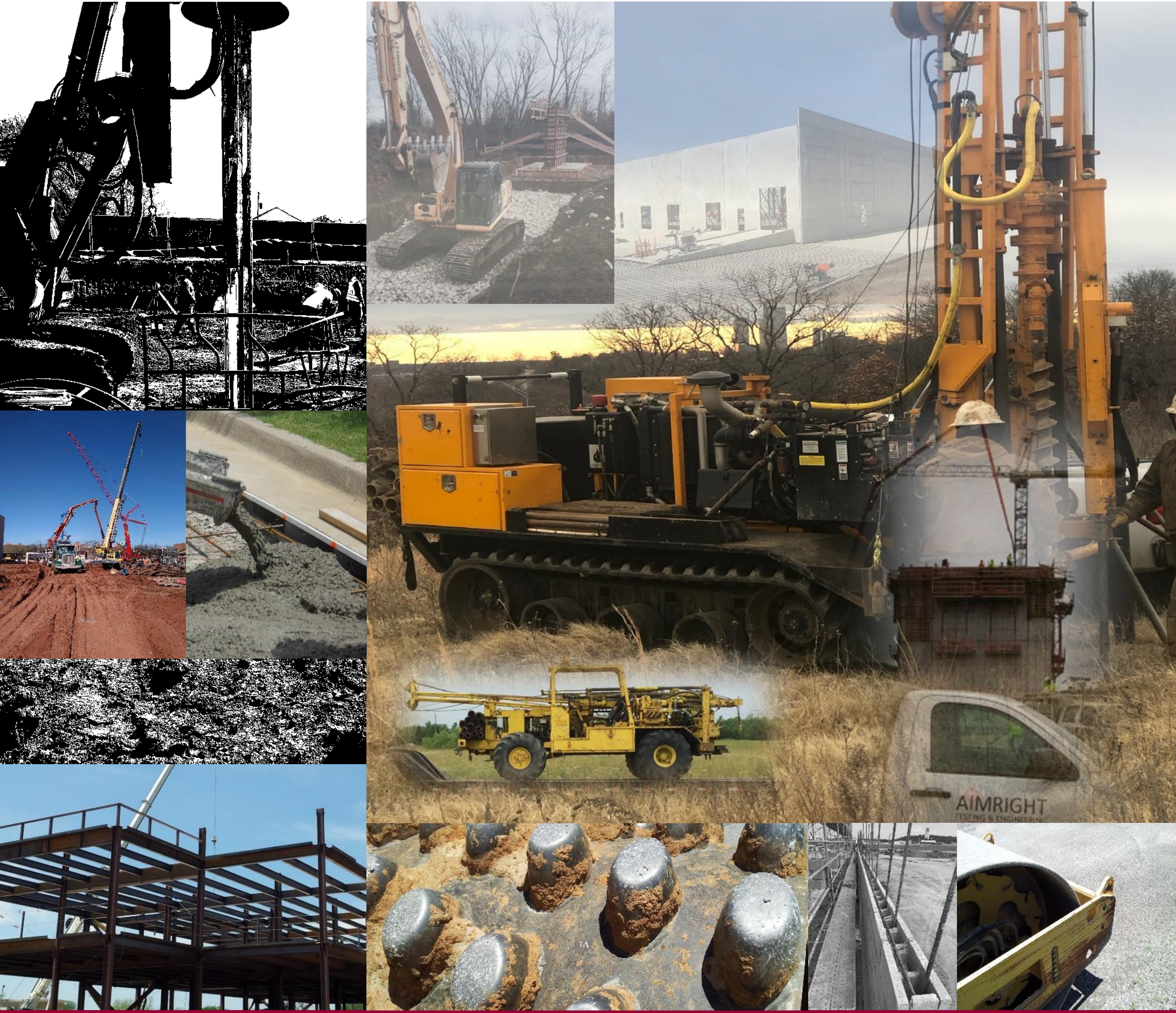

GEOTECHNICAL ENGINEERING REPORT

AIMRIGHT Project No. 11400722
August 18, 2022

Pryor Creek Mennonite Church

Prepared for:
Lowry Construction Services, Inc.

AIMRIGHT
TESTING & ENGINEERING

Construction Materials Testing • Special Inspections • Geotechnical Engineering

August 18, 2022

Lowry Construction Services, Inc.
1729 South Boston Avenue
Tulsa, OK 74119
(918) 592-2442

Attn: Hutton Lowry, hutton@lowrycs.com

Re: Geotechnical Engineering Report | Project No. 11400722
Pryor Creek Mennonite Church
1919 West 470 Road, Pryor, OK 74361

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. 6/30/24)
Justin J. Boyd Jr., P.E.
Engineering Manager
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(918) 392-8041

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1.0 PROJECT INFORMATION

1.1 Description

We understand that new one-story school and gym (with mezzanine area or 2nd level area) additions and associated parking/drive areas will be constructed on the referenced site. The final site design has not been completed. The planned construction sites are located adjacent to the existing church structure and are mainly grass/gravel covered with few trees or shrubbery.

The site is generally level with minimal elevation differences across the site. Cut/fill depths have not been finalized; however, we estimate that cut/fill of approximately 6 to 12 inches will be required to reach the final site elevations.

The structures are anticipated to be supported by a concrete slab-on-ground and shallow foundation system. Information regarding estimated structural loading conditions was not provided; however, we utilized maximum column loads of 20 to 60 kip and wall loads of 1 to 2 kip per linear foot in our engineering analyses.

The new parking/drive areas will more than likely be constructed with an asphalt and/or concrete surface and aggregate base course overlying a properly prepared subgrade. Information was not provided; however, we utilized an estimated 20-year traffic volume to be equal to 25,000 (standard) and 50,000 (heavy duty) equivalent 18-kip single-axle loads (ESALs).

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 six (6) soil test borings (borings) to depths of approximately 15 feet or auger refusal, whichever occurred first.
- 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, slope stability analysis, 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. No claim is made as to the accuracy of the locations shown on the Boring Location Plans, 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 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	4 to 6 inches	organic laden soils (topsoil) sampled as silty sand/sandy silt with organics and root matter
	5 to 8 inches	existing aggregate base
Native Soils	0 to 8.5 feet	soft to hard, lean, lean-to-fat, fat clay with varying amounts of clay, silt, sand, and limestone fragments
Weathered Rock	6 to 10 feet	highly weathered, soft limestone

Auger refusal was encountered in the borings at depths ranging from approximately 9.5 to 10 feet. Auger refusal is defined as material that could not be penetrated with the drill rig equipment used on the project. Auger refusal material may be caused by rock, large boulders, rock ledges, lenses, seams, or the top of parent bedrock.

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 (ft)	In-place Moisture Content (%)	Finer than No. 200 Sieve (%)	Atterberg Limits		
				Liquid Limit (%)	Plastic Limit (%)	Plasticity Index
B-1	1.5 to 3	26.9	92.5	69	23	46
B-2	0 to 1.5	21.0	86.7	35	20	15
	3.5 to 5	23.1	88.1	58	21	37
B-3	1.5 to 3	26.8	88.8	34	16	18
B-4	0 to 1.5	25.7	89.4	29	18	11
B-5	3.5 to 5	24.0	85.8	64	19	45
B-6	1.5 to 3	23.6	91.4	65	24	41

4.0 ANALYSIS & CONCLUSIONS

4.1 Analysis

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.

Our exploration revealed the following potentially adverse subsurface conditions:

- Native soils comprised of low to high plastic clay capable of low to high shrink/swell potential was encountered in the borings at just below the surface and extending down to varying depths.
- With respect to shrink/swell, due to the anticipated moisture volumetric changes throughout the seasonal wetting/drying cycles, a potential vertical rise (PVR) range of approximately 1.5 to 2.3 inches (or more) is estimated for the near surface soils within the upper 5 feet.

4.2 Conclusions

Provided the recommendations outlined in this report are followed throughout the design and construction phases of this project, it is our opinion that the site is suitable for the planned development. A concrete slab-on-ground in conjunction with a shallow foundation design may be utilized to support the structures. Notable site preparation and earthwork recommendations are outlined below.

Structure Footprints

- To reduce the PVR potential to or less than 1 inch (total) and ½ inch (differential), minimize the potential for excessive differential moisture volumetric changes, and provide for a more stable subgrade for slab-on-ground and shallow foundations; we recommend that a minimum depth of 36 inches of compacted engineered fill or native soils stabilized with a lime additive be provided below the final soil subgrade elevations plus an additional 5 feet beyond the structure footprints.

- Any flatwork (i.e., sidewalks, canopy footings, ramps, patios, equipment slabs, etc.) that are beyond the 5 feet of the footprints and are considered sensitive to movement should be included within the over-excavation footprint.

Parking/Drive Areas

- The exposed subgrade within some areas, may be comprised soft, wet surface, or other unsuitable conditions. 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.

- AIMRIGHT recommends conducting additional soil sampling and laboratory testing of the final soil subgrades during completion of grading activities to determine characteristics and stabilization requirements prior to beginning pavement construction.

- Where soils with PI greater than 18 are encountered, to provide the parking/drive areas with a more stable subgrade, at minimum, the upper 8 inches of the final soil subgrade plus an additional 2 feet beyond the footprint be constructed with properly compacted engineered fill or native soils stabilized with a lime additive.

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 structures, pavements, 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 and 2 feet beyond the structure and parking/drive area footprints, respectively.

- We recommend that a minimum depth of 36 inches of compacted engineered fill or native soils stabilized with a lime additive be provided below the final soil subgrade elevations plus an additional 5 feet beyond the structure footprints. Any flatwork (i.e., sidewalks, canopy footings, ramps, patios, equipment slabs, etc.) that are beyond the 5 feet of the footprints and are considered sensitive to movement should be included within the over-excavation footprint.

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 +1 to +4 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.

5.2 Excavations Adjacent to Existing Structures

Caution should be exercised when excavating immediately adjacent to existing structure foundations and the following should be considered.

The contractor should consider conducting excavations along the building structure perimeter footings in shorter segments (i.e., ≤ 10 feet in length parallel to existing foundation) and backfilling with properly compacted engineered fill with hand-held or smaller-sized equipment having a maximum pre-compacted thickness of 4 to 6 inches prior to moving to the next section.

Excavations shall not impose on area extending outward at a 1:1 slope from the bottom of any footings of existing structures.

When determined applicable, appropriate shoring techniques for existing structures and/or foundations should be utilized, and the contractor shall have the necessary project approval and experience in executing such activities.

Similarly, due to the proximity of the existing adjacent structures, larger compaction equipment vibrations may disturb, crack or damage existing structural elements. The existing conditions of the structures should be documented before beginning earthwork operations.

5.3 Potential Excavation Difficulties

Highly weathered, soft limestone was encountered in the borings beginning at depths of approximately 6 to 8.5 feet and extending down to the termination depths. Auger refusal was encountered in the borings at depths ranging from approximately 9.5 to 10 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.

5.4 Site Drainage

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.

Permanent positive drainage should be provided around the perimeter of the structures to minimize moisture infiltration into the foundation and/or subgrade soils. We recommend landscaped areas adjacent to the structures be provided with a fall of at least 6 inches for the first 10 feet outward from the structure areas.

All grades must provide effective drainage away from the structures during and after construction. Water permitted to pond next to the structures can result in unacceptable differential floor slab movements and cracked slabs and/or walls.

After construction and landscaping, AIMRIGHT recommends verifying final grades to document that effective drainage has been achieved. Grades around the structures should also be periodically inspected and adjusted as necessary, as part of the structure's maintenance program.

Sprinkler mains and spray heads should be located a minimum of 5 feet away from the structure lines. Low-volume, drip style landscaped irrigation should not be used near the structures.

Roof runoff should be collected in drains or gutters. Roof drains and downspouts should be discharged onto pavements which slope away from the structures or downspouts should be extended a minimum of 10 feet away from the structures.

5.5 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.

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.

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 and 5,000 sf within structural and parking/drive area footprints, respectively.

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 contain at least 35% fines (material passing the No. 200 sieve, based on dry weight) with a maximum rock size of 1.5 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. Moderately to highly plastic clay capable of moderate shrink/swell potential that do not meet engineered fill requirements will be exposed during earthwork activities. AIMRIGHT recommends conducting additional soil sampling and laboratory testing of any excavated or cut native soils to determine characteristics and stabilization requirements prior to beginning any fill placement.

AIMRIGHT estimates that approximately 4 to 6 percent (based on the soil's compacted dry weight) hydrated lime would be required to reduce the PI of the native soils to 18 or less. The actual amounts of lime should be determined in the field and shall be performed and monitored in general accordance with 2009 ODOT Standard Specifications for Highway Construction Section 307 Subgrade Treatment.

Aggregate base shall meet the requirements for ODOT Type A and beneath pavements, shall 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 Modified Proctor (ASTM D1557).

5.6 Shallow 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**	1 to 2 kip/ft
	Column	20 to 60 kip
Bearing Material		approved engineered fill or native soils
Net Allowable Bearing Pressure[1] (FS ≥ 3.0)		2,000 psf
Coefficient of Sliding Friction[2], μ		0.25 to 0.35
Total Unit Weight[2], γ		105 to 115 pcf
Angle of Friction[2], ø		5°
Rankine Passive Earth Pressure Coefficient[2], K_p		1.19
Minimum Footing Embedment[3]		24 inches
Minimum Footing Width	**Wall**	18 inches
	Column	30 inches
Estimated Maximum Settlement[4]	**Total**	≤ ½ inch
	Differential	≤ ½ inch
Earthquake Loads Site Class[5]		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. Exclude total passive pressure resistance within 2 feet of the adjacent lowest final site elevation.

3. Minimum depth applies to both perimeter footings and foundations in unheated areas. Minimum depth will provide frost protection and reduce the potential for moisture variation below the bearing level. Interior foundations should extend at least 12 inches below the final adjacent subgrade to provide minimum confinement.

4. 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.

5. 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.

5.7 Shallow 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.

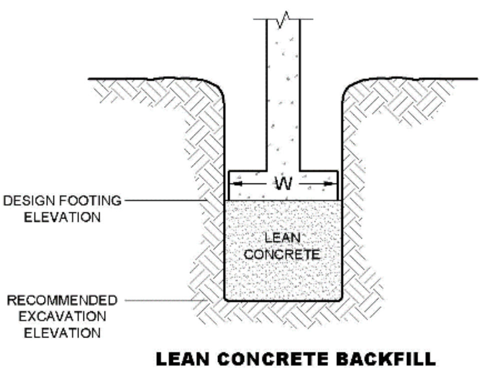

Figure 1

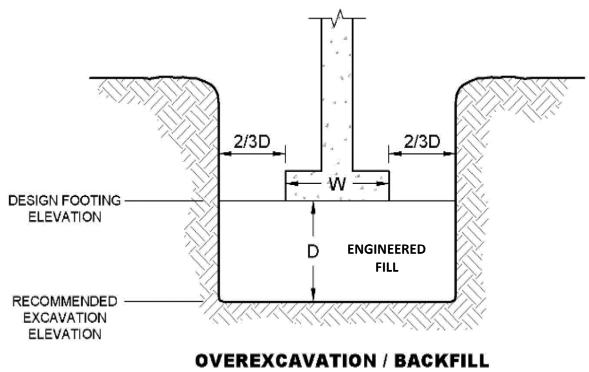

Figure 2

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.

5.8 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	125	150

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.

5.9 Pavement Design

These recommendations are based on our discussions with you, interpretation of the field and laboratory data, assumed traffic loading conditions, review of the provided documents, our experience with similar projects and utilization of the 1993 AASHTO Pavement Design Guidelines. AIMRIGHT recommends that governing authorities (i.e., city, county, or other recognized officials) be contacted to discuss appropriate pavement section requirements with respect to this project. The project architect or engineer of record should design the final pavement section. We utilized the design parameters as illustrated below.

Maximum Estimated Traffic, 20-yr ESALs	**Standard**	25,000	**Overall Standard Deviation**	**Asphalt**	0.40
	Heavy Duty	50,000		**Concrete**	0.35
Subgrade Resilient Modulus (M_r), psi		3,000	**Serviceability**	**Initial (Asphalt)**	4.2
Modulus of Subgrade Reaction (K), psi/in		100		**Initial (Concrete)**	4.5
Concrete Modulus of Rupture (R), psi		650		**Terminal**	2.0
Load Transfer Coefficient		3.2	**Layer Coefficients**	**Asphalt Wearing**	0.44
Drainage Coefficient		1.0		**Asphalt Base**	0.40
Reliability, %		85		**Aggregate Base**	0.14

It is our opinion the following minimum sections overlying a properly prepared subgrade as outlined in this report may be utilized for construction:

Pavement Type	Section	Standard (inches)	Heavy Duty (inches)
Concrete[1, 2]	Concrete (≥ 4,000 psi, air-entrained)	4.0	6.0
	ODOT Type A Aggregate Base	4.0	
	Properly Prepared Subgrade[3]	As Required	
Asphalt[1]	ODOT Type B (S4) or C (S5)	2.0	
	ODOT Type A (S3)	2.0	4.0
	ODOT Type A Aggregate Base	6.0	8.0
	Properly Prepared Subgrade[3]	As Required	

1. Constructed in accordance with Oklahoma Department of Transportation (ODOT) and city or county governing specifications and applicable American Concrete Institute (ACI) guidelines.

2. A minimum thickness of 7 inches of concrete and 6 inches of aggregate base should be provided in front of and beneath dumpster areas or any other areas subjected to continuous concentrated truck wheel loading.

3. Per Section 5.1, 5.5, and 5.10.

5.10 Pavement Construction

The parking/drive areas generally consist of near surface conditions that are generally suitable for support of the anticipated loads. Soft, wet surface, or other unsuitable conditions may be encountered within some areas. Remediation of these soils shall be required during site preparation and earthwork while following the recommendations outlined in this report.

AIMRIGHT recommends conducting additional soil sampling and laboratory testing of the final soil subgrades during completion of grading activities to determine characteristics and stabilization requirements prior to beginning pavement construction.

- Where soils with PI greater than 18 are encountered, to provide the parking/drive areas with a more stable subgrade, at minimum, the upper 8 inches of the final soil subgrade plus an additional 2 feet beyond the footprint be constructed with properly compacted engineered fill or native soils stabilized with a lime additive.

- The actual amounts of lime should be determined in the field and the modification/stabilization procedure shall be performed and monitored in general accordance with 2009 ODOT Standard Specifications for Highway Construction Section 307 Subgrade Treatment.

In general, long-term pavement performance requires good drainage, performance of periodic maintenance activities, and attention to subgrade preparation. We emphasize that good base course drainage is essential for successful pavement performance and should always be maintained in a drained condition. Consideration for proper drainage design should be carefully evaluated where unequal minimum pavement sections meet (i.e., light, or standard to heavy duty). Depending on drainage flow design, it may be necessary to deepen the aggregate base course for the thinner section requirement.

Water build-up in the base course could result in premature pavement failures. Sub-drains are typically utilized beneath a pavement where water may enter the pavement from below or above. Based on the results of the borings, we do not anticipate that sub-drains are required for this site. However, site drainage problems may be revealed during construction that requires sub-drains.

Proper drainage may be aided by grading the site such that surface water is directed away from pavements and by construction of swales adjacent to the pavements. All pavements should be graded such that surface water is directed towards the outer limits of the paved areas or to catch basins located such that surface water does not remain on the pavement.

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.: 11400722
SOURCE: Aerial Imagery/Provided Plan

PROJECT: Pryor Creek Mennonite Church
CLIENT: Lowry Construction Services, Inc.

AIMRIGHT TESTING & ENGINEERING

APPROXIMATE BORING LOCATIONS

BORING LOCATION PLAN

PROJECT NO.: 11400722
SOURCE: Aerial Imagery

PROJECT: Pryor Creek Mennonite Church
CLIENT: Lowry Construction Services, Inc.

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LOG OF BORING B-1

PROJECT: Pryor Creek Mennonite Church

CLIENT: Lowry Construction Services, Inc. **PROJECT NO.:** 11400722

PROJECT LOCATION: 1919 West 470 Road, Pryor, OK 74361

LOCATION: see Boring Location Plan **ELEVATION:** N/A

DRILLER: H. Wilson **LOGGED BY:** R. Melton **DRILLING RIG:** CME-550 ATV-Mounted

DRILLING METHOD: Rotary Continuous Flight Augers **DATE:** 8/4/22

DEPTH TO WATER> INITIAL: Dry **AT COMPLETION:** Dry **CAVING>** No

Depth (feet)	Description	USCS Symbol	SPT N-value (bpf)	Groundwater	Moisture Content	% < #200	Liquid Limit	Plastic Limit	Plasticity Index
0 – 0.333	TOPSOIL - 4 inches		9						
0.333 – 1.5	LEAN CLAY w/ trace sand stiff, dark grayish brown, moist								
1.5 – 6	FAT CLAY w/ trace sand, limestone fragments stiff, dark and medium grayish brown, moist	CH	8		26.9	92.5	69	23	46
			10						
6 – 9.721	LIMESTONE highly weathered soft, light grayish brown, moist		21 50/2.0						
			50/2.0						
			50/0.25						

Auger refusal encountered at 9.7 ft.
Boring terminated at 9.721 ft.

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

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AIMRIGHT TESTING & ENGINEERING

LOG OF BORING B-2

PROJECT: Pryor Creek Mennonite Church
CLIENT: Lowry Construction Services, Inc. **PROJECT NO.:** 11400722
PROJECT LOCATION: 1919 West 470 Road, Pryor, OK 74361
LOCATION: see Boring Location Plan **ELEVATION:** N/A
DRILLER: H. Wilson **LOGGED BY:** R. Melton **DRILLING RIG:** CME-550 ATV-Mounted
DRILLING METHOD: Rotary Continuous Flight Augers **DATE:** 8/4/22
DEPTH TO WATER> INITIAL: Dry **AT COMPLETION:** Dry **CAVING>** No

Depth (feet)	Description	USCS Symbol	SPT N-value (bpf)	Groundwater	Moisture Content	% < #200	Liquid Limit	Plastic Limit	Plasticity Index
0 – 0.333	TOPSOIL - 4 inches								
0.333 – 3.5	LEAN CLAY w/ trace sand stiff, dark grayish brown, moist	CL	9		21.0	86.7	35	20	15
			11						
3.5 – 6	FAT CLAY w/ trace sand stiff, dark and medium grayish brown, moist	CH	10		23.1	88.1	58	21	37
6 – 9.5	LIMESTONE highly weathered soft, light grayish brown, moist		50/2.0						
			50/5.0						
			50/0.25						

Auger refusal encountered at 9.5 ft.
Boring terminated at 9.521 ft.

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-3

PROJECT: Pryor Creek Mennonite Church
CLIENT: Lowry Construction Services, Inc. **PROJECT NO.:** 11400722
PROJECT LOCATION: 1919 West 470 Road, Pryor, OK 74361
LOCATION: see Boring Location Plan **ELEVATION:** N/A
DRILLER: H. Wilson **LOGGED BY:** R. Melton **DRILLING RIG:** CME-550 ATV-Mounted
DRILLING METHOD: Rotary Continuous Flight Augers **DATE:** 8/4/22
DEPTH TO WATER> INITIAL: Dry **AT COMPLETION:** Dry **CAVING>** No

Depth (feet)	Description	Graphic	USCS Symbol	SPT N-value (bpf)	Groundwater	Moisture Content	% < #200	Liquid Limit	Plastic Limit	Plasticity Index
-0.42	AGGREGATE BASE - 5 inches									
0	LEAN CLAY w/ trace sand stiff, dark grayish brown, moist			7						
			CL	9		26.8	88.8	34	16	18
3.5	LEAN to FAT CLAY w/ trace sand stiff, medium olive brown, moist			7						
6	LEAN to FAT CLAY w/ trace sand, limestone fragments hard, medium olive brown mottled light gray, moist			29						
8.5	LIMESTONE highly weathered soft, medium and light grayish olive brown, moist			50/5.5						
10				50/0.5						

Auger refusal encountered at 10 ft.
Boring terminated at 10.04 ft.

LOG OF BORING B-4

AIMRIGHT TESTING & ENGINEERING

PROJECT: Pryor Creek Mennonite Church
CLIENT: Lowry Construction Services, Inc. **PROJECT NO.:** 11400722
PROJECT LOCATION: 1919 West 470 Road, Pryor, OK 74361
LOCATION: see Boring Location Plan **ELEVATION:** N/A
DRILLER: H. Wilson **LOGGED BY:** R. Melton **DRILLING RIG:** CME-550 ATV-Mounted
DRILLING METHOD: Rotary Continuous Flight Augers **DATE:** 8/4/22
DEPTH TO WATER> INITIAL: Dry **AT COMPLETION:** Dry **CAVING>** No

Depth (feet)	Description	USCS Symbol	SPT N-value (bpf)	Groundwater	Moisture Content	% < #200	Liquid Limit	Plastic Limit	Plasticity Index
-0.5 – 0	AGGREGATE BASE - 6 inches								
0 – 1.5	LEAN CLAY w/ trace sand soft, dark grayish brown, moist	CL	3		25.7	89.4	29	18	11
1.5 – 3.5	LEAN to FAT CLAY w/ trace sand stiff, dark grayish brown, moist		8						
3.5 – 8.5	FAT CLAY w/ trace sand stiff, dark and medium grayish brown, moist		9 9						
8.5 – 9.5	LIMESTONE highly weathered soft, medium and light grayish brown, moist		50/1.0 50/0.25						

Auger refusal encountered at 9.5 ft.
Boring terminated at 9.521 ft.

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-5

PROJECT: Pryor Creek Mennonite Church
CLIENT: Lowry Construction Services, Inc. **PROJECT NO.:** 11400722
PROJECT LOCATION: 1919 West 470 Road, Pryor, OK 74361
LOCATION: see Boring Location Plan **ELEVATION:** N/A
DRILLER: H. Wilson **LOGGED BY:** R. Melton **DRILLING RIG:** CME-550 ATV-Mounted
DRILLING METHOD: Rotary Continuous Flight Augers **DATE:** 8/4/22
DEPTH TO WATER> INITIAL: Dry **AT COMPLETION:** Dry **CAVING>** No

Depth (feet)	Description	USCS Symbol	SPT N-value (bpf)	Groundwater	Moisture Content	% < #200	Liquid Limit	Plastic Limit	Plasticity Index
-0.67	AGGREGATE BASE - 8 inches								
0	LEAN CLAY w/ trace sand stiff, dark grayish brown, moist		12						
1.5	LEAN to FAT CLAY w/ trace sand stiff, dark grayish brown, moist		9						
3.5	FAT CLAY w/ trace sand stiff, dark and medium olive brown, moist	CH	7		24.0	85.8	64	19	45
			9						
8.5	LIMESTONE highly weathered soft, medium and light grayish brown, moist		50/2.5						
10			50/0.25						

Auger refusal encountered at 10 ft.
Boring terminated at 10.02 ft.

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

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AIMRIGHT TESTING & ENGINEERING

LOG OF BORING B-6

PROJECT: Pryor Creek Mennonite Church
CLIENT: Lowry Construction Services, Inc. **PROJECT NO.:** 11400722
PROJECT LOCATION: 1919 West 470 Road, Pryor, OK 74361
LOCATION: see Boring Location Plan **ELEVATION:** N/A
DRILLER: H. Wilson **LOGGED BY:** R. Melton **DRILLING RIG:** CME-550 ATV-Mounted
DRILLING METHOD: Rotary Continuous Flight Augers **DATE:** 8/4/22
DEPTH TO WATER> INITIAL: Dry **AT COMPLETION:** Dry **CAVING>** No

Depth (feet)	Description	USCS Symbol	SPT N-value (bpf)	Groundwater	Moisture Content	% < #200	Liquid Limit	Plastic Limit	Plasticity Index
0 – 0.5	TOPSOIL - 6 inches		3						
0.5 – 1.5	LEAN to FAT CLAY w/ trace sand soft, dark grayish brown, moist								
1.5 – 6	FAT CLAY w/ trace sand stiff, dark and medium grayish brown, moist	CH	8		23.6	91.4	65	24	41
			9						
6 – 10	LIMESTONE highly weathered soft, medium and light grayish brown, moist		11 50/5.0						
			12 50/3.0						
			50/0.5						
	Auger refusal encountered at 10 ft. Boring terminated at 10.04 ft.								

KEY TO SYMBOLS

Symbol **Description**

Strata Symbols

Topsoil

Low Plasticity Clay

High Plasticity Clay

Limestone

Aggregate Base

Low to High Plasticity Clays

Misc. Symbols

Auger Refusal

Soil Samplers

Standard Penetration Test

Auger