GEOTECHNICAL INVESTIGATION FOR

Errecart Blvd

PREPARED FOR:

City OF Elko

780 College Ave.

Elko NV 89801

PREPARED BY:

SUMMIT ENGINEERING CORPORATION™

1150 Lamoille Highway

Elko, NV 89801

SUMMIT ENGINEERING CORPORATION™

May 22nd 2024 **Job No. 3-82787**

City of Elko
Attn: Scott Wilkinson
780 College Ave
Elko NV 89801

RE: Geotechnical Investigation for the Errecart Blvd in Elko, Nevada.

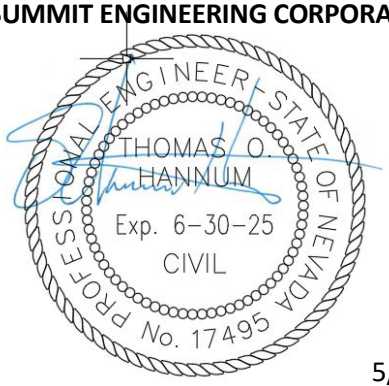
Dear Scott:

Attached please find the results of our geotechnical investigation for the proposed Errecart Blvd in Elko, Nevada. Summit excavated 12 test pits to characterize geotechnical conditions at the site. Material testing was performed on samples from the site. Results of the analyses and logs of the test pits are included as sheets in this report.

The native soils found on site classify predominately as: Silty Sand (SM), Lean Clay (CL), Sandy Silt (ML). The clay soils on the western half of the roadway project. The soil gets more course as you move east along the alignment. The cuts on the roadway do exceed the test pit depths. The shale material on the west side of the project and sandy material with silts gravels on the west end.

The following report provides geotechnical recommendations and guidelines for the design and construction of the project. The new "Standard Specifications for Public Works Construction" (section 336.01) requires all sampling and acceptance testing be done by an accredited AASHTO Lab or ASTM accrediting organization effective March 2008. Also, all field technicians performing acceptance testing or sampling shall be NAQTC, and ACI, certified. This includes any source acceptance testing for materials used in Asphalt, Concrete mix design. We wish to thank you for the opportunity of providing our services. We are readily available to answer any related questions.

Sincerely,
SUMMIT ENGINEERING CORPORATION



5/22/2024

Thomas O. Hannum, P.E.
Geotechnical Department Manager

1150 Lamoille Highway • Elko, Nevada 89801 • (775) 738-8058 FAX (775) 738-8267
5405 Mae Anne Avenue • Reno, Nevada 89523 • (775) 747-8550 FAX (775) 747-8559

Table of Contents

I. INTRODUCTION

A. Project Description

This report presents the results of our Geotechnical Investigation to evaluate the proposed roadway with respect to geotechnical and geologic site conditions. Exploration, laboratory testing, and engineering analyses were conducted to provide geotechnical recommendations for the design and construction of the project.

The proposed development consists of is anticipated to consist of either roadway with moderate street slopes and cut and fill slopes of 4:1 and 3:1. Sheet 1 presents a vicinity map and Sheet 2 presents the project site with test pit locations.

B. Purpose and Scope

The purpose of this investigation was to determine subsurface soil conditions and to provide geotechnical design criteria for the proposed roadway. The scope of this investigation included surface reconnaissance, subsurface exploration, analyses of field and laboratory data, research of pertinent geologic literature and report preparation. This report provides conclusions and recommendations concerning:

- General subsurface conditions and geology
- Site preparation and earthwork
- Engineering properties of the soils that will influence design of future structures, including:
  - Bearing capacities
  - Settlement potential
  - Lateral earth pressures
  - Portland cement concrete
  - Asphalt concrete
  - Seismic design criteria

C. Field Exploration and Laboratory Testing

Summit Engineering Corporation conducted the subsurface investigation by excavating 12 test pits to a maximum depth of 15 feet. All test pits were excavated with a Case 590. Representative samples of the soil were collected from the test pits. Selected samples were tested at Summit's laboratory. Sheet 1 shows the vicinity map and Sheet 2 presents a site map with the locations of the test pits. A FEMA flood plain location to property is on sheets 3. Sheets 4-15 display the log of soils encountered in the excavations. Sheet 16 provides a key to the test pit logs as well as a copy of the Unified Soil Classification System used to identify the site soils. Sheet 17 is a summary of testing.

Representative bulk samples were taken from the excavations at every significant lithologic change. Representative samples were tested as follows: 1) sieve analyses tests (ASTM D422); 2) moisture content tests (ASTM D2216); 3) Atterberg limits tests (ASTM 4318), & and R-value to confirm field soil classifications. The index test results can be used to estimate engineering properties of the native soil. Results of the laboratory tests are displayed on the test pit logs and presented independently in Sheets 4-17. All laboratory testing was conducted in accordance with the applicable standards.

II. DISCUSSION

A. Site Description

The site of the proposed Roadway is located on south of Elko along the adobe summit running east to west making connection from Errecart Bridge to the Errecart Blvd at the hospital site on Lamoille Hwy. The site is situated in the northern 1/2 of sections 22, 23, 24 township 34 north range 55 east (M.D.B.& M.). The existing area is undeveloped and the road is new road alignment with large cuts and fills.

B. Site Geology

The primary geologic reference reviewed was the Geologic Map of County, Nevada (Coats, 1987). The bulletin and its geologic map (Sheet 3) provided information about the general geology and earthquake hazards for the subject property and surrounding area. The geologic units mapped on the site include "Qal" or "Tes" or "Tet". The authors characterize these units as the following:

Qal: Silt, Sand, and Gravel alonmg streams, Maximum thickness of 60 Feet

Tes: *siltstone and oil shale member, light grey ato light reddish -ortange thinly bedded siltstone interbedded with dark brown oil shale in thin beds with wavy lamination: contain minor amount of clay-stone, limestone, lignite, and tuff. Ostracodes common in oil shale; oil shale is siliceous. Siltstone is locally crossbedded in small to medium-scale sets and commonly contains leaf imprints, reed fragments and other bituminous material. Tuff commonly altered to Clinoptilolite. Limestone locally contains dolomite and analcime.*

Tet*: tuff, shale, and siltstone member light grey quartz biotite tuff commonly altered to clinoptilolite, interbedded with light brown to light grey thinly and evenly bedded shale and siltstone. Sparse interbedded limestone commonly contains ostracode fragment and coated grains in sparry calcite cement analcime in the limestone is common; reed fragments are parse.*

C. FEMA

According to the map (#32007C5628F & #32007C5609F) available by F.E.M.A. (Federal Emergency Management Agency), the site is in Zone X "Areas determined to be outside the 0.2% and chance floodplain."

D. Regional Seismicity

The property, according to International Building Code 2018 maps, may be subject to moderate seismic acceleration, and therefore has a moderate probability for experiencing another major seismic event. The effect of seismic shaking, therefore, is an important consideration. The site has native soil profile of D, "stiff soil." The following table summarizes seismic design parameters for the 2018 International Building Code criteria for structural design of the project:

IBC SEISMIC DESIGN

Site Class	D
Soil Profile Type	Stiff Soil
Seismic Source Type	B
Soil Shear Wave Velocity ($\ddot{u}_s$)	600-1200
Standard penetration resistance (N)	15-50
Soil undrained shear strength (s_u)	1000-2000
Site Coefficient (F_a) w/ short accel. (s_s)	1.401
Site Coefficient (F_v) w/ 1-sec. accel. (s_1)	2.269
Max. ground motion, 0.2-sec SA (S_s), g	0.499
Max. ground motion, 1.0-sec SA (S_1), g	0.166
Design acceleration, S_{DS}, g	0.466
Design acceleration, S_{D1}, g	0.250
Peak Ground Acc (PGA)	0.305

Design of improvements shall be based on Site Class D as per IBC 2018 standards**.** The Peak Ground Acceleration (PGA) of the site with a Probability of Exceedance of 5 %.

The site is not located in any of the major Nevada Seismic Belts. Earthquake activity is difficult to predict, and it is not known which documented fault system may produce an earthquake event and associated

surface rupture. Current research by the Nevada Bureau of Mines and Geology and the University of Nevada, Reno indicates that a local earthquake event of Magnitude 7.0 would be unlikely. The nearest other active faults known to be capable of producing such an event are located approximately 100 miles southwest of the site (dePolo and dePolo, 1999).

At the present time, there are not any local codes that provide guidelines for the evaluation of seismic risk or surface rupture hazard associated with Quaternary (Holocene and Pleistocene) faults. The State of Nevada requires the use of seismic provisions set by the IBC, as well as adoptions of appropriate local standards (NRS 278.580.5). For the purposes of assessing seismic hazard and potential fault rupture hazard, standard engineering practice is to pursue the most diligent investigation of those faults deemed to be most likely to be active. Most geological consultants in Nevada follow the conventions established by the Nevada Earthquake Safety Council, whose guidelines are based on the Alquist-Priolo Act of 1972 in California. Per these guidelines, faults with evidence of movement in Holocene time (past 10,000 years) are considered "Holocene active". Those faults with evidence of displacement during Late Pleistocene time (10,000 to 130,000 years ago) would be considered "Late Quaternary active". Faults with evidence of last displacement having occurred during middle and early Quaternary time (130,000 years to 1,600,000 years ago) are considered "Quaternary Active Faults" (formerly "potentially active"). Faults with last displacement older than 1,600,000 years are deemed "inactive". Active faults are afforded a greater degree of study and analysis than those regarded as inactive.

Normally, any fault suspected of being active, as demonstrated by offset of the argillic (topsoil) horizon, poses a greater risk to development, and requires a minimum setback of 50 feet for occupied structures. According to the Geologic Map of County, Nevada (Coats, 1987; Sheet 3), no mapped faults cross the site nor were any encountered during this investigation. The closest mapped Elko hills fault fault is located approximately ½ mile of the site. The seismic hazard at the site is probably no greater than other comparable locations in the area that are located at comparable distances to similar faults. Occupied structures have been built over and adjacent to inactive faults in the area for decades, without significant harm to residents from temblors affecting the area. Building codes have evolved in recent years to provide adequate structural protection to residents for the level of tremors experienced to date. Summit Engineering does not recommend designing occupied structures over any faults.

Groundwater was not encountered in any of the test pit excavations. Liquefaction, a hazard in seismic zones where water-saturated granular cohesion less soils lose their bearing during seismic shaking, should not be an issue. Most soil was cohesive

E. Subsurface Materials and Conditions

12 test pits were excavated to a maximum depth of 15 feet or refusal in the course of this investigation. The native soils found on site classify predominately as: Silty Sand (SM), Sandy Silt (ML), and Lean Clay (CL) The material contains a lot of limestone and shale deposits particularly on the west end of the alignment. The soil was sightly dense for the sands and slightly stiff too stiff for the silts and clay soils. The eastern cut is sandy material with mixed gravel and some larger cobbles mixed in. The cut just west of the connect to existing Errecart on east side of the alignment is the most dense section and may require effort to rip the soils once a depth.

III. CONCLUSIONS AND RECOMMENDATIONS

From a geotechnical engineering standpoint, it is our opinion that the site is suitable for the construction of the proposed roadway development provided that the recommendations contained in this report are incorporated into design and construction. The following sections present our conclusions and recommendations concerning the proposed project.

A. Foundation Considerations

The native is adequate except for the Lean Clay (CL) to provide direct foundation support. NO uncontrolled fill was found however if any is discovered this uncontrolled fill removed and re-compacted in areas that receive structural loading. The primary geotechnical recommendation is to remove these materials entirely from all structural areas and replace it with structural fill to footing grade and pavement and concrete slab subgrade.

The native materials uncovered during the course of the investigation are adequate to provide direct foundation support. If any other materials are encountered in the course of construction, alerting the geotechnical engineer right away. Analysis obtained from field and laboratory testing indicates the native to be: Silty Sand (SM), Sandy Silt (ML), and Lean Clay (CL) If the native soils of this type can typically support up to 1,5000 pounds per square foot for dead plus long-term live loads, (per IBC 2018 Table 1804.2) on spread type footings with less than 1 inch of total settlement and less than 1/2 inch of differential settlement across the length of the structures.

The design coefficient of friction for Silty Sand (SM) or the majority of native material on site is 0.30. The passive soil pressure was calculated as 358 pounds per cubic foot (358 psf per foot of depth). The active soil pressure was similarly was calculated as 36 pounds per cubic foot (36 psf per foot of depth). The at-rest soil pressure, when walls are braced on the top and the bottom, was calculated as 52 pounds per cubic foot (52 psf per foot of depth). These design values assume the non-expansive granular soils that meet the outlined parameters are providing vertical and lateral support. All exterior footings shall be embedded a minimum 36 inches below adjacent finished grade or minimum depth per local code for frost

protection, and a minimum of four feet above groundwater.

B. Grading and Filling

Most of native soils encountered is not expansive except the Lean Clay (CL) and can be used for direct foundation support. All expansive materials that are encountered within 3 feet of the bottom of footings during construction shall be removed prior to placing any fill. These materials are unsuitable for use as fill in structural areas due to their potentially detrimental properties. Therefore, these materials shall only be placed as the final lift of fill in landscaped areas.

All areas that are to receive fill or structural loading shall be scarified to a depth of at least 12 inches, moisture conditioned to within 2 percent of optimum, and recompacted to at least 90 percent relative compaction (ASTM D 1557). If the native subgrade is too coarse to density test, then moisture conditioning and compaction shall be completed to the satisfaction of the Geotechnical Engineer. A proof-rolling program of a minimum 5 complete passes with a Cat 825 self-propelled sheepsfoot (or equivalent) may be acceptable. For footing trenches, five complete passes with hand compactors may be adequate.

All fill, except rock fill, shall be placed in 12-inch maximum lifts, moisture conditioned to within 2 percent of optimum, and compacted to at least 90 percent (ASTM D1557). If any of the on-site materials are too coarse for density testing (>30% retained on the ¾" sieve), these materials must be treated as rock fill. Whenever structural foundations will be placed partially in cut and partially in fill, over-excavation, and replacement of material on the cut side may be necessary in order to reduce the potential for differential settlement. Any differential fills in original topo shall be reduced to a maximum of 4 feet within the building envelope.

The maximum particle size shall be 12 inches up to 5 feet below finished grade and 6 inches from 5 feet below finished grade to finished grade. This material shall be placed in 12-inch lifts (maximum), moisture conditioned, and compacted to the satisfaction of the Geotechnical Engineer. Care should be taken to ensure that voids between cobbles and boulders are filled with finer materials. Five complete passes of a Cat 825 sheepsfoot compactor (or equivalent) may achieve adequate compaction. Acceptance of density requirements for this type of rock fill shall be by observation of lift thickness, moisture

conditioning, and applied compactive effort. The maximum allowable particle size shall be decreased if the Geotechnical Engineer is not satisfied with the achieved compaction and/or "nesting" of particles is observed.

Native materials are suitable to be utilized as structural cap material provided requisite parameters are met. Structural cap materials are materials within 3 feet below bottom of footing and within 2 feet below pavement and concrete subgrade. Any native materials encountered that do not meet the requirements of structural fill will not be permitted within 3 feet of footings or 2 feet of roadway improvements without approval of the Geotechnical Engineer.

Any expansive soils, if encountered during the course of excavation, may not be utilized for direct support of improvements (including streets), nor may they be reused as structural fill. The primary geotechnical recommendation is to remove this material entirely from all structural areas and replace it with structural fill to footing grade and pavement and concrete slab subgrade. A less preferable, but less costly alternative with more risk is to minimize the potential for post-construction differential foundation and subgrade movement by providing a minimum of 3 feet of structural fill beneath footings, and 2 feet of structural fill beneath all pavement and concrete slab subgrades. This may be accomplished entirely by fill or by over-excavation and replacement with structural fill, or any combination thereof. Soils at the bottom of the over excavation shall be scarified to a minimum depth of 6 inches; moisture conditioned to at least optimum moisture, and recompacted to 90 percent (ASTM D1557). If the Owner/Developer elects to implement this alternate method and not remove all clays from structural areas, he will assume the risk of potential post-construction differential foundation movement and will hold harmless the Geotechnical Engineer for this decision.

Expansive soil shall be defined as any soil or bedrock with more than 30 percent (by weight) passing the No. 200 sieve and/or a plasticity index of 16 or greater and/or an expansion index of at least 21. Expansive soils may only be placed as fill in non-structural areas, or as structural fill to within 3 feet of footing grade or 2 feet of pavement subgrade. Expansive soils utilized as fill shall be moisture conditioned to at least optimum and compacted to a minimum of 90 percent. All direct structural support shall be provided by non-expansive material. Any imported structural fill for this project should meet or exceed the following guideline specifications:

Sieve Sizes	Percentage Passing (by weight)
4 Inch	100
3/4 Inch	70-100
No. 40	15-50
No. 200	10-30
Additional Requirements are as Engineers Request:	
Water Soluble Sulfate (SO_4)(max)	0.1%
Total Available Water-Soluble Sodium Sulfate (Na_2SO_4)(max)	0.2%
Solubility (max)(AWWA 2540C)	0.5%
Liquid Limit (max.)	38
Plasticity Index (max.)	15
Expansion Index (max.)	20

This specification is meant as a guideline to pre-approve imported structural fill. Other materials not meeting this specification may be suitable but will require approval from the Geotechnical Engineer. Mining of structural fill material on-site is not permissible unless taken from non-structural areas, or from re-using suitable material as structural fill taken from areas of designated cut.

C. Surface and Subsurface Drainage

Surface drainage shall be diverted away from all buildings and shall not be permitted to pond or pool adjacent to foundations or within 3' of building envelope. If crawlspaces are utilized it is recommended that all crawlspaces be lined with Visqueen sheeting, and that positive crawlspace drainage be provided to a collection point. A small diameter pipe (2 to 4-inch) may be placed beneath and perpendicular to the footing, sloped to drain to daylight, or the drain rock bedding of the storm water catchment basin lateral to the street may be utilized to drain the crawlspace.

Slab-on-grade foundation systems may require subsurface drainage dependent on conditions encountered during grading. A vapor retarder should be placed under slab to prevent moisture intrusion. Subsurface drainage is required for drainage on the outside of all foundation walls adjacent landscape areas and areas were retaining walls support soil above any finish floors within any structure. A poly membrane should be placed against the wall from the side of footing to within 2" above finish grade on the foundation concrete or CMU block stem wall. A drainage product should be installed against the

membrane with a small diameter pipe (2 to 4-inch) at footing grade be placed against the wall/footing, and sloped to drain to daylight, or to drain rock bedding, or tied onto a local storm drainpipe.

Grading plans should be designed to minimize the potential for infiltrated precipitation or landscaping irrigation to migrate laterally and downslope along the cut/fill interface and surfacing in downslope lots. Roof drains must discharge into subsurface storm ditch system or to pavement areas and avoid drainage to landscaped area adjacent to building. Steps should also be taken to minimize the moisture seepage at the joint between the stem wall and the footing.

D. Slope Stability and Erosion Control

The results of our exploration and testing indicate that 2:1 (H:V) slopes will be stable for on-site materials in cut and fill. All cut and fill slopes should incorporate brow ditches to divert surface drainage away from the slope face. Any major cut or fill slopes shall include mid-height benches in accordance with International Building Code standards.

The potential for dust generation, both during and after construction, is extremely high at this project. Dust control will be mandatory on this project in order to comply with air quality standards. The contractor shall submit a dust control plan and obtain the required permits from the City of Elko prior to commencing site grading.

Stabilization of all slopes and areas disturbed by construction will be required to prevent erosion and to control dust. Stabilization may consist of riprap, revegetation and landscaping, or dust palliative. Slopes steeper than 3:1 (H:V) will require stabilization.

Where the fill extends onto native slopes with gradients greater than 5:1, the fill shall be keyed into the native soils. The keys will have a minimum width of equipment width or 10 feet, whichever is lesser, and constructed with a minimum 5 percent slope into the hillside.

E. Trenching and Excavation

All trenching and excavation shall be conducted in accordance with all local, state, and federal (OSHA) standards. In general, the soil, encountered during exploration meets the criteria for OSHA Type C soils. Any oversized material loosened during excavation will require scaling prior to permitting workmen to enter the trench.

Any area in question should be examined by the Geotechnical Engineer. The following table is reproduced from Occupational Safety and Health, Subpart P, 1926.652, Appendix B:

TABLE B-1

MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V) [1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP [3]
STABLE ROCK	VERTICAL (90°)
TYPE A [2]	3/4:1 (53°)
TYPE B	1:1 (45°)
TYPE C	1 1/2:1 (34°)

NOTES

Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

A short-term maximum allowable slope of 1/2 H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4 H:1V (53°).

Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

Bedding material of 12 inches and initial backfill over the pipe will require import to meet the specifications of the utility having jurisdiction. For storm drains and sanitary sewers only, bedding sand

may be substituted for gravel or pea gravel provided filter fabric is placed over this material. In a groundwater condition, fabric shall be rapped entirely around gravel material. On-site soils may be used for trench backfill, provided particles over 4 inches in diameter are removed. Imported structural cap material or native material meeting the requirements for structural fill will be required within 3 feet below bottom of footing and 2 feet below bottom of pavement subgrade. All trench backfill shall be placed in 12 inch (max.) finished lifts, moisture conditioned to within 2 percent of optimum, and densified to at least 90 percent relative compaction (ASTM D1557). If metal pipes are to be utilized, corrosion protective measures shall be taken per manufactures written recommendations.

F. Asphaltic Concrete Design

Traffic counts and the type of trucks anticipated at the site were not available during the preparation of this report. A minimum R-value of 30 is specified for this type of construction; therefore, this material is adequate support for the intended paving improvements for the proposed section. A Type 2 (3/4-inch size) 75 blow mix is recommended for the city owned roads for a durable surface which is less susceptible to truck trafic. A 75 Blow, Marshall Mix design with 3-5 percent air voids is recommended for this project. The use of PG64-22 is also recommended in order to increase the resistance to thermal cracking and help reduce pavement maintenance over the life of the pavement. A mix design shall be submitted to the Geotechnical Engineer for approval one week prior to paving.

Aggregate base materials (Type 2, Class B) shall be placed on top of the subgrade. The aggregate base materials shall be approved by the Geotechnical Engineer prior to incorporation into the pavement structure. Aggregate base shall be moisture conditioned to within 2 percent of optimum and compacted to at least 95 percent compaction (ASTM D 1557).

Subgrade material can be native material or import with approval of the soils engineer and should have a min R-value of 30 as stated above. This material shall be moisture conditioned to within 2 percent of optimum and compacted to at least 90 percent

Finally, the asphalt sections for the defined areas area listed below.

- **Errecart Blvd –** 6" of Type III Asphalt compacted to 92% of Rice Max Theoretical or 96% of the Marshall shall be placed on 12" of Type 2 Class B Agg Base compacted to 95% relative compaction per ASTM 1557. These should be placed over native or fill material with a min R-value of 30 and compacted to 90% relative compaction per ASTM 1557.

- **9th Street –** 4" of Type III Asphalt in two separate 2" lifts, compacted to 92% of Rice Max Theoretical or 96% of the Marshall shall be placed on 8" of Type 2 Class B Agg Base compacted to 95% relative compaction per ASTM 1557. These should be placed over native or fill material with a min R-value of 30 and compacted to 90% relative compaction per ASTM 1557.

- **Pinion Street –** 3.5" of Type III Asphalt in two separate 2" lifts, compacted to 92% of Rice Max Theoretical or 96% of the Marshall shall be placed on 7" of Type 2 Class B Agg Base compacted to 95% relative compaction per ASTM 1557. These should be placed over native or fill material with a min R-value of 30 and compacted to 90% relative compaction per ASTM 1557.

G. Concrete Slabs

All dedicated concrete walkways and driveways should be directly underlain by aggregate base per accepted standards. Crushed Gravel, the same unit thickness as aggregate base, can be used in lieu of aggregate base under private improvement and driveways. The concrete mix design for exterior concrete shall have a minimum of 6.5 sacks of Portland cement, with a maximum water to cement ratio of 0.45, and air content between 4.5 and 7.5 percent. This recommendation is to provide resistance to freeze-thaw cycles that occur in the Elko area. Additional requirements for exterior site concrete are as follows:

Minimum compression strength = 4,000 psi,
Maximum slump = 4" with Plastizer
6" with Plastizer

Structural foundations, Interior slab-on-grade and private concrete shall follow criteria established by the

project structural engineer. Soluble sulfates have a detrimental effect on Portland cement concrete. Therefore, the sulfate exposure is ranked “moderate”.

This is according to Table 4.3.1 of the ACI Building Code Requirements (as per IBC, 2018), as follows:

TABLE 4.3.1

REQUIREMENTS FOR CONCRETE EXPOSED TO SULFATE-CONTAINING SOLUTIONS

SULFATE EXPOSURE	WATER SOLUBLE SULFATE (SO_4)IN SOIL, PERCENT BY WEIGHT	SULFATE (SO_4) IN WATER (ppm)	CEMENT TYPE	MAXIMUM WATER-CEMENTITIOUS MATERIAL RATIO, BY WEIGHT, NORMAL WEIGHT AGGREGATE CONCRETE *	MINIMUM f'_c NORMAL-WEIGHT AND LIGHTWEIGHT AGGREGATE CONCRETE (psi)*
Negligible	$0.00 \le SO_4 < 0.10$	$0 \le SO_4 < 150$	-	-	-
Moderate†	$0.10 \le SO_4 < 0.20$	$150 \le SO_4 < 1500$	II, IP(MS), IS(MS), P(MS), I(PM)(MS), I(SM)(MS)	0.50	4,000
Severe	$0.20 \le SO_4 < 2.00$	$1500 \le SO_4 < 10,000$	V	0.45	4,500
Very severe	$SO_4 > 0.20$	$SO_4 > 10,000$	V plus pozzolan‡	0.45	4,500

* When both Table 4.3.1 and Table 4.2.2 are considered, the lowest applicable maximum water-cementitious material ratio and highest applicable minimum f'_c shall be used.

† Seawater.

‡ Pozzolan that has been determined by test or service record to improve sulfate resistance when used in concrete containing Type V cement.

All structural concrete mix designs for interior and private improvements only should meet one of the additional following criteria:

TYPE OF CEMENT	MINIMUM SACKS OF CEMENT PER CUBIC YARD (prior to replacement with fly ash)	MAXIMUM WATER TO CEMENTIOUS MATERIALS RATIO
Type II	6	0.5
Type II and fly ash	5.5	0.53
Type IP	5.5	0.53
Type V	5.5	0.53
Type V and fly ash	5.5	0.53

Concrete mix designs shall be determined per Chapter 7 of "Design and Control of Concrete Mixtures" by the Portland Cement Association and as further modified by IBC 2018 standards and submitted to the Geotechnical Engineer for approval at least one week prior to pouring the concrete.

The greater elko area is in a climatic zone of low humidity and concrete is susceptible to shrinkage cracking and curling during curing. All concrete work shall follow the procedures of the American Concrete Institute.

H. Anticipated Construction Problems

The site has a high potential for dust generation and will require constant dust suppression measures during construction. The site has access availability by the public.

LIMITATIONS

This report is prepared solely for the use of Summit Engineering's client. Any entity wishing to utilize this report must obtain permission from them prior to doing so. Our services consist of professional opinions and recommendations made in accordance with generally accepted soil and foundation engineering principles and practices. The analyses and recommendations contained in this report are based on our site reconnaissance, the information derived from our field exploration and laboratory testing, our understanding of the proposed development, and the assumption that the soil conditions in the proposed building and grading areas do not deviate from the anticipated conditions.

Unanticipated variations in soil conditions could exist in unexplored areas on the site. If any soil or groundwater conditions are encountered at the site that are different from those discussed in this report, our firm should be immediately notified so that our recommendations can be modified to accommodate the situation. In addition, if the scope of the proposed construction, including proposed loads or structural location, changes from that described in this report, our firm should be notified.

Recommendations made in this report are based on the assumption that an adequate number of tests and inspections will be made during construction to verify compliance with these recommendations. Such tests and inspections should include, but not necessarily be limited to, the following:

- Review of site construction plans for conformance with soils investigation.
- Observation and testing during site preparation, grading, excavation, and placement of fill.
- Observation and testing of materials and placement of asphalt concrete and site concrete.
- Foundation observation and review.
- Consultation as may be required during construction.

The findings in this report are valid as of the present date; however, changes in the conditions of the property can occur with the passage of time, whether they are due to natural processes or to the works of man on this or adjacent lands. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

REFERENCES

Coats, Robert R., 1987, Geology of County, Nevada: Nevada Bureau of Mines and Geology, Bulletin 101.

dePolo, Diane M., and dePolo, Craig M., 1999, Earthquakes in Nevada, 1852-1998: Nevada Bureau of Mines and Geology Map 119; Reno, 1 sheet.

Federal Emergency Management Agency, FEMA map (#32007C5628F & #32007C5609F)

http://eqhazmaps.usgs.gov

International Building Code, 2018, International Conference of Building Officials.

Lindeburg, Michael R., 2003, Civil Engineering Reference Manual: Professional Publications, Inc.

Naval Facilities Engineering Command, 1986, Soil Mechanics – Design Manual 7.01.

Naval Facilities Engineering Command, 1986, Foundations and Earth Structures – Design Manual 7.02.

Occupational Safety and Health Administration Guidelines, Subpart P, 1926.652, Appendix B.

Standard Specifications for Public Works Construction, 2016, Sponsored by Regional Transportation Commission of Washoe County, County, City of Reno, City of Sparks, et al.

APPENDIX A – GUIDELINE SPECIFICATIONS

APPENDIX A

SPECIFICATIONS FOR

SITE PREPARATION, EXCAVATION, COMPACTION

STRUCTURAL FILL, AND SUBGRADE PREPARATION

1. GENERAL

1.1. Standard Specifications - Where referred to in these specifications, "Standard Specifications" shall mean the Standard Specifications for Public Works Construction sponsored and distributed by the Regional Transportation Commission of Washoe County, County, *et al.* (Latest edition).

1.2. Scope - All work shall be done in accordance with the Standard Specifications except as may be modified by the specifications outlined below. The work done under these specifications shall include clearing, stripping, removal of unsuitable material, excavation and preparation of natural soil, placement, and compaction of on-site and/or imported fill material, or as specifically referred to in the plans or specifications.

1.3. Geotechnical Engineer - When used herein, Geotechnical Engineer shall mean the engineer or a representative under the engineer's supervision. The work covered by these specifications shall be inspected by a Geotechnical Engineer, who shall be retained by the Owner. The Geotechnical Engineer will be present during the site preparation and grading to inspect the work and to perform the tests necessary to evaluate material quality and compaction. The Geotechnical Engineer shall submit a report to the Owner, including a tabulation of all tests performed.

1.4. Soils Report - A "Geotechnical Investigation" report, prepared by Summit Engineering Corporation, is available for review and may be used as a reference to the surface and subsurface soil and groundwater conditions on these projects. The Contractor shall make his own interpretation with regards to the methods and equipment necessary to perform the excavations.

1.5. Percent Relative Compaction - Where referred to herein, percent relative compaction shall mean the in-place dry unit weight of soil expressed as a percentage of the maximum dry unit weight of the same material, as determined by ASTM D-1557, laboratory compaction test procedure. Optimum moisture content is the moisture content corresponding to the maximum dry density determined by ASTM D-1557.

2. SITE PREPARATION AND EARTHWORK

2.1. All earthwork and site preparation should be performed in accordance with the requirements of this report and attached specifications, and the Standard Specifications.

2.2. Clearing - Areas to be graded shall be cleared of brush and debris. These materials shall be removed from the site and discarded by an acceptable means approved by the owner.

2.3. Stripping - Surface soils containing roots and organic matter shall be stripped from areas to be graded and stockpiled or discarded as specified by the plans and specifications or at the discretion of the owner. Strippings may be used as the final lift of fill for areas to be planted.

2.4. Dust Control- The contractor shall prevent and maintain control of all dust generated during construction in compliance with all federal, state, and county regulations. The project specifications should include an indemnification by the contractor of the engineer and owner for all dust generated during the entire construction period.

2.5. Materials - All material not suitable for use as structural fill, shall be removed from the sites by the Contractor, or placed in non-structural fill areas. The Geotechnical Engineer shall determine the suitability of material for reuse as structural fill.

2.6. Ground Surface - The ground surface exposed by stripping and/or excavation shall be scarified to a minimum depth of 12 inches, moisture conditioned, by aerating or adding water, to within 2 percent of optimum moisture content and compacted to 90 percent relative compaction, unless otherwise specified. Compaction of the ground surface shall be approved by the Geotechnical Engineer prior to placement of fill, structural fill, aggregate base, and/or

Portland cement concrete.

2.7. Backfill of test pits and trenches – Our exploration pits and trenches were backfilled without mechanical compaction. In structural areas, backfill in the pits should be removed and replaced in lifts with compactive effort.

3. FILL MATERIAL

3.1. Fill material shall be free of perishable, organic material. Rock used in the fill shall be placed in such a manner that no voids are present, either between or around the rock, after compacting each layer.

3.2. Structural Fill Material - Material shall consist of suitable non-expansive soils having a plasticity index less than 16, and a minimum R-value of 30. The gradation requirements shall be as follows:

Sieve Sizes	Percentage Passing (by weight)
4"	100
3/4"	70 - 100
#40	15 - 50
#200	10 - 30

Materials not meeting the above requirements may be suitable for use as structural cap material at the discretion of the Geotechnical Engineer. Samples of imported fill proposed for use as structural cap material shall be submitted to the Geotechnical Engineer and approved before it is delivered to a site.

3.3. Rock Fill - Fill material containing over 30 percent (by weight) of rock larger than 3/4 inches in greatest dimension is defined as rock fill. Rock Fill located five or more feet below finished grade may be constructed in loose lifts up to the maximum size of the rock in the material but not exceeding diameters of 18 inches. The voids around the rock in each rock fill lift shall be

filled with granular material and fines and compacted to the satisfaction of the Geotechnical Engineer. Rocks larger than 18 inches in diameter shall be placed in non-structural areas or in deep fills at the discretion of the geotechnical engineer. Care should be taken to fill all voids with finer grained materials. No nesting of larger rocks shall be allowed. Rock fill shall not be used for slab-on-grade construction without the approval of the Geotechnical Engineer. The maximum allowable particle size shall be decreased by the Geotechnical Engineer if the achieved compaction is not satisfactory to the Geotechnical Engineer or "nesting" is observed by the Geotechnical Engineer.

4. EARTHWORK AND FILL PLACEMENT

4.1. Placement - Fill material shall be placed in layers that shall not exceed 12 inches of compacted thickness, unless otherwise approved by the Geotechnical Engineer. Each layer shall be evenly spread, and moisture conditioned to within 2 percent of optimum moisture content. Unless otherwise specified, each layer of earth fill shall be compacted to 90 percent relative compaction. Compaction shall be approved by the Geotechnical Engineer. Rock fill shall be placed in accordance with the appropriate sections of the Standard Specifications. Rock fill placement and compaction shall be approved by the Geotechnical Engineer. Full time inspection of fill placement is required in structural areas and areas designated as dedicated improvement for County, unless otherwise approved by the Engineer.

4.2. Keyways - Where the fill extends onto native slopes with gradients greater than 5:1, the fill shall be keyed into the native soils. The keys will have a minimum width of equipment width or 10 feet, whichever is lesser, and constructed with a minimum 5 percent slope into the hillside.

4.3. Compaction Equipment - The Contractor shall provide and use equipment of a type and weight suitable for the conditions encountered in the field. The equipment shall be capable of obtaining the required degree of compaction in all areas including those that are inaccessible to ordinary rolling equipment.

4.4. Reworking - When, in the judgment of the Geotechnical Engineer, sufficient compaction

effort has not been used, or where the field density tests indicate that the required compaction or moisture content has not been obtained, subgrade and/or fill materials shall be reworked and compacted as needed to obtain the required density and moisture content. This reworking shall be accomplished prior to the placement of fill, structural fill, aggregate base, and/or Portland cement concrete.

4.5. Unstable Areas - If pumping or other indications of instability are noted, fill and/or subgrade materials shall be evaluated by the Geotechnical Engineer, scarified, left to dry, and recompacted or removed and replaced as needed to obtain the required density and moisture content. This work shall be accomplished prior to the placement of fill, structural fill, aggregate base, and/or Portland cement concrete.

4.6. Frozen Materials – Fill shall not be placed on frozen materials, nor shall frozen material be utilized as fill.

5. EXCAVATION AND SLOPE REQUIREMENTS

5.1. Finished cut slopes shall not exceed 2 horizontals to 1 vertical and fill slopes should not exceed ratios of 2 horizontal to 1 vertical. Slopes steeper than three horizontals to one vertical or more than ten feet in height should be protected from erosion using riprap, vegetation, or a similar designated and acceptable means meeting the applicable standards.

5.2. Temporary, unsupported construction slopes less than ten feet in height may stand at a slope as steep as 1½:1 (H:V) provided that the length of the unsupported slope does not exceed twenty feet. These temporary slopes should not remain unsupported for extended periods of time.

6. FOUNDATIONS AND FOOTING DESIGN

6.1. Spread type continuous and column footings should be designed to impose a maximum net dead plus long-term live load 1,500 pounds per square foot (per IBC 2018 Table 1804.2)". Net bearing pressures of up to one-third in excess of the given bearing value are permitted for transient live loads from wind and earthquake.

6.2. Exterior footings should be embedded a minimum of 36 inches below the lowest adjacent final compacted subgrade or minimum depth per local code to provide adequate frost protection and confinement. Isolated interior footings should be imbedded per IBC requirements. The recommendations of this report are applicable to all footings.

6.3. Passive soil resistance to lateral footing pressures may be calculated as 358 pounds per square foot per foot of depth and a base coefficient of friction of 0.30 for footings. Active soil pressure may be calculated as 36 pounds per square foot per foot of depth. At-rest soil pressure may be calculated as 52 pounds per square foot per foot of depth.

6.4. Backfill of footing excavations or formed footings should be moisture conditioned to within 2 percent of optimum moisture content and compacted to a minimum of 90 percent relative compaction.

6.5. All footing excavations should be clear of loose material prior to placement of concrete. The bottom of the footing excavation should be scarified to a depth of 12 inches, moisture conditioned to within 2 percent of optimum moisture content, and compacted to a minimum of 95 percent relative compaction.

7. UTILITY TRENCH BACKFILL

7.1. Bedding Material - Bedding material shall meet one of the following gradation requirements listed below and shall be nonplastic:

Bedding will require import to meet one of the following specifications:

	CLASS A BACKFILL	**CLASS B BACKFILL**	**CLASS C BACKFILL**
SIEVE SIZE	% PASSING	%PASSING	% PASSING
1”	-	-	100
¾”	-	-	90-100
½”	-	100	-
3/8”	100	-	10-55
#4	90-100	0-15	0-10
#50	10-40	-	-
#100	3-20	-	-
#200	0-15	0-3	-

Bedding as defined in this report shall be within 6 inches of the bottom of the pipe, within 12 inches of the sides of the pipe, and within 12 inches, or to a depth required from the top of the pipe to the top of the groundwater table, whichever is greater, over the pipe. Where groundwater is encountered, filter fabric or filter material shall encapsulate the bedding, if Class B or Class C backfill is utilized. The filter fabric shall be a 10 oz./sq. yd. nonwoven geotextile.

Individual utility companies may have additional specifications, which should also be followed.

7.2. Placement and Compaction - Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of 0.4 times the outside diameter of the barrel. Bedding shall also extend to one foot above the top of the pipe. Pipe bedding within 6 inches of the pipe shall be placed in thin layers not exceeding 8 inches in loose thickness, conditioned to the proper moisture content for compaction. Class A backfill shall be compacted to at least 90 percent relative compaction. Class B and/or C backfill shall be compacted to the satisfaction of the Geotechnical Engineer. All other trench backfill shall be placed in thin layers not exceeding 8 inches in loose thickness, conditioned to within 2 percent of optimum moisture content, and compacted as required for adjacent fill, or if not specified, to at least 90 percent compaction in areas under structures, utilities, roadways, parking areas, and concrete flatwork.

7.3. Drain Rock - Any necessary subsurface drainage systems shall use drain rock conforming to the following Class C gradation:

Sieve Sizes	Percentage Passing (by weight)
1"	100
3/4"	90-100
3/8"	10-55
#4	0-10

8. CONCRETE SLAB-ON-GRADE AND FLATWORK CONSTRUCTION

8.1. Slab-on-grade - When used in this report, slab-on-grade shall refer to all interior concrete floors.

8.2. Concrete flatwork - A general term, flatwork refers to all exterior concrete site work including sidewalks, driveways, curb and gutters, and patios.

8.3. Subgrade - The upper twelve inches of subgrade beneath the aggregate base under concrete flatwork and slabs-on-grade shall be scarified, moisture conditioned to within 2 percent of optimum moisture content, and compacted to 90 percent relative compaction. Compaction shall be approved by the Geotechnical Engineer.

8.4. Concrete Mix Design - The contractor shall submit a concrete mix design to the Geotechnical Engineer for review and approval at least 1 week prior to placement of any concrete. The exterior concrete mix design shall utilize a minimum of 6 sacks of Portland Cement Concrete and a maximum water cement ratio of 0.45. Exterior concrete shall also meet the following specifications:

Minimum 28-day compressive strength = 4,000 psi.
Air content = 4.5 – 7.5%
Maximum slump = 4 inches, 6” with plasterer

Interior concrete mix designs shall comply with the structural plans and the tables included in Section G of this report.

Admixtures - All admixtures incorporated in the mix design shall be approved by the Geotechnical Engineer.

Finishing - All finishing shall be done in the absence of bleed water. No water shall be added to placed concrete during finishing.

8.5. Over excavation - If encountered, expansive soils within two feet of flatwork or three feet of footings shall be over excavated. Over excavations should extend at least two feet laterally beyond the edge of the flatwork/slab-on-grade section.

8.6. Base - Base material shall be compacted to 95 percent relative compaction. Compaction shall be approved by the Geotechnical Engineer. Type II Class B aggregate base meeting the following requirements shall be used:

Gradation Requirements

Sieve Size	Percentage Passing (by weight)
1"	100
3/4"	90-100
#4	35-65
#16	15-40
#200	2-10

Plasticity Index should meet the following requirements:

Percentage Passing #200 (by weight)	Plasticity Index Maximum
0.1 to 3.0	15
3.1 to 4.0	12
4.1 to 5.0	9
5.1 to 8.0	6
8.0 to 11.0	4

Other Requirements

R-value	Minimum of 70
Fractured faces	Minimum of 35%
LA Abrasion	Maximum of 45%
Liquid Limit	Maximum of 35%

8.7. Concrete slab-on-grade thickness and compressive strength requirements shall be in accordance with design criteria provided by the Structural Engineer. Minimum slab thickness

and compressive strength for flatwork shall be in accordance with the applicable requirements.

8.8. Concrete work shall conform to all requirements of ACI 301-84, Specifications for Structural Concrete for Buildings, except as modified by supplemental requirements.

8.9. To facilitate curing of the slab, base materials shall be kept moist until placement of the concrete.

8.10. Excessive slump (high water cement ratio) of the concrete and/or improper curing procedures used during hot or cold weather could lead to excessive shrinkage, cracking or curling of slabs and other flatwork.

9. RETAINING WALLS

9.1. Retaining walls should be designed using a passive pressure calculated as 358 pounds per square foot per foot of depth and active soil pressure should be calculated as 36 pounds per square foot per foot of depth. A base coefficient of 0.30 should be used for resistance to sliding.

9.2. Footings should be placed at least 36 inches below the lowest adjacent finished grade or minimum depth per local code. Subgrade shall be prepared as per these specifications.

9.3. In addition to active soil pressures the effects of any surcharge from adjacent structures or roadways should be included in calculating lateral pressures on retaining walls.

9.4. The design pressures given assume the soils retained are granular, non-expansive and free draining.

9.5. Retaining wall backfill should be moisture conditioned to within 2 percent of optimum and compacted to 90 percent in non-structural areas and 95 percent in structural areas. The use

of heavy compaction equipment could cause excessive lateral pressures, which may cause failure of the wall.

9.6. Installation of weep holes or a continuous drain along the base of the wall is recommended to prevent water from being retained behind the wall.

9.7. An interceptor swale should be provided at the top of all retaining walls.

10. ASPHALTIC CONCRETE PAVEMENT

10.1. Material and Procedure- The asphalt-concrete material and placement procedures shall conform to appropriate sections of the "Standard Specifications". Aggregate materials for asphaltic concrete shall conform to the requirements listed for Type 2 and Type 3 aggregate in Section 200.02.02 of the "Standard Specifications, 2016". A Type 3, 50-blow, Marshall Mix design with 3 to 5 percent air voids is recommended. An asphaltic cement grade PG64-22 or equivalent is recommended for top layer for this project. The Contractor shall submit proposed asphalt-concrete mix designs to the Geotechnical Engineer for review and approval at least one week prior to paving. Asphalt materials should be compacted to a minimum of 92 percent of its theoretical maximum specific gravity or 96 percent of its Marshall density.

10.2. Subgrade Preparation- After completion of the utility trench backfill and prior to the placement of aggregate base, the upper 12 inches of finished subgrade soil or structural fill material shall be moisture conditioned to at within 2 percent of optimum and compacted to at least 90 percent. This may require scarifying, moisture conditioning and compacting.

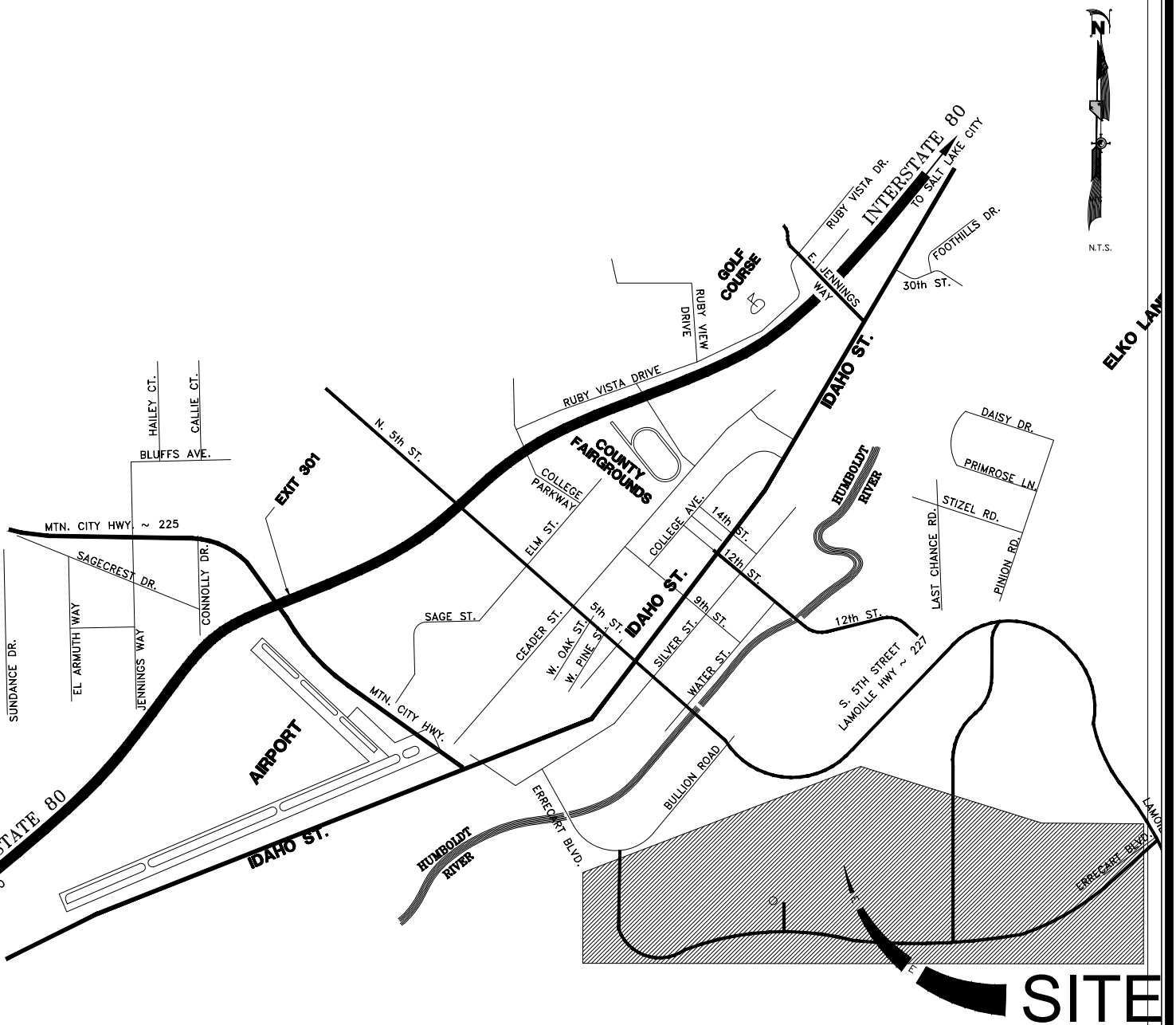
10.3. Aggregate Base Rock- After the subgrade and/or structural fill is properly prepared, the aggregate base material shall be placed uniformly on the approved areas. Aggregate base shall be placed in such a manner as to prevent segregation of the different sizes of material and any such segregation, unless satisfactorily corrected, shall be cause for rejection at the discretion of the Geotechnical Engineer. The aggregate base material shall be spread for compaction in layers not to exceed six inches; moisture conditioned to within 2 percent of

optimum and compacted to at least 95 percent compaction. Aggregate base materials shall meet the requirements of Section 200.01.03 of the "Standard Specifications, 2016" for Type 2, Class B aggregate base. The aggregate base materials shall be approved by the Geotechnical Engineer prior to incorporation into the pavement structure.

11. SEISMIC DESIGN

11.1. Design of structures should include an allowance for earthquake loading. Structures should be designed in conjunction with IBC 2018 criteria for seismic acceleration in soil profile.

APPENDIX B – LIST OF SHEETS



VICINTITY MAP

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

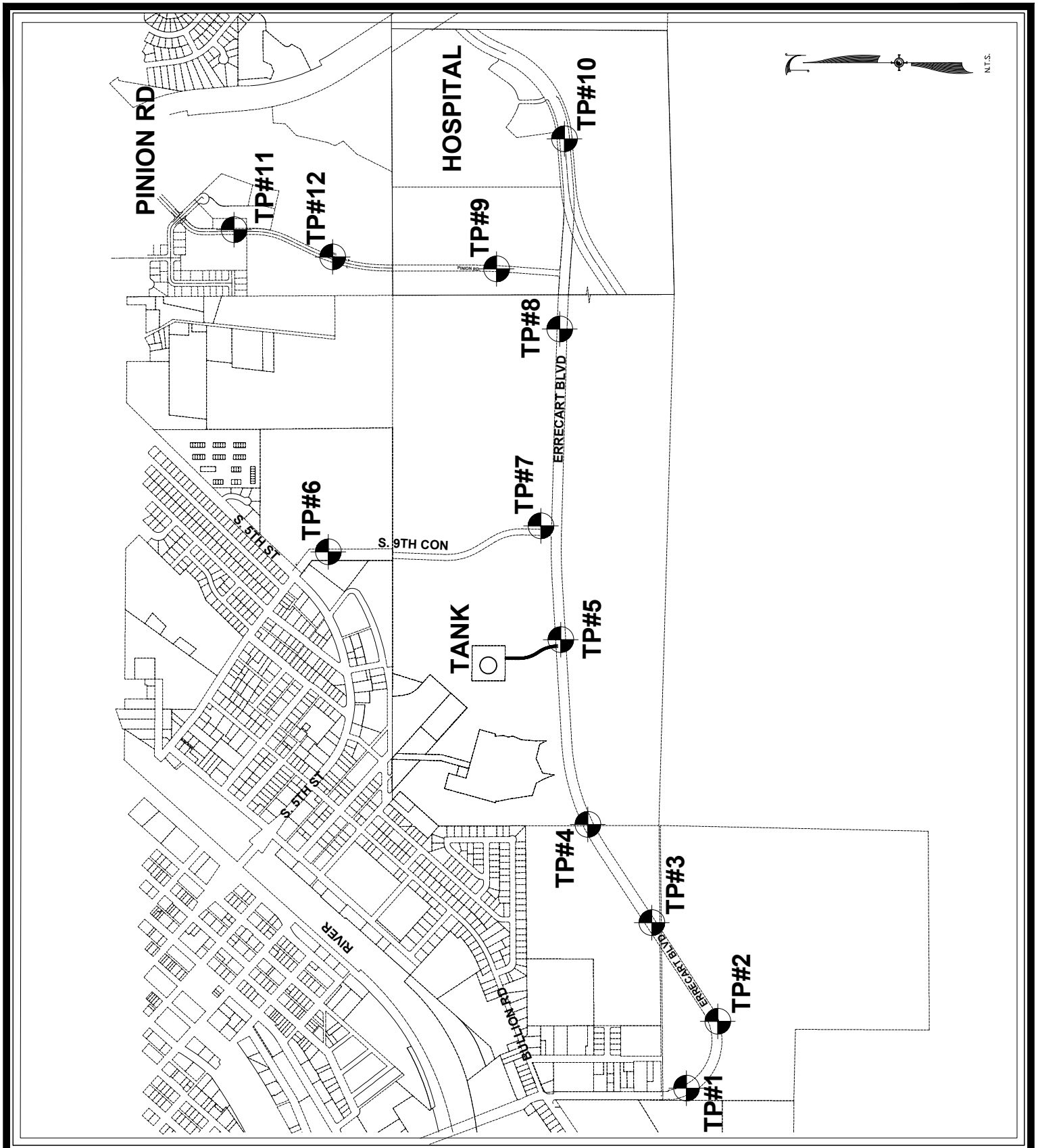
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

SHEET 1

OF 17

* 5/22/2024 2:45 PM



SITE MAP

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

SHEET 2

OF 17

FEMA MAP

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY . ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

SHEET 3 OF 17

National Flood Hazard Layer FIRMette

FEMA

115°45'10"W 40°49'24"N

115°44'33"W 40°48'57"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

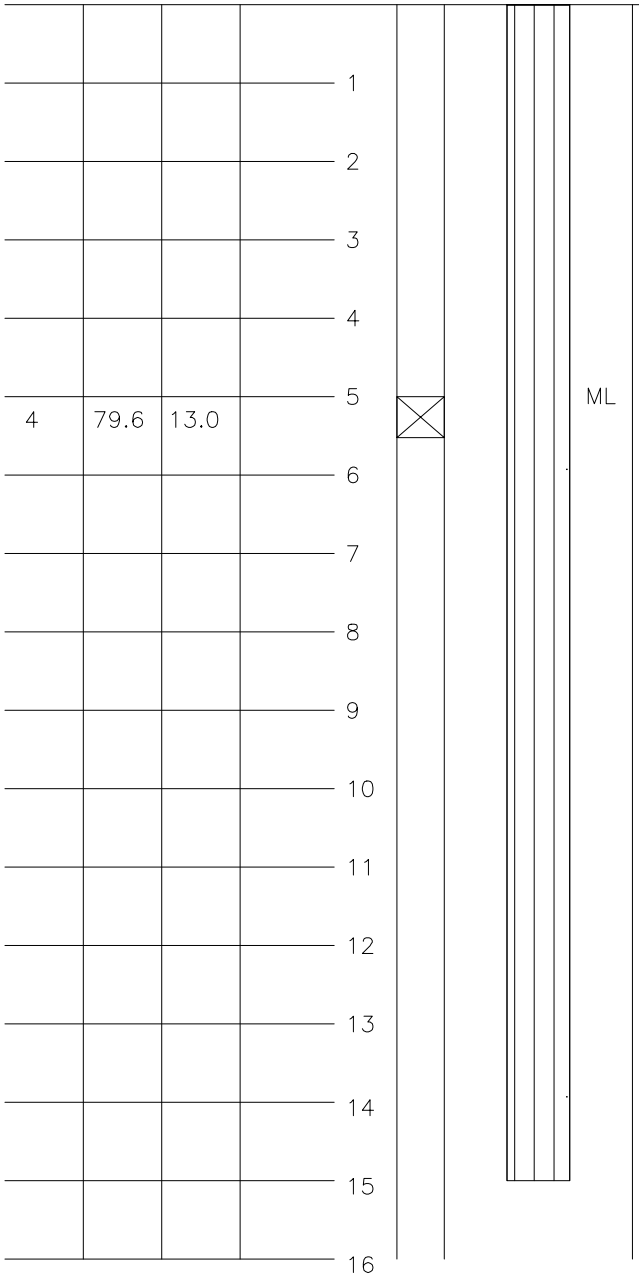
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/22/2024 at 6:16 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

LOG OF TEST PIT 1

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.



PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / 6"
4	79.6	13.0		5	⊠	

ML

0' TO 15' SANDY SILT (ML),
BROWN, SLIGHTLY MOIST, SLIGHTLY STIFF,
APROX. 1.0% GRAVEL, 19.6% SAND,
79.6% FINES LOW PLASTIC.

Test pit depth to 15.0
NO Groundwater Encountered.

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

BY.: TOH

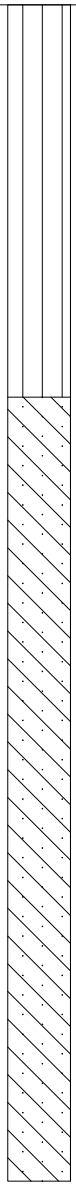
SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 2

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / 6"	
				1			
				2			
5	61.8	15.9		3	X		ML
				4			
				5			
				6			
29	20.1	22.4		7	X		SC
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			



0' TO 5' LEAN CLAY (CL),
ORANGE, SLIGHTLY MOIST, SLIGHTLY STIFF,
APROX. 2.5% GRAVEL, 35.7% SAND,
61.8% FINES MEDIUM PLASTIC.

5' TO 15' CLAYEY SAND (SC),
DARK BROWN, MOIST, SOFT,
APROX. 11.2% GRAVEL, 68.8% SAND,
20.1% FINES MEDIUM PLASTIC.

Test pit depth to 15.0
NO Groundwater Encountered.

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

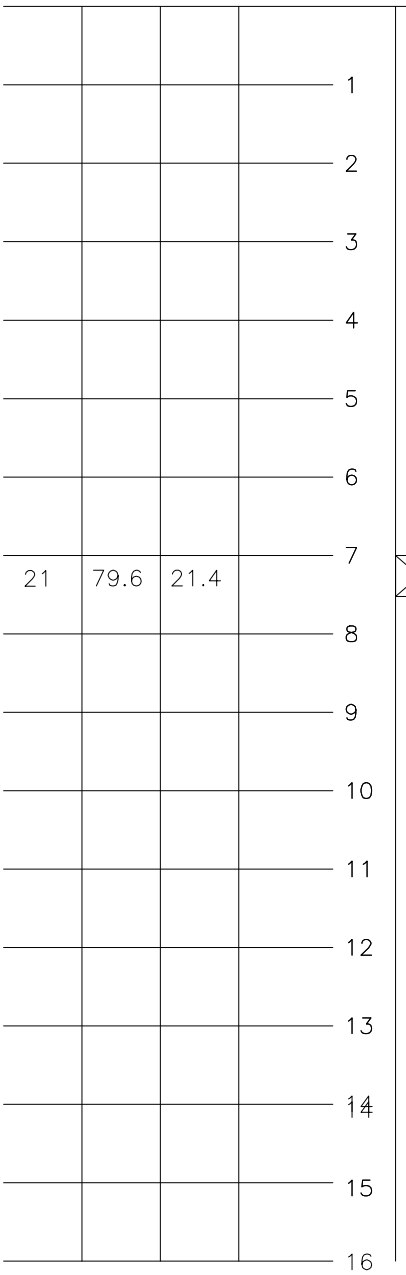
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 3

EQUIPMENT: CAT 420

DATE: 2/7/23 ELEV.



0' TO 15' LEAN CLAY (CL),
ORANGE, SLIGHTLY MOIST, SLIGHTLY STIFF,
APROX. 1.8% GRAVEL, 40.4% SAND,
57.8% FINES MEDIUM PLASTIC.

Test pit depth to 15.0
NO Groundwater Encountered.

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

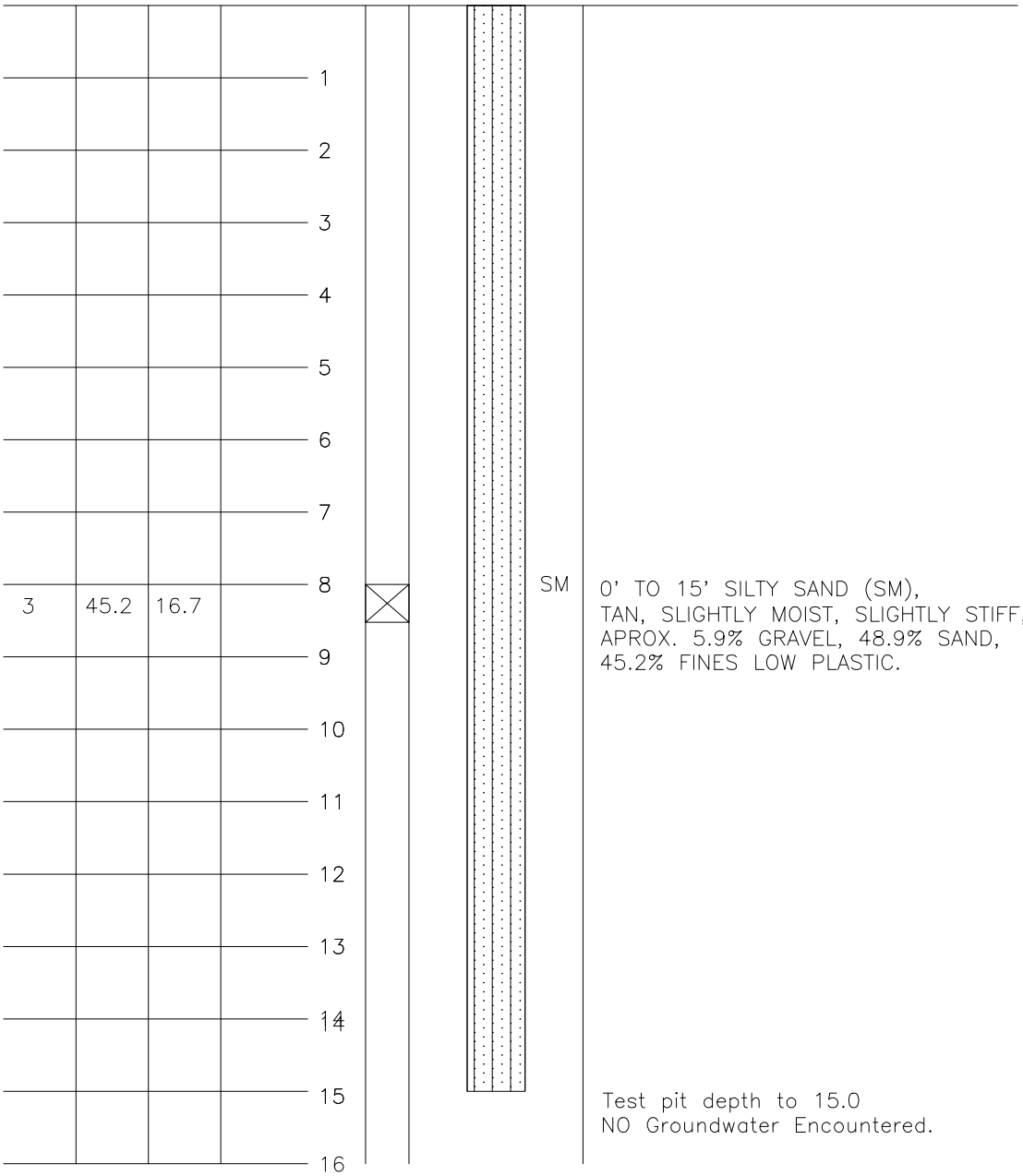
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 4

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.



TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

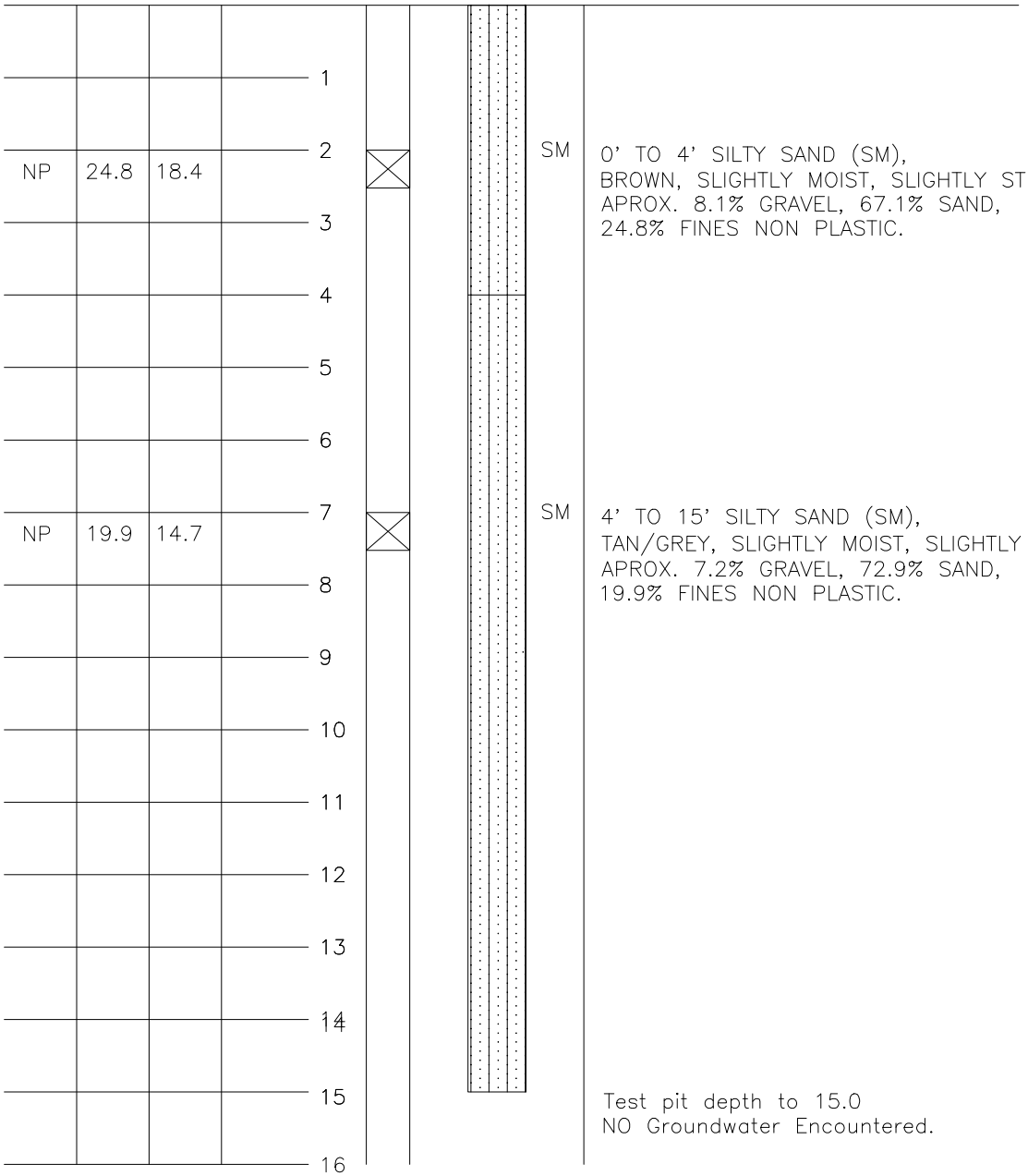
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 5

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.



PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
				1				
NP	24.8	18.4		2	X		SM	0' TO 4' SILTY SAND (SM), BROWN, SLIGHTLY MOIST, SLIGHTLY STIFF, APROX. 8.1% GRAVEL, 67.1% SAND, 24.8% FINES NON PLASTIC.
				3				
				4				
				5				
				6				
NP	19.9	14.7		7	X		SM	4' TO 15' SILTY SAND (SM), TAN/GREY, SLIGHTLY MOIST, SLIGHTLY STIFF, APROX. 7.2% GRAVEL, 72.9% SAND, 19.9% FINES NON PLASTIC.
				8				
				9				
				10				
				11				
				12				
				13				
				14				
				15				Test pit depth to 15.0 NO Groundwater Encountered.
				16				

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 6

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT	
				1			
				2			
				3			
				4			
NP	34.6	18.2		5	X		SM
				6			
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			

SM 0' TO 15' SILTY SAND (SM), TAN, SLIGHTLY MOIST, SLIGHTLY STIFF, APROX. 12.4% GRAVEL, 52.7% SAND, 34.6% FINES LOW PLASTIC.

SOME LARGER ROCK AT DEPTH 4'

Test pit depth to 15.0
NO Groundwater Encountered.

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

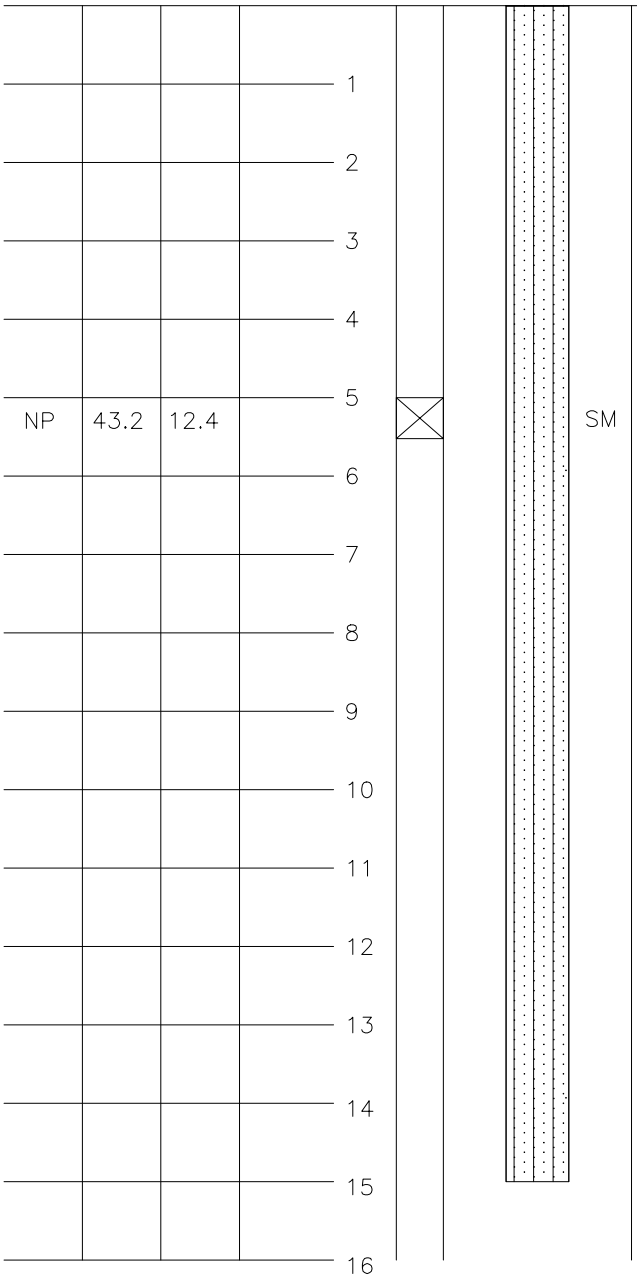
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 7

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.



PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / 6"		
				1				
				2				
				3				
				4				
NP	43.2	12.4		5	X		SM	0' TO 15' SILTY SAND (SM), LIGHT BROWN, SLIGHTLY MOIST, SLIGHTLY STIFF, APROX. 5.1% GRAVEL, 51.7% SAND, 43.2% FINES NON PLASTIC.
				6				
				7				
				8				
				9				
				10				
				11				
				12				
				13				
				14				
				15				Test pit depth to 15.0 NO Groundwater Encountered.
				16				

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 8

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / 6"		
				1				
				2				
				3				
				4				
				5				
				6				
NP	27.8	16.4		7	X		SM	0' TO 9' SILTY SAND (SM), LIGHT BROWN, MOIST, SLIGHTLY STIFF, APROX. 27.4% GRAVEL, 44.8% SAND, 27.8% FINES NON PLASTIC.
				8				
				9				
				10				
5	35.7	14.1		11	X		SM	9' TO 15' SILTY SAND (SM), GRAY/TAN, MOIST, SLIGHTLY STIFF, APROX. 16.7% GRAVEL, 47.6% SAND, 35.7% FINES LOW PLASTIC.
				12				
				13				
				14				
				15				Test pit depth to 15.0 NO Groundwater Encountered.
				16				

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

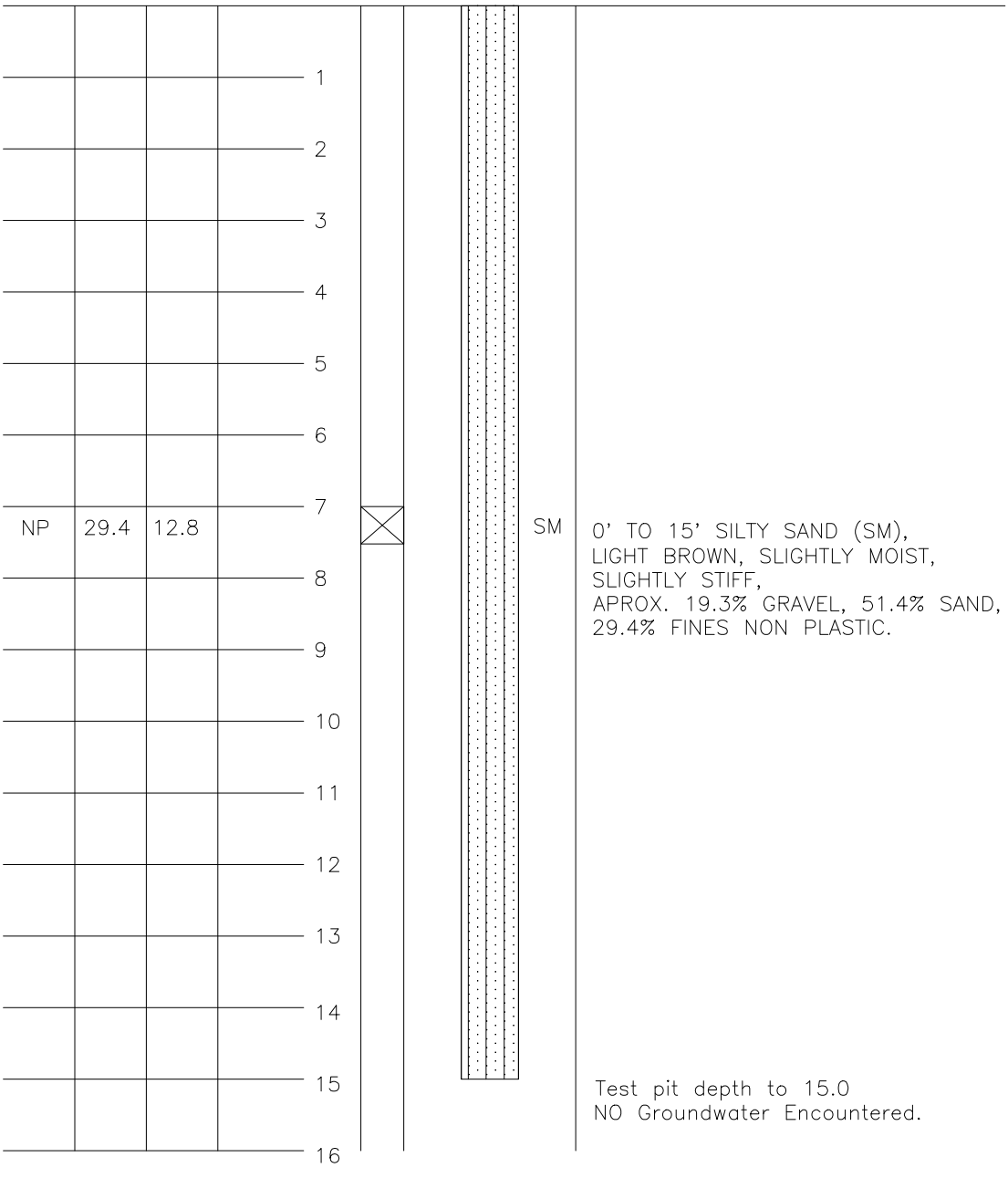
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 9

EQUIPMENT: CAT 420

DATE: 2/7/23 ELEV.



0' TO 15' SILTY SAND (SM),
LIGHT BROWN, SLIGHTLY MOIST,
SLIGHTLY STIFF,
APROX. 19.3% GRAVEL, 51.4% SAND,
29.4% FINES NON PLASTIC.

Test pit depth to 15.0
NO Groundwater Encountered.

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

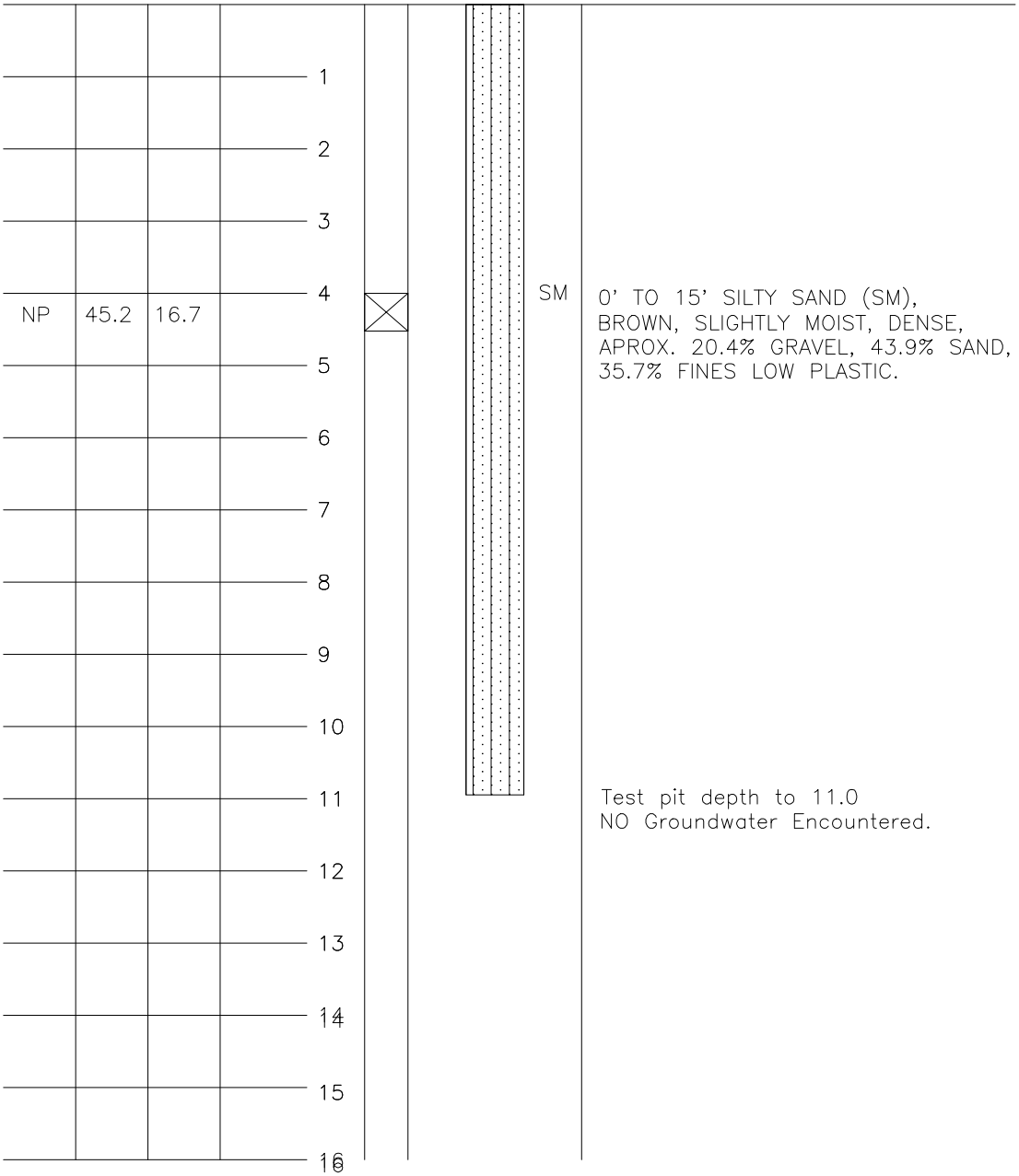
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 10

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.



TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

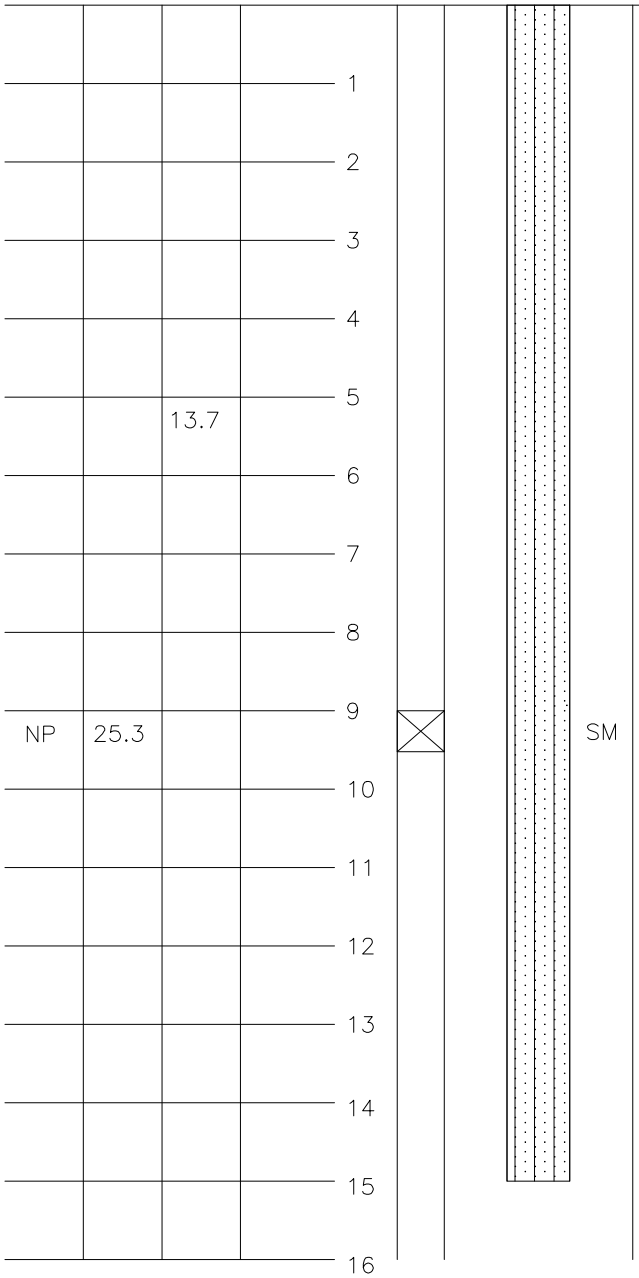
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 11

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.



0' TO 15' SILTY SAND (SM),
BROWN, SLIGHTLY MOIST, SLIGHTLY STIFF,
APROX. 9.3% GRAVEL, 65.4% SAND,
25.3% FINES NON PLASTIC.

Test pit depth to 15.0
NO Groundwater Encountered.

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

LOG OF TEST PIT 12

EQUIPMENT: CASE 590

DATE: 2/7/23 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
				1				
				2				
				3				
				4				
NP	35.1	12.7		5	⊠		SM	0' TO 15' SILTY SAND (SM), TAN, SLIGHTLY MOIST, SLIGHTLY STIFF, APROX. 10.4% GRAVEL, 54.5% SAND, 35.1% FINES LOW PLASTIC.
				6				
				7				
				8				
				9				
				10				
				11				
				12				
				13				
				14				
				15				Test pit depth to 15.0 NO Groundwater Encountered.
				16				

TEST PIT LOG

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

	MAJOR DIVISIONS		GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS LESS THAN 50% PASSING No. 200 SIEVE	GRAVELS LESS THAN 50% COARSE FRACTION PASSES THE No.4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES		GW	WELL GRADED GRAVELS, GRAVEL/SAND MIXTURE
				GP	POORLY GRADED GRAVELS, GRAVEL/SAND MIXTURE
		GRAVELS WITH OVER 12% FINES		GM	SILTY GRAVEL, POORLY GRADED GRAVEL/SAND/SILT MIXTURE
				GC	CLAYEY GRAVEL, POORLY GRADED GRAVEL/SAND/CLAY MIXTURE
	SANDS MORE THAN 50% COARSE FRACTION PASSES THE No.4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES		SW	WELL GRADED SANDS, GRAVELLY SANDS
				SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES		SM	SILTY SANDS, POORLY GRADED SAND/CLAY MIXTURES
				SC	CLAYEY SAND, POORLY GRADED SAND/CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING No. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS & VERY FINE SANDS OF LOW PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, LEAN CLAYS
				OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
ORGANIC RICH SOILS				PT	TOPSOIL, PEAT, ORGANIC RICH SOILS
OTHER SOILS				F	FILL MATERIALS

UNIFIED SOIL CLASSIFICATION SYSTEM

UNDISTURBED SAMPLE

BULK SAMPLE

NO RECOVERY

WATER LEVEL AT TIME OF DRILLING

STATIC WATER LEVEL AFTER DRILLING

KEY TO LOGS
ERRECART BLVD
ELKO, NEVADA

JOB NO.: 82787
APPR.: TOH
BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267

SAMPLE LOCATION	SAMPLE DEPTH	% PASSING #200	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE %	USCS
TP−1	5.0’	79.6	39	35	13.0	ML
TP−2	3.0’	61.8	40	35	15.9	ML
TP−2	7.0’	20.1	78	49	22.4	SC
TP−3	7.0’	79.6	71	50	21.4	CL
TP−4	8.0’	45.2	40	37	16.7	SM
TP−5	2.0’	24.8	NP	NP	18.4	SM
TP−5	7.0’	19.9	NP	NP	14.7	SM
TP−6	5.0’	34.6	NP	NP	18.2	SM
TP−7	5.0’	43.2	NP	NP	12.4	SM
TP−8	7.0’	27.8	NP	NP	16.4	SM
TP−8	11.0	35.7	NP	NP	14.1	SM
TP−9	7.0	29.4	NP	NP	12.8	SM
TP−10	4.0’	45.2	NP	NP	16.7	SM
TP−11	9.0’	25.3	NP	NP	13.7	SM
TP−12	5.0’	35.1	NP	NP	12.7	SM

GRADING SUMAMARY

ERRECART BLVD

ELKO, NEVADA

JOB NO.: 82787

APPR.: TOH

BY.: TOH

SUMMIT ENGINEERING CORPORATION
1150 LAMOILLE HIGHWAY, ELKO, NV 89801
PHONE:(775) 738-8058 FAX:(775) 738-8267