GEOTECHNICAL REPORT

CHEYENNE AVENUE INTERCHANGE
AT U.S. 15
LAS VEGAS

AUGUST, 1997

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

MATERIALS DIVISION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
GEOTECHNICAL SECTION

GEOTECHNICAL REPORT

I-15 IN NORTH LAS VEGAS
AT CHEYENNE INTERCHANGE
STRUCTURE NOS. G-1127, I-1126, & B-954N

AUGUST 25, 1997

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CLARK COUNTY, NEVADA

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INTRODUCTION

During the months of April through June, 1996 the Geotechnical Section conducted a subsurface site investigation for the new bridges and retaining walls to be built at the intersection of Cheyenne Avenue and Interstate 15 in North Las Vegas. A subsurface investigation was also completed for the proposed bridge widening at the existing I-15/Las Vegas Wash crossing (Structure B-954N) located approximately 1 km northeast of Cheyenne Interchange along I-15. Preliminary plans indicate that the two existing structures on Cheyenne Ave. which convey traffic over I-15 and the Union Pacific Railroad (U.P.R.R.) tracks will be replaced. The U.P.R.R. grade separation (Structure G-1127) is scheduled to be replaced with a simple span bridge. The I-15 overpass (Structure I-1126) is scheduled to be replaced with a two span bridge. The existing three span Las Vegas Wash structure is to be widened approximately 4.6 m along the northbound side of I-15.

Exploration Program

Ten borings were completed at the Cheyenne Interchange project site. Four borings were drilled to depths ranging from 25 to 31 meters below the ground surface near the proposed abutment locations for each structure. An additional 6 borings were drilled to depths between 6 to 11 meters below the ground surface near proposed retaining wall locations along each of the interchange ramp lines. One 19.35 m deep boring was completed in the area that will be utilized to widen the Las Vegas Wash Structure. Representative soil samples were taken from each boring using Standard Penetration Testing, thin-walled Shelby Tube, Pitcher Barrel, and diamond core barrel sampling equipment and procedures. Each soil sample was classified using the Unified Soil Classification System. Cohesive soil strengths were measured in the field using

a pocket penetrometer or pocket torvane. Copies of the finished boring logs and a boring location map are included in Appendix 1.

Laboratory Testing Program

Selected soil samples were transported back to NDOT's Headquarters laboratory facilities in Carson City for additional physical and chemical tests. A total of 127 Atterberg Limit tests, 64 coarse sieve analyses (-200 sieve washes) and 58 complete particle size analyses (hydrometer) were completed to aid in soil identification and classification. Sixteen consolidation tests were performed to evaluate the settlement and expansive properties of the fine grained clays. Twenty-nine chemical analyses were conducted to evaluate corrosive properties of the on-site soils. Twenty-nine UU (unconsolidated undrained), one unconfined compressive strength, and nine direct shear strength tests were completed to ascertain the shear strengths of the on site soils. Fifty-four unit weight determinations were done to establish the range of wet and dry densities of the native soils at the project site. One contaminated soil sample from boring LVW-1 was submitted to an independent lab for chemical analyses. The results of these tests are presented in the Appendices.

GENERAL GEOLOGIC DISCUSSION

Soils

The project sites are located within the central portion of the Las Vegas Valley. The majority of this valley is underlain by hundreds of feet of mostly unconsolidated alluvial sediments denoted in existing references (2) as "Plio-Pleistocene Basin Fill". Lithologic studies have concluded that the surface and near surface soils in the basin can be basically classified within two distinct depositional facies: 1) Coarse grained pediment slope alluvium and 2) fine grained fluvial and

lacustrine deposited basin fill. The coarser grained soils are found within the pediment slopes and alluvial fans flanking the mountain ranges which surround the Las Vegas Basin. Typically, these soils consist of angular, poorly sorted gravels and sands. Often these gravels and sands are found to be moderately to strongly cemented within a secondary calcium carbonate (ie..caliche) matrix. These caliche layers have a conglomerate like appearance, can be up to 10 m thick, and seem to occur randomly throughout the coarse subsurface soils. Strongly cemented caliche beds may also appear in various colors ranging from tan to crystalline white. These beds are generally more fine grained and occur in massive form in similar thicknesses.

The finer grained soils are located further away from the mountains within the central portions of the Las Vegas Valley. These soils typically consist of interbedded fine sands, silts, clays, and various combinations of each. Geologic studies (2,8,9,12) indicate that these soils are commonly found to contain substantial amounts of gypsum and secondary calcium carbonate (ie..caliche). Strongly cemented caliche layers, usually less than 1 meter thick, are randomly distributed throughout the fine grained soil section. Existing references (2,8) indicate that these fine grained soils were deposited during late Cenozoic times under fluvial and lacustrine conditions which existed in the valley during wetter climatic periods. During these times shallow playa lakes, small rivers, and a generally marshy environment probably dominated the landscape of the Las Vegas Valley.

Structural Geology

Clark County is located with the southern section of the Basin and Range Province. Las Vegas Valley is a tectonic zone of deformation which effectively serves as a structural boundary

separating the southern Spring Mountain Range from the mountain ranges located north of the valley basin. Structural geologic evidence indicates that right lateral movement has occurred along this shear zone during its geologic history. Less certain evidence has been presented to suggest that the Las Vegas Valley is actually the southeastern terminus of a much larger shear zone commonly known as the Walker Lane Trend. The Walker Lane Trend has been described as a great shear zone extending southeast some 645 km from western Nevada through the Las Vegas Valley (8). Orientation of this shear zone is generally parallel to the well known San Andreas fault zone located in California. Currently the continuity of this great shear zone has not been confirmed by field study.

Compaction Faults, Fissure Zones, & Ground Subsidence

Locally, a series of north-south trending "compaction faults" dominate the structural character of the Las Vegas Valley. Also, several fissure zones are mapped within the Las Vegas Basin. The origin of these fault lineaments and fissure zones are somewhat controversial. However, studies (2,16) have shown that recent differential ground movement across most of the "compaction fault" scarps has been influenced by deep groundwater withdrawals from the Las Vegas Valley Basin sediments. Evidence has been presented to suggest that these fault escarpments may actually represent surface expressions of differential ground subsidence between deeply seated fine grained and coarse grained sediments found within the basin. Differential compaction occurs as these soils are dewatered, with the finer grained silts and clays compressing much more than the coarser grained sands and gravels. In theory, "compaction fault" scarps and related fissure zones could form above areas where the underlying sediments grade rapidly from coarse grained to fine grained soils. However, extremely large amounts of natural prehistoric basin

dewatering would have been necessary to account for some of the larger escarpments (>30.5 m) seen in the valley. More than likely at least some of the fault scarps in the valley have tectonic origins but have continued to be activated by both natural and man-caused dewatering processes over time. Recent work by University of Nevada, Reno (13) presumes that the "compaction faults" seen in the Las Vegas Valley have tectonic origins. This presumption is based on subsurface evidence of basement rock offsets found beneath the faulted basin fill.

In any case, ground subsidence, related fault movements, and ground fissuring will continue to occur in the Las Vegas Valley as long as groundwater is removed from the underlying aquifers at rates greater than it can be recharged. Finally, it is possible that tectonic movements may occur on some of these "compaction faults" in the future.

Tectonic Faults & Seismicity

The Las Vegas Valley is located within Seismic Zone 2B as shown on the UBC (Unified Building Code, 1997 edition) Seismic Zone Map of the United States. This classification represents a low to moderately active seismic area. The valley is also located in an area defined by the National Highway Institute Map of Horizontal Acceleration as having a an acceleration coefficient between .075g and .10g. Numerous shocks of Richter magnitude M = 3.0 and larger have been recorded in the Las Vegas area. Most of the these shocks were the result of below ground blasts conducted at the Nevada Test Site. The largest and closest documented earthquake (M>6) occurred approximately 60 miles southwest of Las Vegas in 1916 (13). In 1989 an earthquake (M=3.5) caused minor damage to structures in North Las Vegas (13). No geologically recent (< 10,000 years old) tectonic faults have been mapped within the Las Vegas

Valley sediments.

Caliche

Secondary calcium carbonate alteration occurs throughout the Las Vegas Basin sediments and can be found in various forms, consistencies, and states of composition. These range from the indurated massive beds mentioned above to soft, whitish, limy silty clay layers. Indurated caliche layers can cause significant construction difficulties and may require special excavation procedures or equipment in some cases.

Other Problem Soils

The Las Vegas Valley is known to contain several problem soils which may require special design and construction procedures. As previously mentioned the fine grained soils found in the valley interior commonly contain large amounts of soluble sulfate salts. These soils can cause severe settlement or salt heave problems. Also these soils may attack nonsulfate resistant concrete. Expansive clays and hydro-collapsible soils are also present in the Las Vegas Valley. These soils can cause extensive damage to roadways and structures if they are not considered during the design and construction of these facilities.

SITE CONDITIONS

Cheyenne Ave Interchange

The existing Cheyenne Interchange is a conventional diamond shape with four ramps leading to and away from Structure I-1126 which conveys traffic over I-15. Maximum fill heights of approximately 9.5 m have been placed beneath the paved ramps as measured from I-15's roadway surface. Structure I-1126 has four spans. The abutments are supported by 1.57 m wide continuous footings founded in embankment fill material. Each pier is supported by five 1.52 m

diameter drilled shafts ranging in length from 6.4 to 11.3 meters. Structure G-1127 is located approximately 33 m northwest of the west edge of Structure I-1126. This three span bridge conveys Cheyenne Ave. traffic over the U.P.R.R. tracks. Structure G-1127 is supported at the abutments with 1.52 m wide continuous spread footings founded in embankment fill. Each pier is supported by five 1.22 m diameter drilled shafts which are approximately 10.3 m long. A double 2.44 m by 3.05 m reinforced concrete box (RCB) culvert is buried beneath the embankment fill used to support the east abutment. Original Construction Contract 1338 plan sheets indicate that the west edge of the RCB is directly under the center line of the existing east abutment.

Existing references (9) indicate that the surficial soils at the site are composed of mapped units Qts and Qa. Unit QTs is described as pinkish gray to reddish-orange "consolidated fluvial sediments" consisting of fine sand interstratified with silt, pebbly sand, pebble to small cobble gravel, and clay. QTs contains well to moderately consolidated layers and local caps of caliche as well as fibrous and encrusting gypsum crystals. Unit Qa is identified as "active alluvium" consisting of pink to pale brown sand to pebble and/or cobble gravel. Qa is mostly unconsolidated but locally cemented caliche layers may be present. Detrital gypsum can also be major soil component locally. Generally unit Qa occurs as thin veneers in incised stream channels and on alluvial flats between stream channels.

The closest mapped fault to the project site with evidence of geologically recent movement is located at the base of Frenchman Mountain (9). This fault is approximately 10.3 km east of the

interchange site. Additionally, a "compaction fault" is mapped approximately 0.35 km due south of Cheyenne Interchange (9). As previously mentioned, the origin of these "compaction fault" scarps found in the Las Vegas Valley are in question. If this fault has tectonic origins there is a small chance that movement will occur along this lineament during the design life of the proposed structures.

Subsurface

Generally all borings drilled in native soils at the Cheyenne Interchange site encountered stiff to hard sandy clays interbedded with dense to very dense clayey sands. Layers of dense silty sands with variable gravel content were also logged but were less common. The majority of the native soils contained substantial areas of secondary caliche alteration in the form of cemented thin layers, limey pockets, and gravel to sand sized caliche nodules. Thick sections of strongly cemented clays and caliche lenses were logged within the upper 10 meters of the native soils in each of the borings drilled near the proposed abutment locations. A very hard 5 m thick cemented section was logged between Elev. 584.2 m and 579.2 m in Boring CI-3. A 1.5 m thick cemented section was logged from Elev. 584.5 m to 583.0 m in Boring CI-1. Cemented sections were also logged between Elev. 582.3 m and 578.4 m in Boring CI-2 and between Elev. 577.1 m and 575.4 m in Boring CI-4. Strongly cemented layers were also encountered in each of the borings drilled into native ground at the interchange site.

Practically all of the clay soils at the interchange site have been preconsolidated to pressures exceeding 287.3 kPA. This has been determined by reviewing consolidation, shear strength, natural moisture content, Standard Penetration, and Atterberg test results. Out of 63 calculated

or laboratory measured preconsolidation pressure values only 4 were less than 287.3 kPa. Only 8 of 59 calculated liquidity indices were more than 0.7. Values less than 0.7 are generally accepted (3) as indicators that soils have been preconsolidated. Preconsolidation of these soils is probably a result of desiccation processes in combination with the lowering of the ground water table within the Las Vegas Valley Basin during recent geologic times. Secondary caliche alteration of these soils may also play a part in this process. Soft to medium stiff clay layers were only logged in two borings drilled east of the proposed structure locations at the interchange site. A 1.2 m thick fat clay was logged in Boring CI-6 between Elev. 576.7 m and 575.5 m, and a 1.5 m thick lean clay was logged from Elev. 573.1 m to 571.5 m in Boring CI-4. In both of these cases the softer layers of clay were directly overlain by strongly cemented caliche lenses.

The near surface clays (upper 5 meters) typically exhibit low to marginal swell potentials as determined by Atterberg Limit testing and natural moisture content measurements. The only exception to this was found in the upper fat clay layer logged in Boring CI-6. Groundwater levels were measured from 11 to 13 meters below the original ground surface between Elevations 569.9 m and 574.7 m at the time of investigation. The phreatic surface tends to slope downwards with the surface topography toward the northeast. Groundwater levels should be expected to fluctuate seasonally.

A major "lost circulation zone" (LCZ) was logged in Boring CI-4 between Elev. 573 m to 570 m. This "thief zone" took over 5200 liters of bentonite drilling fluid during the course of completing this boring. Minor LCZs were also logged in Borings CI-1 and CI-3. Typically, all of the logged LCZs originated in clay layers located just above the static groundwater table

surface. However the LCZ in Boring CI-4 was logged approximately 9.5 meters above the groundwater surface. Soil samples taken from this layer were fissured. These fissures have probably developed in these clays due to desiccation processes and in some cases are substantial enough to convey substantial amounts of fluids. In all borings lost circulation problems were overcome by increasing the drilling mud viscosity within the borings and allowing the time for the thicker mud to seal the borehole walls. It is not expected that these zones will adversely affect the proposed structures to be built at the interchange site.

Las Vegas Wash Structure Widening Site

Structure B-954N is located approximately 1 km northeast of Cheyenne Interchange along I-15. This bridge, which conveys northbound I-15 traffic over Las Vegas Wash, is a three span structure supported by three 0.91 m diameter drilled shafts at each abutment and pier. Original shaft design lengths of 12.7 m and 10.4 m were used at the abutment and pier supports, respectively. Existing references (9) indicate that the surficial soils at the site are classified as soil unit Qa which has been described above. The closest mapped fault to the bridge widening project site with evidence of geologically recent (< 10,000 years) movement is once again located at the base of Frenchman Mountain (9). This fault is approximately 9.7 km southeast of the bridge site.

Subsurface

Boring LVW-1 generally encountered very stiff to hard sandy clays. Layers of medium dense silty sands and clayey sands with variable gravel content were also logged. Secondary caliche alteration of these soils in the form of cemented thin layers, limey pockets, and the presence of sand to gravel sized caliche fragments was common. No indurated cemented layers greater than

0.3 m were logged at the site. The groundwater surface was recorded in Boring LVW-1 at 14.6 m below the ground surface at approximately Elev. 563.5 m. This level should be expected to fluctuate seasonally. Soils encountered between 17.4 to 19.4 meters below the ground surface in Boring LVW-1 had a chemical fuel oil like odor. By Elev. 558.7 m the odor was considered strong enough to cease drilling operations. Soil samples gathered from these areas were placed into glass jars and transported to an independent laboratory for chemical analyses. Results from these analyses indicated that the soils contained amounts of acetone and 2-butanone at concentrations of 1.4 and 0.64 ppm, respectively.

CONCLUSIONS & RECOMMENDATIONS

Bridge Foundations at Cheyenne Ave Interchange and U.P.P.R. Overpass

Existing pier supports for each bridge at the site are founded on cast-in-drilled-hole (CIDH) piles. Existing abutments are supported on continuous spread footings founded in engineered fill. According to the original soils report (7) CIDH piles were recommended at Cheyenne Interchange due to the presence of a compressible layer believed to exist 8 to 10 feet below the existing ground surface at this bridge site. Spread footings founded in surficial native soils with allowable bearing pressures of up to 2.5 tsf (239.4 kPa) were recommended in this report for support of the U.P.R.R overpass structure. This alternative was given because ground conditions were deemed better than those at the interchange site. A drilled shaft alternative was also given and apparently selected for final bridge construction. Review of boring information gathered at both sites does not confirm the existence of this compressible layer. The only "soft" clay layer encountered at either of these bridge sites was logged nearly 10 meters below I-15's roadway surface in Boring CI-4 near the proposed northwest abutment area of Structure I-1126. The liquidity index of this clay layer was measured at 0.25 which indicates it has been preconsolidated. As mentioned previously test results indicate the vast majority of the clays present at these locations have been over consolidated to pressures exceeding 287.3 kPa.

Given the above, conventional spread footings are recommended for structural support of both bridges. Bearing capacity calculations completed for this location indicate that conventional spread footings established on undisturbed native soils should be capable of supporting gross allowable footing loads up to 287.3 kPa. Footings should be embedded at least 1 meter below

the final ground surface. Spread footing lateral resistance will be derived from the frictional resistance between the base of the concrete footing and the foundation soils and the passive soil resistance of the soils against the vertical faces of the footing and the abutment or pier walls. A coefficient of friction equal to 0.4 between the footing base and native soils or properly compacted structural fill is recommended for design purposes. A passive earth pressure coefficient (Caquot and Kerisel) of $K_p = 4.2$ is recommended to calculate the ultimate available passive soil resistance derived from the very stiff to hard native clayey soils that the footings will be founded in.

Total individual footing settlements of less than 90 mm are predicted at Structure G-1127. Maximum anticipated long term differential settlement between abutment footings should be less than 50 mm. These values were calculated by assuming a gross applied dead load of 207.7 kPa on a 10 m wide by 61.8 m long continuous spread footing founded at Elev. 581.8 m. Total individual abutment and pier footing settlements of less than 100 mm and 32 mm respectively, are predicted at Structure I-1126. Maximum anticipated long term differential settlement between pier and abutment footings should be less than 50 mm. These values were calculated by assuming a gross applied dead load of 210.7 kPa on a 9.8 m wide by 95.8 m long abutment footings founded at Elev. 580.2 m. An gross applied dead load of 229.8 kPa and a 4.8 meter square footing founded at 581.0 m was used to calculate pier footing settlement.

Please note that settlement estimates are based on data obtained from test results from small clay samples which cannot realistically represent the caliche cemented fabric present within the native

soils at this site. Additionally, native soil preloading due to existing embankment fills and the load distributing affect of the thick indurated caliche layers and existing drilled shafts underlying the site have not been accounted for. Because of the partially saturated, cemented, and over consolidated nature of the native surficial clays, and the depth of the groundwater surface at the site, most if not all of the predicted footing settlements are expected to take place during bridge construction. The maximum long term differential settlement values listed above were determined assuming that the saturated native clays located near the water table may undergo some long term virgin consolidation. Actual settlements are expected to be somewhat lower than predicted.

Site Preparation

All existing asphalt, vegetation, debris, and unsuitable fill soils should be removed from within the proposed construction areas. This specifically includes the new bridge footing areas, new retaining wall locations, and any paved areas to be used for traffic movements. Plans indicate that the existing 2.44 m by 3.05 m double RCB structure may complicate the construction of Structure G-1127's easterly abutment. To insure that the new bridge footing does not adversely affect the RCB the closest footing edge should be kept a minimum horizontal distance away from the RCB equal to half the vertical distance measured between the final footing and RCB bottom elevations. Existing drilled shafts will also complicate the construction of new spread footings at both bridges. To avoid these conflicts the existing drilled shafts should be cut off a minimum of 0.3 m below the final footing bottom elevations. The resulting void should be filled with material meeting AASHTO structural backfill requirements and compacted to at least 95% maximum density as determined by Nevada Test Method T101. There is a small chance that

localized thin layers of soft clays may be exposed in footing excavations which are dug below the surficial strongly cemented soil layers, especially in the area of Boring CI-1 (ie..the northwest abutment of the railroad overpass structure). Soft soils exposed in footing excavations should be removed and replaced with structural backfill to a maximum depth of 1.5 m or to firm ground if it is encountered within this depth. The structural backfill should be compacted to 95% maximum density as measured by Nevada Test Method T101. After completion of the required footing excavations, the exposed soils should inspected by qualified personnel to verify that all unsuitable materials have been removed prior to footing construction. If necessary a representative from the Geotechnical Section will be made available for these inspections upon request by the Resident Engineer. Exposed clayey foundation soils should not be allowed to become saturated during construction. Steps should be taken to insure that surface drainage is directed and maintained away from footing excavations.

Mechanically Stabilized Earth Walls

Recommended soil design parameters are provided for each MSE wall location below:

Ramp 1

MSE wall left of stations "R1M" 2+40 to 2+80

Maximum wall height of H_{max} = 3.1 m (embedment of 0.46 m assumed). MSE base between elevations 582.79 m and 583.14 m. Boring CI-8 indicates the wall will be founded on very hard partially cemented silty clay. Recommended foundation soil parameters: $\Phi' = 34°$ and $C' = 0$ kPa

MSE wall right of stations "R1M" 2+80 to 4+90

H_{max} of approximately 5.6 m (embedment of 0.46 m assumed). MSE base between elevations 584.03 m and 589.96 m. This wall will be founded on compacted embankment soils which are

generally classified as clayey sands (SC), sandy lean clays (CL) and silty sands (SM). Recommended foundation soil parameters: $\Phi' = 32°$ and $C' = 0$ kPa

MSE wall left of stations "R1M" 4+21 to "R1A" 0+60

H_{max} of approximately 2.5 m (embedment of 0.46 m assumed). MSE base between elevations 584.24 m and 584.79 m. Wall will be founded on a combination of new compacted embankment soils which will be placed during project and existing surficial soils. Recommended soil parameters: $\Phi' = 30°$ and $C' = 0$ kPa

Ramp 2

MSE wall right of stations "R2M" 0+90 to 1+17

H_{max} approximately 5.0 m (embedment of 0.46 m assumed). MSE base between elevations 586.80 m and 587.96 m. Boring CI-10 indicates that base will be founded on embankment fill classified as a hard fine sandy lean clay (CL). Recommended foundation soil parameters: $\Phi' = 32°$ and $C' = 0$ kPa

MSE wall left of stations "R2A" 0+00 to "R2M" 3+20

H_{max} approximately 2.1 m (embedment of 0.46 m assumed). MSE base between elevations 591.53 m and 583.10 m. Borings CI-10 and CI-9 indicate that MSE base will be founded on embankment fill classified as hard fine sandy lean clay (CL) and dense slightly cemented clayey sand with gravel (SC). Recommended foundation soil parameters: $\Phi' = 32°$ and $C' = 0$ kPa

MSE wall left of stations "R2M" 3+20 to 4+00

H_{max} approximately 2.0 m (embedment of 0.46 m assumed). MSE base between elevations 582.93 m and 581.04 m. Boring CI-9 indicates that MSE base will be founded on native soil classified as very stiff sandy lean clay (CL) with limey areas and cemented pockets. Recommended foundation soil parameters: $\Phi' = 30°$ and $C' = 0$ kPa

Ramp 3

MSE wall right of stations "R3A" 1+70 to 2+55

H_{max} approximately 8.7 m (embedment of 0.46 m assumed). MSE base between elevations 581.0 m and 581.32 m. Boring CI-7 indicates MSE base will be on very hard partially cemented silty clay. However a substantial portion of this wall will be located on unexplored soils in a former residential neighborhood. Recommended foundation soil parameters: $\Phi' = 30°$ and $C' = 0$ kPa

MSE wall left of station "R3M" 5+10 to 5+30

H_{max} approximately 5.6 m (embedment of 0.46 m assumed). MSE base at elevation 585.77 m. Boring CI-2 indicates MSE base will be founded on compacted embankment fill classified as medium dense clayey fine gravelly sand (SC). Recommended foundation soil parameters: $\Phi' = 32°$ and $C' = 0$ kPa. Please note that between elevations 583.8 m and 582.6 m boring CI-2 indicates that the existing embankment fill soil is classified as a very stiff fine sandy fat clay. If the MSE wall base is founded in this material we recommend reducing the soil design values to $\Phi' = 27°$ and $C' = 0$.

Ramp 4

MSE wall left of "R4M" 1+17 to 1+64

H_{max} approximately 4.5 m (embedment of 0.46 m assumed). MSE base between elevation 585.49 m and 585.84 m. Wall will be founded on embankment fill soils which are generally classified as clayey sands (SC), sandy lean clays (CL) and silty sands (SM). Recommended foundation soil parameters $\Phi' = 32°$ and $C' = 0$

Sound Wall Design Parameters

Native soils

Review of the existing boring logs indicates that the upper 4.6 m of existing native soils along the project alignment are classified as stiff to hard cohesive sandy lean clays (CL). These soils commonly contain strongly cemented caliche layers. Natural moisture contents generally indicate that the soils have been preconsolidated by desiccation processes. The following soil parameters are recommend for foundation design: $\Phi'=30°$ and $C'=0$; $\Phi=0°$ and $C_u= 86.2$ kPa; Moist unit weight equal to 19.65 kN/m^3.

Existing embankment fill soils

Boring logs indicate that the existing embankment fill soils can be generally classified as dense clayey sands with gravel (SC) and stiff to very stiff sandy clays (CL/CH). These soils were also commonly slightly caliche cemented. The following soil parameters are recommend for sound wall foundation design: $\Phi'=32°$ and $C'=0$; $\Phi=0°$ and $C_u= 95.8$ kPa. Moist unit weight = 19.65 kN/m^3

New structural section material

Type 1 or 2 aggregate base compacted to 95% relative maximum density will be used to widen the existing freeway. These soils can be classified as dense silty sands and gravels (GM/SM). The following soil parameters are recommend for sound wall foundation design:

$\Phi'=34°$ and $C'=0$; Moist unit weight = 19.65 kN/m^3

Excavations

Existing embankment fills

Information gathered during our site investigation indicates that the existing fills may be classified

as cohesive sandy clays and clayey sands. These soils should be suitable for reuse as embankment borrow material. Because of the cohesive nature of these soils special attention to proper moisturizing and compaction of this material by project inspectors is recommended. The soils can be classified as OSHA Class B soils, which allows excavation back slopes of up to 1:1 (H:V) for excavations less than 6.1 m deep.

Native surficial soils

The existing native surfical soils can generally be classified as Type A and Type B OSHA soil types. However, the close proximity of the railroad tracks to the proposed abutment footings for Structure G-1127 and RCB excavations requires that OSHA Soil Type B criteria be used for excavation back slopes in these areas. Review of Contract 1338 plan sheets shows that 0.5:1 (H:V) excavation limits were specified for channel excavation and backfill quantities. These soils should also be suitable for reuse as embankment borrow material. Once again, due to the cohesive nature of these soils special attention to proper moisturizing and compaction of this material by project inspectors is recommended.

Caliche

Strongly cemented caliche layers have been logged in the surficial (upper 5 m) soils at the project site, especially along the south side of the proposed new structures (Borings CI-1 & CI-3). Additionally, pipe jacking methods are planned on being used to relocate a jet fuel line and a water line just south of the new structures. Specialized equipment or excavation procedures will probably be needed to complete footing excavations and pipe bores in this material.

Given the above, all excavations completed at the Cheyenne Interchange and the U.P.R.R. crossing

should be laid back or shored in accordance with OSHA Excavation Standards (10) as specified for Type B soil conditions. However, these requirements may change based upon the soil conditions exposed during construction operations. Surcharges and traffic loadings should be kept a minimum horizontal distance from shored excavation walls equal to 50% of the total excavation depth. Otherwise these surcharges shall be accounted for in excavation shoring designs.

RCB Extension & New Concrete Lined Channel

Bedding material requirements should conform to standard NDOT specifications for the proposed RCB extension. A minimum of 100 mm of bedding material meeting NDOT specs for granular backfill or Type 2 Class B Aggregate should be used beneath the new channel bottom slabs. This material should be placed in accordance with Section 207 of NDOT's Standard Specifications for Road and Bridge Construction. Given the apparent success of the original concrete channel weephole design it should be appropriate to use the original contract design configuration for the new channel walls with minor changes. The original contract plans called for 75 mm diameter weepholes placed on 6.1 m centers at 0.91 m above the channel flow line. The backside of the weepholes should be covered with 150 mm square aluminum or galvanized steel wire mesh hardware cloth (minimum wire diameter of 0.76 mm). A minimum of 0.06 m^3 of Type 2 Drain Backfill encapsulated within a moderate survivability filter fabric should be centered on the backside of the weepholes. This fabric should meet the following minimum specifications:

Property		Test Method
Grab Strength	366 N (80 lbs)	ASTM D 4632
Seam Strength	311 N (70 lbs)	ASTM D 4632
Puncture Strength	111 N (25 lbs)	ASTM D 4833
Trapezoidal Tear	111 N (25 lbs)	ASTM D 4533
Apparent Opening Size < 0.31 mm		ASTM D 4751

A rough sketch showing the weephole design has been included in the Appendix 2.

Corrosivity

Both the existing fills and native soils at the site contain substantial amounts of sulfate salts. Chemical analyses indicates that the existing embankment fills and near surface native soils exhibit low resistivities (< 500 ohm-cm) and high salt content (average chloride content = 500 ppm, average sulfate content 2600 ppm). Soils containing high concentrations of sulfates are known to be corrosive to concrete and metal. Therefore, Type V or an approved equivalent sulfate resistant cement should be used in concrete mix designs for this project. Additionally, consideration should be given to providing corrosion protection for any metal which comes into contact with the native soils. Buried piping should be constructed with nonmetallic materials if possible.

Las Vegas Wash Structure B-954N Widening

Axial Capacity

Drilled shafts are recommended for structural support for the proposed bridge widening. Calculations indicate that a 0.91 m diameter 11.9 m long drilled shaft founded at Elev. 561.4 m should be able to support allowable loadings of 616.5 kN with a safety factor of 2.0 for the channel pier supports. This tip elevation should match the original Contract 1338 design tip elevation of 1842' for the original pier shafts. Calculations completed for abutment soil conditions show that a 0.91 m diameter, 12.7 m long drilled shaft founded at Elev. 564.4 m will also be capable of supporting 616.5 kN with a safety factor of 2.0. This tip elevation should match the original Contract 1338 design tip elevation of 1852' for the original abutment shafts. Settlement analyses indicates that total settlements of less than 10 mm are expected at either location under a applied loading of 616.5 kN. Total long term differential settlement between the abutment and pier shafts

is estimated at less than 5 mm. The following parameters were assumed during the pier shaft capacity analyses:

1) Top of concrete lined channel above channel drilled shafts assumed at 574.2 m (1884').
2) Pier shaft cut off elevation at 573.3 m (1881').
3) Abutment shaft cut off elevation at 577.0 m (1893').

According to Bridge Division these channel bottom and drilled shaft cut off elevations will be confirmed by Construction Division or the Contractor in the field during the Contract. If assumed elevations are found to be incorrect at that time the minimum drilled shaft design lengths specified above should be adhered to (ie.. The design tip elevations should be adjusted to meet the design length requirements).

Soil Profile and Input Parameters for COM624P

The following information is recommended for use in the lateral load analyses for the above mentioned drilled shafts.

Layer 1

Soil type: Medium dense fine sand and silt between Elev. 578.14 m and 575.40 m. Angle of internal friction = 36 degrees, Moist unit weight = 19.02 kN/m^3

$K_{static} = K_{cyclic} = 24.37$ MN/m^3. Use criteria curve #4 for sands.

Layer 2

Soil type: Stiff to very stiff fine sandy clay, limey, with caliche pockets and thin layers, between Elev. 575.40 m and 566.93 m. Cohesion = 113.63 kPa , $E_{50} = .006$

Moist unit weight = 17.61 kN/m^3

$K_{static} = 196.51$ MN/m^3 , $K_{cyclic} = 78.61$ MN/m^3

Use criteria curve #3 for stiff clay over water table.

Layer 3

Soil type: Hard to very hard clay, limey with strongly cemented layers, between elevations 566.93 m and 563.51 m. Cohesion = 196.79 kPa , E_{50}= .005

Moist unit weight = 14.15 kN/m^3

K_{static} = 408.75 MN/m^3, K_{cyclic} = 163.50 MN/m^3 Use criteria curve #3 for stiff clay over water table.

Ground water table is at Elev. 563.5 m.

Layer 4

Soil type: Very stiff clay with sand, contains occasional caliche hard layers, between elevations 563.51 m and 558.94 m, Cohesion = 106.53 kPa , E_{50}= .006, Buoyant unit weight = 9.59 kN/m^3

K_{static} = 196.51 MN/m^3, K_{cyclic} = 78.61 MN/m^3, Use criteria curve #2 for stiff clay under water table.

Seismic Design

Structures should be designed in accordance with the 1996 AASHTO Standard Specifications for Highway Bridges. A minimum horizontal ground acceleration of 0.15g is required by NDOT for structural design of bridges in the Clark County. A Type II Soil Profile is recommended for use in seismic design analyses for all bridges to be built for this project.

REFERENCES

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11) OSHA Excavation Standards, Code of Federal Regulations--29, Chapter XVII (7-1-91 Edition), Office of the Federal Registrar, National Archives and Records Administration, Washington D.C., 1991.

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13) Siddharthan R. et al, "Peak Bedrock Acceleration for Las Vegas Region--A Preliminary Report to NDOT", Univ. of Nevada, Reno, 1991.

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16) Varnum, N.C., "Results of Leveling Across Fault Scarps in the Las Vegas Valley, Nevada", Open File Report 87-7, Nevada Bureau of Mines and Geology, Reno, Nevada, 1987.

APPENDIX 1

Log of Exploration Borings, Key to Boring Logs and Location Map
Summary of Test Results Sheets
Summary Sheets for Chemical Analyses

FED. RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA	STP-015-1(104)46	CLARK	BL-1

NOTE: FOUNDATION REPORT AVAILABLE FOR CONTRACTORS STUDY IN DISTRICT OFFICE AND MATERIALS & TESTING DIVISION.

METRIC NDOT

KEY TO BORING LOGS

PARTICLE SIZE LIMITS

CLAY	SILT	SAND			GRAVEL		COBBLES	BOULDERS
		FINE	MEDIUM	COARSE	FINE	COARSE		
.002 mm		#200	#40	#10	#4	19 mm	75 mm	300 mm

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
GM	Silty gravels, poorly graded gravel-sand-silt mixtures
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
CE	Caliche
PT	Peat and other highly organic soils

MOISTURE CONDITION CRITERIA

Description	Criteria
Dry	Absence of moisture, dusty, dry to touch
Moist	Damp but no visible free water
Wet	visible free water, usually below goundwater table
▼	Groundwater Elevation Symbol

SOIL CEMENTATION CRITERIA

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

STANDARD PENETRATION CLASSIFICATION*

GRANULAR SOIL		CLAYEY SOIL	
BLOWS/0.3m	DENSITY	BLOWS/0.3m	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) 63.5 Kg hammer 760mm free fall on 50.8mm O.D. x 35mm I.D. sampler.

Blow counts on California Split Spoon (N_{css}) can be converted to N_{spt} by:
$(N_{css})(0.563) = N_{spt}$

Blow counts from Automatic Hammer can be converted to Standard N_{spt} by:
$(N_{Automatic\ Hammer})(1.33) = N_{spt}$

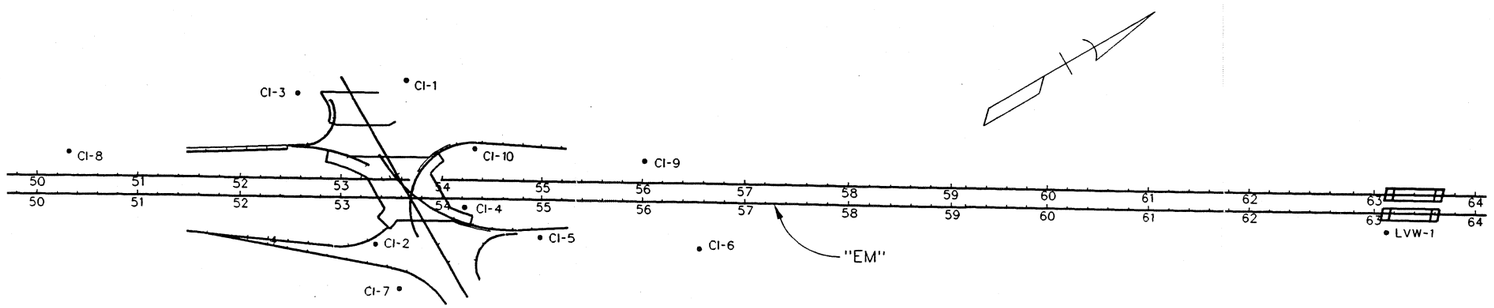
TEST ABBREVIATIONS

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

SAMPLER NOTATION

CPT	CONE PENETRATION
CS	CONTINUOUS SAMPLER①
CSS	CALIFORNIA SPLIT SPOON②
P	PUSHED (NOT DRIVEN)
PB	PITCHER BARREL
RC	ROCK CORE③
SH	SHELBY TUBE④
SPT	STANDARD PENETRATION TEST
TP	TEST PIT

①- I.D.= 82mm with tube; 88.9mm w/o tube
②- I.D.= 61.5mm
③- N XW
④- I.D.= 73mm



BORING PLAN

NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION
Geotechnical Section

I-15 CHEYENNE INTERCHANGE

LOG OF TEST BORINGS

BRIDGE NO.	MILE POST	E.A. NO. 72031	SHEET 1	OF 1
		REVISION DATES	(PRELIMINARY STAGE ONLY)	

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/2/96
END DATE: 4/4/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED NW ABUT U.P.R.R. OVERPASS
BORING: CI-1
E.A. #: 72031-1
GROUND ELEV.: 586.37 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
4/8/96	13.1	573.3

STATION: "EM" 53+66.7
OFFSET: 116.0 m Left
ENGINEER: SALAZAR
EQUIPMENT: Drill B-80 Unit 2041
OPERATOR: DENSON/WHITEHEAD
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	**SILTY SAND with GRAVEL**, fill, loose to medium dense, with some wood fragments.	
	0.61								
	0.91						SC-CL	**SANDY LEAN CLAY**, stiff, light brown, with gravel	
585.4	1 1.37	A	SPT	13	7	Visual			SPT (A) Rock plugged sampler
	1.83								
584.4	2 2.44						CL-CE	**FINE SANDY LEAN CLAY** very hard, strongly cemented, grayish orange pink, with occasional caliche gravel	
	2.90	B	SPT	124	93	PI,S,CH,W			
583.4	3								
	3.35								
	3.96						CL	**LEAN CLAY with FINE SAND** limey, stiff to very stiff, grayish orange pink, contains light brown veinlets and fissures	
582.4	4 4.42	C	SPT	17	67	PI,H,W			Lost circulation zone; bottom of SPT(C) sample fissured
581.4	5 5.49								
	5.03								
	5.94	D	SPT	18	110	PI,H,W	CH	**FAT CLAY** stiff to very stiff, variable fine sand content with occasional cemented pockets, light brown	
580.4	6								
579.4	7 7.01								
	7.32	E	SH		100	PI,UU,UW, H,W			
	7.62								
578.4	8 8.53						SC	**CLAYEY FINE SAND with GRAVEL** dense, moderate reddish orange, contains sub to well rounded gravelly layers, moderate orange pink to white cemented areas	
	8.99	F	SPT	49	107	PI,S,W			
577.4	9								
	9.60								
576.4								**LEAN CLAY with FINE SAND** stiff, mottled light brown and moderate orange pink,	

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/2/96
END DATE: 4/4/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED NW ABUT U.P.R.R. OVERPASS
BORING: CI-1
E.A. #: 72031-1
GROUND ELEV.: 586.37 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
4/8/96	13.1	573.3

STATION: "EM" 53+66.7
OFFSET: 116.0 m Left
ENGINEER: SALAZAR
EQUIPMENT: Drill B-80 Unit 2041
OPERATOR: DENSON/WHITEHEAD
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.06					PI,S,W		contains occasional cemented areas	
	10.52	G	SPT	14	107		CL		
575.4	11								
	11.58								
						PI,S,W			
574.4	12	H	SPT	53	93		SC-CE		
	12.04								
573.4	13								
	13.11 ▼							11.28 **CLAYEY FINE SAND** dense to very dense, moderate orange pink, containing strongly cemented layers (up to 150 mm thick)	
	13.18	I	SPT		100	Visual		13.11 **SANDY LEAN CLAY** hard to very hard, moderate orange pink to light brown, containing strongly cemented caliche interbeds	Hole caved @ 12.9 m, 9:15 A.M. 4/11/96 SPT (I) refusal
572.4	14								
	14.63								
						UW,U	CL-CE		
571.4	15								
		J	RC		41				
570.4	16								
	16.10							16.46 **SILTY FINE SAND** very dense, moderate to light reddish orange, with occasional strongly cemented thin layers	
569.4	17								
	17.68						SM-CE		
						PI,S,W			SPT(K) refusal
568.4	18	K	SPT						
	18.11							18.59 **LEAN CLAY** very stiff to hard, light brown	
567.4	19								
	19.20								
						PI,H,W			
	19.66	L	SPT	32	107		CL		
566.4									

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EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/2/96
END DATE: 4/4/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED NW ABUT U.P.R.R. OVERPASS
BORING: CI-1
E.A. #: 72031-1
GROUND ELEV.: 586.37 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
4/8/96	13.1	573.3

STATION: "EM" 53+66.7
OFFSET: 116.0 m Left
ENGINEER: SALAZAR
EQUIPMENT: Drill B-80 Unit 2041
OPERATOR: DENSON/WHITEHEAD
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								20.73	
565.4	21							**LEAN CLAY** hard to very hard, moderate orange pink, with cemented nodules and thin layers, containing occasional clayey silt interbeds	
564.4	22								
	22.25								
	22.71	M	SPT	91	127	PI,H,W			
563.4	23						CL-CE		
562.4	24								
561.4	25								
	25.30								
	25.73	N	SPT	115	107	PI,H,W		S.A.A. with clayey silt interbeds	
								25.73 **B.O.H.**	

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EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/8/96
END DATE: 4/10/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED SE ABUT I-15 OVERPASS
BORING: CI-2
E.A. #: 72031-1
GROUND ELEV.: 587.13 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
4/15/96	14.4	572.7
5/15/96	14.4	572.7

STATION: "EM" 53+31.0
OFFSET: 24.7 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: ALTIMIRANO/WHITED
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61							**CLAYEY FINE GRAVELLY SAND** fill, medium dense, moderate orange pink to light brown	
586.1	1 1.07	A	SPT	24	13	PI,W	SC		
	1.52								
585.1	2 2.13						SM	**SILTY SAND with GRAVEL** fill, dense, light brown to moderate orange pink, contains partially cemented areas	
	2.59	B	SPT	36	60	PI,S,W			
584.1	3								
	3.35								
	3.66						CH	**FINE SANDY FAT CLAY** fill, very stiff, light brown with moderate orange pink cemented pockets and layers	
583.1	4 4.11	C	SPT	17	80	PI,H,W			
	4.57								
	4.88						SM	**SILTY SAND with GRAVEL** fill, medium dense, multi-colored	
582.1	5 5.18							**CLAYEY SAND** very dense, mottled light brown and moderate orange pink, with strongly cemented pockets and thin layers	
	5.64	D	SPT	69	80	PI,S,W			
581.1	6 6.71								
580.1	7 7.04	E	SPT		91	PI,CH,W	SC-CE		SPT(E) refusal
579.1	8 8.23								
	8.50	F	SPT		88	PI,S,W			SPT(F) refusal
	8.69								
578.1	9						SM	**SILTY SAND WITH GRAVEL** medium dense, grayish black to light brown	
	9.30								
	9.75							**POORLY GRADED SAND with CLAY and GRAVEL** medium dense, contains weakly cemented areas and limey pockets, light brown	
577.1									

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EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/8/96
END DATE: 4/10/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED SE ABUT I-15 OVERPASS
BORING: CI-2
E.A. #: 72031-1
GROUND ELEV.: 587.13 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
4/15/96	14.4	572.7
5/15/96	14.4	572.7

STATION: "EM" 53+31.0
OFFSET: 24.7 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: ALTIMIRANO/WHITED
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21	G	SPT	20	77	S,W	SP-SC		
								10.67 — **SILTY SAND with GRAVEL** very dense, light brown and moderate orange pink, contains strongly caliche cemented pockets and thin layers	
576.1	11								
	11.28								
	11.73	H	SPT	74	83	PI,S,W	SM		
575.1	12								
	12.80								
								12.89 — **LEAN CLAY** very hard, reddish brown, dry, with cemented pockets, and layers	SPT(I) refusal on caliche
574.1	13					S,W,PI	CL-CE		Slight Loss Circulation Zone
	13.11	I	SPT		90				
573.1	14							14.02 — **LEAN CLAY** very stiff, light brown with white specks, contains strongly cemented thin layers (<50 mm)	Driller notes softer formation
	14.23								
	14.78	J	SPT	24	83	PI,H,W	CL-CE		
572.1	15								
								15.24 — **LEAN CLAY** hard, light brown, with moderate pale orange strongly cemented areas	
	15.85								
571.1	16					PI,CH,W	CL-CE		
	16.31	K	SPT	50	117				
								16.76 — **LEAN CLAY** hard to very stiff, light brown with occasional limey areas and caliche gravel	
570.1	17								
	17.37								
	17.83	L	SH		100	UU,UW,H,W			
569.1	18								
	18.90								
568.1	19					PI,UW,OC, H,W	CL		
	19.35	M	CSS		100				
567.1									

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/8/96
END DATE: 4/10/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED SE ABUT I-15 OVERPASS
BORING: CI-2
E.A. #: 72031-1
GROUND ELEV.: 587.13 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
4/15/96	14.4	572.7
5/15/96	14.4	572.7

STATION: "EM" 53+31.0
OFFSET: 24.7 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: ALTIMIRANO/WHITED
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.42								
	20.88	N	SPT	33	140	PI,S,W			
566.1	21								
								21.34	
								LEAN CLAY hard to very hard, light brown, contains strongly cemented pockets and thin layers and occasional silty clay layers, 10% to 15% of section cemented	
	21.95								
565.1	22								
	22.40	O	SPT	60	133	PI,S,W			
564.1	23								
	23.47								
	23.73	P	SH		100	PI,S,W	CL-CE		Bagged sample
563.1	24								
562.1	24.99								
	25.45	Q	SPT	130		PI,S,W			
561.1	26								
								25.91	
								FAT CLAY with SAND hard to very hard, light brown, contains strongly cemented pockets and thin layers	
	26.52								
	26.97	R	CSS		136	PI,UW,OC, H,W	CH-CE		
560.1	27								
								27.49	
								LEAN CLAY very stiff, light to moderate brown, with cemented pockets and white caliche gravel, contains intermittent silty clay layers	
559.1	28.04								
	28.50	S	SPT	28	140	PI,H,W			
558.1	29								
	29.57								
		T	SPT	38		PI,S,W			
557.1									

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/8/96
END DATE: 4/10/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED SE ABUT I-15 OVERPASS
BORING: CI-2
E.A. #: 72031-1
GROUND ELEV.: 587.13 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
4/15/96	14.4	572.7
5/15/96	14.4	572.7

STATION: "EM" 53+31.0
OFFSET: 24.7 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: ALTIMIRANO/WHITED
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	30.02								
556.1	31 31.09								
	31.33	U	SH			PI,S,W	CL-CE		Collapsed tube; bagged sample
555.1	32								
	32.61								
554.1	33 33.07	V	SPT	21		PI,H,W			
553.1	34 34.14								
	34.32	W	SPT		92	PI,W			SPT(W) refusal, attempted Shelby 1st, crushed tube end
552.1	35								
	35.07							**SILTY CLAY with GRAVEL** very stiff, light brown, limey, with caliche gravel	
	35.66						CL-ML		
	35.94	X1	SPT			PI,S,W			
551.1	36 36.12	X2	SPT			PI,S,W	CH-CE	**FAT CLAY** light brown, with caliche gravel	
								B.O.H.	

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/15/96
END DATE: 4/17/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED SW ABUT U.P.R.R. OVERPASS
BORING: CI-3
E.A. #: 72031-1
GROUND ELEV.: 587.32 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/16/96	12.6	574.7

STATION: "EM" 52+61.5
OFFSET: 107.3 m Left
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/ALTAMIRANO
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC-CL	**CLAYEY SAND**, fill, very dense, light brown, dry, with asphalt chunks, small cobbles, caliche chunks, minor gravel	
586.3	1 1.07	A	SPT	61	87	PI,S,W			
	1.52						CL-CE	**FINE SANDY LEAN CLAY** hard, light brown with moderate orange pink limey cemented areas and white caliche gravel	
585.3	2 2.13								
	2.59	B	SPT	36	83	PI,S,CH,W			
584.3	3								
	3.14						CL-CE	**CEMENTED LEAN CLAY** very hard, caliche cemented sand, gravel,and small cobbles (conglomerate-like appearance), interbedded with very stiff to strongly cemented, moderate reddish orange to light brown lean clay	Approximately 50%-60% of this layer is strongly cemented. SPT(C) Refusal
	3.66	C	SPT		0				
583.3	4								
582.3	5								
	5.18								
	5.36	D	SPT		0	Visual,S,W			SPT(D) Refusal
	5.49								
	5.79	E	RC		70	Visual			Bagged sample E
581.3	6								
	6.71								
580.3	7					Visual			
		F	RC		62				Sample F stored in core box
579.3	8								
	8.11								
	8.18						CL-CE	**SANDY LEAN CLAY** very stiff, partially cemented, mottled light reddish brown and moderate orange pink, limey, contains caliche gravel and strongly cemented thin layers (<150 mm)	
	8.23					PI,H,CH,W			
	8.69	G	SPT	25	100				
578.3	9								
	9.75								
577.3						PI,H,W		**FINE SANDY LEAN CLAY** very stiff to hard,	SPT(H) attempted

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/15/96
END DATE: 4/17/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED SW ABUT U.P.R.R. OVERPASS
BORING: CI-3
E.A. #: 72031-1
GROUND ELEV.: 587.32 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/16/96	12.6	574.7

STATION: "EM" 52+61.5
OFFSET: 107.3 m Left
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/ALTAMIRANO
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21	H	SPT	25	93		CL-CE	light brown, contains clayey silt interbeds and intermittent cemented layers and pockets	Shelby 1st, crushed tube end
								10.67 — **LEAN CLAY** very stiff to hard, light brown	
576.3	11								
	11.28								
	11.58	I	SH		100	PI,UU,UW, H,W			
575.3	12						CL		
	▼ 12.80								
574.3	13					PI,CU,UW, H,W,OC,CH			
	13.29	J	SH		100				
573.3	14							14.02 — **CLAY** very stiff, light brown	
	14.33						CL-CH		
	14.63	K	CSS		75	UW,W,PI,OC		14.63 — **LEAN CLAY** hard to very hard, light brown, with intermittent cemented pockets and thin layers; contains occasional thin clayey silt interbeds	
572.3	15								
	15.85								
571.3	16					PI,H,W			
	16.31	L	SPT	62					
570.3	17								
	17.37								
	17.65	M	SH			PI,UU,UW, H,W			
569.3	18						CL-CE		
	18.90								
568.3	19 19.05	N	CSS			PI,H,UW,W			
567.3									

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 4/15/96
END DATE: 4/17/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED SW ABUT U.P.R.R. OVERPASS
BORING: CI-3
E.A. #: 72031-1
GROUND ELEV.: 587.32 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/16/96	12.6	574.7

STATION: "EM" 52+61.5
OFFSET: 107.3 m Left
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/ALTAMIRANO
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.42								
	20.88	O	SPT	62	127	PI,S,W			
566.3	21								
	21.95							21.92	
565.3	22						CH-CE	**SANDY FAT CLAY (CH-CE)**, very stiff to hard, light brown, with cemented pockets, thin layers, and caliche gravel; contains black carbon filled hairline fractures	
	22.40	P	SPT	20	147	PI,H,W			
564.3	23								
	23.47								
	23.56	Q	SH		0				Sample Q not retained, crushed tube end
	24.02	R	SPT	37	133	PI,S,W			
563.3	24								
562.3	25								
								25.60	
561.3	26						CL-ML	**SILTY CLAY (CL-ML)**, very hard, light brown, with clayey silt interbeds; contains thin, strongly cemented layers and pockets	
	26.52								
	26.97	S	SPT	84	133	PI,H,W			
560.3	27								
559.3	28								
								28.96	
558.3	29							**LEAN CLAY (CL-CE)**, very stiff to very hard, light brown; contains strongly cemented layers, and black, carbon filled hairline fractures	
	29.57								
		T	SPT	22	140	PI,S,W			
557.3									

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

START DATE: 4/15/96
END DATE: 4/17/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED SW ABUT U.P.R.R. OVERPASS
BORING: CI-3
E.A. #: 72031-1
GROUND ELEV.: 587.32 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/16/96	12.6	574.7

STATION: "EM" 52+61.5
OFFSET: 107.3 m Left
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/ALTAMIRANO
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 5/16/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS/300mm	SAMPLE Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	30.02						CL-CE		
556.3	31								
	31.09					PI,H,W			
	31.55		SPT	85				31.55 B.O.H.	

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/3/96
END DATE: 6/5/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED NE ABUT I-15 OVERPASS
BORING: CI-4
E.A. #: 72031-1
GROUND ELEV.: 582.87 m
HAMMER DROP SYSTEM: SAFTEY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/17/96	13.0	569.9

STATION: "EM" 54+24.3
OFFSET: 7.5 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/DENSON
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 6/17/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								0.12 **PLANTMIX ASPHALT**	
	0.91							**SANDY LEAN CLAY** very stiff, contains limey pockets and caliche gravel,moderate yellowish brown	
581.9	1					CH,PI,W	CL		
	1.37	A	SPT	18	73				
								1.83	
580.9	2							**SANDY LEAN CLAY** hard to very stiff, limey with cemented nodules and thin layers,light brown to moderate orange pink	
	2.44								
	2.90	B	SPT	29	73	H,W,PI	CL		
579.9	3								
								3.66	
	3.96							**LEAN CLAY** hard, limey with caliche cemented nodules and thin layers, mottled pinkish gray and light brown, appears granular due to cementation	
578.9	4								
	4.42	C	SPT	42	73	PI,W			
	4.57								
						CH,PI,W, UW,H	CL-CE		
577.9	5								
	5.33	D	PB		84				
								5.79	
576.9	6							**SILTY CLAY** very hard, 60% to 80% of layer is caliche cemented, light brown	
							CE-CL		
575.9	7 7.01								
	7.13	E	SPT		100	S,W			(E) SPT refusal
								7.47	
574.9	8						CL	**SILTY CLAY** very stiff, limey with occasional caliche pockets, moderate reddish orange	
	8.53								
	8.75	F	SH		100	S,PI,W		8.56	
							SM	**SILTY FINE SAND** dense, contains caliche gravel and strongly cemented pockets, moderate reddish orange	
573.9	9							9.14	
							CE-GP	**CEMENTED SAND AND GRAVEL** moderately caliche cemented	Begin Lost Circulation Zone (LCZ)
								9.75	
572.9								**LEAN CLAY** soft to medium stiff, contains	

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/3/96
END DATE: 6/5/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED NE ABUT I-15 OVERPASS
BORING: CI-4
E.A. #: 72031-1
GROUND ELEV.: 582.87 m
HAMMER DROP SYSTEM: SAFTEY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/17/96	13.0	569.9

STATION: "EM" 54+24.3
OFFSET: 7.5 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/DENSON
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 6/17/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.06					PI,W		occasional cemented pockets and thin layers,light brown	
	10.52	G	SPT	5	53		CL		
571.9	11								
	11.28								
	11.58					S,PI,W	SC	**CLAYEY SAND with GRAVEL** medium dense, light brown	Pumped over 5200 liters of drill mud into LCZ to complete boring
570.9	12.04	H	SPT	23					
	12.19							**CLAYEY SAND with GRAVEL** very dense,limey, light brown	
569.9	13 ▼ 13.11						SC		End LCZ
	13.56	I	SPT	80		PI,S,W			
568.9	14								
	13.87						CE	**CALICHE** very hard, contains grey black sand and gravel, grayish pink	
	14.66						CH	**FAT CLAY** soft,limey, light brown	
567.9	14.90 15						CE-CL	**CEMENTED SILTY CLAY** hard, strongly cemented, red brown	
	15.70								
566.9	16 16.15						CL-SC	**LEAN CLAY** very stiff, partially cemented, contains silty fine sand interbeds, moderate reddish orange	
	16.43	J	SPT			S,PI,W			(J) SPT refusal
	16.76						CE	**CALICHE** very hard, strongly cemented, contains sand and gravel, conglomerate like appearance, very pale orange	
565.9	17								
	17.68							**SILTY FINE SAND** very dense, limey, contains cemented pockets and nodules, slightly plastic, mottled very pale orange and light brown	
564.9	18 18.14	K	SPT	106		H,PI,W	SM		
	18.90								Mix heavy mud and fill hole to seal LCZ overnight 6/4/96
563.9	19 19.20							**LEAN CLAY** hard, contains occasional cemented nodules and thin layers, light brown with black swirls	
	19.66	L	SPT	56	120	PI,H,W			Mud level at 7.6 m below pavement 7AM 6/5/96
562.9									

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/3/96
END DATE: 6/5/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: PROPOSED NE ABUT I-15 OVERPASS
BORING: CI-4
E.A. #: 72031-1
GROUND ELEV.: 582.87 m
HAMMER DROP SYSTEM: SAFTEY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/17/96	13.0	569.9

STATION: "EM" 54+24.3
OFFSET: 7.5 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/DENSON
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 6/17/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							CL		
	20.73								
561.9	21.03	M	SH		90	PI,H,W		21.00	
								LEAN CLAY hard to very hard, contains cemented nodules and thin layers,light brown	
560.9	22								
	22.25								
	22.71	N	SPT		107	PI,S,W			(N) SPT refusal
559.9	23						CL-CE		
558.9	24								
557.9	25								
	25.51								(O) SPT refusal
	25.94	O	SPT			PI,H,W		25.94	
								B.O.H.	

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/10/96
END DATE: 6/10/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: NEAR INTERSECTION OF RAMP #4 & CHEYENNE
BORING: CI-5
E.A. #: 72031-1
GROUND ELEV.: 580.95 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/10/96	dry	dry

STATION: "EM" 54+97.0
OFFSET: 43.1 m Right
ENGINEER: BAFGHI
EQUIPMENT: DRILL B-57 Unit 2362
OPERATOR: WHITED
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 6/10/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SILTY CLAY yellowish brown	
							CL-ML		
580.0	0.91							**FINE SANDY LEAN CLAY** stiff, moderate pinkish brown	
	1 1.52								
	2 1.98	A	SPT	15	100	PI,H,W	CL		
579.0									
	2.44							**CLAY with SAND** stiff to very stiff, light pinkish brown	
578.0	3 3.05								
	3.51	B	SPT	15	89	PI,CH,W			
577.0	4 4.57						CL-CH		
	5 5.03	C	SPT	16	117	PI,H,W			
576.0	5.18							**FINE SANDY LEAN CLAY** stiff reddish brown, moist, contains silt lenses up to 150 mm thick	
575.0	6 6.10								
	6.40	D	CSS	15	100	PI,E,OC, UW, W	CL		
574.0	7 7.62								
	7.16							**LEAN CLAY with FINE SAND** hard, reddish brown	
	8 8.08	E	SPT	48	133	PI, S, W			
573.0							CL		
572.0	9 9.14								
	9.14							**CLAYEY SAND with GRAVEL** very dense, strongly cemented, light pinkish brown with minor well-rounded gravel up to 13 mm in diameter	
	9.60	F	SPT	122		PI, S, W			
571.0							SC-CE		

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/10/96
END DATE: 6/10/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: NEAR INTERSECTION OF RAMP #4 & CHEYENNE
BORING: CI-5
E.A. #: 72031-1
GROUND ELEV.: 580.95 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/10/96	dry	dry

STATION: "EM" 54+97.0
OFFSET: 43.1 m Right
ENGINEER: BAFGHI
EQUIPMENT: DRILL B-57 Unit 2362
OPERATOR: WHITED
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 6/10/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.36								
								10.52	
	10.82	G	SPT	16	111	S, W	SC-CE	**CLAYEY SAND** very stiff, light reddish brown, contains weakly cemented layers and nodules	No groundwater was encountered
								10.82 **B.O.H.**	

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/11/96
END DATE: 6/11/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: NEAR INTERSECTION OF RAMP #4 & I-15
BORING: CI-6
E.A. #: 72031-1
GROUND ELEV.: 580.81 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/11/96	dry	dry

STATION: "EM" 56+55.0
OFFSET: 27.5 m Right
ENGINEER: BAFGHI
EQUIPMENT: DRILL B-57 Unit 2362
OPERATOR: WHITED
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 6/11/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								FAT CLAY with FINE SAND stiff to very stiff, light brown, dry to moist; contains lenses of clear gypsum crystals	
579.8	1 1.22								
	1.68	A	SPT	16	89	PI,CH,W			
578.8	2 2.74						CH		
577.8	3 3.20	B	SPT	26	89	PI,S,W			
								3.81	
576.8	4 4.27						CE	**CALICHE** very dense, strongly cemented	
								4.11	
	4.72	C	SPT	4	78	PI,H,W		**FAT CLAY** soft, light brown	
575.8	5 5.79						CH		
								5.33	
								LEAN CLAY with FINE SAND stiff, light brown	
574.8	6 6.25	D1 D2	CSS	22		PI,UW,OC, E,W			
573.8	7 7.32						CL		
	7.77	E	SPT	11	114	PI,S,W			
572.8	8 8.84								
								8.23	
								FINE SANDY LEAN CLAY very stiff, light brown	
571.8	9 9.30	F	SPT	23	111	PI,H,W	CL		
								9.30	
								B.O.H.	No groundwater was encountered

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/12/96
END DATE: 6/12/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: NEAR PROPOSED MSE WALL ON RAMP 3A
BORING: CI-7
E.A. #: 72031-1
GROUND ELEV.: 581.83 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/12/96	dry	dry

STATION: "EM" 53+56.0
OFFSET: 74.0 m Right
ENGINEER: BAFGHI
EQUIPMENT: DRILL B-57 Unit 2362
OPERATOR: WHITED
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 6/12/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC-SM	**SILTY CLAYEY SAND with GRAVEL** fill, medium dense, light brown, contains asphalt chunks	
								0.61	
580.8	1 1.22							**SILTY SAND** very dense, dry to slightly moist, contains strongly cemented areas.	
	1.68	A	SPT		83	S,CH,W	CE-SM		SPT(A) refusal
579.8	2 2.74							2.13	
								SANDY LEAN CLAY hard, moist, moderate reddish brown	
578.8	3 3.20	B	SPT	49	78	S,PI,W	CL		
								3.66	
577.8	4 4.27							**CLAYEY SAND** dense, moderate reddish brown	
	4.72	C	SPT	48	83	S,PI,W	SC-CH		
576.8	5 5.18							5.18	
	5.49	D	BULK			S,W		**SILTY SAND with GRAVEL** medium dense, gravel up to 25 mm in diameter	Auger stuck in hole, removed and redrilled hole 1 m north
	5.79								
575.8	6 6.25	E	SPT	21		S,PI,W	SM		
574.8	7 7.32							6.86	
	7.77	F	SPT	42		S,PI,W	SM-CL	**SILTY FINE SAND with GRAVEL** dense, pale reddish brown, contains moderately cemented layers and pockets	
573.8	8 8.84							8.08	
572.8	9 9.30	G	SPT	16	100	H,PI,W	SC-CL	**CLAYEY SAND** medium dense, moist, moderate reddish brown	
571.8									

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/12/96
END DATE: 6/12/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: NEAR PROPOSED MSE WALL ON RAMP 3A
BORING: CI-7
E.A. #: 72031-1
GROUND ELEV.: 581.83 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/12/96	dry	dry

STATION: "EM" 53+56.0
OFFSET: 74.0 m Right
ENGINEER: BAFGHI
EQUIPMENT: DRILL B-57 Unit 2362
OPERATOR: WHITED
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 6/12/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.36					S,PI,W		10.52	
	10.82	H	SPT	135	100		CE-SM	**SILTY SAND** very dense, moist, contains strongly cemented areas, pale reddish brown	
								10.82 **B.O.H.**	No groundwater encountered

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 6/13/96
END DATE: 6/13/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: NEAR PROPOSED MSE WALL ON RAMP 1M
BORING: CI-8
E.A. #: 72031-1
GROUND ELEV.: 583.66 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/13/96	dry	dry

STATION: "EM" 50+32.3
OFFSET: 42.1 m Left
ENGINEER: BAFGHI
EQUIPMENT: DRILL B-57 Unit 2362
OPERATOR: WHITED
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 6/13/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							CL	**SANDY CLAY** stiff, pale red	
	0.61								
582.7	1 1.22							**SILTY CLAY** partially cemented, contains strongly cemented areas, moist, pale red	
	1.68	A	SPT	101	100	PI,CH,W	CL-CE		
581.7	2 2.74								
	2.59								
580.7	3 3.20	B	SPT	20	144	PI,S,W		**LEAN CLAY** very stiff, contains occasional strongly cemented layers, moist, moderate reddish brown	
579.7	4 4.27								
	4.72	C	SPT	64	119	PI,S,W			
578.7	5 5.79						CL-CE		
577.7	6 6.25	D	SPT	21	144	PI,H,W			
576.7	7 7.32								
	7.57	E	CSS			PI,H,W,UW			
	7.57							**B.O.H.**	No groundwater encountered

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

SHEET 1 OF 1

START DATE: 6/18/96
END DATE: 6/18/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: NEAR PROPOSED MSE WALL ON RAMP #2
BORING: CI-9
E.A. #: 72031-1
GROUND ELEV.: 585.64 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/18/96	dry	dry

STATION: "EM" 56+03.0
OFFSET: 45.0 m left
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: ARGALL
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 6/18/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								0.12 **PLANTMIX ASPHALT**	
584.6	1 1.19						SC	**CLAYEY SAND with GRAVEL** fill, dense, light brown, dry, slightly cemented in places, moderate reddish orange	
	1.65	A	SPT	35	67	CH,S,W			
583.6	2 2.71							2.59 **SANDY LEAN CLAY with GRAVEL** very stiff, moist, pale yellowish brown, contains occasional limey areas and cemented pockets	Driller notes material change; clay cuts
582.6	3 3.17	B	SPT	19	80	PI,S,W			
581.6	4 4.24						CL		
	4.69	C	SPT	15	73	PI,H,W			
580.6	5 5.76							5.30 **FINE SANDY CLAY** hard to very hard, dry to moist, grayish orange pink to very pale orange, limey, contains strongly cemented pockets and thin layers	
579.6	6 6.22	D	SPT	38	67	PI,W	CL-CE		SPT(D) refused on cemented layer @ 6.22 m
								6.71 **FAT CLAY with SAND** very stiff, light brown to moderate brown, contains occasional clear gypsum crystals	
578.6	7 7.28						CH		
	7.74	E	SPT	21		PI,H,W		7.73 **B.O.H.**	No groundwater encountered

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

SHEET 1 OF 1

START DATE: 6/18/96
END DATE: 6/18/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: NEAR PROPOSED MSE WALL ON RAMP #4
BORING: CI-10
E.A. #: 72031-1
GROUND ELEV.: 591.71 m
HAMMER DROP SYSTEM: SAFTEY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/18/96	dry	dry

STATION: "EM" 54+33.5
OFFSET: 57.2 m Left
ENGINEER: SALAZAR
EQUIPMENT: Drill B-80 Unit 2041
OPERATOR: ARGALL
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 6/18/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								0.12 **PLANTMIX ASPHALT**	
590.7	1 1.19						SC	**CLAYEY SAND with GRAVEL** fill, dense, moderate orange pink	
	1.65	A	SPT	45	73	PI, CH, W			Had to repair safety driver cable
589.7	2 2.71								
588.7	3 3.17	B	SPT	28		PI, S, W			
								3.51	
587.7	4 4.24						CL	**FINE SANDY LEAN CLAY** fill, hard, light pinkish brown	Entire section contains sandstone-like gravel sized particles
	4.69	C	SPT	33		PI, H, W			
586.7	5							5.75 **B.O.H.**	Rig broke down; Used B-57 to remove drill stem from hole No groundwater encountered

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 5/14/96
END DATE: 5/15/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: LV WASH @ I-15 STRUCTURE WIDENING
BORING: LVW-1
E.A. #: 72031-1
GROUND ELEV.: 578.11 m
HAMMER DROP SYSTEM: SAFETY

STATION: "EM" 63+11.9
OFFSET: 19.8 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/DENSON
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 6/6/96

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/6/96	14.6	563.5

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61							**FINE SANDY SILT** fill, dry, medium dense, slightly plastic, very pale orange to light tan, contains white sand to gravel sized caliche fragments and glass shards	
577.1	1 1.07	A	SPT	19		PI,S,W,CH	ML		
								1.52	
							SP	**POORLY GRADED MEDIUM TO COARSE SAND** medium dense, clean, blackish red	
576.1	2 2.13							1.83 **SILTY FINE SAND** medium dense, slightly plastic, light brown	
	2.74	B	PB		94	PI,H,W,CH, UW,UU	SM		
								2.77	
575.1	3 3.35	C	PB		65	PI,S,W,CH, UW,UU	CL-ML	**FINE SANDY SILTY CLAY** very stiff, light brown, contains limey areas	Lost 0.3 m of sample B upon retrieval
	3.66							3.51	
574.1	4 4.11	D	SPT	20	80	PI,S,W	CL-SC	**FINE SANDY LEAN CLAY** very stiff, light brown, contains limey pockets and caliche gravel	
								4.57	
573.1	5 5.18							**LEAN CLAY with FINE SAND** very stiff, light brown, contains yellowish gray limey seams and pockets	
	5.64	E	SPT	25	87	PI,H,W	CL		Sample E had vertical cracks filled with darker brown clay
572.1	6 6.71							5.94 **FINE SANDY LEAN CLAY** very stiff, limey, yellowish grey, contains moderately cemented layers and pockets	
571.1	7 7.32	F	PB		35	PI,H,W,UU, UW	CL		
								7.62	
570.1	8 8.23							**GRAVELLY FAT CLAY** stiff, light brown, gravel is cemented caliche particles	
	8.69	G	SPT	13	80	PI,H,W	CH		
								8.84	
569.1	9 9.75						SC	**CLAYEY FINE SAND** medium dense, pale yellowish brown, contains limey areas	Driller notes harder formation
568.1						PI,H,W			

DRFT_EM 72031 8/1/97

EXPLORATION LOG

NEVADA DEPARTMENT OF TRANSPORTATION — GEOTECHNICAL ENGINEERING

START DATE: 5/14/96
END DATE: 5/15/96
JOB DESCRIPTION: I-15/CHEYENNE INTCHG RECONSTRUCTION
LOCATION: LV WASH @ I-15 STRUCTURE WIDENING
BORING: LVW-1
E.A. #: 72031-1
GROUND ELEV.: 578.11 m
HAMMER DROP SYSTEM: SAFETY

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
6/6/96	14.6	563.5

STATION: "EM" 63+11.9
OFFSET: 19.8 m Right
ENGINEER: SALAZAR
EQUIPMENT: DRILL B-80 Unit 2041
OPERATOR: WHITED/DENSON
DRILLING METHOD: ROTARY WASH
BACKFILLED: YES DATE: 6/6/96

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.24	H	SPT	21	107				
	10.36							10.21	
						PI,H,W,UU, DS,CH,UW	CH	**FAT CLAY with FINE SAND** very stiff, pale yellowish brown to pinkish grey, contains caliche gravel and thin strongly cemented layers	
567.1	10.97	I	PB		120				
	11							11.13	
	11.28							**LEAN CLAY** hard to very hard, pale yellowish brown to pinkish grey, contains strongly cemented thin layers	SPT(J) refusal
	11.66	J	SPT		120	PI,S,W	CL		
566.1	12							11.89	
	12.80							**FAT CLAY with FINE SAND** hard, pinkish grey with pink veinlets, contains occassional moderately cemented thin layers and nodules	
565.1	13					PI,H,W			
	13.26	K	SPT	37	120		CH		
564.1	14								
	14.33								
	▼					PI,H,W,CH, UU,UW		14.51	
	14.94	L	PB		95			**FAT CLAY with FINE SAND** very stiff, light brown, with occasional moderately cemented thin layers and pockets	
563.1	15								
	15.85						CH		
562.1	16					PI,H,W			
	16.31	M	SPT	21	133				
								16.76	
561.1	17							**LEAN CLAY with FINE SAND** very stiff, light brown, contains occasional clayey fine sand interbeds	
	17.37						CH		
						PI,H,W,UU, UW,OC,CH			Lab soil tech notes petroleum smell in sample tubes N & O
560.1	17.98	N	PB		75			17.83	
	18							**LEAN CLAY** very stiff, light brown, with silty clay interbeds	
						PI,H,W,CH, UW,UU,DS	CL-ML		
	18.59	O	PB		90			18.59	
	18.90						CE	18.75 **CALICHE** very hard, strongly cemented	
559.1	19							**SILTY CLAY** very stiff, dark greenish grey grading to greyish orange pink, contaminated with petroleum product?	Sample P put in glass jar, submitted for chemical tests
	19.35	P	SPT	21	80		CL	19.35	
								B.O.H. TERMINATE BORING DUE TO CONTAMINATED SOILS	

DRFT_EM 72031 8/1/97

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 1 Total Depth (ft.) 84.4 Station or Location: "EM" 53+66.7 116 m Left

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	Cu tsf	Su tsf	
A	3.0 - 4.5	SPT	13	CL/SC	-----	-----	-----	-----	-----	-----					visual only
B	8.0 - 9.5	SPT	124	CL/CE	-----	-----	15.0	59	14	30					CH
C	13.0 - 14.5	SPT	17	CL	-----	-----	23.8	81	23	41					H, G=2.75
D	18.0 - 19.5	SPT	18	CH	-----	-----	43.2	88	35	53	Pkt Torvane			0.43	H, G=2.75
E	23.0 - 24.0	SH	----	CH	79.9 *	108.2 *	35.6*	69	47	69					H, G=2.73
E1	0 - 1.5 "	SH	----	CH	-----	-----	-----	-----	-----	-----					wasted
E2	1.5 - 7.5 "	SH	----	CH	77.5	106.3	37.1	69	47	69	UU @ 8 psi			0.62	combined E2&
E3	7.5 - 12.75 "	SH	----	CH	82.2	110.1	34.0		-----	-----	UU @ 12 psi			0.9	E3 for S, PI
F	28.0 - 29.5	SPT	49	SC	-----	-----	16.0	40	9	23					
G	33.0 - 34.5	SPT	14	CL	-----	-----	30.1	71	15	36					
H	38.0 - 39.5	SPT	53	SC/CE	-----	-----	22.0	34	27	55					
I	43.0 - 43.25	SPT	R	CE/CL	-----	-----	-----	-----	-----	-----					
J	48.0 - 52.83	RC	----	CE/CL	144.6	151.1	-----	-----	-----	-----	U				Qu=157.1 tsf
K	58.0 - 59.4	SPT	64/R	SM/CE	-----	-----	22.6	26	NP	20					
L	63.0 - 64.5	SPT	32	CL	-----	-----	27.2	89	17	33	Pkt Torvane			0.64	H, G=2.75
M	73.0 - 74.5	SPT	91	CL/CE	-----	-----	26.6	91	11	29	Pkt Torvane			0.78	H, G=2.73
N	83.0 - 84.4	SPT	115	CL/CE	-----	-----	26.3	96	10	28					H, G=2.71

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
SPT = Split Spoon 1.38" ID
CS = Continuous Sample 3.24" ID w/tubes
3.5" ID w/o tubes
CSS = California Split Spoon
2.42" ID w/ rings, 2.5 "ID w/o rings
CSSw/SH = fitted with Shelby shoe 2.42" ID
PB = Pitcher Barrel 2.87" ID
RC = Rock Core Barrel 1.875" ID

STRENGTH TESTS

UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
U = Unconfined Compression
Cu = Undrained Cohesion
Qu = Unconfined Compressive Strength
Su = Undrained Shear Strength
PHI = Angle of Internal Friction - Degrees

MISCELLANEOUS

CH = Chem Analysis
CM = Compaction
D = Dispersive Soils
E = Expansive Soils
G = Specific Gravity
H = Hydrometer
HC = Hydro-Collapse
K = Permeability
LL = Liquid Limit

TESTS

O = Organic Content
OC = Consolidation
PI = Plastic Index
RQD = Rock Quality Designation
RV = R - Value
S = Sieve Analysis
SL = Shrinkage Limit
W = Water Content

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 2 Total Depth (ft.) 118.5 ' Station or Location: "EM" 53+31 24.7 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	Cu tsf	Su tsf	
A	2.0 - 3.5	SPT	24	SC			19.2		23	41					
B	7.0 - 8.5	SPT	36	SC			11.6	24	N.P.	17					
C	12.0 - 13.5	SPT	17	CH			39.0	68	46	64					H, G = 2.73
D	17.0 - 18.5	SPT	69	SC/CE			18.8	35	28	59					
E	22.0 - 23.1	SPT	R	SC/CE			13.5		16	29					CH
F	27.0 - 27.9	SPT	R	SC/CE			15.6	22	16	39					
G	32.0 - 33.5	SPT	20	SP/SC			14.7	12							
H	37.0 - 38.5	SPT	74	SM			12.2	18	2	17					
I 1	42.0 - 42.3	SPT	R	SM			11.5	14							
I 2	42.3 - 43.0	SPT	R	CL			14.6		10	26					
J	47.0 - 48.5	SPT	24	CL/CE			27.6	50	18	36					H, G = 2.73
K	52.0 - 53.5	SPT	50	CE/CL			24.0		10	26					CH
L	57.0 - 58.55	SH		CL	97.6*	124.5*	27.7*				UU			0.93*	
L1	0 - 1.75 "	SH													wasted
L2	1.75 - 7.5 "	SH		CL	96.9	124.4	28.4	94	20	37	UU @ 10psi			0.71	add L2 & L3 for
L3	7.5 - 13.25 "	SH		CL	98.2	124.6	26.9				UU @ 15psi			1.14	PI,H, G=2.73
L4	13.25 - 14.25 "	SH									DS @ 3ksf				
L5	14.25 - 15.25 "	SH									DS @ 4ksf				
L6	15.25 - 16.25 "	SH									DS @ 2ksf	30	0.88		
L7	16.25 - 17.25 "	SH									DS @ 2ksf				
L8	17.25 - 18.25 "	SH													wasted
M	62.0 - 63.7	CSSw /SH		CL											
M1	0 - 1 "	"													added to m4

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
SPT = Split Spoon 1.38" ID
CS = Continuous Sample 3.24" ID w/tubes
3.5" ID w/o tubes
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2.42" ID w/ rings, 2.5 "ID w/o rings
CSSw/SH = fitted with Shelby shoe 2.42" ID
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STRENGTH TESTS

UU = Unconsolidated Undrained
CD = Consolidated Drained
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DS = Direct Shear
U = Unconfined Compression
Cu = Undrained Cohesion
Qu = Unconfined Compressive Strength
Su = Undrained Shear Strength
PHI = Angle of Internal Friction - Degrees

MISCELLANEOUS

CH = Chem Analysis
CM = Compaction
D = Dispersive Soils
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HC = Hydro-Collapse
K = Permeability
LL = Liquid Limit

TESTS

O = Organic Content
OC = Consolidation
PI = Plastic Index
RQD = Rock Quality Designation
RV = R - Value
S = Sieve Analysis
SL = Shrinkage Limit
W = Water Content

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 2 Total Depth (ft.) 118.5 ' Station or Location: "EM" 53+31 24.7 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS TEST TYPE	PHI degrees	CU tsf	Su tsf	OTHER TESTS PERFORMED
M2	1 - 2 "	CSSw/SH			90.5	114.8	26.8								OC, Pc =10.2 tsf
M3	2 - 3 "	"			72.0	108.2	50.2								OC, Pc = 9.2 tsf
M4	3 - 4 "	"		CH					37	55					mixed w/ M1
M5	4 - 5 "	"			71.4	107.8	51.0								OC, Pc=10.2tsf
M6	5 - 6 "	"			68.8	107.0	55.4								OC, Pc=10.5tsf
M7	6 - 7 "	"			71.3	107.8	51.2								OC, Pc=9tsf
M8	7 - 8 "	"													mixed M8,M9,
M9	8 - 9 "	"		CL/CH					34	51					& M10 for PI
M10	9 - 10 "	"													
M11	12 - 18 "	"		CL	92.5	120.1	29.8	93	19	36					H, G=2.74
N	67.0 - 68.5	SPT	33	CL			30.3	96	16	33	Pkt Torvane			0.90	
O	72.0 - 73.5	SPT	60	CL/CE			27.8	85	18	33	Pkt Torvane			0.47	
P	77.0 - 77.85	SH		CL/ML			24.1	97	7	28	Pkt Torvane			0.50	
Q	82.0 - 83.5	SPT	130	CL/CE			25.1	91	10	28	Pkt Torvane			0.55	
R	87.0 - 88.5	CSS w/SH									Pkt Torvane			0.51	
R1	0 - 1 "	"													stored
R2	1 - 2 "	"													stored
R3	2 - 3 "	"													stored
R4	3 - 4 "	"													stored
R5	4 - 5 "	"													stored
R6	5 - 6 "	"													stored
R7	6 - 7 "	"													stored
R8	7 - 8 "	"			92.3	119.7	29.6								OC, Pc=8.3tsf

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
SPT = Split Spoon 1.38" ID
CS = Continuous Sample 3.24" ID w/tubes 3.5" ID w/o tubes
CSS = California Split Spoon 2.42" ID w/ rings, 2.5 "ID w/o rings
CSSw/SH = fitted with Shelby shoe 2.42" ID
PB = Pitcher Barrel 2.87" ID
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STRENGTH TESTS

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Qu = Unconfined Compressive Strength
Su = Undrained Shear Strength
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E = Expansive Soils
G = Specific Gravity
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HC = Hydro-Collapse
K = Permeability
LL = Liquid Limit

TESTS

O = Organic Content
OC = Consolidation
PI = Plastic Index
RQD = Rock Quality Designation
RV = R - Value
S = Sieve Analysis
SL = Shrinkage Limit
W = Water Content

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 2 Total Depth (ft.) 118.5 ' Station or Location: "EM" 53+31 24.7 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI	CU tsf	Su tsf	
R9	8 - 9 "	CSS w /SH			92.2	119.4	29.5								OC, Pc=10.8tsf
R10	9 - 10 "	"			89.8	118.1	31.5								OC, Pc=8.3tsf
R11	12 - 18 "	"		CH/CE	91.9	119.8	30.3	71	33	53					H, G=2.72
S	92-93.5	SPT	28	CL/CE			33.1	88	22	40					H, G=2.73
T	97.0 - 98.5	SPT	28	CL/CE			28.1	76	24	40	Pkt Torvane			2.1	
U	102.0 - 102.8	SH		CL/CE			26.4	96	9	28	Pkt Torvane			0.5	
V	107.0 - 108.5	SPT	21	CL/CE			29.6	93	17	34	Pkt Torvane			0.5	H G= 2.69
W	112.0 - 112.6	SPT	72/R	ML-CL/CE			22.7		7	25					
X1	117.0 - 117.9	SPT	27	CL/CE			30.7	72	29	47					
X2	117.9 - 118.5	SPT	27	CH/CE			27.7	68	60	79					

Subsample depths shown in inches P = Pushed under hammer weight NP = Nonplastic * averaged value
R = Refusal

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
SPT = Split Spoon 1.38" ID
CS = Continuous Sample 3.24" ID w/tubes
3.5" ID w/o tubes
CSS = California Split Spoon
2.42" ID w/ rings, 2.5 "ID w/o rings
CSSw/SH = fitted with Shelby shoe 2.42" ID
PB = Pitcher Barrel 2.87" ID
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STRENGTH TESTS

UU = Unconsolidated Undrained
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CU = Consolidated Undrained
DS = Direct Shear
U = Unconfined Compression
Cu = Undrained Cohesion
Qu = Unconfined Compressive Strength
Su = Undrained Shear Strength
PHI = Angle of Internal Friction - Degrees

MISCELLANEOUS

CH = Chem Analysis
CM = Compaction
D = Dispersive Soils
E = Expansive Soils
G = Specific Gravity
H = Hydrometer
HC = Hydro-Collapse
K = Permeability
LL = Liquid Limit

TESTS

O = Organic Content
OC = Consolidation
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RQD = Rock Quality Designation
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S = Sieve Analysis
SL = Shrinkage Limit
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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 3 Total Depth (ft.) 118.5 Station or Location: "EM" 52+61.5 107 m Left

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	CU tsf	Su tsf	
A	2.0 - 3.5	SPT	61	CL/CS			9.7	51	11	38					
B	7.0 - 8.5	SPT	36	CL/CE			12.9	69	14	28	Pkt Torvane			1.00	CH
C	12.0	SPT	R	CE											Refused
D2	17.0 - 17.6	SPT	R	CL/CE			8.3	20							D1 visual
E	18.0 - 19.0	RC		CL/CE											visual
F	22.0 - 26.83	RC		CL/CE											visual
G	27.0 - 28.5	SPT	25	CL/CE			31.5	61	18	36	Pkt Torvane			0.80	H, G=2.68 CH
H	32.0 - 33.5	SPT	25	CL/CE			30.2	64	11	31	Pkt Torvane			1.00	H, G=2.67
I	37.0 - 38.0	SH		CL	99.5*	124.8*	25.6*	93	14	32					H, G=2.72
I 1	0 - 0.5"	SH		CL											wasted
I 2	0.5 - 6"	SH		CL	96.3	122.6	27.3				UU @ 10psi			0.80	mixed I2 & I3 for
I 3	6 - 11.5"	SH		CL	102.6	127.0	23.8				UU @ 15psi			1.40	PI,H
J	42.0 - 43.6	SH		CL	95.8*	122.9*	28.3*	98	16	34	CU	20.8	0.36		
J 1	0 - 0.5"	SH		CL											wasted
J 2	0.5 - 6"	SH		CL	94.3	121.5	28.2				CU @ 5psi				mixed J2,J3,&J4
J 3	6 - 11.5"	SH		CL	92.0	120.2	30.7				CU @ 10psi				for PI,H,CH, &
J 4	11.5 - 17"	SH		CL	89.7	118.3	31.9				CU @ 15psi				G = 2.77
J 5	17 - 18"	SH		CL	98.4	124.6	26.7								OC, Pc>4tsf
J 6	18 - 19"	SH		CL	104.5	129.8	24.2								OC, Pc=5.3tsf
K	47.0 - 47.75	CSSw/SH		CL/CH	81.9*	113.2*	38.4*				Pkt Torvane			0.80	
K 1	0 - 3.5"	"		CL/CH											wasted
K 2	3.5 - 4.5"	"		CL/CH	86.7	116.8	34.7								OC, Pc=4.5tsf
K 3	4.5 - 9.0"	"		CL/CH	77.1	109.5	42	90	35	51					H, G=2.71

Subsample depths shown in inches P = Pushed under hammer weight NP = Nonplastic * averaged value
R = Refusal

SAMPLER TYPE

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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 3 Total Depth (ft.) 118.5 Station or Location: "EM" 52+61.5 107 m Left

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	CU tsf	Su tsf	
L	52.0 - 53.5	SPT	62	CL			25.7	93	11	28	Pkt Torvane			0.82	H, G=2.69
M	57.0 - 57.75	SH		CL				96*	16*	35*					
M 1	0 - 0.5 "	SH		CL											wasted
M 2	0.5 - 6 "	SH		CL	98.6	124.3	26.1	96	16	35	UU @ 15psi			0.55	H, G=2.74
M 3	6 - 7 "	SH		CL				96	15	34					mixed M3,M4,M5
M 4	7 - 8 "	SH		CL											& M6 for PI & S
M 5	8 - 9"	SH		CL											
M 6	9 - 10 "	SH		CL											
N	62.0 - 62.5	CSS w/SH		CL/ML	105.8	128.6	21.6	97	7	27	Pkt Torvane			0.65	H, G=2.74
O	67.0 - 68.5	SPT	62	CL/CE			26.8	93	12	31	Pkt Torvane			0.60	
P	72.0 - 73.5	SPT	20	CH/CE			31.4	69	33	52	Pkt Torvane			0.85	H, G=2.70
Q	77.0 - 77.3	SH													not retained
R	77.3 - 78.8	SPT	37	CL/CE			33.6	75	28	46					
S	87.0 - 88.5	SPT	84	CL/CE			25.4	94	13	30	Pkt Torvane			0.52	H, G=2.75
T	97.0 - 98.5	SPT	22	CL/CE			31.8	78	24	39	Pkt Torvane			1.05	
U	102.0 - 103.5	SPT	85	CL/CE			26.5	95	16	35					H, G=2.71

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 4 Total Depth (ft.) 85.1 Station or Location: "EM" 54+24.3 7.5 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	CU tsf	Su tsf	
A	3.0 - 4.5	SPT	18	CL			16.7		18	34					CH
B	8.0 - 9.5	SPT	29	CL			20.4	61	19	37					H,G=2.68
C	13.0 - 14.5	SPT	42	CL/CE			15.4		15	29					
D	15.0 - 17.1	PB		CL/CE			25.8*	65*	29*	45*					
D1	0 - 8.5 "	PB		CH/CE			30.6	32	37	51					CH
D2	8.5 - 10.5 "	PB		CL/CE			20.9	75	24	40					
D3	10.5 - 11.5 "	PB		CL/CE				87	25	43					Mixed D3 thru
D4	11.5 - 12.5 "	PB		CL/CE											D8 for H,PI,CH,
D5	12.5 - 13.5 "	PB		CL/CE											& G=2.69
D6	13.5 - 14.5 "	PB		CL/CE											
D7	14.5 - 15.5 "	PB		CL/CE											
D8	15.5 - 16.5 "	PB		CL/CE											
D9	16.5 - 21.5 "	PB		CL/CE	111.4	138.5	24.4	83	17	36					H,G=2.71
E	23.0 - 23.4	SPT	R	CL/CE			16.7	77							
F	28.0 - 28.7	SH													
F1	0 - 2 "	SH		CL			10.8		8	22					
F2	2 - 7 "	SH		SM			12.8	36							
G	33.0 - 34.5	SPT	5	CL			24.0		24	42					
H	38.0 - 39.5	SPT	23	SC			13.2	20	10	25					
I	43.0 - 44.5	SPT	80	SC			11.8	21	7	22					
J1	53.0 - 53.5	SPT	18	CL			35.9		21	37					
J2	53.5 - 53.9	SPT	R	SC			24.0	26							
K	58.0 - 59.5	SPT	106	SM			19.7	34	NP	18					H,G=2.68

Subsample depths shown in inches P = Pushed under hammer weight NP = Nonplastic * averaged value
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SAMPLER TYPE

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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 4 Total Depth (ft.) 85.1 Station or Location: "EM" 54+24.3 7.5 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	CU tsf	Su tsf	
L	63.0 - 64.5	SPT	56	CL			23.8	87	9	26	Pkt Torvane			0.55	H,G=2.70
M	68.0 - 69.0	SH		CL	96.0*	122.4*	27.6 *	94 *	19*	36*					
M 1	0 - 5.25"	SH		CL	94.3	121.6	28.9	94	22	40	UU@ 40psi			0.66	H,G=2.72
M 2	5.25 - 10.5"	SH		CL	97.7	123.2	26.2	94	15	32	UU@ 30 psi			0.98	H,G=2.70
N	73.0 - 74.3	SPT	62/R	CL/CE			26.3	96	15	32	Pkt Torvane			0.85	
O	83.7 - 85.1	SPT	52/R	CL/CE			27.3	97	11	31					H,G=2.73

Subsample depths shown in inches P = Pushed under hammer weight NP = Nonplastic * averaged value
R = Refusal

SAMPLER TYPE

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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 5 Total Depth (ft.) 35.5 Station or Location: "EM" 54+97 43.1 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS TEST TYPE	PHI degrees	CU tsf	Qu tsf	OTHER TESTS PERFORMED
A	5.0 - 6.5	SPT	15	CL			13.0	70	9	25	Pocket Pen			2.0*	H
B	10.0 - 11.5	SPT	15	CH/CL			17.9		34	51	Pocket Pen			3.2*	CH
C	15.0 - 16.5	SPT	16	CL			23.5	68	29	47	Pocket Pen			1.75*	H
D	20.0 - 21.0	CSSw/SH	15	CL	91.8	113.2	23.3		17	38					OC, GS=2.675
															ES, Pc=3.8tsf
E	25.0 - 26.5	SPT	48	CL			21.6	76	20	35	Pocket Pen			1.55*	
F	30.0 - 31.5	SPT	122	SC/CE			12.3	40	25	53					
G1	34.0 - 34.5	SPT	16	SC/CE			8.3	16							
G2	34.5 -35.5	SPT	16	SC/CE			22.3	37							

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
SPT = Split Spoon 1.38" ID
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3.5" ID w/o tubes
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MISCELLANEOUS TESTS

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O = Organic Content
OC = Consolidation
PI = Plastic Index
RQD = Rock Quality Designation
RV = R - Value
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SL = Shrinkage Limit
W = Water Content

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 6 Total Depth (ft.) 30.5 Station or Location: "EM" 56+55 2.75 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS TEST TYPE	PHI degrees	CU tst	Qu tsf	OTHER TESTS PERFORMED
A	4.0 - 5.5	SPT	16	CH			19.4		54	76	Pocket Pen*			2.6*	CH
B	9.0 - 10.5	SPT	26	CH/CL			16.1	75	35	51	Pocket Pen*			1.5*	
C	14.0 - 15.5	SPT	4	CH			32.4	91	39	54	Pocket Pen*			1.3*	H,G=2.74
D	19.0 - 20.5	CSSw/SH	22	CL	110.5	121.9	10.3		29	45					ES, G=2.613
															OC, Pc=3.5tsf
E	24.0 - 25.5	SPT	11	CL			27.4	77	18	33	Pocket Pen*			1.0*	
F	29.0 - 30.5	SPT	23	CL			16.3	59	10	23	Pocket Pen*			1.9*	H, G=2.65

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 7 Total Depth (ft.) 35.5 Station or Location: "EM" 53+56 74 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	CU tsf	Qu tsf	
A	4.0 - 5.5	SPT	R	CE/SM			5.2	34							CH
B	9.0 - 10.5	SPT	49	CL			11.2	61	15	29	Pocket Pen			3.75*	
C	14.0 - 15.5	SPT	48	SC/CH			15.4	47	43	74	Pocket Pen			3.75*	
D	17.0 - 18.0	BULK	---	GM			3.0	13							
E	19.0 - 20.5	SPT	21	SM			3.6	15	3	21					
F	24.0 - 25.5	SPT	42	CE/SM			6.8	32	NP	19					
G	29.0 - 30.5	SPT	16	SC/CL			26.6	49	18	37	Pocket Pen			1.04*	H,G=2.68
H	34.0 - 35.5	SPT	135	CE/SM			13.8	33	2	21					

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 8 Total Depth (ft.) 25.5' Station or Location: "EM" 50+32.3 42.1 m Left

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	CU tsf	Qu tsf	
A	4.0 - 5.5	SPT	101	CL/ML			18.0		7	27	Pocket Pen			1.5*	CH
B	9.0 - 10.5	SPT	20	CL			26.3	92	19	35	Pocket Pen			1.5*	
C	14.0 - 15.5	SPT	64	CL/CE			20.7	85	14	31					
D	19.0 - 20.5	SPT	21	CL			29.8	88	18	36					H,G=2.76
E	24.0 - 24.85	CSSw/SH	R	CL/CE	104.6	124.4	18.9	89	8	26					H,G=2.67

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
SPT = Split Spoon 1.38" ID
CS = Continuous Sample 3.24" ID w/tubes
3.5" ID w/o tubes
CSS = California Split Spoon
2.42" ID w/ rings, 2.5 "ID w/o rings
CSSw/SH = fitted with Shelby shoe 2.42" ID
PB = Pitcher Barrel 2.87" ID
RC = Rock Core Barrel 1.875" ID

STRENGTH TESTS

UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
U = Unconfined Compression
Cu = Undrained Cohesion
Qu = Unconfined Compressive Strength
Su = Undrained Shear Strength
PHI = Angle of Internal Friction - Degrees

MISCELLANEOUS

CH = Chem Analysis
CM = Compaction
D = Dispersive Soils
E = Expansive Soils
G = Specific Gravity
H = Hydrometer
HC = Hydro-Collapse
K = Permeability
LL = Liquid Limit

TESTS

O = Organic Content
OC = Consolidation
PI = Plastic Index
RQD = Rock Quality Designation
RV = R - Value
S = Sieve Analysis
SL = Shrinkage Limit
W = Water Content

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 9 Total Depth (ft.) 30.0 Station or Location: "EM" 56+03 45 m Left

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS TEST TYPE	PHI degrees	CU tsf	QU tsf	OTHER TESTS PERFORMED
A	3.9 - 5.4	SPT	35	SC			6.1	35							CH
B	8.9 - 10.4	SPT	19	CL			14.4	59	25	40					
C	13.9 - 15.4	SPT	15	CL			10.7	56	24	36					H,G=2.73
D	18.9 - 20.3	SPT	38/R	CL/CE			9.7	---	26	45					
E	23.9 - 25.4	SPT	21	CH			29.2	84	54	75					H,G=2.70

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
SPT = Split Spoon 1.38" ID
CS = Continuous Sample 3.24" ID w/tubes
3.5" ID w/o tubes
CSS = California Split Spoon
2.42" ID w/ rings, 2.5 "ID w/o rings
CSSw/SH = fitted with Shelby shoe 2.42" ID
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CM = Compaction
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G = Specific Gravity
H = Hydrometer
HC = Hydro-Collapse
K = Permeability
LL = Liquid Limit

TESTS

O = Organic Content
OC = Consolidation
PI = Plastic Index
RQD = Rock Quality Designation
RV = R - Value
S = Sieve Analysis
SL = Shrinkage Limit
W = Water Content

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. CI - 10 Total Depth (ft.) 18.9 Station or Location: "EM" 54+33.5 57.2 m Left

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	CU tsf	QU tsf	
A	3.9 - 5.4	SPT	45	SC			11.5		18	38					CH
B	8.9 - 10.4	SPT	28	SC			8.2	42	14	30					
C	13.9 - 15.4	SPT	33	CL			11.8	67	13	30					H,G=2.73

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
SPT = Split Spoon 1.38" ID
CS = Continuous Sample 3.24" ID w/tubes 3.5" ID w/o tubes
CSS = California Split Spoon 2.42" ID w/ rings, 2.5 "ID w/o rings
CSSw/SH = fitted with Shelby shoe 2.42" ID
PB = Pitcher Barrel 2.87" ID
RC = Rock Core Barrel 1.875" ID

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UU = Unconsolidated Undrained
CD = Consolidated Drained
CU = Consolidated Undrained
DS = Direct Shear
U = Unconfined Compression
Cu = Undrained Cohesion
Qu = Unconfined Compressive Strength
Su = Undrained Shear Strength
PHI = Angle of Internal Friction - Degrees

MISCELLANEOUS

CH = Chem Analysis
CM = Compaction
D = Dispersive Soils
E = Expansive Soils
G = Specific Gravity
H = Hydrometer
HC = Hydro-Collapse
K = Permeability
LL = Liquid Limit

TESTS

O = Organic Content
OC = Consolidation
PI = Plastic Index
RQD = Rock Quality Designation
RV = R - Value
S = Sieve Analysis
SL = Shrinkage Limit
W = Water Content

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. LVW-1 Total Depth (ft.) 63.5 Station or Location: "EM" 63+11.9 19.8 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	Cu tsf	Su tsf	
A	2.0 - 3.5 '	SPT	19	ML			17.0	68							CH
B	7.0 - 9.0 '	PB		SM	103.8*	123.6*	20.1*	30	3	20					
B1	0 - 2"	"													waste
B2	2 - 3"	"	----				22.6								
B3	3 - 8.75"	"	----	SM	102.4	122.9	19.9	32	2	20					CH,H,G=2.74
B4	8.75 - 14.25"	"	----		101.9	123.0	21.1				UU @ 5psi			0.14	
B5	14.25 - 19.75"	"	----	SM	107.1	125.0	16.7	27	3	20	UU @ 10psi			0.15	CH,H,G=2.76
C	9.0 - 11.0 '	PB		CL/ML	100.4	120.8	20.3	55*	7*	22*					
C1	0 - 0.5"	"													waste
C2	0.5 - 6.5"	"	----	CL	100.4	120.8	20.3	57	9	23	UU @ 15psi			0.21	CH,H,G=2.73
C3	6.5 - 7.5"	"	----	CL/ML				52	4	21					
C4	7.5 - 8.5"	"	----												
C5	8.5 - 9.5"	"	----												
C6	9.5 - 10.5"	"	----												
C7	10.5 - 11.5"	"	----												
C8	11.5 - 12.5"	"	----												
C9	12.5 - 13.5"	"	----												
D	12.0 - 13.5 '	SPT	20	CL/SC			17.8	51	16	31					
E	17.0 - 18.5 '	SPT	25	CL			36.4	82	25	41					H,G=2.67
F	22.0 - 22.7 '	PB	----	CL	112.0	131.3	17.2	59	10	24					
F1	0 - 1"	"													waste
F2	1 - 6.5"	"		CL	112.0	131.3	17.2	59	10	24	UU @ 15psi			0.32	H,G=2.66
G	27.0 - 28.5 '	SPT	13	CH			52.8	66	52	78					H,G=2.68

Subsample depths shown in inches P = Pushed under hammer weight NP = Nonplastic * averaged value
R = Refusal

SAMPLER TYPE

SH = Shelby Tube 2.87" ID TP = Test Pit
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CS = Continuous Sample 3.24" ID w/tubes
3.5" ID w/o tubes
CSS = California Split Spoon
2.42" ID w/ rings, 2.5 "ID w/o rings
CSSw/SH = fitted with Shelby shoe 2.42" ID
PB = Pitcher Barrel 2.87" ID
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STRENGTH TESTS

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CU = Consolidated Undrained
DS = Direct Shear
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CH = Chem Analysis
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O = Organic Content
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PI = Plastic Index
RQD = Rock Quality Designation
RV = R - Value
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SL = Shrinkage Limit
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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. LVW-1 Total Depth (ft.) 63.5 Station or Location: "EM" 63+11.9 19.8 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI degrees	Cu tsf	Su tsf	
H	32.0 - 33.5 '	SPT	21	SC			34.5	36	47	69					H,G=2.67
I	34.0 - 36.3 '	PB		CH	54.5*	83.4*	53.1*	86*	72*	108*				0.51*	
I1	0 - 1"	"													wasted
I 2	1 - 6"	"	----	CH	62.4	96.8	55.3	75	76	116	UU @ 10psi			0.78	CH, H,G=2.73
I 3	6 - 11.5"	"	----	CH	52.7	79.0	50				UU @ 15psi			0.66	
I 4	11.5 - 17.25"	"	----	CH	51.5	78.6	52.6	93	68	99	UU @ 20psi			0.33	CH, H,G=2.73
I 5	17.25 - 23"	"	----	CH	51.3	79.2	54.4				UU @ 25psi			0.28	
I 6	23.0 - 24.0"	"	----	CH				91			S @ 3ksf	20°	0.78		
I 7	24.0 - 25.0"	"	----	CH							S @ 4ksf				
J	37.0 - 38.3	SPT	R	CL			28.5	88	22	43	Pkt Torvane			1.9	
K	42.0 - 43.5	SPT	37	CH			55.8	83	46	73					H,G=2.77
L	47.0 - 49.0'	PB		CH	64.1*	93.4*	45.9*	77*	32*	59*				0.63*	
L 1	0 - 5.5"	"	----	CL	72.7	105.5	45.2	68	19	39	UU @ 15psi			1.24	CH, H,G=2.71
L 2	5.5 - 11.0"	"	----	CH	64.3	93.3	45.2	82	39	67	UU @ 20psi			0.21	CH, H,G=2.73
L 3	11.0 - 16.5"	"	----	CH/MH	56.6	82.3	45.4	80	38	72	UU @ 25psi			0.22	CH, H,G=2.72
L 4	16.5 - 21.5"	"	----	CH/MH	62.6	92.4	47.7				UU @ 30psi			0.87	
M	52.0 - 53.5	SPT	21	CH			49.0	80	29	51	Pkt Torvane			0.50	H,G=2.75
N	57.0 - 59.0'	PB		CL	91.3*	118.9*	29.2*	64*	25*	44*				0.83*	
N1	0 - 1.5"	"													wasted
N 2	1.5 - 2.5"	PB	----		82.2	111.5	35.7								OC, Pc = 2.0tsf
N 3	2.5 - 8.0"	"	----	SC	93.0	119	29.0	45	20	38	UU @ 25psi			0.62	CH, H,G=2.70
N 4	8.0 - 9.0"	"	----		95.5	121.6	27.3								OC, Pc = 3.75tsf
N 5	9.0 - 14.5"	"	----	CL	91.5	119.5	30.6	83	30	49	UU @ 30psi			1.03	CH, H,G=2.75

Subsample depths shown in inches P = Pushed under hammer weight R = Refusal NP = Nonplastic * averaged value

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3.5" ID w/o tubes
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TESTS

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W = Water Content

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION
SUMMARY OF TEST RESULTS

E.A. No. 72031-1

Boring No. LVW-1 Total Depth (ft.) 63.5 Station or Location: "EM" 63+11.9 19.8 m Right

SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLER TYPE	No. BLOWS /FOOT	SOIL GROUP	DRY UNIT WT lb/ft³	WET UNIT WT lb/ft³	WATER CONTENT	% MINUS 200	PI	LL	SHEAR STRENGTH PARAMETERS				OTHER TESTS PERFORMED
											TEST TYPE	PHI	Cu	Su	
N 6	14.5 - 15.5"	PB	----		94.3	122.8	23.2								OC, Pc=3.75tsf
N 7	15.5 - 21.0"	"	----								Pkt Torvane		1.43		
O	59.0 - 61.0 '	PB			103.7*	127.4*	23.0*	97*						1.1*	
O 1	0 - 5.5"	"	----	CL	97.3	123.3	26.8	97	13	30	UU @ 35psi			0.55	CH, H,G=2.79
O 2	5.5 - 11.0"	"	----	CL/ML	109.0	130.8	20.0	95	5	25	UU @ 40psi			1.21	CH, H,G=2.74
O 3	11.0 - 16.5"	"	----	CL	104.9	128.2	22.2	99	11	29	UU @ 45psi			1.51	CH, H,G=2.76
O 4	16.5 - 17.5"	"	----	CL/ML				97	5	24	S @ 3ksf	33.4	1.0		
O 5	17.5 - 18.5"	"	----								S @ 4ksf				
O 6	18.5 - 19.5"	"	----								S @ 5ksf				
O 7	19.5 - 21.5"	"	----												
P#	62.0 - 63.5	SPT	21												

Sample was contaminated, sent to an independent lab for chem analyses.

#Acetone @ 1.4 ppm & 2-Butanone @ 0.64ppm

Subsample depths shown in inches

P = Pushed under hammer weight
R = Refusal

NP = Nonplastic

* averaged value

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NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

CHEMICAL ANALYSIS

LAB # FL - 11 - 97 E.A. No. 72031

PROJECT Cheyenne Avenue Interchange at I-15

Sample No.	Chlorides ppm	Sulfates ppm	Ph	Resistivity Ohm-cm
CI - 1 - B	800	2,000	8.30	295
CI - 2 - E	470	900	8.6	671
CI - 2 - K	60	trace	8.2	5,319
CI - 3 - B	2,200	4,000	8.7	158
CI - 3 - G	50	trace	7.3	5,128
CI - 3-J2-J4	40	0	8.1	6,211
CI - 4 - A	70	2,500	8.0	413
CI - 4 - D1	230	1,250	8.2	426
CI-4-D3-D8	1600	1800	8.5	260
CI - 5 - B	160	700	8.3	1,468
CI - 6 - A	60	2,100	8.1	417
CI - 7 - A	200	1,200	8.5	498
CI - 8 - A	130	700	8.1	1,852
CI - 9 - A	60	6,500	8.0	461
CI - 10 - A	130	7,500	8.3	345

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

CHEMICAL ANALYSIS

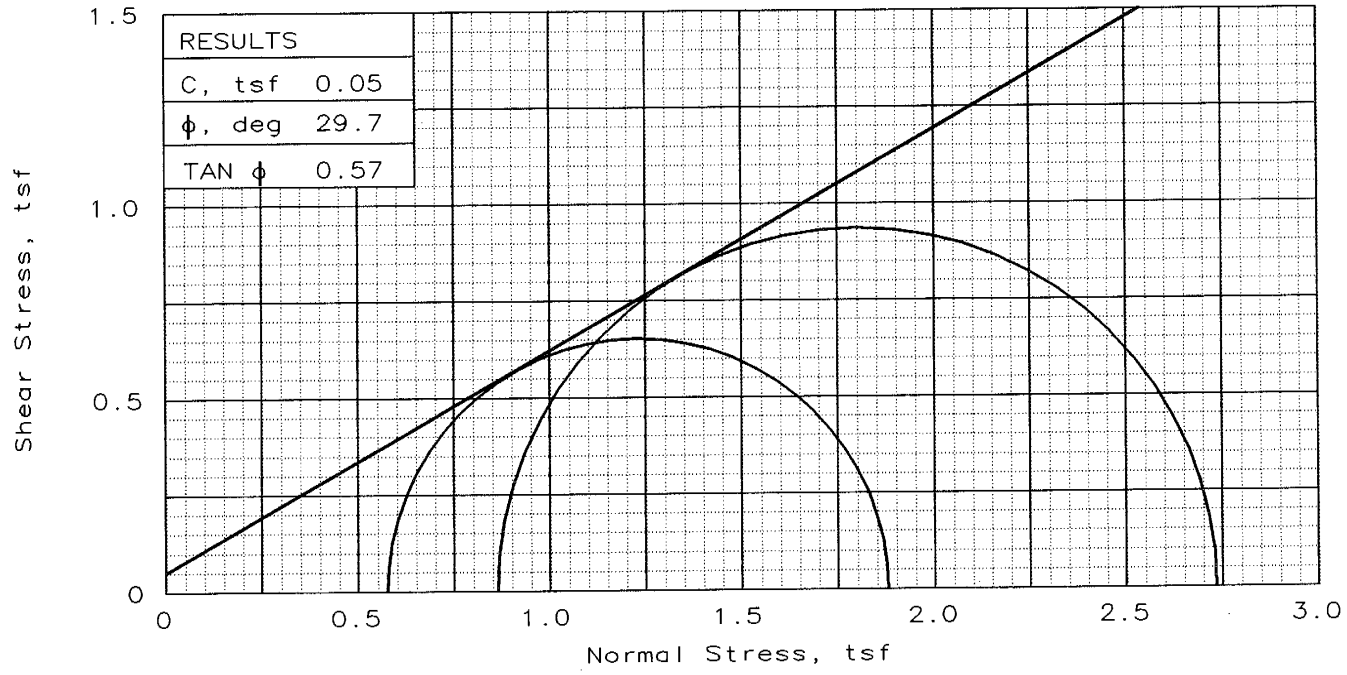
LAB # FL - 11 - 97 E.A. No. 72031

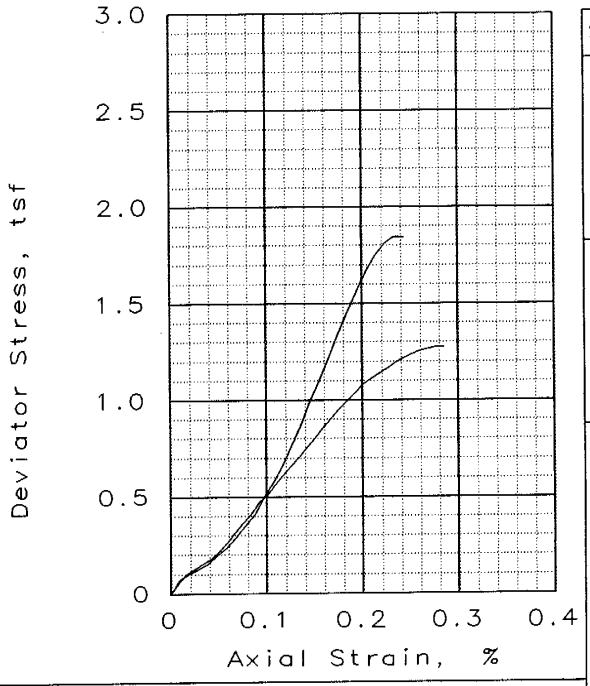
PROJECT Cheyenne Avenue Interchange--Las Vegas Wash at I-15

Sample No.	Chlorides ppm	Sulfates ppm	Ph	Resistivity Ohm-cm
LVW - 1 - A	900	3,000	8.30	383
LVW - 1 - B3	500	2,500	8.1	431
LVW - 1 - B5	140	900	8.3	832
LVW - 1 - C2	130	800	8.3	1,136
LVW - 1 - I2	130	800	8.2	1,645
LVW - 1 - I4	110	700	8.2	1,383
LVW - 1 - L1	90	trace	8.1	1,852
LVW - 1 - L2	130	800	8.2	1,066
LVW - 1 - L3	170	1,000	8.1	851
LVW - 1 - N3	80	0	8.2	4,237
LVW - 1 - N5	60	0	8.3	3,534
LVW - 1 - O1	60	0	8.1	3,968
LVW - 1 - O2	60	0	8.2	5,618
LVW - 1 - O3	50	0	8.3	4,902

APPENDIX 2

Individual Laboratory Test Results
Triaxial Shear Test Reports
Consolidation Test Reports
Particle Size Analyses Test Reports
Weephole Design Detail Sketch





SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	37.1	34.0
	DRY DENSITY, pcf	77.5	82.2
	SATURATION, %	84.5	86.4
	VOID RATIO	1.200	1.075
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.96	5.14
AT TEST	WATER CONTENT, %	0.0	0.0
	DRY DENSITY, pcf	77.5	82.2
	SATURATION, %	0.0	0.0
	VOID RATIO	1.200	1.075
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.96	5.14
Strain rate, in/min		0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00
CELL PRESSURE, tsf		0.58	0.86
FAIL. STRESS, tsf		1.30	1.87
ULT. STRESS, tsf			
σ_1 FAILURE, tsf		1.88	2.74
σ_3 FAILURE, tsf		0.58	0.86

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay

LL= 69 PL= 22 PI= 47
SPECIFIC GRAVITY= 2.731
REMARKS:
Sample 1 = E-2
Sample 2 = E-3

Page No.: 1

CLIENT: M Salazar

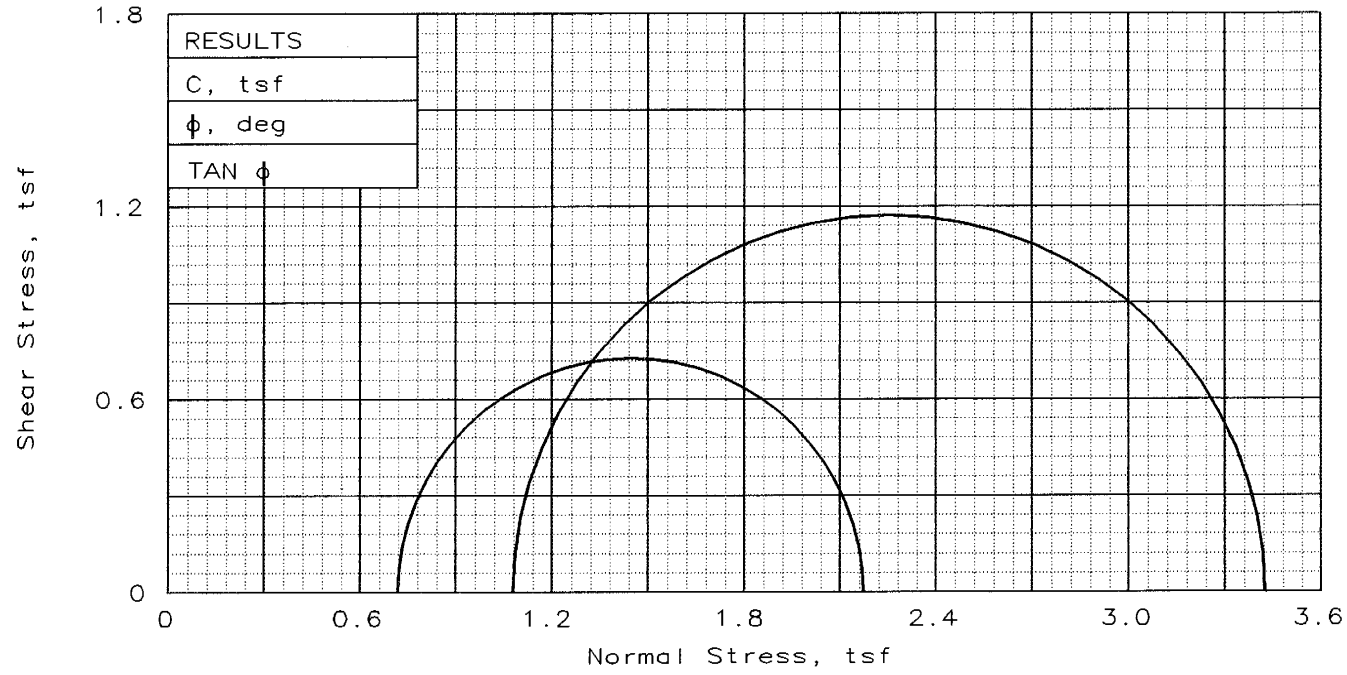
PROJECT: Cheyenne Ave, Las Vegas

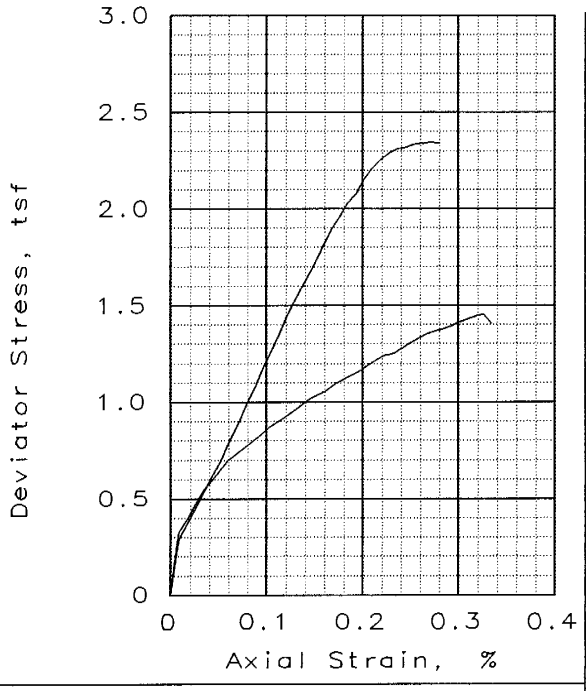
SAMPLE LOCATION: Boring CI-1
Station 116m Lt "EM" 53+66.7

PROJ. NO.: 72031 DATE: 4/4/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	28.4	26.9
	DRY DENSITY, pcf	97.2	98.5
	SATURATION, %	103.0	100.5
	VOID RATIO	0.753	0.731
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.83	5.70
AT TEST	WATER CONTENT, %	0.0	0.0
	DRY DENSITY, pcf	97.2	98.5
	SATURATION, %	0.0	0.0
	VOID RATIO	0.753	0.731
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.83	5.70
Strain rate, in/min		0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00
CELL PRESSURE, tsf		0.72	1.08
FAIL. STRESS, tsf		1.45	2.34
ULT. STRESS, tsf			
σ_1 FAILURE, tsf		2.17	3.42
σ_3 FAILURE, tsf		0.72	1.08

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay

LL= 37 PL= 17 PI= 20
SPECIFIC GRAVITY= 2.73
REMARKS:
Sample 1 = L-2
Sample 2 = L-3

Page No.: 1

CLIENT: M Salazar

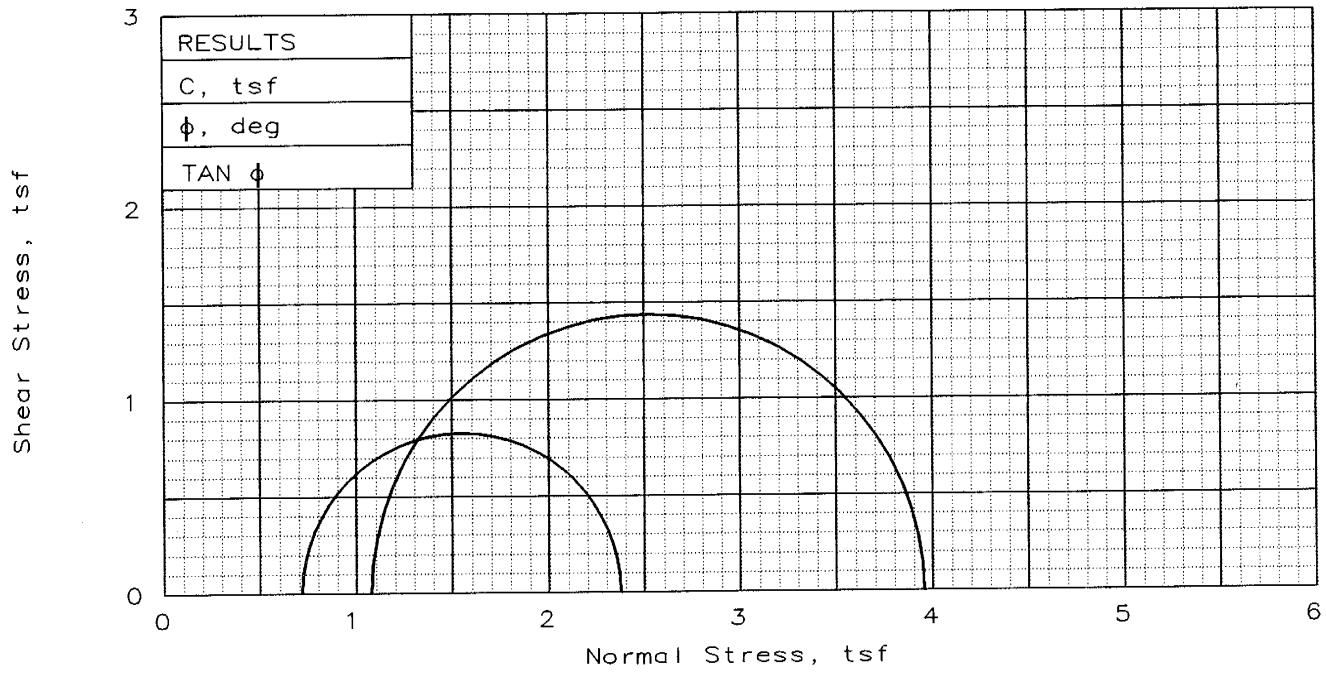
PROJECT: Cheyenne Ave, Las Vegas

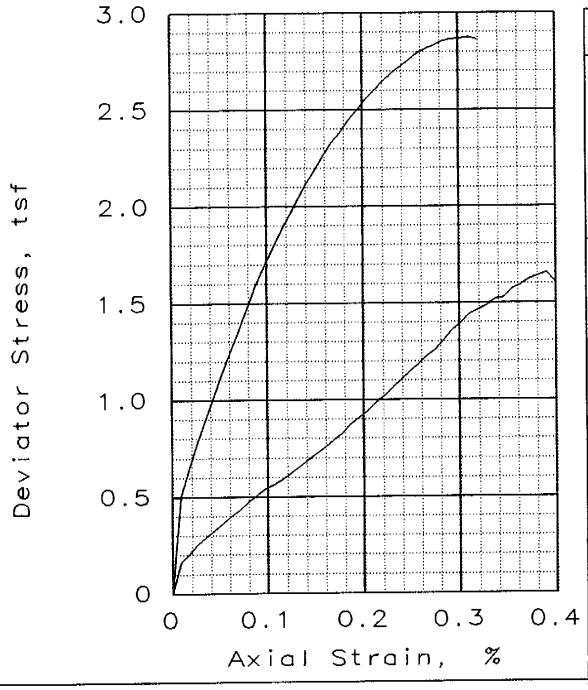
SAMPLE LOCATION: Boring CI-2
Station 24.68m Rt "EM" 53+31

PROJ. NO.: 72031 DATE: 5/8/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	27.3	23.8
	DRY DENSITY, pcf	96.6	102.9
	SATURATION, %	98.2	99.8
	VOID RATIO	0.757	0.649
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.64	5.64
AT TEST	WATER CONTENT, %	0.0	0.0
	DRY DENSITY, pcf	96.6	102.9
	SATURATION, %	0.0	0.0
	VOID RATIO	0.757	0.649
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.64	5.64
Strain rate, in/min		0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00
CELL PRESSURE, tsf		0.72	1.08
FAIL. STRESS, tsf		1.66	2.87
ULT. STRESS, tsf			
σ_1 FAILURE, tsf		2.38	3.95
σ_3 FAILURE, tsf		0.72	1.08

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay

LL= 32 PL= 18 PI= 14
SPECIFIC GRAVITY= 2.72
REMARKS: Sample 1 = i-2
Sample 2 = i-3

Page No.: 1

CLIENT: M Salazar

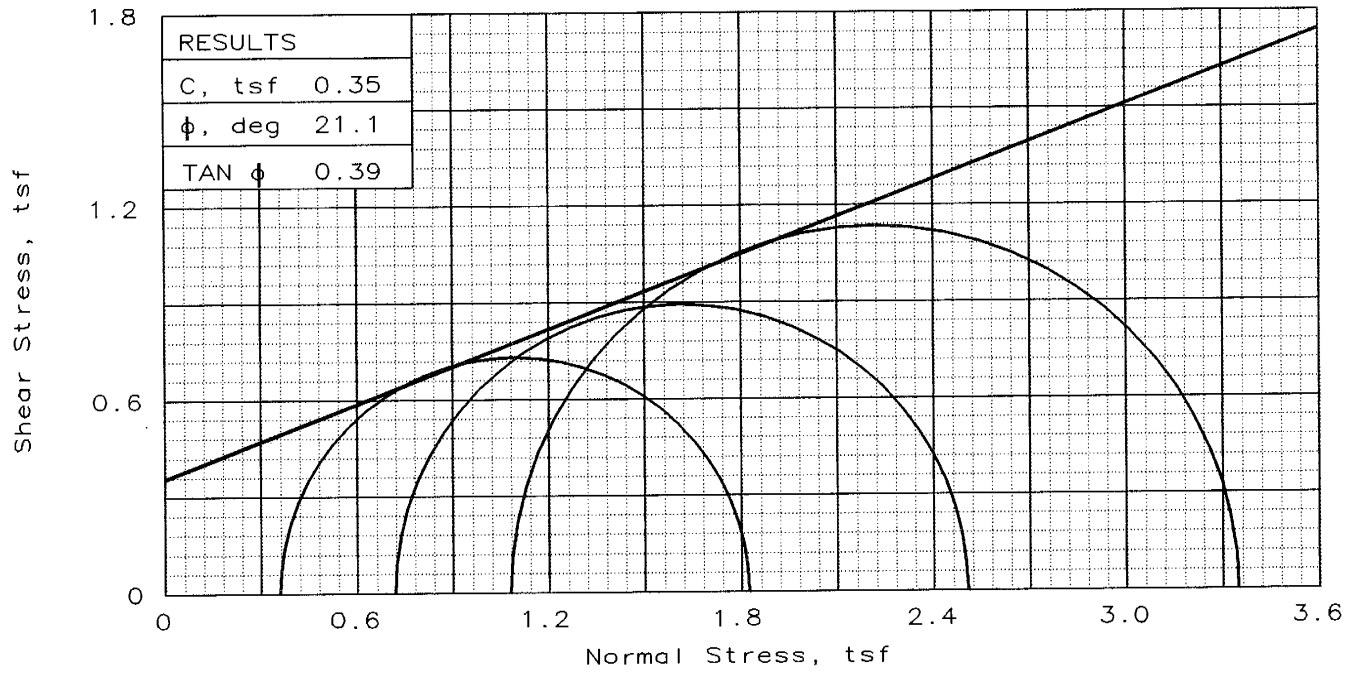
PROJECT: Cheyenne Ave, Las Vegas

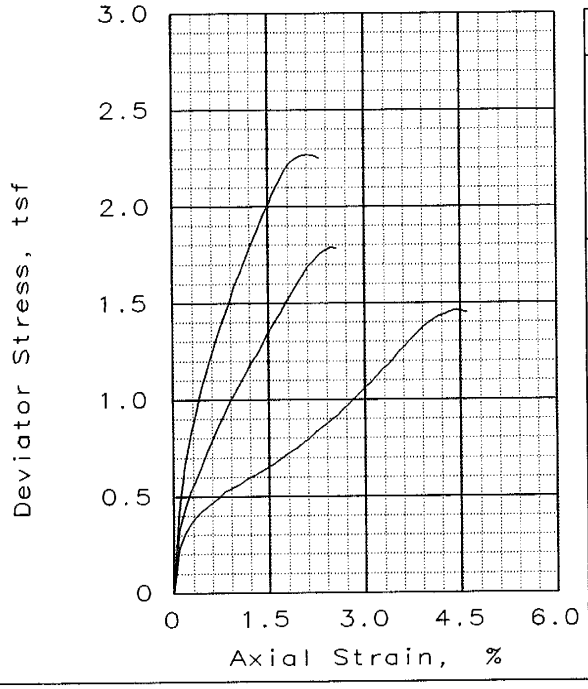
SAMPLE LOCATION: Boring CI-3
Station 107m Lt "EM" 52+61.5

PROJ. NO.: 72031 DATE: 5/8/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	28.8	30.7	31.9
	DRY DENSITY, pcf	94.7	92.3	90.1
	SATURATION, %	96.4	97.3	95.9
	VOID RATIO	0.827	0.873	0.917
	DIAMETER, in	2.87	2.87	2.87
	HEIGHT, in	5.65	5.67	5.66
AT TEST	WATER CONTENT, %	0.0	0.0	0.0
	DRY DENSITY, pcf	N/A	N/A	N/A
	SATURATION, %	N/A	N/A	N/A
	VOID RATIO	N/A	N/A	N/A
	DIAMETER, in	N/A	N/A	N/A
	HEIGHT, in	5.65	5.67	5.66
Strain rate, in/min		0.0154	0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00	0.00
CELL PRESSURE, tsf		0.36	0.72	1.08
FAIL. STRESS, tsf		1.46	1.79	2.27
ULT. STRESS, tsf				
σ_1 FAILURE, tsf		1.82	2.51	3.35
σ_3 FAILURE, tsf		0.36	0.72	1.08

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay

LL= 34 PL= 18 PI= 16
SPECIFIC GRAVITY= 2.77
REMARKS: Sample 1 = J-2
Sample 2 = J-3
Sample 3 = J-4

Page No.: 1

CLIENT: M Salazar

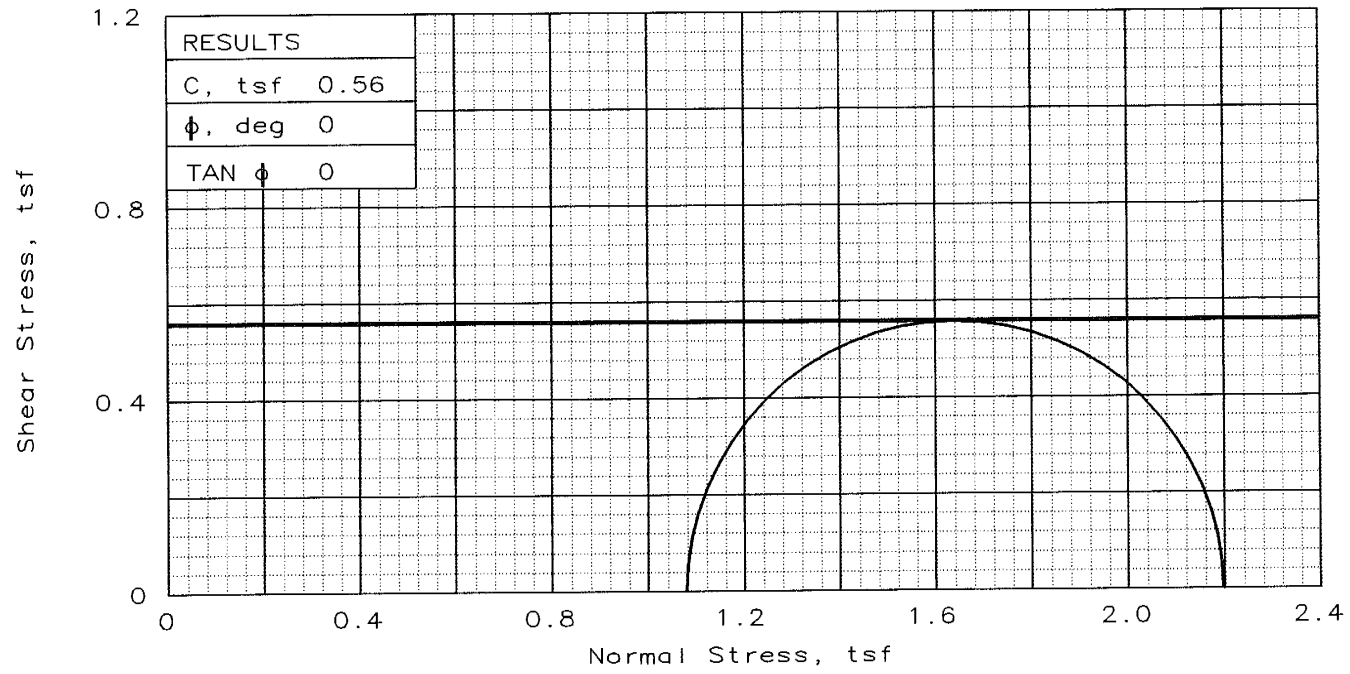
PROJECT: Cheyenne Ave, Las Vegas

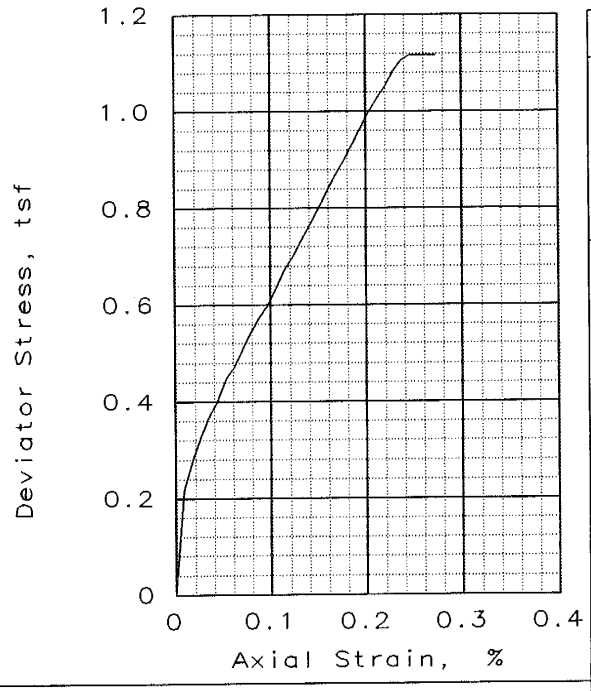
SAMPLE LOCATION: Boring CI-3
Station 107m Lt "EM" 52+61.5

PROJ. NO.: 72031 DATE: 5/8/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1
INITIAL	WATER CONTENT, %	26.1
	DRY DENSITY, pcf	99.0
	SATURATION, %	98.1
	VOID RATIO	0.729
	DIAMETER, in	2.87
	HEIGHT, in	5.68
AT TEST	WATER CONTENT, %	0.0
	DRY DENSITY, pcf	99.0
	SATURATION, %	0.0
	VOID RATIO	0.729
	DIAMETER, in	2.87
	HEIGHT, in	5.68
Strain rate, in/min		0.0154
BACK PRESSURE, tsf		0.00
CELL PRESSURE, tsf		1.08
FAIL. STRESS, tsf		1.12
ULT. STRESS, tsf		
σ_1 FAILURE, tsf		2.20
σ_3 FAILURE, tsf		1.08

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay

LL= 35 PL= 19 PI= 16
SPECIFIC GRAVITY= 2.74
REMARKS:
Sample 1 = M-2

Page No.: 1

CLIENT: M Salazar

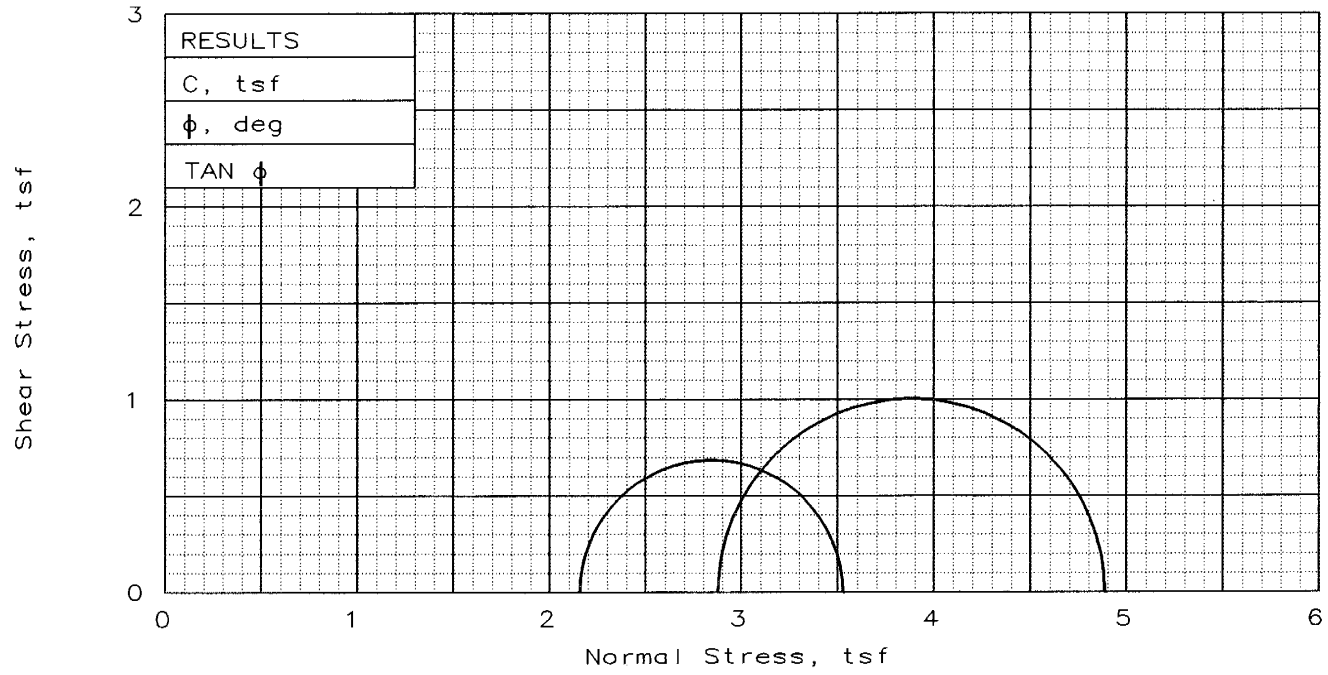
PROJECT: Cheyenne Ave, Las Vegas

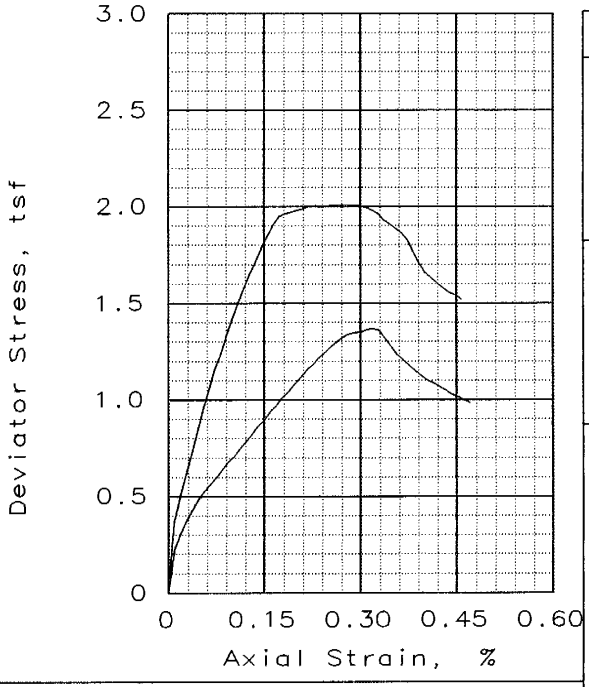
SAMPLE LOCATION: Boring CI-3
Station 107m Lt "EM" 52+61.5

PROJ. NO.: 72031 DATE: 5/8/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	28.9	26.2
	DRY DENSITY, pcf	94.3	97.7
	SATURATION, %	98.1	97.4
	VOID RATIO	0.804	0.725
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.31	5.47
AT TEST	WATER CONTENT, %	0.0	0.0
	DRY DENSITY, pcf	94.3	97.7
	SATURATION, %	0.0	0.0
	VOID RATIO	0.804	0.725
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.31	5.47
Strain rate, in/min		0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00
CELL PRESSURE, tsf		2.16	2.88
FAIL. STRESS, tsf		1.37	2.01
ULT. STRESS, tsf			
σ_1 FAILURE, tsf		3.53	4.89
σ_3 FAILURE, tsf		2.16	2.88

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay

LL= 40 PL= 18 PI= 22
SPECIFIC GRAVITY= 2.724
REMARKS:
Sample 1 = M-1
Sample 2 = M-2 LL=32 PI=15
S/G=2.699

Page No.: 1

CLIENT: M Salazar

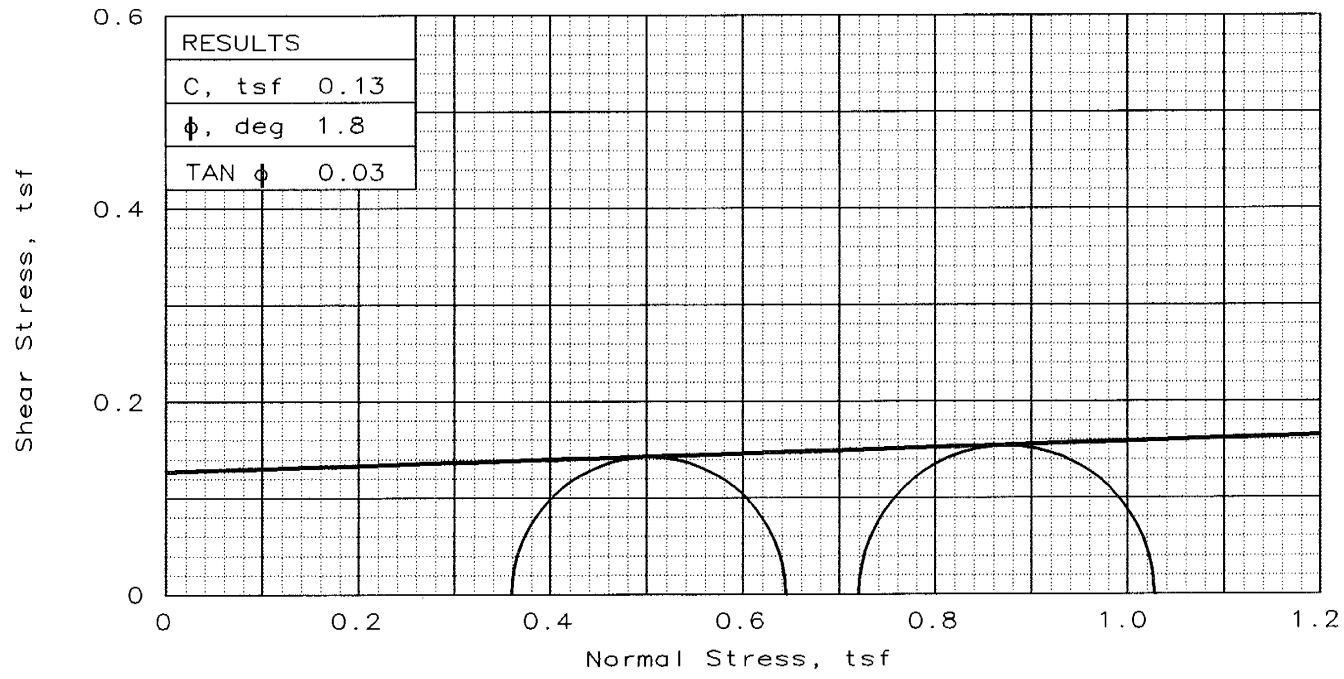
PROJECT: Cheyenne Ave, Las Vegas

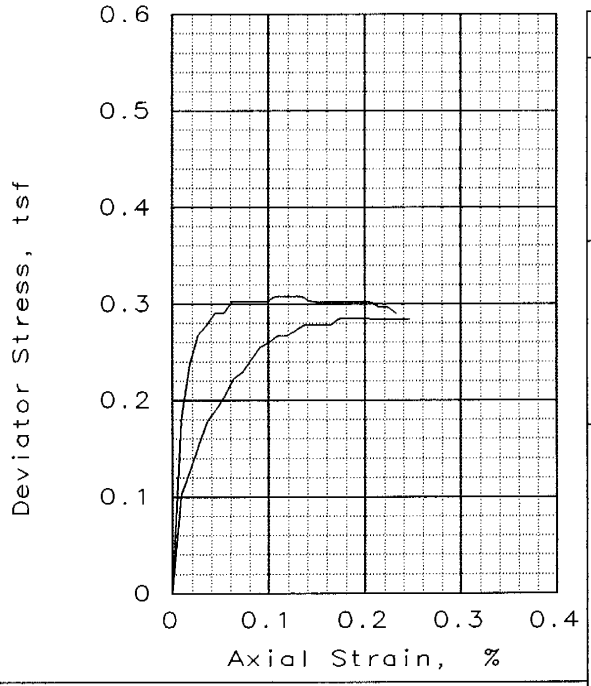
SAMPLE LOCATION: Boring CI-4
Station 7.5m "EM" 54+24.3

PROJ. NO.: 72031 DATE: 6/13/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	21.1	16.7
	DRY DENSITY, pcf	101.6	106.6
	SATURATION, %	83.5	74.7
	VOID RATIO	0.696	0.617
	DIAMETER, in	2.88	2.88
	HEIGHT, in	5.48	5.59
AT TEST	WATER CONTENT, %	0.0	0.0
	DRY DENSITY, pcf	101.6	106.6
	SATURATION, %	0.0	0.0
	VOID RATIO	0.696	0.617
	DIAMETER, in	2.88	2.88
	HEIGHT, in	5.48	5.59
Strain rate, in/min		0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00
CELL PRESSURE, tsf		0.36	0.72
FAIL. STRESS, tsf		0.28	0.31
ULT. STRESS, tsf			
σ_1 FAILURE, tsf		0.64	1.03
σ_3 FAILURE, tsf		0.36	0.72

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay (SM)

LL= 22 PL= 15 PI= 7
SPECIFIC GRAVITY= 2.76
REMARKS: Sample 1 = B-4
Sample 2 = B-5

Page No.: 1

CLIENT: M Salazar

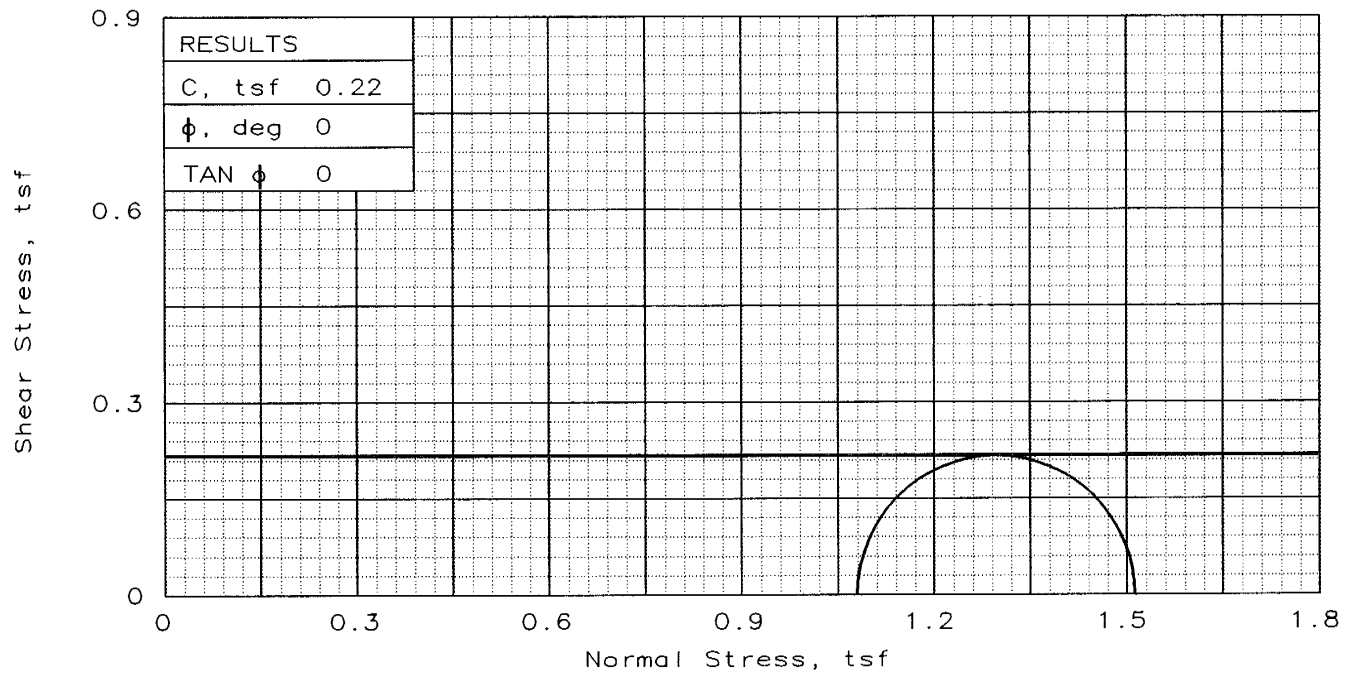
PROJECT: Cheyenne Ave, Las Vegas

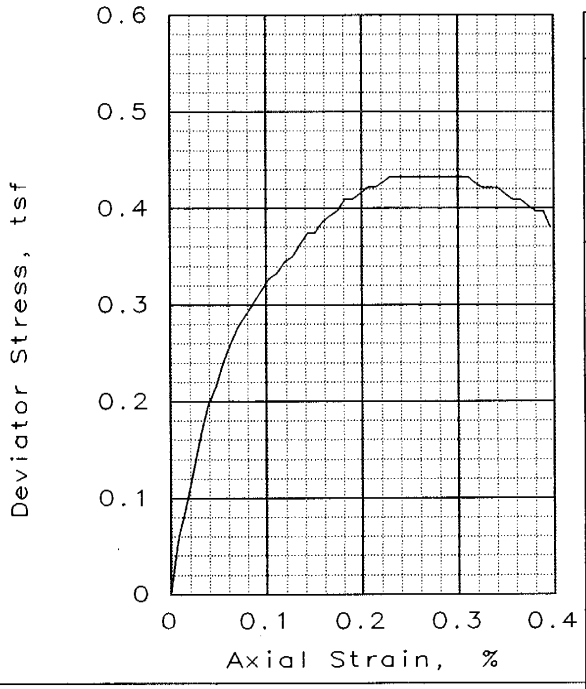
SAMPLE LOCATION: Boring LVW-1
Station "EM" 63+11.9 19.8m Right

PROJ. NO.: 72031 DATE: 6/4/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1
INITIAL	WATER CONTENT, %	20.3
	DRY DENSITY, pcf	100.1
	SATURATION, %	79.0
	VOID RATIO	0.703
	DIAMETER, in	2.88
	HEIGHT, in	6.30
AT TEST	WATER CONTENT, %	0.0
	DRY DENSITY, pcf	100.1
	SATURATION, %	0.0
	VOID RATIO	0.703
	DIAMETER, in	2.88
	HEIGHT, in	6.30
Strain rate, in/min		0.0154
BACK PRESSURE, tsf		0.00
CELL PRESSURE, tsf		1.08
FAIL. STRESS, tsf		0.43
ULT. STRESS, tsf		
σ_1 FAILURE, tsf		1.51
σ_3 FAILURE, tsf		1.08

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay (CL)

LL= 23 PL= 14 PI= 9
SPECIFIC GRAVITY= 2.73
REMARKS: Sample 1 = C-2

CLIENT: M Salazar

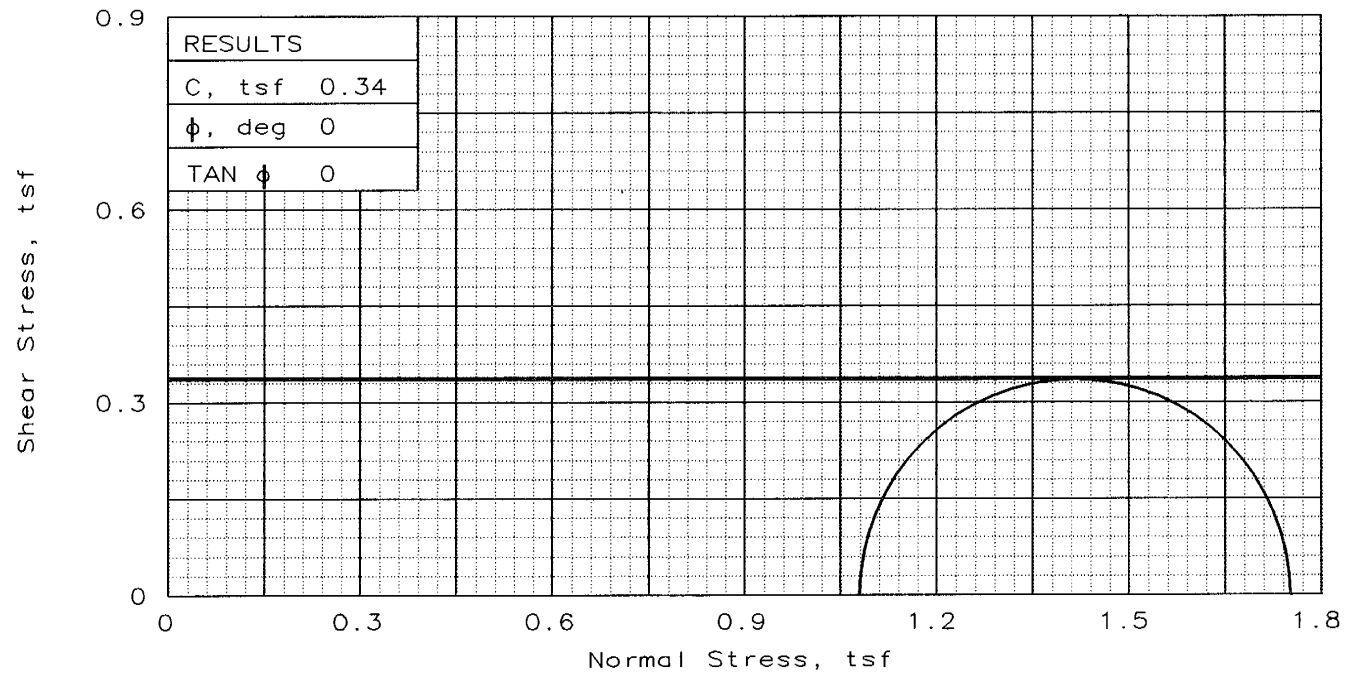
PROJECT: Cheyenne Ave, Las Vegas

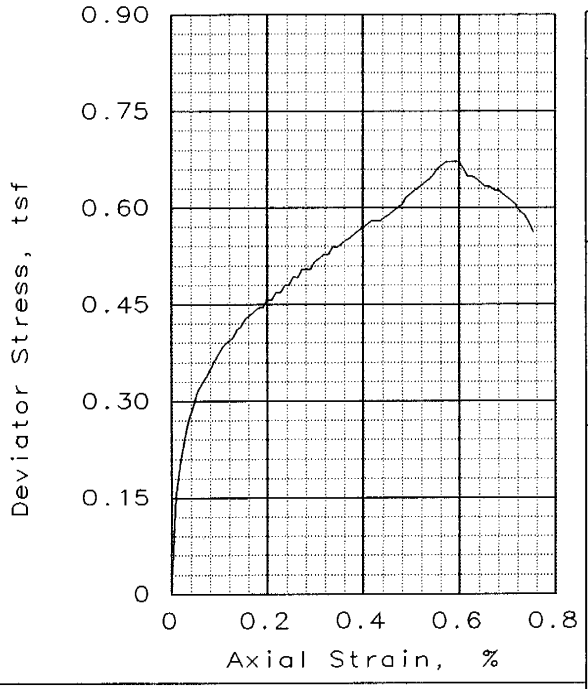
SAMPLE LOCATION: Boring LVW-1
Station "EM" 63+11.9 19.8m Right

PROJ. NO.: 72031 DATE: 6/4/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1
INITIAL	WATER CONTENT, %	17.2
	DRY DENSITY, pcf	111.6
	SATURATION, %	94.0
	VOID RATIO	0.488
	DIAMETER, in	2.88
	HEIGHT, in	5.50
AT TEST	WATER CONTENT, %	0.0
	DRY DENSITY, pcf	111.6
	SATURATION, %	0.0
	VOID RATIO	0.488
	DIAMETER, in	2.88
	HEIGHT, in	5.50
Strain rate, in/min		0.0154
BACK PRESSURE, tsf		0.00
CELL PRESSURE, tsf		1.08
FAIL. STRESS, tsf		0.67
ULT. STRESS, tsf		
σ_1 FAILURE, tsf		1.75
σ_3 FAILURE, tsf		1.08

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay (CL)

LL= 24 PL= 14 PI= 10
SPECIFIC GRAVITY= 2.66
REMARKS: Sample 1 = F-2

CLIENT: M Salazar

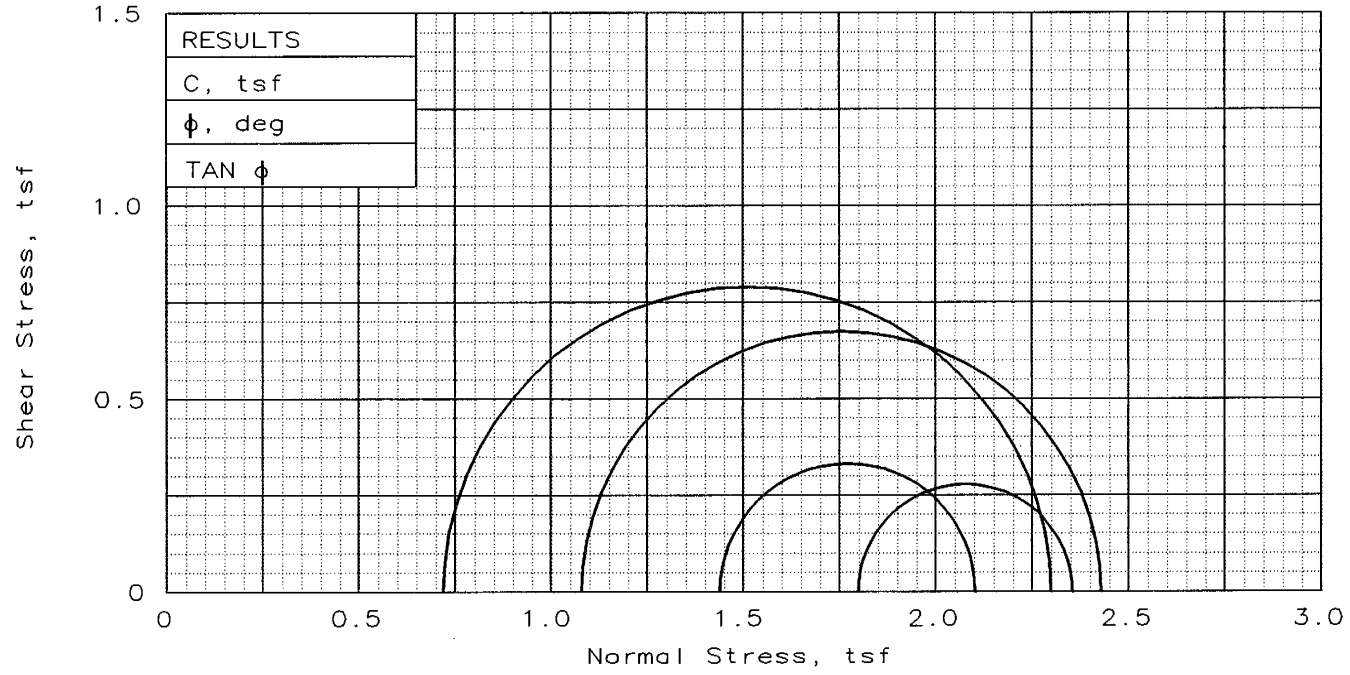
PROJECT: Cheyenne Ave, Las Vegas

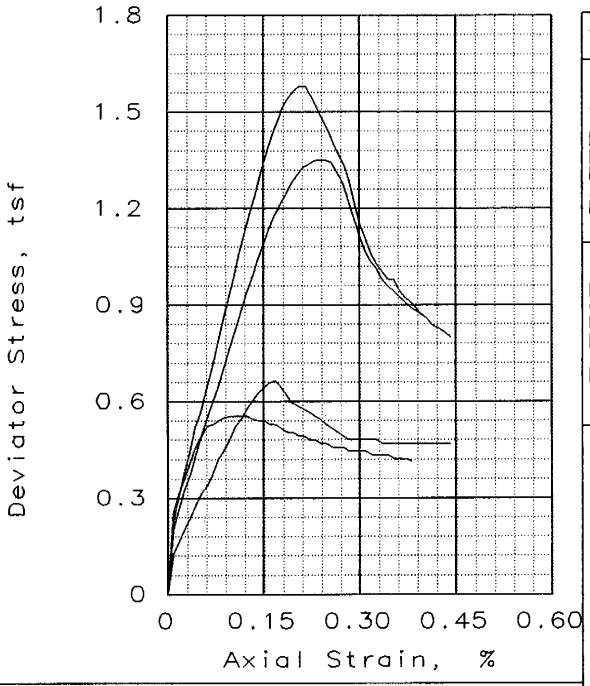
SAMPLE LOCATION: Boring LVW-1
Station "EM" 63+11.9 19.8m Right

PROJ. NO.: 72031 DATE: 6/4/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2	3	4
INITIAL	WATER CONTENT, %	55.3	50.0	52.6	54.4
	DRY DENSITY, pcf	62.1	52.5	51.3	51.2
	SATURATION, %	86.6	60.7	61.8	63.9
	VOID RATIO	1.744	2.247	2.324	2.326
	DIAMETER, in	2.88	2.88	2.88	2.88
	HEIGHT, in	5.80	5.66	5.67	5.65
AT TEST	WATER CONTENT, %	0.0	0.0	0.0	0.0
	DRY DENSITY, pcf	62.1	52.5	51.3	51.2
	SATURATION, %	0.0	0.0	0.0	0.0
	VOID RATIO	1.744	2.247	2.324	2.326
	DIAMETER, in	2.88	2.88	2.88	2.88
	HEIGHT, in	5.80	5.66	5.67	5.65
Strain rate, in/min		0.0154	0.0154	0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00	0.00	0.00
CELL PRESSURE, tsf		0.72	1.08	1.44	1.80
FAIL. STRESS, tsf		1.58	1.35	0.66	0.56
ULT. STRESS, tsf					
σ_1 FAILURE, tsf		2.30	2.43	2.10	2.36
σ_3 FAILURE, tsf		0.72	1.08	1.44	1.80

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay (CH)

LL= 116 PL= 40 PI= 76
SPECIFIC GRAVITY= 2.73
REMARKS: Sample 1 = i-2
Sample 2 = i-3
Sample 3 = i-4
Sample 4 = i-5
Page No.: 1

CLIENT: M Salazar

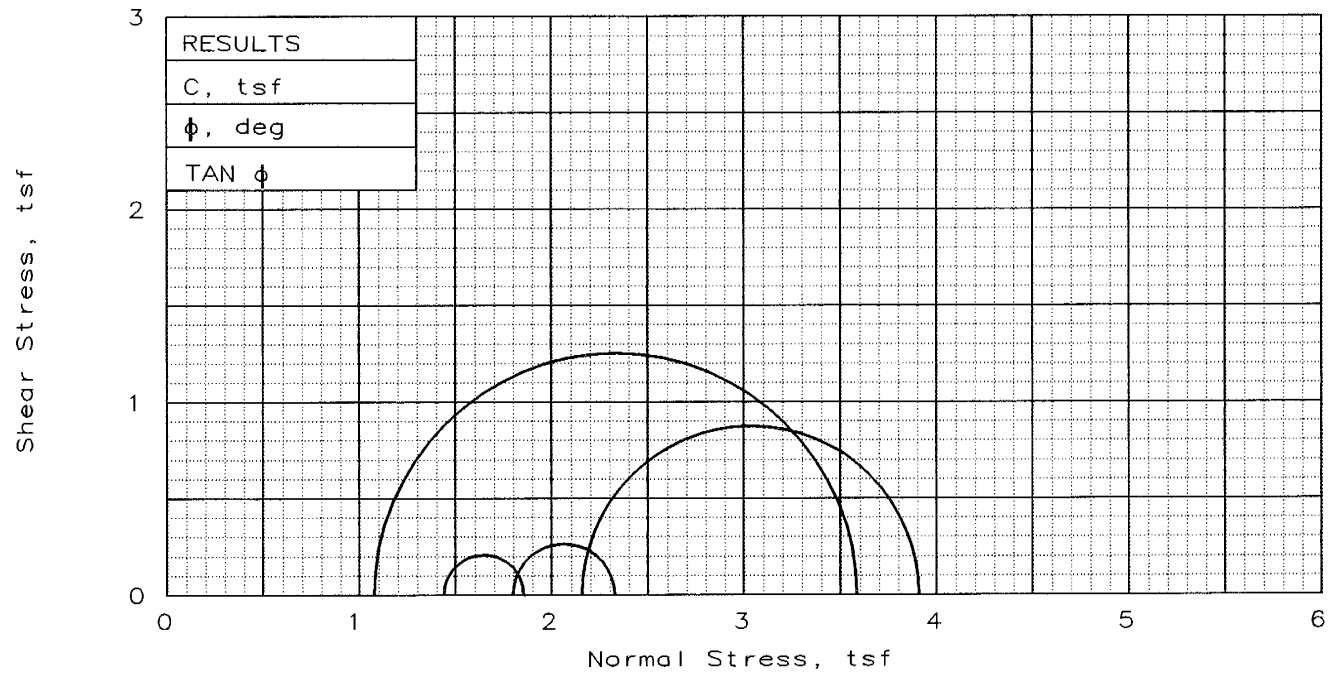
PROJECT: Cheyenne Ave, Las Vegas

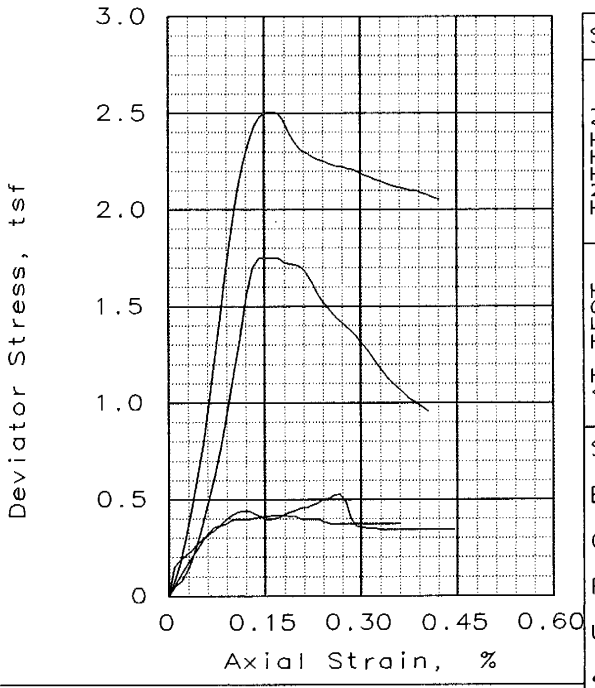
SAMPLE LOCATION: Boring LVW-1
Station "EM" 63+11.9 19.8m Right

PROJ. NO.: 72031 DATE: 6/4/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2	3	4
INITIAL	WATER CONTENT, %	45.2	45.2	45.4	47.7
	DRY DENSITY, pcf	72.4	64.1	56.4	62.3
	SATURATION, %	91.7	74.3	61.4	75.3
	VOID RATIO	1.337	1.660	2.009	1.724
	DIAMETER, in	2.88	2.88	2.88	2.88
	HEIGHT, in	5.57	5.58	5.62	4.94
AT TEST	WATER CONTENT, %	0.0	0.0	0.0	0.0
	DRY DENSITY, pcf	72.4	64.1	56.4	62.3
	SATURATION, %	0.0	0.0	0.0	0.0
	VOID RATIO	1.337	1.660	2.009	1.724
	DIAMETER, in	2.88	2.88	2.88	2.88
	HEIGHT, in	5.57	5.58	5.62	4.94
Strain rate, in/min		0.0154	0.0154	0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00	0.00	0.00
CELL PRESSURE, tsf		1.08	1.44	1.80	2.16
FAIL. STRESS, tsf		2.50	0.42	0.53	1.75
ULT. STRESS, tsf					
σ_1 FAILURE, tsf		3.58	1.86	2.33	3.91
σ_3 FAILURE, tsf		1.08	1.44	1.80	2.16

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay

LL= 59 PL= 27 PI= 32
SPECIFIC GRAVITY= 2.71
REMARKS: Sample 1 = L-1
Sample 2 = L-2
Sample 3 = L-3
Sample 4 = L-4
Page No.: 1

CLIENT: M Salazar

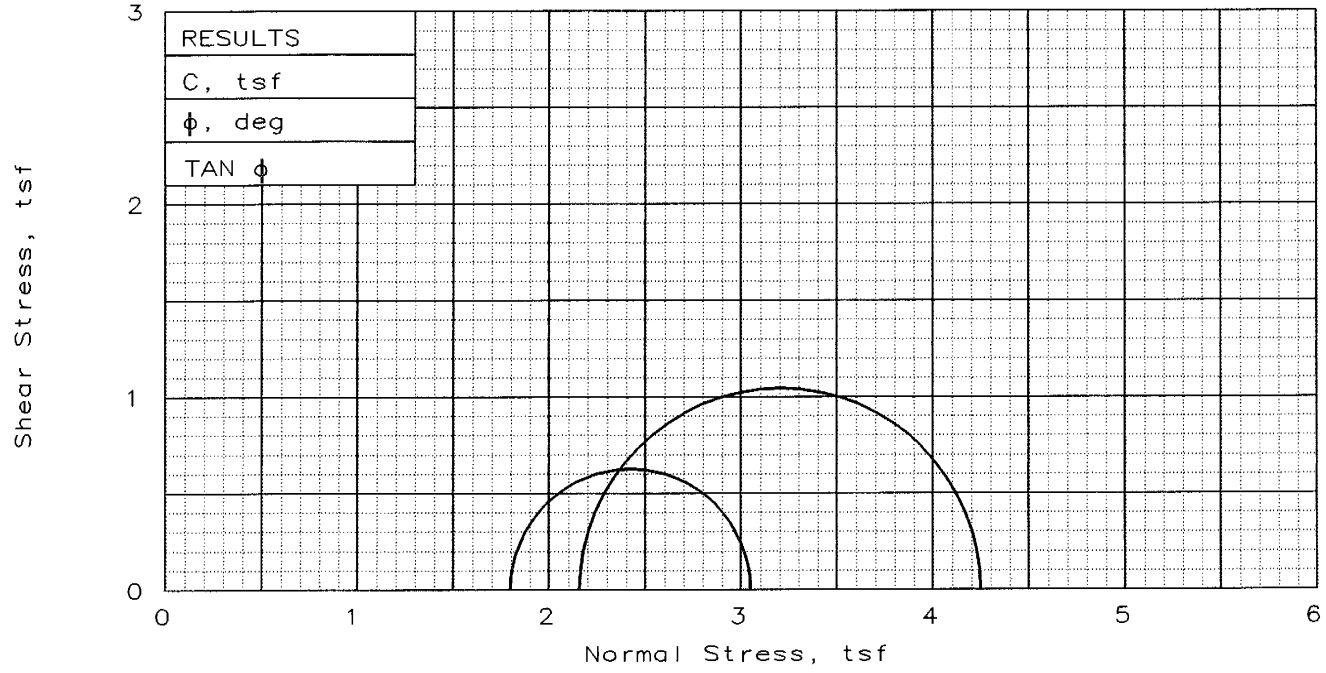
PROJECT: Cheyenne Ave, Las Vegas

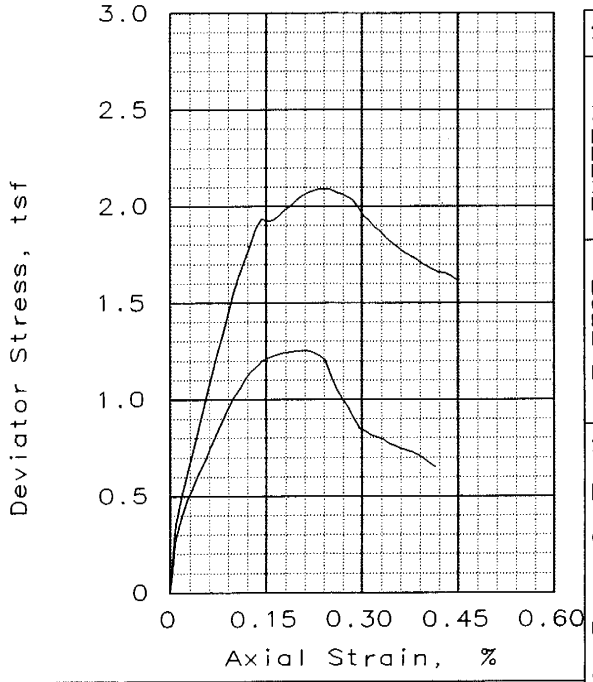
SAMPLE LOCATION: Boring LVW-1
Station "EM" 63+11.9 19.8m Right

PROJ. NO.: 72031 DATE: 6/4/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	29.0	30.6
	DRY DENSITY, pcf	92.7	91.2
	SATURATION, %	95.7	95.3
	VOID RATIO	0.819	0.883
	DIAMETER, in	2.88	2.88
	HEIGHT, in	5.56	5.60
AT TEST	WATER CONTENT, %	0.0	0.0
	DRY DENSITY, pcf	92.7	91.2
	SATURATION, %	0.0	0.0
	VOID RATIO	0.819	0.883
	DIAMETER, in	2.88	2.88
	HEIGHT, in	5.56	5.60
Strain rate, in/min		0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00
CELL PRESSURE, tsf		1.80	2.16
FAIL. STRESS, tsf		1.25	2.09
ULT. STRESS, tsf			
σ_1 FAILURE, tsf		3.05	4.25
σ_3 FAILURE, tsf		1.80	2.16

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay

LL= 38 PL= 18 PI= 20
SPECIFIC GRAVITY= 2.7
REMARKS: Sample 1 = N-3
Sample 2 = N-5
N-5 LL=49, Pi=30

Page No.: 1

CLIENT: M Salazar

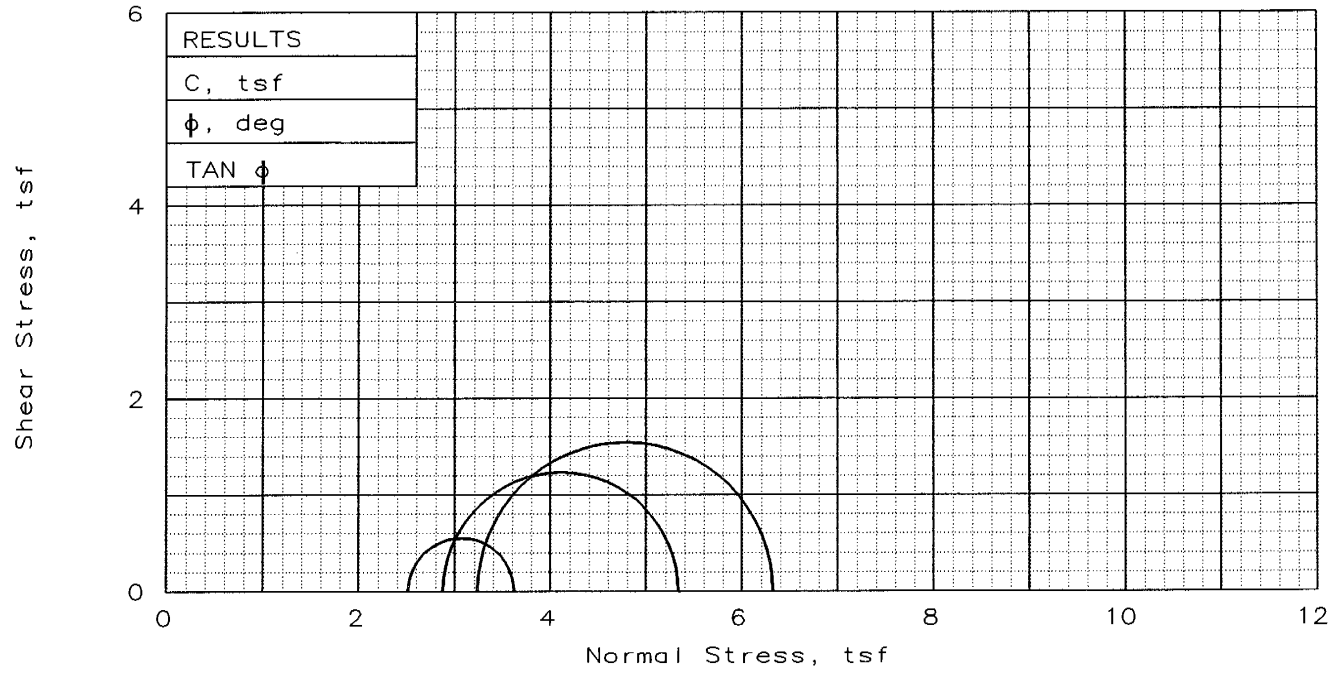
PROJECT: Cheyenne Ave, Las Vegas

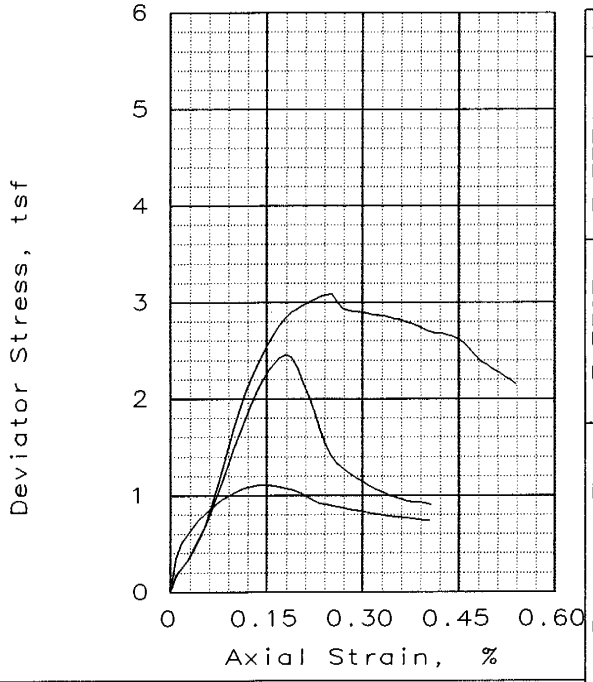
SAMPLE LOCATION: Boring LVW-1
Station "EM" 63+11.9 19.8m Right

PROJ. NO.: 72031 DATE: 6/4/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	26.8	20.0	22.2
	DRY DENSITY, pcf	96.9	108.6	104.6
	SATURATION, %	93.7	95.3	94.4
	VOID RATIO	0.797	0.575	0.648
	DIAMETER, in	2.88	2.88	2.88
	HEIGHT, in	5.57	5.55	5.57
AT TEST	WATER CONTENT, %	0.0	0.0	0.0
	DRY DENSITY, pcf	96.9	108.6	104.6
	SATURATION, %	0.0	0.0	0.0
	VOID RATIO	0.797	0.575	0.648
	DIAMETER, in	2.88	2.88	2.88
	HEIGHT, in	5.57	5.55	5.57
Strain rate, in/min		0.0154	0.0154	0.0154
BACK PRESSURE, tsf		0.00	0.00	0.00
CELL PRESSURE, tsf		2.52	2.88	3.24
FAIL. STRESS, tsf		1.10	2.46	3.09
ULT. STRESS, tsf				
σ_1 FAILURE, tsf		3.62	5.34	6.33
σ_3 FAILURE, tsf		2.52	2.88	3.24

TYPE OF TEST:
Unconsolidated Undrained
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Clay (CL)

LL= 28 PL= 18 PI= 10
SPECIFIC GRAVITY= 2.79
REMARKS: Sample 1 = O-1
Sample 2 = O-2
Sample 3 = O-3

Page No.: 1

CLIENT: M Salazar

PROJECT: Cheyenne Ave, Las Vegas

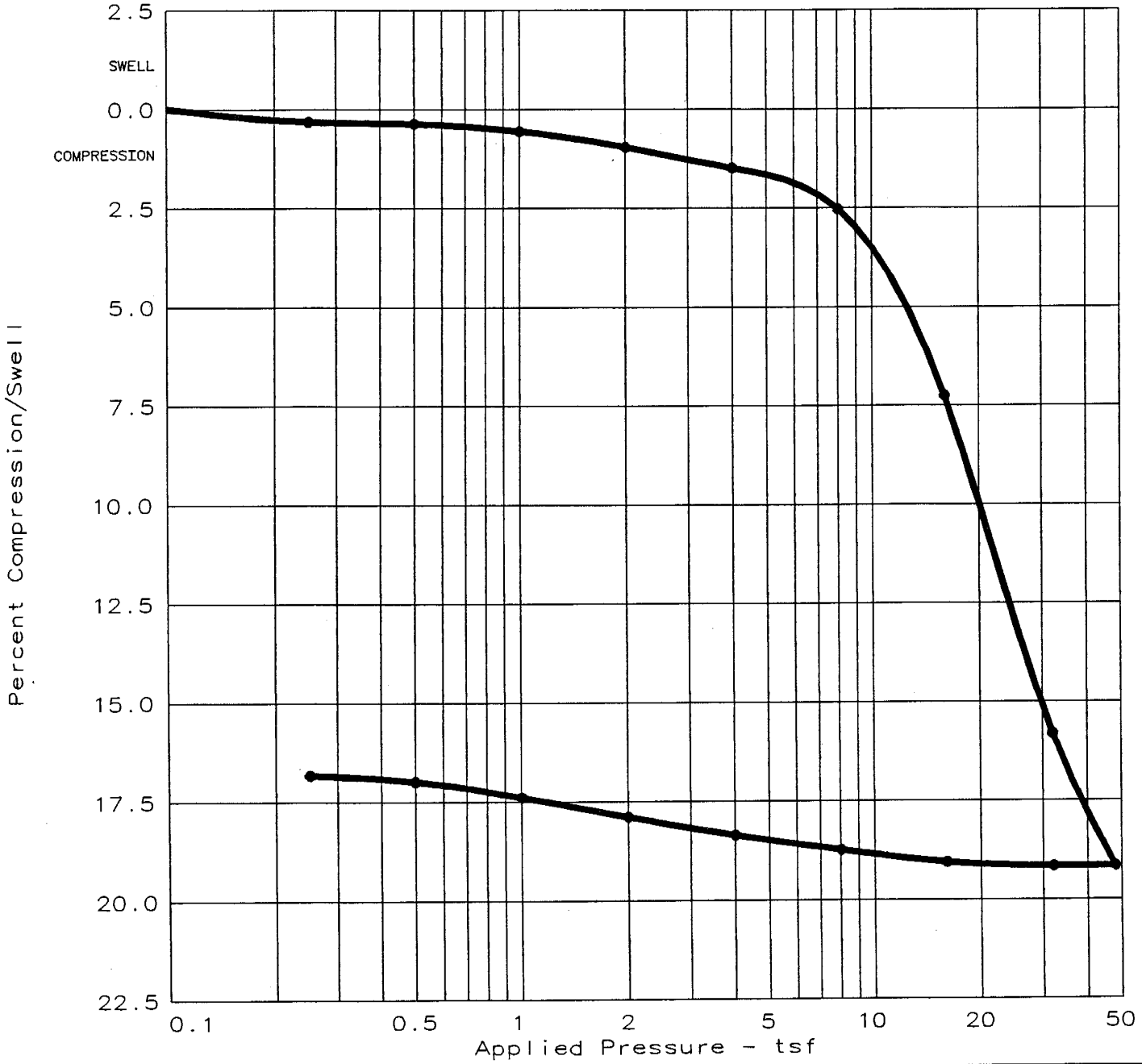
SAMPLE LOCATION: Boring LVW-1
Station "EM" 63+11.9 19.8m Right

PROJ. NO.: 72031 DATE: 6/4/96

TRIAXIAL SHEAR TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
82.6 %	26.8 %	90.5	----	----	2.740	0.8904

TEST RESULTS

MATERIAL DESCRIPTION

Hard to very stiff- light brown clay

Class: cl

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI2-M-2
"EM" 53+31 24.68m Rt
Date: 4/97

Remarks:

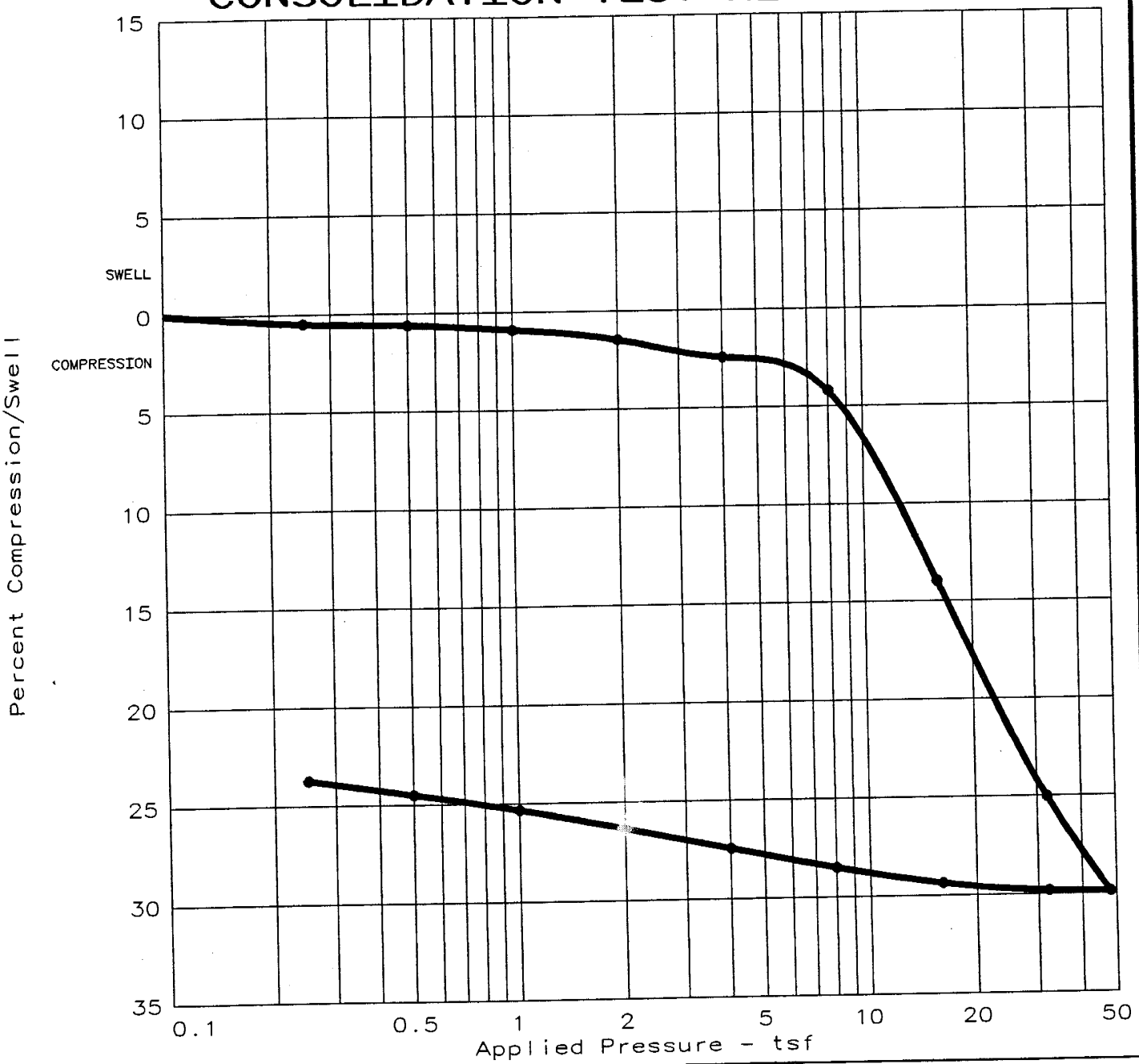
CI2-M-2
Depth of 64'

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
100.5 %	50.2 %	72.0	----	----	2.726	1.3631

TEST RESULTS

MATERIAL DESCRIPTION

Hard to very stiff-
light brown clay

Class: CL

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI2-M-3
"EM" 53+31 24.68m Rt
Date: 4/97

Remarks:

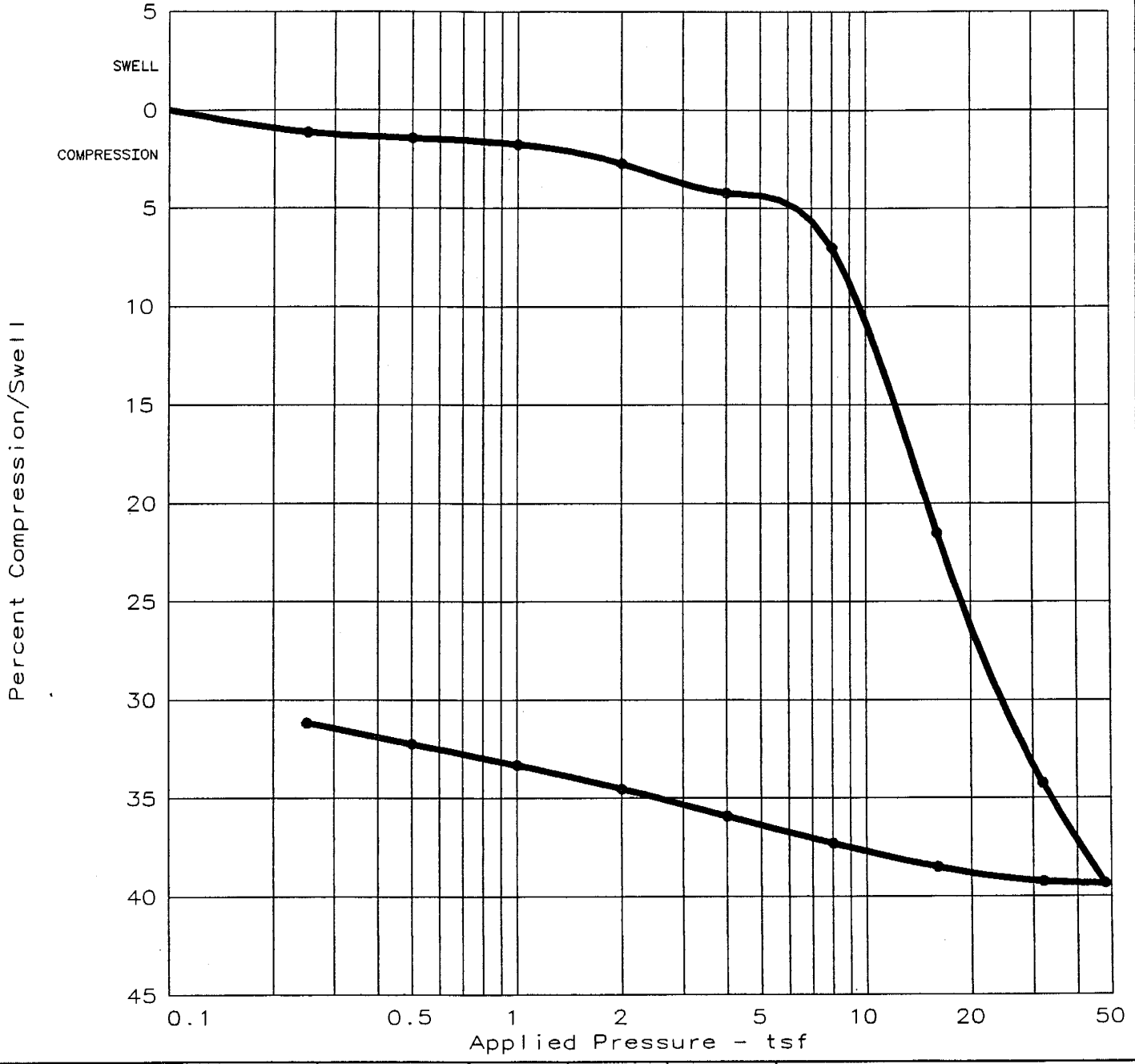
CI2-M-3
Depth of 64'

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
100.1 %	51.0 %	71.4	---	---	2.740	1.3953

TEST RESULTS

MATERIAL DESCRIPTION

Hard to very stiff-
light brown clay

Class: CL

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI2-M-5
"EM" 53+31 24.68m RT
Date: 4/96

Remarks:

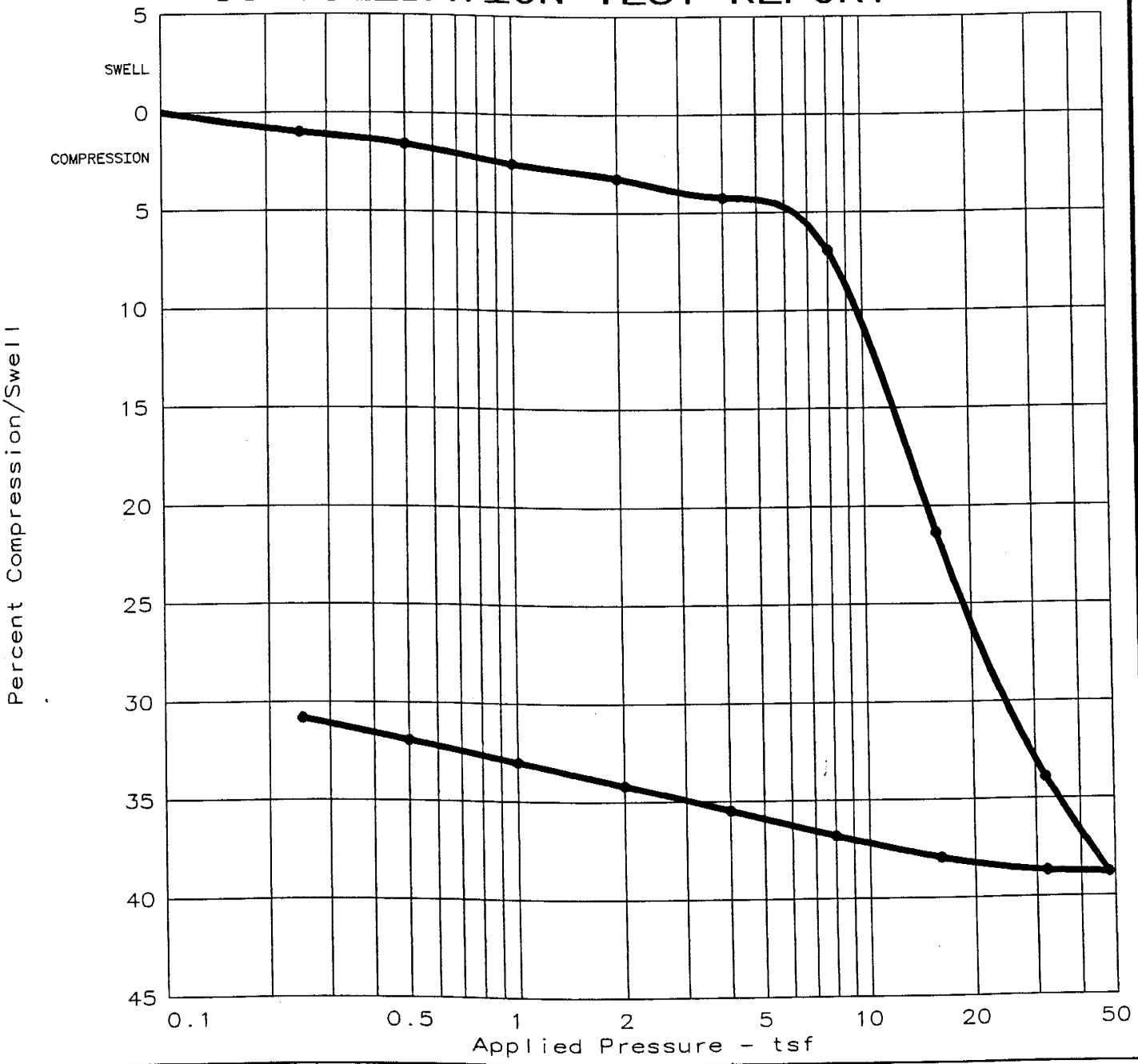
CI2-M-5
Depth of 64.1'

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
102.2 %	55.4 %	68.8	---	---	2.740	1.4850

TEST RESULTS

MATERIAL DESCRIPTION

Hard to very stiff light brown clay

Class: CL

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI2-M-6
"EM" 53+31 24.68m RT
Date: 4/96

Remarks:

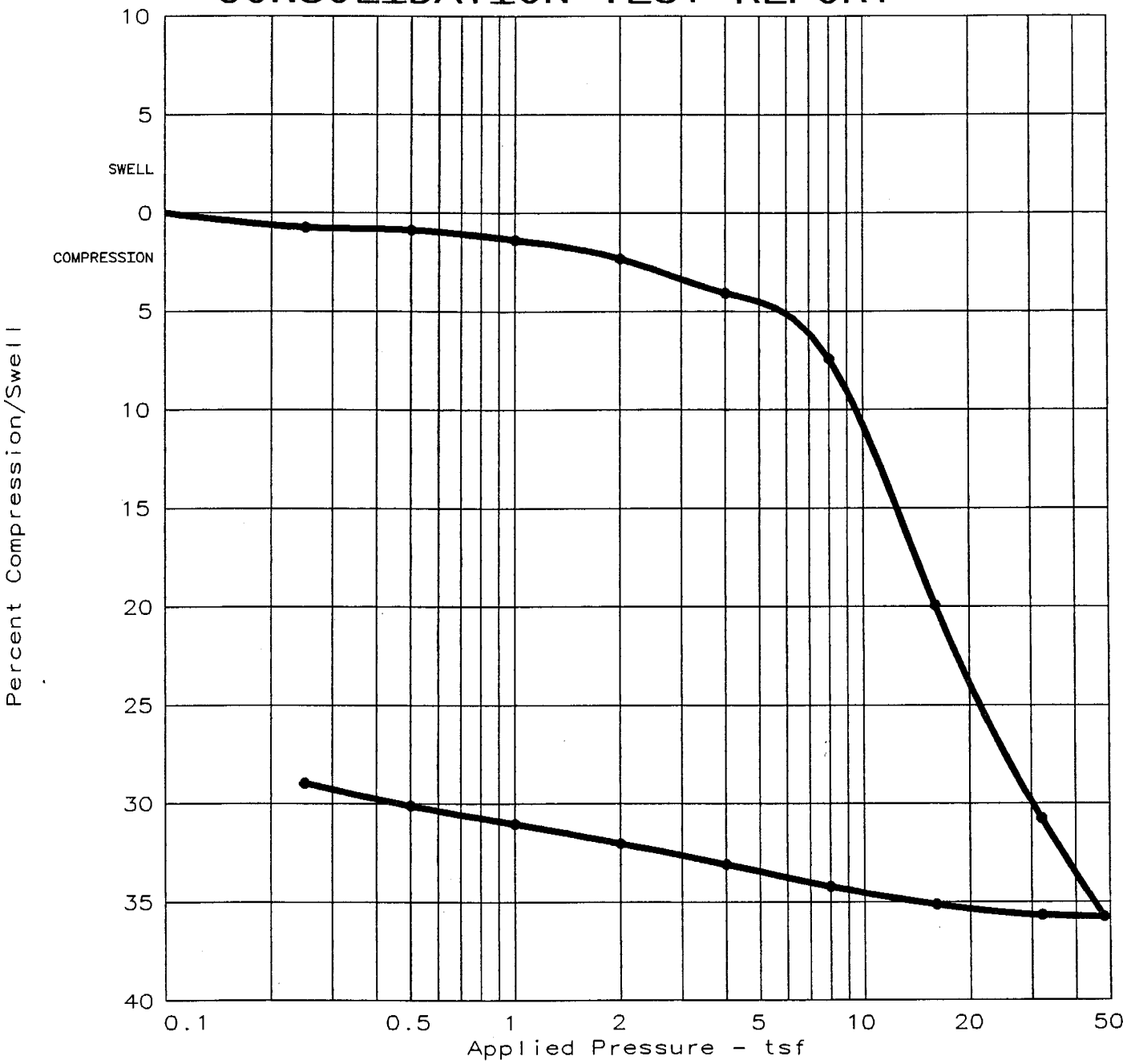
CI2-M-6
Depth of 64.2'

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
100.2 %	51.2 %	71.3	---	---	2.740	1.3998

TEST RESULTS

MATERIAL DESCRIPTION

Hard to very stiff light brown clay

Class: CL

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI2-M-7
"EM" 53+31 24.68m RT
Date: 4/96

Remarks:

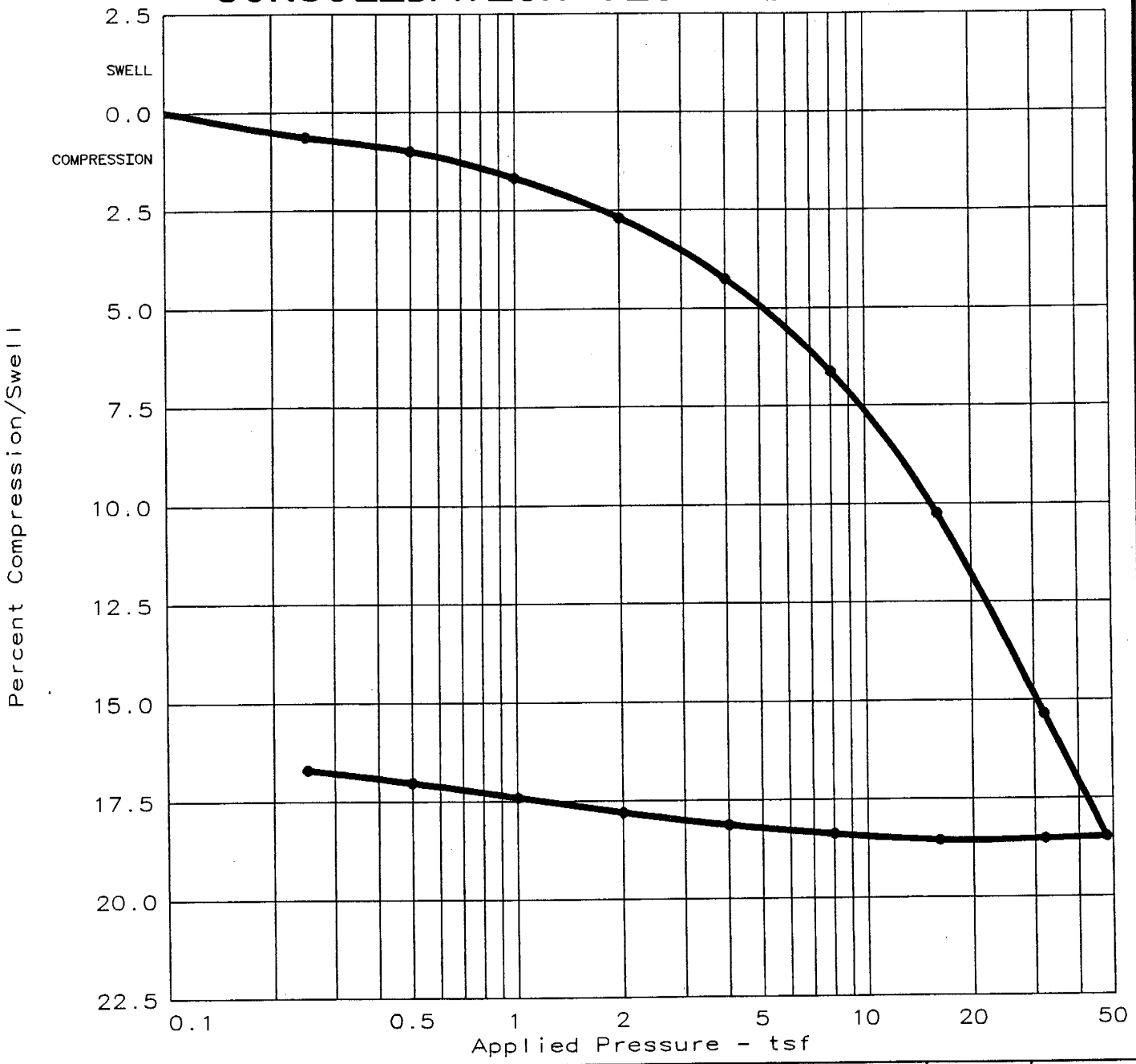
CI2-M-7
Depth of 64.3'

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
95.1 %	29.6 %	92.3	---	---	2.720	16.20	0.33	0.8470

TEST RESULTS

Compression Index = 0.33

MATERIAL DESCRIPTION

Hard to very hard-light brown fatty clay

Class: CH/CE

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI2-R-8
"EM" 53+31
Date: 5/96

Remarks:

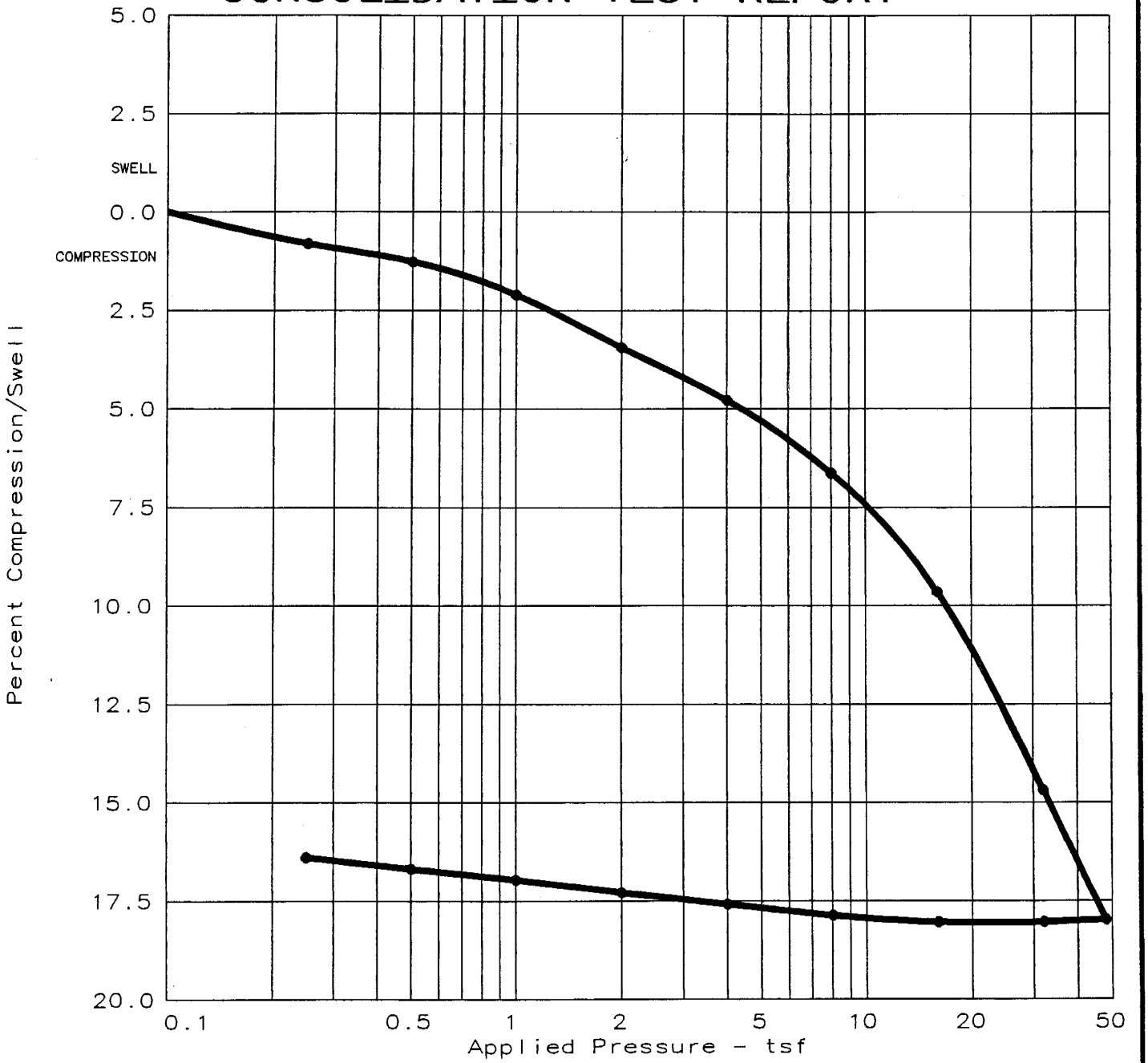
24.68m RT
Depth of 89.1'

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
95.3 %	29.5 %	92.2	---	---	2.720	17.32	0.35	0.8412

TEST RESULTS

Compression Index = 0.35

MATERIAL DESCRIPTION

Hard to very hard-light brown fatty clay

Class: CH/CE

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI2-R-9
"EM" 53+31 24.68m RT
Date: 5/96

Remarks:

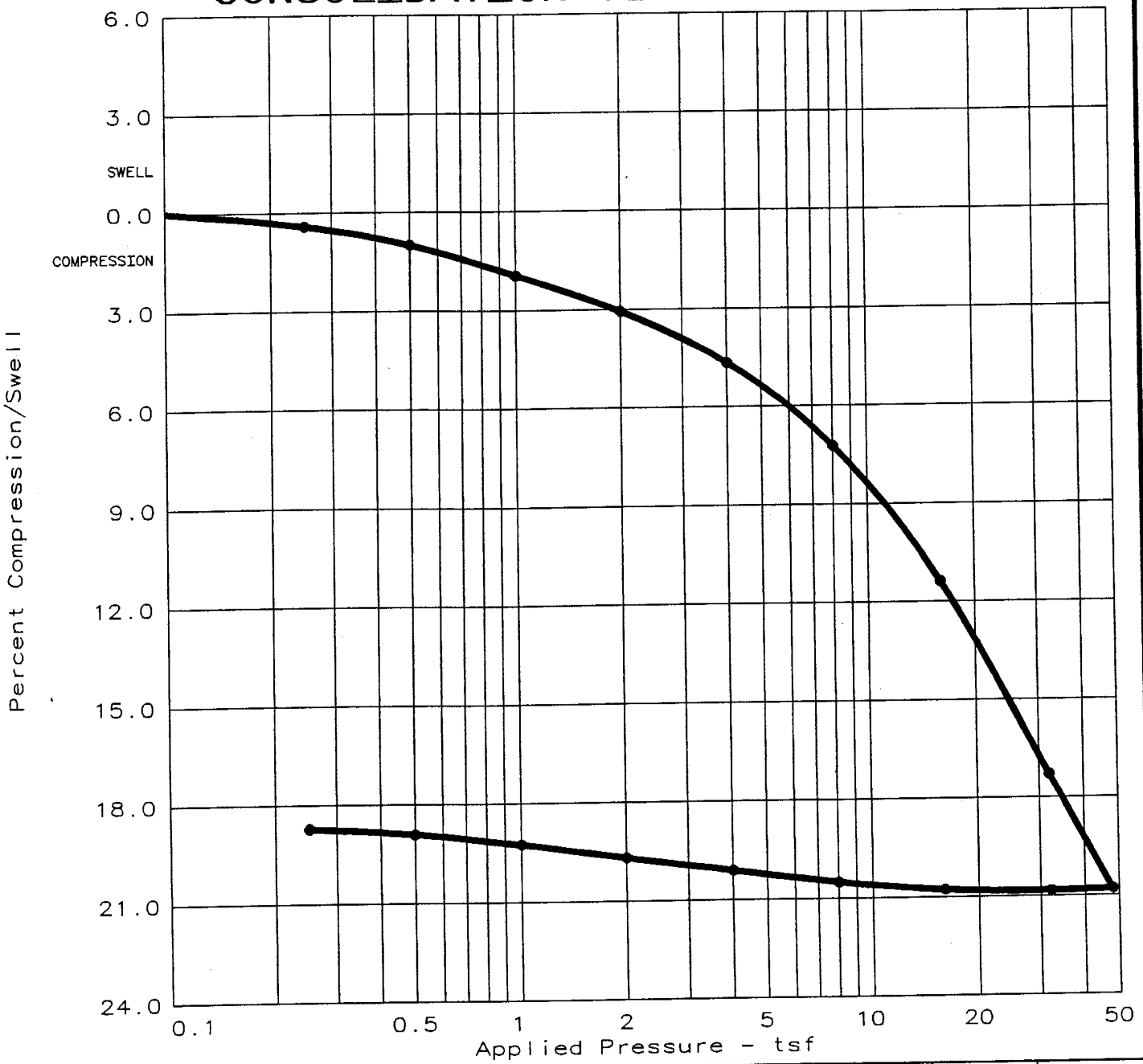
CI2-R-9
Depth of 89.2'

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
96.2 %	31.5 %	89.8	---	---	2.720	15.58	0.38	0.8903

TEST RESULTS

Compression Index = 0.38

MATERIAL DESCRIPTION

Hard to very hard-light brown fatty clay

Class: CH/CE

Project No.: 72031-1
Project: Cheyenne Ave Interchange
Location: CI2-R-10
"EM" 53+31 24.68m RT
Date: 5/96

Remarks:

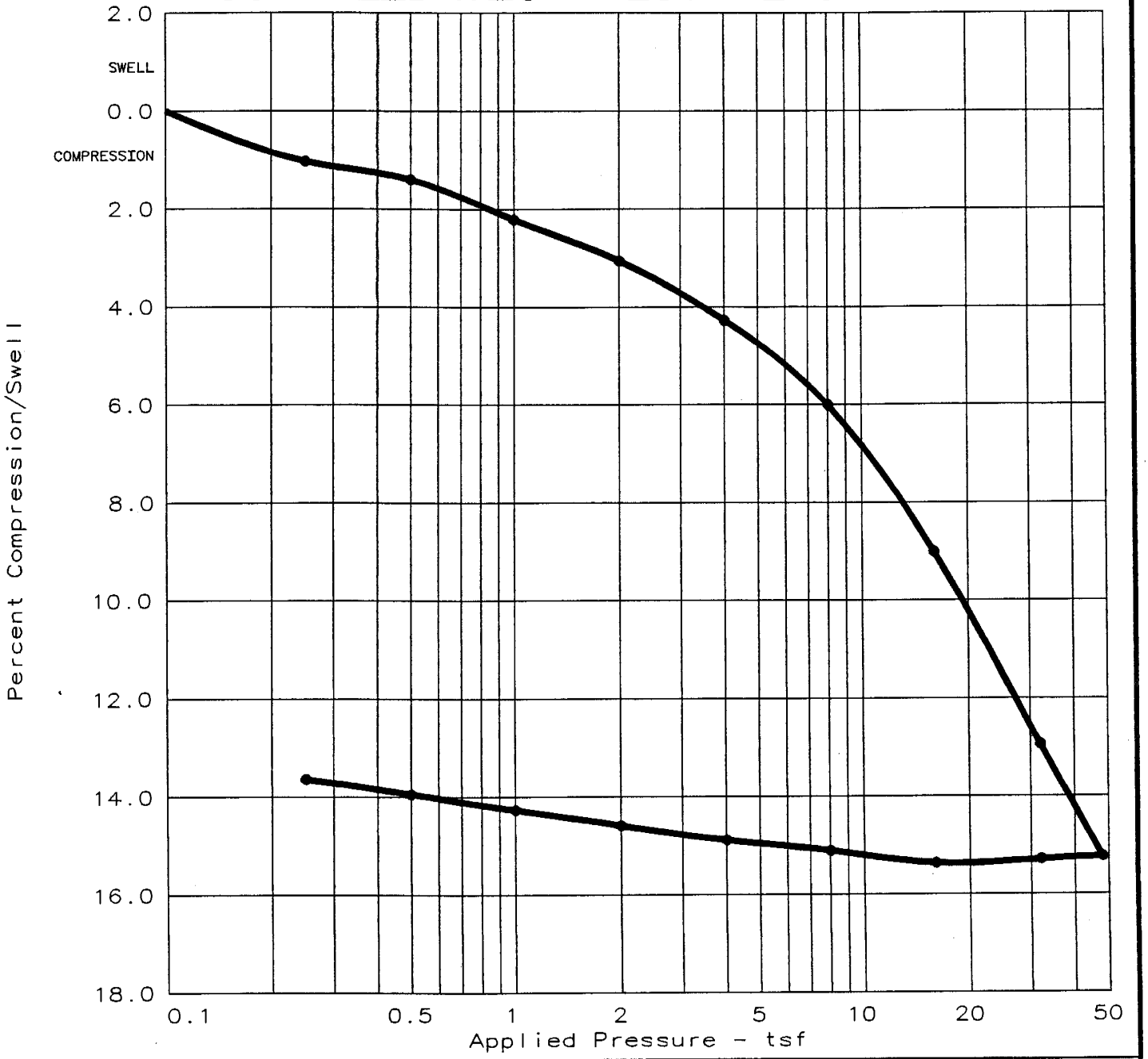
CI2-R-10
Depth of 89.3'

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
102.4 %	24.2 %	104.5	34	16	2.770	0.6549

TEST RESULTS

MATERIAL DESCRIPTION

Very stiff to hard light brown lean clay

Class: CL

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI-3J-6 "EM" 52+61.5
depth of 45.6'
Date: 7/96

Remarks:

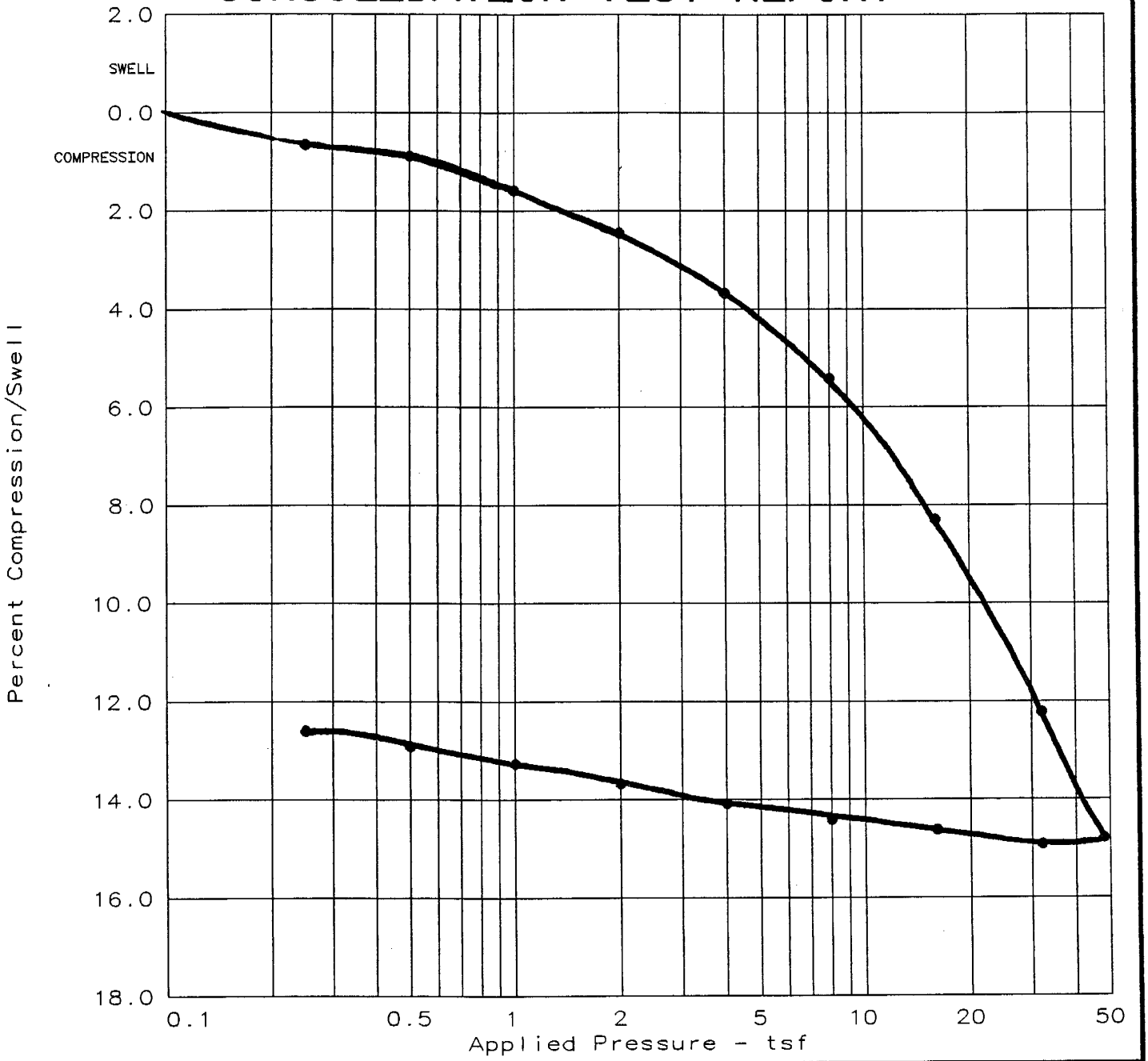
CI-3J-6
"EM" 52+61.5

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
97.6 %	26.7 %	98.4	34	16	2.770	0.7570

TEST RESULTS

MATERIAL DESCRIPTION

very stiff to hard, light brown lean clay

Class: CL

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI-3J-5 "EM" 52+61.5 107m lt
depth of 13.7m
Date: 7/25/96

Remarks:

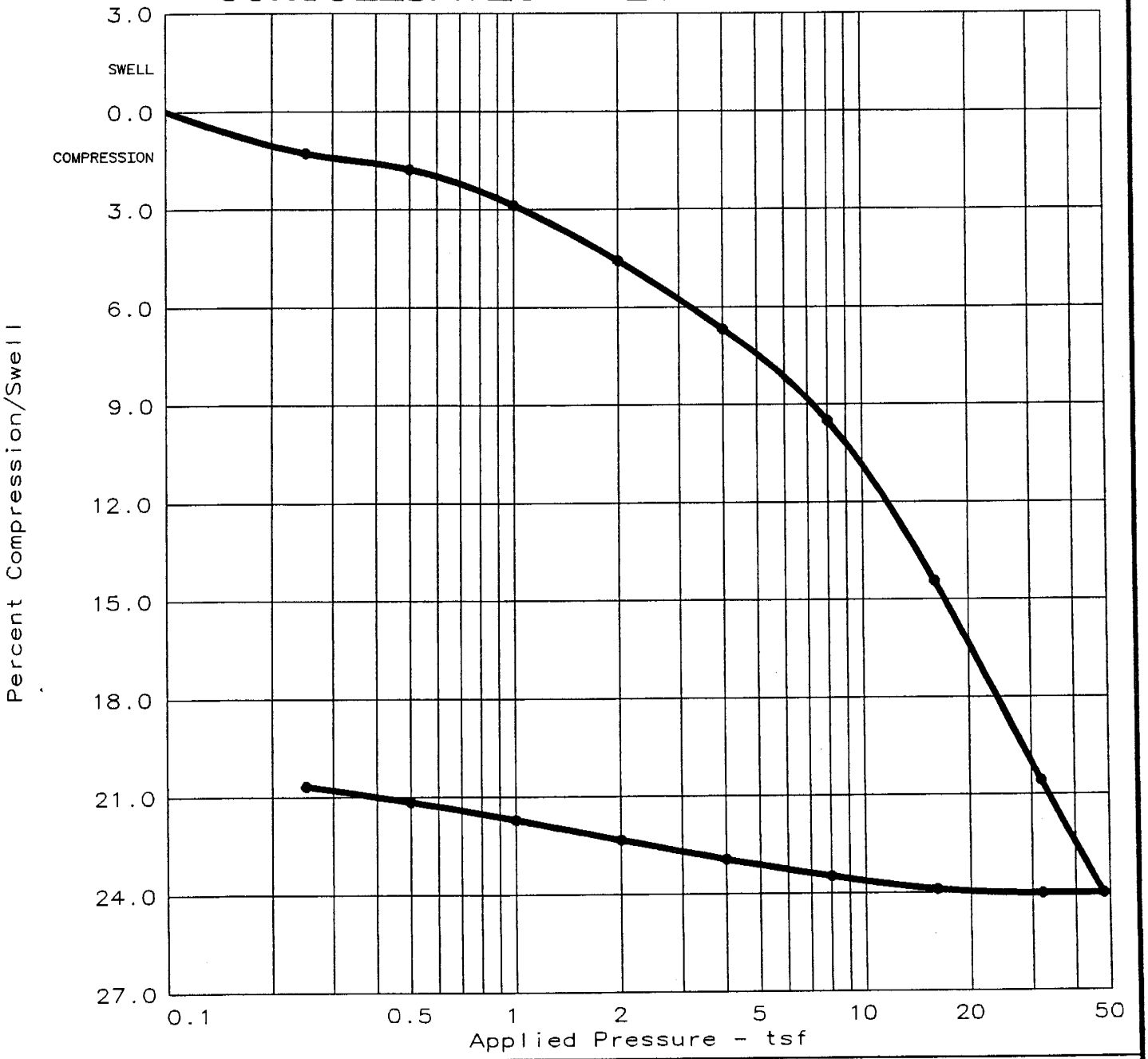
CI-3J-5
"EM" 52+61.5

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

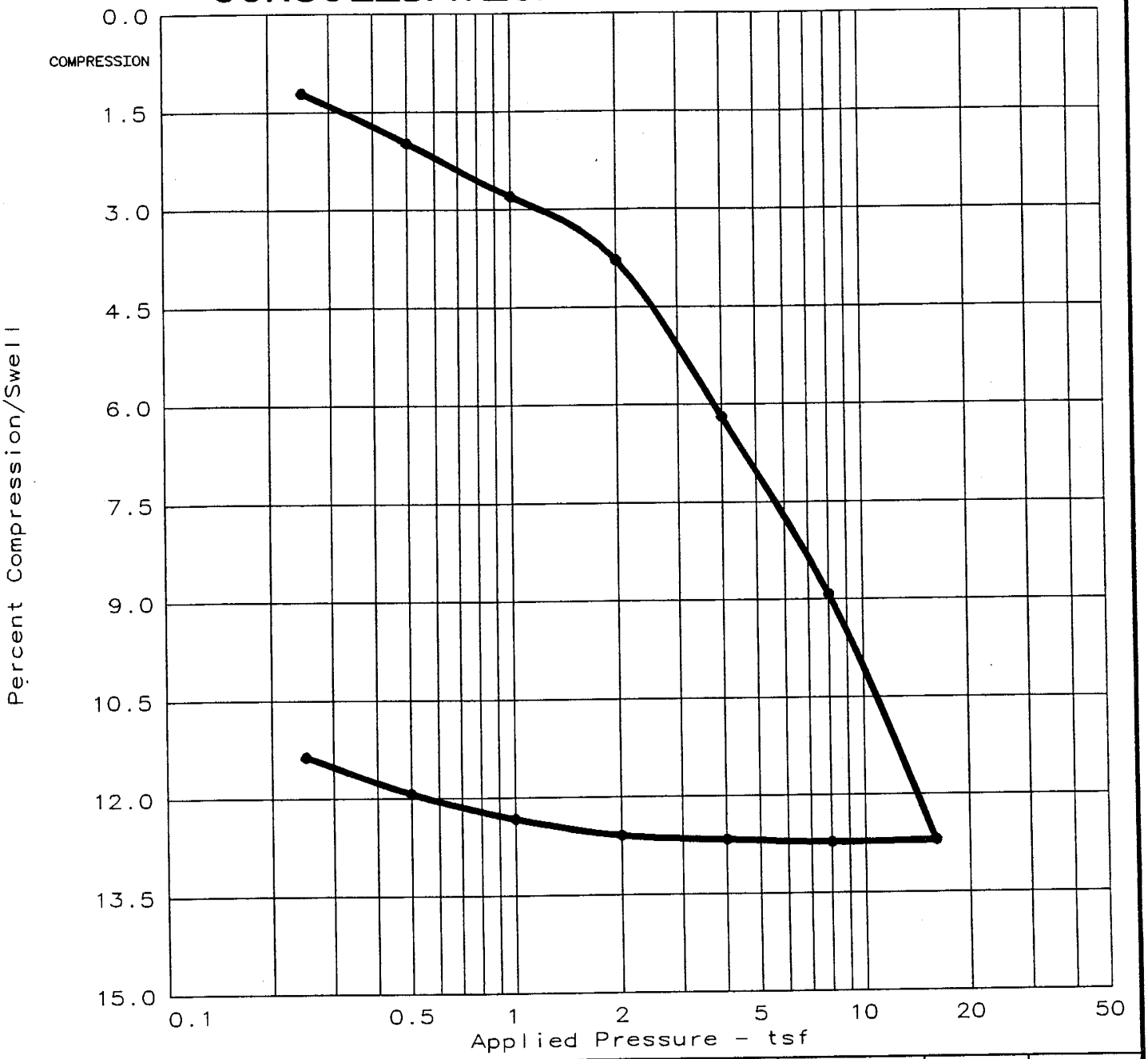
CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
85.7 %	34.7 %	86.7	51	35	2.710	1.0963

TEST RESULTS	MATERIAL DESCRIPTION
	Very stiff light brown clay Class: CL/CH
Project No.: 72031-1 Project: CHeyenne Avenue Interchange Location: CI-3K-2 "EM" 52+61.5 107m lt depth of 45.7' Date: 7/96	Remarks: CI-3K-2 "EM" 52+61.5
CONSOLIDATION TEST REPORT **NEVADA DEPARTMENT OF TRANSPORTATION**	Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
78.2 %	23.3 %	91.8	38	17	2.675	3.42	0.23	0.7979

TEST RESULTS

Compression Index = 0.23

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: CI5-D
Depth of 20.0'
Date: 5/96

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

MATERIAL DESCRIPTION

Reddish brown fat clay w/silt lenses

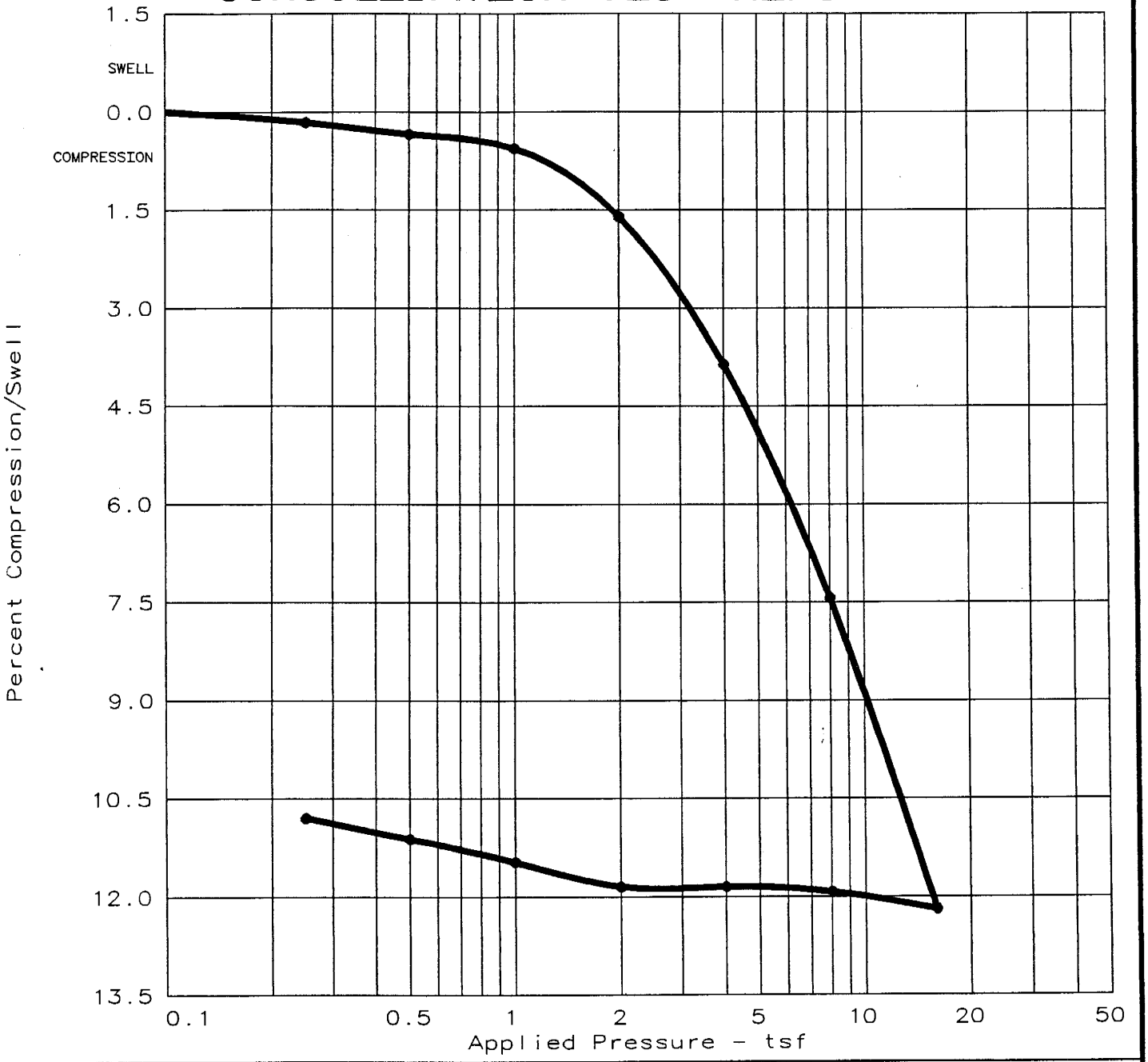
Class: CH

Remarks:

CI5-D

Fig. No. _____

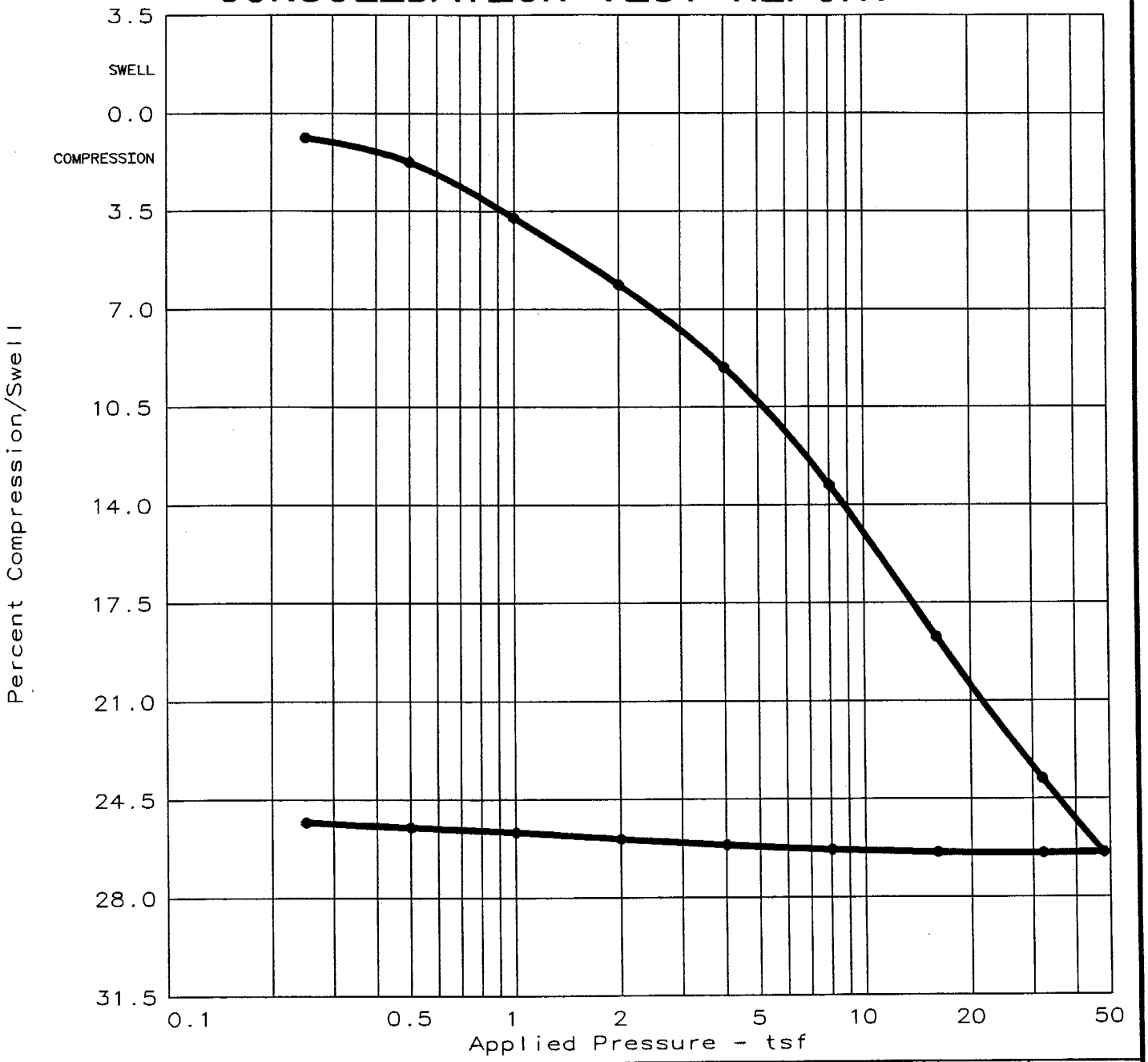
CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
58.4 %	10.3 %	111.5	45	29	2.613	0.4627

TEST RESULTS	MATERIAL DESCRIPTION
	Very plastic soft pink-brownish fat clay Class: CH
Project No.: 72031-1 Project: Cheyenne Avenue Interchange Location: CI6-D Station unkown depth of 20.0' Date: 7/96	Remarks: CI-6-d Station unknown
CONSOLIDATION TEST REPORT **NEVADA DEPARTMENT OF TRANSPORTATION**	Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
91.7 %	35.7 %	82.2	38	20	2.700	4.59	0.31	1.0507

TEST RESULTS

Compression Index = 0.31

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: LVW-1-N2

Date: 5/96

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

MATERIAL DESCRIPTION

Lean clay very stiff l/brown w/silty clay

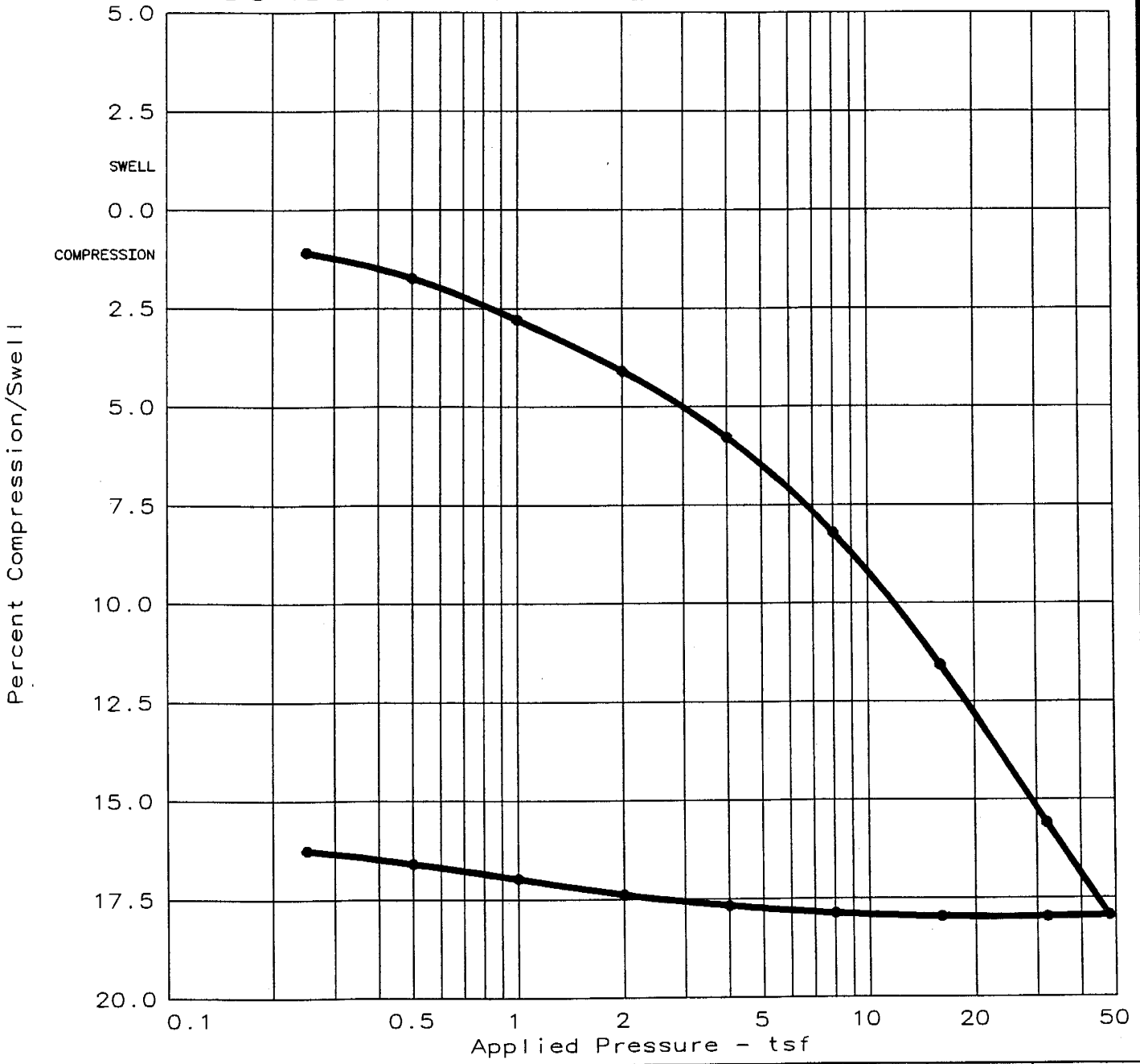
Class: CL

Remarks:

LVW-1-N2

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
96.4 %	27.3 %	95.6	38	20	2.700	9.97	0.24	0.7637

TEST RESULTS

Compression Index = 0.24

MATERIAL DESCRIPTION

Lean clay very stiff l/brown w/silty clay

Class: CL

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: LVW-1-N4

Date: 5/96

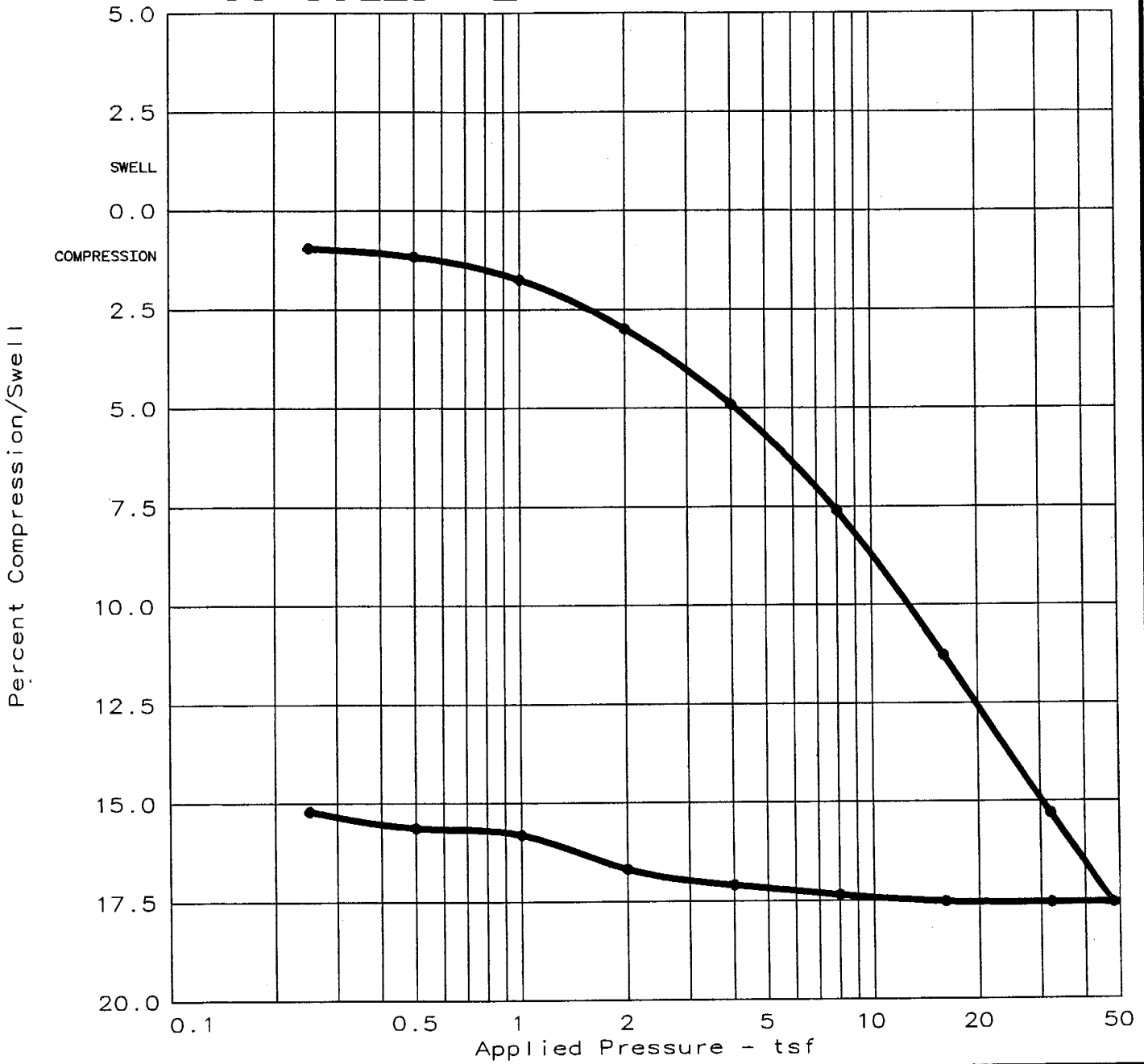
Remarks:
LVW-1-N4

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
101.1 %	30.1 %	94.3	49	30	2.750	7.82	0.23	0.8200

TEST RESULTS

Compression Index = 0.23

Project No.: 72031-1
Project: Cheyenne Avenue Interchange
Location: LVW-1-N6

Date: 5/96

CONSOLIDATION TEST REPORT

NEVADA DEPARTMENT OF TRANSPORTATION

MATERIAL DESCRIPTION

Lean clay very stiff l/brown w/silty clay

Class: CL

Remarks:

LVW-1-N6

Fig. No. _____

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -1
DATE	05/09/96	SAMPLE #	C

Particle Size Analysis
AASHTO T88

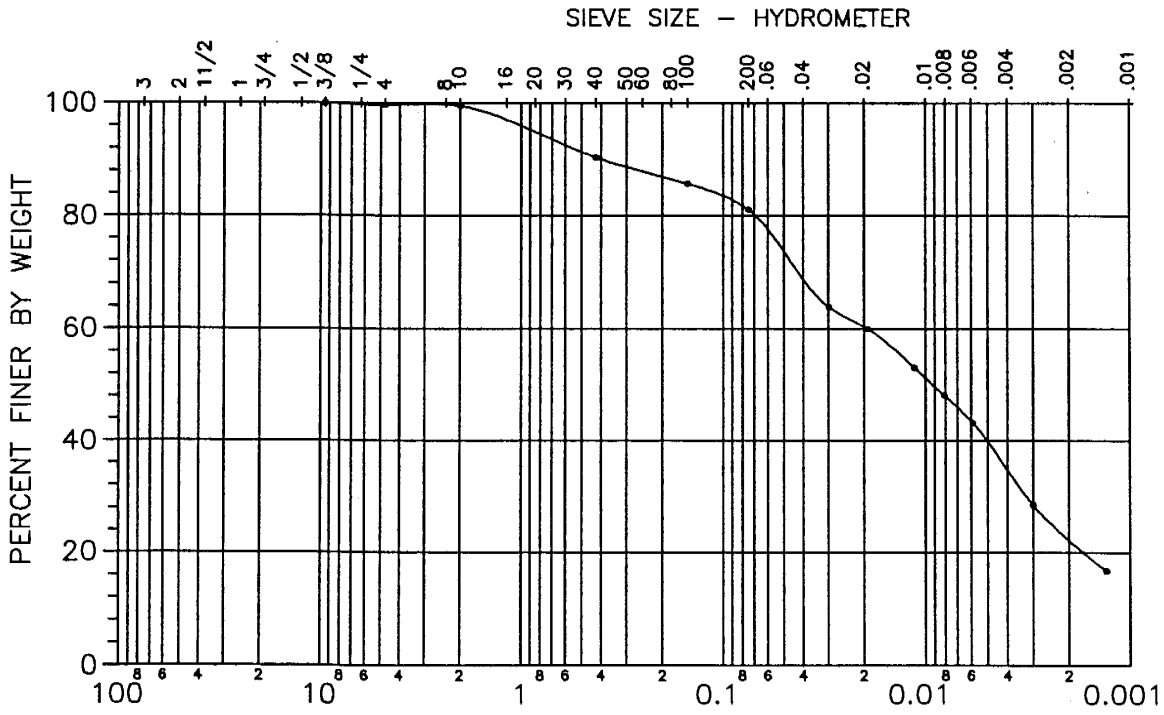
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**99.66**	**99.47**	**90.36**	**81.13** ✓	**2.75**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**60.40**	**22.20**	**13.20**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**19**	**59**	**22**	**41**	**23**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.131	**0.019**	**0.009**	**0.003**		



G R A D A T I O N C U R V E

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -1
DATE	05/09/96	SAMPLE #	D

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	100.00	99.11	88.23

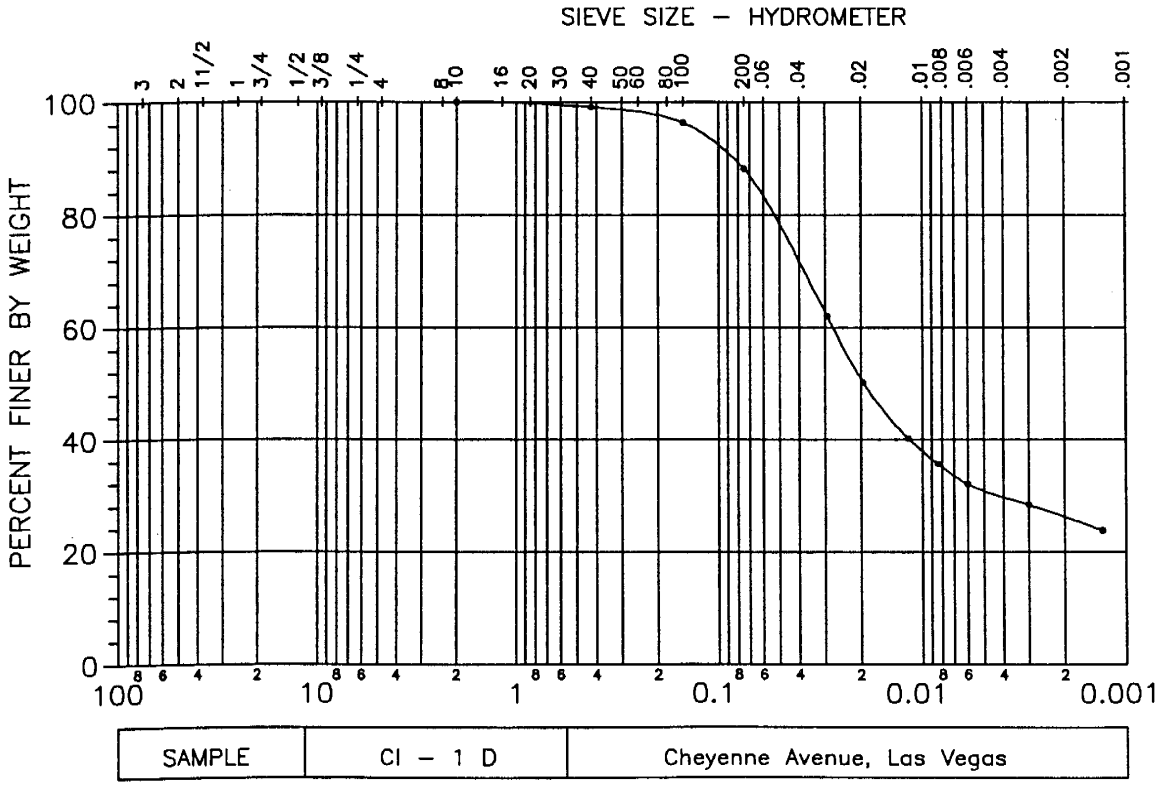
Gravity
2.75

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	50.80	26.20	22.30		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	12	62	26	53	35

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.064	0.028	0.019	0.004		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -1
DATE	05/09/96	SAMPLE #	E

Particle Size Analysis
AASHTO T88

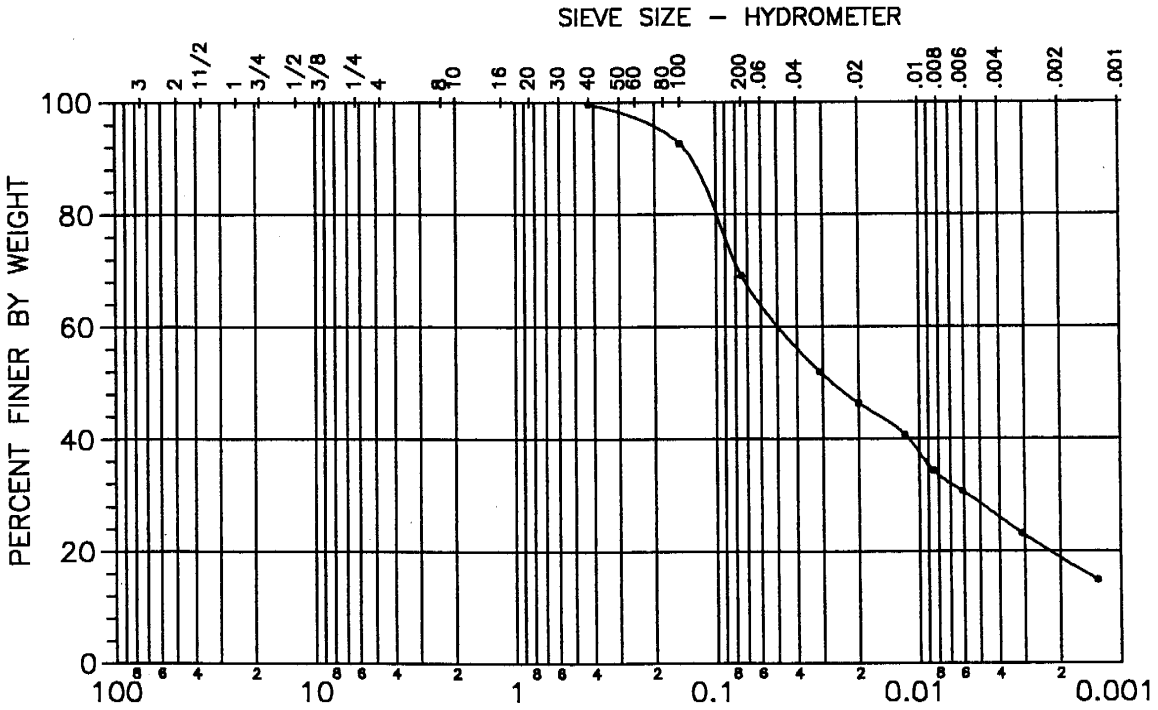
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)		Gravity
% Passing	**100.00**	**100.00**	**99.59**	**69.08**		**2.73**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**46.30**	**18.80**	**12.70**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**31**	**50**	**19**	**69**	**47**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.112	**0.050**	**0.027**	**0.006**	**0.0013**	



SAMPLE	CI – 1 E	Cheyenne Avenue, Las Vegas

G R A D A T I O N C U R V E

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -1
DATE	05/09/96	SAMPLE #	M

Particle Size Analysis
AASHTO T88

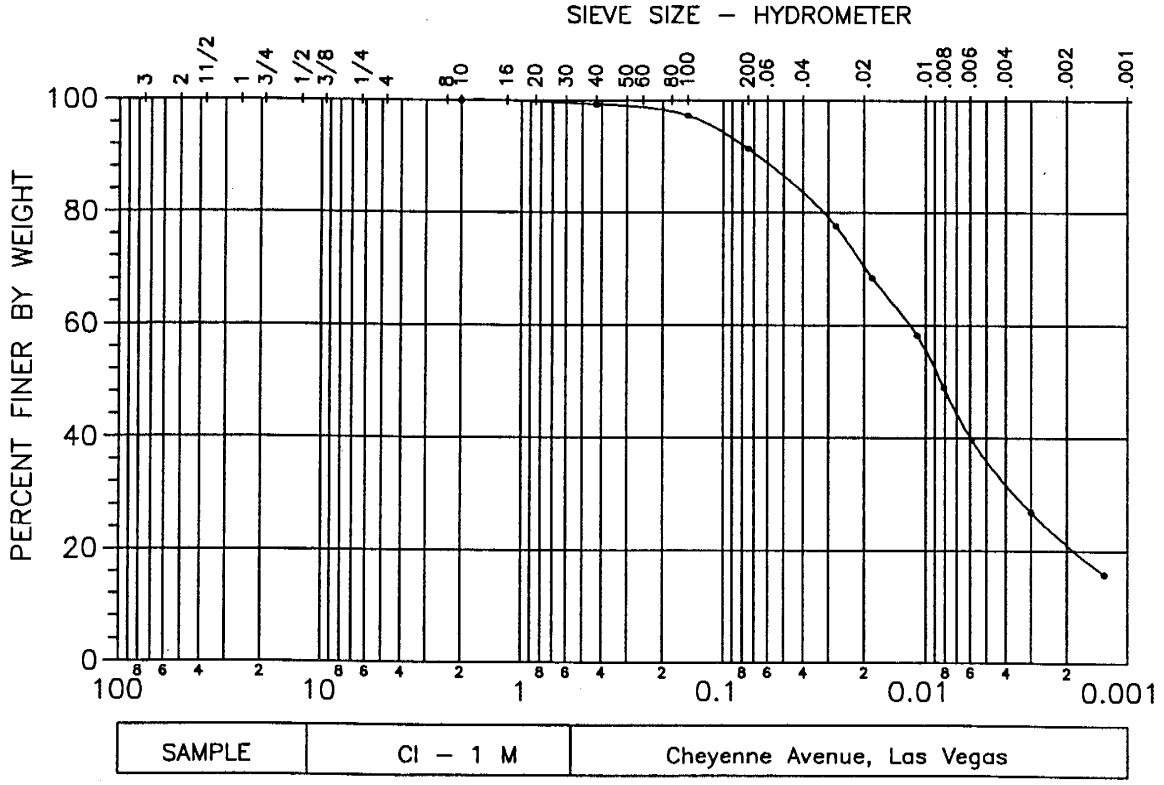
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**100.00**	**99.30**	**91.41**	**2.73**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**70.50**	**21.00**	**12.90**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**9**	**70**	**21**	**29**	**11**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.045	**0.012**	**0.008**	**0.004**		



G R A D A T I O N C U R V E

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -1
DATE	05/09/96	SAMPLE #	N

Particle Size Analysis
AASHTO T88

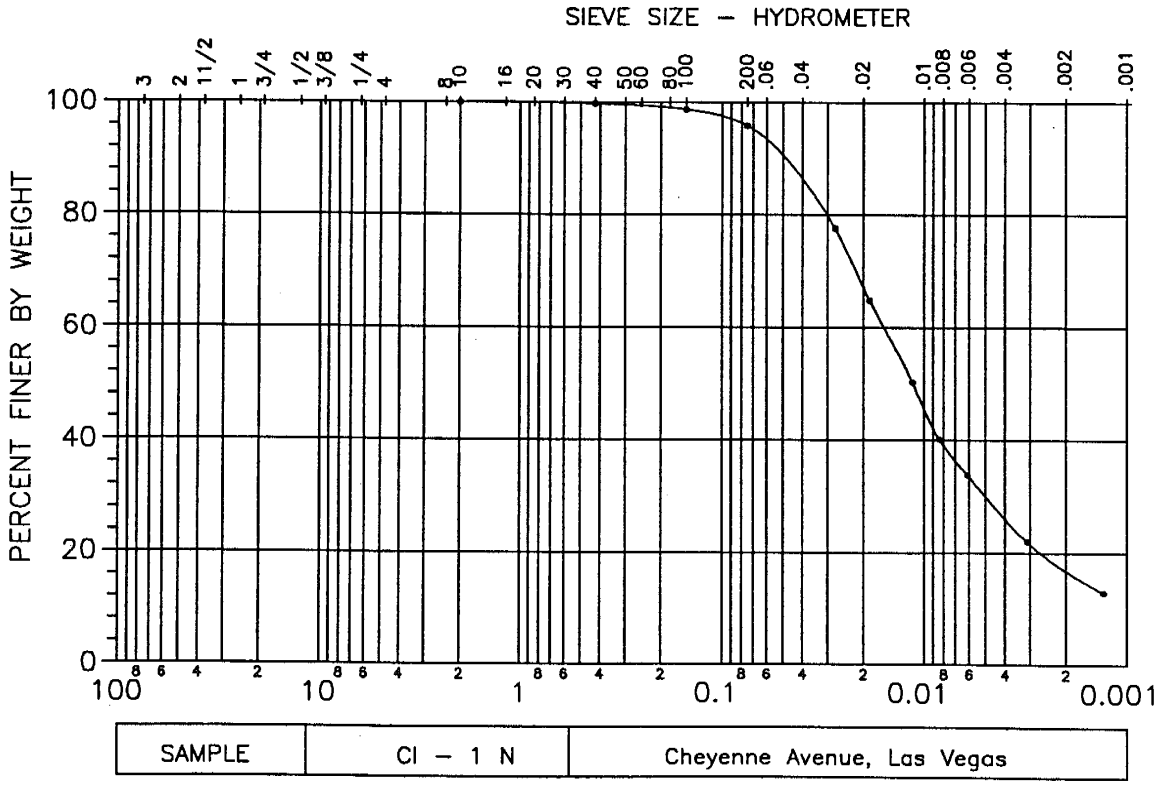
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**100.00**	**99.76**	**95.89**	**2.71**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**67.30**	**16.80**	**10.20**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**4**	**79**	**17**	**28**	**10**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.037	**0.016**	**0.011**	**0.005**	**0.0017**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -2
DATE	06/16/96	SAMPLE #	C

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	86.35	84.49	81.20	67.59

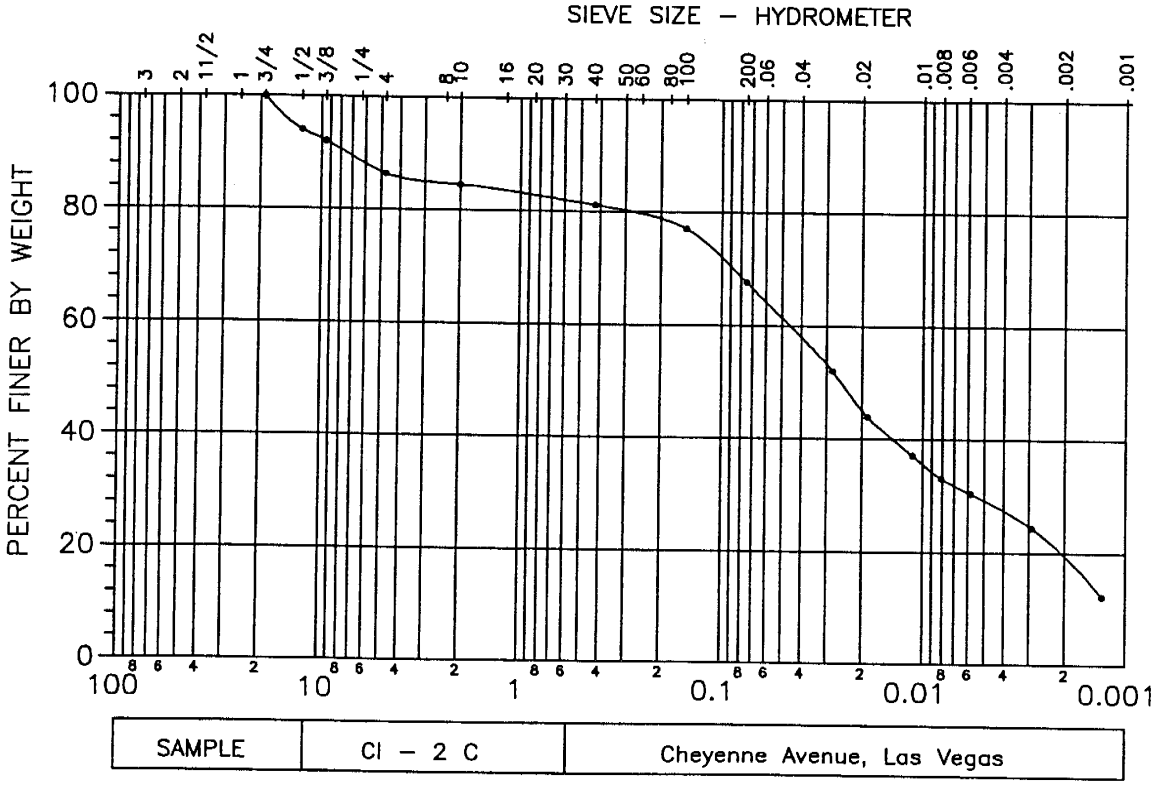
Gravity
2.77

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	45.20	19.60	9.50		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	14	19	48	20	64	46

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
3.000	0.045	0.025	0.006	0.0015	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -2
DATE	06/16/96	SAMPLE #	J

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**82.28**	**78.02**	**70.08**	**49.52**

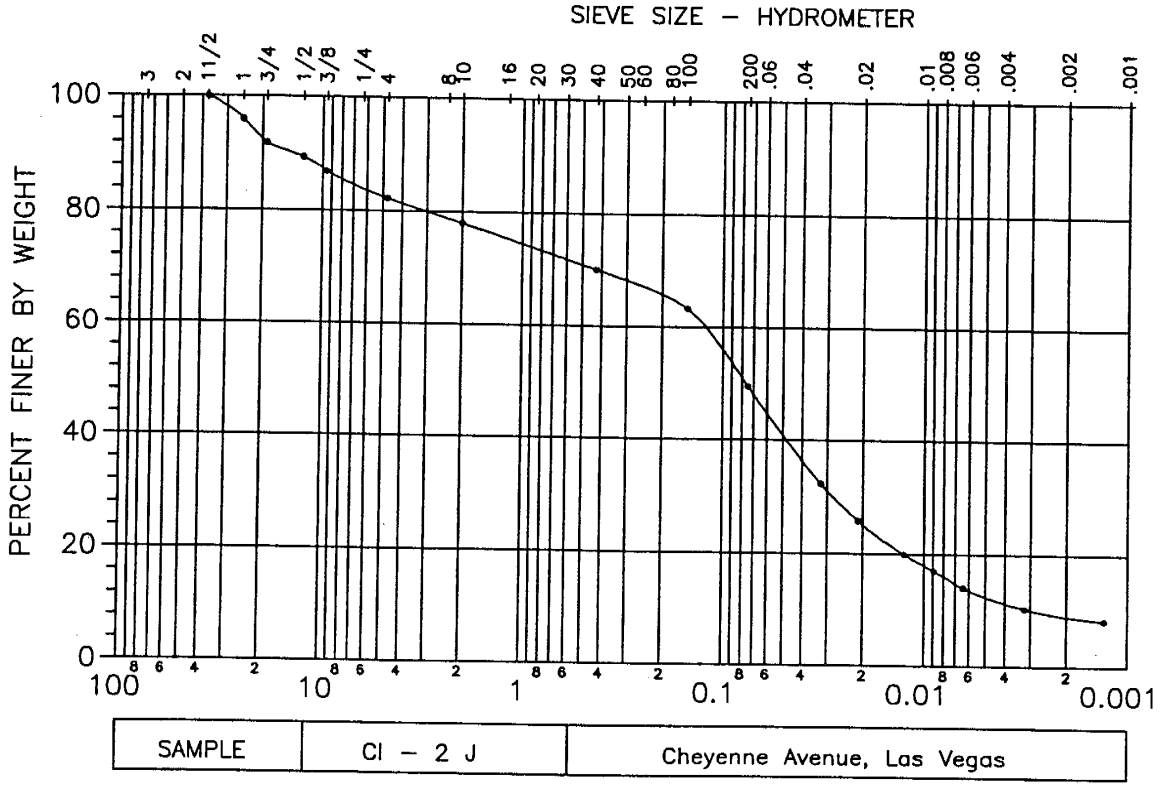
Gravity
2.73

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**25.15**	**9.00**	**8.00**		**43.15**	**2.24**

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**18**	**33**	**41**	**9**	**36**	**18**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
7.400	**0.123**	**0.077**	**0.028**	**0.0072**	**0.0029**



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -2
DATE	06/16/96	SAMPLE #	L - 2

Particle Size Analysis
AASHTO T88

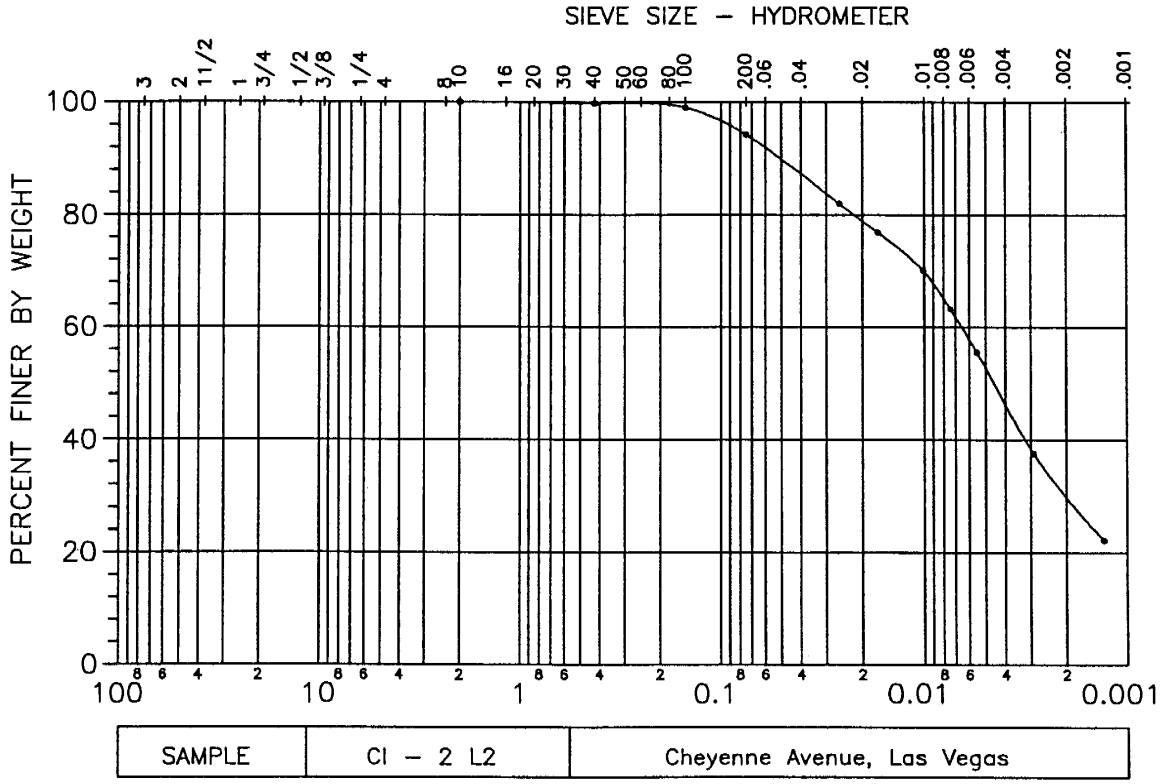
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**100.00**	**99.76**	**94.27**	**2.73**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**79.00**	**30.00**	**17.50**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**6**	**64**	**30**	**37**	**20**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.033	**0.007**	**0.005**	**0.002**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -2
DATE	06/16/96	SAMPLE #	M - 11

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**100.00**	**92.89**

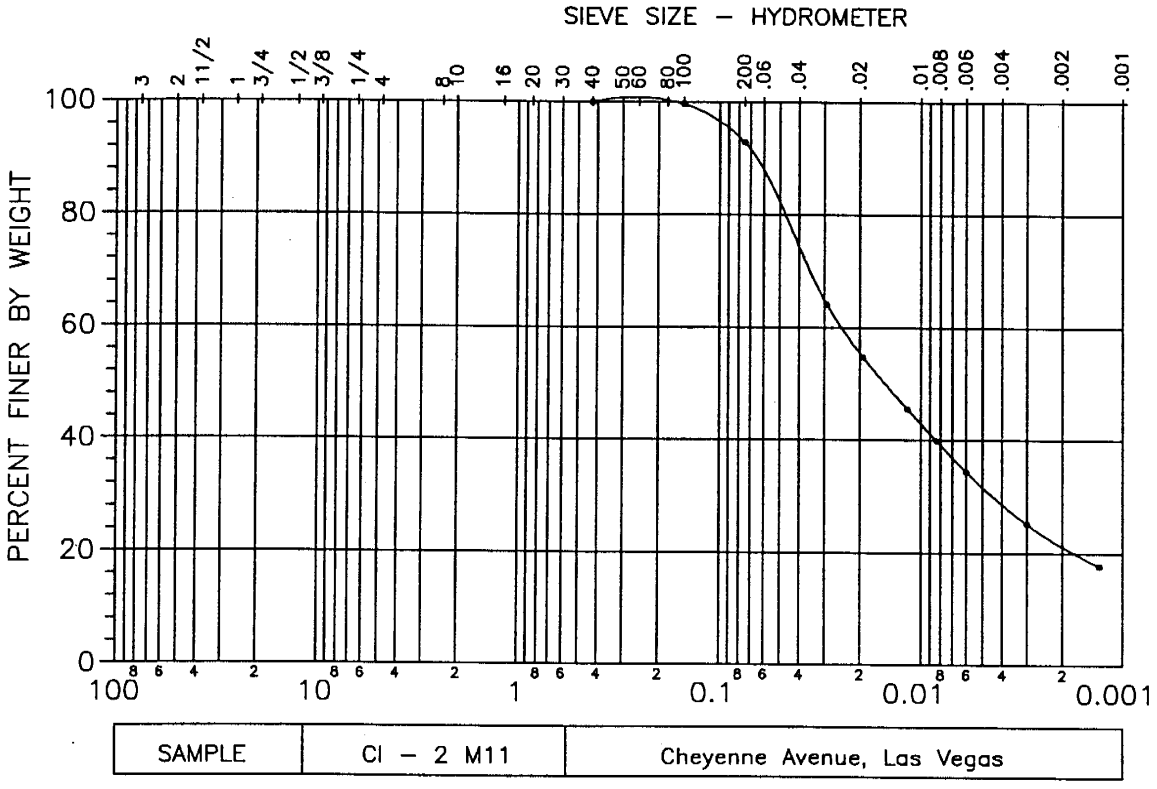
Gravity
2.74

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**55.50**	**21.10**	**15.50**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**7**	**72**	**21**	**36**	**19**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.054	**0.025**	**0.015**	**0.004**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -2
DATE	05/09/96	SAMPLE #	R-11

Particle Size Analysis
AASHTO T88

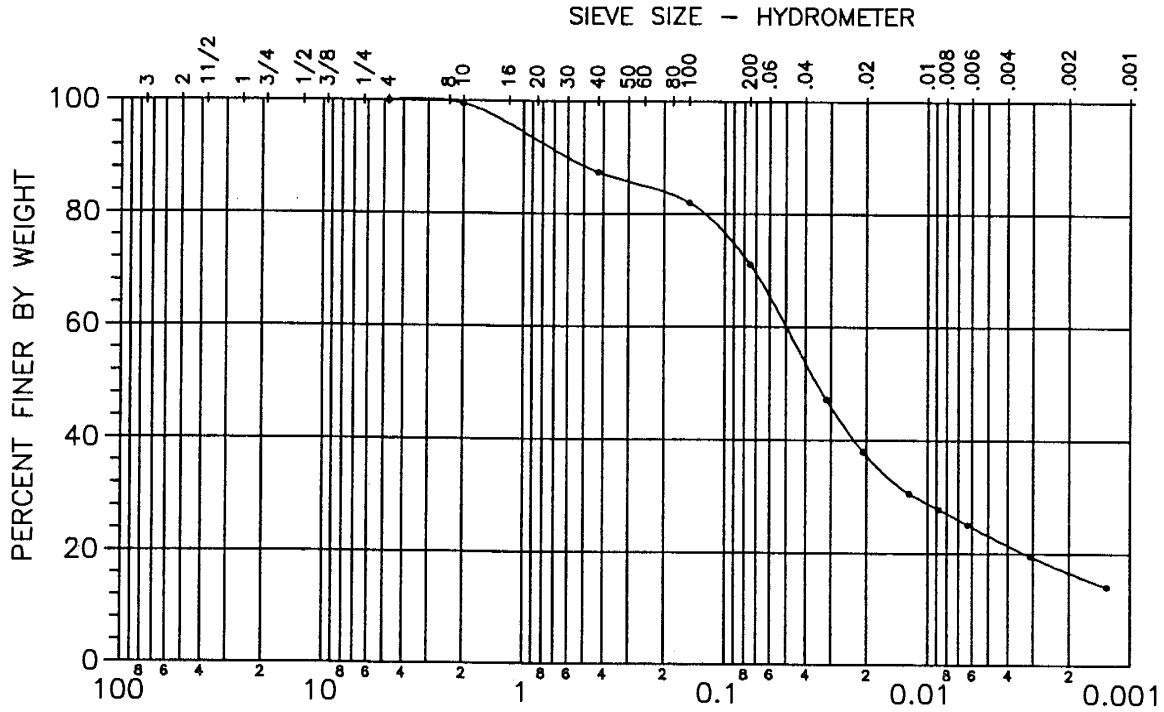
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**99.45**	**87.39**	**71.02**	**2.72**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**37.40**	**16.60**	**12.30**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**29**	**54**	**17**	**53**	**33**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.253	**0.050**	**0.035**	**0.012**	**0.0016**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -2
DATE	06/16/96	SAMPLE #	S

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**96.54**	**87.70**

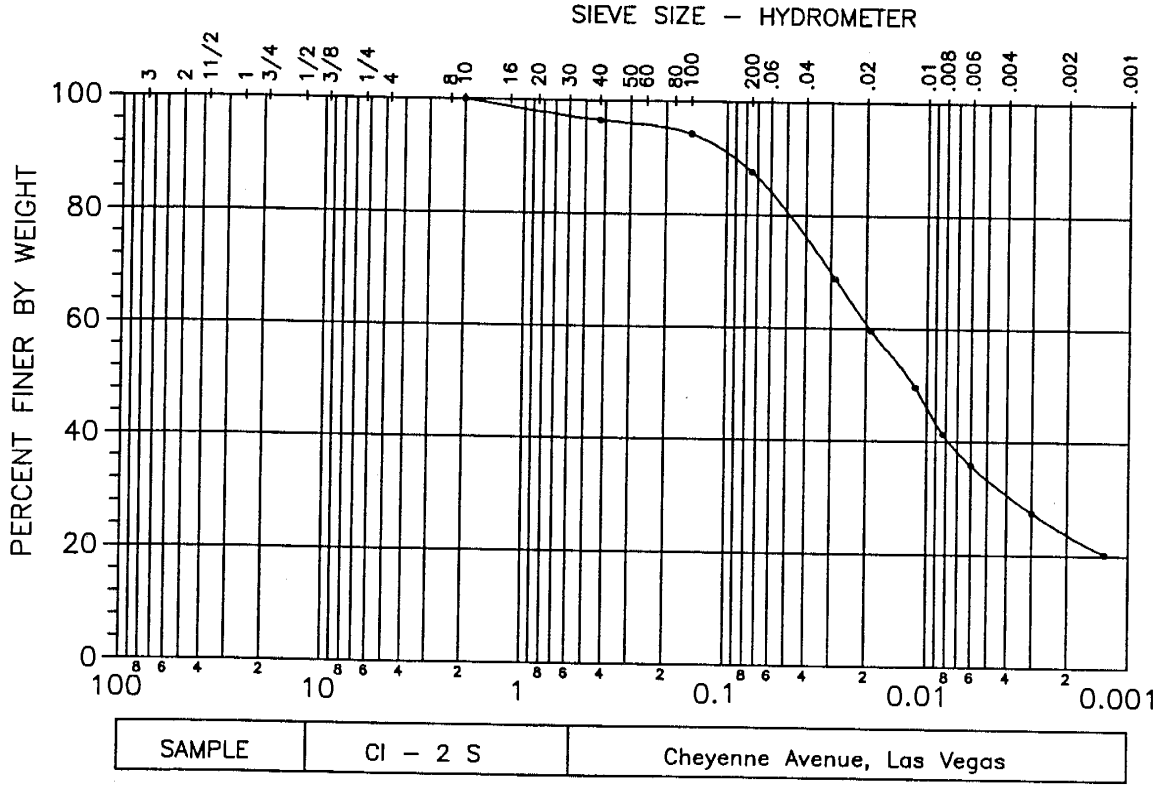
Gravity
2.73

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**60.80**	**23.70**	**18.50**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**12**	**64**	**24**	**40**	**22**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.063	**0.019**	**0.012**	**0.004**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue, Las Vegas	BORING	CI -2
DATE	06/16/96	SAMPLE #	V

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**98.26**	**93.06**

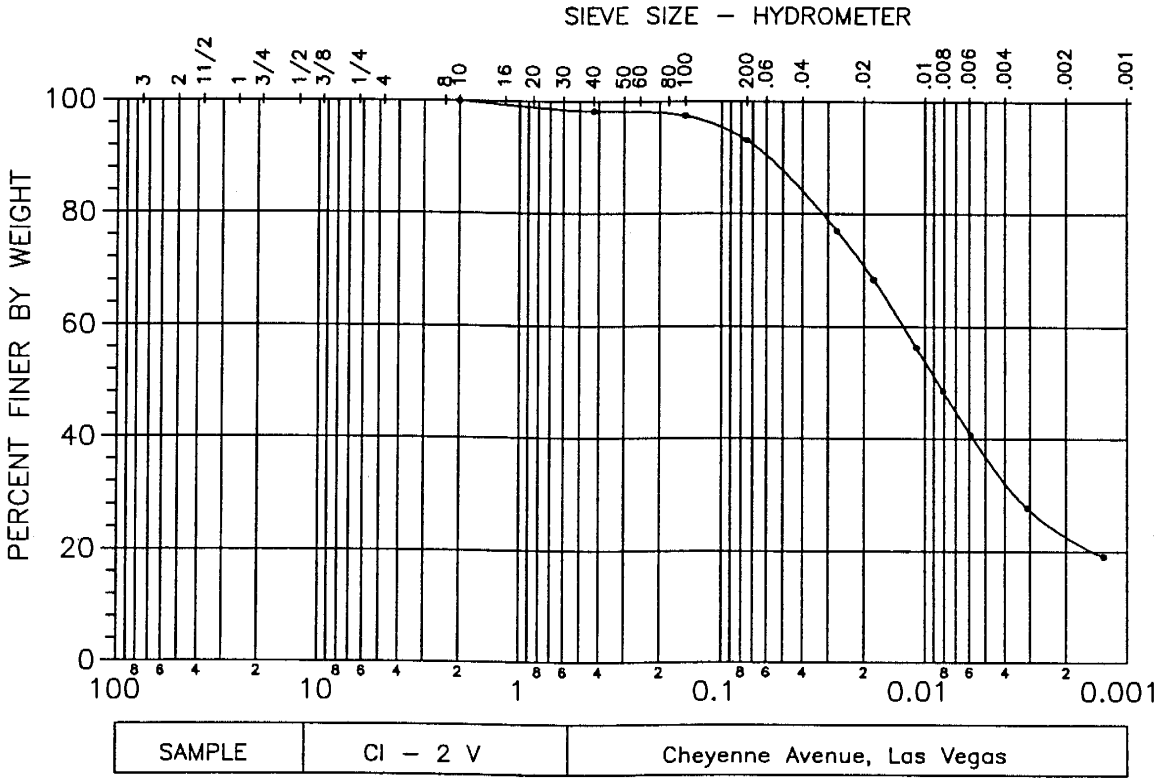
Gravity
2.69

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**70.80**	**22.60**	**17.10**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**7**	**70**	**23**	**34**	**17**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.042	**0.013**	**0.009**	**0.004**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Inter.	BORING	CI-3
DATE	07/22/96	SAMPLE #	g

Particle Size Analysis
AASHTO T88

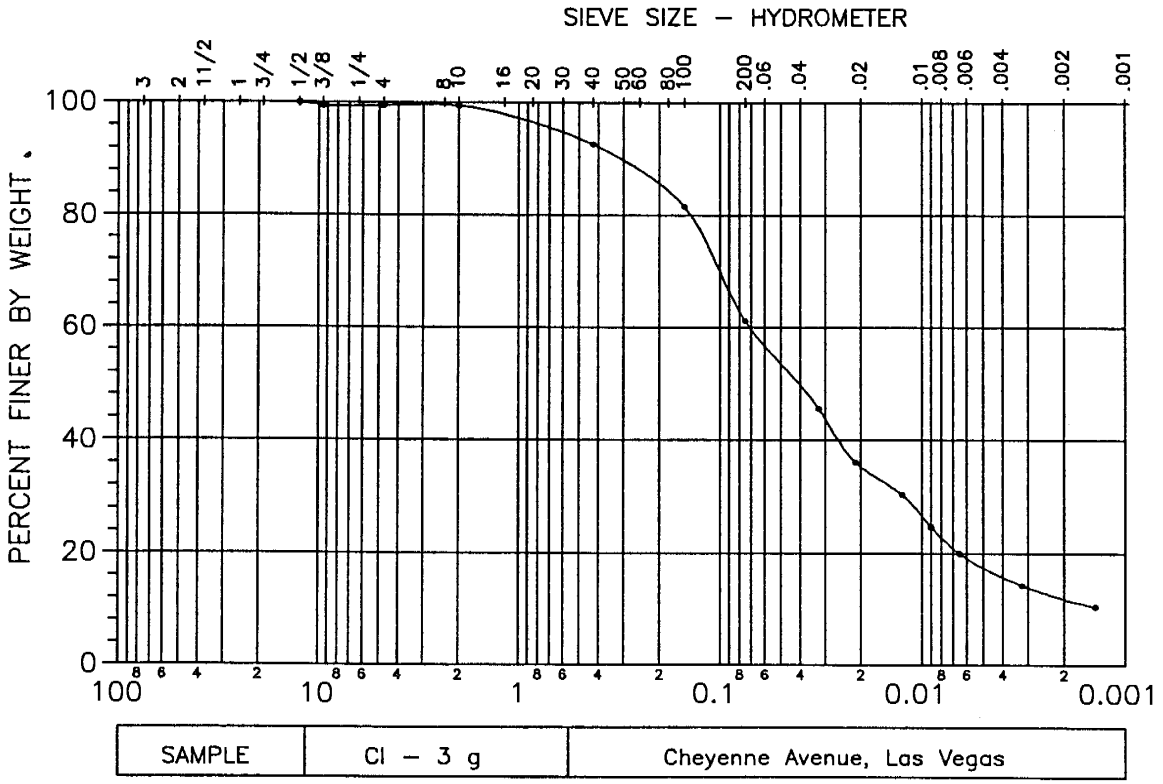
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**99.41**	**99.40**	**92.63**	**61.16**	**2.68**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**35.40**	**11.90**	**9.60**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**1**	**38**	**49**	**12**	**36**	**18**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.189	**0.071**	**0.041**	**0.012**	**0.0036**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	h

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.19**	**64.42**

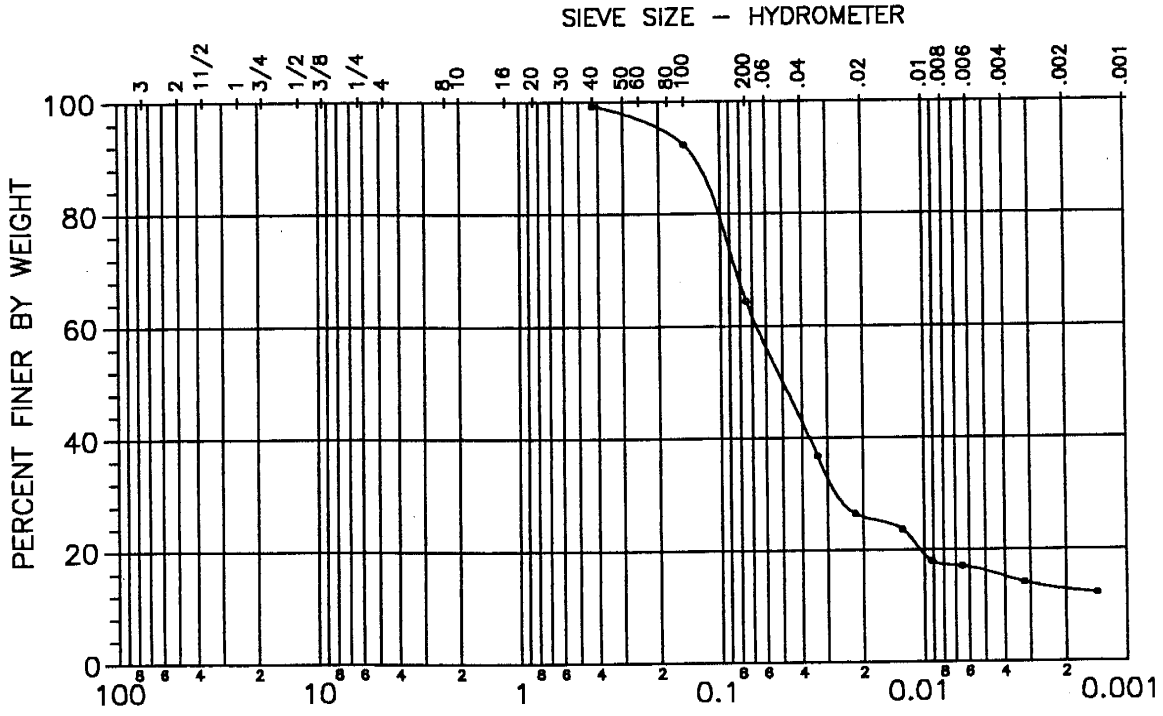
Gravity
2.67

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**25.90**	**12.80**	**12.20**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**36**	**52**	**13**	**31**	**11**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.114	**0.068**	**0.050**	**0.028**	**0.0039**	



SAMPLE	CI – 3 H	Cheyenne Avenue, Las Vegas

GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	i

Particle Size Analysis
AASHTO T88

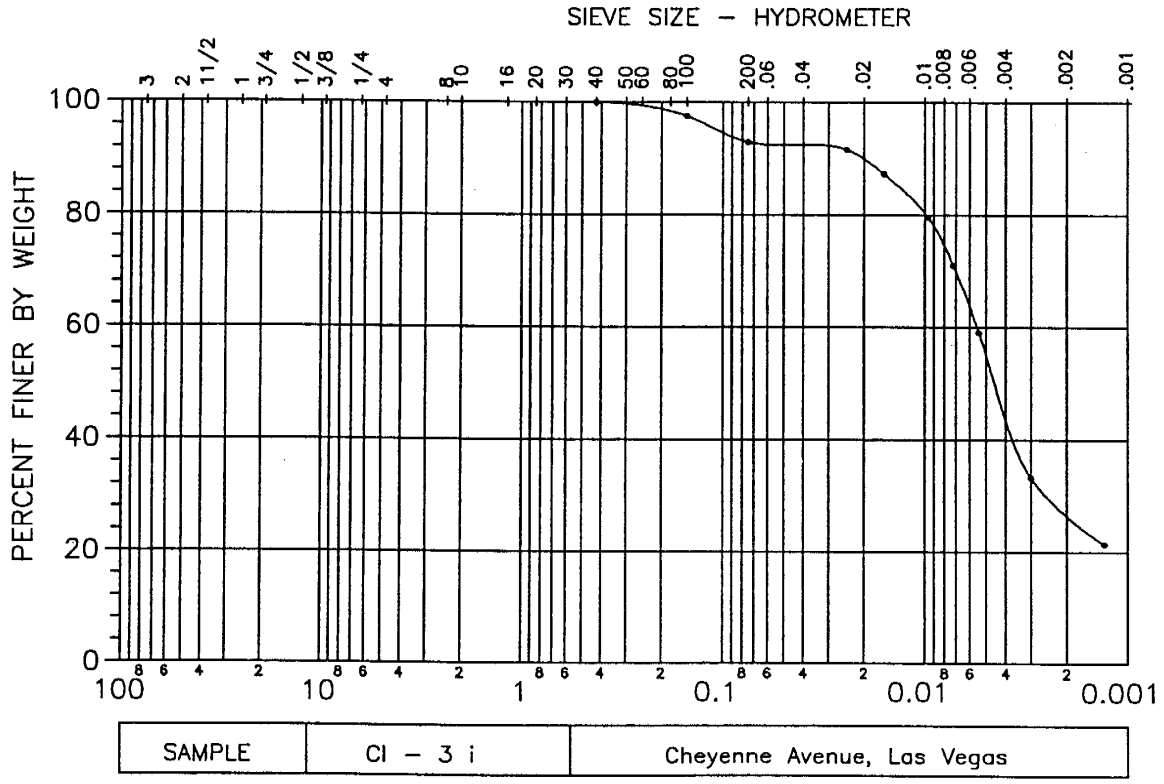
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	100.00	100.00	100.00	92.94	2.72

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	90.00	26.60	19.10		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	7	66	27	32	14

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.013	0.006	0.005	0.003		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	j2, J3, J4

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.91**	**97.72**

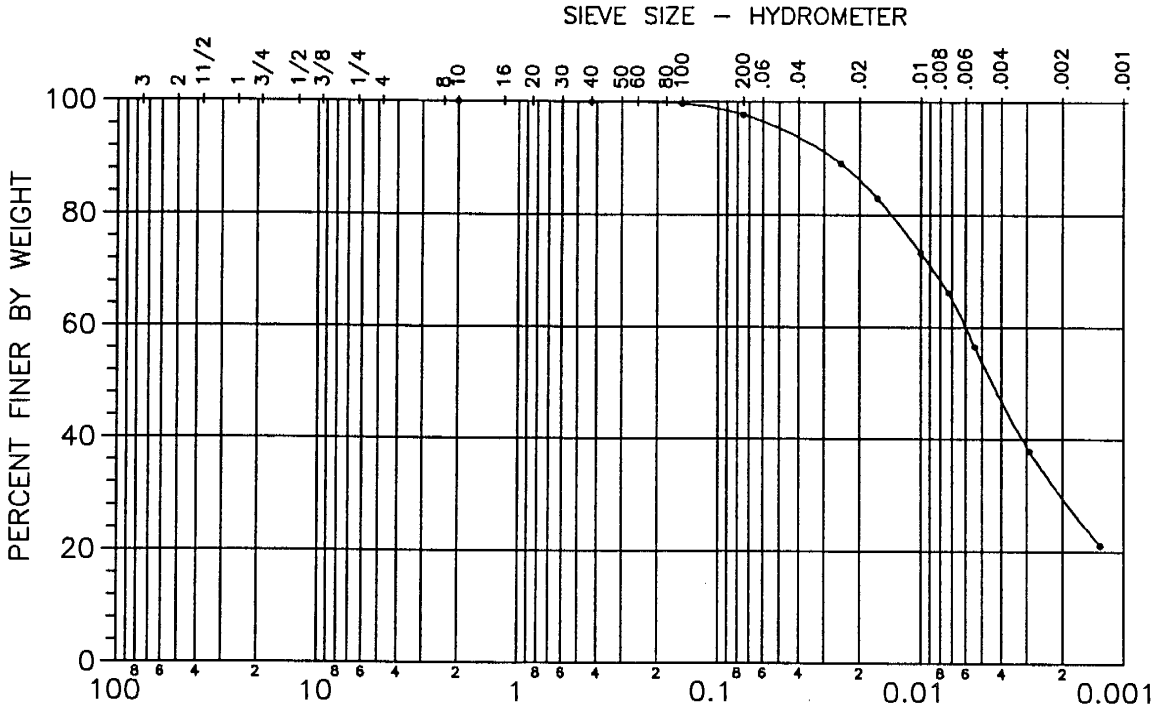
Gravity
2.77

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**86.30**	**29.60**	**16.70**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**2**	**68**	**30**	**34**	**16**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.018	**0.006**	**0.004**	**0.002**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	k 3

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**98.66**	**89.67**

Gravity
2.71

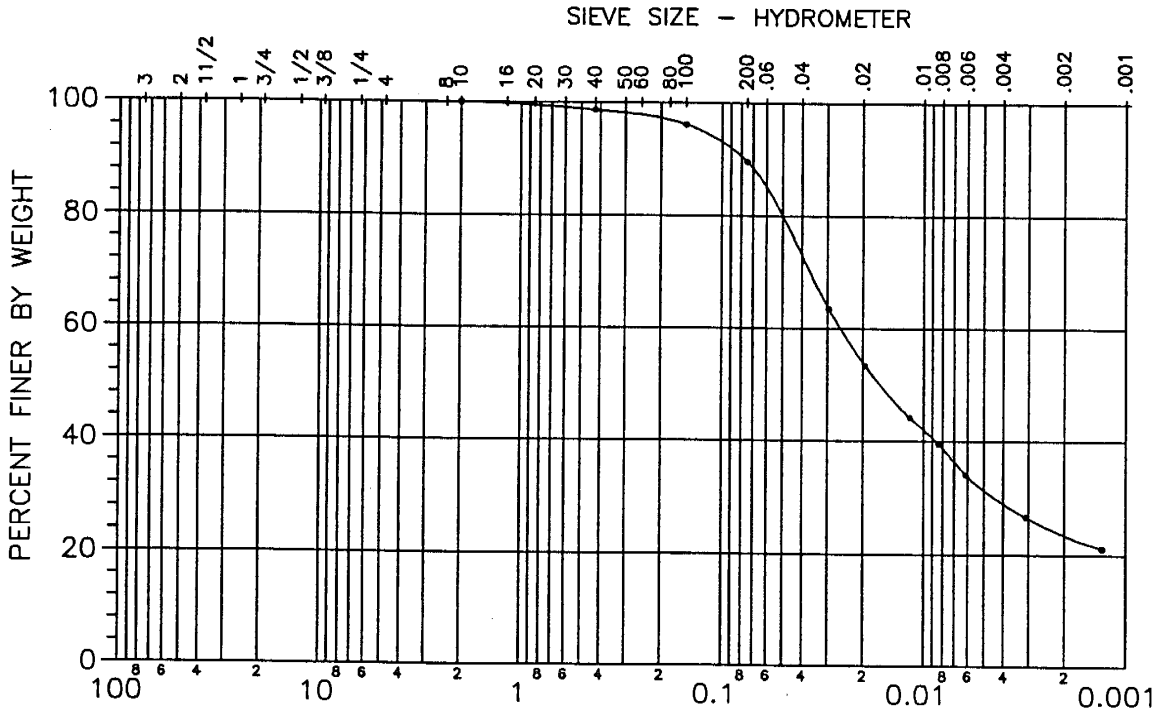
Hydrometer	.02mm	.002mm	.001mm
% Passing	**53.80**	**23.60**	**20.00**

Coefficients	C_u	C_c
	-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**10**	**66**	**24**	**51**	**35**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.059	**0.026**	**0.017**	**0.005**		



SAMPLE	CI – 3 k1	Cheyenne Avenue, Las Vegas

GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	I

Particle Size Analysis
AASHTO T88

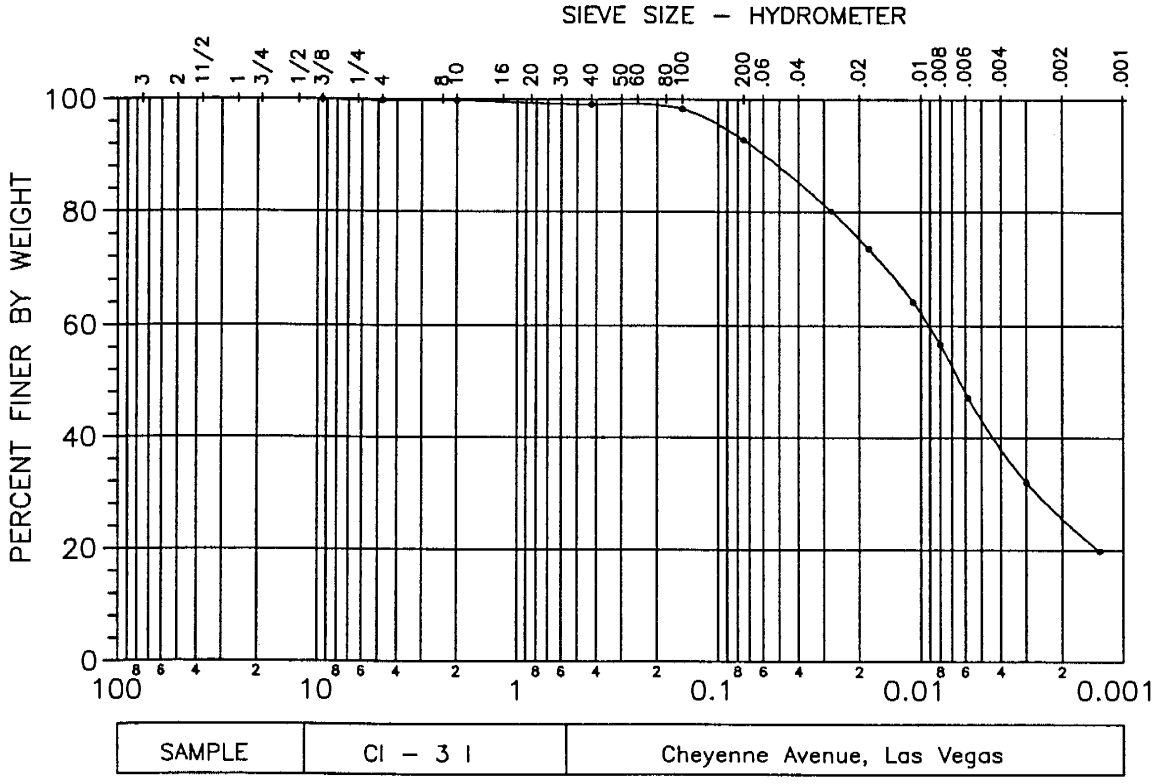
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**99.78**	**99.77**	**99.07**	**92.80**	**2.69**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**75.30**	**25.70**	**17.10**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**7**	**67**	**26**	**28**	**11**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.039	**0.009**	**0.006**	**0.003**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	m2

Particle Size Analysis
AASHTO T88

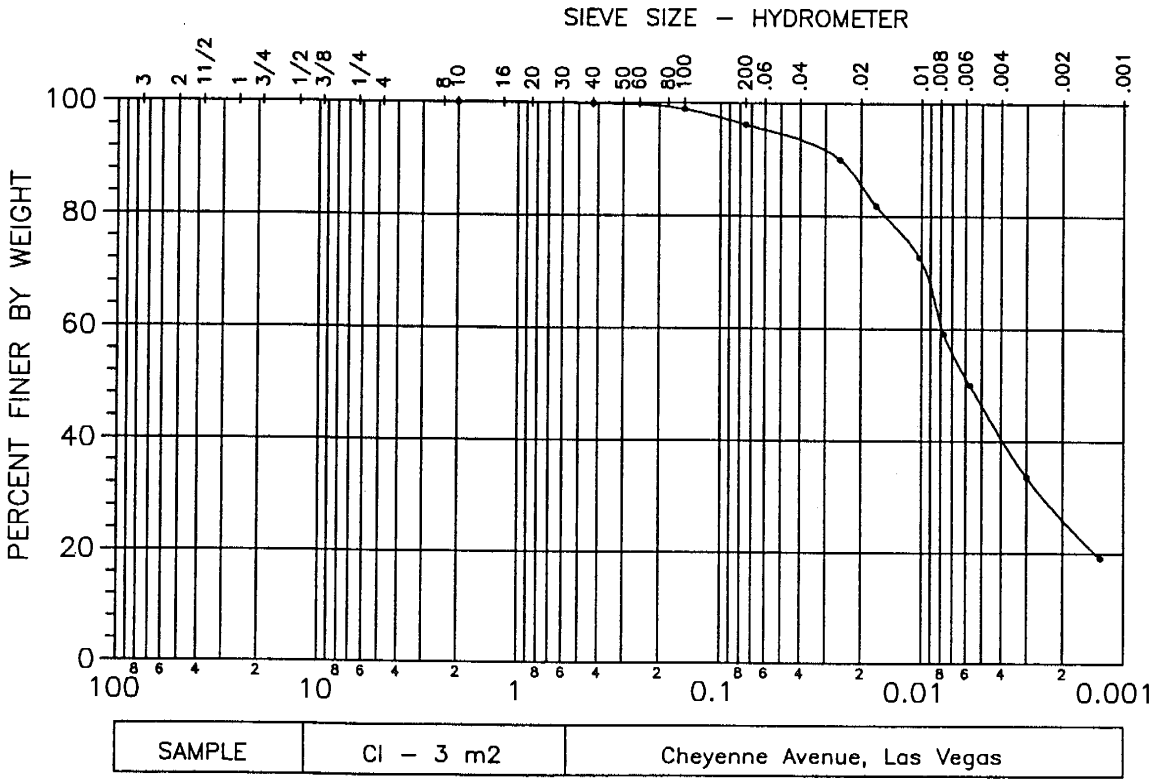
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**100.00**	**99.87**	**96.22**	**2.74**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C u	C c
% Passing	**85.60**	**26.10**	**15.20**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**4**	**70**	**26**	**35**	**16**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.020	**0.008**	**0.006**	**0.003**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	n

Particle Size Analysis
AASHTO T88

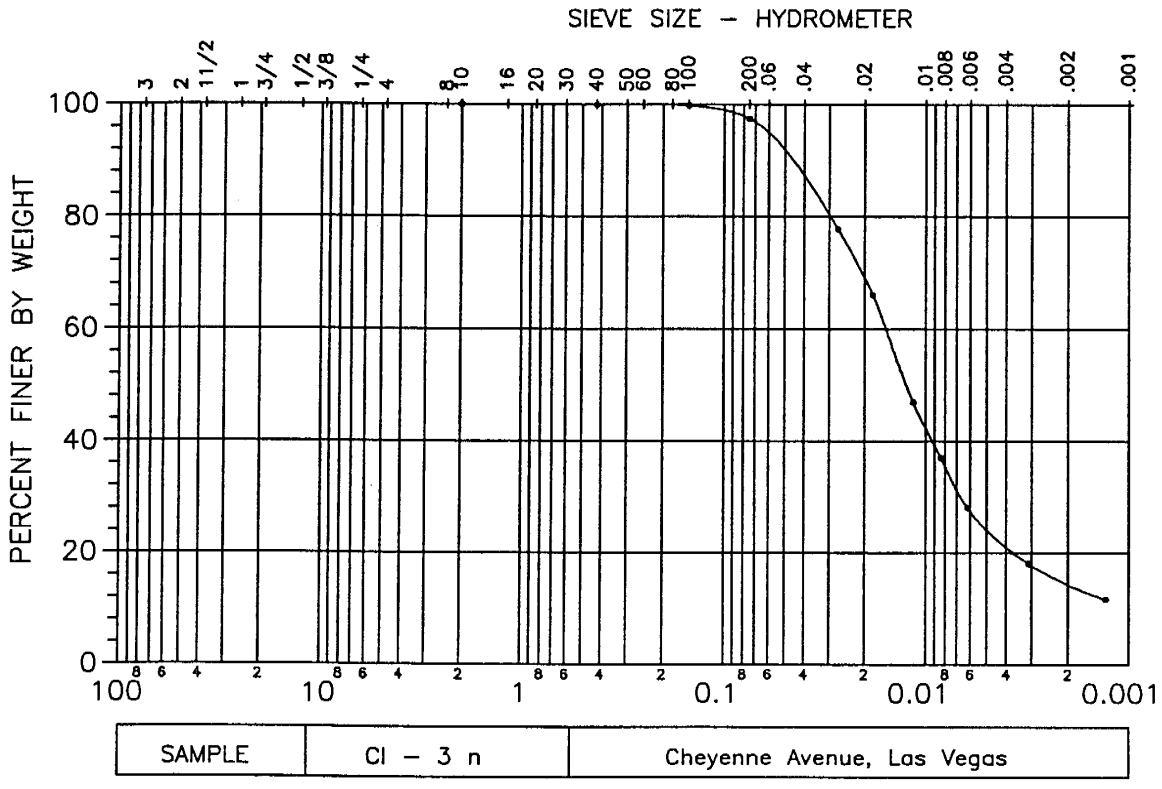
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	100.00	100.00	99.94	97.44	2.74

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	69.10	14.40	10.50		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	3	83	14	27	7

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.036	0.016	0.012	0.007	0.0022	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	p

Particle Size Analysis
AASHTO T88

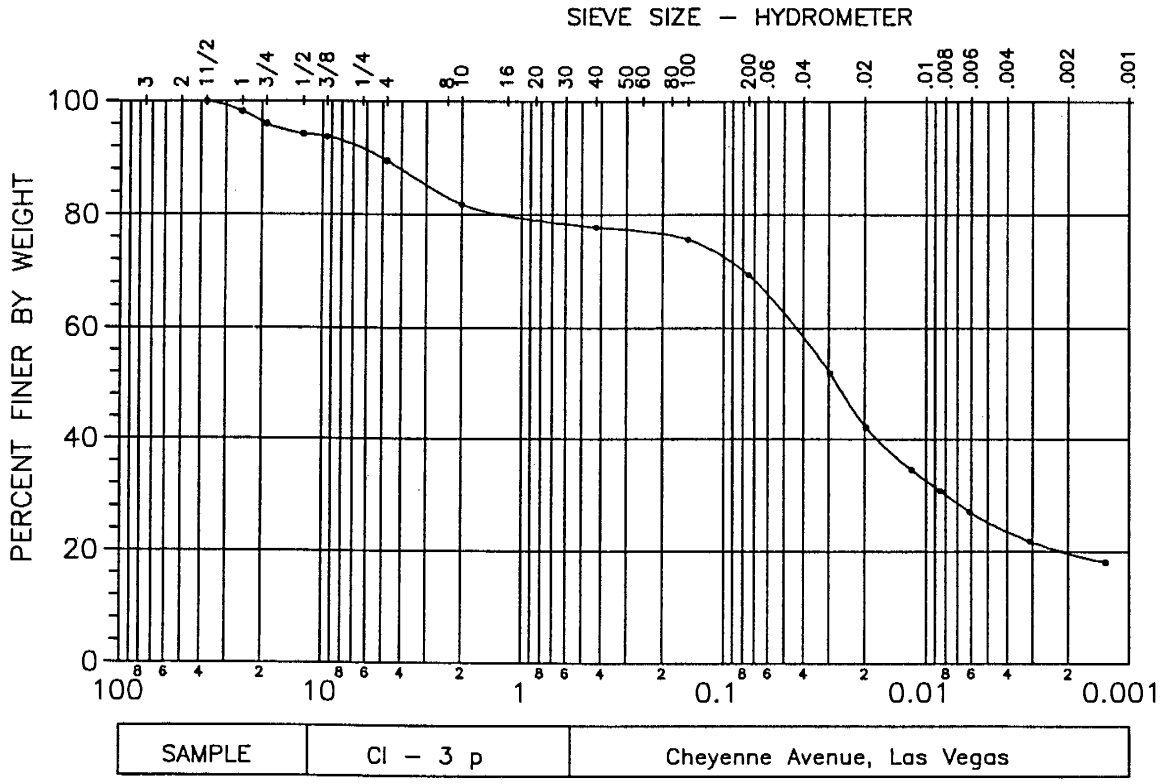
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**89.50**	**81.81**	**77.82**	**69.38**	**2.70**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**42.40**	**19.70**	**17.40**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**10**	**20**	**50**	**20**	**52**	**33**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
2.970	**0.044**	**0.027**	**0.008**		



G R A D A T I O N C U R V E

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	s

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**99.99**	**99.83**	**94.34**

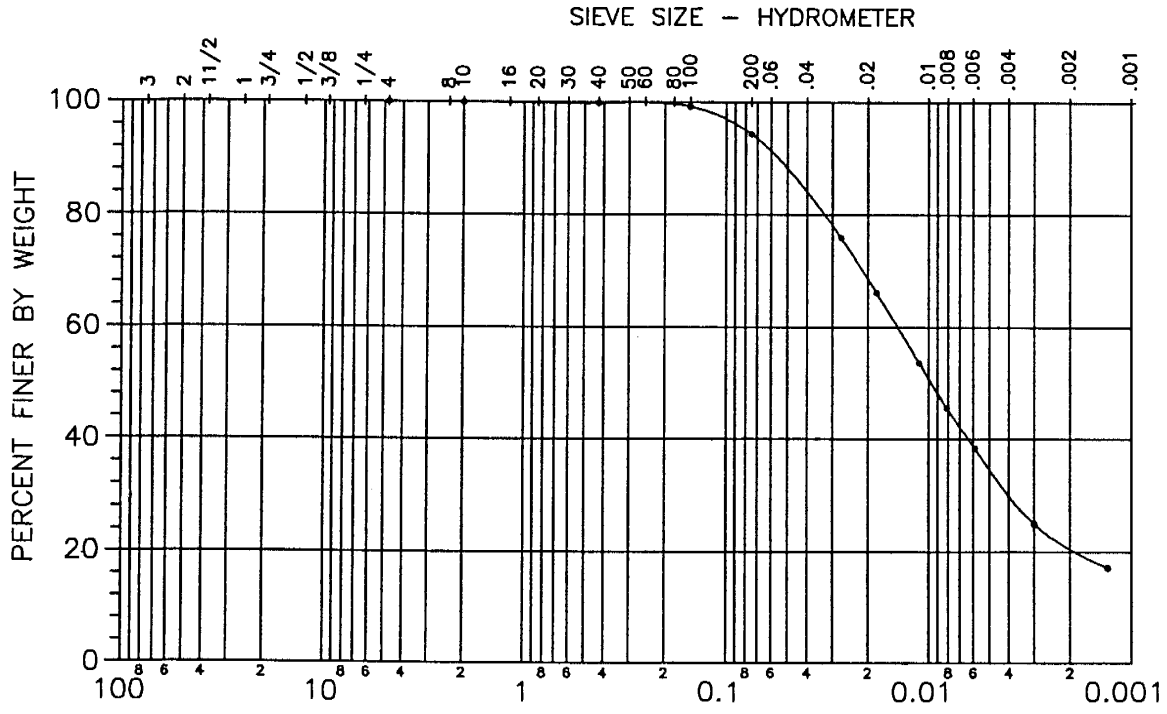
Gravity
2.75

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**68.60**	**20.60**	**15.90**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**6**	**74**	**21**	**30**	**13**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.042	**0.014**	**0.010**	**0.004**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave. Inter.	BORING	CI-3
DATE	07/23/96	SAMPLE #	u

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.40**	**94.66**

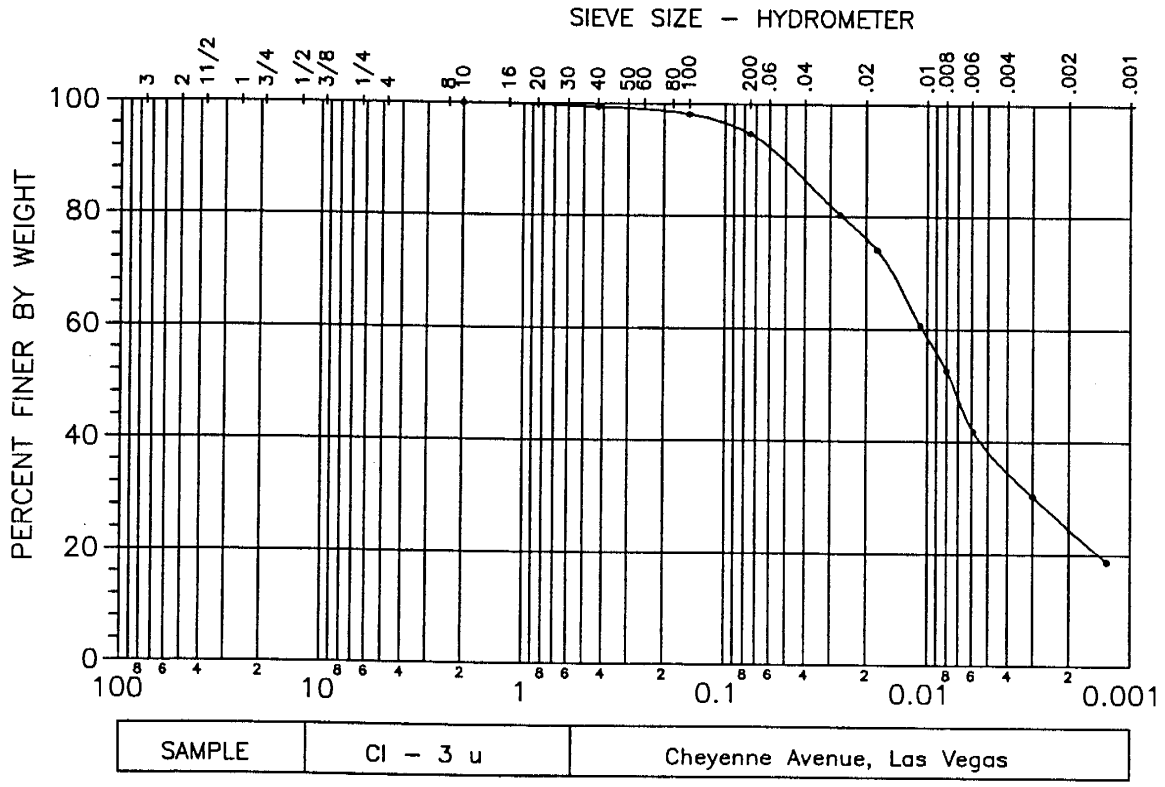
Gravity
2.71

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**76.20**	**24.60**	**16.00**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**5**	**70**	**25**	**35**	**16**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.037	**0.011**	**0.007**	**0.003**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Inter.	BORING	CI-4
DATE	07/26/96	SAMPLE #	b

Particle Size Analysis
AASHTO T88

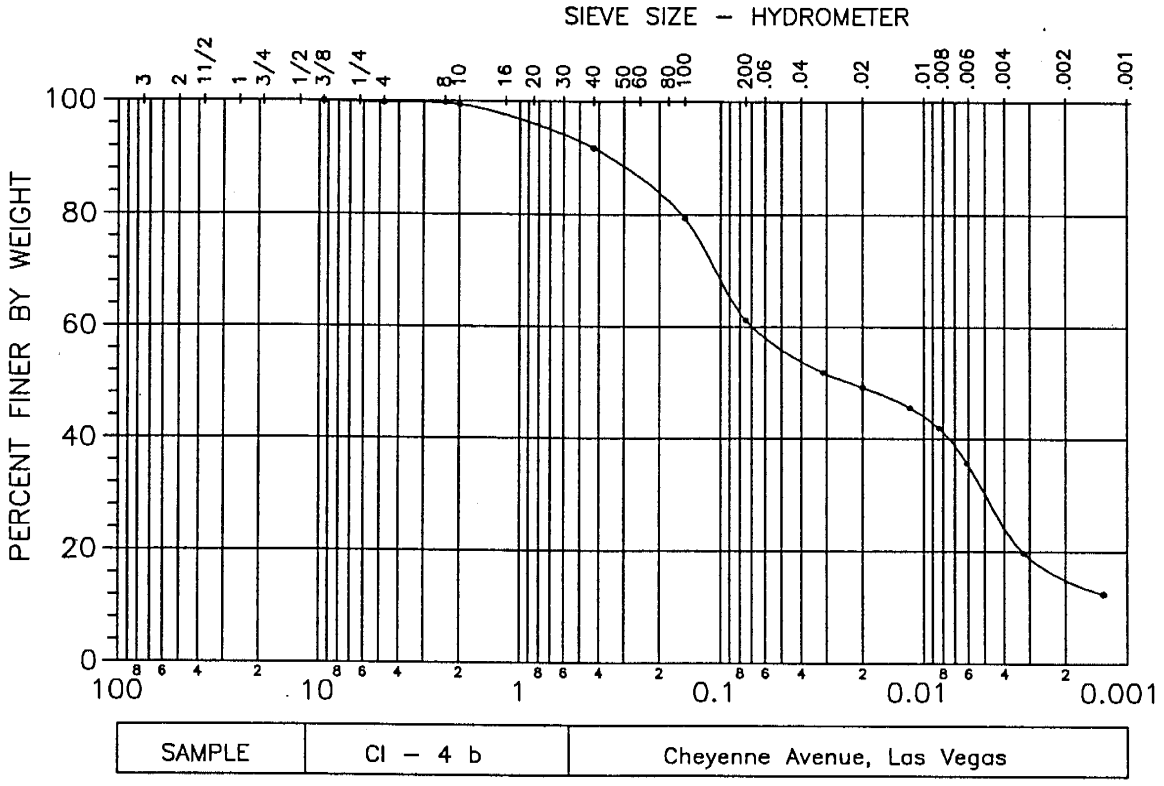
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**99.76**	**99.35**	**91.75**	**61.19**	**2.68**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**49.14**	**15.02**	**11.58**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**39**	**46**	**15**	**37**	**19**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.219	**0.070**	**0.023**	**0.005**	**0.0020**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Interchance	BORING	CI4
DATE	8/01/96	SAMPLE #	d3, d4, d5, d6, d7, composite

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	100.00	98.11	87.35

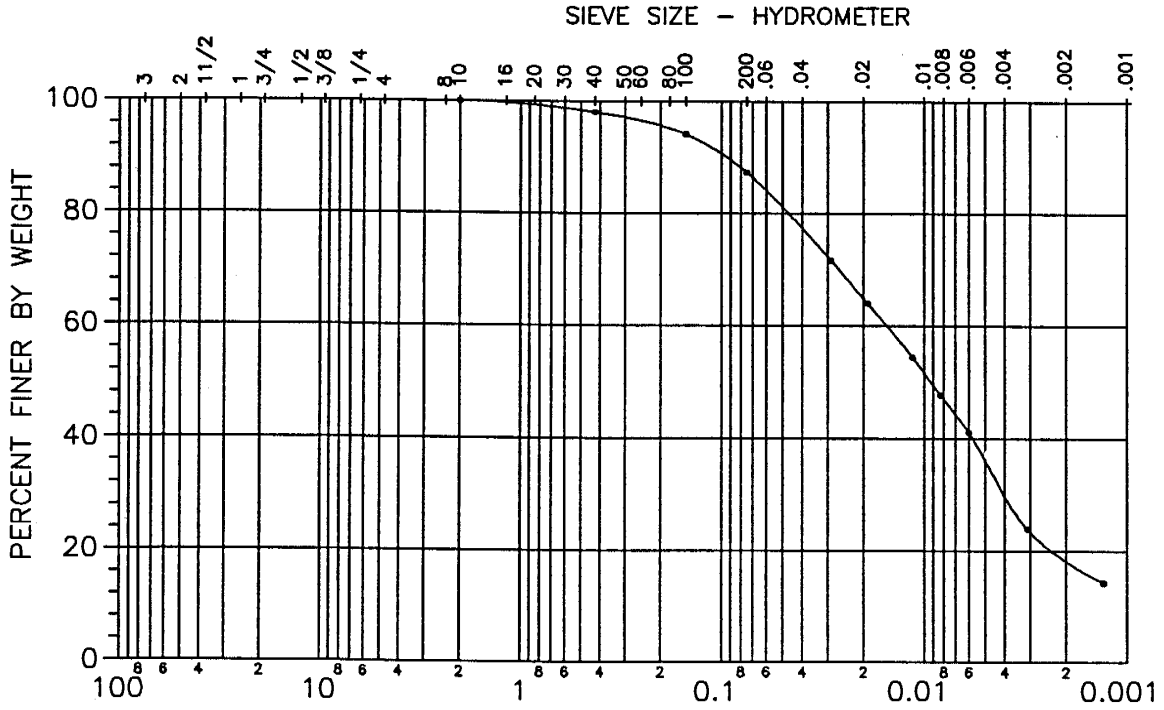
Gravity
2.69

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	64.89	18.26	12.21		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	13	69	18	43	25

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.047	0.015	0.009	0.004	0.0014	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Interchange	BORING	CI-4
DATE	8/1/96	SAMPLE #	d9

Particle Size Analysis
AASHTO T88

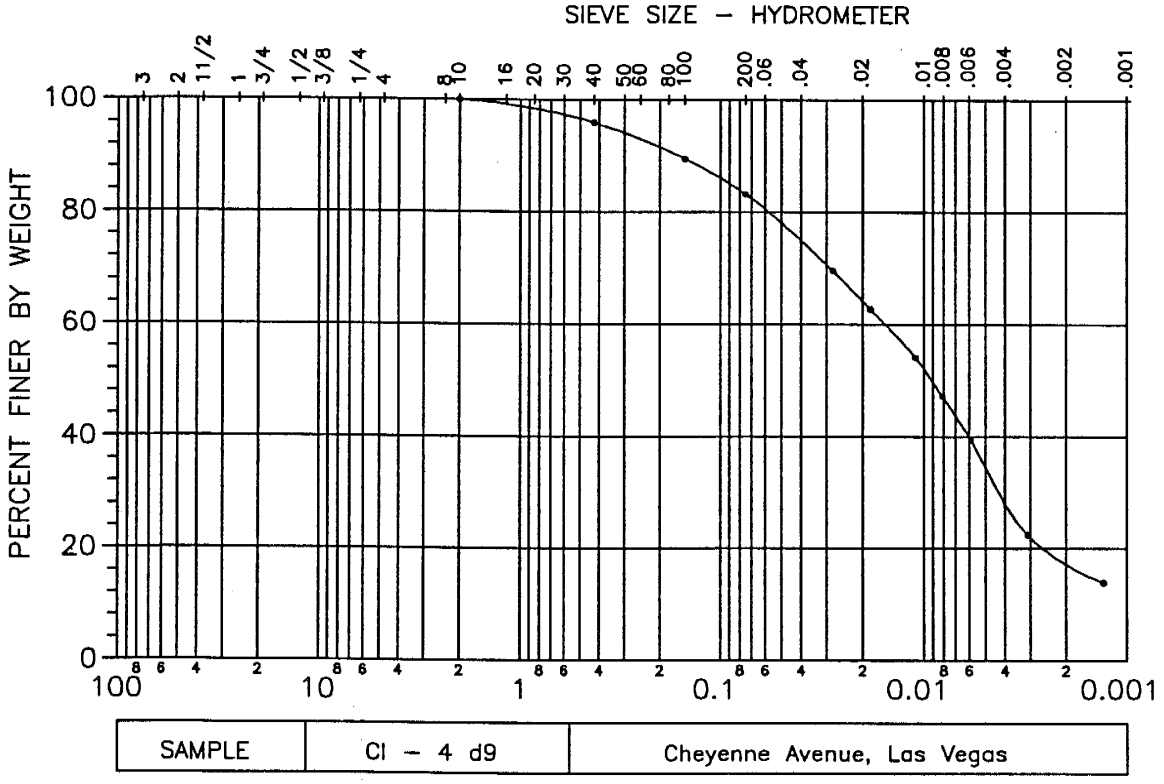
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**100.00**	**95.99**	**83.24**	**2.71**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**64.16**	**17.22**	**12.21**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**17**	**66**	**17**	**36**	**17**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.090	**0.016**	**0.009**	**0.004**	**0.0016**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Interchange	BORING	CI-4
DATE	8/1/96	SAMPLE #	k

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.36**	**34.25**

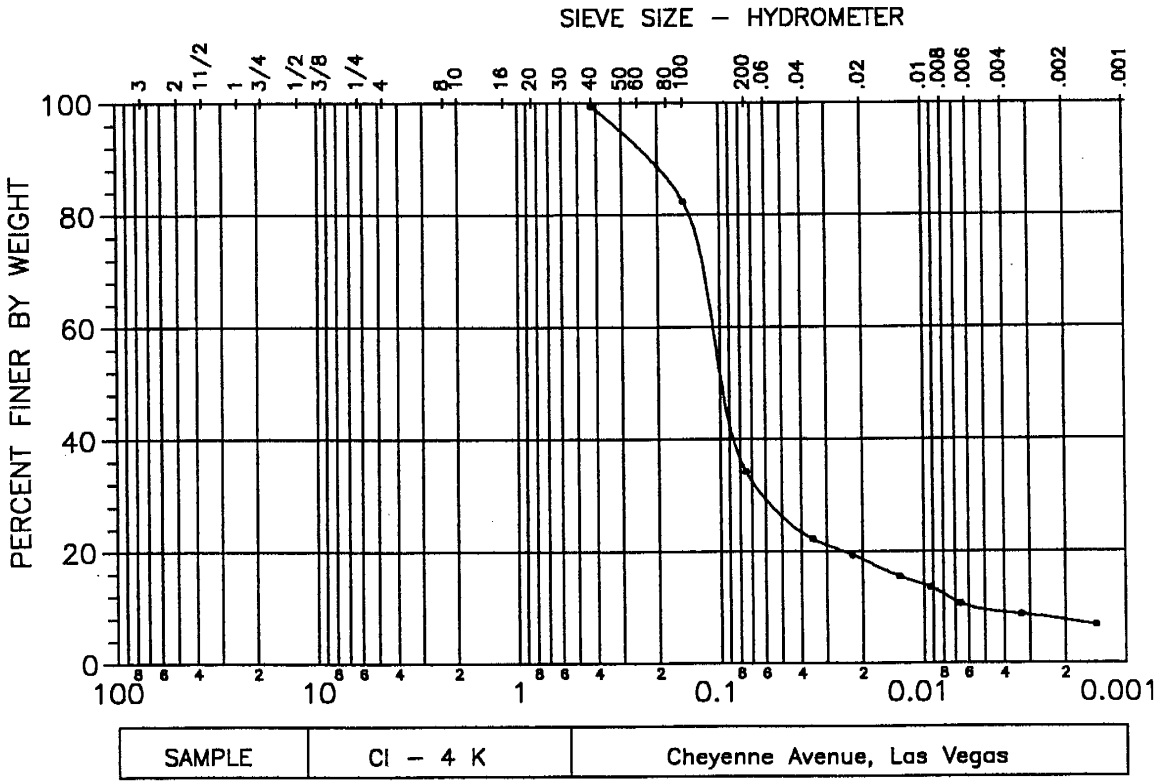
Gravity
2.68

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**89.41**	**7.72**	**6.26**		**18.37**	**6.15**

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**66**	**27**	**8**	**18**	**np**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.165	**0.108**	**0.099**	**0.063**	**0.0120**	**0.0059**



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Interchange	BORING	CI-4
DATE	8/1/96	SAMPLE #	L

Particle Size Analysis
AASHTO T88

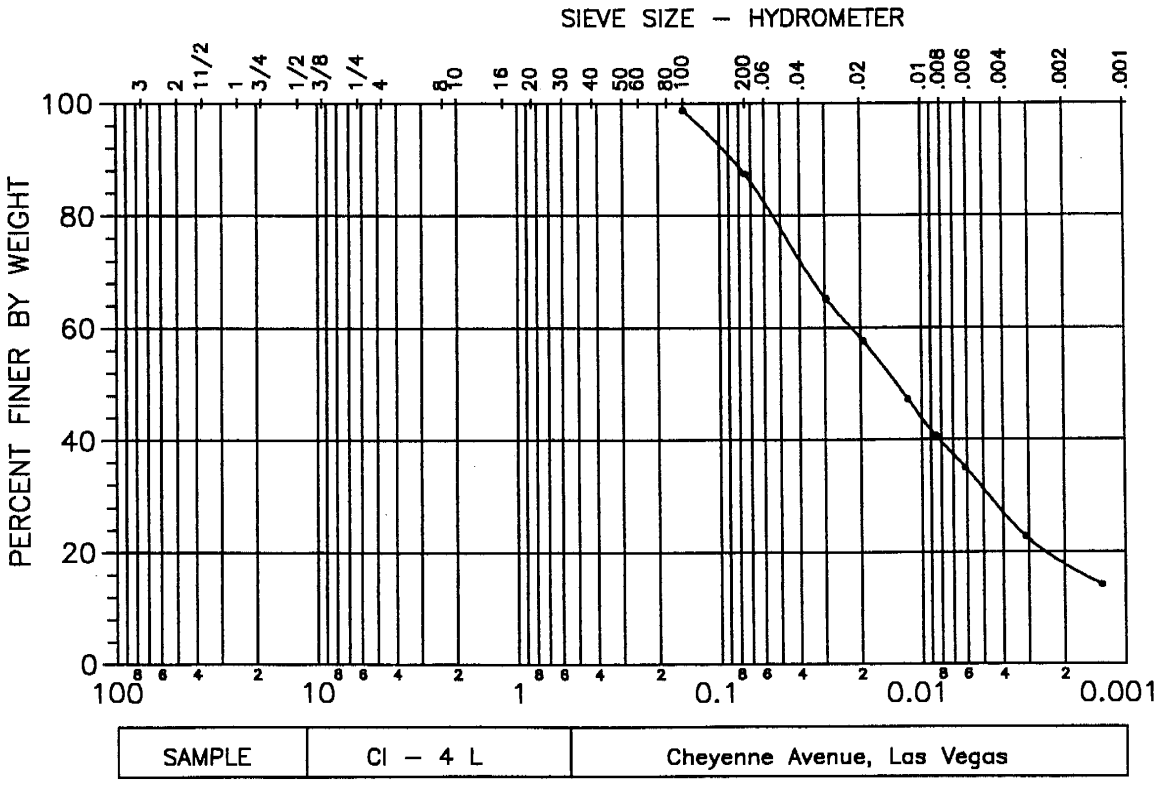
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**100.00**	**100.00**	**87.40**	**2.70**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**58.22**	**17.74**	**12.21**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**13**	**70**	**18**	**26**	**9**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.068	**0.022**	**0.013**	**0.005**	**0.0015**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Interchange	BORING	CI-4
DATE	8/1/96	SAMPLE #	m1

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.96**	**93.83**

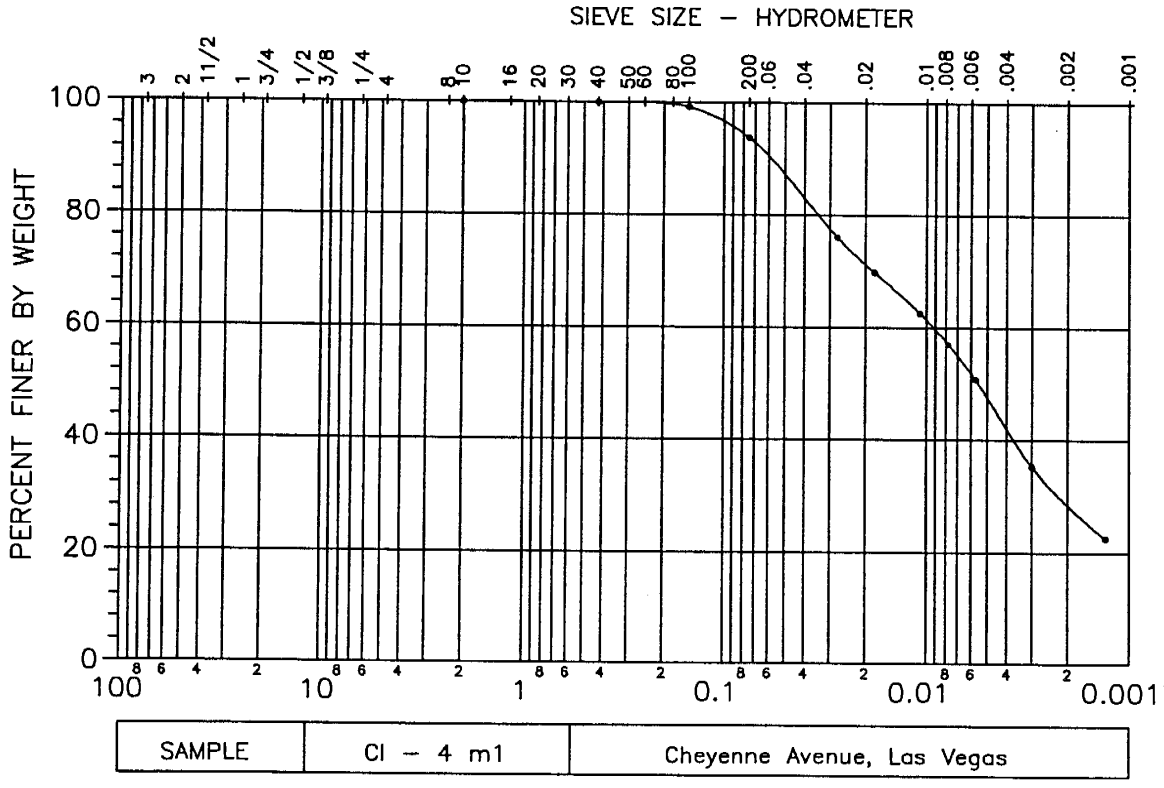
Gravity
2.72

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**71.26**	**28.59**	**19.20**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**6**	**65**	**29**	**40**	**22**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.044	**0.009**	**0.006**	**0.002**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Interchange	BORING	CI-4
DATE	8/1/96	SAMPLE #	m2

Particle Size Analysis
AASHTO T88

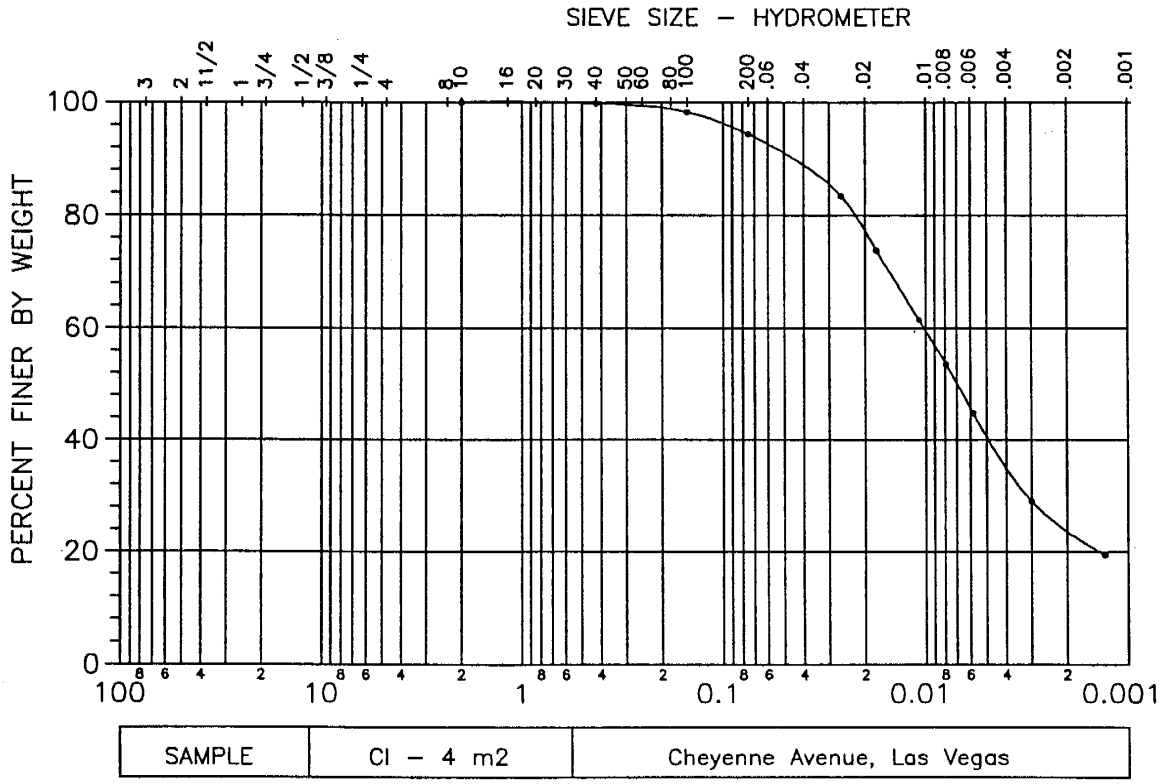
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)		Gravity
% Passing	**100.00**	**100.00**	**99.84**	**94.33**		**2.70**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**77.41**	**23.68**	**17.22**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**6**	**71**	**24**	**32**	**15**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.029	**0.010**	**0.007**	**0.003**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Ave Interchange	BORING	CI-4
DATE	8/1/96	SAMPLE #	o

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.62**	**96.64**

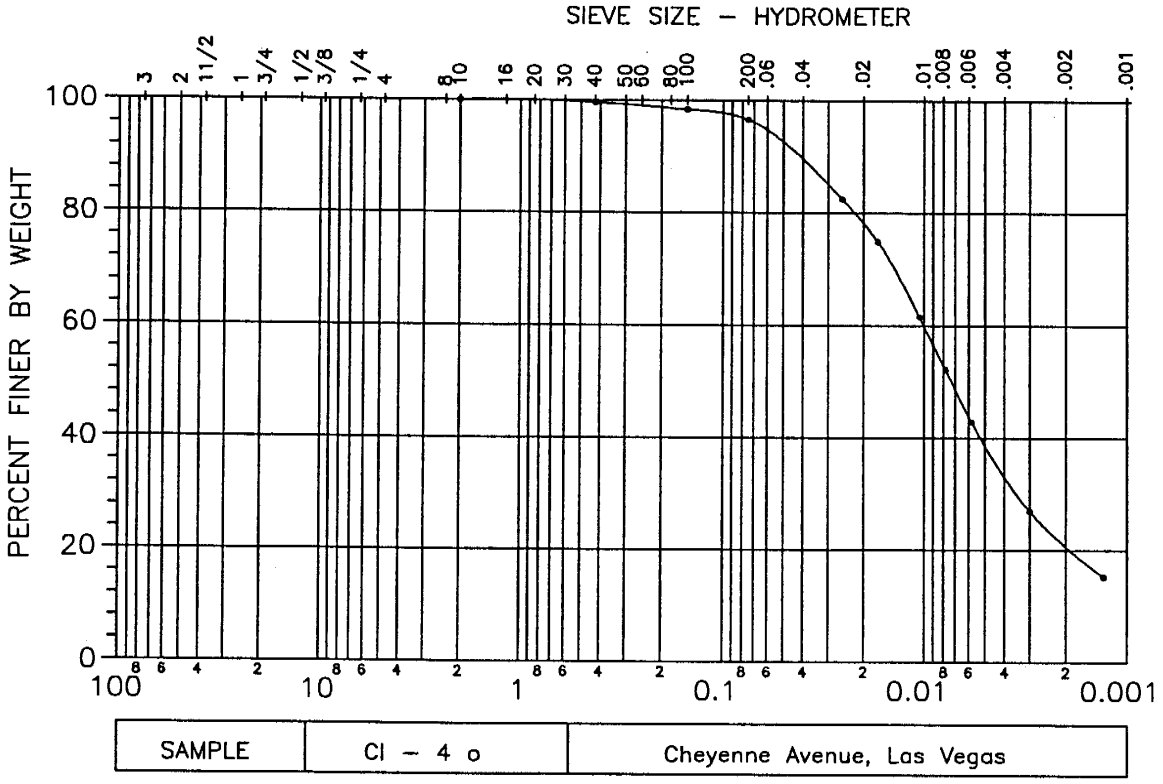
Gravity
2.73

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**78.25**	**20.76**	**12.52**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**3**	**76**	**21**	**31**	**11**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.030	**0.010**	**0.007**	**0.004**	**0.0013**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI-5
DATE	8/13/96	SAMPLE #	A

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	100.00	100.00	70.20

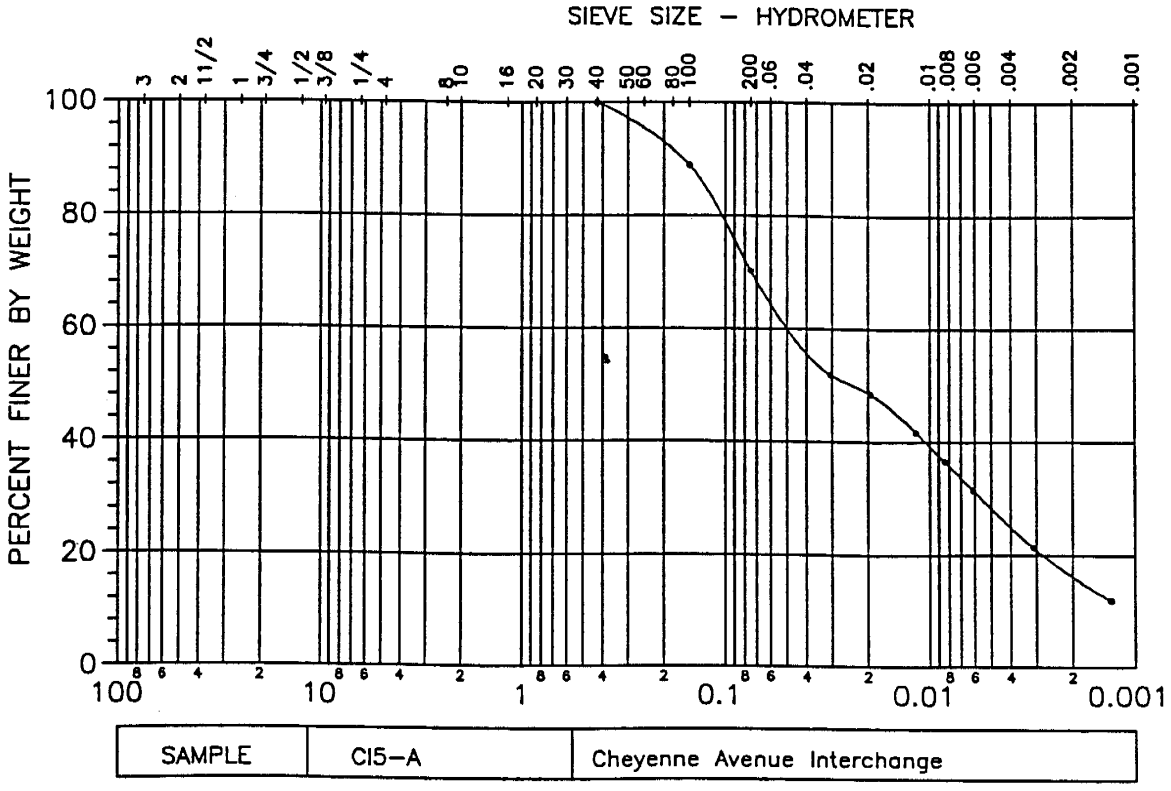
Gravity
2.72

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	48.70	16.30	9.60		51.00	0.61

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	30	54	16	25	9

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.012	0.051	0.024	0.006	0.0018	0.0010



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL-11-96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI-5
DATE	8/13/96	SAMPLE #	C

Particle Size Analysis
AASHTO T88

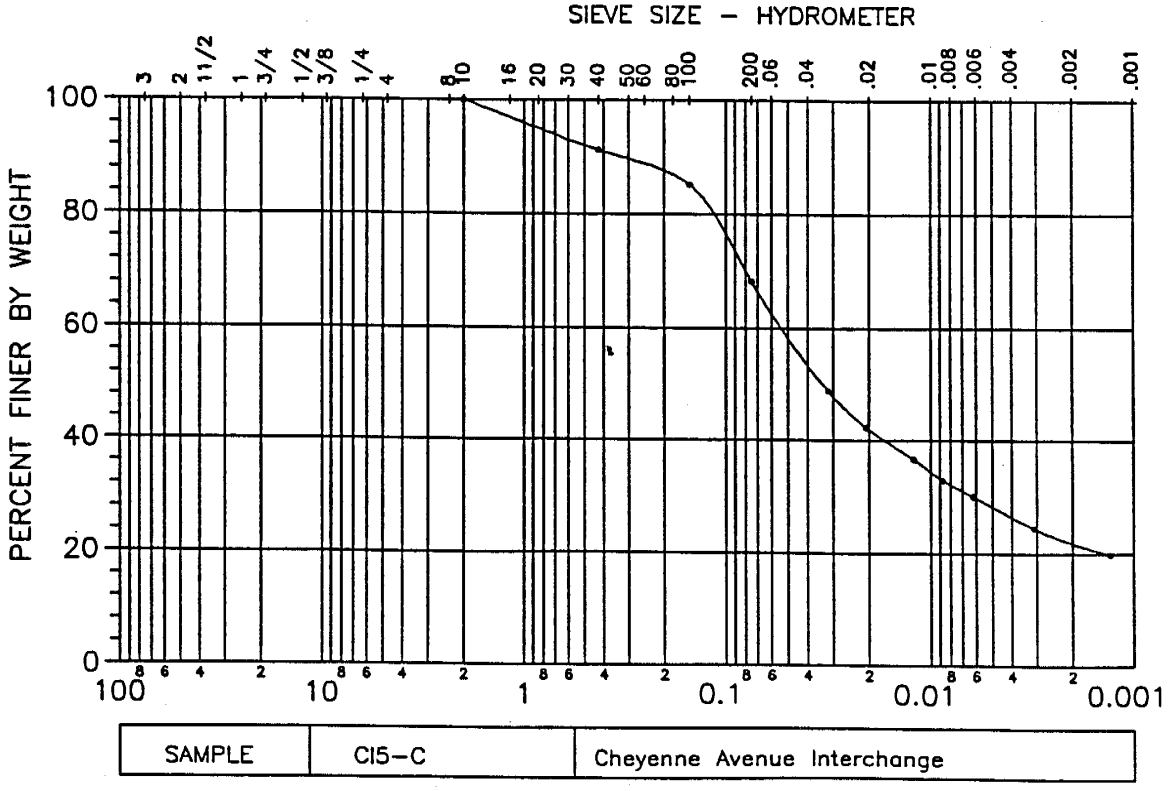
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	100.00	100.00	91.26	68.26	2.70

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	41.90	21.80	18.50		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	32	46	22	47	29

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.011	0.054	0.013	0.006		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI 6
DATE	11/08/96	SAMPLE #	C

Particle Size Analysis
AASHTO T88

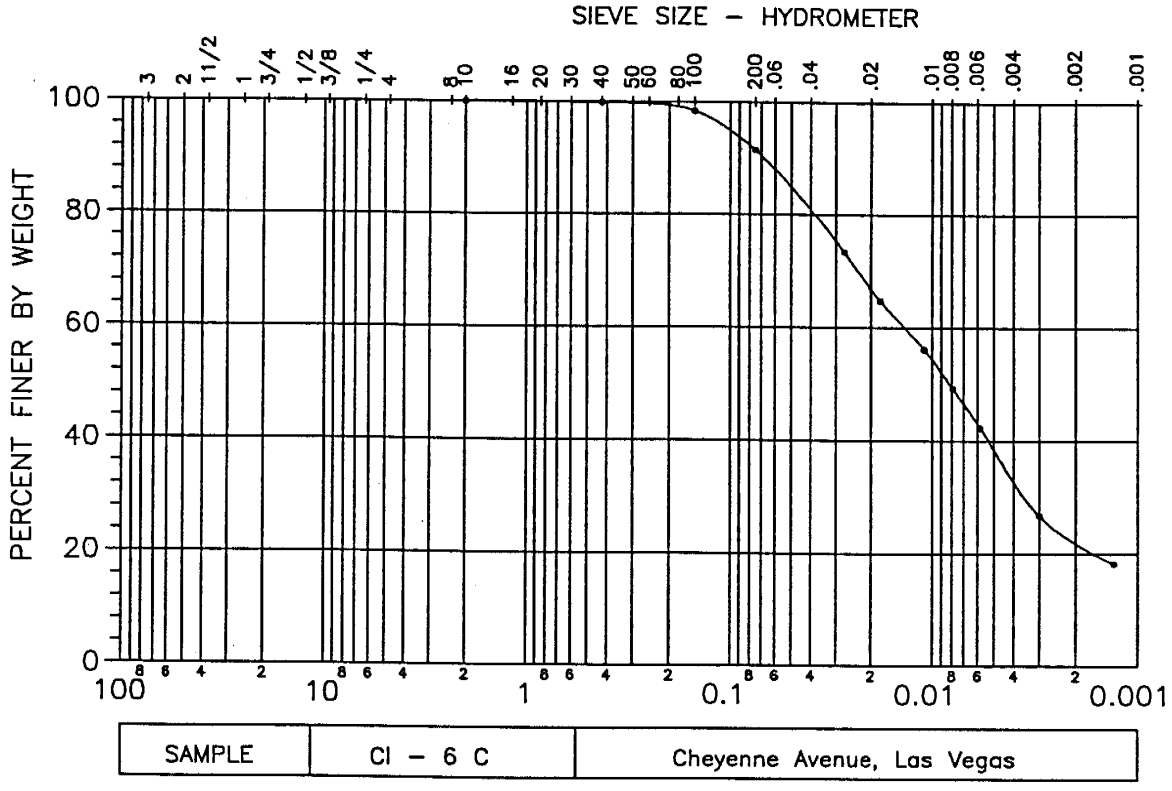
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**100.00**	**99.84**	**91.46**	**2.74**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**66.77**	**21.81**	**16.49**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**9**	**70**	**22**	**54**	**39**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.050	**0.014**	**0.008**	**0.004**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI 6
DATE	11/08/96	SAMPLE #	F

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**99.40**	**98.52**	**97.25**	**58.69**

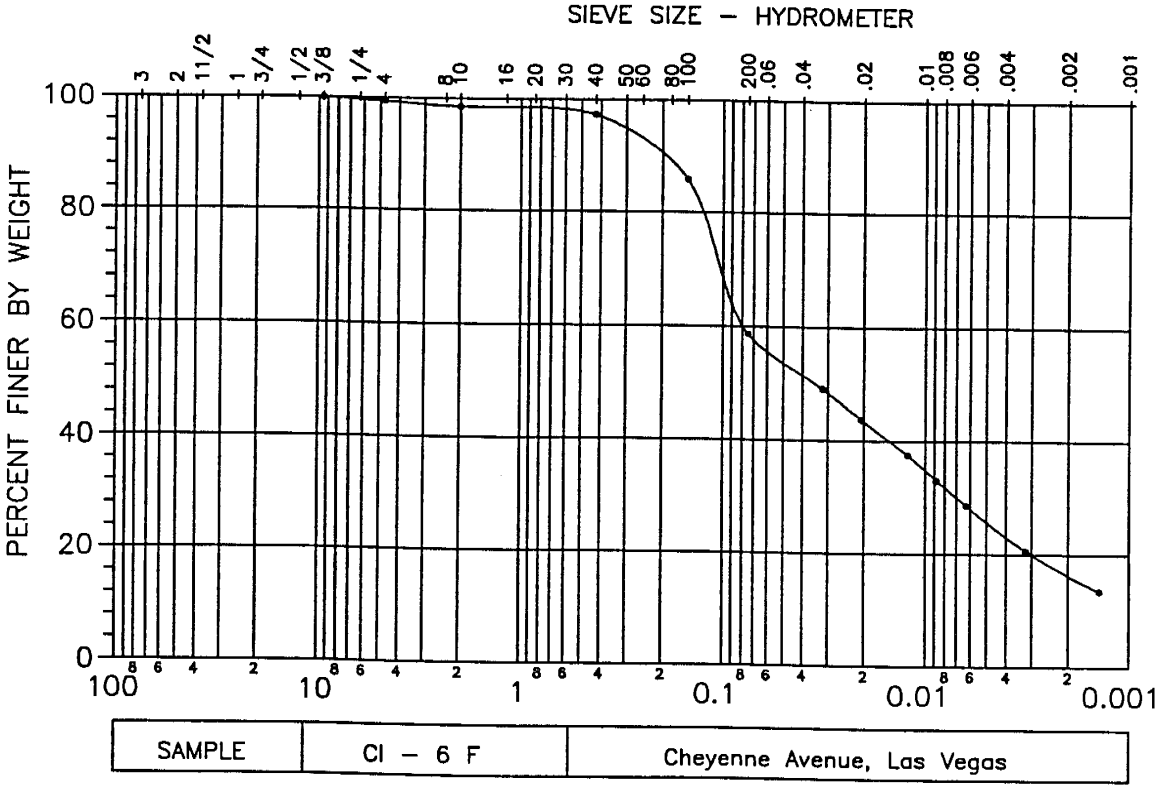
Gravity
2.65

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**43.40**	**16.38**	**10.96**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**1**	**41**	**42**	**16**	**23**	**10**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.145	**0.080**	**0.035**	**0.007**	**0.0017**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI 7
DATE	11/08/96	SAMPLE #	G

Particle Size Analysis
AASHTO T88

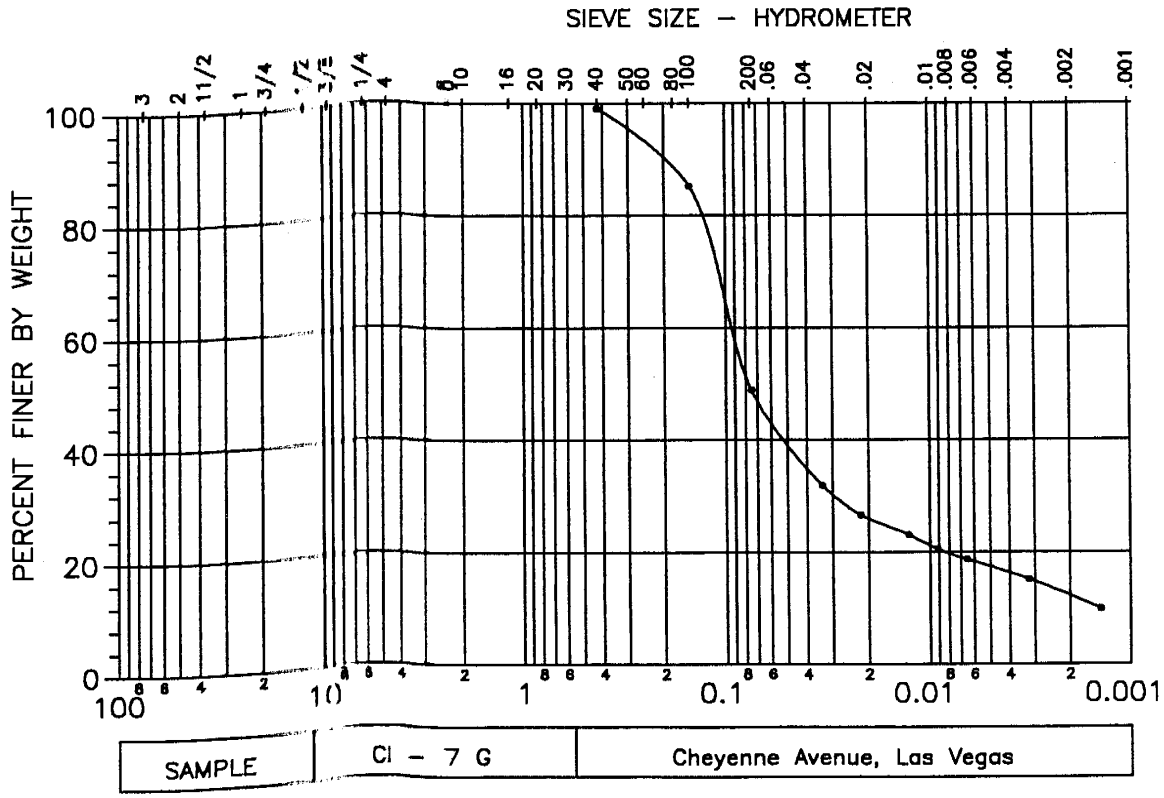
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)		Gravity
% Passing	100.00	100.00	99.09	48.88		2.68

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	25.98	12.31	7.30		67.14	6.84

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	51	37	12	37	18

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.150	0.094	0.078	0.030	0.0032	0.0014



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI 8
DATE	11/08/96	SAMPLE #	D

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.50**	**88.29**

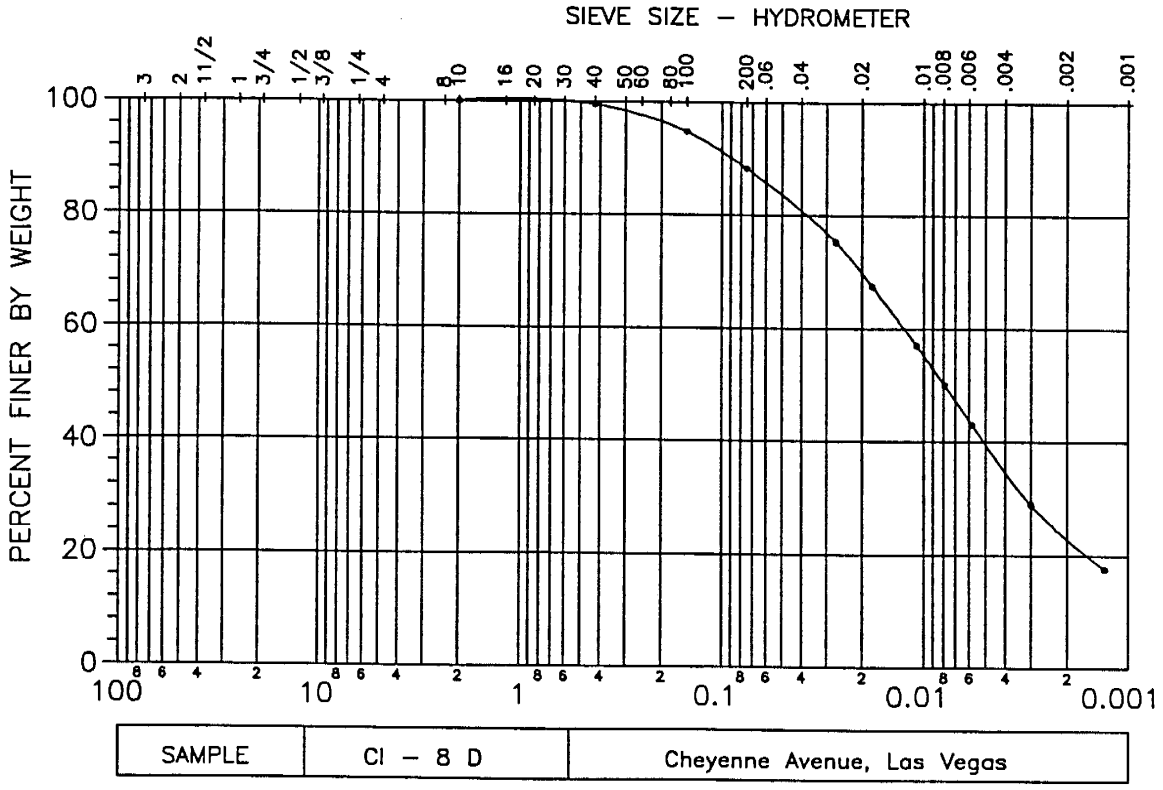
Gravity
2.76

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**69.90**	**22.95**	**14.61**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**12**	**65**	**23**	**36**	**18**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.056	**0.012**	**0.008**	**0.003**	**0.0010**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI-8
DATE	10/15/96	SAMPLE #	E

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**95.36**	**88.85**

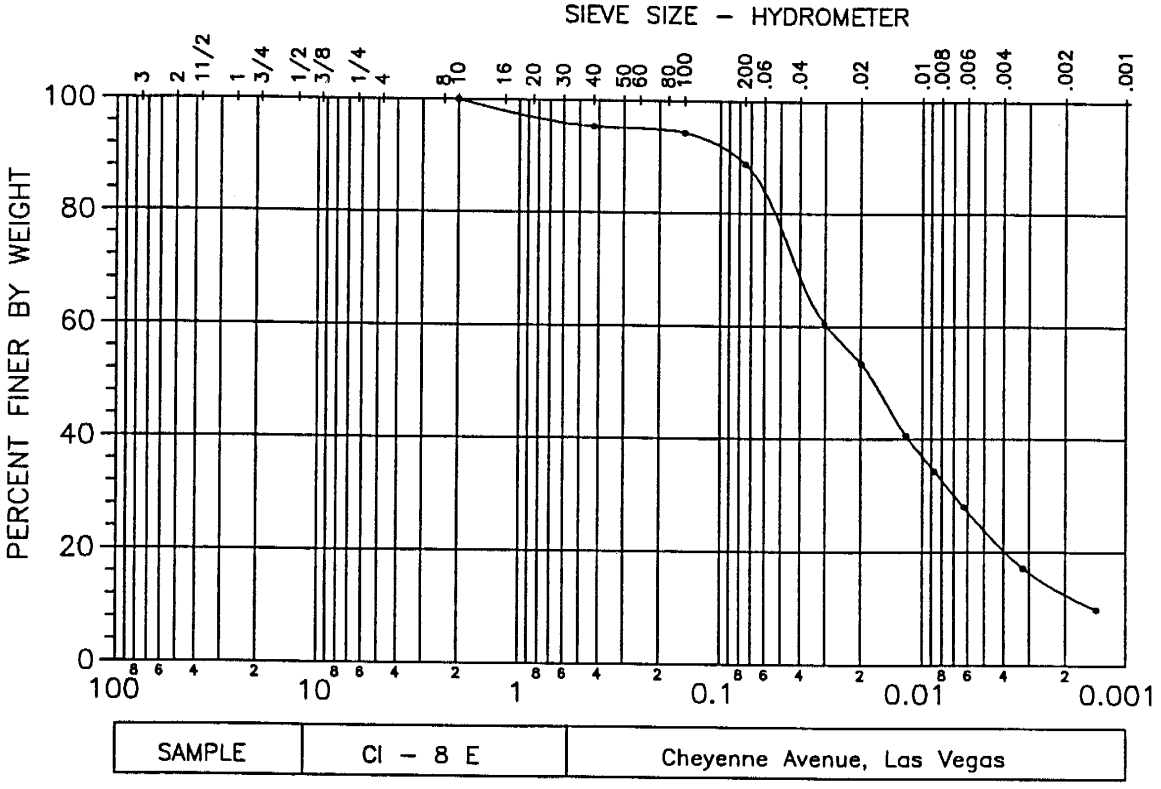
Gravity
2.67

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**53.52**	**12.52**	**7.83**		**21.43**	**1.17**

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**11**	**76**	**13**	**26**	**8**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.062	**0.030**	**0.017**	**0.007**	**0.0026**	**0.0014**



SAMPLE	CI – 8 E	Cheyenne Avenue, Las Vegas

GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI-9
DATE	11/18/96	SAMPLE #	C

Particle Size Analysis
AASHTO T88

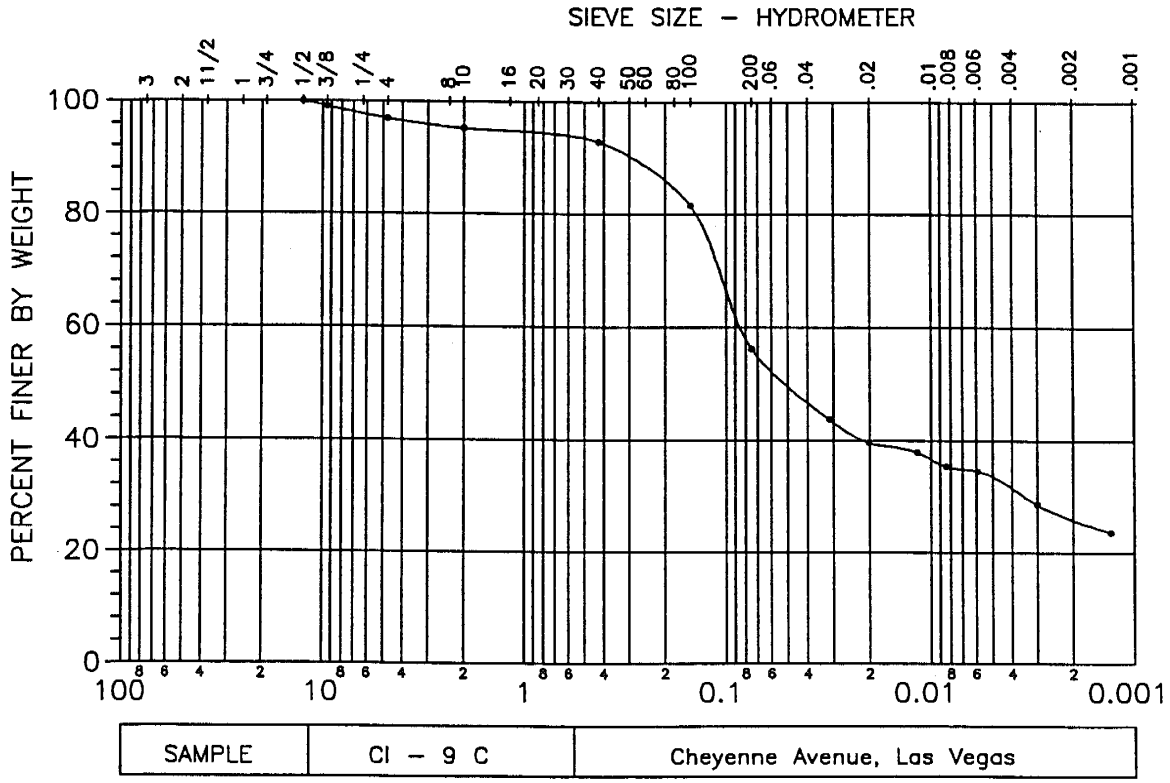
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**96.89**	**95.18**	**92.81**	**56.20**	**2.73**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**39.65**	**26.00**	**22.54**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**3**	**41**	**30**	**26**	**36**	**24**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.185	**0.086**	**0.052**	**0.003**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI-9
DATE	11/18/96	SAMPLE #	E

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**99.55**	**98.47**	**94.70**	**83.69**

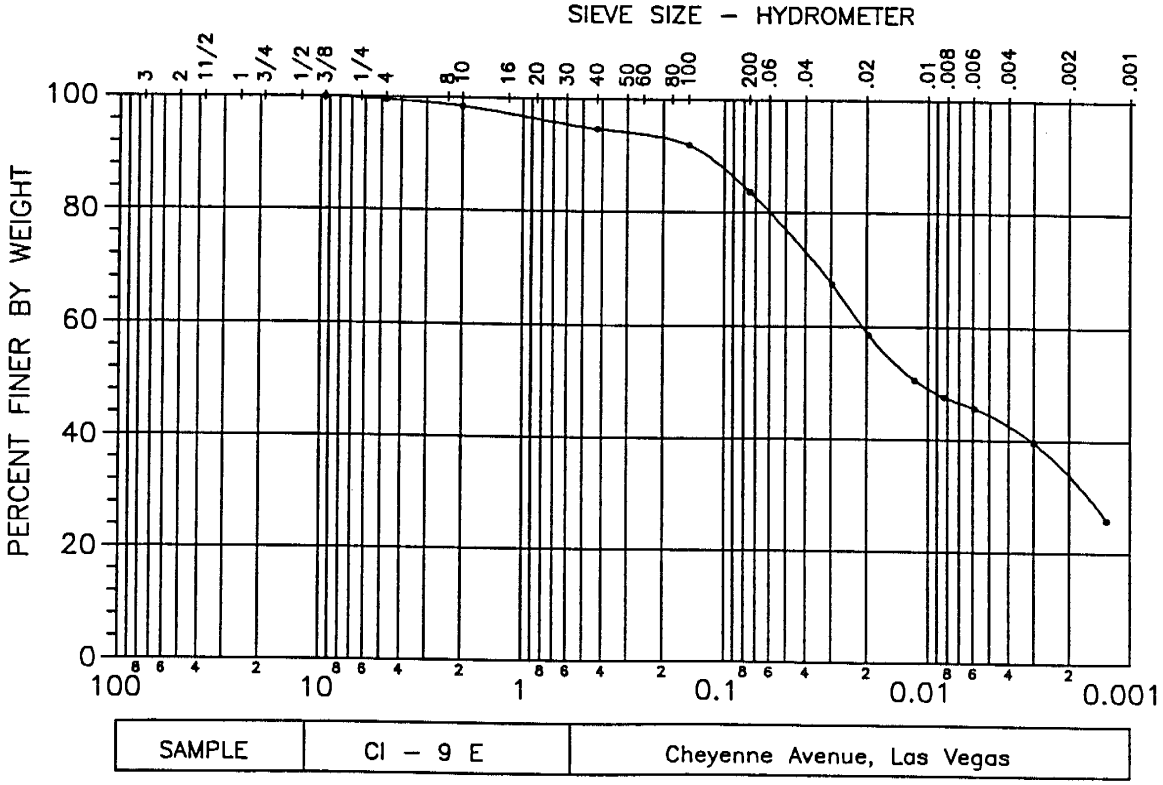
Gravity
2.70

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**58.95**	**34.12**	**19.93**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**16**	**50**	**34**	**75**	**54**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.082	**0.021**	**0.011**	**0.002**		



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	CI-10
DATE	11/18/96	SAMPLE #	C

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**95.92**	**94.39**	**91.01**	**67.30**

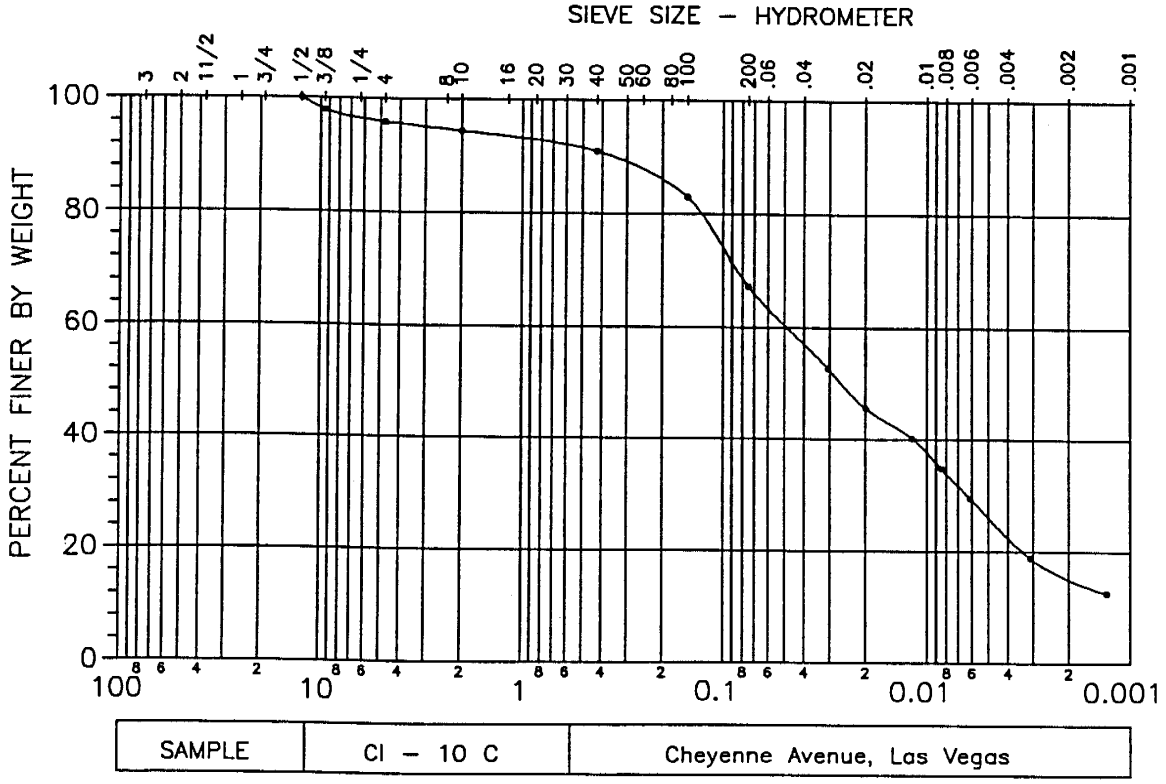
Gravity
2.73

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**45.60**	**15.02**	**11.37**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**4**	**29**	**52**	**15**	**30**	**13**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.176	**0.049**	**0.027**	**0.006**	**0.0010**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	B3

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**98.61**	**96.75**	**88.02**	**32.48**

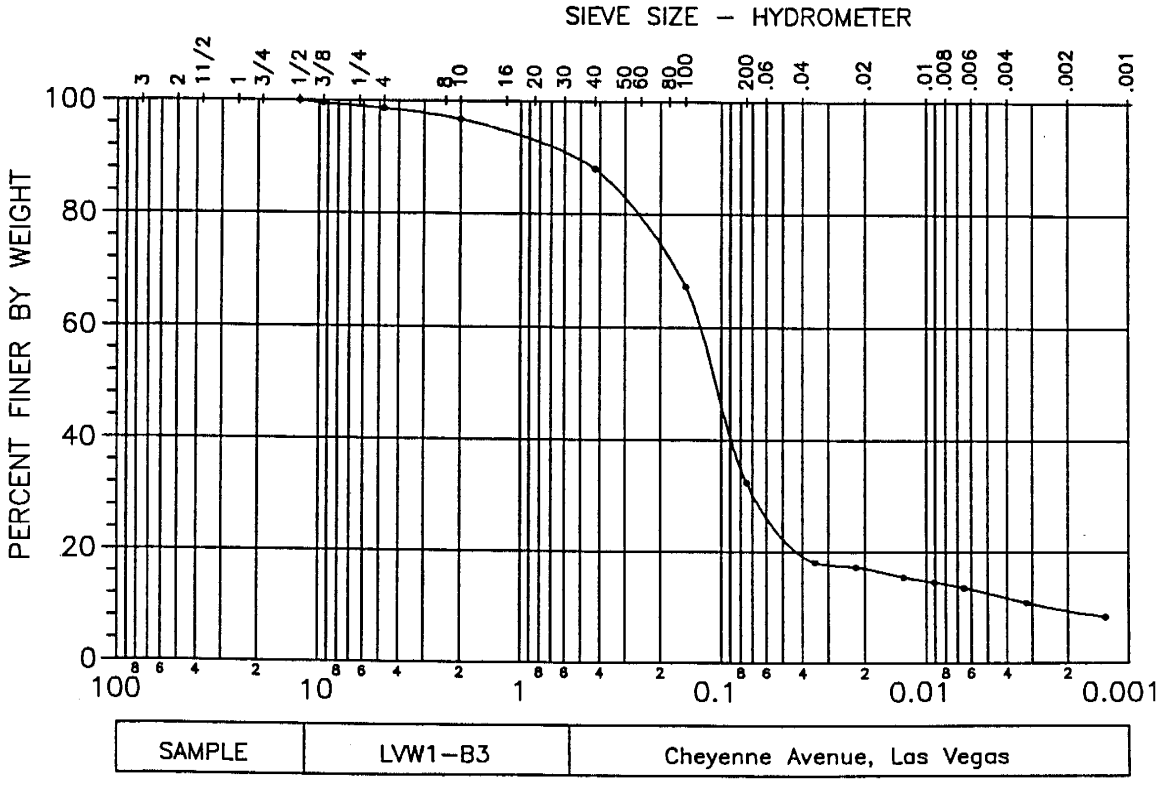
Gravity
2.74

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**17.00**	**9.40**	**7.62**		**5.08**	**149.95**

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**1**	**66**	**23**	**9**	**20**	**2**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.342	**0.013**	**0.011**	**0.069**	**0.0113**	**0.0025**



G R A D A T I O N C U R V E

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	B5

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**92.14**	**85.58**	**69.70**	**27.28**

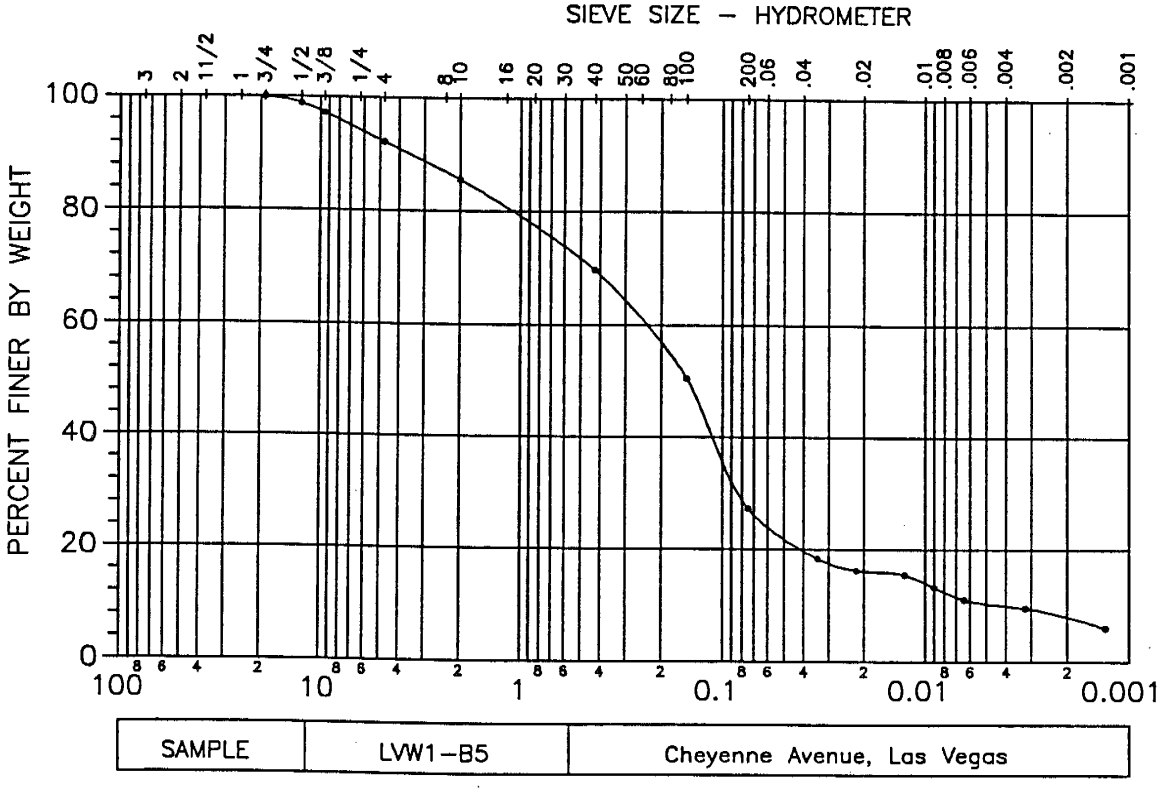
Gravity
2.76

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**16.07**	**8.03**	**4.59**		**53.18**	**6.92**

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**8**	**65**	**19**	**8**	**20**	**3**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
1.890	**0.234**	**0.147**	**0.084**	**0.0116**	**0.0044**



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	C2

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	99.86	98.89	56.98

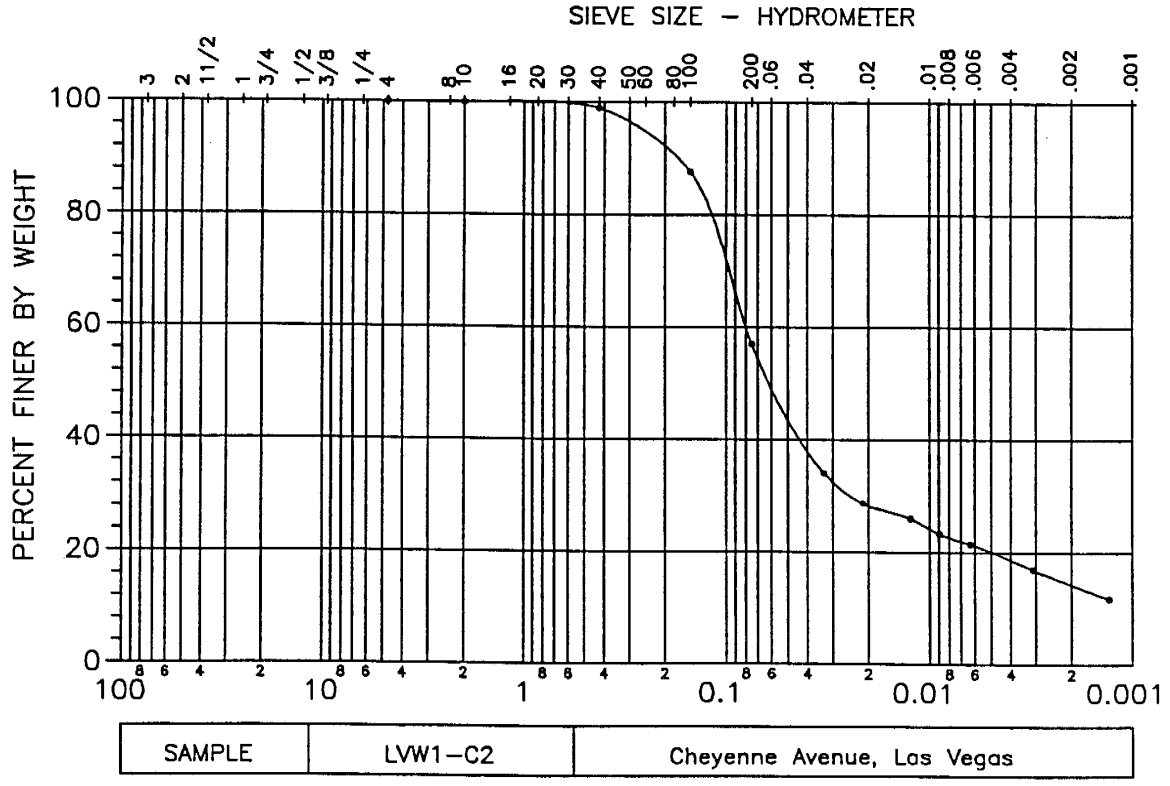
Gravity
2.73

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	28.27	14.29	10.12		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	43	43	14	23	9

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.135	0.081	0.062	0.025	0.0023	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	E

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**99.89**	**99.78**	**99.73**	**81.62**

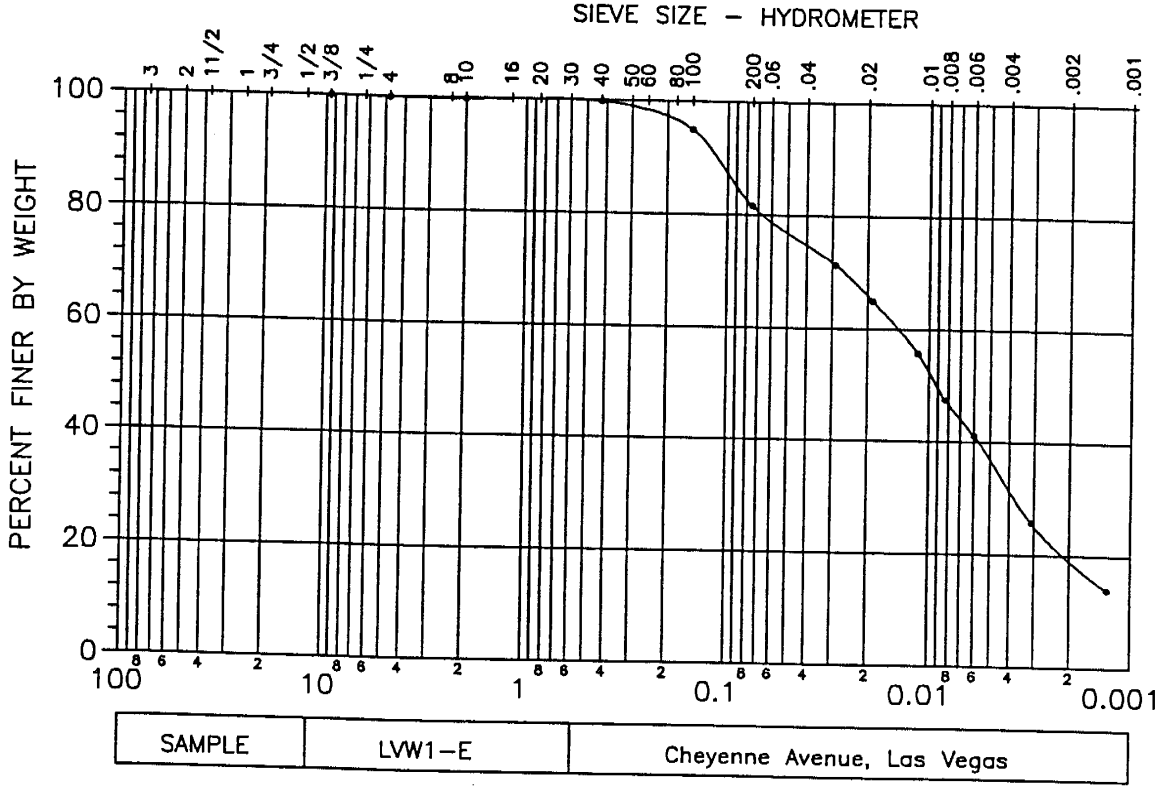
Gravity
2.67

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**65.94**	**19.09**	**11.16**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**18**	**63**	**19**	**41**	**25**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.090	**0.014**	**0.009**	**0.004**	**0.0014**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	F

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**99.80**	**99.47**	**98.26**	**58.58**

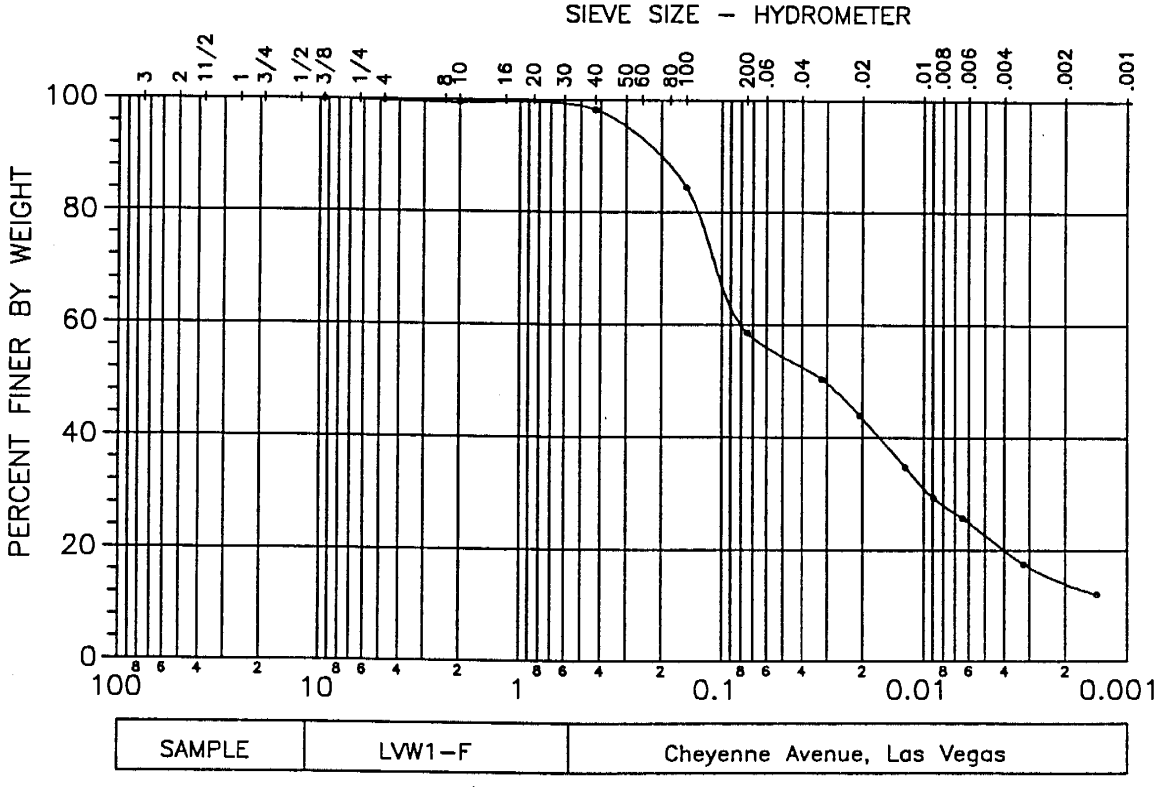
Gravity
2.66

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**43.40**	**13.98**	**10.23**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**41**	**45**	**14**	**24**	**10**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.154	**0.081**	**0.031**	**0.010**	**0.0024**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	G

Particle Size Analysis
AASHTO T88

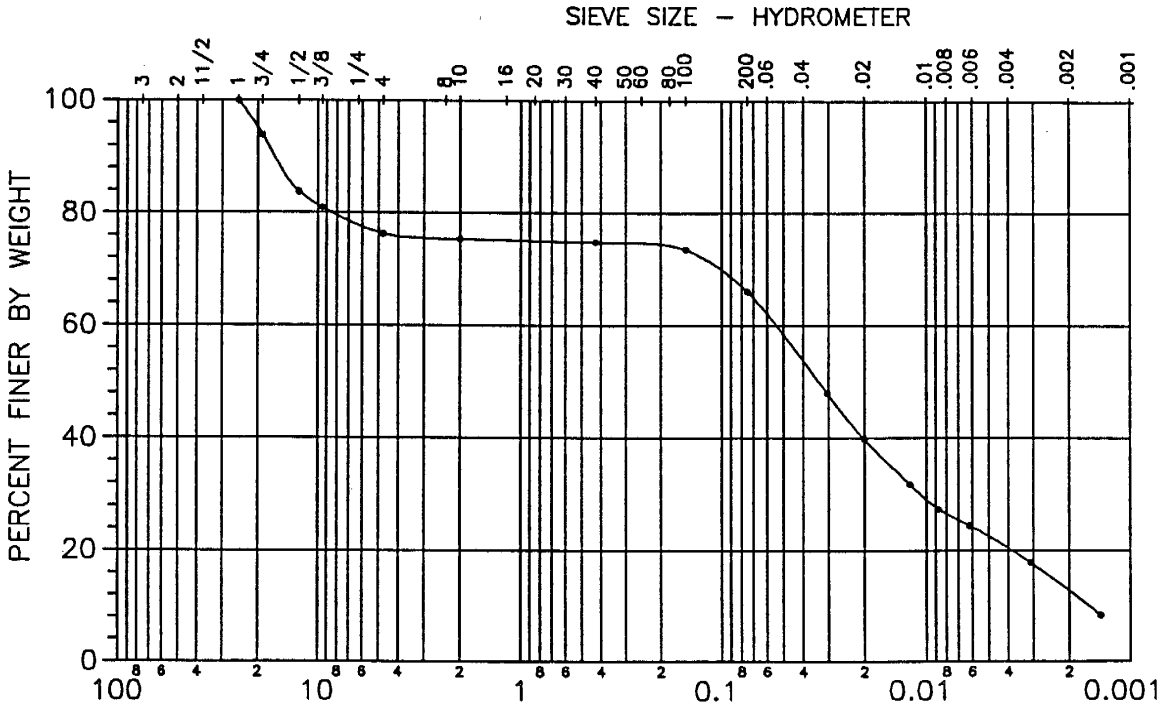
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**76.30**	**75.35**	**74.86**	**66.02**	**2.68**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**39.85**	**12.83**	**2.92**		**33.75**	**1.33**

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**24**	**10**	**53**	**13**	**78**	**52**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
13.580	**0.054**	**0.034**	**0.011**	**0.0024**	**0.0016**



SAMPLE	LVW1–G	Cheyenne Avenue, Las Vegas

GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	H

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**97.47**	**97.46**	**97.00**	**35.57**

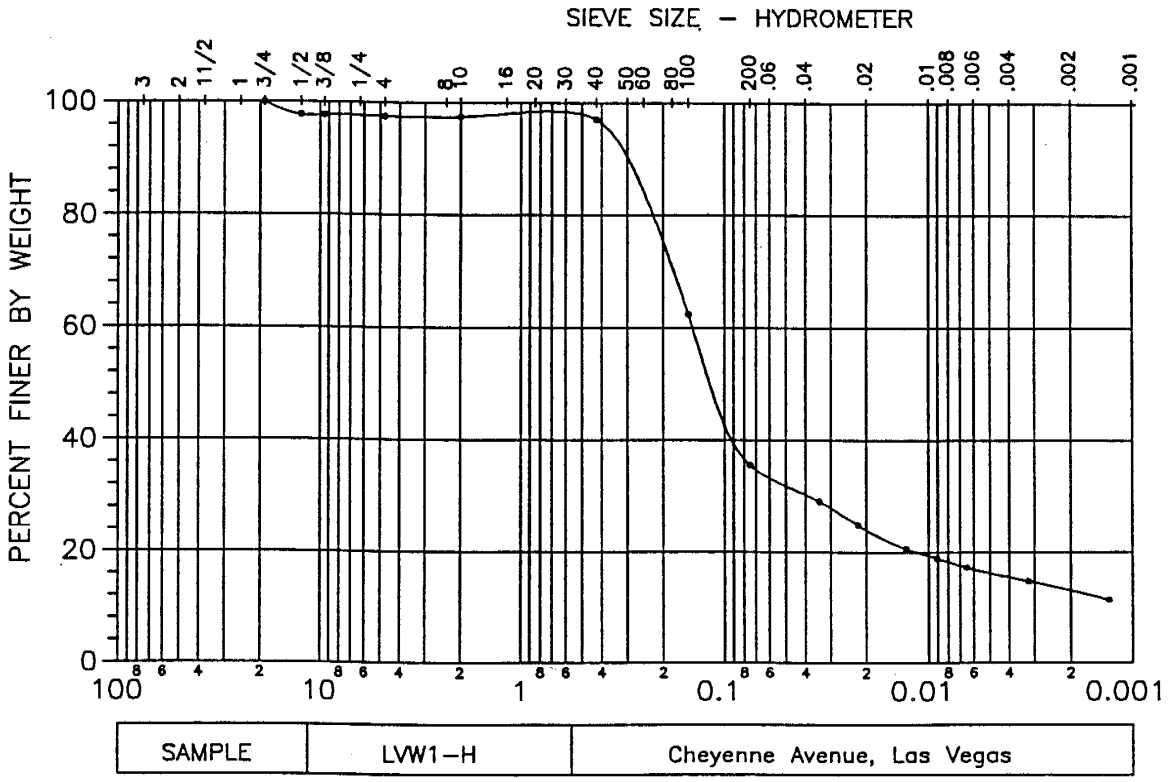
Gravity
2.67

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**24.00**	**12.94**	**10.12**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**3**	**62**	**23**	**13**	**69**	**47**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.254	**0.143**	**0.118**	**0.039**	**0.0036**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	I2

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	100.00	93.58	75.24

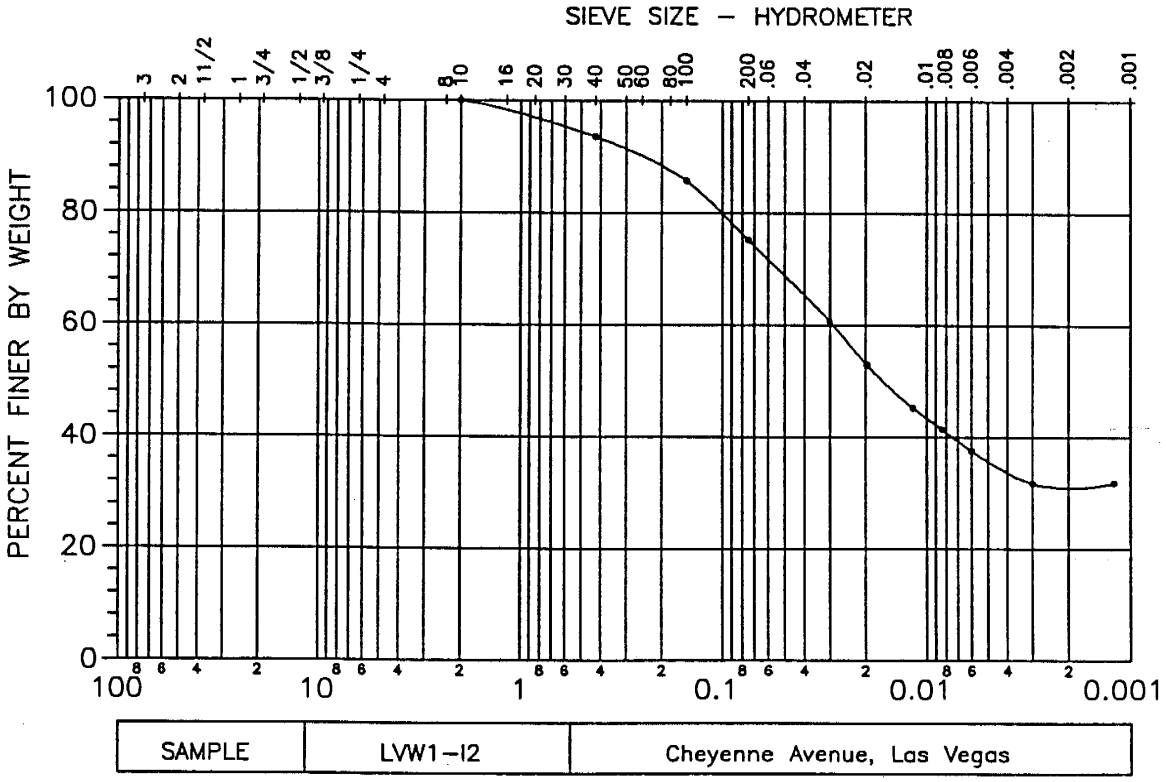
Gravity
2.73

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	53.31	31.82	31.82		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	25	43	32	116	76

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.141	0.029	0.016			



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	I4

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.64**	**92.94**

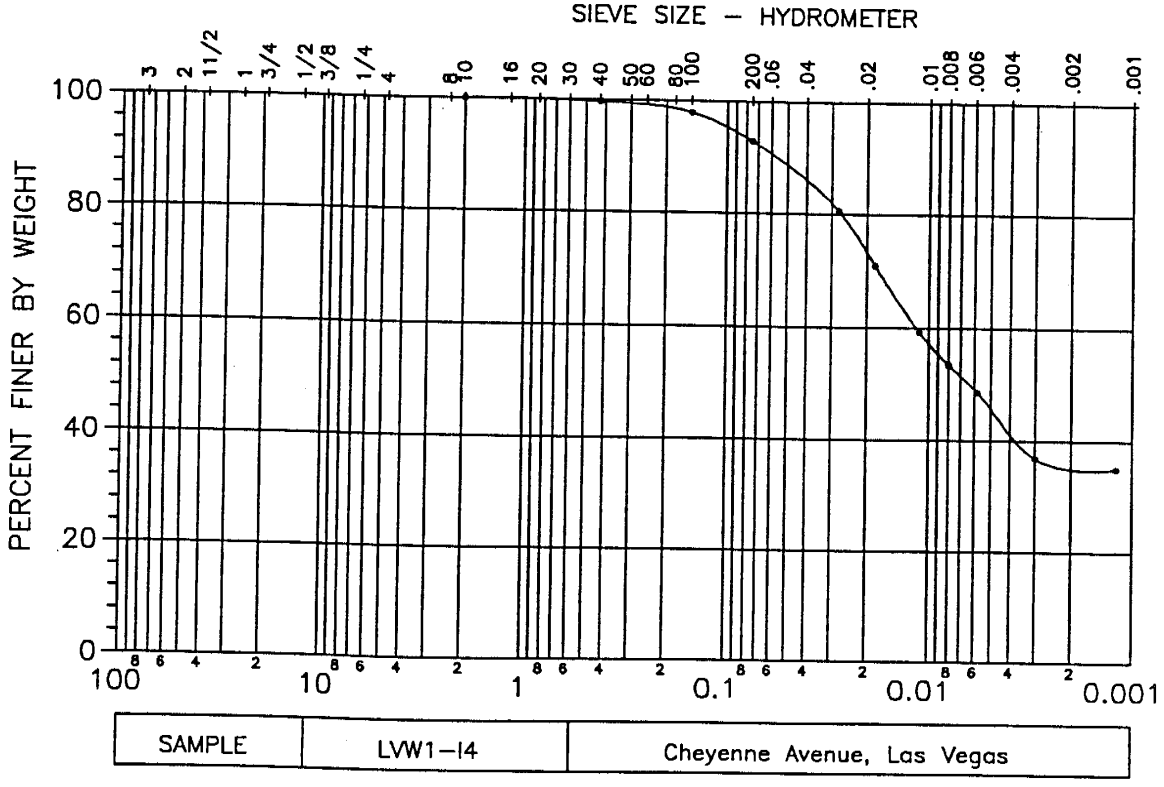
Gravity
2.73

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**73.34**	**35.16**	**35.16**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**7**	**58**	**35**	**99**	**68**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.037	**0.012**	**0.006**			



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	K

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	100.00	97.68	83.36

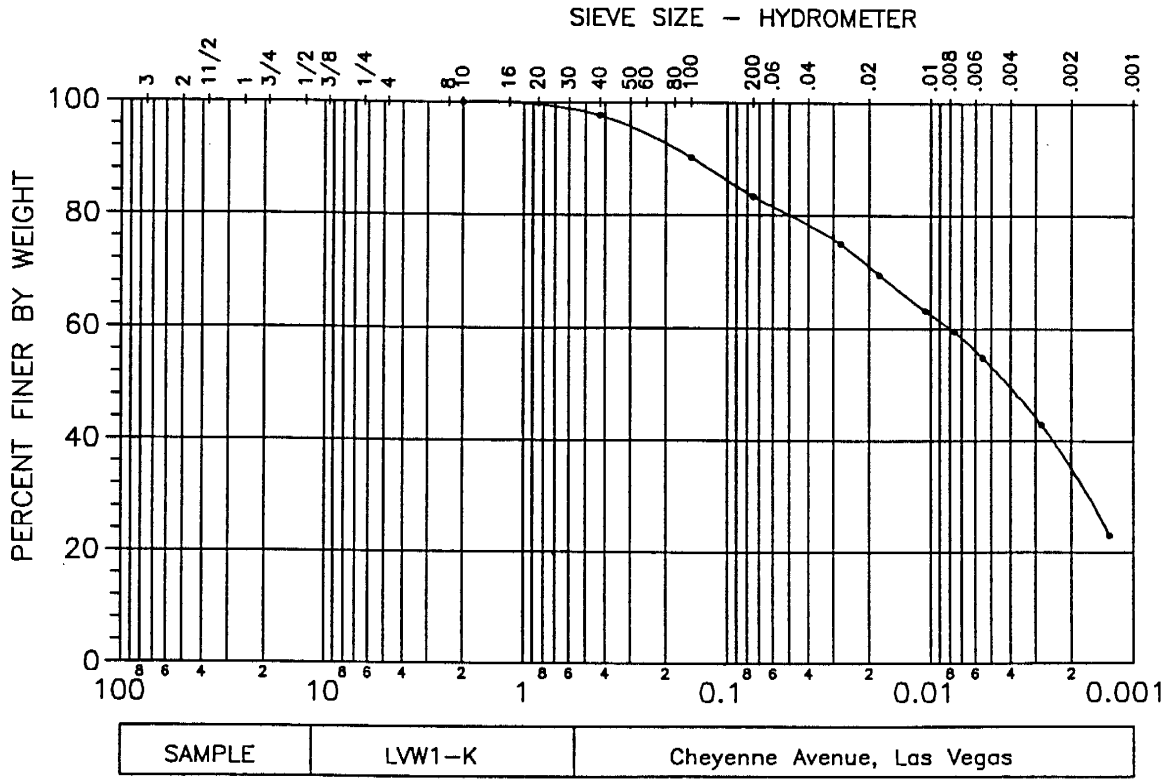
Gravity
2.77

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	71.05	35.26	12.60		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	17	48	35	73	46

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.089	0.008	0.004	0.002	0.0010	



SAMPLE	LVW1–K	Cheyenne Avenue, Las Vegas

GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	L1

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	100.00	95.30	67.51

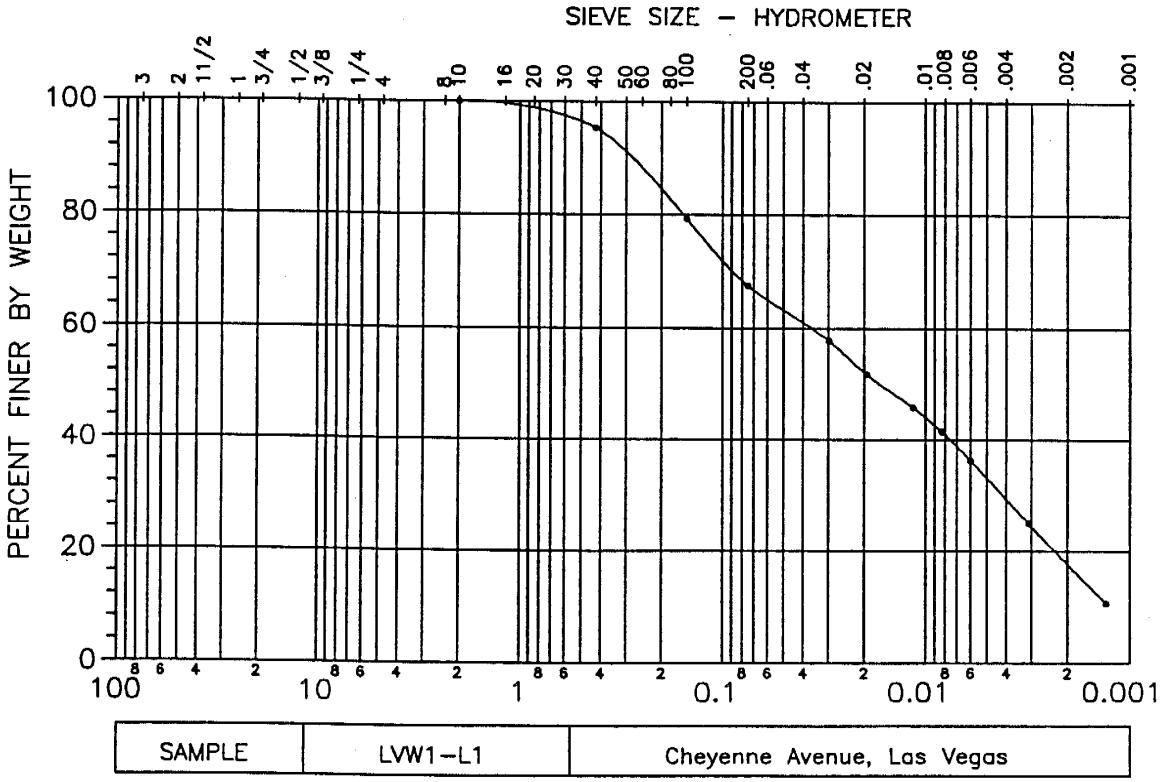
Gravity
2.71

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	52.17	17.74	6.57		27.69	0.38

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	32	50	18	39	19

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.206	0.036	0.017	0.004	0.0017	0.0013



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	L2

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	100.00	96.06	82.18

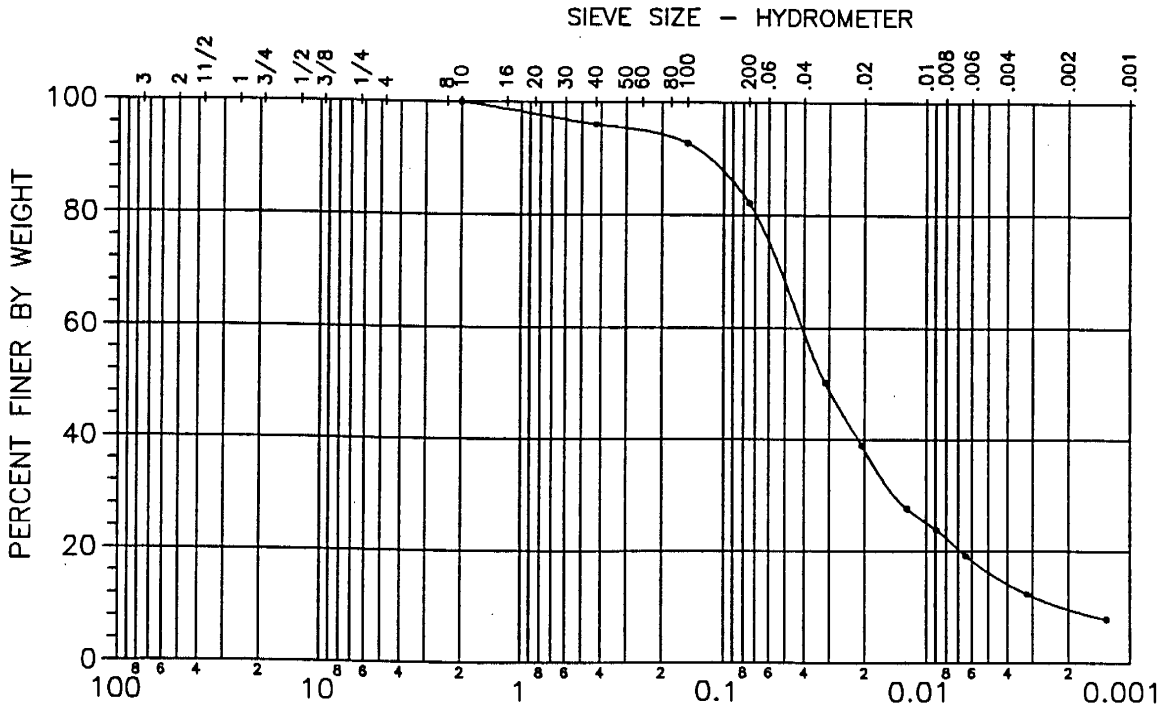
Gravity
2.73

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	37.98	9.60	6.89		18.64	2.36

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	18	73	10	67	39

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.086	0.041	0.031	0.015	0.0044	0.0022



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	L3

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**99.49**	**99.34**	**97.70**	**79.78**

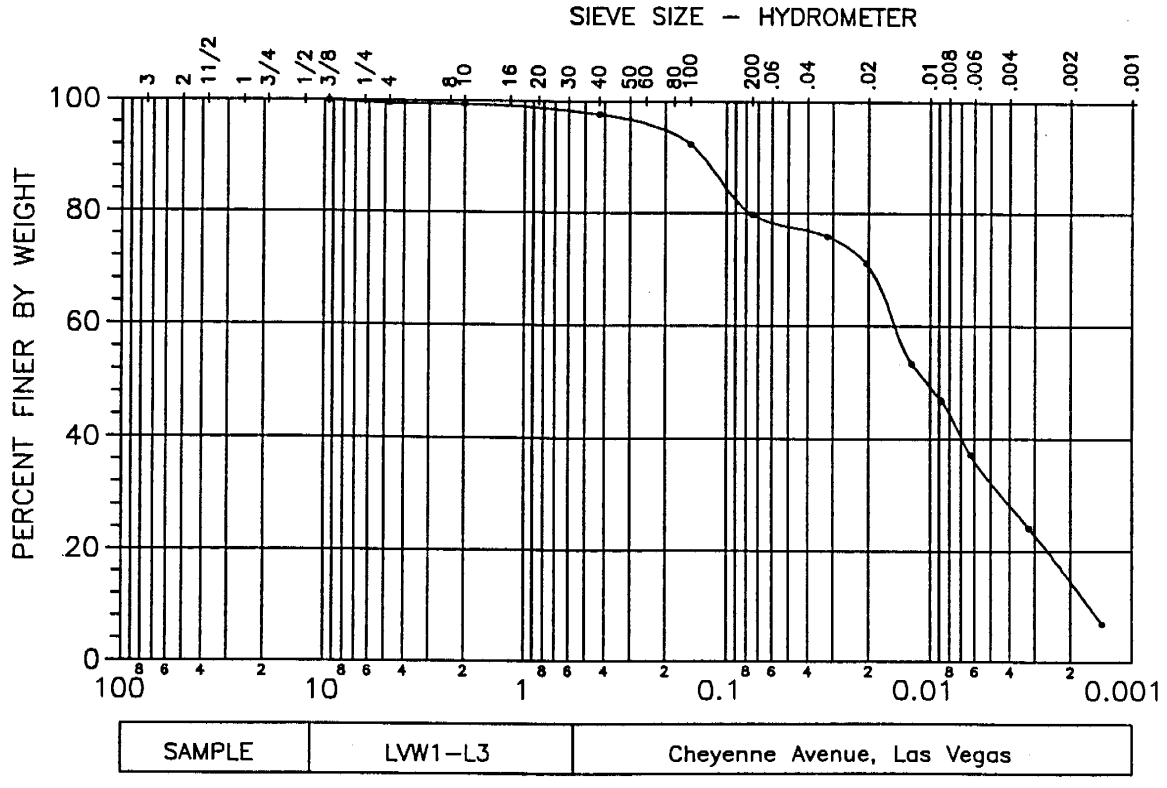
Gravity
2.72

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**70.32**	**14.71**	**0.04**		**9.63**	**0.79**

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**1**	**20**	**65**	**15**	**72**	**38**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.105	**0.015**	**0.010**	**0.004**	**0.0020**	**0.0016**



G R A D A T I O N C U R V E

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	M

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	100.00	100.00	96.37	80.13

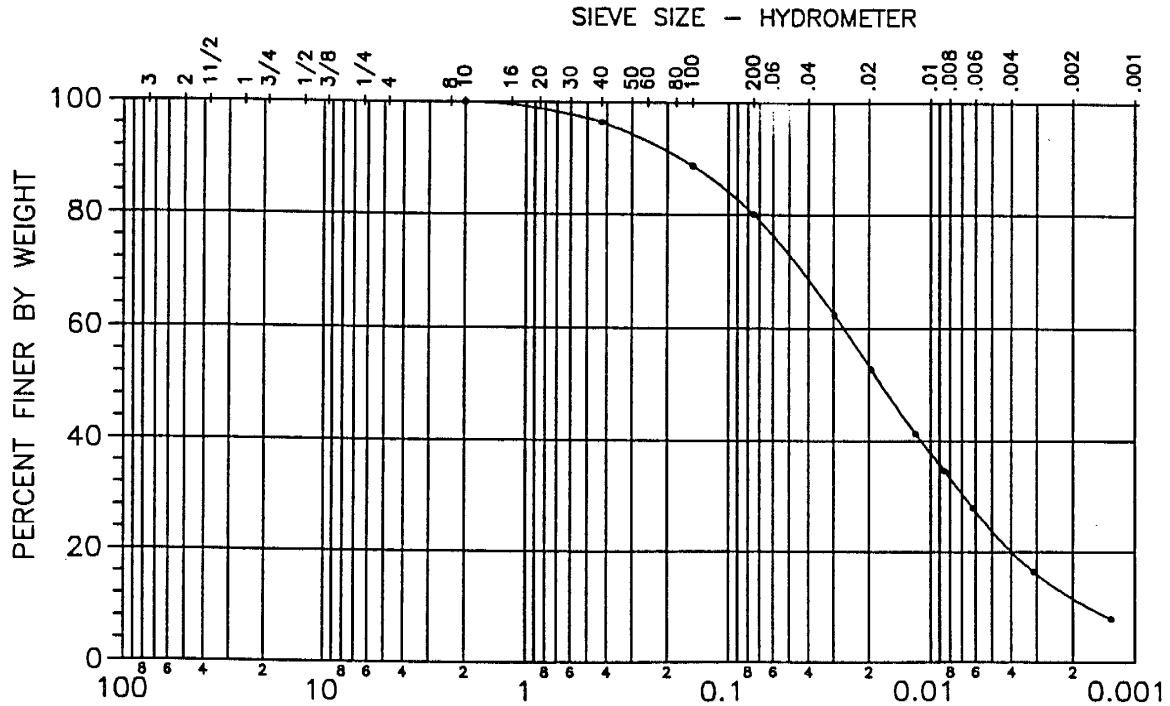
Gravity
2.75

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	53.42	11.58	5.84		15.88	1.04

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	0	20	69	12	51	29

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.108	0.027	0.017	0.007	0.0028	0.0017



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	N3

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**97.95**	**44.58**

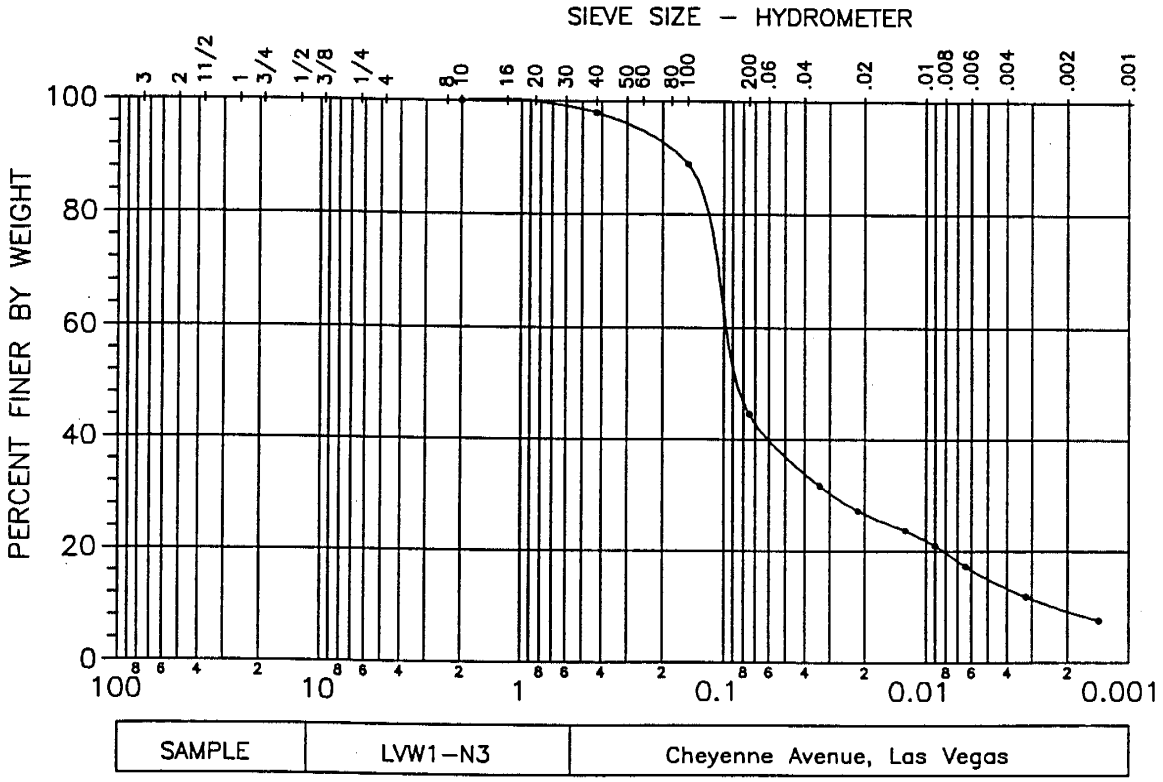
Gravity
2.70

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**26.71**	**9.08**	**6.36**		**40.42**	**3.61**

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**55**	**35**	**9**	**38**	**20**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.131	**0.097**	**0.086**	**0.029**	**0.0050**	**0.0024**



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	N5

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**99.99**	**99.84**	**82.63**

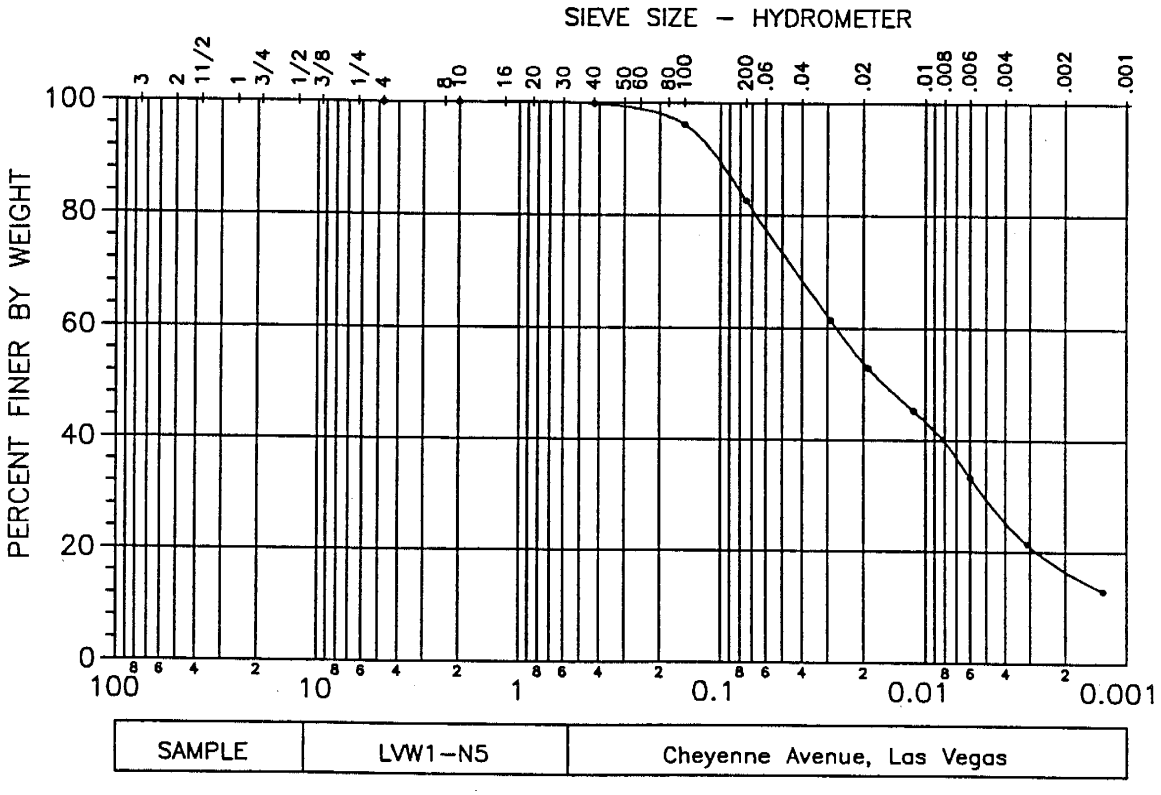
Gravity
2.75

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**53.94**	**16.59**	**11.48**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**17**	**66**	**17**	**49**	**30**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.083	**0.027**	**0.016**	**0.005**	**0.0017**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	01

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**99.96**	**97.30**

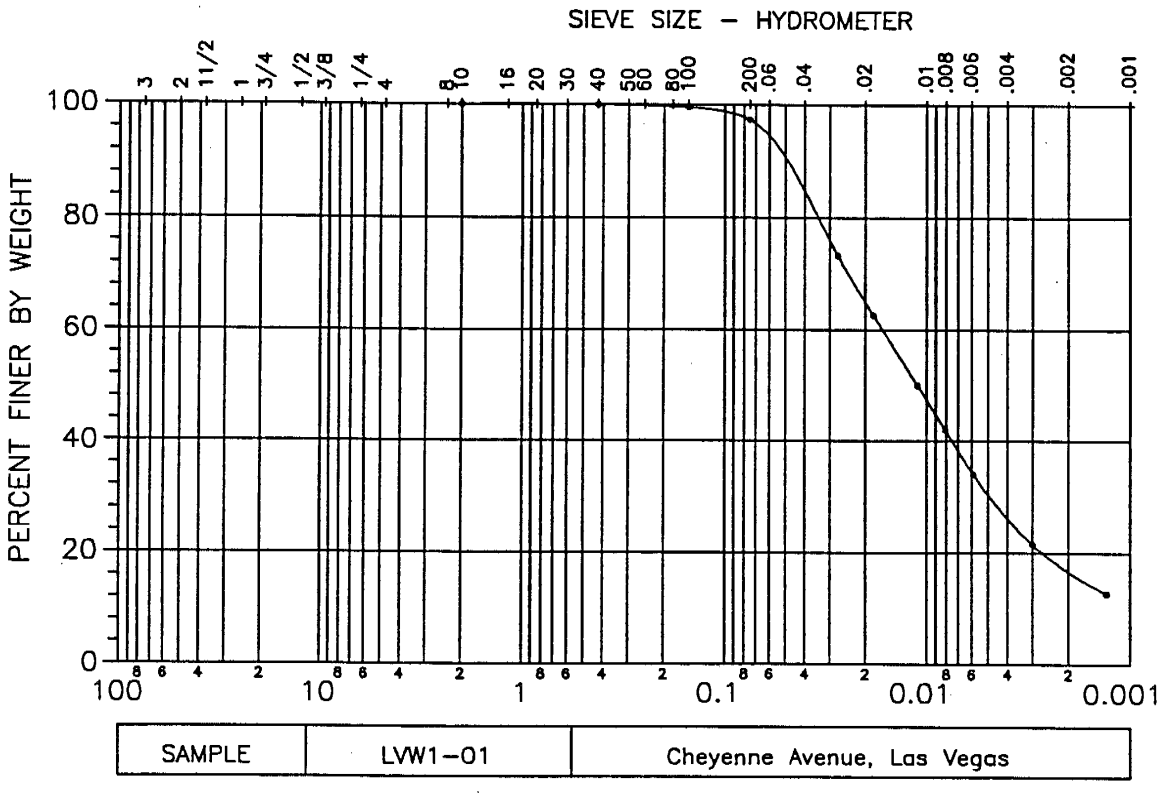
Gravity
2.79

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**64.89**	**16.69**	**10.75**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**3**	**81**	**17**	**30**	**13**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.040	**0.016**	**0.011**	**0.005**	**0.0017**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	O2

Particle Size Analysis
AASHTO T88

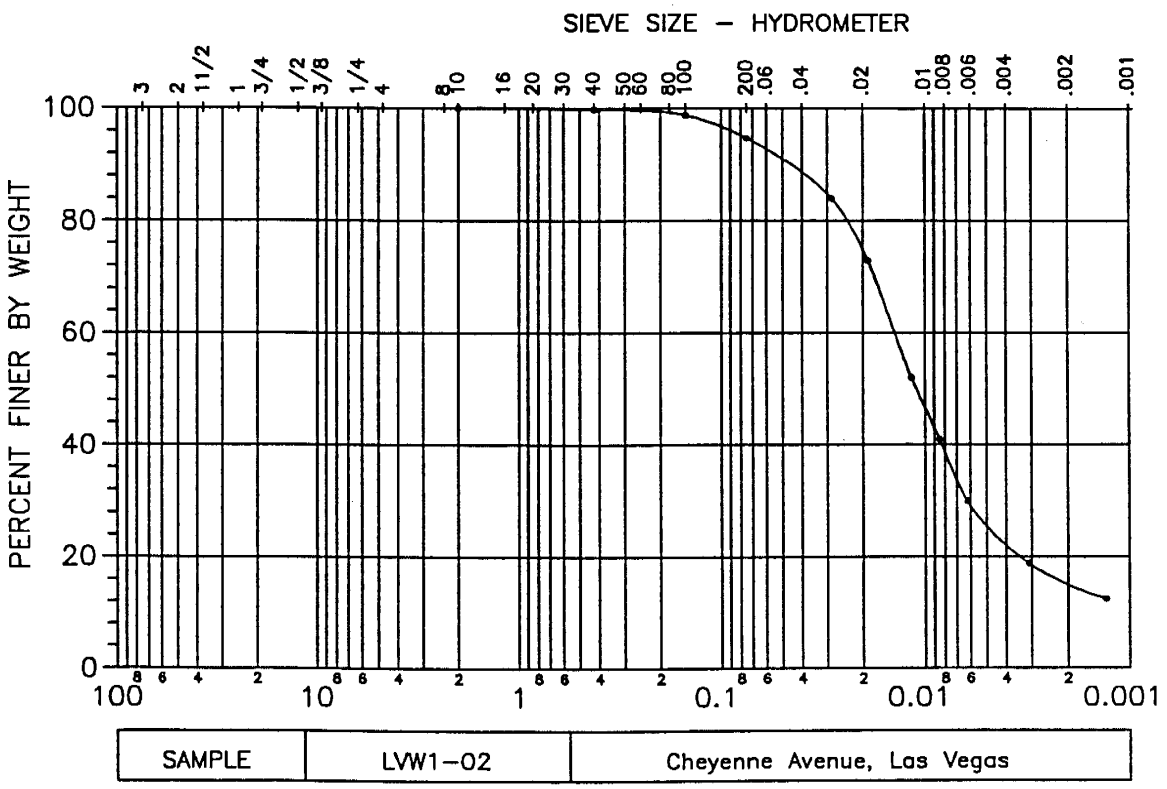
Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)	Gravity
% Passing	**100.00**	**100.00**	**99.75**	**94.68**	**2.74**

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**77.73**	**15.02**	**11.27**		-	-

Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**5**	**80**	**15**	**25**	**5**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.022	**0.015**	**0.011**	**0.006**	**0.0020**	



GRADATION CURVE

NEVADA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL SECTION

LAB #	FL - 11 - 96	E. A. NO.	72031
PROJECT	Cheyenne Avenue Interchange	BORING	LVW-1
DATE	11/19/96	SAMPLE #	03

Particle Size Analysis
AASHTO T88

Sieve Size	4.75mm (#4)	2mm (#10)	.425mm (#40)	.075mm (#200)
% Passing	**100.00**	**100.00**	**100.00**	**98.72**

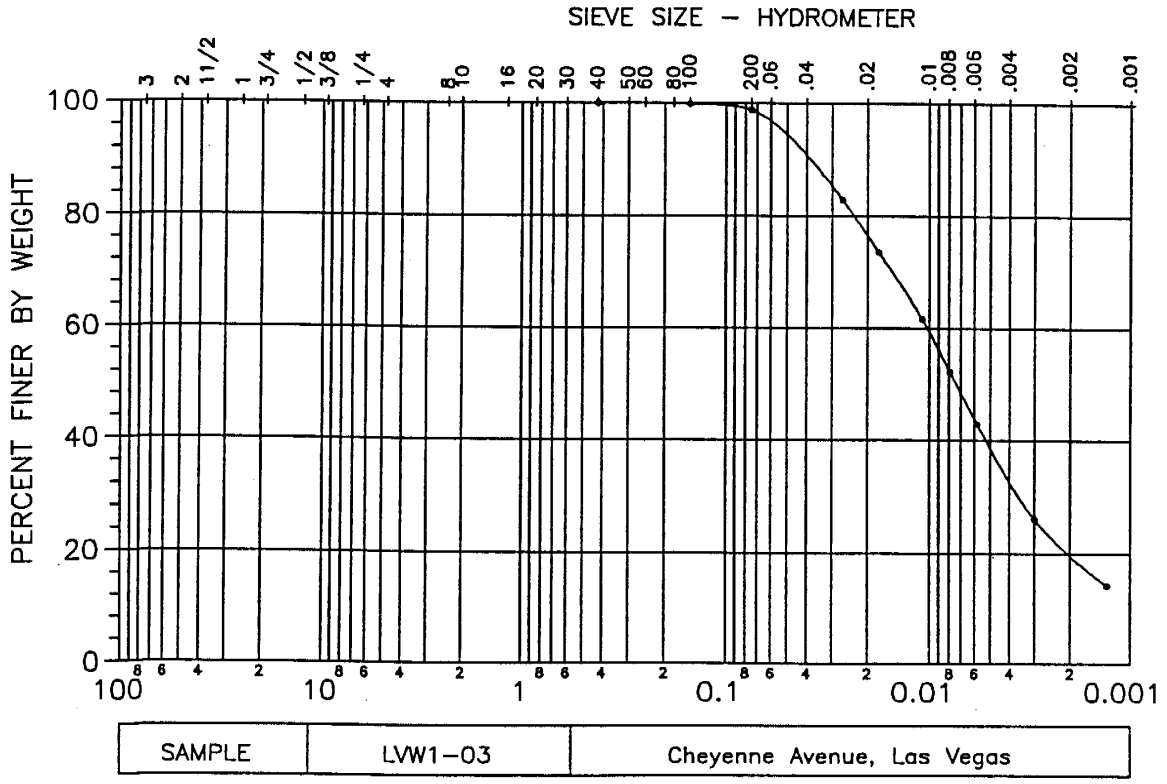
Gravity
2.76

Hydrometer	.02mm	.002mm	.001mm	Coefficients	C_u	C_c
% Passing	**76.47**	**19.72**	**11.27**		-	-

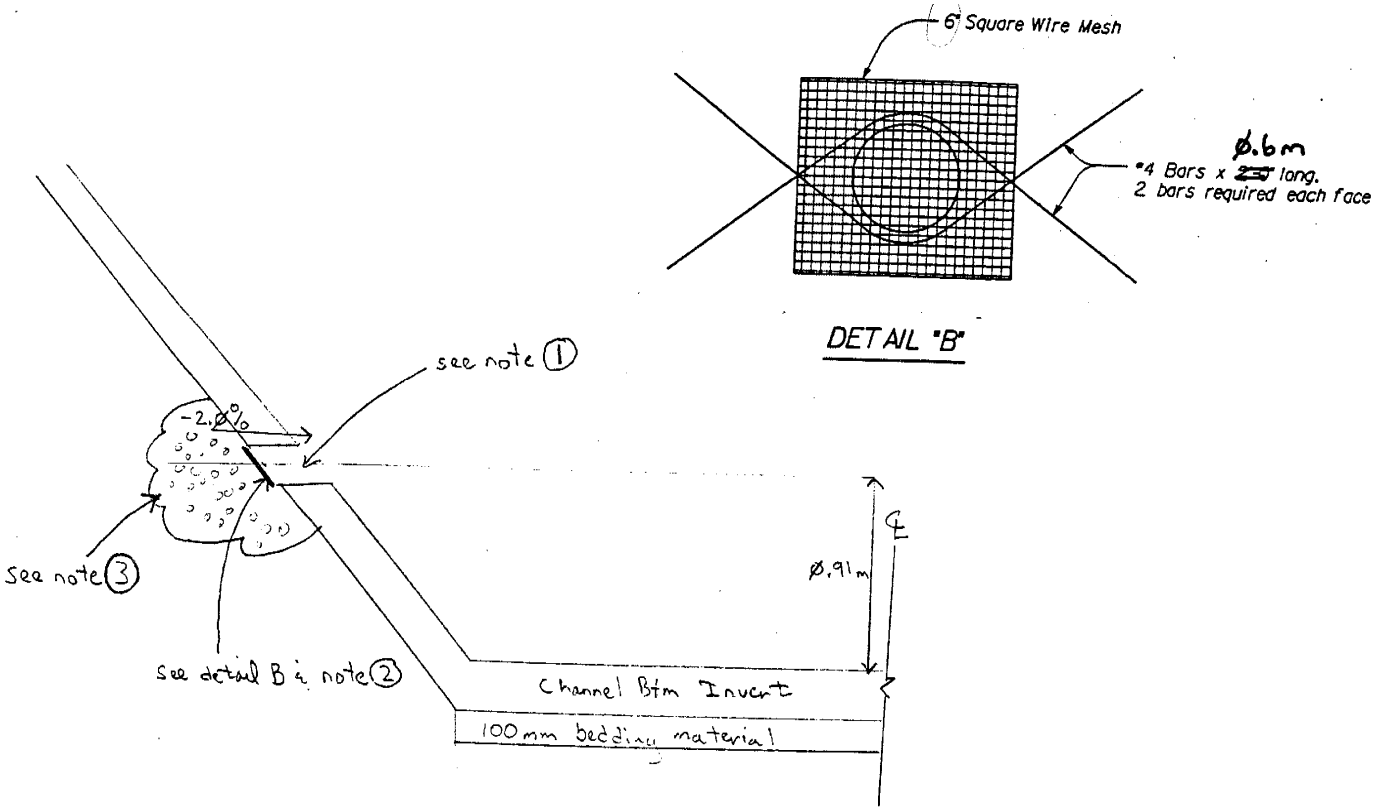
Unified Soil Classification System

% +75mm	% Gravel	% Sand	% Silt - Sized	% Clay - Sized	LL	PI
0	**0**	**1**	**79**	**20**	**29**	**11**

D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}
0.029	**0.010**	**0.007**	**0.004**	**0.0014**	



GRADATION CURVE



WEEPHOLE DESIGN DETAILS

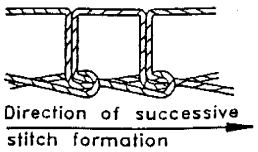
NOTES:

(1) 75mm drains at 6.1m centers locate Ø.91m above channel flowline

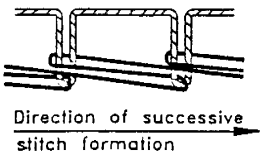
(2) 150mm Square aluminum or galvanized steel wire mesh hardware cloth with minimum wire diameter of Ø.76mm

(3) Ø.06m^3 of Type 2 Drain backfill encapsulated in filter fabric sack. Sacks shall be constructed by using flat, J, or "Butterfly" seams, using single thread chain or double thread chain stitches. Thread used to construct seams shall be polyethylene or polyester. Stitch density shall be no less than 200 stitches per meter

TYPE OF STITCHES



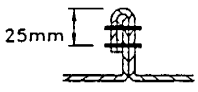
Type 101:
Single Thread Chain Stitch



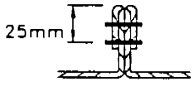
Type 401:
Double Thread Chain
or "Lock" Stitch

TYPE OF SEAMS

Flat or "prayer" seam



J Seam



"Butterfly" Seam