# Appendix C: Geotechnical Engineering Services Report

GEO-TEST

# GEOTECHNICAL ENGINEERING SERVICES REPORT JOB NO. 1-21204

# REGINA MDWCA NARANJO CREEK WATERLINE REPLACEMENT

# SANDOVAL COUNTY, NEW MEXICO

PREPARED FOR

**SOUDER, MILLER & ASSOCIATES**

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June 27, 2023
**Job No. 1-21204**

**Souder, Miller & Associates**
**401 West Broadway**
**Farmington, New Mexico 87401**

**ATTN: Colin Daly, P.E.**

RE: Geotechnical Engineering Services
Regina MDWCA
Naranjo Creek Waterline Replacement
Sandoval County, New Mexico

Dear Mr. Daly:

Submitted herein is the Geotechnical Engineering Services Report for the above referenced project. The report contains the results of our field investigation, laboratory testing, and recommendations for a concrete vault/manhole, trenching, bedding, backfill and general site grading.

It has been a pleasure to serve you on this project. If you should have any questions, please contact this office.

Respectfully submitted: Reviewed by:

**GEO-TEST, INC.**

Timothy Matson, Staff Engineer

PATRICK R. WHORTON NEW MEXICO 26342 PROFESSIONAL ENGINEER

Patrick R. Whorton, PE

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## INTRODUCTION

This report presents the results of the geotechnical engineering services investigation performed for the proposed water system improvements to be located along Naranjo Creek Road in Sandoval County, New Mexico.

The objectives of this investigation were to:

1) Evaluate the nature and engineering properties of the subsurface soils underlying the waterline and concrete vault.

2) To provide recommendations for concrete vault/manhole design and criteria for the necessary earthwork during construction and installation of the proposed waterline including temporary slopes and general site grading.

The investigation includes subsurface exploration, selected soil sampling, laboratory testing of the samples, performing an engineering analysis and preparation of this report.

## PROPOSED CONSTRUCTION

It is understood that the project consists of the installation of approximately 14,000 linear feet of new waterline to be installed 4-10 ft below grade. In addition, a concrete vault/manhole will also be constructed about 6 feet in diameter and bear about 7 feet below grade, however, the exact location of the vault is unknown at this time.

Should structural or other project details vary significantly from those outlined above, this firm should be notified for review and possible revision of the recommendations contained herein.

## FIELD EXPLORATION

Twenty (20) exploratory borings were drilled along the roadway to depths ranging from about 10 to 20½ feet below existing site grades. The locations of the borings are shown on the Boring Location Map, Figure 1. The soils encountered in the borings were continuously examined, visually classified and logged during the drilling operation. The boring logs are presented in a following section of this report. Drilling was accomplished using a truck mounted drill rig equipped with 2.25-inch inside diameter continuous flight hollow stem auger. Subsurface materials were sampled at five-foot intervals or less utilizing an open tube split barrel sampler driven by a standard penetration test hammer in some of the borings. Bulk samples of the auger cuttings were also obtained during the drilling.

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## LABORATORY TESTING

Selected soil samples were tested in the laboratory to determine certain engineering properties of the soils. Moisture contents were determined to evaluate the various soil deposits with depth. The results of these tests are shown on the boring logs.

Sieve analysis and Atterberg limits tests were performed to aid in soil classification. Results of these tests are presented in the Summary of Laboratory Results and on the individual test reports presented in a following section of this report.

To aid in corrosion analysis, sulfate and chloride ion concentrations are being determined by Hall Environmental Analysis Laboratory. The results of these tests will be provided in an addendum once they are completed.

## SITE CONDITIONS

A brief site reconnaissance was performed during our site exploration. The site for the proposed waterline replacement is located on Naranjo Creek Road. The road is unpaved, and we observed markings of an underground communication cable line which runs mainly along the southside and eastside shoulder of the road. We also observed some plastic buried waterline markers which mainly runs along the northside of the road, and it is understood there are a couple areas where the lines crosses the roadway. During our investigation we observed a backhoe trenching for a waterline tie-in. See Photo 1 in a later section of this report.

## SUBSURFACE SOIL CONDITIONS

The soils encountered in the borings consist primarily of clays with various amounts of fine sand. These soils ranged from low to high in plasticity, range from moderately firm to very firm and hard and generally extended to full depth explored. Lesser amounts of non-plastic silty sand and low plasticity clayey sand were encountered in some of the borings. Although this material was logged as soils, it is possible that some of the material encountered may be weathered sedimentary bedrock of the San Jose Formation. According to the Geology of the Regina Quadrangle, Rio Arriba and Sandoval Counties, New Mexico map the area along Naranjo Creek Road is mapped as the San Jose Formation, a sedimentary formation consisting of sandstone with overlying gray, tan and purple shale. Naranjo Creek Road is overlayed on the Geologic Map, as shown in Figure 2. Detailed lithologic descriptions are shown on the attached boring logs. No groundwater was encountered in the borings and soil moisture contents were generally low to moderate throughout the extent of the borings.

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## CONCLUSIONS AND RECOMMENDATIONS

### Concrete Vault/Manhole

As indicated by the standard penetration test data and laboratory work, most of the near surface soils are moderately firm to firm. These soils will provide reliable support for the concrete vault/manhole structure, such that the base may be founded directly on prepared native soils with no special site treatment required. Detailed recommendations for vault foundation preparation are presented in the following sections of this report.

Moisture protection of the foundation supporting soils is considered essential for the satisfactory performance of the structure. This should be reflected in the overall site grading and drainage details as presented in a following section of this report.

### Waterline

The results of this investigation as well as the observance of an existing open trench being excavated with a backhoe, indicate that the surficial soils encountered in the borings can be readily excavated using normal earth moving and excavation equipment. In addition, it is our opinion that the very firm and hard soils or possible weathered sedimentary bedrock encountered in some of the borings can also be excavated, although may require more effort with heavier equipment, mainly between boring nos. 15 and 19, below about 10 feet. In general, if the material does not refuse the drilling auger, then the material can be excavated using normal earth moving equipment. In addition, most of the excavated soils will be suitable for use as backfill above the pipe embedment.

Excavated slopes for utility construction should be designed and constructed in accordance with 29 CFR 1926, Subpart P, and any applicable state or local regulations. Temporary cut slopes should not exceed 1.5 horizontal to 1 vertical. Spoil piles and heavy equipment should not be allowed within 3 feet of the top of the slopes. Shoring, bracing or benching should be performed by the contractor in accordance with the strictest governing safety standards.

Bedding and pipe embedment materials to be used around the proposed waterline should consist of well graded sand or gravel conforming to the pipe manufacturer's recommendations and be placed and compacted in accordance with project specifications, local requirements or governing jurisdiction. General fill to be used above pipe embedment materials should be placed and compacted in accordance with the plans and specifications. On-site soils may be used as general fill above pipe embedment materials. Water jetting of trench backfill should not be allowed.

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## FOUNDATIONS

The concrete vault/manhole may be supported by a precast or cast-in-place reinforced manhole base. An allowable soil bearing pressure of 1,500 pounds per square foot (psf) is recommended for use in foundation design. This bearing pressure applies to full dead plus realistic live loads and can be safely increased by one-third for totals loads including wind and seismic forces.

A modulus of subgrade reaction of 200 pounds per square inch per inch of deflection (pci) is recommended for use in a non-rigid design such as a two-dimensional finite element method. If a 6-inch thickness of granular base is placed and compacted beneath the slabs, the modulus of subgrade reaction can be increased to 300 pounds per square inch per inch of deflection.

Total settlement of the foundations designed and constructed as recommended herein are estimated not to exceed ½ inch for the soil moisture contents encountered during this investigation or moisture contents introduced during construction. Differential movements should be less than 75 percent of total movements.

Significant post-construction moisture increases in the supporting soils could create additional movements and could cause excessive movements of foundation bearing soils. Accordingly, the moisture protection provisions as recommended in a following section of this report are considered critical for the satisfactory performance of lift station elements.

## LATERAL SOIL PRESSURES

Resistance to lateral forces will be provided by soil friction between the concrete vault base and the soil and by passive earth resistance against the sides of the structure. A coefficient of friction of 0.40 should be used for computing the lateral resistance between bases of foundations and the soil or crushed stone. A passive soil resistance equivalent to a fluid weighing 375 pounds per cubic foot should be used for analysis.

Lateral pressure against the walls of the vault should be designed for an ‘at rest’ earth pressure of 60 pounds per square foot of depth. This lateral soil pressure is applicable to a condition of horizontal backfill without surcharge loads. Analysis of earth pressures produced by sloping backfill or surcharge loads can be provided by this firm upon request.

Backfill should meet the specifications outlined in the Site Grading section of this report. During backfilling, the contractor should be limited to the use of hand operated compaction equipment within a zone of about 3 feet horizontally from the perimeter of the wells. The use of heavier equipment could apply lateral pressures well in excess of the recommended design earth pressure, particularly over the upper portions of the wells.

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## SITE-GRADING

The following general guidelines should be included in the project construction specifications to provide a basis for quality control during site grading. It is recommended that all fill and backfill be placed and compacted under engineering observation and in accordance with the following:

1) The results of this investigation indicate that most of the native soils will be suitable for use as trench backfill; however, some blending and/or processing may be required. Import material may also be used as fill provided it meets the specifications presented below.

2) All trench and vault backfill should be free of vegetation and debris and contain no rocks larger than 3 inches. Gradation of the backfill material, as determined in accordance with ASTM D-422, should be as follows:

| Size | Percent Passing |
|---|---|
| 3-inch | 100 |
| No. 4 | 60 - 100 |
| No. 200 | 20 - 90 |

3) Trench and vault/manhole backfill consisting of soil approved by the geotechnical engineer, shall be placed in 8-inch loose lifts and compacted with approved compaction equipment. All compaction of fill or backfill outside of the roadway shall be accomplished to a minimum of 90 percent of the maximum dry density as determined in accordance with ASTM D-698 and 95 percent for backfill within the roadway. The moisture content of the backfill during compaction should be within 2 percent of the optimum moisture content.

4) Tests for degree of compaction should be determined by the ASTM D-1556 method or ASTM D-6938. Observation and field tests should be performed during fill and backfill placement by the geotechnical engineer to assist the contractor in obtaining the required degree of compaction. If less than 90 percent is indicated, additional compaction effort should be made with adjustment of the moisture content as necessary until the required compaction is obtained.

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## MOISTURE PROTECTION

Precautions should be taken during and after construction to minimize moisture increase of foundation soils. Accumulations of excessive moisture can weaken or cause other changes in the soils supporting the foundations. This can cause differential movement of the foundations and can result in cosmetic or structural damage to the concrete vault.

Positive drainage should be established away from the perimeters of the concrete vault. A typical adequate slope is 6 inches in the first 5 feet with positive drainage being provided from those points to streets, pavement or natural water courses. If necessary to provide positive drainage, the area should be raised above adjacent grades with structural fill. Utility backfill should be well compacted and should meet the specifications outlined in the Site Grading section of this report.

The foregoing recommendations should only be considered minimum requirements for overall site development. It is recommended that a civil/drainage engineer be consulted for more detailed grading and drainage recommendations.

## FOUNDATION REVIEW AND INSPECTION

This report has been prepared to aid in the evaluation of this site and to assist in the design of this project. It is recommended that the geotechnical engineer be provided the opportunity to review the design drawings and specifications in order to determine whether the recommendations in this report are applicable to the design. Review of the design drawings and specifications should be noted in writing by the geotechnical engineer.

In order to permit correlation between the conditions encountered during construction and to confirm recommendations presented herein, it is recommended that the geotechnical engineer be retained to perform continuous observations and testing during the earthwork portion of this project. Observation and testing should be performed during construction to confirm that suitable fill soils are placed upon competent materials and properly compacted, and foundation elements penetrate the recommended soils.

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## CLOSURE

Our conclusions, recommendations and opinions presented herein are:

1) Based upon our evaluation and interpretation of the findings of the field and laboratory program.

2) Based upon an interpolation of soil conditions between and beyond the explorations.

3) Subject to confirmation of the conditions encountered during construction.

4) Based upon the assumption that sufficient observation will be provided during construction.

5) Prepared in accordance with generally accepted professional geotechnical engineering principles and practice.

This report has been prepared for the sole use of Souder, Miller & Associates, specifically to aid in the design of the proposed waterline replacement to be located in Sandoval County, New Mexico and is not for the use by any third parties.

We make no other warranty, either express or implied. Any person using this report for bidding or construction purposes should perform such independent investigation as they deem necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

If conditions encountered during construction appear to be different than indicated by this report, this office should be notified. All soil samples will be discarded 60 days after the date of this report unless we receive a specific request to retain the samples for a longer period of time.

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# BORING LOCATION MAP


Regina MDWCA-Naranjo Creek Waterline Replacement
Sandoval County, New Mexico
Job No. 1-21204

Figure 1

N
W E
S

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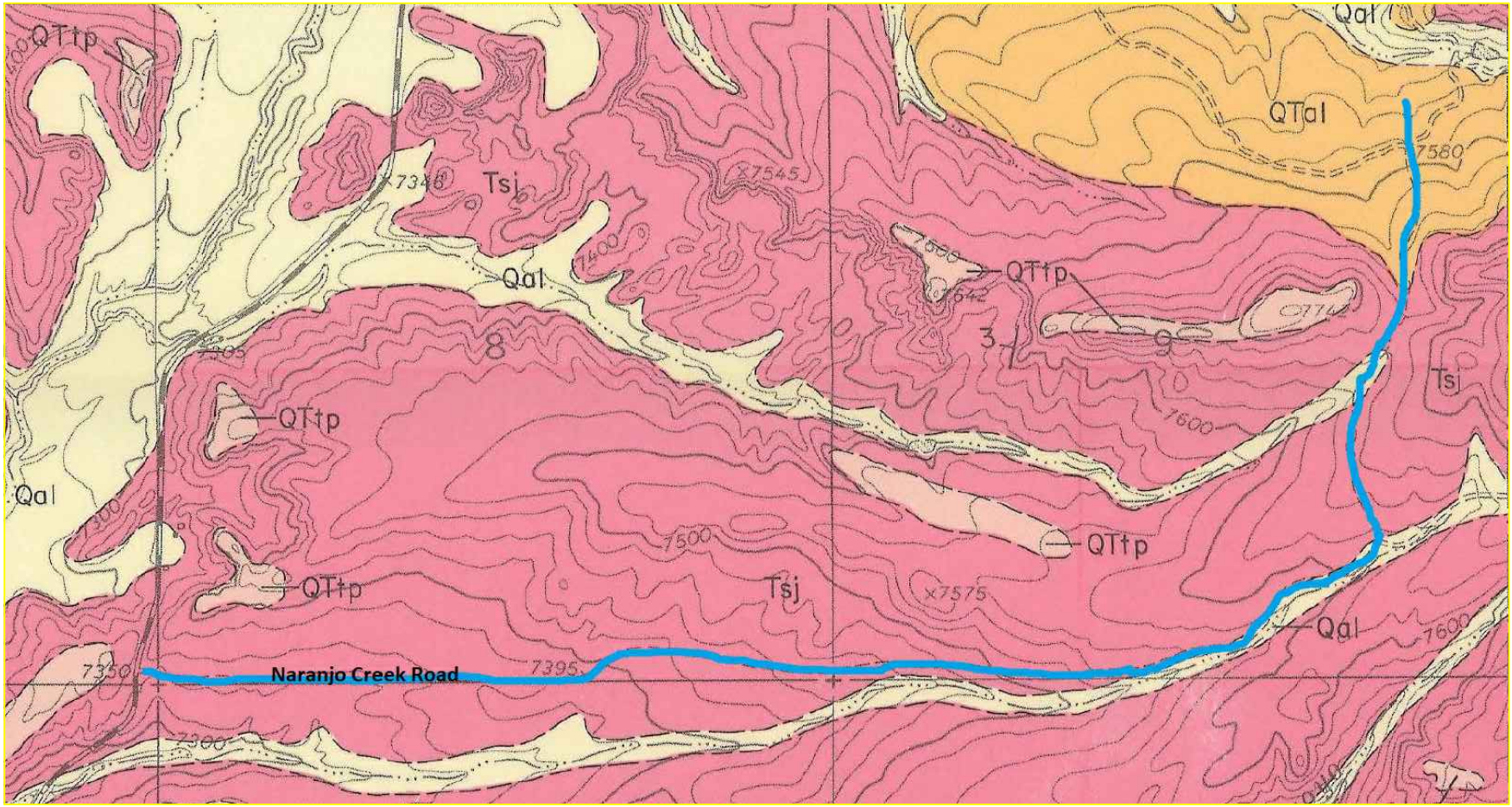
GEOTECHNICAL ENGINEERING
AND MATERIAL TESTING

# GEOLOGIC MAP




Regina MDWCA-Naranjo Creek Waterline Replacement
Sandoval County, New Mexico
Job No. 1-21204

Figure 2

N
W E
S

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GEOTECHNICAL ENGINEERING
AND MATERIAL TESTING

| | |
|---|---|
| Project: | Naranjo Creek Waterline Replacement |
| Photo 1: | Looking North at a trench between B-6 & B-7 |

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Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

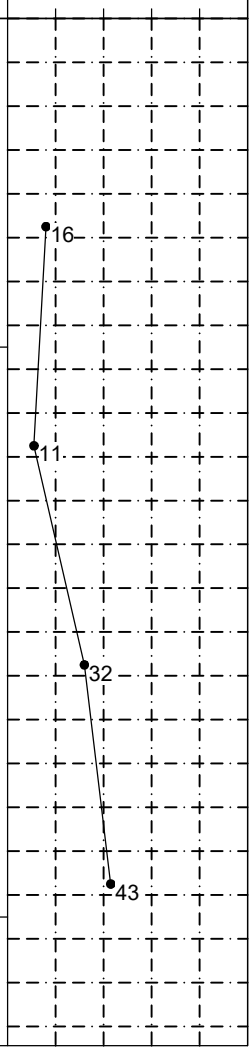
# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 1

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 5 | | | SS | 7-7-9<br>16 | 7 | | SC | CLAYEY SAND with GRAVEL, low to medium plasticity, moderately firm to firm, slightly moist to dry, brown |
| 10 | | | SS | 9-6-5<br>11 | 10 | | CL | CLAY with SAND, medium to high plasticity, moderately firm to hard, slightly moist, tan/light brown with white inclusions<br><br>*purplish/red/brown below 14' |
| 15 | | | SS | 8-15-17<br>32 | 10 | | | |
| 20 | | | SS | 15-19-24<br>43 | 7 | | | |
| | | | | | | | | STOPPED AUGER AT 19'<br>STOPPED SAMPLER AT 20.5' |




LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurments were made.

GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 2

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft (20 40 60 80) |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | | AC | | 10 | | CL | CLAY with SAND, low plasticity, slightly moist to dry, light brown to tan/light brown | |
| | | | AC | | 6 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 3

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| | | | AC | | 11 | | | | |
| 5 | | | SS | 11-10-15<br>25 | 9 | | CL | CLAY with SAND, low to medium plasticity, moderately firm to firm, slightly moist to moist, brown to tan/light brown | 25 |
| 10 | | | SS | 10-13-13<br>26 | 10 | | | | 26 |
| | | | | | | | | STOPPED AUGER AT 9'<br>STOPPED SAMPLER AT 10.5' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
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Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 4

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | | AC | | 16 | | CL | CLAY with SAND, medium plasticity, moist to very moist, brown | |
| | | | AC | | 19 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 9'<br>STOPPED SAMPLER AT 10.5' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

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Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

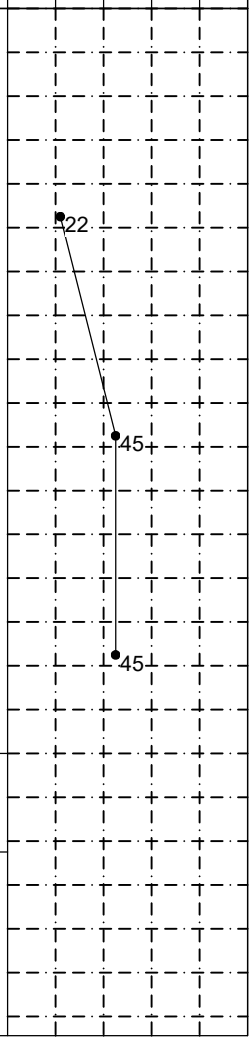
# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 5

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 5 | | | SS | 4-8-14<br>22 | 21 | | CL | SANDY CLAY, medium to high plasticity, firm to very firm, moist to very moist, brown/light brown |
| 10 | | | SS | 13-17-28<br>45 | 10 | | | *purple/gray/brown at 14' |
| 15 | | | SS | 14-21-24<br>45 | 11 | | SM | SILTY SAND, fine to medium grained, non-plastic, very dense, slightly moist, purple/gray/brown |
| 20 | | | SS | 50/3" | 6 | | | STOPPED SAMPLER AT 19'<br>SAMPLER REFUSAL AT 19.25' |




LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

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Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 6

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft (20 40 60 80) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | AC | | 11 | | CL | CLAY with SAND, low to medium plasticity, slightly moist to dry, brown/light brown | |
| 5 | | | AC | | 10 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurments were made.

GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

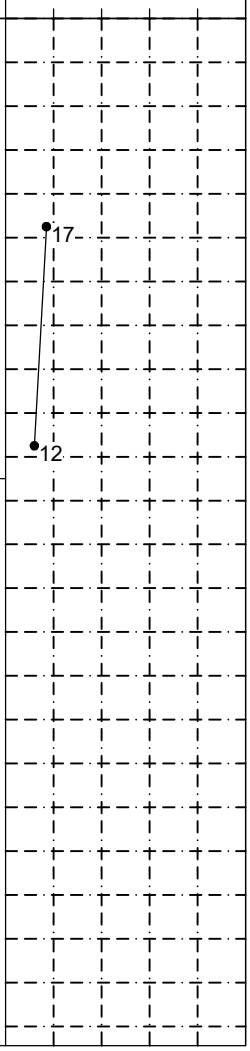
# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 7

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 5 | | | SS | 6-8-9<br>17 | 5 | | CL | CLAY with SAND, low to medium plasticity, firm to moderately firm, slightly moist to dry, dark brown to brown/light brown |
| 10 | | | SS | 5-6-6<br>12 | 6 | | | STOPPED AUGER AT 9'<br>STOPPED SAMPLER AT 10.5' |
| 15 | | | | | | | | |
| 20 | | | | | | | | |




LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 8

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | | AC | | 7 | | CL | CLAY with SAND, medium plasticity, slightly moist to dry, light brown | |
| | | | AC | | 7 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 9

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft (20 40 60 80) |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | | AC | | 13 | | CL | CLAY, medium to high plasticity, slightly moist, dark brown to light brown | |
| | | | AC | | 11 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 10

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft (20 40 60 80) |
|---|---|---|---|---|---|---|---|---|---|
| | | | AC | | 10 | | | | |
| 5 | | | SS | 5-6-5<br>11 | 18 | | | | 11 |
| 10 | | | SS | 4-5-7<br>12 | 9 | | CL | CLAY with SAND, medium plasticity, moderately firm to firm, slightly moist to dry, dark brown to tan/light brown | 12 |
| 15 | | | SS | 5-5-6<br>11 | 9 | | | | 11 |
| 20 | | | SS | 7-7-9<br>16 | 8 | | | | 16 |
| | | | | | | | | STOPPED AUGER AT 19'<br>STOPPED SAMPLER AT 20.5' | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 11

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| | | | AC | | 9 | | CL | CLAY with SAND, medium plasticity, slightly moist to dry, dark brown | |
| 5 | | | AC | | 7 | | CL-ML | SILTY CLAY with SAND, low plasticity, slightly mosit to dry, light brown | |
| 10 | | | | | | | | STOPPED AUGER AT 9'<br>STOPPED SAMPLER AT 10.5' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 12

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | AC | | 12 | | CL | CLAY with SAND, low plasticity, slightly moist, dark brown |
| 5 | | | SS | 10-12-12<br>24 | 6 | | SC | CLAYEY SAND, fine graiend, low plasticity, firm, weakly cemented, slighty moist to dry, light brown with white inclusions |
| | | | | | | | SM | SILTY SAND, fine grained, non-plastic to low plasticity, medium dense, slightly moist, brown |
| 10 | | | SS | 6-7-8<br>15 | 7 | | | STOPPED AUGER AT 9'<br>STOPPED SAMPLER AT 10.5' |
| 15 | | | | | | | | |
| 20 | | | | | | | | |

N blows/ft
20 40 60 80
24
15

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 13

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | | AC | | 14 | | CL | CLAY, medium to high plasticity, slightly moist to moist, brown to reddish/brown | |
| | | | AC | | 9 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 14

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | AC | | 18 | | CL | CLAY, medium plasticity, very moist to moist, dark brown | |
| 5 | | | AC | | 12 | | | *black between 4'-6' | |
| | | | AC | | 18 | | | *light brown below 6' | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 15

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | | AC | | 11 | | CL | CLAY with SAND, low to medium plasticity, slgithly moist to dry, brown<br>*dark brown/black below 5' | |
| | | | AC | | 10 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21204-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/26/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 16

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | | AC | | 14 | | CL | CLAY with SAND, medium to high plasticity, moist to slightly moist, brown | |
| | | | AC | | 11 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

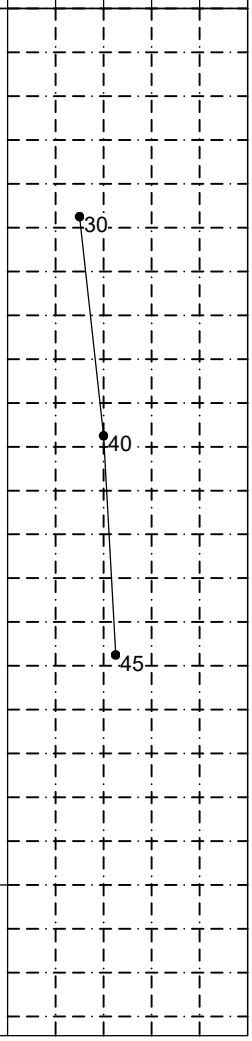
# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 17

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 5 | | | SS | 9-14-16<br>30 | 9 | | | |
| 10 | | | SS | 15-17-23<br>40 | 6 | | CL | CLAY with SAND, low to medium plasticity, slightly moist to dry, brown<br>*gray/light brown below 5 feet<br>*reddish/purple below 15 feet |
| 15 | | | SS | 11-20-25<br>45 | 8 | | | |
| 20 | | | SS | 28-50/6" | 7 | | | STOPPED AUGER 19'<br>STOPPED SAMPLER AT 20'<br>*slow drilling below 15' |




LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
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CS - Continuous Sampler
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ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

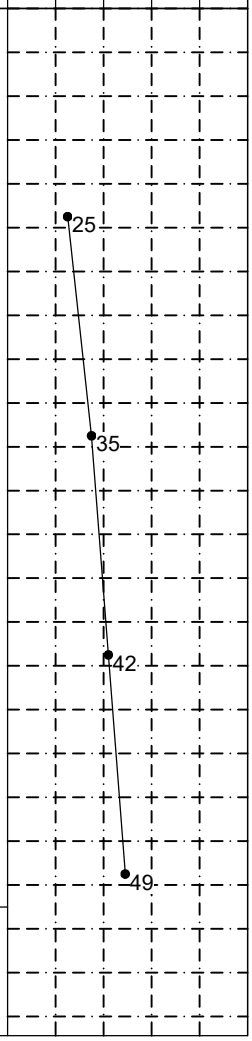
# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 18

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 5 | | | SS | 8-8-17<br>25 | 10 | | | |
| 10 | | | SS | 14-19-16<br>35 | 7 | | CL | CLAY with SAND, low to medium plasticity, slightly moist to dry, brown<br>*gray/light brown below 5 feet<br>*reddish/purple below 15 feet |
| 15 | | | SS | 22-19-23<br>42 | 8 | | | |
| 20 | | | SS | 26-22-27<br>49 | 8 | | | |
| | | | | | | | | STOPPED AUGER 19'<br>STOPPED SAMPLER AT 20.5'<br>*slow drilling below 15' |




LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
CS - Continuous Sampler
UD - Undisturbed
ST - Shelby Tube

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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 19

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION | N blows/ft 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | | AC | | 16 | | CL | CLAY with SAND, medium to high plasticity, moist dark brown/black to brown | |
| | | | AC | | 15 | | | | |
| 10 | | | | | | | | STOPPED AUGER AT 10' | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
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GEO-TEST

Project: Regina MDWCA-Naranjo Creek Waterline Replacement
Date: 06/06/2023 Project No: 1-21204
Elevation: Type: 2.25" I.D. HSA

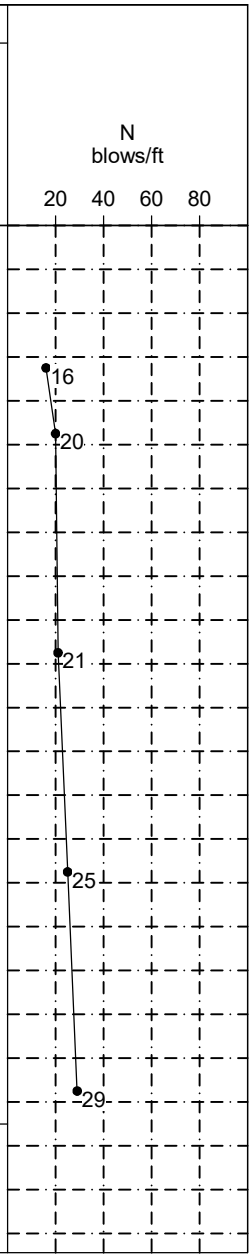
# LOG OF TEST BORINGS

GROUNDWATER DEPTH

NO: 20

During Drilling: NONE After 24 Hours:

| DEPTH (Ft) | LOG | SAMPLE INTERVAL | TYPE | N. BLOWS/FT | MOISTURE % | DRY DENSITY (pcf) | USC | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | SS | 6-8-8<br>16 | | | | |
| 5 | | | SS | 6-9-11<br>20 | 15 | | | |
| 10 | | | SS | 8-9-12<br>21 | 12 | | CL | SANDY CLAY, medium to high plasticity, moist to slightly moist, dark brown/black<br><br>*slightly moist to dry, brown below 15' |
| 15 | | | SS | 8-11-14<br>25 | 9 | | | |
| 20 | | | SS | 9-13-16<br>29 | 10 | | | STOPPED AUGER AT 19'<br>STOPPED SAMPLER AT 20.5' |




LOG OF TEST BORING 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

LEGEND

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
AMSL - Above Mean Sea Level
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# SUMMARY OF LABORATORY RESULTS



| | | | | | | SIEVE ANALYSIS PERCENT PASSING | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TEST HOLE | DEPTH (FEET) | UNIFIED CLASS | (%) MOIST | LL | PI | NO 200 | NO 100 | NO 40 | NO 10 | NO 4 | 3/8" | 1/2" | 3/4" | 1" | 1 1/2" | 2" | 4" |
| 1 | 5.0 | SC | 6.6 | 37 | 20 | 46 | 55 | 62 | 70 | 75 | 79 | 82 | 84 | 100 | | | |
| 1 | 10.0 | | 10.1 | | | | | | | | | | | | | | |
| 1 | 15.0 | | 10.4 | | | | | | | | | | | | | | |
| 1 | 20.0 | | 7.4 | | | | | | | | | | | | | | |
| 2 | 2.5 | | 9.6 | | | | | | | | | | | | | | |
| 2 | 7.5 | CL | 6.0 | 24 | 10 | 73 | 88 | 96 | 98 | 99 | 100 | | | | | | |
| 3 | 1.5 | | 11.3 | | | | | | | | | | | | | | |
| 3 | 5.0 | | 9.1 | | | | | | | | | | | | | | |
| 3 | 10.0 | CL | 10.3 | 32 | 18 | 81 | 86 | 94 | 100 | | | | | | | | |
| 4 | 2.5 | | 15.7 | | | | | | | | | | | | | | |
| 4 | 7.5 | | 18.6 | | | | | | | | | | | | | | |
| 5 | 5.0 | | 20.5 | | | | | | | | | | | | | | |
| 5 | 10.0 | | 10.2 | | | | | | | | | | | | | | |
| 5 | 15.0 | CL | 10.7 | 42 | 32 | 68 | 82 | 98 | 100 | | | | | | | | |
| 5 | 19.0 | | 6.3 | | | | | | | | | | | | | | |
| 6 | 2.5 | CL | 11.1 | 35 | 21 | 79 | 88 | 93 | 95 | 97 | 99 | 100 | | | | | |
| 6 | 7.5 | | 10.1 | | | | | | | | | | | | | | |
| 7 | 5.0 | | 5.2 | | | | | | | | | | | | | | |
| 7 | 10.0 | CL | 5.6 | 33 | 19 | 79 | 90 | 95 | 97 | 99 | 100 | | | | | | |

GEO-TEST

LL = LIQUID LIMIT
PI = PLASTICITY INDEX
NP = NON PLASTIC or NO VALUE

Project: Regina MDWCA-Naranjo Creek Waterline Replacement

Location: Sandoval County, New Mexico

Number: 1-21204

SUMMARY OF LABORATORY RESULTS 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

# SUMMARY OF LABORATORY RESULTS



| | | | | | | SIEVE ANALYSIS PERCENT PASSING | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TEST HOLE | DEPTH (FEET) | UNIFIED CLASS | (%) MOIST | LL | PI | NO 200 | NO 100 | NO 40 | NO 10 | NO 4 | 3/8" | 1/2" | 3/4" | 1" | 1 1/2" | 2" | 4" |
| 8 | 2.5 | | 6.7 | | | | | | | | | | | | | | |
| 8 | 7.5 | | 6.5 | | | | | | | | | | | | | | |
| 9 | 2.5 | | 12.5 | | | | | | | | | | | | | | |
| 9 | 7.5 | CL | 10.5 | 39 | 24 | 90 | 94 | 99 | 100 | | | | | | | | |
| 10 | 1.5 | | 10.1 | | | | | | | | | | | | | | |
| 10 | 5.0 | | 17.8 | | | | | | | | | | | | | | |
| 10 | 10.0 | | 8.6 | | | | | | | | | | | | | | |
| 10 | 15.0 | CL | 9.3 | 33 | 19 | 85 | 94 | 98 | 100 | | | | | | | | |
| 10 | 20.0 | | 8.0 | | | | | | | | | | | | | | |
| 11 | 2.5 | | 9.3 | | | | | | | | | | | | | | |
| 11 | 7.5 | CL-ML | 7.3 | 24 | 7 | 72 | 89 | 98 | 100 | | | | | | | | |
| 12 | 1.5 | CL | 11.6 | 31 | 17 | 75 | 89 | 95 | 98 | 99 | 100 | | | | | | |
| 12 | 5.0 | | 6.0 | | | | | | | | | | | | | | |
| 12 | 10.0 | | 7.1 | | | | | | | | | | | | | | |
| 13 | 2.5 | | 13.5 | | | | | | | | | | | | | | |
| 13 | 7.5 | CL | 9.3 | 42 | 28 | 89 | 95 | 100 | | | | | | | | | |
| 14 | 2.5 | CL | 17.7 | 37 | 23 | 87 | 96 | 99 | 100 | | | | | | | | |
| 14 | 6.0 | | 11.8 | | | | | | | | | | | | | | |
| 14 | 7.5 | | 18.0 | | | | | | | | | | | | | | |

GEO-TEST

LL = LIQUID LIMIT
PI = PLASTICITY INDEX
NP = NON PLASTIC or NO VALUE

Project: Regina MDWCA-Naranjo Creek Waterline Replacement

Location: Sandoval County, New Mexico

Number: 1-21204

SUMMARY OF LABORATORY RESULTS 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23

# SUMMARY OF LABORATORY RESULTS



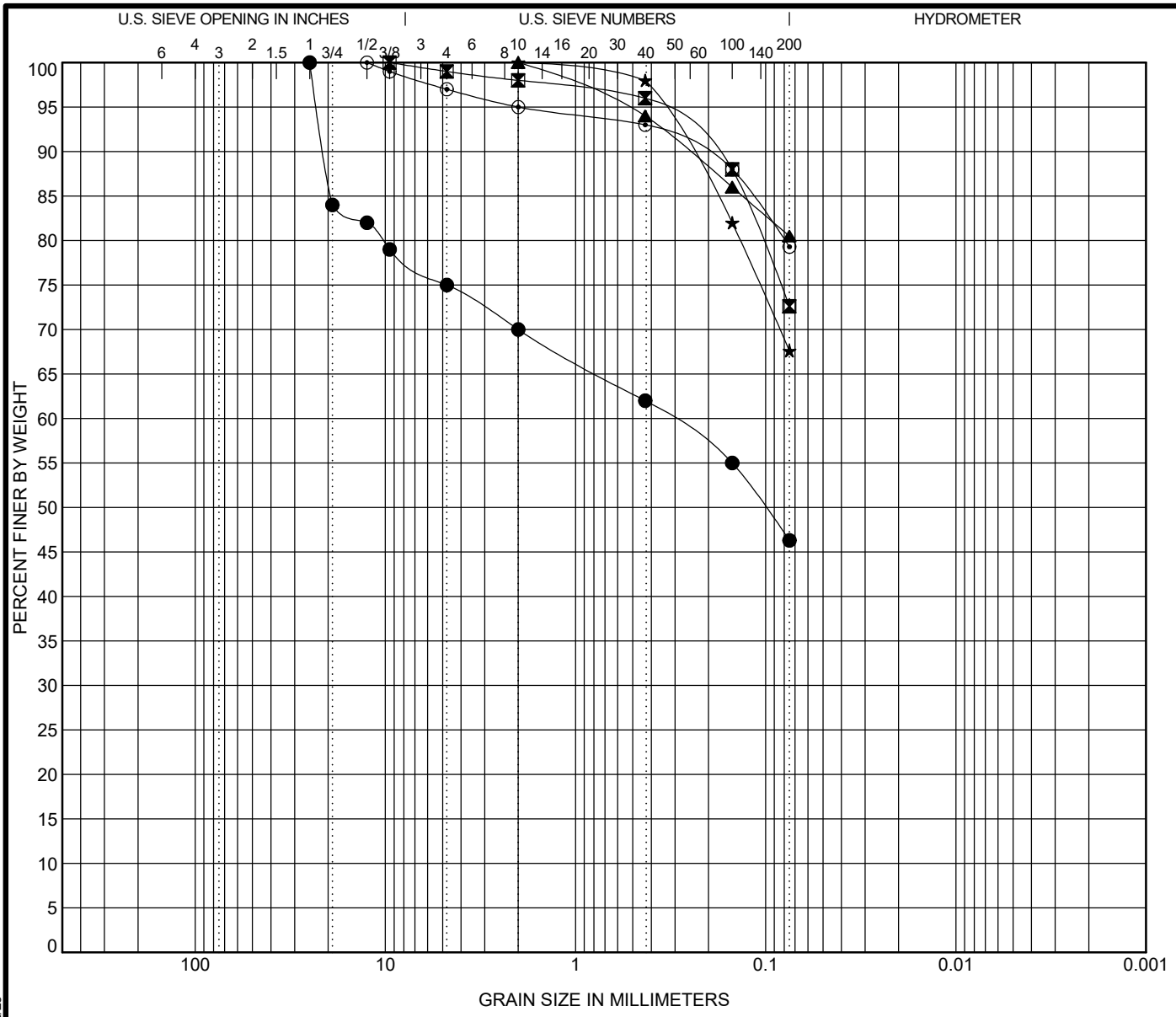
| | | | | | | SIEVE ANALYSIS PERCENT PASSING | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TEST HOLE | DEPTH (FEET) | UNIFIED CLASS | (%) MOIST | LL | PI | NO 200 | NO 100 | NO 40 | NO 10 | NO 4 | 3/8" | 1/2" | 3/4" | 1" | 1 1/2" | 2" | 4" |
| 15 | 2.5 | | 10.7 | | | | | | | | | | | | | | |
| 15 | 7.5 | CL | 9.7 | 31 | 13 | 84 | 94 | 98 | 100 | | | | | | | | |
| 16 | 2.5 | CL | 14.1 | 37 | 22 | 82 | 92 | 97 | 98 | 98 | 99 | 100 | | | | | |
| 16 | 7.5 | | 11.3 | | | | | | | | | | | | | | |
| 17 | 5.0 | | 9.0 | | | | | | | | | | | | | | |
| 17 | 10.0 | | 6.1 | | | | | | | | | | | | | | |
| 17 | 15.0 | CL | 7.7 | 26 | 12 | 76 | 86 | 96 | 99 | 100 | | | | | | | |
| 17 | 19.0 | | 7.1 | | | | | | | | | | | | | | |
| 18 | 5.0 | | 9.6 | | | | | | | | | | | | | | |
| 18 | 10.0 | CL | 6.8 | 38 | 24 | 72 | 84 | 91 | 97 | 97 | 97 | 98 | 100 | | | | |
| 18 | 15.0 | | 8.4 | | | | | | | | | | | | | | |
| 18 | 20.0 | | 8.1 | | | | | | | | | | | | | | |
| 19 | 2.5 | CL | 16.0 | 41 | 26 | 82 | 91 | 99 | 100 | | | | | | | | |
| 19 | 7.5 | | 14.6 | | | | | | | | | | | | | | |
| 20 | 5.0 | | 14.9 | | | | | | | | | | | | | | |
| 20 | 10.0 | | 12.4 | | | | | | | | | | | | | | |
| 20 | 15.0 | CL | 8.6 | 35 | 21 | 51 | 63 | 86 | 95 | 97 | 98 | 99 | 100 | | | | |
| 20 | 20.0 | | 10.4 | | | | | | | | | | | | | | |

GEO-TEST

LL = LIQUID LIMIT
PI = PLASTICITY INDEX
NP = NON PLASTIC or NO VALUE

Project: Regina MDWCA-Naranjo Creek ReWaterline Replacement
Location: Sandoval County, New Mexico
Number: 1-21204

SUMMARY OF LABORATORY RESULTS 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| | Specimen Identification | | Classification | LL | PL | PI | Cc | Cu |
|---|---|---|---|---|---|---|---|---|
| ● | 1 | 5.0 | **CLAYEY SAND with GRAVEL(SC)** | 37 | 17 | 20 | | |
| ⊠ | 2 | 7.5 | **LEAN CLAY with SAND(CL)** | 24 | 14 | 10 | | |
| ▲ | 3 | 10.0 | **LEAN CLAY with SAND(CL)** | 32 | 14 | 18 | | |
| ★ | 5 | 15.0 | **SANDY LEAN CLAY(CL)** | 42 | 10 | 32 | | |
| ⊙ | 6 | 2.5 | **LEAN CLAY with SAND(CL)** | 35 | 14 | 21 | | |

| | Specimen Identification | | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| ● | 1 | 5.0 | **25** | **0.318** | | | **25.0** | **28.7** | **46.3** | |
| ⊠ | 2 | 7.5 | **9.5** | | | | **1.0** | **26.4** | **72.6** | |
| ▲ | 3 | 10.0 | **2** | | | | **0.0** | **19.5** | **80.5** | |
| ★ | 5 | 15.0 | **2** | | | | **0.0** | **32.4** | **67.6** | |
| ⊙ | 6 | 2.5 | **12.5** | | | | **3.0** | **17.7** | **79.3** | |

GEO-TEST

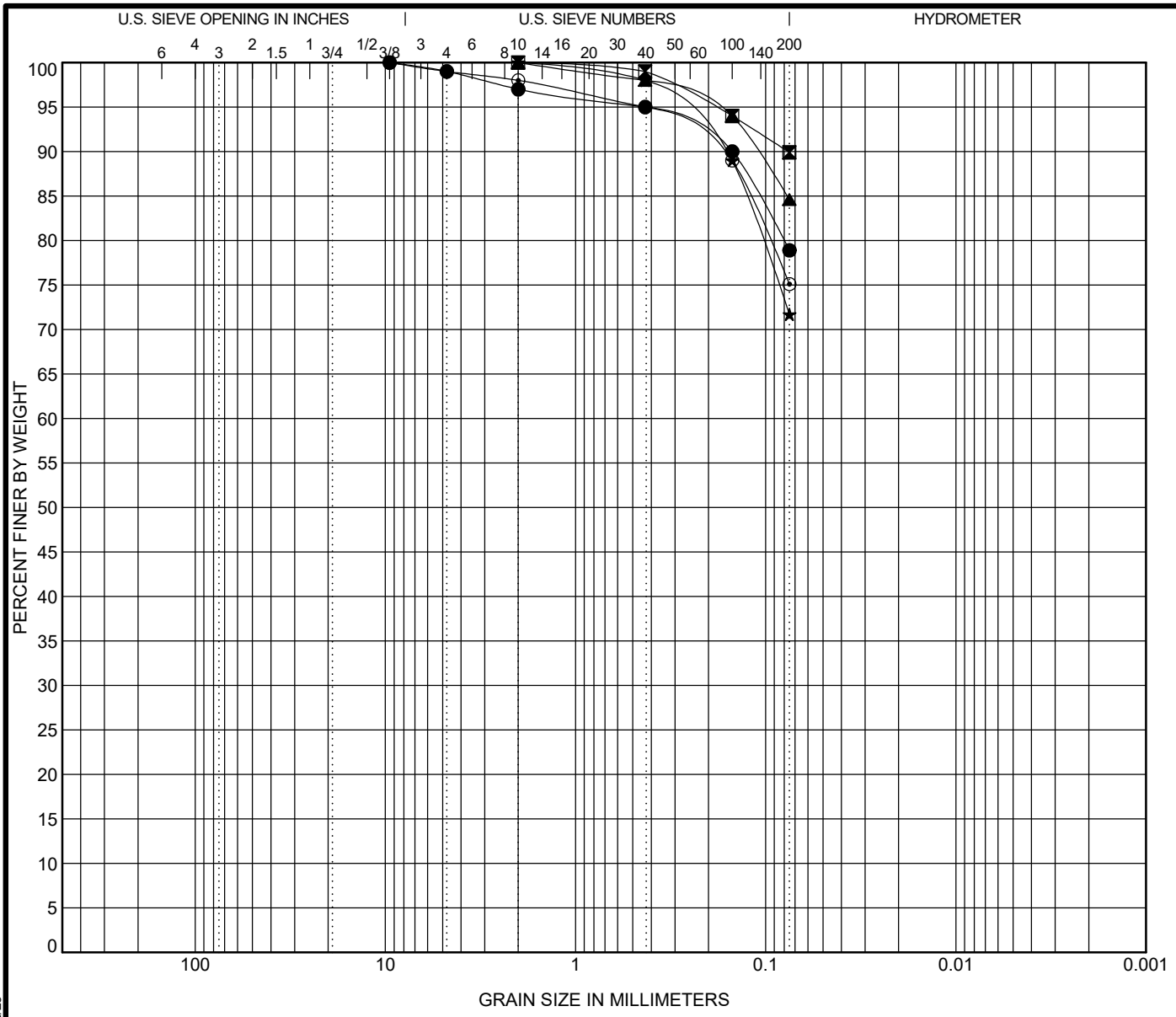
# GRAIN SIZE DISTRIBUTION

Project: Regina MDWCA-Naranjo Creek Waterline Replacement

Location: Sandoval County, New Mexico

Number: 1-21204

US GRAIN SIZE 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| | Specimen Identification | | Classification | LL | PL | PI | Cc | Cu |
|---|---|---|---|---|---|---|---|---|
| ● | 7 | 10.0 | **LEAN CLAY with SAND(CL)** | 33 | 14 | 19 | | |
| ⊠ | 9 | 7.5 | **LEAN CLAY(CL)** | 39 | 15 | 24 | | |
| ▲ | 10 | 15.0 | **LEAN CLAY with SAND(CL)** | 33 | 14 | 19 | | |
| ★ | 11 | 7.5 | **SILTY CLAY with SAND(CL-ML)** | 24 | 17 | 7 | | |
| ⊙ | 12 | 1.5 | **LEAN CLAY with SAND(CL)** | 31 | 14 | 17 | | |

| | Specimen Identification | | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| ● | 7 | 10.0 | 9.5 | | | | 1.0 | 20.1 | 78.9 | |
| ⊠ | 9 | 7.5 | 2 | | | | 0.0 | 10.1 | 89.9 | |
| ▲ | 10 | 15.0 | 2 | | | | 0.0 | 15.4 | 84.6 | |
| ★ | 11 | 7.5 | 2 | | | | 0.0 | 28.3 | 71.7 | |
| ⊙ | 12 | 1.5 | 9.5 | | | | 1.0 | 23.9 | 75.1 | |

GEO-TEST

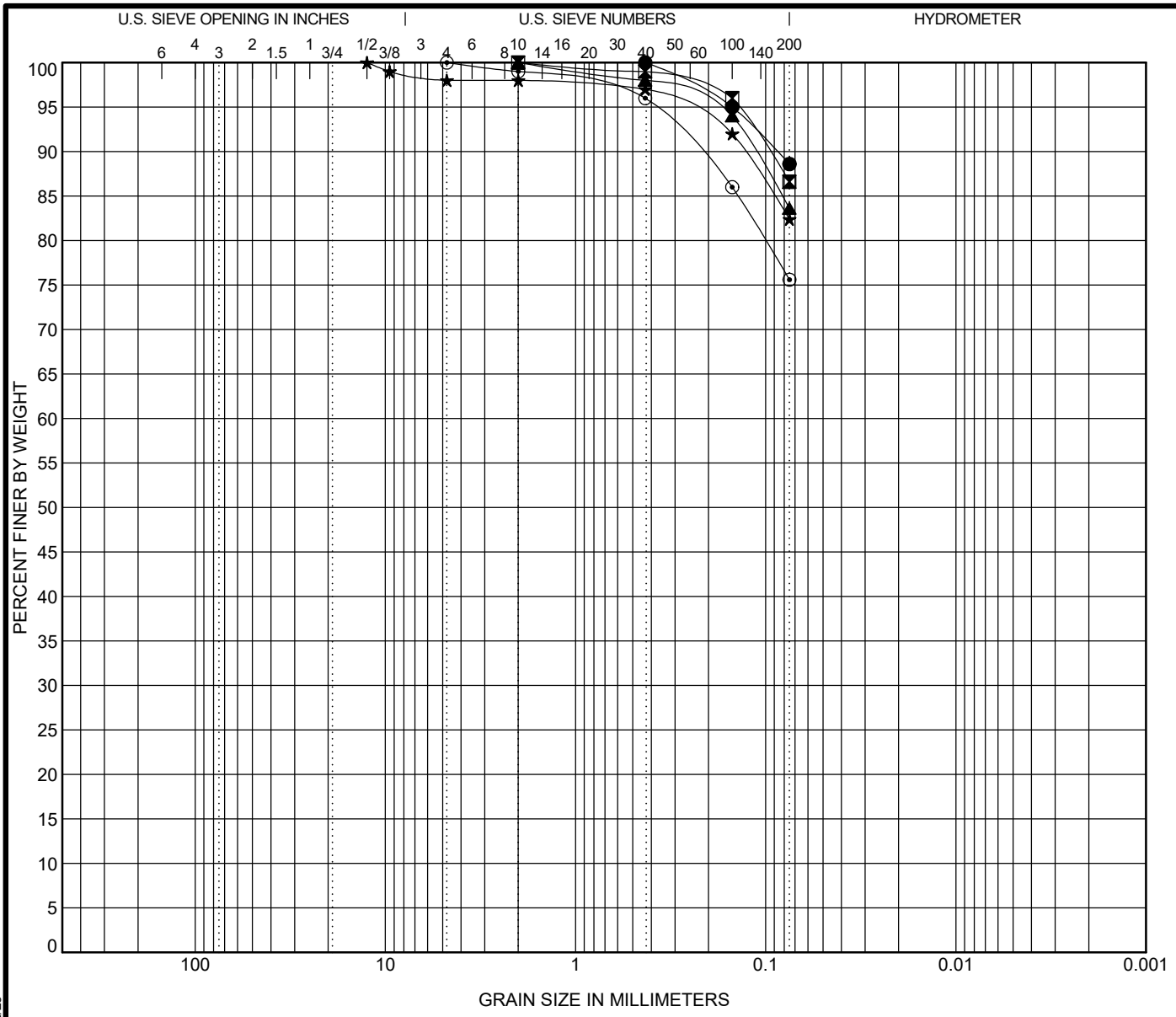
# GRAIN SIZE DISTRIBUTION

Project: Regina MDWCA-Naranjo Creek Waterline Replacement

Location: Sandoval County, New Mexico

Number: 1-21204

US GRAIN SIZE 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| | Specimen Identification | | Classification | LL | PL | PI | Cc | Cu |
|---|---|---|---|---|---|---|---|---|
| ● | 13 | 7.5 | **LEAN CLAY(CL)** | 42 | 14 | 28 | | |
| ⊠ | 14 | 2.5 | **LEAN CLAY(CL)** | 37 | 14 | 23 | | |
| ▲ | 15 | 7.5 | **LEAN CLAY with SAND(CL)** | 31 | 18 | 13 | | |
| ★ | 16 | 2.5 | **LEAN CLAY with SAND(CL)** | 37 | 15 | 22 | | |
| ⊙ | 17 | 15.0 | **LEAN CLAY with SAND(CL)** | 26 | 14 | 12 | | |

| | Specimen Identification | | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| ● | 13 | 7.5 | **0.43** | | | | **0.0** | **11.4** | **88.6** | |
| ⊠ | 14 | 2.5 | **2** | | | | **0.0** | **13.4** | **86.6** | |
| ▲ | 15 | 7.5 | **2** | | | | **0.0** | **16.4** | **83.6** | |
| ★ | 16 | 2.5 | **12.5** | | | | **2.0** | **15.6** | **82.4** | |
| ⊙ | 17 | 15.0 | **4.75** | | | | **0.0** | **24.4** | **75.6** | |

GEO-TEST

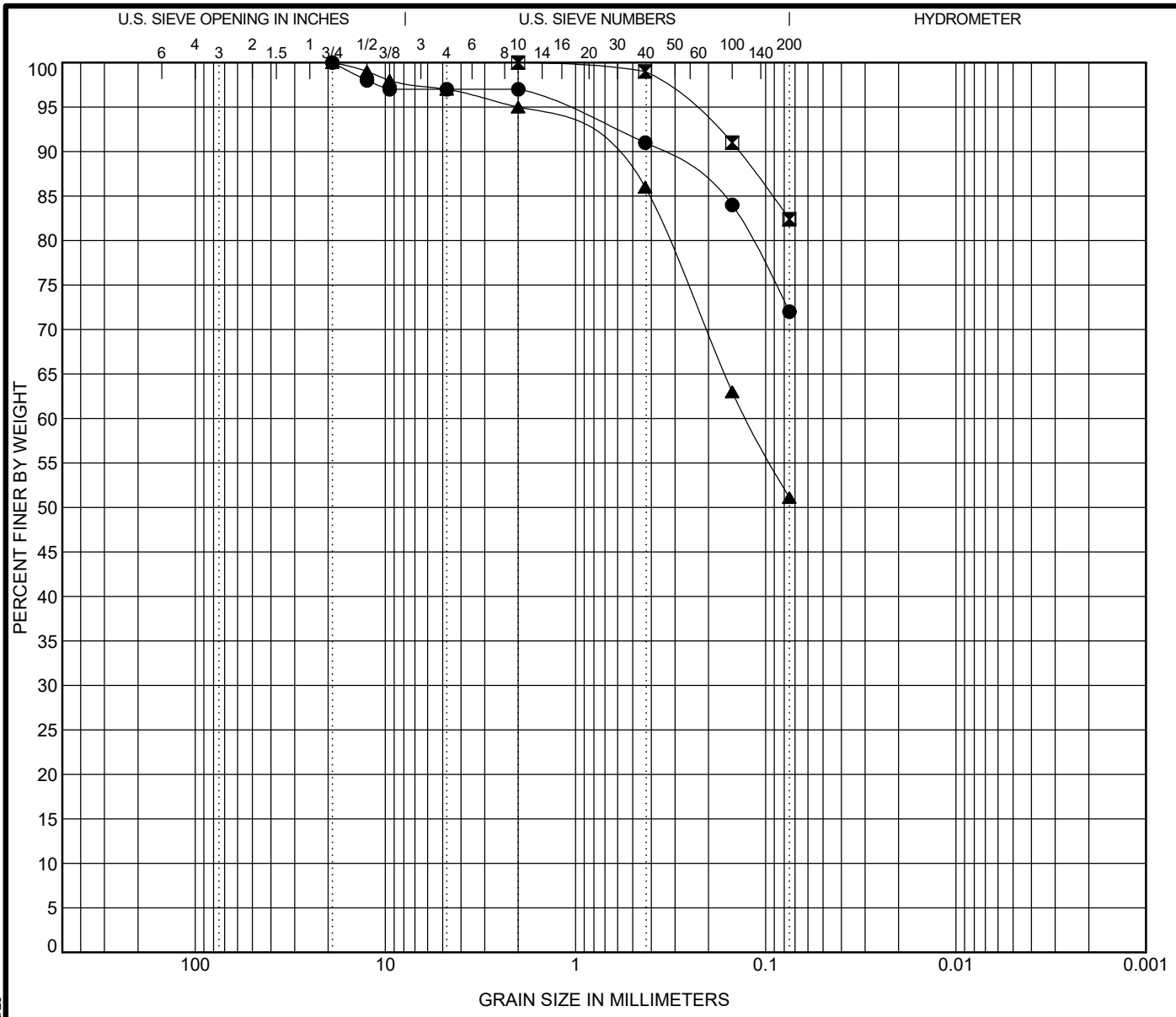
# GRAIN SIZE DISTRIBUTION

Project: Regina MDWCA-Naranjo Creek Waterline Replacement

Location: Sandoval County, New Mexico

Number: 1-21204

US GRAIN SIZE 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| | Specimen Identification | | Classification | LL | PL | PI | Cc | Cu |
|---|---|---|---|---|---|---|---|---|
| ● | 18 | 10.0 | **LEAN CLAY with SAND(CL)** | **38** | **14** | **24** | | |
| ⊠ | 19 | 2.5 | **LEAN CLAY with SAND(CL)** | **41** | **15** | **26** | | |
| ▲ | 20 | 15.0 | **SANDY LEAN CLAY(CL)** | **35** | **14** | **21** | | |
| | | | | | | | | |
| | | | | | | | | |

| | Specimen Identification | | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| ● | 18 | 10.0 | **19** | | | | **3.0** | **25.0** | **72.0** | |
| ⊠ | 19 | 2.5 | **2** | | | | **0.0** | **17.6** | **82.4** | |
| ▲ | 20 | 15.0 | **19** | **0.126** | | | **3.0** | **45.9** | **51.1** | |
| | | | | | | | | | | |
| | | | | | | | | | | |

GEO-TEST

# GRAIN SIZE DISTRIBUTION

Project: Regina MDWCA-Naranjo Creek Waterline Replacement

Location: Sandoval County, New Mexico

Number: 1-21204

US GRAIN SIZE 1-21201-NARANJO CREEK WATERLINE REPLACEMENT.GPJ GEO TEST.GDT 6/22/23