ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

# SUBSURFACE SOIL INVESTIGATION
# CRAWFORD APARTMENTS
# CRAWFORD AVENUE AND KITTERY DRIVE
# EL PASO COUNTY, COLORADO

Prepared for:

**John P. Nelson Associates**
**1626 East Pikes Peak**
**Colorado Springs, Colorado 80909**

**Attn: John Nelson**

May 31, 2022

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Stuart Wood
Geologist

COLORADO REGISTERED PROFESSIONAL ENGINEER
JOSEPH COLLIN GOODE JR.
23725
6-7-2022

Reviewed by:

Joseph C. Goode, Jr., P.E.
President

SW/el

Encl.

Entech Job No. 220095
AAprojects/2021/210777ssi

Table of Contents

# SUBSURFACE SOIL INVESTIGATION
# CRAWFORD APARTMENTS
# CRAWFORD AVENUE AND KITTERY DRIVE
# EL PASO COUNTY, COLORADO

## 1.0 INTRODUCTION

John P. Nelson Associates, Inc. plans to develop the site with a new apartment building complex and associated site improvements. The site is located at the north end of Kittery Drive, north of Crawford Avenue, located southeast of Colorado Springs, Colorado. The location of the project is shown on the Vicinity Map, Figure 1. The test boring locations are shown on the Test Boring Location Map, Figure 2.

This report describes the subsurface investigation conducted for the site and provides recommendations for foundation design and construction. The Subsurface Soil Investigation included the drilling of eight test borings across the site; six in the footprints of the proposed buildings and two in the proposed parking areas, collecting samples of soil, and conducting a geotechnical evaluation of the investigation findings. All drilling and subsurface investigation activities were performed by Entech Engineering, Inc. (Entech). The contents of this report, including the geotechnical evaluation and recommendations, are subject to the limitations and assumptions presented in Section 6.0.

## 2.0 PROJECT AND SITE DESCRIPTION

The project will consist of the construction of three new two-story apartment buildings to include 22 units in all, and associated site improvements. The site is located north of the intersections of Kittery Drive and Crawford Avenue southeast of Colorado Springs. At the time of drilling, the site was vacant, with a partially paved road leading onto the site. Topography of the site is relatively flat. Vegetation of site consisted of sparse field grasses and weeds. The site is bordered by existing residential to the north and west, a commercial property to the east, and Crawford Avenue to the south.

## 3.0 SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

Subsurface conditions on the site were explored by drilling eight test borings at the approximate locations shown on the Test Boring Location Map, Figure 2. Six borings were drilled in the approximate footprints of the proposed buildings and two borings were drilled in the proposed parking areas for pavement recommendations, which will be provided in a separate report. The borings were drilled to depths of 5 to 20 feet below the existing ground surface (bgs). The drilling was performed using a truck-mounted, continuous flight auger-drilling rig supplied and operated by Entech. Boring logs descriptive of the subsurface conditions encountered during drilling are presented in Appendix A. At the conclusion of drilling, and subsequent to drilling, observations for groundwater levels were made in the open boreholes.

Soil samples were obtained from the borings utilizing the Standard Penetration Test (ASTM D-1586) using California samplers. Results of the Standard Penetration Test (SPT) are included on the boring logs in terms of N-values expressed in blows per foot (bpf). Soil samples recovered from the borings were visually classified and recorded on the boring logs. The soil classifications were later verified utilizing laboratory testing and grouped by soil type. The soil type numbers are included on the boring logs. It should be understood that the soil descriptions shown on the boring logs may vary between boring location and sample depth. It should also be noted that the lines of stratigraphic separation shown on the boring logs represent approximate boundaries between soil types and the actual stratigraphic transitions may be more gradual and vary with location.

Moisture content testing (ASTM D-2216) was performed on the samples recovered from the borings, and the results are shown on the boring logs. Grain-Size Analysis testing (ASTM D-

422) and Atterberg limits testing (ASTM D-4318) were performed on selected samples to assist in classifying the materials encountered in the borings. Swell/Consolidation testing (ASTM D-4546) and FHA Swell Testing was performed on select samples to evaluate the expansion/compression characteristics of the soils. Soluble sulfate testing was also performed on selected samples to evaluate the corrosive characteristics of the soils. The Laboratory Testing Results are summarized on Table 1 and are presented in Appendix B.

## 4.0 SUBSURFACE CONDITIONS

Two soil type and one bedrock type were encountered in the test borings drilled for the subsurface investigation: Type 1: native sandy to very sandy clay (CL), Type 2: native very clayey sand (SC), and Type 3: native sandy claystone to shale bedrock (CL). Bedrock was encountered at 1 to 9 feet bgs in all of the test borings, which were drilled to depths ranging from 5 to 20 feet. Each soil type was classified in accordance with the Unified Soil Classification System (USCS) using the laboratory testing results and the observations made during drilling.

### 4.1 Soil and Bedrock

Soil Type 1 classified as native sandy to very sandy clay (CL). The clay was encountered in seven of the eight test borings at the existing ground surface, and extending to depths of 1 to 9 feet bgs. Standard Penetration Testing on the clay resulted in N-values of 30 to 46 blows per foot (bpf), indicating stiff to very stiff consistencies. Moisture content and grain size testing resulted in water contents of 3.5 to 8 percent, with approximately 59 to 98 percent of the soil size particles passing the No. 200 sieve. Atterberg limits testing resulted in liquid limits of 31 to 39 percent and plastic indexes of 17 to 23 percent. Swell/Consolidation Testing indicated a volume change of 0.4 and 1.5 percent, indicating a low to moderate expansion potential. Sulfate testing resulted in 0.02 percent soluble sulfate by weight, indicating a negligible potential for concrete degradation due to sulfate attack.

Soil Type 2 classified as native very clayey sand (SC). The sand was encountered in Test Boring No. 4 from the existing ground surface and extending to 4 feet bgs Standard Penetration Testing on the sand resulted in an N-value of 34 blows-per-foot (bpf), indicating a dense state. Water content and grain size testing resulted in a water content of 6.3 percent, with approximately 48 percent of the soil size particles passing the No. 200 sieve. Swell/Consolidation Testing on the very clayey sand resulted in a volume change of 0.4 percent, indicating a low expansion potential. Sulfate testing on the sand resulted in 0.01 percent soluble sulfate by weight, indicating the sand has negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 3 classified as native sandy claystone to shale bedrock (CL). The claystone/shale was encountered in all of the test borings below the Soil Types 1 and 2 at 1 to 9 feet bgs and extending to termination of borings at 5 to 20 feet. Standard Penetration Testing on the claystone resulted in N-values of 50 or greater than 50, indicating hard consistencies. Water content and grain size testing resulted in water contents of 5 to 12 percent, with approximately 81 to 98 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing on the claystone/shale resulted in liquid limits of 37 to 40, with plastic indexes of 17 to 23 percent. Swell/Consolidation Testing resulted in volume changes of 1.1 to 8 percent, indicating low to very high expansion potential. A sulfate test performed on a sample of the claystone indicated less than 0.01 percent soluble sulfate by weight which indicates a negligible potential for below grade degradation due to sulfate attack.

Additional descriptions and engineering properties of the soil and bedrock encountered during drilling are included on the boring logs and in Table 1. It should be understood that the soil and bedrock descriptions reported on the boring logs likely vary between boring locations and sampling depth. Similarly, the lines of stratigraphic separation shown on the boring logs represent approximate boundaries between soil and bedrock types and the actual transitions between soil types is likely more gradual or variable.

### 4.2 Groundwater

Groundwater was not encountered in any of the test borings during or subsequent to drilling. The test borings were drilled to depths of 5 to 20 feet. It is anticipated groundwater will not affect shallow foundations on this site. Development of this and adjacent properties, as well as seasonal precipitation changes, and changes in runoff may affect groundwater elevation.

## 5.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

*The following discussion is based on the subsurface conditions encountered in the borings drilled on the site. If subsurface conditions differ from those described herein are encountered during construction or if the project elements change from those described, Entech Engineering, Inc. should be notified so that evaluation and recommendations presented can be reviewed and revised if necessary.*

This site will be developed with the construction of three residential two-story apartment buildings designed as two four-plex buildings and one fourteen-plex building along with a parking lot and associated site improvements. The proposed apartment buildings are expected to have shallow foundations. Given the subsurface conditions encountered at the time of drilling and the site development as described, shallow spread footings systems resting on verified well-compacted controlled structural fill is anticipated for the building foundations. Overexcavation and replacement with structural fill where expansive soils or bedrock are encountered is anticipated for all of the buildings. Design considerations are discussed in the following sections.

Subsurface soil conditions encountered in the test borings drilled for the apartment buildings and parking lot generally consisted of native very clayey sand and sandy to very sandy clay overlying claystone, and shale bedrock. SPT N-values measured in the native sands and clay generally indicated medium dense states to stiff to very stiff consistencies. Expansive soils will require overexcavation and replacement with non-expansive structural fill. Any uncontrolled fill encountered will require complete removal and recompaction

Expansive soils will require removal and replacement with non-expansive structural fill compacted according to the "Structural Fill" paragraphs. The depth of overexcavation, where required, is anticipated to be a minimum of 5 feet for the clays and 7 feet, if claystone is encountered at footing grade. Overexcavations should extend laterally beyond planned footings at least the distance equal to depth below planned footings. Entech should approve any imported fill to be used within the foundation area prior to delivery to the site, and onsite materials prior to placement. Testing and analysis for overexcavation/moisture conditioning to utilize the on-site clays can be considered. Similar overexcavation depths are anticipated, and additional laboratory testing of the soils to verify the expansion potential is adequately reduced would be required.

Excavation of the upper granular soils should be moderate with rubber-tired equipment. Claystone or shale, may be moderate to very difficult to excavate and require track-mounted equipment. The in-situ on-site soils are not unsuitable for use as structural fill, unless approved following further lab testing.

Groundwater was not encountered in the test borings which were drilled to depths of 5 to 20 feet. Groundwater is not expected to affect development of this site utilizing a shallow foundation system. It should be noted that groundwater levels, other than those observed at the time of the subsurface investigation, could change due to seasonal variations, changes in land runoff characteristics and future development of nearby areas.

### 5.1 Footing Subgrade Improvement and Bearing Capacity

Based on the conditions encountered in the test borings and the associated laboratory testing results, it is expected that the structures can be supported by shallow foundations resting on structural fill, providing that the subgrade improvements and mitigation of unsuitable materials are performed. A discussion of the subsurface conditions encountered in the test borings and the expected effect on foundation performance is provided in the following sections. Sections 5.2 through 5.13 provide foundation design construction recommendations relative to the subsurface soil conditions encountered on this site.

In situations where site filling is necessary to increase the existing site elevation, the structural fill should consist of a granular non-expansive soil. Non-expansive on-site sand or imported structural fill may be used as structural fill as approved by Entech. The structural fill should be placed according to the "Structural Fill" paragraph.

Expansive soils were encountered in the majority of the test borings at foundation grade. Expansive soils encountered at or near foundation or floor slabs grade, must be overexcavated and replaced with structural fill. The structural fill should be a non-expansive granular fill approved by Entech. Overexcavation depths of 5 to 7 feet are anticipated, as discussed above.

Overexcavation should extend laterally beyond planned footings at least the distance equal to the depth below planned footings.

The overexcavation subgrade should be scarified, moisture-conditioned, and compacted to a minimum of 95 percent of its maximum Standard Proctor Dry Density (ASTM D-698) at 0 to +4 percent of optimum moisture content. The granular structural fill should be placed in finished lifts less than 6-inches thick and be compacted to a minimum of 95 percent of its maximum Modified Proctor Dry Density (ASTM D-1557). The structural fill should be moisture-conditioned to within ± 2 percent of its optimum moisture content to aid in compaction. Density tests should be performed frequently to verify compaction with the first density test performed at overexcavated subgrade elevation and when each 12 to 18 inches of structural fill have been placed.

A discussion of the subsurface conditions encountered in the test borings and the expected effect on foundation performance is provided in the following sections. Sections 5.2 through 5.12 provide foundation design construction recommendations and considerations relative to the subsurface soil conditions encountered on this site.

### 5.2 Shallow Foundations

For design, a maximum allowable bearing pressure of 2600 pounds per square foot (psf) is recommended for imported structural fill soils. Continuous spread footings are recommended to have a minimum width of 16 inches, and individual column footings for main support beams should have minimum plan dimensions of 24 inches on each side in order to avoid punching failure into the supporting subgrade soils. Exterior footings should extend a minimum of 30 inches below the adjacent exterior site grade for frost protection.

Foundation walls should be designed to resist lateral pressures generated by the soils on this site. An equivalent hydrostatic fluid pressure (in the active state) of 45 pcf is recommended for the imported structural fill. Expansive clay soils, if any, are not recommended for backfill against the walls. It should be noted that this value applies to level backfill conditions. If sloping backfill conditions exist, pressures will increase substantially depending on the conditions adjacent to the walls. Surcharge loading should also be considered in wall designs. Equivalent fluid pressures for sloping conditions should be determined on an individual basis.

Entech should observe overexcavated subgrades as well as the overall foundation excavation subgrade and evaluate if the exposed soil conditions are consistent with those described in this report. Entech should also provide recommendations for additional overexcavation depth, if required, and foundation drainage based on the excavation conditions observed at that time. **An alternative to shallow foundations would be a deep foundation system utilizing a drilled pier foundation. Parameters for drilled piers can be provided upon request.**

### 5.3 Foundation Wall and Retaining Wall Design Values

The following values for approved imported structural fill are recommended for use in designing below grade foundation walls with unbalanced lateral loading and or retaining walls that may be associated with the project.

Recommended Design Values – Lateral Loading

| | |
|---|---|
| Equivalent fluid density for lateral earth pressure (active), pcf | 45 |
| Equivalent fluid density for lateral earth pressure (passive), pcf | 350 |
| Equivalent fluid density for lateral earth pressure (at rest), pcf | 60 |
| Soil density (compacted), pcf | 130 |
| Angle of Internal Friction (loose), degrees | 28 |
| Angle of Internal Friction (compacted), degrees | 34 |
| Coefficient of sliding between concrete and sand | 0.30 |

*Note: The above lateral loading design values are for level backslope angles and no surcharge loads. If wall backfill is submerged, water pressures must be taken into account as additional wall loading. If backfill slope angles are greater than zero degrees, if the backfill is surcharged, the design values must be adjusted to account for additional lateral loading.

### 5.4 Seismic Site Classification

Based on the subsurface conditions encountered at the site and in accordance with Section 1613 of the 2015 International Building Code (IBC), the site meets the conditions of a Site Class D.

## 5.5 On-Grade Floor Slabs

On-grade floor slabs for the planned structure will be supported with a 4-foot layer of imported structural fill which will be placed with the uniform building pad. Any uncontrolled fill encountered beneath the floor slabs will require complete removal and recompaction.

Non-structural, grade supported floor slabs should be separated from other building/structural components and utility penetrations to allow for possible future vertical movement unless they are designed as part of the foundation system. Interior partition walls should be constructed in such a manner so as not to transfer slab movement into the overlying floor(s) and/or roof members, should slab movement occur. Control joints in grade-supported slabs are recommended at 10 to 15 feet perpendicular spacings to control cracking. If slab movement cannot be tolerated a structural floor system should be used.

Grade supported slabs should be separated from building structural components and utility penetrations in order to allow for possible future vertical movement unless they are designed as part of the structure. Control joints in grade-supported slabs are recommended to control cracking and should be spaced according to ACI guidelines. If grade supported slab movements cannot be tolerated, structural floors should be considered.

## 5.6 Surface and Subsurface Drainage

Positive surface drainage is recommended around the building's perimeter to minimize infiltration of surface water into the supporting foundation soils. A minimum ground surface slope of 5 percent in the first 10 feet adjacent to exterior foundation walls is recommended for unpaved areas. For paved areas and other impervious surfaces, a minimum slope of 2 percent is adequate. All roof drains and gutter downspouts should be extended to discharge well beyond the building's foundation backfill zone or be connected to a storm sewer system.

To help minimize infiltration of water into the foundation zone, vegetative plantings placed close to foundation walls should be limited to those species having low watering requirements and irrigated grass should not be located within 5 feet of the foundation. Similarly, sprinklers are not recommended to discharge water within 5 feet of foundations. Irrigation near foundations should be limited to the minimum amount sufficient to maintain vegetation. Application of more irrigation water than necessary can increase the potential for slab and foundation movement.

A subsurface perimeter drain is not required for slab-on-grade construction above exterior finished grade, providing positive grading is maintained, the top slab is above exterior grade, and exterior backfill is properly compacted. Perimeter drains are recommended for usable space below grade. A typical perimeter drain detail is shown in Figure 3.

### 5.7 Concrete Degradation Due to Sulfate Attack

Sulfate solubility testing was conducted on several samples recovered from the test borings to evaluate the potential for sulfate attack on concrete placed below grade. The test results indicated less than 0.01 to 0.02 percent soluble sulfate (by weight). The test results indicate the sulfate component of the in-place soils presents a negligible exposure threat to concrete placed below the site grade.

Type II cement is recommended for concrete at this site. To further avoid concrete degradation during construction it is recommended that concrete not be placed on frozen or wet ground. Care should be taken to prevent the accumulation or ponding of water in the foundation excavation prior to the placement of concrete. If standing water is present in the foundation excavation, it should be removed by ditching to sumps and pumping the water away from the foundation area prior to concrete placement. If concrete is placed during periods of cold temperatures, the concrete must be kept from freezing. This may require covering the concrete with insulated blankets and adding heat to prohibit freezing.

### 5.8 Foundation Excavation Observation

Subgrade preparation for building foundations should be observed by Entech prior to construction of the footings and floor slabs in order to verify that (1) no anomalies are present, (2) materials of the proper bearing capacity have been encountered or placed, and (3) no soft spots, expansive or organic soil, soil or debris are present in the foundation area prior to concrete placement or backfilling. Entech should make final recommendations for over-excavation and foundation drainage at the time of excavation observation.

### 5.9 Structural Fill

Compacted, non-expansive granular soil, free of organics, debris and cobbles greater than 3-inches in diameter, is recommended for structural fill beneath foundation components and floor slabs. All fill placed within the foundation area should be approved by Entech, and be compacted to a minimum of 95 percent of the soils maximum dry density as determined by the Modified Proctor Test (ASTM D-1557). Fill material should be placed in horizontal lifts such that each finished lift has a compacted thickness of six inches or less. Fill should be placed at water contents conducive to achieving adequate compaction, usually within ±2 percent of the optimum water content as determined by ASTM D-1557. The overexcavation subgrade should be scarified a minimum of 12 inches, moisture conditioned to 0 to +4 percent and be compacted to a minimum of 95 percent of its Standard Proctor Dry Density, ASTM D-698 for clay and 95 percent compaction, ±2 percent optimum moisture content, utilizing a Modified Proctor dry density ASTM D-1557 for sand. Mechanical methods can be used for placement and compaction of fill; however, heavy equipment should be kept at distance from foundation walls and below slab infrastructure to avoid overstressing. No water flooding techniques of any type should be used for compaction or placement of foundation or floor slab fill material. Entech should approve any imported fill to be used within the foundation area prior to delivery to the site.

### 5.10 Utility Trench Backfill

Fill placed in utility trenches should be compacted according to local specifications. Fill should be placed in horizontal lifts having a compacted thickness of six inches or less and at a water content conducive to adequate compaction, within ±2 percent of optimum water content. Mechanical methods should be used for fill placement; however, heavy equipment should be kept at a distance from foundation walls. No water flooding techniques of any type should be used for compaction or placement of utility trench fill.

Trench backfill placement should be performed in accordance with El Paso County or other appropriate specifications as required. All excavation and excavation shoring/bracing should be performed in accordance with OSHA guidelines.

### 5.11 General Backfill

Any areas to receive fill outside the foundation limits should have all topsoil, organic material, and debris removed. Fill must be properly benched into existing slopes in order to be adequately compacted. The fill receiving surface should be scarified to a depth of 12-inches and moisture conditioned to ±2 percent of the optimum water content, and compacted to a minimum of 95 percent of the maximum dry density ASTM D-1557 for sand and ASTM D-698 for clay before the addition of new fill. Fill should be placed in thin lifts not to exceed 6 inches in thickness after compaction while maintaining moisture and density as shown above. Fill material should be free of vegetation and other unsuitable material and shall not contain rocks or fragments greater than 3-inches. Topsoil and strippings should be segregated from all other fill sources on the site. Fill placement and compaction beneath and around foundations, in utility trenches, beneath roadways or other structural features of the project should be observed and tested by Entech during construction.

### 5.12 Excavation Stability

Excavation sidewalls must be properly sloped, benched and/or otherwise supported in order to maintain stable conditions. All excavation openings and work completed therein shall conform to OSHA Standards as put forward in CFR 29, Part 1926.650-652, (Subpart P).

### 5.13 Winter Construction

In the event construction of the planned facility occurs during winter, foundations and subgrades should be protected from freezing conditions. Concrete should not be placed on frozen soil and once concrete has been placed, it should not be allowed to freeze. Similarly, once exposed, the foundation subgrade should not be allowed to freeze. During site grading and subgrade preparation, care should be taken to eliminate burial of snow, ice or frozen material within the planned construction area.

### 5.14 Construction Observations

It is recommended that Entech observe and document the following activities during construction of the building foundations.

- Excavated subgrades and subgrade preparation.
- Placement of foundation perimeter drains (if installed).
- Placement/compaction of fill material for the foundation components and floor slab.
- Placement/compaction of utility bedding and trench backfill.

## 6.0 CLOSURE

The Subsurface Investigation, geotechnical evaluation and recommendations presented in this report are intended for use by John P. Nelson Associates. with application to the planned apartment buildings located in the Crawford Apartment complex, at Crawford Avenue and Kittery Drive, in the southeastern portion of Colorado Springs, Colorado. In conducting the subsurface investigation, laboratory testing, engineering evaluation and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in same locality and under similar conditions. No other warranty, expressed or implied is made. During final development design and prior to construction, additional investigation is recommended after site grading to provide final recommendations for each building site.

If there are any questions regarding the information provided herein or if Entech Engineering, Inc. can be of further assistance, please do not hesitate to contact us.

**TABLE**

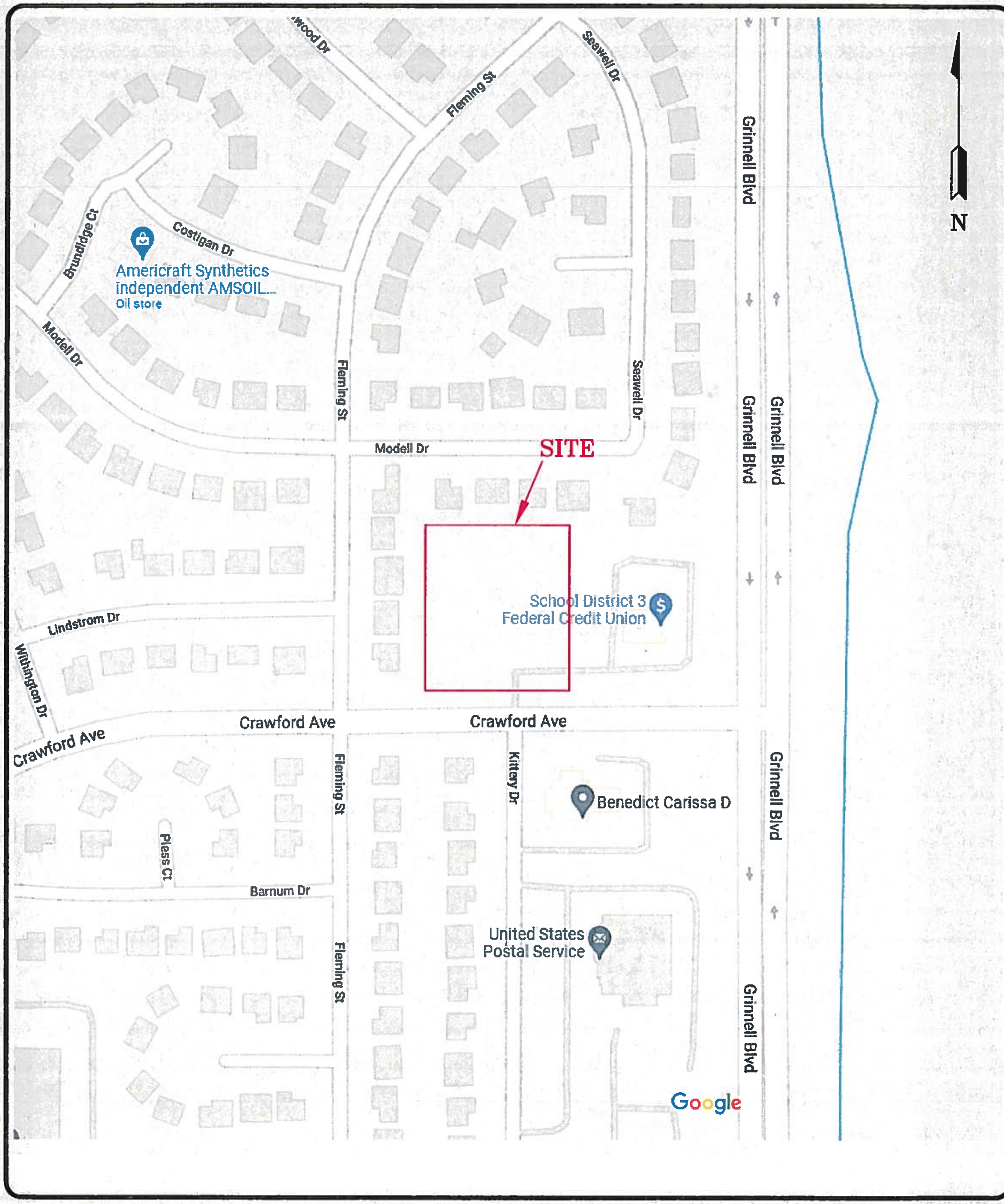
# TABLE 1

## SUMMARY OF LABORATORY TEST RESULTS

CLIENT JOHN P. NELSON
PROJECT CRAWFORD APARTMENTS
JOB NO. 220095

| SOIL TYPE | TEST BORING NO. | DEPTH (FT) | WATER (%) | DRY DENSITY (PCF) | PASSING NO. 200 SIEVE (%) | LIQUID LIMIT (%) | PLASTIC INDEX (%) | SULFATE (WT %) | FHA SWELL (PSF) | SWELL/ CONSOL (%) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7 | 0-3 | | | 97.9 | 39 | 23 | | | | CL | CLAY, SANDY |
| 1 | 1 | 2-3 | 7.5 | 112.5 | 84.5 | 33 | 17 | 0.02 | | 0.4 | CL | CLAY, SANDY |
| 1 | 8 | 1-2 | 5.4 | 108.8 | 58.8 | 31 | 17 | | | 1.5 | CL | CLAY, VERY SANDY |
| 2 | 4 | 2-3 | 6.8 | 117.4 | 48.0 | | | 0.01 | | 0.4 | SC | SAND, VERY CLAYEY |
| 3 | 2 | 5 | 8.7 | 109.0 | 95.2 | 37 | 20 | | | 2.0 | CL | CLAYSTONE, SANDY |
| 3 | 3 | 10 | 10.4 | 111.2 | 81.0 | 37 | 17 | | | 3.9 | CL | CLAYSTONE, SANDY |
| 3 | 5 | 5 | | | 95.6 | | | | 970 | | CL | CLAYSTONE, SANDY |
| 3 | 6 | 10 | 10.4 | 116.0 | 97.8 | | | | | 1.1 | CL | CLAYSTONE, SANDY |
| 3 | 7 | 1-2 | 10.3 | 119.0 | 93.1 | 40 | 23 | <0.01 | | 8.0 | CL | CLAYSTONE, SANDY |

# FIGURES



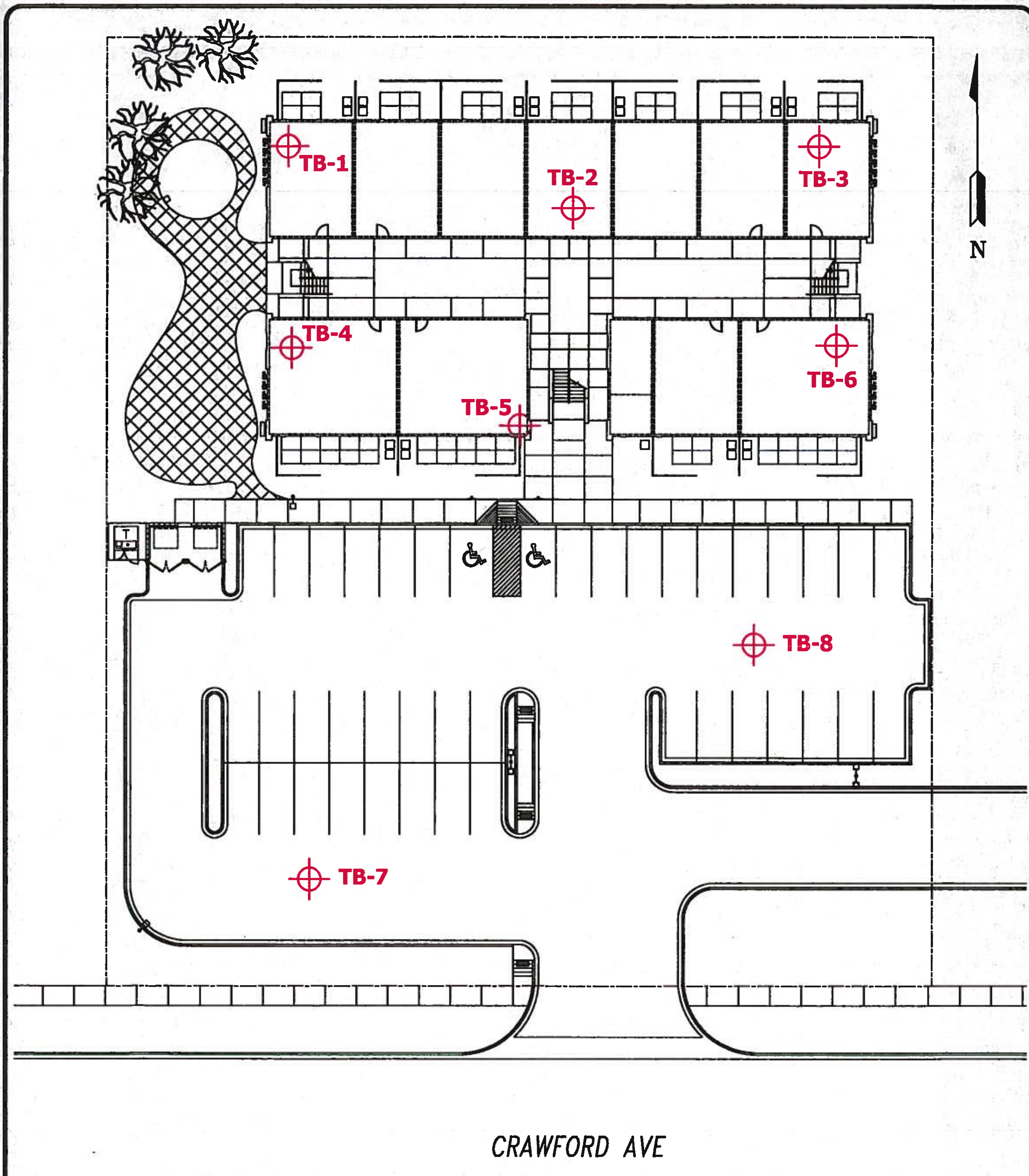

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

**VICINITY MAP**
**CRAWFORD APARTMENTS**
**EL PASO COUNTY, COLORADO**
**FOR: JOHN P. NELSON ASSOCIATES**

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| JAC | 2/3/22 | DPS | 2/3/22 |

JOB NO.: 220095

FIG NO.: 1




TB- APPROXIMATE TEST BORING LOCATION AND NUMBER

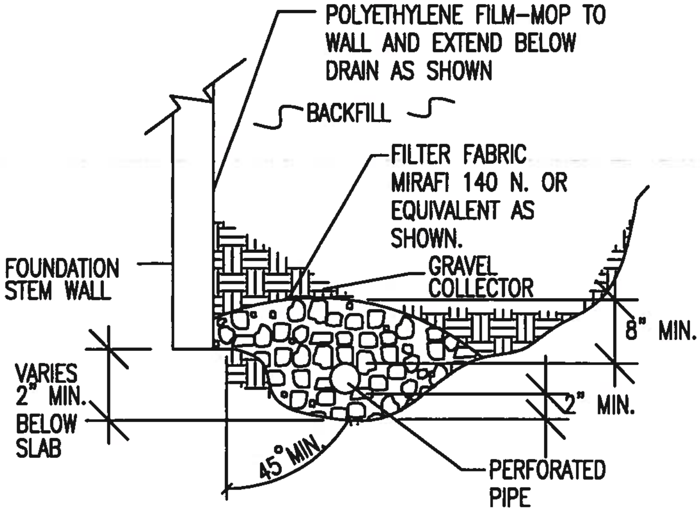
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

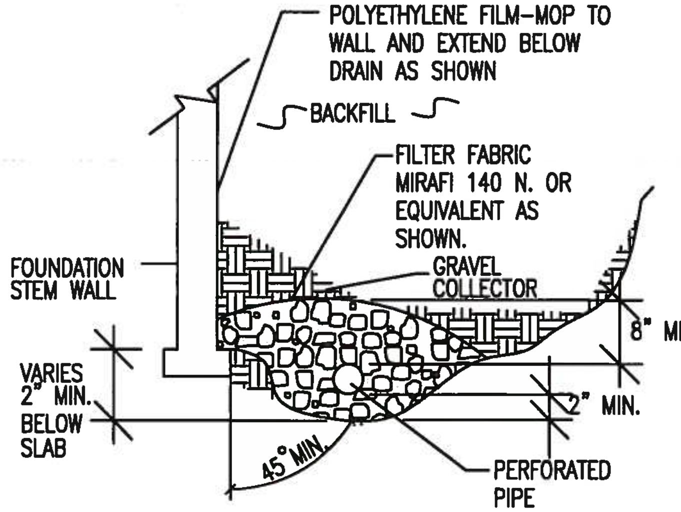
TEST BORING LOCATION MAP
CRAWFORD APARTMENTS
EL PASO COUNTY, COLORADO
FOR: JOHN P. NELSON ASSOCIATES

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| JAC | 2/3/22 | DPS | 2/3/22 |

JOB NO.: 220095

FIG NO.: 2




NOTES:

–GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS–85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

–PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4–INCH DIAMETER IS MOST OFTEN USED.

–ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON–PERFORATED PIPE.

–FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

–MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

–DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUT FALL IS NOT AVAILABLE.

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907 (719) 531-5599

*PERIMETER DRAIN DETAIL*

| DRAWN: | DATE: | DESIGNED: | CHECKED: |
|---|---|---|---|
| | | | SW |

JOB NO.: 220095

FIG NO.: 3

# APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 1/20/2022
Job # 220095

REMARKS

DRY TO 17', 1/24/22

| Description | Depth (ft) | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| CLAY, SANDY, BROWN, VERY STIFF, MOIST | | | 37 | 6.6 | 1 |
| | 5 | | 34 | 6.0 | 1 |
| CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST | 10 | | 50/9" | 10.2 | 3 |
| SHALE, GRAY BROWN, HARD, MOIST | 15 | | 50/5" | 9.9 | 3 |
| AUGER REFUSAL AT 17' | | | | | |
| | 20 | | | | |

TEST BORING NO. 2
DATE DRILLED 1/20/2022
CLIENT JOHN P. NELSON
LOCATION CRAWFORD APARTMENTS

REMARKS

DRY TO 10', 1/24/22

| Description | Depth (ft) | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| CLAY, SANDY, BROWN, VERY STIFF, MOIST | | | 30 | 7.9 | 1 |
| CLAYSTONE, SANDY, BROWN, HARD, MOIST | 5 | | 50/5" | 8.7 | 3 |
| SHALE, GRAY BROWN, HARD, MOIST | 10 | | 50/4" | 10.2 | 3 |
| AUGER REFUSAL AT 13' | | | | | |
| | 15 | | | | |
| | 20 | | | | |

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

DRAWN: DATE: CHECKED: SW DATE: 2-9-22

JOB NO.: 220095
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 1/20/2022
Job # 220095

REMARKS: DRY TO 18', 1/24/22

| Description | Depth (ft) | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|
| CLAY, SANDY, LIGHT BROWN, VERY STIFF, MOIST | | 31 | 3.8 | 1 |
| | 5 | 46 | 4.4 | 1 |
| CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST | 10 | 50/11" | 8.3 | 3 |
| | 15 | 50/8" | 11.3 | 3 |
| SHALE, GRAY BROWN, HARD, MOIST | 20 | 50/2" | 9.2 | 3 |

TEST BORING NO. 4
DATE DRILLED 1/20/2022
CLIENT JOHN P. NELSON
LOCATION CRAWFORD APARTMENTS

REMARKS: DRY TO 13', 1/24/22

| Description | Depth (ft) | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|
| SAND, VERY CLAYEY, FINE GRAINED, TAN, DENSE, MOIST | | 34 | 6.3 | 2 |
| CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST | 5 | 50 | 5.2 | 3 |
| SHALE, GRAY BROWN, HARD, MOIST | 10 | 50/6" | 12.3 | 3 |
| | 15 | 50/3" | 10.0 | 3 |
| | 20 | | | |

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

JOB NO.: 220095
FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 1/20/2022
Job # 220095

REMARKS

DRY TO 11', 1/24/22

| Description | Depth (ft) | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|
| CLAY, SANDY, BROWN | | | | 1 |
| CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST | | 50/6" | 8.8 | 3 |
| | 5 | 50/6" | 11.6 | 3 |
| SHALE, GRAY BROWN, HARD, MOIST | 10 | 50/3" | 10.7 | 3 |
| AUGER REFUSAL AT 13' | | | | |
| | 15 | | | |
| | 20 | | | |

TEST BORING NO. 6
DATE DRILLED 1/20/2022
CLIENT JOHN P. NELSON
LOCATION CRAWFORD APARTMENTS

REMARKS

DRY TO 18', 1/24/22

| Description | Depth (ft) | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|
| CLAY, VERY SANDY, TAN, VERY STIFF, MOIST | | 44 | 4.7 | 1 |
| | 5 | 46 | 3.5 | 1 |
| CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST | 10 | 50/8" | 9.9 | 3 |
| | 15 | 50/6" | 9.8 | 3 |
| SHALE, GRAY BROWN, HARD, MOIST | | | | |
| | 20 | 50/2" | 9.0 | 3 |

TEST BORING NO. 7
DATE DRILLED 1/20/2022
Job # 220095

REMARKS

DRY TO 9', 1/24/22

| Description | Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|---|
| CLAY, SANDY, BROWN | | | | | | 1 |
| CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST | | | | 50/6" | 9.0 | 3 |
| | 5 | | | 50/7" | 10.7 | 3 |
| SHALE, GRAY BROWN, HARD, MOIST | | | | | | |
| | 10 | | | 50/3" | 10.0 | 3 |
| | 15 | | | | | |
| | 20 | | | | | |

TEST BORING NO. 8
DATE DRILLED 1/20/2022
CLIENT JOHN P. NELSON
LOCATION CRAWFORD APARTMENTS

REMARKS

DRY TO 5', 1/24/22

| Description | Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|---|
| CLAY, VERY SANDY, TAN, VERY STIFF, MOIST | | | | 36 | 6.5 | 1 |
| CLAYSTONE, SANDY, BROWN, HARD, MOIST | 5 | | | 50/11" | 9.5 | 3 |
| | 10 | | | | | |
| | 15 | | | | | |
| | 20 | | | | | |

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

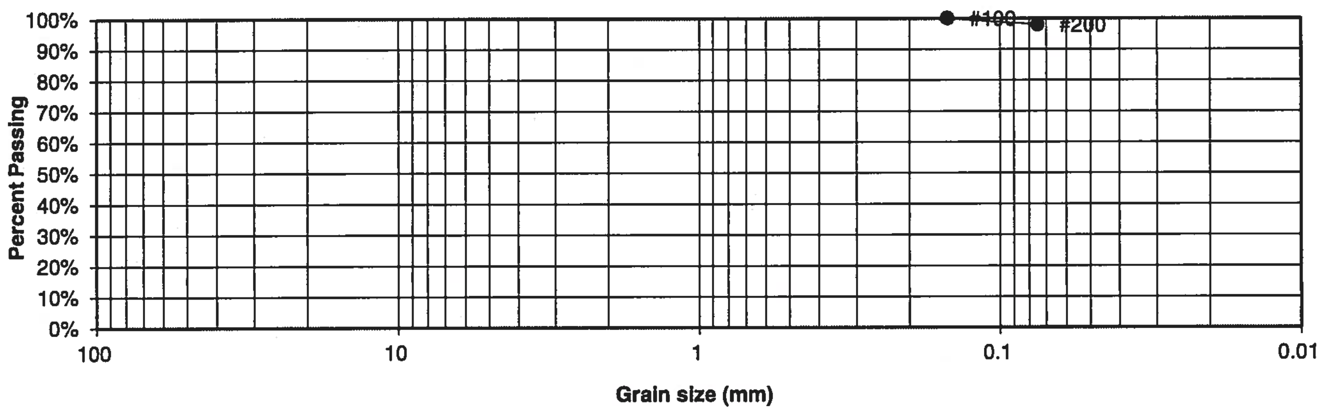
**TEST BORING LOG**

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | DS | 2/21/22 |

JOB NO.: 220095
FIG NO.: A- 4

# APPENDIX B: Laboratory Testing Results

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 1 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 7 | JOB NO. | 220095 |
| DEPTH (FT) | 0-3 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | |
| 40 | |
| 100 | 100.0% |
| 200 | 97.9% |

**Atterberg Limits**

| | |
|---|---|
| Plastic Limit | 16 |
| Liquid Limit | 39 |
| Plastic Index | 23 |

**Swell**

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

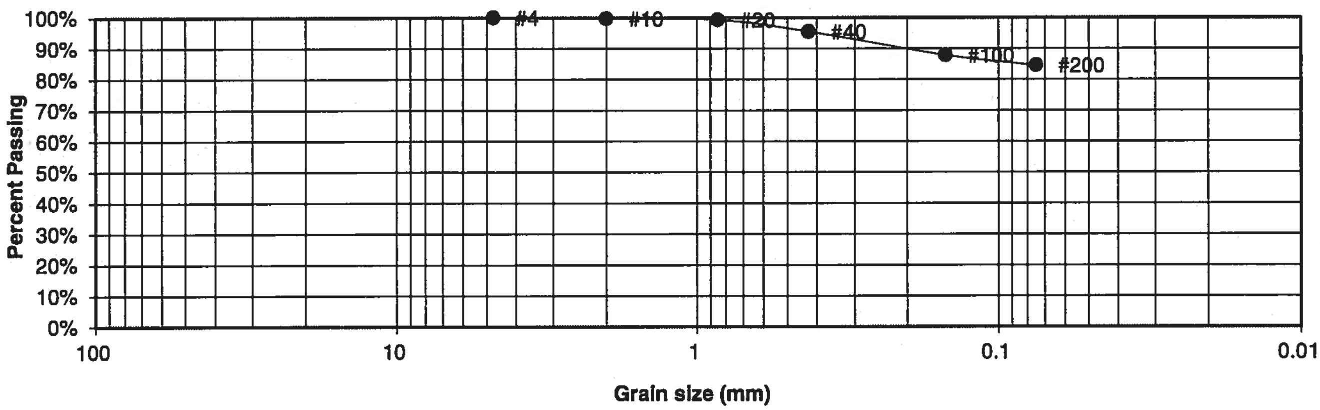
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

JOB NO.: 220095

FIG NO.: B-1

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 1 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 1 | JOB NO. | 220095 |
| DEPTH (FT) | 2-3 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | 100.0% |
| 10 | 99.7% |
| 20 | 99.3% |
| 40 | 95.5% |
| 100 | 87.8% |
| 200 | 84.5% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 16 |
| Liquid Limit | 33 |
| Plastic Index | 17 |

| Swell | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

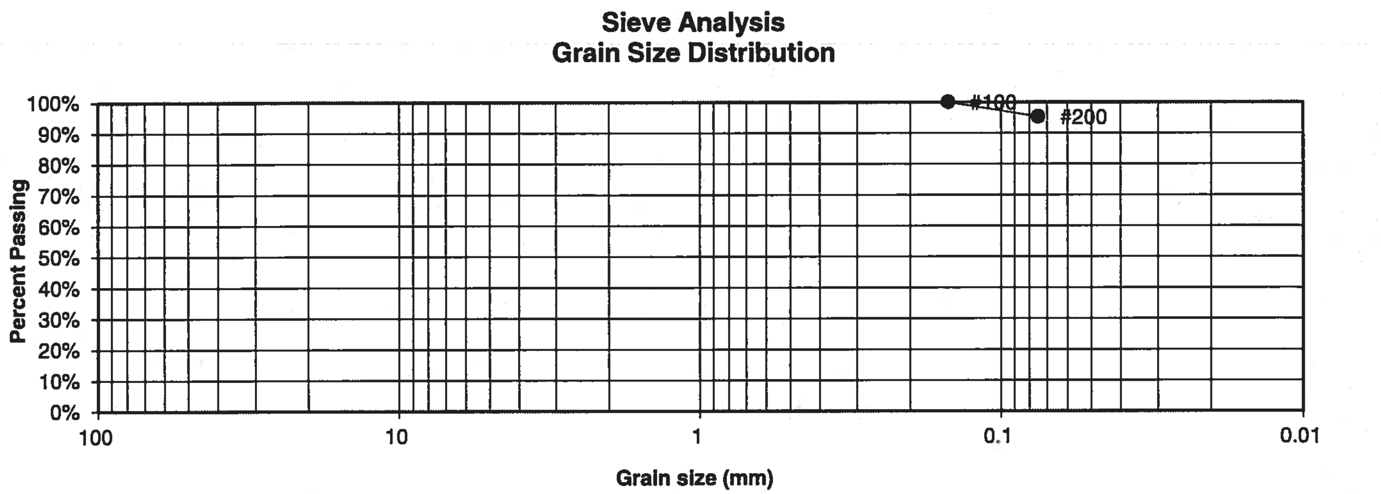
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 2-9-22 |
|---|---|---|---|

JOB NO.: 220095

FIG NO.: B-2

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 3 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 2 | JOB NO. | 220095 |
| DEPTH (FT) | 5 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | |
| 40 | |
| 100 | 100.0% |
| 200 | 95.2% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 17 |
| Liquid Limit | 37 |
| Plastic Index | 20 |

| Swell | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

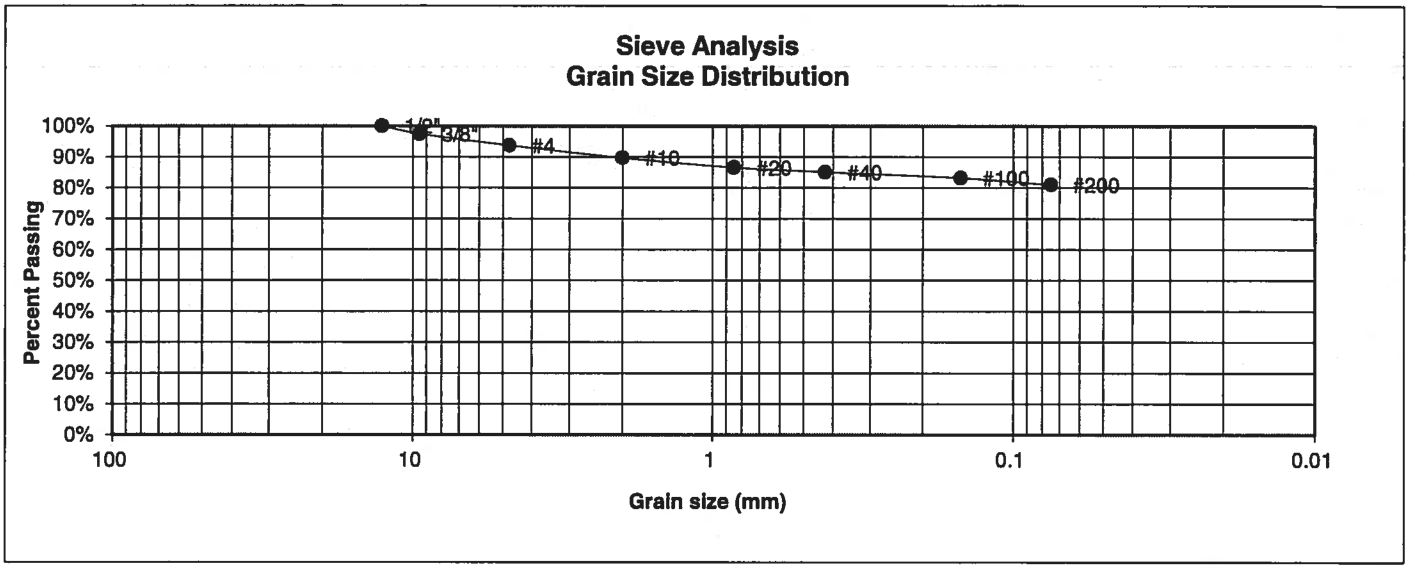
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

JOB NO.: 220095

FIG NO.: B-3

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 3 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 3 | JOB NO. | 220095 |
| DEPTH (FT) | 10 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | 100.0% |
| 3/8" | 97.5% |
| 4 | 93.7% |
| 10 | 89.7% |
| 20 | 86.6% |
| 40 | 85.1% |
| 100 | 83.2% |
| 200 | 81.0% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 20 |
| Liquid Limit | 37 |
| Plastic Index | 17 |

**Swell**

Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

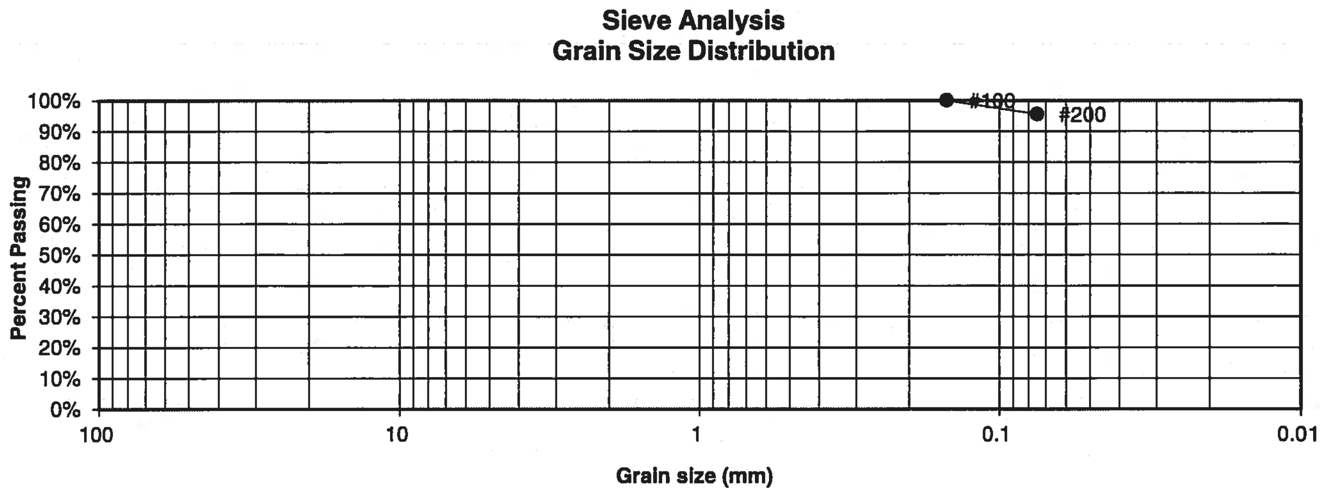
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 2-9-22 |
|---|---|---|---|

JOB NO.: 220095

FIG NO.: B-4

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 3 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 5 | JOB NO. | 220095 |
| DEPTH (FT) | 5 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | |
| 40 | |
| 100 | 100.0% |
| 200 | 95.6% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | |
| Liquid Limit | |
| Plastic Index | |

| Swell | |
|---|---|
| Moisture at start | 13.1% |
| Moisture at finish | 20.3% |
| Moisture increase | 7.2% |
| Initial dry density (pcf) | 105 |
| Swell (psf) | 970 |

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

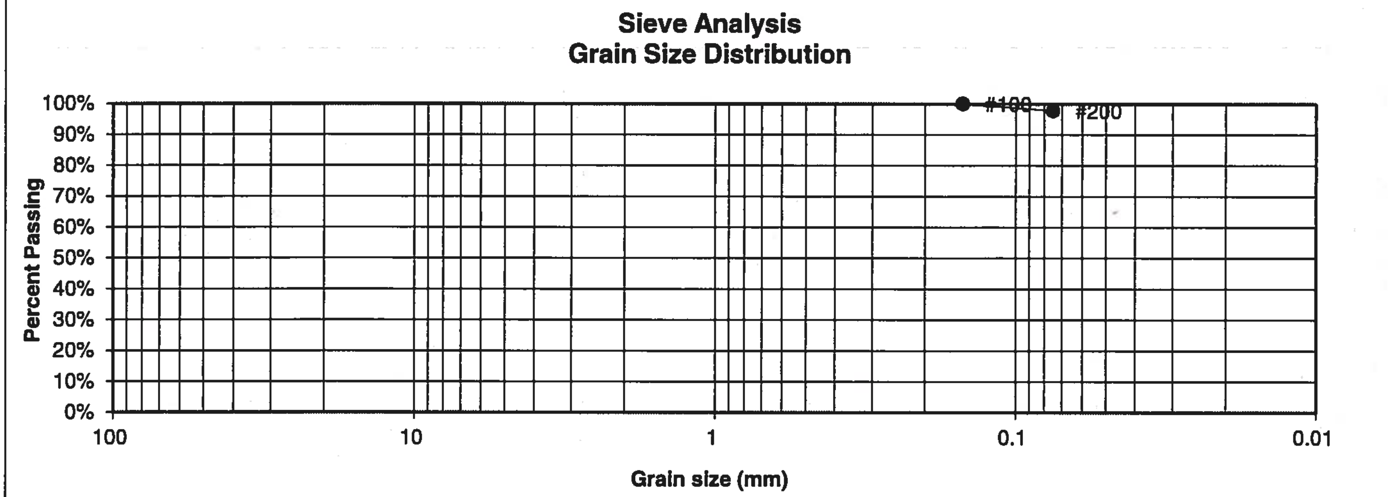
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

JOB NO.: 220095

FIG NO.: B-5

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 3 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 6 | JOB NO. | 220095 |
| DEPTH (FT) | 10 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | |
| 40 | |
| 100 | 100.0% |
| 200 | 97.8% |

Atterberg
Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

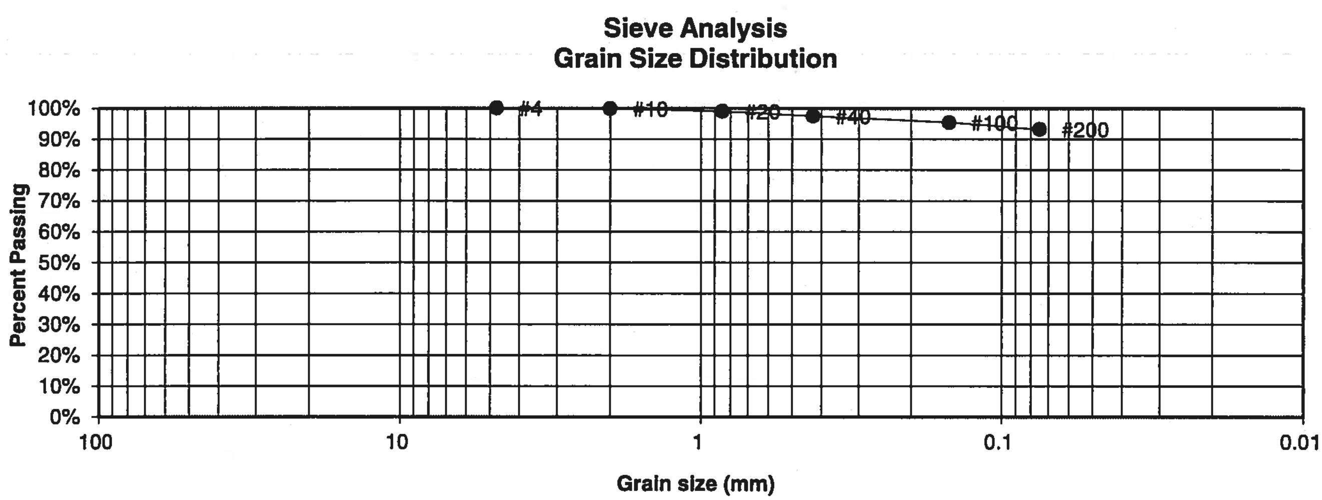
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 2-9-22 |
|---|---|---|---|

JOB NO.: 220095

FIG NO.: B-6

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 3 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 7 | JOB NO. | 220095 |
| DEPTH (FT) | 1-2 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | 100.0% |
| 10 | 99.8% |
| 20 | 99.0% |
| 40 | 97.4% |
| 100 | 95.4% |
| 200 | 93.1% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 17 |
| Liquid Limit | 40 |
| Plastic Index | 23 |

| Swell | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |

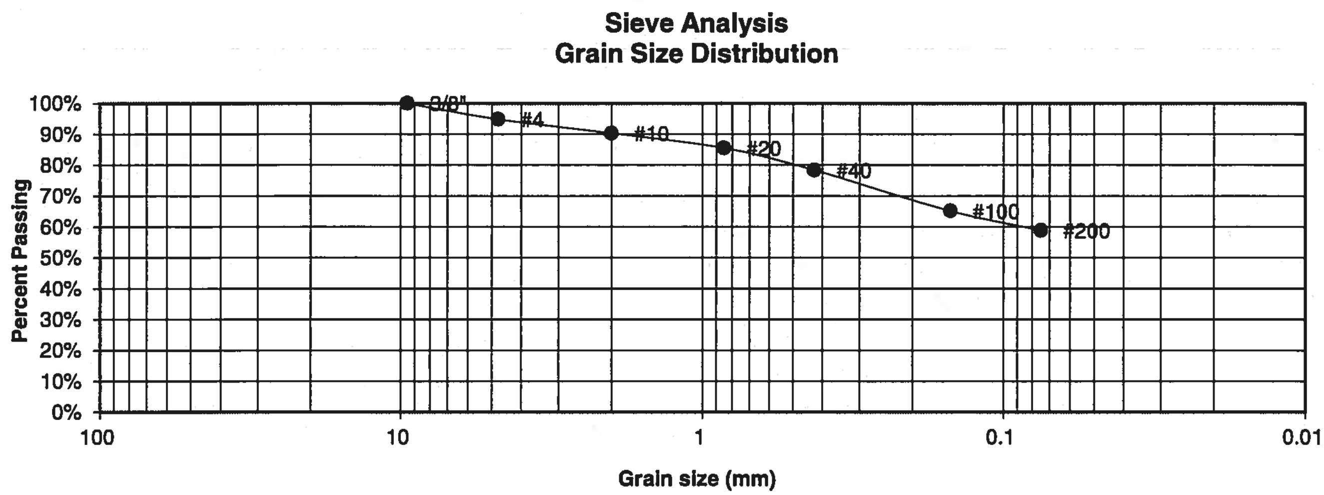
**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

JOB NO.: 220095
FIG NO.: B-7

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 1 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 8 | JOB NO. | 220095 |
| DEPTH (FT) | 1-2 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 94.8% |
| 10 | 90.3% |
| 20 | 85.5% |
| 40 | 78.3% |
| 100 | 65.1% |
| 200 | 58.8% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 14 |
| Liquid Limit | 31 |
| Plastic Index | 17 |

**Swell**

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)

**ENTECH ENGINEERING, INC.**

505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

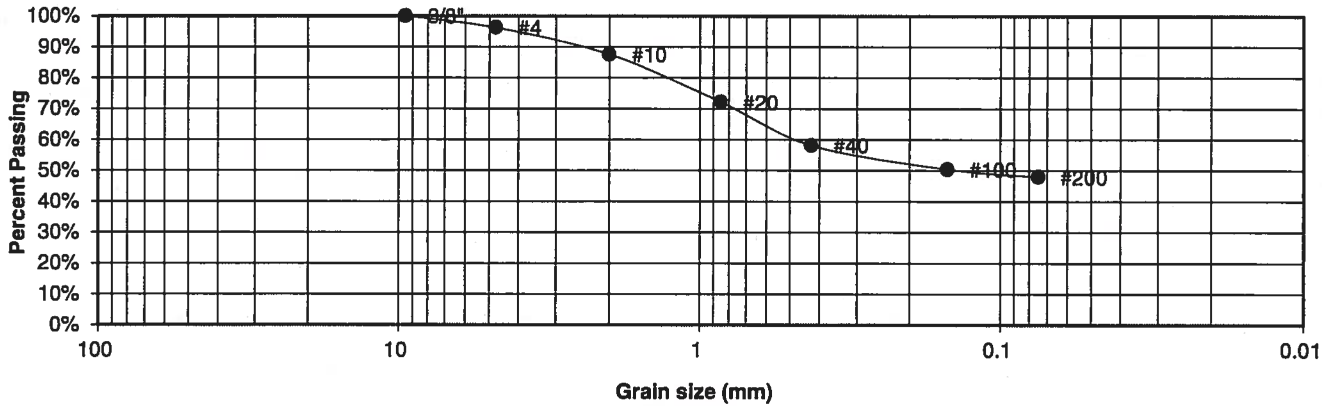
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

JOB NO.: 220095

FIG NO.: B-8

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SC | CLIENT | JOHN P. NELSON |
| SOIL TYPE # | 2 | PROJECT | CRAWFORD APARTMENTS |
| TEST BORING # | 4 | JOB NO. | 220095 |
| DEPTH (FT) | 2-3 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 96.2% |
| 10 | 87.6% |
| 20 | 72.2% |
| 40 | 58.2% |
| 100 | 50.4% |
| 200 | 48.0% |

Atterberg
Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 2-9-22 |
|---|---|---|---|

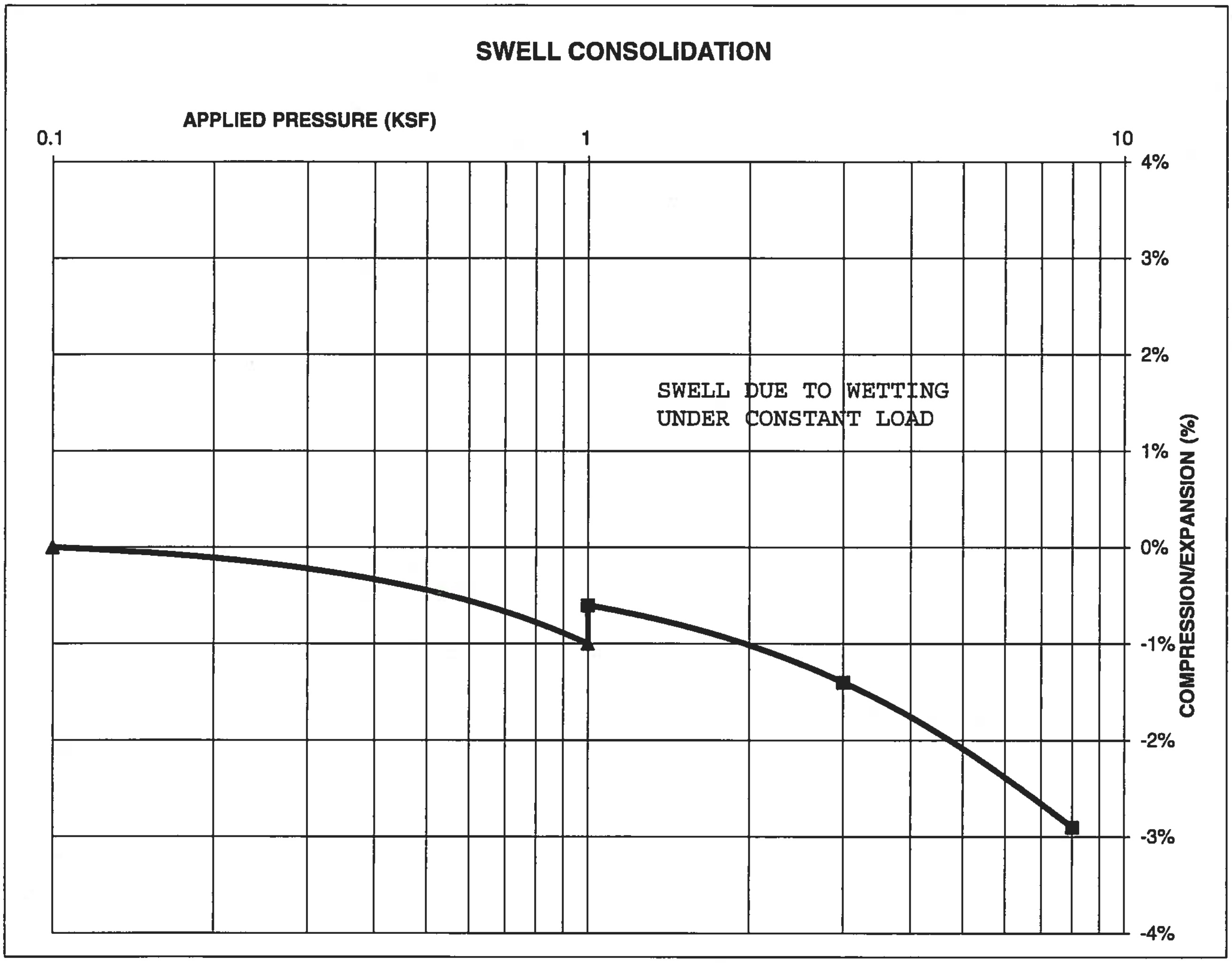
JOB NO.: 220095

FIG NO.: B-9

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 1 | DEPTH(ft) | 2-3 |
| DESCRIPTION | CL | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 112 |
| NATURAL MOISTURE CONTENT | | | 7.5% |
| SWELL/CONSOLIDATION (%) | | | 0.4% |

JOB NO. 220095
CLIENT JOHN P. NELSON
PROJECT CRAWFORD APARTMENTS




**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

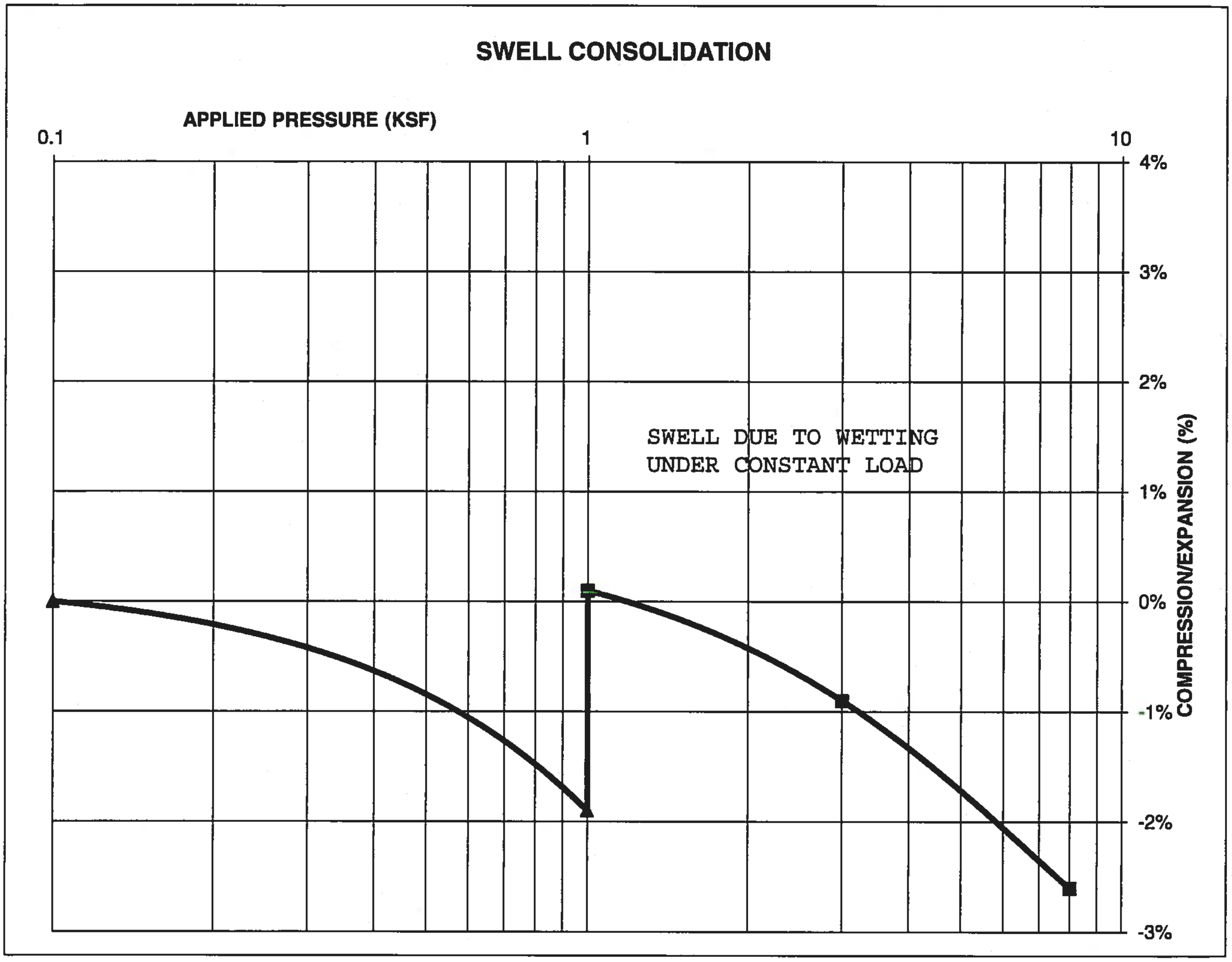
| DRAWN: | DATE: | CHECKED: SW | DATE: 2-9-22 |
|---|---|---|---|

JOB NO.: 220095
FIG NO.: B-10

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 2 | DEPTH(ft) | 5 |
| DESCRIPTION | CL | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 109 |
| NATURAL MOISTURE CONTENT | | | 8.7% |
| SWELL/CONSOLIDATION (%) | | | 2.0% |

JOB NO. 220095
CLIENT JOHN P. NELSON
PROJECT CRAWFORD APARTMENTS




ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 2-9-22 |
|---|---|---|---|

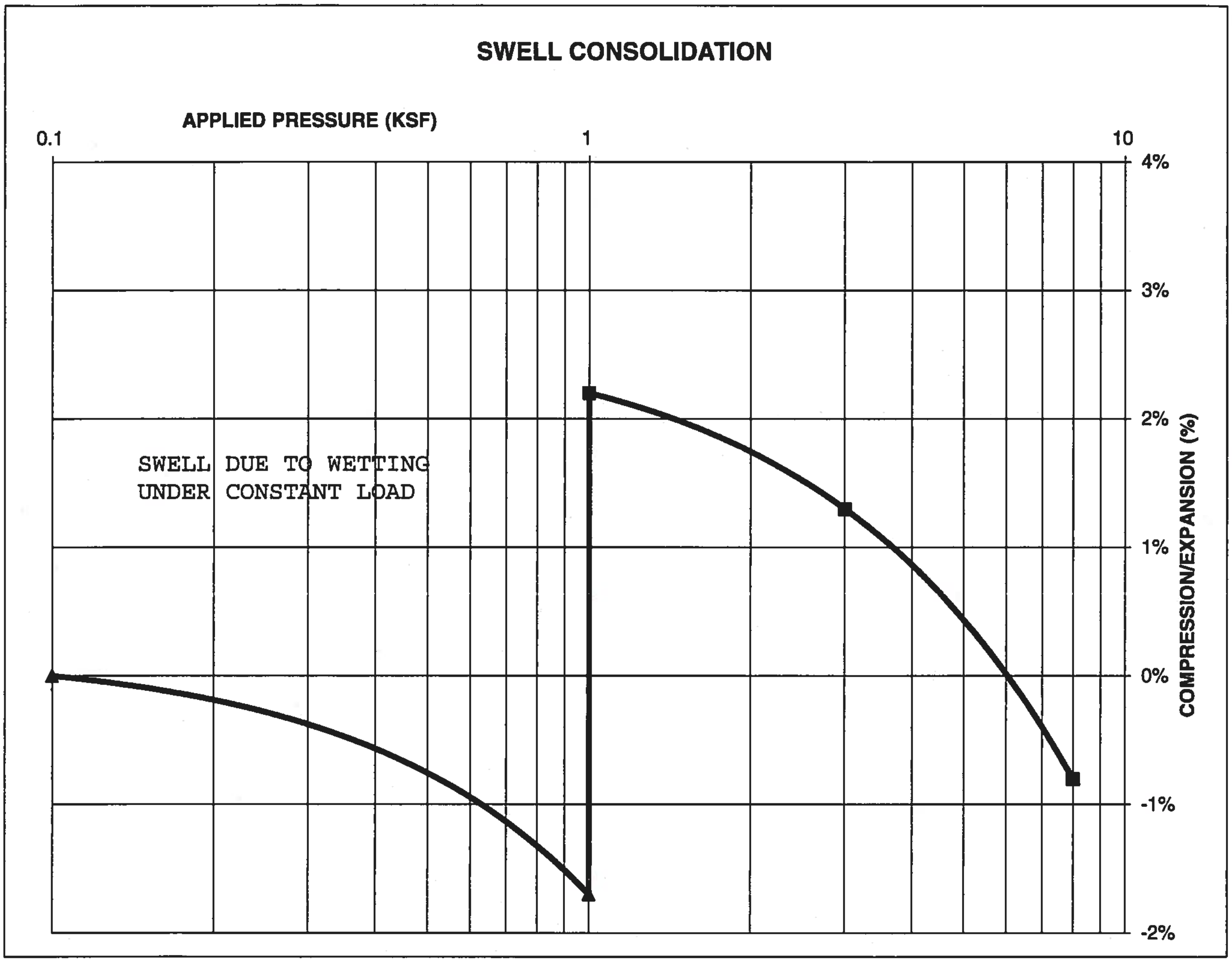
JOB NO.: 220095

FIG NO.: B-11

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 3 | DEPTH(ft) | 10 |
| DESCRIPTION | CL | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 111 |
| NATURAL MOISTURE CONTENT | | | 10.4% |
| SWELL/CONSOLIDATION (%) | | | 3.9% |

JOB NO. 220095
CLIENT JOHN P. NELSON
PROJECT CRAWFORD APARTMENTS




**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

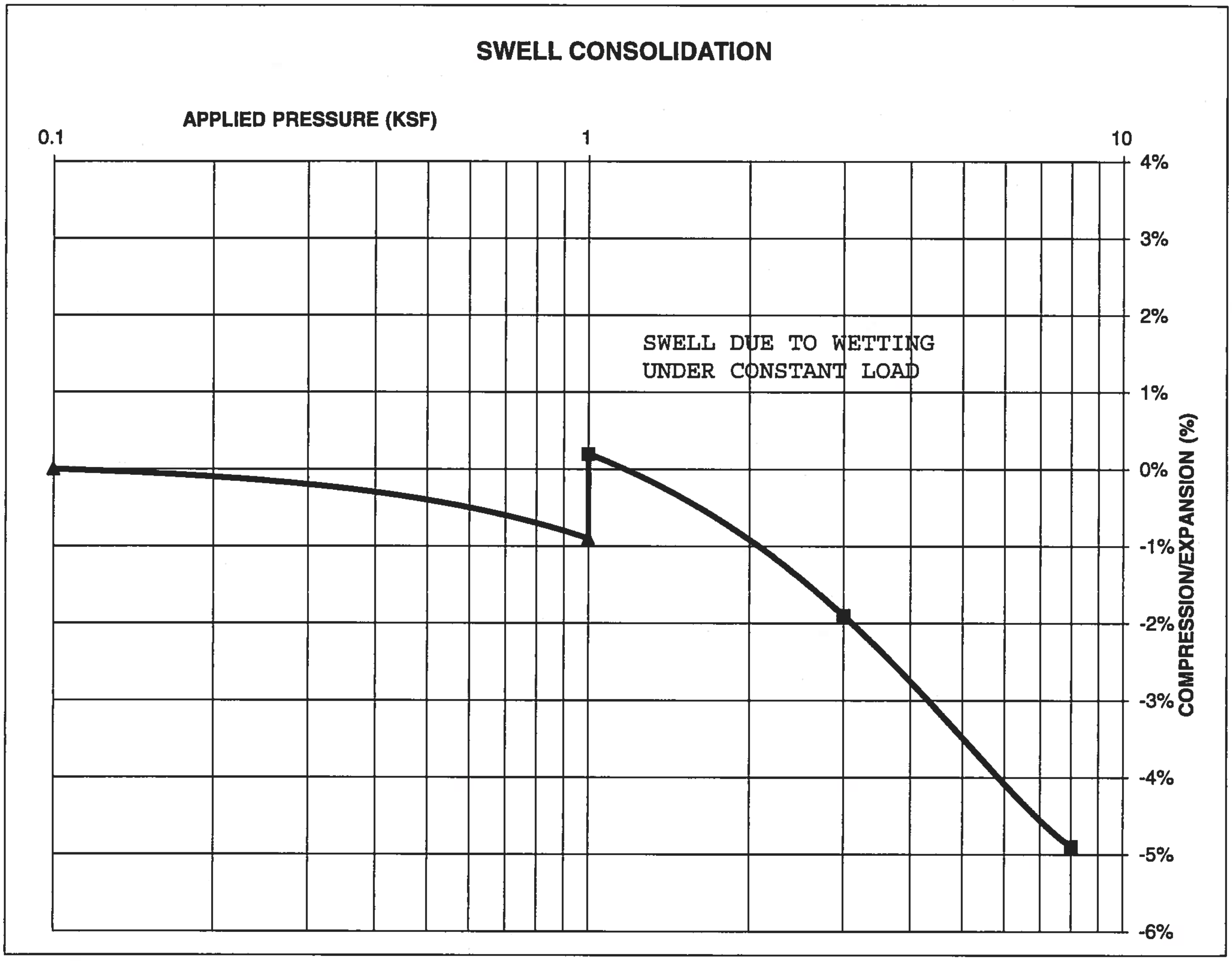
| DRAWN: | DATE: | CHECKED: 3W | DATE: 2-9-22 |
|---|---|---|---|

JOB NO.: 220095
FIG NO.: B-12

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 6 | DEPTH(ft) | 10 |
| DESCRIPTION | CL | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 116 |
| NATURAL MOISTURE CONTENT | | | 10.4% |
| SWELL/CONSOLIDATION (%) | | | 1.1% |

JOB NO. 220095
CLIENT JOHN P. NELSON
PROJECT CRAWFORD APARTMENTS




ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

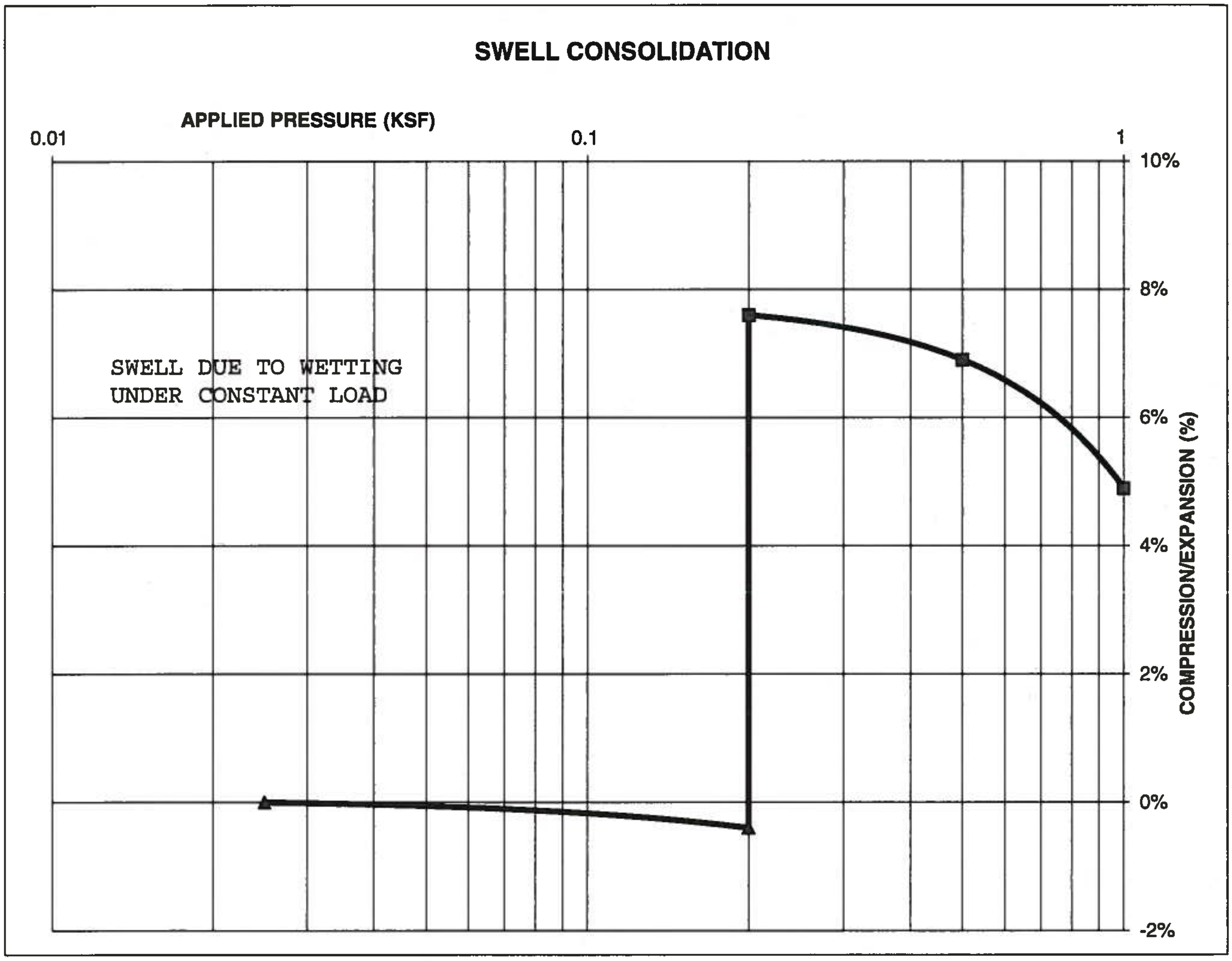
JOB NO.: 220095

FIG NO.: B-13

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 7 | DEPTH(ft) | 1-2 |
| DESCRIPTION | CL | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 119 |
| NATURAL MOISTURE CONTENT | | | 10.3% |
| SWELL/CONSOLIDATION (%) | | | 8.0% |

JOB NO. 220095
CLIENT JOHN P. NELSON
PROJECT CRAWFORD APARTMENTS




**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

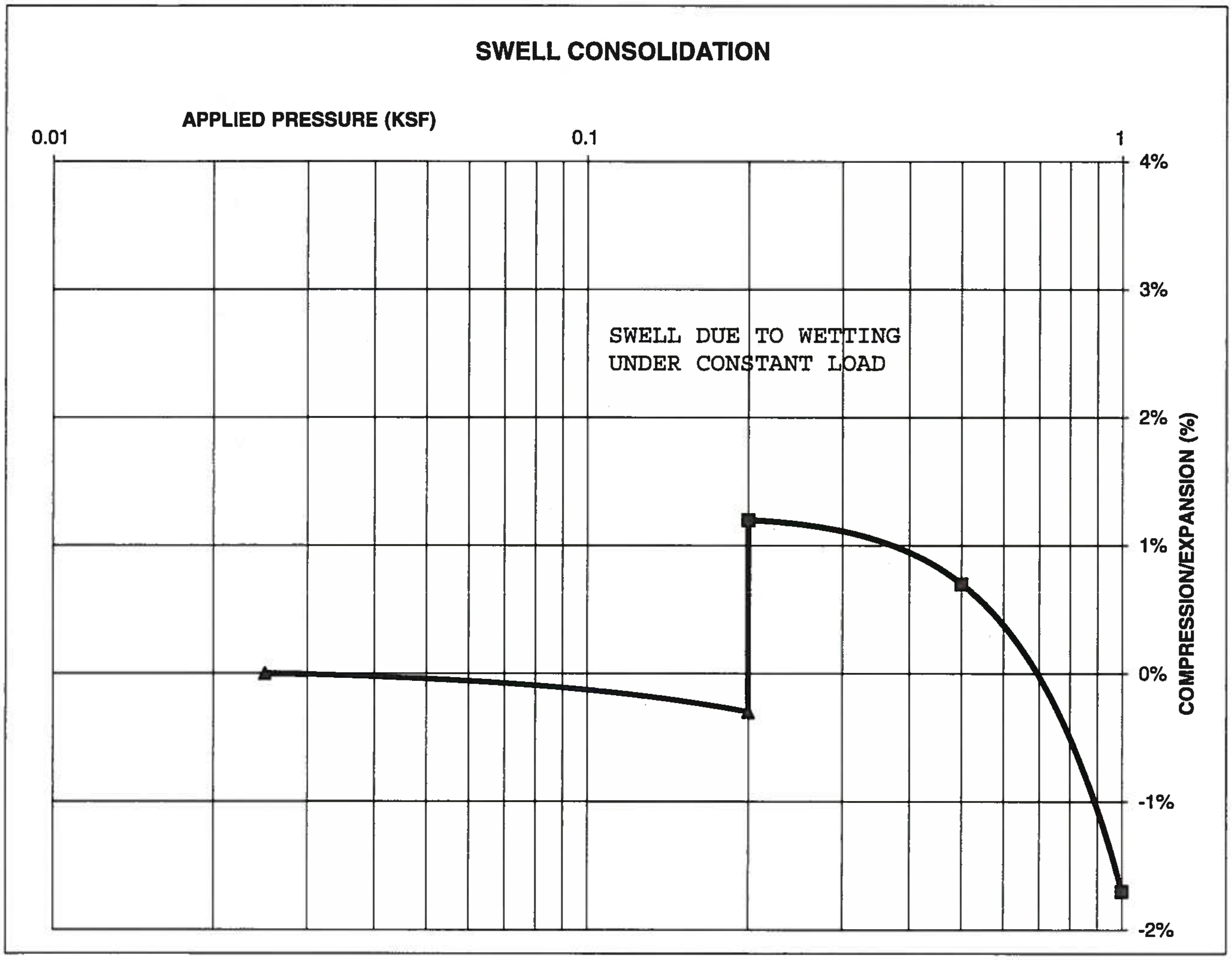
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

JOB NO.: 220095
FIG NO.: B-14

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 8 | DEPTH(ft) | 1-2 |
| DESCRIPTION | CL | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 109 |
| NATURAL MOISTURE CONTENT | | | 5.4% |
| SWELL/CONSOLIDATION (%) | | | 1.5% |

JOB NO. 220095
CLIENT JOHN P. NELSON
PROJECT CRAWFORD APARTMENTS




ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

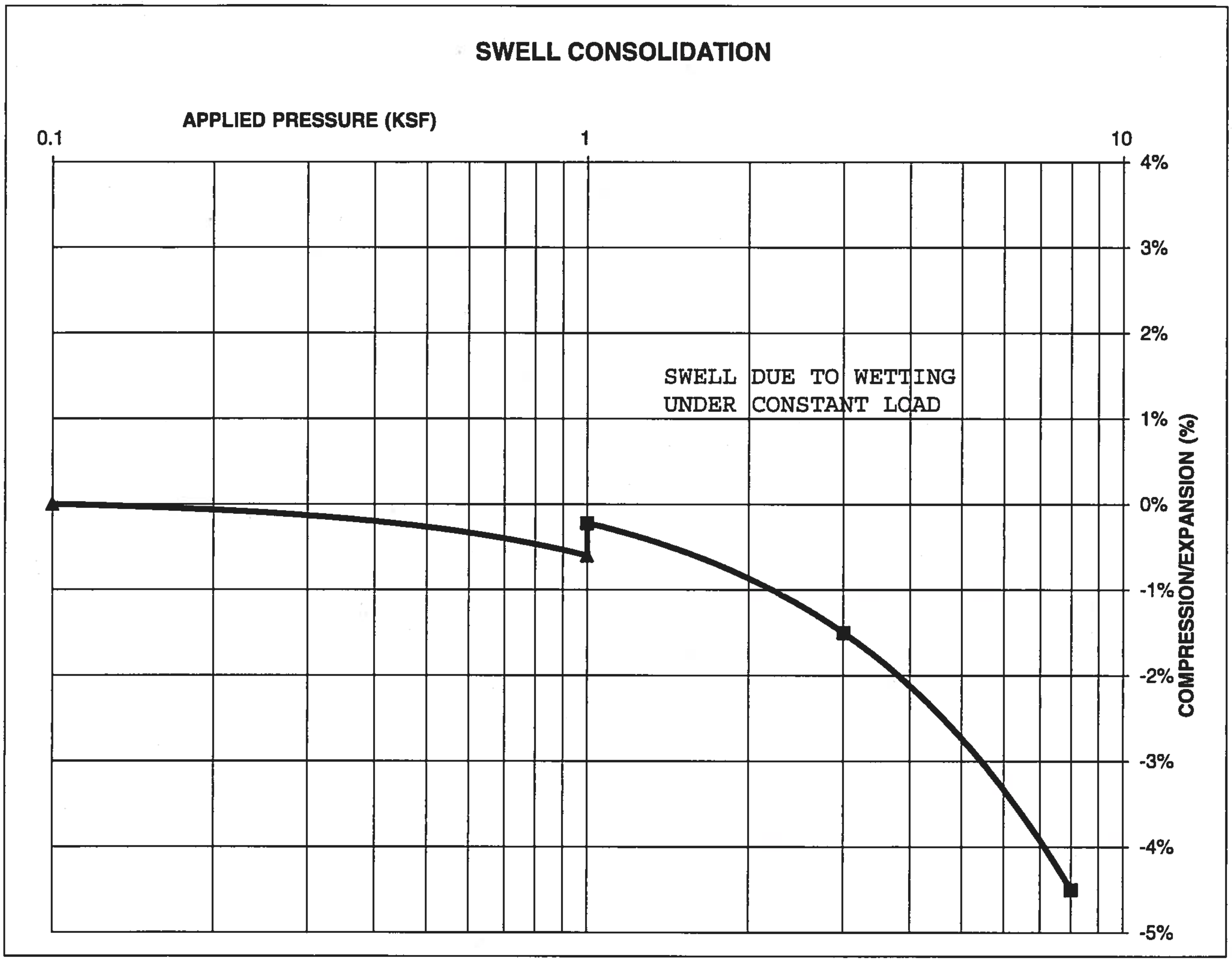
JOB NO.: 220095

FIG NO.: B-15

## *CONSOLIDATION TEST RESULTS*

| | | | |
|---|---|---|---|
| TEST BORING # | 4 | DEPTH(ft) | 2-3 |
| DESCRIPTION | SC | SOIL TYPE | 1 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 117 |
| NATURAL MOISTURE CONTENT | | | 6.8% |
| SWELL/CONSOLIDATION (%) | | | 0.4% |

JOB NO. 220095
CLIENT JOHN P. NELSON
PROJECT CRAWFORD APARTMENTS




ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION
TEST RESULTS

| DRAWN: | DATE: | CHECKED: SW | DATE: 2-9-22 |
|---|---|---|---|

JOB NO.: 220095
FIG NO.: B-16

| | | | |
|---|---|---|---|
| CLIENT | JOHN P. NELSON | JOB NO. | 220095 |
| PROJECT | CRAWFORD APARTMENTS | DATE | 1/26/2022 |
| LOCATION | CRAWFORD APARTMENTS | TEST BY | BL |

| BORING NUMBER | DEPTH, (ft) | SOIL TYPE NUMBER | UNIFIED CLASSIFICATION | WATER SOLUBLE SULFATE, (wt%) |
|---|---|---|---|---|
| TB-1 | 2-3 | 1 | CL | 0.02 |
| TB-4 | 2-3 | 2 | SC | 0.01 |
| TB-7 | 1-2 | 1 | CL | <0.01 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

QC BLANK PASS

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST
SULFATE RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | SW | 2-9-22 |

JOB NO.: 220095

FIG NO.: B-17