CITY OF WACO

Purchasing Services
Post Office Box 2570
Waco, Texas 76702-2570
254-750-8062
Fax: 254-750-8063
www.waco-texas.com

Date: **06/27/2023**
RFQ No: **2023-029**
Commodity: **HWY 84 Wastewater System Improvements Phase 3-B**
Purchasing Agent: **Daryle Bullard**

Closing Time: 2:00 P.M. CST, Tuesday, July 29, 2023
Opening Time: 2:01 P.M. CST, Tuesday, July 29, 2023

RFQ Opening Location: Operations Center, Purchasing Services Office, 1415 N. 4th St., Waco, TX 76707

Addendum No: 1

The above-mentioned RFQ invitation has been changed in the following manner. **Sign and return addendum to the Purchasing Office by the closing time and date with your RFQ response**. Returning this page signed by your authorized agent will serve to acknowledge this change. All other requirements of the invitation remain unchanged. If you have any questions, please call or stop by the Purchasing Office at the above address.

1. **Geotechnical Documents and Technical Specifications**

Firm:_____

Address_____

Signature of Person
Authorized to Sign Bid:_____

Signor's Name and Title
(print or type):_____

E-mail Address:_____

Date:_____Telephone:_____Fax:_____

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

CITY OF WACO

HIGHWAY 84 CORRIDOR WASTEWATER SYSTEM IMPROVEMENTS PHASE 3
CONTRACT B
RFB 2023-029

ADDENDUM NO. 1

Date Issued: June 23, 2023

Prepared by Alan D. Rhames, PE 72089 06-23-2023
CDM Smith Inc Texas Registration No. F-3043

Bidders on this project are hereby notified that this addendum shall be attached to and made a part of the above-named Contract Documents and Technical Specifications, issued Friday, May 26, 2023.

The following items are issued to add to, modify, and clarify the Contract Documents and Technical Specifications and Drawings. These items shall have full force and effect as the Contract Documents and Technical Specifications, and cost involved shall be included in bid prices. Bids to be submitted on the specific bid date shall conform to the additions and revisions listed herein.

Acknowledge receipt of this addendum by designating receipt of the addendum on the first page of the Bid Proposal. Failure to do so may subject bidder to disqualification.

ADDITIONAL INFORMATION

a) Please see attached a MEETING SUMMARY detailing the proceedings of the Preconstruction Conference which is hereby incorporated into the bid documents by reference.
b) Please see attached a copy of the Geotechnical Investigation Report which is hereby incorporated into the bid documents by reference.

RESPONSES TO QUESTIONS RECEIVED:

a) Please see attached a document titled RESPONSES TO QUESTIONS which is hereby incorporated into the bid documents by reference. Note that the document addresses questions expressed during the preconstruction conference and questions received on CivCast.

REVISIONS TO CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS REVISIONS TO THE REQUEST FOR BID

In Appendix A, delete the CITY OF WACO OFFICIAL BID SHEET, pages 15 through 20 in its entirety and replace with the attached CITY OF WACO OFFICIAL BID SHEET, pages 15 through 20A labeled as Appendix 1. The bid sheet was updated to identify 30" ASTM D3262 FRP as the base bid items (16

and 18) and 30" ASTM F679 PVC as alternate bid items.

REVISIONS TO THE SPECIFICATIONS

None.

REVISIONS TO DRAWINGS

SHEET CP-3 – PLAN AND PROFILE 30" WASTEWATER LINE STA 10+00 TO STA 15+00

a) Delete the text in Note Number 5 in the note listing on the top right side of the page and replace with the following:

"TRENCH BACKFLL UNDERNEATH ANY ROADWAY OR THE CONCRETE TRAIL SHALL BE PLACED IN ACCORDANCE WITH PAVED AREAS IN ACCORDANCE WITH DETAIL E ON SHEET CD-3. FOR THE CONCRETE TRAIL ONLY, THE THICKNESS OF THE COMPACTED TYPE "A" BACKFILL MAY BE REDUCED TO INCLUDE SIX INCHES IMMEDIATELY BELOW THE CONCRETE PAVEMENT. FOR THE CONCRETE TRAIL ONLY, TRENCH BACKFLL MATERIAL BETWEEN THE TYPE "A" MATERIAL AND THE BEDDING ENVELOPE MUST BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY (TEX-113E) BUT SHALL BE COMPOSED OF STANDARD TRENCH BACKFILL MATERIAL OTHERWISE ALLOWED UNDER THE SPECIFCATIONS. TRENCH BACKFILL BELOW ALL OTHER PAVEMENT SHALL BE PLACED IN ACCORDANCE WITH DETAIL E ON SHEET CD-3 WITH NO MODIFICATION."

OTHER SHEET CHANGES:

a) Replace individual notes on the following sheets with the replacement note detailed above for Note 5 on Sheet CP-3:

Sheet CP-4, Note 4,
Sheet CP-5, Note 4,
Sheet CP-6, Note 3,
Sheet CP-7, Note 3,
Sheet CP-8, Note 3,
Sheet CP-9, Note 3,
Sheet CP-10, Note 4,
Sheet CP-11, Note 4,
Sheet CP-12, Note 4,
Sheet CP-13, Note 2, and,
Sheet CP-16, Note 2.

END OF ADDENDUM NO. 1

HIGHWAY 84 CORRIDOR WASTEWATER SYSTEM IMPROVEMENTS PHASE 3 CONTRACT B
CITY OF WACO RFB 2023-029
RESPONSES TO QUESTIONS

Note: Questions include those submitted on CivCast and those asked during the pre-bid meeting.

Question A: Is this a rebid from the January of 2022 bid? If so, can you please let me know why it is rebidding and if there were any major changes.

Response A: This project was bid in 2022, however the project was not awarded. Due to rapid price escalation, the bid amounts were significantly higher than anticipated and the City of Waco elected to delay construction approximately 18 months for budgeting purposes. The project documents represent an updated version of those issued for the prior bid but were updated to include the prior addenda items and other minor changes. The pipe alignment, sizes, depth, bores, etc. remain the same.

Question B: Who is responsible for the materials testing for the project?

Response B: The City of Waco typically provides for installed material testing with some conditions. Please refer to the Special Project Provisions, Section 14 for additional information on material testing requirements.

Question C: Is it acceptable to spoil some of the material generated by trenching on the surrounding park land or does spoil need to be hauled off?

Response C: The contract documents require all excess material generated by the project to be hauled off and disposed of offsite in a legal manner. Representatives of the City of Waco Water Utility Services will coordinate with Parks representatives to discern if Parks has any need for fill material, however, this information will not be available prior to the bid opening date. All bids submitted shall therefore be based on the assumption that all spoils will be hauled off.

Question D: According to the solicitation for this project, there is a soils report that was completed by Langerman Foster Engineering Company. Can you please forward us a copy of that report?

Response D: A copy of the soils report has been posted on CivCast and is referenced in Addendum 1. Note that the spoils report was prepared for a much larger overall project area (this bid is one of four independent, but related improvements), so only some of the bores are located within the proposed limits of construction for this project.

Question E: It was mentioned during the pre-bid meeting that the cost estimate would be updated. What is the current Engineer's Opinion of Probable Construction Cost (OPCC)?

Response E: The Engineer's OPCC is $5,400,000.

Question F: The plan and profile sheets depict topographic information at a one-foot contour interval. Is the CAD file for the topography available?

Response F: The CAD file associated with the topographic information shown on the drawings will not be issued during the bid phase. Project CAD files will be made available to the selected contractor following execution of a standard release document.

Question G: Approximately how much of the existing concrete hike-and-bike trail is proposed for replacement?

Response G: Approximately 4,400 LF of the alignment more-or-less parallels the concrete hike-and-bike trail. Bid Item 51 includes the full width replacement of 3,200 linear feet of the trail, or approximately 73 percent of the coincident length. Should the contractor elect to remove more concrete hike and bike trail than is indicated on the drawings for removal, replacement of such trails shall be made at no additional contract cost to the Owner. Should a Bidder anticipate removal of more trail than indicated in the bid form, the cost of replacement of the additional trail removed will not be made separately but shall be considered subsidiary to items and quantities included in the Bid Form.

Question H: For the 30" line which allows FRP or PVC pipe, do bidders need to declare the type of pipe being proposed at the time of bid?

Response H: Bid Item 16 in the Bid Form is modified by Addendum 1 to include 30-inch ASTM D3262 PS72 FRP Pipe as the base bid item and ASTM F679 PS115 (SDR26) PVC Pipe as an alternate bid item. Bidders shall therefore provide a price for both types of pipe material. After the bid opening, the Owner will select the option it prefers based on the terms and conditions of the bid documents.

HIGHWAY 84 CORRIDOR WASTEWATER SYSTEM IMPROVEMENTS PHASE 3 CONTRACT B
CITY OF WACO RFB 2023-029
PREBID MEETING SUMMARY

Date: June 13, 2023
Time: 10:00 AM
Location Trail Blazer Park, 1101 Harris Creek Road, McGregor, Texas 76657

Attendees: Linda Dvorak, City of Waco
Daryle Bullard, City of Waco
Brett Haines, TTG Utilities
Shay Fanning, Blackrock Construction
Dustin Barber, S.J. Louis Construction
Keith Meitzler, Belt Construction
Jesus Hernandez, Skyblue Utilities
Alan Rhames, CDM Smith

A mandatory pre-bid meeting was held for the Highway 84 Corridor Wastewater System Improvements Phase 3 Contract B project. The following is a summary of the proceedings.

Daryle Bullard, Purchasing Agent for the City of Waco, called the meeting to order shortly after 10:00 AM. Darryl provided a brief overview of the bid process including the following items of note:

- The prebid meeting is mandatory – all attendees must sign in to document their presence.
- Bids close June 29, 2023 at 2:00 PM. Bid will be opened immediately following the closing. This bid opening will be virtual. A link to the zoom meeting is included in the bid documents.
- The bid submission procedures were reviewed. Darlye cautioned bidders to make sure bids were submitted in time as no late bids will be accepted or opened by the City.
- The question period closes at 5:00 PM on June 21st, 2023.
- Refer the bid documents for other bid submission and contract requirements.

Daryle introduced Linda Dvorak, Project Manager for the City of Waco. Linda provided a brief overview of the project goals of the City of Waco Utilities Department and subsequently asked Alan Rhames, Project Engineer with CDM Smith to provide a project summary. Alan subsequently noted the following:

- The project is primarily intended to connect an existing manhole in Harris Creek Road on the west (upstream) end of the project with a line located just upstream of the Church Road Lift Station on the east end of the project. Several system connections are proposed along the alignment.
- The project includes about 7,560 linear feet of wastewater gravity piping, mostly composed of 30” pipe with smaller quantities of 4, 6, 8, 12 and 27-inch pipe.
- The project includes 275 linear feet of steel casing. 200 linear feet of the casing will be installed by bore under Old Lorena Road (a TxDOT right-of-way) and 75 linear feet of casing will be installed by open cut adjacent to an existing culvert.
- A TxDOT permit for the utility installation at Old Lorena Road has been issued. The Contractor will need to obtain a traffic control/right-of-way permit directly from TxDOT.

- An existing 12-inch wastewater line along the project alignment will be abandoned once the new line is in service. The old line will be filled with flowable fill.
- Lines that currently flow into the 12-inch wastewater line will be converted to flow to the new pipeline instead.
- Several existing manholes will be abandoned per details included in the drawings.
- The project parallels a concrete hike and bike trail for about 4,400 linear feet. Alan anticipates that about 70% of the trail will need to be removed and replaced to allow for construction; sections to be removed are noted on the plans.
- Several trail appurtenances exist adjacent to the trail including plaques, decorative bricks, trash cans, etc. The Contractor will be required to remove and replace these items as necessary to complete the construction. Removal and replacement of such items will not be paid for separately but shall be considered subsidiary to actual bid items.
- The City expects the Contractor to conduct operations in a manner that will seek to minimize the time the trail is out of service. While the City understands that the trail will need to be closed for a period of time, the Contractor is expected to plan and execute the work efficiently to minimize trail down time. Close coordination with Parks officials will be necessary.
- The project also includes work in the park access roadway which will necessitate pavement repair. The drawings (see Sheet G-3 and others) require that the Contractor maintain access to the park at all times. The City anticipates this will require the placement and removal of temporary driving surfaces while active work is occurring in the access drive.
- All disturbed ground is to be returned to a condition equal or superior to that which existed immediately prior to the commencement of construction. The Contractor shall video all areas anticipated to be disturbed prior to commencing active construction for use a documentation of preexisting conditions.
- The Engineer's opinion of probable construction cost listed in the bid documents is outdated. The current estimate is $5,400,000.
- At least one Addendum will be issued. Bidders shall note receipt of all addendums in their bid submittal.

Following Alan's summary, the floor was opened for questions. Written responses to these questions are included in the *Responses to Questions* document included with Addendum 1. The following questions were asked:

- For the 30" line which allows FRP or PVC pipe, do bidders need to declare the type of pipe being proposed at the time of bid?
- Approximately how much of the existing concrete hike-and-bike trail is proposed for replacement?
- The plan and profile sheets depict topographic information at a one-foot contour interval. Is the CAD file for the topography available?
- Is it acceptable to spoil some of the material generated by trenching on the surrounding park land or does spoil need to be hauled off?

Following the questions, Daryle Bullard reminded all in attendance to sign in, thanked everyone for their interest in the project and adjourned the meeting.

CITY OF WACO
OFFICIAL BID SHEET
BID INVITATION NO: RFB 2023-029

Highway 84 Corridor Wastewater System Improvements Phase 3 Contract B

DATE: _____

BIDDER: _____

I. Review the RFB before completing Bid Sheet.
   a. Price: quote your best price, F.O.B. Destination, on each item.
   b. Price: includes labor, materials, and equipment needed to perform all of the work.

II. In submitting this bid, I certify:
   a. Items bid are in exact accordance with specifications, unless noted in bid.
   b. That prices in this bid have been arrived at independently, without consultation or agreement with any competitor for the purpose of restricting competition.

AUTHORIZED
SIGNATURE: _____

Item No.	Estimated Quantity	Unit	Item Description	Unit Price In Figures	Amount In Figures
			BASE BID		
1	1	LS	Mobilization and Demobilization Related Expenses per Special Project Provision Section 1.3.	$_____	$_____

Item No.	Estimated Quantity	Unit	Item Description	Unit Price In Figures	Amount In Figures
2	1	LS	Bonds and Insurance Related Expenses per Special Project Provision Section 1.4.	$_____	$_____
3	1	LS	Storm Water Pollution Prevention Plan (SWPPP) as required by the contract documents.	$_____	$_____
4	1	LS	Storm Water Pollution Prevention Plan (SWPPP) Implementation, including installing all erosion and sedimentation control devices including silt fence and rock berm shown on the drawings and other required temporary sedimentation and erosion control best management practices as required by the SWPPP plan, complete in place as detailed and specified.	$_____	$_____
5	4	EA	Installation of Stabilized Construction Entrance in Accordance with Detail D, Sheet CD-3 as shown on the plans or in locations identified by the Inspector, including installation, maintenance and removal, complete in place as detailed and specified.	$_____	$_____
6	1	LS	Site and Right-of-Way Preparation, including clearing, grubbing, complete in place as detailed and specified.	$_____	$_____
7	1	LS	Traffic Control Plan (for roadways, driveways and concrete trails), all locations, including engineered traffic control plans, as required by the contract documents.	$_____	$_____
8	1	LS	Traffic Control Plan Implementation (for roadways, driveways and concrete trails), all locations, complete in place as detailed and specified.	$_____	$_____
9	1	LS	Trench Safety Plan, including engineered trench safety plans, as required for all pipe trenches and excavations deeper than 5 feet, as required by the contract documents.	$_____	$_____
10	7,391	LF	Trench Safety Plan Implementation, including engineered trench safety plans, as required for all pipe trenches and excavations deeper than 5 feet, complete in place as detailed and specified.	$_____	$_____
11	53	LF	Furnish and Install 4-inch ASTM D3034 SDR26 PVC Pipe (Open Trench Construction), including fittings, excavation, dewatering, bedding, backfill, and trench surface restoration, complete in place as detailed and specified.	$_____	$_____
12	40	LF	Furnish and Install 6-inch ASTM D3034 SDR26 PVC Pipe (Open Trench Construction), including fittings, excavation, dewatering, bedding, backfill, and trench surface restoration, complete in place as detailed and specified.	$_____	$_____

Item No.	Estimated Quantity	Unit	Item Description	Unit Price In Figures	Amount In Figures
13	85	LF	Furnish and Install 8-inch ASTM D3034 SDR26 PVC Pipe (Open Trench Construction), including fittings, excavation, dewatering, bedding, backfill, and trench surface restoration, complete in place as detailed and specified.	$_____	$_____
14	21	LF	Furnish and Install 12-inch ASTM D3034 SDR26 PVC Pipe (Open Trench Construction), including fittings, excavation, dewatering, bedding, backfill, and trench surface restoration, complete in place as detailed and specified.	$_____	$_____
15	25	LF	Furnish and Install 27-inch ASTM F679 PS115 (SDR26) PVC Pipe (Open Trench Construction), including fittings, excavation, dewatering, bedding, backfill, and trench surface restoration, complete in place as detailed and specified.	$_____	$_____
16	7,054	LF	Furnish and Install 30-inch ASTM D3262 PS72 FRP Pipe, (Open Trench Construction), including fittings, excavation, dewatering, bedding, backfill, and trench surface restoration, complete in place as detailed and specified.	$_____	$_____
17	7	LF	Furnish and Install 30-inch ASTM F679 PS115 (SDR26) PVC (Open Trench Construction), including fittings, casing spacers, end seals, and appurtenances, complete in place as detailed and specified.	$_____	$_____
18	275	LF	Furnish and Install 30-inch ASTM D3262 PS72 FRP Pipe inside Steel Casing, including fittings, casing spacers, end seals, and appurtenances, complete in place as detailed and specified.	$_____	$_____
19	200	LF	Furnish and Install 42-inch Steel Casing by Bore, including grouting of the annular space, including 42” Diameter, 1/2” Wall Steel Casing Pipe, complete in place as detailed and specified.	$_____	$_____
20	75	LF	Furnish and Install 42-inch Steel Casing by Open Cut, including excavation, bedding, backfill, 42” Diameter, 1/2” Wall Steel Casing Pipe, complete in place as detailed and specified.	$_____	$_____
21	9	EA	Install 3-Foot Wide Clay Plug from Bottom of Trench to 2-feet above the Bedding Envelope, full width of trench, complete in place as detailed and specified.	$_____	$_____
22	3	EA	Furnish and Install 6-Foot Diameter Precast Manhole, 8.0-Foot to 16.0-Foot Depth including appurtenances, complete in place as detailed and specified.	$_____	$_____
23	10	EA	Furnish and Install 6-Foot Diameter Precast Manhole, 16.0-Foot to 20.0-Foot Depth including appurtenances, complete in place as detailed and specified.	$_____	$_____
24	8	EA	Furnish and Install 6-Foot Diameter Precast Manhole, 20.0-Foot Depth and greater including appurtenances, complete in place as detailed and specified.	$_____	$_____

Item No.	Estimated Quantity	Unit	Item Description	Unit Price In Figures	Amount In Figures
25	1	LS	Modify Existing Manhole near Harris Creek Road (for 8" WW Line), including wastewater bypass pumping, cut and plug existing lines, filling with concrete, reshaping invert, backfill, raising the manhole, coating and all appurtenances, complete in place as detailed and specified.	$_____	$_____
26	4	EA	Encase Bottom of Manholes in Flowable Fill, complete in place as detailed and specified.	$_____	$_____
27	1	LS	Construct and Install Junction Box B-2 on Existing 21" Wastewater Line, including excavation, bedding, backfill, subgrade prep, connection to existing lines, temporary plugs, grouting, invert, coating, wastewater bypass pumping and appurtenances, complete in place as detailed and specified.	$_____	$_____
28	1	LS	Abandon Manhole 9 by removing manhole structure to at least 12" below the existing 8" pipe and abandon remaining manhole structure per Detail D, Sheet CD-2, including excavation, pipe connections, fittings, adapters, backfill temporary plugs, wastewater bypass pumping, temporary piping, property owner coordination and appurtenances, complete in place as detailed and specified.	$_____	$_____
29	1	LS	Abandon Manhole 17 by removing manhole structure to at least 12" below the existing 8" pipe and abandon remaining manhole structure per Details D, Sheet CD-2, including excavation, pipe connections, fittings, adapters, backfill temporary plugs, wastewater bypass pumping, temporary piping, property owner coordination and appurtenances, complete in place as detailed and specified.	$_____	$_____
30	1	LS	Abandon Manhole 20 by removing manhole structure to at least 12" below the existing 4" pipe and abandon remaining manhole structure per Detail D, Sheet CD-2, including excavation, pipe connections, fittings, adapters, backfill temporary plugs, wastewater bypass pumping, temporary piping, property owner coordination and appurtenances, complete in place as detailed and specified.	$_____	$_____
31	73	LF	Abandon Existing 10-Inch Wastewater Line per notes on Sheet G-3, including excavation, grouting with CLSM (flowable fill), plugs, caps, backfill and appurtenances, complete in place as detailed and specified.	$_____	$_____
32	6,700	LF	Abandon Existing 12-Inch Wastewater Line per notes on Sheet G-3, including excavation, grouting with CLSM (flowable fill), plugs, caps, backfill and appurtenances, complete in place as detailed and specified.	$_____	$_____

Item No.	Estimated Quantity	Unit	Item Description	Unit Price In Figures	Amount In Figures
33	1	EA	Connect New 27-Inch Pipe to Existing 27-Inch Line at Harris Creek Road, including excavation, bedding, removing existing plug, managing wastewater, wastewater bypass pumping, backfill and appurtenances, complete in place as detailed and specified.	$_____	$_____
34	1	EA	Connect New 30-Inch Pipe to Existing 30-Inch Line near Old Lorena Road, including excavation, bedding, removing existing plug, managing wastewater, wastewater bypass pumping, backfill and appurtenances, complete in place as detailed and specified.	$_____	$_____
35	1	LS	Leak Testing of 4, 6 and 8-inch Wastewater Pipeline, complete in place as detailed and specified.	$_____	$_____
36	1	LS	Leak Testing of 12-inch Wastewater Pipeline, complete in place as detailed and specified.	$_____	$_____
37	1	LS	Leak Testing of 27-inch Wastewater Pipeline, complete in place as detailed and specified.	$_____	$_____
38	1	LS	Leak Testing of 30-inch Wastewater Pipeline, complete in place as detailed and specified.	$_____	$_____
39	1	LS	Mandrel Testing of 4, 6 and 8-inch Wastewater Pipeline, complete in place as detailed and specified.	$_____	$_____
40	1	LS	Mandrel Testing of 12-inch Wastewater Pipeline, complete in place as detailed and specified.	$_____	$_____
41	1	LS	Mandrel Testing of 27-inch Wastewater Pipeline, complete in place as detailed and specified.	$_____	$_____
42	1	LS	Mandrel Testing of 30-inch Wastewater Pipeline, complete in place as detailed and specified.	$_____	$_____
43	22	EA	Testing of New Manholes (including Junction Box B-2), complete in place as detailed and specified.	$_____	$_____
44	1	LS	Testing of Modified Existing Manholes, complete in place as detailed and specified.	$_____	$_____
45	10	EA	Abandon Existing Manholes in Accordance with Detail D, Sheet CD-2, all depths, complete in place as detailed and specified.	$_____	$_____
46	1	LS	Rock Rubble Apron Over 30-Inch Wastewater Line Near Station 10+40, including excavation, materials, backfill and appurtenances, complete in place as detailed and specified.	$_____	$_____

Item No.	Estimated Quantity	Unit	Item Description	Unit Price In Figures	Amount In Figures
47	2,578	SY	Full Width Replacement of Park Access Asphalt Drive including demolition, hauling, excavation, subgrade prep, 12-inch thick crushed limestone base (2' wider than the asphalt both sides), 2-inch thick hot mix asphaltic pavement, striping, shoulder backfill and appurtenances, complete in place as detailed and specified, per square yard of finished asphalt surface.	$_____	$_____
48	1	LS	City of Waco Project Sign, per Detail E, Sheet CD-4, installed in a location to be identified by the Owner, complete in place as detailed and specified.	$_____	$_____
49	9	EA	Manhole Delineator Post per Detail F, Sheet CD-3, installed in locations to be identified by the Owner, complete in place as detailed and specified.	$_____	$_____
50	1	LS	Trench Repair in Harris Creek Road in Accordance with Detail E, Sheet CD-3, complete in place as detailed and specified.	$_____	$_____
51	3,200	LF	Full Width Replacement of Concrete Trail, including demolition, hauling, subgrade prep, concrete pavement, joints, shoulder backfill and appurtenances, complete in place as detailed and specified, per linear foot of trail for all widths.	$_____	$_____
52	1	LS	Revegetation of All Areas Disturbed by Construction, including labor, materials, topsoil, seed, fertilizer, watering, fine grading and appurtenances, complete in place as detailed and specified.	$_____	$_____
53	1	LS	Relocation of Existing 16" Water Line at Approximate Station 5+65 per Detail D, Sheet CD-1, complete in place as detailed and specified.	$_____	$_____
54	150	LF	Additional Installation of Rock Berm in Accordance with Detail A, Sheet CD-3 in additional locations identified by the Inspector, including installation, maintenance and removal, complete in place as detailed and specified.	$_____	$_____
55	500	LF	Additional Installation of Silt Fence in Accordance with Detail H, Sheet CD-2 in locations identified by the Inspector, including installation, maintenance and removal, complete in place as detailed and specified.	$_____	$_____
56	1	LS	Furnish, Install and Remove Provisions for Temporary Vehicle Access Across Easement Areas, complete in place as required for temporary vehicle and equipment access in all locations.	$_____	$_____

Item No.	Estimated Quantity	Unit	Item Description	Unit Price In Figures	Amount In Figures
TOTAL BASE BID AMOUNT (ITEMS 1-56)					
$_____ Words				$_____ Figures	
BID ALTERNATE A					
57A	-7,054	LF	Furnish and Install 30-inch ASTM D3262 PS72 FRP Pipe, (Open Trench Construction), including fittings, excavation, dewatering, bedding, backfill, and trench surface restoration, complete in place as detailed and specified.	$_____	$_____
58A	7,054	LF	Furnish and Install 30-inch ASTM F679 PS115 (SDR26) PVC Pipe, (Open Trench Construction), including fittings, excavation, dewatering, bedding, backfill, and trench surface restoration, complete in place as detailed and specified.	$_____	$_____
59A	-275	LF	Furnish and Install 30-inch ASTM D3262 PS72 FRP Pipe inside Steel Casing, including fittings, casing spacers, end seals, and appurtenances, complete in place as detailed and specified.	$_____	$_____
60A	275	LF	Furnish and Install 30-inch ASTM F679 PS115 (SDR26) PVC Pipe inside Steel Casing, including fittings, casing spacers, end seals, and appurtenances, complete in place as detailed and specified.	$_____	$_____
TOTAL BID AMOUNT FOR ALTERNATE A (ITEMS 57A–60A) PLUS BASE BID AMOUNT (ITEM Nos. 1 – 56)					
$_____ Words				$_____ Figures	

COMPLETED FORM MUST BE RETURNED WITH BID

LANGERMAN FOSTER ENGINEERING COMPANY

January 8, 2020

CDM Smith
9430 Research Boulevard, Suite 1-200
Austin, Texas 78759

Attention: Ms. Alexandra Doody, P.E.

Reference: Limited Geotechnical Investigation Report
Wastewater Interceptor
Waco, Texas
LFE Project No. W19-111

Dear Ms. Doody:

This letter transmits our geotechnical report, which has been electronically produced. We appreciate the opportunity to provide engineering services for you.

Once the project plans and specifications are completed, we would be pleased to review those portions that pertain to this report. We would also appreciate the opportunity to provide construction phase services such as materials testing as a part of the success of the project. If you have any questions regarding our report, please call me at (254) 235-1048.

Best Regards,

LANGERMAN FOSTER ENGINEERING COMPANY
Texas Registered Engineering Firm No. F-13144

Scott M. Langerman, P.E.
Principal / Geotechnical Engineer

Distribution List:

- CDM Smith- Ms. Alexandra Doody, P.E. (DoodyAT@cdmsmith.com)
- CDM Smith- Mr. Alan Rhames, P.E. (RhamesAD@cdmsmith.com)

LANGERMAN FOSTER
ENGINEERING COMPANY

LIMITED GEOTECHNICAL INVESTIGATION

Wastewater Interceptor

Waco, Texas

LFE Project No. W19-111

Report Prepared For:

CDM Smith
Austin, Texas

Report Prepared By:

Scott M. Langerman, P.E.
Principal / Geotechnical Engineer

STATE OF TEXAS
SCOTT MILES LANGERMAN
82700
LICENSED
PROFESSIONAL ENGINEER

January 8, 2020

LANGERMAN FOSTER
ENGINEERING COMPANY
2000 South 15th Street, Waco, Texas 76706
Ph: 254/235-1048 www.LFEctx.com

LANGERMAN FOSTER
ENGINEERING COMPANY

LIMITED GEOTECHNICAL INVESTIGATION
WASTEWATER INTERCEPTOR
WACO, TEXAS

1.0 INTRODUCTION

Purpose: The purpose of this limited geotechnical investigation is to provide geotechnical field and laboratory test results as well as comments regarding excavatability. Geotechnical data are provided in a brief, and hopefully user friendly manner.

Authorization: Services were performed in general accordance with LFE Proposal No. GEO19-014R1, dated November 11, 2019, and a CDM Smith Agreement, dated November 12, 2019. CDM Purchase Order No. 93135 was provided on December 6, 2019.

2.0 SUBSURFACE EXPLORATION

Drilling Dates: December 18 and 19, 2019.

Boring Layout: The borings were staked in the field by LFE personnel based on a site plan provided by CDM Smith. Plates 1 and 2 show the approximate boring locations.

If precise location and elevation data are desired, then a licensed professional land surveyor should be retained to locate the borings and determine the ground surface elevations.

Sampling Methods: Push-tubes and a split-spoon were used to sample the soils. The split spoon sampler was used in conjunction with standard penetration tests, and N-Values were recorded on the boring logs. Limestone was cored in Borings B-2 and B-7 with an NX-size (2-inch) cutting bit, and water was used to cool the bit and discharge cuttings.

3.0 LABORATORY TESTS

Test Procedures: The following tests were conducted in general conformance with the standards noted in Table 3.1.

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TABLE 3.1: LABORATORY TESTS	
Test Name	***Test Method***
Atterberg Limits	ASTM D 4318
-#200 Mesh Sieve	ASTM D 1140
Moisture Content	ASTM D 2216
Soil Classification	ASTM D 2487
Unconfined Compression (clay)	ASTM D 2166
Unconfined Compression (rock)	ASTM D 2938

Test Results: Laboratory test results are shown on Plate 3 in the Appendix, and selected test results on the boring logs.

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4.0 SUBSURFACE MATERIALS AND GROUNDWATER

Stratigraphy: Major strata types for the borings are listed in Tables 4.1A and 4.2B. Individual boring logs are contained in the Appendix. Material descriptions are general and range of depths approximate because boundaries between different strata are seldom clear and abrupt in the field.

TABLE 4.1A: MAJOR STRATA TYPES (BORINGS B-1 THROUGH B-7)

Strata	*Depth to Top of Strata (ft)*	*Depth to Base of Strata (ft)*	*General Description*
I	0	2.5 to 10	FILL- CLAYEY SAND/GRAVEL, SANDY LEAN CLAY, and LEAN CLAY; tan to red-brown (FILL was only logged in Borings B-6 and B-7)
II	2.5 to 10	6.5 to 18.5	FAT CLAY, SANDY LEAN CLAY, LEAN CLAY, GRAVELLY FAT CLAY, and CLAYEY SAND/GRAVEL; dark brown, tan, and gray
III	6.5 to 18.5	10 to 23.5	SEVERELY WEATHERED LIMESTONE; tan, consists of a mixture of marly clay and broken limestone
IV	10 to 23.5	30+	WEATHERED LIMESTONE and LIMESTONE; tan to gray
Strata changes are approximate, and in-situ transitions are usually gradual.			

TABLE 4.1B: MAJOR STRATA TYPES (BORING B-8)

Strata	*Depth to Top of Strata (ft)*	*Depth to Base of Strata (ft)*	*General Description*
I	0	23	SANDY LEAN CLAY and FAT CLAY; tan, brown, and gray
II	23	30+	CLAYSHALE; gray to dark gray
Strata changes are approximate, and in-situ transitions are usually gradual.			

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Geology:

Based on the available geologic map[(1)] of the area (see Figure 4.1) and the contents of the borings, the wastewater interceptor route traverses the *Del Rio (Grayson Marl)* and *Main Street* Formations, with Alluvial and Terrace Deposits along a portion.

The *Del Rio* and *Main Street* are primary geologic formations that were deposited in a marine environment during the Cretaceous Period (at least 60 million years ago). Alluvial and Terrace Deposits are more recent, typically less than 10,000 years ago.

There are not any mapped faults within the route, nor did the borings suggest the presence of faults.

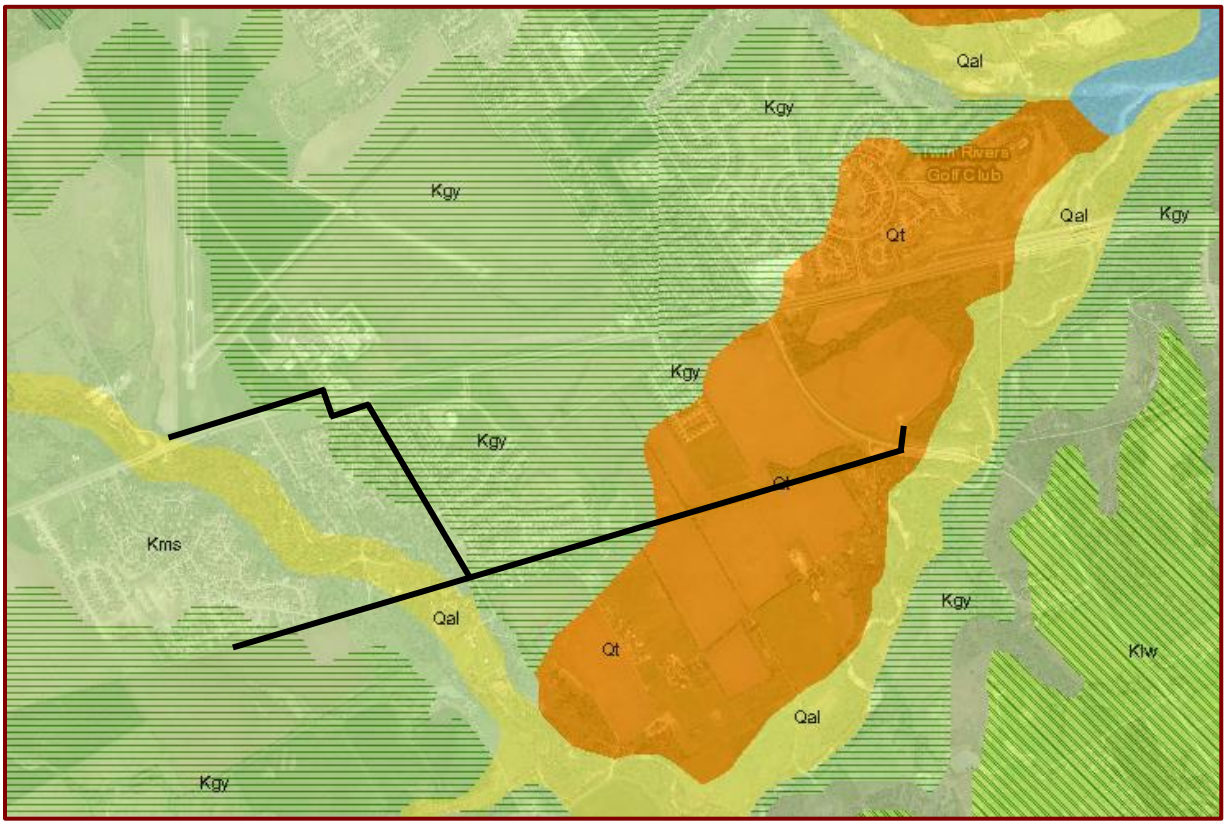

Figure 4.1: Geology Map[(1)]. Kgy is the Del Rio (green striped), Kms is the Main Street Formation (light green). Qal is Alluvial Deposits (yellow), and Qt is Terrace Deposits (orange).

The *Del Rio* Formation, is composed of shale that has weathered to form highly expansive clay soils. Along most of the route, the *Del Rio* forms a relatively thin layer of soils that overlie limestone of the *Main Street* Formation. At the lift station (Boring B-8), Del Rio was present within the

full depth of the boring with clay in the upper 23 feet followed by clayshale from 23 to 30 feet. Clayshale is partially weathered shale that is harder than clay, but not hard enough to be classified as shale.

The *Main Street* is considered a relatively soft limestone based on universal rock classification systems, but is considered relatively hard rock in the Central Texas area. Although the *Main Street* is usually described as limestone, it is comprised of interbedded layers of limestone and marl (marl is calcareous clay). The unweathered *Main Street* is gray in color, and was logged in all of the borings except B-1 and B-8.

The soil profile over the limestone consists primarily of surficial clay that transitions into severely weathered limestone. These are residual soils produced by weathering of the parent shale and limestone over a period of at least 60 million years.

Severely weathered limestone is a transition between clay and rock. Its composition varies from clayey sand and gravel to lean clay. For discussion purposes in this report, weathered limestone and limestone are rock-like while severely weathered limestone is soil-like. However, severely weathered limestone may contain large rock fragments or boulders. Severely weathered limestone may also have layers of expansive clay soil.

Alluvial and Terrace Deposits are derived from ancient meandering paths and flood events of the South Bosque River and Harris Creek. Due to the inconsistent means of deposition, the deposits vary both horizontally and vertically in content and engineering properties. From a geologic perspective, terrace deposits are considered recent, and generally consist of clay, sand, and gravel soils.

Groundwater:

Boring B-1 was drilled to a depth of 15 feet using dry methods, meaning that water was not used in the drilling process. Groundwater was not observed during drilling.

Borings B-2 through B-7 were drilled to depths of 10 to 25 feet prior to using water in the rock core drilling process. Water was used to cool the cutting bit and discharge cuttings. Groundwater was not observed prior to using drilling water to core.

Boring B-8 was drilled to a depth of 30 feet using dry methods, meaning that water was not used in the drilling process. Groundwater was not observed during drilling. However, groundwater was logged at a depth of about 10 feet in a previous boring that was drilled near the lift station.

Although not encountered during our field exploration, groundwater is common in this area, and will likely be present during construction. The water tends to percolate down through the surficial soils until encountering a relatively impervious layer, and then either flow down gradient or become trapped.

The water observations conducted for this investigation are short-term and should not be interpreted as a groundwater study. However, the presence of groundwater will likely affect construction and long-term performance of the proposed wastewater line.

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5.0 EXCAVATIONS AND OSHA SOIL TYPES

Excavations:

The following paragraphs contain general comments regarding below grade excavations. Excavation characteristics, design of temporary support systems, and dewatering methods are the sole responsibility of the contractor. Accordingly, the following statements should be regarded only as opinions.

The surficial soils consist of clay and clayey sand/gravel. Excavations in the clay and clayey sand/gravel materials can be accomplished with conventional earth moving equipment.

Severely weathered limestone is a variable mixture of broken limestone and marly clay, and can generally be excavated with conventional earth moving equipment. Sometimes boulders are present.

Excavations in weathered limestone and limestone of the Main Street Formation are described as having a degree of difficulty of "moderate to very high"[(2)]. Therefore, the contractor should carefully the choice of rock excavating equipment. Hoe rams or other specialized excavation equipment may be needed.

Strength tests in weathered limestone and limestone ranged from 64 to 278 tons per square foot (about 900 to 3,900 psi). Normal concrete has a strength of about 3,000 psi, therefore harder layers of the rock exceed the strength of concrete.

We advise that the contractor evaluate the excavation potential with test pits. Although weathered limestone and limestone contain discontinuities in the form of marly layers and fractures, it should not be inferred that these features will facilitate excavation of the predominant massive rock. In addition, the term "weathered limestone" is based on visual observations of the rock without regard to strength or hardness.

Clayshale was logged in Borings B-8 at depths of 23 feet, and is considered a soft rock. In general, we believe that this material can be excavated with conventional equipment; however, it will be a slower process, and a large, heavy-duty excavator will likely be needed.

The design of temporary excavation support systems, trench safety systems, and slope stability for temporary open cut excavations were excluded from our scope of services. The contractor is solely responsible for designing and constructing stable, temporary excavations and must shore, slope, or bench the sides of the excavations as required to maintain

stability of both the excavation sides and bottom. All excavations must comply with applicable local, state, and federal safety regulations, including current OSHA Excavation and Trench Safety Standards. Construction site safety is generally the sole responsibility of the contractor, who shall also be responsible for the means, methods, and sequencing of construction operations. We are providing information in this report solely as a service to our client. Under no circumstances should the provided information be interpreted to mean that LFE is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and must not be inferred.

In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. Specifically, the current OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926 must be followed. The contractor's "responsible person" as defined in 29 CFR Part 1926, must evaluate the materials exposed in the excavations as part of the contractor's safety procedures. If an excavation, including a trench, is extended to a depth of more than twenty (20) feet, it will be necessary to have the side slopes designed by a professional engineer licensed in the State of Texas. The contractor's "responsible person" must establish a minimum lateral distance from the crest of the slope for vehicles, spoil piles, or other surcharge loads. Likewise, the contractor's "responsible person" shall establish protective measures for exposed slope faces.

The contractor must include the proximity to adjacent features when planning their method of excavation and support. These features include, but are not limited to, adjacent structures and utility lines. The contractor must also be prepared to manage varying amounts of subsurface water. Dewatering quantities will depend on drainage features, any groundwater, and rainfall prior to and during construction.

We have been requested to provide OSHA soil types. The predominant strata observed in the borings drilled for this investigation have been classified according to the system provided in Appendix A to Subpart P of 29 CFR Part 1926. Based on that classification system, and the results of our field and laboratory tests, the predominant strata have the classifications listed in Table 5.1.

Retention systems must be designed by a professional engineer licensed in the State of Texas with experience in designing such systems.

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TABLE 5.1: OSHA SOIL CLASSIFICATIONS		
General Description	***OSHA Soil Type[(1)]***	***Maximum Allowable Slope[(2)]***
CLAY	B	1 (H) : 1 (V)
CLAYEY SAND/GRAVEL	C	1.5 (H) : 1 (V)
SEVERELY WEATHERED LIMESTONE	C	1.5 (H) : 1 (V)
WEATHERED LIMESTONE, LIMESTONE and CLAYSHALE[(3)]	A	0.75 (H) : 1 (V)

[(1)]All soil that is submerged or soil from which water is freely seeping is classified as Type C, which has a maximum allowable slope of 1.5 (H) : 1 (V).

[(2)]Only for excavations less than 20 feet in depth.

[(3)]The allowable slope angle for weathered limestone, limestone, and clayshale may need to be flatter if high angle fractures or sloped bedding planes, joints, or soft layers are present.

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6.0 DESIGN REVIEW AND LIMITATIONS

Design Review: The recommendations contained in this report were based on preliminary site plans and design information provided by the Client. Our recommendations may not be applicable if changes have been made to the original information that formed the basis for this report, and we must be retained to make such a determination if such changes have been made. We also must be given the opportunity to review construction documents to affirm that our recommendations have been interpreted correctly. We cannot be responsible for misinterpretations if not given the opportunity to review aspects of the project that are based on the contents of this report. Such a review is considered an additional service.

Limitations: This report has been prepared for the exclusive use of our client and their designated project design team. Preparation of the report has been performed using that degree of care and skill ordinarily exercised under similar conditions by reputable geotechnical engineers practicing in the same locality. No warranties, express or implied, are intended or made.

As stated in the attachment "Important Information about Your Geotechnical Engineering Report", the subsurface conditions are interpreted from samples taken only at the boring locations. During construction, variations will be encountered, and will require interpretation by LFE to verify the adequacy of the geotechnical recommendations. Other concerns and limitations are discussed in the attachment.

This investigation did not include environmental testing or evaluations, and does not address whether landfilling operations, as defined by the State of Texas, have occurred on the property. An environmental professional should be retained to address environmental issues.

7.0 REFERENCES:

1. Geologic Atlas of Texas, Waco Sheet, Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas 1970.

2. Garner, L.E. & Young, K.P., "Environmental Geology of the Austin Area: An Aid to Urban Planning," Report of Investigations No. 86, Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas 1976.

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APPENDIX

Site Location Map
Boring Location Sketch
Laboratory Test Results
Boring Logs
Important Information about Your Geotechnical Engineering Report

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SITE LOCATION MAP

WASTEWATER INTERCEPTOR
WACO, TEXAS
LFE PROJECT NO. W19-111

PLATE

1

LANGERMAN FOSTER ENGINEERING COMPANY	**BORING LOCATION SKETCH** WASTEWATER INTERCEPTOR WACO, TEXAS LFE PROJECT NO. W19-111	**PLATE** **2A**

LANGERMAN FOSTER ENGINEERING COMPANY	**BORING LOCATION SKETCH** WASTEWATER INTERCEPTOR WACO, TEXAS LFE PROJECT NO. W19-111	**PLATE** **2B**

Boring No.	Sample Depth (ft.)	Liquid Limit	Plastic Limit	Plasticity Index	Percent Passing No. 200 Sieve	Moisture Content (%)	Unit Dry Weight (pcf)	Unconfined Compressive Strength (tsf)	Strain at Failure (%)
B-1	2.0 - 4.0	68	24	44	95	31			
B-1	4.0 - 6.0					18	110.5	2.8	7.0
B-1	8.0 - 10.0	33	14	19	58	19			
B-1	13.5 - 15.0				17	9			
B-2	2.0 - 4.0	66	23	43	28	10			
B-2	4.0 - 6.0				26	10			
B-2	6.5 - 6.8				55	10			
B-2	13.6 -							132.9	1.5
B-2	18.3 -							138.2	1.8
B-2	22.1 -							232.1	1.9
B-3	2.0 - 4.0	75	25	50	81	31			
B-3	4.0 - 6.0				72	24			
B-3	6.5 - 8.0	52	17	35	24	10			
B-3	8.5 - 9.0				24	10			
B-3	12.4 -							278.0	1.9
B-3	19.0 -							72.0	1.8
B-3	21.8 -							242.0	2.1
B-4	2.5 - 4.0	61	22	39	92	24			
B-4	4.5 - 6.0	61	20	41	26	6			
B-4	6.5 - 6.9				42	8			
B-4	10.1 -							64.0	2.0
B-4	16.9 -							219.1	2.1
B-4	22.2 -							204.4	1.9
B-5	0.0 - 2.0	56	22	34	82	26			
B-5	2.0 - 4.0					24	102.8	4.9	7.0
B-5	6.0 - 8.0	48	21	27	78	18			
B-5	8.5 - 10.0				37	12			
B-5	10.0 - 12.0	49	19	30	94	21			
B-5	13.0 - 15.0				86	22			
B-6	0.0 - 1.5				5	2			
B-6	2.5 - 4.0	67	24	43	54	15			
B-6	6.0 - 8.0	44	19	25	26	9			
B-6	8.5 - 9.3				45	8			
B-6	10.5 - 11.4	37	17	20	74	11			
B-6	13.5 - 13.9				46	9			
B-6	16.5 -							223.5	1.9
B-6	24.5 -							78.6	1.2
B-6	28.4 -							217.4	2.0
B-7	0.5 - 2.0				29	7			
B-7	2.0 - 3.5	39	15	24	64	13			
B-7	6.0 - 8.0	43	17	26	77	20			
B-7	8.0 - 9.5				27	15			

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Summary of Laboratory Results

Project: Wastewater Interceptor

Project Number: W19-111

Boring No.	Sample Depth (ft.)	Liquid Limit	Plastic Limit	Plasticity Index	Percent Passing No. 200 Sieve	Moisture Content (%)	Unit Dry Weight (pcf)	Unconfined Compressive Strength (tsf)	Strain at Failure (%)
B-7	10.0 - 11.5	59	22	37	87	22			
B-7	13.0 - 15.0					22	108.0	6.4	7.0
B-7	28.5 -							215.9	3.1
B-7	29.3 -							60.2	0.9
B-8	2.0 - 4.0	42	19	23	63	14			
B-8	4.0 - 6.0					19	112.2	4.5	11.8
B-8	8.0 - 10.0	50	18	32	85	19			
B-8	13.0 - 15.0					23	104.7	5.4	5.0
B-8	18.0 - 20.0	55	21	34	94	17			
B-8	23.0 - 23.5				91	12			
B-8	28.5 - 29.0				88	10			

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Summary of Laboratory Results

Project: Wastewater Interceptor

Project Number: W19-111

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BORING NO. B-1

CLIENT CDM Smith Inc. **PROJECT NAME** Wastewater Interceptor

PROJECT NUMBER W19-111 **PROJECT LOCATION** Waco, TX

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STRAIN AT FAILURE (%)
0		Approximate Surface Elevation feet												
		FAT CLAY; dark brown, trace sand	ST			4.5+								
			ST			3.0	68	24	44	95	31			
5			ST			4.5+					18	110	2.8	7.0
		SANDY LEAN CLAY; tan	ST			3.5								
			ST			2.0	33	14	19	58	19			
10			ST			4.5+								
			A											
		SEVERELY WEATHERED LIMESTONE; tan, consists of a mixture of marly clay and broken limestone	SS		12-21-24 (45)					17	9			
15														

Completion Depth: 15 ft.
Date Started: 12/18/19
Completed: 12/18/19
Logged by: S.Knight

Remarks: Boring was advanced to a depth of 15 feet using dry drilling techniques. Groundwater was not observed above that depth.

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BORING NO. B-2

CLIENT CDM Smith Inc. **PROJECT NAME** Wastewater Interceptor

PROJECT NUMBER W19-111 **PROJECT LOCATION** Waco, TX

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STRAIN AT FAILURE (%)
0		Approximate Surface Elevation feet												
		FAT CLAY; dark brown, trace sand	ST			2.5								
		CLAYEY GRAVEL; tan, consists of marly clay mixed with limestone fragments	ST			4.5+	66	23	43	28	10			
5			ST			4.5+				26	10			
			A											
		SEVERELY WEATHERED LIMESTONE; tan, consists of a mixture of marly clay and broken limestone	SS		50/3"					55	10			
			A											
		WEATHERED LIMESTONE; tan, highly fractured, with marly layers	SS		50/2"									
10			A											
			RC	60 (24)									132.9	1.5
15		LIMESTONE; gray												
			RC	92 (62)									138.2	1.8
20														
			RC	94 (82)									232.1	1.9
25														

Completion Depth: 25 ft.
Date Started: 12/18/19
Completed: 12/18/19
Logged by: S.Knight

Remarks: Boring was advanced to a depth of 10 feet before using water in the rock core drilling process. Groundwater was not observed above that depth.

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BORING NO. B-3

CLIENT CDM Smith Inc. **PROJECT NAME** Wastewater Interceptor

PROJECT NUMBER W19-111 **PROJECT LOCATION** Waco, TX

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STRAIN AT FAILURE (%)
0		Approximate Surface Elevation feet												
		FAT CLAY; dark brown, with sand and limestone fragments	ST			1.5								
			ST			1.0	75	25	50	81	31			
5			ST			3.5				72	24			
		CLAYEY GRAVEL; tan, consists of marly clay mixed with limestone fragments	A											
			SS		12-22-31 (53)		52	17	35	24	10			
			A											
		SEVERELY WEATHERED LIMESTONE; tan, consists of a mixture of marly clay and broken limestone	SS		19-50/0"					24	10			
10			A											
		WEATHERED LIMESTONE; tan, highly fractured, with marly layers	RC	72 (36)									278.0	1.9
15														
		LIMESTONE; gray	RC	90 (50)									72.0	1.8
20														
			RC	92 (92)									242.0	2.1
25														

Completion Depth: 25 ft.
Date Started: 12/18/19
Completed: 12/18/19
Logged by: S.Knight

Remarks: Boring was advanced to a depth of 10 feet before using water in the rock core drilling process. Groundwater was not observed above that depth.

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BORING NO. B-4

CLIENT CDM Smith Inc. **PROJECT NAME** Wastewater Interceptor

PROJECT NUMBER W19-111 **PROJECT LOCATION** Waco, TX

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STRAIN AT FAILURE (%)
0		Approximate Surface Elevation feet												
		FAT CLAY; dark brown, trace sand	ST			4.5+								
			A											
			SS		1-2-3 (5)		61	22	39	92	24			
5			A											
		CLAYEY GRAVEL; tan, consists of marly clay mixed with limestone fragments	SS		12-25-25 (50)		61	20	41	26	6			
			A											
		SEVERELY WEATHERED LIMESTONE; tan, consists of a mixture of marly clay and broken limestone	SS		50/5"					42	8			
			A											
			SS		50/4"									
10			A											
		WEATHERED LIMESTONE; tan, highly fractured, with marly layers	RC	98 (50)									64.0	2.0
15														
			RC	100 (60)									219.1	2.1
20		LIMESTONE; gray												
			RC	74 (68)									204.4	1.9
25														

Completion Depth: 25 ft.
Date Started: 12/19/19
Completed: 12/19/19
Logged by: S.Knight

Remarks: Boring was advanced to a depth of 10 feet before using water in the rock core drilling process. Groundwater was not observed above that depth.

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BORING NO. B-5

CLIENT CDM Smith Inc. **PROJECT NAME** Wastewater Interceptor

PROJECT NUMBER W19-111 **PROJECT LOCATION** Waco, TX

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STRAIN AT FAILURE (%)
0		Approximate Surface Elevation feet												
		FAT CLAY; dark brown, with sand and limestone fragments	ST			2.0	56	22	34	82	26			
			ST			3.0					24	103	4.9	7.0
5			ST			3.0								
		LEAN CLAY; tan, with sand and limestone fragments	ST			4.0	48	21	27	78	18			
		CLAYEY GRAVEL; tan, consists of marly clay mixed with limestone fragments	A											
10			SS		8-9-12 (21)					37	12			
		LEAN CLAY; tan, trace sand and limestone fragments	ST			3.0	49	19	30	94	21			
			A											
15			ST			3.5				86	22			
		SEVERELY WEATHERED LIMESTONE; tan, consists of a mixture of marly clay and broken limestone	A											
		LIMESTONE; gray, highly fractured, with marly layers	SS		50/3"									
20			A											
			RC	90 (0)										
25			T		100/1"									

Completion Depth: 25.1 ft.
Date Started: 12/19/19
Completed: 12/19/19
Logged by: S.Knight

Remarks: Boring was advanced to a depth of 20 feet before using water in the rock core drilling process. Groundwater was not observed above that depth.

Langerman Foster Engineering Company
Waco and Harker Heights (Killeen), Texas
Ph: 254-235-1048 www.LFECTX.com

BORING NO. B-6

CLIENT CDM Smith Inc. **PROJECT NAME** Wastewater Interceptor

PROJECT NUMBER W19-111 **PROJECT LOCATION** Waco, TX

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STRAIN AT FAILURE (%)
0		Approximate Surface Elevation feet												
		FILL - GRAVEL; tan, consists of broken limestone rubble	SS		12-4-4 (8)					5	2			
			A											
		GRAVELLY FAT CLAY; dark brown, with broken limestone			4-4-7 (11)		67	24	43	54	15			
5			A											
			SS		4-3-5 (8)									
		CLAYEY SAND and GRAVEL; tan, consists of marly clay mixed with limestone fragments	ST			4.5+	44	19	25	26	9			
			A											
		SEVERELY WEATHERED LIMESTONE; tan, consists of a mixture of marly clay and broken limestone	SS		26-50/4"					45	8			
10			A											
			SS		9-50/5"		37	17	20	74	11			
			A											
			SS		50/5"					46	9			
15			A											
		WEATHERED LIMESTONE; tan, highly fractured, with marly layers	RC	76 (40)									223.5	1.9
20														
			RC	84 (32)										
25													78.6	1.2
			RC	100 (60)										
		LIMESTONE; gray											217.4	2.0
30														

Completion Depth: 30 ft.
Date Started: 12/18/19
Completed: 12/18/19
Logged by: S.Knight

Remarks: Boring was advanced to a depth of 15 feet before using water in the rock core drilling process. Groundwater was not observed above that depth.

Langerman Foster Engineering Company
Waco and Harker Heights (Killeen), Texas
Ph: 254-235-1048 www.LFECTX.com

BORING NO. B-7

CLIENT CDM Smith Inc. **PROJECT NAME** Wastewater Interceptor

PROJECT NUMBER W19-111 **PROJECT LOCATION** Waco, TX

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STRAIN AT FAILURE (%)
0		Approximate Surface Elevation feet												
		FILL - CLAYEY SAND and GRAVEL; tan, with limestone fragments	ST			4.5+								
			SS		14-33-21 (54)					29	7			
		FILL - SANDY LEAN CLAY; red-brown	SS		4-5-6 (11)		39	15	24	64	13			
			A											
5			ST			3.0								
		FILL - LEAN CLAY; red-brown, with sand and trace gravel	ST			3.0	43	17	26	77	20			
		FILL - CLAYEY SAND and GRAVEL; red-brown	SS		6-9-6 (15)					27	15			
10			A											
		FAT CLAY; tan and gray, trace sand and gravel	SS		3-6-8 (14)		59	22	37	87	22			
			A											
			ST			3.5					22	108	6.4	7.0
15			A											
		SEVERELY WEATHERED LIMESTONE; gray	SS		50/4"									
20			A											
		LIMESTONE; gray	SS		50/2"									
25			A											
			RC	100 (20)									215.9	3.1
30													60.2	0.9

Completion Depth: 30 ft.
Date Started: 12/19/19
Completed: 12/19/19
Logged by: S.Knight

Remarks: Boring was advanced to a depth of 25 feet before using water in the rock core drilling process. Groundwater was not observed above that depth.

Langerman Foster Engineering Company
Waco and Harker Heights (Killeen), Texas
Ph: 254-235-1048 www.LFECTX.com

BORING NO. B-8

CLIENT CDM Smith Inc. **PROJECT NAME** Wastewater Interceptor

PROJECT NUMBER W19-111 **PROJECT LOCATION** Waco, TX

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STRAIN AT FAILURE (%)
0		Approximate Surface Elevation feet												
		SANDY LEAN CLAY; tan to brown, with gravel	ST			4.5+								
			ST			4.5+	42	19	23	63	14			
5			ST			4.5+					19	112	4.5	11.8
			ST			3.0								
		FAT CLAY; tan, with sand	ST			3.0	50	18	32	85	19			
10			ST			2.5								
			A											
			ST			4.5+					23	105	5.4	5.0
15		FAT CLAY; gray, trace sand												
			A											
			ST			4.5+	55	21	34	94	17			
20			A											
		CLAYSHALE; gray to dark gray	SS		50/6"					91	12			
25			A											
			SS		50/6"					88	10			
30			A											
			SS		50/4"									

Completion Depth: 30.3 ft.
Date Started: 12/19/19
Completed: 12/19/19
Logged by: J.Morrison

Remarks: Boring was advanced to a depth of 30.3 feet using dry drilling techniques. Groundwater was not observed above that depth.

Important Information about This

Geotechnical-Engineering Report

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

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

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org