Bid / RFP / RFQ Number: SB-2022-11

Project Number: E2017-010

Project Name: Lowry Bridge Utility

Addendum No.: 1

Date of Addendum: July 19, 2022

To All Plan Holders:

Please note the following changes and/or clarifications:

1. **Geotechnical Report:**

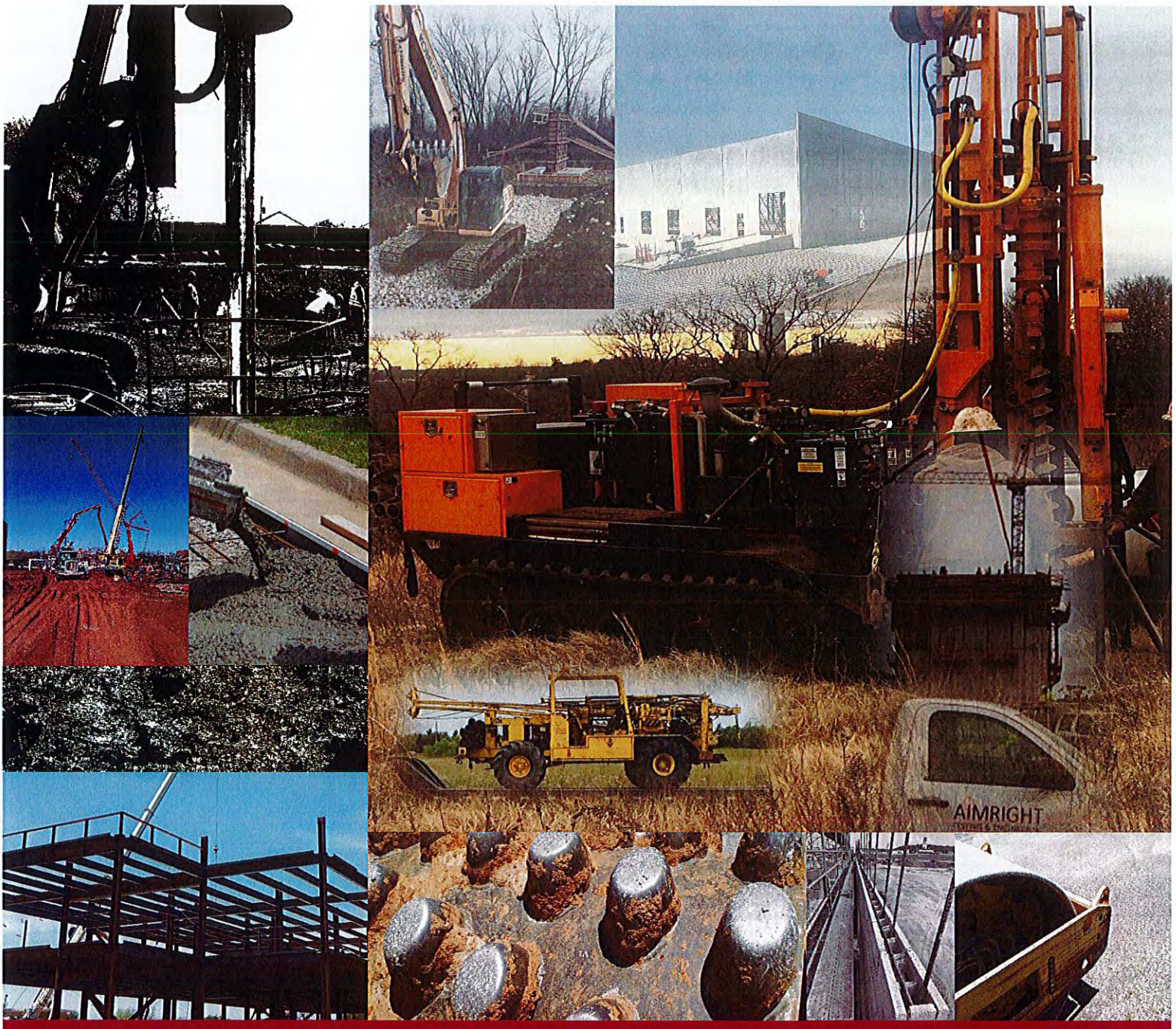
   The Geotechnical Report for the area around the future bridge is attached to this addendum. The report has been requested and may be beneficial for the installation of utility lines that cross the creek. This is the only geotechnical information available for this project.

All other terms, conditions and specifications remain unchanged. Any additions made to the Bidding and Contract Documents including the Plans and Specifications per this Addendum shall be considered a part of the original Bidding and Contract Documents. The professional seals and signatures applied to the original Bidding and Contract Documents are thereby considered to cover any additions to said documents per this Addendum.

Levi P. Hix, P.E.
Engineering Project Manager

7/19/22
Date

Bidders shall acknowledge receipt of this Addendum in the space provided in the Bid Proposal Form.



GEOTECHNICAL ENGINEERING REPORT

AIMRIGHT Project No. 10080122
January 21, 2022

Lowry Road Box Culvert Replacement

Prepared for:
City of Claremore

AIMRIGHT
TESTING & ENGINEERING

Construction Materials Testing • Special Inspections • Geotechnical Engineering

January 21, 2022

City of Claremore
724 Ramm Road
Claremore, OK 74017
(918) 341-0457

Attn: Garrett L. Ball, P.E., City Engineer
gball@claremorecity.com

Re: Geotechnical Engineering Report | No. 10080122
Lowry Road Box Culvert Replacement
Lowry Road at Cat Creek Crossing, Claremore, OK 74017

It has been a pleasure serving you on this project. AIMRIGHT is pleased to submit this Geotechnical Engineering Report for the proposed construction planned at the referenced site. This report presents the findings of the geotechnical exploration and presents recommendations for design for the project.

We appreciate the opportunity to provide geotechnical consultation services for the subject project. We look forward to serving as your geotechnical engineer and construction materials testing laboratory on the remainder of this and future projects. Please do not hesitate to contact us with any concerns or questions regarding this report.

Respectfully submitted,

AIMRIGHT Testing & Engineering, LLC
CA No. 5794 (exp. 6/30/22)
Justin J. Boyd Jr., P.E.
Engineering Manager
jboyd@aimrighttesting.com
(918) 392-8041

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1.0 PROJECT INFORMATION

1.1 Description

We understand that a new "Fast Cast" box culvert structure (by Premier Steel) will be constructed on the referenced site. The existing corrugated metal pipes underlying the existing roadway will be removed prior to beginning construction.

The site is generally level with minimal elevation differences across the planned construction footprint. Cut/fill depths have been somewhat finalized; and we estimate that fill of approximately 1 to 4 feet will be required to reach the final site elevations and potentially 8 to 10 feet of backfill around the structure will be required.

The structure will be mainly comprised of pre-cast and cast-in-place reinforced concrete elements and supported by a concrete foundation system and slab-on-ground with a planned bearing elevation of approximately 610 feet. Information regarding estimated structural loading conditions was provided; and we utilized estimated a net allowable bearing pressure of 3 kip per square foot (footing width of 3 feet and wall loading of 9 kip per linear foot) in our engineering analyses.

1.2 Scope of Services

The primary purpose of this report is to provide geotechnical engineering recommendations for the proposed site development. Our Scope of Services consisted of the following:

- Drilling two (2) soil test borings (borings) to depths of approximately 25 feet.
- Performing laboratory testing of selected soil samples obtained from the borings.
- Providing engineering analysis and preparation of this report discussing, in general, project description, our scope, exploration, testing, analysis, and recommendations.

The Boring Location Plans, Boring Logs, and other supporting data are presented in the Appendices to this report. Our Scope of Services did not include a survey of boring locations and elevations, rock coring, quantity estimates, preparation of plans or specifications, or the identification and evaluation of environmental aspects of the project site.

1.3 Field Exploration

AIMRIGHT located the borings in the field by making measurements from known existing site features. Boring elevations were interpreted from the provided plan and profile drawings. No claim is made as to the accuracy of the locations and elevations shown on the Boring Location Plans and Boring Logs, respectively, and they should be considered approximate.

The borings were advanced using an ATV-mounted drill rig equipped with an automatic hammer and 6-inch diameter augers. Representative soil samples were obtained using a standard 2-inch outside diameter split-barrel sampler in general compliance with the Standard Penetration Testing (SPT) method of the American Society of Testing and Materials (ASTM) D1586 standard to evaluate the consistency and general engineering properties of the subsurface soils.

The number of blows required to drive the split-barrel sampler three (3) consecutive 6-inch increments is recorded, and the blows of the last two 6-inch increments are added to obtain the SPT N-value in blows per foot (bpf) representing the penetration resistance of the soil. At regular intervals within the borings, split-spoon samples were visually classified based on texture and plasticity.

During the drilling process, all encounters with groundwater, if any, were recorded. Upon completion of drilling, all borings were backfilled per OWRB requirements.

1.4 Laboratory Testing

The samples obtained from the geotechnical exploration were transported to the AIMRIGHT laboratory where representative samples were selected for testing. Testing consisted of Atterberg limits, sieve analysis, and determination of moisture content in general accordance with the ASTM testing procedures.

2.0 FIELD EXPLORATION FINDINGS

2.1 Subsurface

The subsurface conditions illustrated in the table below represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. The transitions between soil strata are usually less distinct than shown on the Boring Logs.

Stratum	General Depth Interval	General Description of Conditions
Surface	12 to 13 inches	existing pavement section
Native Soils	0 to 8.5 feet	stiff to hard, lean clay with varying amounts of clay, silt, sand, and shale, sandstone, fragments
Weathered Rock	8.5 to 25 feet	highly to moderately weathered, soft to moderately hard shale

2.2 Groundwater

Groundwater was not encountered during or at the completion of drilling in any of the borings. Water traveling through soil and rock is often unpredictable and may be present at shallow depths. Due to the seasonal changes in groundwater and the unpredictable nature of groundwater paths, groundwater levels will fluctuate. As such, groundwater levels at other times of the year may be different than those described in this report.

Generally, the highest groundwater levels occur in late winter and early spring and the lowest levels in late summer and fall. Therefore, it is necessary during construction to be observant for groundwater seepage in excavations to assess the situation and make necessary changes. Where applicable, the contractor should determine the actual groundwater levels at the time of construction.

3.0 LABORATORY TESTING RESULTS

Laboratory tests were conducted on selected samples in general accordance with ASTM standards. The laboratory testing performed for this project consisted of Atterberg Limits (ASTM D4318), Moisture Content (ASTM D2216) and Sieve Analysis – No. 200 Sieve Wash Method (ASTM D1140) testing. The test results are presented on the Boring Logs and are summarized in the table below.

Boring No.	Sample Depth Interval[1] (ft)	In-place Moisture Content (%)	Finer than No. 200 Sieve (%)	Atterberg Limits		
				Liquid Limit (%)	Plastic Limit (%)	Plasticity Index
B-1	0 to 1.5	21.0	74.6	44	18	26
	3.5 to 5	15.2	92.8	36	20	16
B-2	1.5 to 3	20.5	74.3	38	16	22
	3.5 to 5	20.9	90.8	40	20	20

1. Sample depth is the measured depth from the existing surface grades.

4.0 ANALYSIS & CONCLUSIONS

The following recommendations are based on our observations at the site, interpretation and analysis of the field and laboratory data obtained during this exploration, assumed loads, and our experience with previous exploration and testing with similar projects. Soil penetration data have been used to estimate an allowable bearing pressure and associated settlement using established correlations. Subsurface conditions in unexplored locations may vary from those encountered.

If structure location, loadings, or elevations are changed, we request that we be advised so that we may re-evaluate our recommendations. In the event changes are made in the proposed design/construction plans, the recommendations presented in this report shall not be considered valid unless reviewed by AIMIRIGHT and modified or verified in writing.

Determination of an appropriate foundation system for a given structure is dependent on the proposed structural loads, soil conditions, and construction constraints such as proximity to other structures, etc. The subsurface exploration aids the geotechnical engineer in determining the soil stratum appropriate for structural support. This determination includes considerations regarding both allowable bearing pressure and compressibility of the soil strata. In addition, since the method of construction greatly affects the soils intended for structural support, consideration must be given to the implementation of suitable methods of site preparation, fill compaction, and other aspects of construction.

In conclusion, provided the recommendations outlined in this report are followed throughout the design and construction phases of this project, it is our opinion that a concrete foundation and slab-on-ground design may be utilized to support the structure.

5.0 RECOMMENDATIONS

5.1 Site Preparation and Earthwork

Before proceeding with construction, AIMRIGHT recommends conducting a pre-grading meeting to discuss recommendations as outlined in this report.

Where appropriate, existing utilities beneath the construction footprints should be properly abandoned; or, should be removed and backfilled with properly compacted engineered fill as outlined in this report.

Any existing pavement, structures, topsoil/vegetation, moderately to highly plastic clay, wet, soft, or loose soils and any other deleterious non-soil materials should be removed to a minimum distance of 5 feet beyond the construction footprints.

Upon completion of required excavations, proof-rolling of the subgrade with a 20 to 30-ton loaded truck or other pneumatic-tired vehicle of similar size and weight should then be performed. Proof-rolling should be performed during a time of good weather and not while the site is wet, frozen, or severely desiccated. The proof-rolling observation is an opportunity for the geotechnical engineer to locate inconsistencies intermediate of our boring locations in the existing subgrade.

All unsuitable materials observed during the evaluation and proof-rolling operations should be over-excavated and replaced with compacted fill or stabilized in place. The possible need for, and extent of over-excavation and/or in-place stabilization required can best be determined by the geotechnical engineer at that time.

The upper 8 inches of the existing subgrade in construction areas shall then be scarified, moisture-conditioned and re-compacted to at least ninety-five percent (95%) of the maximum dry density and within ±2 percentage points of the optimum moisture content as determined by a Standard Proctor (ASTM D698). The moisture content and compaction shall be maintained prior to beginning any fill or aggregate placement and/or construction.

At the time of the investigation, the site soils were generally moist. If dry weather conditions exist prior to and during construction, the near surface soils may need moisture-conditioning to sufficiently enable adequate scarifying and compaction. However, if wet conditions exist at the time of construction, then care shall be taken to assure proper surface water drainage. If these soils do get wet, they must be dried or treated prior to further compaction efforts.

An important aspect to consider during development of this site is surface water control. During the initiation of grading operations, we recommend that the grading contractor take those steps necessary to enhance surface flow and promote rapid clearing of rainfall and runoff water following rain events. It should be incumbent on the contractor to maintain favorable site drainage during construction to minimize deterioration of otherwise stable subgrades.

5.2 Potential Excavation Difficulties

Highly to moderately weathered, soft to moderately hard shale was encountered in the borings beginning at a depth of approximately 8.5 feet.

We anticipate the near-surface soils above these depths at the site can be excavated with pans, scrapers, backhoes, and front-end loaders using conventional means and methods.

Our experience indicates rock in a weathered, boulder, and/or massive form may vary erratically in location and depth within the referenced site. Therefore, there is always a potential that these materials could be encountered at shallower depths between the boring locations and should be anticipated during construction.

Installation or excavation of proposed subgrade, foundations, or underground utilities (depending on layout and planned bottom elevations) within some portions of the site may require jackhammering, coring, ripping, or other suitable methods to remove these materials.

5.3 Cut and Fill Slopes

From a general slope stability standpoint, we recommend that unreinforced fill slopes (where required to raise site grades) be sloped at 3(H):1(V) or flatter.

Fill slopes placed over existing slopes should be adequately benched or keyed into the existing slopes so that fill is not placed and/or compacted on a sloping subgrade or vertical wall excavation. The benches will help facilitate compaction, reduce the potential for high differential settlements over short distances, and increase the overall global stability of the constructed fill.

Slopes should be protected with silt fencing during construction, stabilized and hydro-seeded or similarly seeded for permanent protection. We note that surficial sloughing/erosion of the slope face soils is most likely to occur until the face of the slopes are completely stabilized with vegetation.

Similarly, to reduce sloughing/erosion, surface water should be diverted away from the slope crest and face for both temporary and permanent slopes. It may be necessary to utilize stabilization materials (turf-reinforcement mat or similar), depending on the conditions encountered during the slope construction.

All fill materials should be placed under the full-time control and supervision of a qualified geotechnical engineer. All fill materials should be adequately compacted, as outlined in this report, and where applicable, all slopes should be seeded and maintained as soon as possible after construction.

5.4 Fill Material

A sample of each material type should be submitted to the geotechnical engineer for evaluation. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

All fill material in structural areas (including utility backfill) should be placed in continuous, horizontal lifts having a maximum pre-compacted thickness of 9 inches. Aggregate base should have a maximum pre-compacted thickness of 6 inches; and fill compacted with hand-held or smaller-sized equipment having a maximum pre-compacted thickness of 4 to 6 inches.

Each lift should be compacted to at least ninety-five percent (95%) of the maximum dry density and within ±2 percentage points of the optimum moisture content as determined by a Standard Proctor (ASTM D698), unless noted otherwise and maintained throughout construction activities.

A minimum of two (2) field tests to determine in-place density and moisture content should be performed per lift for each 2,000 sf or as required by project specifications.

Engineered fill should consist of approved materials that are free of organic matter and debris, exhibit a maximum plasticity index (PI) of 18, maximum liquid limit (LL) of 40, and a maximum rock size of 3.0 inches.

Native soils could be used as fill; whereby, upon re-use, the soils meet the requirements for engineered fill as stated in this report. AIMRIGHT recommends conducting additional soil sampling and laboratory testing of any cut native soils during completion of grading activities to determine characteristics prior to beginning placement in structural areas.

Aggregate base shall meet the requirements for ODOT Type A and may be utilized as engineered fill.

5.5 Foundation Design

The project structural engineer should determine the final foundation sizes based on the actual design loads, building code requirements, and other structural considerations. Structure foundations may be designed utilizing the following parameters.

Maximum Structural Loads	**Wall**	9 kip/ft
	Column	N/A
Bearing Material		approved native soils
Net Allowable Bearing Pressure[1] (FS ≥ 3.0)		3,000 psf
Coefficient of Sliding Friction[2], μ		0.35 to 0.40
Total Unit Weight[2], γ		105 to 115 pcf
Angle of Friction[2], ø		5 to 10°
Minimum Footing Width	**Wall**	3 ft (*as indicated on Fast Cast drawings*)
	Column	N/A
Estimated Maximum Settlement[3]	**Total**	≤ 1 inch
	Differential	≤ ½ inch
Earthquake Loads Site Class[4]		D

1. The recommended net allowable bearing pressure is based on foundations within approved bearing materials and is the pressure more than the minimum surrounding overburden pressure at the footing base elevation.

2. Range of values provided for soil types encountered at the site and/or anticipated import material that are prepared in accordance with this report are illustrated, however, actual parameters are dependent on bearing material placed and/or exposed during construction. Values are provided for guidance and should only be utilized by experienced engineers and designers.

3. The magnitude of the settlements will be highly influenced by the variation in excavation requirements across the structure footprint, the distribution of loads, and the variability of underlying soils.

4. 2015 International Building Code (IBC) Section 16, a weighted average of the soil penetration resistance conditions recorded (limited N-value of 100 bpf) and estimated for the upper 100 feet of the site was calculated.

5.6 Foundation Construction

All exposed foundation subgrades should be re-compacted, observed, evaluated, and verified for the design soil bearing pressure by the geotechnical engineer after excavation and prior to concrete placement. This evaluation should include, as a minimum, Dynamic Cone Penetrometer (DCP) testing at the planned bearing elevations at intervals of no less than 35 feet and extending to depths of at least 3 feet below the bearing elevations.

If unsuitable material is encountered during foundation bearing grade testing and inspections (DCP Testing), foundations should; 1) extend deeper to a more suitable bearing material and bear directly on this material; 2) extend deeper to a more suitable bearing material and backfill with lean concrete to the designed bottom of footing elevation (see Figure 1); 3) extend deeper to a more suitable bearing material and backfilled with engineered fill (see Figure 2). If option 3 is selected, the over-excavation should extend laterally a minimum of 2/3 of the total depth of excavation.

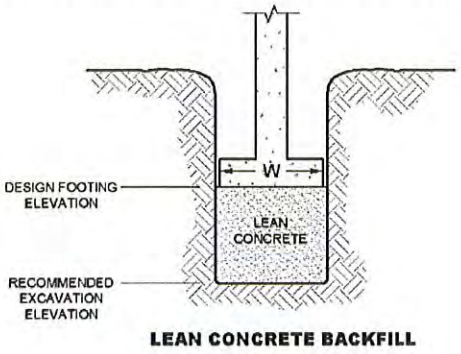


Figure 1

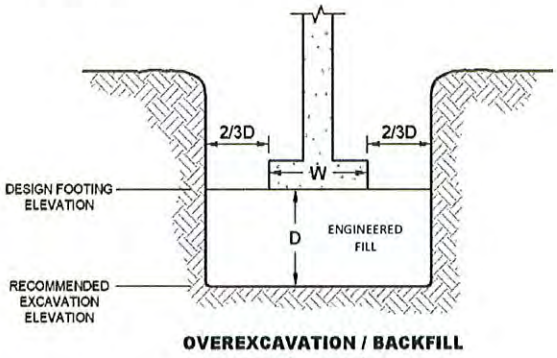


Figure 2

Note: Figures are shown for convenience and excavations shall be conducted with appropriate safety requirements.

Foundation excavations must be maintained in a drained/de-watered condition throughout the foundation construction process and water should not be allowed to pond in any excavation. Excavations for footings should be made in such a way as to provide bearing surfaces that are firm and free of loose, soft, wet, or otherwise disturbed soils. Foundations should be concreted as soon as practical after they are excavated, and concrete should also not be placed on frozen or saturated subgrades.

If the foundation excavations must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, it is recommended that a 2 to 4-inch-thick "mud mat" of lean concrete with a minimum compressive strength of 1,500 psi be placed on the bearing soils before placing the reinforcing steel to minimize damage to the bearing surface from weather or construction activities.

5.7 Slab-on-ground Design

The structure subgrades should be prepared as described in this report. Four (4) inches or more of granular base should be placed over the final soil subgrade and shall meet the requirements outlined in the table below. The modulus of subgrade reaction, k, value illustrated in the table below is based on 30-inch diameter plate load test.

Minimum Percent Finer than 1 ½-inch Sieve	Maximum Percent Finer than No. 200 Sieve	Maximum Plasticity Index	k w/ 4 inches of Granular Base (psi/in)	k w/ 8 inches of Granular Base (psi/in)
100	15	6	150	175

At the time of concrete placement, the granular base should be moist, but free of any self-draining water. If floor coverings are susceptible to moisture damage by moist floor conditions (capillary moisture), a vapor retarder should be placed below the slab-on-ground in accordance with the most recent addendum to ACI 302.1R-04 / 302.2R-06 and other current industry recommendations for use and placement of vapor retarders.

5.8 Lateral Earth Pressure Parameters

Lateral earth pressures vary as a function of construction sequence, type of backfill and retained soil, the rigidity of the retaining structure and the magnitude of any surface loading, if any, including stresses induced by adjacent building or wall loads on the retained soils. Adjacent footings or other surcharge loads may also exert appreciable additional lateral pressures. The effect of surcharge loads should be added to the recommended earth pressures to determine total lateral stresses.

Excavated in-situ or imported soils should be approved, placed, and compacted as outlined in this report. Values provided for soil types encountered at the site that are prepared in accordance with this report are illustrated, however, actual parameters are dependent on bearing material exposed and/or placed during construction. Values are provided for guidance and should only be utilized by experienced engineers and designers.

Material Type	Total Unit Weight γ (pcf)	Angle of Friction ø (°)	Rankine Earth Pressure Coefficients		
			Active K_a	At-Rest K_o	Passive K_p
Clay w/ trace sand	90 to 110	5	0.91	0.84	1.19
Sandy Clay or Clayey Sand	110 to 115	15	0.74	0.58	1.69
Silty Sand	115 to 125	30	0.50	0.33	3.00
Washed Aggregate	90 to 105	35	0.43	0.27	3.69

All material to be considered retained backfill should extend a minimum distance of 0.5 times the wall height laterally from the heel of cantilever wall footings. In backfilling against the walls, care should be taken to prevent the backfill from being over compacted, as this could result in excessive lateral stresses against the walls. Heavy equipment should not operate within 5 feet of walls to prevent excess lateral earth pressures.

All retaining walls should be provided with a positive drainage system, so they are not subject to hydrostatic pressures. We recommend that a minimum one-foot-wide zone of free-draining washed aggregate be constructed adjacent to the back of the walls and extend down to a foundation drain (perforated drainpipe).

Washed aggregate should be placed in lifts no greater than 2 feet in thickness and compacted with a backhoe bucket or similar method. The washed aggregate should be placed using a separation geotextile at the interface between the remaining backfill material. The foundation drain should be positively graded to allow drainage of any water that may collect in the wall backfill.

6.0 CONSTRUCTION MONITORING

We recommend that all earthwork construction be monitored by an experienced engineering technician of AIMRIGHT. Monitoring should include site preparation, subgrade earthwork, engineered fill earthwork, structure foundation systems, conventional and/or structural slabs.

Monitoring will allow AIMRIGHT to confirm the soil conditions on site and evaluate the recommendations presented within this report. If at the time of construction, our recommendations are inappropriate for the project, monitoring will allow us to remediate the recommendations at that time to better serve the project.

Monitoring during construction will also allow for the testing of all construction materials for the project. This includes but is not limited to:

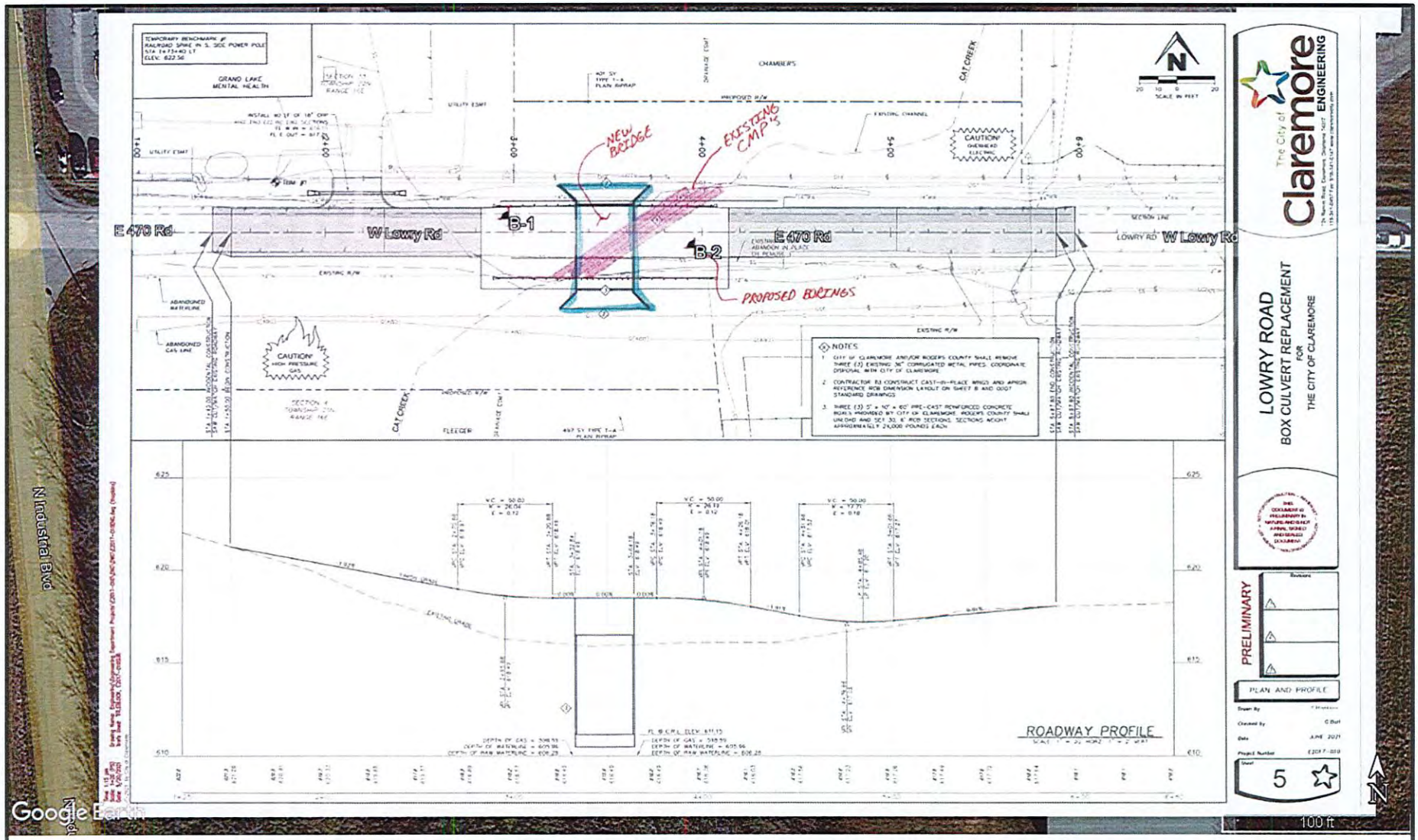
- ✓ subgrade inspection and density testing,
- ✓ structural area fill placement density testing,
- ✓ foundation bearing grade observations and testing,
- ✓ structural and reinforcing steel inspection,
- ✓ concrete testing, and
- ✓ asphaltic concrete testing, as applicable.

We recommend that AIMRIGHT be retained to provide these services based upon our current familiarity with the project subsurface conditions, and the provided intent of the geotechnical recommendations pertaining to the proposed development.

7.0 LIMITATIONS

The recommendations provided are based in part on project information provided to us and they only apply to the specific project and site discussed in this report. If our statements or assumptions concerning the location and design of this project contain 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. We can then modify our recommendations if they are inappropriate for the proposed project.

Regardless of the thoroughness of the geotechnical exploration, there is always a possibility that subsurface conditions will be different from those at a specific boring location and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used 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. The conclusions and recommendations presented in this report were derived in accordance with standard geotechnical engineering practices and no other warranty is expressed or implied.



APPROXIMATE BORING LOCATIONS

BORING LOCATION PLAN

PROJECT NO.: 10080122
SOURCE: Aerial Imagery/Provided Plan

PROJECT: Lowry Road Box Culvert Replacement
CLIENT: City of Claremore

AIMRIGHT TESTING & ENGINEERING

APPROXIMATE BORING LOCATIONS

BORING LOCATION PLAN

PROJECT NO.: 10080122
SOURCE: Aerial Imagery

PROJECT: Lowry Road Box Culvert Replacement
CLIENT: City of Claremore

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LOG OF BORING B-1

PROJECT: Lowry Road Box Culvert Replacement
CLIENT: City of Claremore **PROJECT NO.:** 10081221
PROJECT LOCATION: Lowry Road at Cat Creek Crossing, Claremore, OK 74017
LOCATION: see Boring Location Plan **ELEVATION:** 616.5
DRILLER: H. Wilson **LOGGED BY:** P. Scarborough **DRILLING RIG:** CME-550 ATV-Mounted
DRILLING METHOD: Rotary Continuous Flight Augers **DATE:** 1/14/22
DEPTH TO WATER> INITIAL: ▽ Dry **AT COMPLETION:** ▽ Dry **CAVING>** ℄ None

Depth (feet)	Sampler Type	Description	Graphic	USCS Symbol	SPT N-value (bpf)	Groundwater	Moisture Content	% < #200	Liquid Limit	Plastic Limit	Plasticity Index
-1 — 616.5		-1.06 CONCRETE - 7.75 inches; AGGREGATE BASE - 5 inches									
0 — 615.5		0 LEAN CLAY w/ SAND very stiff, dark and medium olive brown, moist		CL	13		21.0	74.6	44	18	26
1 — 614.5											
2 — 613.5		LEAN CLAY w/ SAND, trace sandstone fragments stiff, medium olive brown, moist			7						
3 — 612.5											
4 — 611.5		LEAN CLAY w/ trace sand, shale fragments stiff, light grayish brown, moist		CL	9		15.2	92.8	36	20	16
5 — 610.5											
6 — 609.5		LEAN CLAY w/ trace sand, shale fragments hard, light grayish brown, moist			36						
7 — 608.5											
8 — 607.5											
9 — 606.5		8.5 SHALE highly to moderately weathered soft to moderately hard, medium grayish brown, moist			50/2.75						
10 — 605.5											
11 — 604.5											
12 — 603.5											
13 — 602.5											
14 — 601.5					50/3.0						
15 — 600.5											
16 — 599.5											
17 — 598.5											
18 — 597.5											
19 — 596.5					50/2.0						
20 — 595.5											
21 — 594.5											
22 — 593.5											
23 — 592.5											
		Boring terminated at 23.67 ft.			50/2.0						

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

AIMRIGHT TESTING & ENGINEERING

LOG OF BORING B-2

PROJECT: Lowry Road Box Culvert Replacement
CLIENT: City of Claremore **PROJECT NO.:** 10081221
PROJECT LOCATION: Lowry Road at Cat Creek Crossing, Claremore, OK 74017
LOCATION: see Boring Location Plan **ELEVATION:** 616.5
DRILLER: H. Wilson **LOGGED BY:** P. Scarborough **DRILLING RIG:** CME-550 ATV-Mounted
DRILLING METHOD: Rotary Continuous Flight Augers **DATE:** 1/14/22
DEPTH TO WATER> INITIAL: ▽ Dry **AT COMPLETION:** ▼ Dry **CAVING>** ℄ None

Depth (feet)	Sampler Type	Description	Graphic	USCS Symbol	SPT N-value (bpf)	Groundwater	Moisture Content	% < #200	Liquid Limit	Plastic Limit	Plasticity Index
-1 616.5		-1.04 CONCRETE - 7.5 inches; AGGREGATE BASE - 5 inches									
0 615.5		0 LEAN CLAY w/ SAND stiff, dark grayish brown, moist			9						
1 614.5											
2 613.5		LEAN CLAY w/ SAND stiff, dark and medium grayish brown, moist		CL	10		20.5	74.3	38	16	22
3 612.5											
4 611.5		LEAN CLAY w/ trace sand, shale fragments stiff, medium and light grayish olive brown, moist		CL	9		20.9	90.8	40	20	20
5 610.5											
6 609.5		LEAN CLAY w/ trace sand, shale fragments hard, light and medium olive brown, moist			43						
7 608.5											
8 607.5											
9 606.5		8.5 SHALE highly to moderately weathered soft to moderately hard, light and medium grayish brown, moist			50/2.25						
10 605.5											
11 604.5											
12 603.5											
13 602.5											
14 601.5					50/2.0						
15 600.5											
16 599.5											
17 598.5											
18 597.5											
19 596.5					50/2.25						
20 595.5											
21 594.5											
22 593.5											
23 592.5											
		Boring terminated at 23.67 ft.			50/2.0						

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

KEY TO SYMBOLS

Symbol	Description
Strata Symbols	
	Existing Pavement Section
	Low Plasticity Clay
	Shale
Soil Samplers	
	Auger
	Standard Penetration Test