FINAL
GEOTECHNICAL INVESTIGATION REPORT
PROPOSED CARSON FREEWAY, U.S. 395
(NORTH PART)
CARSON CITY, NEVADA

July 15, 1999

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Mr. Parviz Noori, P.E.
Materials Division
Nevada Department of Transportation
1263 South Stewart Street
Carson City, Nevada 89712

SUBJECT: Final Geotechnical Investigation Report
Proposed Carson Freeway, U.S. 395 (North Part)
Carson City, Nevada

Dear Parviz:

The attached final report presents the results of our geotechnical investigation for the proposed Carson Freeway, U.S. 395. The proposed freeway is to be located approximately two kilometers east of the existing U.S. 395 at the north end of Carson City and extends from Duck Hill to U.S. 50 West at the south end of Carson City. This investigation was conducted for the northern five kilometer portion of the freeway from Duck Hill to U.S. 50 East including seven bridge structures, several retaining walls, on/off ramps, and realignment of several adjacent surface streets. It is understood that the Nevada Department of Transportation (NDOT) will conduct the geotechnical investigation for the southern end of the freeway. Our work consisted of subsurface exploration, laboratory testing, engineering analyses, and preparation of a draft report. The draft report was submitted to NDOT for review and comment. NDOT's review comments are incorporated into this final report.

Based on our work completed to date, we have drawn the following general conclusions:

- Site soils encountered in our field investigation generally consist of sandy soils with occasional interbedded clay zones. The near-surface sandy soils tend to be loose to medium dense, increasing in density with depth. The clay zones, where encountered, tend to be medium stiff to stiff and of moderate plasticity.

- Groundwater was encountered at depths as shallow as 1-1/2 meters below the existing ground surface south of Arrowhead Drive. The shallow groundwater may adversely impact construction in some areas of the project south of Arrowhead Drive.

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- Two potential fill borrow areas were explored as part of our investigation at Duck Hill and Edmonds Drive. The Duck Hill area is composed of decomposed granite (DG), and the Edmonds Drive area composed of silty sands. Both areas are deemed to be adequate fill sources; however some blending of the silty fine sand portions of the south end of the Edmonds area must be performed to produce a good quality fill. We estimate that a 50-50 blend of the fine sand at the south end of Edmonds with the DG from the Duck Hill area or the northern Edmonds area will provide a suitable fill soil.

- We analyzed embankment stability assuming a material internal angle of friction of 34 degrees (as requested by NDOT) and a material internal angle of 38 degrees (based empirical values provided in Table 4-5, Publication No. FHWA-HI-97-013 for dense materials). Our results indicate slopes of inclinations of 2H:1V or less and up to 9.1 meters in height are stable under static and seismic conditions for materials with internal angles of friction of 34 to 38 degrees. Our results also indicate slopes constructed at a batter of 1.5H:1V are unstable during a design level seismic event for a cohesionless soil with an internal angle of friction of 34 degrees. We recommend that permanent fill be constructed to a maximum slope of 2H:1V.

- Our stability analysis performed using the XSTABL5.2 computer program indicates low factors of safety for abutment foundations supported within the embankments during a design seismic event. We recommend that all bridge structures be founded on deep foundations. Recommendations for driven pipe piles, sizes PP305, PP406 and PP457 are provided.

- Resitivity testing indicates potentially corrosive to moderately corrosive conditions at the bridge locations. Carbon steel corrosion rates are anticipated to be on the order of 12 μm/yr. Assuming a design life of 100 years for the proposed bridge abutments and a uniform loss model, steel pipe piles will have an overall sacrificial wall thickness loss of less than 1.5 mm. We recommend a sacrificial wall thickness of 1.5 mm be used in determining the required pipe pile wall thickness.

- The potential for liquefaction of the site soils and the resultant settlement are expected to be minimal.

These and other conclusions and recommendations, along with restrictions and limitations on these conclusions, are discussed in the attached report.

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We appreciate this opportunity to be of service to you, and look forward to future endeavors. If you have any questions regarding this report or need additional information or services, please feel free to call one of the undersigned in our Reno office.

Sincerely,

KLEINFELDER, INC.

Mark Doehring, P.E. 7/15/99
Project Engineer

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Enclosures: Report (10 Bound)

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CARSON CITY, NEVADA

1. INTRODUCTION AND SCOPE

1.1 Project Description

This report presents the results of our geotechnical investigation for the alignment, structures, ramps, and surface street realignment portion of the proposed Carson Freeway, U.S. 395. The new U.S. 395 freeway will extend from approximately two kilometers east of the existing U.S. 395 at Duck Hill at the north end of Carson City, southward to the intersection of U.S. 50 West at the south end of Carson City. This study focused on the northern portion of the freeway from Duck Hill southward to U.S. 50 East. The Nevada Department of Transportation (NDOT) will conduct the geotechnical investigation for the southern portion of the freeway, south of U.S. 50 East. The project location is shown on the attached site plans (Figures A-1 through A-6, Appendix A).

We understand that the northern portion of the project will include construction of a five kilometer, multiple lane, limited access highway. Construction will include seven bridge structures at U.S. 395 and Bonanza Drive, Arrowhead Drive, Northgate Lane, Emerson Drive, East College Parkway, Carmine Street and U.S. 50 East. Construction will also include on/off ramps at U.S. 395, at Bonanza Drive, East College Parkway and the intersection of U.S. 50 East. Realignments of Bonanza Drive, Imus Road, Arrowhead Drive, and Lompa Lane are included in this project. Construction of drainage channels and retaining walls are planned at various areas throughout the proposed five kilometer freeway alignment, and additional drainage channels south of U.S. 50 East were also studied. Although the section of the project south of U.S. 50 East is not included in our overall geotechnical study, a portion of our scope of work included drilling, sampling, and laboratory testing in areas of the southern end of the project to evaluate drainage issues and potential fill sources.

1.2 Purpose and Scope of Work

The purpose of this study is to evaluate the feasibility of the proposed freeway construction with respect to the observed subsurface conditions, and to provide our geotechnical recommendations and opinions as outlined in NDOT's Task Order No. 2, dated June 30, 1997 and summarized below.

- General soil and groundwater conditions at the project site, with emphasis on how the conditions are expected to affect the proposed construction;
- Suggested specifications for earthwork construction, including site preparation recommendations, a discussion of reuse of existing near surface soils as structural or non-structural fill, and a discussion of remedial earthwork recommendations, if warranted;
- Recommendations for temporary excavations and trench backfill;
- Recommendations for permanent cut and fill slopes;
- Conventional shallow spread foundation design including soil bearing values, minimum footing depth, resistance to lateral loads and estimated settlements.
- Lateral earth pressures and drainage recommendations for short retaining structures; and
- Steel corrosion potential and concrete reactivity of site soils.

In addition, we have been asked to provided the following information for deep foundations, using closed end driven pipe piles, designations PP305, PP406 and PP457:

- Ultimate capacities for each bridge location;
- Recommended grade of steel and minimum wall thickness;
- Wave equations relating expected driving resistance for each bridge location; and
- Pile lateral load design parameters.

Our scope of services consisted of background review, site reconnaissance, field exploration, laboratory testing, engineering analyses, and preparation of a draft report. The draft report was

submitted to NDOT for review and comment. NDOT's review comments have been incorporated into this final report.

1.3 Authorization

Authorization to proceed with our work on this project was provided by Mr. Rod Johnson, P.E. and Mr. Dean Weltzel, P.E. on June 30, 1997 in the form of a signed Nevada Department of Transportation Task Order.

1.4 References

The following information was provided to Kleinfelder in the course of this study and serves as the basis of our understanding of the project type and scope.

- Several site plans prepared by the Nevada Department of Transportation. These drawings are the basis for the site plans shown on Figures A-1 through A-6, Plates A-1 through A-14, Figures B-1 through B-3 and Plates B-1 through B-7 presented in Appendices A & B.
- Preliminary 300-scale site plan showing retaining wall locations.
- Preliminary retaining wall profile sheet.

In addition, the following published and unpublished references were reviewed during preparation of this report.

- "U.S. 395 Carson City Interim Bypass, Expressway 2000, Carson City, Nevada, Preliminary Roadway Design Report, Phase II Submittal," prepared by Lumos and Associates, Inc., dated August 1994.
- "Geotechnical Investigation for Hydraulics Analysis Report (Draft), Proposed Carson Freeway, Carson City, Nevada," prepared by Kleinfelder, Inc., dated January 26, 1998, File No.: 30-1348-15.001.
- "Geotechnical Investigation Report (Draft), Proposed Carson Freeway, U.S. 395, Carson City, Nevada," prepared by Kleinfelder, Inc., dated March 11, 1998, File No.: 30-1348-15.002.
- AASHTO Standard Specifications for Highway Bridges, 16th edition, 1996.

- "Design and Construction of Driven Pile Foundations," Publication No. FHWA-HI-97-013.
- "Earth Retaining Structures, Reference Manual (Draft)," FHWA Publication NHI Course No. 132326 – Module 6, May 1998.
- "Corrosion / Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes," Publication No. FHWA-SA-96-072.
- Ishihara, K. (1985), Stability of Natural Deposits During Earthquakes, Proceedings, Eleventh International Conference on Soil Mechanics and Foundation Engineering, San Francisco, August 12-16, pp. 321-376.
- Seed, H.B., Idriss, I.M., and Arango, I. (1983), Evaluation of Liquefaction Potential Using Field Performance Data, Journal of Geotechnical Engineering, ASCE, Vol. 109, No. 3, March, pp. 458-482.
- Seed, R.B., Harder, L.F. (1990), SPT-Based Analysis of Cyclic Pore Pressure Generation and Undrained Residual Strength, Proceedings, H. Bolton Seed Memorial Symposium, Vol. 2, ed: J. Michael Duncan, pp. 351-376.
- Tokimatsu, K and Seed, H.B. (1987), Evaluation of Settlements in Sands Due to Earthquake Shaking, Journal of Geotechnical Engineering, ASCE, Vol. 113, No. 8, August, pp. 861-878.
- Youd, T.L. and Garris, C.T., (1995), Liquefaction-Induced Ground-Surface Disruption, Journal of Geotechnical Engineering, ASCE, Vol. 121, No. 11, November, pp. 805-809.
- "Geotechnical Earthquake Engineering, Reference Manual," FHWA Publication HI-99-012, NHI Course No. 13239 – December 1998.

2. METHODS OF STUDY

2.1 Field Exploration

Our selection of field exploration locations was based on the anticipated roadway alignment, bridge layouts, ramp and realignment layouts, and site access. The subsurface exploration consisted of drilling 40 alignment borings ranging in depth from 2 to 12 meters below existing grade, 23 drainage borings ranging in depth from 9 to 16 meters below existing grade and 27 ramp and roadway realignment borings ranging in depth from 2 to 8 meters below existing grade. These borings were advanced using an auger type drill rig. The subsurface exploration for the bridge structures consisted of drilling 14 borings to depths of 14 to 24 meters below existing grade using mud-rotary type drilling methods.

Locations of borings shown on the site plans in Appendices A and B were approximated by pacing and measuring from features shown on the site plans. Elevations shown on the boring logs were obtained by interpolation between contour lines shown on the site plans. These locations and elevations should be considered accurate only to the degree implied by the method used.

Soil conditions encountered are presented on boring logs as follows:

- Line Borings, Plates C-2 through C-41A, Appendix C;
- Structure Borings, Plates D-2 through D-15A, Appendix D;
- Drainage Borings, Plates E-2 through E-24, Appendix E; and
- Ramp and Realignment Borings, Plates F-2 through F-28, Appendix F.

A key to the boring logs is presented as the first plate of Appendices C through F (C-1, D-1, E-1 and F-1).

A field engineer logged the soil conditions exposed in the borings and collected bulk and relatively undisturbed driven samples for laboratory testing. Soil samples were obtained by driving a 50.8 mm ID, 63.5 mm OD Modified California (MC) Sampler containing thin brass liners, into the bottom of the boring. The number of blows required to drive the last 300 mm of

an 458 mm drive with a 64 kg hammer dropping 760 mm is recorded as the blows per 300 mm (Blow Count) on the boring logs. Based on our field experience, the Standard Penetration Test (SPT) Blow Count can be approximated from the MC Sampler Blow Count by multiplying the field count by a factor of 0.85. Blow counts shown on the logs represent field counts and have not been corrected for sampler type, hammer efficiency, and overburden pressure. When the sampler was withdrawn from the boring, the brass liners containing the samples were removed, examined for logging, labeled and sealed to preserve the natural moisture content for laboratory testing.

After borings were completed, they were backfilled with excavated soil using the equipment at hand. Where borings were drilled in existing pavement, the pavement structural sections were measured and the borings were backfilled to the bottom of the structural section with drill cuttings with the final few inches backfilled with quick setting low shrinkage grout.

Our field exploration also included the coring of the existing pavement along the freeway alignment at College Parkway, Carmine Street, and Lompa Lane. Our cores extended through the structural section to the top of the subgrade soil. The results of our coring are presented in Section 3.2.4 of this report.

2.2 Laboratory Testing

Laboratory testing is useful for evaluating both index and engineering properties of soils. Typical index tests evaluate soil moisture content, unit weight, soil particle gradation, and plasticity characteristics. Tests for engineering properties can assess soil strength, compressibility, swell potential, and potential for steel corrosion or adverse reactivity with Portland Cement Concrete. We performed laboratory testing on selected soil samples to assess the following:

- Soil Classification (AASHTO T11, T27, T89 and T90)
- Unit Weight and Moisture Content (ASSHTO T204 and T265)
- Consolidation (AASHTO T216)
- Direct Shear Strength (AASHTO T216)
- R-Value (Nevada Test Method T115)
- Permeability (California Test Method 220)

A number of consolidation tests were conducted to evaluate settlement. Some of the tests were conducted on sandy samples prior to the completion of classification testing based on visual evaluation of the tube samples. These tests were initiated because of the long time required to complete the tests. In some cases, the amount of consolidation was minimal. In some cases, however, fine sandy soils consolidated as much or more than the more clayey soils although by classification, they tended to be more sandy rather than fine grained.

The following analytical tests were performed by Acculabs, Inc. (formerly Chemax Laboratories) on selected samples obtained from borings in the proposed structure locations:

- Soluble Sulfate Content
- Resistivity and pH

Individual laboratory test results can be found on the boring logs and in Appendices at the end of this report as follows:

- Laboratory tests for Line Borings, Appendix C, Plates C-42 through C-89;
- Laboratory tests for Structure Borings, Appendix D, Plates D-16 through D-41;
- Laboratory tests for Drainage Borings, Appendix E, Plates E-25 through E-34; and
- Laboratory tests for Ramp and Realignment Borings Appendix F, Plates F-29 through F-55.

3. DISCUSSION

3.1 Site Conditions

The majority of the Carson Freeway alignment north of U.S. 50 crosses undeveloped land. Some small areas cross through single family home sites. In addition, near its intersection with U.S. 50, the alignment crosses through a mobile home park and a strip mall. The general project area is relatively flat with a slight overall gradient down toward the south, except at the far northern end of the project (Duck Hill) where the ground slopes sharply down to the south, and where a total relief of approximately 31 meters is present. The Carson Freeway south of U.S. 50 primarily crosses undeveloped land. The area is relatively flat in the Lompa Ranch area, but gently slopes to the north and west in the Edmonds Drive area. In general, vegetation consisted of a low to moderate cover of sagebrush and native grasses. Surface runoff consists of sheetflow to existing road ditches and detention ponds.

3.2 Subsurface Conditions

The following paragraphs summarize the results of our field exploration. The boring logs should be reviewed for a more detailed description of the subsurface conditions at the locations explored.

3.2.1 Line Borings

We generally encountered sandy soils along the total alignment between Duck Hill on the north, to U.S. 50 East on the southern end of the project. However, clay soils were observed in the following locations: in the area near Northgate Lane below 6 meters, in the area near Emerson Drive between approximately 1/2 and 2 meters, and south of College Parkway below 4 meters. The sandy soils tend to be medium dense and fine to medium grained, while the clayey soils tend to be medium stiff to stiff and moderately plastic. Groundwater was encountered during our exploration at depths ranging from 8 to 9 meters (elevation 1445 to 1446) below the ground surface south of Bonanza at the base of Duck Hill. The general groundwater level south of Arrowhead Drive was typically 1-1/2 meters below the ground surface (approximate elevation

1441.5). No groundwater was encountered during our exploration north of Bonanza. Fluctuations in the level of the groundwater and soil moisture conditions as noted in this report may occur due to variations in precipitation, land use, irrigation, and other factors. A key to soil classification and terms is presented in Appendix C, Plate 1. The logs of line borings are presented in Appendix C, Plates C-2 through C-41A.

3.2.2 Structure Borings

As with the line borings, we generally encountered sandy soils with occasional relatively thin clay zone in the structure borings. The clay zones were more dominant in the borings drilled for the Northgate Lane structures. The clayey soils, although moderately plastic, tended to be very stiff to hard in consistency. In general, the near surface sandy soils were relatively loose to depths of 1-1/2 to 2 meters below the existing ground surface. Below this depth, soils encountered consisted of medium dense to very dense sandy soils with some interbedding of very stiff clayey soils. Groundwater levels were not be measured in any of the structure borings because all of the structure borings were drilled using the mud rotary drilling method. This method of drilling was used so that accurate blow counts could be measured for liquefaction analyses. Groundwater levels were measured in the other (line, ramp, and realignment and drainage) borings. Based on the groundwater measurements in these borings, groundwater is expected to be in excess of 6 to 8 meters (elevation 1460 to 1458) in the U.S. 395 over-crossing area, approximately 3 to 4 meters (elevation 1442 to 1441) in the Arrowhead Drive area, and 1-1/2 to 2 meters in areas of the remaining structures. A key to soil classification and terms is presented in Appendix D, Plate D-1. The logs of structure borings are presented in Appendix D, Plates D-2 through D-15A.

3.2.3 Drainage Borings

Drainage borings were drilled south of U.S. 50 in two general areas. The first area was in the Lompa Ranch area and the State Prison. In general, the groundwater level ranged from 1 to 2-1/2 meters below the ground surface. The soil types encountered were generally sandy soils. The exception was on the Lompa Ranch itself. One boring encountered clays up to 4 meters below the ground surface, with a second boring encountering clays within the first meter.

The second set of drainage borings south of U.S. 50 was drilled along the west side of Edmonds Avenue. The purpose of these borings, in addition to drainage issues, was to evaluate the subsurface conditions for the possible construction of the freeway below grade and the possible

use of the excavated soil for fill in the north of U.S. 50 section of freeway. In general, sandy soils were encountered in the borings. The near-surface soils tended to be more clayey toward the south, although all of the soils encountered in the borings were classified as sand, silty sand, or clayey sand. No groundwater was observed in these borings up to the depth drilled of over 15 meters. A key to soil classification and terms is presented in Appendix E, Plate E-1. The logs of drainage borings are presented in Appendix E, Plates E-2 through E-24.

3.2.4 Ramp and Realignment Borings and Cores

Subsurface conditions consisted of sandy soils. The density of the sandy soils varied from loose to medium dense. Groundwater was encountered at depths in the range of 1 to 2 meters (elevation 1413 to 1412) in the U.S. 50 and the north side of College Parkway ramp areas (elevation 1429 to 1428). This was also the typical depth to groundwater for the realignment of Lompa Lane (elevation 1415 to 1411) and Arrowhead Drive (elevation 1446 to 1445). In the realignment area for Imus Road groundwater was not encountered to the maximum depth explored of 3-1/2 meters below the existing ground surface. No groundwater was encountered south of College Parkway to the maximum depth explored of about 4-1/2 meters. This was also the case for the U.S. 395 ramps where the maximum depth explored was 8 meters. A key to soil classification and terms is presented in Appendix F, Plate F-1. The logs of ramp and realignment borings are presented in Appendix F, Plates F-2 through F-28.

Pavement cores were obtained for the realignment of College Parkway, Carmine Street, and Lompa Lane. Cores were taken at random locations within the areas proposed for realignment. Presented in Table 1 is a summary of the results of our coring study.

TABLE 1

CORING OF EXISTING PAVEMENTS

STREET NAME	CORE NO.	AC THICKNESS	AB THICKNESS	REMARKS
College Parkway	1	115 mm	75 mm	Eastbound
	2	120 mm	75 mm	Eastbound
	3	95 mm	130 mm	Turn lane
	4	100 mm	175 mm	Turn lane
	5	125 mm	75 mm	Westbound

Street Name	Core No.	AC Thickness	AB Thickness	Remarks
	6	115 mm	90 mm	Westbound
Carmine Street	7	145 mm	305 mm	Westbound
	8	125 mm	305 mm	Westbound
	9	120 mm	455 mm*	Eastbound
	10	125 mm	480 mm*	Eastbound
Lompa Lane	11	75 mm	610 mm**	Northbound
	12	75 mm	455 mm**	Southbound
	13	75 mm	305 mm	Southbound
	14	80 mm	305 mm	Northbound

*Very sandy base. Not expected to meet NDOT requirements for base.

**Minimum thickness. Could not hand auger to bottom of base.

3.2.5 Groundwater Measurements

Groundwater levels for the line, ramp, and drainage borings, along with corresponding surface elevations, boring depths, and project stationing, are provided in Table 2. Locations of alignment and bridge borings are also shown on the site plans in Appendices A and B, respectively. Groundwater levels were not measured in any of the structural borings since the borings were drilled using rotary mud methods.

TABLE 2

MEASURED GROUNDWATER LEVELS

Boring Number	Surface Elevation (m)	Boring Depth (m)	Groundwater Elevation	Station
BL-1	1414.27	1.98	NFWE	227+00
BL-2	1417.32	1.98	NFWE	332+00
BL-3	1417.32	3.51	1416.20	337+00
BL-4	1420.37	5.03	1416.67	342+00
BL-5	1420.37	6.55	1417.97	347+00
BL-6	1420.37	6.55	1419.27	352+00
BL-7	1423.42	6.55	1419.92	357+00
BL-8	1424.94	3.51	NFWE	362+00

Boring Number	Surface Elevation (m)	Boring Depth (m)	Groundwater Elevation	Station
BL-9	1425.55	3.51	NFWE	367+00
BL-10	1435.00	4.27	1432.00	372+00
BL-11	1432.56	7.16	1429.56	377+00
BL-12	1431.34	6.55	1428.14	382+00
BL-13	1431.34	6.55	1429.54	387+00
BL-14	1432.56	10.97	1431.06	393+00
BL-15	1432.56	11.13	1430.86	397+00
BL-16	1432.56	11.13	1430.86	402+00
BL-17	1434.08	7.16	1432.28	407+00
BL-18	1435.91	8.08	1434.21	424+00
BL-19	1435.61	8.08	1434.21	429+00
BL-20	1439.27	9.60	1437.77	439+00
BL-21	1435.61	10.21	1434.11	434+00
BL-22	1437.13	6.55	1435.73	444+00
BL-23	1440.48	10.21	1438.68	449+00
BL-24	1441.70	6.55	1440.00	454+00
BL-25	1443.23	8.08	1441.53	458+00
BL-26	1443.23	9.60	1441.53	462+00
BL-27	1447.80	8.69	1444.30	467+00
BL-28	1452.68	9.60	1445.08	474+00
BL-29	1455.72	9.60	1446.32	478+00
BL-30	1460.60	9.60	NFWE	483+00
BL-31	1469.14	9.60	NFWE	489+00
BL-32	1475.84	8.08	NFWE	494+00
BL-33	1480.11	9.60	NFWE	498+00
BL-34	1417.32	5.03	1415.82	339+00
BL-35	1420.37	6.55	1418.27	349+00
BL-36	1435.61	6.55	1433.91	404+00
BL-37	1440.48	6.55	1438.98	451+00
BL-38	1514.25	12.34	NFWE	503+00
BL-39	1530.10	9.75	NFWE	511+00
BL-40	1527.66	12.34	NFWE	521+00
BR-1	1497.18	3.20	NFWE	18+00
BR-2	1476.45	3.51	NFWE	8+00

Boring Number	Surface Elevation (m)	Boring Depth (m)	Groundwater Elevation	Station
BR-3	1469.14	1.98	NFWE	3+00
BR-4	1475.23	8.08	NFWE	15+00
BR-5	1470.36	3.51	NFWE	10+00
BR-6	1466.09	1.98	NFWE	6+50
BR-7	1466.09	3.51	NFWE	22+00
BR-8	1458.77	3.51	NFWE	18+00
BR-9	1456.33	3.51	NFWE	15+00
BR-10	1447.80	3.51	NFWE	5+50
BR-11	1429.51	3.51	1427.81	3+00
BR-12	1431.04	6.55	1429.24	8+00
BR-13	1430.43	1.98	NFWE	1+00
BR-14	1430.43	3.51	NFWE	4+00
BR-15	1431.65	4.72	NFWE	12+00
BR-16	1430.73	3.51	NFWE	9+00
BR-17	1430.12	3.51	NFWE	4+00
BR-18	1447.19	3.51	NFWE	5+00
BR-19	1446.58	3.51	1445.38	2+00
BR-20	1417.32	3.51	1415.62	20+00
BR-21	1414.27	3.51	1412.77	6+00
BR-22	1412.75	3.51	1411.55	1+00
BR-23	1412.75	3.51	1410.65	2+00
BR-24	1413.66	3.51	1412.16	6+00
BR-25	1414.88	3.51	1413.98	10+00
BR-26	1414.27	3.51	1412.57	10+00
BR-27	1413.05	3.51	1411.55	5+00
BD-1	1444.75	15.70	NFWE	144+00
BD-2	1444.75	15.39	NFWE	138+50
BD-3	1444.14	15.70	NFWE	135+00
BD-4	1444.75	15.54	NFWE	130+00
BD-5	1444.14	15.70	NFWE	125+00
BD-6	1409.70	9.45	1408.20	254+00
BD-7	1409.70	9.45	1408.20	253+00
BD-8	1409.70	9.60	1408.50	254+00
BD-9	1417.32	12.65	1415.92	343+86

Boring Number	Surface Elevation (m)	Boring Depth (m)	Groundwater Elevation	Station
BD-10	1417.62	12.65	1416.92	344+60
BD-11	1417.62	12.65	1415.82	349+83
BD-12	1417.62	12.65	1416.12	350+89
BD-13	1417.02	12.65	1415.32	337+00
BD-14	1417.32	12.65	1415.82	337+90
BD-15	1410.00	9.60	1408.80	254+75
BD-16	1410.31	9.60	1407.91	262+50
BD-17	1410.31	9.60	1408.21	262+50
BD-18	1410.61	9.60	1408.81	277+50
BD-19	1410.61	9.60	1408.81	227+50
BD-20	1410.61	9.60	1409.11	282+50
BD-21	1410.61	9.60	1409.41	303+50
BD-22	1410.61	9.60	1409.41	308+50
BD-23	1411.22	9.45	1409.42	312+80

NFWE=No free water encountered
BL=Line boring
BR=Ramp boring
BD=Drainage boring

3.3 Liquefaction

Liquefaction is a phenomena where soils undergo a sudden loss of strength as a result of increased pore pressure induced by ground shaking. Soil conditions considered most susceptible to liquefaction are saturated sands, coarse silts and gravel with little or no fines.

The boring logs at Arrowhead Drive (Borings BS-03 & BS-04), at Northgate Lane (Borings BS-05 & BS-06), and at Emerson Drive (Borings BS-07 & BS-08) (Appendix D) indicate that these sites are underlain by material consisting of loose to medium dense sands, silty sands, and sandy silts. The depth to groundwater is approximately 1.5 meters. Because of the shallow groundwater at these structure locations, these structures were analyzed for liquefaction. The liquefaction analyses were performed according to the method proposed by Seed et. al. (1983) using the field SPT N-values. We have performed liquefaction analyses for the Design Level Earthquake (DLE) which is defined as a ground motion having 10 percent probability of exceedance in 50 years. Assuming Magnitude 6.9 associated with the Genoa fault and a peak

ground acceleration of 0.4g, the results of our analyses indicate that some of the layers consisting of sands and silty sands will likely liquefy under the design level earthquake. These liquifiable soil layers for the design level of ground shaking within typical borings are summarized in Table 3.

TABLE 3

DEPTH OF LIQUEFACTION AND UNDRAINED RESIDUAL STRENGTH

Boring	Depth (m)		Thickness (m)	$(N_1)_{60\text{-}cs}$*	Undrained Residual Strength (kN/m^2)
	From	To			
BS-03	1.5	3.0	1.1	15	0.31
BS-04	1.5	3.0	1.8	12	0.18
BS-05	4.9	5.8	1.5	22	0.67
BS-07	8.5	10.1	2.7	25	>0.7

* For the definition of $(N_1)_{60\text{-}cs}$, see Seed and Harder (1990).

If liquefaction occurs, foundations resting on or within the liquefiable layers may undergo settlement. This will result in reduction of foundation stiffness and capacities. In some cases, the soil layer may liquefy but the residual shear strength may still be enough so that the earthquake induced settlements will be negligible. Therefore, we have also estimated the residual strengths for each zone of liquefaction. The residual strengths were estimated based on the data presented by Seed and Harder (1990) in which $(N_1)_{60\text{-}cs}$ is the SPT penetration resistance in blows per 300 mm corrected for overburden pressure, applied energy to the drill rods, and fines content.

3.4 Earthquake Induced Settlement and Ground Surface Disruption

During an earthquake, saturated sands tend to settle and densify as a result of pore pressure dissipation. A layer may or may not liquefy, nevertheless, it can experience settlement during an earthquake. Another major concern during an earthquake is some form of ground surface disturbance or ground failure. The ground failure can be in the form of sand boils, small ground fissures, ground oscillation such as buckled pavements, curbs, broken pipelines, etc., and lateral ground displacement. One of the major reasons for ground surface disruption is insufficient cover thickness of non-liquefiable layer over a liquefiable layer (Ishihara, 1985; Youd and Garris, 1995).

We have estimated the earthquake induced settlement based on the method proposed by Tokimatsu and Seed (1987). The ground surface disruption has been estimated using the criteria proposed by Ishihara (1985). The results of our settlement analysis as well as potential for ground disruption for each boring is presented in Table 4. The results of our analysis show that the Arrowhead Drive site can experience settlements on the order of 25 to 35 mm during a seismic event. However, the earthquake induced settlements will be minimal at Northgate Lane and Emerson Drive. The settlement amount may increase at the Arrowhead Drive location in the event the sand manifests as sand boils or the groundwater table is higher than assumed in the analysis. Also, ground surface disruption is likely to occur only at the Arrowhead Drive location during a seismic event. This may result in an increase in settlement locally beneath footings.

TABLE 4

EARTHQUAKE INDUCED SETTLEMENTS

Boring	Settlement (mm)	Ground Surface Disruption
BS-03	25	Yes
BS-04	30	Yes
BS-05	13	No
BS-07	0	No

4. CONCLUSIONS

The following conclusions are based on the data collected during this assessment and are subject to the limitations stated in this report. These conclusions may change if additional information becomes available. Based on the results of our study, no severe soil or groundwater constraints were observed which would preclude the planned construction. The following is a summary of our conclusions.

- Site soils encountered in our field investigation generally consist of sandy soils with occasional interbedded clay zones. The near-surface sandy soils tend to be loose to medium dense, increasing in density with depth. The clay zones, where encountered, tend to be medium stiff to stiff and of moderate plasticity.

- Groundwater was encountered at depths as shallow as 1-1/2 meters below the existing ground surface south of Arrowhead Drive. The shallow groundwater may adversely impact construction in some areas of the project south of Arrowhead Drive.

- Two potential fill borrow areas were explored as part of our investigation at Duck Hill and Edmonds Drive. The Duck Hill area is composed of decomposed granite (DG), and the Edmonds Drive area composed of silty sands. Both areas are deemed to be adequate fill sources; however some blending of the silty fine sand portions of the south end of the Edmonds area must be performed to produce a good quality fill. We estimate that a 50-50 blend of the fine sand at the south end of Edmonds with the DG from the Duck Hill area or the northern Edmonds area will provide a suitable fill soil.

- We analyzed embankment stability assuming a material internal angle of friction of 34 degrees (as requested by NDOT) and a material internal angle of 38 degrees (based empirical values provided in Table 4-5, Publication No. FHWA-HI-97-013 for dense materials). Our results indicate slopes of inclinations of 2H:1V or less and up to 9.1 meters in height are stable under static and seismic conditions for materials with internal angles of friction of 34 to 38 degrees. Our results also indicate slopes constructed at a batter of 1.5H:1V are unstable during a design level seismic event for a cohesionless soil with an internal angle of friction of 34 degrees. We recommend that permanent fill be constructed to a maximum slope of 2H:1V.

- Our stability analysis performed using the XSTABL5.2 computer program indicates low factors of safety for abutment foundations supported within the embankments during a design seismic event. We recommend that all bridge structures be founded

on deep foundations. Recommendations for driven pipe piles, sizes PP305, PP406 and PP457 are provided.

- Resitivity testing indicates potentially corrosive to moderately corrosive conditions at the bridge locations. Carbon steel corrosion rates are anticipated to be on the order of 12 µm/yr. Assuming a design life of 100 years for the proposed bridge abutments and a uniform loss model, steel pipe piles will have an overall sacrificial wall thickness loss of less than 1.5 mm. We recommend a sacrificial wall thickness of 1.5 mm be used in determining the required pipe pile wall thickness.

- The potential for liquefaction of the site soils and the resultant settlement are expected to be minimal.

Specific recommendations for project design and construction including mitigation of potential problems described above are presented in Section 5.0.

5. RECOMMENDATIONS

5.1 Standard Specifications

Specifications or Standard Specifications as referenced to in this report, mean the "Standard Specifications for Road and Bridge Construction, State of Nevada, Department of Transportation," 1996 Edition.

5.2 Site Clearing and Preparation

Prior to construction, surface vegetation and organic soils should be stripped and removed from the alignment or stockpiled for use in non-structural areas. Clearing and grubbing should be performed in accordance with Section 201 of NDOT Standard Specifications for Road and Bridge Construction. Although it will vary considerably along the project length, it appears 150 mm can be used as a reasonable estimate for average depth of stripping. Deeper stripping/grubbing of organic soils, tree roots, etc., may be required in localized areas. Tree root balls should be removed and the resulting voids backfilled with adequately compacted backfill soil. All man-made debris and improvements including structures such as foundations, dump fills and trash should be removed from the alignment. Brush may be disposed of beneath fill slopes of roadway embankments provided the embankment height is greater than one meter and NDOT requirements are followed.

The geotechnical engineer should be present during stripping and surface preparation operations to observe stripping and grubbing depths, and to evaluate whether buried obstacles such as underground utilities, wells, and foundations are present. Special care should be exercised in evaluating whether loose utility backfills exist which could adversely affect the planned pavements and structures. Any existing wells should be abandoned in accordance with local requirements. Excavations resulting from removal operations should be cleaned of all loose material and widened as necessary to permit access to compaction equipment.

Dust control will be the responsibility of the contractor. A dust control plan should be prepared by NDOT or the contractor prior to the start of grading.

5.3 Earthwork

5.3.1 Fill Sources

Two areas of possible fill source were evaluated as part of this investigation, the area at the north end of the project (Duck Hill) and the area south of U.S. 50 along Edmonds Drive. Based on the borings and laboratory tests on samples from these areas, we have developed the following conclusions and recommendations:

- The potential fill source at Duck Hill consists of relatively clean sand or decomposed granite (DG) (see Appendix C for boring logs and laboratory test results) and is an acceptable borrow source. The majority of the site soils including topsoil contain less than 25% fines. Any layers with excessive fines are anticipated to be limited and should be readily mixed during construction to obtain an acceptable fill material. The material in this area can be excavated with conventional earthmoving equipment. An occasional large boulder may be encountered which will require special handling.

- The potential fill source along Edmonds Drive south of the Lompa Ranch is also a viable borrow source. The soil types in this area are generally sandy. Toward the south end of the area explored as part of this study (see Appendix E for boring logs and laboratory test results), the silt content and the fineness of the sandy soils encountered in our borings resulted in fairly low R-Value test results. Some special handling of some of these fine silty sand zones, such as mixing with other sandy soils or the DG from Duck Hill, may become necessary. We recommend a 50-50 mixture of these fine sandy soils with either DG from the Duck Hill area or the more sandy soils of the northern portions of the Edmonds area. We believe this mixture will provide a suitable fill material. Alternating loads of these materials on grade with mixing as part of the filling and compaction process should provide suitable mixing. It is not expected that this will be a major construction issue if these soils are chosen as borrow sources.

5.3.2 General Site Grading

Site preparation and grading should conform to the requirements contained in this report and in the standard specifications. We anticipate that site grading can be performed with conventional

earthmoving equipment. Prior to fill placement, the exposed native soils should be scarified to a minimum depth of 150 mm, moisture conditioned within 2% of optimum moisture, and compacted to a minimum of 90% relative compaction in accordance with the AASHTO T180 compaction test method. Fill soils, which have been similarly moisture conditioned can then be placed and compacted to the designed lines and grades.

Shallow groundwater and the percentage of fines within near surface soils at Highway U.S. 50 and Arrowhead Drive may dictate the need for soil stabilization prior to the placement of embankment fill. Suitable subgrade support can be accomplished with a geogrid reinforced aggregate raft or with the creation of a construction platform using pit run gravel. The actual design will depend on conditions encountered during construction. In general, with the exception of shallow groundwater at some locations, we do not believe that the near surface soils are unstable or pose major construction difficulties.

5.3.3 Recommended Permanent Slope Angles

Although no borrow source(s) has been formerly designated for construction of embankments for the Carson Freeway, material properties similar to the soil conditions encountered in the Duck Hill and Edmonds Drive areas can be expected. Based on these conditions, we have conducted slope stability analyses for the conditions shown in Table 5. We have analyzed embankment stability assuming a material internal angle of friction of 34 degrees (as requested by NDOT) and also assuming a material internal angle of 38 degrees (based on empirical values provided in Table 4-5, Publication No. FHWA-HI-97-013 for dense materials). Based on laboratory results, fill materials were assumed to have an average cohesion value of 6 kPa. The embankment stability was also analyzed assuming a non-cohesive sand fill.

The stability analyses were performed using the XSTABL5.2 computer program, which analyzes circular and/or block failure surfaces and their attendant Factor of Safety (FS) by the modified Bishop or Janbu methods. The program analyzes two-dimensional cross-sections of the slope using available information on the subsurface structure, strength of the various earth materials, surcharge or seismic loading conditions, and groundwater conditions. The computed FS is the ratio of forces tending to resist movement to the forces tending to drive movement. A FS less than 1 suggests the slope is unstable. From a practical perspective, a FS of at least 1.5 is used as an acceptance criteria for the static load case, and a minimum factor of 1.1 is used for the seismic case. The results of these analyses are shown on Plates 1 through 4a for static and seismic states using both 34 and 38 degrees, at the end of Section 5.0, and are also presented below in Table 5.

TABLE 5

RESULTS OF EMBANKMENT STABILITY ANALYSES

Soil Type	Soil Properties	Embankment Height & Slope	Seismic Coefficients	Factor of Safety for c=0	Factor of Safety for c=6 kPa
Fill (assumed average properties)	γ = 19.63 kN/m^3 ϕ = 34° & 38° c=0 kPa and 6 kPa	9.1 meters			
Native (average measured properties)	γ = 18.69 kN/m^3 γ = 20.26 kN/m^3 (saturated) c= 9 kPa ϕ = 31° Water level @1.5m				
	For ϕ = 34°	2H:1V	0V,0H	1.62	2.15
			0V,0.175H	1.06	1.41
		1.5H:1V	0V,0H	1.16	1.73
			0V,0.175H	0.80	1.25
	For ϕ = 38°	2H:1V	0V,0H	1.88	2.25
			0V,0.175H	1.10	1.50
		1.5H:1V	0V,0H	1.34	2.04
			0V,0.175H	0.93	1.42

Our results indicate the slopes are globally stable under seismic and static loading conditions for construction slopes of 1.5H:1V and 2H:1V constructed with fill material with an average cohesion value of 6 kPa. Embankments constructed with non-cohesive materials can be expected to experience shallow instability (surface sloughing). In areas where clean sand is placed on the surface embankments, periodic maintenance should be anticipated.

Drainage and runoff primarily affect satisfactory slope performance. Care must be taken that drainage is not directed to flow over slope faces. Interceptor (brow) ditches should be

constructed at the tops of slopes in order to collect and divert runoff which otherwise would flow over slope face. Slope faces should be protected against erosion resulting from direct rain impact and melting snow. Consideration should be given to permanent measures such as concrete, geosynthetics and vegetation.

Clay layers were encountered in some of our line borings. An analysis of these clay layers indicates that long-term settlement should not be an issue in the performance of fill slopes along the alignment. The clay layers encountered are relatively thin and stiff to very stiff. Relatively loose surface sandy soils are expected to experience the majority of their settlement during construction.

5.3.4 Embankment Fill Stability Supporting Shallow Spread Foundations

We have analyzed fill stability assuming bridge abutment foundations would be supported within the embankment fill. The abutment foundations were assumed to be 2.5 meters wide, with an embedment depth of 1.5 meters and a design bearing pressure of load of 191.5 kPa. We analyzed the embankment stability assuming a material internal angle of friction of 34 degrees and 38 degrees, a non-cohesive material and a material cohesion of 6 kPa and an embankment inclination of 2H:1V. Each case was analyzed for static and seismic loading conditions. The results of these analyses are shown on Plates 5 through 8 and summarized below in Table 5a.

TABLE 5a

RESULTS OF EMBANKMENT STABILITY SUPPORTING ABUTMENT FOUNDATIONS

Soil Type	Soil Properties	Embankment Height & Slope	Seismic Coefficients	Factor of Safety for c=0	Factor of Safety for c=6 kPa
Fill (assumed average Properties)	γ = 19.63 kN/m^3 c=6 kPa ϕ = 34° & 38°	9.1 meters			
Native (average measured Properties)	γ = 18.69 kN/m^3 γ = 20.26 kN/m^3 (saturated) c= 9 kPa ϕ = 31° Water level@1.5m				
	For ϕ = 34°	2H:1V	0V,0H 0V,0.175H	1.30 0.87	1.50 1.13
	For ϕ = 38°	2H:1V	0V,0H 0V,0.175H	1.53 1.00	1.59 1.20

Our results indicate the slopes are globally stable under static and seismic conditions for slopes materials with a minimum cohesion of 6 kPa and constructed at a maximum batter of 2H:1V. However, for a cohesionless fill material with an internal angle of friction 34 degrees the factor of safety is insufficient for both the static and seismic cases. Cohesionless materials with an internal angle of friction of 38 degrees are also considered unstable during a design earthquake event. Deep foundations are recommended for the support of bridge abutment foundations.

5.3.5 Temporary Trench Excavation and Backfill

It appears that excavations for footings and utility trenches can be readily made with either a conventional backhoe or excavator in either native soil or compacted imported fill. We expect the trench walls for excavations less than 1-1/2 meters deep to stand nearly vertical without significant sloughing provided that proper moisture contents are maintained. The contractor should evaluated and verify the stability of each trench prior to occupation by construction personnel. At some locations shoring or sloping of trench walls may be necessary to protect personnel and provide temporary stability. All excavations above the water table should comply with current OSHA safety requirements for Type B soils, which allows for a maximum vertical slope of 1H:1V for excavations less than 6 meters in height (Federal Register 29 CFR, Part 1926). In areas of shallow groundwater, or where water is freely seeping from trench walls, excavations should comply with OSHA safety requirements for Type C soils, which allows for a maximum allowable slope of 1.5H:1V. Shoring and/or dewatering may be required. Sloping or benching of excavations greater than 6 meters in depth will need to be evaluated on a case by case basis.

During wet weather, runoff water should be prevented from entering excavations. Water should be collected and disposed of outside the construction limits. Heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed within a distance of one-third the slope height from the top of any excavation. Backfills for trenches or other excavations within pavement areas, beneath concrete slabs, and adjacent to foundations should be compacted in 150 to 200 mm layers with mechanical tampers. Jetting and flooding should not be permitted. We recommend all backfill be compacted to a minimum compaction of 90% of the maximum dry density as determined by Nevada Test Method T101.

5.3.6 Soil Shrinkage

Shrinkage will generally occur where native soils are excavated and placed in compacted fills. Also, shrinkage can be expected in the Duck Hill and Edmonds Drive borrow areas. We estimate that shrinkage will range from 5% to 15% as a result of volume change due to compactive effort. The oversize materials may also contribute to loss of volume where screening is required prior to placement in structural fill areas or trench backfill. Provisions should be made for replacing the volume of oversize materials with additional imported structural fill material.

Alternately, oversize rocks up to 300 mm in diameter may be placed in deep fill areas, at depths greater than 1 meter below utilities and foundations. Incorporation of oversize rocks into structural fills will require special construction techniques to prevent nesting. The geotechnical engineer or his representative should observe all procedures for placement of oversize materials within fills.

The shrinkage estimates discussed in this report are based on a comparison of in-place density tests and estimated maximum densities. The actual volume of soils tested is minuscule when compared to the volume of materials, which will be involved in earthwork operations. NDOT and the Contractor are warned against relying on these estimates for bidding purposes or quantity calculations. In general, the Contractor's past experience in the area is a better predictor of volume changes during earthwork operations.

5.4 Foundations

5.4.1 Alternative Foundation Types

Our stability analysis performed using the XSTABL 5.2 computer program indicates low factors of safety for abutment foundations supported within the embankments during a design seismic event. We recommend that all bridge structures be founded on deep foundations. Recommendations for driven pipe piles, sizes PP305, PP406 and PP457 are provided below Recommendations for conventional foundations for retaining walls are provided in Section 5.5.2.

5.4.2 Deep Foundation Design Parameters

Included in Plates 9 through 29 at the end of Section 5.0, are design charts for ultimate capacities with depth for single driven closed end pipe piles, designations PP305, PP406, and PP457. Design charts have been provided for each bridge location and are based on conditions encountered during our subsurface exploration. In accordance with AASHTO *Standard Specifications for Highway Bridges, 16th edition, 1996, Section 4.3.2*, ultimate bearing capacities have been limited to six meters above the bottom of our subsurface exploration at each location. The ultimate capacity line has been extended below the six meter limit in each chart to reflect an inferred ultimate bearing which could be achieved; however, additional subsurface exploration is required to verify this extrapolation.

For piles driven through embankment fill, capacities for PP305, PP406, and PP457 pile types may be increased by 7 kN, 15 kN and 21 kN, respectively. Piles driven through embankment fills should extend to a minimum of three meters into the original ground surface unless a competent bearing layer is encountered at a shallower depth. The maximum size rock within the embankment fill should not exceed 150 mm in areas where pile foundations are to be constructed.

In accordance with AASHTO *Standard Specifications for Highway Bridges, 16th edition, 1996, Table 4.5.6.2A*, we recommend that allowable pile capacities be calculated using a factor of safety of 2.75. This factor of safety value is consistent with the use of the 1997 version of the Wave Equation Pile Analysis (WEAP) program. For construction control which might include a static load test, a factor of safety of 2.0 may be used.

We recommend that pipe piles be Grade 2 steel (ASTM A252-96) with a minimum wall thickness of 7.9 mm. The actual wall thickness will need to be determined by the structural engineer. A sacrificial wall thickness of 1.5 mm should be considered when determining the actual wall thickness to account for possible corrosion of the steel piles by the native site soils (see Appendix D, Plates D-40 and D-41).

Wave equations relating expected driving resistance with depth for each bridge location are provided below in Table 6. Driving resistances were calculated assuming various Delmag diesel hammers and wood block cushions. Maximum allowable driving resistance is estimated to be approximately 217 MPa or $0.9F_y$.

TABLE 6

SUMMARY OF WEAP ANALYSIS

Boring Location	Pile Length (m)	Pile Type	Ultimate Pile Capacity (kN)	Required Yield Strength (MPa)	Hammer Description	Blows per Meter	Driving Stress (MPa)	Allowable Driving Stress (MPa)
BS-1	14	PP305 7.9mm wall	1229	241	Delmag D 36-32	186	200.4	217
BS-1	14	PP406 9.5mm wall	1966	241	Delmag D 62-22	283	191.9	217
BS-1	14	PP457 9.5mm wall	2222	241	Delmag D 80-23	168	208.1	217
BS-4	18	PP305 7.9mm wall	1229	241	Delmag D 36-32	170	196.8	217

Boring Location	Pile Length (m)	Pile Type	Ultimate Pile Capacity (kN)	Required Yield Strength (MPa)	Hammer Description	Blows per Meter	Driving Stress (MPa)	Allowable Driving Stress (MPa)
BS-4	18	PP406 9.5mm wall	1966	241	Delmag D 62-22	245	188.7	217
BS-4	18	PP457 9.5mm wall	2222	241	Delmag D 80-23	137.7	201.7	217
BS-5	18	PP305 7.9mm wall	1229	241	Delmag D 36-32	152	196.1	217
BS-5	18	PP406 9.5mm wall	1966	241	Delmag D 62-22	234	187.2	217
BS-5	18	PP457 9.5mm wall	2222	241	Delmag D 80-23	132	199.3	217
BS-8	14	PP305 7.9mm wall	1229	241	Delmag D 36-32	185	200.3	217
BS-8	14	PP406 9.5mm wall	1966	241	Delmag D 62-22	285	191.9	217
BS-8	14	PP457 9.5mm wall	2222	241	Delmag D 80-23	154	205.6	217
BS-10	18	PP305 7.9mm wall	1229	241	Delmag D 36-32	289	200.4	217
BS-10	18	PP406 9.5mm wall	1966	241	Delmag D 62-22	468	192.7	217
BS-10	18	PP457 9.5mm wall	2222	241	Delmag D 80-23	244	205.9	217
BS-11	18	PP305 7.9mm wall	1229	241	Delmag D 36-32	251	198.4	217
BS-11	18	PP406 9.5mm wall	1966	241	Delmag D 62-22	385	190.6	217
BS-11	18	PP457 9.5mm wall	2222	241	Delmag D 80-23	197	206.7	217
BS-14	15	PP305 7.9mm wall	1229	241	Delmag D 36-32	188	200.5	217
BS-14	15	PP406 9.5mm wall	1966	241	Delmag D 62-22	286	192.4	217
BS-14	15	PP457 9.5mm wall	2222	241	Delmag D 80-23	151	206.0	217

Notes: Hammer efficiency is assumed to be 80 percent. A factor of safety of 2.75 is used for ultimate pile capacities.

Soil parameters for laterally loaded pile analysis are provided in Table 7. Design parameters were estimated based on corrected blow counts, laboratory index test results and recommendations provided in Tables 9-12 and 7-13 of FHWA *Design and Construction of Driven Pile Foundations, Workshop Manual* - Volume 1, December 1996. As noted in Table 7, where cohesionless soils were encountered in our field investigation, soil parameters consisting of friction angles were used in our analyses. Where clayey soils were encountered, values of cohesion and strain at 50 percent of the maximum principal stress were used in the analyses.

TABLE 7

PILE LATERAL LOAD DESIGN PARAMETERS

Structure Location	Elevation (M)	Groundwater Elevation (M)	Dry Density (kN/m^3)	Soil Parameters	K (kN/m^3)
U.S. 395	1460.1	NFWE [1]			
			19	$\phi = 32°$	24,430
	1462.6				
			19	$\phi = 35°$	24,430
	1457.1				
			21	$\phi = 35°$	24,430
	1454.1				
			21	$\phi = 40°$	24,430
	1451.6				
Arrowhead Drive	1446.0				
			20	$\phi = 32°$	24,430
	1441.0	1441.0			
			11	$\phi = 32°$	16,300
	1430.0				
			8	$C_u = 80$ kPa $\varepsilon_{50} = 0.007$	136,000 (static) 54,300 (cyclic)
	1427.0				
Northgate Lane	1436.5				
			20	$C_u = 50$ kPa $\varepsilon_{50} = 0.007$	136,000 (static) 54,300 (cyclic)
	1434.0	1434.0			
			10	$\phi = 32°$	5,430
	1432.5				
			10	$\phi = 32°$	16,300
	1428.0				
			10	$C_u = 100$ kPa $\varepsilon_{50} = 0.005$	136,000 (static) 54,300 (cyclic)
	1426.0				
			10	$\phi = 36°$	33,900
	1417.5				
Emerson Drive	1433.2				
			20	$\phi = 32°$	24,430
	1432.2	1432.2			
			10	$C_u = 25$ kPa	27,150

Structure Location	Elevation (M)	Groundwater Elevation (M)	Dry Density (kN/m^3)	Soil Parameters	K (kN/m^3)
				$\varepsilon_{50} = 0.01$	
	1430.2				
			10	$\phi = 33°$	16,300
	1424.2				
			10	$C_u = 50$ kPa	136,000 (static)
				$\varepsilon_{50} = 0.007$	54,300 (cyclic)
	1423.2				
			10	$\phi = 33°$	16,300
	1418.2				
			10	$C_u = 150$ kPa	271,000 (static)
				$\varepsilon_{50} = 0.005$	108,500 (cyclic)
	1415.2				
			10	$\phi = 34°$	16,300
	1414.2				
College Parkway	1430.1		17	ϕ=33	24,430
	1428.0	1428.0			
			17	ϕ=33	16,300
	1413.1		16	C_u=70 kPa	136,000 (static)
				ε_{50}=0.007	54,300 (seismic)
	1408.8		18	ϕ=40	33,900
Carmine Street	1417.3				
			19	$\phi = 33°$	24,430
	1415.3	1415.3			
			10	$\phi = 33°$	16,300
	1401.8				
			10	$C_u = 300$ kPa	543,000 (static)
				$\varepsilon_{50} = 0.004$	217,000 (cyclic)
	1398.3				
U.S 50	1411.2		14	$\phi = 30°$	24,450
	1409.4	1409.4	16	$\phi = 35°$	16,300
	1406.8		17	$\phi = 37°$	33,900
	1404.7		18	$C_u = 96$ kPa	271,000 (static)
				$\varepsilon_{50} = 0.005$	108,500 (seismic)
	1403.3		17	ϕ=40	33,900
	1400.6		17	$C_u = 96$ kPa	271,000 (static)

Structure Location	Elevation (M)	Groundwater Elevation (M)	Dry Density (kN/m^3)	Soil Parameters	K (kN/m^3)
	1397.8		17	$\varepsilon_{50} = 0.005$ $\phi=35$	108,500 (seismic) 25,100

(1) NFWE = No Free Water Encountered

The recommended driving shoe to be used on pipe piles is presented on Plate 30 at the end of Section 5.0.

5.5 Retaining Structures

5.5.1 Lateral Earth Pressure

Retaining walls are currently planned for seven locations along the proposed alignment. These locations are designated as Hot Springs, Bike Path #1, Emerson and Northgate, Broadleaf East, Bike Path #2, South of Arrowhead, and LV3. Lateral earth pressures will be imposed on all subterranean structures, including retaining walls and foundations. Table 8 presents a list of soil parameters which we recommend for use in the design of these structures.

TABLE 8

LATERAL EARTH PRESSURES

Backfill Angle	Earth Pressure	Earth Pressure Coefficient	Equivalent Fluid Density
0°	Active	0.25	5.0 kN/m^3
	At-rest	0.44	8.8 kN/m^3
	Passive	7.24	144.8 kN/m^3
	Active (K_{AE})	0.56	11.2 kN/m^3
	Passive (K_{PE})	5.95	119.0 kN/m^3
26° (2:1)	Active	0.40	8.0 kN/m^3
	Passive	19.30	392.0 kN/m^3
	Active (K_{AE})	1.36	27.2 kN/m^3
	Passive (K_{PE})	138.86*	2,777.2 kN/m^3
	Friction Coefficient (tan δ)		0.4

	Angle of Internal Friction (ϕ)		34°
	Wall Friction Angle (δ)		22°
	Unit Weight (γ)		20 kN/m^3

*Rotation into 2:1 slope

Earth pressures provided above were calculated in accordance with recommendations provided in the Federal Highway Administration *Earth Retaining Structures, Reference Manual (Draft)*, dated May 1998. As noted, an angle of internal friction of 34 degrees is recommended per NDOT's request. Seismic lateral earth pressure design parameters were calculated using the Mononobe-Okabe analysis as outlined in the National Cooperative Highway Research Program Report 343 (*Manuals for the Design of Bridge Foundations, Part 3 – Engineering Manual for Retaining Walls and Abutments)* December 1991.

The at-rest case is applicable for braced walls where rotational movement is confined to less than 0.001 H. If greater movement is possible, the active case applies. These values do not include hydrostatic pressures that might be caused by groundwater or surface water trapped behind a structure. Where backfill is placed against structures such as retaining walls, we recommend that non-expansive, free-draining materials meeting NDOT filter criteria be used in the zone immediately adjacent to the structure to reduce hydrostatic forces. The free-draining material should have a minimum lateral thickness of 600 mm. Alternately, the use of pre-manufactured drainage panels should be considered. Furthermore, adequate drainage of the backfill in the form of subdrains and/or weepholes should be provided at the base of the wall. If weepholes are constructed, they should be on a maximum of three-meter centers vertical spacing, five-meter centers horizontal spacing, and have a minimum diameter of 102 mm. All weepholes should be backed with a minimum of 0.06 cubic meters of Type 2 drain backfill encased in geofabric, Mirafi 160N, 180N, or equal.

General backfill should be non-expansive material conforming to NDOT specifications for granular backfill. The lateral loads computed using the values in Table 8 assume that the non-expansive backfill will extend laterally at least one-half of the wall height. If this condition does not apply, the design values may require revision. This backfill should be compacted to 95% of maximum dry density and within 2% of the optimum moisture content as determined by AASHTO T99. Over-compaction should be avoided as the increased compactive effort will result in lateral pressures higher than those recommended above. Heavy equipment or other

loads should not be allowed in within one-third of the wall height unless planned for in the structural design.

5.5.2 Bearing Capacity

Presented in Plates 31 through 37 at the end of Section 5.0 are our recommended retaining wall foundation bearing pressures and associated estimated settlements as a function of footing width and embedment depth. Plates 31 through 37 are for the seven locations where retaining walls are planned for construction. Bearing Capacities were calculated in accordance with AASHTO *Standard Specifications for Highway Bridges, 16th edition, 1996, Section 4.4.7.*

Foundations should bottom on firm native soil or compacted structural fill. Any loose soil in the bottom of the footing excavation should be recompacted to at least 95% relative compaction or removed to expose firm unyielding material.

The allowable bearing pressures were calculated using a factor of safety of 3.0 in accordance with AASHTO procedures. The allowable bearing pressures are net values; therefore, the weight of the foundation and backfill may be neglected when computing dead loads.

If seismic loading is evaluated in accordance with AASHTO *Standard Specifications for Highway Bridges 16th edition, 1996, Section 3*, we recommend using an acceleration coefficient of 0.35g and a Site Coefficient (S) of 1.2 which is applicable to a Type II Soil Profile. The allowable bearing capacity for seismic loading can be determined by multiplying the allowable bearing pressure in Plates 31 through 37 by 3.0 (to determine the ultimate bearing capacity) and dividing by a factor of safety of 1.5.

The data presented on Plates 31 through 37 were developed based on conditions encountered in adjacent borings. The effects of shallow groundwater were considered in the ultimate/allowable bearing values and calculated settlements as presented in the design Plates. Assumed groundwater levels for each location are presented below in Table 9.

TABLE 9

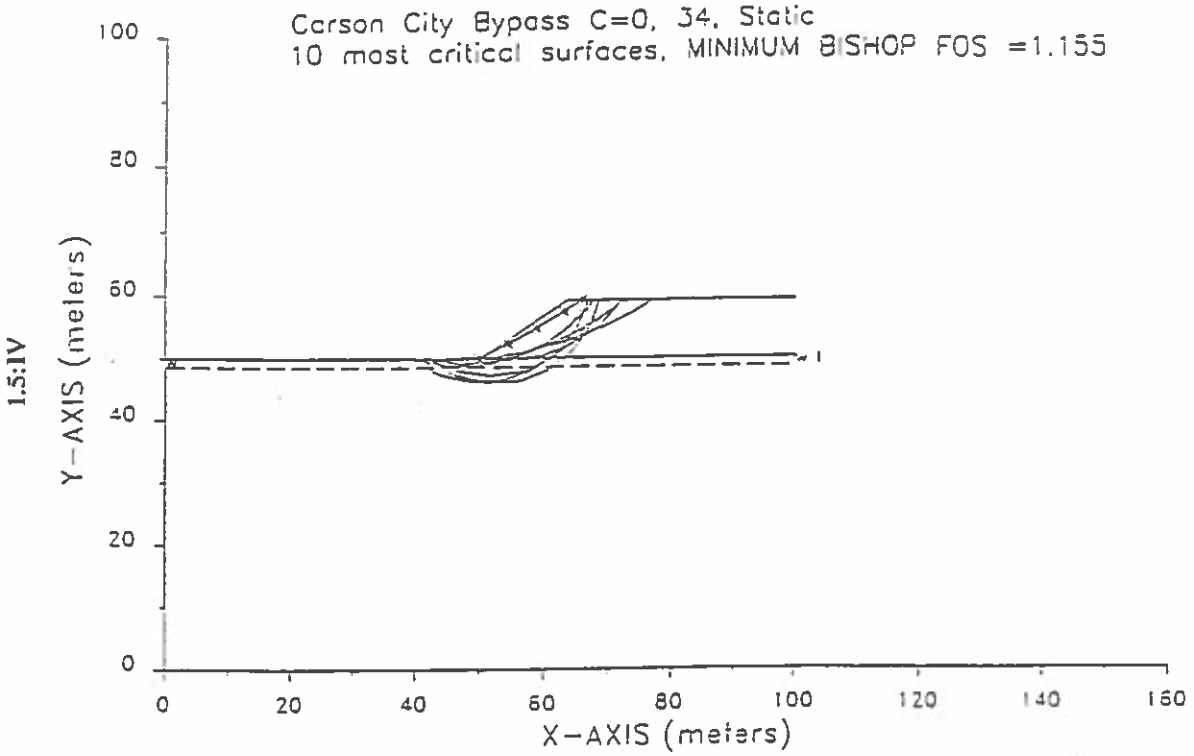
ASSUMED GROUNDWATER LEVELS FOR RETAINING WALL DESIGN

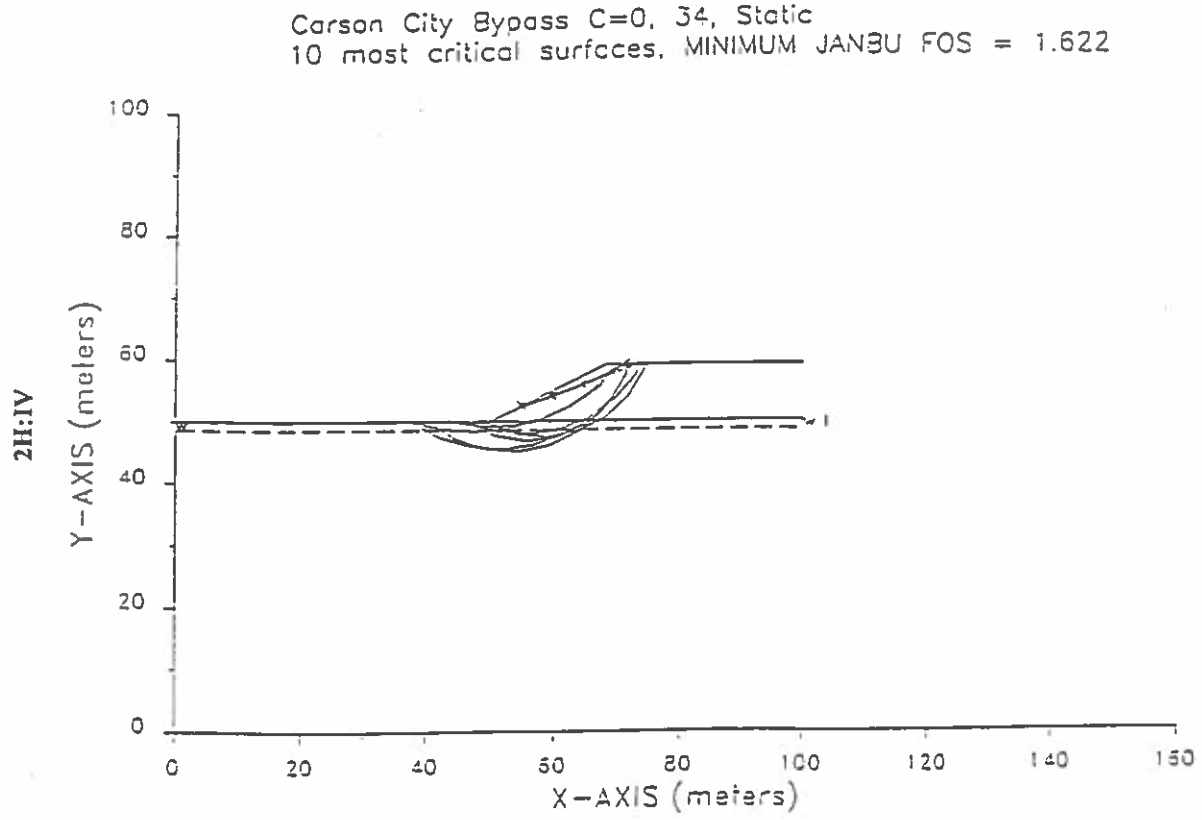
Wall Location	Adjacent Boring	Groundwater Depth, (m)
Hot Springs	BL-15	1.7
Bike Path #1	BL-16	1.7
Emerson and Northgate	BL-17	1.8
Broadleaf East	BL-22	1.4
Bike Path #2	BL-25	1.7
South of Arrowhead	BL-25	1.7
LV3	BL-40	---

5.6 Steel and Concrete Reactivity

Analytical testing of selected soil samples from structure borings was performed to assess the potential for adverse reactivity with concrete and corrosivity with steel. Soluble sulfate tests were performed to evaluate potential sulfate attack against Portland Cement Concrete. Soluble sulfate contents were observed to be less than 0.02 percent. Therefore, the potential for sulfate attack appears to be negligible and conventional Type II cement may be used according to data furnished by Cement Industry Technical Committee of California and Acculabs, Inc.

Resistivity tests are used as an indication of possible steel corrosion activity. Generally, the lower the native resistivity of the soils, the more likely that galvanic currents may occur and corrosion result. Resistivity values for the near-surface native soils are on the order of 500 to 5000 ohm-cm with a typical value of less than 2000 ohm-cm and; therefore, appear to be corrosive to moderately corrosive where metal will be in contact with native soils. Carbon steel corrosion rates are anticipated to be on the order of 12 µm/yr per exposed side. Assuming a design life of 100 years for the proposed bridge abutments and a uniform loss model, steel pipe piles will have a sacrificial wall thickness of less than 1.5 mm. We recommend a sacrificial wall thickness of 1.5 mm be used in determining the required pipe pile wall thickness. Consideration should be given to epoxy coating steel reinforcing, since this material could be exposed to the additional corrosive potential from deicing salts during the winter months. The coating thickness should be on the order of 450 µm.





KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.003

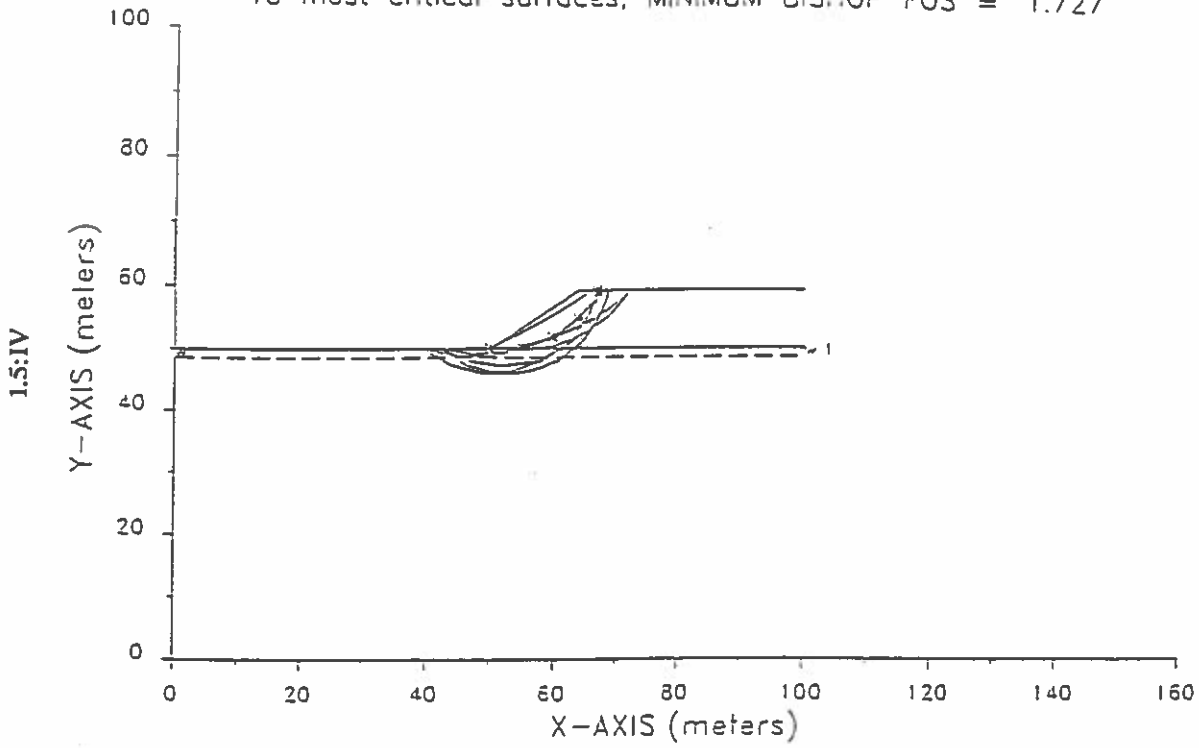
SLOPE STABILITY
STATIC STATE
Cohesion = 0

INTERNAL ANGLE OF FRICTION 34 DEGREES
CARSON FREEWAY
CARSON CITY, NEVADA

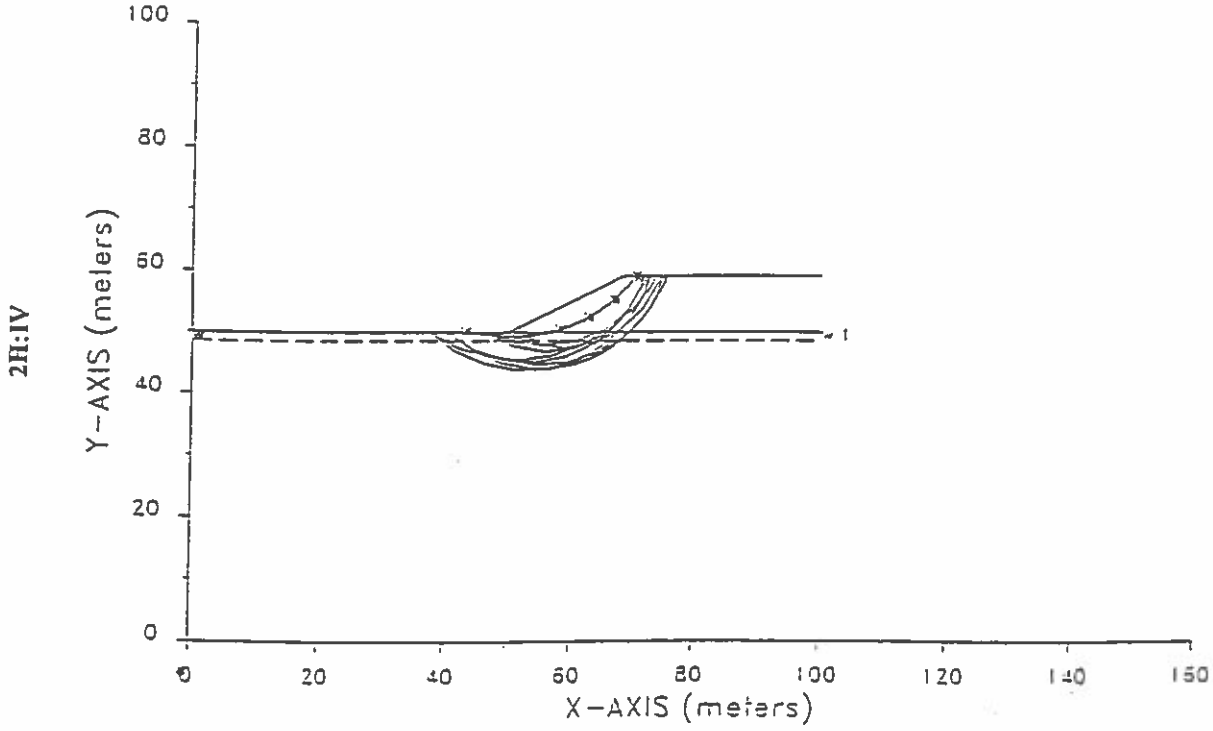
PLATE
1

CAD FILE: L:\1999\ING\301348\301348150003-SLOPE.DWG

Carson City Bypass C=6, 34, Static
10 most critical surfaces, MINIMUM BISHOP FOS = 1.727



Carson City Bypass C=6, 34, Static
10 most critical surfaces, MINIMUM JANBU FOS =2.150



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Tel. (702) 689-7800

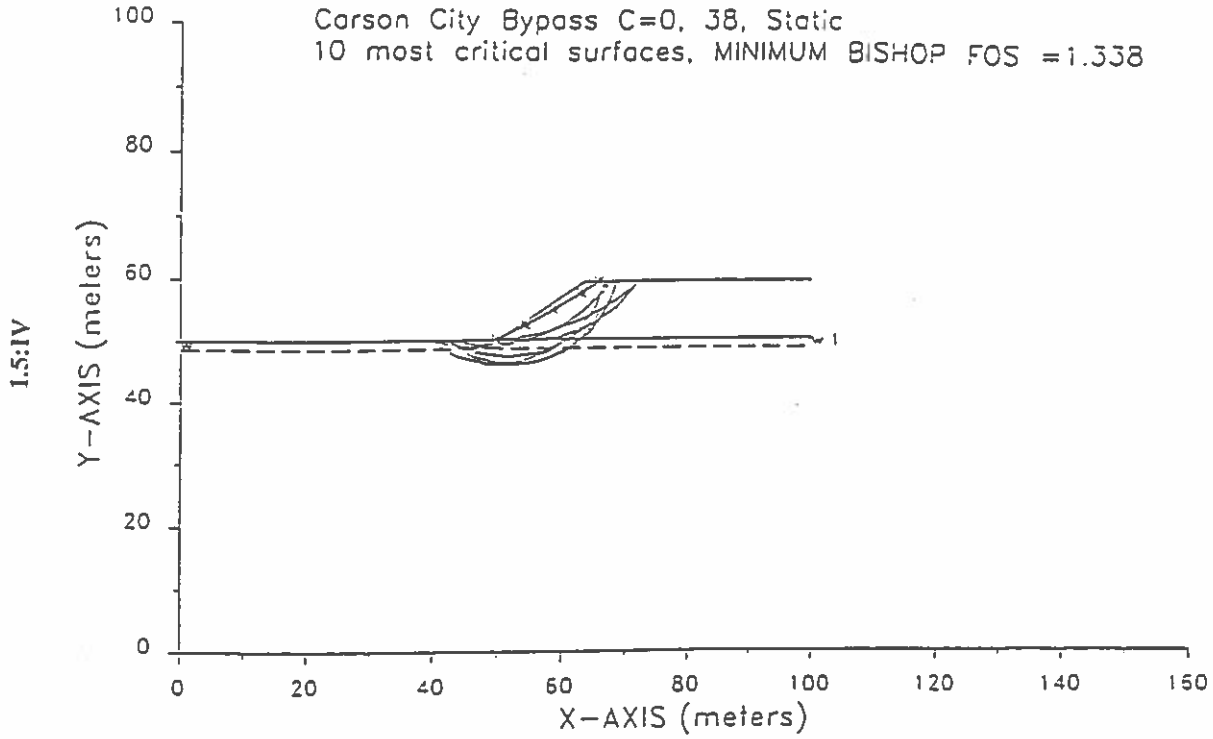
PROJECT NO. 30-1348-15.003

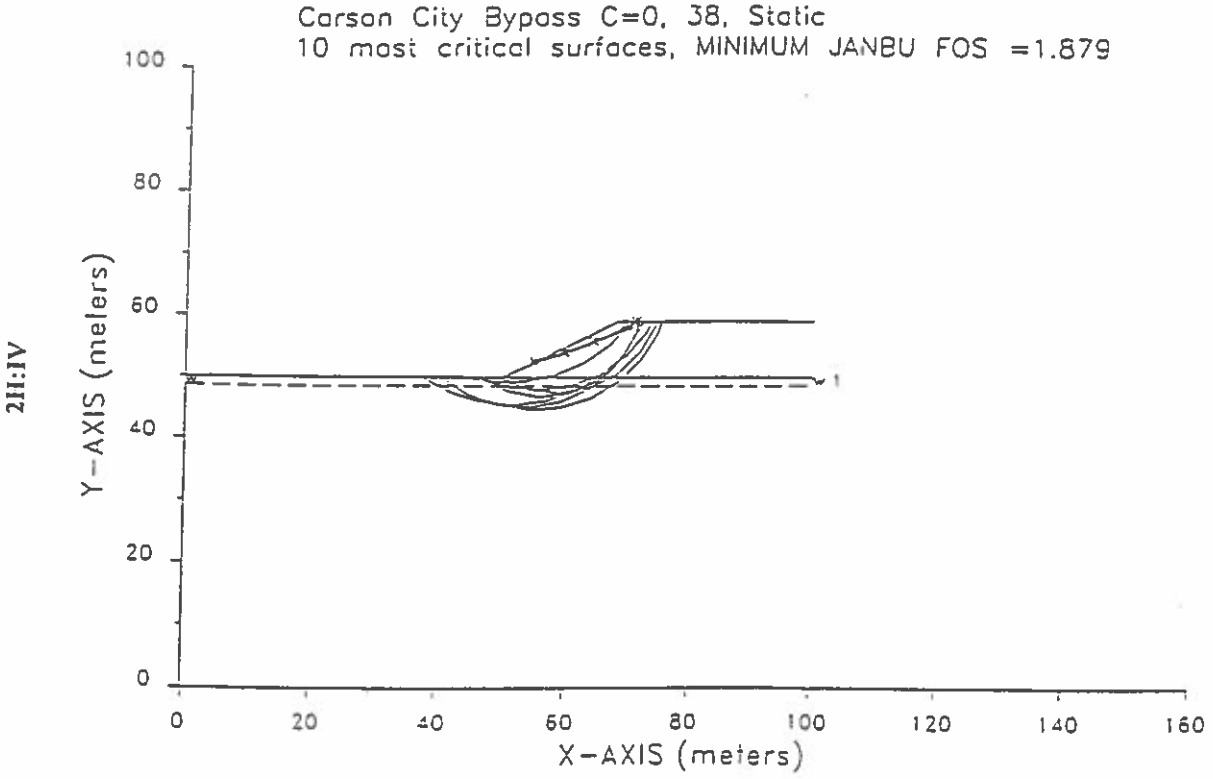
SLOPE STABILITY
STATIC STATE
Cohesion = 6kPa

CARSON FREEWAY
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
1A

CAD FILE: L:\1999\D...IG\301348\30134815003-slope.DWG





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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.003

SLOPE STABILITY
STATIC STATE
Cohesion = 0

INTERNAL ANGLE OF FRICTION 38 DEGREES
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
2

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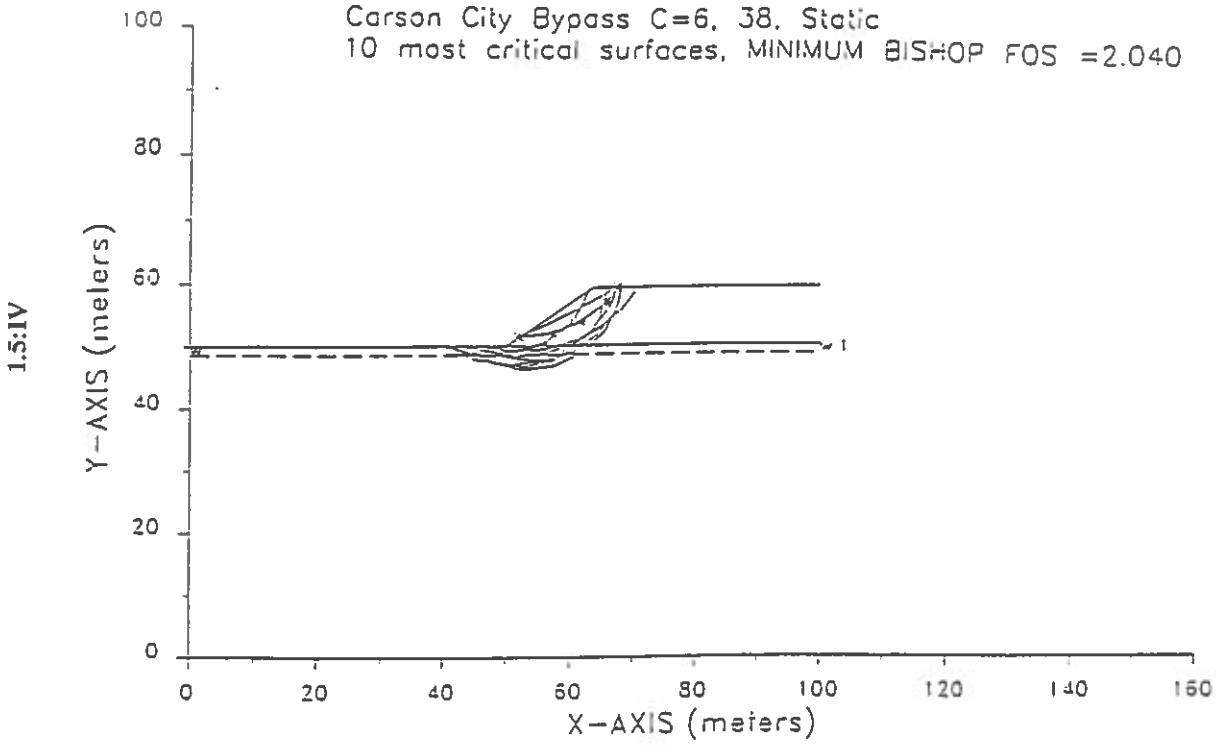

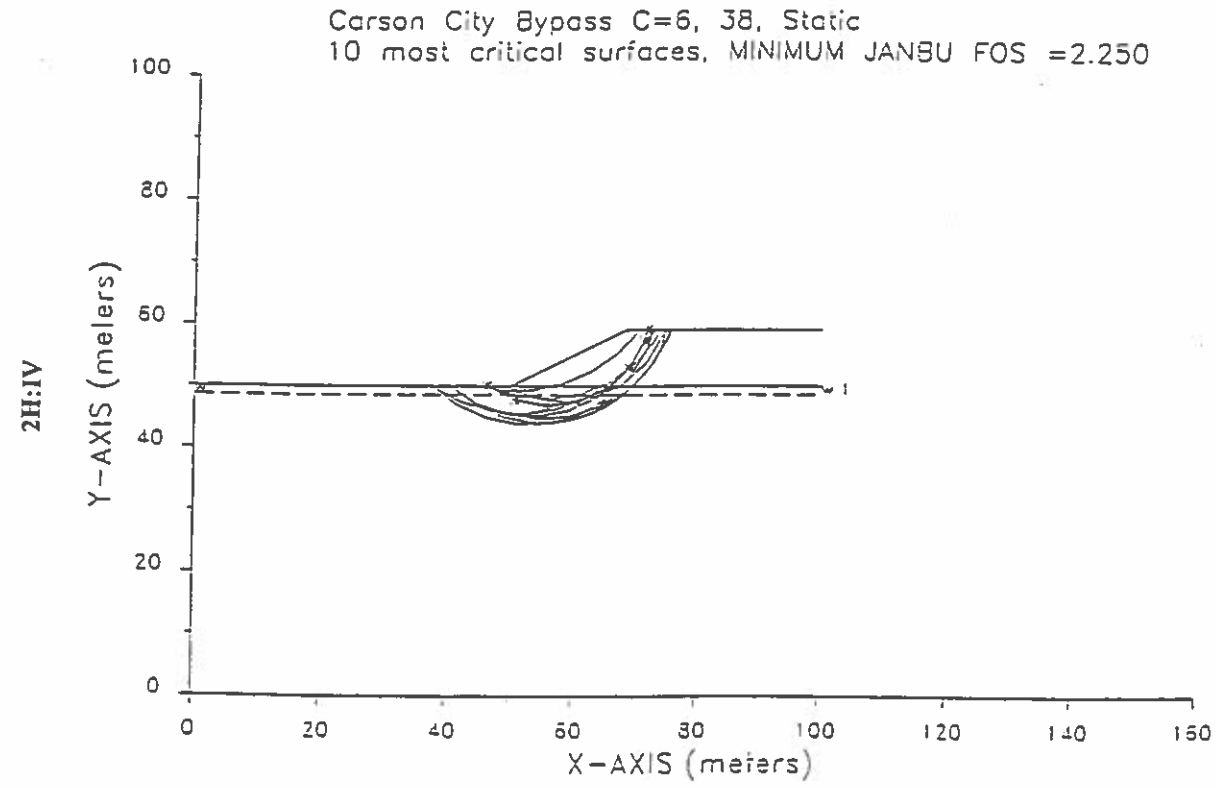

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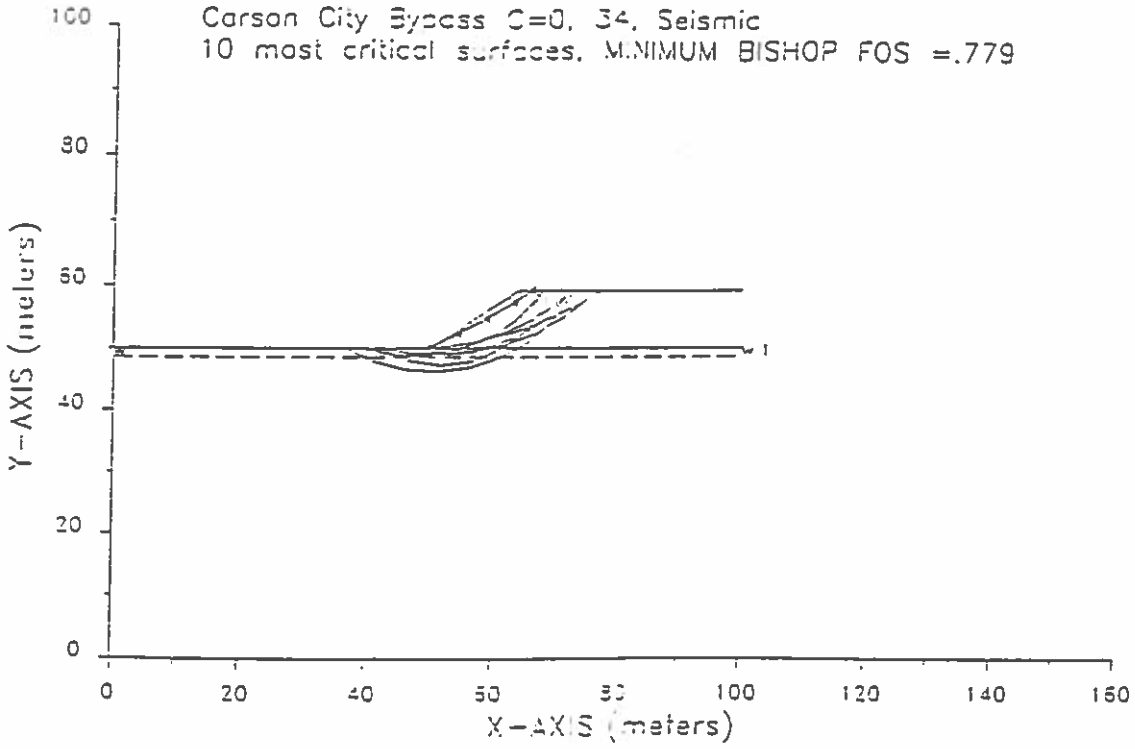
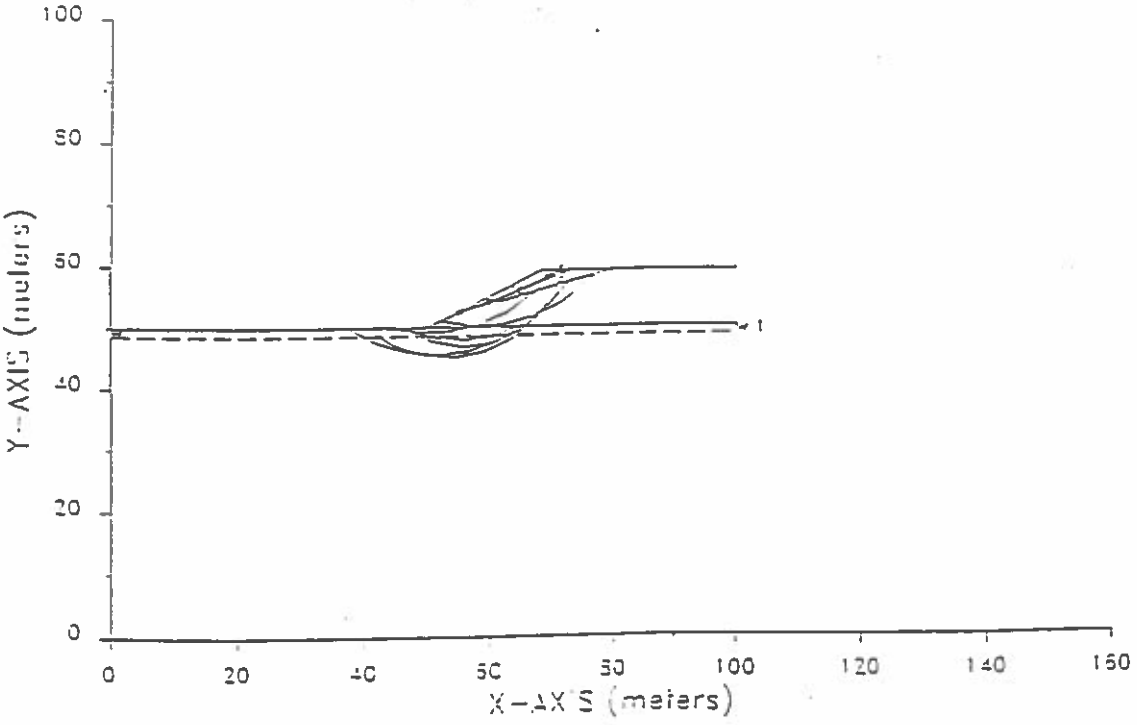
PROJECT NO. 30-1348-15.003

SLOPE STABILITY
STATIC STATE
Cohesion = 6kPa

INTERNAL ANGLE OF FRICTION 38 DEGREES
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
2A





KLEINFELDER
4875 LONGLEY LANE, SUITE 102
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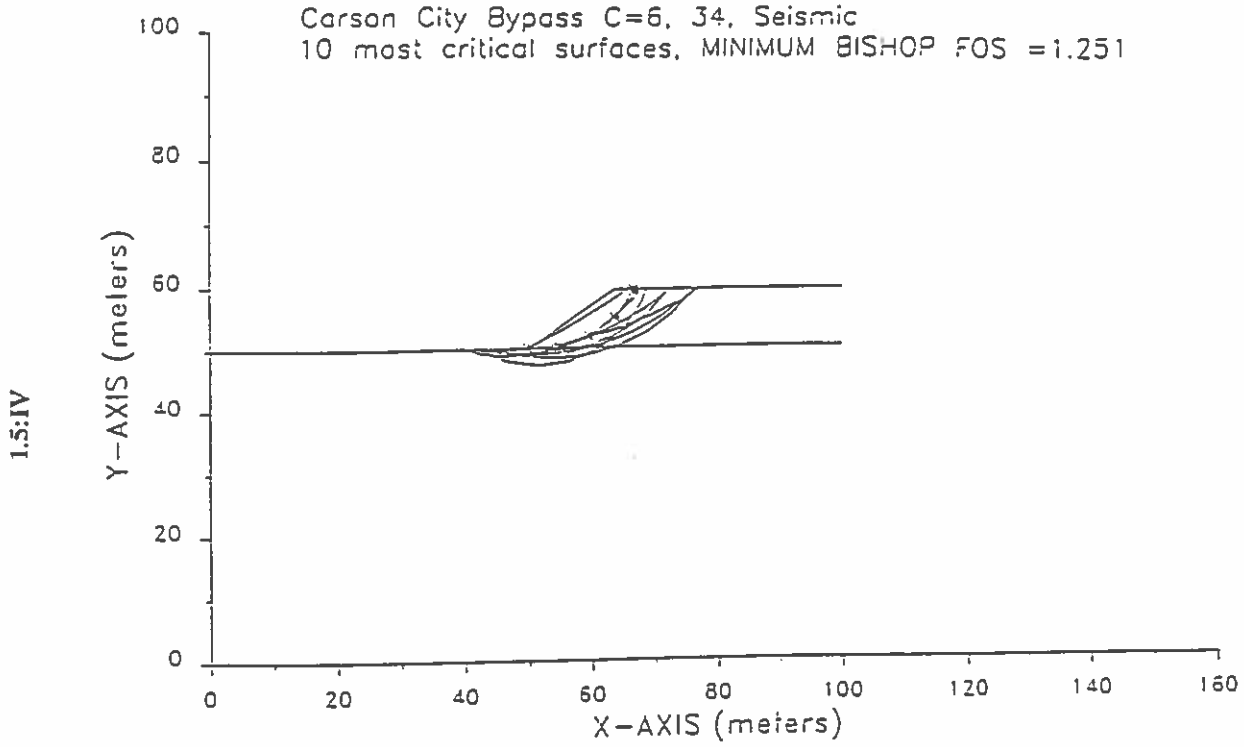
Tel. (702) 689-7800

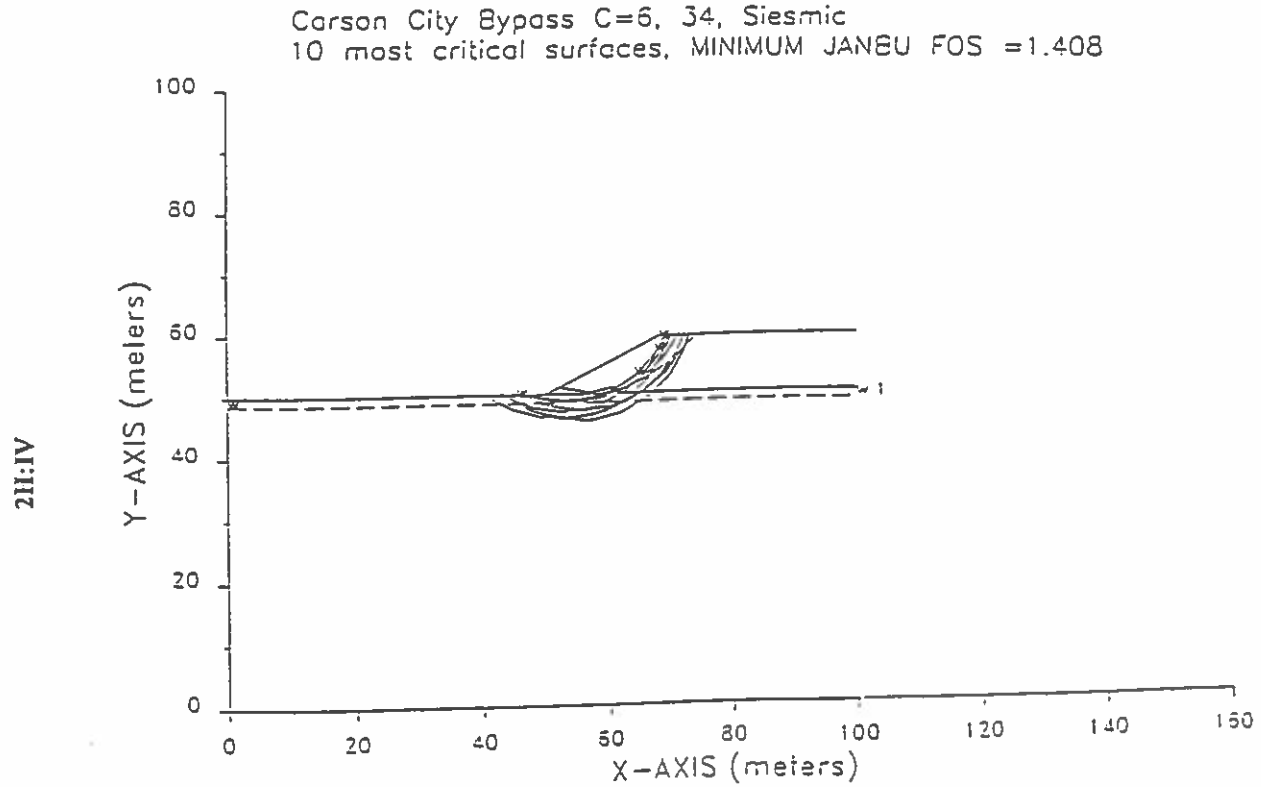
SLOPE STABILITY
STATIC STATE
Cohesion = 0
INTERNAL ANGLE OF FRICTION 34 DEGREES
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
3

PROJECT NO. 30-1348-15.003

CAD FILE: L:\1999\...\30134815003-SLOPE.DWG





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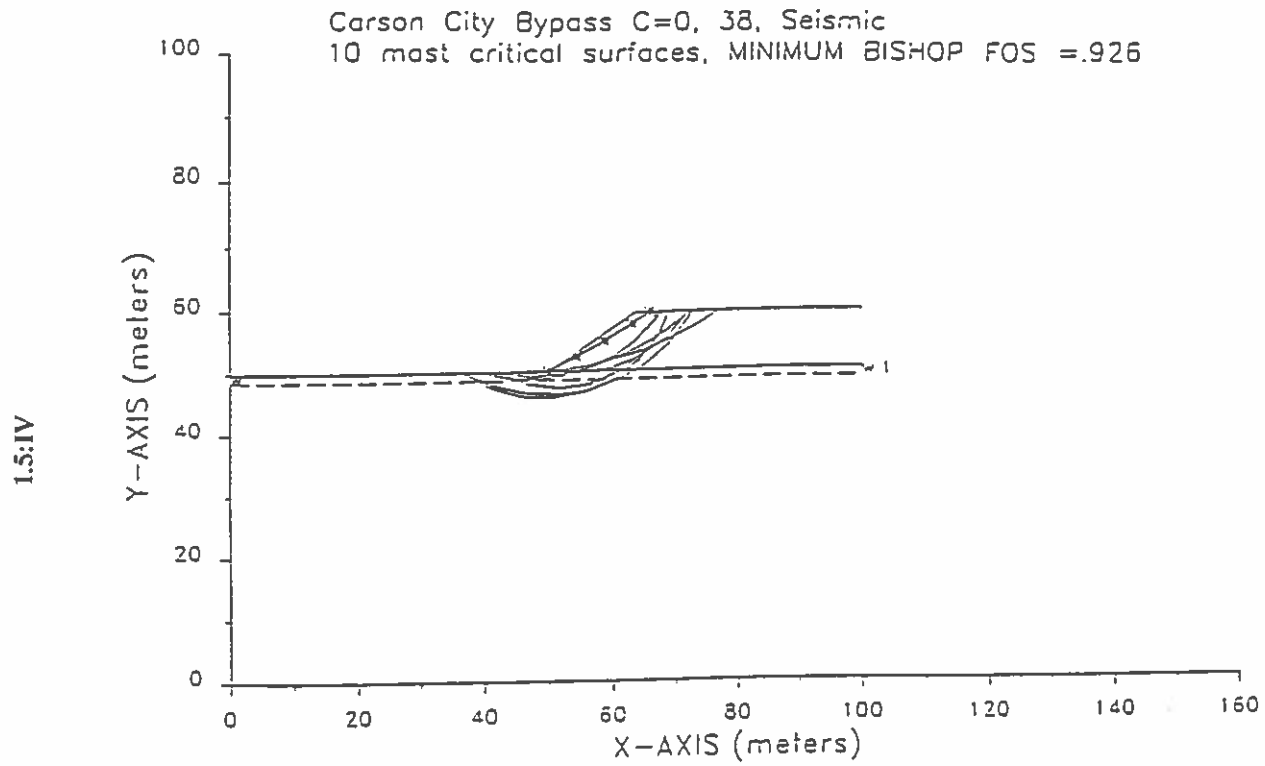
PROJECT NO. 30-1348-15.003

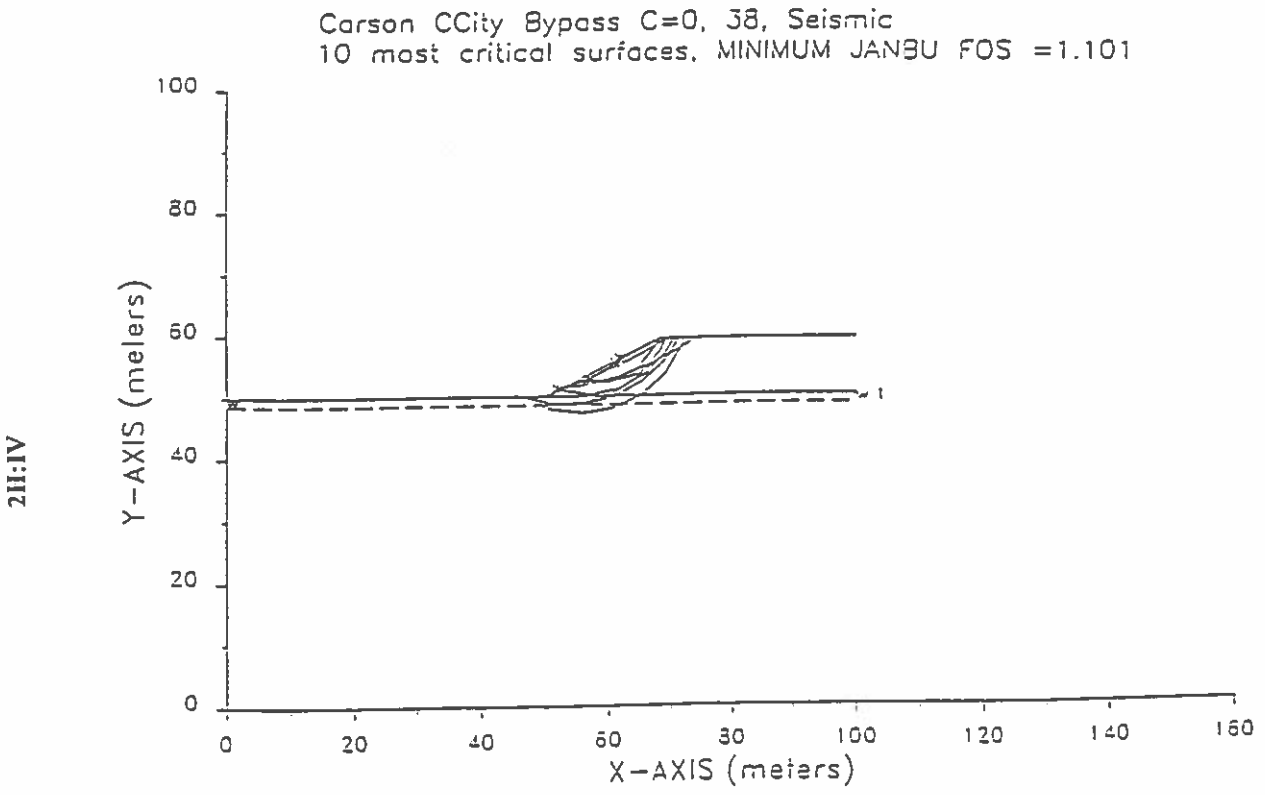
SLOPE STABILITY
STATIC STATE
Cohesion = 6kPa

CARSON FREEWAY
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
3A

CAD FILE: L:\1999\...FTING\301348\30134815003-slope.DWG





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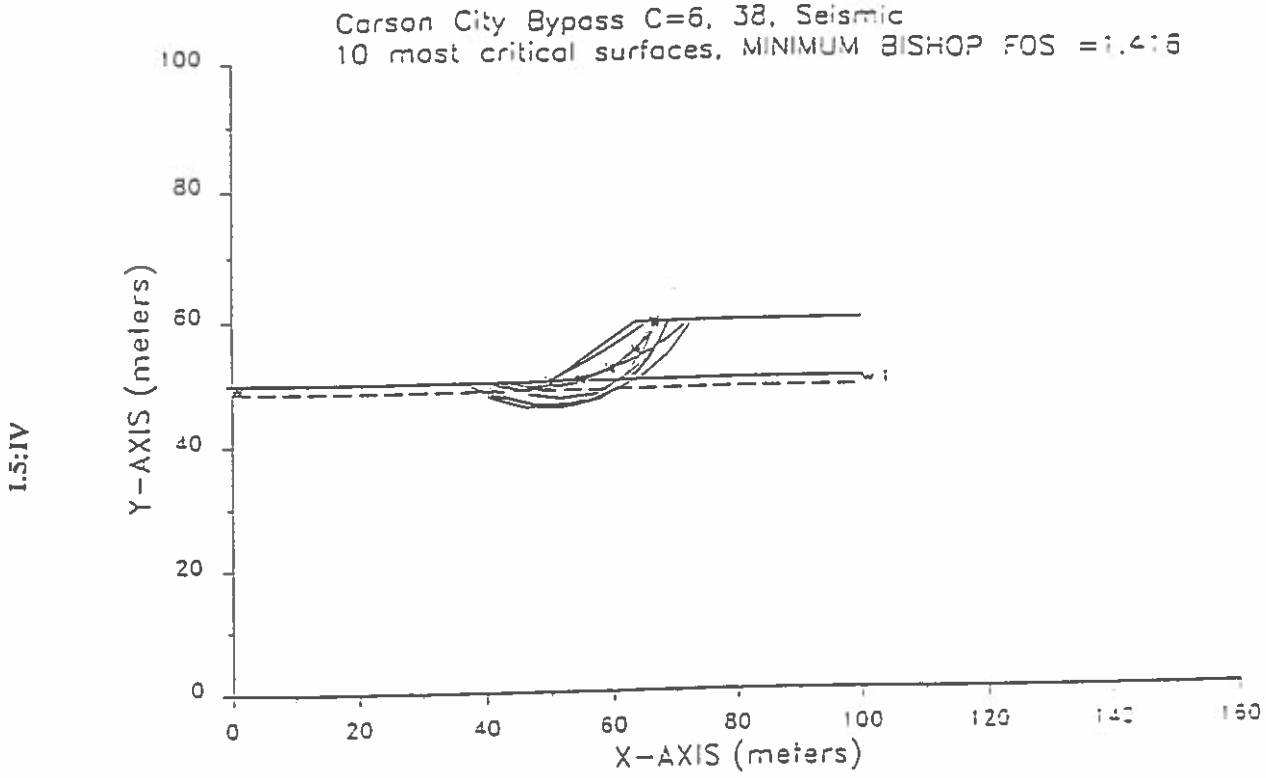
PROJECT NO. 30-1348-15.003

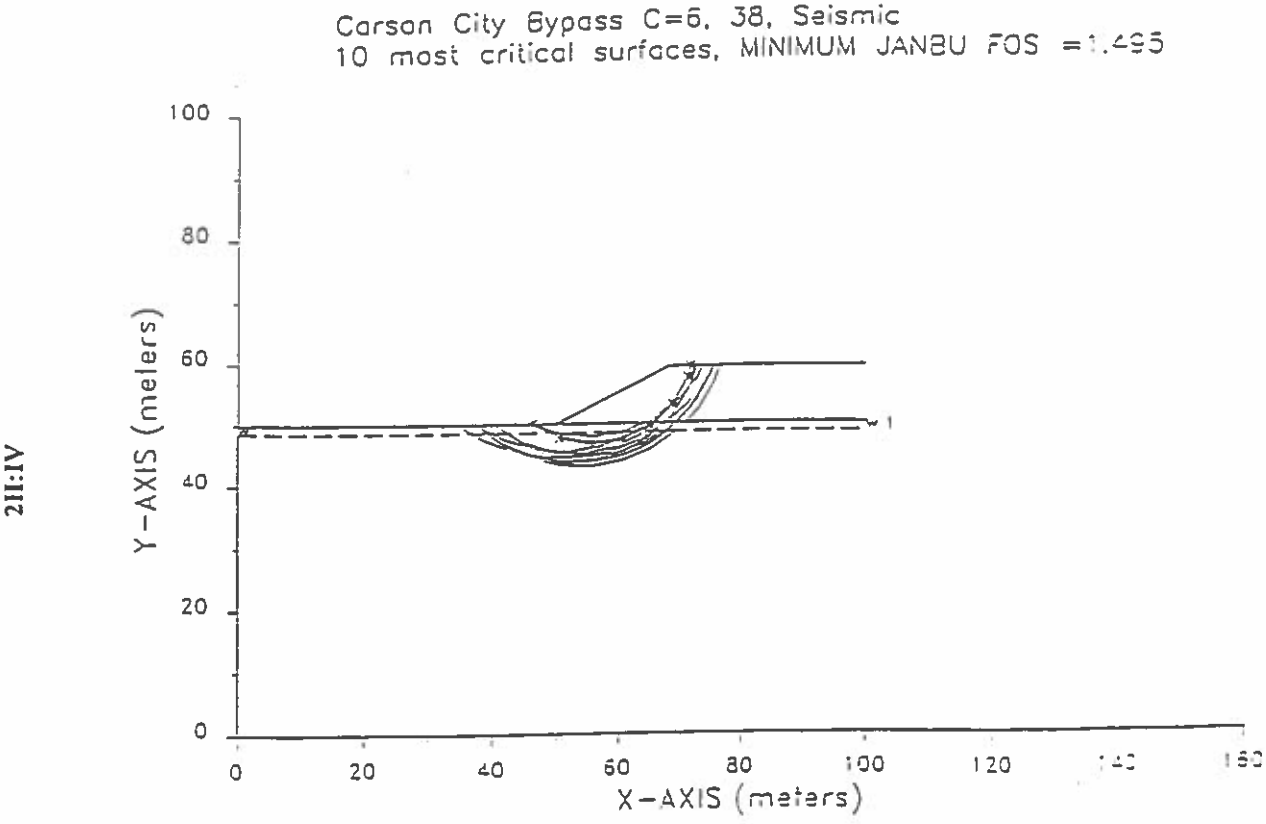
SLOPE STABILITY
STATIC STATE
Cohesion = 0

INTERNAL ANGLE OF FRICTION 38 DEGREES
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
4

CAD FILE: L:\1999\DWG\301348\30134815003-SLOPE.DWG





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Tel. (702) 689-7800

SLOPE STABILITY
STATIC STATE
Cohesion = 6kPa

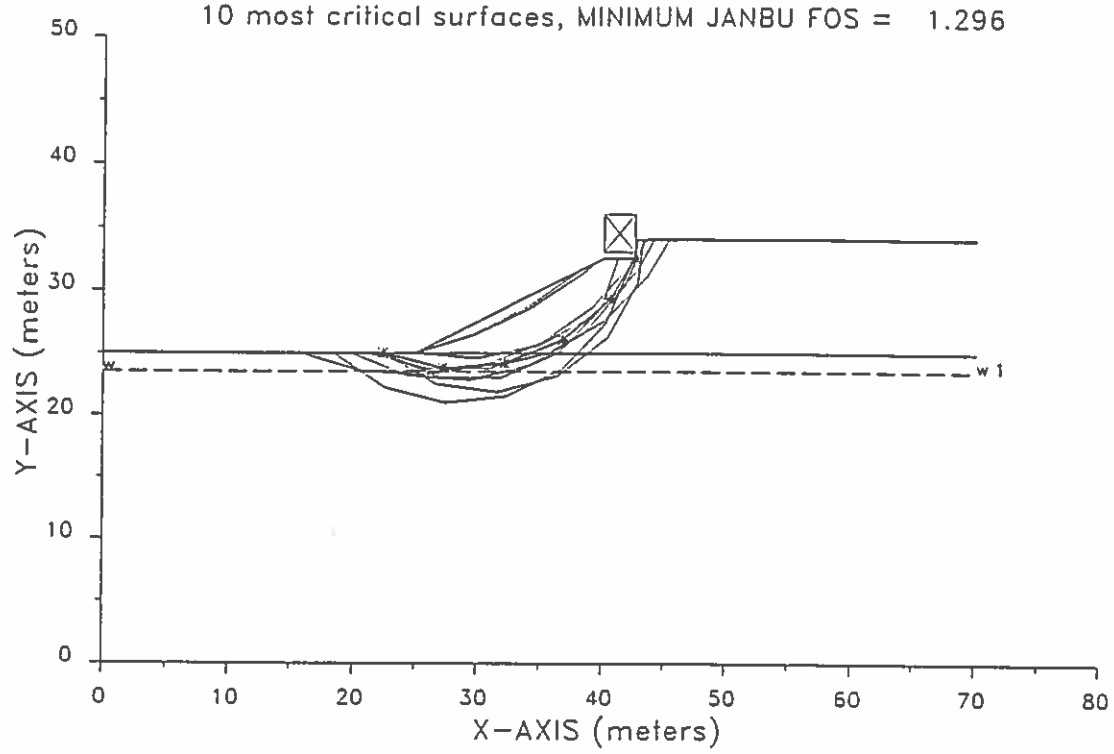
INTERNAL ANGLE OF FRICTION 38 DEGREES
CARSON FREEWAY
CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.003

PLATE
4A

CAD FILE: L:\1999\D...\301348\301348150O3-slope.DWG

C.C. Bypass,C=0,34,Static,Surcharge
10 most critical surfaces, MINIMUM JANBU FOS = 1.296



C.C. Bypass,C=0,38,Static,Surcharge
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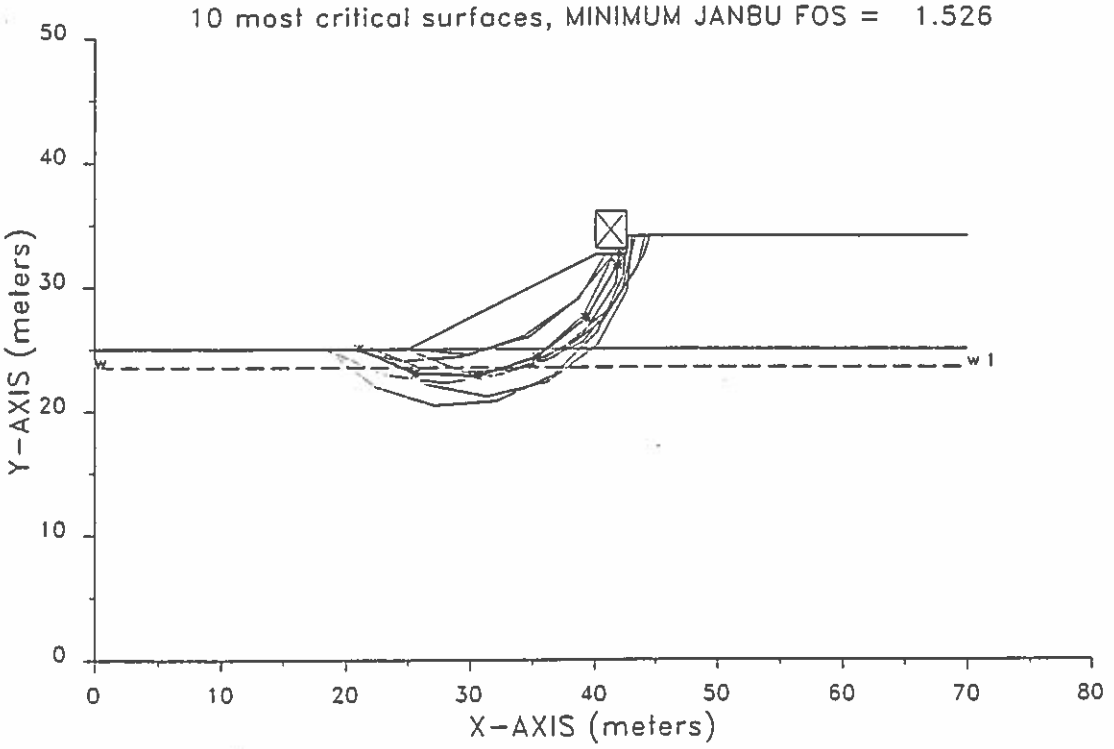

KLEINFELDER
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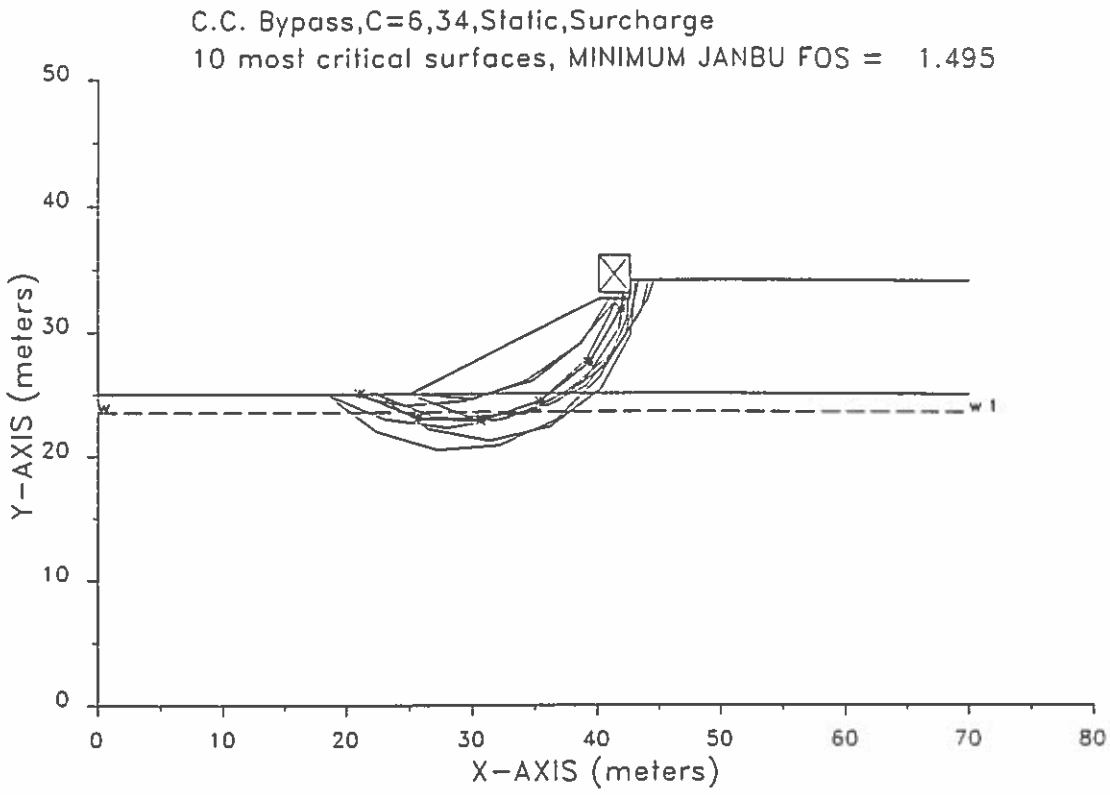
Tel. (702) 689-7800

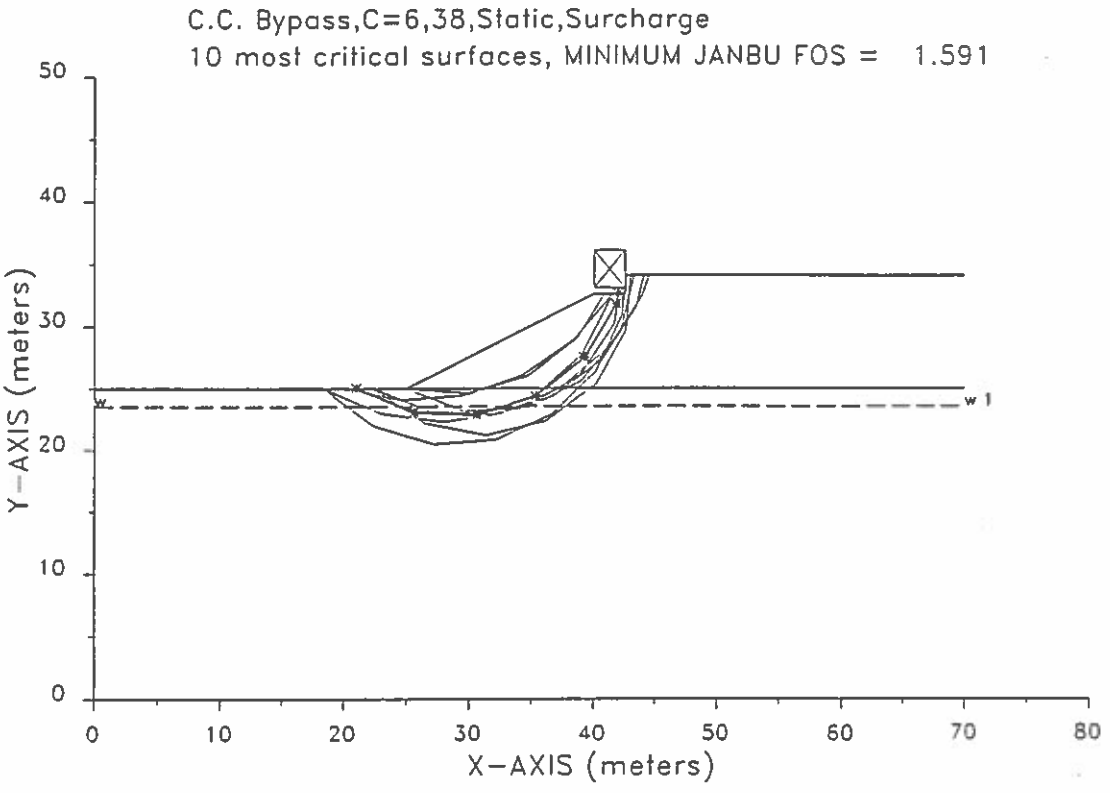
SLOPE STABILITY WITH ABUTMENT
STATIC STATE
Cohesion = 0
CARSON FREEWAY
CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.003

PLATE
5

CAD FILE: L:\1999\D...ING\301348\30134815003-SLOPE.DWG





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Tel. (702) 689-7800

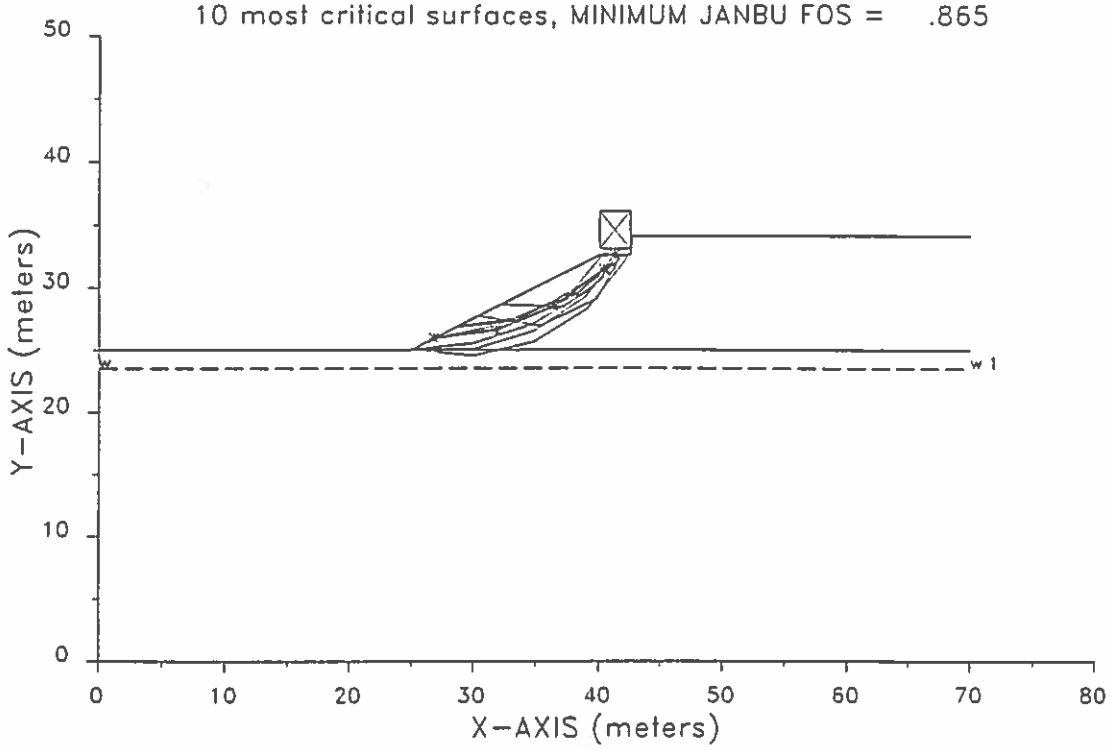
PROJECT NO. 30-1348-15.003

SLOPE STABILITY WITH ABUTMENT
STATIC STATE
Cohesion = 6kPa
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
6

CAD FILE: L:\1999\[illegible]NG\301348\30134815003-SLOPE.DWG

C.C. Bypass,C=0,34,Surcharge,H=0.175
10 most critical surfaces, MINIMUM JANBU FOS = .865



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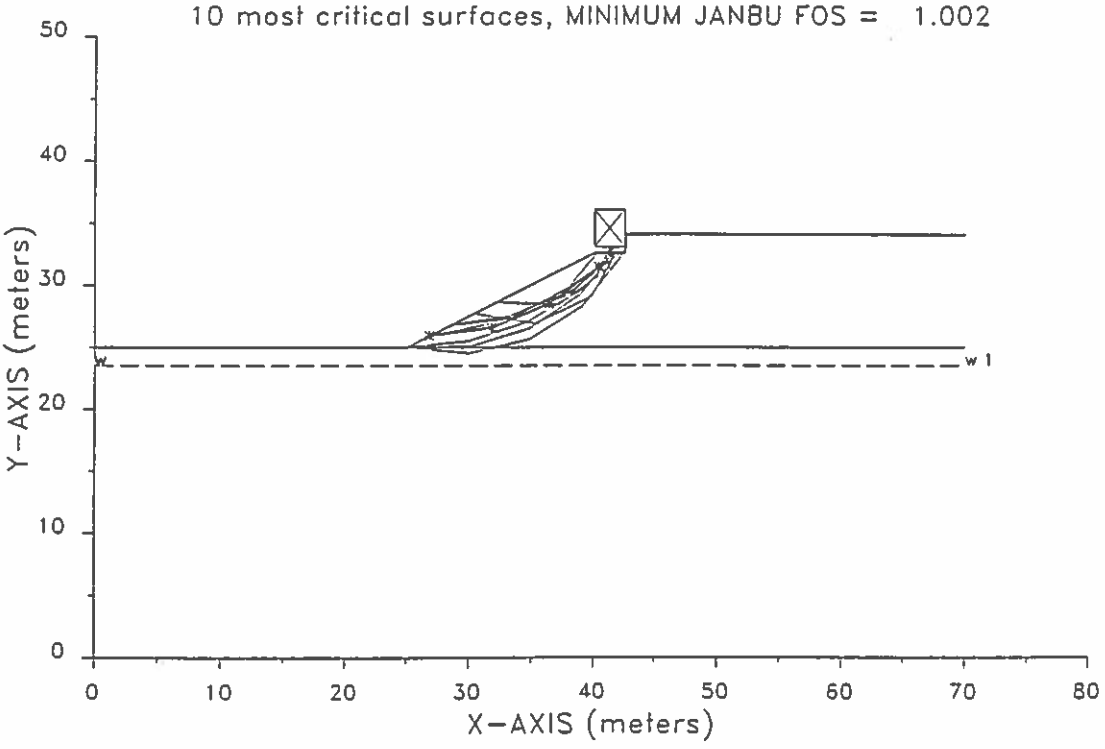

KLEINFELDER
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Tel. (702) 689-7800

SLOPE STABILITY WITH ABUTMENT
SEISMIC STATE
Cohesion = 0
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
7

PROJECT NO. 30-1348-15.003

CAD FILE: L:\1999\DRAFTING\301348\301348150O3-SLOPE.DWG

C.C. Bypass,C=6,34,Surcharge,H=0.175
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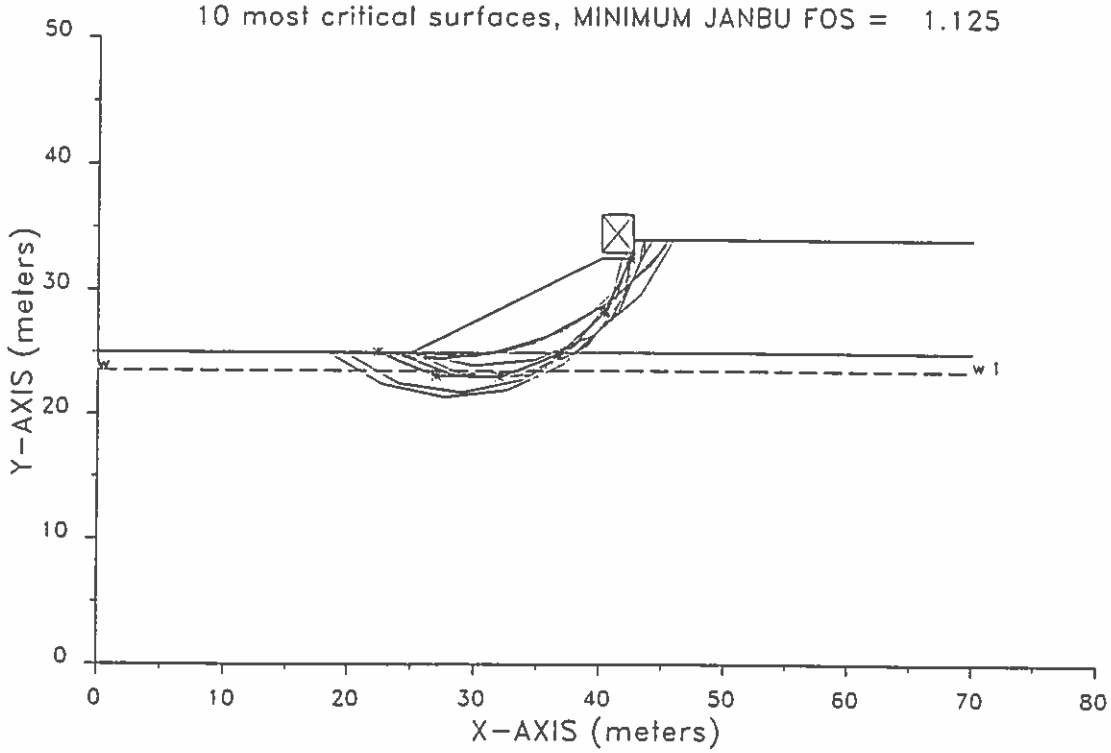

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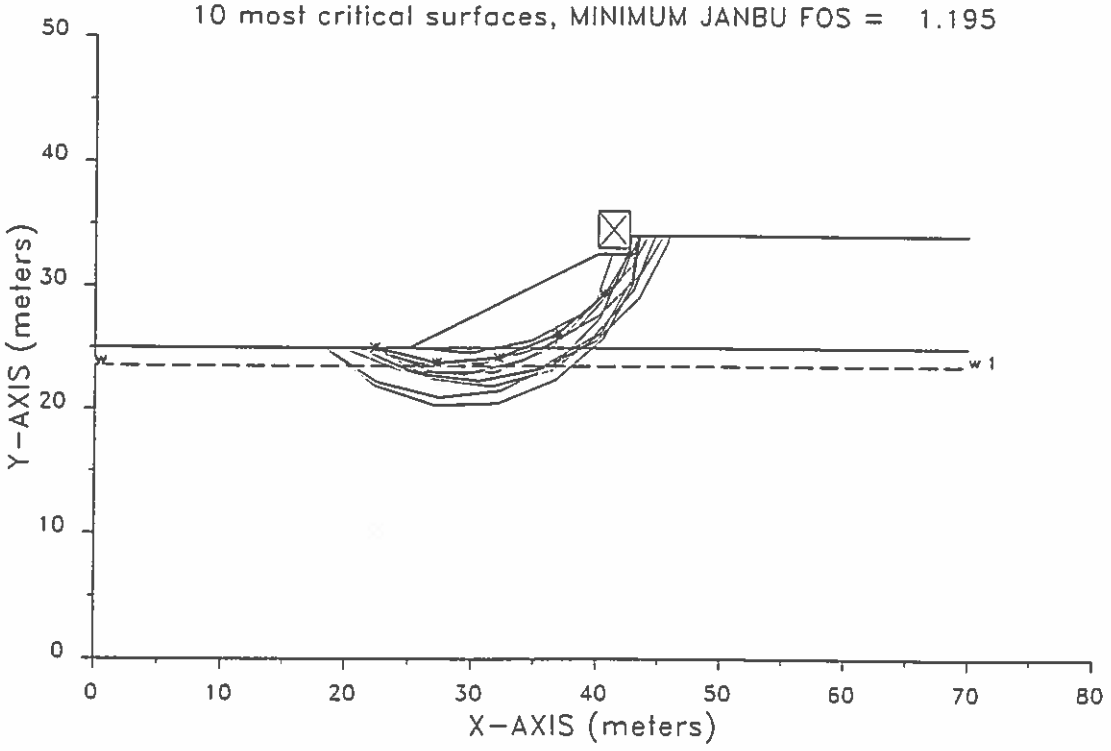


KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

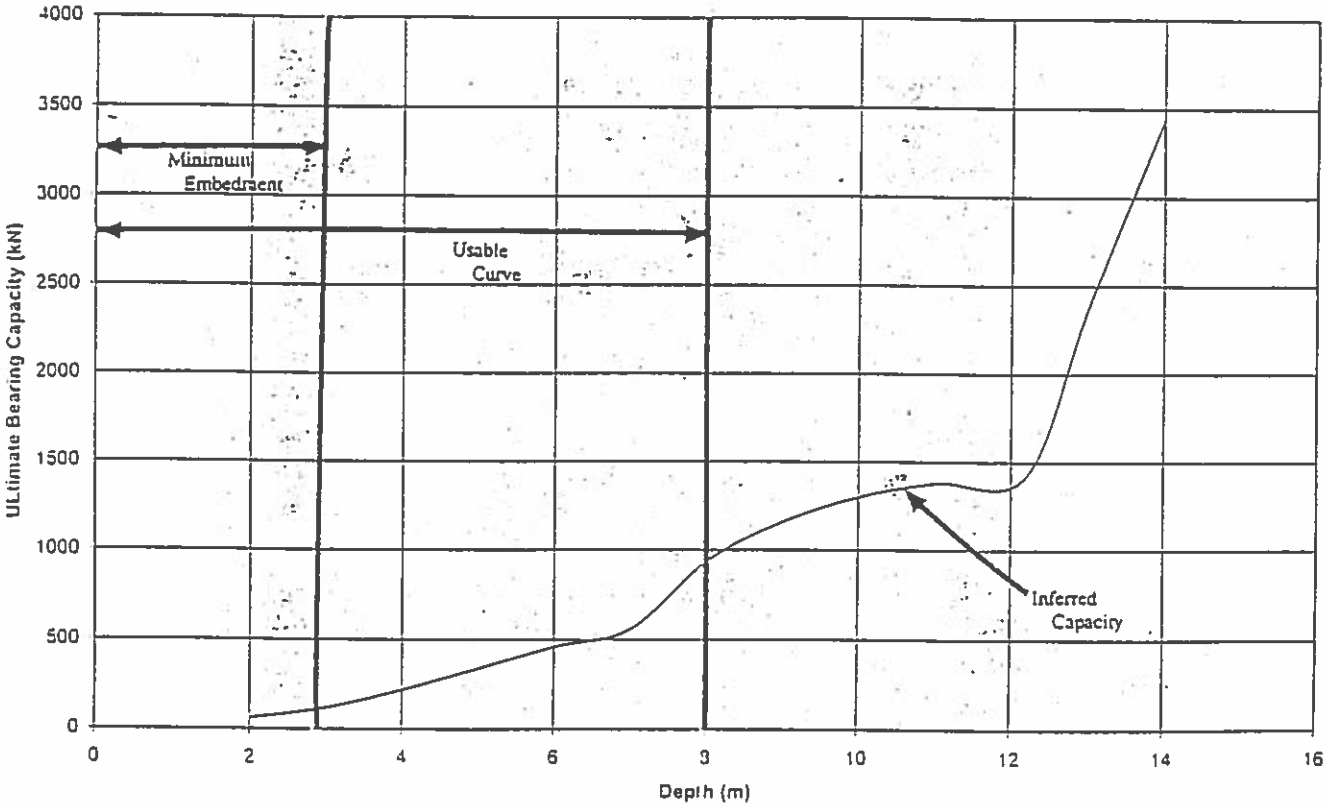
SLOPE STABILITY WITH ABUTMENT
SEISMIC STATE
Cohesion = 0
CARSON FREEWAY
CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.003

PLATE
8

CAD FILE: L:\1999\DRAFTING\30134B\30134815003-SLOPE.DWG

Pipe Pile, PP305, Ultimate Bearing Capacity



KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

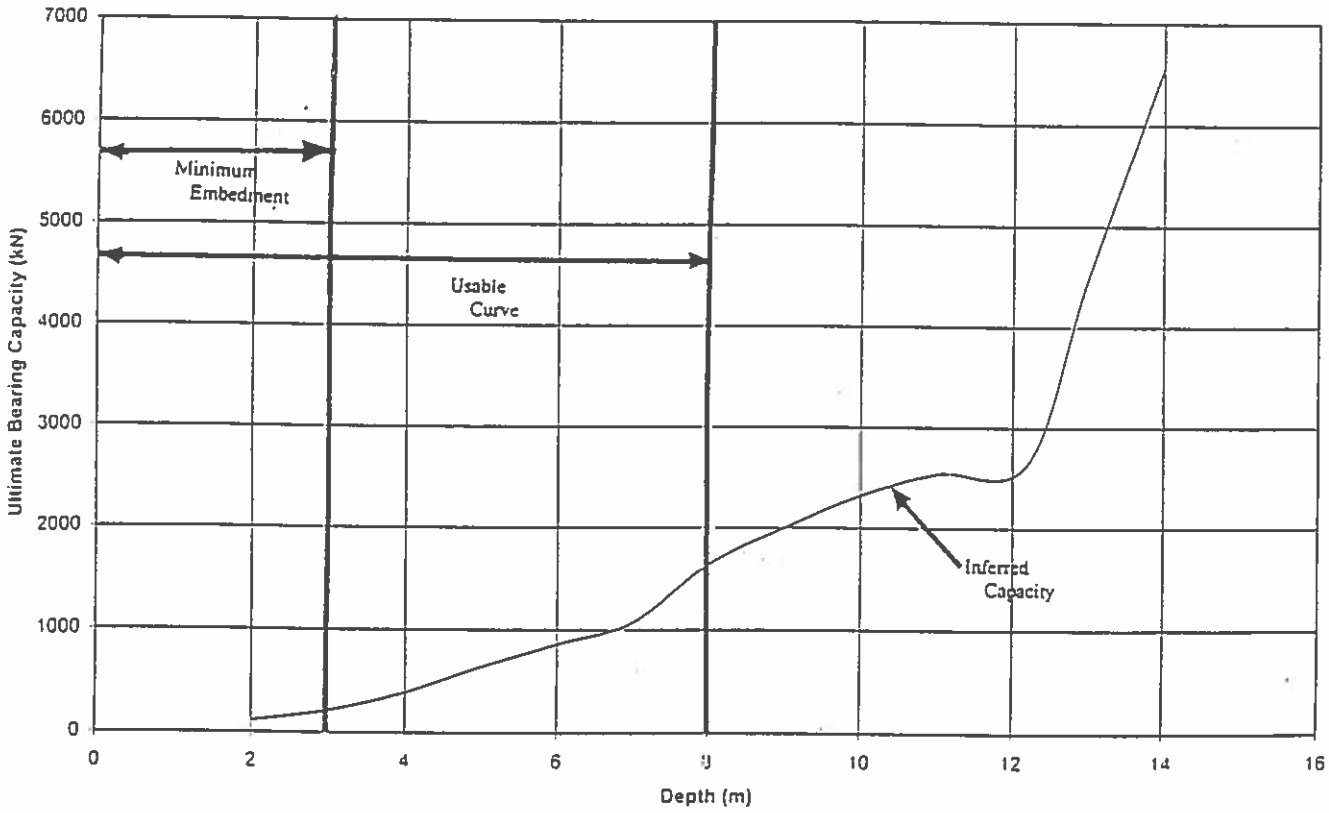
PROJECT NO. 30-1348-15.002

PILE DESIGN, PP305
ULTIMATE BEARING CAPACITY
US 395
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
9

CAD FILE: L:\1999\D...IG\301348\30134815002-PLATES.DWG

Pipe Pile PP406, Ultimate Bearing Capacity



KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

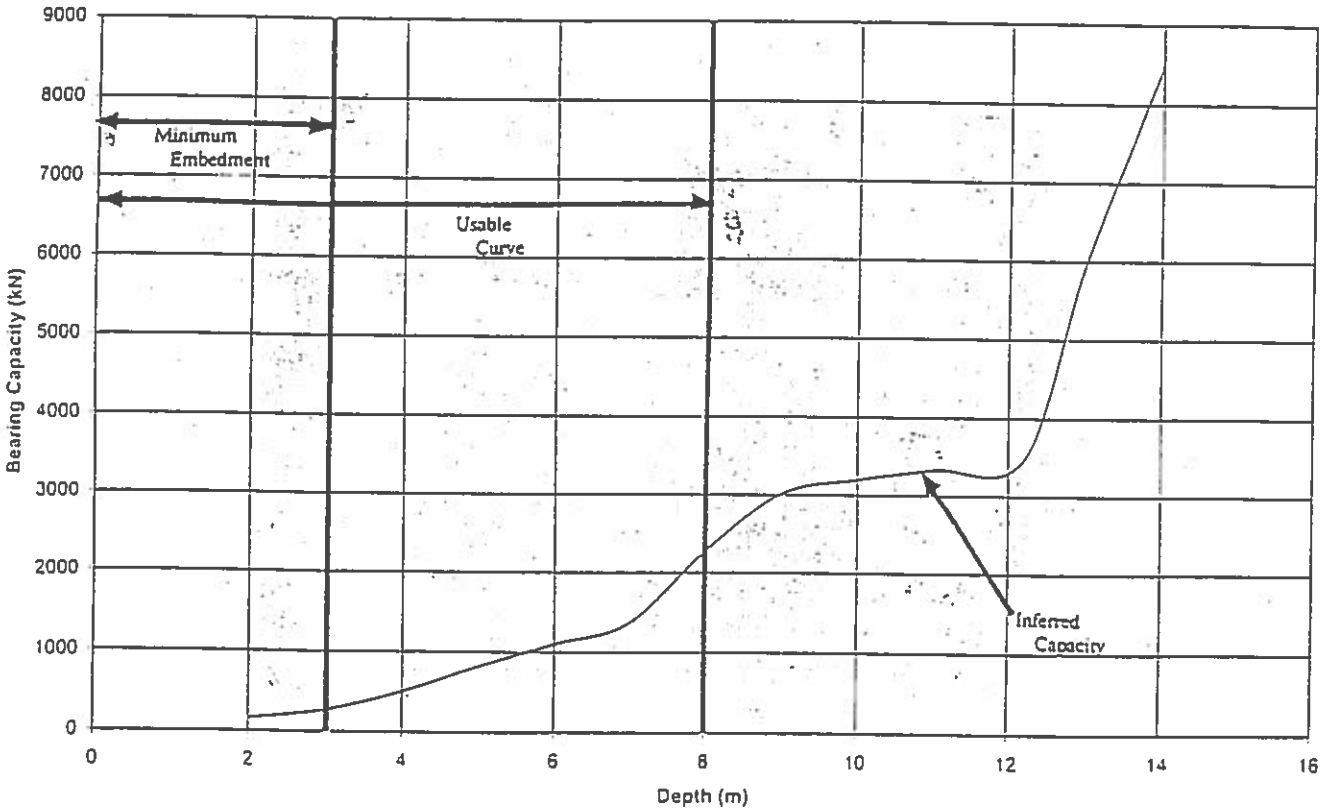
PROJECT NO. 30-1348-15.002

PILE DESIGN, PP406
ULTIMATE BEARING CAPACITY
US 395
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
10

CAD FILE: L:\1999\DRAFTING\301348\30134815002-PLATES.DWG

Pipe Pile PP457, Ultimate Bearing Capacity



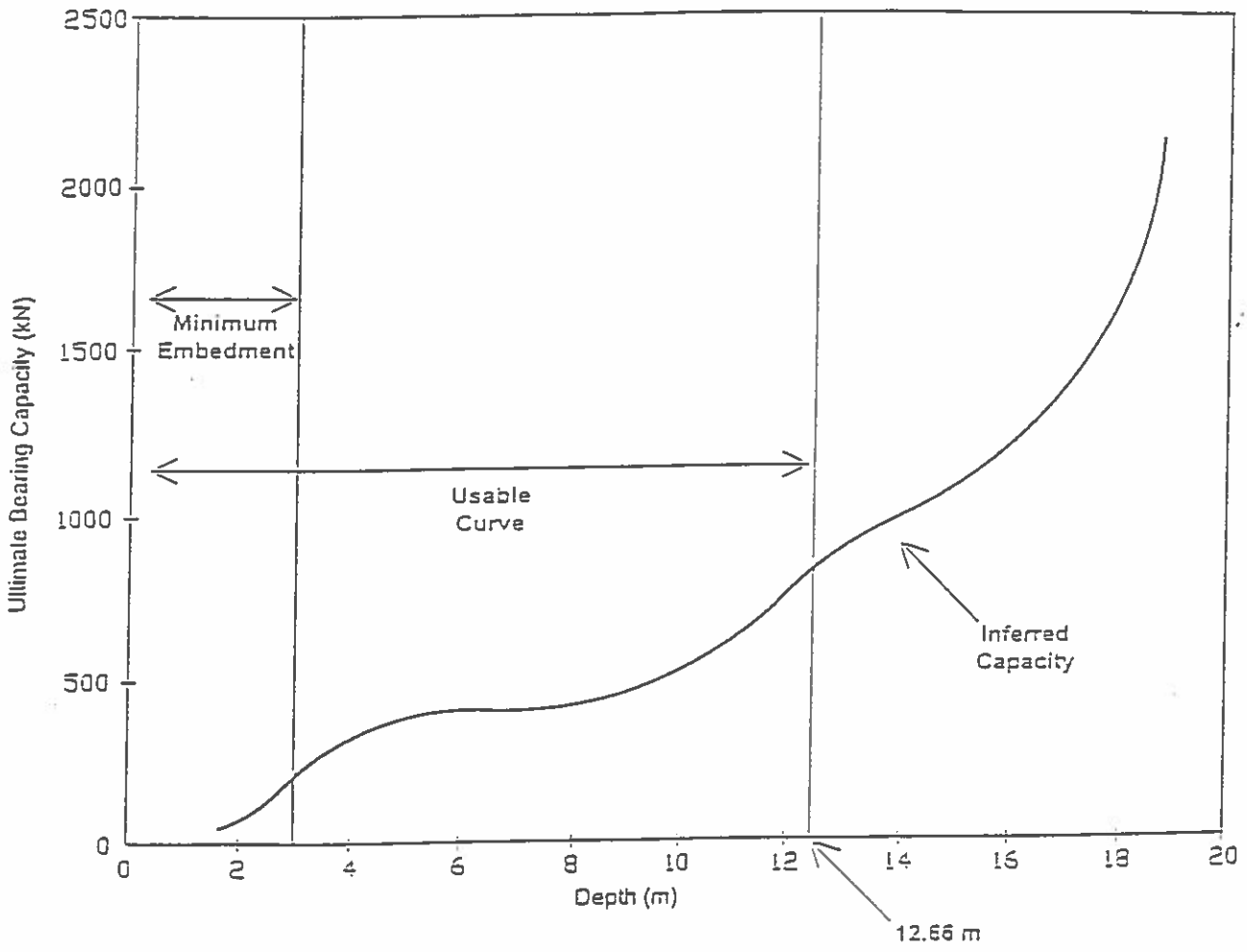
KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP457
ULTIMATE BEARING CAPACITY
US 395
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
11

CAD FILE: L:\1999\DRAFTING\301348\30134815002-PLATES.DWG



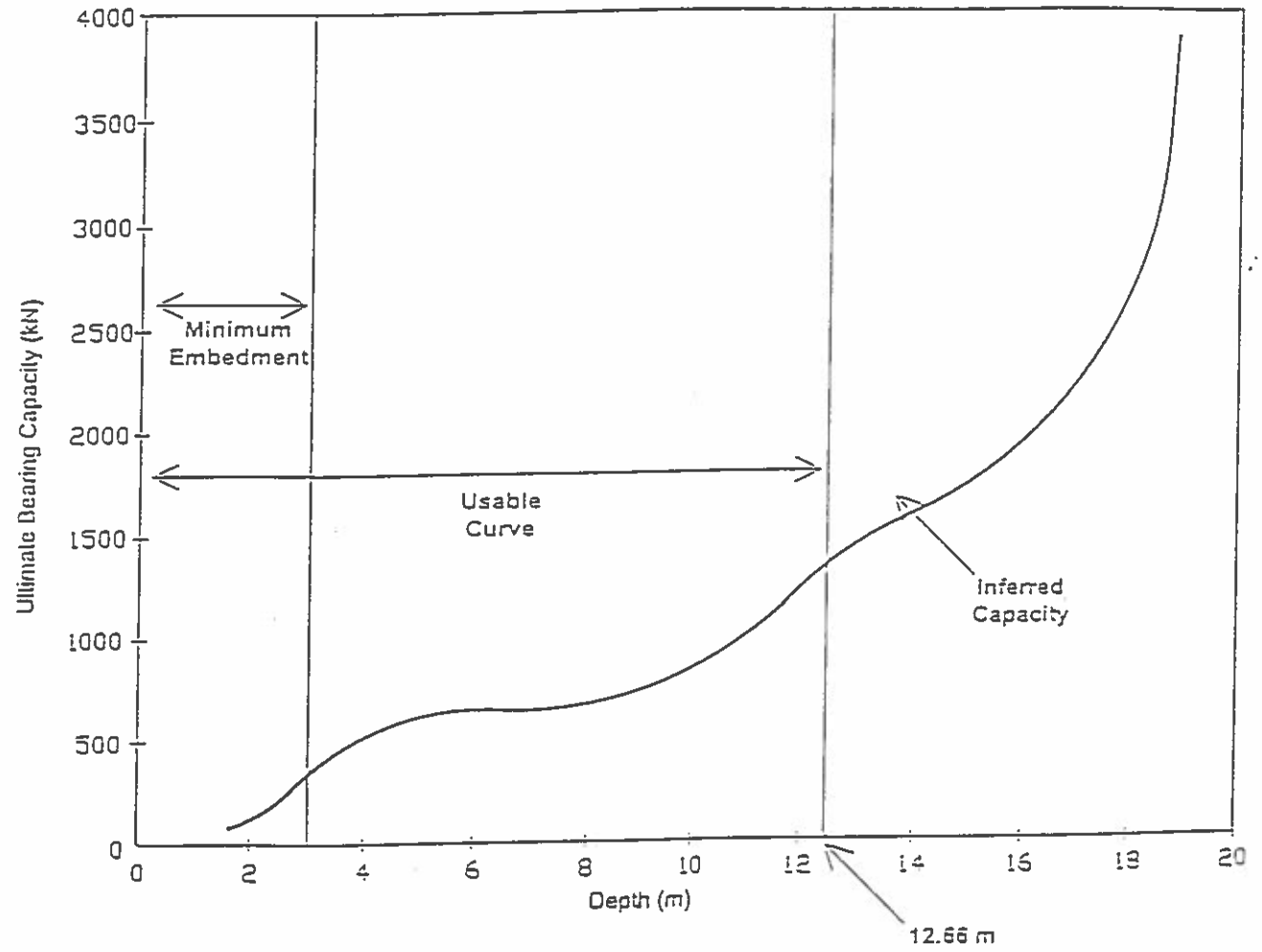
KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP305
ULTIMATE BEARING CAPACITY
ARROWHEAD DRIVE
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
12

CAD FILE: L:\1999\DRAFTING\301348\30134815002-PLATES.DWG



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4875 LONGLEY LANE, SUITE 100
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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP406
ULTIMATE BEARING CAPACITY
ARROWHEAD DRIVE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE 13

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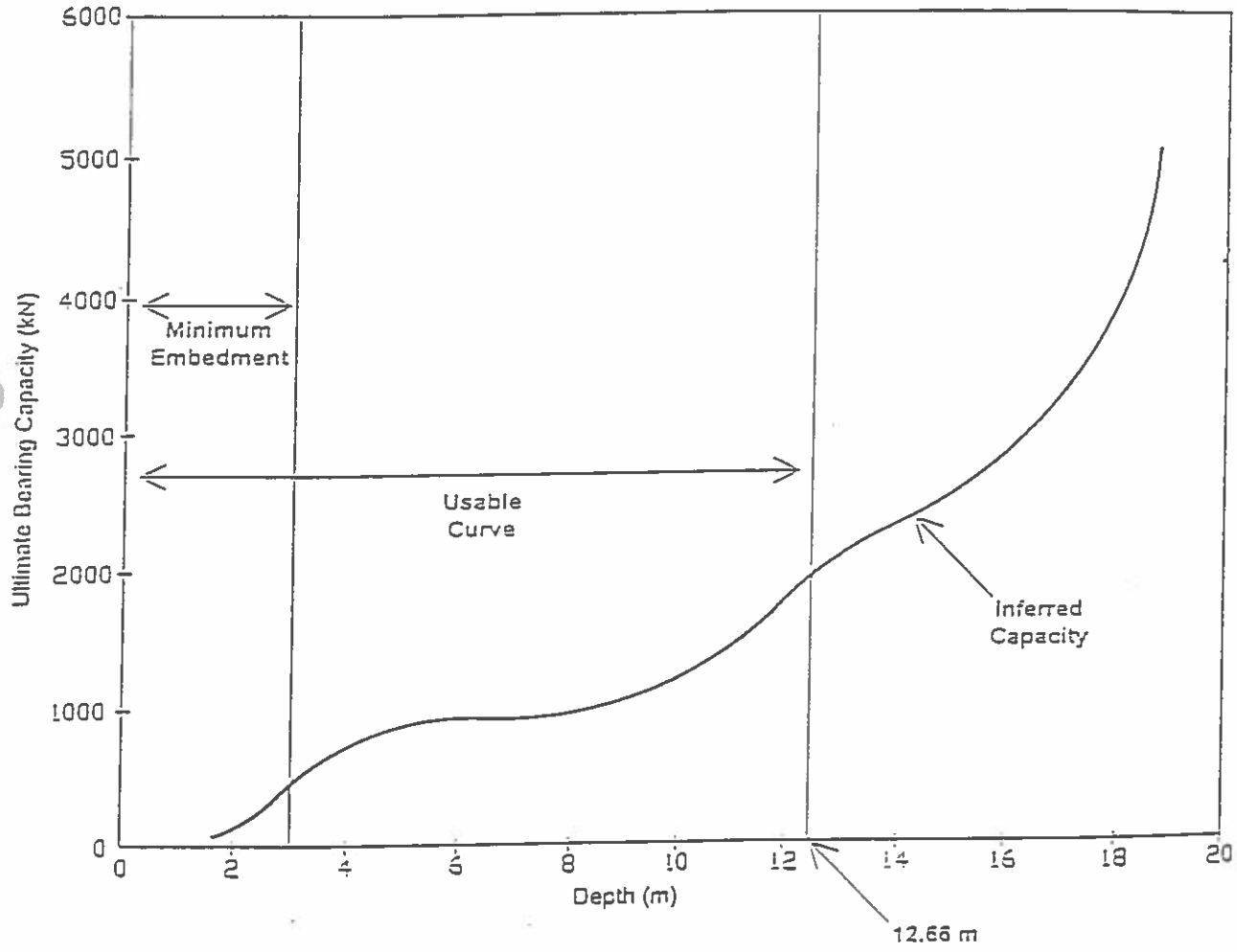

KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP457
ULTIMATE BEARING CAPACITY
ARROWHEAD DRIVE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE 14

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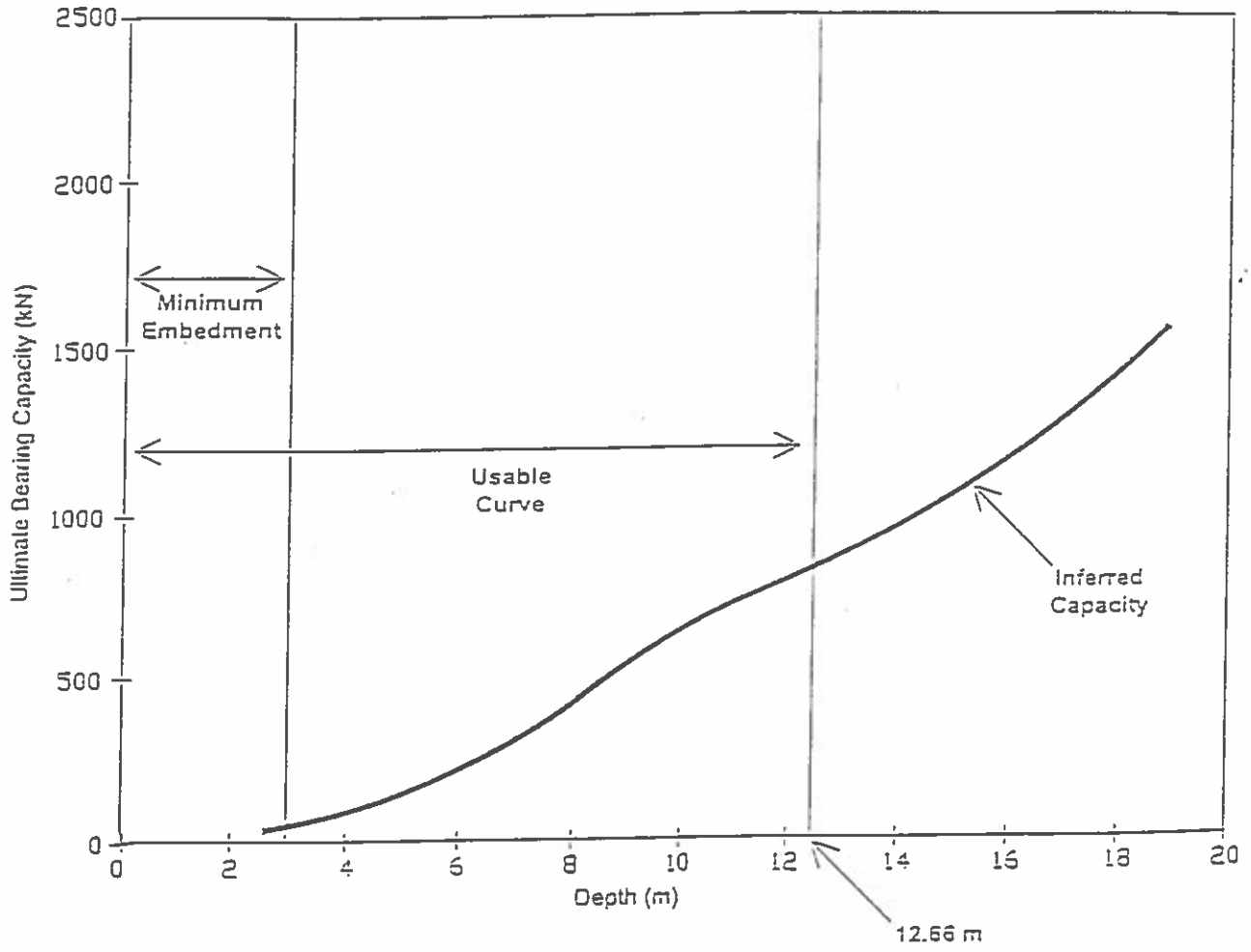

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PILE DESIGN, PP305
ULTIMATE BEARING CAPACITY
NORTHGATE LANE
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
15

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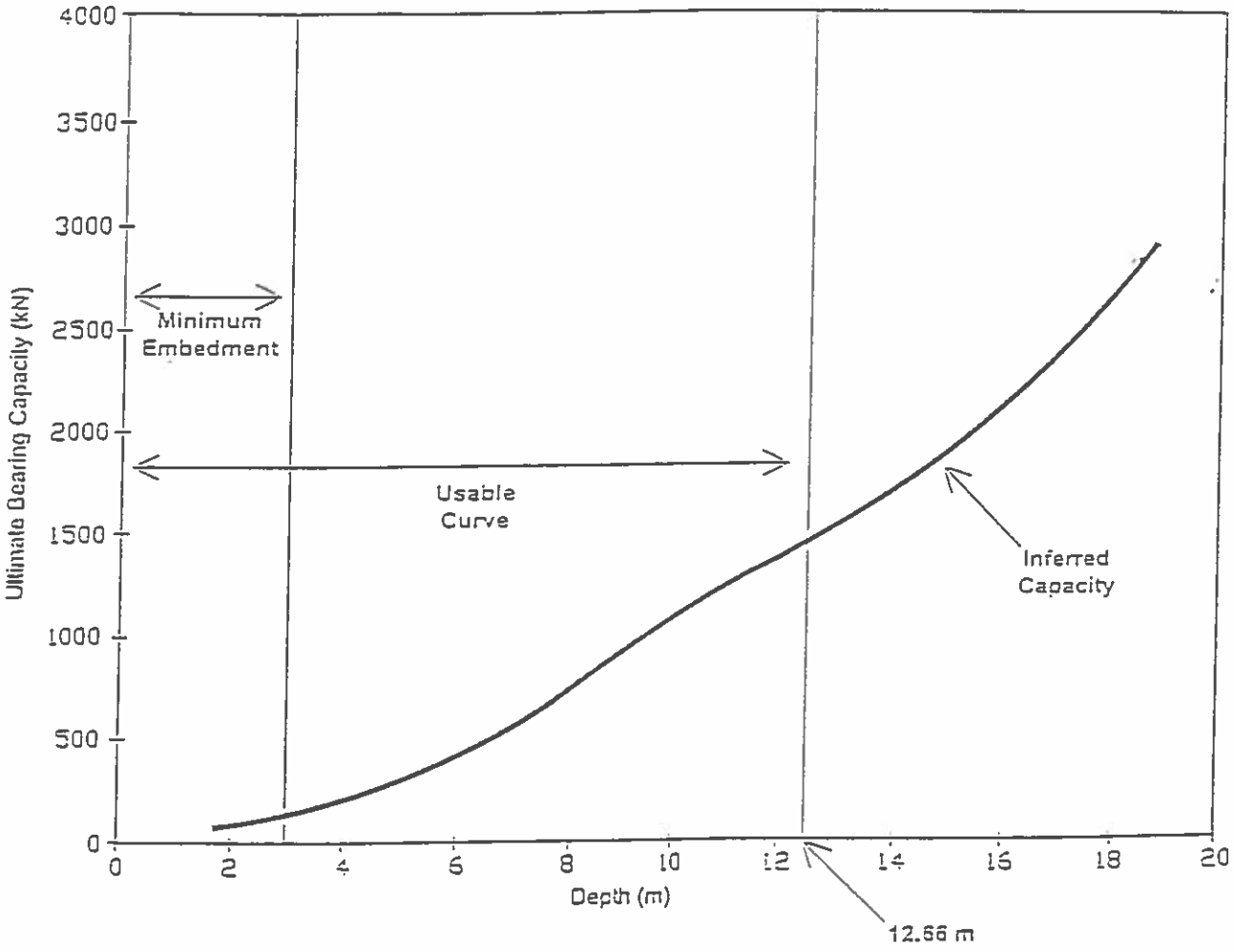

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4875 LONGLEY LANE, SUITE 100
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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP406
ULTIMATE BEARING CAPACITY
NORTHGATE LANE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE 16

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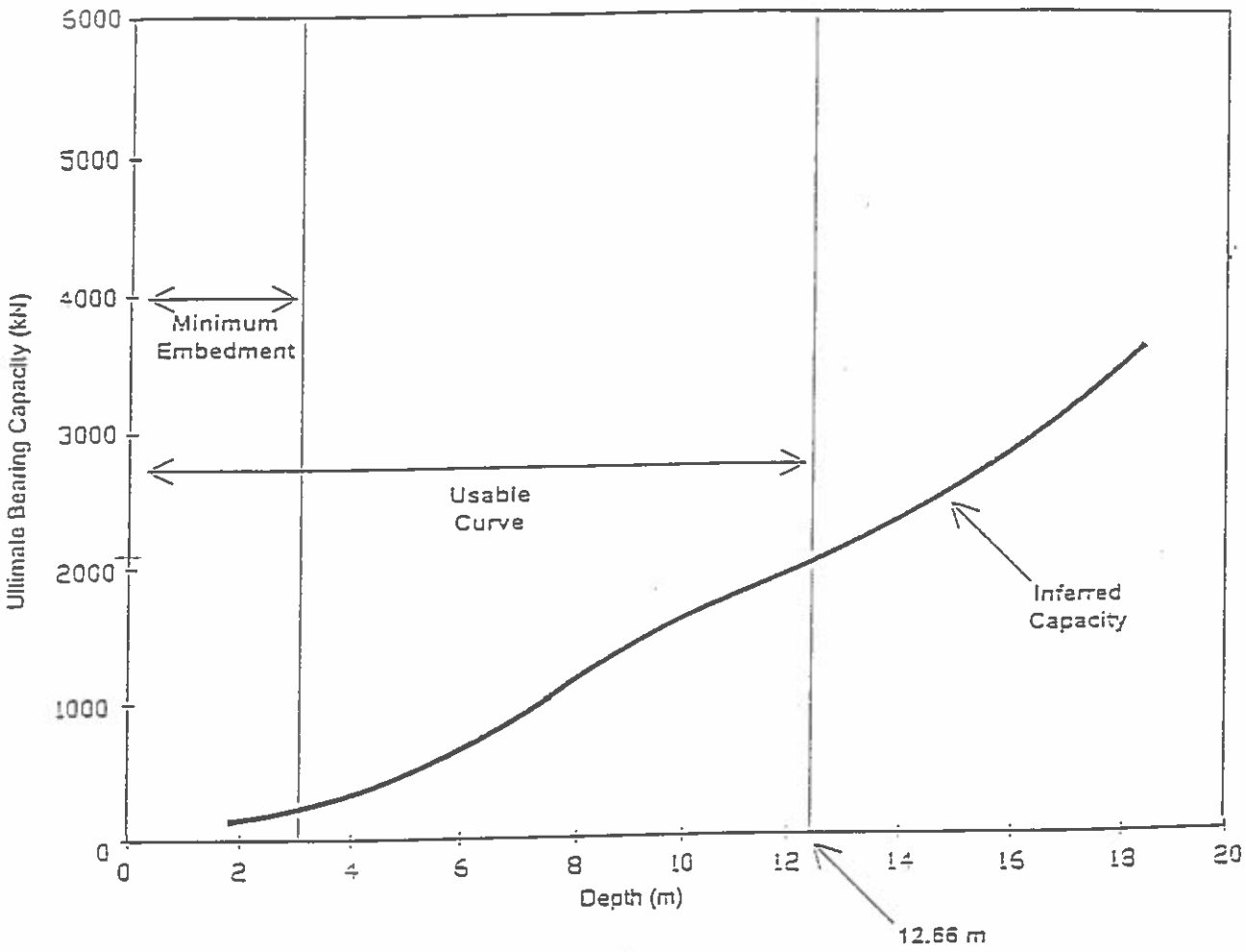

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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

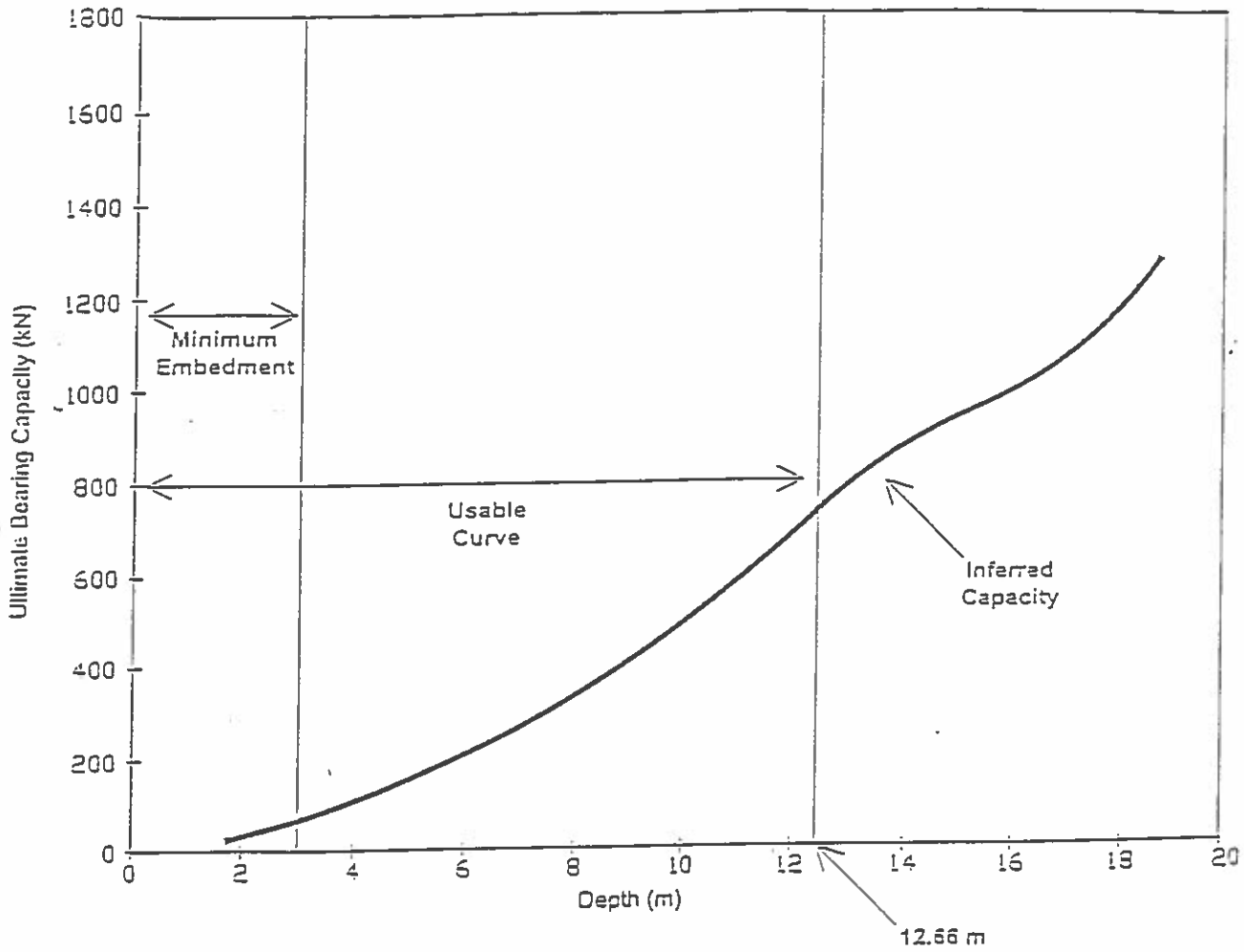
PILE DESIGN, PP457
ULTIMATE BEARING CAPACITY
NORTHGATE LANE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

17



KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP305
ULTIMATE BEARING CAPACITY
EMERSON DRIVE
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
18

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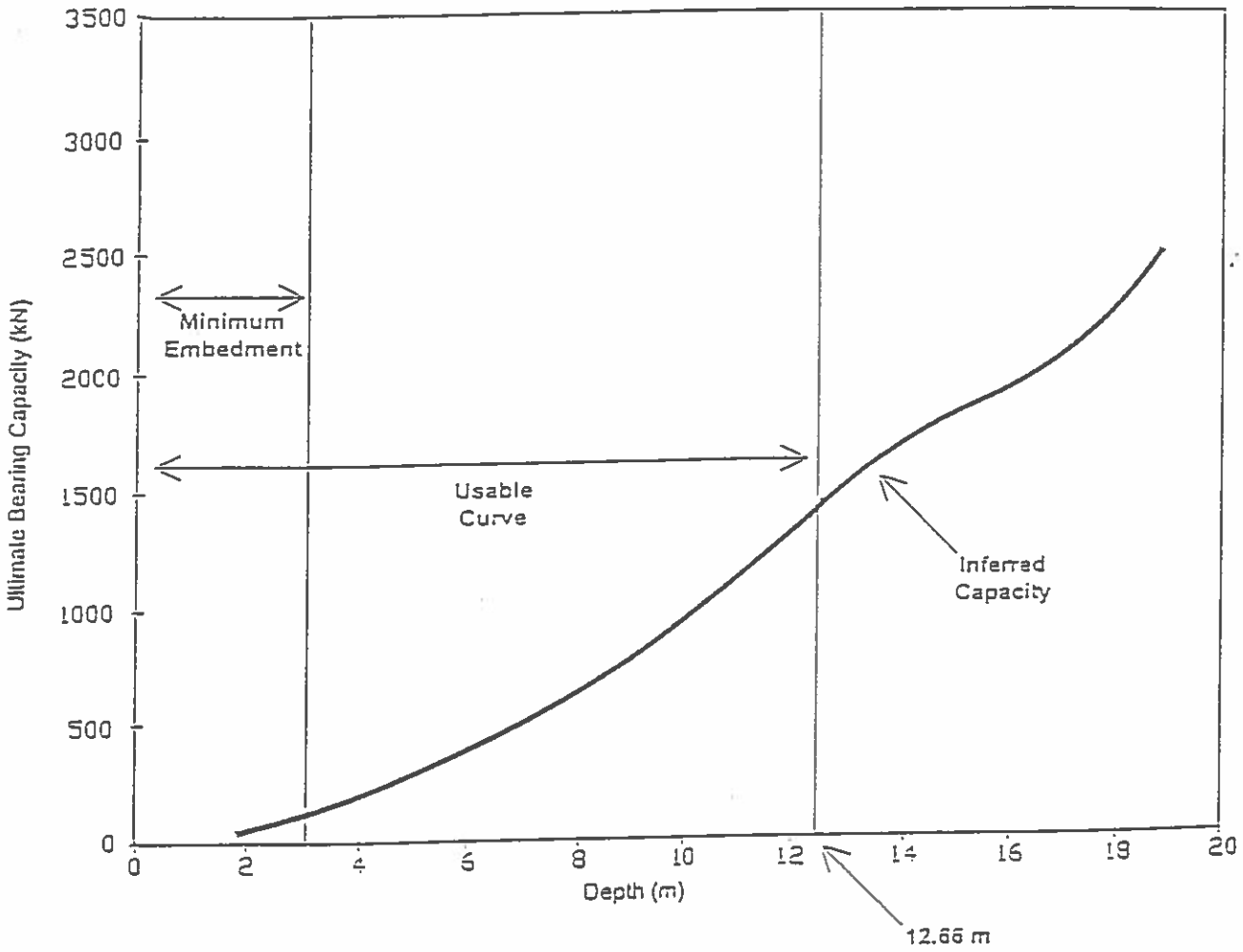

KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP406
ULTIMATE BEARING CAPACITY
EMERSON DRIVE
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
19

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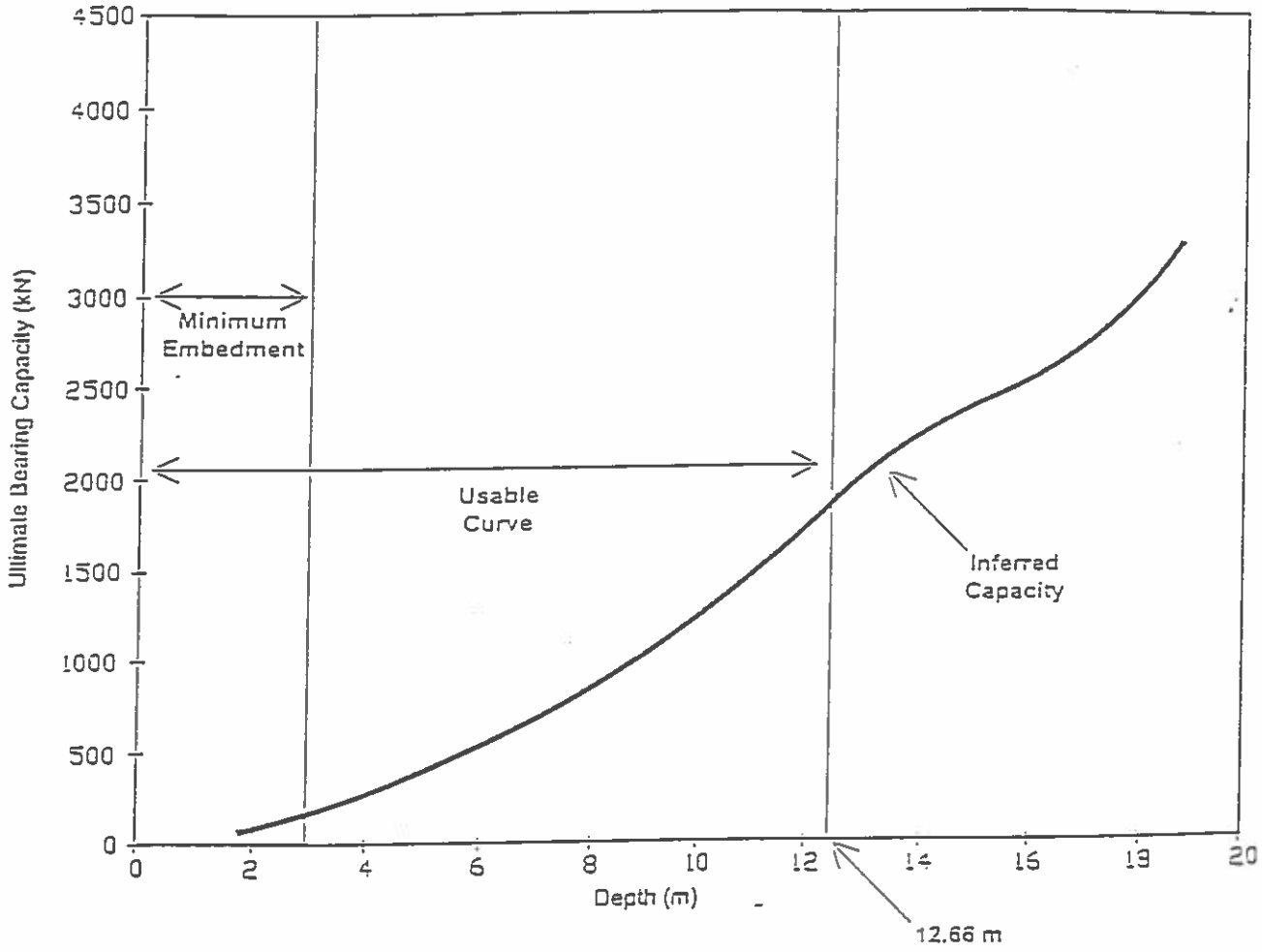

KLEINFELDER
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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP457
ULTIMATE BEARING CAPACITY
EMERSON DRIVE

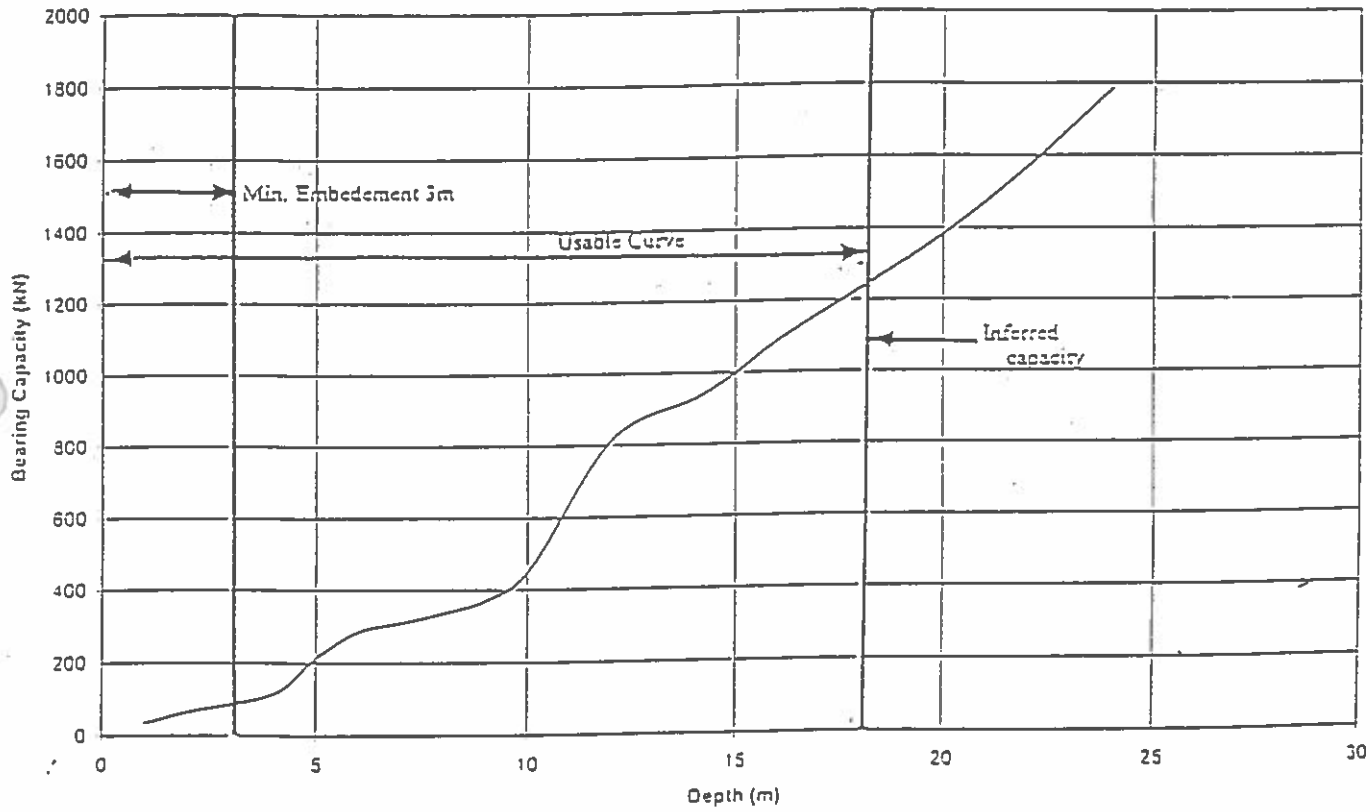
CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

20

BS-13A, Pipe Pile PP305, Ultimate Bearing Capacity



KLEINFELDER
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Tel. (702) 689-7800

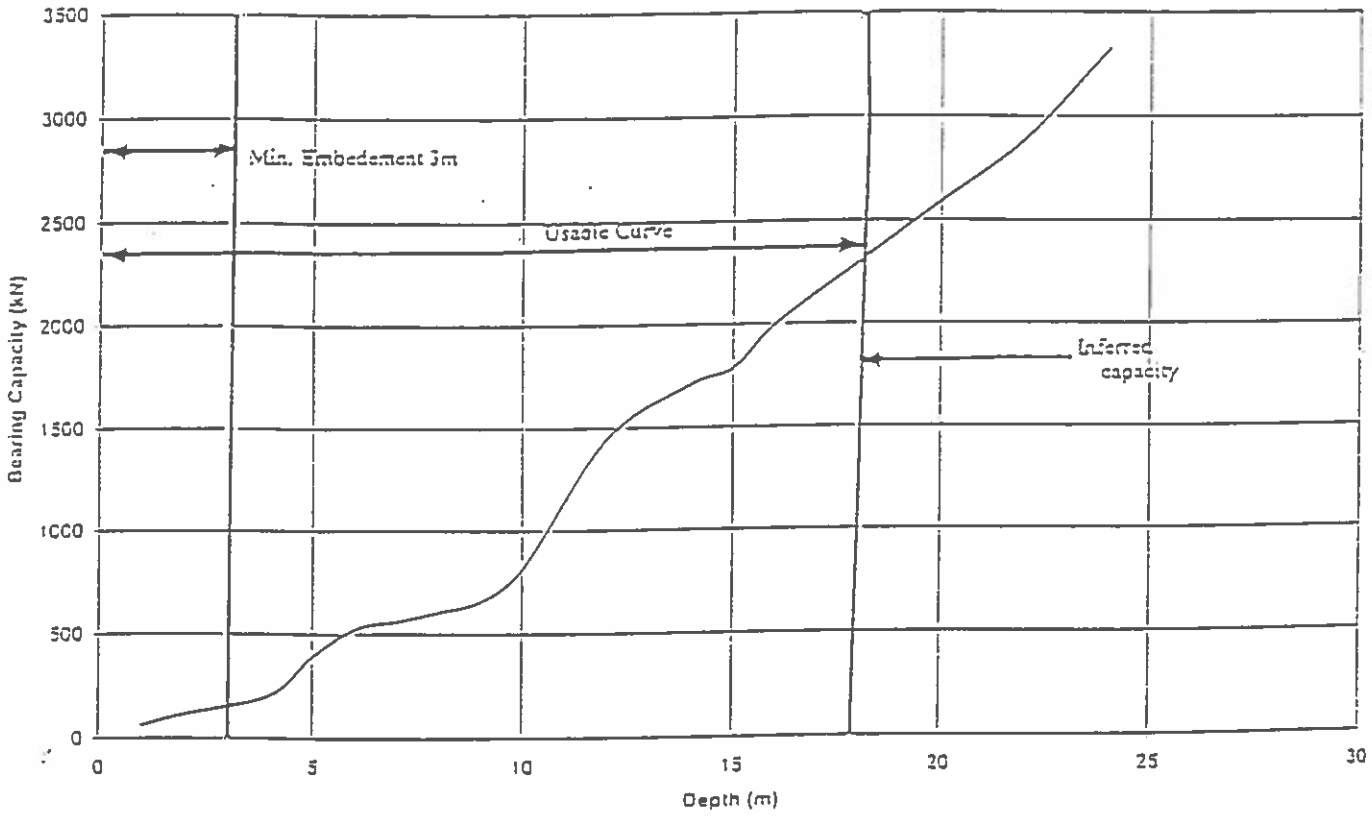
PROJECT NO. 30-1348-15.002

PILE DESIGN, PP305
ULTIMATE BEARING CAPACITY
COLLEGE PARKWAY
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
21

CAD FILE: L:\1999\DRAFTING\301348\30134815002-PLATES.DWG

BS-13A, Pipe Pile PP406, Ultimate Bearing Capacity



KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

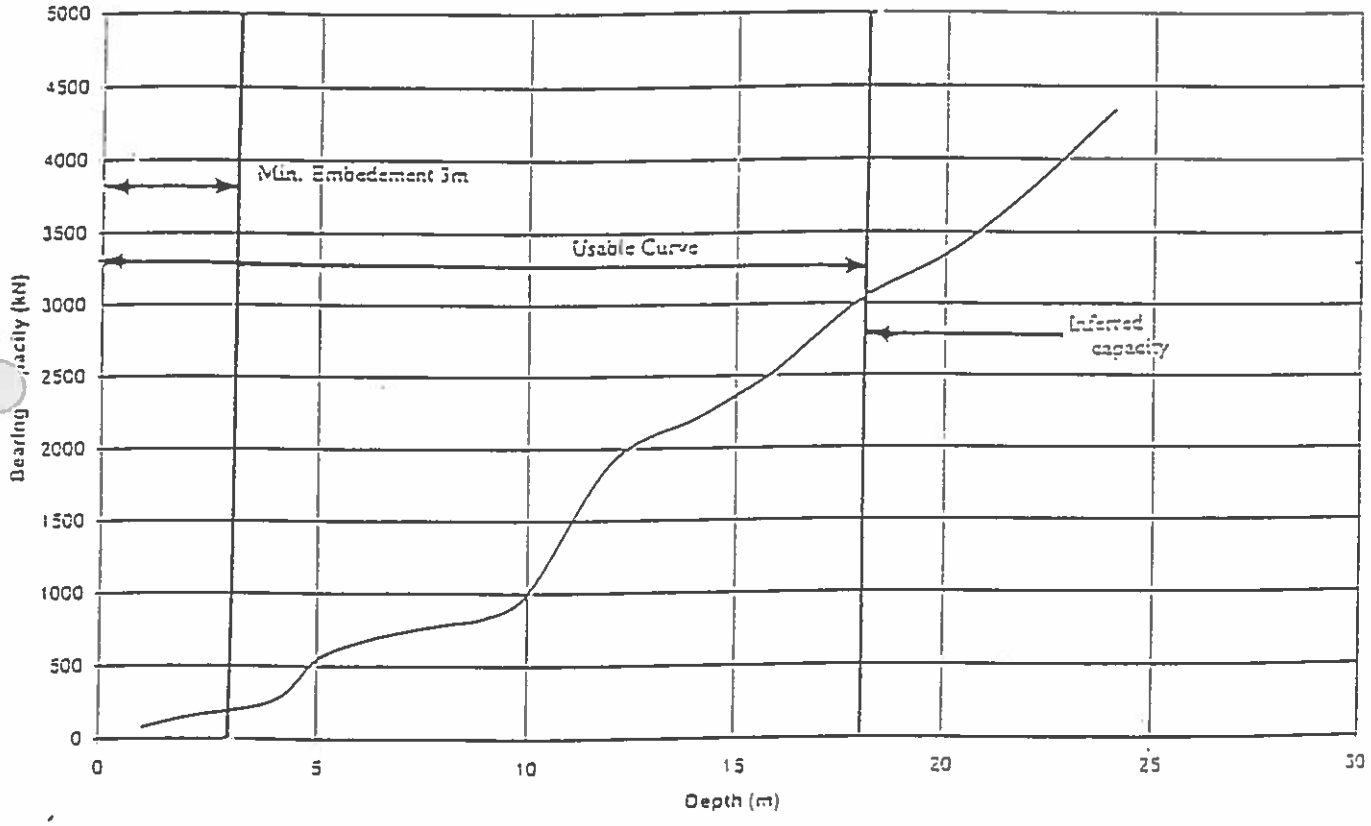
PROJECT NO. 30-1348-15.002

PILE DESIGN, PP406
ULTIMATE BEARING CAPACITY
COLLEGE PARKWAY
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
22

CAD FILE: L:\1999\DRAWING\301348\30134815002-PLATES.DWG

BS-13A, Pipe Pile PP457, Ultimate Bearing Capacity



KLEINFELDER
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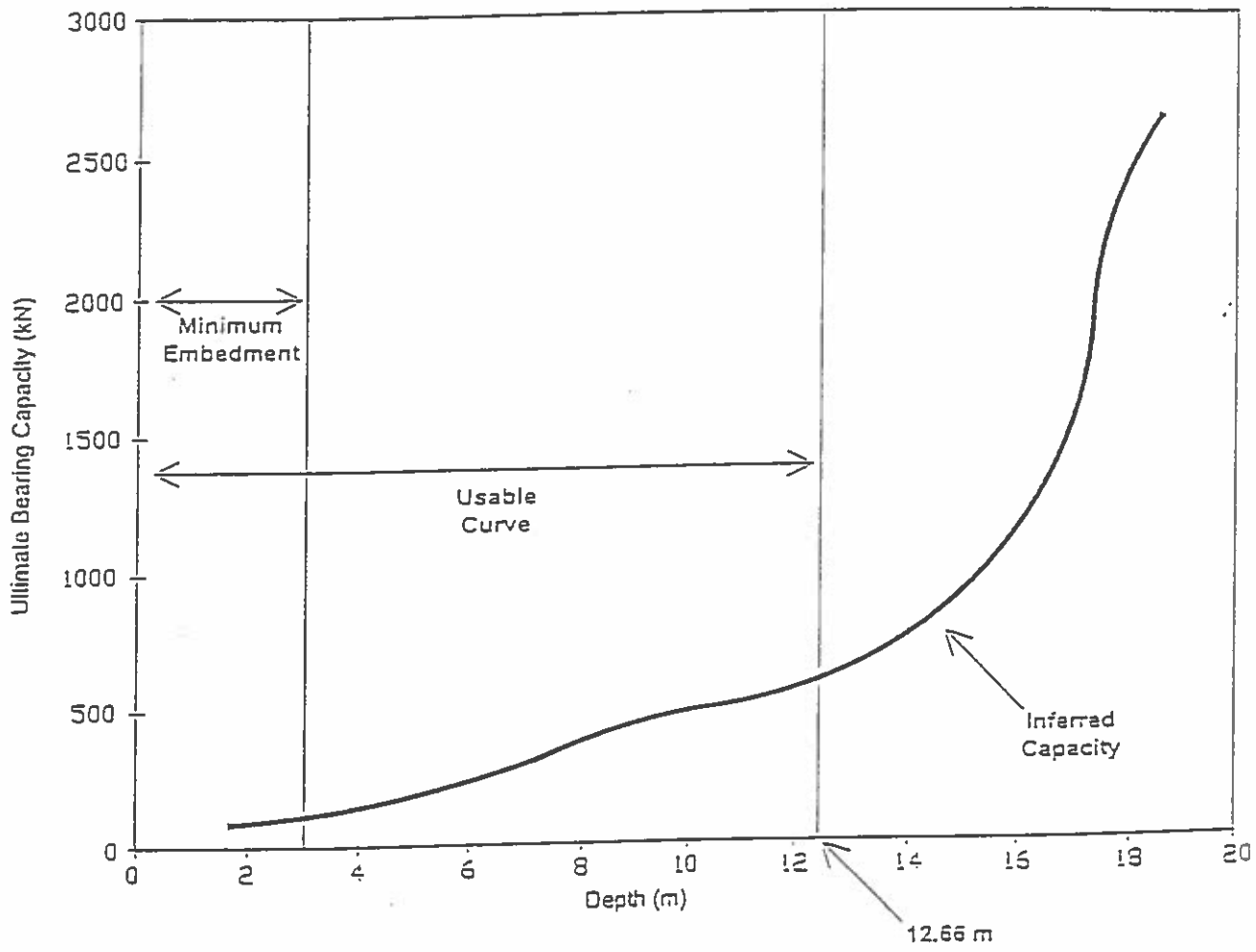
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP457
ULTIMATE BEARING CAPACITY
COLLEGE PARKWAY
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
23



KLEINFELDER
4875 LONGLEY LANE, SUITE 100
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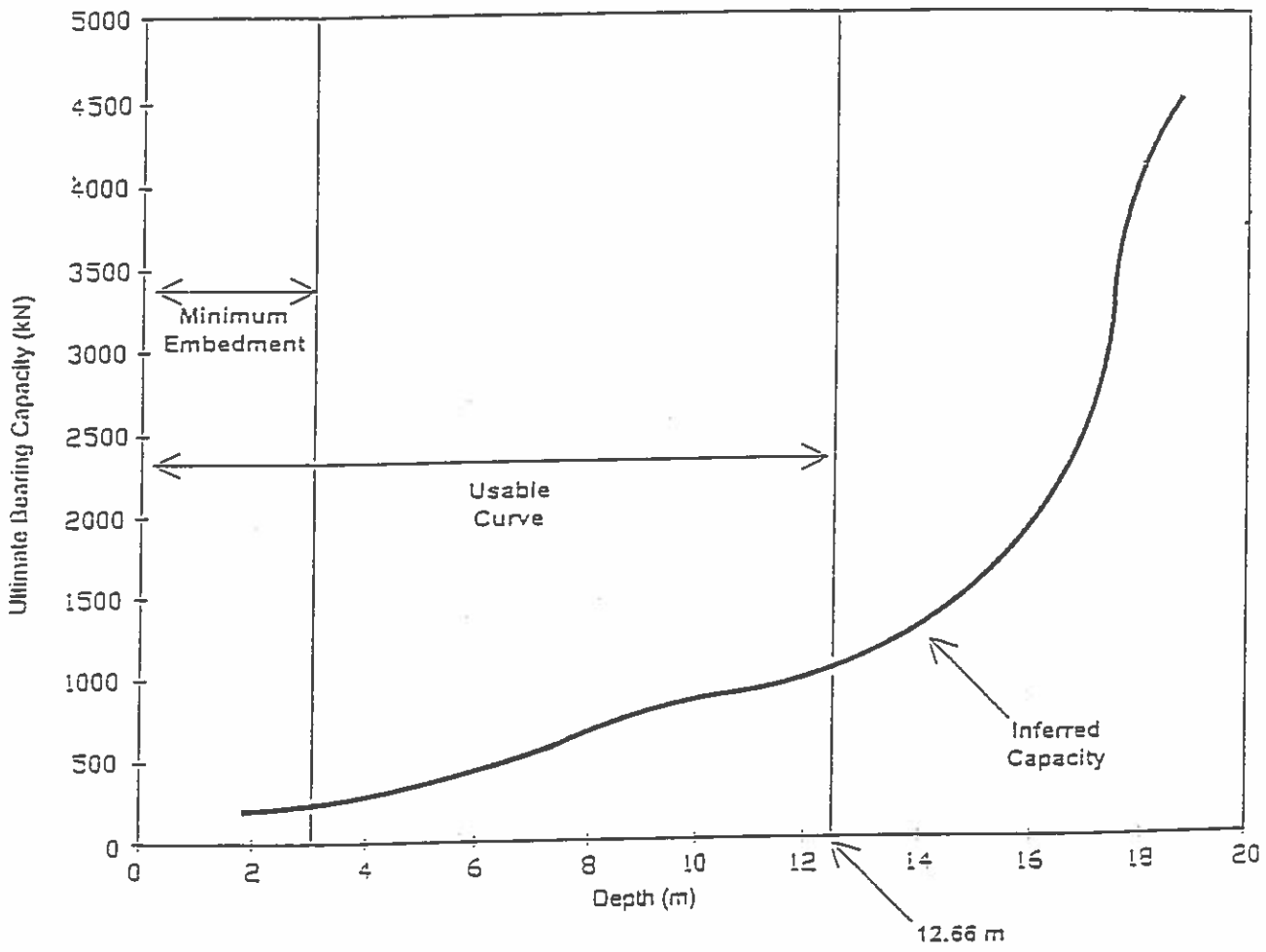
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

PILE DESIGN, PP305
ULTIMATE BEARING CAPACITY
CARMINE STREET
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
24

CAD FILE: L:\1999\DRAFTING\301348\30134815002-PLATES.DWG



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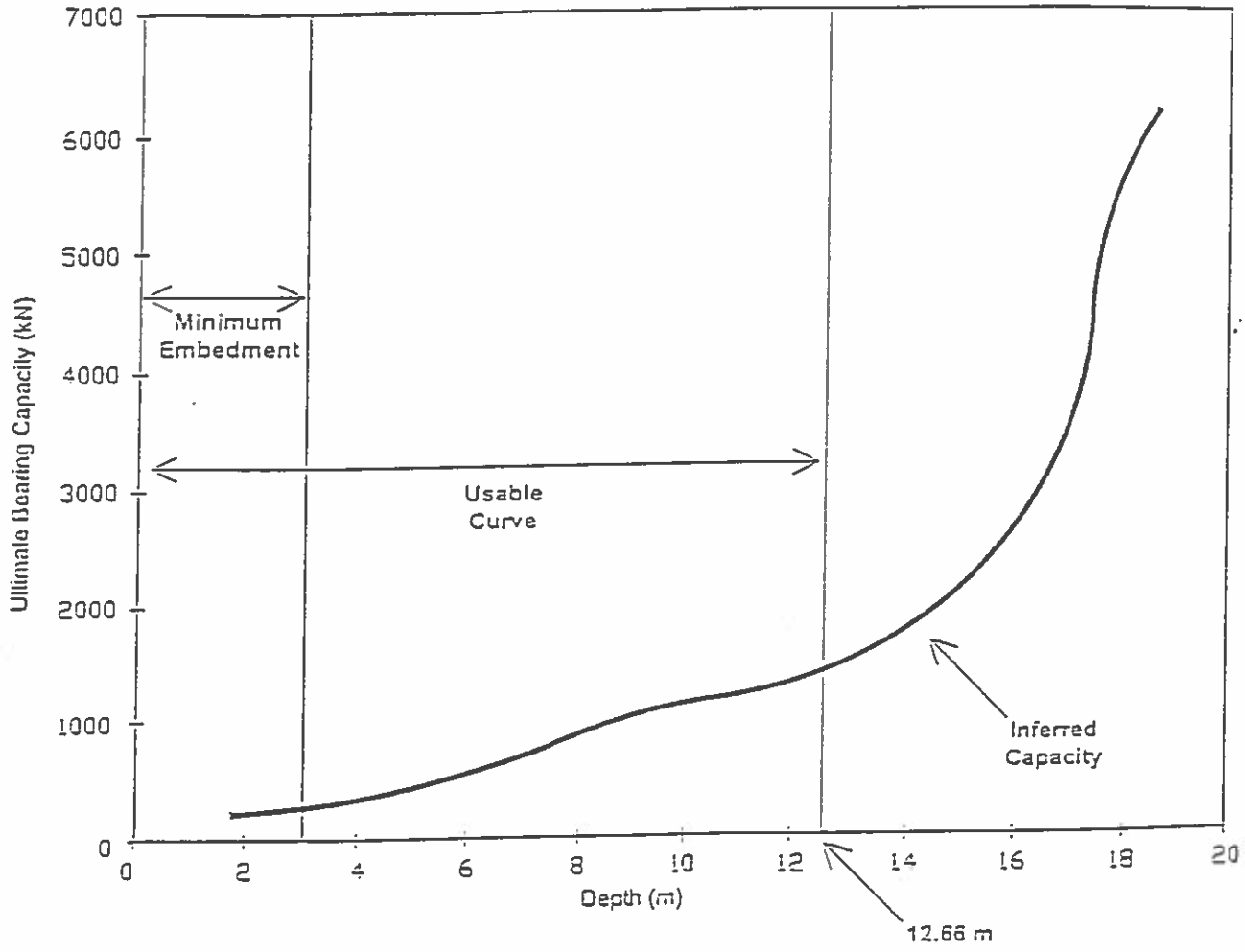
PROJECT NO. 30-1348-15.002

PILE DESIGN, PP406
ULTIMATE BEARING CAPACITY
CARMINE STREET
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
25

CAD FILE: L:\1999\DRAWING\301348\301348150O2-PLATES.DWG



KLEINFELDER
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RENO, NEVADA 89502
Tel. (702) 689-7800

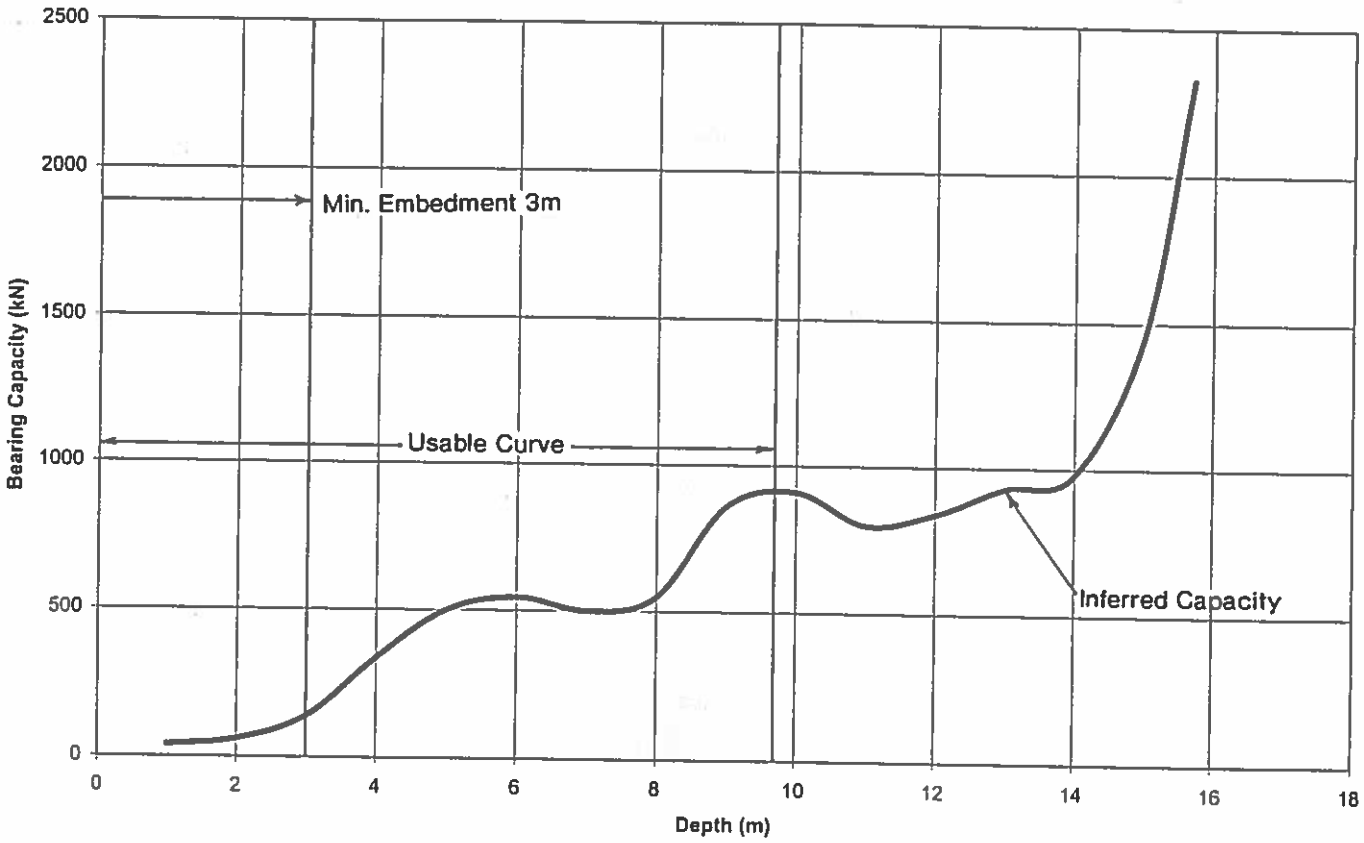
PROJECT NO. 30-1348-15.002

PILE DESIGN, PP457
ULTIMATE BEARING CAPACITY
CARMINE STREET
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
26

CAD FILE: L:\1999\DRA...\301348\30134815002-PLATES.DWG

BS-14, Pipe Pile PP305, Ultimate Bearing Capacity



KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (775) 689-7800

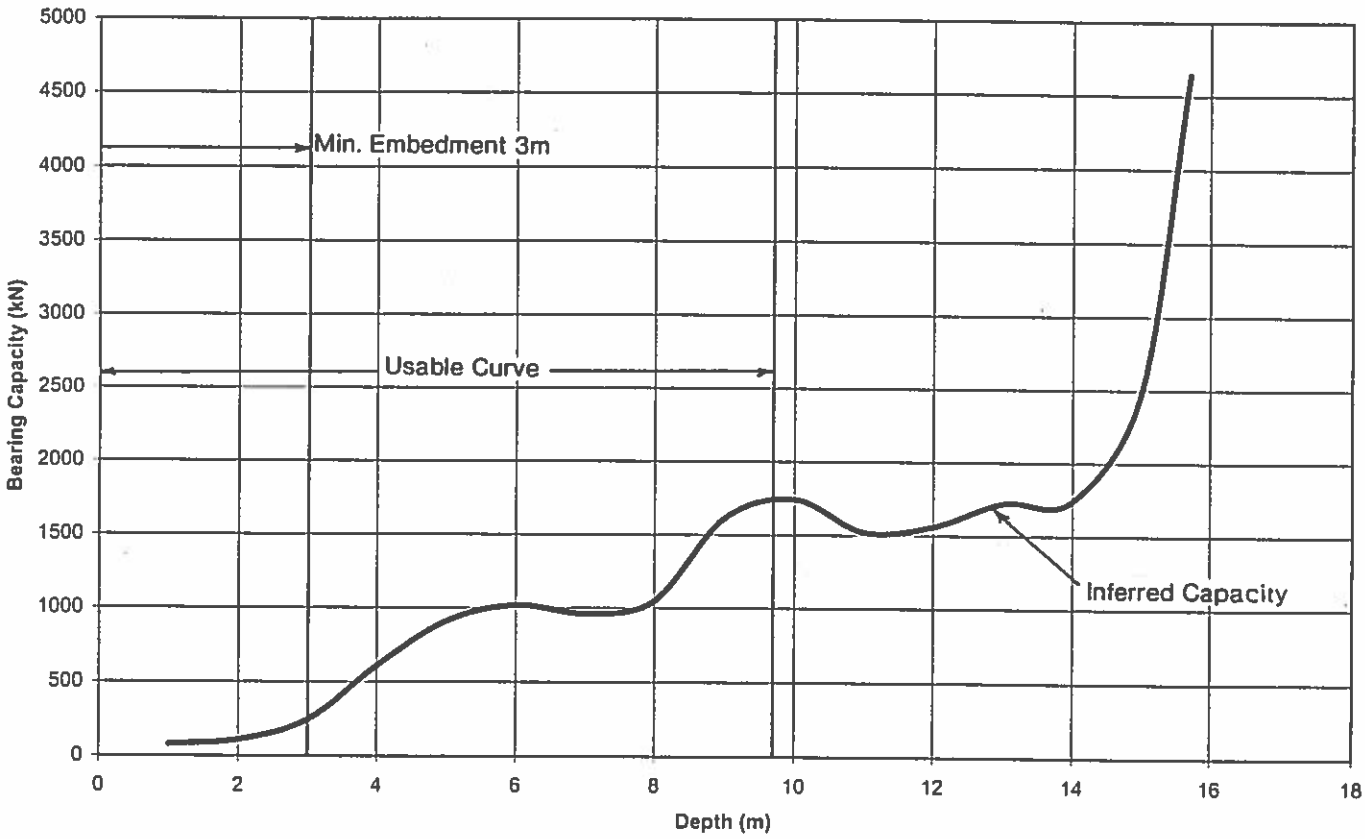
PROJECT NO. 30-1438-15.003

PILE DESIGN, PP305
ULTIMATE BEARING CAPACITY
U.S. 50
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
27

CAD FILE: L:\1999\...NG\30143815003\30143815003-PLATES.DWG

BS-14, Pipe Pile PP406, Ultimate Bearing Capacity



KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (775) 689-7800

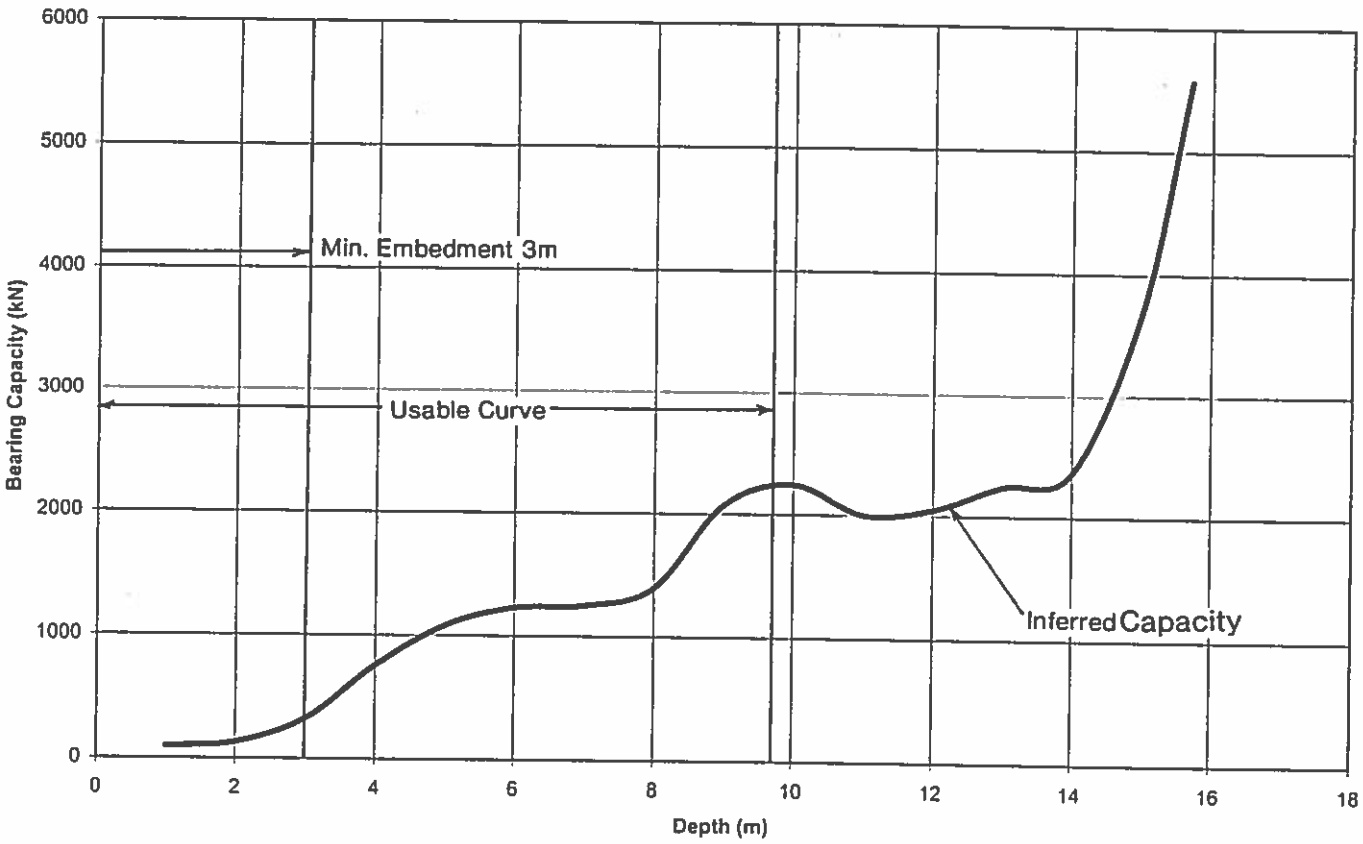
PROJECT NO. 30-1438-15.003

PILE DESIGN, PP406
ULTIMATE BEARING CAPACITY
U.S. 50
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
28

CAD FILE: L:\1999\D...NG\30143815003\30143815003-PLATES.DWG

BS-14, Pipe Pile PP457, Ultimate Bearing Capacity



KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (775) 689-7800

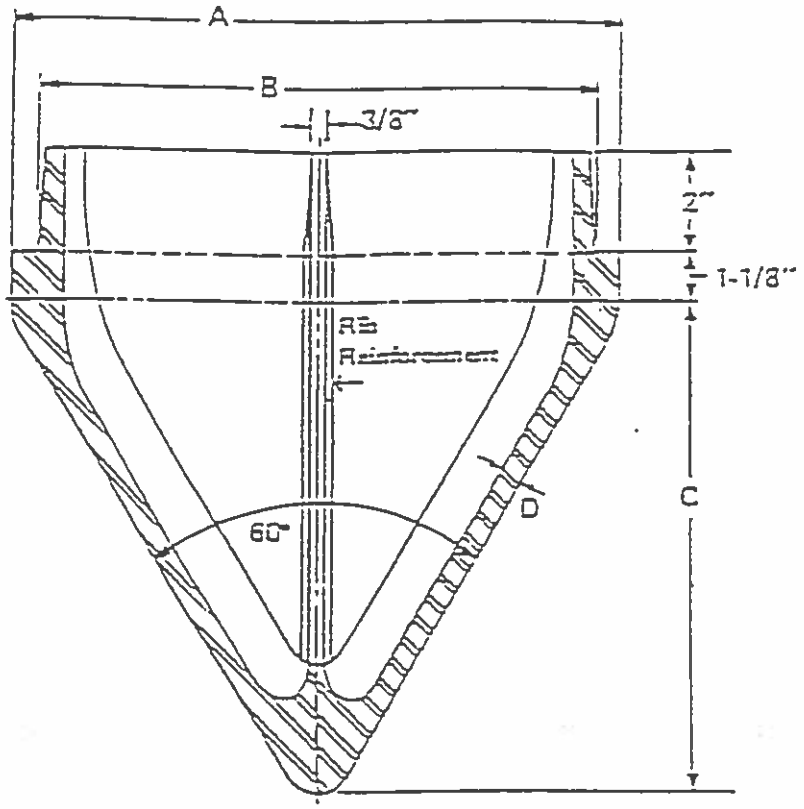
PROJECT NO. 30-1438-15.003

PILE DESIGN, PP457
ULTIMATE BEARING CAPACITY
U.S. 50
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
29

CAD FILE: L:\1999\DRAFTING\30143815003\30143815003-PLATES.DWG

MATERIAL: CAST STEEL ASTM A27 60/30 HEAT-TREATED



PIPE O.D.	A	B	C	D
8-5/8"	8-3/4"	7-1/2"	7-1/8"	1/2"
9-5/8"	9-3/4"	7-1/2"	7-1/8"	1/2"
10-3/4"	10-7/8"	9-3/4"	9"	1/2"
12"	12-1/8"	11"	10-3/8"	1/2"
12-3/4"	12-7/8"	11-3/4"	10-3/4"	1/2"
13-3/8"	13-1/2"	11-11/16"	11-3/8"	1/2"
14"	14-1/8"	13"	11-13/16"	9/16"
16"	16-1/8"	15"	13-1/2"	9/16"
18"	18-1/8"	17"	15-1/4"	5/8"
20"	20-1/8"	19"	17"	5/8"
22"	22-1/8"	21"	18-7/8"	5/8"
24"	24-1/8"	23"	20-3/8"	5/8"

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PROJECT NO. 30-1348-15.002

PIPE PILE DRIVING SHOE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE 30

CAD FILE: L:\1999\DR...G\301348\30134815002-PLATES.DWG

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	144	148	147	174
1.0	131	185	147	175
1.5	156	223	172	200
2.0	181	260	197	225

Allowable Bearing Capacity (kN/m2)

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	1	2	3	4
1.0	2	4	4	5
1.5	3	6	5	7
2.0	4	8	7	9

Elastic Settlement (mm)

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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

RETAINING WALL DESIGN
ALLOWABLE LOAD AND SETTLEMENT
HOT SPRINGS
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
31

CAD FILE: L:\1999\DR...\NG\301348\301348150O2-PLATES.DWG

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	90	124	159	158
1.0	146	156	162	174
1.5	150	150	163	179
2.0	120	136	152	168

Allowable Bearing Capacity (kN/m2)

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	2	4	6	7
1.0	5	7	9	11
1.5	6	8	11	14
2.0	5	9	12	15

Elastic Settlement (mm)

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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

RETAINING WALL DESIGN
ALLOWABLE LOAD AND SETTLEMENT
BIKE PATH #1
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
32

CAD FILE: L:\1999\DR...G\301348\30134815002-PLATES.DWG

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	61	70	84	87
1.0	77	86	101	104
1.5	94	103	117	120
2.0	111	119	134	137

Allowable Bearing Capacity (kN/m2)

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	1	1	2	2
1.0	1	2	3	3
1.5	2	3	4	4
2.0	2	4	5	6

Elastic Settlement (mm)

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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

RETAINING WALL DESIGN
ALLOWABLE LOAD AND SETTLEMENT
EMERSON & NORTHGATE
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
33

CAD FILE: L:\1999\D...G\301348\30134815002-PLATES.DWG

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	60	74	91	109
1.0	72	89	106	122
1.5	100	116	133	150
2.0	127	144	161	178

Allowable Bearing Capacity (kN/m2)

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	1	2	4	5
1.0	2	4	6	8
1.5	4	6	9	12
2.0	6	9	13	16

Elastic Settlement (mm)

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PROJECT NO. 30-1348-15.002

RETAINING WALL DESIGN
ALLOWABLE LOAD AND SETTLEMENT
BROADLEAF EAST
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
34

CAD FILE: L:\1999\D...NG\301348\30134815002-PLATES.DWG

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	87	113	121	132
1.0	128	120	129	141
1.5	100	117	133	150
2.0	128	145	161	178

Allowable Bearing Capacity (kN/m2)

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	2	4	5	6
1.0	2	5	7	9
1.5	4	6	9	12
2.0	6	9	13	16

Elastic Settlement (mm)

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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

RETAINING WALL DESIGN
ALLOWABLE LOAD AND SETTLEMENT
BIKE PATH #2
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
35

CAD FILE: L:\1999\Dr...NG\301348\30134815002-PLATES.DWG

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	44	61	77	94
1.0	72	89	105	122
1.5	100	117	133	150
2.0	128	145	161	178

Allowable Bearing Capacity (kN/m2)

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	1	2	3	4
1.0	2	4	6	8
1.5	4	6	9	12
2.0	6	9	13	16

Elastic Settlement (mm)

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PROJECT NO. 30-1348-15.002

RETAINING WALL DESIGN
ALLOWABLE LOAD AND SETTLEMENT
SOUTH OF ARROWHEAD

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE 36

CAD FILE: L:\1999\DR...\IC\301348\301348150O2-PLATES.DWG

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	117	163	209	255
1.0	188	234	280	326
1.5	258	304	350	397
2.0	329	375	421	467

Allowable Bearing Capacity (kN/m2)

Footing Width (m)

Embedment Depth (m)	0.5	1.0	1.5	2.0
0.5	1	3	4	6
1.0	3	5	8	10
1.5	5	8	12	15
2.0	7	12	16	21

Elastic Settlement (mm)

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Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

RETAINING WALL DESIGN
ALLOWABLE LOAD AND SETTLEMENT
LV3
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
37

CAD FILE: L:\1999\DG\301348\301348150O2-PLATES.DWG

6. ADDITIONAL SERVICES

6.1 Project Bid Documents

It has been our experience during the bidding process, that contractors often contact us to discuss the geotechnical aspects of the project. Informal contacts between Kleinfelder and an individual contractor could result in incorrect or incomplete information being provided to the contractor. Therefore, we recommend a pre-bid meeting be held to answer any questions about the report prior to submittal of bids. If this is not possible, questions or clarifications regarding this report should be directed to NDOT or his designated representative. After consultation with Kleinfelder, NDOT(or representative) should provide clarifications or additional information to all contractors bidding the job.

6.2 Construction Observation/Testing and Plan Review

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

- Observations and testing during site preparation and earthwork.
- Observation of footing trench excavations.
- Observation and testing of construction materials.
- Consultation as may be required during construction.

We also recommend that project plans and specifications be reviewed by us to verify compatibility with our conclusions and recommendations. Additional information concerning the scope and cost of these services can be obtained from our office.

The review of plans and specifications and the field observation and testing by Kleinfelder are an integral part of the conclusions and recommendations made in this report. If we are not retained for these services, the Client agrees to assume Kleinfelder's responsibility for any potential claims that may arise during construction.

7. LIMITATIONS

Recommendations contained in this report are based on our field explorations, laboratory tests, and our understanding of the proposed construction. The study was performed using a mutually agreed upon scope of work. It is our opinion that this study was a cost-effective method to evaluate the subject site and evaluate some of the potential geotechnical concerns. More detailed, focused, and/or thorough investigations can be conducted. Further studies will tend to increase the level of assurance, however, such efforts will result in increased costs. If the Client wishes to reduce the uncertainties beyond the level associated with this study, Kleinfelder should be contacted for additional consultation.

The soils data used in the preparation of this report were obtained from borings made for this investigation. It is possible that variations in soils exist between the points explored. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered at this site which are different from those described in this report, our firm should be immediately notified so that we may make any necessary revisions to our recommendations. In addition, if the scope of the proposed project, locations of structures, or structural loads change from the description given in this report, our firm should be notified.

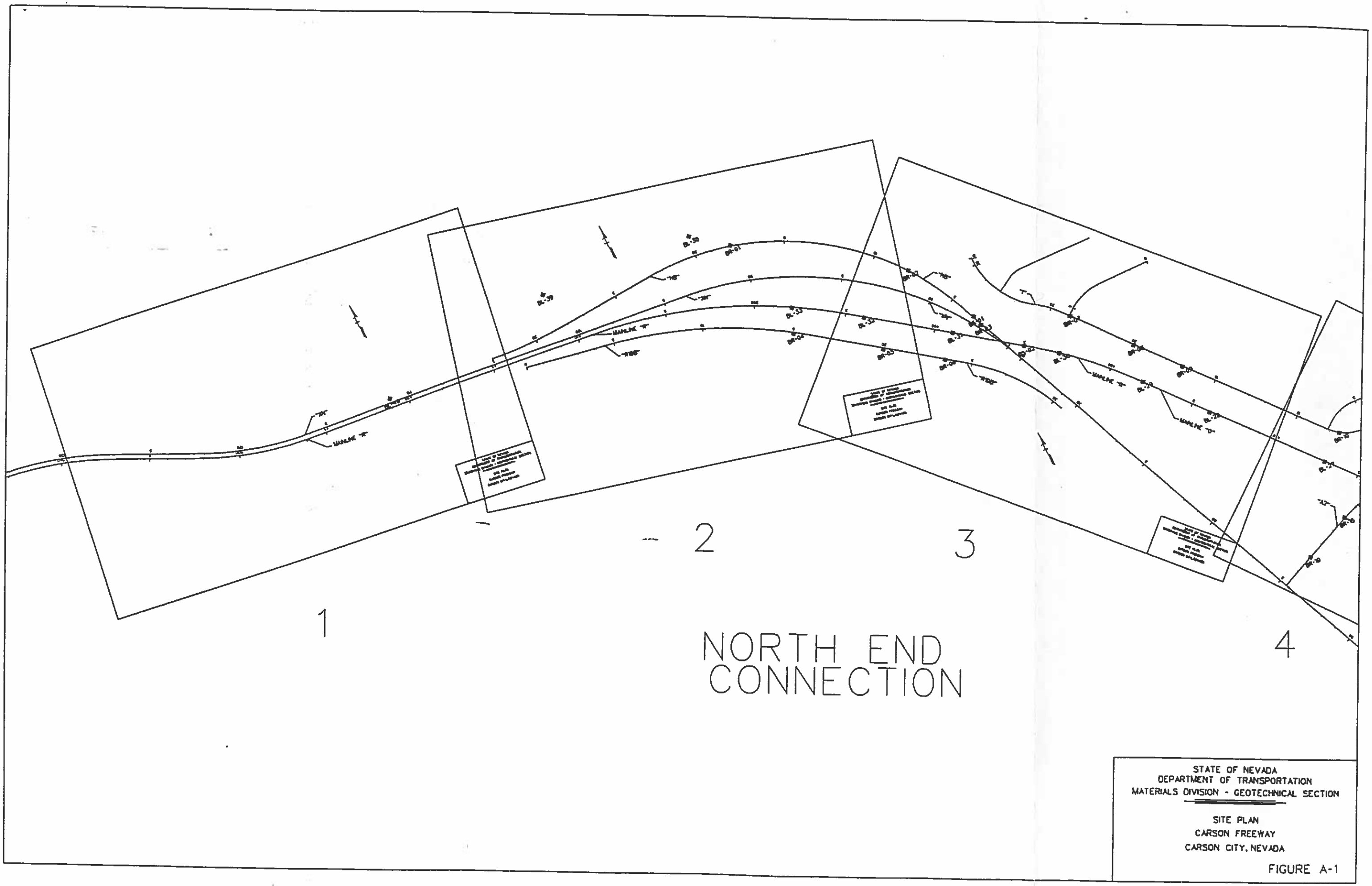
This report has been prepared for design purposes for specific application to the Carson Freeway Project in accordance with the generally accepted standards of practice at the time the report was written. No warranty, express or implied, is made.

This report may be used only by the Client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors including advances in man's understanding of applied science may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 36 months from its issue. Kleinfelder should be notified if the project is delayed by more than 24 months from the date of this report so that a review of site conditions can be made, and recommendations revised if appropriate.

It is the CLIENT'S responsibility to see that all parties to the project including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk. Any party other than the Client who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

APPENDIX A

Project Site Plans

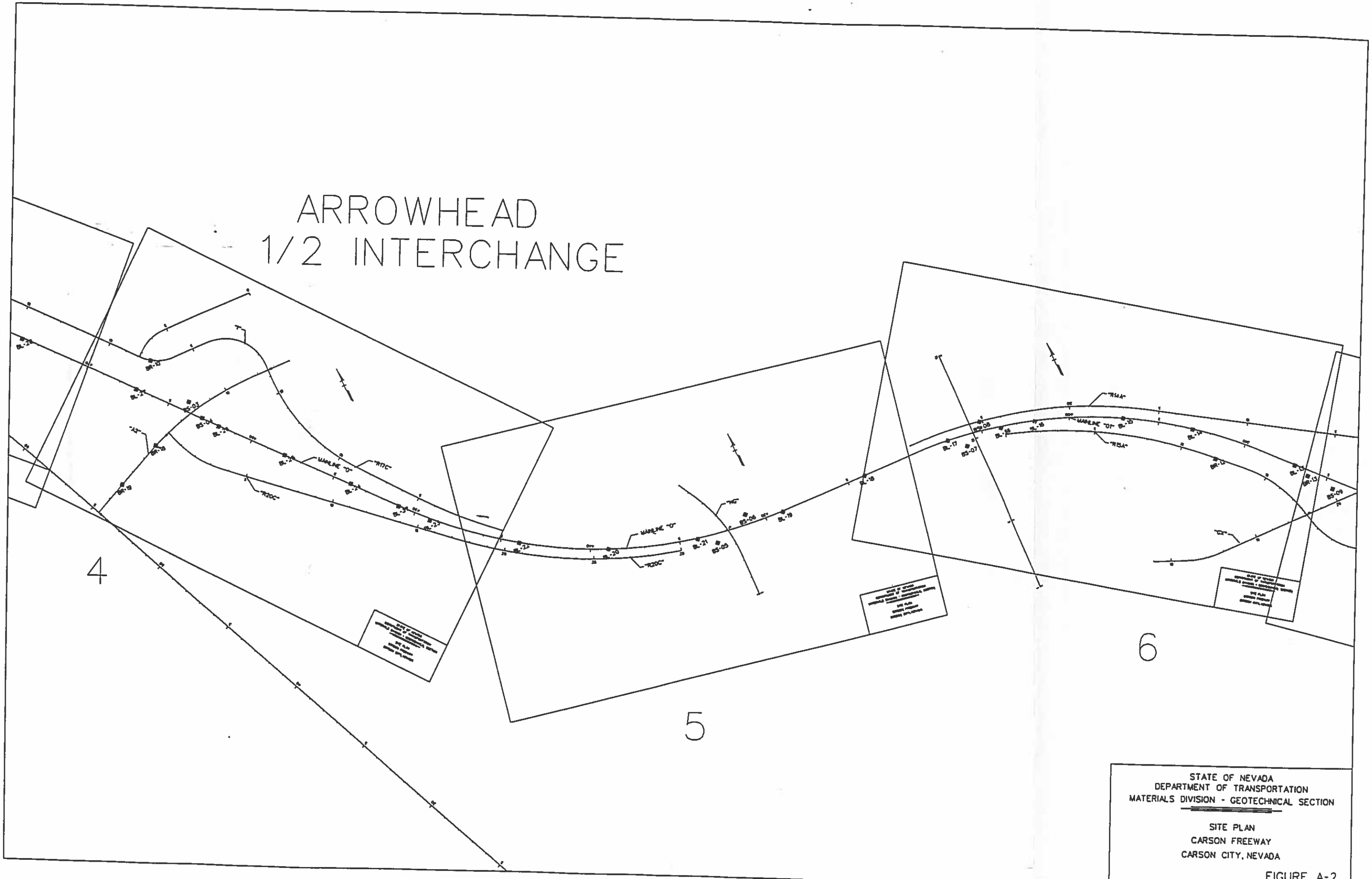


STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

FIGURE A-1

ARROWHEAD
1/2 INTERCHANGE

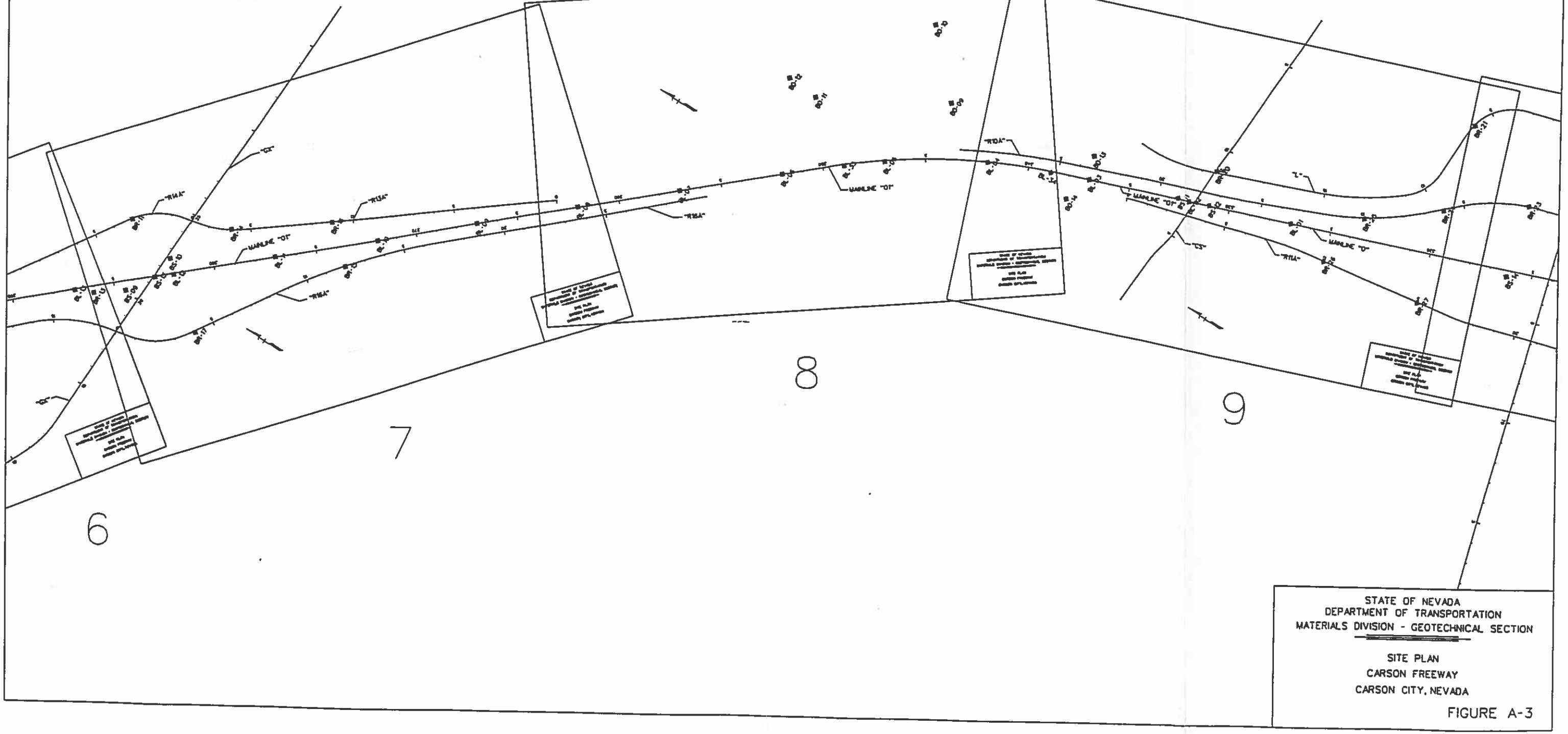


STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

FIGURE A-2

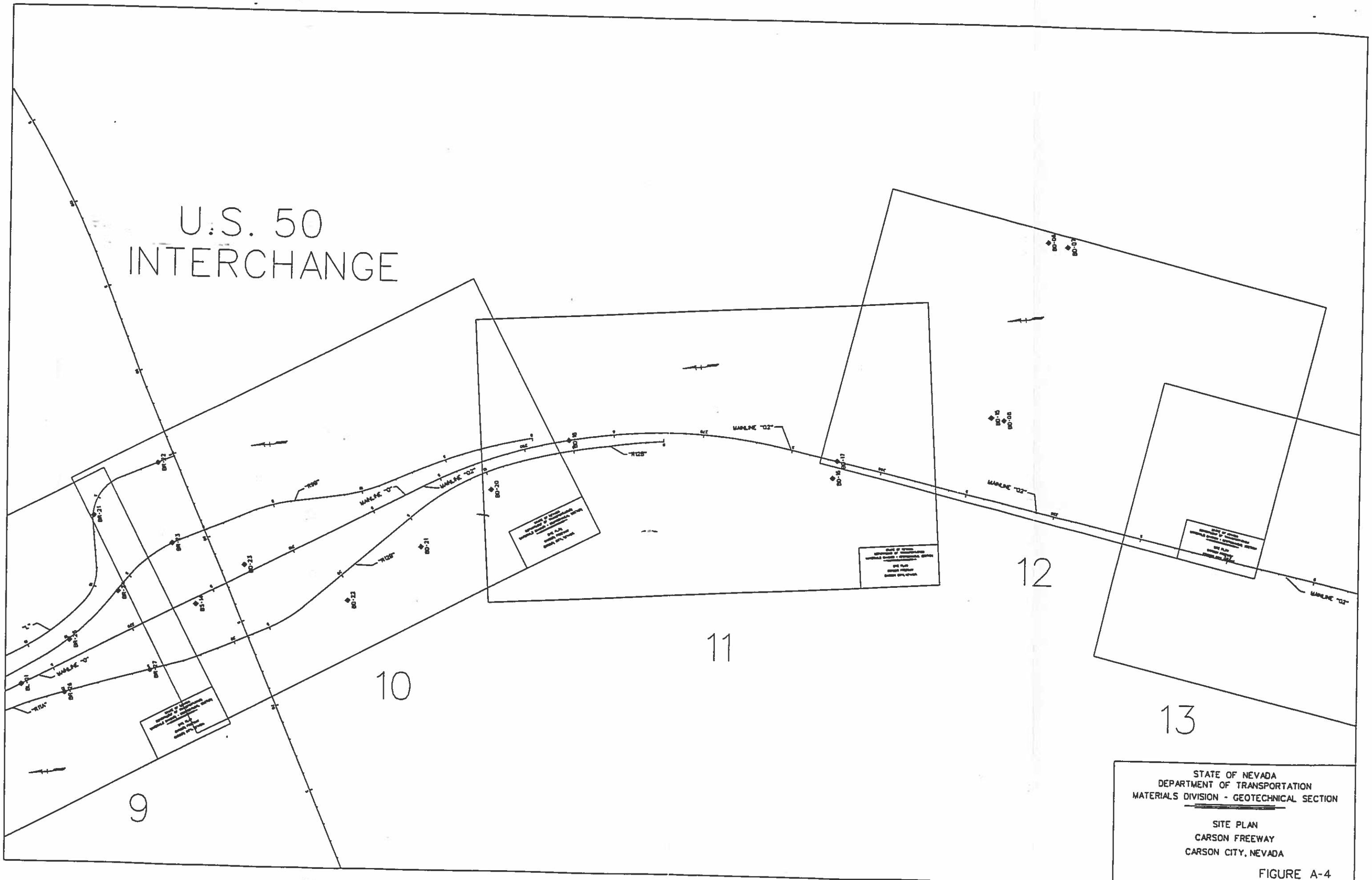
COLLEGE PARKWAY INTERCHANGE



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

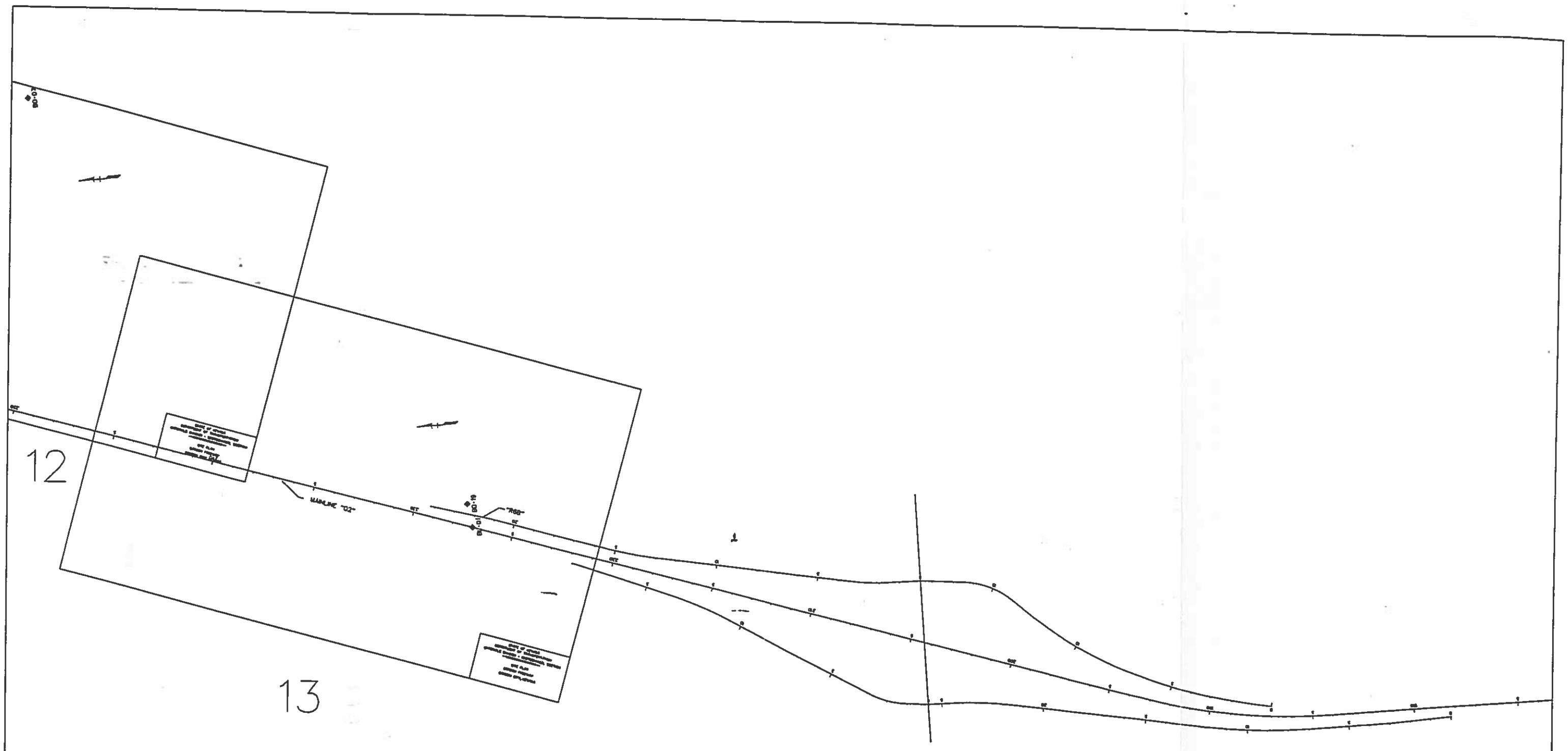
FIGURE A-3



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

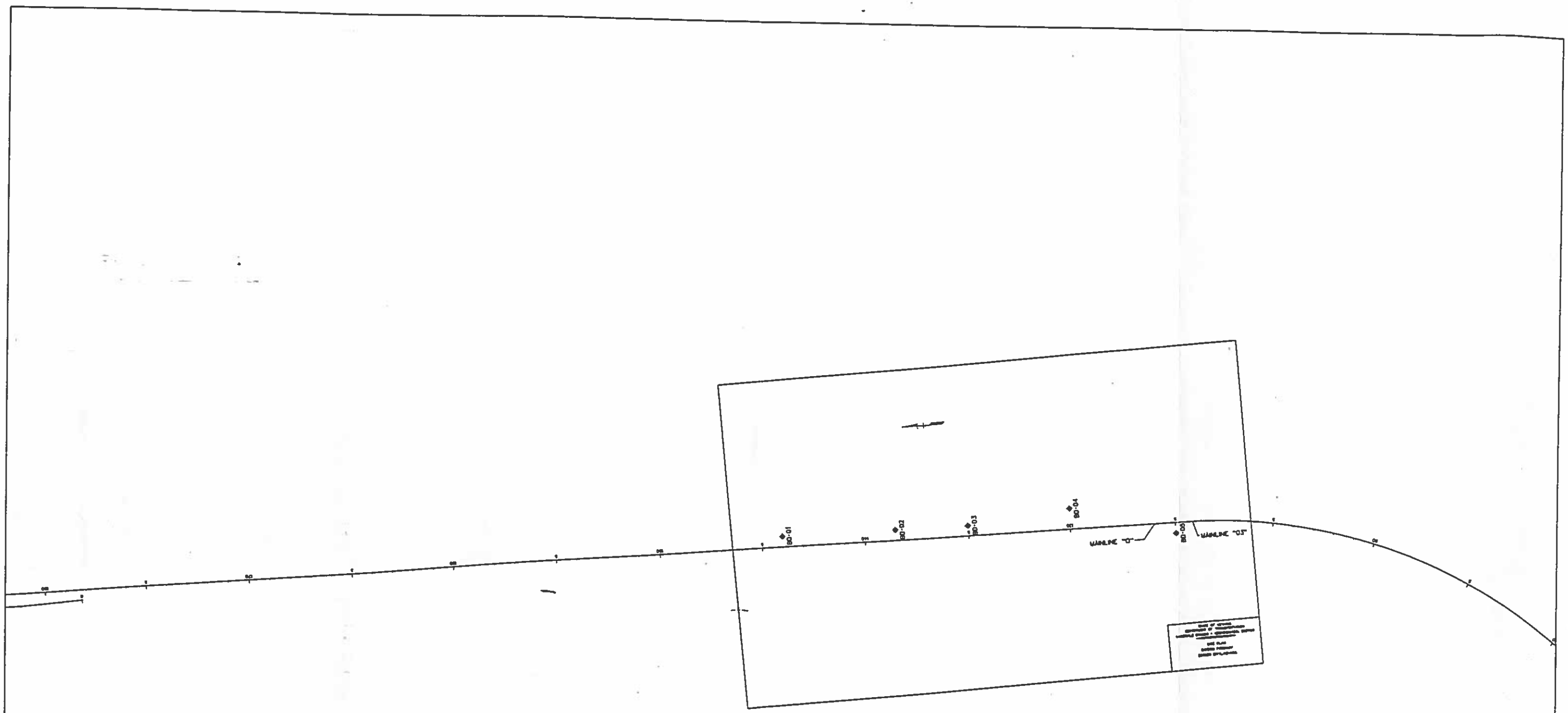
FIGURE A-4



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

FIGURE A-5



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

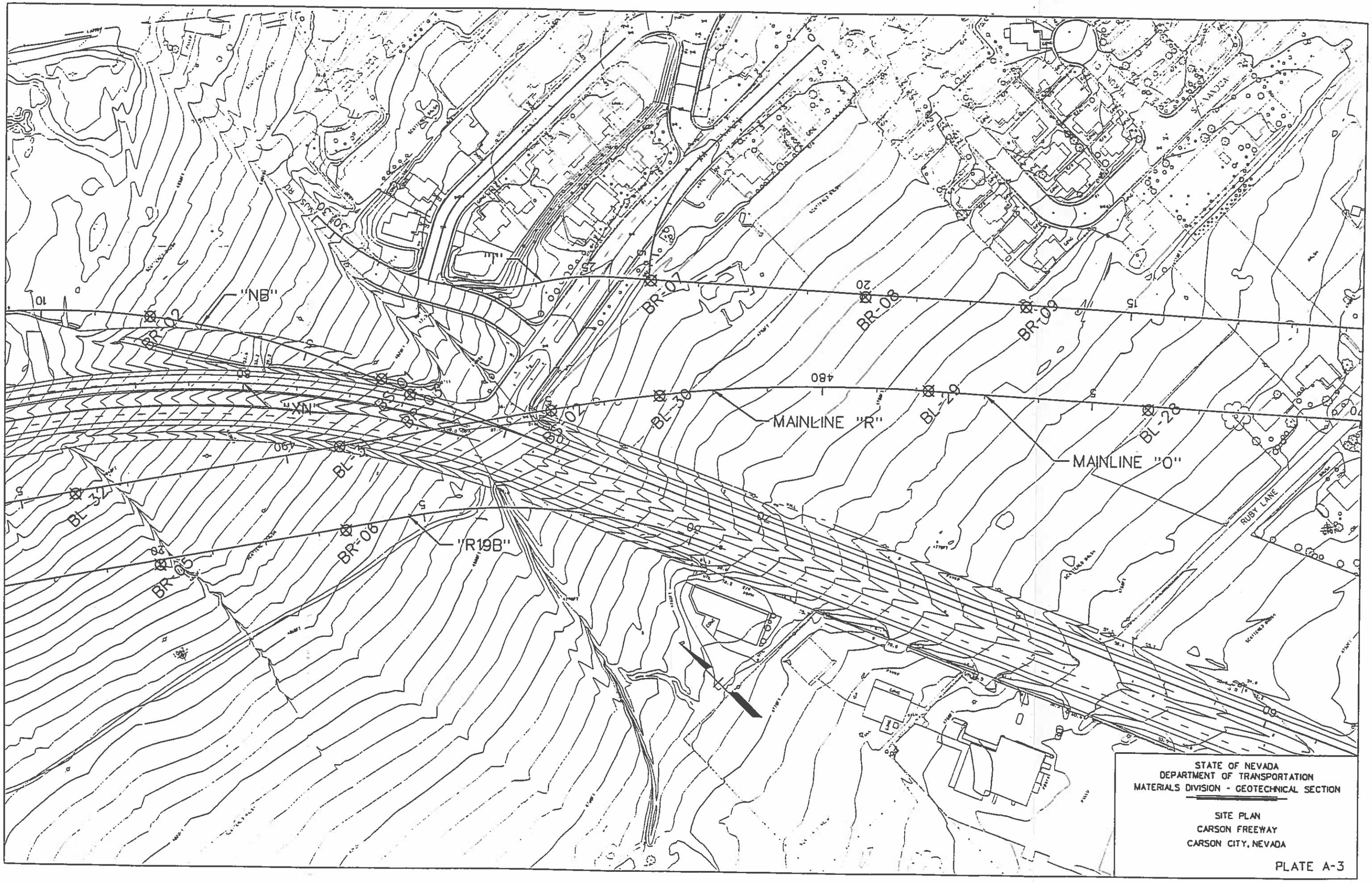
FIGURE A-6


MAINLINE "R"
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA
PLATE A-1

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

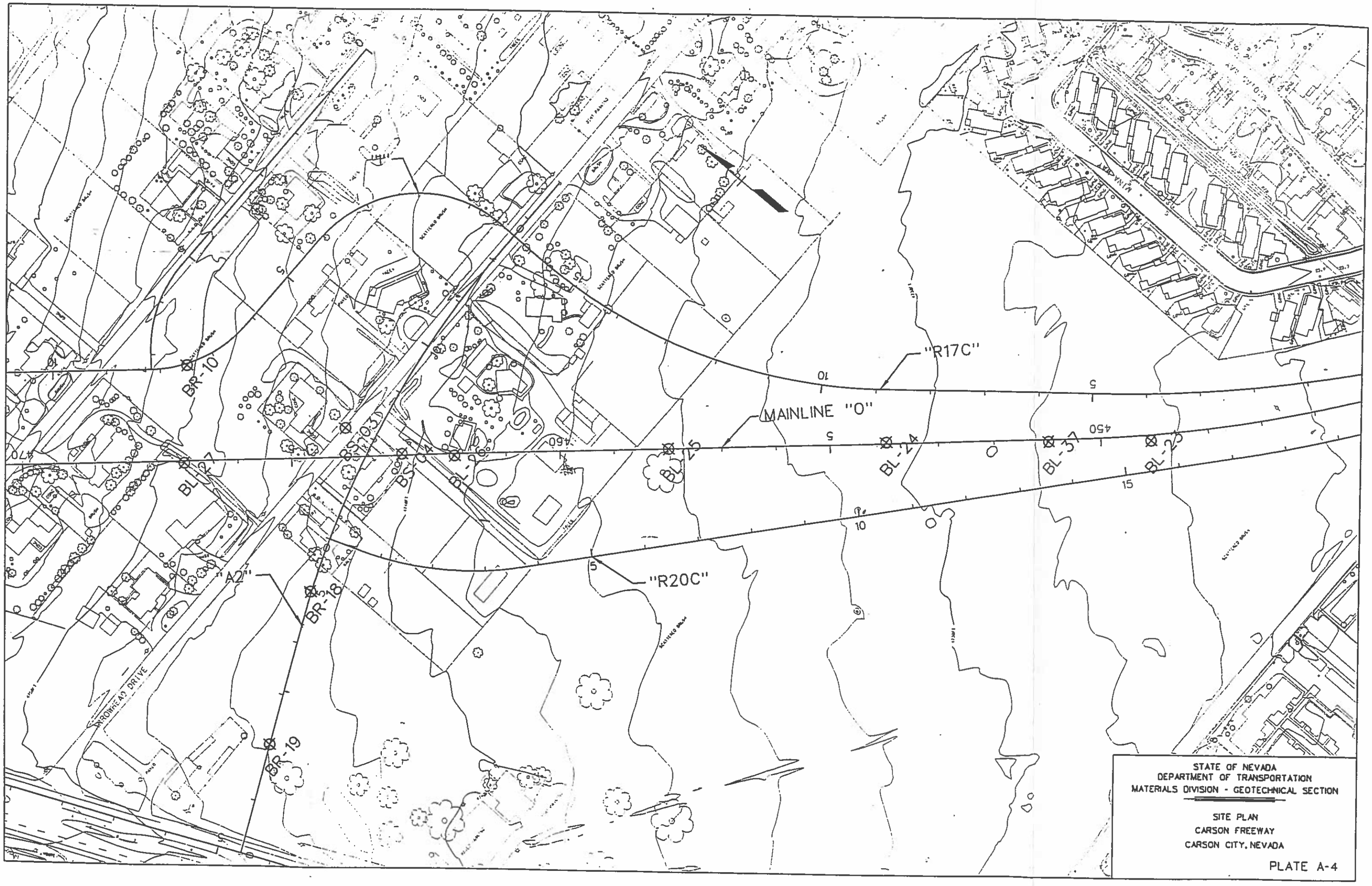
PLATE A-2



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

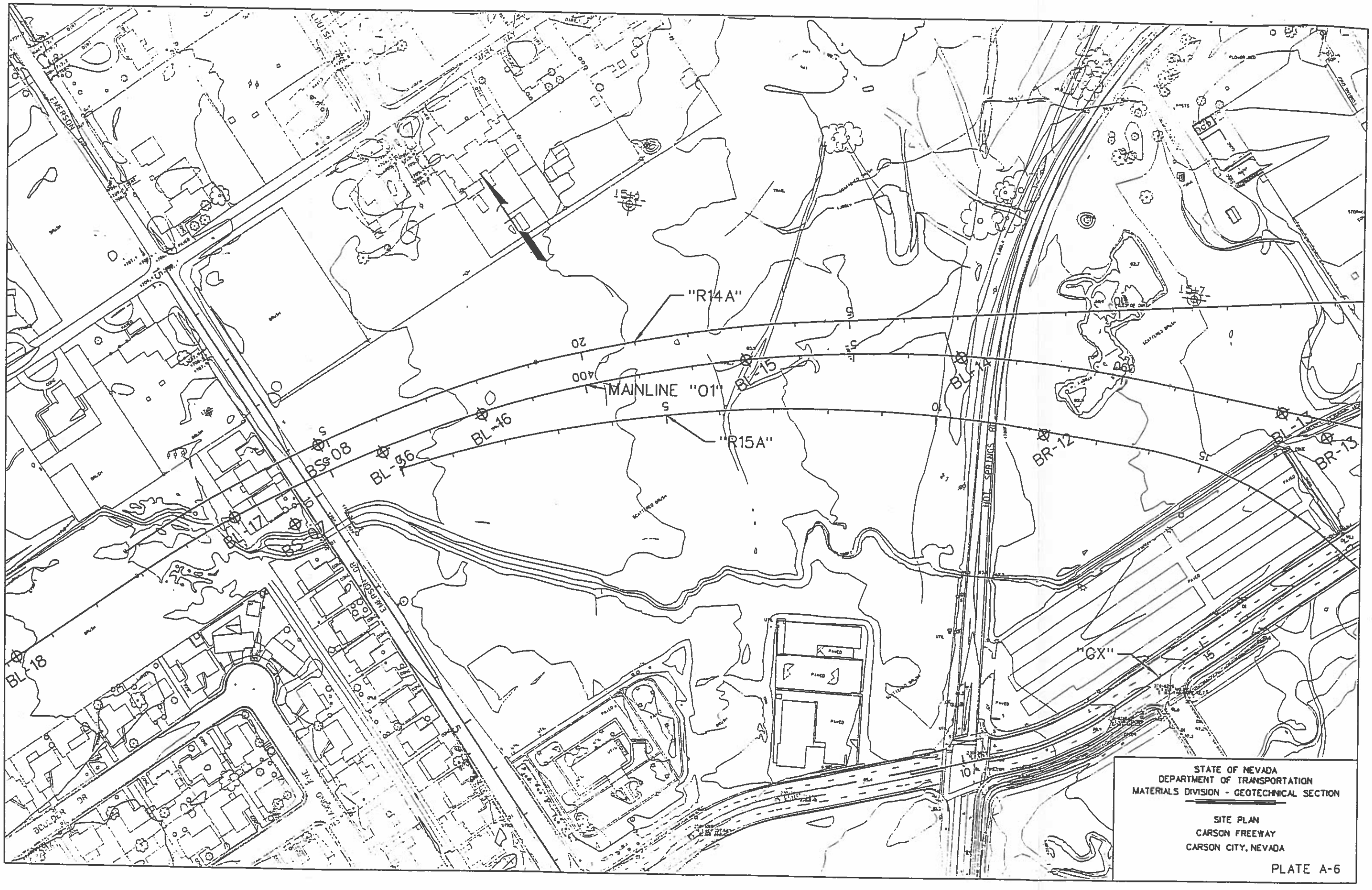
PLATE A-3


BR-10
BR-18
BR-19
"A2"
"R17C"
"R20C"
MAINLINE "O"
BL-27
BL-26
BL-25
BL-24
BL-37
BL-23
BS-03
BS-04
SNOWHEAD DRIVE
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA
PLATE A-4

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE A-5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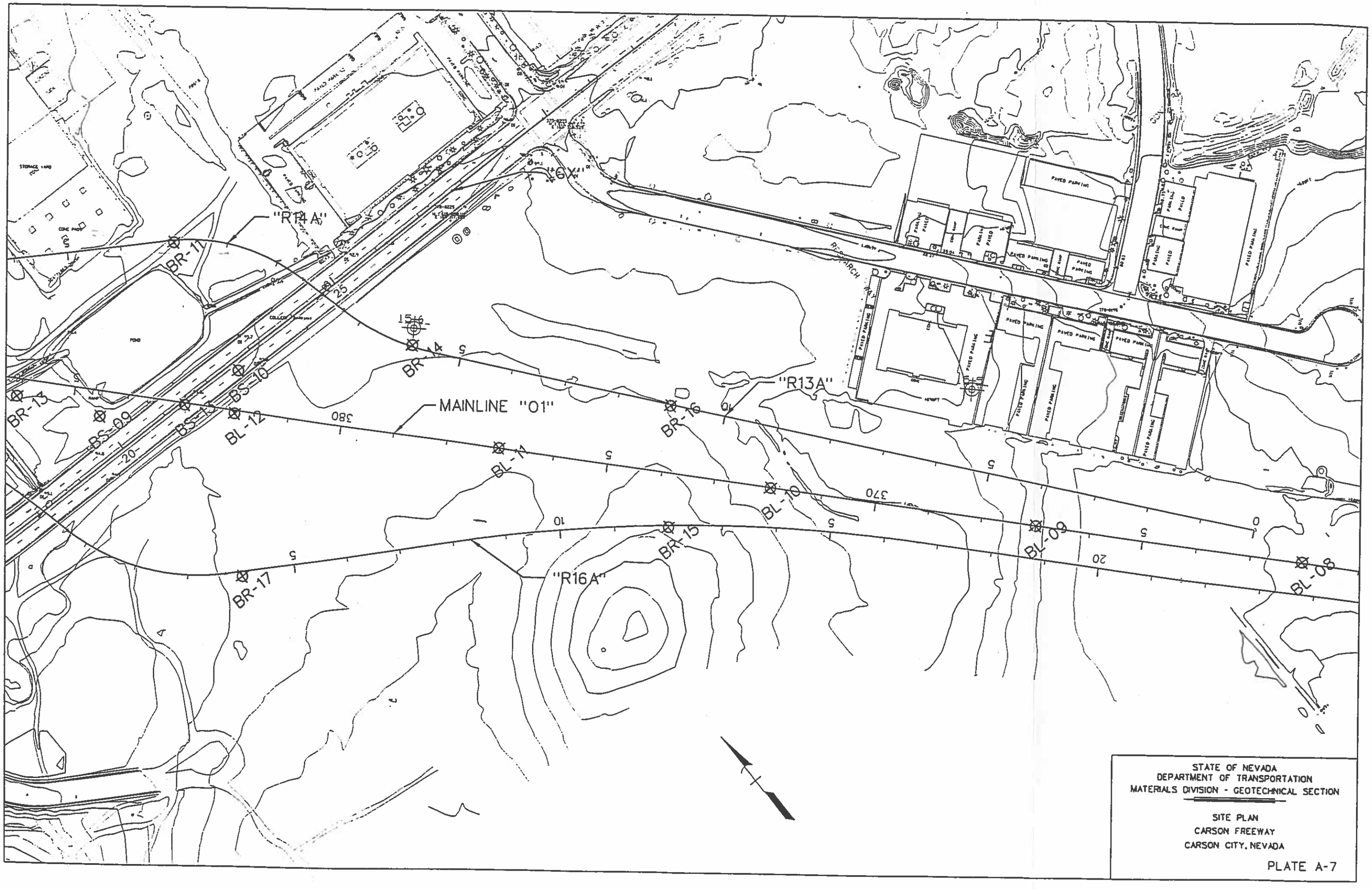
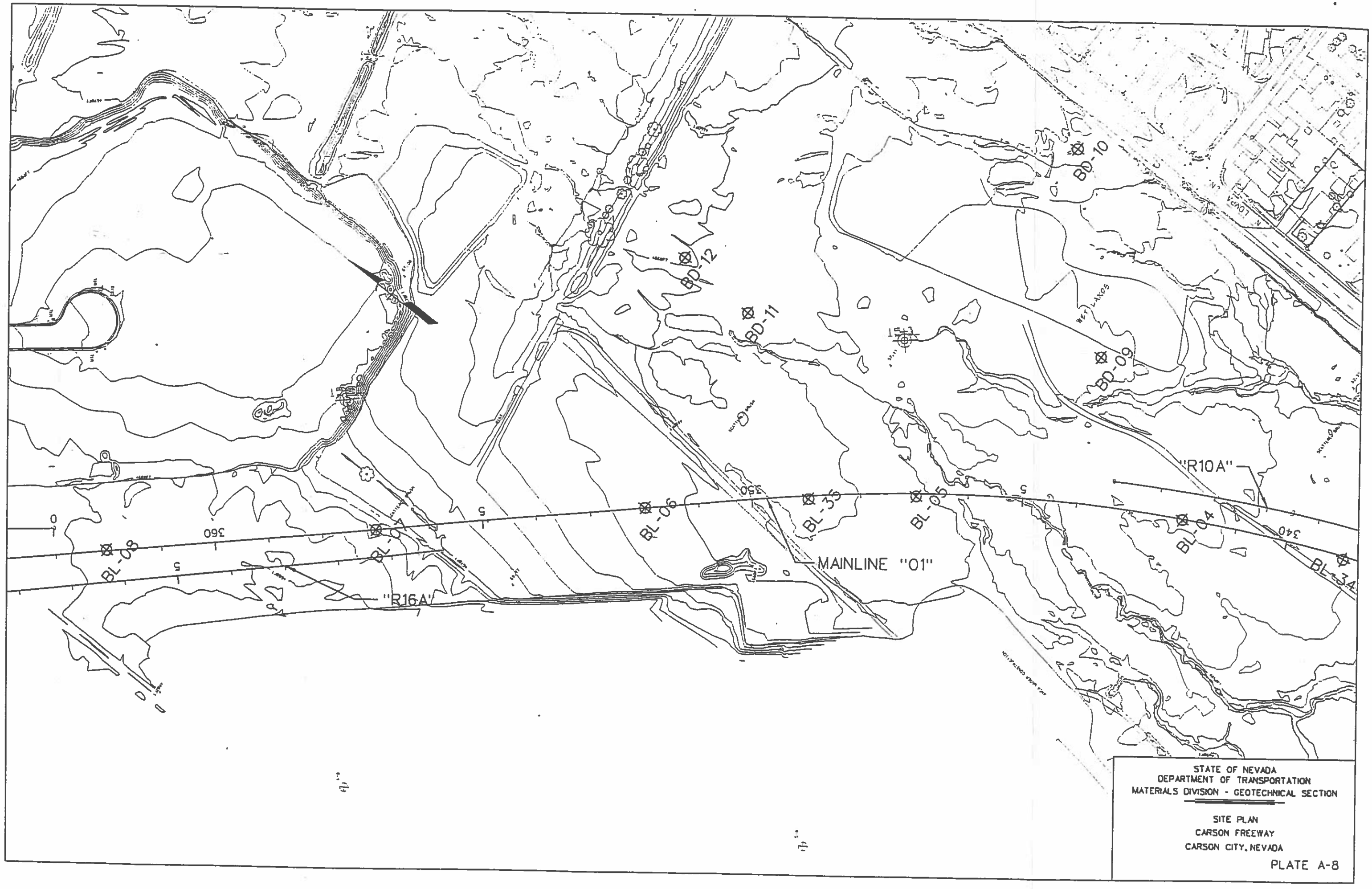
MAINLINE "01"
"R15A"
"GX"
BL-15
BL-16
BL-17
BL-18
BL-14
BL-13
BR-12
BR-13
BS-08
EMERSON DR
BOULDER DR
SPRINGS RD
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA
PLATE A-6



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

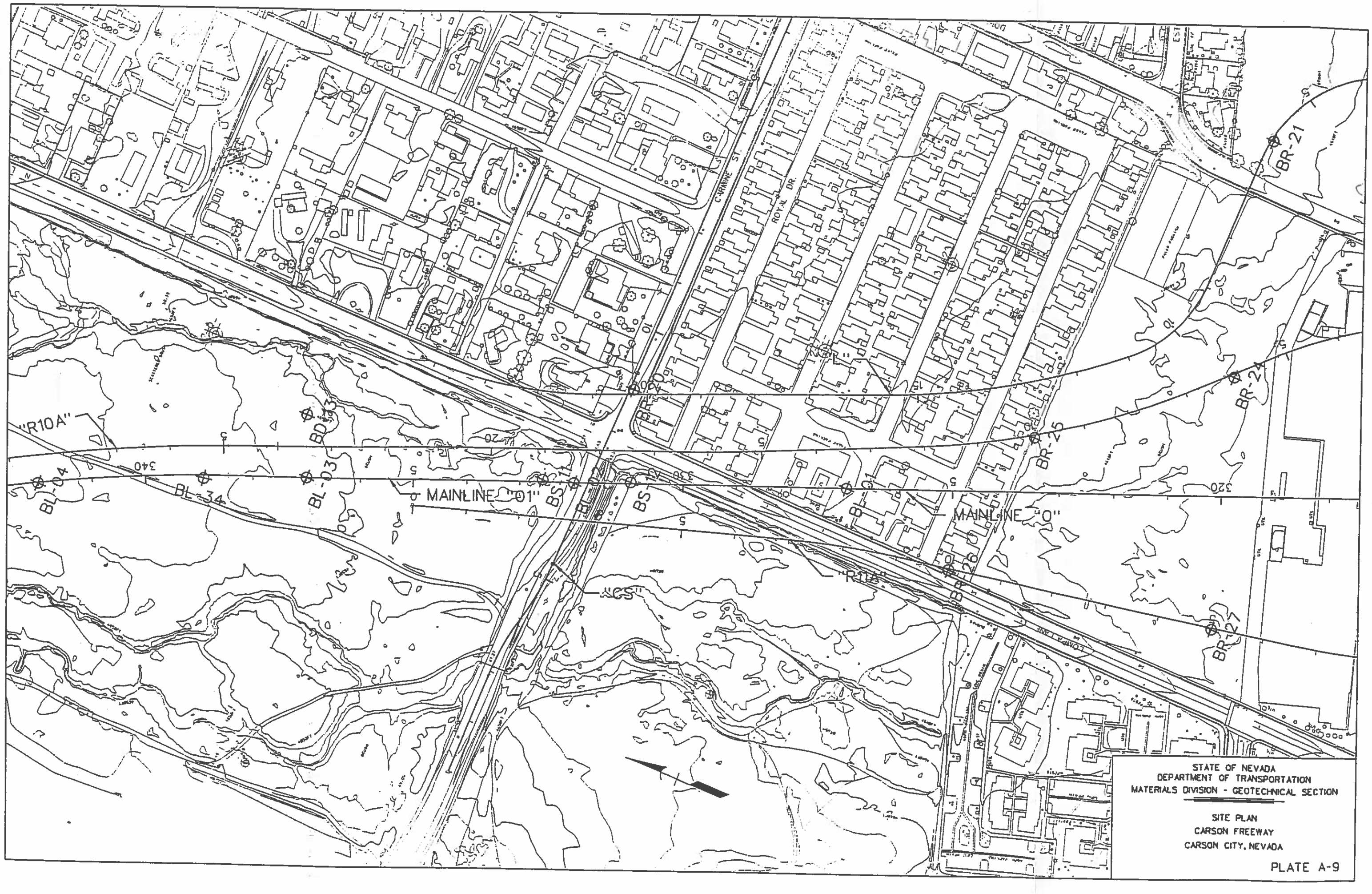
PLATE A-7

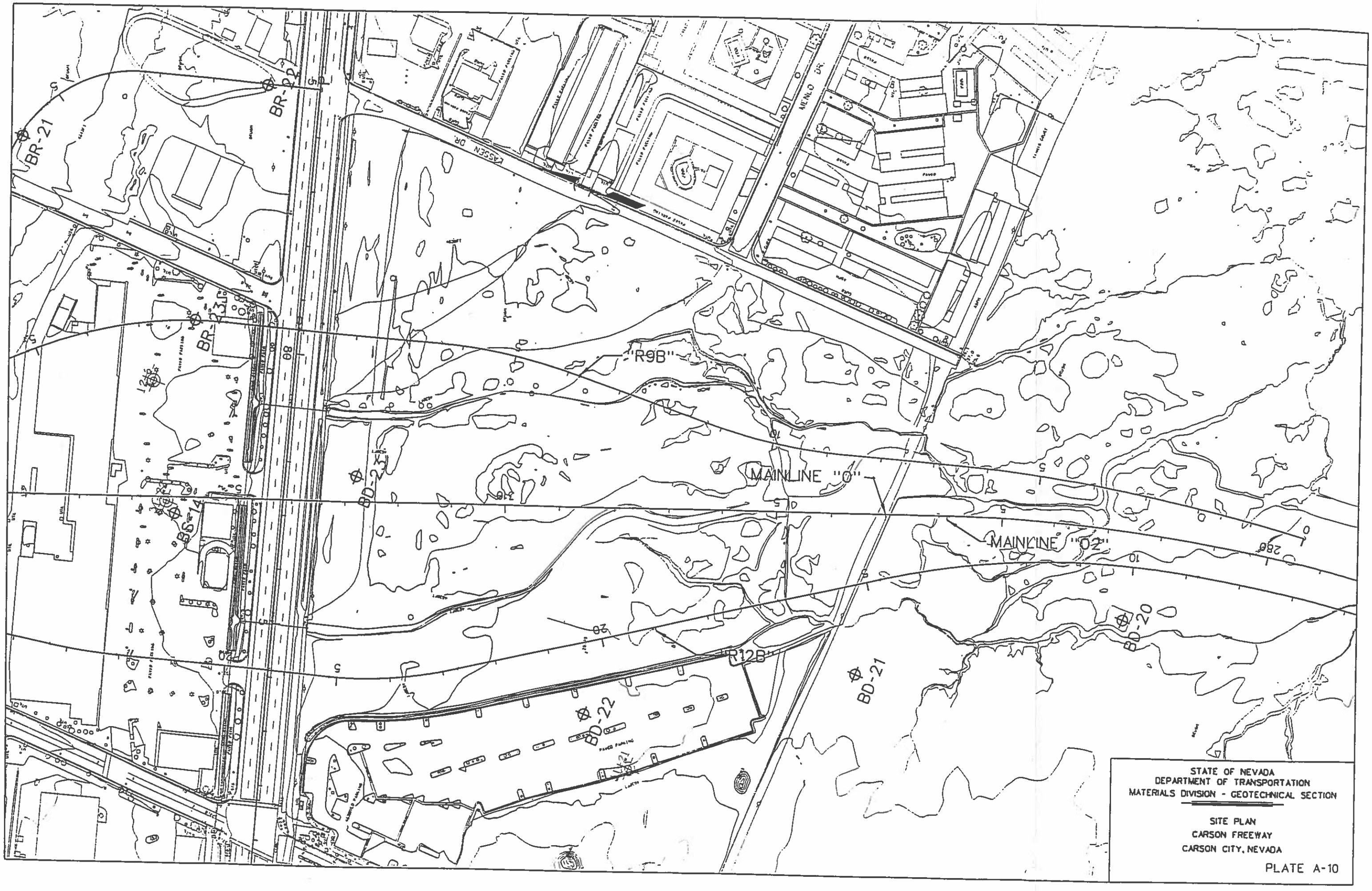


STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE A-8

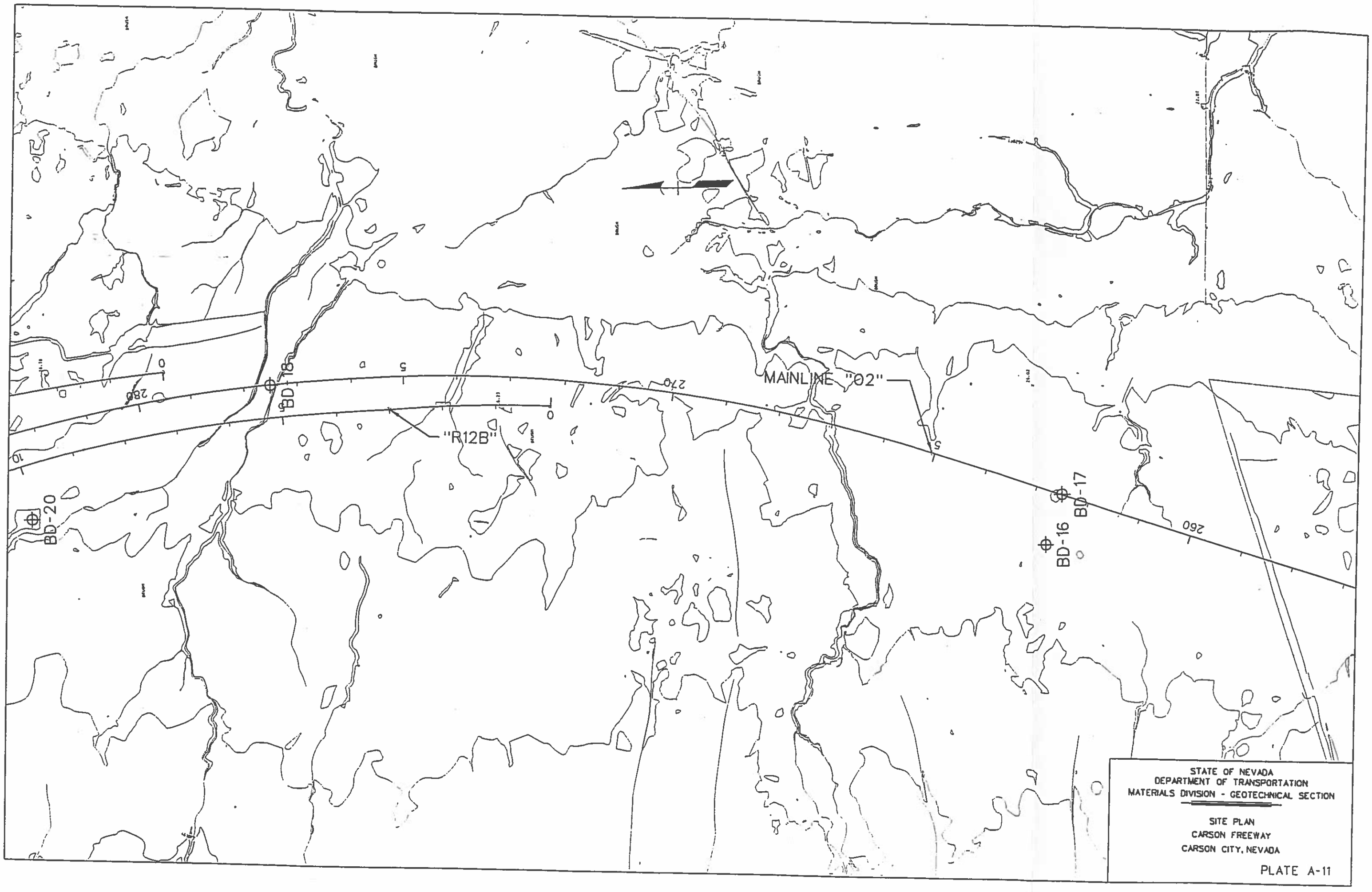

CARMINE ST.
ROYAL DR.
BR-20
BR-21
BR-24
BR-25
BR-26
BR-27
BD-03
BL-04
BL-34
BL-03
BS-01
BL-02
BS-02
BL-01
"R10A"
MAINLINE "01"
"ACS"
"R11A"
MAINLINE "0"
LOMA LANE
340
320
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA
PLATE A-9



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

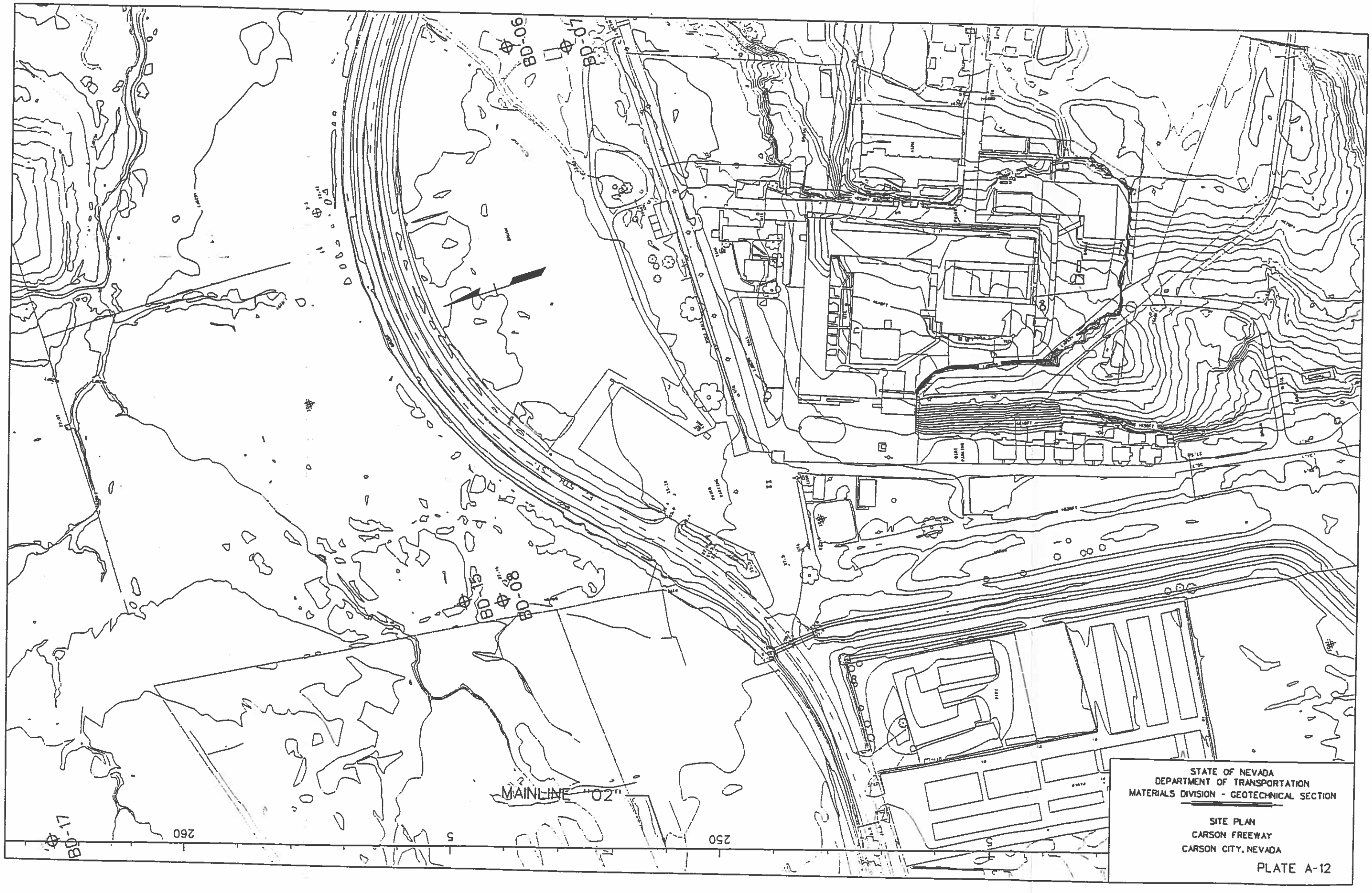
PLATE A-10



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

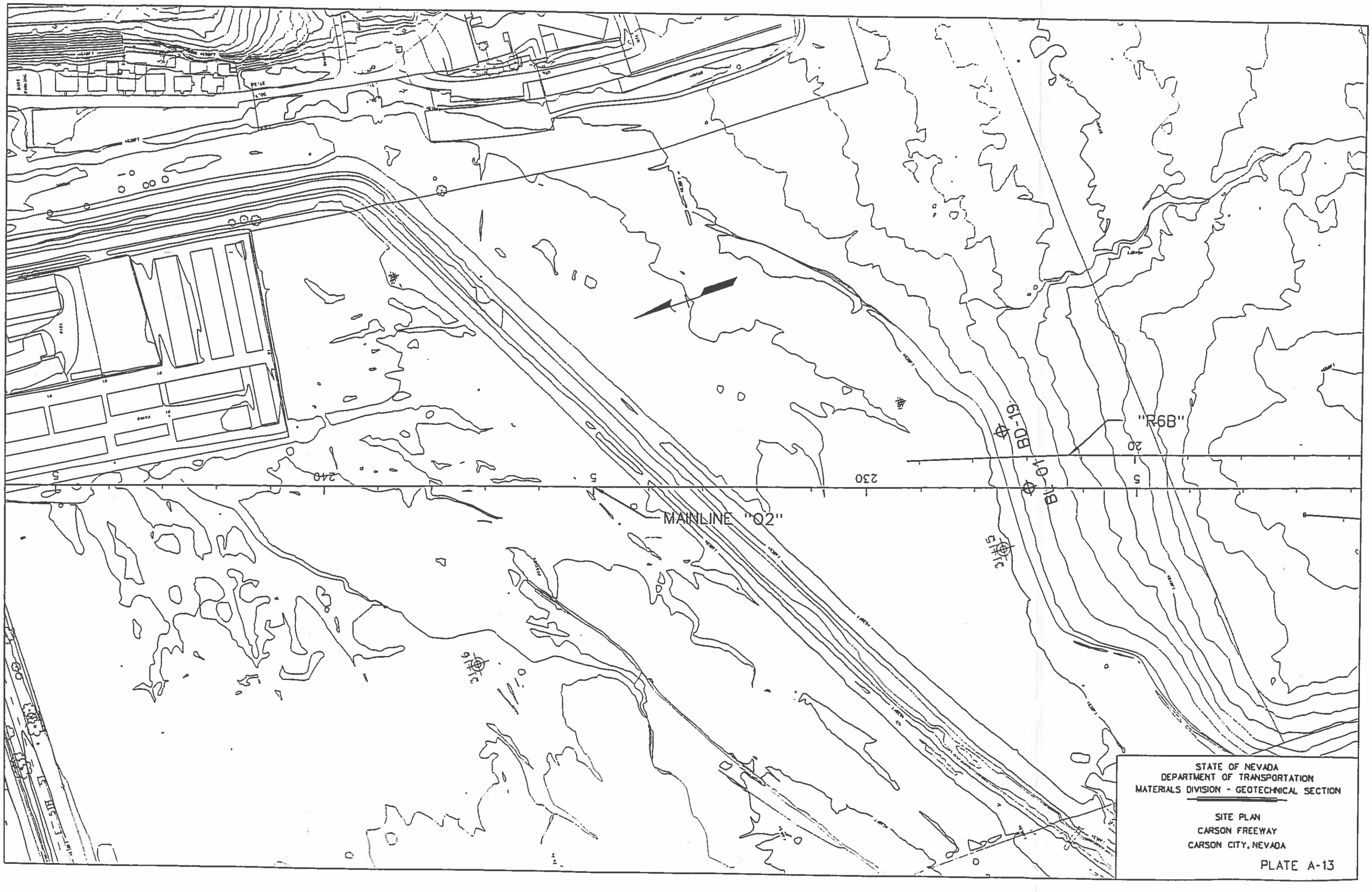
PLATE A-11

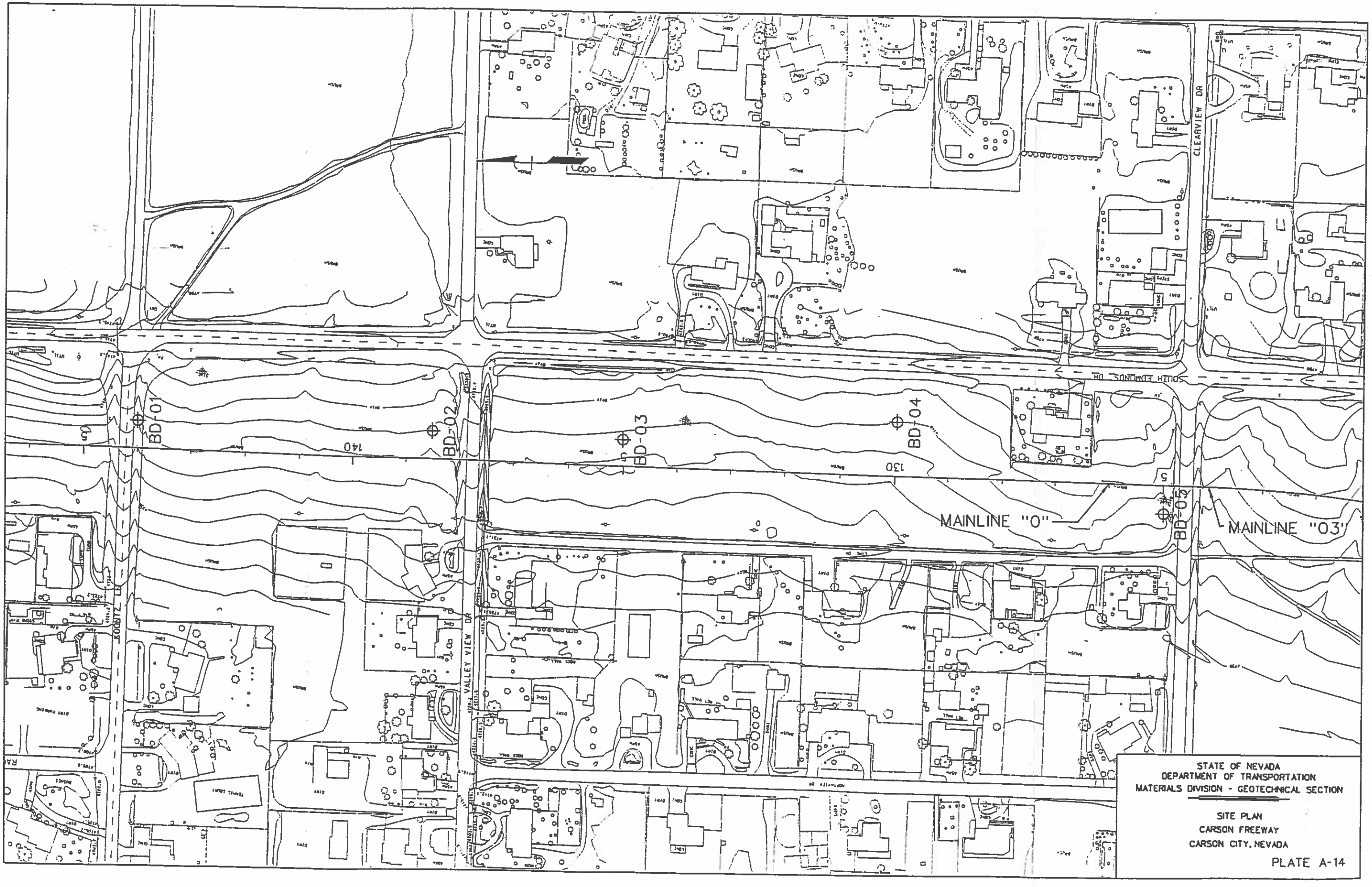


STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE A-12


"R6B"
MAINLINE "O2"
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA
PLATE A-13



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

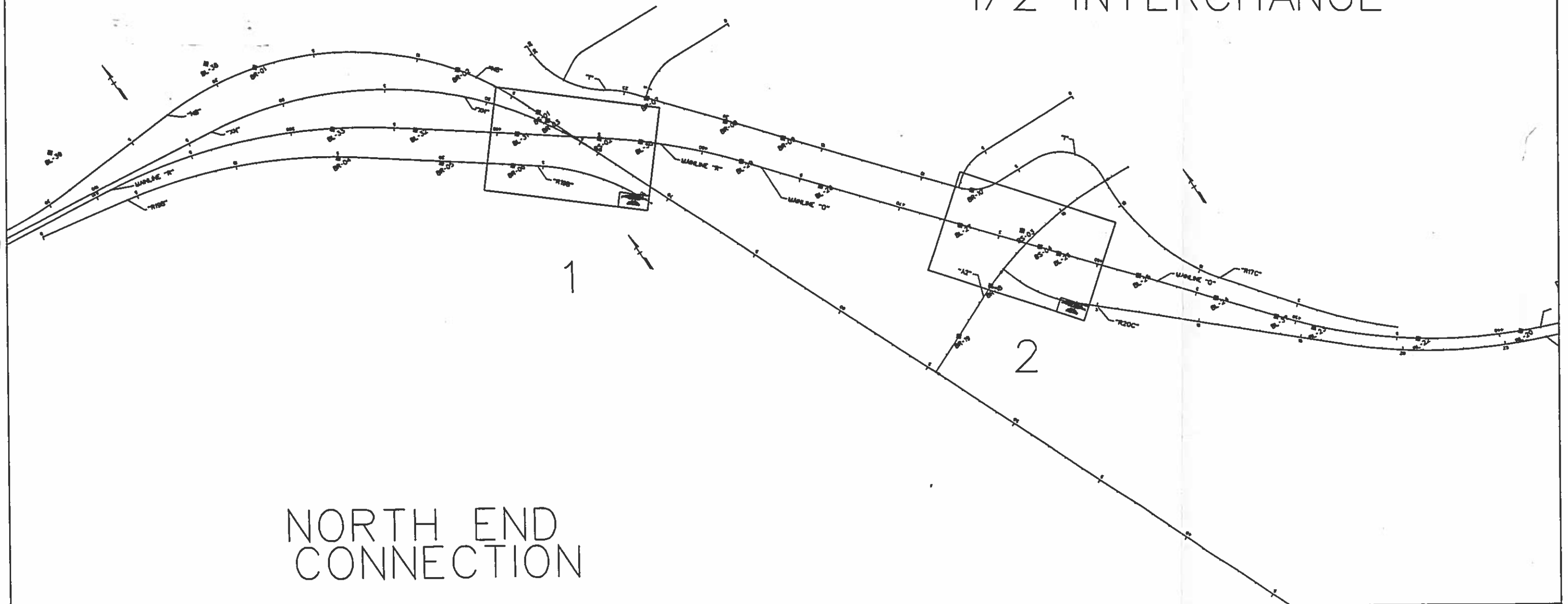
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE A-14

APPENDIX B

Bridge Structure Site Plans

ARROWHEAD
1/2 INTERCHANGE



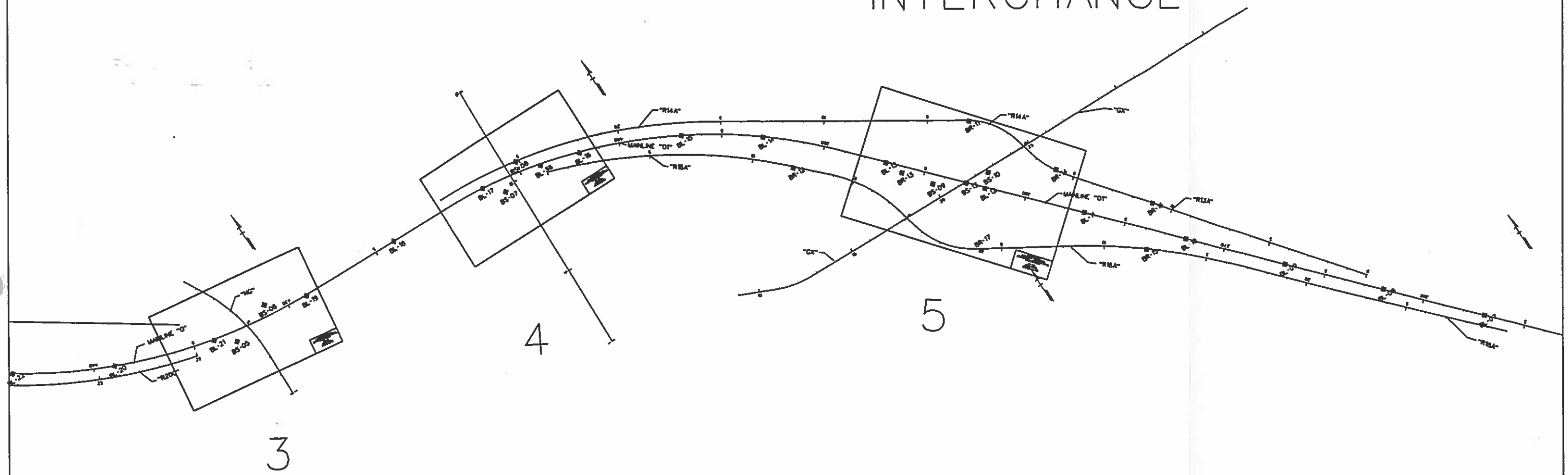
NORTH END
CONNECTION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

FIGURE B-1

COLLEGE PARKWAY INTERCHANGE

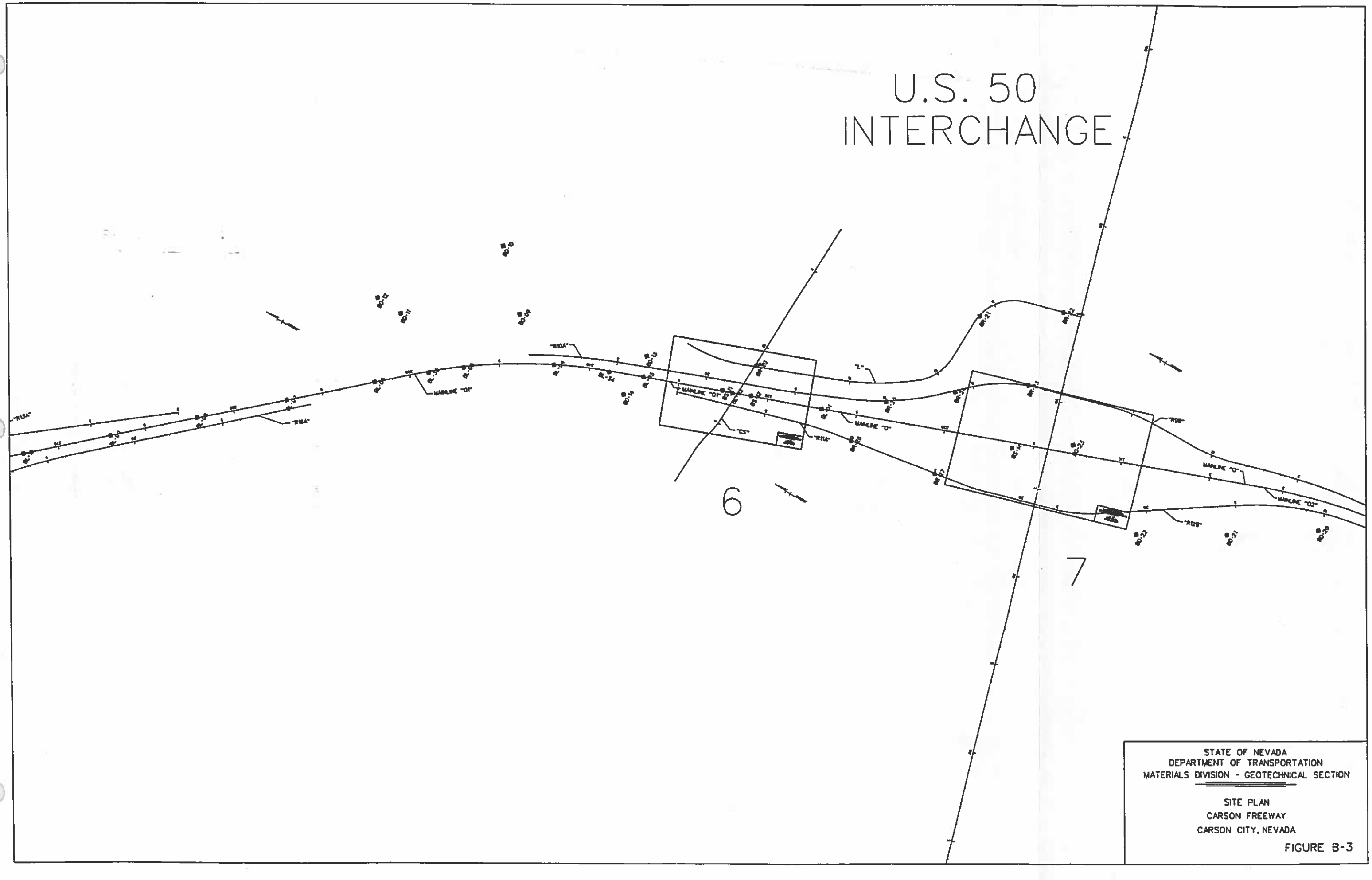


STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

FIGURE B-2

U.S. 50
INTERCHANGE



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

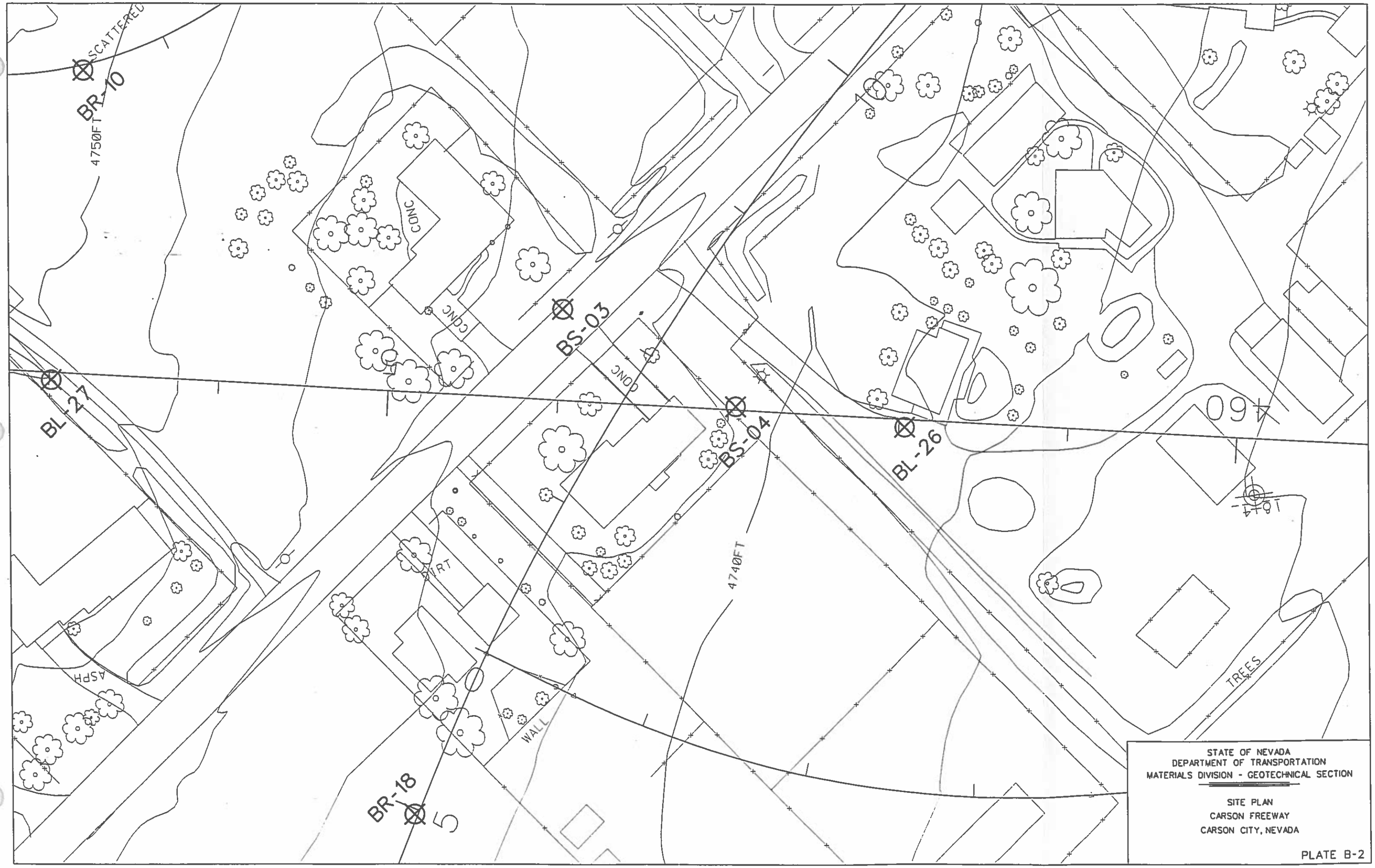
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

FIGURE B-3

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

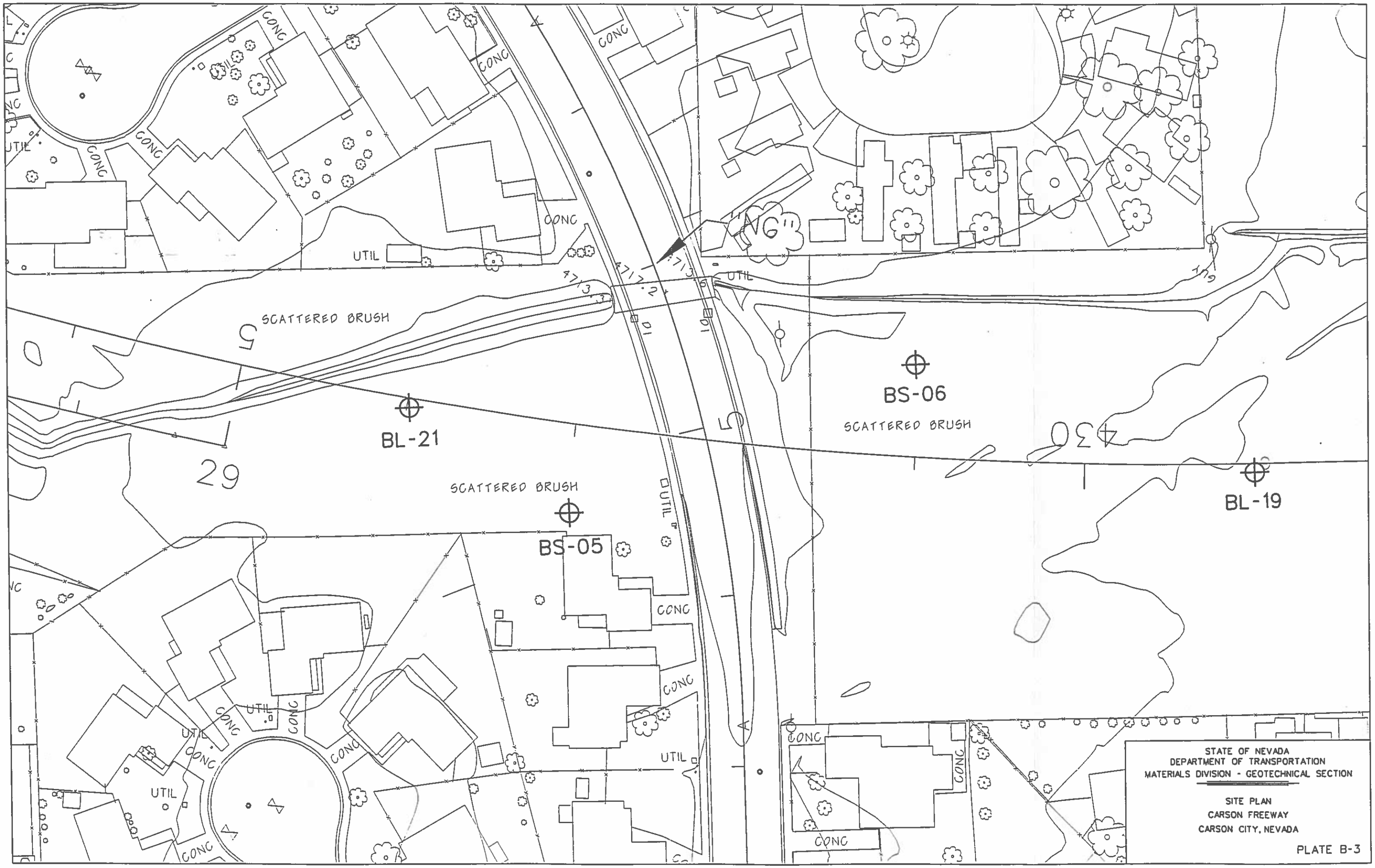
PLATE B-1



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE B-2


CONC
UTIL
SCATTERED BRUSH
BL-21
29
BS-06
SCATTERED BRUSH
BL-19
BS-05
SCATTERED BRUSH
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA
PLATE B-3

BRUSH

BRUSH

1715

UTIL

S

BL-17

BS-08

BL-36

BS-07

BL-16

BRUSH

4702.5

4707.6

4707.3

R/W

D1

R/W

MH

CONC

CONC

R/W

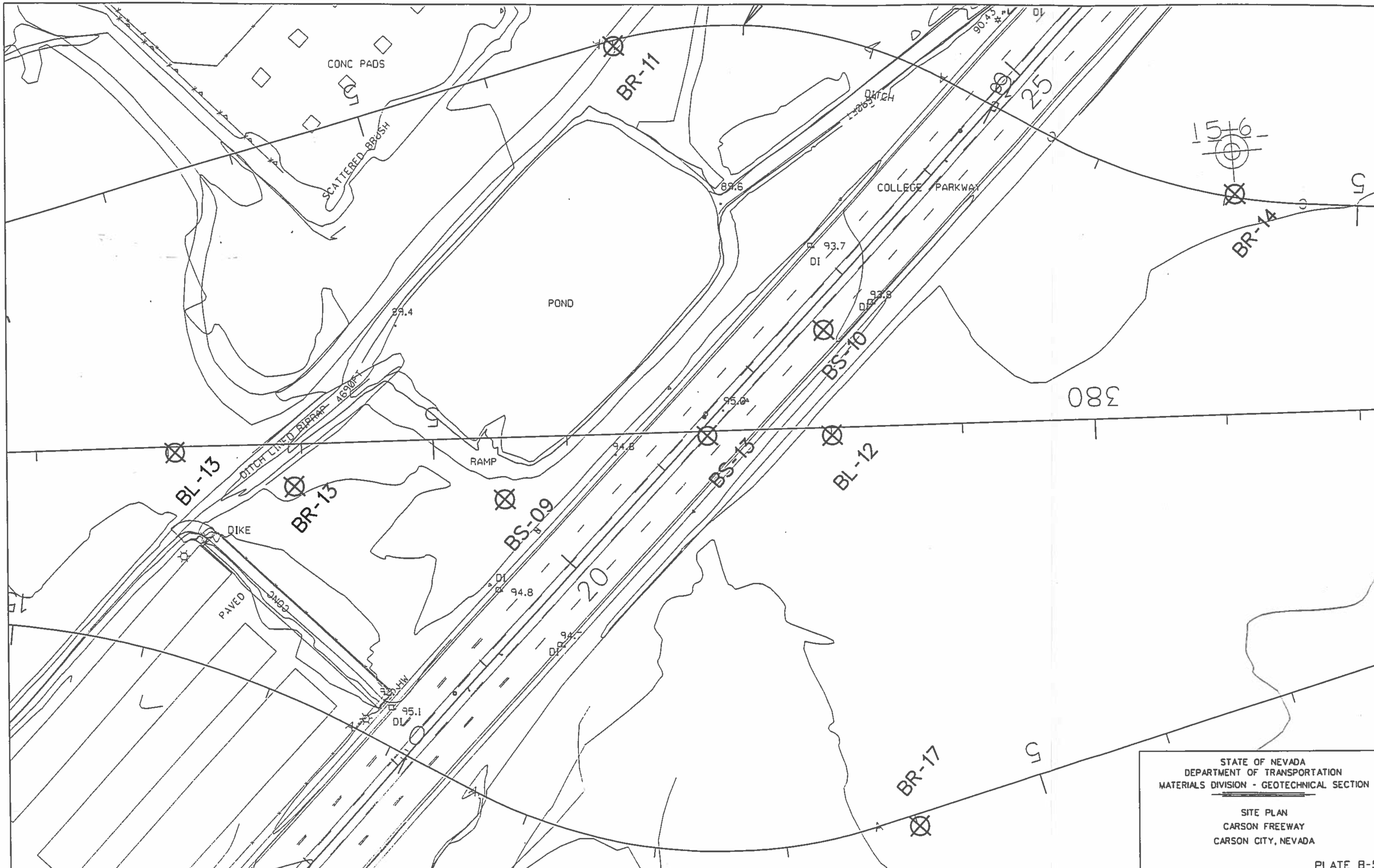
UTIL

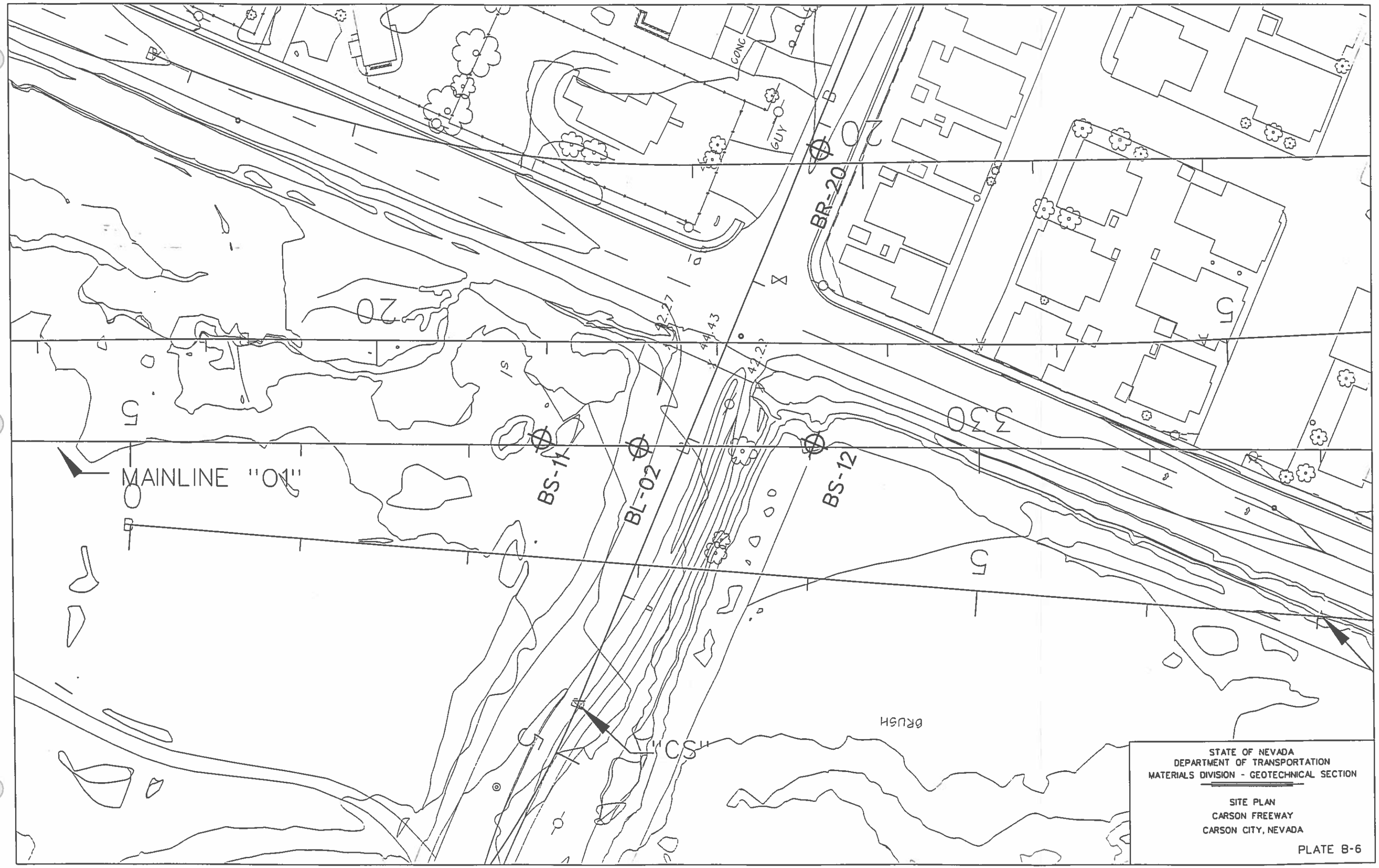
MERSON DR

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE B-4

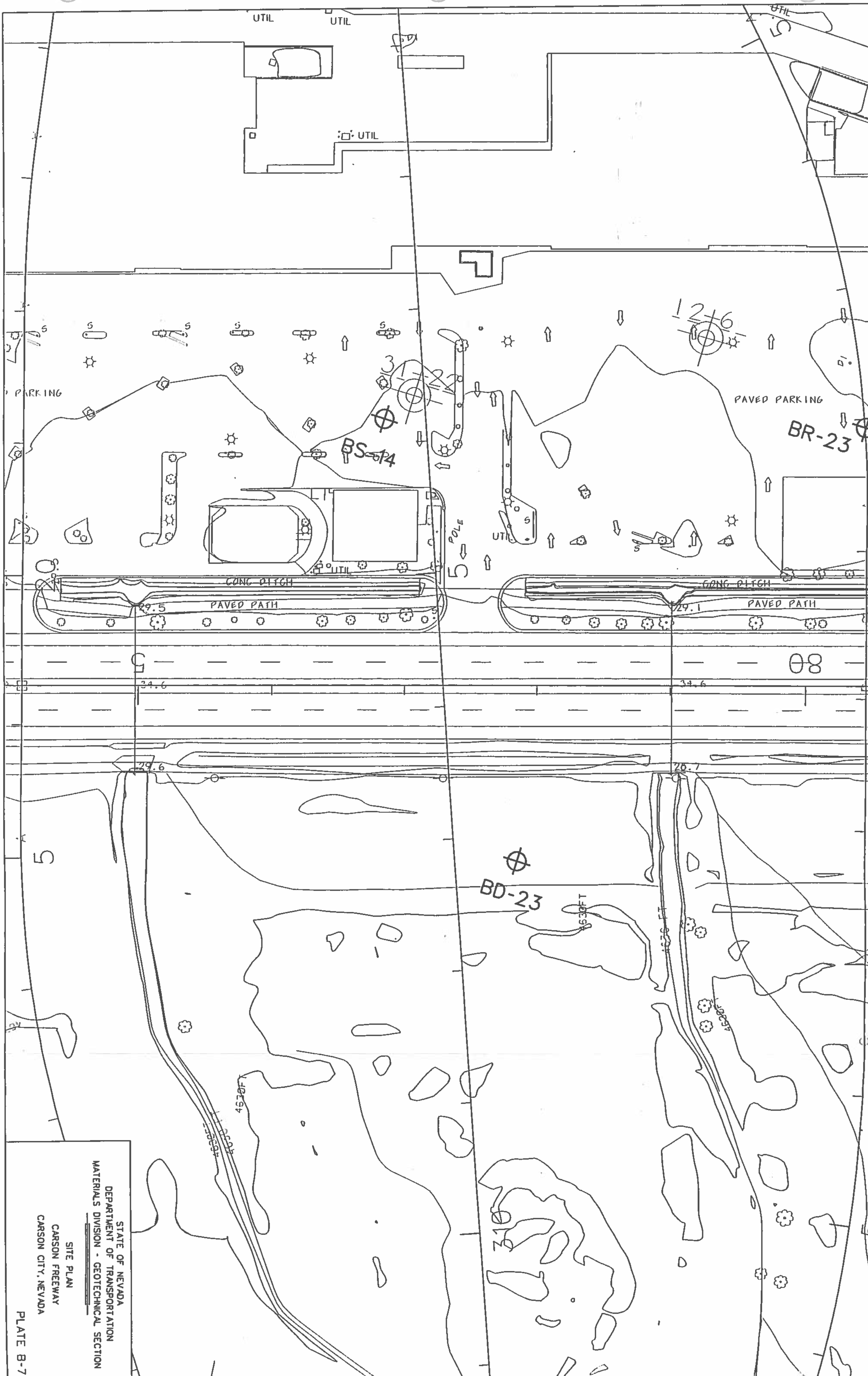

CONC PADS
SCATTERED BRUSH
BR-11
POND
89.4
89.6
COLLEGE PARKWAY
DITCH
DITCH LINED RIPRAP 4690FT
BL-13
BR-13
DIKE
RAMP
BS-09
BS-13
BS-10
BL-12
BR-14
BR-17
DI
93.7
94.8
95.0
95.1
PAVED
CONC
20
25
380
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION
SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA
PLATE B-5



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE B-6



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

SITE PLAN
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE B-7

APPENDIX D

Structure Borings
and
Laboratory Test Results

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

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

MOISTURE CONDITION CRITERIA

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

SOIL CEMENTATION CRITERIA

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

STANDARD PENETRATION CLASSIFICATION*			
GRANULAR SOIL		CLAYEY SOIL	
BLOWS/0.3m	DENSITY	BLOWS/0.3m	CONSISTENCY
0 – 4	VERY LOOSE	0 – 1	VERY SOFT
5 – 10	LOOSE	2 – 4	SOFT
11 – 30	MEDIUM DENSE	5 – 8	MEDIUM STIFF
31 – 50	DENSE	9 – 15	STIFF
OVER 50	VERY DENSE	16 – 30	VERY STIFF
		31 – 60	HARD
		OVER 60	VERY HARD

*Standard Penetration Test (N) 63.5 Kg hammer 760mm free fall on 50.8mm O.D. x 35mm I.D. sampler.

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

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

TEST ABBREVIATIONS

CD	CONSOLIDATED DRAINED	O	ORGANIC CONTENT
CH	CHEMICAL (CORROSIVENESS)	OC	CONSOLIDATION
CM	COMPACTION	PI	PLASTICITY INDEX
CU	CONSOLIDATED UNDRAINED	RQD	ROCK QUALITY DESIGNATION
D	DISPERSIVE SOILS	RV	R- VALUE
DS	DIRECT SHEAR	S	SIEVE ANALYSIS/-200 WASH
E	EXPANSIVE SOIL	SL	SHRINKAGE LIMIT
G	SPECIFIC GRAVITY	U	UNCONFINED COMPRESSION
H	HYDROMETER	UU	UNCONSOLIDATED UNDRAINED
HC	HYDRO-COLLAPSE	UW	UNIT WEIGHT
K	PERMEABILITY	W	MOISTURE CONTENT

SAMPLER NOTATION

CPT	CONE PENETRATION
CS	CONTINUOUS SAMPLER(1)
MC	MODIFIED CA SPLIT SPOON (2)
P	PUSHED (NOT DRIVEN)
PB	PTICHER BARREL
RC	ROCK CORE(3)
SH	SHELBY TUBE (4)
SPT	STANDARD PENETRATION TEST
TP	TEST PIT

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

KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

KEY TO SOIL CLASSIFICATION AND TERMS

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-1

CAD FILE: L:\19[illegible]RAFTING\301348\301348150020PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 4/29/97
END DATE: 4/29/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE U.S. 395
BORING: BS-01
E.A. #: 30-1348-15.002
GROUND ELEV.: 1466.09 m
HAMMER DROP SYSTEM: MANUAL

STATION: STA 488+00
OFFSET: 30.48 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/29/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1465.1	1						SM	RED BROWN SILTY SAND slightly moist, loose to medium dense, red brown, fine to coarse sand and gravel, estimated 20 to 30% fines	
	1.52	A	MC	10		OC			
1464.1	2 1.98							1.98	
							SM SP	LIGHT BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to coarse grained sand.	
1463.1	3 3.05								
	3.51	B	MC	19		W,UW,S			7% fines
1462.1	4								
	4.57	C	MC	41		W,UW,S			9% fines
1461.1	5 5.03							Dense, some fine gravel.	
								5.64	
1460.1	6 6.10						SC	YELLOW BROWN CLAYEY SAND slightly moist, hard, yellow brown, fine grained sand, weakly cemented, low plasticity fines	
	6.55	D	MC	44		W,UW,S,PI			PI=9 32% fines
1459.1	7								
	7.62							7.01	
							SC	RED BROWN CLAYEY SAND moist, very dense, red brown, fine to medium grained sand, low plasticity fines	
1458.1	8 8.08	E	MC	61		W,UW,S			31% fines
								8.59	
1457.1	9 9.14						SM	YELLOW BROWN SILTY SAND moist, very dense, yellow brown, fine to medium grained sand	
	9.60	F	MC	65		W,UW,S			15% fines

KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-2

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\FTING\301348\30134815002DPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 4/29/97
END DATE: 4/29/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE U.S. 395
BORING: BS-01
E.A. #: 30-1348-15.002
GROUND ELEV.: 1466.09 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 488+00
OFFSET: 30.48 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/29/97

ELEV. (MSL)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67	G	MC	51		W,UW,S		10.85 Encountered some fine gravel.	32% fines
1455.1	11 11.13						SC	RED BROWN CLAYEY SAND moist, very dense, red brown, fine to coarse grained sand, estimated 20 to 30% fines, moderate to high plasticity fines	
1454.1	12 12.19								
	12.65	H	MC	50/140		W,UW		Becoming more sandy, estimated 10 to 20% fines.	
1453.1	13 13.72								
1452.1	14 14.02	I	MC	50/140		W,UW		14.02 B.O.H.	Could not measure water level due to use of mud rotary
1451.1	15								
1450.1	16								
1449.1	17								
1448.1	18								
1447.1	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-2A

CAD FILE: L:\1999\TING\30134B\30134B15002DPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 4/29/97
END DATE: 4/29/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST STRUCTURE U.S. 395
BORING: BS-02
E.A. #: 30-1348-15.002
GROUND ELEV: 1466.09 m
HAMMER DROP SYSTEM: MANUAL

STATION: STA 485+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/29/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1465.1	1						SM	LIGHT BROWN SILTY SAND: moist, loose to medium dense, fine to coarse grained sand and some fine gravel, estimated 20 to 30% silt.	
	1.52	A	MC	10		OC			
1464.1	2 1.98								
	2.44						SM	YELLOW BROWN SILTY SAND slightly moist, medium dense to dense, fine to medium grained sand.	
1463.1	3 3.05								
	3.51	B	MC	39		W,UW,S			18% fines
1462.1	4								
	4.11						SC	RED BROWN CLAYEY SAND (SC): moist, very dense, fine to coarse grained sand and fine gravel, low to moderate plasticity fines.	
	4.57	C	MC	67		W,UW,S			16% fines
1461.1	5 5.03								
1460.1	6 6.10								
	6.55	D	MC	49		W,UW,S		Becoming more clayey, olive, moderate to high plasticity fines, no gravel.	31% fines
1459.1	7								
	7.62	E	MC	43		W,UW,S			20% fines
1458.1	8 8.08							Becoming more sandy	
1457.1	9 9.14								
	9.60	F	MC	87		W,UW,S			14% fines

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-3

CAD FILE: L:\1999\...ING\301348\301348150020PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 4/29/97
END DATE: 4/29/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST STRUCTURE U.S. 395
BORING: BS-02
E.A. #: 30-1348-15.002
GROUND ELEV: 1466.09 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 485+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/29/97

ELEV. (MSL)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS/300mm	SAMPLE Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1455.1	11	G	MC	50/292		W,UW,S			27% fines
	11.13								
1454.1	12								
	12.19	H	MC	127					
	12.65							Low plasticity fines.	
1453.1	13								
	13.72								
	13.87	I	MC	127				13.87	Could not measure water level due to use of mud rotary
1452.1	14								
1451.1	15								
1450.1	16								
1449.1	17								
1448.1	18								
1447.1	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-3A

EXPLORATION LOG

KLEINFELDER

START DATE: 4/29/97
END DATE: 4/29/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST STRUCTURE, ARROWHEAD DRIVE
BORING: BS-03
E.A. #: 30-1348-15.002
GROUND ELEV: 1445.97 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 464+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/29/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM SP	RED BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to medium grained sand.	
1445.0	1								
	1.52	A	MC	14		W,UW,S			11% fines
1444.0	2 1.98							Encountered some fine gravel	
1443.0	3 3.05	B	MC	43		W,UW,S		Sands becoming cleaner	10% fines
	3.51							Becoming more clayey	
1442.0	4							3.96	
	4.57	C	MC	36		W,UW,S	SC	LIGHT BROWN CLAYEY SAND moist, loose to medium dense, fine to medium grained sand, low plasticity fines, some fine gravel.	19% fines
1441.0	5 5.03								
1440.0	6 6.10	D	MC	12		S,DS			15% fines
	6.55								
1439.0	7								
	7.62	E	MC	14					
1438.0	8 8.08								
1437.0	9								
	9.14	F	MC	32		W,UW,S,PI		Becoming more sandy, dense	PI = 1 19% fines
	9.60								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-4

CAD FILE: L:\1999\TING\301348\301348150O2DPLATES.DWG

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 4/29/97
END DATE: 4/29/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST STRUCTURE, ARROWHEAD DRIVE
BORING: BS-03
E.A. #: 30-1348-15.002
GROUND ELEV.: 1445.97 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 464+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/29/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67							10.52	
1435.0	11	G	MC	15		W,UW	CH	GRAY FAT CLAY moist, very stiff, high plasticity fines.	
	11.13							10.82	
							SC	GRAY CLAYEY SAND moist, medium dense, fine to coarse grained sand, moderate to high plasticity fines.	
1434.0	12								
	12.19	H	MC	23		W,UW			
	12.65								
1433.0	13								
	13.72	I	MC	35		W,UW			
1432.0	14.02							14.17 Dense	Could not measure water level due to use of mud rotary
1431.0	15								
1430.0	16								
1429.0	17								
1428.0	18								
1427.0	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-4A

CAD FILE: L:\1999\ING\301348\30134815002DPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 4/30/97
END DATE: 4/30/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE, ARROWHEAD DRIVE
BORING: BS-04
E.A. #: 30-1348-15.002
GROUND ELEV.: 1444.75 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

SHEET 1 OF 2

STATION: STA 463+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/30/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1443.8	1						SM	YELLOW BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand, estimated 10 to 20% silt.	
	1.52	A	MC	10		S,OC			19% fines
1442.8	2 1.98							Becoming moist, dense.	
1441.8	3 3.05								
	3.51	B	MC	41		W,UW,S		Encountered some fine gravel	20% fines
1440.8	4							Becoming red brown in color.	
	4.57	C	MC	35		W,UW,S			19% fines
1439.8	5 5.03								
								5.49	
							SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, low plasticity fines.	
1438.8	6 6.10								
	6.55	D	MC	27		W,UW,S			15% fines
1437.8	7								
	7.62	E	MC	29		W,UW,S		Becoming more clayey	26% fines
1436.8	8 8.08								
1435.8	9								
	9.14	F	MC	27		W,UW,S		Becoming more sandy, fine to medium grained sand	19% fines
	9.60								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-5

CAD FILE: L:\1999\INC\301348\301348150020PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 4/30/97
END DATE: 4/30/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE, ARROWHEAD DRIVE
BORING: BS-04
E.A. #: 30-1348-15.002
GROUND ELEV.: 1444.75 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 463+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/30/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
	11	G	MC	36		W,UW		Dense	
1433.8	11.13								
1432.8	12								
	12.19	H	MC	46					
	12.65								
1431.8	13								
	13.72	I	MC	35					
1430.8	14							Fine to coarse sand, low to moderate plasticity fines.	
	14.17								
								14.78	
1429.8	15						CL	OLIVE SLIGHTLY SANDY CLAY moist, very stiff, fine grained sand, moderate plasticity fines.	
	15.24	J	MC	15		W,UW,S,PI			PI = 22 62% fines
	15.70								
1428.8	16								
1427.8	17							17.07	
							SC	BROWN CLAYEY SAND moist, very dense, fine to coarse grained sand, moderate to high plasticity fines.	
1426.8	18								
	18.29								
	18.59	K	MC	70					Could not measure water level due to use of mud rotary
								18.75	
1425.8	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-5A

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 4/30/97
END DATE: 4/30/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST STRUCTURE, NORTHGATE LANE
BORING: BS-05
E.A. #: 30-1348-15.002
GROUND ELEV: 1436.52 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 433+00
OFFSET: 15.24 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/30/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand, estimated 20 to 30% silt.	
								0.76	
1435.5	1						CH	LIGHT BROWN FAT CLAY moist, stiff to very stiff, high plasticity fines.	
	1.52								
		A	MC	16		W,UW,S			26% fines
								1.83	
1434.5	2 1.98						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, moderate to high plasticity fines.	
1433.5	3 3.05								
		B	MC	3		W,UW,S			29% fines
	3.51							Very loose, fine grained sand, estimated 15 to 25% fines.	
	3.66								
		C	MC	9					
1432.5	4 4.11								
	4.57							4.27 Loose	
		D	MC	21		W,UW	CL	RED BROWN SANDY CLAY moist, very stiff, very fine grained sand, moderate plasticity fines.	
								4.88	
1431.5	5 5.03						SM SP	YELLOW BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	
								5.79	
1430.5	6 6.10						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, moderate to high plasticity fines.	
		E	MC	13		S,OC			15% fines
	6.55								
1429.5	7								
	7.62							Becoming more sandy, non-plastic.	
		F	MC	45		W,UW,S,PI			17% fines
1428.5	8 8.08							8.53	
							CL	LIGHT BROWN SILTY CLAY moist, very stiff, trace of fine sand, moderate to high plasticity fines.	
1427.5	9 9.14								
		G	MC	22		W,UW,S,PI			PI=32 62% fines
	9.60								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-6

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 4/30/97
END DATE: 4/30/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST STRUCTURE, NORTHGATE LANE
BORING: BS-05
E.A. #: 30-1348-15.002
GROUND ELEV.: 1436.52 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 433+00
OFFSET: 15.24 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/30/97

ELEV.	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								10.52	
	10.67						SC	RED BROWN CLAYEY SAND moist, dense, fine to medium grained sand, moderate to high plasticity fines, some fine gravel.	24% fines
1425.5	11 11.13	H	MC	46		W,UW,S		Lenses of very sandy clay	
1424.5	12 12.19							12.04	
	12.65	I	MC	35		W,UW,S	SM	YELLOW BROWN SILTY SAND moist, dense, fine to medium grained sand.	25% fines
1423.5	13 13.72								
1422.5	14 14.17	J	MC	79		W,UW		Gray brown, very dense	
1421.5	15 15.24								
	15.70	K	MC	52		W,UW,S		15.54	16% fines
1420.5	16						SC	GRAY SLIGHTLY CLAYEY SAND moist, dense to very dense, fine to medium grained sand, low plasticity fines.	
1419.5	17							17.07	
1418.5	18 18.29						SM SP	GRAY BROWN SLIGHTLY SILTY SAND moist, dense to very dense, fine to medium grained sand, estimated 5 to 12% silt.	
	18.59	L	MC	50		W,UW		18.75	Could not measure water level due to use of mud rotary
1417.5	19								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-6A

CAD FILE: L:\1998\TING\301348\30134815002DPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 4/30/97
END DATE: 4/30/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE, NORTHGATE LANE
BORING: BS-06
E.A. #: 30-1348-15.002
GROUND ELEV: 1436.52 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

SHEET 1 OF 2

STATION: STA 431+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/30/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND moist, loose to medium dense, fine to coarse grained sand, estimated 20 to 30% silt.	
								0.76	
1435.5	1						CH	LIGHT BROWN SLIGHTLY SANDY CLAY moist, medium stiff, fine to medium grained sand, high plasticity fines.	
	1.52	A	MC	6					
1434.5	2 1.98							1.83	
	2.13						SC	LIGHT BROWN CLAYEY SAND moist, very loose, fine to medium grained sand, low to moderate plasticity fines, estimated 10 to 20% fines	
		B	MC	3					
	2.59					OC			
								2.74	
1433.5	3 3.05						CH	LIGHT BROWN SLIGHTLY SANDY CLAY moist, medium stiff, fine grained sand, high plasticity fines.	
		C	MC	7				3.05	
	3.51						SC	LIGHT BROWN CLAYEY SAND moist, loose, fine to medium grained sand, low plasticity fines.	
1432.5	4 3.96								
		D	MC	25					29% fines
	4.42							4.27	
	4.57						SP	LIGHT BROWN CLAYEY SAND moist, loose, fine to medium grained sand, low plasticity fines, less than 5% silt.	
		E	MC	31		W,UW,S		4.57	19% fines
1431.5	5 5.03						SM	GRAY BROWN SILTY SAND moist, fine to medium grained sand.	
1430.5	6 6.10								
		F	MC	32		S,DS			26% fines
	6.55								
1429.5	7								
	7.62							7.32	
		G	MC	4			CL	LIGHT BROWN SLIGHTLY SANDY CLAY moist, very loose to loose, fine grained sand, moderate to high plasticity fines.	
1428.5	8 8.08								
	8.53								
		H	MC	17		W,UW,S,PI			PI=34 81% fines
1427.5	9 8.99							8.99	
	9.14						SM SP	GRAY BROWN SLIGHTLY SILTY SAND moist, very dense, fine to medium grained sand.	
		I	MC	65		S			7% fines
	9.60								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-7

CAD FILE: L:\1995\...TING\301348\301348150020PLATES.DWG

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 4/30/97
END DATE: 4/30/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE, NORTHGATE LANE
BORING: BS-06
E.A. #: 30-1348-15.002
GROUND ELEV: 1436.52 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 431+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 4/30/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
		J	MC	29		W,UW			
1425.5	11							10.97	
	11.13						SC	BED BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
1424.5	12								
	12.19								
		K	MC	24		W,UW			
	12.65							Estimated 10 to 20% fines, low plasticity fines.	
1423.5	13								
								13.25	
	13.72						SM	GRAY WHITE SILTY SAND moist, very dense, fine to coarse grained sand.	
		L	MC	50/140		S			13% fines
1422.5	14.02							14.02	Could not measure water level due to use of mud rotary
1421.5	15								
1420.5	16								
1419.5	17								
1418.5	18								
1417.5	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-7A

CAD FILE: L:\1999 TING\301348\301348150O2DPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/1/97
END DATE: 5/1/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST STRUCTURE, EMERSON DRIVE
BORING: BS-07
E.A. #: 30-1348-15.002
GROUND ELEV.: 1433.17 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

SHEET 1 OF 2

STATION: STA 406+00
OFFSET: 15.24 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/1/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	LIGHT BROWN CLAYEY SAND moist, loose, fine to coarse grained sand, low to moderate plasticity fines, fine to coarse surface gravel.	
1432.2	1								
	1.52	A	MC	7		S			33% fines
1431.2	2 1.98					OC			
	2.44	B	MC	38				Becoming more sandy, slightly clayey, low plasticity fines, dense.	
	2.90								
1430.2	3 3.05								
		C	MC	26		W,UW,S			31% fines
	3.51								
								3.66 Medium dense.	
1429.2	4						CH	LIGHT BROWN SLIGHTLY SANDY CLAY moist, very stiff, fine grained sand, high plasticity fines.	
	4.57	D	MC	3		OC		Becoming more sandy and soft.	
1428.2	5 5.03							4.88	
	5.18						SC	BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, low plasticity fines.	
		E	MC	27		S,PI			PI = 10 30% fines
	5.64								
1427.2	6 6.10								
		F	MC	22		W,UW,S		Light brown, medium grained sand, low to moderate plasticity fines.	23% fines
	6.55								
1426.2	7								
	7.62	G	MC	28					
1425.2	8 8.08							Estimated 10 to 20% fines, low plasticity fines.	
								8.53	
							SM SP	GRAY BROWN SLIGHTLY SILTY SAND moist, medium dense to dense, fine to medium grained sand, estimated 5 to 12% silt.	
1424.2	9 9.14								
		H	MC	30					
	9.60								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-8

CAD FILE: L:\1999\TING\301348\301348150020PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/1/97
END DATE: 5/1/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST STRUCTURE, EMERSON DRIVE
BORING: BS-07
E.A. #: 30-1348-15.002
GROUND ELEV.: 1433.17 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 406+00
OFFSET: 15.24 M SOUTH
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/1/97

ELEV. (1433.2)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67						SC	10.06 LIGHT BROWN CLAYEY SAND moist, dense, fine to medium grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
1422.2	11 11.13	I	MC	41					
1421.2	12 12.19								
	12.65	J	MC	92				12.50	
1420.2	13 13.72						SP SM	GRAY BROWN SLIGHTLY SILTY SAND moist, dense to very dense, fine to coarse sand, estimated 5 to 12% silt.	
1419.2	14 14.17	K	MC	38				14.02	
							SC	LIGHT BROWN CLAYEY SAND moist, dense, fine to medium grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
1418.2	15 15.24							14.94	
	15.70	L	MC	32		W,UW	SC CL	BROWN CLAYEY SAND moist, dense/hard, fine to coarse grained sand, moderate to high plasticity fines.	
1417.2	16								
1416.2	17								
1415.2	18 18.29							17.98	
	18.75	M	MC	45			SC	BROWN CLAYEY SAND moist, dense, fine to medium grained sand, moderate plasticity fines, estimated 15 to 25% fines.	Could not measure water level due to use of mud rotary
1414.2	19							18.75	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-8A

EXPLORATION LOG

KLEINFELDER

START DATE: 5/1/97
END DATE: 5/1/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE, EMERSON DRIVE
BORING: BS-08
E.A. #: 30-1348-15.002
GROUND ELEV: 1433.17 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 405+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/1/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	LIGHT BROWN CLAYEY SAND moist, loose, fine to coarse grained sand, low plasticity fines.	
1432.2	1								
	1.52	A	MC	11		S,Pl			Pl = 13 38% fines
1431.2	2 1.98								
	2.13								
		B	MC	34			SM SP	BED SLIGHTLY SILTY SAND moist, dense, fine to coarse grained sand, some fine gravel, estimated 5 to 12% silt.	
	2.59								
1430.2	3 3.05								
		C	MC	26		W,UW			
	3.51							3.51 Becoming more clayey	
							CL CH	LIGHT BROWN SANDY CLAY moist, very stiff, fine grained sand, moderate to high plasticity fines.	
1429.2	4								
	4.57							4.57	
		D	MC	11		W,UW,S,Pl	SC	LIGHT BROWN CLAYEY SAND moist, dense to very dense, fine to coarse grained sand, moderate plasticity fines, estimated 20 to 30% fines.	Pl = 23 22% fines
1428.2	5 5.03								
	5.49								
		E	MC	55					
1427.2	6 5.94								
	6.10								
		F	MC	20				Medium dense, moderate to high plasticity fines.	
	6.55								
1426.2	7								
	7.62								
		G	MC	32				Becoming more sandy.	
1425.2	8 8.08								
								8.84	
1424.2	9						CH	LIGHT BROWN FAT CLAY moist, medium stiff, some fine grained sand, high plasticity fines.	
	9.14	H	MC	7		UC			
	9.60								
	9.75							9.75	
		I	MC	10		S,Pl	SC		Pl = 19

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-9

CAD FILE: L:\1998\...TING\301348\301348150020PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/1/97
END DATE: 5/1/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE, EMERSON DRIVE
BORING: BS-08
E.A. #: 30-1348-15.002
GROUND ELEV.: 1433.17 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 405+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/1/97

ELEV. (1433)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21							LIGHT BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, moderate plasticity fines.	36% fines
	10.67								
1422.2	11	J	MC	28					
	11.13								
1421.2	12								
	12.19	K	MC	43					
	12.65								
1420.2	13						SM SP	GRAY BROWN SLIGHTLY SILTY SAND moist, dense, fine to coarse grained sand, estimated 5 to 12% silt.	
	13.72								
1419.2	14	L	MC	66			SC	BROWN SLIGHTLY CLAYEY SAND moist, very dense, fine to medium grained sand, low plasticity fines.	Could not measure water level due to use of mud rotary
	14.17								
1418.2	15								
1417.2	16								
1416.2	17								
1415.2	18								
1414.2	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-9A

CAD FILE: L:\1999\...TING\301348\30134815002DPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 5/1/97
END DATE: 5/1/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH STRUCTURE, COLLEGE PARKWAY
BORING: BS-09
E.A. #: 30-1348-15.003
GROUND ELEV: 1429.51 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 384+50
OFFSET: 15.24 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/1/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1428.5	1						SM	LIGHT BROWN SILTY SAND moist, medium dense, fine to coarse grained sand, estimated 20 to 30% silt.	
	1.07								
	1.52						SM SP	GRAY BROWN SLIGHTLY SILTY SAND medium dense, fine to medium grained sand, estimated 5 to 12% silt.	
		A	MC	21		W,UW,S			19% fines
	1.83								
1427.5	2 1.98						SM	GRAY BROWN SILTY SAND moist, medium dense, fine grained sand.	
	2.74								
1426.5	3 3.05						SM SP	GRAY SLIGHTLY SILTY SAND moist, dense, fine to medium grained sand.	
		B	MC	36		W,UW,S			11% fines
	3.51								
1425.5	4								
	4.42								
	4.57						SC	LIGHT BROWN CLAYEY SAND moist, dense, fine grained sand, low to moderate plasticity fines, estimated 25 to 35% fines.	
		C	MC	36		W,UW			
1424.5	5 5.03								
1423.5	6 6.10								
		D	MC	25					
	6.55								
1422.5	7								
	7.62								
		E	MC	59					
1421.5	8 8.08								
	7.92						SM SP	RED BROWN SLIGHTLY SILTY SAND moist, very dense, fine to coarse grained sand and fine gravel, estimated 5 to 12% silt.	
1420.5	9								
	9.14								
		F	MC	44		S	SC	RED BROWN CLAYEY SAND moist, dense, fine grained sand, low plasticity fines.	19% fines
	9.60								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-10

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/1/97
END DATE: 5/1/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH STRUCTURE, COLLEGE PARKWAY
BORING: BS-09
E.A. #: 30-1348-15.003
GROUND ELEV.: 1429.51 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 384+50
OFFSET: 15.24 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/1/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1418.5	11	G	MC	44					
	11.13							10.97	
							SM SP	RED BROWN SLIGHTLY SILTY SAND moist, dense, fine to medium grained sand, estimated 5 to 12% fines.	
1417.5	12							12.04	
	12.19						GC	RED CLAYEY GRAVEL moist, very dense, fine to coarse sand and gravel, moderate plasticity fines, 62.5 mm maximum particle size.	
	12.42	H	MC	50/64mm				12.65	
1416.5	13						CH	RED BROWN FAT CLAY moist, hard, fine grained sand, high plasticity fines.	
	13.72								
1415.5	14	I	MC	59					Could not measure water level due to use of mud rotary
	14.17							14.17	
1414.5	15								
1413.5	16								
1412.5	17								
1411.5	18								
1410.5	19								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-10A

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EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 5/2/97
END DATE: 5/2/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH STRUCTURE, COLLEGE PARKWAY
BORING: BS-10
E.A. #: 30-1348-15.002
GROUND ELEV.: 1430.12 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 382+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/2/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1429.1	1						SC	LIGHT BROWN VERY CLAYEY SAND slightly moist, dense to very dense, fine to medium grained sand, moderate plasticity fines.	
	1.52	A	MC	67		W,UW,S,PI			PI = 12 43% fines
1428.1	2 1.98								
1427.1	3 3.05	B	MC	56		W,UW			
	3.51							Fine to coarse grained sand.	
1426.1	4								
	4.57	C	MC	38		W,UW		Becoming more sandy.	
1425.1	5 5.03							5.03 Slightly clayey, estimated 10 to 15% fines.	
							SM SP	GRAY BROWN SLIGHTLY SILTY SAND moist, dense, fine to coarse grained sand, estimated 5 to 12% silt.	
1424.1	6 6.10								
	6.55	D	MC	42				6.40	
							SC	LIGHT BROWN CLAYEY SAND moist, dense, fine to medium grained sand, low plasticity fines, estimated 10 to 20% fines.	
1423.1	7							7.32	
	7.62						SC	LIGHT BROWN CLAYEY SAND moist, dense, fine grained sand, low plasticity fines.	PI = 10 30% fines
		E	MC	31		W,UW,S,PI			
1422.1	8 8.08								
								8.84	
1421.1	9 9.14						SC	LIGHT BROWN CLAYEY SAND moist, dense, fine to medium grained sand, low to moderate plasticity fines, estimated 10 to 20% fines, some fine gravel.	
	9.60	F	MC	30					

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-11

EXPLORATION LOG

KLEINFELDER

START DATE: 5/2/97
END DATE: 5/2/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH STRUCTURE, COLLEGE PARKWAY
BORING: BS-10
E.A. #: 30-1348-15.002
GROUND ELEV.: 1430.12 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 382+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/2/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								10.52	
	10.67	G	MC	44		W,UW,S,PI	SC	LIGHT BROWN CLAYEY SAND moist, dense, fine to coarse grained sand, low plasticity fines.	PI = 11 34% fines
1419.1	11 11.13								
1418.1	12 12.19							Some fine gravel.	
	12.65	H	MC	29				12.50	
1417.1	13						CH	LIGHT BROWN FAT CLAY moist, very stiff, fine grained sand, high plasticity fines.	
	13.72							13.41	
1416.1	14 14.17	I	MC	73			SC	GRAY BROWN CLAYEY SAND moist, very dense, fine to medium grained sand, low plasticity fines, estimated 10 to 20% fines. Becoming more sandy.	
								14.48	
1415.1	15 15.24						CL	RED SANDY CLAY moist, hard, fine to medium grained sand, moderate to high plasticity fines.	
	15.70	J	MC	76		W,UW,S,PI			PI = 20 63% fines
1414.1	16								
	16.76							16.46	
1413.1	17 17.22	K	MC	31			CH	RED SANDY CLAY moist, hard, fine to coarse grained sand, trace of fine and coarse gravel up to 50 mm in diameter, high plasticity fines.	
1412.1	18 18.29								
	18.75	L	MC	34				18.75	Could not measure water level due to use of mud rotary
1411.1	19								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-11A

CAD FILE: L:\1999\FTINC\301348\301348150020PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/2/97
END DATE: 5/2/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH STRUCTURE, CARMINE STREET
BORING: BS-11
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.32 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 332+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/2/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.3	1						SC	LIGHT BROWN CLAYEY SAND slightly moist, dense, fine to coarse sand and surface gravel, low to moderate plasticity fines, estimated 20 to 30% fines.	
	1.52								
		A	MC	42		S			27% fines
1415.3	2 1.98								
1414.3	3 3.05								
		B	MC	18		W,UW		Green, medium dense, estimated 10 to 20% fines.	PI = 18% fines 38% fines
	3.51								
1413.3	4							3.96	
							SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine grained sand, moderate plasticity fines.	
	4.57								
		C	MC	17		W,UW,PI			
1412.3	5 5.03								
1411.3	6 6.10							5.94	
		D	MC	29			SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, estimated 15 to 25% fines.	
	6.55								
1410.3	7								
	7.62								
		E	MC	32		S		Becoming more sandy, dense, low plasticity fines.	26% fines
1409.3	8 8.08								
1408.3	9 9.14								
		F	MC	28				Becoming more clayey, medium dense, low to moderate plasticity fines.	
	9.60								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-12

CAD FILE: L:\1998\...TING\301348\301348150020PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/2/97
END DATE: 5/2/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH STRUCTURE, CARMINE STREET
BORING: BS-11
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.32 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 332+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/2/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1406.3	11	G	MC	23					
	11.13								
								11.89	
1405.3	12						SM	GRAY BROWN SILTY SAND moist, very dense, fine to medium grained sand.	21% fines
	12.19	H	MC	59		W,UW,S			
	12.65								
1404.3	13								
	13.72								
1403.3	14	I	MC	32				Red gray, fine to coarse grained sand, medium dense.	
	14.17							14.02	
							SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
1402.3	15								
	15.24								
	15.70	J	MC	29					
								15.54	
1401.3	16						CH	LIGHT BROWN FAT CLAY moist, very stiff to hard, very fine grained sand, high plasticity fines.	
	16.76								
1400.3	17	K	MC	63				Fine grained sand.	
	17.22								
1399.3	18								
	18.29								
	18.75	L	MC	58					Could not measure water level due to use of mud rotary
								18.75	
1398.3	19								

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PROJECT NO. 30-1348-15.002

LOG OF BORING
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
D-12A

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/2/97
END DATE: 5/2/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE U.S. 395
BORING: BS-12
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.32 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 331+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/2/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.3	1						SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand, estimated 20 to 30% fines.	
	1.52							0.91	
		A	MC	42		W,UW,S	SM SP	YELLOW BROWN SLIGHTLY SILTY SAND moist, dense, fine to medium grained sand, slight plasticity fines, estimated 5 to 12% fines.	9% fines
1415.3	2 1.98								
1414.3	3 3.05								
		B	MC	38		W,UW,S		Becoming less silty, fine to coarse grained sand, some fine gravel.	5% fines
	3.51								
1413.3	4								
	4.57							3.81	
		C	MC	27			SC	GREEN CLAYEY SAND moist, medium dense, fine grained sand, low plasticity fines.	
1412.3	5 5.03							Brown fine to coarse grained sand and fine gravel.	
1411.3	6 6.10								
		D	MC	24		W,UW,S		Becoming more sandy, fine grained sand.	16% fines
	6.55								
1410.3	7								
	7.62								
		E	MC	29		W,UW,S			15% fines
1409.3	8 8.08							7.92	
							SM SP	YELLOW BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to medium grained sand, estimated 5 to 12% silt, some fine gravel.	
1408.3	9 9.14								
		F	MC	26					
	9.60							9.45	
							SC	BROWN CLAYEY SAND moist, medium dense, fine grained sand, low to moderate plasticity	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-13

CAD FILE: L:\1995\ING\301348\301348150020PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/2/97
END DATE: 5/2/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST STRUCTURE U.S. 395
BORING: BS-12
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.32 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 331+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/2/97

ELEV. 1417.3	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS/300mm	SAMPLE Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								fines, some fine gravel, estimated 10 to 20% fines. Lenses of slightly clayey sands.	
	10.67	G	MC	37					
1406.3	11 / 11.13								
								11.73	
							CH	LIGHT BROWN SLIGHTLY SANDY CLAY moist, very stiff to hard, fine grained sand, moderate to high plasticity fines.	
1405.3	12 / 12.19								
	12.42	H	MC	28					Could not measure water level due to use of mud rotary
1404.3	13							13.11	
							SP SM	GRAY BROWN SLIGHTLY SILTY SAND moist, dense, fine to medium grained sand, estimated 5 to 12% fines.	
	13.72	I	MC	38					
1403.3	14 / 14.17							14.17	
1402.3	15								
1401.3	16								
1400.3	17								
1399.3	18								
1398.3	19								

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LOG OF BORING
CARSON FREEWAY
CARSON CITY, NEVADA

PLATE D-13A

PROJECT NO. 30-1348-15.002

EXPLORATION LOG

KLEINFELDER

START DATE: 3/3/97 & 6/2/99
END DATE: 3/3/97 & 6/2/99
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: CENTER STRUCTURE, COLLEGE PARKWAY
BORING: BS-13A
E.A. #: 30-1348-15.003
GROUND ELEV: m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION:
OFFSET:
ENGINEER: J. FORGA/M. DOEHRING
EQUIPMENT: CME85/MOB. DRILL 980
OPERATOR: SPECTRUM/NDOT
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/3/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0							0.27 Approx. 10 cm of A.C. and 15 cm of A.B.	
							SM	UGHT BROWN SILTY SAND moist, dense, weakly cemented lenses, fine to coarse grained sand and fine gravel, non-plastic fines.	
	1 1.07	A-1	SPT	35					
	1.37								
	1.52	A	MC	13		S,UC		becoming medium dense	26% fines
	2 1.98								
	2.44	B	MC	15					
	2.90								
	3 3.05	C	MC	28		W,UW,S,PI			PI=2 20% fines
	3.51								
	3.81							3.66	
	4 4.11	C-1	MC	25		W,UW	SC	OLIVE BROWN SILTY CLAYEY SAND moist, medium dense, low plasticity fines, fine-grained sands, yellow-brown mottling.	
	4.57	D	MC	27					
	5 5.03							Fine to medium sized gravel.	
	6 6.10	E	MC	31		W,UW,S			17% fines
	6.55								
	6.86							6.86	
	7 7.16	E-1	SPT	25			SM	RED-BROWN SILTY SAND moist to wet, medium dense, fine to coarse grained sand, non-plastic fines, trace fine gravel.	
	7.52	F	MC	27					
	8 8.08								
	9 9.14							8.99	
		G	MC	23		W,UW,S,PI	SC	UGHT BROWN CLAYEY SAND medium dense, fine to medium grained sand, low to moderate plasticity fines.	PI=9 39% fines
	9.60								

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BORING LOG
CARSON FREEWAY

PLATE
D-14

PROJECT NO. 30-1348-15.003

CARSON CITY, NEVADA

CAD FILE: L:\1999\drafting\30134815\30134815003-LOG.DWG

START DATE: 5/3/97 & 6/2/99	EXPLORATION LOG		SHEET 2 OF 3
END DATE: 5/3/97 & 6/2/99		STATION	
JOB DESCRIPTION: CARSON FREEWAY		OFFSET	
LOCATION: CENTER STRUCTURE, COLLEGE PARKWAY		ENGINEER	J. FORGA/M. DOEHRING
BORING: BS-13A		EQUIPMENT	CME85/MOB. DRILL 880
E.A. #: 30-1348-15.003	GROUNDWATER LEVEL	OPERATOR	SPECTRUM/NDOT
GROUND ELEV: m	DATE / DEPTH / ELEV.	DRILLING METHOD	MUD ROTARY
HAMMER DROP SYSTEM: MANUAL		BACKFILLED	YES DATE 5/3/97

KLEINFELDER

ELEV. (m)	DEPTH (m)	SAMPLE NO.	TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21	G-1	MC	25		W,UW	SM	OLIVE BROWN SILTY SAND moist to wet, medium dense, non-plastic fines, fine-grained sand, red mottling.	
	10.57								
	10.90	H	MC	25					
	11								
	11.28								
	11.43						SM		
	11.73	H-1	SPT	27				OLIVE BROWN SILTY SAND moist, dense, fine grained sand, slight plasticity, estimated 20 to 30% fines.	
	12								
	12.19								
	12.65	I	MC	42					
	12.95								
	13								
	13.26	I-1	MC	50		W,UW		yellow brown mottling	
	13.72								
	14	J	MC	39					
	14.17								
	14.48						SM		
	14.78	J-1	SPT	25				RED BROWN SILTY SAND moist, medium dense, non-plastic fines, fine to medium grained sand, trace subrounded fine gravel, occasional fine to coarse silty sand seams.	
	15								
	16								
	16.00								
	16.31	K	LM	42				becoming dense	
	17								
	17.07						SC	BROWN CLAYEY SAND moist, dense, low plasticity fines, fine to coarse sand, predominantly fine grained sand, yellow brown mottling, some subrounded gravel up to 19mm in diameter	
	17.53								
	17.83	L	SPT	32					
	18								
	19								
	19.05								
	19.35	M	LM	58		W,UW		becoming very dense, fine-grained sand	

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BORING LOG
CARSON FREEWAY

PLATE

D-14A

PROJECT NO. 30-1348-15.003

CARSON CITY, NEVADA

EXPLORATION LOG

KLEINFELDER

START DATE: 5/3/97 & 6/2/99
END DATE: 5/3/97 & 6/2/99
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: CENTER STRUCTURE, COLLEGE PARKWAY
BORING: BS-13A
E.A. #: 30-1348-15.003
GROUND ELEV.: m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 3 OF 3

STATION:
OFFSET:
ENGINEER: J. FORGA/M. DOEHRING
EQUIPMENT: CME85/MOB. DRILL 580
OPERATOR: SPECTRUM/NDOT
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/3/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	20.57						CL	GRAY SANDY CLAY moist to wet, stiff, high plasticity fines, fine grained sand, frequent clay lenses, trace highly weathered fine gravel.	PI=33 51% fines
	20.88	N	SPT	10		S,PI			
	21								
	21.74						GC		
	22								
	22.10								
	22.40	O	MC	84		W,UW			
	23							GRAY CLAYEY SANDY GRAVEL moist, very dense, medium to high plasticity fines, fine to coarse grained sand, highly weathered angular gravel.	
	23.52								
	23.93	Q	SPT	104					Could not measure water level due to use of mud rotary
	24							23.93	
	25								
	26								
	27								
	28								
	29								

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BORING LOG
CARSON FREEWAY

PLATE
D-14B

PROJECT NO. 30-1348-15.003

CARSON CITY, NEVADA

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 5/3/97
END DATE: 5/3/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: U.S. 50 STRUCTURE
BORING: BS-14
E.A. #: 30-1348-15.002
GROUND ELEV.: 1411.22 m
HAMMER DROP SYSTEM: MANUAL

STATION: STA 316+00
OFFSET: 32 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/3/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	0.21 Approximately 6 cm A.C., 15 cm of Aggregate Base. RED CLAYEY SAND moist, medium dense, fine to coarse grained sand, moderate to high plasticity fines.	
1410.2	1							1.22	
	1.52	A	MC	11		S,UC	SM	GRAY VERY SILTY SAND moist, loose, fine grained sand, some organics.	45% fines
1409.2	2 1.98								
	2.44	B	MC	23					
	2.90							2.74	
1408.2	3 3.05						SC	BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, low to moderate plasticity fines, estimate 15 to 25% fines. Lenses of gray sandy clay, moderate plasticity fines.	
	3.51	C	MC	30		W,UW			
1407.2	4							Becoming more sandy.	
	4.57							4.42	
		D	MC	53		W,UW	SM SP	GRAY SLIGHTLY SILTY SAND moist, very dense, fine to coarse grained sand, some fine gravel, estimated 5 to 12% silt.	
1406.2	5 5.03								
1405.2	6 6.10								
	6.55	E	MC	71		W,UW		6.55 Becoming more clayey.	
1404.2	7						CL	GRAY SANDY CLAY moist, very stiff to hard, fine grained sand, low to moderate plasticity fines.	
	7.62	F	MC	31					
1403.2	8 8.08							7.92	
							SC	GRAY CLAYEY SAND moist, medium dense, fine to medium grained sand.	25% fines
1402.2	9 9.14								
	9.60	G	MC	79		W,UW		Becoming more clayey.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE D-15

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/3/97
END DATE: 5/3/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: U.S. 50 STRUCTURE
BORING: BS-14
E.A. #: 30-1348-15.002
GROUND ELEV.: 1411.22 m
HAMMER DROP SYSTEM: MANUAL

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 316+00
OFFSET: 32 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 85
OPERATOR: SPECTRUM
DRILLING METHOD: MUD ROTARY
BACKFILLED: YES DATE: 5/3/97

ELEV. 1411.22 m	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS/300mm	SAMPLE Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67							10.67	
1400.2	11 11.13	H	MC	26			CH	LIGHT GRAY FAT CLAYEY moist, very stiff, moderate to high plasticity fines.	
1399.2	12 12.19								
	12.65	I	MC	48				Brown slightly sandy, fine to medium grained sand, hard.	
1398.2	13 13.72							13.41	
		J	MC	24			SC	BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, moderate to high plasticity fines.	
1397.2	14 14.17								
1396.2	15 15.24								
	15.70	K	MC	90				15.70	Could not measure water level due to use of mud rotary
1395.2	16								
1394.2	17								
1393.2	18								
1392.2	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-15A

CAD FILE: L:\1999\TING\301348\301348150020PLATES.DWG

MOISTURE CONTENT AND UNIT WEIGHT
STRUCTURE BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu m)
BS-1	3.35	9.0	17.28
BS-1	4.88	5.0	17.90
BS-1	6.40	9.9	16.96
BS-1	7.92	9.2	18.85
BS-1	9.45	9.8	19.00
BS-1	10.97	8.8	19.95
BS-1	12.34	7.9	19.48
BS-1	13.87	10.6	19.00
BS-2	3.35	8.4	17.43
BS-2	4.88	11.5	19.63
BS-2	6.40	11.4	19.00
BS-2	7.92	12.9	19.00
BS-2	9.45	6.1	18.85
BS-2	10.97	8.2	20.26
BS-3	1.83	10.7	17.43
BS-3	3.35	13.8	18.22
BS-3	4.88	13.7	18.22
BS-3	9.45	25.9	16.65
BS-3	10.97	17.2	16.96
BS-3	12.50	11.5	18.38
BS-3	14.02	15.0	18.53
BS-4	3.35	15.4	17.59
BS-4	4.88	14.0	18.38
BS-4	6.40	14.7	17.75
BS-4	7.92	17.6	17.12
BS-4	9.45	17.4	17.28
BS-4	10.97	15.1	17.75
BS-4	15.54	30.3	13.82
BS-5	1.83	16.7	17.12
BS-5	3.35	19.2	16.49
BS-5	4.88	20.8	15.86
BS-5	7.92	12.5	18.06
BS-5	9.45	26.9	15.08
BS-5	10.97	13.5	18.69
BS-5	12.34	18.2	17.12
BS-5	14.02	14.7	17.59
BS-5	15.54	14.3	18.06
BS-5	18.59	15.2	18.22
BS-6	4.88	20.9	16.49
BS-6	8.84	23.0	15.55
BS-6	10.97	15.2	18.22
BS-6	12.50	19.6	16.81
BS-7	3.35	15.7	17.43

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MOISTURE / DENSITY TABLE

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE
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MOISTURE CONTENT AND UNIT WEIGHT
STRUCTURE BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu.m)
BS-7	6.40	16.1	17.75
BS-7	15.54	11.5	18.69
BS-8	3.35	14.6	17.28
BS-8	4.88	13.2	17.59
BS-9	1.83	19.3	15.71
BS-9	3.35	14.4	18.22
BS-9	4.88	15.3	17.90
BS-10	1.83	18.7	16.96
BS-10	3.35	11.8	19.16
BS-10	4.88	15.2	17.59
BS-10	7.92	14.2	18.69
BS-10	10.97	15.5	18.22
BS-10	15.54	33.0	13.51
BS-11	3.35	18.1	16.65
BS-11	4.88	21.2	16.33
BS-11	12.50	12.6	18.22
BS-12	1.83	15.0	16.96
BS-12	3.35	6.8	17.12
BS-12	6.40	18.4	17.12
BS-12	7.92	17.0	17.28
BS-13	3.35	18.0	16.49
BS-13	4.11	23.2	16.21
BS-13	6.40	18.0	16.96
BS-13	9.45	16.8	17.43
BS-13	10.21	22.6	16.48
BS-13	13.26	19.4	17.01
BS-13	19.33	19.8	16.84
BS-13	22.25	16.2	16.08
BS-14	3.385	18.8	16.49
BS-14	4.88	15.3	16.96
BS-14	6.40	12.7	18.06
BS-14	9.45	13.6	17.43

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PROJECT NO. 30-1348-15.003

MOISTURE / DENSITY TABLE

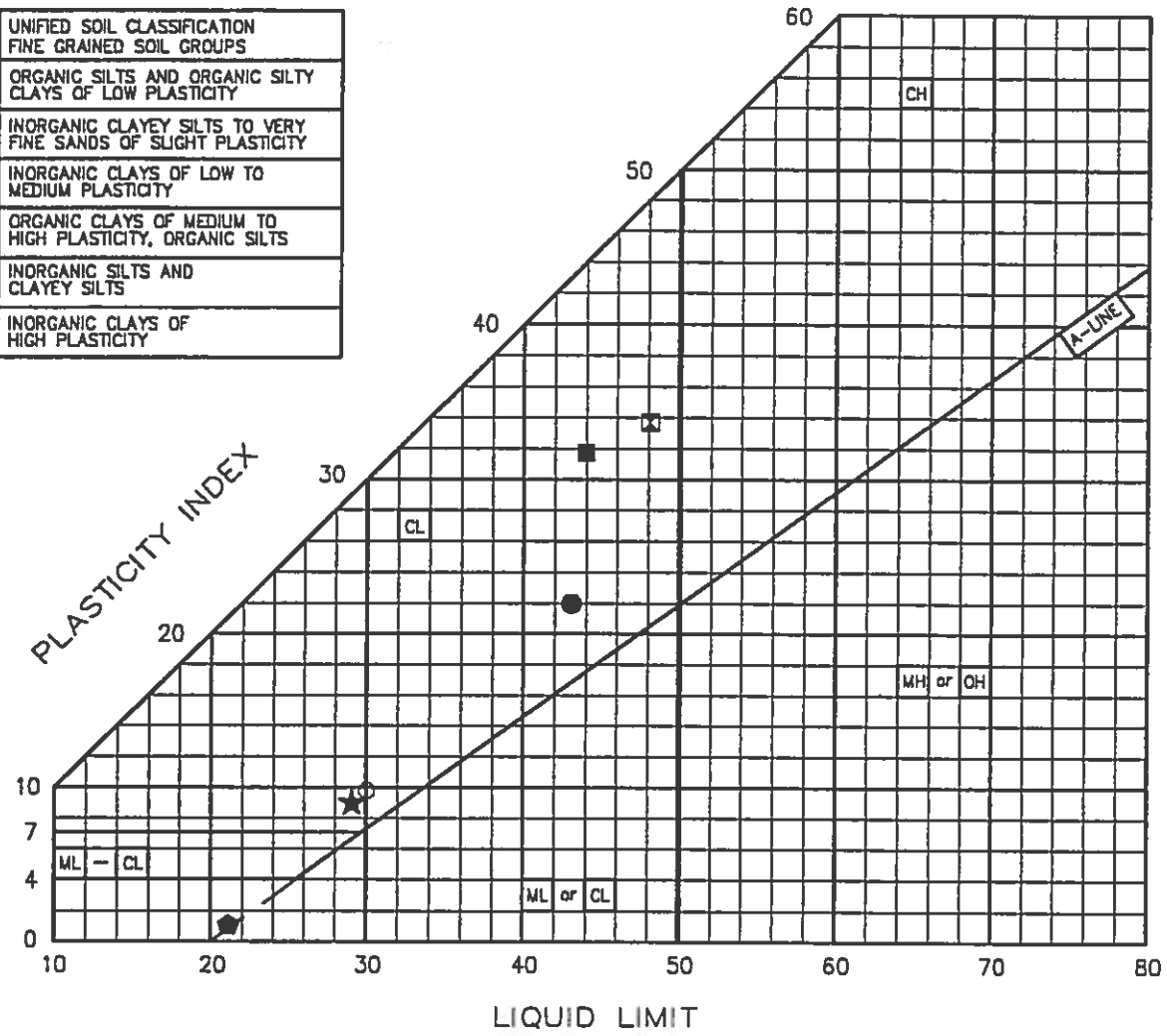
CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-16A

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BS-1	6.40	29	9	Yellow Brown Clayey Sand (SC) -200=32%
⬟	BS-3	9.45	21	1	Light Brown Clayey Sand (SC) -200=19%
●	BS-4	15.54	43	22	Olive Slighty Sandy Clay (CL) -200=62%
▲	BS-5	7.92	---	NP	Light Brown Clayey Sand (SC) -200=17%
■	BS-5	9.45	44	32	Light Brown Silty Clay (CL) -200=62%
⊠	BS-6	8.84	48	34	Light Brown Slightly Sandy Clay (CL) -200=81%
○	BS-7	5.33	30	10	Brown Clayey Sand (SC) -200=30%

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PLASTICITY CHART

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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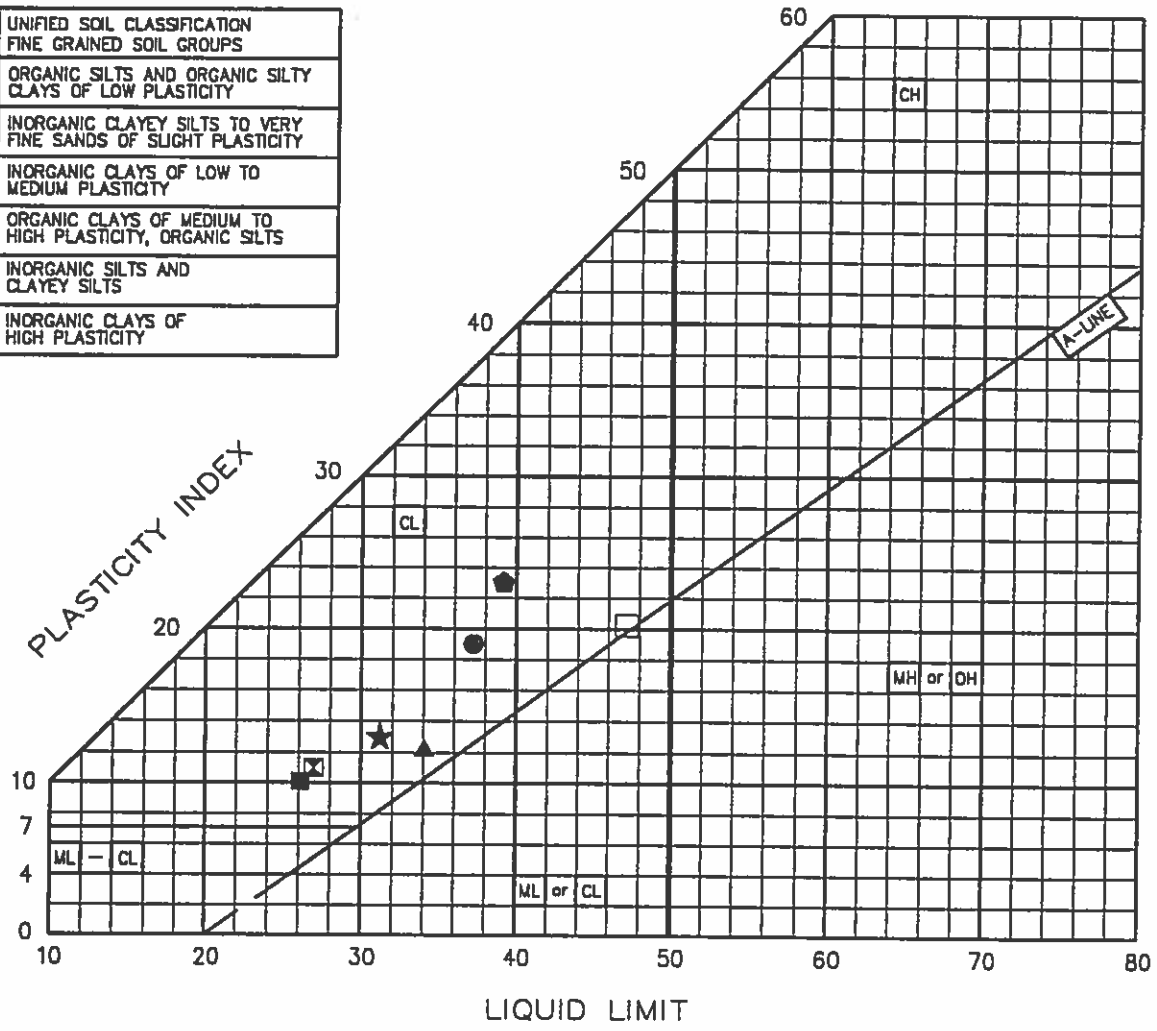
GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BS-8	1.68	31	13	Light Brown Clayey Sand (SC) -200 =38%
⬟	BS-8	4.88	39	23	Light Brown Clayey Sand (SC) -200=22%
●	BS-8	9.91	37	19	Light Bown Clayey Sand (SC) -200=36%
▲	BS-10	1.83	34	12	Light Brown Clayey Sand (SC) -200=43%
■	BS-10	7.92	26	10	Light Brown Clayey Sand (SC) -200= 30%
⊠	BS-10	10.97	27	11	Light Brown Clayey Sand (SC) -200=34%
□	BS-10	15.54	47	20	Red Sandy Clay (CL) -200=63%

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PROJECT NO. 30-1348-15.002

PLASTICITY CHART

CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
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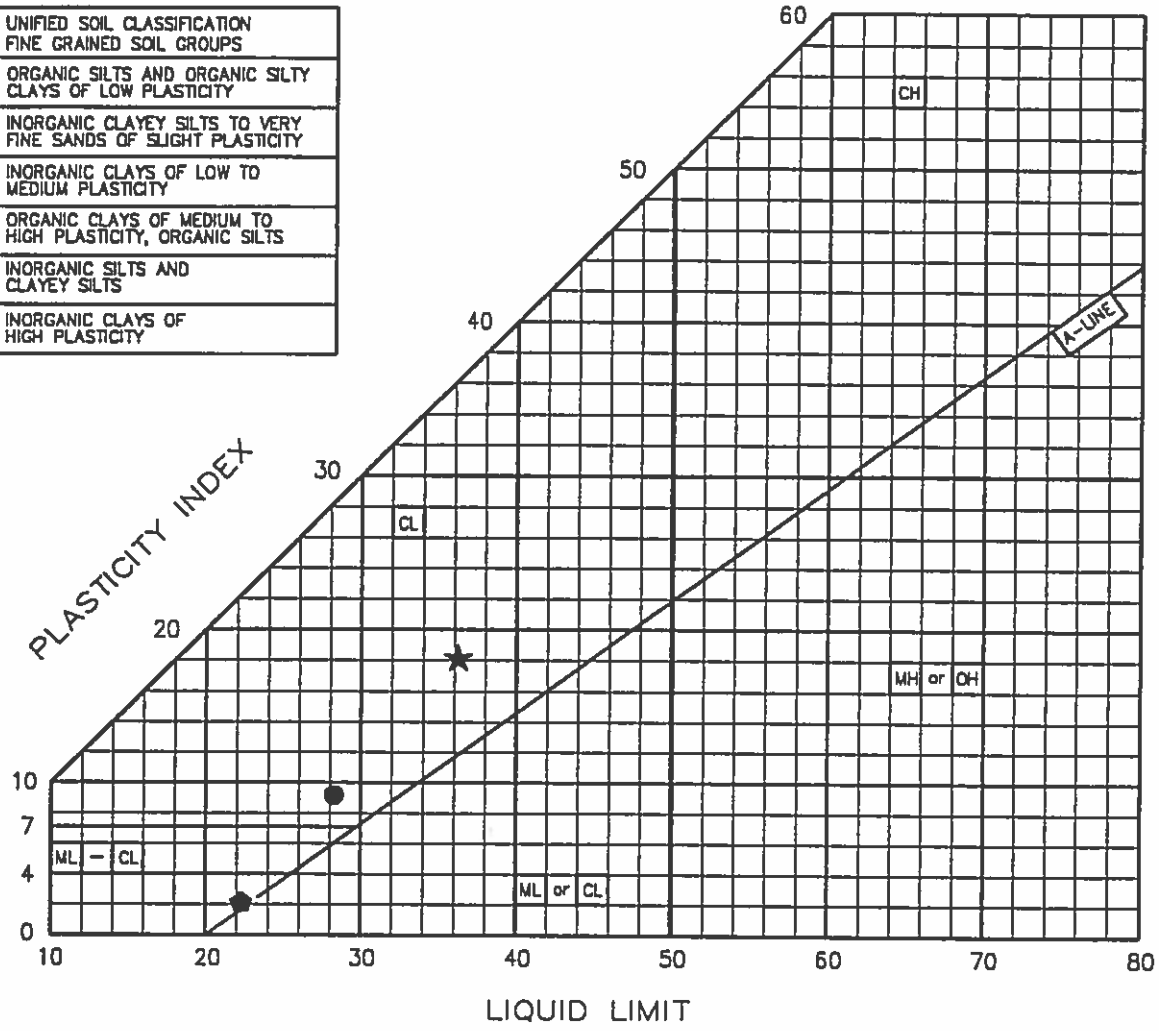
CAD FILE: L:\1995TING\30134B\30134B15002-STRUCTBOR-PI.DWG

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BS-11	4.88	36	18	Light Brown Clayey Sand (SC) -200=38%
⬟	BS-13	3.35	22	2	Light Brown Clayey Sand (SC) -200=20%
●	BS-13	9.45	28	9	Light Brown Clayey Sand (SC) -200=39%

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PLASTICITY CHART

CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
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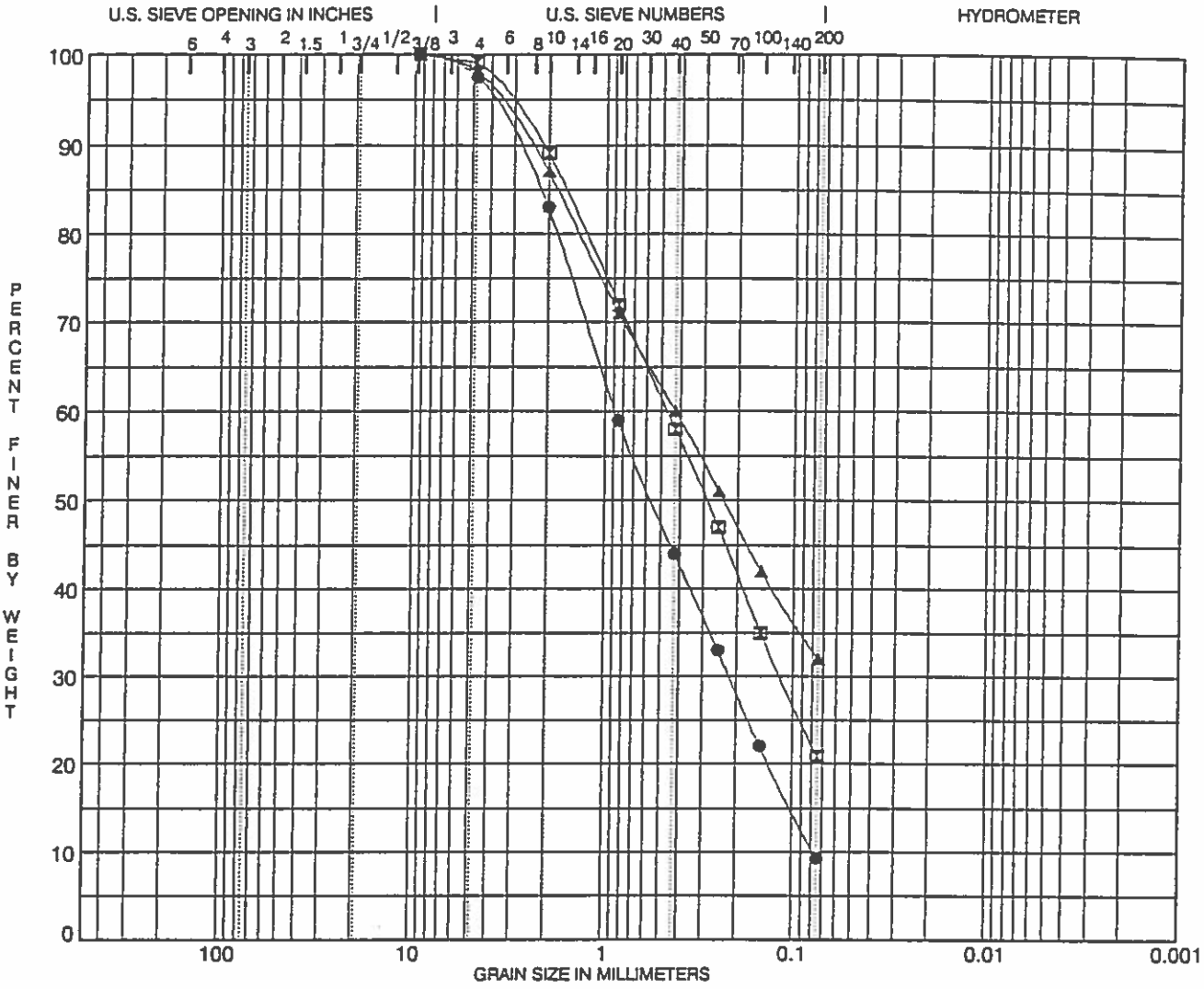

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BS-01	at 4.9	Light Brown Slightly Silty Sand (SM/SP)					0.69	11.3
⊠	BS-01	at 7.9	Red Brown Clayey Sand (SC)						
▲	BS-01	at 11.0	Red Brown Clayey Sand (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BS-01	at 4.9	9.50	0.88	0.218	0.0779	2.5	88.2	9.3	
⊠	BS-01	at 7.9	9.50	0.47	0.118		1.0	78.2	20.8	
▲	BS-01	at 11.0	9.50	0.43			2.0	66.0	32.0	

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PROJECT NO. 30-1348-15.002

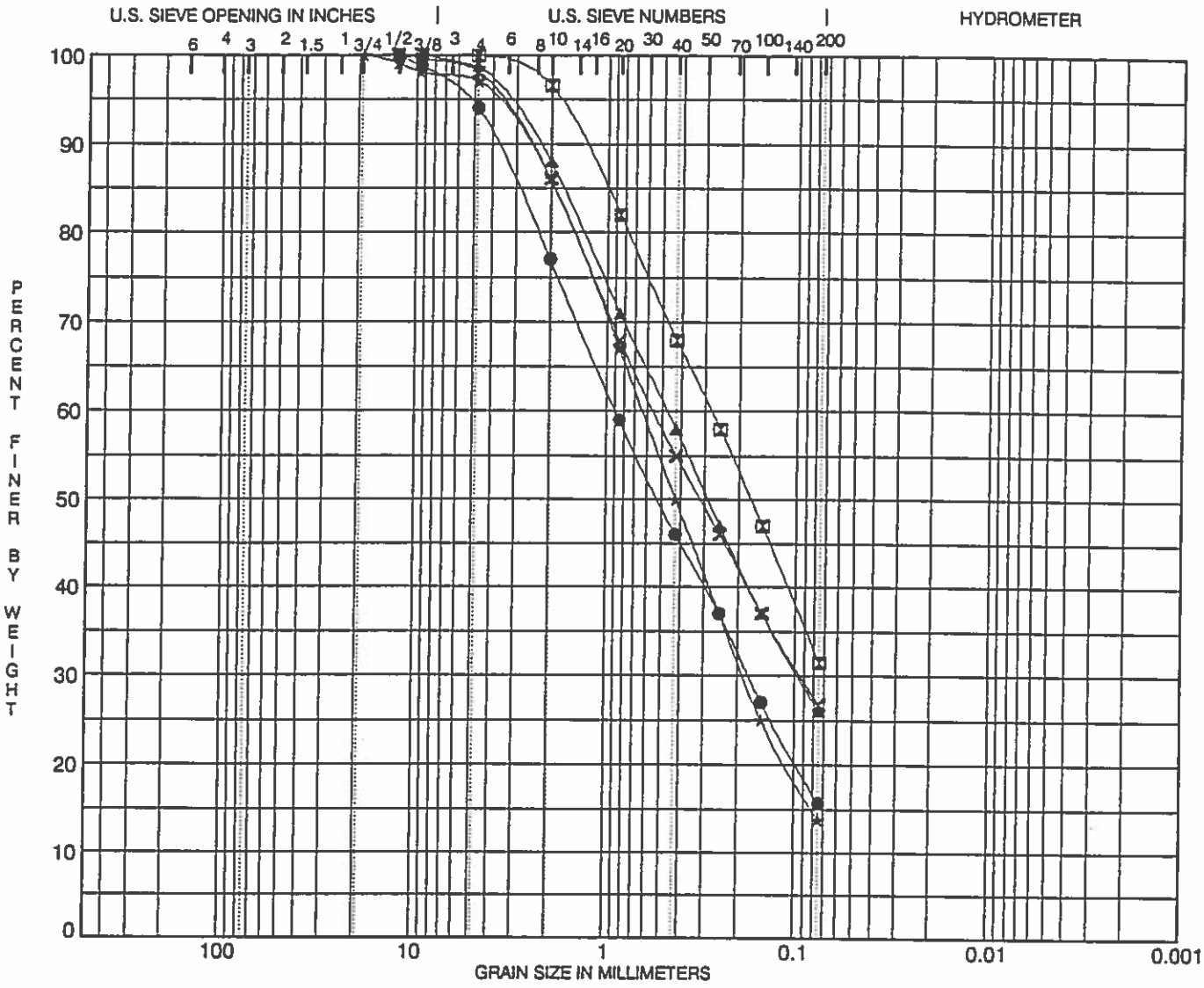
GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BS-02	at 4.9	Red Brown Clayey Sand (SC)						
⊠	BS-02	at 6.4	Red Brown Clayey Sand (SC)						
▲	BS-02	at 7.9	Red Brown Clayey Sand (SC)						
★	BS-02	at 9.5	Red Brown Clayey Sand (SC)						
✕	BS-02	at 11.0	Red Brown Clayey Sand (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BS-02	at 4.9	12.50	0.89	0.175		6.0	78.3	15.7	
⊠	BS-02	at 6.4	9.50	0.28			0.1	68.5	31.4	
▲	BS-02	at 7.9	9.50	0.47	0.097		1.3	72.7	26.0	
★	BS-02	at 9.5	19.00	0.64	0.186		3.0	83.2	13.8	
✕	BS-02	at 11.0	12.50	0.55	0.094		2.0	71.3	26.7	

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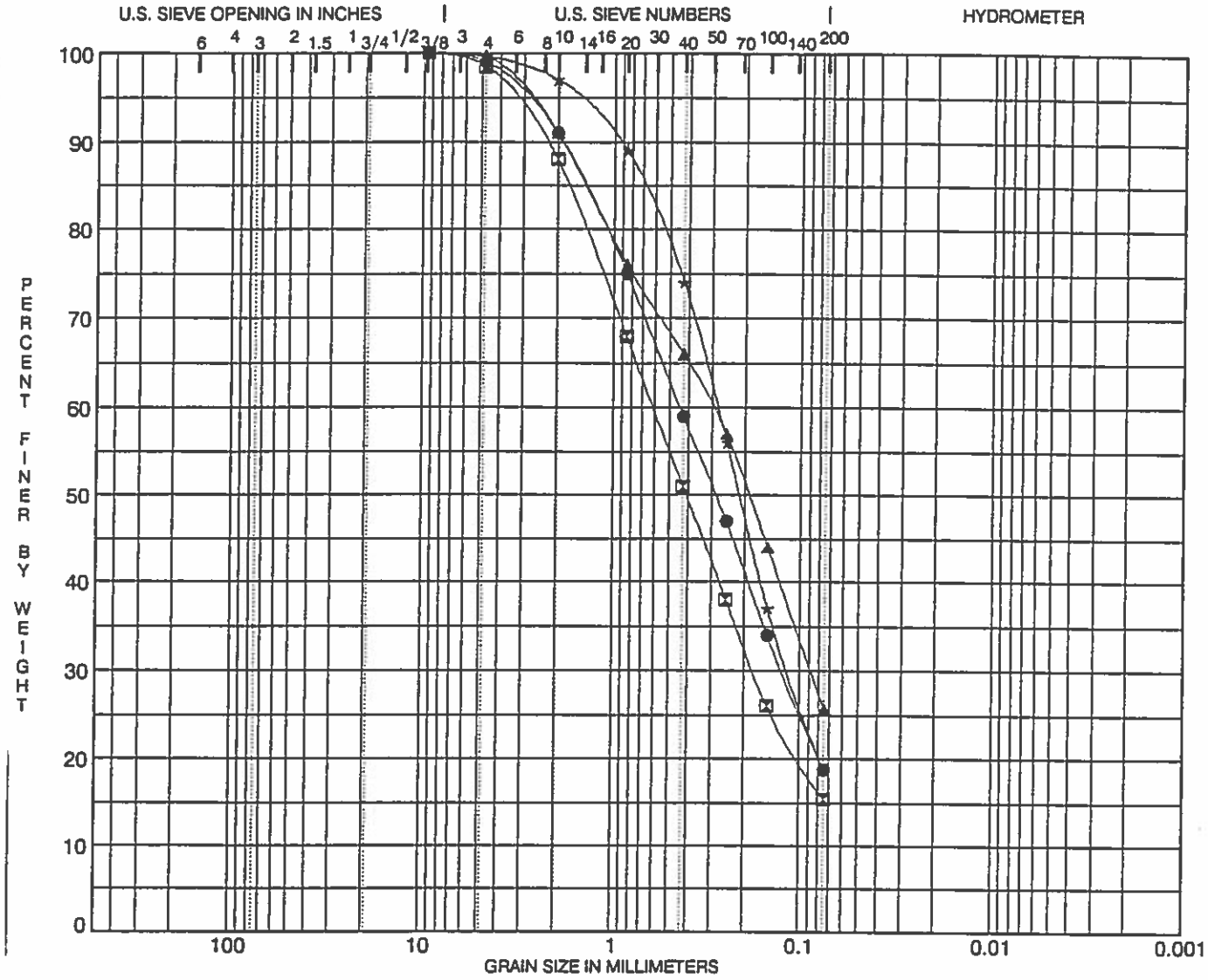
GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-21



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (ft.)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BS-03	at 4.9	Light Brown Clayey Sand (SC)						
⊠	BS-03	at 6.4	Light Brown Clayey Sand (SC)						
▲	BS-04	at 7.9	Light Brown Clayey Sand (SC)						
★	BS-04	at 9.5	Light Brown Clayey Sand (SC)						

	Boring	Depth (ft.)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BS-03	at 4.9	9.50	0.44	0.125		1.0	80.2	18.8	
⊠	BS-03	at 6.4	9.50	0.61	0.178		1.5	83.1	15.4	
▲	BS-04	at 7.9	9.50	0.30	0.088		0.3	74.0	25.7	
★	BS-04	at 9.5	9.50	0.28	0.115		0.4	80.8	18.8	

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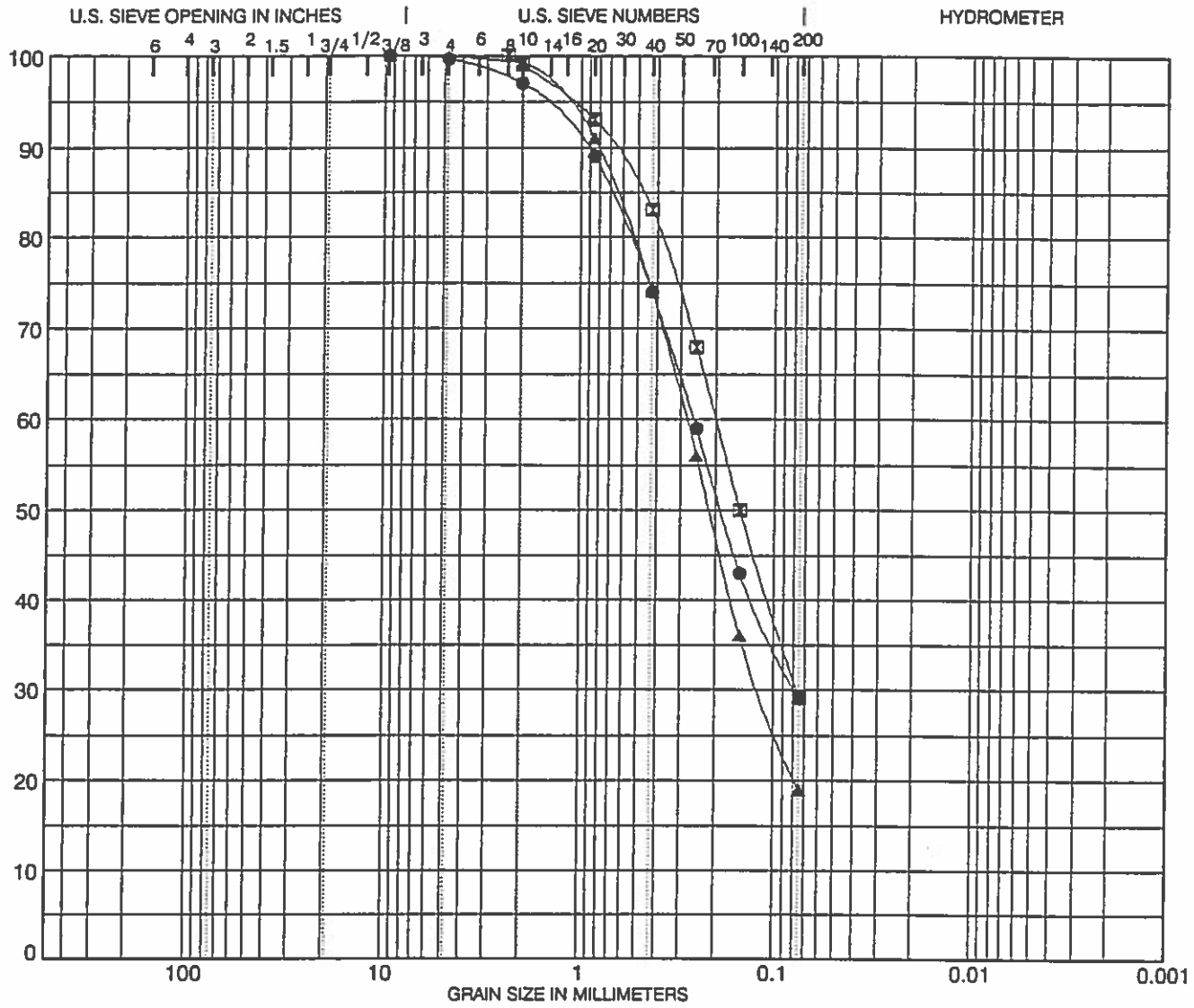
GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-22



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BS-05	at 3.4	Light Brown Clayey Sand (SC)						
⊠	BS-06	at 3.4	Light Brown Clayey Sand (SC)						
▲	BS-06	at 4.9	Gray Brown Silty Sand (SM)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BS-05	at 3.4	9.50	0.26	0.079		0.4	70.6	29.0	
⊠	BS-06	at 3.4	2.36	0.20	0.077		0.0	70.8	29.2	
▲	BS-06	at 4.9	9.50	0.28	0.117		0.1	80.9	19.0	

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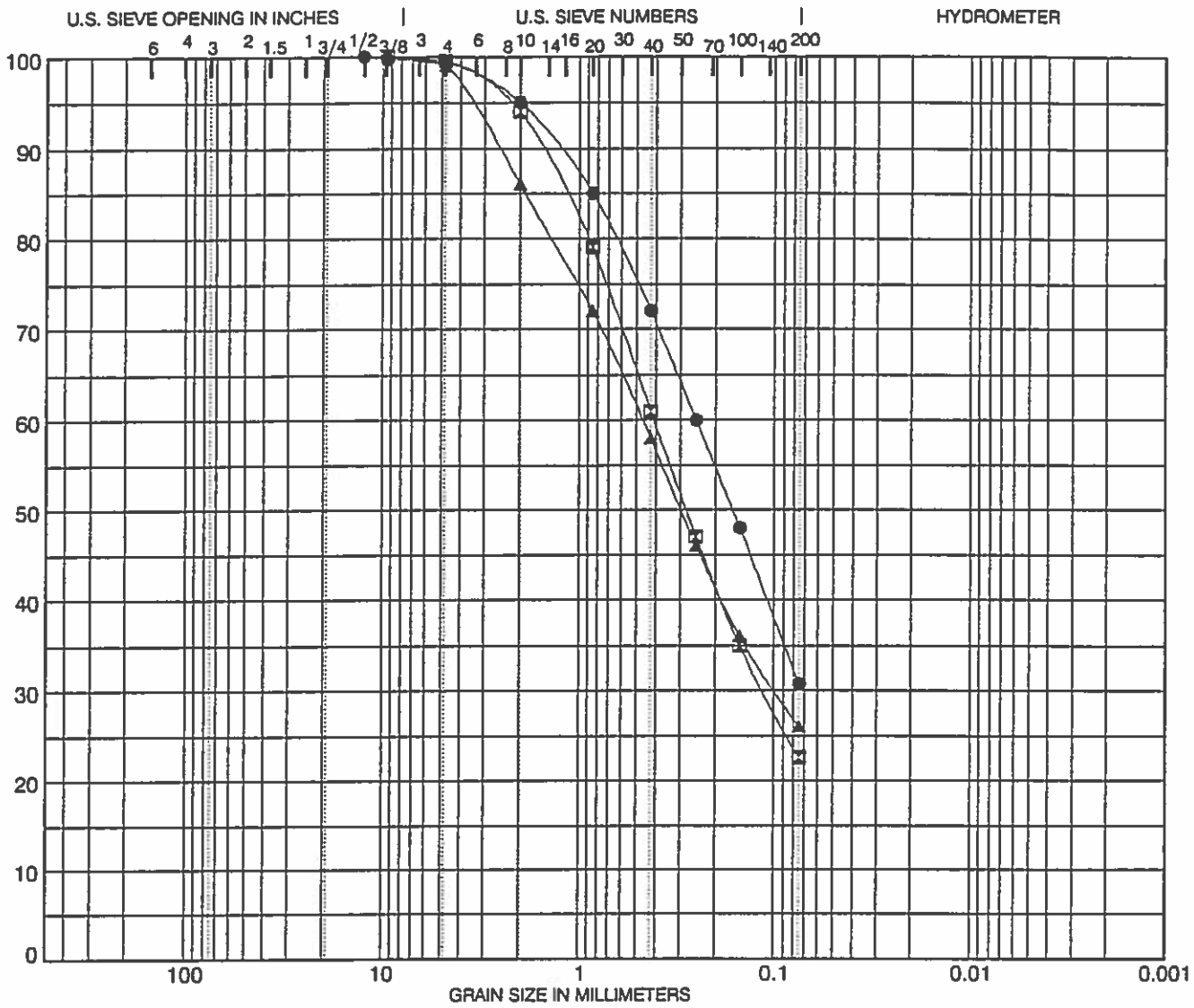
GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-23



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BS-07	at 3.4	Light Brown Clayey Sand (SC)						
⊠	BS-07	at 6.4	Brown Clayey Sand (SC)						
▲	BS-11	at 3.4	Light Brown Clayey Sand (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BS-07	at 3.4	12.50	0.25			0.7	68.6	30.7	
⊠	BS-07	at 6.4	9.50	0.41	0.113		0.5	76.9	22.6	
▲	BS-11	at 3.4	9.50	0.47	0.099		1.0	73.0	26.0	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

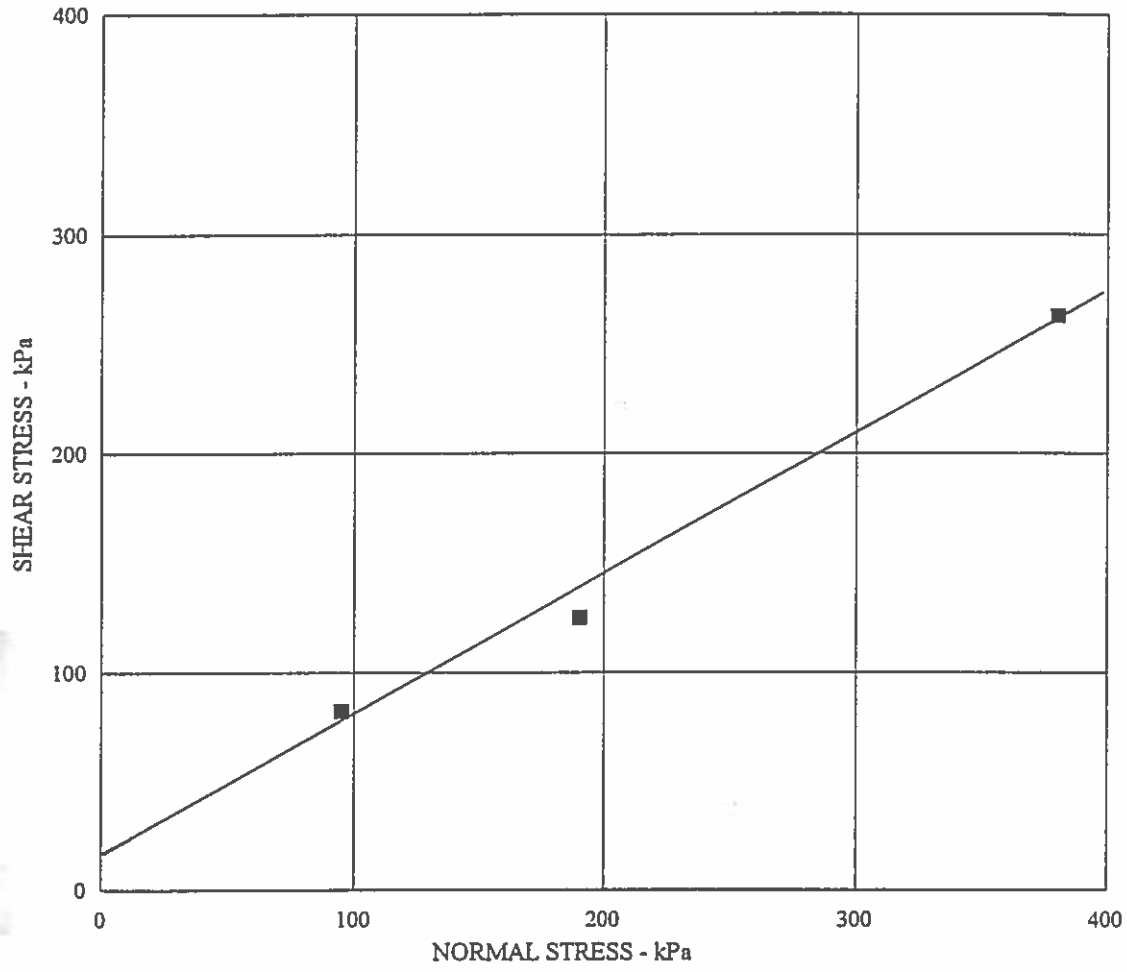
CARSON CITY, NEVADA

PLATE

D-24

DIRECT SHEAR

BS-3 @ 6.40 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BS-3
DEPTH:	6.40 meters
SOIL DESCRIPTION:	Lt. Brown Clayey Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	33
COHESION:	13 kPa

DRY DENSITY - kN/cu m	16.7		
INITIAL WATER CONTENT - %	45.1		
FINAL WATER CONTENT - %	19.2		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	82	125	263

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PROJECT NO. 30-1348-15.002

DIRECT SHEAR

CARSON FREEWAY

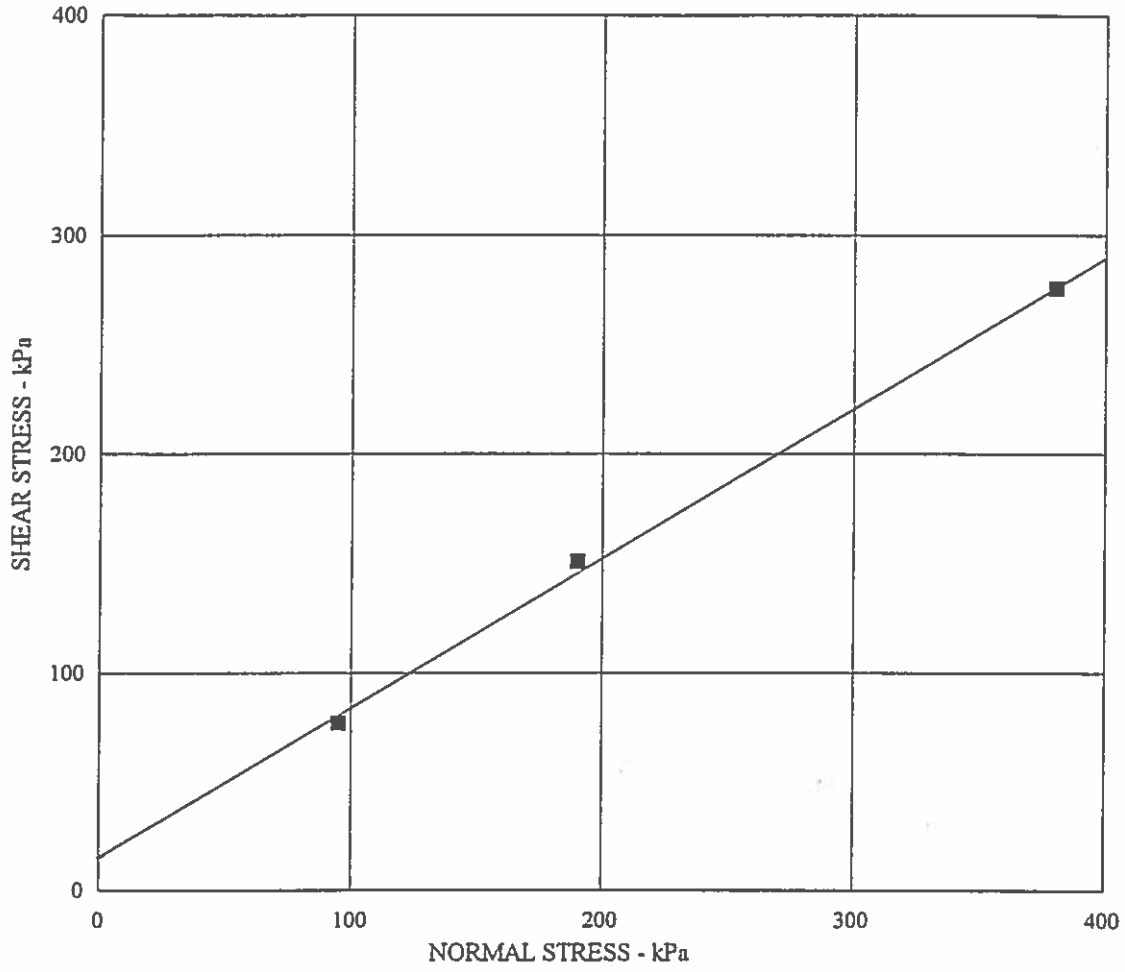
CARSON CITY, NEVADA

PLATE

D-25

DIRECT SHEAR

BS-6 @ 6.40 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BS-6
DEPTH:	6.40 meters
SOIL DESCRIPTION:	Gray Brown Silty Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	35
COHESION:	45 kPa

DRY DENSITY - kN/cu m	16.7		
INITIAL WATER CONTENT - %	15.9		
FINAL WATER CONTENT - %	20.4		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	77	151	276

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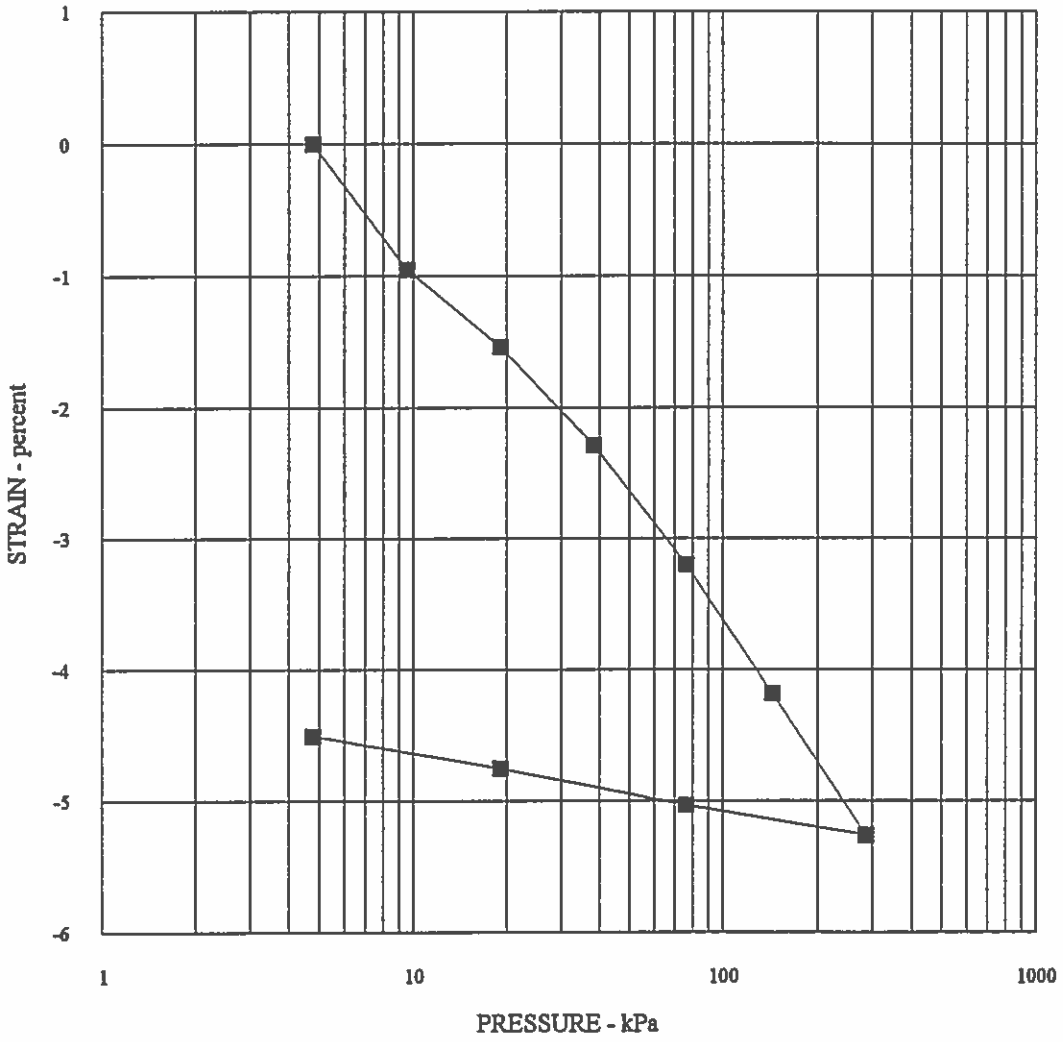
DIRECT SHEAR

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-26



BORING NO.: BS-1	DEPTH:	1.83 m	
SAMPLE DESCRIPTION:	Red Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		31	
PRECONSOLIDATION PRESSURE, kPa :		14	

	INITIAL	FINAL
DRY DENSITY - kN/cu m	16.37	17.23
WATER CONTENT - %	10.7	17.8
VOID RATIO	0.5393	0.4622
DEGREE OF SATURATION, %	51.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.51

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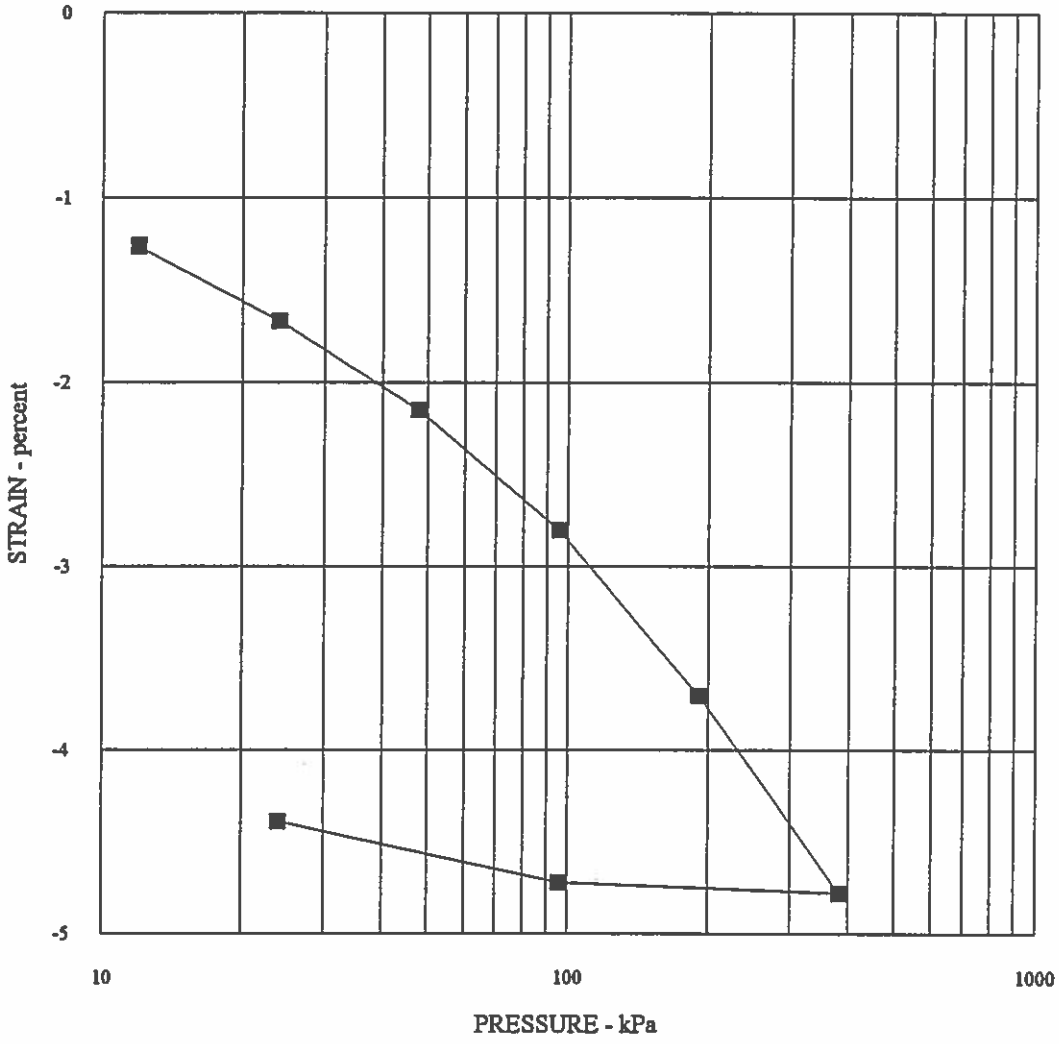
CONSOLIDATION TEST

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

D-27



BORING NO.: BS-4	DEPTH:	1.83 m	
SAMPLE DESCRIPTION: Yellow Brown Silty Sand			
OVERBURDEN PRESSURE, kPa		32	
PRECONSOLIDATION PRESSURE, kPa :		48	

	INITIAL	FINAL
DRY DENSITY - kN/cu m	17.39	18.22
WATER CONTENT - %	12.8	16.3
VOID RATIO	0.5131	0.4413
DEGREE OF SATURATION, %	67.00	99.00
SAMPLE HEIGHT - cm	2.54	2.43

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CONSOLIDATION TEST

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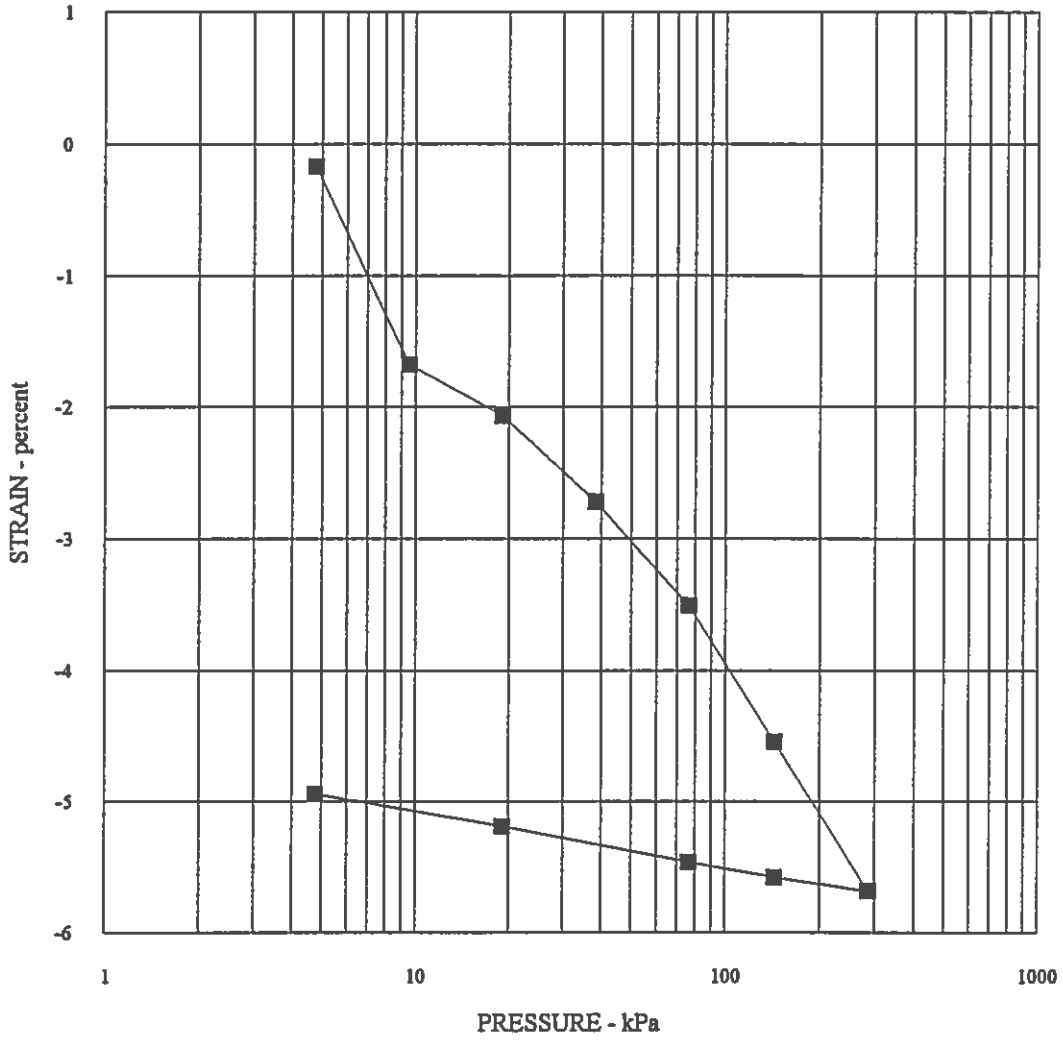
CARSON CITY, NEVADA

PLATE

D-29



BORING NO.: BS-2	DEPTH:	1.83 m
SAMPLE DESCRIPTION: Light Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		35
PRECONSOLIDATION PRESSURE, kPa :		14

	INITIAL	FINAL
DRY DENSITY - kN/cu m	15.33	16.19
WATER CONTENT - %	7.8	20.5
VOID RATIO	0.6122	0.5201
DEGREE OF SATURATION, %	32.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.5

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CONSOLIDATION TEST

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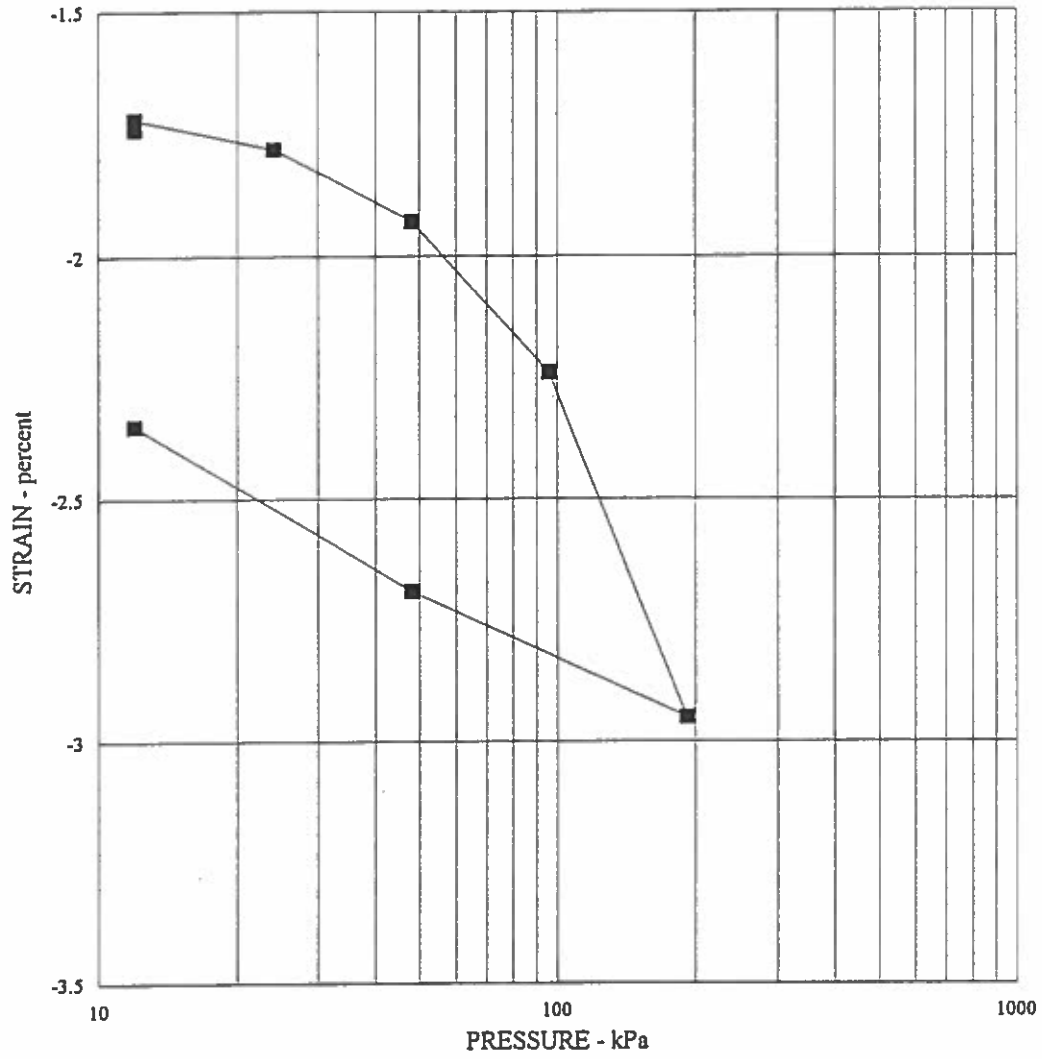
CARSON CITY, NEVADA

PLATE

D-28



BORING NO.: BS-5	DEPTH:	6.4
SAMPLE DESCRIPTION Light Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		112
PRECONSOLIDATION PRESSURE, kPa		57

	INITIAL	FINAL
DRY DENSITY - kN/cu m	16.7	17.1
WATER CONTENT - %	20.0	20.0
VOID RATIO	0.5792	0.5431
DEGREE OF SATURATION, %	93.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.48

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CONSOLIDATION TEST

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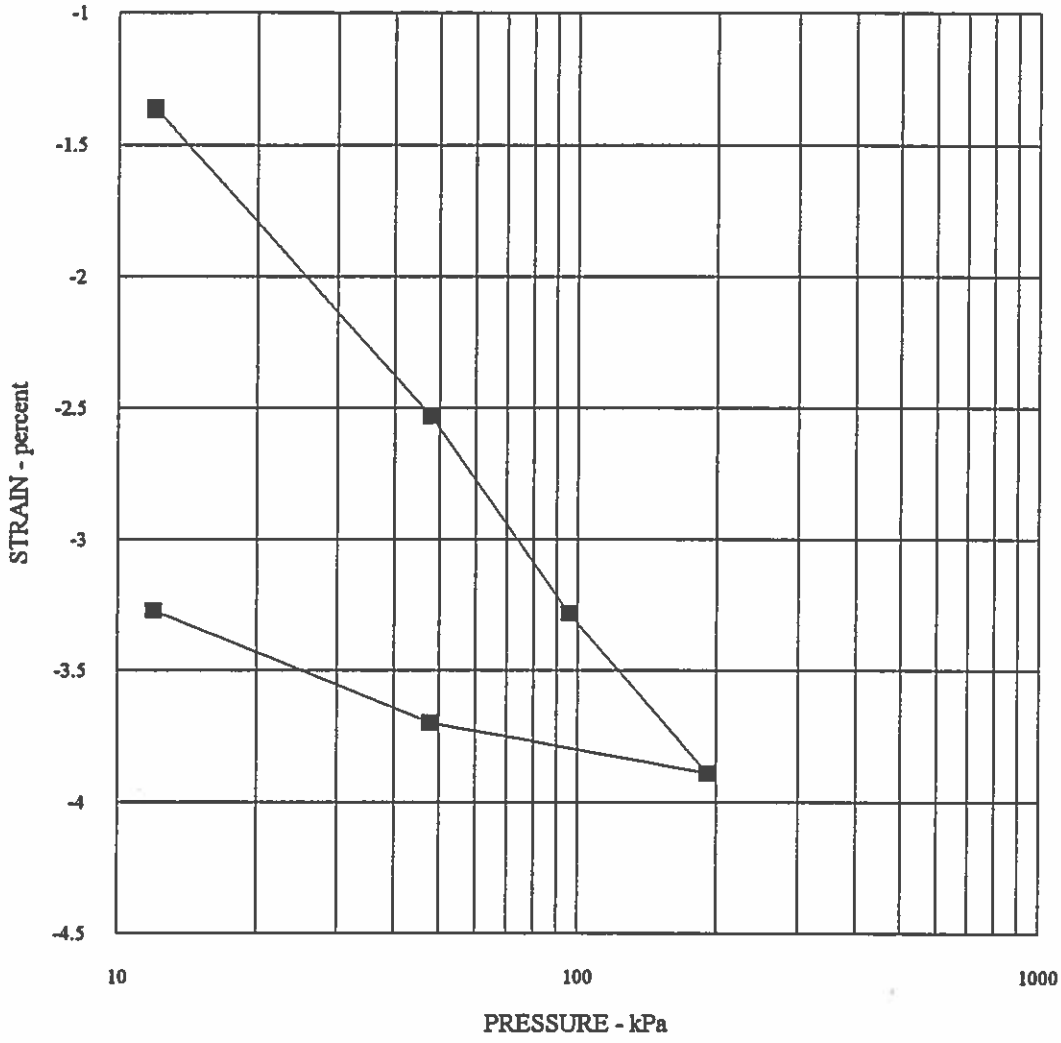
PLATE

D-30



BORING NO.: BS-6	DEPTH:	2.44 m	
SAMPLE DESCRIPTION:	Light Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		38	
PRECONSOLIDATION PRESSURE, kPa :		7	

	INITIAL	FINAL
DRY DENSITY - kN/cu m	16.32	16.85
WATER CONTENT - %	26.1	23.2
VOID RATIO	0.7309	0.6768
DEGREE OF SATURATION, %	100.00	96.10
SAMPLE HEIGHT - cm	2.54	2.46

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CONSOLIDATION TEST

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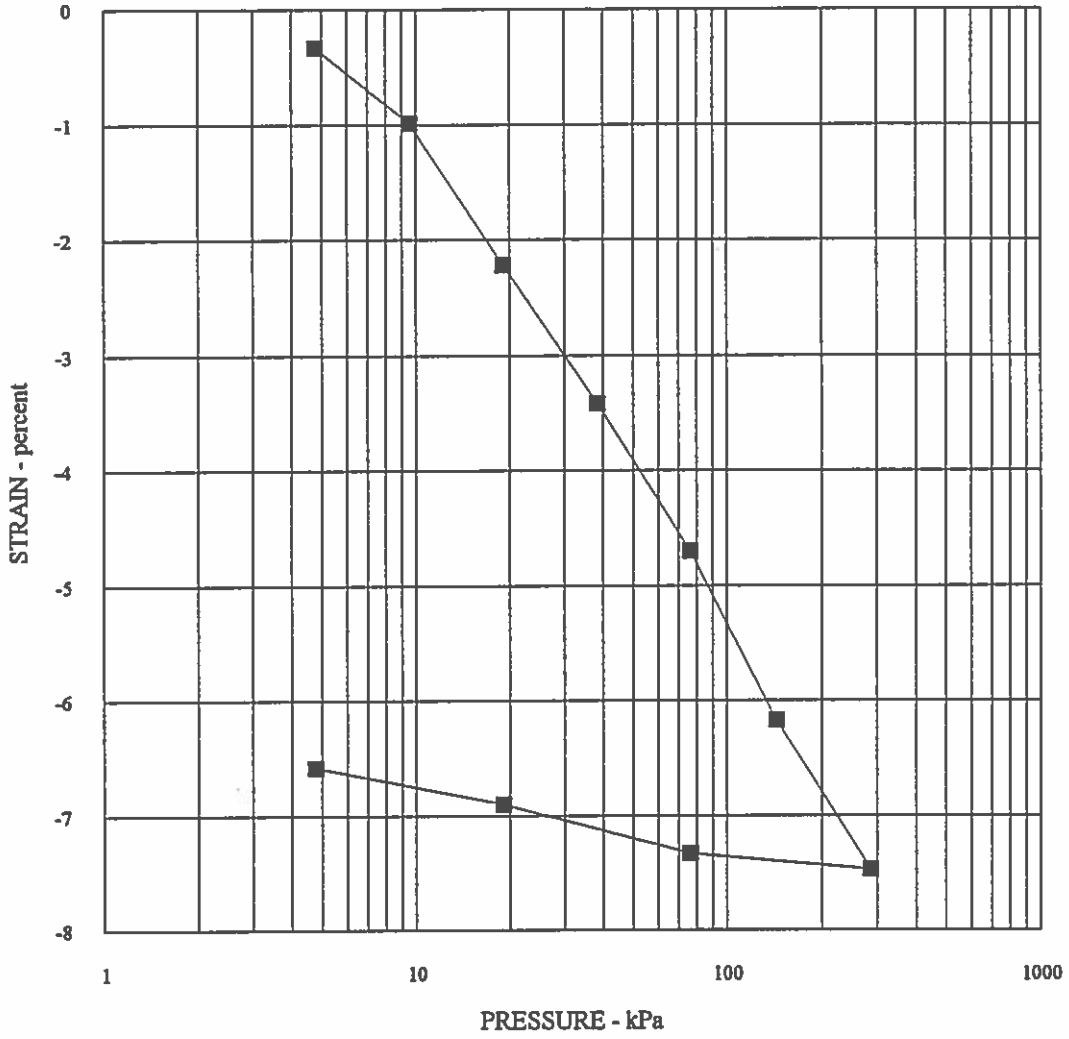
PLATE

D-31



BORING NO.: BS-7	DEPTH:	1.83 m	
SAMPLE DESCRIPTION:	Light Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		32	
PRECONSOLIDATION PRESSURE, kPa :		8	

	INITIAL	FINAL
DRY DENSITY - kN/cu m	15.67	17.45
WATER CONTENT - %	20.8	22.4
VOID RATIO	0.8614	0.6746
DEGREE OF SATURATION, %	72.00	99.00
SAMPLE HEIGHT - cm	2.54	2.39

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CONSOLIDATION TEST

CARSON FREEWAY

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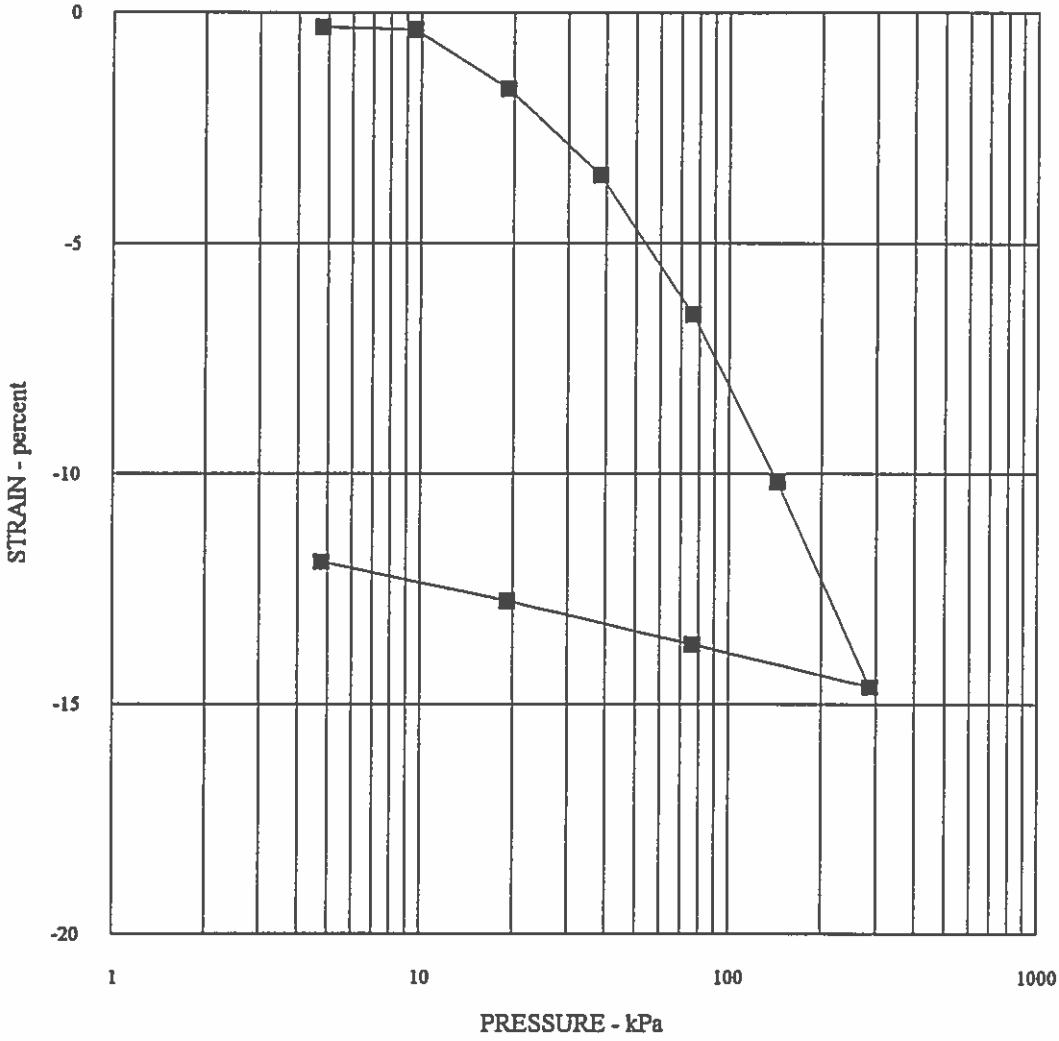
PLATE

D-32



BORING NO.: BS-7	DEPTH:	4.66 m
SAMPLE DESCRIPTION:	Light Brown Sl. Sandy Clay	
OVERBURDEN PRESSURE, kPa		68
PRECONSOLIDATION PRESSURE, kPa :		40

	INITIAL	FINAL
DRY DENSITY - kN/cu m	10.19	12.53
WATER CONTENT - %	48.1	45.3
VOID RATIO	1.9771	1.4100
DEGREE OF SATURATION, %	75.00	99.00
SAMPLE HEIGHT - cm	1.63	1.32

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CONSOLIDATION TEST

CARSON FREEWAY

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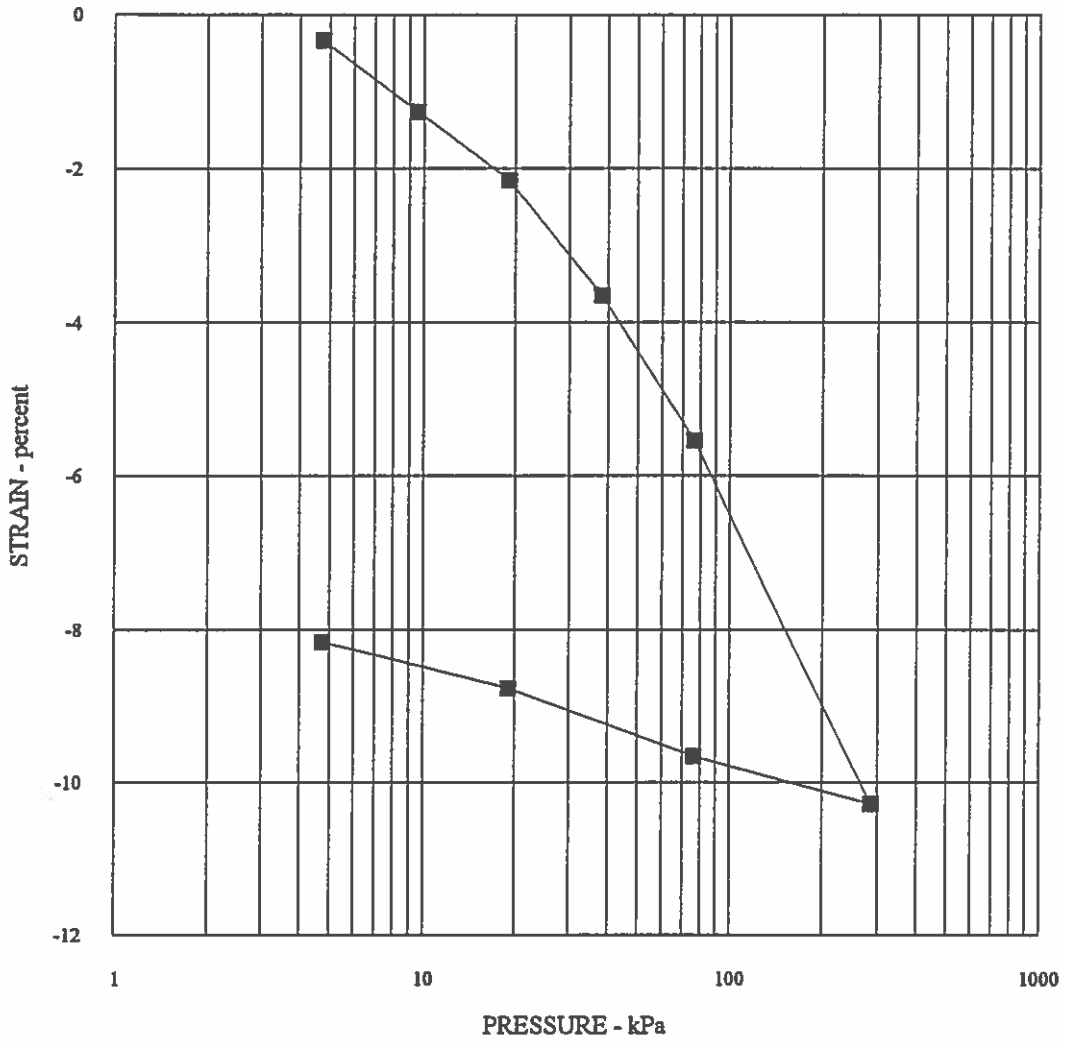
PROJECT NO. 30-1348-15.002

PLATE

D-33



BORING NO.: BS-8	DEPTH:	9.45 m
SAMPLE DESCRIPTION: Light Brown Clay		
OVERBURDEN PRESSURE, kPa		166
PRECONSOLIDATION PRESSURE, kPa :		60

	INITIAL	FINAL
DRY DENSITY - kN/cu m	12.91	14.26
WATER CONTENT - %	35.8	34.0
VOID RATIO	1.2108	0.9989
DEGREE OF SATURATION, %	86.00	99.00
SAMPLE HEIGHT - cm	2.54	2.39

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CONSOLIDATION TEST

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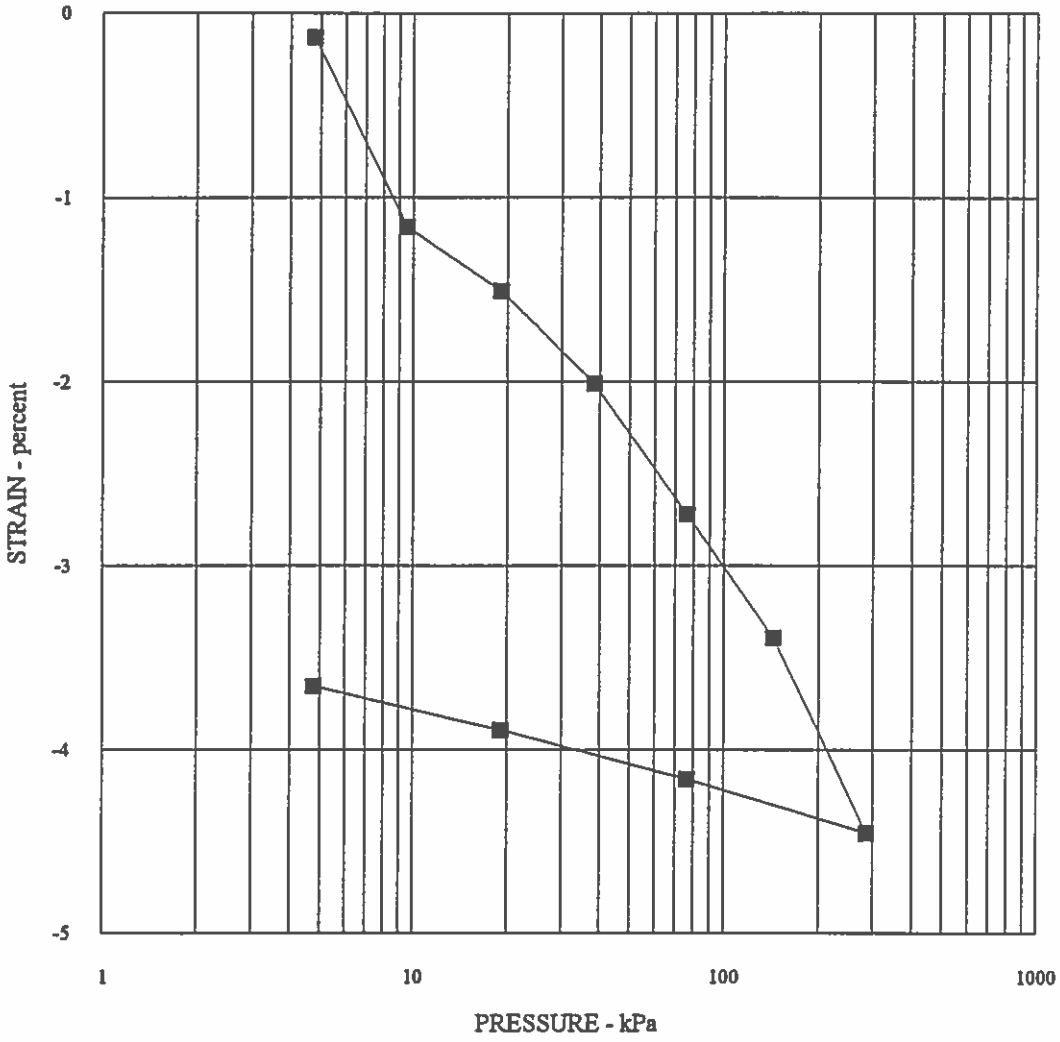
PLATE

D-34



BORING NO.: BS-13	DEPTH: 1.83 m
SAMPLE DESCRIPTION:	Light Brown Clayey Sand
OVERBURDEN PRESSURE, kPa	30
PRECONSOLIDATION PRESSURE, kPa :	20

	INITIAL	FINAL
DRY DENSITY - kN/cu m	14.73	15.41
WATER CONTENT - %	8.1	25.6
VOID RATIO	0.7663	0.6850
DEGREE OF SATURATION, %	28.00	99.00
SAMPLE HEIGHT - cm	2.54	2.39

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CONSOLIDATION TEST

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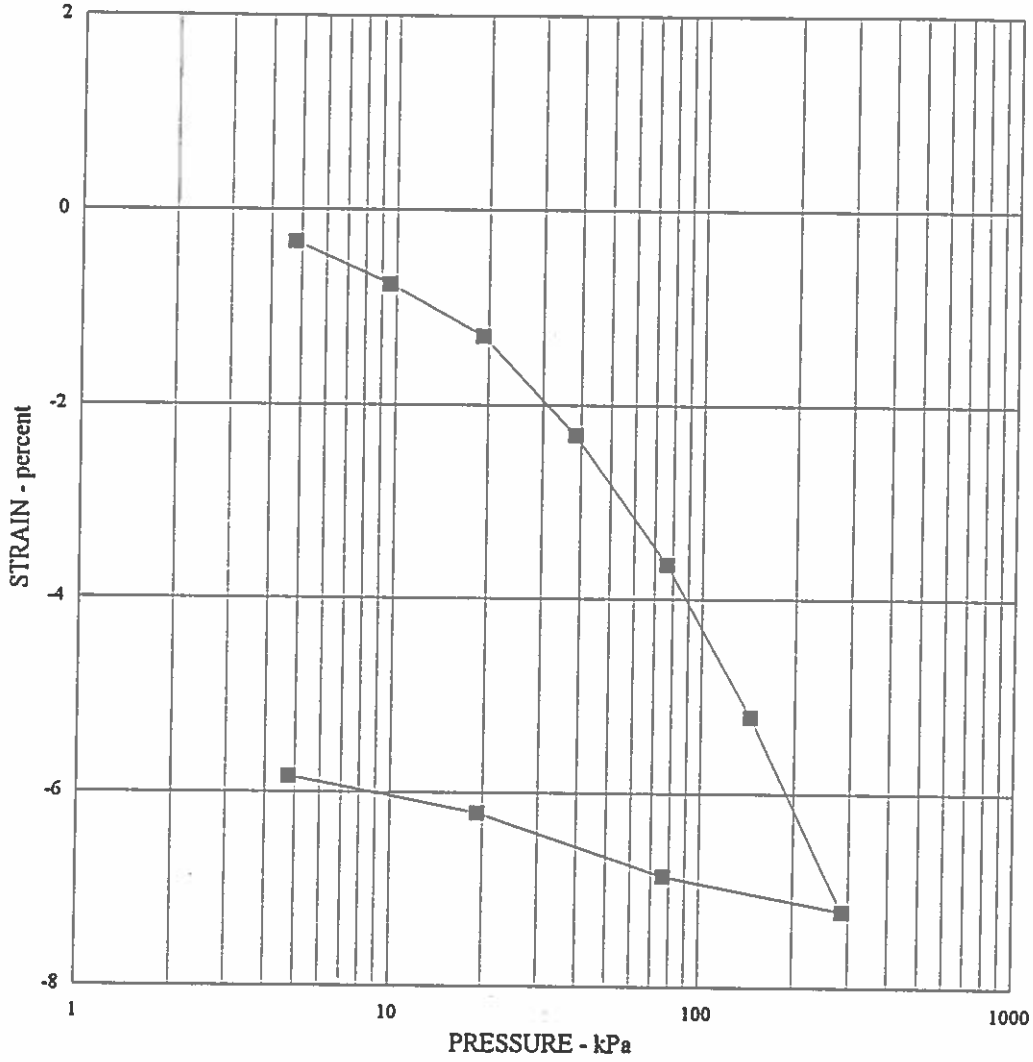
PLATE

D-35



BORING NO.: BS-14	DEPTH:	1.83 m
SAMPLE DESCRIPTION Gray Silty Sand		
OVERBURDEN PRESSURE, kPa		30
PRECONSOLIDATION PRESSURE, kPa		47

	INITIAL	FINAL
DRY DENSITY - kN/cu m	13.18	14.36
WATER CONTENT - %	34.4	34.0
VOID RATIO	1.1928	1.0122
DEGREE OF SATURATION, %	85.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.48

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CONSOLIDATION TEST

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CARSON CITY, NEVADA

PLATE

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PROJECT NO. 30-1348-15.002

POTENTIAL REACTIVITY OF SOLUBLE SULFATES IN SOIL OR GROUNDWATER WITH PORTLAND CEMENT CONCRETE

TABLE 1: RECOMMENDATIONS FOR CONCRETE IN SULFATE ENVIRONMENTS *				
Soluble Sulfates in Soil %	Sulfates in Water P.P.M.	Cement Type	Maximum Water/Cement Ratio	Minimum Cement Content – Lbs.
0–0.02	0–150	(Negligible.....Sulfate.....Reaction)		
0.02–0.10	150–1000	I or II	0.55	470
0.10–0.20	1000–2000	II	0.50	560
0.20–1.50	2000–15,000	II	0.45	660
		V	0.50	560
Over 1.50	Over 15,000	V	0.45	660

* NOTE A. Concrete for piling and other concrete in sea water environments may contain Type II cement when the water–cement ratio is a maximum of 0.50 or the cement factor is a minimum of 560 pounds. The sulfate concentration in Table I should govern in all cases.

* NOTE B. Sewage treatment facilities normally are constructed using Type II cement except in areas where high sulfate soils of waters exist (See Table I). In sewage, sulfides rather than where sulfates are formed. The sulfide combining with water in the presence of oxygen, can produce sulfuric acid to which no Portland cement is time resistant. Under these conditions, plastic liners, or coatings, are generally used. Closed tanks normally contain an atmosphere of methane rather than oxygen, so acid attack would not be likely to occur. Good quality concretes containing Type II cement with a maximum water cement ratio of 0.53 have provided excellent service in Los Angeles City and County sanitary treatment facilities.

Under special conditions, a concrete materials engineer should be consulted.

Reference: "Recommended Practice to Minimuze Attack on Concrete by Sulfate Soils and Water" by Cement Industry Technical Committee of California.

SAMPLE IDENTIFICATION	BS-01 @ 1.68 M	BS-03 @ 1.68 M	BS-05 @ 1.68 M	BS-06 @ 2.29 M
SAMPLE DESCRIPTION	SILTY SAND (SM)	SLIGHTLY SILTY SAND (SM/SP)	FAT CLAY (CH)	CLAYEY SAND (SC)
SOLUBLE SULFATE (%)	0.0036	0.0029	<0.001	<0.001
SOLUBLE SULFATES (PPM)	--	--	--	--
COMMENTS	NEGLIGIBLE SULFATE REACTION	NEGLIGIBLE SULFATE REACTION	NEGLIGIBLE SULFATE REACTION	NEGLIGIBLE SULFATE REACTION

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PROJECT NO. 30-1348-15.002

POTENTIAL REACTIVITY

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-37

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POTENTIAL REACTIVITY OF SOLUBLE SULFATES IN SOIL OR GROUNDWATER WITH PORTLAND CEMENT CONCRETE

TABLE 1: RECOMMENDATIONS FOR CONCRETE IN SULFATE ENVIRONMENTS *

Soluble Sulfates In Soil %	Sulfates In Water P.P.M.	Cement Type	Maximum Water/Cement Ratio	Minimum Cement Content – Lbs.
0–0.02	0–150	(Negligible.....Sulfate.....Reaction)		
0.02–0.10	150–1000	I or II	0.55	470
0.10–0.20	1000–2000	II	0.50	560
0.20–1.50	2000–15,000	II	0.45	660
		V	0.50	560
Over 1.50	Over 15,000	V	0.45	660

* NOTE A. Concrete for piling and other concrete in sea water environments may contain Type II cement when the water–cement ratio is a maximum of 0.50 or the cement factor is a minimum of 560 pounds. The sulfate concentration in Table I should govern in all cases.

* NOTE B. Sewage treatment facilities normally are constructed using Type II cement except in areas where high sulfate soils of waters exist (See Table I). In sewage, sulfides rather than where sulfates are formed. The sulfide combining with water in the presence of oxygen, can produce sulfuric acid to which no Portland cement is time resistant. Under these conditions, plastic liners, or coatings, are generally used. Closed tanks normally contain an atmosphere of methane rather than oxygen, so acid attack would not be likely to occur. Good quality concretes containing Type II cement with a maximum water cement ratio of 0.53 have provided excellent service in Los Angeles City and County sanitary treatment facilities.

Under special conditions, a concrete materials engineer should be consulted.

Reference: "Recommended Practice to Minimuze Attack on Concrete by Sulfate Soils and Water" by Cement Industry Technical Committee of California.

SAMPLE IDENTIFICATION	BS-07 @ 1.68 M	BS-10 @ 1.68 M	BS-11 @ 1.68 M	
SAMPLE DESCRIPTION	CLAYEY SAND (SC)	CLAYEY SAND (SC)	CLAYEY SAND (SC)	
SOLUBLE SULFATE (%)	0.0023	0.0047	0.02	
SOLUBLE SULFATES (PPM)	--	--	--	
COMMENTS	NEGLIGIBLE SULFATE REACTION	NEGLIGIBLE SULFATE REACTION	SEE ABOVE WATER/CEMENT RATIO AND MIN. CEMENT CONTENT	

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PROJECT NO. 30-1348-15.002

POTENTIAL REACTIVITY

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-38

CAD FILE: L:\1998\DRAFTING\301348\301348150002-STRUCBOR-REACT.DWG

POTENTIAL REACTIVITY OF SOLUBLE SULFATES IN SOIL OR GROUNDWATER WITH PORTLAND CEMENT CONCRETE

TABLE 1: RECOMMENDATIONS FOR CONCRETE IN SULFATE ENVIRONMENTS *				
Soluble Sulfates In Soil %	Sulfates In Water P.P.M.	Cement Type	Maximum Water/Cement Ratio	Minimum Cement Content – Lbs.
0–0.02	0–150	(Negligible.....Sulfate.....Reaction)		
0.02–0.10	150–1000	I or II	0.55	470
0.10–0.20	1000–2000	II	0.50	560
0.20–1.50	2000–15,000	II	0.45	660
		V	0.50	560
Over 1.50	Over 15,000	V	0.45	660

* NOTE A. Concrete for piling and other concrete in sea water environments may contain Type II cement when the water–cement ratio is a maximum of 0.50 or the cement factor is a minimum of 560 pounds. The sulfate concentration in Table I should govern in all cases.

* NOTE B. Sewage treatment facilities normally are constructed using Type II cement except in areas where high sulfate soils of waters exist (See Table I). In sewage, sulfides rather than where sulfates are formed. The sulfide combining with water in the presence of oxygen, can produce sulfuric acid to which no Portland cement is time resistant. Under these conditions, plastic liners, or coatings, are generally used. Closed tanks normally contain an atmosphere of methane rather than oxygen, so acid attack would not be likely to occur. Good quality concretes containing Type II cement with a maximum water cement ratio of 0.53 have provided excellent service in Los Angeles City and County sanitary treatment facilities.

Under special conditions, a concrete materials engineer should be consulted.

Reference: "Recommended Practice to Minimuze Attack on Concrete by Sulfate Soils and Water" by Cement Industry Technical Committee of California.

SAMPLE IDENTIFICATION	BS-12 @ 4.57 M	BS-13 @ 1.68 M	BS-14 @ 1.68 M	
SAMPLE DESCRIPTION	CLAYEY SAND (SC)	CLAYEY SAND (SC)	SILTY SAND (SM)	
SOLUBLE SULFATE (%)	0.0076	0.0014	0.013	
SOLUBLE SULFATES (PPM)	--	--	--	
COMMENTS	NEGLIGIBLE SULFATE REACTION	NEGLIGIBLE SULFATE REACTION	NEGLIGIBLE SULFATE REACTION	

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PROJECT NO. 30-1348-15.002

POTENTIAL REACTIVITY

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-39

STEEL CORROSION POTENTIAL OF SOILS*

Aggressiveness	Resistivity (ohm-cm)
Non-Corrosive	>10,000
Mildly Corrosive	5,000 to 10,000
Moderately Corrosive	2,000 to 5,000
Corrosive	700 to 2,000
Very Corrosive	<700

LABORATORY TEST RESULTS

Soil Type	Source	Resistivity (ohm-cm)	pH**
SILTY SAND (SM	BS-01 @ 1.68 M	2,080	7.25
SLIGHTLY SILTY SAND (SM/SP)	BS-03 @ 1.68 M	4,650	6.91
FAT CLAY (CH)	BS-05 @ 1.68 M	1,910	8.53
CLAYEY SAND (SC)	NORTH GATE BS-06 @ 2.29 M	4,970	8.24
CLAYEY SAND (SC)	BS-07 @ 1.68 M EMERSON	1,890	7.67

*Reference: FHWA Publication No. FHWA-SA-96-072

**Note: Allowable pH range is greater than 5 and less than 10

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STEEL CORROSION POTENTIAL OF SOIL

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-40

STEEL CORROSION POTENTIAL OF SOILS*

Aggressiveness	Resistivity (ohm-cm)
Non-Corrosive	>10,000
Mildly Corrosive	5,000 to 10,000
Moderately Corrosive	2,000 to 5,000
Corrosive	700 to 2,000
Very Corrosive	<700

LABORATORY TEST RESULTS

Soil Type	Source	Resistivity (ohm-cm)	pH**
CLAYEY SAND (SC)	BS-10 @ 1.68 M	1,060	8.68
CLAYEY SAND (SC)	BS-11 @ 1.68 M	473	9.49
CLAYEY SAND (SC)	BS-12 @ 4.57 M	1,160	9.12
CLAYEY SAND (SC)	BS-13 @ 1.68 M	1,790	8.35
SILTY SAND (SM)	BS-14 @ 1.68 M	1,205	8.22

*Reference: FHWA Publication No. FHWA-SA-96-072

**Note: Allowable pH range is greater than 5 and less than 10

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STEEL CORROSION POTENTIAL OF SOIL

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE D-41

CAD FILE: L:\1[illegible]RAFTING\301348\30134815002-STRUCBOR-REACT.DWG

APPENDIX C

Line Borings
and
Laboratory Test Results

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

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

MOISTURE CONDITION CRITERIA

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

SOIL CEMENTATION CRITERIA

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

STANDARD PENETRATION CLASSIFICATION*			
GRANULAR SOIL		CLAYEY SOIL	
BLOWS/0.3m	DENSITY	BLOWS/0.3m	CONSISTENCY
0 – 4	VERY LOOSE	0 – 1	VERY SOFT
5 – 10	LOOSE	2 – 4	SOFT
11 – 30	MEDIUM DENSE	5 – 8	MEDIUM STIFF
31 – 50	DENSE	9 – 15	STIFF
OVER 50	VERY DENSE	16 – 30	VERY STIFF
		31 – 60	HARD
		OVER 60	VERY HARD

*Standard Penetration Test (N) 63.5 Kg hammer 760mm free fall on 50.8mm O.D. x 35mm I.D. sampler.

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

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

TEST ABBREVIATIONS

CD	CONSOLIDATED DRAINED	O	ORGANIC CONTENT
CH	CHEMICAL (CORROSIVENESS)	OC	CONSOLIDATION
CM	COMPACTION	PI	PLASTICITY INDEX
CU	CONSOLIDATED UNDRAINED	RQD	ROCK QUALITY DESIGNATION
D	DISPERSIVE SOILS	RV	R- VALUE
DS	DIRECT SHEAR	S	SIEVE ANALYSIS/-200 WASH
E	EXPANSIVE SOIL	SL	SHRINKAGE LIMIT
G	SPECIFIC GRAVITY	U	UNCONFINED COMPRESSION
H	HYDROMETER	UU	UNCONSOLIDATED UNDRAINED
HC	HYDRO-COLLAPSE	UW	UNIT WEIGHT
K	PERMEABILITY	W	MOISTURE CONTENT

SAMPLER NOTATION

CPT	CONE PENETRATION
CS	CONTINUOUS SAMPLER(1)
MC	MODIFIED CA SPLIT SPOON (2)
P	PUSHED (NOT DRIVEN)
PB	PTICHER BARREL
RC	ROCK CORE(3)
SH	SHELBY TUBE (4)
SPT	STANDARD PENETRATION TEST
TP	TEST PIT

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

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KEY TO SOIL CLASSIFICATION AND TERMS

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-1

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 30.48 M EAST OF LOMPA LANE
BORING: BL-01
E.A. #: 30-1348-15.002
GROUND ELEV.: 1414.27 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 227+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS/300mm	SAMPLE Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00						SC	Approx. 6.35 cm of AC, 10.16 cm of AB. BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
1413.3	1								
	1.22						SM	LIGHT BROWN SILTY SAND moist, medium dense, fine to medium grained sand.	13% fines
	1.52	A	MC	14		W,UW,S			
1412.3	2 1.98							1.98 No free water encountered.	
1411.3	3								
1410.3	4								
1409.3	5								
1408.3	6								
1407.3	7								
1406.3	8								
1405.3	9								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-2

CAD FILE: L:\1999\...TING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 6.10 M NORTH OF CARMINE STREET
BORING: BL-02
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.32 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 332+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS/300mm	SAMPLE Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SM		
		A	GRAB			RV,S		LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to medium grained sand.	31% fines
	0.61								
1416.3	1								
	1.52							Becoming less silty, gray brown, moist, fine grained sand.	
		B	MC	21		W,UW,S			18% fines
1415.3	2 1.98							1.98	
								No free water encountered.	
1414.3	3								
1413.3	4								
1412.3	5								
1411.3	6								
1410.3	7								
1409.3	8								
1408.3	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-3

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\...TING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 76.2 M WEST OF LOMPA LANE
BORING: BL-03
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.32 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/12/97	1.2	1416.1

STATION: STA 337+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.3	1						SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand, estimated 25 to 35% fines.	
	1.07								
	1.52						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, medium dense, fine grained sand. Encountered groundwater at 1.22 M.	
		A	MC	20		W,UW,S			7% fines
1415.3	2 1.98								
1414.3	3 3.05								
		B	MC	27		W,UW,S		Gray fine to medium grained sand.	6% fines
	3.51							3.51	
1413.3	4								
1412.3	5								
1411.3	6								
1410.3	7								
1409.3	8								
1408.3	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-4

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\TING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 152.4 M WEST OF LOMPA LANE
BORING: BL-04
E.A. #: 30-1348-15.002
GROUND ELEV.: 1420.37 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 342+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/12/97	3.7	1416.7

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1419.4	0						SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand, estimated 25 to 35% fines.	
	0.91								
	1						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine grained sand, low plasticity fines.	
	1.52	A	MC	28		PI,W,UW,S			PI = 4
1418.4	2 1.98								14% fines
	2.44						SM	YELLOW BROWN SILTY SAND wet, fine to medium grained sand.	
1417.4	3 3.05								
		B	MC	28		W,UW,S			14% fines
	3.51							Encountered groundwater at 3.66 M.	
1416.4	4								
	4.11						SC	GRAY CLAYEY SAND wet, medium dense, fine to medium grained sand, low plasticity fines.	
	4.57	C	MC	20		W,UW,S			33% fines
1415.4	5 5.03								
	5.03								
1414.4	6								
1413.4	7								
1412.4	8								
1411.4	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-5

CAD FILE: L:\1999\...TING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 244 M WEST OF LOMPA LANE
BORING: BL-05
E.A. #: 30-1348-15.002
GROUND ELEV.: 1420.37 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 347+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/12/97	2.4	1417.9

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	LIGHT BROWN CLAYEY SAND slightly moist, medium dense, fine to coarse grained sand, low to moderate plasticity fines.	
1419.4	1								
	1.52							0.91	
		A	MC	23		W,UW,S	SM SP	GRAY BROWN SLIGHTLY SILTY SAND moist, medium dense, fine grained sand.	9% fines
1418.4	2 1.98								
								2.59 Encountered groundwater at 2.44 M.	
1417.4	3 3.05						SC	YELLOW BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low plasticity fines.	
		B	MC	18		S,W,UW			32% fines
	3.51								
	3.66								
		C	MC	26					
1416.4	4 4.11							Gray, becoming less clayey.	
	4.57								
		D	MC	35		W,UW,S			16% fines
1415.4	5 5.03							Lenses of clean sands	
								Becoming more clayey.	
1414.4	6 6.10								
		E	MC	20		W,UW,S			39% fines
	6.55							6.55 Low to moderate plasticity fines.	
1413.4	7								
1412.4	8								
1411.4	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-6

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 120 M WEST OF LOMPA LANE
BORING: BL-06
E.A. #: 30-1348-15.002
GROUND ELEV: 1420.37 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV
5/12/97	1.1	1419.3

SHEET 1 OF 1

STATION: STA 352+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1419.4	1						SM	LIGHT BROWN SILTY SAND slightly moist, loose to medium dense, fine to medium grained sand, estimated 25 to 35% fines. Encountered groundwater at 1.07 M.	
	1.52	A	MC	12		CD			
1418.4	2 1.98							1.98	
	2.13	B	MC	14			SC	RED BROWN CLAYEY SAND wet, medium dense, fine grained sand, low plasticity fines.	
	2.59							2.90	
1417.4	3 3.05	C	MC	21		S,W	SM	GRAY BROWN SILTY SAND wet, medium dense, fine grained sand.	32% fines
	▼3.51								
1416.4	4							4.27	
	4.57	D	MC	21		W,UW,S	SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low plasticity fines.	47% fines
1415.4	5 5.03								
1414.4	6 6.10	E	MC	21		W,UW			
	6.55							6.55	
1413.4	7								
1412.4	8								
1411.4	9								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-7

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTHWEST OF RESEARCH WAY
BORING: BL-07
E.A. #: 30-1348-15.002
GROUND ELEV: 1423.42 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/12/97	3.5	1419.9

SHEET 1 OF 1

STATION: STA 357+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	LIGHT BROWN CLAYEY SAND slightly moist, dense, fine to medium grained sand, low to moderate plasticity fines.	
1422.4	1								
	1.52	A	MC	15		W,UW,S			18% fines
1421.4	2 1.98							Becoming more sandy.	
	2.13							2.13	
		B	MC	11			SM SP	GRAY BROWN SLIGHTLY SILTY SAND moist, loose to medium dense, fine to coarse grained sand, estimated 5 to 12% fines.	
	2.59								
1420.4	3 3.05								
		C	MC	7		DS			
	▼3.51							Encountered groundwater at 3.51 M.	
	3.66								
		D	MC	15					
1419.4	4 4.11								
								4.27	
	4.57						SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low plasticity fines.	
		E	MC	16		W,UW,S			25% fines
1418.4	5 5.03								
	5.18								
		F	MC	16					
	5.64								
								5.79	
1417.4	6 6.10						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, fine to medium grained sand	
		G	MC	26		W,UW,S			12% fines
	6.55							6.55	
1416.4	7								
1415.4	8								
1414.4	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-8

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTHWEST OF RESEARCH WAY
BORING: BL-08
E.A. #: 30-1348-15.002
GROUND ELEV: 1424.94 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 362+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1423.9	1						SC	RED BROWN CLAYEY SAND slightly moist, medium dense, fine to coarse grained sand, low plasticity fines, estimated 20 to 30% fines.	
	1.07								
	1.52	A	MC	38		W,UW,S	SM	YELLOW BROWN SILTY SAND slightly moist, fine to coarse grained sand and fine gravel.	15% fines
1422.9	2 1.98							Becoming more silty.	
1421.9	3 3.05								
		B	MC	20		W,UW		Becoming cleaner	
	3.51							Becoming wet.	
								No free water encountered.	
1420.9	4								
1419.9	5								
1418.9	6								
1417.9	7								
1416.9	8								
1415.9	9								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-9

CAD FILE: L:\1999\...TING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF RESEARCH WAY
BORING: BL-09
E.A. #: 30-1348-15.002
GROUND ELEV: 1425.55 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 367+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	BROWN SILTY SAND slightly moist, medium dense, fine to medium grained sand.	
1424.5	1								
	1.52	A	MC	11		CD			
1423.5	2 1.98								
	2.13	B	MC	34				Dense	
	2.59								
1422.5	3 3.05	C	MC	36		W,UW,S		Light brown, some coarse grained sand.	32% fines
	3.51							3.51	
1421.5	4							No free water encountered.	
1420.5	5								
1419.5	6								
1418.5	7								
1417.5	8								
1416.5	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-10

CAD FILE: L:\1999\...TING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF COLLEGE PARKWAY
BORING: BL-10
E.A. #: 30-1348-15.002
GROUND ELEV.: 1435.00 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 372+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/12/97	3.0	1432.0

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1434.0	1						SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand, some fine surface gravel, estimated 20 to 30% fines.	
	0.91								
	1.52	A	MC	19		W,UW,S,PI	SC	BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low plasticity fines.	PI = 8 41% fines
1433.0	2 1.98								
	2.44						GC	GRAY CLAYEY GRAVEL wet, very dense, fine to coarse sand and gravel, estimated 10 to 20% fines, low to moderate plasticity fines. Encountered groundwater at 3.04 M.	
1432.0	3 ▼3.05								
	3.20	B	MC	50/4"					
1431.0	4 4.11								
	4.27	C	GRAB					4.27	
								Refusal at 4.27 Meters.	
1430.0	5								
1429.0	6								
1428.0	7								
1427.0	8								
1426.0	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-11

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/9/97
END DATE: 5/9/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF COLLEGE PARKWAY
BORING: BL-11
E.A. #: 30-1348-15.002
GROUND ELEV: 1432.56 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 377+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/9/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/9/97	3.0	1429.5

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1431.6	1						SM	LIGHT BROWN SILTY SAND slightly moist, dense to very dense, fine to medium grained sand, slight plasticity fines.	
	1.52	A	MC	57		W,UW,S			21% fines
1430.6	2 1.98								
								2.44	
1429.6	3 3.05						SM	YELLOW BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to medium grained sand, estimated 5 to 12% fines	
	▼	B	MC	23		W,UW,S		Encountered groundwater @ 3.2M	16% fines
	3.51								
1428.6	4								
	4.57							4.11	
		C	MC	16		W,UW,S,PI	CL	BROWN SANDY CLAY wet, stiff to very stiff, fine grained sand, low to moderate plasticity fines.	PI=11
1427.6	5 5.03								38% fines
	5.18	D	MC	8					
	5.64								
								5.79	
1426.6	6 6.10						CL CH	LIGHT BROWN SLIGHTLY SANDY CLAY wet, stiff, fine grained sand, moderate to high plasticity fines.	
		E	MC	11		S,CO			72% fines
	6.55								
	6.71	F	MC	24				Red brown, becoming more sandy.	
1425.6	7 7.16								
								7.16	
1424.6	8								
1423.6	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-12

CAD FILE: L:\1999\TNG\301348\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/9/97
END DATE: 5/9/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF COLLEGE PARKWAY
BORING: BL-12
E.A. #: 30-1348-15.002
GROUND ELEV.: 1431.34 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/9/97	3.2	1428.1

SHEET 1 OF 1

STATION: STA 382+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/9/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1430.3	1						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND slightly moist, medium dense, fine to coarse grained sand, fine gravel.	
	1.52	A	MC	20		W,UW,S			9% fines
1429.3	2 1.98								
								2.44	
							SC	LIGHT BROWN CLAYEY SAND slightly moist, medium dense, fine to medium grained sand, low plasticity fines, estimated 15 to 25% fines.	
1428.3	3 3.05								
	▽	B	MC	20		W,UW,S		Encountered groundwater at 3.20 M.	17% fines
	3.51								
1427.3	4								
	4.57	C	MC	20		W,UW,S			14% fines
1426.3	5 5.03							Lenses of clean sands.	
								5.49	
							SM	GRAY BROWN SILTY SAND wet, medium dense, fine to medium grained sand.	
1425.3	6 6.10								
	6.55	D	MC	25		W,UW,S			14% fines
								6.55	
1424.3	7								
1423.3	8								
1422.3	9								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-13

CAD FILE: L:\1999\...TING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/9/97
END DATE: 5/9/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF COLLEGE PARKWAY
BORING: BL-13
E.A. #: 30-1348-15.002
GROUND ELEV: 1431.34 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/9/97	1.8	1429.5

SHEET 1 OF 1

STATION: STA 387+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/9/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	LIGHT BROWN CLAYEY SAND slightly moist, medium dense, fine grained sand, low plasticity fines, estimated 20 to 30% fines.	
1430.3	1							0.91	
	1.52						SM	LIGHT BROWN SILTY SAND moist, medium dense, fine grained sand.	
		A	MC	20		W,UW,S			25% fines
1429.3	2 ▼ 1.98							Encountered groundwater at 1.83 M.	
								2.59	
1428.3	3 3.05						SC	RED BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low plasticity fines.	
		B	MC	16		W,UW,S			20% fines
	3.51								
	3.66								
		C	MC	26				Lenses of cleaner sand	
1427.3	4 4.11								
	4.57								
		D	MC	27		W,UW			
1426.3	5 5.03								
								5.49	
							SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, dense, fine to medium grained sand, estimated 5 to 12% fines.	
1425.3	6 6.10								
		E	MC	44		W,UW			
	6.55							6.55	
1424.3	7								
1423.3	8								
1422.3	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-14

CAD FILE: L:\1999\...TING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 5/9/97
END DATE: 5/9/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF HOT SPRINGS ROAD
BORING: BL-14
E.A. #: 30-1348-15.002
GROUND ELEV: 1432.56 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 393+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/9/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/9/97	1.5	1431.0

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							CL	LIGHT BROWN SANDY CLAY slightly moist, stiff, fine to medium grained sand, low to moderate plasticity fines.	
1431.6	1							0.91	
	1.52 ▽						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine grained sand, low plasticity fines.	
		A	MC	12		W,UW,S		Encountered groundwater at 1.52 M.	43% fines
1430.6	2 1.98							1.98	
	2.13						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND wet, fine grained sand, estimated 5 to 12% fines.	
		B	MC	29					
	2.59								
1429.6	3 3.05								
		C	MC	20		W,UW,S			5% fines
	3.51							Fine to medium grained sand.	
1428.6	4							3.96	
	4.57						SC	BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low plasticity fines, estimated 10 to 20% fines.	
		D	MC	13		S,DS			32% fines
1427.6	5 5.03								
	5.18								
		E	MC	18					
	5.64								
1426.6	6 6.10								
		F	MC	40		W,UW,S			18% fines
	6.55							Dense	
1425.6	7								
	7.62								
		G	MC	33		W,UW,S		Lenses of clean sand, fine grained.	26% fines
1424.6	8 8.08								
1423.6	9 9.14								
		H	MC	16		W,UW,S PI			PI = 14 29% fines
	9.60								
	9.75								
		I	MC	8				Lenses of soft fat clay	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-15

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\ENG\301348\30134815002CPLATES.DWG

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 5/9/97
END DATE: 5/9/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF HOT SPRINGS ROAD
BORING: BL-14
E.A. #: 30-1348-15.002
GROUND ELEV: 1432.56 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/9/97	1.5	1431.0

STATION: STA 393+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/9/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21								
	10.67								
1421.6	11	J	MC	15		W,UW			
	11.13						CH	10.97 11.13 LIGHT BROWN FAT CLAY wet, very stiff, no sand, high plasticity fines.	
1420.6	12								
1419.6	13								
1418.6	14								
1417.6	15								
1416.6	16								
1415.6	17								
1414.6	18								
1413.6	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-15A

CAD FILE: L:\1999\TWNG\301348\301348150002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 5/10/97
END DATE: 5/10/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST OF EMERSON DRIVE
BORING: BL-15
E.A. #: 30-1348-15.002
GROUND ELEV.: 1432.56 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 397+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/10/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/10/97	1.7	1430.9

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1431.6	1						SC	LIGHT BROWN CLAYEY SAND slightly moist, fine grained sand, low to moderate plasticity fines.	
	1.22								
	1.52	A	MC	9		S,PI,CD	CL	YELLOW BROWN VERY SANDY CLAY moist, stiff, fine grained sand, moderate plasticity fines. Encountered groundwater at 1.68 M.	PI = 17 51% fines
1430.6	2 1.98								
	2.13	B	MC	20					
	2.29								
	2.59						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, fine to coarse grained sand, fine gravel, estimated 5 to 12% fines.	
1429.6	3 3.05								
	2.90								
	3.51	C	MC	14		W,UW,S,PI	SC	YELLOW BROWN VERY CLAYEY SAND wet, medium dense, very fine grained sand, moderate plasticity fines.	PI = 18 49% fines
	3.66								
1428.6	4 4.11	D	MC	22					
	4.11							Becoming more sandy.	
	4.57						SM SP	YELLOW BROWN SLIGHTLY SILTY SAND wet, fine to medium grained sand, estimated 5 to 12% fines.	
	5.03	E	MC	8		W,UW,S			6% fines
1427.6	5 5.18								
	5.64	F	MC	18				Yellow brown, fine grained sand.	
1426.6	6 6.10								
	6.10								
	6.55	G	MC	33		W,UW,S	SC	BROWN CLAYEY SAND wet, dense, fine to medium grained sand, moderate to high plasticity fines, estimated 20 to 30% fines.	28% fines
1425.6	7 7.62								
	8.08	H	MC	10		W,UW			
1424.6	8 8.23								
	8.69	I	MC	16		W,UW		Medium dense.	
1423.6	9 9.14								
	9.14								
	9.60	J	MC	2			SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, very loose, fine to medium grained sand, estimated 5 to 12% fines. 4" of heaving sands.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-16

CAD FILE: L:\1999\ENG\30134B\30134B15002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/10/97
END DATE: 5/10/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST OF EMERSON DRIVE
BORING: BL-15
E.A. #: 30-1348-15.002
GROUND ELEV.: 1432.56 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/10/97	1.7	1430.9

STATION: STA 397+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/10/97

ELEV. (1400's)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1421.6	11	K	MC	38					
	11.13							11.13	
1420.6	12								
1419.6	13								
1418.6	14								
1417.6	15								
1416.6	16								
1415.6	17								
1414.6	18								
1413.6	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-16A

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 5/9/97
END DATE: 5/9/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST OF EMERSON DRIVE
BORING: BL-16
E.A. #: 30-1348-15.002
GROUND ELEV: 1432.56 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 402+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/9/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/9/97	1.7	1430.9

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1431.6	1						SC	LIGHT BROWN CLAYEY SAND moist, loose, fine to medium grained, low to moderate plasticity fines, estimated 20 to 30% fines.	
	1.52	A	MC	8		CD		Encountered groundwater at 1.68 M.	
1430.6	2 1.98							1.98	
	2.13	B	MC	13			SM SP	RED SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	
	2.59							2.44	
1429.6	3 3.05						SC	RED BROWN CLAYEY SAND wet, medium dense, fine grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
		C	MC	26		W,UW,S		3.20	4% fines
	3.51						SP	GRAY BROWN CLEAN SAND wet, medium dense, fine to medium grained sand.	
1428.6	4							4.42	
	4.57	D	MC	16		W,UW,S,PI	SC	RED BROWN CLAYEY SAND wet, medium dense, fine grained sand, moderate plasticity fines.	PI=23 44% fines
1427.6	5 5.03								
	5.18	E	MC	31					
	5.64							5.64 Lenses of clean sand and fat clay	
1426.6	6 6.10						SM	WHITE SILTY SAND wet, medium dense, fine to medium grained sand.	
		F	MC	23		W,UW,S			23% fines
	6.55							6.40	
							SC	BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, moderate to high plasticity fines.	
1425.6	7							7.16	
	7.62						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND wet, dense, fine grained sand, estimated 5 to 12% fines.	
		G	MC	39		W,UW			
1424.6	8 8.08								
1423.6	9 9.14							Heaving sands at 9 M.	
		H	MC	5				9.45	
	9.60						SC	LIGHT BROWN CLAYEY SAND wet, loose to	
	9.75	I	MC	16		W,UW,S		medium dense, fine to medium grained sand,	24% fines

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-17

CAD FILE: L:\1999\...TING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 5/9/97
END DATE: 5/9/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST OF EMERSON DRIVE
BORING: BL-16
E.A. #: 30-1348-15.002
GROUND ELEV: 1432.56 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/9/97	1.7	1430.9

STATION: STA 402+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/9/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21							moderate plasticity fines, estimated 30 to 40% fines.	
	10.36								
	10.67						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, dense, fine grained sand, estimated 5 to 12% silt.	
1421.6	11	J	MC	37					
	11.13							11.13	
1420.6	12								
1419.6	13								
1418.6	14								
1417.6	15								
1416.6	16								
1415.6	17								
1414.6	18								
1413.6	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-17A

CAD FILE: L:\1999\...ING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/8/97
END DATE: 5/8/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF EMERSON DRIVE
BORING: BL-17
E.A. #: 30-1348-15.002
GROUND ELEV: 1434.08 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/8/97	1.8	1432.3

STATION: STA 407+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/8/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1433.1	1						SC	LIGHT BROWN CLAYEY SAND slightly moist, loose to medium dense, fine to medium grained sand, low to moderate plasticity fines.	
	1.52						CL CH	LIGHT BROWN SANDY CLAY moist, medium stiff, fine to medium grained sand, moderate to high plasticity fines.	
		A	MC	6		W,UW,S,PI	SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low plasticity fines. Encountered groundwater at 1.83 M.	PI = 13 28% fines
1432.1	2 1.98								
	2.13	B	MC	14					
	2.59								
1431.1	3 3.05						SP	YELLOW BROWN CLEAN SAND wet, medium dense, fine to medium grained sand.	1% fines
		C	MC	21		W,UW,S			
	3.51								
1430.1	4						SC	LIGHT BROWN CLAYEY SAND wet, very loose, fine grained sand, moderate plasticity fines.	PI = 23 22% fines
	4.57								
		D	MC	3		CD,S,PI			
1429.1	5 5.03								
	5.18	E	MC	15					
	5.64							Becoming more sandy.	
1428.1	6 6.10								
		F	MC	15		W,UW	SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to coarse grained sand, trace of fine gravel, moderate to high plasticity fines.	
	6.55								
	6.71								
		21	MC	21					
1427.1	7 7.16								
1426.1	8								
1425.1	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-18

CAD FILE: L:\1999\TING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/8/97
END DATE: 5/8/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST OF NORTHGATE LANE
BORING: BL-18
E.A. #: 30-1348-15.002
GROUND ELEV: 1435.91 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/8/97	1.7	1434.2

SHEET 1 OF 1

STATION: STA 424+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/8/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1434.9	1						SC	LIGHT BROWN CLAYEY SAND moist, loose to medium dense, fine to medium grained sand, low to moderate plasticity fines.	
	1.52							0.91	
		A	MC	20		W,UW	CL CH	LIGHT BROWN SLIGHTLY SANDY CLAY moist, stiff to very stiff, fine grained sand, moderate to high plasticity fines.	
1433.9	2 1.98							1.83 Encountered groundwater at 1.68 M. Becoming more sand.	
							SC	GRAY BROWN CLAYEY SAND wet, medium dense, fine grained sand, low plasticity fines, estimated 10 to 20% fines.	
1432.9	3 3.05								
		B	MC	20		W,UW,S			34% fines
	3.51							Fine to coarse grained sand.	
1431.9	4							3.66	
	4.57						CL CH	LIGHT BROWN SLIGHT SANDY CLAY wet, stiff to very stiff, fine grained sand, moderate to high plasticity fines.	
		C	MC	24		W,UW,S		4.72	16% fines
1430.9	5 5.03						SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
								5.49	
1429.9	6 6.10						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	
		D	MC	21		W,UW,S			29% fines
	6.55							6.40	
							SC	6.71 LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines, estimated 15 to 25% fines.	
1428.9	7						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	
	7.62								
		E	MC	32		W,UW		7.92	
1427.9	8 8.08						SC	8.08 LIGHT BROWN CLAYEY SAND wet, dense, fine to medium grained sand, low to moderate plasticity fines.	
1426.9	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-19

CAD FILE: L:\1999\TING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/8/97
END DATE: 5/8/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST OF NORTHGATE LANE
BORING: BL-19
E.A. #: 30-1348-15.002
GROUND ELEV: 1435.61 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 429+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/8/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/8/97	1.4	1434.2

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1434.6	1						SC	LIGHT BROWN CLAYEY SAND slightly moist, loose to medium dense, fine grained sand, low to moderate plasticity fines.	
	1.52							Encountered groundwater at 1.37 M.	
		A	MC	7		W,UW,S			13% fines
1433.6	2 1.98							1.98	
	2.13						SC	LIGHT BROWN CLAYEY SAND wet, very loose, fine grained sand, non-plastic.	
		B	MC	2		PI			22% fines
	2.59								
		C	SHELBY						
1432.6	3								
	3.35								
1431.6	3.96 4								
		D	MC	14					
	4.42							4.42	
	4.57						SM	GRAY BROWN SILTY SAND wet, loose, fine to medium grained sand, some thin lenses of more silty material.	
		E	MC	7		S,DS			19% fines
1430.6	5 5.03								
	5.18								
		F	MC	3				Very loose.	
	5.64							5.49	
							SC	LIGHT BROWN CLAYEY SAND wet, very loose, very fine grained sand, non-plastic.	
1429.6	6 6.10								
		G	MC	3		S,DS			29% fines
	6.55							Becoming more sandy.	
	6.71								
		H	MC	2		W,UW			
1428.6	7 7.16							Less sandy.	
	7.62								
		I	MC	29		W,UW			
								7.92	
1427.6	8 8.08						SC	8.08 LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, moderate to high plasticity fines, estimated 20 to 30% fines.	
1426.6	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-20

CAD FILE: L:\1999\...TING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF NORTHGATE LANE
BORING: BL-20
E.A. #: 30-1348-15.002
GROUND ELEV: 1439.27 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV
5/14/97	1.5	1437.7

SHEET 1 OF 1

STATION: STA 439+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand, estimated 20 to 30% fines.	
1438.3	1							1.22	
	1.52	A	MC	32		W,UW,S	SM SP	LIGHT BROWN SLIGHTLY SILTY SAND moist, dense, fine to coarse grained sand. Encountered groundwater at 1.52 M.	6% fines
1437.3	2 1.98							1.98	
							SC	LIGHT BROWN CLAYEY SAND wet, loose, fine grained sand, low plasticity fines.	
1436.3	3 3.05	B	MC	7		S			15% fines
	3.51								
	3.66	C	MC	5		CD			
1435.3	4 4.11								
	4.57	D	MC	13		W,UW,S			23% fines
1434.3	5 5.03							5.03 Becoming more sandy.	
	5.18	E	MC	34			SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, dense, fine to medium grained sand, estimated 5 to 12% fines.	
	5.64						5.49 SC	LIGHT BROWN CLAYEY SAND wet, medium dense, very fine grained sand, estimated 15 to 25% fines, low plasticity fines.	
1433.3	6 6.10	F	MC	28		W,UW,S	6.10 SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand.	7% fines
	6.55								
1432.3	7								
	7.62	G	MC	10				Becoming less sandy.	
1431.3	8 8.08							7.92	
	8.23	H	MC	5		S,PI,CO	CL	LIGHT BROWN VERY SANDY CLAY wet, stiff, fine grained sand, low plasticity fines.	PI = 12 54% fines
	8.69								
1430.3	9 9.14							Becoming more sandy, moderate plasticity fines.	
		I	MC	30				9.14	
	9.60						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND wet, medium dense to dense, fine to medium grained sand, estimated 5 to 12% fines.	
								9.60	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-21

CAD FILE: L:\1999\...TING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/8/97
END DATE: 5/8/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF NORTHGATE LANE
BORING: BL-21
E.A. #: 30-1348-15.002
GROUND ELEV.: 1435.61 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 434+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/8/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/8/97	1.5	1434.1

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1434.6	1						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, moderate to high plasticity fines, estimated 20 to 30% fines.	
	1.52 ▽	A	MC	16		DS		Encountered groundwater at 1.52 M.	
1433.6	2 1.98							1.83	
	2.13	B	MC	13			SM SP	BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines, lenses of clayey sand, moderate to high plasticity fines.	
	2.59								
1432.6	3 3.05								
		C	MC	30		W,UW,S			7% fines
	3.51							Yellow brown, no clayey sand lenses, fine to coarse grained sand.	
1431.6	4								
	4.57								
		D	MC	32		W,UW,S			6% fines
1430.6	5 5.03							Lenses of very fine sand, slightly more silty.	
1429.6	6 6.10							6.10 Approx. 46 cm of heave at 20 feet.	
		E	MC	5		CD	CH	LIGHT BROWN SANDY CLAY wet, medium stiff, fine to medium grained sand, high plasticity fines, estimated 10 to 20% sand.	
	6.55								
	6.71	F	MC	27					
1428.6	7 7.16							Becoming more sandy, less plasticity fines.	
	7.62								
		G	MC	7				Lenses of cleaner sand.	
1427.6	8 8.08								
	8.23								
		H	MC	2		CD			
	8.69							Fat clay, little or no sand, soft.	
1426.6	9 9.14								
		I	MC	12		W,UW			
	9.60								
	9.75								
		J	MC	25					

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-22

CAD FILE: L:\1998\...TING\30134B\30134815002CPLATES.DWG

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 5/8/97
END DATE: 5/8/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF NORTHGATE LANE
BORING: BL-21
E.A. #: 30-1348-15.002
GROUND ELEV: 1435.61 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/8/97	1.5	1434.1

STATION: STA 434+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/8/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21							10.21 Becoming more sandy, fine to medium grained sand.	
1424.6	11								
1423.6	12								
1422.6	13								
1421.6	14								
1420.6	15								
1419.6	16								
1418.6	17								
1417.6	18								
1416.6	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-22A

CAD FILE: L:\1999\...NG\301348\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/8/97
END DATE: 5/8/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF BROADLEAF LANE
BORING: BL-22
E.A. #: 30-1348-15.002
GROUND ELEV.: 1437.13 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/8/97	1.4	1435.8

SHEET 1 OF 1

STATION: STA 444+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/8/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1436.1	1						SM	LIGHT BROWN SILTY SAND moist, loose to medium dense, fine to coarse grained sand, estimated 20 to 30% fines.	
	1.37								
	1.52	A	MC	7		S,CO	ML	Encountered groundwater at 1.37 M. LIGHT BROWN SANDY SILT wet, stiff, fine grained sand.	64% fines
1435.1	2 1.98								
	2.13	B	MC	13					
	2.59								
1434.1	3 3.05								
		C	MC	12		W,UW,S,PI			PI=5 18% fines
	3.35								
	3.51						SC	BROWN CLAYEY SAND wet, medium dense, fine grained sand, low plasticity fines. Lenses of cleaner sands.	
	3.66	D	MC	14					
1433.1	4 4.11								
	4.57								
		E	MC	10					
1432.1	5 5.03								
	5.18	F	MC	18					
	5.64								
	5.79								
1431.1	6 6.10						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, very dense, fine to medium grained sand.	
		G	MC	54		W,UW,S			11% fines
	6.55							6.55	
1430.1	7								
1429.1	8								
1428.1	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-23

CAD FILE: L:\1999\D...NG\301348\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/7/97
END DATE: 5/7/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF BROADLEAF LANE
BORING: BL-23
E.A. #: 30-1348-15.002
GROUND ELEV.: 1440.48 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/7/97	1.8	1438.7

STATION: STA 449+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/7/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand, some fine surface gravel, estimated 20 to 30% fines.	
								0.76	
1439.5	1						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low plasticity fines.	
	1.52	A	MC	15		S,PI			PI = 6 11% fines
1438.5	2 1.98 ▼							Encountered groundwater at 1.83 M.	
	2.13	B	MC	21					
	2.59								
								2.74	
1437.5	3 3.05						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	
		C	MC	13		DS		3.35	
	3.51						SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
	3.66	D	MC	17					
1436.5	4 4.11								
	4.57								
		E	MC	20		W,UW,S			16% fines
1435.5	5 5.03								
1434.5	6 6.10								
		F	MC	11					
	6.55							6.55 Loose, becoming more sandy.	
	6.71						SM SP	GRAY BROWN SILTY SAND wet, medium dense, fine to medium grained sand.	14% fines
		G	MC	19		S			
1433.5	7 7.16							7.32 Becoming more clayey	
	7.62						SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
		H	MC	13		W,UW		Fine grained sand, low plasticity fines.	
1432.5	8 8.08								
	8.53								
		I	MC	6		S,CD,PI			PI = 12 25% fines
1431.5	9 8.99								
	9.75								
		J	MC	18				Light brown, fine to medium grained sand, low to moderate plasticity fines, estimated 15 to 25% fines.	

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-24

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 5/7/97
END DATE: 5/7/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF BROADLEAF LANE
BORING: BL-23
E.A. #: 30-1348-15.002
GROUND ELEV: 1440.48 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV
5/7/97	1.8	1438.7

STATION: STA 449+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/7/97

ELEV. 1440.48 (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS/300mm	SAMPLE Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.21							10.21	
1429.5	11								
1428.5	12								
1427.5	13								
1426.5	14								
1425.5	15								
1424.5	16								
1423.5	17								
1422.5	18								
1421.5	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-24A

CAD FILE: L:\1999\...ING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/7/97
END DATE: 5/7/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF BROADLEAF LANE
BORING: BL-24
E.A. #: 30-1348-15.002
GROUND ELEV: 1441.70 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/7/97	1.7	1440.0

SHEET 1 OF 1

STATION: STA 454+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/7/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1440.7	1						SM	LIGHT BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand, estimated 20 to 30% fines.	
	1.22								
	1.52	A	MC	26			SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low plasticity fines. Encountered groundwater at 1.68 M.	
1439.7	2 1.98								
	2.59						SM	GRAY BROWN SILTY SAND wet, medium dense, fine to medium grained sand.	
1438.7	3 3.05	B	MC	21		W,UW,S			18% fines
	3.51								
1437.7	4								
	4.57	C	MC	10		DS			
1436.7	5 5.03								
	5.18	D	MC	13		S	SC	LIGHT BROWN CLAYEY SAND loose to medium dense, fine grained sand, low plasticity fines.	27% fines
	5.64							Fine to medium grained sand.	
1435.7	6 6.10								
		E	MC	21		S,W,UW			29% fines
	6.55							6.55 Low to moderate plasticity fines.	
1434.7	7								
1433.7	8								
1432.7	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-25

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\...TING\301348\301348150026PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/7/97
END DATE: 5/7/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF ARROWHEAD DRIVE
BORING: BL-25
E.A. #: 30-1348-15.002
GROUND ELEV: 1443.23 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/7/97	1.7	1441.6

SHEET 1 OF 1

STATION: STA 458+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/7/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1442.2	1						SM	LIGHT BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand, estimated 20 to 30% fines.	
	1.37							Encountered groundwater at 1.68 M.	
	1.52	A	MC	7		DS	SM SP	YELLOW BROWN SLIGHTLY SILTY SAND loose, fine to coarse grained sand, estimated 5 to 12% fines.	
1441.2	2 1.98								
	2.13	B	MC	9		S			8% fines
	2.59								
1440.2	3 3.05								
		C	MC	33				Light brown, medium dense to dense, some fine gravel.	
	3.51								
1439.2	4								
	4.57								
	4.57	D	MC	20		W,UW,S	SC	BROWN CLAYEY SAND wet, medium dense, fine grained sand, low to moderate plasticity fines.	25% fines
1438.2	5 5.03								
1437.2	5.94								
	6 6.10						SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines. Fine sand.	
		E	MC	27					
	6.55								
1436.2	7								
	7.32						SC	LIGHT BROWN SLIGHTLY CLAYEY SAND medium dense, fine grained sand, low plasticity fines, estimated 10 to 20% fines.	
	7.62	F	MC	20					
1435.2	8 8.08								
	8.08								
1434.2	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-26

CAD FILE: L:\1999\DRAWING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/7/97
END DATE: 5/7/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF ARROWHEAD DRIVE
BORING: BL-26
E.A. #: 30-1348-15.002
GROUND ELEV: 1443.23 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/7/97	1.7	1441.6

STATION: STA 462+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/7/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, loose, fine to coarse grained sand, estimated 20 to 30% fines.	
1442.2	1								
	1.52	A	MC	6				Encountered groundwater at 1.68 M	
1441.2	2 1.98								
	2.13								
		B	MC	21			SP SM	RED BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	
	2.59								
1440.2	3 3.05								
		C	MC	25		DS			
	3.51								
1439.2	4								
	4.57								
		D	MC	42					
1438.2	5 5.03								
							SC	LIGHT BROWN CLAYEY SAND wet, dense, fine to medium grained sand, low plasticity fines, estimated 10 to 20% fines.	
1437.2	6 6.10								
		E	MC	29		W,UW			
	6.55								
1436.2	7								
	7.62								
		F	MC	18					
1435.2	8 8.08							Fine grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
	8.23								
		G	MC	12					
	8.69								
								8.84	
1434.2	9 9.14						SP SM	YELLOW BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	
		H	MC	19		W,UW		9.45	
	9.60						SC	9.60 LIGHT BROWN CLAYEY SAND wet, medium dense, fine to coarse grained sand, low to moderate plasticity fines.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-27

CAD FILE: L:\1999\ING\30134B\30134B15002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/7/97
END DATE: 5/7/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF ARROWHEAD DRIVE
BORING: BL-27
E.A. #: 30-1348-15.002
GROUND ELEV.: 1447.80 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/7/97	3.5	1444.3

STATION: STA 467+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/7/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM SP	LIGHT BROWN SLIGHTLY SILTY SAND slightly moist, loose, fine to medium grained sand, trace of fine surface gravel, estimated 5 to 12% fines.	
1446.8	1								
	1.52	A	MC	7		S,CD			9% fines
1445.8	2 1.98							1.98	
	2.13	B	MC	26			SM	LIGHT BROWN SILTY SAND moist, medium dense, fine to medium grained sand.	
	2.59								
1444.8	3 3.05	C	MC	41		W,UW,S		Becoming wet, red brown.	14% fines
	▼3.51							Encountered groundwater at 3.5 M.	
1443.8	4								
	4.57	D	MC	38		W,UW,S			17% fines
1442.8	5 5.03								
1441.8	6 6.10								
		E	MC	17					
	6.55							6.55	
	6.71						SC	BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low plasticity fines.	
		F	MC	15					
1440.8	7 7.16								
	7.62								
		G	MC	15		W,UW,S,PI			PI=9 31% fines
1439.8	8 8.08								
	8.23								
		H	MC	25				Becoming more dense.	
	8.69							8.69	
1438.8	9								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-28

CAD FILE: L:\1999\DWG\301348\301348150002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/7/97
END DATE: 5/7/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF BONANAZA DRIVE
BORING: BL-28
E.A. #: 30-1348-15.002
GROUND ELEV.: 1452.68 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/7/97	7.6	1445.1

SHEET 1 OF 1

STATION: STA 474+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/7/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1451.7	1						SM	BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand and fine surface gravel, estimated 20 to 30% fines.	
	1.52								
		A	MC	12		CD		Encountered coarse gravel at 2 M.	
1450.7	2 1.98								
	2.13	B	MC	25		W,UW,S			21% fines
	2.59							Low plasticity fines.	
								2.74	
1449.7	3 3.05						SP	YELLOW BROWN CLEAN SAND slightly moist, very dense, fine to coarse grained sand, trace of fine gravel.	
	3.51	C	MC	62		W,UW,S			4% fines
1448.7	4								
	4.57	D	MC	44		W,UW,S			4% fines
1447.7	5 5.03								
								5.64	
1446.7	6 6.10						SM SP	RED BROWN SLIGHTLY SILTY SAND moist, medium dense, fine grained sand.	
	6.55	E	MC	25		W,UW,S			12% fines
1445.7	7								
	▼7.62	F	MC	32		W,UW,S		Encountered groundwater @ 7.62M Wet, fine to coarse grained sand.	10% fines
1444.7	8 8.08								
1443.7	9 9.14								
		G	MC	36					
	9.60							9.45	
							SC	9.60 LIGHT BROWN CLAYEY SAND wet, medium dense to dense, fine to coarse grained sand, moderate to high plasticity fines.	

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-29

CAD FILE: L:\1999\DRAWING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/7/97
END DATE: 5/7/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF BONANZA DRIVE
BORING: BL-29
E.A. #: 30-1348-15 002
GROUND ELEV: 1455.72 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/7/97	9.4	1446.3

SHEET 1 OF 1

STATION: STA 478+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/7/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	BROWN SILTY SAND slightly moist, fine to coarse grained sand, some fine surface gravel.	
1454.7	1								
	1.52	A	MC	11		CD		Becoming more sandy.	
1453.7	2 1.98								
	2.13	B	MC	10		S			20% fines
	2.59							Trace of coarse gravel.	
1452.7	3 3.05								
		C	MC	28		W,UW,S			20% fines
	3.51							Medium dense, fine grained sand.	
1451.7	4								
	4.57							4.42	
		D	MC	52		W,UW,S	SM SP	BED BROWN SLIGHTLY SILTY SAND moist, very dense, fine grained sand, estimated 5 to 12% fines, some fine gravel.	8% fines
1450.7	5 5.03								
1449.7	6 6.10							6.10	
		E	MC	38		W,UW,S	SM	LIGHT BROWN SILTY SAND moist, medium dense, fine grained sand, estimated 15 to 25% fines, low plasticity fines.	16% fines
	6.55								
1448.7	7								
	7.62	F	MC	23		W,UW			
1447.7	8 8.08								
								8.84	
1446.7	9 9.14						SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to coarse grained sand, moderate to high plasticity fines.	
		G	MC	26		W,UW			
	9.60							9.60 Encountered groundwater at 9.45 M.	

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-30

CAD FILE: L:\1999\DP\30134B\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/6/97
END DATE: 5/6/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF BONANZA DRIVE
BORING: BL-30
E.A. #: 30-1348-15.002
GROUND ELEV: 1460.60 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 483+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/6/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1459.6	1						SM	LIGHT BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand, some fine surface gravel, estimated 15 to 25% fines.	
	1.52	A	MC	7		CD			
1458.6	2 1.98								
	2.13	B	MC	13		S		2.29	10% fines
	2.59						SM SP	RED BROWN SLIGHTLY SILTY SAND moist, medium dense, fine grained sand.	
1457.6	3 3.05								
	3.51	C	MC	29		W,UW,S		3.20	10% fines
1456.6	4						SM	LIGHT BROWN SILTY SAND moist, medium dense, fine to coarse grained sand.	
	4.57							4.27	
	5 5.03	D	MC	57		W,UW,S	SM SP	LIGHT BROWN SLIGHTLY SILTY SAND moist, very dense, finet o coarse sand.	11% fines
1455.6									
1454.6	6 6.10								
	6.55	E	MC	42		W,UW,S		Red brown, dense, fine grained sand, some fine gravel.	9% fines
1453.6	7								
	7.62	F	MC	26		W,UW,S			11% fines
1452.6	8 8.08							Medium dense, fine to medium grained sand.	
1451.6	9 9.14								
	9.60	G	MC	63		W,UW,S			10% fines
								9.60 Very moist, very dense, fine gravel.	
								No free water encountered.	

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-31

EXPLORATION LOG

KLEINFELDER

START DATE: 5/6/97
END DATE: 5/6/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF U.S. 395
BORING: BL-31
E.A. #: 30-1348-15.002
GROUND ELEV.: 1469.14 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 489+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/6/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1468.1	1						SM	BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand, some fine gravel, estimated 15 to 25% fines.	
	1.52								
		A	MC	6					
1467.1	2 1.98								
	2.13								
		B	MC	11					
	2.59								
1466.1	3 3.05								
		C	MC	12		W,UW		Becoming more sandy, estimated 10 to 20% fines. Lenses of clean sand, estimated 5 to 12% fines.	
	3.51								
1465.1	4							Fine to coarse grained sand, encountered a piece of coarse gravel 3 cm in diameter.	
	4.57								
		D	MC	30		W,UW			
1464.1	5 5.03								
								5.49	
1463.1	6 6.10						SC	BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low to moderate plasticity fines, estimated 15 to 25% fines.	
		E	MC	28		W,UW			
	6.55								
1462.1	7								
	7.62							7.32	
		F	MC	30		W,UW	SM	LIGHT BROWN SILTY SAND moist, dense, fine to medium grained sand, estimated 10 to 20% fines.	
1461.1	8 8.08								
								8.38	
							SC	BROWN CLAYEY SAND very moist, dense, fine to medium grained sand, low to moderate plasticity fines, estimated 15 to 25% fines.	
1460.1	9 9.14								
		G	MC	43		W,UW			
	9.60							9.60 Becoming more sandy. No free water encountered.	

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-32

CAD FILE: L:\1999\DRAWING\30134B\30134B15002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/6/97
END DATE: 5/6/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF U.S. 395
BORING: BL-32
E.A. #: 30-1348-15.002
GROUND ELEV: 1475.84 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 494+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/6/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1474.8	1						SM	LIGHT BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse sand and fine surface gravel.	
	1.52	A	MC	8		S,CD			13% fines
1473.8	2 1.98								
	2.13	B	MC	32		W,UW,S,PI			PI = 13
	2.29						SC	RED BROWN CLAYEY SAND moist, dense, fine to medium grained sand, low plasticity fines.	15% fines
	2.59								
1472.8	3 3.05								
		C	MC	38		W,UW			
	3.51								
1471.8	4								
	4.27						SM	RED BROWN SILTY SAND moist, medium dense, fine to coarse grained sand, fine gravel.	
	4.57	D	MC	25		W,UW,S			15% fines
1470.8	5 5.03								
1469.8	6 6.10								
		E	MC	15					
	6.55								
	6.71						SM	RED BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	
1468.8	7 7.16	F	MC	18					
	7.62								
		G	MC	34		W,UW			
	7.77						SC	BROWN CLAYEY SAND moist, dense, fine to medium grained sand, low plasticity fines, estimated 15 to 25% fines.	
1467.8	8 8.08							No free water encountered.	
1466.8	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-33

CAD FILE: L:\1999\DF\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/6/97
END DATE: 5/6/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF U.S. 395
BORING: BL-33
E.A. #: 30-1348-15 002
GROUND ELEV.: 1480.11 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 498+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/6/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand, fine surface gravel, estimated 20 to 30% fines.	
1479.1	1							0.91	
	1.52						SC	BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low plasticity fines.	
		A	MC	30		W,UW,S,PI			PI = 14 14% fines
1478.1	2 1.98								
								2.74	
1477.1	3 3.05						SM SP	BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to medium grained sand.	
	3.51	B	MC	27		W,UW			
1476.1	4								
	4.57								
		C	MC	21		W,UW,S			8% fines
1475.1	5 5.03							Becoming more silty.	
								5.79	
1474.1	6 6.10						SC		
		D	MC	38		W,UW		BROWN CLAYEY SAND moist, dense, fine to medium grained sand, fine gravel, estimated 10 to 20% fines, low plasticity fines.	
	6.55								
1473.1	7								
	7.62								
		E	MC	28					
1472.1	8 8.08								
								Trace of coarse gravel up to 3 cm in diameter.	
1471.1	9 9.14								
		F	MC	28		W,UW			
	9.60							9.60 Very moist.	
								No free water encountered.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-34

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\DF\30134B\30134B15002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF CARMINE
BORING: BL-34
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.32 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/12/97	1.5	1415.8

STATION: STA 339+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.3	1						SM	LIGHT BROWN SILTY SAND slightly moist, loose ti medium dense, fine to coarse grained sand, estimated 25 to 35% fines.	
	1.07								
	1.52 ▽	A	MC	37		W,UW,S,PI	SM	YELLOW BROWN SILTY SAND moist, fine to medium grained sand. Encountered groundwater at 1.52 M. Non-plastic.	16% fines
1415.3	2 1.98								
	2.74								
1414.3	3 3.05						SC	YELLOW BROWN CLAYEY SAND wet, loose to medium dense, fine grained sand, estimated 25 to 35% fines, low to moderate plasticity fines.	
		B	MC	11					
	3.51								
	3.66								
		C	MC	15					
1413.3	4 4.11								
	4.27								
	4.57						SM SP	GRAY SLIGHTLY SILTY SAND wet, dense, fine to medium grained sand, estimated 5 to 12% fines.	
		D	MC	34		W,UW			
1412.3	5 5.03								
	5.03								
1411.3	6								
1410.3	7								
1409.3	8								
1408.3	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-35

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\DATA\30134B\30134B15002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF CARMINE
BORING: BL-35
E.A. #: 30-1348-15.002
GROUND ELEV.: 1420.37 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/12/97	2.1	1418.2

STATION: STA 349+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1419.4	1						SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand, estimated 25 to 35% fines.	
	1.52	A	MC	22		W,UW			
1418.4	2 1.98							2.13	
							SM SP	GRAY BROWN SLIGHTLY SILTY SAND wet, fine to medium grained sand, estimated 5 to 12% fines. Encountered groundwater at 2.13 M.	
1417.4	3 3.05	B	MC	23		W,UW,S			9% fines
	3.51							With lenses of clayey sand, fine grained sand, low plasticity fines.	
1416.4	4							4.27	
	4.57						SC	BROWN CLAYEY SAND wet, medium dense, fine grained sand, low plasticity fines.	
		C	MC	18		W,UW,PI			PI=5
1415.4	5 5.03								29% fines
	5.18	D	MC	29					
	5.64							Gray fine to medium grained sand, less plastic.	
1414.4	6 6.10								
			MC	35					
	6.55							6.55	
1413.4	7								
1412.4	8								
1411.4	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-36

CAD FILE: L:\1999\D...IG\301348\301348150002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/8/97
END DATE: 5/8/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST OF EMERSON
BORING: BL-36
E.A. #: 30-1348-15.002
GROUND ELEV.: 1435.61 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/8/97	1.7	1433.9

SHEET 1 OF 1

STATION: STA 404+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/8/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	LIGHT BROWN CLAYEY SAND slightly moist, medium dense, fine to coarse grained sand, low to moderate plasticity fines.	
1434.6	1								
	1.52	A	MC	17		W,UW,S			12% fines
	▼							Encountered groundwater at 1.68 M., fine to medium grained sand.	
1433.6	2 1.98								
	2.13	B	MC	18				Becoming more clayey.	
	2.59								
1432.6	3 3.05								
		C	MC	18		W,UW,S			35% fines
	3.51								
	3.66	D	MC	5					
1431.6	4							Loose	
	4.11								
	4.57	E	MC	11		CD,S			39% fines
1430.6	5 5.03								
	5.18	F	MC	19					
	5.64							Fine grained sand, becoming more sandy.	
1429.6	6 6.10								
		G	MC	32		W,UW,S		Lenses of clean sand, fine to medium grained sand.	24% fines
	6.55							6.55	
1428.6	7								
1427.6	8								
1426.6	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-37

CAD FILE: L:\1999\D...IG\30134B\30134B15002CPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF BROADLEAF LANE
BORING: BL-37
E.A. #: 30-1348-15.002
GROUND ELEV.: 1440.48 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 451+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5/14/97	1.5	1439.0

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand, estimated 10 to 20% fines.	
								0.76	
1439.5	1						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, estimated 15 to 25% fines, low plasticity fines.	
	1.52 ▽							Encountered groundwater at 1.52 M.	
		A	MC	16		W,UW			
1438.5	2 1.98								
	2.13								
		B	MC	15					
	2.59							Becoming more sandy, estimated 10 to 20% fines.	
								2.74	
1437.5	3 3.05						SM SP	YELLOW BROWN SLIGHTLY SILTY SAND wet, dense, fine to medium grained sand.	8% fines
		C	MC	36		W,UW,S			
	3.51								
1436.5	4								
	4.57							Loose	
		D	MC	6		CD			
1435.5	5 5.03							4.88	
	5.18						SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low plasticity fines.	
		E	MC	18					
	5.64								
1434.5	6 6.10								
		F	MC	21		W,UW		Lenses of clean sand, becoming more sandy.	
	6.55							6.55	
1433.5	7								
1432.5	8								
1431.5	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-38

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\DWG\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF U.S. 395
BORING: BL-38
E.A. #: 30-1348-15.002
GROUND ELEV.: 1514.25 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

SHEET 1 OF 2

STATION: STA 503+00
OFFSET: 121.9 M NORTH
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	YELLOW BROWN SILTY SAND slightly moist, dense, fine to coarse grained sand, surface gravel, cobbles and boulders up to 36 cm diameter. Decomposed granite.	
1513.2	1								
	1.52								
	1.68	A	MC	50/127		W,UW,S		Very dense.	16% fines
1512.2	2								
1511.2	3								
	3.05								
	3.20	B	MC	50/140		W,S			18% fines
1510.2	4								
	4.57								
	4.72	C	MC	50/127					
1509.2	5								
1508.2	6								
	6.10								
	6.25	D	MC	50/76					
1507.2	7								
	7.62								
	7.77	E	MC	50/114					
1506.2	8								
1505.2	9								
	9.14								
	9.30	F	MC	50/76					

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-39

CAD FILE: L:\1999\...NG\30134B\30134B15002CPLATES.DWG

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF U.S. 395
BORING: BL-38
E.A. #: 30-1348-15.002
GROUND ELEV: 1514.25 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 503+00
OFFSET: 121.9 M NORTH
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
	10.82	G	MC	50/127					
1503.2	11								
1502.2	12								
	12.19								
	12.34	H	MC	50/114				12.34	
								No free water encountered.	
1501.2	13								
1500.2	14								
1499.2	15								
1498.2	16								
1497.2	17								
1496.2	18								
1495.2	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-39A

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF U.S. 395
BORING: BL-39
E.A. #: 30-1348-15.002
GROUND ELEV: 1530.10 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 511+00
OFFSET: 91 M NORTH
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1529.1	1						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND slightly moist, dense, fine to coarse grained sand, some fine to coarse surface gravel. Decomposed granite.	
	1.52								
	1.68	A	MC	50/76		W,S		Very dense.	9% fines
1528.1	2								
								2.13	
							SM	LIGHT BROWN SILTY SAND slightly moist, very dense, fine to coarse grained sand and some fine to coarse gravel. Decomposed granite.	
1527.1	3 3.05								
	3.20	B	MC	50/76		W,S			13% fines
1526.1	4								
	4.57								
	4.72	C	MC	50/51					
1525.1	5								
1524.1	6 6.10								
	6.25	D	MC	50/51					
1523.1	7							Encountered more gravelly soils at 7 M.	
	7.62								
	7.77	E	MC	50/51					
1522.1	8								
1521.1	9								
	9.14								
	9.30	F	MC	50/51					
								9.75 Refusal at 10 M. No free water encountered.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-40

CAD FILE: L:\1999\...ING\301348\30134815002CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF U.S. 395
BORING: BL-40
E.A. #: 30-1348-15.002
GROUND ELEV.: 1527.66 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 2

STATION: STA 521+00
OFFSET: 15 M NORTH
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, loose to medium dense, fine to coarse grained sand, estimated 10 to 20% fines.	
								0.40	
							SC	DARK BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
1526.7	1								
	1.52	A	MC	29		W,UW,S			13% fines
1525.7	2 1.98							Light brown, some fine to coarse gravel.	
								2.74	
1524.7	3 3.05						SC	YELLOW CLAYEY SAND moist, very stiff, fine grained sand, high plasticity fines.	PI=33
	3.51	B	MC	13		W,UW,S			48% fines
	3.66								
1523.7	4 4.11	C	MC	13					
								4.27	
	4.57						SM	RED BROWN SILTY SAND slightly moist, very dense, fine to coarse grained sand, estimated 10 to 20% fines (decomposed granite).	
	4.88	D	MC	50/127		W,UW			
1522.7	5								
1521.7	6 6.10								
	6.25	E	MC	50/76		W,UW,S			28% fines
1520.7	7								
	7.62								
	7.77	F	MC	50/25					
1519.7	8								
1518.7	9								
	9.14								
	9.30	G	MC	50/76				Some fine gravel, granite becoming stronger.	

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CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE C-41

CAD FILE: L:\1999\...TING\301348\301348150O2CPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF U.S. 395
BORING: BL-40
E.A. #: 30-1348-15.002
GROUND ELEV: 1527.66 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 521+00
OFFSET: 15 M NORTH
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
	10.82	H	MC	50/51					
1516.7	11								
1515.7	12								
	12.19								
	12.34	L	MC	50/51				12.34	
1514.7	13								
1513.7	14								
1512.7	15								
1511.7	16								
1510.7	17								
1509.7	18								
1508.7	19								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

C-41A

EXPLORATION LOG

KLEINFELDER

START DATE: 5/12/97
END DATE: 5/12/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF U.S. 395
BORING: BL-40
E.A. #: 30-1348-15.002
GROUND ELEV.: 1527.66 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 521+00
OFFSET: 15 M NORTH
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/12/97

ELEV. 15(m)z	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
	10.82	H	MC	50/51					
1516.7	11								
1515.7	12								
	12.19								
	12.34	I	MC	50/51				12.34	
1514.7	13								
1513.7	14								
1512.7	15								
1511.7	16								
1510.7	17								
1509.7	18								
1508.7	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-41A

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1999\...TING\301348\301348150O2CPLATES.DWG

MOISTURE CONTENT AND UNIT WEIGHT
LINE BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu m)
BL-1	1.83	12.2	----
BL-2	1.83	22.2	15.86
BL-3	1.83	13.0	16.33
BL-3	3.35	18.8	16.65
BL-4	1.83	13.0	16.33
BL-4	3.35	17.5	16.18
BL-4	4.88	20.7	15.71
BL-5	1.83	15.6	16.96
BL-5	3.35	25.5	15.08
BL-5	4.88	16.9	17.12
BL-5	6.40	17.8	17.43
BL-6	3.35	19.5	15.71
BL-6	4.88	19.9	16.18
BL-6	6.40	17.2	16.65
BL-7	1.83	13.2	16.65
BL-7	4.88	14.6	14.76
BL-7	6.40	19.0	14.14
BL-8	1.83	10.7	15.08
BL-8	3.35	19.0	13.51
BL-9	3.35	16.1	10.52
BL-10	1.83	16.9	14.61
BL-11	1.83	7.6	18.06
BL-11	3.35	10.5	15.55
BL-11	4.88	15.0	16.02
BL-12	1.83	15.3	13.19
BL-12	3.35	15.4	12.88
BL-12	4.88	19.1	13.66
BL-12	6.40	14.5	11.62
BL-13	1.83	12.2	15.86
BL-13	3.35	12.1	15.55
BL-13	4.88	3.3	15.55
BL-13	6.40	7.5	18.53
BL-14	1.83	17.0	16.49
BL-14	3.35	17.8	15.71
BL-14	6.40	10.2	18.38
BL-14	7.92	12.5	19.00
BL-14	9.45	16.1	17.28
BL-14	10.97	20.5	16.02
BL-15	3.35	22.8	15.39
BL-15	5.49	11.0	18.38
BL-15	6.40	23.2	14.14
BL-15	7.92	19.4	16.65
BL-15	10.97	15.7	17.12
BL-16	3.35	7.0	17.75

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MOISTURE / DENSITY TABLE

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE
C-42

MOISTURE CONTENT AND UNIT WEIGHT
LINE BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu m)
BL-16	4.88	22.5	16.02
BL-16	6.40	15.5	17.28
BL-16	7.92	17.8	16.81
BL-16	10.05	20.0	16.18
BL-17	1.83	18.5	16.02
BL-17	3.35	2.0	15.86
BL-17	6.40	17.3	15.86
BL-18	1.83	10.7	16.65
BL-18	3.35	18.5	15.39
BL-18	4.88	12.7	18.22
BL-18	6.40	14.7	18.38
BL-18	7.92	12.2	18.06
BL-19	1.83	13.8	18.06
BL-19	7.01	34.8	12.56
BL-19	7.92	8.3	17.90
BL-20	1.83	12.2	17.90
BL-20	4.88	22.2	14.92
BL-20	6.40	10.0	18.38
BL-21	3.35	12.0	18.38
BL-21	4.88	11.9	18.06
BL-21	9.45	21.4	15.55
BL-22	3.35	14.6	17.58
BL-22	6.40	9.2	18.53
BL-23	4.88	13.0	16.64
BL-23	7.92	31.1	13.35
BL-24	3.35	19.6	16.02
BL-24	6.40	14.9	15.55
BL-25	4.88	14.2	17.59
BL-26	6.40	10.1	17.90
BL-26	9.45	15.8	17.12
BL-27	3.35	12.4	17.75
BL-27	4.88	9.8	18.69
BL-27	7.92	15.3	16.18
BL-28	2.44	8.7	16.81
BL-28	3.35	6.4	16.49
BL-28	4.88	6.4	16.96
BL-28	6.40	9.9	17.59
BL-28	7.92	9.4	18.38
BL-29	3.35	10.3	15.86
BL-29	4.88	10.3	17.43
BL-29	6.40	7.8	17.12
BL-29	7.92	15.3	16.96
BL-29	9.45	22.1	15.86
BL-30	3.35	16.5	16.18

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MOISTURE / DENSITY TABLE

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE
C-43

MOISTURE CONTENT AND UNIT WEIGHT
LINE BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu m)
BL-30	4.88	6.9	16.65
BL-30	6.40	6.3	16.65
BL-30	7.92	8.5	16.65
BL-30	9.45	5.9	18.53
BL-31	3.35	3.6	14.45
BL-31	4.88	5.8	14.76
BL-31	6.40	7.3	14.92
BL-31	7.92	9.0	15.08
BL-31	9.45	7.9	17.28
BL-32	2.74	9.4	15.55
BL-32	3.35	10.2	15.39
BL-32	4.88	6.9	15.39
BL-32	7.92	7.8	16.18
BL-33	1.83	9.3	15.71
BL-33	3.35	10.9	15.86
BL-33	4.88	5.8	14.76
BL-33	6.40	5.9	18.06
BL-33	9.45	8.3	18.06
BL-34	1.83	15.2	14.45
BL-34	4.88	16.9	15.39
BL-35	1.83	19.3	13.19
BL-35	3.35	22.4	12.41
BL-35	4.88	21.0	13.35
BL-36	1.83	13.3	15.08
BL-36	3.35	19.0	13.66
BL-36	6.40	10.3	15.39
BL-37	1.83	11.8	15.71
BL-37	3.35	11.2	17.37
BL-37	6.40	14.1	14.76
BL-38	1.52	3.0	14.76
BL-38	3.05	8.0	----
BL-39	1.52	0.5	----
BL-39	3.05	0.8	----
BL-40	1.83	8.7	16.81
BL-40	3.35	23.2	----
BL-40	4.72	8.9	----
BL-40	6.10	5.6	----

KLEINFELDER
4875 LONGLEY LANE, SUITE 100
RENO, NEVADA 89502
Tel. (702) 689-7800

PROJECT NO. 30-1348-15.002

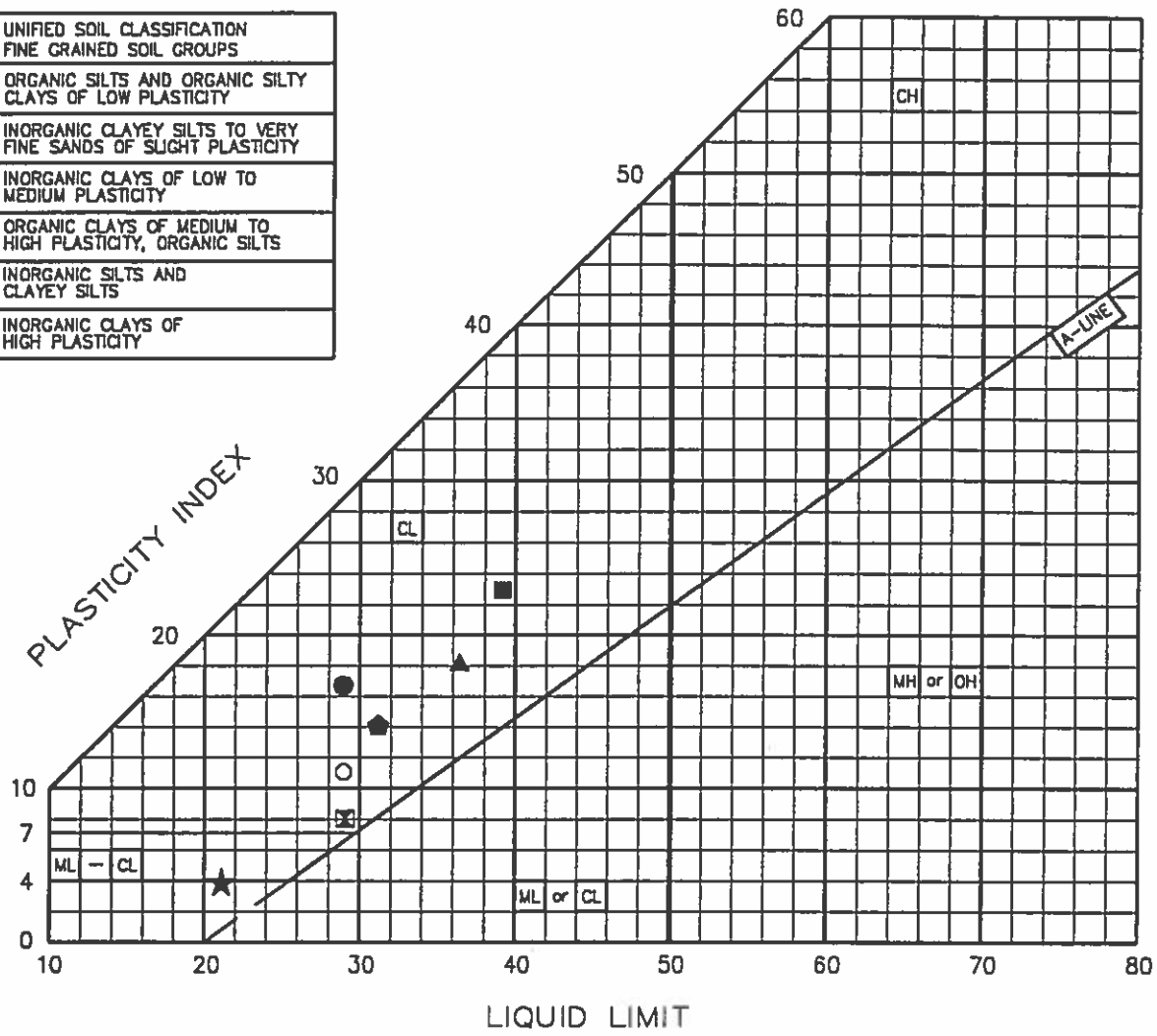
MOISTURE / DENSITY TABLE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE
C-44

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BL-4	1.83	21	4	Light Brown Clayey Sand (SC) -200=14%
⊠	BL-10	1.83	29	8	Brown Clayey Sand (SC) -200=41%
○	BL-11	4.88	29	11	Brown Clayey Sand (SC) -200=38%
⬟	BL-14	9.45	31	14	Brown Clayey Sand (SC) -200=29%
●	BL-15	1.68	29	17	Yellow Brown Very Sandy Clay (CL) -200=51%
▲	BL-15	3.35	36	18	Yellow Brown Very Clayey Sand (SC) -200=49%
■	BL-16	4.88	39	23	Red Brown Clayey Sand (SC) -200=44%

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PLASTICITY CHART

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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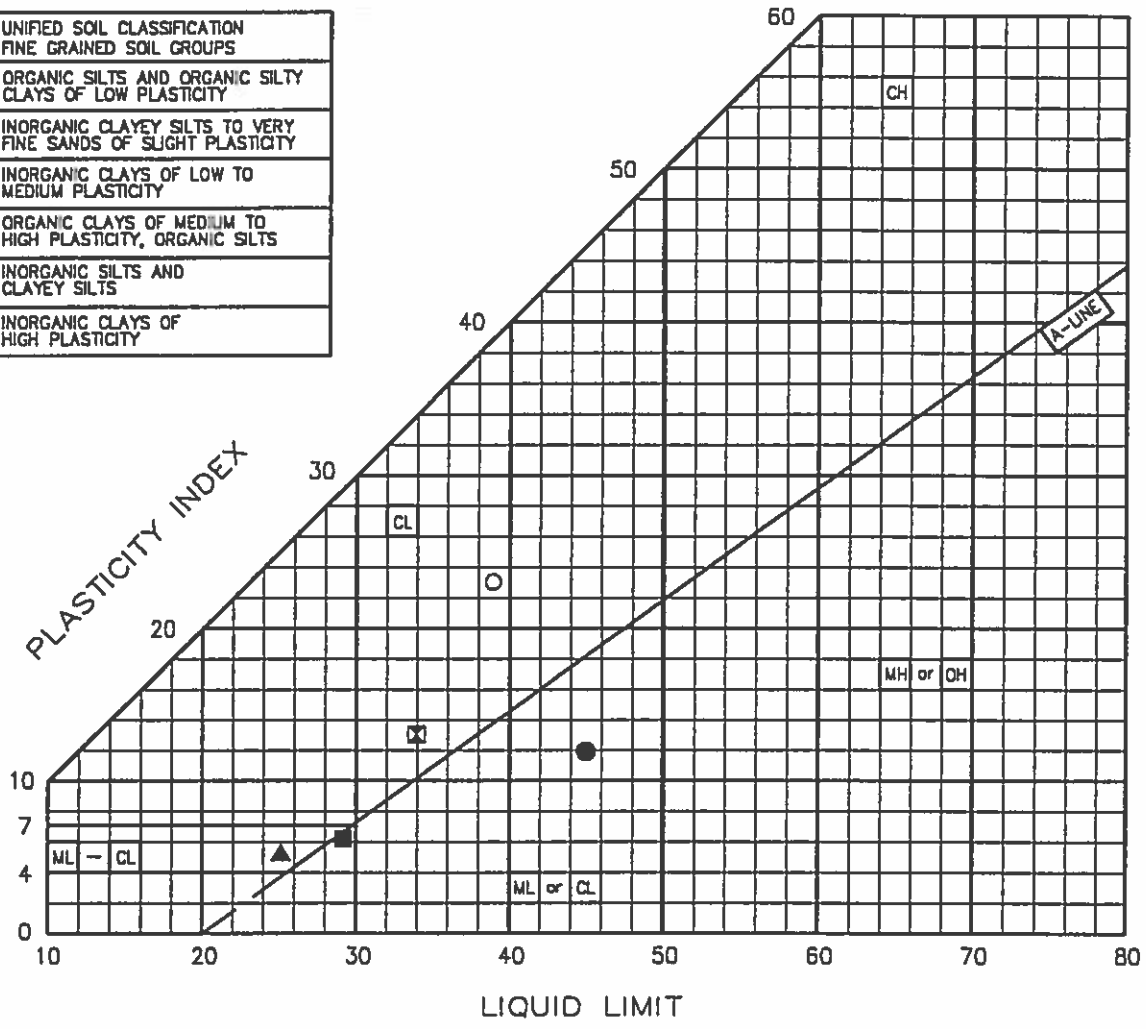
GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
⊠	BL-17	1.83	34	13	Light Brown Clayey Sand (SC) -200=28%
O	BL-17	4.72	39	23	Light Brown Clayey Sand (SC) -200=22%
★	BL-19	2.29	---	NP	Light Brown Clayey Sand (SC) -200 =22%
⬟	BL-19	6.25	---	NP	Light Brown Clayey (SC) -200=29%
●	BL-20	8.38	46	12	Light Brown Very Sandy Clay (CL) -200=54%
▲	BL-22	3.35	25	5	Brown Clayey Sand (SC) -200=18%
■	BL-23	1.83	29	6	Light Brown Clayey Sand (SC) -200= 11%

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PLASTICITY CHART

CARSON FREEWAY
CARSON CITY, NEVADA

PLATE
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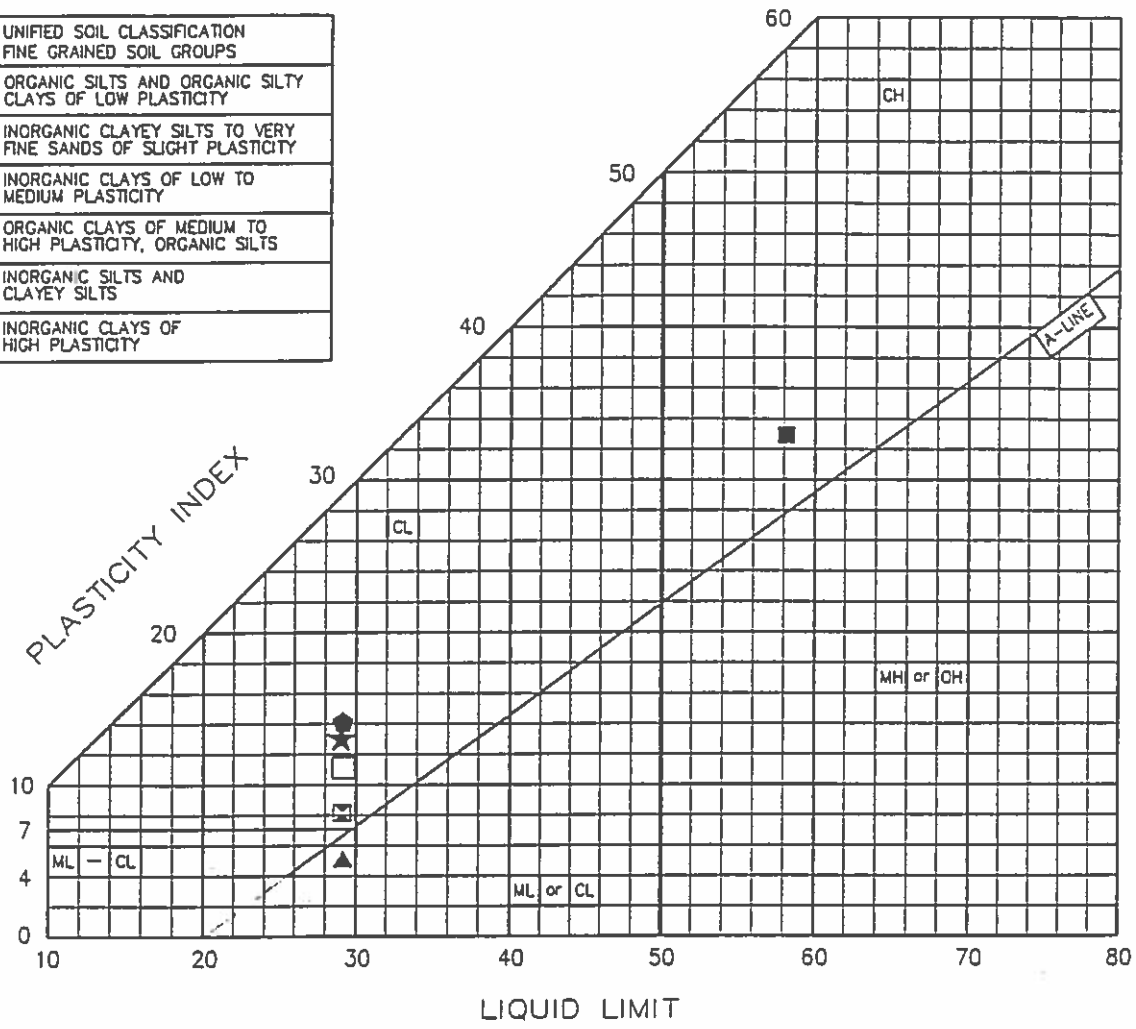
GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BL-32	2.74	29	13	Red Brown Clayey Sand (SC) -200=15%
⬟	BL-33	1.83	29	14	Brown Clayey Sand (SC) -200=14%
●	BL-34	1.83	---	NP	Yellow Brown Silty Sand (SM) -200=16%
▲	BL-35	4.88	29	5	Brown Clayey Sand (SC) -200=29%
■	BL-40	3.35	58	33	Red Yellow Clayey Sand (SC) -200=48%
⊠	BL-10	1.83	29	8	Brown Clayey Sand (SC) -200=41%
□	BL-11	4.88	29	11	Brown Clayey Sand (SC) -200=38%

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PLASTICITY CHART

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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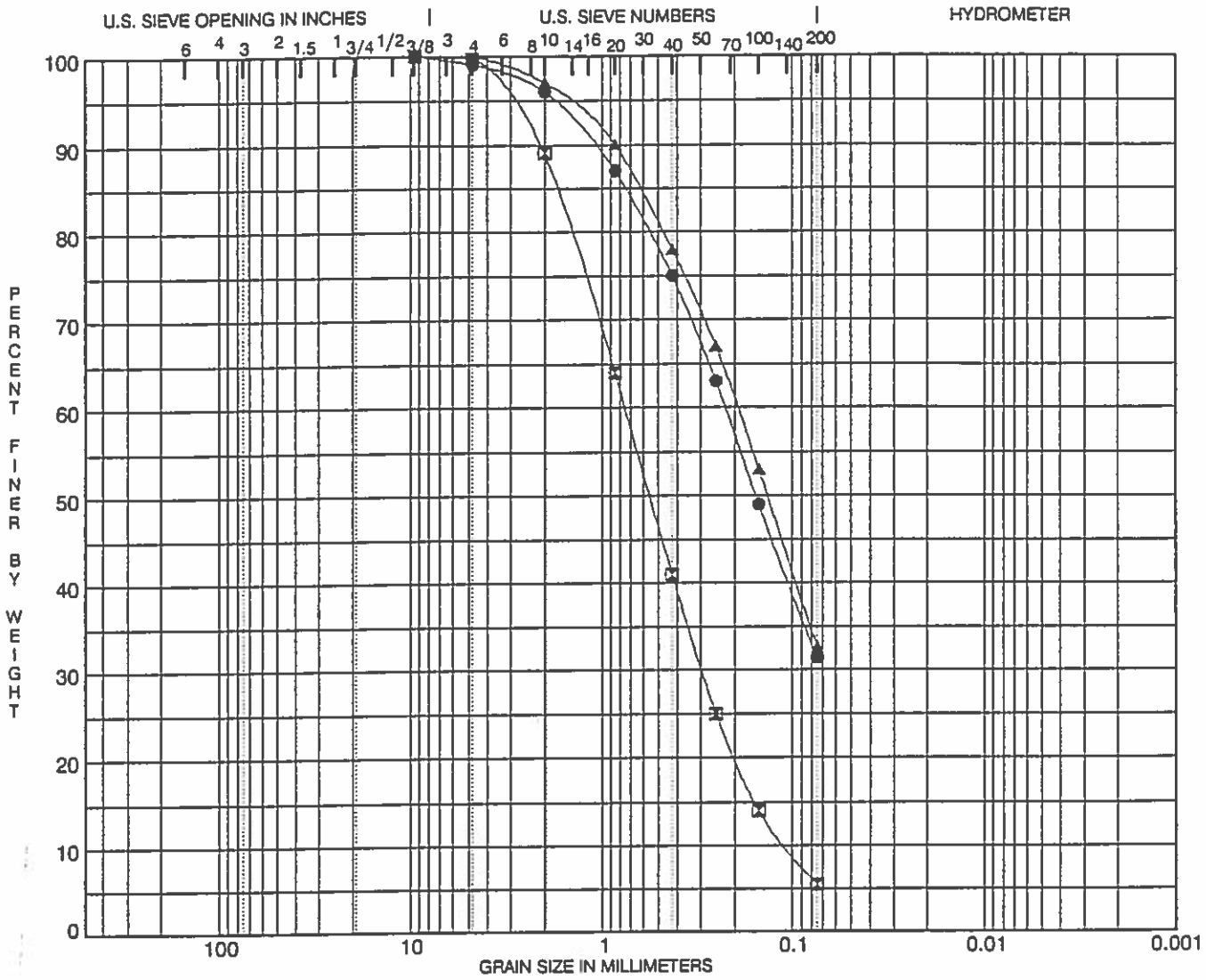

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-02	at 0.6	Light Brown Silty Sand (SM)						
⊠	BL-03	at 3.4	Yellow Brown Silty Sand (SM)					1.07	7.0
▲	BL-04	at 4.9	Gray Clayey Sand (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-02	at 0.6	9.50	0.22			1.0	67.6	31.4	
⊠	BL-03	at 3.4	9.50	0.75	0.295	0.1078	0.3	94.1	5.6	
▲	BL-04	at 4.9	9.50	0.19			0.1	67.3	32.6	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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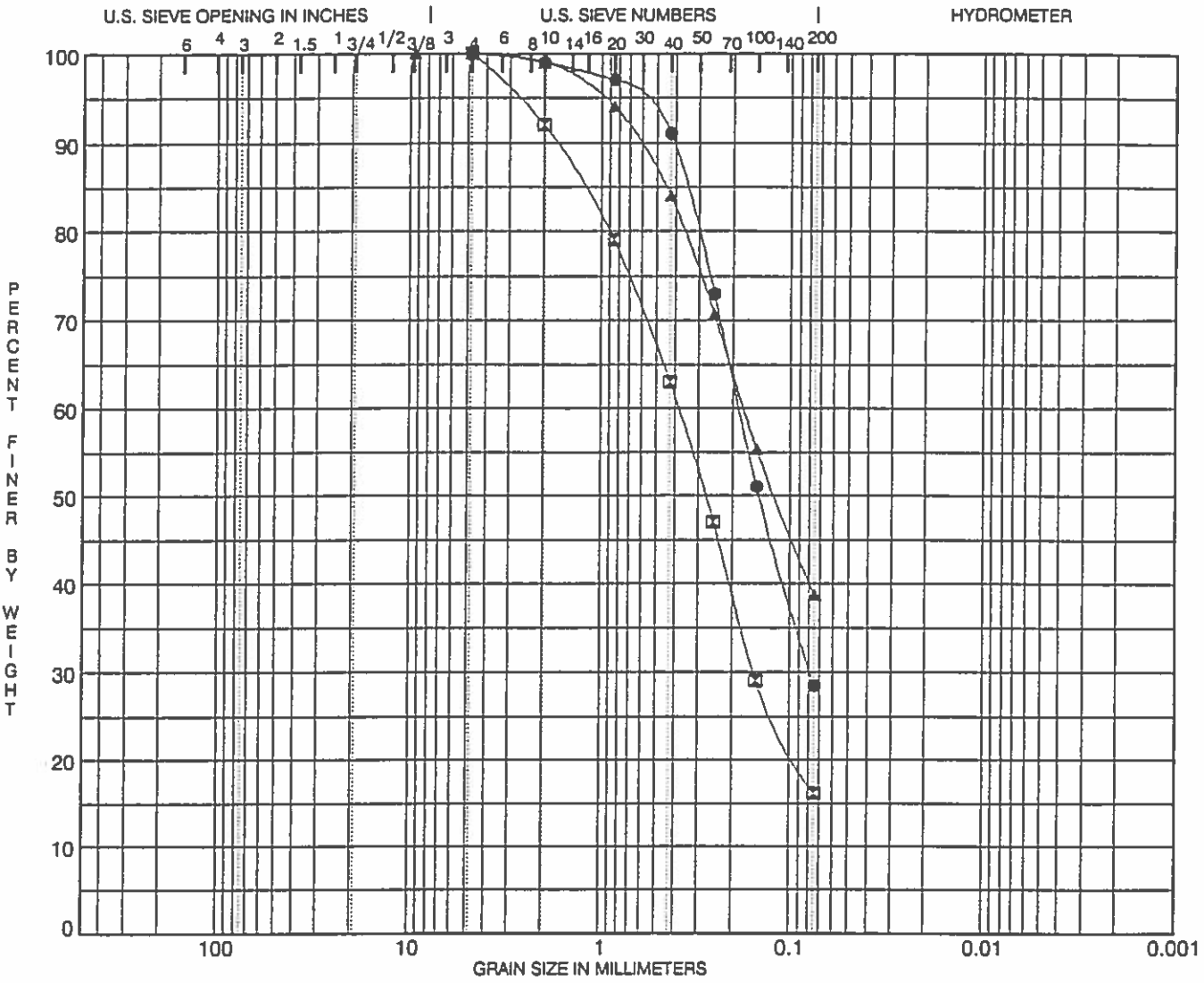

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-05	at 3.4	Yellow Brown Clayey Sand (SC)						
⊠	BL-05	at 4.9	Yellow Brown Clayey Sand (SC)						
▲	BL-05	at 6.4	Yellow Brown Clayey Sand (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-05	at 3.4	4.75	0.18	0.079		0.0	71.5	28.5	
⊠	BL-05	at 4.9	4.75	0.38	0.154		0.0	83.9	16.1	
▲	BL-05	at 6.4	9.50	0.18			0.1	61.2	38.7	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE

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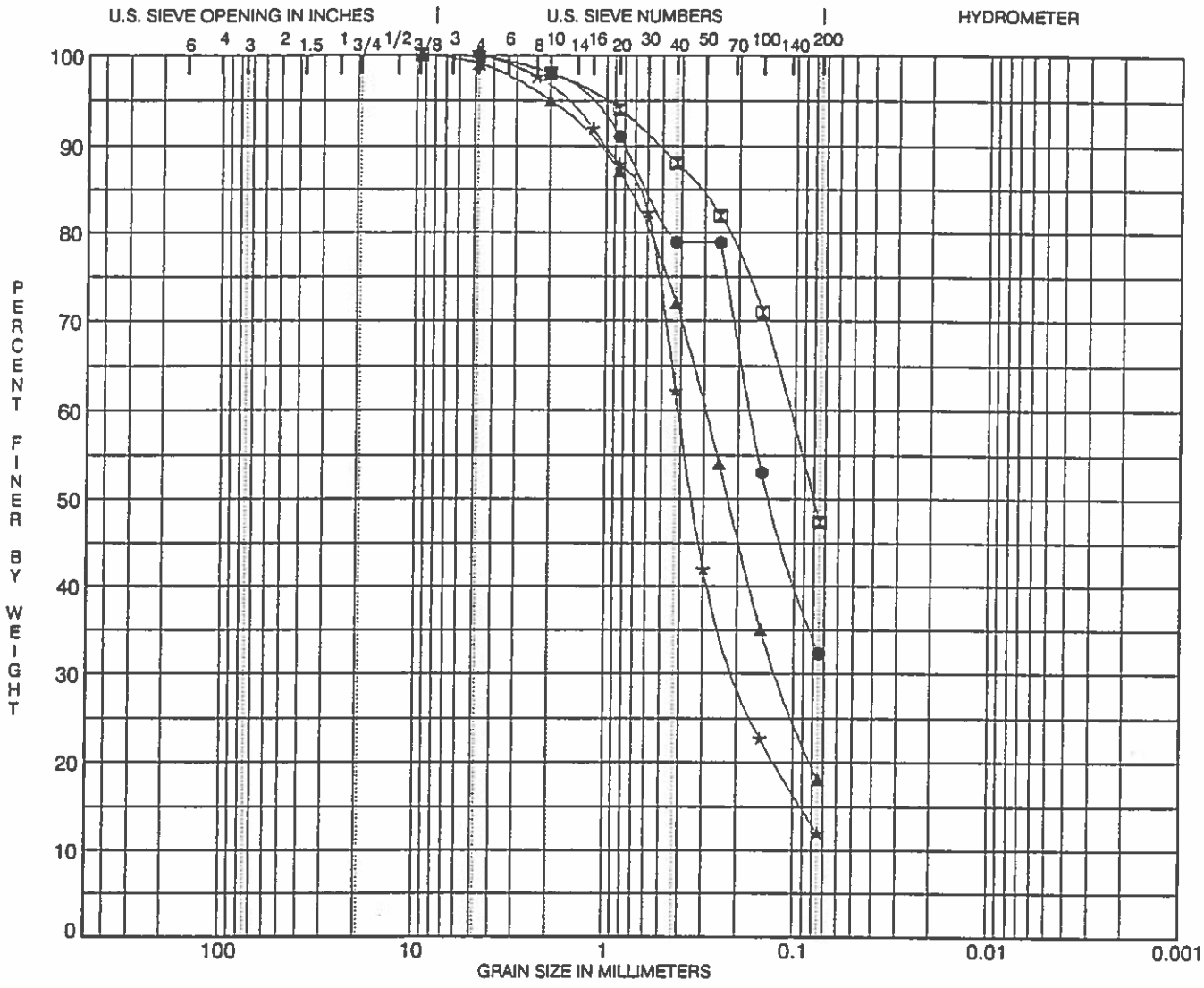

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-06	at 3.4	Gray Brown Silty Sand (SM)						
⊠	BL-06	at 4.9	Light Brown Clayey Sand (SC)						
▲	BL-07	at 1.8	Light Brown Clayey Sand (SC)						
★	BL-07	at 4.9	Light Brown Clayey Sand (SC)					1.33	5.8

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-06	at 3.4	4.75	0.17			0.0	67.7	32.3	
⊠	BL-06	at 4.9	9.50	0.11			0.2	52.4	47.4	
▲	BL-07	at 1.8	9.50	0.30	0.122		1.0	81.0	18.0	
★	BL-07	at 4.9	9.50	0.41	0.195		0.2	87.8	12.0	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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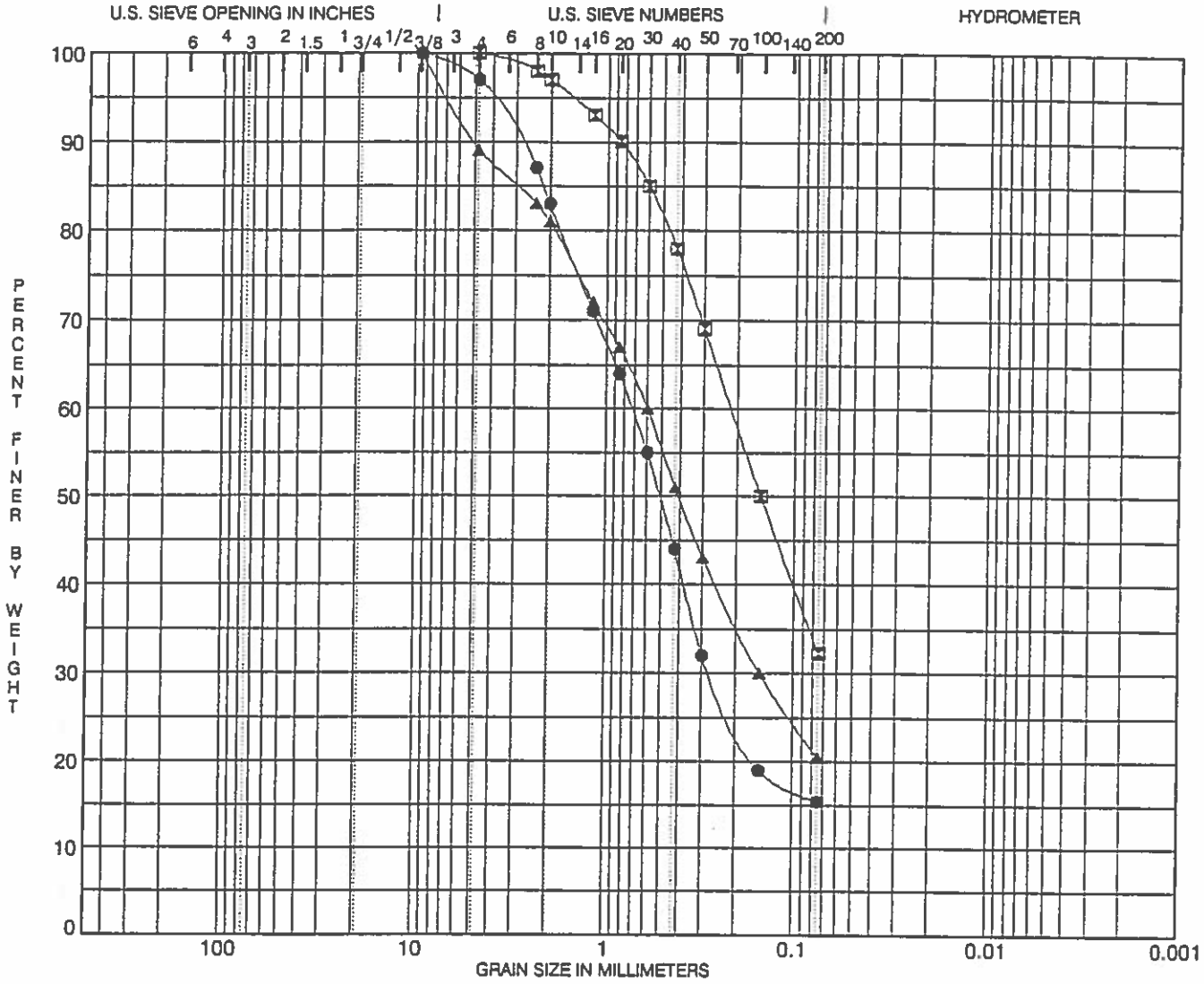

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-08	at 1.8	Yellow Brown Silty Sand (SM)						
⊠	BL-09	at 3.4	Brown Silty Sand (SM)						
▲	BL-11	at 1.8	Light Brown Silty Sand (SM)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-08	at 1.8	9.50	0.73	0.270		3.0	81.6	15.4	
⊠	BL-09	at 3.4	4.75	0.22			0.0	67.7	32.3	
▲	BL-11	at 1.8	9.50	0.60	0.150		11.0	68.5	20.5	

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GRAIN SIZE ANALYSES

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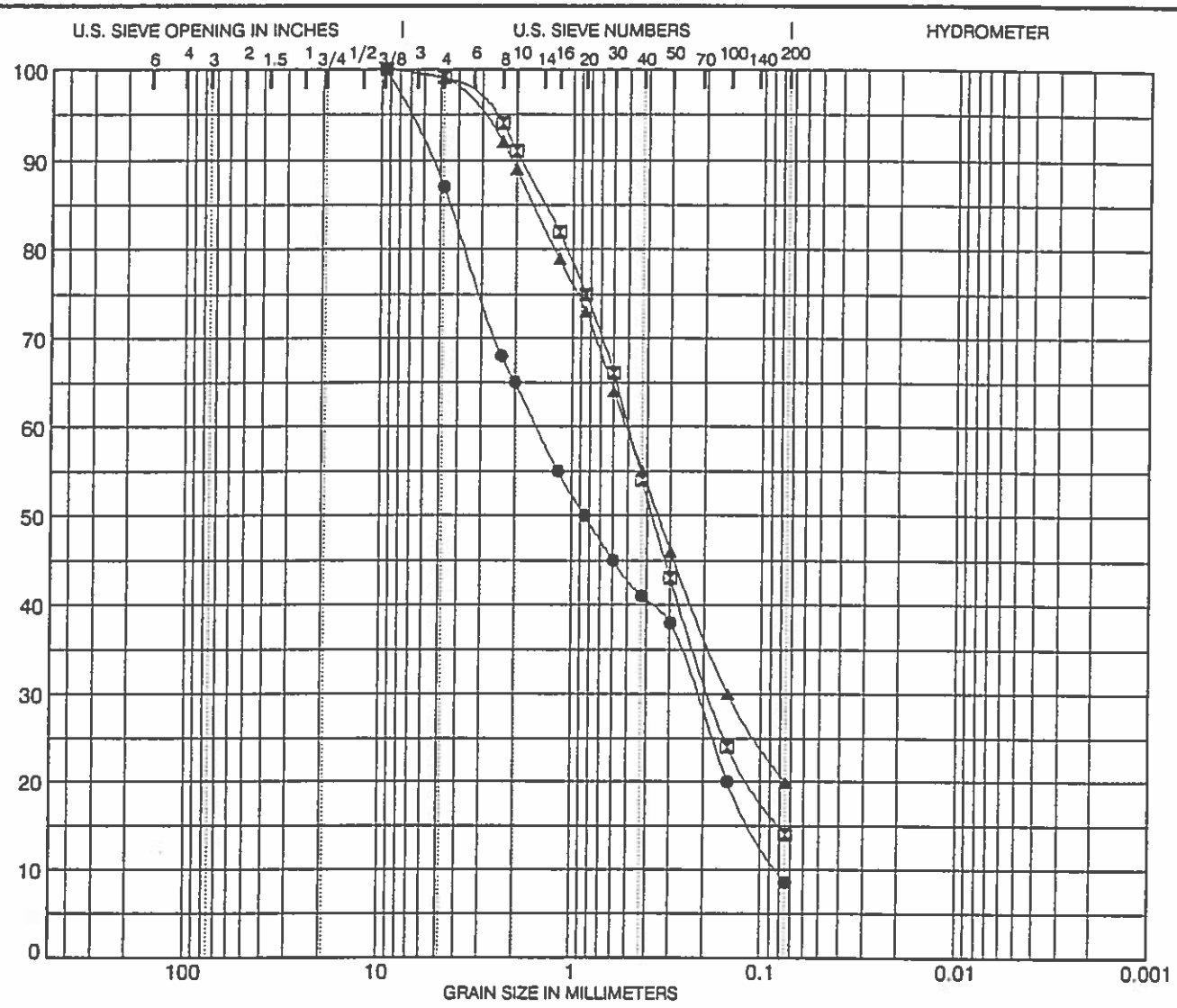

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-12	at 1.8	Light Brown Slightly Silty Sand (SM/SP)					0.39	18.8
⊠	BL-12	at 4.9	Light Brown Clayey Sand (SC)						
▲	BL-13	at 3.4	Red Brown Clayey Sans (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-12	at 1.8	9.50	1.54	0.221	0.0817	13.0	78.4	8.6	
⊠	BL-12	at 4.9	9.50	0.51	0.187		1.0	85.0	14.0	
▲	BL-13	at 3.4	9.50	0.51	0.150		1.0	79.1	19.9	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-52

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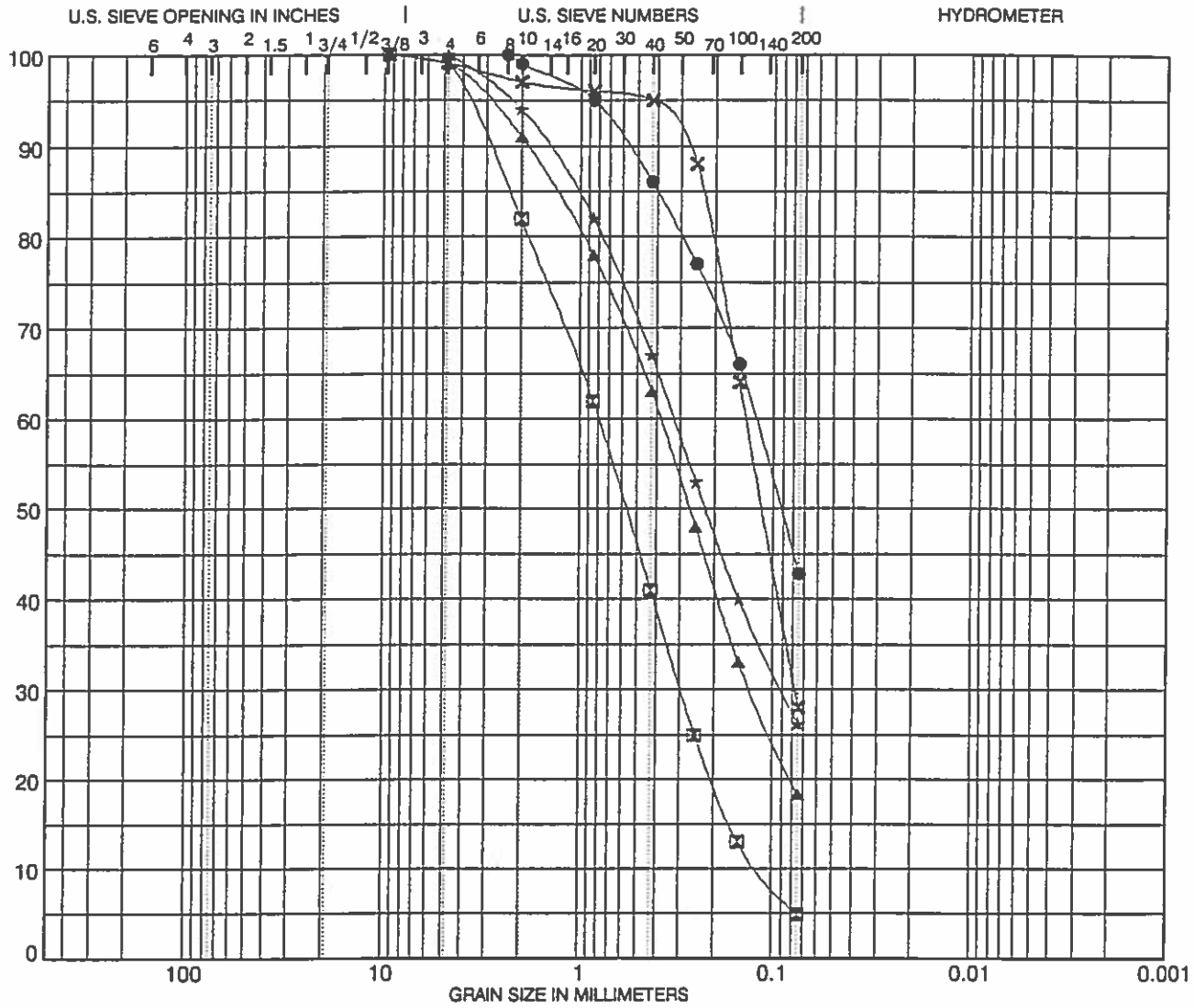

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-14	at 1.8	Light Brown Clayey Sand (SC)						
⊠	BL-14	at 3.4	Light Brown Slightly Silty Sand (SM/SP)					0.95	6.9
▲	BL-14	at 6.4	Brown Clayey Sand (SC)						
★	BL-14	at 7.9	Brown Clayey Sand (SC)						
✕	BL-15	at 6.4	Brown Clayey Sand (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-14	at 1.8	2.36	0.13			0.0	57.2	42.8	
⊠	BL-14	at 3.4	9.50	0.80	0.295	0.1157	1.0	94.0	5.0	
▲	BL-14	at 6.4	9.50	0.38	0.130		1.0	80.7	18.3	
★	BL-14	at 7.9	4.75	0.33	0.091		0.0	73.8	26.2	
✕	BL-15	at 6.4	9.50	0.14	0.078		1.0	71.0	28.0	

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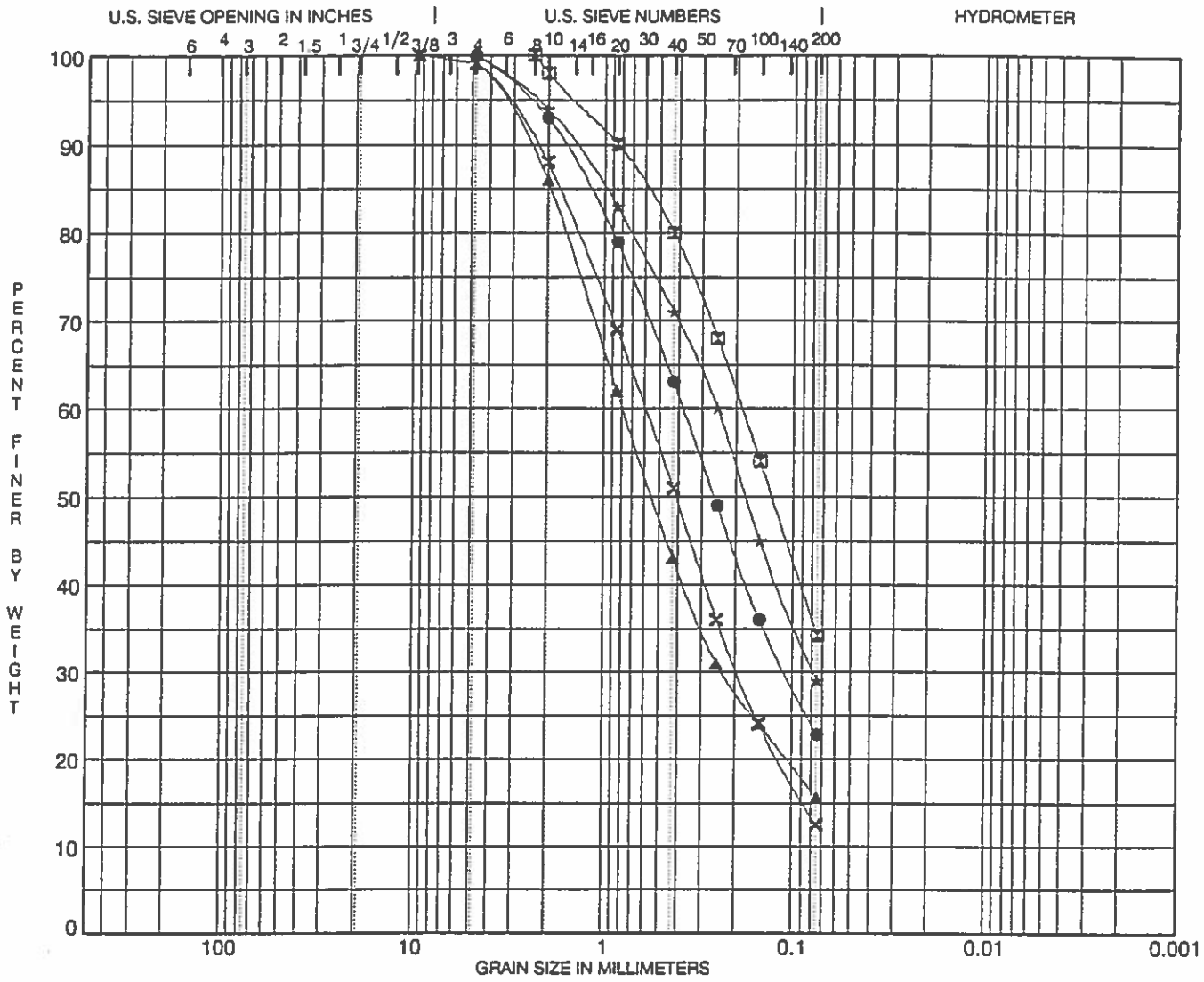
GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-53



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-16	at 6.4	White Silty Sand (SM)						
⊠	BL-18	at 3.4	Gray Brown Clayey Sand (SC)						
▲	BL-18	at 4.9	Light Brown Clayey Sand (SC)						
★	BL-18	at 6.4	Light Brown Clayey Sand (SC)						
✕	BL-19	at 1.8	Light Brown Clayey Sand (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-16	at 6.4	4.75	0.38	0.110		0.0	77.2	22.8	
⊠	BL-18	at 3.4	2.36	0.19			0.0	65.8	34.2	
▲	BL-18	at 4.9	9.50	0.79	0.232		1.0	83.4	15.6	
★	BL-18	at 6.4	4.75	0.25	0.078		0.0	71.0	29.0	
✕	BL-19	at 1.8	9.50	0.60	0.194		1.0	86.5	12.5	

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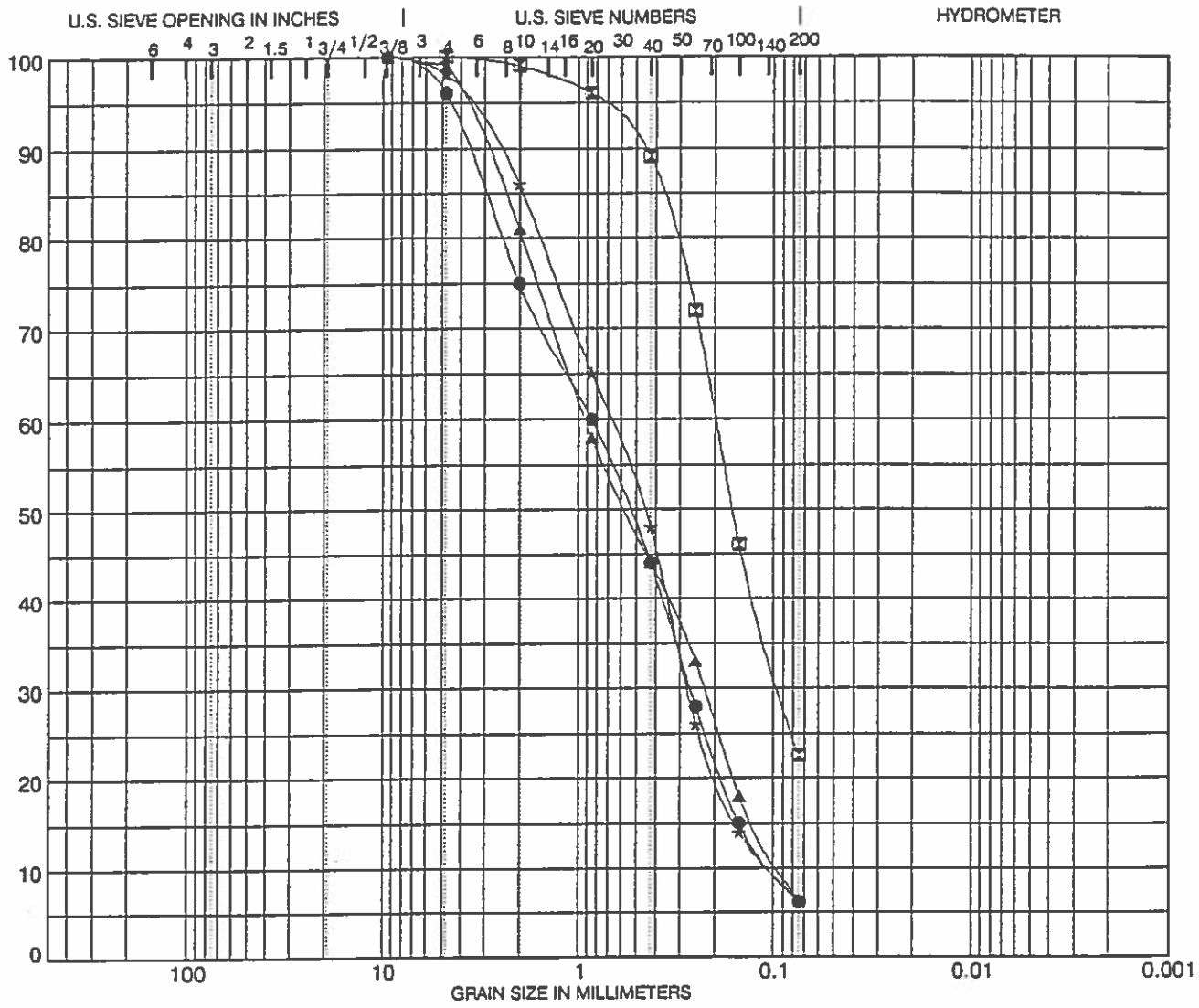
GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE C-54



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-20	at 1.8	Light Brown Slightly Silty Sand (SM/SP)					0.83	8.4
⊠	BL-20	at 4.9	Light Brown Clayey Sand (SC)						
▲	BL-21	at 3.4	Brown Slightly Silty Sand (SM/SP)					0.60	9.9
★	BL-21	at 4.9	Brown Slightly Silty Sand (SM/SP)					1.05	6.7

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-20	at 1.8	9.50	0.85	0.267	0.1012	4.0	89.8	6.2	
⊠	BL-20	at 4.9	4.75	0.20	0.094		0.0	77.5	22.5	
▲	BL-21	at 3.4	9.50	0.92	0.226	0.0926	1.0	92.5	6.5	
★	BL-21	at 4.9	9.50	0.69	0.275	0.1041	2.0	91.6	6.4	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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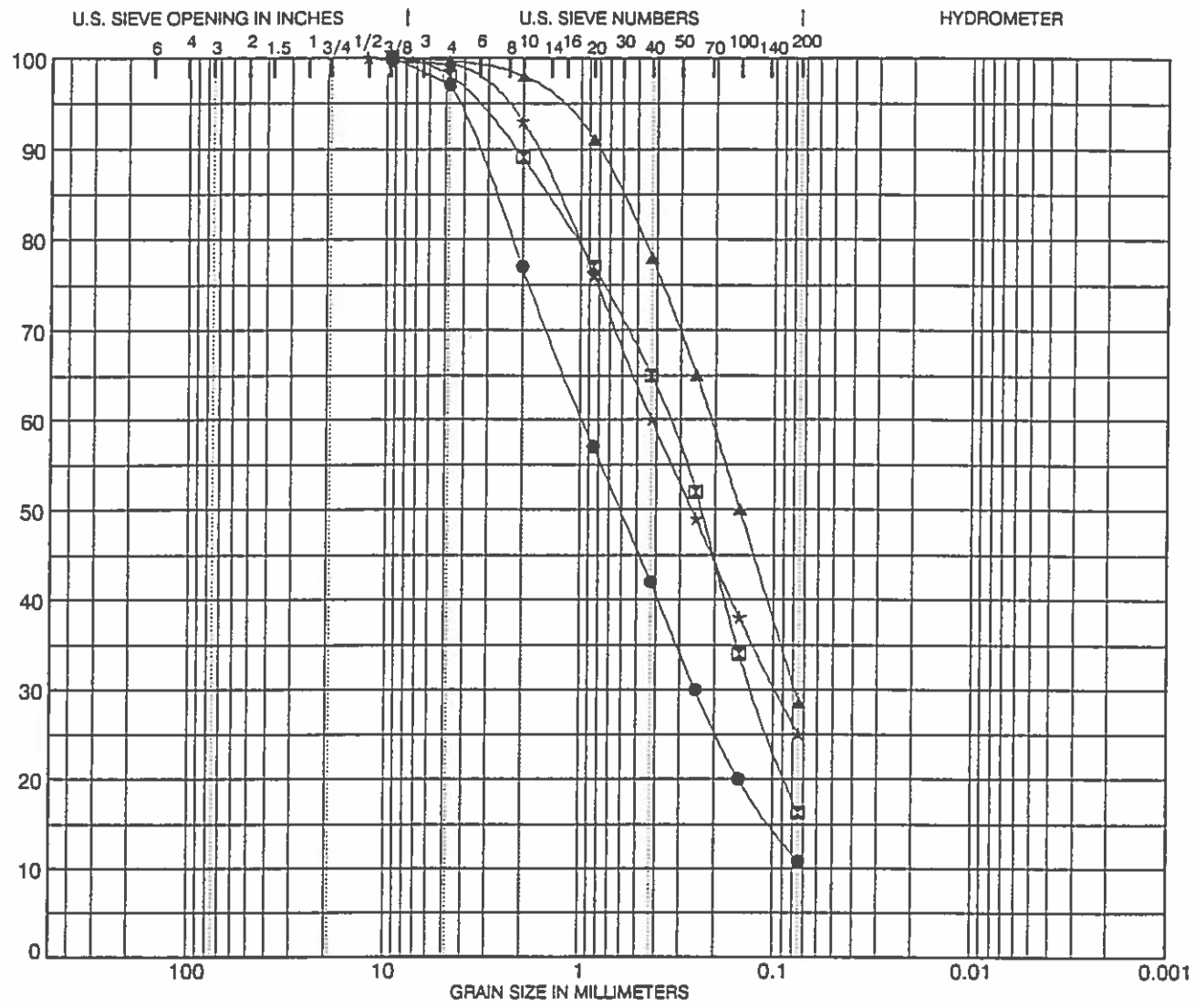

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-22	at 6.4	Gray Brown Slightly Silty Sand (SM/SP)					0.92	13.8
⊠	BL-23	at 4.9	Light Brown Clayey Sand (SC)						
▲	BL-24	at 6.4	Light Brown Clayey Sand (SC)						
★	BL-25	at 4.9							

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-22	at 6.4	9.50	0.97	0.250		3.0	86.2	10.8	
⊠	BL-23	at 4.9	9.50	0.35	0.128		2.0	81.7	16.3	
▲	BL-24	at 6.4	9.50	0.21	0.079		0.4	71.0	28.6	
★	BL-25	at 4.9	12.50	0.43	0.098		0.7	74.3	25.0	

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GRAIN SIZE ANALYSES

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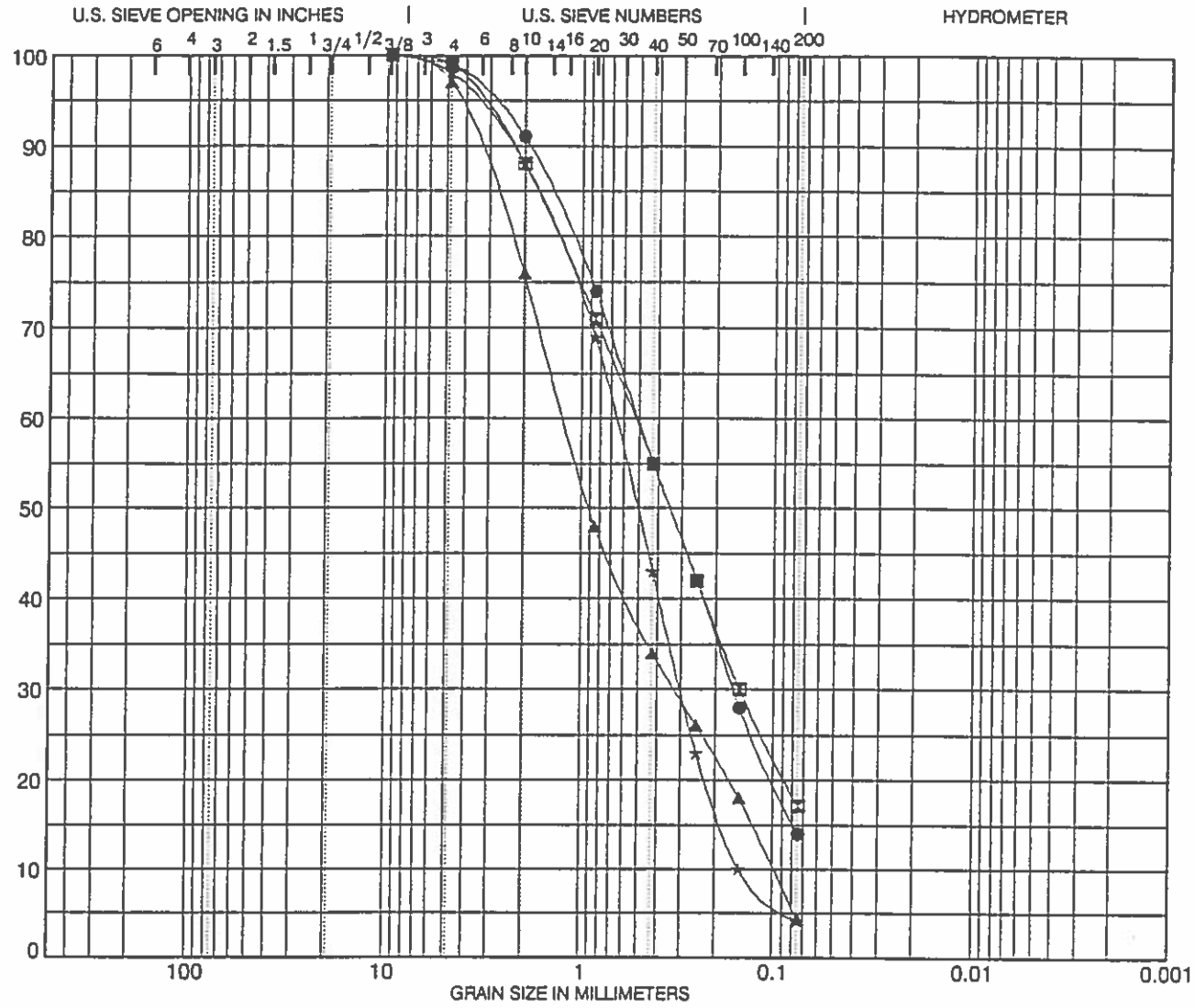

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-27	at 3.4	Light Brown Silty Sand (SM)						
⊠	BL-27	at 4.9	Light Brown Silty Sand (SM)						
▲	BL-28	at 3.4	Yellow Brown Clean Sand (SP)					0.87	12.3
★	BL-28	at 4.9	Yellow Brown Clean Sand (SP)					0.90	4.5

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-27	at 3.4	9.50	0.51	0.161		1.0	85.0	14.0	
⊠	BL-27	at 4.9	9.50	0.53	0.150		1.0	81.9	17.1	
▲	BL-28	at 3.4	9.50	1.23	0.326	0.0998	3.0	92.6	4.4	
★	BL-28	at 4.9	9.50	0.67	0.301	0.1500	2.0	93.9	4.1	

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GRAIN SIZE ANALYSES

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PLATE

C-57

PROJECT NO. 30-1348-15.002

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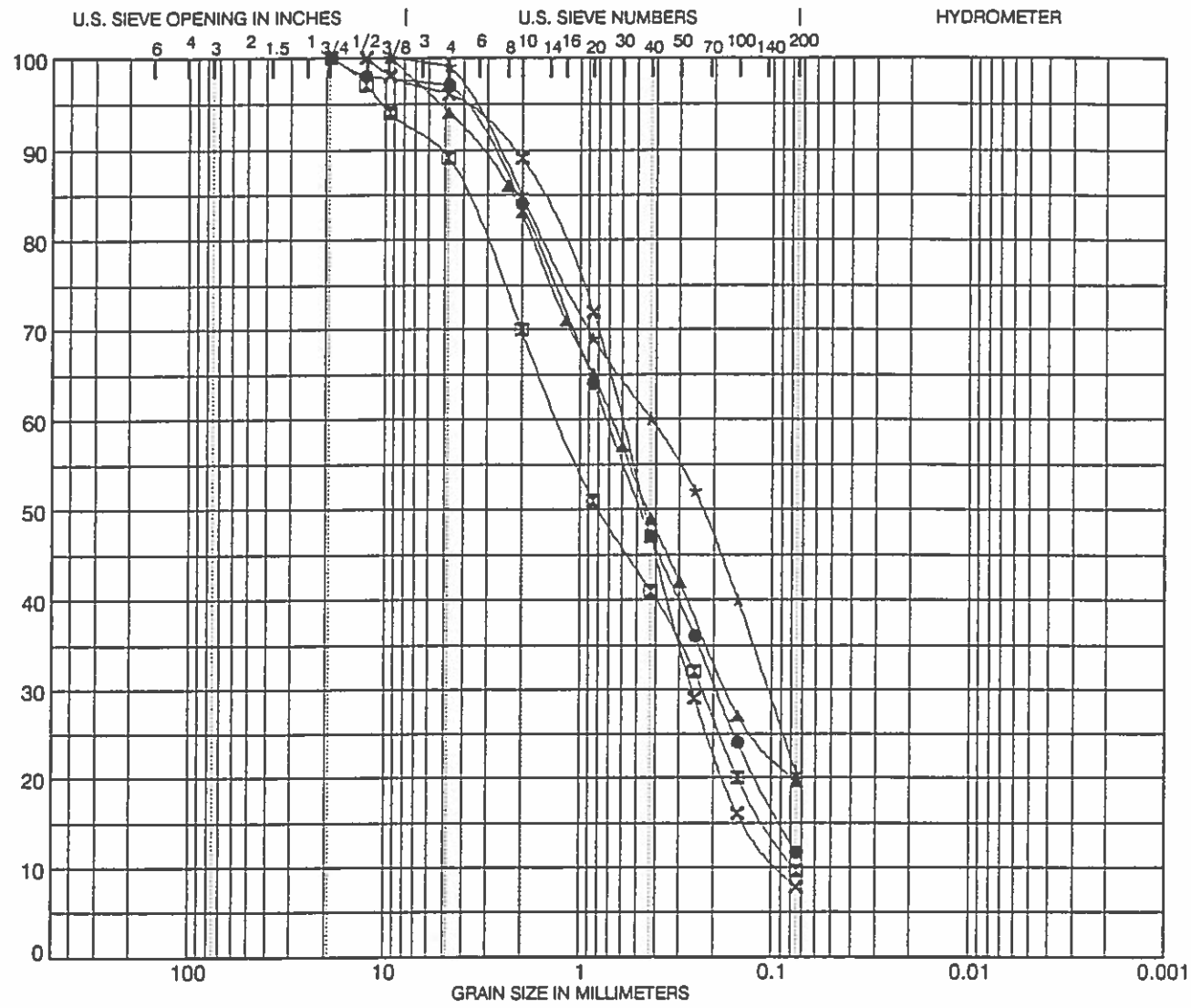

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-28	at 6.4	Red Brown Slightly Silty Sand (SM/SP)					0.74	10.3
⊠	BL-28	at 7.9	Red Brown Slightly Silty Sand (SM/SP)					0.54	16.6
▲	BL-29	at 2.6	Brown Silty Sand (SM)						
★	BL-29	at 3.4	Brown Silty Sand (SM)						
✕	BL-29	at 4.9	Red Brown Slightly Silty Sand (SM/SP)					1.20	6.7

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-28	at 6.4	19.00	0.72	0.194		3.0	85.3	11.7	
⊠	BL-28	at 7.9	19.00	1.28	0.230	0.0770	11.0	79.4	9.6	
▲	BL-29	at 2.6	9.50	0.68	0.172		6.0	74.4	19.6	
★	BL-29	at 3.4	9.50	0.43	0.105		1.0	78.6	20.4	
✕	BL-29	at 4.9	12.50	0.61	0.258	0.0903	4.0	88.2	7.8	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

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PLATE

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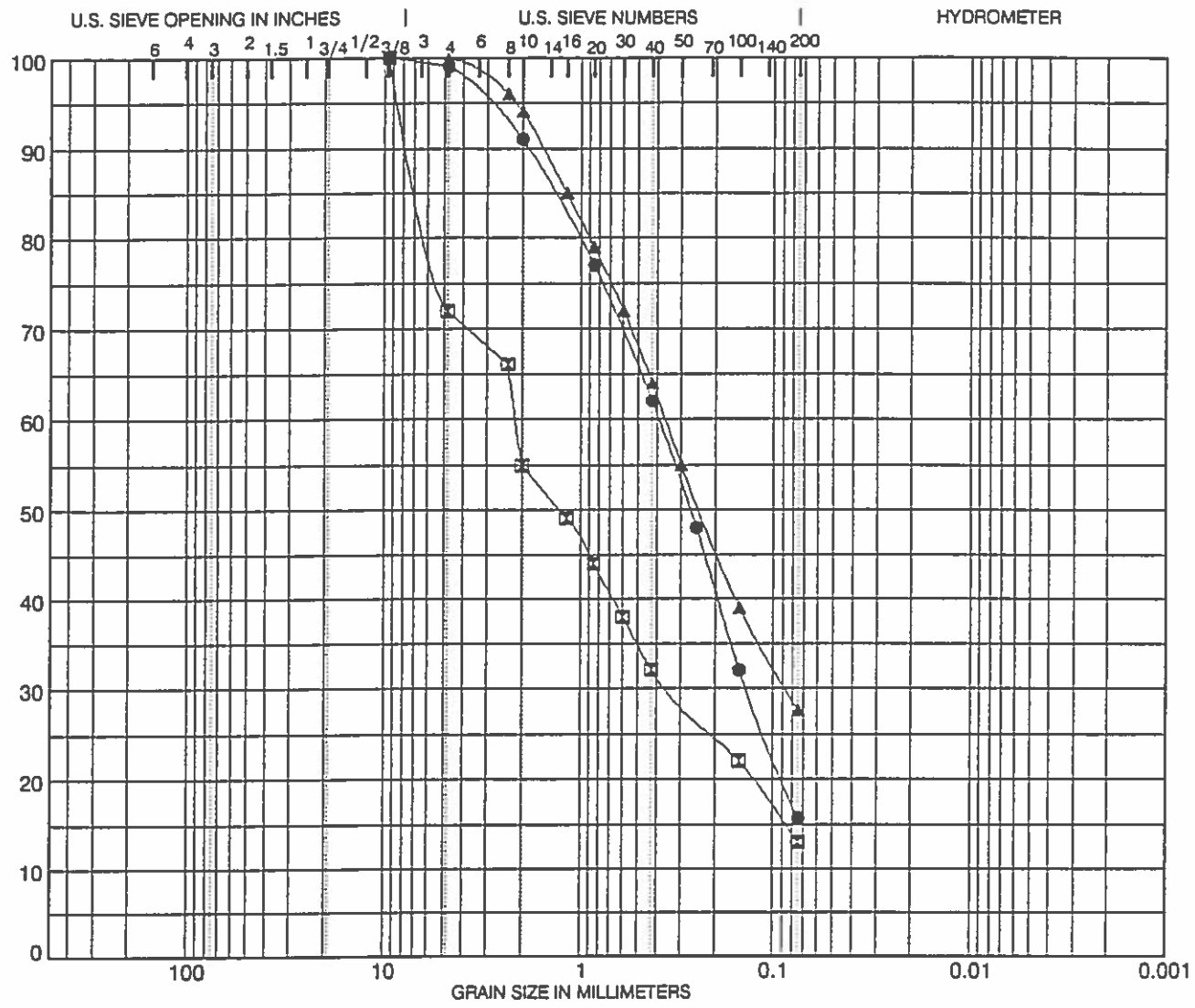

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BL-29	at 6.4	Light Brown Silty Sand (SM)						
⊠	BL-40	at 1.8	Dark Brown Clayey Sand (SC)						
▲	BL-40	at 6.1	Red Brown Silty Sand (SM)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BL-29	at 6.4	9.50	0.39	0.138		1.0	83.3	15.7	
⊠	BL-40	at 1.8	9.50	2.16	0.345		28.0	59.0	13.0	
▲	BL-40	at 6.1	9.50	0.36	0.087		0.1	72.3	27.6	

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GRAIN SIZE ANALYSES

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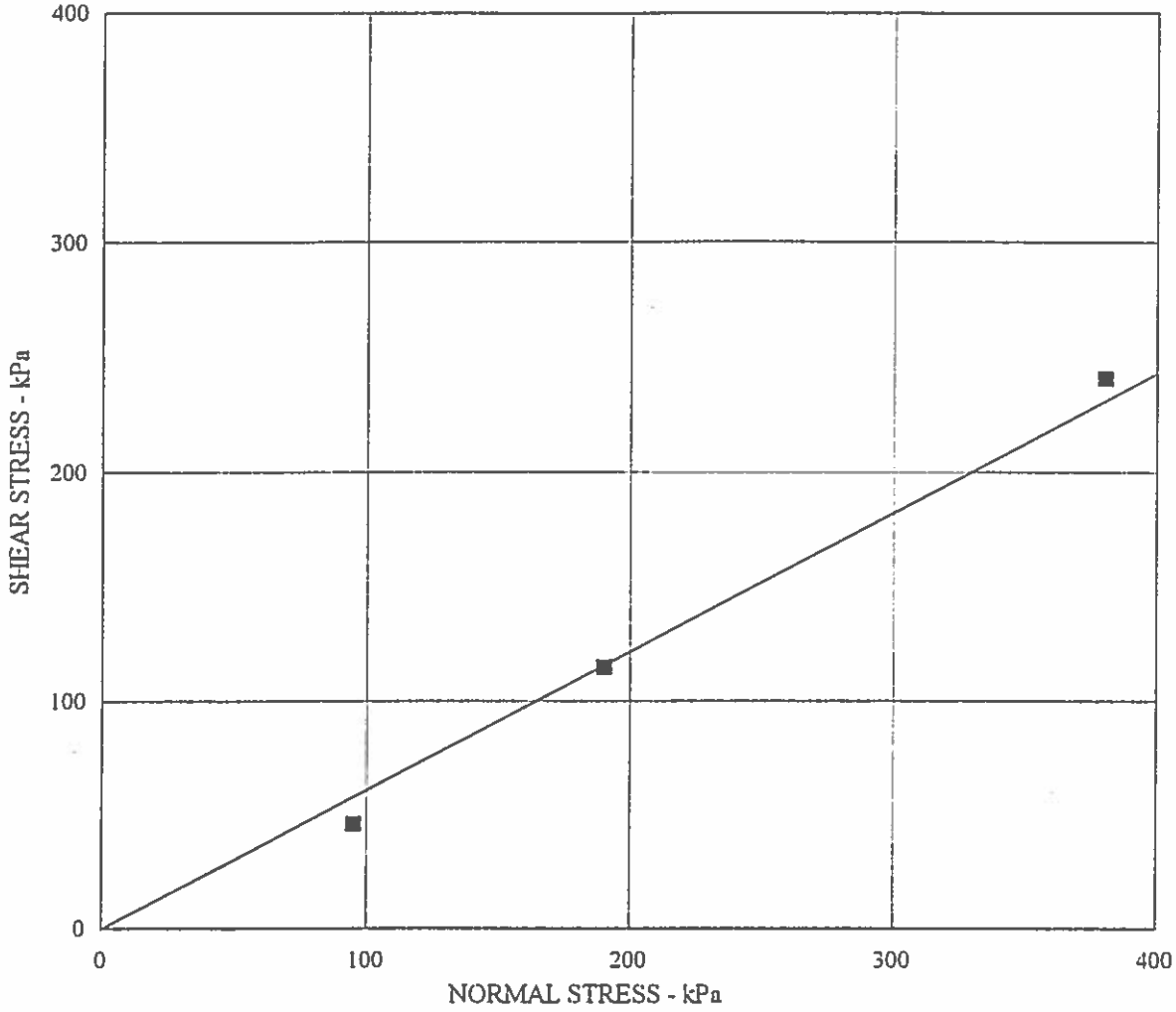
PLATE

C-59

DIRECT SHEAR

BL-7 @ 3.35 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BL-7
DEPTH:	3.35 Meters
SOIL DESCRIPTION:	Brown Silty Sand w/some Clay
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	34 deg.
COHESION:	0 kPa

DRY DENSITY - kN/cu m	14.92		
INITIAL WATER CONTENT - %	17.2		
FINAL WATER CONTENT - %	20.8		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	46	115	241

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DIRECT SHEAR

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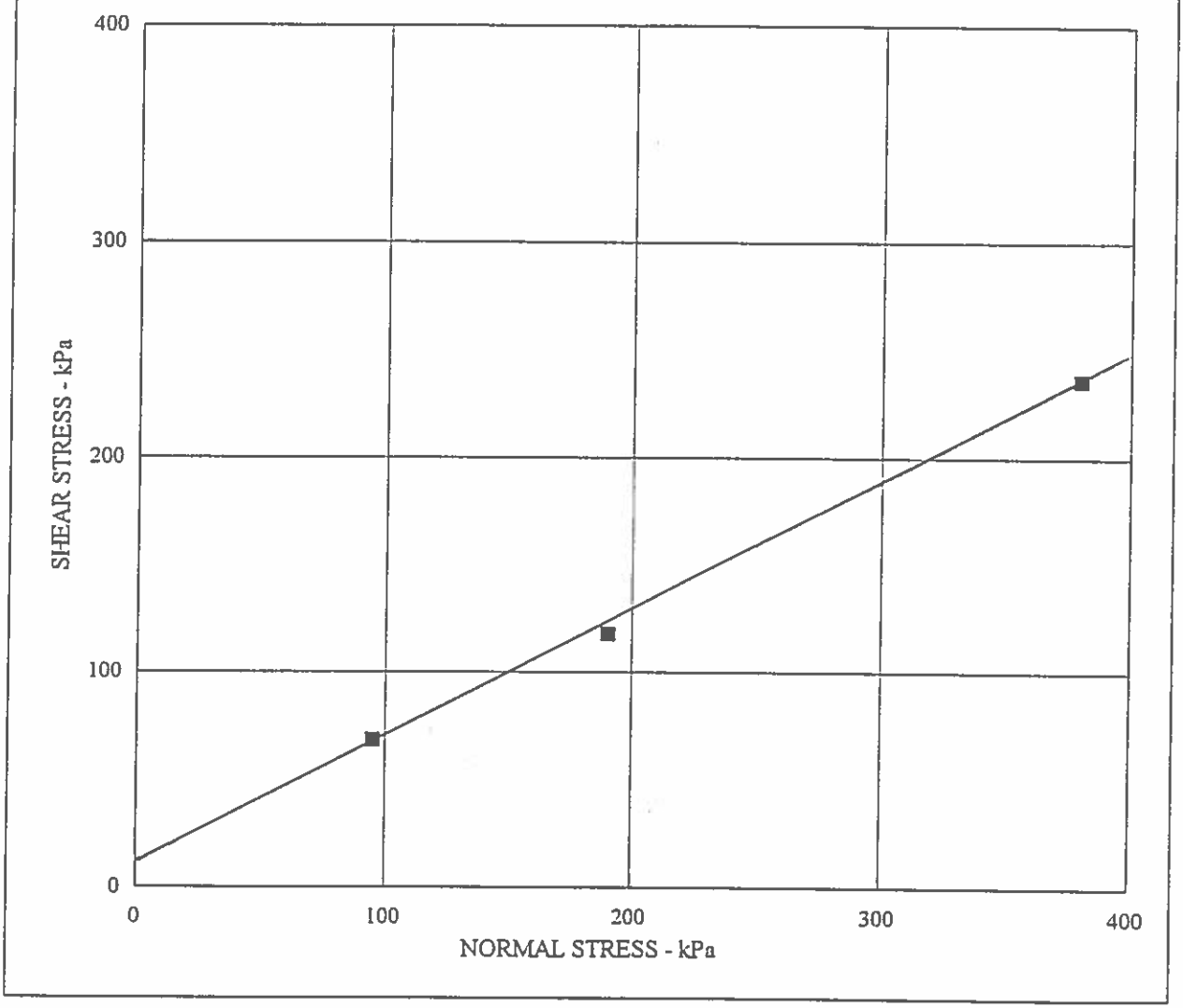
PLATE

C-60

DIRECT SHEAR

BL-14 @ 4.88 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BL-14
DEPTH:	4.88 meters
SOIL DESCRIPTION:	Brown Clayey Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	31
COHESION:	9 kPa

DRY DENSITY - kN/cu m	16.18		
INITIAL WATER CONTENT - %	18.1		
FINAL WATER CONTENT - %	18.6		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	68	118	236

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DIRECT SHEAR

CARSON FREEWAY

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PLATE

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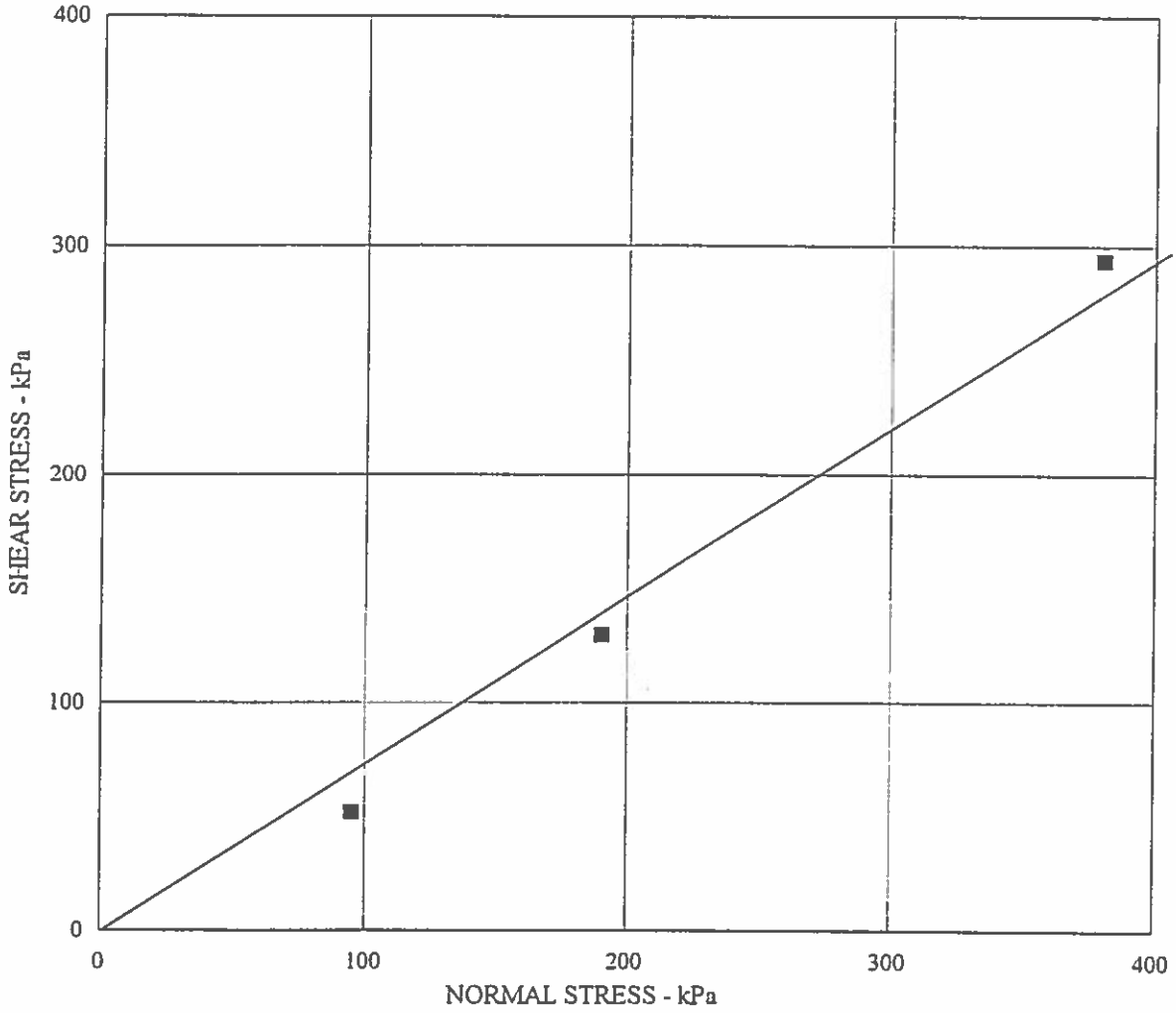
DIRECT SHEAR

BL-19 @ 4.88 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BL-19
DEPTH:	4.88 meters
SOIL DESCRIPTION:	Gr. Brown Silty Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	40
COHESION:	0 kPa

DRY DENSITY - kN/cu m	16.02		
INITIAL WATER CONTENT - %	18.9		
FINAL WATER CONTENT - %	19.7		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	52	130	294

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DIRECT SHEAR

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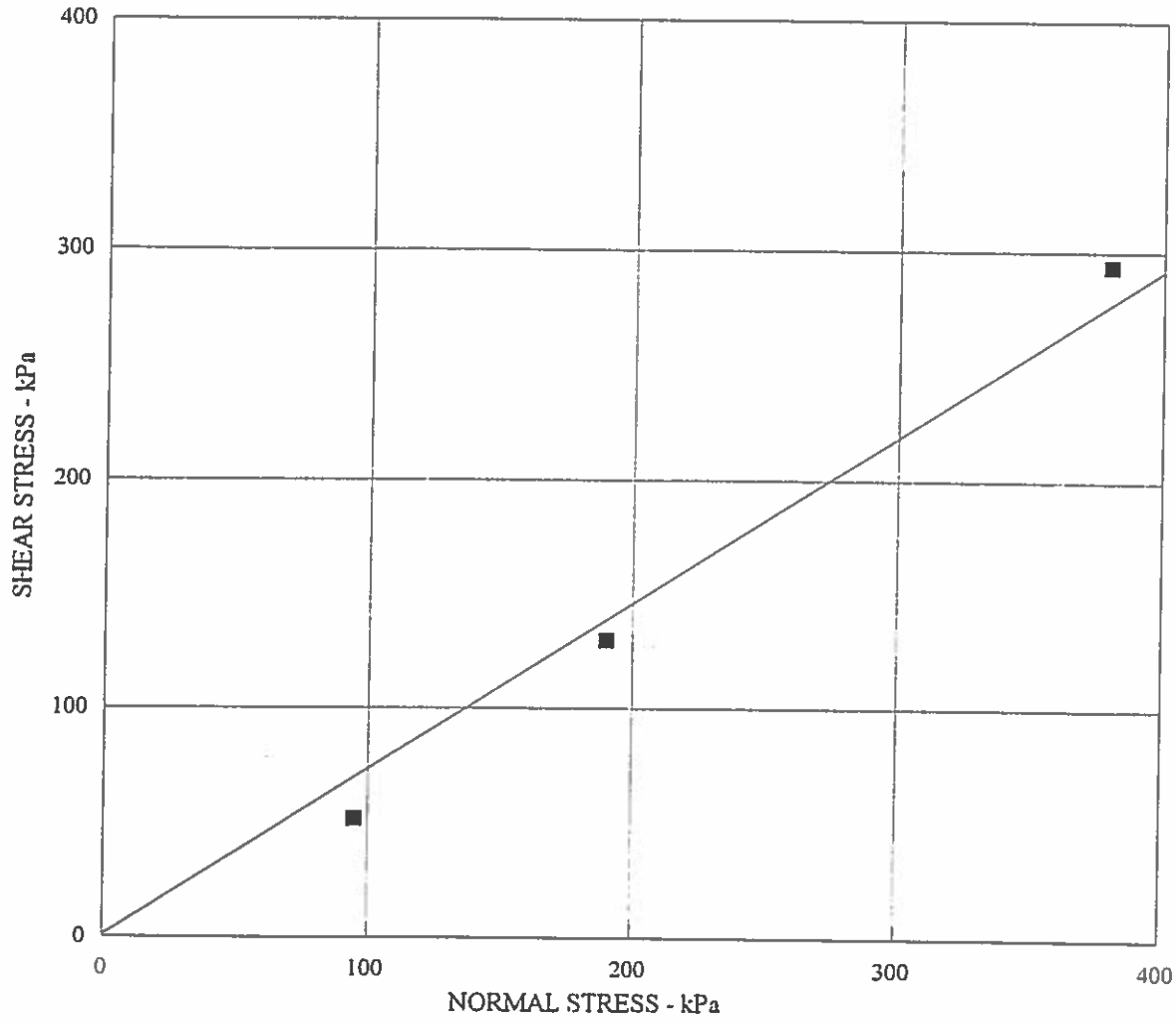
DIRECT SHEAR

BL-19 @ 4.88 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BL-19
DEPTH:	4.88 meters
SOIL DESCRIPTION:	Gr. Brown Silty Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	40
COHESION:	0 kPa

DRY DENSITY - kN/cu m	16.02		
INITIAL WATER CONTENT - %	18.9		
FINAL WATER CONTENT - %	19.7		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	52	130	294

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DIRECT SHEAR

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PLATE

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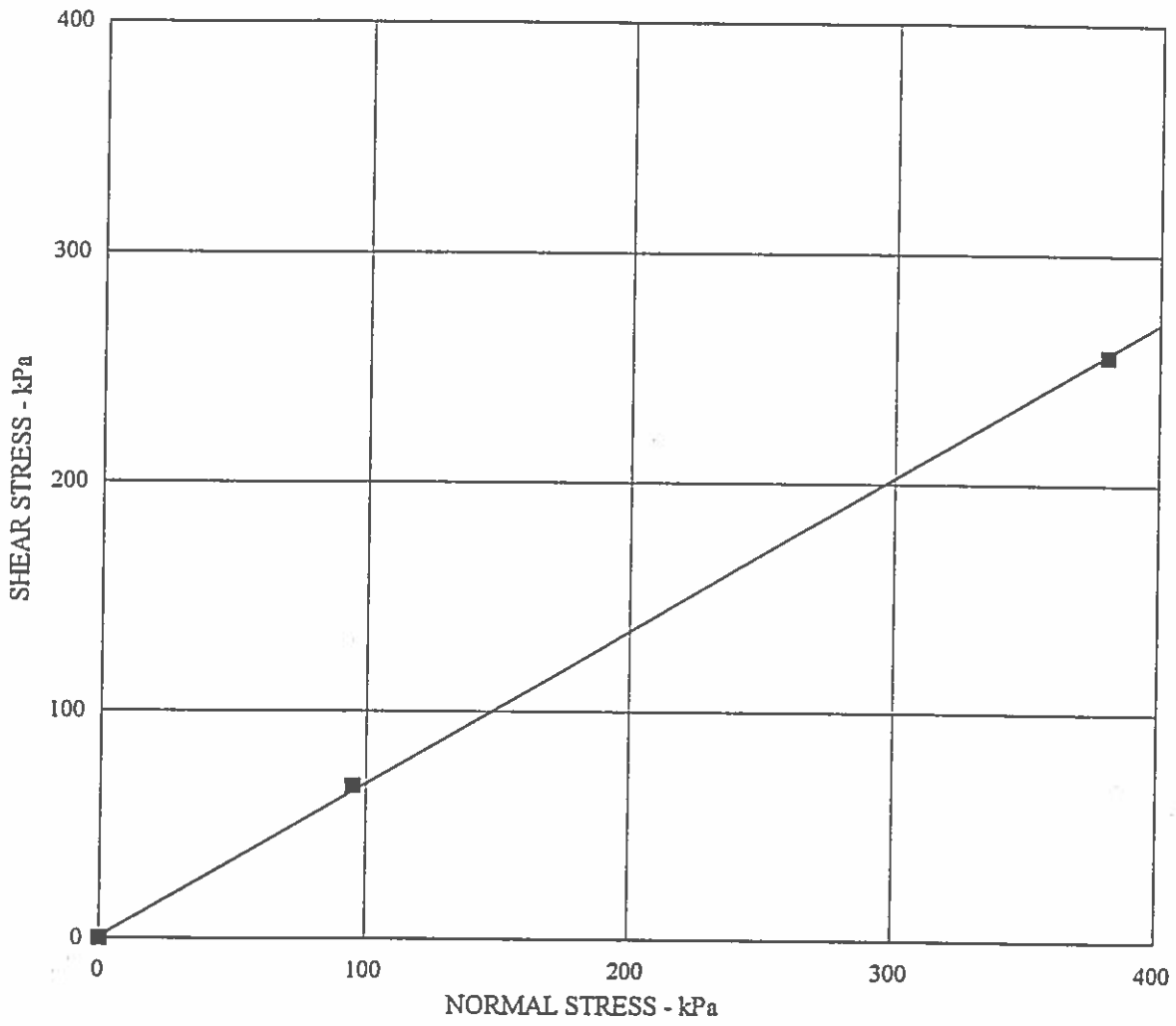
DIRECT SHEAR

BL-24 @ 4.88 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BL-24
DEPTH:	4.88 meters
SOIL DESCRIPTION:	Lt. Brown Clayey Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	33
COHESION:	4 kPa

DRY DENSITY - kN/cu m	15.71		
INITIAL WATER CONTENT - %	20.7		
FINAL WATER CONTENT - %	20.0		
NORMAL STRESS - kPa	95	380	
MAXIMUM STRESS - kPa	67	256	

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DIRECT SHEAR

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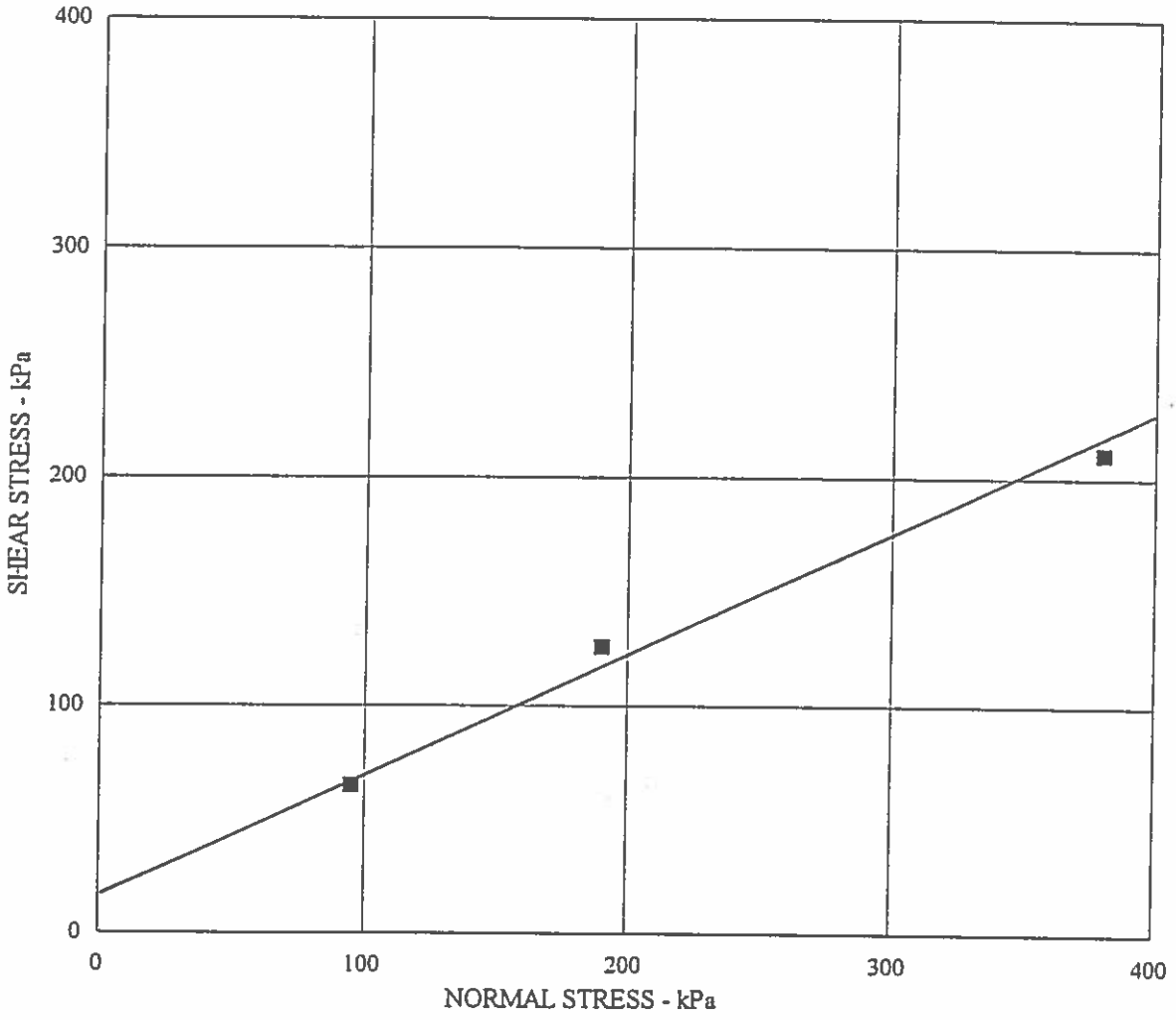
DIRECT SHEAR

BL-25 @ 1.83 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BL-25
DEPTH:	1.83 meters
SOIL DESCRIPTION:	Yellow Brown Sl. Silty Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	26
COHESION:	23 kPa

DRY DENSITY - kN/cu m	16.33		
INITIAL WATER CONTENT - %	16.5		
FINAL WATER CONTENT - %	18.7		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	65	126	211

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DIRECT SHEAR

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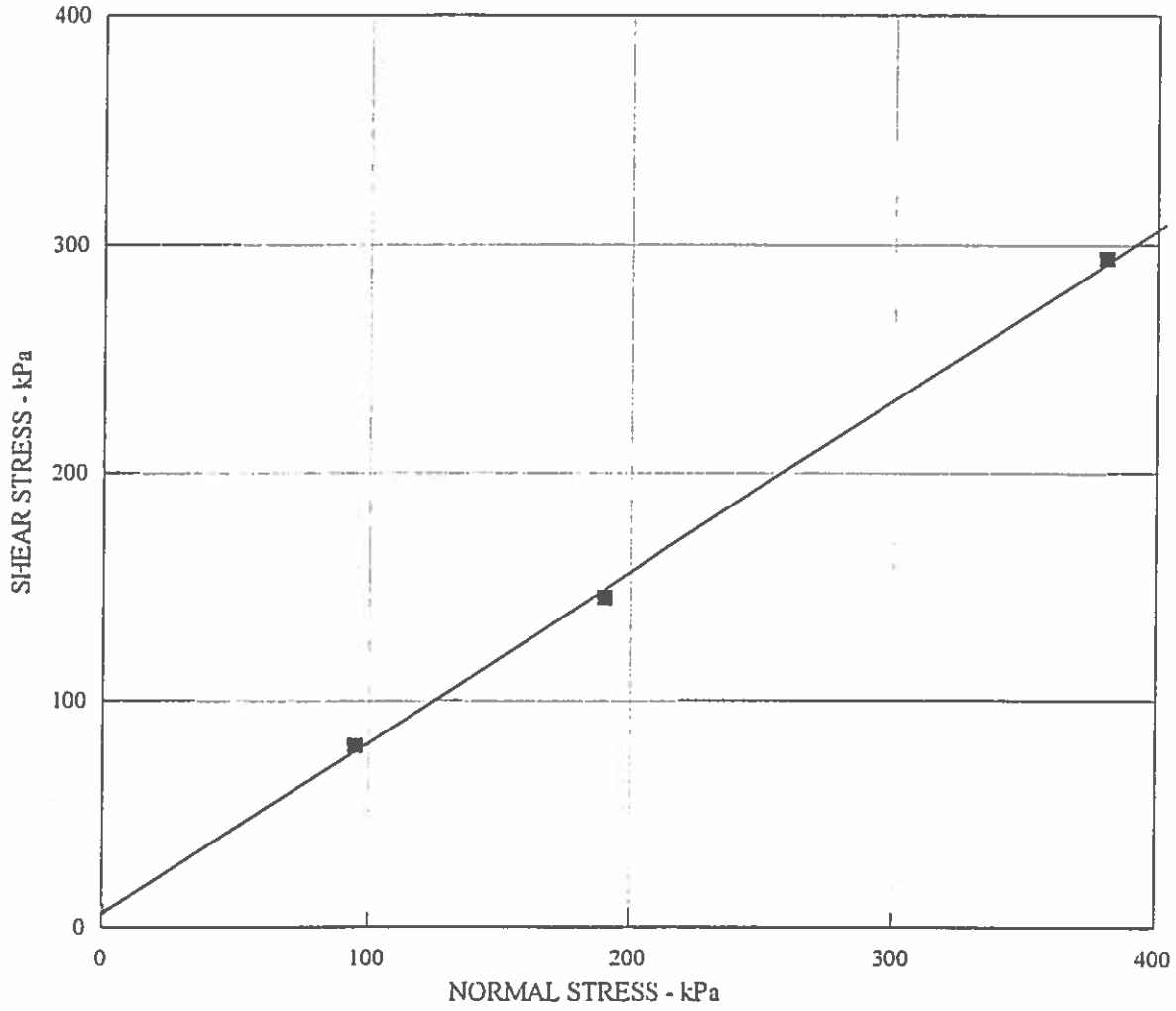
DIRECT SHEAR

BL-26 @ 3.35 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BL-26
DEPTH:	3.35 meters
SOIL DESCRIPTION:	Red Brown Sl. Silty Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	37
COHESION:	6 kPa

DRY DENSITY - kN/cu m	15.71		
INITIAL WATER CONTENT - %	15.7		
FINAL WATER CONTENT - %	19.1		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	80	145	294

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DIRECT SHEAR

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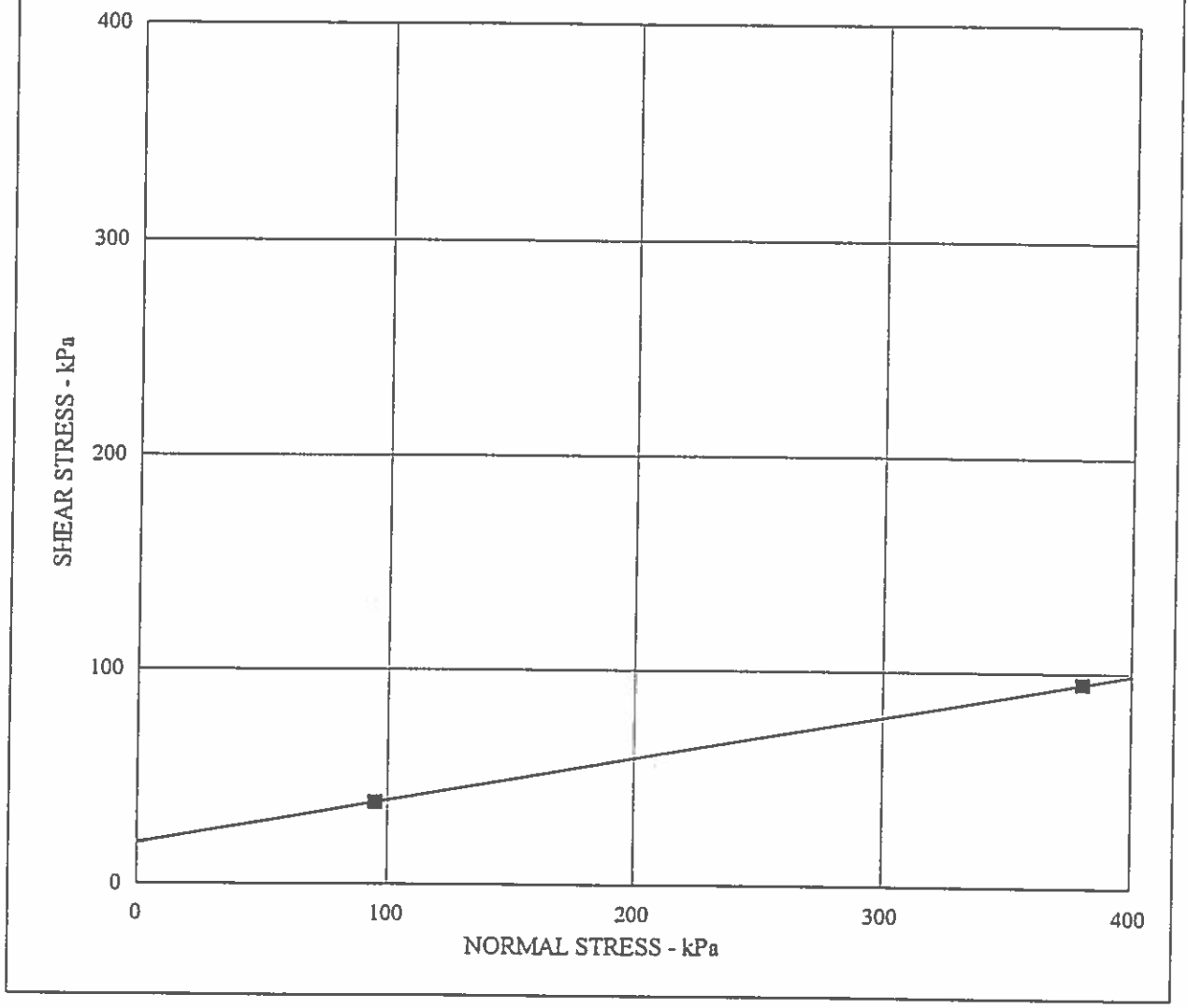
DIRECT SHEAR

BL-32 @ 6.40 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BL-32
DEPTH:	6.40 meters
SOIL DESCRIPTION:	Red Brown Silty Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	8
COHESION:	64 kPa

DRY DENSITY - kN/cu m	13.04		
INITIAL WATER CONTENT - %	11.3		
FINAL WATER CONTENT - %	20.4		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	38	148	95

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DIRECT SHEAR

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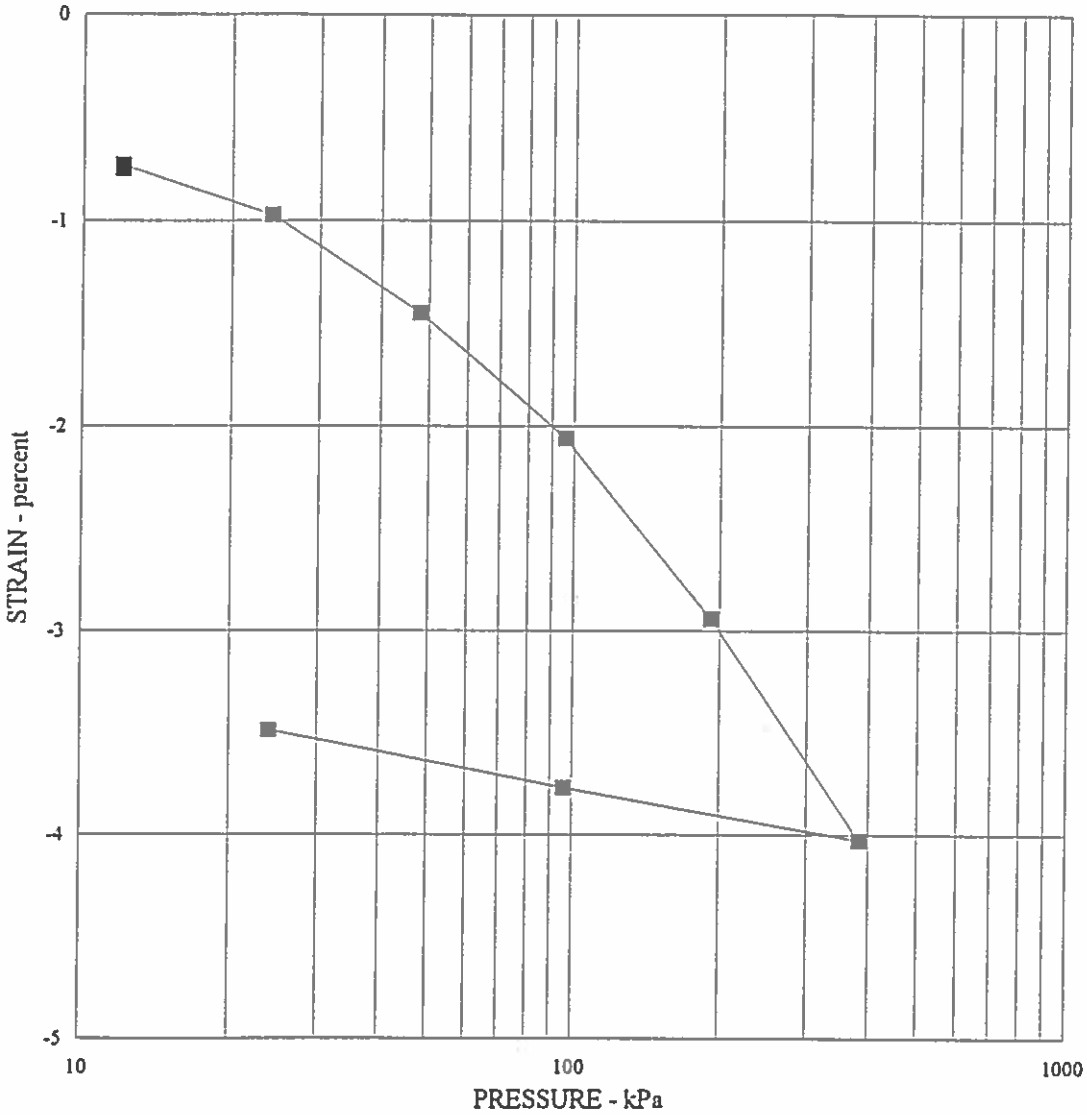

BORING NO.: BL-6	DEPTH:	1.83 m
SAMPLE DESCRIPTION Light Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		33
PRECONSOLIDATION PRESSURE, kPa		58

	INITIAL	FINAL
DRY DENSITY - kN/cu m	16.43	17.03
WATER CONTENT - %	20.8	20.0
VOID RATIO	0.5983	0.5393
DEGREE OF SATURATION, %	93.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.45

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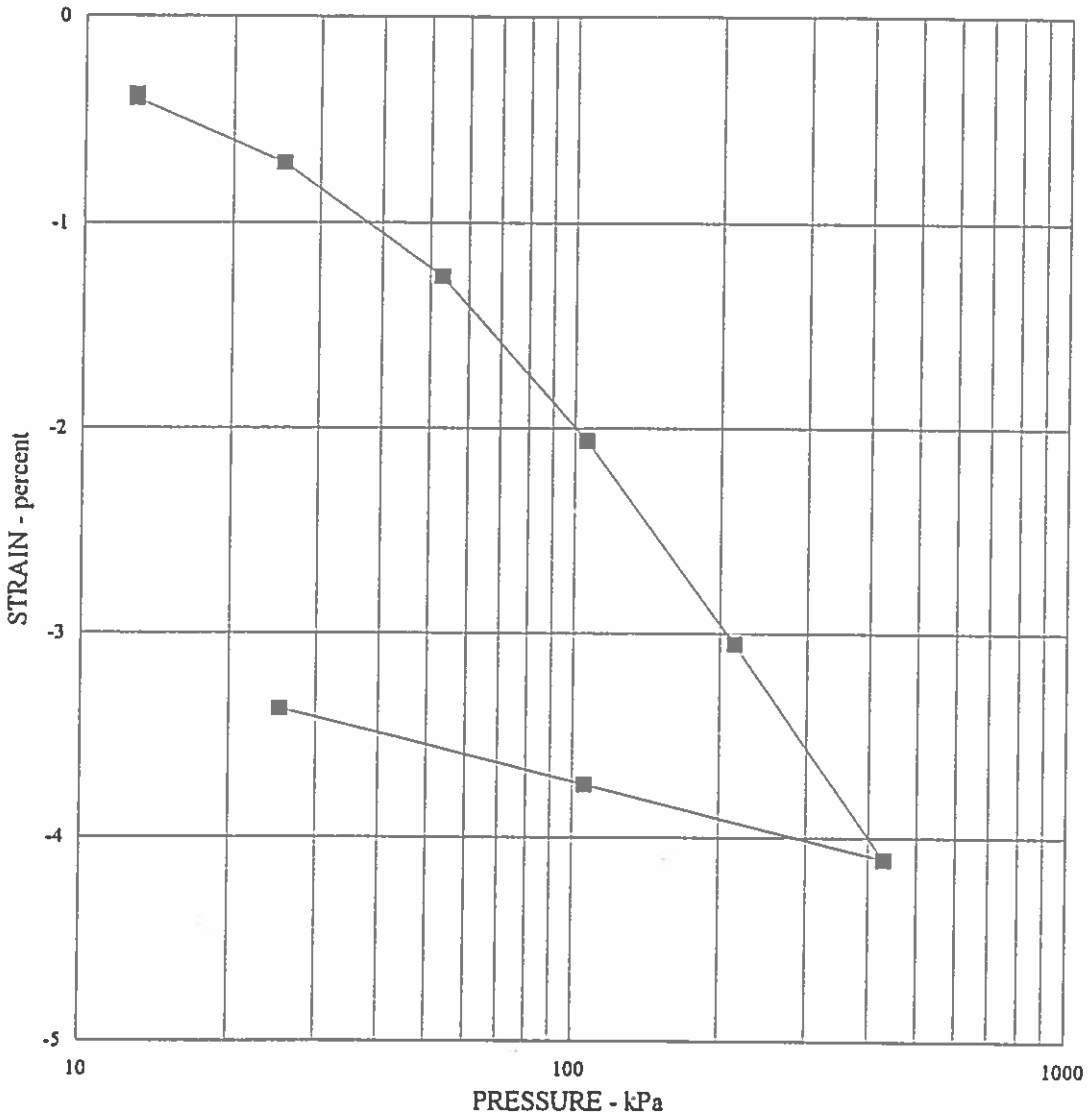

BORING NO.: BL-9	DEPTH:	1.83 m
SAMPLE DESCRIPTION Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		33
PRECONSOLIDATION PRESSURE, kPa		43

	INITIAL	FINAL
DRY DENSITY - kN/cu m	18.38	20.17
WATER CONTENT - %	8.0	15.3
VOID RATIO	0.4197	0.3810
DEGREE OF SATURATION, %	47.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.46

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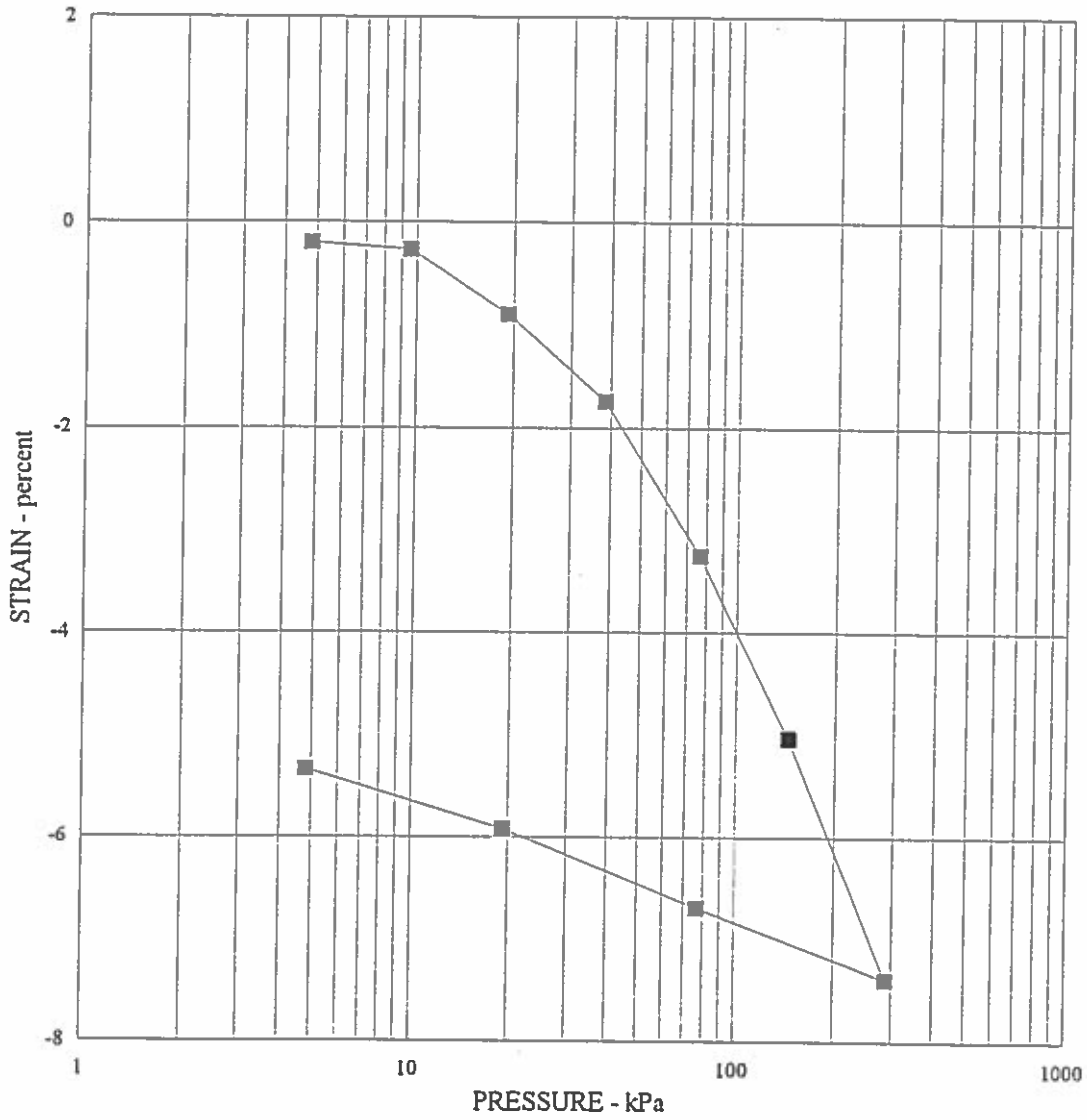

BORING NO.: BL-11	DEPTH:	6.40 m
SAMPLE DESCRIPTION Lt Brown Sl. Sandy Clay		
OVERBURDEN PRESSURE, kPa		100
PRECONSOLIDATION PRESSURE, kPa		38

	INITIAL	FINAL
DRY DENSITY - kN/cu m	15.06	16.26
WATER CONTENT - %	24.2	27.7
VOID RATIO	1.0121	0.8660
DEGREE OF SATURATION, %	74.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.49

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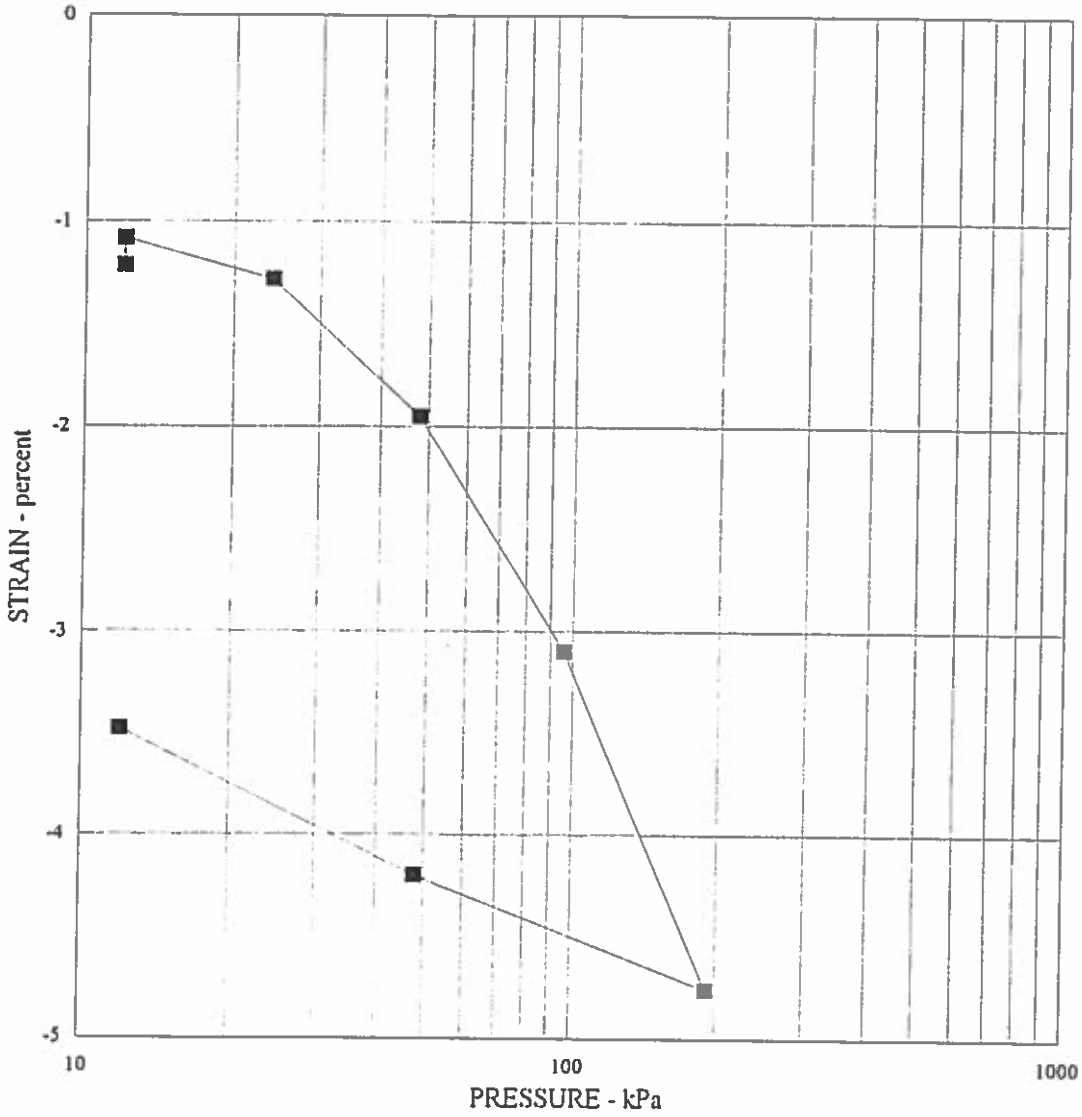

BORING NO.: BL-15	DEPTH:	1.83 m
SAMPLE DESCRIPTION Yellow Brown Sandy Clay		
OVERBURDEN PRESSURE, kPa		28
PRECONSOLIDATION PRESSURE, kPa		38

	INITIAL	FINAL
DRY DENSITY - kN/cu m	14.84	15.38
WATER CONTENT - %	24.7	26.7
VOID RATIO	0.7990	0.7343
DEGREE OF SATURATION, %	84.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.45

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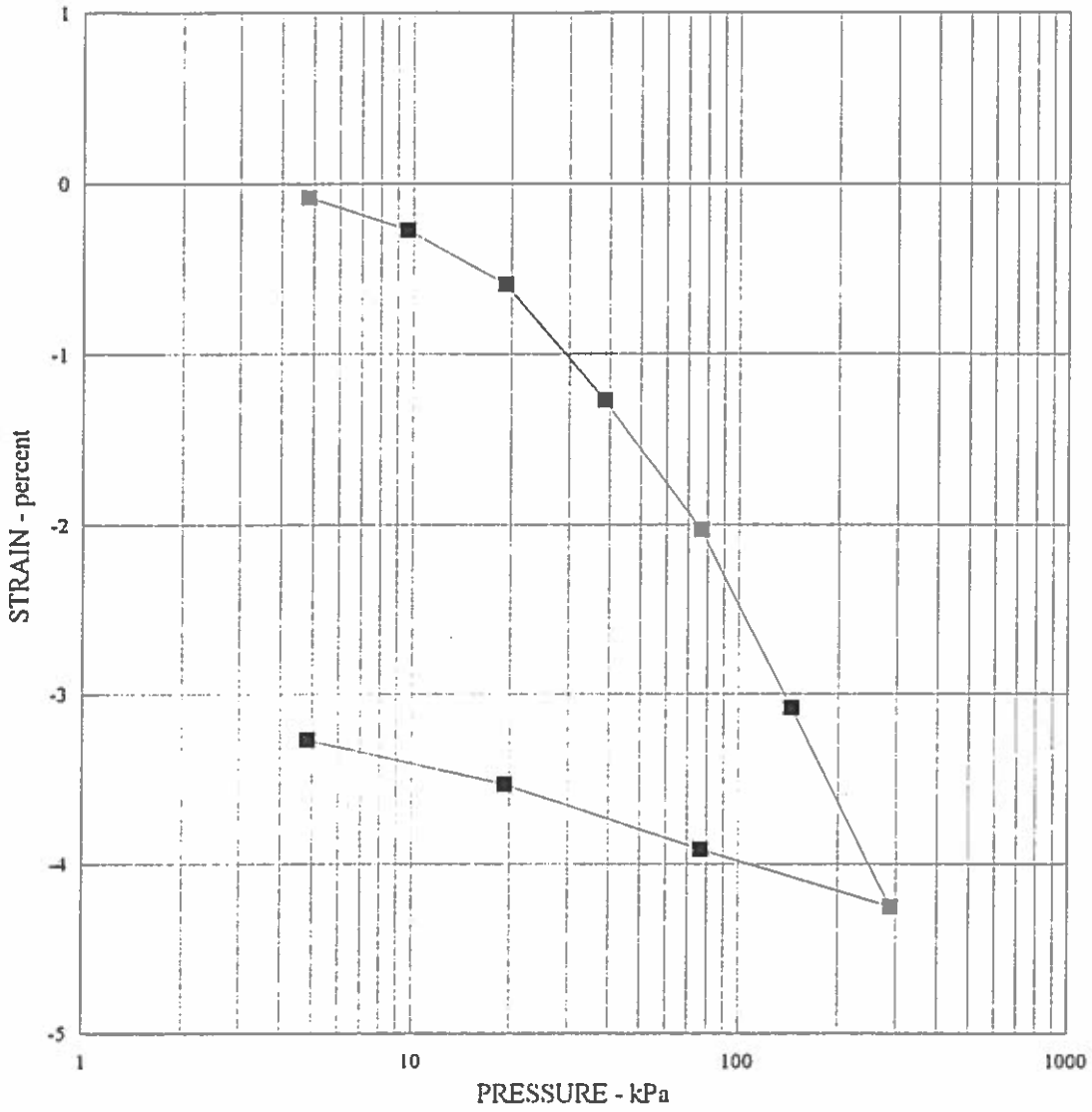

BORING NO.: BL-16	DEPTH:	1.83 m
SAMPLE DESCRIPTION Lt. Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		33
PRECONSOLIDATION PRESSURE, kPa		36

	INITIAL	FINAL
DRY DENSITY - kN/cu m	19.02	17.84
WATER CONTENT - %	5.6	21.5
VOID RATIO	1.0671	0.8691
DEGREE OF SATURATION, %	21.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.54

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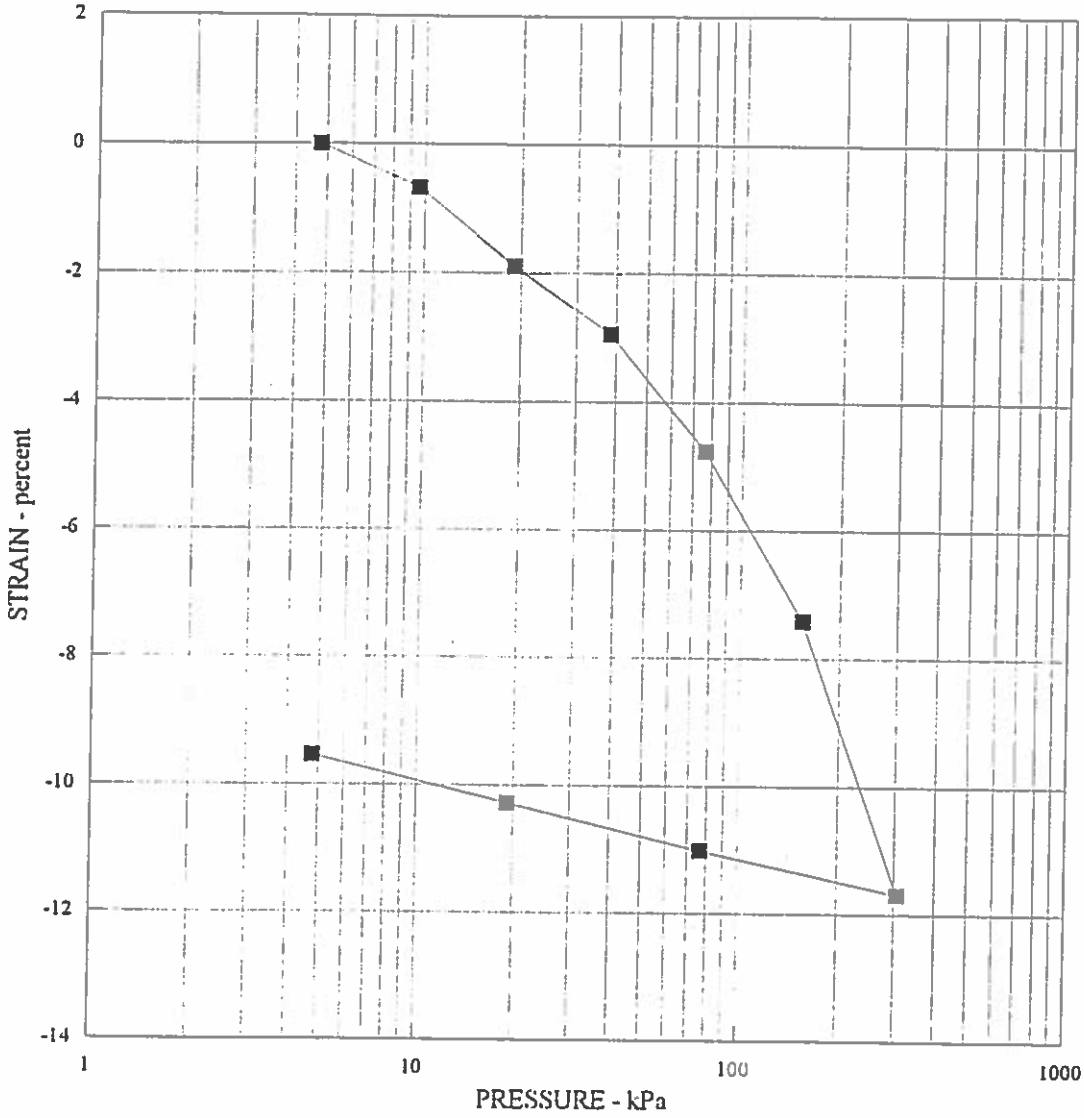

BORING NO.: BL-17	DEPTH:	4.88
SAMPLE DESCRIPTION Lt. Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		77
PRECONSOLIDATION PRESSURE, kPa		50

	INITIAL	FINAL
DRY DENSITY - kN/cu m	13.63	15.44
WATER CONTENT - %	30.0	30.2
VOID RATIO	1.1816	0.9251
DEGREE OF SATURATION, %	77.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.45

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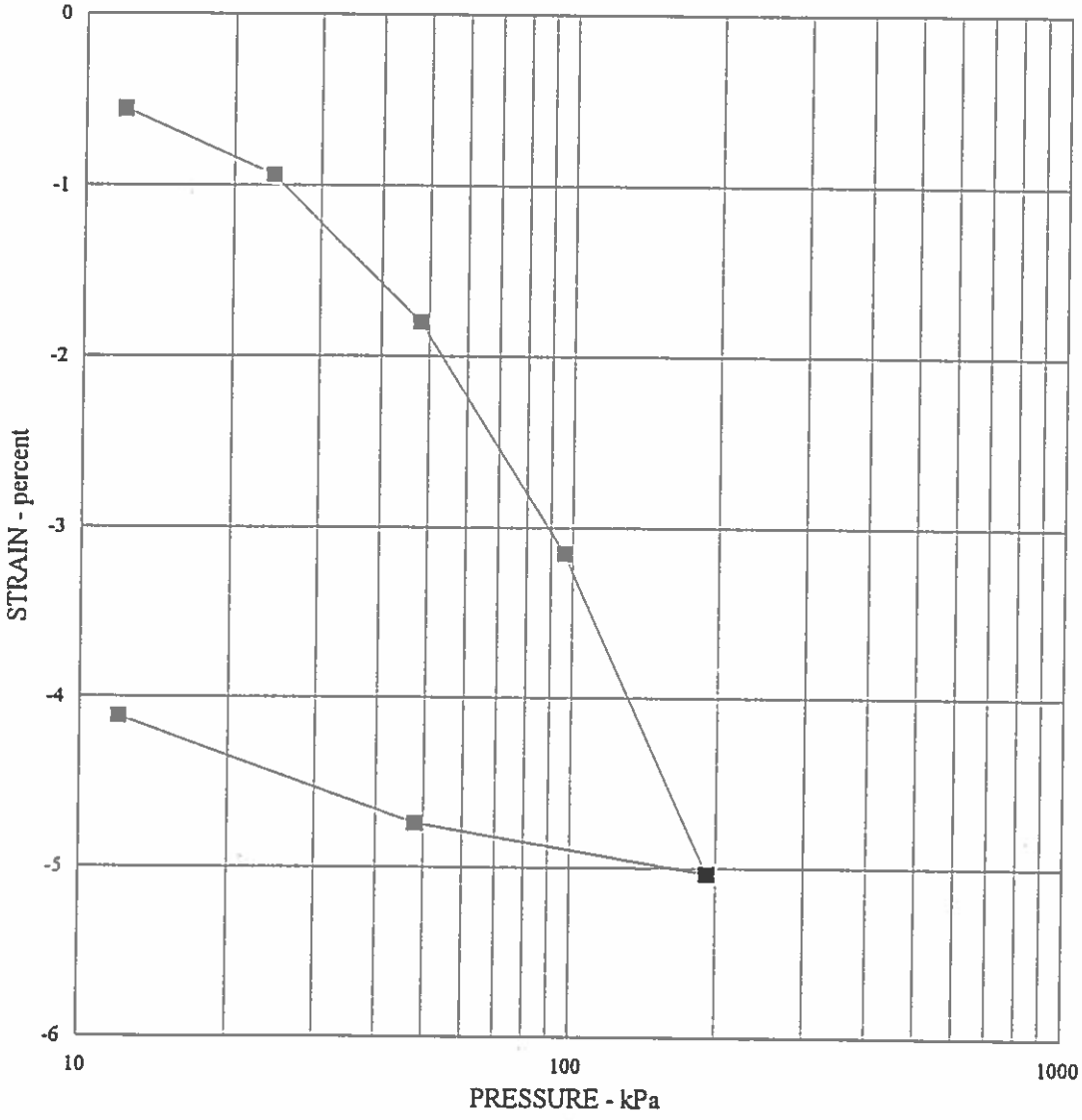

BORING NO.: BL-19	DEPTH:	6.4
SAMPLE DESCRIPTION Lt. Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		116
PRECONSOLIDATION PRESSURE, kPa		41

	INITIAL	FINAL
DRY DENSITY - kN/cu m	12.56	13.11
WATER CONTENT - %	39.6	37.3
VOID RATIO	1.1024	1.0182
DEGREE OF SATURATION, %	97.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.44

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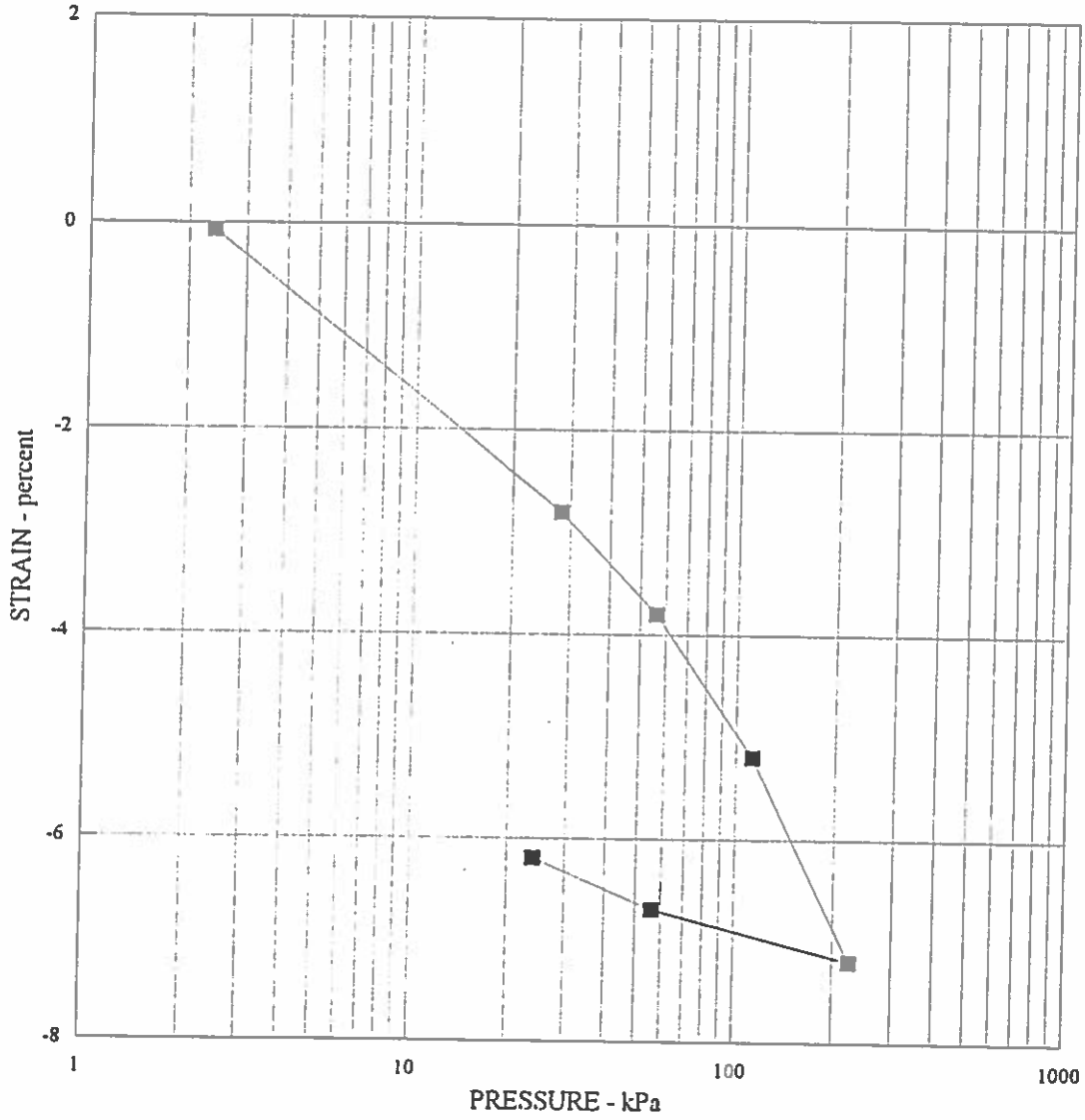

BORING NO.: BL-20	DEPTH:	3.96 m
SAMPLE DESCRIPTION Lt. Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		59
PRECONSOLIDATION PRESSURE, kPa		48

	INITIAL	FINAL
DRY DENSITY - kN/cu m	9.27	NA
WATER CONTENT - %	20.0	NA
VOID RATIO	NA	NA
DEGREE OF SATURATION, %	NA	NA
SAMPLE HEIGHT - cm	2.5400	2.45

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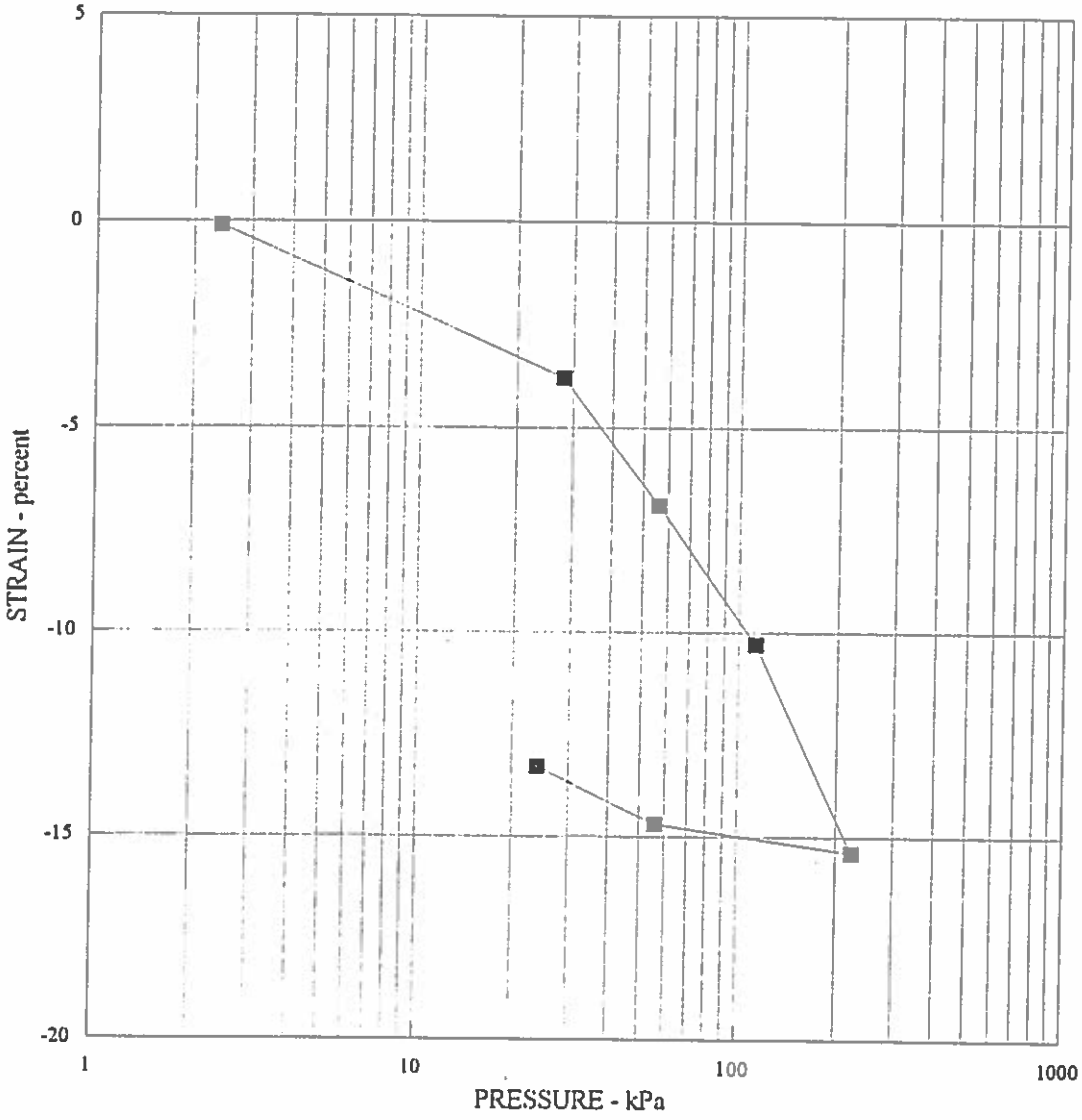

BORING NO.: BL-20A	DEPTH:	8.53 m
SAMPLE DESCRIPTION Lt. Brown Very Sandy Clay		
OVERBURDEN PRESSURE, kPa		160
PRECONSOLIDATION PRESSURE, kPa		67

	INITIAL	FINAL
DRY DENSITY - kN/cu m	6.44	NA
WATER CONTENT - %	41.0	NA
VOID RATIO	NA	NA
DEGREE OF SATURATION, %	NA	NA
SAMPLE HEIGHT - cm	2.5400	2.45

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PLATE

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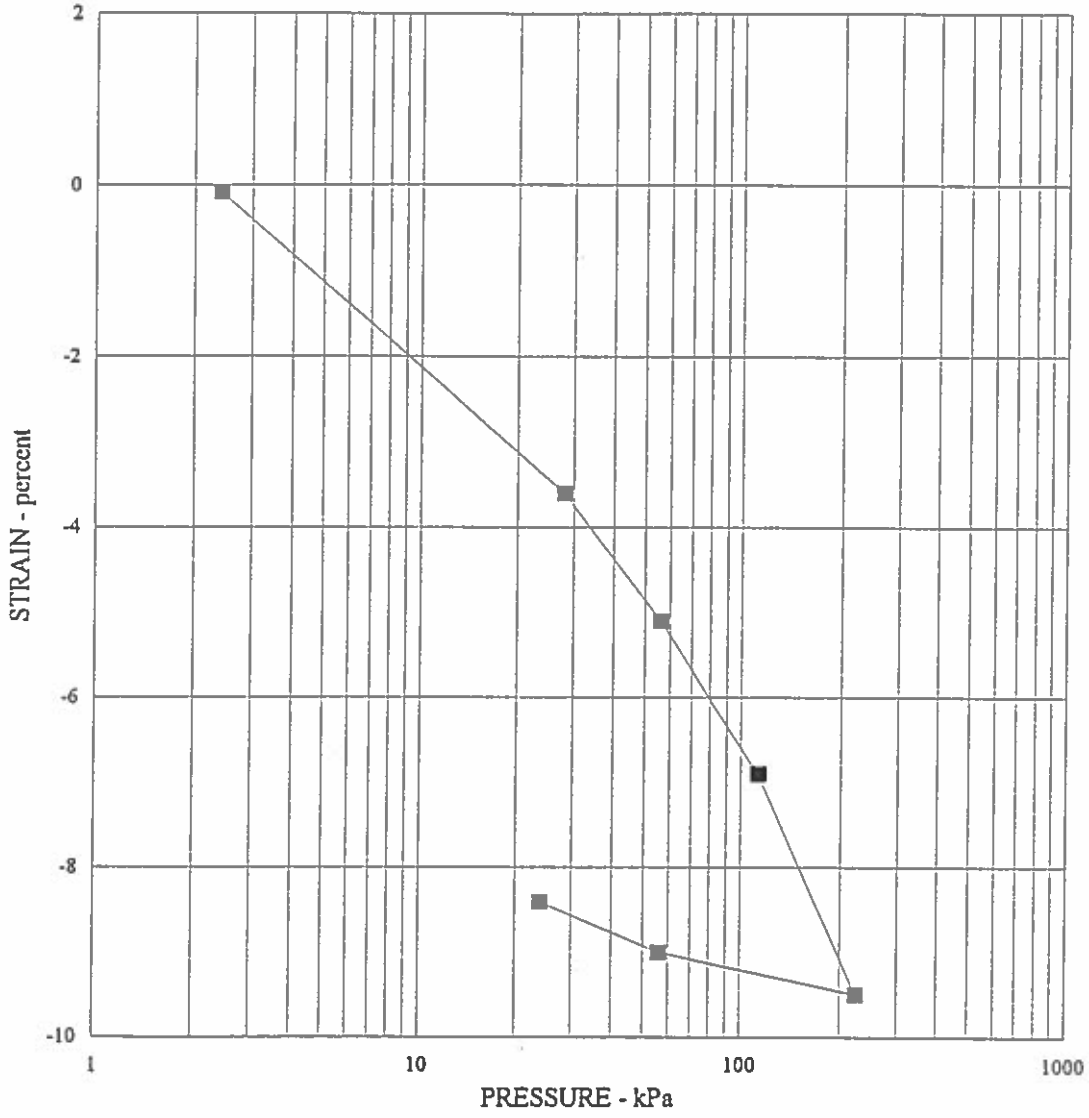

BORING NO.: BL-21	DEPTH:	6.40 m
SAMPLE DESCRIPTION Lt. Brown Sandy Clay		
OVERBURDEN PRESSURE, kPa		105
PRECONSOLIDATION PRESSURE, kPa		38

	INITIAL	FINAL
DRY DENSITY - kN/cu m	8.95	NA
WATER CONTENT - %	20.0	NA
VOID RATIO	NA	NA
DEGREE OF SATURATION, %	NA	NA
SAMPLE HEIGHT - cm	2.5400	2.45

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CONSOLIDATION TEST

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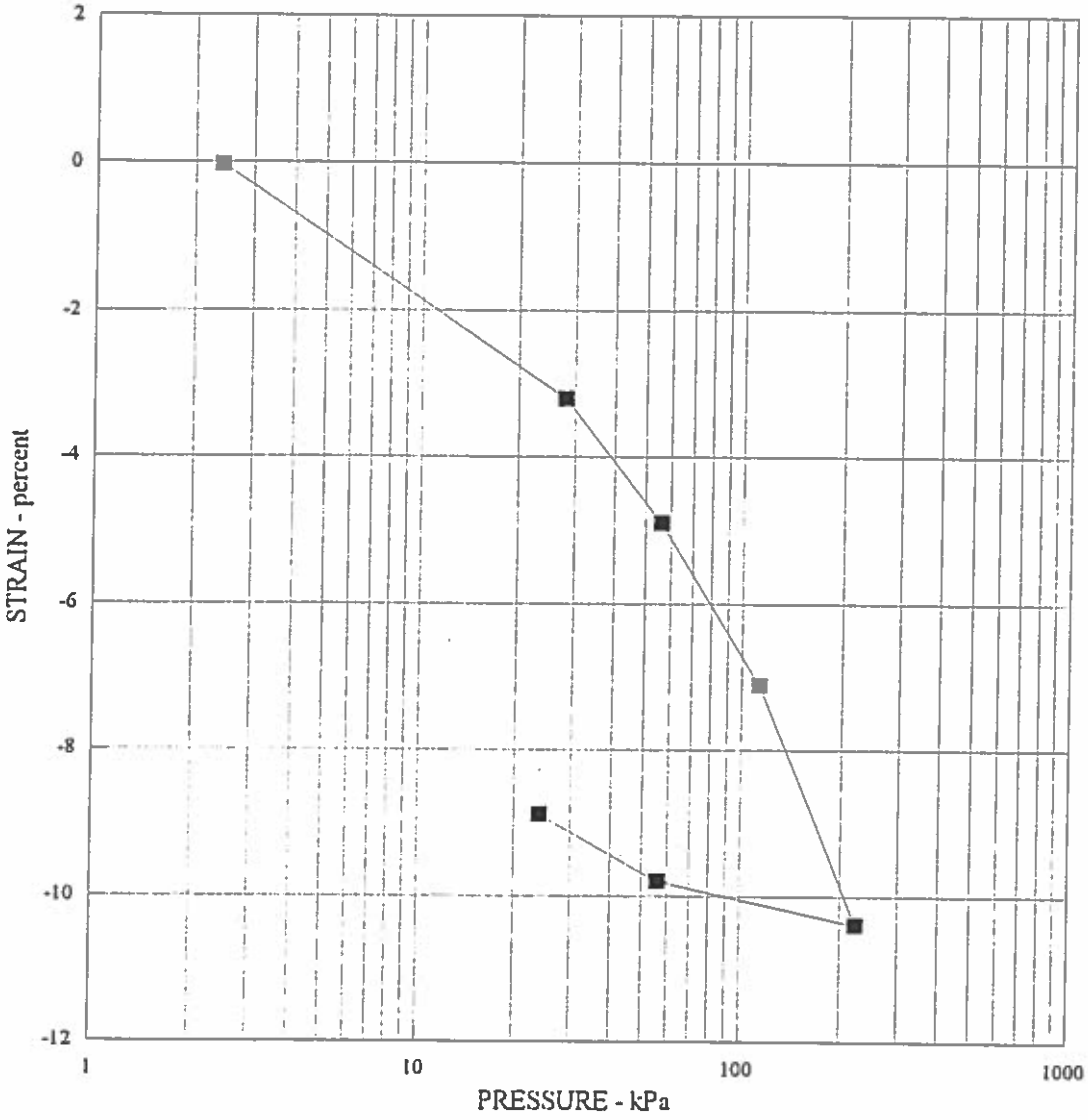
CARSON CITY, NEVADA

PLATE

C-77



BORING NO.: BL-21A	DEPTH:	8.53 m
SAMPLE DESCRIPTION Lt. Brown Sandy Clay		
OVERBURDEN PRESSURE, kPa		145
PRECONSOLIDATION PRESSURE, kPa		72

	INITIAL	FINAL
DRY DENSITY - kN/cu m	6.13	NA
WATER CONTENT - %	41.0	NA
VOID RATIO	NA	NA
DEGREE OF SATURATION, %	NA	NA
SAMPLE HEIGHT - cm	2.5400	2.45

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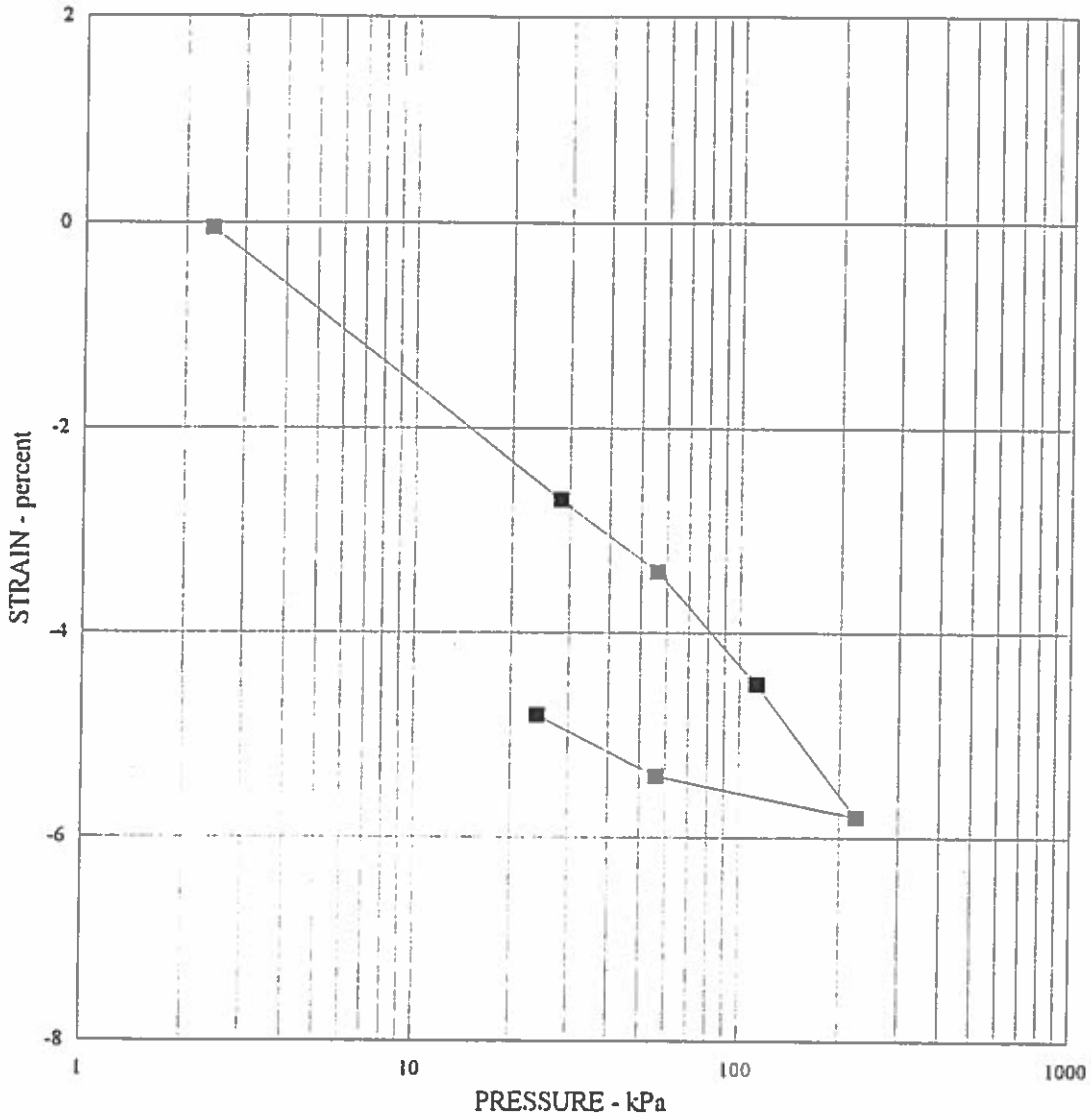
PLATE

C-78



BORING NO.: BL-22	DEPTH:	1.83
SAMPLE DESCRIPTION Lt. Brown Sandy Silt		
OVERBURDEN PRESSURE, kPa		29
PRECONSOLIDATION PRESSURE, kPa		24

	INITIAL	FINAL
DRY DENSITY - kN/cu m	9.89	NA
WATER CONTENT - %	7.0	NA
VOID RATIO	NA	NA
DEGREE OF SATURATION, %	NA	NA
SAMPLE HEIGHT - cm	2.5400	2.45

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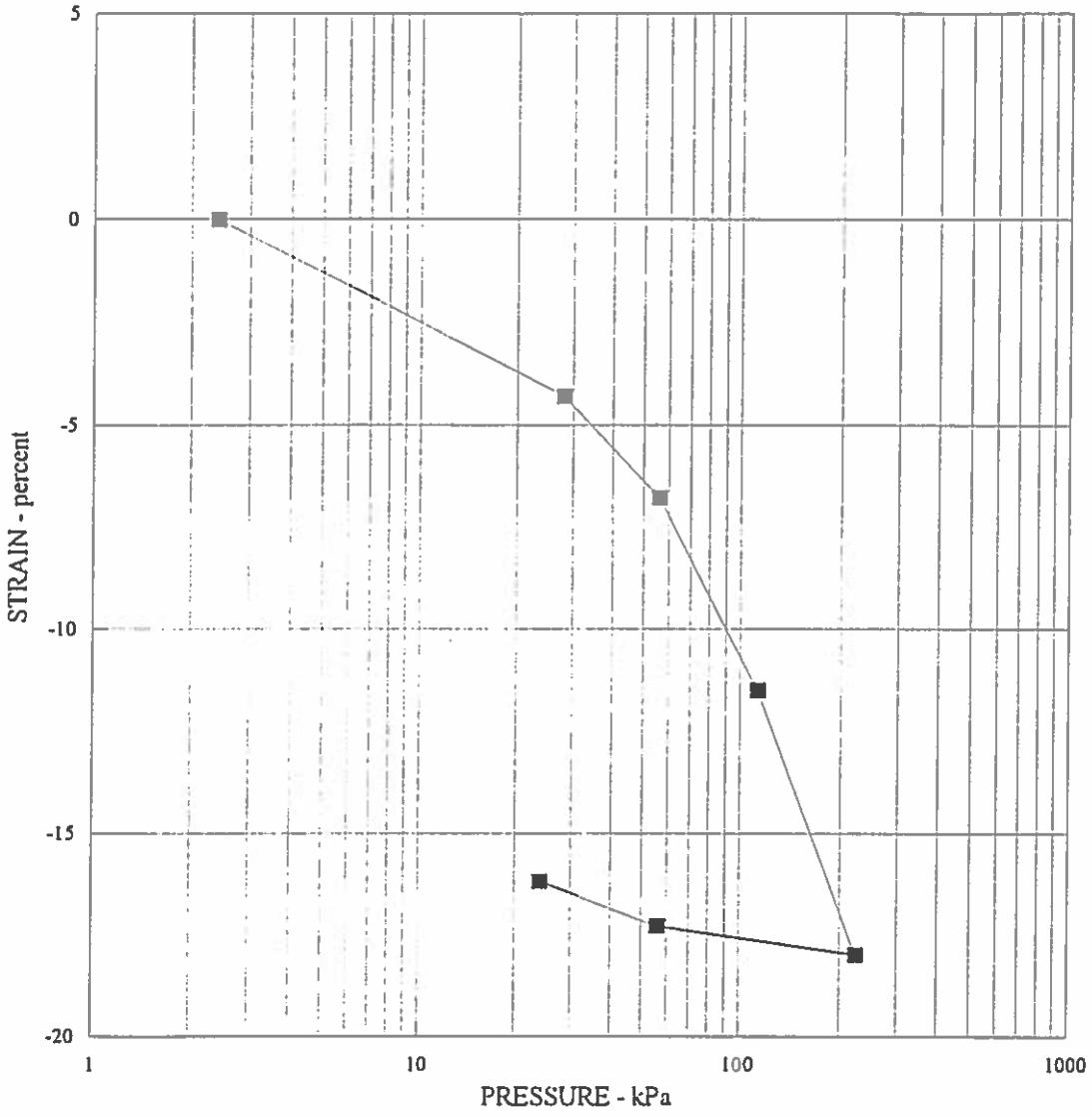
PLATE

C-79



BORING NO.: BL-23	DEPTH:	8.84 m
SAMPLE DESCRIPTION Lt. Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		132
PRECONSOLIDATION PRESSURE, kPa		72

	INITIAL	FINAL
DRY DENSITY - kN/cu m	5.97	NA
WATER CONTENT - %	48.0	NA
VOID RATIO	NA	NA
DEGREE OF SATURATION, %	NA	NA
SAMPLE HEIGHT - cm	2.5400	2.45

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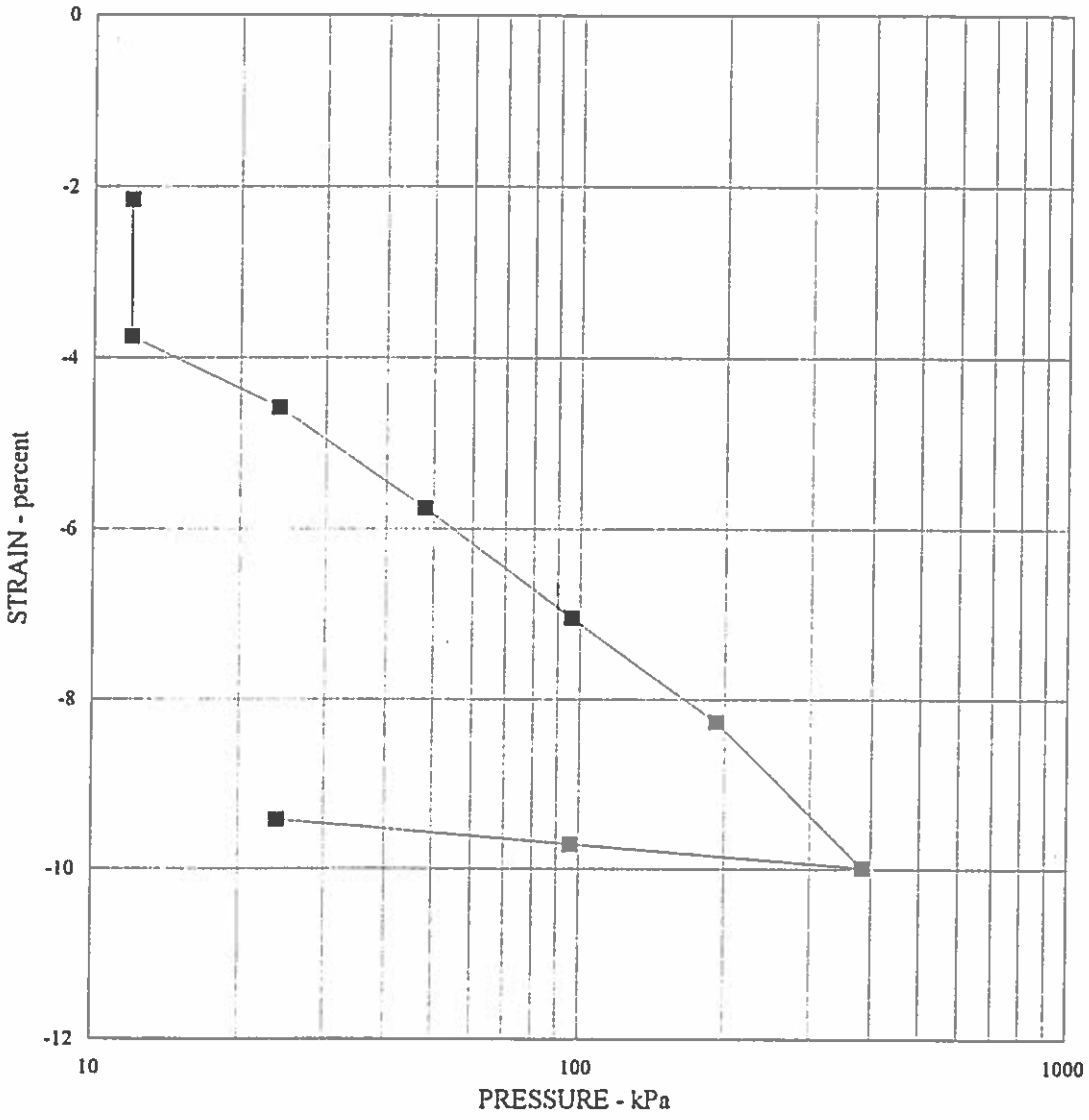

BORING NO.: BL-27	DEPTH:	1.83 m
SAMPLE DESCRIPTION Lt. Brown Sl. Silty Sand		
OVERBURDEN PRESSURE, kPa		32
PRECONSOLIDATION PRESSURE, kPa		29

	INITIAL	FINAL
DRY DENSITY - kN/cu m	15.5	17.12
WATER CONTENT - %	4.6	19.2
VOID RATIO	0.6717	0.5137
DEGREE OF SATURATION, %	18.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.3

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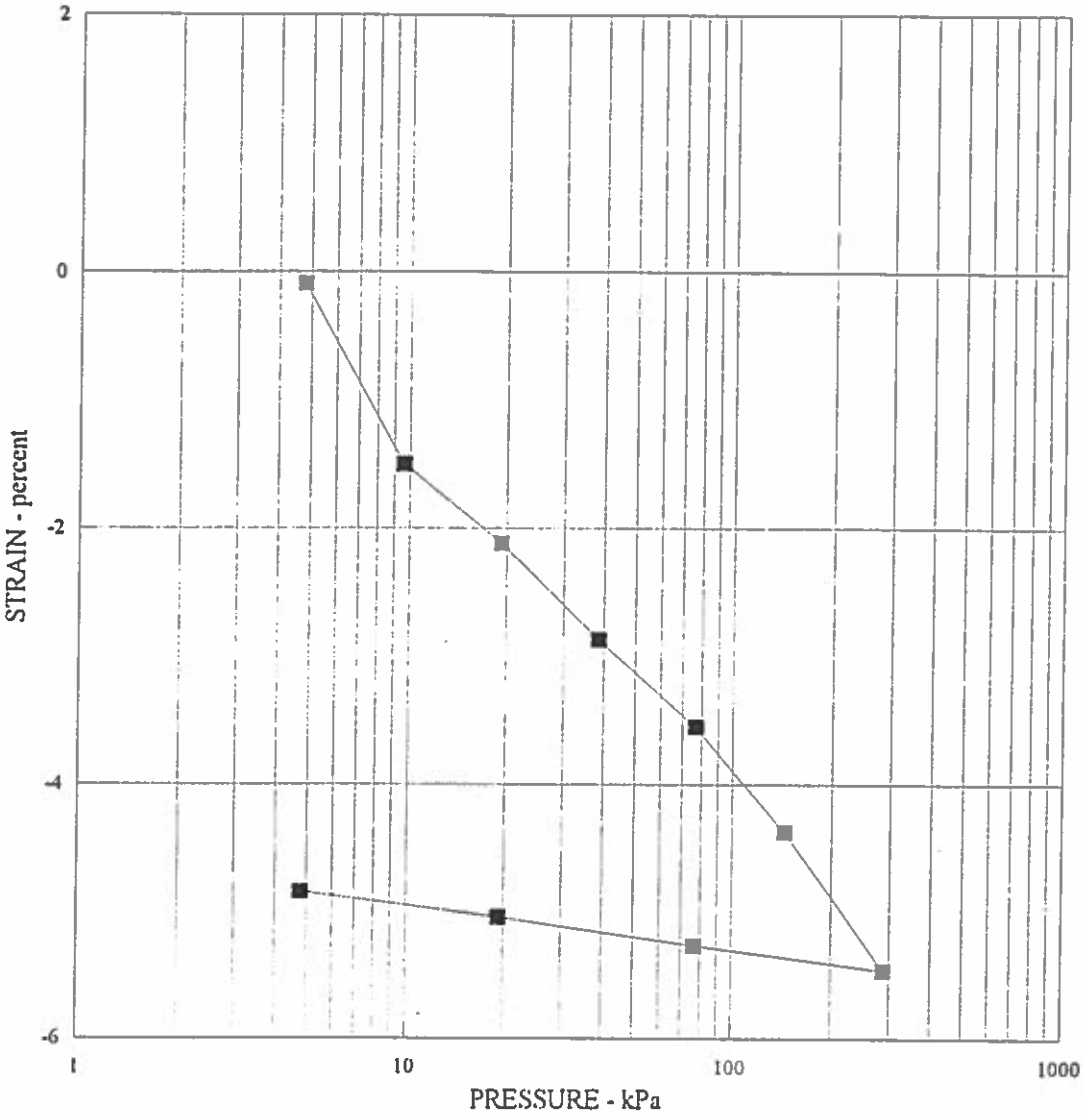
PROJECT NO. 30-1348-15.002

PLATE

C-81



BORING NO.: BL-28	DEPTH:	1.83 m
SAMPLE DESCRIPTION Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		31
PRECONSOLIDATION PRESSURE, kPa		12

	INITIAL	FINAL
DRY DENSITY - kN/ cu m	15.17	16.08
WATER CONTENT - %	7.2	17.7
VOID RATIO	0.5067	0.4152
DEGREE OF SATURATION, %	33.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.5

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PLATE

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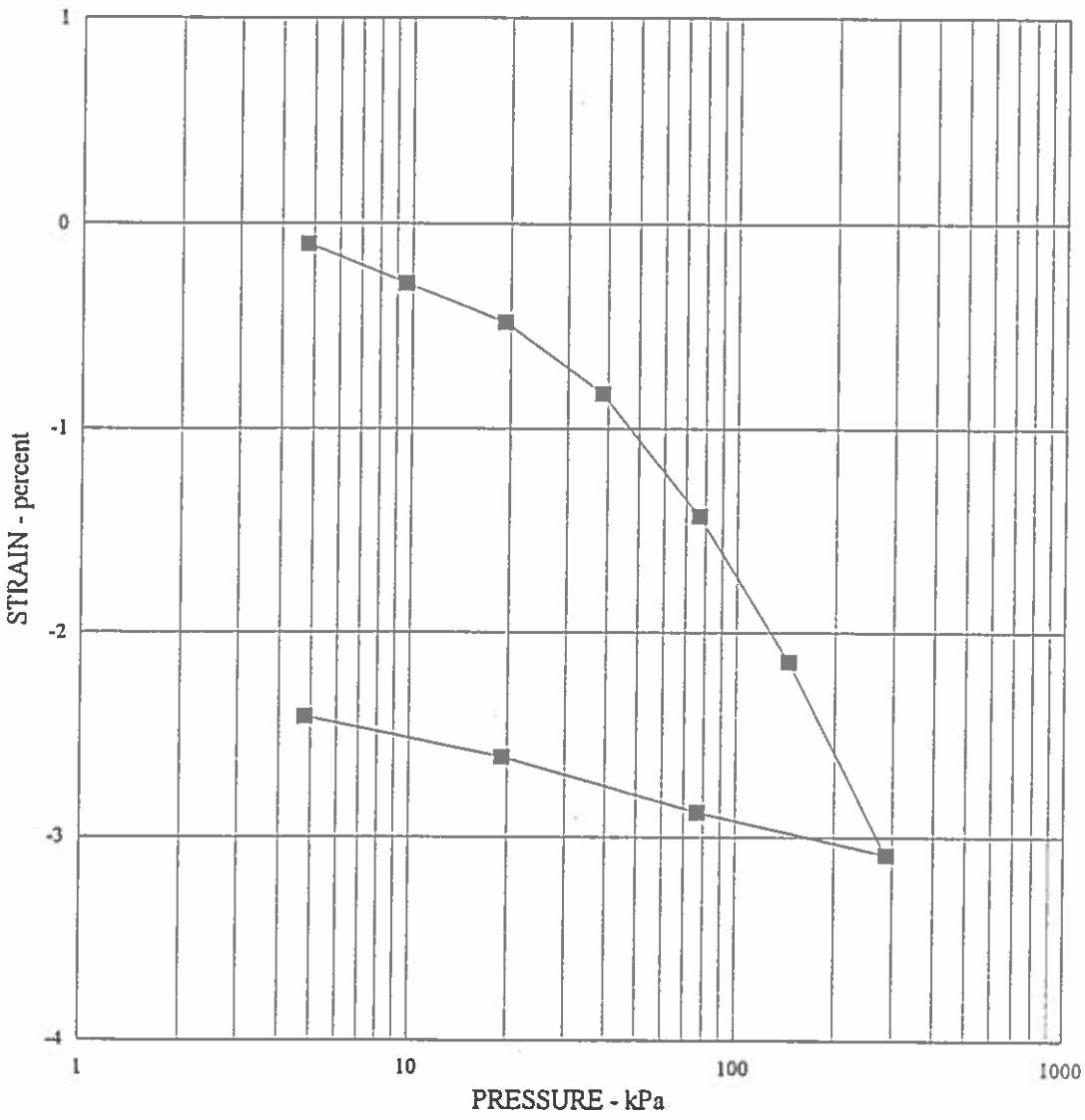

BORING NO.: BL-29	DEPTH:	1.83 m
SAMPLE DESCRIPTION Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		29
PRECONSOLIDATION PRESSURE, kPa		48

	INITIAL	FINAL
DRY DENSITY - kN/cu m	16.44	16.9
WATER CONTENT - %	11.9	17.7
VOID RATIO	0.4863	0.4457
DEGREE OF SATURATION, %	61.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.56

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CONSOLIDATION TEST

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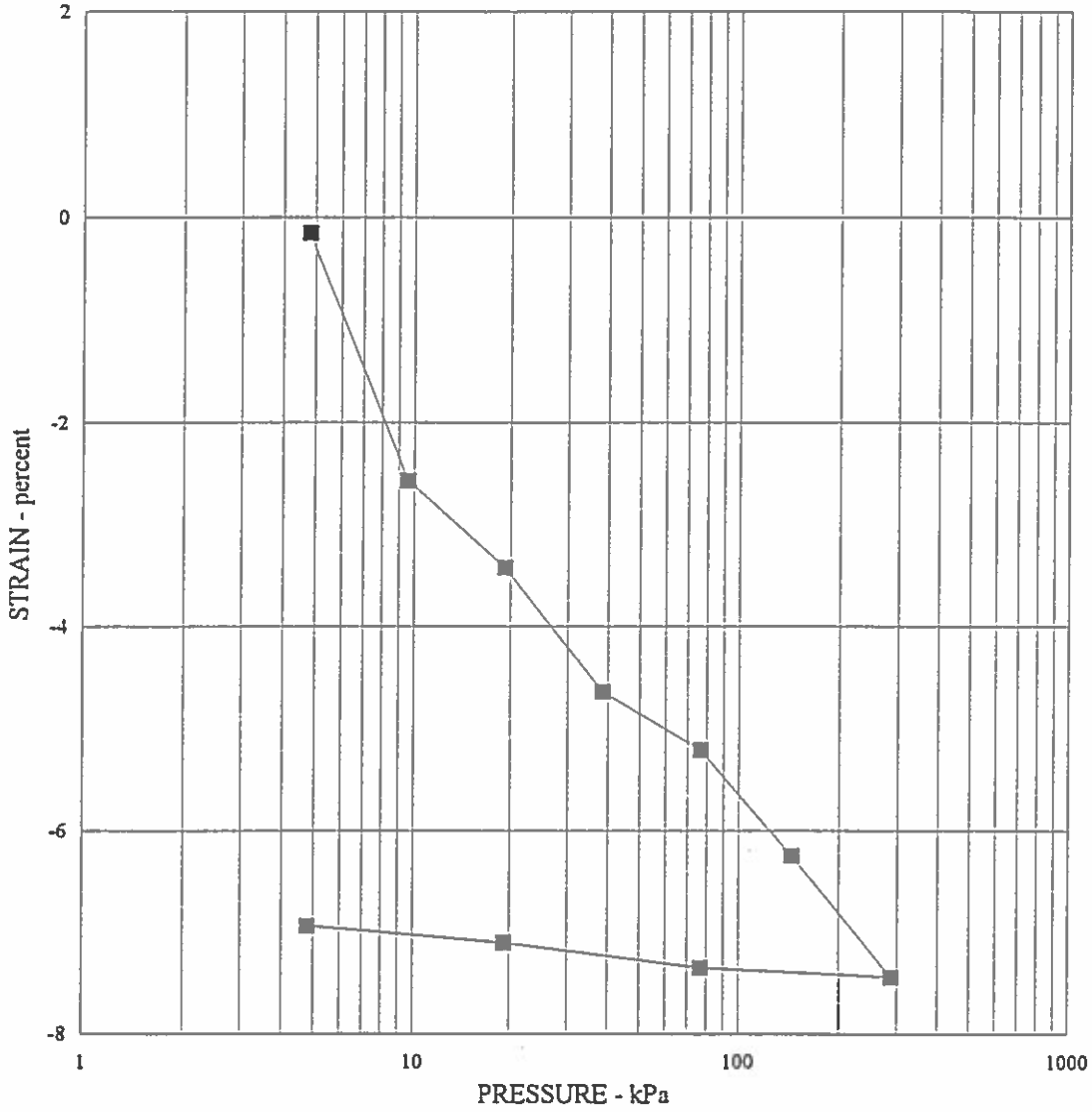
PLATE

C-83



BORING NO.: BL-30	DEPTH:	1.83 m
SAMPLE DESCRIPTION Light Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		30
PRECONSOLIDATION PRESSURE, kPa		5

	INITIAL	FINAL
DRY DENSITY - kN/cu m	14.39	15.71
WATER CONTENT - %	6.4	19.2
VOID RATIO	0.5953	0.4510
DEGREE OF SATURATION, %	25.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.45

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CARSON FREEWAY

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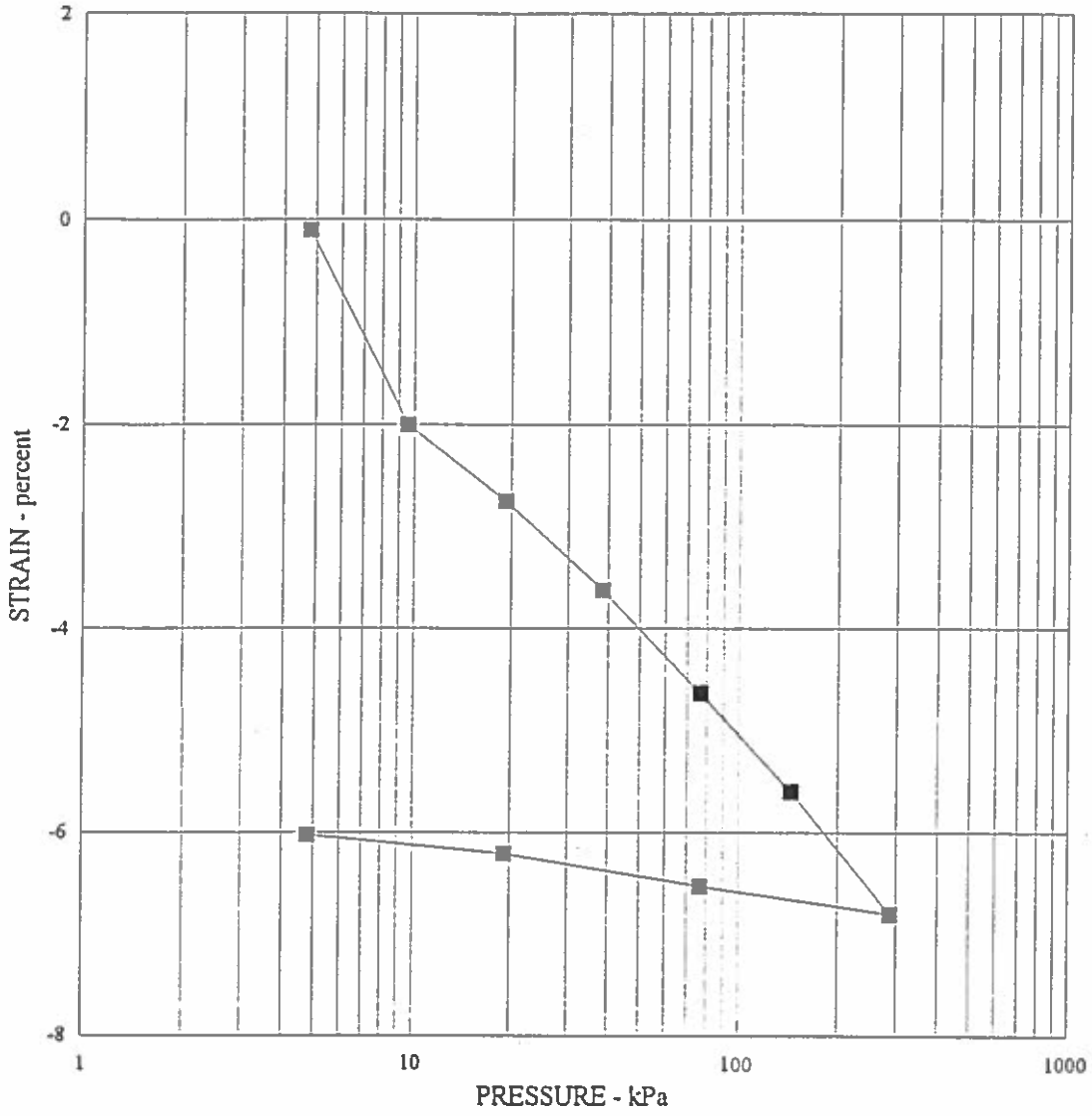
PROJECT NO. 30-1348-15.002

PLATE

C-84



BORING NO.: BL-31	DEPTH:	1.83 m
SAMPLE DESCRIPTION Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		26
PRECONSOLIDATION PRESSURE, kPa		7

	INITIAL	FINAL
DRY DENSITY - kN/cu m	14.42	15.17
WATER CONTENT - %	5.8	19.8
VOID RATIO	0.5202	0.4485
DEGREE OF SATURATION, %	25.00	99.00
SAMPLE HEIGHT - cm	1.6300	1.51

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CARSON CITY, NEVADA

PLATE

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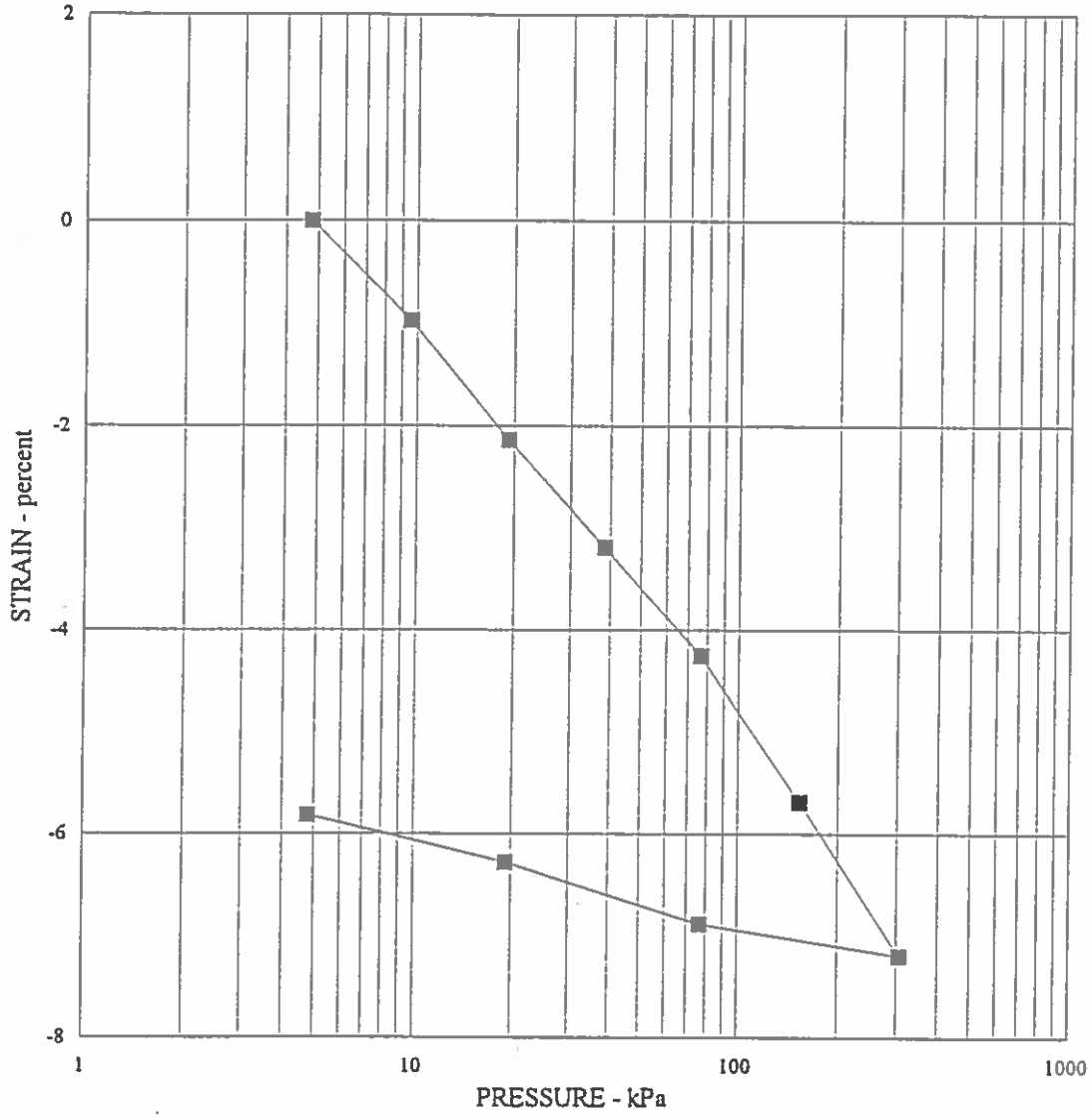

BORING NO.: BL-36	DEPTH:	4.88 m
SAMPLE DESCRIPTION Lt. Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		72
PRECONSOLIDATION PRESSURE, kPa		10

	INITIAL	FINAL
DRY DENSITY - kN/cu m	18.38	19.81
WATER CONTENT - %	12.0	13.6
VOID RATIO	0.4937	0.3843
DEGREE OF SATURATION, %	68.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.3

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CONSOLIDATION TEST

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PLATE

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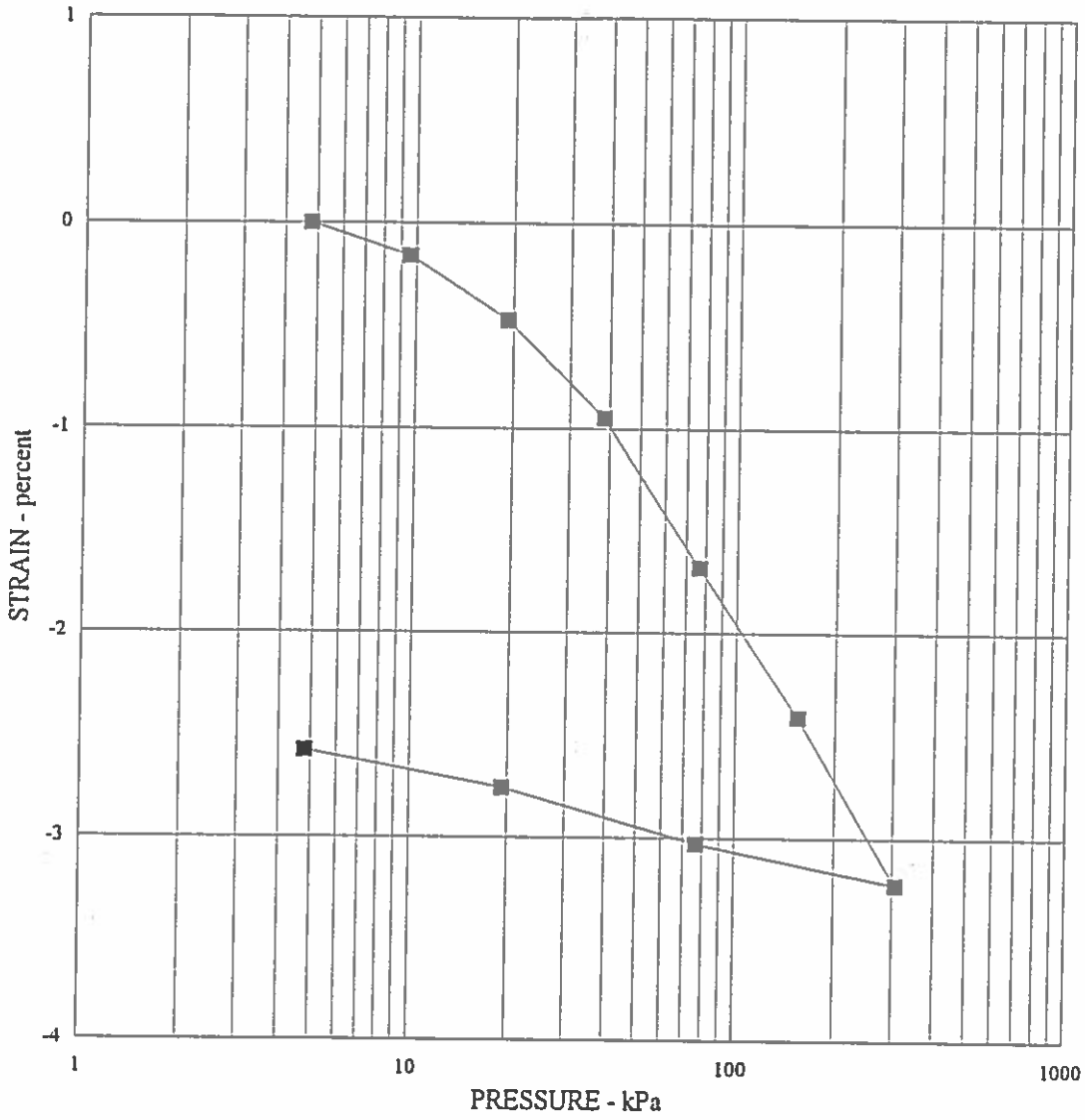

BORING NO.: BL-37	DEPTH: 4.88 m
SAMPLE DESCRIPTION Lt. Brown Sl. Silty Sand	
OVERBURDEN PRESSURE, kPa	76
PRECONSOLIDATION PRESSURE, kPa	12

	INITIAL	FINAL
DRY DENSITY - kN/cu m	18.36	18.97
WATER CONTENT - %	15.0	14.6
VOID RATIO	0.4466	0.3996
DEGREE OF SATURATION, %	91.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.45

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CONSOLIDATION TEST

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CARSON CITY, NEVADA

PLATE

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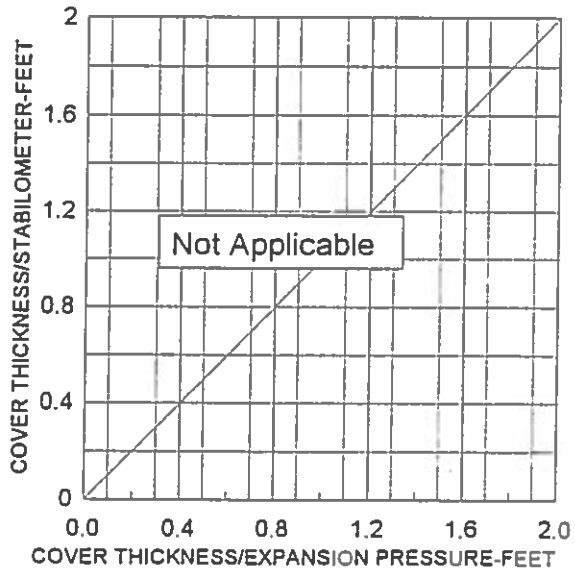
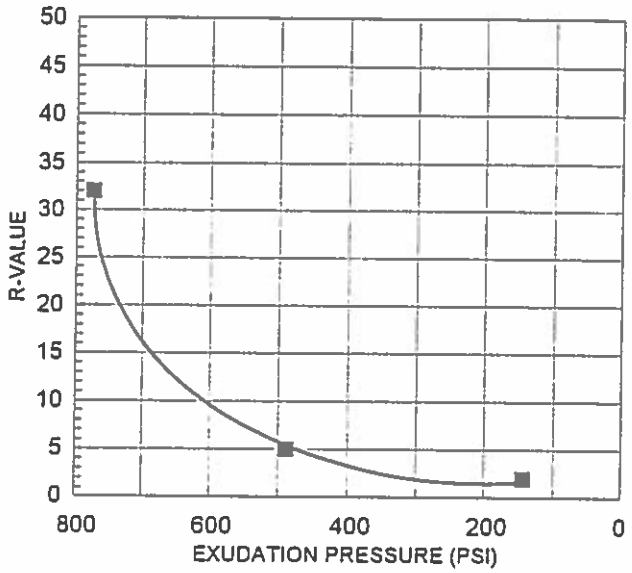
Sample Source: BL-2 @ .30-.61 meters
Sample Description: Light Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	774	490	144
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	32	5	2
% Moisture at Test	11.7	13.9	16.1
Dry Density at Test, pcf	123.2	117.8	112.0
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		3	

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R-VALUE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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APPENDIX E

Drainage Borings
and
Laboratory Test Results

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

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

MOISTURE CONDITION CRITERIA

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

SOIL CEMENTATION CRITERIA

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

STANDARD PENETRATION CLASSIFICATION*			
GRANULAR SOIL		CLAYEY SOIL	
BLOWS/0.3m	DENSITY	BLOWS/0.3m	CONSISTENCY
0 – 4	VERY LOOSE	0 – 1	VERY SOFT
5 – 10	LOOSE	2 – 4	SOFT
11 – 30	MEDIUM DENSE	5 – 8	MEDIUM STIFF
31 – 50	DENSE	9 – 15	STIFF
OVER 50	VERY DENSE	16 – 30	VERY STIFF
		31 – 60	HARD
		OVER 60	VERY HARD

*Standard Penetration Test (N) 63.5 Kg hammer 760mm free fall on 50.8mm O.D. x 35mm I.D. sampler.

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

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

TEST ABBREVIATIONS

CD	CONSOLIDATED DRAINED	O	ORGANIC CONTENT
CH	CHEMICAL (CORROSIVENESS)	OC	CONSOLIDATION
CM	COMPACTION	PI	PLASTICITY INDEX
CU	CONSOLIDATED UNDRAINED	RQD	ROCK QUALITY DESIGNATION
D	DISPERSIVE SOILS	RV	R- VALUE
DS	DIRECT SHEAR	S	SIEVE ANALYSIS/-200 WASH
E	EXPANSIVE SOIL	SL	SHRINKAGE LIMIT
G	SPECIFIC GRAVITY	U	UNCONFINED COMPRESSION
H	HYDROMETER	UU	UNCONSOLIDATED UNDRAINED
HC	HYDRO-COLLAPSE	UW	UNIT WEIGHT
K	PERMEABILITY	W	MOISTURE CONTENT

SAMPLER NOTATION

CPT	CONE PENETRATION
CS	CONTINUOUS SAMPLER(1)
MC	MODIFIED CA SPLIT SPOON (2)
P	PUSHED (NOT DRIVEN)
PB	PTICHER BARREL
RC	ROCK CORE(3)
SH	SHELBY TUBE (4)
SPT	STANDARD PENETRATION TEST
TP	TEST PIT

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

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KEY TO SOIL CLASSIFICATION AND TERMS

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-1

EXPLORATION LOG

KLEINFELDER

START DATE: 7/15/97
END DATE: 7/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 15.24 M SOUTH OF KOONTZ LANE
BORING: BD-01
E.A. #: 30-1348-15.002
GROUND ELEV: 1444.75 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 144+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00	A	GRAB			S,RV	SM	RED BROWN SILTY SAND slightly moist, very dense, fine to medium dense, trace fine gravel.	
	0.61								
1443.8	1 1.07	B	MC	83				Weakly cemented.	26% fines
	1.52								
	1.83	C	MC	50/64					
1442.8	2 2.13							1.98	
		D	MC	64		S	SM SP	YELLOW BROWN SLIGHTLY SILTY SAND slightly moist, very dense, fine to medium grained sand.	8% fines
	2.59								
1441.8	3 3.05								
		E	MC	60		DS			
	3.51								
1440.8	4							4.11	
							SM	YELLOW BROWN SILTY SAND moist, very dense, fine grained sand.	
	4.57	F	MC	61					
1439.8	5 5.03								
								5.79	
1438.8	6 6.10						SC	YELLOW BROWN CLAYEY SAND moist, very dense, fine grained sand, low plasticity fines, estimated 20 to 30% fines.	
		G	MC	96/254					
	6.55								
1437.8	7								
	7.62								
		H	MC	50/127					
1436.8	7.92 8								
1435.8	9 9.14								
		I	MC	50		S,PI			PI = 13 31% fines
	9.60							Becoming low to moderate plasticity fines.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-2

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EXPLORATION LOG

KLEINFELDER

START DATE: 7/15/97
END DATE: 7/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 15.24 M SOUTH OF KOONTZ LANE
BORING: BD-01
E.A. #: 30-1348-15.002
GROUND ELEV: 1444.75 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 144+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1433.8	11	J	MC	35				Becoming less clayey.	
	11.13								
							SM	RED YELLOW SILTY SAND moist, very dense, fine grained sand, estimated 35 to 45% fines.	
1432.8	12								
	12.19	K	MC	50/140					
	12.50								
1431.8	13								
								13.41	
	13.72						SC	RED BROWN CLAYEY SAND moist, very dense, fine to coarse grained sand, some fine gravel, estimated 20 to 30% fines.	
1430.8	14	L	MC	50/114					
	14.02								
								14.63	
							SM	LIGHT BROWN SILTY SAND moist, very dense, fine grained sand, estimated 30 to 40% fines.	
1429.8	15								
	15.24	M	MC	80/279				Encountered trace of coarse gravel.	
	15.70								
								15.70	
1428.8	16							No free water encountered	
1427.8	17								
1426.8	18								
1425.8	19								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

E-2A

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EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 7/16/97
END DATE: 7/16/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF VALLEY VIEW DRIVE
BORING: BD-02
E.A. #: 30-1348-15.002
GROUND ELEV.: 1444.75 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 138+50
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/16/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00	A	GRAB			S,RV	SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to medium grained sand, some surface gravel.	21% fines
	0.61	B	MC	18		W,UW,S			17% fines
1443.8	1 1.07								
	1.52	C	MC	15		W,UW			
	1.83								
1442.8	2 2.13								
		D	MC	46		W,UW		Red brown, dense, fine to coarse grained sand, slightly plastic.	
	2.59								
1441.8	3 3.05							Becoming more silty.	
	3.20	E	MC	50/140				Fine grained sand, very dense.	
1440.8	4								
	4.57								
	4.72	F	MC	50/127		W,UW,S			21% fines
1439.8	5								
1438.8	6 6.10								
		G	MC	50/127				Yellow brown, becoming more sandy.	
	6.40								
1437.8	7								
	7.62								
	7.92	H	MC	94/279				Becoming more silty. Encountered some fine gravel.	
1436.8	8								
1435.8	9 9.14								
	9.45	I	MC	50/102					

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-3

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

KLEINFELDER

START DATE: 7/16/97
END DATE: 7/16/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH OF VALLEY VIEW DRIVE
BORING: BD-02
E.A. #: 30-1348-15.002
GROUND ELEV.: 1444.75 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 138+50
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/16/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1433.8	11	J	MC	50/279		W,UW,S			29% fines
	11.13								
								11.58	
1432.8	12						SC	BED BROWN CLAYEY SAND moist, very dense, fine to medium grained sand, low plasticity fines.	
	12.19								
	12.50	K	MC	50/140		W,UW			
1431.8	13								
	13.72								
1430.8	14.02	L	MC	50/127		W,UW,S			33% fines
1429.8	15								
	15.24								
	15.39	M	MC	50/140				15.39	
								No free water encountered.	
1428.8	16								
1427.8	17								
1426.8	18								
1425.8	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-3A

CAD FILE: L:\1999\ING\301348\30134815002EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 7/16/97
END DATE: 7/16/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF VALLEY VIEW DRIVE
BORING: BD-03
E.A. #: 30-1348-15.002
GROUND ELEV: 1444.14 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 135+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/16/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00	A	GRAB			S,RV	SM	LIGHT BROWN SILTY SAND slightly moist, loose, fine to coarse grained sand, some fine surface gravel.	19% fines
	0.61								
1443.1	1 1.07	B	MC	12					
	1.52								
	1.83	C	MC	7					
1442.1	2 2.13								
	2.59	D	MC	13				Sands becoming cleaner, fine to medium grained sand.	
1441.1	3 3.05								
	3.51	E	MC	37				Red brown, dense. Estimated 5 to 15% fine gravel, wet.	
1440.1	4 4.57								
	5.03	F	MC	43		S		Yellow brown, fine grained sand. Lenses of sandy silt. No gravel.	58% fines
1439.1	5								
1438.1	6 6.10								
	6.55	G	MC	47		DS			
1437.1	7								
	7.62	H	MC	60				Slightly plastic, some fine gravel.	
1436.1	8 8.08								
								8.84	
1435.1	9 9.14						SC	YELLOW BROWN CLAYEY SAND moist, very dense, fine to medium grained sand, low plasticity fines.	
	9.60	I	MC	60					

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-4

EXPLORATION LOG

KLEINFELDER

START DATE: 7/16/97
END DATE: 7/16/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF VALLEY VIEW DRIVE
BORING: BD-03
E.A. #: 30-1348-15.002
GROUND ELEV: 1444.14 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 135+00
OFFSET: 15.24 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/16/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1433.1	11	J	MC	69				Some fine gravel.	
	11.13								
1432.1	12								
	12.19	K	MC	50/89					
	12.50								
1431.1	13								
	13.72								
	13.87	L	MC	50/127					
1430.1	14								
1429.1	15								
	15.24								
		M	MC	48					
	15.70							15.70	
1428.1	16							No free water encountered.	
1427.1	17								
1426.1	18								
1425.1	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE

E-4A

CAD FILE: L:\1999\TING\30134B\30134B15002EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 7/16/97
END DATE: 7/16/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF SOUTH EDMONDS DRIVE
BORING: BD-04
E.A. #: 30-1348-15.002
GROUND ELEV: 1444.75 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 2

STATION: STA 130+00
OFFSET: 30.48 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/16/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00	A	GRAB			S,RV	SM	RED BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand.	27% fines
	0.61								
1443.8	1 1.07	B	MC	15		W,UW			
	1.52								
	1.91	C	MC	88/229				Fine grained sand, very dense.	
1442.8	2 2.13								
	2.59	D	MC	40				Dense.	
1441.8	3 3.05								
	3.51	E	MC	36		W,UW,S		Lenses of sandy silt.	54% fines
1440.8	4								
	4.57	F	MC	43		W,UW			
1439.8	5 5.03							4.88	
							SC	RED BROWN CLAYEY SAND moist, dense, fine grained sand, low plasticity fines.	
1438.8	6 6.10								
	6.55	G	MC	88/279		W,UW,S		Low plasticity fines.	30% fines
1437.8	7								
	7.62							7.16	
							SM	RED BROWN SILTY SAND moist, very dense, fine grained sand.	
		H	MC	84		W,UW			
1436.8	8 8.08								
1435.8	9 9.14								
	9.45	I	MC	50/140		W,UW,S			21% fines

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-5

CAD FILE: L:\1999 ...TING\301348\301348150O2EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 7/16/97
END DATE: 7/16/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF SOUTH EDMONDS DRIVE
BORING: BD-04
E.A. #: 30-1348-15.002
GROUND ELEV: 1444.75 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 130+00
OFFSET: 30.48 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/16/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67	J	MC	50/140		W,UW			
1433.8	10.97								
								11.73	
1432.8	12						SC	RED BROWN CLAYEY SAND moist, very dense, fine to medium grained sand, low plasticity fines.	22% fines
	12.19	K	MC	92/279		W,UW,S			
	12.50							Occasional coarse gravel.	
1431.8	13								
	13.72	L	MC	50/140		W,UW			
1430.8	14.02							Less plastic.	
1429.8	15								
	15.24	M	MC	50/140					
	15.54							15.54 Encountered some fine gravel.	
1428.8	16							No free water encountered.	
1427.8	17								
1426.8	18								
1425.8	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-5A

PROJECT NO. 30-1348-15.002

CAD FILE: L:\1995TING\30134B\30134B15002EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 7/16/97
END DATE: 7/16/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 15.24 M NORTH OF CLEARVIEW DRIVE
BORING: BD-05
E.A. #: 30-1348-15.002
GROUND ELEV: 1444.14 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 125+00
OFFSET: 15.24 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/16/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00	A	GRAB			S,RV	SM	YELLOW BROWN SILTY SAND slightly moist, very dense, fine to coarse grained sand, coarse gravel.	28% fines
	0.61								
1443.1	1 1.07	B	MC	80/229					
	1.52							No gravel.	
	1.83	C	MC	50/127					
1442.1	2 2.13								
	2.29	D	MC	50/140					
1441.1	3 3.05								
	3.35	E	MC	50/140					
1440.1	4 4.57								
		F	MC	50/140					
1439.1	5 5.03								
1438.1	6 6.10								
	6.40	G	MC	50/127				Sands becoming cleaner.	
1437.1	7 7.62								
		H	MC	94/279					
1436.1	8 8.08								
1435.1	9 9.14								
	9.45	I	MC	50/127					
							SC	RED BROWN CLAYEY SAND moist, very dense, fine to medium grained sand, low plasticity fines, estimated 20 to 30% fines.	

8.23

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-6

CAD FILE: L:\1999\...TING\301348\301348150O2EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 7/16/97
END DATE: 7/16/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 15.24 M NORTH OF CLEARVIEW DRIVE
BORING: BD-05
E.A. #: 30-1348-15.002
GROUND ELEV: 1444.14 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 125+00
OFFSET: 15.24 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/16/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
	10.97	J	MC	50/140					
1433.1	11							Low to moderate plasticity fines.	
1432.1	12								
	12.19	K	MC	50					
	12.65							Encountered some fine gravel.	
1431.1	13								
								13.26	
	13.72						SM	YELLOW BROWN SILTY SAND moist, very dense, fine to medium grained sand, estimated 15 to 25% fines.	
1430.1	14	L	MC	72					
	14.17								
1429.1	15								
	15.24	M	MC	46					
	15.70							15.70	
1428.1	16							No free water encountered.	
1427.1	17								
1426.1	18								
1425.1	19								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

E-6A

EXPLORATION LOG

KLEINFELDER

START DATE: 9/24/97
END DATE: 9/24/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: PRISON PROPERTY
BORING: BD-06
E.A. #: 30-1348-15.002
GROUND ELEV: 1409.70 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/24/97	1.5	1408.2

SHEET 1 OF 1

STATION: STA 254+00
OFFSET: 457 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/24/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND (SM) moist, medium dense, very fine to medium grained sand.	
	0.61								
		A	MC	31		W,UW,S			32% fines
1408.7	1 1.07							Dense	
	1.52								
		B	MC	42		K			
1407.7	2 1.98								
1406.7	3 3.05								
		C	MC	17		S,K			3% fines
	3.51							Heaving sands. Medium dense	
1405.7	4								
	4.57								
		D	MC	50/76					
	4.88							4.72	
1404.7	5						SC	DARK GRAY CLAYEY SAND (SC) wet, very dense, fine to medium grained sand, low to moderate plasticity fines, estimated 15 to 25% fines.	
1403.7	6 6.10								
		E	MC	50/102					
	6.40								
1402.7	7								
	7.62							7.32	
		F	MC	95/279			CL	DARK BROWN SANDY CLAY (CL) wet, hard, fine grained sand, low to moderate plasticity fines.	
1401.7	8 8.08								
								8.53	
							SC	GRAY CLAYEY SAND (SC) wet, very dense, fine to coarse sand, low plasticity fines.	
1400.7	9 9.14								
		G	MC	50/102					
	9.45							9.45	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-7

CAD FILE: L:\1999\D...NG\301348\30134815002EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 9/24/97
END DATE: 9/24/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: PRISON PROPERTY
BORING: BD-07
E.A. #: 30-1348-15.002
GROUND ELEV.: 1409.70 m
HAMMER DROP SYSTEM: STANDARD

STATION: STA 253+75
OFFSET: 457 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/24/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/24/97	1.5	1408.2

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SM	LIGHT BROWN SILTY SAND (SM) moist, medium dense, fine to coarse grained sand, estimated 15 to 25% fines.	
		A	MC	19		W,UW			
1408.7	1 1.07								
	1.52							1.22	
		B	MC	25		W,UW,S	SM SP	GRAY SLIGHTLY SILTY SAND (SM/SP) wet, medium dense, fine to coarse grained sand. Groundwater encountered at 1.5 M.	5% fines
1407.7	2 1.98								
								2.74	
1406.7	3 3.05						SC	GRAY CLAYEY SAND (SC) wet, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
		C	MC	17		W,UW,S			16% fines
	3.51								
1405.7	4								
	4.57							Becoming more clayey.	
		D	MC	41		W,UW,S			38% fines
	4.88								
1404.7	5							5.33	
							CL	GRAY SANDY CLAY (CL) wet, hard, fine grained sand, low to moderate plasticity fines, estimated 60 to 70% fines.	
1403.7	6 6.10								
		E	MC	87/279					
	6.55								
1402.7	7							7.16	
	7.62						SC	DARK GRAY CLAYEY SAND (SC) wet, very dense, fine to medium grained sand, low to moderate plasticity fines.	
		F	MC	50/140					
1401.7	7.92 8								
1400.7	9 9.14								
		G	MC	50/127					
	9.45							9.45	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-8

CAD FILE: L:\1999\D...NG\301348\30134815002EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 9/24/97
END DATE: 9/24/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA RANCH
BORING: BD-08
E.A. #: 30-1348-15.002
GROUND ELEV: 1409.70 m
HAMMER DROP SYSTEM: STANDARD

STATION: STA 254+00
OFFSET: 137 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/24/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/24/97	1.2	1408.5

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						CL	DARK BROWN SANDY CLAY (CL) moist, stiff, fine grained sand, moderate to high plasticity fines.	
1408.7	1 1.07	A	MC	8		W,UW,S,PI			
	1.52							Groundwater encountered at 1.2 M.	
		B	MC	10		K		Wet Yellow brown	PI=32 63% fines
1407.7	2 1.98								
1406.7	3 3.05								
	3.51	C	MC	22		W,UW		Becoming less clayey	
1405.7	4								
	4.57							4.11	
		D	MC	30		W,UW,S	SM	DARK BROWN SILTY SAND (SM) wet, dense, fine to medium grained sand, low plasticity fines.	28% fines
1404.7	5 5.03								
								5.79	
1403.7	6 6.10						SM SP	GRAY SLIGHTLY SILTY SAND (SM/SP) wet, very dense, fine to coarse grained sand, estimated 5 to 12% fines.	
	6.55	E	MC	65		W,UW			
1402.7	7								
	7.62							7.16	
		F	MC	35			SC	OLIVE CLAYEY SAND (SC) wet, dense, fine to medium grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
1401.7	8 8.08								
1400.7	9 9.14								
		G	MC	55					
	9.60							9.60 Very dense.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-9

CAD FILE: L:\1998\D...G\301348\30134815002EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 7/14/97
END DATE: 7/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 91 M WEST OF LOMPA RANCH
BORING: BD-09
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.32 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/14/97	1.4	1415.9

STATION: STA 343+86
OFFSET: 84 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.3	1						SC	YELLOW BROWN CLAYEY SAND slightly moist, medium dense, fine to coarse grained sand, low to moderate plasticity fines.	
	1.52	A	MC	31		S,K		Fine to medium grained sand. Encountered groundwater at 1.37 M.	19% fines
1415.3	2 1.98								
1414.3	3 3.05	B	MC	35		S,K		Becoming more clayey, fine grained.	19% fines
	3.51								
1413.3	4								
	4.57	C	MC	27					
1412.3	5 5.03								
1411.3	6 6.10								
	6.55	D	MC	25					
1410.3	7							Becoming less plastic.	
	7.62	H	MC	23					
1409.3	8 8.08								
								8.69	
1408.3	9 9.14						SM	GRAY SILTY SAND wet, medium dense, fine to coarse grained sand.	
	9.60	I	MC	29		S			24% fines

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-10

CAD FILE: L:\1998\0...NG\301348\301348150O2PLATES.DWG

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 7/14/97
END DATE: 7/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 91 M WEST OF LOMPA RANCH
BORING: BD-09
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.32 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 343+86
OFFSET: 84 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/14/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/14/97	1.4	1415.9

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1406.3	11	J	MC	43				10.97 Heaving sands at 11 M.	
	11.13						SP	GRAY CLEAN SAND wet, dense, medium to coarse grained sand, less than 5% silt.	
1405.3	12								
	12.19	K	MC	24				12.50	
	12.65						SC	12.65 LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
1404.3	13							No free water encountered.	
1403.3	14								
1402.3	15								
1401.3	16								
1400.3	17								
1399.3	18								
1398.3	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-10A

EXPLORATION LOG

KLEINFELDER

START DATE: 7/15/97
END DATE: 7/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 46 M WEST OF LOMPA LANE
BORING: BD-10
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.62 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/15/97	1.2	1416.4

STATION: STA 344+60
OFFSET: 198 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.6	1						SC	BROWN CLAYEY SAND moist, medium dense, fine grained sand, moderate to high plasticity fines.	
	1.52	A	MC	20		W,UW,S		Encountered groundwater at 1.2 M.	28% fines
1415.6	2 1.98							Becoming more sandy, low plasticity fines.	
1414.6	3 3.05								
	3.51	B	MC	24		W,UW,S			27% fines
1413.6	4							Fine to medium grained sand.	
	4.57							4.27	
		C	MC	23			SM SP	LIGHT BROWN SLIGHTLY SILTY SAND wet, fine to coarse grained sand, estimated 5 to 12% fines.	
1412.6	5 5.03							4.88	
							SC	GRAY CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
1411.6	6 6.10								
	6.55	D	MC	20					
1410.6	7								
	7.62	H	MC	19				Becoming more sandy, low plasticity fines.	
1409.6	8 8.08								
								8.69	
1408.6	9 9.14						SM SP	GRAY SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand.	
		I	MC	28		W,UW,S			9% fines
	9.60								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-11

CAD FILE: L:\1998\...ING\301348\30134815002EPLATES.DWG

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 7/15/97
END DATE: 7/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: 46 M WEST OF LOMPA LANE
BORING: BD-10
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.62 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 344+60
OFFSET: 198 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/15/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/15/97	1.2	1416.4

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67							10.52	
1406.6	11 11.13	J	MC	19			SC	GRAY CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
								11.73	
1405.6	12 12.19						SM SP	GRAY SLIGHTLY SILTY SAND wet, dense, fine to medium grained sand, estimated 5 to 12% fines.	
	12.65	K	MC	43				12.65	
1404.6	13							No free water encountered.	
1403.6	14								
1402.6	15								
1401.6	16								
1400.6	17								
1399.6	18								
1398.6	19								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-11A

CAD FILE: L:\1999\D...ING\301348\30134815002EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 7/15/97
END DATE: 7/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF LOMPA LANE
BORING: BD-11
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.62 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/15/97	1.8	1415.8

STATION: STA 349+83
OFFSET: 107 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.6	1						SC	GRAY BROWN CLAYEY SAND slightly moist, loose to medium dense, fine grained sand, low plasticity fines.	
	1.07								
	1.52						SM SP	YELLOW BROWN SLIGHTLY SILTY SAND wet, loose to medium dense, fine to coarse grained sand, estimated 5 to 12% fines.	
		A	MC	12		K		Encountered groundwater at 1.83 M.	
1415.6	2 1.98								
	2.13								
		B	MC	20				Medium dense	
	2.59								
1414.6	3 3.05								
	3.05						SC		
	3.51	C	MC	36		K			
1413.6	4							GRAY CLAYEY SAND wet, medium dense, fine to medium grained sand, moderate to high plasticity fines.	
	4.57								
		D	MC	28					
1412.6	5 5.03								
1411.6	6 6.10								
		H	MC	21					
	6.55								
1410.6	7							Lenses of sandy clay (CL), moderate plasticity fines.	
	7.62								
		I	MC	20					
1409.6	8 8.08								
1408.6	9								
	9.14								
		J	MC	26					
	9.60								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-12

EXPLORATION LOG

KLEINFELDER

START DATE: 7/15/97
END DATE: 7/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF LOMPA LANE
BORING: BD-11
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.62 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/15/97	1.8	1415.8

STATION: STA 349+83
OFFSET: 107 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1406.6	11	K	MC	22				Lenses of slightly clayey sands.	
	11.13								
	11.43						SM SP	GRAY SLIGHTLY SILTY SAND wet, very dense, fine to coarse grained sand, estimated 5 to 12% fines.	
1405.6	12								
	12.19	L	MC	51					
	12.65								
1404.6	13								
1403.6	14								
1402.6	15								
1401.6	16								
1400.6	17								
1399.6	18								
1398.6	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-12A

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EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 7/15/97
END DATE: 7/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF LOMPA LANE
BORING: BD-12
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.62 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/15/97	1.5	1416.1

STATION: STA 350+89
OFFSET: 139 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.6	1						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine grained sand, low plasticity fines.	
	1.52	A	MC	22				Encountered groundwater at 1.52 M.	
1415.6	2 1.98								
1414.6	3 3.05							Gray, becoming more sandy.	
	3.51	B	MC	23				Yellow brown.	
1413.6	4							3.96	
	4.57						SM SP	GRAY SLIGHTLY SILTY SAND wet, medium dense, fine to coarse grained sand, estimated 5 to 12% fines.	
		C	MC	29					
1412.6	5 5.03							5.79	
1411.6	6 6.10						SC	GRAY CLAYEY SAND wet, dense, fine to coarse grained sand, low to moderate plasticity fines.	
	6.55	D	MC	38					
1410.6	7								
	7.62	H	MC	33				Becoming more clayey, fine grained sand.	
1409.6	8 8.08								
1408.6	9 9.14								
	9.60	I	MC	24				Medium dense, becoming more sandy, fine to medium grained sand.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-13

EXPLORATION LOG

SHEET 2 OF 2

KLEINFELDER

START DATE: 7/15/97
END DATE: 7/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF LOMPA LANE
BORING: BD-12
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.62 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/15/97	1.5	1416.1

STATION: STA 350+89
OFFSET: 139 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1406.6	11 11.13	J	MC	56				Very dense, moderate to high plasticity fines.	
1405.6	12 12.19								
	12.65	K	MC	23				12.65	
1404.6	13								
1403.6	14								
1402.6	15								
1401.6	16								
1400.6	17								
1399.6	18								
1398.6	19								

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LOG OF BORING

CARSON FREEWAY

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PROJECT NO. 30-1348-15.002

PLATE E-13A

CAD FILE: L:\1999\...TING\30134B\30134815002EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 2

KLEINFELDER

START DATE: 7/14/97
END DATE: 7/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF LOMPA LANE
BORING: BD-13
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.02 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/14/97	1.7	1415.3

STATION: STA 337+00
OFFSET: 35 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1416.0	1						SC	LIGHT BROWN CLAYEY SAND slightly moist, moderately dense, fine to coarse grained sand, low plasticity fines.	
	1.52	A	MC	19		S,K		Fine grained sand, becoming less clayey. Encountered groundwater at 1.68 M.	22% fines
1415.0	2 1.98								
	2.44						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND wet, medium dense to dense, fine to coarse grained sand.	4% fines
1414.0	3 3.05								
	3.51	B	MC	30		S K			
	3.38						SC	OLIVE CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
1413.0	4								
	4.27						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND wet, fine to medium grained sand, estimated 5 to 12% fines.	
	4.57	C	MC	29					
1412.0	5 5.03								
	5.03						SC	LIGHT BROWN CLAYEY SAND wet, dense, fine to medium grained sand, low plasticity fines.	
1411.0	6 6.10								
	6.55	D	MC	37				Becoming more clayey, low to moderate plasticity fines, red brown.	
1410.0	7								
	7.62								
	8.08	H	MC	23					
1409.0	8								
	9.14							Heaving sands at 7.6 M.	
1408.0	9							Lenses of clean sands.	
	9.60	I	MC	36				Fine grained sands.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-14

CAD FILE: L:\1999\DRAWING\301348\30134815002EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 7/14/97
END DATE: 7/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF LOMPA LANE
BORING: BD-13
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.02 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/14/97	1.7	1415.3

STATION: STA 337+00
OFFSET: 35 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1406.0	11	J	MC	49				Becoming less plastic.	
	11.13								
1405.0	12								
	12.19	K	MC	28					
	12.65							12.65	
1404.0	13								
1403.0	14								
1402.0	15								
1401.0	16								
1400.0	17								
1399.0	18								
1398.0	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-14A

CAD FILE: L:\1999\D...NG\301348\301348150O2EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 7/14/97
END DATE: 7/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF LOMPA LANE
BORING: BD-14
E.A. #: 30-1348-15.002
GROUND ELEV: 1417.32 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/14/97	1.5	1415.8

STATION: STA 337+90
OFFSET: 35 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	LIGHT BROWN CLAYEY SAND slightly moist, medium dense, fine to coarse grained sand, low to moderate plasticity fines.	
1416.3	1								
	1.22								
	1.52						SM	LIGHT BROWN SILTY SAND wet, medium dense, fine to medium grained sand. Encountered groundwater at 1.52 M.	
		A	MC	27		W,UW,S			20% fines
1415.3	2 1.98								
	2.59								
1414.3	3 3.05						SC	Fine grained sand, low plasticity fines.	
		B	MC	11		W,UW,S			26% fines
	3.51								
1413.3	4								
	4.57							Gray, lenses of clean fine to coarse sand.	
		C	MC	19		W,UW,S			20% fines
1412.3	5 5.03							Red brown, low to moderate plasticity fines.	
1411.3	6 6.10								
		D	MC	37		W,UW,S			27% fines
	6.55								
	6.71								
		H	MC	15					
1410.3	7 7.16								
	7.62								
		I	MC	25		W,UW,S			16% fines
	7.92								
1409.3	8 8.08						SM	RED BROWN SILTY SAND wet, medium dense, fine to coarse grained sand.	
1408.3	9 9.14								
		J	MC	19		W,UW,S			25% fines
	9.60							Becoming more clayey, fine grained sand.	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-15

CAD FILE: L:\1999\DWG\301348\301348150O2EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 7/14/97
END DATE: 7/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST OF LOMPA LANE
BORING: BD-14
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.32 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
7/14/97	1.5	1415.8

STATION: STA 337+90
OFFSET: 35 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 7/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	10.67								
1406.3	11	K	MC	N/A				Gray, becoming less clayey.	
	11.13							Approx. 60 cm of heaving sand at 11 M.	
1405.3	12								
	12.19								
		L	MC	N/A					
	12.65							12.65	
1404.3	13								
1403.3	14								
1402.3	15								
1401.3	16								
1400.3	17								
1399.3	18								
1398.3	19								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE
E-15A

CAD FILE: L:\1999\DRAFTING\301348\301348150028PLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 9/24/97
END DATE: 9/24/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA RANCH
BORING: BD-15
E.A. #: 30-1348-15.002
GROUND ELEV: 1410.00 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/24/97	1.2	1408.8

STATION: STA 254+75
OFFSET: 137 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/24/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC	LIGHT BROWN CLAYEY SAND (SC) moist, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
1409.0	1 1.07	A	MC	20					
	1.52							Groundwater encountered at 1.22 M.	
		B	MC	18		W,UW,S		Yellow brown	20% fines
1408.0	2 1.98								
								2.44	
1407.0	3 3.05						SM	GRAY SLIGHTLY SILTY SAND (SM/SP) wet, dense, fine to coarse grained sand.	
	3.51	C	MC	31		K			
1406.0	4 4.57								
		D	MC	61		W,UW,S		Very dense	7% fines
1405.0	5 5.03								
1404.0	6 6.10								
	6.55	H	MC	56		W,UW			
1403.0	7 7.62								
		I	MC	19					
1402.0	8 8.08							Becoming more clayey.	
								8.23	
1401.0	9 9.14						SC	DARK GRAY CLAYEY SAND (SC) wet, medium dense, fine to medium grained sand, low plasticity fines, estimated 15 to 25% fines.	
	9.60	J	MC	29					
								9.60	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-16

CAD FILE: L:\1999\D...\ING\301348\301348150O2EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 9/25/97
END DATE: 9/25/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA RANCH
BORING: BD-16
E.A. #: 30-1348-15 002
GROUND ELEV: 1410.31 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/25/97	2.4	1407.9

SHEET 1 OF 1

STATION: STA 262+50
OFFSET: 30 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/25/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						CL	LIGHT BROWN SANDY CLAY/CLAYEY SAND (CL/SC) moist, very stiff/medium dense, very fine grained sand, low plasticity fines.	
1409.3	1 1.07	A	MC	24		PI, W,UW,S			PI = 10 50% fines
	1.52							1.22	
		B	MC	22		W,UW,S	SM	RED YELLOW SILTY SAND (SM) moist, medium dense, fine to medium grained sand, low plasticity fines.	46% fines
1408.3	2 1.98							Groundwater encountered at 2.4 M.	
1407.3	3 3.05							2.90	
	3.51	C	MC	43		K	SM SP	GRAY BROWN SLIGHTLY SILTY SAND (SM/SP) moist, dense, fine to coarse grained sand, some fine gravel, estimated 5 to 12% fines.	
1406.3	4								
	4.57	D	MC	24				Medium dense	
1405.3	5 5.03							More gravelly	
								5.33	
1404.3	6 6.10						SM	YELLOW BROWN SILTY SAND (SM) wet, medium dense, fine grained sand, estimated 20 to 30% fines.	
	6.55	H	MC	19				Low plasticity fines.	
1403.3	7								
	7.62							7.16	
		I	MC	46			SM SP	GRAY SLIGHTLY SILTY SAND (SM/SP) wet, dense, fine to coarse grained sand, estimated 5 to 12% fines, some fine gravel.	
1402.3	8 8.08								
								8.84	
1401.3	9 9.14						SM	LIGHT BROWN SILTY SAND (SM) wet, dense, fine grained sand, estimated 15 to 25% fines.	
	9.60	J	MC	30				9.60	

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-17

CAD FILE: L:\1999\...ING\301348\301348150028PLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 9/25/97
END DATE: 9/25/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA RANCH
BORING: BD-17
E.A. #: 30-1348-15.002
GROUND ELEV: 1410.31 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/25/97	2.1	1408.2

SHEET 1 OF 1

STATION: STA 262+50
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/25/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC	LIGHT BROWN CLAYEY SAND (SC) moist, very stiff/medium dense, very fine grained sand, low plasticity fines.	
1409.3	1 1.07	A	MC	19		W,UW,S,PI			PI = 12 46% fines
	1.52							1.22	
		B	MC	33		K	SC	LIGHT BROWN CLAYEY SAND (SC) moist, dense, fine to medium grained sand, moderate plasticity fines, estimated 20 to 30% fines.	
1408.3	2 1.98							Groundwater encountered at 2.3 M.	
1407.3	3 3.05							2.90	
		C	MC	52		W,UW,S	SM SP	GRAY SLIGHTLY SILTY SAND (SM/SP) wet, very dense, fine to coarse grained sand, estimated 5 to 12% fines.	5% fines
	3.51								
1406.3	4							4.27	
	4.57						SC	GRAY VERY CLAYEY SAND (SC) wet, loose, fine to medium grained sand, low to moderate plasticity fines.	50% fines
		D	MC	10		W,UW,S			
1405.3	5 5.03								
1404.3	6 6.10								
		H	MC	28				Medium dense, fine to coarse sand.	
	6.55								
1403.3	7								
	7.62							Less clayey, estimated 20 to 30% fines.	
		I	MC	48					
1402.3	8 8.08								
1401.3	9 9.14							Lenses of slightly silty sand (SM/SP), fine to coarse grained sand.	
		J	MC	42					
	9.60							9.60	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-18

CAD FILE: L:\1999\...TING\301348\30134815002EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 9/25/97
END DATE: 9/25/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA RANCH
BORING: BD-18
E.A. #: 30-1348-15.002
GROUND ELEV.: 1410.61 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/25/97	1.8	1408.8

STATION: STA 277+50
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/25/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC	LIGHT BROWN CLAYEY SAND (SC) moist, medium dense, fine to medium grained sand, moderate plasticity fines.	
1409.6	1 1.07	A	MC	23		W,UW,S,PI			PI = 17 43% fines
	1.52	B	MC	32					
1408.6	2 1.98							Groundwater encountered at 1.83 M, dense.	
1407.6	3 3.05	C	MC	42		W,UW,S			15% fines
	3.51							Becoming more sandy.	
1406.6	4								
	4.11						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND (SM/SP) wet, dense, fine to medium grained sand, estimated 5 to 12% fines.	
	4.57	D	MC	39		K			
1405.6	5 5.03								
1404.6	6 6.10								
	6.55	H	MC	35					
1403.6	7								
	7.32						SC	LIGHT BROWN CLAYEY SAND (SC) wet, dense, fine to medium grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
	7.62	I	MC	43					
1402.6	8 8.08								
1401.6	9 9.14								
	9.60	J	MC	65					
								9.60	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-19

CAD FILE: L:\1998\...TING\301348\301348150O2EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 9/25/97
END DATE: 9/25/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA RANCH
BORING: BD-19
E.A. #: 30-1348-15.002
GROUND ELEV: 1410.61 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/25/97	1.8	1408.8

STATION: STA 227+50
OFFSET: 32 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/25/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC	LIGHT BROWN CLAYEY SAND/SANDY CLAY (SC/CL) moist, medium dense/very stiff, fine grained sand, low to moderate plasticity fines.	
1409.6	1 1.07	A	MC	19					
	1.22								
	1.52						SC	YELLOW BROWN CLAYEY SAND (SC) moist, medium dense, fine to medium grained sand, moderate plasticity fines. Groundwater encountered at 1.83 M.	
		B	MC	19					
1408.6	2 1.98								
1407.6	3 3.05								
		C	MC	26					
	3.51								
1406.6	4							Lenses of clean sand.	
	4.57								
		D	MC	27					
1405.6	5 5.03								
1404.6	6 6.10								
		H	MC	19					
	6.55							Encountered a piece of fine gravel.	
1403.6	7								
	7.62								
		I	MC	14					
1402.6	8 8.08								
	8.38						SM	YELLOW BROWN SLIGHTLY SAND (SM/SP) wet, dense, fine to medium grained sand, estimated 5 to 12% fines.	
1401.6	9 9.14								
		J	MC	37					
	9.60								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE E-20

CAD FILE: L:\1999\DRAWING\301348\30134815002EPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 9/25/97
END DATE: 9/25/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA RANCH
BORING: BD-20
E.A. #: 30-1348-15.002
GROUND ELEV: 1410.61 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/25/97	1.5	1409.1

STATION: STA 282+50
OFFSET: 50 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/25/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC	LIGHT BROWN CLAYEY SAND (SC) moist, medium dense, fine grained sand, low plasticity fines.	
1409.6	1 1.07	A	MC	17		W,UW,S			28% fines
	1.52								
1408.6	2 1.98	B	MC	55		W,UW		Groundwater encountered at 1.5 M.	
1407.6	3 3.05								
	3.51	C	MC	32		W,UW,S			16% fines
1406.6	4							Dense, becoming more sandy.	
	4.57	D	MC	35		W,UW			
1405.6	5 5.03								
1404.6	6 6.10								
	6.55	H	MC	52				Very dense.	
1403.6	7								
	7.62	I	MC	79					
1402.6	8 8.08								
1401.6	9 9.14								
	9.60	J	MC	55					
								9.60	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-21

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EXPLORATION LOG

KLEINFELDER

START DATE: 9/26/97
END DATE: 9/26/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF U.S. 50
BORING: BD-21
E.A. #: 30-1348-15.002
GROUND ELEV: 1410.61 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/26/97	1.2	1409.4

SHEET 1 OF 1

STATION: STA 303+50
OFFSET: 91 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/26/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC	LIGHT BROWN CLAYEY SAND (SC) moist, dense, fine to medium grained sand, low to moderate plasticity fines.	
1409.6	1 1.07	A	MC	34		W,UW,S			32% fines
	1.52							Groundwater encountered at 1.2 M.	
		B	MC	29				Wet	
1408.6	2 1.98								
								2.74	
1407.6	3 3.05						SC	GRAY CLAYEY SAND (SC) wet, loose, fine grained sand, estimated 20 to 30% fines.	
		C	MC	11		K			
	3.51								
1406.6	4								
	4.57							4.11	
		D	MC	72		W,UW,S	SC	GRAY CLAYEY SAND (SC) wet, very dense, fine to medium grained sand, moderate plasticity fines.	16% fines
1405.6	5 5.03								
1404.6	6 6.10								
		H	MC	49		W,UW,S,PI		Becoming more clayey.	PI = 17
	6.55								33% fines
1403.6	7								
	7.62								
	7.92	I	MC	50/127					
1402.6	8								
1401.6	9								
	9.14								
		J	MC	37					
	9.60							9.50	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-22

CAD FILE: L:\1999\...TING\301348\301348150O2EPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 9/26/97
END DATE: 9/26/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF U.S. 50
BORING: BD-22
E.A. #: 30-1348-15 002
GROUND ELEV.: 1410.61 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/26/97	1.2	1409.4

SHEET 1 OF 1

STATION: STA 308+50
OFFSET: 118 M LEFT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/26/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC	LIGHT BROWN CLAYEY SAND (SC) moist, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
1409.6	1 1.07	A	MC	25					
	1.22							Groundwater encountered at 1.2 M.	
	1.52						SC	LIGHT BROWN/GRAY CLAYEY SAND/SANDY CLAY (SC/CL) moist, loose/stiff, fine to medium grained sand, moderate to high plasticity, estimated 40 to 60% fines.	
		B	MC	13					
1408.6	2 1.98								
	2.74								
1407.6	3 3.05						SC	GRAY CLAYEY SAND (SC) wet, dense, fine to medium grained sand, low plasticity fines, estimated 20 to 30% fines.	
		C	MC	43					
	3.51								
1406.6	4								
	4.57								
		D	MC	85/279					
1405.6	5 5.03							Very dense, more sandy, estimated 15 to 25% fines.	
1404.6	6 6.10								
		H	MC	41				Dense, more sandy, estimated 15 to 25% fines.	
	6.55								
1403.6	7								
	7.16								
	7.62						SM	GRAY SLIGHTLY SILTY SAND (SM/SP) wet, very dense, fine to medium grained sand, estimated 5 to 12% fines.	
		I	MC	50/140					
1402.6	8 7.92								
1401.6	9 9.14								
		J	MC	69					
	9.60								
								9.60	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

E-23

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EXPLORATION LOG

KLEINFELDER

START DATE: 9/26/97
END DATE: 9/26/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SOUTH OF U.S. 50
BORING: BD-23
E.A. #: 30-1348-15.002
GROUND ELEV.: 1411.22 m
HAMMER DROP SYSTEM: STANDARD

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
9/26/97	1.8	1409.4

SHEET 1 OF 1

STATION: STA 312+80
OFFSET: 15 M RIGHT
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: ANDRESEN
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 9/26/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.61						SC	LIGHT BROWN CLAYEY SAND (SC) moist, medium dense, fine to medium grained sand, low to moderate plasticity fines, estimated 20 to 30% fines.	
1410.2	1 1.07	A	MC	17				Lenses of clean sand.	
	1.52	B	MC	16					
1409.2	2 1.98							Groundwater encountered at 1.83 M.	
1408.2	3 3.05								
	3.51	C	MC	49				Gray, dense, more sandy.	
1407.2	4								
	4.57							3.96	
		D	MC	65/254			SM	GRAY SLIGHTLY SILTY SAND (SM) wet, very dense, fine to medium grained sand, estimated 5 to 12% fines.	
1406.2	5 5.03							Lenses of clayey sand.	
1405.2	6 6.10								
	6.55	H	MC	47				Some heaving.	
1404.2	7							Becoming clayey.	
	7.62	I	MC	42					
1403.2	8 8.08								
								8.78	
							SM	GRAY BROWN SILTY SAND (SM) wet, very dense, fine grained sand, estimated 10 to 20% fines.	
1402.2	9 9.14								
	9.45	J	MC	50/140					
								9.45	

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE E-24

CAD FILE: L:\1999...TING\301348\301348150O2EPLATES.DWG

MOISTURE CONTENT AND UNIT WEIGHT
DRAINAGE BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu m)
BD-2	.091	7.7	17.12
BD-2	3.35	5.6	17.12
BD-2	2.44	7.1	18.22
BD-2	4.57	3.5	----
BD-2	10.97	9.8	17.43
BD-2	13.72	7.6	19.16
BD-4	0.91	4.0	16.96
BD-4	3.35	16.8	15.86
BD-4	4.88	5.7	16.65
BD-4	6.25	2.3	----
BD-4	6.40	7.2	18.22
BD-4	7.92	7.3	18.06
BD-4	9.14	3.8	----
BD-4	9.30	8.0	18.22
BD-4	10.97	8.5	18.85
BD-4	12.19	6.5	18.69
BD-4	12.34	7.5	17.90
BD-4	13.87	7.6	18.69
BD-5	0.91	4.7	17.59
BD-5	3.20	5.6	16.96
BD-5	6.25	4.4	16.96
BD-6	0.91	11.3	14.29
BD-7	0.91	7.6	16.96
BD-7	1.83	13.1	18.22
BD-7	3.35	17.5	17.59
BD-7	4.88	17.6	17.90
BD-8	0.91	29.9	13.98
BD-8	3.35	17.8	16.96
BD-8	4.88	19.8	16.96
BD-8	6.40	12.6	19.00
BD-15	1.83	16.4	17.43
BD-15	4.88	12.2	20.10
BD-15	6.40	14.7	17.12
BD-16	0.91	9.2	16.02
BD-16	1.83	17.7	15.71
BD-17	0.91	10.5	16.02
BD-17	3.35	17.5	17.59
BD-17	4.88	24.3	15.55
BD-18	0.91	17.6	16.18
BD-18	3.35	14.8	18.38
BD-20	0.91	18.6	16.96
BD-20	1.83	13.6	18.69
BD-20	3.35	15.5	17.90

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MOISTURE / DENSITY TABLE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE
E-25

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MOISTURE CONTENT AND UNIT WEIGHT
DRAINAGE BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu m)
BD-20	4.88	14.2	18.85
BD-21	0.91	16.5	17.59
BD-21	4.88	15.0	19.16
BD-21	6.40	15.9	17.90
BD-10	3.35	21.9	15.71
BD-10	4.88	17.6	17.12
BD-10	9.45	17.2	17.59
BD-14	1.83	14.3	16.96
BD-14	3.35	18.1	15.23
BD-14	4.88	19.2	16.65
BD-14	6.40	20.0	16.02
BD-14	7.92	17.9	16.96
BD-14	9.45	18.3	17.12

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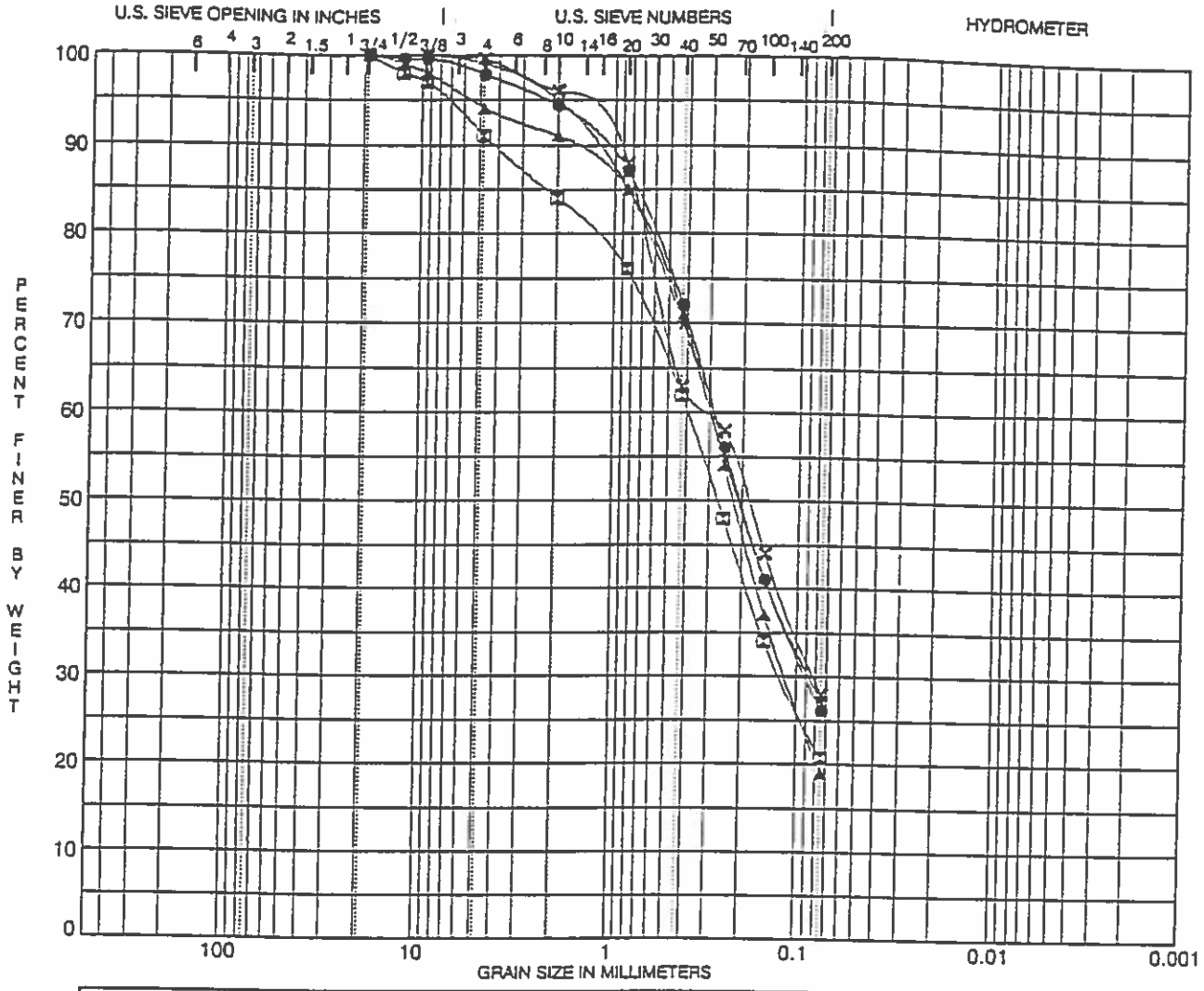
MOISTURE / DENSITY TABLE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

E-25A



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BD-01	at 0.6	Red Brown Silty Sand (SM)						
■	BD-02	at 0.6	Light Brown Silty Sand (SM)						
▲	BD-03	at 0.6	Light Brown Silty Sand (SM)						
★	BD-04	at 0.6	Red Brown Silty Sand (SM)						
✕	BD-05	at 0.6	Yellow Brown Silty Sand (SM)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BD-01	at 0.6	19.00	0.29	0.090		2.2	71.7	26.1	
■	BD-02	at 0.6	19.00	0.39	0.122		9.0	70.3	20.7	
▲	BD-03	at 0.6	19.00	0.30	0.115		6.0	75.0	19.0	
★	BD-04	at 0.6	9.50	0.30	0.086		1.0	71.6	27.4	
✕	BD-05	at 0.6	9.50	0.31	0.082		0.4	71.6	28.0	

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GRAIN SIZE ANALYSES

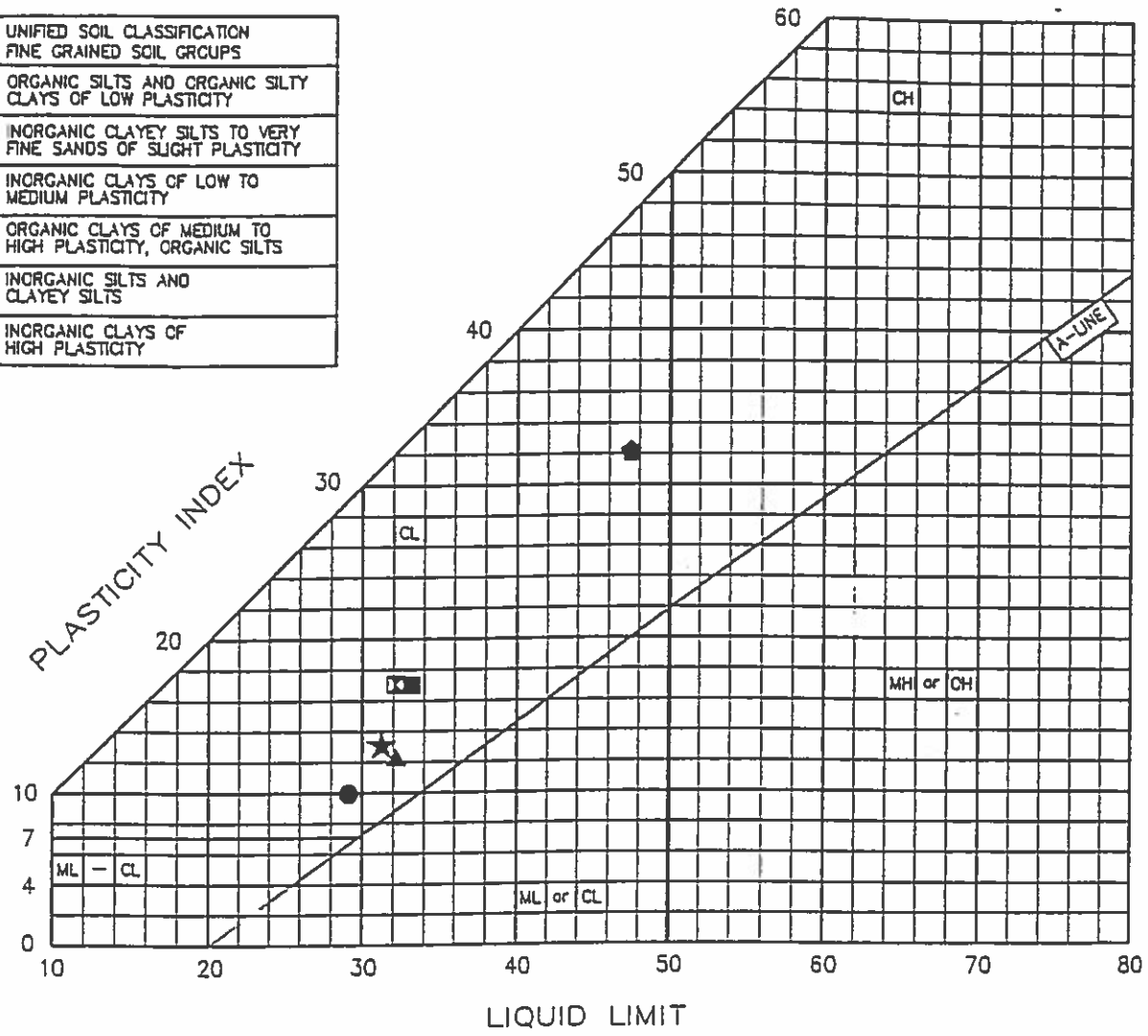
CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

E-26

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
CH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BD-1	9.45	31	13	Yellow Brown Clayey Sand (SC) -200=31%
⬟	BD-8	0.91	47	32	Dark Brown Sandy Clay (CL) -200=63%
●	BD-16	0.91	29	10	Light Brown Sandy Clay (CL) -200=50%
▲	BD-17	0.91	32	12	Light Brown Clayey Sand (SC) -200=46%
■	BD-18	0.91	33	17	Light Brown Clayey Sand (SC) -200=43%
⊠	BD-21	6.40	32	17	Gray Clayey Sand (SC) -200=33%

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PLASTICITY CHART

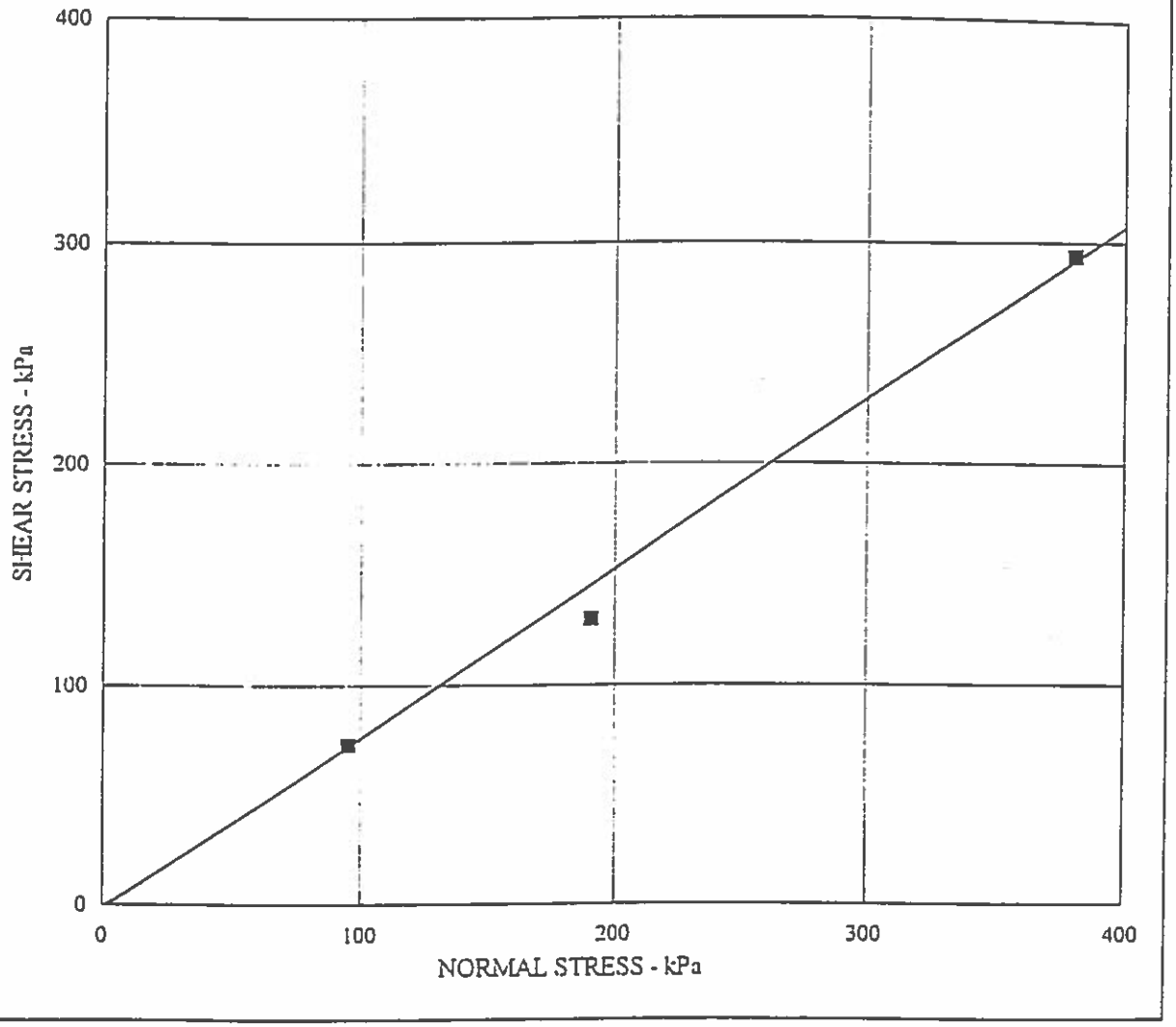
CARSON FREEWAY

CARSON CITY, NEVADA

PLATE
E-27

DIRECT SHEAR

BD-1 @ 3.35 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BD-1
DEPTH:	3.35 meters
SOIL DESCRIPTION:	Yellow Brown Sl.Silty Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	38
COHESION:	0 kPa

DRY DENSITY - kN/cu m	13.5		
INITIAL WATER CONTENT - %	3.8		
FINAL WATER CONTENT - %	24.9		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	73	130	294

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PROJECT NO. 30-1348-15.002

DIRECT SHEAR

CARSON FREEWAY

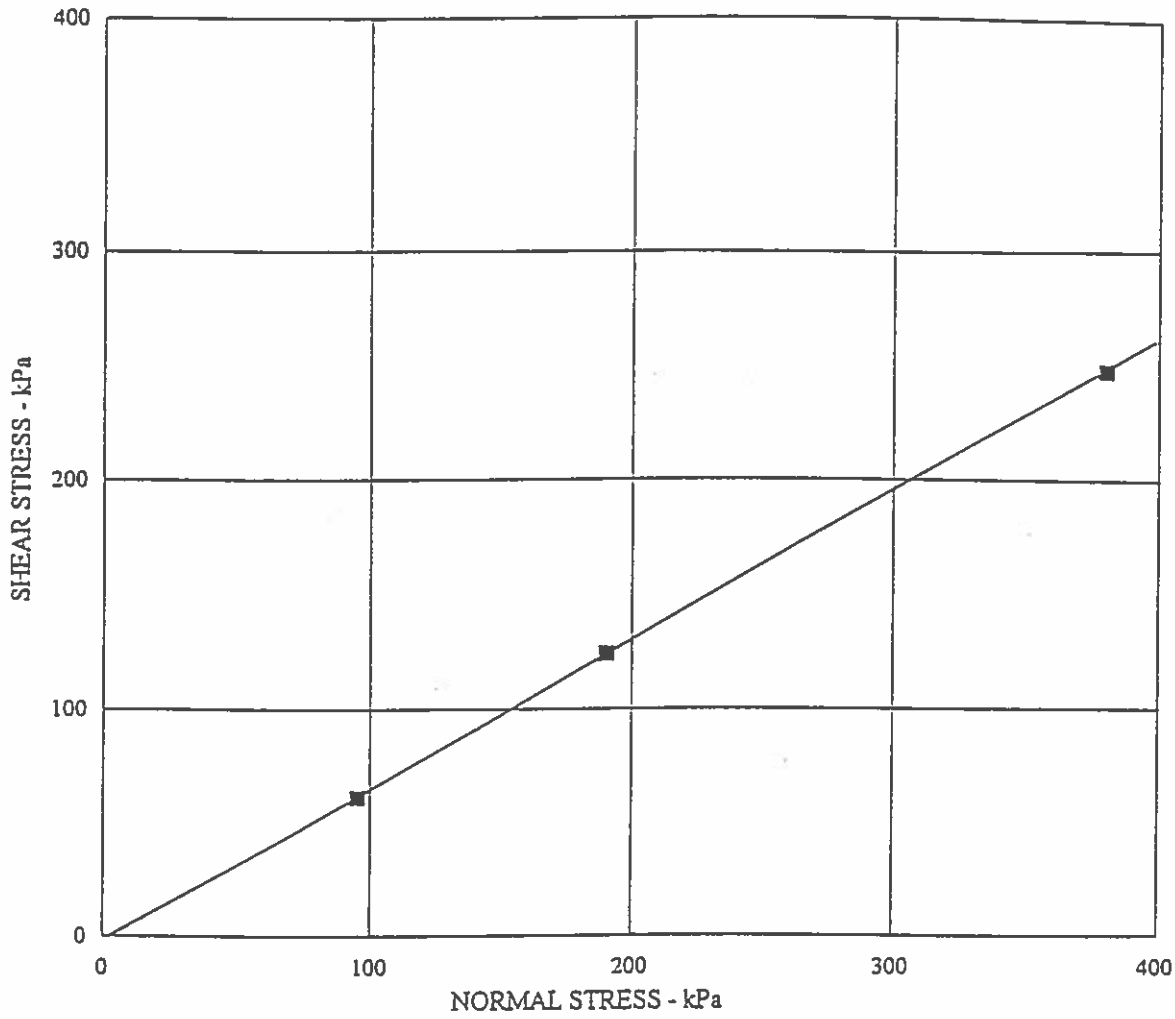
CARSON CITY, NEVADA

PLATE

E-28

DIRECT SHEAR

BD-3 @ 6.40 meters



TEST TYPE:	CD/WET/STAGED
BORING NO:	BD-3
DEPTH:	6.40 meters
SOIL DESCRIPTION:	Lt. Brown Silty Sand
RATE OF SHEAR:	0.0019 cm/sec

FRICTION ANGLE:	33
COHESION:	0 kPa

DRY DENSITY - kN/cu m	16.51		
INITIAL WATER CONTENT - %	15.5		
FINAL WATER CONTENT - %	18.8		
NORMAL STRESS - kPa	95	190	380
MAXIMUM STRESS - kPa	61	124	248

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DIRECT SHEAR

CARSON FREEWAY

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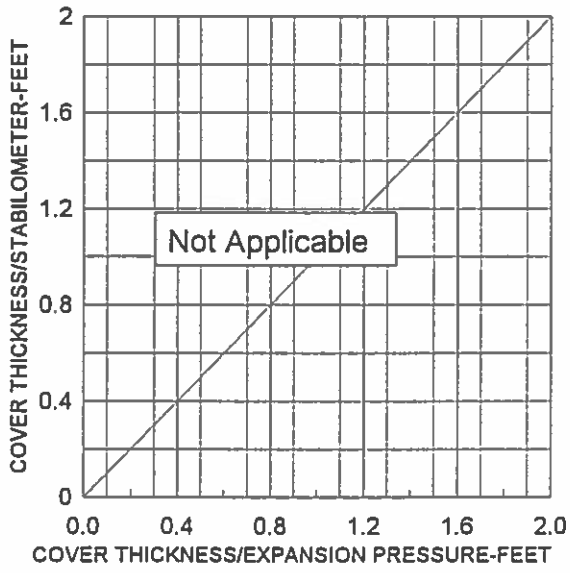
PROJECT NO. 30-1348-15.002

PLATE

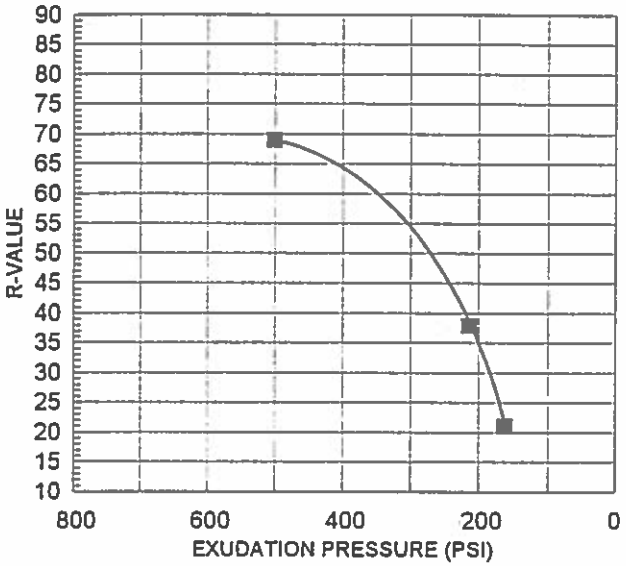
E-29

Sample Source: BD-1 @ 0-.61meters
Sample Description: Red Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	502	215	164
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	69	38	21
% Moisture at Test	8.9	10.6	11.7
Dry Density at Test, pcf	128.4	125.2	119.4
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		54	

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R-VALUE

CARSON FREEWAY

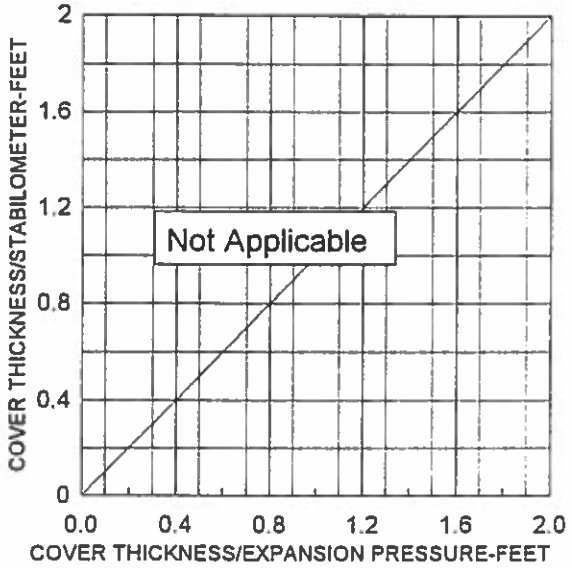
CARSON CITY, NEVADA

PLATE

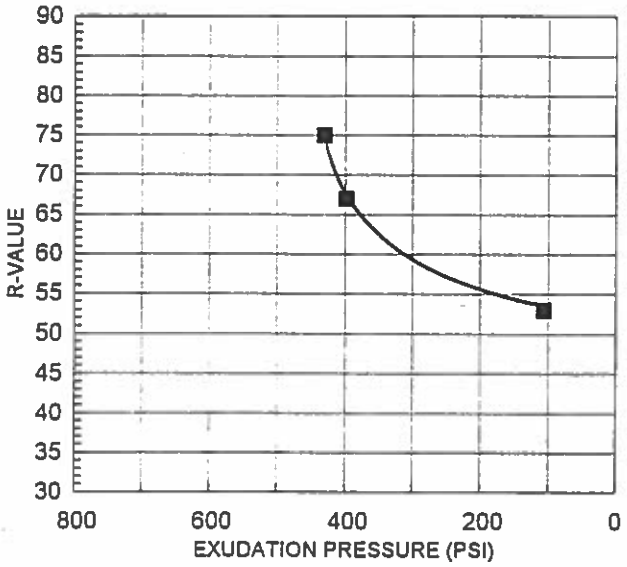
E-30

Sample Source: BD-2 @ 0-.61 Meters
Sample Description: Light Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	431	399	108
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	75	67	53
% Moisture at Test	8.7	9.8	10.2
Dry Density at Test, pcf	125.3	128.9	128.9
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		59	

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PROJECT NO. 30-1348-15.002

R-VALUE

CARSON FREEWAY

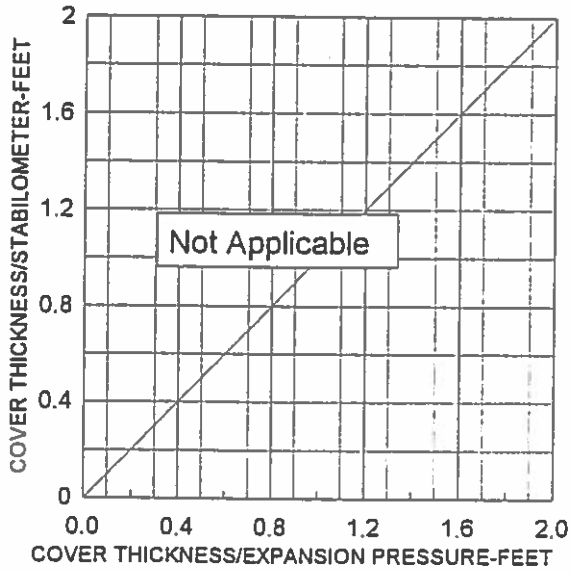
CARSON CITY, NEVADA

PLATE

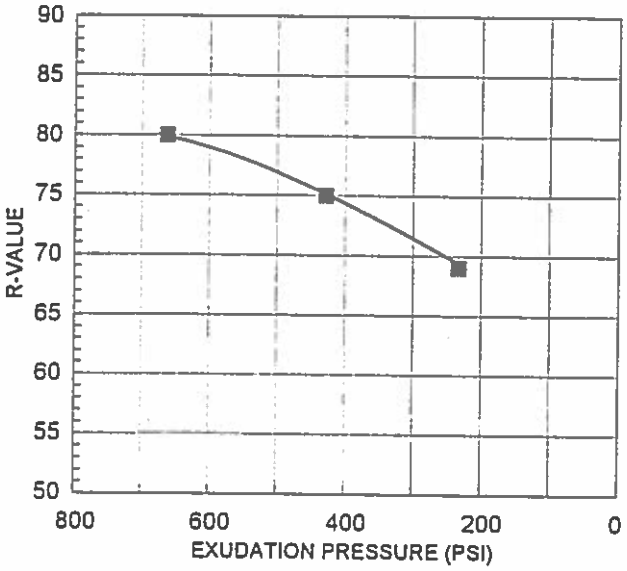
E-31

Sample Source: BD-3 @ 0-.61Meters
Sample Description: Light Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	662	430	234
Expansion Dial (.0001")	0.0001	0.0000	0.0000
Expansion Pressure, psf	4	0	0
Resistance Value, R	80	75	69
% Moisture at Test	9.3	9.8	10.4
Dry Density at Test, pcf	124.4	122.5	124.8
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		72	

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PROJECT NO. 30-1348-15.002

R-VALUE

CARSON FREEWAY

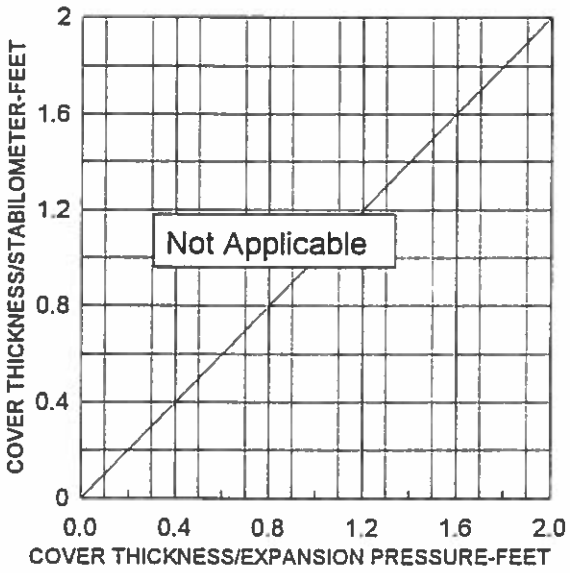
CARSON CITY, NEVADA

PLATE

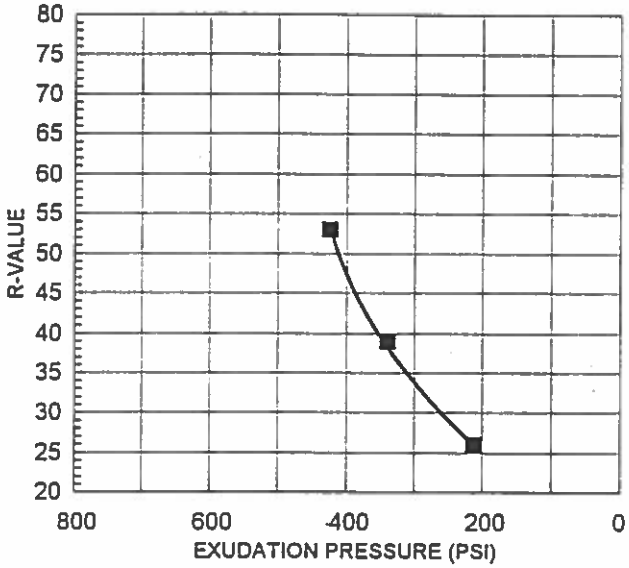
E-32

Sample Source: BD-4 @ 0 - 0.61 meters
Sample Description: Red Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	426	340	214
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	53	39	26
% Moisture at Test	10.3	10.9	11.4
Dry Density at Test, pcf	127.1	126.8	124.5
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		34	

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CARSON FREEWAY

CARSON CITY, NEVADA

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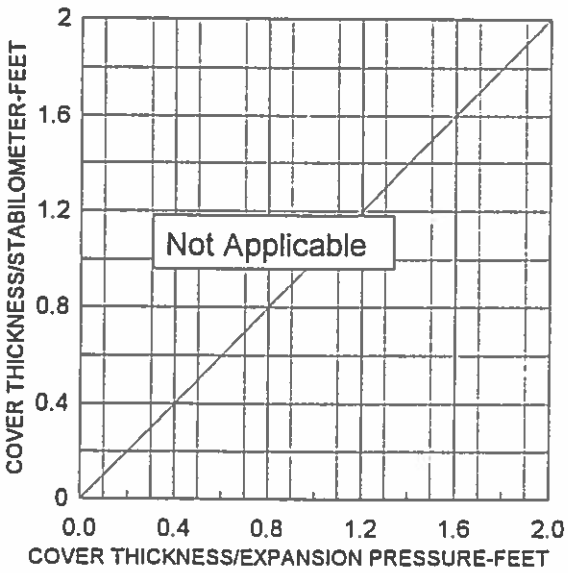
PLATE

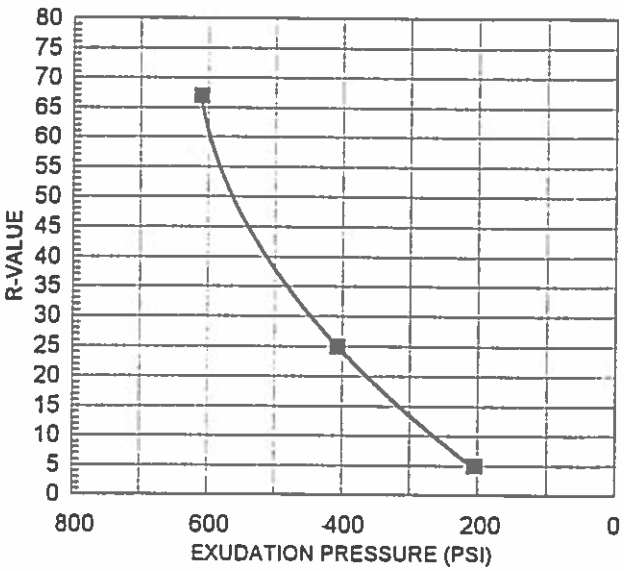
E-33

Sample Source: BD-5 at 0 - .61 meters
Sample Description: Yellow Brown Silty Fine Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	205	407	611
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	5	25	67
% Moisture at Test	11.9	10.8	9.7
Dry Density at Test, pcf	123.8	127.2	129.0
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		12	

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PROJECT NO. 30-1348-15.002

R-VALUE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

E-34

APPENDIX F

Ramp and Realignment Borings
And
Laboratory Test Results

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

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

MOISTURE CONDITION CRITERIA

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

SOIL CEMENTATION CRITERIA

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

STANDARD PENETRATION CLASSIFICATION*			
GRANULAR SOIL		CLAYEY SOIL	
BLOWS/0.3m	DENSITY	BLOWS/0.3m	CONSISTENCY
0 – 4	VERY LOOSE	0 – 1	VERY SOFT
5 – 10	LOOSE	2 – 4	SOFT
11 – 30	MEDIUM DENSE	5 – 8	MEDIUM STIFF
31 – 50	DENSE	9 – 15	STIFF
OVER 50	VERY DENSE	16 – 30	VERY STIFF
		31 – 60	HARD
		OVER 60	VERY HARD

*Standard Penetration Test (N) 63.5 Kg hammer 760mm free fall on 50.8mm O.D. x 35mm I.D. sampler.

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

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

TEST ABBREVIATIONS

CD	CONSOLIDATED DRAINED	O	ORGANIC CONTENT
CH	CHEMICAL (CORROSIVENESS)	OC	CONSOLIDATION
CM	COMPACTION	PI	PLASTICITY INDEX
CU	CONSOLIDATED UNDRAINED	RQD	ROCK QUALITY DESIGNATION
D	DISPERSIVE SOILS	RV	R- VALUE
DS	DIRECT SHEAR	S	SIEVE ANALYSIS/-200 WASH
E	EXPANSIVE SOIL	SL	SHRINKAGE LIMIT
G	SPECIFIC GRAVITY	U	UNCONFINED COMPRESSION
H	HYDROMETER	UU	UNCONSOLIDATED UNDRAINED
HC	HYDRO-COLLAPSE	UW	UNIT WEIGHT
K	PERMEABILITY	W	MOISTURE CONTENT

SAMPLER NOTATION

CPT	CONE PENETRATION
CS	CONTINUOUS SAMPLER[1]
MC	MODIFIED CA SPLIT SPOON [2]
P	PUSHED (NOT DRIVEN)
PB	PTICHER BARREL
RC	ROCK CORE[3]
SH	SHELBY TUBE [4]
SPT	STANDARD PENETRATION TEST
TP	TEST PIT

(1) I.D. = 82mm with tube; 88.9mm w/o tube
(2) I.D. = 61.5mm
(3) NXW
(4) I.D. = 73mm

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PROJECT NO. 30-1348-15.002

KEY TO SOIL CLASSIFICATION AND TERMS

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

F-1

EXPLORATION LOG

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST RAMP, U.S. 395
BORING: BR-01
E.A. #: 30-1348-15.002
GROUND ELEV.: 1497.18 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 18+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1496.2	1						SC	LIGHT BROWN CLAYEY SAND slightly moist, dense, fine to coarse sand and gravel, some surface cobbles, estimated 20 to 30% fines.	
	1.52							1.37	
		A	MC	47		W,UW,S	SM	LIGHT BROWN SILTY SAND moist, dense, fine to coarse sand and gravel decomposed granite.	14% fines
1495.2	2 1.98								
1494.2	3 3.05								
	3.20	B	MC	50/76				3.20 Very dense.	
								No free water encountered.	
1493.2	4								
1492.2	5								
1491.2	6								
1490.2	7								
1489.2	8								
1488.2	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-2

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST RAMP U.S. 395
BORING: BR-02
E.A. #: 30-1348-15.002
GROUND ELEV: 1476.45 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 8+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1475.5	1						SM SP	BROWN SLIGHTLY SILTY SAND slightly moist, loose fine to coarse grained sand.	
	1.52	A	MC	7		W,UW,S			10% fines
1474.5	2 1.98							Fine to medium grained sand.	
								2.59	
1473.5	3 3.05						SP	YELLOW BROWN CLEAN SAND moist, loose, fine to medium grained sand.	
	3.20	B	MC	9		S			3% fines
								3.51	
1472.5	4							No free water encountered.	
1471.5	5								
1470.5	6								
1469.5	7								
1468.5	8								
1467.5	9								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-3

CAD FILE: L:\1999\DRAFTING\301348\301348150O2FPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: EAST RAMP U.S. 395
BORING: BR-03
E.A. #: 30-1348-15.002
GROUND ELEV.: 1469.14 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 3+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SM		
		A	GRAB			S,RV		RED BROWN SILTY SAND moist, loose, fines to coarse grained sand and fine surface gravel.	27% fines
1468.1	0.91								
	1.52								
		B	MC	12		W,UW,S			11% fines
1467.1	1.98							Fine to medium grained sand, trace of fine gravel.	
								No free water encountered.	
1466.1	3								
1465.1	4								
1464.1	5								
1463.1	6								
1462.1	7								
1461.1	8								
1460.1	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-4

CAD FILE: L:\1999\DRAFTING\301348\30134815002FPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST RAMP U.S. 395
BORING: BR-04
E.A. #: 30-1348-15.002
GROUND ELEV.: 1475.23 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 15+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	BROWN SILTY SAND moist, loose, fine to medium grained sand, some surface coarse sand, estimated 20 to 30% fines.	
1474.2	1							0.91	
	1.52						SM SP	BROWN SLIGHTLY SILTY SAND moist, loose, fine to medium grained sand.	
		A	MC	6		W,UW,S			8% fines
1473.2	2 1.98								
	2.13	B	MC	4					
	2.59								
1472.2	3 3.05								
		C	MC	9					
	3.51								
	3.66								
		D	MC	7		S,Pl		Non-plastic	10% fines
1471.2	4 4.11								
	4.57								
		E	MC	21		W,UW			
1470.2	5 5.03							Becoming more sandy, medium dense.	
								Fine to coarse grained sand.	
1469.2	6 6.10								
		F	MC	19		W,UW,S			6% fines
	6.55								
								6.86	
1468.2	7						SC	BROWN CLAYEY SAND moist, fine to medium grained sand, low plasticity fines.	
	7.62								
		G	MC	24		W,UW,S			14% fines
1467.2	8 8.08							8.08	
								No free water encountered.	
1466.2	9								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-5

CAD FILE: L:\1999\DRAFTING\301348\30134815002FPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST RAMP U.S. 395
BORING: BR-05
E.A. #: 30-1348-15.002
GROUND ELEV: 1470.36 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 10+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, loose, fine to medium grained sand, estimated 15 to 25% fines, some fine surface gravel.	
1469.4	1								
	1.52	A	MC	7		OC			
1468.4	2 1.98								
	2.13	B	MC	6					
	2.59								
								2.74	
							SC	BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low plasticity fines.	PI=3 22% fines
1467.4	3 3.05								
		C	MC	18		W,UW,S,PI			
	3.51							3.51	
								No free water encountered.	
1466.4	4								
1465.4	5								
1464.4	6								
1463.4	7								
1462.4	8								
1461.4	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-6

CAD FILE: L:\1999\DRAFTING\301348\301348150021FPLATES.DWG

EXPLORATION LOG

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: WEST RAMP U.S. 395
BORING: BR-06
E.A. #: 30-1348-15.002
GROUND ELEV: 1466.09 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 6+50
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SM	LIGHT BROWN SILTY SAND slightly moist, loose, fine to coarse grained sand.	
		A	GRAB			S,RV			22% fines
1465.1	0.91 1							1.07	
	1.52						SP	LIGHT BROWN CLEAN SAND moist, loose, fine to coarse grained sand.	
		B	MC	8		W,UW,S			4% fines
1464.1	1.98 2							1.98	
								No free water encountered.	
1463.1	3								
1462.1	4								
1461.1	5								
1460.1	6								
1459.1	7								
1458.1	8								
1457.1	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-7

CAD FILE: L:\1998\DRAFTING\301348\301348150O2\PLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NORTH END IMUS REALIGNMENT
BORING: BR-07
E.A. #: 30-1348-15.002
GROUND ELEV: 1466.09 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 22+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								0.21 Approx. 8 cm of AC, 15 cm of Aggregate Base	
							SC	BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, estimated 20 to 30% fines, low plasticity fines.	
1465.1	1							1.07	
	1.52						SM	BROWN SILTY SAND moist, medium dense, fine to medium grained sand.	
		A	MC	22		W,UW,S			13% fines
1464.1	2 1.98								
								2.74 Becoming bore sandy	
1463.1	3 3.05						SM SP	BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to medium grained sand.	
		B	MC	13		W,UW,S			10% fines
	3.51							3.51	
								No free water encountered.	
1462.1	4								
1461.1	5								
1460.1	6								
1459.1	7								
1458.1	8								
1457.1	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-8

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/13/97
END DATE: 5/13/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: IMUS REALIGNMENT
BORING: BR-08
E.A. #: 30-1348-15.002
GROUND ELEV.: 1458.77 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 18+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/13/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30	A	GRAB			RV,S	SM	BROWN SILTY SAND moist, loose, fine to coarse grained sand, some fine surface gravel, estimated 15 to 25% fines.	20% fines
1457.8	0.91								
	1								
	1.22							Becoming more sandy.	
	1.52	B	MC	8		W,UW,S	SM SP	BROWN SLIGHTLY SILTY SAND moist, loose to medium dense, fine to coarse grained sand.	10% fines
1456.8	2 1.98								
1455.8	3 3.05	C	MC	14		W,UW,S		Occasional coarse gravel.	6% fines
	3.51							3.51	
								No free water encountered.	
1454.8	4								
1453.8	5								
1452.8	6								
1451.8	7								
1450.8	8								
1449.8	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-9

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: IMUS REALIGNMENT
BORING: BR-09
E.A. #: 30-1348-15.002
GROUND ELEV.: 1456.33 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 15+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SM		
		A	GRAB			S,RV		BROWN SILTY SAND moist, medium dense, fine to coarse grained sand, fine surface gravel, some coarse surface gravel.	20% fines
1455.3	0.91 1								
	1.52	B	MC	14		W,UW,S		Becoming more sandy, with gravel.	15% fines
1454.3	2 1.98								
							SM SP	2.13 LIGHT BROWN SLIGHTLY SILTY SAND moist, medium dense, fine grained sand.	
1453.3	3 3.05	C	MC	14		W,UW,S			8% fines
	3.51							3.51 No free water encountered.	
1452.3	4								
1451.3	5								
1450.3	6								
1449.3	7								
1448.3	8								
1447.3	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-10

CAD FILE: L:\1999\DRAFTING\301348\301348150002FPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: IMUS REALIGNMENT, NEAR ARROWHEAD
BORING: BR-10
E.A. #: 30-1348-15.002
GROUND ELEV: 1447.80 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

STATION: STA 5+50
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30	A	GRAB			S,PI,RV	SC	BROWN CLAYEY SAND moist, medium dense, fine to coarse grained sand, fine surface gravel, estimated 20 to 30% fines, low plasticity fines.	PI=6 31% fines
1446.8	1 0.91								
	1.52	B	MC	13		W,UW,S	SM SP	YELLOW BROWN SLIGHTLY SILTY SAND moist, medium dense, fine to coarse grained sand.	8% fines
1445.8	2 1.98								
1444.8	3 3.05	C	MC	48		W,UW,S,PI		Light brown, non-plastic.	8% fines
	3.51							No free water encountered.	
1443.8	4								
1442.8	5								
1441.8	6								
1440.8	7								
1439.8	8								
1438.8	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-11

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NE RAMP COLLEGE PARKWAY
BORING: BR-11
E.A. #: 30-1348-15.002
GROUND ELEV: 1429.51 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5-14-97	1.7	1427.8

SHEET 1 OF 1

STATION: STA 3+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1428.5	1						SC	BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low to moderate plasticity fines.	
	1.52	A	MC	19		W,UW,S		Yellow brown Encountered groundwater at 1.7 M. Becoming more sandy.	20% fines
1427.5	2 1.98								
								2.29	
							SP	YELLOW BROWN CLEAN SAND wet, dense, fine to coarse grained sand.	
1426.5	3 3.05	B	MC	31		W,UW,S			3% fines
	3.51							3.51	
1425.5	4								
1424.5	5								
1423.5	6								
1422.5	7								
1421.5	8								
1420.5	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-12

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NW RAMP COLLEGE PARKWAY
BORING: BR-12
E.A. #: 30-1348-15.002
GROUND ELEV: 1431.04 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5-14-97	1.8	1429.2

STATION: STA 8+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1430.0	1						SC	LIGHT BROWN CLAYEY SAND slightly moist, medium dense, fine to coarse grained sand, low plasticity fines.	
	1.52	A	MC	22		W,UW,S,PI		Moist, fine to medium grained sand. Encountered groundwater at 1.82 M. Non-plastic.	14% fines
1429.0	2 1.98								
1428.0	3 3.05								
		B	MC	7				Loose.	
	3.51								
	3.66	C	MC	21		OC			
1427.0	4 4.11							Fine grained sand.	
	4.27						SM SP	YELLOW BROWN SLIGHTLY SILTY SAND wet, dense, fine to medium grained sand, estimated 5 to 12% fines.	5% fines
	4.57	D	MC	32		W,UW,S			
1426.0	5 5.03								
1425.0	6 6.10								
	6.25	E	MC	32		W,UW			
	6.55						SC	BROWN CLAYEY SAND wet, dense, fine to medium grained sand, estimated 20 to 30% fines, low to moderate plasticity fines.	
1424.0	7								
1423.0	8								
1422.0	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-13

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: NW RAMP COLLEGE PARKWAY
BORING: BR-13
E.A. #: 30-1348-15.002
GROUND ELEV: 1430.43 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV

STATION: STA 1+00
OFFSET: 60 M EAST
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30	A	GRAB			S,RV	SC	LIGHT BROWN VERY CLAYEY SAND moist, medium dense, fine grained sand, low plasticity fines.	46% fines
1429.4	1 0.91								
	1.52	B	MC	15		W,UW,S,PI		Becoming more sandy. Non-plastic.	20% fines
1428.4	2 1.98							1.98 No free water encountered.	
1427.4	3								
1426.4	4								
1425.4	5								
1424.4	6								
1423.4	7								
1422.4	8								
1421.4	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-14

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SE RAMP COLLEGE PARKWAY
BORING: BR-14
E.A. #: 30-1348-15.002
GROUND ELEV.: 1430.43 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 4+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SM		
		A	GRAB			S,RV		LIGHT BROWN SILTY SAND slightly moist, dense, fine to coarse grained sand.	30% fines
1429.4	0.91 1								
	1.52								
		B	MC	75		W,UW,S		Moist, very dense, fine to medium grained sand, weakly cemented. Lenses of cleaner sand.	10% fines
1428.4	2 1.98								
								2.44	
							SC	LIGHT BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low plasticity fines.	
1427.4	3 3.05								
		C	MC	20		S,PI			PI=3 14% fines
	3.51							3.51	
								No free water encountered.	
1426.4	4								
1425.4	5								
1424.4	6								
1423.4	7								
1422.4	8								
1421.4	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-15

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SW RAMP COLLEGE PARKWAY
BORING: BR-15
E.A. #: 30-1348-15.002
GROUND ELEV: 1431.65 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 12+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SM	LIGHT BROWN SILTY SAND slightly moist, very dense, fine to coarse sand and gravel, cobbles up to 30 cm.	
1430.6	1								
	1.52								
	1.68	A	MC	50/127		W,UW,S		Gray	15% fines
1429.6	2								
1428.6	3 3.05								
	3.20	B	MC	50/51					
1427.6	4								
	4.57								
	4.72	C	MC	50/51		W,UW,S		4.72	22% fines
1426.6	5							No free water encountered.	
1425.6	6								
1424.6	7								
1423.6	8								
1422.6	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-16

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SE RAMP COLLEGE PARKWAY
BORING: BR-16
E.A. #: 30-1348-15.002
GROUND ELEV.: 1430.73 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

STATION: STA 9+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	BROWN CLAYEY SAND slightly moist, dense, fine to coarse grained sand, estimated 20 to 30% fines, low to moderate plasticity fines.	
1429.7	1							0.91	
	1.52						SM	OLIVE SILTY SAND moist, very dense, fine to medium grained sand.	
		A	MC	50/140		W,UW,S			13% fines
	1.83								
1428.7	2								
								2.59	
1427.7	3 3.05						SC	DARK GRAY CLAYEY SAND moist, dense, fine to medium grained sand, low plasticity fines.	
		B	MC	39		W,UW,S			26% fines
	3.51							3.51	
								No free water encountered.	
1426.7	4								
1425.7	5								
1424.7	6								
1423.7	7								
1422.7	8								
1421.7	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-17

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/14/97
END DATE: 5/14/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: SW RAMP COLLEGE PARKWAY
BORING: BR-17
E.A. #: 30-1348-15.002
GROUND ELEV: 1430.12 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.

SHEET 1 OF 1

STATION: STA 4+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/14/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
1429.1	1						SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand.	
	1.52	A	MC	28		W,UW,S			19% fines
1428.1	2 1.98								
1427.1	3 3.05								
		B	MC	14		W,UW,S		Yellow brown, fine to medium grained sand.	18% fines
	3.51							3.51	
1426.1	4							No free water encountered.	
1425.1	5								
1424.1	6								
1423.1	7								
1422.1	8								
1421.1	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-18

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: ARROWHEAD REALIGNMENT
BORING: BR-18
E.A. #: 30-1348-15.002
GROUND ELEV: 1447.19 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5-14-97	1.5	1445.7

SHEET 1 OF 1

STATION: STA 5+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SC		
		A	GRAB			S,RV		BROWN CLAYEY SAND slightly moist, medium dense, fine to medium grained sand, low plasticity fines.	28% fines
1446.2	0.91 1								
	1.52	B	MC	15		W,UW,S,PI		Encountered groundwater at 1.5 M. Becoming more sandy, moist. Non-plastic. Lenses of cleaner sand.	11% fines
1445.2	1.98 2								
1444.2	3 3.05							Red brown, fine to coarse grained sand.	
		C	MC	27		W,UW,S			13% fines
	3.51							3.51	
								No free water encountered.	
1443.2	4								
1442.2	5								
1441.2	6								
1440.2	7								
1439.2	8								
1438.2	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-19

PROJECT NO. 30-1348-15.002

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: ARROWHEAD REALIGNMENT
BORING: BR-19
E.A. #: 30-1348-15.002
GROUND ELEV: 1446.58 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.
5-15-97	1.2	1445.4

SHEET 1 OF 1

STATION: STA 2+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/ 300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SC	BROWN CLAYEY SAND moist, medium dense, fine to medium grained sand, low plasticity fines.	
		A	GRAB			S,RV			21% fines
1445.6	1 0.91								
	1.52							Encountered groundwater at 1.2 M.	
		B	MC	24		W,UW,S			19% fines
1444.6	2 1.98								
1443.6	3 3.05								
		C	MC	23		W,UW,S		Becoming more sandy.	19% fines
	3.51							3.51	
1442.6	4								
1441.6	5								
1440.6	6								
1439.6	7								
1438.6	8								
1437.6	9								

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PROJECT NO. 30-1348-15.002

LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-20

CAD FILE: L:\1999\DRAFTING\301348\30134815002FPLATES.DWG

EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA REALIGNMENT
BORING: BR-20
E.A. #: 30-1348-15.002
GROUND ELEV.: 1417.32 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 20+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.
5-15-97	1.7	1415.6

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								0.21 Approx. 9 cm AC., 15 cm Aggregate Base.	
							SC	LIGHT BROWN CLAYEY SAND moist, loose to medium dense, fine to medium grained sand, moderate plasticity fines.	
1416.3	1								
	1.52							Wet	
		A	MC	12		W,UW,S,PI		Encountered groundwater at 1.68 M.	PI = 14 29% fines
1415.3	2 1.98								
1414.3	3 3.05								
		B	MC	11		W,UW,S,PI		Gray, fine to medium grained sand. High plasticity fines.	PI = 41 28% fines
	3.51							3.51	
1413.3	4								
1412.3	5								
1411.3	6								
1410.3	7								
1409.3	8								
1408.3	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE F-21

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA REALIGNMENT
BORING: BR-21
E.A. #: 30-1348-15.002
GROUND ELEV: 1414.27 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 6+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV
5-15-97	1.5	1412.7

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30	A	GRAB			S,RV	SM	LIGHT BROWN SILTY SAND slightly moist, fine to medium grained sand.	33% fines
1413.3	0.91								
	1.52	B	MC	28		W,UW,S		Encountered groundwater at 1.52 M.	6% fines
	1.83							Becoming more sandy, some fine gravel.	
1412.3	1.98						SM SP	RED BROWN SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand.	
	2.90								
1411.3	3.05	C	MC	7		W,UW,S,PI	SC	LIGHT BROWN VERY CLAYEY SAND wet, stiff, fine grained sand, moderate plasticity fines.	PI = 16 47% fines
	3.51							Gray.	
1410.3	4								
1409.3	5								
1408.3	6								
1407.3	7								
1406.3	8								
1405.3	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-22

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: LOMPA REALIGNMENT AT U.S. 50
BORING: BR-22
E.A. #: 30-1348-15.002
GROUND ELEV.: 1412.75 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5-15-97	1.2	1411.5

SHEET 1 OF 1

STATION: STA 1+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SM	LIGHT BROWN SILTY SAND moist, medium dense, fine to coarse grained sand, non-plastic.	
		A	GRAB			S,PI,RV			25% fines
1411.7	0.91 1								
	1.52							Encountered groundwater at 1.22 M. Wet, dense, fine to medium grained sand.	
		B	MC	36		W,UW,S			30% fines
1410.7	1.98 2								
								2.44	
							SC	YELLOW BROWN CLAYEY SAND wet, medium dense, fine to coarse grained sand, low to moderate plasticity fines.	
1409.7	3.05 3								
		C	MC	14		W,UW,S			13% fines
	3.51							3.51	
1408.7	4							No free water encountered.	
1407.7	5								
1406.7	6								
1405.7	7								
1404.7	8								
1403.7	9								

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CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-23

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: U.S. 50 EAST RAMP
BORING: BR-23
E.A. #: 30-1348-15.002
GROUND ELEV.: 1412.75 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5-15-97	2.1	1410.6

SHEET 1 OF 1

STATION: STA 2+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
							SC	0.15 Approx. 5 cm of AC, 15 cm of Aggregate Base.	
1411.7	1							LIGHT BROWN CLAYEY SAND moist, loose, fine to medium grained sand, moderate plasticity fines.	
	1.52	B	MC	9		W,UW,S,PI		Very fine grained sand. Wet	PI = 15 19% fines
1410.7	2 1.98							Encountered groundwater at 2.13 M.	
1409.7	3 3.05	C	MC	31		W,UW,S,PI		Dense, fine to medium grained sand, low plasticity fines.	PI = 5 33% fines
	3.51							3.51	
1408.7	4								
1407.7	5								
1406.7	6								
1405.7	7								
1404.7	8								
1403.7	9								

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CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-24

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EXPLORATION LOG

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: U.S. 50 EAST RAMP
BORING: BR-24
E.A. #: 30-1348-15.002
GROUND ELEV: 1413.66 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5-15-97	1.5	1412.1

SHEET 1 OF 1

STATION: STA 6+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SM	LIGHT BROWN SILTY SAND slightly moist, medium dense, fine to coarse grained sand.	
		A	GRAB			S,RV			21% fines
1412.7	0.91 1								
	1.07						SC	LIGHT BROWN CLAYEY SAND moist, medium dense, small cemented pieces, fine grained sand, low plasticity fines.	
	1.52	B	MC	16		W,UW,S,PI			PI = 13
								Encountered groundwater at 1.5 M.	41% fines
1411.7	1.98 2								
	2.59						SM SP	LIGHT BROWN SLIGHTLY SILTY SAND wet, dense, fine to medium grained sand, slightly plastic.	
1410.7	3 3.05	C	MC	30		W,UW,S			9% fines
	3.51								
1409.7	4								
1408.7	5								
1407.7	6								
1406.7	7								
1405.7	8								
1404.7	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-25

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: U.S. 50 EAST RAMP
BORING: BR-25
E.A. #: 30-1348-15.002
GROUND ELEV: 1414.88 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 10+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5-15-97	0.9	1414.0

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30	A	GRAB			S,RV	SC	LIGHT BROWN VERY CLAYEY SAND slightly moist, loose, fine to medium grained sand, low plasticity fines.	42% fines
1413.9	0.91							Encountered groundwater at 0.91 M.	
	1.22						SP	YELLOW BROWN CLEAN SAND wet, fine to medium grained sand.	
	1.52	B	MC	12		W,UW,S			3% fines
1412.9	1.98								
	2.59						SC	LIGHT BROWN CLAYEY SAND wet, loose, fine to medium grained sand, low to moderate plasticity fines.	
1411.9	3.05	C	MC	10		W,UW,S			41% fines
	3.51								
1410.9	4								
1409.9	5								
1408.9	6								
1407.9	7								
1406.9	8								
1405.9	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-26

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: U.S. 50 WEST RAMP
BORING: BR-26
E.A. #: 30-1348-15.002
GROUND ELEV: 1414.27 m
HAMMER DROP SYSTEM: AUTOMATIC

GROUNDWATER LEVEL		
DATE	DEPTH	ELEV.
5-15-97	1.7	1412.6

STATION: STA 10+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SC		
		A	GRAB			S,RV		LIGHT BROWN CLAYEY SAND slightly moist, medium dense, fine to medium grained sand, low plasticity fines.	29% fines
1413.3	0.91 1								
	1.22						SM SP		
	1.52	B	MC	15		W,UW,S		GRAY SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand. Encountered groundwater at 1.68 M.	9% fines
1412.3	1.98 2								
1411.3	3 3.05							3.05	
		C	MC	14		W,UW,S	SC	LIGHT BROWN CLAYEY SAND wet, medium dense, fine to medium grained sand, low to moderate plasticity fines.	26% fines
	3.51							3.51	
1410.3	4								
1409.3	5								
1408.3	6								
1407.3	7								
1406.3	8								
1405.3	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-27

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EXPLORATION LOG

SHEET 1 OF 1

KLEINFELDER

START DATE: 5/15/97
END DATE: 5/15/97
JOB DESCRIPTION: CARSON FREEWAY
LOCATION: U.S. 50 WEST RAMP
BORING: BR-27
E.A. #: 30-1348-15.002
GROUND ELEV: 1413.05 m
HAMMER DROP SYSTEM: AUTOMATIC

STATION: STA 5+00
OFFSET: 0
ENGINEER: J. FORGA
EQUIPMENT: CME 55
OPERATOR: SPECTRUM
DRILLING METHOD: HOLLOW STEM AUGER
BACKFILLED: YES DATE: 5/15/97

GROUNDWATER LEVEL

DATE	DEPTH	ELEV.
5-15-97	1.5	1411.5

ELEV. (m)	DEPTH (m)	SAMPLE NO.	SAMPLE TYPE	BLOWS/300mm	Recovery (%)	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.30						SC	LIGHT BROWN CLAYEY SAND moist, loose to medium dense, fine to moderate grained sand, low to moderate plasticity, estimated 20 to 30% fines.	
		A	GRAB			S,RV			26% fines
1412.1	0.91								
	1								
	1.52							1.37	
		B	MC	12		W,UW,S	SM SP	Encountered groundwater at 1.5 M. GRAY SLIGHTLY SILTY SAND wet, medium dense, fine to medium grained sand, estimated 5 to 12% fines.	19% fines
1411.1	2 1.98								
1410.1	3 3.05								
		C	MC	14					
	3.51							3.51	
1409.1	4								
1408.1	5								
1407.1	6								
1406.1	7								
1405.1	8								
1404.1	9								

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LOG OF BORING

CARSON FREEWAY

CARSON CITY, NEVADA

PROJECT NO. 30-1348-15.002

PLATE F-28

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MOISTURE CONTENT AND UNIT WEIGHT
RAMP AND REALIGNMENT BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu m)
BR-1	1.83	7.8	17.43
BR-2	1.83	4.8	16.33
BR-3	1.83	7.3	16.96
BR-4	1.83	5.6	16.18
BR-4	3.35	11.3	17.28
BR-4	4.88	9.0	15.71
BR-4	6.40	10.9	16.18
BR-4	7.92	9.2	17.75
BR-5	3.35	9.2	18.93
BR-6	1.83	6.0	16.65
BR-7	1.83	7.7	18.06
BR-7	3.35	7.2	16.65
BR-8	1.83	6.7	16.81
BR-8	3.35	9.4	15.71
BR-9	1.83	9.0	16.81
BR-9	3.35	6.4	16.02
BR-10	1.83	6.8	16.49
BR-10	3.35	10.8	17.43
BR-11	1.83	18.1	16.33
BR-11	3.35	5.6	17.43
BR-12	1.83	12.8	17.43
BR-12	4.88	14.5	17.28
BR-12	6.40	12.0	18.33
BR-13	1.83	12.2	17.28
BR-14	1.83	12.7	17.75
BR-14	3.35	16.5	17.12
BR-15	1.52	0.6	----
BR-15	4.57	0.5	----
BR-16	1.83	14.0	17.28
BR-16	3.35	12.8	16.65
BR-17	1.83	10.9	17.12
BR-17	3.35	21.8	15.85
BR-18	1.83	15.9	16.96
BR-18	3.35	14.4	17.28
BR-19	1.83	13.6	18.06
BR-19	3.35	12.9	16.81
BR-20	1.83	24.0	14.61
BR-20	3.35	23.3	15.55
BR-21	1.83	5.1	16.81
BR-21	3.35	34.7	13.04
BR-22	1.83	21.4	16.02
BR-22	3.35	15.6	17.28
BR-23	1.83	24.7	14.92

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MOISTURE / DENSITY TABLE

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE
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MOISTURE CONTENT AND UNIT WEIGHT
RAMP AND REALIGNMENT BORINGS

BORING	DEPTH (meters)	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (kN/cu m)
BR-23	3.35	24.4	14.45
BR-24	1.83	21.7	16.02
BR-24	3.35	18.4	16.49
BR-25	1.83	6.2	16.33
BR-25	3.35	23.3	15.23
BR-26	1.83	18.7	16.02
BR-26	3.35	16.5	16.96
BR-27	1.83	19.1	16.33

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MOISTURE / DENSITY TABLE

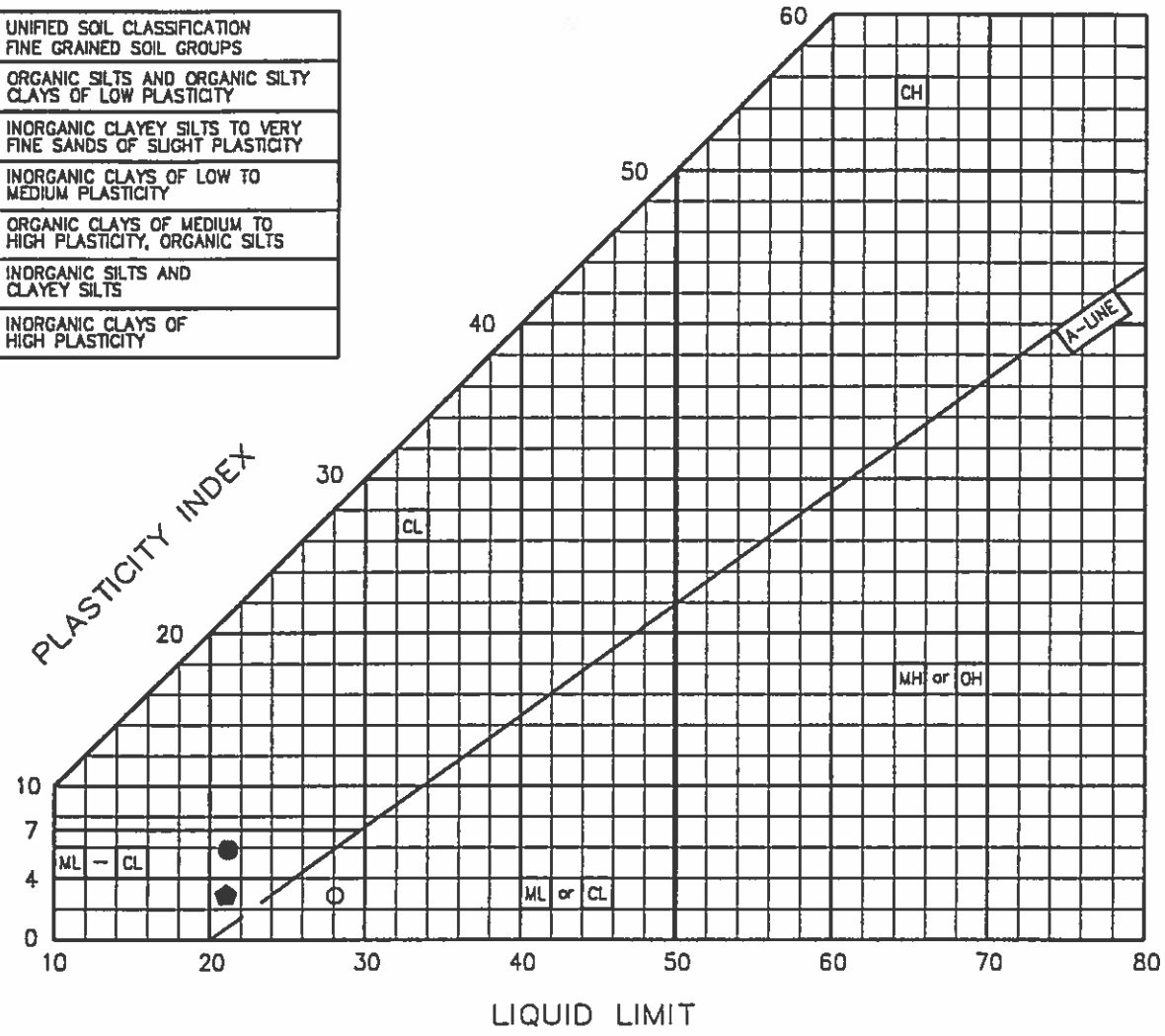
CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

F-29A

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BR-4	3.81	---	NP	Brown Slightly Silty Sand (SM) -200=10%
⬟	BR-5	3.35	21	3	Brown Clayey Sand (SC) -200=22%
●	BR-10	0.30	21	6	Brown Clayey Sand (SC) -200=31%
▲	BR-10	3.35	---	NP	Yellow Brown Slightly Silty Sand (SM) -200=8%
■	BR-12	1.83	---	NP	Light Brown Clayey Sand (SC) -200=14%
⊠	BR-13	1.83	---	NP	Light Brown Clayey Sand (SC) -200=20%
○	BR-14	3.35	28	3	Light Brown Clayey Sand (SC) -200=14%

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KEY SOIL CLASSIFICATION AND TERMS

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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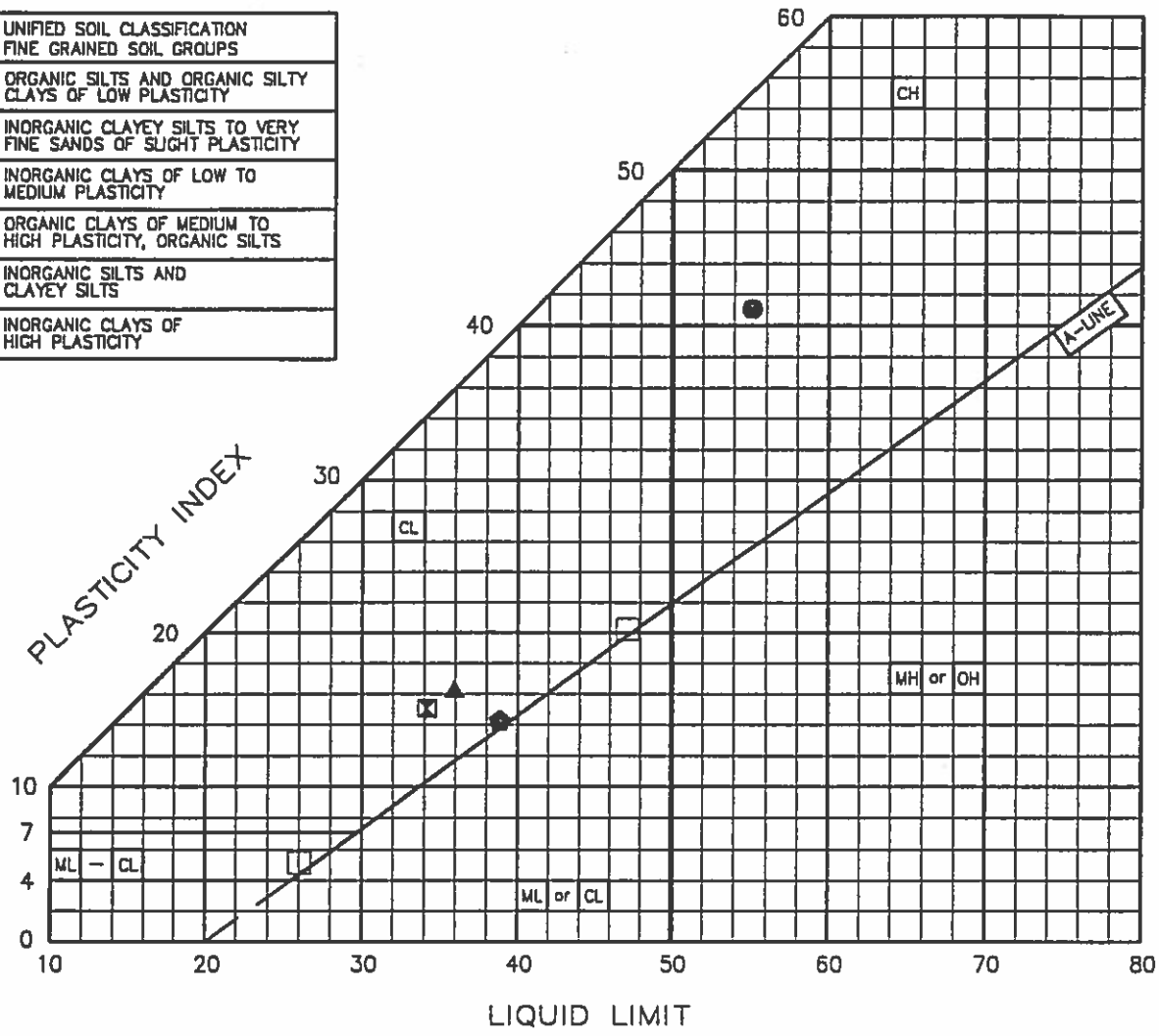
GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BR-18	1.83	---	NP	Brown Clayey Sand (SC) -200 =11%
⬟	BR-20	1.83	39	14	Light Brown Clayey Sand (SC) -200=29%
●	BR-20	3.35	55	41	Light Bown Clayey Sand (SC) -200=28%
▲	BR-21	3.35	36	16	Light Brown Very Clayey Sand (SC) -200=47%
■	BR-22	0.30	---	NP	Light Brown Silty Sand (SC) -200= 25%
⊠	BR-23	1.83	34	15	Light Brown Clayey Sand (SC) -200=19%
□	BR-23	3.35	26	5	Light Brown Clayey Sand (SC) -200=33%

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KEY SOIL CLASSIFICATION AND TERMS

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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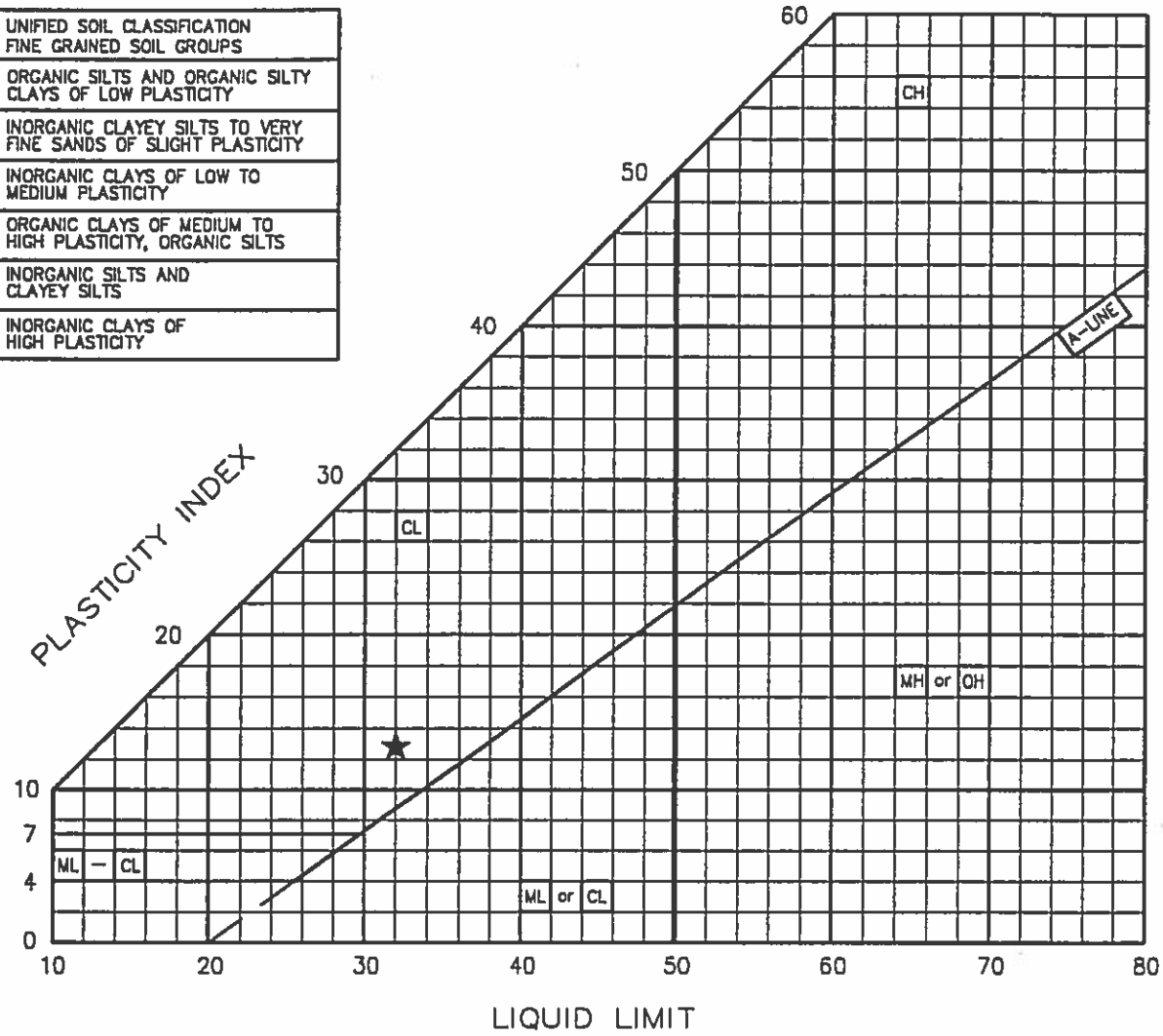
GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
MH	INORGANIC SILTS AND CLAYEY SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE NO.	SAMPLE (DEPTH)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
★	BR-24	1.83	32	13	Light Brown Clayey Sand (SC) -200=41%

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KEY SOIL CLASSIFICATION AND TERMS

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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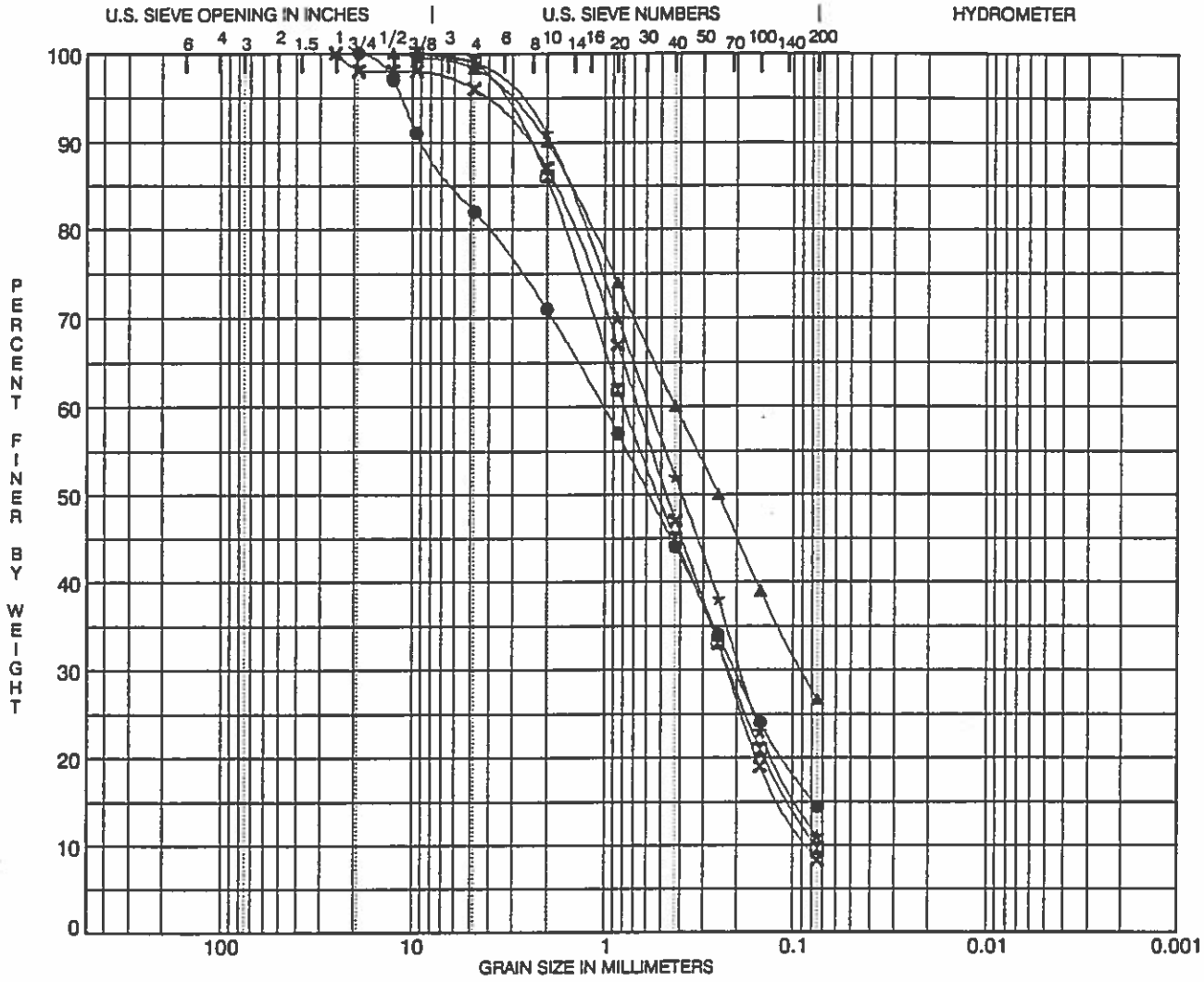

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BR-01	at 1.8	Light Brown Silty Sand (SM)						
⊠	BR-02	at 1.8	Brown Slightly Silty Sand (SM/SP)					0.80	10.2
▲	BR-03	at 0.3	Red Brown Silty Sand (SM)						
★	BR-03	at 1.8	Brown Slightly Silty Sand (SM/SP)					0.90	8.3
✕	BR-04	at 1.8	Brown Slightly Silty Sand (SM/SP)					0.90	8.0

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BR-01	at 1.8	19.00	1.02	0.204		18.0	67.6	14.4	
⊠	BR-02	at 1.8	9.50	0.78	0.220	0.0768	1.0	89.4	9.6	
▲	BR-03	at 0.3	12.50	0.43	0.091		1.7	71.7	26.6	
★	BR-03	at 1.8	9.50	0.58	0.190		1.0	88.0	11.0	
✕	BR-04	at 1.8	25.00	0.67	0.224	0.0837	4.0	87.7	8.3	

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GRAIN SIZE ANALYSES

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PLATE F-33

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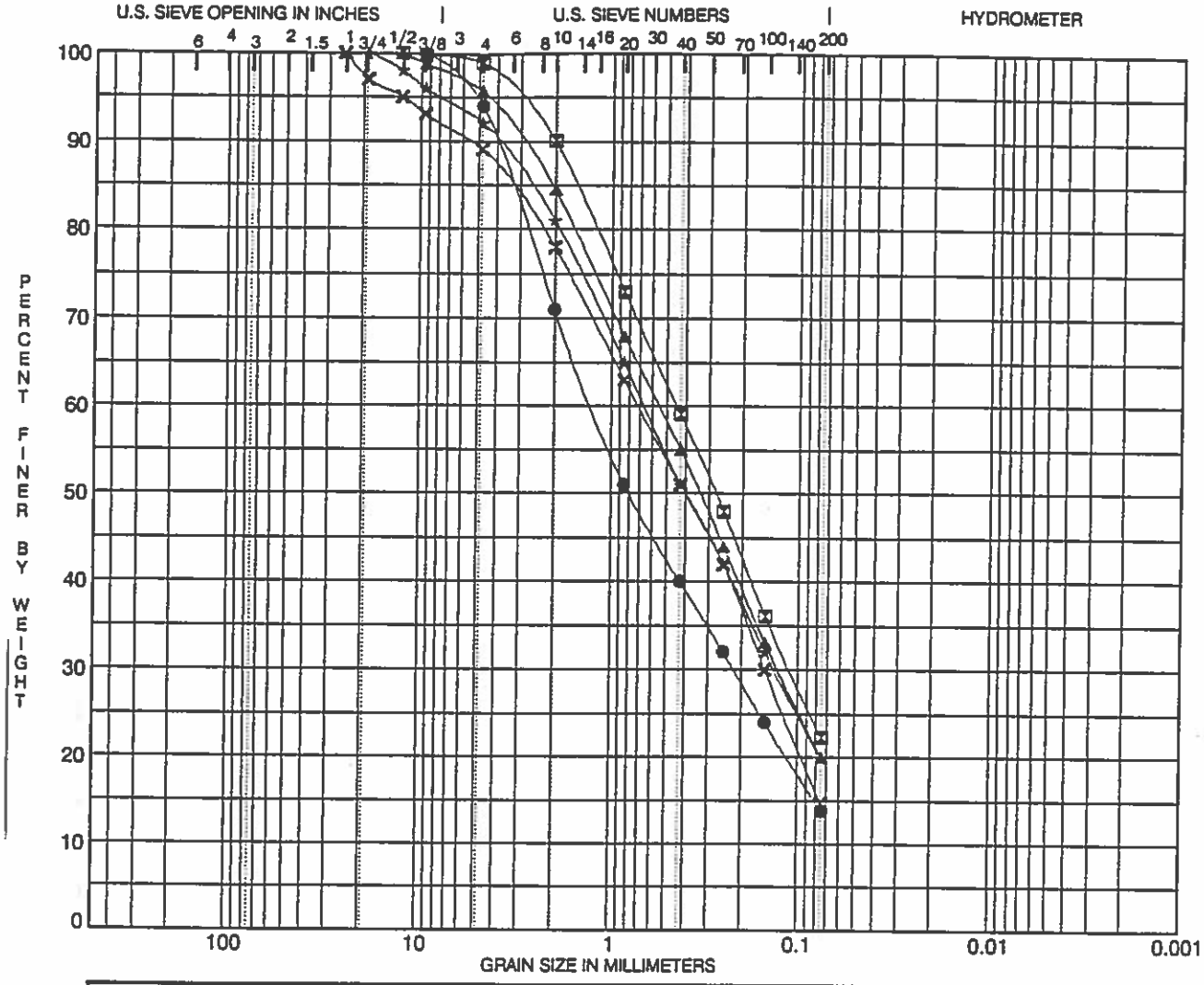

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BR-04	at 7.9	Brown Clayey Sand (SC)						
⊠	BR-06	at 0.3	Light Brown Silty Sand (SM)						
▲	BR-08	at 0.3	Brown Silty Sand (SM)						
★	BR-09	at 0.3	Brown Silty Sand (SM)						
✕	BR-09	at 1.8	Yellow Brown Slightly Silty Sand (SM/SP)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BR-04	at 7.9	9.50	1.25	0.220		6.0	80.2	13.8	
⊠	BR-06	at 0.3	12.50	0.45	0.111		1.1	76.6	22.3	
▲	BR-08	at 0.3	12.50	0.55	0.128		4.4	75.6	20.0	
★	BR-09	at 0.3	19.00	0.66	0.134		8.0	72.2	19.8	
✕	BR-09	at 1.8	25.00	0.71	0.150		11.0	74.3	14.7	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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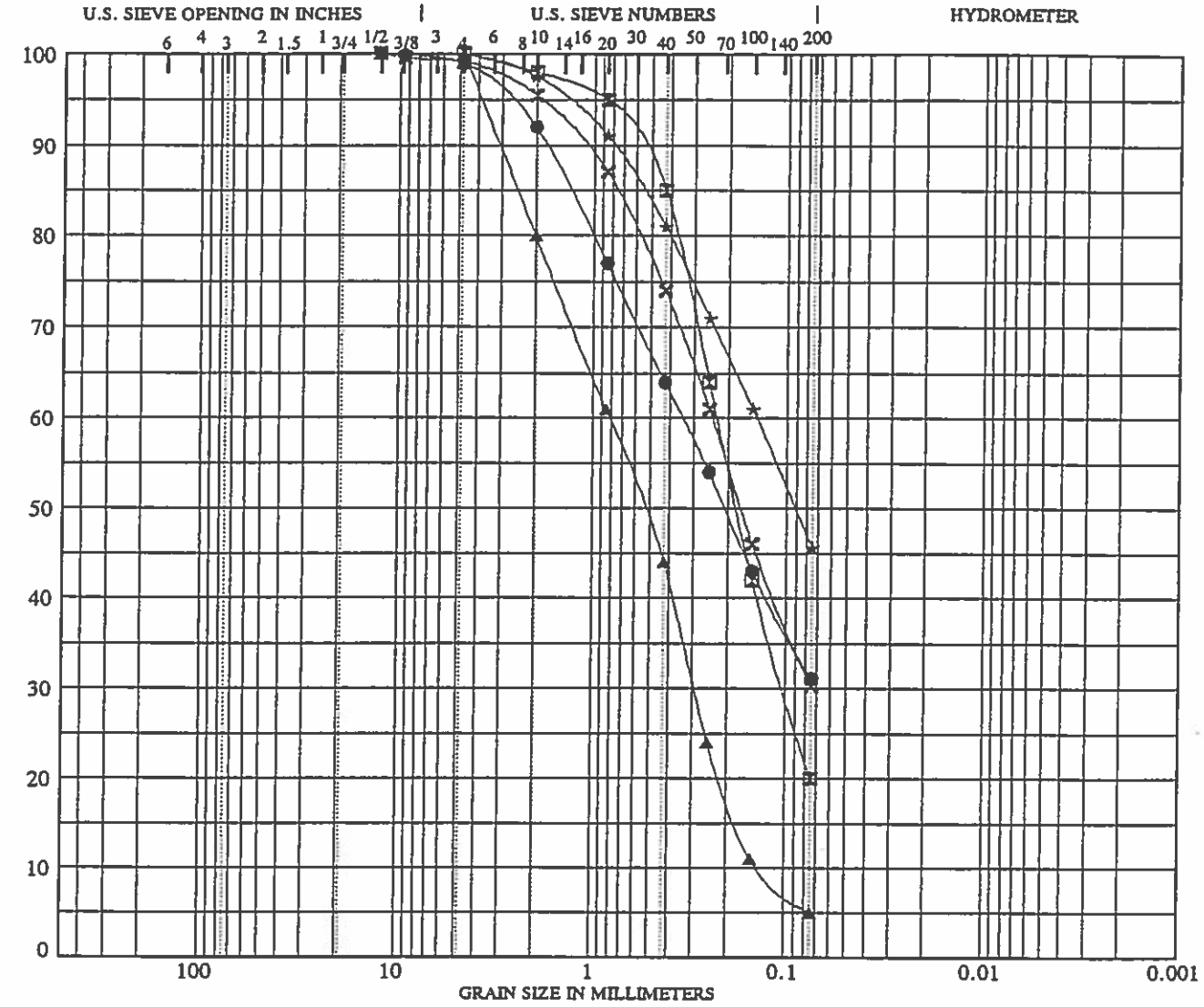

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (ft.)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BR-10	at 0.3	Brown Clayey Sand (SC)						
⊠	BR-11	at 1.8	Yellow Brown Clayey Sand (SC)						
▲	BR-12	at 4.9	Light Brown Sand (SP)					0.79	6.1
★	BR-13	at 0.3	Light Brown Clayey Sand (SC)						
✕	BR-14	at 0.3	Light Brown Silty Sand (SM)						

	Boring	Depth (ft.)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BR-10	at 0.3	12.50	0.34			1.1	67.8	31.1	
⊠	BR-11	at 1.8	4.75	0.23	0.103		0.0	80.0	20.0	
▲	BR-12	at 4.9	4.75	0.82	0.293	0.1334	0.0	94.9	5.1	
★	BR-13	at 0.3	9.50	0.14			0.1	54.3	45.6	
✕	BR-14	at 0.3	12.50	0.24			0.9	68.9	30.2	

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GRAIN SIZE ANALYSES

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PLATE

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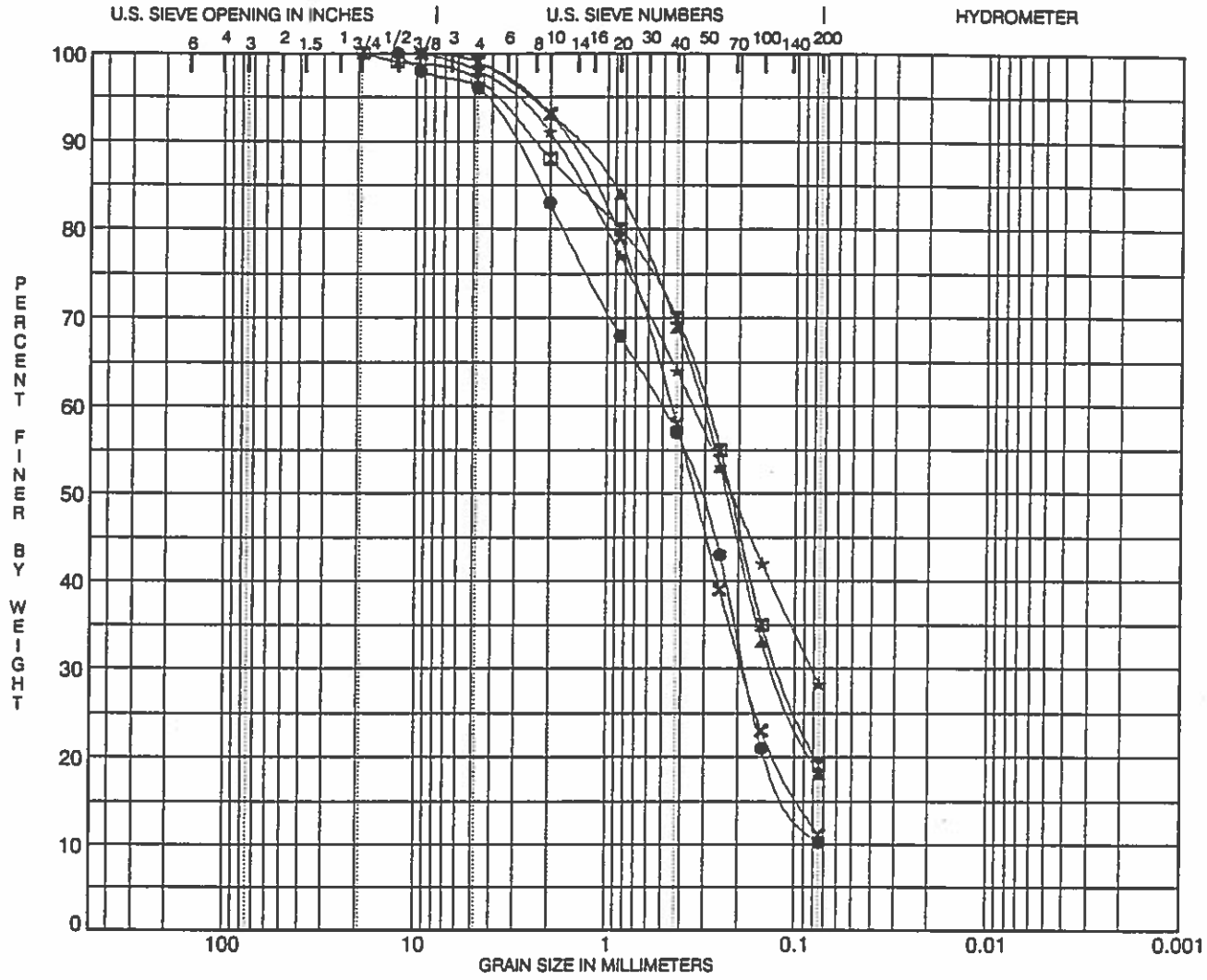

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BR-14	at 1.8	Light Brown Silty Sand (SM)					0.95	7.3
⊠	BR-17	at 1.8	Light Brown Silty Sand (SM)						
▲	BR-17	at 3.4	Yellow Brown Silty Sand (SM)						
★	BR-18	at 0.3	Brown Clayey Sand (SC)						
✕	BR-18	at 1.8	Brown Clayey Sand (SC)					1.11	6.5

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BR-14	at 1.8	12.50	0.51	0.185		4.0	85.7	10.3	
⊠	BR-17	at 1.8	19.00	0.30	0.121		3.0	77.9	19.1	
▲	BR-17	at 3.4	9.50	0.32	0.131		1.0	80.9	18.1	
★	BR-18	at 0.3	9.50	0.35	0.082		2.0	69.8	28.2	
✕	BR-18	at 1.8	9.50	0.45	0.188		1.0	87.8	11.2	

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GRAIN SIZE ANALYSES

CARSON FREEWAY

CARSON CITY, NEVADA

PLATE

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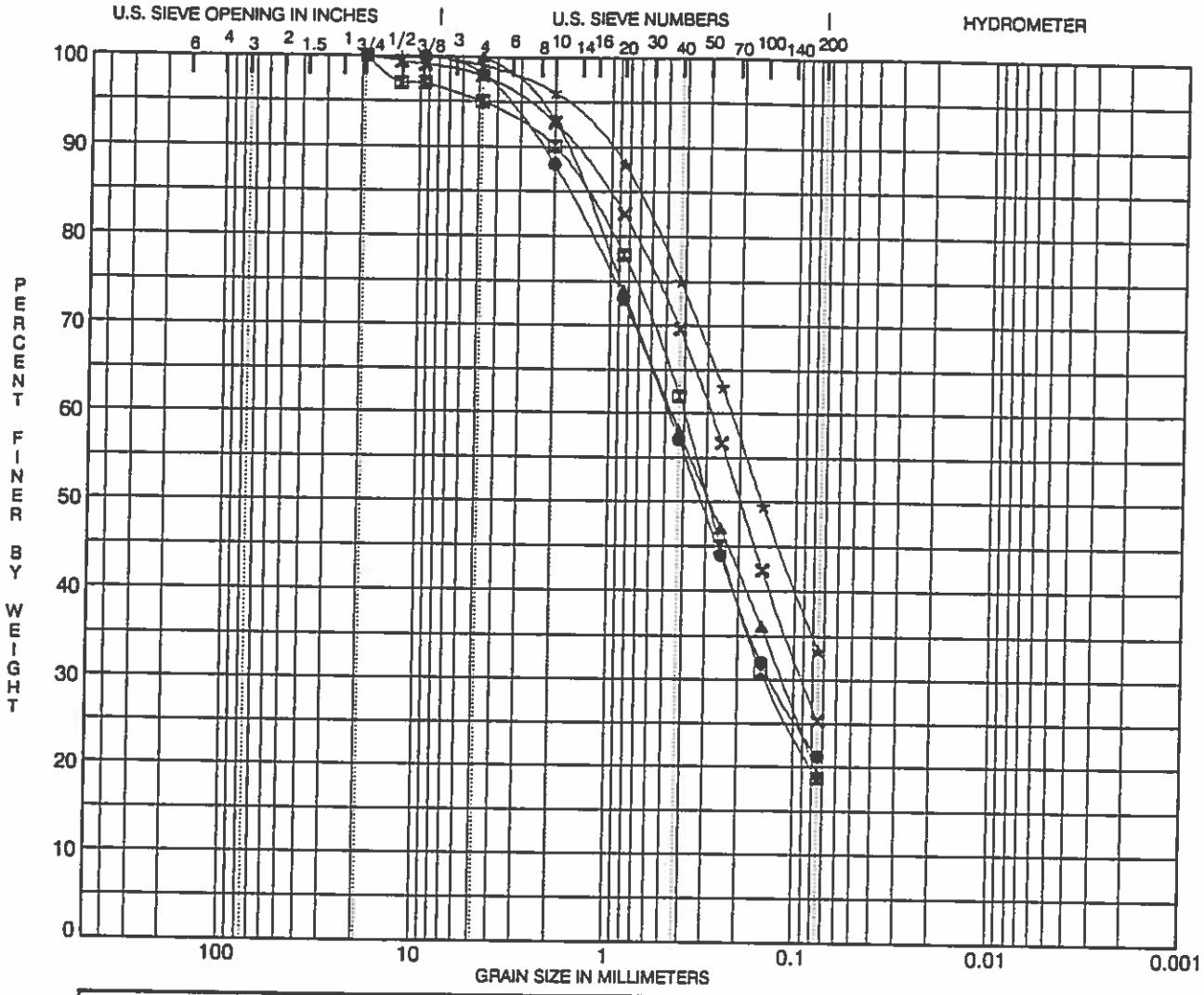

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BR-19	at 0.3	Brown Clayey Sand (SC)						
⊠	BR-19	at 1.8	Brown Clayey Sand (SC)						
▲	BR-19	at 3.4	Brown Clayey Sand (SC)						
★	BR-21	at 0.3	Light Brown Clayey Sand (SC)						
✕	BR-22	at 0.3	Light Brown Silty Sand (SM)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BR-19	at 0.3	9.50	0.48	0.132		2.0	76.8	21.2	
⊠	BR-19	at 1.8	19.00	0.40	0.142		5.0	76.3	18.7	
▲	BR-19	at 3.4	4.75	0.46	0.117		0.0	80.8	19.2	
★	BR-21	at 0.3	19.00	0.22			1.0	65.7	33.3	
✕	BR-22	at 0.3	19.00	0.29	0.091		2.2	72.5	25.3	

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GRAIN SIZE ANALYSES

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CARSON CITY, NEVADA

PLATE

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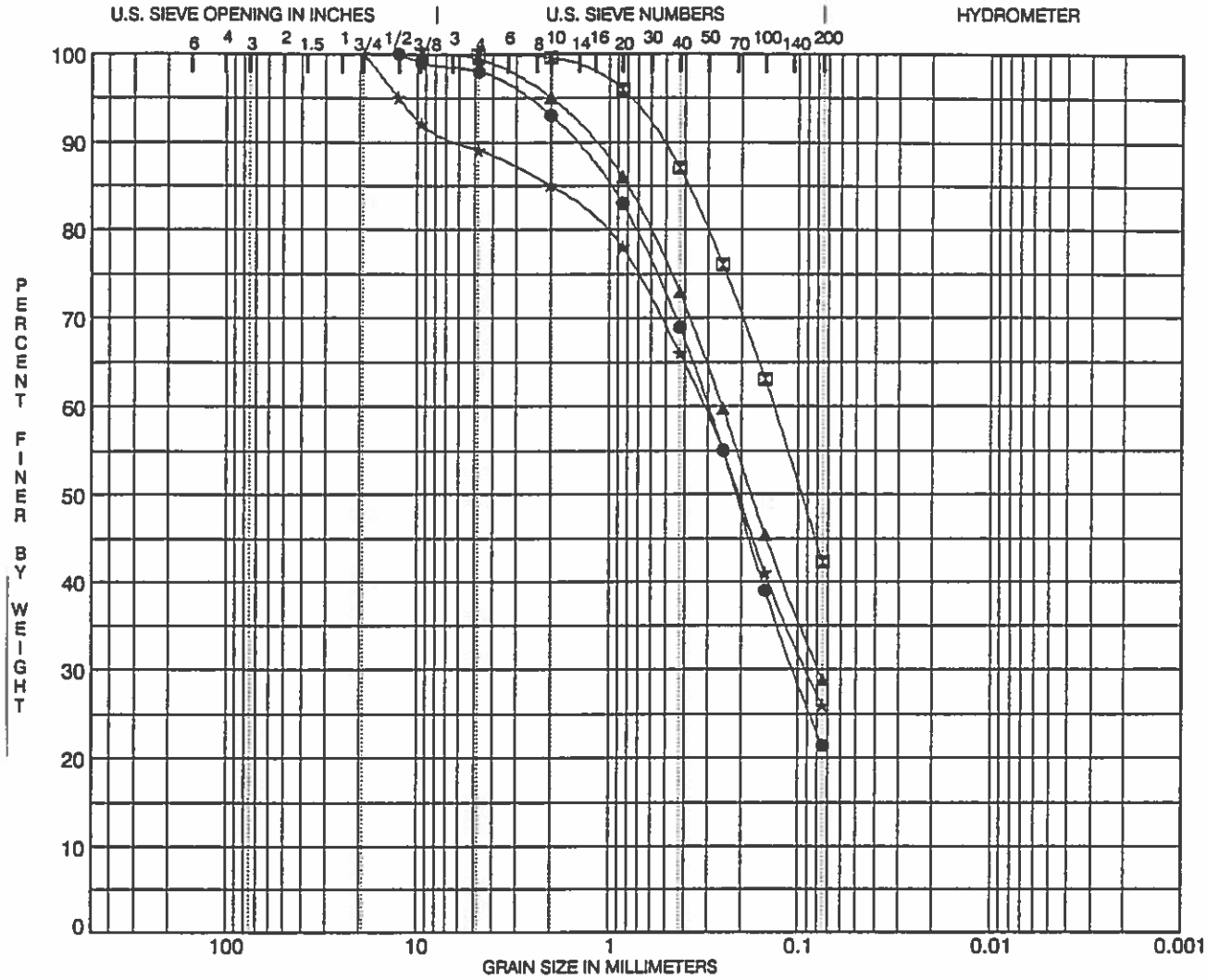

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	Depth (M)	Description - ASTM Classification	MC%	LL	PL	PI	Cc	Cu
●	BR-24	at 0.3	Light Brown Silty Sand (SM)						
⊠	BR-25	at 0.3	Light Brown Clayey Sand (SC)						
▲	BR-26	at 0.3	Light Brown Clayey Sand (SC)						
★	BR-27	at 0.3	Light Brown Clayey Sand (SC)						

	Boring	Depth (M)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BR-24	at 0.3	12.50	0.30	0.105		2.0	76.6	21.4	
⊠	BR-25	at 0.3	9.50	0.14			0.1	57.6	42.3	
▲	BR-26	at 0.3	9.50	0.25	0.079		0.6	70.6	28.8	
★	BR-27	at 0.3	19.00	0.32	0.091		11.0	63.1	25.9	

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GRAIN SIZE ANALYSES

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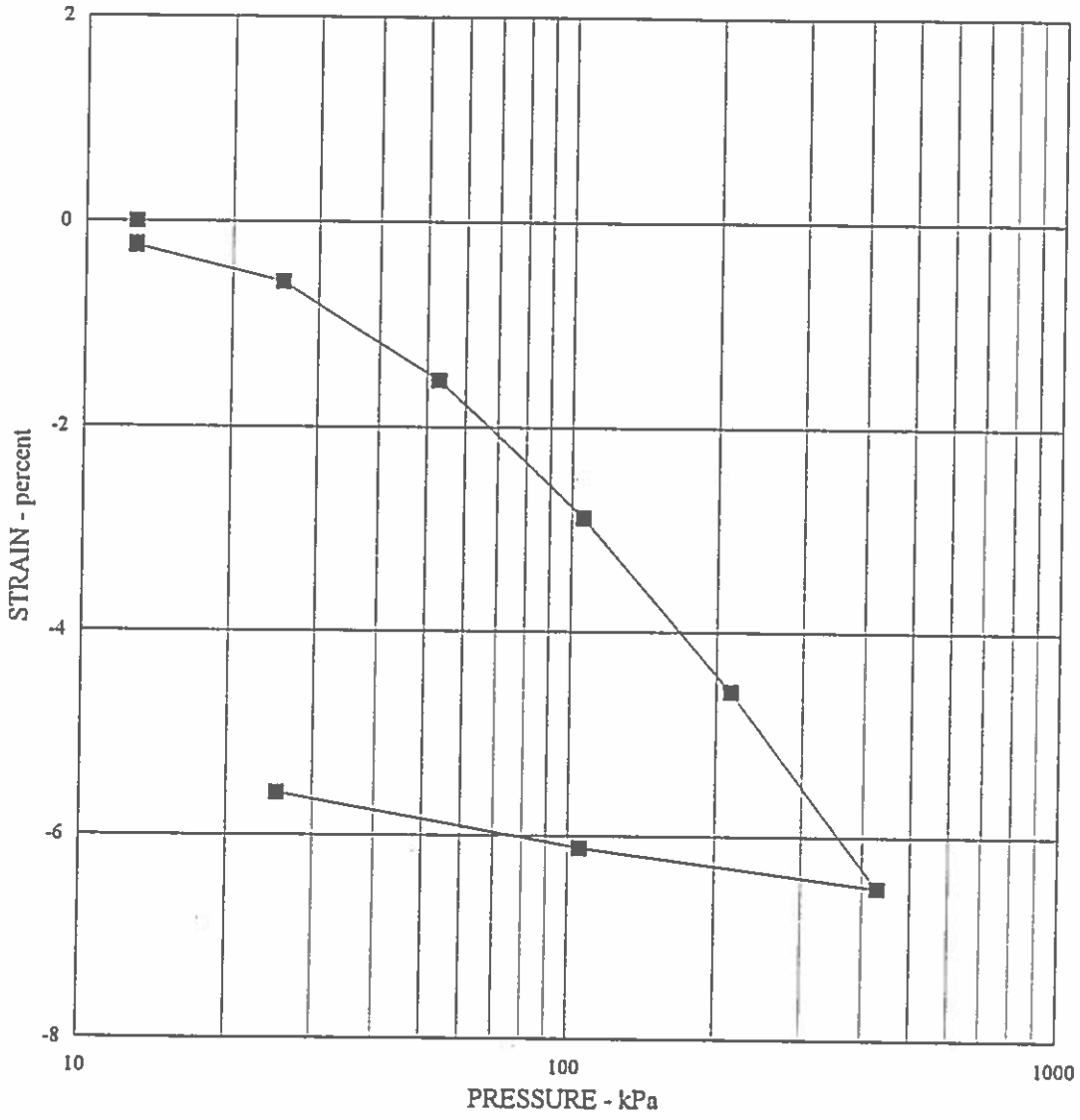

BORING NO.: BR-5	DEPTH:	1.83 m
SAMPLE DESCRIPTION Light Brown Silty Sand		
OVERBURDEN PRESSURE, kPa		33
PRECONSOLIDATION PRESSURE, kPa		48

	INITIAL	FINAL
DRY DENSITY - kN/cu m	16.81	17.67
WATER CONTENT - %	6.5	14.6
VOID RATIO	0.4314	0.3621
DEGREE OF SATURATION, %	37.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.39

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CONSOLIDATION TEST

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CARSON CITY, NEVADA

PLATE

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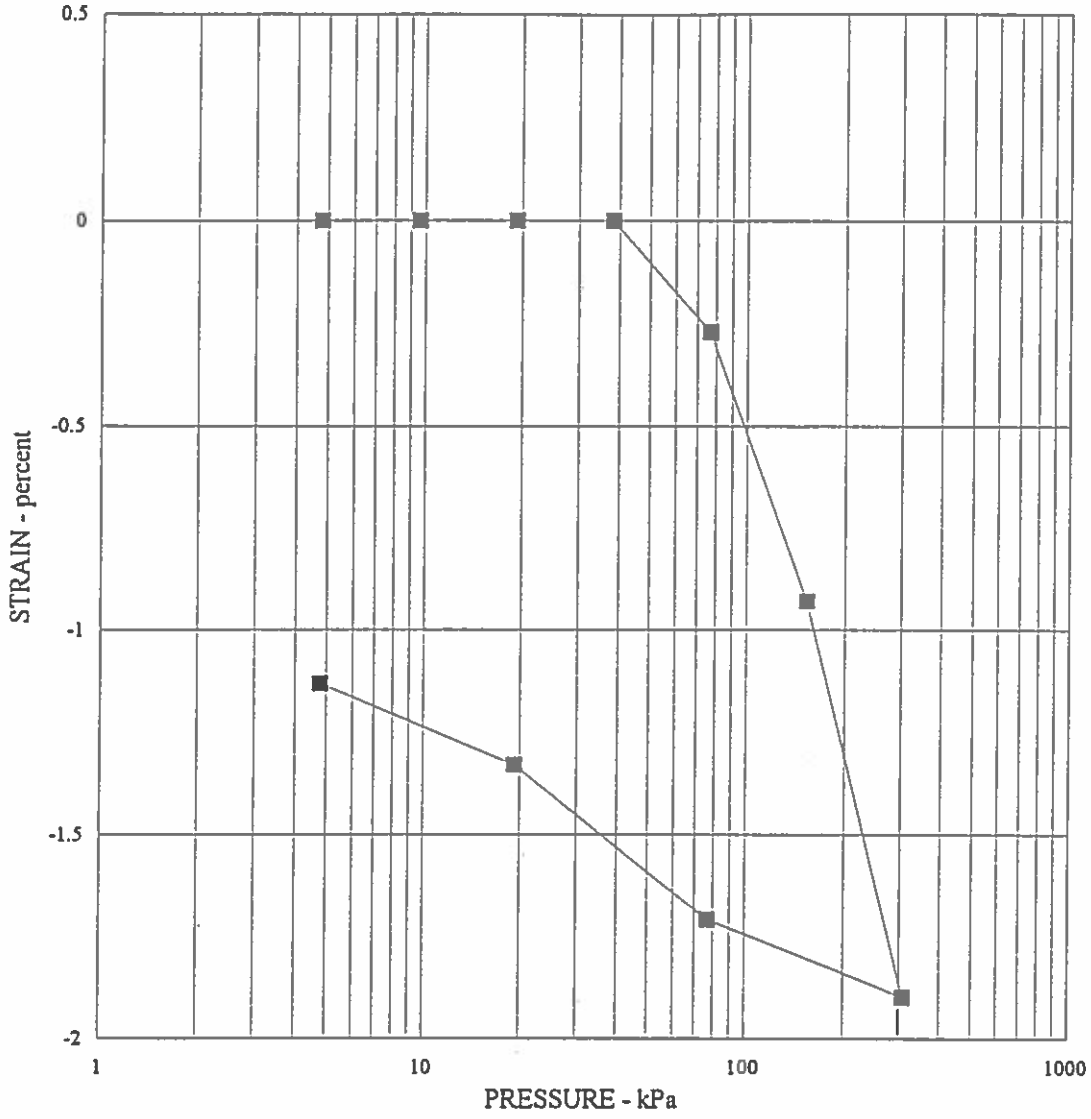

BORING NO.: BR-12	DEPTH:	3.96 m
SAMPLE DESCRIPTION Light Brown Clayey Sand		
OVERBURDEN PRESSURE, kPa		33
PRECONSOLIDATION PRESSURE, kPa		68

	INITIAL	FINAL
DRY DENSITY - kN/cu m	19.466	19.84
WATER CONTENT - %	7.8	8.5
VOID RATIO	0.2330	0.2103
DEGREE OF SATURATION, %	82.00	99.00
SAMPLE HEIGHT - cm	2.5400	2.39

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CONSOLIDATION TEST

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PLATE

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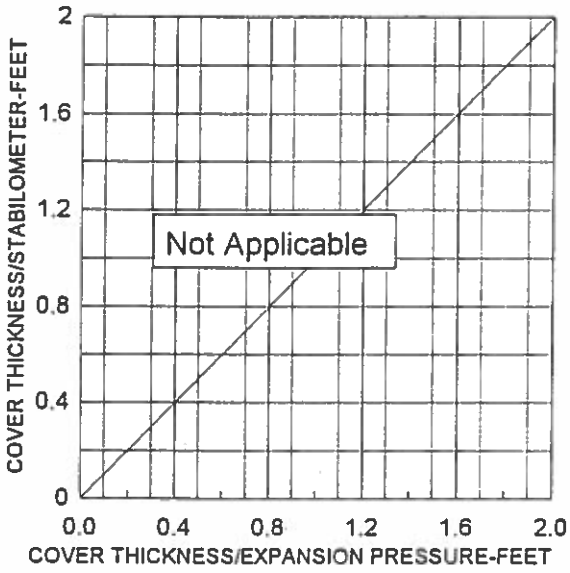
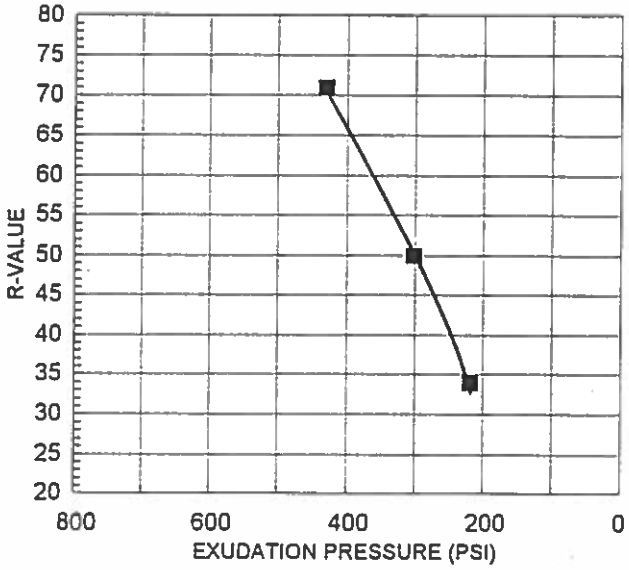
Sample Source: BR-3 @ .30-.91 meters
Sample Description: Red Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	431	303	220
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	71	50	34
% Moisture at Test	8.9	9.5	10.0
Dry Density at Test, pcf	130.1	129.1	127.7
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		50	

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R-VALUE

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PLATE

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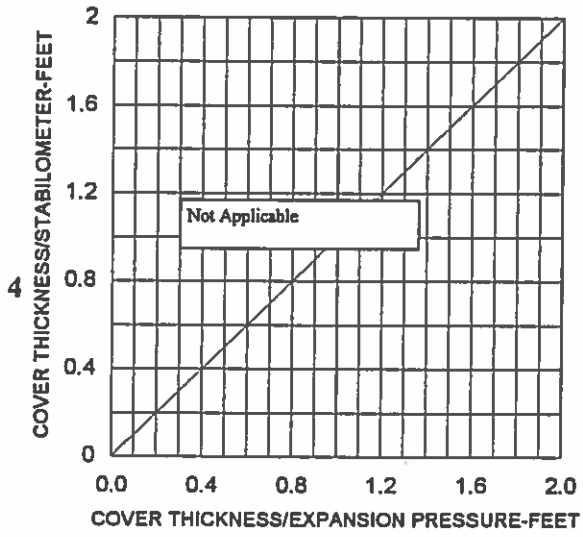
Sample Source: BR-6 @ .30-.91 meters
Sample Description: Light Brown Silty Sand

EXPANSION PRESSURE CHART



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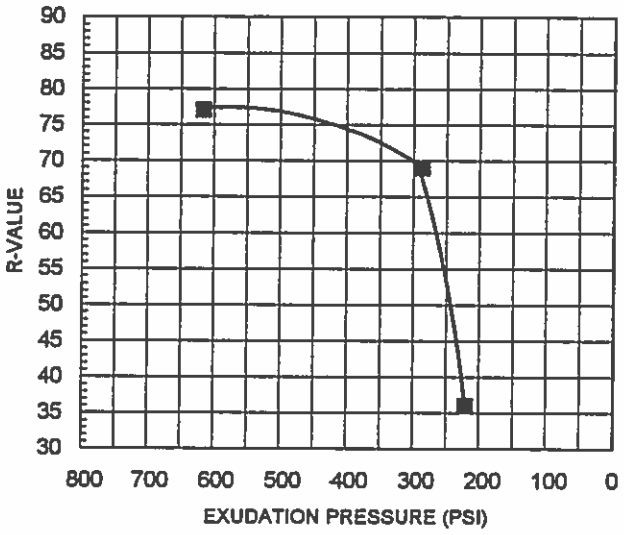
EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	617	288	221
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	77	69	36
% Moisture at Test	8.8	4.0	10.4
Dry Density at Test, pcf	129.6	129.0	126.7
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		70	

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R-VALUE

CARSON FREEWAY

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PLATE

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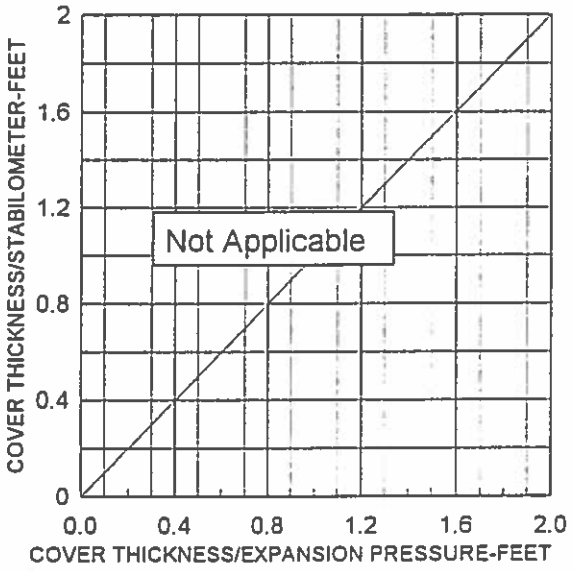
Sample Source: BR-8 @ .03-91 meters
Sample Description: Brown Silty Sand w/Trace of Gravel

EXPANSION PRESSURE CHART



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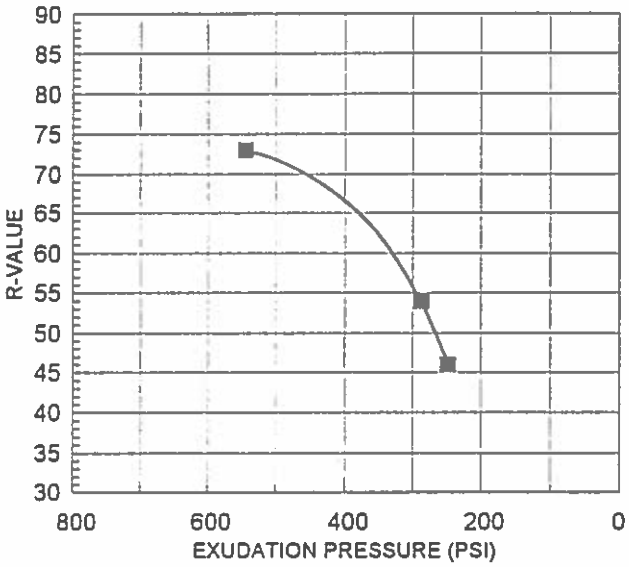

Specimen	A	B	C
Exudation Pressure, psi	545	288	249
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	73	54	46
% Moisture at Test	9.5	10.6	11.1
Dry Density at Test, pcf	124.9	125.6	124.3
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		56	

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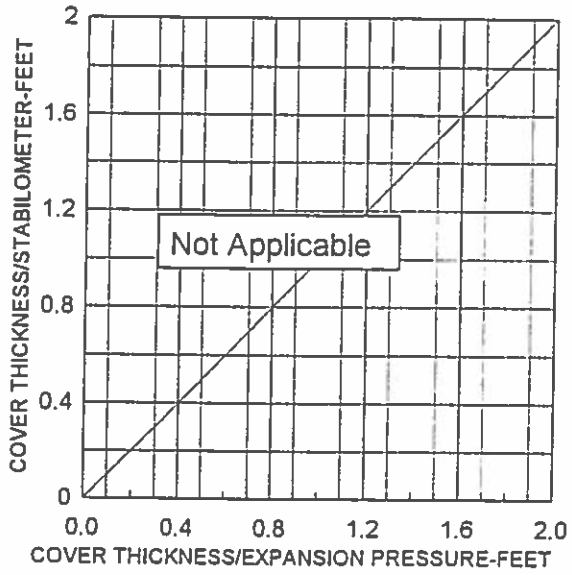
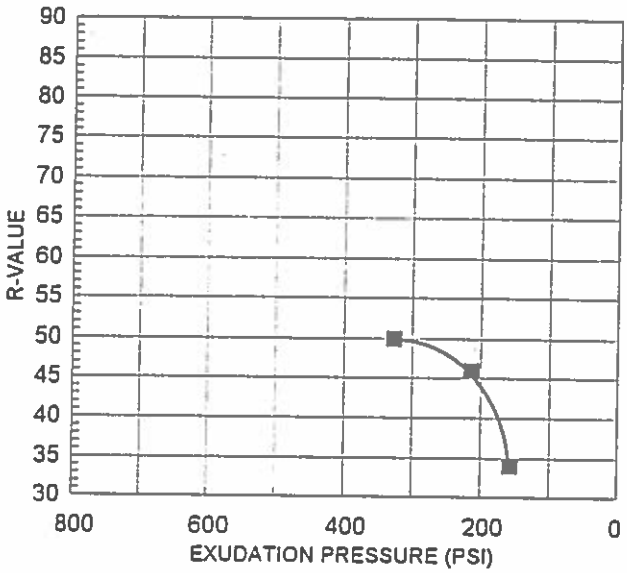
Sample Source: BR-9 @ .30-.91 meters
Sample Description: Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	328	215	158
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	50	46	34
% Moisture at Test	9.9	10.4	10.9
Dry Density at Test, pcf	128.4	127.3	126.3
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		49	

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R-VALUE

CARSON FREEWAY

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PLATE

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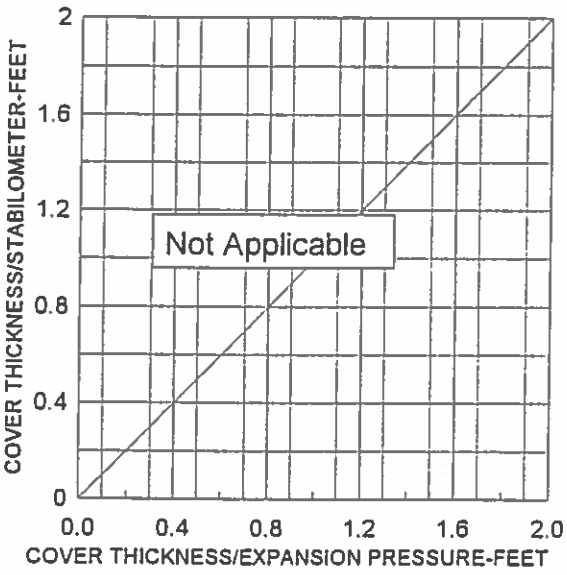
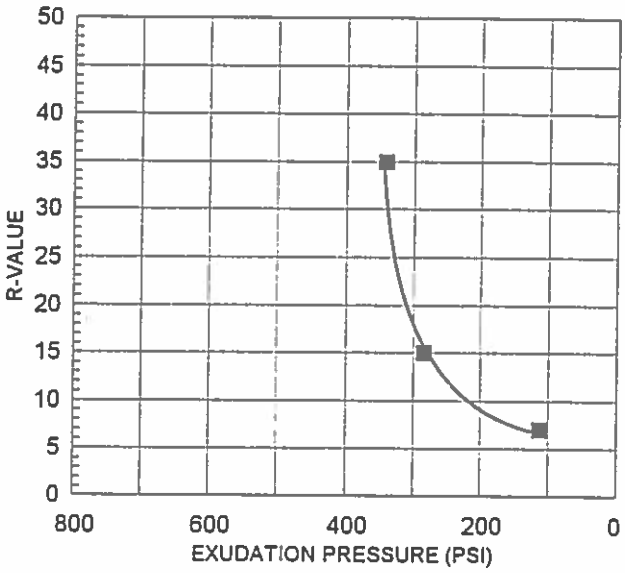
Sample Source: BR-10 @ .30-.91 meters
Sample Description: Brown Clayey Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	343	284	113
Expansion Dial (.0001")	0.0019	0.0020	0.0017
Expansion Pressure, psf	82	87	74
Resistance Value, R	35	15	7
% Moisture at Test	9.3	10.3	11.4
Dry Density at Test, pcf	124.3	126.5	124.9
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		17	

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R-VALUE

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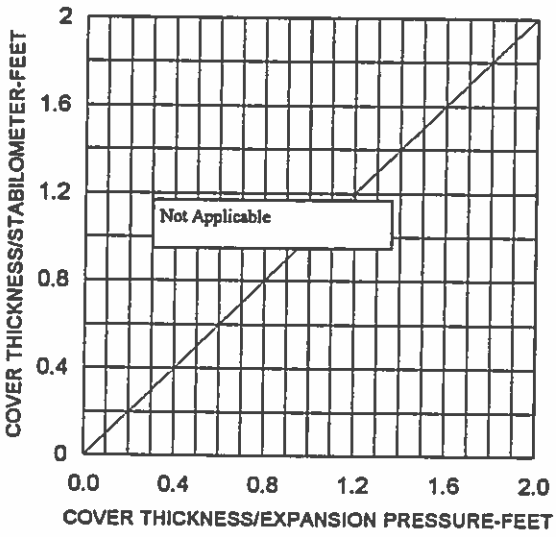
PLATE

F-45

Sample Source: BR-13 @ .30-.91 meters
Sample Description: Light Brown Very Clayey Sand

EXPANSION PRESSURE CHART



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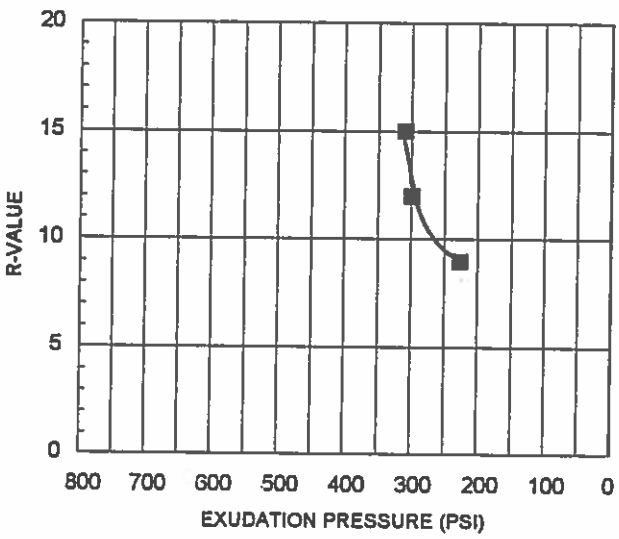

Specimen	A	B	C
Exudation Pressure, psi	226	300	310
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	9	12	15
% Moisture at Test	20.6	21.2	21.8
Dry Density at Test, pcf	104.7	106.3	105.1
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		12	

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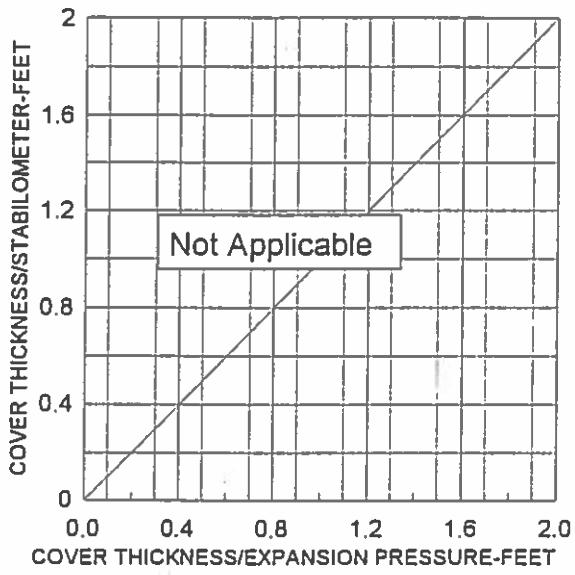
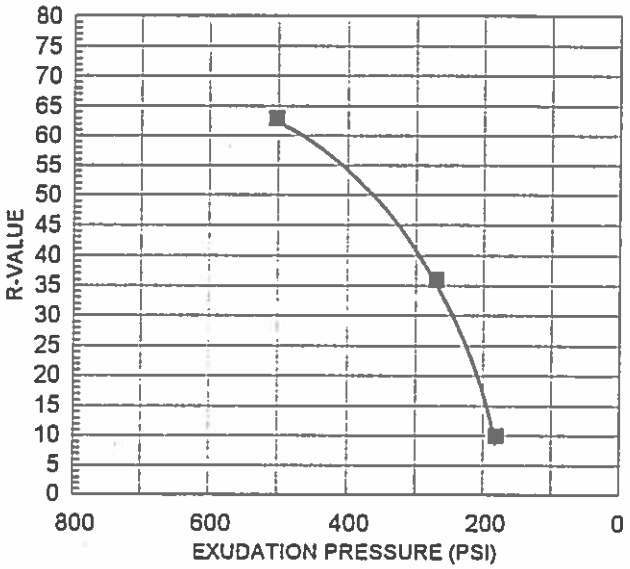
Sample Source: BR-14 @ .30-.91meters
Sample Description: Light Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	503	270	182
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	63	36	10
% Moisture at Test	10.4	11.5	12.5
Dry Density at Test, pcf	128.1	125.8	121.9
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		40	

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PLATE

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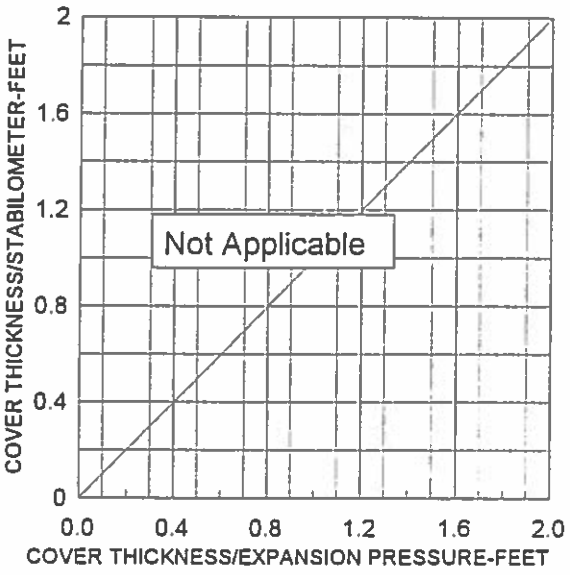
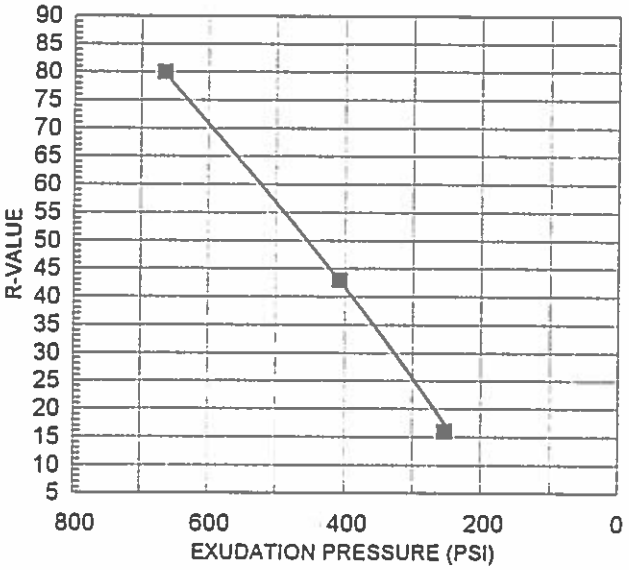
Sample Source: BR-18 @ .30-.91 meters
Sample Description: Brown Clayey Fine Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	666	408	254
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	80	43	16
% Moisture at Test	8.3	9.4	10.4
Dry Density at Test, pcf	129.0	127.2	126.6
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		25	

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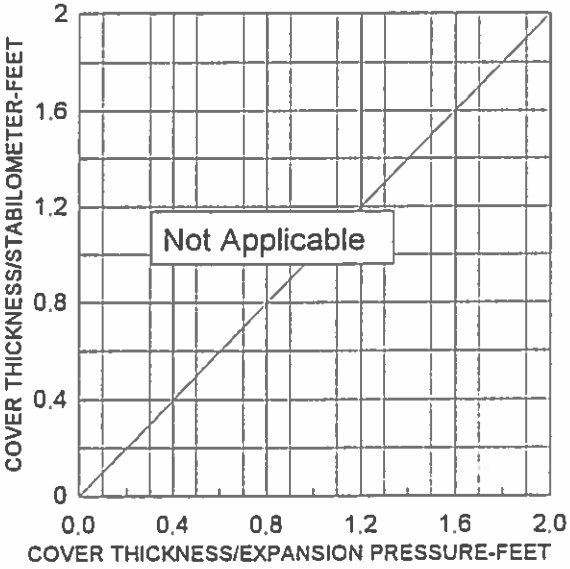
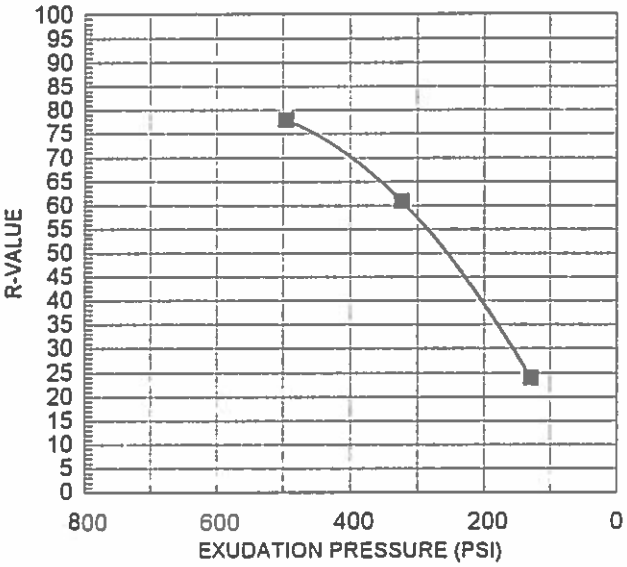
Sample Source: BR-19 @ .30-.91 meters
Sample Description: Brown Clayey Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	497	324	130
Expansion Dial (.0001")	0.0002	0.0000	0.0000
Expansion Pressure, psf	9	0	0
Resistance Value, R	78	61	24
% Moisture at Test	8.9	10.1	11.1
Dry Density at Test, pcf	129.7	128.1	126.2
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		57	

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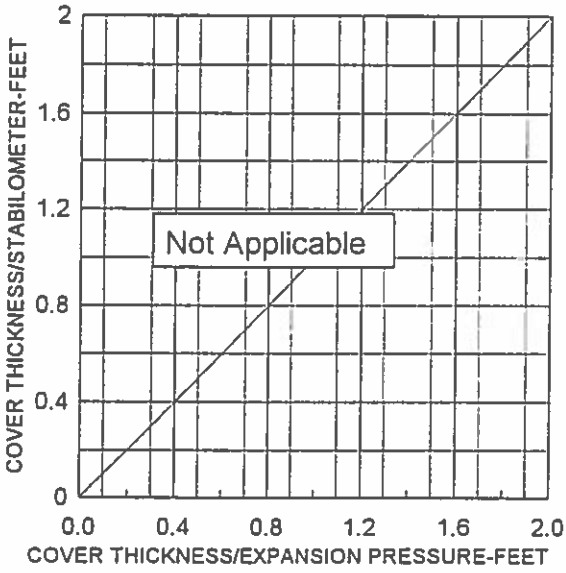
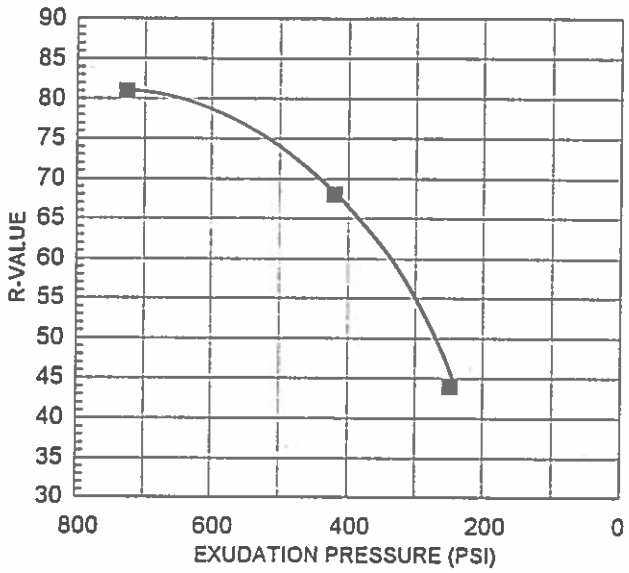
Sample Source: BR-21 @ .30-.91 meters
Sample Description: Light Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	728	420	249
Expansion Dial (.0001")	0.0002	0.0000	0.0000
Expansion Pressure, psf	9	0	0
Resistance Value, R	81	68	44
% Moisture at Test	10.5	10.9	11.5
Dry Density at Test, pcf	121.8	123.0	118.4
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		55	

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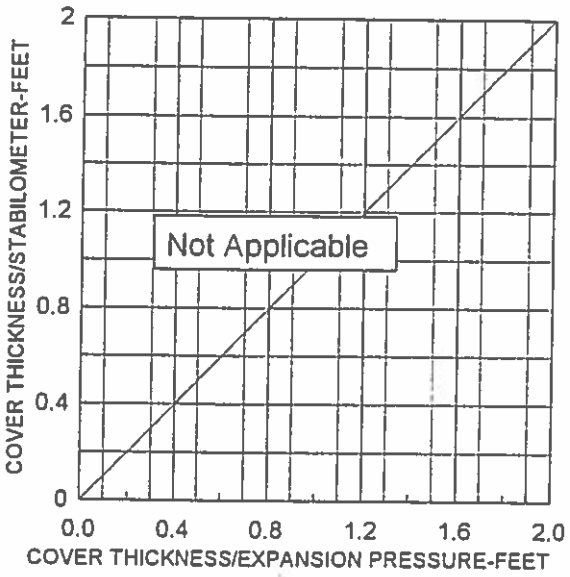
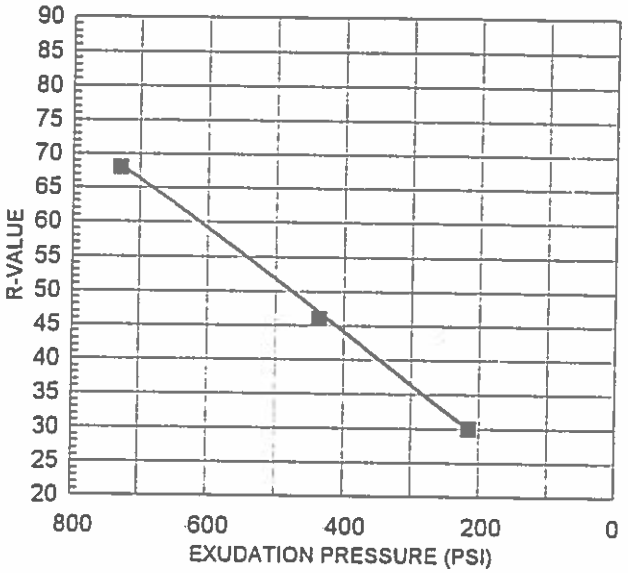
Sample Source: BR-22 @ .30-.91 meters
Sample Description: Light Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	729	437	216
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	68	46	30
% Moisture at Test	11.0	12.1	13.1
Dry Density at Test, pcf	121.1	119.8	117.2
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		36	

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PLATE

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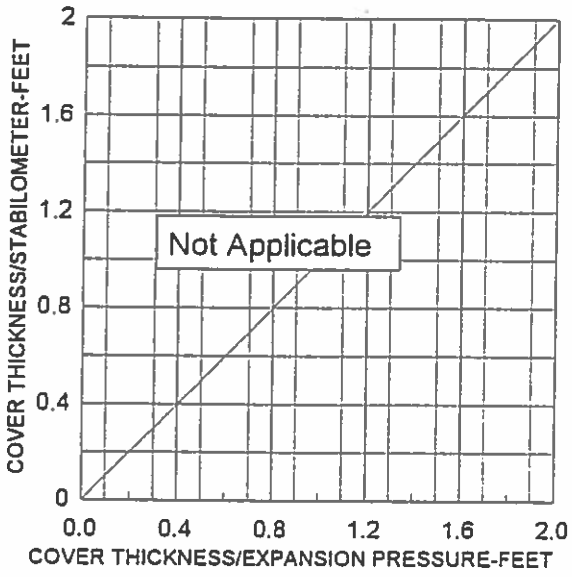
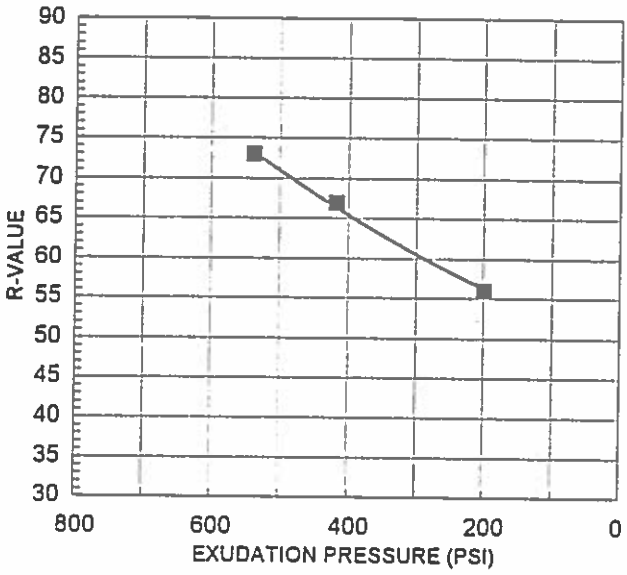
CAD FILE: L:\1999\...FTING\301348\301348150O2FPLATES.DWG

Sample Source: BR-24 @ .30-.91 meters
Sample Description: Light Brown Silty Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	539	418	200
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	73	67	56
% Moisture at Test	10.7	11.2	11.8
Dry Density at Test, pcf	121.2	119.4	118.7
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		61	

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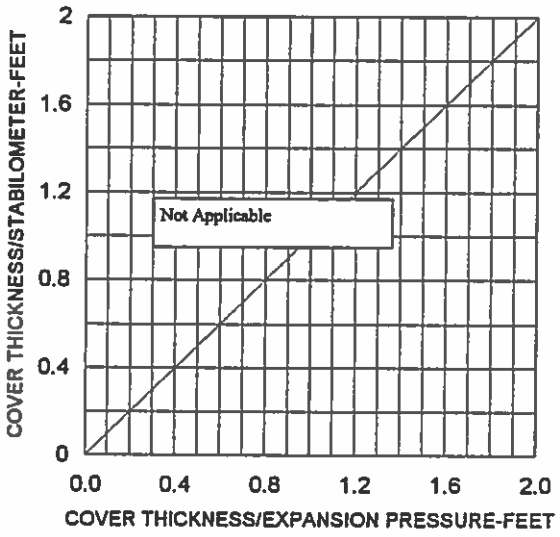
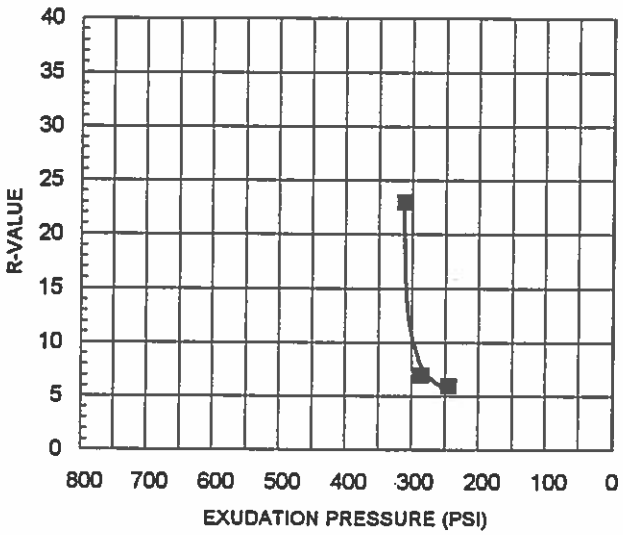
PROJECT NO. 30-1348-15.002

Sample Source: BR-25 @ .30-.91 meters
Sample Description: Light Brown Very Clayey Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	311	286	245
Expansion Dial (.0001")	0.0005	0.0000	0.0000
Expansion Pressure, psf	22	0	0
Resistance Value, R	23	7	6
% Moisture at Test	16.4	17.5	18.7
Dry Density at Test, pcf	111.2	108.9	106.0
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		9	

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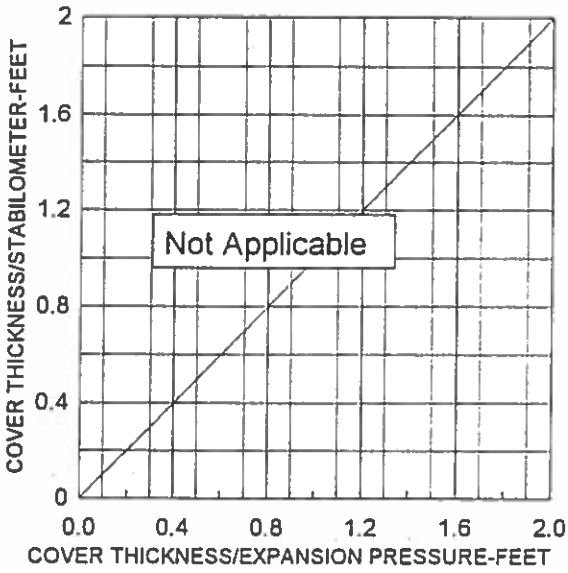
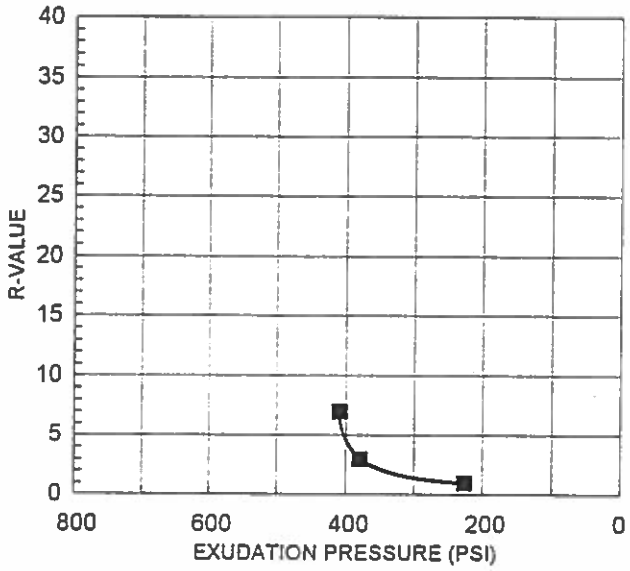
Sample Source: BR-26 @ .30-.91 meters
Sample Description: Light Brown Clayey Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	410	380	227
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	7	3	1
% Moisture at Test	13.9	15.0	16.2
Dry Density at Test, pcf	118.5	115.7	112.4
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		2	

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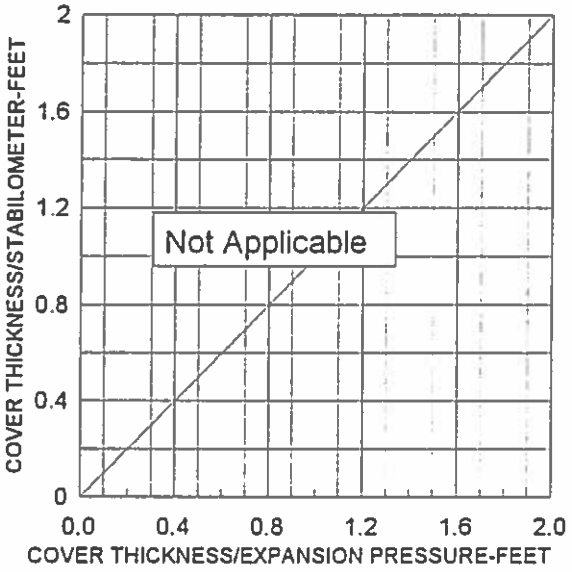
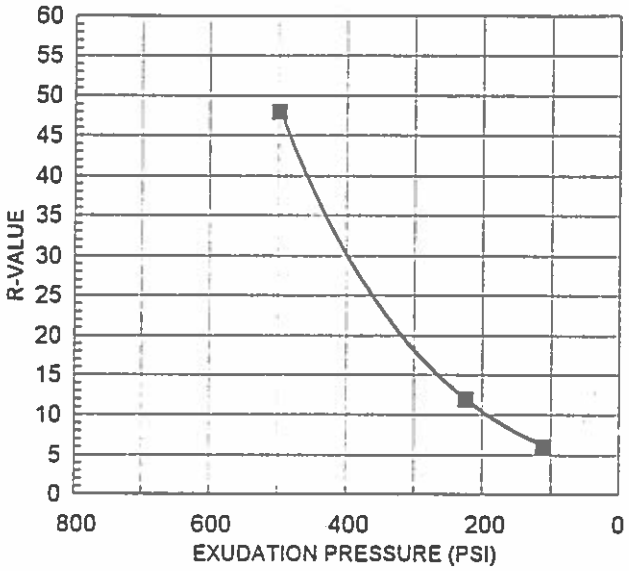
PROJECT NO. 30-1348-15.002

Sample Source: BR-27 at .30-.91 meters
Sample Description: Light Brown Clayey Sand

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



Specimen	A	B	C
Exudation Pressure, psi	500	225	112
Expansion Dial (.0001")	0.0000	0.0000	0.0000
Expansion Pressure, psf	0	0	0
Resistance Value, R	48	12	6
% Moisture at Test	17.5	16.3	15.1
Dry Density at Test, pcf	117.1	116.2	114.7
R Value by Expansion Pressure (TI=)		Not Applicable	
R Value at 300 psi Exudation Pressure		18	

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