GEOTECHNICAL INVESTIGATION

REPORT

for

19 & 20 Knoll Drive
Carson City, Nevada

Prepared for:

Jack and Colleen Britton
3937 Sierra Vista Dr.
Vacaville, CA 95688

Prepared by:

LUMOS and ASSOCIATES, INC.
800 E. College Parkway
Carson City, Nevada 89706
Tel: (775) 883-7077
Fax: (775) 883-7114

May, 2018
JN: 9407.001

GEOTECHNICAL INVESTIGATION REPORT

19 & 20 Knoll Drive

Carson City, Nevada

TABLE OF CONTENTS

GEOTECHNICAL INVESTIGATION REPORT
for
19 & 20 KNOLL DRIVE
Carson City, Nevada

INTRODUCTION

Submitted herewith are the results of Lumos and Associates, Inc. (Lumos) geotechnical investigation for the proposed residential development to be located at 19 and 20 Knoll Drive Carson City, Nevada (Plate 1).

We understand improvements on the lot will consist of a single story house with conventional spread footings and concrete slab-on-grade and an associated asphalt concrete driveway. We have assumed that the final grades will be within twenty (20) feet of existing grades. The anticipated loads for the project have been assumed to be less than 4 kips/linear foot for continuous footings and less than 30 kips for isolated interior footings.

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, a fault study, 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, and Portland cement concrete. In addition, information

such as logs of all test pits and, allowable soil bearing capacities, estimated total and differential settlements, moisture and drainage protection and International Building Code (IBC) seismic site class designation are provided in this report.

The recommendations contained herein have been prepared based on our understanding and assumptions of the 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 site geology and sub-surface conditions is implied or intended.

GEOLOGIC SETTING

Carson City is at the extreme western portion of the Great Basin geomorphic province. The Great Basin is characterized by internal drainage and large normal fault-bounded valleys (grabens) separated by high mountain ranges (horst). The Sierra Nevada province to the west is characterized by large granite masses that have been uplifted and tilted a few degrees toward the west. Overlying the granites are older oceanic meta-sedimentary rocks.

Generally, the geologic evolution of the region involves uplift, volcanism, extension, and sedimentation, which created the present 'Basin and Range' physiography. Arid, erosional processes continue to shape the Great Basin.

Specifically, the site is located in the western portion of Eagle Valley inside Kings Canyon. The surface geology of the project has been mapped by Trexler (1977). The mapping indicates that mafic metavolcanic rocks underlie the site (Rmu). The mapping indicates that the deposit consists of "Grayish-green to greenish black, fine grained, sparsely porphyritic, dense and hard metamorphosed mafic andesite flows and volcanic breccia; locally epidote-rich. Includes small, shallow intrusive masses of andesite porphyry and fine grained diorite." This is illustrated on Plate 5.

SEISMIC CONSIDERATIONS

Carson City, 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/Quatenary/Faults). It shows a northeast/southwest trending active fault of Holcene age (<15,000 years), less than a quarter of a mile away from the site. This fault does not extend into our site and no evidence of faulting was noted during our site investigation. Refer to Plate 4. The maximum credible earthquake (MCE) for the vicinity of the project is estimated at 7.5 in moment magnitude. This correlates to a Modified Mercalli Intensity of XI. Refer to Plate 3.

Liquefaction is the phenomenon where loose saturated granular soils lose their shear strength when subjected to strong vibration or cyclical loading, and become unstable. Large earthquakes, as described above, may provide that type of cyclical loading. Loose saturated sands are the most susceptible to this phenomenon. These conditions were not encountered during our field investigation. Additionally, according to the groundwater map of the area, groundwater is not a factor on this site because the site is within a consolidated rock area with very poor water yielding capacity. Therefore, the liquefaction of subsurface soils at the site is not considered likely to occur. The majority of any structural damage to buildings at this site is most likely to be the result of strong seismic shaking rather than subsurface soil liquefaction.

2012/2015 IBC Design: The mapped maximum considered earthquake spectral response acceleration at short periods (S_S) is 2.273g corresponding to a 0.2 second spectral response acceleration at five percent (5%) of critical damping and for a Site Class B (IBC Figure 1613.3.1(1)). The mapped maximum considered earthquake spectral response acceleration at a 1-second period (S_1) is 0.857g corresponding to a 1.0 second spectral response acceleration at five percent (5%) of critical damping and

for a Site Class B (IBC Figure 1613.3.1(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 1.0 (IBC Table 1613.3.3(1)). The site class effect for spectral response acceleration adjustment at 1-second periods (F_v) is 1.5 (IBC Table 1613.3.3(2)). The maximum considered earthquake spectral response acceleration parameter for short period (S_{MS}) is 2.273g and for 1-second period (S_{M1}) is 1.286g. This corresponds to design spectral response acceleration parameters of 1.515g for short period (S_{DS}) and of 0.857g 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 Carson City 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 site was undeveloped. The site was relatively steep and generally sloping down to the north at approximate slope of 35%. Vegetation consists of sage brush.

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

Three (3) exploratory test pits were excavated within the proposed improvement areas to a maximum depth of 17 feet below-ground-surface (bgs). The locations of the exploratory test pits within the site are shown on Plate 2. The subsurface soils were continuously logged and visually classified in the field by our Geotechnical Engineering Intern in accordance with the Unified Soil Classification System (USCS).

The subsurface soils encountered consisted generally of sands with varying amounts of gravel and silt to the total depths explored for this project. Groundwater was not encountered at the time of our investigation and is not expected to impact the development of this site. However, seasonal groundwater fluctuations should be anticipated at the site. Test pits 2 and 3 were terminated at 9 feet due to refusal, which may impact grading operations and trenching for utilities.

FIELD AND LABORATORY TEST DATA

Field data was developed from samples taken and tests conducted during the field exploration and laboratory testing phases of this project. Representative soil samples were obtained at material changes in the exploratory test pits. Samples were collected using ASTM approved techniques for sampling from a stockpile. All the samples were subsequently transported to our Carson City geotechnical laboratory for testing and analysis.

Laboratory tests performed on representative samples included sieve analysis (included fines), Atterberg limits, modified proctor, direct shear, expansion index, soluble sulfates, pH value, and resistivity. Much of this data is displayed on the "logs" of the exploratory test pits facilitate correlation. Field descriptions presented on the logs have been modified, where appropriate, to reflect laboratory test results. The logs of the exploratory test pits are included in Appendix A of this report as Plates A-1 to A-5. A key to the logs is included as Plate A-6.

Individual laboratory test results are presented in Appendix B as Plates B-1 through B-4. 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. Special testing conducted for this project is described below.

During the site exploration, additional percolation test holes were dug south of the future house pad at the anticipated leach field. Percolation tests were performed in accordance with NAC 444.796. Results from percolation tests can be found in Appendix D.

Analytical Testing: Silver State Laboratory, Inc. of Reno, Nevada, conducted the laboratory testing. Testing results are included (on Silver State's letterhead) as Plate B-5.

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

From a geotechnical viewpoint, the site is considered suitable for the proposed improvements when prepared as recommended herein.

The following recommendations are based upon the construction and our understanding of this project, as outlined in the introduction of this report. If changes in the construction are proposed, they should be presented to the Lumos Geotechnical Department, so that these recommendations can be reviewed and modified in writing, 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 18 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 three (3) inches in maximum dimension may be stockpiled and moisture conditioned for later use as compacted structural fill provided it meets the criteria for structural fill soils.

All surfaces to receive fill and/or improvements should be observed and approved by a Lumos representative prior to placement of fill. The surfaces shall be scarified to a minimum depth of twelve (12) inches, moisture conditioned to within two percent (2%) of optimum, and re-compacted to at least ninety-five percent (95%) of the ASTM D1557 standard. 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 fill operations should not resume until a Lumos representative approves the moisture content and density conditions of the subgrade or previously placed fill.

Unstable conditions due to yielding and/or pumping soils may be encountered on site. Native 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, the 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.

Acceptable structural fill soils to be used for this project should consist of non-expansive material (LL less than 30 and/or a PI less than 8, and/or an Expansion Index less than 20), and should be free of contaminants, organics (less than two percent (2%)), rubble, or natural rock larger than three (3) inches in largest dimension. The soluble sulfate content shall be less than 0.1% and the R-Value shall be a minimum of 30. Any import soils should be tested and approved prior to being placed or delivered on-site (seven (7) day advanced notice). Structural fill soils shall also meet the following gradation requirements:

TABLE 1
STRUCTURAL FILL GRADATION

Sieve Size	% Passing
3"	100
3/4"	70 - 100
#40	15 - 75
#200	10 - 45

Soils not meeting all of the above requirements may be approved for use as structural fill at the discretion of the Geotechnical Engineer. The site sands (SM and SC-SM) are suitable for reuse as structural fill. If encountered, fine grained soils (silts and clays) shall be overexcavated to a minimum depth of 2 feet below, and laterally from, footings and 2 feet below, and laterally from, hardscape improvements. Fine Grained soils were reencountered in Test Pit 1 from 0.5' to 3' The overexcavated fine grained soils shall be replaced with properly compacted structural fill. Compacted fill should be placed only on compacted sub-grade or on compacted fill in lifts not exceeding eight (8) inches in loose thickness, moisture conditioned to within two percent (2%) of optimum, and

compacted to at least ninety-five percent (95%) relative compaction, as determined by the ASTM D1557 standard. Differential Fill depth across the building pad(s) shall not exceed 5 feet. Overexcavation may be required to meet this requirement.

Fill placed on slopes steeper than 5:1 (H:V) will require benching into existing slope. The benches shall extend into the existing slope a minimum of 5 feet into the existing slope. The bench shall have a negative slope into the face of 15:1 (H:V). A key shall be constructed at the toe of the slope that shall be a minimum of 2 feet deep and 10 feet wide.

Landscaped areas should be cleared of all organic and objectionable material such as wood, root stumps, etc., if any. In cut areas, no other work is necessary except grading to proper elevation and drainage conditions. In landscape fill areas, fill should be placed in loose lifts not exceeding eight (8) inches, and compacted to at least ninety-five percent (95%) relative compaction to prevent erosion.

A representative of Lumos should be present during all site clearing, excavation removals, and grading operations to ensure that 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 services 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 acceptable fill, compaction, and stability requirements. Further, recommendations in this report are provided 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 12 inches of properly prepared structural fill/suitable subgrade may be used to support the proposed buildings within the project site. The building shall not be supported by a combination of "cut" and fill. If "cut" and fill soils are encountered at footing grade, the cut soils shall be overexcavated to a depth of one foot below and laterally from footings, the exposed surface prepared, as discussed earlier, and replaced with properly compacted structural fill. Additionally, the differential fill height across the building pad shall not exceed 5 feet. Overexcavation may be required to meet this requirement. The foundation shall be set back a minimum of distance of 1/3 the height of the slope from the tow of the slope. Also, foundations shall be set back a minimum distance of 1/2 the height of the slope from the toe and the crest of the slope.

Spread footings: Footings should have a minimum embedment of 24 inches below lowest adjacent grade for frost protection. Footings founded on 12 inches of properly prepared structural fill/suitable subgrade may be designed for a net allowable bearing pressure of 2,000 pounds-per-square-foot (psf).

Footing Settlements: The maximum anticipated settlements, caused by static loading, for continuous or isolated footings bearing on 12 inches of properly prepared structural fill/suitable subgrade and designed for a 2,000 psf bearing pressure is estimated at one (1) inch or less. Differential settlements are generally expected to be half of the total settlements. Settlements in granular soils are primarily expected to occur shortly after dead and sustained live loads are applied.

Lateral Loading: Resistance to lateral loads can be provided by friction acting at the base of foundations and by lateral earth resistance. A coefficient of friction of 0.35 may be assumed at the base of footings. An allowable passive earth resistance of 250 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 2,000 psf. The at-rest lateral 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 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 equation.

Dynamic Lateral Force = $49H^2K_h$

H = height of wall
K_h = Horizontal Acceleration

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

RETAINING WALLS

Retaining structures over three (3) feet in height, if used, will require local code compliance and 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 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, and to at least ninety-five percent (95%) of the maximum ASTM D1557 standard.

CORROSION AND CHEMICAL ATTACK

On-site soils have a negligible water soluble sulfate content of less than 0.10% (less than 0.01% actual). No specific type of cement is required for concrete in direct contact with on-site soils, as required by the International Building Code. However, Type II cement (meeting ASTM C150) is recommended for concrete in direct contact with on-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. All interior concrete should also be placed pursuant to ACI recommendations.

Native soils have a pH of 6.89 and have a resistivity of 23,000 ohm-cm under saturated conditions. This indicates the soils are essentially noncorrosive towards ferrous metals when in contact with these soils. Corrosion mitigation measures, such as protective coatings, wrappings, and cathodic protection are, however, 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.

SLOPE STABILITY AND EROSION CONTROL

The results of our exploration, testing, and calculations confirm that 2:1 (H:V) maximum slopes will be stable for on-site materials both in cut and fill. Refer to Appendix E. All slopes shall incorporate a brow ditch to direct surface drainage away from the slope face. Slopes steeper than 2:1 will require stabilization, such as retaining walls.

The potential for dust generation is high at this project. Dust control will be mandatory on this project in order to comply with air quality standards. The contractor shall be responsible for submitting a dust control plan and securing any required permits.

Stabilization of all slopes and areas disturbed by construction will be required to prevent erosion and to control dust. Stabilization may consist of rip-rap, revegetation, or dust pallative, depending on the inclination of the slope.

In order to minimize storm water discharge from this site, best management practices should be implemented.

UTILITY EXCAVATIONS

Many on-site soils are anticipated to be excavatable with conventional construction equipment. Refusal was encountered at Test Pits 2 and 3 at 9 feet with a backhoe. Therfore, specialized equipment may be needed. Compliance with OSHA regulations should be enforced for Type C soils. Excavated coarse grained soils may be suitable for backfill of utility trenches after screening any oversize material (greater than 3 inches) and debris provided they meet the requirements of Class E backfill. However, on-site soils do not meet the minimum requirements for Class A bedding and should be imported, where required.

MOISTURE PROTECTION, EROSION AND DRAINAGE

The finish surfaces around all structures should slope away from the building and toward appropriate drop inlets or other surface drainage devices. It is recommended that within ten (10) feet of the building a minimum slope of five percent (5%) be used for soil subgrades and one percent (1%) be used for pavements. These grades should be maintained for the life of the structures.

Landscaping and downspouts should be planned to prevent discharge adjacent to the building. Instead, water flow should be conveyed and re-routed to discharge areas away from any improvements.

Backfill adjacent to the proposed building perimeters should be properly compacted to minimize water infiltration into the foundation soils.

CONSTRUCTION SPECIFICATIONS

All work on-site shall be governed by the latest edition of the International Building Code (IBC) as accepted by Carson City, except where modified herein.

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

LIMITATIONS

This report has been prepared in accordance with the currently accepted engineering practices in Northern Nevada. 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 the Jack and Colleen Britton ("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 from the use of the report in the preparation of an Engineer's Cost Estimate.

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, 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.

As explained above, subsurface variations may exist and as such, beyond the express findings located in this report, no warranties express, or implied, are made by this report. No affirmation of fact, including but not limited to statements regarding suitability for use of performance shall be deemed to be a warranty or guaranty for any purpose.

Michael Hartley, EI
Geotechnician
Lumos and Associates Inc.

Mitch Burns, P.E.
Materials Engineering Manager
Lumos and Associates Inc.

LUMOS & ASSOCIATES

References

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

DePolo, Craig M. and DePolo, Diane M., 1998, Earthquakes in Nevada 1852-1996, Map 111, Nevada Bureau of Mines and Geology, Reno, NV

International Conference of Building Officials, 2012, International Building Code (IBC), ICBO, Whittier, CA

Katzer, Terry, 1980, General Ground Water Map, Carson City Quadrangle, U.S. Geologic Survey, Carson City, NV

Naval Facilities Engineering Command, 1986, Design Manual 7.01

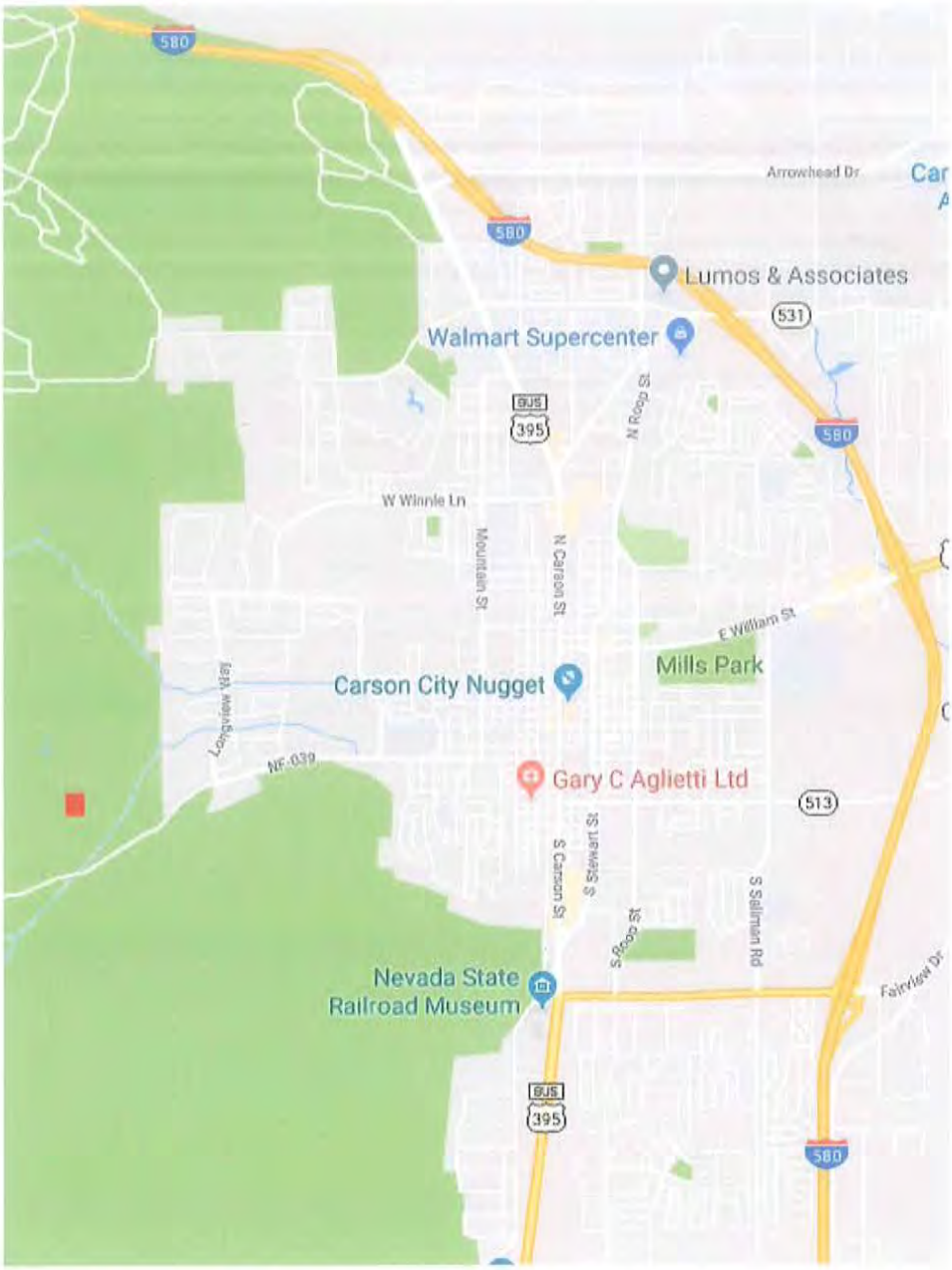
Naval Facilities Engineering Command, 1986, Design Manual 7.02

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

Trexler, Denis T., 1977, Carson City Folio Geologic Map, Nevada Bureau of Mines and Geology, Reno, Nevada

US Army Corps of Engineers, 2003, Slope Stability Engineer Manual, Department of the Army, Washington, DC

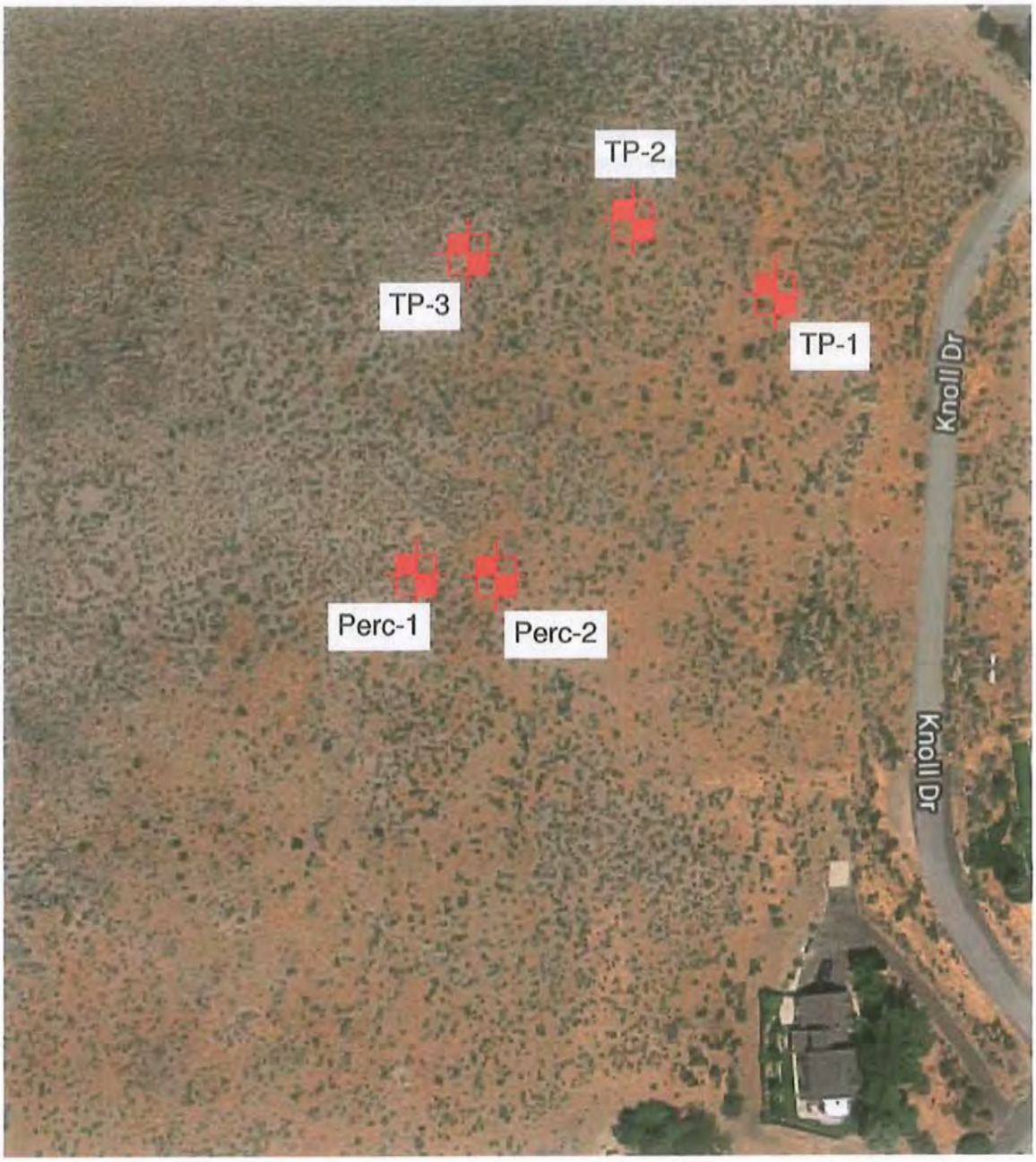
USGS 2002 Website, www.eqdesign.cr.usgs.gov



Approximate location of project:

Scale: NTS

Lumos and Associates 800 E College Parkway Carson City, NV 89706 (775) 883-7077 Fax:	19 & 20 Knoll Drive **Vicinity Map** Job Number: 9407.001 Date: May, 2018	**PLATE** **1**



Approximate Excavation Pit Location:

Scale: NTS

Lumos and Associates 800 E College Parkway Carson City, NV 89706 (775) 883-7077 Fax:	19 & 20 Knoll Drive **Site Map** Job Number: 9407.001 Date: May, 2018	**PLATE** **2**

MODIFIED MERCALLI SCALE		RICHTER SCALE: MAGNITUDE
INTENSITY	EFFECT	
I	*Not felt except by a very few under especially favorable conditions.*	1.5
II	*Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.*	2
III	*Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.*	2.5
IV	*Felt indoors by many, outdoors by few during the day. At night some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.*	3
V	*Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.*	3.5
VI	*Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.*	4
VII	*Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.*	4.5
VIII	*Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture moved.*	5
IX	*Damage considerable in specially designed structures, well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.*	5.5
X	*Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.*	6
XI	*Few, if any, (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.*	6.5
XII	*Damage total. Lines of sight and level are distorted. Objects thrown into the air.*	7 7.5 8.0

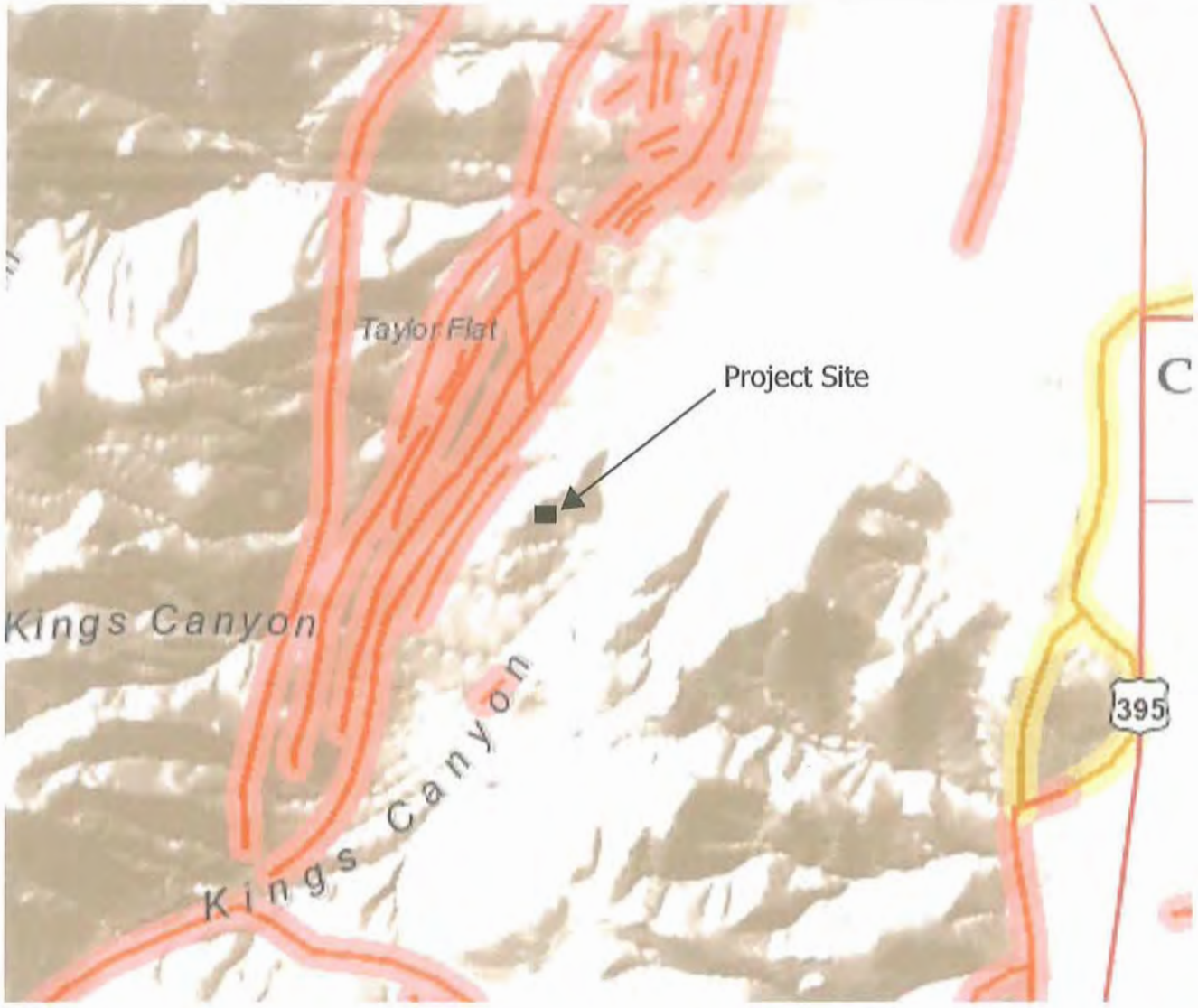
LUMOS & ASSOCIATES
Lumos and Associates
800 E College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

Modified Mercalli Intensity Scale

Job Number: 9407.001 Date: May, 2018

PLATE 3



Quaternary Faults

Historical Ruptures
- <150 years

Quaternary Faults by Age
- <15,000 years
- <130,000 years
- <750,000 years
- <1.8 million years
- Class B faults
- Unclassified

100m Buffer

Historical Ruptures - 100m Buffer
- <150

Quaternary Faults by Age - 100m Buffer
- <15,000
- <130,000
- <750,000
- <1,800,000
- Class B faults
- Unclassified

LUMOS & ASSOCIATES

Lumos and Associates
800 E. College Parkway
Carson City, NV 89706
(775) 883-7077
Fax: (775) 883-7114
bsexton@lumosinc.com

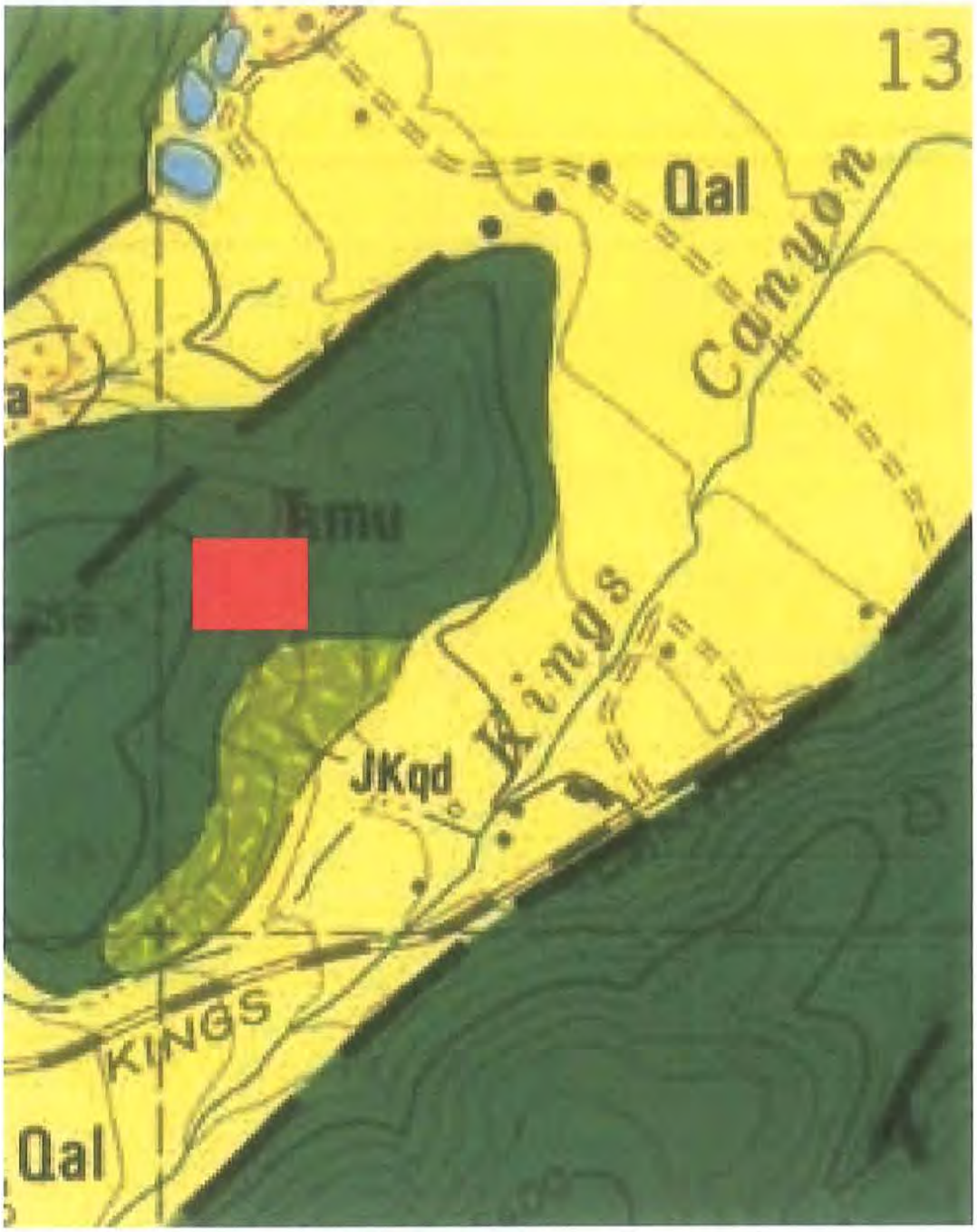
19 & 20 Knoll Drive

EARTHQUAKE MAP

Job Number: 5407.001

Date: May, 2018

PLATE 4



Rmu **Mafic metavolcanic rocks, undifferentiated.** Grayish-green to greenish-black, fine-grained, sparsely porphyritic, dense and hard metamorphosed mafic andesite flows and volcanic breccia; locally epidote-rich. Includes small, shallow intrusive masses of andesite porphyry and fine-grained diorite.

Approximate location of project:

Scale: NTS

LUMOS & ASSOCIATES **Lumos and Associates** 800 E College Parkway Carson City, NV 89706 (775) 883-7077 Fax:	19 & 20 Knoll Drive **Geologic Map** Job Number: 9407.001 Date: May, 2018	**PLATE** **5**

APPENDIX A

TEST PIT No. TP-1

Logged By: M. Harltey
Date Logged: 5/10/2018
Drill Type: Case Backhoe

Total Depth: 17 feet
Water Depth: No groundwater encountered
Ground Elev.: Not Surveyed

Percolation Test | Split Spoon | Ziplock Sample | California Sampler | Bulk Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	SPT (N) Blows/Foot	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	Direct Shear
			Topsoil 0.5										
		B	**Sand Lean CLAY (CL)** Reddish Brown, Moist, Medium Stiff to Stiff 3.0				28	15	3.7	29.6	66.8	8	
5		B	**Silty SAND (SM)** Tan, Slightly Moist, Medium Dense to Dense Estimated: Trace Gravel to 1/2", 70% Coarse to Fine Sand, 30% Slighlty Plastic Fines 5.5										
		B	**Silty SAND (SM)** Tan, Slightly Moist, Very Dense, Moderately Cemented 13.5				NP	NP	4.5	55.0	40.5		32.2
10													
15		B	**Silty SAND with Gravel (SM)** Greenish Tan, Slightly Moist, Very Dense\ Estimated: 30% Gravel to 3", 50% Coarse to Fine Sand, 20% Non-Plastic Fines 17.0										
			Test pit terminated at 17 feet										

LUMOS TP FULL PAGE KNOLL DRIVE.GPJ US LAB.GDT 5/31/18

LUMOS & ASSOCIATES

Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

LOG OF EXPLORATORY TEST PIT

Job Number: 2007.001

Date: May 2018

PLATE A-1

TEST PIT No. TP-2

Logged By: M. Harltey
Date Logged: 5/10/2018
Drill Type: Case Backhoe

Total Depth: 9 feet
Water Depth: No groundwater encountered
Ground Elev.: Not Surveyed

Percolation Test | Split Spoon | Ziplock Sample | California Sampler | Bulk Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	SPT (N) Blows/Foot	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	Direct Shear
0			**Topsoil**										
1.5			**Silty SAND (SM)** Dark Brown, Moist, Medium Dense Estimated: 60% Coarse to Fine Sand, 40% Slightly Plastic Fines										
3.5		B	**Silty SAND (SM)** Greenish Tan, Slightly Moist, Dense Estimated: 70% Coarse to Fine Sand, 30% Non-Plastic Fines										
5.5		B	**Silty SAND with Gravel (SM)** Greenish Tan, Slightly Moist, Very Dense, Moderately Cemented 1' Diamter boulders at 7.5'.				NP	NP	15.4	53.0	21.5		
9.0		B	Test pit terminated at 9 feet due to refusal.										

LUMOS & ASSOCIATES
Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

LOG OF EXPLORATORY TEST PIT

Job Number: 5407.001

Date: May 2018

PLATE A-2

TEST PIT No. TP-3

Logged By: **M. Harltey**
Date Logged: **5/10/2018**
Drill Type: **Case Backhoe**
Total Depth: **9 feet**
Water Depth: **No groundwater encountered**
Ground Elev.: **Not Surveyed**

Percolation Test | Split Spoon | Ziplock Sample | California Sampler | Bulk Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	SPT (N) Blows/Foot	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	Direct Shear
			Topsoil 1.0										
1			**Silty SAND (SM)** Light Brown, Moist, Medium Dense to Dense Estimated: 70% Coarse to Fine Sand, 30% Non-Plastic Fines										
2													
3		B											
			Weakly cemented from 3.5' to 6'										
4													
5													
6			6.0 **Silty, Clayey SAND (SC-SM)** Gray, Dry, Very Dense										
		B					24	5	12.6	43.0	44.4		
7													
8			1' Diameter boulders at 8.5'.										
9			9.0										

Test pit terminated at 9 feet due to refusal.

LUMOS TP FULL PAGE KNOLL DRIVE.GPJ US LAB.GDT 5/29/18

LUMOS & ASSOCIATES
Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

LOG OF EXPLORATORY TEST PIT

Job Number: 3407.001
Date: May 2018

PLATE
A-3

TEST PIT No. Perc-1

Logged By: M. Harltey
Date Logged: 5/10/2018
Drill Type: Case Backhoe

Total Depth: 13 feet
Water Depth: No groundwater encountered
Ground Elev.: Not Surveyed

Percolation Test | Split Spoon | Ziplock Sample | California Sampler | Bulk Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	SPT (N) Blows/Foot	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	Direct Shear
0			**Topsoil**										
0.5			**Silty SAND with Gravel** Brown, Slightly Moist, Medium Dense Estimated: 20% Gravel, 55% Coarse to Fine Sand, 25% Non-Plastic Sand										
3.5			**Silty SAND (SM)** Gray, Slightly Moist, Medium Dense to Dense Estimated: 60% Coarse to Fine Sand, 40% Non-Plastic Fines										
13.0			Test pit terminated at 13 feet.										

LUMOS TP FULL PAGE KNOLL DRIVE.GPJ US LAB.GDT 5/29/18

LUMOS & ASSOCIATES
Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

LOG OF EXPLORATORY TEST PIT

Job Number: 9407.001 Date: May 2018

PLATE A-4

TEST PIT No. Perc-2

Logged By: M. Harltey
Date Logged: 5/10/2018
Drill Type: Case Backhoe

Total Depth: 13 feet
Water Depth: No groundwater encountered
Ground Elev.: Not Surveyed

Percolation Test | Split Spoon | Ziplock Sample | California Sampler | Bulk Sample | Static Water Table

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION	SPT (N) Blows/Foot	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	Expansion Index	Direct Shear
1			**Topsoil**										
			1.5										
2			**Silty Sand with Gravel (SM)** Light Brown, Slightly Moist, Dense Estimated: 60% Coarse to Fine Sand, 40% Slightly Plastic Fines										
3													
4			4.5										
5			**Silty SAND (SM)** Gray, Slightly Moist, Dense Estimated: 60% Coarse to Fine Sand, 40% Non-Plastic Fines										
6			6.5										
7			**Silty SAND with Gravel (SM)** Gray, Dry, Dense to Very Dense Estimated: 20% Gravel to 3", 50% Coarse to Fine Sand, 30% Non-Plastic Fines										
8													
9													
10													
11													
12													
13			13.0										
			Test pit terminated at 13 feet.										

LUMOS TP FULL PAGE KNOLL DRIVE.GPJ US LAB.GDT 5/29/18

LUMOS & ASSOCIATES
Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

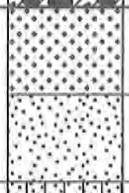
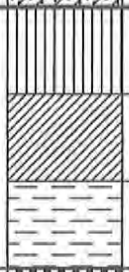
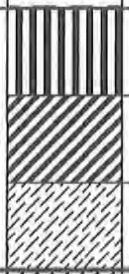
19 & 20 Knoll Drive

LOG OF EXPLORATORY TEST PIT

Job Number: 5107.001 Date: May 2018

PLATE A-5

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
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

LUMOS & ASSOCIATES
Lumos and Associates
800 E College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

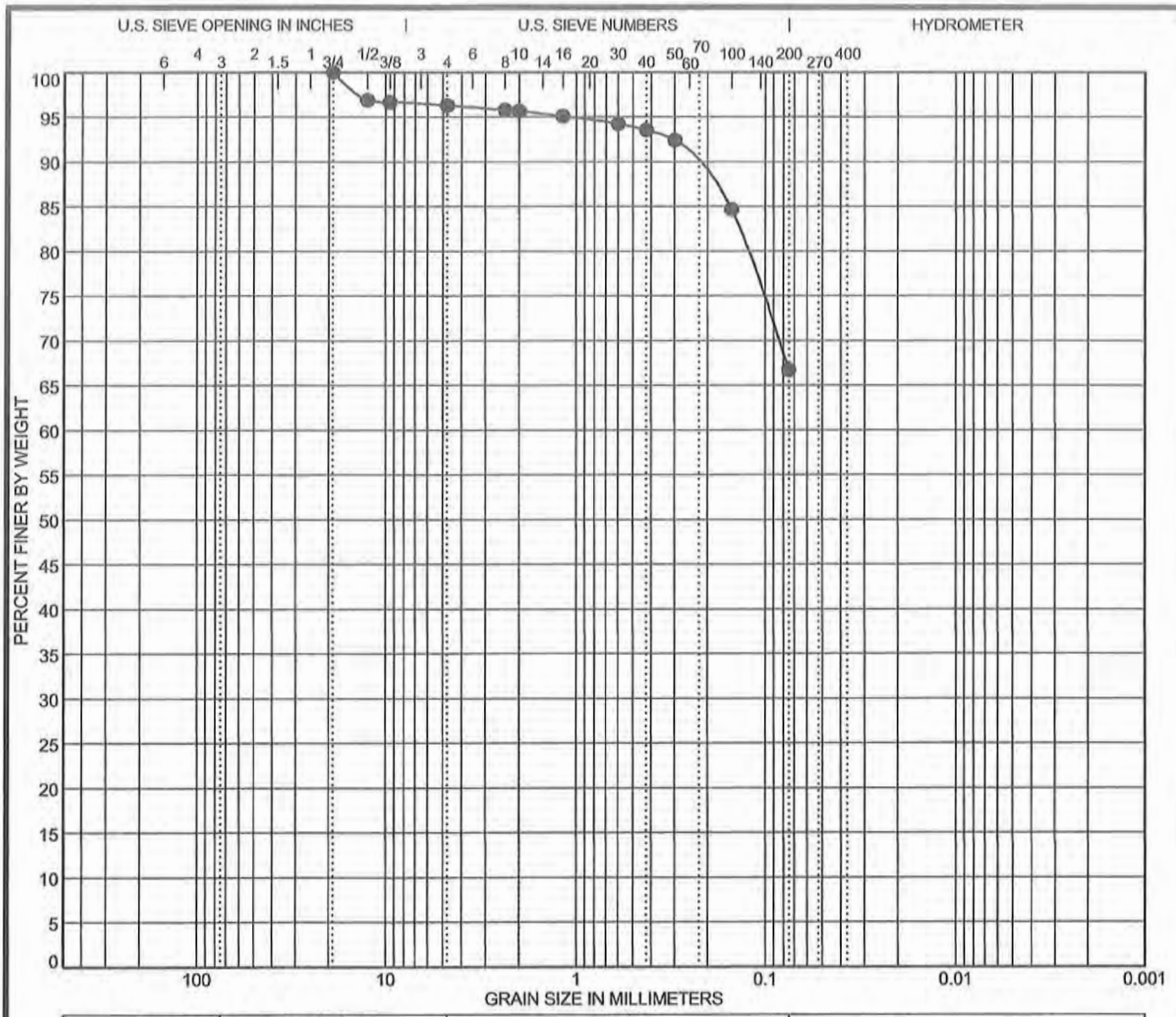
19 & 20 Knoll Drive

Legend

Job Number: 9407.001 Date: May, 2018

PLATE A-6

APPENDIX B



Specimen Identification	Date: 5/14/218								
TP-1	Classification				LL	PL	PI	Cc	Cu
Depth: 1	Sandy Lean CLAY (CL)				28	12	16		
Sample Location	TP-1 from 1' to 1.5'								
USCS	CL								
AASHTO									

Specimen Identification								
TP-1	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
Depth: 1	19				3.7	29.6	66.8	
Natural Moisture	%		S.E.		Absorption %			
R-Value			Durability Index		Soundness			
Perctage of Wear (500 rev)	%		Specific Gravity		Direct Shear			

LUMOS & ASSOCIATES
Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

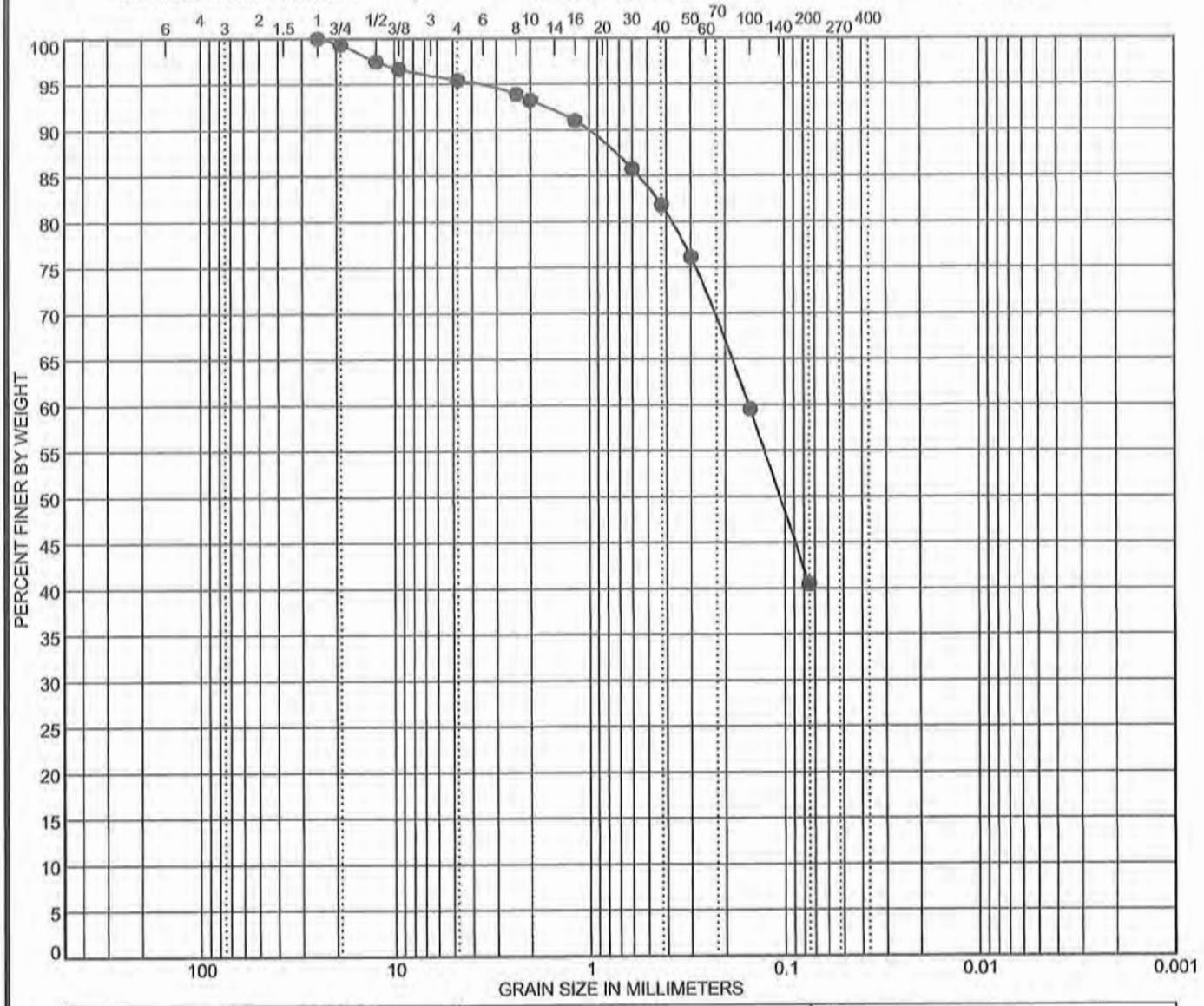
19 & 20 Knoll Drive

GRAIN SIZE DISTRIBUTION

Job Number: 9407.001 Date: May 2018

PLATE B-1.1

LUMOS GRAIN SIZE KNOLL DRIVE.GPJ US LAB.GDT 5/19/18



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Date: 5/14/218							
●	TP-1	Classification				LL	PL	PI	Cc	Cu
	Depth: 5.5	Silty SAND (SM)				NP	NP	NP		
	Sample Location	TP-1 from 5.5' to 6'								
	USCS	SM								
	AASHTO									

	Specimen Identification								
●	TP-1	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	Depth: 5.5	25	0.153			4.5	55.0	40.5	

Natural Moisture	%	S.E.		Absorption %	
R-Value		Durability Index		Soundness	
Perctage of Wear (500 rev)	%	Specific Gravity		Direct Shear	31.1

LUMOS & ASSOCIATES

Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

GRAIN SIZE DISTRIBUTION

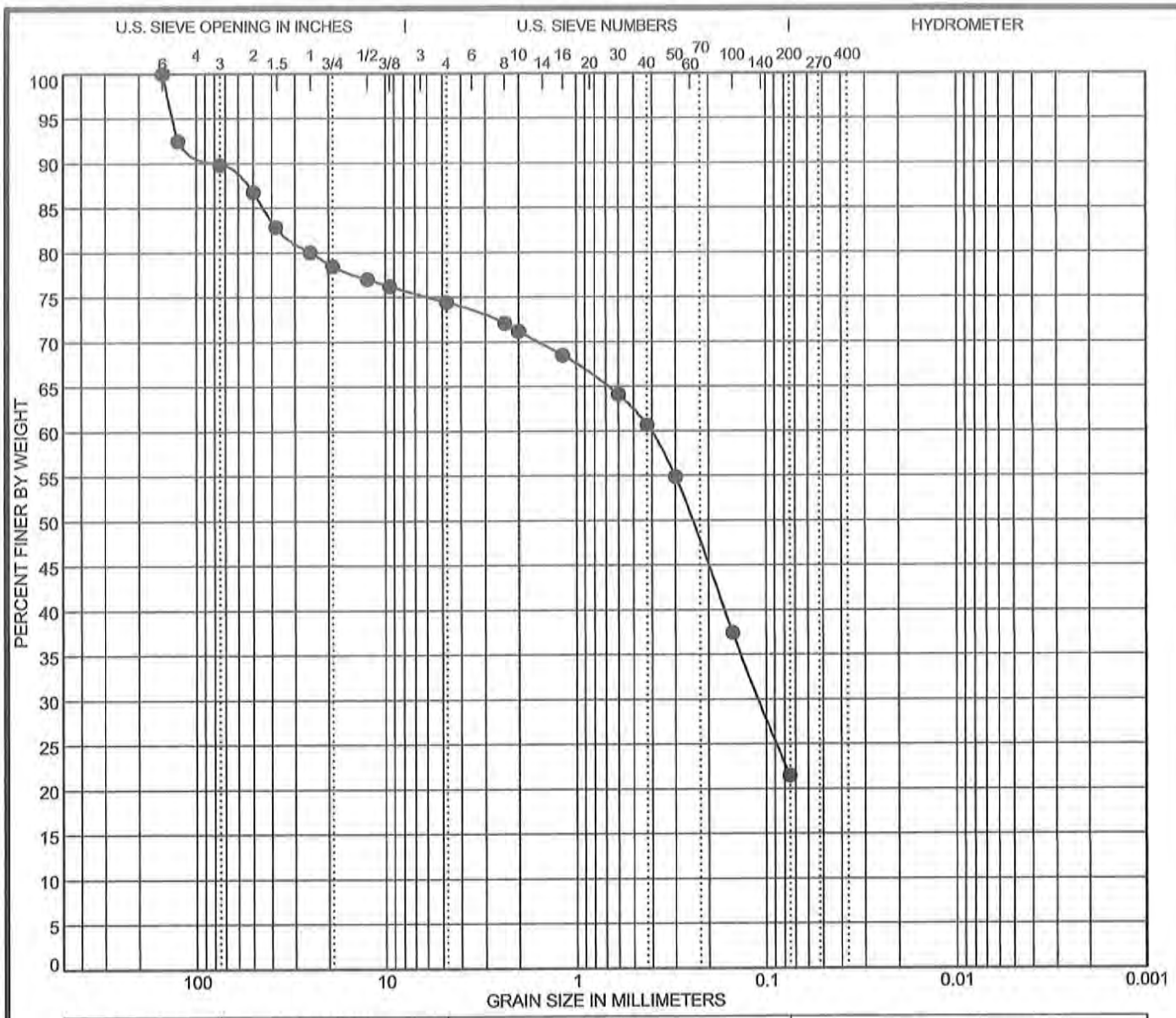
Job Number: 9407.001

Date: May 2018

PLATE

B-1.2

LUMOS GRAIN SIZE KNOLL DRIVE.GPJ US LAB.GDT 5/19/18



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Date: 5/14/2018								
● TP-2	Classification					LL	PL	PI	Cc	Cu
Depth: 6	Silty SAND with Gravel (SM)					NP	NP	NP		
Sample Location	TP-2 from 6' to 6.5'									
USCS	SM									
AASHTO										

Specimen Identification								
● TP-2	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
Depth: 6	150	0.408	0.109		15.4	53.0	21.5	
Natural Moisture	%		S.E.		Absorption %			
R-Value			Durability Index		Soundness			
Perctage of Wear (500 rev)	%		Specific Gravity		Direct Shear			

LUMOS_GRAIN SIZE KNOLL DRIVE.GPJ US LAB.GDT 5/19/18

LUMOS & ASSOCIATES
Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

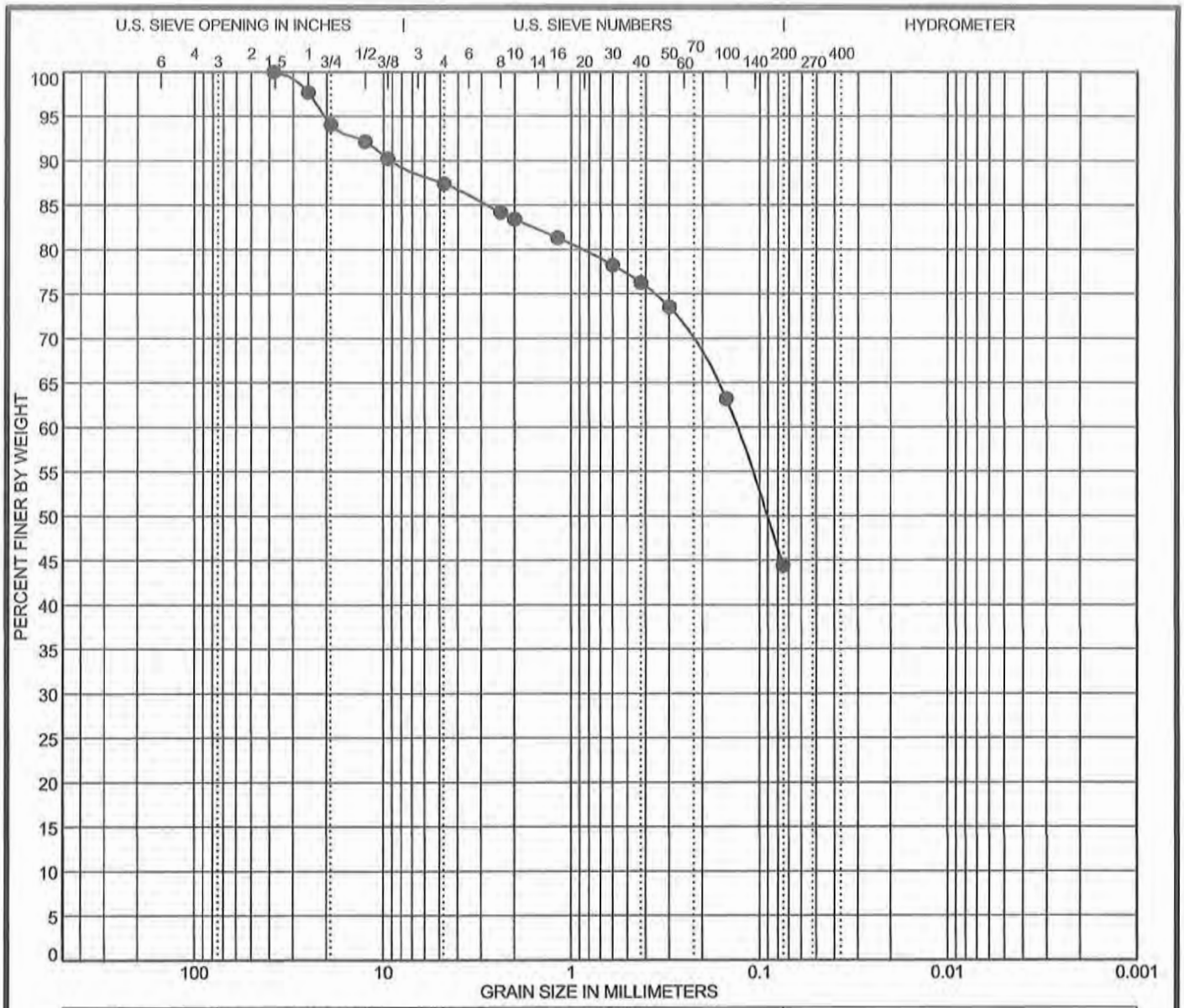
19 & 20 Knoll Drive

GRAIN SIZE DISTRIBUTION

Job Number: 9407.001

Date: May 2018

PLATE B-1.3



Specimen Identification	Date: 5/14/2018								
● TP-3	Classification				LL	PL	PI	Cc	Cu
Depth: 6.5	Silty, Clayey, SAND (SC-SM)				24	19	5		
Sample Location	TP-3 from 6.5' to 7'								
USCS	SM								
AASHTO									

Specimen Identification								
● TP-3	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
Depth: 6.5	38.1	0.133			12.6	43.0	44.4	
Natural Moisture	%		S.E.		Absorption %			
R-Value			Durability Index		Soundness			
Perctage of Wear (500 rev)	%		Specific Gravity		Direct Shear			

LUMOS & ASSOCIATES
Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

GRAIN SIZE DISTRIBUTION

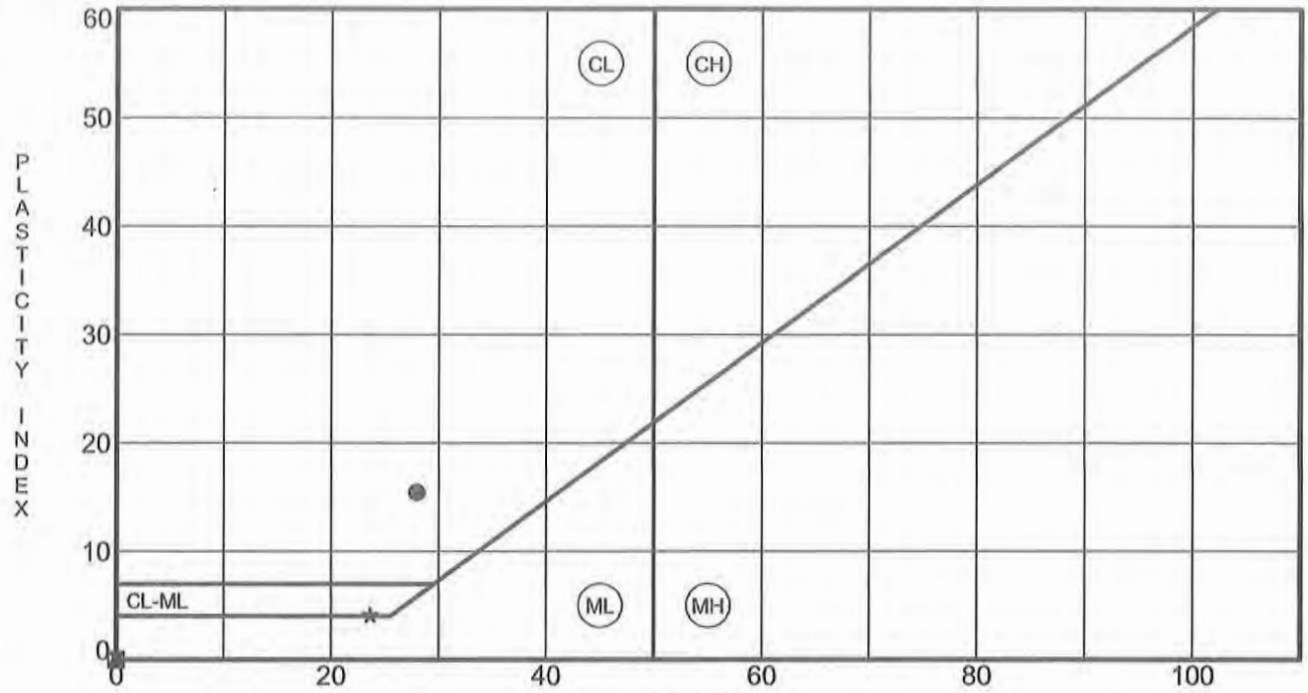
Job Number: 9407.001

Date: May 2018

PLATE

B-1.4

LUMOS_GRAIN_SIZE_KNOLL_DRIVE.GPJ US_LAB.GDT 5/19/18



	Specimen Identification		LL	PL	PI	Fines	Classification
●	TP-1	1.0	28	12	16	67	Sandy Lean CLAY (CL)
⊠	TP-1	5.5	NP	NP	NP	40	Silty SAND (SM)
▲	TP-2	6.0	NP	NP	NP	21	Silty SAND with Gravel (SM)
★	TP-3	6.5	24	19	5	44	Silty, Clayey, SAND (SC-SM)

LUMOS & ASSOCIATES

Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

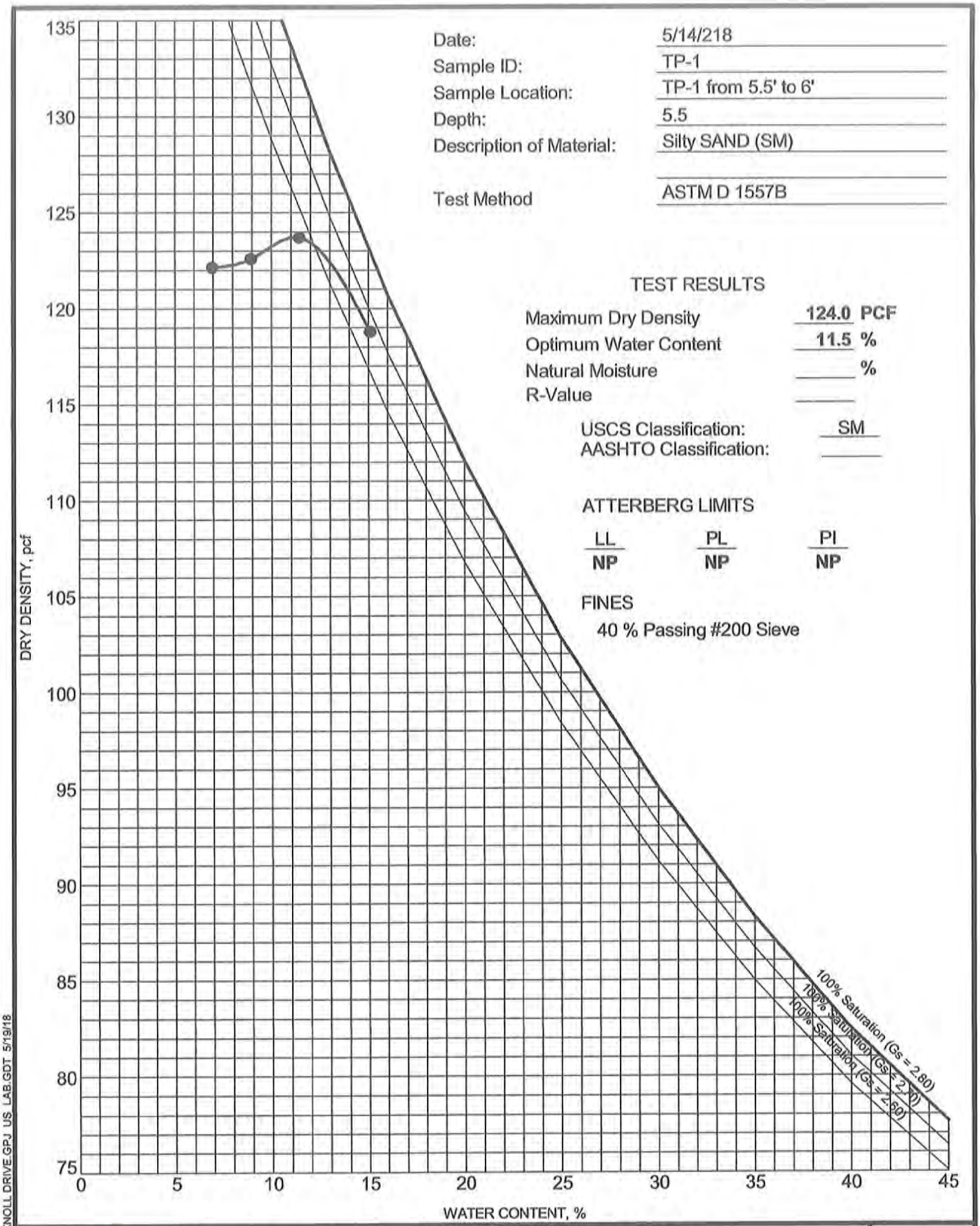
ATTERBERG LIMITS' RESULTS

Job Number: 9407.001 Date: May 2018

PLATE

B-2

LUMOS_ATTERBERG_LIMITS_KNOLL DRIVE.GPJ_US_LAB.GDT 5/19/18



Date: 5/14/218
Sample ID: TP-1
Sample Location: TP-1 from 5.5' to 6'
Depth: 5.5
Description of Material: Silty SAND (SM)

Test Method: ASTM D 1557B

TEST RESULTS

Maximum Dry Density	124.0 PCF
Optimum Water Content	11.5 %
Natural Moisture	%
R-Value	
USCS Classification:	SM
AASHTO Classification:	

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

FINES

40 % Passing #200 Sieve

LUMOS COMPACTION KNOLL DRIVE.GPJ US_LAB.GDT 5/19/18

LUMOS & ASSOCIATES
Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

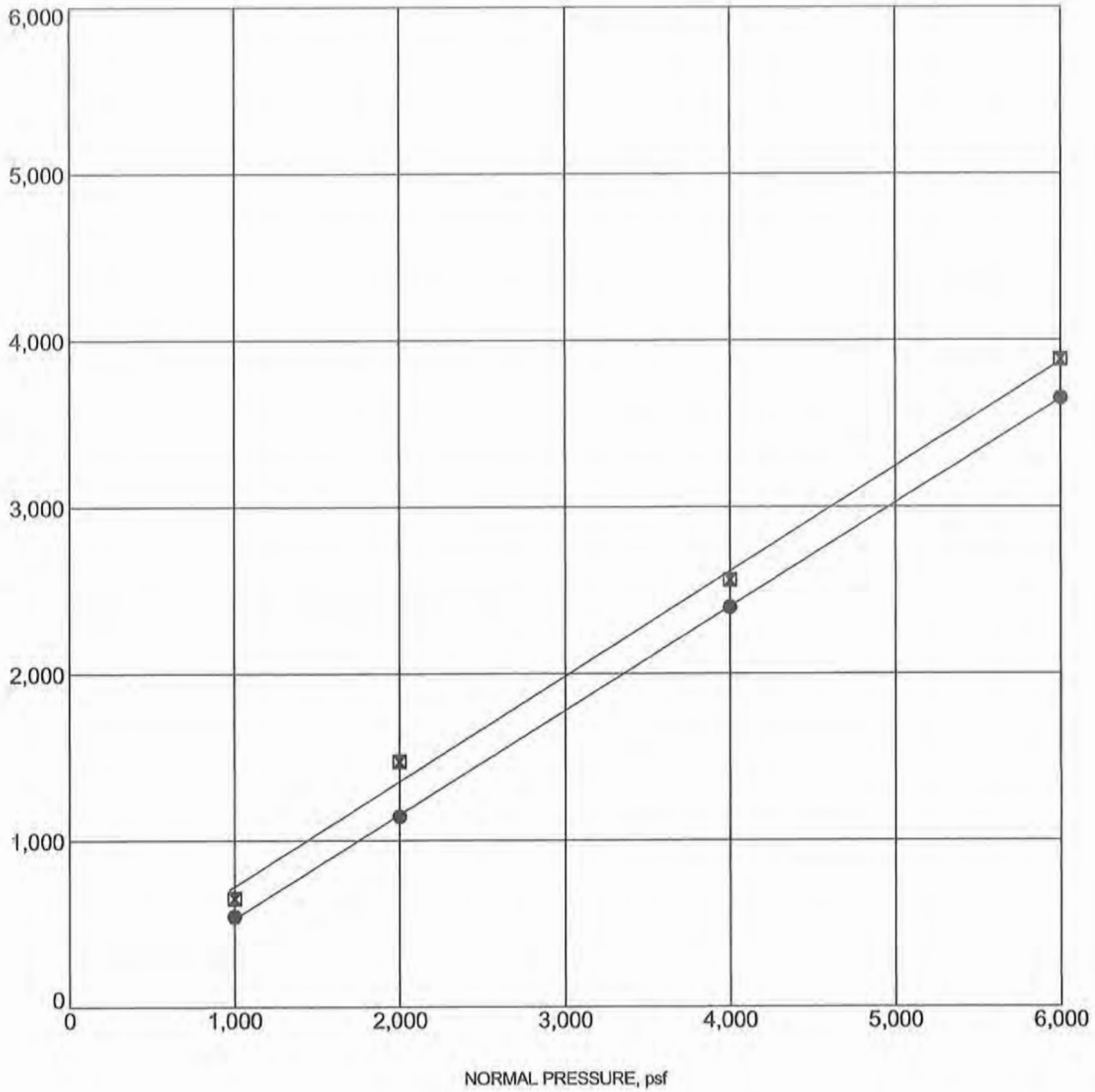
MOISTURE-DENSITY CURVE

Job Number: 9407.001

Date: May 2018

PLATE

B-3



Specimen Identification			Classification	γ_d	MC%	c	ϕ
●	TP-1	5.5	Silty SAND (SM) Test Run Saturated	124	12	0.0	31.1
⊠	TP-1	5.5	Silty SAND (SM) Test Run Near Optimum	124	12	95.2	32.2

LUMOS & ASSOCIATES

Lumos and Associates
800 East College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

DIRECT SHEAR TEST

Job Number: 9407.001

Date: May 2018

PLATE

B-4

LUMOS DIRECT SHEAR KNOLL DRIVE.GPJ US LAB.GDT 5/31/18

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

Analytical Report

Workorder#: 18050832
Date Reported: 5/24/2018

Client: Lumos and Associates-C.C
Project Name: 9407.001 / MTB - TP-2, 6' - 6.5'
PO #: 9407.001/MTB

Sampled By: M. Hartley

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
18050832-01	TP-2, 6' - 6.5'	05/10/2018 0:00	5/15/2018

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	EPA 300.0	<5	mg/Kg	10	JF	05/23/2018 10:21	
pH	SW-846 9045D	6.89	pH Units		LRB	05/16/2018 14:25	
pH Temperature	SW-846 9045D	22.0	°C		LRB	05/16/2018 14:25	
Resistivity	AASHTO T288	23000	Ohms-cm		KK	05/23/2018 12:47	
Sodium	ASTM D2791	< 0.01	%	0.01	LRB	05/23/2018 15:12	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	LRB	05/23/2018 16:18	
Sulfate	SM4500 SO4E	< 0.01	%	0.01	LRB	05/23/2018 15:13	

LUMOS & ASSOCIATES

Lumos and Associates
800 E College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

Soluble Sulfates

Job Number: 9407.001 Date: May, 2018

PLATE
B-5

APPENDIX C

USGS Design Maps Summary Report

User-Specified Input

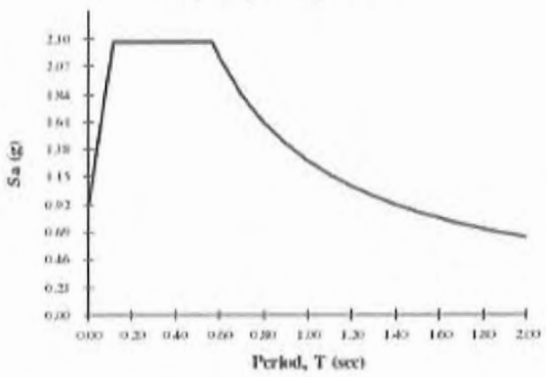
Report Title	19 & 20 Knoll Drive Fri May 18, 2018 22:14:27 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	39.1607°N, 119.80499°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS-Provided Output

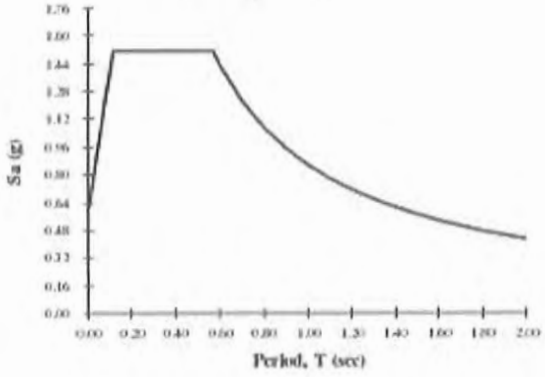
S_S =	2.273 g	S_{MS} =	2.273 g	S_{DS} =	1.515 g
S_1 =	0.857 g	S_{M1} =	1.286 g	S_{D1} =	0.857 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



LUMOS & ASSOCIATES
Lumos and Associates
800 E College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive
Earthquake Hazard Assessment
Job Number: 9407.001 Date: May, 2018

PLATE C-1

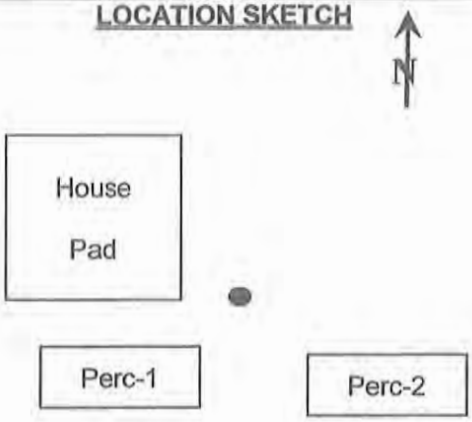
APPENDIX D

PERCOLATION TEST

PROJECT: 19 & 20 Knoll Drive Grading Plan JOB # 9401.007 DATE: 5/11/2018

TEST HOLE NO: 1 LOCATION: Perc-2 BY: M. Hartley

LOCATION SKETCH



BORE LOG

DEPTH (FT)	SOIL DESCRIPTION
0	0-0.5' Topsoil 0.5-3.5' Brown Silty SAND with Gravel (SM) Gravel to 3"
5	3.5-13' Gray Silty SAND (SM)
13	

GWS ENCOUNTERED? YES NO

DEPTH TO GWS

SURFACE ELEVATION: EG

DEPTH TO TEST: 5 feet

TIME OF 1st SATURATION (12" WATER) (1): 12:09

TIME WATER DISAPPEARS: >10 minutes

TIME OF REFILL **Run Presoak for 4 Hours**

TIME WATER DISAPPEARS TIME TO DRAIN (MIN.) (2)

IF 2 IS LESS THAN 10 MIN. AND TEST IS IN SANDY SOIL, IMMEDIATELY PROCEED WITH PERCOLATION TEST USING 10 MIN. READ/FILL INTERVALS. OTHERWISE, PROCEED WITH 4-HOUR TEST BETWEEN 16 AND 30 HOURS AFTER 1

TIME	INTERVAL	DEPTH TO WATER	CHANGE IN WATER	
BEGIN TEST	in Minutes	INITIAL DEPTH	INCHES	MIN/IN
8:17	30	6.5	3.25	9.2
8:47		9.75		
8:47	30	REFILL TO 6.875	2.75	10.9
9:17		9.625		
9:17	30	REFILL TO 6	3.125	9.6
9:47		9.125		
9:47	30	REFILL TO 6.625	3.125	9.6
10:17		9.75		
		REFILL TO		
		REFILL TO		
		REFILL TO		
	3	REFILL TO	4	
		FINAL		

PERCOLATION RATE = 3 / 4 = 9.6 MIN. / INCH

LUMOS & ASSOCIATES
Lumos and Associates
800 E. College Parkway
Carson City, NV 89706
(775) 883-7077
Fax: (775) 883-7114
bsexton@lumosinc.com

19 & 20 Knoll Drive Grading Plan

PERCOLATION TEST

Job Number: 9407.007 Date: 5/11/2018

PLATE

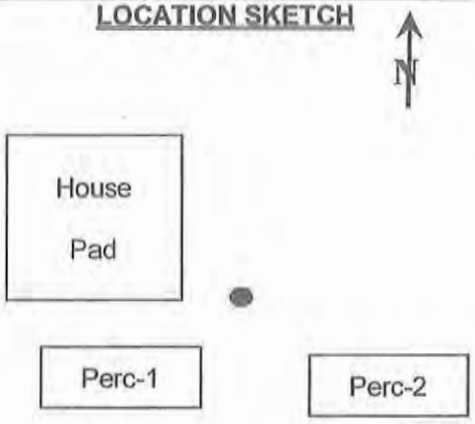
D-1

PERCOLATION TEST

PROJECT: 19 & 20 Knoll Drive Grading Plan JOB # 9401.007 DATE: 5/11/2018

TEST HOLE NO: 2 LOCATION: Perc-1 BY: M. Hartley

LOCATION SKETCH



BORE LOG

DEPTH (FT)	SOIL DESCRIPTION
0	0-0.5' Topsoil 0.5-3.5' Brown Silty SAND with Gravel (SM) Gravel to 3"
5	3.5-13' Gray Silty SAND (SM)
13	

GWS ENCOUNTERED? YES NO

DEPTH TO GWS

SURFACE ELEVATION: EG

DEPTH TO TEST: 3 feet

TIME OF 1st SATURATION (12" WATER) (1): 12:09

TIME WATER DISAPPEARS: >10 minutes

TIME OF REFILL **Run Presoak for 4 Hours**

TIME WATER DISAPPEARS TIME TO DRAIN (MIN.) (2)

IF 2 IS LESS THAN 10 MIN. AND TEST IS IN SANDY SOIL, IMMEDIATELY PROCEED WITH PERCOLATION TEST USING 10 MIN. READ/FILL INTERVALS. OTHERWISE, PROCEED WITH 4-HOUR TEST BETWEEN 16 AND 30 HOURS AFTER 1

TIME	INTERVAL	DEPTH TO WATER	CHANGE IN WATER	
BEGIN TEST	in Minutes	INITIAL DEPTH	INCHES	MIN/IN
8:17	30	6.625	2.5	12.0
8:47		9.125		
8:47	30	REFILL TO 6.5	2.25	13.3
9:17		8.75		
9:17	30	REFILL TO 6.375	2.375	12.6
9:47		8.75		
9:47	30	REFILL TO 6	2.125	14.1
10:17		8.125		
10:17	30	REFILL TO 5.75	2.125	14.1
10:47		7.875		
		REFILL TO		
		REFILL TO		
	3	REFILL TO	4	
		FINAL		

PERCOLATION RATE = 3 / 4 = 14.1 MIN. / INCH

LUMOS & ASSOCIATES
Lumos and Associates
800 E. College Parkway
Carson City, NV 89706
(775) 883-7077
Fax: (775) 883-7114
bsexton@lumosinc.com

19 & 20 Knoll Drive Grading Plan

PERCOLATION TEST

Job Number: 9107.001 Date: 5/11/2018

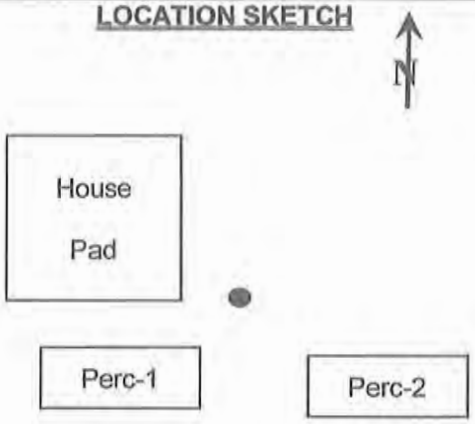
PLATE D-2

PERCOLATION TEST

PROJECT: 19 & 20 Knoll Drive Grading Plan JOB # 9401.007 DATE: 5/11/2018

TEST HOLE NO: 3 LOCATION: Perc-2 BY: M. Hartley

LOCATION SKETCH



BORE LOG

DEPTH (FT)	SOIL DESCRIPTION
0	0-0.5' Topsoil
	0.5-4.5' Brown Silty SAND (SM)
5	
	6.5-13' Gray Silty SAND with Gravel (SM)
	Gravel to 3"
13	

GWS ENCOUNTERED? YES NO

DEPTH TO GWS

SURFACE ELEVATION: EG

DEPTH TO TEST: 4 feet

TIME OF 1st SATURATION (12" WATER) (1): 12:09

TIME WATER DISAPPEARS: >10 minutes

TIME OF REFILL **Run Presoak for 4 Hours**

TIME WATER DISAPPEARS TIME TO DRAIN (MIN.) (2)

IF 2 IS LESS THAN 10 MIN. AND TEST IS IN SANDY SOIL, IMMEDIATELY PROCEED WITH PERCOLATION TEST USING 10 MIN. READ/FILL INTERVALS. OTHERWISE, PROCEED WITH 4-HOUR TEST BETWEEN 16 AND 30 HOURS AFTER 1

TIME	INTERVAL	DEPTH TO WATER		CHANGE IN WATER	
BEGIN TEST	in Minutes	INITIAL DEPTH		INCHES	MIN/IN
8:50	10		7.125	1.75	5.7
9:00			8.875		
9:00	10	REFILL TO	7.375	1.5	6.7
9:10			8.875		
9:10	10	REFILL TO	6.625	1.625	6.2
9:20			8.25		
9:20	10	REFILL TO	6.125	1.5	6.7
9:30			7.625		
9:30	10	REFILL TO	6.75	1.625	6.2
9:40			8.375		
9:40	10	REFILL TO	6.75	1.125	8.9
9:50			7.875		
9:50	10	REFILL TO	6.75	1.375	7.3
10:00			8.125		
	3	REFILL TO		4	
		FINAL			

PERCOLATION RATE = 3 / 4 = 7.3 MIN. / INCH

LUMOS & ASSOCIATES
Lumos and Associates
800 E. College Parkway
Carson City, NV 89706
(775) 883-7077
Fax: (775) 883-7114
bsexton@lumosinc.com

19 & 20 Knoll Drive Grading Plan

PERCOLATION TEST

Job Number: 9401.001 Date: 5/11/2018

PLATE

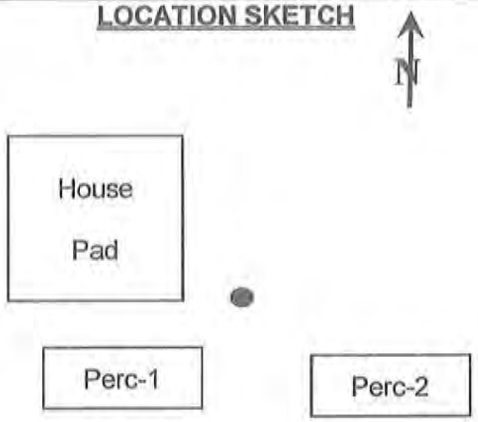
D-3

PERCOLATION TEST

PROJECT: 19 & 20 Knoll Drive Grading Plan JOB # 9401.007 DATE: 5/11/2018

TEST HOLE NO: 4 LOCATION: Perc-2 BY: M. Hartley

LOCATION SKETCH



BORE LOG

DEPTH (FT)	SOIL DESCRIPTION
0	0-0.5' Topsoil 0.5-4.5' Brown Silty SAND (SM)
5	
	6.5-13' Gray Silty SAND with Gravel (SM) Gravel to 3"
13	

GWS ENCOUNTERED? YES NO

DEPTH TO GWS_____

SURFACE ELEVATION: EG

DEPTH TO TEST: 2 feet

TIME OF 1st SATURATION (12" WATER) (1): 12:09

TIME WATER DISAPPEARS: >10 minutes

TIME OF REFILL **Run Presoak for 4 Hours**

TIME WATER DISAPPEARS TIME TO DRAIN (MIN.) (2)

IF 2 IS LESS THAN 10 MIN. AND TEST IS IN SANDY SOIL, IMMEDIATELY PROCEED WITH PERCOLATION TEST USING 10 MIN. READ/FILL INTERVALS. OTHERWISE, PROCEED WITH 4-HOUR TEST BETWEEN 16 AND 30 HOURS AFTER 1

TIME	INTERVAL	DEPTH TO WATER	CHANGE IN WATER	
BEGIN TEST	in Minutes	INITIAL DEPTH	INCHES	MIN/IN
8:50	30	6.875	3.5	8.6
9:00		10.375		
9:00	30	REFILL TO 6.5	2.75	10.9
9:10		9.25		
9:10	30	REFILL TO 6.375	2.625	11.4
9:20		9		
9:20	30	REFILL TO 6.125	2.375	12.6
9:30		8.5		
9:30	30	REFILL TO 6.125	2.375	12.6
9:40		8.5		
		REFILL TO		
		REFILL TO		
	3	REFILL TO	4	
		FINAL		

PERCOLATION RATE = 3 / 4 = 12.6 MIN. / INCH

LUMOS & ASSOCIATES
Lumos and Associates
800 E. College Parkway
Carson City, NV 89706
(775) 883-7077
Fax: (775) 883-7114
bsexton@lumosinc.com

19 & 20 Knoll Drive Grading Plan

PERCOLATION TEST

Job Number: 9407.001 Date: 5/11/2018

PLATE

D-4

APPENDIX E

$\Phi = 32.2$

$c = 95.2$ psf

$\gamma = 130$ psf

$H = 20$ feet

$H_w = 0$ feet $H_w' = 12$ feet

$q = 200$ psf

$P_d = \frac{\gamma * H + q - \gamma_w * H_w}{Mq * Mw * Mt}$

$\beta = 33^o$ for 1.5:1 slope

$M_q = 0.99$

$M_w = 1.0$

$M_t = 0.99$

$Pd = \frac{130pcf * 20ft + 200psf - 62.4pcf * 0}{0.99 * 1 * 0.99} = 2{,}856.9$ psf

$M_q = 0.99$

$M_w' = 0.95$

$P_e = \frac{\gamma * H + q - \gamma_w * H_w}{M_q * M_w'}$

$P_e = \frac{130pcf * 20\,feet + 200psf - 62.4pcf * 12\,feet}{0.99 * 0.95} = 2181.0$ psf

$\lambda_{c\phi} = \frac{P_e * \tan(\theta)}{c} = \frac{2181.0\,psf * \tan(32.2)}{95.2psf} = 14.4 \Rightarrow N_{cf} = 33$

$F = N_{cf} * \frac{c}{P_e} = 33 * \frac{95.2psf}{2\,856.9\,psf} = 1.1 \Rightarrow$ NO GOOD

LUMOS & ASSOCIATES

Lumos and Associates

800 E College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

Slope Stability Calculations

Job Number: 9407.001 Date: May, 2018

PLATE E-1

$\beta = 30^0$ for 1.75:1 slope

$M_q = 0.99$

$M_w = 1.0$

$M_t = 0.99$

$Pd = \frac{130pcf*20ft+200psf-62.4pcf*0}{0.99*1*0.99} = 2{,}856.9$ psf

$M_q = 0.99$

$M_w' = 0.95$

$P_e = \frac{130pcf*20\ feet+200psf-62.4pcf*12\ feet}{0.99*0.95} = 2181.0$ ps

$\lambda_{c\phi} = \frac{2181.0\ psf*\tan(32.2)}{95.2psf} = 14.4 \Rightarrow N_{cf} = 39$

$F = N_{cf} * \frac{c}{P_d} = 39 * \frac{95.2psf}{2{,}856.9\ psf} = 1.3 \Rightarrow$ NO GOOD

$\beta = 27^0$ for 2:1 slope

$M_q = 0.99$

$M_w = 1.0$

$M_t = 0.99$

$Pd = \frac{130pcf*20ft+200psf-62.4pcf*0}{0.99*1*0.99} = 2{,}856.9$ psf

$M_q = 0.99$

$M_w' = 0.95$

$P_e = \frac{130pcf*20\ feet+200psf-62.4pcf*12\ feet}{0.99*0.95} = 2181.0$ psf

$\lambda_{c\phi} = \frac{2181.0\ psf*\tan(32.2)}{95.2psf} = 14.4 \Rightarrow N_{cf} = 44$

$F = N_{cf} * \frac{c}{P_d} = 44 * \frac{95.2psf}{2{,}856.9\ psf} = 1.5 \Rightarrow$ OKAY

LUMOS & ASSOCIATES
Lumos and Associates
800 E College Parkway
Carson City, NV 89706
(775) 883-7077
Fax:

19 & 20 Knoll Drive

Slope Stability Calculations

Job Number: 9407.001 Date: May, 2018

PLATE
E-2

JACK AND COLLEEN BRITTON

19 & 20 KNOLL DRIVE SITE GRADING PROJECT

APN: 007-131-19 / 007-131-20

EMERGENCY CONTACT:

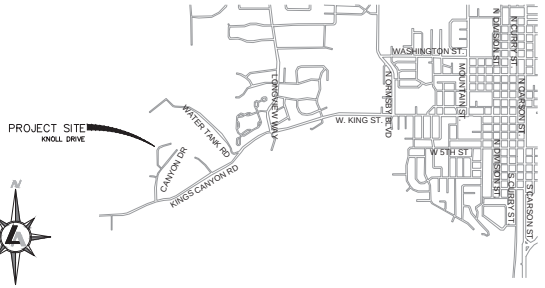
RON KIPP
ARMAC CONSTRUCTION, LLC
PO BOX 4616
CARSON CITY, NV 89702
PH.: 775.884.3053

1

OWNER/DEVELOPER:

JACK AND COLLEEN BRITTON
3937 SIERRA VISTA DRIVE
VACAVILLE, CA 95688
PH.: 707.486.3944
EMAIL: JWBRITTON181@GMAIL.COM

LOCATION MAP



VICINITY MAP

APPROVED BY:

CITY OF CARSON, ENGINEER — DATE

CARSON CITY FIRE PROTECTION DISTRICT — DATE

JACK BRITTON — DATE

ENGINEER

LUMOS & ASSOCIATES
308 N. CURRY ST., STE. 200
CARSON CITY, NEVADA 89706
TEL: 775.883.7077

BASIS OF BEARING:

THE BASIS OF BEARINGS FOR THIS SURVEY IS NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE NAD83(94) BASED UPON REAL TIME KINEMATIC GPS OBSERVATIONS, OBSERVED FEBRUARY 21, 2018 USING A SURVEY GRADE DUAL FREQUENCY GPS RECEIVER FROM THE CARSON CITY CONTROL MONUMENT NO. CC059 MODIFIED BY A COMBINED FACTOR OF 1.0002, SCALED FROM 0.00N ,0.00E AND CONVERTED TO U.S. SURVEY FEET. ALL DIMENSIONS ON THIS MAP ARE GROUND DISTANCES.

BASIS OF ELEVATION:

DATUM: NAVD 88
PROJECT BENCHMARK = CARSON CITY CONTROL MONUMENT NO. CC059 HAVING AN ELEVATION OF 4899.15

811
Know what's below.
Call before you dig.

SHEET INDEX:

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

12-18-18

JACK AND COLLEEN BRITTON
19 & 20 KNOLL DRIVE
SITE GRADING PROJECT
TITLE SHEET
NEVADA
CARSON CITY

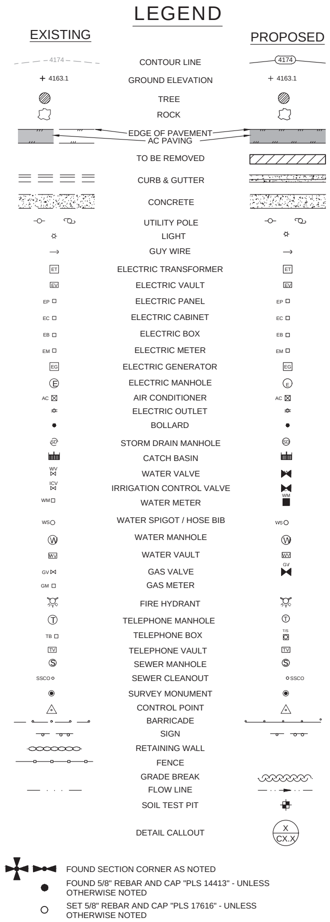
REV	DATE	DESCRIPTION	BY
1	10/1/18	CITY COMMENTS	RS

PERMIT SET
OCTOBER 30, 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 N/A
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C1.0

DRAWN BY: KLN
DESIGNED BY: KLN
CHECKED BY: RS
JOB NO.: 9407.000



Know what's **below.**
Call before you dig.

ABBREVIATIONS

AC	ASPHALT CONCRETE
ACP	ASBESTOS CEMENT PIPE
AGG	AGGREGATE
BC	BEGIN CURVE (HORIZONTAL)
BOW	BOTTOM OF WALL
BF, BOF	BOTTOM OF FOOTING
BV	BUTTERFLY VALVE
BVC	BEGIN VERTICAL CURVE
BW	BACK OF WALK
CB	CATCH BASIN
cfs	CUBIC FEET PER SECOND
CF	CUBIC FEET
C&G	CURB AND GUTTER
℄	CENTER LINE
CL	CLASS / CENTER LINE
CMP	CORRUGATED METAL PIPE
COMP	COMPACTION
CONC	CONCRETE
CONTR	CONTRACTOR
CP	CONCRETE PAD
CTV	CABLE TELEVISION
DI	DROP INLET
DIA	DIAMETER
DWY	DRIVEWAY
E	EAST
EA	EACH
EC	END CURVE (HORIZONTAL)
ELL	ELBOW
ELEC	ELECTRICAL
ELEV	ELEVATION
EVC	END VERTICAL CURVE
EX, (E)	EXISTING
EXT	EXTERIOR
FCA	FLANGE COUPLING ADAPTER
FE	FINISH ELEVATION
FES	FLARED END SECTION
FF	FINISH FLOOR
FFC	FRONT FACE OF CURB
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FLG	FLANGE
fps	FEET PER SECOND
FTG	FOOTING
G	GAS
GALV	GALVANIZED
GB	GRADE BREAK
GDW	GRAVEL DRIVEWAY
GD	GROUND
GV	GATE VALVE
H	HANDICAPPED
HGL	HYDRAULIC GRADE LINE
HORIZ	HORIZONTAL
HP	HIGH POINT
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
INT	INTERSECTION
IRR	IRRIGATION
LAT	LATERAL
LF	LINEAR FEET
LP	LOW POINT
LT	LEFT
MAX	MAXIMUM
MDD	MAXIMUM DRY DENSITY
MH	MANHOLE
MIN	MINIMUM
MJ	MECHANICAL JOINT
MMD	MAXIMUM MARSHALL DENSITY
MUTCD	MANUAL FOR TRAFFIC CONTROL DEVICES
N	NORTH
NAP	NOT A PART
NIP	NOT IN PROJECT
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OH	OVERHEAD
(P)	PROPOSED
PCC	PORTLAND CEMENT CONCRETE
PG	PAD GRADE
PI	POINT OF INTERSECTION
PIVC	POINT OF INTERSECTION VERTICAL CURVE
PL	PROPERTY LINE
POCC	POINT OF COMPOUND CURVATURE
POT	POINT OF TANGENCY
PP	POWER POLE
PRC	POINT OF REVERSE CURVE
PRVC	POINT OF REVERSE VERTICAL CURVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
Q 5	5 YEAR PEAK FLOW
Q 100	100 YEAR PEAK FLOW
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
REF	REFERENCE
RET	CURB RETURN
RP	RADIUS POINT
RT	RIGHT
R/W, ROW	RIGHT-OF-WAY
S=	SLOPE
S	SOUTH
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SL	STREET LIGHT
SS	SANITARY SEWER
SSCO	SANITARY SEWER CLEAN OUT
SSMH	SANITARY SEWER MANHOLE
SSPWC	STANDARD SPEC. FOR PUBLIC WORKS CONSTRUCTION
STA	STATION
SW	SIDEWALK
TELE	TELEPHONE
TBO	TEMPORARY BLOW OFF VALVE
TC	TOP OF CURB
TG	TO GRADE
TOB	TOP OF BERM
TF, TOF	TOP OF FOOTING
TW, TOW	TOP OF WALL
TS	TRAFFIC SIGNAL
TSCB	TRAFFIC CONTROL SIGNAL BOX
TR	TOP OF RAIL
TRANS	TRANSITION
TYP	TYPICAL
UG/P	UNDER GROUND POWER
UNO	UNLESS NOTED OTHERWISE
V_5	VELOCITY AT 5 YEAR PEAK
VC	VERTICAL CURVE
VEL	VELOCITY
VERT	VERTICAL
VG	VALLEY GUTTER
W	WEST
W/G	WATER AND GAS
WL	WATER LINE
WM	WATER METER
WS	WATER SURFACE
WV	WATER VALVE
WWF	WELDED WIRE FABRIC
YR	YEAR

1

VOLUME TABLE		
CUT	FILL	NET VOLUME
16,725 cy	6,558 cy	10,168 cy

NOTES:

GENERAL

1. ALL WORK SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, LATEST EDITION.
2. DETAILS NOT SHOWN ON THESE DRAWINGS SHALL BE CONTAINED IN THE STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION (ORANGE BOOK).
3. CONSTRUCTION SHALL COMPLY WITH THESE PLANS AND CURRENT NDOT or CALTRANS STANDARD PLANS/SPECIFICATIONS (STANDARD SPECIFICATIONS) AND MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ARRANGING A PRE-CONSTRUCTION JOB SITE CONFERENCE WITH GOVERNING AGENCIES, ALL UTILITY COMPANIES, OWNER'S REPRESENTATIVES, AND THE PROJECT ENGINEER PRIOR TO COMMENCING WORK. THIS MEETING SHALL BE HELD AT LEAST FORTY-EIGHT (48) HOURS, OR TWO (2) BUSINESS DAYS, PRIOR TO THE START OF CONSTRUCTION AND SHALL COMMUNICATE SCHEDULES, CONTRACTORS MEAN AND METHODS, MATERIALS TO BE USED, AND OTHER RELEVANT MATTERS ASSOCIATED WITH THE CONSTRUCTION OF THE PROJECT.
5. ALL WORK EITHER DIRECTLY OR INDIRECTLY RELATED TO THE PROJECT SHALL BE COORDINATED WITH THE APPROPRIATE UTILITY SYSTEM MANAGER.
6. THE CONTRACTOR SHALL MAINTAIN AN ONSITE RECORD COPY OF ALL DRAWINGS, SPECIFICATIONS, ADDENDA, CHANGE ORDERS, WORK CHANGE DIRECTIVES, FIELD ORDERS, FIELD CHANGES, AND WRITTEN INTERPRETATIONS AND CLARIFICATIONS. RECORDS SHALL BE IN GOOD ORDER AND ANNOTATED TO SHOW CHANGES MADE DURING CONSTRUCTION.
7. CONTRACTOR SHALL PROVIDE MATERIALS AND EQUIPMENT SUBMITTALS AND/OR SHOP DRAWINGS TO THE PROJECT ENGINEER FOR REVIEW PRIOR TO ORDERING OR INSTALLATION. A SIGNED SET OF REVIEWED SUBMITTALS MUST ALWAYS BE AVAILABLE ONSITE DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT AT 1-800-642-2444 TO PROVIDE FIELD LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO THE START OF CONSTRUCTION.
9. THE LOCATION OF EXISTING UTILITIES SHOWN ON THESE PLANS ARE BASED ON THE BEST INFORMATION AVAILABLE TO THE ENGINEER. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY PROPOSED POINTS OF CONNECTION AND IN AREAS OF POSSIBLE CONFLICT WITH NEW UTILITY INSTALLATION PRIOR TO BEGINNING CONSTRUCTION. SHOULD THE CONTRACTOR FIND ANY DISCREPANCIES BETWEEN THE CONDITIONS EXISTING IN THE FIELD AND THE INFORMATION SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER BEFORE PROCEEDING WITH CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROTECT AND MAINTAIN ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THE PLAN.
10. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROCURE ALL NECESSARY PERMITS, LICENSES, INSURANCE POLICIES, ETC. AS MAY BE NECESSARY TO COMPLY WITH LOCAL, COUNTY, STATE, AND FEDERAL LAWS ASSOCIATED WITH THE PERFORMANCE OF THE WORK; UNLESS OTHERWISE OBTAINED BY THE OWNER.
11. THE CONTRACTOR AGREES TO ASSUME SOLE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, AND FURTHER AGREES THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS IN ACCORDANCE WITH THE PROVISIONS OUTLINED BY THE PROJECT CONTROL AND THE STANDARD SPECIFICATIONS.
12. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR COMPLIANCE WITH ALL APPLICABLE PROVISIONS OF OSHA AND NRS CHAPTER 618.
13. THE CONTRACTOR SHALL PURSUE THE WORK IN A CONTINUOUS AND DILIGENT MANNER, CONFORMING TO ALL THE PERTINENT SAFETY REGULATIONS TO INSURE A TIMELY COMPLETION OF THE PROJECT.
14. THE CONTRACTOR SHALL MAINTAIN A CLEAN PROJECT SITE, REMOVING CONSTRUCTION DEBRIS AT THE END OF EACH ACTIVITY DAY. THE CONTRACTOR SHALL MAINTAIN DEBRIS FREE CONSTRUCTION ROUTES, ADJACENT STREETS AND STORM DRAIN SYSTEMS.
15. TEMPORARY CONSTRUCTION FENCING SHALL BE PROVIDED AND MAINTAINED BY THE CONTRACTOR THROUGHOUT THE DURATION OF THE PROJECT IN AREAS AS DELINEATED ON THE PLANS OR AS DIRECTED BY THE PROJECT ENGINEER. THE TEMPORARY FENCING SHALL PREVENT CHILDREN AND PETS FROM ENTERING THE CONSTRUCTION AREA, CREATE A VISUAL BARRIER OF THE CONSTRUCTION ACTIVITIES FROM THE ADJACENT RESIDENCE AND YARDS, AND PROTECT VEGETATION FROM CONSTRUCTION EQUIPMENT.
16. THE CONTRACTOR SHALL USE ONLY AUTHORIZED SITES FOR STORAGE OF EQUIPMENT AND MATERIALS AND OBTAIN PROPER APPROVALS FROM THE LAND OWNER AND LOCAL GOVERNING AUTHORITY TO DO SO. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SECURITY OF ALL EQUIPMENT AND MATERIALS.
17. CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURVEY MONUMENTS AND OTHER SURVEY MARKERS DURING CONSTRUCTION. IN THE EVENT A MONUMENT IS DISTURBED, THE CONTRACTOR SHALL HAVE THE MONUMENT REPLACED, AT HIS OWN EXPENSE, BY A LICENSED SURVEYOR IN THE STATE OF THE PROJECT SITE.
18. CONSTRUCTION HOURS SHALL BE WEEKDAYS BETWEEN 7:00 AM AND 6:00 PM UNLESS OTHERWISE DICTATED BY LOCAL ORDINANCE. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE PROJECT ENGINEER TO MODIFY WORK HOURS.
19. ALL FIELD CHANGES MUST BE PRE-APPROVED BY THE PROJECT ENGINEER.
20. SHOULD IT APPEAR THAT THE WORK TO BE DONE, OR ANY MATTER RELATIVE THERETO, IS NOT SUFFICIENTLY DETAILED OR EXPLAINED ON THESE PLANS, THE CONTRACTOR SHALL CONTACT THE PROJECT ENGINEER FOR SUCH FURTHER EXPLANATIONS AS MAY BE NECESSARY.
21. ALL SALVAGED MATERIALS ARE THE PROPERTY OF THE OWNER AND SHALL BE PALLETIZED ONSITE UNLESS OTHERWISE ARRANGED WITH THE OWNER AND/OR PROJECT ENGINEER.
22. THE OWNER IS RESPONSIBLE FOR FURNISHING QUALIFIED SITE INSPECTIONS AS REQUIRED TO COMPLY WITH LOCAL ORDINANCES.
23. A GEOTECHNICAL INVESTIGATION WAS PERFORMED, BY LUMOS & ASSOCIATES, INC., ON THIS PROJECT. ALL RECOMMENDATIONS INCLUDED IN THE REPORT ARE HEREBY MADE A PART OF THE CONSTRUCTION DOCUMENTS UNLESS MODIFIED WITHIN THESE PLANS. INSPECTION AND TESTING DURING CONSTRUCTION SHALL BE REQUIRED IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINED WITHIN THE REPORT.
    TITLE: GEOTECHNICAL INVESTIGATION REPORT FOR 19 & 20 KNOLL DRIVE
    DATE: MAY, 2018
24. A DRAINAGE REPORT WAS PERFORMED, BY LUMOS & ASSOCIATES,INC., ON THIS PROJECT. ALL RECOMMENDATIONS INCLUDED IN THE REPORT ARE HEREBY MADE A PART OF THE CONSTRUCTION DOCUMENTS UNLESS MODIFIED WITHIN THESE PLANS. INSPECTION AND TESTING DURING CONSTRUCTION SHALL BE REQUIRED IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINED WITHIN THE REPORT.
    TITLE: DRAINAGE REPORT FOR 19 & 20 KNOLL DRIVE
    DATE: OCTOBER, 2018
25. CONTRACTOR SHALL REFER TO 2012 IFC AND 2012 NORTHERN NEVADA AMENDMENTS.

1

1

STORM WATER POLLUTION PREVENTION

THE CONTRACTOR SHALL SECURE COVERAGE UNDER THE NPDES GENERAL PERMIT AND PROVIDE FOR THE DAY-TO-DAY OPERATIONAL CONTROL OF ACTIVITIES THAT ARE NECESSARY TO ENSURE COMPLIANCE WITH THE REQUIREMENTS FOR EROSION CONTROL DUE TO STORM WATER AND CONSTRUCTION RELATED RUNOFF FROM CONSTRUCTION SITES AS ESTABLISHED UNDER NRS AND NAC 445A.

THIS WORK SHALL INCLUDE, BUT IS NOT LIMITED TO, FILLING THE NOI AND THE NOT, AND DEVELOPMENT AND IMPLEMENTATION OF THE SWPPP, INCLUDING FURNISHING MATERIALS, CONSTRUCTING, AND MAINTAINING PERMANENT AND TEMPORARY SEDIMENT CONTROL MEASURES FOR THE DURATION OF CONSTRUCTION ACTIVITIES.

THE SWPPP SHALL INCLUDE BMP DESCRIPTIONS AND SITE-SPECIFIC DIAGRAMS INDICATING PROPOSED LOCATIONS OF EROSION CONTROL DEVICES. THIS PLAN SHALL INCLUDE PROVISIONS FOR INSTALLATION, MAINTENANCE, REMOVAL, AND DISPOSING OF EROSION CONTROL DEVISES AND PROVIDE FOR MEANS OF RECORDING ALL INSPECTIONS AND MAINTENANCE ACTIONS. A COPY OF THE NOI, SWPPP, INSPECTION AND MAINTENANCE RECORDS SHALL BE POSTED AT THE CONSTRUCTION SITE WITH OTHER PROJECT RECORDS AND SHALL BE AVAILABLE FOR PUBLIC INSPECTION

GRADING, EXCAVATION & SURFACE IMPROVEMENTS

26. THE CONTRACTOR IS RESPONSIBLE FOR PERFORMING THEIR OWN QUANTITY TAKE-OFF AND SHALL BUDGET THE PROJECT ACCORDINGLY. ALL EXCESS GRADING MATERIALS SHALL BE DISPOSED OF OFFSITE.
27. ALL EARTHWORK ACTIVITIES SHALL BE IN ACCORDANCE WITH THE PROJECT'S GEOTECHNICAL REPORT.
28. THE SOILS ENGINEER SHALL APPROVE ALL EARTHWORK AND GRADING TO CONFIRM COMPACTION REQUIREMENTS ARE MET.
29. CONTRACTOR SHALL PROTECT EXISTING PAVING, CONCRETE, LANDSCAPING, FENCING, MAILBOXES, SIGNS AND ANY OTHER IMPROVEMENTS NOT SPECIFICALLY CALLED OUT FOR REPLACEMENT. CONTRACTOR SHALL REPAIR/REPLACE ANYTHING DAMAGED BY FORCES UNDER THEIR EMPLOY OR CONTRACT.
30. ALL ASPHALT CONCRETE SURFACES SHALL BE SAWCUT THREE FEET MINIMUM INSIDE THE EDGE OF PAVEMENT TO A NEAT, STRAIGHT LINE AND REMOVED. THE EXPOSED PAVEMENT TIE-IN EDGES SHALL BE METICULOUSLY CLEANED OF ALL LOOSE MATERIAL AND THEN TREATED WITH BITUMINOUS EMULSION PRIOR TO PAVING. THE EXPOSED BASE MATERIALS SHALL BE GRADED AND RECOMPACTED PRIOR TO PAVING.

ENVIRONMENTAL

31. ALL CONSTRUCTION SHALL BE PERFORMED IN COMPLIANCE WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES). CONTRACTOR IS RESPONSIBLE FOR ACQUIRING AND MAINTAINING A SWPPP.
32. INSTALLATION AND MAINTENANCE OF EROSION CONTROL MEASURES ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREVENTION OF EROSION AND SILTATION FROM ENTERING THE STORM DRAIN SYSTEM, NATURAL DRAINAGE COURSES, AND/OR INTRUDING UPON ADJACENT ROADWAYS AND PROPERTIES. EROSION CONTROL MEASURES SHOWN ON THESE PLANS ARE INTENDED AS A GUIDE. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED AS DETERMINED IN THE FIELD. THIS RESPONSIBILITY SHALL APPLY THROUGHOUT THE COURSE OF CONSTRUCTION AND UNTIL ALL DISTURBED AREAS HAVE BECOME STABILIZED AND SHALL NOT BE LIMITED TO WET WEATHER PERIODS. THE CONTRACTOR IS RESPONSIBLE FOR SWPPP UPDATES.
33. THE CONTRACTOR SHALL MAINTAIN AN ON-GOING DUST CONTROL PROGRAM INCLUDING WATERING OF OPEN AREAS, TO CONFORM WITH THE LATEST FEDERAL, STATE, AND COUNTY AIR POLLUTION REGULATIONS. CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND UPDATING DUST CONTROL PERMITS FOR THE PROJECT.
34. ALL AREAS DISTURBED AND LEFT UNDEVELOPED FOR A PERIOD OF MORE THAN 30 DAYS SHALL BE STABILIZED BY THE APPLICATION OF AN APPROVED DUST PALLIATIVE OR HYDROMULCH.
35. THE CONTRACTOR SHALL IDENTIFY A STANDBY CREW FOR EMERGENCY WORK AND THEY SHALL BE AVAILABLE AT ALL TIMES. MATERIAL NECESSARY TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES OR TO REPAIR DAMAGED EROSION CONTROL MEASURES SHALL BE AVAILABLE ON-SITE AND STOCKPILED AT APPROVED LOCATIONS.
36. PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS SHALL BE USED TO PROTECT ADJOINING PROPERTIES DURING CONSTRUCTION OF IMPROVEMENTS.
37. AFTER A RAINSTORM, ALL SILT AND DEBRIS SHALL BE REMOVED FROM CHECK BERMS AND DESILTING FACILITIES. GRADED SLOPE SURFACE PROTECTION MEASURES DAMAGED DURING THE RAINSTORM SHALL ALSO BE REPAIRED.
38. FILL SLOPES AT THE PROJECT PERIMETER MUST DRAIN AWAY FROM THE TOP OF THE SLOPE AT THE END OF EACH WORKING DAY.
39. ALL DISTURBED AREAS ARE REQUIRED TO HAVE A PALLIATIVE APPLIED FOR DUST CONTROL. ALL GRADING SHALL COMPLY WITH STATE AND COUNTY REGULATIONS.
40. A SIX-FOOT HIGH PERIMETER FENCE OR A 24-HOUR GUARD SHALL BE POSTED ON THE SITE WHENEVER THE DEPTH OF WATER IN A FACILITY EXCEEDS 18".
41. ALL AREAS DISTURBED BECAUSE OF THE WORK SHALL BE REVEGETATED IN ACCORDANCE WITH INDUSTRY BEST MANAGEMENT PRACTICES.
42. NO CONSTRUCTION MATERIALS SHALL BE STORED IN A STREAM ENVIRONMENT ZONES (SEZ) AT ANY TIME.
43. IF GROUNDWATER IS ENCOUNTERED, THE CONTRACTOR SHALL STOP WORK IMMEDIATELY, PREPARE A DEWATERING PLAN, AND OBTAIN APPROVAL FROM THE PROJECT ENGINEER BEFORE PROCEEDING WITH WORK. DEWATERING ACTIVITIES MAY REQUIRE THE CONTRACTOR TO OBTAIN A DISCHARGE/PUMPING PERMIT FROM THE STATE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN SUCH PERMITS.
44. ALL STREETS SHALL BE MAINTAINED FREE OF DUST AND MUD CAUSED BY GRADING OPERATIONS.

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

PROFESSIONAL ENGINEER – STATE OF NEVADA
RYAN SPREEMAN
Exp. 6/30/20
CIVIL
No. 023420
12–18–18

JACK AND COLLEEN BRITTON

19 & 20 KNOLL DRIVE
SITE GRADING PEOJECT
NOTES, ABBREVIATIONS, AND LEGEND

CARSON CITY
NEVADA

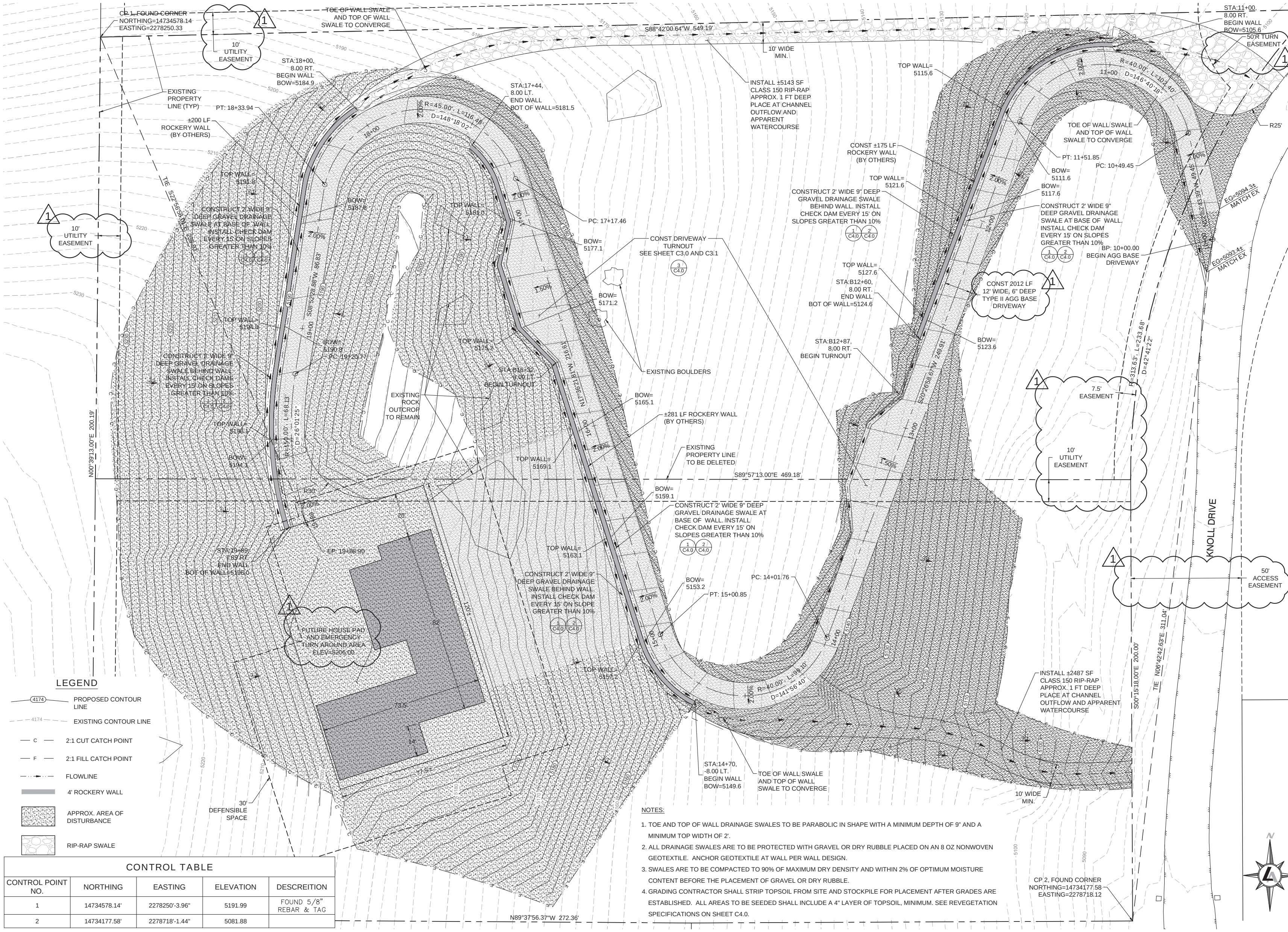
REV	DATE	DESCRIPTION	BY
1	12/9.18	CITY COMMENTS	RS

PERMIT SET
OCTOBER 30, 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 N/A
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C1.1

DRAWN BY:	KLN
DESIGNED BY:	KLN
CHECKED BY:	RS
JOB NO.:	9407.000



LEGEND

- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- 2:1 CUT CATCH POINT
- 2:1 FILL CATCH POINT
- FLOWLINE
- 4' ROCKERY WALL
- APPROX. AREA OF DISTURBANCE
- RIP-RAP SWALE

CONTROL TABLE				
CONTROL POINT NO.	NORTHING	EASTING	ELEVATION	DESCREITION
1	14734578.14'	2278250'-3.96"	5191.99	FOUND 5/8" REBAR & TAG
2	14734177.58'	2278718'-1.44"	5081.88	

NOTES:

1. TOE AND TOP OF WALL DRAINAGE SWALES TO BE PARABOLIC IN SHAPE WITH A MINIMUM DEPTH OF 9" AND A MINIMUM TOP WIDTH OF 2'.
2. ALL DRAINAGE SWALES ARE TO BE PROTECTED WITH GRAVEL OR DRY RUBBLE PLACED ON AN 8 OZ NONWOVEN GEOTEXTILE. ANCHOR GEOTEXTILE AT WALL PER WALL DESIGN.
3. SWALES ARE TO BE COMPACTED TO 90% OF MAXIMUM DRY DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT BEFORE THE PLACEMENT OF GRAVEL OR DRY RUBBLE.
4. GRADING CONTRACTOR SHALL STRIP TOPSOIL FROM SITE AND STOCKPILE FOR PLACEMENT AFTER GRADES ARE ESTABLISHED. ALL AREAS TO BE SEEDED SHALL INCLUDE A 4" LAYER OF TOPSOIL, MINIMUM. SEE REVEGETATION SPECIFICATIONS ON SHEET C4.0.

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

PROFESSIONAL ENGINEER, RYAN SPREEMAN, Exp. 6/30/20, CIVIL, No. 023420, STATE OF NEVADA
12-18-18

JACK AND COLLEEN BRITTON
KNOLL DRIVE SITE GRADING PROJECT
GRADING PLAN
CARSON CITY NEVADA

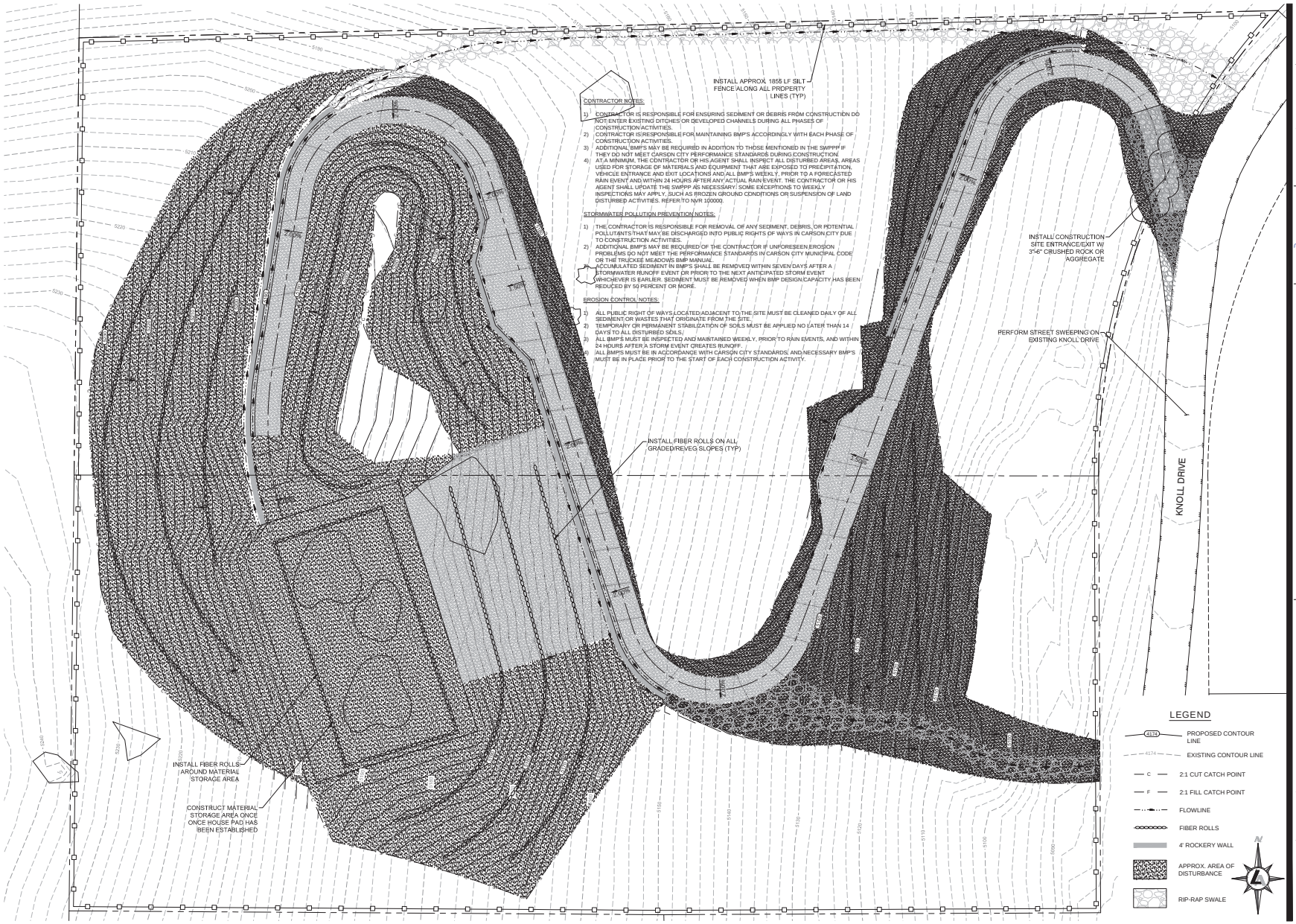
REV	DATE	DESCRIPTION	BY
1	12/18	CITY COMMENTS	RS

PERMIT SET
OCTOBER 30, 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 20'
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C2.0

DRAWN BY: KLN
DESIGNED BY: KLN
CHECKED BY: RS
JOB NO.: 9407.000



C:\Users\knorse\AppData\Local\Temp\AcPublish_8732\9407000BAS.dwg,EROSION CONTROL, 12/19/2018 12:13 pm knorton

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

PROFESSIONAL ENGINEER
RYAN SPREEMAN
Exp. 6/30/20
CIVIL
No. 023470
STATE OF NEVADA
12-18-18

JACK AND COLLEEN BRITTON

KNOLL DRIVE
SITE GRADING PROJECT
EROSION CONTROL PLAN

NEVADA
CARSON CITY

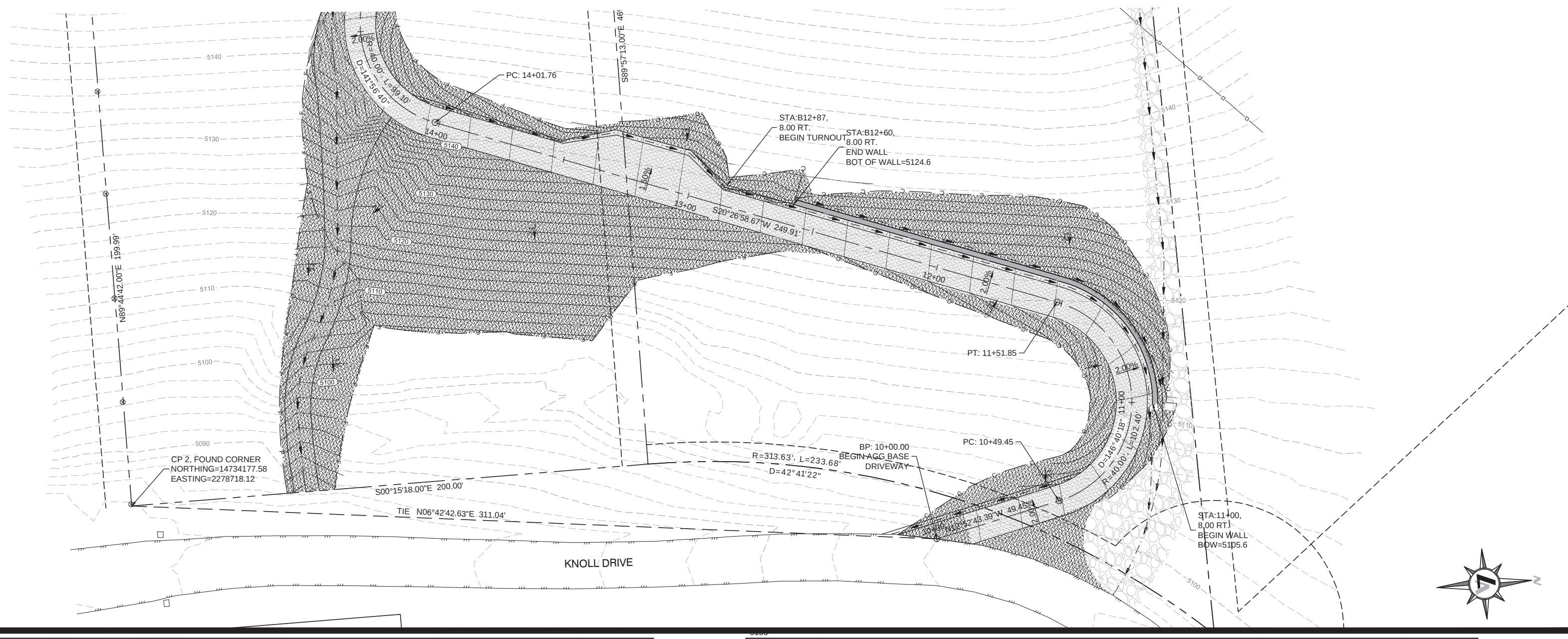
REV	DATE	DESCRIPTION	BY
1	12/19/18	CITY COMMENTS	RS

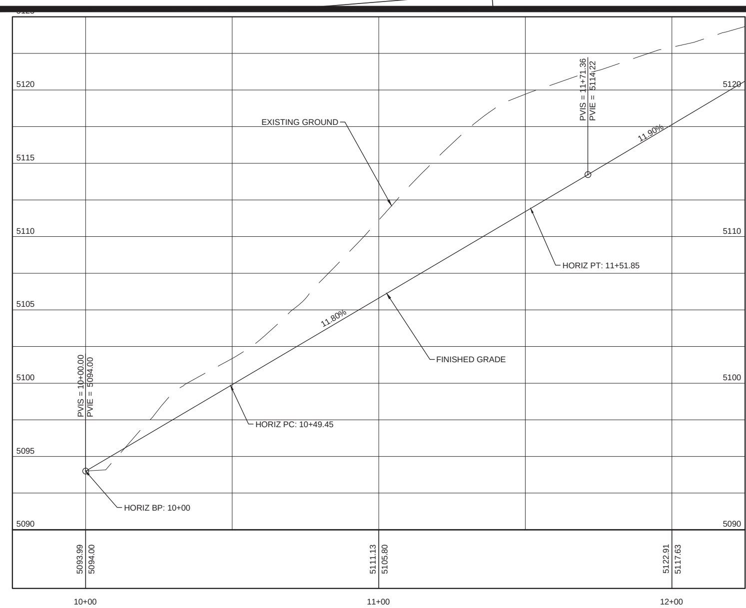
PERMIT SET
OCTOBER 30, 2018

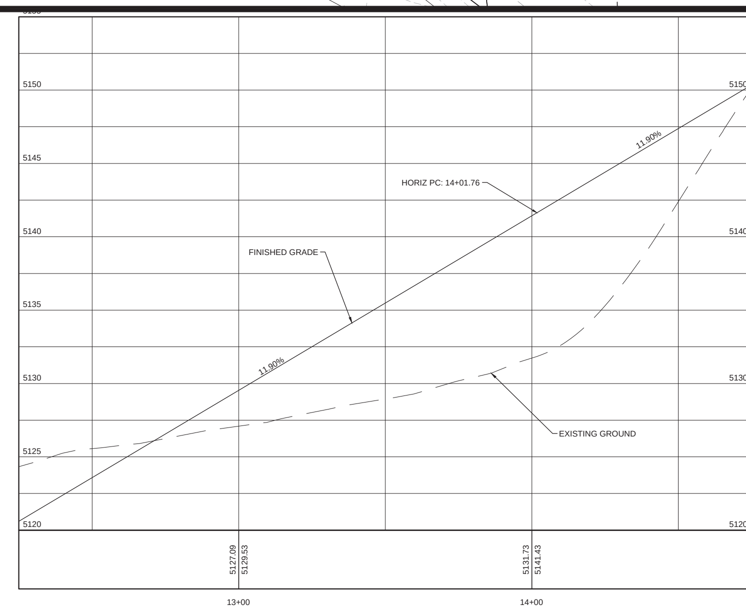
BAR IS 1 INCH ON ORIGINAL DRAWING
0 20
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C2.1

DRAWN BY:	KLN
DESIGNED BY:	KLN
CHECKED BY:	RS
JOB NO.:	9407.000







LUMOS & ASSOCIATES

9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111

WWW.LUMOSINC.COM

PROFESSIONAL ENGINEER
RYAN T. SPREEMAN
Exp. 6/30/20
CIVIL
No. 023420
STATE OF NEVADA

12-18-18

JACK AND COLLEEN BRITTON

KNOLL DRIVE
SITE GRADING PROJECT
PLAN AND PROFILE

CARSON CITY
NEVADA

REV	DATE	DESCRIPTION	BY

PERMIT SET

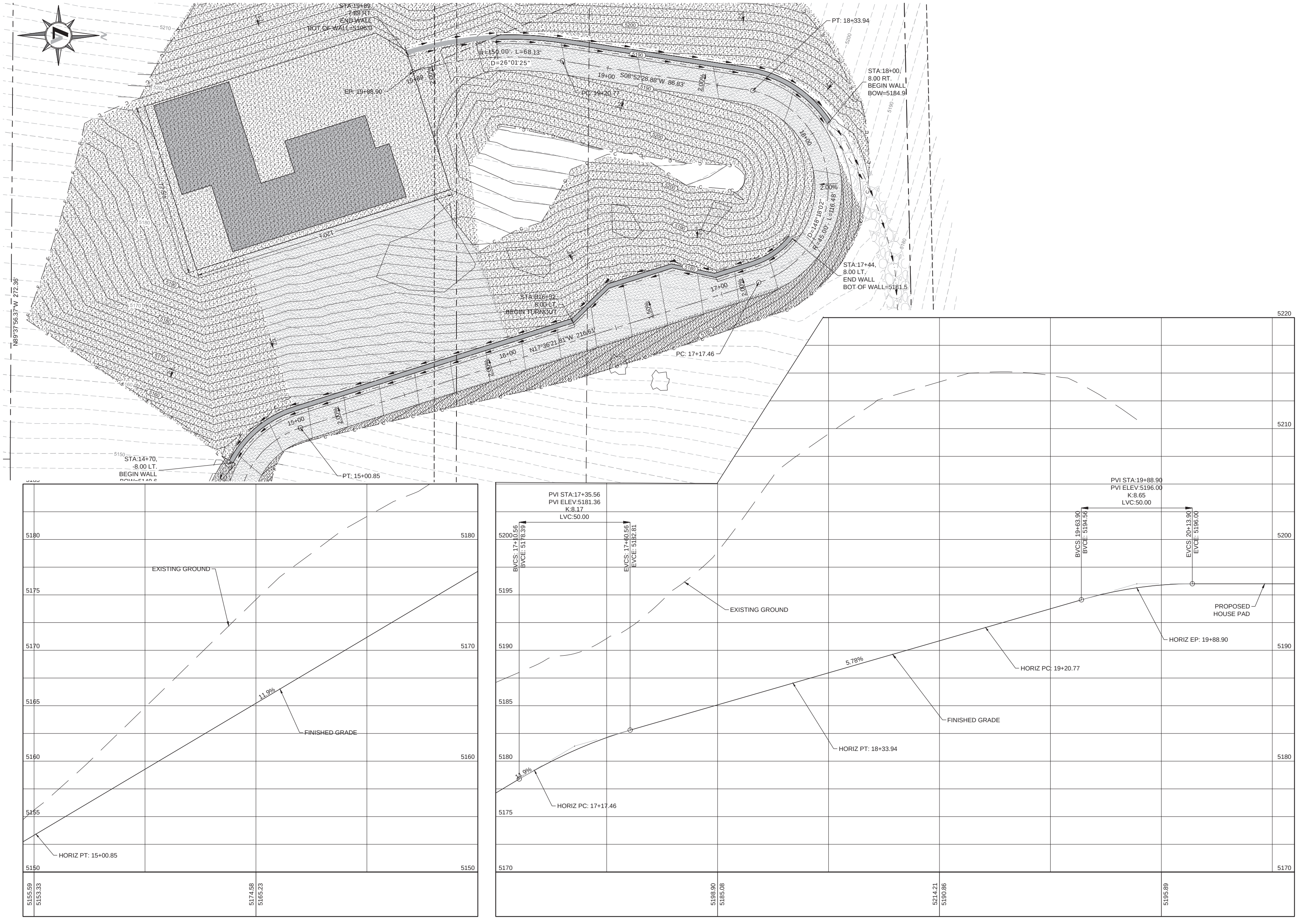
OCTOBER 30, 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 20'
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C3.0

DRAWN BY: KLN
DESIGNED BY: KLN
CHECKED BY: RS
JOB NO.: 9407.000

C:\Users\kcomers\AppData\Local\Temp\AcPublish_8732\9407001BAS.dwg,P&P 1, 12/18/2018 12:13 pm kmorton



LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

PROFESSIONAL ENGINEER – STATE OF NEVADA
RYAN SPREEMAN
Exp. 6/30/20
CIVIL
No. 023420
12–18–18

JACK AND COLLEEN BRITTON

KNOLL DRIVE SITE GRADING PROJECT PLAN AND PROFILE

CARSON CITY — NEVADA

REV	DATE	DESCRIPTION	BY

PERMIT SET
OCTOBER 30, 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 20'
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C3.1

DRAWN BY:	KLN
DESIGNED BY:	KLN
CHECKED BY:	RS
JOB NO.:	9407.000

C:\Users\kmoore\AppData\Local\Temp\AcPublish_8732\9407001BAS.dwg,P&P 1 (2),
12/18/2018 12:13 pm kmorton

GENERAL:
1. CONTRACTOR SHALL LOCATE AND STAKE TREATMENT BOUNDARIES. THE LANDSCAPE ARCHITECT AND ALL OTHERS OR THEIR REPRESENTATIVE SHALL APPROVE CONTRACTORS STAKING PRIOR TO PROGRESSING WITH THE WORK. PERFORM ALL WORK WITHIN AREAS IDENTIFIED AND AS SHOWN ON THE PLANS. THERE SHALL BE NO PAY ITEM OR CLAIM FROM THE CONTRACTOR FOR THERE RESTORATION OF DISTURBED AREAS BEYOND THOSE DESIGNATED ON THE PLANS AND IN THE FIELD.

THE REVEGEATATION WORK SHALL CONSIST OF APPLICATION OF SOIL AMENDMENTS, SOIL INOCULANTS, SEEDING AND APPLICATION OF WOOD FIBER MULCH WITH TACKIFIERS WITHIN 30 DAYS. LANDSCAPE ARCHITECT OR OWNER'S REPRESENTATIVE WILL INSPECT MATERIALS AND WORKMANSHIP, WEEKLY, THROUGHOUT THE PROJECT.

2. TREATMENT TYPES AND SUMMARIES:
APPLY INOCULANTS, SEED, WOOD FIBER AND TACKIFIER AS SPECIFIED BELOW.

3. SUBMITTALS:
SUBMIT THE FOLLOWING MATERIAL SAMPLES OR LABELS AND RATES OR QUANTITIES OF APPLICATION FOR ACCEPTANCE BY THE LANDSCAPE ARCHITECT, OR THEIR REPRESENTATIVE:
- SEED (SAMPLES, TAGS, LOT TEST RESULTS)
- SOIL INOCULANTS
- WOOD FIBER MULCH
- HYDROSTRAW TACKIFIER
- TUBELING RESTORATION PLANTS

4. MATERIALS.

SEED
A. ALL SEED SHALL CONFORM WITH ALL LAWS AND REGULATIONS PERTAINING TO THE SALE AND SHIPMENT OF SEED REQUIRED BY THE NEVADA STATE DEPARTMENT OF AGRICULTURE AND THE FEDERAL SEED ACT. DELIVER SEED TO THE SITE TAGGED AND LABELED IN ACCORDANCE WITH THE STATE AGRICULTURE CODE AND ACCEPTABLE TO THE COUNTY AGRICULTURE COMMISSION. FOR RABBITBRUSH, PROSTRATE SUMMER CYPRESS, AND SAGEBRUSH, TEST SEED WITHIN 6 MONTHS OF APPLICATION DATE. SEED TAGS MUST REFLECT THE MOST RECENT TEST DATE:

WEED SEED SHALL NOT EXCEED 0.25 PERCENT OF THE PURE LIVE SEED AND INERT MATERIAL AND SHALL NOT INCLUDE ANY SEED OF CHEATGRASS, (BROMUS TECTORUM) OR SWEET CLOVER (MELILOTUS OFFICINALIS, M. ALBA). CROP SEED SHALL NOT EXCEED .50 PERCENT UNLESS OTHERWISE APPROVED. INDIVIDUAL SEED TEST RESULTS, BY SPECIES, AND LOT NUMBER SHALL BE PROVIDED 30 DAYS PRIOR TO COMMENCING THE WORK PRIOR TO ACCEPTANCE AND BEFORE SEED IS BLENDED. ALL SEED IS SUBJECT TO INSPECTION AND TAGS SHALL BE SUBMITTED TO THE LANDSCAPE ARCHITECT OR THEIR REPRESENTATIVE FOR APPROVAL AND ACCEPTANCE. SPECIES AND/OR VARIETIES MAY ONLY BE SUBSTITUTED UPON THE WRITTEN APPROVAL OF THE LANDSCAPE ARCHITECT OR THEIR REPRESENTATIVE.

B. SOIL INOCULANTS
MYCHORRHIZAL INOCULANTS SHALL CONSIST OF SPORES, MYCELIUM, AND MYCHORRHIZAL ROOT FRAGMENTS IN A SOLID CARRIER SUITABLE FOR HANDLING BY DRY APPLICATION. THE CARRIER SHALL BE THE MATERIAL IN WHICH THE INOCULUM WAS ORIGINALLY PRODUCED, AND MAY INCLUDE ORGANIC MATERIALS. VERMICULITE, PER-LITE, CALCINED CLAY, OR OTHER APPROVED MATERIALS CONSISTENT WITH PROPER APPLICATION AND GOOD PLANT GROWTH.

INOCULA SHALL BE TRANSPORTED AND PLACED IN AREAS WITH A TEMPERATURE OF LESS THAN 90° F. USE A DUST MASK WHEN HANDLING THE MATERIAL. APPLY AT 60 LBS. PER ACRE. MATERIAL TO BE FROM ROCKY MOUNTAIN BIO PRODUCTS OR APPROVED EQUAL. REFER TO WWW.ROCKYMNTBIOPRODUCTS.COM.

C. WOOD FIBER MULCH:
WOOD FIBER MULCH SHALL CONSIST OF HAMILTON "NATURE'S OWN' FIBER MULCH, DEGRADABLE GREEN DYED WOOD CELLULOSE FIBER, 100% RECYCLED LONG-FIBER PULP, AND SHALL BE PRODUCED FROM NEWSPRINT, CHIPBOARD, CORRUGATED CARDBOARD, OR A COMBINATION OF THESE MATERIALS, AND SHALL BE FREE FROM WEEDS OR OTHER FOREIGN MATTER TOXIC TO SEED GERMINATION. APPLY AT A RATE OF 500 PPA.

D. HYDROSTRAW (IF SHOWN ON PLAN):
MATERIAL SHALL BE BALED TURF GRASS STRAW WITH ORGANIC TACKIFIERS. APPLY AT A RATE OF 3,000 LBS. PER ACRE WITH 200 LBS/ACRE PSYLLIUM TACKIER, 200 LBS/ACRE PLANTAGO TACKIFIER OR 65 LBS/ACRE GUAR TACKIFIER.

E. TACKIFIER:
MATERIAL SHALL BE OF AN ORGANIC, PLANT DERIVED SUBSTANCE CONTAINING PSYLLIUM, GUAR GUM, OR CORNSTARCH SUCH AS PT-TAC, SUPERTAK, RECLAMARE 2400, M-BINDER, ECO-TAK, PLANTAGO, OR APPROVED EQUAL. MATERIAL SHALL FORM A TRANSPARENT 3-DIMENSIONAL FILM LIKE CRUST PERMEABLE TO WATER AND AIR AND CONTAINING NO AGENTS TOXIC TO SEED GERMINATION.

5. IMPLEMENTATION:
1.0(A) BROADCAST SEEDING:
SEED AND INOCULANTS SHALL BE UNIFORMLY BROADCAST WITH HAND-HELD SEEDERS OR APPROVED EQUAL OVER PREPARED AREAS. SEED MUST NOT BE LEFT UNCOVERED MORE THAN 24 HOURS UNLESS OTHERWISE APPROVED. SEEDING SHALL NOT OCCUR UNDER CONDITIONS THAT WOULD ALLOW THE SEED TO BECOME WIND BORNE. ALL SEEDING SHALL BE CONDUCTED IN THE FALL OR WINTER BEFORE FEBRUARY 15TH. COVER SEEDING BY RAKING OR DRAGGING.

REVEGETATION SPECS.

1.0(B) ALTERNATE METHOD - APPLICATION OF INOCULANTS AND SEED:
FIRST PASS: APPLY SEED AND INOCULANT HYDRAULICALLY WITH 500 LBS/ACRE WOOD FIBER MULCH. HYDRAULIC APPLICATIONS MAY NOT TAKE PLACE UNDER WINDY CONDITIONS (GREATER THAN 8 MPH). MIX IN A TANK WITH AN AGITATOR SO A UNIFORM SUSPENSION IS ACHIEVED. THE INOCULANTS AND SEED SHALL NOT REMAIN IN THE TANK FOR LONGER THAN 30 MINUTES BEFORE APPLICATION. THE WOOD MULCH RATE FOR THE FIRST PASS SHALL BE 500 LBS/ACRE. THE SLURRY SHALL COVER 85% OF THE SOIL SURFACE AND SHALL NOT RUN OFF THE SURFACE. EACH PASS SHALL OCCUR IN A DIFFERENT DIRECTION.

SECOND PASS: APPLY MULCH
HYDRAULICALLY USING 3,000 LBS/ACRE HYDROSTRAW AND 200 LBS/ACRE PSYLLIUM TACKIFIER, 200 LBS/ACRE PLANTAGO TACKIFIER OR 65 LBS/ACRE GUAR TACKIFIER. MIX HYDROSTRAW AND TACKIFIER IN A TANK EQUIPPED WITH AN AGITATOR SO UNIFORM SUSPENSION IS ACHIEVED. APPLY THE SLURRY WITHIN 30 MINUTES OF MIXING AT A RATE OF 3,000 LBS/ACRE WITH A TACKIFIER AS SPECIFIED ABOVE. SEVERAL PASSES MAY BE REQUIRED TO ACHIEVE THE SPECIFIED RATES. ALL SEEDING SHALL BE CONDUCTED IN THE FALL OR WINTER AFTER NOVEMBER 15, BUT BEFORE FEBRUARY 15. CONTRACTOR TO PROVIDE TRAFFIC CONTROL TO KEEP ALL VEHICULAR AND PEDESTRIAN TRAFFIC OFF OF THE SITE AFTER HYDROSEEDING. TRAFFIC CONTROL SHALL CONSIST OF ROADWAY CLOSURE, TEMPORARY FENCES AND SIGNAGE.

6. APPLICATION RATES:
- SEED, PER PLAN. NO LESS THAN 32 LBS/AC HAND BROADCAST & 20 LBS/AC PLS DRILL SEEDED (CITY OF RENO)
- SOIL INOCULANTS @ 60 LBS/AC
- WOOD FIBER MULCH @ 500 LBS/AC
- TACKIFIER @ 200 LBS/AC
- HYDROSTRAW @ 3,000 LBS/AC PPA(IF REQUIRED)
- TUBELING RESTORATION PLANTS, PER PLAN

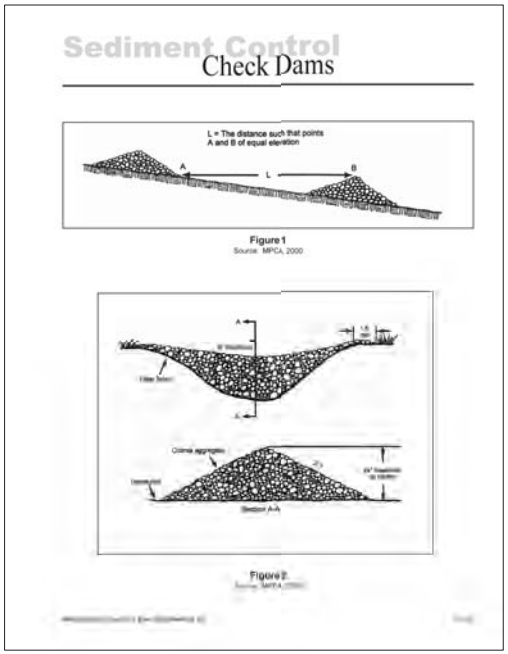
MAY-2016

GUARANTEE

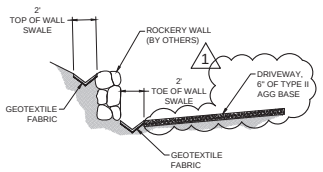
FOR REVEGETATED AREAS NOT TEMPORARILY IRRIGATED, CONTRACTOR SHALL GUARANTEE 20% COVERAGE IN THREE YEARS. CONTRACTOR SHALL RE-APPLY SEEDING TREATMENT IN AREAS OF COVERAGE-FAILURE AS NEEDED.

Botanical Name	Common Name/Variety	PLS lbs./acre
Achillea millefolium	Yarrow	0.20
Achnatherum occidentalis	Western needlegrass	1.00
Artemisia tridentata ssp vaseyana	Mtn. sagebrush	0.50
Bromus carintaus	California brome	4.00
Elymus elymoides	Blue wildrye 'Stanislaus'	4.00
Elymus trachycaulus	Slender wheatgrass, 'Pryor'	6.00
Ericameria nauseosa	Rubber rabbitbrush	1.00
Poa secunda	Sandberg bluegrass 'Sherman'	2.00
Purshia tridentata	Bitterbrush	3.00
Total		21.70

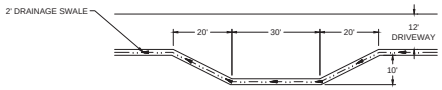
SEED MIX SCHEDULE



1 / C4.1 SWALE CHECK DAM
SCALE: NTS



2 / C4.1 TYPICAL WALL SECTION
SCALE: NTS



3 / C4.1 TURNOUT
SCALE: NTS

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

PROFESSIONAL ENGINEER STATE OF NEVADA BRYAN SPREEMAN Exp. 6/30/20 CIVIL No. 023400
12-18-18

JACK AND COLLEEN BRITTON
19 & 20 KNOLL DRIVE
SITE GRADING PEOJECT
DETAIL SHEET
NEVADA
CARSON CITY

REV	DATE	DESCRIPTION
1	12/18/18	CITY COMMENTS

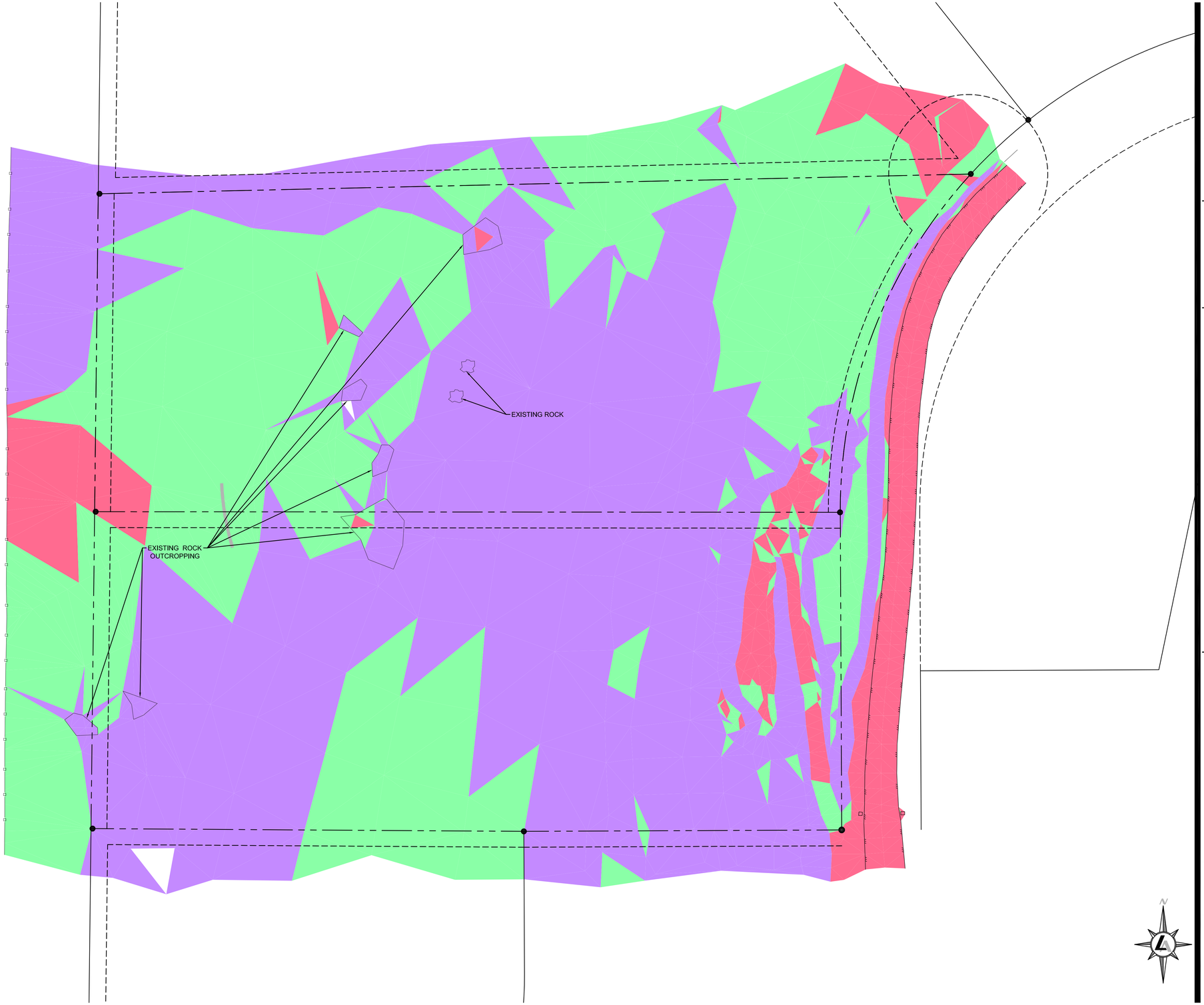
PERMIT SET
OCTOBER 30, 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 N/A
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C4.0

DRAWN BY: KLN
DESIGNED BY: KLN
CHECKED BY: RS
JOB NO.: 9407.000

C:\Users\knorton\AppData\Local\Temp\AcPublish_8732\9407000BAS.dwg,BETAILS, 12/18/2018 12:13 pm knorton



SLOPE LEGEND

- 0% - 15%
- 15% - 30%
- 30%+

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

JACK AND COLLEEN BRITTON

KNOLL DRIVE
SITE GRADING PROJECT
CONSTRAINTS MAP

CARSON CITY NEVADA

REV	DATE	DESCRIPTION	BY

PERMIT SET

JANUARY 2019

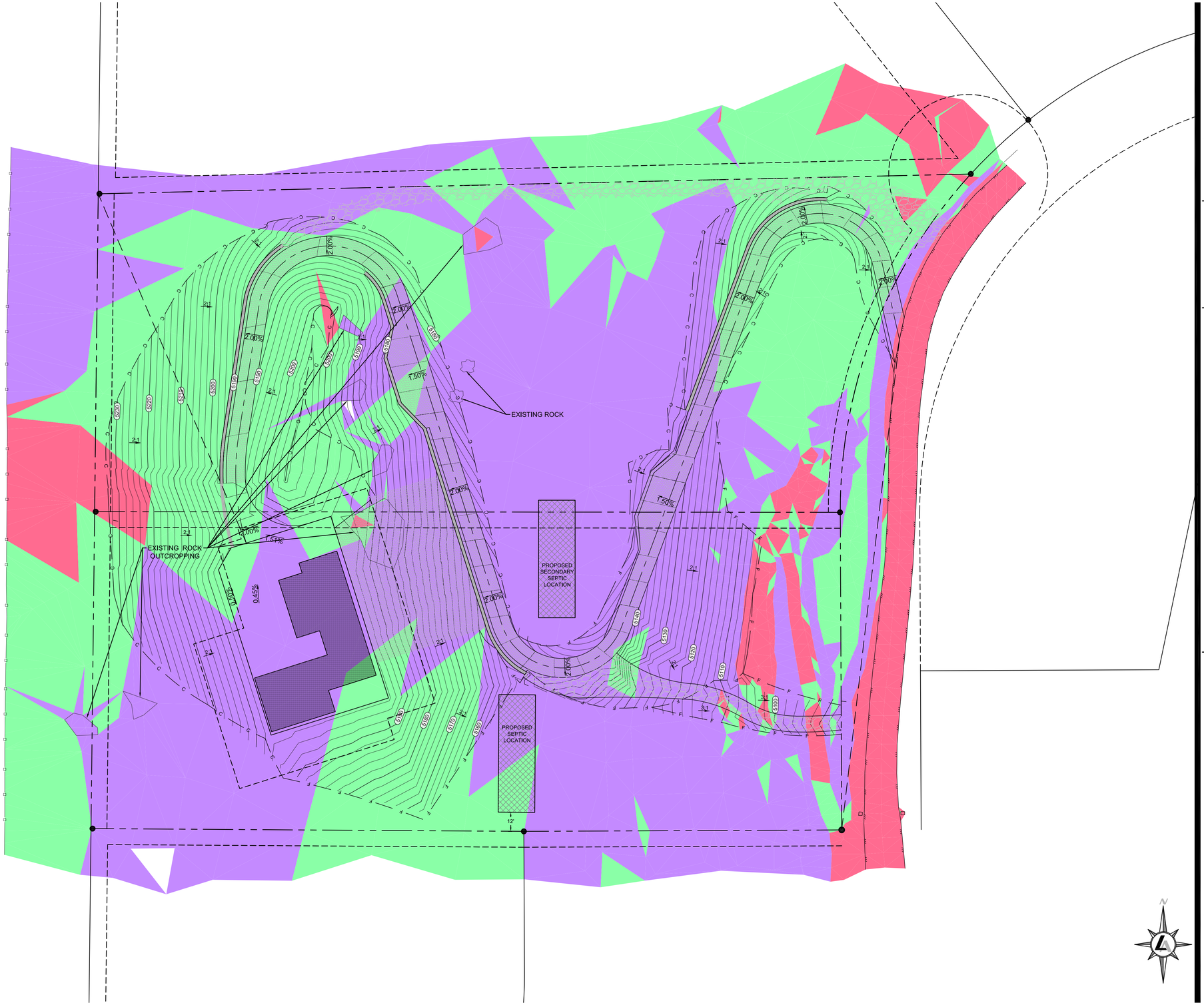
BAR IS 1 INCH ON ORIGINAL DRAWING
0 30'

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MAP 1

DRAWN BY:	KLN
DESIGNED BY:	KLN
CHECKED BY:	RS
JOB NO.:	9407.001

L:\LAPro\9407.001 - 19 & 20 Knoll Drive Site Grading Plan\DWG\Civil3D\9407001BAS - Slope Maps.dwg,CONSTRAINT EX, 01/04/2019 09:52 am, kmorton



LEGEND

- 0% - 15% SLOPE
- 15% - 30% SLOPE
- 30%+ SLOPE
- PROPOSED CONTOUR LINE
- 2:1 CUT CATCH POINT
- 2:1 FILL CATCH POINT
- PROPERTY LINE
- EASEMENT
- 4' ROCKERY WALL
- PROPOSED HOUSE FOOTPRINT
- RIP-RAP SWALE
- AGG BASE DRIVEWAY AND GRADING AREA
- POSSIBLE SEPTIC LOCATION

L:\LAPro\9407.001 - 19 & 20 Knoll Drive Site Grading Plan\DWG\Civil 3D\9407001BAS --Slope Maps.dwg,CONSTRAINT WITH MP (2), 01/04/2019 09:52 am, kmorton

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

JACK AND COLLEEN BRITTON

KNOLL DRIVE
SITE GRADING PROJECT
CONSTRAINTS MAP

CARSON CITY NEVADA

REV | DATE | DESCRIPTION | BY

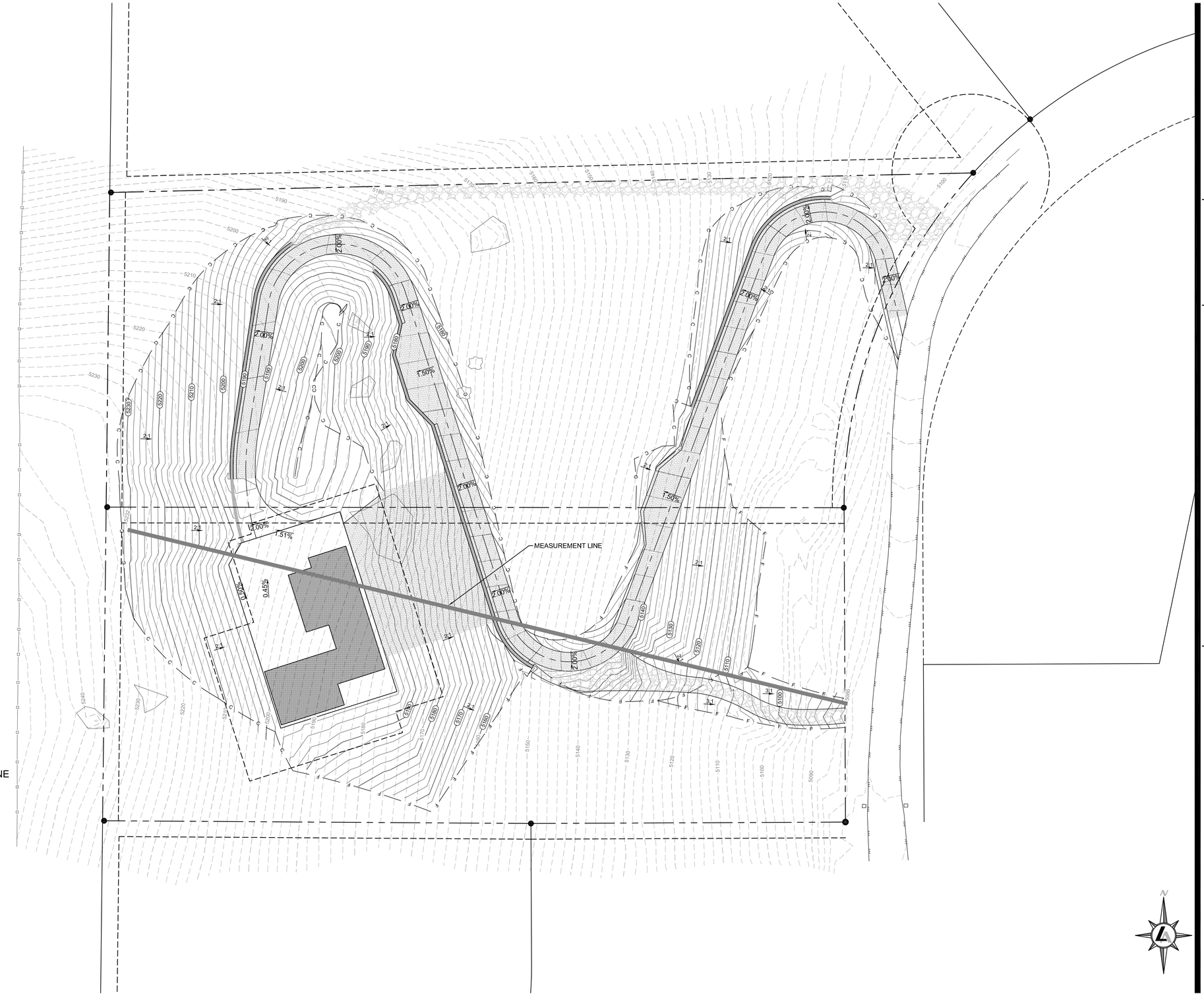
PERMIT SET

JANUARY 2019

BAR IS 1 INCH ON ORIGINAL DRAWING
0 30'
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MAP 2

DRAWN BY:	KLN
DESIGNED BY:	KLN
CHECKED BY:	RS
JOB NO.:	9407.001



SLOPE CALC

S = I / D x 100
S = 146 / 471 x 100
S = 30.99

LEGEND

- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- 2:1 CUT CATCH POINT
- 2:1 FILL CATCH POINT
- PROPERTY LINE
- EASEMENT
- 4' ROCKERY WALL
- PROPOSED HOUSE FOOTPRINT
- RIP-RAP SWALE
- AGG BASE DRIVEWAY AND GRADING AREA

L:\LAPro\9407.001 - 19 & 20 Knoll Drive Site Grading Plan\DWG\Civil3D\9407001BAS -Slope Maps.dwg,CONSTRAINT WITH IMP (3), 01/04/2019 09:51 am kmorton

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

JACK AND COLLEEN BRITTON

KNOLL DRIVE
SITE GRADING PROJECT
SITE PLAN - AVERAGE SLOPE MAP

CARSON CITY NEVADA

REV	DATE	DESCRIPTION	BY

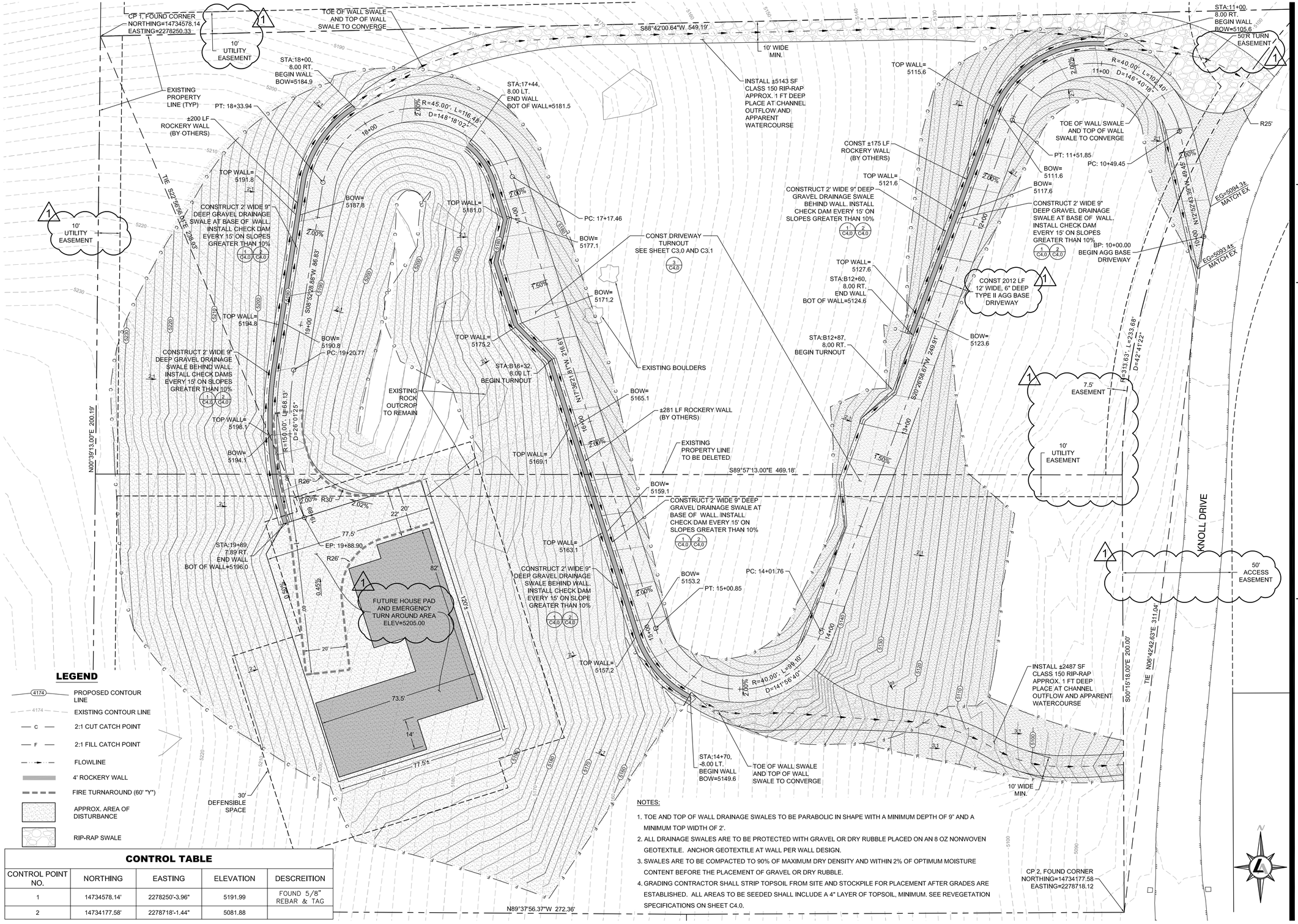
PERMIT SET

JANUARY 2019

BAR IS 1 INCH ON ORIGINAL DRAWING
0 30"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MAP 3

DRAWN BY:	KLN
DESIGNED BY:	KLN
CHECKED BY:	RS
JOB NO.:	9407.001



LEGEND

- PROPOSED CONTOUR LINE (4174)
- EXISTING CONTOUR LINE (4174)
- 2:1 CUT CATCH POINT (C)
- 2:1 FILL CATCH POINT (F)
- FLOWLINE
- 4' ROCKERY WALL
- FIRE TURNAROUND (60' "Y")
- APPROX. AREA OF DISTURBANCE
- RIP-RAP SWALE

CONTROL TABLE

CONTROL POINT NO.	NORTHING	EASTING	ELEVATION	DESCREITION
1	14734578.14'	2278250'-3.96"	5191.99	FOUND 5/8" REBAR & TAG
2	14734177.58'	2278718'-1.44"	5081.88	

NOTES:

1. TOE AND TOP OF WALL DRAINAGE SWALES TO BE PARABOLIC IN SHAPE WITH A MINIMUM DEPTH OF 9" AND A MINIMUM TOP WIDTH OF 2'.
2. ALL DRAINAGE SWALES ARE TO BE PROTECTED WITH GRAVEL OR DRY RUBBLE PLACED ON AN 8 OZ NONWOVEN GEOTEXTILE. ANCHOR GEOTEXTILE AT WALL PER WALL DESIGN.
3. SWALES ARE TO BE COMPACTED TO 90% OF MAXIMUM DRY DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT BEFORE THE PLACEMENT OF GRAVEL OR DRY RUBBLE.
4. GRADING CONTRACTOR SHALL STRIP TOPSOIL FROM SITE AND STOCKPILE FOR PLACEMENT AFTER GRADES ARE ESTABLISHED. ALL AREAS TO BE SEEDED SHALL INCLUDE A 4" LAYER OF TOPSOIL, MINIMUM. SEE REVEGETATION SPECIFICATIONS ON SHEET C4.0.

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

JACK AND COLLEEN BRITTON

KNOLL DRIVE
SITE GRADING PROJECT
GRADING PLAN

CARSON CITY NEVADA

REV	DATE	DESCRIPTION	BY
1	12/6.18	CITY COMMENTS	RS

PERMIT SET

OCTOBER 30, 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 20"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C2.0

DRAWN BY: KLN
DESIGNED BY: KLN
CHECKED BY: RS
JOB NO.: 9407.000

L:\LAProj\9407.001 - 19 & 20 Knoll Drive Site Grading Plan\DWG\Civil3D\9407000BAS.dwg,GRADING PLAN, 01/03/2019 02:56 pm kmorton