City of Elko Clerk's Department
1751 College Avenue
Elko, NV 89801
(775) 777-7126
FAX (775) 777-7129

ADDENDUM NUMBER ONE

EXIT 298 SEWER – PHASE 2

Please confirm receipt of ADDENDUM NUMBER ONE AND FAX BACK TO (775) 777-7129 or email to cityclerk@elkocitynv.gov.

RECEIVED:

SIGNATURE _____ COMPANY NAME _____

Dated this 16th day of June, 2022.

Elko City Clerk

Kelly Wooldridge

***** PLEASE NOTE RECEIPT OF ADDENDUM NUMBER ONE ON APPLICABLE LINE ON SUBMITTED BID PROPOSAL*****

CITY OF ELKO
ENGINEERING DEPARTMENT
1755 COLLEGE AVENUE
ELKO, NEVADA 89801
(775)777-7210
(775)777-7219 FAX

ADDENDUM #1
EXIT 298 SEWER – PHASE 2

PWP# EL-2022-365

JUNE 16, 2022

This addendum addresses additions, changes, and clarifications to the Contract Documents and Contract Drawings for the City of Elko, Exit 298 Sewer Phase 2 project.

CHANGES:

1. A soils report from a nearby City project is provided and attached hereto as Exhibit A. This report was completed in 2019 for the design of the lift station, shown on the plans for this project at station 52+50. Bore pit number 10 was located at this future lift station site. Bore pits 1 through 9 are along the south side of West Idaho Street, where a future sewer force main will be constructed. Bore pit number 2 is located across the street from some of the deepest sewer construction for this project. The report also addresses ground water. This report was not intended for use with this project. This should not be construed as an exact indication of soils expected throughout this project, but may be of some general use to bidders.

2. There is a discrepancy in the drawings regarding the type of pipe required as the carrier pipe within the bore locations. Detail A on sheet 10 correctly describes the carrier pipe as “DUCTILE IRON CARRIER PIPE, CEMENT MORTAR LINED, PRESSURE CLASS 350” with restrained joints. The plan and profile sheets 5 and 7 incorrectly call for SDR 35 PVC carrier pipe within the bores. All pipe outside the bore locations shall be SDR 35 PVC pipe as noted. Transitions from the mortar lined ductile iron to the PVC may be made just outside the end of the steel bore casing, or may be made at the nearest manhole at the discretion of the contractor. Pay for bore lengths vs. PVC pipe lengths will be paid per plan quantities for bores, regardless of where the transition to PVC pipe is made.

CLARIFFICATIONS

1. The engineer’s estimate for this project is $2,000,000.

3. All state permits for dewatering are the responsibility of the Contractor. A T&S Temporary Groundwater Discharge permit is required for trench dewatering if ground

water is encountered. The fee is $250. The review time is roughly one week. The permit is valid for 6 months. Please contact Bonnie Hartley at NDEP Bureau of Water Pollution Control for additional information 775-687-9502. Any other necessary state permits not mentioned here will also be the responsibility of the contractor.

4. As stated on Page 24 of the bid documents, Article 6, Section N of Responsibilities of Contractor, the City will provide construction layout surveying and quality control testing.

5. A potential laydown area has been identified at the southwest corner of the freeway interchange. The area is roughly one half acre. A permit for Temporary Occupancy of N.D.O.T. right-of-way can be obtained through the local District 3 office. The City well parcel and Future lift station area may also be used as laydown yards. A map of the areas is attached hereto as Exhibit B.

6. Gas line locations shown on the plans, station 69+50 and east, are from a few years ago, prior to the construction of the gas station and Komatsu. A request for additional gas information has been made. A revised plan set will be released in a subsequent addendum.

7. Notes from the Pre-bid meeting, held on June 15, 2022 are attached hereto as Exhibit C.

Thank you for your interest in bidding this project.

Sincerely,

Bob Thibault

Bob Thibault, P.E., P.L.S.
City of Elko
Civil Engineer

PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT
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EXHIBIT A

GEOTECHNICAL INVESTIGATION REPORT

for

WRF – EXIT 298 LIFT STATION AND FORCE MAIN

Elko, Nevada

Prepared for:

City of Elko
1751 College Avenue
Elko, NV 89801

Prepared by:

LUMOS & ASSOCIATES, INC.
808 E. College Parkway, Suite 101
Carson City, Nevada 89706
Tel: (775) 883-7077
Fax: (775) 883-7114

June, 2019

JN: 9718.000

GEOTECHNICAL INVESTIGATION REPORT

WRF – EXIT 298 LIFT STATION AND FORCE MAIN

Elko, Nevada

TABLE OF CONTENTS

GEOTECHNICAL INVESTIGATION REPORT
for
WRF – EXIT 298 LIFT STATION AND FORCE MAIN
Elko, Nevada

INTRODUCTION

This report presents the results of Lumos & Associates, Inc.'s Geotechnical Analysis for the proposed construction of a lift station and a sewer force main Elko, Nevada. We understand the project begins just east of the Interstate 80 and West Idaho Street interchange at exit 298 with the construction of a lift station. The accompanying force main will then run approximately twelve-thousand (12,000) feet east along southern side of West Idaho Street. A vicinity map is included as Plate 1 and a site map is included as Plate 2.

It is our understanding that the proposed project will consist of the construction of a lift station and sewer force main. We have assumed that final grades at the site will be approximately the same as the existing grades.

The purpose of our investigation was to characterize the site geology and soil conditions, describe the native soils and determine their engineering properties as they relate to the proposed construction. The investigation was also intended to identify possible adverse geologic, soil, and/or water table conditions. However, this study did not include an environmental assessment or an evaluation for soil and/or groundwater contamination at the site.

This report concludes with recommendations for site grading, foundations, footing area preparation, utility installation, asphalt concrete and Portland cement concrete. In

addition, information such as logs of all borings, and allowable bearing capacities, estimated total and differential settlement, moisture and drainage protection, and International Building Code (IBC) seismic class designation are provided in this report.

The recommendations contained herein have been prepared based on our understanding and assumptions of proposed construction, as outlined above. Re-evaluation of the recommendations presented in this report should be conducted after the final site grading and construction plans are completed, if there are any variations from the assumptions described herein.

It is possible that subsurface discontinuities may exist between and beyond exploration points. Such discontinuities are beyond the evaluation of the Engineer at this time. No guarantee of the consistency of the geology and sub-surface conditions is implied or intended.

GEOLOGIC SETTING

Elko is located at the extreme eastern portion of the Great Basin geomorphic province. The Great Basin is characterized by large normal fault-bounded valleys (grabens) that are separated by large mountain ranges (horst).

The geologic evolution of the region involves uplift, volcanism, extension, and sedimentation. All these factors have contributed to the current "Basin and Range" physiography.

Specifically, Elko is located in a faulted sub-basin bounded by the Adobe Range to the north, and the Elko Hills to the south. Elko is located in the upper Humboldt River basin. Sediments vary from alluvial cobble bearing sandy gravels to lacustrine silt, sand and clay deposits. Sediment depths in the Elko area are reported to be hundreds of feet deep.

Specifically, the site is located in the western portion of the City of Elko. The surface geology of the project has been mapped by Crafford (2010). The mapping indicates the predominant geologic formation is Alluvium. This map is presented on plate 3.

SEISMIC CONSIDERATIONS

Elko, similar to many areas in Nevada, is located near active faults that are capable of producing significant earthquakes. We reviewed the Quaternary Fault Map of Nevada's interactive map (https://gisweb.unr.edu/Quaternary/Faults). It shows the nearest active fault of Holocene age (<15,000 years) is located fifteen (15) miles to the southeast along the base of the Ruby Mountains. Refer to Plate 4.

Liquefaction is the phenomena where more commonly loose saturated relatively clean nonplastic sands (less than 35% minus the 200 sieve) lose their shear strength when subjected to cyclic loading, and become unstable. Large earthquakes, as described above, may provide that type of cyclic loading. During our field investigation loose, saturated, relatively clean nonplastic sands (less than 35% minus the 200 sieve) were not encountered. Our observations and tests performed during our investigation indicate that liquefaction of the site soils is not likely to occur.

2018 IBC Design: The mapped maximum considered earthquake spectral response acceleration at short periods (S_S) is 0.486g corresponding to a 0.2 second spectral response acceleration at five percent (5%) of critical damping and for a Site Class B (IBC Figure 1613.2.1(1)). The mapped maximum considered earthquake spectral response acceleration at a 1-second period (S_1) is 0.161 corresponding to a 1.0 second spectral response acceleration at five percent (5%) of critical damping and for a Site Class B (IBC Figure 1613.2.1(2). At this time, the soil conditions are not known in sufficient detail to a depth of 100 feet, thus, a Site Class D may be assumed per the IBC. These spectral response accelerations are adjusted for site class effects because Site Class D is assumed instead of Site Class B. The site coefficient for spectral response accelerations adjustment at short periods (F_a) is 1.4 (IBC Table 1613.2.2(1) and Section 1613.2.3). The site class effect for spectral response acceleration adjustment at 1-second periods (F_v) is 2.2 (IBC Table 1613.2.3(2)). The maximum

considered earthquake spectral response acceleration parameter for short period (S_{MS}) is 0.686g and for 1-second period (S_{M1}) is 0.366g. This corresponds to design spectral response acceleration parameters of 0.244g for short period (S_{DS}) and of 0.244g for 1-second period (S_{D1}). Refer to Appendix C.

It is emphasized that the above values are the minimum requirements intended to maintain public safety during strong ground shaking. These minimum requirements are meant to safeguard against loss of life and major structural failures. However, they are not intended to prevent damage or insure the functionality of the structure during and/or after a large seismic event.

In conclusion, seismic concerns for this site are not unlike other sites in the City of Elko area. However, due to the proximity of the site to a number of faults that are considered active, as noted above, strong seismic shaking should be anticipated during the life of any structures.

SITE CONDITIONS AND FIELD EXPLORATION

At the time of our investigation the lift station site had been previously graded with approximately three (3) feet of fill and currently is moderately vegetated with weeds and grass. The actual alignment of the force main was unknown at the time of this investigation. For convenience and accessibility, we performed our borings within the southern shoulder of the existing roadway (West Idaho Street). The area investigated along the roadway shoulder was graded and unpaved with 0-1.5' of roadway shoulder gravel (pulverized asphalt mixture). Fill was encountered below the pulverized asphalt mixture down to five (5) below existing grade (b.e.g.) in every boring along the roadway shoulder except borings 1, 3, and 6. Fill soils below the pulverized asphalt mixture consisted of clayey sands (SC) and lean clays (CL). The fill soils were underlain, primarily by, lean clays (CL) and clayey sands (SC). These soils were underlain by coarse grained sands and gravels. In boring 10, a silt (ML) layer was encountered beneath the coarse grained soils.

The current field investigation included a site reconnaissance and subsurface exploration. During the site reconnaissance, surface conditions were noted and the location of the exploratory borings were determined by using existing features at the site. Therefore, the approximate location of the explorations should be considered accurate only to the degree implied by the methods used.

One (1) exploratory boring was investigated with a CME 75 drill rig within the proposed lift station site to a to a maximum depth of forty-one and one-half (41.5) feet below-existing-grade. Eight (8) borings along the roadway shoulder of West Idaho Street were investigated to a maximum depth of sixteen and one-half (16.5) feet below-existing-grade. Boring 4 was not explored due to existing utility proximity to proposed exploration site. The locations of the exploratory borings are shown on Plate 2. The subsurface soils were continuously logged and visually classified in the field by our Geotechnical Engineer in accordance with the Unified Soil Classification System (USCS). Representative soil samples were collected at regular intervals within each exploration and subsequently

transported to our Carson City geotechnical laboratory for testing and additional analysis.

The subsurface soils encountered consisted generally of clays (CL and CL-ML), silts (ML), sands (SC, SC-SM, SP-SM and SW-SM) and gravel (GP) in varying arrangements. Groundwater was encountered in all borings at the time of our investigation. Seasonal fluctuations in the groundwater table should be anticipated and may impact construction.

At the lift station site the lean clay (CL) fill soils will require removal below structural areas. The site sandy silt clay soils (CL-ML) encountered in boring 10 at the lift station site have a moderate collapse potential and will require some mitigation. Scarification, moisture conditioning, and recompaction, as well as reduced bearing capacity are proposed and discussed later in this report.

FIELD AND LABORATORY TEST DATA

Laboratory tests performed on representative samples included sieve analysis (including fines), Atterberg limits, modified proctor, R-value, in situ moisture/density, hydro collapse potential, and soluble sulfate/pH/resistivity. Much of this data is displayed on the "logs" of the explorations to facilitate correlation. Field descriptions presented on the logs have been modified, where appropriate, to reflect laboratory test results. The logs of the borings are included in Appendix A of this report as Plates A-1 through A-10. A key to the logs is included as Plate A-11.

Individual laboratory test results are presented in Appendix B as Plates B-1 through B-6. Laboratory testing was performed per ASTM standards, except when test procedures are briefly described and no ASTM standard is specifically referenced in the report. Atterberg limits were determined using the dry method of preparation.

Analytical Testing: Silver State Analytical Laboratories, Reno, Nevada, conducted this testing. The testing included soluble sulfates, pH, and resistivity. Test results are included (on Silver State letterhead) in Plate B-6.

The soil samples obtained during this investigation will be held in our laboratory for 30 days from the date of this report. The samples may be retained longer at an additional cost to the client or obtained from this office upon request.

DISCUSSION AND RECOMMENDATIONS

General

The following recommendations are based upon the construction and our understanding and assumptions of the proposed improvements, as outlined in the introduction of this report, and based on our findings during the field exploration phase of this project. If changes in the construction project are proposed, they should be presented to Lumos & Associates, Inc. Geotechnical Department, so that the recommendations provided herein can be reviewed and modified as necessary. As a minimum, final construction drawings should be submitted to the Lumos Geotechnical Department for review prior to actual construction and verification that our geotechnical design recommendations have been implemented.

General Site Grading

Prior to placement of fill and/or the proposed improvements, the areas to receive fill and/or improvements shall be cleared and grubbed. Clearing and grubbing is anticipated to be as much as twelve (12) inches or more where thicker vegetation/roots are present.

Root- or organic-laden soils encountered during excavations, should be stockpiled in a designated area on site for later use in landscaping, or removed off site as directed by the owner. Excavated soils free from any organics, debris or otherwise unsuitable material and with particles no larger than four (4) inches in maximum dimension may be stockpiled and moisture conditioned for later use as compacted fill provided it meets the criteria for structural fill/trench backfill soils.

Exposed excavation surfaces to support any of the proposed improvements should be

observed and approved by a Lumos representative. Upon re-compaction and prior to placing any fill and/or base, the re-compacted surface should be proof-rolled to identify any possible yielding surfaces. Proof-rolling should be conducted with a heavy rubber-tire loader with a fully loaded bucket, or a fully loaded water truck, and observed and approved by a Lumos representative.

Unstable conditions due to yielding and/or pumping soils may be encountered on site. Additionally, the exposed soils may yield or pump under heavy equipment loads or where vibratory equipment draws up water. If yielding or pumping conditions are encountered, the soils should be scarified in place, allowed to dry as necessary and re-compacted, where applicable. Alternatively, unsuitable or saturated soil should be removed, the exposed surface leveled and compacted/tamped as much as practical without causing further pumping, and covered (including the sides) with geotextile stabilizing fabric (Mirafi HP370 or other equivalent). The fabric should then be covered with at least 12 inches of 4 to 8 inch **angular rock fill** with enough fines to fill the inter-rock pore spaces. Placement should be by end dumping. No traffic or other action should be allowed over the fabric, which may cause it to deflect/deform prior to cobble placement. Test sections should be used to determine the minimum thickness and/or number of layers required for stabilization.

Stabilization should be evaluated by proof-rolling standards commensurate with the equipment used, and approved by a Lumos representative. The placement of the stabilizing rock-fill may require additional over-excavation to maintain appropriate grading elevations. A filter fabric (Mirafi 180N or equal) should also be placed over the cobble rock fill to prevent piping of fines from covering soils into the stabilizing rock matrix.

Properly compacted structural fill and trench backfill soils to be used on site should consist of non-expansive materials [LL less than thirty-five (35) and/or a PI less than twelve (12) and/or Expansion Index less than twenty (20)], should be free of

contaminants, organics [less than three percent (3%)], rubble, or natural rock larger than four (4) inches in largest dimension and have a minimum R-Value of forty-five (45). All structural fill and trench backfill soils shall also be non-corrosive and have a water soluble sulfate content of less than one-tenth (0.1) percent. Structural fill and trench backfill soils shall also meet the following gradation requirements.

TABLE 1

STRUCTURAL FILL/TRENCH BACKFILL GRADATION

Sieve Size	% Passing
4″	100
¾″	70 - 100
#40	15 - 65
#200	5 - 35

Structural fill and trench backfill soils that do not meet the above requirements may be approved at the discretion of the Geotechnical Engineer. It is anticipated that the sands (SC-SM, SP-SM, and SW-SM) and gravel (GP) encountered during the exploration will be suitable for reuse as structural fill and trench backfill. For the purpose of this report we will define fine grained soils as having greater than thirty-five percent (35%) material finer that the #200 sieve. Fine grained soils are relatively weak. The fine grained clays (CL and CL-ML), silts (ML), and clayey sands (SC) encountered during the investigation do not meet the requirements for structural fill/trench backfill and should be removed completely from within one (1) foot vertically and laterally from structural sections and a minimum of one (1) foot below and laterally any foundations. These fine grained soils may be used as trench backfill provided they are separated from within one (1) foot vertically and laterally from structural sections by material meeting the requirements of structural fill/trench backfill defined in this section. Undocumented fill shall be completely removed from below foundations and pavement structural section, however,

it may be replaced provided it meets the structural fill/trench backfill criteria noted above. Import structural fill and trench backfill soils should be tested and approved prior to being placed or delivered on-site (**seven day advanced notice**).

Prior to placement of structural fill, the site subgrade shall be scarified to a depth of twelve (12) inches, moisture conditioned to within two percent (2%) of optimum, and recompacted to a minimum of ninety percent (90%) as determined by the ASTM D1557 Standard.

Structural fill and trench backfill should be placed only on compacted sub-grade or on compacted fill in loose lifts not exceeding eight (8) inches, moisture conditioned to within two percent (2%) of optimum, and compacted to at least **ninety percent (90%)** relative compaction as determined by the ASTM D1557 Standard. Lift thickness may be increased, at the discretion of the Geotechnical Engineer, provided the contractor can demonstrate that adequate compaction is being achieved.

Fill material should not be placed, spread or compacted while the ground is frozen or during unfavorable weather conditions. When site grading is interrupted by heavy rain or snow, grading or filling operations should not resume until a Lumos representative approves the moisture content and density conditions of the subgrade or previously placed fill. When fill is placed on existing slopes steeper than 5:1, the existing slope shall be horizontally benched.

Landscape areas should be cleared of all objectionable material. In cut areas, no other work is necessary except grading to proper elevation. In landscape areas, fill should be placed in loose lifts not exceeding eight inches and compacted to at least ninety percent (90%) relative compaction to prevent erosion.

Water should not be allowed to pond on pavements or adjacent to structures, and measures should be taken to reduce surface water infiltration into the subgrade soils. A

representative of Lumos should be present during site grading operations to ensure any unforeseen or concealed conditions within the site are identified and properly mitigated, and to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction and is dependent upon compaction and stability of the subgrade soils. The soils engineer may reject any material that does not meet engineering characteristics, compaction, and stability requirements. Further, recommendations of this report are based upon the assumption that earthwork construction will conform to recommendations set forth in this section of the report.

FOUNDATION DESIGN CRITERIA

Conventional spread footings founded on a minimum of twelve (12) inches of properly prepared structural fill, as discussed earlier in the report, may be used to support the proposed foundations within the lift station site.

Spread footings: Footings should have a minimum embedment of 30 inches below lowest adjacent grade for frost protection. Footings founded on a minimum of twelve (12) inches properly prepared structural fill may be designed for a net allowable bearing pressure of 1,500 pounds-per-square-foot (psf).

Footing Settlements: The maximum anticipated settlement for continuous spread footings bearing on properly prepared structural fill (as discussed above and documented by Lumos) over properly prepared native subgrade soils, and designed for a 1,500 psf bearing pressure, is estimated to be one (1) inch or less. Differential settlements are generally expected to be half of the total settlements.

Lateral Loading: Resistance to lateral loads can be provided by friction acting at the base of conventional foundations and by passive earth resistance. A coefficient of friction of 0.4 may be assumed at the base of footings founded on a minimum of twelve (12) inches of properly prepared structural fill (as discussed above and documented by Lumos). An allowable passive earth resistance of 200 psf per foot of depth starting six (6) inches below lowest adjacent grade may be used for the sides of footings poured against properly compacted structural fill. Passive resistance should not exceed 1,500 psf. The at-rest pressure can be calculated utilizing an equivalent fluid pressure of 70 pcf.

Dynamic Factors: Vertical and lateral bearing values indicated above are for total dead load and frequently applied live loads. If normal code requirements are applied for design, the above vertical bearing values and passive resistance for conventional foundations may be increased by thirty three percent (33%) for short duration loading due to wind or seismic

forces. The additional dynamic lateral earth pressure can be calculated utilizing the following:

Dynamic Lateral Force = $23H^2$ (non-yielding walls)

Dynamic Lateral Force = $9H^2$ (yielding walls)

This force should be assumed to act at a height of 0.6H above the bottom of the wall.

RETAINING WALLS

Retaining structures over four (4) feet in height, if used, will require local code compliance and shall be engineered based on parameters described in this section of the report. Retaining structures should be designed to resist the appropriate lateral earth pressures. Cantilevered walls, which are able to deflect at least 0.01 radians, can be designed using an equivalent fluid (backfill) unit weight of 45 pounds-per-cubic-foot (pcf). However, if the wall is fixed against rotation, the wall should be designed using an equivalent fluid (backfill) unit weight of 70 pcf. These design parameters are based upon the assumption that walls will retain only level backfill and no hydrostatic pressure will be present. Any other surcharge pressures (such as sloped backfill) should be added to the above recommended lateral earth pressures. Retaining walls should be backfilled with free draining granular material that extends vertically to the bottom of the stem and laterally at least six (6) inches beyond the face of the stem (wall) and wrapped with a Mirafi 180 N or equivalent non-woven filter fabric. Weep holes should be provided on the walls at regular intervals, or a slotted drainpipe placed at the bottom of the wall (bottom of granular material) to relieve any possible build-up of hydrostatic pressure. Backfill material within two (2) feet of the wall should be compacted with hand-held equipment only, to at least ninety percent (90%) of the maximum ASTM D1557 standard. A brow ditch shall be constructed in the pre-retained earth parallel to the retaining wall to divert surface runoff.

CONCRETE SLAB DESIGN

Interior concrete slabs should be underlain with at least six (6) inches of Type 2, Class B Aggregate Base, compacted to a minimum of ninety-five percent (95%) and supported on a minimum of twelve (12) inches of properly compacted structural fill as recommended previously. We recommend the aggregate base be placed after utility trenches are excavated and backfilled. A vapor barrier should be provided for all interior concrete slabs where floor moisture is undesirable. The vapor barrier should be a synthetic plastic sheeting at least ten (10) mils thick and meet the requirements of ASTM E1745 for Class A vapor retarder materials. The vapor barrier shall be installed per the manufacturer's recommendations.

Slab thickness design should be based on a Modulus of Subgrade Reaction equal to two hundred (200) pounds-per-cubic-inch (pci) for construction on a minimum of twelve (12) inches of properly compacted structural fill as recommended previously. Reinforcement of concrete slabs should be as specified by the Project Structural Engineer.

Exterior concrete slabs on grade should be underlain with at least six (6) inches of Type 2, Class B aggregate base and on a minimum of twelve (12) inches of properly compacted structural fill as recommended previously. All subgrade and fill should be prepared and placed as described in the grading section of this report, while the aggregate base material should be compacted to at least ninety-five percent (95%) relative compaction as determined by the ASTM D1557 standard.

PAVEMENT DESIGN

Areas to be paved shall be scarified in place to a depth of at least 12 inches, moisture conditioned to within two percent (2%) of optimum, and compacted to at least ninety percent (90%) of the laboratory maximum dry density determined by the ASTM D1557 standard. We understand the sewer main will be constructed utilizing jack and bore techniques to pass under West Idaho Street and, therefore, no pavement patching recommendations are given. Pavement structural sections for the lift station parking lot utilizing an R-value of 20 (laboratory test results) are provided in Table 2, "Recommended Asphalt Pavement Sections". A Traffic Index (TI) value of 5 was assumed for areas to receive car traffic and a TI of 6 was assumed for areas to receive truck traffic. Aggregate base should consist of Type II, Class B material and meet the requirements of the Standard Specifications for Public Works Construction (SPPWC). Aggregate base material should be compacted to at least ninety-five percent (95%) of the laboratory maximum density, as determined by the ASTM D1557 standard.

TABLE 2
RECOMMENDED LIFT STATION PARKING LOT ASPHALT PAVEMENT SECTIONS

	Minimum Asphalt Pavement (inches)	Minimum Aggregate Base (inches)	Properly Compacted Structural Fill (inches)
Car Traffic TI = 5	3	4	12
Truck Traffic TI = 6	4	6	12

Calculations Included in Appendix D.

In all areas of the project, the asphalt concrete mix design should be 50 blow Marshall mix with PG64-28NV with four percent (4%) air voids and Type III asphalt aggregate per the standard specification. Asphalt concrete, in any case, should be compacted to

between ninety-three percent (92%) and ninety-eight percent (98%) of the Rice theoretical maximum density. A mix design shall be submitted to the Geotechnical Engineer for review and **approval seven (7) days prior to paving**.

CORROSION AND CHEMICAL ATTACK

Four (4) representative site soils samples were tested and all have a negligible water soluble sulfate content of less the 0.01%. However, Type II cement is recommended for concrete in direct contact with site soils.

All exterior concrete should have between 4.5 and 7.5 percent entrained air, a maximum water-cement ratio of 0.45, and comply with all other ACI recommendations for concrete placed in areas subject to freezing. A minimum compression strength of 4,000 psi is recommended for all external concrete.

Native soils from boring 3 at 6' had a pH of 9.41 and a resistivity of 1800 ohm-cm under saturated conditions. This indicates a highly corrosive potential for ferrous metals in contact with these soils. Native soils from boring 6 at 10.5' had a pH of 8.33 and a resistivity of 2500 ohm-cm under saturated conditions. This indicates a highly corrosive potential for ferrous metals in contact with these soils. Native soils from boring 9 at 6.5' had a pH of 9.41 and a resistivity of 820 ohm-cm under saturated conditions. This indicates an extremely corrosive potential for ferrous metals in contact with these soils. Native soils from boring 10 at 11' had a pH of 9.01 and a resistivity of 680 ohm-cm under saturated conditions. This indicates an extremely corrosive potential for ferrous metals in contact with these soils. Corrosion mitigation measures, such as protective coatings, wrappings, and cathodic protection are therefore recommended. If protective coatings are used, the type and quantity will depend on the kind of steel and specific construction application. Steel and wire concrete reinforcement cover of at least three (3) inches where cast against soil, unformed, is recommended.

UTILITY EXCAVATIONS

On-site soils are anticipated to be excavatable with conventional construction equipment. Compliance with OSHA regulations should be enforced for Type C soils. Native coarse grained sands (SC-SM, SW-SM, and SP-SM) and gravel (GP) as define as having less than thirty-five percent (35%) pass the #200 sieve may be suitable for backfill of utility trenches, provided soils meet the requirements of structural fill/trench backfill as mentioned earlier in this report. The native fine grained silt (ML), Clays (CL and CL-ML) and clayey sand (SC) with more than thirty-five percent (35%) passing the #200 may be utilized as trench backfill provided they are separated from any structural improvements by at least one (1) foot of material meeting the criteria of structural fill/trench backfill outline earlier in this report. Structural fill/trench backfill shall be moisture conditioned, placed and compacted as previously discussed in the grading and filling section. On-site soils encountered during our field exploration do not meet the minimum requirements for bedding sand (Class A Backfill). Therefore, import of Class A Bedding materials should be anticipated. Bedding sand shall be placed in eight (8) inch maximum loose lifts and compacted to a minimum of ninety percent (90%) of the ASTM D1557 Standard. Groundwater was encountered in all borings during our field investigation. Where groundwater is encountered we recommend "burrito wrapped" Class C Drain Rock be utilized as bedding to an elevation of at least one (1) foot above groundwater. Class C material shall meet the requirements in the Standard Specifications. The Class C Drain Rock shall be placed in one (1) foot lifts and compacted with a vibra plate to the satisfaction of the geotechnical engineer.

MOISTURE PROTECTION, EROSION AND DRAINAGE

The finish surfaces around all structures should slope away from the foundations and toward appropriate drop inlets or other surface drainage devices. It is recommended that within ten feet of any structure a minimum slope of five percent (5%) be used for soil subgrade and a minimum of one percent (1%) be used for pavement. These grades should be maintained for the life of the structures.

CONSTRUCTION SPECIFICATIONS

All work shall be governed by the Standard Specifications and Standard Details for Public Works Construction (SSPWC), as distributed by City of Elko Public Works, except as modified herein.

LIMITATIONS

This report has been prepared in accordance with the currently accepted engineering practices in Northern Nevada and Northern California. The analysis and recommendations in this report are based upon exploration performed at the locations shown on the site plan, the proposed improvements as described in the Introduction section of this report and upon the property in its condition as of the date of this report. Lumos makes no guarantee as to the continuity of conditions as subsurface variations may occur between or beyond exploration points and over time. Any subsurface variations encountered during construction should be immediately reported to Lumos so that, if necessary, Lumos' recommendations may be modified.

This report has been prepared for and provided directly to City of Elko Public Works ("The Client"), and any and all use of this report is expressly limited to the exclusive use of the Client. The Client is responsible for determining who, if anyone, shall be provided this report, including any designers and subcontractors whose work is related to this project. Should the Client decide to provide this report to any other individual or entity, Lumos shall not be held liable for any use by those individuals or entities to whom this report is provided. The Client agrees to indemnify, defend and hold harmless Lumos, its agents and employees from any claims resulting from unauthorized users.

If this report is utilized in the preparation of an Engineer's Estimate of Probable Construction Costs, then the preparer of the estimate acknowledges that the report recommendations are based on the subsurface conditions found at the specific locations investigated on site; that subsurface conditions may vary outside these locations; and that no guaranty or warranty, express or implied, is made that the conditions encountered are representative of the entire site. The preparer of the estimate agrees to indemnify, defend and hold harmless Lumos & Associates, its agents and employees from any and all claims, causes of action or liability arising from any claims resulting

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This report is not intended for, nor should be utilized for, bidding purposes. If it is utilized for bidding purposes, Client acknowledges that the report recommendations are based on the subsurface conditions found at the specific locations investigated on site; that subsurface conditions may vary outside these locations; and that no guaranty or warranty, express or implied, is made that the conditions encountered are representative of the entire site. The Client agrees to indemnify, defend and hold harmless Lumos & Associates, Inc., its agents and employees from any and all claims, causes or action or liability arising from any claims resulting from the use of the report for bidding purposes.

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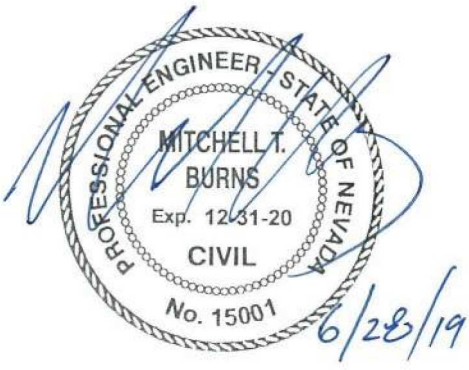

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References

American Society for Testing and Materials (ASTM), 2016, Annual Book of ASTM Standards, West Conshohoken

Crafford, A. Elizabeth Jones, Geologic Terrane map of Nevada, Plate 1 of 1, 2010, Nevada Bureau of Mines and Geology, Washoe County, Nevada

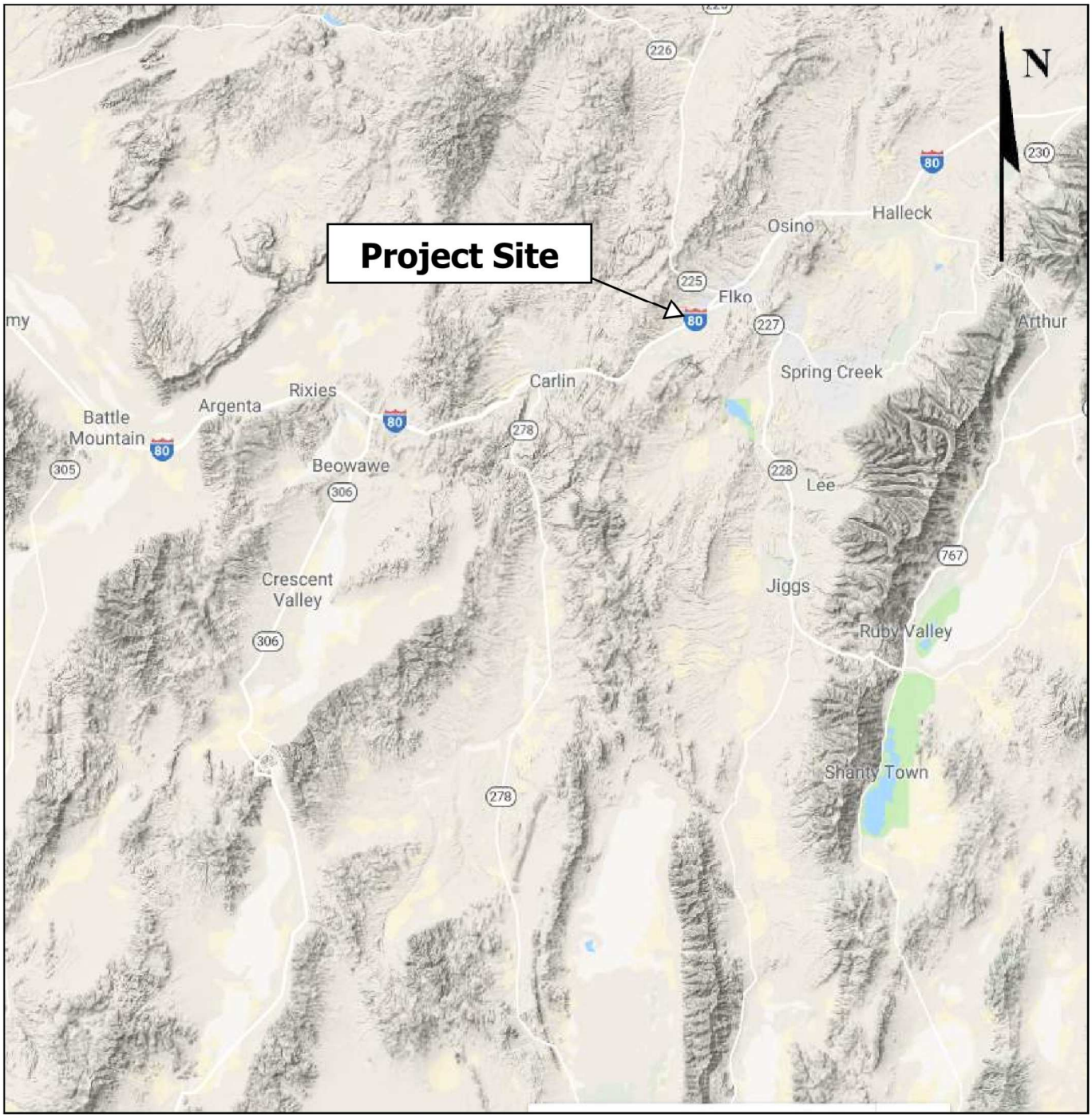
Naval Facilities Engineering Command, 1986, Design Manual 7.01

Naval Facilities Engineering Command, 1986, Design Manual 7.02

Occupational Safety and Health Administration (OSHA), 1995, Occupational Safety and Health Standards for the Construction Industry, Commerce Clearing House, Inc.

Standard Specifications for Public Works Construction, "Orange Book", Elko County, NV

Quaternary Faults on Nevada
https://gisweb.unr.edu/QuaternaryFaults/



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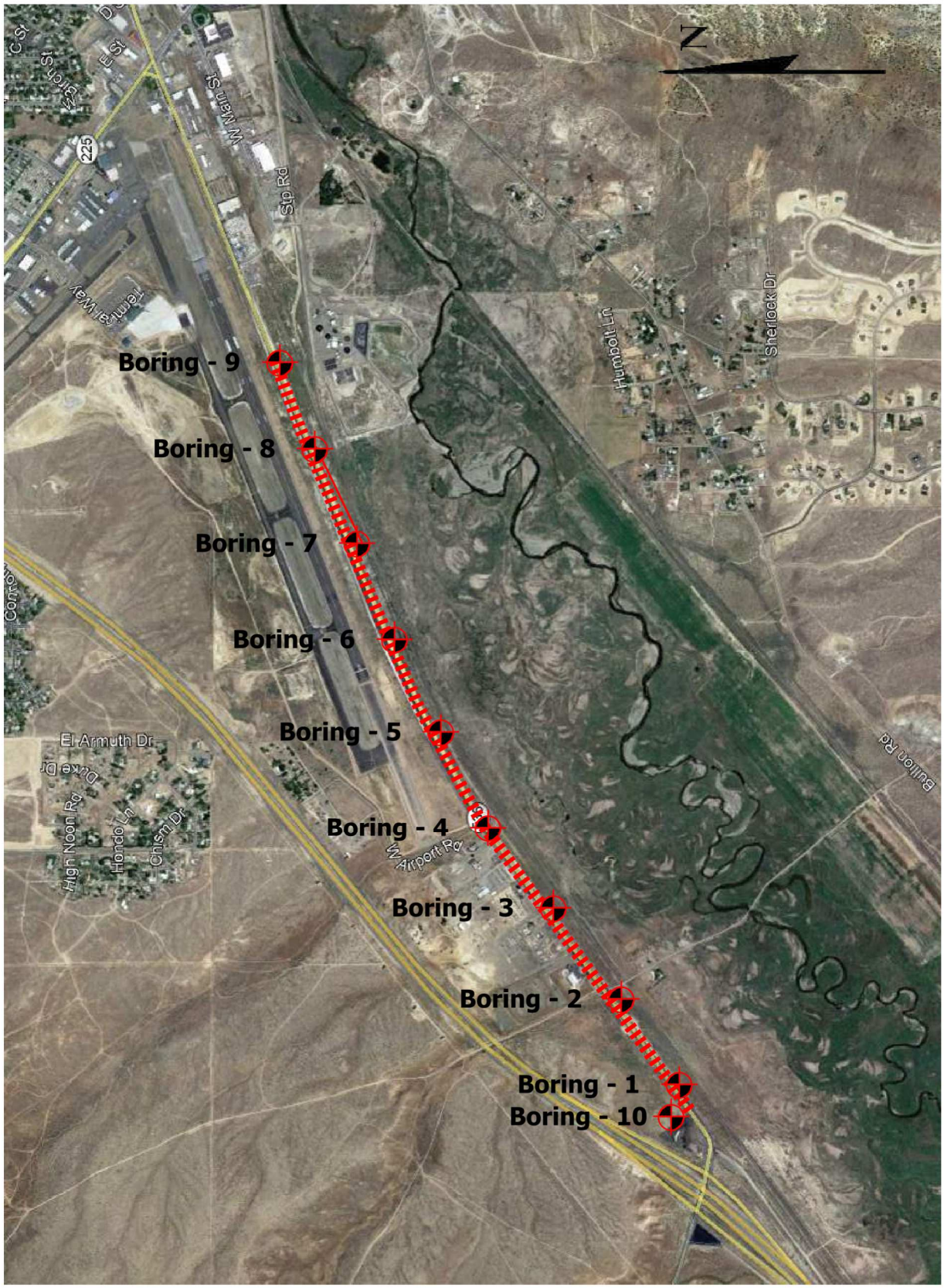
VICINITY MAP

Job Number: 9718.000

Date: June 2019

PLATE

1



Approximate Boring Locations: ⊕ Project Site: ▮▮▮▮▮▮

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SITE MAP

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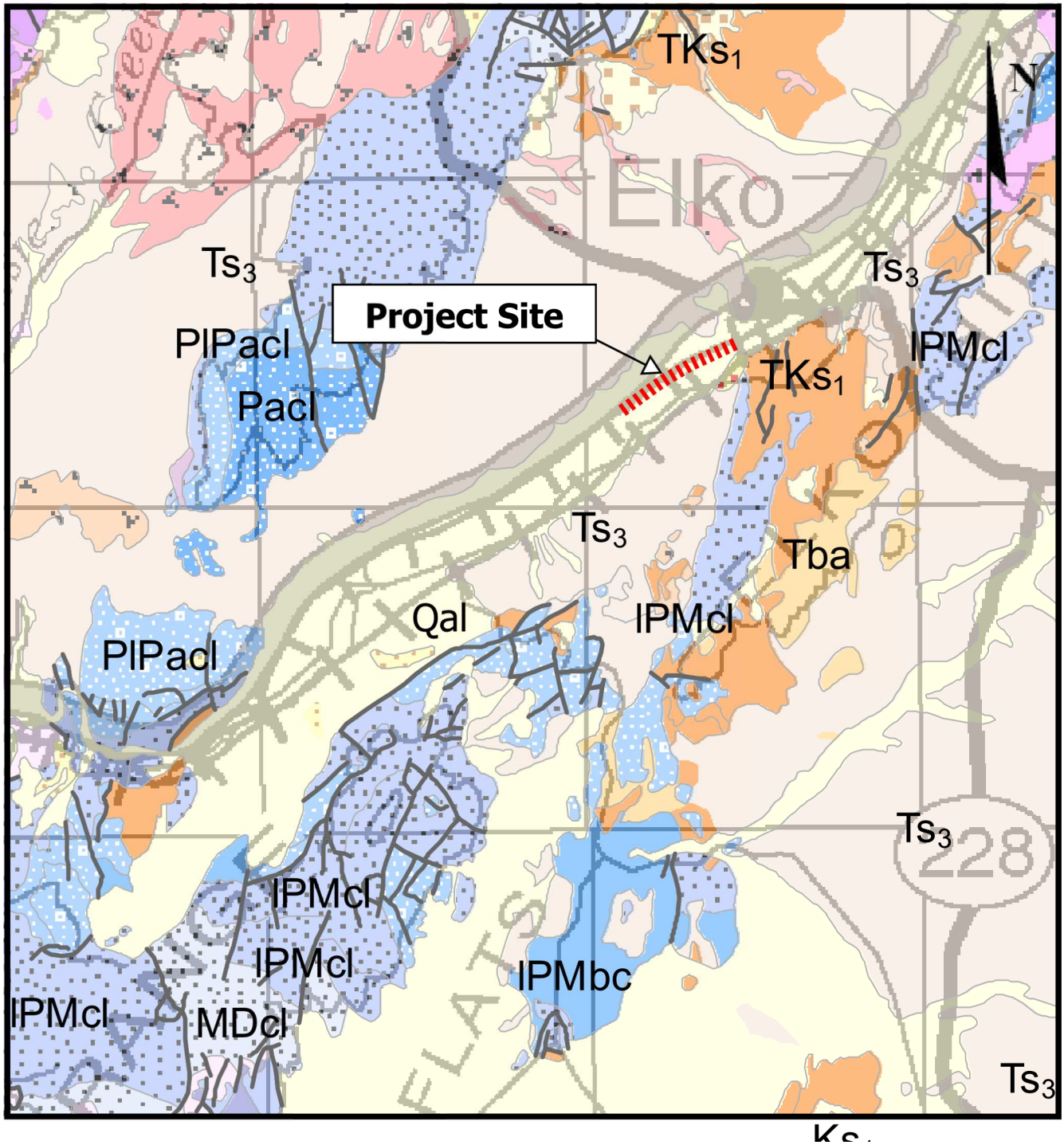
PLATE

2



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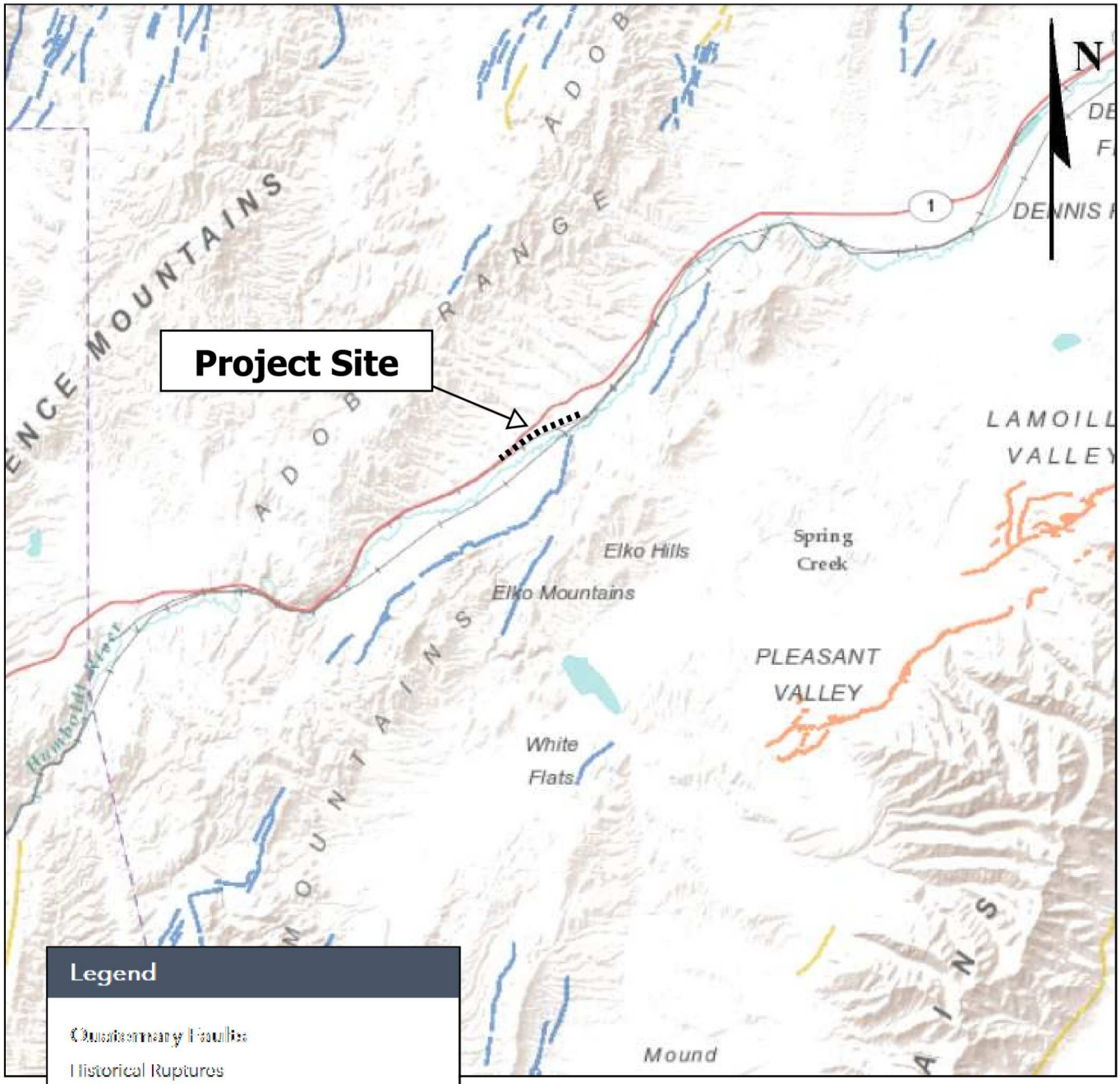
GEOLOGIC MAP

Job Number: 9718.000 Date: June 2019

PLATE

3



Project Site: .....

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FAULT MAP

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PLATE

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APPENDIX A

LUMOS & ASSOCIATES

Sheet 1 of 1

BOREHOLE No. 01

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**

Total Depth: **16.5 feet**
Water Depth: **5.5 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
			Fill, Pulverized Asphalt, Sandy LEAN CLAY (CL) Slighty Moist and Stiff.				25	8	12.5	28.4	59.1		
			1.5										
		B	**Reddish Brown Sandy LEAN CLAY (CL)** Moist to Wet and Medium Stiff. Estimated Trace Subrounded Gravel to 1/2", 20% Medium to Fine Sand, and 80% Moderatley Plastic Clay.										
5			Ground Water Level Rose to 5.5' B.E.G.	11*									
10			Becomes Stiff.	15*									
15			Ground Water at 15' B.E.G. No Sample Recovery.	20*									
			16.5										

Boring terminated at 16.5 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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LOG OF EXPLORATORY BORING

Job Number: 9718.000

Date: June 2019

PLATE

A-1

Sheet 1 of 1

BOREHOLE No. 02

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**

Total Depth: **16.5 feet**
Water Depth: **15 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
		B	**Fill, Reddish Brown Sandy LEAN CLAY (CL)** **Pulverized Asphlt Near the Suface.** Moist and Hard. Estimated Trace Subrounded Cobble to 6", Trace Subrounded Gravel to 3", 20% Medium to Fine Sand, and 80% Moderatley Plastic Clay.										
5			5.0 **Reddish Brown Clayey SAND (SC)** Moist to Wet and Dense.	28*									
10			Becomes Loose.	9*	15.2	108.0	31	16	12.3	43.9	43.7		
15			16.5	9*									

Boring terminated at 16.5 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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LOG OF EXPLORATORY BORING

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PLATE
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Sheet 1 of 1

BOREHOLE No. 03

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**

Total Depth: **16.5 feet**
Water Depth: **10 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
0			**Reddish/Medium Brown Sandy LEAN CLAY (CL)** Moist and Stiff. Estimated Trace Subrounded Gravel to 1/2", 20% Medium to Fine Sand, and 80% Moderately Plastic Clay. Very Easy Drilling to 5'.										
5				12*									
10			10.0 Groundwater at 10' B.E.G. No Sample Recovery.	7*									
15			**Dark Brown, Well-Graded SAND with Silt and Gravel (SW-SM)** Wet and Loose. Becomes Very Dense.										
			16.5	56*	11.1	114.7	NP	NP	39.5	53.9	6.5		

Boring terminated at 16.5 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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LOG OF EXPLORATORY BORING

Job Number: 9718.000

Date: June 2019

PLATE

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Sheet 1 of 1

BOREHOLE No. 04

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**

Total Depth: **0 feet**
Water Depth: **No groundwater encountered**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
			Utility Conflict - Location Not Explored										

Boring terminated at 0 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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Job Number: 9718.000
Date: June 2019

PLATE
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Sheet 1 of 1

BOREHOLE No. 05

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**

Total Depth: **16.5 feet**
Water Depth: **7.5 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
		B	**Fill, Medium Brown Silty, Clayey SAND with Gravel (SC-SM)** Silghtly Moist and Dense.		5.6		26	8	37.7	39.5	22.8		
5			5.0										
			Medium/Dark Brown Sandy LEAN CLAY (CL) Moist to Wet and Very Stiff. Estimated 20% Medium to Fine Sand and 80% Moderately Plastic Clay.	26*									
			Water Table at 7.5' B.E.G.										
10			Becomes Medium Stiff and Percent Sand Increases.	9*									
15			16.0										
			Grey, Well-Graded SAND with Silt and Gravel (SW-SM) Wet and Dense. Estimated 30% Subrounded Gravel to 1/2", 60% Coarse to Fine Sand, and 10% Non-Plastic Silt.	25*									
			16.5										

Boring terminated at 16.5 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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Job Number: 9718.000
Date: June 2019

PLATE
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Sheet 1 of 1

BOREHOLE No. 06

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**

Total Depth: **16 feet**
Water Depth: **6 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
0	**Reddish Brown Sandy LEAN CLAY (CL)** Wet and Soft. Estimated Trace Gravel to 1/2", 20% Medium to Fine Sand, and 80% Moderately Plastic Lean Clay.										
5	Water Table at 6' B.E.G. No Sample Recovery. Color Change to Dark Brown and Incerease in Percent Sand.	6*									
10		18*									
11.3	**Grey Poorly GRADED SAND (SP)** Wet and Medium Dense. Estimated 95% Coarse to Fine Sand and 5% Non-Plastic Silt.										
15	Heaving Sands 5' of heave at 15' Depth B.E.G. Becomes Very Dense.	100+ * **									
16.5											

Boring terminated at 16 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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LOG OF EXPLORATORY BORING

Job Number: 9718.000
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Sheet 1 of 1

BOREHOLE No. 07

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**
Total Depth: **16.5 feet**
Water Depth: **5 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
			Fill, Pulverized Asphalt, Sandy LEAN CLAY (CL) Slighty Moist and Stiff.										
			1.5										
		B	**Fill, Medium Brown Clayey SAND (SC)** Moist to Wet and Loose. Estimated 25% Subrounded Gravel to 1", 50% Coarse to Fine Sand, and 25% Moderately Plastic Clay.										
5			Water table at 5' B.E.G.										
			6.0										
			Brown Sandy LEAN CLAY Wet and Medium Stiff. Estimated 20% Medium to Fine Sand and 80% Moderately Plastic Lean Clay.	11*									
10			11.5	7*									
			Grey Brown POORLY-GRADED GRAVEL with Sand (GP) Wet and Loose.										
15			Becomes Very Dense.				NP	NP	53.8	43.3	2.9		
			16.5	37*									

Boring terminated at 16.5 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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LOG OF EXPLORATORY BORING

Job Number: 9718.000
Date: June 2019

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Sheet 1 of 1

BOREHOLE No. 08

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**

Total Depth: **16.5 feet**
Water Depth: **6 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
			Fill, Pulverized Asphalt, Sandy LEAN CLAY (CL) Slighty Moist and Stiff. 1.5										
		B	**Fill, Medium Brown Clayey SAND with Gravel(SC)** Moist and Medium Dense. Estimated 25% Subrounded Gravel to 2", 50% Coarse to Fine Sand, and 25% Moderately Plastic Lean Clay. 5.0										
5			**Brown Sandy LEAN CLAY (CL)** Moist to Wet and Very Stiff. Water Table at 6' B.E.G. Boring Heaved from 10' to 7' B.E.G. 10.0	24*	27.0	91.1	33	10	0.8	23.7	75.5		
10			**Grey Brown POORLY-GRADED SAND with Gravel (SP)** Wet and Loose. Estimated 30% Subrounded Gravel to 1", 70% Coarse to Fine Sand, and Trace Non-Plastic Silt.	6*									
15			No Sample Recovery. Becomes Very Dense. 16.5	100+ *									

Boring terminated at 16.5 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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LOG OF EXPLORATORY BORING

Job Number: 9718.000
Date: June 2019

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Sheet 1 of 1

BOREHOLE No. 09

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**

Total Depth: **16.5 feet**
Water Depth: **8 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
			Fill, Pulverized Asphalt, Sandy LEAN CLAY (CL) Slighty Moist and Stiff.										
			1.5										
		B	**Fill, Medium Brown Clayey SAND with Gravel(SC)** Moist and Medium Dense. Estimated 25% Subrounded Gravel to 2", 50% Coarse to Fine Sand, and 25% Moderately Plastic Lean Clay.										
5			6.0										
			Reddish Brown Sandy LEAN CLAY (CL) Moist to Wet and Medium Stiff. Estimated 40% Medium to Fine Sand and 60% Moderately Plastic Lean Clay.	9*									
			▼ Water Table Rose from 13' to 8' B.E.G.										
10			Becomes Cemented and very Stiff.	35*									
			13.0										
			Grey POORLY-GRADED GRAVEL (GP) Wet and Very Dense. 50% Subrounded Gravel to 2", 50% Coarse to Fine Sand, and Trace Non-Plastic Silt. Water Table at 13'.										
15			16.5	73*									
			Boring terminated at 16.5 feet. Boring backfilled with excavated soils without compaction verification *Blows/Foot - Modified California Sampler										

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LOG OF EXPLORATORY BORING

Job Number: 9718.000

Date: June 2019

PLATE

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Sheet 1 of 1

BOREHOLE No. 10

Logged By: **P. McCreary**
Date Logged: **6-3-19**
Drill Type: **CME 75**
Total Depth: **41.5 feet**
Water Depth: **15 feet ±**
Ground Elev.: **EXISTING**

Ziplock Sample | Standard Split Spoon (SPT) | Cuttings Sample | Modified California | Bag Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	Blows/Foot	Moisture Content, %	Dry Unit Weight, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	R-Value
			Fill, Brown Sandy LEAN CLAY (CL) Moist and Stiff. Estimated Trace Gravel to 11", 20% Medium to Fine Sand, and 80% Moderately Plastic Lean Clay. 3.0										
5			**Reddish Brown Sandy Silty CLAY (CL-ML)** Moist and Stiff.	24*	17.0	102.7	25	6	3.7	39.7	56.6	12	20
				18*									
10				15*									
				25*									
15			▼ Hole Heave From 15' to 14' B.E.G. 15.0 Perched Water Table Encountered at 15' to 25' B.E.G. No Sample Recovery.	22*									
20			**Grey POORLY-GRADED SAND with Silt (SP-SM)** Wet and Medium Dense to Very Dense.	50			NP	NP	0.2	92.9	6.9		
25			25.0 **Reddish Brown Sandy Silt (ML)** Moist and Hard.	36									
30				36			30	5	0.7	49.1	50.2		
35				26									
40			41.5	50									

Boring terminated at 41.5 feet.
Boring backfilled with excavated soils without compaction verification
*Blows/Foot - Modified California Sampler

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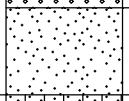
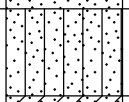
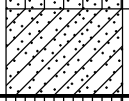
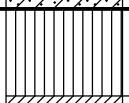
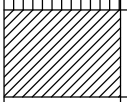
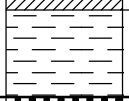
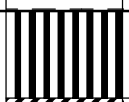
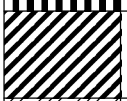
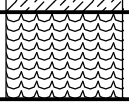
LOG OF EXPLORATORY BORING

Job Number: 9718.000
Date: June 2019

PLATE
A-10

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Other Tests

AN	ANALYTICAL TEST (pH, Soluble Sulfate, and Resistivity)
C	CONSOLIDATION TEST
DS	DIRECT SHEAR TEST
MD	MOISTURE DENSITY CURVE

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LEGEND

Job Number: 9718.000

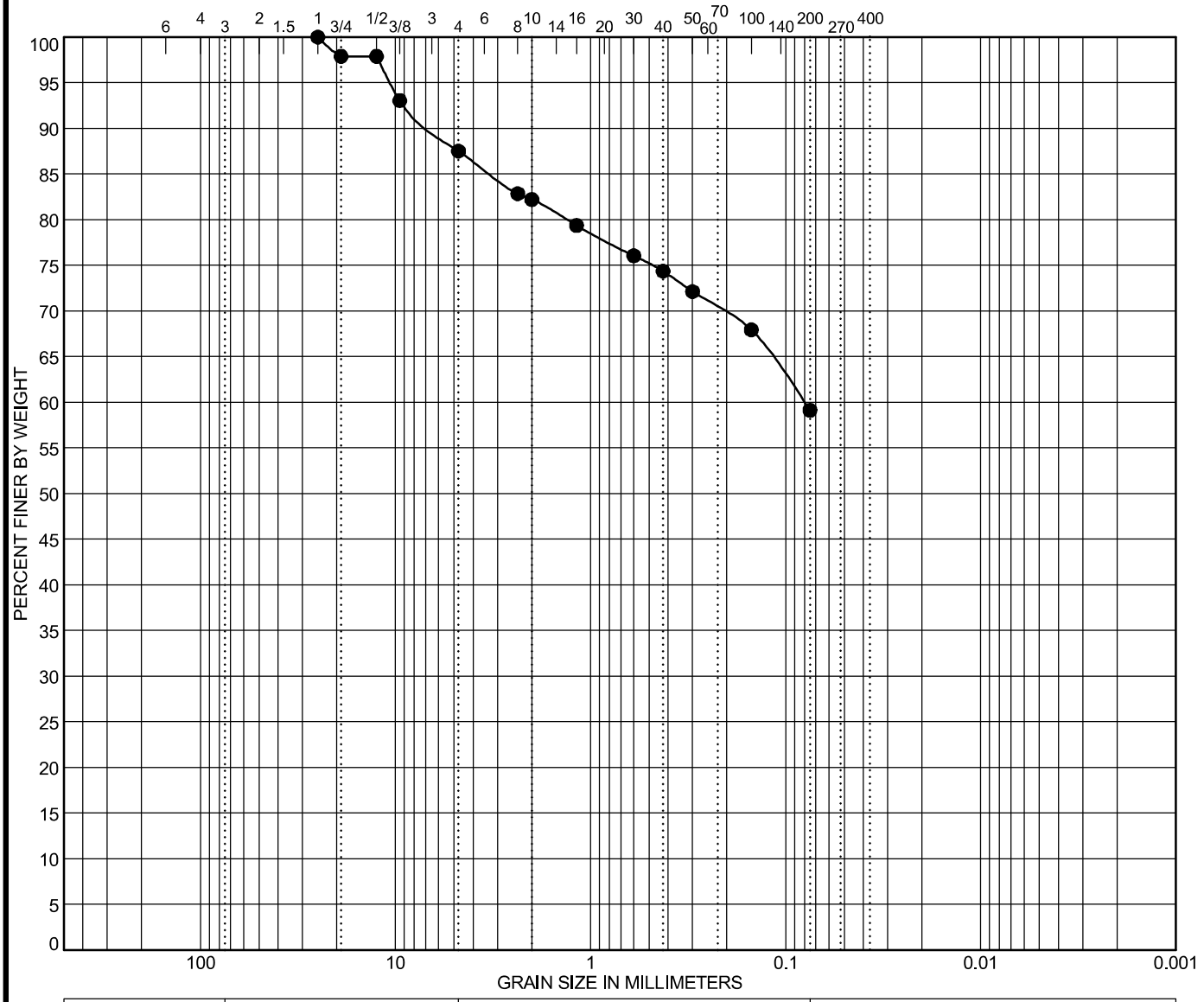
Date: June 2019

PLATE

A-11

APPENDIX B

LUMOS & ASSOCIATES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-2019						
●	**01**	Classification	LL	PL	PI	Cc	Cu	
	Depth: 0	Sandy LEAN CLAY (CL)	25	16	9			
	Sample Location	B-1 at 0-1.5'						
	USCS	CL						
	AASHTO							

	Specimen Identification								
●	**01**	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	Depth: 0	25	0.08			12.5	28.4	59.1	

Natural Moisture	9.9 %		**S.E.**		**Absorption %**	
R-Value			**Durability Index**		**Soundness**	
Perctage of Wear (500 rev)	%		**Specific Gravity**		**Direct Shear**	

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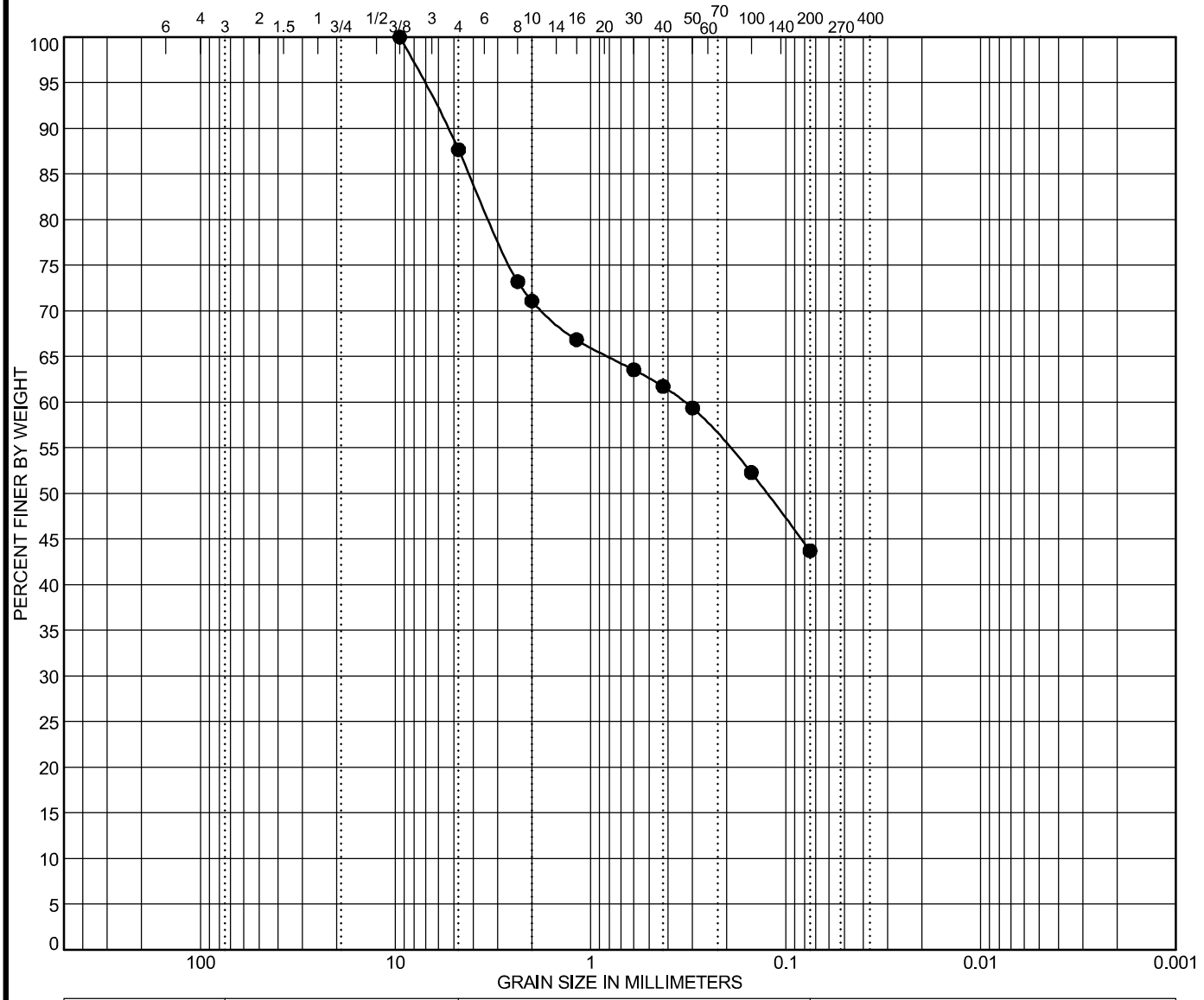
GRAIN SIZE DISTRIBUTION

Job Number: 9718.000 Date: June 2019

PLATE

B-1.1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-19	LL	PL	PI	Cc	Cu
●	**02**	Classification					
	Depth: 11	Clayey SAND (SC)	31	15	16		
	Sample Location	B-2 at 11-11.5'					
	USCS	SC					
	AASHTO						

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**02**								
	Depth: 11	9.5	0.33			12.3	43.9	43.7	

Natural Moisture	15.2 %		**S.E.**		**Absorption %**		
R-Value			**Durability Index**		**Soundness**		
Perctage of Wear (500 rev)	%		**Specific Gravity**		**Direct Shear**		

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GRAIN SIZE DISTRIBUTION

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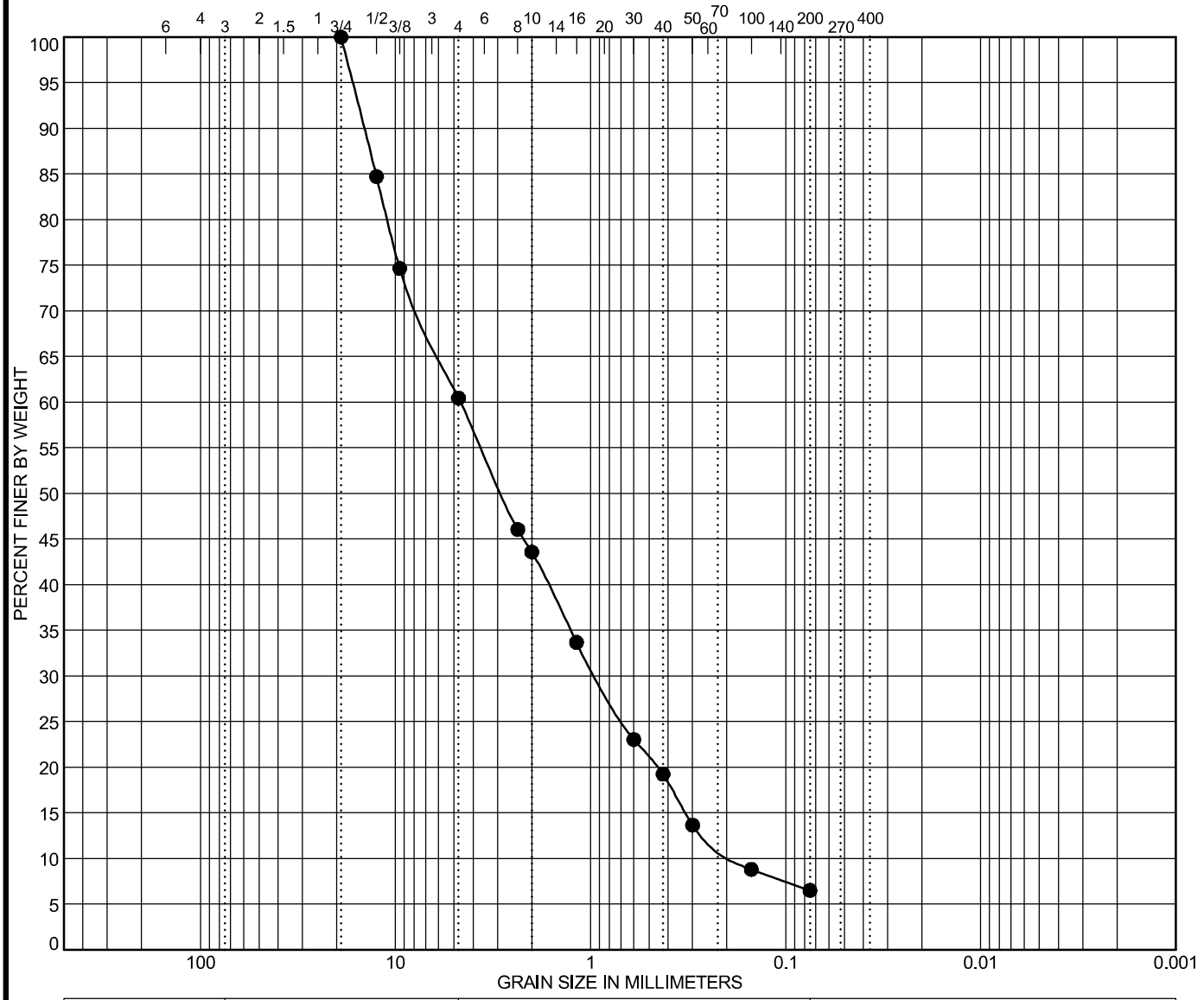
PLATE

B-1.2

LUMOS_GRAIN_SIZE_GINT 9718.GPJ US_LAB.GDT 6/28/19



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-19					
●	**03**	Classification	LL	PL	PI	Cc	Cu
	Depth: 16	WELL- GRADED SAND with Silt and Gravel (SW-SM)	NP	NP	NP	1.1	26.1
	Sample Location	B-3 at 16-16.5'					
	USCS	SW-SM					
	AASHTO						

	Specimen Identification								
●	**03**	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	Depth: 16	19	4.646	0.934	0.178	39.5	53.9	6.5	
	Natural Moisture	11.1 %		**S.E.**		**Absorption %**			
	R-Value			**Durability Index**		**Soundness**			
	Perctage of Wear (500 rev)	%		**Specific Gravity**		**Direct Shear**			

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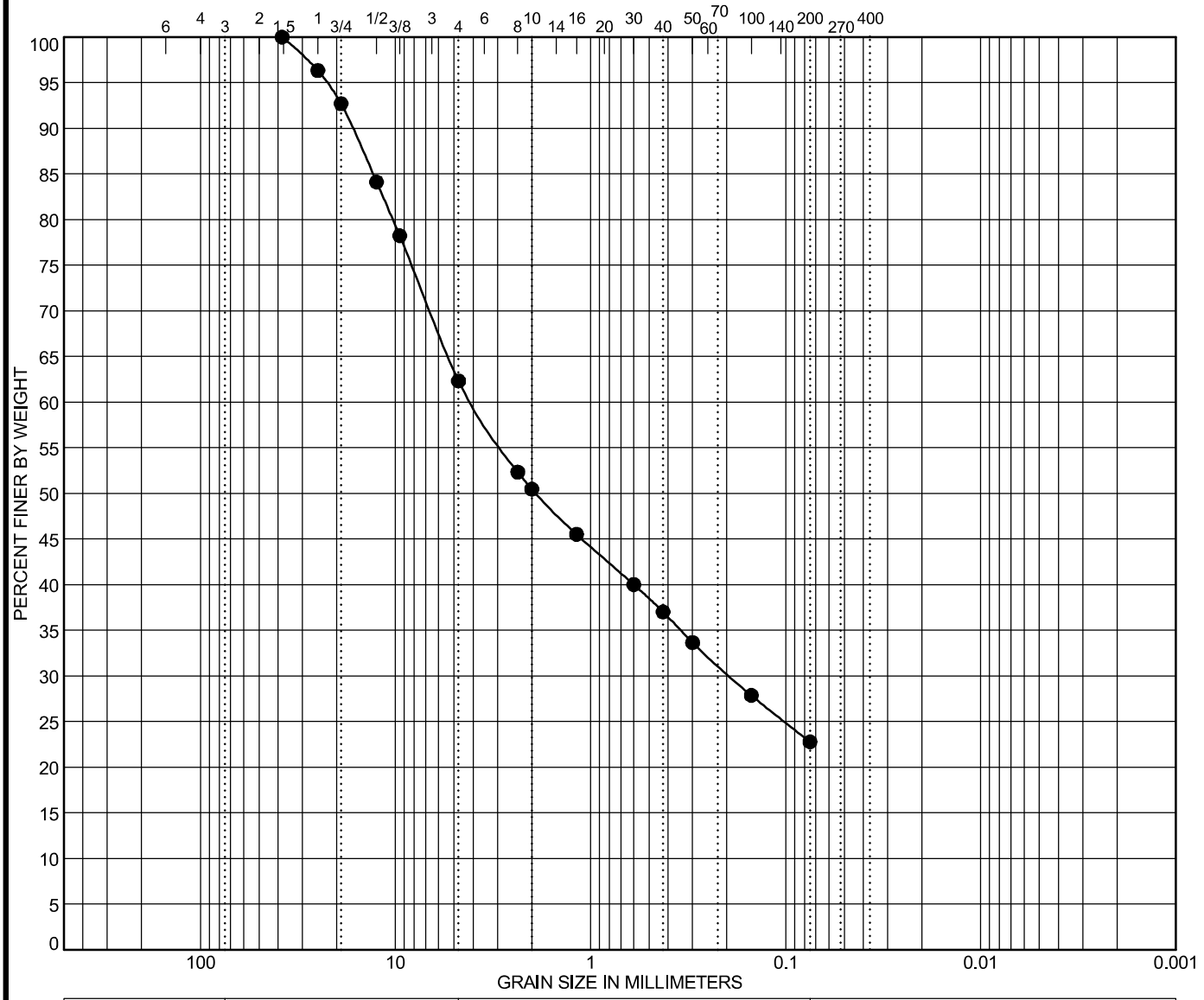
PLATE

B-1.3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-2019	LL	PL	PI	Cc	Cu
●	**05**	Classification					
	Depth: 0	Silty, Clayey SAND with Gravel (SC-SM)	26	19	7		
	Sample Location	B-5 at 0-5'					
	USCS	SC-SM					
	AASHTO						

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**05**								
	Depth: 0	38.1	4.034	0.193		37.7	39.5	22.8	

Natural Moisture	5.6 %		**S.E.**		**Absorption %**		
R-Value			**Durability Index**		**Soundness**		
Perctage of Wear (500 rev)	%		**Specific Gravity**		**Direct Shear**		

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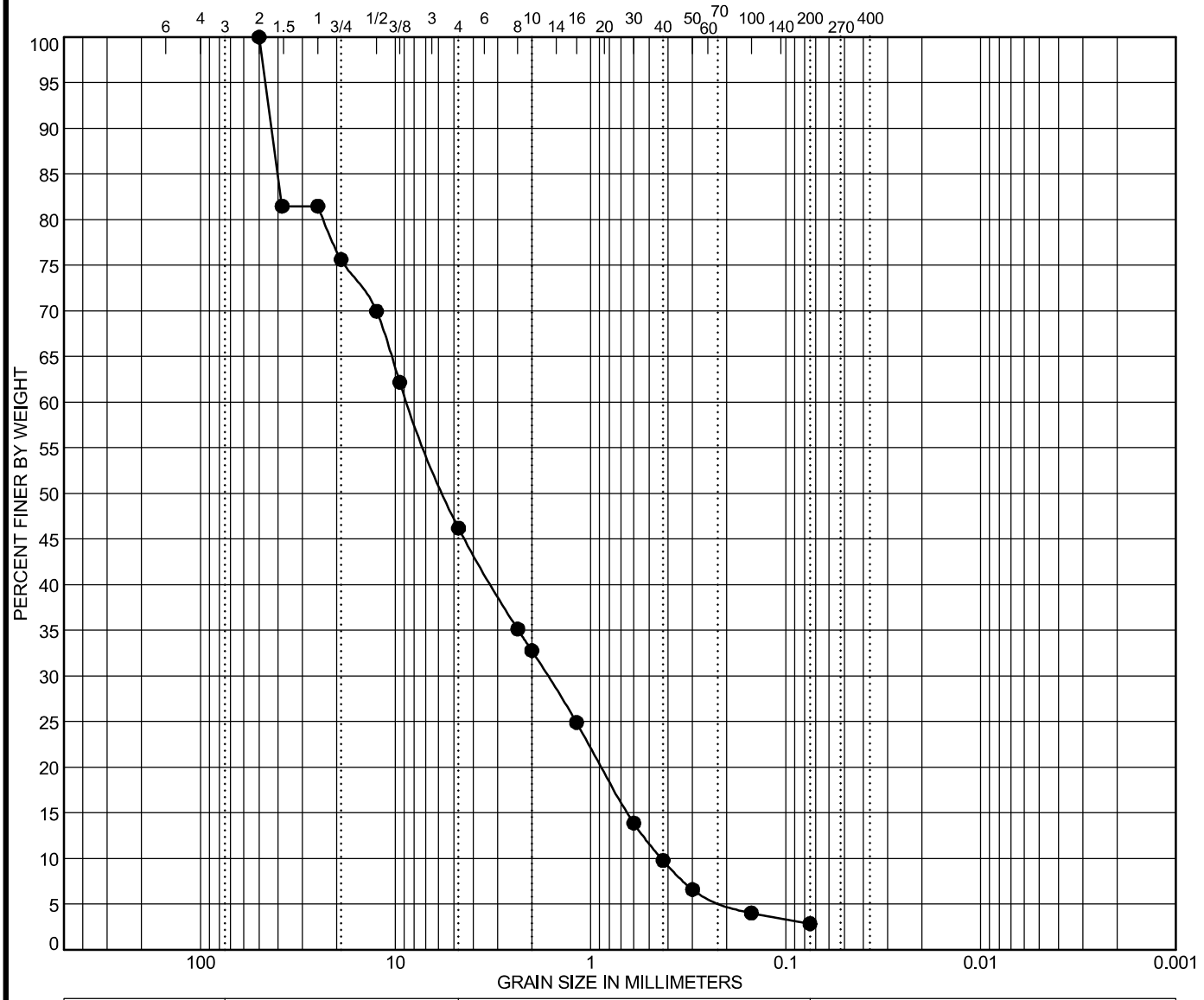
PLATE

B-1.4



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-2019						
●	**07**	Classification	LL	PL	PI	Cc	Cu	
	Depth: 15	POORLY-GRADED GRAVEL with Sand (GP)	NP	NP	NP	0.7	20.0	
	Sample Location	B-7 at 15-16.5'						
	USCS	GP						
	AASHTO							

	Specimen Identification								
●	**07**	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	Depth: 15	50	8.643	1.66	0.432	53.8	43.3	2.9	

Natural Moisture	8.3 %		**S.E.**		**Absorption %**	
R-Value			**Durability Index**		**Soundness**	
Perctage of Wear (500 rev)	%		**Specific Gravity**		**Direct Shear**	

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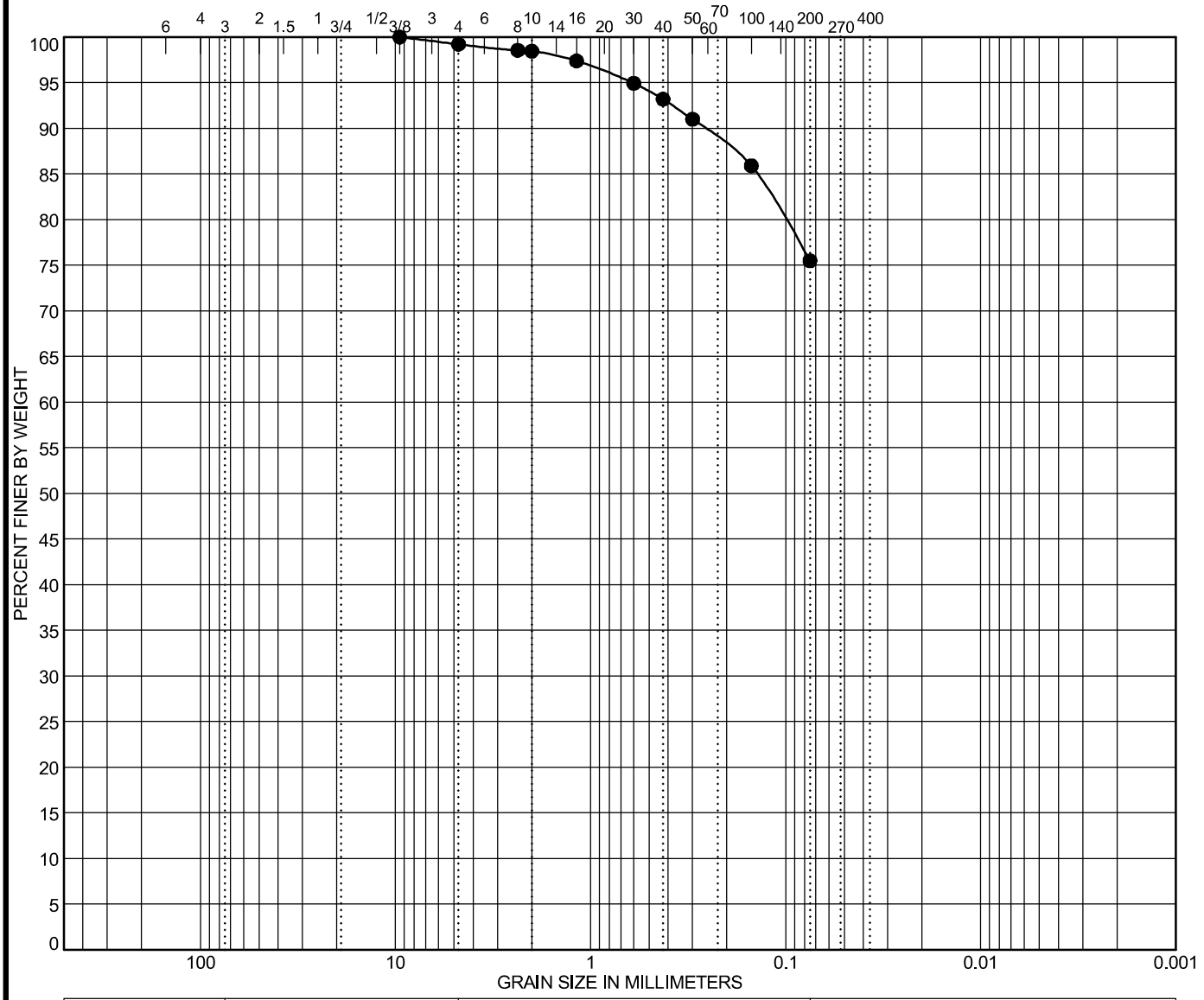
PLATE

B-1.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-2019	LL	PL	PI	Cc	Cu
●	**08**	Classification					
	Depth: 6	LEAN CLAY with Sand (CL)	33	23	10		
	Sample Location	B-8 at 6-6.5'					
	USCS	CL					
	AASHTO						

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**08**								
	Depth: 6	9.5				0.8	23.7	75.5	

	Natural Moisture	27.6 %		**S.E.**		**Absorption %**	
	R-Value			**Durability Index**		**Soundness**	
	Perctage of Wear (500 rev)	%		**Specific Gravity**		**Direct Shear**	

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GRAIN SIZE DISTRIBUTION

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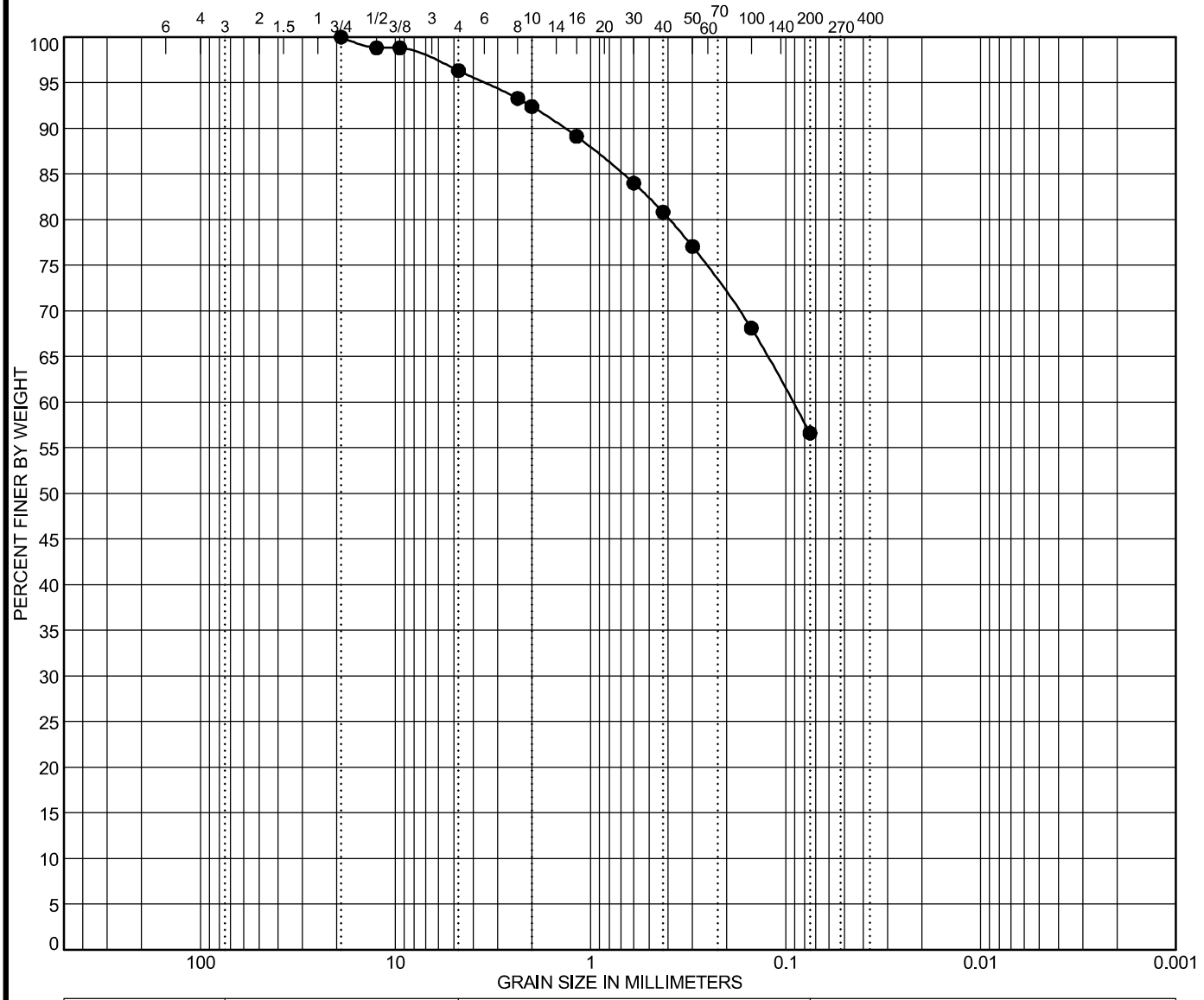
Date: June 2019

PLATE

B-1.6



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-2019					
●	**10**	Classification	LL	PL	PI	Cc	Cu
	Depth: 3.5	Sandy Silty CLAY (CL-ML)	25	19	6		
	Sample Location	B-10 at 3.5-4'					
	USCS	CL-ML					
	AASHTO						

	Specimen Identification								
●	**10**	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	Depth: 3.5	19	0.092			3.7	39.7	56.6	

	Natural Moisture	17.0 %	**S.E.**		**Absorption %**		
	R-Value		**Durability Index**		**Soundness**		
	Perctage of Wear (500 rev)	%	**Specific Gravity**		**Direct Shear**		

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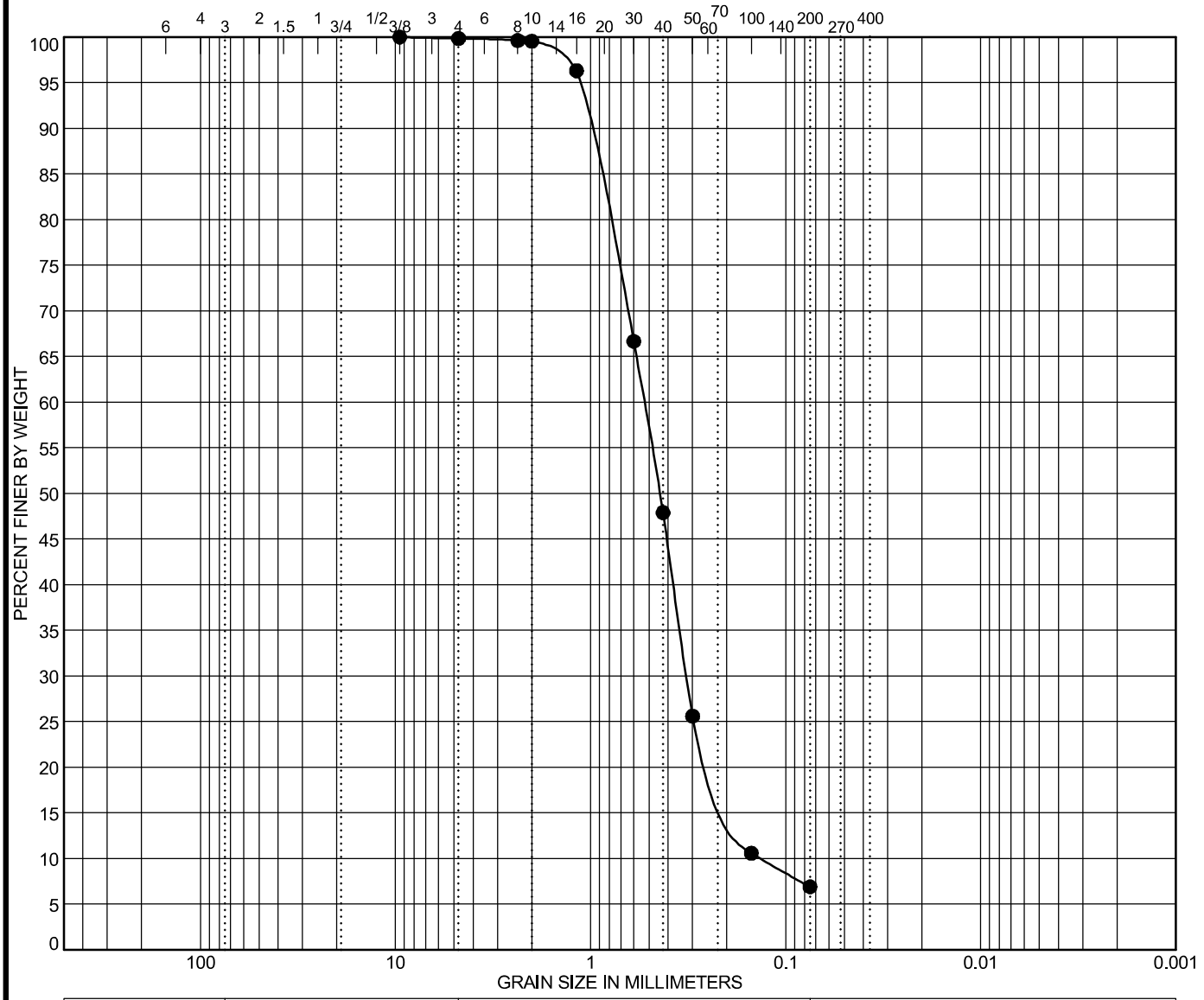
PLATE

B-1.7



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-2019					
●	**10**	Classification	LL	PL	PI	Cc	Cu
	Depth: 20	POORLY-GRADED SAND with Silt (SP-SM)	NP	NP	NP	1.4	4.0
	Sample Location	B-10 at 20-21.5'					
	USCS	SP-SM					
	AASHTO						

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10**								
	Depth: 20	9.5	0.531	0.321	0.134	0.2	92.9	6.9	

	Natural Moisture	27.4 %	**S.E.**		**Absorption %**		
	R-Value		**Durability Index**		**Soundness**		
	Perctage of Wear (500 rev)	%	**Specific Gravity**		**Direct Shear**		

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GRAIN SIZE DISTRIBUTION

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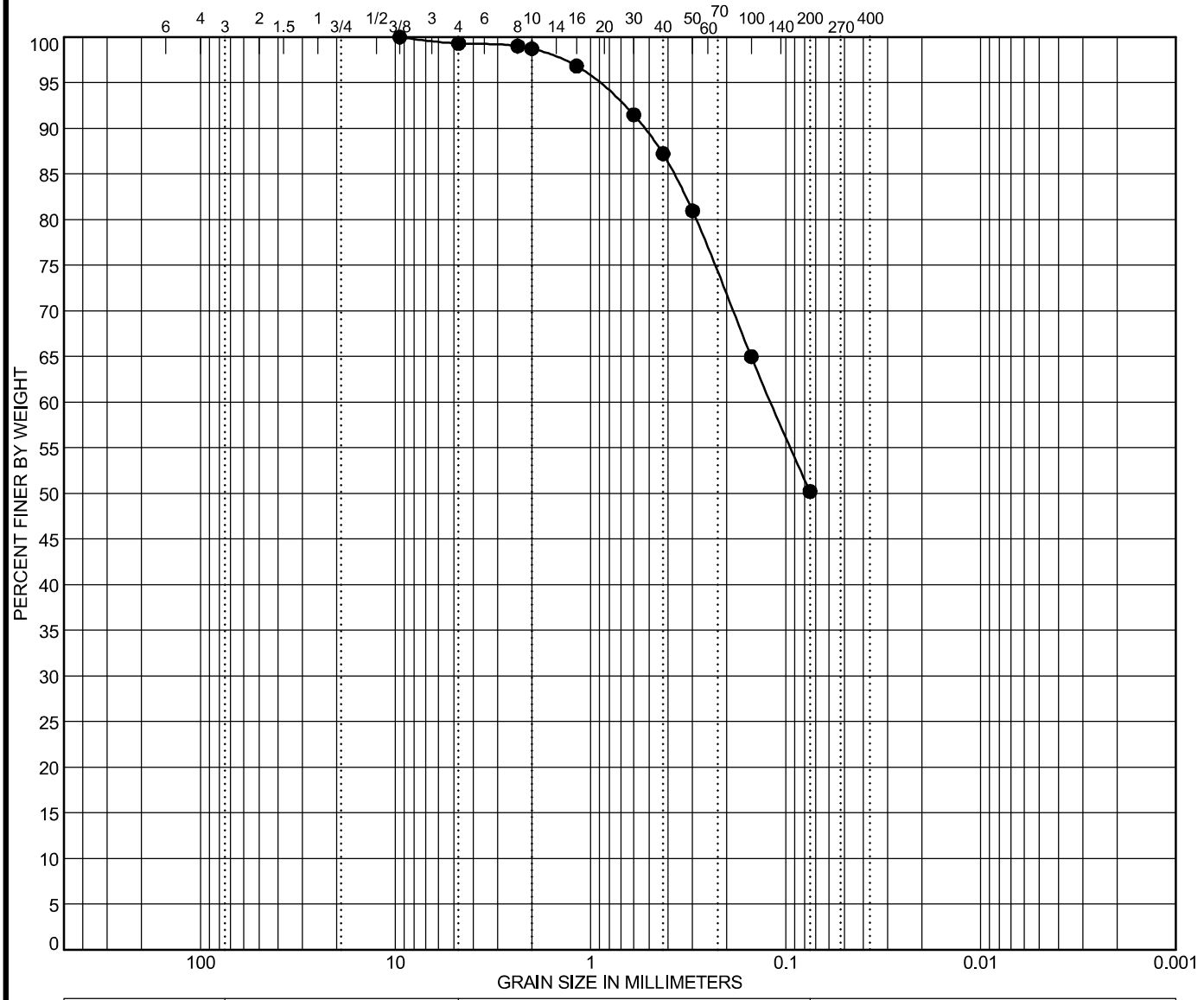
PLATE

B-1.8



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 6-6-2019					
●	**10**	Classification	LL	PL	PI	Cc	Cu
	Depth: 30	Sandy SILT (ML)	30	25	5		
	Sample Location	B-10 at 30-31.5'					
	USCS	ML					
	AASHTO						

	Specimen Identification								
●	**10**	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	Depth: 30	9.5	0.119			0.7	49.1	50.2	

Natural Moisture	23.7 %		**S.E.**		**Absorption %**	
R-Value			**Durability Index**		**Soundness**	
Perctage of Wear (500 rev)	%		**Specific Gravity**		**Direct Shear**	

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GRAIN SIZE DISTRIBUTION

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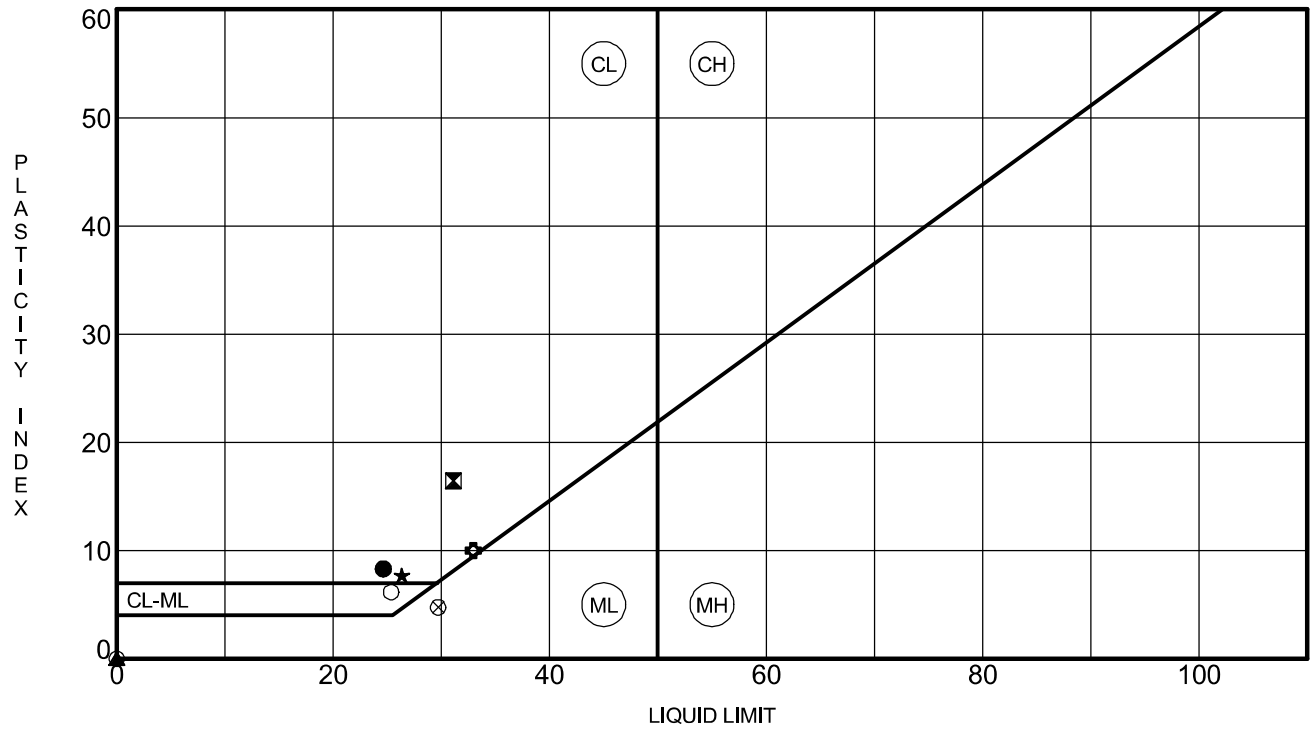
Date: June 2019

PLATE

B-1.9



Specimen Identification			LL	PL	PI	Fines	Classification
●	01	0.0	25	16	9	59	Sandy LEAN CLAY (CL)
⊠	02	11.0	31	15	16	44	Clayey SAND (SC)
▲	03	16.0	NP	NP	NP	7	WELL- GRADED SAND with Silt and Gravel (SW-SM)
★	05	0.0	26	19	7	23	Silty, Clayey SAND with Gravel (SC-SM)
⊙	07	15.0	NP	NP	NP	3	POORLY-GRADED GRAVEL with Sand (GP)
✿	08	6.0	33	23	10	75	LEAN CLAY with Sand (CL)
○	10	3.5	25	19	6	57	Sandy Silty CLAY (CL-ML)
△	10	20.0	NP	NP	NP	7	POORLY-GRADED SAND with Silt (SP-SM)
⊗	10	30.0	30	25	5	50	Sandy SILT (ML)

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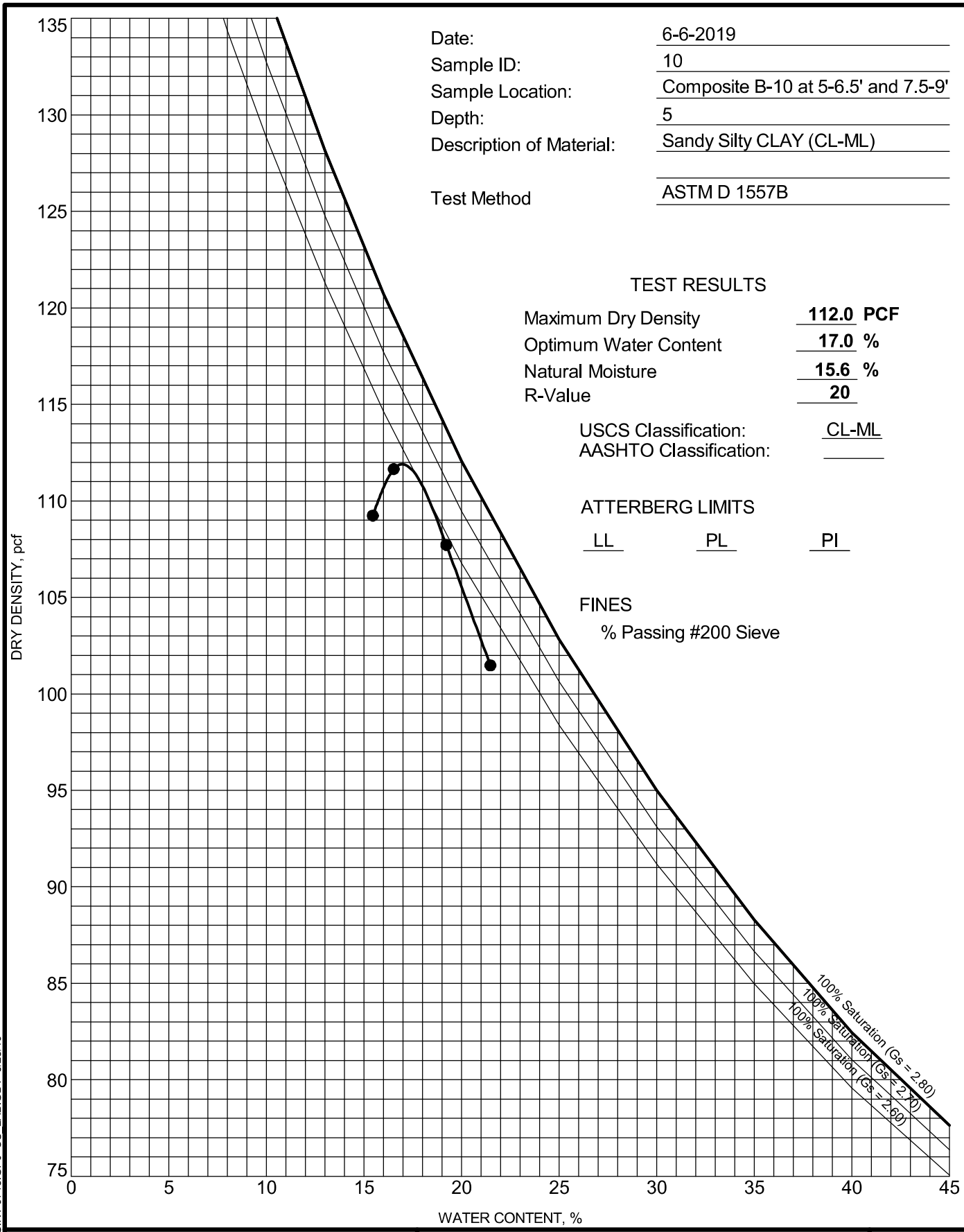
ATTERBERG LIMITS' RESULTS

Job Number: 9718.000 Date: June 2019

PLATE

B-2



Date: 6-6-2019
Sample ID: 10
Sample Location: Composite B-10 at 5-6.5' and 7.5-9'
Depth: 5
Description of Material: Sandy Silty CLAY (CL-ML)

Test Method: ASTM D 1557B

TEST RESULTS

Maximum Dry Density	**112.0 PCF**
Optimum Water Content	**17.0 %**
Natural Moisture	**15.6 %**
R-Value	**20**

USCS Classification: CL-ML
AASHTO Classification:

ATTERBERG LIMITS

LL	PL	PI

FINES
% Passing #200 Sieve

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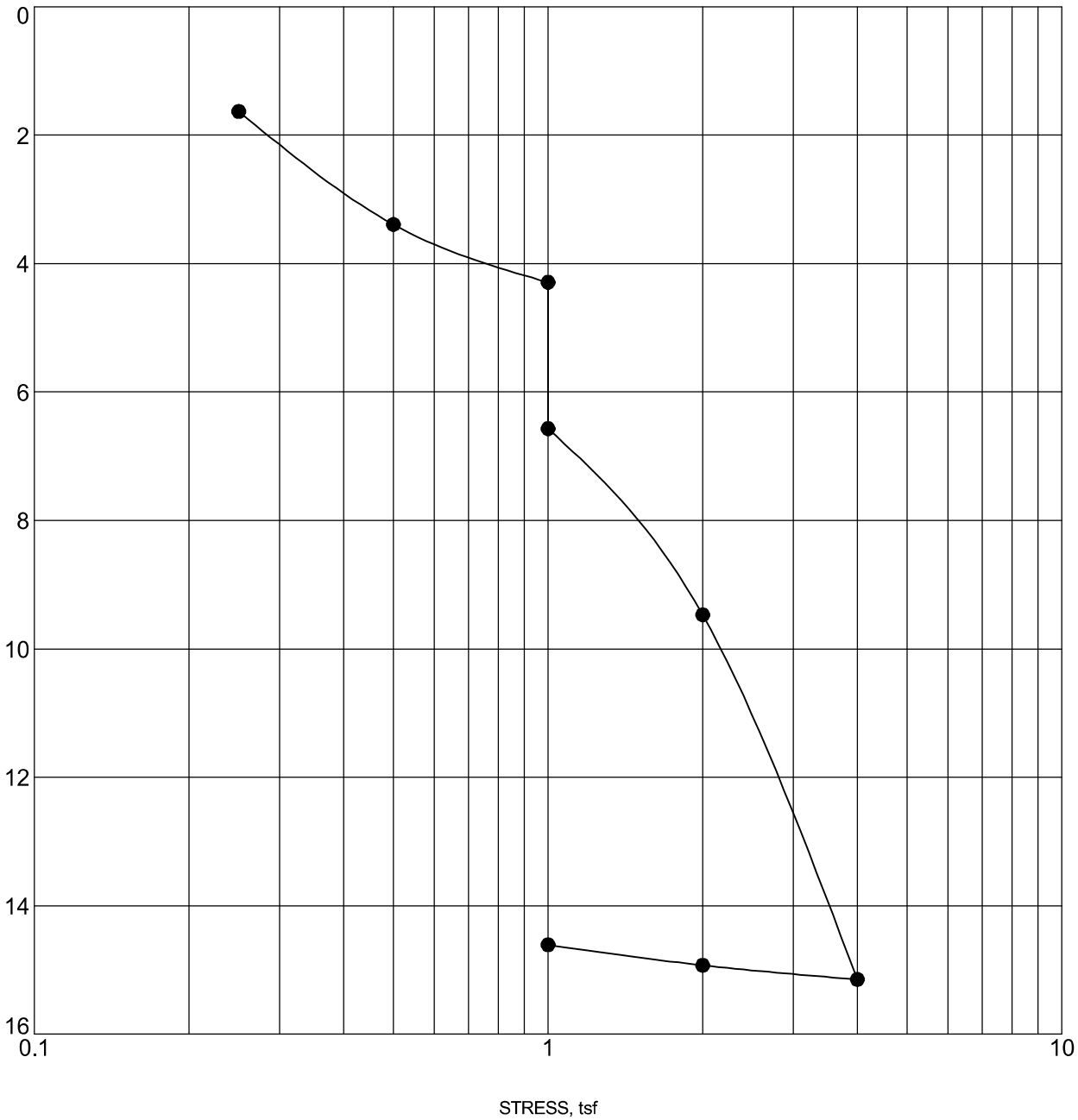
MOISTURE-DENSITY CURVE

Job Number: 9718.000 Date: June 2019

PLATE

B-3



⊙ Field Moisture

● Soaked

Specimen Identification		Classification	γ_d	MC%
● 10	10.5	**Sandy Silty CLAY (CL-ML)**		

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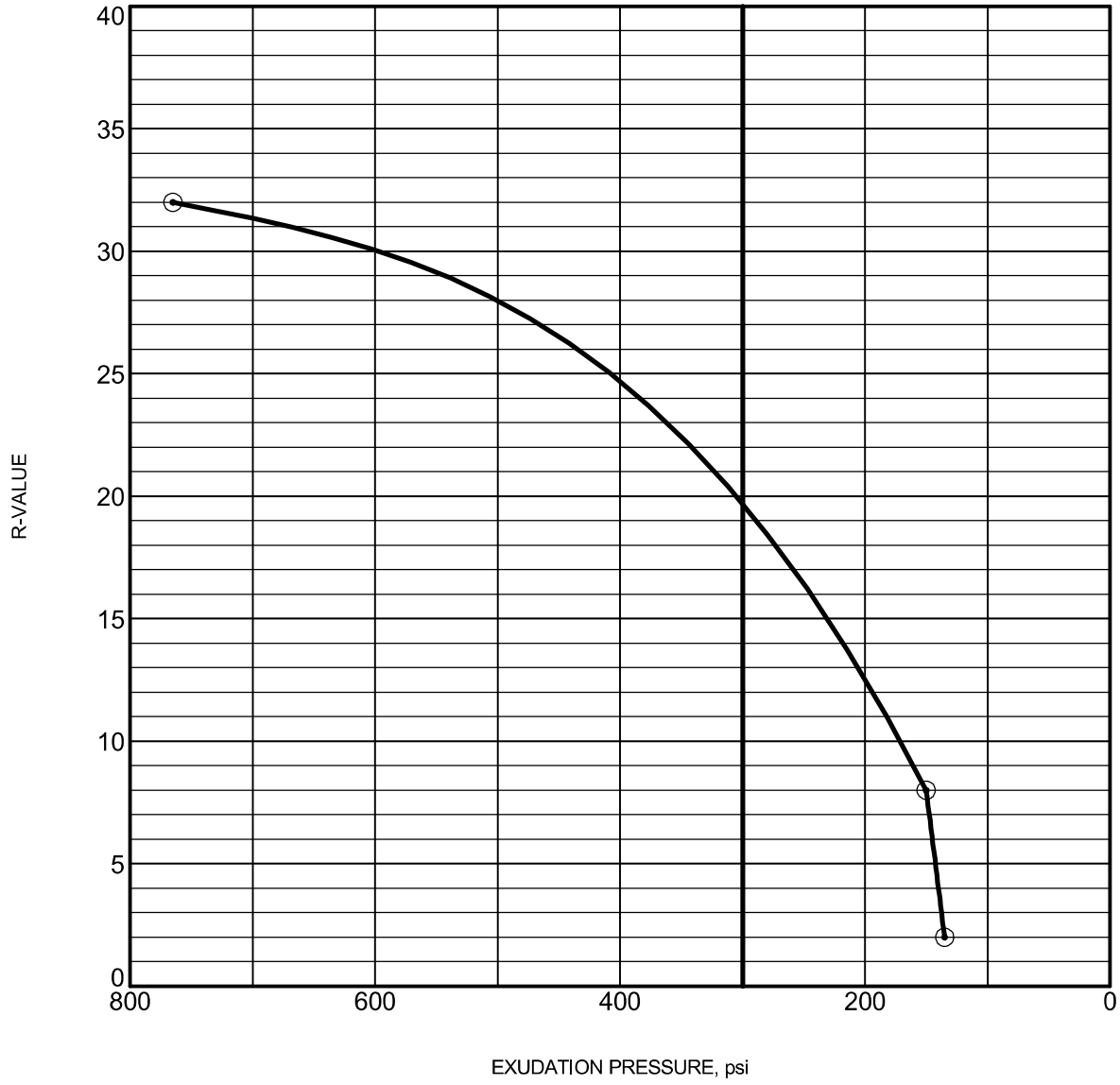
CONSOLIDATION TEST

Job Number: 9718.000 Date: June 2019

PLATE

B-4



Test Data

Specimen No.	Water Content (%)	Dry Density (pcf)	Expansion (psf)	Exudation (psi)	Test R-Value*
1	**20.4**	**104.4**	**0.0**	**135.0**	**2.0**
2	**18.9**	**105.8**	**0.0**	**150.0**	**8.0**
3	**16.3**	**113.3**	**0.0**	**765.0**	**32.0**

* Reported values have been corrected for sample height, where required.

Test Result

Specimen Identification		Classification	R-Value
10	**5.0**	**Sandy Silty CLAY (CL-ML)**	**20**

LUMOS & ASSOCIATES
Lumos & Associates
808 E. College PKWY, Suite 101
Carson City, NV
(775) 883-7077
Fax: (775) 883 7114
mburns@lumosinc.com

WRF - Exit 298 Lift Station and Force Main

RESISTANCE VALUE TEST

Job Number: 9718.000 Date: June 2019

PLATE

B-5

Silver State Labs-Reno
1135 Financial Blvd
Reno, NV 89502
(775) 857-2400 FAX: (888) 398-7002
www.ssalabs.com

Analytical Report

Workorder#: **19060291**
Date Reported: **6/19/2019**

Client: Lumos and Associates - Reno
Project Name: 9718.000 / B-3 6'-6.5'
PO #: 9718.000/MTB

Sampled By: Client

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
19060291-01	B-3 6'-6.5'	06/03/2019 11:00	6/5/2019

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	EPA 9056	59	mg/Kg	5	MA	06/11/2019 20:58	
pH	SW-846 9045D	9.41	pH Units		AA	06/07/2019 14:23	
pH Temperature	SW-846 9045D	22.0	°C		AA	06/07/2019 14:23	
Resistivity	AASHTO T288	1800	Ohms-cm		MA	06/10/2019 14:32	
Sodium	ASTM D2791	< 0.01	%	0.01	MA	06/18/2019 12:54	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	MA	06/18/2019 14:34	
Sulfate	SM4500 SO4E	< 0.01	%	0.01	AA	06/11/2019 15:11	

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
19060291-02	B-6 10.5'-11'	06/03/2019 13:00	6/5/2019

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	EPA 9056	27	mg/Kg	5	MA	06/11/2019 23:18	
pH	SW-846 9045D	8.33	pH Units		AA	06/07/2019 14:23	
pH Temperature	SW-846 9045D	22.0	°C		AA	06/07/2019 14:23	
Resistivity	AASHTO T288	2500	Ohms-cm		MA	06/10/2019 14:32	
Sodium	ASTM D2791	< 0.01	%	0.01	MA	06/18/2019 12:54	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	MA	06/18/2019 14:34	
Sulfate	SM4500 SO4E	< 0.01	%	0.01	AA	06/11/2019 15:11	

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
19060291-03	B-9 6'-6.5'	06/03/2019 16:00	6/5/2019

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	EPA 9056	290	mg/Kg	5	MA	06/11/2019 23:46	
pH	SW-846 9045D	8.41	pH Units		AA	06/07/2019 14:23	
pH Temperature	SW-846 9045D	22.0	°C		AA	06/07/2019 14:23	
Resistivity	AASHTO T288	820	Ohms-cm		MA	06/10/2019 14:32	
Sodium	ASTM D2791	< 0.01	%	0.01	MA	06/18/2019 12:54	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	MA	06/18/2019 14:34	
Sulfate	SM4500 SO4E	< 0.01	%	0.01	AA	06/11/2019 15:11	

Silver State Labs-Reno
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www.ssalabs.com

Analytical Report

Workorder#: **19060291**
Date Reported: **6/19/2019**

Client: Lumos and Associates - Reno
Project Name: 9718.000 / B-3 6'-6.5'
PO #: 9718.000/MTB

Sampled By: Client

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
19060291-04	B-10 11'-11.5'	06/04/2019 8:00	6/5/2019

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	EPA 9056	150	mg/Kg	5	MA	06/12/2019 0:14	
pH	SW-846 9045D	9.01	pH Units		AA	06/07/2019 14:23	
pH Temperature	SW-846 9045D	22.0	°C		AA	06/07/2019 14:23	
Resistivity	AASHTO T288	680	Ohms-cm		MA	06/10/2019 14:32	
Sodium	ASTM D2791	0.01	%	0.01	MA	06/18/2019 12:54	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	MA	06/18/2019 14:34	
Sulfate	SM4500 SO4E	< 0.01	%	0.01	AA	06/12/2019 13:50	

APPENDIX C

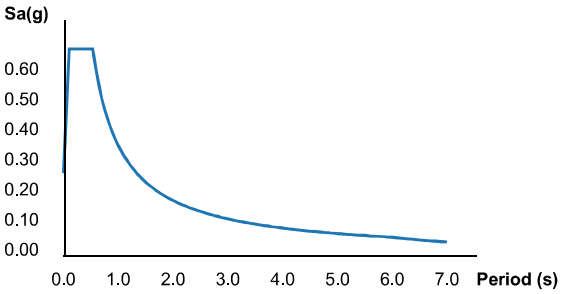
LUMOS & ASSOCIATES

ATC Hazards by Location

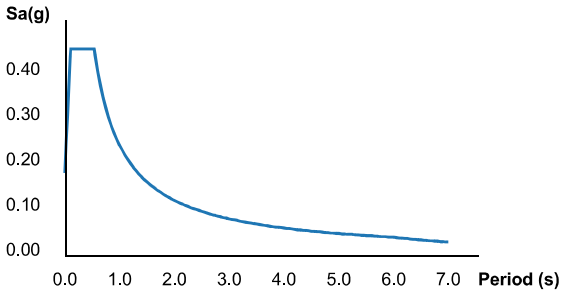
Search Information

Coordinates:	40.81000870595127, -115.82088885871343
Elevation:	5032 ft
Timestamp:	2019-06-25T23:25:51.203Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	III
Site Class:	D-default

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.486	MCE_R ground motion (period=0.2s)
S_1	0.161	MCE_R ground motion (period=1.0s)
S_{MS}	0.686	Site-modified spectral acceleration value
S_{M1}	0.366	Site-modified spectral acceleration value
S_{DS}	0.457	Numeric seismic design value at 0.2s SA
S_{D1}	0.244	Numeric seismic design value at 1.0s SA

Assuming exceptions provided in Section 11.4.8 are applicable to proposed structures, the following parameters may be utilized.

IBC 2018

F_a = 1.4 Table 1613.2.3(1) and Section 1613.2.3

F_v = 2.2 Table 1613.2.3(2)

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WRF - Exit 298 Lift Station and Force Main

SEISMIC DESIGN

Job Number: 9718.000 Date: June 2019

PLATE C-1

APPENDIX D

LUMOS & ASSOCIATES

Job # 9718.000
Client: City of Elko
Description: Asphalt Concrete Pavement Calculations for the Lift Station Parking Lot
By: P. McCreary

R-Value for Native Sandy Silty CLAY = 20
R-Value for Structural Fill = 45 (Specified)
R-Value for Gravel (Type II, Class B) = 70

T.I. = 5.0

G_f = 2.5
GE = 0.0032(TI)(100-R)
tl_{ayer} = GE/Gf

GE_{AC}= 0.0032(5.0)(100-70) = 0.48'
t_{AC}= 0.48/(2.5)*(12") = 2.3" => use 3" asphalt
$t_{AC(actual)}$= (3)(2.5)/12" = 0.63'

$GE_{AB(70)}$= 0.0032(5.0)(100-45) = 0.88'
t_{AB}= (0.88-0.63)(12")/1.1 = 2.78" => use 4" aggregate base
$t_{AB(actual)}$= (4)(1.1)/12" =0.37'

$GE_{SF(45)}$= 0.0032(5.0)(100-20) = 1.28'
t_{AB}= (1.28-0.63-0.37)(12") = 3.46" => use 12" structural fill

Therefore, 3" of Asphalt Concrete (AC) underlain by a minimum of 4" of Aggregate Base, underlain by 12" of properly prepared structural fill will be suitable for paved areas to receive light vehicle traffic.

T.I. = 6.0

G_f = 2.32
GE = 0.0032(TI)(100-R)
t_{layer} = GE/Gf

GE_{AC}= 0.0032(6.0)(100-70) = 0.58'
t_{AC}= 0.58/(2.32)*(12") = 2.76" => use 4" asphalt
$t_{AC(actual)}$= (4)(2.32)/12" = 0.77'

$GE_{AB(70)}$= 0.0032(6.0)(100-45) = 1.06'
t_{AB}= (1.06-0.77)(12")/1.1 = 3.1" => use 6" aggregate base
$t_{AB(actual)}$= (6)(1.1)/12" =0.55'

$GE_{SF(45)}$= 0.0032(6.0)(100-20) = 1.54'
t_{AB}= (1.54-0.77-0.55)(12") = 2.64" => use 12" structural fill

Therefore, 4" of Asphalt Concrete (AC) underlain by a minimum of 6" of Aggregate Base, underlain by 12" of properly prepared structural fill will be suitable for paved areas to receive truck traffic.

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Carson City, NV 89706
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mburns@lumosinc.com

WRF - Exit 298 Lift Station and Force Main

PAVEMENT DESIGN

Job Number: 9718.000

Date: June 2019

PLATE D-1

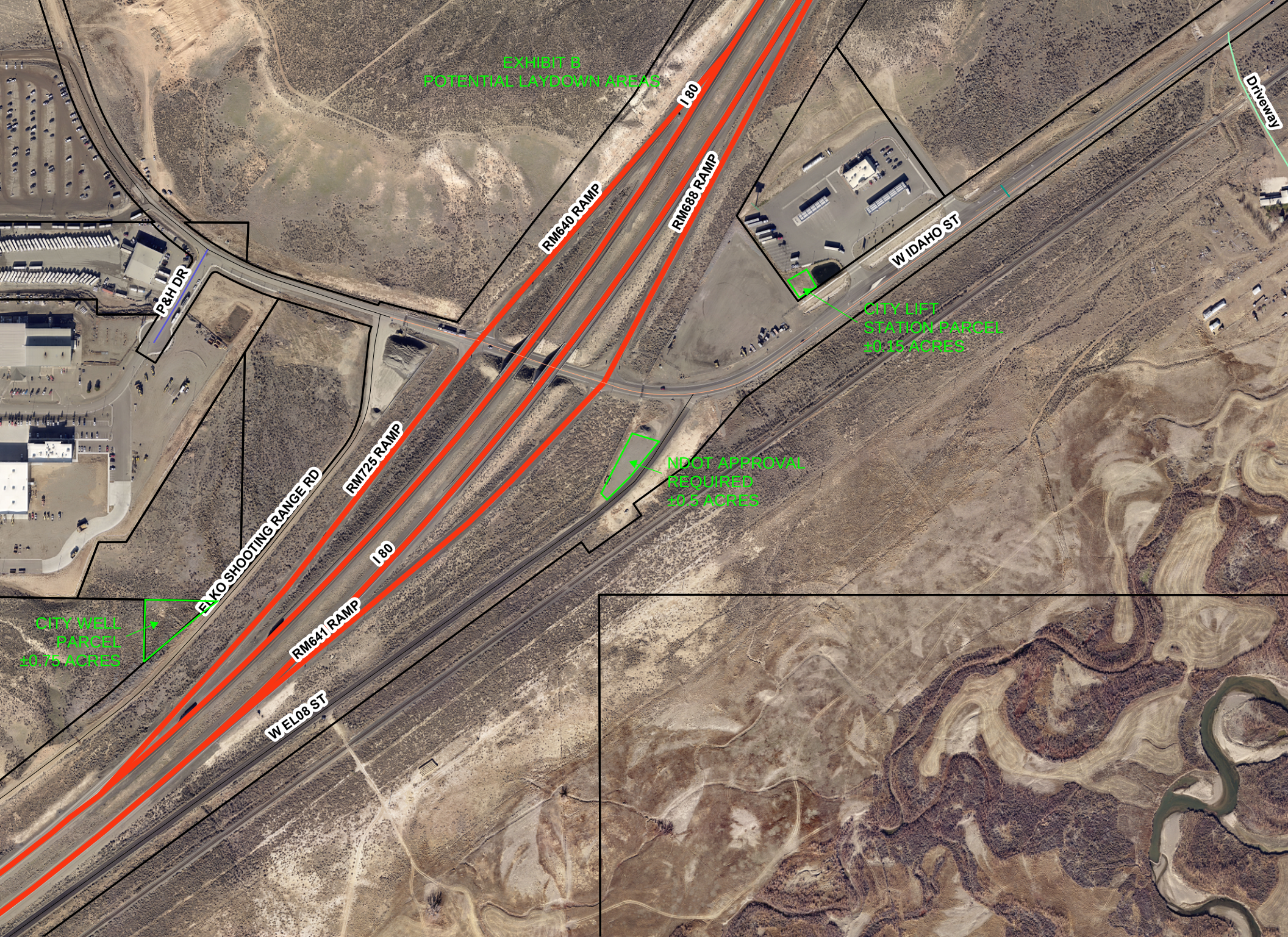
EXHIBIT B
POTENTIAL LAYDOWN AREAS
I 80
RM640 RAMP
RM688 RAMP
W IDAHO ST
Driveway
P&H DR
CITY LIFT
STATION PARCEL
±0.15 ACRES
NDOT APPROVAL
REQUIRED
±0.5 ACRES
RM725 RAMP
ELKO SHOOTING RANGE RD
I 80
CITY WELL
PARCEL
±0.75 ACRES
RM641 RAMP
W EL08 ST

EXHIBIT C

PROJECT NAME: EXIT 298 SEWER PHASE 2

PRE-BID MEETING

DATE: 6/15/2022 - TIME: 1:30 PM - PLACE: ELKO CITY HALL, 1751 COLLEGE AVE. ELKO NV.

Introductions / Project Contacts

City Staff

- Bob Thibault- City of Elko, Engineer – 775-777-7214 bthibault@elkocitynv.gov.
- Dale Johnson – Utilities Director – 775-777-7212 djohnson@elkocitynv.gov.
- Jim Keer- Water Superintendent – 775-777-7374 jkerr@elkocitynv.gov.
- Dean Cernick – Water Assistant Superintendent – 775-777-7373 dcernick@elkocitynv.gov. (Not in attendance)
- Shelley Petersen-Ralph – Admin Assistant 775-777-7210 s.petersen@elkocitynv.gov.
- Kelly Wooldridge – City Clerk – 775-777-7216 kwooldridge@elkocitynv.gov or cityclerk@elkocitynv.gov. (Not in attendance)
- Diann Byingon – Recording Secretary 775-777-7127 dbyington@elkocitynv.gov. (Not in attendance)

Engineer:

Bob Thibault (see above for contact information)

Construction Management:

City of Elko Staff - Dale Johnson, Bob Thibault, Dean Cernick, and Jim Kerr City of Elko.

Project Description:

The Project is generally described as follows: This project includes the construction of 4,641 lineal feet of twelve-inch diameter gravity sewer including 546 lineal feet of boring, 1,178 lineal feet of twenty-one-inch diameter gravity sewer line, and associated manholes and appurtenances.

- This is a Prevailing Wage Project as with all PWP Projects, please be certain to send all **Certified Payroll** reports to our Clerk's office, attention : Diann Byington or Kelly Wooldridge, also, be certain to follow all **AUA requirments**, contact the City Clerk's Office if you need waivers for the AUA or have any questions.

- Permits Required: State permit from NDEP for dewatering may be required if ground water is encountered. SWPP permit requirements depend on the area of disturbance. If the disturbance is 10' wide over the length of the project, the disturbed area will be less than one acre. Contractors will be responsible to plan according to their construction methods, and get a SWPP if needed. The project site is just over ¼ mile from the river. **IT IS VERY IMPORTANT TO COMPLETE THE PERMIT PROCESS ENTIRELY**. Failure to compelte the process could cause issues with final project payouts.
- Please be certain to write out each bid amount in numbers and in words, and please be certain that both match exactly! (Please see example below)

THE CITY OF ELKO
EXIT 298 SEWER PHASE 2

The bidder agrees that the work will be performed in accordance with the Contract Documents together with incidental items necessary to complete the work to be constructed in accordance with the Contract, any and all Exhibits to the Contract, Exhibit 16 – Technical Specifications, Exhibit 8 – Project Construction Plans and also in accordance with the *"Standard Specifications and Details for Public Works Construction", 2016 Revised Edition*, and amendments (Orange Book) as adopted by the City of Elko, Nevada.

Item No. & Work Description	Quantity	Unit	Unit Price	Bid Amount
1. Mobilization and Demobilization @ *One hundred fifty dollars and 50/100.* per Lump Sum.	1	LS	$ 150.50	$ 150.50
2. Provide Traffic Control @ _____ per Lump Sum.	1	LS	$_____	$_____
3. Saw-cut Asphalt Pavement @ _____ per Lineal Foot.	1,126	LF	$_____	$_____
4. Remove and dispose of Asphalt Pavement @ _____ per Square Foot.	2,243	SF	$_____	$_____

- Questions are due on **Wednesday June 22, 2022**.
- Bid Opening is scheduled for: **Wednesday June 29, 2022** at 3:00PM at Elko City Hall, 1751 College Avenue, in the Council Chambers. Attendance is not required but welcomed.
- Engineers Estimate is: $2,000,000.00
- Project Completion is anticipated to be 120 CALENDAR days, with a potential start date of August 8, 2022.
- Special Inspections: The City will hire a consultant for Quality Control Testing.
- Survey will be perfomed by City Engineering Department, Bob Thibault and Jake Jefferson.
- Staging and Parking: NDOT will Allow for an area along the south frontage road to be used with the request for a Temporary Permit to Occupy NDOT right-of-way from the contractor. Other options for staging may include the Well parcel, lift station parcel, or the water line staging area on the Miller's property if they give consent. Rhonda Moffin is the contact at NDOT. See map in Addendum 1 for a display of staging areas.
- Discussion regarding boring portion of the project:

  Follow detail on sheet 10 regarding using Ductile iron-pipe, this should be easier for the bore contractors. Transitions to the PVC pipe will be the at descrition of the Contractor.
- Export / Import of Materials: There may be minimial areas of export due to the volume of pipe and bedding sand being imported. Clean fill is accepted at the landfill at no fee.
- Disposal of Material: Construction material other than clean fill can be disposed of at the landfill at standard tipping fees. (To be paid for by the Contractor)
- Schedule Times / Day's and Hours: Standard work schedule is expected. This project is in the Industrial area, shouldn't have any issues with sheduling.
- Submittals, for supplies, materials, equipment: Submittals for materials should go to Bob Thibault, via email (see above) additional details can be worked out between Dale Johnson, and Bob Thibault.

- Training: Site Specific Training will be required from the Water/Sewer Department. This is mostly in regard to the trenching and excavation, we want everyone to have this training all attendees will need to sign that they have completed the training. Either the Contractor can give this training, or the City can hold the training at the Utility Department Shop.
- Traffic Control Plan: This will be the responsibility of the Contractor, and needs to be submitted to NDOT, the City of Elko Public Workd Department and Elko County, please work with all divisions regarding the TCP.
- Site Restoration: Site Restoration: Reference the City of Elko Best Management Practices Handbook. (See link below)

  https://cms1files.revize.com/revize/elkonv/WPCP-Management%20Plans-Construction%20BMP%20Manual-DEC2015.pdf.
- Site Visit to follow Pre-Bid Meeting if desired. There was no interest in a site visit.

ADDITIONAL NOTES:

- Bob Thibault reported that NDOT responded to the question regarding fencing having to be replaced. NDOT indicated that all fencing will be maintained with no breaks to insure no livestock will NOT reach I80. It would be interpreted that the fence should not be taken down or maybe temporay fencing will have to be in place during the course of construction. Bob will get clarification. A question was asked from Mr. Katsma with High Mark Construction, he asked if the areas of fence have to be taken down will the replacment fence have to be the same? Barbed wire vs. chain link? Bob Thibault will follow up on this item.
- The City has an easement for a future lift station on the gas station parcel that may be used as a lay-down yard if necessary.
- At the area of 17 ½‘ Depth there will be a need for a 60” diamter manhole to accommodate the three pipes. Everything else should be 48” diameter manhole with 21” pipe, this should work out.
- Bob will address the manhole assoiation correction from the plans in an addendum. (Re: manhole 17)
- A Geotechnical Report was completed by Lumos and Assoicates back in June 2019 for the future Lift Station. This report will be availble to share with bidders. There is no guarntee that these soils will be the same in areas across the street or in other areas. This report will indicate ground water discovery at that time.
- Bonnie Heartly is the contact at NDEP regarding the De-Watering Permit, Bob will share her contact details in the addendum. Permit fee is $250.00 Review is approx. 1 week, with the permit being valid for 6 months.
- A permit for SWPP will be required if the disturbance is over 1 acre of disturbance. Consider construction methods and the distrubance area.
- NDOT will have some forms that will need to be completed.
- County Pemits may be required, contacts at the County would be Corey Rice or Dennis Price. Bob will reach out to them.
- If there are errors with the math on the Bid, the written word for the unit price will be honored. Please be certain all totals are clear and totals match.
- This section of sewer line extension is dry, there will not be any bypass of live sewer lines.
- Are there any As Built details availble for this area from South West Gas. Bob will reach out to South West Gas to determine what lines maybe located at this area.