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SUBSURFACE SOIL INVESTIGATION

Foundation Lutheran Church
TR C, Paint Brush Hills, Filing No. 13A
Falcon, Colorado

PREPARED FOR:

Colorado Commercial Construction
12325 Oracle Blvd, Suite 120
Colorado Springs, CO 80921

JOB NO. 191726

April 3, 2023

Respectfully Submitted,

RMG – Rocky Mountain Group

Nathan Malefyt
Staff Geologist

Reviewed by,

RMG – Rocky Mountain Group

COLORADO REGISTERED
ANTHONY P. MUNGER
4/3/23
39818
PROFESSIONAL ENGINEER

Tony Munger, P.E.
Sr. Geotechnical Project Manager

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GENERAL SITE AND PROJECT DESCRIPTION

Project Description and Scope of Work

RMG has completed a geotechnical investigation for the proposed 1-story structure on conventional construction southwest of the intersection of Towner Avenue and Londonderry Drive, in the northeastern portion of El Paso County, Colorado. The purpose of the investigation was to evaluate the subsurface soil conditions and provide geotechnical design and construction criteria for the project. These services were provided in accordance with our Proposal for RMG Job No. 191726 dated February 10, 2023.

RMG understands the proposed church is to be a 1-story structure of conventional construction, with a footprint of approximately 8,000 square feet.

Existing Site Conditions

At the time of the subsurface investigation, the site appears to have been modified from a natural state. The site appears to have been cleared and grubbed, and leveled by overlot grading. The location of the site is shown on the Site Vicinity Map, Figure 1.

FIELD INVESTIGATION AND LABORATORY TESTING

Drilling

The subsurface conditions on the site were investigated by drilling three exploratory test borings to depths of approximately 20 feet within the proposed building footprint, and three test borings to depths of approximately 5 to 10 feet within the proposed parking areas. The approximate locations of the test borings are presented in the Test Boring Location Plan, Figure 2.

The test borings were advanced with a power-driven, continuous-flight auger drill rig. Soil samples were obtained in general accordance with ASTM D-1586 utilizing a 2-inch OD split-barrel sampler or in general accordance with ASTM D-3550 utilizing a 2½-inch OD modified California sampler. Samples were returned to RMG's materials testing laboratory for testing and analysis. An Explanation of Test Boring Logs is presented in Figure 3. The Test Boring Logs are presented in Figures 4 through 6.

Laboratory Testing

The moisture content for the recovered samples was obtained in the laboratory. Grain-size analysis and Atterberg Limits tests were performed on selected samples for purposes of classification and to develop pertinent engineering properties. A Summary of Laboratory Test Results is presented in Figure 7. Soil Classification Data are presented in Figures 8 and 9.

SUBSURFACE CONDITIONS

Subsurface Materials

The test borings revealed the soil strata across the site to be fairly consistent from boring to boring. The subsurface materials encountered in the test borings consisted of silty to clayey sand fill, and silty to clayey sandstone.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented on the Test Boring Logs. The classifications shown on the logs are based upon the engineer's classification of the samples at the depths indicated. Stratification lines shown on the logs represent the approximate boundaries between material types and the actual transitions may be gradual and vary with location.

Groundwater

Groundwater was not encountered in the test borings at the time of drilling. Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels. Groundwater is not expected to be a significant factor in foundation design. Fluctuations in groundwater and subsurface moisture conditions may occur due to seasonal variations in rainfall and other factors not readily apparent at this time.

Soil Parameters

The following table presents estimated in-situ soil parameters.

Soil Description	Unit Weight (lb/ft^3)	Friction Angle (degree)	Active Earth Pressure Ka	Passive Earth Pressure Kp	At-Rest Earth Pressure Ko	Modulus of Elasticity E_s (lb/in^2)	Poisson's Ratio μ_s
Silty Sand	120	28	0.361	2.77	0.531	1,500	0.20

Seismic Design

In accordance with the Minimum Design Loads and Associated Criteria for Buildings and Other Structures, ASCE/SEI 7-16, seismic design parameters have been determined for this site. The seismic site class has been interpreted from the results of the soil test borings drilled within the project site. The Advanced Technology Council seismic design tool has been used to determine the seismic response acceleration parameters. The soil on this site is not considered susceptible to liquefaction.

The following recommended seismic design parameters are based upon Seismic Site Class D, and a 2-percent probability of exceedance in 50 years. The Seismic Design Category is "B".

Period (sec)	Mapped MCE Spectral Response Acceleration (g)		Site Coefficients		Adjusted MCE Spectral Response Acceleration (g)		Design Spectral Response Acceleration (g)	
0.2	S_s	0.188	F_a	1.6	S_{ms}	0.301	S_{ds}	0.201
1.0	S_1	0.055	F_v	2.4	S_{m1}	0.133	S_{d1}	0.089

Notes: MCE = Maximum Considered Earthquake
g = acceleration due to gravity

CONCLUSIONS AND RECOMMENDATIONS

The following discussion is based on the subsurface conditions encountered in the test borings and the project characteristics previously described. If conditions are different from those described in this report or the project characteristics change, RMG should be retained to review and revise our recommendations as necessary.

Geotechnical Considerations

Fill soils were encountered during our investigation. As of the issue date of this report, no documentation has been provided to RMG indicating that the fill was placed in a controlled manner, or that it was observed or tested during placement. Until such documentation is provided, the fill soils encountered on the site are considered non-engineered and are not suitable for support of foundation components. These unsuitable fill soils may be encountered in the excavations, even on lots where none are indicated on the test boring logs. Furthermore, any fill placed atop those unsuitable fill soils will also be considered unsuitable for support of foundation components, unless the new fill soils comprise one component of a foundation bearing enhancement system. This report does not include recommendations for design or construction of such a bearing enhancement system. If such recommendations are desired, contact personnel of RMG for more information.

Based on the subsurface soil conditions encountered in our test borings, it is our opinion that a shallow foundation system is suitable for the proposed structure. Deep foundation systems, while not anticipated to be necessary, are also a suitable alternative for the proposed structure. If a deep foundation system is desired, please contact personnel of RMG for revised recommendations.

Site Preparation

Standard Penetration Test blow counts vary across the site and with depth. Due to this variability we recommend removing (overexcavating) the foundation areas and backfilling with compacted structural fill. The on-site material is suitable as structural backfill. Site preparation should include clearing and grubbing the site of all vegetation, topsoil, and any other deleterious material within the construction area and disposing this material appropriately. Where overexcavation has not already been performed due to fill soils, the area within the foundation footprint and a 1-foot perimeter beyond should be overexcavated one (1) foot below the bottom of footing elevation. Material from the excavation may be stockpiled for reuse as structural backfill. An Open Excavation Observation should be made at this point to verify soil conditions are as reported in the soil boring logs herein.

Upon verification, the upper 6 inches of the exposed subsurface soils should then be scarified and moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) prior to placing structural fill.

After compaction, the native material previously removed may be used as structural backfill to bring the site to bottom-of-footing grade. The material should not be excessively wet, should be free of organic matter and construction debris, and should not contain rock fragments greater than 3-inches in any dimension. The fill material should be moisture-conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and placed in lifts of not more than 10 inches. Each loose lift should be compacted to a minimum of 95 percent of Modified Proctor maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698). The first density tests should be conducted when 12 inches of compacted fill have been placed.

Foundation Recommendations

A spread footing foundation supported on compacted structural fill is suitable for the proposed structure. We have anticipated the deepest excavation cuts will be approximately 3 to 4 feet below the existing ground surface, not including overexcavation.

For a structure supported atop structural fill, a maximum allowable bearing pressure of 2,000 psf with no minimum dead load requirement may be used for design. The foundation design should be prepared by a qualified Colorado Registered Professional Engineer using the recommendations presented in this report. This foundation system should be designed to span a minimum of 10 feet under the design loads. The bottoms of exterior foundations should be at least 30 inches below finished grade for frost protection.

Open Excavation Observations

As referenced above, foundation excavations should be observed by RMG prior to placing structural fill, forms, or concrete to verify the foundation bearing conditions for each structure. Based on the conditions observed in the foundation excavation, the recommendations made at the time of construction may vary from those contained herein. In the case of differences, the Open Excavation Observation report shall be considered to be the governing document to be used to modify the site preparation recommendations as necessary.

Floor Slabs

The in-situ sand soil exhibited nil swell potential in laboratory testing and should be stable at its natural moisture content. Any fill material placed below slabs should be granular, non-expansive material to reduce the potential for slab movement.

Areas under floor slabs should be overexcavated a minimum of 1-foot and the upper 6 inches of the exposed subsurface soils should then be scarified and moisture-conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) prior to placing structural fill. Floor slabs should bear upon a minimum of 1-foot of structural backfill compacted to a minimum of 95 percent of Modified Proctor maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698). Non-structural slabs should be isolated from foundation members with expansion material. To reduce the possibility of capillary rise of groundwater into the floor slab, and to reduce the potential for concrete curling, a minimum 3-inch layer of ¾-inch crushed stone over 6-mil vapor retarder may be placed atop the compacted structural fill. A conventionally-reinforced or post-tensioned slab supported on stemwalls or grade beams may also be considered for strength and to reduce the potential for movement, curling, and differential settlement.

Exterior Concrete Flatwork

Reinforced concrete exterior slabs should be constructed similarly to floor slabs on compacted structural fill, with the additional caveat they be isolated from the building with expansion material and have a downturned reinforced thickened edge. Conventionally-reinforced or post-tensioned slabs supported on stemwalls or grade beams may also be considered to reduce the potential for movement, curling, and differential settlement.

Lateral Earth Pressures

Foundation walls should be designed to resist lateral pressures. For non-expansive backfill materials, we recommend an equivalent fluid pressure of 40 pcf for design. Expansive soils or bedrock should not be used as backfill against walls. The above lateral pressure applies to level, drained backfill conditions. Equivalent Fluid Pressures for sloping/undrained conditions should be determined on an individual basis.

CONSTRUCTION CONSIDERATIONS

Surface Grading and Drainage

A contributing factor to foundation settlement and floor slab heave in Colorado Front Range soils is the introduction of excess water. Improper site grading and irrigation water are respectively the most common cause and source of excess water. The ground surface should be sloped from the building with a minimum gradient of 10 percent for the first 10 feet. This is equivalent to 12 inches of fall across this 10-foot zone. Where a 10-foot zone cannot be achieved, a well-defined swale should be created a minimum 5 feet from the foundation and parallel with the wall, with a minimum slope of 2 percent to collect the surface water and transport it around and away from the structure. Roof drains should extend across backfill zones and landscaped areas to a region that is graded to direct flow away from the structure(s). Future maintenance operations should include activities to maintain the surface grading and drainage recommendations herein to help prevent water from being directed toward and/or ponding near the foundations.

Landscaping should be selected to reduce irrigation requirements. Plants used close to foundation walls should be limited to those with low moisture requirements and irrigated grass should not be located within 5 feet of the foundation. To help control weed growth, geotextiles should be used below landscaped areas adjacent to foundations. Impervious plastic membranes are not recommended. Irrigation devices should not be placed within 5 feet of the foundation. Irrigation should be limited to the amount sufficient to maintain vegetation. Application of excess water will increase the likelihood of slab and foundation movements.

Perimeter Drain

The site soil is generally anticipated to be well-draining, and groundwater was not encountered at depths anticipated to impact the proposed construction. A subsurface perimeter drain is recommended around portions of the structure which will have habitable or storage space located below the finished ground surface. This includes crawlspace areas if applicable. Where main-level slab-on-grade foundation systems are utilized, a subsurface perimeter drain will not be required around the foundation. An underslab drain is not anticipated to be necessary.

Concrete

Sulfate testing was performed on selected samples based on ASTM C1580. Test results showed 0.02% by weight, indicating the soils present Class 0 (negligible) sulfate exposure. Based on these results Type I/II cement or an equivalent mixture according to ACI 201.2R-10 is suggested for concrete in contact with the subsurface materials. Cement type shall be designed and approved by a licensed Colorado Professional Engineer and Foundation Designer. Calcium chloride should not be used for the onsite soils. The concrete should not be placed on frozen ground. If placed during periods of cold temperatures, the concrete should be kept from freezing. This may require covering the concrete with insulated blankets and heating. Concrete work should be completed in accordance with the latest applicable guidelines and standards published by ACI.

Exterior Backfill

Backfill around foundation stemwalls and other buried structures should be placed in loose lifts of not more than 10-inches, moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to 85 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or to 92 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) on exterior sides of walls in landscaped areas. In areas where backfill supports pavement and concrete flatwork, the materials should be compacted to 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or to 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698).

Fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

The appropriate government/utility specifications should be used for fill placed in utility trenches. If material is imported for backfill, the material should be approved by the Geotechnical Engineer prior to hauling it to the site.

The backfill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement. Backfill should be compacted by mechanical means, and foundation walls should be braced during backfilling and compaction.

Structural Fill - General

Areas to receive structural fill should have topsoil, organic material, or debris removed. The upper 6 inches of the exposed surface soils should be scarified and moisture-conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or to 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) prior to placing structural fill. Structural fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

Structural fill should be placed in loose lifts of not more than 10-inches, moisture-conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or to 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698). The materials should be compacted by mechanical means.

Materials used for structural fill should be approved by the RMG prior to use. Structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement.

To verify the condition of the compacted soils, density tests should be performed during placement. The first density tests should be conducted when 24 inches of fill have been placed.

ANTICIPATED PAVEMENT RECOMMENDATIONS

The discussion presented below is based on the subsurface conditions encountered in the test borings, laboratory test results and the project characteristics previously described. If the subsurface conditions are different from those described in this report or the project characteristics change, RMG should be retained to review our recommendations and modify them, if necessary. The conclusions and recommendations presented in this report should be verified by RMG during construction.

Pavement Design

The pavement design was performed using the Colorado Asphalt Pavement Association's *A Guideline for the Design and Construction of Asphalt Parking Lots in Colorado*. Table 1 of this document shows suggested thicknesses for Hot Mix Asphalt (HMA) over aggregated base course (ABC) for various California Bearing Ratio (CBR) values and traffic levels.

Test Borings 4, 5, and 6 were performed for the purpose of pavement design. Bulk soil samples were collected from the top two feet of the soil stratum in each location and returned to RMG's soil laboratory for testing, classification and analysis. This material will form the subgrade of the pavement section, and its stability and strength are critical to pavement design. The soil consisted of well-graded and poorly-graded silty to clayey sand. The majority of the silty to clayey sand classifies as A-1 and A-2 soil in accordance with the American Association of State Highway and Transportation Officials (AASHTO) classification system. These soils are considered "excellent to good" as subgrade material.

The CBR of the bulk sample is assumed to be approximately 20 for silty to clayey sands.

Subgrade Preparation

All subgrade fill material placed below pavements should be moisture conditioned and compacted in accordance with the ***Structural Fill – General*** section of this report. Prior to placement of the pavement section, the final subgrade should be scarified to a depth of 12 inches, adjusted to within 2 percent of the optimum moisture content and recompacted. The subgrade should then be proof-rolled with a heavy, pneumatic tired vehicle. Areas which deform under wheel loads should be removed and replaced. Base course should be compacted to at least 95 percent of the maximum Modified Proctor density (ASTM D1557).

Pavement Thickness

Based on Table 1 (referenced above) and the estimated CBR of 20, the recommended pavement section for the majority of paved areas and for heavy vehicle loading areas is presented below.

Estimated Hot-Mix Asphalt Pavement Section	
Traffic Level	**HMA over ABC (inches)**
Moderate Traffic / Some Trucks	4.0 / 6.0
Heavy Vehicles with Turning Motions	5.5 / 6.0

As an alternative to the HMA section above, Rigid Concrete Pavements are recommended in areas where heavy vehicle loading is expected. These areas include drop-off/pick-up areas, loading docks, trash pick-up areas, and other locations where heavy trucks will be making frequent turning and braking movements. Rigid pavements may be constructed directly on proof-rolled non-expansive granular subgrade, the top one foot of which has been compacted to a minimum of 95% of maximum dry density as determined by ASTM D1557.

Minimum Rigid Concrete Pavement Section	
Traffic Level	**Portland Cement Concrete (in.)**
Heavy Vehicles with Turning Motions	5.0 in.

These recommendations are for preliminary planning purposes only. The CBR value is based on the materials encountered at the time of drilling and will be dependent upon the soil material used for site fill and subgrade construction. We suggest evaluating the soil conditions after site grading and pavement layout to assess our recommendations.

Pavement Materials

Pavement materials should be selected, prepared, and placed in accordance with the above referenced document, the *Pikes Peak Region Asphalt Paving Specifications*, and all other requirements set forth by the governing jurisdictions. Tests should be performed in accordance with the applicable procedures presented in those specifications.

Surface Drainage

Surface drainage is important for the satisfactory performance of pavement. Wetting of the subgrade soils or base course will cause a loss of strength which can result in pavement distress. Surface drainage should provide for efficient removal of storm-water runoff. As a general rule, parking area surfaces should have a minimum slope of 2 percent (approximately ¼ inch per foot). Water should not be allowed to pond on the pavement or at the edges of the pavement, and areas adjacent to the pavement should be designed to provide positive drainage away from the paved surface.

CLOSING

This report has been prepared for the exclusive purpose of providing geotechnical engineering information and recommendations for development described in this report. RMG should be retained to review the final construction documents prior to construction to verify our findings, conclusions and recommendations have been appropriately implemented.

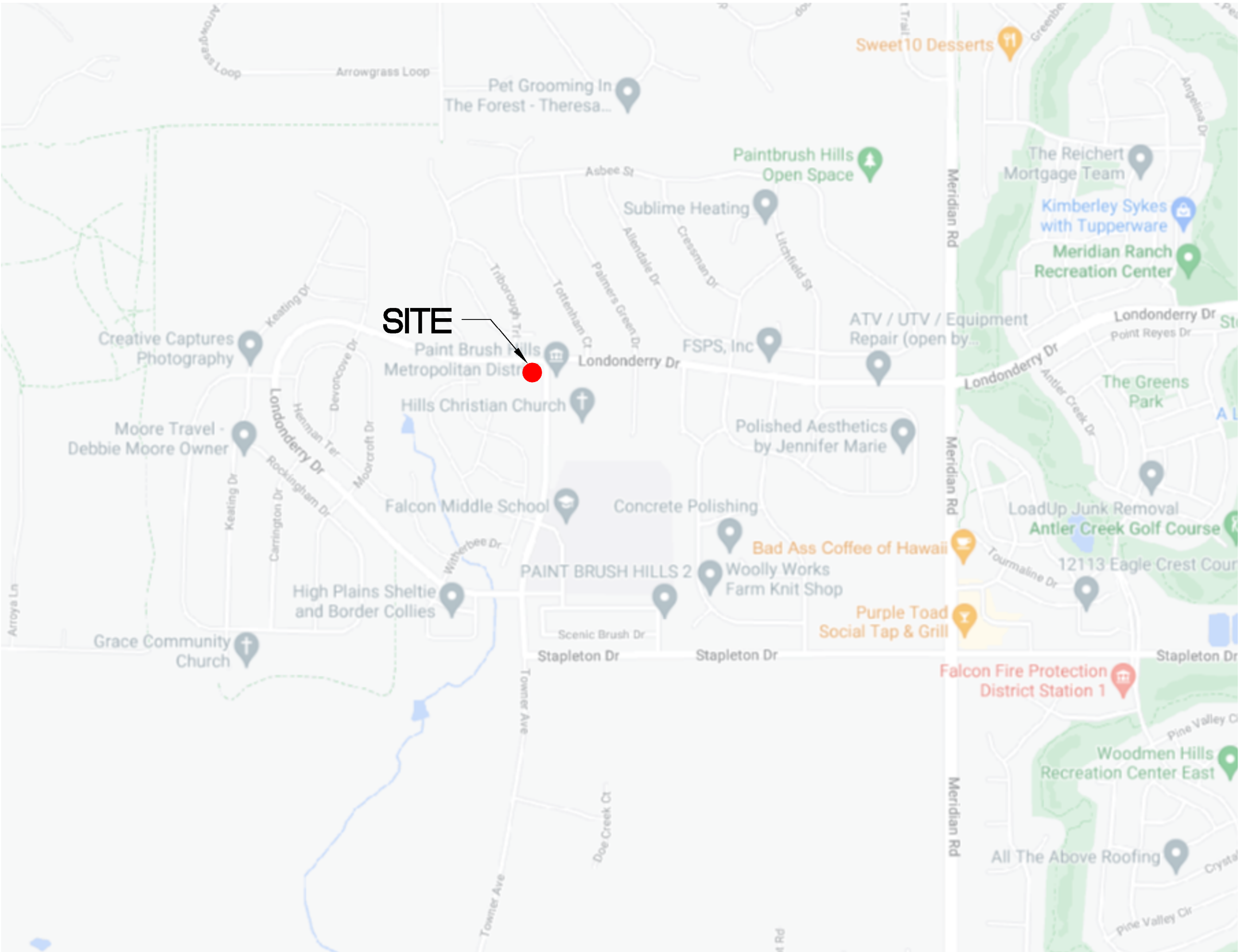
This report has been prepared for the exclusive use by **Colorado Commercial Construction** for application as an aid in the design and construction of the proposed development in accordance with generally accepted geotechnical engineering practices. The analyses and recommendations in this report are based in part upon data obtained from test borings, site observations and the information presented in referenced reports. The nature and extent of variations may not become evident until construction. If variations then become evident, RMG must be retained to review and revise the recommendations presented in this report as appropriate.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

The scope of services for this project does not include, either specifically or by implication, environmental assessment of the site or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to biological or toxicological issues, are beyond the scope of this report. If the Client desires investigation into the potential for such contamination or conditions, other studies should be undertaken.

If we can be of further assistance in discussing the contents of this report or analysis of the proposed development, from a geotechnical engineering point-of-view, please feel free to contact us.

FIGURES



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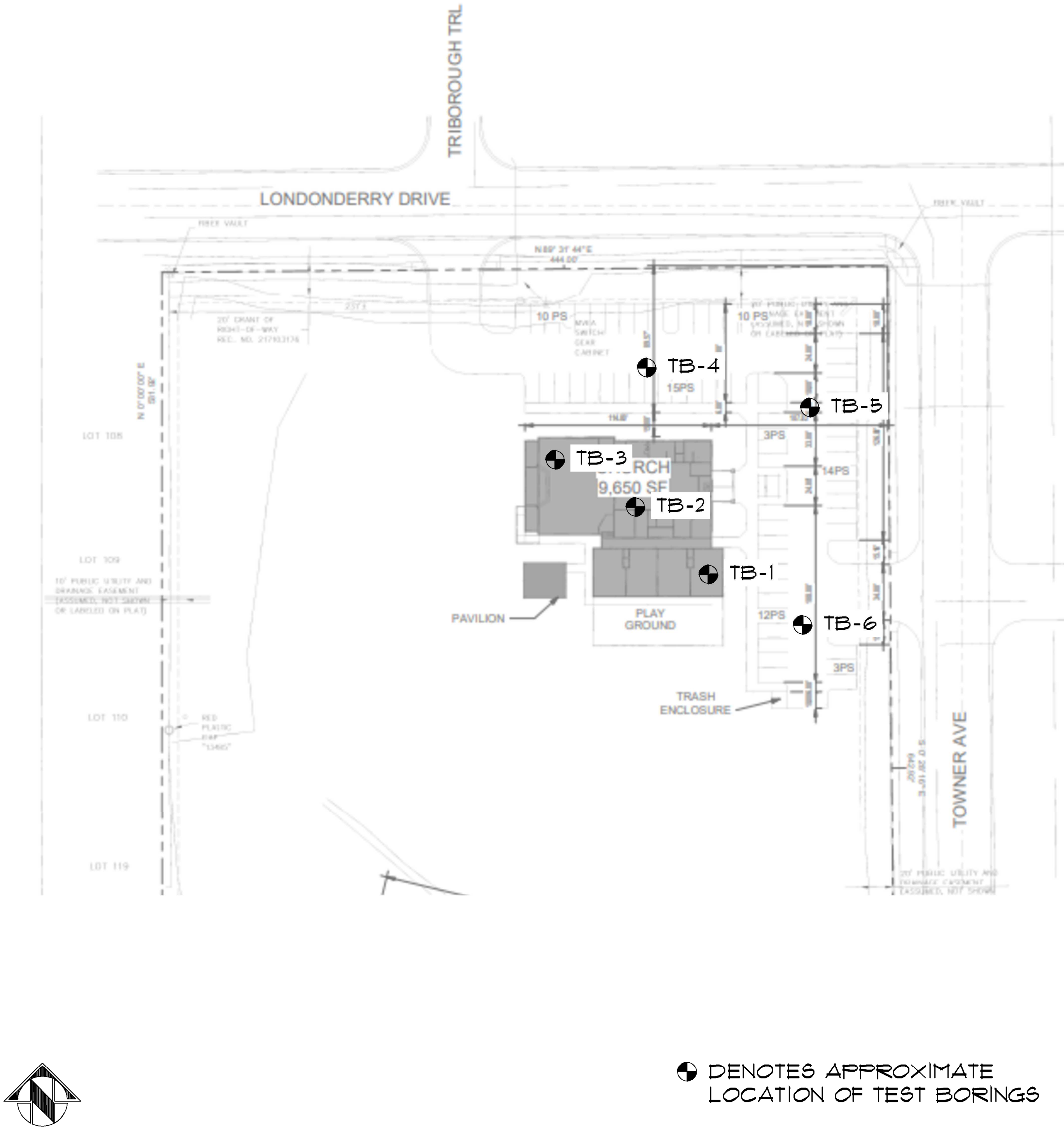
SITE VICINITY MAP

FOUNDATION LUTHERAN CHURCH
TR C, PAINT BRUSH HILLS, FILING NO. 13A
FALCON, COLORADO
COLORADO COMMERCIAL CONSTRUCTION

JOB No. 191726

FIG No. 1

DATE 4-3-2023



DENOTES APPROXIMATE LOCATION OF TEST BORINGS

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TEST BORING LOCATION PLAN

FOUNDATION LUTHERAN CHURCH
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COLORADO COMMERCIAL CONSTRUCTION

JOB No. 191726

FIG No. 2

DATE 4-3-2023

SOILS DESCRIPTION

FILL: SAND, SILTY TO CLAYEY

SANDSTONE

UNLESS NOTED OTHERWISE, ALL LABORATORY
TESTS PRESENTED HEREIN WERE PERFORMED BY:
RMG - ROCKY MOUNTAIN GROUP
2910 AUSTIN BLUFFS PARKWAY
COLORADO SPRINGS, COLORADO

SYMBOLS AND NOTES

XX STANDARD PENETRATION TEST - MADE BY DRIVING A SPLIT-BARREL SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-1586. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).

XX UNDISTURBED CALIFORNIA SAMPLE - MADE BY DRIVING A RING-LINED SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-3550. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).

FREE WATER TABLE

DEPTH AT WHICH BORING CAVED

BULK DISTURBED BULK SAMPLE

AUG AUGER "CUTTINGS"

4.5 WATER CONTENT (%)

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EXPLANATION OF TEST BORING LOGS

JOB No. 191726

FIGURE No. 3

DATE Apr/03/2023

TEST BORING: 1

DATE DRILLED: 2/20/23

NO GROUNDWATER ON 2/20/23

DESCRIPTION	DEPTH (FT)	SAMPLES	BLOWS PER FT.	WATER CONTENT %
FILL: SAND, SILTY, with gravel and sandy clay seams, brown, medium dense, moist	0–6			
	4–5	Sample	19	6.4
SANDSTONE, CLAYEY, with gravel, brown to gray, hard to very hard, moist	6–19			
	~9	Sample	50/5"	8.3
	14	Sample	50/11"	14.3
	19	Sample	50/2"	12.0

TEST BORING: 2

DATE DRILLED: 2/20/23

NO GROUNDWATER ON 2/20/23

DESCRIPTION	DEPTH (FT)	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SANDSTONE, SILTY, with gravel, brown, hard to very hard, moist	0–19			
	2	Sample	50/11"	4.1
	7	Sample	50/8"	8.1
	14	Sample	50/9"	11.1
	19	Sample	50/3"	7.4

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TEST BORING LOG

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FIGURE No. 4

DATE Apr/03/2023

TEST BORING: **3**

DATE DRILLED: 2/20/23
NO GROUNDWATER ON 2/20/23

DEPTH (FT)	SAMPLES	BLOWS PER FT.	WATER CONTENT %
~4.5	sample	50/6"	7.8
~9.5	sample	50/7"	10.2
~14.5	sample	10/0"	7.5
~19.5	sample	50/6"	10.6

SANDSTONE, CLAYEY, with gravel, brown, very hard, moist (0 to ~19.5 ft)

Depth scale: 5, 10, 15, 20

TEST BORING: **4**

DATE DRILLED: 2/20/23
NO GROUNDWATER ON 2/20/23

DEPTH (FT)	SAMPLES	BLOWS PER FT.	WATER CONTENT %
~2.5	sample	50/11"	2.4
~4.5	sample	50/6"	4.2

SANDSTONE, SILTY, with gravel, medium hard to hard, moist (0 to ~4.5 ft)

Depth scale: 5

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TEST BORING LOG

JOB No. 191726

FIGURE No. 5

DATE Apr/03/2023

TEST BORING: **5** DATE DRILLED: 2/20/23 NO GROUNDWATER ON 2/20/23	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SANDSTONE, CLAYEY, with gravel, brown, hard to very hard, moist				50/4"	4.1
				50/6"	6.0
	5				
				50/6"	9.5
	10				

TEST BORING: **6** DATE DRILLED: 2/20/23 NO GROUNDWATER ON 2/20/23	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SANDSTONE, SILTY, with gravel, brown, hard, moist				50/6"	3.1
				50/6"	5.3
	5				

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TEST BORING LOG

JOB No. 191726

FIGURE No. 6

DATE Apr/03/2023

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
1	4.0	6.4								
1	9.0	8.3		29	13	6.4	21.1			SC
1	14.0	14.3								
1	19.0	12.0								
2	2.0	4.1		NP	NP	15.6	12.2			SM
2	7.0	8.1								
2	14.0	11.1								
2	19.0	7.4								
3	4.0	7.8								
3	9.0	10.2								
3	14.0	7.5				4.9	18.0			
3	19.0	10.6								
4	2.0	2.4								
4	4.0	4.2				23.1	13.2			
5	2.0	4.1								
5	4.0	6.0				9.7	14.4			
5	9.0	9.5								
6	2.0	3.1				7.4	12.6			
6	4.0	5.3								

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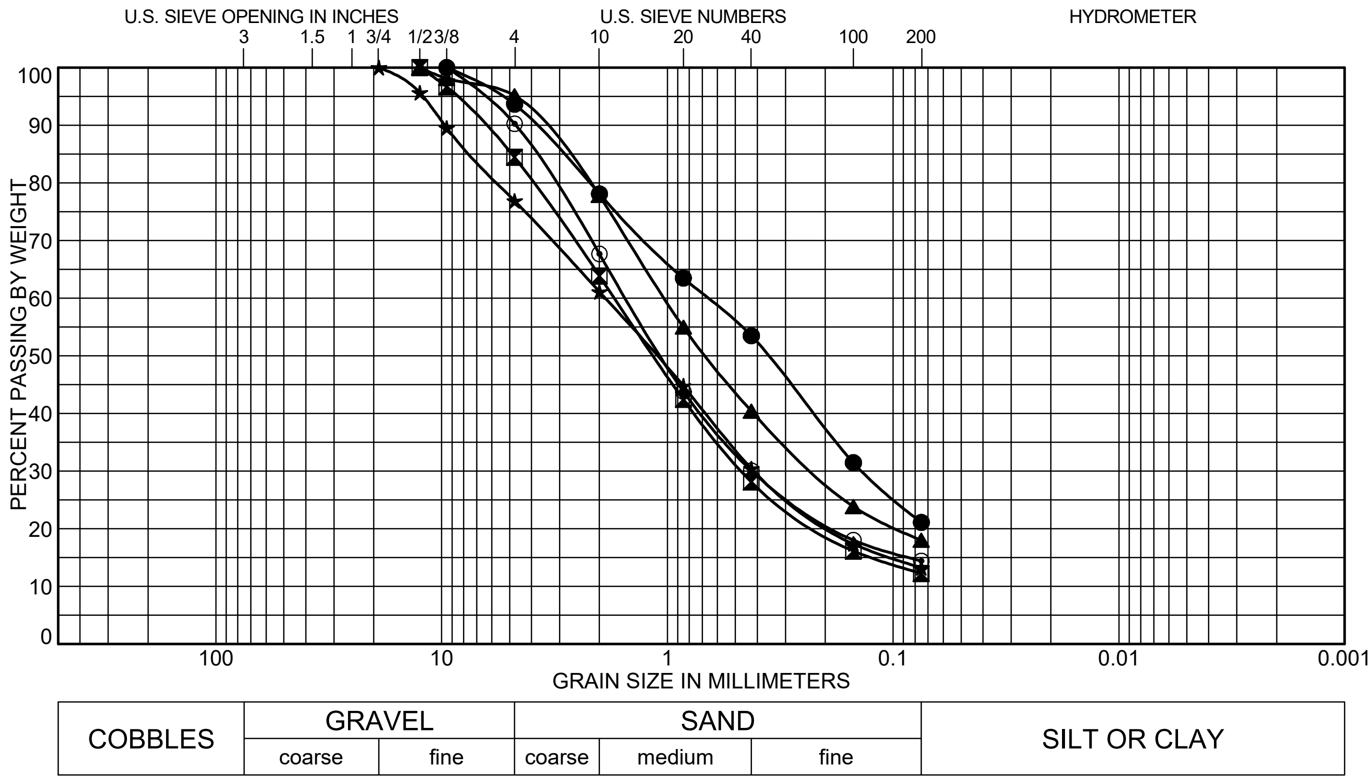
SUMMARY OF LABORATORY TEST RESULTS

JOB No. 191726
FIGURE No. 7
PAGE 1 OF 1
DATE Apr/03/2023



	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	**1**	**9.0**	**CLAYEY SAND(SC)**	**29**	**16**	**13**
⧗	**2**	**2.0**	**SILTY SAND with GRAVEL(SM)**	**NP**	**NP**	**NP**
▲	**3**	**14.0**				
★	**4**	**4.0**				
⊙	**5**	**4.0**				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	**1**	**9.0**	**6.4**	**72.6**	**21.1**	
⧗	**2**	**2.0**	**15.6**	**72.2**	**12.2**	
▲	**3**	**14.0**	**4.9**	**77.2**	**18.0**	
★	**4**	**4.0**	**23.1**	**63.6**	**13.2**	
⊙	**5**	**4.0**	**9.7**	**75.9**	**14.4**	

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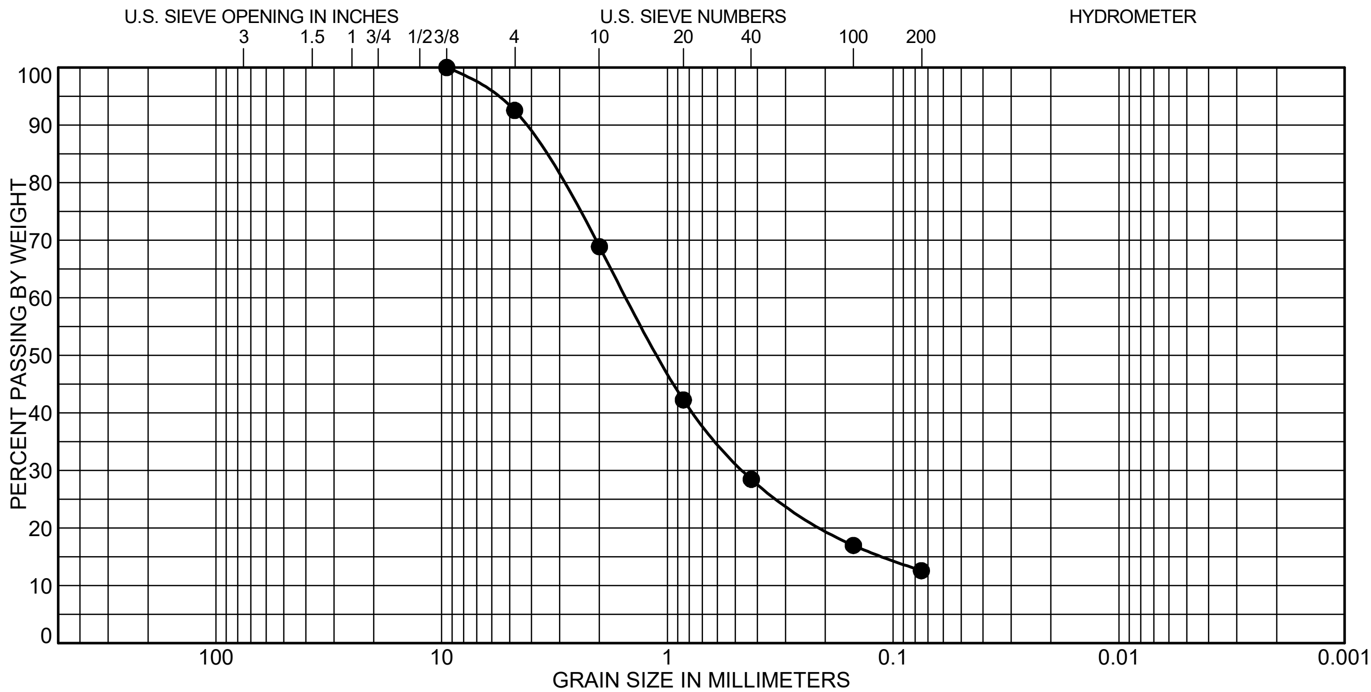
SOIL CLASSIFICATION DATA

JOB No. 191726

FIGURE No. 8

DATE Apr/03/2023



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	6	2.0				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	6	2.0	7.4	80.0	12.6	

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SOIL CLASSIFICATION DATA

JOB No. 191726

FIGURE No. 9

DATE Apr/03/2023