final Payment

Upon written notice from Contractor that the Project is complete, Engineer will make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to remedy such deficiencies.

After Contractor has completed all such corrections to the satisfaction of Engineer and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection and other documents -- all as required by the Contract Documents, he may make Application for final Payment

following the procedure for progress payments. The final Application for Payment shall be accompanied by such date and scheduling as Engineer may reasonably require, together with complete and legally effective releases or waivers (satisfactory to Owner) of all Liens arising out of the Contract Documents and the labor and services performed and the material and equipment furnished hereunder. In lieu thereof and as approved by Owner, Contractor may furnish receipts or releases in full, an affidavit of Contractor that the releases and receipts include all labor, services, material and equipment for which a Lien could be filled, and that all payrolls, material and equipment bills, and other indebtedness connectedwith the work for which Owner or his property might in any way be responsible, have been paid or otherwise satisfied; and consent of the Surety, if any, to final payment. If any Subcontractor, material man,fabricator or supplier fails to furnish a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to Owner to indemnify him against any Lien.

If, on the basis of his observation and review of the Work during construction, his final inspection and his review of the final Application for Payment -- all required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor has fulfilled all of his obligations under the Contract Documents, he will, within ten (10) days after receipt of the final Application for Payment, indicate in writing his approval of payment and present the Application to Owner for payment. Thereupon Engineer will give written notice to Owner and Contractor that the Work is acceptable. Otherwise, he will return theApplication to Contractor, indicating in writing his reasons for refusing to approve final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. Owner shall, within ten (10) days of presentation to him of an approved final Application for Payment, pay Contractor the amount approved by Engineer.

If after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of Contractor and Engineer so confirms, Owner shall, upon certification by Engineer and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completedand accepted. If the remaining balance for Work is not fully completed or corrected and is less than the retainage stipulated in the Agreement, and if Bonds have been furnished, the written consent of the Suretyto the payment of the balance due for that portion of the Work fully completed and accepted, shall be submitted by the Contractor to the Engineer prior to certification of such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

The making and acceptance of final payment shall constitute:

a. a waiver of all claims by Owner against Contractor other than those arising from unsettled Liens, from defective Work appearing after final inspection or from failure to comply with the requirements of the Contract Documents or the terms of any special guarantees specified therein,and

b. a waiver of all claims by Contractor against Owner other than those previously made in writing and still unsettled.

Contractor's obligation to perform the Work and complete the Project in accordance with the Contract Documents shall be absolute. Neither approval of any progress or final payment by Engineer, nor the issuance of a certificate of Substantial Completion, nor any payment by Owner to Contractor under the Contract Documents, nor any use or occupancy of the Project or any part thereof by Owner, nor any act of acceptance by Owner nor any failure to do so, nor any correction of defective Work by Owner shall constitute an acceptance of Work not in accordance with the Contract Documents.

47. Owner's Right to Suspend Work

Owner may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to Contractor and Engineer which shall fix the date on which Work shall be resumed. Contractor shall resume the Work on the date so fixed. Contractor will be

allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if he makes a claim therefore as provided in these Contract Documents.

48. Owner's Right to Terminate Contract

If the Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper material, or if he should fail to make prompt payment tosubcontractors or for material or labor, or persistently disregard laws, ordinances or the instruction of the Engineer, or otherwise be guilty of a substantial violation of any provision of the Contract, then the Owner, upon the certificate of the Engineer that sufficient cause exists to justify such action, may without prejudiceto any other right or remedy and after giving the Contractor and his Surety a minimum of seven (7) days from delivery of a written notice, take possession of the premises and of all materials, tools and appliances thereof and finish the Work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price shall exceed the expense of finishing the Work including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If any such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner.
The expense incurred by the Owner as herein provided, and the damage incurred through the Contractor's default, shall be certified by the Engineer and incorporated in a Change Order.

Where the Contractor's services have been so terminated by the Owner, said termination shall not affect any right of the Owner against the Contractor then existing or which may thereafter accrue. Any retention or payment of moneys by the Owner due the Contractor will not release the Contractor from compliance with the Contract Documents.

After ten (10) days from delivery of a written notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the Contract. In such case, the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.

49. Contractor's Right to Stop Work or Terminate

If, through no act or fault of Contractor the Work is suspended for a period of more than ninety (90) days by Owner or under an order of court or other public authority, or Engineer fails to act on any Application for Payment within thirty (30) days after it is submitted, or Owner fails to pay Contractor any sum approved by Engineer or awarded by arbitrators within thirty (30) days of its approval and presentation, then Contractor may, upon fifteen (15) days' written notice to Owner and Engineer, terminate the Agreement and recover from Owner payment for all Work executed and any expense sustained plus a reasonable profit. In addition, and in lieu of terminating the Agreement, if Engineer has failed to act on an Application for Payment or Owner has failed to make any payment as aforesaid, Contractor may upon fifteen (15) days' notice to Owner and Engineer stop the Work until he has been paid all amounts then due.

50. Arbitration by Mutual Consent

All claims, disputes and other matters in question arising out of, or relating to, this Agreement or the breach thereof except for claims which have been waived by the making or acceptance of final payment,may be decided by arbitration if the parties mutually agree. Any agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

Notice of the request for arbitration shall be filed in writing with the other party to the Agreement and a copy shall be filed with Engineer. Request for arbitration shall in no event be made on any claim, disputeor other matter in question which would be barred by the applicable statute of limitations.

The Contractor will carry on the Work and maintain the progress schedule during any arbitrationproceedings, unless otherwise mutually agreed in writing.

51. Computation of Time

When any period of time is referred to in the Contract Documents by days, it shall be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day shall be omitted from the computation.

52. Assignments

Neither the Contractor nor the Owner shall sell, transfer, assign or otherwise dispose of the Contract orany portion thereof, or of his right, title of interest herein, or his obligations thereunder, without written consent of the other party.

53. Ownership of Drawings

All Drawings, Specifications and copies thereof furnished by the Engineer are the property of the Engineer. They are not to be used on other work and, with the exception of the signed Contract set, are tobe returned to the Engineer or his representative upon request, at the completion of the Work.

54. Compliance With Prevailing Wage Law (Not Applicable to this Project)

Full compliance by the Contractor and any Subcontractor as to their duties prescribed by the applicableState or Federal Minimum Wage Laws is required in the performance of Work under this Contract.

The Contractor will be required to accept liability for payment of all payroll taxes or deductions required by local and federal law, including old age pension, social security or annuities. Workmen's Compensation Insurance shall be carried to the full amounts as required by local statutes.

Incorporated within the Labor Regulations and Wage Rates is a classified list of labor positions used in this work. Opposite the positions are shown the general prevailing hourly rates of wages as ascertained for this contract.

In case it shall become necessary for the Contractor or any Subcontractor to employ on the work under this contract any person in a trade or occupation (except executive, administrative or supervisory workers) for which no wage rates are specified herein, the Contractor shall immediately notify the Engineer who will promptly thereafter furnish the Contractor with the general prevailing rates. The rates thus furnished shall be applicable for such trade or occupation from the time of initial employment of the person or persons affected and during the continuance of such employment.

The Contractor and any Subcontractor shall post and keep posted in a conspicuous place at the site of the Work a copy of the prevailing rates of wages and work hours for each classification of laborers employed in the performance of this Contract.

55. Measurement and Computation of Quantities

Computation of quantities that will be the basis for payment estimates, both monthly and final, will bemade by the Engineer. In general, all payment-estimates will be checked and approved by a representative of the funding agency before payment.

No extra measurements of any kind, unless specially noted shall be allowed in measuring the Work under these Specifications; but the length, area solid contents or number only shall be considered as the basis for payment as hereinafter specified.

Where the computation of areas or volumes by exact geometric methods is unduly laborious or refined, the planimeter shall be held an instrument of precision and may be used in the determination of quantities upon which payments are based.

The measurements of the Engineer as to the amount of Work done shall be final and conclusive.Payments shall be made upon the Work done within the lines prescribed by the Drawings or Specifications and in accordance with the unit prices for the items under which the Work is done.

56. Project Signs

The Contractor shall erect a project sign at a prominent location on the Project. The sign shall be four feet by eight feet, two colors and shall contain the name of the Project, the Owner, the Engineer, and the Contractor. The lettering shall be approved by the Engineer prior to making the signs.

End of Section

Construction Sign

PROJECT: LAKE CUMBERLAND REGIONAL COMMERCE COMPLEX

ACCESS ROAD EXTENSION PROJECT

Owner: Russell County Industrial Development Authority

Jamestown, KY 42629

Engineer: MSE of Kentucky, Inc.

Lexington, KY 40503

859-223-5694

Contractor:

Sign Dimensions: 1200mm x 2400mm x 19 mm (app. 4’ x 8’ x ¾”) Plywood Panel (APA Rated A-B grade – Exterior)

SECTION 00800 - SPECIAL CONDITIONS

1. Description of the Work and Designation of the Owner
2. Available Funds
3. Time of Completion and Liquidated Damages
4. Insurance
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6. Additional Bonds and Insurance
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8. Site Dimensions
9. Damage to Equipment Stored and/or In Place Prior to Initial Operations
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11. Salvaged Materials and Equipment
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22. Personal Liability of Public Officials
23. Blasting
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30. Resolving Conflicts in Contract Documents
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32. Lubrication
33. Labor Regulations
34. Preconstruction Conference
35. Record Drawings

1. Description of the Work and Designation of the Owner

These specifications and accompanying plans describe the work to be done and the materials to be furnished for the construction of the LCRIC 2023 PDI Access Road Extension Project for the Russell County Industrial Development Authority.

All references to the Owner in these specifications, Contract Documents and plans shall mean the Russell County Industrial Development Authority.

2. Available Funds

The attention of all bidders is directed to the fact that the funds will be made available for the award of the contract from the Owner.

3. Time of Completion and Liquidated Damages

The time allowed for completion of the contract is One Hundred Eighty (180) calendar days. The time allowed for completion shall begin at midnight, local time, on the date which the Owner shall instruct the Contractor, in writing, to start work, but not later than 10 days after Notice to Proceed.

The Contract completion time stipulated above includes an allowance for an average number of inclement weather days as follows:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Precip.	7	7	9	8	8	8	8	7	6	5	6	7
Freeze	10	6	1								1	5

When number of days (including Saturdays, Sundays and Holidays) of precipitation in excess of 0.1" per day or maximum daily temperatures of 32 degrees F exceed those shown above in any month, the Contractor shall be entitled to an equal number of additional days for Contract Completion.

It is understood that time is the essence of this contract and that the Owner will sustain damages, monetary and otherwise, in the event of delay in completion of the work hereby contracted.

Therefore, if the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as part consideration for the awarding of this contract, to pay the Owner the amount specified in the contract, not as a penalty, but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in

default after the time stipulated in the contract for completing the work.

The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the extreme difficulty in fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.

Liquidated damages are fixed at $800 per day for each calendar day of overrun beyond the date set for completion or authorized extension thereof for the contract.

4. Insurance

Insurance is to be furnished by the Contractor for the benefit of the Owner, Contractor and subcontractors as their interests may appear. The minimum amounts of insurance coverage to be furnished under these contracts, in accordance with the applicable provisions of the General Conditions are:

(a) Workmen's Compensation ---------- Statutory

(b) Comprehensive General Liability - Including coverage for the explosion, collapse, and underground hazards where applicable; also including contractual liability and also products and/or completed operations liability coverage (no deductible clauses are acceptable for these coverages):

Bodily Injury Liability	$1,000,000 Each Person $3,000,000 Each Occurrence $500,000 Aggregate Products
Property Damage Liability	$1,000,000 Each Occurrence $2,000,000 General Aggregate $1,000,000 Aggregate Products $1,000,000 Aggregate Contractual $3,000,000 Excess/Umbrella Property Insurance

(c) Comprehensive Automobile Liability - Including hired car and employers' nonownership liability coverage:

Bodily Injury Liability	$1,000,000 Each Person $3,000,000 Each Occurrence $3,000,000 Excess/Umbrella Property Insurance

Property Damage Liability $1,000,000 Each Occurrence

(d) Builder's Risk (Building Construction) - Including coverage for fire, extended coverages, vandalism, and malicious mischief; 100% of insurable values.

(e) Installation Floater (Non-Building Construction): 100% of insurable values.

(f) Flood Hazard Insurance - In accordance with General Conditions.

All policies shall provide for a minimum of fifteen (15) days written cancellation notice with notice to be given both to the Owner and the Engineer. The Owner and Engineer shall be included as additional insured parties.

5. Performance and Payment Bond

The Contractor shall furnish separate performance and payment bonds issued by an approved bonding company (in accordance with the General Conditions) in an amount at least equal to one hundred (100%) percent of the contract price, as security for the faithful performance of this contract and for the payment of persons performing labor and furnishing materials in connection with this contract. These bonds shall be executed by a company authorized to do business in the State of Kentucky and shall be signed or countersigned by a Kentucky resident agent. Bonds shall remain in effect for one year after date of final acceptance of the work.

6. Additional Bonds and Insurance

Prior to delivery of the executed Agreement by the Owner to the Contractor, the Owner may require the Contractor to furnish such other Bonds and such additional insurance, in such forms and with such sureties or insurers as the Owner may require. If such other Bonds or such other insurance are specified by written instructions given prior to opening of the bids, the premium shall be paid by the Contractor; if subsequent thereto, they shall be paid by the Owner (except as otherwise provided for bonding of substitute materials or equipment).

7. Sequence of Work

Contractor shall apply their forces as necessary to complete the project within the allowed time.

8. Site Dimensions

All Contractors furnishing materials and equipment for this contract shall obtain exact dimensions at the site. Scale or figure dimensions on the drawings and details show the correct size under ideal conditions and shall not, under any circumstances, be so construed as to relieve

the Contractor from responsibility for taking measurements at the site and furnishing materials or equipment of the correct size.

9. Damage to Equipment Stored and/or In Place Prior to Initial Operations

Any equipment damaged or which has been subjected to possible damage by reason of inundation, improper storage and/or protection during the construction period of a project, shall be replaced with new equipment, or with the approval of the Engineer, be returned to the manufacturer of the equipment, or his authorized repair agency, for inspection and repair; provided, however, that such repair after inspection will place the equipment in new condition and restore the manufacturer's guarantee the same as for new equipment.

10. Equipment Rental - Charges for Extra Work

Equipment rental charges by the Contractor for rented equipment units used on "Extra Work" or "Changes in Work" as may be ordered and authorized by the Owner shall not exceed those charges listed in the latest edition of the "Green Book," compiled and distributed by Associated Equipment Distributors, 615 West 22nd Street, Oak Brook, Illinois 60523.

11. Salvaged Materials and Equipment

All materials and/or equipment to be removed from existing structures and not specifically specified to be reused shall remain the property of the Owner. Such materials and/or equipment shall be stored on site by the Contractor as directed by the Owner.

12. Sanitary Facilities

Each Contractor shall construct and maintain, in a sanitary condition, sanitary facilities for his employees and also employees of his subcontractors. At completion of the contract work, these sanitary facilities shall be properly disposed of.

13. Utilities

Obtaining utilities for construction, including power and water, shall be the responsibility of the Contractor and he shall bear the cost of all utilities used for construction. Cost of all connections and facilities for use of utilities shall be borne by the Contractor.

14. Cash Allowances

No cash allowances are included in this project. However, the Contractor is required to make labor and material allowances for unforeseen repairs, to the existing improvements as described

in these specifications.

15. Nondiscrimination in Employment

During the performance of this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, creed, color or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, creed, color or national origin.

16. Minimum Wage Rates

If available, the prevailing minimum wage rates are contained in these specifications. However, applicable wage rates may be provided at any time before bids are received. In that event the wage rates will be provided by addendum to these specifications.

The Contractor will be required to pay not less than the higher of the State or Federal minimum wage rate for each job classification as and if set forth in these specifications or in an addendum to the specifications. The stipulated wage rates represent prevailing minimum rates of pay allowable as determined by the appropriate governing agency and shall not be construed to mean that the Contractor may not have to pay higher rates to secure labor. No contract adjustment is permissible should this condition become applicable.

17. Property Protection

Care is to be exercised by the Contractor in all phases of construction to prevent damage and injury to the Owner's or other property.
In connection with work performed on "private property" (property other than that belonging to the Owner), the Contractor shall confine his equipment and stored materials to lands and rights-of-way provided for the project by the Owner and shall take every precaution to avoid damage to the private property owner's buildings, grounds and facilities.

Fences, hedges, shrubs, etc., within the construction limits shall be carefully removed, preserved and replaced when the back filling has been completed. If sod is damaged or not handled properly, it shall be replaced with new sod equal to existing sod at the Contractor's expense. Grassed areas, other than lawns, shall be graded, fertilized and seeded when construction is completed. When construction is completed the private property owner's facilities and grounds shall be restored to as good or better condition than found as quickly as possible at the Contractor's expense.

When directed by the Engineer, large trees or other facilities that cannot be replaced or preserved shall be removed by the Contractor. The Owner will assume responsibility for settling with the property owner for such loss. The Contractor shall be solely and entirely responsible for any

damage to all other trees or facilities.

The Contractor, in the use of easements and rights-of-way, will comply with any and all agreements between the Owner and the property owner.

Carelessness on the part of the Contractor or his employees in leaving gates open, parking cars, trucks or vehicles in such a way as to interfere with farming operations will not be tolerated. Contractor shall use existing roads to transport pipe, materials and workmen to and from the job.

Foundations, adjacent to where an excavation is to be made below the bottom of the foundation, shall be supported by shoring, bracing and underpinning as long as the excavation shall remain open and the Contractor shall be held strictly responsible for any damage to said foundation.

Highway rights-of-way, railroad rights-of-way, public parks, school yards and other such properties shall be considered "private properties" for the purpose of this section.

18. Rock Excavation

It is specifically noted that separate payment for solid rock excavation will not be made under this contract, all excavation being considered "unclassified."

19. Extra Fill Material

Extra fill material required to complete the finished grading to the line and grade shown on the plans shall be obtained by the Contractor at no extra cost to the Owner above that included in the unit price bid.

20. Layout of the Work

The layout of the work shall be the responsibility of the Contractor and shall be subject to checking by the Engineer. All instruments, stakes, batter boards, barricades, traffic signs, flags and other materials necessary and personnel needed for establishing and marking lines, grades and structure location during construction, shall be furnished and paid for by the Contractor. The Contractor's personnel engaged in the layout work described herein and any aides used shall be fully capable of performing the duties set out herein.

21. Conflict With or Damage to Existing Utilities and Facilities

Insofar as location data is available to the Engineers, existing underground utilities (such as water lines, sewer lines, gas lines, telephone conduits, etc.) are accurately located on the drawings. Due, however, to the approximate nature of much of this data, the location of any particular facility cannot be certified to be correct. In general, locations and elevations shown

are approximate only.

Repair to existing utilities and facilities damaged by the Contractor's construction forces shall be considered as a part of the Contract covered only by the price bid for the new construction. The only exceptions to this provision, wherein extra compensation will be authorized, are relocation of an existing facility due to direct conflict with the new pipeline, and relocation (outside of limits of maximum allowable trench widths) of an existing facility presently located within the bounds of maximum allowable trench width, where necessitated for assurance against future damage due to settlement or to permit reasonable access to the new work.

Before proceeding with the work, the Contractor shall confer with all public or private companies, agencies, or departments that own and operate utilities in the vicinity of the construction work to verify the location of and possible interference with, the existing utilities that are shown on the Plans, arrange for necessary suspension of service and make arrangements to locate and avoid interference with all utilities (including house connections) that are not shown on the Plans.

Where the existing utilities must be disturbed during construction under this contract, their operation and function shall be maintained by the Contractor to such a degree that service to customers will be interrupted for minimum time periods only. Such disturbances and any maintenance use of these lines shall constitute no cost to the Owner. The Owner shall be notified of interruptions in sufficient time to prepare for them and shall agree to the hour, date and duration of them before they are undertaken.

Should shutdowns in service be in excess of the time of duration agreed upon and such excessive shutdown time be due to the Contractor's negligence, faulty work and/or inability to perform, then and in that event, the Contractor shall be held liable to the Owner, by reason of such excessive shutdown periods.

When existing utilities or appurtenant structures, either underground or above ground, are encountered, they shall not be displaced or disturbed unless necessary and in such case shall be replaced in as good or better condition that found, as quickly as possible. Temporary relocation and replacement of all utilities and appurtenant structures to accommodate the construction work shall be at the Contractor's expense and permanent relocation of such facilities as described herein to accommodate the construction work shall be at the Owner's expense, unless such temporary or permanent relocation and replacement is by statute or agreement the responsibility of the Owner. It is expected that the Contractor will be diligent in his efforts and use every possible means to locate existing utilities.

Payment for necessary disconnection and reconnection of utility services shall be included as a

part of the Contractor's bid and no extra compensation will be made for same.

The Contractor shall at all times maintain on hand an adequate supply of repair materials and tools with which to make repair to damaged water, gas and sewer lines. Should the Contractor inadvertently damage existing utilities, he shall make immediate repair thereto and in no event shall he leave the site before such repair has been made and proven to be successful. Repair to damaged utilities must meet the requirements of the agency in charge of that particular utility.

The intent of this article is to assure compensation to the Contractor for changes in existing utilities reasonably necessary and at the same time, to protect the Owner against excessive damage due to carelessness of the Contractor's construction force.

22. Personal Liability of Public Officials

In carrying out any of the provisions of the Contract or in exercising any power or authority granted to them thereby, there shall be no personal liability upon the Engineer, or its authorized agents or employees, or upon any other officer or employee of the Owner, it being understood that in such matters they act as the agent and representative of that Owner.

23. Blasting

All blasting operations shall be conducted in strict accordance with Kentucky Revised Statutes 351.320 to 351.340 and the rules and regulations promulgated under KRS 351.320 to 351.340, effective October 6, l972, which shall be deemed to be included in these Specifications the same as though herein written out in full. The Contractor shall also comply with applicable municipal ordinances, Federal safety regulations and Section 9 of the Manual of Accident Prevention in Construction published by the Associated General Contractor's of America, Inc. All explosives shall be stored in conformity with said ordinances, laws and safety regulations. No blasting shall be done within five feet of any water mains, except with light charges of explosives. Any damage done by blasting is the responsibility of the Contractor and shall be promptly and satisfactorily repaired by him.

To implement these requirements and unless otherwise required by ordinance or law, each excavation crew shall be provided with two metal boxes equipped with suitable locks. One of these boxes shall be for storing explosives and one for caps. The boxes shall always be locked except when in actual use. They shall be painted a bright color and stenciled with appropriate warning signs. At night explosives and caps shall be stored in separate magazines.

All shots shall be covered with heavy timber, steel or rope blasting mats to prevent flying material. Unless otherwise specified or directed, delay caps shall be used to reduce earth

vibration and noise. In sparsely populated areas, the Engineer may permit the Contractor to use regular type caps.

The Contractor shall keep a blasting log and, for each blast, shall record the date, time of blast, number of holes, type of explosive, number of delays, amount of charge per delay, stemming and number and type of caps. An inventory of all explosives handled and stored shall also be kept. Blasting operations shall be covered by comprehensive general liability insurance or separate public liability insurance to cover blasting as set forth in the General Conditions.

24. Control of Erosion

The Contractor shall be responsible for control of siltation and erosion from the project work. Control shall include all necessary ditching, check dams, mulching, etc. to prevent deposition of materials in roadside ditches. The Owner shall incur no extra costs from such work.

25. Occupational Safety and Health

It shall be the Contractor's responsibility to be informed of and comply with all Kentucky Department of Labor, Division of Occupational Safety and Health requirements for this type of construction. He shall also comply with all reporting requirements of the Occupational Safety and Health Law. The Contractor shall provide adequate protection against accidents due to special hazards caused by blasting, deep trenches, excavations, heavy equipment or vehicle operation, electrical work, work in dangerous atmospheres, work above the ground, traffic control, work with augering and drilling equipment and any other construction work which he might undertake as a part of this project.

The Contractor shall provide safety controls for protection of the life and health of employees. He will utilize precautionary methods for the prevention of damage to property, materials, supplies and equipment and for avoidance of work interruptions in the performance of this contract. In order to provide such safety controls aforesaid, the Contractor shall comply with all pertinent provisions of the Kentucky Safety Standards of the Division of Occupational Safety, Department of Labor, that are in effect at the time this contract is entered into and during the period in which the contract is to be performed. The Contractor shall also take or cause to be taken such additional measures as the Division of Occupational Safety may determine to be reasonably necessary for the purpose.

The Contractor shall maintain an accurate record of, and shall report to the Division of Occupational Safety in the manner and on the forms prescribed by the Division; exposure date and all accidents resulting in death, traumatic injury, occupational disease and/or damage to property, materials, supplies and equipment incident to work performed under this contract.

The Division of Occupational Safety will notify the Contractor through the Owner of any noncompliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately correct conditions. Such notice when delivered to the Contractor or his representative at the site of the work shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory or corrective action has been taken. Failure or refusal to comply with the order will be grounds for stopping all payments due under the contract to the Contractor. No part of the time lost due to any such stop order shall be made the subject of claim or extension of time or for excess cost or damages to the Contractor.

Compliance with the provisions of the foregoing sections by subcontractors will be the responsibility of the prime Contractor.

The Contractor shall provide necessary first aid facilities and employees trained to provide first aid as required by the Occupational Safety and Health Law. In addition to the reporting requirements of other agencies, the Contractor must report promptly in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work, whether on or adjacent to the site, which caused death, personal injury, or property damages, giving full details and statements of witnesses. In addition, if death or serious injuries or serious damages are caused, such shall be reported to both the Engineer and the Owner.

26. Construction Warning Signs

The Contractor shall provide construction warning signs for each location where he is working in the highway right-of-way. Safety rules, including size, type and placement of construction signs, shall be equal to those required by the Kentucky Department of Highways.

27. Pipeline Right-of-way

The Owner will attempt to obtain all pipeline right-of-way before construction is begun. However, the Contractor must be prepared to work in right-of-way which have been acquired and shall not be entitled to a time extension due to delay over lack of particular right-of-way unless he has been provided no other place to work.

28. Responsibility for Trench Settlement

Where the pipelines installed under this contract are located within existing or proposed street right-of-way the Contractor shall be responsible for any settlement of the street surfacing, curbs, or sidewalks caused by the pipeline construction, that occurs within one year after the final acceptance of this contract. Repair of any damage caused by settlement shall meet the approval of the Owner.

29. Permission to Use Property Other Than That Provided by Owner

Should the Contractor desire or elect to use, pass over and/or encroach on private property title or right-of-way for a specific purpose, he shall obtain such rights and permission at his own expense and risk.

30. Resolving Conflicts in Contract Documents

Anything called for in the specifications and not shown on the drawings or shown on the drawings and not called for in the specifications shall be included in the Contractor's work, the same as if included in both. Where the details and general drawings do not agree, the Contractor shall notify the Engineer at least five (5) days before the date of the receipt of bids and the Engineer will have the Owner issue an addendum to all Contractors as to which of the two methods of construction shall be followed. Failure to make this determination shall make the Contractor subject to furnishing either method as may be later called for by the Engineer. In case of discrepancies between the various parts of the plans and the specifications, the detailed drawings shall take precedence over the general layouts or elevations and the written specifications shall take precedence over all other documents.

Figure dimensions on the drawings shall govern over scale dimensions. Work, materials or equipment described in words which so applied have a well-known technical or trade meaning shall be deemed to refer to such recognized standards.

In resolving conflicts, errors and discrepancies in the Contract Documents, the documents shall be given precedence in the following order: Agreement, Modifications, Addenda, Funding Agency Specifications or Contract Documents, Special Conditions, Special Provisions, Supplementary General Conditions, Information for Bidders, General Conditions, Technical Specifications and Drawings.

31. Access to the Work

The Engineer and the Owner shall have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection.

32. Lubrication

The Contractor shall make suitable provision for the proper lubrication of all equipment furnished under this Contract. Accessible grease fittings shall be provided where required. A supply of oil, grease and other lubricants of proper quality, as recommended by the manufacturer of the equipment, shall be furnished. Lubricants shall be furnished in their original, unopened containers, in sufficient quantity for initial fillings and for at least one (1) year of operation.

33. Labor Regulations (Not Applicable)

All public works projects bid and constructed in the State of Kentucky are subject to the provisions of Chapter 337 of the Kentucky Revised Statutes entitled Wages and Hours. In addition, if the project to which these specifications apply is funded in whole or in part by a Federal grant program whereby the U.S. Department of Labor is required to prescribe predetermined prevailing minimum wages, compliance with the applicable Federal labor regulations is also required.

All Contractors and subcontractors on the work will be required to comply with all applicable provisions of State and Federal regulations as outlined in the Supplemental General Conditions.

34. Pre-Construction Conference

A pre-construction conference shall or shall not be held prior to issuance of notice to proceed. The Contractor shall be represented by at least one (1) principal of the firm and the job superintendent. The Contractor shall at that time present the construction schedule, progress payment format and estimates, any available subcontractor approval requirements, required insurance and any other documents deemed necessary.

35. Record Drawings

The Contractor shall keep an accurate record of the location, size and material for all piping and changes in dimensions, and any other variations between the work actually provided and that shown on the Contract Drawings. The representation of such variations shall conform to standard drafting practice and shall include such supplementary notes, legends and details as may be necessary for legibility and clear portrayal of the construction. This requirement shall not be deleted regardless of the record keeping practices of the Engineer or the Owner.

End of Section

SECTION 01200 - PROJECT MEETINGS

PART 1. GENERAL

1.1 Requirements Included

A. Contractor participation in pre-construction conferences, progress meetings, pre-final inspection and final inspection.

B. Contractor administration of pre-installation conferences and pre-final inspection.

1.2 Related Requirements

A. Section 01300 - Submittals: Progress Schedules.

B. Section 01300 - Submittals: Shop drawings, product data, and samples.

C. Section 01400 - Quality Control.

D. Section 01700 - Contract Close-out: Project record documents.

E. Section 01700 - Contract Close-out: Operation and maintenance data.

1.3 Pre-construction Conferences

A. Engineer will administer pre-construction conference for execution of Owner-Contractor Agreement and exchange of preliminary submittals.

1.4 Progress Meetings

A. Attend progress meetings.

B. Review of Work progress, status of progress schedule and adjustments thereto, delivery schedules, submittals, maintenance of quality standards, pending changes and substitutions, and other items affecting progress of Work.

1.5 Pre-installation Conferences

A. When required in individual specification Section, convene a pre-installation conference prior to commencing work of the Section.

B. Require attendance of entities directly affecting, or affected by, work of the Section.

C. Review conditions of installation, preparation and installation procedures, and coordination with related work.

1.6 Pre-final Inspection

A. When work is substantially complete, convene a pre-final inspection.

B. Require attendance of Owner, Engineer and funding agency officials.

C. Review installation, cleanup and operation of work.

D. Review record drawings, operation and maintenance materials, and other close-out documents.

1.7 Final Inspection

A. When punch list work is complete, attend a final inspection.

B. Review completion of punch list items.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01300 - SUBMITTALS

PART 1. GENERAL

1.1 Requirements Included

A. Procedures.

B. Construction Progress Schedules.

C. Shop Drawings.

D. Product Data.

E. Manufacturer's Instructions.

F. Manufacturer's Certificates.

G. Record Drawings.

1.2 Related Requirements

A. Section 01005 - Administrative Provisions: Applications for Payment.

B. Section 01400 - Quality Control: Testing laboratory reports.

C. Section 01400 - Quality Control: Manufacturers' field service reports.

D. Section 01700 - Contract Close-out: Close-out submittals.

1.3 Procedures

A. Deliver submittals to Engineer at address listed on cover of Project Manual.

B. Identify Project, Contractor, major supplier; identify pertinent Drawing sheet and detail number, and Specification Section number, as appropriate. Identify deviations from Contract Documents. Provide space for Contractor and Engineer review stamps.

C. Submit initial progress schedule in duplicate within 15 days after date established in Notice to Proceed. After review by Engineer revise and resubmit as required. Submit revised schedule with each second Application for Payment, reflecting changes since previous submittal.

D. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.

E. After Engineer review of submittal, revise and resubmit as required, identifying changes made since previous submittal.

F. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.4 Construction Progress Schedules

A. Submit horizontal bar chart or network analysis system using the critical path method, showing complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Show projected percentage of completion for each item of Work as of time of each Application for Progress Payment.

B. Show submittal dates required for shop drawings, product data, and samples, and product delivery dates.

1.5 Shop Drawings

A. Submit the number of copies which Contractor requires, plus two copies which will be retained by Engineer.

1.6 Product Data

A. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work.

B. Submit the number of copies which Contractor requires, plus two copies which will be retained by Engineer.

1.7 Manufacturer's Instruction

A. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, startup, operation, maintenance, adjusting, and finishing, in quantities specified for product data.

1.8 Record Drawings

A. Maintain accurate records of any variations between the work actually provided and that shown on the Contract Drawings. The representation of such variations shall conform to standard drafting practice and shall include such supplementary notes, legends and details as may be necessary for legibility and clear portrayal of the construction.

B. Submit one copy of all such records to the Engineer.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01400 - QUALITY CONTROL

PART 1. GENERAL

1.1 Requirements Included

A. General Quality Control.

B. Workmanship.

C. Manufacturer's Instructions.

D. Manufacturer's Certificates.

E. Manufacturers' Field Services.

1.2 Related Requirements

A. Document 00700 - General Conditions: Inspection and testing required by governing authorities.

B. Section 01005 - Administrative Provisions: Applicability of specified reference standards.

C. Section 01300 - Submittals: Submittal of Manufacturer's Instructions.

1.3 Quality Control, General

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.4 Workmanship

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.5 Manufacturer's Instructions

A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.6 Manufacturer's Certificates

A. When required by individual Specifications Section, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.7 Manufacturer's Field Services

A. When specified in respective Specification Sections, require supplier or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.

B. Representative shall submit written report to Engineer listing observations and recommendations.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01420 - INSPECTION OF THE WORK

PART 1. GENERAL

1.1 The Engineer's Duties

It is not the Engineer's function to supervise or direct the manner in which the work under this Contract is carried on or conducted.

The Engineer is not responsible for construction means, methods, techniques, sequences, or procedures, nor for safety precautions and programs in connection with the work.

The Engineer will not be responsible for the Contractor's failure to carry out the work in accordance with the Contract Documents.

1.2 The Contractor's Duties

The Contractor shall perform no work in the absence of the Engineer or his assistants, without prior approval.

The Contractor shall use no material of any kind until it has been inspected and accepted by the Engineer.

The Contractor agrees that any method or procedure, which in the opinion of the Engineer does not achieve the required results or quality of the work specified, shall be discontinued immediately upon the order of the Engineer.

The Contractor shall remedy all materials or workmanship found at any time to be defective or not of the quality required by the Plans and Specifications, regardless of previous inspection of the materials and workmanship.

The Engineer's inspection does not relieve the Contractor from any obligation to perform the work specified, strictly in accordance with the Drawings and Specifications. Any work not so constructed shall be removed and made good by the Contractor free of all expense to the Owner.

Upon completion, the Contractor shall have Record Drawings and certified as to their completeness and correctness by the Resident Inspector and delivered to the Engineer for incorporation in the Drawings.

At Contract close-out, deliver Record Documents to the Engineer for the Owner.

Accompany submittal with transmittal letter in duplicate, containing:

Date. Project title and number. Contractor's name and address. Title and number of each Record Document. Signature of the Contractor or his authorized representative.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

Not Used.

End of Section

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1. GENERAL

1.1 Requirements Included

A. Barriers

B. Protection of Installed Work.

C. Security.

D. Water Control.

E. Cleaning During Construction.

F. Project Identification.

1.2 Related Requirements

A. Section 01005 - Administrative Provisions: Work sequence. Contractor use of premises.

B. Section 01700 - Contract Close-out: Final cleaning.

1.3 Barriers

A. Provide as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways as required by governing authorities for public rights-of-way and for public access to existing building or site.

1.4 Protection of Installed Work

A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

B. Where applicable, follow project traffic control plan as required by state or local authorities having jurisdiction over roads or streets. Provide required signage, markings, cones, barriers, flaggers or other controls as may be required by the jurisdictional agency.

1.5 Cleaning During Construction

A. Control accumulation of waste materials and rubbish; periodically dispose of off-site.

1.6 Project Identification

A. Provide Project identification sign of wood frame and exterior grade plywood construction, painted with required design and colors. List title of Project, names of Owner, Engineer, Contractor.

B. Erect on site at location established by Engineer.

1.7 Removal

A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1. GENERAL

1.1 Requirements Included

A. Barriers

B. Protection of Installed Work.

C. Security.

D. Water Control.

E. Cleaning During Construction.

F. Project Identification.

1.2 Related Requirements

A. Section 01005 - Administrative Provisions: Work sequence. Contractor use of premises.

B. Section 01700 - Contract Close-out: Final cleaning.

1.3 Barriers

A. Provide as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways as required by governing authorities for public rights-of-way and for public access to existing building or site.

1.4 Protection of Installed Work

A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

B. Where applicable, follow project traffic control plan as required by state or local authorities having jurisdiction over roads or streets. Provide required signage, markings, cones, barriers, flaggers or other controls as may be required by the jurisdictional agency.

1.5 Cleaning During Construction

A. Control accumulation of waste materials and rubbish; periodically dispose of off-site.

1.6 Project Identification

A. Provide Project identification sign of wood frame and exterior grade plywood construction, painted with required design and colors. List title of Project, names of Owner, Engineer, Contractor.

B. Erect on site at location established by Engineer.

1.7 Removal

A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1. GENERAL

1.1 Work Included

The Contractor shall maintain at the site for the Owner one record copy of:

A. Drawings.

B. Specifications.

C. Addenda.

D. Change orders and other modifications to the Contract.

E. Engineer field orders or written instructions.

F. Approved shop drawings, product data and samples.

G. Field test records.

1.2 Related Requirements

A. Section 01200 - Project Meetings

B. Section 01340 - Shop Drawings, Product Data and Samples

C. Section 01500 - Construction Facilities and Temporary Controls

1.3 Recording

A. Each document shall be labeled "PROJECT RECORD" in large printed letters.

B. Record information shall be kept current with construction progress.

1.4 Submittals

A. Sketches showing the "Record" information shall be provided monthly to the Engineer and submitted with the partial pay request. Copies of quality control test results notes shall be supplied weekly and all test results shall be submitted with close-out documents.

B. Upon completion, the Contractor shall have Record Drawings and certified as to their completeness and correctness by the Resident Inspector and delivered to the Engineer for incorporation in the Drawings.

C. At Contract close-out, the Contractor shall deliver Record Documents to the Engineer for the Owner.

D. The Contractor shall accompany the submittal with a transmittal letter containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each Record Document.
5. Signature of the Contractor or his authorized representative.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

Not Used.

End of Section

SECTION 02100 - EROSION CONTROL

PART 1. GENERAL

1.1 Work Included

Submit KPDES Notice of Intent (NOI) and all follow-up information. Take responsibility for locating, furnishing, installing, and maintaining temporary sediment and erosion control best management practices for earth disturbing activity areas and developing a Best Management Practices (BMP) Plan using good engineering practices as required by the Kentucky Pollutant Discharge Eliminating System (KPDES) Permit. Make and record inspections of BMPs and areas as required by the KPDES Permit. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, State or Local agencies, adhere to the more restrictive laws, rules, or regulations. A template for the Contractor's use in preparing the BMP Plan is supplied in these documents.

1.2 Related Work

A. Section 02110 - Site Clearing
B. Section 02200 - Earth and Rock Work
C. Section 02936 - Seeding

PART 2. PRODUCTS

Not used

PART 3. EXECUTION

As the permittee, submit the KPDES Notice of Intent (NOI) form to the Division of Water. Additionally, delegate in writing to Manager, KPDES Branch, who will have signature authority for reports. Provide the Engineer a copy of the NOI and a BMP Plan to represent and warrant compliance with the Kentucky Division of Water (KDOW) KPDES Permit, related rules, and specifications prior to starting work.

Locate, furnish, install, and maintain temporary sediment and erosion control best management practices (BMP) to represent and warrant compliance with the Clean Water Act, (33 USC Section 1251 et seq.), the 404 permit, the 401 Water Quality Certification, local government agency requirements, and other related rules and permits until the project has a formal release issued.

Provide the Engineer a copy of all weekly and rainfall event inspections as they are completed. Ensure all reports are signed by the delegated authority. keep a current BMP Plan and all inspection records available for public inspection as required by the KPDES Permit.

These provisions survive the completion and/or termination of the contract. The following provisions must be followed:

1. Take full responsibility and make all corrections when a governmental agency or a local governmental authority finds a violation of the above noted requirements; that the BMPs are incomplete; that the BMP Plan is incomplete; or that the implementation of the BMP Plan is not being performed correctly or completely.

2. Make payment to the Owner for the full amount, within 10 Calendar Days of notification, when a governmental agency or a local governmental authority furnishes an assessment, damage judgment or finding, fine, penalty, or expense for a violation of the above noted requirements; the BMPs being incomplete; or the BMP Plan being incomplete or its implementation not being performed correctly or completely. The Owner may withhold the amount of money requested for the above from the next pay estimate and deliver that sum to the governmental agency or local governmental authority issuing the assessment, damage judgment or finding, fine, penalty or expense.

3. Indemnify and hold harmless the Department, and reimburse the Department for any assessments, damage judgment or finding, fine, penalty, or expense as a result of the failure of performing this portion of the Contract. The Owner may withhold the amount of any assessments, damage judgments or finding, fine, penalty or expense from the next pay estimate.

4. The Owner will find the Contract in default if a governmental agency or a local governmental authority furnishes a stop work order for any of the following: a violation of the above noted requirements, that the BMPs are incomplete, that the BMP Plan is incomplete, that the implementation of the BMP Plan is not being performed correctly or completely.

5. When the Owner or any government regulatory agency finds a violation of the above noted requirements, or that the BMPs are incomplete, or that the "BMP Plan is incomplete or that the implementation of the BMP Plan is not being performed correctly or completely, correct and mitigate the conditions within 48 hours of notification by the Owner or regulatory agency. Failure to correct non-compliant site conditions will result in the Owner applying a penalty of $500 per day until corrective actions are completed.

Upon completion of the project, provide the Engineer with a copy of the submitted KPDES Notice of Termination (NOT) form. Retain all records for 2 years.

6. Maintenance of all BMPs at the site will be handled by a Contractor's employee or sub-contractor , who has been trained on construction site BMPs at workshops sponsored by the KY DOW and the Kentucky Erosion Protection and Sediment Control (KEPSC) Program. Other workers on-site will be trained in BMP installation, maintenance, and good housekeeping by this employee or sub-contractor.

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- Areas at final grade will be seeded and mulched within 14 days.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported. This information will be logged on the SWPPP/BMP Plan.
- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts. Bypasses will be repaired immediately.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- The inlet sediment protection devices will be inspected for depth of sediment, and built-up sediment will be removed when it impairs flow into the inlet and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.

7. Inspection Procedures (Stormwater, Erosion, and Sedimant Control Inspection Practices). Inspection of all BMPs at the site will be handled by the Contractor's qualified employee or sub-contractor, who has been trained on inspecting construction site BMPs at workshops sponsored by the KY DOW and the Kentucky Erosion Protection and Sediment Control (KEPSC) Program.

- All erosion prevention and sediment control measures will be inspected at least once each week and following any rain of one-half inch or more.
- The Contractor's erosion control inspector will train three other people who will be responsible for assisting in the inspections and installing, maintaining, and repairing the controls on the site.
- Inspection reports will be written, signed, dated, and kept on file for two years.

End of Section

Special Note for Erosion Prevention and Sediment Control
Lake Cumberland Commerce Complex
2023 PDI Access Road Extension

The contractor shall be responsible for filing the Kentucky Pollution Discharge Elimination System (KPDES) KYR10 permit Notice of Intent (NOI) with the Kentucky Division of Water (DOW). The NOI shall name the contractor as the Facility Operator and include the Owner Contract ID Number for reference.

The Contractor shall perform all temporary erosion/sediment control functions including: providing a Best Management (BMP) Plan, conducting required inspections, modifying the BMP plan documents as construction progresses and documenting the installation and maintenance of BMPs in conformance with the KPDES KYR10 permit effective on August 1, 2009 or a permit reissue to replace that KYR10 permit. This work shall be conducted in conformance with the requirements of Section 213 of KYTC 208 Department of Highway, Standard Specifications for Road and Bridge Construction.

In addition to the requirements of Section 213.03.03, paragraph 2, the Engineer may conduct inspections as needed to verify compliance with Section 213 of KYTC 2019 Department of Highway, Standard Specification for Road and Bridge Construction. The Engineer's inspections shall be performed a minimum of once per month and within seven days after a storm of ½ inch or greater. Copies of the Engineer's inspections shall not be provided to the Contractor unless improvements to the BMP's are required. The contractor shall initiate corrective action within 24 hours of any reported deficiency and complete the work within 5 days. The Engineer shall use Form TC 63-61 A for this report. Inspection performed by the Engineer do not relieve the Contractor of any responsibility for compliance with the KPDES permit.

Contrary to Section 213.05, bid items for temporary BMPs may not be listed and will be replaced with one lump sum item for their services. Payment will be prorated based on the Project Schedule as submitted by the Contractor and as agreed by the Engineer.

The contractor shall provide the Engineer copies of all documents required by the KPDES permit at the time they are prepared.

The contractor shall be responsible for the examination of the soils to be encountered and make his own independent determination of the temporary BMPs that will be required to accomplish effective erosion prevention and sediment control.

The Contractor shall be responsible for filling the KPDES permit Notice of Termination (NOT) with the Kentucky DOW. The NOT shall be filed after the Engineer agrees that the project is stabilized or the project has been formally accepted.

SECTION 02110 - SITE CLEARING

PART 1. GENERAL

1.1 Work Included

A. Furnish all labor and equipment required and perform all clearing, grubbing and stripping of topsoil complete as shown on the Drawings and as specified herein.

B. Protect existing improvements and vegetation indicated to remain.

1.2 Related Work

A. Section 02200 - Earth and Rock Work.

PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

3.1 Protection

A. Protect existing improvements, bench marks, monuments and other reference points.

B. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning of bark, piling construction materials or excavated materials within drip line, excess traffic or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to remain.

3.2 Site Clearing

A. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions, interfering with installation of new construction. All stumps, roots, and root clusters shall be grubbed out to a depth of at least two feet below subgrade elevation.

B. Strip topsoil to whatever depths encountered in a manner to prevent mixing with subsoil or other material.

3.3 Removal

A. Remove waste materials and unsuitable topsoil from to location designated by the Engineer.

End of Section

SECTION 02200 - EARTH AND ROCK WORK

PART 1. GENERAL

1.1 Work Included

A. This section includes all labor, materials, equipment, and related items to complete all earth and rock work.

B. The extent of earth and rock work is shown on drawings. The following work is included:
1. Strip top soil and vegetation from the work area.
2. Undercut the pad area as shown on the drawing.
3. Perform earthwork to achieve the required grades. Re-use suitable undercut materials by re-compacting in layers in the undercut excavation.
4. Establish and maintain horizontal and vertical ground control throughout the work.
5. Locate and clearly mark all utilities (if any) on or adjacent to the site.

1.2 Related Work Specified Elsewhere

A. Section 02100 - Erosion Control
B. Section 02110 - Site Clearing
C. Section 02936 - Seeding

1.3 Excavation Classification

A. All mass, structural, and trench excavation shall be considered unclassified. No adjustments will be allowed to the contract price for rock encountered during mass or structural excavation.

1.4 Quality Assurance

A. Codes and Standards: Perform earth and rock work in compliance with applicable requirements of governing authorities having jurisdiction. Applicable references include the following:

- ASTM D422 Particle Size Analysis of Soils.
- ASTM D423 Test for Liquid Limit of Soils.
- ASTM D424 Test for Plastic Limit and Plasticity Index of Soils.
- ASTM D698 Laboratory Compaction Characteristics of Soil Using Standard Effort
- ASTM D3017 Moisture content of Soil Aggregates in Place by Nuclear Methods (Shallow Depth).

B. Testing and Inspection Service: A testing laboratory will be employed using the allowance in the bid, to perform soil testing and inspection services for quality control testing during earth and rock work operations. Testing laboratory employed is to observe, test and report to the Engineer that the compaction requirements specified herein have been obtained.

1.5 Submittals

A. Test Reports-Excavating: Coordinate and schedule in a timely manner the following quality related items. The following reports shall be submitted directly to the Engineer from the testing services, with copy to the Contractor:

- Test reports on borrow material.
- Field density test reports of sufficient number to verify compaction of structural fill.
- One optimum moisture-density curve for each type of soil encountered. Determine particle size, liquid limit, plastic limit, plasticity index and maximum density of each type of soil.
- Observe proof-rolling.

1.6 Job Conditions

A. Site Information. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn by the Contractor. The data is made available for the convenience of the Contractor and is not guaranteed to represent all condition that may be encountered. No claim for extra compensation, or for extension of time, will be allowed on account of subsurface conditions inconsistent with the data shown. Additional test borings and other site examination and exploratory operations may be made by Contractor at no cost to Owner. Notify Owner prior to making any subsurface exploration.

B. Groundwater. Groundwater may be encountered during the excavation. Control the ground water to a level at least three feet below the top of the subgrade or bottom of the excavation as appropriate.

C. Explosives. Blasting shall only be conducted by licensed blasters and shall be in accordance with state and local requirements, and after conducting a thorough pre-blast survey.

D. Protection of Persons and Property. Barricade open excavations occurring as part of this work and post with warning lights.

E. Bench Marks and Monuments. Maintain carefully all bench marks, monuments and other reference points. If disturbed or destroyed, replace as directed at no cost to the owner.

F. Notify the Engineer 48 hours prior to the beginning of any excavation work.

PART 2. PRODUCTS

2.1 Materials

A. Satisfactory soil. Satisfactory soils are materials complying with Unified Soil Classification System (USCS), ASTM D 2487-93, soil classification group SP, SM, SC, ML, MH and CL.

PART 3. EXECUTION

3.1 Excavation

A. Excavation consists of removal and disposal of material encountered when establishing required finish grade elevations. For the purpose of this contract, mass, structural and trench excavation of all materials shall be considered unclassified. Adjustments for rock or similar materials will not be considered.

B. Unauthorized excavation. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer.

- Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.
- Backfill and compact unauthorized excavations, as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

C. Additional Excavation. When excavation has reached required subgrade elevations, notify Engineer who will make an inspection of conditions.
   - If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Engineer.
   - Removal of unsuitable bearing material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.

D. Stability of Excavations. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restriction or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

E. Shoring and Bracing. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

   - Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
   - Maintain shoring and bracing in excavations, regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

F. Dewatering. Prevent surface water and subsurface or ground water from flowing into excavations and flooding project site and surrounding area.

   - Do not allow water to accumulate in excavations. Remove water to prevent softening of excavation bottoms and soil changes detrimental to stability of subgrades. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
   - Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches. Site grading should be maintained during construction so that positive drainage of the site is promoted at all times.

G. Material Storage. Stockpile satisfactory excavated materials, where directed by Engineer, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

   - Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain. Do not fill in or disturb wetland areas.
   - Dispose of excess soil material and waste materials as herein specified. Maximum rock size allowed in fill is 12” in any one direction.

H. Cold Weather Protection. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1 degree C).

I. Proofrolling. After excavation and before any fill placement, entire subgrade shall be proof-rolled with a loaded pneumatic tired vehicle, such as a dual axle dump truck with a gross weight of 16 to 20 tons, or similar equipment. Remove any soft, organic, or highly plastic soil encountered during proof-rolling and replace it with properly compacted fill. The exposed undercut subgrade shall then be densified through the use of caterpillar C-443C Compactor, or equivalent, by a minim of six passes over the entire undercut area.

3.2 Compaction

A. General. Control soil compaction during construction, providing minimum percentage of density specified for each area classification.

B. Lift Thickness. Soil used for structural fill construction should be placed in layers no greater than eight (8) inches in loose placement for heavy equipment placement, or 5 inches for hand operated whacker or vibratory plate placement. Normal density testing can not usually be accomplished with any degree of accuracy in rocky fills. Observation and monitoring of the fill performance in those areas is required.

C. Percentage of Maximum Density Requirements. Compact soil to within 98% of optimum maximum dry density as measured by the Standard Proctor Test. The contractor shall provide 2 samples of the excavated material for performance of Standard Proctor Tests for compaction control. These tests will be paid for in the testing allowance..

D. Moisture Control. Maintain soil moisture to + or – 2% of optimum moisture content. Where soil must be moisture conditioned before compaction, uniformly apply water to prevent free water from appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.3 Backfill and Fill

A. General. Place acceptable soil material in layers to required subgrade elevations.

B. Backfill excavations as promptly as work permits, but not until acceptance of construction below finish grade and removal of trash and debris.

C. Ground Surface Preparation. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

D. Placement and Compaction. Place backfill and fill materials in layers to provide lift thickness.

3.4 Grading

A. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

3.5 Field Quality Control

A. Quality Control Testing During Construction. Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed. It shall be the Contractor's responsibility to notify the testing agency at least 24 hours prior to beginning any work which requires testing.

B. If in opinion of Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Owner.

3.6 Maintenance

A. Protection of Graded Areas. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and reestablish grades in settled, eroded and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas. Where completed compacted areas are disturbed by subsequent construction operations or weather, scarify surface, reshape and compact to required density prior to further construction.

C. Settling. Where settling is measurable or observable at excavated areas during general project warranty period, add backfill material, compact, and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

D. Desiccation. Where desiccation cracks are observable, remove and replace soil to restore appearance, quality and condition of surface.

3.7 Disposal of Excess and Waste Materials

A. Excess excavated material shall be re-spread, uniformly graded and seeded at a location near the site designated by the Engineer.

End of Section

SECTION 02342 - GEOTEXTILES

PART 1. GENERAL

1.1 Summary

A. Work Included. Geotextile fabrics.

1.2 Quality Assurance

A. Geotextiles shall conform to the requirements of the following codes and standards:

1. Kentucky Transportation Cabinet, Department of Highways - Standard Specifications for Road and Bridge Construction.

1.3 Submittals

A. Shop Drawings. Submit shop drawings in accordance with requirements of Section 01300.

PART 2. PRODUCTS

2.1 Fabric

A. Use only woven or non-woven fabric consisting only of long chain polymeric filaments or yarns such as polypropylene, polyethylene, polyester, polyamide, or polyvinylidene-chloride formed into a stable network such that the filaments or yarns retain their relative position to each other. Use fabric that is inert to commonly encountered chemicals and free of defects or flaws significantly affecting its physical or filtering properties.

B. Ensure that the fabric, except wrapping placed directly against perforated pipe, is formed in widths of at least 6 feet. When necessary, sew sheets of fabric together to form required fabric widths. Sew the widths of fabric together at the point of manufacture or other approved locations.

C. Conform to Kentucky Transportation Cabinet, Department of Highways - Standard Specifications for Road and Bridge Construction for Type I, Type II, Type III or Type IV Fabric, as required.

2.2 Fastener Pins

A. For underdrain systems, use pins that are formed of No. 9 diameter or heavier steel wire and are a least one foot long with a 4-inch right angle bend on one end.

B. For slope protection, channel lining, subgrade and embankment foundation stabilization, and wrapped aggregate drainage blankets, provide fastener pins that are formed of 3/16 inch diameter or heavier steel, pointed at one end with ahead on the opposite end to retain a washer with a minimum diameter of 1 ½ inches.

PART 3. EXECUTION

3.1 General

A. Prepare the surface to receive the fabric to a smooth condition, free of obstructions, debris or sharp objects that may puncture the fabric. Place the fabric smooth and free of tension, stress, folds, wrinkles or creases. Do not operate equipment directly on the fabric. Protect the fabric at all times from contamination. Remove and replace any contaminated fabric with uncontaminated fabric.

B. Repair and replace any damaged fabric. Repair individual isolated cuts, tears, or punctures by placing a patch of geotextile fabric that extends at least 3 feet beyond the damage in all directions or by field splicing the patch.

C. Cover the fabric with a layer of the specified material within 14 calendar days. Remove and replace fabric not covered within the 14 days.

3.2 Laps

When more than one strip is necessary, place an overlap of at least 18 inches. Place transverse laps so the upstream strip laps over the downstream strip. Place horizontal laps so the upper strip laps over the lower strip.

3.3 Field Splices

Sew the full length of the boundary between adjacent sheets of fabric. Ensure that the seam strength conforms to the requirements of Part 2.

3.4 Slope Protection and Channel Lining

Place fabric with the long dimension parallel to the channel or toe of slope. Protect the fabric from damage due to the placement of the slope protection or channel lining either by limiting the height of drop of the material to no greater than 3 feet or by placing a cushioning layer of sand on top of the fabric before dumping the material. Begin placement at the toe and proceed up the slope.

3.5 Underdrains

Place and shape fabric to the sides and bottom of the trench without stretching the fabric. Place filter aggregate so as not to damage, displace, or dislodge the fabric. Fold the fabric over the backfilled trench and secure it with steel pins at intervals of 5 feet to produce a double of thickness of fabric over the top of the trench.

3.6 Drainage Blankets

Place fabric with the long dimension parallel to the long dimension of the area to be covered. Place the drainage blanket material to present a reasonable even surface free from mounds or depressions. After the material is placed, fold the fabric over the ends and sides of the material, and place additional fabric over the material so that the material is completely encased within the fabric. install additional pins, regardless of the location, as necessary to prevent any slippage of the fabric. Place the fabric so that laps do not occur at the edges or ends of the drainage blanket. Place embankment in a manner to avoid damage or displacement off the completed drainage blanket.

End of Section

SECTION 02520 - PORTLAND CEMENT CONCRETE PAVING

PART 1. GENERAL

1.1 Description of Work

This section includes furnishing labor, materials, equipment and related items required to complete all Portland cement concrete paving as shown on drawings, including steps, curbs, gutters, walks and plaza areas as specified herein.

1.2 Related Work

A. Section 02200 - Earth and Rock Work
B. Section 03100 - Concrete Formwork
C. Section 03200 - Concrete Reinforcement
D. Section 03300 - Cast-In-Place Concrete

PART 2. PRODUCTS

2.1 Formwork

Comply with Section 03100 - Concrete Formwork. Steel, wood or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

Use flexible spring steel forms or laminated boards to form radius bends as required.

Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

2.2 Concrete

Concrete materials shall be in accordance with Section 03300.

Design mix to produce normal-weight concrete consisting of Portland cement, aggregate, water-reducing or high-range water-reducing admixture (super plasticizer), air-entraining admixture and water to produce the following properties:

Compressive Strength: 3,500 psi, minimum at 28 days

Slump Range: 4 inches

Air Content: 4% to 6%

2.3 Expansion Joint Material

Expansion joint material shall be 5/8" thick by the depth of the concrete section and shall be asphaltic, premolded, non-extruding type filler confirming to ASTM D1752.

2.4 Backer Rods

Backer rod to be used in all joints shall be a soft, closed cell polyryhylene foam meeting requirements of AASTHO Specifications M153-54, Type I and III and shall be Ethafoam SB as manufactured by the Dow Corning Corporation, or approved equal as manufactured by the Sonneborn Building Products, Inc., Williams Products, Inc.

2.5 Joint Sealer

Joint sealer for installation at joints in concrete paving, etc., shall be a self-leveling one, part urethane sealant conforming to ASTM D412-51T and ASTM D-746 and shall be "Sonolastic Paving Joint Sealant" as manufactured by Sonneborn Building Products, Inc., "Colma Joint Sealer" as manufactured by the Sika Chemical Company, or approved equal. Color shall be gray.

PART 3. EXECUTION

3.1 Surface Preparation

A. Grading. Do any necessary grading in addition to that performed under work of Section 02200 to bring subgrades for paving to the required elevations and sections.

B. Preparation of Subgrade. Loosen exceptionally hard spots and recompact. Remove spongy and otherwise unsuitable material and replace with stable material. Fill and tamp traces of utility trenches.

C. Compaction of Subgrade. Compact the subgrade of all surface areas with appropriate compacting equipment or by other means to such degree as will insure against settlement of the superimposed work. All surfaces shall be proof-rolled with suitable equipment to verify stability of base.

D. Checking Subgrade. Maintain all subgrades in satisfactory condition, protected against traffic and properly drained until the surface improvements are placed. Immediately in advance of concreting, check subgrade levels with templates riding the forms, correct irregularities and compact thoroughly any added fill material. On areas to receive concrete pavement, place grade stakes spaced sufficiently to afford facility for checking subgrade levels. Correct irregularities prior to concreting.

E. Utility Structures. Check for correct elevation and position all manhole covers, drainage castings, valve boxes and similar items located within areas to be paved and make or have made any necessary adjustments.

3.2 Form Work

A. General. Formwork shall produce concrete that strictly conforms to the shapes, lines and dimensions as called for on the drawings. Procedures and control shall be in accordance with ACI347 "Recommended Practice for Concrete Formwork" or as modified herein. Forms shall be clean, smooth, sufficiently watertight to prevent leakage of mortar; securely tied together and braced to maintain shape and position while being filled, and shored to support construction loads.

B. Tolerances. Formwork for concrete steps shall be to such tolerances that the finished steps shall conform with Section 817.6.1 of the 1991 Kentucky Building Code for Dimensional Uniformity. There shall be no variations exceeding 3/16" in the depth of adjacent treads or the height of adjacent risers. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 3/8" in any flight of stairs. For walks and curbs, top of forms not more than 1/8" in 10' deviation from proposed line. Vertical face on longitudinal axis, not more than 1/8" in 10' deviation from proposed line.

C. All removable forms shall be treated with oil on inside faces or thoroughly drenched and saturated with water on both faces before concrete is placed therein.

3.3 Concrete Placement

A. General. Comply with requirements of Section 03300 for mixing and placing concrete and as herein specified.

B. Lines and Grades. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Placing Concrete. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint. Do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.

D. Concrete Curbs. All exposed concrete curbs surfaces shall be rubbed to a smooth even finish with carborundum stone, removing all form marks, imperfections and any unevenness which may appear on the surfaces of the concrete. Saw cut curbs per details within 24 hours of removing forms. Automatic extruding machines may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross section, lines, grades, finish and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

3.4 Joints

A. General. Construct expansion, weakened-plane (contraction) and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated. Contraction joints shall be on five-foot increments. Expansion joints shall be at 25-foot increments and where pavements adjoin existing structures.

B. Contraction Joints. Tooled joints shall be made in the plastic concrete during the finishing operation by means of a sidewalk tool. Round all edges of such joints to a uniform 1/4" radius. Depth of tooled joints shall be a minimum depth of 1" or shall be one-fourth (1/4) the thickness of the slab.

C. Construction Joints. Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such placements terminate at expansion joints. Construction joints must occur only at location of proposed contraction joints as shown on the drawings. Use standard metal keyway-section forms.

D. Expansion Joints: Provide pre-molded joint filler for expansion joints, manholes, structures, walks and other fixed objects, unless otherwise indicated.

Extend joint fillers full-width and depth of slab and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.

Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

3.5 Concrete Finishing

A. General. Tamp and screed concrete true to grade and section, bringing sufficient mortar to the surface for finishing.

B. Screening and Floating. After striking-off and consolidating concrete, smooth surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

C. Surface Irregularities. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide a continuous smooth finish.

D. Edging. Work edges of slabs, back top edge of curb and formed joints with an edging tool and round to 1/2" radius unless otherwise indicated. Eliminate tool marks on concrete surface.

E. Finish. Broom finishes shall be made by means of stiffer fiber brooms, applied lineally with uniform pressures as necessary to produce uniformly striated surface of required coarseness.

F. Form Removal. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects.

3.6 Curing

Exposed surfaces of concrete shall be cured with an approved membrane curing compound meeting ASTM C309. Curing compound shall be applied by roller for uniform coverage and not exceeding 450 square feet coverage per gallon of material, and otherwise, in strict accordance to manufacturer's instructions.

3.7 Repair

Repair or replace broken or defective concrete.

3.8 Protection

Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur. Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

End of Section

SECTION 02720 - STORM DRAINAGE SYSTEMS

PART 1. GENERAL

1.1 Work Included

A. Storm drainage pipe fittings, and accessories.

B. Storm water structures

1.2 Submittals

A. Submit product data under provisions of Section 01300.

PART 2. PRODUCTS

2.1 Reinforced Concrete Pipe

A. Reinforced concrete pipe shall meet requirements of ANSI/ASTM C76, Class I with Wall Type A; B; C; mesh reinforcement; inside nominal diameter as required; bell and spigot end joints.

B. Joint device shall meet requirements of ANSI/ASTM C443, rubber compression gasket joint.

C. Fittings shall be of the same material as pipe, molded or formed to suit pipe size and end design, in required 'T', bends, elbows, cleanouts, reducers, traps, and other configurations required.

2.2 HDPE Pipe

HDPE pipe shall meet the following requirements:

- ASTM D1248 Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
- ASTM F405 Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings
- ASTM F667 Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.

2.3 Storm Water Structures

Storm water structures shall meet the following requirements, as applicable:

- ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete
- ACI 318 - Building Code Requirements for Reinforced Concrete
- ASTM C478 - Specification for Precast Reinforced Concrete Manholes Sections
- ASTM 1433 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
- ASTM C1478 - Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
- ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
- ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealant
- CRSI Manual of Standard Practice

PART 3. EXECUTION

3.1 Pipe Installation

A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated on Drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal joints watertight.

C. Lay pipe to slope gradients noted on drawings, with maximum variation from true slope of 1/8 inch in 10 feet.

3.2 Storm Water Structure Installation

A. Precast concrete products shall be installed to the lines and grades shown in the contract documents or otherwise specified.

B. Products shall be lifted by suitable lifting devices at points provided by the precast concrete producer.

C. Products shall be installed per the precast concrete producer’s recommendation.

End of Section

SECTION 02936 - SEEDING

PART 1. GENERAL

1.1 Work Included

The work described herein shall consist of replacing the surface soil, furnishing and incorporating the materials, for all exposed earth areas.

1.2 Submittals

Submit certificates of analysis and weight for all fertilizers to the Engineer. All seed shall be delivered in separate bags or packages according to species. The tags from each package shall be delivered to the Engineer.

PART 2. PRODUCTS

2.1 Seed

Seed shall be certified seed to be the latest season's crop and shall be delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures and pure live seed. Seed shall be labeled in conformance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable state seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable.

Seed Mixture	Lbs./Acre PLS

For permanent cover:

Kentucky 31 Tall Fescue	15
Birdsfoot Trefoil	8

For temporary cover during application period from February 15 to May 15 and August 1 to November 1:

Either	
Annual Ryegrass	5
or	
Perennial Ryegrass	10

For temporary cover during application period from May 15 to August 1:

Either	
Foxtail Millet	12
Pearl Millet	10
Japanese Millet	15
Weeping Lovegrass	2.5
or Bermuda Grass	4

For temporary cover for application period from November 1 to February 15:

Winter Wheat	100

2.2 pH Adjusters

Agricultural limestone shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 90 percent will pass a 10-mesh sieve and at least 50 percent will pass a 60-mesh sieve. Agricultural ground limestone shall be from quarries approved by the Kentucky Department of Agriculture.

2.3 Fertilizer

Fertilizer shall be a commercial grade ammonium nitrate (33.5-0-0), monocalcium phosphate (0-46-0), and potassium chloride (0-0-60). Where fertilizer is furnished from bulk storage, the Contractor shall furnish a supplier's certification of analysis and weight.

2.4 Mulch

Mulch shall consist of wheat or rye straw. The mulch material shall be air dry, reasonable light in color, and shall not be musty, moldy, caked, and shall not contain noxious weeds.

2.5 Inoculants

Inoculant for treating legume seeds shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species and shall not be used later than the date indicated on the container. A mixing medium, as recommended by the manufacturer, shall be used to bond the inoculant to the seed. Seed shall be sown within twenty four hours of treatment and shall not remain in a hydraulic seeder longer than four hours.

PART 3. EXECUTION

3.1 Delivery, Storage and Handling

Fertilizer and limestone shall be delivered to the site in the original, unopened containers bearing the manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to State and Federal laws. In lieu of containers, fertilizer and limestone may be furnished in bulk and a certificate indicating the above information shall accompany each delivery.

Seed, limestone and fertilizer shall be kept in dry storage away from contaminants, insects and rodents.

3.2 Preparation of Seed and Planting Beds

A. Tillage: Soil shall be tilled to a depth of at least 4 inches. Tillage shall be accomplished by plowing, disking, or harrowing during periods when beneficial results are likely to be obtained. Undulations or irregularities in the surface shall be leveled before the next specified operations.

B. Placing topsoil: Topsoil shall be spread evenly with a minimum thickness of 2 inches. Surface irregularities resulting from topsoiling or other operations shall be leveled. Topsoil shall not be placed when the subgrade is frozen, excessively wet, extremely dry or excessively compacted.

C. Application of Soil Conditioners: Lime shall be applied by tillage at the rate of four tons per acre. Fertilizer shall be applied at the rate of 120 pounds per acre of each nutrient. Equivalent amounts are 353 pounds of ammonium nitrate (33.5-0-0), 261 pounds of monocalcium phosphate (0-46-0), and 200 pounds of potassium chloride (0-0-60). Lime and fertilizer rates may be adjusted with the approval of the Engineer based upon the results of soils testing of final cover material. All fertilizers, pH adjusters, and soil conditioners shall be incorporated into the soil to a depth of at least 2 inches.

3.3 Seeding

A. Seed shall be broadcast uniformly at the required rate. The seed shall be covered to an average depth of 1/4 inch by means of spike-tooth harrow, cultipacker, or other approved device. Seed shall not be broadcast when winds are above 10 mph.

B. Immediately after seeding, the entire area shall be firmed with a roller not exceeding 90 pounds for each foot of roller width and the soil moistened to a depth of 6-8 inches. If seeding is performed with a cultipacker-type seeder or if seed is applied in combination with hydromulching, rolling will not be required.

3.4 Maintenance

Seeded areas shall be protected and maintained by watering and replanting as may be necessary to produce a uniform stand of grass. Maintenance shall continue until a dense, uniform turf is established composed of the grasses specified and until acceptance, and shall include repair of damage caused by erosion.

End of Section

SECTION 02511 - HOT-MIXED ASPHALT PAVING

PART 1. GENERAL

1.1 Work Included

A. This Section includes provisions for hot-mixed asphalt paving over prepared subbase.

B. Prepared subbase is specified in Section 02200 - Earth and Rock Work.

1.2 Submittals

A. Submit certificates that each material item meets or exceeds specified requirements.

1.3 Site Conditions

A. Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 degrees F (10 deg. C) and when temperature has not been below 35 degrees F (1 deg. C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

B. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40 degrees F (4 deg. C) and when base is dry. Base course may be placed when air temperature is above 30 degrees F (-1 deg. C) and rising.

C. Grade Control: Establish and maintain required lines and elevations.

1.4 Quality Assurance

A. Codes and Standards: Comply with State Department of Transportation standard specifications, latest edition, and with local governing regulations if more stringent than herein specified.

PART 2. PRODUCTS

2.1 Materials

A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.

B. Coarse Aggregate: Sound, angular crushed stone, crushed gravel, complying with ASTM D 692-88.

C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone complying with ASTM D 1073.

D. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.

E. Prime Coat: Cut-back asphalt type, ASTM D 2027; MC-30, MC-70 or MC-250.

F. Tack Coat: Emulsified asphalt, ASTM D 977.

G. Subgrades shall be in accordance with applicable provisions of "Kentucky Standard Specifications for Road & Bridge Construction" .

H. Dense Graded Aggregate Base shall be in accordance with Section 303 of "Kentucky Standard Specifications for Road and Bridge Construction."

I. Lane Marking Paint: Chlorinated rubber-alkyd type, ready-mixed, complying with AASHTO M 248, (FS TT-P-115), Type III. Color shall be White.

J. Asphalt - Aggregate Mixture: Bituminous Concrete shall be Class 1 and shall be in accordance with "Kentucky Standard Specifications for Road and Bridge Construction".

PART 3. EXECUTION

3.1 Systems Defined

A. Refer to the Drawings for thickness of base and surfacing.

3.2 Surface Preparation

A. General: Remove loose material from compacted subbase surface immediately before applying herbicide treatment or prime coat.

B. Proof-roll prepared subbase surface to check for unstable areas and areas requiring additional compaction.

C. Notify Engineer of unsatisfactory conditions. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

D. Prime Coat: Apply at rate of 0.20 to 0.50 gallons per square yard, over compacted subgrade. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.

E. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at rate of 0.05 to 0.15 gallons per square yard of surface.

F. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.3 Placing Mix

A. General: Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225 degrees F (107 deg. C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section and compacted thickness.

B. Paver Placing: Place in strips not less than 10 feet wide, unless otherwise acceptable to Engineer. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.

C. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.

D. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat. At joining of new paving with existing, cut out and trim existing paving to straight lines. Prime or seal existing edges prior to placement of new material so as to produce bonded, watertight joining.

3.4 Rolling

A. General: Begin rolling when mixture will bear roller weight without excessive displacement.
B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.

D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.

E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density.

F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.5 Traffic and Lane Markings

A. Cleaning: Sweep and clean surface to eliminate loose material and dust.

B. Striping: Use chlorinated-rubber base traffic lane-marking paint, factory-mixed, quick-drying, and non-bleeding. Color shall be White.

C. Do not apply traffic and lane marking paint until layout and placement have been verified with Engineer.

D. Apply paint with mechanical equipment to produce uniform, straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils. dry thickness.

3.6 Field Quality Control

A. General: Test in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Engineer.

B. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if in excess of the following variations:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus or minus 1/4 inch.

C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable is in excess of the following tolerances for smoothness:

1. Base Course Surface: 1/4 inch.
2. Wearing Course Surface: 3/16 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

D. Check surface areas at intervals as directed by Engineer.

End of Section

Report of Geotechnical Exploration

for

Lake Cumberland Regional Industrial Complex

Russell Springs, Kentucky

September 22, 2020

Prepared for

Russell County Industrial Development Authority

Jamestown, Kentucky

CSI Project Number LX200112

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Consulting Services Incorporated
Lexington 859.309.6021 | Cincinnati 513.252.2059
Geotechnical & Materials Engineering | IBC Special Inspection | Material Testing

September 22, 2020

Russell County Industrial Development Authority
2150 N Main Street
Jamestown, KY 42629

Attention: Mr. Bennie Garland
Email: bgarland@duobroadband.com

Subject: **Report of Geotechnical Exploration**
Lake Cumberland Regional Industrial Complex
Russell Springs, Kentucky
CSI Project No. LX200112

Dear Mr. Garland:

Consulting Services Incorporated of Kentucky (CSI) is pleased to present our report for the geotechnical services completed for the proposed Lake Cumberland Regional Industrial Complex - App Harvest Facility in Russell Springs, Kentucky. We provided our services in general accordance with CSI's proposal number 6842, dated September 3, 2020.

Our report represents information provided to us, readily available published data relevant to the site and site area, our observations and subsurface conditions encountered and our opinion of primary geotechnical conditions (discussion and recommendations) affecting design, construction and performance of the proposed soil portions of the project.

We appreciate the opportunity to provide our geotechnical services to you and the design team. Please do not hesitate to contact us for questions or comments about the information contained herein.

Cordially,

Barry F. Bishop

Barry F. Bishop, EIT
Engineering Group Leader

Joseph S. Cooke, PE
Principal
Licensed KY 21244

STATE OF KENTUCKY
JOSEPH S. COOKE
21244
LICENSED PROFESSIONAL ENGINEER

9/22/20

APPENDICES, FIGURES, PHOTOS AND TABLES

APPENDICES:

Site Location Plan
Boring Location Plan
Test Pit Location Plan
Boring Logs
Test Pit Logs
Field Testing Procedures
Summary of Laboratory Tests
Specific Laboratory Test Tables
Laboratory Testing Procedures

List of Figures

List of Photos

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INTRODUCTION

1 SCOPE OF THE GEOTECHNICAL EXPLORATION

As proposed, we conducted geotechnical services which are summarized in the following report. Our services included a review of the project information provided, conducting a subsurface exploration that used soil borings and test pit excavations to obtain samples for modeling the soil conditions at the subject site, an analysis of the data and information obtained, and providing recommendations for the earth supported portions of the project as listed in our proposal.

2 PROVIDED INFORMATION

Project information was provided to us via telephone and email correspondence from your office. We understand that you are requesting CSI to conduct a geotechnical exploration as a 2nd opinion for the soil conditions and geotechnical recommendations for a proposed new "AppHarvest" greenhouse facility (and associated support structure).

We have reviewed provided geotechnical information for the site by Thoroughbred Engineering (Initial Findings Letter), conducted this year. We have also reviewed 2 additional geotechnical explorations previously conducted at the site (LE Gregg and MACTEC reports). Mr. Joe Cooke, PE, our Principal Geotechnical Engineer conducted one of those explorations (the MACTEC report). We have also reviewed 10 other geotechnical reports for sites within 1 mile of the site that CSI has conducted in the past 7 years.

The project site is located just south of the MACTEC exploration site, in the Lake Cumberland Regional Industrial Complex on the south side of French Valley Road. Please reference the Site Location Plan in the Appendix for further details. The new project will be a large acreage "greenhouse" structure and will also have irrigation/fire suppression ponds, associated roads and support buildings.

These structures are very large in footprint, but not very "heavy" in loading. The main building is "flexible" (compared to masonry or structural steel), but the utility lines (especially water supply and drainage) are critical. We understand that settlement, particularly differential, is of concern.

Site grading was not provided, but based on the provided topographic information for the "rolling" small hills and valleys typical of Russell Springs, maximum cut and fills on the order of 10 to 15 feet would be expected.

The provided Thoroughbred report indicates a major concern of "shallow water", which would greatly increase the site development/earthwork costs for the project. We also have

seen some shallow water issues (at the site and in the area). However, we believe most of these issues are not as severe as stated in the Thoroughbred report.

Several large footprint industrial projects in the area have shown that these shallow water tables are “isolated” or can be resolved using common french drain/rock filters or other conventional de-watering and drainage measures. This will be discussed in greater detail in the following report.

No structural foundation plans were provided for this report. However, several data sheets have been provided showing some loading information. We are assuming the following:

- Potential tank or storage building - 150 kip maximum column loads;
- Maximum main building column loads of 50 kips;
- Maximum continuous wall loads of 3 kips per linear foot;
- Potential uplift loading of less than 10 kips;
- Area slab or floor loading of less than 250 pounds per square feet (psf) over most of the main building;
- Some areas may have area loading of up to 750 psf.

For grading within the new building addition area, we have assumed the following:

- Cuts of up to 5 to 10 feet are expected;
- Fills of up to 15 feet are possible;
- No basement, partial basement, or equipment pits are expected within the main new building;
- A large pond/lake (multiacres) with either a filled berm in the site swale areas or some combination of cut and fill to create the pond.

If any of this information is incorrect, please let us know so we can reassess our scope of services needed and provide best fit recommendations for the project.

3 AREA/SITE INFORMATION

3A AREA TOPOGRAPHY/PHYSIOGRAPHY

The project site is located in The Pennyrile Physiographic Region of Kentucky. The region stretches from the Land Between the Lakes in the west across the state to the Pottsville Escarpment in the east. It is a Mississippian plateau with a large Karst region that includes Mammoth Cave. Published topographic mapping by the USGS (United States Geologic Survey) indicates the elevations in the project site vicinity range from approximately 960 feet to 1050 feet. Figure 1 depicts the location of the site with respect to the regional physiography.

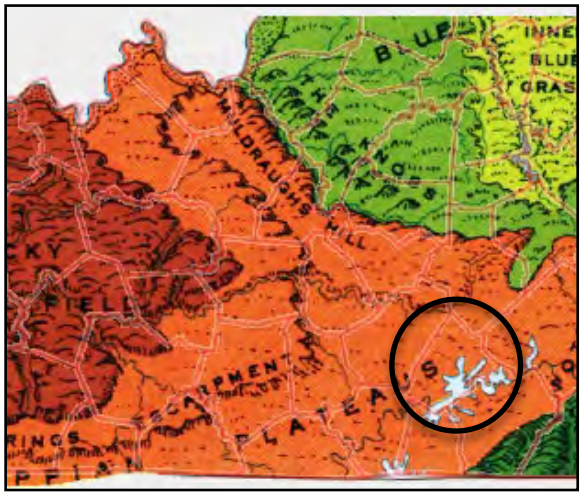

Figure 1. Kentucky Physiographic Map (site vicinity shown in the circle)

3B SITE GEOLOGY

A review of the USGS Geologic Map of the *Russell Springs Quadrangle, Kentucky* (dated 1965) indicates that the project site is underlain by the Salem and Warsaw Formations of Upper Mississippian aged rock deposits. Also, the "Sandstone" boundary unit (of the bottom of the Salem and Warsaw and the top of the Fort Payne Formation) is present at the site. The Sandstone Unit is of the Lower and Upper Mississippian Aged rock deposit.

The Salem and Warsaw Formations consist primarily of limestone and shale. The limestone is, light olive gray to medium to dark gray. The limestone is medium to coarse grained, thick bedded to thinly cross-laminated, argillaceous and arenaceous. The limestone is interbedded and gradational with light olive gray to medium gray silty limestone and calcareous silt shale. The limestone contains abundant silicified fossil brachiopods. Chert is locally abundant in thin irregular beds and small Quartz geodes are common. The limestone weathers to form yellowish brown to brownish red sandy clay soil and porous sandstone.

The shale is calcareous, dark to medium gray, irregularly fractured, fissile, and fossiliferous. The shale crops out in several isolated areas across northern part of quadrangle, but is not present in southern part of Quadrangle.

The Sandstone unit is various shades of red to gray, fine grained sandstone. It contains chert lenses and has beds of clayey shale and sandy siltstone.

The bedrock underlying the site dips less than 1 percent to the south-southwest. There are no trending fault zones within 2 miles of the the project site. Figure 2 depicts the site location with respect to the area geology.

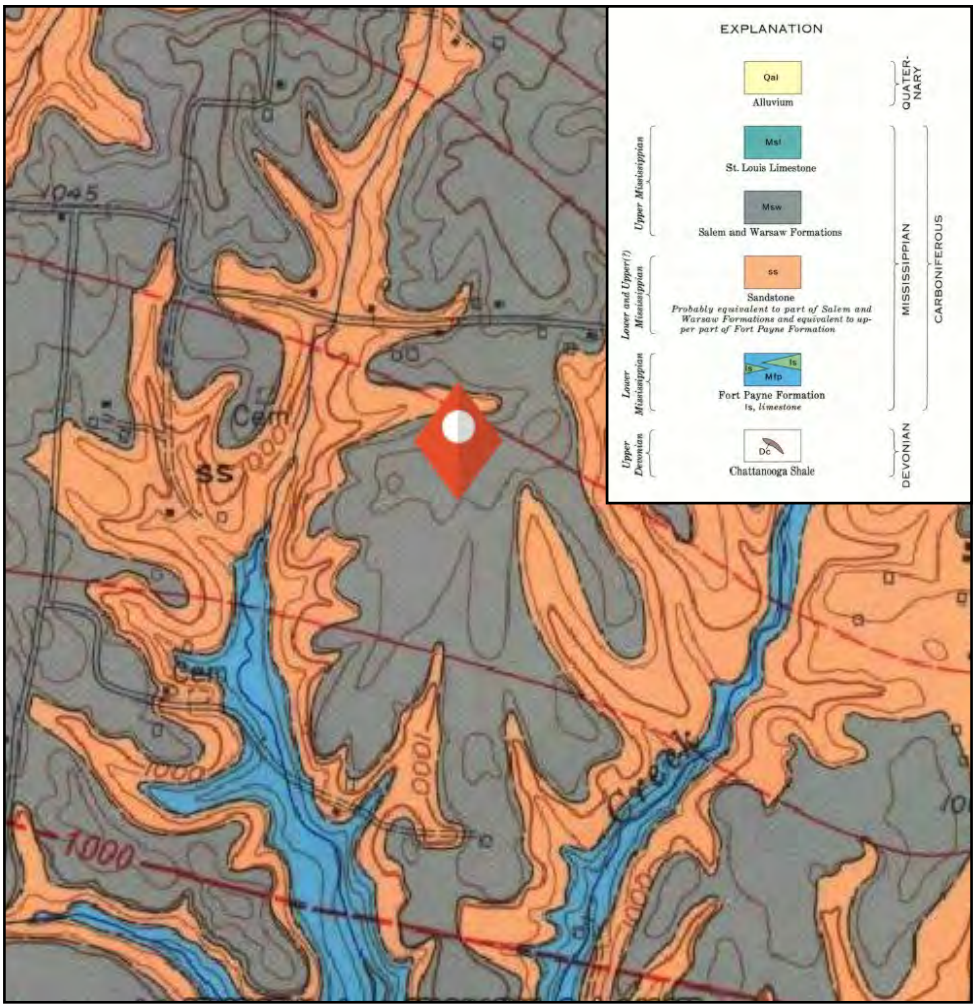

Figure 2. Site Geology Russell Springs Quadrangle, Kentucky dated 1965
(site vicinity indicated by diamond marker)

As with most of the geology of this portion of Kentucky, Karst (sinkholes, weathered bedrock, caverns, erratic bedrock, etc.) is associated with the site geology. The Russell County Karst Areas map published by the Kentucky Geological Survey (KGS) indicates no mapped sinkhole activity on-site. The site area is mapped with a low to very high risk of Karst development. Figure 3 indicates the likelihood of Karst occurrence. Primarily the lower elevations pose the most Karst risk. Our report discusses means and methods to lower these risks.

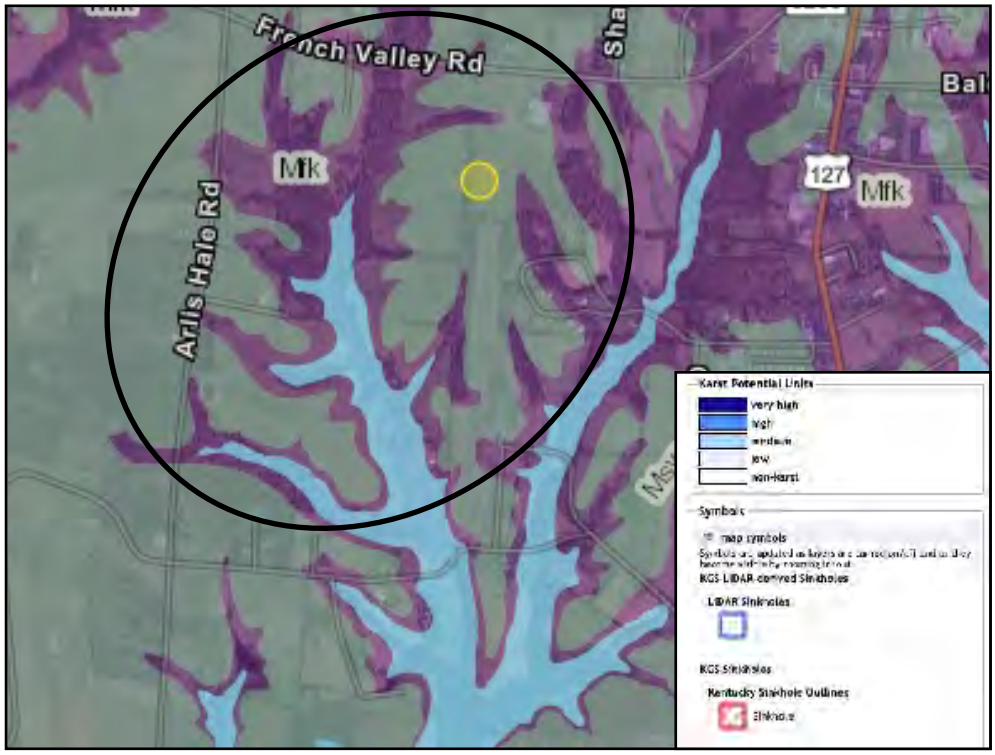

Figure 3. Russell County Karst Areas Map, KGS (site shown in circle)

3C PUBLISHED SITE SOIL CONDITIONS

According to the USDA Soil Survey of Russell County (NRCS website), the soils underlying the site vicinity consist of the following series:

- GpC—Gilpin silt loam, 6 to 12 percent;
- GpD—Gilpin silt loam, 12 to 20 percent slopes;
- LoB—Lonewood loam, 2 to 6 percent slopes;
- LoC—Lonewood loam, 6 to 12 percent slopes;
- Me—Melvin silt loam;
- SaB—Sango silt loam, 1 to 4 percent slopes

The following Table 1 describes the limitations with respect to construction at the site.

Table 1: Soil Series Limitations with Respect to Construction									
	Activity								
Series	Depth to Restrictive Layer (in)	Depth to Water Table (in)	Drainage Class	Shallow Excavations	Dwellings without Basements	Local Roads and Streets	Small Commercial Buildings	Flooding Frequency Class	Ponding Frequency Class
GpC	30	80	Well Drained	Somewhat Limited	Somewhat Limited	Somewhat Limited	Very Limited	None	None
GpD	30	80	Well Drained	Very Limited	Very Limited	Very Limited	Very Limited	None	None
LoB	45	80	Well Drained	Somewhat Limited	Not Limited	Very Limited	Very Limited	None	None
LoC	45	80	Well Drained	Somewhat Limited	Somewhat Limited	Very Limited	Somewhat Limited	None	None
Me	80	6	Poorly Drained	Very Limited	Very Limited	Very Limited	Very Limited	Occasional	None
SaB	26	24	Moderately Well Drained	Very Limited	Somewhat Limited	Very Limited	Somewhat Limited	None	None

Particular issues affecting the site include flooding, depth to saturated zone, shrink-swell, depth to cemented pan, slope, depth to hard bedrock, and unstable excavation walls. The “Me” and “SaB” series present the “wettest” widespread areas typically. These are located at lower elevations and/or the eastern section of the site. Our report addresses these issues. Figure 4 depicts the USDA website soils map.

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Figure 4. USDA Soil Survey Map of Project Site
(site vicinity outlined in green and orange)

3D OTHER PUBLISHED SITE INFORMATION

We have reviewed several available aerial photographs, dated as far back as March 1997. The project area is located to the south of French Valley Boulevard in Russell Springs, Kentucky. The construction of the park entrance road and warehouse building to the north of the site appears to have started in June 2008 and completed prior to June 2010. No other site improvements are documented in the historic aerial research. Please reference the following aerial photographs for further details.

Figure 5: Aerial photograph, dated March 1997 from Google Earth

Figure 6: Aerial photograph, dated June 2003 from

Figure 7: Aerial photograph, dated June 2008

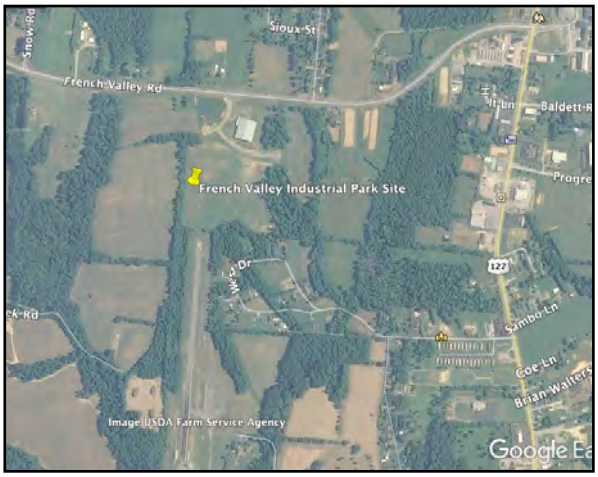

Figure 8: Aerial photograph, dated June 2010 from Google Earth

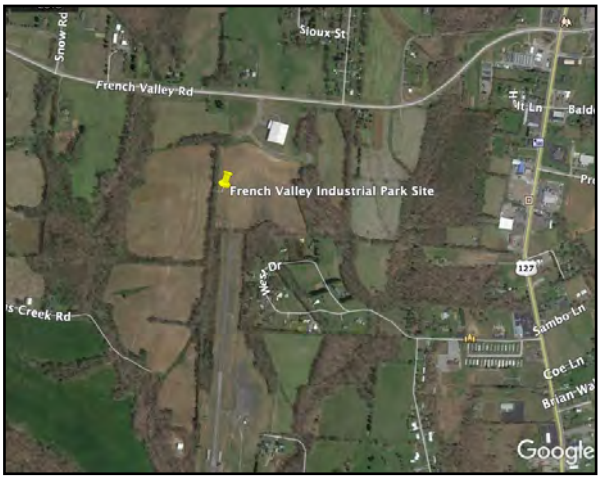

Figure 9: Aerial photograph, dated April 2016 from Google Earth

Figure 10: Aerial photograph, dated June 2018 from Google Earth

4 SITE SURFACE OBSERVATIONS

Mr. Barry Bishop, EIT of CSI performed a field reconnaissance and located boring and test pit locations on September 8, 2020. Mr. Bishop logged the soil borings and directed field operations on September 9, 14, and 15, 2020. Mr. Joe Cooke, PE logged test pit excavations and directed filed operations on September 10, 2020 within the proposed project site area.

The project site is located on the south side of French Valley Road in the existing Lake Cumberland Regional Industrial Complex in Russell Springs, Kentucky. Specifically, the project site is to the south and southwest of the existing warehouse currently occupied by Dr. Schneider Automotive Systems. The site area consists of approximately 96 acres and forms an upside down "L" shape. The site is currently bound by the entrance to the Lake Cumberland Regional Industrial Complex to the north, wooded areas to the west, south, and southwest. A small drainage swale also traverses the northern perimeter of the site running in the east/ west direction. A former airplane runway, referred to as the "drag strip" lies along the southeast perimeter of the property running in the north/south direction. A narrow swale covered in vegetation and large mature trees lies between the southeast perimeter and the drag strip. From provided topographic information the swale slopes downward from the north to the south. We understand that the Industrial Authority may be purchasing the land occupied by the drag strip, which could be included as part of the overall site.

The site is currently occupied by farm land, with corn being grown most recently. At the time of our exploration the corn had already been harvested, and the remaining vegetation had been cut to ground level. Thus, ground cover consisted of bare soil with dead vegetation over the majority of the site with some new, less than ankle high vegetation starting to grow.

The farmland topography is currently composed of rolling hills with ridges and swales traversing the site. The ridges occupy the middle of the site running in the northeast/ southwest direction dropping off in the northern and western perimeters of the site. Swales exist on the western and northern perimeters, with a large bowl feature in the northeast area of the site (just south of the warehouse and north of the drag strip). From provided topographic mapping, there is at least 30 feet of vertical relief across the site. The highest elevation was near the middle of the site.

The surficial soils were very silty. Preceding the second day of drilling (over a weekend) significant rain events occurred at the site. The site was difficult to traverse the day following the rains, however the surface soils were relatively dry by the following day. The area to the north of the drag strip was saturated at the surface on the day of our initial reconnaissance after a week of dry weather preceding our field exploration. The area forms a bowl described in the preceding paragraph, in which the surrounding grade drains into the bowl area.

A water line traverses the northern perimeter of the site, with gas, communications, and electric utilities observed in the area of the park entrance to the north. No utilities were

observed, marked or unmarked, within the site area. The following photos depict the site conditions at the time of our exploration.

Photo 1. View of the northern perimeter from the north central portion of the site

Photo 2. View from the western side of the site from the north

Photo 3. Photo depicting the creek along the northern perimeter

Photo 4. View of the "bowl" area to the north of the drag strip with ponding water and saturated soils at the surface

Photo 5. Photo of rutting from pick up trucks in saturated soils near the "bowl" area

Photo 6. Photo of the southwestern portion of the site from the north

Photo 7. Photo of the swale separating the southeastern perimeter and the drag strip

5 SUBSURFACE CONDITIONS

The subsurface conditions encountered at our soil boring and test pit locations are shown on the Boring and Test Pit Logs in the Appendix. It should be noted that our soil borings and test pits were sampled according to the procedures presented in the Appendix. The Boring and Test Pit Logs represents our interpretations of the subsurface conditions based on field logs, visual examination of field samples, and tests of the samples collected. The letters in parentheses following the soil descriptions are the soil classifications in accordance with the Unified Soil Classification System. It should be noted that the stratification lines shown on the soil boring and test pit logs represent approximate transitions between material types. In-situ stratum changes could occur gradually or at slightly different depths. Water levels shown on the Boring and Test Pit Logs represents the conditions only at the time of our exploration.

5A SOIL CONDITIONS

We performed a total of 20 soil borings within the site area. All borings were advanced to auger refusal. Auger refusal depths ranged from 5.3 to 19.0 feet. The borings along the northern perimeter (with the exception of B-101) tended to be deeper to bedrock, closer to the 19 feet range, while the borings around the rest of the site tended to be in the 13 feet range. Additionally, we performed 13 test pit excavations across the site area. All of the test pits were advanced to equipment refusal (by reach of the extent of the equipment or on a hard surface such as bedrock). The test pits were generally terminated within the residual clay zone at around 8 feet because of the reach of the equipment, while 3 of the test pits did terminate on hard bedrock at 3-½ feet at TP-1, 3-½ feet at TP-110, and 5-½ feet at TP-112. Our test pits were left open for the entire day while excavations were being performed, then filled at the end of the day. Partial sloughing only occurred in 1 test pit (TP-111).

The residual on-site soils consisted of a mixture of clays, silts, and sands. The soil horizons were heterogeneously mixed and inconsistent between borings. The general overburden subsurface conditions are summarized in the following Table 2 as well as the *Boring and Test Pit Location Plans* in the Appendix for more details.

Bedrock was encountered at all of our boring locations, and 4 of our test pit locations. Bedrock appeared to be a fine gray to red sandstone (as observed in some of our last SPT samples before achieving auger refusal as well as the observed rock surface in our 4 test pits that achieved refusal). Auger refusal

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Table 2: General Overburden Conditions Observed		
Strata	Thickness	Notes
Surface Cover: Topsoil	Approximately 4 to 6 inches	Present in all borings and test pits
Till Zone - Tan, Gray, to Dark Brown Silty Clays, with fine roots and some sand	Approximately 1-½ feet	Present in 6 of our 10 boring; ranging from firm to hard
Residual Soil: Sandy Silty Clay (CL-ML) to Lean Clay with Sand (CL)— Brown to Tan some times sandy and clayey.	On average about 3-½ with depths up to 6 to 8 feet	Present in all 14 borings and 5 test pits; ranging from soft to very stiff
Residual Soil: Tan to Red Sandy Fat Clays (CH) that were silty with some chert and sandstone in samples	On average about 8 feet with a range of approximately 5 to 10 feet*	Present in all 17 borings and 7 test pits; ranging from firm to very stiff
Residual Soil: Red sand, fine grained with clay	Approximately 3 to 10 feet	Present in all 10 borings and no test pits; ranging from loose to very dense

5B GROUNDWATER CONDITIONS

Groundwater was observed at 15 of our 20 boring locations, and 3 of our 10 test pit locations. Piezometers were installed at each of boring locations as well. Twenty four hour (or more) follow-up ground water readings were taken at each boring location. Heavy rainfall proceeded 14 of our 20 borings. Please note that the majority of the water level readings shallower 10 feet were taken in the area to the north of the drag strip. Please reference Table 3 for a summation of the collected water level readings.

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Table 3: Ground Water Readings (Borings)				
Boring	Ground Surface Elevation (Feet)	Auger Refusal	Initial Groundwater Reading (Depth From Surface in Feet)	Follow-Up Ground Water Reading (Depth From Surface in Feet)
B-101	1006.0	8.7	8.2	7.8* *TOR*
B-102	1015.8	18.9	18.7	16.0* *TOR*
B-103	1022.9	18.9	16.7	13.2
B-104	1030.2	19.0	14.0	13.5
B-105	1017.8	18.9	18.7	16.9* *TOR*
B-106	1032.7	18.4	12.4	6.2
B-107	1022.2	13.7	Dry	11.2* *TOR*
B-108	1033.7	18.5	16.2	11.4
B-109	1023.8	13.9	Dry	12.5* *TOR*
B-110	1024.0	15.5	8.5	5.4
B-111	1021.4	13.5	13.2	10.2
B-112	1019.2	13.4	13.3	10.5
B-113	1019.2	13.5	7.5	1.2
B-114	1021.5	13.8	Dry	Dry
B-115	1013.4	13.1	12.1	10.8* *TOR*
B-116	1008.6	9.0	8.3	6.0
B-117	1018.5	13.4	12.0	10.9* *TOR*
B-118	983.2	9.0	5.0	Dry
B-119	1012.5	5.3	Dry	Dry
B-120	1011.4	12.2	Dry	Dry

**TOR = At or Near Top of Bedrock*

Table 4: Ground Water Readings (Test Pits)				
Test Pit	Ground Surface Elevation (Feet)	Termination Depth (Feet)	Initial Groundwater Reading (Depth From Surface in Feet)	Follow-Up Ground Water Reading (Depth From Surface in Feet)
TP-101	1010.1	3.5* *TOR*	Dry	N/A
TP-102	1023.0	7.5	Dry	N/A
TP-103	1022.0	7.5	Dry	N/A
TP-104	1024.9	7.5	Dry	N/A
TP-105	1032.0	7.5	Dry	N/A
TP-106	1027.4	8.0	7.8	N/A
TP-107	1031.7	7.5	Dry	N/A
TP-108	1024.8	8.0	7.9	N/A
TP-109	1022.4	8.0	Dry	N/A
TP-110	1022.4	7.3* *TOR*	Dry	N/A
TP-111	1017.8	6.1* *TOR*	5.3	N/A
TP-112	1012.4	5.5* *TOR*	Dry	N/A
TP-113	984.0	8.5	Dry	N/A

**TOR = At or Near Top of Bedrock*

Water conditions that could affect construction and performance of this project likely consists of a shallow water table as trapped/perched water zones also seem to occur in variable areas in the soil mass as well as near the soil/rock interface. Perched water sources are often not linked to the more continuous relatively stable ground water table that typically occurs at greater depths, but could be because of the rolling topography, and the channelling of water in various areas across the site. Site excavation activities or ground disturbance can expose these features and the resulting seepage can vary greatly. Finally, water issues are also dependent upon recent rainfall activity and surface and subsurface drainage patterns in the area.

6 LABORATORY TESTING

Laboratory tests were performed on selected recovered samples from our borings and off-site borrow materials. Detailed descriptions of these tests and the results of our testing are included in the Appendix. Tests performed included:

- Natural moisture contents;
- Atterberg limits;
- Percent fines analyses.

GEOTECHNICAL DISCUSSION AND RECOMMENDATIONS

7 DISCUSSION-GEOTECHNICAL ISSUES

Based on our experience with similar projects and the conditions observed during our subsurface exploration, we believe that this site can be adapted for the proposed construction. The primary geotechnical concerns are:

- Thick Topsoil/Till Zone;
- Silty Soils;
- Sandy Soils;
- Soil Plasticity;
- Groundwater;
- Site Grading;
- Karst Geology.

The following sections discuss each issue. However, recommendations to address the issues are contained in later sections of the report.

7A THICK TOPSOIL / TILL ZONE

Thick topsoil (till zone) was encountered at all of our borings and test pits across the site. The thickness of the till zone varied from 1-½ to 2 feet. A qualified CSI geotechnical engineer should be present during site stripping to ensure that adequate (but not excessive) till zone removal is performed. Some areas may require minimal till zone removal.

7B SILTY SOILS

Our boring and test pits, experience in the area, as well as published site geology, indicate silty soils are on the site. The silty soils occur in "pockets". Silty soils are extremely sensitive to moisture change, are prone to degradation and become unstable during wet periods of the year and/or under heavy construction traffic.

Care must be taken and exercised during earthwork and in areas where construction traffic is expected to minimize repetitive traffic one there site soils. The repetitive traffic will cause the soils to become unstable; therefore, filling operations should only use enough comparative effort to achieve stability and job site requirements for compaction. Also, undercutting and recompaction of these soils usually proves futile (the soil matrix is usually degraded).

During wet periods of weather, undercutting should be expected. Mass earthwork operations must be avoided during wetter seasons of the year, between November and May. If not, means of stabilization such as lime treatment may be needed. Again, recompaction of silty soils is problematic and other means of stabilization should be considered.

7C SANDY SOILS

Our borings also encountered sandy soils on-site. Sandy soils will not remain stable and slough/slump in excavations. Also, sandy soils will not remain stable when left exposed to weathering conditions (i.e. - if left open in foundation or other excavations).

Recommendations for slope construction was beyond our scope of services, but sandy soils typically will not remain stable (even in temporary slopes) steeper than about 3H:1V. Also, sandy soils tend to hold/have water pockets when surrounded by more clayey soils.

7D SOIL PLASTICITY

Our laboratory testing indicates that "Fat Clay" soils exist across the site in layers and "pockets". These soils can be susceptible to shrinking and swelling. Atterberg limits testing was performed on 3 representative residual soil samples. Our laboratory testing indicated that 1 of the tested samples are high plasticity (Fat) clay (CH). The Atterberg limits testing on the representative sample indicated a Plasticity Index (PI) of the sample collected from the site was 27 percent. This falls within the low susceptibility range with respect to swell potential. Means to control swelling (or shrinking) potential in these soils typically include strict moisture control (see Section 8 of this report) during earthwork.

7E GROUNDWATER

Moist to wet, inconsistent soils were found in some of our borings and test pit excavations. Generally, the soils were very soft to very stiff in the silty clay and clayey horizons. However, in the wettest horizons the clays were much softer with some weight of hammer (WOH) readings in the wet areas. These soils have the potential to compress if they are within the zone of influence of the project foundations, possibly causing differential settlement. In-depth earthwork observations by CSI can help identify these areas, and provided remediation recommendations on a case by case basis.

As previously discussed, the rain events proceeded a portion of our field exploration. This made traversing the site difficult for approximately 1 day. However, the site "dried" rapidly. Travel in our support trucks with-out assistance from our drill rig was easily possible the next day. Thus, we believe the soils dry and drain relatively quickly. Note the weather when the soils were drying was approximately 75 degrees with minor winds.

As stated in Section 5, free water was encountered in numerous borings and test pits. These can likely be attributed to 3 main conditions and areas:

1. The "bowl" along the north and east
2. Depth near top of rock (within 3 feet of the rock surface)
3. Isolated pockets within the soil mass

Figure 11 delineates areas with a water level reading in our borings and test pits of shallower than 10 feet. It also notes the area and likely cause of wet conditions (Numbers 1, 2, 3, respectively).

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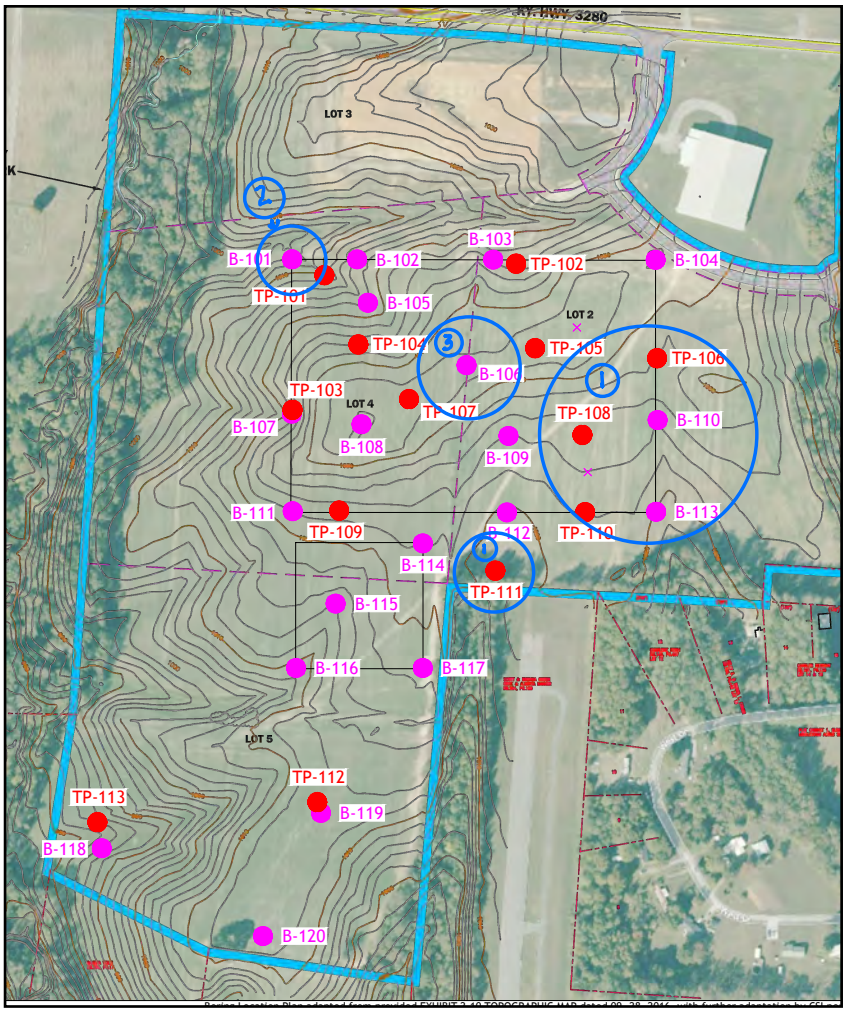


Figure 11: Areas with observed shallow water

7F SITE GRADING

While the structure for this project is flexible and loading is relatively light, we understand that some of the production equipment has a low tolerance for settlement. We have not been provided grades, or final site design at this time, but we expect that some of the swales will require moderate fills. Any fills greater than 15 feet (deep fills) are cause for settlement concern. Additionally, the areas the transition from cuts to deep fills over a short horizontal difference are of concern for differential settlement. If fill thickness is limited to less than 12 feet within the building footprint, most of the settlement concerns at this site would be minimized.

As previously discussed, water can be an isolated issue at this site, sometimes at shallow depth. Settlement could be of concern if the wet soils are “squished” once a load is applied, or new fill is placed. Methods for remediation will be discussed later in this report.

Lastly, the site grading will also determine the recommended Seismic Site Classification. If

the average final grading depth to rock is less than 10 feet, a Site Class of "C" can be used. Otherwise a Site Class "D" should be used.

7G KARST GEOLOGY

Karst is common in Kentucky and typically includes: sinkholes, caverns, erratic/irregular (pinnacle and rock channels) bedrock surfaces, and "floater" type boulders or rock cobbles in the native soil overburden. The prominent topographic feature of Karst regions in Kentucky is the sinkhole. This is defined as areas underlain by carbonate rocks that are characterized by closed surface depressions and internal drainage systems. The site is characterized as an area of low to very high Karst potential by the Kentucky Geologic Survey (KGS) website. However, obvious signs of Karst were not readily apparent in our site reconnaissance, soil samples, or auger cuttings. Further, Section 15 contains recommendations for Karst construction.

8 EARTHWORK

Historically, more change orders (in total number and costs) occur during the earthwork portion of construction than in almost any other part of the project. Further, the site preparation phase of construction always affects the future performance of project structures. Add into this, the fact that earthwork is the portion of work most influenced by wet weather and unknown conditions and time-wise, this section of the report could be the most important to prevent and minimize delays and costs during construction and for the life of the project.

The earthwork phase of the project will be particularly difficult due to the silty, sandy soils observed on-site. Water was observed, sometimes at shallow depths as previously discussed. Thus, wet soils that require drying could be encountered during the earthwork phase of the project. Also, dewatering remedial efforts will likely be required. Strict adherence to soil placement criteria presented in section 8B should be followed and observed by a qualified CSI geotechnical engineer.

Deep fills (again greater than 15 feet), can create settlement issues of the fill mass. We recommend to keep fill thickness to less than 12 (twelve) feet within 10 horizontal feet of the buildings on-site.

Please note that a formal settlement analysis was not in our scope of work. If soil fills are utilized for this project they will either require adequate time to settle, or require induced settlement (i.e. - preloading, wick drains, etc.) in these areas.

Please review the concerns listed in section 7 prior to reading the following recommendations. If problems occur that the recommendations do not address or do not adequately remedy, please contact CSI as soon as possible.

8A SITE PREPARATION (WORK PRIOR TO FILLING)

- Do not strip existing ground cover until the last possible point in time. Silty soils deteriorate very rapidly once exposed to weathering conditions. Part of the till zone materials may be suitable in-place as is. Over-stripping is likely if stripping is not supervised by a CSI geotechnical engineer;
- Areas ready to receive new fill should be proofolled with a loaded dump truck (as determined by a CSI geotechnical engineer) or similar equipment judged acceptable by the geotechnical engineer;
- The level of proofroll should be determined by a CSI geotechnical engineer on a case-by-case basis.
- Perform the proofrolling after a suitable period of dry weather to avoid degrading the subgrade;
- Areas which pump, rut, or wave during proofrolling may require undercutting, depending on the location of the area and the use of the area, so the geotechnical engineer should be contacted for guidance;
- Dewatering and stabilization efforts may be required in areas that are unstable, or require deep fills;
- We areas are also often soft. One of the dewatering measures (See Section 9) is horizontal wicked textile that also provides stabilizing measure. This would eliminate undercutting;
- Backfill of undercut areas should be performed in accordance with sections 8B and 8C;
- Retain CSI to observe the proofrolling operations and make recommendations for any unstable or unsuitable conditions encountered. This can save time on the construction schedule and save unnecessary undercutting.

Site grading should take place between about May to early November. Earthwork taking place outside this time period will likely encounter wet conditions and weather conditions that will provide little to no assistance with drying the soils.

8B NEW FILL OPERATIONS

We understand that this project is early in the design phase and final grades are yet to be determined. However, because of existing topographic we expect that deep fills could be possible.

After the subgrade has been approved to receive new fill, the fill may commence with the following procedures and guidelines recommended:

- Silty soils exist at this project site, thus no vibration should be used in compaction equipment;
- Place fill in maximum 8-inch thick loose lifts;
- Fill lifts should be compacted to at least 95 percent of the soil's maximum dry density (ASTM D 698) and maintain the moisture content of compacted fill minus 3 percent of optimum moisture to optimum moisture content (different than normal due to silty soils);
- Off-site soils (if necessary) with a plasticity index (PI) of greater than 20 should not be used as new fill;
- Maximum particle size of the soil should be limited to 4 inches in any dimension with no large concentrations of large fragments;
- Density testing should be performed as a means to verify percent compaction and moisture content of the material as it is being placed and compacted;
- Observation of fill "stability" is also critical, so it is recommended to observe the operation of the filling equipment traversing over the new fill to document movement (similar to proofrolling);
- Soils should not be "overcompacted" and construction traffic should be kept to minimum to assure compaction is achieved and that the soil is not allowed to "break down";
- Retain a representative of CSI to observe and document fill placement and compaction operations.

8C BACKFILL OPERATIONS (FOUNDATION WALLS, UTILITIES, ETC.)

These materials are placed in more confined areas than mass earthwork materials or pavement materials and therefore cannot be placed in full compliance with section 8B. The following are general recommendations for backfill areas:

- Fill lift thicknesses will vary dependent on compaction equipment available and material types, but in no case should exceed 8 inches;
- For crushed stone/aggregate backfills in trenches or wall backfill and when using smaller compaction equipment (such as a plate compactor or trench compactor or similar) the lift thickness should not exceed 4 inches;
- CSI should be retained to provide additional recommendations for backfill (if necessary).

8D GENERAL NOTES

- For all earthwork operations, positive surface drainage is prudent to keep water from ponding on the surface and to assist in maintaining surface stability.
- The surface should be sealed prior to expected wet weather. This can usually be accomplished with rubber-tired construction equipment or a steel-drum roller.
- If any fill placement problems occur, CSI should be retained to provide additional recommendations, as needed.

9 SITE DRAINAGE

As previously discussed, water was observed in several of our borings and test pits during our subsurface exploration. Again, most of the wet zones were either: near the "bowl" area, near top of bedrock depths, or in isolated wet "pockets". Water and wet soils will likely be encountered during site grading activities. Dewatering measures include:

- Large french drains;
- Wick drains;
- Spring boxes;
- A high strength geosynthetic liner such as Tencate Miriafi H_2R*i* could be utilized to provide drainage. Drainage is provided using this product via a horizontal wicking action. The liner has an added benefit of providing stabilization without having to account for additional stone thickness (soil removal) and cost. This material is expensive, but would likely be offset by the ease and reduced schedule of installation, as well as the elimination of extra haul off material. may be utilized to drain areas where shallow water exists.

The perimeters of the site are naturally lower in elevation and could be utilized for drainage. Additionally, all of these options would help induce and speed up settlement in deep fill areas.

Bowl Area: Prior to construction, the "bowl" area should be ditched and drained. The "drag strip" may provide the means to daylight drain the area.

During construction, water should not be allowed to pond in excavations or undercutting will likely be required. Additionally, allowing water to pond in excavations (especially excavations that approach the soil/rock interface) greatly increases the risk for activating latent Karst features. During the life of the project, slope the subgrade and other site features so that surface water flows away from the site structures. Diversion ditches should be used to keep surface water from accumulating at or near site structures.

10 FOUNDATIONS

Based on the information provided and the conditions encountered, shallow foundations bearing on soil should be a suitable foundation system to support the proposed development. If there are any changes in the project criteria, CSI should be allowed to review the recommendations to determine if any modifications are required.

10A SHALLOW SPREAD FOUNDATIONS BEARING ON SOIL

Shallow spread footings may be sized using a maximum allowable bearing pressure of 2,000 pounds per square foot (psf). Foundations should bear on newly placed and properly compacted fill, or firm or better residual soils.

Additional design considerations for project foundations are outlined as follows:

- Design all footings with a minimum 24 inches width;
- All exterior footing bottoms should bear at least 24 inches below finished exterior grading (Kentucky Building Code, Table 1805.2.1 for Russell County);
- Recommended Cohesion value of 750 psf for uplift.

10B SHALLOW FOUNDATIONS ON SOIL - CONSTRUCTION NOTES

Any soils can lose strength if they become wet, so we recommend the foundation subgrades be protected from exposure to water. For foundation construction, we also recommend the following procedures:

- Undercut rock (not expected) to 2 feet below the design bottom of footing elevation. Backfill this area with compacted soil. Do not use DGA or No. 57 stone as backfill material;
- For soils that will remain exposed overnight or for an extended period of time, place a "lean" concrete mudmat over the bearing areas. The concrete should be at least 4 inches thick. Flowable fill concrete or low-strength concrete is suitable for this cover, as conditions allow;
- Disturbed soil should be removed prior to foundation concrete placement;
- Foundation bearing conditions should be benched level;
- Areas loosened by excavation operations should be recompacted prior to reinforcing steel placement;
- Loose soil, debris, and excess surface water should be removed from the bearing surface prior to concrete placement;
- Retain a CSI geotechnical engineer to observe all foundation excavations and provide recommendations for treatment of any unsuitable conditions encountered;

- The foundation bearing conditions should be checked by means of portable dynamic cone penetration (DCP) testing at the direction of the CSI geotechnical engineer. This is imperative, especially in areas where foundations are directly bearing on cut material.

11 SEISMIC SITE CLASSIFICATION

The latest edition of the Kentucky Building Code (KBC) was reviewed to determine the Site Seismic Classification. Based on our review of geologic data, our experience, and subsurface conditions encountered, we recommend the following. The Site Class is highly dependent on mass site grading (i.e. final building pad elevations).

- a Seismic SITE CLASS "D" for design purposes if the average depth to bedrock (including the fill mass) is greater than 10 feet;

- a Seismic SITE CLASS "C" for design purposes if the average depth to bedrock (including the fill mass) is less than 10 feet;

A detailed geotechnical earthquake engineering analysis was not performed since it was beyond the scope of our authorized work. However, based on a review of published literature and our experience with similar subsurface conditions, we believe the potential for slope instability, liquefaction, and surface rupture due to faulting or lateral spreading resulting from earthquake motions is low. However, this potential could be elevated during wet periods of the year unless adequate drainage is provided.

12 GRADE SUPPORTED SLABS

A grade supported floor slab is suitable for the proposed structure (if any), provided the subgrade is prepared according to the recommendations contained within this report. As previously stated, the owner has elected to leave the existing fill in-place. The following features are recommended as part of the floor slab construction.

- Perform a proofroll of the floor slab area just prior to the placement of base stone. Since silty soils are present at the site, proofrolls should be performed under the guidance of a CSI geotechnical engineer;

- Retain CSI to review the actual subgrade conditions prior to slab construction and to make recommendations for any unsuitable conditions encountered;

- Provide isolation joints between the slab and columns and along footing supported walls;

- Do not use turned down slabs or thickened slab sections to support load bearing walls;

- Adequate joint patterns (ACI and ICC guidelines) should be used to permit slab movement due to normal settlement, normal subgrade disturbance, and material expansion/contraction;

- Place a minimum of 4 inches of compacted crushed stone beneath the slab to provide a working base. The actual thickness of the crushed stone layer should be based on design requirements;

- Keep the crushed stone moist, but not wet, immediately prior to slab concrete placement to minimize curling of the slab due to differential curing conditions between the top and bottom of the slab.

13 PAVEMENT RECOMMENDATIONS

Adequate soil/subgrade support is critical for any pavement area. As previously stated, silty soils are prone to degradation and typically produce low CBR values (which are used in pavement design calculations).

Proper drainage considerations for the pavement areas will be mandatory in order to control soft/wet soils beneath the pavement. Please refer to the Earthwork section of this report for subgrade preparation recommendations. CSI personnel should be retained for pavement remediation recommendations (if necessary).

13A ASPHALT PAVEMENT

As previously stated, our obtained information indicated silty soils on-site. Typical CBR values for the low plasticity silty soils encountered on-site are 3 to 5 percent. Thus, we used a CBR value of 3 percent for the pavement design. Typically, pavement design is based on supplied traffic loads and CBR values. However, no traffic loads were provided to us for this project. We have assumed that the expected traffic will be limited to mostly automobiles, small buses, delivery trucks, and occasional garbage trucks. Thus, a generalized pavement design for light duty asphalt pavement are offered in the following Tables 5 and 6.

Table 5- Light Duty Asphalt Pavement Section (auto parking lot)	
Pavement Section Component	Thickness (in)
Bituminous Surface Course	1.5
Bituminous Binder Course	1.5
Dense Graded Aggregate (DGA)*	8.0

**DGA to be placed in 6 inch thick maximum, compacted lifts*

Table 6- Heavy Duty Asphalt Pavement Section (entrance and drive lane)	
Pavement Section Component	Thickness (in)
Bituminous Surface Course	1.5
Bituminous Binder Course	2.5
Dense Graded Aggregate (DGA)*	10.0

**DGA to be placed in 6 inch thick maximum, compacted lifts*

The dense graded aggregate (DGA) should be placed and compacted in accordance with Kentucky Department of Highways Standard Specifications, latest edition. The asphalt should be mixed, placed, and compacted in accordance with Kentucky Department of Highways Standard Specifications, latest edition. It is common practice to place the base stone and binder course prior to completion of construction without placing the surface course. It should be noted that repeated passes of heavily loaded construction traffic on the binder course will likely decrease the service life of your pavement.

13B CONCRETE PAVEMENT

Concrete pavement will likely be utilized in the dumpster pad area and possibly other areas of the project site. This should also be used for the interior slabs in the garage areas. Typically, concrete pavement is used when heavy, repeated loads are expected in a specific area.

We recommend a minimum DGA (dry) thickness of 8 inches beneath new concrete pavement and a minimum concrete thickness of 6 inches for new concrete pavement areas. Obviously, thicker pavement concrete sections can be used in select areas where heavy wheel loads are expected. We also recommend that the concrete pavement be reinforced with heavy welded wire fabric or reinforcing steel. For dumpster pads and refuse container pads, the concrete pads should be large enough to accommodate both the refuse container and all axles of the truck.

14 POND CONSTRUCTION

For the proposed constructed pond, either a new berm constructed along existing swales or a combination of cut and fill in other areas of the site would be the likely means to create the pond. For the new berm construction, the recommendations for soil compaction in Section 7 should be followed. Zones of very sandy material on site may not be suitable for the berm construction, but the remaining site soils appear to be suitable for use in constructing the berm. Soil slopes for the berm should be no steeper than 2H:1V. A shallower slope of 3H:1V is usually preferred for mowing/maintenance. The bottom of the dam should be keyed into native soils as per industry standards. Other construction and design of the berm should also follow industry standards. Lastly, it should be noted that water/wet conditions “pockets” were observed throughout the site, but especially along the northeast area (the “bowl” area). Due to potentially larger amount of subsurface wet conditions, the pond should not be located in this area. Other areas will encountered wet conditions, but these should be more of a “isolated” condition.

15 KARST CONSTRUCTION

If a sinkhole, dropout, or mud-filled slot/trough in the bedrock is encountered, then a CSI geotechnical engineer should be contacted immediately. Typically, repairs of Karst features consist of two primary alternatives – an inverted rock filter, or a concrete plug. Both of these alternatives are described briefly in the following sections; however, Karst features can vary

greatly in size, width, depth and complexity of repair. Their repair will depend entirely upon the specific conditions encountered and the proposed construction for that area. Therefore, remediation of Karst features should only be performed at the direction of, and under the supervision of, a CSI geotechnical engineer.

Inverted Rock Filter – In most instances, an inverted rock filter is the preferred remediation technique for repairing Karst features. An inverted rock filter allows the infiltration/ transmission of water while preventing erosion of the adjoining soil into the underlying Karst openings and/or conduits.

Construction of an inverted filter usually begins with excavating the Karst feature down to bedrock on all sides. An extended boom backhoe with a narrow bucket is typically the preferred excavation equipment for small to moderate size Karst features. For larger Karst features, a trackhoe is commonly used. Soil and/or mud are removed from the sidewalls of the Karst feature so that rock is exposed on all sides. Hand tools are sometimes required to clean the sidewalls since mud-filled crevices are common. In some instances, a bedrock "bottom" is not encountered. However, it is important that the excavation be extended to a point where the rock sidewalls narrow or converge.

Once the Karst feature has been excavated to the satisfaction of the CSI geotechnical engineer, heavy-duty, non-woven filter fabric is used to line the excavation. The filter fabric allows water to flow through the rock within the filter, but will not allow soil fines to be washed away. Large rock is then placed in the bottom of the excavation. The size of the large rock fragments will depend entirely upon the size and depth of the excavation. It is imperative that the size of rock fragments used in the bottom layer be considerably larger than the solution channel opening in the bedrock. Thus, large rock boulders would be used for a large excavation, while rip rap would be used for a smaller excavation. Layers of smaller rock fragments would then be placed on top of the larger rock fragments until the desired grade is obtained. For large/deep excavations, the rock fragments would typically consist of layers of boulders, rip rap, No. 2 stone, capped with No. 57 stone. For smaller/shallow excavations, the rock fragments would typically consist of layers of No. 2 stone capped with No. 57 stone. The thickness of each layer of rock should be determined in the field by the CSI geotechnical engineer.

Once the final layer of No. 57 crushed stone is placed, it should be leveled by raking. Once leveled, the filter fabric should be lapped over the No. 57 crushed stone so that no stone is exposed. The filter fabric should totally encapsulate the rock filter with no gaps between pieces of filter fabric. A minimum overlap of 2 feet is typically recommended for filter fabric used in inverted rock filters. From this elevation, compacted soil or crushed stone can be used to obtain the desired final grade. Please reference Figure 12 as an example of an inverted rock filter.

Remediation options for a concrete plug will not be presented in this report. Concrete plugs remediations are unique to each sinkhole. Thus, if a sinkhole requiring a concrete plug is required for your project, a remediation design will be provided when required.

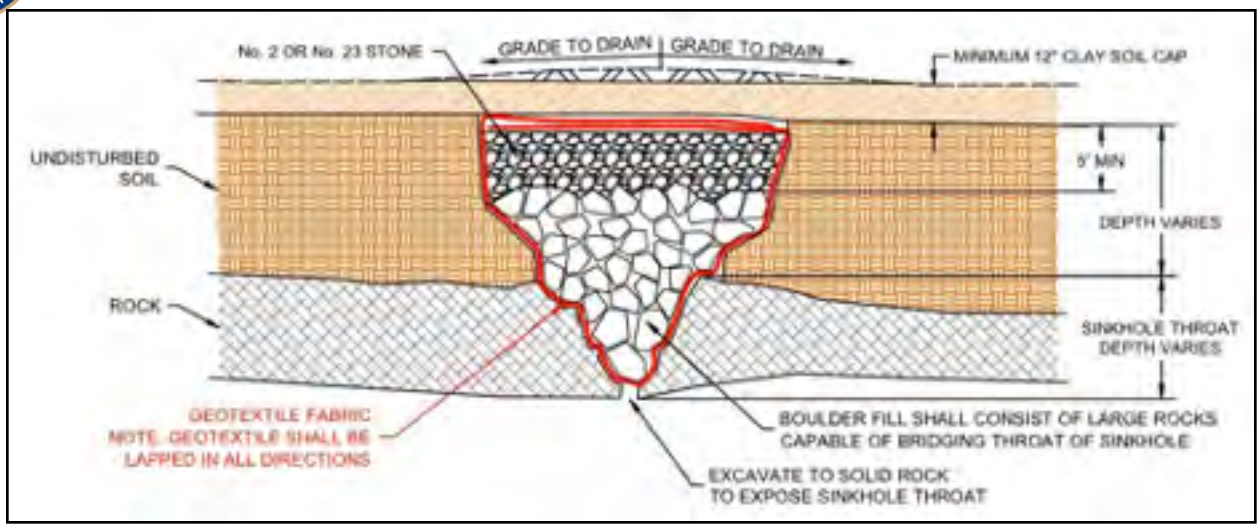


Figure 12: Typical Inverted Rock Filter

16 NOTES ON THE REPORT AND RECOMMENDATIONS

We recommend that this complete report be provided to the various design team members, the contractors and the project Owner. Potential contractors should be informed of this report in the "Instructions to Bidders" section of the bid documents. A geotechnical exploration, such as the one we performed, uses widely spaced borings to attempt to model the subsurface conditions at the site. Because no exploration contains complete data or a complete model, there is always a possibility that conditions between borings will be different from those at specific boring locations. Thus, it is possible that some subsurface conditions will not be as anticipated by the project team or contractor. If this report is included or referenced in the actual contract documents, it shall be explicitly understood that this report is for informational purposes only. CSI shall not be responsible for the opinions of, or conclusions drawn by, others.

It has been our experience that the construction process often disturbs soil conditions and this process, no matter how much experience we use to anticipate construction methodology, is not completely predictable. Therefore, changes or modifications to our recommendations are likely needed due to these possible variances. Experienced CSI geotechnical personnel should be used to observe and document the construction procedures and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created. We recommend that the Owner retain CSI to provide this service based upon our familiarity with the project, the subsurface conditions and the intent of our recommendations.

This report is based on the supplied project information, the subsurface conditions observed at the time of the report, and our experience with similar conditions. As such, it cannot be applied to other project sites, types, or combinations thereof. If the Project Information section in this report contains incorrect information or if additional information is available,

you should convey the correct or additional information to us and retain us to review our recommendations. Our recommendations may then require modification.

No section or portion of this report (including Appendix information) can be used as a stand alone article to make distinct changes or assumptions. The entire report and Appendix should be used together as one resource.

While this report deals with samples of subsurface materials and some comments on water conditions at the site, no assessment of site environmental conditions or the presence of contaminants were performed.

We wish to remind you that our exploration services include storing the soil and rock core samples collected and making them available for inspection for 30 days. The samples are then discarded unless you request otherwise. Please inform us if you wish to keep any of the obtained samples.

APPENDIX

Site Location Plan

Boring Location Plan

Test Pit Location Plan

Key to Symbols and Descriptions

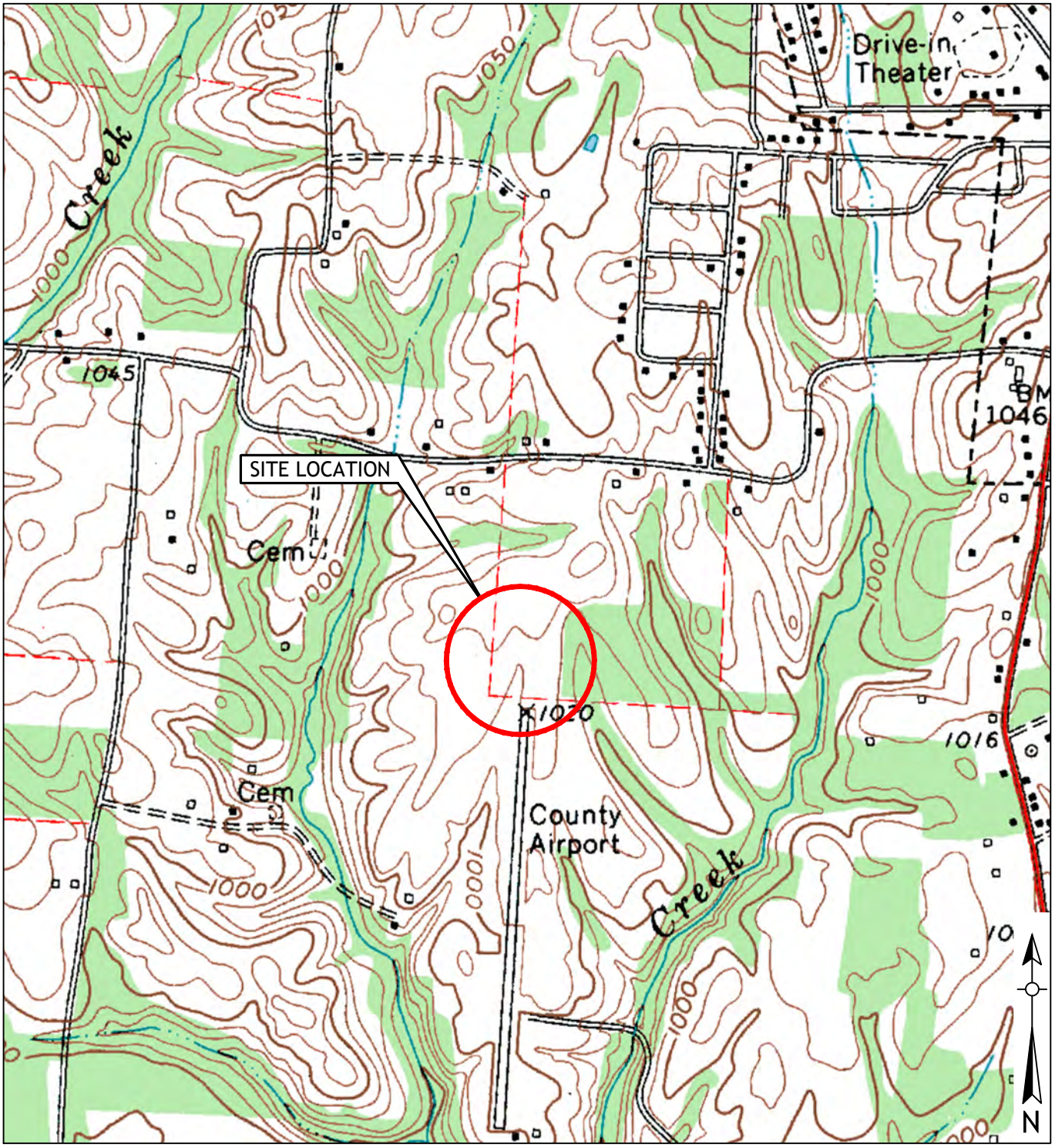
Boring Logs

Test Pit Logs

Field Testing Procedures

Summary of Lab Testing Table(s) and Lab Testing Sheets

Laboratory Testing Procedures



Site Location Plan adapted from USGS Russell Springs, KY, dated 1973, Topographic Quadrangle map, with further adaptation by CSI personnel.

FOR ILLUSTRATION PURPOSES ONLY

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SITE LOCATION PLAN	Project No: LX200112	Drawn By: RE
Lake Cumberland Regional Industrial Complex Russell Springs, Kentucky	Date: 9/22/2020	Checked By: BB
	Scale: Not To Scale	Drawing No: SLP - 1

UTHORITY
LLEY
PARK

2.10
IIC MAP

KY. HWY. 3280

FRENCH VALLEY
BUSSINESS PARK

LOT 3

LOT 1

LOT 2

LOT 4

LOT 5

B-101 B-102 B-103 TP-102 B-104
TP-101 B-105
TP-104 TP-105 TP-106
B-106
TP-103 TP-107 TP-108 B-110
B-107 B-108 B-109
B-111 TP-109 B-112 TP-110 B-113
B-114
TP-111
B-115
B-116 B-117
TP-112 B-119
TP-113
B-118
B-120

LEGEND:
PROPERTY BOUNDARY
PAVED AREAS
CONCEPTUAL LOT LINE
2' CONTOUR INTERVAL

Total Acreage
96.352± ACRES

150'
N

Boring Location Plan adapted from provided EXHIBIT 2.10 TOPOGRAPHIC MAP dated 09, 28, 2016, with further adaptation by CSI personnel.
Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

FOR ILLUSTRATION PURPOSES ONLY

LEGEND

B-XXX BORING LOCATIONS
TP - XXX TEST PIT LOCATIONS

Project No: LX200112	Drawn By: RE	
Date: 9/22/2020	Checked By: BB	
Scale: Not To Scale	Drawing No: BLP - 1	

BORING LOCATION PLAN

Lake Cumberland Regional Industrial Complex
Russell Springs, Kentucky

Consulting Services Incorporated of Kentucky
858 Contract Street
Lexington, Kentucky 40505
859.309.6021 Office | 888.792.3121 Fax
www.csikentucky.com

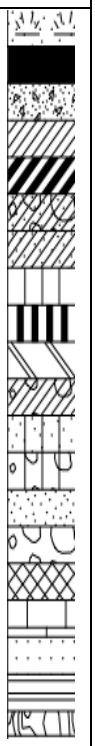
Consulting Services Incorporated
LEXINGTON | LOUISVILLE | CINCINNATI

Geotechnical Boring Information Sheet

Sample Type Symbols

Splitspoon (SPT)
Shelby Tube
Grab
Rock Core
Auger Cuttings

Surface Symbols



Topsoil
Asphalt
Concrete
Lean Clay
Fat Clay
Glacial Till
Sandy Clay
Silt
Elastic Silt
Lean Clay to Fat Clay
Gravelly Clay
Sandy Silt
Gravelly Silt
Sand
Gravel
Fill
Limestone
Sandstone
Shale/Siltstone
Weathered Rock

Samples Strength Descriptors

Cohesive Soils:	N
Very Soft	0-1
Soft	2-4
Firm	5-8
Stiff	9-15
Very Stiff	16-30
Hard	31+
Non-cohesive Soils:	
Very Loose	0-4
Loose	5-10
Firm	11-20
Very Firm	21-30
Dense	30-50
Very Dense	51+

Definitions

SPT-"Splitspoon" or standard penetration test. Blow counts are number of drops required for a 140 lb hammer dropping 30 inches to drive the sampler 6 inches.

N-value is the addition of the last two intervals of the 18-inch sample.

Shelby tubes are often called "undisturbed samples". They are directly pushed into the ground, twisted, allowed to rest for a small period of time and then pulled out of the ground. Tops and bottoms are cleaned and then sealed.

Sample classification is done in general accordance with ASTM D2487 and 2488 using the Unified Soil Classification System (USCS) as a general guide.

Soil moisture descriptions are based on the recovered sample observations. The descriptors are dry, slightly moist, moist, very moist and wet. These are typically based on relative estimates of the moisture condition of a visual estimation of the soils optimum moisture content (EOMC). Dry is almost in a "dusty" condition usually 6 or more percent below EOMC. Slightly moist is from about 6 to 2 percent below EOMC at a point at which the soil color does not readily change with the addition of water. Moist is usually 2 percent below to 2 percent above EOMC and the point at which the soil will tend to begin forming "balls" under some pressure in the hand. Very moist is usually from about 2 percent to 6 percent above EOMC and also the point at which it's often considered "muddy". Wet soil is usually 6 or more percent above EOMC and often contains free water or the soil is in a saturated state.

Silt or Clay is defined at material finer than a standard #200 US sieve (<0.075mm) Sand is defined as material between the size of #200 sieve up to #4 sieve. Gravel is from #4 size sieve material to 3". Cobbles are from 3" to 12". Boulders are over 12".

Rock hardness is classified as follows:

Very Soft:	Easily broken by hand pressure
Soft:	Ends can be broken by hand pressure; easily broken with hammer
Medium:	Ends easily broken with hammer; middle requires moderate blow
Hard:	Ends require moderate hammer blow; middle requires several blows
Very Hard:	Many blows with a hammer required to break core

Rock Quality Designation (RQD) is defined as total combined length of 4" or longer pieces of core divided by the total core run length; defined in percentage.

Water or cave-in observed in borings is at completion of drilling each boring unless otherwise noted.

Strata lengths shown on borings represents a rough estimate. Transition may be more abrupt or gradual. Soil borings are representative of that estimated location at that time and are based on recovered samples. Conditions may be different between borings and between sample intervals. Boring information is not to be considered stand alone but should be taken in context with comments and information in the geotechnical report and the means by which the borings are logged, sampled and drilled.

BORING LOG

Consulting Services Incorporated
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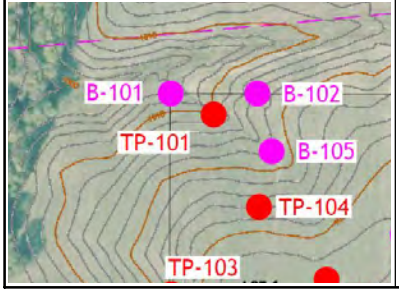
BORING: **B-101**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1006.0	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/10/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/10/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
			TILL ZONE - dark brown, clay with sand, silt, moist	3-3-3 (6)	10		
1004	2	CL ML	SANDY SILTY CLAY - FIRM, reddish-brown, moist	2-3-3 (6)	8		
1002	4		SAND - SANDSTONE (weakly cemented) - reddish-brown, fine grained, with clay, sand increasing at 9 feet, moist	50/5"	2		
1000	6			50/5"	2		
998	8			50/1"	0	▼ ▽	24 hour water level reading measured at 7.8 feet Water observed at 8.2 feet upon completion of drilling
			Auger Refusal at 8.7 feet				
996	10						
994	12						
992	14						
990	16						
988	18						



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

BORING LOG

BORING: **B-101A**

Consulting Services Incorporated
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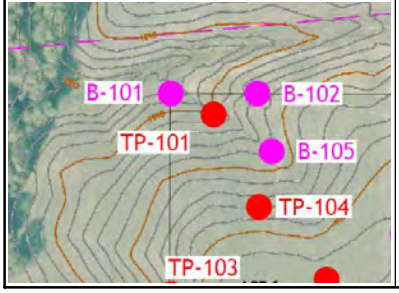
Lexington, Kentucky 40505
Phone: 859.309.6021
Fax: 888.792.3121

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1006.0	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/10/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/10/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
			B-101A offset from B-101 for Shelby Tube				Dry upon completion of soil augering
1004	2		SHELBY TUBE				
1002	4						
1000	6						
998	8						
996	10						
994	12						
992	14						
990	16						
988	18						



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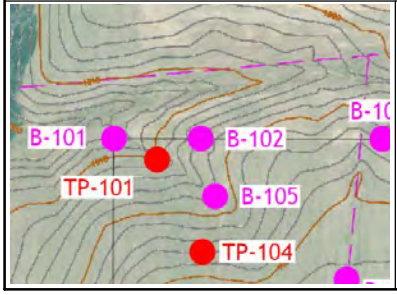
BORING: **B-102**

Project Number: LX200112 Name: Lake Cumberland Regional Industrial Complex Client: Russell Co. Ind. Development Authority Location: Russell Springs, Kentucky Logged By: B. Bishop, EIT	Weather: Sunny, 80s *Elevation: 1015.8 Date Started: 9/10/20 Date Completed: 9/10/20 Checked By: J. Cooke, PE	Contractor: Strata Group Drill Rig: D-50 Method: SFA Hole Size (in): 4

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
			TOPSOIL - 6 inches				
		CH	SANDY FAT CLAY (CH) - STIFF, reddish-brown, moist	3-4-6 (10)	16		
1014	2			4-6-7 (13)	10		
1012	4	CH	SANDY FAT CLAY (CH) - FIRM to STIFF, red, with silt, wet	3-3-3 (6)	10		
1010	6						
1008	8			3-3-7 (10)	12		
			CLAYEY SAND - FIRM, red, with silt, very moist				
1006	10			5-5-7 (12)	10		
1004	12						
1002	14			50/2"			
1000	16					▼	24 hour water level reading measured at 16 feet
998	18					▽	Water observed at 18.7 feet upon completion of drilling
996			Auger Refusal at 18.9 feet				



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

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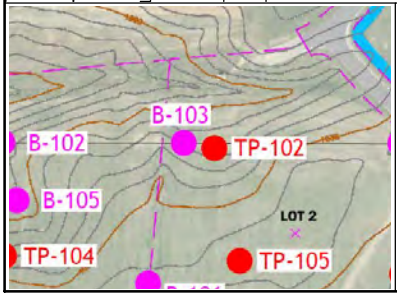
BORING: **B-103**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1022.9	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/10/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/10/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1022	0		TOPSOIL - 5 inches				
			TILL ZONE - sampled as STIFF to VERY STIFF, clay, tan to red, moist	4-4-7 (11)	10		
	2	CH	SANDY FAT CLAY (CH) - VERY STIFF to STIFF, red, with gray mottling, cherty, moist	4-7-10 (17)	12		
1020							
	4			4-6-7 (13)	16		
1018							
	6						
1016				3-6-7 (13)	12		
	8						
1014			SANDY SILTY CLAY (CL-ML) - FIRM to STIFF, tannish-red, oxidized sand layers at 14 feet, moist				
	10			2-3-3 (6)	16		
1012							
	12						
1010						▼	24 hour water level reading measured at 13.2 feet
	14	CL ML		4-3-6 (9)	18		
1008							
	16					▽	Water observed at 16.7 feet upon completion of drilling
1006							
	18						
1004			Auger Refusal at 18.9 feet				



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

BORING LOG

BORING: **B-104**

Consulting Services Incorporated
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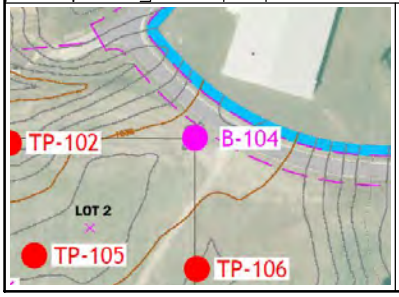
Fax: 888.792.3121

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1030.2	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/10/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/10/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1030			TOPSOIL - 5 inches				
			TILL ZONE - sampled as FIRM, clay, moist	5-4-3 (7)	18		
1028	2	CH	SANDY FAT CLAY (CH) - VERY STIFF, tan, with red, moist	4-10-10 (20)	18		
1026	4	CH	SANDY FAT CLAY (CH) - VERY STIFF, reddish-brown, with some gray increasing with depth, sand increasing with depth, moist with wet zones	5-6-10 (16)	18		
1024	6	CH					
		CH		4-6-10 (16)	18		
1022	8	CH					
		CH		3-2-50/2"	10		
1020	10	CH					
1018	12		SAND - LOOSE, red, fine grained, with clay, moist to wet			▼	24 hour water level reading measured at 13.5 feet
1016	14			7-6-2 (8)	12	▽	Water observed at 14 feet upon completion of drilling
1014	16						
1012	18		Auger Refusal at 19.0 feet	50/0"			



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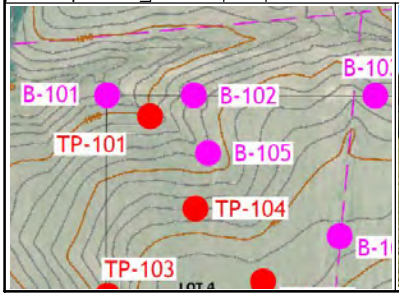
BORING: **B-105**

Project Number: LX200112 Name: Lake Cumberland Regional Industrial Complex Client: Russell Co. Ind. Development Authority Location: Russell Springs, Kentucky Logged By: B. Bishop, EIT	Weather: Sunny, 80s *Elevation: 1017.8 Date Started: 9/10/20 Date Completed: 9/10/20 Checked By: J. Cooke, PE	Contractor: Strata Group Drill Rig: D-50 Method: SFA Hole Size (in): 4

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
			TOPSOIL - 4 inches				
			TILL ZONE - sampled as SOFT, dark brown, silty, clay, moist	1-2-1 (3)	18		
1016	2	CL	LEAN CLAY (CL) - FIRM, brown, silty, with sand, moist	1-2-4 (6)	18		
1014	4	CL		4-4-4 (8)	12		
1012	6	CH	SANDY FAT CLAY (CH) - FIRM to STIFF, reddish-brown, with silt, very moist	1-3-3 (6)	16		
1010	8	CH					
1008	10	CH		7-5-5 (10)	16		
1006	12		SAND - VERY FIRM, brown, fine grained, with silt, moist				
1004	14			4-9-13 (22)			
1002	16					▼	24 hour water level reading measured at 16.9 feet
1000	18					▽	Water observed at 18.7 feet upon completion of drilling
998			Auger Refusal at 18.9 feet				



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
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BORING LOG

BORING: **B-106**

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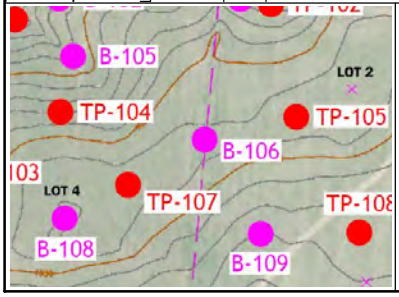
Fax: 888.792.3121

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1032.7	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/15/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/15/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1032	0		TILL ZONE - 11 inches	1-4-4 (8)	10		
	1		SILTY CLAY (CL-ML) - FIRM, tan to brown, with dark tones, moist				
1030	2			1-2-2 (4)	12		
	3						
1028	4	CH	SANDY FAT CLAY (CH) - STIFF to FIRM, reddish-brown, with alternating layers of silty clay, brown with dark brown, moist	2-4-7 (11)	14		
	5						
1026	6					▼	24 hour water level reading measured at 6.2 feet
	7			5-7-8 (15)	14		
1024	8						
	9						
1022	10			3-3-4 (7)	18		
	11						
1020	12		SANDY SILTY CLAY (CL) - STIFF, reddish-brown, with clay, with sandstone fragments, with clean sand lenses, moist			▽	Water observed at 12.4 feet upon completion of drilling
	13						
1018	14	CL		5-8-6 (14)	18		
	15						
1016	16						
	17						
1014	18		Auger Refusal 18.4 feet				



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

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BORING LOG

BORING: **B-107**

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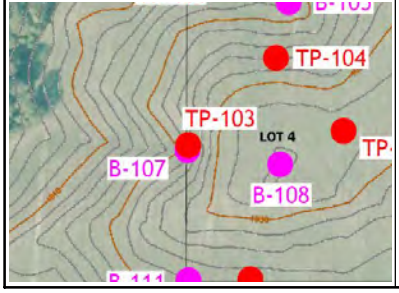
Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1022.2	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/15/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/15/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1022			TILL ZONE - 11 inches	2-1-2 (3)	18		Dry upon completion of soil augering
1020	2	CL ML	SANDY SILTY CLAY (CL-ML) - SOFT to STIFF, reddish-brown, moist	3-4-6 (10)	12		
1018	4	CH	SANDY FAT CLAY (CH) - STIFF to FIRM, red, with brown mottling, moist	5-5-7 (12)	16		
1016	6						
1014	8			3-5-6 (11)	18		
1012	10			3-3-5 (8)	18	▼	24 hour water level reading measured at 11.2 feet
1010	12						
1008	14		Auger Refusal at 13.7 feet				
1006	16						
1004	18						



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Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

BORING LOG

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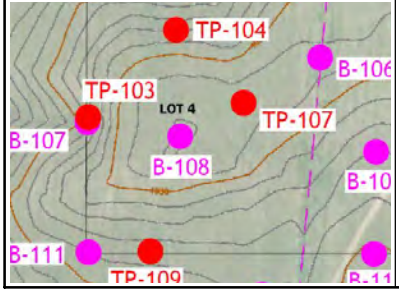
BORING: **B-108**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1033.7	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/14/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/14/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
			TILL ZONE - 13 inches	1-1-1 (2)	18		
1032	2	CL ML	SANDY SILTY CLAY (CL-ML) - STIFF, brown, moist	3-5-7 (12)	18		
1030	4	CH	SANDY FAT CLAY (CH) - VERY STIFF to FIRM, red, with tan mottling, chert observed at 9 feet, moist to wet	3-7-9 (16)	18		
1028	6						
1026	8			4-7-9 (16)	18		
1024	10			4-4-4 (8)	18		
1022	12					▼	24 hour water level reading measured at 11.2 feet
1020	14	CL ML	SANDY SILTY CLAY (CL-ML) - STIFF, red and tan, moist	3-5-6 (11)	18		
1018	16					▽	Water observed at 16.2 feet upon completion of drilling
1016	18						
1014			Auger Refusal at 18.5 feet				



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Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

BORING LOG

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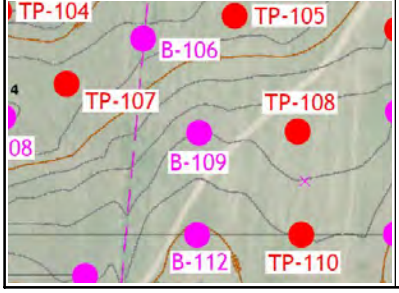
BORING: **B-109**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1023.8	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/14/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/14/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
			TILL ZONE - 12 inches	3-2-3 (5)	18		Dry upon completion of soil augering
1022	2	CL ML	SANDY SILTY CLAY (CL-ML) - FIRM to STIFF, brown, with red striations, moist to very moist	2-2-3 (5)	18		
1020	4			2-3-5 (8)	18		
1018	6			2-5-5 (10)	18		
1016	8	CH	SANDY FAT CLAY (CH) - STIFF, red, with silt, very moist	7-6-8 (14)	18		
1014	10						
1012	12					▼	24 hour water level reading measured at 12.5 feet
1010	14		Auger Refusal at 13.9 feet				
1008	16						
1006	18						
1004							



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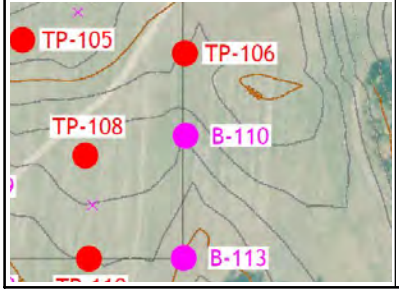
BORING: **B-110**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1024.0	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/14/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/14/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
			TILL ZONE - 10 inches	4-4-5 (9)	18		
1022	2	CH	SANDY FAT CLAY (CH) - STIFF to VERY SOFT, gray, with red mottling, moist to wet	6-7-8 (15)	18		
1020	4			3-3-7 (10)	16	▼	24 hour water level reading measured at 5.4 feet
1018	6						
				WOH-WOH-WOH	18		
1016	8					▽	Water observed at 8.4 feet upon completion of drilling
			SAND - FIRM, gray and red, fine grained, with clay and silt, wet	4-5-8 (13)	18		
1014	10						
1012	12						
1010	14			50/5"	0		
			WEATHERED SANDSTONE				
1008	16		Auger Refusal at 15.5 feet				
1006	18						



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

BORING LOG

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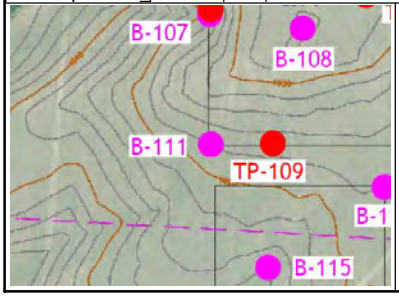
BORING: **B-111**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1021.4	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/16/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/16/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1020	0		TILL ZONE - 12 inches	2-1-1 (2)	18		
	2	CL ML	SANDY SILTY CLAY (CL-ML) - FIRM, brown, moist	3-3-3 (6)	18		
1018	4	CL	SANDY LEAN CLAY (CL) - STIFF, gray, with some red and dark brown, with some clean sandy pockets and chert, moist to very moist	3-4-7 (11)	10		
1016	6						
1014	8			4-6-5 (11)	12		
1012	10	CH	SANDY FAT CLAY (CH) - VERY STIFF, gray and red, with silt, with chert, moist	3-5-11 (16)	18	▼	24 hour water level reading measured at 10.2 feet
1010	12						
1008	14		Auger Refusal at 13.5 feet			▽	Water observed at 13.2 feet upon completion of drilling
1006	16						
1004	18						
1002							



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

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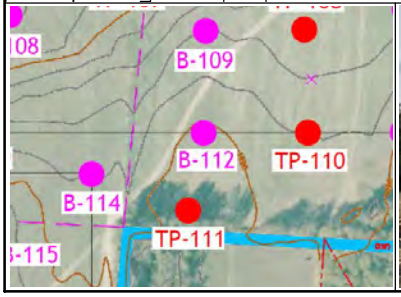
BORING: **B-112**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1019.2	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/14/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/14/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1018	0		TILL ZONE - 12 inches	1-1-2 (3)	16		
	2	CL ML	SANDY SILTY CLAY (CL-ML) - FIRM, brown, moist	2-2-3 (5)	12		
1016	4	CH	SANDY FAT CLAY (CH) - STIFF to FIRM to VERY STIFF, red, with gray mottling, with silt, moist	4-5-6 (11)	14		
1014	6						
1012	8			2-2-4 (6)	12		
1010	10			6-8-9 (17)	18	▼	24 hour water level reading measured at 10.5 feet
1008	12						
1006	14		Auger Refusal at 13.4 feet			▽	Water observed at 13.3 feet upon completion of drilling
1004	16						
1002	18						
1000							



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

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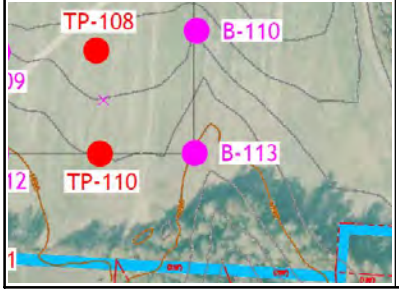
BORING: **B-113**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name:Lake Cumberland Regional Industrial Complex	*Elevation: 1019.2	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/14/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/14/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1018	0		TILL ZONE - 12 inches	2-2-1 (3)	18	▼	24 hour water level reading measured at 1.2 feet
	2	CL ML	SANDY SILTY CLAY (CL-ML) - FIRM to VERY STIFF, brown, with red mottling, moist	3-2-4 (6)	18		
1016	4			6-7-10 (17)	18		
1014	6						
1012	8	CH	SANDY FAT CLAY (CH) - STIFF to VERY STIFF, red, with gray mottling, with sandstone fragments, wet	2-5-7 (12)	18	▽	Water observed at 7.5 feet upon completion of drilling
1010	10			6-10-7 (17)	0		
1008	12						
1006	14		Auger Refusal at 13.5 feet				
1004	16						
1002	18						
1000							



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

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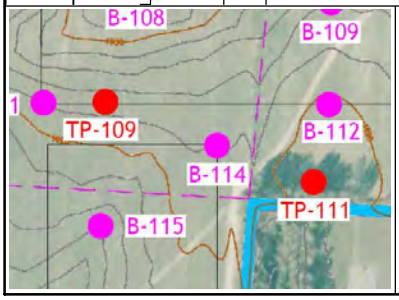
BORING: **B-114**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1019.2	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/15/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/15/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1018	0		TILL ZONE - 14 inches	4-3-4 (7)	16		Dry upon completion of soil augering and 24 hour water level readings
1016	2	CL ML	SANDY SILTY CLAY (CL-ML) - STIFF, brown, moist	4-4-6 (10)	18		
1014	4	CH	SANDY FAT CLAY (CH) - STIFF to FIRM, red and gray, with silt, gray silty zones at 7 feet, moist to very moist	4-6-7 (13)	14		
1012	8			3-4-4 (8)	18		
1010	10		SAND - LOOSE, red, fine grained, with clay, very moist	4-6-4 (10)			
1008	12						
1006	14		Auger Refusal at 13.8 feet				
1004	16						
1002	18						
1000							



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

BORING LOG

BORING: **B-115**

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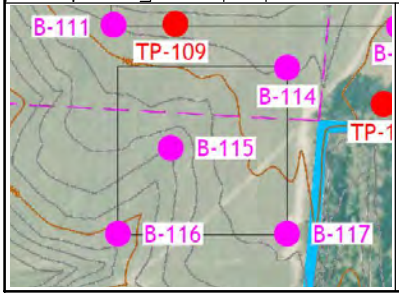
Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1013.4	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/15/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/15/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
			TILL ZONE - 12 inches	2-2-1 (3)	18		
1012	2	CL ML	SANDY SILTY CLAY (CL-ML) - FIRM, brown, moist	3-3-3 (6)	16		
1010	4	CH	SANDY FAT CLAY (CH) - STIFF, red and tan, with some silt, with chert, wet	3-4-5 (9)	18		
1008	6						
1006	8			2-4-6 (10)	12		
1004	10		SAND - VERY DENSE, red, fine grained, with clay, wet	8-50/5"	6	▼	24 hour water level reading measured at 10.8 feet
1002	12					▽	Water observed at 12.1 feet upon completion of drilling
1000	14		Auger Refusal at 13.1 feet				
998	16						
996	18						
994							



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
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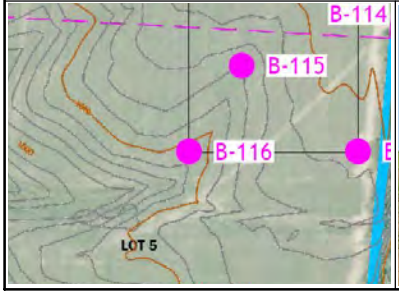
BORING: **B-116**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1008.6	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/15/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/15/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1008	0		TILL ZONE - 13 inches	2-3-5 (8)	12		
1006	2	CH	SANDY FAT CLAY (CH) - STIFF, red and brown, silty, with chert, moist	3-4-6 (10)	12		
1004	4		SAND - FIRM, red, fine grained, with clay, with sandstone fragments, with oxide staining, very moist to wet	7-7-10 (17)	18		
1002	6			6-50/5"		▼	24 hour water level reading measured at 6.0 feet
1000	8		WEATHERED SANDSTONE			▽	Water observed at 8.3 feet upon completion of drilling
998	10		Auger Refusal at 9.0 feet				
996	12						
994	14						
992	16						
990	18						



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

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BORING: **B-117**

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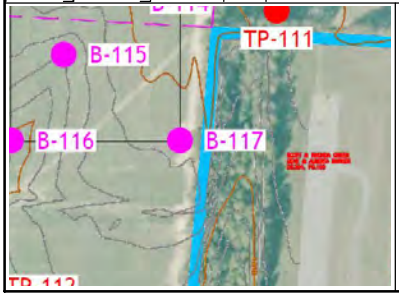
Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1018.5	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/15/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/15/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1018			TILL ZONE - 12 inches	2-2-2 (4)	18		
1016	2	CH	SANDY FAT CLAY (CH) - SOFT to VERY STIFF with STIFF zone, gray, with red mottling, silty, with chert, moist	4-4-6 (10)	18		
1014	4			4-7-7 (14)	18		
1012	6			3-6-10 (16)	18		
1010	8						
1008	10		SAND - FIRM, red, fine grained, with clay, moist	11-5-7 (12)	18	▼	24 hour water level reading measured at 10.9 feet
1006	12					▽	Water observed at 12.0 feet upon completion of drilling
1004	14		Auger Refusal at 13.4 feet				
1002	16						
1000	18						



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

BORING LOG

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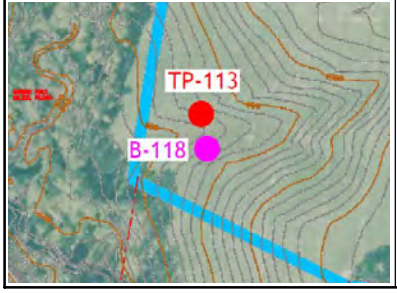
BORING: **B-118**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 983.2	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/15/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/15/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
982	0		TILL ZONE - 15 inches	1-1-2 (3)	18		Dry upon completion of soil augering
980	2	CL ML	SANDY SILTY CLAY (CL-ML) - SOFT, brown, moist	2-2-1 (3)	18		
978	4		SAND - FIRM to LOOSE, brownish-gray, fine grained, moist to very moist	2-4-8 (12)	16	▽	24 hour water level reading measured at 5.0 feet
976	6						
974	8			2-4-5 (9)	18		
972	10		Auger Refusal at 9.0 feet				
970	12						
968	14						
966	16						
964	18						



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

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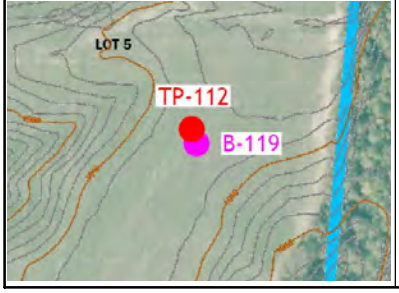
BORING: **B-119**

Project Number: LX200112	Weather: Sunny, 80s	Contractor: Strata Group
Name: Lake Cumberland Regional Industrial Complex	*Elevation: 1012.5	Drill Rig: D-50
Client: Russell Co. Ind. Development Authority	Date Started: 9/15/20	Method: SFA
Location: Russell Springs, Kentucky	Date Completed: 9/15/20	Hole Size (in): 4
Logged By: B. Bishop, EIT	Checked By: J. Cooke, PE	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1012	0		TILL ZONE - 14 inches	1-1-1 (2)	14		Dry upon completion of soil augering and 24 hour water level readings
1010	2	CL ML	SANDY SILTY CLAY (CL-ML) - SOFT to STIFF, brownish-gray, with red mottling, moist	3-4-5 (9)	18		
1008	4			4-50/4"	5		
	5.3		WEATHERED SANDSTONE				
1006	6		Auger Refusal at 5.3 feet				
1004	8						
1002	10						
1000	12						
998	14						
996	16						
994	18						



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

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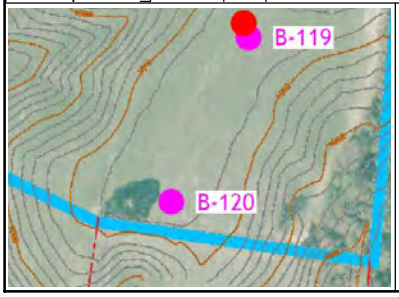
BORING: **B-120**

Project Number: LX200112 Name: Lake Cumberland Regional Industrial Complex Client: Russell Co. Ind. Development Authority Location: Russell Springs, Kentucky Logged By: B. Bishop, EIT	Weather: Sunny, 80s *Elevation: 1011.4 Date Started: 9/15/20 Date Completed: 9/15/20 Checked By: J. Cooke, PE	Contractor: Strata Group Drill Rig: D-50 Method: SFA Hole Size (in): 4

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
1010	0		TILL ZONE - 12 inches	1-1-2 (3)	18		Dry upon completion of soil augering and 24 hour water level readings
		CL ML	SANDY SILTY CLAY (CL-ML) - SOFT, brownish-gray, moist				
1008	2	CH	SANDY FAT CLAY (CH) - VERY STIFF, brown, with red mottling, with silt, becoming red at 5 feet, moist	9-9-8 (17)	18		
1006	4			5-9-11 (20)	18		
1004	6			4-9-16 (25)	18		
1002	8		SAND - red, fine grained, with clay, moist	50/4"			
1000	10		WEATHERED SANDSTONE				
998	12		Auger Refusal at 12.2 feet				
996	14						
994	16						
992	18						



*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS network.

Left Photo: Photo of Boring Location
Right Photo: Photo of Boring

Test Pit: TP-101

Elevation (ft): 1010.1

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
1010		TOPSOIL - 4 inches				Dry upon completion of soil excavation	
		TILL ZONE - dark brown, lean clay, silty, damp					
1009	1						
		SANDY FAT CLAY (CH) - brown, with rock fragments stacking at 2.5 feet (max dimension of 15 inches), moist					
1008	2						
1007	3						
		Equipment Refusal at 3.5 feet					
1006	4						
1005	5						
1004	6						
1003	7						
1002	8						
1001	9						

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

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CLIENT: Russell Co. Ind. Development Authority
PROJECT: Lake Cumberland Regional Industrial Complex
LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-102

Elevation (ft): 1023.0

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
		TOPSOIL - 5 inches				Dry upon completion of soil excavation	
1022	1	TILL ZONE - brown, lean clay, silty, with few fine roots, damp					
1021	2	SANDY FAT CLAY (CH) - brown to reddish-brown mottled, moist					
1020	3						
1019	4						
1018	5	SANDY SITLY CLAY (CL-ML) - gray to brown to reddish-brown mottled, moist					
1017	6						
1016	7						
1015	8	Test Pit Terminated at 7.5 feet					
1014	9						

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

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CLIENT: Russell Co. Ind. Development Authority
PROJECT: Lake Cumberland Regional Industrial Complex
LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-103

Elevation (ft): 1022.0

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
		TOPSOIL - 5 inches				Dry upon completion of soil excavation	
1021	1	TILL ZONE - dark brown, lean clay, silty, damp					
1020	2	SANDY FAT CLAY (CH) - red and brown, with tan mottling increasing with depth, moist					
1019	3						
1018	4						
1017	5						
1016	6						
1015	7						
1014	8	Test Pit Terminated at 7.5 feet					
1013	9						

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

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CLIENT: Russell Co. Ind. Development Authority
PROJECT: Lake Cumberland Regional Industrial Complex
LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-104

Elevation (ft): 1024.9

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
1024	0	TOPSOIL/FILL - 7 inches, dark brown, with fine roots, damp				Dry upon completion of soil excavation	
	1	SANDY FAT CLAY (CH) - red, with tan mottling, moist					
1023	2						
1022	3						
1021	4						
1020	5						
1019	6						
1018	7						
	7.5	Test Pit Terminated at 7.5 feet					
1017	8						
1016	9						
1015							

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

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CLIENT: Russell Co. Ind. Development Authority
PROJECT: Lake Cumberland Regional Industrial Complex
LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-105

Elevation (ft): 1032.0

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
		TOPSOIL/TILL ZONE - 7 inches				Dry upon completion of soil excavation	
1031	1	SANDY SILTY CLAY (CL-ML) - tan, damp					
1030	2						
1029	3	SANDY FAT CLAY (CH) - red, with tan mottling, moist					
1028	4						
1027	5						
1026	6						
1025	7						
		Test Pit Terminated at 7.5 feet					
1024	8						
1023	9						

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

Consulting Services Incorporated
858 Contract Street
Lexington, KY 40505
Phone: 859.309.6021
Fax: 888.792.3121

CLIENT: Russell Co. Ind. Development Authority
PROJECT: Lake Cumberland Regional Industrial Complex
LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-106

Elevation (ft): 1027.4

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
1027		TOPSOIL - 4 inches					
	1	LEAN CLAY (CL) - tan and gray mottled changing to gray and tan mottled with depth, with sand, moist					
1026							
	2						
1025							
	3						
1024							
	4						
1023							
	5						
1022							
	6						
1021		SANDY FAT CLAY (CH) - red, with tan mottling, moist					
	7						
1020						Water observed at 7.8 feet upon completion of soil excavation	
	8	Test Pit Terminated at 8.0 feet					
1019							
	9						
1018							

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

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LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-107

Elevation (ft): 1031.7

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
1031	0	TOPSOIL - 6 inches				Dry upon completion of soil excavation	
	1	SANDY SILTY CLAY (CL-ML) - tan, damp					
1030	2						
1029	3						
		SANDY FAT CLAY (CH) - red, with some tan mottling, moist					
1028	4						
1027	5						
1026	6						
1025	7						
1024	8	Test Pit Terminated at 7.5 feet					
1023	9						
1022							

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LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-108

Elevation (ft): 1024.8

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
1024	0	TOPSOIL - 3 inches					
		SANDY SILTY CLAY (CL-ML) - tan, damp					
1023	1						
1022	2						
1021	3	LEAN CLAY (CL) - gray and tan mottled changing to gray and red to reddish-brown with depth, with sand, moist					
1020	4						
1019	5						
1018	6						
1017	7					Water observed at 7.9 feet upon completion of soil excavation	
1016	8	Test Pit Terminated at 8.0 feet					
1015	9						

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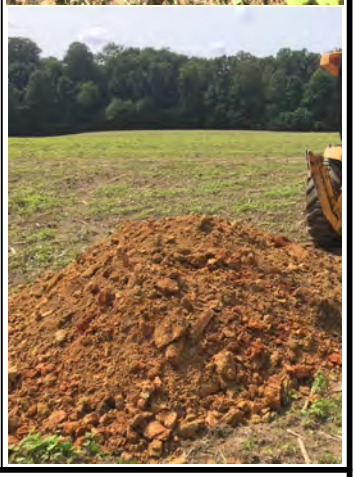
LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-109

Elevation (ft): 1022.4

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
1022		TOPSOIL - 4 inches				Dry upon completion of soil excavation	
		LEAN CLAY (CL) - tan, with sand, damp to moist					
1021	1						
1020	2						
1019	3						
	4						
1018		SANDY SILTY CLAY (CL-ML) - reddish-tan and gray mottled changing to red, tan and gray mottled with depth, moist					
1017	5						
1016	6						
1015	7						
	8						
1014		Test Pit Terminated at 8.0 feet					
1013	9						

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

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LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-110

Elevation (ft): 1022.1

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
1022		TOPSOIL - 5 inches				Dry upon completion of soil excavation	
		SANDY SILTY CLAY (CL-ML) - tan changing to reddish-brown and gray and tan with depth, damp to moist with depth					
1021	1						
1020	2						
1019	3						
1018	4						
1017	5						
1016	6						
1015	7						
		Equipment Refusal at 7.3 feet					
1014	8						
1013	9						

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LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-111

Elevation (ft): 1017.8

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
		TOPSOIL - 4 inches					
1017	1	SANDY SILTY CLAY (CL-ML) - tan changing to gray and tan to reddish-tan mottled with depth, wet near surface, moist					
1016	2						
1015	3						
1014	4						
1013	5					Water observed at 5.3 feet upon completion of soil excavation	
1012	6						
		Equipment Refusal at 6.1 feet					
1011	7						
1010	8						
1009	9						
1008							

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

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LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/9/2020
DATE COMPLETED: 9/9/2020
WEATHER: Sunny, 70s

Test Pit: TP-112

Elevation (ft): 1012.4

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
1012	0	TOPSOIL - TILL ZONE - clay, dark brown, with fine roots, moist				Dry upon completion of soil excavation	
1011	1	SANDY SILTY CLAY (CL-ML) - gray, with red mottling, moist					
1010	2						
1009	3						
1008	4						
1007	5	Equipment Refusal at 5.5 feet					
1006	6						
1005	7						
1004	8						
1003	9						

*Elevations were determined using Real Time Kinematic Differential GPS referencing the KYCORS Network.

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LOCATION: Russell Springs, Kentucky
JOB NUMBER: LX200112
LOGGED BY: J. Cooke, PE
APPROVED BY: B. Bishop, EIT

CONTRACTOR: CSI
EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/10/2020
DATE COMPLETED: 9/10/2020
WEATHER: Sunny, 70s

Test Pit: TP-113

Elevation (ft): 984.0

Elev. (ft)	Depth (ft)	Description	DCP	Samples	Symbol	Remarks	Photos
983	1	TOPSOIL - TILL ZONE - clay, dark brown, with fine roots, moist				Dry upon completion of soil excavation	
982	2	SANDY SILTY CLAY (CL-ML) - gray, with red mottling, moist					
981	3						
980	4	SAND - fine grained, gray, with clay, sandstone, and chert fragments at 6 feet, moist					
979	5						
978	6						
977	7						
976	8						
975	9	Test Pit Terminated at 8.5 feet					

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EQUIPMENT: John Deere 110
METHOD: 24" Bucket
DATE STARTED: 9/10/2020
DATE COMPLETED: 9/10/2020
WEATHER: Sunny, 70s

FIELD TESTING PROCEDURES

Field Operations: The general field procedures employed by CSI are summarized in ASTM D 420 which is entitled "Investigating and Sampling Soils and Rocks for Engineering Purposes." This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the subsurface conditions. These techniques are:

a. Continuous 2-1/2 or 3-1/4 inch I.D. hollow stem augers;

b. Wash borings using roller cone or drag bits (mud or water);

c. Continuous flight augers (ASTM D 1425).

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by the chief driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM D 2488 and prepares the final boring records, which are the basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

The detailed data collection methods using during this study are discussed on the following pages.

Soil Test Borings: Soil test borings were made at the site at locations shown on the attached Boring Plan. Soil sampling and penetration testing were performed in accordance with ASTM D 1586.

The borings were made by mechanically twisting a hollow stem steel auger into the soil. At regular intervals, the drilling tools were removed and soil samples obtained with a standard 1.4 inch I.D., 2 inch O.D., split tube sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "penetration resistance". The penetration resistance, when properly evaluated, is an index to the soil strength and foundation supporting capability.

Representative portions of the soil samples, thus obtained, were placed in glass jars and transported to the laboratory. In the laboratory, the samples were examined to verify the driller's field classifications. Test Boring Records are attached which graphically show the soil descriptions and penetration resistances.

Core Drilling: Refusal materials are materials that cannot be penetrated with the soil drilling methods employed. Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Prior to coring, casing is set in the drilled hole through the overburden soils, if necessary, to keep the hole from caving. Refusal materials are then cored according to ASTM D 2113 using a diamond-studded bit fastened to the end of a hollow double tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovered is measured, the samples are removed and the core is placed in boxes for storage.

The core samples are returned to our laboratory where the refusal material is identified and the percent core recovery and rock quality designation is determined by a soils engineer or geologist. The percent core recovery is the ratio of the sample length obtained to the depth drilled, expressed as a percent. The rock quality designation (RQD) is obtained by summing up the length of core recovered, including only the pieces of core which are four inches or longer, and dividing by the total length drilled. The percent core recovery and RQD are related to soundness and continuity of the refusal material. Refusal material descriptions, recoveries, and RQDs are shown on the "Test Boring Records".

Hand Auger Borings and Dynamic Cone Penetration Testing: Hand auger borings are performed manually by CSI field personnel. This consists of manually twisting hand auger tools into the subsurface and extracting “grab” or baggie samples at intervals determined by the project engineer. At the sample intervals, dynamic cone penetration (DCP) testing is performed. This testing involves the manual raising and dropping of a 20-pound hammer, 18 inches. This “driver” head drives a solid-13/4 inch diameter cone into the ground. DCP “counts” are the number of drops it takes for the hammer to drive three 13/4 inch increments, recorded as X-Y-Z values.

Test Pits: Test pits are excavated by the equipment available, often a backhoe or trackhoe. The dimensions of the test pits are based on the equipment used and the power capacity of the equipment. Samples are taken from the spoils of typical buckets of the excavator and sealed in jars or “Ziploc” baggies. Dynamic Cone Penetration or hand probe testing is often performed in the upper few feet as OSHA standards allow. Refusal is deemed as the lack of advancement of the equipment with reasonable to full machine effort.

Water Level Readings: Water table readings are normally taken in conjunction with borings and are recorded on the "Test Boring Records". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The time of boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table, which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Summary of Laboratory Results

Borehole	Depth	Sample Type	Liquid Limit	Plastic Limit	Plasticity Index	Class-ification	Water Content (%)	Unconfined Compressive Strength (ksf)	Dry Density (pcf)	Wet Density (pcf)	Max. Dry Density (pcf)	Opt. Water Content (%)	CBR	Swell (%)	RQD	Percent Recovery	k (cm/sec)	% Finer #200
B-102	0.0	SS					22.8											
B-102	1.5	SS					22.7											
B-102	4.0	SS					37.4											
B-102	6.5	SS					36.8											
B-102	9.0	SS					18.6											
B-104	0.0	SS					17.9											
B-104	1.5	SS					11.8											
B-104	4.0	SS					24.8											
B-104	6.5	SS					25.0											
B-104	9.0	SS					40.6											
B-104	14.0	SS					28.7											
B-105	0.0	SS					20.2											
B-105	1.5	SS					19.4											
B-105	4.0	SS					22.3											
B-105	6.5	SS					37.4											
B-105	9.0	SS					35.1											
B-105	14.0	SS					14.1											
B-109	0.0	SS					19.3											
B-108	1.5	SS					28.9											
B-108	4.0	SS					24.2											
B-108	6.5	SS					30.1											
B-108	9.0	SS					34.4											
B-108	14.0	SS					32.5											
B-110	0.0	SS					19.4											
B-110	1.5	SS					25.7											
B-110	4.0	SS					23.1											

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SS - Split Spoon Sample
GRAB - Bulk Grab Sample
k - Coefficient of Permeability
- See Attached test Results

PROJECT INFORMATION

Client: Russell County Industrial Development Authority
Project Name: Lake Cumberland Regional Industrial Complex
Project Number: LX200112
Project Location: Russell Springs, Kentucky

Summary of Laboratory Results

Borehole	Depth	Sample Type	Liquid Limit	Plastic Limit	Plasticity Index	Class-ification	Water Content (%)	Unconfined Compressive Strength (ksf)	Dry Density (pcf)	Wet Density (pcf)	Max. Dry Density (pcf)	Opt. Water Content (%)	CBR	Swell (%)	RQD	Percent Recovery	k (cm/sec)	% Finer #200
B-110	6.5	SS					30.7											
B-110	9.0	SS					19.3											
B-111	0.0	SS					20.7											
B-111	1.5	SS					20.2											
B-111	4.0	SS					27.8											
B-111	6.5	SS					20.8											
B-111	9.0	SS					28.1											
B-113	0.0	SS					18.7											
B-113	1.5	SS					19.5											
B-113	4.0	SS					21.9											
B-113	6.5	SS					41.9											
B-115	0.0	SS					18.0											
B-115	1.5	SS					21.2											
B-115	4.0	SS					43.5											
B-115	6.5	SS					31.1											
B-117	0.0	SS					18.1											
B-117	1.5	SS					17.5											
B-117	4.0	SS					20.6											
B-117	6.5	SS					29.8											
B-117	9.0	SS					25.0											
TP-103	1.4	GRAB	56	29	27		26.9				92.9	27.0						58.1
TP-106	0.3	GRAB	31	22	9		26.0				108.6	16.7						76.2
TP-107	0.5	GRAB	21	17	4		18.1				115.7	12.0						69.1

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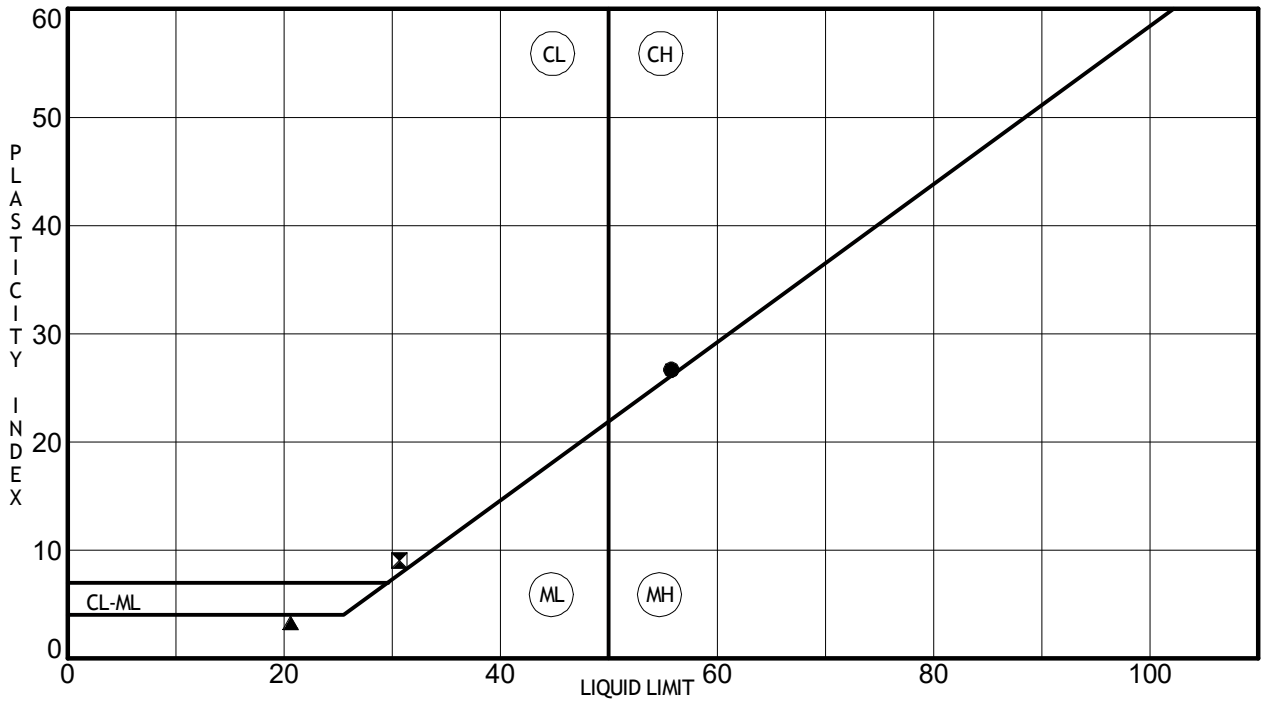
SS - Split Spoon Sample
GRAB - Bulk Grab Sample
k - Coefficient of Permeability
- See Attached test Results

PROJECT INFORMATION

Client: Russell County Industrial Development Authority
Project Name: Lake Cumberland Regional Industrial Complex
Project Number: LX200112
Project Location: Russell Springs, Kentucky

Liquid and Plastic Limits Test Report



	Boring	Depth (ft)	LL	PL	PI	Water Content	% < #40	% < #200	USCS	Description
●	TP-103	1.4	56	29	27	26.9		58.1	CH	red brown SANDY FAT CLAY
⊠	TP-106	0.3	31	22	9	26.0		76.2	CL	light brown LEAN CLAY with SAND
▲	TP-107	0.5	21	17	4	18.1		69.1	CL-ML	light brown SANDY SILTY CLAY

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PROJECT INFORMATION

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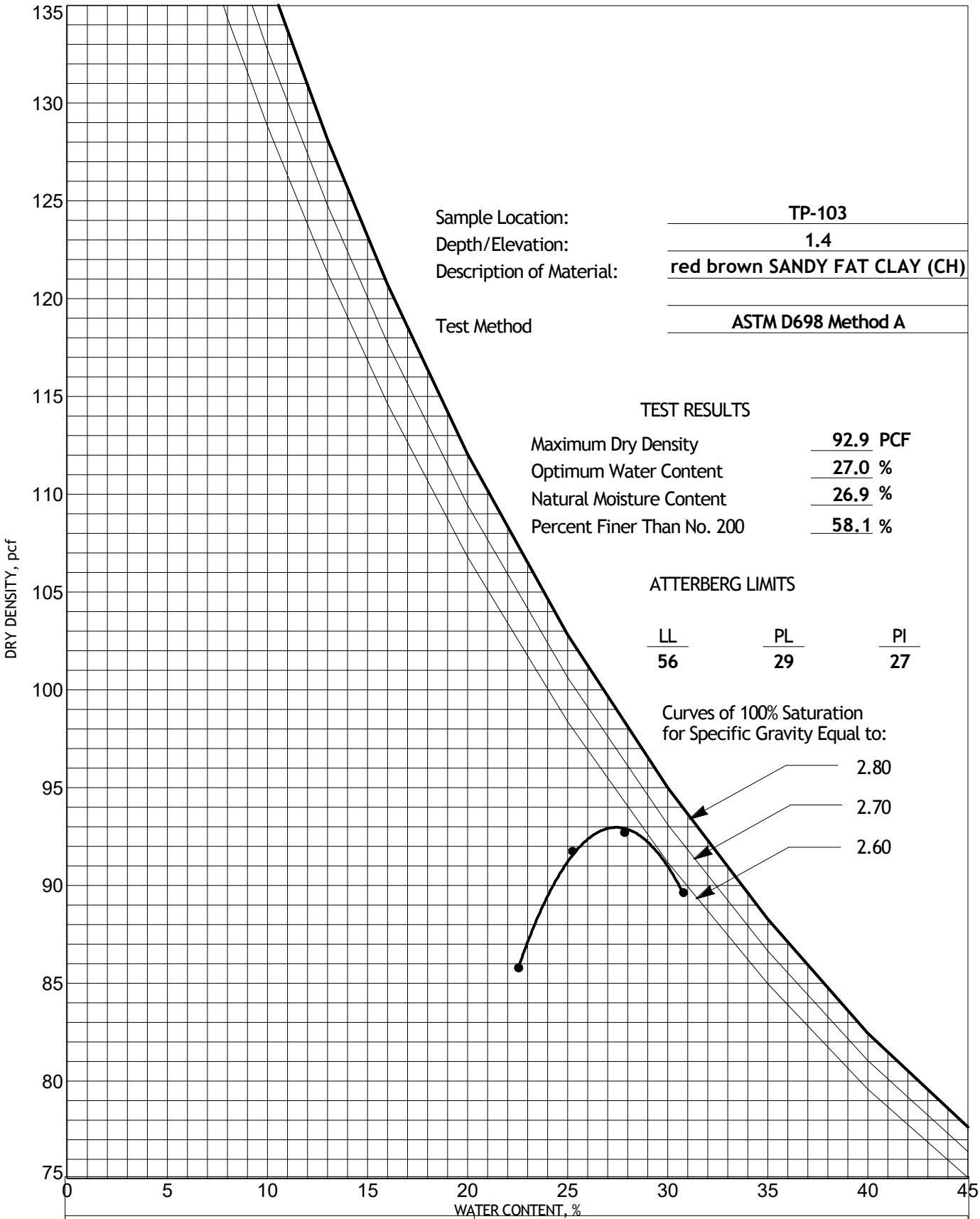
Project Location: Russell Springs, Kentucky

MOISTURE-DENSITY RELATIONSHIP



Sample Location:	TP-103
Depth/Elevation:	1.4
Description of Material:	red brown SANDY FAT CLAY (CH)
Test Method	ASTM D698 Method A

TEST RESULTS

Maximum Dry Density	92.9	PCF
Optimum Water Content	27.0	%
Natural Moisture Content	26.9	%
Percent Finer Than No. 200	58.1	%

ATTERBERG LIMITS

LL	PL	PI
56	29	27

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

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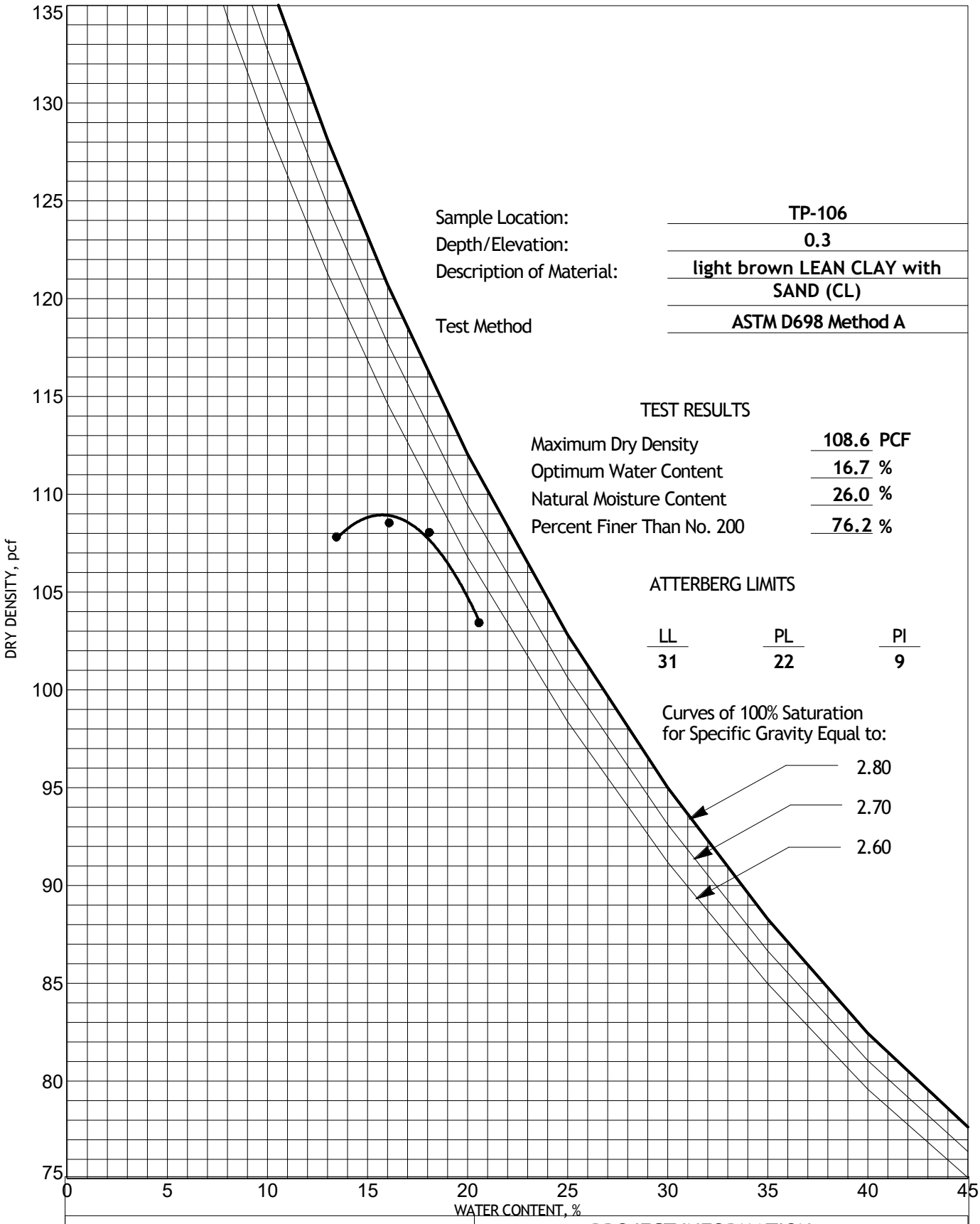
Project Number: LX200112

Project Location: Russell Springs, Kentucky

MOISTURE-DENSITY RELATIONSHIP



Sample Location:	TP-106
Depth/Elevation:	0.3
Description of Material:	light brown LEAN CLAY with SAND (CL)
Test Method	ASTM D698 Method A

TEST RESULTS

Maximum Dry Density	108.6	PCF
Optimum Water Content	16.7	%
Natural Moisture Content	26.0	%
Percent Finer Than No. 200	76.2	%

ATTERBERG LIMITS

LL	PL	PI
31	22	9

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

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PROJECT INFORMATION

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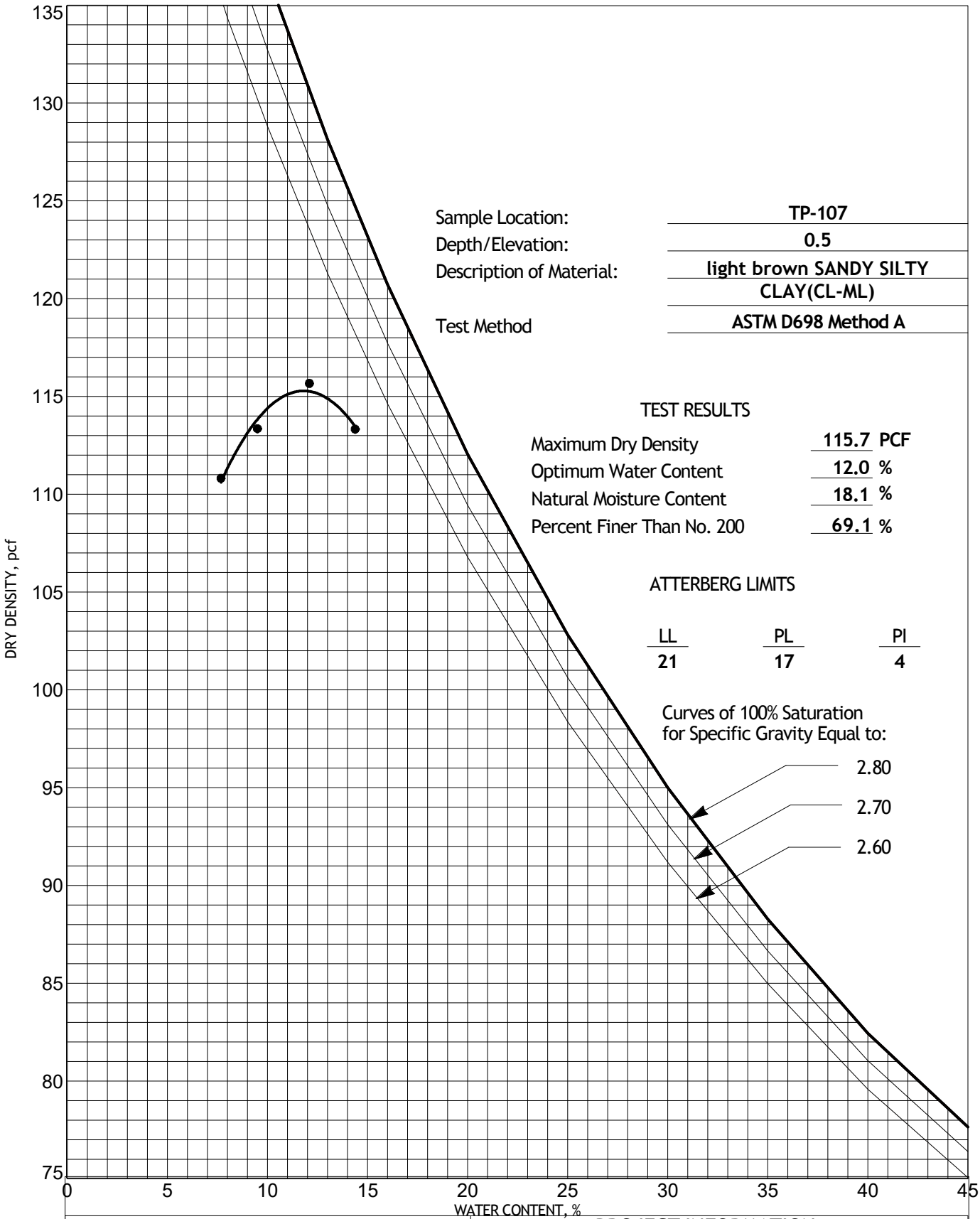
MOISTURE-DENSITY RELATIONSHIP



Sample Location:	TP-107
Depth/Elevation:	0.5
Description of Material:	light brown SANDY SILTY CLAY(CL-ML)
Test Method	ASTM D698 Method A

TEST RESULTS

Maximum Dry Density	115.7	PCF
Optimum Water Content	12.0	%
Natural Moisture Content	18.1	%
Percent Finer Than No. 200	69.1	%

ATTERBERG LIMITS

LL	PL	PI
21	17	4

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

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PROJECT INFORMATION

Client: Russell County Industrial Development Authority

Project Name: Lake Cumberland Regional Industrial Complex

Project Number: LX200112

Project Location: Russell Springs, Kentucky

LABORATORY TESTING PROCEDURES

Soil Classification: Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Test Boring Records."

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D 2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

Rock Classification: Rock classifications provide a general guide to the engineering properties of various rock types and enable the engineer to apply past experience to current situations. In our explorations, rock core samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The rock cores are classified according to relative hardness and RQD (see Guide to Rock Classification Terminology), color, and texture. These classification descriptions are included on our Test Boring Records.

Atterberg Limits: Portions of the samples are taken for Atterberg Limits testing to determine the plasticity characteristics of the soil. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes sufficiently "wet" to flow as a heavy viscous fluid. The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into tiny threads. The liquid limit and plastic limit are determined in accordance with ASTM D 4318.

Moisture Content: The Moisture Content is determined according to ASTM D 2216.

Percent Finer Than 200 Sieve: Selected samples of soils are washed through a number 200 sieve to determine the percentage of material less than 0.074 mm in diameter.

Rock Strength Tests: To obtain strength data for rock materials encountered, unconfined compression tests are performed on selected samples. In the unconfined compression test, a cylindrical portion of the rock core is subjected to increasing axial load until it fails. The pressure required to produce failure is recorded, corrected for the length to diameter ratio of the core and reported.

Compaction Tests: Compaction tests are run on representative soil samples to determine the dry density obtained by a uniform compactive effort at varying moisture contents. The results of the test are used to determine the moisture content and unit weight desired in the field for similar soils. Proper field compaction is necessary to decrease future settlements, increase the shear strength of the soil and decrease the permeability of the soil.

The two most commonly used compaction tests are the Standard Proctor test and the Modified Proctor test. They are performed in accordance with ASTM D 698 and D 1557, respectively. Generally, the Standard Proctor compaction test is run on samples from building or parking areas where small compaction equipment is anticipated. The Modified compaction test is generally performed for heavy structures, highways, and other areas where large compaction equipment is expected. In both tests a representative soil sample is placed in a mold and compacted with a compaction hammer. Both tests have three alternate methods.

Test	Method	Hammer Wt./ Fall	Mold Diam.	Run on Material Finer Than	No. of Layers	No. of Blows/ Layer
Standard D 698	A	5.5 lb./12"	4"	No. 4 sieve	3	25
	B	5.5 lb./12"	4"	3/8" sieve	3	25
	C	5.5 lb./12"	6"	3/4" sieve	3	56

Test	Method	Hammer Wt./ Fall	Mold Diam.	Run on Material Finer Than	No. of Layers	No. of Blows/ Layer
Modified D 15557	A	10 lb./18"	4"	No. 4 sieve	5	25
	B	10 lb./18"	4"	3/8" sieve	5	25
	C	10 lb./18"	6"	3/4" sieve	5	56

The moisture content and unit weight of each compacted sample is determined. Usually 4 to 5 such tests are run at different moisture contents. Test results are presented in the form of a dry unit weight versus moisture content curve. The compaction method used and any deviations from the recommended procedures are noted in this report.

Laboratory California Bearing Ratio Tests: The California Bearing Ratio, generally abbreviated to CBR, is a punching shear test and is a comparative measure of the shearing resistance of a soil. It provides data that is a semi-empirical index of the strength and deflection characteristics of a soil. The CBR is used with empirical curves to design pavement structures.

A laboratory CBR test is performed according to ASTM D 1883. The results of the compaction tests are utilized in compacting the test sample to the desired density and moisture content for the laboratory California Bearing Ratio test. A representative sample is compacted to a specified density at a specified moisture content. The test is performed on a 6-inch diameter, 4.58-inch-thick disc of compacted soil that is confined in a cylindrical steel mold. The sample is compacted in accordance with Method C of ASTM D 698 or D 1557.

CBR tests may be run on the compacted samples in either soaked or unsoaked conditions. During testing, a piston approximately 2 inches in diameter is forced into the soil sample at the rate of 0.05 inch per minute to a depth of 0.5 inch to determine the resistance to penetration. The CBR is the percentage of the load it takes to penetrate the soil to a 0.1 inch depth compared to the load it takes to penetrate a standard crushed stone to the same depth. Test results are typically shown graphically.

Consolidation Tests: Consolidation tests are conducted on representative soil samples to determine the change in height of the sample with increasing load. The results of these tests are used to estimate the settlement and time rate of settlement of structures constructed on similar soils. A consolidation test is performed according to ASTM D2435 on a single section of an undisturbed sample extruded from a sample tube. The sample is trimmed into a disc 2.5 inches in diameter and 0.75 inch thick. The disc is confined in a stainless steel ring and sandwiched between porous plates. It is then subjected to incrementally increasing vertical loads, and the resulting deformations are measured with a micrometer dial gauge. Void ratio are then calculated from these deformation readings. The test results are typically provided in tabular form or in the form of plots of void ratio versus applied stress (e-log p curves).

Organic Content: The Organic Content is determined according to ASTM D2974. The moisture content is first determined by drying portions of the sample at 105 degrees Celsius. The ash content is then determined by igniting the oven-dried sample from the moisture content determination in a muffle furnace at 440 degrees Celsius. The substance remaining after ignition is the ash. The organic content is expressed as a percentage by subtracting the percent ash from one hundred.

Direct Shear Tests: Direct shear tests are performed according to ASTM D3080 to determine the shear strength parameters of the soil. The specimen of soil is placed in a rigid box that is divided horizontally into two frames. The specimen is then confined under a vertical or normal stress and horizontal force is applied to fail the specimen along a horizontal plane at its mid-height.

Because drainage of the soil specimen cannot be easily controlled, undrained tests (i.e., UU and CU tests) are possible only on impervious soils and pore pressure measurements cannot be made. Drained tests (i.e., CD tests), however, are possible on all soil types. Since the drainage paths through the specimen are short and pore water pressures are dissipated fairly rapidly, the direct shear test is well suited to the CD test.

A minimum of three test specimens are required to establish the strength envelope of a soil. The soil parameters obtained are the cohesion and angle of internal friction.

Unconfined Compression Tests: The unconfined compression test is an unconsolidated-undrained triaxial shear test with no lateral confining pressure. This test is used to determine the shear strength of clayey soils. An unconfined compression test is performed according to ASTM D2166 on a single section of an undisturbed sample extruded from a sampling tube. The sample is trimmed to a length-to-diameter ratio of about 2 and placed in the testing device. Incrementally increasing vertical loads are applied until the sample fails. Test results are provided in the form of a stress-strain curve or a value representing the unconfined compressive strength of the sample.

Grain Size Tests: Grain Size Tests are performed to determine the soil classification and the grain size distribution. The soil samples are prepared for testing according to ASTM D421 (dry preparation) or ASTM D2217 (wet preparation). The grain size distribution of soils coarser than a number 200 sieve (0.074 mm opening) is determined by passing the samples through a standard set of nested sieves. Materials passing the number 200 sieve are suspended in water and the grain size distribution calculated from the measured settlement rate. These tests are conducted in accordance with ASTM D422.

Triaxial Shear Tests: Triaxial shear tests are used to determine the strength characteristics and friction angle of a given soil sample. Triaxial tests are also used to determine the elastic properties of the soil specimen. Triaxial shear tests are performed on several sections of a relatively undisturbed sample extruded from the sampling tube. The samples are trimmed into cylinders 1.4 to 2.8 inches in diameter and encased in rubber membranes. Each is then placed in a compression chamber and confined by all around water pressure. Samples are then subjected to additional axial and/or lateral loads, depending on the soil and the field conditions to be simulated. The test results are typically presented in tabular form or in the form of stress-strain curves and Mohr envelopes or p-q plots.

Three types of triaxial tests are normally performed. The most suitable type of triaxial test is determined by the loading conditions imposed on the soil in the field and the soil characteristics.

1. Consolidated-Undrained (designated as a CU or R Test).

2. Consolidated-Drained (designated as a CD or S Test).

3. Unconsolidated-Undrained (designated as a UU or Q Test).