# GEOTECHNICAL REPORT

## WILDLIFE OVERPASS
## ACROSS US 93 NEAR WELLS
## ELKO COUNTY, NEVADA

**April 2009**

NEVADA DOT
GEOTECHNICAL ENGINEERING

**MATERIALS DIVISION**

**STATE OF NEVADA**

**DEPARTMENT OF TRANSPORTATION**

**MATERIALS DIVISION**

**GEOTECHNICAL SECTION**

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# INTRODUCTION

## General

This report has been prepared for the proposed wildlife overpass across US 93 at Milepost EL 83.34, approximately 10 miles north of Wells, Nevada. US 93 crosses a mule deer migration route for a length of approximately 3 miles at this location. During the migration, a number of deer are hit by vehicles on US 93. The purpose of this report is to provide information regarding the subsurface soil conditions at the proposed project site and to provide geotechnical design and construction recommendations for the bridge structure proposed for this project.

The photograph on the cover shows the proposed location for the wildlife overpass at a cut section of US 93. A Site Location Map, Topographic Map, Boring Location Map and additional photographs of the project site are included in Appendix A.

## Scope

The scope of this report consists primarily of geotechnical investigation, testing, analysis, design and recommendations for construction. The investigation included gathering data from past field exploration and reports, in addition to information obtained from recent subsurface explorations, soil sampling, and analysis of field and laboratory testing data. The purpose of the investigation was to (1) evaluate geologic conditions and determine if any hazards exist in the area of the site, (2) characterize the general subsurface conditions in the area of the site and delineate or determine the presence of any features that might impact the locations of the proposed new structure and (3) provide geotechnical subsurface investigation boring logs and sample test results for use in design and construction.

# PROJECT DESCRIPTION

The wildlife overpass is proposed to be a prefabricated concrete arch system supported on cast-in-place reinforced concrete spread footings founded in native soil. The structure is planned to be approximately 162 feet wide and will span across a cut section of the US 93 roadway which contains one 12-foot traffic lane and one 4-foot paved shoulder in each direction. The arch must provide clearances above the roadway of 22.5 feet in height by 16 feet in width in the center of the arch and 16.5 feet in height by 48 feet in width across the width of the arch. One headwall

and two wingwalls on each end of the bridge will retain the soil around the arch. The contractor will be required to provide a complete design for all of the elements of the wildlife overpass including but not limited to the structure, foundations and retaining walls for review and approval by the Nevada Department of Transportation (NDOT).

Presently, the toes of the cut slopes along the roadway sit approximately 14 feet from the edge of pavement. The cut slopes sit at approximately a 1.5H:1V to a maximum height of approximately 20 feet above the roadway.

## GEOLOGIC CONDITIONS AND SEISMICITY

### Local Geology

The site is founded on Quaternary Alluvium composed of relatively thin, coarse, poorly sorted, unconsolidated gravel and sand along the present streams. Generally, most of the material in the alluvium is locally derived and reflects the composition of the bedrock in the locality and upstream. The site is located downstream of the Windermere Hills to the southeast, the HD Range to the northeast and Snake Mountains to the northwest. The geology of the Windermere Hills, the HD Range and the Snake Mountains is a widespread sequence consisting of Ordovician to Early Triassic miogeosynclinal rocks (the upper plate) is thrust over a basement of metamorphosed and allochthonous lower Paleozoic to middle-Mesozoic rocks (apparently the lower plate). A map depicting the geology around the project site is included in Appendix A.

### Faulting and Seismicity

A number of quaternary faults exist in the vicinity of the project location. These faults are generally groups of normal faults consisting of quaternary alluvium juxtaposed against bedrock. A map depicting the locations of these quaternary faults and the project site is included in Appendix A. Also, included in Appendix is a map showing epicenters of earthquakes in northeast Nevada from 1900 through 2007.

A magnitude 6.0 earthquake originated approximately 5 miles north-northeast of Wells at a depth of about 5 miles on February 21, 2008, and hundreds of aftershocks have been recorded. Seismological data shows that the earthquake occurred on a normal dip-slip fault that trends roughly northeast-southwest and has a dip of about 50 degrees. The earthquake occurred in a

small step, or cross-fault, that connects two larger fault zones, the Eastern East Humbolt Range fault zone and the Eastern Snake Mountains fault zone. A comparison of before and after radar images from satellites found that the ground surface had fallen 5 inches over the middle of the earthquake rupture. This earthquake event demonstrates that the normal faults surrounding the project area remain active and have the potential to generate large magnitude earthquakes even though the geological expression of these faults indicate relatively low long-term rates of activity. A map showing the magnitude 6.0 epicenter and all reviewed aftershocks of the February 21, 2008 earthquake surrounding the project site is included in Appendix A.

Geologists recently found evidence that a paleo-earthquake offset the ground by about two feet just north of Wells, indicating earthquakes larger than the February 21, 2008 event have occurred in the region.

## FIELD INVESTIGATION

Geotechnical field investigations were conducted August 19th and 20th, 2008 and February 3rd and February 4th, 2009. The subsurface soil conditions were explored by drilling six boreholes, three boreholes at each one of the two proposed footing locations. The approximate locations of the borings are shown in the Boring Location Map in Appendix A.

Drilling was performed using an NDOT Diedrich D-120 Drill Rig (Unit #1082) equipped with an automatic hammer. The energy transfer from the automatic hammer into the drill string is 79% (SPT Energy Calibration done by Foundation Tech, LLC, July 17, 2006) with an approximate energy correction factor of 1.3. Hollow Stem Continuous Flight Augering (HSA) methods were used. Logs of the subsurface conditions, as encountered during the field investigation, were recorded by NDOT geotechnical engineers. A Key to Boring Logs and the Boring Logs are can be found in Appendix B.

## LABORATORY ANALYSES

Representative soil samples were obtained using SPT (Standard Penetration Testing – ASTM D1586) and CMS (California Modified Sampler – ASTM D3550) equipment and procedures. Soils were classified using the Unified Soil Classification System (USCS) in accordance with

ASTM D 2487 and ASTM D 2488. Boring locations were determined using alignment information provided by NDOT Roadway Design and surveyed by District III Survey Crew. Ground surface elevations were surveyed by NDOT Crew 908.

Soil particle size gradations through No. 200 sieve (Nevada T 206), Atterberg limits (AASHTO T 89 & T 90), natural moisture contents (AASHTO T 265), unit weights, pH (Nevada T 238), conductivity/resistivity (Nevada T 235), hydrometer gradations (AASHTO T 88), specific gravity (AASHTO T 100), direct shear tests (AASHTO T 236), consolidated-undrained triaxial compression tests (AASHTO T 297), consolidation tests (AASHTO T 216) and resistance value (R-Value – Nevada T 115) were completed according to the respective parenthesized test methods to assist in sample identification, classification, and evaluation.

Individual laboratory test results can be found in Appendix C of this report.

## DISCUSSION

Based on the conditions encountered in our exploratory borings, the soil profiles generally consist of medium dense to dense, nonplastic silty sand and gravel, sometimes poorly sorted, with locations of partially decomposed rock in the upper 28 feet and high plastic lean to fat expansive clay with varying amounts of gravel, sand and silt from approximately 28 feet to the bottom of the borings at about 60 feet. In Borings WLC1 and WLC5 at the south side of the proposed structure, a loose to medium dense silt layer was encountered at a depth of about 6 to 9 feet, between elevations of 6082.6' and 6079.6'. This same silt layer was encountered at a depth of 4 feet to 4.5 feet, between elevations of 6084.7, and 6084.2', in boring WLC6, just 20 feet north of boring WLC5.

Engineering analyses were performed to evaluate anticipated immediate and long term settlements for a 13-foot wide and 162-foot long spread footing with an applied bearing pressure of 5,000 pounds per square foot (psf). For this analysis, bottom of footing elevations were set at 6084.64' at Station "X" 148+90 and 6085.59' at Station "X" 150+52. The elevation of the bottom of footing increases at the same rate as the elevation of the centerline of the roadway, at 0.59% slope as stationing increases. Analysis using this scenario gave calculated results of immediate settlement due to the pressure applied during construction of up to 1.35 inches at the

north side of the structure and up to 1.75 inches at the south side of the structure due in large part to the shallow silt layer encountered in borings WLC1, WLC5 and WLC6. The clay layers at depth would contribute an additional 0.25 inches of anticipated long term settlement after construction for a total anticipated settlement magnitude of up to 2 inches. Maximum differential settlement of approximately 1 inch over the length of a 162-foot long footing and 0.5 inches from the east end to the west end of the structure can be anticipated given the aforementioned conditions.

Groundwater was encountered only in boring WLC1 at an estimated depth of 50 feet.

R-Value is a measure of subgrade strength and expansion potential. Bulk samples taken from depths of zero to 15 feet have R-Values of 41 to 75. Refer to the Summary of Results Tables in Appendix C for locations and depths of R-Values.

## RECOMMENDATIONS

Continuous spread footing foundations having a length approximately equal to the width of the structure, approximately 162 feet, are anticipated. The actual spread footing dimensions need to be determined by the contractor's design. A minimum of 1.5 feet of cover and a minimum embedment depth of 5 feet are required below the lowest adjacent grade. A deep foundation alternative may be considered for this project if the contractor deems it more economical.

The contractor will submit a complete settlement analysis using the actual design loads on and dimensions of the foundations. For shallow foundations supported on native soils in their present condition, larger immediate settlements are expected at the south side of the structure than at the north side of the structure due to the silt layer found at shallow depths in borings WLC 1, WLC5 and WLC 6. The silty material can be removed and replaced with better material prior to construction of the structure to reduce the immediate settlement magnitude if needed. Another alternative would be to place the bottom of the foundations below the silty layer. If the silty material is removed and replaced with better material, immediate settlements can be expected to reduce significantly at the south side of the structure. The silty sand and gravel material found above the silt layer in the borings can be used as the replacement material and compacted per NDOT specifications to at least 95% of maximum density from the bottom of the

excavation to the bottom of the footing elevations. NDOT Geotechnical Engineering staff should be on-site during this process. Excavated material may be used for Borrow material provided it meets the requirements.

Shoring may be required for foundation excavations. The native soils should be considered OSHA Type B for temporary excavation purposes. According to OSHA, a maximum allowable slope inclination of 1H:1V may be used in excavations in Type B soils. The contractor should also monitor the existing paved roadway adjacent to the excavations to minimize surface deflection or damage to the structural section. Foundation excavations must be performed according to NDOT Standard Specifications. Footing excavations should be inspected and approved by NDOT Geotechnical Engineering staff before footing construction begins.

Spread footings for foundation areas prepared in accordance with the above replacement recommendation may be designed using an allowable bearing capacity of 5,000 psf. Allowable bearing capacity is governed by settlement rather than bearing capacity failure.

A peak ground acceleration of 0.15g is recommended for use in seismic design applications at this site in accordance with NDOT Bridge Manual.

NDOT has decided to eliminate our requirements to use only approved mechanically stabilized earth (MSE) retaining wall patentees for this project. We have also eliminated our requirement to use inextensible reinforcements and our typical 30-square foot maximum concrete panel size limitation. Consequently, proprietary concrete arch systems with full height panel MSE retaining walls with extensible reinforcement will be allowed for this project.

The contractor may need to test soils for chlorides and sulfates in order to determine corrosion potential.

## REFERENCES


1. AASHTO, "LRFD Bridge Design Specifications," 4th Edition, 2007. Includes Interims published through 2008.
2. AASHTO, "Manual on Subsurface Investigations," 1988.
3. NDOT, "Bridge Design and Procedures Manual, Structural Division."
4. Coats, Robert R., *Geology of Elko County, Nevada*; Nevada Bureau of Mines and Geology, University of Nevada, Reno, 1987, Bulletin No. 101.
5. dePalo, Craig, *The February 21, 2008 Wells, Nevada Earthquake*, Nevada Seismological Lab website, http://www.seismo.unr.edu/feature/2008/wells/wells_craig.htm, added 2/26/2009, accessed 3/9/2009.
6. Nevada Seismological Lab website, Special Earthquake Report, *M 6.0 Wells Earthquake*, http://www.seismo.unr.edu/feature/2008/wells.html, Page Last updated 2/19/2009 01:01 PM, accessed 3/09/2009.
7. U.S. Geological Survey website, *Magnitude 6.0 – NEVADA* http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/us2008nsa9.php, Page Last Modified: September 23, 2008 16:56:28 UTC, accessed 10/22/08.
8. U.S. Geological Survey website, Quaternary Fault and Fold Database of the United States, http://earthquake.usgs.gov/regional/qfaults/index.php, Page Last Modified: January 29, 2009 18:43:46 UTC.

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1. AASHTO, "LRFD Bridge Design Specifications," 4th Edition, 2007. Includes Interims published through 2008.
2. AASHTO, "Manual on Subsurface Investigations," 1988.
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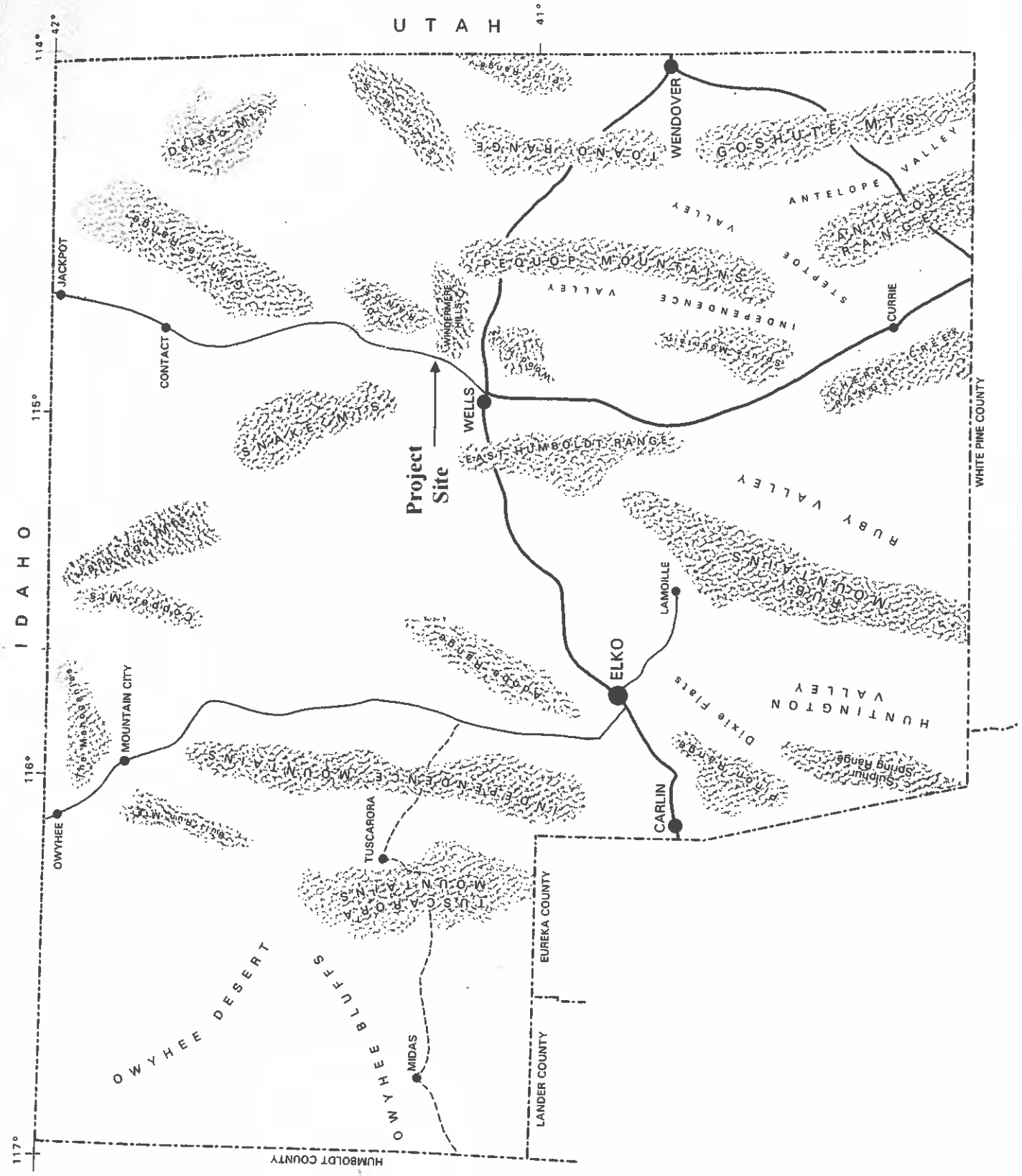
6. Nevada Seismological Lab website, Special Earthquake Report, *M 6.0 Wells Earthquake*, http://www.seismo.unr.edu/feature/2008/wells.html, Page Last updated 2/19/2009 01:01 PM, accessed 3/09/2009.
7. U.S. Geological Survey website, *Magnitude 6.0 – NEVADA* http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/us2008nsa9.php, Page Last Modified: September 23, 2008 16:56:28 UTC, accessed 10/22/08.
8. U.S. Geological Survey website, Quaternary Fault and Fold Database of the United States, http://earthquake.usgs.gov/regional/qfaults/index.php, Page Last Modified: January 29, 2009 18:43:46 UTC.

# APPENDIX A

Site Location Map
Topography Map
Boring Location Map
Site Location Photographs
Geologic Map
Description of Geologic Map Units
Quaternary Faults Map
Epicenters of Earthquakes in Northeastern Nevada Map
February 21, 2008 Earthquake Map

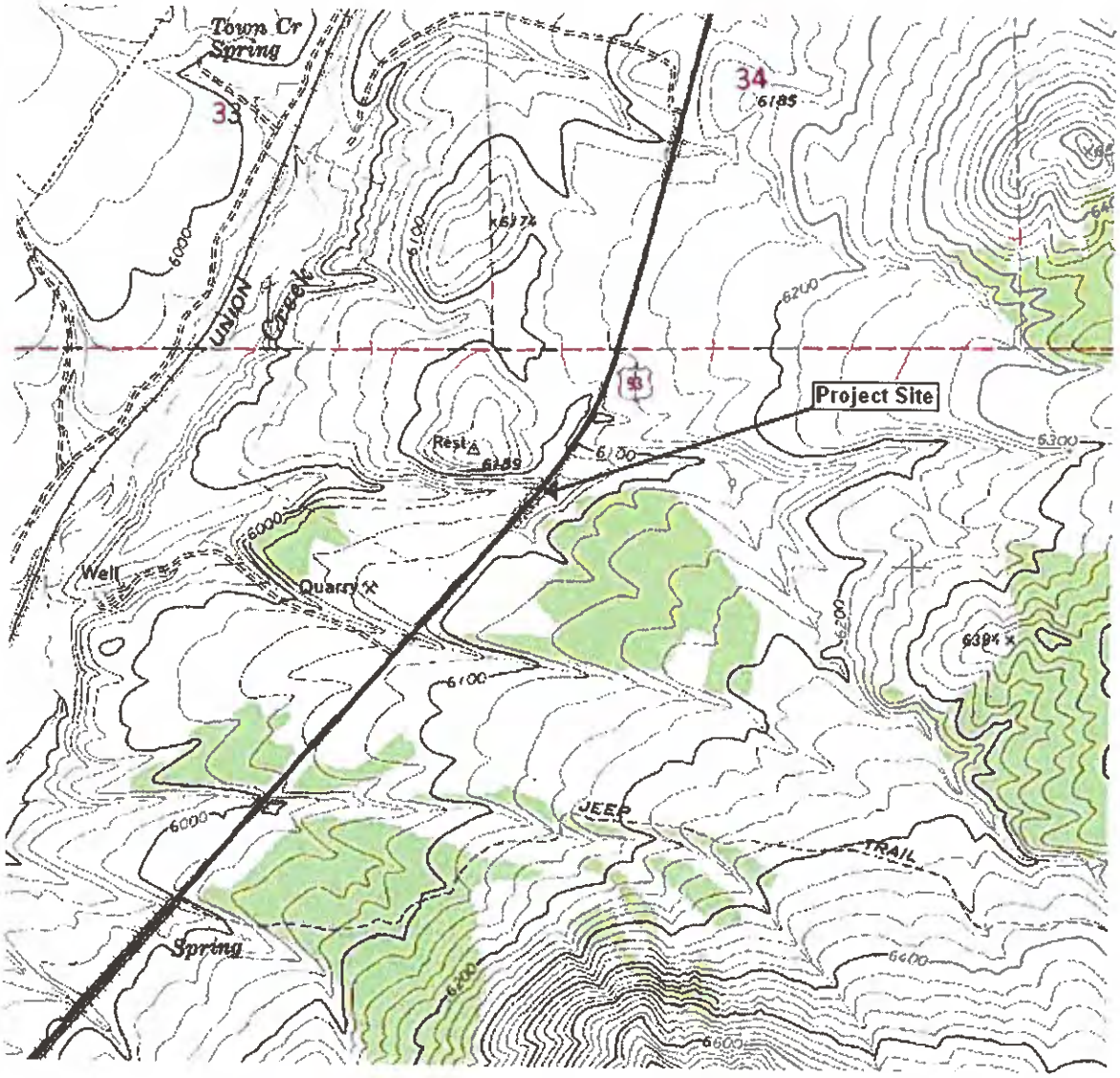
# SITE LOCATION MAP




From Coats, Robert R., *Geology of Elko County, Nevada*; Nevada Bureau of Mines and Geology, University of Nevada, Reno, 1987, Bulletin No. 101, page 4.

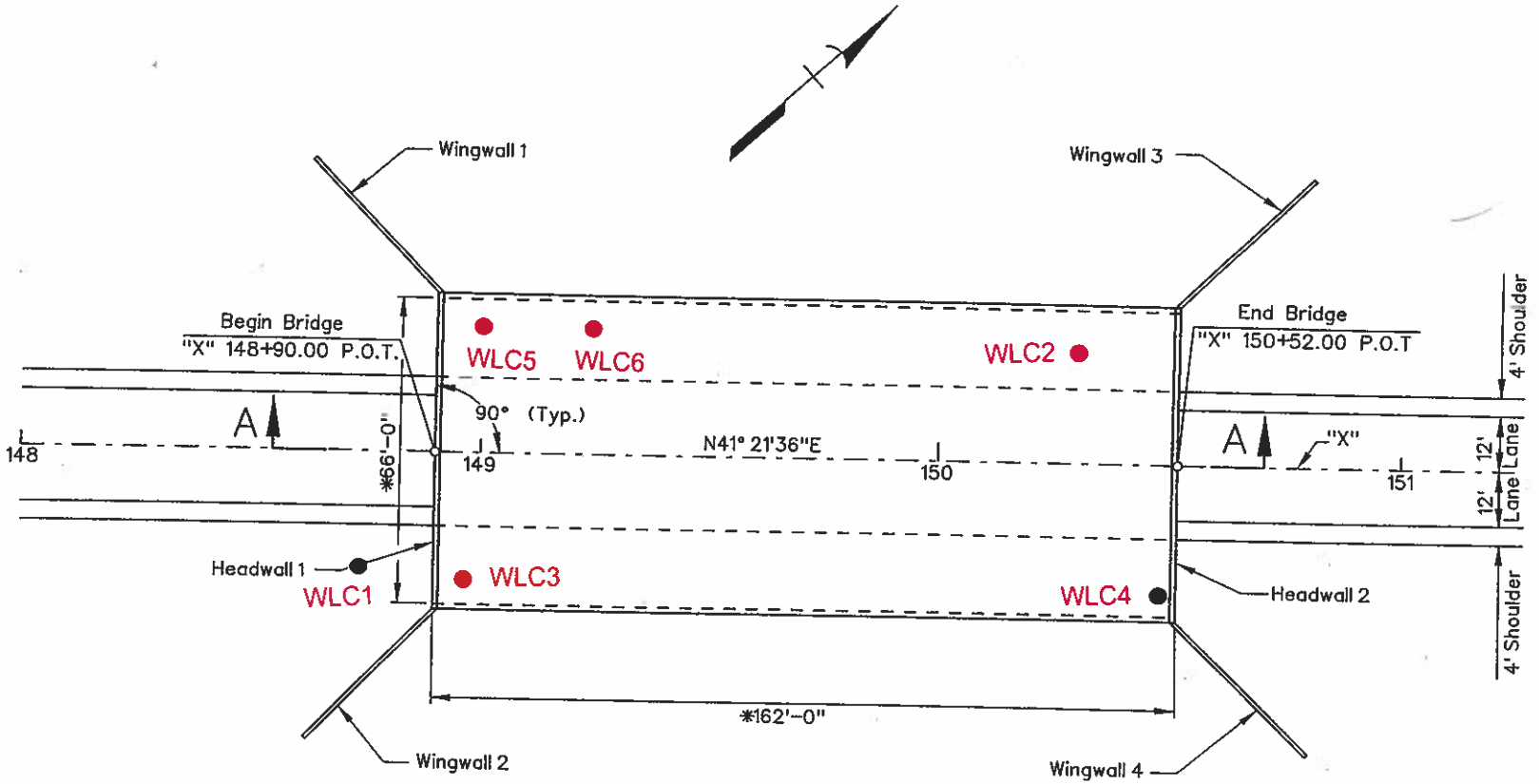
# Topography Map

Contour Interval 20 Feet




From Wells Peak Quadrangle, Nevada – Elko Co., 7.5 Minute Series (Topographic) Map. Mapped, edited and published by U.S. Geological Survey, 1968.

# Boring Location Map

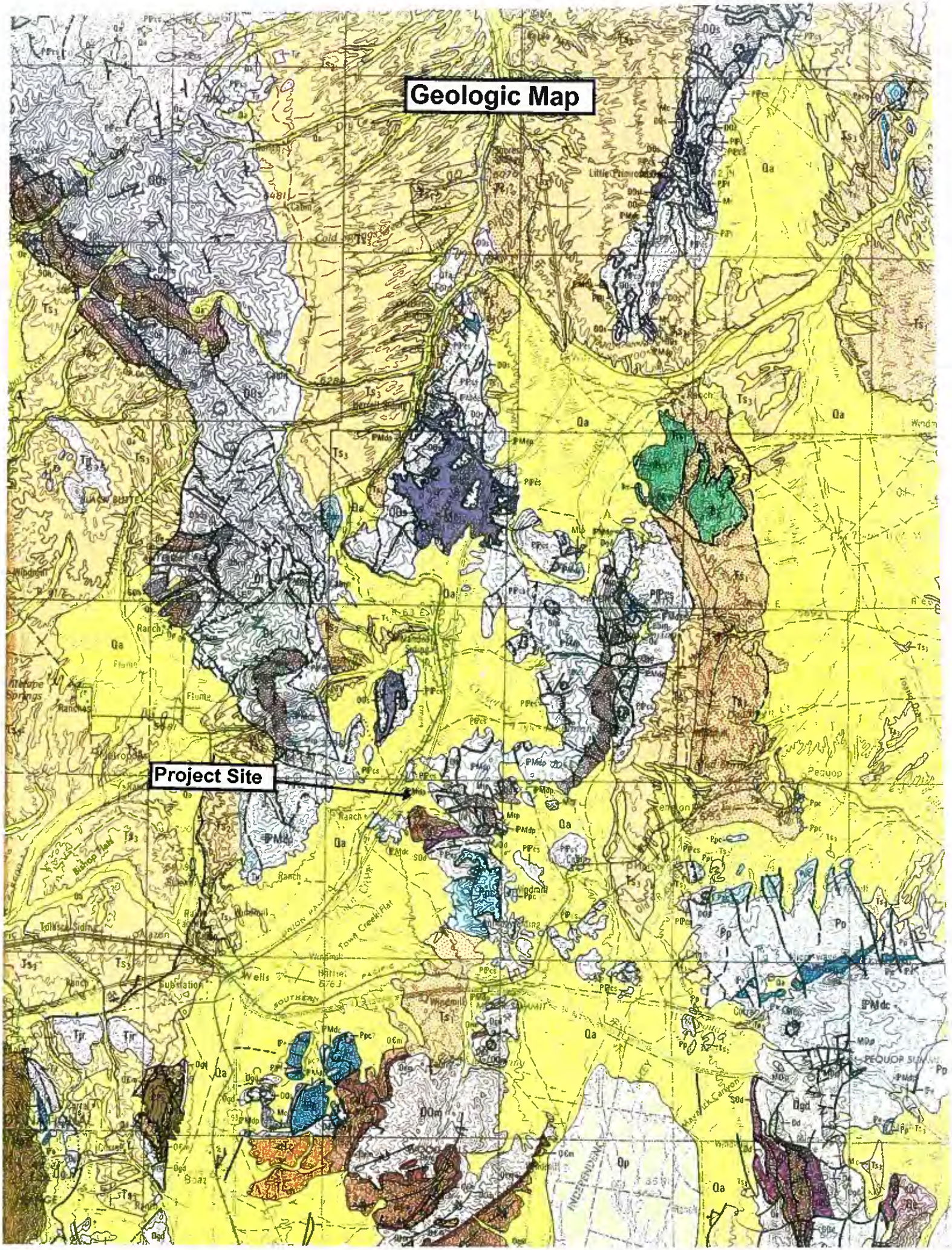



PLAN

* Assumed dimension. Actual dimension may vary per contractor's design

Project site location looking south east with Windermere Hills in the background.

Project site location looking north.


Geologic Map
Project Site

## DESCRIPTION OF MAP UNITS

[Numbers in brackets refer to areas on the index map]

Qa — ALLUVIUM—Silt, sand, and gravel along present streams. Includes alluvial fans

Qp — PLUVIAL LAKE DEPOSITS—Includes beach-and-bar gravel and playa silt

Qg — GLACIAL MORAINES AND ROCK GLACIERS

Qls — LANDSLIDE DEPOSITS AND COLLUVIUM

QTa — OLDER ALLUVIUM—Boulder gravel and sand deposits on high-level stream terraces

QTs — SEDIMENTARY ROCKS—Tuffaceous limestone, silt, and sand, locally indurated. Includes the Hay Ranch Formation

QThs — HOT-SPRING TRAVERTINE AND SINTER

QTls — LANDSLIDE DEPOSITS AND COLLUVIUM

$Tt_3$ — PYROXENE PHENODACITE IGNIMBRITE—Phenocryst poor; contains oligoclase, sanidine, pigeonite, and augite. Many coarse vitrophyric clasts

Tgr — ALASKITIC GRANITE—Extreme range in texture

$Ta_3$ — PYROXENE AND HORNBLENDE PHENOANDESITE AND PHENODACITE AND PIGEONITE PHENOANDESITE—Dark-gray- to dark-brown-weathering [3, 4]. Includes the Gods Pocket Dacite

$Tr_3$ — PHENORHYOLITIC AND PHENODACITIC FLOWS AND DOMES—Sempatic, containing quartz, and rich in sanidine; locally vitrophyric

Tjr — JARBIDGE RHYOLITE—Light-brown to gray phenocryst-rich ferroaugite rhyolite and minor tuff. Occurs mostly as flows and some domes

Tpr — PORPHYRITIC PHENORHYOLITIC AND PHENODACITIC FLOWS AND DOMES—Commonly as domes. Phenocrysts abundant; commonly contains sanidine, quartz, and oligoclase [19]

$Tb_3$ — BASALT—In the Sheep Creek Range [19] and the Dairy Valley quadrangle [8]

Tbi, Tb, Tbc — BIG ISLAND FORMATION (Miocene)—Tbi, tholeiitic olivine basalt, overlying and underlying gravel, minor amounts of rhyolite tuff directly beneath basalt; Tb, basalt flows; Tbc, basaltic cinder, tuff, and lava cones

Tts — IGNIMBRITE, TUFF, AND SEDIMENTARY ROCKS—Includes the Idavada Volcanics and the Cougar Point Welded Tuff

$Ts_3$ — SEDIMENTARY AND VOLCANIC ROCKS—Tuff, vitric ash, tuffaceous siltstone and sandstone, conglomerate, and limestone. Includes the Humboldt Formation and the Young America Gravel of Bushnell (1967) [5]

$Tg_3$ — GRAVEL—Includes the Slide Creek Gravel [6] and mudflows northwest of Walker Mountain

PCd — CARBONATE AND DETRITAL ROCKS (Middle and Lower Pennsylvanian)—Cherty limestone, sandy and silty limestone, and conglomerate. Includes the Moleen and Tomera Formations, undivided

IPMdc — DIAMOND PEAK AND CHAINMAN FORMATIONS, UNDIVIDED (Lower Pennsylvanian and Upper Mississippian)—Conglomerate, sandstone, shale, and minor limestone

IPMdp — DIAMOND PEAK FORMATION (Lower Pennsylvanian and Mississippian)—Conglomerate, sandstone, shale, and minor limestone

Mbn — BANNER AND NELSON FORMATIONS (Mississippian)—Limestone containing quartzite-cobble conglomerate at base, grading upward through peperite to meta-andesite [3, 4]. Includes the Diamond A Formation

Ms — SEDIMENTARY CLASTIC AND LIMY ROCKS (Mississippian)—Conglomerate, sandstone, and limestone

Mc — CHAINMAN SHALE (Mississippian)—Shale and sandstone. Includes the Mountain City Formation, consisting of shale and calcareous shale, locally metamorphosed to schist and slate. Also includes slate and phyllite of Sikikareh Mountain [3, 4]

Ma — ARGILLITE OF LEE CANYON (Lower Mississippian)—Black siliceous argillite [43]

Mw — WEBB FORMATION (Lower Mississippian)—Mudstone and claystone, minor sandstone and limestone [43]

MDg — GROSSMAN FORMATION (Mississippian?)—Coarse conglomerate, siltstone, sandstone, and phyllite [3, 4]

### CARBONATE AND DETRITAL ROCKS IN FORELAND BASIN

Pph — PHOSPHORIA FORMATION—Chert, phosphatic mudstone, siltstone, and limestone. Includes the Meade Peak Phosphatic Shale and Rex Chert Members and a dolomitic member

Pgp — GERSTER AND PHOSPHORIA FORMATIONS, UNDIVIDED—Carbonate rock, chert, and phosphorite; includes the Murdock Mountain Formation

Ppc — PARK CITY GROUP—Includes the Kaibab Limestone and the Plympton, Gerster, Murdock Mountain, Grandeur, and Phosphoria Formations [46, 50, 51, 54]

Ppcg — GRANDEUR FORMATION—Carbonate rocks and chert

Pbl — UNNAMED BIOCLASTIC LIMESTONE (Lower Permian)—In the Leach Mountains

Pp — PEQUOP FORMATION (Lower Permian)—Fusulinid limestone. As mapped, locally includes the Loray Formation and part of the Arcturus Formation in southern part of county

PIPl — LIMESTONE AND DOLOMITE—Includes Upper Pennsylvanian rocks mapped by *Riva (1970)* in the HD Range [17] and the Rib Hill Formation, the Riepe Spring Limestone at Spruce Mountain [46], and the Ferguson Mountain Formation, all Lower Permian, in southeastern part of county

PIPu — UNDIVIDED LIMY ROCKS (Lower Permian to Lower Pennsylvanian)—Includes the Strathearn, Rib Hill, Ferguson Mountain, and Pequop Formations in the Leppy and Pilot Ranges [36, 42]

PMl — LIMESTONE, SHALE, CHERT, ORTHOQUARTZITE, AND QUARTZ SILTITE (Lower Permian to Upper Mississippian)—Includes the Chellis, Storff, Poorman Peak and Hammond Canyon Formations [8, 13, 14]

Tls — LANDSLIDE DEPOSITS—Poorly sorted volcanic debris [14B]

$Tt_2$ — PHENORHYOLITIC TO PHENODACITIC IGNIMBRITE—Locally vitrophyric, commonly contains phenocrysts of biotite, as well as hornblende, quartz, plagioclase, and sanidine. Includes ignimbrite of Willow Creek [1]

$Ta_2$ — PHENOANDESITIC AND PHENOLATITIC FLOWS AND PYROCLASTIC ROCKS—Commonly contains phenocrysts of hornblende and pyroxene

$Tr_2$ — PHENORHYOLITIC AND PHENODACITIC TUFF, FLOWS, AND DOMES—Characterized by small sparse crystals of biotite. Relatively fine grained and generally holocrystalline

$Ts_2$ — TUFFACEOUS AND CLASTIC SEDIMENTARY ROCKS—Includes minor amounts of tuff and welded tuff; near Mountain City, contains Arikareean fossils; includes the Danger Point Tuff [6]

$Tg_2$ — GRAVEL—Locally tuffaceous

Tw — WELDED TUFF, TUFFACEOUS SEDIMENTARY ROCKS, VITRIC ASH AND TUFF, AND LAVA—Includes limestone, tuffaceous limestone, and ash sandstone. Includes the Indian Well Formation [43]

$Tb_2$ — BASALT, BASALTIC TUFF, AND TUFF BRECCIA—Alkali olivine basalt, commonly porphyritic, containing sparse to common, large to very large phenocrysts of labradorite; groundmass contains purplish augite, olivine, ilmenite, biotite, and alkali feldspar. Some minor intrusions are present. Includes the Seventy Six Basalt of Oligocene or Miocene age [4, 6, 14]

$Tr_1$ — RHYOLITIC TO DACITIC FLOWS AND DOMES—May include some ignimbrite. Includes the Ottawanah Rhyolite and rhyolite of Walker Mountain

Ttsl — TUFF, SEDIMENTARY ROCKS, AND LAVA—Includes tuff and gravel of Toejam Creek

Tbx — BRECCIA—Volcanic breccia of late Tertiary age; also includes breccia of undetermined age

$Tt_1$ — PHENORHYOLITIC TO PHENODACITIC IGNIMBRITE—Commonly micaceous; may also contain hornblende, augite, and hypersthene. In many places has high concentrations of phenocrysts, and xenoliths of chert of the Valmy Formation

Tgd — GRANODIORITE, QUARTZ MONZONITE, AND GRANODIORITE AND QUARTZ MONZONITE PORPHYRY—Commonly contains biotite and, locally, augite or hornblende

$Ta_1$ — ANDESITIC TO LATITIC FLOWS AND PYROCLASTIC ROCKS—Phenocrysts are generally plagioclase, hornblende, pyroxene, locally biotite, or any combination of these mafic minerals. Includes andesite of Summit Creek [3, 4]

Tl — LATITIC ROCKS—Flows and dike feeders. Dark-gray to black holocrystalline to hypocrystalline very fine grained rocks, locally vesicular, containing olivine, hypersthene, labradorite, and potassium feldspar

$Ts_1$ — SEDIMENTARY ROCKS—Limestone (locally cherty), conglomerate, sandstone, claystone, siltstone, shale (including micaceous shale and oil shale), and tuff. Limestone is gray to tan or white [43]. Includes the Elko Formation

Tc — CONGLOMERATE (Eocene and Eocene?)—Fragments, generally chert and quartzite, commonly well rounded, locally angular. Fragments locally as large as 2 ft, commonly only a few inches; may have siliceous cement and be stained by iron oxide; matrix tuffaceous in some places. Includes the Meadow Fork Formation [6]. Includes limestone-clast conglomerate [43]

Kgr — GRANITE—Commonly biotitic. Includes granodiorite and quartzmonzonite that contain biotite or hornblende, or both

Knc — NEWARK CANYON FORMATION (Upper and Lower Cretaceous)—Nonmarine conglomerate, sandstone, siltstone, shale, and limestone. Clastic rocks commonly gray, tan, brown, and red. Clasts may be as large as 1 ft in diameter and include volcanic rock, sandstone, quartzite, chert, limestone, and silicified limestone. Limestone is dense, silty, gray and tan to creamy tan [43]

Mzgn — GNEISS—Granodiorite and quartz monzonite gneiss in the Ruby Mountains

IPvd — VAN DUZER LIMESTONE (Middle Pennsylvanian)—limestone and shaly limestone [3, 4, 5, 9]. Contains Desmoinesian marine fossils

IPq — QUILICI FORMATION (Middle Pennsylvanian)—Limestone, siltstone, sandstone, and chert conglomerate of Desmoinesian age

IPe — ELY LIMESTONE (Middle and Lower Pennsylvanian)—Limestone, chiefly bioclastic. Includes the Hogan Formation [40]

MDp — TRIPON PASS LIMESTONE (Lower Mississippian)—Clastic limestone, argillite, quartz siltite and quartz arenite, and quartz-chert arenite [26]. Also includes an unnamed Kinderhookian limestone in the Peko Hills, and the Camp Creek sequence in the Swales Mountain area (Ketner, 1975b)

MDjp — JOANA LIMESTONE AND PILOT SHALE, UNDIVIDED (Lower Mississippian and Upper Devonian)—Limestone and argillaceous limestone and carbonaceous shale

## WESTERN ASSEMBLAGE

Dw — WOODRUFF FORMATION (Devonian)—Dark siliceous mudstone, shale, chert, siltstone, and dolomite; contains some limestone, sandy limestone, and calcareous sandstone [43]

DOs — MUDSTONE, SHALE, CHERT, SILTSTONE, GRAY QUARTZITE, GREENSTONE, AND MINOR LIMESTONE (Devonian, Silurian, and Ordovician)—Includes the Valmy, Vinini, Noh, and Valder Formations; the Agort Chert; the Tiser Limestone; and the North Fork sequence of Ketner (1975)

DOsl — LIMESTONE (Devonian and Ordovician)—Bioclastic and biohermal limestone, sandy limestone, dolomitic siltstone, and dolomite. Includes the Tiser Limestone

## TRANSITIONAL ASSEMBLAGE

Dt — PLATY SILTSTONE, LIMESTONE, AND SHALE (Devonian) [15, 30]

DSrm — ROBERTS MOUNTAINS FORMATION (Lower Devonian to Lower Silurian)—Platy silty limestone and dolomite [1, 21, 30]

Oa — AURA FORMATION—Brown to black phyllite, partly calcareous, also contains chert and quartzite [9]

O€s — SHALE, PHYLLITE, AND LIMESTONE (Ordovician and Cambrian)—Includes the Tennessee Mountain Formation [5] and an unnamed shale in the Snake Mountains [15, 25]

€pm — PROSPECT MOUNTAIN QUARTZITE (Lower Cambrian)—Quartzite with phyllite interbeds

## EASTERN ASSEMBLAGE AND RELATED ROCKS

Dgd — GUILMETTE AND DEVILS GATE FORMATIONS (Upper and Middle Devonian)—Dolomite and limestone

Dl — LIMESTONE (Devonian)—[15, 21, 30, 37]

Dd — SEVY, SIMONSON, AND NEVADA FORMATIONS (Middle and Lower Devonian)—Light- to dark-gray dolomite and limestone

DSlm — LONE MOUNTAIN DOLOMITE (Devonian and Silurian)—Includes some Devonian rocks in the Sulphur Spring Range

DSd — DOLOMITIC LIMESTONE AND DOLOMITE (Lower Devonian? and Silurian)—Includes the Lone Mountain and Laketown Dolomites

DOd — DOLOMITIC ROCKS (Devonian, Silurian, and Ordovician)—Mainly dolomite with minor limestone and chert. Includes the Laketown, Fish Haven, and Sevy Dolomites

SOd — PREDOMINANTLY DOLOMITIC ROCKS (Upper and Lower Silurian and Upper and Middle Ordovician)—Includes Laketown, Fish Haven and Ely Springs Dolomites

SOh — HANSON CREEK FORMATION (Lower Silurian and Upper and Middle Ordovician)—Limestone and dolomite

Oe — EUREKA QUARTZITE (Middle Ordovician)—White, brown-weathering orthoquartzite

Jgr GRANITE

Jd DIORITE—Locally includes granite and granodiorite

Jf FRENCHIE CREEK RHYOLITE (Upper Jurassic)—Rhyolite flows and other volcanic rocks; contains some sedimentary rocks [43]

JTrs NONMARINE SEDIMENTARY ROCKS—Possibly correlative with the Chinle Formation and the Aztec Sandstone of southern Nevada and with the Nugget Sandstone of Wyoming

TrPs MARINE SEDIMENTARY ROCKS—Includes the Dinwoody(?) and Thaynes(?) Formations and unnamed Lower Triassic rocks [13, 14]

TrPs SEDIMENTARY AND VOLCANIC ROCKS—Silty limestone, shale, and minor greenstone at north end of Adobe Range [29]. Long Canyon and Adobe Range sequences

TrPc MARINE CONGLOMERATE—Locally contains limestone cobbles and matrix [14]

## SILICEOUS AND VOLCANIC ASSEMBLAGE

PIPhr HAVALLAH AND RESERVATION HILL FORMATIONS—Metagraywacke, fine-grained dolomitic sandstone and siltstone, gray siliceous dolomitic limestone, and minor meta-andesite [3, 4, 14]

Pmc MITCHELL CREEK FORMATION—Limestone and andesitic tuff

IPPsh SCHOONOVER FORMATION (Pennsylvanian and Upper Mississippian (Chesterian))—Sandstone, chert, minor limestone, and andesitic lava [11]

## CARBONATE AND DETRITAL SEQUENCES WITHIN AND ON THE MARGIN OF THE ANTLER OROGENIC BELT

Pem EDNA MOUNTAIN FORMATION—Coarse-grained, buff-weathering sandstone, typically chert-quartz arenite but can be conglomeratic or very fine grained locally

Phm SANDSTONE AND SILTSTONE OF HORSE MOUNTAIN—Medium-grained, brown-weathering sandstone containing mainly chert fragments, and dark-gray to black siltstone

PIPcs CARLIN SEQUENCE (amended)—Includes the Buckskin Mountain, Beacon Flat, Carlin Canyon, and Phosphoria Formations and, locally, the Strathearn Formation at its base

PIPs STRATHEARN FORMATION (Lower Permian and Upper Pennsylvanian)—Limestone, conglomeratic near base. Includes the Sunflower Formation [4, 5, 43]

Op POGONIP GROUP (Middle and Lower Ordovician)—Includes the Antelope Valley and Goodwin Limestones; the Ninemile, Garden City, and Lehman Formations; the Kanosh Shale; the Swan Peak Quartzite; and the Crystal Peak Dolomite

Ec CARBONATE ROCKS AND MINOR QUARTZITE (Cambrian)—Includes the Pioche, Secret Canyon, and Dunderburg Shales; the Eldorado and Hamburg Dolomites; the Geddes Limestone; and the Windfall Formation

Epm PROSPECT MOUNTAIN QUARTZITE (Lower Cambrian)—Quartzite with phyllite interbeds

Pmc McCOY CREEK GROUP [36]—Quartzite and phyllite. Includes other unnamed Proterozoic rocks [6, 13]

## REGIONALLY METAMORPHOSED ROCKS

DPm METAMORPHIC ROCKS (Devonian? to Proterozoic?)—Granitic to dioritic gneiss, and biotite and muscovite schist, locally containing sillimanite; quartzitic schist, quartzite, calc-silicate rocks, and marble. Includes some younger granitic rocks

Dm GRAPHITIC MARBLE—Metamorphosed Guilmette(?) Formation and Devils Gate(?) Limestone

DOm DOLOMITE MARBLE (Devonian?, Silurian?, and Ordovician?)

DOEm CALCITE MARBLE AND DOLOMITE MARBLE (Devonian?, Silurian?, Ordovician?, and Cambrian?)—In the Pequop Mountains

OEm CALCITE MARBLE—Metamorphosed Pogonip(?) Group and undifferentiated Cambrian rocks

Oem METAQUARTZITE—Possibly metamorphosed Eureka Quartzite

EPq FOLIATED METAQUARTZITE—Prospect Mountain(?) Quartzite in part. May include some Proterozoic schist

Ps SCHIST (Late Proterozoic)—Sillimanite-biotite schist and quartzitic schist

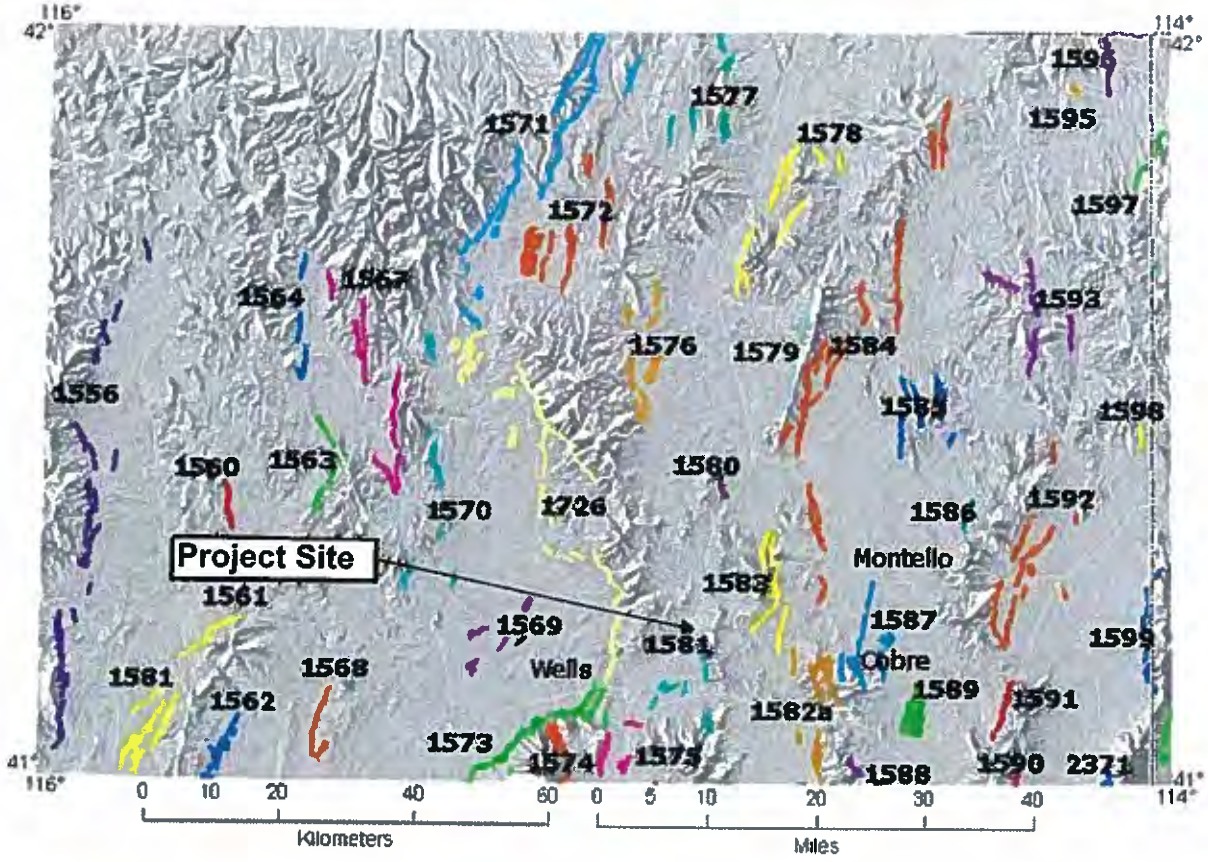
## OTHER ROCKS

m MIGMATITE—Contains granodiorite of Oligocene age, granite of Jurassic and Cretaceous age, and quartzite relics of Precambrian and Cambrian age in the Ruby Mountains; includes the Harrison Pass Granodiorite

bx BRECCIA—Mostly fault breccia (age unknown)

From Coats, Robert R., *Geology of Elko County, Nevada*; Nevada Bureau of Mines and Geology, University of Nevada, Reno, 1987, Bulletin No. 101, Plate 1, *Geologic Map of Elko County, Nevada.*

# Quaternary Faults



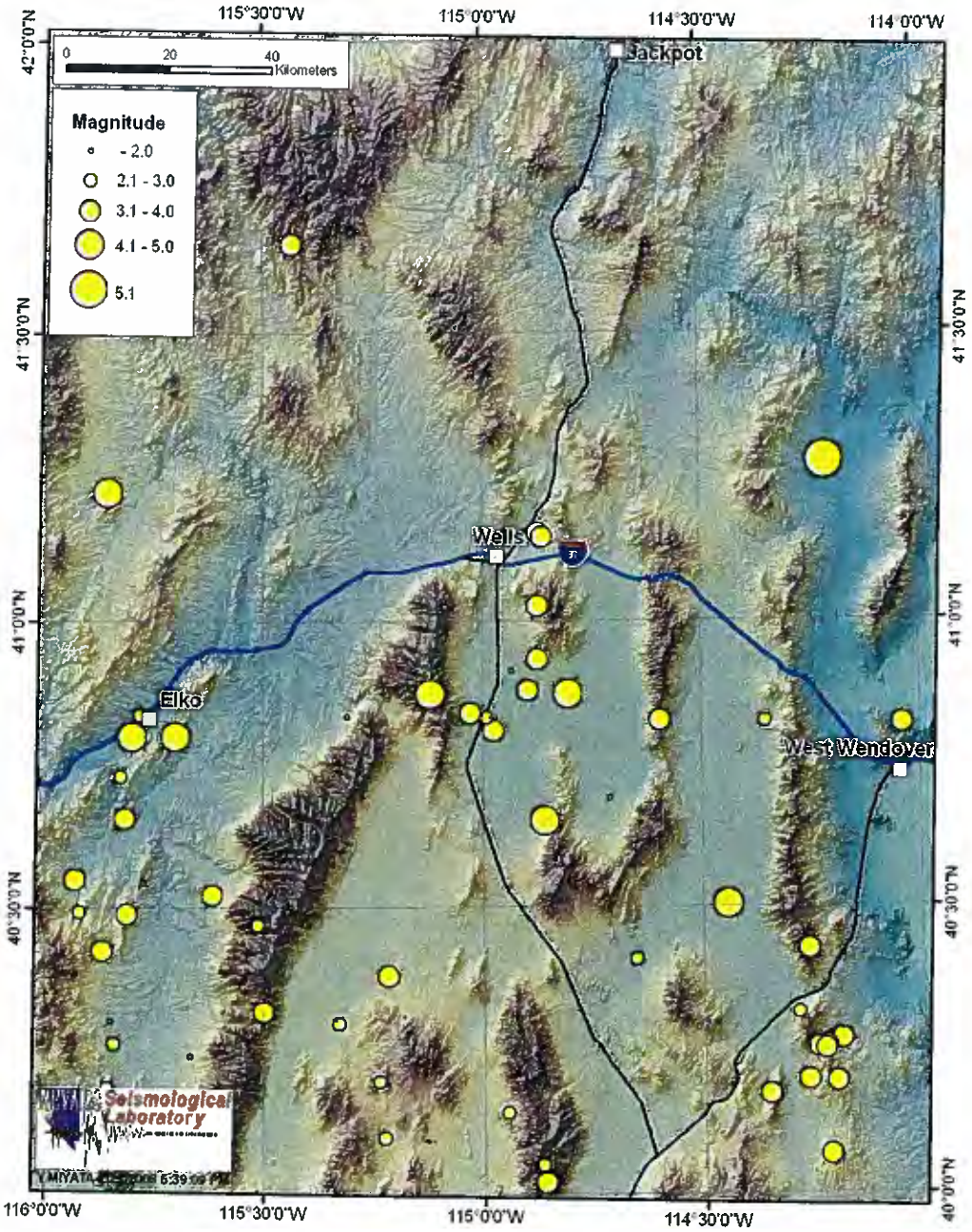

**USGS**

**Quaternary Fault and Fold Database for the United States**

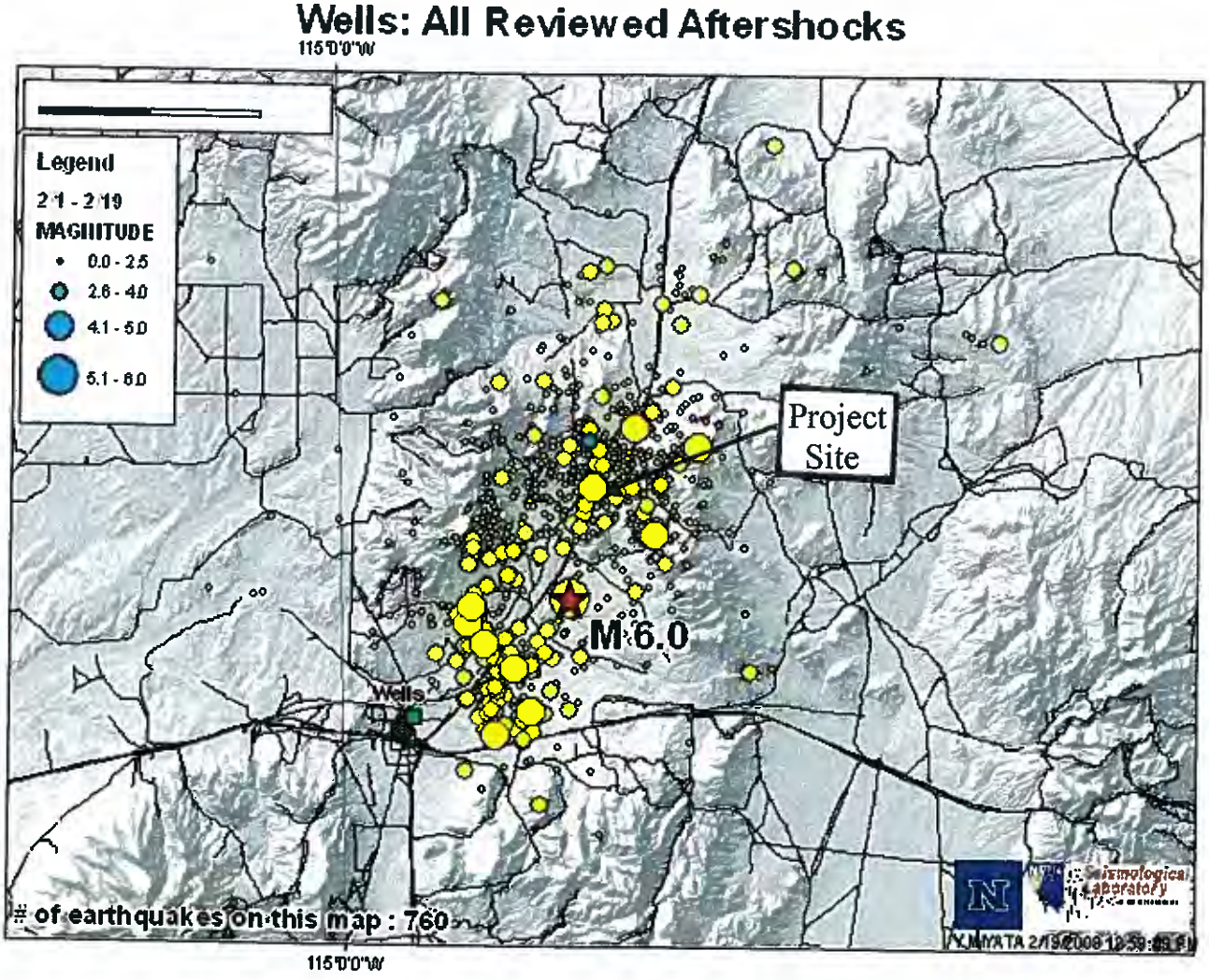
Last modified December 16, 2005 by Web Team

URL http://earthquake.usgs.gov/regional/qfaults/nv/wel.html

# Epicenters of Earthquakes in Northeastern Nevada, 1900 through 2007




From Anderson, John, *Wells Earthquake*, Nevada Seismological Lab website, http://www.seismo.unr.edu/feature/2008/Wells_Earthquake_r2.pdf, March 2, 2008, accessed 3/09/2009.




Latest map of aftershocks as of: 02/19/2009 01 01 PM

From Nevada Seismological Lab website, Special Earthquake Report, *M 6.0 Wells Earthquake*, http://www.seismo.unr.edu/feature/2008/wells.html, Page Last updated 2/19/2009 01:01 PM, accessed 3/09/2009.

# APPENDIX B

Key to Boring Logs
Boring Logs

# KEY TO BORING LOGS

| PARTICLE SIZE LIMITS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CLAY | SILT | SAND | | | GRAVEL | | COBBLES | BOULDERS |
| | | FINE | MEDIUM | COARSE | FINE | COARSE | | |
| .002 mm | | #200 | #40 | #10 | #4 | ¾ inch | 3 inch | 12 inch |

| USCS GROUP | TYPICAL SOIL DESCRIPTION |
|---|---|
| GW | Well graded gravels, gravel-sand mixtures, little or no fines |
| GP | Poorly graded gravels, gravel-sand mixtures, little or no fines |
| GC | Clayey gravels, poorly graded gravel-sand-clay mixtures |
| SW | Well graded sands, gravelly sands, little or no fines |
| SP | Poorly graded sands, gravelly sands, little or no fines |
| SM | Silty sands, poorly graded sand-silt mixtures |
| SC | Clayey sands, poorly graded sand-clay mixtures |
| ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity |
| CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays |
| OL | Organic silts and organic silt-clays of low plasticity |
| MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts |
| CH | Inorganic clays of high plasticity, fat clays |
| OH | Organic clays of medium to high plasticity |
| CS | Claystone/Siltstone |
| PT | Peat and other highly organic soils |

**MOISTURE CONDITION CRITERIA**

| Description | Criteria |
|---|---|
| Dry | Absence of moisture, dusty, dry to touch. |
| Moist | Damp, no visible free water. |
| Wet | Visible free water, usually below groundwater table. |

▽ ▼ Groundwater Elevation Symbols

**SOIL CEMENTATION CRITERIA**

| Description | Criteria |
|---|---|
| Weak | Crumbles or breaks with handling or little finger pressure. |
| Moderate | Crumbles or breaks with considerable finger pressure. |
| Strong | Won't break or crumble w/finger pressure |

**STANDARD PENETRATION CLASSIFICATION***

| GRANULAR SOIL | | CLAYEY SOIL | |
|---|---|---|---|
| BLOWS/FT | DENSITY | BLOWS/FT | CONSISTENCY |
| 0 - 4 | VERY LOOSE | 0 - 1 | VERY SOFT |
| 5 – 10 | LOOSE | 2 - 4 | SOFT |
| 11 - 30 | MEDIUM DENSE | 5 - 8 | MEDIUM STIFF |
| 31 - 50 | DENSE | 9 - 15 | STIFF |
| OVER 50 | VERY DENSE | 16 - 30 | VERY STIFF |
| | | 31 - 60 | HARD |
| | | OVER 60 | VERY HARD |

*Standard Penetration Test (N) 140 lb hammer 30 inch free fall on 2 inch O.D. x 1.4 inch I.D. sampler.

Blow counts on Calif. Modified Sampler ($N_{CMS}$) can be converted to $N_{SPT}$ by:

$(N_{CMS})(0.62) = N_{SPT}$

Blow counts from Automatic or Safety Hammer can be converted to Standard SPT $N_{60}$ by:

$(N_{AUTOMATIC})(1.3) = N_{60}$

$(N_{SAFETY})(1.17) = N_{60}$

**TEST ABBREVIATIONS**

| | | | |
|---|---|---|---|
| CD | CONSOLIDATED DRAINED | O | ORGANIC CONTENT |
| CH | CHEMICAL (CORROSIVENESS) | OC | CONSOLIDATION |
| CM | COMPACTION | PI | PLASTICITY INDEX |
| CU | CONSOLIDATED UNDRAINED | RQD | ROCK QUALITY DESIGNATION |
| D | DISPERSIVE SOILS | RV | R-VALUE |
| DS | DIRECT SHEAR | S | SIEVE ANALYSIS |
| E | EXPANSIVE SOIL | SL | SHRINKAGE LIMIT |
| G | SPECIFIC GRAVITY | U | UNCONFINED COMPRESSION |
| H | HYDROMETER | UU | UNCONSOLIDATED UNDRAINED |
| HC | HYDRO-COLLAPSE | UW | UNIT WEIGHT |
| K | PERMEABILITY | W | MOISTURE CONTENT |

SOIL COLOR DESIGNATIONS ARE FROM THE MUNSELL SOIL COLOR CHART.

EXAMPLE: (7.5 YR 5/3) BROWN

**SAMPLER NOTATION**

| | |
|---|---|
| CMS | CALIF. MODIFIED SAMPLER① |
| CPT | CONE PENETRATION TEST |
| CS | CONTINUOUS SAMPLER② |
| CSS | CALIFORNIA SPLIT SPOON |
| P | PUSHED (NOT DRIVEN) |
| PB | PITCHER BARREL |
| RC | ROCK CORE③ |
| SH | SHELBY TUBE④ |
| SPT | STANDARD PENETRATION TEST |
| TP | TEST PIT |

① I.D.= 2.421 inch

② I.D.=3.228 inch with tube; 3.50 inch w/o tube

③ NXB I.D.= 1.875 inch

④ I.D.= 2.875 inch

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 8/19/08
END DATE 8/19/08
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC1
E.A. #
GROUND ELEV. 6088.56 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| 8/19/08 | 50.00 | 6038.6 |
| | | |

STATION "X" 148+75
OFFSET 25' RT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 8/19/2008

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | | | | | | | | | Started 8:15 a.m. Finished 1:45 p.m. |
| | | A | SPT | 8<br>9<br>8 | 17 | 100 | S, W | SM | **Silty Sand with Gravel (SM)** light brown, dry.<br>(A) 31% mostly subangular gravel, 40% sand, 29% fines.<br>Bulk Sample1 from 0 to 5', Silty Clayey Sand with Gravel (SC-SM). 39% gravel, 42% sand, 19% fines. PI = 4, R-value = 75. | Temperature 70 - 85 degrees Fahrenheit and partly cloudy. |
| | 2.50 | | | | | | | | | |
| | 3.50 | | | | | | | | | |
| | | B | SPT | 12<br>13<br>32 | 45 | 100 | S, W, CH | | (B1) 21% gravel, 53% sand, 26% fines. | Rig Unit #1082. Energy correction factor 1.3. |
| 6083.6 | 5.00 (5) | | | | | | | | | |
| | 6.00 | | | | | | | SC SM | 4.50<br>**Silty Clayey Sand with Gravel (SC-SM)** tan, dry.<br>(B2) 26% gravel, 50% sand, 24% fines. | |
| | | C | SPT | 4<br>4<br>5 | 9 | 100 | S, W | ML | 6.00<br>**Sandy Silt (ML)** tan to brown, dry to moist.<br>(C1) 5% gravel, 42% sand, 53% fines.<br>(C2) 10% gravel, 29% sand, 61% fines.<br>Bulk Sample 2 from 5' to 10', Silty Clayey Sand with Gravel (SC-SM). 32% gravel, 35% sand, 33% fines. PI = 5 and R-value = 54. | Used sand catcher in all SPT samples. |
| | 7.50 | | | | | | | | | |
| | 8.50 | | | | | | | | | |
| | | D | SPT | 5<br>10<br>16 | 26 | 100 | S, W, CH | | 9.00<br>**Silty Sand with Gravel (SM)** brown, moist.<br>(D) 28% mostly subrounded gravel, 38% sand, 34% fines. | 100 lbs of down pressure entire depth, easy drilling. |
| 6078.6 | 10.00 (10) | | | | | | | | | |
| | 11.00 | | | | | | | SM | | Traces of quartz 0 - 30 ft. |
| | | E | SPT | 11<br>19<br>16 | 35 | 100 | S, W | | (E) Partially decomposed rock fragments with traces of oxidation. 32% gravel, 47% sand, 21% fines. | |
| | 12.50 | | | | | | | | | |
| | 13.50 | | | | | | | | 13.00 | |
| | | F | SPT | 7<br>16<br>33 | 49 | 100 | S, W | GP GM | **Poorly graded Gravel with Sand and Silt (GP-GM)**<br>(F) Dark gray fractured rock, presence of cobble. 66% gravel up to 1", 24% sand, 9% fines. | |
| 6073.6 | 15.00 (15) | | | | | | | | | |
| | 16.00 | | | | | | | | 15.50 | |
| | | G | SPT | 6<br>22<br>27 | 49 | 95 | S, W | ML | **Sandy Silt (ML)** brown, moist.<br>(G1) 5% gravel, 39% sand and 56% fines. | |
| | 17.50 | | | | | | | | 16.50 | |
| | | | | | | | | GM | **Silty Gravel with Sand (GM)** dark gray partially decomposed and fragmented rock with brown silt intrusion.<br>(G2) 43% gravel up to 1", 40% sand, 17% fines. | |
| | 18.50 | | | | | | | | 18.00 | |
| | | H | SPT | 12<br>16<br>19 | 35 | 95 | S, W | | **Silty Sand with Gravel (SM)** moist, brown silty sand and partially decomposed and fragmented rock (angular and subangular).<br>(H) 35% gravel, 52% sand, 13% fines. | |
| 6068.6 | 20.00 (20) | | | | | | | | | |

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 8/19/08
END DATE 8/19/08
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC1
E.A. #
GROUND ELEV. 6088.56 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| 8/19/08 | 50.00 | 6038.6 |
| | | |

STATION "X" 148+75
OFFSET 25' RT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 8/19/2008

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 24.00 | | | | | | | SM | | |
| 6063.6 | 25 25.50 | I | SPT | 11 22 19 | 41 | 100 | W, PI | | (I) PI = 3. | |
| | 29.00 | | | | | | | | 28.00 | |
| 6058.6 | 30 30.50 | J | SPT | 8 11 17 | 28 | 100 | W, PI | SC | **Clayey Sand with Gravel (SC)** moist, brown clay and partially decomposed and fragmented rock. (J) PI = 9. 6" silt/clay layer with no rock, 29.5' - 30'. Traces of oxidation. | |
| | 34.00 | | | | | | | | | |
| 6053.6 | 35 35.50 | K | SPT | 8 10 7 | 17 | 100 | S, W, PI | | (K) 34% gravel, 44% sand, 22% fines, PI=19. | |
| | 39.00 | | | | | | | | 37.00 | |
| 6048.6 | 40 40.50 | L | SPT | 3 5 8 | 13 | 120 | S, W, PI | CH | **Fat Clay (CH)** reddish brown, moist. (L) 3% Sand, 97% fines, PI = 31, pocket penetrometer = 1 to 4 ton/sf. | |
| | | | | | | | | | 42.00 | |

NV_DOT US93 WLC.GPJ NV_DOT.GDT 4/3/09

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 8/19/08
END DATE 8/19/08
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC1
E.A. #
GROUND ELEV. 6088.56 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| 8/19/08 | 50.00 | 6038.6 |
| | | |

STATION "X" 148+75
OFFSET 25' RT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 8/19/2008

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 44.00 | | | | | | | | **Sandy Lean Clay (CL)** reddish brown, moist to wet. | |
| 6043.6 | 45 | M | SPT | 4<br>5<br>6 | 11 | 100 | S, W, Pl | CL | (M) 10% gravel, 36% sand, 54% fines, Pl = 16. | |
| | 45.50 | | | | | | | | | |
| | | | | | | | | | 47.00 | |
| | 49.00 | | | | | | | GC | **Clayey Gravel with Sand (GC)** brown, moist to wet. | (N) CMS pushed 6" with 500 psi down pressure, damaged extension. Sample in shoe and extension. |
| | 49.50 | N | P | | | 100 | S, W, Pl | | (N) 39% gravel up tp 1.5", 24% sand, 37% fines, Pl = 31. | |
| 6038.6 | 50 | | | | | | | | | Estimated ground water level at 50'. |
| | 51.00 | | | | | | | | 51.00 | |
| | 53.00 | O | | | | | S, W, Pl | CH | **Fat Clay with Sand (CH)** reddish brown, wet.<br>(O) 4% gravel, 19% sand, 77% fines, Pl = 31. | (O) Cuttings. |
| | 53.00 | | | | | | | | 53.00 | |
| | 54.00 | | | | | | | GC | **Clayey Gravel with Sand (GC)** wet, reddish brown clay and fractured rock. | |
| 6033.6 | 55 | P | CMS | 19<br>18<br>17 | 35 | 100 | S, W, Pl | | (P1) 36% gravel up 1", 29% sand, 35% fines, Pl = 38. | |
| | 55.50 | | | | | | | | 55.00 | |
| | | | | | | | | CH | **Sandy Fat Clay (CH)** wet, reddish brown clay and fractured rock.<br>(P2) 15% gravel, 33% sand, 52% fines, Pl = 28. | |
| | | | | | | | | | 57.00 | |
| | 59.00 | | | | | | | GC | **Clayey Gravel with Sand (GC)** wet, reddish brown clay and fractured rock. | |
| 6028.6 | 60 | Q | SPT | 8<br>16<br>17 | 33 | 105 | S, W, Pl | | (Q) 35% gravel up to 1", 33% sand, 32% fines, Pl = 38. | |
| | 60.50 | | | | | | | | 60.50 | |
| | | | | | | | | | **B.O.H.**<br>Hole was backfilled with drill cuttings. | |

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 8/20/08
END DATE 8/20/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC2
E.A. #
GROUND ELEV. 6090.11 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 150+29
OFFSET 22' LT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 8/20/2008

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | | | | | | | | **Silty Gravel with Sand (GM)** brown, dry. Possibly base material/grindings in the upper 2 feet. | Started 8:00 a.m. Finished 2:20 p.m. |
| | 2.50 | A | SPT | 5<br>9<br>7 | 16 | 65 | S, W | GM | (A) 49% mostly subangualar gravel up to 1", 32% sand, 19% fines. | Temperature 70 - 85 degrees Fahrenheit and partly cloudy. |
| | 3.50 | | | | | | | | | |
| | 5.00 | B | SPT | 8<br>9<br>7 | 16 | 85 | S, W | | (B) 35% mostly subrounded gravel up to 1", 35% sand, 30% fines. | Rig Unit #1082. Energy correction factor 1.3. |
| 6085.1 | 5 | | | | | | | | 5.50 | Used sand catcher in all SPT samples. |
| | 6.00 | | | | | | | | **Silty Sand with Gravel (SM)** brown, dry to moist. | |
| | 7.50 | C | SPT | 8<br>11<br>10 | 21 | 85 | S, W, CH | | (C) 28% subrounded gravel up to 1", 57% fine to coarse subrounded sand, 15% fines. | 100 lbs of down pressure except where noted otherwise. |
| | 8.50 | | | | | | | | | |
| | 10.00 | D | SPT | 11<br>16<br>15 | 31 | 95 | S, W, CH | SM | (D) 40% subrounded to subangular gravel, 45% fine to coarse sand, 15% fines. | Could not get sample for R-value down to a depth of 10' because cuttings were not coming out. |
| 6080.1 | 10 | | | | | | | | Bulk Sample 1 from 10' to 15', Silty Clayey Sand with Gravel (SC-SM). 39% gravel, 42% sand, 19% fines. PI = 5, R-value = 57. | |
| | 11.00 | | | | | | | | | |
| | 12.50 | E | SPT | 10<br>17<br>18 | 35 | 100 | S, W | | (E) 38% gravel, 47% fine to coarse sand, 14% nonplasic fines. Rock fragments up to 1". | |
| | 13.50 | | | | | | | | 13.00 | |
| | 15.00 | F | SPT | 12<br>14<br>15 | 29 | 80 | S, W | GP<br>GM | **Poorly graded Gravel with Silt and Sand (GP-GM)** brown, dry to moist.<br>(F) 61% gravel up to 1.5", 28% sand and 11% nonplastic fines. Rock fragments up to 1.5". | (F) Possible coarse gravel / cobble cause of high blow counts. |
| 6075.1 | 15 | | | | | | | | 15.50 | |
| | 16.00 | | | | | | | | **Silty Clayey Gravel with Sand (GC-GM)** brown, moist. Presence of cobbles. | |
| | 17.50 | G | CMS | 18<br>42<br>29 | 71 | 100 | S, W, UW | | (G1) 53% gravel up to 2", 33% sand, 14% fines. Rock fragments up to 2.75"<br>(G2) 51% gravel up to 1.5", 36% sand, 13% fines. | |
| | 18.50 | | | | | | | | | Hard drilling 18.5' to 19.5', 300 psi down pressure. Presence of cobble. |
| | 18.90 | H | CMS | 50/.4' | 50/.4' | 0 | | GC<br>GM | (H) No recovery due to presence of cobble. | |
| 6070.1 | 20 | | | | | | | | | Changed butterfly drill bit at 20' and 24'. |

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 8/20/08
END DATE 8/20/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC2
E.A. #
GROUND ELEV. 6090.11 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 150+29
OFFSET 22' LT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 8/20/2008

| ELEV (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 22.00 | |
| | 24.00 | | | | | | | GM | **Silty Gravel with Sand (GM)** brown, moist. Rock fragments up to 2.5". | |
| 6065.1 | 25 25.50 | I | CMS | 15 22 14 | 36 | 100 | S, W, Pl, UW | | (I1) 47% gravel up to 1", 35% sand, 18% fines, PI=3. | |
| | | | | | | | | | 25.00 | |
| | | | | | | | | GC | **Clayey Gravel with Sand (GC)** brown, moist. (I2) 44% gravel up to 1.5", 32% sand, 24% fines, P I= 11. (I3) 49% gravel up to 1", 30% sand, 21% fines, PI = 9. | |
| | 29.00 | | | | | | | | 27.00 | |
| | | | | | | | | | **Clayey Sand with Gravel (SC)** brown, moist. | |
| 6060.1 | 30 30.50 | J | CMS | 4 5 5 | 10 | 100 | S, W, Pl, UW | | (J1) 29% gravel, 31% sand, 40% fines, PI = 16. (J2) 30% gravel, 45% sand, 25% fines, PI = 14. | |
| | | | | | | | | SC | | Soft drilling 32' to 34.5' |
| | 34.00 | | | | | | | | | |
| 6055.1 | 35 35.50 | K | CMS | 6 10 18 | 28 | 100 | S, W, Pl, UW | | (K1) 20% fine gravel, 36% sand, 44% fines, PI = 9. (K2) 4% fine gravel, 52% sand, 24% fines, PI=13. (K3) 37% fine to coarse gravel, 38% sand, 25% fines, PI = 19. | (K) Rock fragments in shoe. |
| | | | | | | | | | 36.00 | |
| | | | | | | | | | **Clayey Gravel with Sand (GC)** brown, moist. | |
| | 39.00 | | | | | | | GC | | |
| 6050.1 | 40 40.50 | L | CMS | 10 26 19 | 45 | 100 | S, W, Pl, UW | | (L1) and (L2) 50% fine to coarse gravel up to 1.5", 29% sand, 21% fines. (L3) 63% fine and coarse gravel up to 1.5", 17% sand, 20% fines, PI = 27. | Easy drilling 39' to 44', 100 psi down pressure. |
| | | | | | | | | | 41.00 | |

NV_DOT US93 WLC.GPJ NV_DOT.GDT 4/3/09

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 8/20/08
END DATE 8/20/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC2
E.A. #
GROUND ELEV. 6090.11 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 150+29
OFFSET 22' LT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 8/20/2008

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CH | **Fat Clay (CH)** brown, moist. | |
| | 44.00 | | | | | | | | | |
| 6045.1 | 45 | M | CMS | 6<br>13<br>17 | 30 | 130 | S, W, Pl, UW, H, G, OC | | (M1) 4% sand, 55% silt, 41% clay, Pl = 36. | |
| | 45.50 | | | | | | | | 45.00 | |
| | | | | | | | | CL | **Lean Clay (CL)** brown, moist.<br>(M3) 9% gravel, 8% sand, 55% silt, 28% clay, Pl = 18. | |
| | 49.00 | | | | | | | | | |
| 6040.1 | 50 | N | CMS | 7<br>10<br>14 | 24 | 130 | S, W, Pl, UW, H, G, OC, CU | | (N1) 10% sand, 67% silt, 23% clay, Pl = 22. | (N) Settled 1 1/2" before hammering. |
| | 50.50 | | | | | | | | 49.50 | |
| | | | | | | | | CH | **Fat Clay (CH)** brown, moist.<br>(N2) 14% sand, 56% silt, 30% clay, Pl = 3.<br>(N3) 3% sand, 67% silt, 30% clay, Pl = 30. | |
| | 54.00 | | | | | | | | (O1) 6% sand, 94% fines, Pl = 51. | |
| 6035.1 | 55 | O | CMS | 8<br>12<br>16 | 28 | 130 | S, W, Pl, UW, H, G, OC | | 54.50 | |
| | 55.50 | | | | | | | | **Lean Clay (CL)** brown, moist to wet.<br>(O2) 10% sand, 67% silt, 23% clay, Pl = 19. | |
| | | | | | | | | CL | | |
| | 59.00 | | | | | | | | | |
| 6030.1 | 60.00<br>60 | P | CMS | 9<br>13 | 22 | 140 | | | 60.00 | (P) Drove only 12" because of high recoveries in previous samples. |
| | | | | | | | | | **B.O.H.**<br>Groundwater was not encountered.<br>Hole was backfilled with drill cuttings. | |

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG

SHEET 1 OF 1

START DATE 2/3/09
END DATE 2/3/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC3
E.A. #
GROUND ELEV. 6088.16 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 148+95
OFFSET 28' RT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 2/3/09

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | | | | | | | | **Silty Sand with Gravel (SM)** dark gray and brown, dry to moist. Possibly base material/grindings in the upper 1.5 feet. |
| | 2.50 | A | SPT | 4<br>5<br>7 | 12 | 100 | S, W, Pl | SM | (A) 35% subangular gravel, 46% sand, 19% nonplastic fines. Looks like grindings in the upper 4" of sample. |
| | 3.00 | | | | | | | | 3.00 |
| | 4.50 | B | SPT | 7<br>7<br>35 | 42 | 100 | S, W, Pl | SP SM<br>SM | **Poorly graded Sand with Silt and Gravel (SP-SM)** brown, moist. 3.50<br>(B1) 39% gravel, 50% subangular sand, 11% nonplastic fines. 4.50 |
| 6083.2 | 5.00<br>5 | | | | | | | | **Silty Sand with Gravel (SM)** tan, moist to wet.<br>(B2) 35% gravel, 37% sand, 28% n.p. fines. |
| | 6.50 | C | CMS | 11<br>19<br>22 | 41 | 100 | S, W, Pl, UW | GC GM | **Silty, Clayey Gravel with Sand (GC-GM)** brown, moist. 6.00<br>(C1) 46% angular and subangular gravel up to 1.5", 34% subangular sand, 20% fines, PI = 6. |
| | 8.00 | D | SPT | 13<br>17<br>18 | 35 | 100 | S, W, Pl, CH | GM | 6.50<br>**Silty Gravel with Sand (GM)** brown, moist.<br>(C2) 49% angular and subangular gravel up to 1", 35% subangular sand, 16% nonplastic fines. |
| | | | | | | | | SM | **Silty Sand with Gravel (SM)** brown, moist.<br>(D) 34% angular and subangular fine gravel, 50% subangular sand, 16% nonplastic fines. |
| | | | | | | | | | 9.00<br>Bulk Sample 1 from 4' to 9', Silty Gravel with Sand (GM). 45% gravel, 36% sand, 19% fines. PI = 2, R-value = 54. |
| 6078.2 | 10.00<br>10 | | | | | | | | **Poorly graded Gravel with Silt and Sand (GP-GM)** |
| | 11.50 | E | CMS | 15<br>29<br>34 | 63 | 100 | S, W, Pl, UW | GP GM | (E) 46-50% gravel up to 1.5 ", 39-43% sand, 11% nonplastic fines. |
| | | | | | | | | | 11.50 |
| | 13.00 | F | SPT | 17<br>19<br>20 | 39 | 100 | S, W, Pl | SM | **Silty Sand with Gravel (SM)** dry.<br>(F) 32% gravel, 55% fine to coarse, subrounded to subangular sand, 13% nonplastic fines. |
| | | | | | | | | | 14.00 |
| 6073.2 | 15.00<br>15 | | | | | | | | **Poorly graded Gravel with Silt and Sand (GP-GM)** brown, dry. |
| | 16.50 | G | CMS | 7<br>14<br>16 | 30 | 100 | S, W, Pl | GP GM | (G) 59% subangular and angular gravel up to 1", 30% sand, 10% nonplastic fines. |
| | 18.00 | H | SPT | 8<br>10<br>12 | 22 | 75 | S, W, Pl | | (H) 49% gravel up to 1", 40% subangular sand, 11% nonplastic fines. |
| | | | | | | | | | 18.00 |
| 6068.2 | 20 | | | | | | | | **B.O.H.**<br>Groundwater was not encountered.<br>Hole was backfilled with drill cuttings. |

**REMARKS**

Started 8:00 a.m.
Finished 10:00 a.m.

Temperature 28 - 38 degrees Fahrenheit and sunny.

Rig Unit #1082.
Energy correction factor 1.3.

Used sand catcher in all SPT samples.

Easy drilling entire depth, used head pressure only.

1" to 2" of snow on cut slopes.
Approximately 1" of precipitation in the previous two weeks.

NV_DOT US93 WLC.GPJ NV_DOT.GDT 4/3/09

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 2/3/09
END DATE 2/3/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC4
E.A. #
GROUND ELEV. 6089.34 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 150+50
OFFSET 29' RT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 2/3/09

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | | | | | | | | **Silty Gravel with Sand (GM)** brown, moist to wet. | Started 10:30 a.m. Finished 3:30 p.m. |
| | 2.50 | A | SPT | 2<br>3<br>4 | 7 | 65 | S, W, Pl | GM | (A) 41% gravel up to 3/4", 27% sand, 33% nonplastic fines. | Temperature 38 - 49 degrees Fahrenheit and sunny. |
| | 3.50 | | | | | | | | 3.00 | |
| | 5.00 | B | CMS | 10<br>16<br>17 | 33 | 100 | S, W, Pl, UW | GP GM | **Poorly graded Gravel with Silt and Sand (GP-GM)** brown, moist.<br>(B1) 51% gravel up to 1.5", 37% sand, 12% nonplastic fines.<br>4.50 | Rig Unit #1082. Energy correction factor 1.3. |
| 6084.3 | 5 | | | | | | | GM | 5.00 **Silty Gravel with Sand (GM)** brown, moist.<br>(B2) 51% gravel up to 1", 36% sand, 13% nonplastic fines. | |
| | 6.50 | C | SPT | 7<br>10<br>14 | 24 | 85 | S, W, Pl, CH | SM | **Silty Sand with Gravel (SM)** brown; moist to dry; fine to coarse, subrounded to subangular sand.<br>(C)39% gravel, 45% sand, 16% nonplastic fines Bulk Sample 1 from 4' to 9', Silty Gravel with Sand (GM). 52% gravel, 30% Sand, 18% fines. PI = 2, R-value = 67.<br>(D1) 22% gravel, 65% sand, 13% nonplastic fines.<br>8.50 | Used sand catcher in all SPT samples. Easy drilling using only head pressure unless noted otherwise. |
| | 7.50 | | | | | | | | | |
| | 9.00 | D | CMS | 11<br>19<br>19 | 38 | 105 | S, W, Pl, UW | GM | 9.00 **Silty Gravel with Sand (GM)** brown; dry; fine to coarse, subrounded to subangular sand.<br>(D2) 45% gravel up to 1", 42% sand, 13% fines, PI = 2. | 1" to 2" of snow on cut slopes. Approximately 1" of precipitation in the previous two weeks. |
| 6079.3 | 10<br>10.50 | E | SPT | 11<br>14<br>23 | 37 | 85 | S, W, Pl | SM | **Silty Sand with Gravel (SM)** brown, dry to moist. | |
| | 11.50 | | | | | | | | (E) 38% gravel; 49% fine to coarse, subrounded to subangular sand; 13% nonplastic fines. | |
| | 13.00 | F | SPT | 10<br>19<br>36 | 55 | 95 | S, W, Pl | | (F) 28% gravel, 57% sand, 15% nonplastic fines. | (F) Fractured rock in shoe. High blow counts due to cobble. |
| 6074.3 | 15<br>15.00 | | | | | | | SM | Bulk Sample 2 from 9' to 14', Silty Sand with Gravel (SM). 40% gravel, 42% sand, 18% nonplastic fines. R-value = 69. | 13' to 15' very gravelly. Grinding while drilling. |
| | 16.50 | G | SPT | 12<br>26<br>24 | 50 | 85 | S, W, Pl | | (G) 41% gravel (mostly fragmented/fractured, angular rock pieces), 42% sand, 17% fines, PI = 3. | |
| | 20.00 | | | | | | | | 17.50 | |
| 6069.3 | 20 | | | | | | | CL | **Lean Clay with Sand (CL)** brown, moist. | At 17.5' to about 30' drilling was very smooth and easy. |
| | | H | SPT | 3<br>5 | 20 | 105 | S, W, Pl | | (H) 3% gravel, 19% sand, 78% fines. PI = 9. | |

NV_DOT US93 WLC.GPJ NV_DOT GDT 4/3/09

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 2/3/09
END DATE 2/3/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC4
E.A. #
GROUND ELEV. 6089.34 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 150+50
OFFSET 29' RT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 2/3/09

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 21.50 | | | 15 | | | | | | |
| | 22.00 | | | | | | | | | |
| | | I | CMS | 4<br>7<br>10 | 17 | 115 | S, W, PI, UW, DS, G, OC | | (I1) 1% gravel, 24% sand, 76% fines, PI = 10.<br>(I2) 24% sand, 76 % fines, PI = 12.<br>(I3) 19% sand, 90% fines, PI = 11. | |
| | 23.50 | | | | | | | | 23.50 | |
| | | J | SPT | 5<br>6<br>8 | 14 | 85 | S, W, PI, H | | **Sandy Silty Clay (CL-ML)** brown, moist.<br>(J) 5% gravel, 33% sand, 56% silt, 6% clay, PI = 4. | |
| 6064.3 | 25.00 | | | | | | | CL ML | | |
| | | | | | | | | | 27.00 | |
| | | | | | | | | CL | **Sandy Lean Clay (CL)** brown, moist.<br>(K1) 32% sand, 68% fines, PI = 18.<br>(K2) 33% sand, 67% fines, PI = 10. | |
| 6059.3 | 30.00 | | | | | | | | | |
| | | K | CMS | 8<br>14<br>19 | 33 | 100 | S, W, PI, UW, DS, G, OC | | | |
| | 31.50 | | | | | | | | 33.00 | |
| | | | | | | | | GC | **Clayey Gravel with Sand (GC)** brown, moist.<br>(L1) 54% gravel up to 3/4", 29% sand, 17% fines, PI = 38.<br>(L2) 42% gravel up to 1", 33% sand, 25% fines, PI = 28. | |
| 6054.3 | 35.00 | | | | | | | | | |
| | | L | CMS | 11<br>19<br>17 | 36 | 115 | S, W, PI, UW | | | |
| | 36.50 | | | | | | | | 36.50 | |
| | | M | SPT | 6<br>8<br>7 | 15 | 120 | S, W, PI | | **Lean Clay (CL)** with varying sand and gravel, brown, moist.<br>(M) 9% gravel, 16% sand, 75% fines, PI = 23. | |
| | 38.00 | | | | | | | | | |
| 6049.3 | 40.00 | | | | | | | | | |
| | | N | SPT | 13<br>21<br>17 | 38 | 125 | S, W, PI | CL | (N) 20% angular gravel, 26% angular sand, 54% fines, PI = 29. | At 40' increasee drilling down pressure to 150 psi. |
| | 41.50 | | | | | | | | | |

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 2/3/09
END DATE 2/3/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC4
E.A. #
GROUND ELEV. 6089.34 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 150+50
OFFSET 29' RT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 2/3/09

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 6044.3 | 45.00 | | | | | | | | (O1) 1% gravel, 11% sand, 88% fines, PI = 24. | |
| | 45 | O | CMS | 8<br>14<br>15 | 29 | 135 | S, W, PI, UW, DS, G, OC | | 45.50<br>**Fat Clay (CH)** brown, moist. | |
| | 46.50 | | | | | | | | (O2) and (O3) 8% sand, 92% fines, PI = 29. | |
| | 48.00 | P | SPT | 7<br>7<br>9 | 16 | 155 | S, W, PI, H | CH | (P) 4% sand, 72% silt, 24% clay, PI = 28. | |
| 6039.3 | 50 | | | | | | | | 50.00<br>**Lean Clay (CL)** brown, moist. | |
| | 53.00 | Q | CMS | 10<br>13 | 23 | 160 | S, W, PI, UW, DS, G, OC | CL | (Q1) 4% sand, 96% fines, PI = 27.<br>(Q2) 1% gravel, 19% sand, 80% fines, PI = 25. | |
| 6034.3 | 54.00<br>55 | | | | | | | | 56.00<br>**Clayey Sand with Gravel (SC)** brown, moist to wet. | (Q) and (R) only drove 12" due to large recoveries in previous samples. |
| | 58.00 | R | SPT | 9<br>13 | 22 | 110 | S, W, PI | SC | (R) 24% gravel, 53% sand, 23% fines, PI = 28. | |
| 6029.3 | 59.00<br>60 | | | | | | | | 59.00<br>**B.O.H.**<br>Groundwater was not encountered.<br>Hole was backfilled with drill cuttings. | |

NV_DOT US93 WLC.GPJ NV_DOT.GDT 4/3/09

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 2/4/09
END DATE 2/4/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC5
E.A. #
GROUND ELEV. 6088.60 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 149+00
OFFSET 28' LT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 2/4/09

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | | | | | | | | **Silty Sand with Gravel (SM)** moist. Black to dark gray grindings mixed with brown silty sand in the upper 4.2 feet. Light tan, slightly to moderately cemented silty, clayey sand from 4.2' to 6'. | Started 8:00 a.m. Finished 1:45 p.m. |
| | 2.50 | A | SPT | 4<br>5<br>12 | 17 | 80 | S, W, PI | | (A) 34% gravel, 51% sand, 15% nonplastic fines. | Temperature 25 - 50 degrees Fahrenheit and sunny. |
| | 3.50 | | | | | | | SM | | |
| | 5.00 | B | SPT | 10<br>7<br>4 | 11 | 100 | S, W, PI | | (B1) 35% gravel, 44% sand, 21% nonplastic fines.<br>(B2) 14% gravel, 36% sand, 50% fines, PI = 9. | Rig Unit #1082. Energy correction factor 1.3. |
| 6083.6 | 5 | | | | | | | | | |
| | 5.70 | C | CMS | 23<br>30/.2' | 30/.2' | 100 | S, W, PI, UW | | (C) 40% gravel, 41% sand, 22% fines, PI = 3. | Used sand catcher in all SPT samples. |
| | 6.50 | | | | | | | | 6.50 | |
| | 8.00 | D | SPT | 11<br>5<br>6 | 11 | 80 | S, W, PI, CH | ML | **Sandy Silt (ML)** brown, moist.<br>(D) 12% gravel, 29% sand, 59% nonplastic fines.<br>Bulk Sample 1 from 4' to 9', Silty, Clayey Sand with Gravel (SC-SM). 30% gravel, 34% sand, 36% fines. PI = 4, R-value = 43. | Used only head pressure for drilling unless noted otherwise. |
| | 9.00 | | | | | | | | 9.00 | 1" to 2" of snow on cut slopes. |
| 6078.6 | 10<br>10.50 | E | SPT | 11<br>12<br>13 | 25 | 95 | S, W, PI | | **Silty Sand with Gravel (SM)** brown, moist to dry, fine to coarse sand mostly angular and subangular.<br>(E) 25% gravel, 56% sand, 19% nonplastic fines. | Approximately 1" of precipitation in the previous two weeks. |
| | 12.00 | | | | | | | | | 5.7' to 6' hard drilling due to cemented layer. |
| | 13.50 | F | SPT | 16<br>20<br>22 | 42 | 85 | S, W, PI | SM | (F) 28% gravel, 59% sand, 13% nonplastic fines. | 6.2' to 6.5' hard drilling using 300 psi down pressure due to cobble. |
| 6073.6 | 15.00<br>15 | | | | | | | | Bulk Sample 2 from 9' to 14', Silty Sand with Gravel (SM). 29% gravel, 50% sand, 21% fines. PI = 2, R-value = 69. | |
| | 16.50 | G | SPT | 19<br>27<br>28 | 55 | 95 | S, W, PI | | (G) 28% gravel, 56% sand, 16% nonplastic fines. | |
| | 18.00 | | | | | | | | 17.50 | |
| | 19.50 | H | SPT | 15<br>22<br>17 | 39 | 85 | S, W, PI | GM | **Silty Gravel with Sand (GM)** brown, dry, with fractured dark gray rock fragments.<br>(H) 56% gravel up to 1", 29% sand, 15% fines, PI = 2. | |
| 6068.6 | 20<br>21.00 | | | | | | | | 20.00 | |

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 2/4/09
END DATE 2/4/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC5
E.A. #
GROUND ELEV. 6088.60 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 149+00
OFFSET 28' LT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 2/4/09

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | I | SPT | 9<br>11<br>14 | 25 | 80 | S, W, PI | SC<br>SM | **Silty, Clayey Sand with Gravel (SC-SM)** brown, dry, with gray fractured rock fragments.<br>(I) 39% gravel, 46% sand, 15% fines, PI = 4. | |
| | 22.50 | | | | | | | | | |
| 6063.6 | 25.00<br>25 | J | SPT | 26<br>50/.4' | 50/.4' | 100 | S, W, PI | | (J) 23% gravel, 52% sand, 25% fines, PI = 5. | Hard drilling 25.9' to 28' due to presence of rock (fractured). |
| | 25.90 | | | | | | | | | |
| | | | | | | | | | 28.00 | |
| | | | | | | | | SC | **Clayey Sand with Gravel (SC)** brown, moist, with fractured rock fragments from 30' to 31'. | |
| 6058.6 | 30.00<br>30 | K | SPT | 16<br>8<br>6 | 14 | 80 | S, W, PI | | (K) 28% gravel, 33% sand, 39% fines, PI = 7. | |
| | 31.50 | | | | | | | | 31.00 | |
| | | | | | | | | | **Lean Clay (CL)** brown, moist. | (K) Lean clay in shoe.<br>Smooth drilling 31' to 39.5'. |
| 6053.6 | 35.00<br>35 | L | SPT | 5<br>8<br>12 | 20 | 100 | S, W, PI | CL | (L) 4% fine sand, 96% fines. PI = 16. | |
| | 36.50 | | | | | | | | | |
| | | | | | | | | | 39.50 | |
| 6048.6 | 40.00<br>40 | M | CMS | 6<br>10<br>17 | 27 | 125 | S, W, PI, UW | SC | **Clayey Sand with Gravel (SC)** brown, moist.<br>(M1) 15% gravel, 35% sand, 50% fines, PI=22.<br>(M2) 14% gravel, 41% sand, 45% fines, PI=22.<br>(M3) 13% gravel, 47% sand, 40% fines, PI=21. | |
| | 41.50 | | | | | | | | | |

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 2/4/09
END DATE 2/4/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC5
E.A. #
GROUND ELEV. 6088.60 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 149+00
OFFSET 28' LT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 2/4/09

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 43.00 | |
| | | | | | | | | | **Clayey Gravel with Sand (GC)** brown, moist. | |
| 6043.6 | 45.00 | | | | | | | | | |
| | 45 | N | SPT | 21<br>22<br>18 | 40 | 100 | S, W, PI | GC | (N) 43% gravel up to 1", 35% sand, 22% fines, PI= 19. | |
| | 46.50 | | | | | | | | | |
| | | | | | | | | | 48.00 | |
| | | | | | | | | | **Clayey Sand with Gravel (SC)** brown, moist. | |
| 6038.6 | 50.00 | | | | | | | | | |
| | 50 | O | CMS | 11<br>22<br>27 | 49 | 140 | S, W, PI, UW | SC | (O1) 13% gravel, 43% sand, 44% fines, PI=22.<br>(O2) 31% gravel, 40% sand, 29% fines, PI=35.<br>(O3) 26% gravel, 45% sand, 29% fines, PI = 35. | |
| | 51.50 | | | | | | | | | |
| | | | | | | | | | 53.00 | |
| | | | | | | | | | **Sandy Lean Clay (CL)** brown, moist. | |
| 6033.6 | 55.00 | | | | | | | | | |
| | 55 | P | SPT | 6<br>10<br>12 | 22 | 135 | S, W, PI | CL | (P) 5% gravel, 26% sand, 69% fines, PI = 19. | |
| | 56.50 | | | | | | | | | |
| | | | | | | | | | 59.00 | |
| | | | | | | | | | **Clayey Sand (SC)** brown, moist. | (Q) only drove 12" due to large recoveries in previous samples. |
| 6028.6 | 60.00 | | | | | | | SC | (Q1) 12% gravel, 40% sand, 48% fines, PI=22. | |
| | 60 | Q | CMS | 13<br>40 | 53 | 140 | S, W, PI | | 60.50 | |
| | 61.00 | | | | | | | GC | 61.00 **Clayey Gravel with Sand (GC)** brown, moist, with decomposed rock fragments.<br>(Q2) 61% gravel, 22% sand, 17% fines, PI=30. | |
| | | | | | | | | | **B.O.H.**<br>Groundwater was not encountered.<br>Hole was backfilled with drill cuttings. | |

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

# EXPLORATION LOG



START DATE 2/4/09
END DATE 2/4/09
JOB DESCRIPTION US 93 Wildlife Crossing Bridge
LOCATION US 93 MP 83.34, 10 miles north of Wells
BORING WLC6
E.A. #
GROUND ELEV. 6088.70 (ft)
HAMMER DROP SYSTEM Automatic

| GROUNDWATER LEVEL | | |
|---|---|---|
| DATE | DEPTH ft | ELEV. ft |
| | N/A | |
| | | |

STATION "X" 149+22
OFFSET 28' LT
ENGINEER A. Ablahani
EQUIPMENT Diedrich D-120
OPERATOR O. Altamirano
DRILLING METHOD 6" H.S.A.
BACKFILLED Yes DATE 2/4/09

| ELEV. (ft) | DEPTH (ft) | SAMPLE NO. | SAMPLE TYPE | BLOW COUNT 6 inch Increments | BLOW COUNT Last 1 foot | Percent Recov'd | LAB TESTS | USCS Group | MATERIAL DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | | | | | | | SC | **Clayey Sand with Gravel (SC)** moist, tan clayey sand mixed with black to dark gray grindings in the upper 2 feet. | Started 2:15 p.m. Finished 4:00 p.m. |
| | 2.50 | A | SPT | 5<br>3<br>2 | 5 | 75 | S, W, PI | | (A) 23% gravel, 31% sand, 46% fines, PI = 8. | Temperature 45 - 50 degrees Fahrenheit and sunny. |
| | 3.00 | | | | | | | | 3.00 | |
| | 4.50 | B | CMS | 3<br>3<br>9 | 12 | 100 | S, W, PI, CH, UW | SM | **Silty Sand with Gravel (SM)** wet, light tan. (B1) 17% gravel, 42% sand, 41% n.p. fines. | |
| | | | | | | | | | 4.00 (B2) 11% gravel, 53% sand, 36% n.p. fines. | Rig Unit #1082. |
| | | | | | | | | ML | 4.50 **Sandy Silt (ML)** wet, light tan. (B3)4% gravel, 41% sand, 55% nonplastic fines | Energy correction factor 1.3. |
| 6083.7 | 5<br>6.00 | C | SPT | 20<br>11<br>10 | 21 | 100 | S, W, PI, CH | GM | **Silty Gravel with Sand (GM)** moist tan, with partially decomposed and fragmented rock. (C) 41% gravel up to 3/4", 39% sand, 20% nonplastic fines. | Used sand catcher in all SPT samples. |
| | 7.00 | | | | | | | | 6.50 | |
| | 8.50 | D | SPT | 3<br>6<br>7 | 13 | 95 | S, W, PI | SC SM | **Silty, Clayey Sand with Gravel (SC-SM)** moist, brown, with partially decomposed and fragmented rock and quartz. (D) 25% gravel, 27% sand, 48% fines, PI = 5. Bulk Sample 1 from 4' to 9', Silty, Clayey Sand with Gravel (SC-SM). 27% gravel, 33% sand, 40% fines. PI = 7, R-value = 41. | Used only head pressure for drilling entire depth. |
| | 9.50 | | | | | | | | 9.00 | |
| 6078.7 | 10<br>11.00 | E | SPT | 10<br>14<br>14 | 28 | 95 | S, W, PI | | **Silty Sand with Gravel (SM)** moist, brown, with partially decomposed and fragmented rock. (E) 37% gravel, 38% sand, 25% nonplastic fines. | 1" to 2" of snow on cut slopes. Approximately 1" or precipitation in the previous two weeks. |
| | 12.00 | | | | | | | | | |
| | 13.50 | F | SPT | 10<br>12<br>12 | 24 | 95 | S, W, PI | SM | (F) 31% gravel, 50% sand, 19% fines, PI = 1. Bulk Sample 2 from 9' to 14', Silty Clayey Gravel with Sand (GC-GM). 58% gravel, 23% sand, 19% fines. PI = 6, R-value = 67. | |
| 6073.7 | 15.00<br>16.50 | G | SPT | 7<br>12<br>15 | 27 | 95 | S, W, PI | | (G) 32% gravel, 53% sand, 15% nonplastic fines. | |
| | 17.00 | | | | | | | | 17.00 | |
| | 18.00 | | | | | | | | **Silty Gravel with Sand (GM)** moist, brown. | |
| | 19.50 | H | SPT | 12<br>12<br>11 | 23 | 85 | S, W, PI | GM | (H) 46% gravel up to 1.5", 41% sand, 13% nonplastic fines. | |
| | | | | | | | | | 19.50 | |
| 6068.7 | 20 | | | | | | | | **B.O.H.** Groundwater was not encountered. Hole was backfilled with drill cuttings. | |

# APPENDIX C

Summary of Results Tables
Particle Size Distribution Reports
Direct Shear Test Reports
Consolidation Test Reports
Consolidated Undrained Triaxial Test Plots
Chemical Analysis Table

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 1 **Elevation (ft)** 6088.94 **Station** "X" 149+00, 25' Rt. **Date** 08/19/2008

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| A | 1.0 - 2.5 | SPT | 17 | SM | 9.2 | | 28.9 | | | | | | | | | |
| B1 | 3.5 - 4.5 | SPT | 45 | SM | 10.0 | | 25.8 | | | | | | | | | Ch |
| B2 | 4.5 - 5.0 | SPT | | SC-SM | 12.7 | | 24.4 | | | | | | | | | |
| C1 | 6.0 - 6.8 | SPT | 9 | ML | 21.1 | | 52.8 | | | | | | | | | |
| C2 | 6.8 - 7.5 | SPT | | ML | 18.6 | | 60.9 | | | | | | | | | |
| D | 8.5 - 10.0 | SPT | 26 | SM | 10.7 | | 33.6 | | | | | | | | | Ch |
| E | 11.0 - 12.5 | SPT | 35 | SM | 5.9 | | 20.8 | | | | | | | | | |
| F | 13.5 - 15.0 | SPT | 49 | GP-GM | 2.4 | | 9.3 | | | | | | | | | |
| G1 | 16.0 - 16.6 | SPT | 49 | ML | 18.7 | | 56.5 | | | | | | | | | |
| G2 | 16.6 - 17.5 | SPT | | GM | 5.2 | | 17.4 | | | | | | | | | |
| H | 18.5 - 20.0 | SPT | 35 | SM | 5.4 | | 12.6 | | | | | | | | | |
| I | 24.0 - 25.5 | SPT | 41 | SM | 5.5 | | | 20 | 17 | 3 | | | | | | |

CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT $N = (N_{CSS})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 1 **Elevation (ft)** 6088.94 **Station** "X" 149+00, 25' Rt. **Date** 08/21/2008

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| J | 29.0 - 30.5 | SPT | 28 | SC | 11.2 | | | 29 | 20 | 9 | | | | | | |
| K | 34.0 - 35.5 | SPT | 17 | SC | 12.5 | | 21.9 | 38 | 19 | 19 | | | | | | |
| L | 39.0 - 40.5 | SPT | 13 | CH | 52.6 | | 96.8 | 58 | 27 | 31 | | | | | | |
| M | 44.0 - 45.5 | SPT | 13 | CL | 34.0 | | 53.7 | 41 | 25 | 16 | | | | | | |
| N | 49.0 - 49.5 | CMS | | GC | 15.7 | | 37.1 | 54 | 23 | 31 | | | | | | |
| O | 52.0 | | | CH | 38.6 | | 77.3 | 53 | 22 | 31 | | | | | | Cuttings |
| P1 | 54.5 - 55.0 | CMS | 35 | GC | 18.0 | | 35.3 | 59 | 21 | 38 | | | | | | |
| P2 | 55.0 - 55.5 | CMS | | CH | 22.1 | | 51.6 | 50 | 22 | 28 | | | | | | |
| Q | 59.0 - 60.5 | SPT | 33 | GC | 16.1 | | 32.3 | 59 | 21 | 38 | | | | | | |
| BULK 1 | 0.0 - 5.0 | | | SC-SM | | | 18.6 | 23 | 19 | 4 | | | | | | Ch, RV = 75 |
| BULK 2 | 5.0 - 10.0 | | | SC-SM | | | 32.8 | 24 | 19 | 5 | | | | | | Ch, RV = 54 |
| | | | | | | | | | | | | | | | | |

CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT $N = (N_{CSS})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 2 **Elevation (ft)** 6090.65 **Station** "X" 150+29, 22' Lt. **Date** 08/20/2008

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| A | 1.0 - 2.5 | SPT | 16 | GM | 6.3 | | 18.7 | | | | | | | | | |
| B | 3.5 - 5.0 | SPT | 16 | GM | 10.4 | | 30.5 | | | | | | | | | |
| C | 6.0 - 7.5 | SPT | 21 | SM | 5.6 | | 15.2 | | | | | | | | | Ch |
| D | 8.5 - 10.0 | SPT | 31 | SM | 5.2 | | 14.8 | | | | | | | | | Ch |
| E | 11.0 - 12.5 | SPT | 35 | SM | 4.6 | | 14.4 | | | | | | | | | |
| F | 13.5 - 15.0 | SPT | 29 | GP-GM | 3.8 | | 11.2 | | | | | | | | | |
| G1 | 16.0 - 17.0 | CMS | 71 | GC-GM | 4.7 | | 14.2 | | | | | | | | | |
| G2 | 17.0 - 17.5 | CMS | | GC-GM | 4.3 | 120.1 | 12.6 | 22 | 17 | 5 | | | | | | |
| H | 18.5 - 18.9 | CMS | R | | | | | | | | | | | | | |
| I1 | 24.5 - 25.0 | CMS | 36 | GM | 8.0 | 105.7 | 18.2 | 25 | 22 | 3 | | | | | | |
| I2 | 25.0 - 25.5 | CMS | | GC | 9.7 | 110.6 | 23.4 | 28 | 17 | 11 | | | | | | |
| I3 | 24.0 - 25.5 | CMS | | GC | 10.0 | | 20.9 | 29 | 20 | 9 | | | | | | |

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CS = Continuous Sample 3.23" ID
RC = Rock Core
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CPT = Cone Penetration Test
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U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
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DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT $N = (N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 2 **Elevation (ft)** 6090.65 **Station** "X" 150+29, 22' Lt. **Date** 08/21/2008

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| J1 | 29.5 - 30.0 | CMS | 10 | SC | 26.8 | 80.0 | 40.0 | 37 | 21 | 16 | | | | | | |
| J2 | 30.0 - 30.5 | CMS | | SC | 17.5 | 89.6 | 25.2 | 35 | 21 | 14 | | | | | | |
| K1 | 34.0 - 34.5 | CMS | 28 | SC | 21.8 | 86.9 | 44.0 | 36 | 27 | 9 | | | | | | |
| K2 | 34.5 - 35.0 | CMS | | SC | 27.3 | 82.1 | 45.0 | 32 | 19 | 13 | | | | | | |
| K3 | 35.0 - 35.5 | CMS | | SC | 15.5 | 98.5 | 25.3 | 39 | 20 | 19 | | | | | | |
| L1 | 39.5 - 40.0 | CMS | 45 | GC | 16.4 | 104.7 | 21.7 | | | | | | | | | |
| L2 | 40.0 - 40.5 | CMS | | GC | 16.6 | 102.6 | 21.3 | | | | | | | | | |
| L3 | 39.0 - 40.5 | $CMS_{bag}$ | | GC | 15.5 | | 20.4 | 47 | 20 | 27 | | | | | | |
| M1 | 44.0 - 44.5 | CMS | 30 | CH | 31.6 | 82.4 | 96.1 | 60 | 24 | 36 | | | | | | H, G = 2.739, OC |
| M2 | 44.5 - 45.0 | CMS | | | | | | | | | | | | | | CU |
| M3 | 45.0 - 45.5 | CMS | | CL | 28.4 | | 83.3 | 37 | 19 | 18 | | | | | | |
| | | | | | | | | | | | | | | | | |

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C = Cohesion
N = No. of blows per ft., sampler

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S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 2 **Elevation (ft)** 6090.65 **Station** "X" 150+29, 22' Lt. **Date** 08/21/2008

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| N1 | 49.0 - 49.5 | CMS | 24 | CL | 33.5 | 81.2 | 90.1 | 40 | 18 | 22 | | | | | | H, G = 2.738, OC |
| N2 | 49.5 - 50.0 | CMS | | CH | 33.9 | 85.3 | 86.2 | 53 | 22 | 31 | | | | | | H, CU |
| N3 | 50.0 - 50.5 | CMS | | CH | 35.4 | | 96.4 | 52 | 22 | 30 | | | | | | H, G = 2.759, CU |
| O1 | 54.0 - 54.5 | CMS | 28 | CH | 30.5 | 82.6 | 93.7 | 72 | 21 | 51 | | | | | | |
| O2 | 54.5 - 55.0 | CMS | | CL | 33.3 | 84.5 | 90.1 | 36 | 17 | 19 | | | | | | H, G = 2.747, OC |
| O3 | 55.0 - 55.5 | CMS | | | | | | | | | | | | | | SAVED |
| P1 | 59.0 - 59.5 | CMS | 22 | | | | | | | | | | | | | SAVED |
| P2 | 59.5 - 60.0 | CMS | | | | | | | | | | | | | | SAVED |
| BULK 1 | 10.0 - 15.0 | | | SC-SM | | | 18.6 | 20 | 15 | 5 | | | | | | Ch, RV = 57 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{CSS})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 3 **Elevation (ft)** **Station** "X" 148+95, 28' Rt. **Date** 02/04/2009

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| A | 1.0 - 2.5 | SPT | 12 | SM | 9.2 | | 18.9 | 18 | NP | NP | | | | | | |
| B1 | 3.0 - 3.5 | SPT | 42 | SP-SM | 7.6 | | 11.2 | 19 | NP | NP | | | | | | |
| B2 | 3.5 - 4.0 | SPT | | SM | 25.0 | | 27.6 | 31 | NP | NP | | | | | | |
| C1 | 5.5 - 6.0 | CMS | 41 | GC-GM | 8.7 | 113.4 | 20.4 | 23 | 17 | 6 | | | | | | |
| C2 | 6.0 - 6.5 | CMS | | GM | 7.8 | 114.6 | 16.2 | 20 | NP | NP | | | | | | |
| D | 6.5 - 8.0 | SPT | 35 | SM | 6.5 | | 16.3 | 20 | 18 | 2 | | | | | | Ch |
| E1 | 10.5 - 11.0 | CMS | 63 | GP-GM | 5.5 | 117.7 | 11.3 | 19 | NP | NP | | | | | | |
| E2 | 11.0 - 11.5 | CMS | | GP-GM | 4.9 | 114.7 | 10.9 | 18 | NP | NP | | | | | | |
| F | 11.5 - 13.0 | SPT | 39 | SM | 4.9 | | 12.6 | 17 | NP | NP | | | | | | |
| G | 15.0 - 16.5 | CMS | 30 | GP-GM | 5.2 | | 10.4 | 19 | NP | NP | | | | | | |
| H | 16.5 - 18.0 | SPT | 22 | GP-GM | 4.2 | | 10.9 | 19 | NP | NP | | | | | | |
| BULK 1 | 4.0 - 9.0 | | | | | | 19.0 | 19 | 18 | 2 | | | | | | Ch, RV = 54 |

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RC = Rock Core
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CPT = Cone Penetration Test
TP = Test Pit
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U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{CSS})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 4 **Elevation (ft)** **Station** "X" 150+50, 29' Rt. **Date** 02/04/2009

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| A | 1.0 - 2.5 | SPT | 7 | GM | 13.1 | | 32.6 | 23 | 21 | 2 | | | | | | |
| B1 | 4.0 - 4.5 | CMS | 33 | GP-GM | 6.2 | 119.5 | 11.9 | 17 | NP | NP | | | | | | |
| B2 | 4.5 - 5.0 | CMS | | GM | 7.2 | 116.2 | 13.3 | 18 | NP | NP | | | | | | |
| C | 5.0 - 6.5 | SPT | 24 | SM | 7.7 | | 16.1 | 18 | NP | NP | | | | | | Ch |
| D1 | 8.0 - 8.5 | CMS | 38 | SM | 7.3 | 113.4 | 12.8 | 19 | NP | NP | | | | | | |
| D2 | 8.5 - 9.0 | CMS | | GM | 5.6 | 107.6 | 12.6 | 21 | 19 | 2 | | | | | | |
| E | 9.0 - 10.5 | SPT | 37 | SM | 4.8 | | 12.5 | 17 | NP | NP | | | | | | |
| F | 11.5 - 13.0 | SPT | 55 | SM | 6.4 | | 14.7 | 17 | NP | NP | | | | | | |
| G | 15.0 - 16.5 | SPT | 50 | SM | 5.6 | | 16.9 | 20 | 17 | 3 | | | | | | |
| H | 20.0 - 21.5 | SPT | 20 | CL | 27.0 | | 78.5 | 28 | 19 | 9 | | | | | | |
| I1 | 22.0 - 22.5 | CMS | 17 | CL | 31.7 | 75.3 | 72.7 | 32 | 22 | 10 | | | | | | |
| I2 | 22.5 - 23.0 | CMS | | CL | 39.2 | 65.2 | 76.2 | 31 | 19 | 12 | | | | | | G = 2.697, OC |

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CPT = Cone Penetration Test
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UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** **Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 4 **Elevation (ft)** **Station** "X" 150+50, 29' Rt. **Date** 02/04/2009

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| I3 | 23.0 - 23.5 | CMS | 17 | CL | 28.9 | 75.0 | 90.3 | 33 | 22 | 11 | DS | 28 | 2.69 | 28 | 1.6 | |
| J | 23.5 - 25.0 | SPT | 14 | CL-ML | 23.1 | | 61.9 | 26 | 22 | 4 | | | | | | H |
| K1 | 30.5 - 31.0 | CMS | 33 | CL | 32.0 | 75.7 | 68.4 | 39 | 21 | 18 | | | | | | G = 2.701, OC |
| K2 | 31.0 - 31.5 | CMS | | ML | 28.0 | 80.1 | 66.8 | 36 | 26 | 10 | DS | 36 | 3.55 | 34 | 3.22 | |
| L1 | 35.5 - 36.0 | CMS | 36 | GC | 14.8 | 101.2 | 17.5 | 56 | 18 | 38 | | | | | | |
| L2 | 36.0 - 36.5 | CMS | | GC | 15.8 | 104.9 | 24.8 | 48 | 20 | 28 | | | | | | |
| M | 36.5 - 38.0 | SPT | 15 | CL | 29.5 | | 74.7 | 45 | 22 | 23 | | | | | | |
| N | 40.0 - 41.0 | SPT | 38 | CL | 17.0 | | 54.3 | 49 | 20 | 29 | | | | | | |
| O1 | 45.0 - 45.5 | CMS | 29 | CL | 24.2 | | 88.5 | 46 | 22 | 24 | | | | | | |
| O2 | 45.5 - 46.0 | CMS | | CH | 32.6 | 82.4 | 91.6 | 52 | 23 | 29 | | | | | | G = 2.732, OC |
| O3 | 46.0 - 46.5 | CMS | | CH | 33.1 | 82.4 | 92.5 | 53 | 24 | 29 | DS | 32 | 1.42 | 31 | 0.53 | |
| P | 46.5 - 48.0 | SPT | 16 | CH | 29.2 | | 95.6 | 51 | 23 | 28 | | | | | | H |

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UU = Unconsolidated Undrained
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CU = Consolidated Undrained
DS = Direct Shear
Φ = Fri Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{css})(0.62)$

H = Hydrometer
S = Sieve
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# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 4 **Elevation (ft)** **Station** "X" 150+50, 29' Rt. **Date** 02/04/2009

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| Q1 | 53.0 - 53.5 | CMS | 23 | CL | 29.7 | 84.9 | 96.2 | 49 | 22 | 27 | | | | | | G = 2.746, OC |
| Q2 | 53.5 - 54.0 | CMS | | CL | 28.5 | 91.7 | 80.2 | 43 | 18 | 25 | DS | 27 | 4.75 | 25 | 3.57 | |
| R | 58.0 - 59.0 | SPT | 22 | SC | 12.2 | | 23.4 | 45 | 17 | 28 | | | | | | |
| BULK 1 | 4.0 - 9.0 | | | GM | | | 18.3 | 19 | 17 | 2 | | | | | | Ch, RV = 67 |
| BULK 2 | 9.0 - 14.0 | | | SM | | | 18.0 | 16 | NP | NP | | | | | | Ch, RV = 69 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
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RC = Rock Core
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UU = Unconsolidated Undrained
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CU = Consolidated Undrained
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Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT $N = (N_{cs})(0.62)$

H = Hydrometer
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G = Specific Gravity
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RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 5 **Elevation (ft)** **Station** "X" 149+00, 28' Lt. **Date** 02/04/2009

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| A | 1.0 - 2.5 | SPT | 17 | SM | 8.4 | | 14.6 | 21 | NP | NP | | | | | | |
| B1 | 3.5 - 4.2 | SPT | 11 | SM | 11.0 | | 20.7 | 20 | NP | NP | | | | | | |
| B2 | 4.2 - 5.0 | SPT | | SM | 31.5 | | 49.8 | 34 | 25 | 9 | | | | | | |
| C | 5.5 - 5.5 | CMS | R | SM | 15.3 | 97.6 | 21.7 | 29 | 26 | 3 | | | | | | |
| D | 6.5 - 8.0 | SPT | 11 | ML | 14.6 | | 59.0 | 18 | NP | NP | | | | | | Ch |
| E | 9.0 - 10.5 | SPT | 25 | SM | 6.6 | | 19.4 | 18 | NP | NP | | | | | | |
| F | 12.0 - 13.5 | SPT | 42 | SM | 4.1 | | 13.2 | 17 | NP | NP | | | | | | |
| G | 15.0 - 16.5 | SPT | 55 | SM | 5.0 | | 15.5 | 17 | NP | NP | | | | | | |
| H | 18.0 - 19.5 | SPT | 39 | GM | 4.6 | | 14.9 | 20 | 18 | 2 | | | | | | |
| I | 21.0 - 22.5 | SPT | 25 | SC-SM | 5.4 | | 14.9 | 21 | 17 | 4 | | | | | | |
| J | 25.0 - 25.9 | SPT | R | SC-SM | 4.6 | | 24.5 | 21 | 16 | 5 | | | | | | |
| K | 30.0 - 31.5 | SPT | 14 | SC | 17.9 | | 39.5 | 36 | 29 | 7 | | | | | | |

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UU = Unconsolidated Undrained
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CU = Consolidated Undrained
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Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{cs})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
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# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #**

**Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 5 **Elevation (ft)** **Station** "X" 149+00, 28' Lt. **Date** 02/04/2009

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| L | 35.0 - 36.5 | SPT | 20 | CL | 30.4 | | 95.7 | 39 | 23 | 16 | | | | | | |
| M1 | 40.0 - 40.5 | CMS | 27 | SC | 23.3 | 92.6 | 49.6 | 41 | 19 | 22 | | | | | | |
| M2 | 40.5 - 41.0 | CMS | | SC | 23.7 | 93.8 | 45.0 | 40 | 18 | 22 | | | | | | |
| M3 | 41.0 - 41.5 | CMS | | SC | 21.5 | 102.2 | 39.6 | 39 | 18 | 21 | | | | | | |
| N | 45.0 - 16.5 | SPT | 40 | GC | 12.3 | | 22.3 | 37 | 18 | 19 | | | | | | |
| O1 | 50.0 - 50.5 | CMS | 49 | SC | 15.5 | | 43.6 | 41 | 19 | 22 | | | | | | |
| O2 | 50.5 - 51.0 | CMS | | SC | 13.1 | 106.2 | 28.7 | 55 | 20 | 35 | | | | | | |
| O3 | 51.0 - 51.5 | CMS | | SC | 16.2 | 104.3 | 29.3 | 55 | 20 | 35 | | | | | | |
| P | 55.0 - 56.5 | SPT | 22 | CL | 21.8 | | 69.3 | 38 | 19 | 19 | | | | | | |
| Q1 | 60.0 - 60.5 | CMS | 53 | SC | 15.9 | | 48.4 | 39 | 17 | 22 | | | | | | |
| Q2 | 60.5 - 61.0 | CMS | | GC | 10.0 | | 17.3 | 48 | 18 | 30 | | | | | | |
| | | | | | | | | | | | | | | | | |

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N = Field SPT N = $(N_{css})(0.62)$

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RQD = Rock Quality Designation
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*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** **Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 5 **Elevation (ft)** **Station** "X" 149+00, 28' Lt. **Date** 02/04/2009

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. | C psi | Φ deg. | C psi | |
| | | | | | | | | | | | | Peak | | Residual | | |
| BULK 1 | 4.0 - 9.0 | | | SC-SM | | | 35.6 | 22 | 18 | 4 | | | | | | Ch, RV = 43 |
| BULK 2 | 9.0 - 14.0 | | | SM | | | 21.1 | 19 | 17 | 2 | | | | | | Ch, RV = 69 |
| | | | | | | | | | | | | | | | | |
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CMS = California Modified Sampler 2.42" ID
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UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

N = Field SPT N = $(N_{CSS})(0.62)$

H = Hydrometer
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OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
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*** = Average of subsamples**

# SUMMARY OF RESULTS
# N.D.O.T. GEOTECHNICAL SECTION

**EA/Cont #** **Job Description** US 93 Wildlife Crossing Bridge

**Boring No.** WLC 6 **Elevation (ft)** **Station** "X" 149+22, 22' Lt. **Date** 02/04/2009

| SAMPLE NO. | SAMPLE DEPTH (ft) | SAMP-LER TYPE | N BLOWS per ft. | SOIL GROUP | W% | DRY UW pcf | % PASS #200 | LL % | PL % | PI % | STRENGTH TEST | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | TEST TYPE | Φ deg. (Peak) | C psi (Peak) | Φ deg. (Residual) | C psi (Residual) | |
| A | 1.0 - 2.5 | SPT | 5 | SC | 26.4 | | 46.1 | 28 | 20 | 8 | | | | | | |
| B1 | 3.0 - 3.5 | CMS | 12 | SM | 30.4 | | 41.3 | 32 | NP | NP | | | | | | |
| B2 | 3.5 - 4.0 | CMS | | SM | 40.1 | 76.9 | 36.1 | 33 | NP | NP | | | | | | |
| B3 | 4.0 - 4.5 | CMS | | ML | 34.6 | 79.6 | 54.9 | 34 | NP | NP | | | | | | Ch |
| C | 4.5 - 6.0 | SPT | 21 | GM | 12.8 | | 20.5 | 25 | NP | NP | | | | | | Ch |
| D | 7.0 - 8.5 | SPT | 13 | SC-SM | 15.4 | | 48.5 | 24 | 19 | 5 | | | | | | |
| E | 9.5 - 11.0 | SPT | 28 | SM | 7.7 | | 24.6 | 20 | NP | NP | | | | | | |
| F | 12.0 - 13.5 | SPT | 24 | SM | 6.7 | | 19.4 | 19 | 18 | 1 | | | | | | |
| G | 15.0 - 16.5 | SPT | 27 | SM | 5.6 | | 14.5 | 17 | NP | NP | | | | | | |
| H | 18.0 - 19.5 | SPT | 23 | GM | 6.0 | | 13.2 | 20 | NP | NP | | | | | | |
| BULK 1 | 4.0 - 9.0 | | | SC-SM | | | 39.7 | 28 | 21 | 7 | | | | | | Ch, RV = 41 |
| BULK 2 | 9.0 - 14.0 | | | GC-GM | | | 19.0 | 24 | 18 | 6 | | | | | | Ch, RV = 67 |

CMS = California Modified Sampler 2.42" ID
SPT = Standard Penetration 1.38" ID
CS = Continuous Sample 3.23" ID
RC = Rock Core
PB = Pitcher Barrel
CSS = Calif. Split Spoon 2.42" ID
CPT = Cone Penetration Test
TP = Test Pit
P = Pushed, not driven
R = Refusal
Sh = Shelby Tube 2.87" ID

U = Unconfined Compressive
UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
Φ = Friction
C = Cohesion
N = No. of blows per ft., sampler

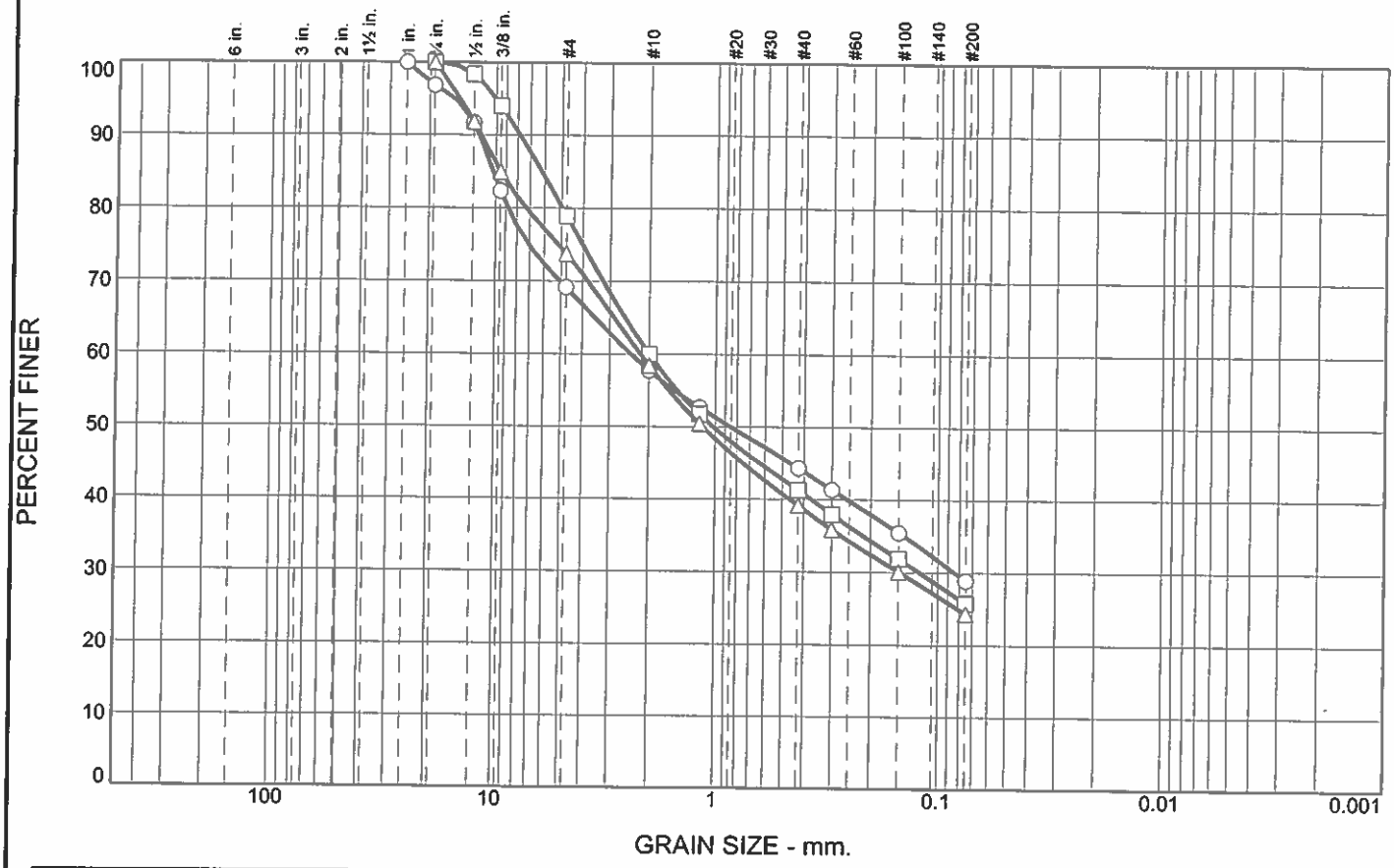
N = Field SPT $N = (N_{cs})(0.62)$

H = Hydrometer
S = Sieve
G = Specific Gravity
PI = Plasticity Index
LL = Liquid Limit
PL = Plastic Limit
NP = Non-Plastic
OC = Consolidation
Ch = Chemical
RV = R - Value
MD = Moisture Density

CM = Compaction
E = Swell/Pressure on Expansive Soils
SL = Shrinkage Limit
UW= Unit Weight
W = Moisture Content
K = Permeability
O = Organic Content
D = Dispersive
RQD = Rock Quality Designation
X = X-Ray Defraction
HCpot = Hydro-Collapse Potential

*** = Average of subsamples**

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 30.8 | 40.3 | 28.9 | | | | | |
| □ | 0.0 | 21.1 | 53.1 | 25.8 | | | | | |
| △ | 0.0 | 26.2 | 49.4 | 24.4 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | | |
| 3/4" | 96.8 | 100.0 | 100.0 |
| 1/2" | 91.7 | 98.4 | 91.8 |
| 3/8" | 82.4 | 94.0 | 85.0 |
| **GRAIN SIZE** | | | |
| $D_{60}$ | 2.4118 | 1.9966 | 2.1838 |
| $D_{30}$ | 0.0837 | 0.1204 | 0.1477 |
| $D_{10}$ | | | |
| **COEFFICIENTS** | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 69.2 | 78.9 | 73.8 |
| #10 | 57.7 | 60.0 | 58.5 |
| #16 | 52.7 | 51.8 | 50.4 |
| #40 | 44.3 | 41.3 | 39.2 |
| #50 | 41.3 | 38.0 | 35.9 |
| #100 | 35.5 | 31.9 | 30.1 |
| #200 | 28.9 | 25.8 | 24.4 |

Material Description
○ SIEVE ONLY
□ SIEVE ONLY
△ SIEVE ONLY

REMARKS:
○
□
△

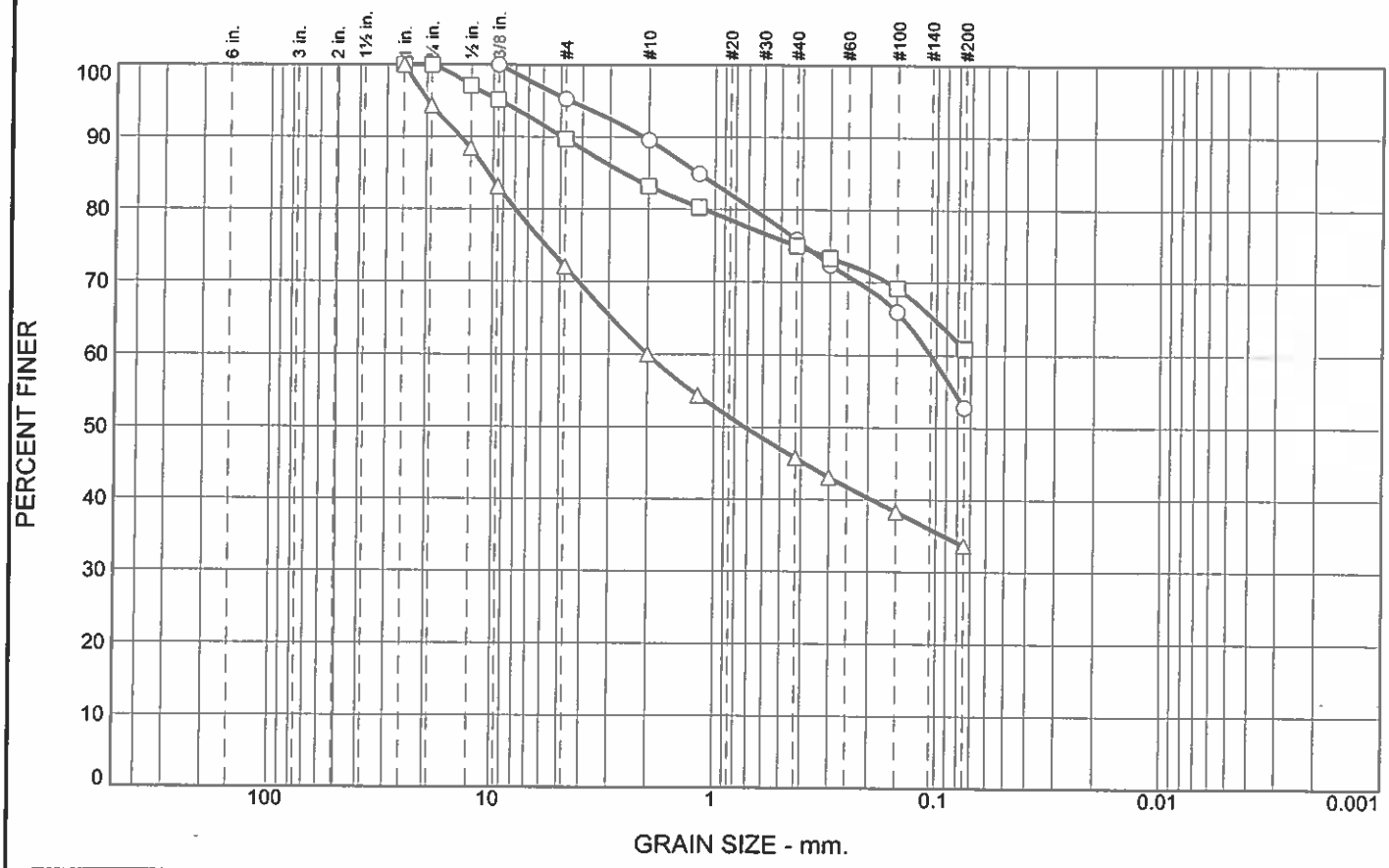
○ Source of Sample: WLC-1 Depth: 1'-2.5' Sample Number: A
□ Source of Sample: WLC-1 Depth: 3.5'-4.5' Sample Number: B1
△ Source of Sample: WLC-1 Depth: 4.5'-5' Sample Number: B2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 4.7 | 42.5 | 52.8 | | | | | |
| □ | 0.0 | 10.3 | 28.8 | 60.9 | | | | | |
| △ | 0.0 | 27.9 | 38.5 | 33.6 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | 100.0 | 100.0 |
| 3/4" | | 100.0 | 94.3 |
| 1/2" | | 97.1 | 88.5 |
| 3/8" | 100.0 | 95.1 | 83.2 |
| GRAIN SIZE | | | |
| $D_{60}$ | 0.1057 | | 1.9965 |
| $D_{30}$ | | | |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_C$ | | | |
| $C_U$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 95.3 | 89.7 | 72.1 |
| #10 | 89.6 | 83.2 | 60.0 |
| #16 | 84.9 | 80.3 | 54.4 |
| #40 | 75.8 | 75.0 | 45.8 |
| #50 | 72.4 | 73.4 | 43.1 |
| #100 | 65.9 | 69.2 | 38.3 |
| #200 | 52.8 | 60.9 | 33.6 |

Material Description
○ SIEVE ONLY
□ SIEVE ONLY
△ SIEVE ONLY

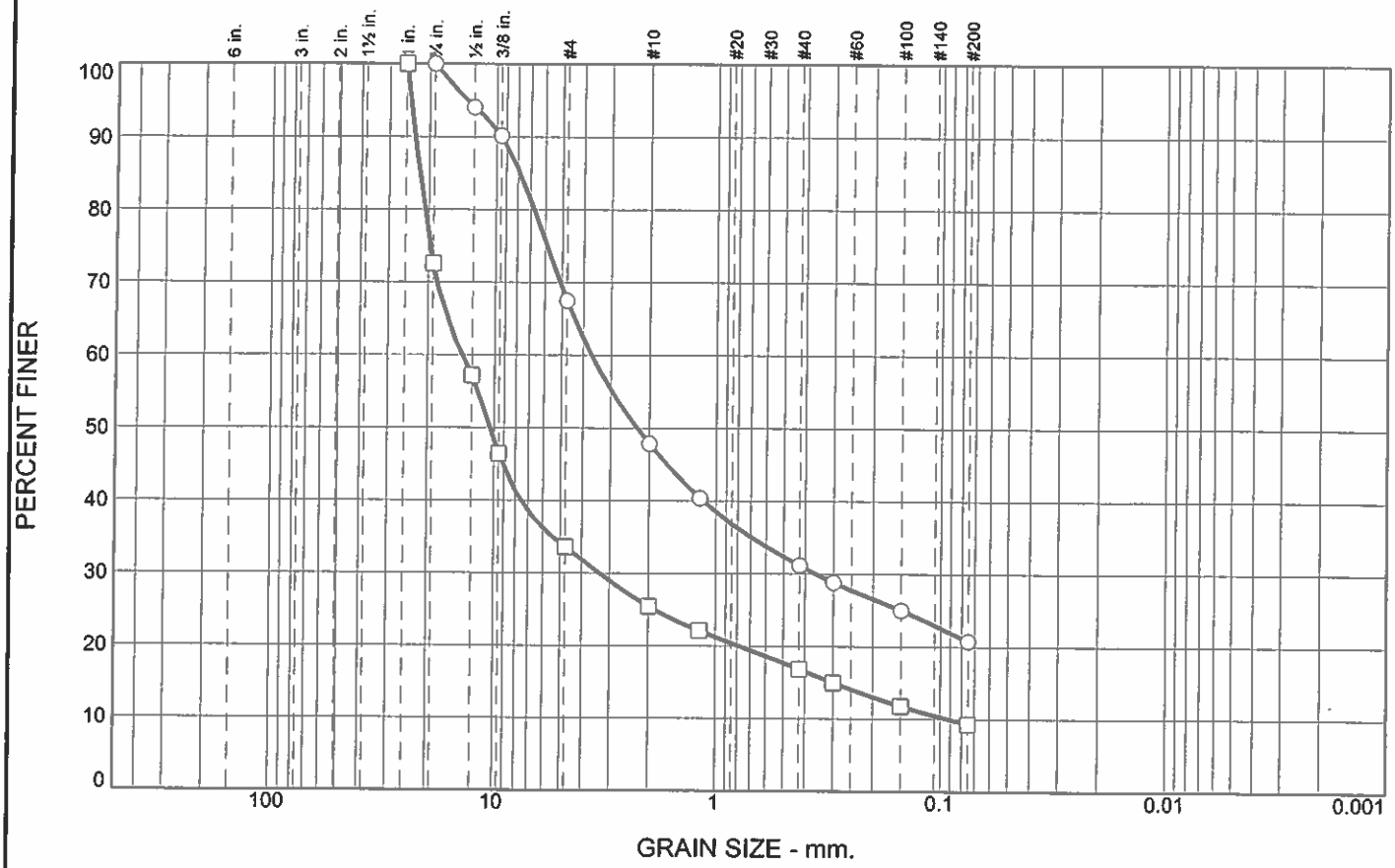
REMARKS:
○
□
△

○ Source of Sample: WLC-1 Depth: 6'-6.8' Sample Number: C1
□ Source of Sample: WLC-1 Depth: 6.8'-7.5' Sample Number: C2
△ Source of Sample: WLC-1 Depth: 8.5'-10' Sample Number: D

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 32.5 | 46.7 | 20.8 | | | | | |
| □ | 0.0 | 66.3 | 24.4 | 9.3 | | | | | |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ |
|---|---|---|
| 1" | | 100.0 |
| 3/4" | 100.0 | 72.6 |
| 1/2" | 94.1 | 57.2 |
| 3/8" | 90.2 | 46.5 |
| | GRAIN SIZE | |
| $D_{60}$ | 3.6744 | 14.0153 |
| $D_{30}$ | 0.3581 | 3.3129 |
| $D_{10}$ | | 0.0916 |
| | COEFFICIENTS | |
| $C_c$ | | 8.55 |
| $C_u$ | | 152.96 |

| SIEVE number size | PERCENT FINER ○ | □ |
|---|---|---|
| #4 | 67.5 | 33.7 |
| #10 | 47.9 | 25.5 |
| #16 | 40.4 | 22.1 |
| #40 | 31.2 | 16.9 |
| #50 | 28.8 | 15.0 |
| #100 | 25.0 | 11.8 |
| #200 | 20.8 | 9.3 |

Material Description
○ SIEVE ONLY
□ SIEVE ONLY

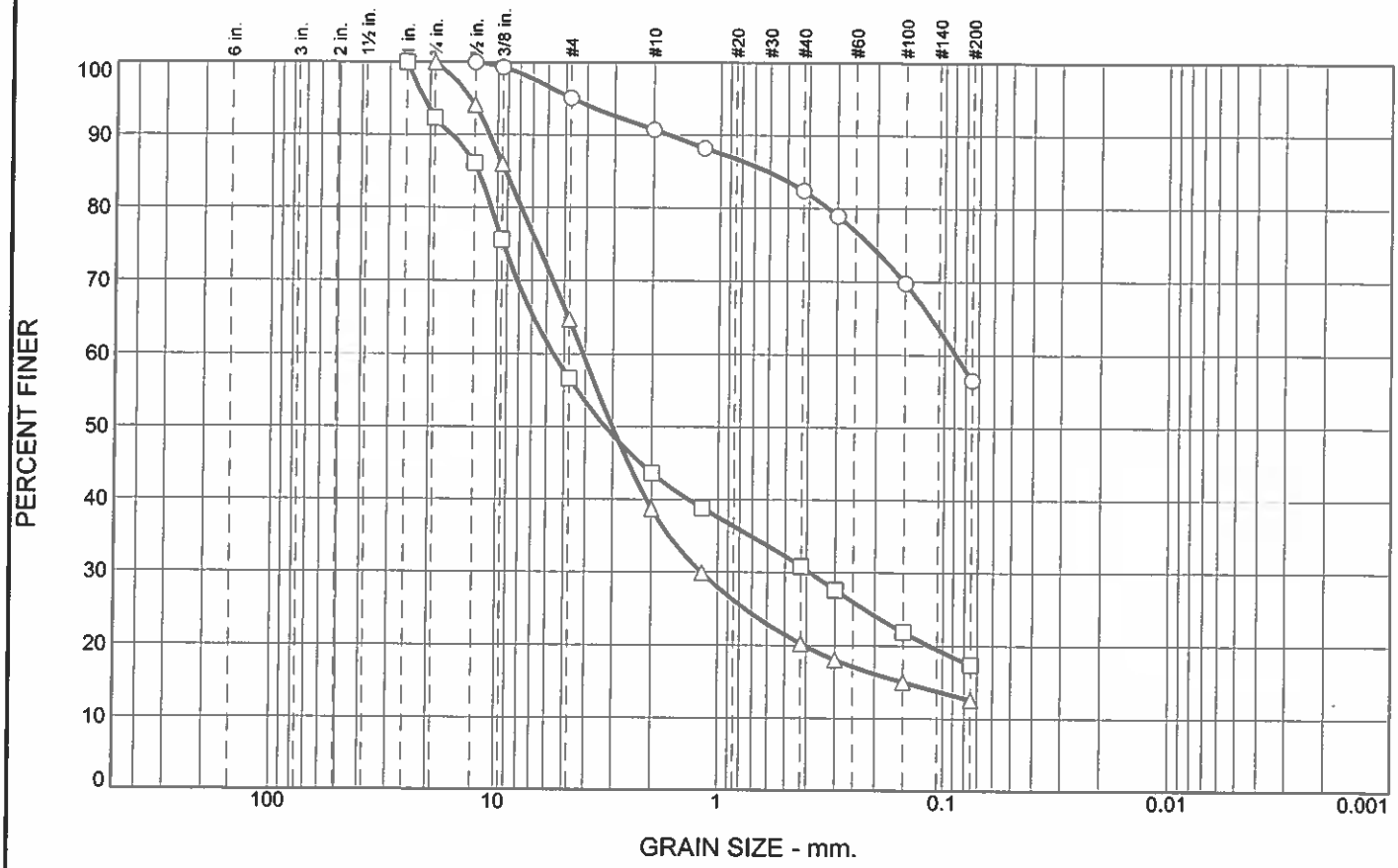
REMARKS:
○
□

○ Source of Sample: WLC-1 Depth: 11'-12.5' Sample Number: E
□ Source of Sample: WLC-1 Depth: 13.5'-15' Sample Number: F

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 4.9 | 38.6 | 56.5 | | | | | |
| □ | 0.0 | 43.3 | 39.3 | 17.4 | | | | | |
| △ | 0.0 | 35.3 | 52.1 | 12.6 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | 100.0 | |
| 3/4" | | 92.3 | 100.0 |
| 1/2" | 100.0 | 86.1 | 94.1 |
| 3/8" | 99.3 | 75.6 | 85.9 |
| | GRAIN SIZE | | |
| $D_{60}$ | 0.0889 | 5.5782 | 4.1077 |
| $D_{30}$ | | 0.3879 | 1.1866 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 95.1 | 56.7 | 64.7 |
| #10 | 90.7 | 43.7 | 38.7 |
| #16 | 88.2 | 38.8 | 29.9 |
| #40 | 82.4 | 30.8 | 20.3 |
| #50 | 78.9 | 27.6 | 18.0 |
| #100 | 69.8 | 21.9 | 15.0 |
| #200 | 56.5 | 17.4 | 12.6 |

Material Description
○ SIEVE ONLY
□ SIEVE ONLY
△ SIEVE ONLY

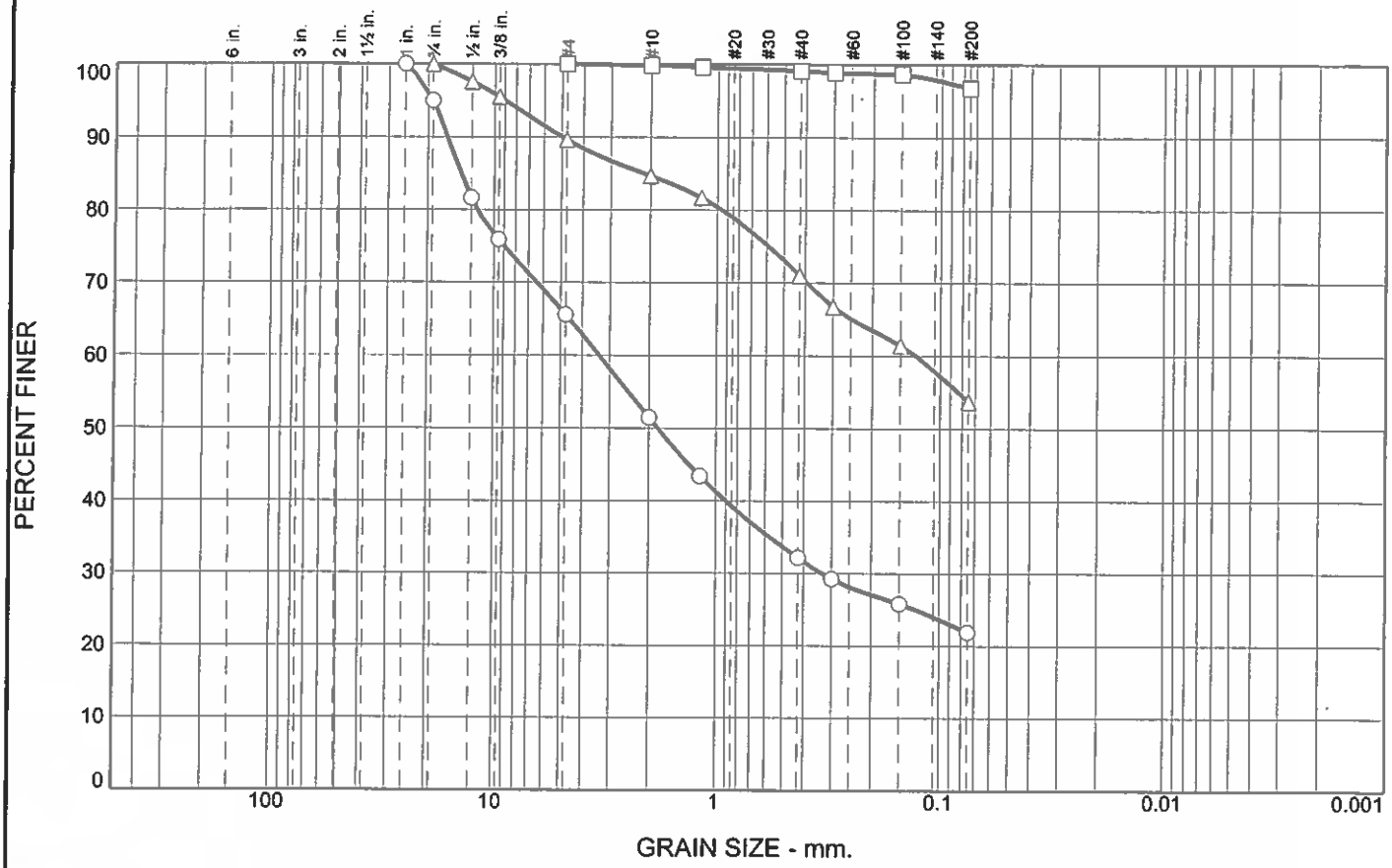
REMARKS:
○
□
△

○ Source of Sample: WLC-1 Depth: 16'-16.6' Sample Number: G1
□ Source of Sample: WLC-1 Depth: 16.6'-17.5' Sample Number: G2
△ Source of Sample: WLC-1 Depth: 18.5'-20' Sample Number: H

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 34.4 | 43.7 | 21.9 | | SC | A-2-6(1) | 19 | 38 |
| □ | 0.0 | 0.0 | 3.2 | 96.8 | | CH | A-7-6(35) | 27 | 58 |
| △ | 0.0 | 10.4 | 35.9 | 53.7 | | CL | A-7-6(6) | 25 | 41 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | | |
| 3/4" | 95.0 | | 100.0 |
| 1/2" | 81.7 | | 97.6 |
| 3/8" | 75.9 | | 95.5 |
| | GRAIN SIZE | | |
| $D_{60}$ | 3.3441 | | 0.1284 |
| $D_{30}$ | 0.3304 | | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_U$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 65.6 | 100.0 | 89.6 |
| #10 | 51.5 | 99.8 | 84.7 |
| #16 | 43.5 | 99.6 | 81.7 |
| #40 | 32.2 | 99.1 | 71.0 |
| #50 | 29.3 | 98.9 | 66.7 |
| #100 | 25.9 | 98.7 | 61.4 |
| #200 | 21.9 | 96.8 | 53.7 |

Material Description
○ clayey sand with gravel
□ fat clay
△ sandy lean clay

REMARKS:
○
□
△

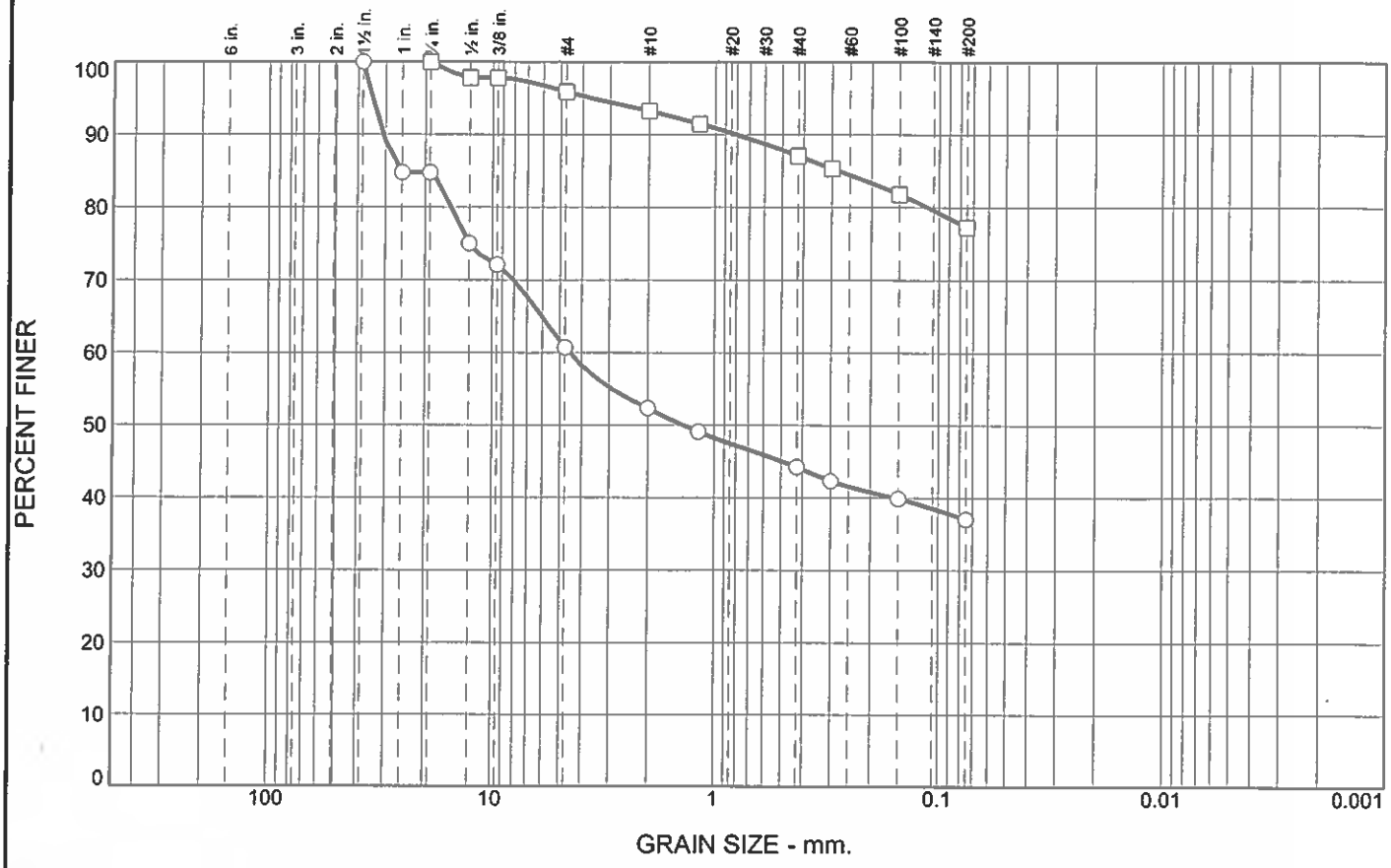
○ Source of Sample: WLC-1 Depth: 34'-35.5' Sample Number: K
□ Source of Sample: WLC-1 Depth: 39'-40.5' Sample Number: L
△ Source of Sample: WLC-1 Depth: 44'-45.5' Sample Number: M

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 39.3 | 23.6 | 37.1 | | GC | A-7-6(5) | 23 | 54 |
| □ | 0.0 | 4.2 | 18.5 | 77.3 | | CH | A-7-6(24) | 22 | 53 |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | |
|---|---|---|---|
| 1 1/2" | 100.0 | | |
| 1" | 84.8 | | |
| 3/4" | 84.8 | 100.0 | |
| 1/2" | 75.1 | 97.8 | |
| 3/8" | 72.1 | 97.8 | |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.5349 | | |
| $D_{30}$ | | | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | |
|---|---|---|---|
| #4 | 60.7 | 95.8 | |
| #10 | 52.3 | 93.2 | |
| #16 | 49.1 | 91.4 | |
| #40 | 44.2 | 87.1 | |
| #50 | 42.3 | 85.3 | |
| #100 | 39.9 | 81.8 | |
| #200 | 37.1 | 77.3 | |

Material Description

○ clayey gravel with sand

□ fat clay with sand

REMARKS:

○

□

○ Source of Sample: WLC-1 Depth: 49'-49.5' Sample Number: N

□ Source of Sample: WLC-1 Depth: 52' Sample Number: O

**NEVADA DEPARTMENT OF TRANSPORTATION**

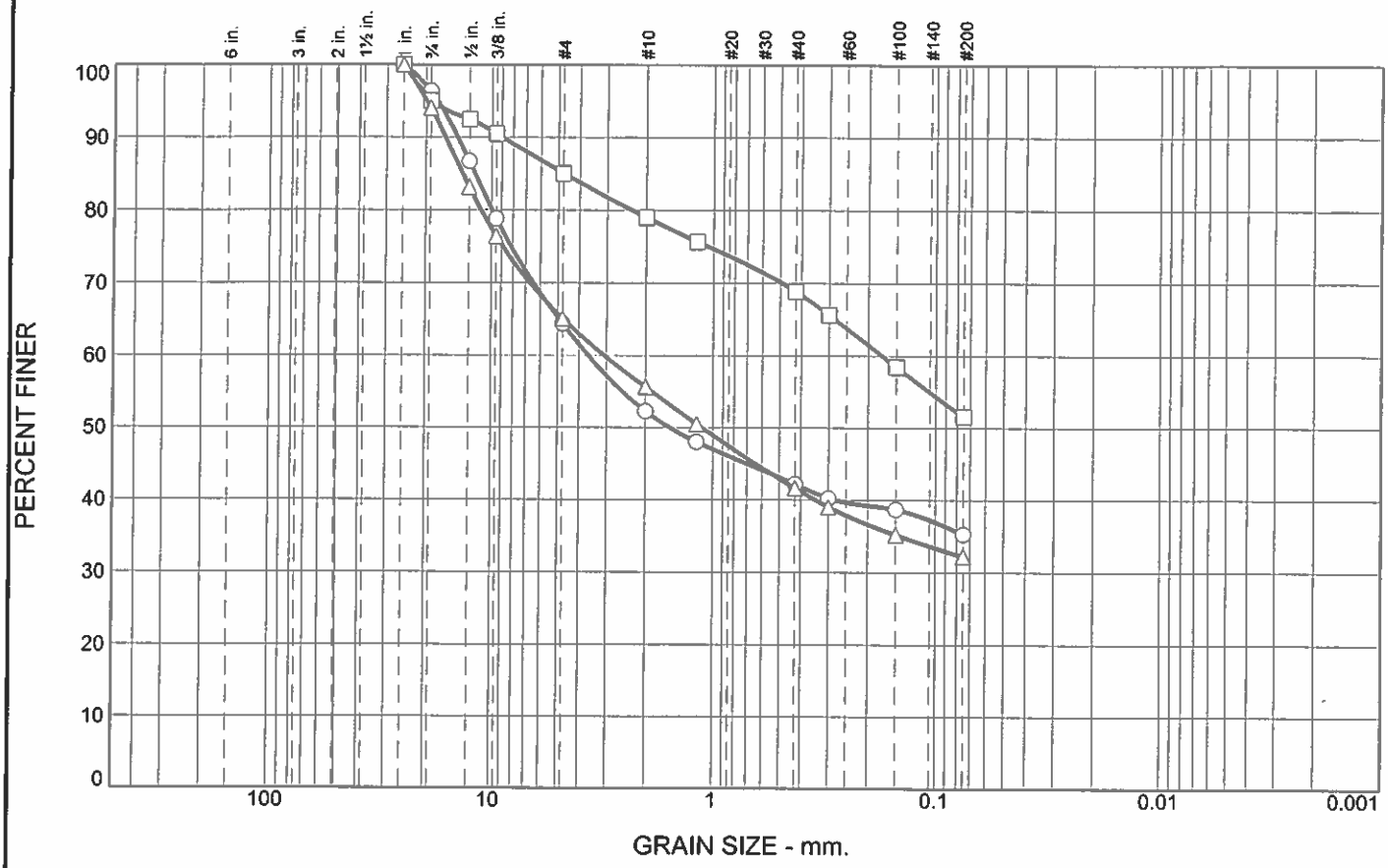
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 35.6 | 29.1 | 35.3 | | GC | A-2-7(6) | 21 | 59 |
| □ | 0.0 | 14.9 | 33.5 | 51.6 | | CH | A-7-6(11) | 22 | 50 |
| △ | 0.0 | 34.9 | 32.8 | 32.3 | | GC | A-2-7(5) | 22 | 59 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | 100.0 | 100.0 |
| 3/4" | 96.4 | 95.0 | 94.0 |
| 1/2" | 86.7 | 92.5 | 83.2 |
| 3/8" | 78.9 | 90.5 | 76.5 |
| | GRAIN SIZE | | |
| $D_{60}$ | 3.6322 | 0.1739 | 3.0711 |
| $D_{30}$ | | | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_U$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 64.4 | 85.1 | 65.1 |
| #10 | 52.3 | 79.0 | 55.6 |
| #16 | 48.0 | 75.7 | 50.5 |
| #40 | 42.2 | 68.9 | 41.6 |
| #50 | 40.3 | 65.6 | 39.1 |
| #100 | 38.7 | 58.5 | 35.2 |
| #200 | 35.3 | 51.6 | 32.3 |

Material Description

○ clayey gravel with sand

□ sandy fat clay

△ clayey gravel with sand

REMARKS:

○

□

△

○ Source of Sample: WLC-1 Depth: 54.5'-55' Sample Number: P1

□ Source of Sample: WLC-1 Depth: 55'-55.5' Sample Number: P2

△ Source of Sample: WLC-1 Depth: 59'-60.5' Sample Number: Q

**NEVADA DEPARTMENT OF TRANSPORTATION**

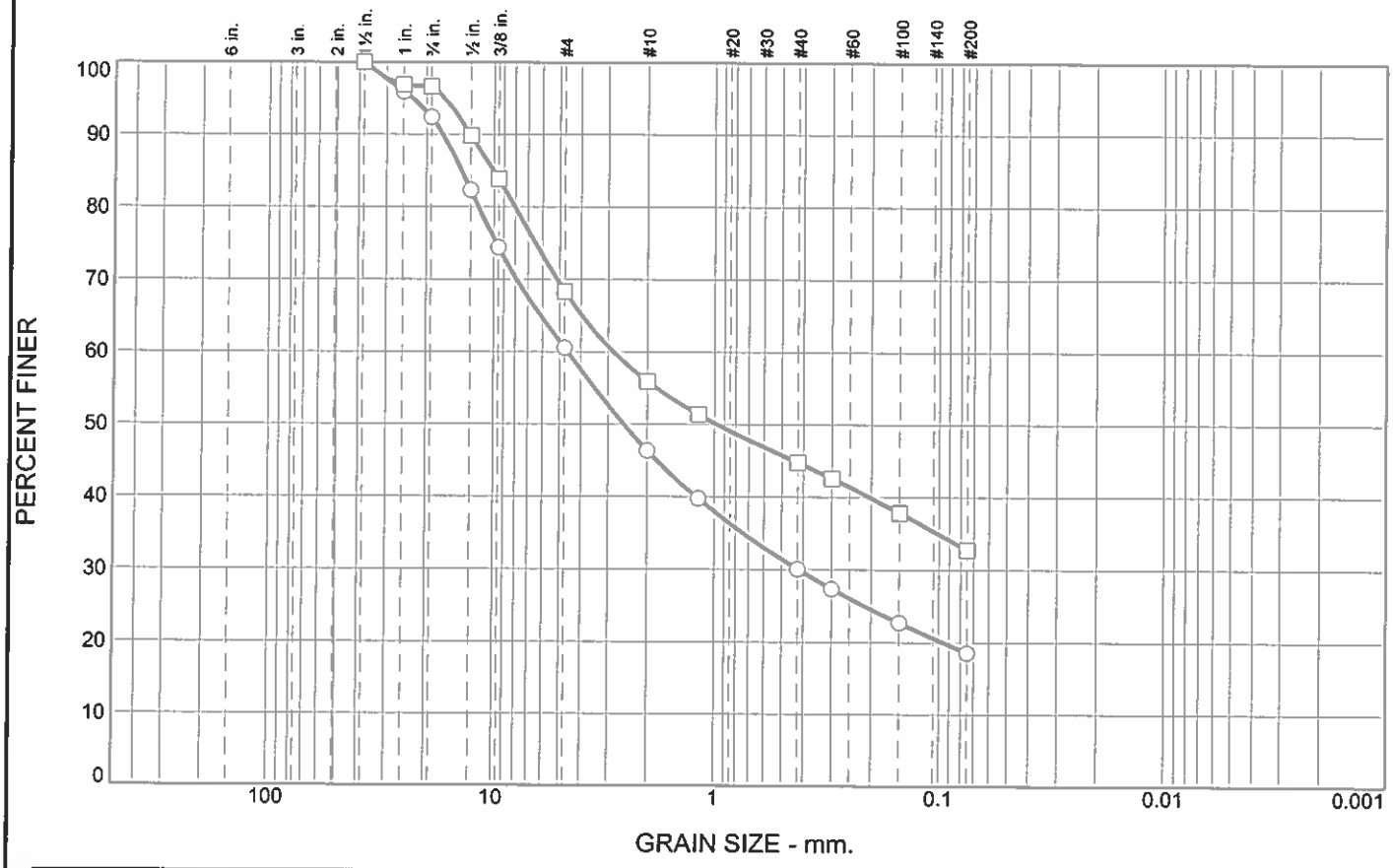
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 39.5 | 41.9 | 18.6 | | SC-SM | A-1-b | 19 | 23 |
| □ | 0.0 | 31.7 | 35.5 | 32.8 | | SC-SM | A-2-4(0) | 19 | 24 |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| 1-1/2" | 100.0 | 100.0 |
| 1" | 95.9 | 96.9 |
| 3/4" | 92.4 | 96.6 |
| 1/2" | 82.3 | 89.8 |
| 3/8" | 74.4 | 83.8 |
| GRAIN SIZE | | |
| $D_{60}$ | 4.6026 | 2.8431 |
| $D_{30}$ | 0.4187 | |
| $D_{10}$ | | |
| COEFFICIENTS | | |
| $C_C$ | | |
| $C_u$ | | |

| SIEVE number size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| #4 | 60.5 | 68.3 |
| #10 | 46.3 | 56.0 |
| #16 | 39.8 | 51.4 |
| #40 | 30.1 | 44.8 |
| #50 | 27.4 | 42.6 |
| #100 | 22.7 | 37.9 |
| #200 | 18.6 | 32.8 |

Material Description

○ silty, clayey sand with gravel

□ silty, clayey sand with gravel

REMARKS:

○

□

○ Source of Sample: WLC-1 Sample Number: BULK 1

□ Source of Sample: WLC-1 Sample Number: BULK 2

**NEVADA DEPARTMENT OF TRANSPORTATION**

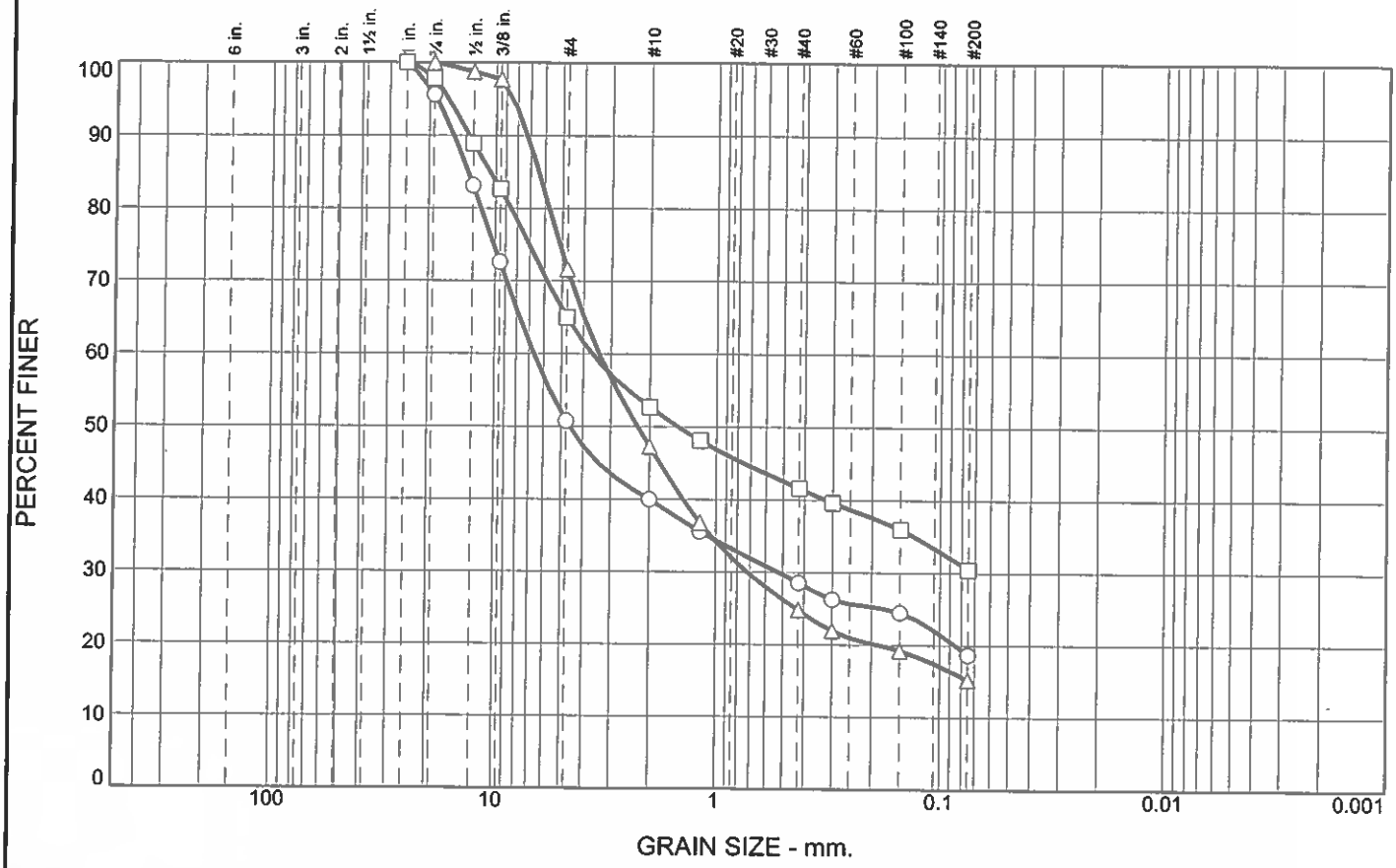
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 49.2 | 32.1 | 18.7 | | | | | |
| □ | 0.0 | 35.0 | 34.5 | 30.5 | | | | | |
| △ | 0.0 | 28.4 | 56.4 | 15.2 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | 100.0 | |
| 3/4" | 95.6 | 97.8 | 100.0 |
| 1/2" | 83.1 | 88.9 | 98.7 |
| 3/8" | 72.6 | 82.7 | 97.7 |
| **GRAIN SIZE** | | | |
| $D_{60}$ | 6.6327 | 3.6504 | 3.3959 |
| $D_{30}$ | 0.5229 | | 0.7206 |
| $D_{10}$ | | | |
| **COEFFICIENTS** | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 50.8 | 65.0 | 71.6 |
| #10 | 40.0 | 52.7 | 47.3 |
| #16 | 35.6 | 48.1 | 36.9 |
| #40 | 28.6 | 41.6 | 24.8 |
| #50 | 26.3 | 39.6 | 21.9 |
| #100 | 24.5 | 36.0 | 19.2 |
| #200 | 18.7 | 30.5 | 15.2 |

Material Description
○ SIEVE ONLY
□ SIEVE ONLY
△ SIEVE ONLY

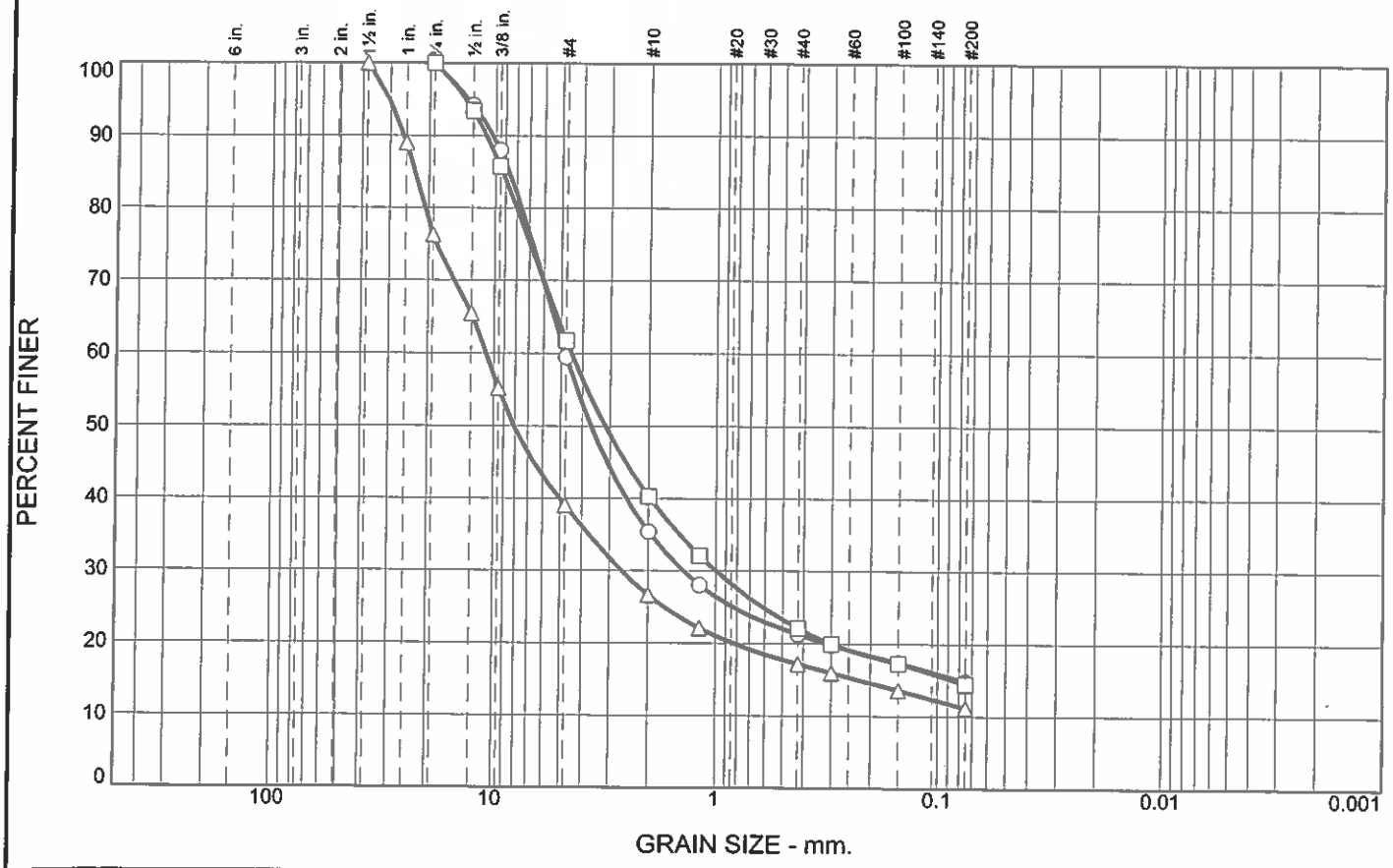
REMARKS:
○
□
△

○ Source of Sample: WLC-2 Depth: 1'-2.5' Sample Number: A
□ Source of Sample: WLC-2 Depth: 3.5'-5' Sample Number: B
△ Source of Sample: WLC-2 Depth: 6'-7.5' Sample Number: C

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 40.5 | 44.7 | 14.8 | | | | | |
| □ | 0.0 | 38.3 | 47.3 | 14.4 | | | | | |
| △ | 0.0 | 61.0 | 27.8 | 11.2 | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1 1/2" | | | 100.0 |
| 1" | | | 89.0 |
| 3/4" | 100.0 | 100.0 | 76.3 |
| 1/2" | 94.2 | 93.5 | 65.5 |
| 3/8" | 88.0 | 85.8 | 55.2 |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.8076 | 4.4998 | 10.8411 |
| $D_{30}$ | 1.3983 | 0.9973 | 2.6310 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_U$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 59.5 | 61.7 | 39.0 |
| #10 | 35.4 | 40.3 | 26.6 |
| #16 | 28.0 | 32.1 | 22.1 |
| #40 | 21.3 | 22.1 | 17.2 |
| #50 | 19.8 | 20.0 | 16.0 |
| #100 | 17.4 | 17.3 | 13.6 |
| #200 | 14.8 | 14.4 | 11.2 |

Material Description
○ SIEVE ONLY
□ SIEVE ONLY
△ SIEVE ONLY

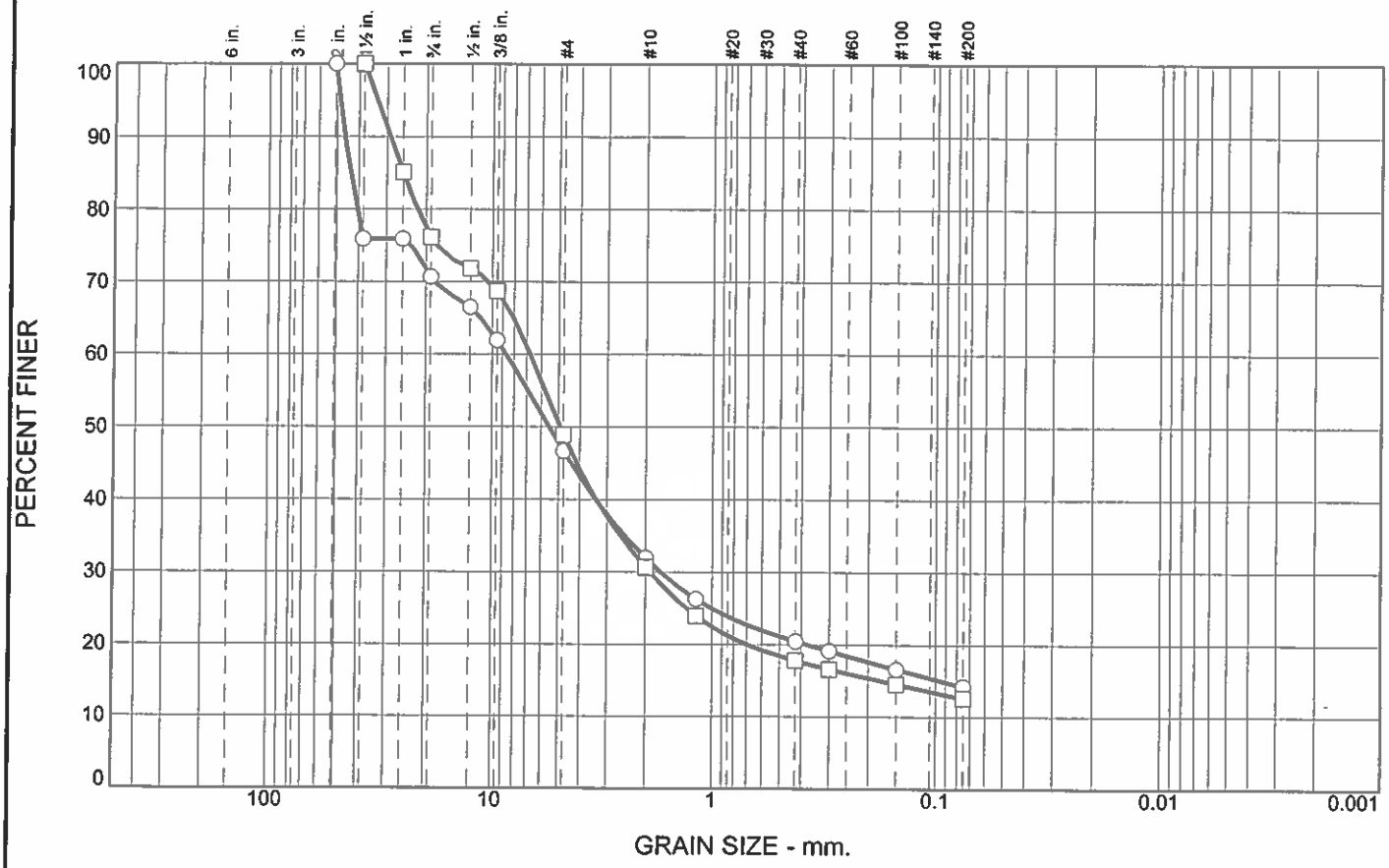
REMARKS:
○
□
△

○ Source of Sample: WLC-2 Depth: 8.5'-10' Sample Number: D
□ Source of Sample: WLC-2 Depth: 11'-12.5' Sample Number: E
△ Source of Sample: WLC-2 Depth: 13.5'-15' Sample Number: F

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 53.3 | 32.5 | 14.2 | | | | | |
| □ | 0.0 | 51.1 | 36.3 | 12.6 | | GC-GM | A-1-a | 17 | 22 |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| 2" | 100.0 | |
| 1 1/2" | 75.9 | 100.0 |
| 1" | 75.9 | 85.2 |
| 3/4" | 70.7 | 76.2 |
| 1/2" | 66.5 | 71.8 |
| 3/8" | 61.9 | 68.7 |
| | GRAIN SIZE | |
| $D_{60}$ | 8.6673 | 6.7564 |
| $D_{30}$ | 1.7004 | 1.9093 |
| $D_{10}$ | | |
| | COEFFICIENTS | |
| $C_c$ | | |
| $C_u$ | | |

| SIEVE number size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| #4 | 46.7 | 48.9 |
| #10 | 32.0 | 30.7 |
| #16 | 26.3 | 24.0 |
| #40 | 20.5 | 17.8 |
| #50 | 19.1 | 16.6 |
| #100 | 16.6 | 14.6 |
| #200 | 14.2 | 12.6 |

Material Description

○ SIEVE ONLY

□ silty clayey gravel with sand

REMARKS:

○

□

○ Source of Sample: WLC-2 Depth: 16'-17' Sample Number: G1

□ Source of Sample: WLC-2 Depth: 17'-17.5' Sample Number: G2

**NEVADA DEPARTMENT OF TRANSPORTATION**

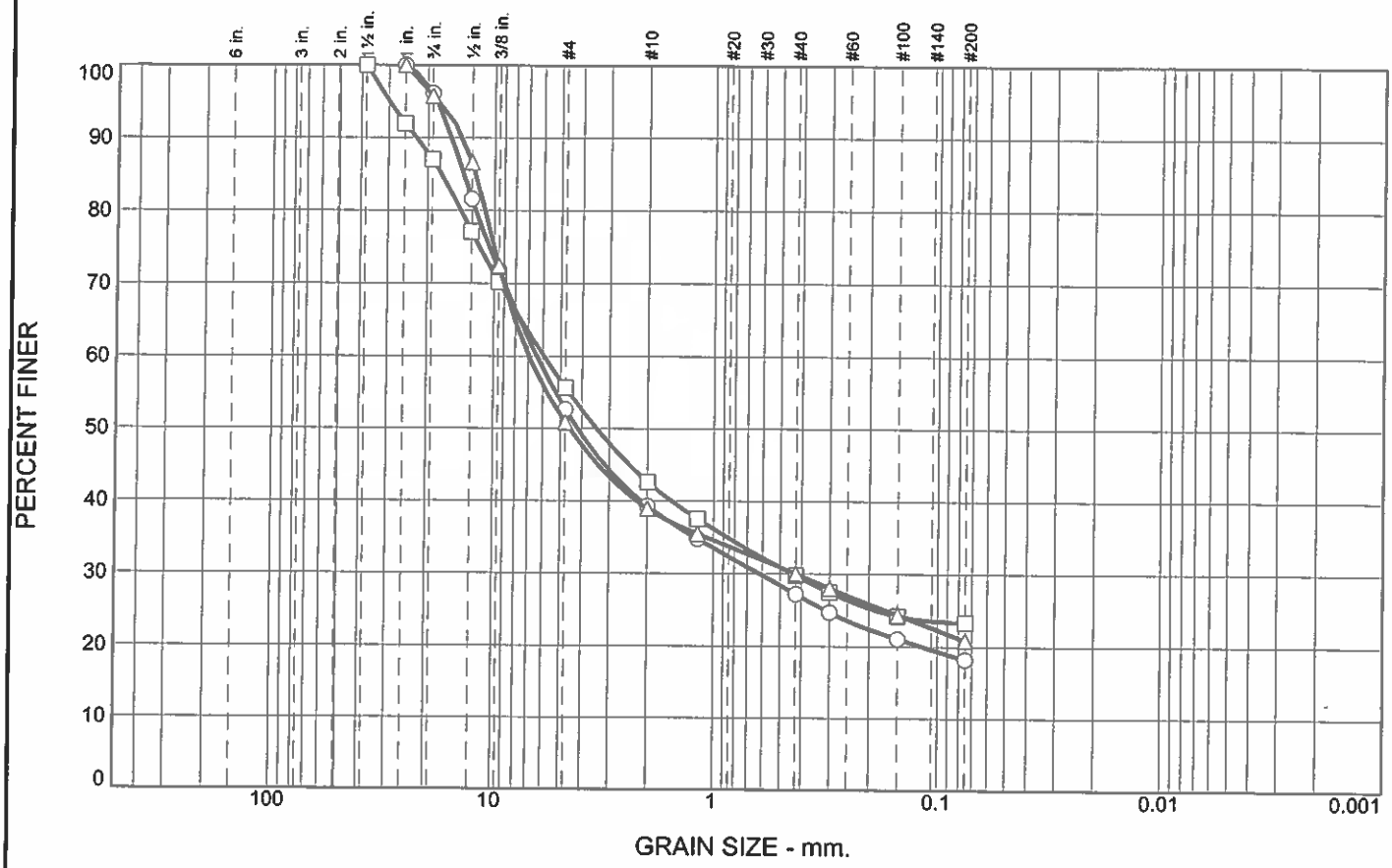
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 47.3 | 34.5 | 18.2 | | GM | A-1-b | 22 | 25 |
| □ | 0.0 | 44.3 | 32.3 | 23.4 | | GC | A-2-6(0) | 17 | 28 |
| △ | 0.0 | 49.1 | 30.0 | 20.9 | | GC | A-2-4(0) | 20 | 29 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1 1/2" | | 100.0 | |
| 1" | 100.0 | 91.9 | 100.0 |
| 3/4" | 96.1 | 87.0 | 95.8 |
| 1/2" | 81.6 | 77.1 | 86.6 |
| 3/8" | 71.8 | 70.2 | 72.4 |
| | GRAIN SIZE | | |
| $D_{60}$ | 6.3873 | 5.9423 | 6.9290 |
| $D_{30}$ | 0.6171 | 0.4387 | 0.4223 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_U$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 52.7 | 55.7 | 50.9 |
| #10 | 39.3 | 42.6 | 38.9 |
| #16 | 34.8 | 37.5 | 35.5 |
| #40 | 27.2 | 29.8 | 30.0 |
| #50 | 24.7 | 27.5 | 28.1 |
| #100 | 21.1 | 24.2 | 24.4 |
| #200 | 18.2 | 23.4 | 20.9 |

Material Description
○ silty gravel with sand
□ clayey gravel with sand
△ clayey gravel with sand

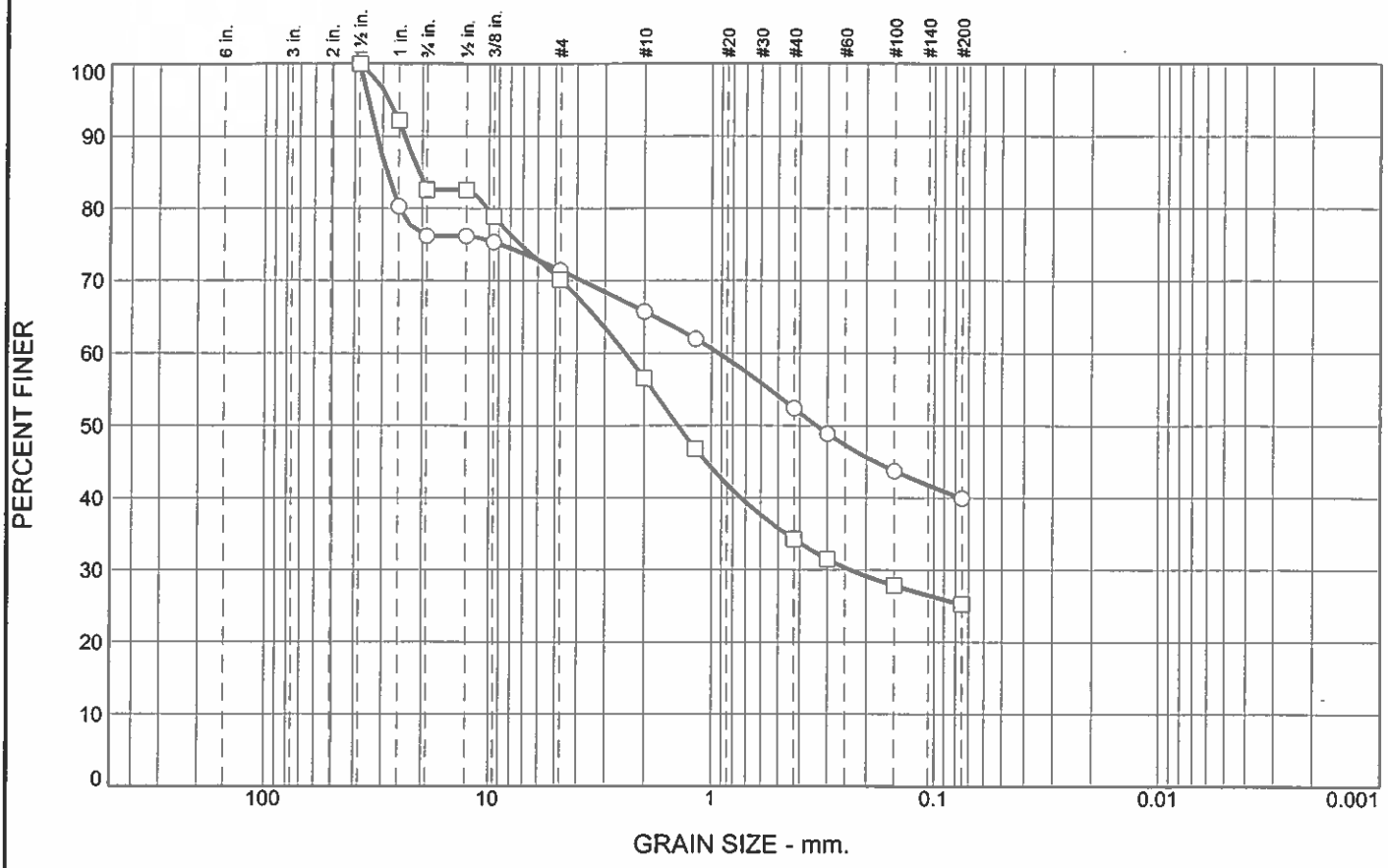
REMARKS:
○
□
△

○ Source of Sample: WLC-2 Depth: 24.5'-25' Sample Number: I1
□ Source of Sample: WLC-2 Depth: 25'-25.5' Sample Number: I2
△ Source of Sample: WLC-2 Depth: 25.5'-26' Sample Number: I3

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 28.6 | 31.4 | 40.0 | | SC | A-6(2) | 21 | 37 |
| □ | 0.0 | 29.9 | 44.9 | 25.2 | | SC | A-2-6(0) | 21 | 35 |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| 1 1/2" | 100.0 | 100.0 |
| 1" | 80.3 | 92.2 |
| 3/4" | 76.2 | 82.6 |
| 1/2" | 76.2 | 82.6 |
| 3/8" | 75.4 | 79.0 |
| **GRAIN SIZE** | | |
| $D_{60}$ | 0.9312 | 2.4257 |
| $D_{30}$ | | 0.2358 |
| $D_{10}$ | | |
| **COEFFICIENTS** | | |
| $C_c$ | | |
| $C_u$ | | |

| SIEVE number size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| #4 | 71.4 | 70.1 |
| #10 | 65.7 | 56.5 |
| #16 | 62.0 | 46.8 |
| #40 | 52.4 | 34.3 |
| #50 | 48.9 | 31.5 |
| #100 | 43.7 | 27.9 |
| #200 | 40.0 | 25.2 |

Material Description

○ clayey sand with gravel

□ clayey sand with gravel

REMARKS:

○

□

○ Source of Sample: WLC-2 Depth: 29.5'-30' Sample Number: J1

□ Source of Sample: WLC-2 Depth: 30'-30.5' Sample Number: J2

**NEVADA DEPARTMENT OF TRANSPORTATION**

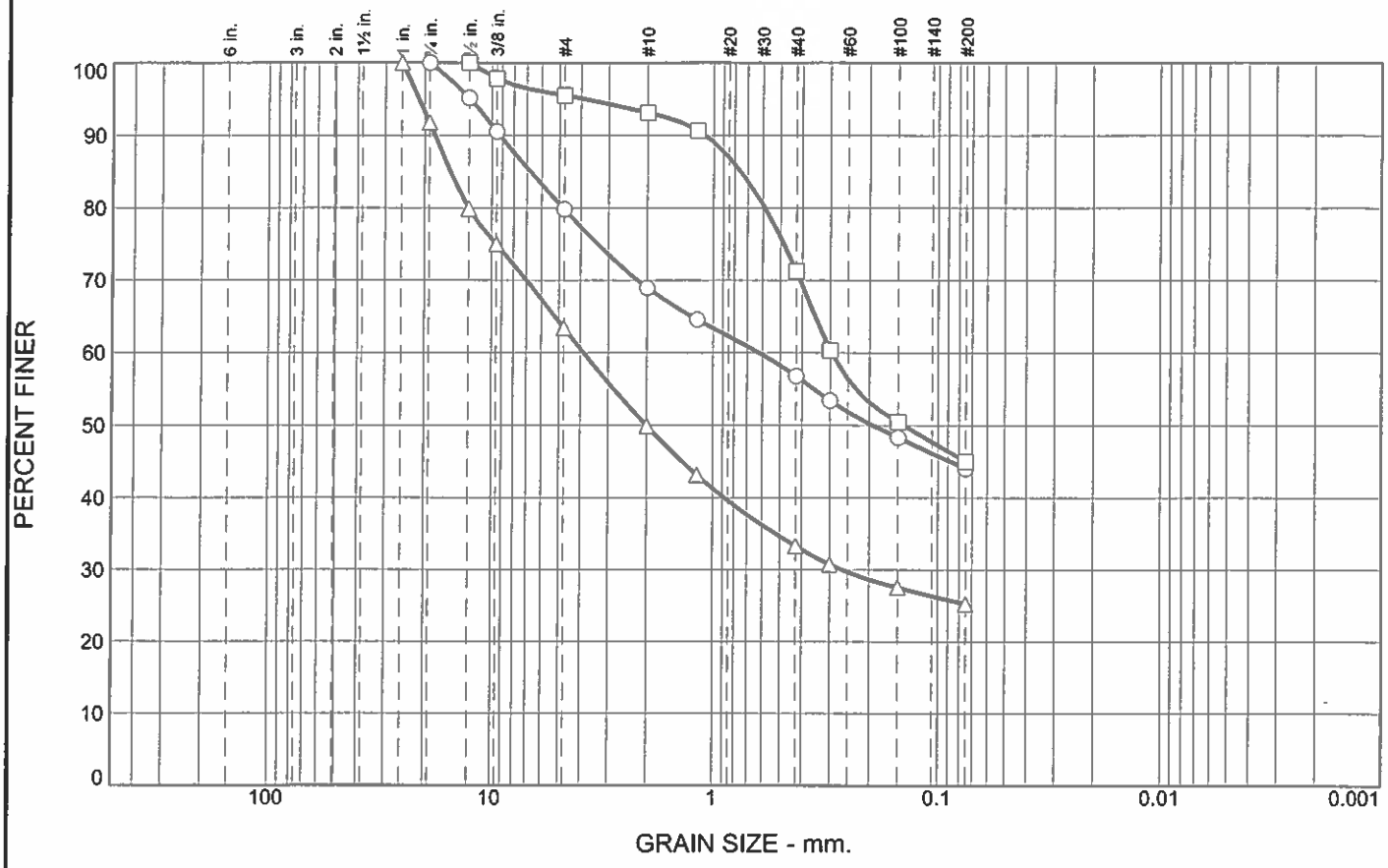
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 20.2 | 35.8 | 44.0 | | SC | A-6(4) | 17 | 36 |
| □ | 0.0 | 4.5 | 50.5 | 45.0 | | SC | A-6(2) | 19 | 32 |
| △ | 0.0 | 36.6 | 38.1 | 25.3 | | SC | A-2-6(1) | 20 | 39 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | | 100.0 |
| 3/4" | 100.0 | | 91.8 |
| 1/2" | 95.2 | 100.0 | 79.9 |
| 3/8" | 90.6 | 97.8 | 75.0 |
| | GRAIN SIZE | | |
| $D_{60}$ | 0.6204 | 0.2959 | 3.8778 |
| $D_{30}$ | | | 0.2637 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 79.8 | 95.5 | 63.4 |
| #10 | 69.0 | 93.1 | 49.9 |
| #16 | 64.6 | 90.7 | 43.2 |
| #40 | 56.8 | 71.2 | 33.3 |
| #50 | 53.4 | 60.4 | 30.8 |
| #100 | 48.3 | 50.5 | 27.5 |
| #200 | 44.0 | 45.0 | 25.3 |

Material Description
○ clayey sand with gravel
□ clayey sand
△ clayey sand with gravel

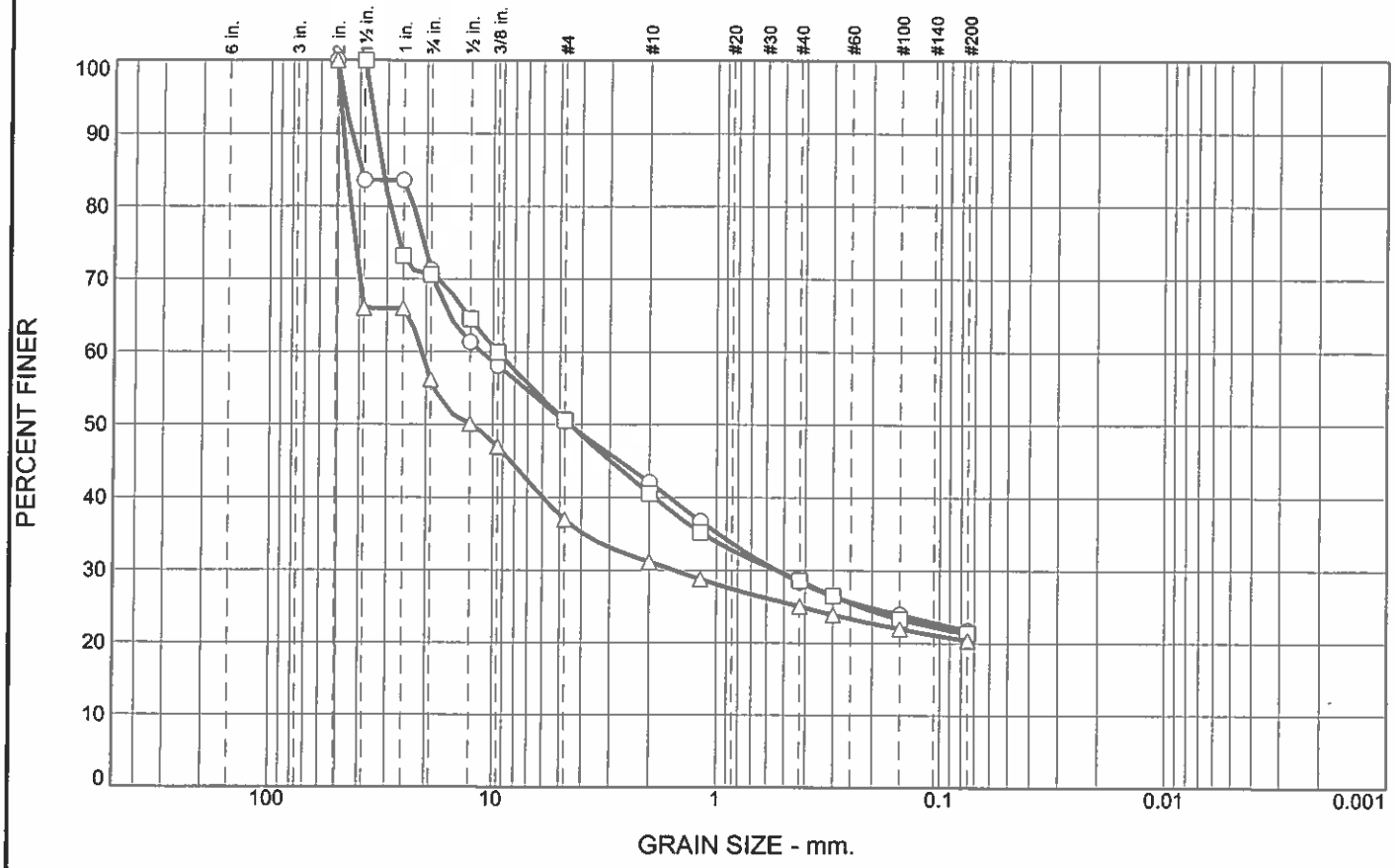
REMARKS:
○
□
△

○ Source of Sample: WLC-2 Depth: 34'-34.5' Sample Number: K1
□ Source of Sample: WLC-2 Depth: 34.5'-35' Sample Number: K2
△ Source of Sample: WLC-2 Depth: 35'-35.5' Sample Number: K3

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 49.6 | 28.7 | 21.7 | | | | | |
| □ | 0.0 | 49.4 | 29.3 | 21.3 | | | | | |
| △ | 0.0 | 63.0 | 16.6 | 20.4 | | GC | A-2-7(1) | 20 | 47 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 2" | 100.0 | | 100.0 |
| 1 1/2" | 83.6 | 100.0 | 66.0 |
| 1" | 83.6 | 73.2 | 66.0 |
| 3/4" | 71.3 | 70.6 | 56.2 |
| 1/2" | 61.3 | 64.5 | 50.1 |
| 3/8" | 58.1 | 60.0 | 47.0 |
| | GRAIN SIZE | | |
| $D_{60}$ | 11.3498 | 9.5376 | 20.9190 |
| $D_{30}$ | 0.5371 | 0.5355 | 1.5390 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 50.4 | 50.6 | 37.0 |
| #10 | 42.1 | 40.6 | 31.2 |
| #16 | 36.8 | 35.2 | 28.8 |
| #40 | 28.4 | 28.7 | 25.1 |
| #50 | 26.5 | 26.5 | 23.9 |
| #100 | 24.0 | 23.3 | 22.0 |
| #200 | 21.7 | 21.3 | 20.4 |

Material Description
○ SIEVE ONLY
□ SIEVE ONLY
△ clayey gravel with sand

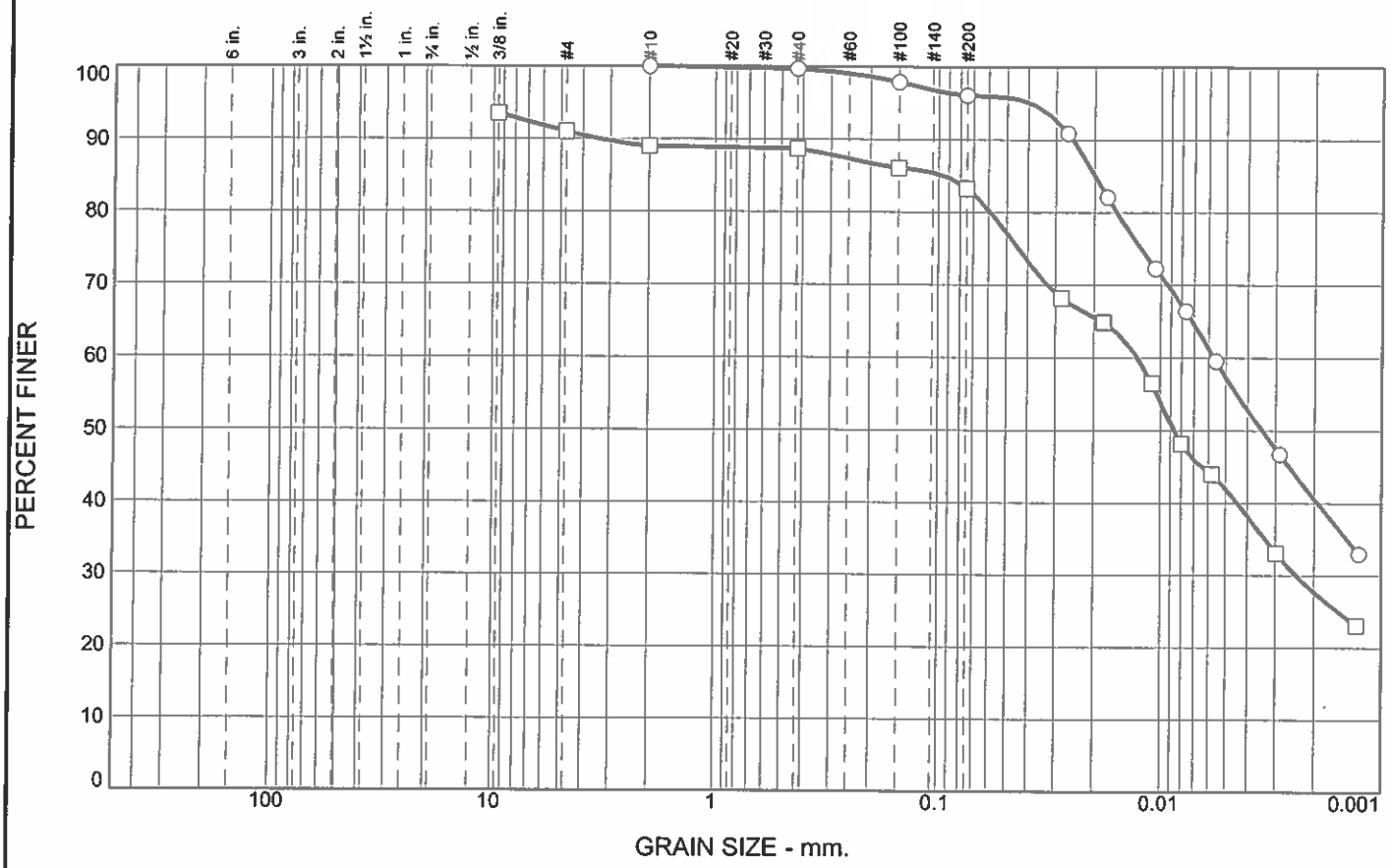
REMARKS:
○
□
△

○ Source of Sample: WLC-2 Depth: 39.5'-40' Sample Number: L1
□ Source of Sample: WLC-2 Depth: 40'-40.5' Sample Number: L2
△ Source of Sample: WLC-2 Depth: 39'-40.5 Sample Number: L3

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 0.0 | 3.9 | 55.5 | 40.6 | CH | A-7-6(39) | 24 | 60 |
| □ | | | 7.7 | 55.6 | 27.7 | CL | A-6(14) | 19 | 37 |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | |
|---|---|---|---|
| 3/8" | | 93.5 | |
| | GRAIN SIZE | | |
| $D_{60}$ | 0.0057 | 0.0127 | |
| $D_{30}$ | | 0.0024 | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | |
|---|---|---|---|
| #4 | | 91.0 | |
| #10 | 100.0 | 89.0 | |
| #40 | 99.7 | 88.7 | |
| #100 | 97.9 | 86.1 | |
| #200 | 96.1 | 83.3 | |

Material Description
○ fat clay
□ lean clay

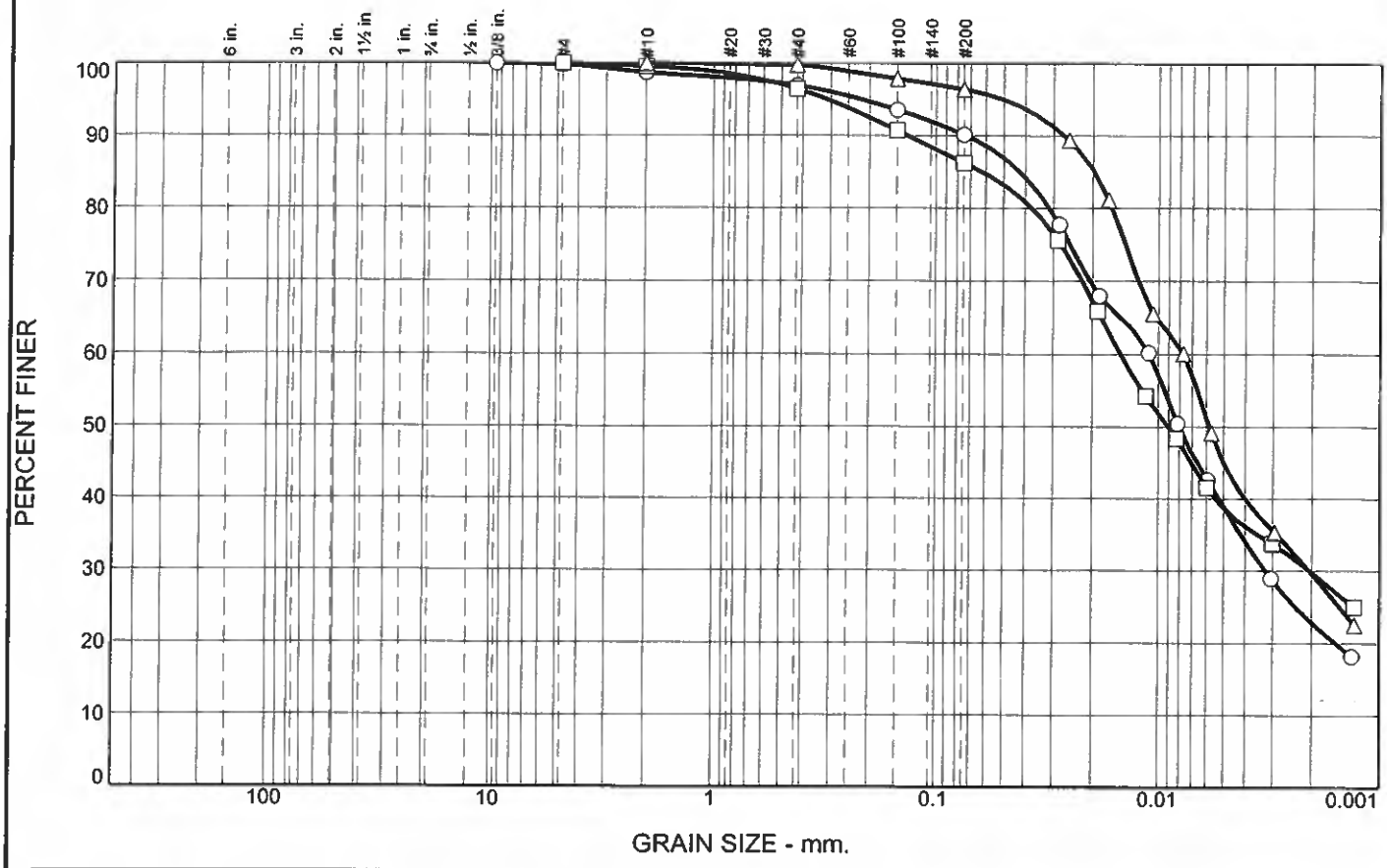
REMARKS:
○
□

○ Source of Sample: WLC-2 Depth: 44'-44.5' Sample Number: M1
□ Source of Sample: WLC-2 Depth: 45'-45.5' Sample Number: M3

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 0.2 | 9.7 | 67.3 | 22.8 | CL | A-6(20) | 18 | 40 |
| □ | 0.0 | 0.0 | 13.8 | 56.4 | 29.8 | CH | A-7-6(28) | 22 | 53 |
| △ | 0.0 | 0.0 | 3.6 | 66.8 | 29.6 | CH | A-7-6(32) | 22 | 52 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 3/8" | 100.0 | | |
| | GRAIN SIZE | | |
| $D_{60}$ | 0.0110 | 0.0149 | 0.0077 |
| $D_{30}$ | 0.0032 | 0.0020 | 0.0021 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 99.8 | 100.0 | |
| #10 | 98.7 | 99.6 | 100.0 |
| #40 | 96.9 | 96.4 | 99.8 |
| #100 | 93.5 | 90.7 | 97.8 |
| #200 | 90.1 | 86.2 | 96.4 |

Material Description
○ lean clay
□ fat clay
△ fat clay

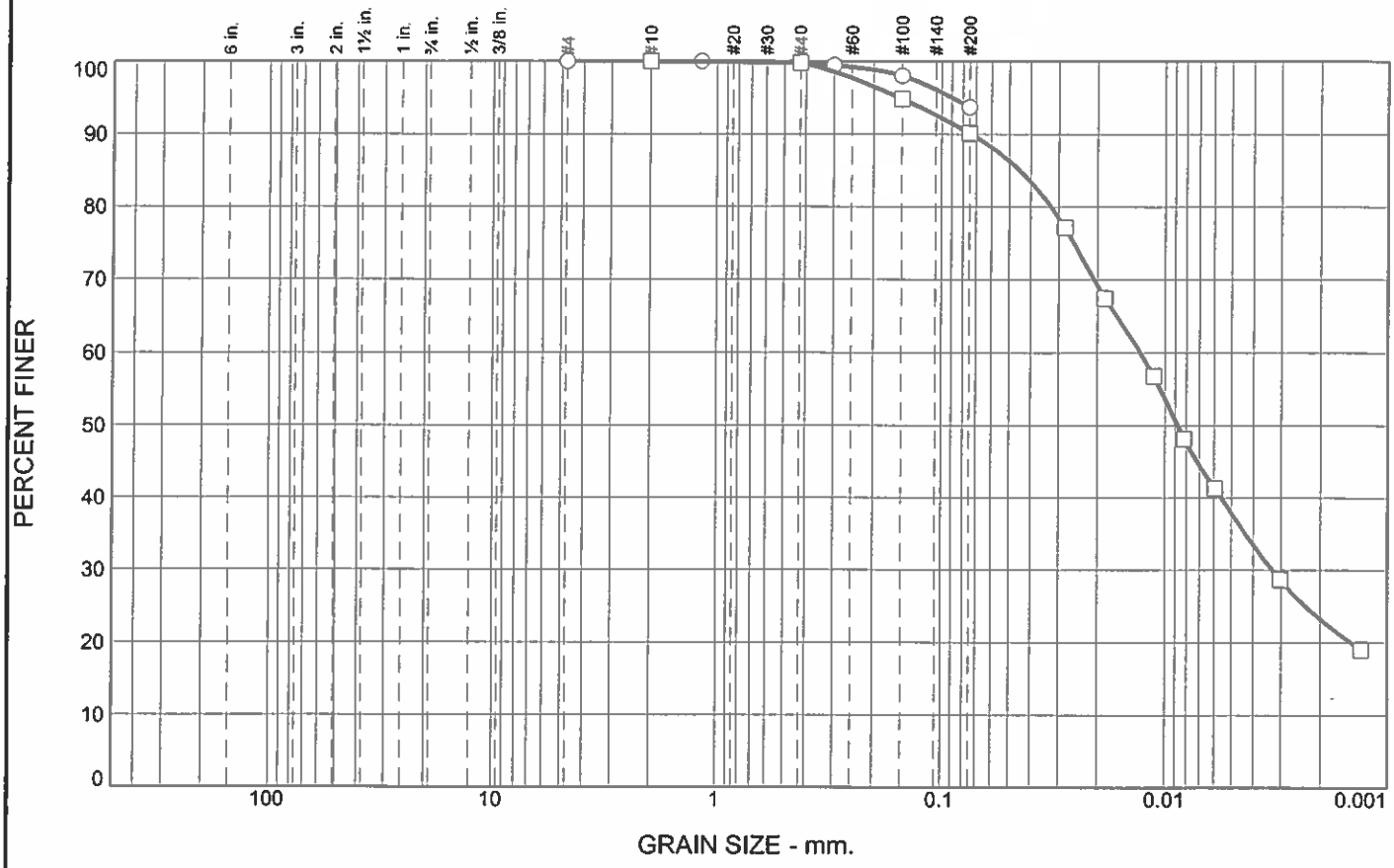
REMARKS:
○
□
△

○ Source of Sample: WLC-2 Depth: 49'-49.5' Sample Number: N1
□ Source of Sample: WLC-2 Depth: 49.5'-50' Sample Number: N2
△ Source of Sample: WLC-2 Depth: 50'-50.5' Sample Number: N3

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 0.0 | 6.3 | 93.7 | | CH | A-7-6(54) | 21 | 72 |
| □ | 0.0 | 0.0 | 9.9 | 66.9 | 23.2 | CL | A-6(17) | 17 | 36 |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | □ | |
|---|---|---|---|
| | | | |
| | GRAIN SIZE | | |
| $D_{60}$ | | 0.0128 | |
| $D_{30}$ | | 0.0033 | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | |
|---|---|---|---|
| #4 | 100.0 | | |
| #10 | 100.0 | 100.0 | |
| #16 | 100.0 | | |
| #40 | 99.8 | 99.7 | |
| #50 | 99.4 | | |
| #100 | 98.0 | 94.8 | |
| #200 | 93.7 | 90.1 | |

Material Description
○ fat clay
□ lean clay

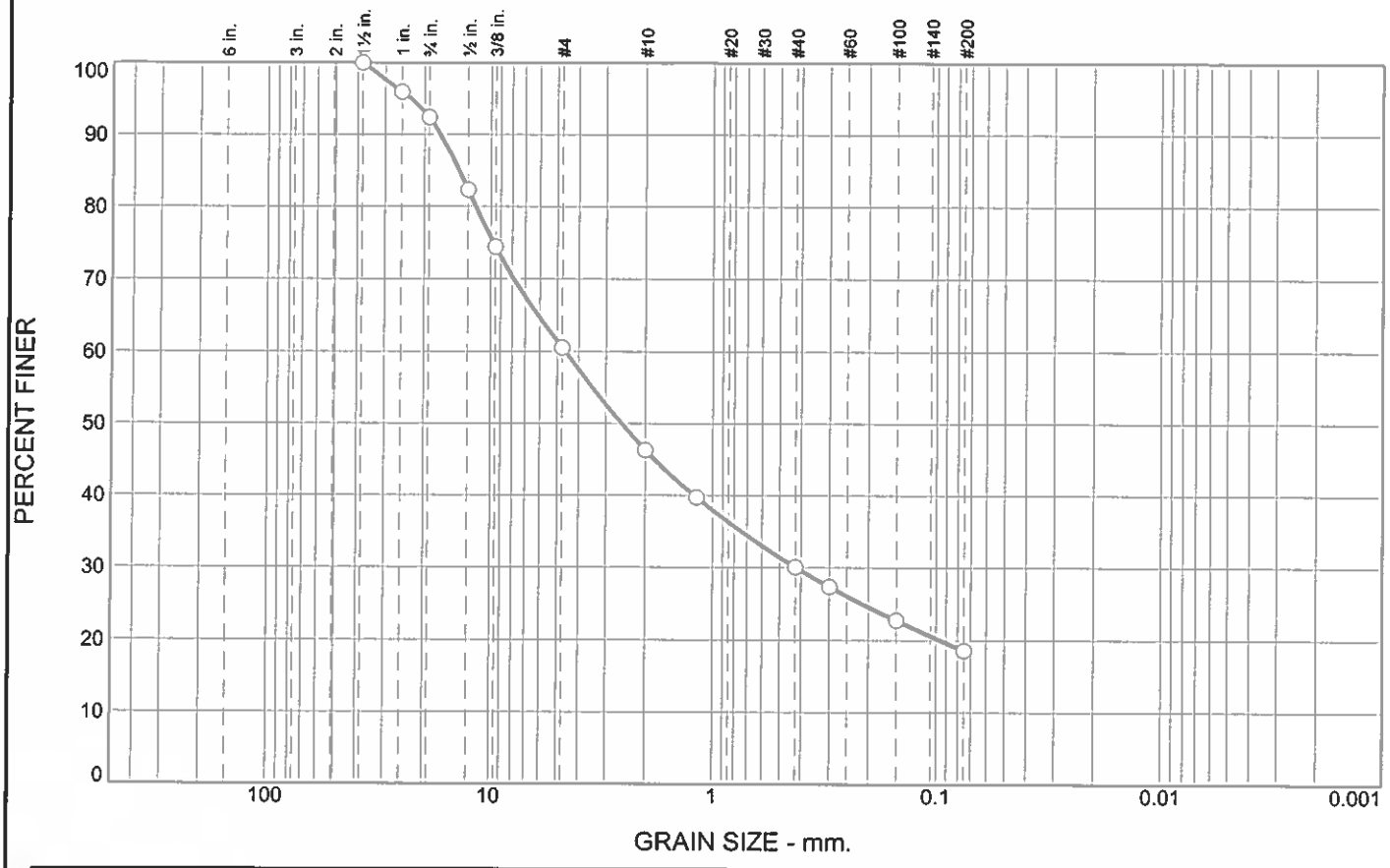
REMARKS:
○
□

○ Source of Sample: WLC-2 Depth: 54'-54.5' Sample Number: O1
□ Source of Sample: WLC-2 Depth: 54.5'-55' Sample Number: O2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 39.5 | 41.9 | 18.6 | | SC-SM | A-1-b | 15 | 20 |
| | | | | | | | | | |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | | |
|---|---|---|---|
| 1-1/2" | 100.0 | | |
| 1" | 95.9 | | |
| 3/4" | 92.4 | | |
| 1/2" | 82.3 | | |
| 3/8" | 74.4 | | |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.6027 | | |
| $D_{30}$ | 0.4198 | | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_U$ | | | |

| SIEVE number size | PERCENT FINER ○ | | |
|---|---|---|---|
| #4 | 60.5 | | |
| #10 | 46.3 | | |
| #16 | 39.8 | | |
| #40 | 30.1 | | |
| #50 | 27.4 | | |
| #100 | 22.7 | | |
| #200 | 18.6 | | |

Material Description

○ silty, clayey sand with gravel

REMARKS:

○

○ Source of Sample: WLC-2 Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

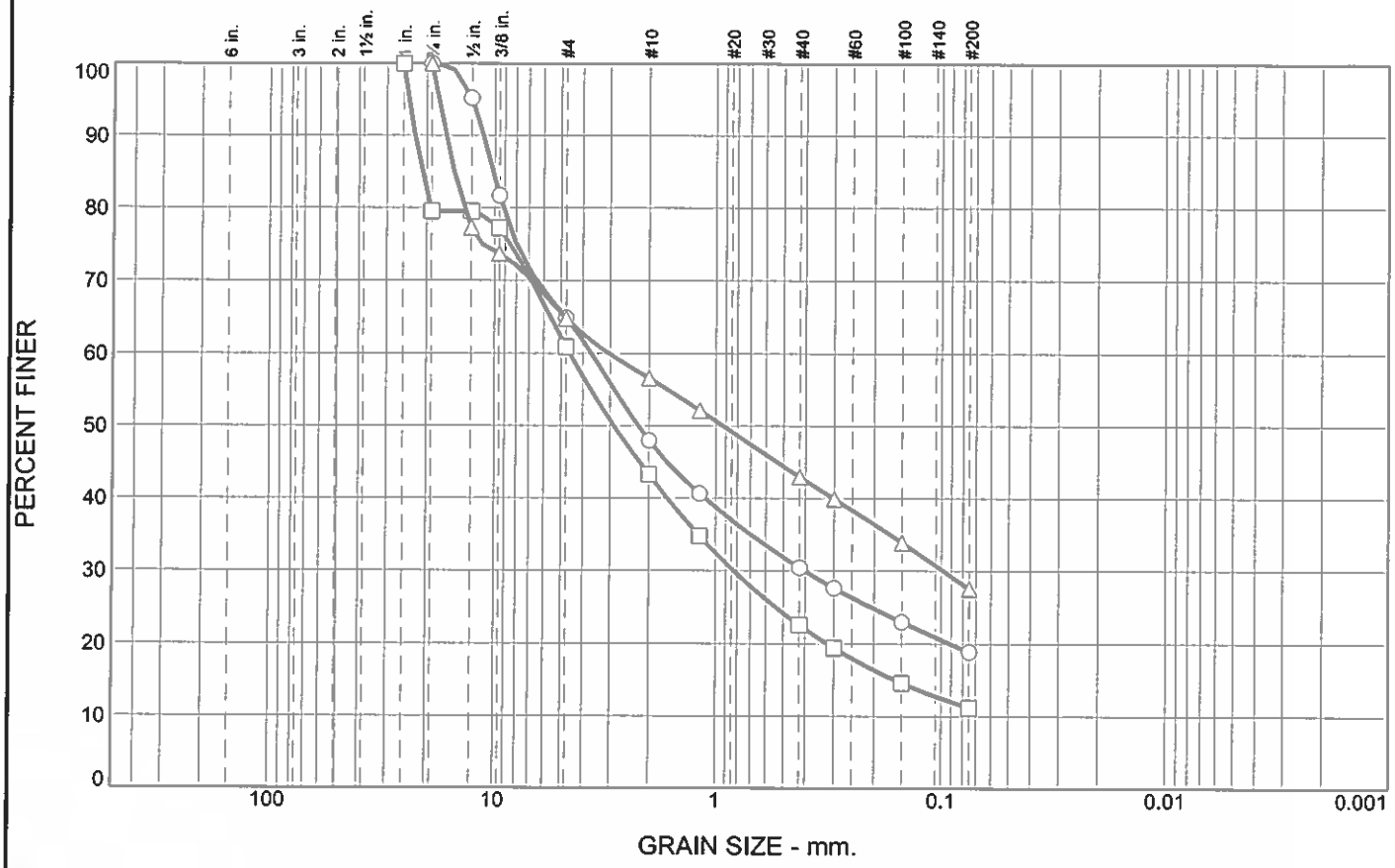
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 35.1 | 46.0 | 18.9 | | SM | A-1-b | NP | 18 |
| □ | 0.0 | 39.1 | 49.7 | 11.2 | | SP-SM | A-1-a | NP | 19 |
| △ | 0.0 | 35.2 | 37.2 | 27.6 | | SM | A-2-4(0) | NP | 31 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | 100.0 | |
| 3/4" | 100.0 | 79.5 | 100.0 |
| 1/2" | 95.2 | 79.5 | 77.3 |
| 3/8" | 81.7 | 77.2 | 73.7 |
| | GRAIN SIZE | | |
| $D_{60}$ | 3.6523 | 4.5789 | 3.0423 |
| $D_{30}$ | 0.4027 | 0.8298 | 0.0975 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 64.9 | 60.9 | 64.8 |
| #10 | 48.0 | 43.3 | 56.6 |
| #16 | 40.7 | 34.8 | 52.2 |
| #40 | 30.5 | 22.6 | 43.0 |
| #50 | 27.6 | 19.4 | 39.9 |
| #100 | 23.0 | 14.6 | 33.9 |
| #200 | 18.9 | 11.2 | 27.6 |

Material Description
○ silty sand with gravel
□ poorly graded sand with silt and gravel
△ silty sand with gravel

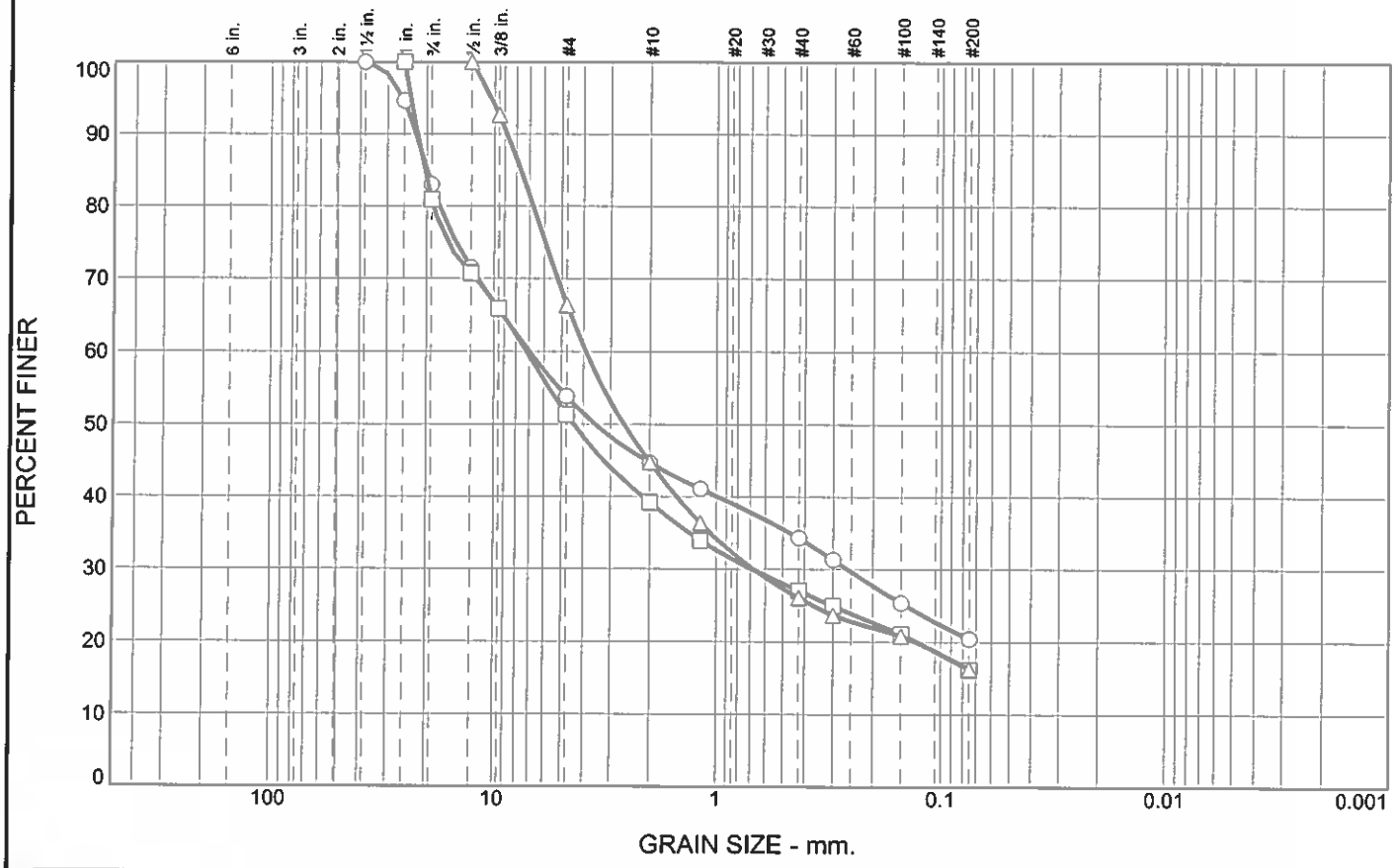
REMARKS:
○
□
△

○ Source of Sample: WLC 3 Depth: 1.0 - 2.5' Sample Number: A
□ Source of Sample: WLC 3 Depth: 3.0 - 3.5' Sample Number: B1
△ Source of Sample: WLC 3 Depth: 3.5 - 4.0' Sample Number: B2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 46.2 | 33.4 | 20.4 | | GC-GM | A-1-b | 17 | 23 |
| □ | 0.0 | 48.6 | 35.2 | 16.2 | | GM | A-1-b | NP | 20 |
| △ | 0.0 | 33.6 | 50.1 | 16.3 | | SM | A-1-b | 18 | 20 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1 1/2" | 100.0 | | |
| 1" | 94.6 | 100.0 | |
| 3/4" | 83.0 | 80.9 | |
| 1/2" | 71.5 | 70.8 | 100.0 |
| 3/8" | 65.8 | 65.9 | 92.7 |
| | GRAIN SIZE | | |
| $D_{60}$ | 6.9473 | 7.1614 | 3.9058 |
| $D_{30}$ | 0.2586 | 0.6849 | 0.6765 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 53.8 | 51.4 | 66.4 |
| #10 | 44.7 | 39.2 | 44.8 |
| #16 | 41.1 | 34.0 | 36.4 |
| #40 | 34.3 | 27.1 | 26.1 |
| #50 | 31.3 | 24.9 | 23.7 |
| #100 | 25.4 | 21.1 | 20.8 |
| #200 | 20.4 | 16.2 | 16.3 |

Material Description
○ silty clayey gravel with sand
□ silty gravel with sand
△ silty sand with gravel

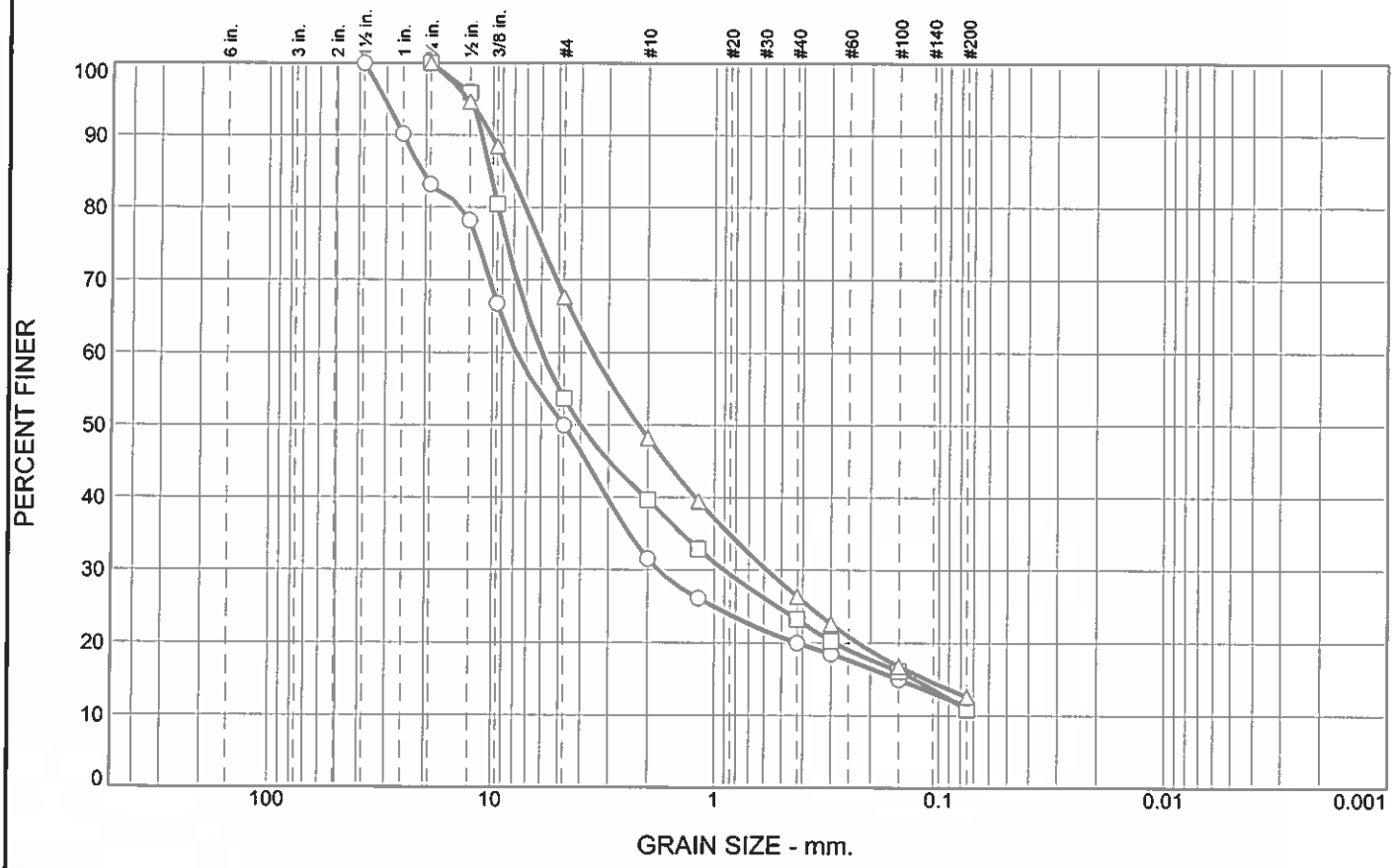
REMARKS:
○
□
△

○ Source of Sample: WLC 3 Depth: 5.5 - 6.0' Sample Number: C1
□ Source of Sample: WLC 3 Depth: 6.0 - 6.5' Sample Number: C2
△ Source of Sample: WLC 3 Depth: 6.5 - 8.0' Sample Number: D

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 50.0 | 38.7 | 11.3 | | GP-GM | A-1-a | NP | 19 |
| □ | 0.0 | 46.3 | 42.8 | 10.9 | | GP-GM | A-1-a | NP | 18 |
| △ | 0.0 | 32.3 | 55.1 | 12.6 | | SM | A-1-a | NP | 17 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1 1/2" | 100.0 | | |
| 1" | 90.2 | | |
| 3/4" | 83.2 | 100.0 | 100.0 |
| 1/2" | 78.2 | 95.9 | 94.7 |
| 3/8" | 66.8 | 80.5 | 88.5 |
| | GRAIN SIZE | | |
| $D_{60}$ | 7.7624 | 5.9565 | 3.5461 |
| $D_{30}$ | 1.7907 | 0.9036 | 0.5797 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 50.0 | 53.7 | 67.7 |
| #10 | 31.6 | 39.7 | 48.2 |
| #16 | 26.1 | 32.9 | 39.5 |
| #40 | 20.0 | 23.2 | 26.4 |
| #50 | 18.5 | 20.3 | 22.6 |
| #100 | 15.0 | 16.1 | 16.8 |
| #200 | 11.3 | 10.9 | 12.6 |

Material Description
○ poorly graded gravel with silt and sand

□ poorly graded gravel with silt and sand

△ silty sand with gravel

REMARKS:
○

□

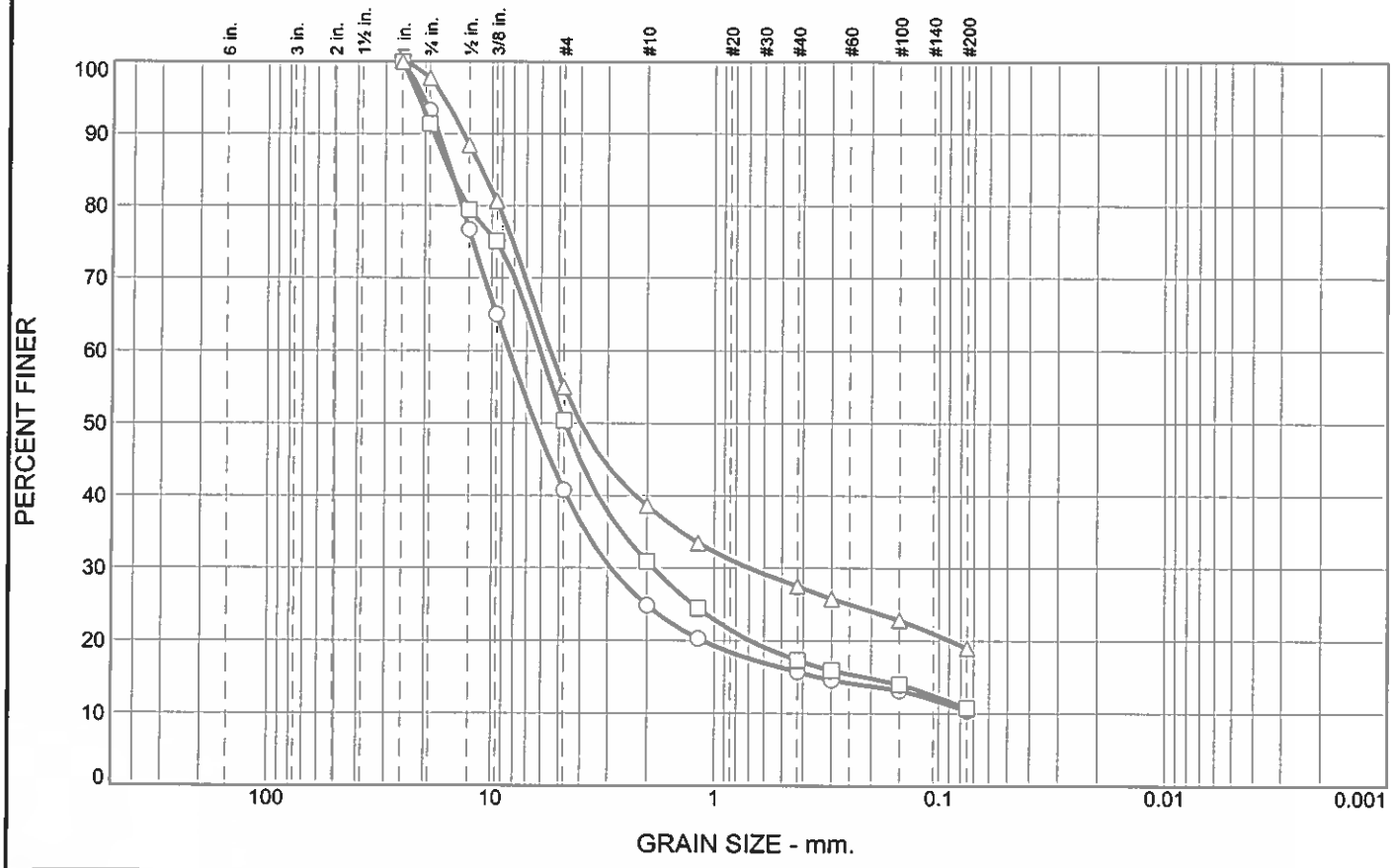
△

○ Source of Sample: WLC 3 Depth: 10.5 - 11.0' Sample Number: E1
□ Source of Sample: WLC 3 Depth: 11.0 - 11.5' Sample Number: E2
△ Source of Sample: WLC 3 Depth: 11.5 - 13.0' Sample Number: F

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 59.2 | 30.4 | 10.4 | | GP-GM | A-1-a | NP | 19 |
| □ | 0.0 | 49.6 | 39.7 | 10.7 | | GP-GM | A-1-a | NP | 17 |
| △ | 0.0 | 45.0 | 36.0 | 19.0 | | GM | A-1-b | 17 | 19 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | 100.0 | 100.0 |
| 3/4" | 93.3 | 91.4 | 97.7 |
| 1/2" | 76.7 | 79.5 | 88.4 |
| 3/8" | 65.0 | 75.0 | 80.7 |
| | GRAIN SIZE | | |
| $D_{60}$ | 8.3640 | 6.0690 | 5.4800 |
| $D_{30}$ | 2.9041 | 1.8731 | 0.6949 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 40.8 | 50.4 | 55.0 |
| #10 | 24.9 | 30.9 | 38.6 |
| #16 | 20.3 | 24.4 | 33.5 |
| #40 | 15.7 | 17.3 | 27.5 |
| #50 | 14.6 | 15.9 | 25.8 |
| #100 | 13.1 | 14.0 | 22.8 |
| #200 | 10.4 | 10.7 | 19.0 |

Material Description

○ poorly graded gravel with silt and sand

□ poorly graded gravel with silt and sand

△ silty gravel with sand

REMARKS:

○

□

△

○ Source of Sample: WLC 3 Depth: 15.0 - 16.5' Sample Number: G

□ Source of Sample: WLC 3 Depth: 16.5 - 18.0' Sample Number: H

△ Source of Sample: WLC 3 Depth: 4.0 - 9.0' Sample Number: BULK 1

**NEVADA DEPARTMENT OF TRANSPORTATION**

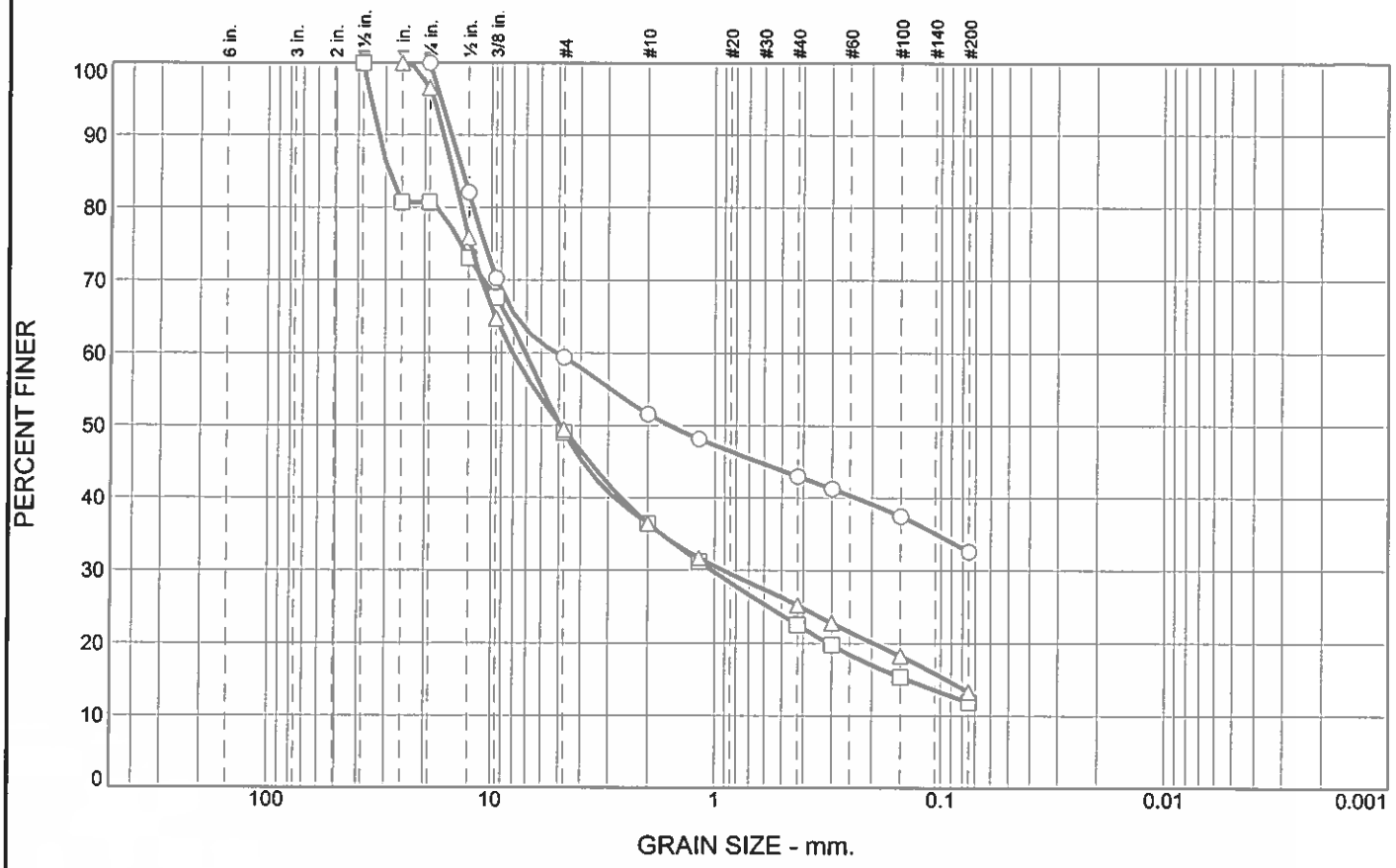
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 40.6 | 26.8 | 32.6 | | GM | A-2-4(0) | 21 | 23 |
| □ | 0.0 | 51.0 | 37.1 | 11.9 | | GP-GM | A-1-a | NP | 17 |
| △ | 0.0 | 50.5 | 36.2 | 13.3 | | GM | A-1-a | NP | 18 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1 1/2" | | 100.0 | |
| 1" | | 80.7 | 100.0 |
| 3/4" | 100.0 | 80.7 | 96.6 |
| 1/2" | 82.1 | 73.1 | 75.9 |
| 3/8" | 70.3 | 67.7 | 64.7 |
| | GRAIN SIZE | | |
| $D_{60}$ | 5.1121 | 7.0406 | 8.0165 |
| $D_{30}$ | | 1.0276 | 0.9122 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 59.4 | 49.0 | 49.5 |
| #10 | 51.6 | 36.4 | 36.5 |
| #16 | 48.2 | 31.3 | 31.7 |
| #40 | 43.0 | 22.6 | 25.3 |
| #50 | 41.3 | 19.8 | 22.8 |
| #100 | 37.5 | 15.4 | 18.3 |
| #200 | 32.6 | 11.9 | 13.3 |

Material Description

○ silty gravel with sand

□ poorly graded gravel with silt and sand

△ silty gravel with sand

REMARKS:

○

□

△

○ Source of Sample: WLC 4 Depth: 1.0 - 2.5' Sample Number: A

□ Source of Sample: WLC 4 Depth: 4.0 - 4.5' Sample Number: B1

△ Source of Sample: WLC 4 Depth: 4.5 - 5.0' Sample Number: B2

**NEVADA DEPARTMENT OF TRANSPORTATION**

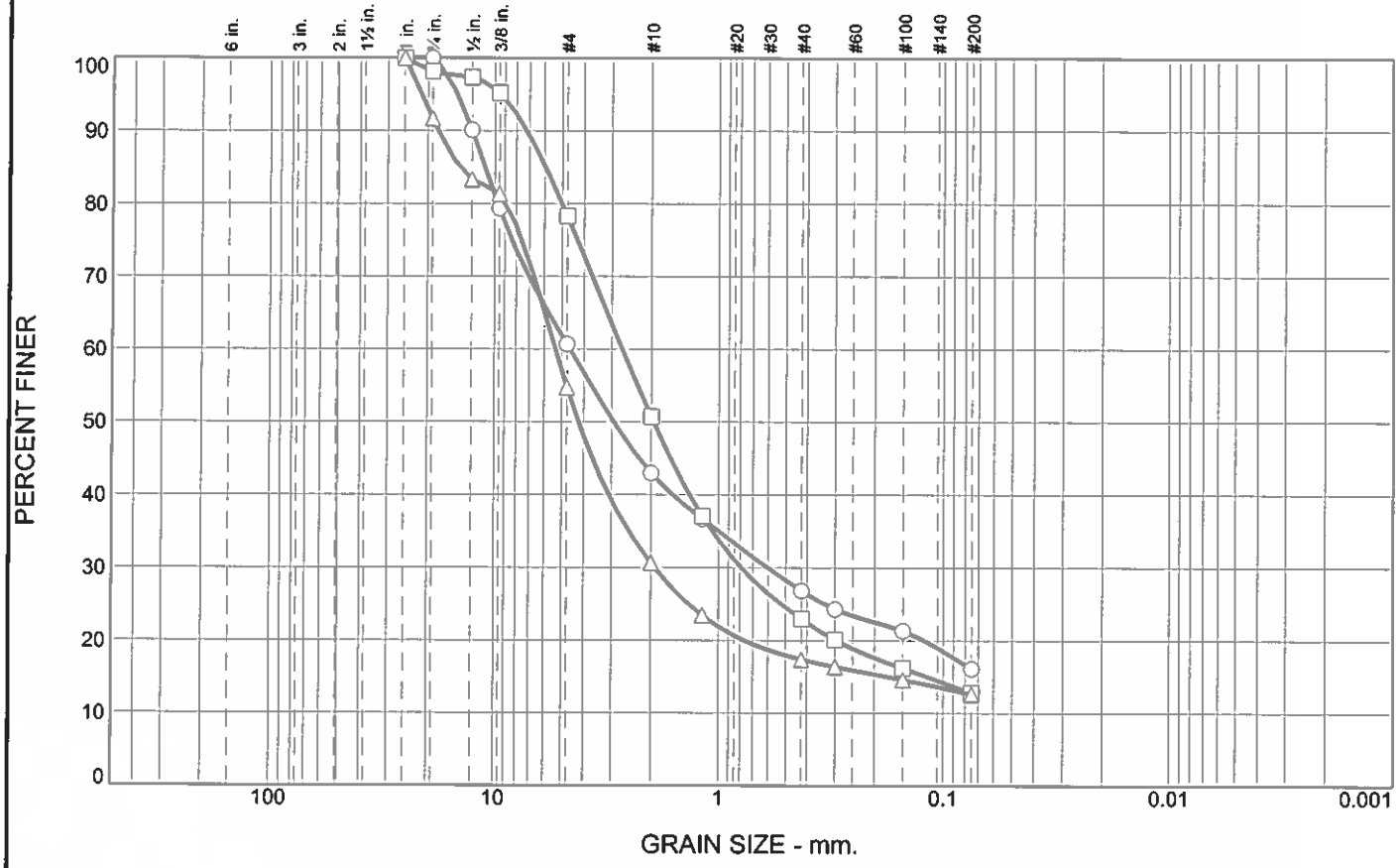
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 39.3 | 44.6 | 16.1 | | SM | A-1-b | NP | 18 |
| □ | 0.0 | 21.7 | 65.5 | 12.8 | | SM | A-1-b | NP | 19 |
| △ | 0.0 | 45.3 | 42.1 | 12.6 | | GM | A-1-a | 19 | 21 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | 100.0 | 100.0 |
| 3/4" | 100.0 | 98.1 | 91.7 |
| 1/2" | 90.1 | 97.3 | 83.3 |
| 3/8" | 79.4 | 95.2 | 81.3 |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.6100 | 2.6995 | 5.3489 |
| $D_{30}$ | 0.6003 | 0.7897 | 1.9232 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 60.7 | 78.3 | 54.7 |
| #10 | 43.0 | 50.7 | 30.7 |
| #16 | 36.7 | 37.1 | 23.5 |
| #40 | 26.9 | 23.0 | 17.4 |
| #50 | 24.3 | 20.1 | 16.4 |
| #100 | 21.4 | 16.2 | 14.6 |
| #200 | 16.1 | 12.8 | 12.6 |

Material Description
○ silty sand with gravel
□ silty sand with gravel
△ silty gravel with sand

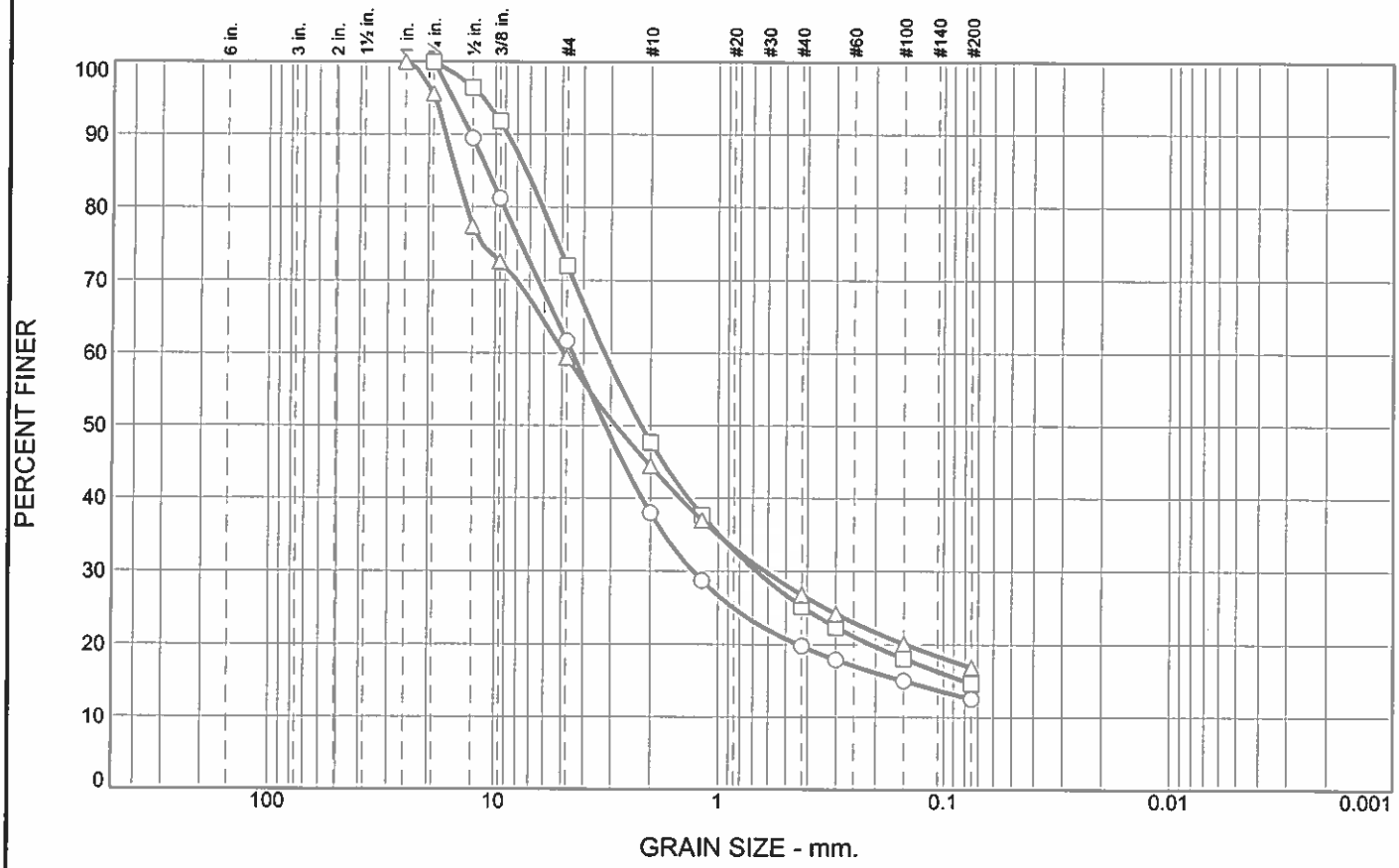
REMARKS:
○
□
△

○ Source of Sample: WLC 4 Depth: 5.0 - 6.5' Sample Number: C
□ Source of Sample: WLC 4 Depth: 8.0 - 8.5' Sample Number: D1
△ Source of Sample: WLC 4 Depth: 8.5 - 9.0' Sample Number: D2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 38.3 | 49.2 | 12.5 | | SM | A-1-a | NP | 17 |
| □ | 0.0 | 28.0 | 57.3 | 14.7 | | SM | A-1-a | NP | 17 |
| △ | 0.0 | 40.6 | 42.5 | 16.9 | | SM | A-1-b | 17 | 20 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | | 100.0 |
| 3/4" | 100.0 | 100.0 | 95.6 |
| 1/2" | 89.5 | 96.5 | 77.4 |
| 3/8" | 81.2 | 91.8 | 72.6 |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.4807 | 3.2033 | 4.8974 |
| $D_{30}$ | 1.2913 | 0.6741 | 0.6174 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 61.7 | 72.0 | 59.4 |
| #10 | 38.0 | 47.7 | 44.4 |
| #16 | 28.7 | 37.7 | 37.0 |
| #40 | 19.8 | 25.2 | 26.8 |
| #50 | 17.9 | 22.4 | 24.2 |
| #100 | 15.0 | 18.1 | 20.1 |
| #200 | 12.5 | 14.7 | 16.9 |

Material Description
○ silty sand with gravel
□ silty sand with gravel
△ silty sand with gravel

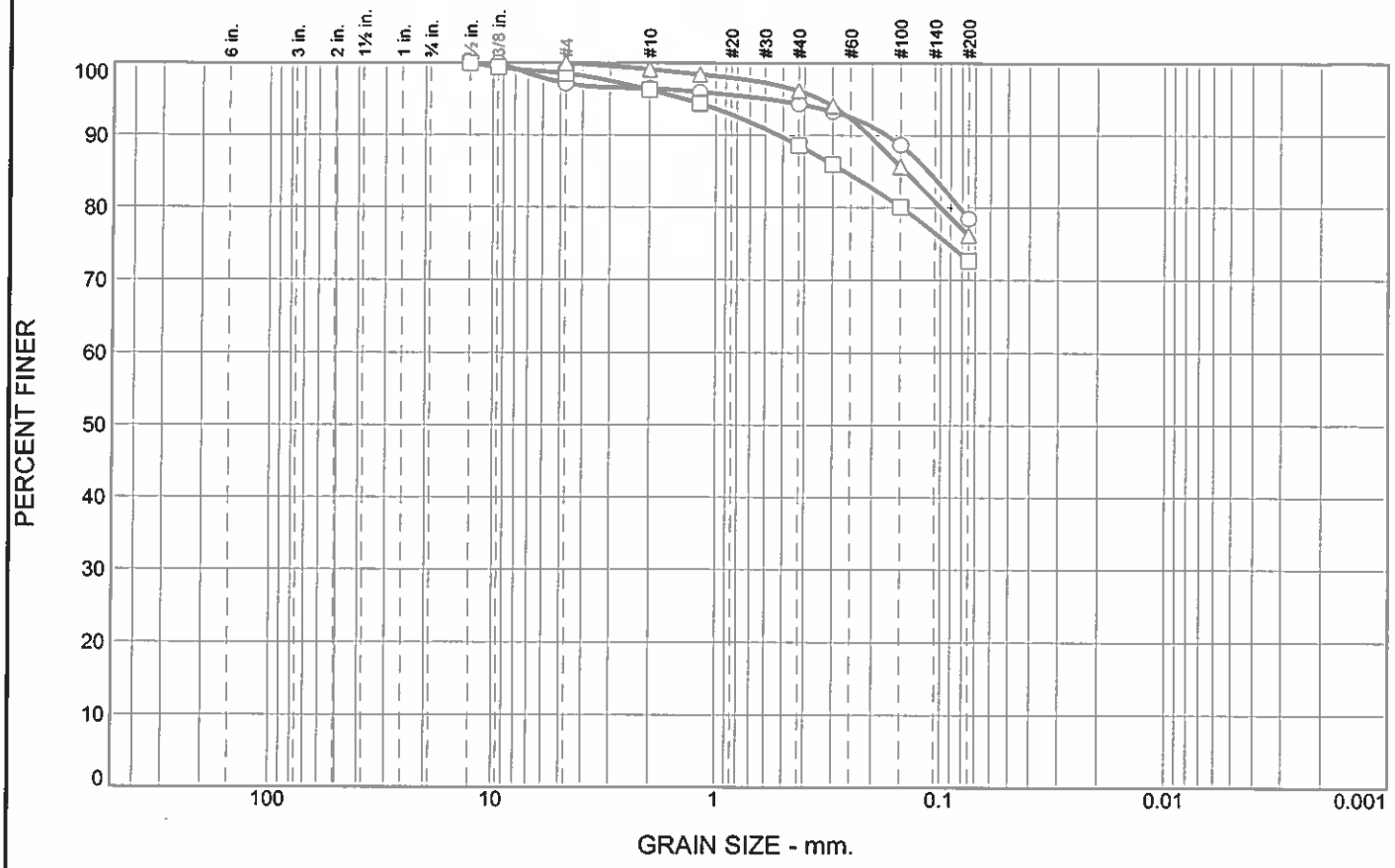
REMARKS:
○
□
△

○ Source of Sample: WLC 4 Depth: 9.0 - 10.5' Sample Number: E
□ Source of Sample: WLC 4 Depth: 11.5 - 13.0' Sample Number: F
△ Source of Sample: WLC 4 Depth: 15.0 - 16.5' Sample Number: G

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 2.8 | 18.7 | 78.5 | | CL | A-4(5) | 19 | 28 |
| □ | 0.0 | 1.5 | 25.8 | 72.7 | | CL | A-4(6) | 22 | 32 |
| △ | 0.0 | 0.0 | 23.8 | 76.2 | | CL | A-6(8) | 19 | 31 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1/2" | | 100.0 | |
| 3/8" | 100.0 | 99.4 | |
| GRAIN SIZE | | | |
| $D_{60}$ | | | |
| $D_{30}$ | | | |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 97.2 | 98.5 | 100.0 |
| #10 | 96.5 | 96.3 | 99.1 |
| #16 | 96.0 | 94.4 | 98.4 |
| #40 | 94.3 | 88.6 | 96.2 |
| #50 | 93.3 | 85.9 | 94.1 |
| #100 | 88.7 | 80.1 | 85.6 |
| #200 | 78.5 | 72.7 | 76.2 |

Material Description
○ lean clay with sand
□ lean clay with sand
△ lean clay with sand

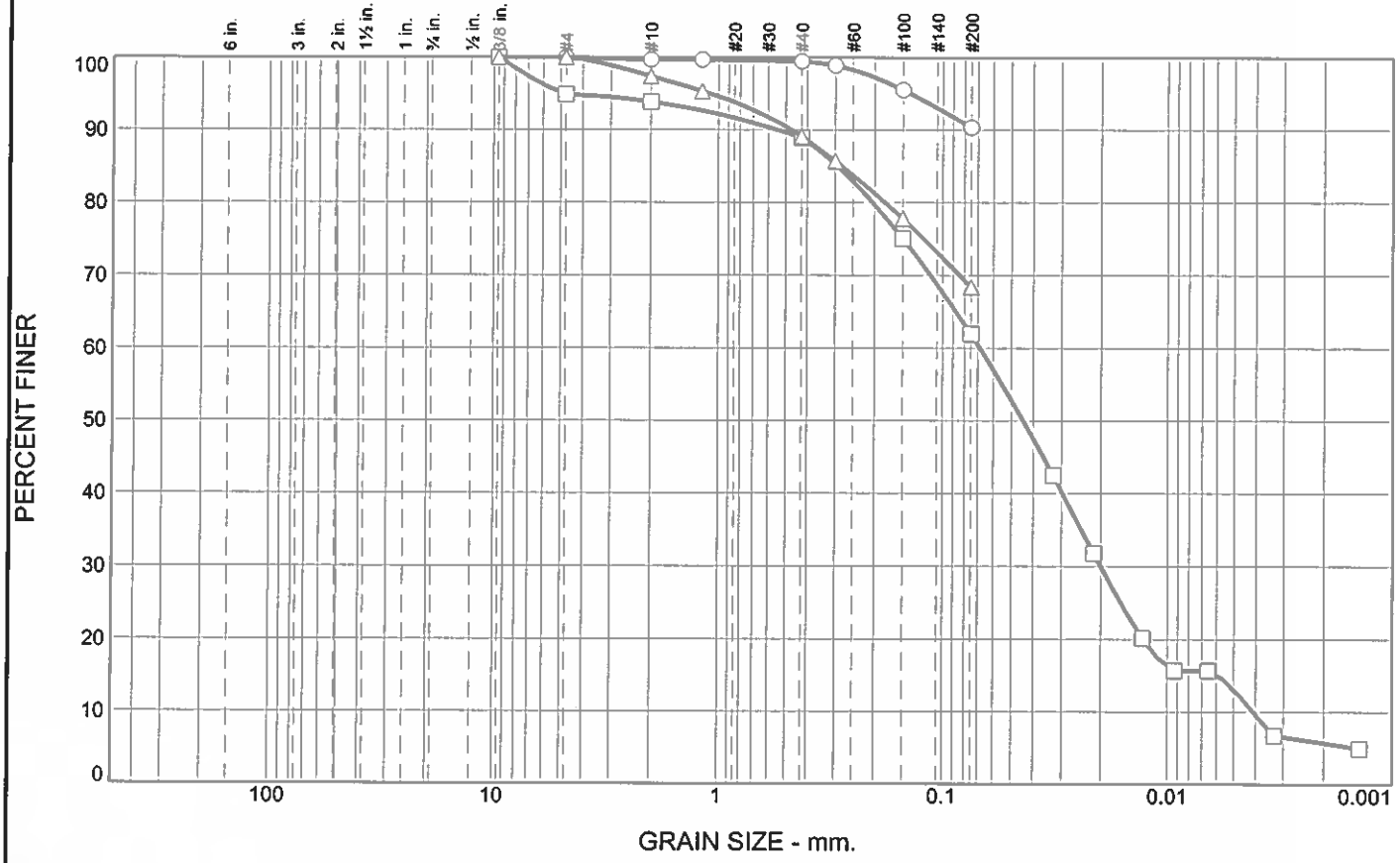
REMARKS:
○
□
△

○ Source of Sample: WLC 4 Depth: 20.0 - 21.5' Sample Number: H
□ Source of Sample: WLC 4 Depth: 22.0 - 22.5' Sample Number: I1
△ Source of Sample: WLC 4 Depth: 22.5 - 23.0' Sample Number: I2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 0.0 | 9.7 | 90.3 | | CL | A-6(10) | 22 | 33 |
| □ | 0.0 | 5.2 | 32.9 | 56.2 | 5.7 | CL-ML | A-4(1) | 22 | 26 |
| △ | 0.0 | 0.0 | 31.6 | 68.4 | | CL | A-6(11) | 21 | 39 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 3/8" | | 100.0 | 100.0 |
| | GRAIN SIZE | | |
| $D_{60}$ | | 0.0685 | |
| $D_{30}$ | | 0.0200 | |
| $D_{10}$ | | 0.0041 | |
| | COEFFICIENTS | | |
| $C_C$ | | 1.42 | |
| $C_u$ | | 16.65 | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 100.0 | 94.8 | 100.0 |
| #10 | 99.7 | 93.9 | 97.4 |
| #16 | 99.7 | | 95.3 |
| #40 | 99.4 | 88.9 | 89.1 |
| #50 | 98.9 | | 85.7 |
| #100 | 95.5 | 75.1 | 77.8 |
| #200 | 90.3 | 61.9 | 68.4 |

Material Description
○ lean clay
□ sandy silty clay
△ sandy lean clay

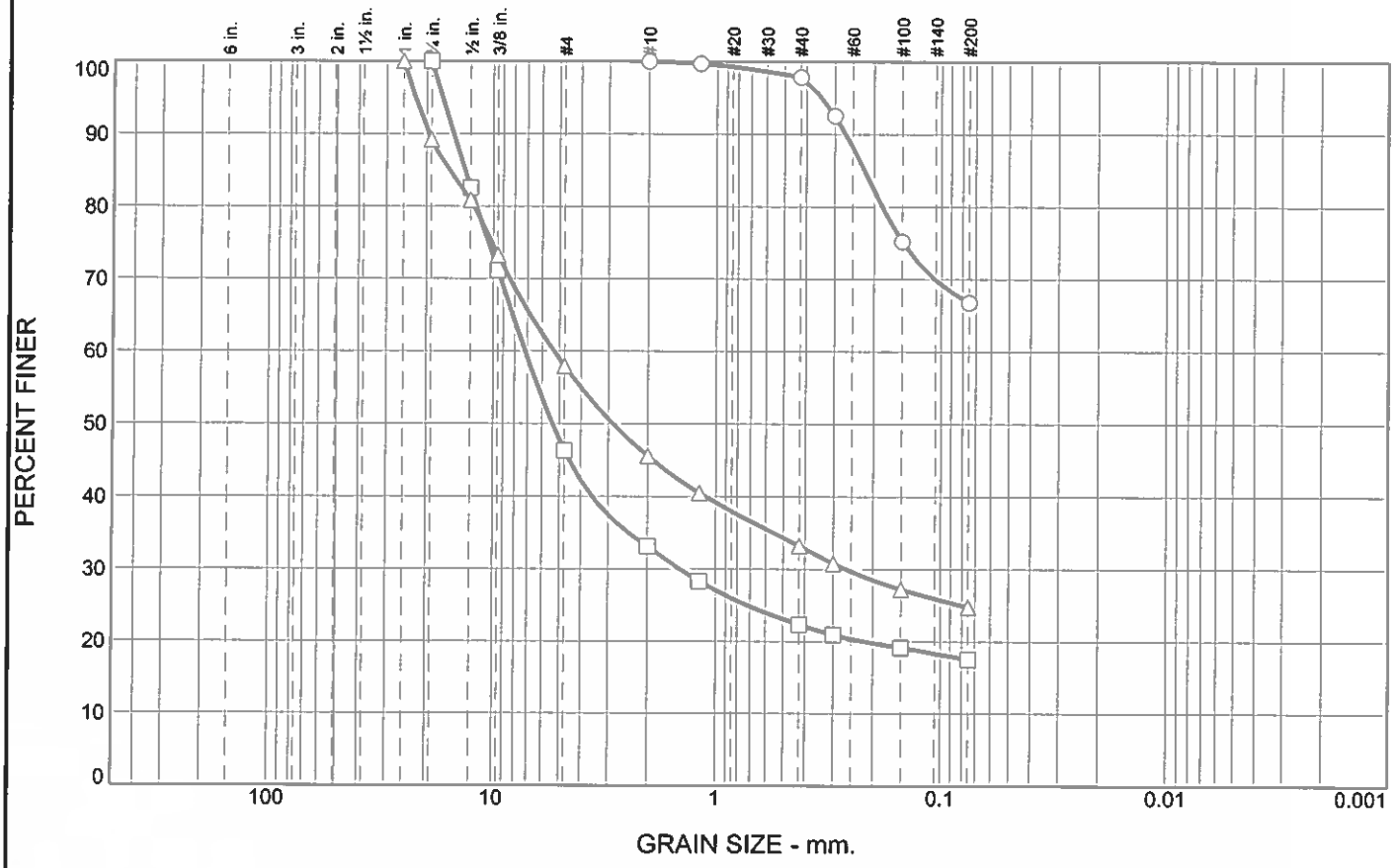
REMARKS:
○
□
△

○ Source of Sample: WLC 4 Depth: 23.0 - 23.5' Sample Number: I3
□ Source of Sample: WLC 4 Depth: 23.5 - 25.0' Sample Number: J
△ Source of Sample: WLC 4 Depth: 30.5 - 31.0' Sample Number: K1

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 0.0 | 33.2 | 66.8 | | ML | A-4(6) | 26 | 36 |
| □ | 0.0 | 53.7 | 28.8 | 17.5 | | GC | A-2-7(1) | 18 | 56 |
| △ | 0.0 | 42.1 | 33.1 | 24.8 | | GC | A-2-7(2) | 20 | 48 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | | 100.0 |
| 3/4" | | 100.0 | 89.2 |
| 1/2" | | 82.6 | 80.9 |
| 3/8" | | 71.2 | 73.3 |
| GRAIN SIZE | | | |
| $D_{60}$ | | 7.1617 | 5.3188 |
| $D_{30}$ | | 1.4290 | 0.2626 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | | 46.3 | 57.9 |
| #10 | 100.0 | 33.1 | 45.6 |
| #16 | 99.7 | 28.4 | 40.5 |
| #40 | 97.8 | 22.4 | 33.2 |
| #50 | 92.5 | 20.9 | 30.8 |
| #100 | 75.2 | 19.2 | 27.3 |
| #200 | 66.8 | 17.5 | 24.8 |

Material Description
○ sandy silt
□ clayey gravel with sand
△ clayey gravel with sand

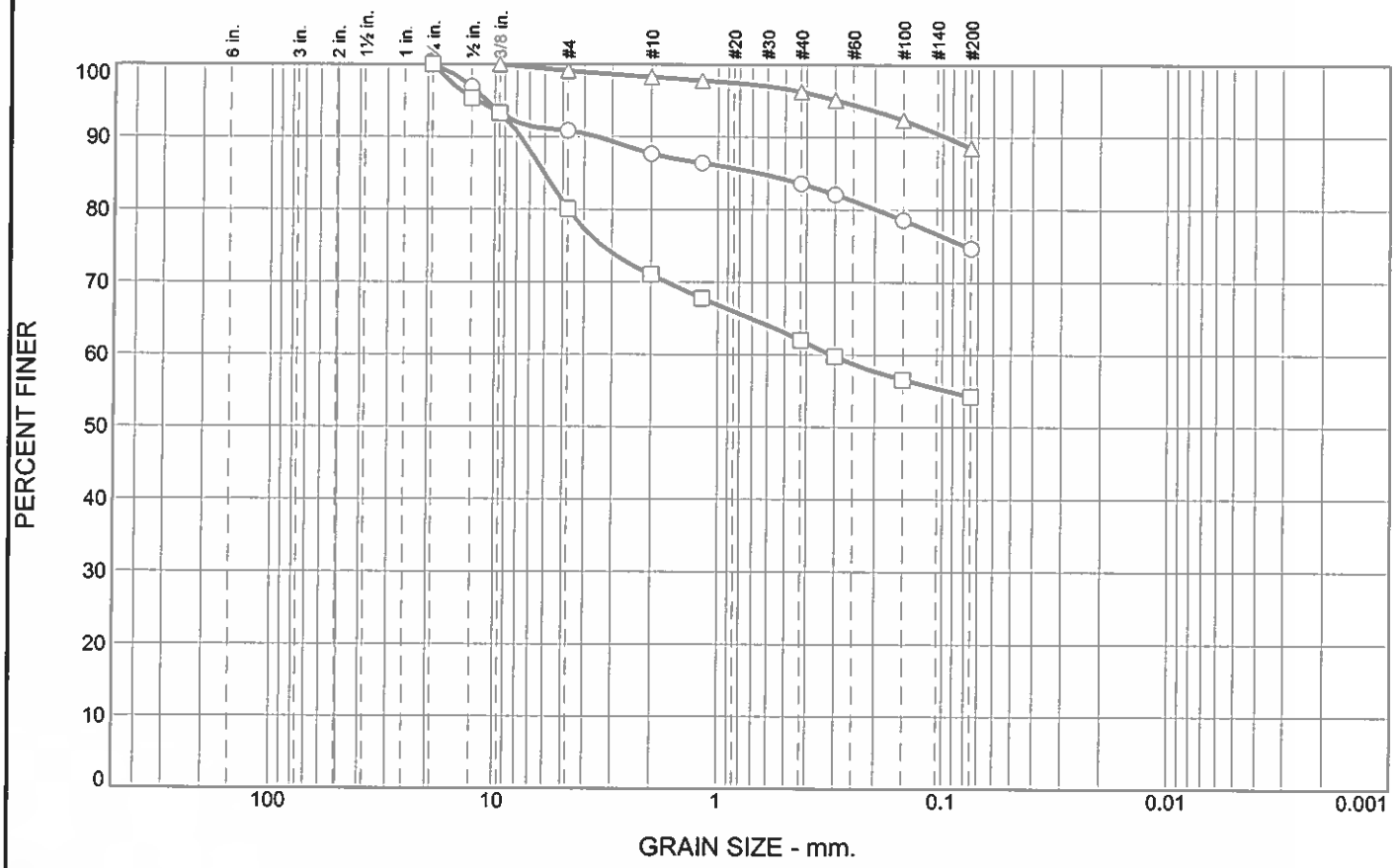
REMARKS:
○
□
△

○ Source of Sample: WLC 4 Depth: 31.0 - 31.5' Sample Number: K2
□ Source of Sample: WLC 4 Depth: 35.5 - 36.0' Sample Number: L1
△ Source of Sample: WLC 4 Depth: 36.0 - 36.5' Sample Number: L2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 9.1 | 16.2 | 74.7 | | CL | A-7-6(17) | 22 | 45 |
| □ | 0.0 | 19.9 | 25.8 | 54.3 | | CL | A-7-6(12) | 20 | 49 |
| △ | 0.0 | 0.9 | 10.6 | 88.5 | | CL | A-7-6(22) | 22 | 46 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 3/4" | 100.0 | 100.0 | |
| 1/2" | 96.9 | 95.3 | |
| 3/8" | 93.3 | 93.3 | 100.0 |
| | GRAIN SIZE | | |
| $D_{60}$ | | 0.3107 | |
| $D_{30}$ | | | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 90.9 | 80.1 | 99.1 |
| #10 | 87.7 | 71.0 | 98.3 |
| #16 | 86.4 | 67.8 | 97.8 |
| #40 | 83.6 | 62.1 | 96.3 |
| #50 | 82.1 | 59.8 | 95.1 |
| #100 | 78.6 | 56.6 | 92.3 |
| #200 | 74.7 | 54.3 | 88.5 |

Material Description
○ lean clay with sand
□ sandy lean clay with gravel
△ lean clay

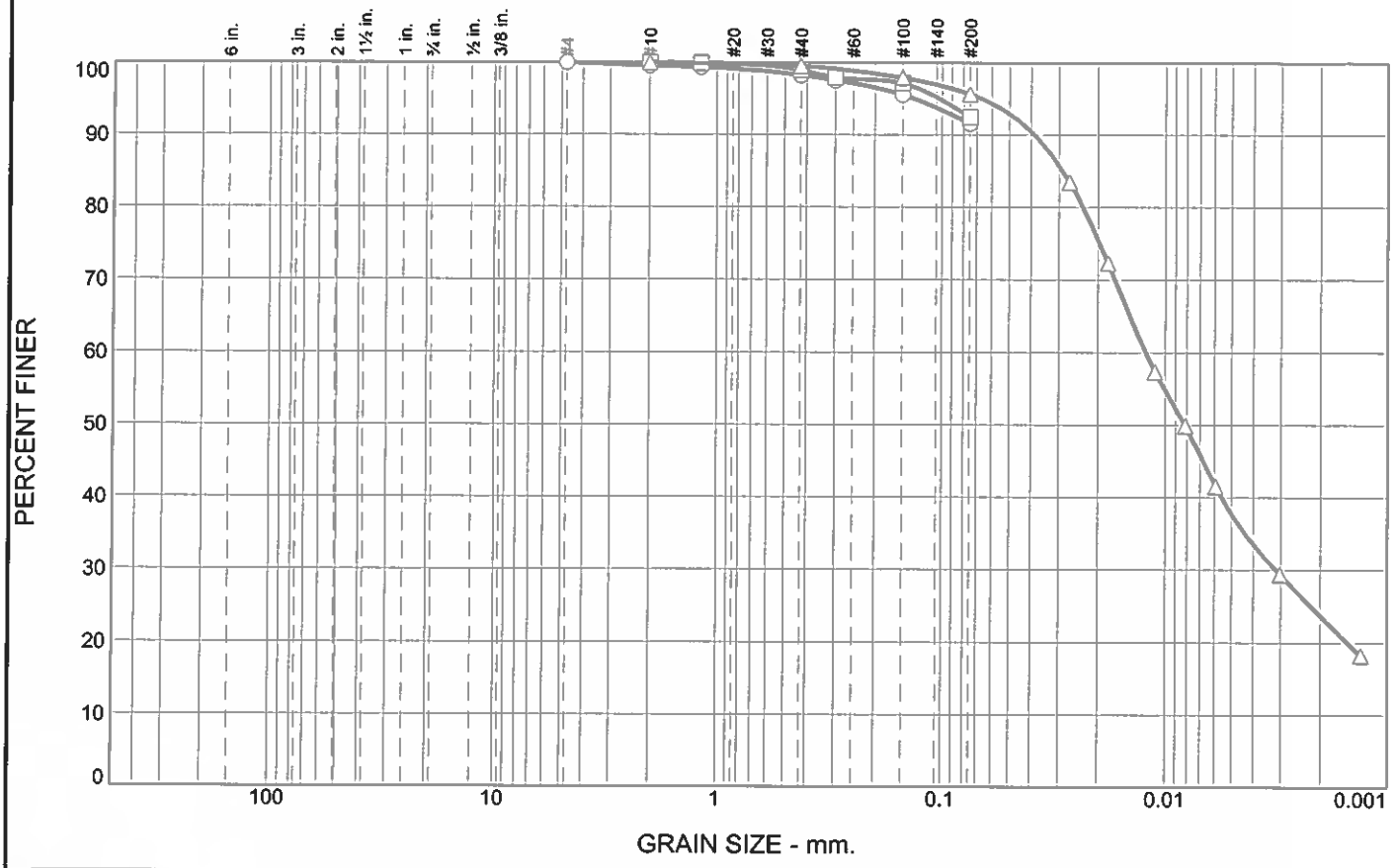
REMARKS:
○
□
△

○ Source of Sample: WLC 4 Depth: 36.5 - 38.0' Sample Number: M
□ Source of Sample: WLC 4 Depth: 40.0 - 41.0' Sample Number: N
△ Source of Sample: WLC 4 Depth: 45.0 - 45.5' Sample Number: O1

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 0.0 | 8.4 | 91.6 | | CH | A-7-6(29) | 23 | 52 |
| □ | 0.0 | 0.0 | 7.5 | 92.5 | | CH | A-7-6(30) | 24 | 53 |
| △ | 0.0 | 0.0 | 4.4 | 71.8 | 23.8 | CH | A-7-6(30) | 23 | 51 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| GRAIN SIZE | | | |
| $D_{60}$ | | | 0.0122 |
| $D_{30}$ | | | 0.0032 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_C$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 100.0 | | |
| #10 | 99.6 | 100.0 | 100.0 |
| #16 | 99.3 | 99.9 | |
| #40 | 98.3 | 98.9 | 99.5 |
| #50 | 97.5 | 97.9 | |
| #100 | 95.6 | 97.2 | 97.9 |
| #200 | 91.6 | 92.5 | 95.6 |

Material Description
○ fat clay
□ fat clay
△ fat clay

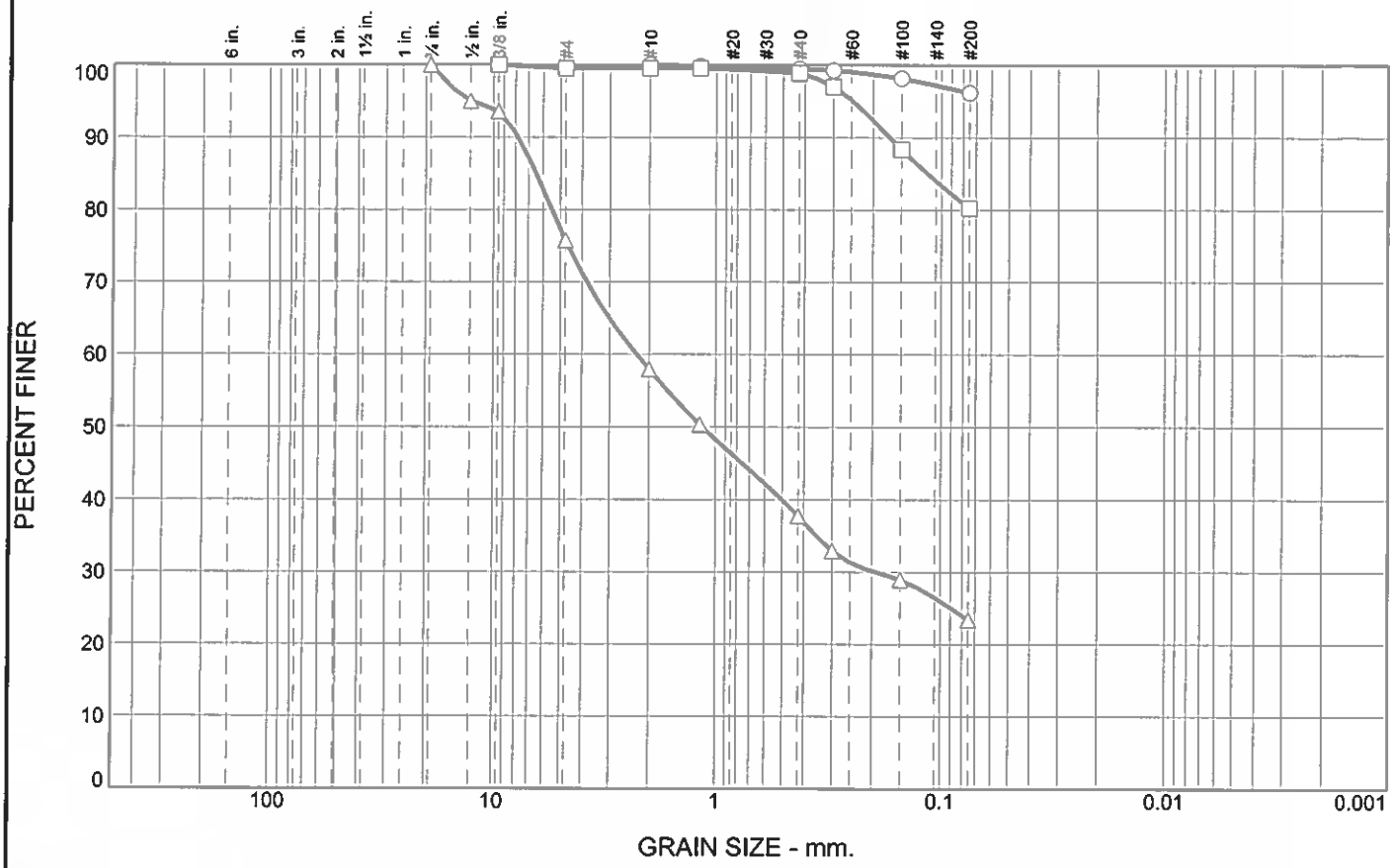
REMARKS:
○
□
△

○ Source of Sample: WLC 4 Depth: 45.5 - 46.0' Sample Number: O2
□ Source of Sample: WLC 4 Depth: 46.0 - 46.5' Sample Number: O3
△ Source of Sample: WLC 4 Depth: 46.5 - 48.0' Sample Number: P

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 0.0 | 3.8 | 96.2 | | CL | A-7-6(29) | 22 | 49 |
| □ | 0.0 | 0.5 | 19.3 | 80.2 | | CL | A-7-6(19) | 18 | 43 |
| △ | 0.0 | 24.2 | 52.4 | 23.4 | | SC | A-2-7(1) | 17 | 45 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 3/4" | | | 100.0 |
| 1/2" | | | 95.0 |
| 3/8" | | 100.0 | 93.5 |
| GRAIN SIZE | | | |
| $D_{60}$ | | | 2.2769 |
| $D_{30}$ | | | 0.1904 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | | 99.5 | 75.8 |
| #10 | 100.0 | 99.5 | 57.9 |
| #16 | 99.8 | 99.5 | 50.4 |
| #40 | 99.5 | 98.8 | 37.8 |
| #50 | 99.2 | 97.0 | 33.0 |
| #100 | 98.1 | 88.4 | 29.0 |
| #200 | 96.2 | 80.2 | 23.4 |

Material Description
○ lean clay
□ lean clay with sand
△ clayey sand with gravel

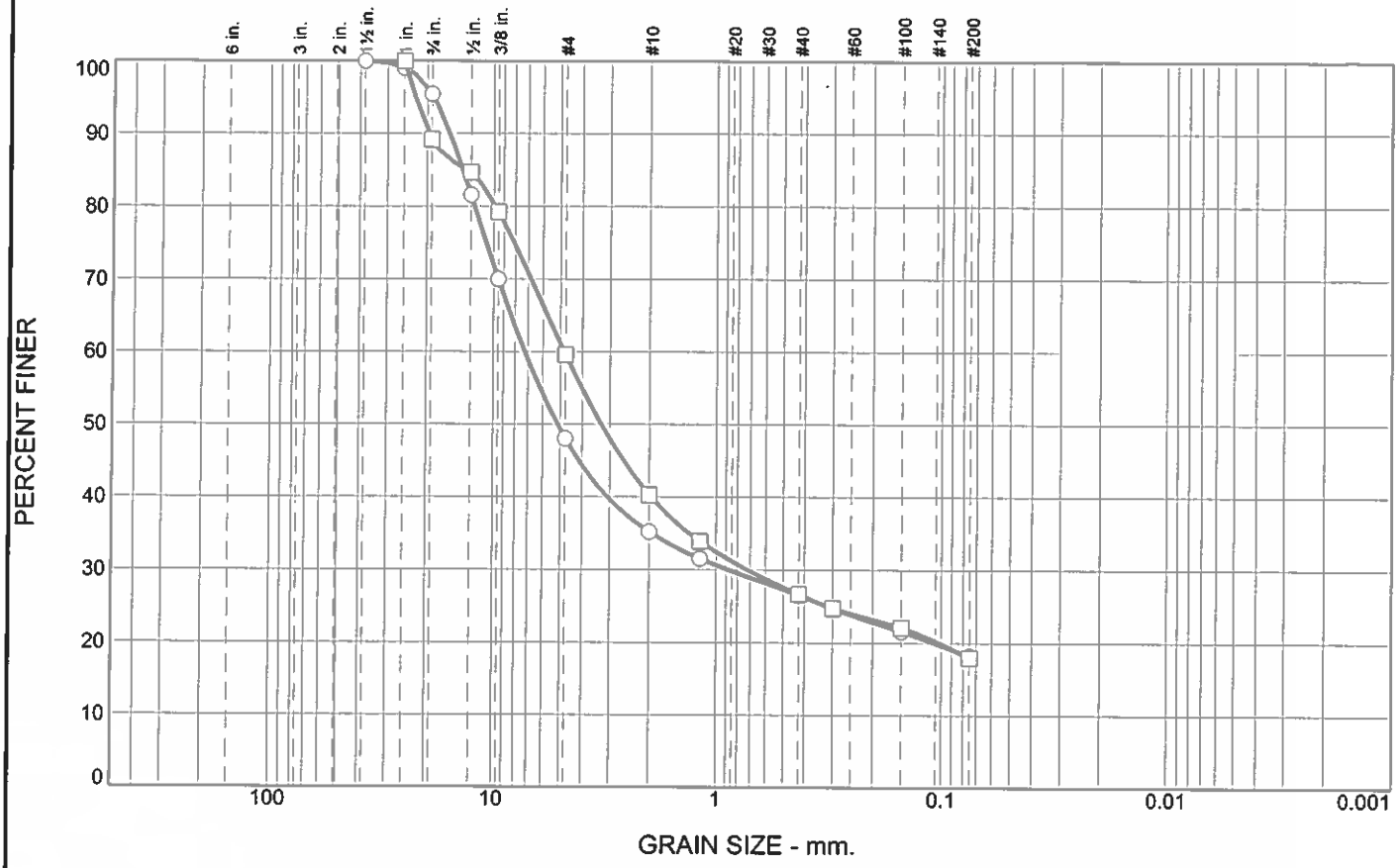
REMARKS:
○
□
△

○ Source of Sample: WLC 4 Depth: 53.0 - 53.5' Sample Number: Q1
□ Source of Sample: WLC 4 Depth: 53.5 - 54.0' Sample Number: Q2
△ Source of Sample: WLC 4 Depth: 58.0 - 59.0' Sample Number: R

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 52.0 | 29.7 | 18.3 | | GM | A-1-b | 17 | 19 |
| □ | 0.0 | 40.4 | 41.6 | 18.0 | | SM | A-1-b | NP | 16 |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| 1 1/2" | 100.0 | |
| 1" | 99.0 | 100.0 |
| 3/4" | 95.4 | 89.1 |
| 1/2" | 81.6 | 84.7 |
| 3/8" | 70.0 | 79.3 |
| **GRAIN SIZE** | | |
| $D_{60}$ | 7.2181 | 4.8218 |
| $D_{30}$ | 0.8777 | 0.7214 |
| $D_{10}$ | | |
| **COEFFICIENTS** | | |
| $C_c$ | | |
| $C_u$ | | |

| SIEVE number size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| #4 | 48.0 | 59.6 |
| #10 | 35.2 | 40.3 |
| #16 | 31.5 | 33.9 |
| #40 | 26.6 | 26.7 |
| #50 | 24.8 | 24.8 |
| #100 | 21.6 | 22.1 |
| #200 | 18.3 | 18.0 |

**Material Description**

○ silty gravel with sand

□ silty sand with gravel

**REMARKS:**

○

□

○ Source of Sample: WLC 4 Depth: 4.0 - 9.0' Sample Number: BULK 1

□ Source of Sample: WLC 4 Depth: 9.0 - 14.0' Sample Number: BULK 2

**NEVADA DEPARTMENT OF TRANSPORTATION**

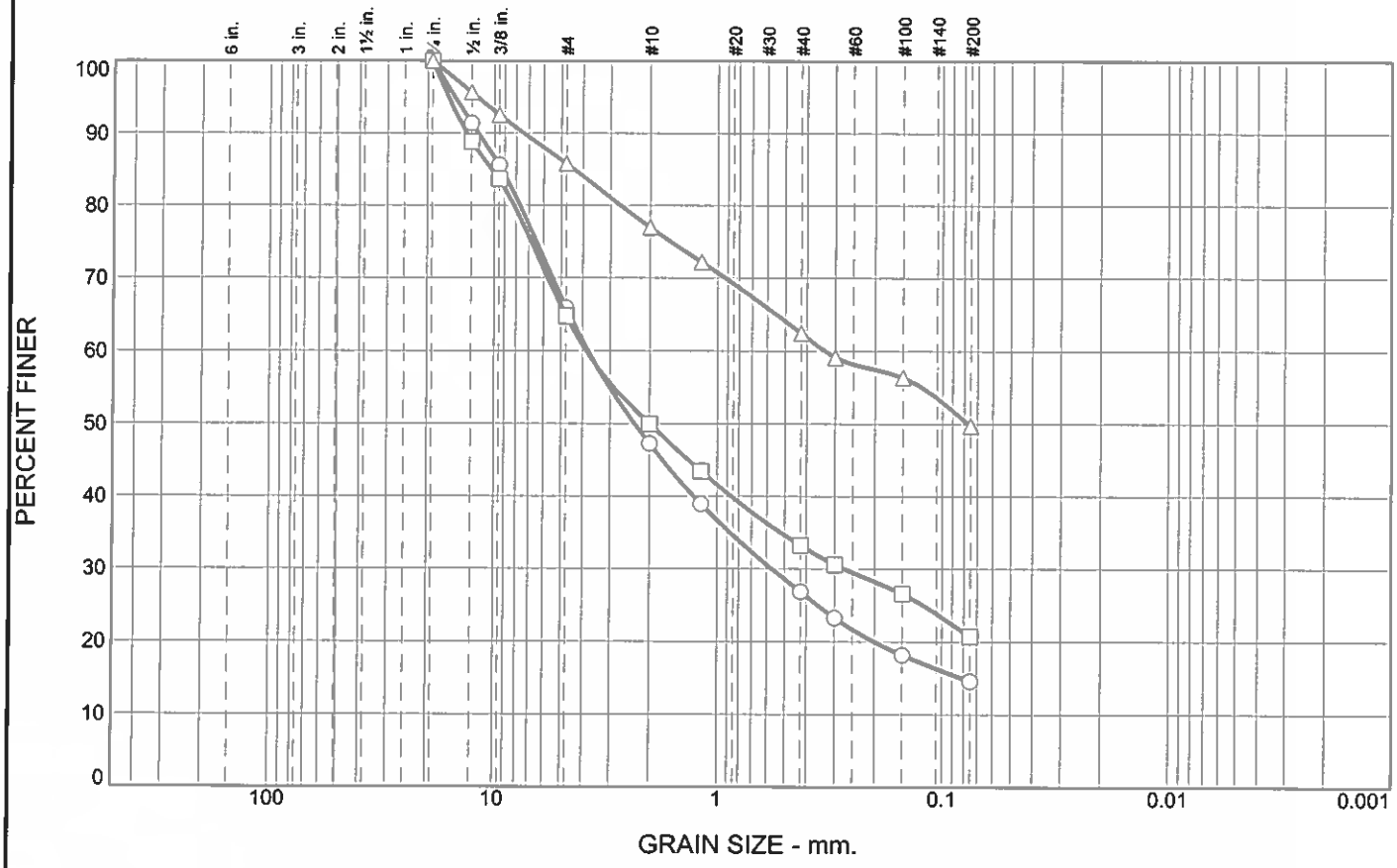
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 34.1 | 51.3 | 14.6 | | SM | A-1-a | NP | 21 |
| □ | 0.0 | 35.2 | 44.1 | 20.7 | | SM | A-1-b | NP | 20 |
| △ | 0.0 | 14.2 | 36.0 | 49.8 | | SM | A-4(2) | 25 | 34 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 3/4" | 100.0 | 100.0 | 100.0 |
| 1/2" | 91.4 | 88.8 | 95.6 |
| 3/8" | 85.6 | 83.6 | 92.5 |
| | GRAIN SIZE | | |
| $D_{60}$ | 3.7757 | 3.8539 | 0.3343 |
| $D_{30}$ | 0.5684 | 0.2733 | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 65.9 | 64.8 | 85.8 |
| #10 | 47.3 | 50.0 | 77.0 |
| #16 | 38.9 | 43.5 | 72.2 |
| #40 | 26.9 | 33.2 | 62.4 |
| #50 | 23.3 | 30.6 | 59.1 |
| #100 | 18.2 | 26.6 | 56.4 |
| #200 | 14.6 | 20.7 | 49.8 |

Material Description
○ silty sand with gravel
□ silty sand with gravel
△ silty sand

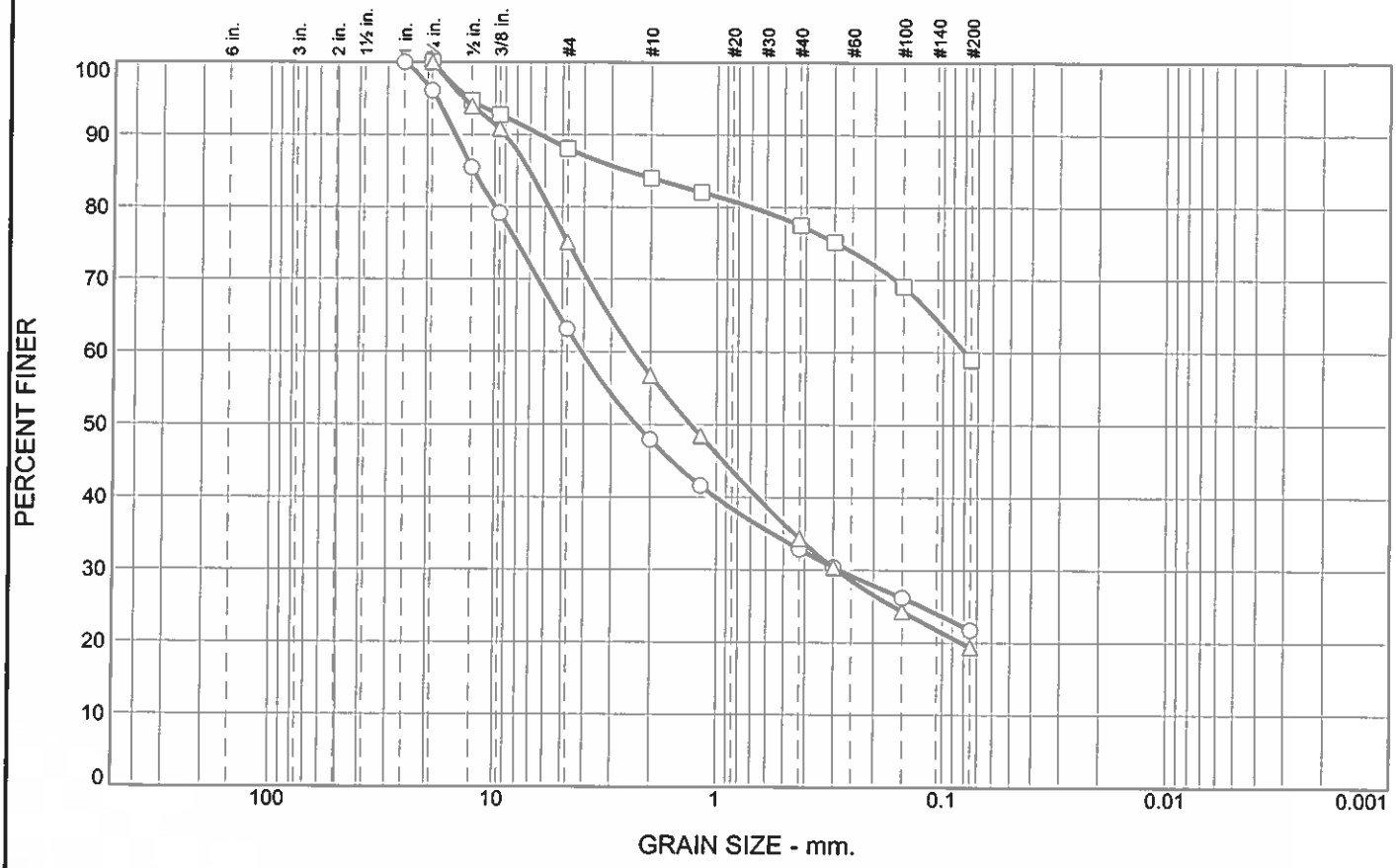
REMARKS:
○
□
△

○ Source of Sample: WLC 5 Depth: 1.0 - 2.5' Sample Number: A
□ Source of Sample: WLC 5 Depth: 3.5 - 4.2' Sample Number: B1
△ Source of Sample: WLC 5 Depth: 4.2 - 5.0' Sample Number: B2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 36.9 | 41.4 | 21.7 | | SM | A-1-b | 26 | 29 |
| □ | 0.0 | 11.9 | 29.1 | 59.0 | | ML | A-4(0) | NP | 18 |
| △ | 0.0 | 24.8 | 55.8 | 19.4 | | SM | A-1-b | NP | 18 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | 100.0 | | |
| 3/4" | 96.1 | 100.0 | 100.0 |
| 1/2" | 85.5 | 94.7 | 94.0 |
| 3/8" | 79.2 | 92.7 | 90.8 |
| **GRAIN SIZE** | | | |
| $D_{60}$ | 4.0947 | 0.0799 | 2.3907 |
| $D_{30}$ | 0.2814 | | 0.2891 |
| $D_{10}$ | | | |
| **COEFFICIENTS** | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 63.1 | 88.1 | 75.2 |
| #10 | 48.0 | 84.0 | 56.8 |
| #16 | 41.6 | 82.1 | 48.5 |
| #40 | 32.9 | 77.5 | 34.4 |
| #50 | 30.4 | 75.2 | 30.4 |
| #100 | 26.2 | 69.1 | 24.3 |
| #200 | 21.7 | 59.0 | 19.4 |

Material Description
○ silty sand with gravel
□ sandy silt
△ silty sand with gravel

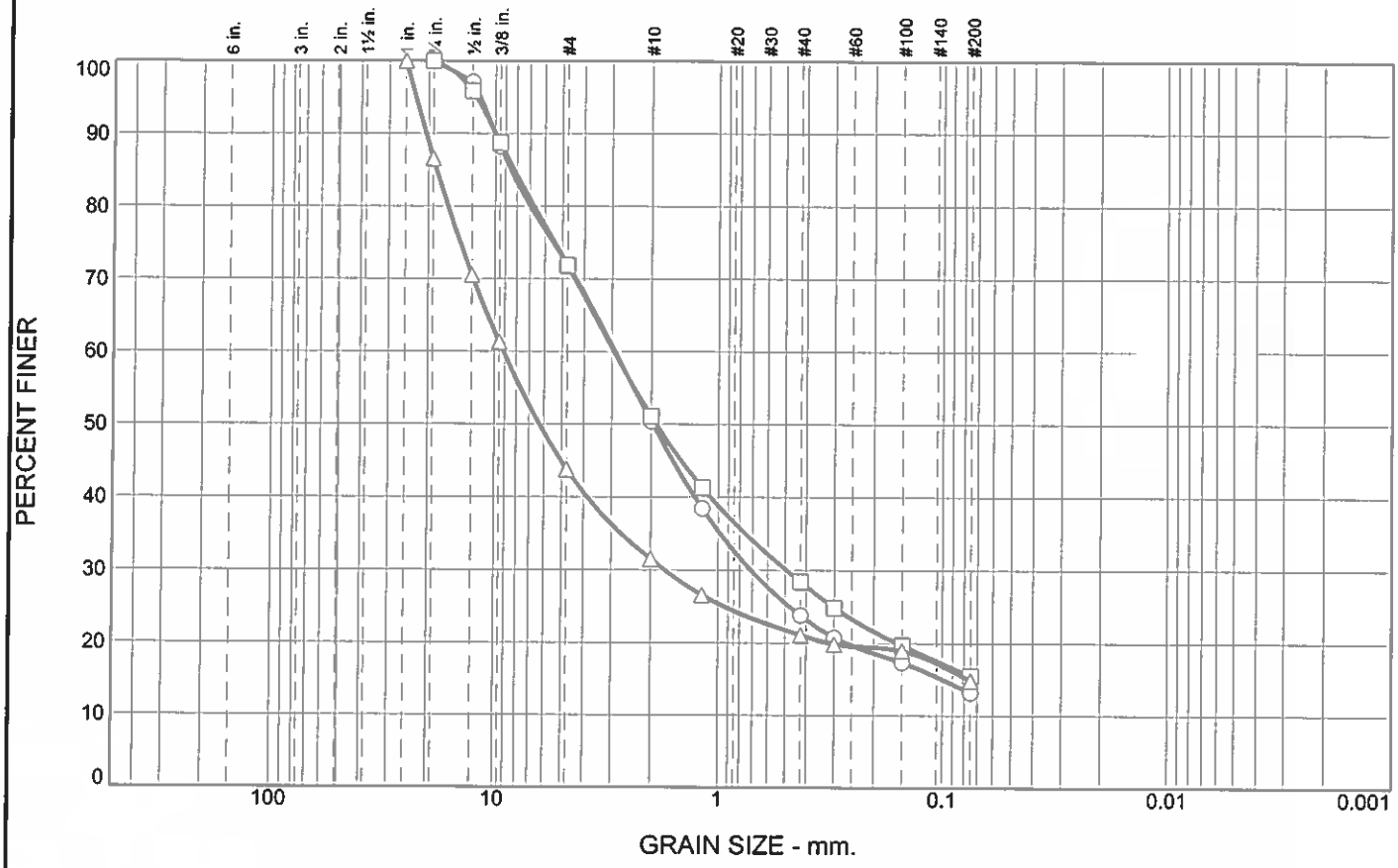
REMARKS:
○
□
△

○ Source of Sample: WLC 5 Depth: 5.0 - 5.5' Sample Number: C
□ Source of Sample: WLC 5 Depth: 6.5 - 8.0' Sample Number: D
△ Source of Sample: WLC 5 Depth: 9.0 - 10.5' Sample Number: E

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 28.1 | 58.7 | 13.2 | | SM | A-1-a | NP | 17 |
| □ | 0.0 | 28.1 | 56.4 | 15.5 | | SM | A-1-b | NP | 17 |
| △ | 0.0 | 56.2 | 28.9 | 14.9 | | GM | A-1-a | 18 | 20 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | | 100.0 |
| 3/4" | 100.0 | 100.0 | 86.6 |
| 1/2" | 97.1 | 95.9 | 70.5 |
| 3/8" | 88.2 | 88.7 | 61.3 |
| GRAIN SIZE | | | |
| $D_{60}$ | 2.9040 | 2.9370 | 9.1206 |
| $D_{30}$ | 0.7124 | 0.4908 | 1.7214 |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 71.9 | 71.9 | 43.8 |
| #10 | 50.4 | 51.1 | 31.6 |
| #16 | 38.5 | 41.3 | 26.6 |
| #40 | 23.8 | 28.4 | 21.1 |
| #50 | 20.8 | 24.9 | 19.9 |
| #100 | 17.4 | 19.7 | 19.0 |
| #200 | 13.2 | 15.5 | 14.9 |

Material Description
○ silty sand with gravel
□ silty sand with gravel
△ silty gravel with sand

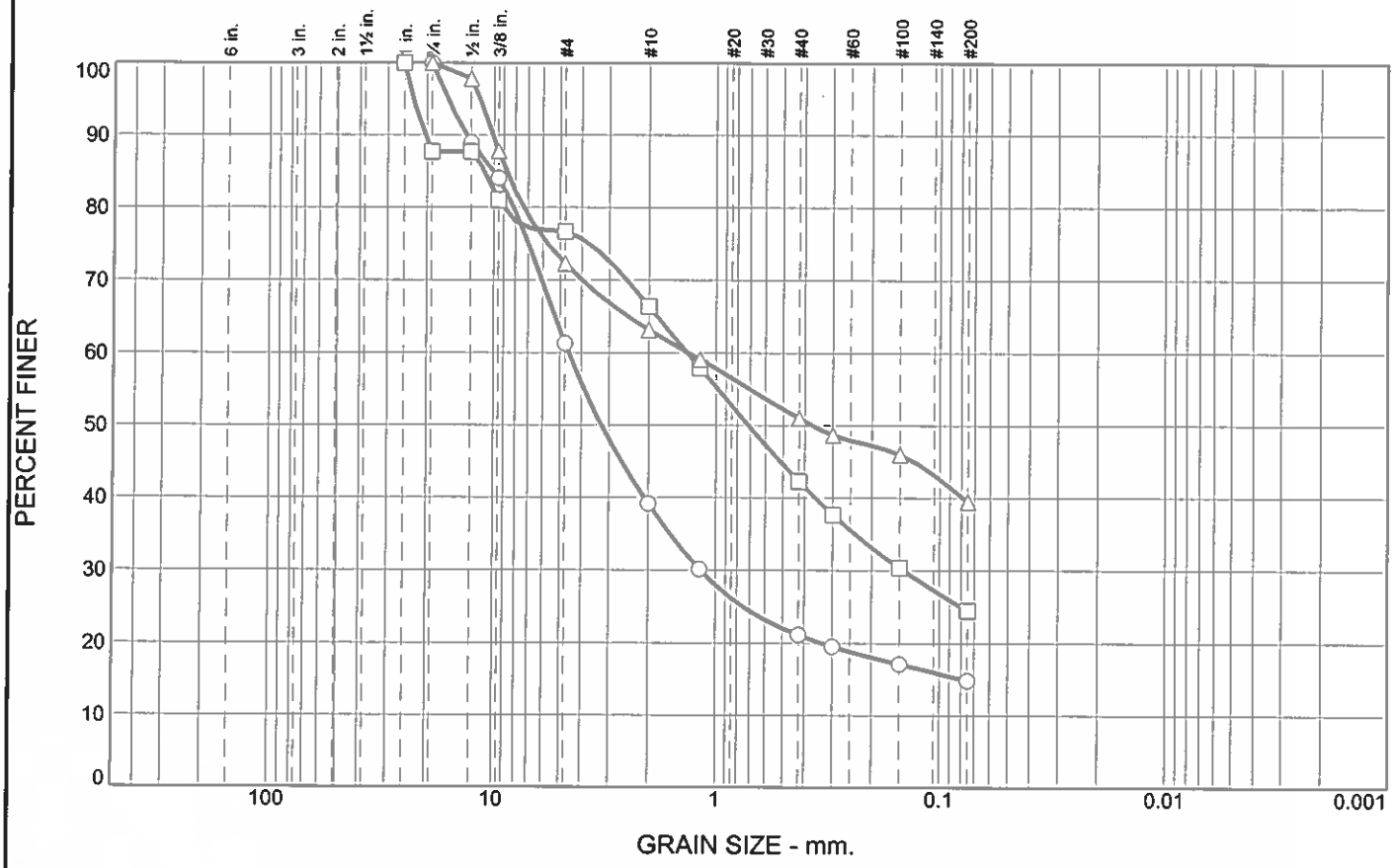
REMARKS:
○
□
△

○ Source of Sample: WLC 5 Depth: 12.0 - 13.5' Sample Number: F
□ Source of Sample: WLC 5 Depth: 15.0 - 16.5' Sample Number: G
△ Source of Sample: WLC 5 Depth: 18.0 - 19.5' Sample Number: H

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 38.7 | 46.4 | 14.9 | | SC-SM | A-1-a | 17 | 21 |
| □ | 0.0 | 23.3 | 52.2 | 24.5 | | SC-SM | A-1-b | 16 | 21 |
| △ | 0.0 | 27.7 | 32.8 | 39.5 | | SC | A-6(3) | 19 | 36 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | 100.0 | |
| 3/4" | 100.0 | 87.7 | 100.0 |
| 1/2" | 88.9 | 87.7 | 97.8 |
| 3/8" | 84.0 | 81.0 | 87.8 |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.5673 | 1.3417 | 1.3287 |
| $D_{30}$ | 1.1681 | 0.1438 | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 61.3 | 76.7 | 72.3 |
| #10 | 39.2 | 66.4 | 63.2 |
| #16 | 30.1 | 57.9 | 59.1 |
| #40 | 21.2 | 42.3 | 51.0 |
| #50 | 19.5 | 37.7 | 48.7 |
| #100 | 17.1 | 30.4 | 46.0 |
| #200 | 14.9 | 24.5 | 39.5 |

Material Description

○ silty, clayey sand with gravel

□ silty, clayey sand with gravel

△ clayey sand with gravel

REMARKS:

○

□

△

○ Source of Sample: WLC 5 Depth: 21.0 - 22.5' Sample Number: I

□ Source of Sample: WLC 5 Depth: 25.0 - 25.9' Sample Number: J

△ Source of Sample: WLC 5 Depth: 30.0 - 31.5' Sample Number: K

**NEVADA DEPARTMENT OF TRANSPORTATION**

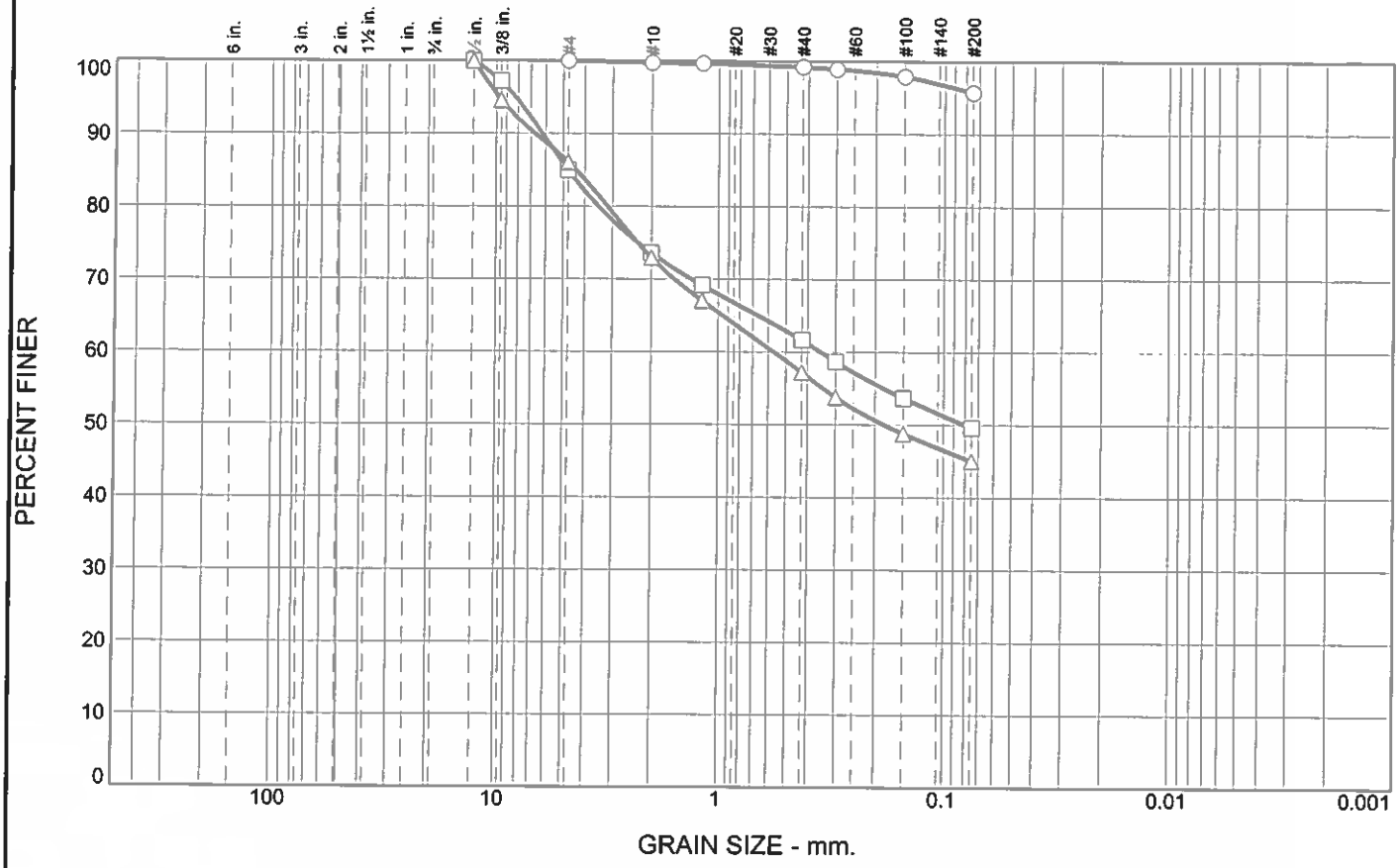
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 0.0 | 4.3 | 95.7 | | CL | A-6(17) | 23 | 39 |
| □ | 0.0 | 15.0 | 35.4 | 49.6 | | SC | A-7-6(7) | 19 | 41 |
| △ | 0.0 | 13.9 | 41.1 | 45.0 | | SC | A-6(6) | 18 | 40 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1/2" | | 100.0 | 100.0 |
| 3/8" | | 97.2 | 94.6 |
| GRAIN SIZE | | | |
| $D_{60}$ | | 0.3512 | 0.5659 |
| $D_{30}$ | | | |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 100.0 | 85.0 | 86.1 |
| #10 | 99.7 | 73.6 | 73.0 |
| #16 | 99.6 | 69.2 | 67.1 |
| #40 | 99.2 | 61.6 | 57.2 |
| #50 | 98.9 | 58.7 | 53.8 |
| #100 | 97.9 | 53.7 | 48.8 |
| #200 | 95.7 | 49.6 | 45.0 |

Material Description
○ lean clay
□ clayey sand with gravel
△ clayey sand

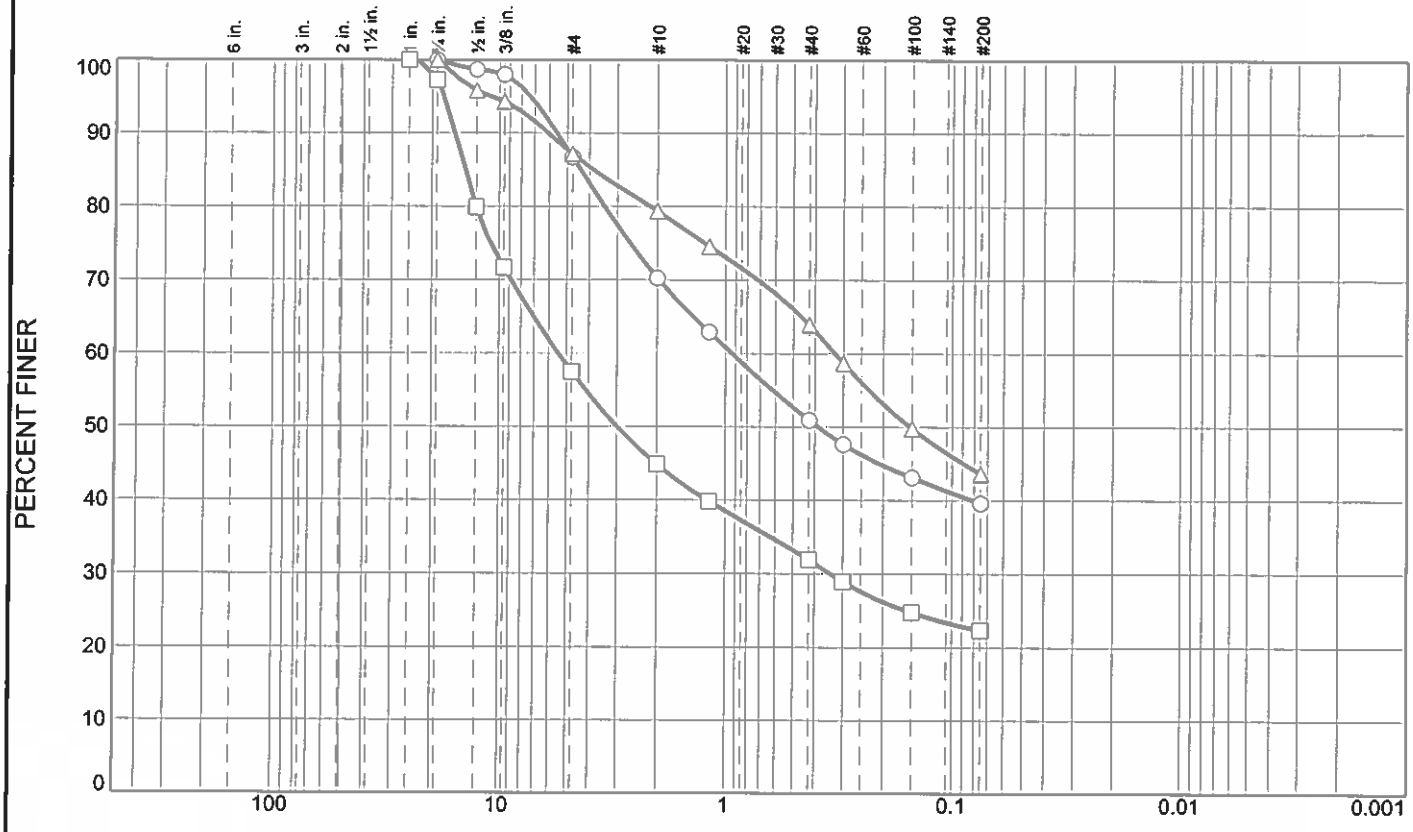
REMARKS:
○
□
△

○ Source of Sample: WLC 5 Depth: 35.0 - 36.5' Sample Number: L
□ Source of Sample: WLC 5 Depth: 40.0 - 40.5' Sample Number: M1
△ Source of Sample: WLC 5 Depth: 40.5 - 41.0' Sample Number: M2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 13.3 | 47.1 | 39.6 | | SC | A-6(4) | 18 | 39 |
| □ | 0.0 | 42.5 | 35.1 | 22.4 | | GC | A-2-6(1) | 18 | 37 |
| △ | 0.0 | 12.9 | 43.5 | 43.6 | | SC | A-7-6(5) | 19 | 41 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | 100.0 | |
| 3/4" | 100.0 | 97.3 | 100.0 |
| 1/2" | 98.7 | 79.9 | 95.8 |
| 3/8" | 98.0 | 71.7 | 94.3 |
| | GRAIN SIZE | | |
| $D_{60}$ | 0.9356 | 5.4468 | 0.3262 |
| $D_{30}$ | | 0.3390 | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_U$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 86.7 | 57.5 | 87.1 |
| #10 | 70.3 | 44.9 | 79.4 |
| #16 | 62.9 | 39.8 | 74.6 |
| #40 | 50.9 | 31.9 | 64.0 |
| #50 | 47.6 | 29.0 | 58.7 |
| #100 | 43.1 | 24.8 | 49.8 |
| #200 | 39.6 | 22.4 | 43.6 |

Material Description
○ clayey sand
□ clayey gravel with sand
△ clayey sand

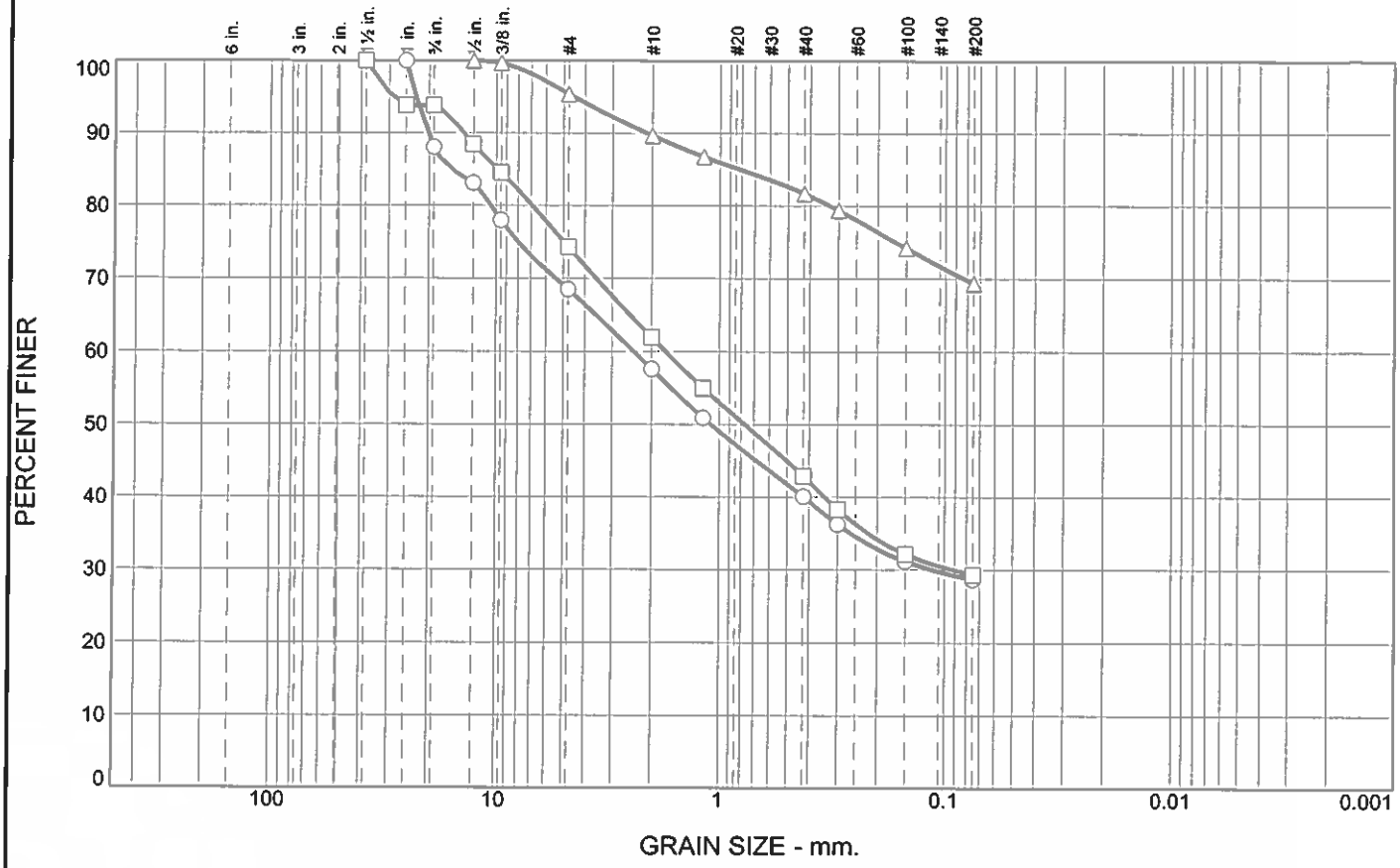
REMARKS:
○
□
△

○ Source of Sample: WLC 5 Depth: 41.0 - 41.5' Sample Number: M3
□ Source of Sample: WLC 5 Depth: 45.0 - 46.5' Sample Number: N
△ Source of Sample: WLC 5 Depth: 50.0 - 50.5' Sample Number: O1

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 31.5 | 39.8 | 28.7 | | SC | A-2-7(4) | 20 | 55 |
| □ | 0.0 | 25.7 | 45.0 | 29.3 | | SC | A-2-7(4) | 20 | 55 |
| △ | 0.0 | 4.6 | 26.1 | 69.3 | | CL | A-6(11) | 19 | 38 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1 1/2" | | 100.0 | |
| 1" | 100.0 | 93.8 | |
| 3/4" | 88.1 | 93.8 | |
| 1/2" | 83.1 | 88.4 | 100.0 |
| 3/8" | 78.0 | 84.6 | 99.7 |
| GRAIN SIZE | | | |
| $D_{60}$ | 2.3968 | 1.7327 | |
| $D_{30}$ | 0.1132 | 0.0915 | |
| $D_{10}$ | | | |
| COEFFICIENTS | | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 68.5 | 74.3 | 95.4 |
| #10 | 57.6 | 62.0 | 89.7 |
| #16 | 50.9 | 55.0 | 86.7 |
| #40 | 40.1 | 42.9 | 81.7 |
| #50 | 36.3 | 38.3 | 79.4 |
| #100 | 31.2 | 32.2 | 74.2 |
| #200 | 28.7 | 29.3 | 69.3 |

**Material Description**

○ clayey sand with gravel

□ clayey sand with gravel

△ sandy lean clay

**REMARKS:**

○

□

△

○ Source of Sample: WLC 5 Depth: 50.5 - 51.0' Sample Number: O2

□ Source of Sample: WLC 5 Depth: 51.0 - 51.5' Sample Number: O3

△ Source of Sample: WLC 5 Depth: 55.0 - 56.5' Sample Number: P

**NEVADA DEPARTMENT OF TRANSPORTATION**

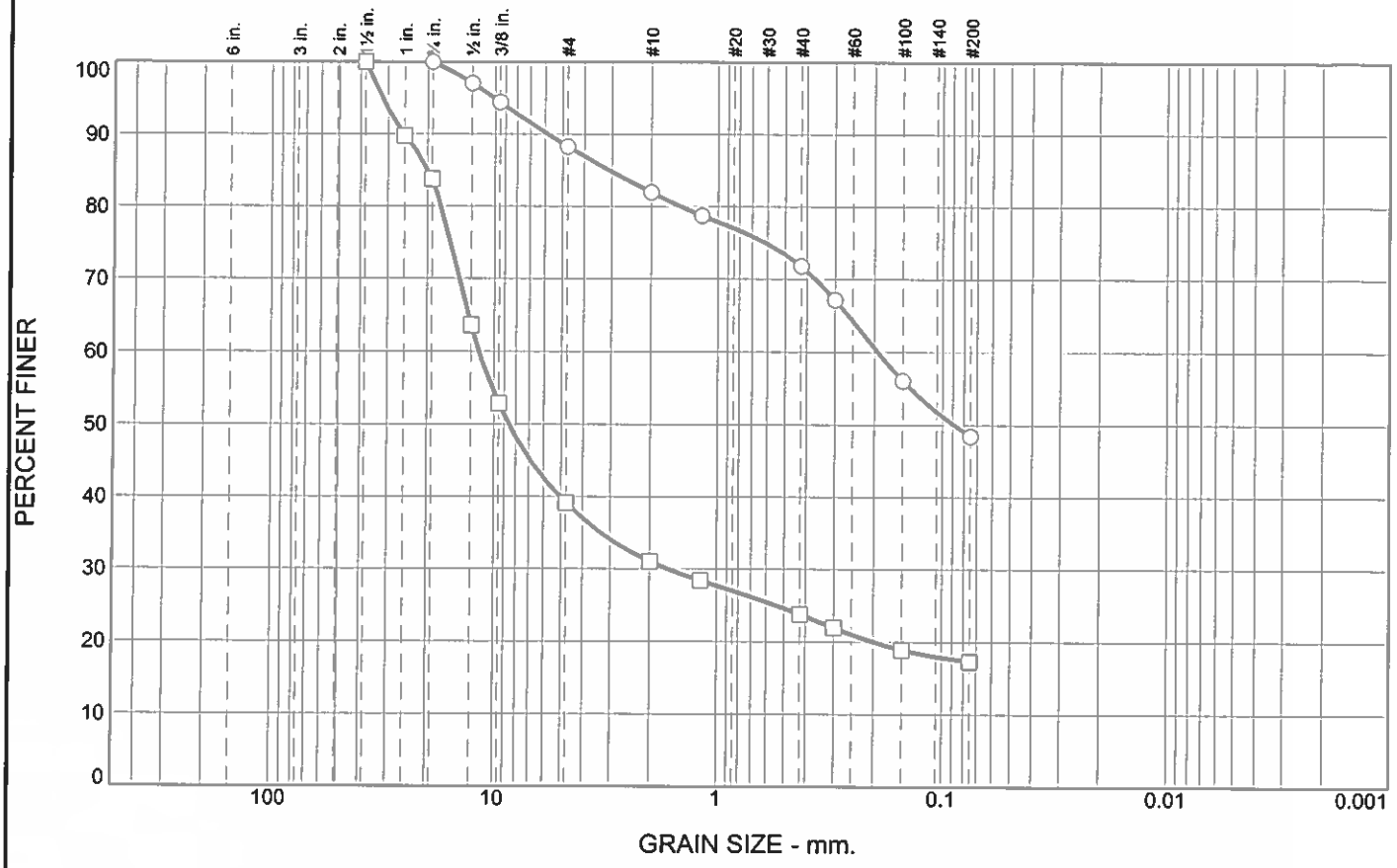
Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08

Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 11.7 | 39.9 | 48.4 | | SC | A-6(6) | 17 | 39 |
| □ | 0.0 | 60.8 | 21.9 | 17.3 | | GC | A-2-7(0) | 18 | 48 |
| | | | | | | | | | |

| SIEVE inches size | ○ | □ |
|---|---|---|
| 1 1/2" | | 100.0 |
| 1" | | 89.7 |
| 3/4" | 100.0 | 83.8 |
| 1/2" | 97.1 | 63.6 |
| 3/8" | 94.4 | 52.9 |
| **GRAIN SIZE** | | |
| $D_{60}$ | 0.1933 | 11.7053 |
| $D_{30}$ | | 1.6544 |
| $D_{10}$ | | |
| **COEFFICIENTS** | | |
| $C_c$ | | |
| $C_u$ | | |

| SIEVE number size | ○ | □ |
|---|---|---|
| #4 | 88.3 | 39.2 |
| #10 | 82.0 | 31.1 |
| #16 | 78.7 | 28.4 |
| #40 | 71.8 | 23.8 |
| #50 | 67.2 | 21.9 |
| #100 | 56.1 | 18.9 |
| #200 | 48.4 | 17.3 |

Material Description
○ clayey sand

□ clayey gravel with sand

REMARKS:
○

□

○ Source of Sample: WLC 5 Depth: 60.0 - 60.5' Sample Number: Q1

□ Source of Sample: WLC 5 Depth: 60.5 - 61.0' Sample Number: Q2

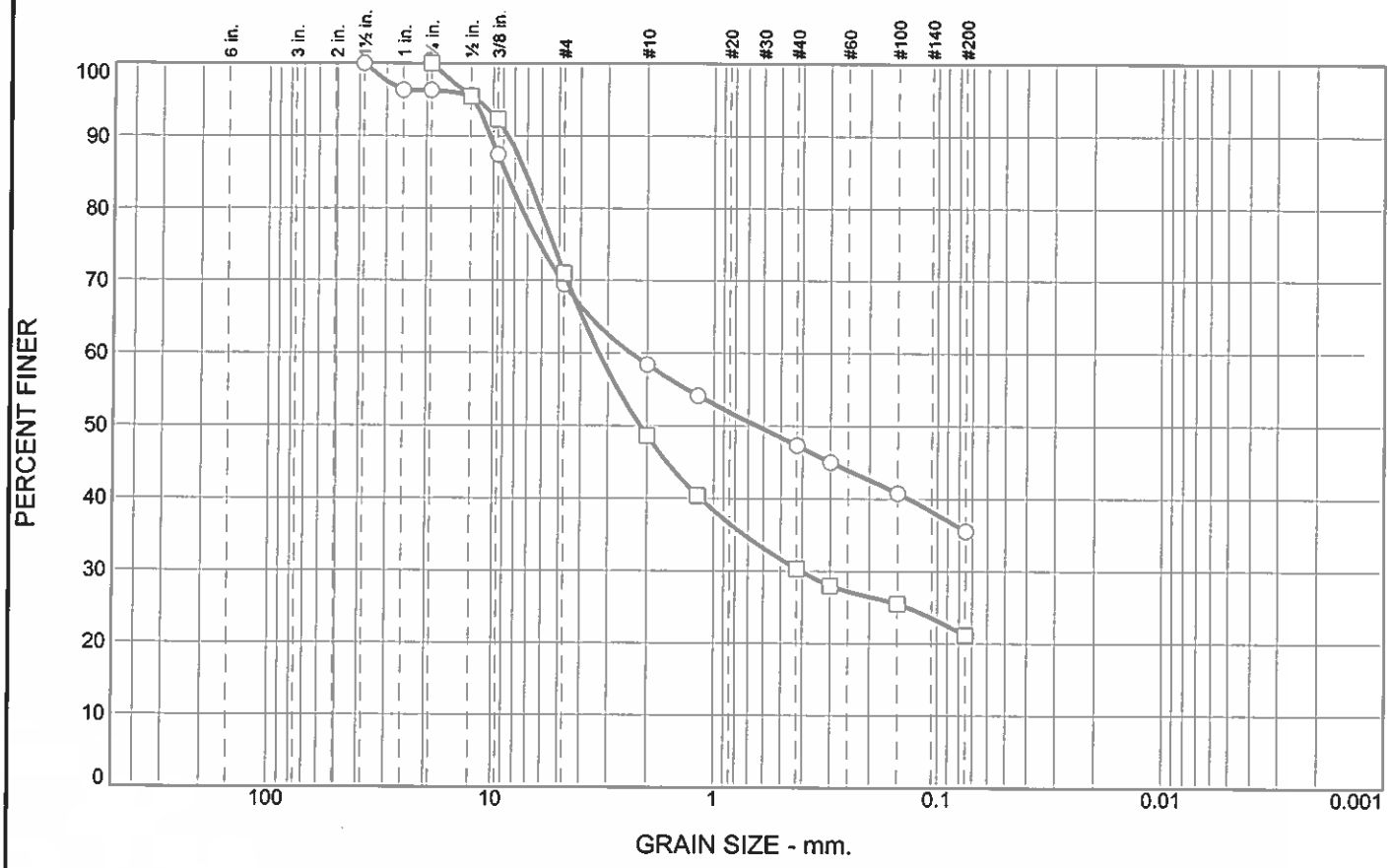
**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 30.5 | 33.9 | 35.6 | | SC-SM | A-4(0) | 18 | 22 |
| □ | 0.0 | 29.0 | 49.8 | 21.2 | | SM | A-1-b | 17 | 19 |
| | | | | | | | | | |

| SIEVE inches size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| 1 1/2" | 100.0 | |
| 1" | 96.3 | |
| 3/4" | 96.3 | 100.0 |
| 1/2" | 95.6 | 95.5 |
| 3/8" | 87.5 | 92.3 |
| **GRAIN SIZE** | | |
| $D_{60}$ | 2.3702 | 3.2991 |
| $D_{30}$ | | 0.4039 |
| $D_{10}$ | | |
| **COEFFICIENTS** | | |
| $C_c$ | | |
| $C_u$ | | |

| SIEVE number size | PERCENT FINER ○ | PERCENT FINER □ |
|---|---|---|
| #4 | 69.5 | 71.0 |
| #10 | 58.4 | 48.6 |
| #16 | 54.1 | 40.4 |
| #40 | 47.4 | 30.4 |
| #50 | 45.1 | 28.0 |
| #100 | 40.8 | 25.5 |
| #200 | 35.6 | 21.2 |

Material Description

○ silty, clayey sand with gravel

□ silty sand with gravel

REMARKS:

○

□

○ Source of Sample: WLC 5 Depth: 4.0 - 9.0' Sample Number: BULK 1

□ Source of Sample: WLC 5 Depth: 9.0 - 14.0' Sample Number: BULK 2

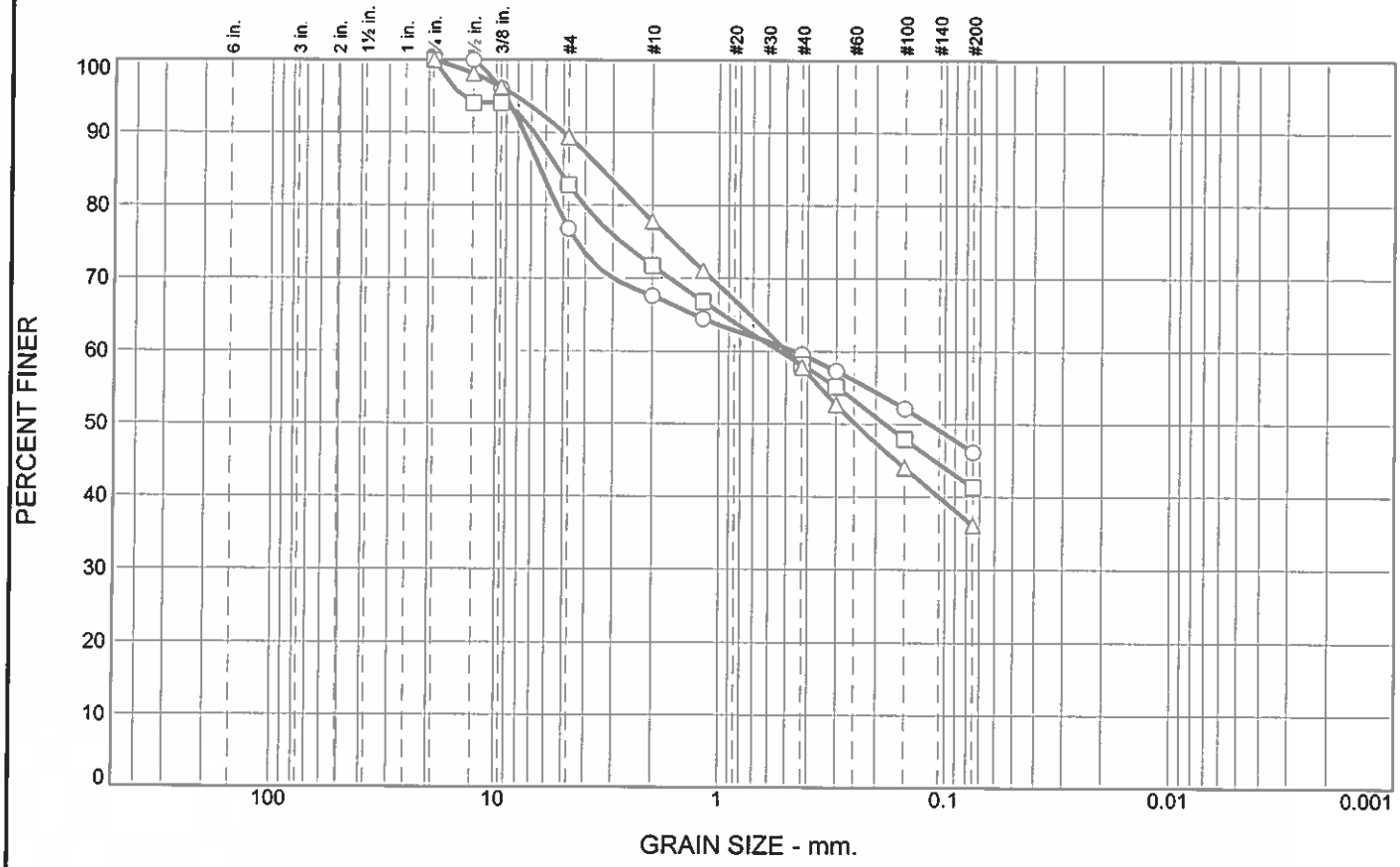
**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani

Project: US 93 Wildlife Crossing Bridge

Project No.: FL-6-08 Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 23.2 | 30.7 | 46.1 | | SC | A-4(1) | 20 | 28 |
| □ | 0.0 | 17.2 | 41.5 | 41.3 | | SM | A-4(0) | NP | 32 |
| △ | 0.0 | 10.6 | 53.3 | 36.1 | | SM | A-4(0) | NP | 33 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 3/4" | | 100.0 | 100.0 |
| 1/2" | 100.0 | 94.0 | 98.1 |
| 3/8" | 96.0 | 94.0 | 96.2 |
| | GRAIN SIZE | | |
| $D_{60}$ | 0.4562 | 0.5295 | 0.4949 |
| $D_{30}$ | | | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_U$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 76.8 | 82.8 | 89.4 |
| #10 | 67.6 | 71.8 | 77.8 |
| #16 | 64.5 | 66.8 | 71.1 |
| #40 | 59.6 | 58.2 | 57.8 |
| #50 | 57.3 | 55.1 | 52.7 |
| #100 | 52.1 | 48.0 | 44.0 |
| #200 | 46.1 | 41.3 | 36.1 |

Material Description
○ clayey sand with gravel
□ silty sand with gravel
△ silty sand

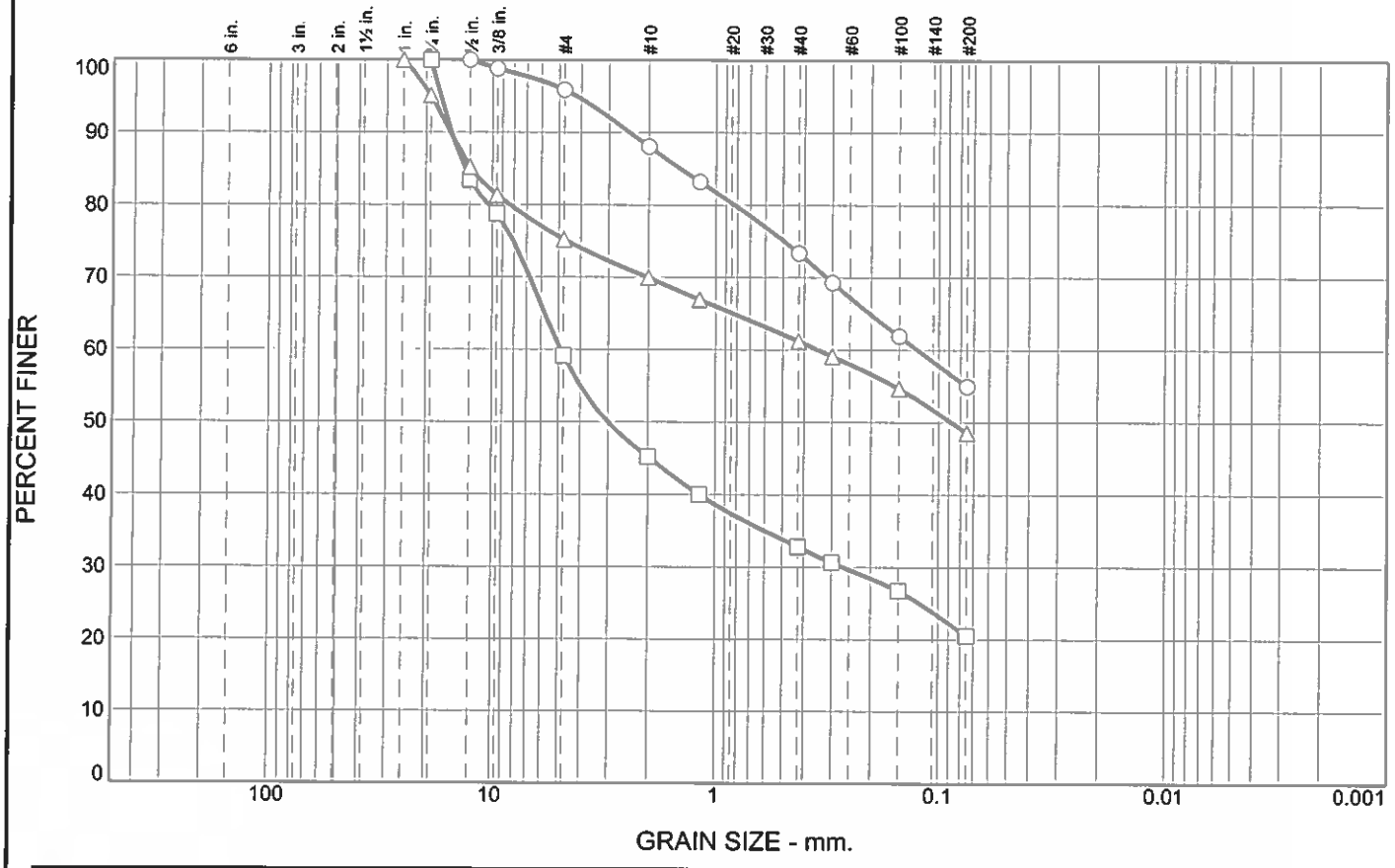
REMARKS:
○
□
△

○ Source of Sample: WLC 6 Depth: 1.0 - 2.5' Sample Number: A
□ Source of Sample: WLC 6 Depth: 3.0 - 3.5' Sample Number: B1
△ Source of Sample: WLC 6 Depth: 3.5 - 4.0' Sample Number: B2

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 4.1 | 41.0 | 54.9 | | ML | A-4(0) | NP | 34 |
| □ | 0.0 | 40.9 | 38.6 | 20.5 | | GM | A-1-b | NP | 25 |
| △ | 0.0 | 24.7 | 26.8 | 48.5 | | SC-SM | A-4(0) | 19 | 24 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1" | | | 100.0 |
| 3/4" | | 100.0 | 95.1 |
| 1/2" | 100.0 | 83.4 | 85.3 |
| 3/8" | 98.8 | 78.8 | 81.4 |
| | GRAIN SIZE | | |
| $D_{60}$ | 0.1243 | 4.9035 | 0.3474 |
| $D_{30}$ | | 0.2662 | |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 95.9 | 59.1 | 75.3 |
| #10 | 88.0 | 45.2 | 70.0 |
| #16 | 83.2 | 40.0 | 66.9 |
| #40 | 73.4 | 32.9 | 61.2 |
| #50 | 69.3 | 30.7 | 59.1 |
| #100 | 61.9 | 26.8 | 54.6 |
| #200 | 54.9 | 20.5 | 48.5 |

Material Description
○ sandy silt
□ silty gravel with sand
△ silty, clayey sand with gravel

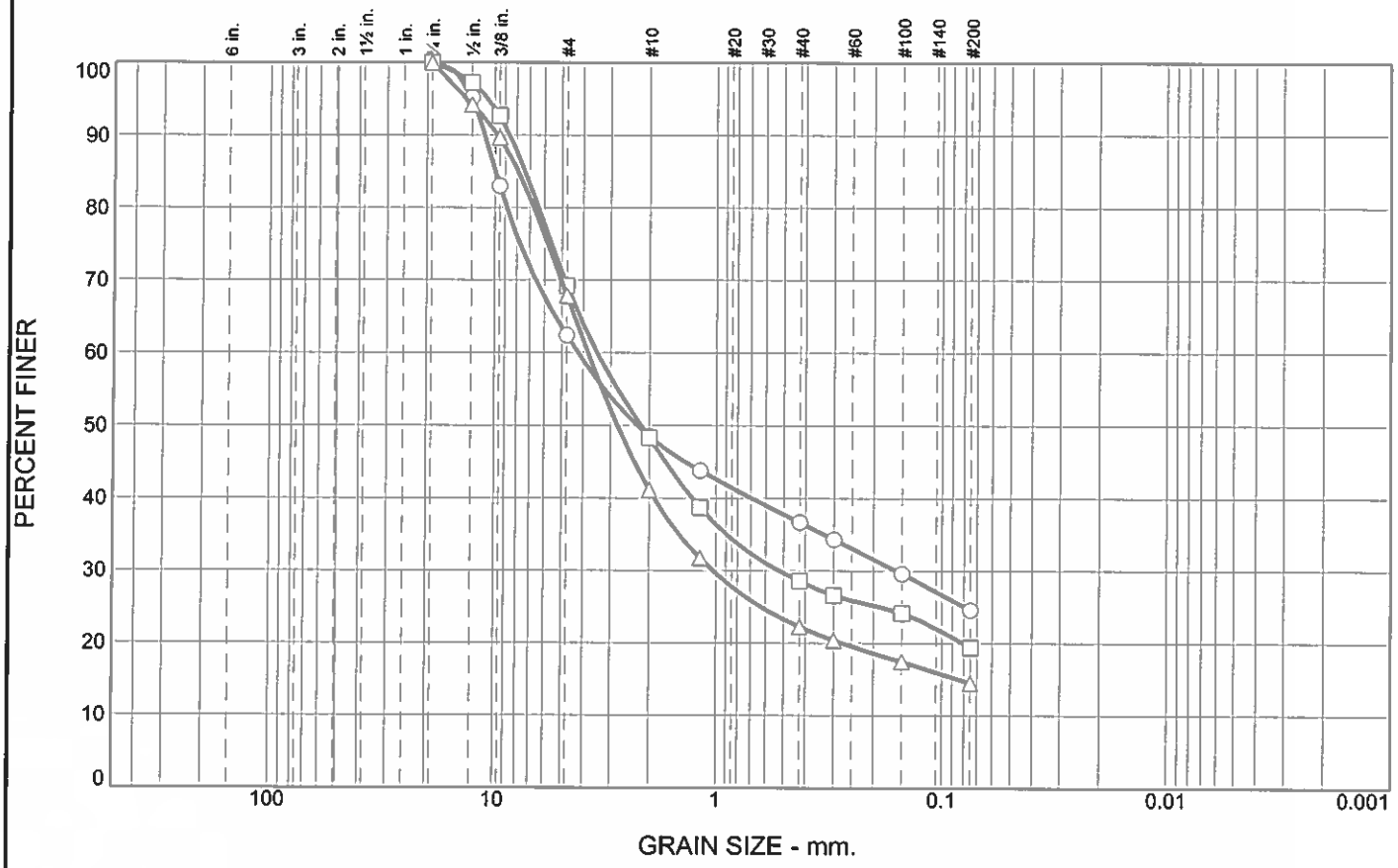
REMARKS:
○
□
△

○ Source of Sample: WLC 6 Depth: 4.0 - 4.5' Sample Number: B3
□ Source of Sample: WLC 6 Depth: 4.5 - 6.0' Sample Number: C
△ Source of Sample: WLC 6 Depth: 7.0 - 8.5' Sample Number: D

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 37.6 | 37.8 | 24.6 | | SM | A-1-b | NP | 20 |
| □ | 0.0 | 30.8 | 49.8 | 19.4 | | SM | A-1-b | 18 | 19 |
| △ | 0.0 | 32.2 | 53.3 | 14.5 | | SM | A-1-a | NP | 17 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 3/4" | 100.0 | 100.0 | 100.0 |
| 1/2" | 95.2 | 97.2 | 94.2 |
| 3/8" | 83.0 | 92.7 | 89.7 |
| | GRAIN SIZE | | |
| $D_{60}$ | 4.2215 | 3.4568 | 3.8031 |
| $D_{30}$ | 0.1580 | 0.5202 | 1.0293 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_C$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 62.4 | 69.2 | 67.8 |
| #10 | 48.5 | 48.3 | 41.1 |
| #16 | 43.8 | 38.7 | 31.8 |
| #40 | 36.7 | 28.6 | 22.3 |
| #50 | 34.4 | 26.6 | 20.4 |
| #100 | 29.6 | 24.2 | 17.4 |
| #200 | 24.6 | 19.4 | 14.5 |

Material Description
○ silty sand with gravel
□ silty sand with gravel
△ silty sand with gravel

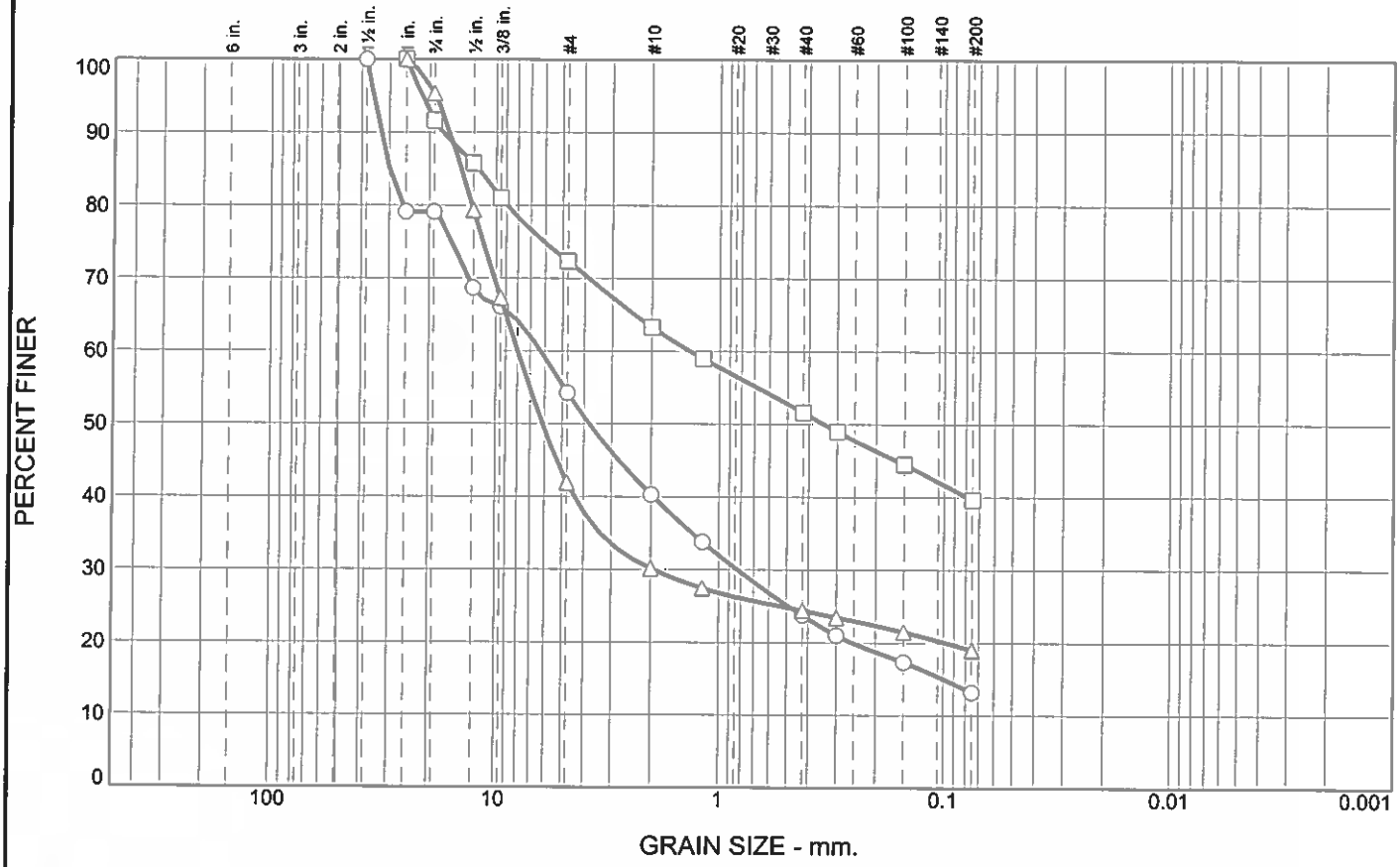
REMARKS:
○
□
△

○ Source of Sample: WLC 6 Depth: 9.5 - 11.0' Sample Number: E
□ Source of Sample: WLC 6 Depth: 12.0 - 13.5' Sample Number: F
△ Source of Sample: WLC 6 Depth: 15.0 - 16.5' Sample Number: G

**NEVADA DEPARTMENT OF TRANSPORTATION**

Client: A. Ablahani
Project: US 93 Wildlife Crossing Bridge
Project No.: FL-6-08
Figure

# Particle Size Distribution Report




| | +3" | % GRAVEL | % SAND | % SILT | % CLAY | USCS | AASHTO | PL | LL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | 0.0 | 45.7 | 41.1 | 13.2 | | GM | A-1-a | NP | 20 |
| □ | 0.0 | 27.6 | 32.7 | 39.7 | | SC-SM | A-4(0) | 21 | 28 |
| △ | 0.0 | 58.1 | 22.9 | 19.0 | | GC-GM | A-1-b | 18 | 24 |

| SIEVE inches size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| 1 1/2" | 100.0 | | |
| 1" | 79.1 | 100.0 | 100.0 |
| 3/4" | 79.1 | 91.6 | 95.4 |
| 1/2" | 68.7 | 85.8 | 79.4 |
| 3/8" | 66.1 | 81.0 | 67.3 |
| | GRAIN SIZE | | |
| $D_{60}$ | 6.2755 | 1.3519 | 7.9580 |
| $D_{30}$ | 0.8261 | | 1.9335 |
| $D_{10}$ | | | |
| | COEFFICIENTS | | |
| $C_c$ | | | |
| $C_u$ | | | |

| SIEVE number size | PERCENT FINER ○ | □ | △ |
|---|---|---|---|
| #4 | 54.3 | 72.4 | 41.9 |
| #10 | 40.3 | 63.3 | 30.2 |
| #16 | 33.8 | 59.0 | 27.5 |
| #40 | 23.8 | 51.6 | 24.4 |
| #50 | 21.0 | 49.0 | 23.5 |
| #100 | 17.4 | 44.5 | 21.5 |
| #200 | 13.2 | 39.7 | 19.0 |

**Material Description**

○ silty gravel with sand

□ silty, clayey sand with gravel

△ silty clayey gravel with sand

**REMARKS:**

○

□

△

○ Source of Sample: WLC 6 Depth: 18.0 - 19.5' Sample Number: H

□ Source of Sample: WLC 6 Depth: 4.0 - 9.0' Sample Number: BULK 1

△ Source of Sample: WLC 6 Depth: 9.0 - 14.0' Sample Number: BULK 2

**NEVADA DEPARTMENT OF TRANSPORTATION**

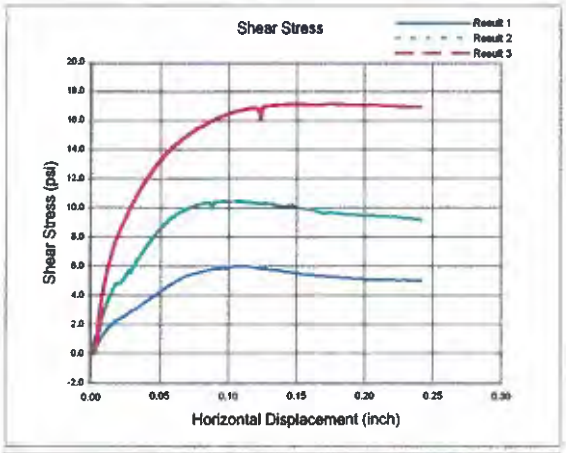
Client: A. Ablahani

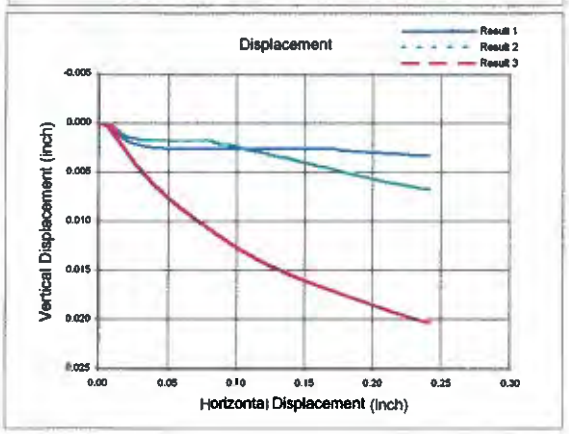
Project: US 93 Wildlife Crossing Bridge

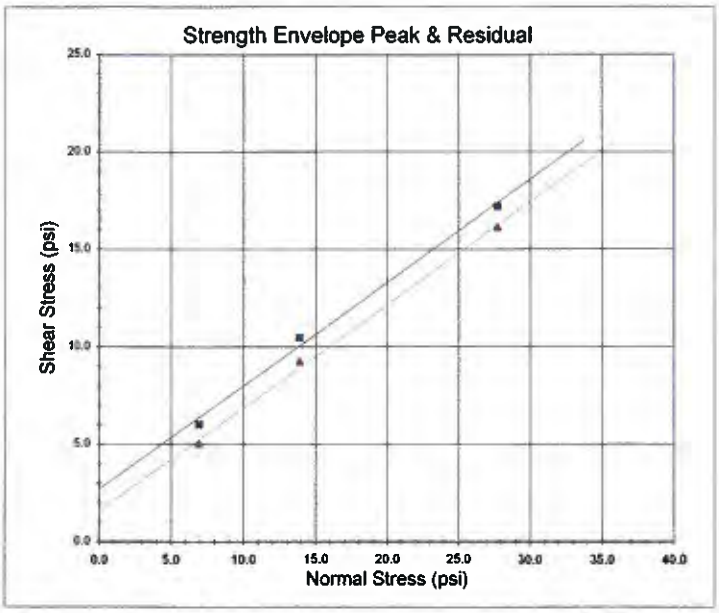
Project No.: FL-6-08

Figure

# DIRECT SHEAR TEST REPORT




| Strength Parameters | | | | |
|---|---|---|---|---|
| | Peak | | Residual |
| Friction Angle = | 28 | degrees | 28 |
| Cohesion = | 2.69 | psi | 1.60 |

Project: FL-6-08 Boring: WLC-4 Sample: I3

| | Result 1 | Result 2 | Result 3 |
|---|---|---|---|
| Specimen: | a | b | c |
| Date Tested | 2/12/2009 | 2/12/2009 | 2/11/2009 |
| Diameter (inch): | 2.42 | 2.42 | 2.42 |
| Height (inch): | 1.00 | 1.00 | 1.00 |
| Depth (ft): | 23.00 | 23.00 | 23.00 |
| Moisture (%) | 25.2 | 32.1 | 29.5 |
| Dry Unit Wt (pcf) | 76.7 | 74.7 | 73.5 |
| SHEAR | | | |
| Displacement Rate($^{in}/_{min}$) | 0.0054 | 0.0055 | 0.0054 |
| Normal Stress (psi) | 6.94 | 13.88 | 27.75 |
| **Peak** Shear Stress(psi) | 6.04 | 10.51 | 17.22 |
| **Residual** Shear Stress(psi) | 5.1 | 9.3 | 16.2 |
| Residual Point Picked @(in) | 0.242 | 0.242 | 0.242 |
| Time @ Peak Failure (min) | 19.3 | 19.4 | 32.1 |

Specimen Comments

a Medium brown silty shear @ 1000 psf

b Medium brown silty shear @ 2000 psf

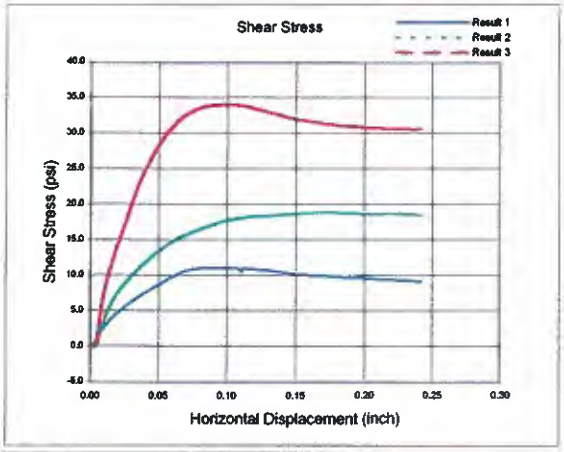
c Medium brown silty shear @ 4000 psf

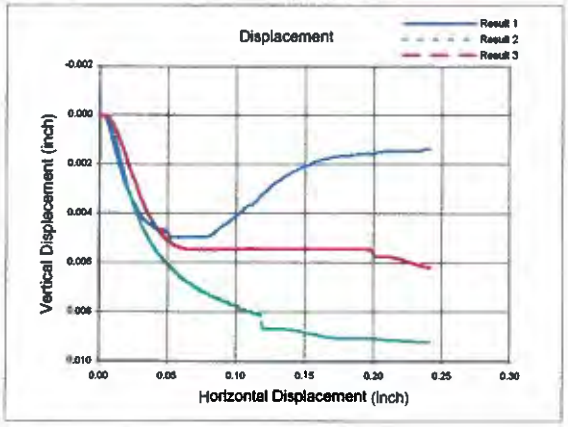
Geotechnical Section

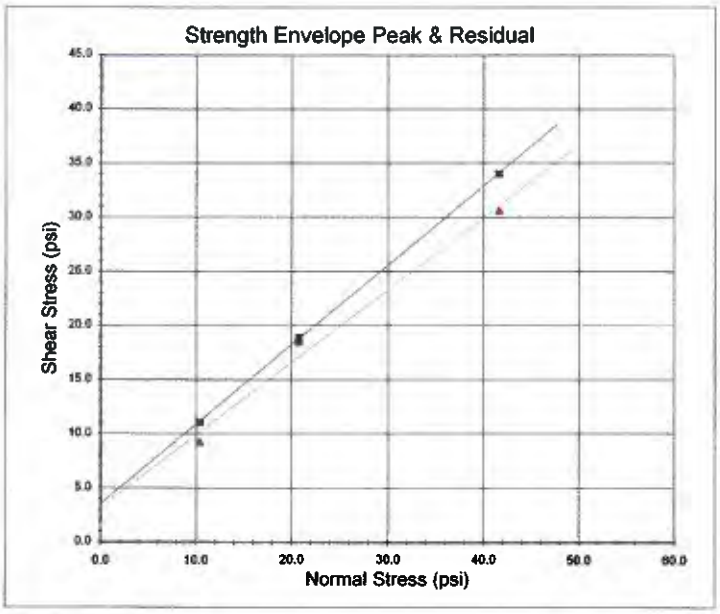
NEVADA DOT

DigiShear Report v4b __ WLC4-I3-08.xls

# DIRECT SHEAR TEST REPORT




**Strength Parameters**

| | Peak | | Residual |
|---|---|---|---|
| Friction Angle = | 36 | degrees | 34 |
| Cohesion = | 3.55 | psi | 3.22 |

Project: FL-6-08 Boring: WLC-4 Sample: K2

| | Result 1 | Result 2 | Result 3 |
|---|---|---|---|
| Specimen: | a | b | c |
| Date Tested | 2/17/2009 | 2/17/2009 | 2/17/2009 |
| Diameter (inch): | 2.42 | 2.42 | 2.42 |
| Height (inch): | 1.00 | 1.00 | 1.00 |
| Depth (ft): | 31.00 | 31.00 | 31.00 |
| Moisture (%) | 27.9 | 34.8 | 21.2 |
| Dry Unit Wt (pcf) | 79.0 | 72.6 | 88.7 |
| SHEAR | | | |
| Displacement Rate($^{in}/_{min}$) | 0.0055 | 0.0055 | 0.0054 |
| Normal Stress (psi) | 10.40 | 20.80 | 41.64 |
| **Peak** Shear Stress(psi) | 11.10 | 18.95 | 34.09 |
| **Residual** Shear Stress(psi) | 9.3 | 18.6 | 30.7 |
| Residual Point Picked @(in) | 0.242 | 0.242 | 0.242 |
| Time @ Peak Failure (min) | 17.5 | 31.5 | 18.9 |

**Specimen Comments**

a Medium brown silty sand shear @ 1500 psf

b Medium brown silty sand shear @ 3000 psf

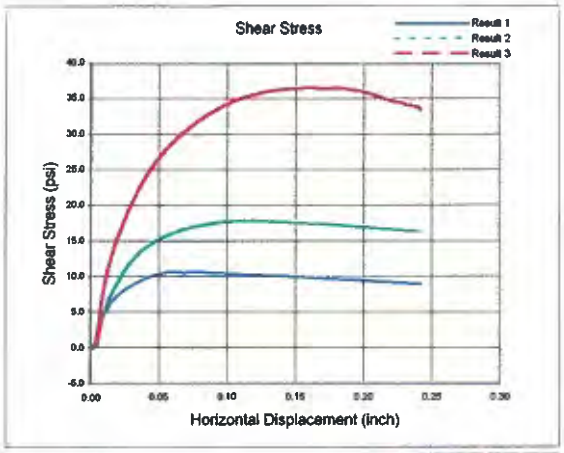
c Medium brown silty sand shear @ 6000 psf

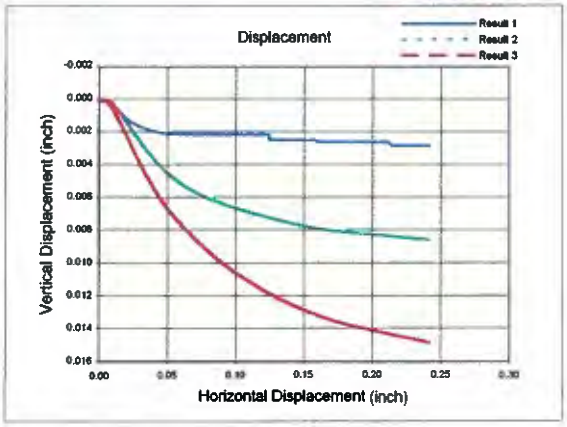
Geotechnical Section

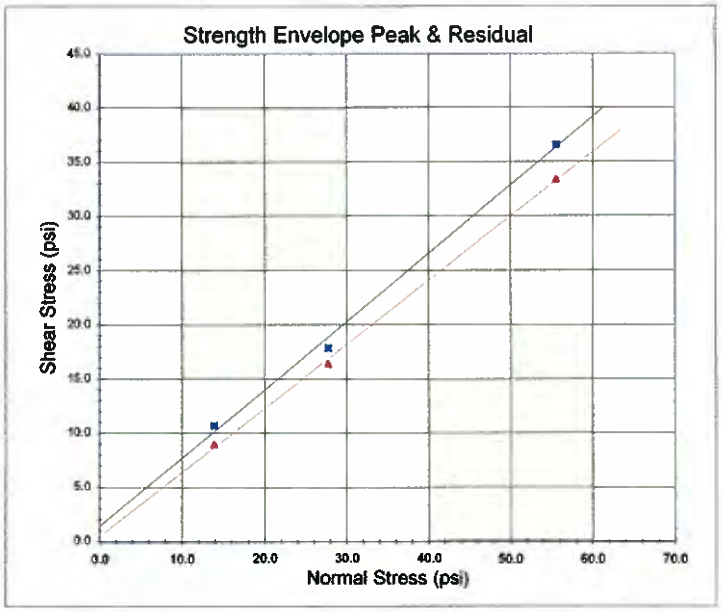
NEVADA DOT

DigiShear Report v4b __ WLC4-K2-08.xls

# DIRECT SHEAR TEST REPORT




**Strength Parameters**

| | Peak | | Residual |
|---|---|---|---|
| Friction Angle = | 32 | degrees | 31 |
| Cohesion = | 1.42 | psi | 0.53 |

Project: FL-6-08 Boring: WLC-4 Sample: O3

| | Result 1 | Result 2 | Result 3 |
|---|---|---|---|
| Specimen: | a | b | c |
| Date Tested | 2/18/2009 | 2/18/2009 | 2/18/2009 |
| Diameter (inch): | 2.42 | 2.42 | 2.42 |
| Height (inch): | 1.00 | 1.00 | 1.00 |
| Depth (ft): | 46.00 | 46.00 | 46.00 |
| Moisture (%) | 34.1 | 34.7 | 33.3 |
| Dry Unit Wt (pcf) | 85.7 | 83.7 | 84.7 |
| SHEAR | | | |
| Displacement Rate($^{in}/_{min}$) | 0.0053 | 0.0054 | 0.0054 |
| Normal Stress (psi) | 13.88 | 27.76 | 55.54 |
| **Peak** Shear Stress(psi) | 10.77 | 17.91 | 36.62 |
| **Residual** Shear Stress(psi) | 9.0 | 16.4 | 33.4 |
| Residual Point Picked @(in) | 0.242 | 0.242 | 0.242 |
| Time @ Peak Failure (min) | 11.7 | 21.0 | 29.3 |

Specimen Comments

a Medium brown Silty shear @ 2000 psf

b Medium brown Silty shear @ 4000 psf

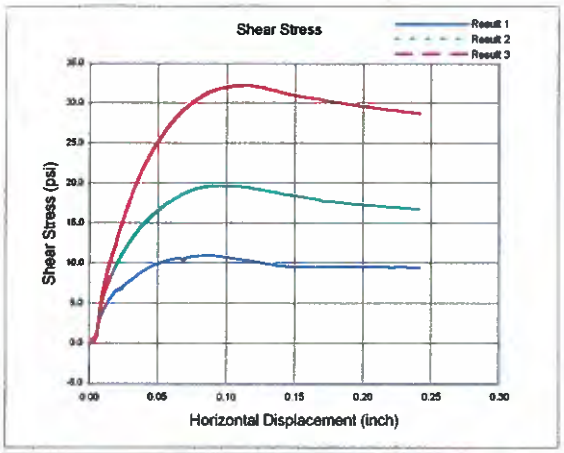
c Medium brown Silty shear @ 8000 psf

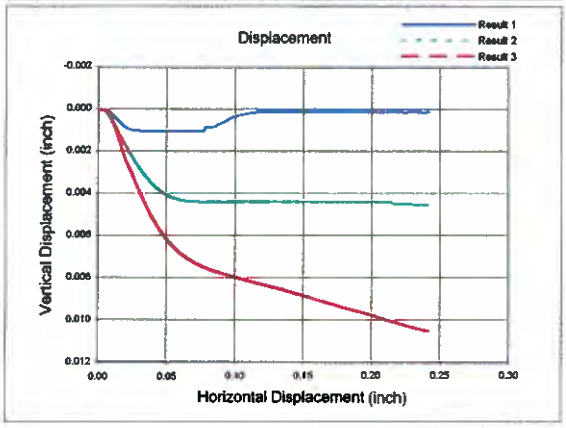
Geotechnical Section

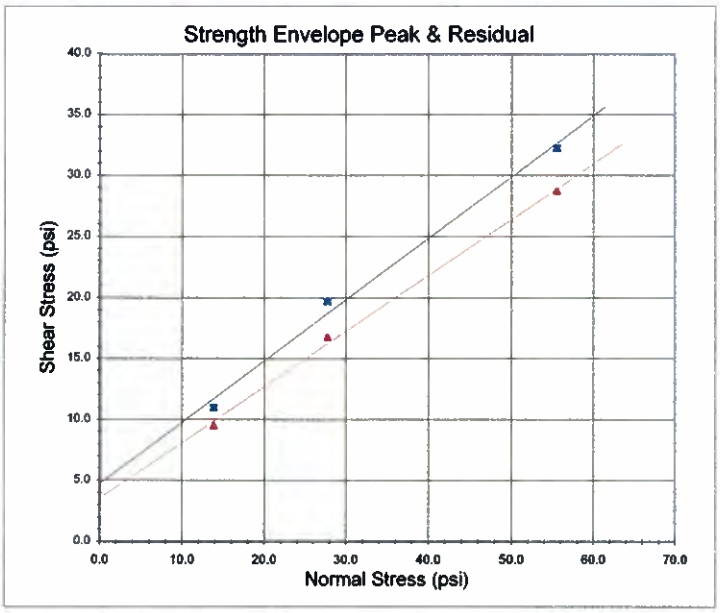
NEVADA DOT

DigiShear Report v4b __ WLC4-O3-08.xls

# DIRECT SHEAR TEST REPORT




**Strength Parameters**

| | Peak | | Residual |
|---|---|---|---|
| Friction Angle = | 27 | degrees | 25 |
| Cohesion = | 4.75 | psi | 3.57 |

Project: FL-6-08 Boring: WLC-4 Sample: Q2

| | Result 1 | Result 2 | Result 3 |
|---|---|---|---|
| Specimen: | a | b | c |
| Date Tested | 2/19/2009 | 2/19/2009 | 2/19/2009 |
| Diameter (inch): | 2.42 | 2.42 | 2.42 |
| Height (inch): | 1.00 | 1.00 | 1.00 |
| Depth (ft): | 54.00 | 54.00 | 54.00 |
| Moisture (%) | 25.9 | 28.1 | 29.3 |
| Dry Unit Wt (pcf) | 94.8 | 93.5 | 91.3 |
| SHEAR | | | |
| Displacement Rate($^{in}/_{min}$) | 0.0055 | 0.0053 | 0.0054 |
| Normal Stress (psi) | 13.85 | 27.75 | 55.53 |
| **Peak** Shear Stress(psi) | 11.01 | 19.73 | 32.29 |
| **Residual** Shear Stress(psi) | 9.5 | 16.8 | 28.8 |
| Residual Point Picked @(in) | 0.242 | 0.242 | 0.242 |
| Time @ Peak Failure (min) | 15.8 | 17.9 | 20.7 |

Specimen Comments

a medium brown silty shear @ 2000 psf

b medium brown silty shear @ 4000 psf

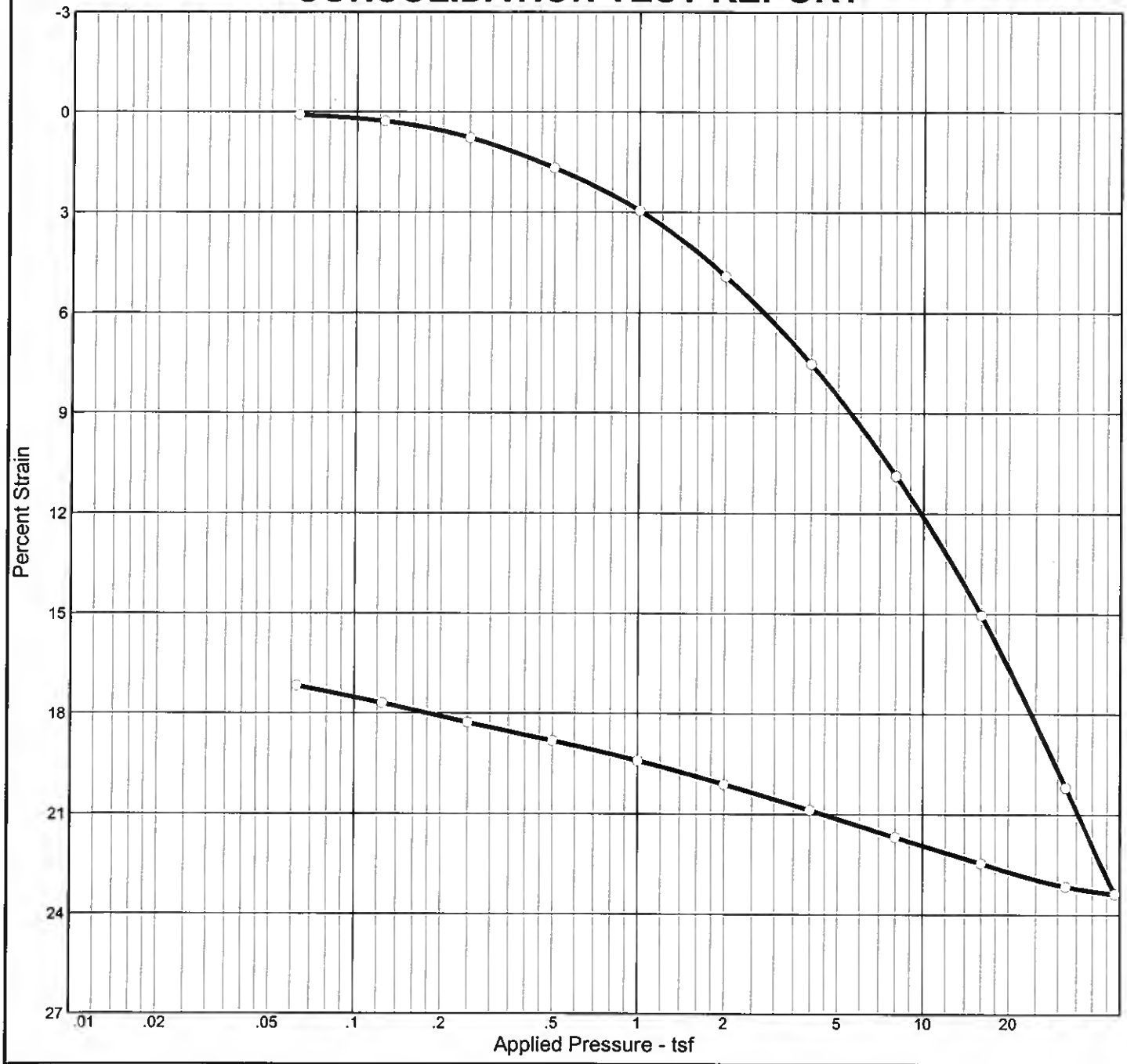
c medium brown silty shear @ 8000 psf

Geotechnical Section

NEVADA DOT

DigiShear Report v4b __ WLC4-Q2-08.xls

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 80.7 % | 34.3 % | 79.1 | 60 | 36 | 2.739 | CH | A-7-6(39) | 1.162 |

**MATERIAL DESCRIPTION**

fat clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC-2 **Sample No.:** M1 a **Elev./Depth:** 44'-44.5'

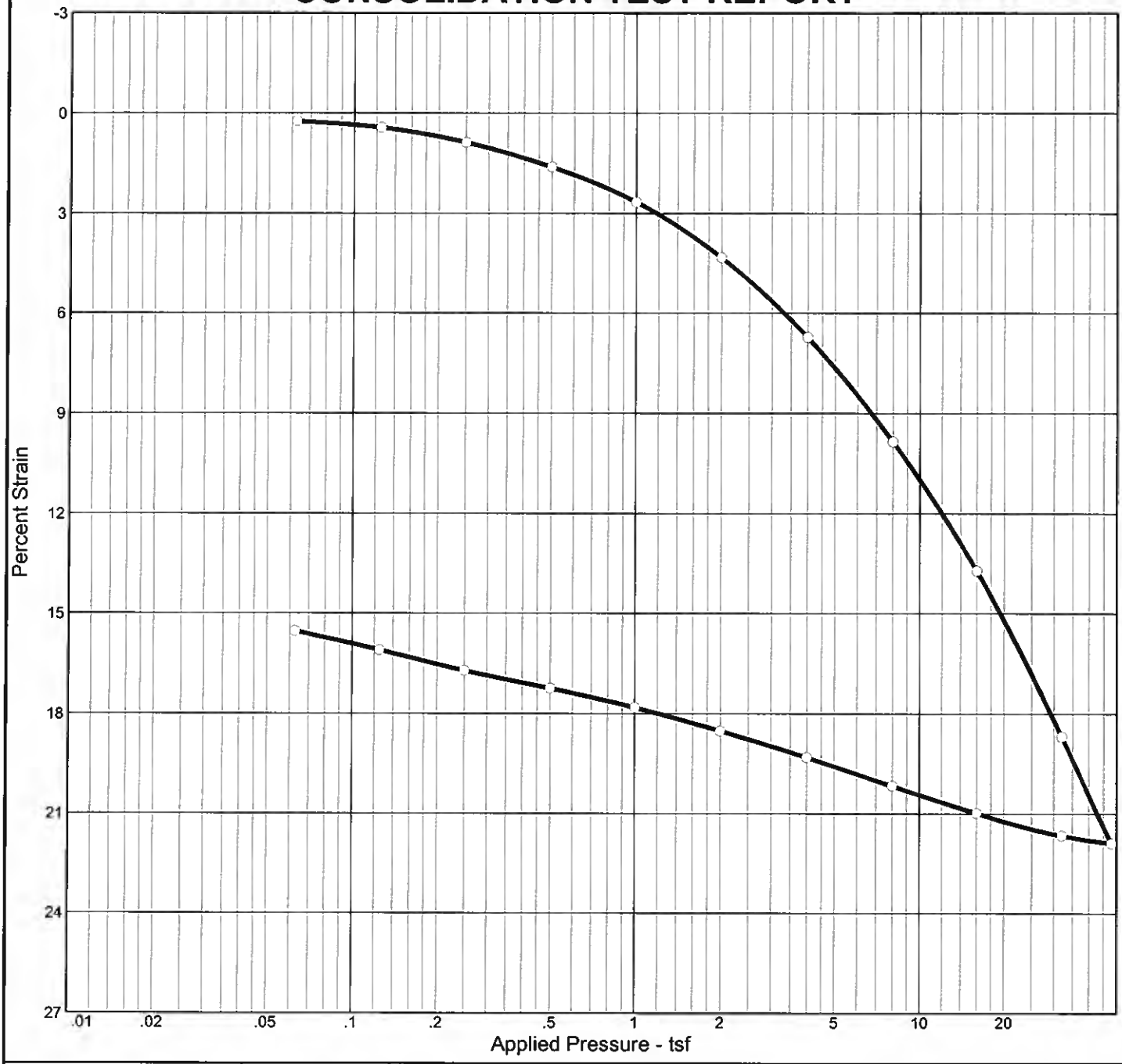
CONSOLIDATION TEST REPORT

**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**
Medium Brown Clay

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 83.1 % | 34.0 % | 80.6 | 60 | 36 | 2.739 | CH | A-7-6(39) | 1.121 |

**MATERIAL DESCRIPTION**

fat clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC-2 **Sample No.:** M1 b **Elev./Depth:** 44'-44.5'

CONSOLIDATION TEST REPORT

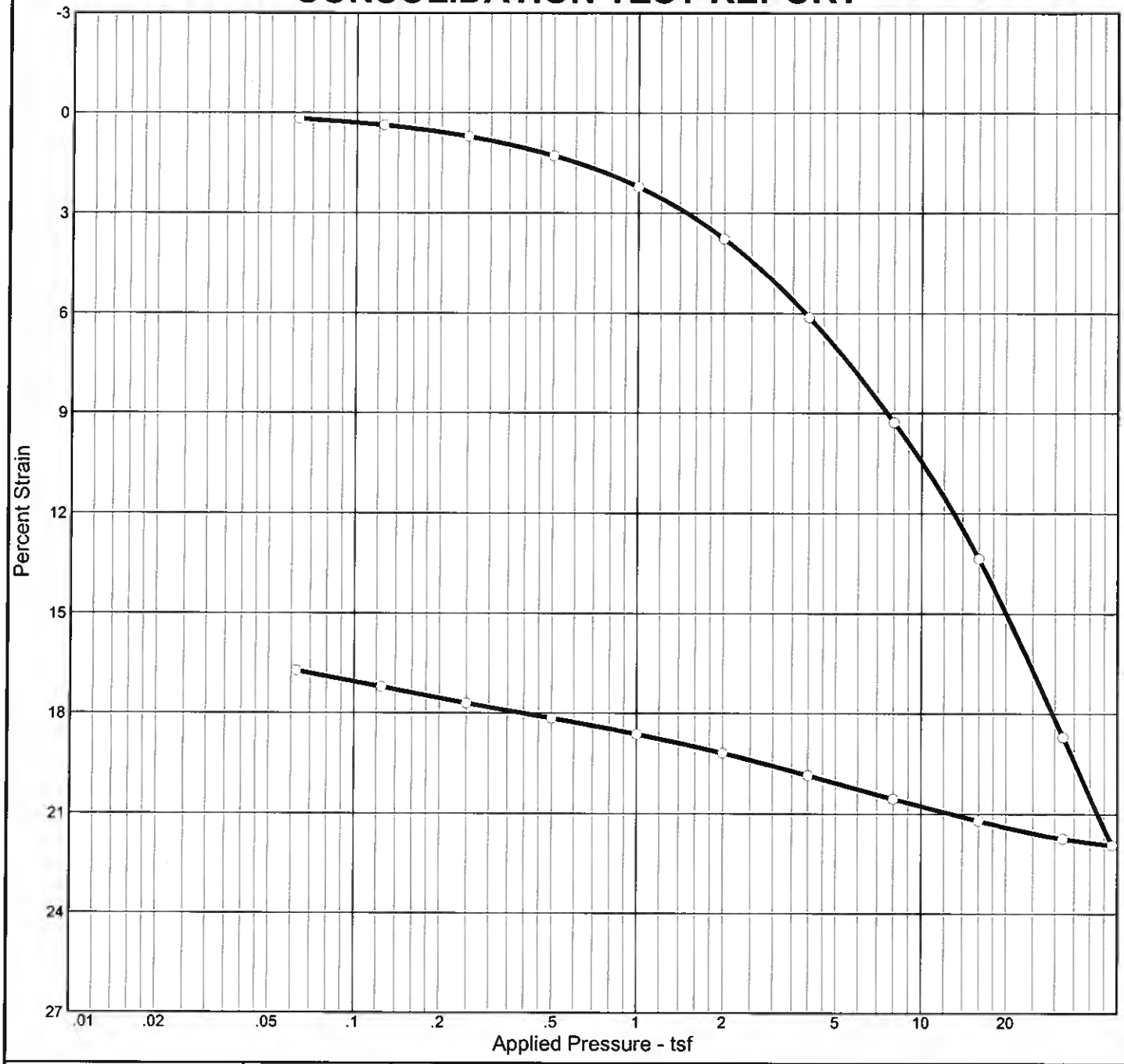
**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**

Medium Brown Clay

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 85.7 % | 36.0 % | 79.5 | 40 | 22 | 2.738 | CL | A-6(20) | 1.149 |

**MATERIAL DESCRIPTION**

lean clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC-2 **Sample No.:** N1 a **Elev./Depth:** 49'-49.5'

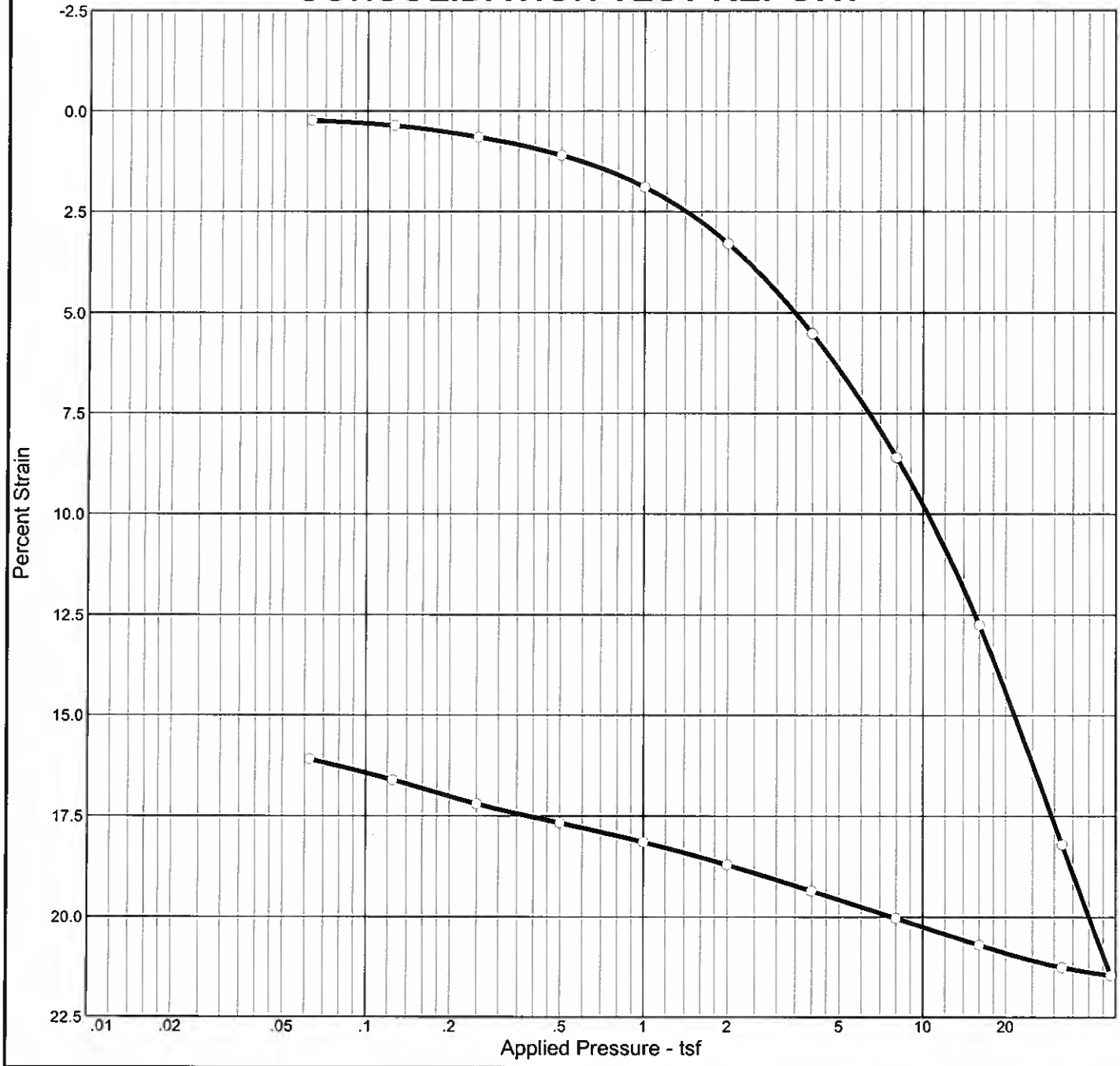
CONSOLIDATION TEST REPORT

**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**
Medium Brown Clay

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 91.4 % | 36.4 % | 81.8 | 40 | 22 | 2.738 | CL | A-6(20) | 1.089 |

**MATERIAL DESCRIPTION**

lean clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC-2 **Sample No.:** N1 b **Elev./Depth:** 49'-49.5'

CONSOLIDATION TEST REPORT

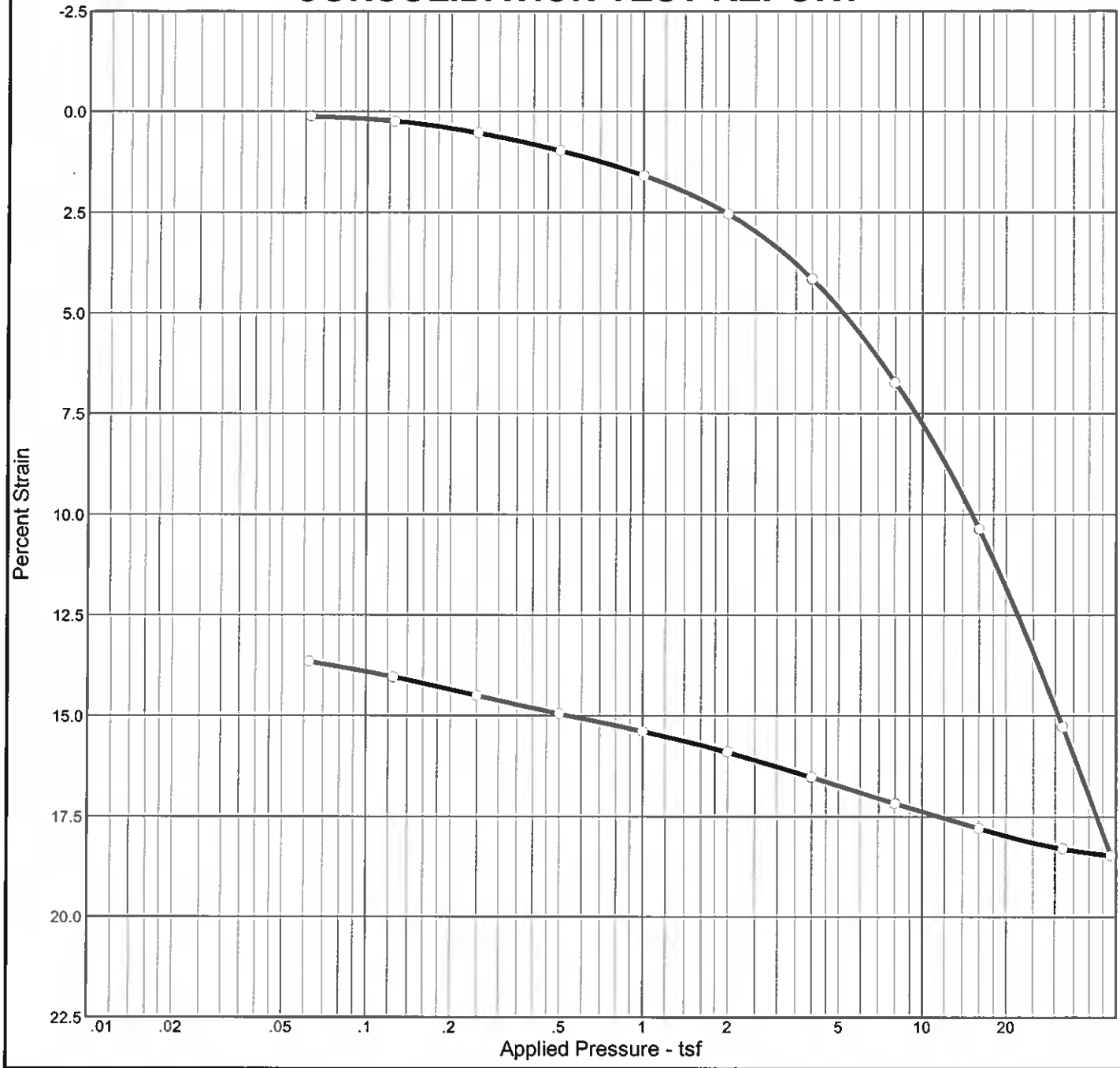
**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**

Medium Brown Clay

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 93.2 % | 34.9 % | 84.5 | 36 | 19 | 2.747 | CL | A-6(17) | 1.030 |

**MATERIAL DESCRIPTION**

lean clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC-2 **Sample No.:** O2 a **Elev./Depth:** 54.5'-55'

CONSOLIDATION TEST REPORT

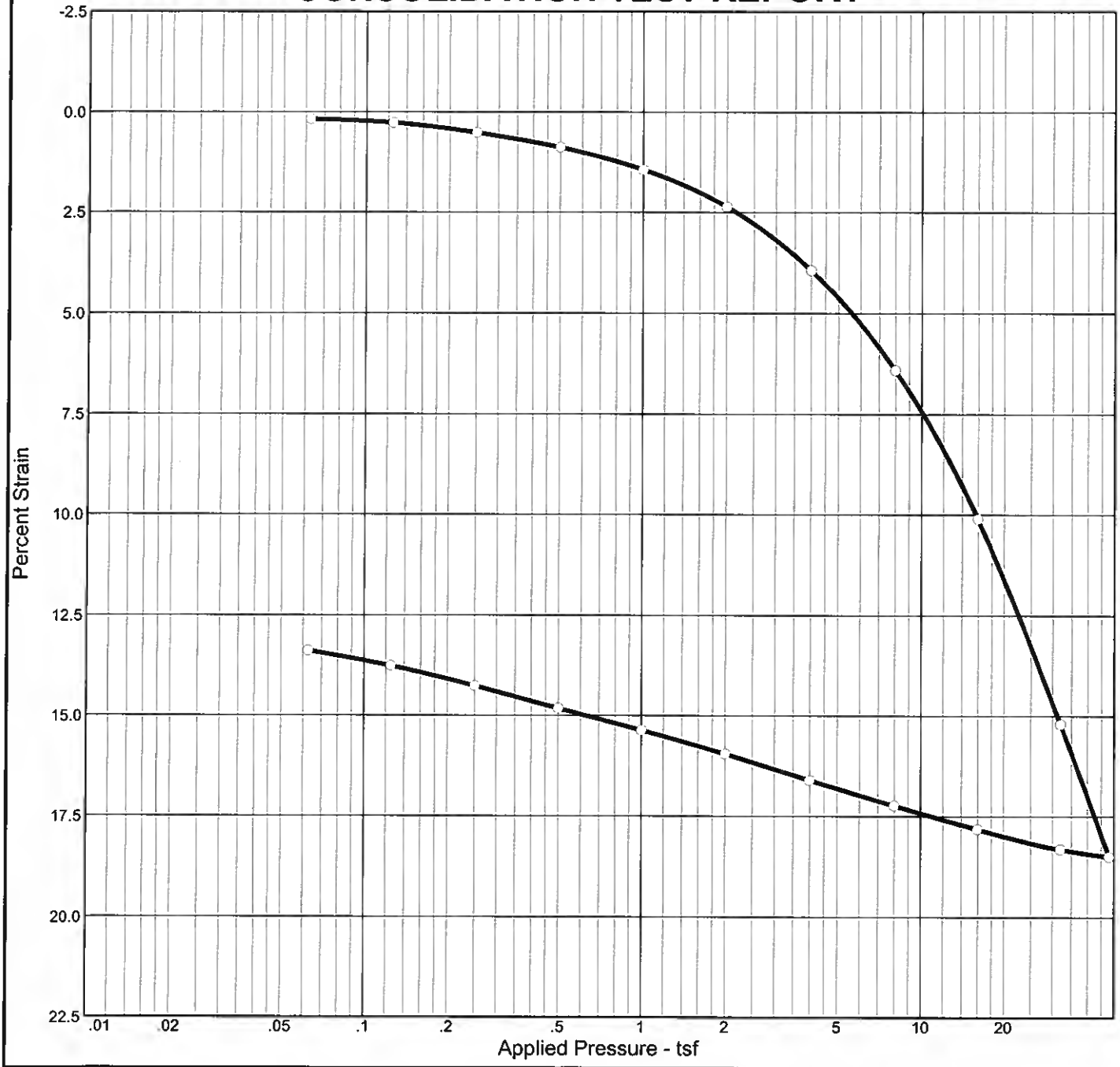
**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**

Medium Brown Brittle Clay.

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 93.3 % | 35.0 % | 84.4 | 36 | 19 | 2.747 | CL | A-6(17) | 1.032 |

**MATERIAL DESCRIPTION**

lean clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC-2 **Sample No.:** O2 b **Elev./Depth:** 54.5'-55'

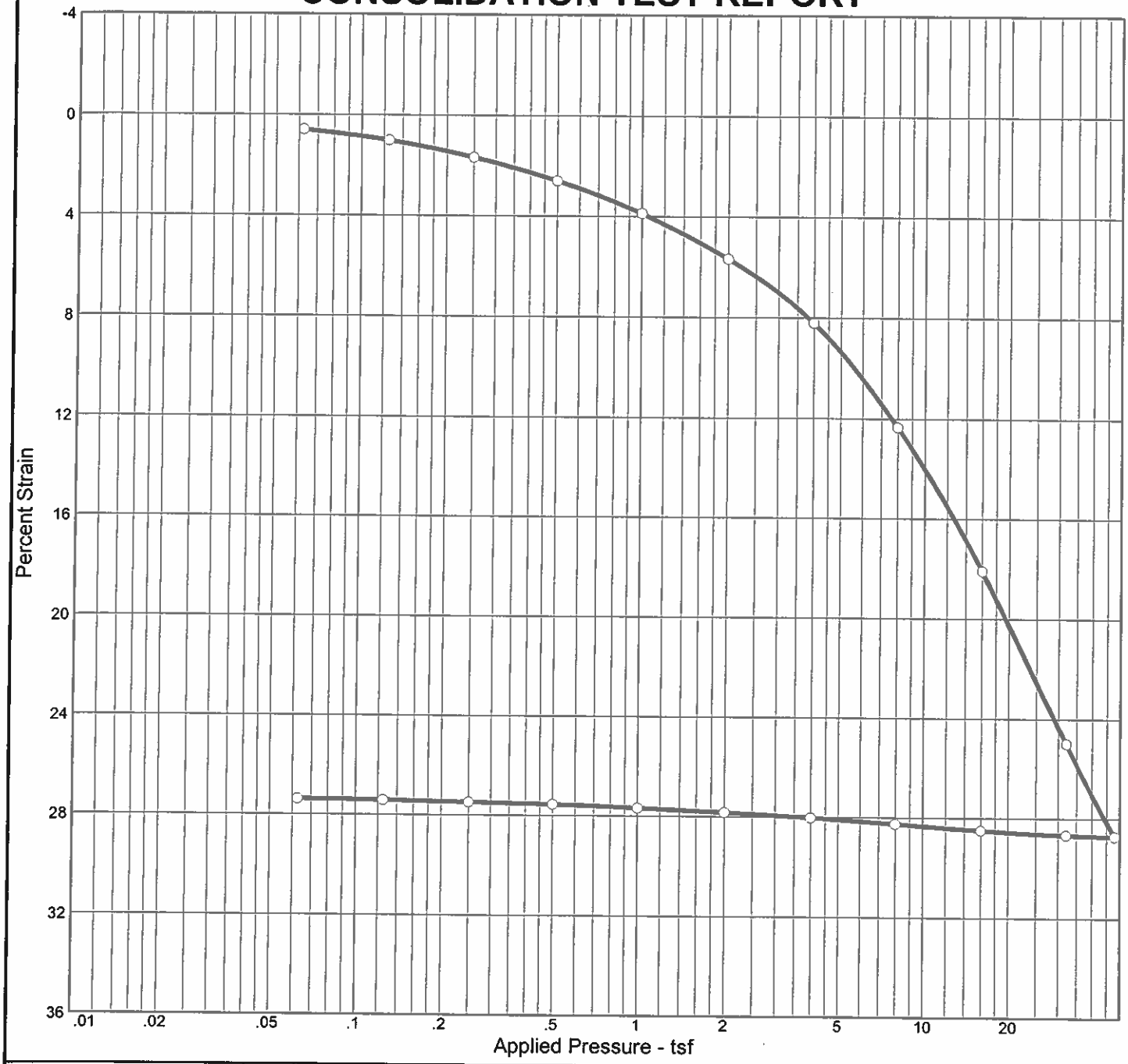
CONSOLIDATION TEST REPORT

**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**
Medium Brown Brittle Clay.

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 75.0 % | 43.9 % | 65.2 | 31 | 12 | 2.697 | CL | A-6(8) | 1.580 |

**MATERIAL DESCRIPTION**

lean clay with sand

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC 4 **Sample No.:** I2 a **Elev./Depth:** 22.5 - 23.0'

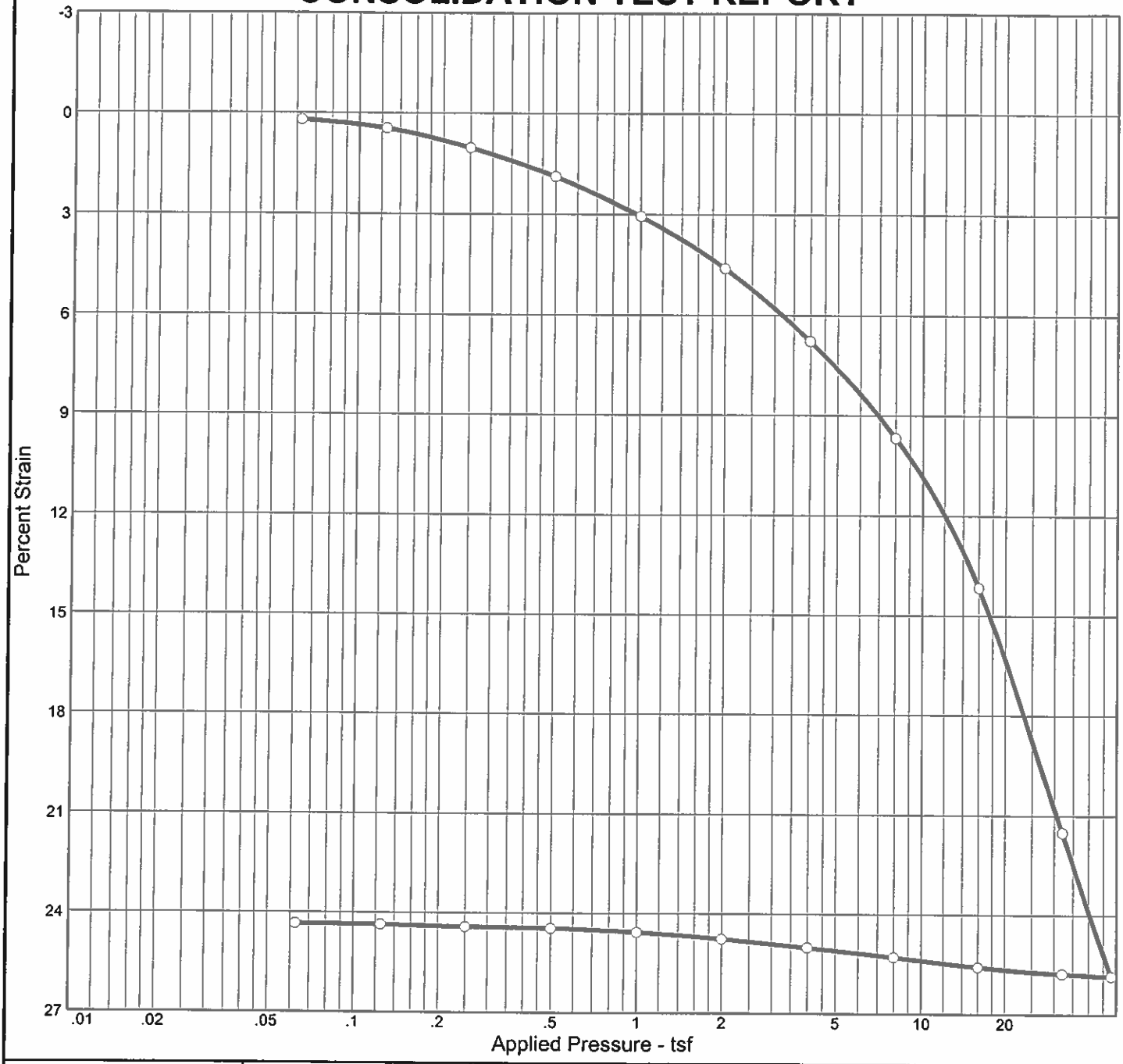
CONSOLIDATION TEST REPORT

**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 71.7 % | 34.4 % | 73.4 | 39 | 18 | 2.701 | CL | A-6(11) | 1.296 |

**MATERIAL DESCRIPTION**

sandy lean clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC 4 **Sample No.:** K1 a **Elev./Depth:** 30.5 - 31.0'

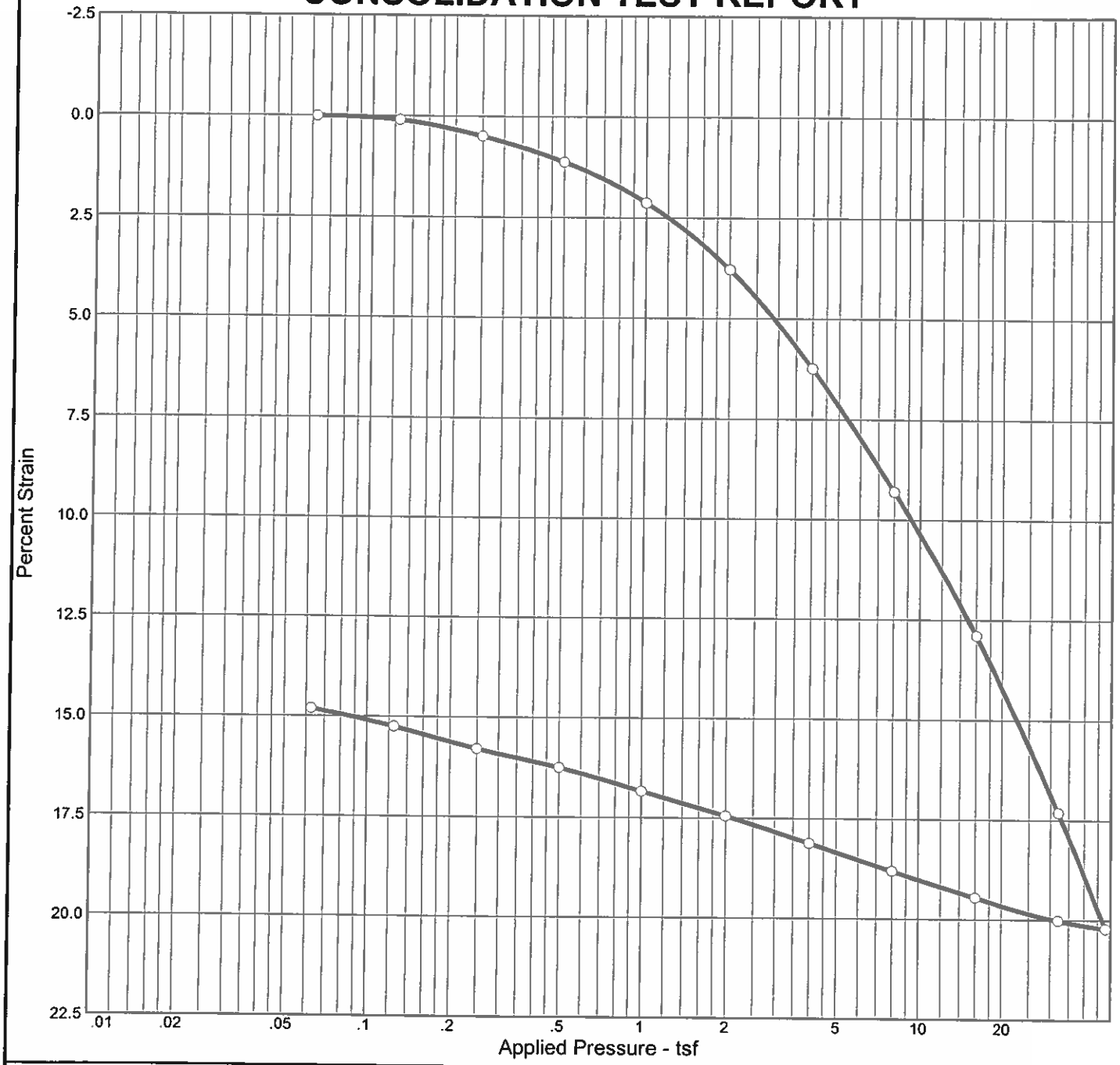
CONSOLIDATION TEST REPORT

**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 85.9 % | 32.7 % | 83.6 | 52 | 29 | 2.732 | CH | A-7-6(29 | 1.039 |

**MATERIAL DESCRIPTION**

fat clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

**Source:** WLC 4 **Sample No.:** O2 a **Elev./Depth:** 45.5 - 46.0'

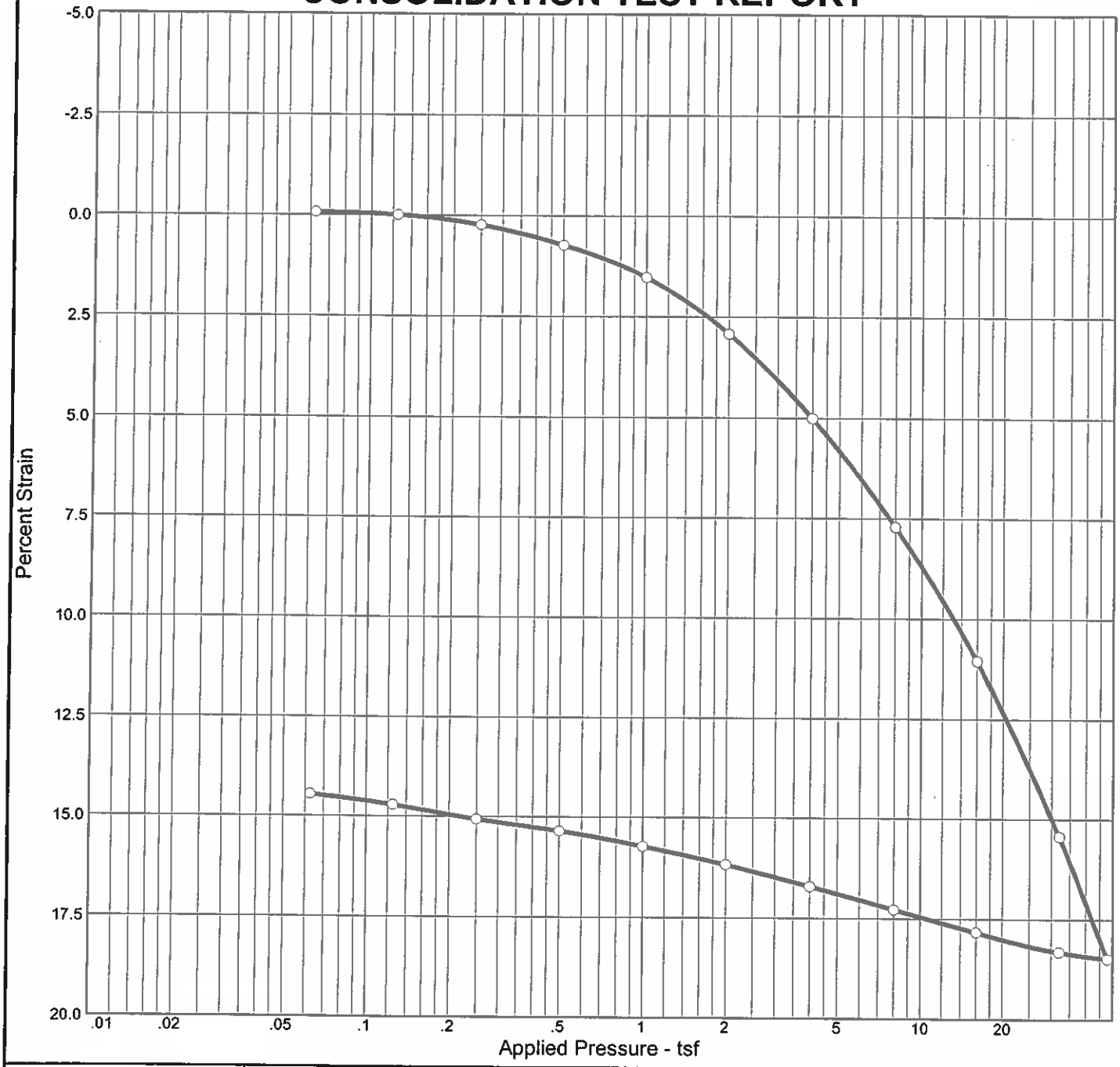
CONSOLIDATION TEST REPORT

**NEVADA DEPARTMENT OF TRANSPORTATION**

**Remarks:**

**Figure**

# CONSOLIDATION TEST REPORT




| Natural | | Dry Dens. (pcf) | LL | PI | Sp. Gr. | USCS | AASHTO | Initial Void Ratio |
|---|---|---|---|---|---|---|---|---|
| Saturation | Moisture | | | | | | | |
| 81.9 % | 30.2 % | 85.3 | 49 | 27 | 2.746 | CL | A-7-6(29 | 1.011 |

**MATERIAL DESCRIPTION**

lean clay

**Project No.** FL-6-08 **Client:** A. Ablahani

**Project:** US 93 Wildlife Crossing Bridge

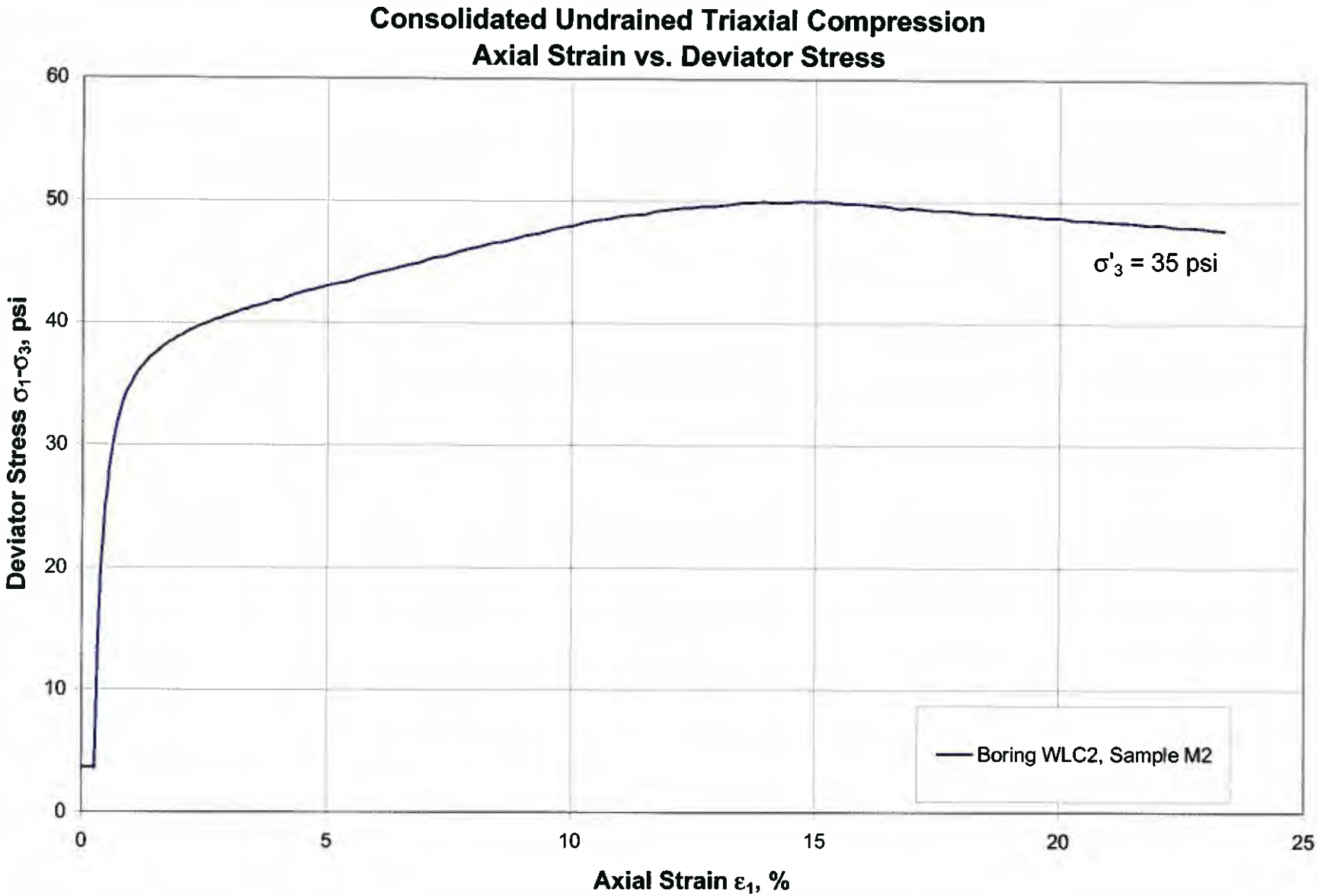
**Source:** WLC 4 **Sample No.:** Q1 a **Elev./Depth:** 53.0 - 53.5'

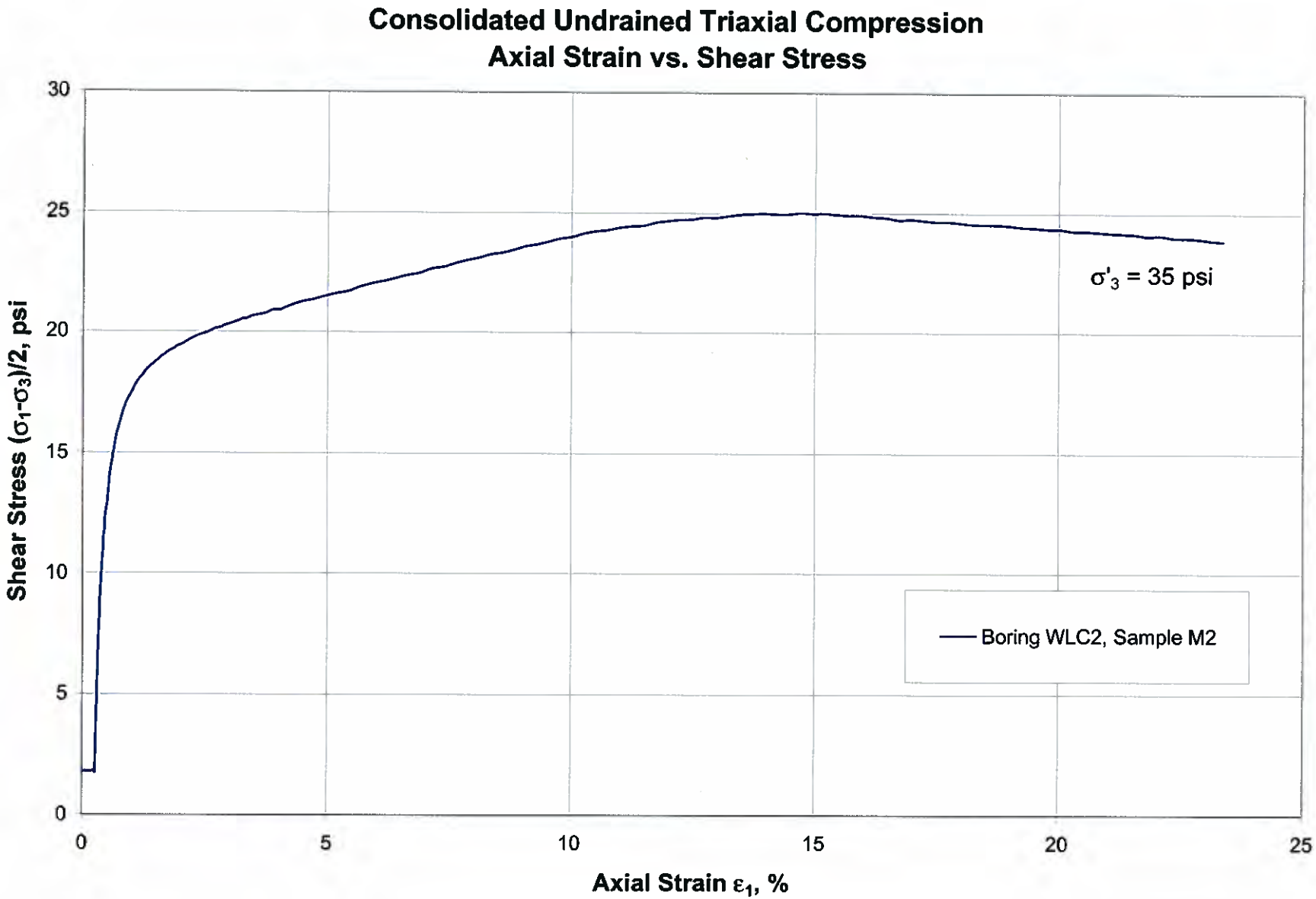
**Remarks:**

CONSOLIDATION TEST REPORT

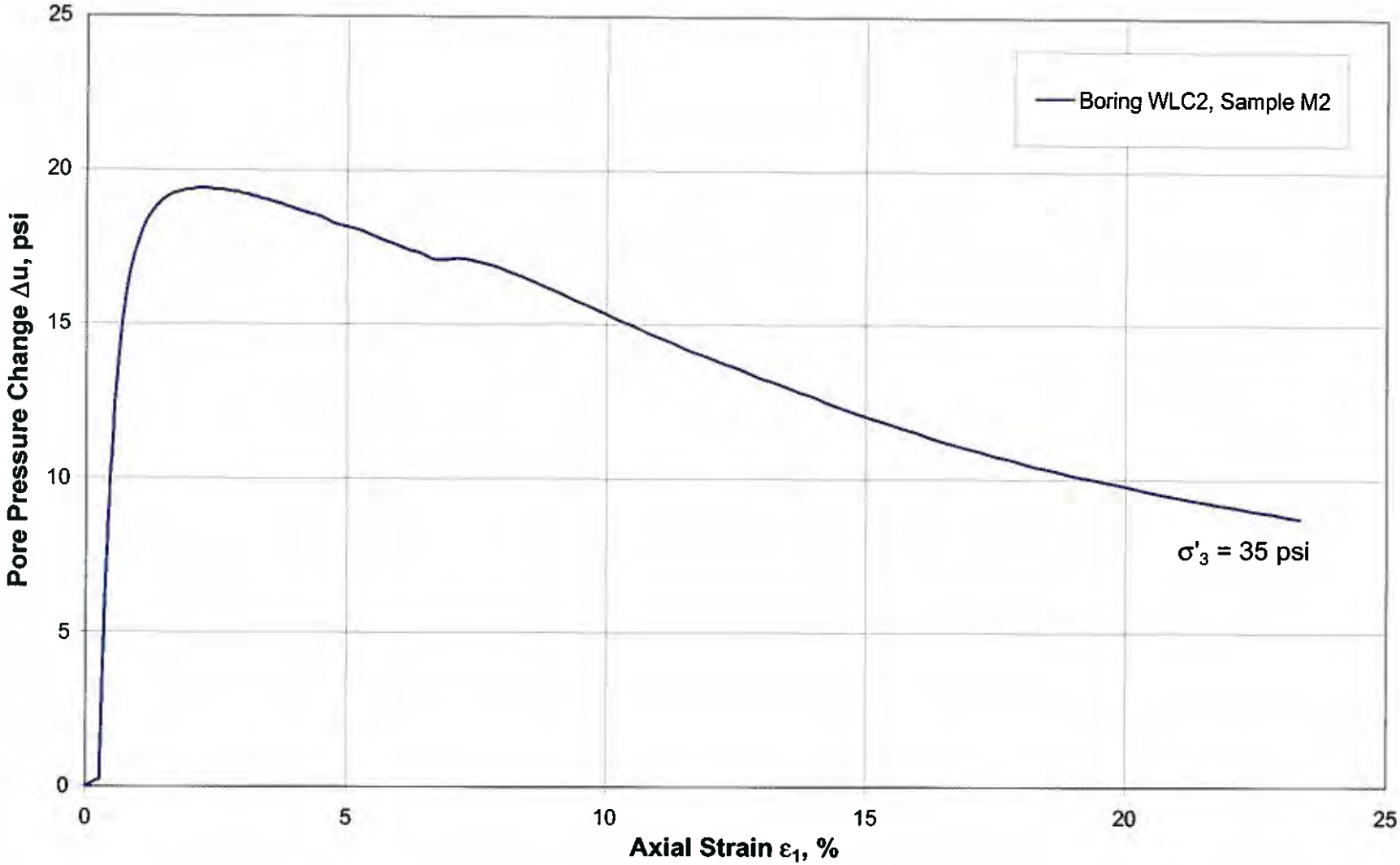
**NEVADA DEPARTMENT OF TRANSPORTATION**

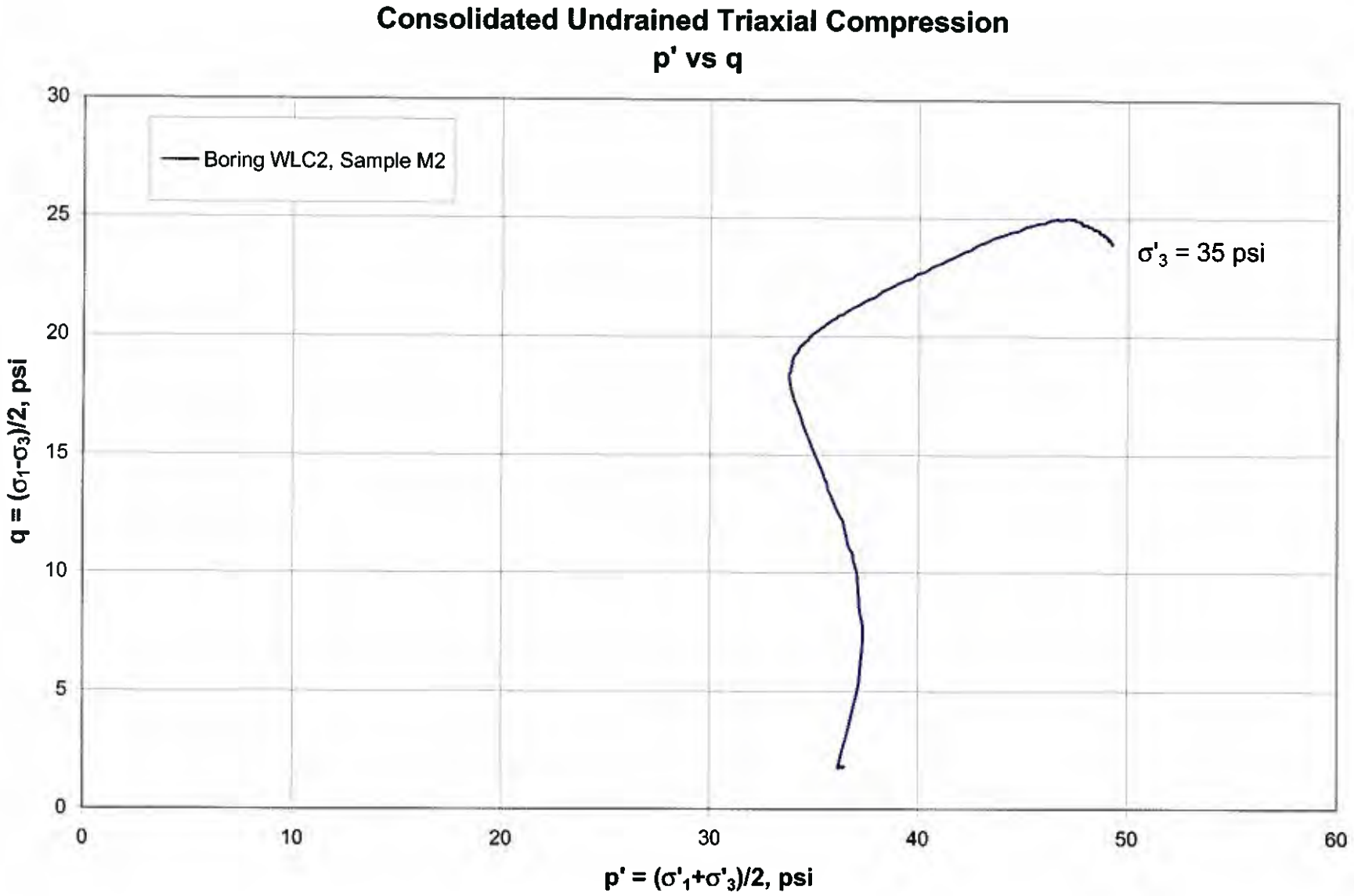
**Figure**


Consolidated Undrained Triaxial Compression
Axial Strain vs. Deviator Stress
Deviator Stress σ1-σ3, psi
Axial Strain ε1, %
σ'3 = 35 psi
Boring WLC2, Sample M2
0
10
20
30
40
50
60
0
5
10
15
20
25

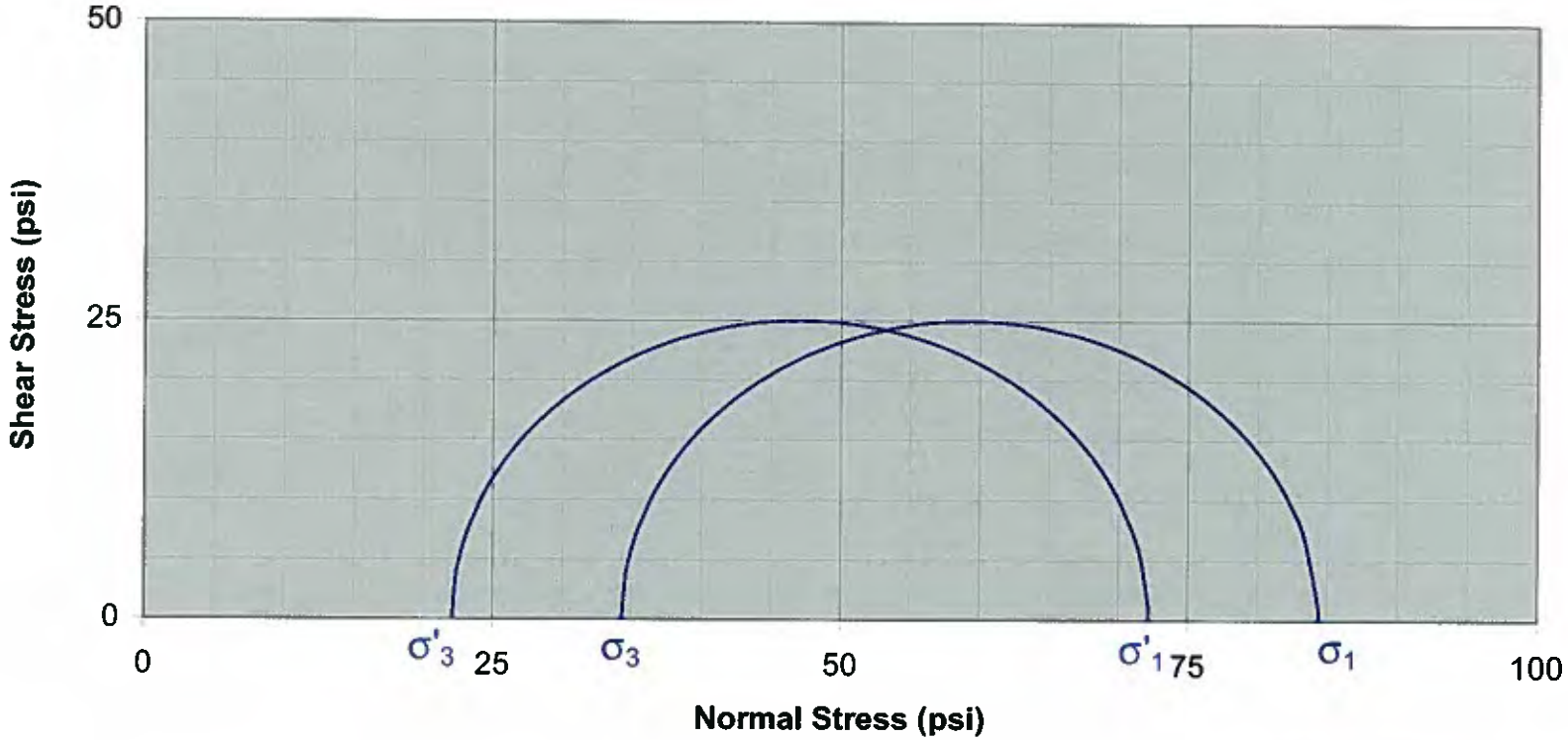

Consolidated Undrained Triaxial Compression
Axial Strain vs. Shear Stress
Shear Stress (σ1-σ3)/2, psi
Axial Strain ε1, %
σ'3 = 35 psi
Boring WLC2, Sample M2
0
5
10
15
20
25
30

## Consolidated Undrained Triaxial Compression
## Axial Strain vs. Pore Pressure Change




Consolidated Undrained Triaxial Compression
p' vs q
Boring WLC2, Sample M2
σ'3 = 35 psi
q = (σ1-σ3)/2, psi
p' = (σ'1+σ'3)/2, psi
0
5
10
15
20
25
30
0
10
20
30
40
50
60

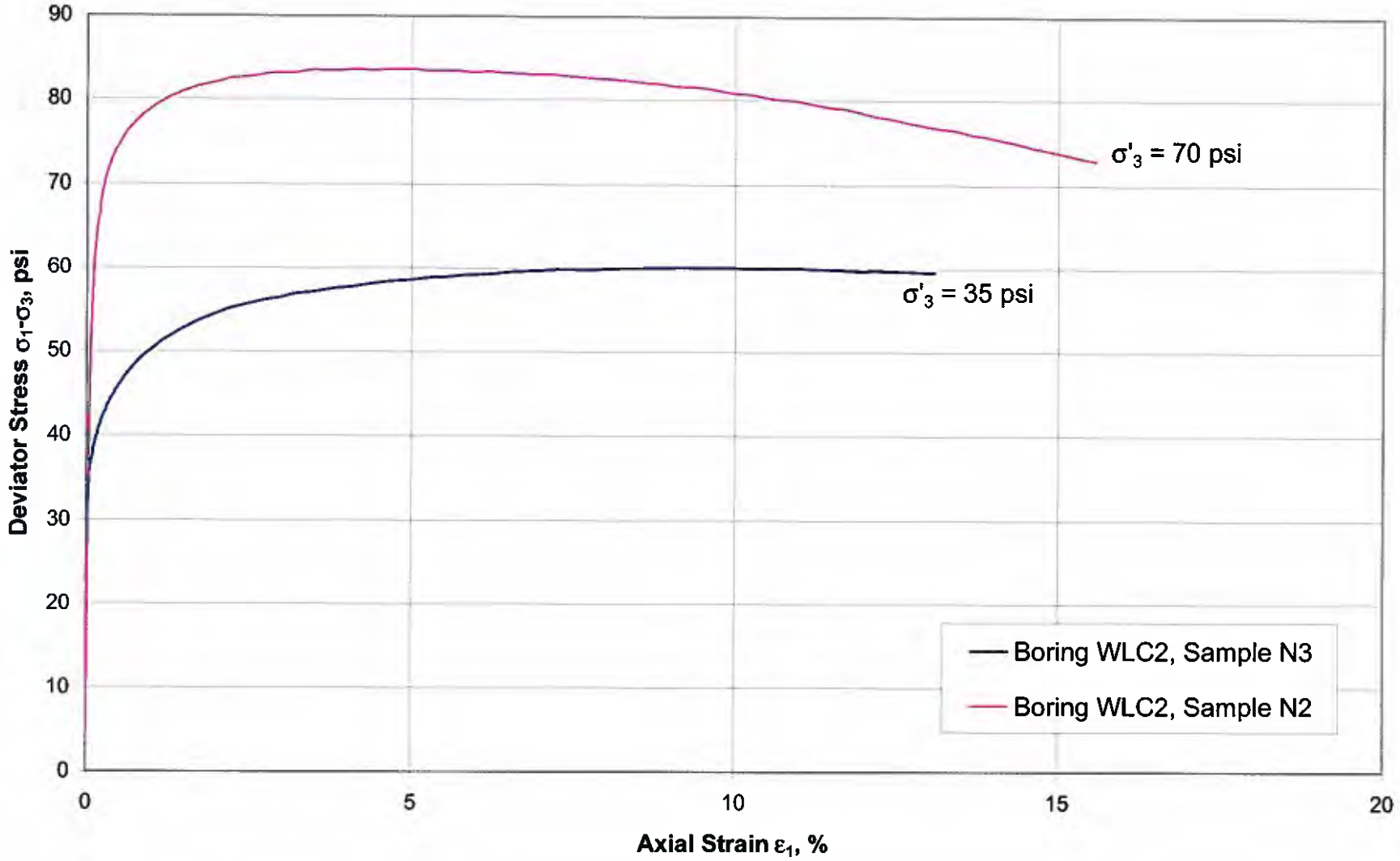
# Consolidated Undrained Triaxial Compression
# Total and Effective Stress Mohr's Circles

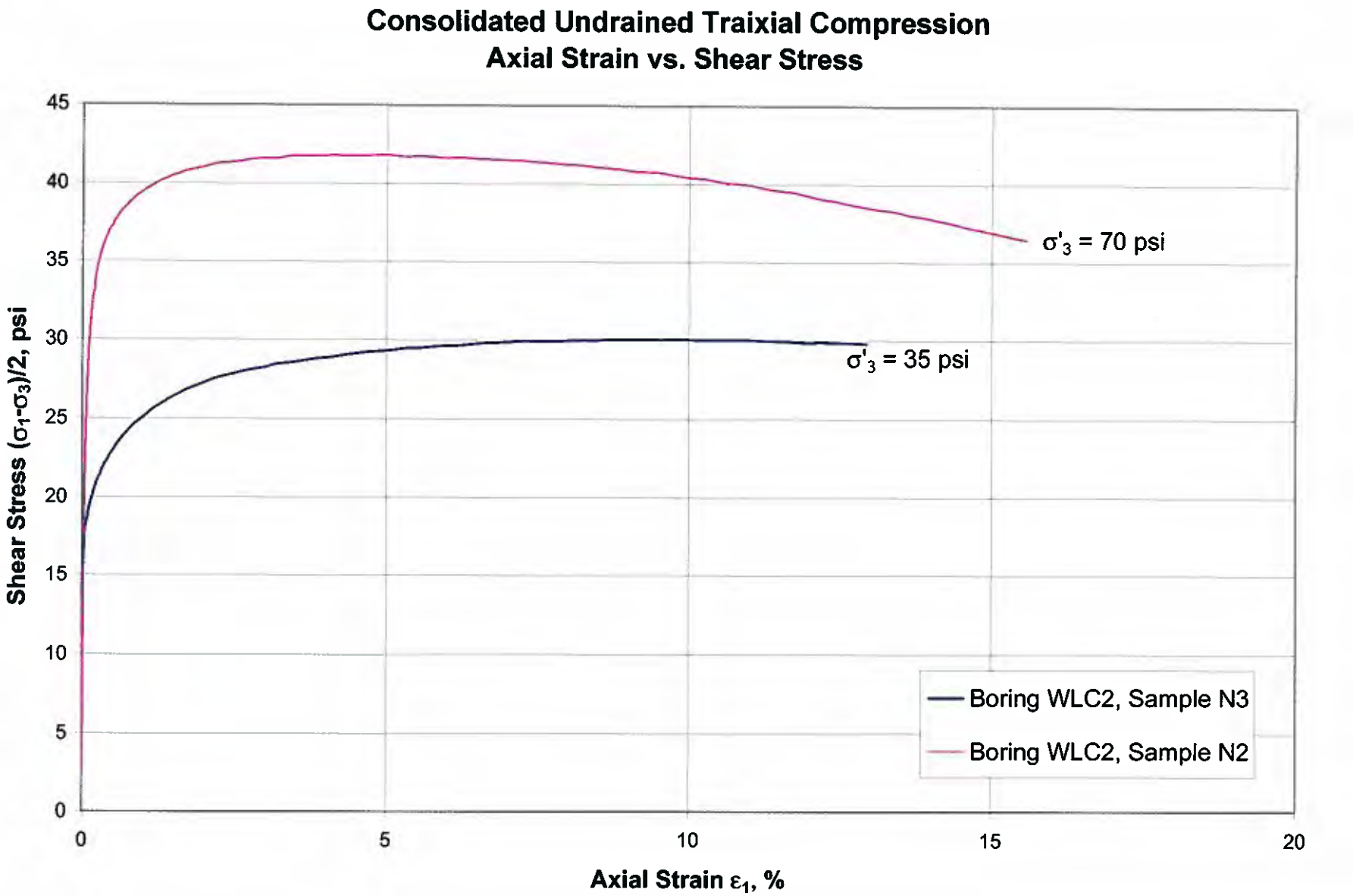



| | Sample M2 |
|---|---|
| Effective Consolidation Stress, psi | 35 |
| Deviator Stress at Failure, psi | 50.05 |
| Effective Minor Principal Stress at Failure, psi | 22.10 |
| Effective Major Principal Stress at Failure, psi | 72.15 |
| Axial Strain at Failure, % | 14.70 |

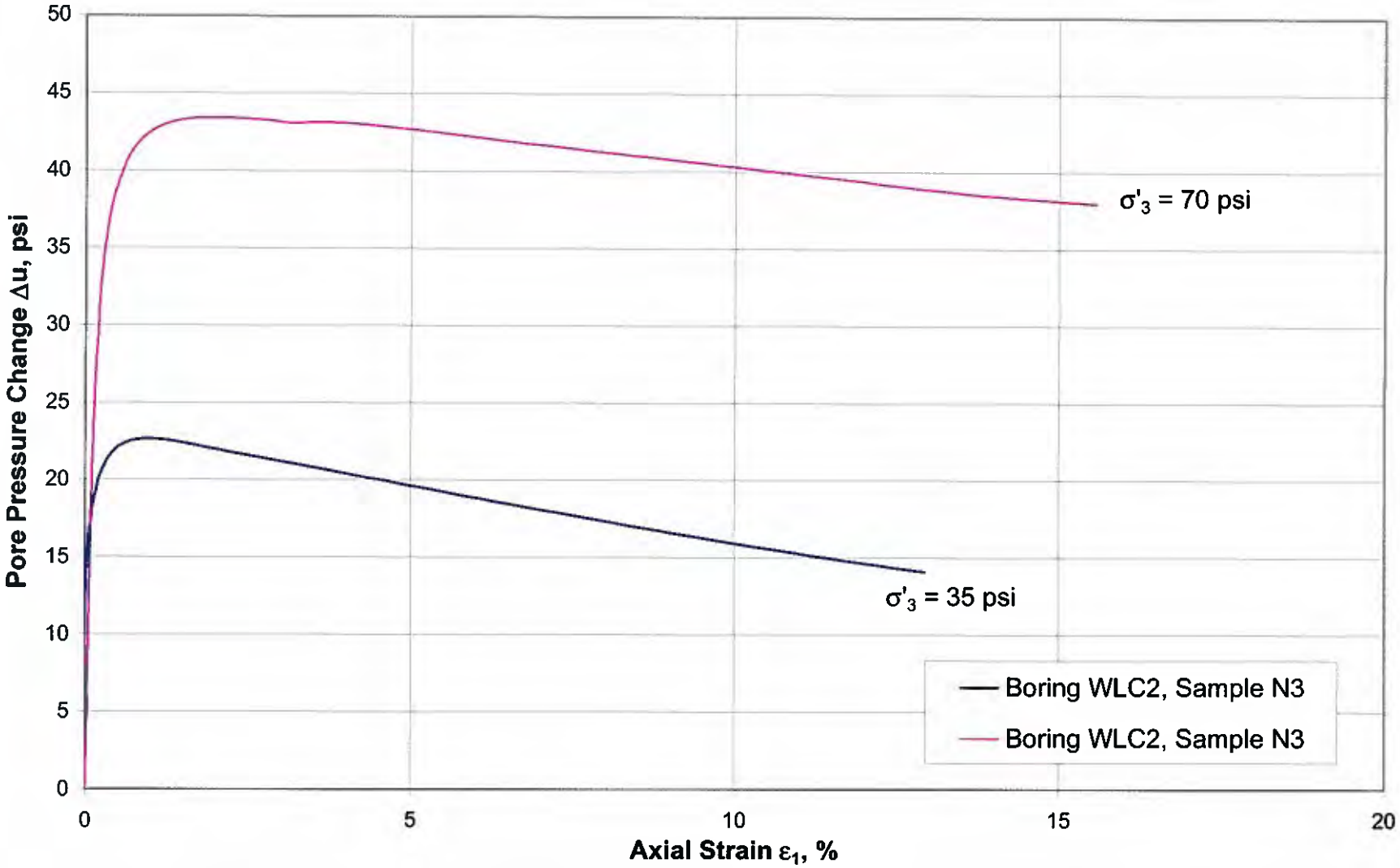
Boring WLC2, Sample M2

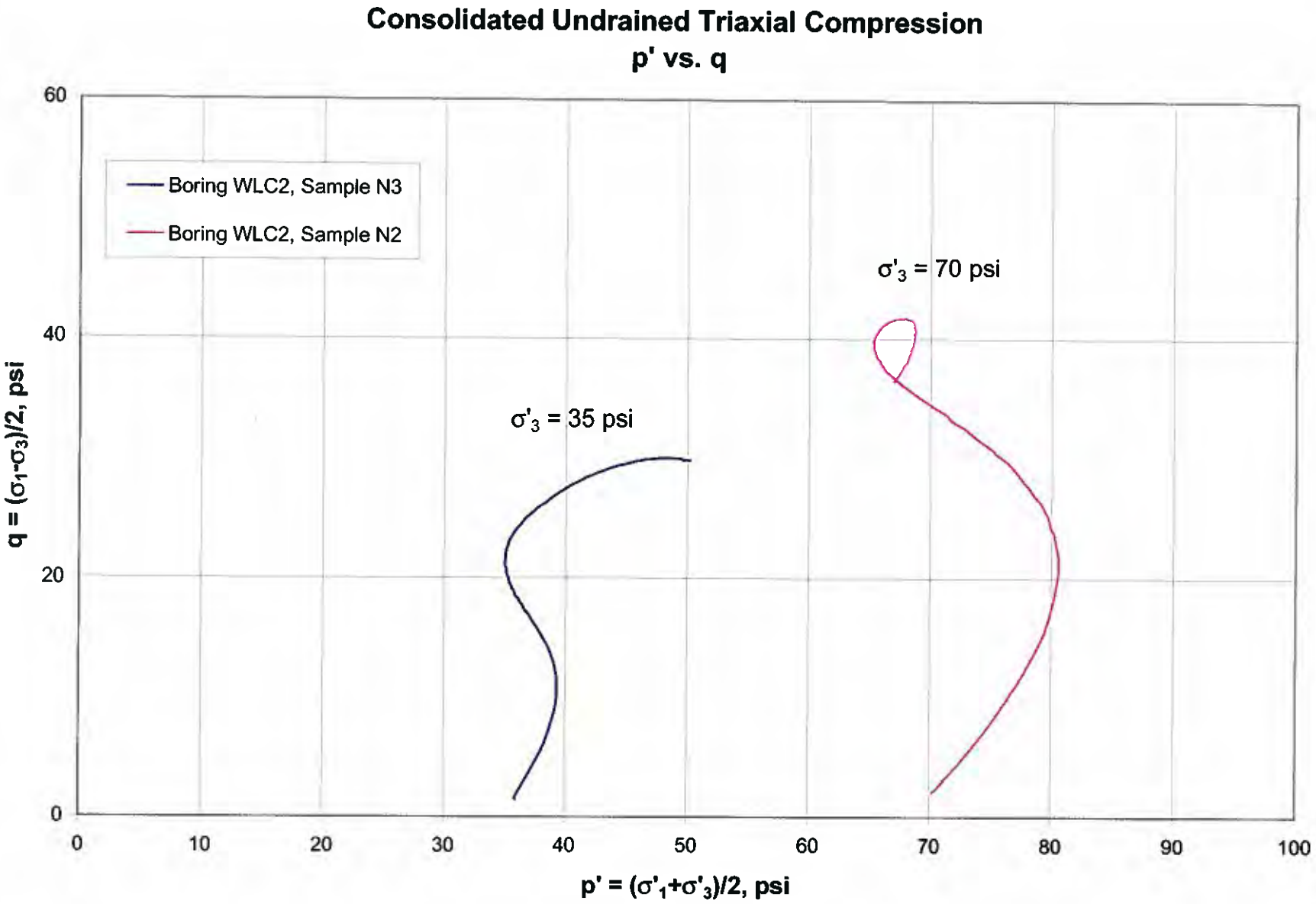
## Consolidated Undrained Triaxial Compression
## Axial Strain vs. Deviator Stress



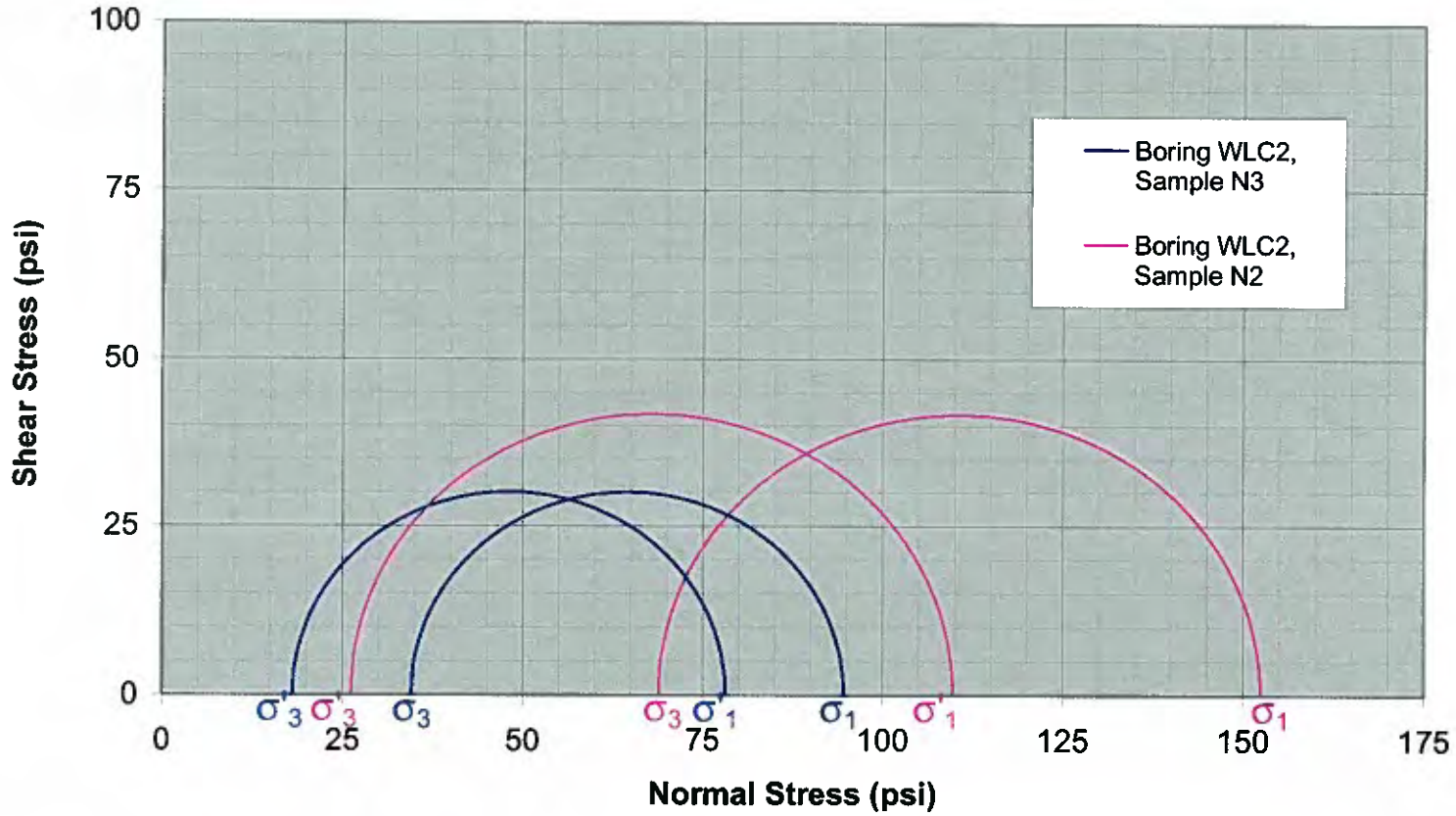

Consolidated Undrained Traixial Compression
Axial Strain vs. Shear Stress
Shear Stress (σ1-σ3)/2, psi
Axial Strain ε1, %
0
5
10
15
20
25
30
35
40
45
0
5
10
15
20
σ'3 = 70 psi
σ'3 = 35 psi
Boring WLC2, Sample N3
Boring WLC2, Sample N2

## Consolidated Undrained Triaxial Compression
## Axial Strain vs. Pore Pressure Change

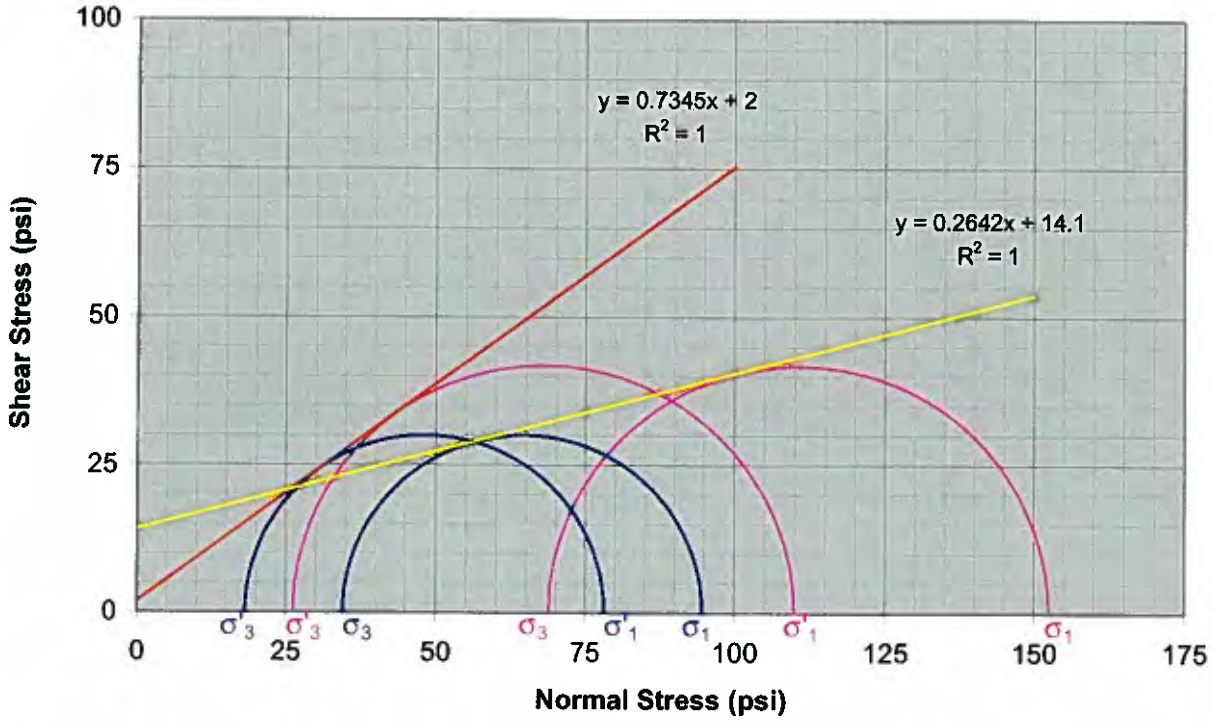



Consolidated Undrained Triaxial Compression
p' vs. q
Boring WLC2, Sample N3
Boring WLC2, Sample N2
σ'3 = 70 psi
σ'3 = 35 psi
q = (σ1-σ3)/2, psi
p' = (σ'1+σ'3)/2, psi
0
20
40
60
0
10
20
30
40
50
60
70
80
90
100

## Consolidated Undrained Triaxial Compression
## Total and Effective Stress Mohr's Circles



## Consolidated Undrained Triaxial Compression
## Total and Effective Stress Mohr's Circles




| Strength Parameters | | | |
|---|---|---|---|
| Total | | Effective | |
| ϕ, ° | 14.8 | ϕ', ° | 36.3 |
| c, psi | 14.1 | c', psi | 2.0 |

— Boring WLC2, Sample N3

— Boring WLC2, Sample N2

| | Sample N3 | Sample N2 |
|---|---|---|
| Effective Consolidation Stress, psi | 35 | 70 |
| Deviator Stress at Failure, psi | 60.12 | 83.58 |
| Effective Minor Principal Stress at Failure, psi | 18.09 | 26.19 |
| Effective Major Principal Stress at Failure, psi | 78.21 | 109.78 |
| Axial Strain at Failure, % | 9.23 | 5.03 |

**NEVADA DEPARTMENT OF TRANSPORTATION**
**GEOTECHNICAL SECTION**

**CHEMICAL ANALYSIS**

**E.A. No.** _____

**PROJECT** US 93 Wildlife Crossing Bridge

**BORING #** WLC 1, WLC 2, WLC 3, WLC 4, WLC 5, WLC 6

| Sample No. | Ph | Resistivity Ohm - cm | Conductivity µs |
|---|---|---|---|
| WLC 1 B1 | 8.4 | 1,305 | 766 |
| WLC 1 D | 8.2 | 1,225 | 216 |
| WLC 1 Bulk 1 | 8.4 | 8,130 | 123 |
| WLC 1 Bulk 2 | 8.1 | 6,993 | 143 |
| WLC 2 C | 8.7 | 2,421 | 413 |
| WLC 2 D | 8.5 | 2,155 | 464 |
| WLC 2 Bulk 1 | 8.0 | 4,761 | 210 |
| WLC 3 D | 8.6 | 3,534 | 283 |
| WLC 3 Bulk 1 | 8.7 | 2,494 | 401 |
| WLC 4 C | 8.6 | 2,674 | 374 |
| WLC 4 Bulk 1 | 8.8 | 2,732 | 366 |
| WLC 4 Bulk 2 | 8.7 | 3,448 | 290 |
| WLC 5 D | 8.7 | 2,833 | 353 |
| WLC 5 Bulk 1 | 8.8 | 1,980 | 505 |
| WLC 5 Bulk 2 | 8.5 | 2,392 | 418 |
| WLC 6 B3 | 8.5 | 1,021 | 979 |
| WLC 6 C | 8.7 | 3,623 | 276 |
| WLC 6 Bulk 1 | 8.8 | 2,179 | 459 |
| WLC 6 Bulk 2 | 8.6 | 2,519 | 397 |
| | | | |