GEOTECHNICAL INVESTIGATION

SUMMERLIN HOV FLYOVER BRIDGE
U.S. 95 WIDENING PROJECT

LAS VEGAS, NEVADA

MAY 2008

Prepared for:

PBS&J

Black Eagle Consulting, Inc. - Geotechnical & Construction Services

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Mr. Thomas Cotton
PBS&J
2270 Corporate Circle, Suite 100
Henderson, NV 89074

May 30, 2008
Project No.: 0324-01-7

RE: Geotechnical Investigation
Summerlin HOV Flyover Bridge
U.S. 95 Widening Project
Las Vegas, Nevada

Dear Mr. Cotton:

Attached please find five copies of the geotechnical report and an electronic copy on CD-ROM for the referenced project. Three of the copies are for PBS&J. Parviz Noori of the Nevada Department of Transportation (NDOT) Materials Division requests that one copy be forwarded to the project manager, John Terry, and one to the Assistant District 2 Engineer, Mohamed Rouas. We are forwarding 6 copies directly to NDOT Materials Division in Carson City, with distribution as listed below.

We appreciate being of service to you on the project. If you have any questions, or require any additional information, please contact us.

Sincerely,

Black Eagle Consulting, Inc.

Larry J. Johnson
Senior Consultant

PROFESSIONAL ENGINEER - STATE OF NEVADA
JONATHAN W. PEASE
Exp: 12-2009
CIVIL

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Copies to: Addressee (5 copies, 1 CD-ROM)
Parviz Noori, NDOT Materials Division (6 copies)
(NDOT Materials Division, 2 copies plus CD-ROM)
(Nancy Kennedy, NDOT Bridge Division, 1 copy)
(Sharon Foershler, NDOT Construction Division, 1 copy)
(Natalie Caffaratti, NDOT Roadway Design, 1 copy)
(Terry Philbin FHWA, 1 copy)

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1.0 INTRODUCTION

Presented herein is the Black Eagle Consulting, Inc. (BEC) geotechnical investigation for the proposed Summerlin Parkway High-Occupancy-Vehicle (HOV) Flyover bridge (Structure I-2744) that is proposed as part of the U.S. 95 / Rainbow Road / Summerlin Parkway interchange in Las Vegas, Nevada. The investigation was performed for the Post, Buckley, Schuh, and Jurnigan (PBS&J) design team, which is preparing the project design for the Nevada Department of Transportation (NDOT). The objectives of this study were to:

1. Determine general soil conditions pertaining to the 100 percent design and construction of the proposed bridge and associated retaining walls.

2. Provide recommendations for design and construction of the proposed bridge and approaches, as related to these geotechnical conditions.

Our investigation included field exploration, laboratory testing, and engineering analysis to determine the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report and form the basis for all conclusions and recommendations. This report includes pertinent borings from previous BEC investigations on this site (BEC, 2002a, 2002b, 2002c, 2003). The services described herein were conducted in accordance with the Subcontract Addendum to PBS&J Sub-consultant Contract for *PBS&J Project 511300.01 with Black Eagle Consulting, Inc., with the short title, "U.S. 95 HOV Flyover."*

2.0 PROJECT DESCRIPTION

2.1 Site Conditions

The Summerlin HOV Flyover bridge will be located within the U.S. 95/Summerlin Parkway/Rainbow Road interchange in the City of Las Vegas. The interchange is contained in Sections 26 and 27, Township 20 South, Range 60 East, Mount Diablo Meridian.

The east half of the HOV Flyover bridge will be located in the future centerline of U.S. 95 freeway, which is being reconstructed for widening. The U.S. 95 freeway in the Summerlin/Rainbow Road interchange is generally depressed as much as 2 to 3 m below original natural grade. The footprint of the south half of the bridge at the time of our exploration was approximately level at the adjacent freeway grade with gravel surfacing and no improvements. Existing traffic on U.S. 95 was moved from the northeast side of the proposed bridge to the southwest side of the proposed bridge shortly before our exploration.

The HOV Flyover bridge will cross over the Rainbow Boulevard bridge and Ramp R7 bridge. North of Rainbow Boulevard, the bridge will cross above U.S. 95 southbound, Ramp R6, and various landscaped areas within the interchange. Landscaping is minimal, consisting of scattered trees or shrubs and gravel hardscape. The west end of the bridge approaches the west end of the Ramp 11 overpass, which connects from U.S. 95 northbound to Summerlin Parkway westbound. The west abutment and Piers 9 through 11 will be built over an existing 2H:1V (Horizontal:Vertical) fill slope for Ramp 11 which is approximately 11 m high.

Various utilities including traffic control loops, overhead lighting wiring, water and storm drain are present in the area. A 1,060-mm-diameter water supply pipeline and a storm drain box culvert cross beneath the flyover bridge footprint south of Rainbow Road.

2.2 Structure/Development Information

The HOV flyover bridge will provide a route for HOV traffic from the median of U.S. 95 northbound to the median of Summerlin Parkway westbound, and from the median of Summerlin Parkway eastbound to the median of U.S. 95 southbound. The bridge will carry one travel lane in each direction, with wide shoulders in each direction and a central barrier rail. The bridge will be 18.3 m wide and 740 m long, with 12 spans between 55 and 69 m in length. Abutment 1 will be located in a Mechanically Stabilized Earth (MSE) fill approximately 5 m high in the median of U.S. 95. Mechanically Stabilized Earth walls H1 and H2 will be as high as 4 and 5 m high extending 71 to 111 m to the southeast, on the northeast and southwest sides of the HOV lanes, respectively. Abutment 2 will be located on an existing 2H:1V fill for the adjacent Ramp 11 overpass. Mechanically Stabilized Earth walls H3 and H4 will be as high as 4 and 11 m high, extending 33 and 75 m to the west, on the north and south sides of the HOV lanes, respectively.

Two concrete cantilever walls, H-5 and H-6, are planned to support the Ramp 11 embankment adjacent to new bridge piers. Wall H-5, which will be up to 3.9 m high and 17 m long, will support the edge of the Ramp 11 adjacent to Pier 11. Wall H-5 will be founded on a 4H:1V slope immediately uphill from Pier 11. Wall H-6, which will be up to 2.65 m high and 4.5 m long, replaces the south end of an existing tieback wall which must be excavated to construct Pier 10. Wall H-6 has level ground at its base and supports a 2H:1V slope below an existing bridge abutment.

The bridge will consist of steel plate girders with a concrete deck supported on cast-in-place concrete piers. Piers will have a single rectangular column, typically 1.8 by 5 m in cross section, and columns will vary in height between 2.5 and 14.1 m above final grade. Abutment 1 will be a closed abutment. Abutment 1 and Piers 1 to 8 will be supported on spread footings that will be least 2 m below the ground surface. The footings for Piers 9 through 11 are proposed to be 1 to 4 m above adjacent interchange grade within existing 2H:1V embankment slopes. The footing for Abutment 2 is proposed to be between 1 to 8 m above adjacent interchange grade. If built at lower elevation, the Abutment 2 footing would be entirely in existing embankment fill. If Abutment 2 is built at the highest elevation, the existing embankment would be widened by the addition of new borrow fill. The north side of the abutment footing would be on existing embankment but the south edge of the footing would be on as much as 3 m of new embankment fill overlying existing embankment fill.

The bridges will be designed using Load and Resistance Factor Design (AASHTO, 2007). Vertical service loads (consisting of dead plus live loads, load factor of 1.0) were 27,000 kN for typical pier foundations. Abutments will be subject to soil and bridge deck longitudinal loading.

3.0 GEOLOGIC CONDITIONS AND SEISMICITY

3.1 Regional Geologic Conditions

The project lies within the Las Vegas Valley. The Las Vegas Valley occupies a topographic and structural basin transitional between the “younger” Basin and Range topography of the Great Basin of Nevada and Utah, and the “older” Basin and Range topography characteristic of the

Mojave and Gila Deserts of Arizona and California. Extensional or normal faulting started in mid- to late-Tertiary time resulting in the basin-and-range topography currently observed in the Las Vegas area. Following the peak of tectonic activity in Miocene time, and continuing through Quaternary time, a thick, semi-continuous sequence of terrestrial sediments accumulated in deep structural basins, including the structural basin that forms the Las Vegas Valley.

The center of the Las Vegas structural basin is characterized by a gradual alluvial plain sloping from the west and northwest to the east and southeast, that is crossed by a series of generally north-south-trending normal faults that extend discontinuously across the center of the valley. The majority of the faults show movement down to the east and extend to depths that approach 150 m.

3.2 Surficial Geology

The HOV flyover bridge alignment is on soils that have been mapped by the Nevada Bureau of Mines and Geology (NBMG) (Matti, et al., 1987) as intermittently active alluvium (Holocene) overlying Older Alluvium of the Red Rock Fan (Pleistocene). According to the NBMG, the Holocene alluvium consists of slightly to moderately consolidated sand and pebble to cobble gravel. The Older alluvium of the Red Rock Fan ("older fan deposits") consist of mostly moderately well-consolidated and cemented, pebble to small cobble gravel with pebble-bearing sand.

3.3 Seismicity

The Las Vegas area is relatively quiet seismically compared to the northern portions of the state of Nevada. The mountain ranges and deep alluvial basin in the Las Vegas area were formed primarily by Tertiary tectonic movements, i.e., activity greater than 1.6 million years before present. The strongest historic seismic activity in the project vicinity has been related seismic response to filling of Lake Mead (M 5.0; several earthquakes between 1938 and 1952) or energy released from underground atomic testing north of Las Vegas in Yucca Flats (maximum magnitude M 5.8).

American Association of State Highway Transportation Officials (2007) shows horizontal rock acceleration potential to be 0.10g for a 10 percent probability of exceedance within 50 years in this area.

3.4 Faults

Area Quaternary faults have been mapped by the NBMG and are presented in the *Map of Faults and Earth Fissures in the Las Vegas Area* (dePolo and Bell, 2000). This map identifies traces of potential Quaternary age tectonic faults approximately four kilometers (km) west and two km east of the site, but there is no evidence of faulting in the site vicinity.

3.5 Ground Subsidence

Regional land subsidence in the Las Vegas Valley related to ground water withdrawal has been monitored since 1935 (Bell and Price, 1993; Bell et al., 2001, 2002). A map included in the 1993 open-file report, titled *Subsidence in Las Vegas Valley 1963 Through 1986/87*, identifies three major Las Vegas subsidence centers located about seven km north, seven km east, and eight km southeast of the site. The map also shows that subsidence of as much as 150 mm may have occurred in the site vicinity between the years 1963 and 1987. The more recent work (Bell, et al., 2001) indicates that subsidence within the project area has been arrested since 1987 and no additional settlement has occurred over the last two decades.

3.6 Ground Fissures

The nearest areas of ground fissures have been mapped approximately three to four km east of the site. No fissures have been mapped by others and no evidence of fissuring was observed in explorations at the project site.

3.7 Liquefaction Potential

There is no potential for liquefaction at the site because design earthquake motions and magnitude are low and the ground water is located at a depth below 30 meters.

4.0 EXPLORATION

4.1 Drilling

Portions of the bridge alignment were explored in 2001 to 2002 by drilling hollow-stem auger borings to a maximum depth of 30.5 meters. The borings were drilled with 152-millimeter (mm), outside-diameter (O.D.), 83-mm-inside-diameter (I.D.) augers using a truck-mounted Foremost

B90 and a track-mounted Diedrich D-50 Turbo drill rig. The locations of closest previous test borings with sufficient depth (B-01, B-02, B-04, B-07 through B-11, B-13, B-18 and B-19) are shown on Plate 1 - Plot Plan. Numerous other borings were performed at greater distances from the HOV bridge alignment, including borings by others, which are shown in BEC (2002b).

Seven borings (FB-01 through FB-07) were drilled in April 2007. Three borings (FB-08 through FB-10) were drilled in October 2007 on the Ramp 11 embankment between Pier 9 and Abutment 2. The borings were drilled with 152-mm O.D., 83-mm I.D. augers to a maximum depth of 24.4 m using a track-mounted Diedrich D-50 Turbo drill rig.

Native soils were sampled in place every 600 to 1,500 mm by use of a standard, 51-mm, O.D., Split-Spoon Sampler or an 89-mm O.D. Split-Spoon Sampler (ASTM D 3550), both driven with a standard 63.6-kilogram (kg) drive hammer and a 760-mm stroke (Standard Penetration Test, AASHTO T 206). The number of blows in a Standard Penetration Test (SPT) is an indication of the density and consistency of the material. Also, at various locations, where the split spoon samplers were not able to retrieve an adequate sample in the cemented, coarse, granular soils, grab samples were acquired from the auger spoils to obtain a sample of sufficient size for determining the approximate maximum particle size and particle gradation.

Coring was attempted in two borings (FB-04 and FB-05) from 1.5 to 4.5 m depth using rock coring equipment. Recovery of intact core was poor, indicating that dense gravel soils are not highly cemented.

The horizontal and vertical locations of each boring were resurveyed by PBS&J after drilling. Logs of borings are included in Appendix B (Subsurface Exploration Data).

4.2 Material Classification

A geological engineer examined and identified all soils in the field in accordance with ASTM D 2488. Additional soil classification was subsequently performed on soil samples in accordance with ASTM 2487 (Unified Soil Classification System [USCS]) upon completion of laboratory testing. Where soil tests are not listed in the appropriate column of the boring log, or soil gradation in the material description column is listed as “estimated,” the USCS symbols and terminology are based on manual identification (ASTM D 2488) rather than laboratory classification. A classification and symbol key is provided as Plate B-2 in Appendix B.

Some unavoidable bias in the grain size distributions is present in the soil identification and classification due to drilling and sampling methods. A majority of samples were collected from driven samples which met refusal (greater than 50 blows per 15 cm driven interval). Sampler refusal frequently results in crushing of material at the sampler tip and a greater fraction of smaller particles and some non-plastic fines (rock flour). Samples were also obtained from auger cuttings, where the auger lifting operation also tends to fracture and degrade larger particles into smaller particles. One sample (FB-04 at 1.8 m) was collected by rock coring techniques. Coring can reduce crushing or breaking of larger-sized particles (up to the diameter of the core barrel) but can result instead in washing out of fine particles. The cored sample had only 2 percent fines, 7 percent sand, and 91 percent gravel-sized particles. For comparison, SPT and auger cutting samples at adjacent depths consistently had 5 to 20 percent fines, 30 to 70 percent sand, and 10 to 65 percent gravel.

4.3 Drive Hammer Calibration

Borings in the 2007 investigation (FB-01 through FB-10) were sampled with a calibrated automatic hammer with an efficiency of 69 percent (Foundation Tech, LLC, 2007). The field SPT values should be multiplied by 1.15 to obtain a standard 60 percent efficiency. Where borings were performed with a calibrated automatic hammer, the hammer efficiency is also listed in the "remarks" column on each boring log.

Previous explorations were performed with a down-hole hammer operated with a wire cable winch system. The wire cable is raised and lowered by a hydraulic winch. Hammer efficiency for this system is unknown but is generally low.

4.4 Shear-Wave Velocity Survey

Redpath Geophysics conducted a shear-wave velocity survey during July 2001 in Boring B-01. The velocity study used conventional down-hole survey methods, where travel times of the shear- and compression-wave arrivals are measured progressively from the surface to the bottom of the borehole. The velocities are shown on Table 1 – Shear-Wave Velocities in Boring B-1.

TABLE 1 – SHEAR-WAVE VELOCITIES IN BORING B-01		
Depth Range in m	**Shear-Wave Velocity, m/s**	**Comment**
0 – 1.5	380	Probably compacted fill
1.5 – 6	710	Probably compacted fill
6 – 29	1,300	Native

5.0 LABORATORY TESTING

All soils testing performed in the BEC soils laboratory were conducted in accordance with the standards and methods described Nevada Department of Transportation (NDOT, 2001), American Association of State Highway Transportation Officials (AASHTO, 2004) and ASTM (2005).

5.1 Index Testing

Samples of each significant soil type were analyzed to determine their in-situ moisture content (NDOT T 206F), grain size distribution, and plasticity index (NDOT 210E, 211E, and 212E). The results of these tests are in Appendix C.1 - Laboratory Test Results.

5.2 Strength Tests

Direct Shear Tests (AASHTO T236-92) were performed on representative samples of soil from the project alignment. Since even ring samples were disturbed and all had particles greater than the 2 mm (No. 10) sieve, all direct shear test samples were prepared by removing particles greater retained on the No. 10 sieve and recompacting near the optimum water content. Direct shear test samples in the present investigation were also split on the No. 200 sieve, and then recombined to provide the same fines content (percentage of material passing the No. 200 sieve) as was present in the original bulk soil sample. Results of these tests are shown in Appendix C-2 – Strength Test Results.

A Harvard Miniature compaction test (NDOT T101E) was performed on one of the screened samples for direct shear testing (FB-10 at 9.1 – 10.7 m) for comparison of tested and compacted densities. The test results showed the maximum dry density of 19.8 kN/m^3 (126 pcf) at an optimum moisture content of 9 percent by dry sample weight. The tested sample at that location had an average density equal to 97 percent of the maximum dry density by this test method.

5.3 Corrosion Potential Tests

Chemical testing was performed on representative samples of site foundation soils to provide data for corrosion potential evaluation. Chemical testing was subcontracted to Western Environmental Testing Laboratory of Sparks, Nevada. Testing for pH was performed in accordance with Environmental Projection Agency (EPA) Method 9045B (AASHTO T289-91). Testing for soil resistivity was performed in accordance with EPA Method 2510B (AASHTO T288-91). Testing for soluble chloride and soluble sulfate was performed in accordance with EPA 600/4-79-020-300.0 (AASHTO T290-94 and T90-95). These test results are shown in Appendix C-3 – Chemical Test Results.

6.0 DISCUSSION OF INVESTIGATION RESULTS

6.1 Geologic and Geotechnical Conditions

The proposed HOV flyover alignment is mapped by the Nevada Bureau of Mines and Geology [NBMG] (Matti et al., 1987) as Pleistocene Older Alluvium of the Red Rock Fan, which is described as *mostly pebble to small cobble gravel, with pebble-bearing sand that is moderately well consolidation and cemented*. The materials encountered in our borings were consistent with the description of the Older Alluvium by the NBMG. Because the interchange is cut 2 to 3 m below original grade, recent (Holocene) deposits are not present at foundation levels. Soils were uniform in consistency across the site and at all depths, and consisted of clayey and silty sands with gravel, clayey and silty gravel, poorly-graded and well-graded sands or gravels with silt or clay, and rarely poorly graded sands or gravels. Samples ranged in proportion from 5 to 25 percent low- to medium-plasticity fines, and 20 to 65 percent gravel content. Some cobbles are likely present but were not extensively observed due to the relatively-small-diameter sampling methods.

The soils are very dense or slightly cemented, indicated by high penetration resistance and shear-wave velocities in excess of 600 meters per second. Soils were not sufficiently cemented to allow successful intact core recovery. No hard caliche layers were encountered that resulted in refusal of the hollow-stem-auger drilling equipment.

Fills for the existing embankment of Summerlin Parkway westbound (Ramp 11) were found to be well-compacted, dense, granular soils similar in grain size characteristics (coarse silty, sandy gravel with occasional cobbles) and density to the underlying native soils.

Ground water was not encountered during the explorations to depths in excess of 30.5 m, and is at a depth that would not affect construction.

6.2 Geologic Hazards

A moderate potential for dust generation is present if grading is performed in dry weather. Regional subsidence has occurred at this site but is not occurring presently, due to more-controlled ground water withdrawal from the aquifers under the site. Regional ground subsidence, if it recurs, is sufficiently gradual in magnitude and widespread in horizontal extent that it should not impact structural performance. No other geologic hazards were identified.

7.0 DISCUSSION AND RECOMMENDATIONS

7.1 General Information

The proposed bridge alignment is on dense, slightly-cemented granular soils which provide good bearing conditions to support the proposed bridge on shallow foundations. Slight cementation may make excavation difficult with smaller equipment. Fills for the existing embankment of Summerlin Parkway westbound (Ramp 11) were found to be well-compacted, dense, granular soils similar to native materials. Gravel and likely cobbles are present that could make temporary excavation support with tiebacks or soil nails difficult, both due to difficult drilling and to possible caving or oversize excavation of drill holes.

7.2 Seismic Design Requirements

For the purposes of this project, we recommend a minimum design acceleration value of 0.15g to be used in accordance with NDOT design policy. Soil Profile Type II is appropriate given the considerable depth of the Las Vegas soil basin under the site.

7.3 Structure Foundation Recommendations

7.3.1 Foundation Type Selection

Shallow foundations are appropriate for the Summerlin Parkway HOV flyover bridge, due to the strong, very dense, granular subgrade soils. If there are tight space constraints or high uplift requirements, drilled shafts would be a suitable alternate foundation method. Driven piles would not be suitable due to very difficult conditions for pile driving.

For design, a friction angle of 37 degrees was used for native soils. The friction angle for native soils was considered to be at least 37 degrees based on high penetration resistance (e.g. FHWA 2007 Table 10.4.6.2.4-1). The selection of friction angle was further supported by the uniform, well-graded particle-size distribution, with sufficient gravel-size particles to provide interlocking of coarse-grained as well as sand-sized particles in the soil matrix. Geologic aging or other minor cementation also was considered in selecting the friction angle. Results of direct shear tests from the original investigation were reviewed. After removing particles larger than the No. 10 sieve, soils had a range of 25 to 48 percent fines content, but still had average friction angle of 37.5 degrees. Since the actual fines content of the original samples was only 10 to 17 percent, and coarse particles were present, lower strength values in the direct shear testing were discounted as not reflecting the actual material characteristics or strength.

A friction angle of 37 degrees was selected for existing embankment fill. Similar grain size distribution and similar to slightly higher penetration resistance was present as for the native soils; however, geologic aging and cementation would not be present. Direct shear testing of fill soils in this investigation used soils with the same fines content as the in situ material, with a resulting friction angle of 37 to 42 degrees; the lower bound was used for design.

7.3.2 Shallow Footing Recommendations

<u>Level Ground Footings (Abutment 1, Piers 1 through 8)</u>

Shallow footings should be designed using the lesser of the factored bearing resistance determined from nominal bearing capacities or the bearing pressure determined from settlement limitations. Nominal bearing resistances for strength design and service bearing resistances providing less than 1 inch of settlement are presented versus footing width on Plate 2. Bearing resistance limits are for footings 2 m or greater depth below adjacent grade in dense native soils (Abutment 1 and Piers 1 through 8). Assumptions regarding footing length and depth of footing are stated on the Plate. If the final footing dimensions (including the effects of eccentric loading), depth, or horizontal locations vary substantially from these assumptions, we should provide additional analysis for the actual design geometry.

Major utilities, including a water main and a box culvert, cross under the bridge alignment south of Rainbow Boulevard. Culverts, utilities, or other infrastructure should lie above a 1½H:1V plane projected downward from the edge of the footings. This separation is recommended to avoid undue stresses on culverts or pipe, to avoid damage to the bridge if failure of the utility occurs, and to allow for repair or replacement of the utility at a future time without requiring complete removal or extensive underpinning or shoring of the bridge abutment. For footings on native soils, abandoned utility trenches which extend under the footing zone of influence should be excavated and backfilled with slurry cement.

<u>Footings in Sloped Embankment Fills (Piers 9 to 11, Abutment 2)</u>

Nominal bearing resistances and service bearing resistances providing less than 1 inch of settlement are presented versus footing width on Plate 3 for footings founded in existing Ramp 11 embankment soils (Piers 9 through 11 and Abutment 2). These conditions are appropriate for where the footings will be supported in existing embankment fill or are founded above the lowest adjacent grade (above the toe of a slope). Design values on Plate 3 are based on a measured soil friction angle for the existing embankment fill of 37 degrees or greater.

For Abutment 2, design options include either a tall abutment founded near the base of the existing fill, or a shallow abutment founded partly above the existing embankment fill prism. In the latter case, the embankment would be widened to provide sufficient fill to support and embed the abutment, so that the outer edge of the abutment could potentially be supported by an additional 3 m thickness of new select borrow. Since the properties of the new select borrow are not determined, a friction angle of 34 degrees is appropriate for design (per NDOT policy). Per NDOT policy, bearing resistances on new embankment fill are typically limited to prescribed values; however, given the size of the proposed footing (9 by 18 m in the present design iteration) we recommend values higher than the prescriptive limit for footings wider than 6 m. Nominal bearing resistances and service bearing resistances providing less than 1 inch of settlement are presented versus footing width on Plate 4 for the Abutment 2 footing founded partly on new embankment fill and partly on existing Ramp 11 embankment fill.

7.4 Lateral Earth Pressures

Earth-pressure coefficients are provided below for lateral load design of retaining walls, abutments, or structures with imbalanced earth loads. Fill slopes and retaining walls will generate active or at-rest pressures that will impose loads on structures. For shallow foundations, wind, seismic, or earth pressure loads may be resisted by passive soil pressure and friction on the bottom of the footings.

Table 2 shows the recommended static and dynamic soil pressure coefficients. The values are based on Mohr-Coulomb analyses, Mononobe-Okabe analyses, and log-spiral passive charts by Caquot and Kerisel as referenced in AASHTO (2007). Table 2 provides recommendations for approximately level ground at the top and bottom of the wall, and different values will be needed if sloped conditions are present. We recommend neglecting the passive pressure where the base of Abutment 2 is adjacent to a 2H:1V slope. Retaining walls can use bearing resistance recommendations provided in the previous section.

7.5 MSE Wall Recommendations

Mechanically Stabilized Earth walls should be designed based on the parameters on Table 3. Retaining walls can use bearing resistance recommendations provided in the previous section. For seismic design, the horizontal seismic coefficient should be one-half the design peak ground acceleration, or 0.075g. Mechanically Stabilized Earth wall external stability design (except for global stability) was performed by PBS&J and is not included in this report.

TABLE 2 - LRFD LATERAL EARTH PRESSURE COEFFICIENTS FOR RETAINING STRUCTURES

Embankment Fill and Granular Backfill (Abutments 1 and 2)				
Unit Weight	*20 kN/m³*			
Sliding Coefficient [1], μ:	*0.54(soil on cast-in-place [CIP] concrete)[1]*			
Bearing Resistance	(Abutment 1 if built on existing embankment soils, use Plate 3, if partly on new embankment fill, use Plate 4)			
Slope Condition (and assumed friction angle)	**Active Coefficient, K_a**	**Active Earthquake Coefficient, K_{ae}**	**At-Rest Coefficient, K_o [2]**	**Passive Coefficient, K_p[1]**
Level Ground (φ=34°)(3)	0.26	0.30	0.44	3.9
2H:1V (φ=34°)(3) **(Wall H-6)**	0.40	0.54	0.44	NA
Dense Native Gravel to Clayey Sand with Gravel				
Unit Weight	*20 kN/m³*			
Sliding Coefficient [1], μ:	*0.54(soil on CIP concrete)[1]*			
Bearing Resistance	(Abutment 1 on native soil 2m below lowest adjacent grade, use Plate 2)			
Passive Pressure Coefficient K_p[1] (φ=37°)	5.5			

Notes:
[1] Values of passive pressure and sliding coefficients include resistance factors of 0.50 and 0.80, respectively for LRFD design (AASHTO, 2007 Table 10.5.5.2.2-1).
[2] For earthquake design of a structure under static at-rest (K_o) conditions, use the greater of the at-rest or active earthquake pressure (K_{ae}) unless walls are rigidly held in place by anchors or battered piles.
[3] Active pressures assume a vertical wall face and an interface friction angle of 17 degrees and the pressure resultant is oriented at the interface friction angle above horizontal.

TABLE 3 - LRFD LATERAL EARTH PRESSURE COEFFICIENTS FOR MSE WALLS				
Embankment Fill, Granular Backfill and MSE Backfill				
Unit Weight	*20 kN/m³*			
Sliding Coefficient [1], μ:	*0.60 (soil on soil)[1]*			
Bearing Resistance	(Walls H3 and H4 if built on existing embankment soils, use Plate 3, if partly on new embankment fill, use Plate 4)			
Slope Condition (and assumed friction angle)	**Active Coefficient, K_a**	**Active Earthquake Coefficient, K_{ae}**	**At-Rest Coefficient, K_o [2]**	**Passive Coefficient, K_p[1]**
MSE Reinforced Zone and MSE Backfill (level, "Rankine" condition [vertical wall, δ=0], ϕ=34°)	0.28	0.33	0.44	NA
Dense Native Gravel to Clayey Sand with Gravel				
Unit Weight	*20 kN/m³*			
Sliding Coefficient [1], μ:	*0.60 (soil on soil)[1]*			
Bearing Resistance	(Walls H1 and H2 if reinforced zone on native soil 2m below lowest adjacent grade, use Plate 2)			
Passive Pressure Coefficient K_p[1] (level, ϕ=37°)	5.5			

Notes:
[1] Values of passive pressure and sliding coefficients include resistance factors of 0.50 and 0.90, respectively for LRFD design (AASHTO, 2007 Table 10.5.5.2.2-1).
[2] For earthquake design of a structure under static at-rest (K_o) conditions, use the greater of the at-rest or active earthquake pressure (K_{ae}) unless walls are rigidly held in place by anchors or battered piles.
[3] For "Rankine" conditions, earth pressure is parallel to the upper ground surface, or horizontal in this case. Rankine pressures determined using the Coulomb equation with interface angle δ= slope angle β, wall back-face angle θ= 0.

7.6 Slope Stability

Global slope stability analyses were performed for the abutment fills, fills with MSE walls, and at Pier 9 where the bridge footing will be founded in the existing embankment above lowest adjacent grade. As requested by the NDOT Materials Division, for global stability purposes only, we have selected a friction angle of 32 degrees for the new and planned embankment fill. Mechanically Stabilized Earth walls with a minimum strap length of 70 percent of the wall height FHWA (2002) were found to provide adequate global slope stability. Mechanically Stabilized Earth wall internal and external stability (overturning, sliding, bearing resistance checks) was analyzed by PBS&J and is not included in this report.

Slope stability cross sections and resulting factors of safety are summarized on Table 4. These slopes have adequate factor of safety for seismic and static conditions. No seismic slope deformations are predicted to occur in the event of the design earthquake (peak ground acceleration of approximately 0.15g).

TABLE 4 - RESULTS OF GLOBAL SLOPE STABILITY ANALYSES

Slope Stability Analysis Section (1)	Static Factor of Safety (FS >1.53 for slopes associated with structures including retaining walls, FS > 1.33 for other slopes)(3)	Seismic Factor of Safety at 0.075 g (FS > 1.1)
Wall H1 & H2 Maximum Section 5.5 m High (2)	2.37 (circular) 1.82 (block)	1.92 (circular) 1.59 (block)
Wall H3 Maximum Section	Less stringent than H1 and H2 by inspection	
Wall H4 Maximum Section 11m High (2)	1.84 (circular) 1.99 (block)	1.58 (circular)
Abutment 2 in 2H:1V Embankment	1.92 (circular) 2.62 (block)	2.19 (block)
Pier 9 in 2H:1V Embankment	1.80 (circular) 1.50 (block)	1.49 (circular) 1.34 (block)
2H:1V Embankment Maximum Section	1.43 (shallow circular)	1.12 (shallow circular) 1.47 (block)

(1) Fill materials assigned zero cohesion and friction angle of 32 degrees for global stability ONLY, native material zero cohesion and friction angle of 37 degrees.

(2) MSE reinforcement length 70 percent of wall height.

(3) Factor of safety corresponds to Φ x Nominal Resistance/Service I Load, where minimum factor of safety of 1.53 corresponds to Φ of 0.55, minimum factor of safety of 1.33 corresponds to Φ of 0.65 according to AASHTO (2007 11.6.2.3), and seismic factor of safety of 1.1 corresponds to Φ of 0.90.

7.7 Corrosion Potential

Soils typically have concentrations of up to 1,400 parts per million (ppm) of soluble sulfate and up to 240 ppm of soluble chloride, pH between 7.5 and 10.6, and soil resistivity between 1,200 and 7,500 ohm-cm.

7.8 Earthwork and Grading Recommendations

7.8.1 Clearing, Grubbing, and Removals

Clearing, grubbing, and removal of obstructions shall be performed in accordance with *NDOT Standard Specifications* Sections 201 and 202 (NDOT, 2001). Except for limited plantings, there is no vegetation on the site, a stripping depth of 0 to 10 cm is expected.

7.8.2 Excavations and Embankment

Excavations and embankment should be prepared in accordance with *NDOT Standard Specifications* Sections 203 (NDOT, 2001). Assuming that embankment will be constructed of sound, gravelly fill similar to the native soil, settlement of the embankment and its foundation should be minor. Settlement of embankment materials should be completed as the fill is raised.

Excavated soils will be slightly-cemented gravelly soils. These soils were drilled without difficulty with hollow-stem augers to a depth of 30 m, indicating that the site materials can generally be excavated with standard excavation equipment, and blasting is not expected to be required. Subsidence and shrinkage of native ground or existing fills excavated and recompacted as embankment fill is expected to be negligible.

7.8.3 Structure Excavation

Structure excavations and backfill should be performed in accordance with *NDOT Standard Specifications* Sections 206, 207 and 208 (NDOT, 2001). All trenching should be performed and stabilized in accordance with OSHA standards. Regardless of excavation soil type or required trench slopes or shoring, pavement quantities should be determined per the *Standard Plans for Road and Bridge Construction* (NDOT, 2007).

As noted above, utilities which lie below a 1.5H:1V plane projected downward from the edge of footings should be completely removed. For footings designed for bearing resistance on native soils, backfill the excavation under the footing area of influence with cement slurry.

Significantly shored or sloped excavations will be required for footing excavations for Piers 9 through 11 and Abutment 2 due to the height of adjacent ramp 11.

The ground water under the project alignment is at a considerable depth and should have no impact on construction

7.8.4 Settlement Monitoring

We recommend that permanent settlement monuments be established and used during construction of the Summerlin HOV Flyover bridge. This will enable NDOT to measure the actual amount of ground settlement that occurs under piers and abutments during and after construction. This type of information has not been gathered by NDOT very often in the past but it is becoming more important as construction pace increased in major urban areas.

Temporary settlement points would be established after the footing is poured and before the columns are formed. The relative elevations would be transferred to a one permanently-accessible location on each column and two locations on the left and right side of the abutments after the forms are removed, and maintained until the end of construction. Settlements would be monitored approximately every 2 months, before and after major increases in bridge loading (column pour, superstructure erection, footing backfill, bridge opening) and once immediately before project completion, whichever is less frequent.

8.0 STANDARD LIMITATIONS CLAUSE

This report has been prepared in accordance with generally accepted geotechnical practices. The analyses and recommendations submitted are based on field exploration performed at the locations shown on Plate 1 - Plot Plan and previous on-site investigations for existing structures. This report does not reflect soils variations that may become evident during the construction period, at which time re-evaluation of the recommendations may be necessary. This report has been prepared to provide information allowing the engineer to design the project. In the event of changes in the design or location of the project from the time of this report, recommendations should be reviewed and possibly modified by the geotechnical engineer. If the geotechnical engineer is not granted an opportunity to make this recommended review, he can assume no responsibility for misinterpretation or misapplication of these recommendations or their validity in the event changes have been made in the original design concept without his prior review. The geotechnical engineer makes no other warranties, expressed or implied, as to the professional recommendations provided under the terms of this agreement and included in this report.

9.0 REFERENCES

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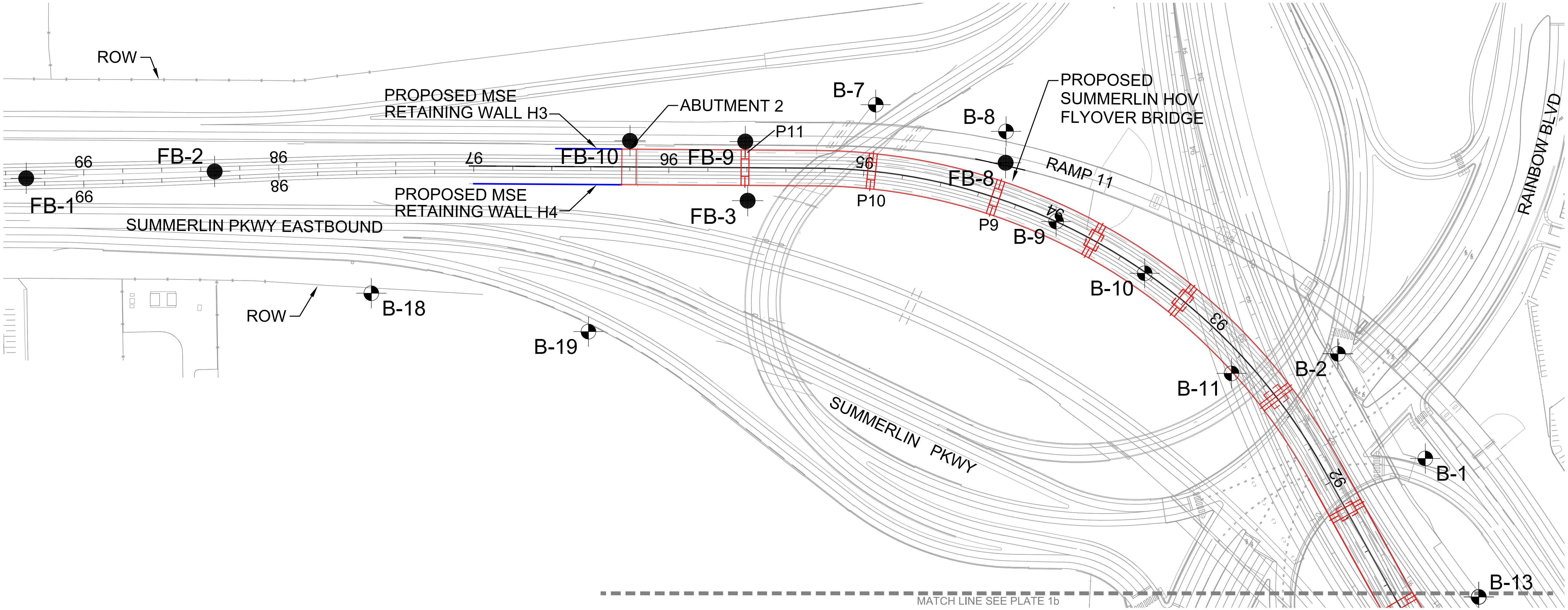
APPENDIX A

FIGURES



LEGEND

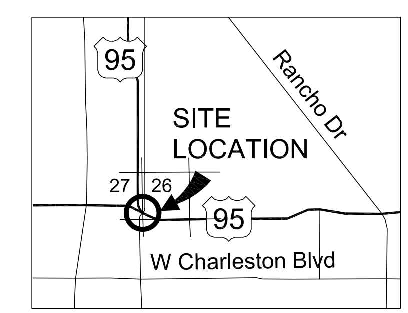
FB-1 APPROXIMATE BORING LOCATION APRIL 2007 BEC EXPLORATION

B-1 APPROXIMATE BORING LOCATION 2001/2002 BEC EXPLORATIONS

NOTES

1. BASE MAP PROVIDED BY PBS & J.
2. PROPOSED HOV LANES & BRIDGE IN RED, RETAINING WALLS IN BLUE.

SCALE: 1cm=20m



T 20S, R 60E, SECTIONS 26, 27
SITE LOCATION MAP
N.T.S.

Black Eagle Consulting, Inc.
Geotechnical & Construction Services
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Facsimile: 775/359-7766

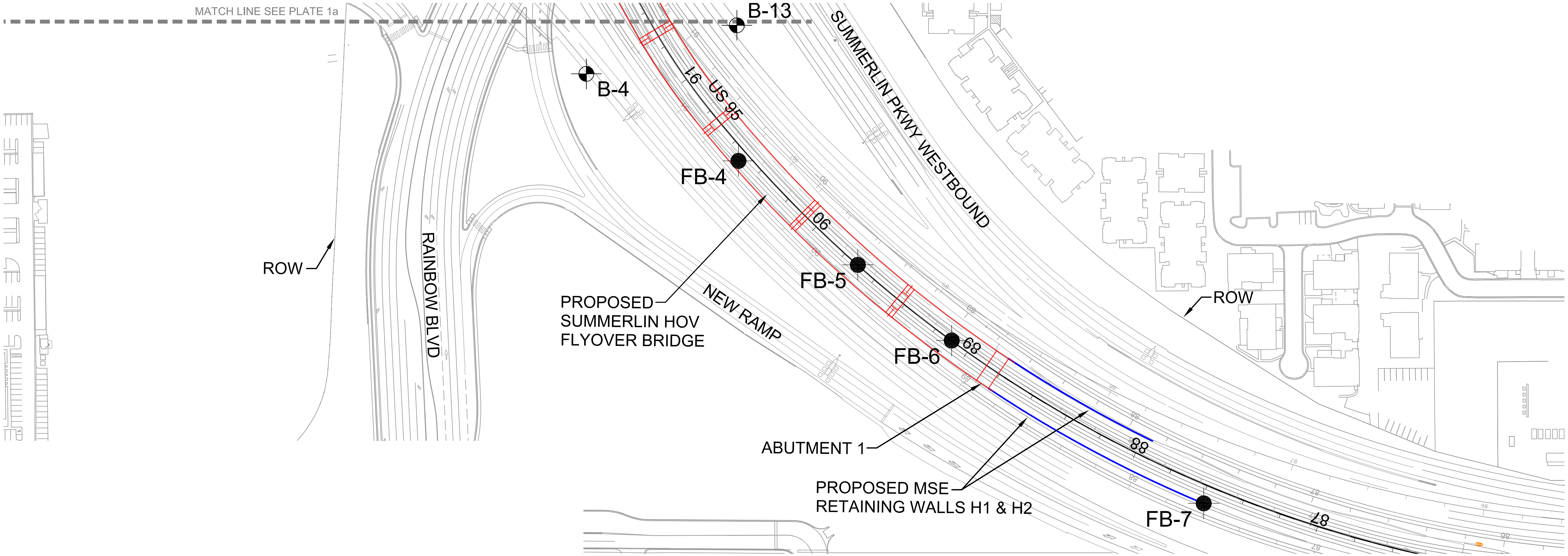
PBS & J

PLOT PLAN - BORING LOCATIONS

SUMMERLIN HOV FLYOVER
LAS VEGAS, NEVADA

Project No.
0324-01-7

Plate 1a



LEGEND

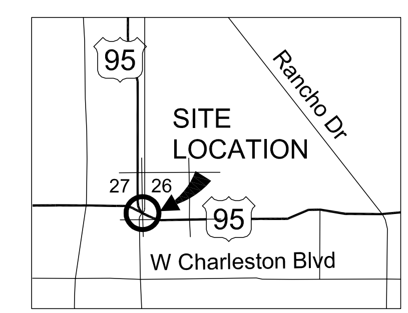
FB-1 APPROXIMATE BORING LOCATION APRIL 2007 BEC EXPLORATION

B-1 APPROXIMATE BORING LOCATION 2001/2002 BEC EXPLORATIONS

NOTES

1. BASE MAP PROVIDED BY PBS & J.
2. PROPOSED HOV LANES & BRIDGE IN RED, RETAINING WALLS IN BLUE.

SCALE: 1cm=20m



T 20S, R 60E, SECTIONS 26, 27
SITE LOCATION MAP
N.T.S.

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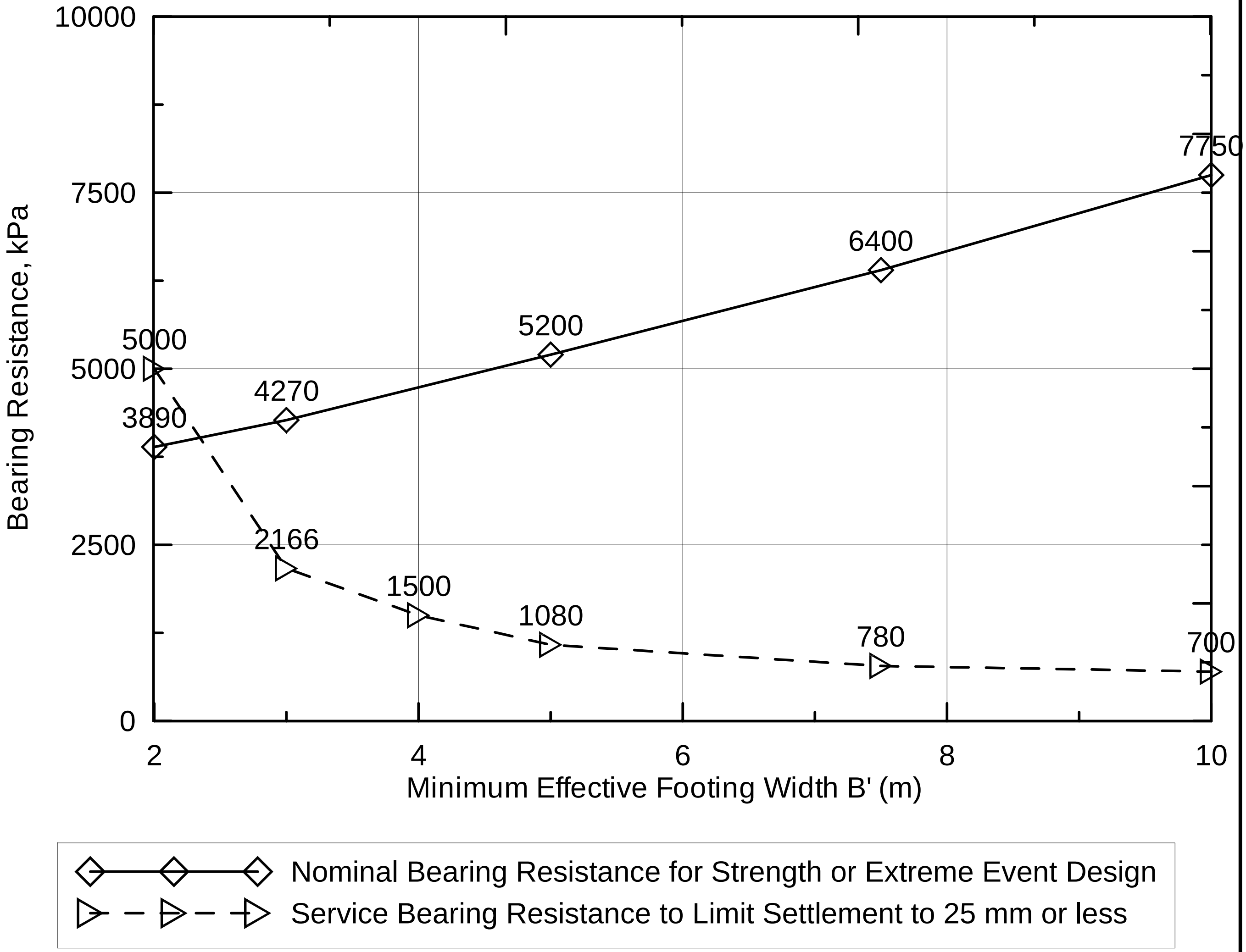
PLOT PLAN - BORING LOCATIONS

SUMMERLIN HOV FLYOVER
LAS VEGAS, NEVADA

Project No.
0324-01-7

Plate 1b



Bearing values are for footings at least 2 m below approximately level ground.
(Abutment 1, Piers 1 through 8). Footing length is <=2 times the footing width.
Effective footing width and length (B' and L') are to be used on
this chart.
A resistance factor of 0.45 should be used for Strength design.

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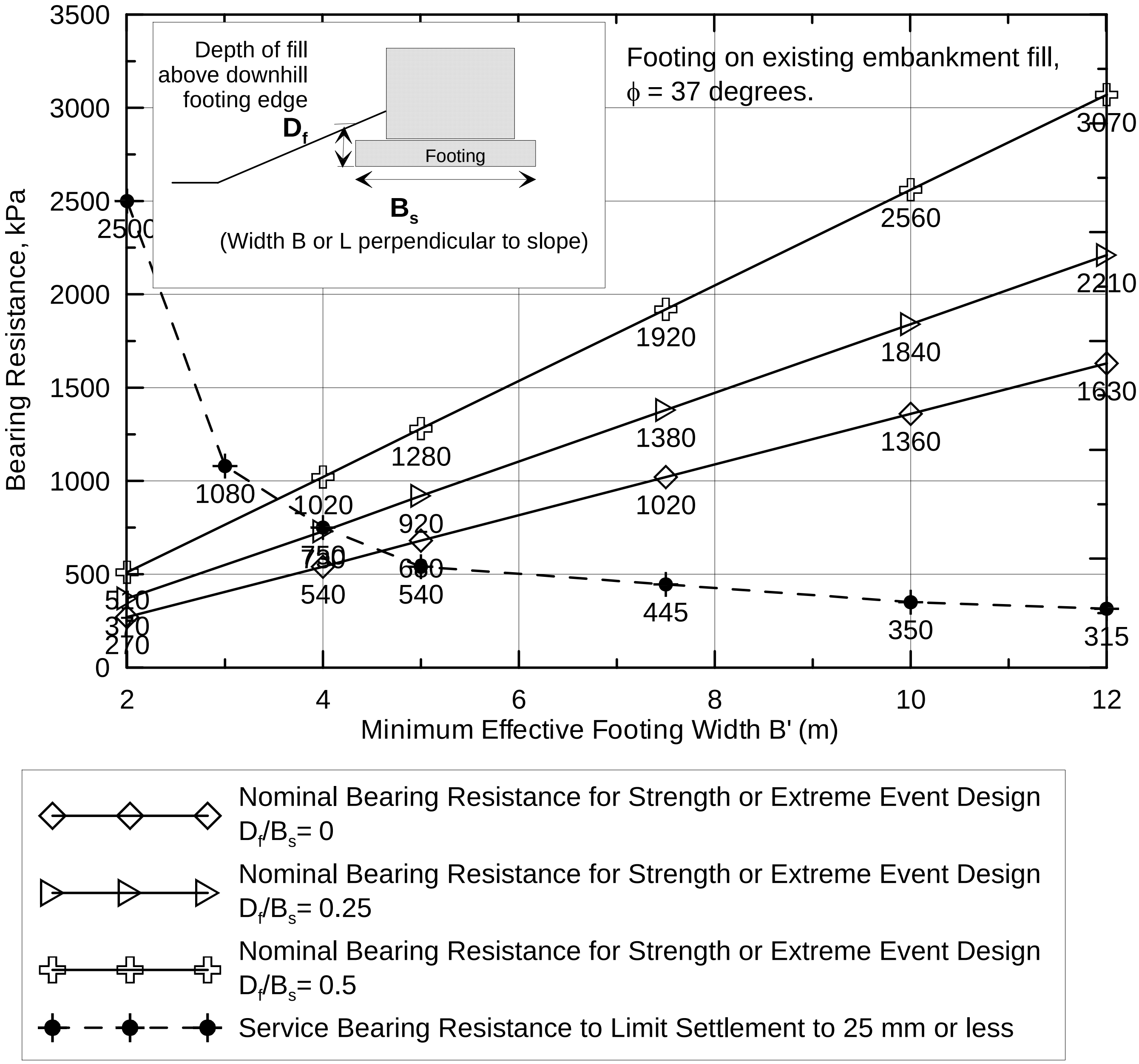
DESIGN BEARING RESISTANCE VERSUS
MINIMUM FOOTING WIDTH ON LEVEL GROUND IN NATIVE SOIL
SUMMERLIN HOV FLYOVER BRIDGE
US 95 WIDENING
LAS VEGAS, NEVADA

Project No:
0324-01-7

Plate 2



Bearing values are for 2H:1V slope embankment condition in existing fill (Piers 9 through 11 and Abutment 2).

Chart assumes that footing length is <=2 times the footing width.

Nominal bearing resistance is sensitive to the embedment depth D_f, relative to the footing width, B_s, perpendicular to the slope. D_f/B_s ratio will change when footing width is changed.

Effective footing width and length (B' and L') are to be used on this chart.

A resistance factor of 0.45 should be used for LRFD Strength design.

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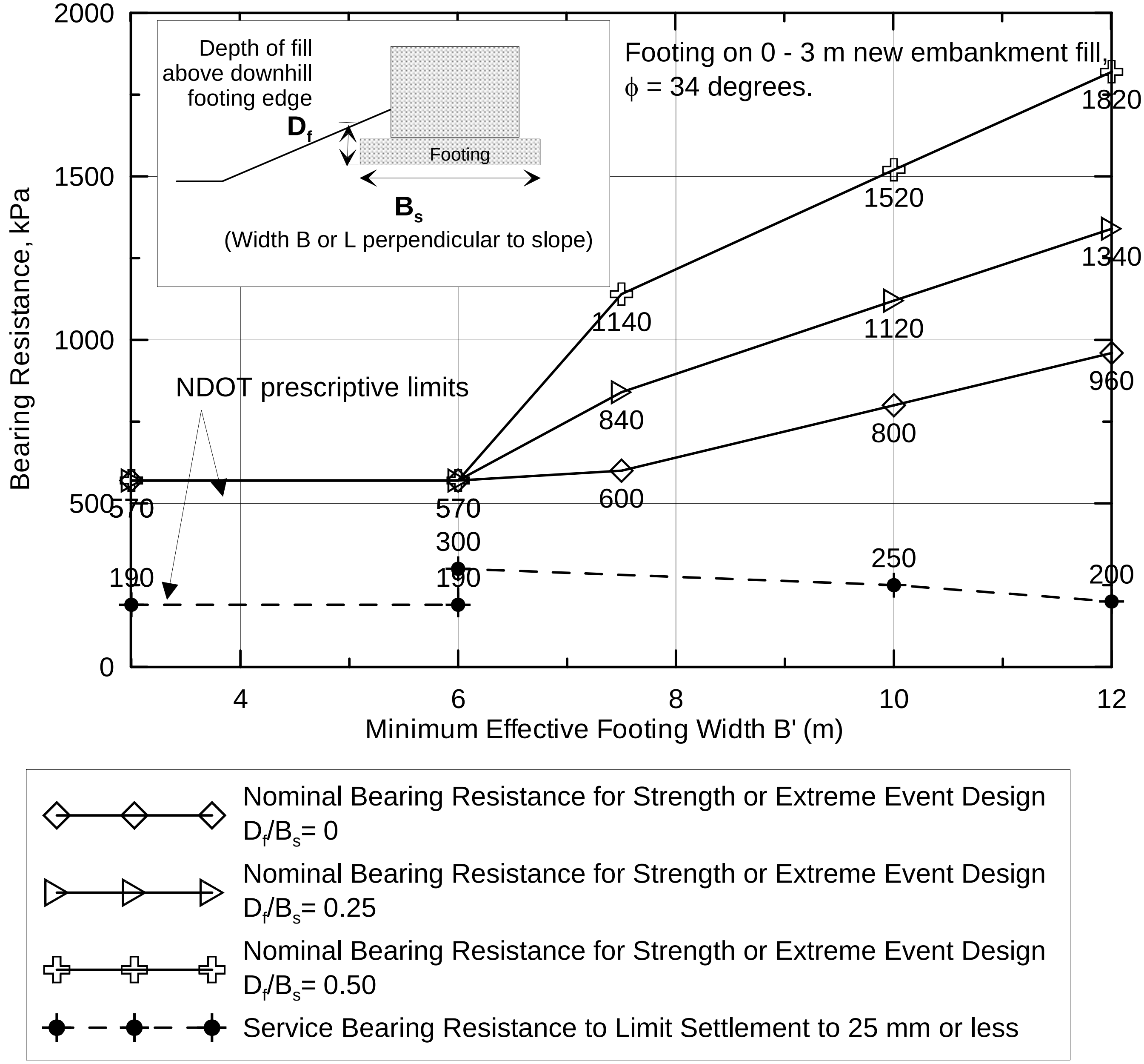
PBS&J

DESIGN BEARING RESISTANCE VERSUS MINIMUM FOOTING WIDTH, FOOTINGS IN EXISTING EMBANKMENT WITH 2H:1V OR SHALLOWER SLOPE, SUMMERLIN HOV FLYOVER BRIDGE

US 95 WIDENING
LAS VEGAS, NEVADA

Project No:
0324-01-7

Plate 3



Bearing Values are for 2H:1V slope embankment condition with footing over 0 - 3 m of new embankment fill above existing embankment fill (at Abutment 2)

Chart assumes that footing length is <=2 times the footing width.

Nominal bearing resistance is sensitive to the embedment depth D_f, relative to the footing width, B_s, perpendicular to the slope. D_f/B_s ratio will change when footing width is changed.

Effective footing width and length (B' and L') are to be used on this chart.

A resistance factor of 0.45 should be used for LRFD Strength design.

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PBS&J

DESIGN BEARING RESISTANCE VERSUS MINIMUM FOOTING WIDTH, FOOTINGS IN NEW EMBANKMENT WITH 2H:1V OR SHALLOWER SLOPE, SUMMERLIN HOV FLYOVER BRIDGE

US 95 WIDENING
LAS VEGAS, NEVADA

Project No:
0324-01-7

Plate 4

APPENDIX B

SUBSURFACE EXPLORATION DATA

B-1

BORING LOGS

EXPLORATION LOG

START DATE 7/20/01
END DATE 7/20/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-01
PROJECT # 0324-01-7
GROUND ELEV. 726.95 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 91+65 QN-2C
OFFSET 45 m Rt.
ENGINEER PGT
EQUIPMENT Foremost B90
OPERATOR Eagle Drilling
DRILLING METHOD 203 mm HS Auger
BACKFILLED Cased DATE 7/20/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS
725.95	1						
	1.52–1.60	1A	MC	50/75mm	50/75mm	0	
	1.60–2.06	1A'	GRAB			50	Sv, PI, M
724.95	2						
723.95	3						
	3.05–3.10	1B	SPT	50/50mm	50/50mm	0	
	3.10–3.55	1B'	GRAB			50	DS
722.95	4						
	4.57–4.62	1C	MC	50/38mm	50/38mm	100	
721.95	5						
720.95	6						
	6.10–6.14	1D	SPT	50/25mm	50/25mm	0	
	6.14–6.60	1D'	GRAB			50	Sv, PI, M
719.95	7						
	7.62–7.70	1E	MC	50/75mm	50/75mm	100	Sv, PI, M
718.95	8						
717.95	9						
	9.14	1F	SPT	50/25mm	50/25mm	50	Sv, PI, M

MATERIAL DESCRIPTION

USCS Group	Depth (m)	MATERIAL DESCRIPTION	REMARKS
GM	0–0.61	**Silty Gravel with Sand** ; light grey brown, dry, very dense, with estimated 15% low plastic fines, 30% fine to coarse sand, 45% subangular limestone gravel to 75 mm. Cobbles to 150-mm-diameter comprise about 10% of the total soil mass. Moderately cemented.	
GP GC	0.61–7.32	**Poorly Graded Gravel with Clay and Sand** ; light brown grey, slightly moist, very dense, with 8-10% low to medium plastic fines, 30-39% fine to coarse sand, 52-59% subangular to subrounded limestone gravel to 50 mm. Moderately cemented. All size fractions, including cement, are calcareous. Lithology is based on auger cuttings which is likely biased toward a more coarse sample (the auger winnows out the fine material thereby increasing the apparent gravel content). Actual soil might be a cemented Silty Gravel with Sand or a Silty Sand with Gravel. Gravel becomes progressively finer and more subrounded down hole. Predominantly <1" at base of unit.	
SC	7.32–	**Clayey Sand with Gravel** ; light grey brown, slightly moist, very dense, with 17-21% low to medium plastic fines, 49-53% fine to coarse sand, 30% subrounded limestone gravel to 25 mm. Moderate to well cemented. Gravel is sheared into sharp fragments during augering. Samples 1E and 1F were combined for lab analysis.	

EXPLORATION LOG

START DATE 7/20/01
END DATE 7/20/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-01
PROJECT # 0324-01-7
GROUND ELEV. 726.95 (m)
HAMMER DROP SYSTEM Cable

STATION 91+65 QN-2C
OFFSET 45 m Rt.
ENGINEER PGT
EQUIPMENT Foremost B90
OPERATOR Eagle Drilling
DRILLING METHOD 203 mm HS Auger
BACKFILLED Cased DATE 7/20/2001

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group
	10.67–10.74	1G	MC	50/75mm	50/75mm	100	Sv, PI, M	
715.95	11							
714.95	12							GC GM
	12.19–12.24	1H	SPT	50/25mm	50/25mm	0	Sv, PI, M	GC GM
	12.24–12.70	1H'	GRAB			50		GC GM
713.95	13							GC GM
	13.72	1I	MC	50/25mm	50/25mm	0		GC GM
712.95	14							GC GM
711.95	15							SC
	15.24–15.34	1J	SPT	50/100	50/100mm	100	Sv, PI, M	SC
710.95	16							SC
	16.76–16.81	1K	MC	50/50mm	50/50mm	50	Sv, PI, M	SC
709.95	17							SC
708.95	18							SC SM
	18.29–18.34	1L	SPT	50/25mm	50/25mm	0		SC SM
	18.34–18.79	1L'	GRAB			50	Sv, PI, M	SC SM
707.95	19							SC SM
	19.81–19.89	1M	MC	50/75mm	50/75mm	67		SC SM

MATERIAL DESCRIPTION

11.58
Silty, Clayey Gravel with Sand ; light brown grey, slightly moist, very dense, with 13% low plastic fines, 39% fine to coarse sand, 48% subangular limestone gravel to 25 mm. Moderate to well cemented.

14.63
Clayey Sand with Gravel ; light brown, slightly moist, very dense, with 19% low plastic fines, 60% fine to coarse sand, 21% subrounded limestone gravel to 25 mm. Moderately cemented.

Samples 1J and 1K were combined for lab analysis.

17.83
Silty, Clayey Sand with Gravel ; light brown grey, slightly moist, very dense, with 12% low plastic fines, 50% fine to coarse sand, 38% subrounded limestone gravel to 38 mm. Moderately cemented.

REMARKS

EXPLORATION LOG

START DATE	7/20/01	STATION	91+65 QN-2C
END DATE	7/20/01	OFFSET	45 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	PGT
LOCATION	Las Vegas, Nevada	EQUIPMENT	Foremost B90
BORING	B-01	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	203 mm HS Auger
GROUND ELEV.	726.95 (m)	BACKFILLED	Cased DATE 7/20/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.42							GP GM	**Poorly Graded Gravel with Silt and Sand** ; light brown, slightly moist, very dense, with 11% low plastic fines, 44% fine to coarse sand, 45% subrounded limestone gravel to 38 mm. Moderate to well cemented.	
705.95	21									
	21.34 / 21.38	1N	SPT	50/12mm	50/12mm	0				
	21.38 / 21.84	1N'	GRAB			50	Sv, PI, M			
704.95	22									
	22.86 / 22.91	1O	MC	50/38mm	50/38mm	0				
703.95	23									
	23.77							GW GC	**Well Graded Gravel with Silty Clay and Sand** ; light brown grey, slightly moist, very dense, with 11% low plastic fines, 39% fine to coarse sand, 50% subangular limestone gravel to 30 mm. Moderately cemented.	
702.95	24									
	24.38 / 24.43	1P	SPT	50/38mm	50/38mm	0				
	24.43 / 24.89	1P'	GRAB			50	Sv, PI, M			
701.95	25									
	25.91 / 25.96	1Q	MC	50/50mm	50/50mm	0				
700.95	26									
	26.21							SC	**Clayey Sand with Gravel** ; light brown, slightly moist, very dense, with estimated 15-20% low to medium plastic fines, 45-50% fine to coarse sand, 30-35% subangular gravel to 20 mm. Moderate to well cemented.	
699.95	27									
	27.43 / 27.48	1R	SPT	50/50mm	50/50mm	100				
698.95	28									
	28.35							SW SM	**Well Graded Sand with Silt and Gravel** ; light brown, slightly moist, very dense, with 12% low to medium plastic fines, 60% fine to coarse sand, 28% subangular limestone gravel to 25 mm.	
	28.96 / 29.04	1S	MC	50/88mm	50/88mm	0				
697.95	29									
	29.04 / 29.50	1S'	GRAB			50	Sv, PI, M			

EXPLORATION LOG

START DATE	7/20/01	STATION	91+65 QN-2C
END DATE	7/20/01	OFFSET	45 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	PGT
LOCATION	Las Vegas, Nevada	EQUIPMENT	Foremost B90
BORING	B-01	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	203 mm HS Auger
GROUND ELEV.	726.95 (m)	BACKFILLED	Cased DATE 7/20/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	30.48	1T	SPT	50/12mm	50/12mm	0			30.48	
695.95	31									
694.95	32									
693.95	33									
692.95	34									
691.95	35									
690.95	36									
689.95	37									
688.95	38									
687.95	39									

EXPLORATION LOG

START DATE	7/21/01	STATION	92+45 QN-2C
END DATE	7/21/01	OFFSET	32 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	PGT
LOCATION	Las Vegas, Nevada	EQUIPMENT	Foremost B90
BORING	B-02	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	203 mm HS Auger
GROUND ELEV.	723.90 (m)	BACKFILLED	Yes
HAMMER DROP SYSTEM	Cable	DATE	7/21/2001

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								GM	**Silty Gravel with Sand** ; light grey brown, dry, very dense, with estimated 15% low plastic fines, 35% fine to coarse sand, 40% subangular limestone gravel to 75 mm. Cobbles to 150-mm-diameter comprise about 10% of the total soil mass. Moderately cemented with weak caliche coating on cobbles.	
								SW SM	0.61 **Well Graded Sand with Silt and Gravel** ; light grey brown, dry, very dense, with 10% low plastic fines, 47% fine to coarse sand, 43% subangular limestone gravel to 38 mm. Moderate to well cemented. Gravel is sheared by the auger. Calcareous cement throughout hole.	
722.90	1									
	1.52 1.57	2A	MC	50/50mm	50/50mm	100				
	1.57	2A'	GRAB			50	Sv, PI, M			
721.90	2 2.03									
								GC	2.44 **Clayey Gravel with Sand** ; light grey brown, dry, very dense, with 13% low to medium plastic fines, 42% fine to coarse sand, 45% subangular limestone gravel to 45 mm. Moderately cemented.	
720.90	3 3.05 3.15	2B	SPT	50/100	50/100mm	50				
	3.15	2B'	GRAB			50	Sv, PI, M			
	3.61									
719.90	4									
								GP	4.27 **Poorly Graded Gravel with Sand** ; light brown grey, dry, very dense, with 4% low plastic fines, 18% fine to coarse sand, 78% subrounded limestone gravel to 65 mm. Moderate to well cemented.	
	4.57	2C	MC	50/25mm	50/25mm	0				
	4.62	2C'	GRAB			50	Sv, PI, M			
718.90	5 5.08									
									5.79 **Clayey Sand with Gravel** ; light brown, dry, very dense, with 17-18% low to medium plastic fines, 52-59% fine to coarse sand, 24-30% subrounded limestone gravel to 50 mm. Moderate to well cemented.	
717.90	6 6.10 6.17	2D	SPT	50/75mm	50/75mm	0				
	6.17	2D'	GRAB			50	Sv, PI, M			
	6.63									
716.90	7									
	7.62 7.67	2E	MC	50/50mm	50/50mm	100	Sv, PI, M			
715.90	8									
714.90	9 9.14	2F	SPT	50/12mm	50/12mm	0				
									9.14 **Clayey Sand with Gravel** ; light brown, dry, very dense, with 14-20% medium plastic fines, 45-54% fine to coarse sand, 26-41% subrounded limestone gravel to 50 mm. Moderate to well cemented.	

EXPLORATION LOG

START DATE	7/21/01	STATION	92+45 QN-2C
END DATE	7/21/01	OFFSET	32 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	PGT
LOCATION	Las Vegas, Nevada	EQUIPMENT	Foremost B90
BORING	B-02	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	203 mm HS Auger
GROUND ELEV.	723.90 (m)	BACKFILLED	Yes DATE 7/21/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67 / 10.72	2G	MC	50/12mm	50/12mm	0		SC		
712.90	11 / 11.17	2G'	GRAB			50	Sv, PI, M, DS			
711.90	12									
	12.19	2H	SPT	50/38mm	50/38mm	0				
710.90	13									
	13.72 / 13.79	2I	MC	50/75mm	50/75mm	100	Sv, PI, M			
709.90	14									
	14.63							GP GC	**Poorly Graded Gravel with Silty Clay and Sand** ; light brown, dry, very dense, with 11% low plastic fines, 37% fine to coarse sand, 52% subangular limestone gravel to 38 mm. Moderate to well cemented.	
708.90	15									
	15.24 / 15.29	2J	SPT	50/38mm	50/38mm	67				
	15.75	2J'	GRAB			50	Sv, PI, M			
707.90	16									
	16.15							SC SM	**Silty, Clayey Sand with Gravel** ; light brown, slightly moist, very dense, with 20-22% low plastic fines, 54-64% fine to coarse sand, 20-22% subangular limestone gravel to 25 mm. Moderate to well cemented.	
	16.76 / 16.82	2K	MC	50/63mm	50/63mm	100	Sv, PI, M			
706.90	17									
705.90	18									
	18.29	2L	SPT	50/25mm	50/25mm	0				
704.90	19									
	19.81 / 19.86	2M	MC	50/50mm	50/50mm	75	Sv, PI, M			

EXPLORATION LOG

START DATE	7/21/01	STATION	92+45 QN-2C
END DATE	7/21/01	OFFSET	32 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	PGT
LOCATION	Las Vegas, Nevada	EQUIPMENT	Foremost B90
BORING	B-02	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	203 mm HS Auger
GROUND ELEV.	723.90 (m)	BACKFILLED	Yes
HAMMER DROP SYSTEM	Cable	DATE	7/21/2001

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									Samples 2M and 2O were combined for lab analysis.	
702.90	21									
	21.34	2N	SPT	50/25mm	50/25mm	0				
701.90	22									
	22.86									
	22.90	2O	MC	50/38mm	50/38mm	67	Sv, PI, M		22.90	
700.90	23									
699.90	24									
698.90	25									
697.90	26									
696.90	27									
695.90	28									
694.90	29									

EXPLORATION LOG

START DATE	7/21/01	STATION	91+10 QN-2C
END DATE	7/21/01	OFFSET	45 m Lt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	PGT
LOCATION	Las Vegas, Nevada	EQUIPMENT	Foremost B90
BORING	B-04	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	203 mm HS Auger
GROUND ELEV.	725.12 (m)	BACKFILLED	Yes DATE 7/21/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS
724.12	1						
	1.52–1.57	4A	MC	50/50mm	50/50mm	100	
	1.57–2.03	4A'	GRAB			50	Sv, PI, M
723.12	2						
722.12	3						
	3.05–3.10	4B	SPT	50/25mm	50/25mm	0	
	3.10–3.55	4B'	GRAB			50	Sv, PI, M
721.12	4						
	4.57	4C	MC	50/25mm	50/25mm	0	
720.12	5						
719.12	6						
	6.10–6.16	4D	SPT	50/62mm	50/62mm	0	
	6.16–6.61	4D'	GRAB			50	DS
718.12	7						
	7.62–7.67	4E	MC	50/50mm	50/50mm	100	Sv, PI, M
717.12	8						
716.12	9						
	9.14–9.20	4F	SPT	50/62mm	50/62mm	60	Sv, PI, M

Depth (m)	USCS Group	MATERIAL DESCRIPTION	REMARKS
0–0.91	GM	**Silty Gravel with Sand** ; light grey brown, dry, very dense, with estimated 15% low plastic fines, 35% fine to coarse sand, 40% subangular limestone gravel to 75 mm. Cobbles to 125-mm-diameter comprise about 10% of the total soil mass. Moderately cemented with weak caliche coating on cobbles.	
0.91–2.44	SP SM	**Poorly Graded Sand with Silt and Gravel** ; light grey brown, dry, very dense, with 10% low plastic fines, 49% fine to coarse sand, 41% subangular limestone gravel to 50 mm. Moderate to well cemented. Gravel is sheared by the auger. Calcareous cement throughout hole.	
2.44–5.18	GW GM	**Well Graded Gravel with Silt and Sand** ; light grey brown, dry, very dense, with 9% low plastic fines, 43% fine to coarse sand, 48% subangular limestone gravel to 50 mm. Moderate to well cemented.	
5.18–7.32	GM	**Silty Gravel with Sand** ; light brown grey, dry, very dense, with estimated 15-20% low plastic fines, 35-40% fine to coarse sand, 45-50% subangular to subrounded limestone gravel to 25 mm. Moderately cemented.	
7.32–		**Clayey Sand with Gravel** ; light brown, dry, very dense, with 18-19% medium plastic fines, 48-55% fine to coarse sand, 27-33% subangular limestone gravel to 25 mm. Moderate to well cemented. Samples 4F and 4H were combined for the lab analysis.	

EXPLORATION LOG

START DATE	7/21/01	STATION	91+10 QN-2C
END DATE	7/21/01	OFFSET	45 m Lt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	PGT
LOCATION	Las Vegas, Nevada	EQUIPMENT	Foremost B90
BORING	B-04	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	203 mm HS Auger
GROUND ELEV.	725.12 (m)	BACKFILLED	Yes DATE 7/21/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SC		
	10.67	4G	MC	50/25mm	50/25mm	0				
714.12	11									
713.12	12									
	12.19–12.29	4H	SPT	50/100	50/100mm	75	Sv, PI, M			
	12.80								**Clayey Sand with Gravel** ; light brown, slightly moist, very dense, with estimated 20-25% low to medium plastic fines, 45-50% fine to coarse sand, 25-30% subangular limestone gravel to 25 mm. Moderate to well cemented.	
712.12	13									
	13.72–13.80	4I	MC	50/88mm	50/88mm	0				
711.12	14									
710.12	15									
	15.24–15.30	4J	SPT	50/62mm	50/62mm	100				
709.12	16							SC		
	16.76–16.82	4K	MC	50/62mm	50/62mm	0				
708.12	17									
707.12	18									
	18.29–18.34	4L	SPT	50/50mm	50/50mm	0				
	18.90								**Clayey Gravel with Sand** ; light brown, slightly moist, very dense, with estimated 15-20% low to medium plastic fines, 35-40% fine to coarse sand, 45-50% subangular to subrounded gravel to 30 mm. Moderate to well cemented. Lithology based on auger cuttings.	
706.12	19									
	19.81–19.89	4M	MC	50/75mm	50/75mm	0				

EXPLORATION LOG

SHEET 3 OF 3

START DATE 7/21/01
END DATE 7/21/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-04
PROJECT # 0324-01-7
GROUND ELEV. 725.12 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 91+10 QN-2C
OFFSET 45 m Lt.
ENGINEER PGT
EQUIPMENT Foremost B90
OPERATOR Eagle Drilling
DRILLING METHOD 203 mm HS Auger
BACKFILLED Yes DATE 7/21/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
704.12	21							GC		
	21.34 / 21.40	4N	SPT	50/62mm	50/62mm	60				
703.12	22									
	22.86 / 22.91	4O	MC	50/38mm	50/38mm	0			22.91	
702.12	23									
701.12	24									
700.12	25									
699.12	26									
698.12	27									
697.12	28									
696.12	29									

EXPLORATION LOG

START DATE 11/9/01
END DATE 11/9/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-07
PROJECT # 0324-01-7
GROUND ELEV. 733.04 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 14+50 R
OFFSET 90 m Rt.
ENGINEER MAM
EQUIPMENT Diedrich D-50 turbo
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 11/9/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								GW GC	**WELL GRADED GRAVEL with SILTY CLAY and SAND** tan, slightly moist, very dense, with 11% nonplastic to low plasticity fines, 42% fine to coarse sand and 47% fine subrounded gravel to 1-1/2". Moderate calcareous cementation.	Previously reported as boring B-C.
732.04	1 — 1.07–1.12	A	SPT	50/25mm	50/25mm	5				
	1.12–1.57	A'	GRAB			50	Sv, PI, M, DS, Chem			
731.04	2									
	2.29							SP SC	**POORLY GRADED SAND with SILTY CLAY and GRAVEL** light brown, slightly moist, very dense, with 11% low plasticity fines, 51% fine to coarse sand and 38% fine to coarse subrounded gravels to 1". Moderate cementation.	
	2.59–2.64	B	MC	75/25mm	75/25mm	5				
730.04	3 — 2.64–3.10	B'	GRAB			50	Sv, PI, M			
	3.66							SC SM	**SILTY, CLAYEY SAND with GRAVEL** tan, slightly moist, very dense, with 13% low plasticity fines, 44% fine to coarse sand and 43% fine subrounded gravel to 1-1/2". Moderate cementation.	
729.04	4 — 4.11–4.16	C	SPT	50/25mm	50/25mm	5				
	4.16–4.62	C'	GRAB			50	Sv, PI, M			
728.04	5									
	5.18							GC GM	**SILTY, CLAYEY GRAVEL with SAND** tan-grey, slightly moist, very dense, with 13% low plasticity fines, 40% fine to coarse sand and 47% fine subrounded limestone gravels to 1/2". Moderate to strong cementation.	
	5.64–5.69	D	MC	75/25mm	75/25mm	5				
727.04	6 — 5.69–6.14	D'	GRAB			50	Sv, PI, M			
726.04	7 — 7.16	E	ST	50/25mm	50/25mm	5				
	7.62								**SILTY SAND with GRAVEL** tan, slightly moist to moist, very dense, with 16% nonplastic to low plasticity fines, 46% fine to coarse sand and 38% fine subrounded limestone gravel to 1-1/2". Moderate cementation.	
725.04	8									
	8.69	F	MC	75/25mm	75/25mm	5				
724.04	9									

EXPLORATION LOG

START DATE	11/9/01	STATION	14+50 R
END DATE	11/9/01	OFFSET	90 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-07	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	733.04 (m)	BACKFILLED	Yes DATE 11/9/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21–10.26	G	SPT	50/50mm	50/50mm	11		SM		
722.04	11									
	11.73–11.78	H	MC	75/25mm	75/25mm	5				
721.04	12 (11.78–12.24)	H'	GRAB			50	Sv, PI, M			
720.04	13									
	13.72								**CLAYEY SAND with GRAVEL** light brown, slightly moist to moist, very dense, with 14-22% low to medium plasticity fines, 46-54% fine to coarse sand and 24-40% fine subrounded limestone gravel to 1". Moderate calcareous cementation.	
719.04	14									
	14.78	I	SPT	50/25mm	50/25mm	5	Sv, PI, M			
718.04	15									
717.04	16									
716.04	17									
	17.83–17.88	J	MC	75/25mm	75/25mm	5				
715.04	18 (17.88–18.34)	J'	GRAB			50	Sv, PI, M	SC		
714.04	19									

EXPLORATION LOG

START DATE 11/9/01
END DATE 11/9/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-07
PROJECT # 0324-01-7
GROUND ELEV. 733.04 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 14+50 R
OFFSET 90 m Rt.
ENGINEER MAM
EQUIPMENT Diedrich D-50 turbo
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 11/9/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.88	K	SPT	50/25mm	50/25mm	5				
712.04	21									
711.04	22									
	22.86							SM	**SILTY SAND with GRAVEL** light brown, slightly moist to moist, very dense, with 15% nonplastic fines, 59% fine to coarse sand and 26% fine subrounded limestone gravel to 3/4".	
710.04	23									
	23.93	L	MC	75/25mm	75/25mm	5	Sv, Pl, M			
709.04	24									
708.04	25									
707.04	26									
	26.97 / 27.02	M	SPT	50/50mm	50/50mm	11				
706.04	27									
705.04	28									
704.04	29									
	30.02									

NV_DOT 0324017.GPJ NV_DOT.GDT 5/30/2008

EXPLORATION LOG

START DATE	11/9/01	STATION	14+50 R
END DATE	11/9/01	OFFSET	90 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-07	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	733.04 (m)	BACKFILLED	Yes DATE 11/9/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	30.07	N	MC	75/50mm	75/50mm	0			30.07	
702.04	31									
701.04	32									
700.04	33									
699.04	34									
698.04	35									
697.04	36									
696.04	37									
695.04	38									
694.04	39									

EXPLORATION LOG

START DATE	11/6/01	STATION	93+88 Q
END DATE	11/6/01	OFFSET	103 m Lt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-08	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	737.62 (m)	BACKFILLED	Yes
HAMMER DROP SYSTEM	Cable	DATE	11/6/2001

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS
736.62	1						
	1.07–1.27	A	SPT	46 50/50mm	50/50mm	44	Sv, PI, M
735.62	2						
	2.59–2.69	B	MC	75/100	75/100mm	0	
734.62	3						
733.62	4						
	4.11–4.29	C	SPT	49 50/75mm	50/75mm	50	Sv, PI, M
732.62	5						
	5.64–5.77	D	MC	50/125	50/125mm	28	Sv, PI, M, DS, Chem
731.62	6						
730.62	7						
	7.16–7.26	E	SPT	50/100	50/100mm	22	
729.62	8						
	8.69–8.79	F	MC	50/100	50/100mm	100	Sv, PI, M
728.62	9						

Depth (m)	USCS Group	MATERIAL DESCRIPTION	REMARKS
0.00	GC GM	**SILTY, CLAYEY GRAVEL with SAND** light brown, slightly moist, dense to very dense, with 14% low plasticity fines, 43% fine to coarse sand and 43% fine subangular limestone gravel to 1-1/2".	Previously reported as boring B-D.
3.35	GC	**CLAYEY GRAVEL with SAND** light brown, slightly moist, very dense, with 14% low to medium plasticity fines, 42% fine to coarse sand and 44% fine subangular limestone gravel to 1". Moderate cementation.	
5.18	GM	**SILTY GRAVEL with SAND** light brown, moist, very dense, with 14% low plasticity fines, 42% fine to coarse sand and 44% fine subangular limestone gravel to 1-1/2". Well cemented.	
6.40	SC SM	**SILTY, CLAYEY SAND with GRAVEL** light brown, moist, very dense, with 18% low plasticity fines, 50% fine to coarse sand and 32% fine subangular limestone gravel to 1-1/2". Moderate cementation. Well cemented between 53-58 feet.	
7.62		**SILTY, CLAYEY GRAVEL with SAND** light brown, slightly moist to moist, very dense, with 18% low plasticity fines, 37% fine to coarse sand and 44% fine to coarse subrounded limestone gravel to 2". Moderate cementation.	

EXPLORATION LOG

START DATE 11/6/01
END DATE 11/6/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-08
PROJECT # 0324-01-7
GROUND ELEV. 737.62 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 93+88 Q
OFFSET 103 m Lt.
ENGINEER MAM
EQUIPMENT Diedrich D-50 turbo
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 11/6/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21	G	SPT	50/25mm	50/25mm	5		GC GM		
726.62	11									
	11.73	H	MC	75/40mm	75/40mm	10				
725.62	12									
724.62	13									
	13.72								**CLAYEY SAND with GRAVEL** light brown, slightly moist to moist, very dense with 14% low plasticity fines, 65% fine to coarse sand and 21% fine to coarse subrounded limestone gravel to 2".	
723.62	14									
	14.78	I	SPT	50/25mm	50/25mm	5				
722.62	15									
721.62	16									
720.62	17									
	17.83	J	MC	75/25mm	75/25mm	5				
719.62	18							SC		
718.62	19									

EXPLORATION LOG

START DATE	11/6/01	STATION	93+88 Q
END DATE	11/6/01	OFFSET	103 m Lt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-08	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	737.62 (m)	BACKFILLED	Yes DATE 11/6/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.88	K	ST	50/25mm	50/25mm	5	Sv, PI, M			
716.62	21									
715.62	22									
	22.40	L	MC	75/25mm	75/25mm	5			22.40	
714.62	23									
713.62	24									
712.62	25									
711.62	26									
710.62	27									
709.62	28									
708.62	29									

EXPLORATION LOG

START DATE	11/7/01	STATION	13+35 R
END DATE	11/7/01	OFFSET	15 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-09	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	723.90 (m)	BACKFILLED	Yes DATE 11/7/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
722.90	1							GP GC	**POORLY GRADED GRAVEL with SILTY CLAY and SAND** light brown, slightly moist, dense to very dense, with 10% low to medium plasticity fines, 35% fine to coarse sand and 55% fine to coarse limestone gravel to 3". Cobbles to 4" comprise an estimated 15% of the unit mass. Moderate cementation.	Previously reported as boring B-E.
	1.07–1.12	A	SPT	50/25mm	50/25mm	5				
	1.12–1.57	A'	GRAB			50	Sv, PI, M			
	1.98									
721.90	2							GW GC	**WELL GRADED GRAVEL with CLAY and SAND** light brown, slightly moist, very dense, with 11% low plasticity fines, 43% fine to coarse sand and 46% fine subangular limestone gravel to 3/4". Moderate cementation.	
	2.59–2.69	B	MC	75/100	75/100mm	11				
720.90	3									
	2.69–3.15	B'	GRAB			50	Sv, PI, M, DS, Chem			
	3.81									
719.90	4							SC	**CLAYEY SAND with GRAVEL** light brown-grey, slightly moist, very dense, with estimated 14% medium to high plasticity fines, 43% fine to coarse sand and 42% fine to coarse subangular limestone gravel to 3". Unit contains an estimated 10% subangular cobbles to 4". Moderate cementation.	
	4.11–4.16	C	SPT	50/15mm	50/15mm	3				
	4.16–4.62	C'	GRAB			50	Sv, PI, M			
718.90	5									
	5.18							SC SM	**SILTY, CLAYEY SAND with GRAVEL** tan-light brown, slightly moist to moist, very dense, with 13% low plasticity fines, 60% fine to coarse sand and 27% fine to coarse subrounded limestone gravel to 2". Moderate calcareous cementation.	
	5.64–5.69	D	MC	50/25mm	50/25mm	5				
717.90	6									
	5.69–6.14	D'	GRAB			50	Sv, PI, M			
	6.40							SC	**CLAYEY SAND with GRAVEL** light brown-tan, slightly moist to moist, very dense, with 17-21% medium plasticity fines, 49-50% fine to coarse sand and 29-33% fine to coarse gravel to 3". Moderate cementation.	
716.90	7									
	7.16–7.29	E	SPT	50/125	50/125mm	28	Sv, PI, M			
715.90	8									
	8.69–8.74	F	MC	75/50mm	75/50mm	11				
714.90	9									

EXPLORATION LOG

START DATE 11/7/01
END DATE 11/7/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-09
PROJECT # 0324-01-7
GROUND ELEV. 723.90 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 13+35 R
OFFSET 15 m Rt.
ENGINEER MAM
EQUIPMENT Diedrich D-50 turbo
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 11/7/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21 / 10.29	G	SPT	50/75mm	50/75mm	17	Sv, PI, M			
712.90	11									
	11.73 / 11.78	H	MC	75/50mm	75/50mm	11				
711.90	12									
	12.19							SW SC	**WELL GRADED SAND with CLAY and GRAVEL** light brown, moist, very dense, with 12% low plasticity fines, 53% fine to coarse sand and 35% fine to coarse subrounded limestone gravel to 2'. Moderate cementation.	
710.90	13									
709.90	14									
	14.78 / 14.98	I	SPT	49 50/50mm	50/50mm	44	Sv, PI, M			
708.90	15									
707.90	16									
	16.15							GC	**CLAYEY GRAVEL with SAND** light brown, moist, very dense, with estimated 15-20% low plasticity fines, 30-35 fine to coarse sand and 50% fine to coarse subrounded gravel to 3".	
706.90	17									
	17.83 / 17.96	J	MC	75/125	75/125mm	28				
705.90	18									
704.90	19									

EXPLORATION LOG

START DATE	11/7/01	STATION	13+35 R
END DATE	11/7/01	OFFSET	15 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-09	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	723.90 (m)	BACKFILLED	Yes
HAMMER DROP SYSTEM	Cable	DATE	11/7/2001

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.88									
	20.98	K	SPT	50/100	50/100mm	22				
702.90	21									
701.90	22									
	22.40	L	MC	75/15mm	75/15mm	3			22.40	
700.90	23									
699.90	24									
698.90	25									
697.90	26									
696.90	27									
695.90	28									
694.90	29									

EXPLORATION LOG

START DATE 11/6/01
END DATE 11/6/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-10
PROJECT # 0324-01-7
GROUND ELEV. 729.39 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 12+55 R
OFFSET 33 m Rt.
ENGINEER MAM
EQUIPMENT Diedrich D-50 turbo
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 11/6/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00 / 0.05	A	MC	50/50mm	50/50mm	11		SC SM	0.00–2.13: **SILTY, CLAYEY SAND with GRAVEL** light brown, slightly moist, very dense, with 14% low plasticity fines, 50% fine to coarse sand and 36% fine to coarse subangular limestone gravels to 1-1/2". Moderate calcareous cementation.	Previously reported as boring B-F.
	0.05 / 0.51	A'	GRAB			50				
728.39	1 — 1.07 / 1.12	B	SPT	50/25mm	50/25mm	5				
	1.12 / 1.57	B'	GRAB			50	Sv, PI, M, DS, Chem			
727.39	2									
	2.59 / 2.67	C	MC	75/50mm	75/50mm	11		SW SC	2.13–3.66: **WELL GRADED SAND with CLAY and GRAVEL** light brown, slightly moist, very dense, with 9% low to medium plasticity fines, 61% fine to coarse sand and 30% fine to coarse subangular limestone gravels to 1-1/2". Well cemented; difficult drilling.	
726.39	3 — 2.67 / 3.12	C'	GRAB			50	Sv, PI, M			
725.39	4 — 4.11 / 4.19	D	SPT	50/50mm	50/50mm	11		GW GM	3.66–4.88: **WELL GRADED GRAVEL with SILT and SAND** tan, slightly moist, very dense, with 10% low plasticity fines, 42% fine to coarse sand and 48% fine to coarse subangular limestone gravels to 2". Well cemented; difficult drilling.	
	4.19 / 4.65	D'	GRAB			50	Sv, PI, M			
724.39	5									
	5.64 / 5.74	E	MC	75/75mm	75/75mm	17		GW GC	4.88–6.71: **WELL GRADED GRAVEL with SILTY CLAY and SAND** light brown, slightly moist to moist, very dense, with 10% low plasticity fines, 43% fine to coarse sand and 47% fine to coarse subangular limestone gravels to 1-1/2". Moderate calcareous cementation.	
723.39	6 — 5.74 / 6.20	E'	GRAB			50	Sv, PI, M			
722.39	7 — 7.16	F	ST	50/15mm	50/15mm	2	Sv, PI, M		6.71–: **POORLY GRADED GRAVEL with SILT and SAND** light brown, moist, very dense, with 10% low plasticity fines, 43% fine to coarse sand and 47% fine subangular limestone gravel to 1-1/2". Moderate cementation.	
721.39	8									
	8.69	G	MC	75/15mm	75/15mm	2				
720.39	9									

EXPLORATION LOG

START DATE	11/6/01	STATION	12+55 R
END DATE	11/6/01	OFFSET	33 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-10	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	729.39 (m)	BACKFILLED	Yes DATE 11/6/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21	H	ST	50/25mm	50/25mm	5		GP GM		
718.39	11									
	11.73	I	MC	75/25mm	75/25mm	5				
717.39	12									
716.39	13									
715.39	14									
	14.78 14.83	J	SPT	50/50mm	50/50mm	11				
714.39	15									
								SC	15.24 **CLAYEY SAND with GRAVEL** light brown, moist, very dense, with 13-16% low to medium plasticity fines, 54-60% fine to coarse sand and 24-33% fine to coarse subrounded limestone gravel to 1". Moderate cementation.	
713.39	16									
712.39	17									
	17.83 17.88	K	MC	75/50mm	75/50mm	11	Sv, PI, M			
711.39	18									
710.39	19									

EXPLORATION LOG

START DATE	11/6/01	STATION	12+55 R
END DATE	11/6/01	OFFSET	33 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-10	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	729.39 (m)	BACKFILLED	Yes
HAMMER DROP SYSTEM	Cable	DATE	11/6/2001

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.88									
	20.93	L	SPT	50/50mm	50/50mm	11				
708.39	21									
707.39	22									
	22.40	M	MC	75/25mm	75/25mm	5	Sv, PI, M		22.40	
706.39	23									
705.39	24									
704.39	25									
703.39	26									
702.39	27									
701.39	28									
700.39	29									

EXPLORATION LOG

START DATE	11/7/01	STATION	91+68 Q
END DATE	11/7/01	OFFSET	31 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-11	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	723.90 (m)	BACKFILLED	Yes DATE 11/7/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS
722.90	1						
	1.07–1.12	A	ST	50/25mm	50/25mm	5	
	1.12–1.57	A'	GRAB			50	Sv, PI, M
721.90	2						
	2.59–2.64	B	MC	75/25mm	75/25mm	5	
720.90	3						
	2.64–3.10	B'	GRAB			50	Sv, PI, M, DS, Chem
719.90	4						
	4.11–4.16	C	ST	50/50mm	50/50mm	11	
	4.16–4.62	C'	GRAB			50	Sv, PI, M
718.90	5						
	5.64–5.70	D	MC	75/38mm	75/38mm	10	
717.90	6						
	5.70–6.16	D'	GRAB			50	Sv, PI, M
716.90	7						
	7.16–7.26	E	ST	50/100	50/100mm	22	Sv, PI, M
715.90	8						
	8.69–8.81	F	MC	75/125	75/125mm	28	Sv, PI, M
714.90	9						

USCS Group	Bottom depth (m)	MATERIAL DESCRIPTION	REMARKS
GP GM	1.68	**POORLY GRADED GRAVEL with SILT and SAND** light brown-tan, slightly moist, very dense, with 6% nonplastic fines, 44% fine to coarse sand and 50% fine subangular limestone gravel to 1". Moderate cementation.	Previously reported as boring B-G.
SW SC	3.35	**WELL GRADED SAND with SILTY CLAY and SAND** light brown, slightly moist, very dense with 11% low plasticity fines, 54% fine to coarse sand and 35% fine subrounded limestone gravel to 3/4". Moderate calcareous cementation.	
GP GC	5.18	**P OORLY GRADED GRAVEL with SILTY CLAY and SAND** light tan, moist, very dense, with 10% low plasticity fines, 39% fine to coarse sand and 51% fine subangular limestone gravel to 1/2". Moderate cementation.	
SW SC	6.40	**WELL GRADED SAND with CLAY and GRAVEL** light brown, moist, very dense with 21% medium plasticity fines, 61% fine to coarse sand and 18% fine subangular limestone gravel to 3/4". Moderate cementation.	
		CLAYEY SAND with GRAVEL light brown, moist, very dense, with 14-21% low plasticity fines, 44-65% fine to coarse sand and 18-42% fine subrounded limestone gravel to 1". Moderate cementation.	

EXPLORATION LOG

START DATE 11/7/01
END DATE 11/7/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-11
PROJECT # 0324-01-7
GROUND ELEV. 723.90 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 91+68 Q
OFFSET 31 m Rt.
ENGINEER MAM
EQUIPMENT Diedrich D-50 turbo
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 11/7/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21	G	ST	50/25mm	50/25mm	6		SC		
712.90	11									
	11.73 / 11.78	H	MC	75/50mm	75/50mm	11				
711.90	12									
710.90	13									
709.90	14									
	14.78 / 14.83 / 14.83	I	SPT	50/50mm	50/50mm	11				
708.90	15	I'	GRAB			50				
	15.29									
707.90	16									
	16.76							GC GM	**SILTY, CLAYEY GRAVEL with SAND** light brown, moist, very dense, with 16% low plasticity fines, 41% fine to coarse sand and 44% fine subrounded gravel to 1". Moderate cementation.	
706.90	17									
	17.83 / 17.89	J	MC	75/63mm	75/63mm	17				
705.90	18									
704.90	19									

EXPLORATION LOG

START DATE	11/7/01	STATION	91+68 Q
END DATE	11/7/01	OFFSET	31 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-11	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	723.90 (m)	BACKFILLED	Yes DATE 11/7/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.88	K	ST	50/25mm	50/25mm	5				
702.90	21									
	21.38									
		K'	GRAB			50	Sv, PI, M			
	21.84									
									21.95	
701.90	22							SC SM	**SILTY, CLAYEY SAND** tan-light brown, moist, very dense, with 23% low plasticity fines, 67% fine to coarse sand and 10% fine to coarse subangular gravel to 2". Moderate calcareous cementation.	
	22.40									
	22.45	L	MC	75/50mm	75/50mm	11	Sv, PI, M		22.45	
700.90	23									
699.90	24									
698.90	25									
697.90	26									
696.90	27									
695.90	28									
694.90	29									

EXPLORATION LOG

START DATE 11/7/01
END DATE 11/7/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-13
PROJECT # 0324-01-7
GROUND ELEV. 720.24 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 93+15 Q
OFFSET 60 m Rt.
ENGINEER MAM
EQUIPMENT Diedrich D-50 turbo
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 11/7/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SC SM	**SILTY, CLAYEY SAND with GRAVEL** light brown, dry to slightly moist, very dense, with 13-15% low plasticity fines, 52% fine to coarse sand and 34-36% fine to coarse subrounded limestone gravel to 3/4". Strong calcareous cementation.	Previously reported as boring B-I.
719.24	1									
	1.07–1.14	A	SPT	50/75mm	50/75mm	16				
	1.14–1.60	A'	GRAB			50	Sv, PI, M			
718.24	2									
	2.59–2.64	B	MC	75/25mm	75/25mm	5				
	2.64–3.10	B'	GRAB			50	Sv, PI, M, SH, Chem			
717.24	3									
	3.35							SC	**CLAYEY SAND with GRAVEL** light brown, slightly moist, very dense, with 15% low plasticity fines, 51% fine to coarse sand and 34% fine subangular limestone gravel to 1-1/2". Strong calcareous cementation.	
716.24	4									
	4.11–4.16	C	SPT	50/25mm	50/25mm	5				
	4.16–4.62	C'	GRAB			50	Sv, PI, M			
715.24	5									
	5.18							SC SM	**SILTY, CLAYEY SAND with GRAVEL** light brown, slightly moist, very dense, with 14% low plasticity to nonplastic fines, 49% fine to coarse sand and 37% fine subangular limestone gravel to 1-1/2". Moderate calcareous cementation.	
	5.64–5.79	D	MC	75/0mm	75/0mm	0				
714.24	6									
	5.79–6.25	D'	GRAB			50	Sv, PI, M			
	6.71							GC	**CLAYEY GRAVEL with SAND** light brown, slightly moist to moist, very dense, with 15-19% low plasticity fines, 34-37% fine to coarse sand and 47-48% fine subrounded gravel to 2". Moderate calcareous cementation.	
713.24	7									
	7.16–7.26	E	SPT	50/100	50/100mm	22	Sv, PI, M			
712.24	8									
	8.69–8.76	F	MC	75/75mm	75/75mm	17	Sv, PI, M			
711.24	9									

EXPLORATION LOG

START DATE 11/7/01
END DATE 11/7/01
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-13
PROJECT # 0324-01-7
GROUND ELEV. 720.24 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION 93+15 Q
OFFSET 60 m Rt.
ENGINEER MAM
EQUIPMENT Diedrich D-50 turbo
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 11/7/2001

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21	G	SPT	50/25mm	50/25mm	5		SC SM	10.06 **SILTY, CLAYEY SAND with GRAVEL** tan, slightly moist to moist, very dense, with 13-17% low plasticity fines, 49-58% fine to coarse sand and 29-34% fine to coarse subrounded limestone gravel to 3".	
709.24	11									
	11.73	H	MC	75/50mm	75/50mm	11				
	11.78	H'	GRAB			50	Sv, PI, M			
708.24	12									
	12.24									
707.24	13									
706.24	14									
	14.78	I	SPT	50/25mm	50/25mm	5	Sv, PI, M			
705.24	15									
								GC	15.24 **CLAYEY GRAVEL with SAND** light brown, slightly moist to moist, very dense, with estimated 25% low plasticity fines, 35% fine to coarse sand and 45% fine subrounded gravel to 1-1/2". Moderate cementation.	
704.24	16									
703.24	17									
	17.83	J	MC	75/38mm	75/38mm	4				
702.24	18									
701.24	19									

EXPLORATION LOG

START DATE	11/7/01	STATION	93+15 Q
END DATE	11/7/01	OFFSET	60 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	MAM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 turbo
BORING	B-13	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	720.24 (m)	BACKFILLED	Yes DATE 11/7/2001
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.88	K	SPT	50/25mm	50/25mm	5				
699.24	21									
698.24	22									
	22.40	L	MC	75/63mm	75/63mm	12				
	22.46								22.46	
697.24	23									
696.24	24									
695.24	25									
694.24	26									
693.24	27									
692.24	28									
691.24	29									

EXPLORATION LOG

START DATE	1/15/02	STATION	R5 13+90
END DATE	1/15/02	OFFSET	20 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	PGT
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50
BORING	B-18	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	152 mm HS Auger
GROUND ELEV.	736.40 (m)	BACKFILLED	Yes DATE 1/14/2002
HAMMER DROP SYSTEM	Cable		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00–1.22							SC SM	**Silty, Clayey Sand with Gravel** ; light grey brown, dry, very dense, with 16% low plastic fines, 50% fine to coarse sand, 34% subangular limestone gravel to 3". Cobbles to 6-inch-diameter comprise 15% of the total mass at the surface. Moderately cemented with weak caliche coating on cobbles.	Boring located in field south of NDOT right-of-way at west end of Summerlin eastbound off-ramp. The westernmost of five holes.
	0.76–0.81	18A	MC	50/25mm	50/25mm	100				
735.40	0.81–1.12	18A'	GRAB			50	Sv, PI, M			
	1.22									
	1.22–2.74							GP GM	**Poorly Graded Gravel with Silt and Sand** ; light brown grey, dry, very dense, with 9% low plastic fines, 36% fine to coarse sand, 55% subangular to subrounded limestone gravel to >2.5". Moderate to well cemented.	
	1.52–1.57	18B	SPT	50/25mm	50/25mm	0				
	1.57–1.88	18B'	GRAB			50	Sv, PI, M			
734.40	2									
	2.74									
	2.74–5.49							GP GC	**Poorly-Graded Gravel with Silty Clay and Sand** ; light grey brown, dry, very dense, with 9% low plastic fines, 39% fine to coarse sand, 52% subangular limestone gravel to 3". Moderately to well cemented. Actual in-place soil is likely a well graded gravel with Silty Clay and Sand	**Grab samples are from auger cuttings at surface. They are much larger in volume than the limited volume SPT and MC samples.**
733.40	3.05–3.11	18C	MC	50/65mm	50/65mm	100				
732.40	4									
	4.57–4.67	18D	SPT	50/100	50/100mm	0				
731.40	4.67–5.13	18D'	GRAB			50	Sv, PI, M			
	5.49									
	5.49–6.71							SW SC	**Well Graded Sand with Silty Clay and Gravel** ; light grey brown, dry, very dense, with 10% low plastic fines, 46% fine to coarse sand, 44% subangular limestone gravel to 3".	**Hard, cemented gravel throughout hole. Auger bit produces angular sand and fine gravel fragments from originally larger gravel and possibly cobble clasts.**
730.40	6.10	18E	MC	50/25mm	50/25mm	100	Sv, PI, M			
	6.71									
	6.71–7.67							SP SC	**Poorly Graded Sand with Silty Clay and Gravel** ; light grey brown, dry, very dense, with 10% low plastic fines, 51% fine to coarse sand, 39% subangular limestone gravel to 3".	
729.40	7.16–7.62	18F'	GRAB			50	Sv, PI, M			
	7.62–7.67	18F	SPT	50/50mm	50/50mm	0				
	7.67									
728.40	8									
727.40	9									

EXPLORATION LOG

START DATE 1/15/02
END DATE 1/15/02
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-19
PROJECT # 0324-01-7
GROUND ELEV. 735.48 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION R5 12+90
OFFSET 10 m Rt.
ENGINEER PGT
EQUIPMENT Diedrich D-50
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 1/14/2002

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.76–0.81	19A	SPT	50/15mm	50/15mm	0		SM	**Silty Sand with Gravel** ; light grey brown, dry, very dense, with 14% low plastic fines, 43% fine to coarse sand, 42% subangular limestone gravel to 3". Cobbles to 6-inch-diameter comprise 15% of the total mass. Moderately cemented with weak caliche coating on cobbles.	Boring located in field south of NDOT right-of-way at west end of Summerlin eastbound off-ramp.
734.48	1 / 0.81–1.12	19A'	GRAB			50	Sv, PI, M			
	1.22									
	1.52–1.57	19B	MC	50/10mm	50/10mm	0		SP SM	**Poorly Graded Sand with Silt and Gravel** ; light grey brown, dry, very dense, with 11% low plastic fines, 47% fine to coarse sand, 42% subangular limestone gravel to 3".	
	1.57–1.88	19B'	GRAB			50	Sv, PI, M			
733.48	2									
	2.13							GW GM	**Well Graded Gravel with Silt and Sand** ; light grey brown, dry, very dense, with 9% low plastic fines, 43% fine to coarse sand, 48% subangular limestone gravel to 3".	**Grab samples are from auger cuttings at surface. They are much larger in volume than the limited volume SPT and MC samples.**
732.48	3 / 3.05–3.12	19C	SPT	50/75mm	50/75mm	100	Sv, PI, M			
	3.66							GW GC	**Well Graded Gravel with Silty Clay and Sand** ; light grey brown, dry, very dense, with 10% low plastic fines, 40% fine to coarse sand, 50% subangular limestone gravel to 3".	
731.48	4									
	4.57–4.65	19D	MC	50/75mm	50/75mm	67				
730.48	5 / 4.65–5.11	19D'	GRAB			50	Sv, PI, M			
	5.49							GW GM	**Well Graded Gravel with Silt and Sand** ; light grey brown, dry, very dense, with 10% low plastic fines, 43% fine to coarse sand, 47% subangular limestone gravel to 3".	**Hard, cemented gravel throughout hole. Auger bit produces angular sand and fine gravel fragments from originally larger gravel and possibly cobble clasts.**
729.48	6 / 6.10–6.17	19E	SPT	50/75mm	50/75mm	67				
	6.17–6.63	19E'	GRAB			50	Sv, PI, M			
728.48	7 / 7.01							SC	**Clayey Sand with Gravel** ; light grey brown, dry, very dense, with 13% medium plastic fines, 50% fine to coarse sand, 37% subangular limestone gravel to 3". Moderately cemented with weak caliche coating on cobbles.	
	7.62	19F	MC	50/25mm	50/25mm	100	Sv, PI, M			
727.48	8									
	8.53							SP SM	**Poorly-Graded Sand with Silt and Gravel** ; light grey brown, dry, very dense, with 9% low plastic fines, 48% fine to coarse sand, 42% subangular limestone gravel to 3".	
726.48	9 / 9.14–9.19	19G	SPT	50/50mm	50/50mm	50				
	9.19–9.65	19G'	GRAB			50	Sv, PI, M			

EXPLORATION LOG

START DATE 1/15/02
END DATE 1/15/02
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING B-19
PROJECT # 0324-01-7
GROUND ELEV. 735.48 (m)
HAMMER DROP SYSTEM Cable

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION R5 12+90
OFFSET 10 m Rt.
ENGINEER PGT
EQUIPMENT Diedrich D-50
OPERATOR Eagle Drilling
DRILLING METHOD 152 mm HS Auger
BACKFILLED Yes DATE 1/14/2002

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.06							SC	10.06 **Clayey Sand with Gravel** ; light grey brown, dry, very dense, with 13% low to medium plastic fines, 52% fine to coarse sand, 35% subangular limestone gravel to 3".	
	10.67–10.74	19H	MC	50/75mm	50/75mm	100	Sv, PI, M			
724.48	11									
723.48	12									
	12.19	19I	SPT	50/25mm	50/25mm	0				
	12.50							GP GC	12.50 **Poorly Graded Gravel with Silty Clay and Sand** ; light grey brown, dry, very dense, with 10% low plastic fines, 35% fine to coarse sand, 55% subangular limestone gravel to 3". Moderately to well cemented.	
722.48	13									
	13.72	19J	MC	50/25mm	50/25mm	0				
	13.76–14.22	19J'	GRAB			50	Sv, PI, M			
721.48	14									
720.48	15									
	15.24–15.37	19K	SPT	50/125	50/125mm	40	Sv, PI, M		15.24	
719.48	16									
718.48	17									
717.48	18									
716.48	19									

EXPLORATION LOG

SHEET 1 OF 1

START DATE	4/12/07	STATION	SW 99+29.5
END DATE	4/12/07	OFFSET	3.8 m Lt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-01	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	740.95 (m)	BACKFILLED	Yes DATE 4/12/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group
739.95	1							
	1.52 – 1.70	A	SPT	44 50/25mm	50/25mm	39	Sv, PI, M	SM
738.95	2							
737.95	3 (3.05 – 3.10)	B	SPT	50/50mm	50/50mm	11		
736.95	4							
	4.57 – 4.75	C	SPT	43 50/25mm	50/25mm	39	Sv, PI, M	SM
735.95	5							
734.95	6 (6.10 – 6.14)	D	SPT	50/50mm	50/50mm	11		
733.95	7							
732.95	8							
731.95	9							

MATERIAL DESCRIPTION

Depth (m)	Description
0.00 – 3.66	**Silty Sand with Gravel** Tan, brown, dry, very dense, with 14% non-plastic fines, 46% fine to coarse sand, and 40% fine to coarse angular to subrounded gravel.
3.66 – 6.14	**Silty Sand** Tan, brown, dry, very dense, with 15% non-plastic fines, 71% fine to coarse sand, and 14% fine to coarse angular to subrounded gravel.

REMARKS

Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.

EXPLORATION LOG

START DATE 4/12/07
END DATE 4/12/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-02
PROJECT # 0324-01-7
GROUND ELEV. 738.47 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION SW 98+32.9
OFFSET 2.4 m Lt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Hollow Stem Auger
BACKFILLED Yes DATE 4/12/2007

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SM	**Silty Sand with Gravel** Tan, brown, dry, very dense, with 21% non-plastic fines, 54% fine to coarse sand, and 25% fine to coarse angular to subrounded gravel.	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.
737.47	1									
	1.52–1.60	A	SPT	50/75mm	50/75mm	17	Sv, PI, M			
736.47	2									
	2.44							SM	**Silty Sand with Gravel** Tan, brown, dry, very dense, with 14% non-plastic fines, 57% fine to coarse sand, and 29% fine to coarse angular to subrounded gravel.	
735.47	3									
	3.05–3.15	B	SPT	50/100	50/100mm	22	Sv, PI, M			
	3.66							SP SM	**Poorly Graded Sand with Silt and Gravel** Tan, brown, dry, very dense, with 10% non-plastic fines, 53% fine to coarse sand, and 37% fine to coarse angular to subrounded gravel.	
734.47	4									
	4.57–4.70	C	SPT	50/125	50/125mm	28	Sv, PI, M			
733.47	5									
732.47	6									
	6.10–6.20	D	SPT	50/100	50/100mm	22			6.20	
731.47	7									
730.47	8									
729.47	9									

EXPLORATION LOG

START DATE 4/12/07
END DATE 4/12/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-03
PROJECT # 0324-01-7
GROUND ELEV. 725.42 (m)
HAMMER DROP SYSTEM Automatic

STATION HOV 95+59.6
OFFSET 0.2 m Lt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Hollow Stem Auger
BACKFILLED Yes DATE 4/12/2007

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								GP GM	**Poorly Graded Gravel with Silt and Sand** Tan, brown, dry, very dense, with 9% non-plastic fines, 37% fine to coarse sand, and 54% fine to medium angular to subrounded gravel.	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.
724.42	1									
	1.52 – 1.65	A	SPT	50/125	50/125mm	28	Sv, PI, M, Chem			
723.42	2									
	2.44							SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 14% medium plasticity fines, 43% fine to coarse sand, and 43% fine to medium angular to subrounded gravel.	
722.42	3									
	3.05 – 3.18	B	SPT	50/125	50/125mm	28	Sv, PI, M			
721.42	4									
	4.27							SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 16% low to medium plasticity fines, 43% fine to coarse sand, and 41% fine to coarse angular to subrounded gravel.	
	4.57 – 4.65	C	SPT	50/75mm	50/75mm	17	Sv, PI, M			
720.42	5									
	5.79							SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 15% medium plasticity fines, 44% fine to coarse sand, and 41% fine to coarse angular to subrounded gravel.	
719.42	6									
	6.10 – 6.17	D	SPT	50/75mm	50/75mm	17	Sv, PI, M			
718.42	7									
	7.62 – 7.72	E	SPT	50/100	50/100mm	22				
717.42	8									
	8.53								**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 22% medium plasticity fines, 54% fine to coarse sand, and 24% fine to coarse angular to subrounded gravel.	
716.42	9									
	9.14 – 9.22	F	SPT	50/75mm	50/75mm	6				

EXPLORATION LOG

START DATE	4/12/07	STATION	HOV 95+59.6
END DATE	4/12/07	OFFSET	0.2 m Lt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-03	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	725.42 (m)	BACKFILLED	Yes DATE 4/12/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SC		
	10.67 / 10.77	G	SPT	50/100	50/100mm	22	Sv, PI, M			
714.42	11									
	11.58								**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 17% low plasticity fines, 46% fine to coarse sand, and 37% fine to coarse angular to subrounded gravel.	
713.42	12									
	12.19 / 12.24	H	SPT	50/50mm	50/50mm	11	Sv, PI, M			
712.42	13							SC		
	13.72 / 13.79	I	SPT	50/75mm	50/75mm	17				
711.42	14									
	14.63								**Silty Sand with Gravel** Tan, brown, dry, very dense, with 13% non-plastic fines, 44-50% fine to coarse sand, and 38-43% fine to coarse angular to subrounded gravel.	
710.42	15									
	15.24 / 15.32	J	SPT	50/75mm	50/75mm	11	Sv, PI, M			
709.42	16							SM		
	16.76 / 16.89	K	SPT	50/125	50/125mm	28	Sv, PI, M			
708.42	17									
	17.68								**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 23% low plasticity fines, 50% fine to coarse sand, and 27% fine to coarse angular to subrounded gravel.	
707.42	18									
	18.29 / 18.36	L	SPT	50/75mm	50/75mm	17				
706.42	19									
	19.81 / 19.86	M	SPT	50/50mm	50/50mm	11				

EXPLORATION LOG

START DATE 4/12/07
END DATE 4/12/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-03
PROJECT # 0324-01-7
GROUND ELEV. 725.42 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION HOV 95+59.6
OFFSET 0.2 m Lt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Hollow Stem Auger
BACKFILLED Yes DATE 4/12/2007

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SC		
704.42	21									
	21.34–21.46	N	SPT	50/125	50/125mm	28	Sv, PI, M			
703.42	22									
									22.25	
								SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 19% medium plasticity fines, 42% fine to coarse sand, and 39% fine to coarse angular to subrounded gravel.	
702.42	23 (22.86–23.14)	O	SPT	14 50/125	50/125mm	61	Sv, PI, M			
									23.77	
701.42	24							SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 20% medium plasticity fines, 50% fine to coarse sand, and 30% fine to coarse angular to subrounded gravel.	
	24.38–24.46	P	SPT	50/75mm	50/75mm	17	Sv, PI, M		24.46	
700.42	25									
699.42	26									
698.42	27									
697.42	28									
696.42	29									

EXPLORATION LOG

START DATE 4/11/07
END DATE 4/11/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-04
PROJECT # 0324-01-7
GROUND ELEV. 719.67 (m)
HAMMER DROP SYSTEM Automatic

STATION HOV 90+91.1
OFFSET 0.2 m Rt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Auger/NQ Core
BACKFILLED Yes DATE 4/11/2007

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
718.67	1							SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 20% medium plasticity fines, 52% fine to coarse sand, and 28% fine to coarse angular to subrounded gravel.	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.
	1.52–1.65	A	SPT	50/125	50/125mm	28	Sv, PI, M			
	1.83								1.83	
717.67	2	B	CORE			15	Sv, PI, M	GW	**Well Graded Gravel** Tan, wet, very dense, with 2% medium plasticity fines, 7% fine to coarse sand, and 91% fine to coarse angular to subrounded gravel. Attempted to core 1.5 to 4.5 meters. Only core recovery was from the 1.8 to 2 meters interval with the remainder consisting of clean medium to coarse subrounded volcanic gravel.	Drilled NC core from 1.5 to 4.5 meters. Poor recovery.
									2.13	
716.67	3							GW GM	**Well Graded Gravel with Silt and Sand** Tan, grey, wet, very dense, with 6% non-plastic fines, 37% fine to coarse sand, and 57% fine to coarse angular to subrounded gravel.	
	3.05–3.32	C	SPT	9 50/125	50/125mm	61	Sv, PI, M			
715.67	4	C'	CORE			0				
									4.27	
	4.57–4.69	D	SPT	50/125	50/125mm	28	Sv, PI, M	SC	**Clayey Sand with Gravel** Tan, grey, wet, very dense, with 16% medium plasticity fines, 45% fine to coarse sand, and 39% fine to coarse angular to subrounded gravel.	
714.67	5									
									5.49	
713.67	6							SC	**Clayey Sand with Gravel** Tan, grey, wet, very dense, with 12% low to medium plasticity fines, 46% fine to coarse sand, and 42% fine to coarse angular to subrounded gravel.	
	6.10–6.19	E	SPT	50/75mm	50/75mm	17	Sv, PI, M			
712.67	7									
	7.62–7.68	F	SPT	50/50mm	50/50mm	11				
711.67	8									
									8.53	
710.67	9							SC	**Clayey Sand with Gravel** Tan, grey, wet, very dense, with 19% medium plasticity fines, 46% fine to coarse sand, and 35% fine to coarse angular to subrounded gravel.	
	9.14–9.42	G	SPT	26 50/125	50/125mm	61	Sv, PI, M			

EXPLORATION LOG

START DATE	4/11/07	STATION	HOV 90+91.1
END DATE	4/11/07	OFFSET	0.2 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-04	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Auger/NQ Core
GROUND ELEV.	719.67 (m)	BACKFILLED	Yes DATE 4/11/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									10.36	
	10.67 / 10.79	H	SPT	50/125	50/125mm	28	Sv, PI, M	SC	**Clayey Sand with Gravel** Tan, grey, wet, very dense, with 18% medium plasticity fines, 56% fine to coarse sand, and 26% fine to coarse angular to subrounded gravel.	
708.67	11									
707.67	12									
	12.19 / 12.25	I	SPT	50/50mm	50/50mm	11				
706.67	13									
									13.41	
	13.72	J	SPT	50/25mm	50/25mm	6		SC	**Clayey Sand with Gravel** Tan, grey, wet, very dense, with 16% low to medium plasticity fines, 51% fine to coarse sand, and 33% fine to coarse angular to subrounded gravel.	
705.67	14									
704.67	15									
	15.24 / 15.30	K	SPT	50/50mm	50/50mm	11	Sv, PI, M			
703.67	16									
	16.76 / 16.82	L	SPT	50/50mm	50/50mm	11				
702.67	17									
701.67	18									
	18.29	M	SPT	50/25mm	50/25mm	6			18.29 **Clayey Sand with Gravel** Tan, grey, wet, very dense, with 16% medium plasticity fines, 42% fine to coarse sand, and 42% fine to coarse angular to subrounded gravel.	
700.67	19									
	19.81	N	SPT	50/25mm	50/25mm	6				

EXPLORATION LOG

START DATE 4/11/07
END DATE 4/11/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-04
PROJECT # 0324-01-7
GROUND ELEV. 719.67 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION HOV 90+91.1
OFFSET 0.2 m Rt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Auger/NQ Core
BACKFILLED Yes DATE 4/11/2007

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
698.67	21							SC		
	21.34 / 21.40	O	SPT	50/50mm	50/50mm	11				
697.67	22									
	22.86									
696.67	23 / 23.07	P	SPT	49 50/ 50mm	50/50mm	44	Sv, PI, M			
									23.77	
695.67	24							GC	**Clayey Gravel with Sand** Tan, grey, wet, very dense, with 14% medium plasticity fines, 36% fine to coarse sand, and 50% fine to coarse angular to subrounded gravel.	
	24.38 / 24.48	Q	SPT	50/100	50/100mm	22	Sv, PI, M		24.48	
694.67	25									
693.67	26									
692.67	27									
691.67	28									
690.67	29									

EXPLORATION LOG

START DATE 4/10/07
END DATE 4/10/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-05
PROJECT # 0324-01-7
GROUND ELEV. 718.92 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION HOV 89+71.3
OFFSET 0.2 m Rt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Auger/NQ Core
BACKFILLED Yes DATE 4/10/2007

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SM	**Silty Sand with Gravel** Tan, brown, slightly moist, very dense, with 13% medium plasticity fines, 51% fine to coarse sand, and 36% fine to coarse angular to subrounded gravel.	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.
717.92	1									
	1.52 – 1.78	A	SPT	43 50/100	50/100mm	56	Sv, PI, M		**Attempt NC core run from 1.8 to 3 m and 3.5 to 4.5 meters. Very poor recovery composed of 0.5 meter of clean coarse volcanic gravel.**	
716.92	2									
715.92	3	B	CORE			15				
714.92	4								4.27	
	4.57 – 4.70	C	SPT	50/125	50/125mm	28	Sv, PI, M	GP GC	**Poorly Graded Gravel with Clay and Sand** Tan, brown, slightly moist, very dense, with 11% medium plasticity fines, 40% fine to coarse sand, and 49% fine to coarse angular to subrounded volcanic gravel.	
	4.88									
713.92	5									
712.92	6									
	6.10 – 6.17	D	SPT	50/75mm	50/75mm	17				
711.92	7									
	7.62 – 7.67	E	SPT	50/50mm	50/50mm	11				
710.92	8								8.53	
									Silty Sand Tan, slightly moist, very dense, with 19% non-plastic fines, 69% fine to coarse sand, and 12% fine to coarse angular to subrounded gravel.	
709.92	9									
	9.14 – 9.19	F	SPT	50/50mm	50/50mm	11				

EXPLORATION LOG

START DATE 4/10/07
END DATE 4/10/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-05
PROJECT # 0324-01-7
GROUND ELEV. 718.92 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION HOV 89+71.3
OFFSET 0.2 m Rt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Auger/NQ Core
BACKFILLED Yes DATE 4/10/2007

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SM		
	10.67									
	10.90	G	SPT	45 50/75mm	50/75mm	50	Sv, PI, M			
707.92	11									
									11.58	
								SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 16% low to medium plasticity fines, 58% fine to coarse sand, and 26% fine to coarse angular to subrounded gravel.	
706.92	12									
	12.19									
	12.29	H	SPT	50/75mm	50/75mm	17				
705.92	13									
	13.72									
	13.84	I	SPT	50/125	50/125mm	28	Sv, PI, M			
704.92	14									
									14.63	
								SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 18% medium plasticity fines, 45% fine to coarse sand, and 37% fine to coarse angular to subrounded gravel.	
703.92	15									
	15.24		SPT			0				
702.92	16									
	16.76									
	16.81	J	SPT	50/50mm	50/50mm	11	Sv, PI, M			
701.92	17									
700.92	18									
	18.29		SPT			0				
699.92	19									
									19.51	
									Clayey Sand with Gravel Tan, brown, dry, very dense, with 23% medium plasticity fines, 61% fine to coarse sand, and 16% fine to	
	19.81		SPT			0				

EXPLORATION LOG

START DATE	4/10/07	STATION	HOV 89+71.3
END DATE	4/10/07	OFFSET	0.2 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-05	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Auger/NQ Core
GROUND ELEV.	718.92 (m)	BACKFILLED	Yes DATE 4/10/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									coarse angular to subrounded gravel.	
697.92	21									
	21.34		SPT			0				
696.92	22							SC		
	22.86									
	22.91	K	SPT	50/50mm	50/50mm	11	Sv, PI, M			
695.92	23									
694.92	24									
	24.38									
	24.43		SPT	50/50mm	50/50mm	0			24.43	
693.92	25									
692.92	26									
691.92	27									
690.92	28									
689.92	29									

EXPLORATION LOG

START DATE	4/9/07	STATION	HOV 89+09.9
END DATE	4/9/07	OFFSET	0.1 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-06	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	718.38 (m)	BACKFILLED	Yes DATE 4/9/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SC SM	**Silty, Clayey Sand with Gravel** Tan, brown, dry, very dense, with 12% low plasticity fines, 44% fine to coarse sand, and 44% angular to subrounded fine to medium gravel. Some gravel clasts are composed of caliche, most are of volcanic origin.	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.
717.38	1									
	1.52 / 1.57	A	SPT	50/50mm	50/50mm	11	Sv, PI, M			
716.38	2									
	2.44							SP SM	**Poorly Graded Sand with Silt and Gravel** Tan, brown, dry, very dense, with 9% non-plastic fines, 62% fine to coarse sand, and 29% angular to subrounded fine to medium gravel. Some gravel clasts are composed of caliche, most are of volcanic origin.	
715.38	3									
	3.05 / 3.18	B	SPT	50/125	50/125mm	28	Sv, PI, M, Chem			
714.38	4									
	4.27							SC SM	**Silty, Clayey Sand with Gravel** Tan, brown, dry, very dense, with 13% low plasticity fines, 53% fine to coarse sand, and 34% angular to subrounded fine to medium gravel.	
	4.57 / 4.67	C	SPT	50/100	50/100mm	22	Sv, PI, M			
713.38	5									
	5.49							SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 14% medium plasticity fines, 59% fine to coarse sand, and 27% angular to subrounded fine to medium gravel.	
712.38	6									
	6.10 / 6.22	D	SPT	50/125	50/125mm	28	Sv, PI, M			
711.38	7									
	7.32								**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 19-25% medium plasticity fines, 46-51% fine to coarse sand, and 25-34% angular to subrounded fine to medium gravel.	
	7.62 / 7.72	E	SPT	50/100	50/100mm	22	Sv, PI, M			
710.38	8									
709.38	9									
	9.14 / 9.24	F	SPT	50/100	50/100mm	22	Sv, PI, M			

EXPLORATION LOG

START DATE	4/9/07	STATION	HOV 89+09.9
END DATE	4/9/07	OFFSET	0.1 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-06	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	718.38 (m)	BACKFILLED	Yes DATE 4/9/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS
	10.67–10.81	G	SPT	50/137	50/137mm	30	Sv, PI, M
707.38	11						
706.38	12						
	12.19–12.24	H	SPT	50/50mm	50/50mm	11	
705.38	13						
	13.72–13.79	I	SPT	50/75mm	50/75mm	17	Sv, PI, M
704.38	14						
703.38	15						
	15.24–15.47	J	SPT	37 50/75mm	50/75mm	50	Sv, PI, M
702.38	16						
	16.76–16.84	K	SPT	50/75	50/75mm	17	Sv, PI, M
701.38	17						
700.38	18						
	18.29–18.67	L	SPT	48 44 50/75mm	94/225mm	83	
699.38	19						
	19.81–19.91	M	SPT	50/100	50/100mm	22	Sv, PI, M

Depth (m)	USCS Group	MATERIAL DESCRIPTION	REMARKS
– 13.41	SC		
13.41 – 14.63	SC SM	**Silty, Clayey Sand with Gravel** Tan, brown, dry, very dense, with 22% low plasticity fines, 56% fine to coarse sand, and 22% angular to subrounded fine to medium gravel.	
14.63 – 16.46	SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 24% medium plasticity fines, 46% fine to coarse sand, and 30% angular to subrounded fine to coarse gravel.	
16.46 – 19.51	SM	**Silty Sand with Gravel** Tan, brown, dry, very dense, with 14% low plasticity fines, 52% fine to coarse sand, and 34% angular to subrounded fine to coarse gravel.	
19.51 –		**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 18% medium plasticity fines, 42% fine to coarse sand, and 40% angular to	

EXPLORATION LOG

START DATE	4/9/07	STATION	HOV 89+09.9
END DATE	4/9/07	OFFSET	0.1 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-06	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	718.38 (m)	BACKFILLED	Yes DATE 4/9/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
									subrounded fine to coarse gravel.	
697.38	21							SC		
	21.34–21.46	N	SPT	50/125	50/125mm	28				
696.38	22									
									22.56	
	22.86–22.91	O	SPT	50/50mm	50/50mm	11	Sv, PI, M	SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 31% medium plasticity fines, 47% fine to coarse sand, and 22% angular to subrounded fine to coarse gravel. Gravel clasts are primarily composed of caliche.	
695.38	23									
									23.77	
694.38	24							SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 22% medium plasticity fines, 43% fine to coarse sand, and 35% angular to subrounded fine to coarse gravel. Gravel clasts are primarily composed of caliche.	
	24.38–24.59	P	SPT	42 50/50mm	50/50mm	44	Sv, PI, M		24.59	
693.38	25									
692.38	26									
691.38	27									
690.38	28									
689.38	29									

EXPLORATION LOG

START DATE 4/11/07
END DATE 4/11/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-07
PROJECT # 0324-01-7
GROUND ELEV. 718.52 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION HOV 87+58.1
OFFSET 9.0 m Lt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Hollow Stem Auger
BACKFILLED Yes DATE 4/11/2007

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SC	**Clayey Sand with Gravel** Tan, brown, dry, very dense, with 18% medium plasticity fines, 44% fine to coarse sand, and 38% angular to subrounded fine to medium gravel. Some gravel clasts are composed of caliche, most are of volcanic origin.	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.
717.52	1									
	1.52 / 1.58	A	SPT	50/50mm	50/50mm	11	Sv, PI, M			
716.52	2									
	2.74									
								SC	**Clayey Sand with Gravel** Tan, dry, very dense, with 18% medium plasticity fines, 47% fine to coarse sand, and 35% fine to coarse angular to subrounded gravel.	
715.52	3									
	3.05 / 3.44	B	SPT	23 49 50/75mm	99/225mm	83	Sv, PI, M			
714.52	4									
	4.27									
								SC	**Clayey Sand with Gravel** Tan, dry, very dense, with 17% medium plasticity fines, 47% fine to coarse sand, and 36% fine to coarse angular to subrounded gravel.	
	4.57 / 4.66	C	SPT	50/75mm	50/75mm	17	Sv, PI, M			
713.52	5									
	5.49									
								GC	**Clayey Gravel with Sand** Tan, dry, very dense, with 15% medium plasticity fines, 42% fine to coarse sand, and 43% fine to coarse angular to subrounded gravel.	
712.52	6									
	6.10 / 6.19	D	SPT	50/100	50/100mm	22	Sv, PI, M			
	6.19									
711.52	7									
710.52	8									
709.52	9									

EXPLORATION LOG

START DATE	10/16/07	STATION	HOV 94+30.0
END DATE	10/17/07	OFFSET	18.5 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-08	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	737.71 (m)	BACKFILLED	Yes
HAMMER DROP SYSTEM	Automatic	DATE	10/17/2007

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS
736.71	1						
	1.52–1.98	A	SPT	21 38 38	76	78	(BULK) Sv, PI, M
735.71	2						
734.71	3						
	3.05–3.15	B	SPT	50/102	50/102mm	25	(BULK) Sv, PI, M
733.71	4						
	4.57–4.65	C	SPT	50/76mm	50/76mm	33	
732.71	5						
731.71	6						
	6.10–6.17		SPT	50/76mm	50/76mm	0	(BULK) Sv, PI, M
	6.86–6.93	D	SPT	50/76mm	50/76mm	33	
730.71	7						
	7.62–7.72	E	SPT	50/102	50/102mm	13	
729.71	8						
	8.38–8.44	F	SPT	50/51mm	50/51mm	49	
728.71	9						
	9.14–9.22	G	SPT	50/76mm	50/76mm	33	(BULK) Sv, PI, M
	9.91			15			

Depth (m)	USCS Group	MATERIAL DESCRIPTION	REMARKS
0.21		**Asphalt Concrete Pavement**	
7.32	GP GC	**Poorly Graded Gravel with Silty Clay and Sand (FILL)** Tan, brown, slightly moist, very dense, with 10-11% low to medium plasticity fines, 30-33% fine to coarse sand, and 56-60% fine to coarse angular to subrounded gravel. Fill for elevated freeway.	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15. Bulk sample collected, 0-1.5m. Bulk sample collected, 1.5-3m. Bulk sample collected, 3-4.5m. Bulk sample collected, 4.5-6m. Bulk sample collected, 6-7.6m.
8.84	SC	**Clayey Sand with Gravel (FILL)** Tan, brown, slightly moist, very dense, with an estimated 15-20% medium plasticity fines, 45-50% fine to coarse sand, and 30-35% fine to coarse angular to subrounded gravel.	Bulk sample collected, 7.6-9m.
	GC GM	**Poorly Graded Sand with Silty Clay and Gravel (FILL)** Tan, brown, slightly moist, very dense, with 10% low plasticity fines, 24% fine to coarse sand, and 66% fine to coarse angular to subrounded gravel.	Bulk sample collected, 9-10.7m.

EXPLORATION LOG

START DATE	10/16/07	STATION	HOV 94+30.0
END DATE	10/17/07	OFFSET	18.5 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-08	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	737.71 (m)	BACKFILLED	Yes DATE 10/17/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.13	H	SPT	50/76mm	50/76mm	56				
	10.67 10.77	I	SPT	50/102	50/102mm	75	(BULK) Sv, PI, M, Chem	GC GM	10.67 **Silty, Clayey Gravel with Sand (FILL?)** Tan, brown, slightly moist, very dense, with 14% low-plasticity fines, 41% fine to coarse sand, and 44% fine to coarse angular to subrounded gravel.	Bulk sample collected, 10.7-12.2m.
726.71	11									
	11.43 11.51	J	SPT	50/76mm	50/76mm	67				
725.71	12									
	12.19 12.29	K	SPT	50/102	50/102mm	75	(BULK) Sv, PI, M, DS	GP GC	12.19 **Poorly Graded Gravel with Silty Clay and Sand (FILL?)** Tan, brown, slightly moist, very dense, with 11% low plasticity fines, 33% fine to coarse sand, and 56% fine to coarse angular to subrounded gravel.	Bulk sample collected, 12.2-13.7m.
724.71	12.95 13 13.17	L	SPT	48 50/76mm	50/76mm	89				
	13.72 13.90	M	SPT	40 50/25mm	50/25mm	85		SW SC	13.72 **Poorly Graded Sand with Silt, Clay, and Gravel (FILL?)** Tan, brown, slightly moist, very dense, with an estimated 10-15% non-plastic to low plasticity fines, 45-50% fine to coarse sand, and 35-40% fine to coarse angular to subrounded gravel.	Bulk sample collected, 13.7-15.2m.
723.71	14									
								GP GM	14.33 **Poorly Graded Gravel with Silt and Sand** Tan, grey, slightly moist to dry, very dense, with an estimated 5-10% non-plastic fines, 20-25% fine to coarse sand, and 65-70% fine to coarse angular to subrounded gravel. Samples consist almost entirely of broken gravel clasts with very little sand or fines recovery.	Hard, slow drilling below 14.3m.
	14.48 14.55	N	SPT	50/76mm	50/76mm	33				
722.71	15									
	15.24 15.34	O	SPT	50/102	50/102mm	25				Level Ground at Toe of Embankment 722 m. Bulk sample collected, 15.2-16.8m.
721.71	16 16.00 16.08	P	SPT	50/76mm	50/76mm	33				
	16.76 16.84	Q	SPT	50/76mm	50/76mm	67			16.82	
720.71	17									
719.71	18									
718.71	19									

EXPLORATION LOG

START DATE	10/15/07	STATION	HOV 95+60
END DATE	10/16/07	OFFSET	13.3 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-09	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	736.49 (m)	BACKFILLED	Yes
HAMMER DROP SYSTEM	Automatic	DATE	10/16/2007

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	BLOW COUNT Percent Recov'd	LAB TESTS
735.49	1						
	1.52–1.62	A	SPT	50/102	50/102mm	75	(BULK) Sv, PI, M
734.49	2						
733.49	3						
	3.05–3.29	B	SPT	22 50/102	50/102mm	70	(BULK) Sv, PI, M
732.49	4						
	4.57–4.80	C	MC	5 50/76mm	50/76mm	33	(BULK) Sv, PI, M
731.49	5						
730.49	6						
	6.10–6.13	D	SPT	50/25	50/25mm	100	(BULK) Sv, PI, M
	6.86–7.32	E	SPT	5 5 30	35	44	
729.49	7						
	7.62–7.74	F	SPT	50/127	50/127mm	80	(BULK) Sv, PI, M
728.49	8						
	8.38–8.41	G	MC	50/25mm	50/25mm	100	
727.49	9						
	9.14–9.22		SPT	50/76mm	50/76mm	0	(BULK) Sv, PI, M, DS, Chem
	9.91			21			

MATERIAL DESCRIPTION

Depth (m)	USCS Group	Material Description
0.21		**Asphalt Concrete Pavement**
1.52	SP SC	**Poorly Graded Sand with Silt, Clay, and Gravel (FILL)** Tan, grey, brown, slightly moist, very dense, with an estimated 5-10% non-plastic to low plasticity fines, 55-60% fine to coarse sand, and 30-35% fine to coarse angular to subrounded gravel. Fill for elevated freeway.
3.05	GP GC	**Poorly Graded Gravel with Clay and Sand (FILL)** Tan, grey, to reddish brown, brown, slightly moist, very dense, with 10% low plasticity fines, 30% fine to coarse sand, and 60% fine to coarse angular to subrounded gravel.
8.84	SC SM	**Silty, Clayey Sand with Gravel (FILL)** Tan, grey, brown, slightly moist, very dense, with 12-16% low plasticity fines, 45-56% fine to coarse sand, and 28-42% fine to coarse angular to subrounded gravel.
		Silty,Clayey Gravel with Sand (FILL) Tan, brown, slightly moist, very dense, with 13% medium plasticity fines, 43% fine to coarse sand, and 44% fine to coarse angular to subrounded gravel.

REMARKS

Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.

Bulk sample collected, 1.5-3m.

Bulk sample collected, 3-4.5m.

Bulk sample collected, 4.5-6m.

Bulk sample collected, 6-7.6m.

Bulk sample collected, 7.6-9m.

Grab sample collected due to poor sample recovery.

Bulk sample collected, 9-10.7m.

EXPLORATION LOG

START DATE	10/15/07	STATION	HOV 95+60
END DATE	10/16/07	OFFSET	13.3 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-09	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	736.49 (m)	BACKFILLED	Yes DATE 10/16/2007
HAMMER DROP SYSTEM	Automatic		

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	BLOW COUNT Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.09	H	SPT	50/25mm	50/25mm	57		GC GM		Hard, slow drilling beginning at 9m.
	10.67 – 10.77		SPT	50/102	50/102mm	0				
725.49	11									Bulk sample collected, 10.7-12.2m.
	11.28								**Poorly Graded Gravel with Clay and Sand** Tan, brown, slightly moist, very dense, with an estimated 10-15% medium plasticity fines, 30-35% fine to coarse sand, and 50-55% fine to coarse angular to subrounded grey gravel.	
	11.43 – 11.67	I	SPT	4 50/102	50/102mm	30		GP GC		
	11.89								**Clayey Gravel with Sand** Tan, brown, slightly moist, very dense, with an estimated 15-20% medium plasticity fines, 25-30% fine to coarse sand, and 50-55% fine to coarse angular to subrounded grey gravel.	
724.49	12									
	12.19 – 12.62	J	SPT	4 8 50/127	58/279mm	47		GC	12.62	Level Ground at Toe of Embankment 724 m.
723.49	13									
722.49	14									
721.49	15									
720.49	16									
719.49	17									
718.49	18									
717.49	19									

EXPLORATION LOG

SHEET 1 OF 2

START DATE	10/18/07	STATION	HOV 96+20
END DATE	10/19/07	OFFSET	13.3 m Rt.
JOB DESCRIPTION	Summerlin HOV Flyover	ENGINEER	SMM
LOCATION	Las Vegas, Nevada	EQUIPMENT	Diedrich D-50 Turbo
BORING	FB-10	OPERATOR	Eagle Drilling
PROJECT #	0324-01-7	DRILLING METHOD	8" Hollow Stem Auger
GROUND ELEV.	735.70 (m)	BACKFILLED	Yes
HAMMER DROP SYSTEM	Automatic	DATE	10/19/2007

GROUNDWATER LEVEL

DATE	DEPTH m	ELEV. m

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	BLOW COUNT Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.21								**Asphalt Concrete Pavement**	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15. Bulk sample collected, 0-1.5m.
								GC GM	**Silty, Clayey Gravel with Sand (FILL)** Tan, brown, grey, slightly moist, very dense, with 13% low plasticity fines, 39% fine to coarse sand, and 48% fine to coarse angular to subrounded grey gravel.	
734.70	1									
	1.52–1.89	A	SPT	11 28 50/51mm	78/203mm	71	(BULK) Sv, PI, M			
733.70	2									Bulk sample collected, 1.5-3m. Hard drillling, 2.1-2.4m.
732.70	3									
	3.05									
	3.05–3.20	B	SPT	50/152	50/152mm	34	(BULK) Sv, PI, M, DS, Chem	GW GC	**Well to Poorly Graded Gravel with Silty Clay and Sand (FILL)** Tan, brown, grey, slightlly moist, very dense, with 10% low plasticity fines, 36-39% fine to coarse sand, and 51-54% fine to coarse angular to subrounded grey gravel. Poor sample return with samples composed primarily of angular gravel chips. Hard drilling.	Bulk sample collected, 3-4.5m.
731.70	4									
	4.57–4.65	C	SPT	50/76mm	50/76mm	17	(BULK) Sv, PI, M		Lower sample at 4.6 m classifies as poorly graded rather than well graded.	Bulk sample collected, 4.5-6m.
730.70	5									
729.70	6									
	6.10									
	6.10–6.20	D	SPT	50/102	50/102mm	50	(BULK) Sv, PI, M	GP GM	**Poorly Graded Gravel with Silt and Sand (FILL?)** White, grey, tan, brown, slightly moist to dry, very dense, with 9% non-plastic fines, 33-40% fine to coarse sand, and 51-58% fine to coarse angular to subrounded gravel.	Bulk sample collected, 6-7.6m.
	6.86–6.96	E	SPT	50/102	50/102mm	50				
728.70	7									
	7.62–7.85	F	SPT	45 50/76mm	50/76mm	100	(BULK) Sv, PI, M			Bulk sample collected, 7.6-9m.
727.70	8									
	8.38–8.61	G	SPT	12 50/76mm	50/76mm	56				
726.70	9									
	9.14									
	9.14–9.33	H	SPT	38 50/25mm	50/25mm	58	(BULK) Sv, PI, M, DS, HM		**Poorly Graded Gravel with Clay and Sand (FILL?)** Tan, brown, slightly moist, very dense, with 9% low plasticity fines, 34% fine to coarse sand, and 57% fine to coarse angular to subrounded gravel.	Bulk sample collected, 9-10.7m. HM is Harvard Minature
	9.91–10.01									

EXPLORATION LOG

START DATE 10/18/07
END DATE 10/19/07
JOB DESCRIPTION Summerlin HOV Flyover
LOCATION Las Vegas, Nevada
BORING FB-10
PROJECT # 0324-01-7
GROUND ELEV. 735.70 (m)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH m	ELEV. m

STATION HOV 96+20
OFFSET 13.3 m Rt.
ENGINEER SMM
EQUIPMENT Diedrich D-50 Turbo
OPERATOR Eagle Drilling
DRILLING METHOD 8" Hollow Stem Auger
BACKFILLED Yes DATE 10/19/2007

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 150 mm Increments	Last 300 mm	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		I	SPT	50/102	50/102mm	50				compaction test (NDOT T101E)
	10.67							GC		
	10.90	J	SPT	13 50/76mm	50/76mm	33				Ditch at Toe of Embankment 725.0 m. Bulk sample collected, 10.7-12.2m.
724.70	11									
	11.43 11.48	K	SPT	50/51mm	50/51mm	26				
									11.89	
723.70	12							GC	**Clayey Gravel with Sand** Tan, brown, slightly moist, very dense, with an estimated 15-20% medium plasticity fines, 30-35% fine to coarse sand, and 45-50% fine to coarse angular to subrounded gravel.	
	12.19 12.29	L	SPT	50/102	50/102mm	50			12.28	
722.70	13									
721.70	14									
720.70	15									
719.70	16									
718.70	17									
717.70	18									
716.70	19									

B-2

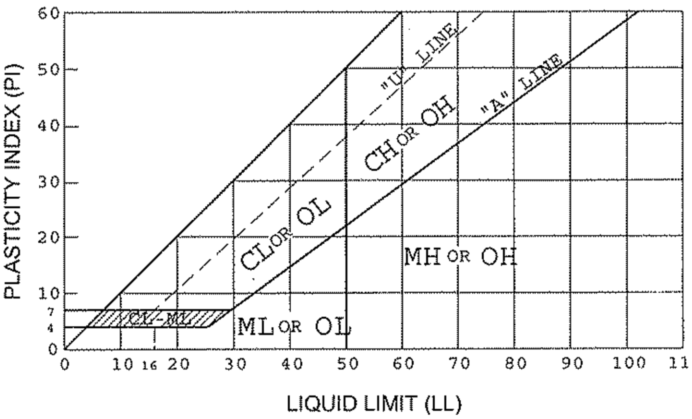
KEY TO BORING LOGS

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

PLASTICITY CHART



FOR CLASSIFICATION OF FINE-GRAINED SOILS AND FINE-GRAINED FRACTION OF COARSE-GRAINED SOILS

Plasticity description: Plasticity Index (PI) <1 non-plastic, 1- 10 low plasticity, 11 - 25 medium plasticity, 26 - 50 high plasticity, >50 very high plasticity

EXPLORATION SAMPLE TERMINOLOGY

Sample Type	Sample Code
Auger Cuttings	Auger
Bulk (Grab) Sample	Grab
Modified California Sampler	MC
Shelby Tube	SH or ST
Standard Penetration Test	SPT
Split Spoon	SS

Field SPT blowcounts with automatic hammer can be corrected to N60 by multiplying by 1.33, unless stated otherwise in log remarks.

MOISTURE CONDITION

Dry	Absence of moisture.
Moist	Damp, no visible water
Wet	Visible Free Water

LABORATORY TEST ABBREVIATIONS

Consol=Consolidation; DS = Direct Shear; E=Expansion; HYD = Hydrometer; MD= Moisture and Density PI= Atterberg Limits; R = R-value; Sv = Sieve Analysis; TXCU= Consolidated Undrained Triaxial; TXUU= Unconsolidated Undrained Triaxial; SpGr = Specific Gravity; Chem = Chemical Testing; M = Moisture Content

GRAIN SIZE TERMINOLOGY

Component of Sample	Size Range
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 2mm)
Sand	# 4 to #200 sieve (2mm to 0.074mm)
Silt or Clay	Passing #200 sieve (0.074mm)

RELATIVE DENSITY OF GRANULAR SOILS

N - Blows/ft	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
greater than 50	Very Dense

Blowcounts on this site typically resulted in refusal before achieving all three 150-mm-increments of driving. The blowcount for each increment and the blowcount sum for the last 300 mm of driving is therefore recorded as 50[blows]/25mm typically. Where the last increment of driving exceeds 100mm, there is not enough room between the log columns, and the "mm" label may be omitted (50[blows]/125[mm] being written as 50/125).

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Key to Boring Logs

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

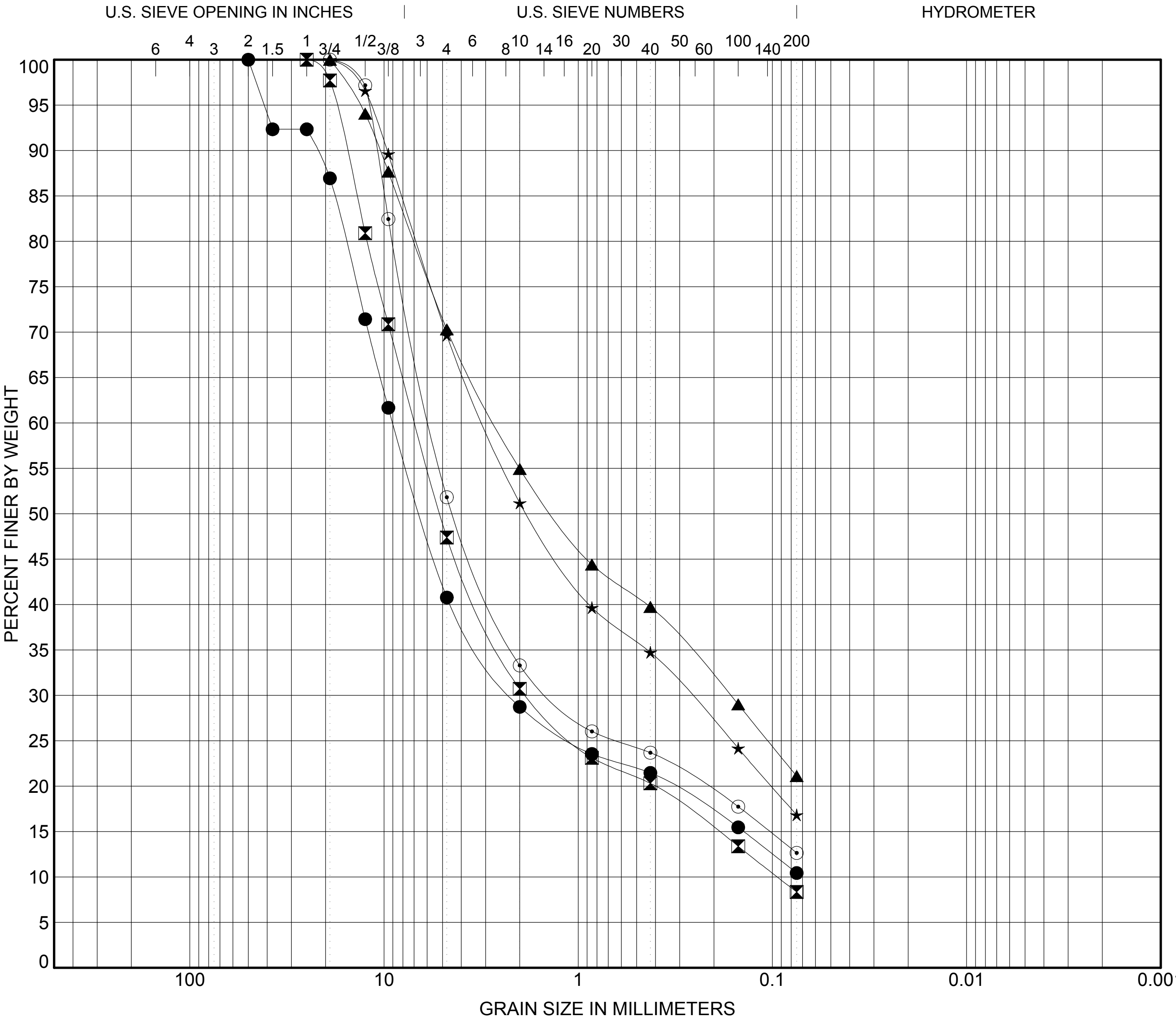
Project Number: 0324-01-7 Plate Number: B-2

APPENDIX C

LABORATORY TEST RESULTS

C-1

INDEX TEST RESULTS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-01**	**1.9**	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**	**28**	**16**	**12**	**7.56**	**127.23**
⧗	**B-01**	**6.5**	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**	**21**	**15**	**6**	**5.24**	**73.19**
▲	**B-01**	**7.7**	**CLAYEY SAND with GRAVEL (SC)**	**31**	**19**	**12**		
★	**B-01**	**9.9**	**CLAYEY SAND with GRAVEL (SC)**	**29**	**18**	**11**		
⊙	**B-01**	**12.6**	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**	**21**	**14**	**7**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**B-01**	**1.9**	**50**	**8.988**	**2.191**		**2.3**	**59.2**	**30.3**	**10.4**	
⧗	**B-01**	**6.5**	**25**	**6.894**	**1.844**	**0.094**	**1.4**	**52.6**	**39.0**	**8.3**	
▲	**B-01**	**7.7**	**19**	**2.66**	**0.165**		**4.2**	**29.7**	**49.2**	**21.1**	
★	**B-01**	**9.9**	**19**	**3.022**	**0.266**		**2.6**	**30.3**	**52.8**	**16.8**	
⊙	**B-01**	**12.6**	**19**	**5.716**	**1.357**		**2.0**	**48.2**	**39.2**	**12.6**	

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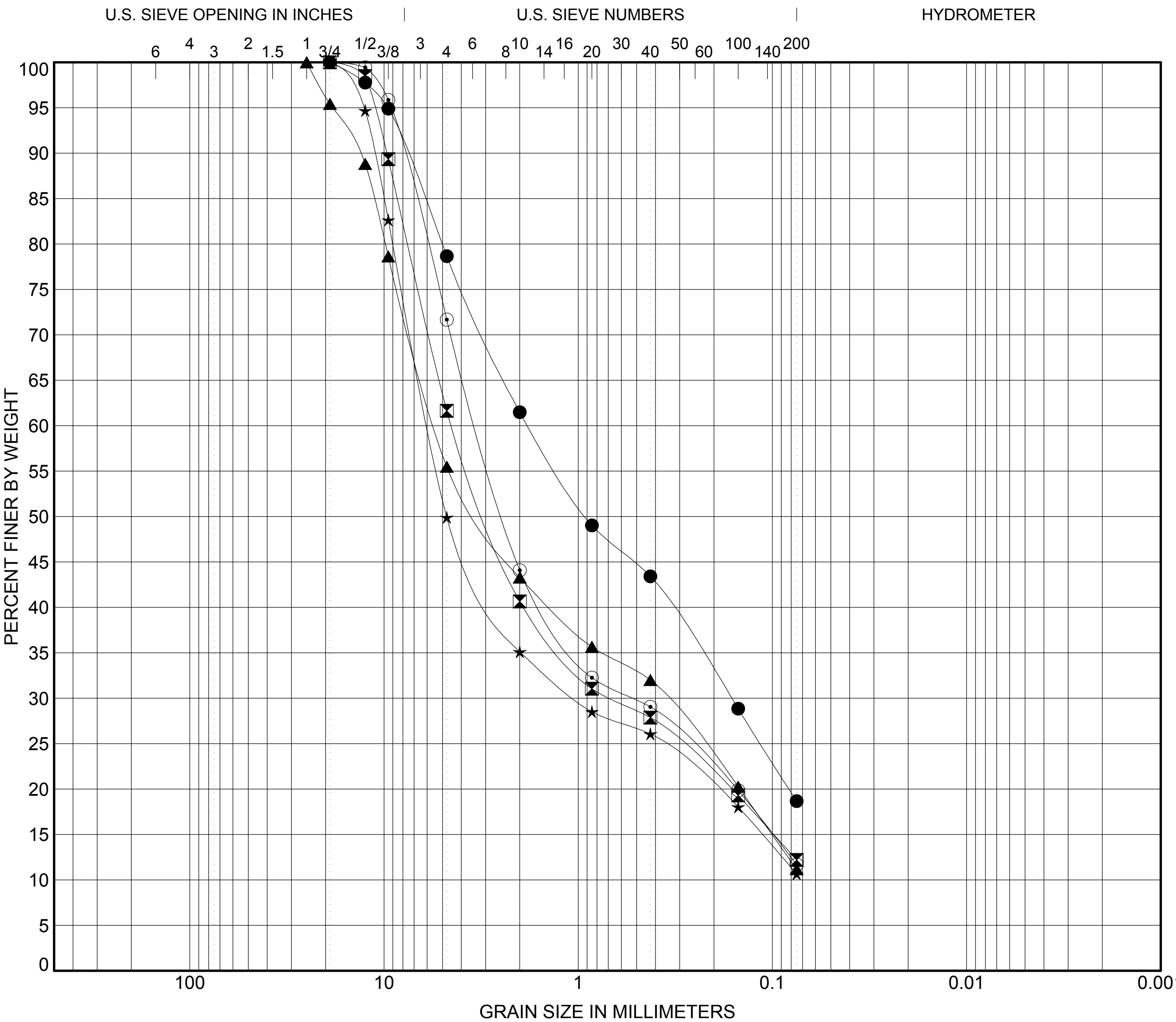
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.1

US_GRAIN_SIZE2_METRIC 0324017.GPJ US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	B-01	16.0	**CLAYEY SAND with GRAVEL (SC)**	26	17	9		
⧗	B-01	18.7	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	19	15	4	1.71	73.35
▲	B-01	21.7	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**	18	15	3	0.34	79.38
★	B-01	24.8	**WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)**	18	14	4	2.56	83.37
⊙	B-01	29.3	**WELL-GRADED SAND with SILT and GRAVEL (SW-SM)**	NV	NV	NP	1.27	50.70

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	B-01	16.0	19	1.806	0.163		2.9	21.3	60.0	18.7	
⧗	B-01	18.7	19	4.44	0.677		2.4	38.4	49.4	12.2	
▲	B-01	21.7	25	5.44	0.356		2.6	44.5	44.3	11.2	
★	B-01	24.8	19	5.882	1.031		2.1	50.1	39.3	10.7	
⊙	B-01	29.3	19	3.294	0.522		2.5	28.3	60.0	11.7	

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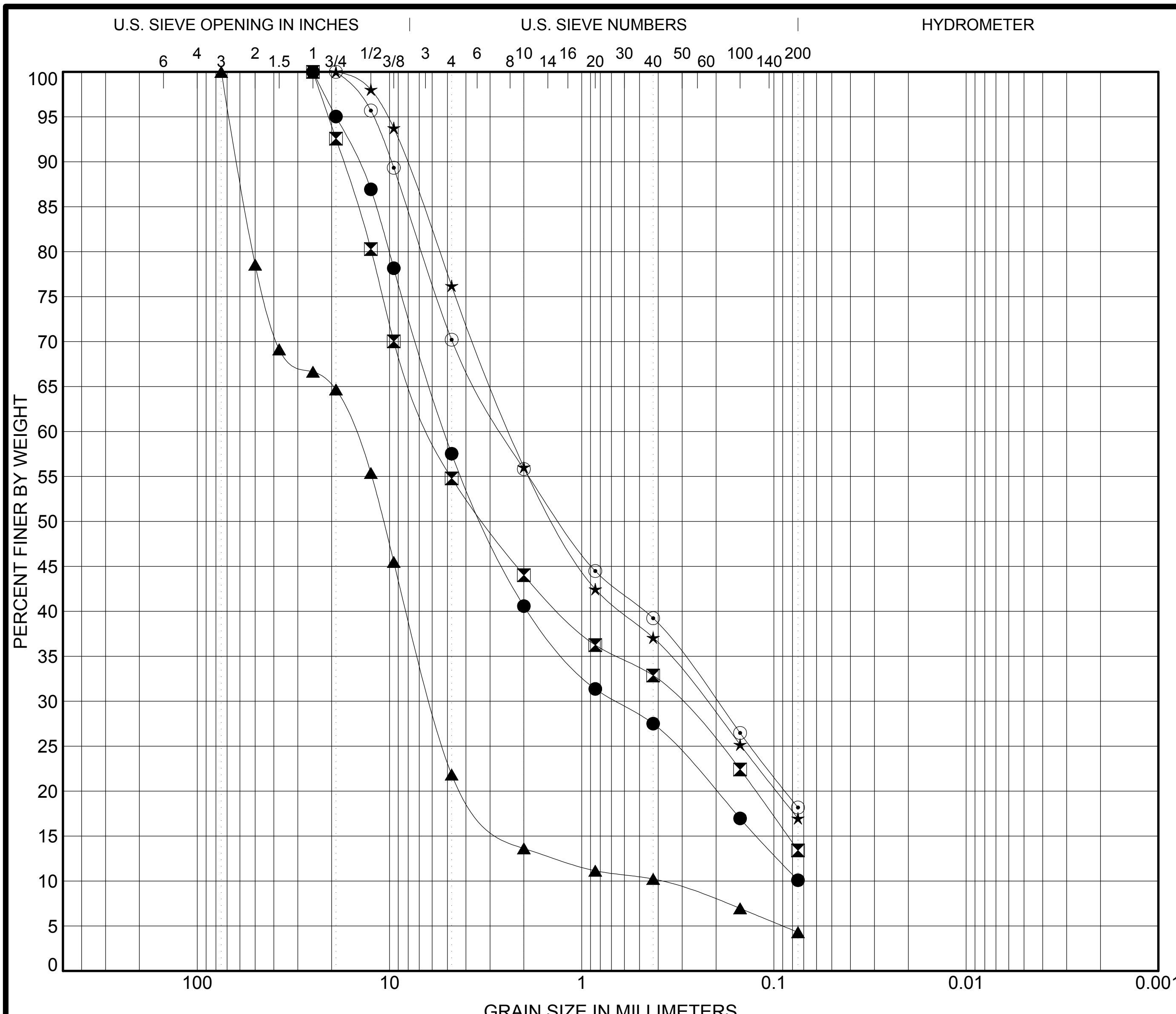
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.2



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-02**	**1.9**	**WELL-GRADED SAND with SILT and GRAVEL (SW-SM)**	**20**	**17**	**3**	**1.15**	**69.43**
⧗	**B-02**	**3.4**	**CLAYEY GRAVEL with SAND (GC)**	**28**	**17**	**11**		
▲	**B-02**	**5.0**	**POORLY GRADED GRAVEL with SAND (GP)**	**26**	**17**	**9**	**5.99**	**39.01**
★	**B-02**	**6.5**	**CLAYEY SAND with GRAVEL (SC)**	**30**	**18**	**12**		
⊙	**B-02**	**7.7**	**CLAYEY SAND with GRAVEL (SC)**	**48**	**24**	**24**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**B-02**	**1.9**	**25**	**5.16**	**0.665**		**1.3**	**42.5**	**47.4**	**10.1**	
⧗	**B-02**	**3.4**	**25**	**6.02**	**0.319**		**2.5**	**45.2**	**41.4**	**13.4**	
▲	**B-02**	**5.0**	**75**	**15.389**	**6.033**	**0.394**	**0.7**	**78.2**	**17.5**	**4.3**	
★	**B-02**	**6.5**	**19**	**2.37**	**0.229**		**2.8**	**23.8**	**59.2**	**17.0**	
⊙	**B-02**	**7.7**	**19**	**2.571**	**0.2**		**4.4**	**29.8**	**52.0**	**18.2**	

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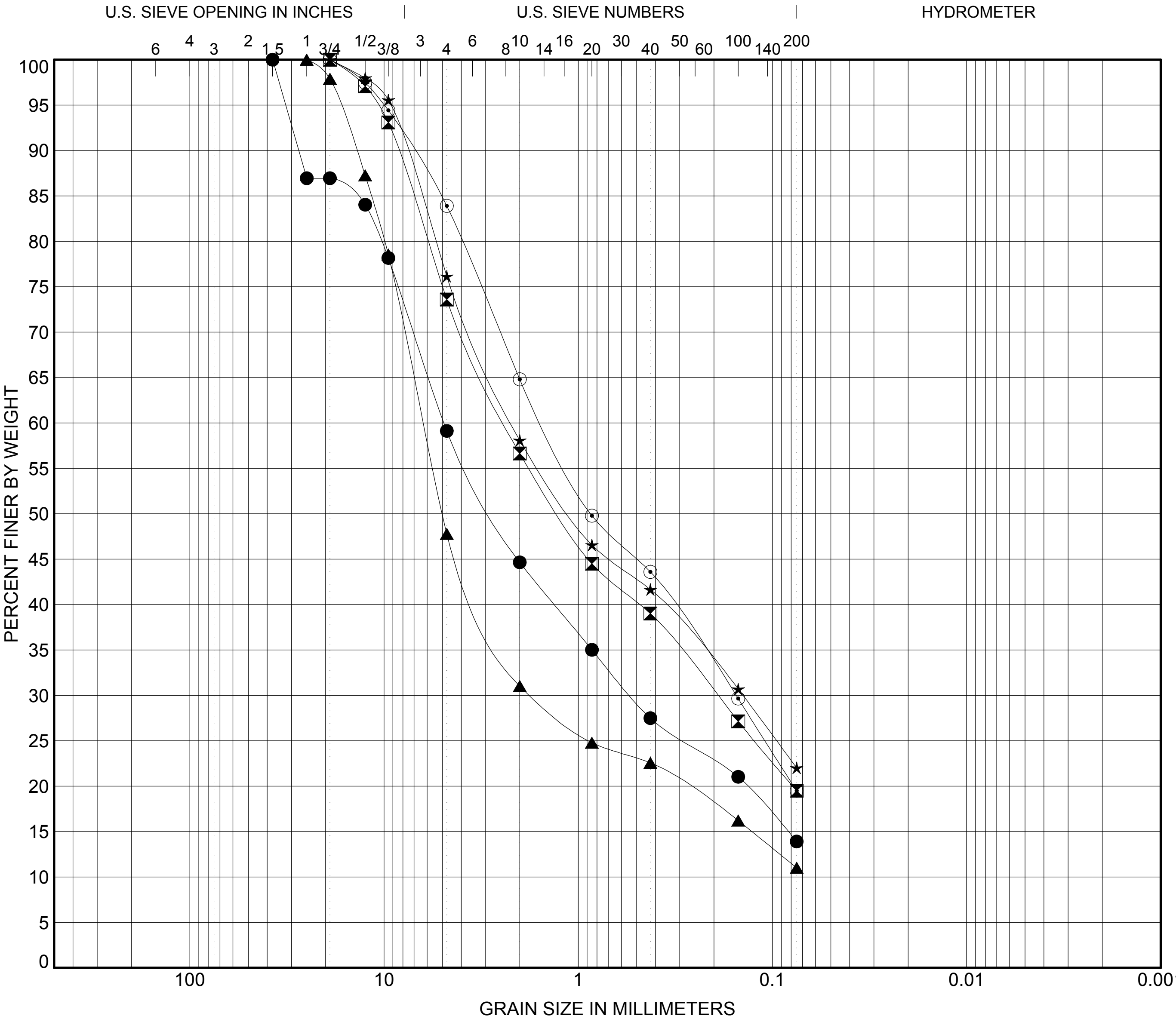
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

Specimen Identification			USCS Classification	LL	PL	PI	Cc	Cu
●	B-02	11.0	CLAYEY SAND with GRAVEL (SC)	32	18	14		
⧗	B-02	13.7	CLAYEY SAND with GRAVEL (SC)	26	16	10		
▲	B-02	15.6	POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)	22	16	6	7.36	95.37
★	B-02	16.8	SILTY, CLAYEY SAND with GRAVEL (SC-SM)	21	14	7		
⊙	B-02	21.3	SILTY, CLAYEY SAND with GRAVEL (SC-SM)	21	15	6		

Specimen Identification			D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	B-02	11.0	37.5	4.905	0.536		2.9	40.9	45.2	13.9	
⧗	B-02	13.7	19	2.374	0.193		2.6	26.4	54.1	19.5	
▲	B-02	15.6	25	6.256	1.738		1.8	52.2	36.8	11.0	
★	B-02	16.8	19	2.192	0.142		2.6	23.8	54.1	22.0	
⊙	B-02	21.3	19	1.521	0.154		2.6	16.1	64.4	19.5	

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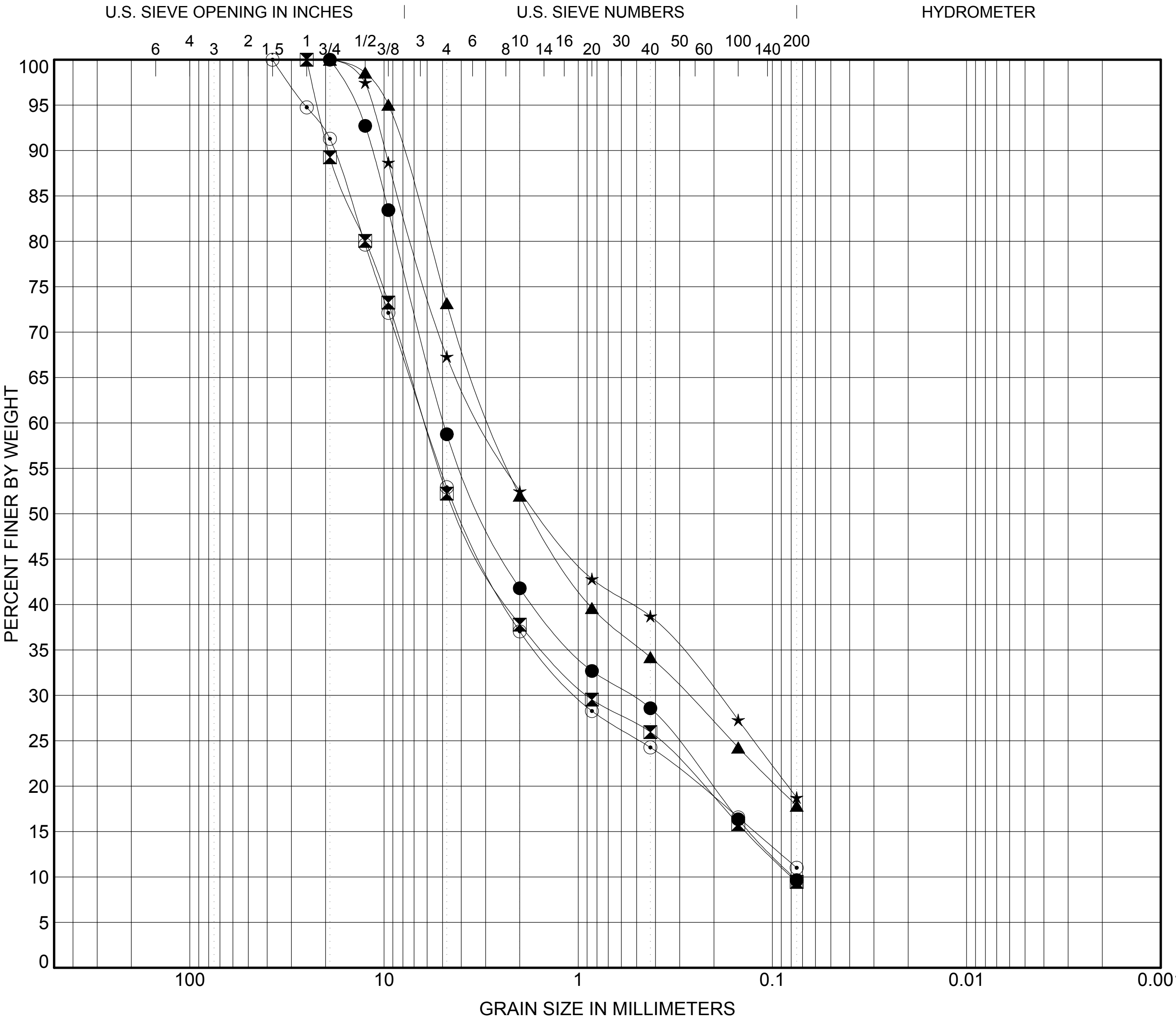
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.4



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-04**	**1.9**	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**	**18**	**16**	**2**	**0.76**	**63.28**
⧗	**B-04**	**3.4**	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**	**18**	**15**	**3**	**1.63**	**77.14**
▲	**B-04**	**7.7**	**CLAYEY SAND with GRAVEL (SC)**	**32**	**20**	**12**		
★	**B-04**	**10.7**	**CLAYEY SAND with GRAVEL (SC)**	**30**	**19**	**11**		
⊙	**B-07**	**1.1**	**WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)**	**21**	**16**	**5**	**2.50**	**92.84**

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**B-04**	**1.9**	**19**	**4.919**	**0.54**	**0.078**	**0.7**	**41.2**	**49.1**	**9.7**	
⧗	**B-04**	**3.4**	**25**	**6.139**	**0.892**	**0.08**	**0.8**	**47.8**	**42.8**	**9.5**	
▲	**B-04**	**7.7**	**19**	**2.773**	**0.274**		**2.3**	**26.8**	**55.3**	**17.8**	
★	**B-04**	**10.7**	**19**	**3.1**	**0.192**		**3.2**	**32.7**	**48.6**	**18.7**	
⊙	**B-07**	**1.1**	**37.5**	**6.133**	**1.006**		**1.4**	**47.1**	**41.9**	**11.0**	

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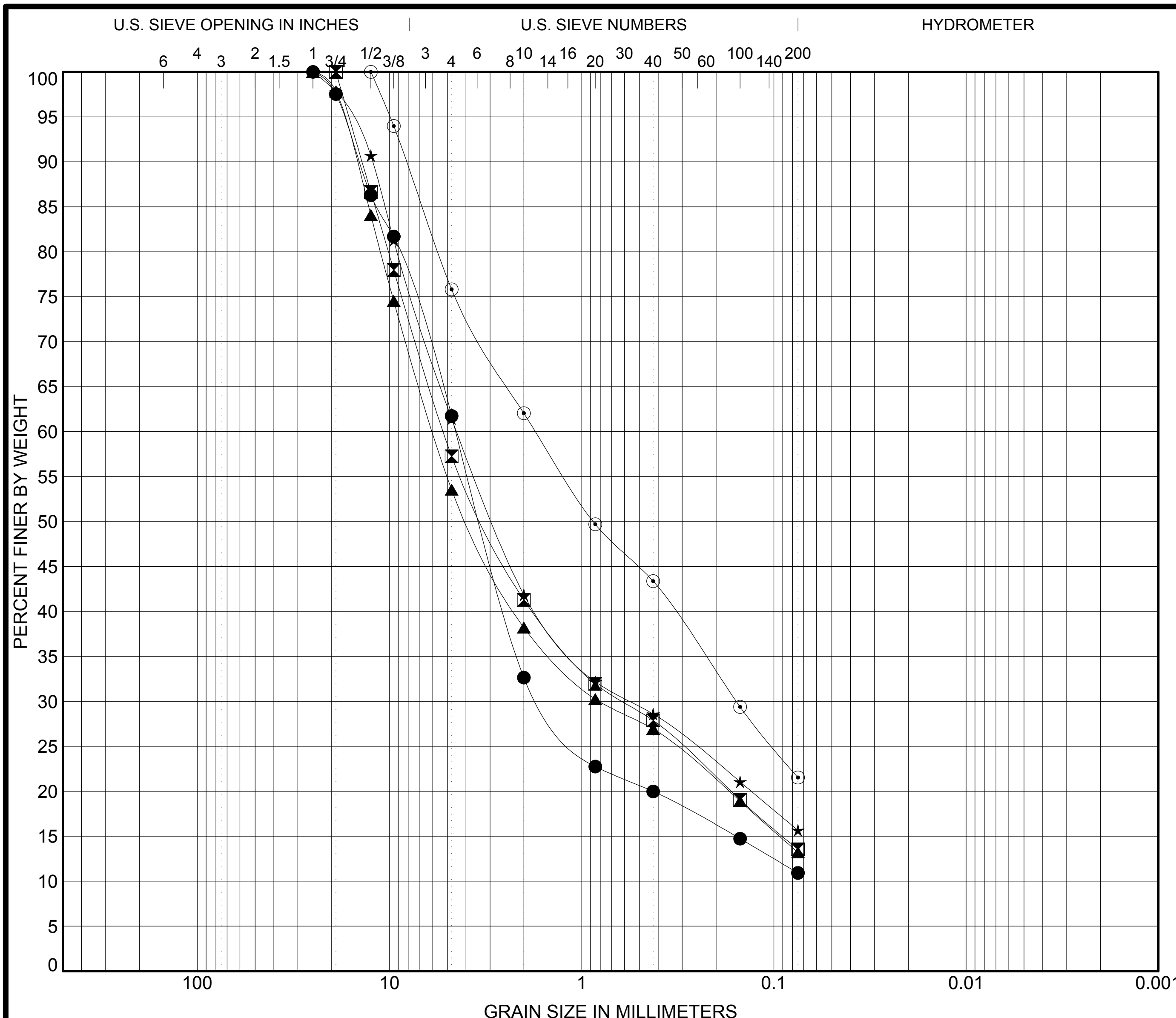
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.5

US_GRAIN_SIZE2_METRIC 0324017.GPJ US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	B-07	2.6	POORLY GRADED SAND with SILTY CLAY and GRAVEL (SP-SC)	21	16	5	8.85	71.06
⧗	B-07	4.1	SILTY, CLAYEY SAND with GRAVEL (SC-SM)	20	15	5		
▲	B-07	5.6	SILTY, CLAYEY GRAVEL with SAND (GC-GM)	24	17	7		
★	B-07	11.7	SILTY SAND with GRAVEL (SM)	19	16	3		
⊙	B-07	14.8	CLAYEY SAND with GRAVEL (SC)	45	26	19		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	B-07	2.6	25	4.511	1.592		1.4	38.3	50.8	10.9	
⧗	B-07	4.1	19	5.207	0.61		1.9	42.7	43.7	13.5	
▲	B-07	5.6	25	5.88	0.807		2.3	46.5	40.3	13.2	
★	B-07	11.7	25	4.457	0.558		2.6	38.6	45.8	15.7	
⊙	B-07	14.8	12.5	1.736	0.157		4.1	24.2	54.3	21.5	

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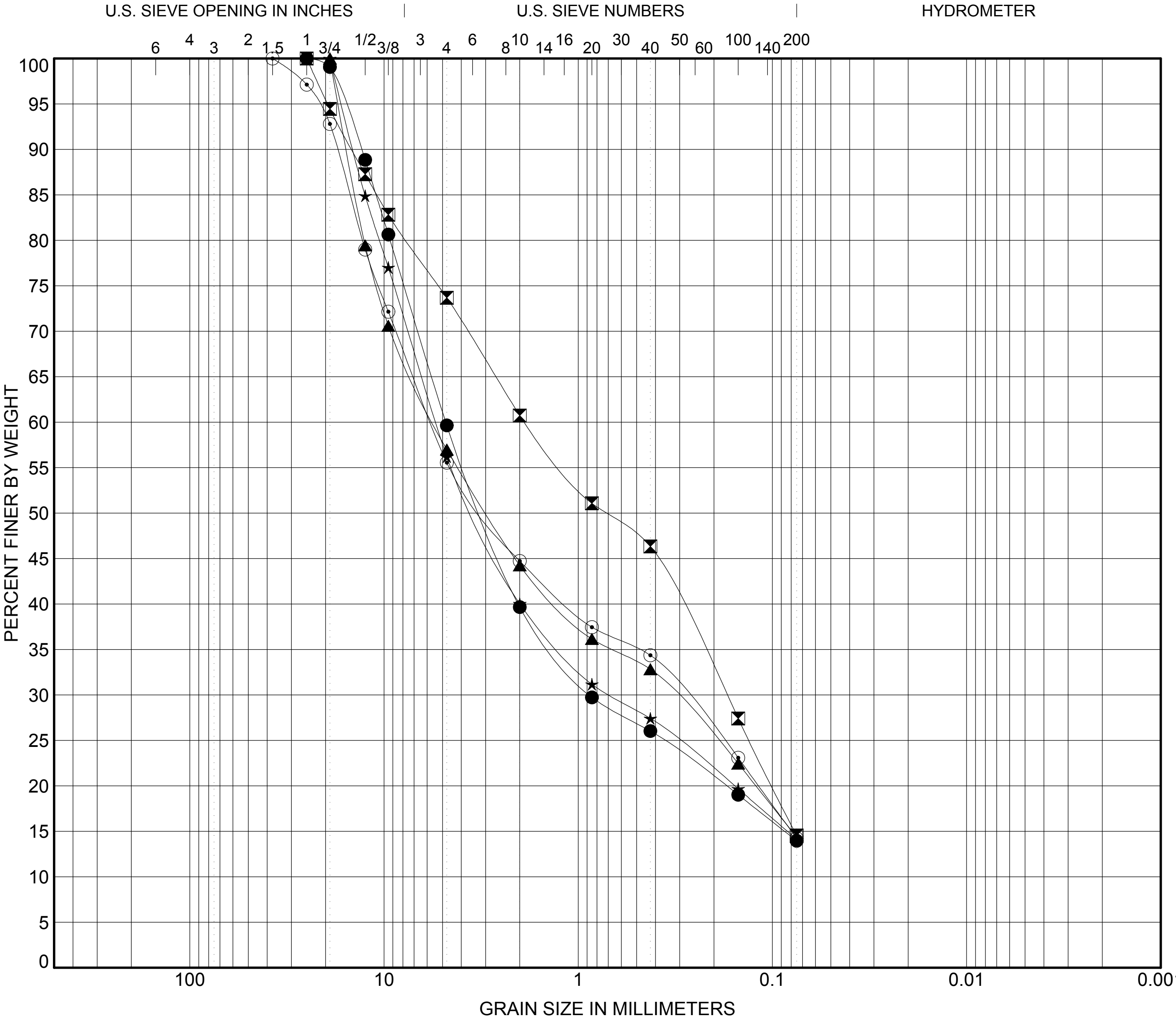
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.6

US_GRAIN_SIZE2_METRIC_0324017.GPJ_US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-07**	**18.4**	**CLAYEY SAND with GRAVEL (SC)**	**23**	**15**	**8**		
⧗	**B-07**	**23.9**	**SILTY SAND with GRAVEL (SM)**	**NV**	**NV**	**NP**		
▲	**B-08**	**1.1**	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**	**20**	**16**	**4**		
★	**B-08**	**4.1**	**CLAYEY GRAVEL with SAND (GC)**	**27**	**17**	**10**		
⊙	**B-08**	**5.6**	**SILTY GRAVEL with SAND (GM)**	**15**	**13**	**2**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**B-07**	**18.4**	**25**	**4.806**	**0.87**		**2.4**	**40.4**	**45.7**	**14.0**	
⧗	**B-07**	**23.9**	**25**	**1.874**	**0.173**		**3.0**	**26.3**	**59.1**	**14.5**	
▲	**B-08**	**1.1**	**19**	**5.536**	**0.32**		**0.9**	**43.0**	**42.6**	**14.4**	
★	**B-08**	**4.1**	**19**	**5.391**	**0.684**		**3.6**	**43.8**	**42.1**	**14.1**	
⊙	**B-08**	**5.6**	**37.5**	**5.719**	**0.284**		**4.7**	**44.4**	**41.3**	**14.2**	

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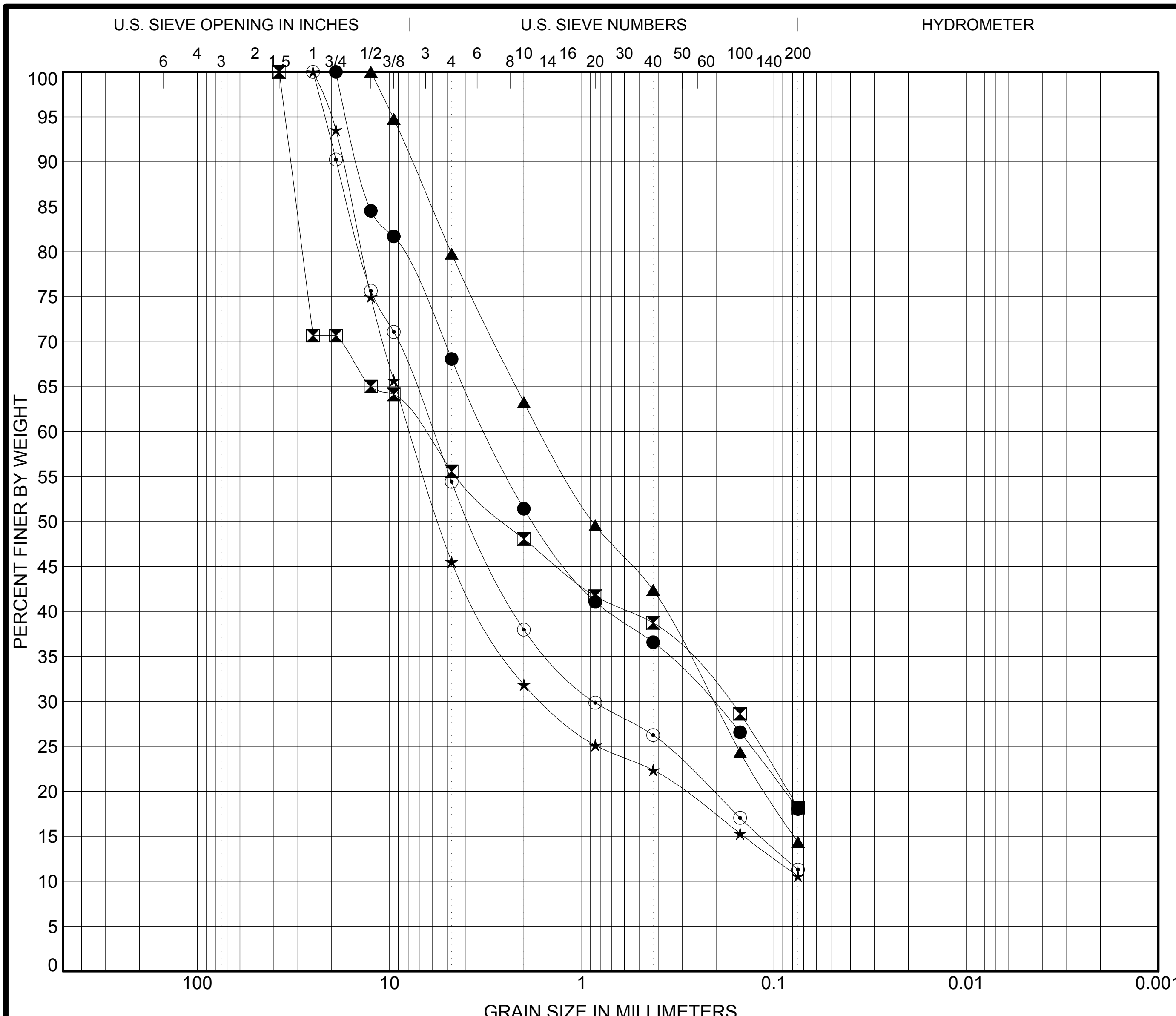
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.7

US_GRAIN_SIZE2_METRIC_0324017.GPJ_US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

Specimen Identification			USCS Classification	LL	PL	PI	Cc	Cu
●	**B-08**	**7.2**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**20**	**15**	**5**		
⧗	**B-08**	**8.7**	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**	**19**	**14**	**5**		
▲	**B-08**	**20.9**	**CLAYEY SAND with GRAVEL (SC)**	**26**	**18**	**8**		
★	**B-09**	**1.1**	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**	**26**	**19**	**7**	**4.63**	**113.32**
⊙	**B-09**	**2.6**	**WELL-GRADED GRAVEL with CLAY and SAND (GW-GC)**	**30**	**21**	**9**	**1.94**	**93.34**

Specimen Identification			D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**B-08**	**7.2**	**19**	**3.123**	**0.214**		**3.0**	**31.9**	**50.0**	**18.0**	
⧗	**B-08**	**8.7**	**37.5**	**6.793**	**0.173**		**4.6**	**44.4**	**37.4**	**18.2**	
▲	**B-08**	**20.9**	**12.5**	**1.631**	**0.208**		**1.5**	**20.2**	**65.4**	**14.3**	
★	**B-09**	**1.1**	**25**	**7.812**	**1.578**		**1.4**	**54.5**	**34.9**	**10.6**	
⊙	**B-09**	**2.6**	**25**	**5.989**	**0.863**		**2.3**	**45.6**	**43.1**	**11.3**	

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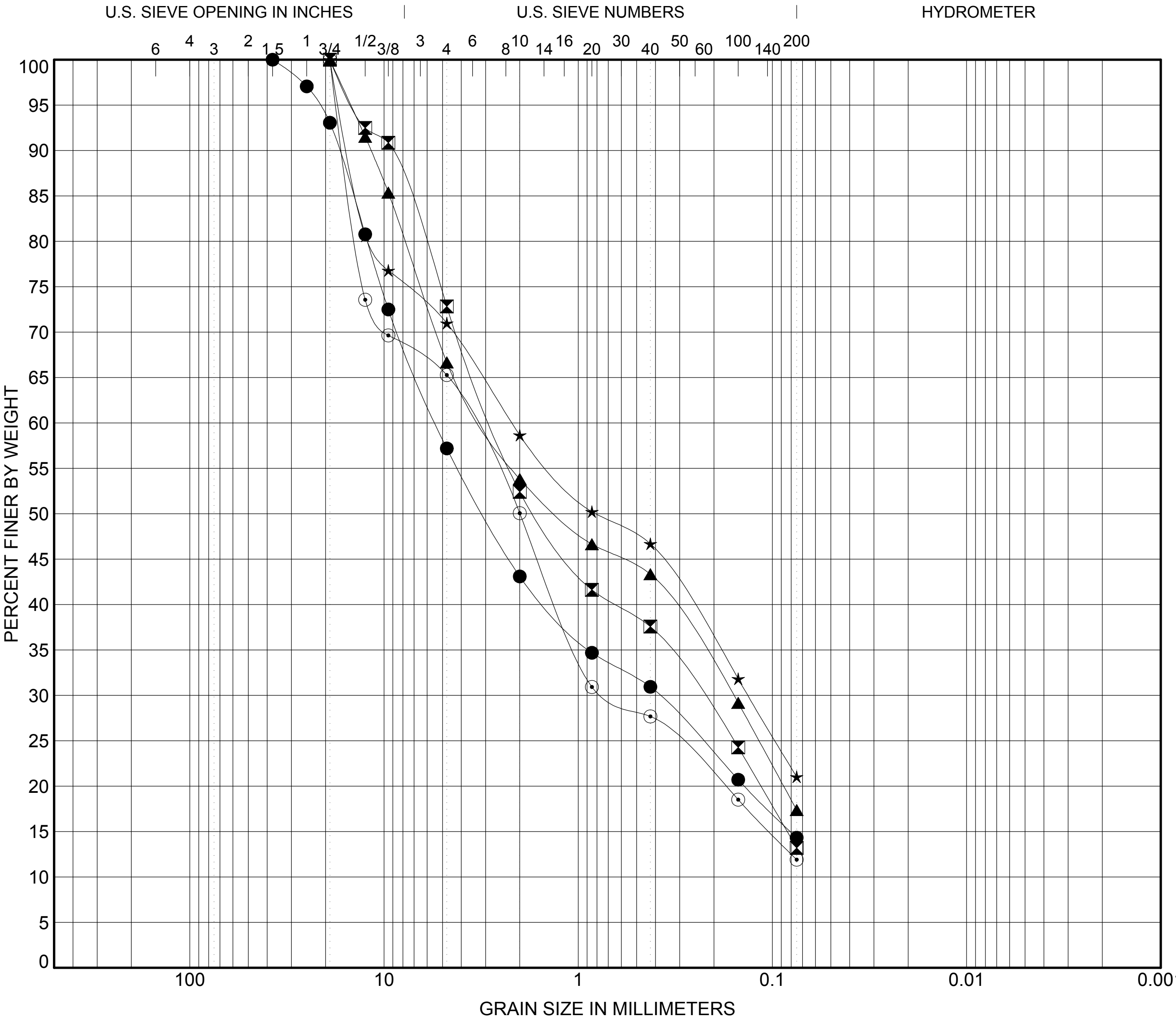
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.8

US_GRAIN_SIZE2_METRIC_0324017.GPJ_US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-09**	**4.1**	**CLAYEY SAND with GRAVEL (SC)**	**38**	**21**	**17**		
⧗	**B-09**	**5.6**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**27**	**21**	**6**		
▲	**B-09**	**7.2**	**CLAYEY SAND with GRAVEL (SC)**	**39**	**24**	**15**		
★	**B-09**	**10.2**	**CLAYEY SAND with GRAVEL (SC)**	**34**	**22**	**12**		
⊙	**B-09**	**14.8**	**WELL-GRADED SAND with CLAY and GRAVEL (SW-SC)**	**28**	**20**	**8**	**2.25**	**57.32**

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt / %Clay
●	**B-09**	**4.1**	**37.5**	**5.394**	**0.386**		**4.1**	**42.8**	**42.9**	**14.3**
⧗	**B-09**	**5.6**	**19**	**2.758**	**0.235**		**2.7**	**27.2**	**59.6**	**13.2**
▲	**B-09**	**7.2**	**19**	**3.032**	**0.159**		**4.4**	**33.3**	**49.3**	**17.4**
★	**B-09**	**10.2**	**19**	**2.197**	**0.133**		**5.9**	**29.0**	**50.0**	**21.0**
⊙	**B-09**	**14.8**	**19**	**3.519**	**0.698**		**1.7**	**34.7**	**53.4**	**11.9**

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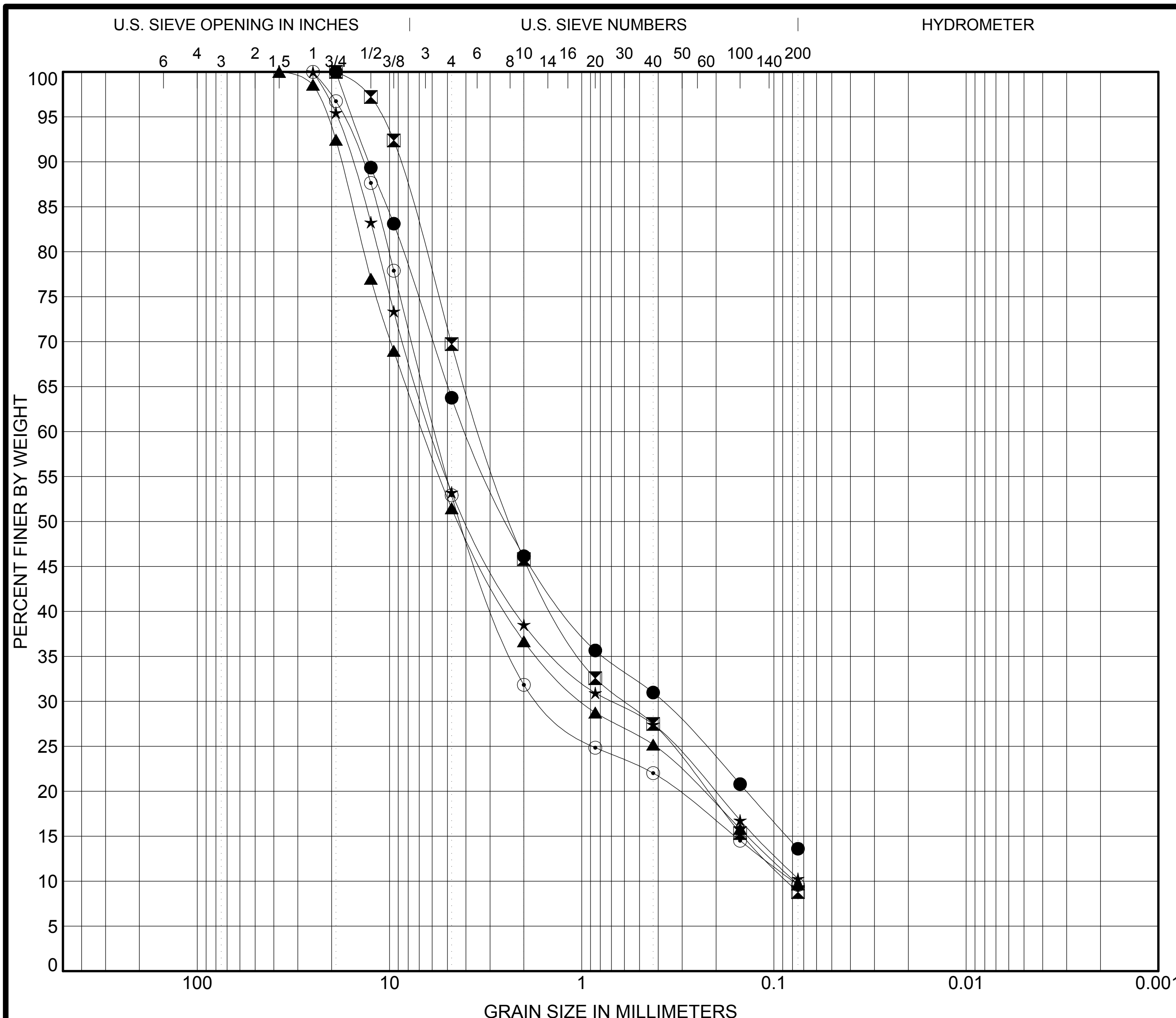
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.9



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-10**	**1.1**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**27**	**20**	**7**		
⧗	**B-10**	**2.6**	**WELL-GRADED SAND with CLAY and GRAVEL (SW-SC)**	**39**	**23**	**16**	**1.26**	**39.22**
▲	**B-10**	**4.1**	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**	**20**	**17**	**3**	**1.82**	**85.22**
★	**B-10**	**5.6**	**WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)**	**22**	**18**	**4**	**1.14**	**82.38**
⊙	**B-10**	**7.2**	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**	**19**	**16**	**3**	**5.55**	**72.65**

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt / %Clay
●	**B-10**	**1.1**	**19**	**3.949**	**0.385**		**2.2**	**36.2**	**50.2**	**13.6**
⧗	**B-10**	**2.6**	**19**	**3.341**	**0.599**	**0.085**	**0.7**	**30.3**	**60.9**	**8.8**
▲	**B-10**	**4.1**	**37.5**	**6.659**	**0.973**	**0.078**	**1.3**	**48.5**	**41.8**	**9.6**
★	**B-10**	**5.6**	**25**	**5.994**	**0.706**		**1.6**	**46.8**	**43.0**	**10.3**
⊙	**B-10**	**7.2**	**25**	**5.782**	**1.598**	**0.08**	**1.3**	**47.1**	**43.3**	**9.6**

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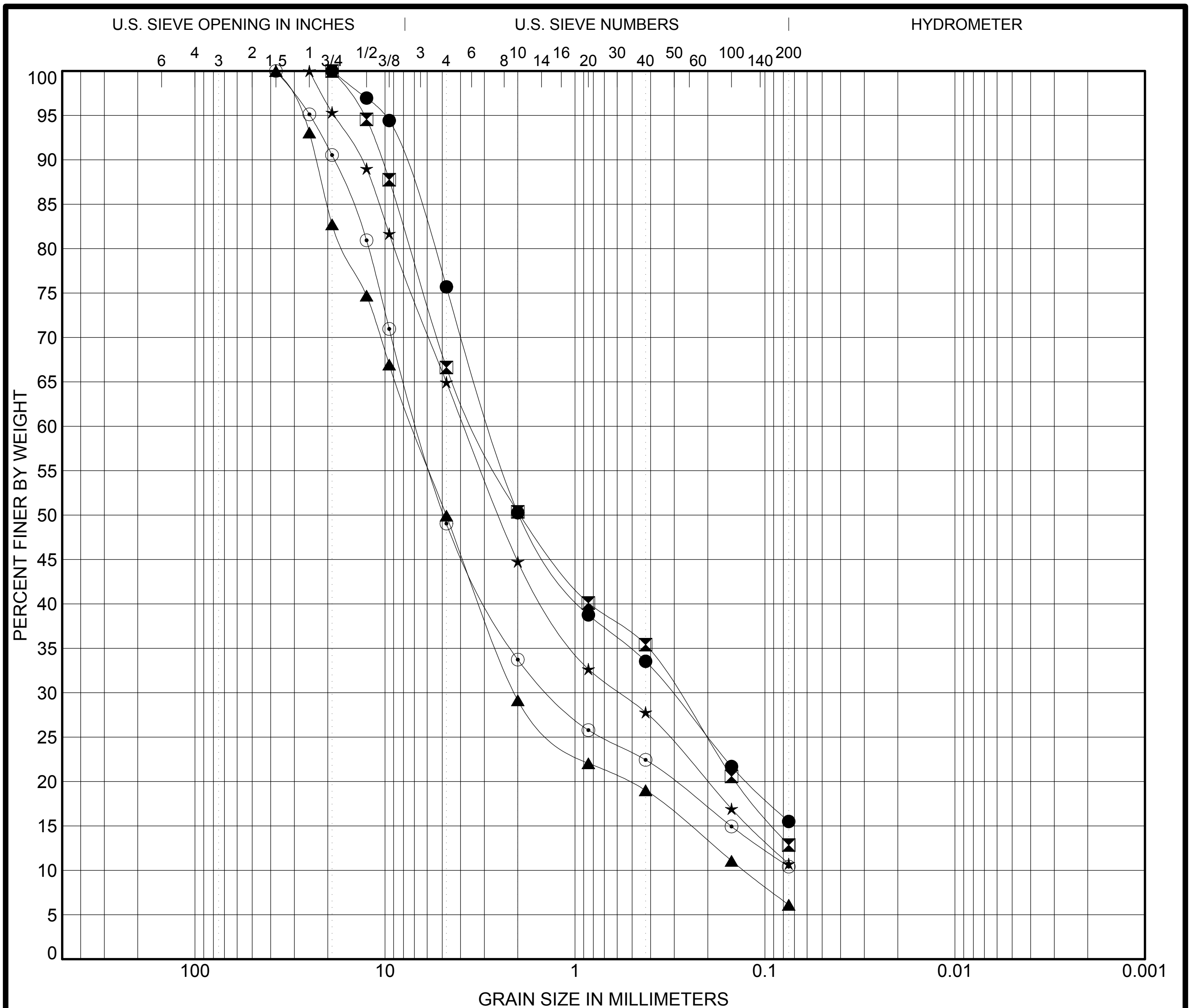
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-10**	**17.8**	**CLAYEY SAND with GRAVEL (SC)**	**31**	**20**	**11**		
⧗	**B-10**	**22.4**	**CLAYEY SAND with GRAVEL (SC)**	**32**	**20**	**12**		
▲	**B-11**	**1.1**	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**	**NV**	**NV**	**NP**	**4.65**	**55.46**
★	**B-11**	**2.6**	**WELL-GRADED SAND with SILTY CLAY and GRAVEL (SW-SC)**	**21**	**16**	**5**	**1.28**	**55.65**
⊙	**B-11**	**4.1**	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**	**26**	**19**	**7**	**3.79**	**95.50**

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**B-10**	**17.8**	**19**	**2.785**	**0.311**		**2.5**	**24.3**	**60.2**	**15.5**	
⧗	**B-10**	**22.4**	**19**	**3.339**	**0.291**		**2.6**	**33.4**	**53.8**	**12.9**	
▲	**B-11**	**1.1**	**37.5**	**7.159**	**2.073**	**0.129**	**0.7**	**50.1**	**43.8**	**6.1**	
★	**B-11**	**2.6**	**25**	**3.841**	**0.582**		**1.6**	**35.0**	**54.2**	**10.7**	
⊙	**B-11**	**4.1**	**37.5**	**6.716**	**1.338**		**0.9**	**51.0**	**38.6**	**10.4**	

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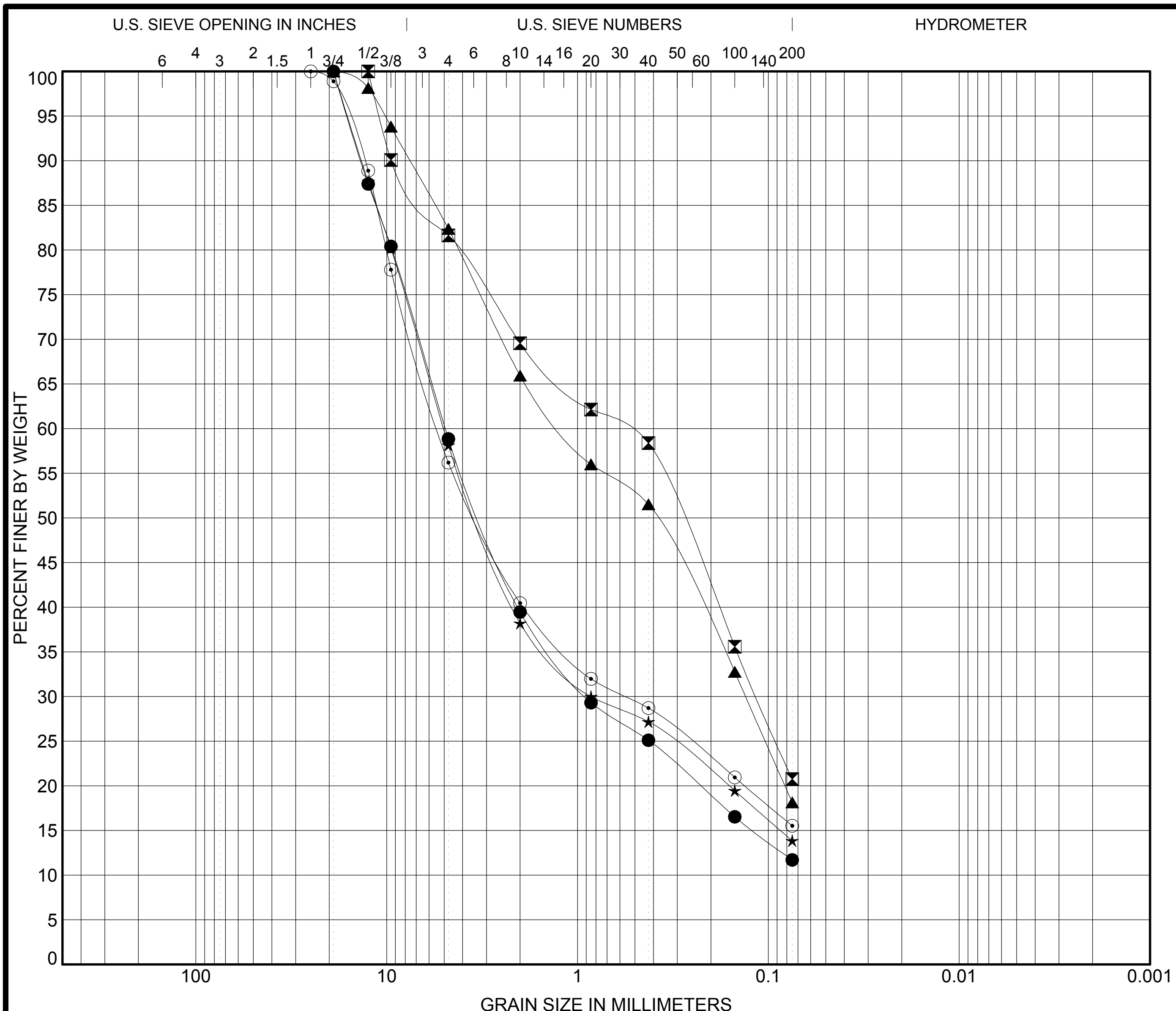
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.11

US_GRAIN_SIZE2_METRIC 0324017.GPJ US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
● B-11	5.6	**WELL-GRADED SAND with CLAY and GRAVEL (SW-SC)**	**30**	**19**	**11**	**2.80**	**83.94**
⧗ B-11	7.2	**CLAYEY SAND with GRAVEL (SC)**	**40**	**22**	**18**		
▲ B-11	8.7	**CLAYEY SAND with GRAVEL (SC)**	**35**	**22**	**13**		
★ B-11	14.8	**CLAYEY SAND with GRAVEL (SC)**	**26**	**17**	**9**		
⊙ B-11	20.9	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**	**18**	**14**	**4**		

Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
● B-11	5.6	**19**	**4.93**	**0.901**		**2.4**	**41.2**	**47.1**	**11.7**	
⧗ B-11	7.2	**12.5**	**0.573**	**0.116**		**6.7**	**18.4**	**60.9**	**20.8**	
▲ B-11	8.7	**19**	**1.2**	**0.132**		**5.9**	**17.6**	**64.2**	**18.1**	
★ B-11	14.8	**19**	**5.035**	**0.85**		**2.8**	**41.9**	**44.3**	**13.9**	
⊙ B-11	20.9	**25**	**5.367**	**0.559**		**2.7**	**43.8**	**40.7**	**15.5**	

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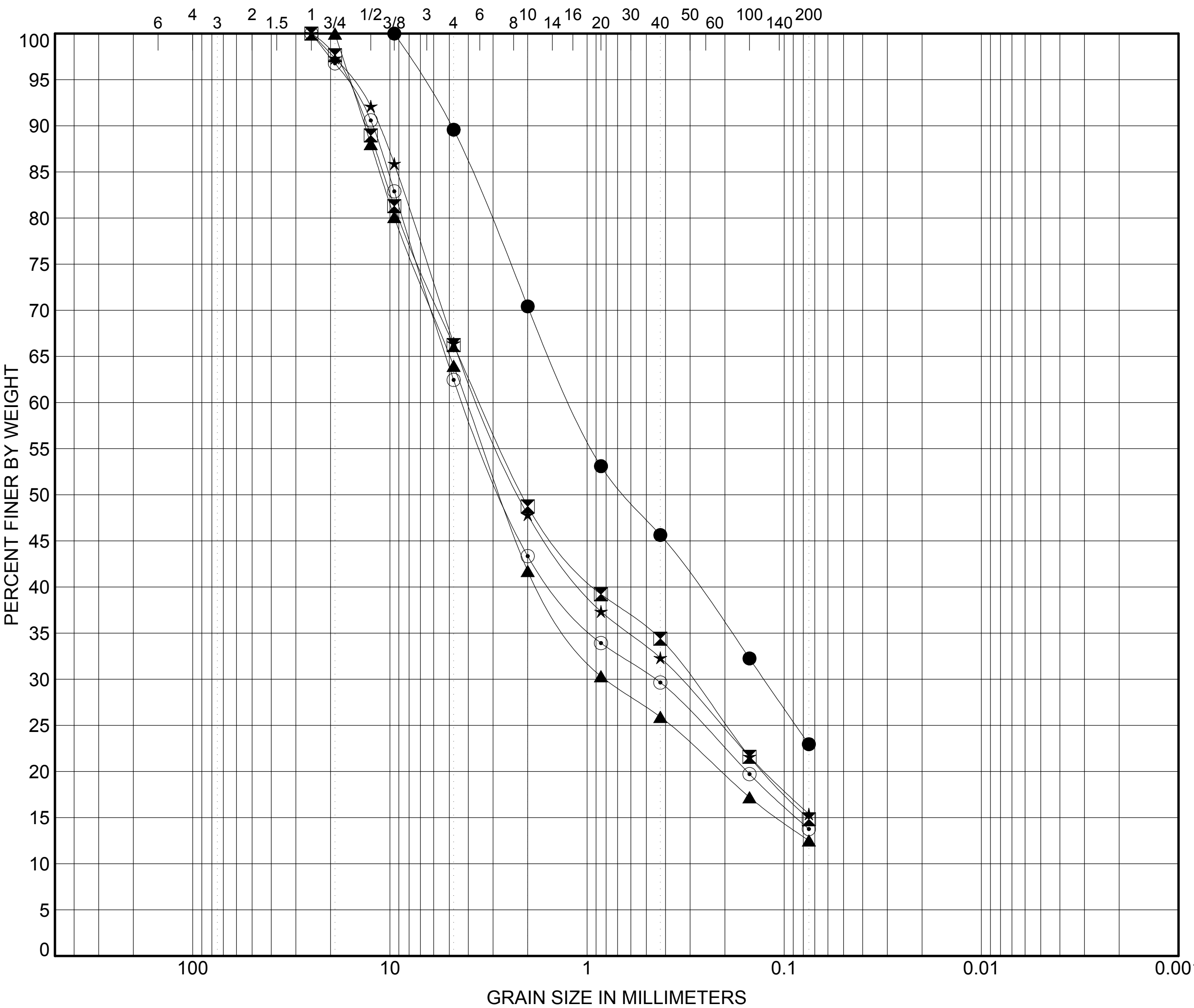
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.12

US_GRAIN_SIZE2_METRIC 0324017.GPJ US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-11**	**22.4**	**SILTY, CLAYEY SAND (SC-SM)**	**25**	**19**	**6**		
⧗	**B-13**	**1.1**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**21**	**17**	**4**		
▲	**B-13**	**2.6**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**24**	**18**	**6**		
★	**B-13**	**4.1**	**CLAYEY SAND with GRAVEL (SC)**	**29**	**19**	**10**		
⊙	**B-13**	**5.6**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**24**	**19**	**5**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**B-11**	**22.4**	**9.5**	**1.195**	**0.127**		**2.3**	**10.4**	**66.6**	**23.0**	
⧗	**B-13**	**1.1**	**25**	**3.49**	**0.297**		**1.7**	**33.8**	**51.4**	**14.8**	
▲	**B-13**	**2.6**	**19**	**4.069**	**0.807**		**2.2**	**36.0**	**51.5**	**12.5**	
★	**B-13**	**4.1**	**25**	**3.521**	**0.339**		**3.0**	**33.6**	**51.0**	**15.4**	
⊙	**B-13**	**5.6**	**25**	**4.251**	**0.45**		**2.5**	**37.5**	**48.7**	**13.8**	

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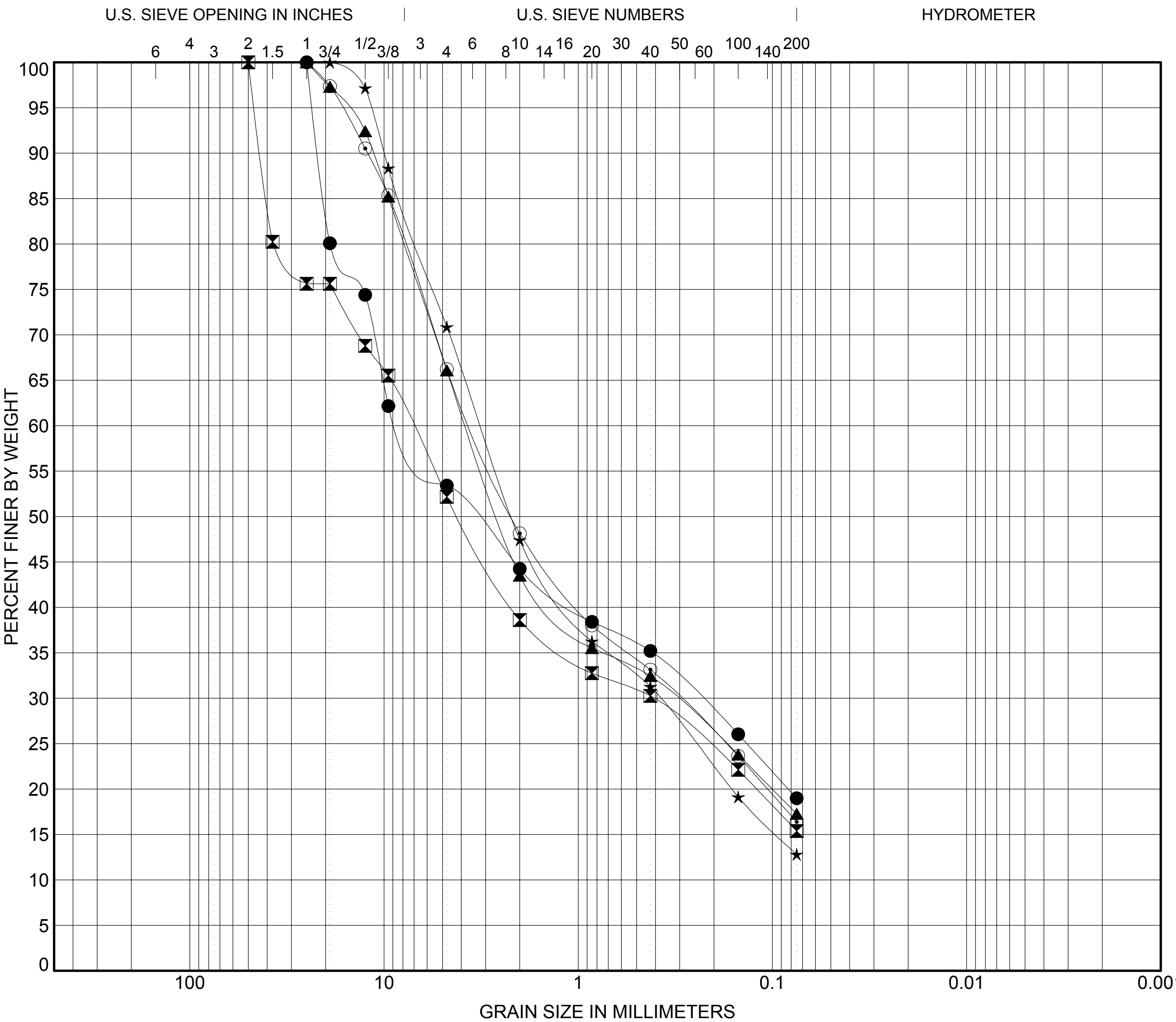
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.13



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	B-13	7.2	**CLAYEY GRAVEL with SAND (GC)**	29	21	8		
⧗	B-13	8.7	**CLAYEY GRAVEL with SAND (GC)**	26	17	9		
▲	B-13	11.7	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	23	16	7		
★	B-13	14.8	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	26	21	5		
⊙	B-18	0.9	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	20	16	4		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	B-13	7.2	25	8.004	0.235		3.5	46.6	34.4	19.0	
⧗	B-13	8.7	50	7.134	0.411		3.1	47.8	36.8	15.4	
▲	B-13	11.7	25	3.762	0.317		3.5	33.9	48.8	17.3	
★	B-13	14.8	19	3.18	0.381		1.5	29.1	58.1	12.8	
⊙	B-18	0.9	25	3.528	0.301		1.4	33.8	49.8	16.4	

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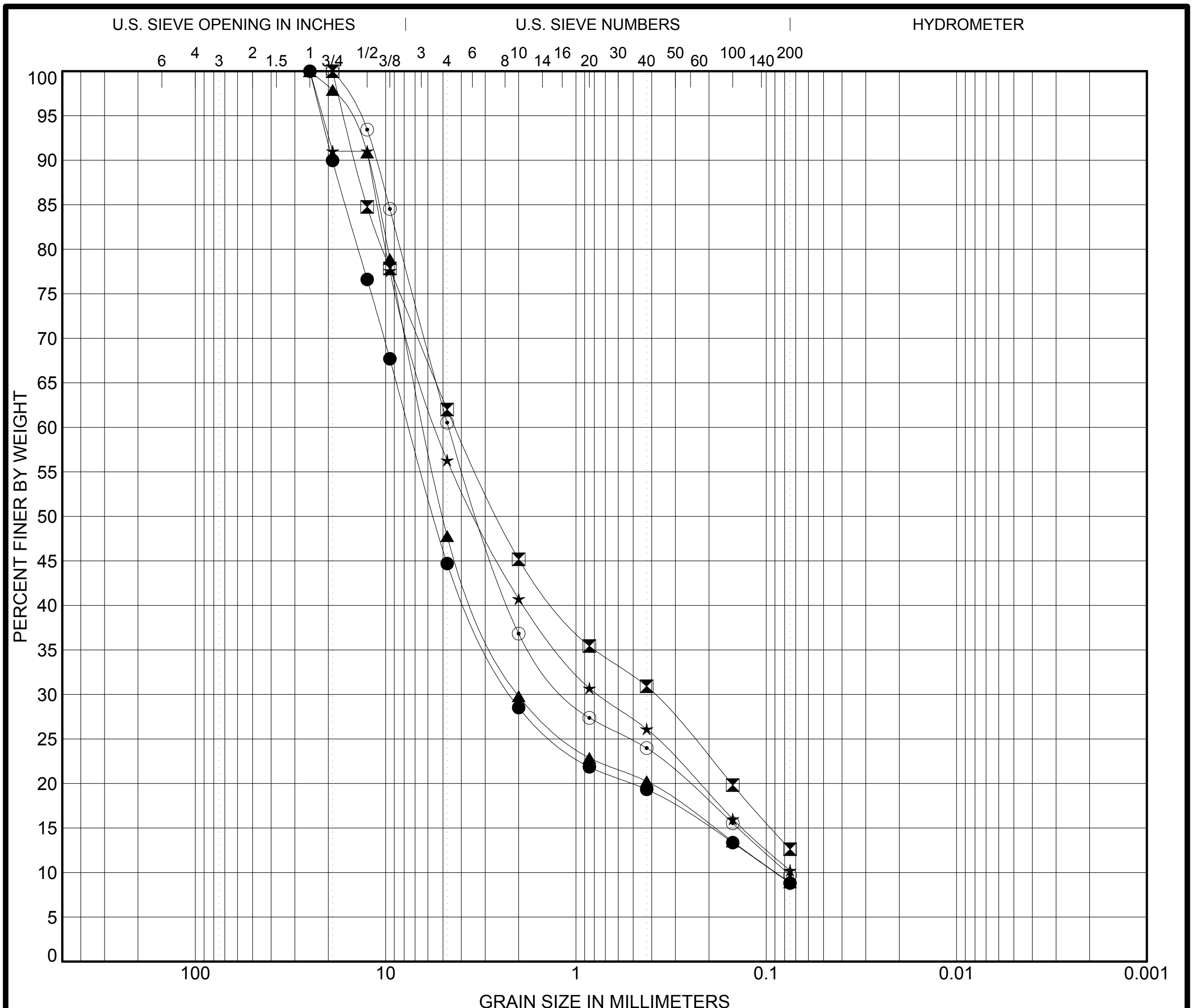
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.14



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-18**	**1.7**	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**	**18**	**17**	**1**	**6.92**	**83.80**
⧗	**B-18**	**3.0**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**23**	**17**	**6**		
▲	**B-18**	**4.7**	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**	**21**	**16**	**5**	**7.37**	**70.29**
★	**B-18**	**6.1**	**WELL-GRADED SAND with SILTY CLAY and GRAVEL (SW-SC)**	**22**	**17**	**5**	**1.50**	**73.44**
⊙	**B-18**	**7.0**	**POORLY GRADED SAND with SILTY CLAY and GRAVEL (SP-SC)**	**20**	**15**	**5**	**3.21**	**60.01**

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**B-18**	**1.7**	**25**	**7.532**	**2.164**	**0.09**	**1.0**	**55.3**	**35.9**	**8.8**	
⧗	**B-18**	**3.0**	**19**	**4.286**	**0.39**		**1.6**	**38.0**	**49.4**	**12.6**	
▲	**B-18**	**4.7**	**25**	**6.236**	**2.02**	**0.089**	**1.4**	**52.2**	**38.9**	**8.9**	
★	**B-18**	**6.1**	**25**	**5.357**	**0.765**		**1.5**	**43.7**	**46.1**	**10.2**	
⊙	**B-18**	**7.0**	**19**	**4.659**	**1.078**	**0.078**	**1.4**	**39.5**	**50.8**	**9.7**	

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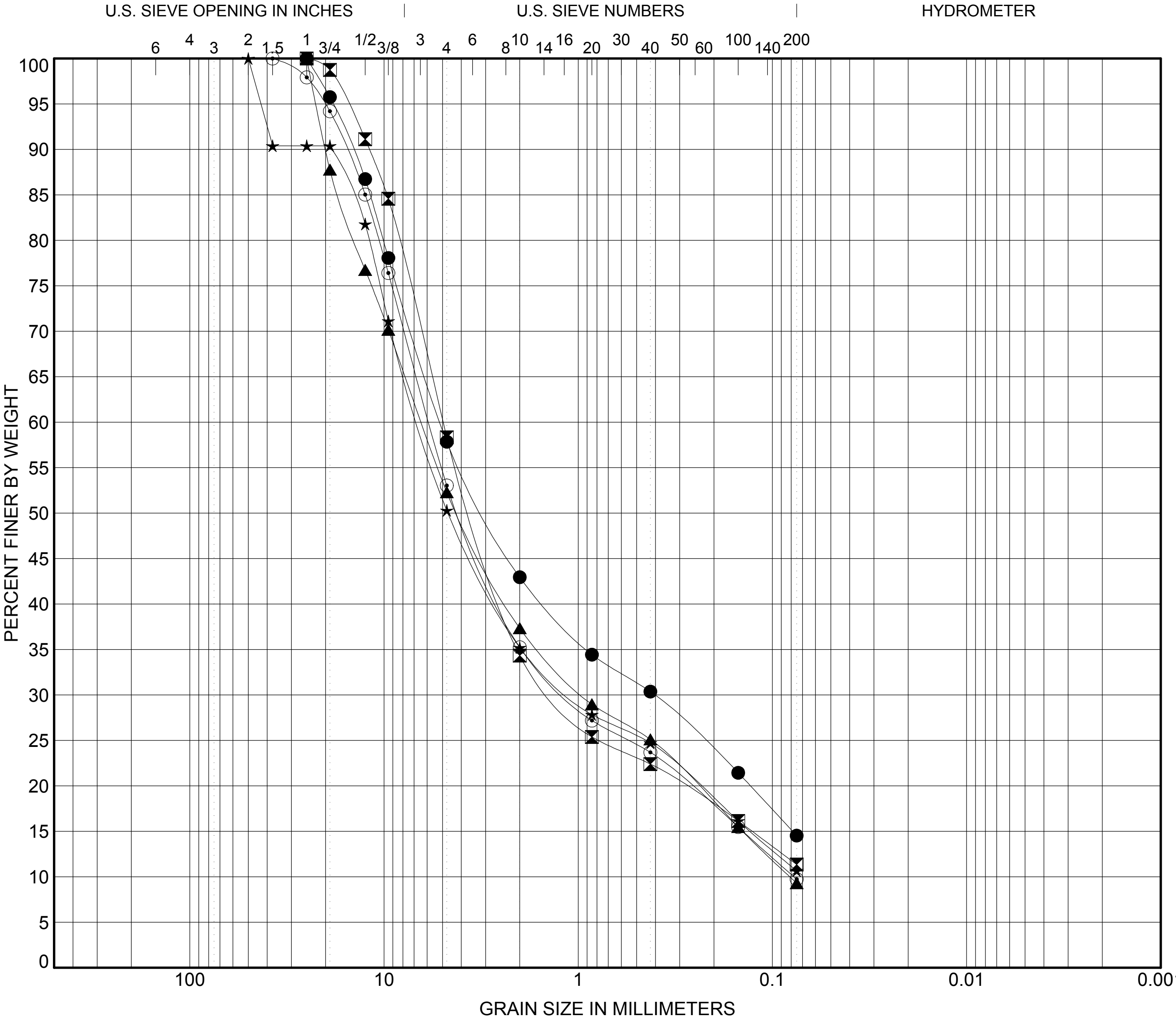
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.15



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

Specimen Identification			USCS Classification	LL	PL	PI	Cc	Cu
●	B-19	0.9	**SILTY SAND with GRAVEL (SM)**	19	16	3		
⧗	B-19	1.7	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**	18	17	1	5.70	80.37
▲	B-19	3.0	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**	20	18	2	1.72	78.97
★	B-19	4.6	**WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)**	21	16	5	2.64	95.22
⊙	B-19	6.1	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**	19	17	2	2.90	75.43

Specimen Identification			D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	B-19	0.9	25	5.115	0.407		1.0	42.2	43.3	14.5	
⧗	B-19	1.7	25	4.963	1.322		0.9	41.7	47.0	11.3	
▲	B-19	3.0	25	6.405	0.944	0.081	0.8	47.7	43.0	9.3	
★	B-19	4.6	50	6.559	1.092		1.0	49.7	39.6	10.7	
⊙	B-19	6.1	37.5	5.84	1.146	0.077	1.2	47.0	43.3	9.7	

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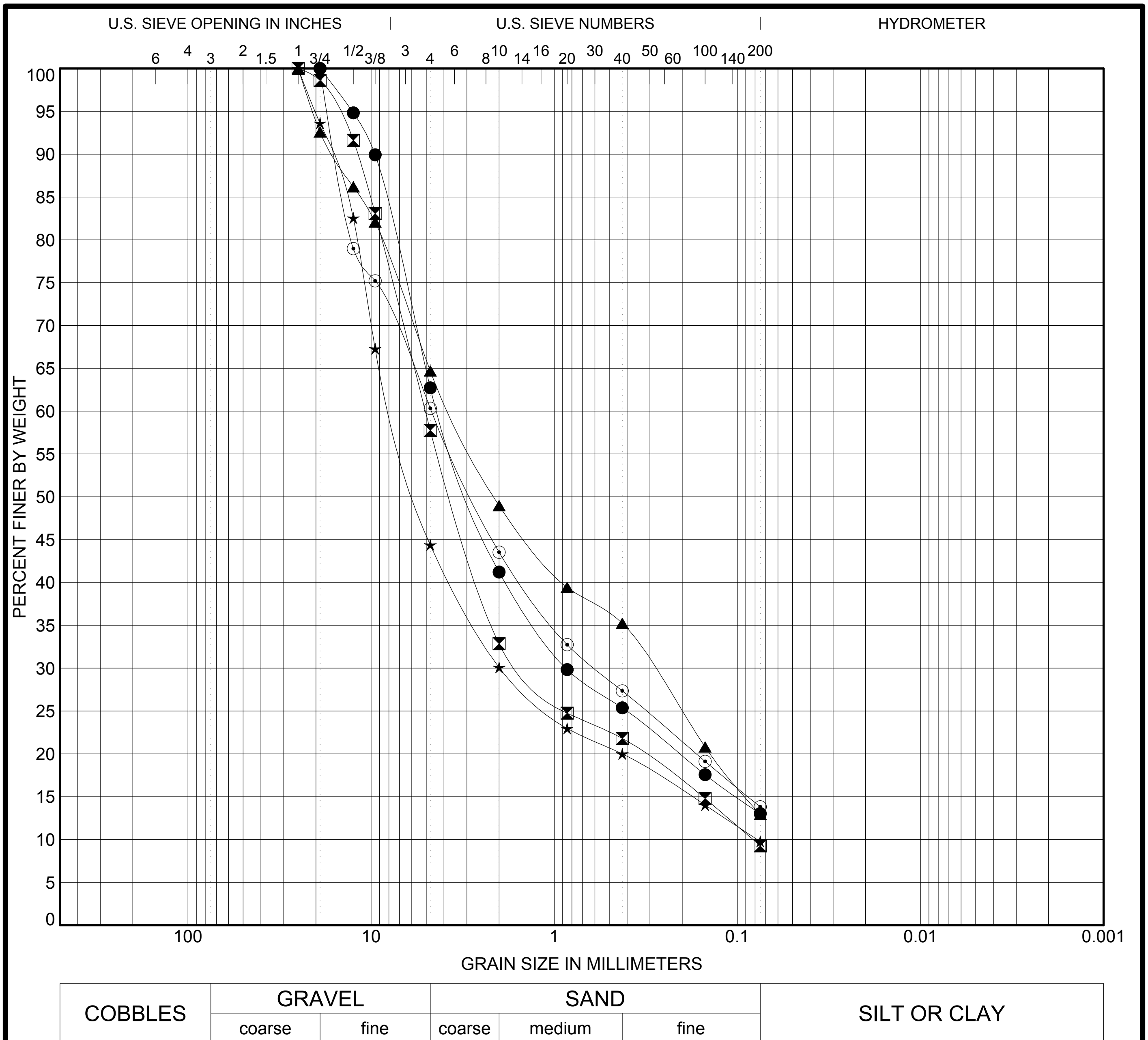
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.16



Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**B-19**	**7.6**	**CLAYEY SAND with GRAVEL (SC)**	**38**	**20**	**18**		
⧗	**B-19**	**9.1**	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**	**19**	**16**	**3**	**5.27**	**61.39**
▲	**B-19**	**10.7**	**CLAYEY SAND with GRAVEL (SC)**	**41**	**24**	**17**		
★	**B-19**	**13.7**	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**	**21**	**16**	**5**	**6.60**	**97.78**
⊙	**FB-01**	**1.5**	**SILTY SAND with GRAVEL (SM)**	**NV**	**NV**	**NP**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt / %Clay
●	**B-19**	**7.6**	**19**	**4.257**	**0.861**		**2.9**	**37.3**	**49.7**	**13.0**
⧗	**B-19**	**9.1**	**25**	**5.052**	**1.48**	**0.082**	**1.4**	**42.2**	**48.5**	**9.3**
▲	**B-19**	**10.7**	**25**	**3.669**	**0.291**		**4.1**	**35.3**	**51.8**	**12.9**
★	**B-19**	**13.7**	**25**	**7.62**	**1.98**	**0.078**	**1.4**	**55.6**	**34.6**	**9.8**
⊙	**FB-01**	**1.5**	**19**	**4.671**	**0.597**		**0.9**	**39.7**	**46.5**	**13.8**

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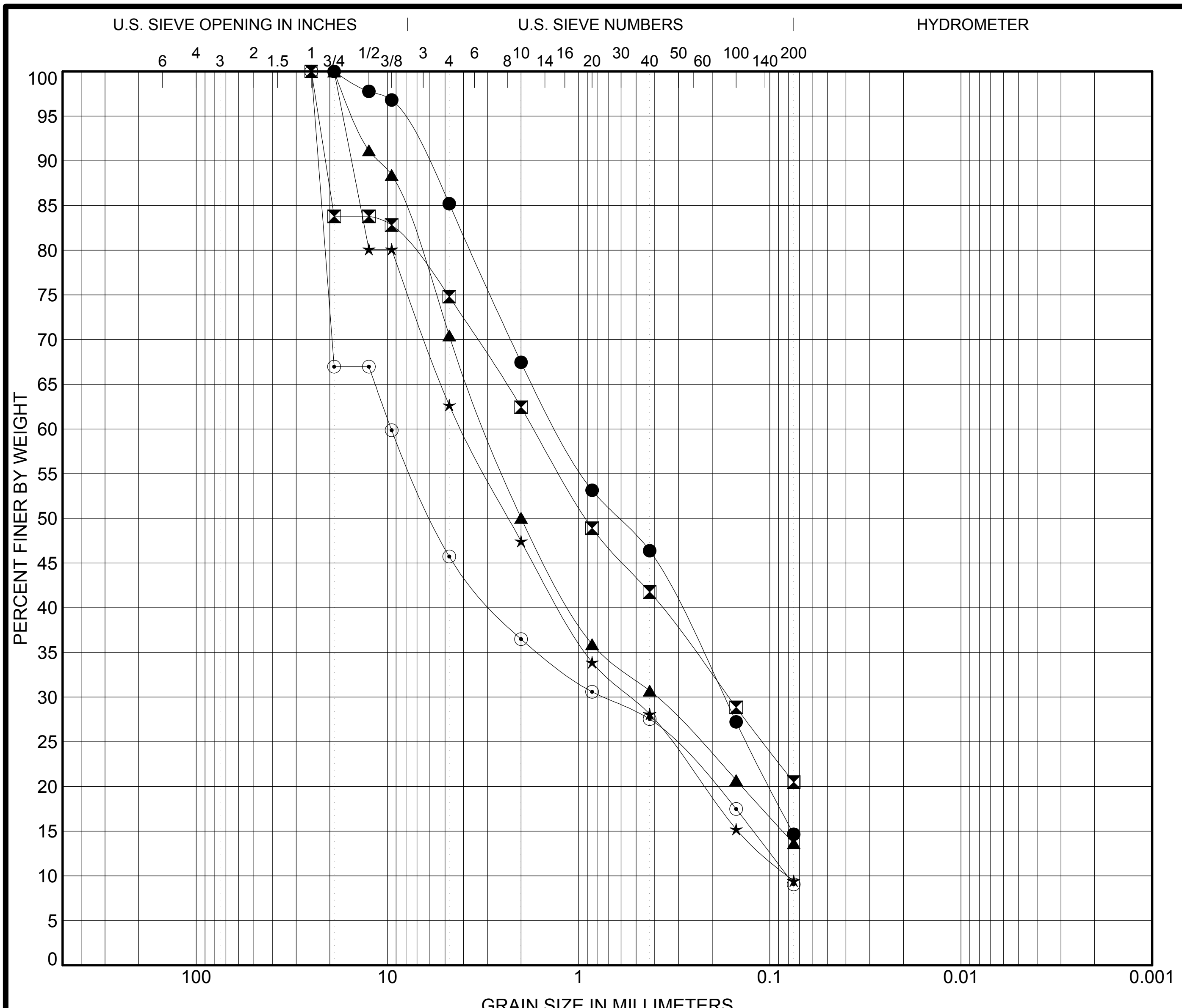
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**FB-01**	**4.6**	**SILTY SAND (SM)**	**NV**	**NV**	**NP**		
⧗	**FB-02**	**1.5**	**SILTY SAND with GRAVEL (SM)**	**NV**	**NV**	**NP**		
▲	**FB-02**	**3.0**	**SILTY SAND with GRAVEL (SM)**	**NV**	**NV**	**NP**		
★	**FB-02**	**4.6**	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**	**NV**	**NV**	**NP**	**0.87**	**50.92**
⊙	**FB-03**	**1.5**	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**	**NV**	**NV**	**NP**	**0.71**	**117.75**

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**FB-01**	**4.6**	**19**	**1.281**	**0.174**		**1.3**	**14.8**	**70.6**	**14.7**	
⧗	**FB-02**	**1.5**	**25**	**1.716**	**0.165**		**1.2**	**25.2**	**54.3**	**20.5**	
▲	**FB-02**	**3.0**	**19**	**3.049**	**0.394**		**1.0**	**29.5**	**56.8**	**13.6**	
★	**FB-02**	**4.6**	**19**	**4.082**	**0.533**	**0.08**	**1.2**	**37.3**	**53.2**	**9.4**	
⊙	**FB-03**	**1.5**	**25**	**9.552**	**0.743**	**0.081**	**1.9**	**54.3**	**36.7**	**9.0**	

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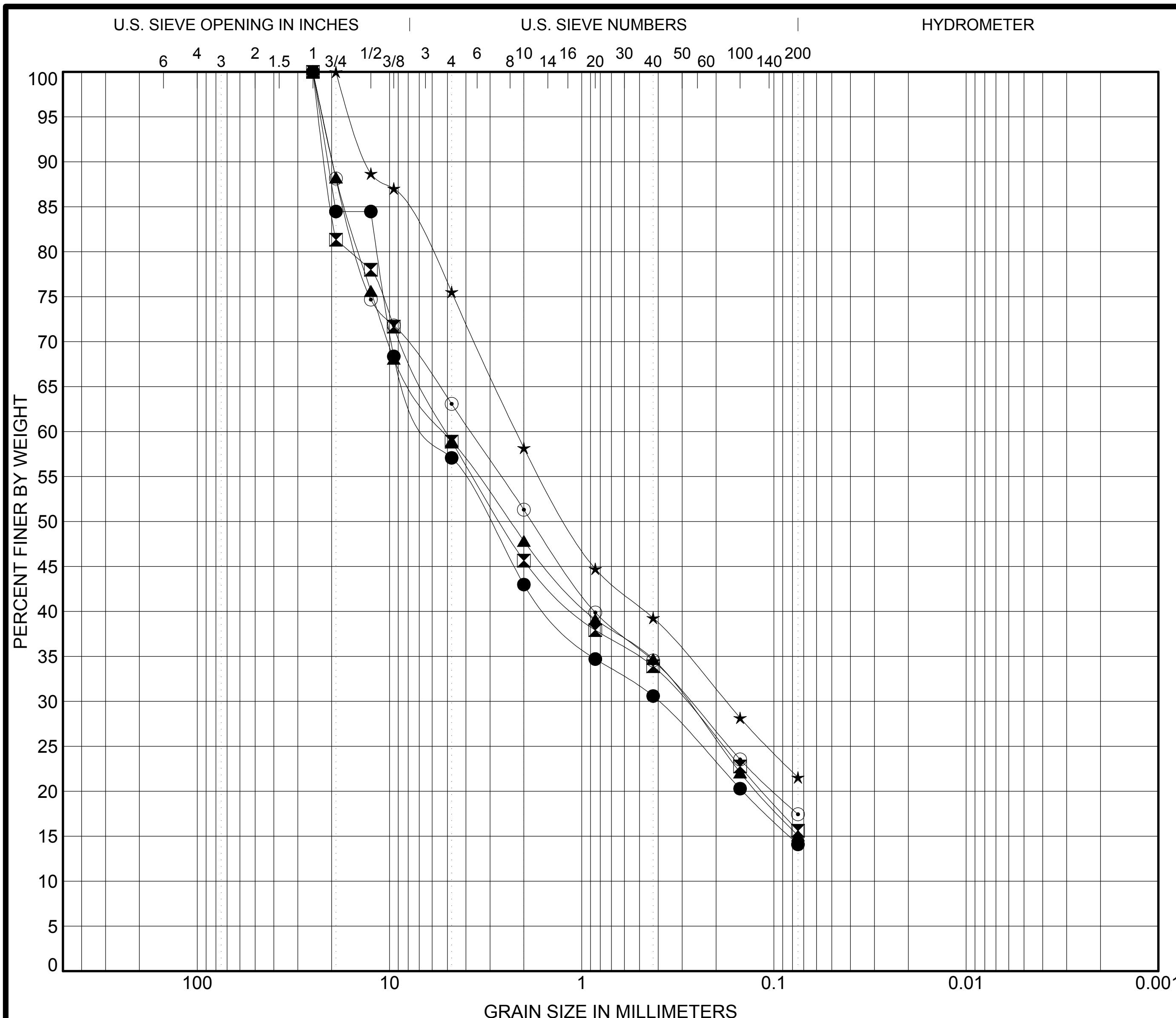
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.18

US_GRAIN_SIZE2_METRIC 0324017.GPJ US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
● FB-03	3.0	**CLAYEY SAND with GRAVEL (SC)**	38	21	17		
⧗ FB-03	4.6	**CLAYEY SAND with GRAVEL (SC)**	28	19	9		
▲ FB-03	6.1	**CLAYEY SAND with GRAVEL (SC)**	31	18	13		
★ FB-03	10.7	**CLAYEY SAND with GRAVEL (SC)**	27	17	10		
⊙ FB-03	12.2	**CLAYEY SAND with GRAVEL (SC)**	24	16	8		

Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
● FB-03	3.0	25	5.684	0.4		2.5	42.9	43.0	14.1	
⧗ FB-03	4.6	25	5.046	0.295		2.9	41.1	43.3	15.6	
▲ FB-03	6.1	25	5.145	0.288		7.4	41.1	43.9	15.1	
★ FB-03	10.7	19	2.189	0.178		4.5	24.5	54.0	21.5	
⊙ FB-03	12.2	25	3.787	0.276		2.0	36.9	45.6	17.4	

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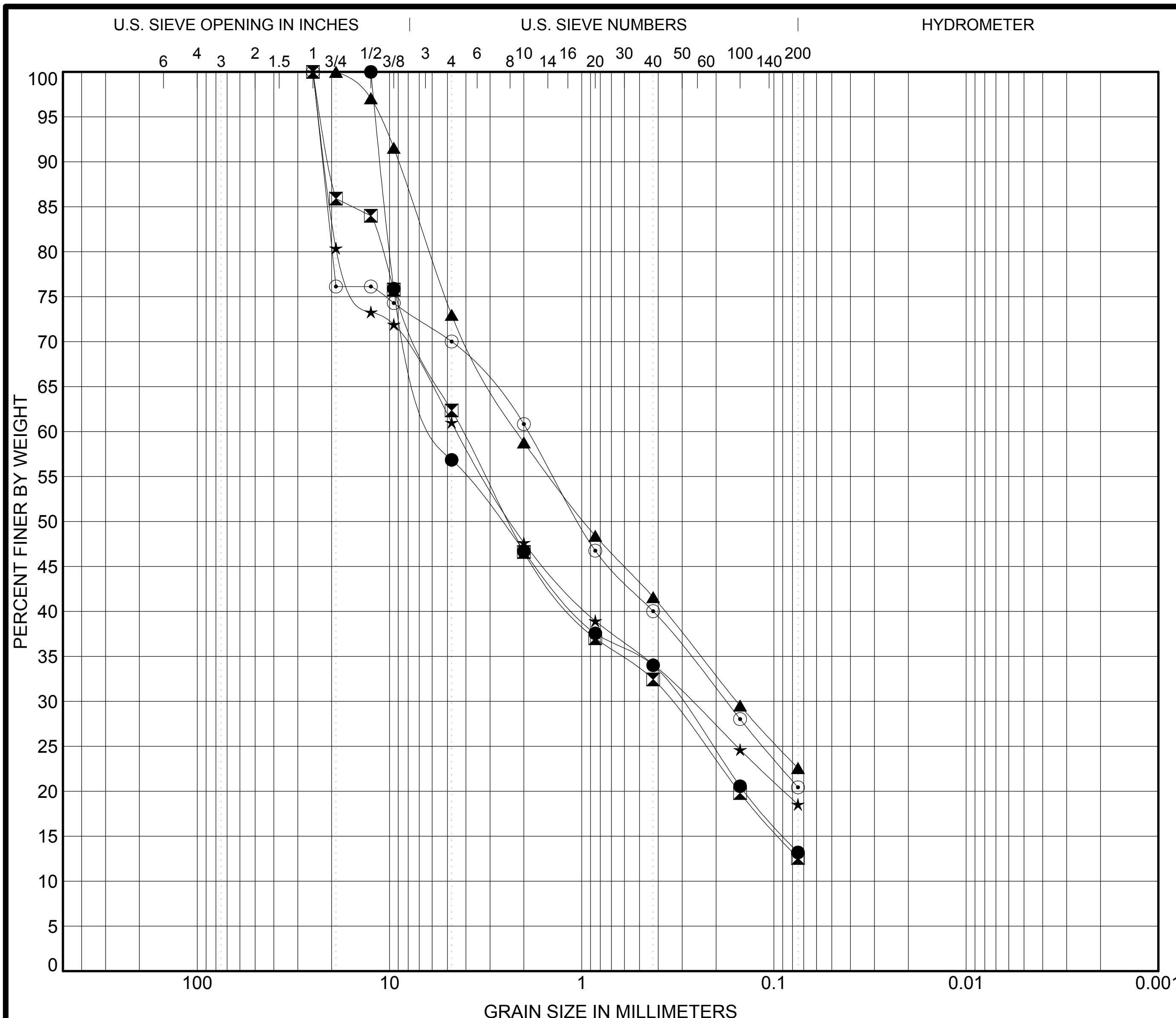
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.19



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**FB-03**	**15.2**	**SILTY SAND with GRAVEL (SM)**	**NV**	**NV**	**NP**		
⧗	**FB-03**	**16.8**	**SILTY SAND with GRAVEL (SM)**	**NV**	**NV**	**NP**		
▲	**FB-03**	**21.3**	**CLAYEY SAND with GRAVEL (SC)**	**25**	**17**	**8**		
★	**FB-03**	**22.9**	**CLAYEY SAND with GRAVEL (SC)**	**29**	**19**	**10**		
⊙	**FB-03**	**24.4**	**CLAYEY SAND with GRAVEL (SC)**	**25**	**13**	**12**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**FB-03**	**15.2**	**12.5**	**5.327**	**0.312**		**1.0**	**43.1**	**43.7**	**13.2**	
⧗	**FB-03**	**16.8**	**25**	**4.175**	**0.347**		**1.5**	**37.7**	**49.8**	**12.6**	
▲	**FB-03**	**21.3**	**19**	**2.153**	**0.156**		**3.4**	**27.0**	**50.4**	**22.6**	
★	**FB-03**	**22.9**	**25**	**4.447**	**0.271**		**4.5**	**39.0**	**42.5**	**18.5**	
⊙	**FB-03**	**24.4**	**25**	**1.901**	**0.178**		**3.1**	**30.0**	**49.6**	**20.4**	

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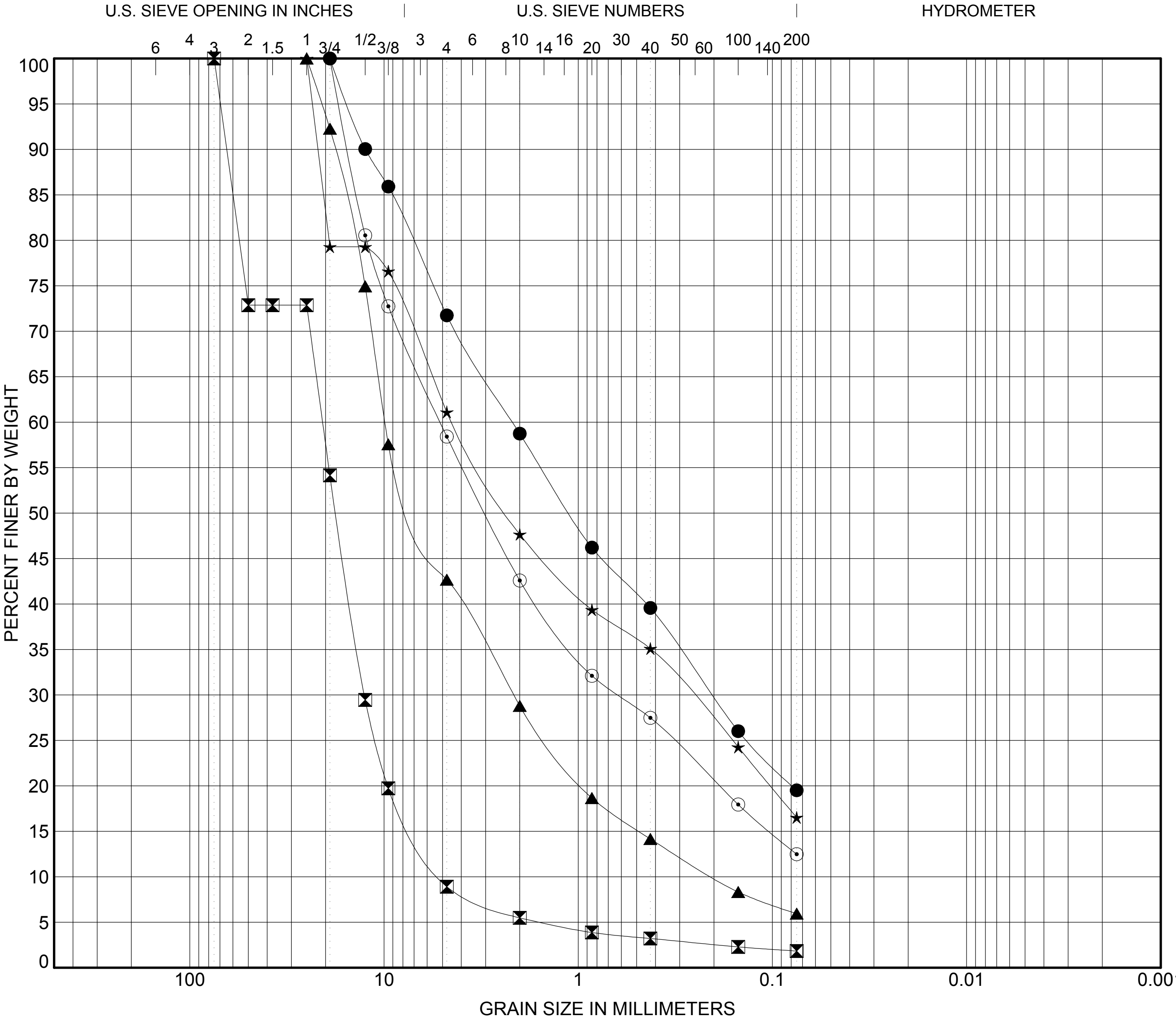
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	FB-04	1.5	**CLAYEY SAND with GRAVEL (SC)**	32	18	14		
⧗	FB-04	1.8	**WELL-GRADED GRAVEL (GW)**	31	16	15	1.51	4.07
▲	FB-04	3.0	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**	NV	NV	NP	2.33	48.82
★	FB-04	4.6	**CLAYEY SAND with GRAVEL (SC)**	37	22	15		
⊙	FB-04	6.1	**CLAYEY SAND with GRAVEL (SC)**	27	18	9	1.37	93.73

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt / %Clay
●	FB-04	1.5	19	2.175	0.204		5.8	28.3	52.2	19.5
⧗	FB-04	1.8	75	20.701	12.617	5.092	2.2	91.1	7.1	1.8
▲	FB-04	3.0	25	9.873	2.155	0.202	7.7	57.3	36.7	6.0
★	FB-04	4.6	25	4.423	0.26		13.0	38.9	44.6	16.5
⊙	FB-04	6.1	19	5.128	0.62		4.1	41.6	45.9	12.5

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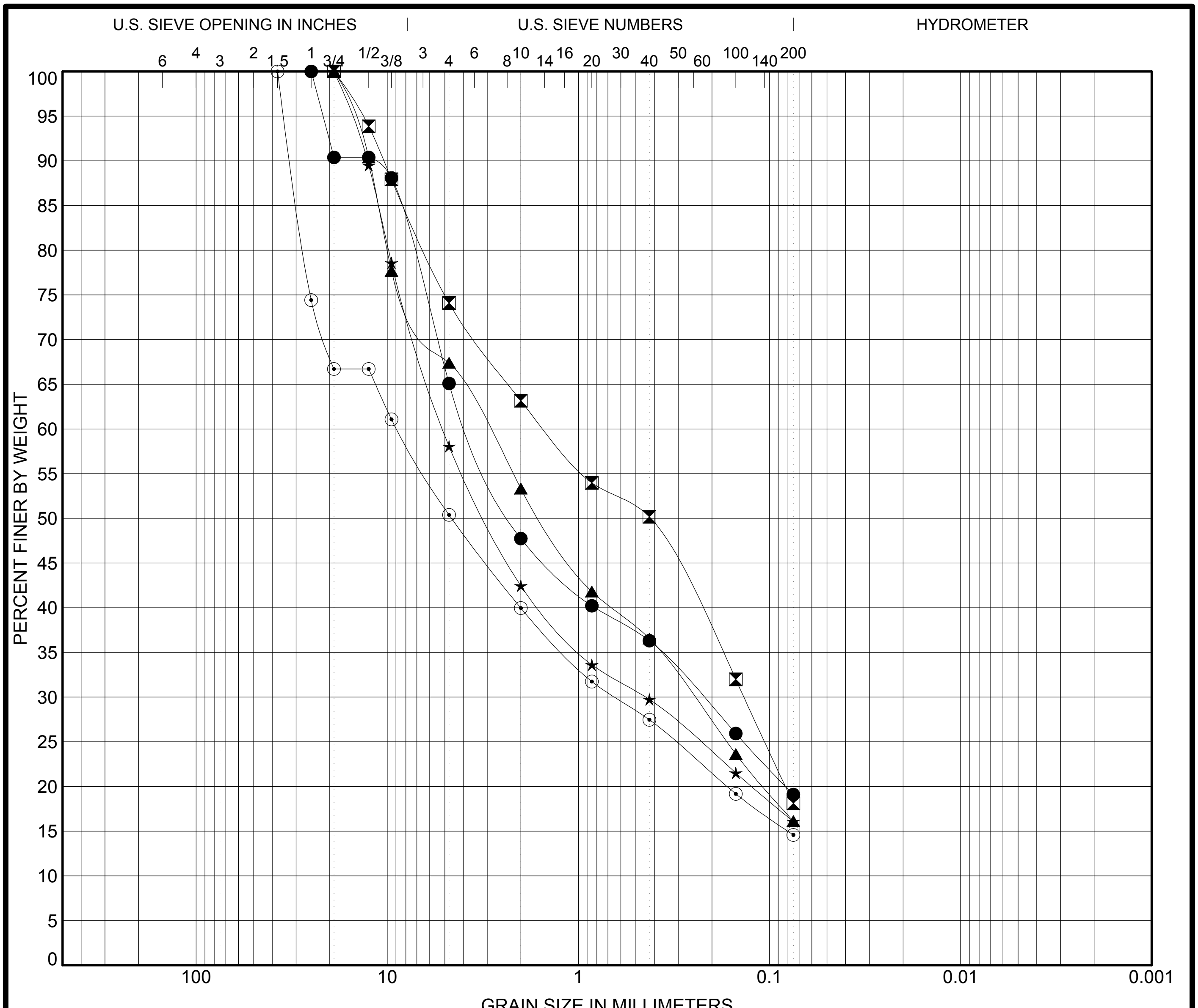
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.21



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**FB-04**	**9.1**	**CLAYEY SAND with GRAVEL (SC)**	**42**	**21**	**21**		
⧗	**FB-04**	**10.7**	**CLAYEY SAND with GRAVEL (SC)**	**35**	**22**	**13**		
▲	**FB-04**	**15.2**	**CLAYEY SAND with GRAVEL (SC)**	**27**	**18**	**9**		
★	**FB-04**	**22.9**	**CLAYEY SAND with GRAVEL (SC)**	**33**	**20**	**13**		
⊙	**FB-04**	**24.4**	**CLAYEY GRAVEL with SAND (GC)**	**29**	**18**	**11**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt / %Clay
●	**FB-04**	**9.1**	**25**	**3.686**	**0.226**		**6.1**	**34.9**	**46.0**	**19.1**
⧗	**FB-04**	**10.7**	**19**	**1.491**	**0.136**		**6.3**	**25.9**	**56.0**	**18.1**
▲	**FB-04**	**15.2**	**19**	**3.013**	**0.251**		**2.7**	**32.6**	**51.3**	**16.1**
★	**FB-04**	**22.9**	**19**	**5.071**	**0.445**		**5.6**	**41.9**	**42.0**	**16.1**
⊙	**FB-04**	**24.4**	**37.5**	**8.86**	**0.641**		**2.3**	**49.6**	**35.8**	**14.6**

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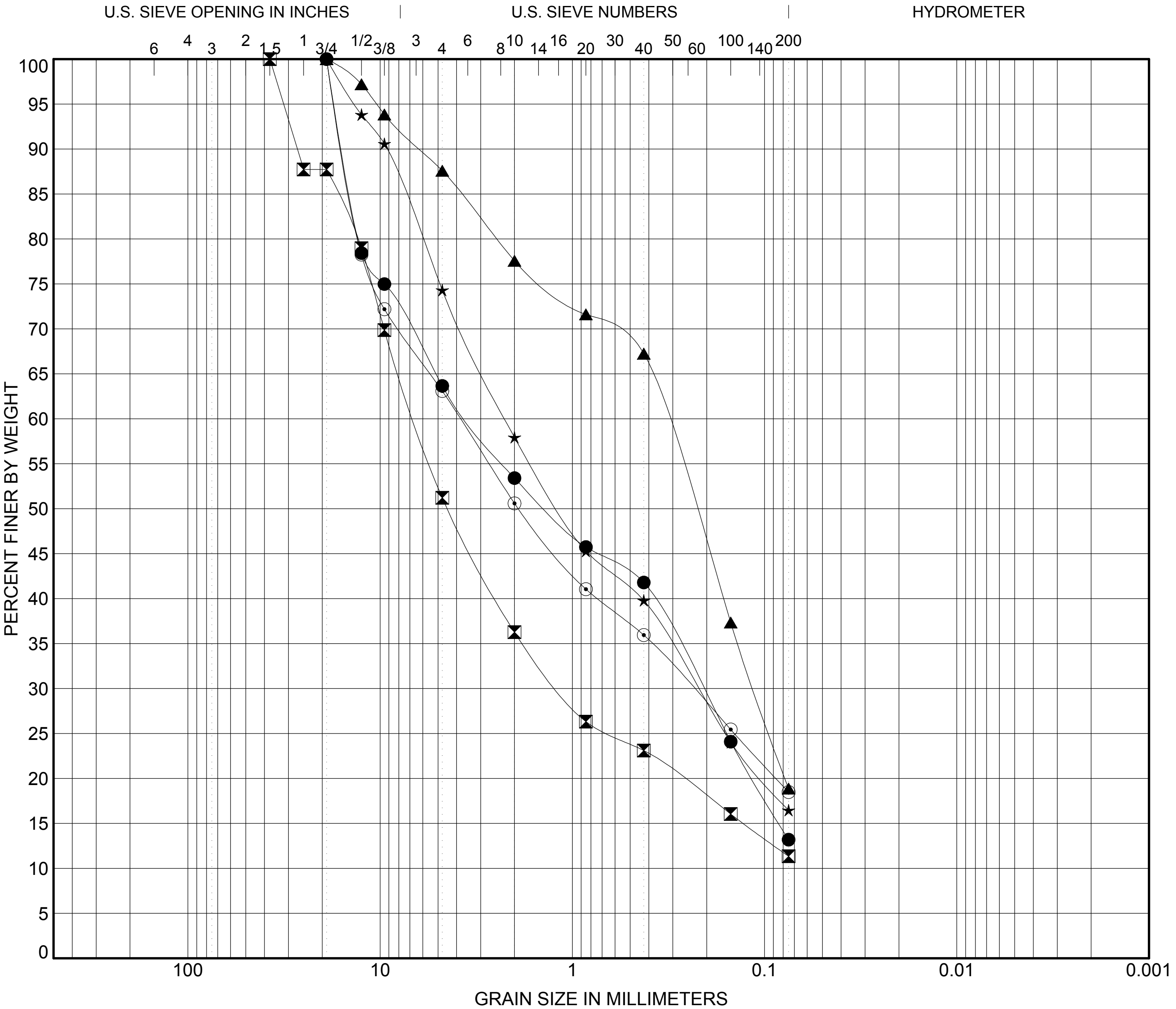
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.22



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**FB-05**	**1.5**	**SILTY SAND with GRAVEL (SM)**	**34**	**24**	**10**		
⧗	**FB-05**	**4.6**	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**	**40**	**18**	**22**	**3.36**	**107.02**
▲	**FB-05**	**10.7**	**SILTY SAND (SM)**	**NV**	**NV**	**NP**		
★	**FB-05**	**13.7**	**CLAYEY SAND with GRAVEL (SC)**	**26**	**17**	**9**		
⊙	**FB-05**	**16.8**	**CLAYEY SAND with GRAVEL (SC)**	**42**	**23**	**19**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**FB-05**	**1.5**	**19**	**3.489**	**0.212**		**4.7**	**36.3**	**50.5**	**13.2**	
⧗	**FB-05**	**4.6**	**37.5**	**6.585**	**1.166**		**12.5**	**48.8**	**39.9**	**11.3**	
▲	**FB-05**	**10.7**	**19**	**0.33**	**0.114**		**8.5**	**12.4**	**68.7**	**18.9**	
★	**FB-05**	**13.7**	**19**	**2.23**	**0.223**		**5.0**	**25.7**	**57.8**	**16.5**	
⊙	**FB-05**	**16.8**	**19**	**3.835**	**0.236**		**6.6**	**36.9**	**44.6**	**18.5**	

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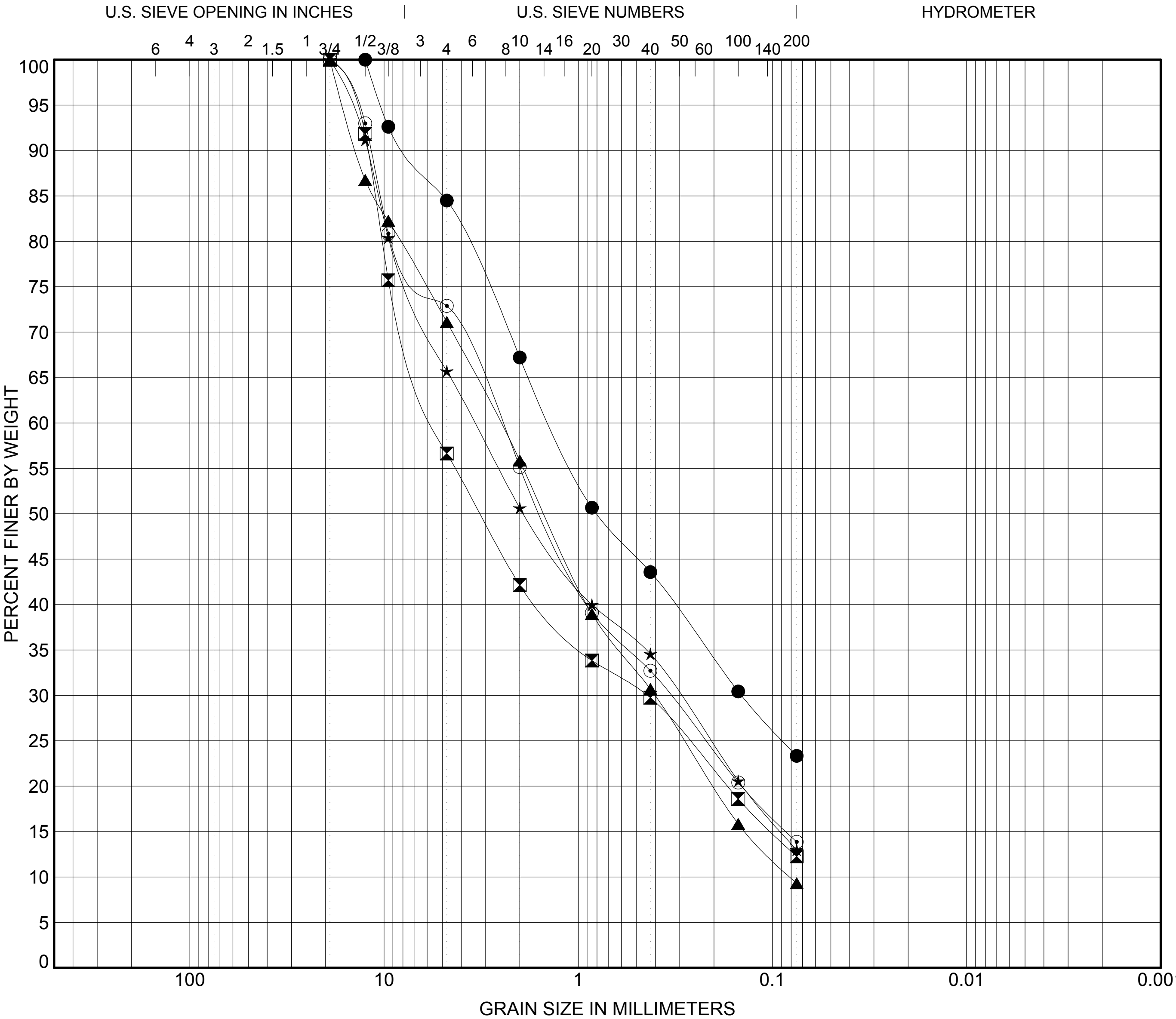
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.23



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**FB-05**	**22.9**	**CLAYEY SAND with GRAVEL (SC)**	**30**	**16**	**14**		
⧗	**FB-06**	**1.5**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**23**	**16**	**7**	**0.63**	**91.79**
▲	**FB-06**	**3.0**	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**	**NV**	**NV**	**NP**	**0.80**	**31.34**
★	**FB-06**	**4.6**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**25**	**18**	**7**		
⊙	**FB-06**	**6.1**	**CLAYEY SAND with GRAVEL (SC)**	**26**	**14**	**12**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**FB-05**	**22.9**	**12.5**	**1.378**	**0.144**		**8.1**	**15.5**	**61.2**	**23.3**	
⧗	**FB-06**	**1.5**	**19**	**5.369**	**0.444**		**5.2**	**43.4**	**44.4**	**12.3**	
▲	**FB-06**	**3.0**	**19**	**2.53**	**0.404**	**0.081**	**2.3**	**28.9**	**61.8**	**9.3**	
★	**FB-06**	**4.6**	**19**	**3.424**	**0.303**		**2.5**	**34.3**	**52.7**	**13.0**	
⊙	**FB-06**	**6.1**	**19**	**2.534**	**0.338**		**6.1**	**27.1**	**59.0**	**13.9**	

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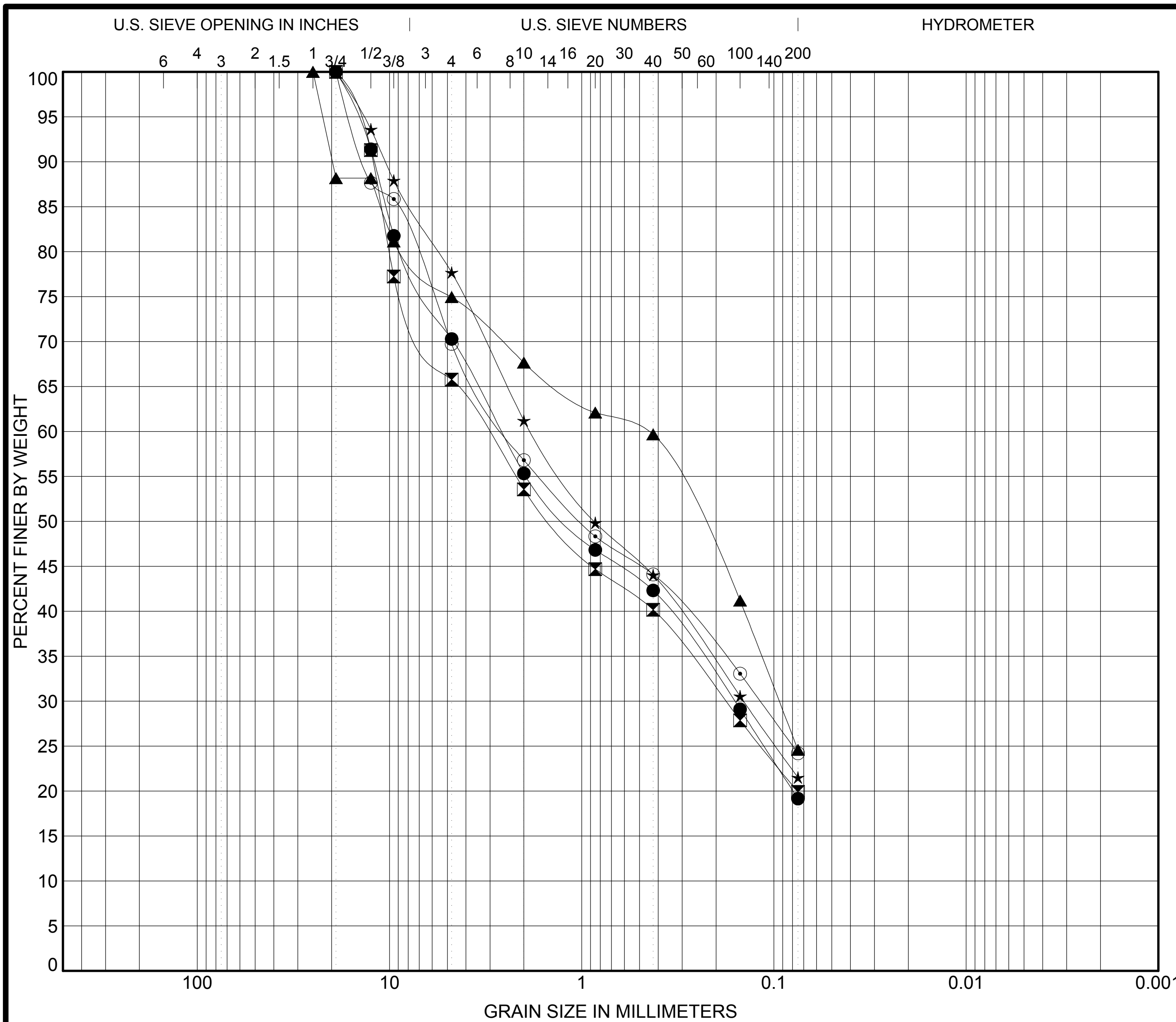
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.24



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**FB-06**	**7.6**	**CLAYEY SAND with GRAVEL (SC)**	**36**	**22**	**14**		
⧗	**FB-06**	**9.1**	**CLAYEY SAND with GRAVEL (SC)**	**30**	**17**	**13**		
▲	**FB-06**	**10.7**	**CLAYEY SAND with GRAVEL (SC)**	**36**	**21**	**15**		
★	**FB-06**	**13.7**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	**24**	**18**	**6**		
⊙	**FB-06**	**15.2**	**CLAYEY SAND with GRAVEL (SC)**	**39**	**18**	**21**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**FB-06**	**7.6**	**19**	**2.62**	**0.161**		**5.6**	**29.7**	**51.1**	**19.2**	
⧗	**FB-06**	**9.1**	**19**	**3.156**	**0.18**		**3.2**	**34.2**	**45.9**	**19.9**	
▲	**FB-06**	**10.7**	**25**	**0.467**	**0.094**		**6.2**	**25.1**	**50.4**	**24.6**	
★	**FB-06**	**13.7**	**19**	**1.826**	**0.144**		**4.4**	**22.3**	**56.2**	**21.5**	
⊙	**FB-06**	**15.2**	**19**	**2.476**	**0.118**		**11.4**	**30.3**	**45.5**	**24.2**	

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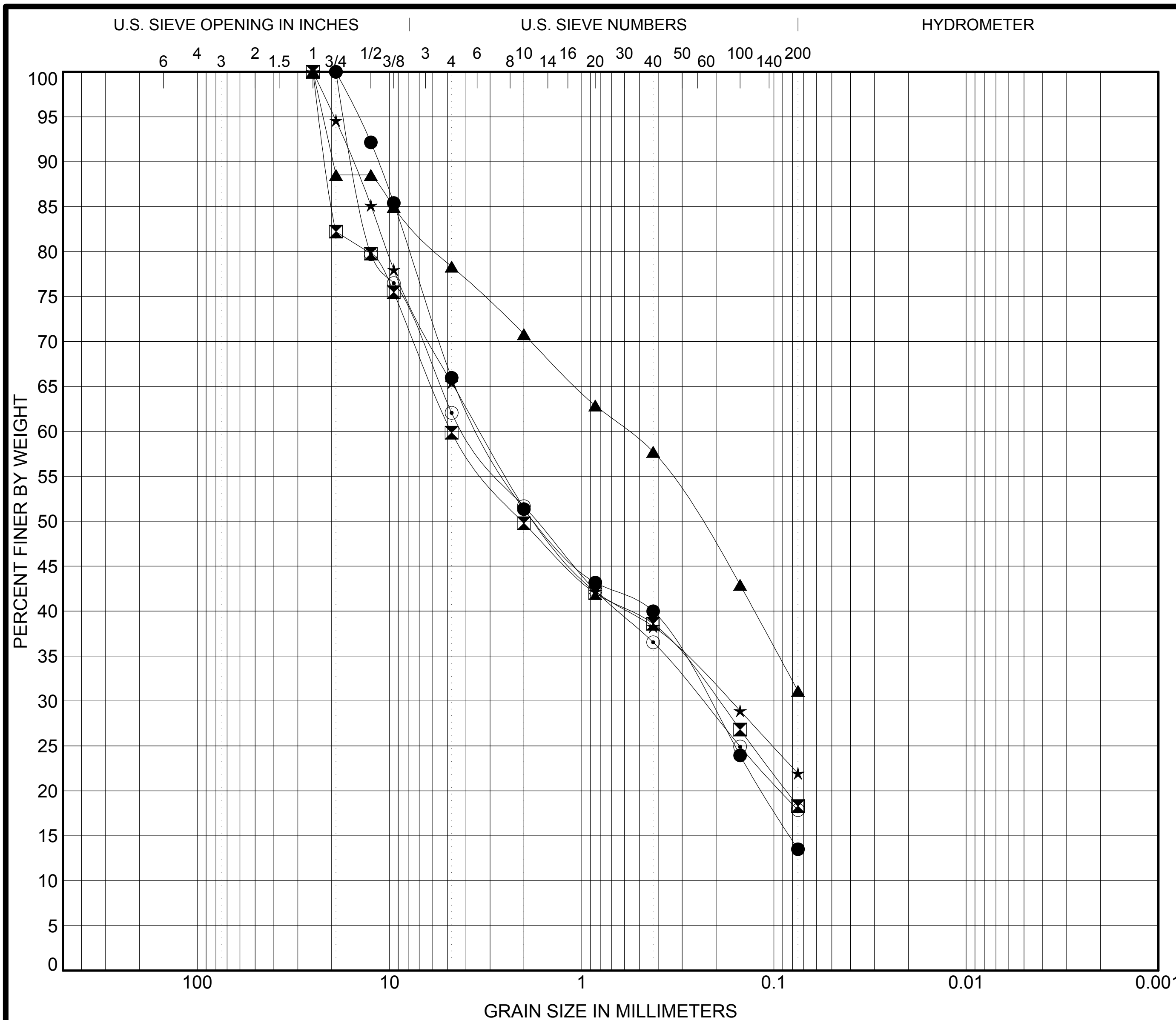
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	**FB-06**	**16.8**	**SILTY SAND with GRAVEL (SM)**	**37**	**30**	**7**		
⧗	**FB-06**	**19.8**	**CLAYEY SAND with GRAVEL (SC)**	**37**	**20**	**17**		
▲	**FB-06**	**22.9**	**CLAYEY SAND with GRAVEL (SC)**	**36**	**16**	**20**		
★	**FB-06**	**24.4**	**CLAYEY SAND with GRAVEL (SC)**	**32**	**22**	**10**		
⊙	**FB-07**	**1.5**	**CLAYEY SAND with GRAVEL (SC)**	**33**	**20**	**13**		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**FB-06**	**16.8**	**19**	**3.338**	**0.222**		**7.4**	**34.0**	**52.5**	**13.5**	
⧗	**FB-06**	**19.8**	**25**	**4.781**	**0.199**		**3.6**	**40.1**	**41.6**	**18.3**	
▲	**FB-06**	**22.9**	**25**	**0.577**			**3.2**	**21.7**	**47.2**	**31.1**	
★	**FB-06**	**24.4**	**25**	**3.392**	**0.169**		**7.6**	**34.6**	**43.5**	**21.9**	
⊙	**FB-07**	**1.5**	**19**	**4.002**	**0.237**		**2.7**	**37.9**	**44.2**	**17.9**	

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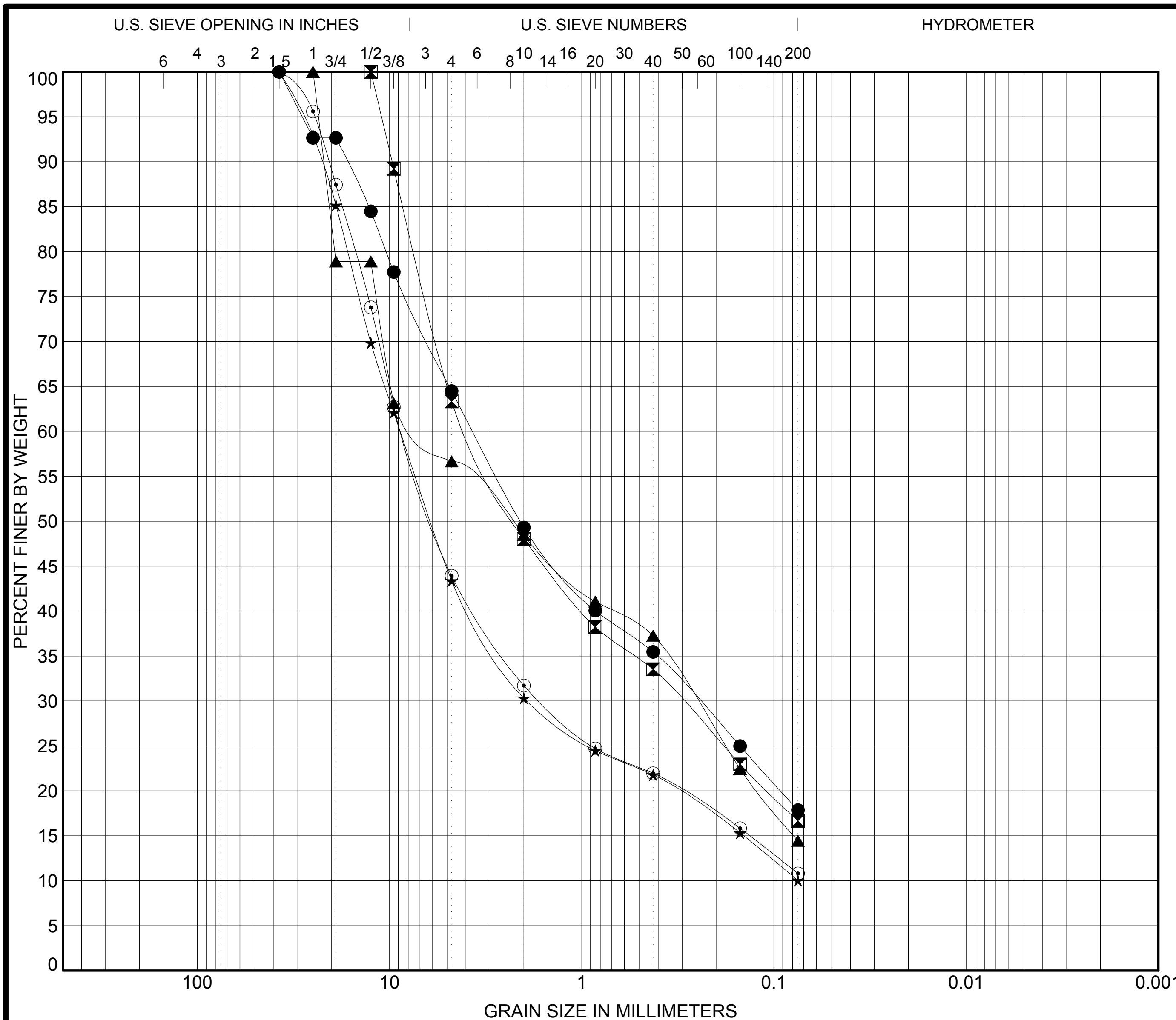
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.26



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

Specimen Identification			USCS Classification	LL	PL	PI	Cc	Cu
●	**FB-07**	**3.0**	**CLAYEY SAND with GRAVEL (SC)**	**46**	**25**	**21**		
⧗	**FB-07**	**4.6**	**CLAYEY SAND with GRAVEL (SC)**	**35**	**19**	**16**		
▲	**FB-07**	**6.1**	**CLAYEY GRAVEL with SAND (GC)**	**34**	**20**	**14**		
★	**FB-08**	**1.5**	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**	**27**	**16**	**11**	**5.56**	**117.72**
⊙	**FB-08**	**3.0**	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**	**27**	**16**	**11**	**4.56**	**128.02**

Specimen Identification			D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	**FB-07**	**3.0**	**37.5**	**3.679**	**0.247**		**4.8**	**35.5**	**46.6**	**17.9**	
⧗	**FB-07**	**4.6**	**12.5**	**3.934**	**0.3**		**2.9**	**36.7**	**46.7**	**16.7**	
▲	**FB-07**	**6.1**	**25**	**6.8**	**0.255**		**2.5**	**43.3**	**42.2**	**14.4**	
★	**FB-08**	**1.5**	**37.5**	**8.794**	**1.912**		**7.5**	**56.6**	**33.4**	**10.0**	
⊙	**FB-08**	**3.0**	**37.5**	**8.595**	**1.622**		**3.9**	**56.1**	**33.1**	**10.8**	

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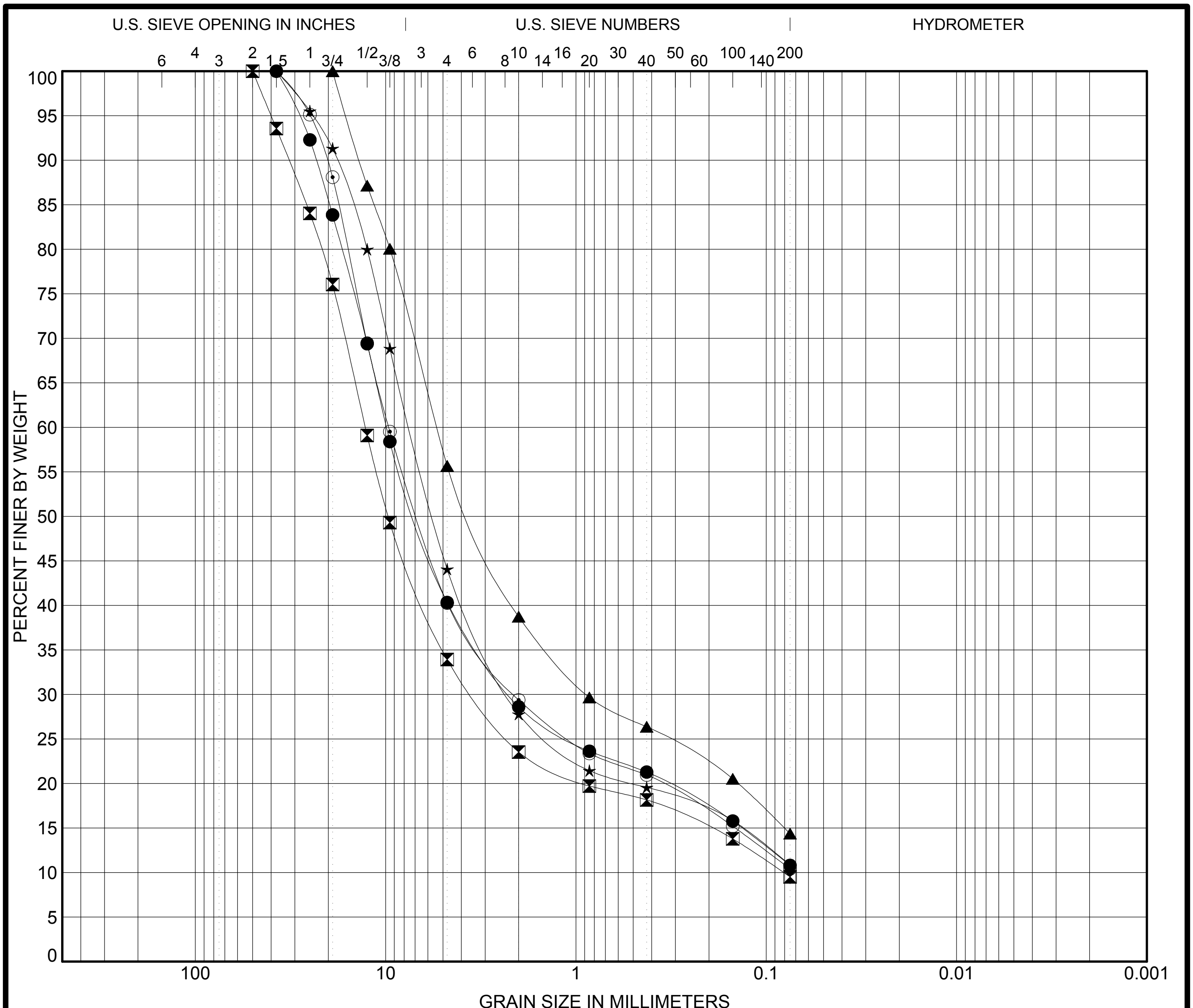
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.27

US_GRAIN_SIZE2_METRIC 0324017.GPJ US_LAB.GDT 12/12/2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	FB-08	6.1	POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)	22	15	7	7.40	147.40
⧗	FB-08	9.1	POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)	21	14	7	11.32	157.59
▲	FB-08	10.7	SILTY, CLAYEY GRAVEL with SAND (GC-GM)	19	13	6		
★	FB-08	12.2	POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)	19	13	6	10.22	111.07
⊙	FB-09	1.5	POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)	26	17	9	6.50	136.38

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt / %Clay
●	FB-08	6.1	37.5	9.888	2.216		6.0	59.7	29.5	10.8
⧗	FB-08	9.1	50	12.786	3.426	0.081	4.9	66.1	24.4	9.5
▲	FB-08	10.7	19	5.371	0.878		3.1	44.3	41.3	14.4
★	FB-08	12.2	37.5	7.416	2.249		2.7	55.9	33.2	10.8
⊙	FB-09	1.5	37.5	9.627	2.101		7.5	59.7	29.8	10.4

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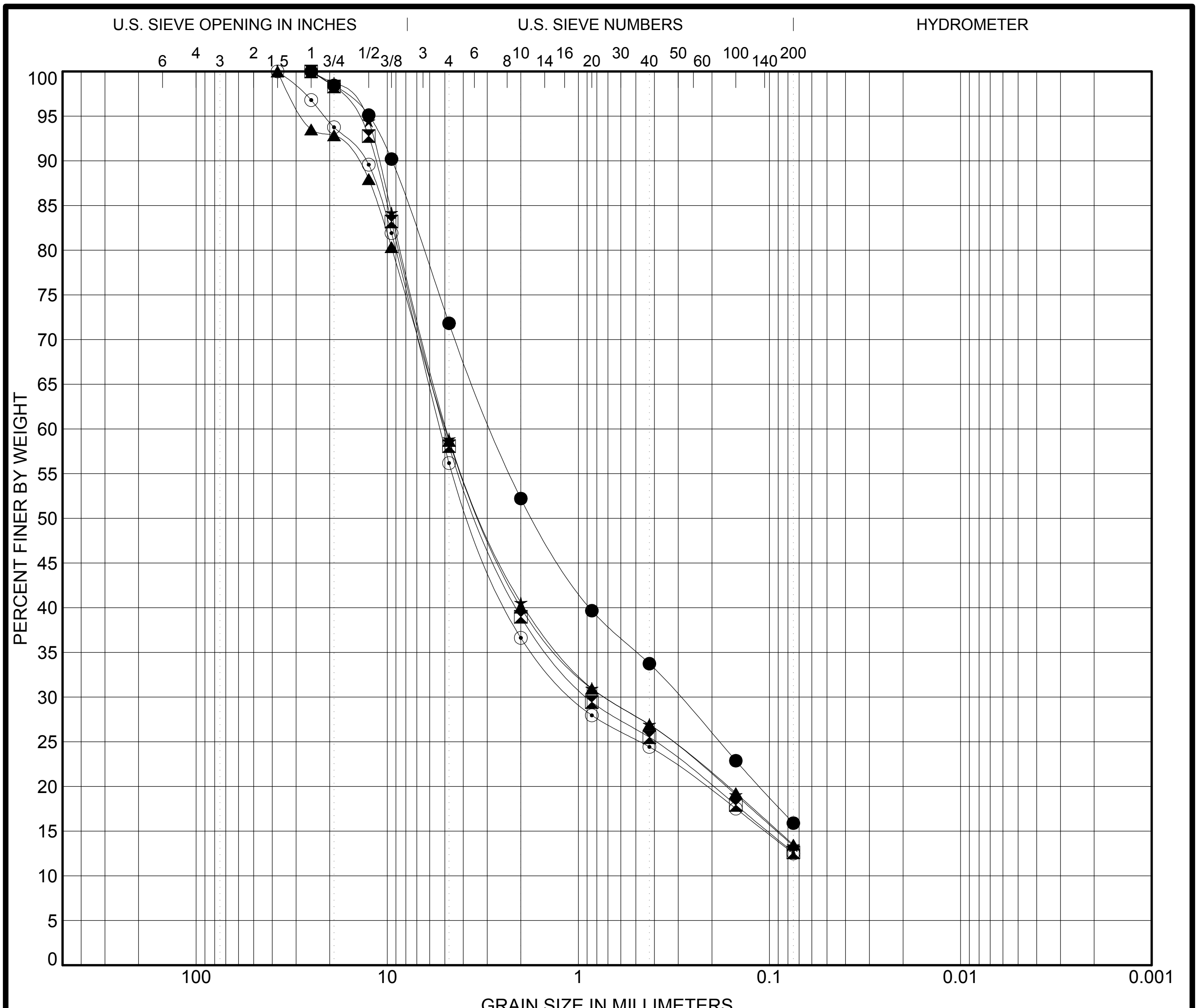
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.28



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	FB-09	3.0	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	19	15	4		
⧗	FB-09	4.6	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	19	13	6		
▲	FB-09	6.1	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	20	15	5		
★	FB-09	7.6	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**	21	15	6		
⊙	FB-09	9.1	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**	19	14	5		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt / %Clay
●	FB-09	3.0	25	2.82	0.297		2.9	28.2	55.9	15.9
⧗	FB-09	4.6	25	5.01	0.894		1.9	41.9	45.4	12.6
▲	FB-09	6.1	37.5	4.959	0.725		3.4	41.3	45.2	13.5
★	FB-09	7.6	25	4.899	0.72		3.4	41.1	45.5	13.4
⊙	FB-09	9.1	37.5	5.265	1.04		2.2	43.8	43.7	12.5

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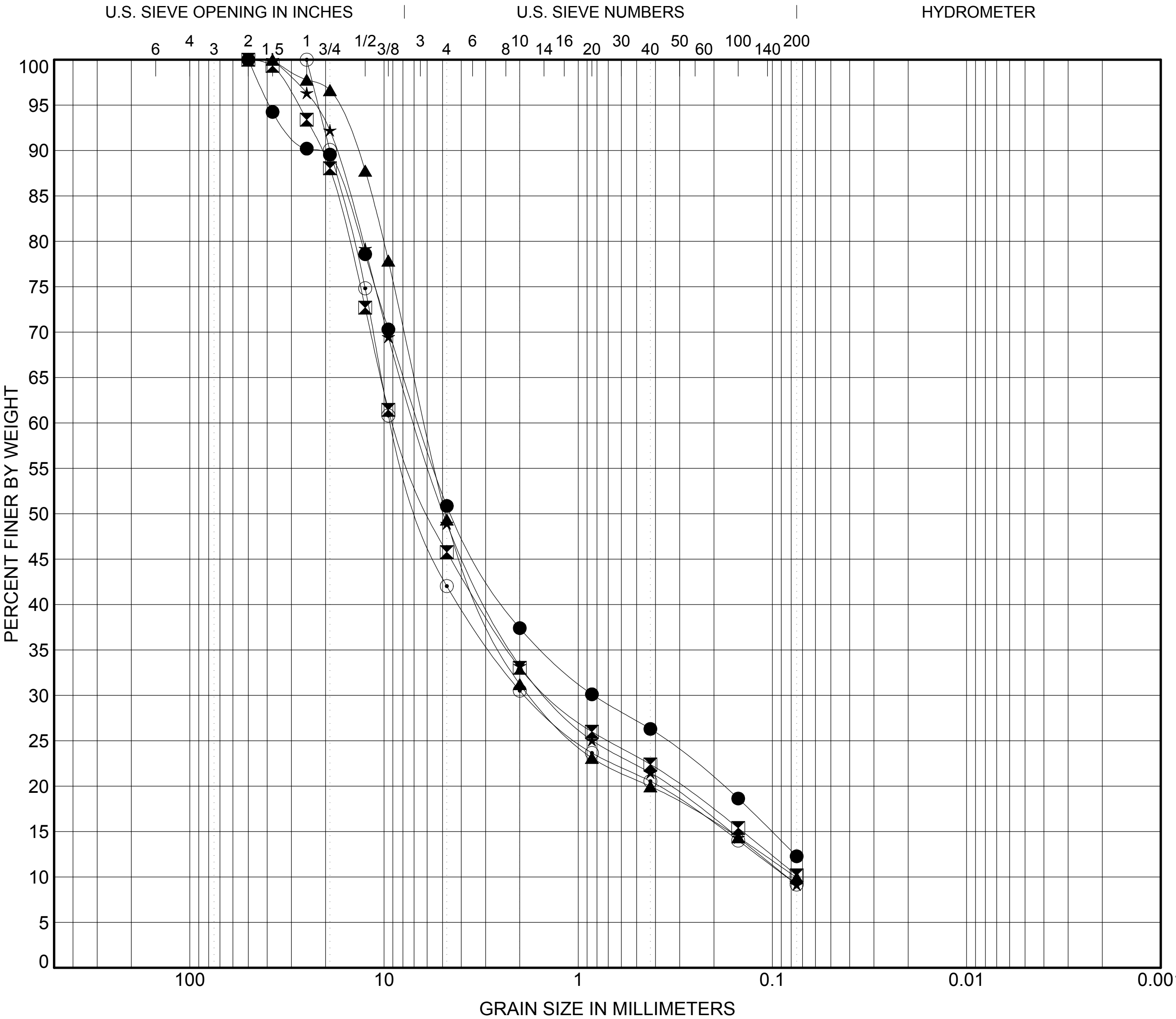
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.29



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	FB-10	1.5	SILTY, CLAYEY GRAVEL with SAND (GC-GM)	19	15	4	1.80	112.45
⧗	FB-10	3.0	WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)	19	14	5	2.94	121.80
▲	FB-10	4.6	POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)	21	15	6	6.60	81.09
★	FB-10	6.1	POORLY GRADED GRAVEL with SILT and SAND (GP-GM)	NV	NV	NP	3.50	82.13
⊙	FB-10	7.6	POORLY GRADED GRAVEL with SILT and SAND (GP-GM)	NV	NV	NP	4.52	109.15

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	FB-10	1.5	50	6.581	0.833		4.8	49.1	38.6	12.3	
⧗	FB-10	3.0	50	8.914	1.384		2.0	54.2	35.6	10.2	
▲	FB-10	4.6	37.5	6.152	1.755	0.076	2.0	50.6	39.4	9.9	
★	FB-10	6.1	37.5	6.902	1.425	0.084	2.5	51.1	39.8	9.1	
⊙	FB-10	7.6	25	9.215	1.875	0.084	2.4	58.0	32.9	9.2	

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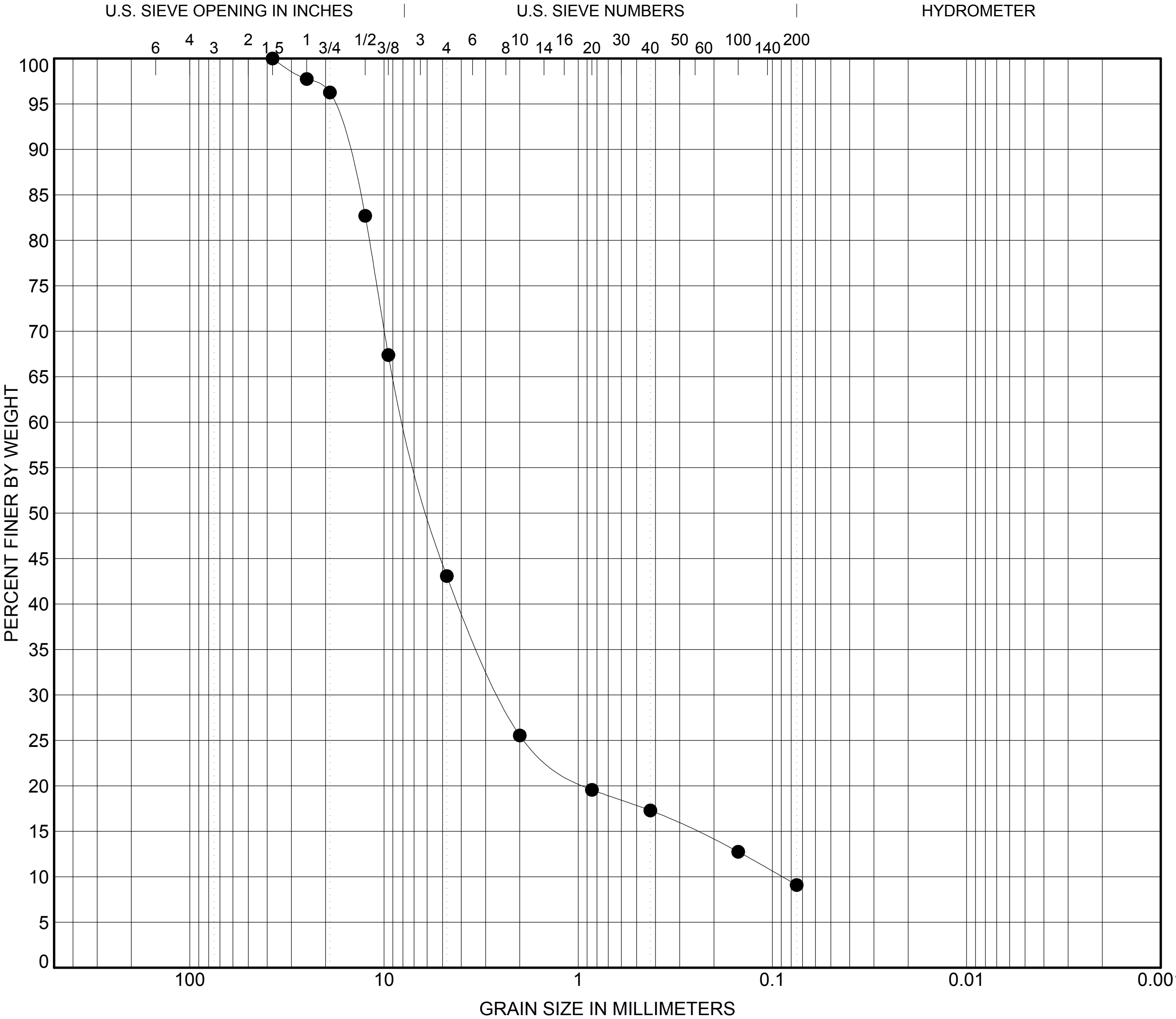
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.30



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Note: NV - No Value, NP - Non Plastic, sample depth in meters.

Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
● FB-10	9.1	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**	**23**	**15**	**8**	**9.06**	**86.41**

Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
● FB-10	9.1	**37.5**	**7.696**	**2.492**	**0.089**	**3.0**	**56.9**	**34.0**	**9.1**	

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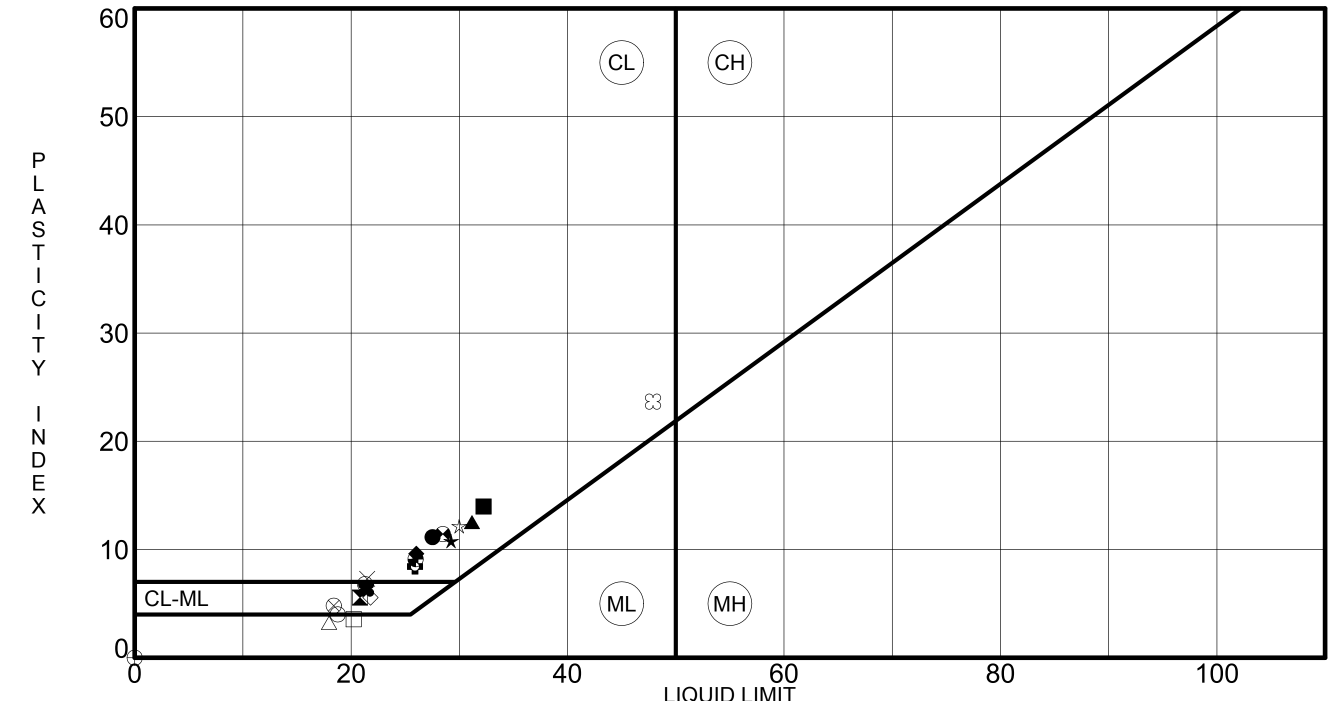
GRAIN SIZE DISTRIBUTION

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.31

US_GRAIN_SIZE2_METRIC 0324017.GPJ US_LAB.GDT 12/12/2007



Note: NV - No Value, NP - Non Plastic, and Specimen Depth in Meters.

	Specimen Identification		LL	PL	PI	Fines	USCS Classification
●	B-01	1.9	28	16	12	10	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**
⧗	B-01	6.5	21	15	6	8	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**
▲	B-01	7.7	31	19	12	21	**CLAYEY SAND with GRAVEL (SC)**
★	B-01	9.9	29	18	11	17	**CLAYEY SAND with GRAVEL (SC)**
⊙	B-01	12.6	21	14	7	13	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**
✿	B-01	16.0	26	17	9	19	**CLAYEY SAND with GRAVEL (SC)**
○	B-01	18.7	19	15	4	12	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
△	B-01	21.7	18	15	3	11	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**
⊗	B-01	24.8	18	14	4	11	**WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)**
⊕	B-01	29.3	NV	NV	NP	12	**WELL-GRADED SAND with SILT and GRAVEL (SW-SM)**
□	B-02	1.9	20	17	3	10	**WELL-GRADED SAND with SILT and GRAVEL (SW-SM)**
☢	B-02	3.4	28	17	11	13	**CLAYEY GRAVEL with SAND (GC)**
◕	B-02	5.0	26	17	9	4	**POORLY GRADED GRAVEL with SAND (GP)**
☆	B-02	6.5	30	18	12	17	**CLAYEY SAND with GRAVEL (SC)**
❀	B-02	7.7	48	24	24	18	**CLAYEY SAND with GRAVEL (SC)**
■	B-02	11.0	32	18	14	14	**CLAYEY SAND with GRAVEL (SC)**
◆	B-02	13.7	26	16	10	20	**CLAYEY SAND with GRAVEL (SC)**
◇	B-02	15.6	22	16	6	11	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**
×	B-02	16.8	21	14	7	22	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
✖	B-02	21.3	21	15	6	19	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**

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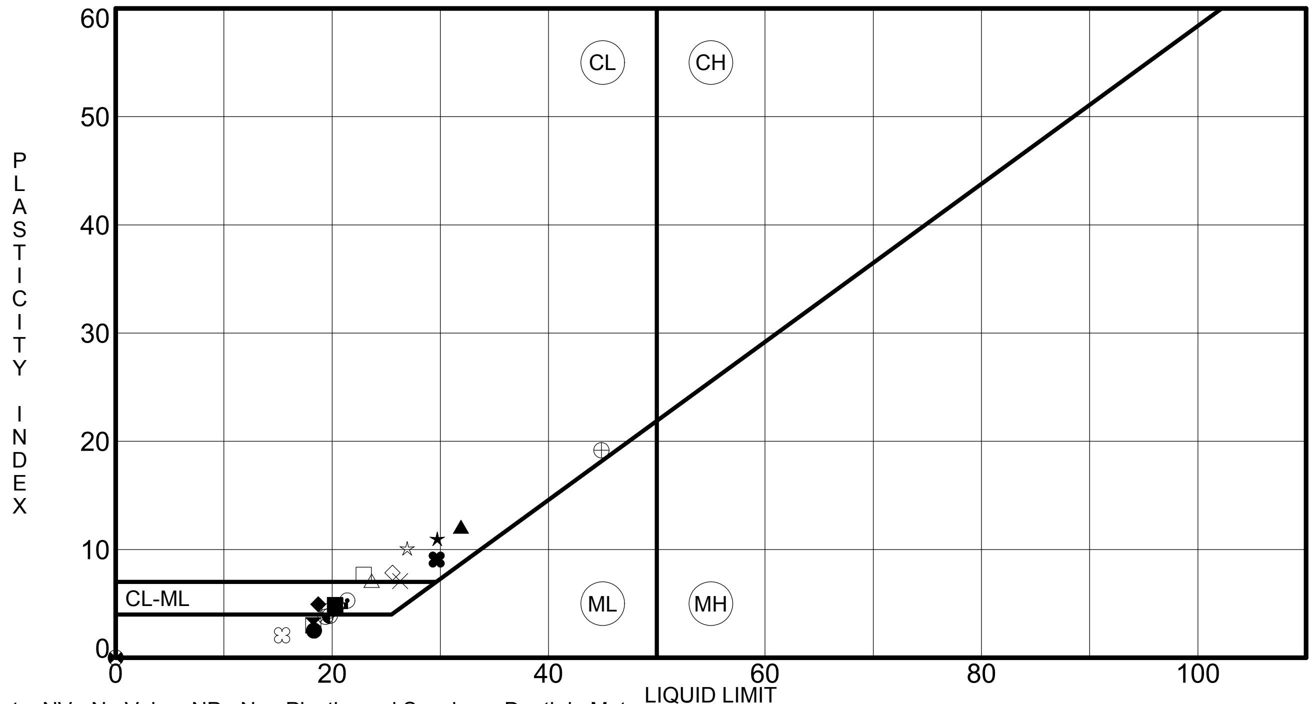
ATTERBERG LIMITS RESULTS

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.32



Note: NV - No Value, NP - Non Plastic, and Specimen Depth in Meters.

Specimen Identification		LL	PL	PI	Fines	USCS Classification
● B-04	1.9	18	16	2	10	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**
⧗ B-04	3.4	18	15	3	9	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**
▲ B-04	7.7	32	20	12	18	**CLAYEY SAND with GRAVEL (SC)**
★ B-04	10.7	30	19	11	19	**CLAYEY SAND with GRAVEL (SC)**
⊙ B-07	1.1	21	16	5	11	**WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)**
✿ B-07	2.6	21	16	5	11	**POORLY GRADED SAND with SILTY CLAY and GRAVEL (SP-SC)**
○ B-07	4.1	20	15	5	14	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
△ B-07	5.6	24	17	7	13	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**
⊗ B-07	11.7	19	16	3	16	**SILTY SAND with GRAVEL (SM)**
⊕ B-07	14.8	45	26	19	22	**CLAYEY SAND with GRAVEL (SC)**
□ B-07	18.4	23	15	8	14	**CLAYEY SAND with GRAVEL (SC)**
B-07	23.9	NV	NV	NP	15	**SILTY SAND with GRAVEL (SM)**
B-08	1.1	20	16	4	14	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**
☆ B-08	4.1	27	17	10	14	**CLAYEY GRAVEL with SAND (GC)**
B-08	5.6	15	13	2	14	**SILTY GRAVEL with SAND (GM)**
■ B-08	7.2	20	15	5	18	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
◆ B-08	8.7	19	14	5	18	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**
◇ B-08	20.9	26	18	8	14	**CLAYEY SAND with GRAVEL (SC)**
× B-09	1.1	26	19	7	11	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**
✖ B-09	2.6	30	21	9	11	**WELL-GRADED GRAVEL with CLAY and SAND (GW-GC)**

US_ATTERBERG_LIMITS_METRIC 0324017.GPJ US_LAB.GDT 12/12/2007

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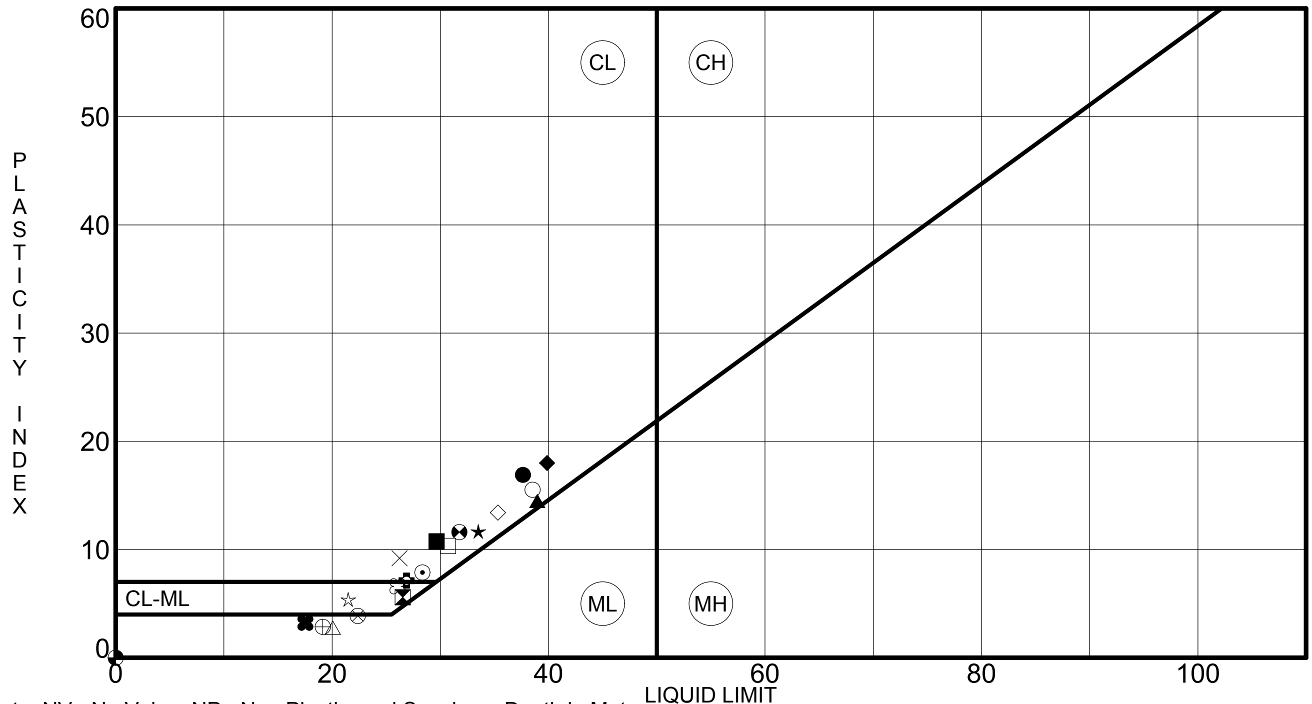
ATTERBERG LIMITS RESULTS

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.33



Note: NV - No Value, NP - Non Plastic, and Specimen Depth in Meters.

	Specimen Identification		LL	PL	PI	Fines	USCS Classification
●	B-09	4.1	38	21	17	14	CLAYEY SAND with GRAVEL (SC)
⧗	B-09	5.6	27	21	6	13	SILTY, CLAYEY SAND with GRAVEL (SC-SM)
▲	B-09	7.2	39	24	15	17	CLAYEY SAND with GRAVEL (SC)
★	B-09	10.2	34	22	12	21	CLAYEY SAND with GRAVEL (SC)
⊙	B-09	14.8	28	20	8	12	WELL-GRADED SAND with CLAY and GRAVEL (SW-SC)
✪	B-10	1.1	27	20	7	14	SILTY, CLAYEY SAND with GRAVEL (SC-SM)
○	B-10	2.6	39	23	16	9	WELL-GRADED SAND with CLAY and GRAVEL (SW-SC)
△	B-10	4.1	20	17	3	10	WELL-GRADED GRAVEL with SILT and SAND (GW-GM)
⊗	B-10	5.6	22	18	4	10	WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)
⊕	B-10	7.2	19	16	3	10	POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
□	B-10	17.8	31	20	11	16	CLAYEY SAND with GRAVEL (SC)
⊛	B-10	22.4	32	20	12	13	CLAYEY SAND with GRAVEL (SC)
◕	B-11	1.1	NV	NV	NP	6	POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
☆	B-11	2.6	21	16	5	11	WELL-GRADED SAND with SILTY CLAY and GRAVEL (SW-SC)
✿	B-11	4.1	26	19	7	10	POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)
■	B-11	5.6	30	19	11	12	WELL-GRADED SAND with CLAY and GRAVEL (SW-SC)
◆	B-11	7.2	40	22	18	21	CLAYEY SAND with GRAVEL (SC)
◇	B-11	8.7	35	22	13	18	CLAYEY SAND with GRAVEL (SC)
×	B-11	14.8	26	17	9	14	CLAYEY SAND with GRAVEL (SC)
✖	B-11	20.9	18	14	4	16	SILTY, CLAYEY GRAVEL with SAND (GC-GM)

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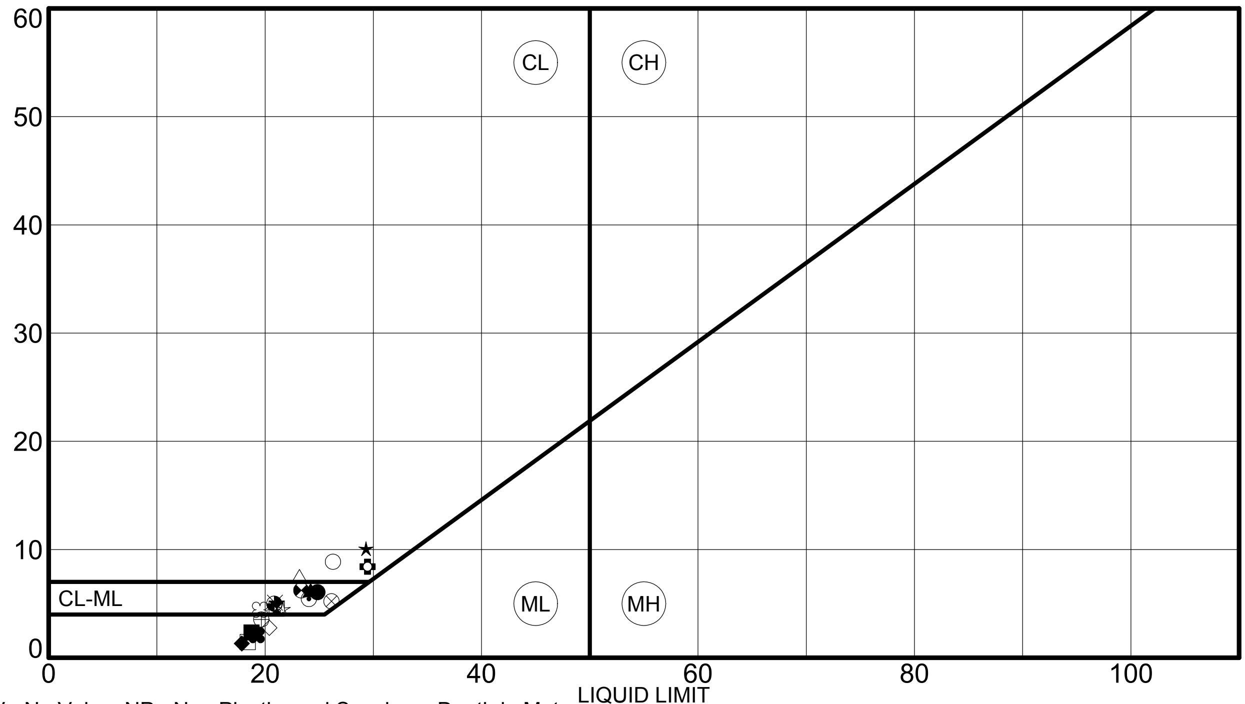
ATTERBERG LIMITS RESULTS

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.34



Note: NV - No Value, NP - Non Plastic, and Specimen Depth in Meters.

	Specimen Identification		LL	PL	PI	Fines	USCS Classification
●	**B-11**	**22.4**	**25**	**19**	**6**	**23**	**SILTY, CLAYEY SAND (SC-SM)**
⧗	**B-13**	**1.1**	**21**	**17**	**4**	**15**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
▲	**B-13**	**2.6**	**24**	**18**	**6**	**13**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
★	**B-13**	**4.1**	**29**	**19**	**10**	**15**	**CLAYEY SAND with GRAVEL (SC)**
⊙	**B-13**	**5.6**	**24**	**19**	**5**	**14**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
✿	**B-13**	**7.2**	**29**	**21**	**8**	**19**	**CLAYEY GRAVEL with SAND (GC)**
○	**B-13**	**8.7**	**26**	**17**	**9**	**15**	**CLAYEY GRAVEL with SAND (GC)**
△	**B-13**	**11.7**	**23**	**16**	**7**	**17**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
⊗	**B-13**	**14.8**	**26**	**21**	**5**	**13**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
⊕	**B-18**	**0.9**	**20**	**16**	**4**	**16**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
□	**B-18**	**1.7**	**18**	**17**	**1**	**9**	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**
◉	**B-18**	**3.0**	**23**	**17**	**6**	**13**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
◕	**B-18**	**4.7**	**21**	**16**	**5**	**9**	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**
☆	**B-18**	**6.1**	**22**	**17**	**5**	**10**	**WELL-GRADED SAND with SILTY CLAY and GRAVEL (SW-SC)**
✾	**B-18**	**7.0**	**20**	**15**	**5**	**10**	**POORLY GRADED SAND with SILTY CLAY and GRAVEL (SP-SC)**
■	**B-19**	**0.9**	**19**	**16**	**3**	**15**	**SILTY SAND with GRAVEL (SM)**
◆	**B-19**	**1.7**	**18**	**17**	**1**	**11**	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**
◇	**B-19**	**3.0**	**20**	**18**	**2**	**9**	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**
×	**B-19**	**4.6**	**21**	**16**	**5**	**11**	**WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)**
✖	**B-19**	**6.1**	**19**	**17**	**2**	**10**	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**

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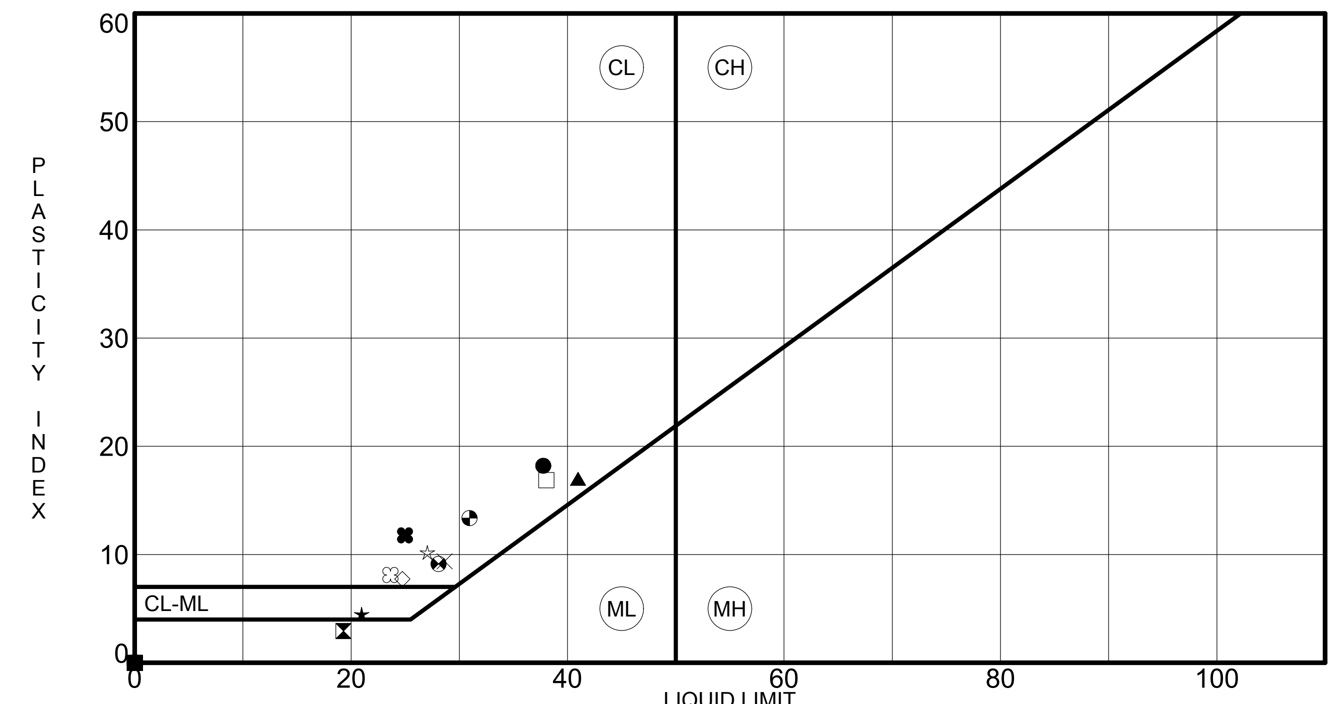
ATTERBERG LIMITS RESULTS

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.35



Note: NV - No Value, NP - Non Plastic, and Specimen Depth in Meters.

Specimen Identification		LL	PL	PI	Fines	USCS Classification
B-19	7.6	38	20	18	13	**CLAYEY SAND with GRAVEL (SC)**
B-19	9.1	19	16	3	9	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**
B-19	10.7	41	24	17	13	**CLAYEY SAND with GRAVEL (SC)**
B-19	13.7	21	16	5	10	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**
FB-01	1.5	NV	NV	NP	14	**SILTY SAND with GRAVEL (SM)**
FB-01	4.6	NV	NV	NP	15	**SILTY SAND (SM)**
FB-02	1.5	NV	NV	NP	20	**SILTY SAND with GRAVEL (SM)**
FB-02	3.0	NV	NV	NP	14	**SILTY SAND with GRAVEL (SM)**
FB-02	4.6	NV	NV	NP	9	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**
FB-03	1.5	NV	NV	NP	9	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**
FB-03	3.0	38	21	17	14	**CLAYEY SAND with GRAVEL (SC)**
FB-03	4.6	28	19	9	16	**CLAYEY SAND with GRAVEL (SC)**
FB-03	6.1	31	18	13	15	**CLAYEY SAND with GRAVEL (SC)**
FB-03	10.7	27	17	10	22	**CLAYEY SAND with GRAVEL (SC)**
FB-03	12.2	24	16	8	17	**CLAYEY SAND with GRAVEL (SC)**
FB-03	15.2	NV	NV	NP	13	**SILTY SAND with GRAVEL (SM)**
FB-03	16.8	NV	NV	NP	13	**SILTY SAND with GRAVEL (SM)**
FB-03	21.3	25	17	8	23	**CLAYEY SAND with GRAVEL (SC)**
FB-03	22.9	29	19	10	19	**CLAYEY SAND with GRAVEL (SC)**
FB-03	24.4	25	13	12	20	**CLAYEY SAND with GRAVEL (SC)**

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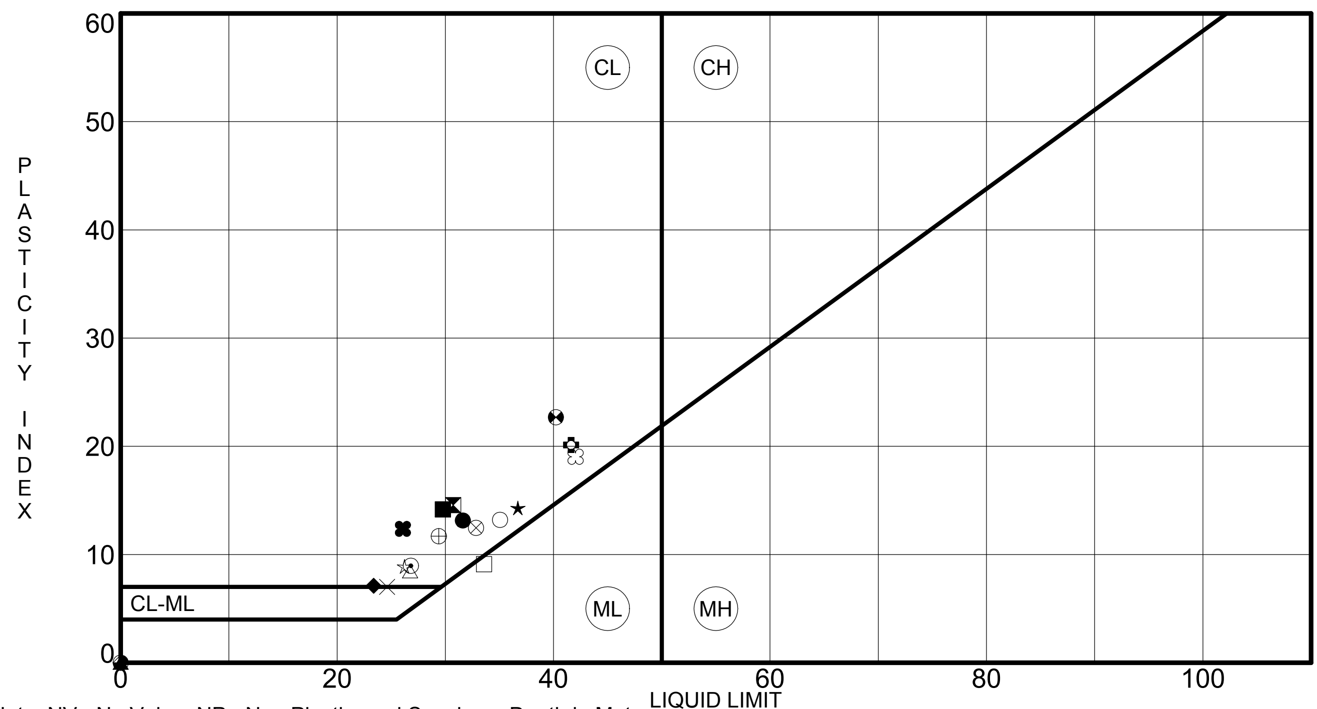
ATTERBERG LIMITS RESULTS

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.36



Note: NV - No Value, NP - Non Plastic, and Specimen Depth in Meters.

	Specimen Identification		LL	PL	PI	Fines	USCS Classification
●	**FB-04**	**1.5**	**32**	**18**	**14**	**20**	**CLAYEY SAND with GRAVEL (SC)**
⧗	**FB-04**	**1.8**	**31**	**16**	**15**	**2**	**WELL-GRADED GRAVEL (GW)**
▲	**FB-04**	**3.0**	**NV**	**NV**	**NP**	**6**	**WELL-GRADED GRAVEL with SILT and SAND (GW-GM)**
★	**FB-04**	**4.6**	**37**	**22**	**15**	**17**	**CLAYEY SAND with GRAVEL (SC)**
⊙	**FB-04**	**6.1**	**27**	**18**	**9**	**12**	**CLAYEY SAND with GRAVEL (SC)**
✿	**FB-04**	**9.1**	**42**	**21**	**21**	**19**	**CLAYEY SAND with GRAVEL (SC)**
○	**FB-04**	**10.7**	**35**	**22**	**13**	**18**	**CLAYEY SAND with GRAVEL (SC)**
△	**FB-04**	**15.2**	**27**	**18**	**9**	**16**	**CLAYEY SAND with GRAVEL (SC)**
⊗	**FB-04**	**22.9**	**33**	**20**	**13**	**16**	**CLAYEY SAND with GRAVEL (SC)**
⊕	**FB-04**	**24.4**	**29**	**18**	**11**	**15**	**CLAYEY GRAVEL with SAND (GC)**
□	**FB-05**	**1.5**	**34**	**24**	**10**	**13**	**SILTY SAND with GRAVEL (SM)**
◉	**FB-05**	**4.6**	**40**	**18**	**22**	**11**	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**
◕	**FB-05**	**10.7**	**NV**	**NV**	**NP**	**19**	**SILTY SAND (SM)**
☆	**FB-05**	**13.7**	**26**	**17**	**9**	**16**	**CLAYEY SAND with GRAVEL (SC)**
✣	**FB-05**	**16.8**	**42**	**23**	**19**	**18**	**CLAYEY SAND with GRAVEL (SC)**
■	**FB-05**	**22.9**	**30**	**16**	**14**	**23**	**CLAYEY SAND with GRAVEL (SC)**
◆	**FB-06**	**1.5**	**23**	**16**	**7**	**12**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
◇	**FB-06**	**3.0**	**NV**	**NV**	**NP**	**9**	**POORLY GRADED SAND with SILT and GRAVEL (SP-SM)**
×	**FB-06**	**4.6**	**25**	**18**	**7**	**13**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
✖	**FB-06**	**6.1**	**26**	**14**	**12**	**14**	**CLAYEY SAND with GRAVEL (SC)**

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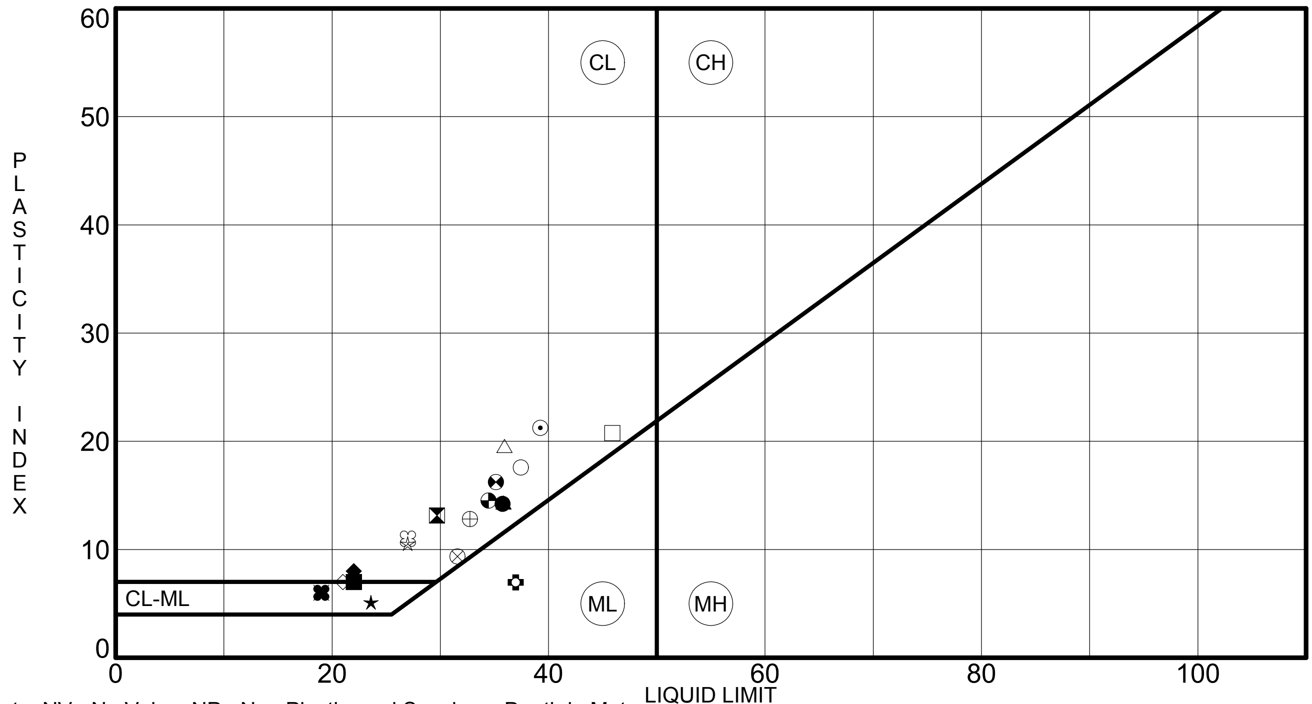
ATTERBERG LIMITS RESULTS

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.37



Note: NV - No Value, NP - Non Plastic, and Specimen Depth in Meters.

Specimen Identification		LL	PL	PI	Fines	USCS Classification
● FB-06	7.6	36	22	14	19	**CLAYEY SAND with GRAVEL (SC)**
FB-06	9.1	30	17	13	20	**CLAYEY SAND with GRAVEL (SC)**
▲ FB-06	10.7	36	21	15	25	**CLAYEY SAND with GRAVEL (SC)**
★ FB-06	13.7	24	18	6	22	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
⊙ FB-06	15.2	39	18	21	24	**CLAYEY SAND with GRAVEL (SC)**
FB-06	16.8	37	30	7	14	**SILTY SAND with GRAVEL (SM)**
○ FB-06	19.8	37	20	17	18	**CLAYEY SAND with GRAVEL (SC)**
△ FB-06	22.9	36	16	20	31	**CLAYEY SAND with GRAVEL (SC)**
⊗ FB-06	24.4	32	22	10	22	**CLAYEY SAND with GRAVEL (SC)**
⊕ FB-07	1.5	33	20	13	18	**CLAYEY SAND with GRAVEL (SC)**
□ FB-07	3.0	46	25	21	18	**CLAYEY SAND with GRAVEL (SC)**
FB-07	4.6	35	19	16	17	**CLAYEY SAND with GRAVEL (SC)**
FB-07	6.1	34	20	14	14	**CLAYEY GRAVEL with SAND (GC)**
☆ FB-08	1.5	27	16	11	10	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**
FB-08	3.0	27	16	11	11	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**
■ FB-08	6.1	22	15	7	11	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**
◆ FB-08	7.6	22	14	8		**()**
◇ FB-08	9.1	21	14	7	10	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**
× FB-08	10.7	19	13	6	14	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**
✖ FB-08	12.2	19	13	6	11	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**

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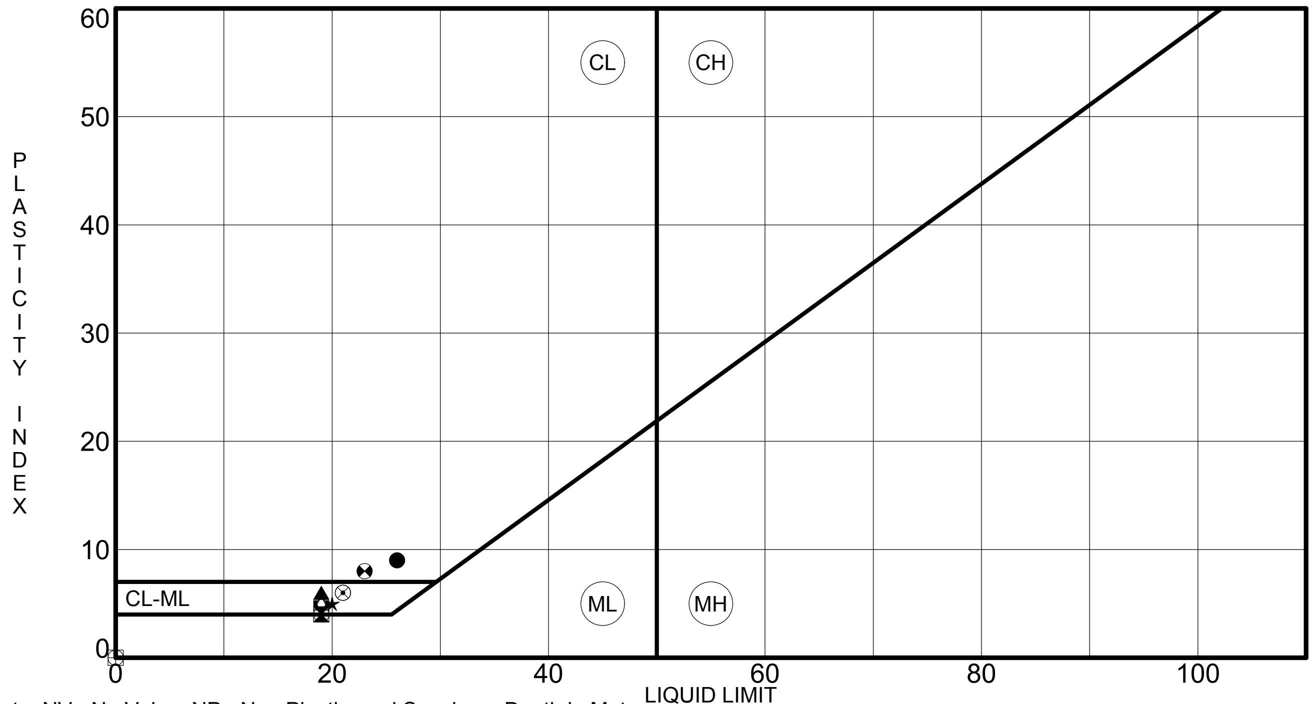
ATTERBERG LIMITS RESULTS

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

Project Number: 0324-01-7 Plate Number: C-1.38



Note: NV - No Value, NP - Non Plastic, and Specimen Depth in Meters.

	Specimen Identification		LL	PL	PI	Fines	USCS Classification
●	**FB-09**	**1.5**	**26**	**17**	**9**	**10**	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**
⧗	**FB-09**	**3.0**	**19**	**15**	**4**	**16**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
▲	**FB-09**	**4.6**	**19**	**13**	**6**	**13**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
★	**FB-09**	**6.1**	**20**	**15**	**5**	**13**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
⊙	**FB-09**	**7.6**	**21**	**15**	**6**	**13**	**SILTY, CLAYEY SAND with GRAVEL (SC-SM)**
✿	**FB-09**	**9.1**	**19**	**14**	**5**	**13**	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**
○	**FB-10**	**1.5**	**19**	**15**	**4**	**12**	**SILTY, CLAYEY GRAVEL with SAND (GC-GM)**
△	**FB-10**	**3.0**	**19**	**14**	**5**	**10**	**WELL-GRADED GRAVEL with SILTY CLAY and SAND (GW-GC)**
⊗	**FB-10**	**4.6**	**21**	**15**	**6**	**10**	**POORLY GRADED GRAVEL with SILTY CLAY and SAND (GP-GC)**
⊕	**FB-10**	**6.1**	**NV**	**NV**	**NP**	**9**	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**
□	**FB-10**	**7.6**	**NV**	**NV**	**NP**	**9**	**POORLY GRADED GRAVEL with SILT and SAND (GP-GM)**
⊛	**FB-10**	**9.1**	**23**	**15**	**8**	**9**	**POORLY GRADED GRAVEL with CLAY and SAND (GP-GC)**

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ATTERBERG LIMITS RESULTS

Project: Summerlin HOV Flyover

Location: Las Vegas, Nevada

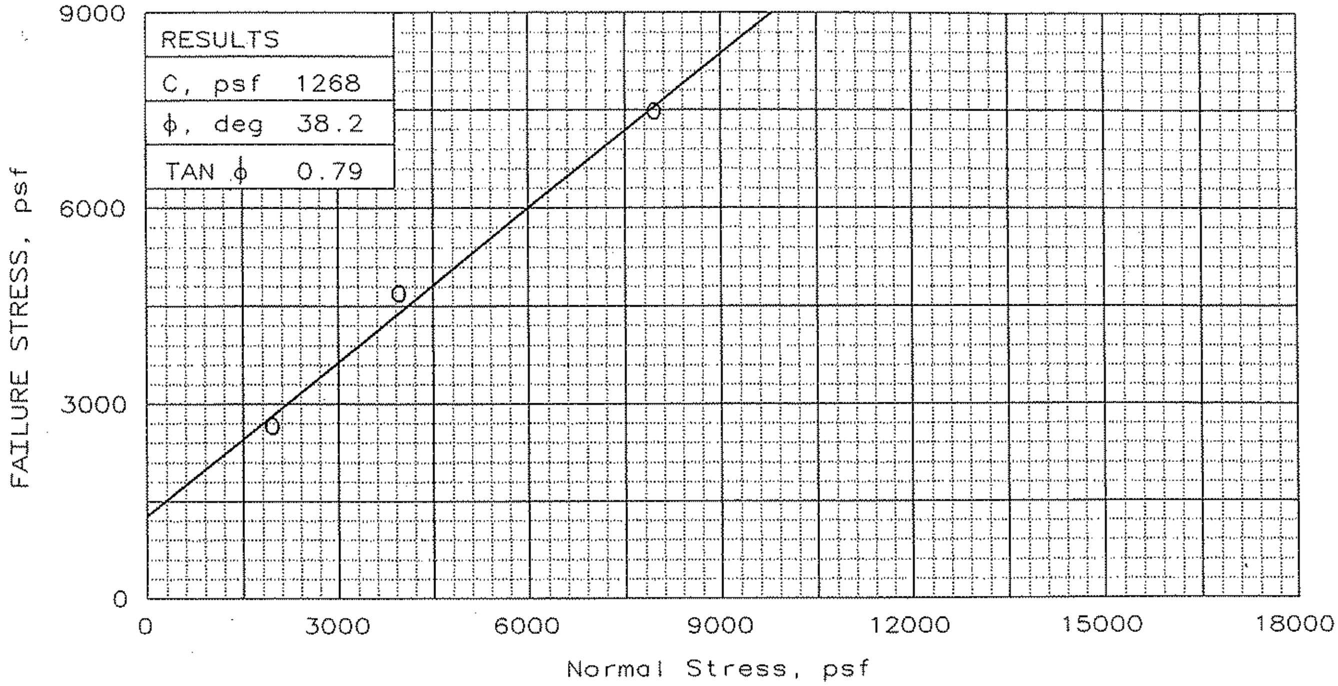
Project Number: 0324-01-7 Plate Number: C-1.39

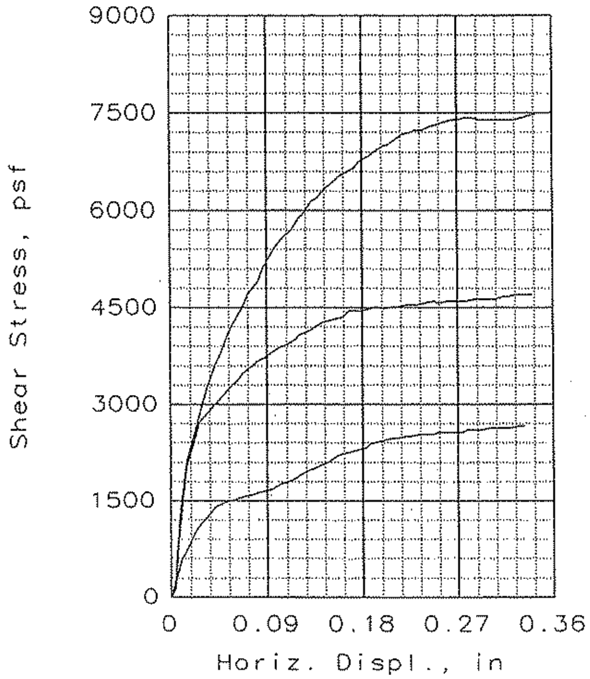
C-2

STRENGTH TEST RESULTS

TABLE C.2-1 - SUMMARY OF STRENGTH TEST RESULTS, SUMMERLIN PARKWAY HOV FLYOVER															
Boring ID	**Sample ID**	**Depth, m**	**Test type**	**Sampler Type**	**Avg Dry Density, kN/m^3**	**Void Ratio**	**Moisture Content (percent)**	**USCS**	**PI**	**Fines, percent^**	**Sand, percent^**	**Gravel, percent^**	**Cohesion, c (kPa)**	**Friction Angle, Φ**	**Comment**
B-01	1B	3.1	Direct Shear Recompacted	Grab	18.8	0.36	4.4	GP-GC(SC)	2	10 (35)	30 (65)	59 (0)	61.5	38.2	
B-02	2G	11	Direct Shear Recompacted	Grab	18.5	0.38	6.2	SC	16	14 (31)	45 (69)	41 (0)	21.2	45.5	
B-04	4D	6.1	Direct Shear Recompacted	Grab	18.7	0.37	5.2	SW-SM	2	17 (48)	37* (52)	45 (0)	57.7	41.1	
B-07	A	1.1	Direct Shear Recompacted	Grab	18.3	0.34	12.7	GW-GC(SC)	5	11 (30)	42 (70)	47 (0)	7.6	42.0	
B-08	D	5.65	Direct Shear Recompacted	MC	15.5	0.49	13.6	GC(SC)	2	14 (31)	41 (69)	44 (0)	28.1	34.0	
B-09	B	2.7	Direct Shear Recompacted	Grab	18.1	0.34	12.2	GW-GC(SC)	9	11 (28)	43 (72)	46 (0)	121.5	27.0	
B-10	B	1.1	Direct Shear Recompacted	Grab	18.0	0.36	13.6	SC-SM	7	14 (31)	50 (69)	36 (0)	18.4	26.2	
B-11	B	2.6	Direct Shear Recompacted	Grab	19.3	0.35	11.4	SW-SC(SC)	5	11 (25)	54 (75)	35 (0)	0.0	46.0	
FB-08	bulk	12.2	Direct Shear Recompacted	Grab	19.6	0.35	6.2	GP-GC(SC)	6	11 (11)	33 (91)	56 (0)	0.0	41.7	
FB-09	bulk	9.1	Direct Shear Recompacted	Grab	20.3	0.31	8.3	GC-GM(SC-SM)	5	13 (13)	43 (87)	44 (0)	0.0	40.2	
FB-10	bulk	3	Direct Shear Recompacted	Grab	19.2	0.38	6.2	GW-GC(SW-SC)	5	10 (10)	36 (90)	54 (0)	11.6	36.9	
FB-10	bulk	9.1	Direct Shear Recompacted	Grab	19.6	0.35	9.7	GP-GC(SP-SC)	8	9 (9)	34 (91)	57 (0)	15.7	37.8	Harvard Miniature Compaction of 19.8 kN/m^3 at 9% moisture content.

^Samples were run according to NDOT standards, requiring all material be screened through the #10 sieve. Bulk gradations shown plain; gradation in parentheses reflect screened, tested material.
* Estimated gradation only
MC = Modified California Sampler





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	4.4	4.4	4.4
	DRY DENSITY, pcf	119.7	119.7	119.7
	SATURATION, %	32.0	32.0	32.0
	VOID RATIO	0.356	0.356	0.356
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	7.1	6.5	4.7
	DRY DENSITY, pcf	125.5	122.3	122.3
	SATURATION, %	62.7	51.6	37.3
	VOID RATIO	0.293	0.327	0.327
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.95	0.98	0.98
NORMAL STRESS, psf		8000	2000	4000
FAILURE STRESS, psf		7482	2661	4696
DISPLACEMENT, in		0.34	0.33	0.32
ULTIMATE STRESS, psf				
DISPLACEMENT, in				
Strain rate, in/min		0.0400	0.0400	0.0400

SAMPLE TYPE: Remolded
DESCRIPTION: Poorly Graded Gravel with Silty Clay and Sand
LL= 22 PL= 6 PI= 16
SPECIFIC GRAVITY= 2.6
REMARKS:

Fig. No.: ______

CLIENT: PBS & J

PROJECT: U.S. 95 Widening

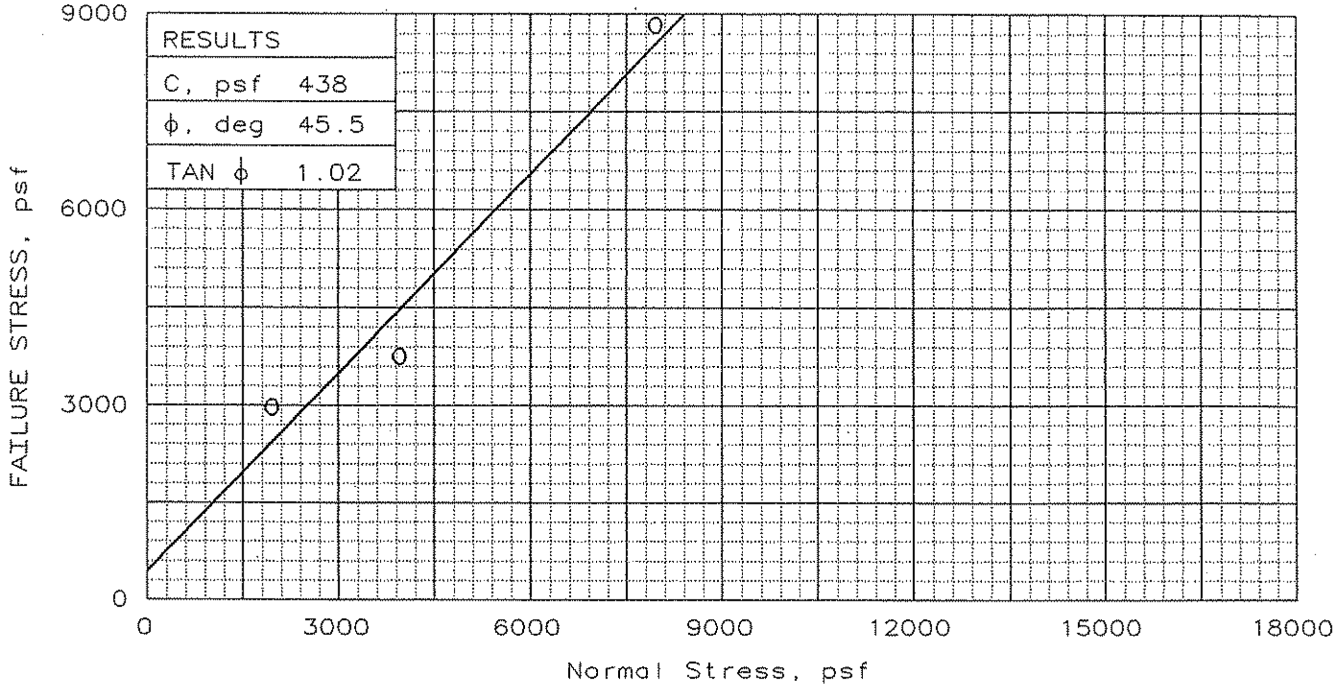
SAMPLE LOCATION: B-1, Sample 1B

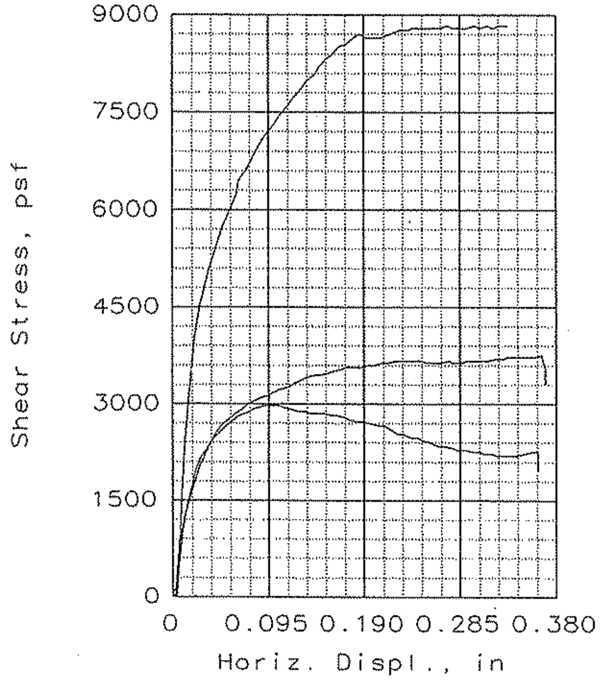
Boring B-01, Sample 1B, 3.1m

PROJ. NO.: 0324-01-1 DATE: 10/30/2001

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.





	SAMPLE NO.:	1	2	3
INITIAL	WATER CONTENT, %	6.2	6.2	6.2
	DRY DENSITY, pcf	117.7	117.7	117.7
	SATURATION, %	42.7	42.7	42.7
	VOID RATIO	0.380	0.380	0.380
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	6.2	6.0	8.7
	DRY DENSITY, pcf	122.4	120.2	120.8
	SATURATION, %	49.5	44.6	65.5
	VOID RATIO	0.326	0.351	0.344
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.96	0.98	0.97
	NORMAL STRESS, psf	8000	2000	4000
	FAILURE STRESS, psf	8829	2974	3757
	DISPLACEMENT, in	0.27	0.09	0.37
	ULTIMATE STRESS, psf			
	DISPLACEMENT, in			
	Strain rate, in/min	0.0400	0.0400	0.0400

SAMPLE TYPE: Remolded
DESCRIPTION: Clayey Sand with Gravel
LL= 32 PL= 18 PI= 14
SPECIFIC GRAVITY= 2.6
REMARKS:

Fig. No.: ______

CLIENT: PBS & J

PROJECT: U.S. 95 Widening

SAMPLE LOCATION: B-2, Sample 2G

Boring B-02, Sample 2G, 11m

PROJ. NO.: 0324-01-1 DATE: 10/30/2001

DIRECT SHEAR TEST REPORT

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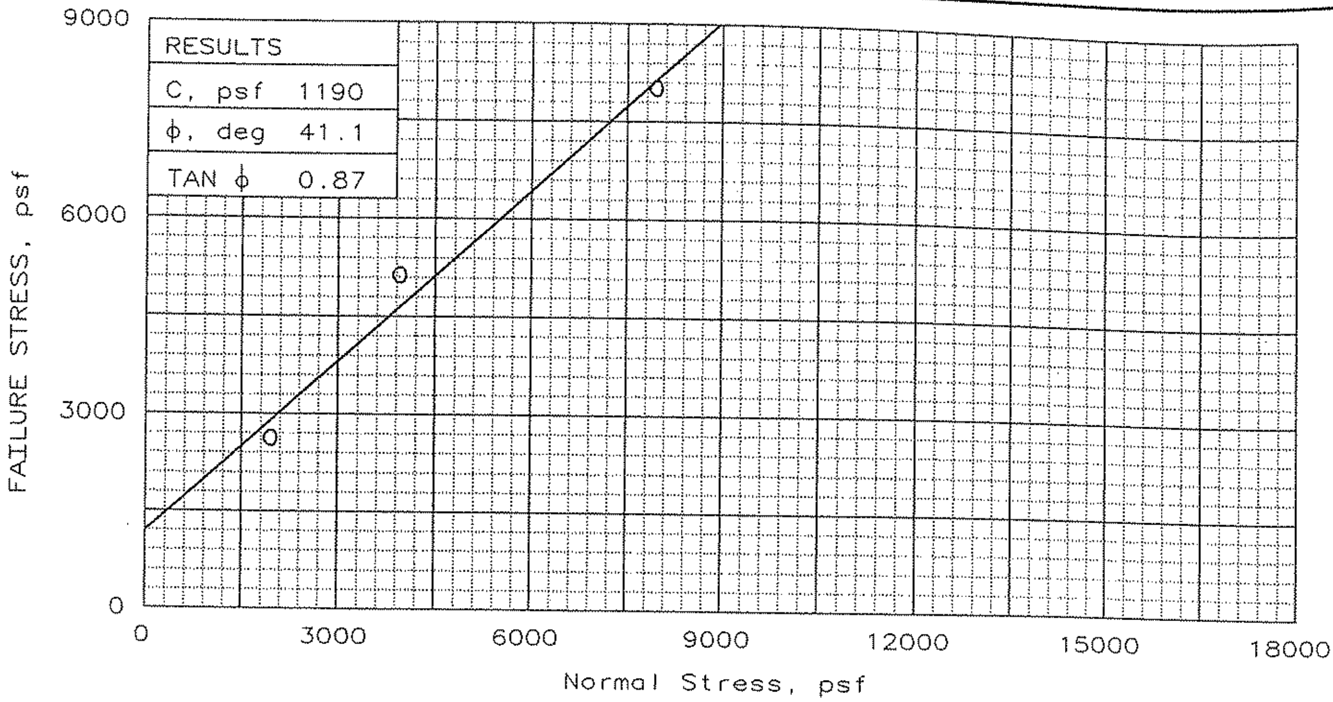
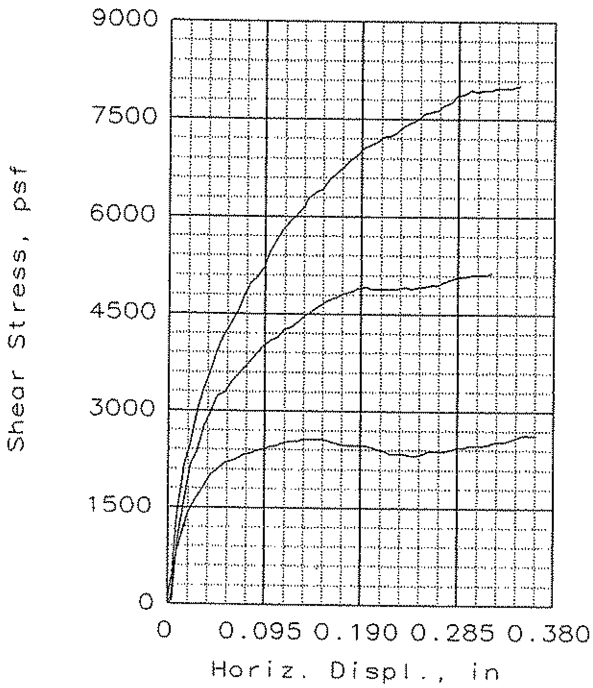




SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	5.2	5.2	5.2
	DRY DENSITY, pcf	118.8	118.8	118.8
	SATURATION, %	37.0	37.0	37.0
	VOID RATIO	0.366	0.366	0.366
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	6.1	4.9	6.6
	DRY DENSITY, pcf	124.9	120.8	122.0
	SATURATION, %	52.8	37.5	51.8
	VOID RATIO	0.300	0.343	0.331
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.95	0.98	0.97
NORMAL STRESS, psf		8000	2000	4000
FAILURE STRESS, psf		8015	2630	5134
DISPLACEMENT, in		0.35	0.35	0.32
ULTIMATE STRESS, psf				
DISPLACEMENT, in				
Strain rate, in/min		0.0400	0.0400	0.0400

SAMPLE TYPE: Remolded
DESCRIPTION: Well-Graded Sand with Silt and Gravel
LL= 18 PL= 16 PI= 2
SPECIFIC GRAVITY= 2.6
REMARKS:

Fig. No.: ____

CLIENT: PBS & J

PROJECT: U.S. 95 Widening

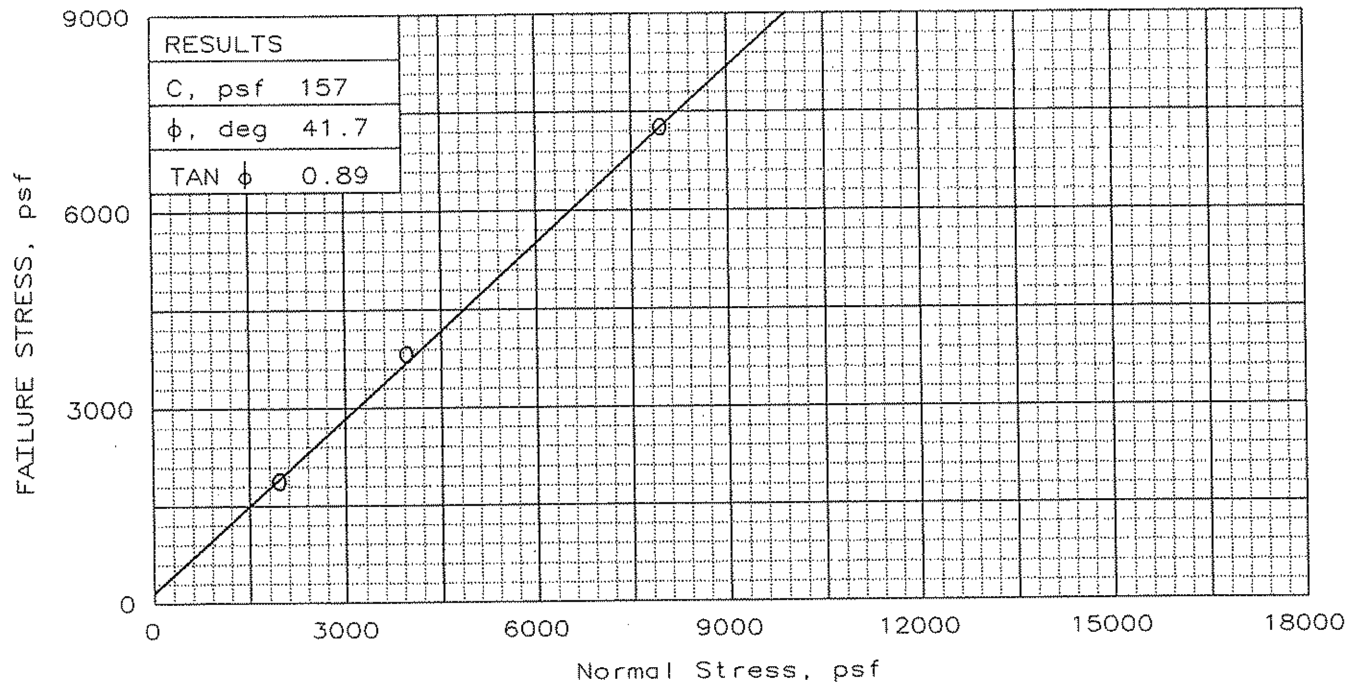
SAMPLE LOCATION: B-4, Sample 4D

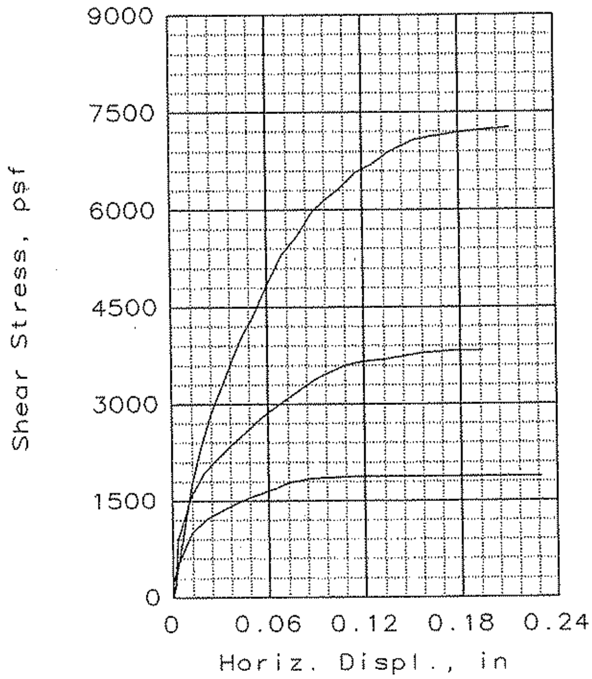
Boring B-04, Sample 4D, 6.1m

PROJ. NO.: 0324-01-1 DATE: 11/2/2001

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	1.4	1.4	1.4
	DRY DENSITY, pcf	116.4	116.4	116.4
	SATURATION, %	10.0	10.0	10.0
	VOID RATIO	0.340	0.340	0.340
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	12.7	12.0	11.6
	DRY DENSITY, pcf	118.2	119.9	120.9
	SATURATION, %	99.2	99.4	99.6
	VOID RATIO	0.320	0.301	0.291
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.97	0.96
NORMAL STRESS, psf		2000	4000	8000
FAILURE STRESS, psf		1878	3819	7263
DISPLACEMENT, in		0.12	0.18	0.21
ULTIMATE STRESS, psf				
DISPLACEMENT, in				
Strain rate, in/min		0.0200	0.0200	0.0200

SAMPLE TYPE: Remolded
DESCRIPTION: Well-Graded Gravel with Silty Clay and Sand
LL= 21 PL= 16 PI= 5
SPECIFIC GRAVITY= 2.5
REMARKS:

Fig. No.: ______

CLIENT: PBS&J

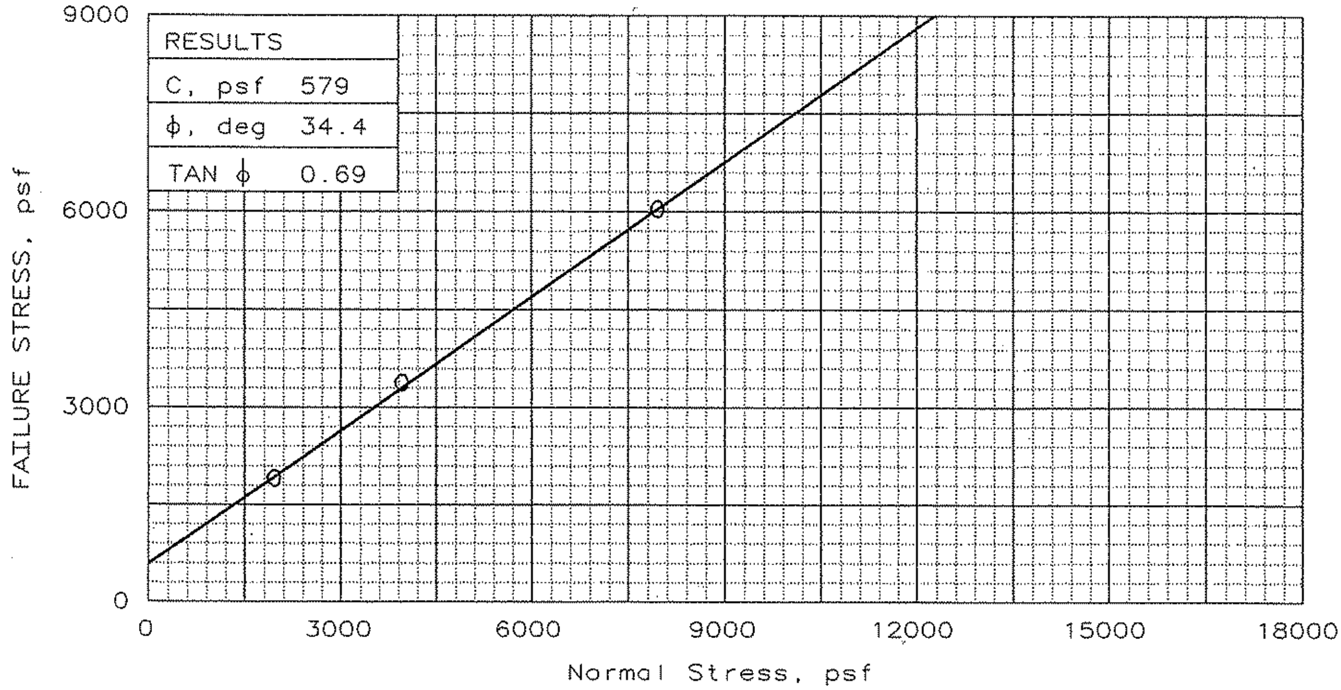
PROJECT: U.S. 95 / Rainbow Boulevard Bridge Reconstruction
SAMPLE LOCATION: B-C, Sample A.

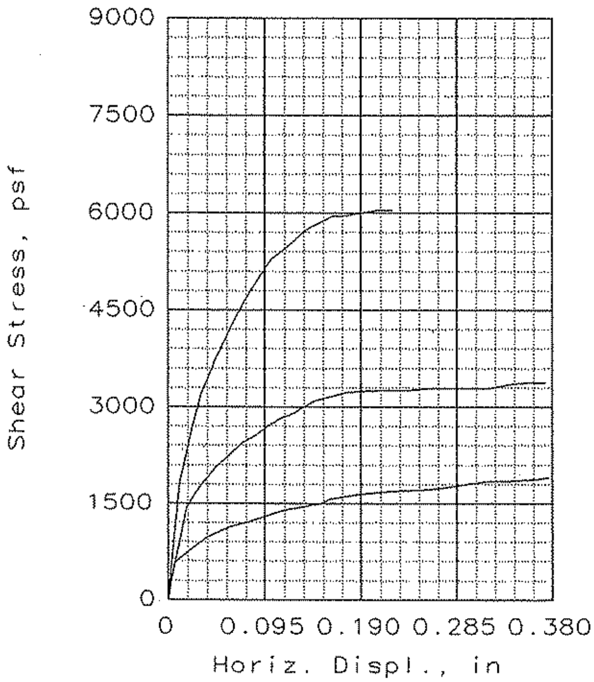
Boring B-07, Sample A, 1.1m

PROJ. NO.: 0324-01-2 DATE: 12/13/2001

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.





	SAMPLE NO.:	1	2	3
INITIAL	WATER CONTENT, %	3.1	3.1	3.1
	DRY DENSITY, pcf	98.6	98.6	98.6
	SATURATION, %	14.9	14.9	14.9
	VOID RATIO	0.488	0.488	0.488
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	13.6	12.8	12.0
	DRY DENSITY, pcf	110.4	112.6	114.2
	SATURATION, %	97.3	99.6	99.4
	VOID RATIO	0.329	0.302	0.284
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.89	0.88	0.86
	NORMAL STRESS, psf	2000	4000	8000
	FAILURE STRESS, psf	1910	3381	6042
	DISPLACEMENT, in	0.38	0.35	0.21
	ULTIMATE STRESS, psf			
	DISPLACEMENT, in			
	Strain rate, in/min	0.0200	0.0200	0.0200

SAMPLE TYPE: Remolded
DESCRIPTION: Silty Gravel with Sand
LL= 15 PL= 13 PI= 2
SPECIFIC GRAVITY= 2.35
REMARKS:

Fig. No.: ______

CLIENT: PBS&J

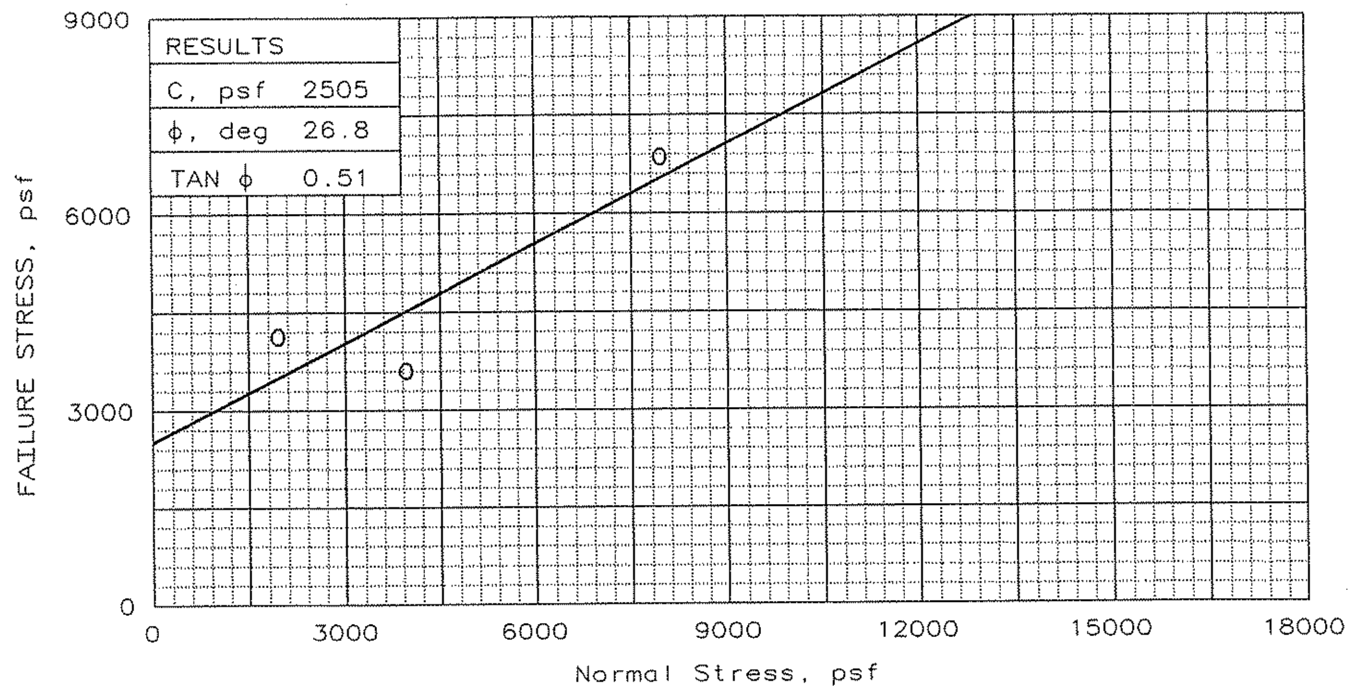
PROJECT: U.S. 95 / Rainbow Boulevard Bridge Reconstruction
SAMPLE LOCATION: B-D, Sample D

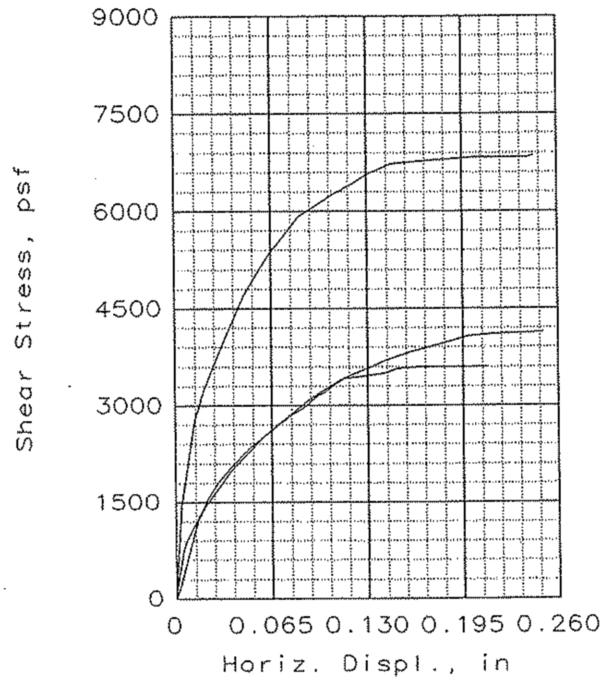
Boring B-08, Sample D, 5.65m

PROJ. NO.: 0324-01-2 DATE: 12/13/2001

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	2.3	2.3	2.3
	DRY DENSITY, pcf	115.4	115.4	115.4
	SATURATION, %	13.2	13.8	13.8
	VOID RATIO	0.460	0.433	0.433
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	12.5	12.2	12.0
	DRY DENSITY, pcf	125.6	124.8	125.3
	SATURATION, %	98.6	99.3	99.0
	VOID RATIO	0.342	0.326	0.320
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.92	0.93	0.92
NORMAL STRESS, psf		2000	4000	8000
FAILURE STRESS, psf		4133	3600	6856
DISPLACEMENT, in		0.25	0.17	0.24
ULTIMATE STRESS, psf				
DISPLACEMENT, in				
Strain rate, in/min		0.0200	0.0200	0.0200

SAMPLE TYPE: Remolded
DESCRIPTION: Well-Graded Gravel with Clay and Sand
LL= 30 PL= 21 PI= 9
SPECIFIC GRAVITY= 2.7
REMARKS:

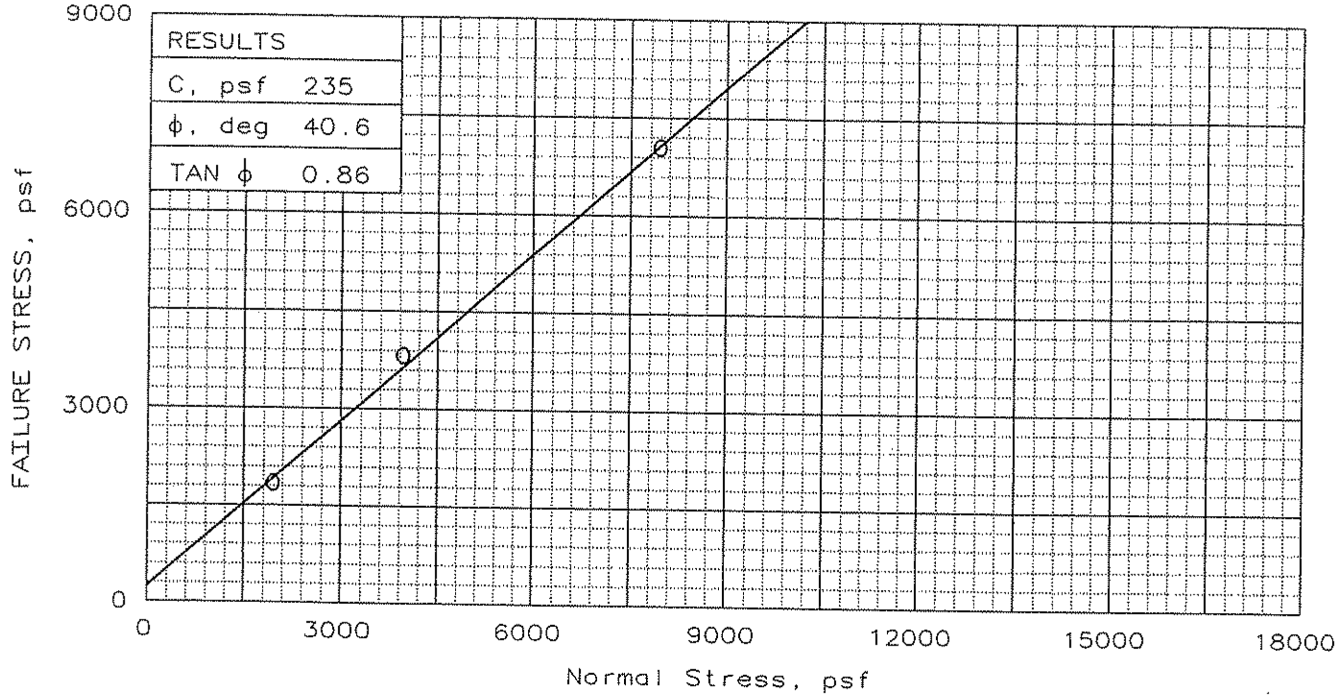
Fig. No.: ______

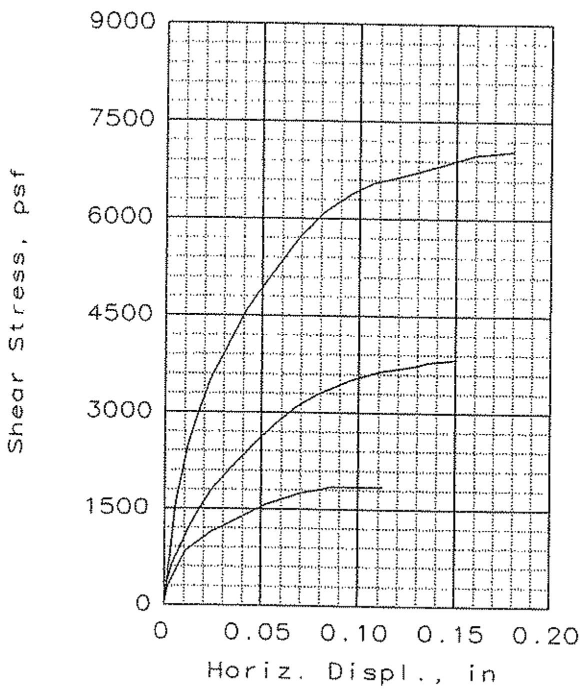
CLIENT: PBS&J

PROJECT: U.S. 95 / Rainbow Boulevard Bridge Reconstruction
SAMPLE LOCATION: B-E, Sample B
Boring B-09, Sample B, 2.7m
PROJ. NO.: 0324-01-2 DATE: 12/14/2001

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	3.0	3.0	3.0
	DRY DENSITY, pcf	114.6	114.6	114.6
	SATURATION, %	20.7	20.7	20.7
	VOID RATIO	0.362	0.362	0.362
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	13.6	13.1	12.7
	DRY DENSITY, pcf	116.5	117.5	118.4
	SATURATION, %	99.9	99.7	99.8
	VOID RATIO	0.340	0.328	0.318
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.98	0.98	0.97
NORMAL STRESS, psf		2000	4000	8000
FAILURE STRESS, psf		1847	3819	7044
DISPLACEMENT, in		0.09	0.15	0.18
ULTIMATE STRESS, psf				
DISPLACEMENT, in				
Strain rate, in/min		0.0200	0.0200	0.0200

SAMPLE TYPE: Remolded
DESCRIPTION: Silty, Clayey Sand with Gravel
LL= 27 PL= 20 PI= 7
SPECIFIC GRAVITY= 2.5
REMARKS:

Fig. No.:

CLIENT: PBS&J

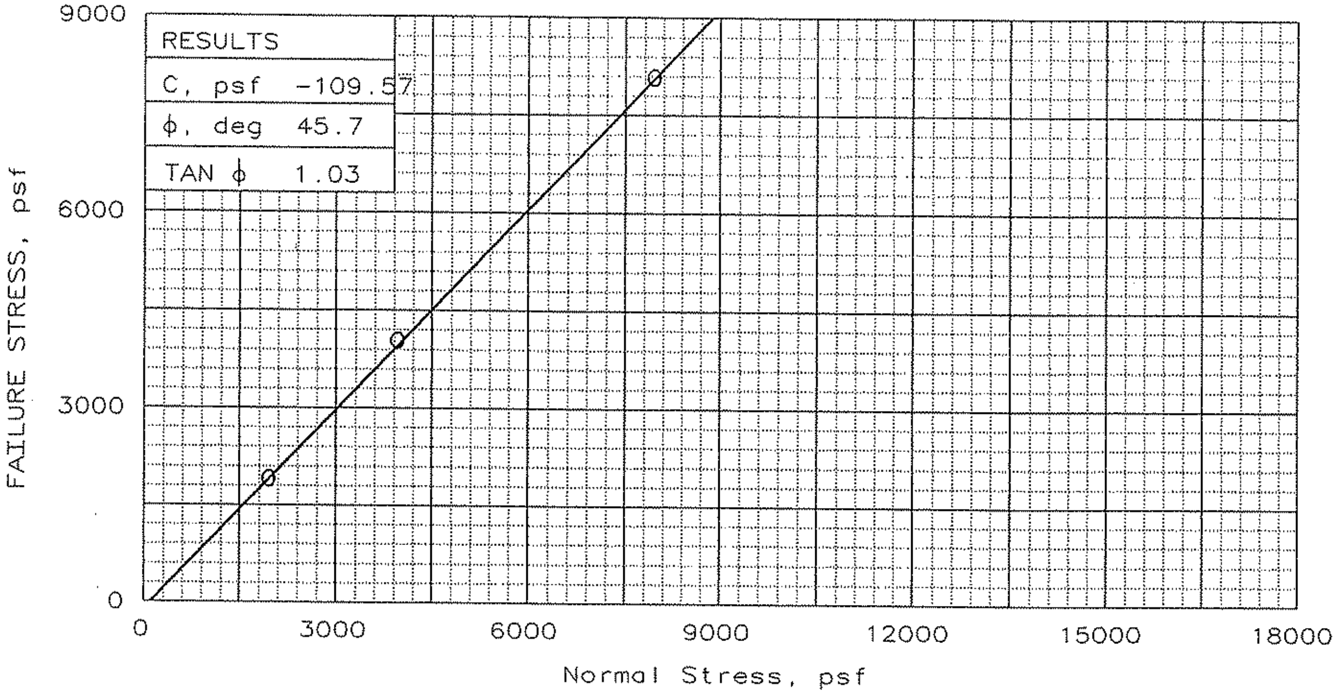
PROJECT: U.S. 95 / Rainbow Boulevard Bridge Reconstruction
SAMPLE LOCATION: B-F, Sample B

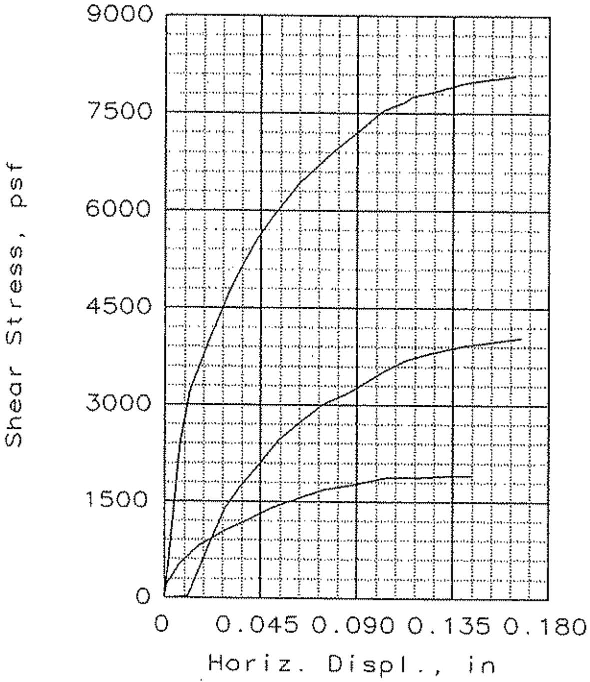
Boring B-10, Sample B, 1.1m

PROJ. NO.: 0324-01-2 DATE: 12/14/2001

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	2.2	2.2	2.2
	DRY DENSITY, pcf	115.5	115.5	115.5
	SATURATION, %	15.6	15.6	15.6
	VOID RATIO	0.351	0.351	0.351
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	11.4	10.4	10.3
	DRY DENSITY, pcf	121.1	123.4	123.9
	SATURATION, %	98.9	98.5	98.9
	VOID RATIO	0.289	0.265	0.259
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.95	0.94	0.93
NORMAL STRESS, psf		2000	4000	8000
FAILURE STRESS, psf		1910	4039	8077
DISPLACEMENT, in		0.13	0.17	0.16
ULTIMATE STRESS, psf				
DISPLACEMENT, in				
Strain rate, in/min		0.0200	0.0200	0.0200

SAMPLE TYPE: Remolded
DESCRIPTION: Well-Graded Sand with Silty Clay and Gravel
LL= 21 PL= 16 PI= 5
SPECIFIC GRAVITY= 2.5
REMARKS:

Fig. No.: ______

CLIENT: PBS&J

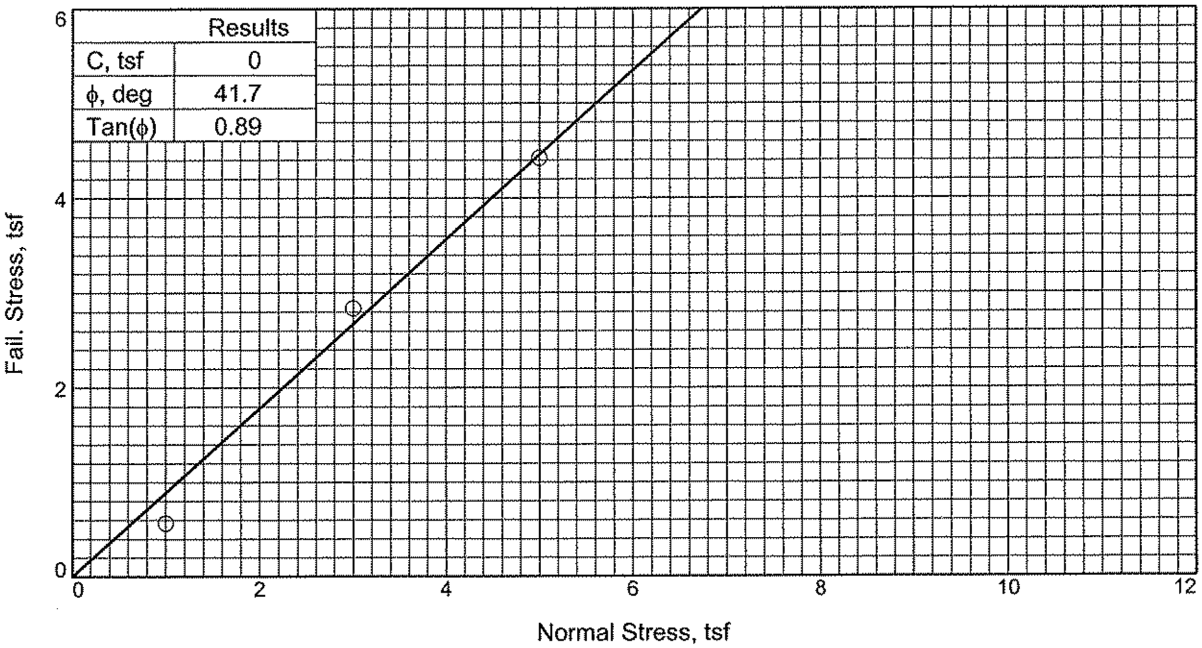
PROJECT: U.S. 95 / Rainbow Boulevard Bridge Reconstruction
SAMPLE LOCATION: B-G, Sample B

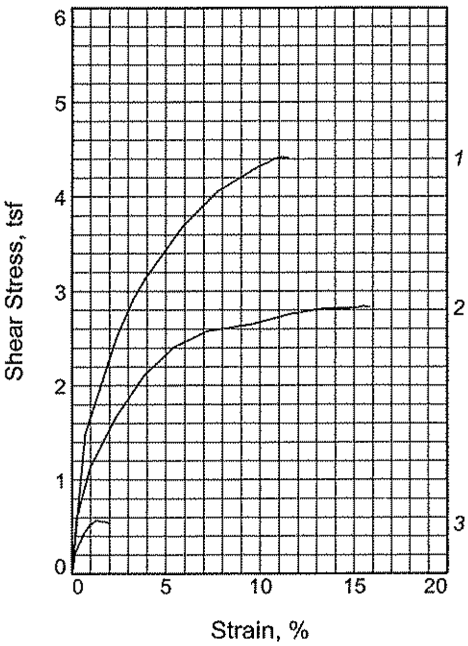
Boring B-11, Sample B, 2.6m

PROJ. NO.: 0324-01-2 DATE: 12/14/2001

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.





Sample No.		1	2	3
Initial	Water Content, %	4.6	5.0	9.1
	Dry Density, pcf	126.6	122.0	126.3
	Saturation, %	37.9	35.7	73.3
	Void Ratio	0.3311	0.3819	0.3342
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.01	1.00	1.10
At Test	Water Content, %	7.8	6.3	10.9
	Dry Density, pcf	138.6	143.7	129.9
	Saturation, %	98.1	97.6	99.0
	Void Ratio	0.2159	0.1729	0.2978
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.92	0.85	1.07
Normal Stress, tsf		5.000	3.000	1.000
Fail. Stress, tsf		4.421	2.838	0.567
Strain, %		11.1	15.5	1.4
Ult. Stress, tsf				
Strain, %				
Strain rate, in./min.		0.02	0.02	0.02

Sample Type: Remolded
Description: Poorly Graded Gravel with Silty Clay and Sand (Screened: 11% Fines, 89% Sand)
LL= 19 **PL=** 13 **PI=** 6
Assumed Specific Gravity= 2.7
Remarks:

Figure C-2.09

Client: PBS & J

Project: Summerlin HOV

Source of Sample: FB-08 **Depth:** 12.2-13.7m 40.0' - 45.0'

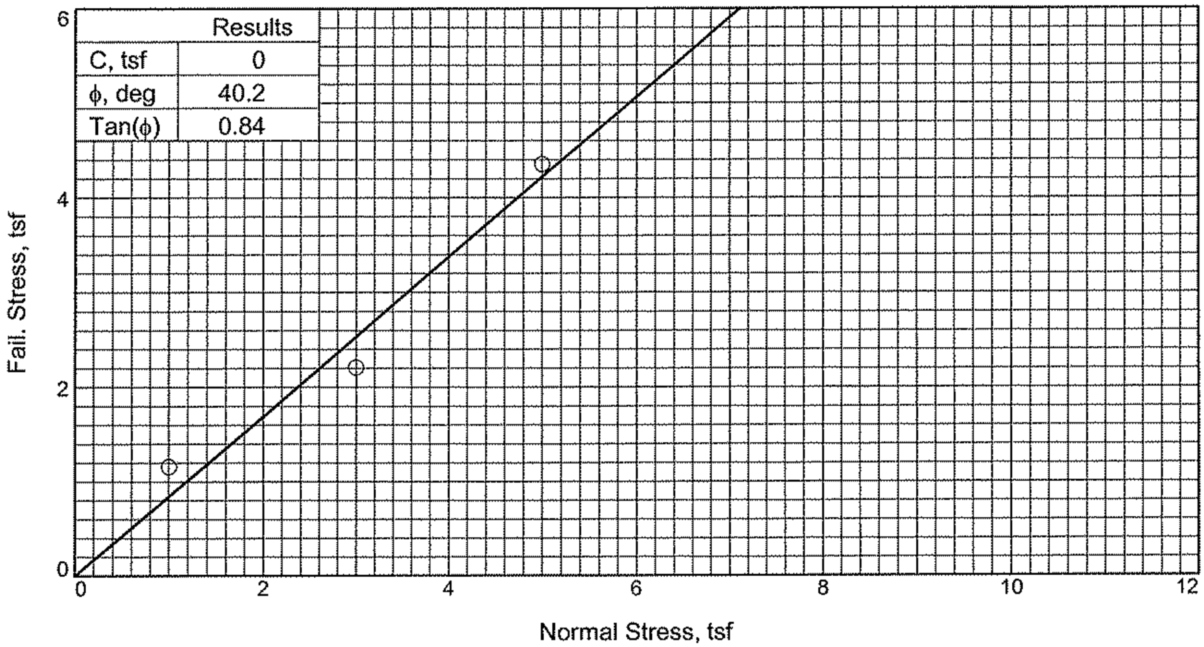
Sample Number: I

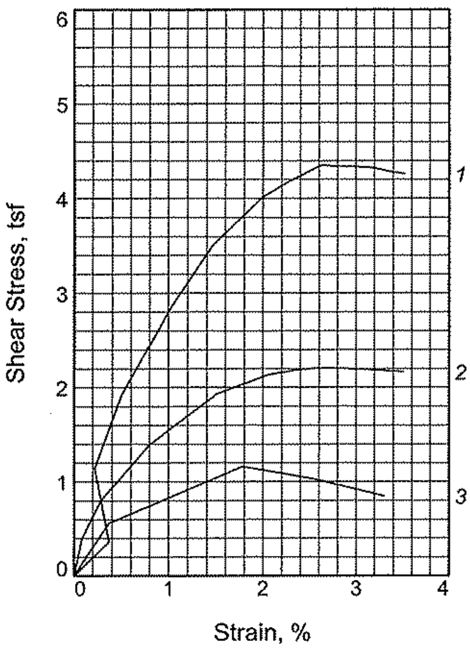
Proj. No.: 0324-01-7 **Date Sampled:** 10/17/07

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.

Tested By: G. Bomberger





Sample No.		1	2	3
Initial	Water Content, %	8.3	8.3	8.3
	Dry Density, pcf	129.9	127.8	129.2
	Saturation, %	75.0	70.1	73.3
	Void Ratio	0.2976	0.3187	0.3045
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.03	1.01
At Test	Water Content, %	8.2	6.9	9.0
	Dry Density, pcf	137.2	141.1	134.8
	Saturation, %	96.7	95.9	97.0
	Void Ratio	0.2287	0.1943	0.2506
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.95	0.93	0.97
Normal Stress, tsf		5.000	3.000	1.000
Fail. Stress, tsf		4.352	2.207	1.160
Strain, %		2.6	2.7	1.8
Ult. Stress, tsf				
Strain, %				
Strain rate, in./min.		0.02	0.02	0.02

Sample Type: Remolded
Description: Silty, Clayey Sand with Gravel
(Screened: 13% Fines, 87% Sand)
LL= 19 **PL=** 14 **PI=** 5
Assumed Specific Gravity= 2.7
Remarks:

Figure C-2.10

Client: PBS & J

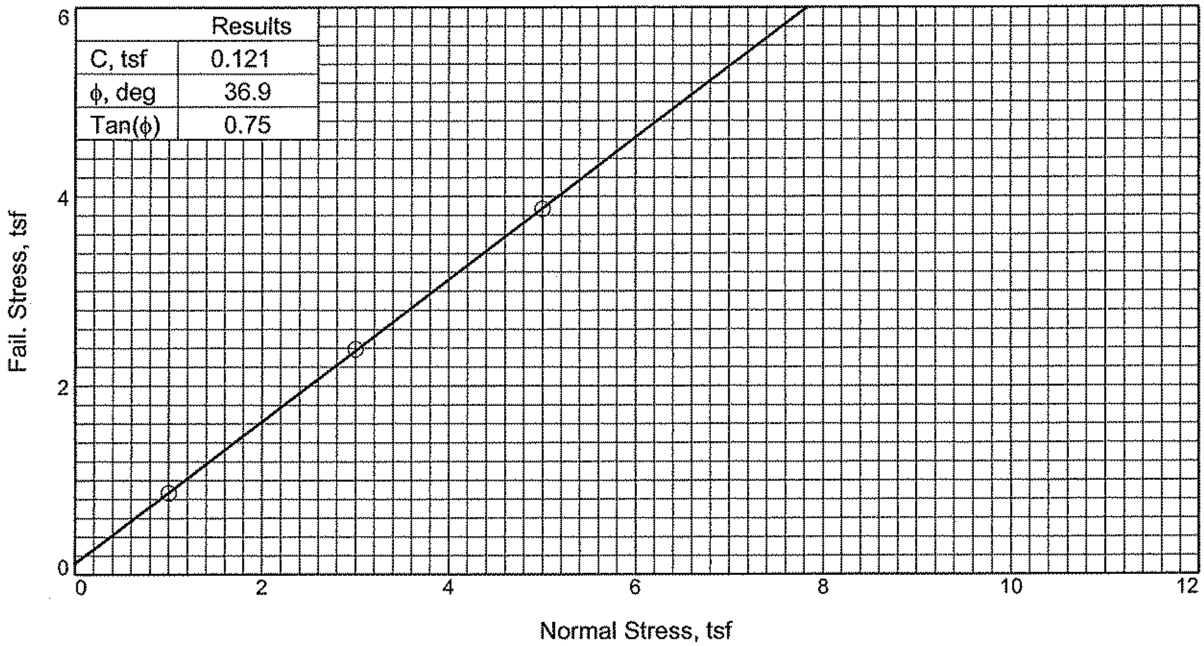
Project: Summerlin HOV

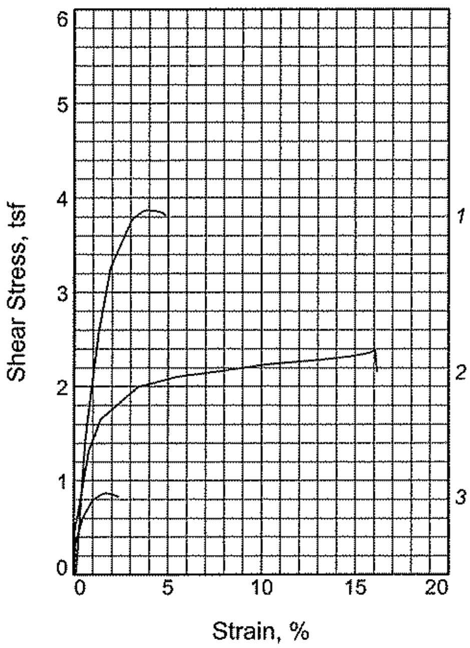
Source of Sample: FB-09 **Depth:** 30.0' - 35.0' 9.1 - 10.7m
Sample Number: H
Proj. No.: 0324-01-7 **Date Sampled:** 10/15/07

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.

Tested By: G. Bomberger





Sample No.		1	2	3
Initial	Water Content, %	9.7	9.7	9.7
	Dry Density, pcf	125.8	119.5	121.5
	Saturation, %	76.6	63.6	67.4
	Void Ratio	0.3403	0.4099	0.3869
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.03	0.99	1.10
At Test	Water Content, %	9.6	11.6	10.2
	Dry Density, pcf	133.4	127.8	131.3
	Saturation, %	98.1	98.2	96.5
	Void Ratio	0.2631	0.3194	0.2839
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.97	0.93	1.02
Normal Stress, tsf		5.000	3.000	1.000
Fail. Stress, tsf		3.866	2.387	0.864
Strain, %		3.9	16.1	1.7
Ult. Stress, tsf				
Strain, %				
Strain rate, in./min.		0.02	0.02	0.02

Sample Type: Remolded
Description: Well Graded Gravel with Silty Clay and Sand (Screened: 10% Fines, 90% Sand)
LL= 19 **PL=** 14 **PI=** 5
Assumed Specific Gravity= 2.7
Remarks:

Figure C-2.11

Client: PBS & J

Project: Summerlin HOV

Source of Sample: FB-10 **Depth:** 10.0' - 15.0' **3.0 - 4.6m**

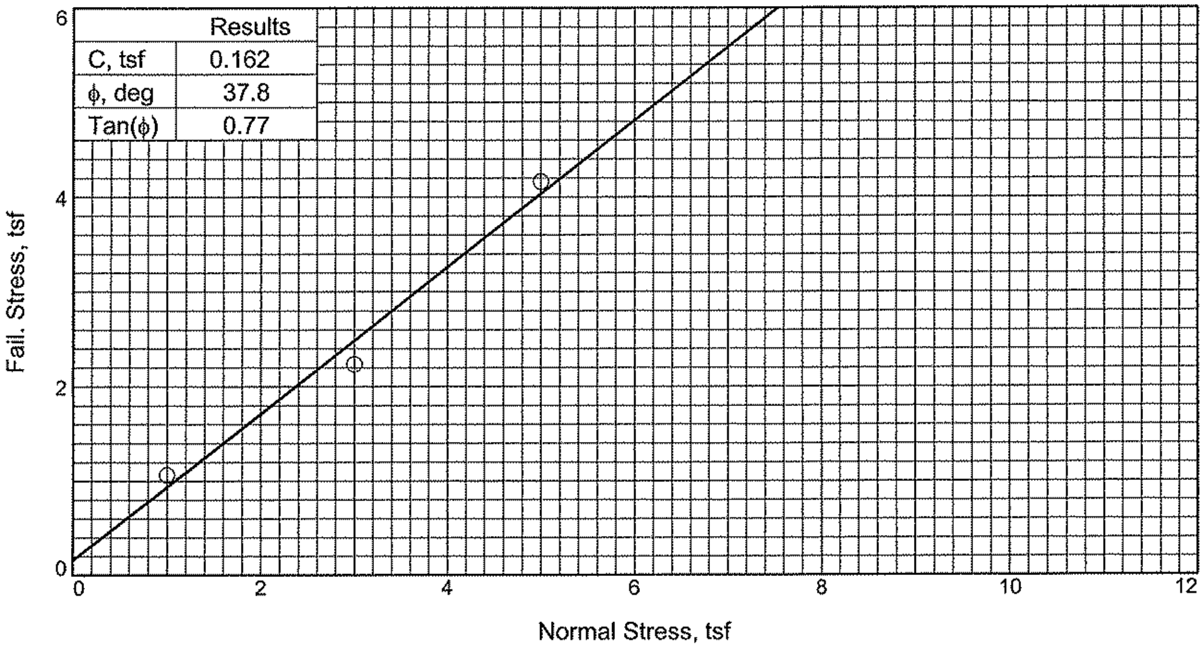
Sample Number: B

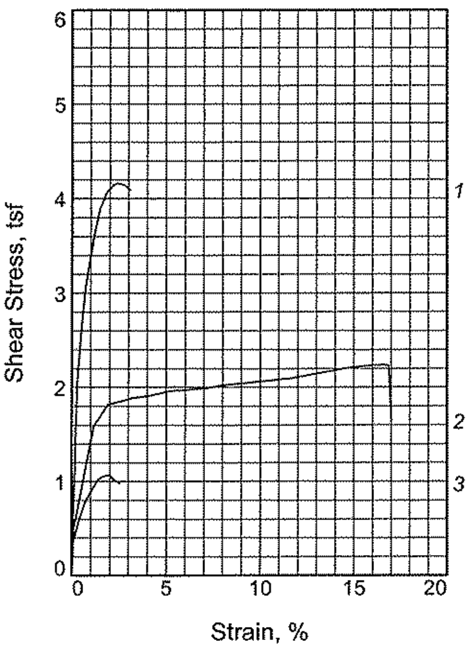
Proj. No.: 0324-01-7 **Date Sampled:** 10/18/07

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.

Tested By: G. Bomberger





Sample No.		1	2	3
Initial	Water Content, %	11.0	9.1	9.1
	Dry Density, pcf	122.8	125.6	126.0
	Saturation, %	79.9	71.7	72.5
	Void Ratio	0.3727	0.3416	0.3379
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.13	1.10	1.10
At Test	Water Content, %	12.4	9.8	11.5
	Dry Density, pcf	126.0	132.6	127.2
	Saturation, %	98.9	98.0	96.0
	Void Ratio	0.3379	0.2710	0.3247
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.10	1.04	1.09
Normal Stress, tsf		5.000	3.000	1.000
Fail. Stress, tsf		4.162	2.235	1.063
Strain, %		2.4	16.8	2.0
Ult. Stress, tsf				
Strain, %				
Strain rate, in./min.		0.02	0.02	0.02

Sample Type: Remolded

Description: Poorly Graded Gravel with Clay and Sand (Screened: 9% Fines, 91% Sand)

LL= 23 **PL=** 15 **PI=** 8

Assumed Specific Gravity= 2.7

Remarks: Remolded to Harvard Miniature Values of 126.2 pcf @ 9.0% moisture **(19.8 kN/m³)**

Figure C-2.12

Client: PBS & J

Project: Summerlin HOV

Source of Sample: FB-10 **Depth:** **9.1 - 10.7m** 30.0' - 35.0'

Sample Number: B

Proj. No.: 0324-01-7 **Date Sampled:** 10/18/07

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.

Tested By: G. Bomberger

C-3

CHEMICAL TEST RESULTS

Laboratory Report

Black Eagle Consulting
1345 Capital Blvd, Suite A
Reno, NV 89502
Attn: Ron Weber

Phone: 359-6600 Fax: 359-7766

EPA Lab ID: NV004
Received: 11/20/01
Lab Sample ID: 5-111-124
Reported: 12/04/01

Project Name/Number: US 95/Rainbow/0324-01-1
Sample ID: See below
Date/Time Collected: 11/20/01
Sampled By: Client

Parameter	Method	Results	Units	Analyzed
US95/RAINBOW BORE C-A @ 3.5-5.0'	**Boring B-07**			
Soluble Chloride	300.0	10	mg/Kg	11/26/01
pH	T238A	8.31	SU	12/03/01
Resistivity	T235B	6000	Ω.cm	12/03/01
Soluble Sulfate	300.0	56	mg/Kg	11/26/01
US95/RAINBOW BORE D-D @ 18.5-20'	**Boring B-08**			
Soluble Chloride	300.0	240	mg/Kg	11/26/01
pH	T238A	8.29	SU	12/03/01
Resistivity	T235B	920	Ω.cm	12/03/01
Soluble Sulfate*	300.0	440	mg/Kg	11/26/01

Comments:
Sulfate & Chloride run from a 1:10 extract.

Lance Bell, Lab Manager

Laboratory Report

Black Eagle Consulting
1345 Capital Blvd, Suite A
Reno, NV 89502
Attn: Ron Weber

Phone: 359-6600 Fax: 359-7766

EPA Lab ID: NV004
Received: 11/20/01
Lab Sample ID: 5-111-124
Reported: 12/04/01

Project Name/Number: US 95/Rainbow/0324-01-1
Sample ID: See below
Date/Time Collected: 11/20/01
Sampled By: Client

Parameter	Method	Results	Units	Analyzed
US 95/RAINBOW BORE E-B @ 8.5-10'	**Boring B-09**			
Soluble Chloride	300.0	15	mg/Kg	11/26/01
pH	T238A	8.21	SU	12/03/01
Resistivity	T235B	1200	Ω.cm	12/03/01
Soluble Sulfate	300.0	1400	mg/Kg	11/26/01
US 95/ RAINBOW BORE F-A @ 3.5-5'	**Boring B-10**			
Soluble Chloride	300.0	<10	mg/Kg	11/26/01
pH	T238A	8.60	SU	12/03/01
Resistivity	T235B	6200	Ω.cm	12/03/01
Soluble Sulfate*	300.0	<50	mg/Kg	11/26/01

Comments:
Sulfate & Chloride run from a 1:10 extract.

Lance Bell, Lab Manager

Calculations

Laboratory Report

Black Eagle Consulting
1345 Capital Blvd, Suite A
Reno, NV 89502
Attn: Ron Weber

Phone: 359-6600 Fax: 359-7766

EPA Lab ID: NV004
Received: 11/20/01
Lab Sample ID: 5-111-124
Reported: 12/04/01

Project Name/Number: US 95/Rainbow/0324-01-1
Sample ID: See below
Date/Time Collected: 11/20/01
Sampled By: Client

Parameter	Method	Results	Units	Analyzed
US 95/RAINBOW BORE G-B @ 8.5-10'	**Boring B-11**			
Soluble Chloride	300.0	<10	mg/Kg	11/26/01
pH	T238A	8.61	SU	12/03/01
Resistivity	T235B	7400	Ω.cm	12/03/01
Soluble Sulfate	300.0	<50	mg/Kg	11/26/01
US 95/RAINBOW BORE H-A @ 3.5-5'	**Boring B-12 (not included in this report)**			
Soluble Chloride	300.0	<10	mg/Kg	11/26/01
pH	T238A	8.58	SU	12/03/01
Resistivity	T235B	7200	Ω.cm	12/03/01
Soluble Sulfate*	300.0	<50	mg/Kg	11/26/01

Comments:
Sulfate & Chloride run from a 1:10 extract.

Lance Bell, Lab Manager

Appendix III
Calculations

Laboratory Report

Black Eagle Consulting
1345 Capital Blvd, Suite A
Reno, NV 89502
Attn: Ron Weber

Phone: 359-6600 Fax: 359-7766

EPA Lab ID: NV004
Received: 11/20/01
Lab Sample ID: 5-111-124
Reported: 12/04/01

Project Name/Number: US 95/Rainbow/0324-01-1
Sample ID: See below
Date/Time Collected: 11/20/01
Sampled By: Client

Parameter	Method	Results	Units	Analyzed
US 95/RAINBOW BORE I-B @ 8.5-10'	**Boring B-13**			
Soluble Chloride	300.0	<10	mg/Kg	11/26/01
pH	T238A	10.64	SU	12/03/01
Resistivity	T235B	7500	Ω.cm	12/03/01
Soluble Sulfate	300.0	<50	mg/Kg	11/26/01

Comments:
Sulfate & Chloride run from a 1:10 extract.

Lance Bell, Lab Manager

Calculations

Western Environmental Testing Laboratory
Analytical Report

Black Eagle Consulting
1345 Capital Boulevard, Suite A
Reno, NV 89502-7140
Attn: Gary Bomberger
Phone: (775) 359-6600 **Fax:** (775) 359-7766
PO\Project: *Summerlin HDV / 0324-01-7*

Date Printed: 5/29/2007
OrderID: *0705087*

Customer Sample ID: FB-03 A 5
WETLAB Sample ID: 0705087-001
Collect Date/Time: 4/6/2007
Receive Date: 5/8/2007 16:40

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Sulfide	A21.5-99	negative			5/9/2007
Redox Potential	SM 2580B	350	mV	1	5/10/2007
Sulfate	EPA 300.0	41	mg/kg	15	5/14/2007
Paste pH	SW846 9045B	7.55	pH Units		5/14/2007
Resistivity	SM 2510B	3100	ohms.cm	1	5/10/2007

Customer Sample ID: FB-06 B 10
WETLAB Sample ID: 0705087-002
Collect Date/Time: 4/10/2007
Receive Date: 5/8/2007 16:40

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Sulfide	A21.5-99	negative			5/9/2007
Redox Potential	SM 2580B	320	mV	1	5/10/2007
Sulfate	EPA 300.0	45	mg/kg	15	5/14/2007
Paste pH	SW846 9045B	8.19	pH Units		5/14/2007
Resistivity	SM 2510B	4300	ohms.cm	1	5/10/2007

Western Environmental Testing Laboratory
Analytical Report

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Phone: (775) 359-6600 **Fax:** (775) 359-7766
PO\Project: *Summerlin/0324-01-7*

Date Printed: 10/31/2007
OrderID: *0710235*

Customer Sample ID: FB-08 Bulk 35-40'
WETLAB Sample ID: 0710235-001
Collect Date/Time: 10/19/2007
Receive Date: 10/24/2007 15:15

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Chloride	EPA 300.0	190	mg/kg	15	10/31/2007
Sulfate	EPA 300.0	200	mg/kg	15	10/31/2007
Paste pH	SW846 9045B	7.92	pH Units		10/31/2007
Resistivity	SM 2510B	670	ohms.cm	1	10/31/2007

Customer Sample ID: FB-09 Bulk 30-35'
WETLAB Sample ID: 0710235-002
Collect Date/Time: 10/19/2007
Receive Date: 10/24/2007 15:15

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Chloride	EPA 300.0	77	mg/kg	15	10/31/2007
Sulfate	EPA 300.0	180	mg/kg	15	10/31/2007
Paste pH	SW846 9045B	8.29	pH Units		10/31/2007
Resistivity	SM 2510B	830	ohms.cm	1	10/31/2007

Customer Sample ID: FB-10 Bulk 10-15'
WETLAB Sample ID: 0710235-003
Collect Date/Time: 10/19/2007
Receive Date: 10/24/2007 15:15

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Chloride	EPA 300.0	36	mg/kg	15	10/31/2007
Sulfate	EPA 300.0	120	mg/kg	15	10/31/2007
Paste pH	SW846 9045B	8.33	pH Units		10/31/2007
Resistivity	SM 2510B	1600	ohms.cm	1	10/31/2007