



J&K Geological Services  
18291 Smokey Pine Rd  
Peyton, Colorado 80831  
(719) 499-5431

November 21, 2019

G3 Investments Inc.  
6215 Corporate Drive  
Colorado Springs, CO. 80919

**RE: Lot 1 Walker Reserve**  
**J&K JOB: 191112**

Gentlemen;

Personnel of J&K Geological Services, LLC (J&K) placed two shallow test borings on the above-referenced site on 11/20/2019. The test boring locations were determined by others. Reference the attached Site Plan and Test Boring Logs (Figures 1&2). The Scope of our involvement is limited to providing soil parameters only. It is our understanding the Geologic Hazards Study (Senate Bill) for the proposed project is being provided by others.

**The recommendations and soil parameters provided in this letter are preliminary and can be used for the foundation design for the proposed structure. However, an open excavation observation (OEO) by J&K must be completed prior to setting foundation forms to verify anticipated on-site soil conditions. There will be an additional charge for the OEO and required report.**

The information and recommendations contained in this letter are intended for use by individuals who are familiar with the construction practices and standards common to this region and all applicable building codes. Warranty companies may require more stringent recommendations than those provided in this report (i.e., final grade slopes). When differences exist between underwriting requirements, the governing code, and/or recommendations contained in this letter, the more stringent shall control.

The recommendations contained in this letter concerning the scope of construction are based upon the information provided. Any changes in conditions, including but not limited to excavation location, scope of project, elevations, etc. are to be brought to the attention of J&K Geologic Services. The recommendations are preliminary and can be utilized by the foundation designer to design the foundation system.

The recommendations contained in this letter are based upon the conditions observed on 11/20/2019. This report is intended for use by the client, and only for the purpose stated, within a reasonable time of issuance. The scope of the project, geologic condition (both on and off site), climatic conditions, state of the art and other variables may change over time. If another engineering firm is retained for site work and excavation observations, they must complete their own subsurface investigation. This report can be used for comparison only.

## SOIL PARAMETERS AND CONDITIONS

- SOIL TYPE(S):** Soil types observed in the test borings drilled on this site were found to consist of clean to silty clayey Eolian (wind deposited) sand over clayey Alluvial (water deposited) sand.
- ALLOWABLE BEARING CAPACITY:** Assuming a minimum 16 inch footing and minimum pad size of 30 inches square, an allowable bearing capacity of 1500 psf is recommended with an equivalent hydrostatic fluid pressure in the active state of 45 pcf. The equivalent hydrostatic fluid pressure assumes level backfill conditions and may require modification for the effects of surcharged load, sloping backfill, etc.
- EXPANSION POTENTIAL:** An expansion pressure of 375 psf with .013% volume change and 7.4% moisture increase was determined by laboratory tests on the Eolian clayey sand encountered in upper soil profile of Test Borings 1&2. This magnitude of expansion is in the low expansion range. The swell test was run to determine the suitability of the upper material for use as structural fill in an overexcavation/replacement scheme.
- MOISTURE CONTENT:** Low
- FILL:** No fill was encountered during the drilling program. Refer below for fill specifications for the recommended overexcavation /replacement scheme.
- SPECIAL CONSIDERATIONS:**
- The recommendations contained in this letter are provided for a new wood framed structure. They are intended to satisfy, inasmuch as practical, on-site soil conditions and provide a system that is compatible with the existing on site soil conditions.
- To reduce the potential for differential movement between the two soil types encountered in the test borings, a minimum 3 feet of the eolian soil should be removed, moisture conditioned and placed as structural fill.
- The overexcavation should include the entire building footprint and extend a minimum of five feet beyond the building footprint. The on-site soils can be utilized for the overexcavation/replacement scheme. The structural fill is to be compacted in lifts not to exceed six inches after compaction, while maintaining a minimum of 95% of its maximum Proctor dry density, ASTM D-698. The granular material should be placed at approximately 2% of its Proctor

## RECOMMENDATIONS

### SPECIAL

#### CONSIDERATIONS: (cont.)

optimum moisture content. Frequent density tests of all structural fill is to be completed during fill placement. The overexcavated site must be observed by a representative of J&K Geological Services, LLC prior to fill placement. The first density tests should be conducted when 18 to 24 inches of fill have been placed.

The homebuyer must be made aware of these conditions and be made familiar with the precautions outlined in this letter. Further, all suggestions, recommendations and protective measures contained in this letter are prudent and will reduce the potential for movement, but are not a guarantee that movement will not occur.

**This site is located in a low expansive potential environment. The soils will change in volume with changes in moisture content. As such, the surface drainage and grading recommendations contained in this letter are critical for the future performance of the structure and is to be maintained over the life of the structure.**

#### FOUNDATION TYPE:

A shallow foundation system utilizing the maximum allowable bearing capacity and equivalent fluid pressure provided in this letter is recommended for this site.

#### REINFORCING:

Reinforcing should be designed to allow foundation walls to span a minimum of 12 feet under the design load. Foundation walls retaining over four feet of soil should be designed to resist an equivalent fluid pressure in the active state of 45 pcf.

#### FLOOR SLABS:

Floor slabs on grade should be separated from structural portions of the building and allowed to float freely as follows:

- Slabs must be separated from all structural and non-structural portions of the building in such a manner that they do not transmit floor slab movement to the roof or overlying floor.
- Stairways and doorways must be designed to accommodate slab movement. Sheetrock and pre-hung doors must not rest on stairway stringers or the slab.
- Columns, pipes, plumbing and utilities penetrating the slab must be isolated from the slab to provide for slab movement.

## RECOMMENDATIONS

### FLOOR SLABS: (cont.)

- Water lines and gas lines connected to water heaters and/or furnaces resting on the slab must be constructed with flexibility to allow for slab movement. Heater ducts must be provided with collapsible connections between the furnace and ductwork.
- Backfill placed below floor slabs is to be compacted to a minimum 90% of its maximum Proctor dry density, ASTM D-698.

The above recommendations are considered prudent and should be followed in order to mitigate the effects of floor slab movement. They do not guarantee, however, that movement will not occur in the event that the subsoils increase in moisture content. The homeowner must be advised of these precautions prior to closing and be advised to monitor these issues to prevent damage if movement occurs.

### DRAINAGE AND GRADING:

The ground surface within 10 feet of the building must be sloped away from the building with a minimum gradient of 5%. This is equivalent to six inches of fall across this 10-foot zone. Concrete flatwork should be sloped away from the building with a minimum of 2% gradient. Where this is not possible, a well-defined swale should be constructed to intercept the surface water and carry it quickly and safely around and away from the building. Plastic should not be utilized beneath decorative rock or bark, etc. A breathable filter fabric should be utilized in lieu of plastic membranes.

Decorative edging, sidewalks and other flatwork should be planned and constructed so that they do not restrict rapid surface flows away from the foundation region.

Roof downspouts should be extended across all backfill zones and discharged into an area of positive drainage away from the structure.

No sod, grass, shrubs, flowers, trees, or other vegetation requiring water should be placed within five feet of the foundation or within any backfill zone. Sprinklers must not discharge water within five feet of the foundation or within any backfill zone.

### SUBDRAIN:

A subsurface drain is to be placed around the entire structure. This would include all exterior walls and interior walls located at steps in the excavation. **Specifications for the subsurface drain should be provided by the foundation engineer.** Collected surface water is not to be discharged into the subsurface drain.

## RECOMMENDATIONS

### **SUBDRAIN: (cont.)**

Extreme care must be exercised when backfilling over the drain, installing utilities near the drain, or performing any other activity that may damage the drain. Any damage to the drain should be repaired and documented.

### **BACKFILL:**

The basement foundation walls, if any, should be laterally supported prior to backfill. If previously recommended, select backfill should be used. Any imported material for backfill must be approved by the soils engineer.

Backfill around foundations and in all utility trenches should be compacted to a minimum 90% of its maximum Proctor dry density, ASTM D-698. Backfill must be compacted by mechanical means. No water flooding techniques of any type should be used.

It must be understood even properly compacted backfill can settle creating ponding areas and negative grading toward foundation components.

Collected surface water permeating the backfill zone to the soils supporting foundation components can adversely affect the foundation and below grade concrete slab components. Any settlement of the backfill adjacent to foundation components is to be modified to satisfy the drainage and grading recommendations contained in this letter.

### **CONCRETE:**

All concrete in contact with the soil should be made using Type II cement for sulfate resistance. Calcium chloride must not be added to Type II cement.

Foundation forms should remain in place for an appropriate length of time in accordance with ACI (American Concrete Institute) recommendations in the ACI Manual of Standard Practice, Part 2.

In accordance with the current Uniform Building Code and good construction practices, concrete must not be placed on frozen ground.

### **OPEN FOUNDATION EXCAVATION OBSERVATION:**

**The open foundation excavation must be observed prior to construction in order to verify that no anomalies are present, that materials of the proper design bearing capacity have been encountered, and that no soft areas or other objectionable materials are present in the foundation area. There is an additional charge for the open excavation observation and letter.**

**REMARKS:**

The proposed structure is to be located on structural fill possessing a low expansion potential. Although the expansive potential of the soil is not expected to cause movement of foundation components, it is probable that flatwork may move.

The recommendations provided in this letter are intended to reduce the potential for settlement of the foundation components. Recommendations pertaining to isolating flatwork from structural and non-structural components of the building are intended to reduce the potential for damage to the superstructure.

Successful construction and performance depends on the implementation of all of the recommendations provided. Problems are likely if any of the recommendations are not followed, or if any of the systems fail. Again, following the recommendations is considered prudent; however, it is not a guarantee that movement will not occur.

**CLOSING:**

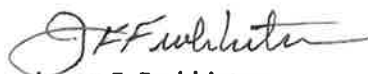
Our investigation consisted of random sampling of a heterogeneous material. As a result, subsurface soil conditions encountered during construction may differ somewhat from the conditions described in this report. Construction and design personnel should be made familiar with the contents herein. We recommend a preconstruction meeting be held onsite to ensure everyone involved in the excavation phase of the project is on the same page. If discrepancies are noted during construction, J&K Geological Services should be notified in order that construction problems may be avoided.

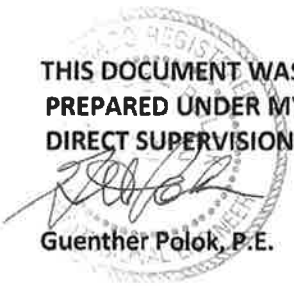
This report has been prepared in accordance with generally accepted engineering standards of care for the time and region. No other guarantee or warranties are either expressed or implied.

We trust this report provides you with the information you required. Should questions arise or further information is needed, please contact J&K Geological Services at your convenience.

Respectfully submitted,

**J&K GEOLOGIC SERVICES, LLC**

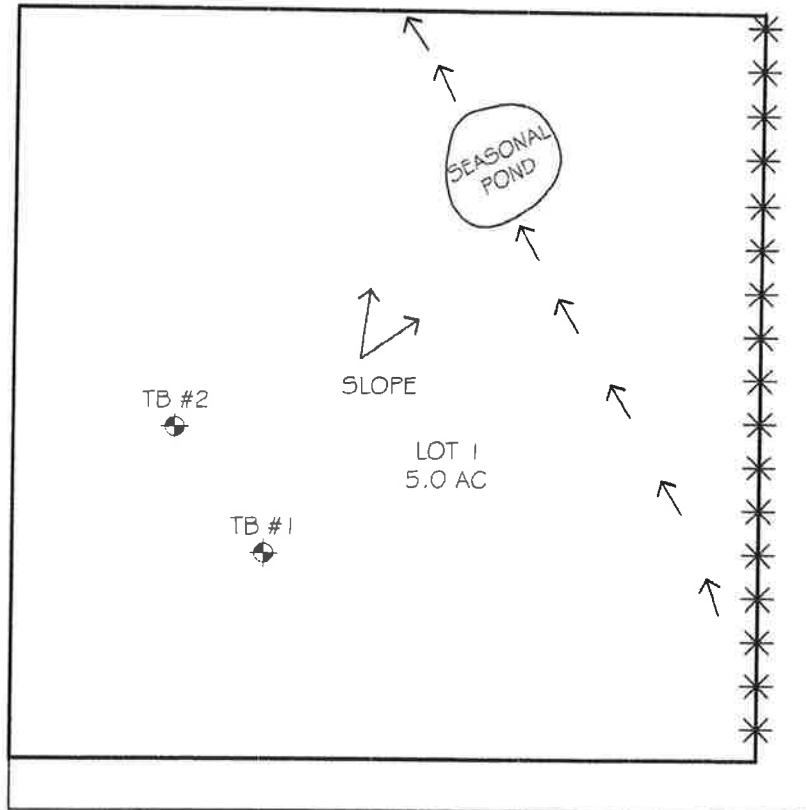
  
James F. Frohbieter,  
Professional Geologist

  
**THIS DOCUMENT WAS  
PREPARED UNDER MY  
DIRECT SUPERVISION:**

  
Guenther Polok, P.E.

JFF/ksf

D  
R  
I  
V  
E  
W  
A  
T



WALKER ROAD



### TEST BORING LOCATION PLAN

SCALE: NOT TO SCALE

## TEST BORING LOCATION PLAN

DRAWN:	DATE:	CHECKED:	DATE:
D58C	11/21/19	JF	11/21/19

**J&K**  
Geological Services

JOB NO.  
191112  
FIG NO.  
1

TEST BORING #1  
DATE DRILLED: 11/20/19

TEST BORING #2  
DATE DRILLED: 11/19/19

SOIL DESCRIPTION	DEPTH (ft.)	SYMBOL	BLOW COUNT	WATER CONTENT (%)	SOIL DESCRIPTION	DEPTH (ft.)	SYMBOL	BLOW COUNT	WATER CONTENT (%)
EOLIAN SAND, FINE TO MEDIUM GRAINED, SILTY TO CLAYEY, LOOSE TO MEDIUM DENSE, LIGHT BROWN TO TAN, LOW MOISTURE CONTENT.	5	[Symbol]	12	5.0	EOLIAN SAND, FINE TO MEDIUM GRAINED, SILTY TO CLAYEY, LOOSE TO MEDIUM DENSE, LIGHT BROWN TO TAN, LOW MOISTURE CONTENT.	5	[Symbol]	10	6.1
	5		10	3.0		5		11	3.1
ALLUVIAL SAND, FINE TO COARSE GRAINED, CLAY MATRIX, ORANGISH TAN TO LIGHT GREY, MEDIUM DENSE, LOW MOISTURE CONTENT.	10	[Symbol]	26	4.3	ALLUVIAL SAND, FINE TO COARSE GRAINED, CLAY MATRIX, ORANGISH TAN TO LIGHT GREY, MEDIUM DENSE, LOW MOISTURE CONTENT.	10	[Symbol]	14	5.0
	15		22	3.8		15		24	5.1
NO WATER TO 15'	15				NO WATER TO 15'	15			
	20					20			
	30					30			
	40					40			
	50					50			

TEST BORING LOGS

**J&K**  
Geological Services

JOB NO.  
191112  
FIG NO.  
2





J&K Geological Services  
18291 Smokey Pine Rd  
Peyton, Colorado 80831  
(719) 499-5431

November 21, 2019

G3 Investments Inc.  
6215 Corporate Drive  
Colorado Springs, CO.80919

**RE: Lot 2 Walker Reserve**  
**J&K JOB: 191111**

Gentlemen;

Personnel of J&K Geological Services, LLC (J&K) placed two shallow test borings on the above-referenced site on 11/22/2019. The test boring locations were determined by others. Reference the attached Site Plan and Test Boring Logs (Figures 1&2). The Scope of our involvement is limited to providing soil parameters only. It is our understanding the Geologic Hazards Study (Senate Bill) for the proposed project is being provided by others.

**The recommendations and soil parameters provided in this letter are preliminary and can be used for the foundation design for the proposed structure. However, an open excavation observation (OEO) by J&K must be completed prior to setting foundation forms to verify anticipated on-site soil conditions. There will be an additional charge for the OEO and required report.**

The information and recommendations contained in this letter are intended for use by individuals who are familiar with the construction practices and standards common to this region and all applicable building codes. Warranty companies may require more stringent recommendations than those provided in this report (i.e., final grade slopes). When differences exist between underwriting requirements, the governing code, and/or recommendations contained in this letter, the more stringent shall control.

The recommendations contained in this letter concerning the scope of construction are based upon the information provided. Any changes in conditions, including but not limited to excavation location, scope of project, elevations, etc. are to be brought to the attention of J&K Geologic Services. The recommendations are preliminary and can be utilized by the foundation designer to design the foundation system.

The recommendations contained in this letter are based upon the conditions observed on 11/20/2019. This report is intended for use by the client, and only for the purpose stated, within a reasonable time of issuance. The scope of the project, geologic condition (both on and off site), climatic conditions, state of the art and other variables may change over time. If another engineering firm is retained for site work and excavation observations, they must complete their own subsurface investigation. This report can be used for comparison only.

<b>SOIL PARAMETERS AND CONDITIONS</b>
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**SOIL TYPE(S):** Soil types observed in the test borings drilled on this site were found to consist of lensatic clean to clayey Alluvial (water deposited) sand derived from the nearby Dawson Sandstone ridges.

**ALLOWABLE BEARING CAPACITY:** Assuming a minimum 16 inch footing and minimum pad size of 30 inches square, an allowable bearing capacity of 2000 psf is recommended with an equivalent hydrostatic fluid pressure in the active state of 40 pcf. The equivalent hydrostatic fluid pressure assumes level backfill conditions and may require modification for the effects of surcharged load, sloping backfill, etc.

**EXPANSION POTENTIAL:** An expansion pressure of 347 psf with .012% volume change and 6% moisture increase was determined by laboratory tests on clayey sand encountered in Test Boring 2 at 4 feet. This magnitude of expansion is in the low expansion range.

**MOISTURE CONTENT:** Low

**FILL:** None

**SPECIAL CONSIDERATIONS:** The recommendations contained in this letter are provided for a new wood framed structure. They are intended to satisfy, inasmuch as practical, on-site soil conditions and provide a system that is compatible with the existing on site soil conditions.

The proposed structure is to be located on soil possessing a low expansion potential. Although the expansive potential of the soil is not expected to cause movement of foundation components, it is probable that flatwork may move. The magnitude of this movement is unpredictable. The recommendations provided in this letter are intended to reduce the potential for settlement of the foundation components. Recommendations pertaining to isolating flatwork from structural and non-structural components of the building are intended to reduce the potential for damage to the superstructure.

The homebuyer must be made aware of these conditions and be made familiar with the precautions outlined in this letter and in Colorado Geological

## RECOMMENDATIONS

### **SPECIAL**

#### **CONSIDERATIONS: (cont.)**

Survey Special Publication 43. Further, all suggestions, recommendations and protective measures contained in this letter and the special publication are prudent and will reduce the potential for movement, but are not a guarantee that movement will not occur.

**This site is located in a low expansive potential environment. The soils will change in volume with changes in moisture content. As such, the surface drainage and grading recommendations contained in this letter are critical for the future performance of the structure and is to be maintained over the life of the structure.**

#### **FOUNDATION TYPE:**

A shallow foundation system utilizing the maximum allowable bearing capacity and equivalent fluid pressure provided in this letter is recommended for this site.

#### **REINFORCING:**

Reinforcing should be designed to allow foundation walls to span a minimum of 12 feet under the design load. Foundation walls retaining over four feet of soil should be designed to resist an equivalent fluid pressure in the active state of 38 pcf.

#### **FLOOR SLABS:**

Floor slabs on grade should be separated from structural portions of the building and allowed to float freely as follows:

- Slabs must be separated from all structural and non-structural portions of the building in such a manner that they do not transmit floor slab movement to the roof or overlying floor.
- Stairways and doorways must be designed to accommodate slab movement. Sheetrock and pre-hung doors must not rest on stairway stringers or the slab.
- Columns, pipes, plumbing and utilities penetrating the slab must be isolated from the slab to provide for slab movement.
- Water lines and gas lines connected to water heaters and/or furnaces resting on the slab must be constructed with flexibility to allow for slab movement. Heater ducts must be provided with collapsible connections between the furnace and ductwork.

## RECOMMENDATIONS

### FLOOR SLABS: (cont.)

- Backfill placed below floor slabs is to be compacted to a minimum 90% of its maximum Proctor dry density, ASTM D-698.

The above recommendations are considered prudent and should be followed in order to mitigate the effects of floor slab movement. They do not guarantee, however, that movement will not occur in the event that the subsoils increase in moisture content. The homeowner must be advised of these precautions prior to closing and be advised to monitor these issues to prevent damage if movement occurs.

### DRAINAGE AND GRADING:

The ground surface within 10 feet of the building must be sloped away from the building with a minimum gradient of 5%. This is equivalent to six inches of fall across this 10-foot zone. Concrete flatwork should be sloped away from the building with a minimum of 2% gradient. Where this is not possible, a well-defined swale should be constructed to intercept the surface water and carry it quickly and safely around and away from the building. Plastic should not be utilized beneath decorative rock or bark, etc. A breathable filter fabric should be utilized in lieu of plastic membranes.

Decorative edging, sidewalks and other flatwork should be planned and constructed so that they do not restrict rapid surface flows away from the foundation region.

Roof downspouts should be extended across all backfill zones and discharged into an area of positive drainage away from the structure.

No sod, grass, shrubs, flowers, trees, or other vegetation requiring water should be placed within five feet of the foundation or within any backfill zone. Sprinklers must not discharge water within five feet of the foundation or within any backfill zone.

### SUBDRAIN:

A subsurface drain is to be placed around usable space located below the exterior finished ground surface. This would include common walls around the area protected. **Specifications for the subsurface drain should be provided by the foundation engineer.** Collected surface water is not to be discharged into the subsurface drain.

Extreme care must be exercised when backfilling over the drain, installing utilities near the drain, or performing any other activity that may damage the drain. Any damage to the drain should be repaired and documented.

## RECOMMENDATIONS

### BACKFILL:

The basement foundation walls, if any, should be laterally supported prior to backfill. If previously recommended, select backfill should be used. Any imported material for backfill must be approved by the soils engineer.

Backfill around foundations and in all utility trenches should be compacted to a minimum 90% of its maximum Proctor dry density, ASTM D-698. Backfill must be compacted by mechanical means. No water flooding techniques of any type should be used.

It must be understood even properly compacted backfill can settle creating ponding areas and negative grading toward foundation components.

Collected surface water permeating the backfill zone to the soils supporting foundation components can adversely affect the foundation and below grade concrete slab components. Any settlement of the backfill adjacent to foundation components is to be modified to satisfy the drainage and grading recommendations contained in this letter.

### CONCRETE:

All concrete in contact with the soil should be made using Type II cement for sulfate resistance. Calcium chloride must not be added to Type II cement.

Foundation forms should remain in place for an appropriate length of time in accordance with ACI (American Concrete Institute) recommendations in the ACI Manual of Standard Practice, Part 2.

In accordance with the current Uniform Building Code and good construction practices, concrete must not be placed on frozen ground.

### OPEN FOUNDATION EXCAVATION OBSERVATION:

**The open foundation excavation must be observed prior to construction in order to verify that no anomalies are present, that materials of the proper design bearing capacity have been encountered, and that no soft areas or other objectionable materials are present in the foundation area. There is an additional charge for the open excavation observation and letter.**

### REMARKS:

The proposed structure is to be located on soil possessing a low expansion potential. Although the expansive potential of the soil is not expected to cause movement of foundation components, it is probable that flatwork may move. The recommendations provided in this letter are intended to reduce the potential for settlement of the foundation components. Recommendations

**REMARKS: (cont.)**

pertaining to isolating flatwork from structural and non-structural components of the building are intended to reduce the potential for damage to the superstructure.

Successful construction and performance depends on the implementation of all of the recommendations provided. Problems are likely if any of the recommendations are not followed, or if any of the systems fail. Again, following the recommendations is considered prudent; however, it is not a guarantee that movement will not occur.

**CLOSING:**

Our investigation consisted of random sampling of a heterogeneous material. As a result, subsurface soil conditions encountered during construction may differ somewhat from the conditions described in this report. Construction and design personnel should be made familiar with the contents herein. If discrepancies are noted during construction, J&K Geological Services should be notified in order that construction problems may be avoided.

This report has been prepared in accordance with generally accepted engineering standards of care for the time and region. No other guarantee or warranties are either expressed or implied.

We trust this report provides you with the information you required. Should questions arise or further information is needed, please contact J&K Geological Services at your convenience.

Respectfully submitted,

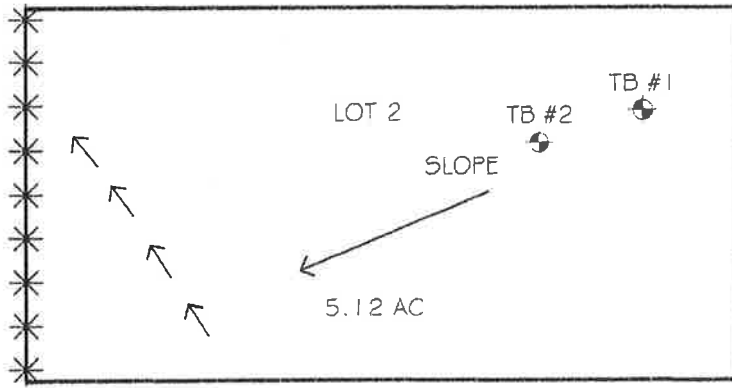
**J&K GEOLOGIC SERVICES, LLC**

  
**James F. Frohbieter,**  
**Professional Geologist**

JFF/ksf



LOT 3  
28.52 AC



**TEST BORING LOCATION PLAN**

SCALE: NOT TO SCALE

**TEST BORING  
LOCATION PLAN**

DRAWN:	DATE:	CHECKED:	DATE:
DSSC	11/2/19	JF	11/2/19

**J&K**  
Geological Services

JOB NO.  
191111  
FIG NO.  
1

TEST BORING #1 DATE DRILLED: 11/20/19	DEPTH (ft.)	SYMBOL	BLOW COUNT	WATER CONTENT (%)	TEST BORING #2 DATE DRILLED: 11/20/19	DEPTH (ft.)	SYMBOL	BLOW COUNT	WATER CONTENT (%)
SOIL DESCRIPTION					SOIL DESCRIPTION				
ALLUVIAL SAND, FINE TO COARSE GRAINED. LENSATIC, CLEAN TO CLAYEY MEDIUM DENSE, TAN TO LIGHT GREY, LOW MOISTURE.	5		14	5.6	ALLUVIAL SAND, FINE TO COARSE GRAINED. LENSATIC, CLEAN TO CLAYEY MEDIUM DENSE, TAN TO LIGHT GREY, LOW MOISTURE.	5		10	8.5
BURIED "A" HORIZON @ 8'	5		19	5.0	BURIED "A" HORIZON @ 7'	5		10	8.8
ALLUVIAL SAND, FINE TO COARSE GRAINED, CLAY MATRIX, LIGHT BROWN TO PINKISH TAN, DENSE, LOW MOISTURE.	5 10		31	4.4	ALLUVIAL SAND, FINE TO COARSE GRAINED, CLAY MATRIX, LIGHT BROWN TO PINKISH TAN, DENSE, LOW MOISTURE.	5 10		19	5.7
NO WATER TO 15'	5 15		36	7.7	NO WATER TO 15'	5 15		18	6.4
	20					20			
	30					30			
	40					40			
	50					50			

TEST BORING LOGS

**J&K**  
Geological Services

JOB NO.  
191111  
FIG NO.  
2