GEOTECHNICAL INVESTIGATION REPORT

MOUNTAIN VIEW CORRIDOR PHASE I

SEGMENT 5

Salt Lake County, Utah

UDOT Project No. MP-0182(6)

Prepared for:
HDR Engineering, Inc.

December 2009

RB&G ENGINEERING, INC.

200901-200

RB&G ENGINEERING, INC.

October 26, 2010

Douglas Jackson, Project Manager
HDR Engineering, Inc.
3949 South 700 East, Suite 500
Salt Lake City, UT 84107-2594

Re: Mountain View Corridor – Phase I, Salt Lake County
Segment 5
UDOT Project No. MP-0182(6)
Geotechnical Investigation Report
ADDENDUM NO. 1

Dear Mr. Jackson:

Included herewith is Addendum No. 1 to the Geotechnical Investigation Report for Segment 5 of the Mountain View Corridor Phase I Project in Salt Lake County, Utah. A list detailing the changes made in Addendum No. 1 is also attached.

We appreciate the opportunity of providing this service for you. If there are any questions relating to the information contained herein, please call.

Sincerely,

RB&G ENGINEERING, INC.

S. Robert Johnson, P.E.

Bradford E. Price, P.E.

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MOUNTAIN VIEW CORRIDOR PHASE I
GEOTECHNICAL REPORT
SUMMARY OF CHANGES MADE IN ADDENDUM 1

DESIGN SEGMENT 5
REPORT DATE 12/18/09
ADDENDUM DATE 10/26/10

No	Section	Description	Design Impact
1	Contents	Updated	None
2	1 1 2	Second sentence revised to state our understanding that current plan is to proceed with construction of Kennecott RR bridge	Minor
3	2	Inserted second sentence to adress review comment	Minor
4	5 1	Modified 1st paragraph to refer to additional test holes subsequent to initial work	Minor
5	5 1	Corrected number of embankment borings discussed in 3rd paragraph	Minor
6	5 1	Modified 4th paragraph to refer to additional test holes subsequent to initial work	Minor
7	6 1 1	Update paragraph to refer to current plans with updated lengths/widths	Minor
8	6 1 2	Slight correction to 4th sentence of 2nd paragraph (switched "24" and "29")	Minor
9	6 1 2	Added sentence to end of 5th paragraph noting characteristics of fat clay in W5-6	Minor
10	6 1 2 1	Inserted Section desribing additional structure borings for revised Kennecott RR bridge and ped tunnel	Significant (Structures)
11	6 1 3	Changed "was" to "is" in last sentence	Minor
12	6 1 4 2	Added first and last paragraphs to discuss AREMA design, and added approx 100-year event to table	Significant (Structures)
13	6 2 1	Added omitted word "of" to first sentence	Minor
14	6 2 1 1 thru 6 2 1 6	Revised sections extensively to address AREMA-based design and the revised/updated bridge location and configuration	Significant (Structures)
15	6 2 2	Renamed section and added subsection containing geotechnical recommendations for proposed pedestrian underpass at Kennecott RR crossing	Significant (Structures)
16	6 2 3 1	Revised last sentence of 2nd paragraph based on review comment	Minor
17	6 2 3 1	Revised last sentence of 6th paragraph for clarification based on review comment	Moderate (Settlement)
18	6 2 3 3	Updated third paragraph based on current understanding that soil nail walls at the bridge abutments will be designed by others.	Significant (Structures)
19	6 2 3 4	Revised last sentence of 2nd paragraph for clarification based on review comment	Moderate (Structures)
20	6 2 4	Added description of additional detention basin borings to section	Significant (Drainage)
21	12	Added AASHTO Guide Spec and AREMA references	Minor
22	Figures	Replaced Figures 2a - 2d	Moderate
23	App A	Replaced preliminary structure drawings with updated drawings	Moderate (Structures)
24	App B	Replaced all boring logs from initial report with new boring logs with updated stations and offsets to adjust for revised MVC alignment	Moderate
25	App. B	Added boring logs for 10-S5-4 through 7, 09-D5-12 through 13A, and 10-D5-14 and 15	Significant (Structures/Drainage)
26	App C	Added test results for the borings added to Appendix B, and added consolidation test from Boring 09-E5-3 at 25-ft depth that was omitted from initial report	Moderate
27	App D	Inserted sheet showing AREMA Seismic Response Coefficients	Significant (Structures)
28	App D	Replaced all axial resistance pages for deep foundations for updated bridge design	Significant (Structures)
29	App D	Replaced WEAP analysis sheet with two new sheets for updated bridge design	Significant (Structures)
30	App D	Replaced LPILE and GROUP recommendation sheets with updated sheets	Significant (Structures)
31	App D	Removed two sheets listing soil parameters for retaining wall design, with the understanding that soil nail wall designer will be responsible for design	Significant (Structures)
32	App D	Replaced Summary of Lateral Earth Pressure recommendation pages, with references added to item (4), spelling of "granular" corrected in item (4), and added "Das, 1994" reference	Minor
33	App. D	Added permeability estimates for five additional detention basin borings	Significant (Drainage)

Geotechnical Investigation Report

Mountain View Corridor
Mountain View
Corridor
Phase I

Segment 5

Salt Lake County, Utah

UDOT Project No. MP-0182(6)

Prepared for:
HDR Engineering, Inc.

December 2009

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GEOTECHNICAL INVESTIGATION REPORT

MOUNTAIN VIEW CORRIDOR – PHASE I
SEGMENT 5

UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NO. MP-0182(6)

Contents

RB&G
ENGINEERING, INC.

GEOTECHNICAL INVESTIGATION REPORT

MOUNTAIN VIEW CORRIDOR – PHASE I
SEGMENT 5

UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NO. MP-0182(6)

1 GENERAL

This report presents the results of geotechnical investigations and provides geotechnical recommendations for bridge foundations, embankments, and retaining walls proposed for Segment 5 of Phase I of the Mountain View Corridor Project, in Salt Lake County, Utah.

1.1 PROJECT DESCRIPTION

Segment 5 of the proposed Mountain View Corridor project begins at Sta. 1500+00 in the vicinity of 7600 South and 6200 West, and initially travels northwest about 0.75 mile to 7000 South and about 6400 West. The alignment then travels north along the west side of 6400 West for approximately 2 miles, crossing 6200 South and terminating at 5400 South near Sta. 1647+00.

1.1.1 GENERAL

The Mountain View Corridor alignment is shown on Figure 1, and the alignment in Segment 5 is further detailed on Figure 2. For the most part, the Segment 5 alignment traverses gravel pits flanked on the east by residential developments.

1.1.2 PROPOSED IMPROVEMENTS

It is our understanding that the current phase of the Project will provide two northbound and two southbound traffic lanes through Segment 5. A two-span bridge is proposed to carry the Kennecott rail line over the MVC lanes at about Sta. 1542+00, just north of 7000 South.

Throughout most of Segment 5, the proposed Phase I northbound and southbound roadways will be separated by a distance of 110 to 140 feet, and it is anticipated that these roadways will serve as the outer lanes of a freeway to be constructed between them at some future date. The separation between the Phase I northbound and southbound roadways increases to about 460 feet at 6200 South and about 310 feet at 5400 South, allowing these roadways to serve as ramps for future freeway interchanges.

The geotechnical investigations described in this report apply primarily to design and construction of the proposed Phase I roadways. We anticipate that additional investigations and geotechnical analyses will be needed to design and construct the future freeway, particularly at the locations of bridge structures.

2 PREVIOUS GEOTECHNICAL INVESTIGATIONS AND REPORTS

It is our understanding that this is the first geotechnical investigation conducted for UDOT within Segment 5 of the proposed Mountain View Corridor alignment. We are unaware of any other geotechnical reports for facilities located within the proposed Segment 5 alignment. An overview of published studies and maps addressing geologic conditions in the Project area is presented in Section 4.3 of this report.

3 EXISTING FACILITIES

The proposed Segment 5 alignment is mostly occupied by gravel pits, and no direct conflicts with existing buildings were noted in our review of aerial photographs. Residential developments exist to the east of the alignment, and several industrial facilities are located on either side of the alignment at 5400 South. It is assumed for the purposes of this report that any potential utility conflicts within the alignment are being evaluated by others.

4 FINDINGS

4.1 SITE CONDITIONS

The natural topography generally slopes down to the east toward the Jordan River, but the ground surface has been disturbed locally at various locations by gravel pit operations. Vegetation within the proposed Segment 5 alignment generally consists of weeds, native grasses, and shrubs, with occasional scattered trees.

4.2 SURFACE DRAINAGE

Surface water within the project area generally flows locally into creeks, washes and shallow ditches, which drain predominantly to the east toward the Jordan River. It is assumed that the hydrology of the Project will be studied in detail by others.

4.3 GEOLOGY

4.3.1 REGIONAL GEOLOGY

The Salt Lake Valley is located along the Wasatch Front, within the Basin and Range Province. The Wasatch Front consists predominantly of Paleozoic sedimentary rocks that were uplifted and thrusted to the east during the Sevier Orogeny, 66-100 million years ago. These compression forces were later replaced by extensional forces during the late Cretaceous. Extensional forces produced the normal faulting that is typical throughout the Basin and Range Province in Utah and Nevada. During the Tertiary Period, igneous activity generated intrusive rocks in northern Utah, and volcanoes with basalt flows and cinder cones in southwestern Utah. During the Oligocene Epoch, 24 to 28 million years ago, igneous intrusions generated copper and other minerals associated with the Bingham mining district located west of the Mountain View Corridor Project area.

During the Pleistocene, the climate became much colder and wetter. While periods of glaciation were common to the north (in and near Canada), Utah experienced more rain, with glacier formation limited to the higher mountain areas. During this time, Lake Bonneville (the largest of the Pleistocene lakes) began spreading over much of northern and central Utah. The lake passed through many cycles of regression and transgression during a 3,500 year period, before eventually rising to elevation 5090 feet (msl) and breaching into the Snake River Plain in Idaho (Bonneville Phase). The lake stabilized at an elevation of about 4740 feet (Provo Phase) about 14,500 years ago. Various shorelines of Lake Bonneville are marked as carved benches in the surrounding hillsides.

During Lake Bonneville times, thousands of feet of clay, silt, sand and gravel were deposited and interbedded throughout the lake. Changes to a drier, warmer climate eventually resulted in the overall regression of the lake to the current level of the Great Salt Lake.

4.3.2 GEOLOGY OF PROJECT AREA

Geologic maps of the Copperton and Magna 7.5' Quadrangles were completed in 2007 by the Utah Geological Survey (Biek et al., Solomon et al.). Portions of these maps are shown on

Figures 3a and 3b. Descriptions of selected mapped geologic units from these maps are listed on Figure 3c. It should be noted that these descriptions are typically generalized for the larger mapped Quadrangles, and not all aspects apply directly to the Segment 5 study area shown in Figures 3a and 3b.

Segment 5 trends in a northerly direction between the Provo and Bonneville shorelines of ancient Lake Bonneville, and traverses two primary mapped geologic units. The first of these units is identified on the map as Qlgb/QTaf, and consists of lacustrine gravel and sand from the Bonneville phase of the lake cycle (Qlgb) overlying oldest alluvial fan deposits of the upper Pleistocene (QTaf). Qlgb is characterized by moderately to well-sorted and rounded pebble to cobble gravel and pebbly sand, and is partly cemented with calcium carbonate at some locations. The QTaf unit consists of poorly to moderately sorted sand, silt and pebble to boulder gravel deposited principally by debris flows, and is also characterized by calcium carbonate cementation.

The second major unit mapped within the Segment 5 footprint is identified as Qfd, which is land disturbed by sand, gravel, and aggregate mining, and mining reclamation operations. Also noted within the proposed alignment are various alluvial deposits consisting of sand, silt, and pebble to boulder gravel. These include Lake Bonneville alluvium (Qalb) between Sta. 1510+00 and 1517+50, and young alluvium (Qaly) between Sta. 1620+50 and 1624+00.

4.3.3 GEOLOGIC HAZARDS

Potential geologic hazards in Segment 5 include ground shaking and subsidence during a seismic event on one of the faults in the area. The potential for fault-related surface rupture is very low, as no active faults have been mapped within the footprint of the proposed Corridor in this segment. Seismic hazards are discussed in further detail in Section 4.4 of this report.

Hazards associated with rockfall are not relevant to the Project area, but localized landsliding could occur on steeper manmade or natural slopes.

It is assumed that surface drainage and the potential for flooding will be addressed in a separate drainage/hydrology report for the Project.

4.4 FAULTING AND SEISMICITY

The Wasatch Fault Zone (WFZ) is characterized as an active normal fault with down to the west displacement. The transition between the Provo and Salt Lake City segments of the fault occurs at the Traverse Mountains. The Salt Lake Segment is mapped between 11 and 13 miles east of the proposed Mountain View Corridor Segment 5 alignment. A maximum earthquake magnitude of about 7.2 is associated with the Salt Lake City Segment. The Provo Segment of the WFZ is capable of generating earthquake magnitudes in the order of 7.4 to 7.5.

The southerly end of the West Valley Fault Zone is mapped approximately 4.2 miles east of Segment 5, and the faults in this zone are considered capable of generating a maximum earthquake magnitude of 6.5. The Oquirrh Fault Zone is located about 10 miles west of Segment 5, and is associated with a maximum earthquake magnitude of about 6.7.

Earthquake considerations applicable to Segment 5, including AASHTO Site Class, mapped ground acceleration values, and liquefaction hazards, are discussed in Section 6.1.4 of this report.

4.5 SOIL MATERIALS

Based on the geologic studies referenced in this report, the surface soil materials within Segment 5 are predominantly lacustrine gravel and sand underlain by sand, silt, and gravel alluvial fan deposits. Cobbles and possible boulders may be present in both the lacustrine and alluvial deposits. It should be noted that the mapped surficial deposits are often underlain by different geologic units. In particular, the borings conducted in Segment 5 encountered clayey soils more frequently than might be expected based on the mapped surficial deposits.

4.6 GEOHYDROLOGIC CONDITIONS

Groundwater in the Salt Lake Valley occurs in late Tertiary and Quaternary alluvial and lacustrine basin-fill deposits that range from coarse gravel to clay. Four hydraulically connected aquifers have been identified in the basin sediments: 1) a deep, unconfined aquifer in gravelly deposits along the fronts of the Wasatch Range and Oquirrh Mountains; 2) a deep, confined aquifer in the center of the valley in gravel deposits beneath clay confined beds; 3) a shallow, unconfined aquifer in the center of the valley overlying the confined aquifer; and 4) local perched aquifers located primarily adjacent to mountain fronts. In general, the hydraulic gradient in the Segment 5 can be expected to slope down with the topography in an easterly direction toward the Jordan River.

Our geotechnical investigations in Segment 5 encountered groundwater in two borings. Because none of the other borings in this segment identified any groundwater, it is likely that the observed groundwater at these two locations was perched on low-permeability soils. Perched water could be encountered occasionally at other locations where surface water infiltrates the soil and becomes trapped on underlying fine-grained soils. Section 6.1.3 of this report addresses groundwater conditions in greater detail.

4.7 CLIMATIC CONDITIONS

The climate in the Project area is characterized by relatively warm summers and cold winters. The frost depth ranges from 20 to 30 inches, and we recommend that a maximum frost depth of 30 inches be assumed for design purposes. Winter snow requires plowing and de-icing salt and chemicals are commonly deposited on roadways in the winter.

5 FIELD AND LABORATORY TESTING

5.1 SUBSURFACE EXPLORATION

One boring was initially drilled at each of the three foundation locations proposed for the Kennecott railroad bridge over MVC. Sampling was typically conducted at depth intervals of five feet in the structure borings, which extended to depths ranging from 110 to 116 feet. To accommodate changes in the proposed facilities as design progressed, additional test holes were drilled at the Kennecott railroad crossing subsequent to the initial field investigations, as described in Section 6.1.2 of this report.

Six borings were drilled at proposed locations of retaining walls to allow evaluation of global stability and geotechnical design parameters. The boring depths depended upon the height of the proposed wall and the subsurface conditions encountered, and ranged from about 26 to 95 feet, with an average depth of about 50 feet.

Six embankment borings were drilled in Segment 5 at the anticipated locations of large embankment fills along the alignment. These borings ranged from about 27 to 87 feet deep, with an average depth of 52 feet.

Eleven borings were initially drilled at locations of proposed detention basins in Segment 5. These borings extended to depths ranging from 21.5 to 41.5 feet, with an average depth of about 34 feet. Sampling was generally performed at depth intervals of 5 feet. Open-hole, constant-head permeability tests were conducted over depth intervals of 5 feet at depths where soil permeability is of interest in design. Five additional detention basin borings were drilled subsequent to preparation of the initial report, and have been added to the report via Addendum 1.

The subsurface explorations described in this report include 29 roadway borings drilled along the proposed northbound and southbound Phase I alignments. The roadway borings in Segment 5 extended to a depth of about 10 feet below the anticipated roadway profile, with sampling conducted at 2.5-foot intervals in the 5 to 6 feet below profile elevation. Because the proposed Segment 5 profiles are often well below the existing ground surface, the roadway borings in this segment ranged from 10 to 56 feet in depth, with an average depth of about 27 feet. Four additional roadway borings were drilled to depths of 10 feet to investigate subgrade conditions for cross streets at 6200 South and 5400 South.

Boring logs and laboratory test results for the subsurface investigations are presented in Appendix B of this report. The test hole logs are numbered with the prefix "09" to indicate the year of the boring. Borings drilled for bridge structures, walls, embankments, detention basins, and cross streets in Segment 5 are further identified by the prefixes "S5," "W5," "E5," "D5," and "CS5," respectively.

Roadway borings were numbered consecutively from south to north along the alignment, with the prefix "09-MVC" followed by the boring number. Roadway Borings 09-MVC-139 through 167 were located in Segment 5. The location of embankment boring 09-E5-4 coincided with that of roadway boring 09-MVC-146, so the roadway boring at this location was simply extended deeper to address embankment considerations.

The subsurface explorations described in this report were conducted using CME-55 rotary drill rigs operated by RB&G Engineering, Inc. and Direct Push Services, LLC. Most of the deeper borings were drilled using tri-cone rock bits and NW casing, with water or drilling mud used to flush out the cuttings. Some borings were drilled using hollow-stem auger. The methods and equipment used for each boring are noted at the top of each test hole log.

Disturbed samples were obtained by driving a 2-inch split spoon sampling tube through a distance of 18 inches using a 140-pound weight dropped from a distance of 30 inches. The energy transferred by the automatic trip sampling hammers to the drill rods is evaluated yearly, and the energy ratios used to correct blow counts for each hammer are listed below:

Drill Rig	Hammer Type	Energy Ratio
2008 CME-55	Automatic Trip	80%
1996 CME-55	Automatic Trip	79%
1978 CME-55	Rope and Cathead	60%
DP-CME-55	Automatic Trip	83%

The number of hammer blows required to drive the sampling spoon through each 6 inches of penetration is shown on the boring logs. The sum of the last two blow counts, which represents the number of blows required to drive the sampling spoon through 12 inches, is the raw blow count N. The $(N_1)_{60}$ value (standard penetration value corrected for overburden and hammer energy), provides a good indication of the in-place density of sandy material; however, it only provides an indication of the relative stiffness of cohesive material, since the penetration resistance of materials of this type is a function of the moisture content.

Considerable care must be exercised in interpreting the standard penetration value in gravelly-type soils, particularly where the size of granular particles exceeds the inside diameter of the sampling spoon. If the spoon can be driven through the full 18 inches and achieve reasonable sample recovery, the standard penetration value provides a good indication of the in-place density of gravelly-type material. For materials containing more than about 35% gravel size particles, the standard penetration value is less reliable. The density descriptions shown on the boring logs for samples containing more than 35% gravel were approximated based on correlations between relative density and standard penetration value for gravelly soils.

At some locations it was not possible to drive the sampling spoon through the full 18 inches without excessive hammer blows. Sampling was typically terminated where 6 inches of penetration could not be achieved in about 50 to 60 blows, as indicated on the boring logs.

Relatively undisturbed samples were obtained by pushing a 2.62-inch (inside diameter) thin-walled sampling tube into the subsurface material using the hydraulic pressure on the drill rig. The locations at which the undisturbed samples were obtained are shown on the boring logs. Where undisturbed samples appeared to terminate in cohesionless soils, the thin-walled tube sample was typically followed immediately by an SPT sample to obtain a quick indication of the material's in-place density.

Miniature vane shear (torvane) tests, which provide an indication of the undrained shearing strength of cohesive materials, were performed on samples of the cohesive soils during the field investigations. The results of these tests are shown on the boring logs as the "torvane" values in units of tons per square foot.

Each sample was visually classified when obtained in the field, and the field classifications were reviewed in the laboratory according to the Unified Soil Classification System. The symbols designating soil types according to this system are presented on the boring logs. A description of the Unified Soil Classification System is included with the logs (see Appendix B), and the meaning of the various symbols shown on the logs can be obtained from this figure. Samples subjected to Atterberg Limits and gradation tests in the laboratory were also classified according to the AASHTO Classification System, and the AASHTO classification symbols are also shown on the boring logs.

5.2 LABORATORY TESTING

Laboratory tests performed on samples obtained from the borings include the following:

1) Mechanical Analysis
2) Density
3) Moisture Content
4) Atterberg Limits
5) Unconfined Compressive Strength
6) Unconsolidated-Undrained Triaxial Compression
7) Consolidated-Undrained Triaxial Compression
8) Direct Shear
9) One-Dimensional Consolidation
10) Moisture-Density Relationship (Proctor)
11) California Bearing Ratio (CBR)
12) pH, Resistivity, Sulfates, and Chlorides

Consolidation test specimens were one inch thick, with drainage provided at both top and bottom of the samples during testing.

Laboratory testing was conducted in accordance with applicable standards published by ASTM International and/or the American Association of State Highway and Transportation Officials (AASHTO).

The results of laboratory tests performed during this investigation are presented on the boring logs and summarized on tables located in Appendix C of this report. Plots of applicable test data are also included in Appendix C.

6 STRUCTURES

6.1 DESCRIPTION

6.1.1 GENERAL

Drawings of the proposed Kennecott railroad over MVC structure are included for reference in Appendix A of this report. These drawings indicate that the bridge will be a two-span structure with span lengths of about 174 feet (approx. 128 ft normal to the proposed MVC roadway). The superstructure width will be approximately 38 feet.

6.1.2 SUBSURFACE CONDITIONS

Borings 09-S5-1, 2, and 3 were drilled at the approximate foundation locations of the proposed Kennecott railroad bridge. In addition, Boring 09-W5-6 was drilled at Abutment 1, about 55 feet southeast of Boring S5-1, and Boring 09-W5-4 was drilled near Abutment 3, approximately 100 feet north of Boring S5-2.

At the southwest abutment (Abut 1), the conditions encountered in Borings S5-1 and W5-6 were relatively similar throughout the depth investigated. Nonplastic to low-plasticity silt with sand was the predominant soil type in the upper 18 to 21 feet. SPT values in this material were indicative of medium-dense soil. The upper silt zone was underlain by soft to stiff silty clay extending to a depth of 24 to 29 feet, followed by relatively dense to very dense sand and gravel to about 53 feet. Most samples between depths of 53 and 68 feet were characterized as medium-dense silty sand. Between 68 and 97 feet, both borings encountered stiff to very stiff lean clay, with occasional layers of clayey sand, clayey gravel, and fat clay. Boring W5-6 terminated at about 97 feet, but Boring S5-1 continued to a final depth of 110 feet, and encountered medium-dense to very dense sand and gravel below a depth of 99 feet.

At the northeast abutment (Abut 3) Borings S5-2 and W5-4 both encountered alternating layers of silt, silty clay, and lean clay in the upper 50 to 55 feet. The silt deposits were typically characterized as nonplastic to slightly plastic and dense to very dense, and the boring logs noted some evidence of cementation and possible cobbles in this material. The consistency of the cohesive soils in the upper 50 feet ranged from firm to hard. Boring S5-2 continued to a depth of 110 feet, encountering mostly firm to stiff silty clay and lean clay to 89 feet, followed by dense/stiff silt to 96 feet, then very dense sand, silt, and gravel to 110 feet. A zone of firm silty clay approximately 2 feet thick was noted at about 103 feet.

At Bent 2, medium-dense silty sand was the predominant soil type in the upper 25 feet of Boring S5-3. Medium-dense to very dense gravel was encountered between 25 and about 43 feet, followed by a zone of firm sandy fat clay to 48 feet, then medium-dense to dense sand with gravel to 58 feet. Clayey sand and gravel were noted at 60 and 65 feet, underlain by dense/hard sandy silt to about 83 feet. At 85 feet, the sample classified as sandy lean clay, and sampler refusal at 90 feet suggests the presence of gravels, cobbles, and possible boulders. The boring log shows dense sandy silt from 91 to 98 feet, then very dense clayey sand to 103 feet, and finally stiff to hard sandy lean clay to the bottom of the boring at 116 feet.

Atterberg limit tests were conducted on 20 samples of plastic soil obtained from the three structure borings. The liquid limits of these soils ranged from 24 to 61, and averaged approximately 32. The plasticity indices varied from 3 to 37, with an average of about 12. The moisture content of these 20 samples was between 10 and 45 percent, with an average of 25 percent. The measured moisture content of 16 nonplastic samples from these borings varied from 4 to 30 percent, and averaged 18 percent. It is notable to add that in Boring 09-W5-6 (not included among the three bridge borings summarized above) the top few inches of the sample obtained at a depth of 80 feet classified as fat clay with a moisture content of 40.6 percent, a liquid limit of 69, and a plasticity index of 42.

Undrained shear strengths of the cohesive soils, as estimated from the results of unconfined compression tests and UU triaxial tests, varied from as low as 700 psf at a depth of 20 feet in Borings S5-1 and 2 to as high as about 12,500 psf at a depth of 115 feet in Boring S5-3. The average undrained shear strength based on all ten tests from these borings is about 3,000 psf; however, the average reduces to about 1550 psf if the two highest and two lowest results are excluded.

6.1.2.1 Additional Investigations

Subsequent to drilling of the test holes described above, the proposed Kennecott railroad bridge (UDOT Structure No. C-1002) was realigned, which substantially modified the anticipated locations of Bent 2 and Abutment 3. Borings 10-S5-4 and 10-S5-5 were drilled after preparation of the initial report at the new locations of C-1002 Bent 2 and Abutment 3, respectively.

At the revised Bent 2 location, Boring 10-S5-4 encountered predominantly medium-dense silty sand and sandy silt with clay lenses in the upper 18 feet, followed by soft to firm silty clay with sand to a depth of about 28 feet. The silty clay was underlain by medium-dense silty sand with clay lenses and layers to about 36 feet, followed predominantly by medium-dense to very dense silty gravel to the final boring depth of 100 feet. The gravelly soils from 35 to 100 feet were interrupted by zones of medium-dense to very dense silty sand (most notably from about 54 to 58 feet, from 75 to 80 feet, and from about 88 to 94 feet), and a zone of soft sandy clay about three feet thick was noted at a depth of about 60 feet.

At the revised Abutment 3 location, Boring 10-S5-5 encountered silty clayey gravel fill in the upper 4 to 5 feet. This fill was underlain predominantly by medium-dense silty sand with clay lenses to a depth of about 34 feet; however, it should be noted that the drilling behavior suggested the presence of gravel and cobbles between depths of about 6.5 and 9 feet. Stiff to very stiff lean clay was logged between 34 and 44 feet, followed by medium-dense sandy silt to

48 feet, very dense silty sand to 53 feet, sandy silt to 56 feet, and dense silty gravel with sand to 59 feet. Stiff to very stiff sandy lean clay was encountered in both samples taken between 59 and and 63 feet. Stiff to hard sandy silty clay was the predominant material encountered between 63 and 96 feet, with the exception of a zone of a sample of very dense silty sand obtained at a depth of 80 feet. The boring encountered hard sandy silt between 96 and 104 feet, followed by silty gravel to about 106 feet, then very dense silty sand to the bottom of the boring at 120 feet.

The design of a proposed pedestrian tunnel (UDOT Structure Number E-2654) crossing beneath the Kennecott railroad line was also undertaken subsequent to completion of the initial field investigation program. Borings 10-S5-6 and 10-S5-7 were drilled after preparation of the initial report near the southwest and northeast ends, respectively, of the proposed tunnel.

Near the southwest end of the proposed pedestrian tunnel, Boring 10-S5-6 encountered medium-dense silty sand to a depth of about 3 feet, followed by dense gravel with silt and sand to about 10 feet, very stiff clayey gravel with sand to 13 feet, then stiff to hard sandy silt to about 22 feet. Very stiff to hard silty clay with sand was the predominant soil type encountered below 22 feet to the bottom of the boring at 46.5 feet. This zone included a deposit of lean clay with sand from about 26 to 30 feet, and a sample of sandy silt was obtained at a depth of 40 feet.

Boring 10-S5-7 encountered medium-dense fill consisting of silty gravel and sand in the upper 5 feet. Medium-dense to very dense silty gravel was encountered below the fill from about 5 to 13 feet, and was underlain by stiff lean clay with sand to 18 feet, then firm to stiff sandy silty clay to about 23 feet. Between 23 feet and 44 feet, the sampled soils were characterized as very dense silty sands and silty gravels. Firm to stiff silty clay soils were sampled at depths of 45 and 50 feet. The soils from about 53 to 73 feet were classified as somewhat plastic silt of firm to hard consistency, and were underlain by dense to very dense silty clayey sand to the bottom of the boring at a depth of 81 feet.

It should be noted that relatively high blow counts and refusal conditions were documented at varying depths and locations throughout Segment 5, and these sampling characteristics indicate the possible presence of cobbles, boulders, and cemented soils.

6.1.3 GROUNDWATER

Slotted pipes were temporarily placed in each boring upon completion of drilling to allow monitoring of groundwater levels over the subsequent weeks. Only two of the borings completed in Segment 5 encountered groundwater. Boring 09-W5-6 (Sta. 1540+65, 104' LT) was drilled to a depth of about 96 feet without the use of drilling fluid, and the water level in this boring has remained at a depth of about 79 feet in the month following drilling. Boring 09-MVC-160 (Sta. 1607+00, 131' RT) was drilled to a depth of 19 feet using auger, and the water level was subsequently measured at a depth of 16 to 17 feet in this boring on multiple occasions. Because water was not encountered in any of the other Segment 5 borings, we suspect that the water encountered in these two borings is perched water supported on clayey soils.

6.1.4 EARTHQUAKE CONSIDERATIONS

6.1.4.1 Seismic Hazards

Due to the proximity of mapped active faults, the Project area is susceptible to significant seismic ground motions during a moderate to large earthquake in the region. The potential ground motions and their associated effects should be accounted for in design of structures on the Project.

6.1.4.2 Seismic Design Parameters

It is our understanding that seismic analyses of bridge structures and retaining walls will be conducted in accordance with the *AASHTO Guide Specifications for LRFD Seismic Bridge Design* and the *AASHTO LRFD Bridge Design Specifications*. We also understand that the proposed bridge and pedestrian tunnel at the Kennecott railroad crossing will be designed primarily in accordance with the *AREMA Manual for Railway Design*. Geotechnical seismic design parameters for both the AASHTO and AREMA design approaches are discussed below.

The 2002 Seismic Hazard Deaggregation feature of the USGS web site was used to determine the mapped probabilistic peak ground acceleration (PGA) and spectral acceleration (SA) values for the anticipated bridge sites in Segment 5.

MAPPED PROBABILISITIC SEISMIC GROUND MOTIONS		
Location		Kennecott RR Bridge
Latitude		40.625 deg N
Longitude		112.045 deg W
Approx. 2500-year event	PGA	0.42g
2% PE in 50 years (2475 yrs)	0.2 s SA	1.04g
3% PE in 75 years (2462 yrs)	1.0 s SA	0.39g
Approx. 1000-year event	PGA	0.30g
5% PE in 50 years (975 yrs)	0.2 s SA	0.74g
7% PE in 75 years (1033 yrs)	1.0 s SA	0.26g
Approx. 500-year event	PGA	0.22g
10% PE in 50 years (475 yrs)	0.2 s SA	0.53g
15% PE in 75 years (461 yrs)	1.0 s SA	0.18g
Approx. 100-year event	PGA	0.077g
50% PE in 75 years (108yrs)	0.2 s SA	0.18g
	1.0 s SA	0.056g

Design ground motion values should be estimated by modifying the mapped values to account for site effects. Site class evaluations were conducted in accordance with the AASHTO Guide Specifications for LRFD Seismic Bridge Design, and the results of these evaluations were inconclusive, ranging from Site Class C to Site Class E, depending upon the boring and the evaluation method used. We recommend that Site Class D be used for stiff structures with vibrational periods up to about 0.5 seconds. Site Class E should be used for structures with longer periods.

We anticipate that use of the AASHTO General Procedure with the Site Class recommendations above to develop design response spectra will result in conservative seismic design for this bridge site. However, a site-specific response analysis should be conducted if the proposed bridge is considered critical or essential. We anticipate that a site-specific response analysis for this site will result in a response spectrum that is generally lower than that determined using the AASHTO General Procedure, and could result in substantial savings in the bridge design.

The *AASHTO LRFD Bridge Design Specifications* require that bridges be designed to meet life safety criteria (low probability of collapse) in the event having a return interval of about 1000 years. UDOT may require that some bridges be designed to a higher performance level (e.g. "repairable," or "operational") and/or a less-frequent design event (e.g. 2500-year return interval). We have computed the design response spectra for the bridge sites using the AASHTO general procedure for both the 2500-year and 1000-year seismic events, and the results are presented in Appendix D of this report.

For seismic design in accordance with the *AREMA Manual for Railway Engineering*, we recommend that seismic coefficients be based on Soil Type 3. Estimated AREMA seismic response coefficients are included in Appendix D for seismic return periods ranging from 108 to 2475 years.

6.1.4.3 Liquefaction and Related Hazards

Saturated deposits of loose cohesionless soils were not encountered in the subsurface explorations, and the potential for liquefaction and lateral spreading is considered negligible within Segment 5.

6.1.5 POTENTIALLY-HAZARDOUS MATERIALS

All soil samples obtained from the borings were examined in both the field and the laboratory, and no unusual conditions indicative of contamination were noted. Any hazardous materials encountered during further investigations or construction should be reported and mitigated in accordance with applicable laws and regulations.

6.2 RECOMMENDATIONS

6.2.1 BRIDGE STRUCTURES

Due to the presence of soft to firm cohesive soils at shallow to moderate depths, we recommend that the proposed railroad bridge be supported on deep foundations. Deep foundations will derive substantial axial compressive resistance from side resistance, and offer benefits with respect to lateral and uplift resistance under seismic conditions.

In our opinion, the subsurface conditions at the proposed bridge site are conducive to the use of either driven piles or drilled shafts. Detailed geotechnical recommendations for design and construction of drilled shafts and driven piles are provided below. The construction considerations discussed in Section 6.2.1.6 should be carefully considered in evaluating foundation options.

6.2.1.1 Axial Resistance

Deep foundation analyses were conducted for the initial report based on the preliminary bridge location and concept, which has since change substantially. The evaluations described below were conducted in the preparation of Addendum 1.

It is our understanding at the time of Addendum 1 that driven piles have been selected as the preferred foundation type for the abutments and bent of the proposed Kennecott railroad bridge in Segment 5. Estimated geotechnical axial resistance values for HP14x102 driven steel H-piles are included in Appendix D of this report. Resistance factors for AASHTO LRFD design were obtained from the *AASHTO LRFD Bridge Design Specifications*. For AREMA Allowable Stress Design (ASD), a factor of safety of 2.25 was used to estimate the allowable geotechnical pile loads in axial compression assuming the installed nominal capacity of piles at each support will be verified using dynamic pile testing (PDA) and signal matching analyses (CAPWAP). A factor of safety of 3.0 was used to estimate the allowable uplift loads. It is our understanding that the design uplift loads for the foundation piles are very small.

Estimated geotechnical axial resistance values for drilled shafts supporting the proposed bridge bent are tabulated and plotted in Appendix D of this report. These values were provided to the structural engineer for preliminary evaluations to determine the desired deep foundation type at the bent. The Bent 2 drilled shaft resistance page in Appendix D has not been refined for the final bridge configuration, and is provided for information only.

We anticipate that some deep foundations at the railroad bridge site will terminate in relatively dense, low-plasticity soil, and that this soil may provide substantial toe resistance. However, these dense deposits are often relatively thin and underlain by or interbedded with weaker compressible soils, which may compromise the useful toe resistance. Additionally, the plugging behavior of H-piles and its effects on pile toe resistance are difficult to predict. We have accounted for these factors by assuming relatively small toe resistance contributes to the axial compression estimates listed in Appendix D.

If the Structural Engineer determines that drilled shafts or pile groups supporting bridges are non-redundant, the estimated resistance values should be reduced 20 percent as outlined in Sections 10.5.5.2.3 and 10.5.5.2.4 of the *AASHTO LRFD Bridge Design Specifications.*

Deep foundation design for this project has been conducted based on the neutral plane method, in which downdrag loads are not considered detrimental to the geotechnical foundation resistance. However, the axial structural strengths of driven piles should be checked to verify that they are not exceeded by the pile dead loads plus the drag loads listed on the axial resistance tables in Appendix D.

6.2.1.2 Lateral Loading Behavior

A summary of recommended parameters for analysis of lateral load response of deep foundations at the railroad bridge is presented in Appendix D of this report. It is good practice to vary the parameters in the upper 30 feet by about 20 percent, in order to evaluate the sensitivity of the computed lateral loading response to these parameters.

It is our understanding that the number of piles used in each foundation may be controlled by lateral loading demands. The elevations of minimum acceptable pile penetration should be specified on the plans based on the desired response to lateral loading as determined by the structural engineer, but should be no shallower than those listed with the axial pile resistance estimates in Appendix D.

6.2.1.3 Group Resistance

It is our understanding that the bridge abutment foundations will consist of two rows of 12 H-piles each, with the rows spaced 5'-9" apart on centers, and the center-to-center spacing of piles equal to 3'-10" within rows. The nominal pile group bearing resistance for the anticipated abutment pile groups may be taken as the nominal axial resistance of all the piles in the group, and no reduction for group efficiency is necessary.

The bent foundation is expected to consist of five rows of 11 H-piles each, with piles spaced 5 feet to about 5'-10" (approx. 4.3 to 5 diameters) on centers. The total plan area of the bent pile cap is approximately 59 feet long by 24 feet wide. For the anticipated bent pile group configuration, the nominal bearing resistance of the pile group may be taken as sum of the axial resistance of all the piles in the group, and no reduction for group efficiency need be applied.

Much of the axial compressive resistance of drilled shafts at this site will be provided by cohesionless soils. Section 10.8.3.6.3 of the *AASHTO LRFD Bridge Design Specifications* requires that a shaft efficiency reduction factor (η) less than 1.0 be applied where shafts are spaced at less than four diameters on centers. If drilled shafts are used and the center-to-center spacing between shafts is less than four diameters, the Geotechnical Engineer should review the proposed shaft configuration to determine whether the group uplift resistance could be reduced by interaction between shafts.

6.2.1.4 Settlement

Settlements were estimated for the abutment and bent pile groups described in the previous section of this report. The computed elastic settlement of each abutment pile group under a service load of about 4500 kips is in the range of 0.2 to 0.3 inch. An additional 0.1 to 0.2 inch of consolidation settlement was computed for a nontransient (dead) abutment load of 1600 kips. At the bent, the computed elastic settlement is 0.4 inches under a 4950-kip dead load, with an additional 0.4 inches computed when a 4400-kip live load is added. The consolidation settlement due to the bent dead load is computed to be less than 0.1 inch.

The computed consolidation settlements listed above are low because the bridge will cross an excavation approximately 30 feet deep. The existing soils that will be excavated are effectively surcharging the deeper cohesive soils that contribute to consolidation settlements that may impact the piles. The estimates of elastic pile settlements do not specifically account for the surcharging effects of the soils that will be excavated, and it is therefore our opinion that the computed elastic settlements are conservative. In particular, we anticipate that actual elastic pile settlements will be in the order of one half to two thirds the computed values listed in the paragraph above.

The axial pile resistance estimates in Appendix D include elevations of minimum acceptable penetration, to which piles and shafts should be installed at each support in order to minimize foundation settlements. These elevations should be included on the foundation drawings. Deeper elevations of minimum acceptable penetration should be specified if needed for lateral or uplift resistance.

6.2.1.5 Testing of Deep Foundations

The driving resistance of H-piles should be tested using dynamic pile testing (i.e. PDA) with signal matching analysis (e.g. CAPWAP) at each abutment and bent, in accordance with UDOT Standard Specification 02455. The driving resistance should increase somewhat in the hours following initial driving, and it may be necessary to conduct restrike tests 24 hours or later after initial driving to verify the required driving resistance. The results of the PDA tests should be used to establish driving criteria (blow count and hammer stroke, or blow count and delivered energy) for the untested piles.

The results of dynamic testing and signal matching analyses may indicate large toe resistance values. However, the measured toe resistance may be an unreliable indicator of the actual toe resistance available to a group of piles, due to the presence of weaker soils within and beneath the bearing stratum. The results of the signal matching analyses for this bridge should be reviewed by the geotechnical engineer to ensure that the required driving resistance is obtained primarily through side resistance and does not depend excessively on toe resistance of questionable reliability. If uplift resistance is critical, the minimum uplift resistance may also be specified on the foundation drawings for verification using the signal matching data.

The number of static load tests required to justify increasing the resistance factor to a given value can be determined from Table 10.5.5.2.3-2, and the number of dynamic tests with signal matching for driven piles can be determined from Table 10.5.5.2.3-3 of the *AASHTO LRFD Bridge Design Specifications*. Because subsurface conditions are moderately to highly variable across the site, we recommend that, as a minimum, dynamic testing with signal matching analysis be conducted on a pile at each end of each abutment and at each corner of the bent foundation to verify the required driving resistance. If driving conditions are found to vary considerably across a given foundation, additional testing may become necessary.

Non-destructive integrity testing such as cross-hole sonic logging should typically be conducted on each drilled shaft used to support bridges. This testing requires that multiple sturdy access tubes be attached to the reinforcing steel extending the full depth of the shaft.

The drilled shaft resistance estimates discussed above are based on the assumption that no load tests will be conducted to demonstrate the axial resistance of the drilled shafts. Load testing may be considered to better estimate shaft resistance values for design purposes and to justify the use of larger resistance factors. Load testing could be performed using a test shaft or group of shafts prior to installation of production shafts. Alternatively, load tests could be conducted on production shafts if the schedule allows time for the foundation design to be refined based on results of the load tests, and if the initial design is flexible enough to accommodate adjustments. The numbers of drilled shaft static load tests required to justify a given resistance factor are tabulated in Table 10.5.5.2.3-2 of the *AASHTO LRFD Bridge Design Specifications*; however, the resistance factor for drilled shafts is not permitted to exceed 0.70.

If methods such as Statnamic or Osterberg Cell testing are considered, the proposed test procedures, interpretation methods, and resistance factors should be submitted to the UDOT Geotechnical Division. If accepted by the Geotechnical Division, conducting this type of testing at each abutment and bent might allow an increase in the order of 10 to 20 percent over the resistance factors based on PDA testing.

6.2.1.6 Construction Considerations

The resistance encountered during pile driving at a given tip elevation depends upon whether the MVC roadway is excavated prior to installation of the piles. The axial pile resistance tables in Appendix D assume that abutment piles will be driven prior to excavation of the MVC roadway, and that the piles at the bents will be driven after excavation to the bent pile cap elevation. Notes detailing these assumptions are included with the axial pile resistance tables. If another construction sequence is implemented, the required driving resistance values will have to be revised by the geotechnical engineer. The required driving resistance that must be verified will be excessive if the bent piles are driven from the currently-existing ground surface.

We have evaluated the capability of several locally-available pile driving hammers to drive HP14x102 piles at the Kennecott railroad bridge site using the computer program GRLWEAP. The results of these analyses are tabulated in Appendix D, and indicate that HP14x102 and HP14x89 piles can be driven at the anticipated depth at an ultimate resistance of 750, and 700 kips, respectively,without exceeding about 120 blows per foot using most of the driving systems considered. The WEAP evaluations are only indicative of the capability of the hammers to drive the piles and verify the required driving resistance at the depth and driving resistance shown, assuming each driving system operates as outlined in the manufacturer's specifications. Piles could encounter very large resistance outside the range evaluated that would prevent them from achieving embedment adequate to resist uplift and/or lateral loads. The apparent presence of cobbles, possibly boulders, and cemented soils at various depths (including above the anticipated pile toe elevations) prevents reliable prediction of final pile toe elevations, and may also cause an undesirable situation in which the pile toe elevations vary substantially across a single bridge support and thereby behave in a non-uniform manner under design loads.

Pilot holes may be predrilled to help drive piles through obstructions or hard soil layers. The maximum diameter of the pilot holes should be no greater than 12.5 inches for 14-inch H-piles (about 90 percent of the H-pile width), in order to avoid reducing the available uplift and lateral resistance. Approximate predrill depths are noted with the pile axial resistance values in Appendix D. The use of hardened pile shoes may also be considered to aid in penetrating hard materials, particularly for HP14x89 piles.

Based on the computed driving stresses and the possible presence of cobbles and boulders, we recommend that 50-ksi steel be used for HP14x102 and HP14x89 driven piles at the proposed Kennecott railroad bridge site. We recommend that the pile driving hammer have a minimum rated energy of 60 kip-ft. In accordance with UDOT Standard Specification 02455, a detailed WEAP analysis must be conducted for the specific driving system the Contractor proposes to use at each abutment.

One or more Special Provisions will be required to specify procedures for construction, inspection, and testing of drilled shafts. The existing UDOT Standard Specification 02466 for drilled shaft construction does not adequately address critical items such as non-destructive testing for drilled shafts supporting bridges in this segment of the project.

It may be necessary or beneficial to use temporary casing to drill the shafts, due to the frequent cohesionless subgrade soil deposits. The use of properly mixed and maintained drilling fluids may also be beneficial to drilled shaft construction. If mineral slurry is used to maintain open shaft excavations, special care should be taken to prevent the formation of a thick slurry cake on the sides of the shaft.

The use of relatively large shaft diameters (about 6 to 8 feet) may present significant advantages compared to smaller diameter shafts in terms of constructability. The more powerful equipment used for larger shafts will be beneficial in drilling through the very dense soils at the site, and the larger shaft diameters will generally facilitate removal of oversize material such as cobbles and boulders from the shaft excavations.

6.2.2 OTHER STRUCTURES

6.2.2.1 Kennecott Railroad Pedestrian Underpass

The proposed pedestrian tunnel structure is expected to be located approximately 150 feet northeast of the east abutment of the proposed railroad bridge over MVC. The structure is expected to be approximately 65 to 70 feet long, 16 to 17 feet wide, and 13 feet high, with the foundation level approximately 15 to 20 feet below the existing ground surface, between elevations 5038 and 5039 feet. It is also anticipated that the structure will be backfilled with Granular Backfill Borrow. We assumed that the backfill will have a total unit weight of 145 pcf and an internal friction angle of 36 degrees.

Preliminary recommendations were provided for the Kennecott Railroad Pedestrian Underpass structure in a Memo dated August 20, 2010. Recommendations were based upon data from borings in the general vicinity, which identified a firm to stiff clay layer at the proposed foundation level (between elev. 5038' and 5039'). The clay layer extended 4 to 5 feet below the footing level (elev. 5034') in Boring 10-S5-7 at the north end of the structure, and was underlain by very dense silty sand and gravel. Boring 09-S5-2, located about 40 feet from the southeast corner of the proposed structure, identified layers of firm to stiff clay extending to about elevation 5024 feet. Bearing capacity values provided in the August 20th Memo were controlled by this clay layer.

Subsequent to submittal of the August 20th Memo, it was reported that structural loads required significantly higher bearing capacities than provided in the memo for spread footings.

An additional boring (10-S5-6) was drilled within the structure footprint at the south end, as shown in Figure 2d. The log for this boring is included in Appendix B, and it will be noted that predominantly very stiff to hard silty clay with sand was encountered at the footing level and extended 20 feet below the footing level. An unconsolidated undrained triaxial shear test performed on a relatively undisturbed sample of this material and the test results are included in Appendix C. An undrained shear strength of 3319 psf was obtained.

A 25% reduction to the undrained shear strength has been used to evaluate net bearing capacity, since laboratory strength testing was limited to one relatively undisturbed sample. This results in a net bearing capacity, calculated in accordance with AREMA 3.4.4 of 13,500 psf, and an allowable bearing capacity of 4500 psf. Field standard penetration testing resulted in an $(N_1)_{60}$ value of 31 for the sample immediately beneath the undisturbed sample, and an average $(N_1)_{60}$ value of 38 for the five samples of silty clay within 10 feet of the footing level.

A settlement analysis has been performed using consolidation test data from Boring 10-S5-7. To limit the total computed settlement to less than 1 inch, the allowable bearing pressure induced into the clay must be limited to 4150 psf.

A significant increase in allowable bearing capacity can be achieved by removing a portion of the native silty clay at the footing level and replacing with granular backfill borrow. To obtain an allowable bearing capacity of 6,000 psf for continuous footings, without inducing more than 4150 psf into the clay, the thickness of granular borrow between the footing and native clay should be equal to at least 0.44 x B, where B equals the footing width. For example, a 16-foot wide footing requires 7 feet of granular fill. It is recommended that at least 3 feet of granular fill be placed beneath all footings at the pedestrian tunnel site. The width of the over-excavated footing excavations should be equal to at least the footing width plus the thickness of fill, with the footing centered on the fill.

Recommendations given in this report for the Kennecott Railroad Bridge relative to seismic ground motions are applicable to the pedestrian undercrossing site. At rest lateral earth pressures can be estimated using the Lateral Earth Pressure Recommendations listed in Appendix D of this report, with specific details of the calculations as follows:

$P_o = 0.5 K_o \gamma H^2$ (triangular distribution)

Where P_o = Calculated earth pressure (psf)
K_o = At-Rest Earth Pressure Coefficient
(Use 0.41 for compacted granular borrow)
γ = Unit weight of backfill (pcf)
(Use 145 pcf for compacted granular borrow)
H = Height of wall (ft)

In order to account for earth pressures created by heavy compaction equipment operating near the walls of the tunnel, we recommend that K_o be conservatively taken as 2.8 in the preceding equation. Lateral earth pressures created by compaction equipment can be reduced by limiting the size of the equipment permitted within a distance equal to half of the wall height.

6.2.2.2 Sign Structures

Major sign structures are not anticipated in Phase I at the time of this report. We can provide foundation investigations and recommendations for sign structures in the future where needed.

6.2.3 EMBANKMENTS AND RETAINING WALLS

Based on our review of available preliminary roadway cross sections, substantial embankment fills will be required at various locations along the alignment. It appears that the proposed embankment side slopes for the current phase of work (frontage roads only) in Segment 5 are typically 2 horizontal to 1 vertical (2H:1V) or flatter. Retaining walls as high as about 29 feet are proposed to retain soil where the roadways will cut below the Kennecott rail line. Geotechnical investigations and design considerations for retaining walls and sloping embankment fills are discussed below.

6.2.3.1 Embankment Settlement

The soils underlying Segment 5 of the proposed Corridor alignment are highly variable, ranging from very dense granular deposits (sand, gravel, cobbles, and possible boulders) to soft to firm cohesive soils (predominantly silt, silty clay, and lean clay). The borings often encountered alternating zones of granular and cohesive soils ranging from about 5 to 20 feet thick.

Compression of cohesionless soils occurs almost immediately upon application of loads, and has minimal impact upon construction schedule. Because the cohesionless soils in Segment 5 are generally relatively dense, the settlements associated with these soils will be small. Substantially larger settlements could occur due to consolidation of cohesive soils, and significant consolidation settlements may take place over the weeks, months, and years following application of embankment loads.

The proposed Phase I roadway alignments in Segment 5 incorporate embankment fills at various locations. The maximum fill height shown on the embankment cross sections is about 20 feet, and occurs at Sta. 1531+00. We have evaluated consolidation settlements for various locations throughout the alignment where the anticipated fill heights are greater than about six feet. The estimated primary and 20-year secondary consolidation settlements are tabulated below. The listed fill heights typically vary across the embankments due to the cross slope of the existing ground surface.

MVC Mainline Station	Approximate Fill Height (ft)	Est. Primary Consolidation (in)	Est. Secondary Consolidation (in)	Est. Total Consolidation (in)	Est. Time to Complete 90% of Primary Consolidation (days)
1517+00	9 to 10	2.5	0.6	3.1	60
1531+00	15 to 20	5.1	1.0	6.1	221
1535+00	12	3.0	1.0	4.0	204
1560+00	8 to 10*	0.8	0.3	1.1	167
1590+00	5 to 8	0.6	0.3	0.9	167
1630+00	14 to 16	1.1	1.0	2.1	50

*Northbound alignment only. Southbound alignment is in cut section

As discussed previously in this report, groundwater was encountered very infrequently within the depths of the exploratory borings in Segment 5. For the most part, the consolidation testing conducted in these investigations used samples that were saturated after a small load was applied. However, we also conducted some tests in which no water was added, for comparison with consolidation tests on saturated samples of the same material. These comparisons indicate that an unsaturated clayey sample will consolidate about 25 to 50 percent less than a saturated sample of the same soil under a given load.

The settlement estimates presented herein are based on consolidation tests of saturated samples, and the estimates are therefore somewhat conservative if the in-situ soils remain in an unsaturated state. For example, the estimated settlement of 6.1 inches at Sta. 1531+00 will likely correspond to about 3 to 4.5 inches of settlement in the field. However, we recommend that the saturated conditions be assumed for design.

We recommend that roadway pavements not be constructed until the estimated remaining 20-year settlements have been reduced to 1.5 inches or less. This can be accomplished by constructing embankments to subbase elevation, and then monitoring settlements under the fill until the necessary degree of consolidation settlement is complete prior to releasing the embankment for paving. Surcharge may be added to the top of the fill to help accomplish a greater magnitude of the anticipated primary consolidation in a given time period and to help reduce secondary consolidation settlement.

Estimated times to complete all but 1.5 inch of the 20-year consolidation settlement are tabulated below. We recommend that settlement be monitored for a minimum of 30 days at all locations where the estimated total consolidation exceeds 1.5 inch. Surcharge options are included in the table for locations where the estimated consolidation time without surcharge exceeds 60 days.

MVC Mainline Station	Approximate Fill Height (ft)	Est. Total Consolidation (in)	To Complete All But 1.5 inch of 20-yr Settlement	
			Est. Time (days)	Surcharge Pressure (psf above finished pavement elev.)
1517+00	9 to 10	3.1	<30	0
1531+00	15 to 20	6.1	221	0
			120	250
			90	450
			60	600
1535+00	12	4.0	120	0
			60	300
1560+00	8 to 10	1.1	0	0
1590+00	5 to 8	0.9	0	0
1630+00	14 to 16	2.1	<30	0

The following recommendations are provided based on the completed Segment 5 embankment settlement analyses:

- Between Sta. 1515+00 and 1519+00, embankments 5 to 10 feet high should be constructed to subbase level and then monitored for an estimated consolidation period of 30 days to verify that consolidation settlements are sufficiently complete before paving the roadway.
- Between Sta. 1524+00 and 1537+00, embankments 4 to 9 feet high should be constructed to subbase level and monitored 30 to 60 days prior to paving. Embankments higher than 9 feet will generally require longer monitoring periods and/or surcharge.
- Between Sta. 1624+00 and 1632+00, embankments between 5 and 16 feet high should be constructed to subbase level and monitored for an estimated consolidation period of 30 days prior to paving.

The recommendations listed above are generalized for relatively large areas and are intended to be used for preliminary estimating and evaluation of mitigation options. Once the project team specifies a desired time frame for settlement mitigation in this area, we can sketch detailed mitigation requirements on copies of the roadway or grading plans.

Because the anticipated retaining walls in Segment 5 are in cuts rather than fills, settlement of the soils beneath the base of walls is expected to be small, and the use of two-stage MSE walls will not be necessary.

6.2.3.2 Slope and Retaining Wall Stability

The minimum acceptable factors of safety for global stability of slopes and retaining walls are listed in the UDOT Geotechnical Manual of Instruction, and are summarized below.

Location	Feature	Condition	Factor of Safety
Located where failure or deformation could impact bridges or critical facilities	Retaining walls	Construction	1.3
		Static long-term	1.5
	Slopes	Construction	1.3
		Static long-term	1.3
All other locations	Retaining walls	Construction	1.1
		Static long-term	1.3
	Slopes	Construction	1.1
		Static long-term	1.2

Slopes adjacent to bridges, as well as all retaining walls, are required to have a minimum factor of safety of 1.0 for the dynamic seismic condition, analyzed using a pseudostatic coefficient equal to 50% of the design peak ground acceleration value for the site. The post-earthquake case should also be evaluated at locations where the failure surface could pass through materials that are weakened by dynamic loading, such as clays and liquefiable soils.

We have conducted global stability analysis for the most significant slopes and retaining walls anticipated within Segment 5 using the computer program SLOPE/W. Spencer's method was used to compute factors of safety for the trial failure surfaces, which were first selected using a grid and radius approach. The critical circular surface for each case was then optimized by iteratively adjusting points on that surface, which typically resulted in a factor of safety one to two tenths lower than that of the critical circular surface. For each pseudostatic case, a parameteric analysis was then conducted to show the sensitivity of the factors of safety to the pseudostatic coefficient.

Appendix D contains a summary of the computed factors of safety against global stability, accompanied by graphics showing the results of each analysis. At the retaining walls adjacent to the proposed railroad bridge abutments, the walls were initially modeled in the global stability analyses as MSE walls with reinforcement lengths equal to 80 percent of the wall height. At locations where substantial slopes rise behind the walls, the reinforcement length had to be increased to 1.1 times the wall height in order to safely retain the large backslopes. The computed critical failure surfaces often pass immediately behind the reinforced soil zone, and the calculated factors of safety are therefore dependent upon the reinforcement lengths. For this reason, global stability of embankments containing retaining walls should be refined at locations where the selected wall types or design dimensions differ substantially from those shown in Appendix D.

It will be noted from Appendix D that the optimized factors of safety meet UDOT minimum requirements for all conditions evaluated.

6.2.3.3 Retaining Wall Design Recommendations

Retaining wall systems should be selected, designed, and constructed in accordance with Special Provision 02831S and the other specifications referenced therein. The special provisions applicable to retaining walls are maintained by the UDOT Geotechnical Division.

The use of soil nail walls may be considered for temporary and/or permanent excavation support adjacent to the proposed railroad bridge. In general, the soil conditions at this location are compatible with typical soil nail design and construction methods. We recommend that soil nail walls be designed and constructed as outlined in *Geotechnical Engineering Circular No. 7: Soil Nail Walls* (Lazarte et al., 2003).

It is our understanding that design of soil nail walls for the project will be conducted by others. A draft special provision for design and construction of soil nail walls has been prepared and provided separately to the MVC design team. While this report includes the results of preliminary global stability evaluations for retaining walls at the Kennecott railroad bridge, we recommend the responsibility for all design and stability calculations (including global/overall stability and bearing capacity) be assigned to the soil nail wall designer to help ensure a unified and coherent design for the final wall configurations.

Lateral earth pressures applicable to design of retaining structures are discussed in the following section of this report. The design parameters used for the reinforced soil zones of MSE walls should be determined by the Contractor and the Wall Designer by conducting laboratory tests on the specific materials to be used, and the selected parameters and applicable test results should be reviewed by the Geotechnical Engineer. We recommend that the internal friction angle used for the select backfill material in internal stability calculations be no greater than 34 degrees.

Geotechnical recommendations applicable to other wall types, such as concrete cantilever walls, can be provided for specific locations as needed.

6.2.3.4 Lateral Earth Pressures

Lateral earth pressures can generally be calculated using the equation

$$P = \frac{1}{2} \gamma K H^2$$

Where
P = total lateral force on the wall, per linear foot
K = earth pressure coefficient
γ = unit weight of the soil (depends on fill material)
H =height of the wall

The earth pressure coefficient used in designing the walls will depend upon whether the wall is free to move during backfilling operations, or whether the wall is restrained during backfilling. If the wall is free to move away from the soil during backfilling operations, we recommend that an active earth pressure coefficient be used in the above equation to calculate the lateral earth pressures. If the walls are restrained or braced from movement during backfilling (as is generally the case with box culverts and similar structures), we recommend that an at-rest earth pressure coefficient be used to calculate the lateral earth pressures. A passive earth pressure coefficient should be used to calculate the lateral soil resistance where the wall is pushed toward the soil. It should be recognized that the pressures calculated by the above equation are earth pressures only and do not include hydrostatic pressures. Where hydrostatic pressures may exist behind a retaining structure, we recommend that either the wall be designed to resist hydrostatic pressure in addition to the design earth pressures, or that a drainage system be placed behind the wall to prevent the development of hydrostatic pressures.

Lateral earth pressure coefficients and other recommendations for computing lateral earth pressures are included in Appendix D. A general earth pressure coefficient has been provided for calculation of earth pressures where mechanical compaction equipment is expected to be operated near non-yielding walls less than about 8 feet high. This scenario is anticipated during placement of fill around culverts. The residual pressure from compaction equipment can be reduced by limiting the proximity and weight of compacting equipment near culvert walls.

Recommendations based on the Mononobe-Okabe approach for active and passive seismic lateral earth forces are included in Appendix D. For non-yielding walls, recommended equations for calculating the dynamic thrust and dynamic overturning moment associated with the seismic ground motions are also provided in Appendix D.

6.2.3.5 Instrumentation

We intend to provide specific recommendations for geotechnical instrumentation for incorporation into the project drawings as design progresses.

Settlement instruments should also be provided in the areas discussed in Section 6.2.3.1 of this report, where it is necessary to verify that ongoing settlements are small prior to releasing embankments for paving. We further recommend that settlement instruments be installed in other fill areas greater than five feet thick throughout Segment 5, in order to verify that actual settlements do not substantially exceed the estimated magnitudes.

6.2.3.6 Construction Considerations

Based on the groundwater conditions encountered in this segment, occasional dewatering may be required in excavations to control perched water. Ponded and/or perched water could be encountered on cohesive soils in low-lying areas, and redirection of existing streams or drainage ditches may be necessary. The use of sumps and drain trenches is generally most efficient for removing water from areas with clayey foundation soils. Localized perched water will typically be easier to drain, cut off, or redirect than water associated with larger unconfined aquifers.

Designers and construction managers should be aware that ponded surface water could create soft conditions in localized depressions, and flowing surface water could erode unprotected slopes.

In general, the soils within this segment are relatively dense or stiff, and widespread constructability issues related to soft soils are not anticipated. However, soils in localized areas (particularly in low-lying areas saturated by recent precipitation) may be too soft to provide an adequate working surface. Stabilization methods will depend upon conditions encountered. As a minimum, it is recommended that an 8-inch layer of granular borrow be placed at the bottom of excavations in cohesive soils to provide a working platform. Moderately soft areas can be stabilized by over-excavating the foundation footprint to a depth of about 1 foot, placing a geotextile fabric such as Mirafi 500X or equivalent and backfilling with compacted sandy gravel. Very soft areas may be stabilized by tamping cobble rock (preferably angular to subangular) into the subgrade as needed. Where cobbles are used for stabilization, care should be taken to remove excess rock that cannot be tamped into the subgrade, in order to prevent nesting and minimize voids left between cobbles.

Temporary excavations on the project should meet OSHA requirements. Slopes of 1H:1V will generally be appropriate for temporary cuts up to 10 feet deep, and slopes of 1.5H:1V or flatter should be used for temporary cuts 10 to 20 feet deep.

6.2.4 DETENTION BASINS

Eleven borings were initially drilled to provide subsurface information for use in the design of detention ponds in Segment 5. The areas investigated include the following:

- Approx. Sta. 1525+00, east of proposed MVC alignment
- Approx. Sta. 1556+00, slightly east of proposed MVC control line
- Approx. Sta. 1578+00, east of proposed MVC alignment
- Approx. Sta. 1628+00, east of proposed MVC alignment

The detention basin borings encountered a variety of soil types. The permeability values computed from the open-hole, constant-head permeability tests are shown on the boring logs. A summary of the permeability values recorded in each proposed detention basin area is presented in Appendix D of this report.

At the proposed pond areas investigated near Sta. 1525+00 and 1556+00, the soils were predominantly lean clay, silty clay, silt, silty sand, and clayey sand, and the measured permeability values were between 10 and 300 feet per year. At the proposed pond area investigated near Sta. 1578+00, the soils were mostly silty sand and clayey gravel, and the permeability was less than 200 feet per year in the upper 15 feet, and between 10,000 and 20,000 feet per year between 15 and 25 feet. The detention basin borings near Sta. 1628+00 encountered mostly lean clay and silty sand to sand with silt, as well as some gravelly deposits. Permeability values near Sta. 1628+00 ranged from as low as 9 feet per year in the clayey soils to as high as about 28,000 feet per year in the cleaner gravels, and zones identified as sand with silt generally had permeabilities in the range of 5,000 to 20,000 feet per year.

Subsequent to the initial detention basin investigations, five additional detention basin borings were drilled at the approximate locations listed below:

- Borings 10-D5-12, 13, and 13A near Sta. 1587+00
- Borings 10-D5-14 and 15 near Sta. 1558+00

Permeability values estimated below depths of about 18 feet in the 6200 South pond area near Sta. 1587+00 ranged from as low as 3 feet per year in the deeper clayey soils to greater than 13,000 feet per year in the shallower gravelly soils. In Borings 10-D5-14 and 15 near Sta. 1558+00 north of the Kennecott railroad crossing, the estimated permeabilities in the upper 30 feet ranged from a low of 7 feet per year in clayey soils to a high of about 6800 feet per year in the cleaner gravels. At this location, the estimated permeabilities were all less than 50 feet per year below a depth of 10 feet.

7 EARTHWORK

7.1 ROADWAY AND EMBANKMENTS

The findings of the 29 roadway borings completed in Segment 5 are presented on boring logs included in Appendix B of this report. The results of classification tests, moisture-density relationship tests, and California Bearing Ratio (CBR) tests are included in Appendix C. It is our understanding that analysis of this data for pavement design will be conducted by others.

7.2 SITE PREPARATION

Foundation and fill areas should be cleared and grubbed in accordance with the applicable provisions of UDOT Standard Specification 02231. Refer to UDOT Standard Specification 02912 for requirements regarding removal and stockpiling of topsoil.

7.3 FILL PLACEMENT AND COMPACTION

Fill materials should be placed in accordance with UDOT Standard Specification 02056. If A-6 soils are used in embankments (see 7.5 below), we recommend that lift thicknesses be limited to eight inches and that sheeps-foot or tamping type equipment be used for compaction.

7.4 EXCAVATION

Excavation should be conducted in accordance with the applicable requirements of UDOT Standard Specifications 02316, 02317, and 02318.

7.5 RE-USE OF EXCAVATED SOIL MATERIALS

Much of the soil encountered within the project area meets AASHTO soil classification A-4 or better and therefore qualifies as Borrow as described in UDOT Standard Specification 02056. However, this material is often interbedded with and/or overlain by plastic A-6 and A-7 soils.

We recommend that A-7 soils not be used in embankments. In addition, it should be recognized by designers and construction managers that greater effort will be required to moisture-condition, place, and compact A-6 material than is typically needed for A-4 or better soil.

Soil meeting the requirements for UDOT Granular Borrow (AASHTO classification A-1-a) was encountered intermittently throughout Segment 5. It should be noted that the samples subjected to laboratory testing were typically obtained from borings, which limited the maximum particle size of the samples. The gradations of these small samples from the borings are not likely to be representative of the same deposits excavated in bulk.

7.6 CUT AND FILL SLOPES

Permanent earth slopes should be 2H:1V or flatter per UDOT requirements. Permanent slopes as steep as 1.5H:1V may be used where protected by concrete slope paving meeting UDOT standards. Bare slopes will be susceptible to erosion from runoff, and should therefore be protected from erosion until vegetation is established.

7.7 DEWATERING AND SUBDRAINS

The large majority of the subsurface investigations in Segment 5 did not encounter groundwater, and permanent dewatering or subdrains will typically not be necessary. Based on the log for Boring 09-MVC-160, perched groundwater may exist in the vicinity of Sta. 1607+00, at about elevation 4954 feet. Based on roadway cross sections currently available to us, it is anticipated that the pavement section at this location will be located at least three feet above this elevation, and that special provisions to control groundwater will not likely be required. However, conditions encountered during construction may dictate that some type of permanent groundwater control be conducted at this or other locations of perched groundwater.

Roadway and drainage systems should be designed to direct surface water off of and away from the pavement, and to limit percolation into the soils underlying pavements and other flatwork. If it becomes necessary, localized groundwater control should be designed on a case-by-case basis for site specific conditions, and with input from the pavement designer and the geotechnical engineer.

8 CORROSION INVESTIGATIONS

Electro-chemical properties commonly used to evaluate the corrosive characteristics of soils were tested for selected samples obtained from the borings, and the results of these tests are presented on the Summaries of Test Data in Appendix C of this report. These test results can be used to evaluate the need for corrosion protection and/or special concrete mixes to limit deterioration within the design life of project features in contact with the soil. Where steel piles are used as foundations, we recommend that they be designed under the assumption that 1/16 inch of the steel on all surfaces will eventually be lost to corrosion. Pipe class selection for culverts should take into account the electro-chemical test results of soils sampled in the vicinity of the pipe.

In general, the electrochemical test results for samples from Segment 5 are indicative of nonaggressive soils, and Type I cement will generally be acceptable. However, Type II cement offers superior resistance to deterioration, and is preferable for use where concrete will be in contact with soil.

9 MATERIAL SPECIFICATIONS

Materials used for the project should meet AASHTO requirements and the UDOT Standard Specifications. In particular, embankment fill materials should meet Standard Specification 02056. The UDOT Geotechnical Division maintains special provisions governing the selection, design, and construction of retaining walls, as well as special provisions for lightweight fill materials.

10 CLOSURE

We appreciate the opportunity of conducting this geotechnical investigation, and look forward to working with the project team toward the successful completion of the project. We anticipate that our participation will be requested at various stages during the design and construction process, including refinements of foundation designs, preparation of special provisions, and observation of bridge foundation construction.

11 LIMITATIONS

The conclusions and recommendations presented in this report are based upon the results of the field and laboratory tests. It should be recognized that soil materials are inherently heterogeneous and that conditions may exist throughout this site which were not defined during this investigation. If conditions are encountered which appear to be different than those presented in this report, we should be advised in order that appropriate action may be taken.

The information contained in this report is provided for the specific location and purpose of the client named herein and is not intended or suitable for reuse by any other person or entity, whether for the specified use or for any other use. Any such unauthorized reuse by any other party is at that party's sole risk, and RB&G Engineering, Inc. does not accept any liability or responsibility for its use.

12 REFERENCES

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FIGURES

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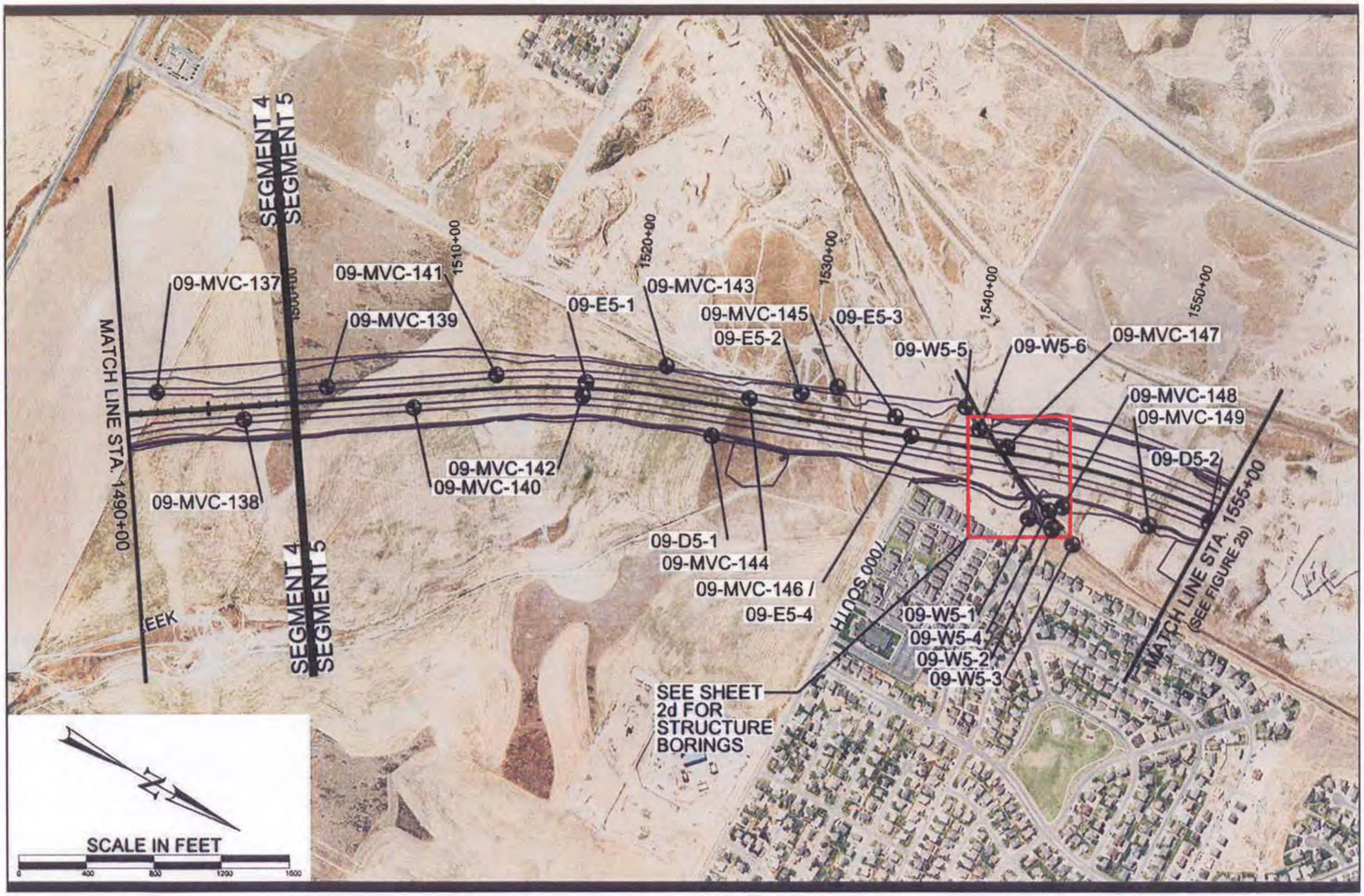
Figure 1 VICINITY MAP

Mountain View Corridor

Salt Lake County, Utah



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ENGINEERING, INC.

Figure 2a Site Plan and Test Hole Locations

Segment 5

Mountain View Corridor

ADDENDUM 1 - OCTOBER 2010

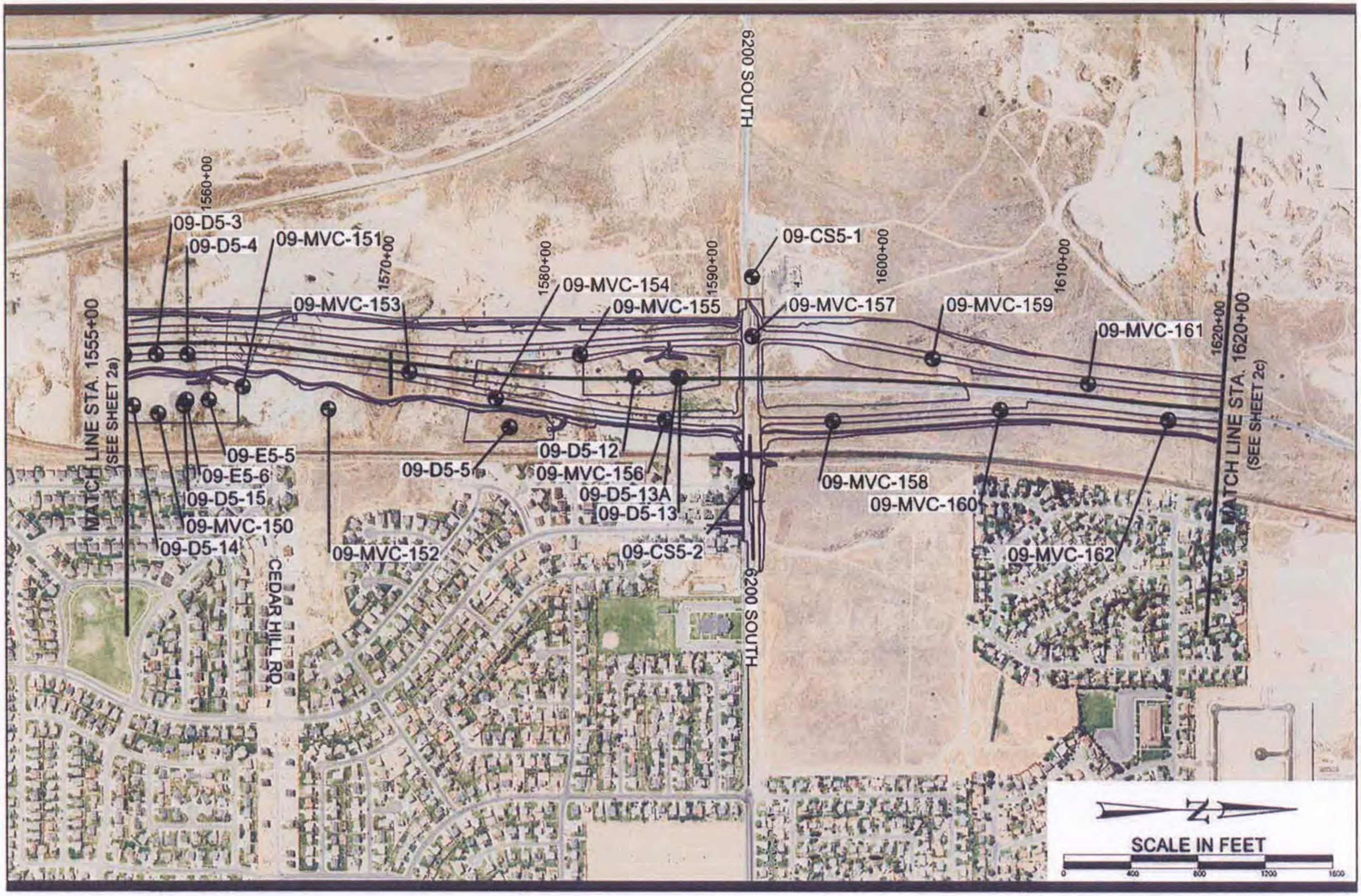

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Figure 2b Site Plan and Test Hole Locations

Segment 5

Mountain View Corridor

ADDENDUM 1 - OCTOBER 2010

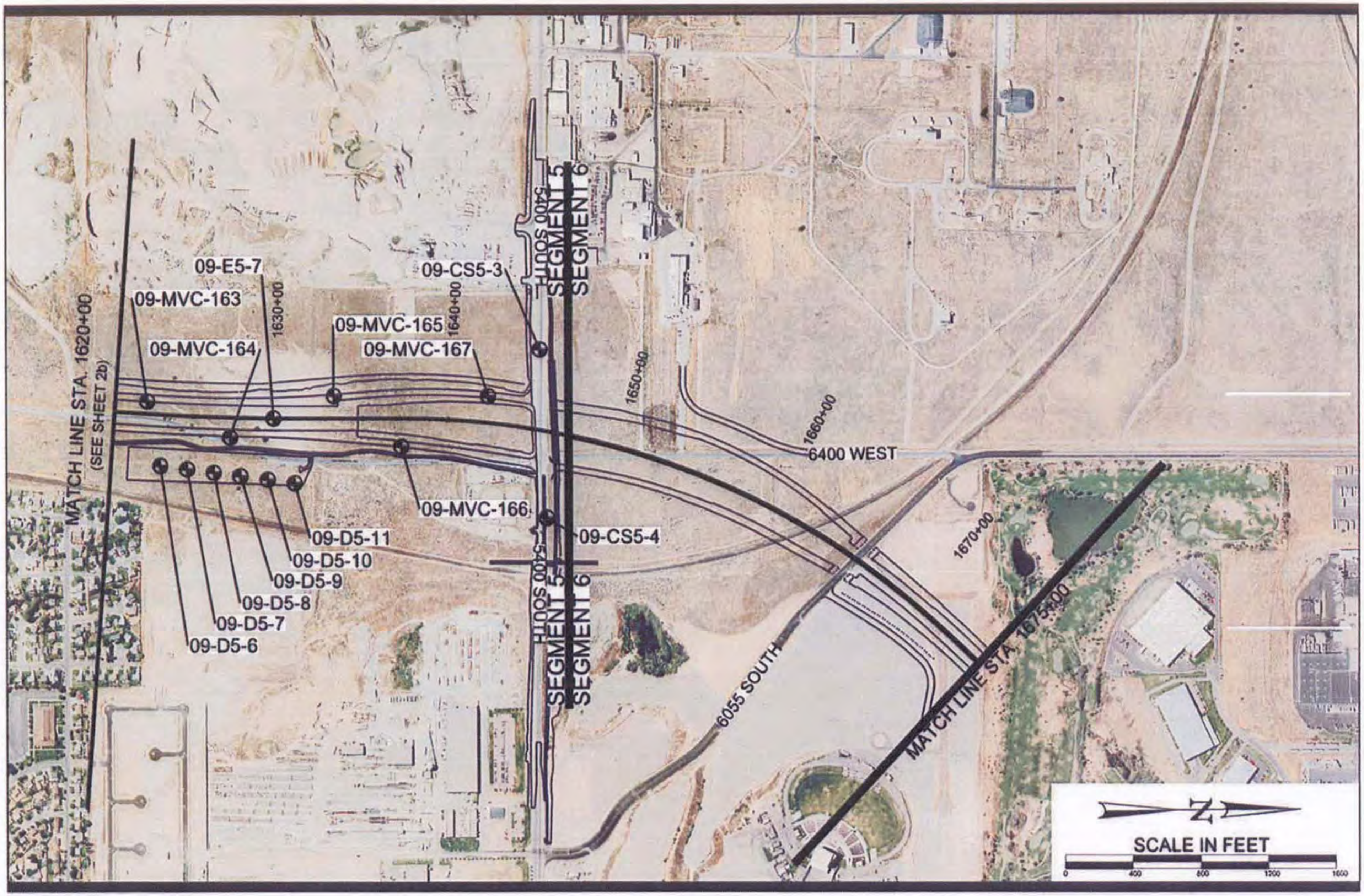

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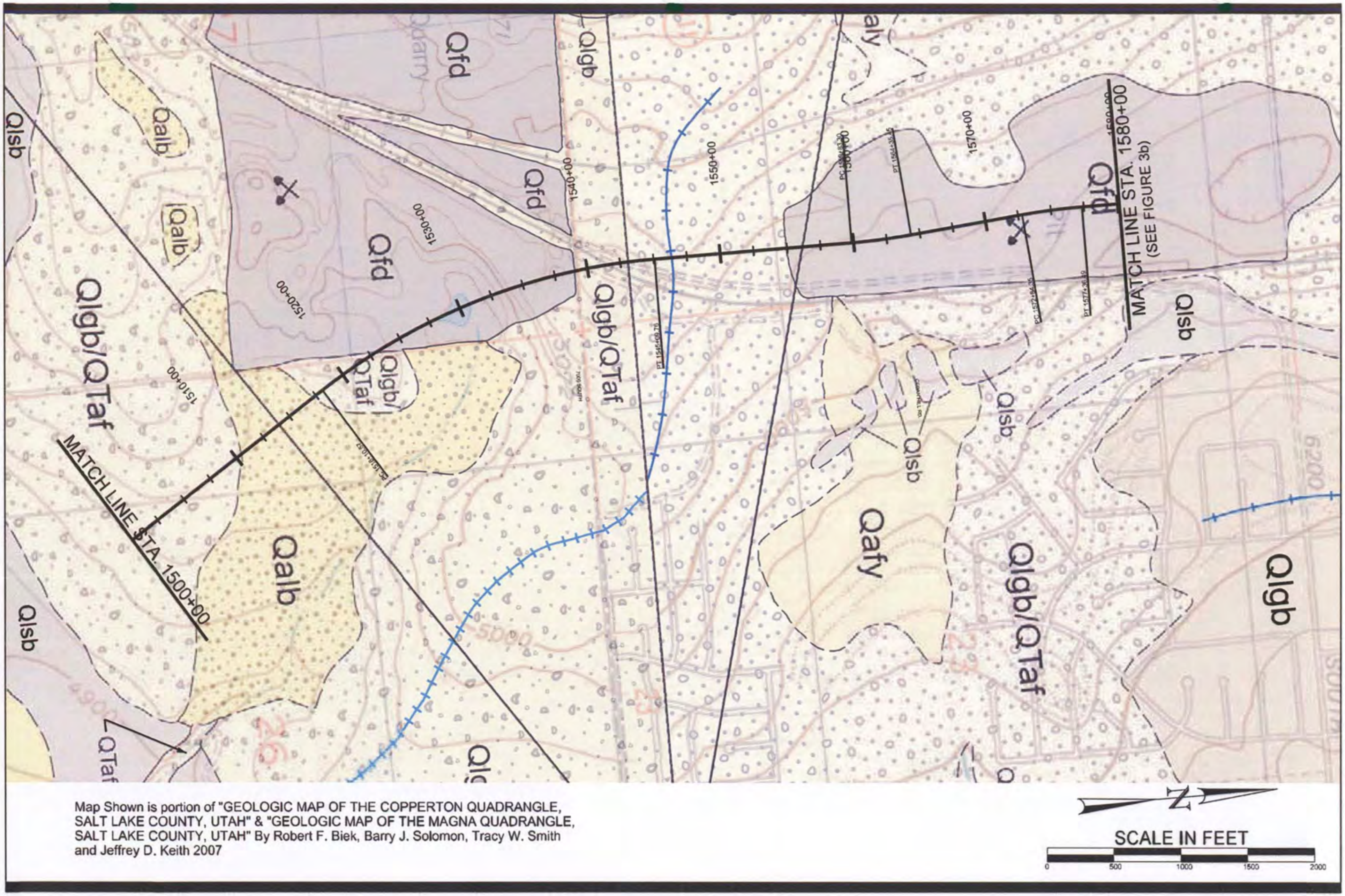
Figure 2c Site Plan and Test Hole Locations

Segment 5

Mountain View Corridor

ADDENDUM 1 - OCTOBER 2010



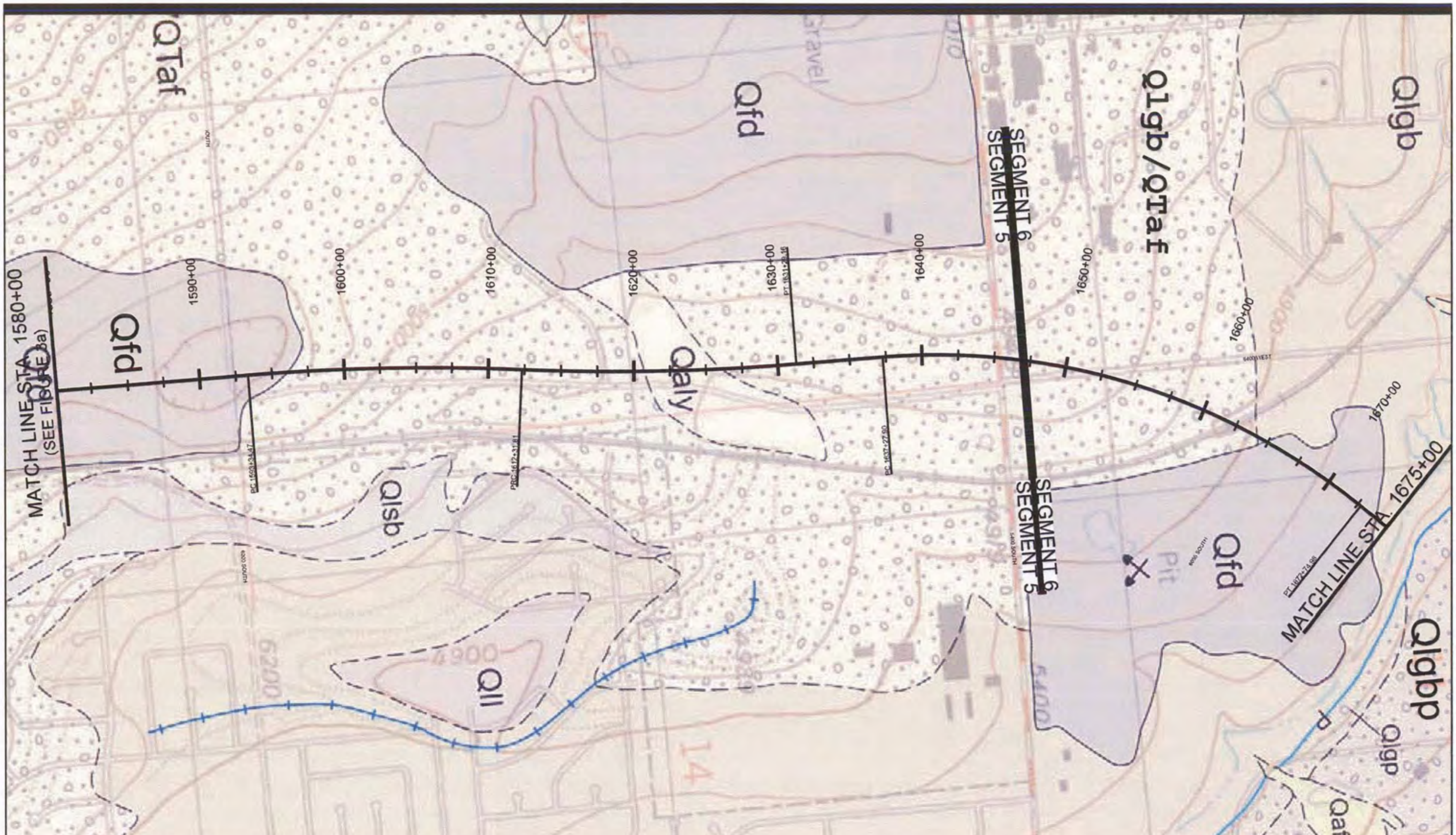
Map Shown is portion of "GEOLOGIC MAP OF THE COPPERTON QUADRANGLE, SALT LAKE COUNTY, UTAH" & "GEOLOGIC MAP OF THE MAGNA QUADRANGLE, SALT LAKE COUNTY, UTAH" By Robert F. Biek, Barry J. Solomon, Tracy W. Smith and Jeffrey D. Keith 2007

RB&G ENGINEERING, INC.

Figure 3a Geologic Map

Segment 5

Mountain View Corridor



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N

SCALE IN FEET

0 500 1000 1500 2000

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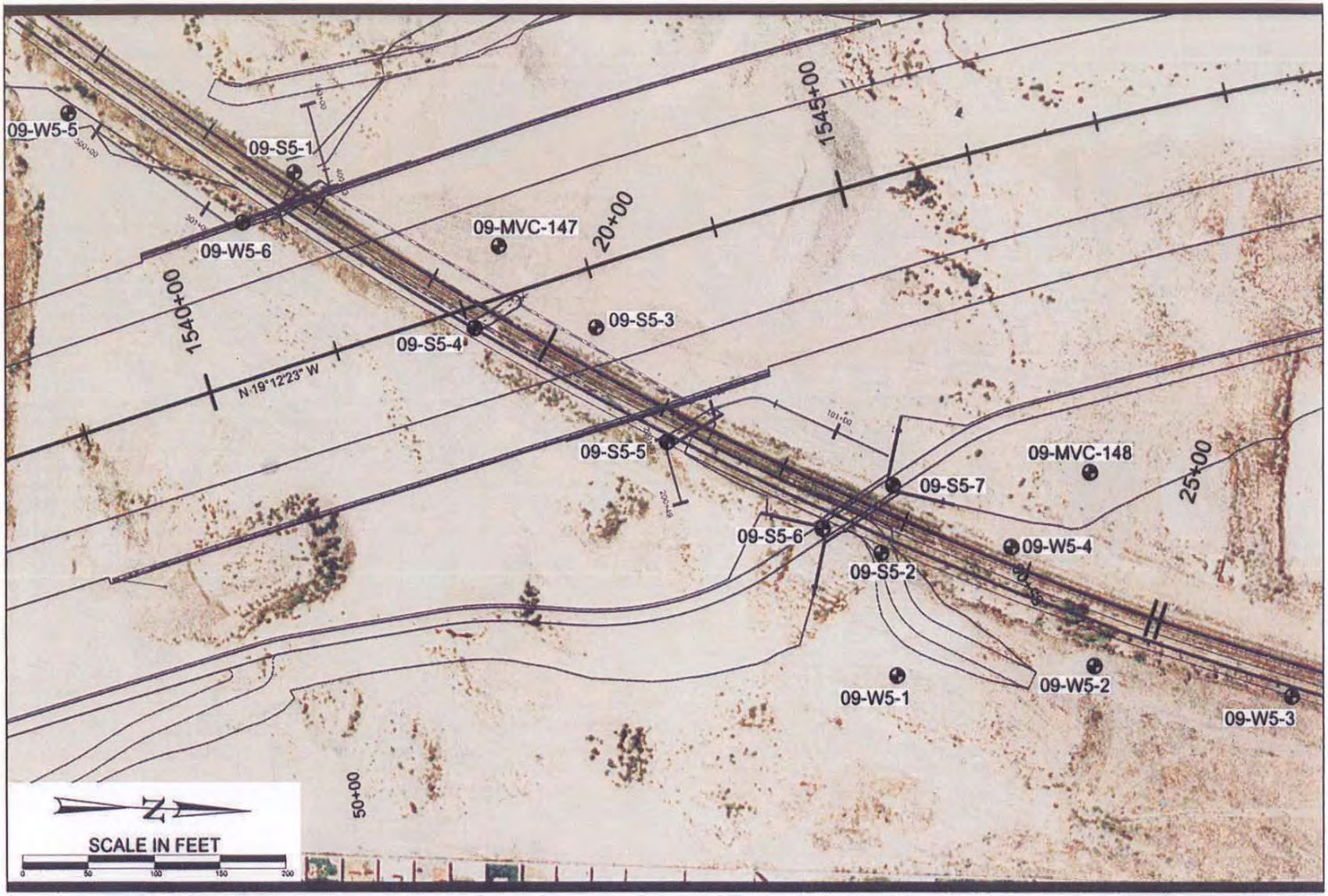
Figure 3b Geologic Map

Segment 5

Mountain View Corridor



RB&G ENGINEERING, INC.

Figure 2d Site Plan and Test Hole Locations

Segment 5

Mountain View Corridor

ADDENDUM 1 - OCTOBER 2010

Qal_1 = Stream deposits (Holocene) - Moderately to well-sorted sand, silt, clay, and pebble to boulder gravel in river channels and flood plains; locally includes small alluvial-fan and colluvial deposits, and minor terraces up to 10 feet (3 m) above current base level; mapped along the Jordan River north of Jordan Narrows; probably less than 30 feet (9 m) thick.

Qaly = Young alluvial deposits (Holocene to Upper Pleistocene) - Moderately sorted sand, silt, clay, and pebble to boulder gravel deposited in stream channels and flood plains; incised by active stream channels, and locally include small alluvial-fan and colluvial deposits; equivalent to modern stream deposits (Qal_1) and older, post-Bonneville stream deposits that are undifferentiated because units are complexly overlapping; probably less than 20 feet (6 m) thick.

Qalb = Alluvial deposits related to the Bonneville (transgressive) phase of the Bonneville lake cycle (upper Pleistocene) – Moderately sorted sand, silt, and pebble to boulder gravel deposited by streams graded to shorelines of the transgressive phase of Lake Bonneville; incised by active streams; mapped east of Harkers Canyon, Clay Hollow and in small, unnamed drainages south of Bingham Creek; about 20 feet (6 m) thick.

Qll = Lagoon-fill deposits (upper Pleistocene) - Silt and clay, with minor fine-grained sand and pebbles; the unit typically underlies level, grass covered fields in closed depressions behind Lake Bonneville barrier beaches;...maximum thickness about 20 feet (6 m).

Qaf_1 = Modern alluvial-fan deposits (holocene) - Poorly to moderately sorted, weakly to non-stratified, clay- to boulder-size sediment deposited by debris at the mouths of active drainages; upper parts typically characterized by abundant boulders and debris-flow levees that radiate away from the apex of the fan. equivalent to the younger part of Qafy, but differentiated because they form smaller, isolated fans; generally less than 30 feet (9 m) thick.

Qafy = Younger undifferentiated alluvial-fan deposits (Holocene to Upper Pleistocene) - Poorly to moderately sorted, weakly to non-stratified, clay- to boulder-size sediment deposted principally by debris flows, debris floods, and streams; equivalent to modern (Qaf_1), level-2 alluvial-fan deposits (Qaf_2), and level-3 alluvial-fan deposits (Qaf_3), but undifferentiated because units are complexly overlapping or too small to show separately; commonly obscures Lake Bonneville shorelines; upper parts of fans are locally deeply incised; thickness unknown, but likely up to several tens of feet.

Qafo = Older alluvial-fan deposits (upper Pleistocene) - Similar to younger undifferentiated alluvial-fan deposits (Qafy), but forms deeply dissected alluvial apron truncated by, and thus predating, the Bonneville shoreline; upper parts of fans locally receive sediment from minor washes; thickness unknown, but likely up to several tens of feet.

Qfd = Disturbed land (Historical) - Land disturbed by sand and gravel and aggregate operations; only the larger operations are mapped and their outlines are based on aerial photographs taken in May 2002; land within these areas contains a complex, rapidly changing mix of cuts and fills as well as excellent exposures of Bonneville and pre-Bonneville and Paleozoic bedrock.

Qlgb = Lacustrine gravel and sand related to the Bonneville (transgressive) phase of the Bonneville lake cycle (upper Pleistocene) - Moderately to well sorted, moderately to well-rounded, clast-supported, pebble to cobble and rare boulder gravel and pebbly sand deposited between the Bonneville and Provo shorelines; thin to thick bedded; typically interbedded with, or laterally gradational to, lacustrine sand and silt; gastropods locally common in sandy lenses; locally partly cemented with calcium carbonate; forms a beach intermittently along the Bonneville shoreline near the base of the Oquirh Mountains, small barrier beaches and spits on deltaic deposits east of Harkers Canyon, and more extensive deposits upslope from the Provo shoreline east of Harkers Canyon; the Bonneville beach is best developed on the southern edge of Little Valley west of Magna where Currey (1982) measured the altitude of the Bonneville shoreline at about 5217 feet (1590 m)...as much as 90 feet (30 m) thick at Little Valley, but typically less than 60 feet (20 m) thick elsewhere.

Qlsp = Lacustrine sand and silt related to the Provo (regressive) phase of the Bonneville lake cycle (upper Pleistocene) - Fine- to coarse-grained lacustrine sand and silt with minor gravel; typically thick bedded and well sorted; gastropods locally common; forms barrier beaches along the Gilbert shoreline in the northeast part of the Magna quadrangle; as much as 10 feet (3 m) thick.

Qlgb/QTaf = Lacustrine gravel and sand related to the Bonneville (transgressive) phase of the Bonneville lake cycle over oldest alluvial-fan deposits (upper Pleistocene) — Oldest alluvial-fan deposits partly concealed by a discontinuous veneer of sediment reworked by Lake Bonneville wave action; closely spaced, well-preserved shorelines are common; mapped on piedmont slopes between drainages from Barneys and Harkers Canyons, where irregular landscape below the Bonneville shoreline reflects buried topography of fan deposits; surficial deposits are generally less than 10 feet (3 m) thick.

QTaf = Oldest alluvial-fan deposits (middle Pleistocene to upper Miocene[?]) - Poorly to moderately well-sorted, weakly to non-stratified sand, silt, and pebble to boulder gravel deposited principally by debris flows; thin to thick beds of white to light gray tuff and tuffaceous sediments near the base of the unit indicate a gradational contact with the underlying Jordan Narrows unit of the Tertiary Salt Lake Formation (Tsl), which is consistently overlain by the oldest alluvial-fan deposits; mapped as part of the informally named Harkers fanglomerate by Slentz (1955);...a late to middle age for the youngest part of the unit is suggested by development of a stage IV calcic paleosol on fan surfaces, characterized by an indurated matrix cemented with laminated calcium carbonate; exposed thickness as much as 350 feet (100 m).

Map Shown is portion of "GEOLOGIC MAP OF THE COPPERTON QUADRANGLE, SALT LAKE COUNTY, UTAH" & "GEOLOGIC MAP OF THE MAGNA QUADRANGLE, SALT LAKE COUNTY, UTAH" By Robert F. Biek, Barry J. Solomon, Tracy W. Smith and Jeffrey D. Keith 2007

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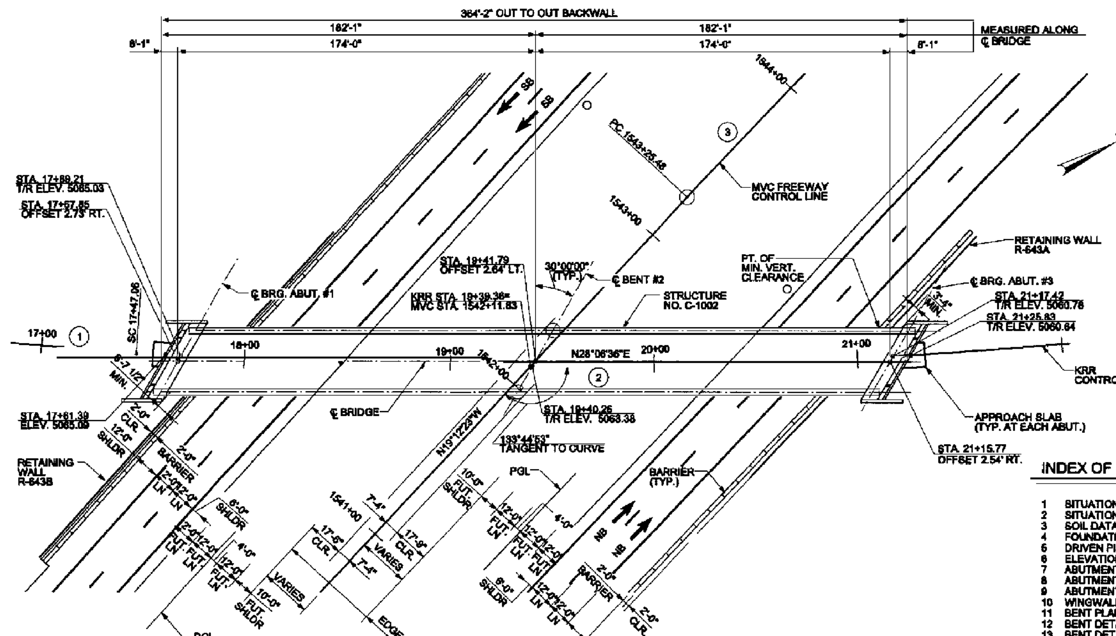
Figure 3c Geologic Names of Selected Map Units

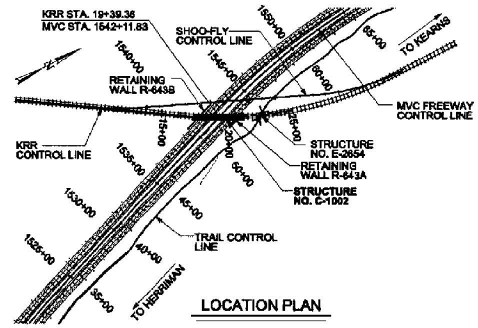
Segment 5

Mountain View Corridor

APPENDIX A



PLAN



LOCATION PLAN

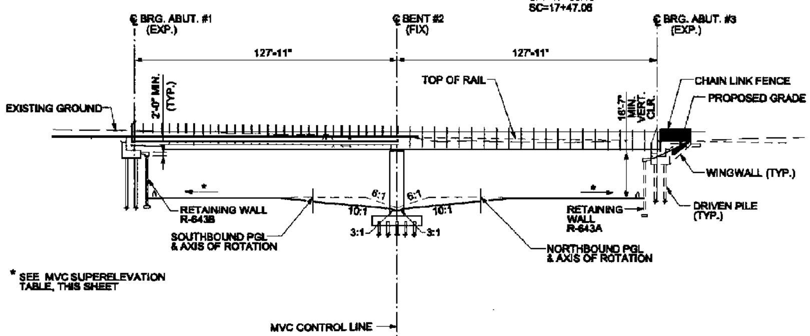
NOTES

1. ALL ABUTMENTS AND BENT ARE PARALLEL TO BRG. N 31°53'24" W
2. NO KNOWN UTILITIES IN THIS AREA.

① SP-RRB-01
SPIRAL CURVE DATA
Δ = 1°24'00"
L = 140.000'
K=70.000'
LT=93.336'
ST=46.669'
TS=16+07.06
SPI=17+00.40
SC=17+47.06

② RRB-01
CURVE DATA
Δ = 15°12'17"
R = 2864.930'
T = 382.380'
L = 760.268'
SC=17+47.06
PI=2129.44

③ MVC-09
CURVE DATA
Δ = 26°33'40"
R = 4700.000'
T = 1109.349'
L = 2178.821'
PC=1543+25.48
PI=1554+34.826



* SEE MVC SUPERELEVATION TABLE, THIS SHEET

ELEVATION

(NORMAL TO MVC FREEWAY MAINLINE)

BRIDGE LOAD RATING

TYPE	E-80 RATING	E-80 LOCATION
NORMAL	E89.1	AT 69.6', F, AREMA LOAD CASE I
MAXIMUM	E129.6	AT 69.6', F, AREMA LOAD CASE I

F - DENOTES RATING CONTROLLED BY FLEXURE
S - DENOTES RATING CONTROLLED BY SHEAR
My AT 69.6' = 34,212.8 FT-KIPS
Vy AT 174.0' = 3456.2 KIPS

MVC SUPERELEVATION DATA

STATION	CROSS SLOPE NB	CROSS SLOPE SB
1526+01.40	-2.00%	2.00%
1539+59.28	-2.00%	-2.00%
1541+17.28	-2.00%	0.00%
1542+75.28	-2.00%	2.00%
1544+64.28	-4.40%	4.40%

INDEX OF SHEETS

GENERAL NOTES:

1. USE COATED DEFORMED CARBON REINFORCING STEEL BARS CONFORMING TO AASHTO M284 OR M111 AND AASHTO M31 GRADE 60, RESPECTIVELY (EXCEPT WHERE NOTED OTHERWISE).
2. USE STRUCTURAL STEEL CONFORMING TO AASHTO M270 GRADE 50W EXCEPT WHERE NOTED OTHERWISE.
3. CHAMFER ALL EXPOSED CONCRETE CORNERS 3/4 " EXCEPT WHERE NOTED OTHERWISE.
4. PROVIDE 2" CONCRETE COVER TO REINFORCING STEEL EXCEPT WHERE NOTED OTHERWISE.
5. USE CLASS AA (AE) CAST-IN-PLACE CONCRETE EXCEPT WHERE NOTED OTHERWISE.
6. UTILITY LOCATIONS TO BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION, PROTECT EXISTING UTILITIES IN PLACE UNLESS NOTED OTHERWISE.
7. REFER TO AESTHETICS PLANS FOR AESTHETICS DETAILS.
8. MATERIALS, CONSTRUCTION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH UTAH DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
9. COAT OR GALVANIZE ALL MATERIALS PLACED IN STRUCTURAL CONCRETE, UNLESS NOTED OTHERWISE.
10. DO NOT SCALE DRAWINGS.

DESIGN DATA

COOPER E-80 RAILROAD LOADING IN ACCORDANCE WITH AREMA "MANUAL FOR RAILWAY ENGINEERING", 2009. ADDITIONAL SEISMIC DETAILING AND DESIGN IN ACCORDANCE WITH AASHTO GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN, 1ST EDITION 2009 WITH 2010 INTERIMS

CAST-IN-PLACE CONCRETE: f'c = 4 KSI; CLASS AA (AE)
n = 8; fy (REINF.) = 60 KSI

STRUCTURAL STEEL: Fy = 50,000 psi

DESIGN SPEED: 40 MPH RAILROAD; 75 MPH MVC; 55 MPH FRONTAGE ROADS

SEISMIC: IN ACCORDANCE WITH AREMA:

	PGA	AREMA RETURN PERIOD
LEVEL 1	0.08	108
LEVEL 2	0.22	475
LEVEL 3	0.42	2475
SOIL TYPE 3, DAMPING = 10%		

IN ACCORDANCE WITH AASHTO GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN:

7% IN 75 YR. DESIGN EVENT; PGA=0.30g; Ss=0.75g; S1=0.25g; SITE CLASS D
SDC D; ESSENTIAL

QUANTITIES

ITEM	EST	UNIT	AS CONSTR
GRANULAR BACKFILL BORROW (PLAN QUANTITY)	245.3	CU YD	
PILE DRIVING EQUIPMENT	1	LUMP	
DRIVEN PILES HP 14 INCH	6483	FT	
8" HALF-ROUND CORRUGATED METAL DRAIN PIPE	738	FT	
6 FT. CHAIN LINK FENCE, TYPE III	81	FT	
REINFORCING STEEL-COATED (PLAN QUANTITY)	205730	LB	
STRUCTURAL CONCRETE (PLAN QUANTITY)	656.3	CU YD	
STRUCTURAL STEEL (PLAN QUANTITY)	2061358	LB	
POT BEARING FIXED	2	EACH	
POT BEARING EXPANSION	8	EACH	
RAILROAD DECK WATERPROOFING	1119.4	SQ YD	
DAMPPROOFING	140	SQ YD	

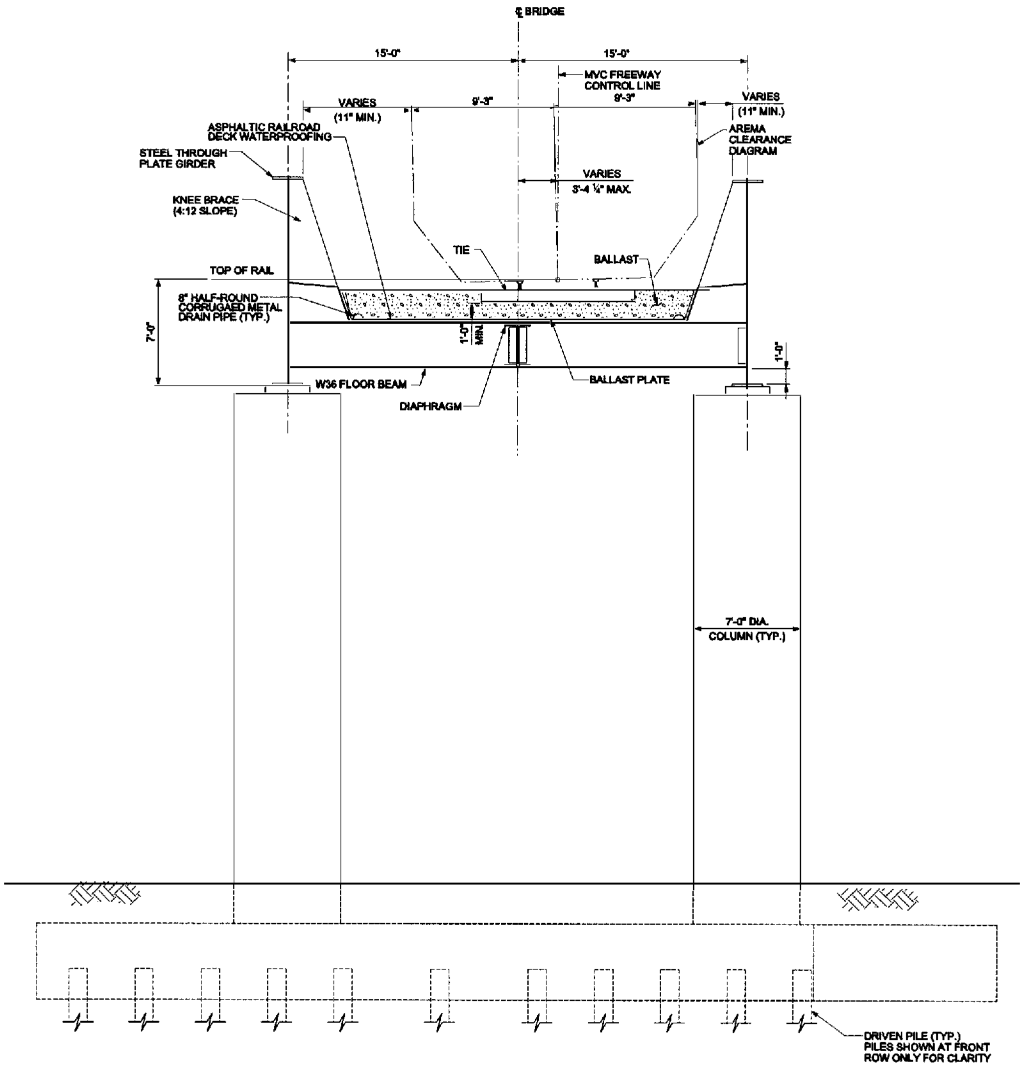
8203 FOR FINAL REVIEW
PRELIMINARY NOT FOR CONSTRUCTION

UTAH DEPARTMENT OF TRANSPORTATION
STRUCTURES DIVISION

MVC; REDWOOD ROAD TO 5400 SOUTH (4-5)
KENNECOTT RR OVER MVC
SITUATION & LAYOUT 1

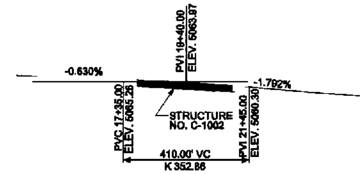
PIN 8203
S-0182(10)0

SALT LAKE
COUNTY
C-1002
DRG. NO.
SHT. 1 OF 34



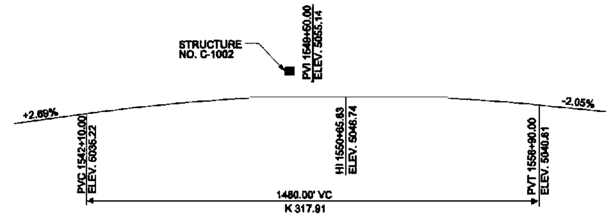
SECTION THROUGH STRUCTURE

(NORMAL TO SUPERSTRUCTURE)



RAILROAD PROFILE

(AT TOP OF RAIL)



MVC MAINLINE ROAD PROFILE

(AT PROFILE GRADE LINE)

8203 FOR FINAL REVIEW

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN DWH 07/15/10 CHECK CMM 09/23/10

DRAWN EF 07/15/10 CHECK CMM 09/23/10

QUANT. LJB 09/23/10 CHECK CMM 09/23/10

UTAH DEPARTMENT OF TRANSPORTATION

STRUCTURES DIVISION

MVC; REDWOOD ROAD TO 5400 SOUTH (4-5)

KENNECOTT RR OVER MVC

SITUATION & LAYOUT 2

PROJECT NUMBER S-0182(10)0

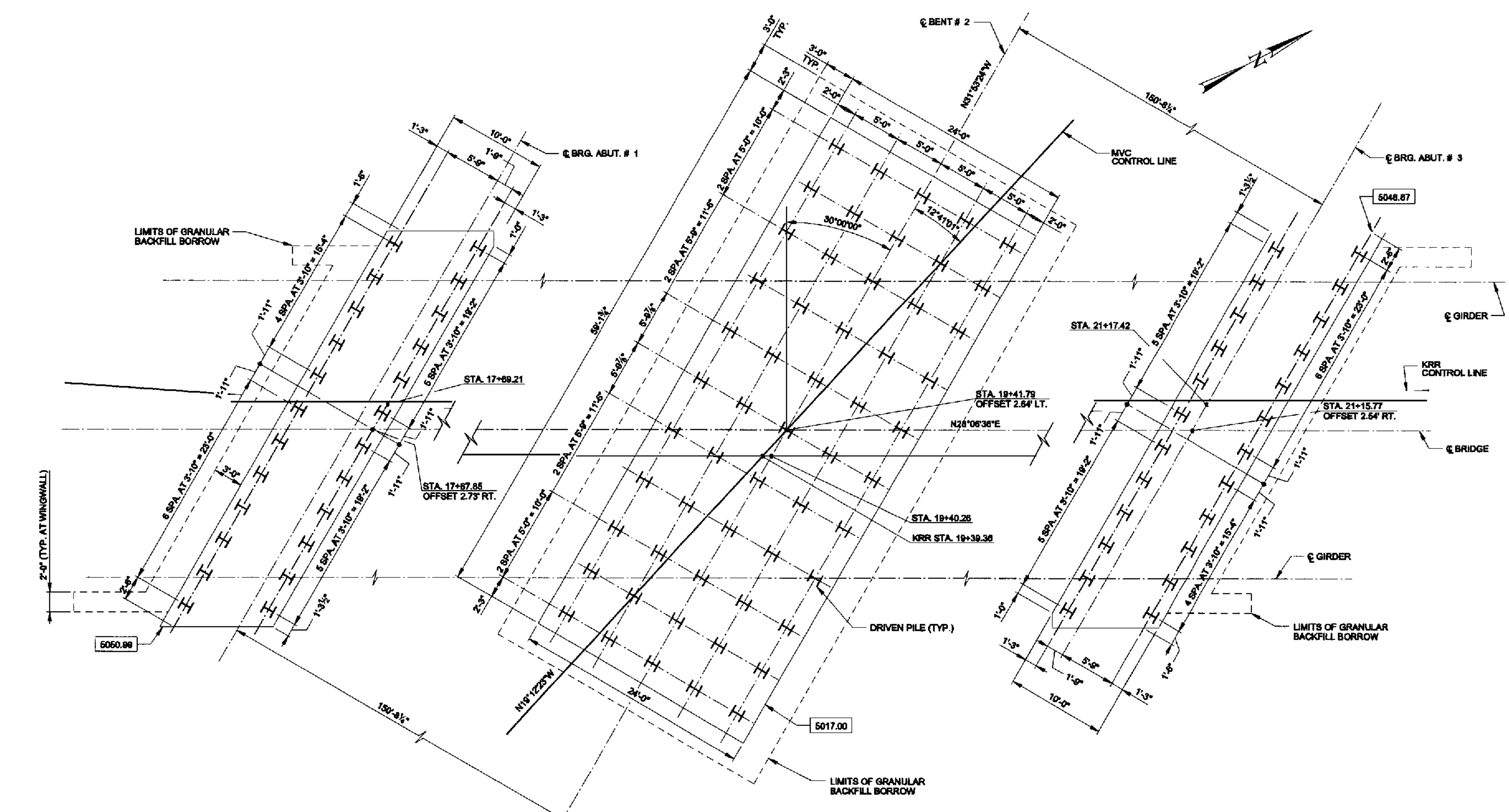
PIN 8203

SALT LAKE COUNTY

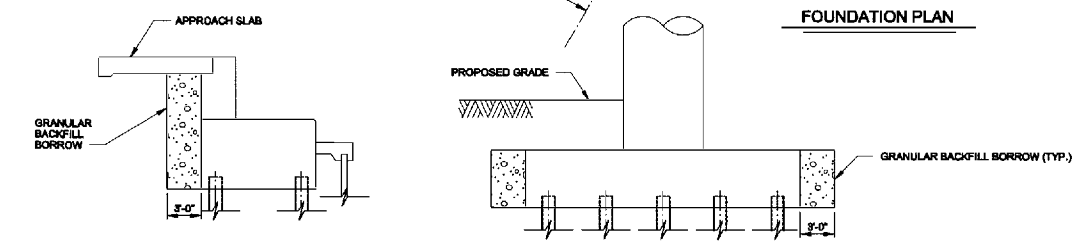
C-1002

DRG. NO.

SHT. 2 OF 34



FOUNDATION PLAN



AT ABUTMENT

AT BENT

GRANULAR BACKFILL BORROW PAY LIMITS

NOTES

1. BOTTOMS OF PILE CAPS ARE LEVEL. ELEVATIONS ARE ENCLOSED IN RECTANGLES E.G. $\boxed{5018.00}$
2. ALL CONSTRUCTION EQUIPMENT, MATERIALS, BRIDGE COMPONENTS MUST BE OUTSIDE OF THE AREMA CLEARANCE LIMITS WHEN TRACK IS LIVE.
3. ALL PILES ARE HP14x89.
4. SEE SHEET 5 FOR DRIVEN PILE DETAILS.

8203 FOR FINAL REVIEW

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN CMM 09/15/10 CHECK DWH 09/23/10
DRAWN EF 09/15/10 CHECK CMM 09/23/10
QUANT. CMM 09/23/10 CHECK DWH 09/23/10

UTAH DEPARTMENT OF TRANSPORTATION

STRUCTURES DIVISION

MVC; REDWOOD ROAD TO 5400 SOUTH (4-5)

KENNECOTT RR OVER MVC

FOUNDATION PLAN

PIN 8203

PROJECT NUMBER S-0182(10)0

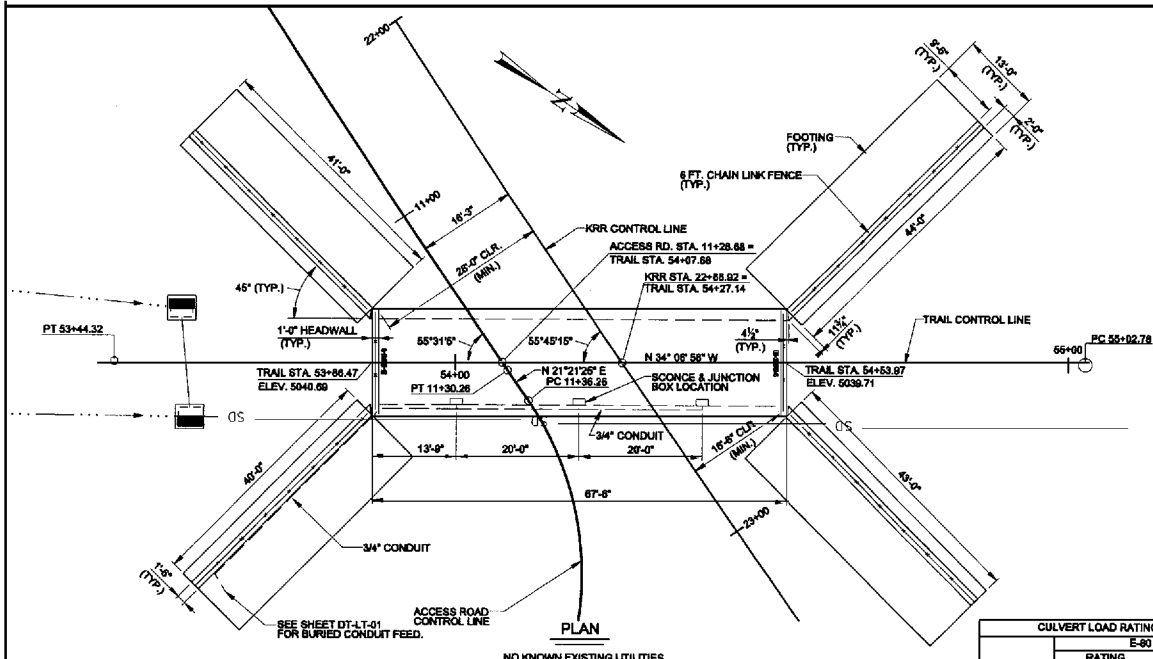
SALT LAKE COUNTY

C-1002

DRG. NO.

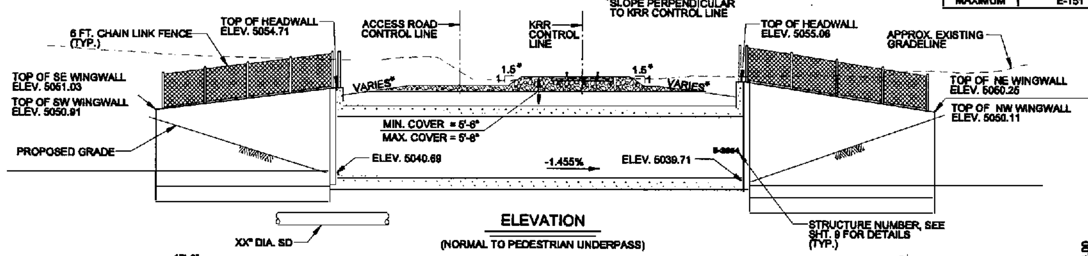
SHT. 4 OF 34

GEOTECH ADDENDUM 1 - OCTOBER 2010 - FOR INFORMATION ONLY



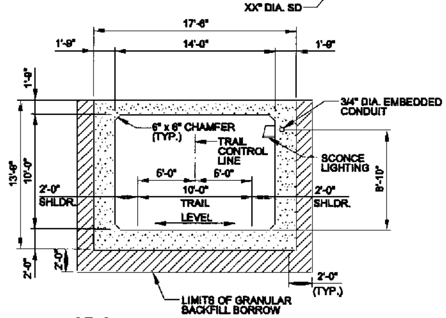
PLAN

NO KNOWN EXISTING UTILITIES

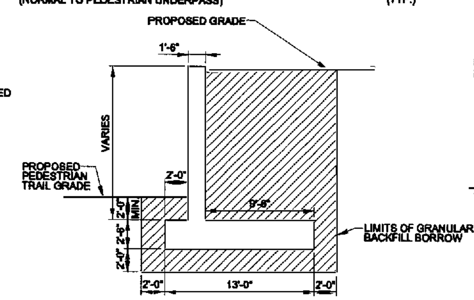


ELEVATION

(NORMAL TO PEDESTRIAN UNDERPASS)

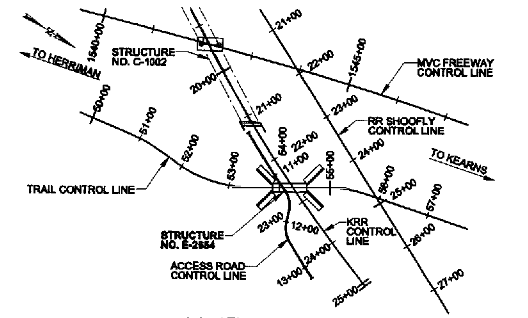


SECTION THROUGH STRUCTURE



SECTION THROUGH WINGWALL

CULVERT LOAD RATING		
	E-80	
	RATING	LOCATION
NORMAL	E-80	TOP CORNER
MAXIMUM	E-151	TOP CORNER



LOCATION PLAN

INDEX OF SHEETS

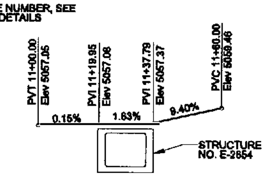
GENERAL NOTES:

1. USE COATED DEFORMED CARBON-REINFORCING STEEL BARS CONFORMING TO AASHTO M284 OR M111 AND AASHTO M31 GRADE 60, RESPECTIVELY (EXCEPT WHERE NOTED OTHERWISE).
2. CHAMFER ALL EXPOSED CONCRETE CORNERS 3/4 " EXCEPT WHERE NOTED OTHERWISE.
3. PROVIDE 2" CONCRETE COVER TO REINFORCING STEEL EXCEPT WHERE NOTED OTHERWISE.
4. USE CLASS AA (AE) CAST-IN-PLACE CONCRETE EXCEPT WHERE NOTED OTHERWISE.
5. UTILITY LOCATIONS TO BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION, PROTECT EXISTING UTILITIES IN PLACE UNLESS NOTED OTHERWISE.
6. REFER TO AESTHETICS PLANS FOR AESTHETICS DETAILS.
7. MATERIALS, CONSTRUCTION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH UTAH DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
8. CONTRACTOR MAY SUBSTITUTE A PRECAST BOX CULVERT PROVIDING THE SAME OPENING AND LOAD CAPACITY. PROVIDE PRECAST BOX CULVERT PER UDOT STANDARD SPECIFICATION 02645.
9. COAT ALL EXPOSED CONCRETE SURFACES WITH GRAFFITI SEALANT.
10. COAT OR GALVANIZE ALL METALLIC HARDWARE EMBEDDED IN CONCRETE.
11. DO NOT SCALE DRAWINGS.

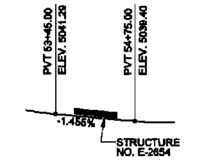
DESIGN DATA

COOPER E-80 RAILROAD LOADING IN ACCORDANCE WITH AREMA "MANUAL FOR RAILWAY ENGINEERING", 2009.

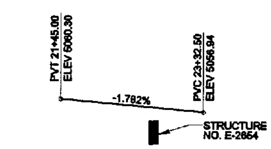
CAST-IN-PLACE CONCRETE: f'c = 4 KSI; CLASS AA (AE)
n = 8; fy (REINF.) = 60 KSI



ACCESS ROAD PROFILE



TRAIL PROFILE



KRR PROFILE

QUANTITIES			
ITEM	EST	UNIT	AS CONSTR
GRANULAR BACKFILL BORROW (PLAN QUANTITY)	1481	CU YD	
REINFORCEMENT STEEL - COATED	73925	LB	
STRUCTURAL CONCRETE (PLAN QUANTITY)	1225	CU YD	
6 FT. CHAIN LINK FENCE, TYPE TB	203	LF	
DAMPPROOFING	338	SQ YD	
STAINED CONCRETE SEALANT; COLOR CODE =	0	SQ YD	
ELECTRICAL WORK BRIDGES	1	LUMP	

8203 PRELIMINARY - NOT FOR CONSTRUCTION
FINAL REVIEW

DESIGN DWM 09/10 CHECK JKG 09/10
DRAWN SHC 09/10 CHECK DWM 09/10
QUANT. DWM 09/10 CHECK JKG 09/10

UTAH DEPARTMENT OF TRANSPORTATION
STRUCTURES DIVISION

MVC; REDWOOD ROAD TO 5400 SOUTH (1-3)
KENNECOTT RAILROAD PEDESTRIAN UNDERPASS
SITUATION & LAYOUT

PIN 8202

PROJECT NUMBER S-0182(9)0

SALT LAKE
COUNTY

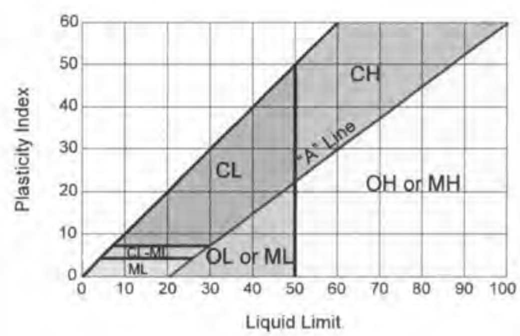
E-2654
DRG. NO.

SHT. 1 OF 9

APPENDIX B

Unified Soil Classification System

Major Divisions			Group Symbols		Typical Names	Laboratory Classification Criteria		
COARSE-GRAINED SOILS *more than half of material is larger than No. 200 sieve*	**Gravels** *more than half of coarse fraction is larger than No. 4 sieve size*	**Clean Gravels** *little or no fines*	GW		Well graded gravels, gravel-sand mixtures, little or no fines	*For laboratory classification of coarse-grained soils*	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines	Determine percentage of gravel and sand from grain-size curve.	Not meeting all gradation requirements for GW	
		Gravels With Fines *appreciable amount of fines*	GM*	d	Silty gravels, poorly graded gravel-sand-silt mixtures	Depending on percentage of fines (*fraction smaller than No. 200 sieve size*), coarse-grained soils are classified as follows:	Atterberg limits below "A" line, or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring uses of dual symbols
				u				
			GC		Clayey gravels, poorly graded gravel-sand-clay mixtures		Atterberg limits above "A" line, or PI greater	
	Sands *more than half of coarse fraction is smaller than No. 4 sieve size*	**Clean Sands** *little or no fines*	SW		Well graded sands, gravelly sands, little or no fines	**Less than 5%** GW, GP, SW, SP	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			SP		Poorly graded sands, gravelly sands, little or no fines	**More than 12%** GM, GC, SM, SC	Not meeting all gradation requirements for SW	
		Sands with Fines *appreciable amount of fines*	SM*	d	Silty sands, poorly graded sand-silt mixtures	**5% to 12%** Borderline cases requiring use of dual symbols**	Atterberg limits below "A" line, or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring uses of dual symbols
				u				
			SC		Clayey sands, poorly graded sand-clay mixtures		Atterberg limits above "A" line, or PI greater	
FINE-GRAINED SOILS *more than half of material is smaller than No. 200 sieve*	**Silts and Clays** *liquid limit is less than 50*		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	*For laboratory classification of fine-grained soils*		
			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			
	Silts and Clays *liquid limit is greater than 50*		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, organic silts			
HIGHLY ORGANIC SOILS			Pt		Peat and other highly organic soils			



Plasticity Chart

*Division of GM and SM groups into subdivisions of d and u for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when liquid limit is 28 or less and the PI is 6 or less, the suffix u used when liquid limit is greater than 28.

***Borderline classification*: Soils possessing characteristics of two groups are designated by combinations of group symbols. (For example GW-GC, well graded gravel-sand mixture with clay biner.)

DRILL HOLE LOG

BORING NO. 09-S5-1

SHEET 1 OF 3

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER: 200901.200
LOCATION: STA. 1541+09, 134' LT. / N:398,502 E:489,357
DATE STARTED: 8/20/09
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 55' / MUD ROTARY
DATE COMPLETED: 8/21/09
DRILLER: T. KERN
GROUND ELEVATION: 5061.9'
DEPTH TO WATER - INITIAL: ∇ 35.0' **AFTER 24 HOURS:** ▼ DRY' 8/28/09
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
5060		18	4,25,17,(88)	ML	brown to dk. brown, dry to slightly moist, very dense	SANDY SILT								
				CL-ML	lt. brown, moist	SILTY CLAY W/SAND								
5055	5	15	Pushed	SM (A-2-4(0))	brown, moist	SILTY SAND very fine grained	97.0	19.0		NP	0	83	17	CT Chem.
		14	5,5,5,(21)	SM	brown, moist, med. dense									
5050	10	11	Pushed	ML (A-4(0))	brown, very moist	SILT W/SAND	86.9	30.0		NP	0	18	82	UU
5045	15	16	3,5,5,(14)	ML	brown, moist, med. dense									
5040	20	12	Pushed 0.28	CL-ML (A-4(4))	brown, very moist, firm	SILTY CLAY W/SAND	87.2	32.7	27	6	0	15	85	CT UC
5035	25	17	2,3,3,(7) 0.23	CL-ML	brown, very moist, soft									
5030	30	18	Pushed 0.59	ML (A-4(0))	brown, moist	SANDY SILT	101.1	23.3		NP	6	42	52	UU
				CL-ML	brown, moist, stiff	SILTY CLAY W/SAND								
5025	35	13	11,12,13,(22)	GP-GM	gray-brown, very moist, loose	GRAVEL W/SILT & SAND possible cobbles								
5020	40	12	55,61,50/5"	GP-GM (A-1-a(0))	gray-brown, moist, very dense			9.3		NP	55	36	9	
5015	45	5	60/5"	GP-GM	gray-brown, moist, very dense									

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) Blow Count per 6"; $(N_1)_{60}$ Value; 0.45 Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-S5-1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1541+09, 134' LT. / N:398,502 E:489,357
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 55' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ 35.0' **AFTER 24 HOURS:** ▼ DRY' 8/28/09

PROJECT NUMBER: 200901.200
DATE STARTED: 8/20/09
DATE COMPLETED: 8/21/09
GROUND ELEVATION: 5061.9'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
5010		Disturbed	11	21,32,44,(56)	GP-GM	gray-brown, moist, dense	GRAVEL W/SILT & SAND possible cobbles								
5005	55	Disturbed	14	19,20,20,(28)	SM (A-2-4(0))	brown, very moist, med. dense			17.9		NP	1	83	16	
5000	60	Disturbed	11	14,11,10,(15) 0.22	SM	brown, moist, med. dense	SILTY SAND occasional lean clay layers 1"-5" thick								
	65	Pushed	14	Pushed	SM (A-2-4(0))	brown, very moist		94.7	25.5		NP	0	66	34	UU
4995		Disturbed	18	5,3,7,(7) 0.44	SM	brown, very moist, loose									
4990	70	Disturbed	18	2,2,1,(2) 0.59	CL	gray, moist, stiff									
4985	75	Pushed	18	Pushed 1.30 0.69	CL (A-6(12))	gray & black, moist, stiff to very stiff	LEAN CLAY W/SAND	87.4	31.8	35	16	0	18	82	CT UC
4980	80	Disturbed	0	0/12",1,(1)	-	no recovery									
4975	85	Disturbed	1	9,7,7,(8)	CL,GC	gray, wet	INTERBEDDED CLAY & GRAVEL LAYERS (driller's observation)								
4970	90	Disturbed	10	9,15,13,(15)	GC (A-2-7(0))	brown, very moist, very loose	CLAYEY GRAVEL W/SAND possible cobbles		21.8	46	28	54	30	16	
	95	Pushed	0	Pushed	-	no recovery									
4965		Disturbed	9	17,23,21,(23) 0.19	CL	brown, very moist, soft	SANDY LEAN CLAY W/GRAVEL								
							SILTY SAND								

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) 0.45 — Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

RB&G ENGINEERING, INC.

DRILL HOLE LOG

BORING NO. 09-S5-1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1541+09, 134' LT. / N:398,502 E:489,357
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 55' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ 35.0' **AFTER 24 HOURS:** ▼ DRY' 8/28/09

PROJECT NUMBER: 200901.200
DATE STARTED: 8/20/09
DATE COMPLETED: 8/21/09
GROUND ELEVATION: 5061.9'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
			■	15	14,21,23,(23)	SM (A-4(0))	brown, moist, med. dense SILTY SAND		27.5		NP	0	62	38	
4960							GRAVELS (driller's observation)								
	105						SAND (driller's observation)								
4955							GRAVELS (driller's observation)								
	110			0	60/2"	-	no recovery								
							BOH								
4950															
	115														
4945															
	120														
4940															
	125														
4935															
	130														
4930															
	135														
4925															
	140														
4920															
	145														
4915															

200 MVC2009 S.GPJ US EVAL.GDT 10/26/10

LEGEND:

DISTURBED SAMPLE ■ 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE ☒ PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

RB&G ENGINEERING, INC.

DRILL HOLE LOG

BORING NO. 09-S5-2

SHEET 1 OF 3

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1544+55, 264' RT. / N:398,953 E:489,623

DATE STARTED: 8/24/09

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 15' / MUD ROTARY

DATE COMPLETED: 8/25/09

DRILLER: E. RICHARDSON

GROUND ELEVATION: 5062.4'

DEPTH TO WATER - INITIAL: ▽ N.M. **AFTER 24 HOURS:** ▼ DRY' 8/28/09

LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				6	2,8,10,(38)	CL-ML	dk. brown, slightly moist, very stiff	SANDY SILTY CLAY W/GRAVEL								
5060																
	5			13	7,6,7,(29) *0.60*	CL *(A-7-6(12))*	brown to lt. brown, moist, stiff	SANDY LEAN CLAY		29.5	46	23	12	26	62	
5055																
	10			9	Pushed	ML *(A-4(6))*	brown, moist	SILT W/SAND plastic		31.4	36	6	0	17	83	Chem.
5050				16	8,10,41,(82)	ML *(A-4(0))*	brown, moist, very dense	SANDY SILT		19.7		NP	0	38	62	
	15															
5045				12	20,16,10,(35) *0.37*	ML CL	brown, moist brown, moist, firm to stiff									
	20			9	Pushed	CL *(A-4(0))*	brown, moist	LEAN CLAY W/SAND sand layers	96.8	22.2	26	8	1	22	77	UU
				17	9,22,18,(48)	CL	brown, moist, very stiff									
5040																
	25			16	7,16,50/5"	ML	brown, moist, very dense	SANDY SILT slightly plastic (possible cobbles)								
5035																
	30			12	Pushed *0.24*	ML *(A-4(0))*	brown, moist	SANDY SILT clay lenses	94.6	18.3		NP	5	29	66	CT UC
				16	8,15,18,(33) *0.48*	CL-ML	brown, moist, soft to firm									
5030								SANDY SILTY CLAY								
	35			17	10,14,15,(27) *0.50*	CL-ML *(A-4(2))*	brown, moist, firm to stiff			21.3	24	6	2	31	67	
5025																
	40			9	Pushed	ML *(A-4(0))*	brown, moist	SILT W/SAND		21.2	24	3	0	29	71	
				15	11,16,35,(44)	ML SM	brown, moist gray-brown, moist, dense									
5020								SILTY SAND W/GRAVEL								
	45			17	14,16,19,(29) *0.42*	CL-ML	brown, moist, firm	SILTY CLAY W/SAND								
5015																
								SILTY SAND W/GRAVEL								

200 MVC2009_S.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) *0.45*: Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45*: Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-S5-2

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1544+55, 264' RT. / N:398,953 E:489,623
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 15' / MUD ROTARY
DRILLER: E. RICHARDSON
DEPTH TO WATER - INITIAL: ▽ N.M. **AFTER 24 HOURS:** ▼ DRY' 8/28/09

PROJECT NUMBER: 200901.200
DATE STARTED: 8/24/09
DATE COMPLETED: 8/25/09
GROUND ELEVATION: 5062.4'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
			Disturbed	16	50,48,27,(59) 0.72	SM (A-1-b(0))	brown, moist, very dense			11.5		NP	35	47	18	
						CL-ML (A-4(1))	brown, moist, stiff	SANDY SILTY CLAY		15.8	24	6	4	36	60	
5010																
	55		Disturbed	7	46,50/2"	CL-ML	brown, slightly moist, hard									
5005								SILTY CLAY W/SAND thin gravel layers (possible cobbles)								
	60		Undisturbed	6	Pushed 0.32	CL-ML (A-4(2))	brown, moist, firm		97.6	21.4	26	5	0	29	71	CT
5000																
	65		Disturbed	17	12,20,28,(33) 0.22	CL-ML	brown, moist, firm									
4995								SANDY SILTY CLAY								
	70		Undisturbed	7	Pushed 0.30	CL-ML (A-4(1))	brown, moist, firm		101.1	18.9	24	5	1	39	60	UC
			Disturbed	16	20,25,41,(44) 1.03	CL-ML	brown, moist, very stiff									
4990																
	75		Disturbed	18	16,20,23,(28) 0.34	CL	brown, moist, firm									
4985																
	80		Disturbed	18	11,15,19,(21) 2.03	CL (A-4(6))	brown, moist, hard	LEAN CLAY W/SAND		28.5	32	10	0	26	74	
4980																
	85		Disturbed	17	13,14,20,(21) 0.63	CL	brown, moist, stiff									
4975																
	90		Undisturbed	9	Pushed	ML (A-4(0))	brown, moist		94.4	22.6		NP	0	45	55	CT UU
			Disturbed	7	20,33,33,(39)	ML	brown, moist, dense	SANDY SILT								
4970																
	95		Disturbed	18	14,19,50/5" 0.67	ML (A-4(2))	brown, moist, stiff	SILT W/SAND plastic		32.4	27	5	0	28	72	
4965								SILTY SAND (possible cobbles)								

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RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) = Blow Count per 6", $(N_1)_{60}$ Value; 0.45 = Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 = Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-S5-2

SHEET 3 OF 3

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1544+55, 264' RT. / N:398,953 E:489,623

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 15' / MUD ROTARY

DRILLER: E. RICHARDSON

DEPTH TO WATER - INITIAL: ▽ N.M. AFTER 24 HOURS: ▼ DRY' 8/28/09

PROJECT NUMBER: 200901.200

DATE STARTED: 8/24/09

DATE COMPLETED: 8/25/09

GROUND ELEVATION: 5062.4'

LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
4960				3	60/4"	SM (A-4(0))	brown, moist, very dense SILTY SAND (possible cobbles)		21.0		NP	13	39	48	
	105				0.41	CL-ML	brown, moist, firm SANDY SILTY CLAY								
4955				9	8,60/4"	ML/SM	brown, slightly moist, very dense SANDY SILT W/GRAVEL TO SILTY SAND W/GRAVEL (possible cobbles)								
	110			5	60/5"	ML/SM	brown, slightly moist, very dense								
							BOH								
4950	115														
4945	120														
4940	125														
4935	130														
4930	135														
4925	140														
4920	145														
4915															

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6" ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-S5-3

SHEET 1 OF 3

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1542+93, 43' RT. / N:398,733 E:489,464

DATE STARTED: 11/9/09

DRILLING METHOD: DP-CME-55 / HSA

DATE COMPLETED: 11/10/09

DRILLER: C.D. (DIRECT PUSH SERVICES, LLC)

GROUND ELEVATION: 5062.0'

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

LOGGED BY: S. CHAFFIN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
				13	3,15,25,(94)	GC-GM CL	~~brown, dry~~ brown, slightly moist, hard	SILTY CLAYEY GRAVEL W/SAND SANDY LEAN CLAY W/GRAVEL								
5060																
	5			18	3,3,4,(16)	SM *(A-4(0))*	lt. brown, moist, med. dense	SILTY SAND occasional clay lenses		13.1		NP	0	57	43	DS
5055																
	10			18	4,3,3,(11)	SM	brown, moist, loose									
5050																
	15			18	2,4,5,(13)	SM	brown, moist, med. dense									Chem.
5045																
	20			18	4,4,6,(13)	SM *(A-4(0))*	brown, moist, med. dense			14.0		NP	0	56	44	DS
5040																
	25			17	22,25,16,(48)	SM GP-GM	brown, moist very lt. brown, slightly moist, med. dense	GRAVEL W/SILT & SAND possible cobbles								
5035																
	30			12	20,19,22,(44)	GP-GM	lt. brown, slightly moist, med. dense									
5030																
	35			15	16,42,48,(89)	GP-GM *(A-1-a(0))*	lt. brown, slightly moist, very dense			4.1		NP	48	43	9	
5025																
	40			16	15,29,22,(47)	GP-GM	lt. brown, slightly moist, dense									
5020																
	45			18	1,1,1,(2) *0.29*	CH *(A-7-6(17))*	black, moist, firm	SANDY FAT CLAY		44.2	61	37	0	45	55	Chem.
5015																
								SAND W/SILT & GRAVEL								

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RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-S5-3

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1542+93, 43' RT. / N:398,733 E:489,464
DRILLING METHOD: DP-CME-55 / HSA
DRILLER: C.D. (DIRECT PUSH SERVICES, LLC)
DEPTH TO WATER - INITIAL: ▽ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 11/9/09
DATE COMPLETED: 11/10/09
GROUND ELEVATION: 5062.0'
LOGGED BY: S. CHAFFIN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
			Pushed	0	Pushed	-	no recovery									
5010			Disturbed	17	11,22,29,(42)	SP-SM (A-1-b(0))	brown, moist, dense	SAND W/SILT & GRAVEL		13.4		NP	23	67	10	
5005	55		Disturbed	6	11,15,18,(26)	SP-SM	brown, moist, med. dense									
5000	60		Disturbed	17	10,16,17,(25)	SC (A-2-6(0))	brown, moist, med. dense	CLAYEY SAND W/GRAVEL		10.4	29	12	31	46	23	
4995	65		Pushed	9	Pushed 0.17	GC (A-2-6(0))	lt. brown, moist	CLAYEY GRAVEL W/SAND 2" rock in sample		16.0	32	13	37	32	31	
4990	70		Disturbed	18	11,19,26,(32)	ML	lt. brown, moist, dense/hard									
4985	75		Disturbed	18	7,12,17,(20)	ML (A-6(6))	lt. brown, moist, med. dense/very stiff	SANDY SILT plastic		27.6	36	11	0	34	66	
4980	80		Disturbed	18	17,28,37,(43)	ML	lt. brown, moist, dense/hard									
	85		Pushed	9	Pushed 0.99+	CL (A-4(3))	lt. brown, moist	SANDY LEAN CLAY		15.2	25	9	6	27	67	
4975			Disturbed	14	18,38,60/4" 0.99+	CL	lt. brown, moist, hard									
4970	90		Disturbed	0	60/1"	-	no recovery	POSSIBLE GRAVELS								
4965	95		Disturbed	15	23,30,53,(50)	ML (A-4(0))	lt. brown, moist, dense	SANDY SILT		19.2		NP	0	34	66	
								CLAYEY SAND W/GRAVEL								

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

RB&G ENGINEERING, INC.

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-S5-3

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1542+93, 43' RT. / N:398,733 E:489,464

DRILLING METHOD: DP-CME-55 / HSA

DRILLER: C.D. (DIRECT PUSH SERVICES, LLC)

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200

DATE STARTED: 11/9/09

DATE COMPLETED: 11/10/09

GROUND ELEVATION: 5062.0'

LOGGED BY: S. CHAFFIN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
4960				13	19,46,60/4"	SC	lt. brown, moist, very dense CLAYEY SAND W/GRAVEL								
	105			18	9,19,40,(34) *0.99+*	CL (*A-6(5)*)	lt. brown, very moist, very stiff to hard		26.6	30	11	1	36	63	
4955							SANDY LEAN CLAY								
	110			16	10,15,35,(28) *0.99+*	CL	lt. brown, very moist, very stiff to hard								
4950															
	115			12	Pushed *0.99+*	CL (*A-6(7)*)	lt. brown, very moist, very stiff to hard	85.7	29.9	34	11	0	30	70	UU
4945							BOH								
	120														
4940															
	125														
4935															
	130														
4930															
	135														
4925															
	140														
4920															
	145														
4915															

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RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-S5-4

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1542+04, 15' RT. / N:398,641 E:489,467

DRILLING METHOD: 08-CME-55 / N.W. CASING TO 68.5' / MUD ROTARY

DRILLER: T. KERN

DEPTH TO WATER - INITIAL: ∇ 58.6' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.206-03

DATE STARTED: 5/13/10

DATE COMPLETED: 5/14/10

GROUND ELEVATION: 5059.4'

LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
			Disturbed	12	3,6,13,(40)	SM	brown, moist, med. dense	SILTY SAND W/GRAVEL								
5055	5		Disturbed	13	3,4,4,(17)	SM	lt. brown, slightly moist, med. dense	SILTY SAND clay lenses								
5050	10		Undisturbed	15	Pushed	SM (A-4(0))	lt. brown, moist			16.5		NP	0	64	36	DS
			Disturbed	15	5,6,8,(23)	ML (A-4(0))	lt. brown, moist, med. dense			21.9		NP	0	43	57	
5045	15		Disturbed	16	5,7,8,(21)	ML	lt. brown, moist, med. dense	SANDY SILT clay lenses								
5040	20		Undisturbed	15	Pushed *0.12* *0.25*	CL-ML (A-4(4))	lt. brown, wet, soft	SILTY CLAY W/SAND	86.6	29.7	27	7	0	19	81	CT UC
5035	25		Disturbed	16	2,3,5,(9) *0.27*	CL-ML	lt. brown, wet, firm	SILTY CLAY W/SAND interbedded w/silty sand lenses & layers to 2" thick								
5030	30		Disturbed	15	6,7,8,(15)	SM (A-4(0))	lt. brown, wet, med. dense	SILTY SAND few clay lenses, possible thin clay layers (driller's observation)		22.7		NP	0	63	37	
5025	35		Disturbed	18	3,4,11,(14)	SM CL GP-GM	lt. brown, wet ~~dk. gray, moist~~ brown, wet	LEAN CLAY								
5020	40		Disturbed	14	23,30,39,(58)	GP-GM (A-1-a(0))	brown, wet, dense	GRAVEL W/SILT & SAND possible cobbles		10.8		NP	50	39	11	
5015	45		Disturbed	5	60/5"	GM	brown, wet, very dense									
5010	50		Disturbed	9	42,39,60/2"	GM (A-1-a(0))	brown, wet, very dense	SILTY GRAVEL W/SAND possible cobbles		10.1		NP	59	28	13	

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RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-S5-4

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1542+04, 15' RT. / N:398,641 E:489,467
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 68.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ 58.6' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.206-03
DATE STARTED: 5/13/10
DATE COMPLETED: 5/14/10
GROUND ELEVATION: 5059.4'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
					SILTY GRAVEL W/SAND possible cobbles								
5005	55	14	11,16,17,(24)	SM	brown, wet, med. dense SILTY SAND								
5000	60	14	0.15 4,11,19,(22)	CL (A-6(4))	SANDY LEAN CLAY very lt. brown, wet, soft		33.1	32	11	5	38	57	
				SM	SILTY SAND rust-brown, wet, med. dense								
4995	65	4	23,49,40,(59)	GM	lt. brown, wet, dense								
					SILTY GRAVEL W/SAND possible cobbles								
4990	70	6	28,20,23,(27)	GM (A-1-b(0))	lt. brown, wet, med. dense		13.1		NP	60	20	20	
4985				GM	lt. brown, wet								
	75	16	22,22,28,(31)	SM	lt. brown, wet, dense SILTY SAND cemented nodules								
4980	80			GM	brown, wet SILTY GRAVEL W/SAND								
		18	45,28,58,(51)	SC (A-2-6(0))	brown, moist, very dense CLAYEY SAND W/GRAVEL		15.7	27	13	18	68	14	
4975	85	3	60/3"	GM	lt. brown, wet, very dense SILTY GRAVEL W/SAND possible cobbles								
4970	90	10	48,60/4"	SM (A-2-4(0))	brown, wet, very dense SILTY SAND W/GRAVEL possible cobbles		15.3		NP	25	43	32	
4965	95	5	60/5"	GM	brown, wet, very dense SILTY GRAVEL W/SAND possible cobbles								
4960	100	3	60/3"	GM	brown, wet, very dense								
					BOH								

200 MVC2009 206-03 S.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:
DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6" ; (N₁)60 Value ; 0.45 ← Torvane (tsf)
UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-S5-5

SHEET 1 OF 3

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1543+18, 140' RT. / N:398,789 E:489,547
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 23.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.206-03
DATE STARTED: 5/14/10
DATE COMPLETED: 5/18/10
GROUND ELEVATION: 5058.4'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
5055			Disturbed	6	3,3,16,(40)	GC-GM	brown, moist, dense	SILTY CLAYEY GRAVEL W/SAND possible cobbles (fill)								
	5		Disturbed	15	11,18,19,(79)	SM (A-2-4(0))	brown, moist, very dense	SILTY SAND		16.0		NP	1	74	25	
5050								GRAVEL & COBBLES (driller's observation)								
	10		Disturbed	15	7,9,7,(28)	SM/ML	lt. brown, moist, med. dense	SILTY SAND TO SANDY SILT								
5045	15		Disturbed	12	7,9,7,(23)	SM (A-4(0))	brown & rust-brown, moist, med. dense	SILTY SAND occasional clay lenses		14.7		NP	0	59	41	
5040	20		Disturbed	13	5,6,6,(15)	SM	brown & rust-brown, moist, med. dense									Chem.
5035	25		Disturbed	17	5,6,4,(11)	SM	brown, wet, med. dense	SILTY SAND interbedded w/silt, clay & clean sand layers to 2" thick								
5030	30		Disturbed	15	4,4,3,(7)	SM (A-2-4(0))	brown, wet, med. dense	SILTY SAND few clay lenses		32.9		NP	3	76	21	
5025	35		Disturbed	18	3,5,6,(10) 0.89	CL	brown, moist, stiff	LEAN CLAY W/SAND drillers noted some gravel approx. 39'-40'								
5020	40		Disturbed	18	10,11,17,(23) 1.88	CL (A-7-6(18))	brown, moist, very stiff			24.6	42	23	3	16	81	
5015	45		Disturbed	18	10,12,11,(18)	ML	lt. brown, moist, med. dense	SANDY SILT								
5010								SILTY SAND								

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-S5-5

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1543+18, 140' RT. / N:398,789 E:489,547
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 23.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.206-03
DATE STARTED: 5/14/10
DATE COMPLETED: 5/18/10
GROUND ELEVATION: 5058.4'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
		18	14,27,44,(53)	SM (A-4(0))	lt. brown, moist, very dense — SILTY SAND		12.9		NP	6	45	49	
5005	55	16	10,44,26,(53)	ML	lt. brown, moist — SANDY SILT								
				GM	lt. brown, moist, dense — SILTY GRAVEL W/SAND possible cobbles								
5000	60	15	Pushed 1.50 0.80	CL (A-7-6(12))	very lt. brown to white, moist, stiff to very stiff — SANDY LEAN CLAY		25.7	44	21	1	34	65	UC
4995	65	18	9,14,20,(24) 1.63	CL	lt. brown, moist, very stiff								
4990	70	6	Pushed	CL-ML (A-4(1))	very lt. brown, very moist — SANDY SILTY CLAY slightly cemented	88.6	24.4	27	7	0	47	53	CT
		12	22,51/6" 0.80	CL-ML	brown, very moist, hard								
4985	75	12	30,51/6" 0.65	CL-ML	brown, very moist, hard								
4980	80	13	43,80/6"	SM (A-4(0))	brown, very moist, very dense — SILTY SAND		24.0		NP	0	53	47	
4975	85	6	31,65/4"	CL-ML	brown, very moist, hard — SANDY SILTY CLAY slightly cemented								
4970	90	13	37,63/6" 0.50	CL-ML (A-4(2))	lt. brown, very moist, hard		24.9	27	7	3	37	60	
4965	95	9	48,60/3" 0.49	CL-ML	lt. brown, very moist, hard								
				ML	brown, moist, hard — SANDY SILT slightly plastic, slightly cemented								
4960													

LEGEND:

DISTURBED SAMPLE: 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE: PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

RB&G ENGINEERING, INC.

DRILL HOLE LOG

BORING NO. 10-S5-5

SHEET 3 OF 3

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1543+18, 140' RT. / N:398,789 E:489,547
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 23.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.206-03
DATE STARTED: 5/14/10
DATE COMPLETED: 5/18/10
GROUND ELEVATION: 5058.4'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS *(AASHTO)*	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				16	24,42,60/4" 0.31	ML *(A-4(2))*	brown, moist, hard — SANDY SILT slightly plastic, slightly cemented		23.4	32	5	6	36	58	
4955															
	105					GM	brown, very moist — SILTY GRAVEL W/SAND								
				16	55,50,40,(47)	SM	brown, very moist, dense								
4950															
	110			12	30,70/6"	SM *(A-4(0))*	brown, wet, very dense — SILTY SAND slightly cemented, drillers noted gravels from 117'-118'		28.7		NP	1	50	49	
4945															
	115			6	62/6"	SM	brown, very moist, very dense								
4940															
	120			3	60/3"	SM *(A-2-4(0))*	brown, very moist, v. dense		18.1		NP	4	67	29	
							BOH								
4935	125														
4930	130														
4925	135														
4920	140														
4915	145														
4910															

200 MVC2009 206-03 S.GPJ US EVAL.GDT 10/26/10

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LEGEND:

DISTURBED SAMPLE 2,3,2,(6) 0.45 — Blow Count per 6", $(N_1)_{60}$ Value, Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-S5-6

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1544+15, 234' RT. / N:398,908 E:489,607
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 15' / MUD ROTARY
DRILLER: S. CHAFFIN
DEPTH TO WATER - INITIAL: ∇ DRY TO 46.5' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.206-11
DATE STARTED: 10/1/10
DATE COMPLETED: 10/1/10
GROUND ELEVATION: 5058.7'
LOGGED BY: J. OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				9	3,5,8,(28)	SM	brown, slightly moist, med. dense	SILTY SAND W/GRAVEL possible cobbles								
5055	5			9	17,13,12,(53)	GP-GM	brown, moist, dense	GRAVEL W/SILT & SAND possible cobbles								
5050	10			13	7,8,13,(34) *1.00*	GC (*A-7-6(5)*)	brown, moist, very stiff	CLAYEY GRAVEL W/SAND		21.2	41	20	31	23	46	
5045	15		Pushed	10	Pushed *0.80*	ML (*A-4(0)*)	lt. brown, moist, stiff	SANDY SILT W/GRAVEL slightly plastic		16.9	27	3	17	20	63	
5040	20			15	13,30,27,(71)	ML	lt. brown, moist, hard									
5035				16	8,10,14,(28)	CL-ML	lt. brown, moist, very stiff	SILTY CLAY W/SAND sand & silt layers								
	25		Pushed	8	Pushed	CL-ML (*A-4(5)*)	lt. brown, moist	SILTY CLAY	89.9	25.7	28	7	0	11	89	UU
				18	8,11,17,(31)	CL	lt. brown, moist, very stiff	LEAN CLAY W/SAND occasional sand layers								
5030				18	12,12,28,(43)	CL	lt. brown, moist, hard									
	30			16	9,11,15,(27)	CL-ML (*A-4(1)*)	lt. brown, moist, very stiff	SANDY SILTY CLAY white stringers		21.3	24	5	5	33	62	
5025	35			18	17,18,27,(40)	CL-ML	lt. brown, moist, hard	SILTY CLAY W/SAND thin gravel layers (driller's observation)								
5020	40		Pushed	6	Pushed	ML (*A-4(0)*)	brown, moist	SANDY SILT		16.9		NP	14	36	50	
				16	53,21,38,(49)	CL-ML/CL	lt. brown, moist, hard	SILTY CLAY W/SAND TO LEAN CLAY W/SAND few gravels								
5015	45			15	15,16,19,(29)	CL-ML/CL	lt. brown, moist, hard									
5010								BOH								

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 10-S5-7

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER: 200901.206-11
LOCATION: STA. 1544+79, 219' RT. / N:398,961 E:489,574
DATE STARTED: 5/19/10
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 18.5' / MUD ROTARY
DATE COMPLETED: 5/19/10
DRILLER: T. KERN
GROUND ELEVATION: 5057.0'
DEPTH TO WATER - INITIAL: ∇ DRY TO 81' **AFTER 24 HOURS:** ▼ N.M.
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
5055	0	Disturbed	6	4,6,7,(28)	GM (A-1-a(0))	gray-brown, moist, med. dense — SILTY GRAVEL W/SAND possible cobbles (fill)		8.2		NP	57	30	13	
					SP-SM	gray-brown, moist, dense — SAND W/SILT (fill)								
5050	5	Disturbed	5	9,8,9,(36) 0.36	GM	lt. brown, moist, med. dense — SILTY GRAVEL W/SAND possible cobbles								
5045	10	Disturbed	7	27,44,40,(99+)	GM (A-1-a(0))	lt. brown, moist, very dense		11.4		NP	58	27	15	
5040	15	Disturbed	11	13,22,16,(51) 0.35	CL	lt. brown, moist, stiff — LEAN CLAY W/SAND white stringers								Chem.
5035	20	Undisturbed	12	Pushed 0.35 0.82	CL-ML (A-4(3))	lt. brown, very moist, firm to stiff — SANDY SILTY CLAY occasional gravels	95.5	22.4	29	7	9	23	68	CT
5030	25	Disturbed	15	37,62,64,(99+)	SM	brown, moist, very dense — SILTY SAND W/GRAVEL slightly cemented								
5025	30	Undisturbed	6	Pushed	SM	brown, moist								
		Disturbed	17	47,60,56,(99+)	SM (A-4(0))	lt. brown, moist, very dense — SILTY SAND slightly plastic, slightly cemented		14.9	18	2	9	47	44	
5020	35	Disturbed	16	56,60,60/3"	GM	lt. brown, moist, very dense — SILTY GRAVEL W/SAND silty sand layers, possible cobbles								
5015	40	Disturbed	3	60/4"	GM	brown, moist, very dense — SILTY GRAVEL W/SAND possible cobbles								
						SILTY CLAY								

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-S5-7

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1544+79, 219' RT. / N:398,961 E:489,574
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 18.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ DRY TO 81' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.206-11
DATE STARTED: 5/19/10
DATE COMPLETED: 5/19/10
GROUND ELEVATION: 5057.0'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
5010			Pushed	12	Pushed 0.45	CL-ML (A-4(6))	lt. brown, moist, firm	SILTY CLAY		20.5	26	7	0	3	97	
5005	50		Disturbed	17	25,50,50,(75) 0.60 0.25	CL-ML	lt. brown, moist, stiff	SANDY SILTY CLAY								
5000	55		Pushed	10	Pushed 0.40	ML (A-4(2))	lt. brown, moist, firm	SILT slightly plastic	101.3	18.5	27	3	3	13	84	CT
4995	60		Disturbed	12	37,60/6"	ML	lt. brown, moist, hard	SILT W/SAND slightly plastic								
4990	65		Disturbed	18	12,21,35,(37) 0.31	ML	very lt. brown, moist, firm to stiff	SILT W/SAND plastic								
4985	70		Pushed	12	Pushed 0.99+	ML (A-7-6(12))	very lt. brown to white, moist, hard		77.5	34.2	41	14	0	18	82	CT
4980	75		Disturbed	18	18,35,45,(49)	SC-SM	lt. brown, moist, dense	SILTY CLAYEY SAND slightly cemented								
4975	80		Disturbed	12	28,60/6"	SC-SM (A-4(0))	lt. brown, v. moist, v. dense	BOH		21.4	23	4	3	52	45	
4970	85															

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LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-W5-1

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1544+41, 353' RT. / N:398,968 E:489,713
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 5' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 10/30/09
DATE COMPLETED: 11/2/09
GROUND ELEVATION: 5073.8'
LOGGED BY: J. OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
5070		13	11,15,15,(67) 0.99+	CL (A-6(8))	lt. brown, slightly moist to moist, hard	LEAN CLAY W/SAND		15.5	30	13	3	23	74	
	5		0.99+	CL	dk. brown, moist, hard	GRAVELLY LEAN CLAY W/SAND								Chem.
		15	13,15,13,(63) 0.99+	CL-ML	brown, moist, hard	SILTY CLAY W/SAND								
5065		13	12,18,22,(78) 0.99+	CL-ML (A-4(2))	brown, moist, hard			18.4	23	6	4	26	70	
	10	7	Pushed	SM (A-2-4(0))	brown, moist	SILTY SAND		10.4		NP	11	56	33	
5060		17	11,12,13,(39) 0.53	ML (A-4(0))	brown, moist, stiff/dense	SANDY SILT slightly plastic		18.9	21	3	0	43	57	Chem.
	15	13	15,18,60/4.5"	SC/ML	brown, moist, very dense	CLAYEY SAND TO SANDY SILT (PLASTIC)								
5055	20	9	Pushed 0.38	ML (A-4(5))	brown, moist, firm	SANDY SILT plastic	87.6	28.9	37	9	0	38	62	DS
5050	25	18	8,12,19,(34) 0.62	CL	brown, moist, stiff	LEAN CLAY W/SAND sand lenses								
5045	30	11	Pushed	SM (A-6(2))	brown, moist	SILTY SAND W/GRAVEL plastic		22.4	40	11	17	41	42	
		18	8,11,17,(28) 0.99+	SM	brown, moist, med. dense/hard									
5040	35	18	23,33,60/5"	ML (A-4(2))	brown, moist, very dense/hard	SANDY SILT plastic, sand layers to 3" thick		27.9	33	8	2	45	53	
5035	40	18	15,22,40,(55)	ML	brown, moist, very dense/hard									
						BOH								
5030														

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LEGEND:
DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)
UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-W5-2

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1546+00, 386' RT. / N:399,118 E:489,701
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 5' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 10/30/09
DATE COMPLETED: 10/30/09
GROUND ELEVATION: 5071.9'
LOGGED BY: J. OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
			Disturbed	14	18,28,32,(99+)	CL	dk. brown, slightly moist, hard	Organics in top 6" SANDY LEAN CLAY								
5070			Disturbed	12	17,24,31,(99+)	CL	lt. brown, slightly moist, hard	LEAN CLAY W/SAND								Chem.
	5		Pushed	11	Pushed 0.99+	CL (A-6(7))	brown, moist, very stiff		101.6	16.1	29	13	6	23	71	CU
5065						GC	red-brown, moist	CLAYEY GRAVEL								
			Disturbed	14	19,15,13,(54) 0.99+	CL	brown, moist, very stiff	LEAN CLAY								
	10		Disturbed	18	8,15,40,(93) 0.99+	CL	brown, moist, hard									Chem.
5060			Disturbed	4	60/4"	GC	brown, moist, very dense	CLAYEY GRAVEL W/SAND								
	15		Disturbed	18	11,10,11,(29) 0.99+	CL	lt. brown, moist, very stiff	LEAN CLAY W/SAND								
5055																
	20		Pushed	9	Pushed 0.99+	CL (A-6(15))	brown, moist, very stiff			24.7	38	20	0	20	80	
5050			Disturbed	18	10,11,26,(44) 0.99+	CL	brown, moist, very stiff to hard									
	25		Pushed	15	Pushed 0.99+	CL (A-7-6(9))	brown, moist, stiff to very stiff	SANDY LEAN CLAY		27.4	46	24	6	42	52	
5045																
	30		Disturbed	18	7,13,13,(26) 0.99+	CL	brown, moist, very stiff	LEAN CLAY								
5040																
	35		Pushed	14	Pushed 0.93	CL (A-7-6(27))	brown, moist, stiff		84.8	33.4	49	28	0	9	91	CT
5035																
	40		Disturbed	17	16,23,17,(35) 0.99+	CL	brown, moist, hard									
5030																
	45		Pushed	18	Pushed 0.96	CL (A-4(5))	brown, moist, stiff	LEAN CLAY W/SAND	87.3	23.8	28	10	0	26	74	
5025																
	50		Disturbed	5	60/4.5"	CL	brown, moist, hard	LEAN CLAY W/GRAVEL								
								BOH								
5020																

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-W5-3

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1547+54, 443' RT. / N:399,268 E:489,720
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 5' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ▽ N.M. AFTER 24 HOURS: ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 10/29/09
DATE COMPLETED: 10/29/09
GROUND ELEVATION: 5063.8'
LOGGED BY: J. OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
			Disturbed	12	6,19,60/2"	SC *(A-6(2))*	dk. brown, slightly moist, very dense/hard	CLAYEY SAND		8.8	27	11	5	50	45	
5060			Disturbed	7	17,14,13,(60)	GC	dk. brown, slightly moist, very dense/hard	CLAYEY GRAVEL W/SAND								
	5		Disturbed	18	7,8,15,(51) *0.99+*	CL	brown, slightly moist to moist, very stiff	SANDY LEAN CLAY								Chem.
5055			Disturbed	18	9,9,10,(37) *0.99+*	CL	brown, moist, very stiff									
	10		Pushed	15	Pushed *0.99+*	CL *(A-4(0))*	brown, moist, very stiff			19.7	33	12	0	42	58	
								GRAVELS (driller's observation)								
5050	15		Disturbed	18	8,23,23,(65) *0.99+*	CH	brown, moist, hard	SANDY FAT CLAY								
5045	20		Pushed	17	Pushed *0.99+*	CH *(A-7-6(17))*	brown, moist, very stiff			28.4	50	26	11	20	69	
5040	25		Disturbed	18	7,10,14,(27) *0.99+*	CL	brown, moist, very stiff	LEAN CLAY								
5035	30		Pushed	15	Pushed *0.60*	CL *(A-7-6(28))*	brown, moist, stiff		79.1	32.7	48	32	0	14	86	
5030								BOH								

200 MVC2009 W.GPJ US EVAL.GDT 10/26/10

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) *0.45* — Blow Count per 6", $(N_1)_{60}$ Value, Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45* — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-W5-4

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1545+58, 286' RT. / N:399,052 E:489,616
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 5' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 11/2/09
DATE COMPLETED: 11/2/09
GROUND ELEVATION: 5054.3'
LOGGED BY: J. OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				8	7,8,16,(50)	GC	very dk. brown, moist, dense	CLAYEY GRAVEL W/SAND (fill)								
				11	16,60/4.5"	ML (A-4(0))	dk. brown, moist, very dense	SANDY SILT (fill?)		13.1		NP	10	33	57	
5050	5			15	28,33,31,(99+) 0.99+	CL-ML (A-4(0))	brown, very moist, hard	SANDY SILTY CLAY slightly cemented		19.0	21	5	5	35	60	
				17	17,30,50,(99+) 0.99+	CL-ML	brown, very moist, hard									Chem.
5045	10			15	Pushed 0.93	ML (A-4(2))	brown, moist, stiff	SILT W/SAND slightly plastic	92.7	23.0	28	3	0	21	79	DS
				18	11,16,18,(52) 0.99+	ML	brown, moist, very stiff to hard/very dense									Chem.
5040	15			18	9,23,36,(83) 0.99+	CL (A-4(4))	brown, very moist, hard	LEAN CLAY W/SAND		22.5	25	8	4	21	75	
5035	20			5	Pushed	ML	lt. brown, moist	SANDY SILT plastic, slightly cemented								
				6	60/5"	ML	brown, moist, very dense									
5030	25			12	Pushed 0.99+	CL-ML (A-4(2))	brown, moist, hard	SANDY SILTY CLAY		17.7	23	6	3	31	66	CU
				18	8,13,19,(35) 0.99+	CL-ML	brown, moist, hard									
5025	30			15	15,18,39,(58) 0.99+	ML (A-4(0))	brown, very moist, hard/very dense	SILT W/SAND slightly plastic		23.3	24	2	5	18	77	
5020	35			18	18,18,26,(41) 0.99+	ML	brown, very moist, hard/dense									
5015	40			6	Pushed 0.10	ML (A-4(0))	brown, moist	SANDY SILT some layers very slightly plastic, slightly cemented	100.4	16.9		NP	0	39	61	
				12	26,24,39,(55)	ML	brown, moist, very dense									
5010	45			5	60/3.5"	ML	brown, moist, very dense									
5005	50			13	29,60,60/1"	ML	brown, moist, very dense									
5000	55			12	Pushed 0.99+	CL (A-6(8))	brown, moist, hard	LEAN CLAY		21.5	30	11	0	14	86	
				17	9,36,32,(51) 0.99+	CL	brown, moist, hard									
								BOH								
4995																

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-W5-5

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1539+60, 228' LT. / N:398,330 E:489,318

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 5' / MUD ROTARY

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ▽ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200

DATE STARTED: 10/29/09

DATE COMPLETED: 10/29/09

GROUND ELEVATION: 5065.0'

LOGGED BY: J. OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				11	12,31,17,(99+)	CL	dk. to lt. brown, slightly moist, hard	SANDY LEAN CLAY W/GRAVEL								
				18	1,2,1,(7)	ML (*A-4(0)*)	rust-brown, moist, loose	SANDY SILT		11.1		NP	0	39	61	
5060	5			12	8,9,12,(47)	ML	rust-brown, moist, dense/very stiff									Chem.
				11	Pushed	ML (*A-4(1)*)	rust-brown, moist	SILT W/SAND slightly plastic	93.5	10.5	24	3	0	22	78	CT
5055	10			11	5,7,11,(31)	ML	rust-brown, moist, very stiff									
5050	15			17	Pushed *0.20*	CL (*A-4(5)*)	rust-brown, wet, soft	LEAN CLAY W/SAND	91.4	27.8	28	8	0	21	79	DS UU
5045	20			17	2,2,5,(9)	SC	rust-brown, wet, loose	CLAYEY SAND								
5040	25					GC	brown, very moist	CLAYEY GRAVEL W/SAND								
				12	7,9,13,(24)	GP-GM	brown, moist, loose	GRAVEL W/SILT & SAND								
								BOH								

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

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ADDENDUM 1 - OCTOBER 2010

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DRILL HOLE LOG

BORING NO. 09-W5-6

SHEET 1 OF 2

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1540+61, 111' LT. / N:398,464 E:489,395
DRILLING METHOD: DP-CME-55 / HSA / NO DRILLING FLUID
DRILLER: C.D. (DIRECT PUSH SERVICES, LLC)
DEPTH TO WATER - INITIAL: ∇ 63.5' **AFTER 24 HOURS:** ▼ 79.4'

PROJECT NUMBER: 200901.200
DATE STARTED: 11/6/09
DATE COMPLETED: 11/9/09
GROUND ELEVATION: 5061.7'
LOGGED BY: S. CHAFFIN, J. BOONE

Elev. (ft)	Depth (ft)	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
5060		16	9,27,38,(99+)	GC	lt. brown, slightly moist, very dense	CLAYEY GRAVEL W/SAND								
5055	5	18	3,4,5,(21)	ML	lt. brown, slightly moist, med. dense	SILT W/SAND occasional clay lenses								Chem.
5050	10	18	5,7,8,(27)	ML (A-4(0))	lt. brown, moist, med. dense			15.7		NP	0	27	73	
5045	15	18	2,4,6,(15) 0.57	ML	lt. brown, moist, stiff	SILT W/SAND slightly plastic								
	20	15	Pushed	ML (A-4(0))	lt. brown, very moist	SILT W/SAND		27.8		NP	0	25	75	CU
5040		18	3,6,7,(16) 0.52	CL-ML	lt. brown, moist, stiff									Chem.
5035	25	18	3,4,3,(8) 0.38	CL-ML (A-4(2))	lt. brown, moist, firm	SILTY CLAY W/SAND		26.8	25	5	0	28	72	
	30	0	Pushed	-	no recovery									
5030		9	6,7,9,(17)	SP-SM	lt. brown, slightly moist, very loose									
5025	35	15	19,30,30,(59)	SP-SM (A-1-a(0))	lt. brown, slightly moist, dense			5.5		NP	39	50	11	
5020	40	10	45,60/4"	SP-SM	lt. brown, slightly moist, very dense	SAND W/SILT & GRAVEL possible cobbles								
5015	45	8	49,60/3"	SP-SM	lt. brown, slightly moist, very dense									

200901.200 MVC2009 W.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) 0.45 — Blow Count per 6" — $(N_1)_{60}$ Value — Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-W5-6

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1540+61, 111' LT. / N:398,464 E:489,395
DRILLING METHOD: DP-CME-55 / HSA / NO DRILLING FLUID
DRILLER: C.D. (DIRECT PUSH SERVICES, LLC)
DEPTH TO WATER - INITIAL: ∇ 63.5' **AFTER 24 HOURS:** ▼ 79.4'

PROJECT NUMBER: 200901.200
DATE STARTED: 11/6/09
DATE COMPLETED: 11/9/09
GROUND ELEVATION: 5061.7'
LOGGED BY: S. CHAFFIN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
5010			■	12	50,60/6"	SP-SM	lt. brown, slightly moist, very dense	SAND W/SILT & GRAVEL possible cobbles								
5005	55		■	15	10,29,42,(56)	SM (A-1-b(0))	very lt. brown, slightly moist, dense			5.1		NP	39	44	17	
5000	60		■	15	16,19,16,(26)	SM	lt. brown, moist, med. dense	SILTY SAND W/GRAVEL possible cobbles								
4995	65		■	10	5,12,25,(27)	SM	brown, wet, med. dense									
4990	70		■	16	0.25 2,2,3,(4)	CL SM	gray, very moist, firm brown, wet, very loose	SANDY LEAN CLAY SILTY SAND								
4985	75		☒	18	Pushed 0.52	CL (A-4(6))	brown-gray, very moist, stiff	LEAN CLAY W/SAND	95.0	27.2	29	10	0	26	74	CT UU
	80		■	18	0.72	CH (A-7-6(44))	black, moist, stiff	FAT CLAY		40.6	69	42	0	9	91	
					0.85	CL	~~brown, moist, stiff~~	LEAN CLAY W/SAND								
4980					4,15,15,(20)	SC (A-2-6(0))	brown, moist, med. dense	CLAYEY SAND W/GRAVEL		15.8	31	16	22	61	17	
4975	85		☒	18	Pushed 0.40	CL (A-6(13))	brown, moist, firm	LEAN CLAY W/SAND	99.5	26.5	34	17	4	14	82	UC
4970	90		■	15	7,10,9,(12) 0.99+	CL	brown, moist, very stiff	GRAVELLY LEAN CLAY W/SAND								
	95		■	18	2,7,10,(11) 0.99+	CL (A-7-6(21))	lt. brown, moist, very stiff	LEAN CLAY W/SAND		33.5	49	26	0	21	79	
4965								BOH								

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-E5-1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1517+27, 37' LT. / N:396,291 E:490,260

DRILLING METHOD: DP-CME-55 / HSA

DRILLER: DIRECT PUSH SERVICES, LLC

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200

DATE STARTED: 10/8/09

DATE COMPLETED: 10/8/09

GROUND ELEVATION: 4974.1'

LOGGED BY: S. CHAFFIN, J. BOONE

Elev. (ft)	Depth (ft)	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
	0	Disturbed	10	3,5,4,(21)	CL	dk. brown, slightly moist, stiff	SANDY LEAN CLAY								
4970	5	Disturbed	10	1,3,2,(12) *0.30*	CL	dk. brown, slightly moist, firm									
4965	10	Pushed	8	Pushed *0.35*	ML *(A-4(5))*	brown, slightly moist to moist, firm	SILT W/SAND plastic	79.6	14.9	30	7	0	17	83	CT
		Disturbed	15	3,8,8,(28) *0.53*	ML	brown, slightly moist to moist, stiff									
4960	15	Disturbed	18	*0.20* 2,2,2,(6)	CL SM	lt. brown, moist, soft / brown, moist, loose	LEAN CLAY / SILTY SAND								
4955	20	Pushed	18	Pushed *0.89*	CL *(A-6(13))*	lt. brown, very moist, stiff	LEAN CLAY more sandy w/depth	85.6	33.0	37	15	1	12	87	CT UU
4950	25	Disturbed	18	2,3,7,(12) *0.50*	CL	lt. brown, very moist, stiff									
4945	30	Disturbed	0	9,8,11,(20)	-	no recovery									
							POSSIBLE GRAVEL LAYER (driller's observation)								
4940	35	Disturbed	11	6,10,13,(23) *0.99+*	CL *(A-4(5))*	lt. brown, moist, very stiff	LEAN CLAY W/SAND		18.7	26	9	1	23	76	
4935	40	Pushed	12	Pushed *0.99+*	CL *(A-7-6(16))*	lt. brown, slightly moist, very stiff to hard	SANDY LEAN CLAY	97.8	19.5	43	27	1	31	68	CT UU
		Disturbed	18	6,11,13,(22) *0.99+*	CL	lt. brown, slightly moist, very stiff to hard									
4930	45	Disturbed	18	8,12,24,(31)	ML	brown, moist, dense	SANDY SILT layers of lean clay to 3" thick								
			0	60/1"	-	no recovery									
4925	50						BOH								
4920							Note: Unable to advance boring using auger, possible boulder.								

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6): Blow Count per 6", $(N_1)_{60}$ Value; 0.45: Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45: Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-E5-2

SHEET 1 OF 2

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1529+86, 153' LT. / N:397,435 E:489,709

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 8.5' / MUD ROTARY

DRILLER: T. KERN

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200

DATE STARTED: 8/11/09

DATE COMPLETED: 8/11/09

GROUND ELEVATION: 4978.3'

LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
	0		Disturbed	16	10,26,14,(84)	SC-SM (A-4(0))	brown, slightly moist, very dense	Organics in top 6" SILTY CLAYEY SAND W/GRAVEL		7.1	26	7	28	30	42	
4975	5		Pushed	12	Pushed 0.68	CL-ML (A-4(3))	lt. brown, moist, stiff	SILTY CLAY W/SAND	95.0	16.6	25	6	1	25	74	DS
4970	10		Disturbed	14	4,6,8,(24) 0.30	ML	lt. gray, moist, firm									
4965	15		Pushed	12	Pushed 0.37	ML (A-4(7))	lt. gray, very moist, firm	SILT plastic	82.6	33.4	34	7	0	14	86	CT DS
4960	20		Disturbed	18	3,4,5,(11) 0.35	ML	lt. gray to lt. brown, very moist, firm									
4955	25		Pushed	17	Pushed 0.40	CL (A-4(10))	brown, very moist to wet, firm	LEAN CLAY	92.1	32.7	32	10	0	4	96	UC
4950	30		Disturbed	21	0/21".(0) 0.37	ML	lt. gray-brown, very moist, firm	SILT plastic								
4945	35		Pushed	18	Pushed 0.74	CL (A-6(14))	brown, moist, stiff		98.4	23.9	32	16	1	7	92	CT
4940	40		Disturbed	13	3,6,12,(16) 0.71	CL	brown, moist, stiff	LEAN CLAY								
4935								GRAVELLY LEAN CLAY W/SAND								

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RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-E5-2

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1529+86, 153' LT. / N:397,435 E:489,709
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 8.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 8/11/09
DATE COMPLETED: 8/11/09
GROUND ELEVATION: 4978.3'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
				4	13,14,9,(18)	CL	gray-brown, moist, very stiff GRAVELLY LEAN CLAY W/SAND								
4930	50			10	Pushed 2.20	CH (A-7-6(21))	rusty-brown, moist, very stiff FAT CLAY W/SAND	81.8	39.1	50	26	0	21	79	CT UU
4925	55			18	7,10,12,(17) 1.10	CH	rusty-brown, moist, very stiff								
4920	60			17	Pushed 1.05	CL (A-6(9))	brown, moist, stiff LEAN CLAY W/SAND	93.0	22.9	37	14	2	25	73	CT
4915	65			12	32,60/4'	CL	brown, moist, hard SANDY LEAN CLAY W/GRAVEL								
4910	70			10	24,60/3"	SM (A-4(0))	rusty-brown, very moist, very dense SILTY SAND		19.5		NP	0	62	38	
4905	75			18	14,16,21,(24) 0.33	ML (A-4(3))	rusty-brown, moist, firm/med. dense SANDY SILT plastic		33.5	37	7	2	37	61	
4900	80			3.5	60/3.5"	GM	rusty-brown, moist, very dense SILTY GRAVEL W/SAND possible cobbles, occasional clay layers 4"-6" thick (driller's observation)								
4895	85			14	29,53,60/5"	ML	rusty-brown, moist, very dense SANDY SILT								
4890							BOH								

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-E5-3

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1535+60, 105' LT. / N:397,993 E:489,566

DRILLING METHOD: DP-CME-55 / HSA TO 43' THEN MUD ROTARY

DRILLER: DIRECT PUSH SERVICES, LLC

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200

DATE STARTED: 10/8/09

DATE COMPLETED: 10/8/09

GROUND ELEVATION: 4994.7'

LOGGED BY: S. CHAFFIN

Elev. (ft)	Depth (ft)	Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
		Disturbed	14	1,2,4,(14)	SP-SM	lt. brown, dry, med. dense	SAND W/SILT & GRAVEL								
4990	5	Disturbed	10	2,14,14,(66)	SP-SM (A-1-a(0))	lt. brown, dry, dense			2.2		NP	43	47	10	
4985	10	Disturbed	17	3,3,5,(14)	ML (A-4(0))	lt. brown, very moist, med. dense	SANDY SILT		25.6		NP	1	39	60	
4980	15	Disturbed	17	14,14,4,(42)	GM	brown, very moist, med. dense	SILTY GRAVEL W/SAND								
				0.40	CL	gray, moist, firm	SANDY LEAN CLAY W/GRAVEL								
4975	20	Disturbed	18	0.88	CH (A-7-6(28))	brown, moist, stiff	FAT CLAY W/SAND		31.4	61	37	5	21	74	
				1,6,6,(16) 0.27	CL	very lt. brown, moist, firm	SANDY LEAN CLAY W/GRAVEL								
4970	25	Undisturbed	5	0.79 Pushed	CH (A-7-6(18))	brown, moist, stiff	FAT CLAY W/SAND	93.4	29.7	50	28	8	24	68	CT
		Disturbed	9	7,24,25,(56)	GC	gray, moist, dense	CLAYEY GRAVEL W/SAND possible cobbles								
4965	30	Undisturbed	0	Pushed	-	no recovery									
		Disturbed	12	14,20,28,(51)	ML (A-4(5))	brown, moist, very dense/hard	SANDY SILT plastic, slightly cemented		27.5	40	8	0	35	65	
4960	35	Disturbed	18	20,30,27,(56)	CL-ML (A-4(1))	lt. brown, moist, hard	SANDY SILTY CLAY slightly cemented		13.9	24	6	1	39	60	
4955	40	Disturbed	18	9,20,30,(46)	CL-ML	brown, moist, hard									
4950	45	Disturbed	18	10,15,21,(31)	SC-SM	brown, moist, dense	SILTY CLAYEY SAND								
4945	50	Disturbed	17	19,39,50,(74)	SC-SM (A-4(0))	brown, moist to very moist, dense			20.9	25	5	8	48	44	
					GM	brown, moist, dense	SILTY GRAVEL W/SAND possible cobbles								
4940	55	Disturbed	10	23,50/3"	SC	brown, moist, very dense	CLAYEY SAND slightly cemented								
							BOH								

200 MVC2009 E.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) 0.45 — Blow Count per 6", $(N_1)_{60}$ Value, Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-E5-5

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1560+25, 338' RT. / N:400,411 E:489,490
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 15' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 8/17/09
DATE COMPLETED: 8/17/09
GROUND ELEVATION: 5003.9'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
			Disturbed	10	7,13,11,(50)	GM	dk. brown, slightly moist, dense — SILTY GRAVEL W/SAND possible cobbles								
5000	5		Disturbed	7	3,3,5,(17)	SC (A-2-6(1))	dk. gray-brown, moist, med. dense — CLAYEY SAND W/GRAVEL		14.9	32	15	30	42	28	
4995	10		Disturbed	12	3,4,4,(13)	SC	gray-brown, moist, med. dense								
4990	15		Pushed	18	Pushed 0.32	CL-ML (A-4(2))	gray, moist, firm — SANDY SILTY CLAY	103.7	21.5	26	5	0	30	70	CT UU
4985	20		Disturbed	18	1,2,3,(6) 0.60	CL	dk. brown, moist, stiff — LEAN CLAY silt and/or sand lenses								
4980	25		Pushed	14	Pushed 2.05 0.77	CL (A-7-6(18))	brown, moist, firm to very stiff	93.6	22.8	43	24	7	14	79	CT UC
4975							BOH								

200 MVC2009 E.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:
DISTURBED SAMPLE — 2,3,2,(6) 0.45 — Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)
UNDISTURBED SAMPLE — PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-E5-6

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1558+80, 338' RT. / N:400,277 E:489,489
DRILLING METHOD: DP-CME-55 / HSA & MUD ROTARY
DRILLER: DIRECT PUSH SERVICES, LLC
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 10/9/09
DATE COMPLETED: 10/12/09
GROUND ELEVATION: 5004.9'
LOGGED BY: S. CHAFFIN

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				11	6,16,14,(71)	SC-SM	dk. brown, dry, very dense	SILTY CLAYEY SAND W/GRAVEL								
5000	5			8	10,7,9,(38)	SM *(A-1-b(0))*	brown, dry, med. dense	SILTY SAND W/GRAVEL		2.0		NP	39	39	22	
4995	10			12	13,18,20,(68)	GM	very lt. brown, slightly moist, dense	SILTY GRAVEL W/SAND possible cobbles								
4990	15			0	4,4,5,(13)	-	no recovery	SANDY LEAN CLAY								
				17	1,3,3,(8) *0.20*	CL *(A-6(6))*	gray, moist to very moist, soft			25.9	30	11	1	30	69	
4985	20			18	*0.32* 1,2,3,(6) *0.48*	CL	gray, moist, firm	LEAN CLAY W/SAND								
						CH	black, moist, firm	FAT CLAY W/SAND								
4980	25			18	7,9,11,(23) *0.62*	CL *(A-7-6(12))*	lt. brown, moist, stiff	SANDY LEAN CLAY		24.0	44	19	11	20	69	
4975	30			15	18,19,23,(45) *1.50*	CL	lt. brown, moist, very stiff									
4970	35			18	5,8,10,(18) *0.80*	CL *(A-6(10))*	brown, moist, stiff	LEAN CLAY W/SAND		30.1	34	15	0	22	78	
4965	40			17	6,15,32,(43) *0.99+*	CL	brown, moist, very stiff									
								SILT W/SAND								

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-E5-6

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1558+80, 338' RT. / N:400,277 E:489,489
DRILLING METHOD: DP-CME-55 / HSA & MUD ROTARY
DRILLER: DIRECT PUSH SERVICES, LLC
DEPTH TO WATER - INITIAL: ∇ N.M. AFTER 24 HOURS: ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 10/9/09
DATE COMPLETED: 10/12/09
GROUND ELEVATION: 5004.9'
LOGGED BY: S. CHAFFIN

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				17	17,32,50/5"	ML (A-4(0))	lt. brown, very moist, dense SILT W/SAND		23.5		NP	0	25	75	
						ML	lt. brown, moist, very dense/hard SILT W/SAND plastic								
4955	50			11	15,50/5"	ML (A-4(6))	lt. brown, moist		20.2	33	8	0	18	82	
						ML	lt. brown, moist SANDY SILT								
4950	55			0	37,30,23,(42)	-	no recovery								
				0	15,12,20,(25)	-	no recovery SILTY SAND W/GRAVEL clay lenses								
4945	60			18	16,17,20,(28)	SM (A-2-4(0))	brown, very moist, med. dense		24.9		NP	15	53	32	
4940	65			17	8,13,19,(23) 1.75	ML	brown, moist, very stiff SILT W/SAND plastic								
4935	70			13	Pushed 0.92	ML (A-7-6(16))	brown, moist, stiff	85.3	31.2	46	18	0	18	82	
							BOH								
4930	75														
4925	80														
4920	85														

200 MVC2009_E.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:
DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)
UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-E5-7

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1629+74, 1' RT. / N:407,346 E:489,640

DATE STARTED: 10/12/09

DRILLING METHOD: DP-CME-55 / HSA

DATE COMPLETED: 10/12/09

DRILLER: DIRECT PUSH SERVICES, LLC

GROUND ELEVATION: 4931.7'

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

LOGGED BY: S. CHAFFIN

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
			Disturbed	15	2,2,2,(9)	SM	lt. brown, dry, loose								
4930							SILTY SAND								
	5		Disturbed	18	5,6,8,(33)	ML	lt. brown, moist, dense SANDY SILT								
4925															
	10		Pushed	9	Pushed *0.23*	CL-ML *(A-4(5))*	lt. brown, very moist, soft SILTY CLAY	99.9	29.5	29	7	0	12	88	CT
4920															
	15		Disturbed	18	3,6,6,(18)	ML *(A-4(0))*	lt. brown, very moist, med. dense SILT W/SAND		25.8		NP	0	28	72	
4915															
	20		Pushed	12	Pushed	ML *(A-4(0))*	lt. brown, very moist	83.5	33.9		NP	0	34	66	CT UU
4910			Disturbed	18	3,3,4,(9)	ML	lt. brown, very moist, loose								
							SANDY SILT								
	25		Disturbed	18	4,4,6,(12)	ML *(A-4(0))*	lt. brown, very moist, med. dense		31.6		NP	0	30	70	
4905															
	30						SANDY LEAN CLAY								
			Disturbed	18	3,2,4,(6) *0.26*	CL	gray, moist, firm								
4900			Pushed	16	Pushed *0.55*	CL *(A-6(13))*	lt. gray, moist, stiff	95.0	25.9	36	18	7	16	77	CT
							LEAN CLAY W/SAND								
	35		Disturbed	18	2,9,10,(19)	CL	lt. brown, moist, med. dense								
4895							BOH								

200 MVC2009_E.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-D5-01

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1524+05, 182' RT. / N:397,091 E:490,184

DATE STARTED: 11/6/09

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 15' / MUD ROTARY

DATE COMPLETED: 11/6/09

DRILLER: K. CONLIN

GROUND ELEVATION: 4976.0'

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

LOGGED BY: J.OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
4975			Disturbed	8	5,6,7,(27)	ML	dk. brown, slightly moist, stiff	182								
							SILT W/SAND plastic									
4970	5		Pushed	9	Pushed *0.39*	ML (*A-4(2)*)	brown, moist, firm	69	102.6	17.6	27	4	0	21	79	
4965	10		Disturbed	18	5,8,5,(22) *0.50*	CL	rust-gray, moist, firm to stiff	62								Chem.
							LEAN CLAY									
4960	15		Pushed	12	Pushed *0.25*	CL (*A-6(9)*)	rust-gray, very moist, firm	296	83.4	33.8	33	11	0	12	88	
4955	20		Disturbed	18	2,2,3,(6) *0.15*	CL	rust-gray, very moist, soft to firm									
							BOH									

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

RB&G ENGINEERING, INC.

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-D5-02

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1555+13, 54' RT. / N:399,914 E:489,221
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 14' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'
PROJECT NUMBER: 200901.200
DATE STARTED: 11/12/09
DATE COMPLETED: 11/12/09
GROUND ELEVATION: 5023.2'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Sample Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
		10	0,8,14,(46)	GC	brown, slightly moist, med. dense	Organics in top 4" CLAYEY GRAVEL W/SAND									
5020	5	12	Pushed 0.73	CL (A-6(12))	brown, moist, stiff	LEAN CLAY W/SAND		90.2	23.5	34	16	0	20	80	
5015		18	13,15,23,(74) 0.99+	CL-ML	brown, slightly moist, hard	SILTY CLAY W/SAND									Chem.
	10	17	29,33,48,(99+) 0.99+	CL-ML (A-4(2))	brown, moist, hard				21.2	24	5	0	20	80	
5010	15	18	14,18,21,(55) 0.99+	CL-ML	brown, moist, hard		31, 42, 22, 15								
5005	20	12	39,60/6"	SM	brown, slightly moist, very dense	SILTY SAND slightly cemented									Chem.
5000	25	13	Pushed 0.99+	MH (A-7-5(10))	brown, slightly moist, hard	SANDY ELASTIC SILT slightly cemented, sand lenses & layers		75.9	26.5	51	21	9	35	56	
		16	32,45,50,(97) 0.99+	MH	brown, slightly moist, hard										
4995	30	14	28,60/5"	SM (A-2-4(0))	brown, moist, very dense	SILTY SAND slightly cemented			19.9		NP	10	57	33	
4990	35	18	12,15,24,(34) 1.63	ML (A-7-6(15))	brown, moist, hard	SILT W/SAND plastic, slightly cemented			26.2	44	16	0	17	83	
4985	40	18	8,16,28,(39) 0.99+	ML	brown, moist, hard										
4980						BOH									

LEGEND:

DISTURBED SAMPLE: 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE: PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

RB&G ENGINEERING, INC.

DRILL HOLE LOG

BORING NO. 09-D5-03

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1557+04, 62' RT. / N:400,102 E:489,218
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 25' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 11/12/09
DATE COMPLETED: 11/12/09
GROUND ELEVATION: 5021.6'
LOGGED BY: J.P., S.C., J.B.

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
5020				18	8,12,14,(55)	SM	brown, slightly moist, very dense	SILTY SAND gravels near surface									
5015	5			9	7,7,10,(38)	SM (A-2-4(0))	brown, moist, dense				21.3		NP	0	72	28	
5010	10			17	3,4,7,(19)	SM	brown, moist, med. dense	SILTY SAND W/GRAVEL plastic									Chem.
5005	15			17	7,7,16,(33)	SM (A-4(2))	lt. brown, moist, dense				22.4	34	10	22	29	49	
5000	20			15	6,6,9,(17)	SC	brown, moist, med. dense	CLAYEY SAND									
4995	25			15	8,8,16,(27)	SC (A-6(4))	brown, moist, med. dense	CLAYEY SAND	24		26.8	38	19	8	48	44	
4990	30			13	21,49,60,(99+)	SM (A-1-b(0))	brown, very moist, very dense	SILTY SAND W/GRAVEL possible cobbles	36		14.9		NP	18	58	24	
4985	35			10	9,27,33,(56)	SC (A-2-6(0))	brown, moist, very dense	CLAYEY SAND W/GRAVEL	21		19.5	35	12	22	53	26	
4980	40			17	11,16,21,(33) 0.99+	CL	brown, moist, hard	SANDY LEAN CLAY									
								BOH									

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-D5-04

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1558+88, 69' RT. / N:400,287 E:489,221
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 25' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 11/13/09
DATE COMPLETED: 11/13/09
GROUND ELEVATION: 5014.0'
LOGGED BY: S. CHAFFIN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
			Disturbed	18	11,35,50,(99+)	GM (A-1-b(0))	brown, slightly moist, very dense SILTY GRAVEL W/SAND possible cobbles			4.4		NP	48	35	17	
5010	5		Disturbed	18	2,3,6,(20)	ML (A-4(1))	brown, moist, stiff SANDY SILT plastic	156		20.0	27	5	0	42	58	
5005	10		Disturbed	18	4,5,5,(17)	ML	brown, moist, stiff	104								Chem.
5000	15		Disturbed	18	1,2,2,(6) *0.20*	CL-ML (A-4(3))	gray, wet, soft SANDY SILTY CLAY	104		31.7	29	7	0	33	67	
4995	20		Undisturbed	15	Pushed *1.15*	CH (A-7-6(26))	brown, moist, very stiff FAT CLAY W/SAND	69	80.9	30.5	50	30	1	15	84	
4990	25		Disturbed	15	4,6,7,(14) *0.60*	CL	lt. brown, moist, stiff LEAN CLAY W/SAND	14								
4985	30		Disturbed	8	6,6,7,(13) *0.57*	CL	lt. brown, moist, stiff									
							BOH									
4980																

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-D5-05

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1578+35, 306' RT. / N:402,188 E:489,662
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 25' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 11/13/09
DATE COMPLETED: 11/13/09
GROUND ELEVATION: 4987.2'
LOGGED BY: S. CHAFFIN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
				14	6,14,13,(57)	GC-GM	brown, slightly moist, dense — SILTY CLAYEY GRAVEL W/SAND									
4985								156								
	5			7	8,9,12,(47)	SM (A-4(0))	brown, moist, dense			12.5		NP	7	49	44	
4980								104								
	10			0	3,3,4,(12)	-	no recovery — SILTY SAND									
4975								41								
	15			8	2,3,10,(18)	SM (A-4(0))	brown, moist, med. dense			17.4		NP	10	45	45	
4970								17,800								
	20			10	9,14,24,(47)	GC	brown, moist, med. dense — CLAYEY GRAVEL W/SAND									
4965								13,800								
	25			13	23,49,60/5"	GP-GM (A-1-a(0))	GRAVEL W/SILT & SAND possible cobbles; brown, moist, very dense			8.4		NP	60	35	5	
4960							BOH									

200 MVC2009_D.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-D5-06

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1623+21, 301' RT. / N:406,675 E:489,913

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 25' / MUD ROTARY

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 11/11/09

DATE COMPLETED: 11/11/09

GROUND ELEVATION: 4947.3'

LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				17	5,13,19,(67)	SM CL	brown, dry dk. gray-brown, slightly moist, hard	SILTY SAND W/GRAVEL (fill) SANDY LEAN CLAY W/GRAVEL (fill)	104								
4945																	
	5			10	17,14,15,(61)	GP-GM	brown, slightly moist, dense	GRAVEL W/SILT & SAND slightly plastic	27,700								
4940																	
	10			13	14,10,5,(24) *0.57*	GP-GM *(A-1-b(0))* CL	brown, moist lt. brown, moist, stiff				12.2	24	4	61	21	18	
4935									24,900								
	15			17	6,8,10,(24) *0.99+*	CL	red-brown, moist, very stiff	LEAN CLAY W/SAND sand lenses									
4930									7490								
	20			18	Pushed *0.75*	CL *(A-4(4))*	red-brown, moist, stiff	SANDY LEAN CLAY gravelly clay layers		108.5	16.0	25	10	6	28	66	
4925				12	*0.49* 5,6,9,(17)	CL SC	red-brown, moist, firm brown, moist, med. dense	CLAYEY SAND	2050								
	25			13	9,10,14,(25) *0.99+*	CL	brown, moist, very stiff	LEAN CLAY W/SAND sand lenses & layers to 0.5" thick	6								
4920																	
	30			18	7,8,7,(14)	SC	brown, moist, med. dense	CLAYEY SAND sand lenses	64								
4915																	
	35			18	Pushed *0.51*	CL *(A-6(16))*	brown, moist, stiff	LEAN CLAY		105.4	21.4	35	18	1	9	90	
4910									277								
	40			16	8,10,15,(21) *0.99+*	CL	brown, moist, very stiff	SANDY LEAN CLAY sand lenses & layers in bottom 3" of sample									
4905								BOH									

200 MVC2009 D.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) *0.45* — Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45* — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-D5-07

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1624+78, 314' RT. / N:406,833 E:489,935
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 30' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 11/11/09
DATE COMPLETED: 11/11/09
GROUND ELEVATION: 4941.4'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Sample Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
4940		13	7,15,28,(90)	CL-ML GC	brown, slightly moist brown, slightly moist, very dense	SANDY SILTY CLAY organics CLAYEY GRAVEL W/SAND	311								
4935	5	11	21,22,19,(86)	SP-SM	brown, slightly moist, very dense	SAND W/SILT & GRAVEL possible cobbles	363								Chem.
4930	10	11	17,18,26,(71)	SP-SM *(A-1-a(0))*	brown, moist, dense		5860		9.8		NP	46	46	8	
4925	15	0	4,4,6,(13)	-	no recovery	LEAN CLAY	141								
4920	20	11	Pushed *0.50*	CL *(A-6(14))*	lt. brown, very moist, stiff		265	84.0	31.6	36	13	0	1	99	
4915	25	11	*0.54* 3,4,7,(11)	CL SM	red-brown, very moist, stiff brown, moist, med. dense	SILTY SAND	125								
4910	30	7	13,11,11,(21)	GC-GM *(A-2-4(0))*	brown, moist, loose	SILTY CLAYEY GRAVEL W/SAND possible cobbles	189		11.7	23	7	43	33	24	
4905	35	12	39,36,30,(58)	GC-GM	brown, moist, dense	BOH									

200 MVC2009 D.GPJ US EVAL.GDT 10/26/10

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-D5-08

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1626+34, 328' RT. / N:406,992 E:489,957

DATE STARTED: 11/10/09

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 30' / MUD ROTARY

DATE COMPLETED: 11/10/09

DRILLER: K. CONLIN

GROUND ELEVATION: 4937.9'

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
			Disturbed	10	4,8,9,(36)	CL	brown, slightly moist, stiff	Organics in top 6" LEAN CLAY W/SAND									
4935	5		Disturbed	12	28,29,26,(99+)	GP-GM	brown, slightly moist, very dense										
4930	10		Disturbed	14	17,27,35,(99+)	GP-GM (A-1-a(0))	brown, moist, very dense	GRAVEL W/SILT & SAND possible cobbles			6.9		NP	51	43	6	
4925	15		Disturbed	11	6,6,7,(18)	SM (A-4(0))	lt. brown, moist, med. dense	SILTY SAND			16.1		NP	0	60	40	
4920	20		Disturbed	18	2,4,4,(10) 0.45	CL	brown, moist, firm										
4915	25		Undisturbed	18	Pushed 0.26	CL (A-6(13))	brown, moist, firm	LEAN CLAY sand lenses	19	91.7	26.0	33	15	0	10	90	
4910	30		Disturbed	11	5,6,8,(14) 0.69	CL	brown, moist, stiff		24								
4905	35		Disturbed	12	7,7,9,(15) 0.60	CL	brown, very moist, stiff	LEAN CLAY W/SAND interbedded w/clayey sand layers									
4900								BOH									

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS

UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-D5-09

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1627+90, 344' RT. / N:407,150 E:489,979
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 25' / MUD ROTARY
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 11/10/09
DATE COMPLETED: 11/10/09
GROUND ELEVATION: 4936.4'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description		Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
4935				10	5,8,12,(42)	CL (A-4(4))	brown, slightly moist, hard	SANDY LEAN CLAY organics	156		10.6	25	10	0	34	66	
4930	5			11	4,5,6,(25)	SM	lt. brown, slightly moist, med. dense		225								Chem.
4925	10			10	8,11,12,(39)	SM (A-2-4(0))	lt. brown, slightly moist, dense	SILTY SAND more silt w/depth, occasional clay lenses	83		8.0		NP	2	72	26	
4920	15			13	5,10,17,(38)	SM	lt. brown, moist, dense		52								
4915	20			17	5,5,9,(17)	SM	lt. brown, moist, med. dense		58								
4910	25			18	Pushed 0.50	CL (A-6(15))	brown, moist, stiff	LEAN CLAY sand lenses, possible sand layers (driller's observation)	85	91.8	22.2	33	18	0	10	90	
4905	30			18	6,7,8,(15) 0.85	CL	brown, moist, stiff										
								BOH									

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) 0.45: Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45: Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-D5-10

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1629+45, 362' RT. / N:407,309 E:490,001

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 25' / MUD ROTARY

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200

DATE STARTED: 11/10/09

DATE COMPLETED: 11/10/09

GROUND ELEVATION: 4935.3'

LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
4935		11	8,10,13,(48)	CL	SANDY LEAN CLAY; brown, slightly moist, very stiff	91								
4930	5	16	25,43,52,(99+)	GP-GM	GRAVEL W/SILT & SAND possible cobbles; brown & gray, slightly moist, very dense									
4925	10	12	27,28,23,(82)	GP-GM (A-1-a(0))	brown, moist, very dense			8.4		NP	52	37	11	
4920	15	12	18,26,34,(80)	GP-GM	brown, moist, very dense									
4915	20	11	6,11,12,(28)	SM (A-2-4(0))	SILTY SAND; lt. brown, moist, med. dense	81		14.1		NP	0	76	24	
4910	25	12	8,6,9,(17)	SM	lt. brown, moist, med. dense	54								
4905	30	18	3,4,4,(8) 0.60	CH (A-7-6(31))	FAT CLAY; brown & gray-brown, moist, stiff			37.3	57	28	0	6	94	

BOH

200 MVC2009 D.GPJ US EVAL.GDT 10/26/10

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) 0.45 — Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

RB&G ENGINEERING, INC.

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-D5-11

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1631+01, 381' RT. / N:407,467 E:490,023

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 30' / MUD ROTARY

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200

DATE STARTED: 11/9/09

DATE COMPLETED: 11/9/09

GROUND ELEVATION: 4935.1'

LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Permeability (ft/yr)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
		18	4,7,9,(34)	SM (A-2-4(0))	lt. brown, slightly moist, dense	SILTY SAND	207	5.8		NP	1	67	32	
4930	5	15	31,31,32,(99+)	SM (A-1-a(0))	brown, slightly moist, very dense	SILTY SAND W/GRAVEL possible cobbles	2210	6.9		NP	41	46	13	
4925	10	10	12,16,19,(60)	SM	brown, moist, very dense		19,900							Chem.
4920	15	10	16,18,20,(54)	SP-SM	brown, moist, very dense	SAND W/SILT & GRAVEL possible cobbles	17,800							
4915	20	14	15,18,31,(60)	SP-SM (A-1-b(0))	brown, moist, very dense		13,800	9.5		NP	45	45	10	
4910	25	14	29,10,10,(22) 0.33	SP-SM / CL	brown, moist / brown, wet, firm	LEAN CLAY W/SAND interbedded w/silty sand layers to 2" thick	38							
4905	30	18	2,3,5,(8) 0.12 0.29	CL (A-6(6))	brown, wet, soft to firm			30.9	28	11	2	24	74	
						BOH								

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) Blow Count per 6"; (N₁)₆₀ Value; 0.45 Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

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ADDENDUM 1 - OCTOBER 2010

200 MVC2009 D.GPJ US EVAL.GDT 10/26/10

DRILL HOLE LOG

BORING NO. 10-D5-12

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1585+46, 12' LT. / N:402,929 E:489,371

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 35' / ROTARY WASH

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ∇ DRY TO 36.5' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 2/18/10

DATE COMPLETED: 2/18/10

GROUND ELEVATION: 5003.9'

LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
		Disturbed	9	3,4,5,(19)	GM	brown, very moist, loose — SILTY GRAVEL W/SAND									
5000						LEAN CLAY W/SAND									
	5	Disturbed	11	*0.36*	CL	lt. brown, very moist, firm									
				7,7,13,(45)	GM	brown, wet, med. dense — SILTY GRAVEL W/SAND possible cobbles									
4995															
	10	Disturbed	11	20,25,35,(95)	GP-GM	brown, very moist, very dense									
4990															
	15	Disturbed	15	41,52,60/5"	GP-GM	brown, very moist, very dense									
4985						GRAVEL W/SILT & SAND possible cobbles									
	20	Disturbed	16	31,38,40,(90)	GP-GM (*A-1-a(0)*)	lt. brown, very moist, very dense	>16,300		8.7		NP	50	41	9	
4980															
	25	Disturbed	8	25,27,27,(56)	GP-GM	lt. brown, very moist, dense	>13,400								
4975															
	30	Disturbed	16	8,12,12,(23)	ML (*A-4(0)*)	lt. brown & reddish-brown, moist, med. dense — SANDY SILT interbedded w/clay lenses & layers	8		22.2		NP	3	45	52	
4970															
	35	Disturbed	17	2,3,5,(7)	ML	lt. brown & reddish-brown, moist, loose									
						BOH									
4965															

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-D5-13

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1588+14, 8' LT. / N:403,197 E:489,377
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 28' / ROTARY WASH
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ▽ DRY TO 34.5' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 2/18/10
DATE COMPLETED: 2/18/10
GROUND ELEVATION: 5000.0'
LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft) / Depth (ft) scale: 4995 – 5; 4990 – 10; 4985 – 15; 4980 – 20; 4975 – 25; 4970 – 30

Sample Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
	0.23	CL	LEAN CLAY brown, moist, soft									
17	5,7,9,(34)	ML	lt. brown, moist, dense SANDY SILT									
	0.56	CL	LEAN CLAY lt. brown, moist, stiff									
14	4,6,15,(39)	GM	brown, very moist, med. dense SILTY GRAVEL W/SAND possible cobbles									
14	18,14,16,(42)	GP-GM	brown, very moist, med. dense GRAVEL W/SILT & SAND possible cobbles									
13	17,17,20,(45)	GP-GM	brown, very moist, med. dense									
	0.42	CL	LEAN CLAY W/GRAVEL lt. brown, very moist, firm									
14	7,16,16,(34)	SM (A-2-4(0))	red-brown, very moist, dense SILTY SAND			23.4		NP	0	72	28	
	0.36	ML	SILT W/SAND plastic red-brown, moist, firm									
12	12,33,23,(58)	GM	red-brown, moist, dense SILTY GRAVEL W/SAND possible cobbles									
		GM	red-brown, moist									
18	3,3,2,(5)	ML (A-4(2))	red-brown, very moist, firm SILT W/SAND plastic			27.5	28	3	0	16	84	
			BOH									

Permeability (ft/yr): >18,200 (approx. 18–23 ft); 1,590 (approx. 23–28 ft); 3,060 (approx. 28–33 ft)

200 MVC2009_D.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (N₁)₆₀ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-D5-13A

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: ~STA. 1587+98, ~7' LT. / N:~403,181 E:~489,377

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 45' / ROTARY WASH

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ▽ DRY TO 51.5' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 2/25/10

DATE COMPLETED: 2/25/10

GROUND ELEVATION: ~5000.0'

LOGGED BY: B. HORROCKS, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description	Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
4995	5															
4990	10															
4985	15						NOT SAMPLED - SEE BORING 10-D5-13 FOR TOP 35'									
4980	20															
4975	25															
4970	30															
4965	35		■	18	2,1,2,(3) *0.20*	CL	brown, wet, soft — LEAN CLAY silt lenses 1"-3" apart	131								
							SAND (driller's observation)									
4960	40		■	18	*0.55* 3,2,1,(3) *0.10*	CL (*A-6(7)*)	brown to lt. brown, stiff to very stiff, moist to wet — LEAN CLAY	3		34.6	30	11	2	22	76	
							LEAN CLAY W/GRAVEL									
4955	45		■	18	7,9,9,(15)	CL CL	lt. brown, very moist brown, very moist, stiff — LEAN CLAY silt layers to 2" thick	42								
							SANDY SILTY CLAY									
4950	50		■	18	22,26,30,(41)	CL-ML (*A-4(0)*)	brown, very moist, hard			16.8	22	4	6	42	52	
							BOH									

200 MVC2009_D.GPJ US EVAL.GDT 10/26/10

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) *0.45* — Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45* — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-D5-14

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1555+39, 356' RT. / N:399,962 E:489,520
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 25' / ROTARY WASH
DRILLER: S. CHAFFIN
DEPTH TO WATER - INITIAL: ▽ DRY TO 31.5' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.206-06
DATE STARTED: 5/17/10
DATE COMPLETED: 5/18/10
GROUND ELEVATION: 5016.3'
LOGGED BY: J. OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Rec. (in)	Sample (See Legend)	USCS (AASHTO)	Material Description		Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
5015		11	13,35,35,(99+)	SM	brown, moist, very dense	SILTY SAND W/GRAVEL	311								
5010	5	13	7,9,9,(38)	SM	brown w/rust, moist, dense	SILTY SAND very slightly plastic	79								
5005	10	17	3,7,3,(17) *0.15*	CL (*A-4(2)*)	brown w/rust, very moist, soft to firm		49		28.7	29	9	0	46	54	
5000	15	18	1,1,3,(6) *0.20*	CL	brown, very moist, soft	SANDY LEAN CLAY sand lenses & layers	21								
4995	20	18	1,2,2,(4) *0.23*	CL (*A-4(2)*)	gray w/black, very moist, soft		39		29.0	28	8	0	41	59	
4990	25	15	Pushed *0.45*	CL	brown, very moist, firm	SANDY LEAN CLAY W/GRAVEL	9								
		6	5,5,7,(13) *0.45*	CL	brown, very moist, firm										
4985	30	14	28,46,56,(96)	GC (*A-2-4(0)*)	lt. brown, moist, very dense	CLAYEY GRAVEL W/SAND possible cobbles	15		11.4	23	9	46	35	19	
						BOH									

200 MVC2009 206-06F D.GPJ US EVAL.GDT 10/26/10

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LEGEND:
DISTURBED SAMPLE 2,3,2,(6) *0.45* — Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)
UNDISTURBED SAMPLE PUSHED *0.45* — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 10-D5-15

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1558+64, 369' RT. / N:400,262 E:489,520

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 15' / ROTARY WASH

DRILLER: S. CHAFFIN

DEPTH TO WATER - INITIAL: ∇ DRY TO 21.5' AFTER 24 HOURS: ▼ N.M.

PROJECT NUMBER: 200901.206-06

DATE STARTED: 5/17/10

DATE COMPLETED: 5/17/10

GROUND ELEVATION: 5005.2'

LOGGED BY: J. OLSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Permeability (ft/yr)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
5005			Disturbed	10	2,5,3,(17)	SM	brown, moist, med. dense SILTY SAND W/GRAVEL	1,920								
5000	5		Disturbed	9	15,11,12,(48)	GP-GM	brown, moist, med. dense	6,770								
							GRAVEL W/SILT & SAND possible cobbles									
4995	10		Disturbed	9	21,22,22,(70)	GP-GM (*A-1-a(0)*)	brown, moist, dense			10.0		NP	50	40	10	
								29								
4990	15		Disturbed	18	6,5,5,(13)	SM (*A-1-b(0)*)	lt. brown, moist SILTY SAND W/GRAVEL			12.9		NP	39	42	19	
						CL-ML (*A-4(0)*)	gray, very moist, stiff SANDY SILTY CLAY	7		24.6	25	5	0	49	51	
							LEAN CLAY									
4985	20		Disturbed	18	1,1,2,(4) *0.35*	CL	gray w/black, moist, firm									
							BOH									

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (N$_1$)$_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-CS5-1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1592+38, 599' LT. / N:403,625 E:488,788
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 11/23/09
DATE COMPLETED: 11/23/09
GROUND ELEVATION: 5011.0'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
		18	6,12,12,(51)	GM	brown, slightly moist — SILTY GRAVEL W/SAND								
5010				SM	brown, slightly moist, very dense — SILTY SAND								
		16	6,6,8,(32) *0.52*	SM *(A-2-4(0))*	brown, moist		8.8		NP	7	66	27	
				CL	lt. brown, moist, stiff — LEAN CLAY W/SAND sand lenses								
	5	11	Pushed *0.75*	CH *(A-7-6(32))*	brown, slightly moist, stiff — FAT CLAY	92.9	25.8	58	33	0	12	88	
5005													
		15	4,3,4,(13) *0.42*	CH	FAT CLAY W/SAND — brown, slightly moist, firm								
	10				BOH								
5000													
	15												
4995													

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-CS5-2

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1592+06, 602' RT. / N:403,584 E:489,989

DRILLING METHOD: 08-CME-55 / N.W. CASING TO 8.5' / MUD ROTARY

DRILLER: T. KERN

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 11/23/09

DATE COMPLETED: 11/23/09

GROUND ELEVATION: 4990.1'

LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
								6" ASPHALT								
				15	14,18,18,(77)	GC-GM	brown, moist, very dense	SILTY CLAYEY GRAVEL W/SAND								
				15	13,12,7,(40)	GP-GM *(A-1-a(0))*	brown, moist, med. dense			7.4		NP	47	41	12	
4985	5							GRAVEL W/SILT & SAND possible cobbles								
				13	9,18,36,(99+)	GP-GM	brown, moist, very dense									
				14	21,71/6"	SM *(A-4(0))*	lt. brown, very moist, very dense	SILTY SAND clay lenses, slightly cemented		34.0		NP	9	50	41	
								BOH								
4980	10															
4975	15															

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) Blow Count per 6", $(N_1)_{60}$ Value; 0.45 Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-CS5-3

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER: 200901.200
LOCATION: STA. 1644+75, 469' LT. / N:408,919 E:489,244
DATE STARTED: 11/23/09
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 8.5' / MUD ROTARY
DATE COMPLETED: 11/23/09
DRILLER: T. KERN
GROUND ELEVATION: 4976.5'
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
								7" ASPHALT								
4975				15	22,27,10,(79)	GC-GM	brown, moist, very dense	10" BASE (SILTY CLAYEY GRAVEL W/SAND)								
						SC	dk. gray-brown, moist, very dense	CLAYEY SAND W/GRAVEL								
				10	6,4,6,(23)	SC (A-2-4(0))	dk. gray-brown, moist			13.4	25	10	19	55	26	
						GP-GM	brown, slightly moist	GRAVEL W/SILT & SAND possible cobbles								
4970	5			12	11,17,25,(89)	GP-GM (A-1-a(0))	brown, moist, very dense			7.6		NP	50	38	12	
				12	15,15,24,(68)	GP-GM	brown, moist, dense									
4965	10							BOH								
4960	15															

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-CS5-4

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1646+91, 501' RT. / N:408,952 E:490,237
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 8.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 11/23/09
DATE COMPLETED: 11/23/09
GROUND ELEVATION: 4936.6'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
				18	7,32,45,(99+)	SC (*A-2-4(0)*)	dk. gray-brown, slightly moist	CLAYEY SAND W/GRAVEL		7.3	26	10	29	45	26	
4935						GP-GM	brown, moist, very dense	GRAVEL W/SILT & SAND possible cobbles								
				11	40,52,40,(99+)	GP-GM	brown, moist, very dense									
	5			8	30,34,20,(99+)	GP-GM	brown, moist, very dense									
4930																
				10	9,11,10,(39)	GP-GM (*A-1-a(0)*)	brown, moist, med. dense			7.8		NP	53	36	11	
	10							BOH								
4925																
	15															
4920																

200_MVC2009_CS.GPJ US EVAL.GDT 10/26/10

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-139

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1502+04, 79' LT. / N:394,962 E:491,014

DRILLING METHOD: 08-CME-55 / N.W. CASING TO 25' / MUD ROTARY

DRILLER: T. KERN

DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 9/16/09

DATE COMPLETED: 9/17/09

GROUND ELEVATION: 4974.3'

LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				18	10,23,42,(99+)	GC (A-4(0))	brown, slightly moist, dense	Organics in top 6" CLAYEY GRAVEL W/SAND		4.9	25	8	38	24	38	
4970	5					SM/ML	brown, slightly moist	SILTY SAND TO SANDY SILT pinhole structure								
				10	14,55/6"	GP-GM	brown, slightly moist, very dense	GRAVEL W/SILT & SAND possible cobbles								
4965	10			9	30,38,24,(99+)	CL-ML (A-4(0))	brown, moist, hard	GRAVELLY SILTY CLAY W/SAND		10.9	23	5	26	21	53	
4960	15			9	28,62/6"	GP-GM	brown, moist, very dense	GRAVEL W/SILT & SAND silt layers to 1" thick, possible cobbles								
4955	20			8	34,60/5"	GP-GM	brown, moist, very dense									
4950	25			5	62/6"	GP-GM	brown, moist, very dense	GRAVEL W/SILT & SAND possible cobbles								
4945	30			5	62/6"	GP-GM	brown, moist, very dense									
				8	20,60/5"	GP-GM (A-1-a(0))	brown, moist, very dense			11.1		NP	52	37	11	
4940	35			3	64/3"	GP-GM	brown, moist, very dense									
				7	50,50/1"	GP-GM	brown, moist, very dense									
4935								BOH								

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-140

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1507+04, 79' RT. / N:395,468 E:490,878

DRILLING METHOD: 78-CME-55 / HSA & 08-CME-55 / N.W. CASING / MUD ROTARY

DRILLER: K. CONLIN, T. KERN

DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/21/09

DATE COMPLETED: 9/17/09

GROUND ELEVATION: 4971.5'

LOGGED BY: E.R., M.H., J.B.

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
								Organics in top 6"								
4970			Disturbed	11	5,16,18,(54)	ML/CL-ML	lt. brown, dry, hard	SANDY SILT TO SANDY SILTY CLAY								
4965	5		Pushed	12	Pushed 0.41	ML/CL-ML	very lt. brown, slightly moist, firm									
	10					CL-ML	dk. brown, slightly moist	SILTY CLAY W/SAND								
4960			Disturbed	18	5,9,11,(35)	SM (A-2-4(0))	brown, moist, dense	SILTY SAND		7.5		NP	2	80	18	
4955	15		Disturbed	13	16,36,30,(66)	GC-GM (A-2-4(0))	lt. brown, moist, dense	SILTY CLAYEY GRAVEL W/SAND possible cobbles		7.8	25	7	47	34	19	
	20		Disturbed	6	58,50/4"	GM	brown, moist, very dense	SILTY GRAVEL W/SAND possible cobbles								
4950			Disturbed	10	20,35,37,(82)	GM (A-1-a(0))	brown, moist, dense			8.2		NP	44	43	13	
	25		Disturbed	10	26,36,39,(81)	GM	brown, moist, dense									
4945			Disturbed	11	33,52/6"	SM (A-1-a(0))	brown, moist, very dense	SILTY SAND W/GRAVEL possible cobbles, slightly plastic		9.8	19	1	42	43	15	
	30		Disturbed	8	30,60/6"	SM	brown, moist, very dense									
4940								BOH								

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LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-141

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1512+03, 79' LT. / N:395,805 E:490,476
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 35' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 9/17/09
DATE COMPLETED: 9/17/09
GROUND ELEVATION: 4988.8'
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
4985	5	Disturbed	10	16,22,24,(98)	GP-GM	brown, dry, dense	GRAVEL W/SILT & SAND possible cobbles								
4980	10	Disturbed	6		GP-GM	brown, moist									
				10,6,6,(20) *0.51*	CL *(A-6(16))*	brown, moist, stiff	LEAN CLAY		22.5	37	20	2	14	84	
4975	15	Disturbed	16	32,42,42,(99+)	GM	brown, moist, very dense	SILTY GRAVEL W/SAND possible cobbles								
4970	20	Disturbed	16	24,30,28,(68)	SM *(A-1-b(0))*	brown, moist, very dense	SILTY SAND W/GRAVEL possible cobbles		11.0		NP	40	42	18	
4965	25	Disturbed	14	45,41,53,(99)	SM	brown, moist, very dense									
4960	30	Disturbed	16	37,34,47,(78)	GM *(A-1-b(0))*	brown, moist, dense	SILTY GRAVEL W/SAND possible cobbles, slightly plastic		11.2	20	2	43	35	22	
		Disturbed	7	31,66/6"	GM	brown, moist, very dense									
4955	35	Disturbed	4	48,60/5"	GM	brown, moist, very dense									
4950		Disturbed	2	60/5"	GM	brown, moist, very dense									
							BOH								

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) Blow Count per 6", (N_1)$_{60}$ Value; *0.45* Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; *0.45* Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

RB&G ENGINEERING, INC.

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-MVC-142

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1517+11, 45' RT. / N:396,311 E:490,341
DRILLING METHOD: 78-CME-55 / HSA
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/21/09
DATE COMPLETED: 8/21/09
GROUND ELEVATION: 4972.9'
LOGGED BY: E.RICHARDSON, J.BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
							Organics in top 6"								
			Disturbed	9	5,7,4,(18)	CL-ML	brown, dry, stiff								
							SILTY CLAY								
4970			Disturbed	13	2,2,3,(9)	CL-ML (A-4(3))	lt. brown, slightly moist, firm		7.6	23	6	0	9	91	
	5		Pushed	11	Pushed 0.39	CL	lt. brown, slightly moist, firm								
4965			Disturbed	16	2,3,2,(8)	CL (A-6(8))	lt. brown, slightly moist to moist, firm		14.6	27	11	0	14	86	
							LEAN CLAY								
	10														
			Disturbed	13	6,11,11,(26) 0.42	CL	brown, moist, firm								
							BOH								
4960															
	15														
4955															

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) 0.45 — Blow Count per 6"; $(N_1)_{60}$ Value; Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-MVC-143

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1521+79, 180' LT. / N:396,662 E:489,949
DRILLING METHOD: 78-CME-55 / HSA
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/21/09
DATE COMPLETED: 8/21/09
GROUND ELEVATION: 5001.0'
LOGGED BY: E.RICHARDSON, J.BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
							Organics in top 6"								
5000			Disturbed	10	4,10,12,(35)	ML	lt. brown, dry, very stiff								
							SILT W/SAND plastic								
4995	5		Pushed	14	Pushed *0.25*	ML (*A-4(4)*)	lt. brown, slightly moist to moist, firm	87.9	19.2	32	4	0	18	82	
	10		Disturbed	16	11,31,26,(78)	ML (*A-4(0)*)	lt. brown, moist, very dense		14.5		NP	0	42	58	
							SANDY SILT slightly cemented								
4990			Disturbed	15	11,43,45,(99+)	ML	brown to lt. brown, moist, very dense								Chem.
			Disturbed	9	9,50/3"	CL (*A-6(4)*)	brown, slightly moist to moist, hard		15.0	30	13	12	32	56	
4985	15						SANDY LEAN CLAY								
			Disturbed	13	2,46,50/1"	CL	lt. brown, slightly moist to moist, hard								
							BOH								

200 MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE: 2,3,2,(6) — Blow Count per 6", $(N_1)_{60}$ Value; 0.45 — Torvane (tsf)

UNDISTURBED SAMPLE: PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-144

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1526+90, 71' LT. / N:397,182 E:489,884

DRILLING METHOD: 78-CME-55 / HSA

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ⊻ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/5/09

DATE COMPLETED: 8/5/09

GROUND ELEVATION: 4982.6'

LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
				11	4,7,8,(24)	CL (A-4(6))	brown, slightly moist, stiff		5.6	25	10	0	16	84	
							LEAN CLAY W/SAND								
4980				13	4,5,7,(20)	CL	brown, slightly moist								
						ML	lt. brown, slightly moist								
	5			17	6,10,13,(37)	ML (A-4(2))	lt. brown, moist, very stiff		17.0	26	4	0	19	81	
							SILT W/SAND plastic								
4975															
				16	2,5,7,(17) 0.32	ML	lt. brown, moist, firm to stiff								
	10						BOH								
4970															
	15														
4965															

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) 0.45 — Blow Count per 6", $(N_1)_{60}$ Value, Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-145

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1531+91, 223' LT. / N:397,606 E:489,576

DRILLING METHOD: 78-CME-55 / HSA

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/5/09

DATE COMPLETED: 8/5/09

GROUND ELEVATION: 4983.2'

LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
			Disturbed	15	3,19,20,(62)	CL-ML (*A-4(1)*)	lt. brown, slightly moist, very stiff		4.7	24	6	4	35	61	
							SANDY SILTY CLAY sand lenses								
4980			Disturbed	14	3,8,10,(31)	CL-ML	lt. brown, slightly moist, stiff								
	5		Disturbed	18	9,14,19,(53)	CL/CL-ML	lt. brown, slightly moist, very stiff								
							LEAN CLAY W/SAND TO SILTY CLAY W/SAND								
4975							SILTY SAND								
			Disturbed	14	8,10,13,(32)	ML (*A-4(0)*)	lt. red-brown, slightly moist, dense		4.6		NP	0	38	62	
	10						BOH								
4970															
	15														
4965															

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE: 2,3,2,(6) — Blow Count per 6"; $(N_1)_{60}$ Value; 0.45 — Torvane (tsf)

UNDISTURBED SAMPLE: PUSHED; 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-146

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1536+69, 8' LT. / N:398,128 E:489,622

DATE STARTED: 8/12/09

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 35' / MUD ROTARY

DATE COMPLETED: 8/12/09

DRILLER: T. KERN

GROUND ELEVATION: 5014.0'

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
				12	5,8,9,(36)	SM	brown, slightly moist, dense	SILTY SAND								
5010	5			15	2,4,7,(25)	ML (A-4(0))	gray-brown, moist, med. dense	SANDY SILT few clay lenses		21.5		NP	2	47	51	
5005	10			10	13,17,25,(67)	SP-SM (A-1-a(0))	gray-brown, moist, very dense	SAND W/SILT & GRAVEL		10.6		NP	29	64	7	
5000	15			8	13,25,24,(65)	GM	gray-brown, moist, dense	SILTY GRAVEL W/SAND possible cobbles								
4995	20			12	Pushed	SM (A-2-4(0))	gray-brown, very moist	SILTY SAND	94.0	24.5		NP	0	66	34	
				15	5,5,7,(14) 0.33	CL	gray-brown, moist, firm	LEAN CLAY W/SAND								
4990	25			20	2,3,4,(8) 0.60 0.40 0.34	CL (A-4(6))	gray-brown to brown, moist, firm to stiff			28.8	29	9	0	19	81	
4985	30			5	15,21,15,(34)	GM	gray-brown, moist, med. dense	SILTY GRAVEL W/SAND possible cobbles								
4980	35			16	Pushed	SM (A-2-4(0))	brown, moist	SILTY SAND		26.5		NP	0	82	18	
				18	3,8,9,(16) 0.52 0.61	CL-ML	gray-brown, moist, stiff	SANDY SILTY CLAY sandy silt layer 4" thick								
								BOH								
4975																

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-MVC-147

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1542+41, 37' LT. / N:398,658 E:489,406
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 8.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/12/09
DATE COMPLETED: 8/12/09
GROUND ELEVATION: 5062.3'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Plast. Index	Gradation Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
				16	30,25,25,(99+)	SM	brown, dry	SILTY SAND W/GRAVEL								
						SC-SM	dk. brown, slightly moist, very dense	SILTY CLAYEY SAND W/GRAVEL								
5060																
	5			15	9,10,8,(40)	SP-SM (A-1-b(0))	gray-brown, moist, dense	SAND W/SILT		9.8		NP	1	92	7	
5055																
	10			13	7,10,14,(39)	SC-SM/SM	brown, moist, dense	SILTY CLAYEY SAND TO SILTY SAND								
5050																
	15			15	6,9,10,(25)	ML (A-4(0))	brown, moist, med. dense	SANDY SILT		20.0		NP	0	33	67	
5045																
	20			16	4,5,6,(13) 0.24	CL-ML	brown, moist, soft	SANDY SILTY CLAY sand lenses								
5040																
	25			17	0.13	CL-ML	brown, moist, soft									
					3,5,18,(25)	SP-SM	brown, moist, med. dense	SAND W/SILT								
5035																
						SP-SM	brown, moist									
				13	8,6,10,(16) 0.26	CL-ML (A-4(1))	brown, moist, firm	SANDY SILTY CLAY		21.9	23	4	0	32	68	
	30					SP-SM	brown, moist, med. dense	SAND W/SILT								
				15	0.28	CL	lt. brown, moist, firm	LEAN CLAY sand lenses								
5030					4,8,11,(19)	SM	brown, moist, med. dense									
				13	9,9,14,(21)	SM (A-2-4(0))	lt. brown, moist, med. dense	SILTY SAND		20.7		NP	0	79	21	
	35															
5025				16	7,5,9,(13) 0.47	CL,SM	lt. brown, moist, med. dense/firm	LEAN CLAY & SILTY SAND LAYERS TO 4" THICK								
								BOH								

200 MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-148

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1543+34, 249' RT. / N:399,111 E:489,561

DATE STARTED: 8/19/09

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 5' / MUD ROTARY

DATE COMPLETED: 8/19/09

DRILLER: T. KERN

GROUND ELEVATION: 5077.0'

DEPTH TO WATER - INITIAL: ⊻ DRY' **AFTER 24 HOURS:** ▼ N.M.

LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
5075				16	8,10,12,(35)	GM CL	gray, dry dk. brown, slightly moist, very stiff	SILTY GRAVEL W/SAND SANDY LEAN CLAY								
5070	5			18	14,31,60,(99+) *0.49*	CL *(A-6(3))*	brown, moist, hard			24.2	33	11	8	42	50	
5065	10			18	13,22,33,(67)	CL	brown, moist, hard	LEAN CLAY W/SAND								
5060	15			15	27,31,50/2.5" *0.55*	SC-SM *(A-4(0))*	brown, very moist, very dense	SILTY CLAYEY SAND		20.4	20	6	10	41	49	
5055	20			16	9,15,50/2.5" *0.83*	CL	brown, moist, hard	LEAN CLAY W/GRAVEL								
5050	25			16	41,17,22,(31) *0.70*	GM CL-ML	gray-brown, moist brown, moist, stiff	SILTY GRAVEL W/SAND possible cobbles SILTY CLAY W/GRAVEL								
5045	30			16	24,20,28,(35)	ML *(A-4(0))*	brown, moist, hard	SANDY SILT plastic		21.8	23	3	1	35	64	
5040	35			18	20,59,43,(68)	ML	brown, moist, hard									
5035	40			13	28,60/5"	ML *(A-4(0))*	brown, moist, very dense	SANDY SILT gravel layers		18.3		NP	4	45	51	
5030	45			17	33,38,50/4"	SC-SM *(A-2-4(0))* SM	gray-brown, moist, very dense brown, moist, very dense	SILTY CLAYEY SAND W/GRAVEL		12.8	23	5	29	38	33	
				9	60,50/2"	SM	brown, moist, very dense	SILTY SAND gravelly layers								Chem.
5025	50			5	50/5"	SM *(A-4(0))*	brown, moist, very dense			13.5	20	3	13	39	48	
5020	55			12	21,36,61,(52)	ML	brown & gray-brown, moist, hard	GRAVELLY SILT W/SAND plastic BOH								

200 MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE: 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE: PUSHED; *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-149

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1551+83, 202' RT. / N:399,612 E:489,406
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 25' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/19/09
DATE COMPLETED: 8/20/09
GROUND ELEVATION: 5053.5'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
				15	6,4,5,(14)	CL-ML	brown, dry	SANDY SILTY CLAY								
						CL	dk. brown, slightly moist, stiff	SANDY LEAN CLAY W/GRAVEL								
5050																
	5			14	33,52,30,(99+)	GP-GM (A-1-a(0))	gray-brown, moist, very dense			8.3		NP	62	32	6	
5045																
	10			9	14,15,13,(34)	GP-GM	gray-brown, moist, med. dense	GRAVEL W/SILT & SAND possible cobbles								
5040																
	15			13	12,20,21,(41)	GP-GM	gray-brown, moist, med. dense									
5035																
	20			9	31,46,50/3"	SP-SM (A-1-a(0))	gray-brown, moist, very dense	SAND W/SILT & GRAVEL		9.1		NP	35	56	9	
5030																
	25			10	73,60/5"	GP-GM	gray-brown, very moist, very dense	GRAVEL W/SILT & SAND possible cobbles								
				15	44,54	GP-GM (A-1-a(0))	gray-brown, very moist, very dense			15.4		NP	48	45	7	
5025						GC	brown, moist	CLAYEY GRAVEL W/SAND								
	30			18	6,5,6,(8) 0.67	CL	brown, moist, stiff	SANDY LEAN CLAY W/GRAVEL								
				9	6,8,19,(20)	SC (A-7-6(11))	brown, very moist, med. dense	CLAYEY SAND W/GRAVEL		45.6	49	34	25	28	47	
5020																
	35			12	11,18,15,(22)	GC (A-2-7(3))	gray-brown, moist, loose	CLAYEY GRAVEL W/SAND possible cobbles		14.9	45	32	48	25	27	
								BOH								
5015																

200 MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-MVC-150

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1556+97, 412' RT. / N:400,111 E:489,567
DRILLING METHOD: 78-CME-55 / HSA
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ⊻ DRY' **AFTER 24 HOURS:** ▼ DRY'

PROJECT NUMBER: 200901.200
DATE STARTED: 8/12/09
DATE COMPLETED: 8/12/09
GROUND ELEVATION: 5009.9'
LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				14	2,3,5,(13)	ML (A-4(0))	lt. brown, moist, med. dense — SILT W/SAND		11.1		NP	0	27	73	
				14	4,2,4,(10)	SM (A-2-4(0))	lt. brown, moist, loose — SILTY SAND		12.4		NP	1	65	34	
5005	5			17	4,6,7,(21) *0.20*	CL (A-4(3))	red-brown, moist — SANDY LEAN CLAY		15.7	27	10	2	38	60	
						CL-ML	brown, moist, soft — SILTY CLAY W/SAND occasional sand layers to 1" thick								
				18	3,4,4,(11) *0.34*	CL-ML	lt. brown, moist, firm								
5000	10						BOH								
4995	15														

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6" ; ← $(N_1)_{60}$ Value ; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED ; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-MVC-151

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1562+34, 250' RT. / N:400,612 E:489,413
DRILLING METHOD: 78-CME-55 / HSA
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/12/09
DATE COMPLETED: 8/12/09
GROUND ELEVATION: 5006.1'
LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
5005				13	7,12,12,(38)	GM	brown, slightly moist, med. dense	SILTY GRAVEL W/SAND possible cobbles								
				7	4,4,5,(15)	SM (A-2-4(0))	brown, slightly moist, med. dense	SILTY SAND W/GRAVEL		7.5		NP	20	58	22	
5000	5			11	10,13,10,(37)	GP-GM (A-1-a(0))	brown, slightly moist, med. dense	GRAVEL W/SILT & SAND possible cobbles		4.4		NP	58	32	10	
4995	10			13	6,9,14,(28)	GP-GM	brown, moist, med. dense									
								BOH								
4990	15															

200_MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (N₁)₆₀ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-152

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1567+69, 328' RT. / N:401,118 E:489,549

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 8.5' / MUD ROTARY

DRILLER: T. KERN

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/14/09

DATE COMPLETED: 8/14/09

GROUND ELEVATION: 5029.8'

LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
			Disturbed	14	9,15,13,(45)	CL	lt. to dk. brown, dry to slightly moist, very stiff	LEAN CLAY sandy & gravelly layers								
5025	5		Disturbed	17	3,4,6,(16) *0.39*	CL (*A-6(13)*)	brown, moist, firm			26.8	36	15	0	12	88	
5020	10		Disturbed	18	8,15,22,(45) *0.64*	CL	brown, moist, stiff									
5015	15		Disturbed	10	34,60/5" *0.73*	CL	brown, moist, hard									
5010	20							SILTY SAND occasional gravelly layers								
			Disturbed	9	47,60/3"	SM (*A-2-4(0)*)	brown, very moist, very dense			30.1		NP	14	61	25	
5005	25		Disturbed	9	39,50/3"	SM	brown, very moist, very dense									Chem.
			Disturbed	7	45,60/1"	SM (*A-4(0)*)	brown, very moist, very dense			27.9		NP	5	51	44	
5000	30		Disturbed	16	50,45,60/4"	SM	gray-brown, very moist, very dense									
								BOH								
4995																

200 MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-153

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1572+17, 53' RT. / N:401,598 E:489,333
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 8.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ▽ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/14/09
DATE COMPLETED: 8/14/09
GROUND ELEVATION: 5035.2'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Sample Rec. (in)	Sample See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
		14	8,19,21,(64)	CL	brown to dk. brown, dry, hard	GRAVELLY LEAN CLAY W/SAND								
5030	5	16	10,14,22,(57) 0.93	CL (A-4(3))	brown, moist, stiff	SANDY LEAN CLAY		15.8	29	10	4	41	55	
5025	10			GC	gray-brown, moist	CLAYEY GRAVEL W/SAND								
		11	22,34,26,(73) 0.75	CL	gray-brown, moist, stiff	SANDY LEAN CLAY W/GRAVEL								
5020	15	16	10,12,15,(27)	ML	brown, moist, med. dense	SANDY SILT W/GRAVEL								
5015	20	17	12,35,47,(72) 0.55 0.88	CL (A-6(10))	brown, moist, stiff			20.3	32	16	5	19	76	
5010	25	18	17,30,62,(72) 0.53	CL	brown, moist, stiff	LEAN CLAY W/SAND occasional gravel layers to 3" thick								
5005	30	18	25,29,45,(53) 0.57	CL	brown, moist, stiff									
5000	35	17	9,19,24,(29) 1.33	SC-SM (A-4(1))	brown, moist, med. dense	SILTY CLAYEY SAND		19.0	26	7	3	50	47	
				CL	brown, moist, very stiff	GRAVELLY LEAN CLAY W/SAND								
		10	39,60/4.5"	SM (A-1-b(0))	gray-brown, moist, very dense	SILTY SAND W/GRAVEL		11.6		NP	30	51	19	
4995	40	8	19,60/2"	ML (A-4(0))	brown, moist, very dense	SANDY SILT		14.9		NP	2	46	52	
		17	19,25,56,(49)	SM	gray-brown, moist, dense	SILTY SAND W/GRAVEL slightly plastic								
4990	45					BOH								

200 MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-154

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1577+41, 146' RT. / N:402,108 E:489,493

DATE STARTED: 8/12/09

DRILLING METHOD: 78-CME-55 / HSA

DATE COMPLETED: 8/12/09

DRILLER: K. CONLIN

GROUND ELEVATION: 5004.4'

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
			Disturbed		Bulk*	GP-GM (*A-1-a(0)*)	brown, slightly moist		4.6		NP	50	41	9	Proct. CBR
5000	5		Disturbed	12	16,21,25,(73)	GP-GM	brown, slightly moist, dense								
			Disturbed		Bulk*	GP-GM (*A-1-a(0)*)			4.1		NP	68	26	5	Proct. CBR
4995	10		Disturbed	11	15,21,26,(57)	GP-GM	brown, slightly moist, dense								
							GRAVEL W/SILT & SAND possible cobbles								
4990	15		Disturbed	10	Bulk*	GP-GM (*A-1-a(0)*)	brown, slightly moist		2.9		NP	73	22	5	Proct. CBR
					15,37,34,(72)	GP-GM (*A-1-a(0)*)	brown, slightly moist, dense		4.0		NP	57	33	10	
			Disturbed	11	15,25,32,(53)	GP-GM	brown, slightly moist, dense								
4985	20		Disturbed	10	17,41,38,(69)	GP-GM (*A-1-a(0)*)	brown, dry, dense		1.9		NP	70	24	6	
4980			Disturbed	9	19,29,29,(47)	GP-GM	brown, dry, med. dense								
	25						BOH								
							*Note: Bulk samples taken at 1'-2', 8'-9' & 15'-16' for Proctor & CBR tests.								
4975															

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) Blow Count per 6"; (N₁)₆₀ Value; 0.45 Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-155

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1582+22, 140' LT. / N:402,607 E:489,240

DATE STARTED: 8/13/09

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 34' / MUD ROTARY

DATE COMPLETED: 8/13/09

DRILLER: T. KERN

GROUND ELEVATION: 5017.7'

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
			■	16	15,21,19,(64)	SM (*A-1-a(0)*)	brown, dry, very dense — SILTY SAND W/GRAVEL		3.0		NP	35	50	15	
5015							SILTY GRAVEL W/SAND								
	5		■	12	22,28,26,(86)	GM	gray-brown, slightly moist								
						SM	brown, slightly moist, very dense — SILTY SAND								
5010															
	10		■	9	8,7,8,(18)	ML (*A-4(0)*)	brown, very moist, med. dense — SANDY SILT few clay lenses		21.6		NP	0	39	61	
5005															
	15		■	16	3,3,6,(9) *0.12*	CL (*A-4(4)*)	brown, very moist to wet, soft — SANDY LEAN CLAY gravelly layers		31.6	31	9	2	32	66	
5000															
	20		■	6	10,13,17,(26)	GP-GM	gray-brown, moist, loose								
4995															
	25		■	7	9,50,60/3"	GP-GM (*A-1-a(0)*)	gray-brown, moist, very dense — GRAVEL W/SILT & SAND possible cobbles		6.6		NP	56	36	8	
4990															
	30		■	10	22,62,50/2"	GP-GM	gray-brown, moist, very dense								
4985															
	35		■	13	29,57,57,(77)	SP-SM (*A-1-a(0)*)	gray-brown, moist, very dense — SAND W/SILT & GRAVEL possible cobbles		7.0		NP	41	50	9	
4980			■	7	8,17,22,(25)	SP-SM	gray-brown, moist, med. dense								
							BOH								

.200 MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; (6) ← $(N_1)_{60}$ Value; *0.45* ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-156

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1587+23, 242' RT. / N:403,103 E:489,625

DRILLING METHOD: 78-CME-55 / HSA

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/12/09

DATE COMPLETED: 8/12/09

GROUND ELEVATION: 4994.8'

LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				16	2,2,2,(6)	CL-ML	lt. brown, moist, firm								
				12	1,0,1,(2)	CL-ML (A-4(0))	lt. brown, very moist, soft SANDY SILTY CLAY		21.0	23	4	0	43	57	
4990	5														
				11	1,1,0,(2)	CL-ML	lt. brown, very moist, soft								
							SANDY LEAN CLAY								
				15	3,5,5,(13)	CL (A-4(2))	brown, moist, stiff		18.0	23	8	0	43	57	
						SM	lt. brown, moist SILTY SAND								
4985	10						BOH								
4980	15														
4975															

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-157

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1592+39, 250' LT. / N:403,623 E:489,137
DRILLING METHOD: 78-CME-55 / HSA
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/12/09
DATE COMPLETED: 8/12/09
GROUND ELEVATION: 5003.4'
LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
								SILTY CLAYEY SAND gravelly layers								
			Disturbed	15	9,13,13,(41)	SC-SM (*A-4(0)*)	brown, slightly moist, dense			10.4	23	6	7	53	40	
5000					Bulk*	SC-SM (*A-2-4(0)*)	brown, slightly moist			10.7	23	6	18	49	33	Proct.
			Disturbed		Bulk**	CL (*A-4(3)*)	brown, slightly moist	SANDY LEAN CLAY		10.4	28	9	3	38	59	Proct. CBR
	5		Disturbed	15	4,6,7,(22) *0.22*	ML (*A-4(0)*)	lt. brown, moist, med. dense			16.1		NP	1	27	72	
								SILT W/SAND								
			Undisturbed	11	Pushed	ML	lt. brown, moist									
4995																
	10							SILTY CLAY W/SAND								
			Disturbed	18	3,4,6,(13)	CL-ML	lt. brown, moist, stiff									
								BOH								
4990																
	15															
4985																

*Note: Bulk sample taken at 2.5'-3' for Proctor test.

**Note: Bulk sample taken at 4'-4.5' for Proctor & CBR tests.

200 MVC2009_R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE 2,3,2,(6) *0.45* ← Blow Count per 6" ← $(N_1)_{60}$ Value ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-158

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1597+24, 246' RT. / N:404,099 E:489,640
DRILLING METHOD: 96-CME-55 / N.W. CASING TO 18.5' / MUD ROTARY
DRILLER: T. KERN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/13/09
DATE COMPLETED: 8/13/09
GROUND ELEVATION: 5008.6'
LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
						CL	~~dk. brown, dry~~	SANDY LEAN CLAY								
				8	15,11,60/3"	GC	dk. brown, slightly moist, very dense	CLAYEY GRAVEL W/SAND possible cobbles								
5005	5			17	8,13,18,(49) 2.25	CL	dk. brown, slightly moist, hard	LEAN CLAY W/SAND								
5000	10			17	15,11,16,(33) 1.83	CL (A-7-6(21))	very lt. brown, slightly moist, very stiff			22.1	46	31	2	24	74	
4995	15			12	14,22,29,(51)	GC-GM	lt. brown to brown, moist, dense	SILTY CLAYEY GRAVEL W/SAND								
4990	20			10	12,59,60/1.5"	SM (A-1-b(0))	gray-brown, moist, very dense	SILTY SAND W/GRAVEL possible cobbles, clay lenses		10.6		NP	40	41	19	
4985				0	50/3"	-	no recovery									
	25			6	86/6"	SC (A-2-4(0))	lt. gray-brown, slightly moist, very dense	CLAYEY SAND W/GRAVEL		10.2	21	9	34	48	18	
4980	30			6	60,60/0.5"	SC	lt. gray-brown, slightly moist, very dense									Chem.
								BOH								
4975																

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-159

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1603+04, 143' LT. / N:404,695 E:489,278

DRILLING METHOD: 96-CME-55 / N.W. CASING TO 5' / MUD ROTARY

DRILLER: T. KERN

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/17/09

DATE COMPLETED: 8/17/09

GROUND ELEVATION: 5000.9'

LOGGED BY: C. SANBORN, J. BOONE

Elev. (ft)	Depth (ft)	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
					CL	dk. brown, dry	SANDY LEAN CLAY								
5000		■	14	15,18,16,(54)	GM	lt. brown, slightly moist, dense	SILTY GRAVEL W/SAND possible cobbles								
4995	5	■	8	37,60/3"	SM (A-1-b(0))	gray, moist, very dense	SILTY SAND W/GRAVEL plastic, boulders (driller's observation)		18.8	26	4	30	46	24	
4990	10	■	11	17,60,50/1"	GC (A-2-4(0))	gray-brown, moist, very dense			14.0	28	9	46	28	26	
4985	15	■	10	46,60/1"	GC	gray-brown, moist, very dense	CLAYEY GRAVEL W/SAND possible cobbles								
4980	20		0	50/0"	-	no recovery									
4975	25	■	10	25,50/4"	SC (A-2-6(0))	gray-brown, moist, very dense	CLAYEY SAND W/GRAVEL possible cobbles		16.2	33	11	29	57	14	
4970	30		0	50/0"	-	no recovery									
			0	50/2"	-	no recovery	SILTY GRAVEL W/SAND plastic, possible cobbles & boulders								
4965	35	■	10	56,50/4.5"	GM (A-1-b(0))	gray-brown, moist, very dense			15.5	22	3	44	40	16	
			0	60/2"	-	no recovery									
							BOH								

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-160

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1607+23, 132' RT. / N:405,091 E:489,584
DRILLING METHOD: 78-CME-55 / HSA
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ 16.8'

PROJECT NUMBER: 200901.200
DATE STARTED: 8/11/09
DATE COMPLETED: 8/11/09
GROUND ELEVATION: 4970.4'
LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
4970													
			Bulk*	SM (A-2-4(0))	brown, dry	106.9	3.5	18	3	8	61	31	
					SILTY SAND								
					SILTY CLAY W/SAND								
	5			CL-ML	brown, dry								
4965		12	Bulk** 2,5,9,(27)	SM (A-1-b(0)) SM	brown, dry to slightly moist; brown, dry to slightly moist, med. dense		5.3	22	3	11	76	13	Proct.
					SILTY SAND occasional silty clay layers to 2" thick								
	10	15	5,9,11,(27)	SM (A-2-4(0))	brown, moist, med. dense		10.2		NP	1	83	16	
4960													
			Bulk***	SM (A-1-b(0))	brown, moist		11.9		NP	6	80	14	Proct. CBR
		18	8,7,11,(21)	SM	brown, moist								
				CL-ML	brown, very moist — SANDY SILTY CLAY								
				SM	brown, very moist — SILTY SAND								
	15	17	3,3,6,(10)	CL-ML (A-4(0))	brown, wet, stiff/loose		22.6	23	5	0	49	51	
4955					INTERBEDDED SILTY CLAY & SILTY SAND LAYERS TO 6" THICK								
		18	3,3,4,(7)	CL-ML,SM	brown, wet, stiff/loose								
					BOH								
	20												
4950													

*Note: Bulk sample taken at 1'-1.5'.

**Note: Bulk sample taken at 5'-6' for Proctor test.

***Note: Bulk sample taken at 11'-12' for Proctor & CBR tests.

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-161

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1612+24, 74' LT. / N:405,611 E:489,433

DRILLING METHOD: 78-CME-55 / HSA

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/11/09

DATE COMPLETED: 8/11/09

GROUND ELEVATION: 4974.6'

LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Sample Rec. (in)	Sample See Legend	Sample USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
								NOT SAMPLED								
								SILTY GRAVEL W/SAND possible cobbles								
4970	5			13	11,43,60/5"	GM	brown, slightly moist									
						SC	red-brown, slightly moist, very dense	CLAYEY SAND W/GRAVEL								
4965	10			11	32,51,60/4"	GM (A-1-b(0))	brown, moist, very dense			7.5		NP	45	35	20	
4960	15			8	42,60/4"	GM	lt. brown, slightly moist, very dense	SILTY GRAVEL W/SAND possible cobbles								
4955	20			15	22,59,48,(94)	GM (A-1-b(0))	red-brown, slightly moist, dense			6.2		NP	53	28	19	
				4	27,60/5.5"	GM	lt. brown, slightly moist, very dense	SILTY GRAVEL W/SAND clay lenses, possible cobbles								
4950	25			18	22,31,33,(50)	GM	lt. brown, slightly moist									
						CL-ML (A-4(0))	lt. brown, moist, hard	SANDY SILTY CLAY		15.9	22	4	1	44	55	
				9	26,60/3.5"	GM	lt. brown, moist, very dense	SILTY GRAVEL W/SAND silty clay lenses, possible cobbles								
4945								BOH								

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-162

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1617+23, 86' RT. / N:406,089 E:489,649

DRILLING METHOD: 78-CME-55 / HSA

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/11/09

DATE COMPLETED: 8/11/09

GROUND ELEVATION: 4961.1'

LOGGED BY: G. PEASLEE, J. BOONE

Sample Rec. (in)	Sample See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
			NOT SAMPLED								
		CL-ML	SILTY CLAY W/SAND lt. brown, slightly moist								
13	7,13,15,(48)	SM	SILTY SAND W/GRAVEL brown, slightly moist, dense								
17	7,29,21,(61)	SM (A-2-4(0))	brown, slightly moist		16.9		NP	21	53	26	
		CL-ML	SILTY CLAY W/SAND brown, moist, hard								
4	60/4"	SP-SM (A-3(0))	SAND W/SILT lt. brown, moist, very dense		13.1		NP	1	90	9	
		CL-ML	SILTY CLAY W/GRAVEL brown, moist								
13	17,43,46,(81)	GM	SILTY GRAVEL W/SAND possible cobbles dk. brown, moist, dense								
11	11,43,60/5"	GM (A-1-b(0))	brown, moist, very dense		6.2		NP	43	41	16	
12	17,31,34,(52)	SM	SILTY SAND red-brown, moist, very dense								
			BOH								

Elevation scale (ft): 4960, 4955, 4950, 4945, 4940, 4935. Depth scale (ft): 5, 10, 15, 20, 25.

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LEGEND:

DISTURBED SAMPLE: 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE: PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-163

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: STA. 1622+23, 73' LT. / N:406,600 E:489,533
DRILLING METHOD: 78-CME-55 / HSA
DRILLER: K. CONLIN
DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200
DATE STARTED: 8/5/09
DATE COMPLETED: 8/5/09
GROUND ELEVATION: 4950.5'
LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
4950													
4945	5	13	3,4,4,(14)	SM	brown, slightly moist, med. dense — SILTY SAND								
4940	10	14	10,13,11,(29)	SM (A-2-4(0))	lt. red-brown, moist, med. dense		8.4		NP	5	79	16	
4935	15	14	5,8,8,(17)	SM	lt. brown, slightly moist, med. dense — SILTY SAND sandy clay lenses & layers								
		15	5,5,4,(9)	SM (A-4(0))	lt. brown, moist, loose		17.0		NP	0	62	38	
4930	20	17	1,3,6,(8) 0.10	ML (A-4(3))	lt. brown, very moist to wet, very soft — SILT W/SAND plastic		34.1	28	5	0	22	78	
		18	0.21	ML	lt. brown, very moist, soft								
			3,6,6,(11) 0.90	CL	brown, moist, stiff								
4925	25				LEAN CLAY W/SAND clayey sand layers								
		18	11,15,23,(31) 0.90	CL	brown, moist, stiff								
					BOH								

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LEGEND:
DISTURBED SAMPLE 2,3,2,(6) 0.45 — Blow Count per 6", $(N_1)_{60}$ Value, Torvane (tsf)
UNDISTURBED SAMPLE PUSHED 0.45 — Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-164

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200901.200

LOCATION: STA. 1627+24, 119' RT. / N:407,091 E:489,751

DATE STARTED: 8/5/09

DRILLING METHOD: 78-CME-55 / HSA

DATE COMPLETED: 8/5/09

DRILLER: K. CONLIN

GROUND ELEVATION: 4940.4'

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
4940							SANDY LEAN CLAY								
					Bulk*	CL (A-6(4))	brown, moist	104.6	13.9	26	11	0	41	59	
4935	5			16	8,10,16,(41)	SM	lt. brown, moist, dense — SILTY SAND								
					Bulk**	SM (A-4(0))	lt. brown, moist		15.6		NP	1	57	42	Proct.
4930	10			17	7,7,9,(21)	ML (A-4(0))	lt. brown, moist, dense — SANDY SILT		15.5		NP	0	43	57	
					Bulk***	ML (A-4(0))	lt. brown, moist		17.6		NP	3	39	58	Proct. CBR
				16	5,8,12,(22)	ML (A-4(0))	brown, moist, med. dense — SILT W/SAND		23.2		NP	0	28	72	
4925	15					CL	brown, moist — SANDY LEAN CLAY								
				14	1,19,55,(80)	GC	brown, slightly moist, dense — CLAYEY GRAVEL W/SAND possible cobbles								
				6	40,60/2.5"	GM	lt. brown, slightly moist, very dense — SILTY GRAVEL W/SAND possible cobbles								
							BOH								
4920	20														

*Note: Bulk sample taken at 2'-2.5'.

**Note: Bulk sample taken at 6'-7' for Proctor test.

***Note: Bulk sample taken at 12'-13' for Proctor & CBR tests.

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LEGEND:

DISTURBED SAMPLE 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE PUSHED 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

ADDENDUM 1 - OCTOBER 2010

DRILL HOLE LOG

BORING NO. 09-MVC-165

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER: 200901.200
LOCATION: STA. 1633+29, 133' LT. / N:407,701 E:489,511
DATE STARTED: 9/18/09
DRILLING METHOD: 08-CME-55 / N.W. CASING TO 33.5' / MUD ROTARY
DATE COMPLETED: 9/18/09
DRILLER: T. KERN
GROUND ELEVATION: 4954.0'
DEPTH TO WATER - INITIAL: ∇ DRY'
AFTER 24 HOURS: ▼ N.M.
LOGGED BY: M. HANSEN, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
4950	5			15	8,8,7,(32)	SM	brown, slightly moist, med. dense	SILTY SAND								
4945	10			15	6,9,9,(29)	SM (*A-2-4(0)*)	brown, moist, med. dense			16.6		NP	0	80	20	
4940	15			15	8,16,28,(59)	SM	brown, moist									
						SP-SM (*A-1-b(0)*)	gray-brown, slightly moist, very dense	SAND W/SILT		6.6		NP	5	85	10	
4935	20			10	40,60/6"	GM	brown, moist, very dense	SILTY GRAVEL W/SAND possible cobbles								
4930	25			6	28,60/4"	GP-GM	brown, moist, very dense	GRAVEL W/SILT & SAND possible cobbles								
				5	56/6"	GP-GM	brown, moist, very dense									
4925	30			11	40,61/6"	GP-GM (*A-1-b(0)*)	brown, moist, very dense			10.1		NP	51	37	12	
4920				3	63/6"	GP-GM	brown, moist, very dense	BOH								

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LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-166

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: STA. 1637+23, 165' RT. / N:408,093 E:489,811

DRILLING METHOD: 78-CME-55 / HSA

DRILLER: K. CONLIN

DEPTH TO WATER - INITIAL: ∇ DRY' **AFTER 24 HOURS:** ▼ N.M.

PROJECT NUMBER: 200901.200

DATE STARTED: 8/18/09

DATE COMPLETED: 8/19/09

GROUND ELEVATION: 4948.8'

LOGGED BY: E.RICHARDSON, J.BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample: Type	Sample: Rec. (in)	Sample: See Legend	Sample: USCS (AASHTO)	Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.: Liquid Limit	Atter.: Plast. Index	Gradation: Gravel (%)	Gradation: Sand (%)	Gradation: Silt/Clay (%)	Other Tests
				14	16,29,19,(77)	SM	brown to lt. brown, dry, very dense	SILTY SAND W/GRAVEL								
4945	5			16	5,6,5,(19) *0.21*	SM *(A-2-4(0))*	brown, slightly moist, med. dense	SILTY SAND clay layers		5.4		NP	0	82	18	
4940	10			14	31,38,44,(99+)	GP-GM	brown, slightly moist, very dense	GRAVEL W/SILT & SAND possible cobbles								
4935	15			15	23,44,42,(87)	GP-GM *(A-1-a(0))*	very lt. brown, slightly moist, dense			3.2		NP	57	35	8	
				16	19,29,26,(51)	SM	very lt. brown, moist, very dense	SILTY SAND W/GRAVEL								
4930	20			16	4,8,10,(16)	SM *(A-2-4(0))*	brown, moist	SILTY SAND occasional silt lenses		11.3		NP	3	77	20	
						SM *(A-2-4(0))*	brown, moist, med. dense			12.2		NP	0	80	20	
4925				18	8,7,6,(11)	SM	brown, moist, med. dense									
	25							BOH								
4920																

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

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LEGEND:

DISTURBED SAMPLE: 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE: PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

DRILL HOLE LOG

BORING NO. 09-MVC-167

SHEET 1 OF 1

PROJECT: MOUNTAIN VIEW CORRIDOR
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER: 200901.200
LOCATION: STA. 1642+23, 156' LT. / N:408,610 E:489,519
DATE STARTED: 8/5/09
DRILLING METHOD: 78-CME-55 / HSA
DATE COMPLETED: 8/5/09
DRILLER: K. CONLIN
GROUND ELEVATION: 4965.9'
DEPTH TO WATER - INITIAL: ∇ DRY'
AFTER 24 HOURS: ▼ N.M.
LOGGED BY: G. PEASLEE, J. BOONE

Elev. (ft)	Depth (ft)	Lithology	Sample Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Atter. Liquid Limit	Atter. Plast. Index	Gradation Gravel (%)	Gradation Sand (%)	Gradation Silt/Clay (%)	Other Tests
4965							GRAVEL W/SAND possible cobbles								
4960	5			13	Bulk*	GP (A-1-a(0))	lt. brown, slightly moist		2.9		NP	71	25	4	Proct. CBR
					29,19,21,(64)	GP	lt. brown, slightly moist, dense								
4955	10			12	11,21,27,(61)	GP-GM (A-1-a(0))	lt. brown, slightly moist, dense		4.0		NP	65	29	6	
					Bulk*	GP-GM (A-1-a(0))	lt. brown, slightly moist		3.5		NP	76	19	5	Proct. CBR
				9	22,39,29,(78)	GP-GM	lt. brown, slightly moist, dense								
							GRAVEL W/SILT & SAND possible cobbles								
4950	15			11	11,16,20,(37)	GP-GM (A-1-a(0))	lt. brown, slightly moist, med. dense		4.6		NP	66	29	5	
				8	11,20,22,(39)	GP-GM	lt. brown, slightly moist, med. dense								
4945	20						BOH								

*Note: Bulk samples taken at 5'-6' & 10'-11' for Proctor & CBR tests.

200 MVC2009 R.GPJ US EVAL.GDT 10/26/10

RB&G ENGINEERING, INC.

LEGEND:

DISTURBED SAMPLE — 2,3,2,(6) ← Blow Count per 6"; ← $(N_1)_{60}$ Value; 0.45 ← Torvane (tsf)

UNDISTURBED SAMPLE — PUSHED; 0.45 ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
UU = Unconsolidated, Undrained
CU = Consolidated, Undrained
Chem. = pH, Resistivity, Sulfate, Chloride

APPENDIX C

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Table 1

SUMMARY OF TEST DATA

PROJECT Mountain View Corridor — PROJECT NO. 200901-200
LOCATION Segment 5 — FEATURE Kennecott RR Bridge

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-S5-1	5-6.5	97.0	19.0				NP	0	83	17		SM (A-2-4 (0))
	10-11.5	86.9	30.0	uu 2454			NP	0	18	82		ML (A-4 (0))
	20-21.5	87.2	32.7	uc 1408	27	21	6	0	15	85		CL-ML (A-4 (4))
	30-31.5	101.1	23.3	uu 6607			NP	6	42	52		ML (A-4 (0))
	40-41.4		9.3				NP	55	36	9		GP-GM (A-1-a (0))
	55-56.5		17.9				NP	1	83	16		SM (A-2-4 (0))
	65-66.5	94.7	25.5	uu 3094			NP	0	66	34		SM (A-2-4 (0))
	75-76.5	87.4	31.8	uc 2165	35	19	16	0	18	82		CL (A-6 (12))
	90-91.5		21.8		46	18	28	54	30	16		GC (A-2-7 (0))
	100-101.5		27.5				NP	0	62	38		SM (A-4 (0))
09-S5-2	5-6.5		29.5		46	23	23	12	26	62		CL (A-7-6 (12))
	10-11.5		31.4		36	30	6	0	17	83		ML (A-4 (6))
	11.5-13		19.7				NP	0	38	62		ML (A-4 (0))
	20-20.8	96.8	22.2	uu 1441	26	18	8	1	22	77		CL (A-4 (4))
	30-31	94.6	18.3	uc 1528			NP	5	29	66		ML (A-4 (0))
	35-36.5		21.3		24	18	6	2	31	67		CL-ML (A-4 (2))
	40-41		21.2		24	21	3	0	29	71		ML (A-4 (0))
	50-50.7		11.5				NP	35	47	18		SM (A-1-b (0))
	50.7-51.5		15.8		24	18	6	4	36	60		CL-ML (A-4 (1))
	60-61.5	97.6	21.4		26	21	5	0	29	71		CL-ML (A-4 (2))
	70-70.4	101.1	18.9	uc 1545	24	19	5	1	39	60		CL-ML (A-4 (1))
	80-81.5		28.5		32	22	10	0	26	74		CL (A-4 (6))
	90-90.8	94.4	22.6	uu 15349			NP	0	45	55		ML (A-4 (0))
	95-96.5		32.4		27	22	5	0	28	72		ML (A-4 (2))
	100-100.3		21.0				NP	13	39	48		SM (A-4 (0))

NP=Non-Plastic

RB&G
ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT Mountain View Corridor PROJECT NO. 200901-200
LOCATION Segment 5 FEATURE Kennecott RR Bridge

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE DRY UNIT WEIGHT (pcf)	IN-PLACE MOISTURE (%)	UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS LIQUID LIMIT (%)	ATTERBERG LIMITS PLASTIC LIMIT (%)	ATTERBERG LIMITS PLASTICITY INDEX (%)	MECHANICAL ANALYSIS PERCENT GRAVEL	MECHANICAL ANALYSIS PERCENT SAND	MECHANICAL ANALYSIS PERCENT SILT & CLAY	PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM (AASHTO CLASSIFICATION)
09-S5-3	5-6.5		13.1				NP	0	57	43		SM (A-4 (0))
	20-21.5		14.0				NP	0	56	44		SM (A-4 (0))
	35-36.5		4.1				NP	48	43	9		GP-GM (A-1-a (0))
	45-46.5		44.2		61	24	37	0	45	55		CH (A-7-6 (17))
	50.5-52		13.4				NP	23	67	10		SP-SM (A-1-b (0))
	60-61.5		10.4		29	17	12	31	46	23		SC (A-2-6 (0))
	65-66.5		16.0		32	19	13	37	32	31		GC (A-2-6 (0))
	75-76.5		27.6		36	25	11	0	34	66		ML (A-6 (6))
	85-86		15.2		25	16	9	6	27	67		CL (A-4 (3))
	95-96.5		19.2				NP	0	34	66		ML (A-4 (0))
	105-106.5		26.6		30	19	11	1	36	63		CL (A-6 (5))
	115-116	85.7	29.9	uu 25113	34	23	11	0	30	70		CL (A-6 (7))

HOLE NO.	DEPTH (ft)	pH	RESISTIVITY (ohm-cm)	SULFATE (mg/kg-dry)	CHLORIDE (mg/kg-dry)
09-S5-1	5-6.5	8.2	4100	< 32	< 6.5
09-S5-2	10-11.5	8.3	2200	< 32	< 6.5
09-S5-3	15-16.5	7.5	6000	3.6	2.4
	45-46.5	7.0	585		

NP=Non-Plastic

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT	Mountain View Corridor	PROJECT NO.	200901-206.03
LOCATION	Segment 5	FEATURE	Kennecott RR Bridge

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
10-S5-4	10-11.5		16.5				NP	0	64	36		SM (A-4 (0))
	11.5-13		21.9				NP	0	43	57		ML (A-4 (0))
	20-21.5	86.6	29.7	uc 1342	27	20	7	0	19	81		CL-ML (A-4 (4))
	30-31.5		22.7				NP	0	63	37		SM (A-4 (0))
	40-41.5		10.8				NP	50	39	11		GP-GM (A-1-a (0))
	50-51.5		10.1				NP	59	28	13		GM (A-1-a (0))
	60-61.5		33.1		32	21	11	5	38	57		CL (A-6 (4))
	70-71.5		13.1				NP	60	20	20		GM (A-1-b (0))
	80-81.5		15.7		27	14	13	18	68	14		SC (A-2-6 (0))
	90-91.5		15.3				NP	25	43	32		SM (A-2-4 (0))
10-S5-5	5-6.5		16.0				NP	1	74	25		SM (A-2-4 (0))
	15-16.5		14.7				NP	0	59	41		SM (A-4 (0))
	30-31.5		32.9				NP	3	76	21		SM (A-2-4 (0))
	40-41.5		24.6		42	19	23	3	16	81		CL (A-7-6 (18))
	50-51.5 (top 9')		12.9				NP	6	45	49		SM (A-4 (0))
	60-61.5	92.8	25.7	uc 2924	44	23	21	1	34	65		CL (A-7-6 (12))
	70-70.5	88.6	24.4		27	20	7	0	47	53		CL-ML (A-4 (1))
	80-81.5		24.0				NP	0	53	47		SM (A-4 (0))
	90.5-92		24.9		27	20	7	3	37	60		CL-ML (A-4 (2))
	100-101.5		23.4		32	27	5	6	36	58		ML (A-4 (2))
	110-111.5		28.7				NP	1	50	49		SM (A-4 (0))
	120-121.5		18.1				NP	4	67	29		SM (A-2-4 (0))

HOLE NO.	DEPTH (ft)	pH	RESISTIVITY (ohm-cm)	SULFATE (mg/kg-dry)	CHLORIDE (mg/kg-dry)
10-S5-5	20-21.5	7.9	2650		

NP=Non-Plastic

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT	Mountain View Corridor	PROJECT NO.	200901-206-11
LOCATION	Segment 5	FEATURE	Kennecott RR Pedestrian Tunnel

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE DRY UNIT WEIGHT (pcf)	IN-PLACE MOISTURE (%)	UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS LIQUID LIMIT (%)	ATTERBERG LIMITS PLASTIC LIMIT (%)	ATTERBERG LIMITS PLASTICITY INDEX (%)	MECHANICAL ANALYSIS PERCENT GRAVEL	MECHANICAL ANALYSIS PERCENT SAND	MECHANICAL ANALYSIS PERCENT SILT & CLAY	PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
10-S5-6	10-11.5		21.2		41	21	20	31	23	46		GC (A-7-6 (5))
	15-16.5		16.9		27	24	3	17	20	63		ML (A-4 (0))
	25-25.8	89.9	25.7	uu 6637	28	21	7	0	11	89		CL-ML (A-4 (5))
	30-31.5		21.3		24	19	5	5	33	62		CL-ML (A-4 (1))
	40-40.5		16.9				NP	14	36	50		ML (A-4 (0))
10-S5-7	0-1.5		8.2				NP	57	30	13		GM (A-1-a (0))
	10-11.5		11.4				NP	58	27	15		GM (A-1-a (0))
	20-21.5	95.5	22.4		29	22	7	9	23	68		CL-ML (A-4 (3))
	30.5-32		14.9		18	16	2	9	47	44		SM (A-4 (0))
	45-46		20.5		26	19	7	0	3	97		CL-ML (A-4 (6))
	55-56	101.3	18.5		27	24	3	3	13	84		ML (A-4 (2))
	70-71	77.5	34.2		41	27	14	0	18	82		ML (A-7-6 (12))
	80-81		21.4		23	19	4	3	52	45		SC-SM (A-4 (0))

HOLE NO.	DEPTH (ft)	pH	RESISTIVITY (ohm-cm)	SULFATE (mg/kg-dry)	CHLORIDE (mg/kg-dry)
10-S5-7	15-16.5	8.0.	2500		

NP=Non-Plastic

H:\2009\200_MVCRedwoodRdto90thSouth\Open-Ended Work\Work Orders\WO 011 Seg 5 Ped Bridge\Testing\10-S5-6 Testing Summary

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT Mountain View Corridor — PROJECT NO. 200901-200

LOCATION Segment 5 — FEATURE Retaining Walls

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE DRY UNIT WEIGHT (pcf)	IN-PLACE MOISTURE (%)	UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS LIQUID LIMIT (%)	ATTERBERG LIMITS PLASTIC LIMIT (%)	ATTERBERG LIMITS PLASTICITY INDEX (%)	MECHANICAL ANALYSIS PERCENT GRAVEL	MECHANICAL ANALYSIS PERCENT SAND	MECHANICAL ANALYSIS PERCENT SILT & CLAY	PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM (AASHTO CLASSIFICATION)
09-W5-1	2.5-4		15.5		30	17	13	3	23	74		CL (A-6 (8))
	7.5-9		18.4		23	17	6	4	26	70		CL-ML (A-4 (2))
	10-11		10.4				NP	11	56	33		SM (A-2-4 (0))
	12.5-14		18.9		21	18	3	0	43	57		ML (A-4 (0))
	20-21.5	87.6	28.9		37	28	9	0	38	62		ML (A-4 (5))
	30-30.9		22.4		40	29	11	17	41	42		SM (A-6 (2))
	35-36.4		27.9		33	25	8	2	45	53		ML (A-4 (2))
09-W5-2	5-5.8	101.6	16.1		29	16	13	6	23	71		CL (A-6 (7))
	20-20.8		24.7		38	18	20	0	20	80		CL (A-6 (15))
	25-26.5		27.4		46	22	24	6	42	52		CL (A-7-6 (9))
	35-36.5	84.8	33.4		49	21	28	0	9	91		CL (A-7-6 (27))
	45-46	87.3	23.8		28	18	10	0	26	74		CL (A-4 (5))
09-W5-3	0-1.2		8.8		27	16	11	5	50	45		SC (A-6 (2))
	10-11.5		19.7		33	21	12	0	42	58		CL (A-6 (5))
	20-21.5		28.4		50	24	26	11	20	69		CH (A-7-6 (17))
	30-31.5	79.1	32.7		48	16	32	0	14	86		CL (A-7-6 (28))
09-W5-4	2.5-3.4		13.1				NP	10	33	57		ML (A-4 (0))
	5-6.5		19.0		21	16	5	5	35	60		CL-ML (A-4 (0))
	10-11.1	92.7	23.0		28	25	3	0	21	79		ML (A-4 (2))
	15-16.5		22.5		25	17	8	4	21	75		CL (A-4 (4))
	25-25.9		17.7		23	17	6	3	31	66		CL-ML (A-4 (2))
	30-31.5		23.3		24	22	2	5	18	77		ML (A-4 (0))
	40-40.4	100.4	16.9				NP	0	39	61		ML (A-4 (0))
	55-56		21.5		30	19	11	0	14	86		CL (A-6 (8))
09-W5-5	2.5-4		11.1				NP	0	39	61		ML (A-4 (0))
	7.5-9	93.5	10.5		24	21	3	0	22	78		ML (A-4 (1))
	15-16.5	91.4	27.8	uu 3161	28	20	8	0	21	79		CL (A-4 (5))

NP=Non-Plastic

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT	Mountain View Corridor	PROJECT NO.	200901-200
LOCATION	Segment 5	FEATURE	Retaining Walls

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-W5-6	10-11.5		15.7				NP	0	27	73		ML (A-4 (0))
	20-21.5		27.8				NP	0	25	75		ML (A-4 (0))
	25-26.5		26.8		25	20	5	0	28	72		CL-ML (A-4 (2))
	35-36.5		5.5				NP	39	50	11		SP-SM (A-1-a (0))
	55-56.5		5.1				NP	39	44	17		SM (A-1-b (0))
	75-76.5	95.0	27.2	uu 7193	29	19	10	0	26	74		CL (A-4 (6))
	80-80.4		40.6		69	27	42	0	9	91		CH (A-7-6 (44))
	80.8-81.5		15.8		31	15	16	22	61	17		SC (A-2-6 (0))
	85-86.5	99.5	26.5	uc 1904	34	17	17	4	14	82		CL (A-6 (13))
	95-96.5		33.5		49	23	26	0	21	79		CL (A-7-6 (21))

HOLE NO.	DEPTH (ft)	pH	RESISTIVITY (ohm-cm)	SULFATE (mg/kg-dry)	CHLORIDE (mg/kg-dry)
09-W5-1	5-6.5	8.0	2700	22	6.5
	12.5-14	7.7	5150	13	3.2
09-W5-2	2.5-4	7.8	3650	14	7.3
	10-11.5	8.2	2100	12	3.3
09-W5-3	5-7.5	7.9	1000	120	13
09-W5-4	7.5-9	7.9	5100	20	3
	12.5-14	7.7	2750	23	2.3
09-W5-5	5-6.5	8.2	3200	15	9.4
09-W5-6	5-6.5	7.7	3000	28	16
	21.5-23	8.0	3500	15	4.8

NP=Non-Plastic

RB&G
ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT	Mountain View Corridor	PROJECT NO.	200901-200
LOCATION	Segment 5	FEATURE	Embankments

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-E5-1	10-10.8	79.6	14.9		30	23	7	0	17	83		ML (A-4 (5))
	20-21.5	85.6	33.0	uu 6620	37	22	15	1	12	87		CL (A-6 (13))
	35-36.5		18.7		26	17	9	1	23	76		CL (A-4 (5))
	40-41	97.8	19.5	uu 14182	43	16	27	1	31	68		CL (A-7-6 (16))
09-E5-2	0-1.5		7.1		26	19	7	28	30	42		SC-SM (A-4 (0))
	5-6.5	95.0	16.6		25	19	6	1	25	74		CL-ML (A-4 (3))
	15-16.5	82.6	33.4		34	27	7	0	14	86		ML (A-4 (7))
	25-26.5	92.1	32.7	uc 3006	32	22	10	0	4	96		CL (A-4 (10))
	35-36.5	98.4	23.9		32	16	16	1	7	92		CL (A-6 (14))
	50-51.5	81.8	39.1	uu 4534	50	24	26	0	21	79		CH (A-7-6 (21))
	60-61.5	93.0	22.9		37	23	14	2	25	73		CL (A-6 (9))
	70-70.8		19.5				NP	0	62	38		SM (A-4 (0))
	75-76.5		33.5		37	30	7	2	37	61		ML (A-4 (3))
09-E5-3	5-6.5		2.2				NP	43	47	10		SP-SM (A-1-a (0))
	10-11.5		25.6				NP	1	39	60		ML (A-4 (0))
	20-21		31.4		61	24	37	5	21	74		CH (A-7-6 (28))
	25-25.5	93.4	29.7		50	22	28	8	24	68		CH (A-7-6 (18))
	30.5-32		27.5		40	32	8	0	35	65		ML (A-4 (5))
	35-36.5		13.9		24	18	6	1	39	60		CL-ML (A-4 (1))
	50-51.2		20.9		25	20	5	8	48	44		SC-SM (A-4 (0))
09-E5-5	5-6.5		14.9		32	17	15	30	42	28		SC (A-2-6 (1))
	15-16.5	103.7	21.5	uu 4393	26	21	5	0	30	70		CL-ML (A-4 (2))
	25-26.5	93.6	22.8	uc 1673	43	19	24	7	14	79		CL (A-7-6 (18))
09-E5-6	5-6.5		2.0				NP	39	39	22		SM (A-1-b (0))
	17-18.5		25.9		30	19	11	1	30	69		CL (A-6 (6))
	25-26.5		24.0		44	25	19	11	20	69		CL (A-7-6 (12))
	35-36.5		30.1		34	19	15	0	22	78		CL (A-6 (10))
	45-46.4		23.5				NP	0	25	75		ML (A-4 (0))
	50-50.9		20.2		33	25	8	0	18	82		ML (A-4 (6))
	60-61.5		24.9				NP	15	53	32		SM (A-2-4 (0))
	70-71.1	85.3	31.2		46	28	18	0	18	82		ML (A-7-6 (16))

NP=Non-Plastic

RB&G
ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT Mountain View Corridor — PROJECT NO. 200901-200

LOCATION Segment 5 — FEATURE Embankments

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-E5-7	10-11	99.9	29.5		29	22	7	0	12	88		CL-ML (A-4 (5))
	15-16.5		25.8				NP	0	28	72		ML (A-4 (0))
	20-21	83.5	33.9	uu 5424			NP	0	34	66		ML (A-4 (0))
	25-26.5		31.6				NP	0	30	70		ML (A-4 (0))
	32-33.5	95.0	25.9		36	18	18	7	16	77		CL (A-6 (13))

NP=Non-Plastic

H:\2009\200_MVCRedwoodRdto90thSouth\Embankment Borings\Lab Testing\Segment 5\09-E5 Summary of Test Data

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT: Mountain View Corridor
LOCATION: Segment 5
PROJECT NO.: 200901-200
FEATURE: Detention Basins

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-D5-01	5-6.5	102.6	17.6		27	23	4	0	21	79		ML (A-4 (2))
	15-16	83.4	33.8		33	22	11	0	12	88		CL (A-6 (9))
09-D5-02	5-6.5	90.2	23.5		34	18	16	0	20	80		CL (A-6 (12))
	10-11.5		21.2		24	19	5	0	20	80		CL-ML (A-4 (2))
	25-26.1	75.9	26.5		51	30	21	9	35	56		MH (A-7-5 (10))
	30-30.9		19.9				NP	10	57	33		SM (A-2-4 (0))
	35-36.5		26.2		44	28	16	0	17	83		ML (A-7-6 (15))
09-D5-03	5-6.5		21.3				NP	0	72	28		SM (A-2-4 (0))
	15-16.5		22.4		34	24	10	22	29	49		SM (A-4 (2))
	25-26.5		26.8		38	19	19	8	48	44		SC (A-6 (4))
	30-31.5		14.9				NP	18	58	24		SM (A-1-b (0))
	35-36.5		19.5		35	23	12	22	52	26		SC (A-2-6 (0))
09-D5-04	0-1.5		4.4				NP	48	35	17		GM (A-1-b (0))
	5-6.5		20.0		27	22	5	0	42	58		ML (A-4 (1))
	15-16.5		31.7		29	22	7	0	33	67		CL-ML (A-4 (3))
	20-21.5	80.9	30.5		50	20	30	1	15	84		CH (A-7-6 (26))
09-D5-5	5-6.5		12.5				NP	7	49	44		SM (A-4 (0))
	15-16.5		17.4				NP	10	45	45		SM (A-5 (0))
	25-26.4		8.4				NP	60	35	5		GP-GM (A-1-a (0))
09-D5-06	10-11.1		12.2		24	20	4	61	21	18		GC-GM (A-1-b (0))
	20-21.5	108.5	16.0		25	15	10	6	28	66		CL (A-4 (4))
	35-36.5	105.4	21.4		35	17	18	1	9	90		CL (A-6 (16))
09-D5-07	10-11.5		9.8				NP	46	46	8		SP-SM (A-1-a (0))
	20-21.5	84.0	31.6		36	23	13	0	1	99		CL (A-6 (14))
	30-31.5		11.7		23	16	7	43	33	24		GC-GM (A-2-4 (0))

NP=Non-Plastic

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT	Mountain View Corridor	PROJECT NO.	200901-200
LOCATION	Segment 5	FEATURE	Detention Basins

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-D5-08	10-11.5		6.9				NP	51	43	6		GP-GM (A-1-a (0))
	15-16.5		16.1				NP	0	60	40		SM (A-4 (0))
	25-26.5	91.7	26.0		33	18	15	0	10	90		CL (A-6 (13))
09-D5-09	0-1.5		10.6		25	15	10	0	34	66		CL (A-4 (4))
	10-11.5		8.0				NP	2	72	26		SM (A-2-4 (0))
	25-26.5	91.8	22.2		33	15	18	0	10	90		CL (A-6 (15))
09-D5-10	10-11.5		8.4				NP	52	37	11		GP-GM (A-1-a (0))
	20-21.5		14.1				NP	0	76	24		SM (A-2-4 (0))
	30-31.5		37.3		57	29	28	0	6	94		CH (A-7-6 (31))
09-D5-11	0-1.5		5.8				NP	1	67	32		SM (A-2-4 (0))
	5-6.5		6.9				NP	41	46	13		SM (A-1-a (0))
	20-21.5		9.5				NP	45	45	10		SP-SM (A-1-b (0))
	30-31.5		30.9		28	17	11	2	24	74		CL (A-6 (6))

HOLE NO.	DEPTH (ft)	pH	RESISTIVITY (ohm-cm)	SULFATE (mg/kg-dry)	CHLORIDE (mg/kg-dry)
09-D5-1	10-11.5	7.8	2200	26	6.6
09-D5-2	6.5-8	7.2	1300	5.5	3.1
	20-21	7.6	2200	6.4	2.6
09-D5-3	10-11.5	6.8	3000	7	1.5
09-D5-4	10-11.5	8.0	3100	8.5	4.3
09-D5-7	5-6.5	8.1	7600	17	6.7
09-D5-9	5-6.5	7.8	4900	12	6.2
09-D5-11	10-11.5	8.0	12,000	20	6.8

NP=Non-Plastic

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT Mountain View Corridor   PROJECT NO. 200901-200
LOCATION Segment 5   FEATURE Detention Basins

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
10-D5-12	20-21.5		8.7				NP	50	41	9		GP-GM (A-1-a (0))
	30-31.5		22.2				NP	3	45	52		ML (A-4 (0))
10-D5-13	23-24.5		23.4				NP	0	72	28		SM (A-2-4 (0))
	33-34.5		27.5		28	25	3	0	16	84		ML (A-4 (2))
10-D5-13A	40-41.5		34.6		30	19	11	2	22	76		CL (A-6 (7))
	50-51.5		16.8		22	18	4	6	42	52		CL-ML (A-4 (0))
10-D5-14	10-11.5		28.7		29	20	9	0	46	54		CL (A-4 (2))
	20-21.5		29.0		28	20	8	0	41	59		CL (A-4 (2))
	30-31.5		11.4		23	14	9	46	35	19		GC (A-2-4 (0))
10-D5-15	10-11.5		10.0				NP	50	40	10		GP-GM (A-1-a (0))
	15-16.5 (top)		12.9				NP	39	42	19		SM (A-1-b (0))
	15-16.5 (bottom)		24.6		25	20	5	0	49	51		CL-ML (A-4 (0))

NP=Non-Plastic

H:\2009\200_MVCRedwoodRdto90thSouth\Detention Basin Borings\Segment 5\10-D5-12,13 Testing Summary

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT Mountain View Corridor PROJECT NO. 200901-200
LOCATION Segment 5 FEATURE Cross Streets

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE DRY UNIT WEIGHT (pcf)	IN-PLACE MOISTURE (%)	UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS LIQUID LIMIT (%)	ATTERBERG LIMITS PLASTIC LIMIT (%)	ATTERBERG LIMITS PLASTICITY INDEX (%)	MECHANICAL ANALYSIS PERCENT GRAVEL	MECHANICAL ANALYSIS PERCENT SAND	MECHANICAL ANALYSIS PERCENT SILT & CLAY	PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
09-CS5-1	2-2.8		8.8				NP	7	66	27		SM (A-2-4 (0))
	5-6	92.9	25.8		58	25	33	0	12	88		CH (A-7-6 (32))
09-CS5-2	2-3.5		7.4				NP	47	41	12		GP-GM (A-1-a (0))
	8.5-9.5		34.0				NP	9	50	41		SM (A-4 (0))
09-CS5-3	2.1-2.8		13.4		25	15	10	19	55	26		SC (A-2-4 (0))
	5-6.5		7.6				NP	50	38	12		GP-GM (A-1-a (0))
09CS5-4	0-1.3		7.3		26	16	10	29	45	26		SC (A-2-4 (0))
	8.5-10		7.8				NP	53	36	11		GP-GM (A-1-a (0))

NP=Non-Plastic

RB&G
ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT Mountain View Corridor PROJECT NO. 200901-200
LOCATION Segment 5 FEATURE Roadway

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-MVC-139	0-1.5		4.9		25	17	8	38	24	38		GC (A-4 (0))
	5-6.5		10.9		23	18	5	26	21	53		CL-ML (A-4 (0))
	29-30.5		11.1				NP	52	37	11		GP-GM (A-1-a (0))
09-MVC-140	10-11.5		7.5				NP	2	80	18		SM (A-2-4 (0))
	15-16.5		7.8		25	18	7	47	34	19		GC-GM (A-2-4 (0))
	21-22.5		8.2				NP	44	43	13		GM (A-1-a (0))
	26-27.5		9.8		19	18	1	42	43	15		SM (A-1-a (0))
09-MVC-141	10-11.5		22.5		37	17	20	2	14	84		CL (A-6 (16))
	20-21.5		11.0				NP	40	42	18		SM (A-1-b (0))
	30-31.5		11.2		20	18	2	43	35	22		GM (A-1-b (0))
09-MVC-142	2-3.5		7.6		23	17	6	0	9	91		CL-ML (A-4 (3))
	7-8.5		14.6		27	16	11	0	14	86		CL (A-6 (8))
09-MVC-143	5-6.5	87.9	19.2		32	28	4	0	18	82		ML (A-4 (4))
	9-10.5		14.5				NP	0	42	58		ML (A-4 (0))
	14-14.8		15.0		30	17	13	12	32	56		CL (A-6 (4))
09-MVC-144	0-1.5		5.6		25	15	10	0	16	84		CL (A-4 (6))
	5-6.5		17.0		26	22	4	0	19	81		ML (A-4 (2))
09-MVC-145	0-1.5		4.7		24	18	6	4	35	61		CL-ML (A-4 (1))
	8.5-10		4.6				NP	0	38	62		ML (A-4 (0))
09-MVC-146	5-6.5		21.5				NP	2	47	51		ML (A-4 (0))
	10-11.5		10.6				NP	29	64	7		SP-SM (A-1-a (0))
	20-21.5	94.0	24.5				NP	0	66	34		SM (A-2-4 (0))
	25-26.5		28.8		29	20	9	0	19	81		CL (A-4 (6))
	35-36.5		26.5				NP	0	82	18		SM (A-2-4 (0))

Underlined Values Indicate Bulk Sample
NP=Non-Plastic

RB&G
ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT Mountain View Corridor — PROJECT NO. 200901-200
LOCATION Segment 5 — FEATURE Roadway

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-MVC-147	5-6.5		9.8				NP	1	92	7		SP-SM (A-1-b (0))
	15-16.5		20.0				NP	0	33	67		ML (A-4 (0))
	28.5-30		21.9		23	19	4	0	32	68		CL-ML (A-4 (1))
	33.5-35		20.7				NP	0	79	21		SM (A-2-4 (0))
09-MVC-148	5-6.5		24.2		33	22	11	8	42	50		CL (A-6 (3))
	15-16.3		20.4		20	14	6	10	41	49		SC-SM (A-4 (0))
	30-31.5		21.8		23	20	3	1	35	64		ML (A-4 (0))
	40-40.9		18.3				NP	4	45	51		ML (A-4 (0))
	46-47.3		12.8		23	18	5	29	38	33		SC-SM (A-2-4 (0))
	51-51.4		13.5		20	17	3	13	39	48		SM (A-4 (0))
09-MVC-149	5-6.5		8.3				NP	62	32	6		GP-GM (A-1-a (0))
	20-21.3		9.1				NP	35	56	9		SP-SM (A-1-a (0))
	27-28		15.4				NP	48	45	7		GP-GM (A-1-a (0))
	32-33.5		45.6		49	15	34	25	28	47		SC (A-7-6 (11))
	35.5-37		14.9		45	13	32	48	25	27		GC (A-2-7 (3))
09-MVC-150	0-1.5		11.1				NP	0	27	73		ML (A-4 (0))
	2.5-4		12.4				NP	1	65	34		SM (A-2-4 (0))
	5-6.5		15.7		27	17	10	2	38	60		CL (A-4 (3))
09-MVC-151	2.5-4		7.5				NP	20	58	22		SM (A-2-4 (0))
	5-6.5		4.4				NP	58	32	10		GP-GM (A-1-a (0))
09-MVC-152	5-6.5		26.8		36	21	15	0	12	88		CL (A-6 (13))
	21.5-22.3		30.1				NP	14	61	25		SM (A-2-4 (0))
	26.5-27.1		27.9				NP	5	51	44		SM (A-4 (0))

Underlined Values Indicate Bulk Sample
NP=Non-Plastic

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT: Mountain View Corridor
LOCATION: Segment 5
PROJECT NO.: 200901-200
FEATURE: Roadway

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE: DRY UNIT WEIGHT (pcf)	IN-PLACE: MOISTURE (%)	UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	MECHANICAL ANALYSIS: PERCENT GRAVEL	MECHANICAL ANALYSIS: PERCENT SAND	MECHANICAL ANALYSIS: PERCENT SILT & CLAY	PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
09-MVC-153	5-6.5		15.8		29	19	10	4	41	55		CL (A-4 (3))
	20-21.5		20.3		32	16	16	5	19	76		CL (A-6 (10))
	34.5-36		19.0		26	19	7	3	50	47		SC-SM (A-4 (1))
	37-37.9		11.6				NP	30	51	19		SM (A-1-b (0))
	39.5-40.2		14.9				NP	2	46	52		ML (A-4 (0))
09-MVC-154	1-2		4.6				NP	50	41	9		GP-GM (A-1-a (0))
	8-9		4.1				NP	68	26	6		GP-GM (A-1-a (0))
	15-16		2.9				NP	73	22	5		GP-GM (A-1-a (0))
	15-16.5		4.0				NP	57	33	10		GP-GM (A-1-a (0))
	20-21.5		1.9				NP	70	24	6		GP-GM (A-1-a (0))
09-MVC-155	0-1.5		3.0				NP	35	50	15		SM (A-1-b (0))
	10-11.5		21.6				NP	0	39	61		ML (A-4 (0))
	15-16.5		31.6		31	22	9	2	32	66		CL (A-4 (4))
	25-26.3		6.6				NP	56	36	8		GP-GM (A-1-a (0))
	34-35.5		7.0				NP	41	50	9		SP-SM (A-1-a (0))
09-MVC-156	2.5-4		21.0		23	19	4	0	43	57		CL-ML (A-4 (0))
	8.5-10		18.0		23	15	8	0	43	57		CL (A-4 (2))
09-MVC-157	2.3.5		10.4		23	17	6	7	53	40		SC-SM (A-4 (0))
	2.5-3		10.7		23	17	6	18	49	33		SC-SM (A-2-4 (0))
	4-4.5		10.4		28	19	9	3	38	59		CL (A-4 (3))
	4.5-6		16.1				NP	1	27	72		ML (A-4 (0))
09-MVC-158	10-11.5		22.1		46	15	31	2	24	74		CL (A-7-6 (21))
	21-22.2		10.6				NP	40	41	19		SM (A-1-b (0))
	26-26.5		10.2		21	12	9	34	48	18		SC (A-2-4 (0))

Underlined Values Indicate Bulk Sample
NP=Non-Plastic

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT	Mountain View Corridor	PROJECT NO.	200901-200
LOCATION	Segment 5	FEATURE	Roadway

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-MVC-159	5-5.8		18.8		26	22	4	30	46	24		SM (A-1-b (0))
	10-11.1		14.0		28	19	9	46	28	26		GC (A-2-4 (0))
	25-25.8		16.2		33	22	11	29	57	14		SC (A-2-6 (0))
	34.5-35.4		15.5		22	19	3	44	40	16		GM (A-1-b (0))
09-MVC-160	1-1.5	106.9	3.5		18	15	3	8	61	31		SM (A-2-4 (0))
	5-6		5.3		22	19	3	11	76	13		SM (A-1-b (0))
	9-10.5		10.2				NP	1	83	16		SM (A-2-4 (0))
	11-12		11.9				NP	6	80	14		SM (A-1-a (0))
	14-15.5		22.6		23	18	5	0	49	51		CL-ML (A-4 (0))
09-MVC-161	10-11.3		7.5				NP	45	35	20		GM (A-1-b (0))
	20-21.5		6.2				NP	53	28	19		GM (A-1-b (0))
	25-26.5		15.9		22	18	4	1	44	55		CL-ML (A-4 (0))
09-MVC-162	10-11.5		16.9				NP	21	53	26		SM (A-2-4 (0))
	16-16.3		13.1				NP	1	90	9		SP-SM (A-3 (0))
	21-22.4		6.2				NP	43	41	16		GM (A-1-b (0))
09-MVC-163	10-11.5		8.4				NP	5	79	16		SM (A-2-4 (0))
	18-19.5		17.0				NP	0	62	38		SM (A-4 (0))
	20.5-22		34.1		28	23	5	0	22	78		ML (A-4 (3))
09-MVC-164	2-2.5	104.6	13.9		26	15	11	0	41	59		CL (A-6 (4))
	6-7		15.6				NP	1	57	42		SM (A-4 (0))
	10-11.5		15.5				NP	0	43	57		ML (A-4 (0))
	12-13		17.6				NP	3	39	58		ML (A-4 (0))
	12.5-14		23.2				NP	0	28	72		ML (A-4 (0))

Underlined Values Indicate Bulk Sample
NP=Non-Plastic

RB&G ENGINEERING, INC.

Table 1

SUMMARY OF TEST DATA

PROJECT	Mountain View Corridor	PROJECT NO.	200901-200
LOCATION	Segment 5	FEATURE	Roadway

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	IN-PLACE		UNCONFINED OR UU TRIAXIAL COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			PERCENT FINER THAN 0.005 mm	UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO CLASSIFICATION)
		DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY		
09-MVC-165	10-11.5		16.6				NP	0	80	20		SM (A-2-4 (0))
	15-16.5		6.6				NP	5	85	10		SP-SM (A-1-b (0))
	30-31.5		10.1				NP	51	37	12		GP-GM (A-1-b (0))
09-MVC-166	5-6.5		5.4				NP	0	82	18		SM (A-2-4 (0))
	15-16.5		3.2				NP	57	35	8		GP-GM (A-1-a (0))
	20-20.7		11.3				NP	3	77	20		SM (A-2-4 (0))
	20.7-21.5		12.2				NP	0	80	20		SM (A-2-4 (0))
09-MVC-167	5-6		2.9				NP	71	25	4		GP (A-1-a (0))
	9-10.5		4.0				NP	65	29	6		GP-GM (A-1-a (0))
	10-11		3.5				NP	76	19	5		GP-GM (A-1-a (0))
	14-15.5		4.6				NP	66	29	5		GP-GM (A-1-a (0))

HOLE NO.	DEPTH (ft)	pH (@ 25°C)	RESISTIVITY (ohm-cm)	SULFATE (mg/kg-dry)	CHLORIDE (mg/kg-dry)			
09-MVC-140	8.5-10	8.3	2400	100	8.9			
09-MVC-143	11.5-13	9.1	1700	43	< 6.0			
09-MVC-148	48.5-49.1	8.8	4700	< 25	< 5.0			
09-MVC-152	24-25.5	8.1	1800	180	9.7			
09-MVC-154	17.5-19	8.4	7750	< 25	< 5.0			
09-MVC-158	29.5-35	8.7	5300	< 25	< 5.0			
09-MVC-162	18.5-20	7.5	5000	37	7.1			
09-MVC-167	11.5-13	7.9	4700	30	9.1			

Underlined Values Indicate Bulk Sample
NP=Non-Plastic

H:\2009\200_MVCRedwoodRdto90thSouth\Road Borings\Segment 5\Summary of Test Data - Seg 5 Roadway

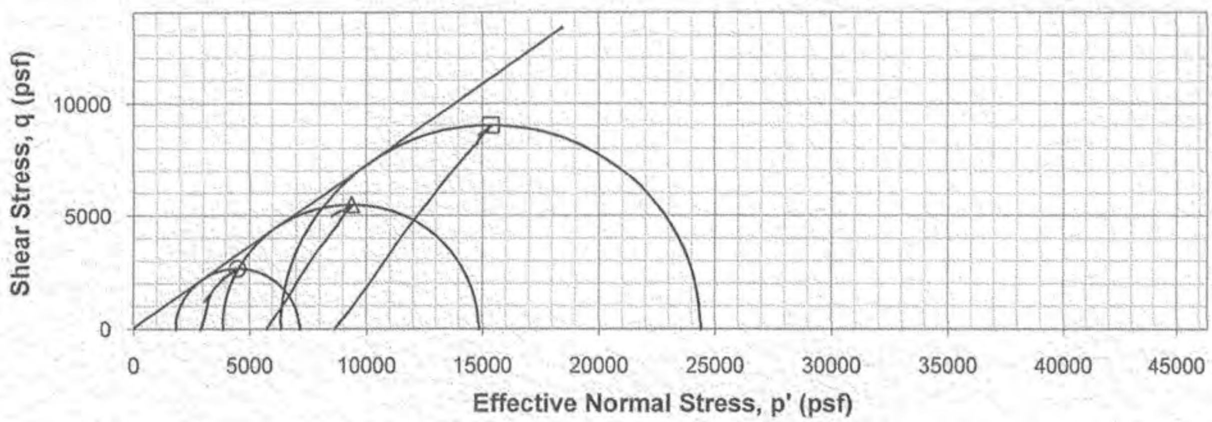
RB&G ENGINEERING, INC.

MULTI-STAGE CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

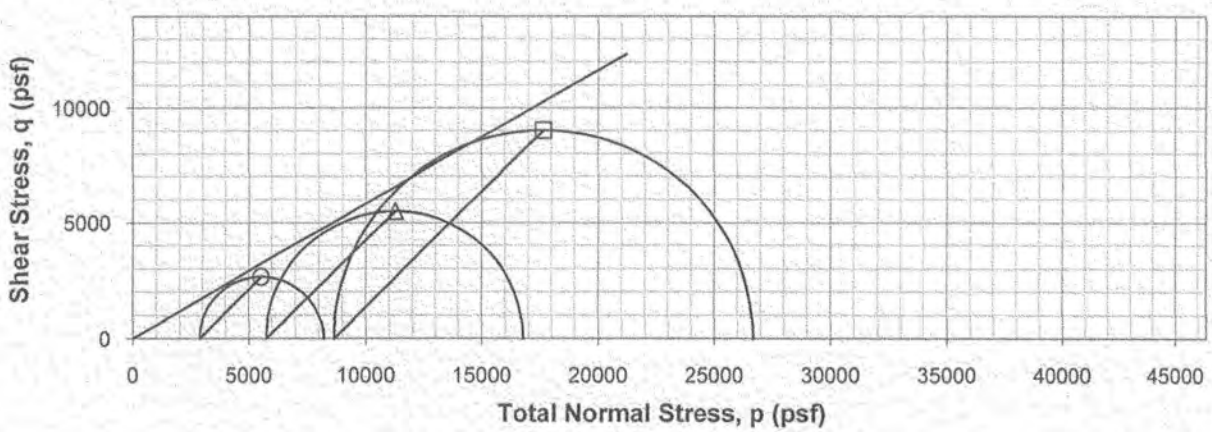
Project	Mountain View Corridor		
Project No.	200901-200	**Boring No**	09-W5-2
Location	Segment 5	**Depth / Elev. (ft)**	5-5.8'
Date	12/2/09	**Sample Type**	shelby
Tested By	J Boone	**Failure Criteria**	Max obliquity
Sample Description	Lean Clay w/ Sand CL(A-6(7)): LL = 29, PI = 13		

Summary of Results		σ'_{consol} psf	$\sigma_{d,f}$* psf	ε_f	$\sigma'_{1,f}$* psf	$\sigma'_{3,f}$* psf
Stage 1	○	2873	5333	2.1%	7154	1821
Stage 2	Δ	5762	11011	9.9%	14853	3843
Stage 3	□	8640	18034	16.1%	24379	6345

Effective stress failure envelope c' = 57 psf ϕ' = 35.7°



Total stress failure envelope c = 0 psf ϕ = 30.2°



See page two for plots of deviator stress and pore water pressure versus strain.

*Values corrected for membrane effects

**A_c calculated according to ASTM D 4767 10.3.2.1 *Method A*

Tested in general accordance with **ASTM D 4767**

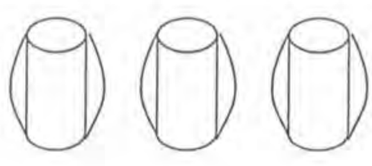
H:\2009\200_MVCRedwoodRdto90thSouth\Wall Borings\Segment 5\09-W5-2 @ 5-5.8' Multistage CU report

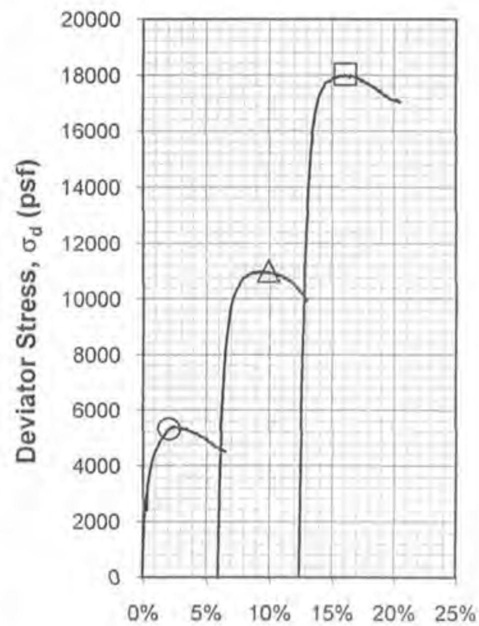
RB&G ENGINEERING, INC.

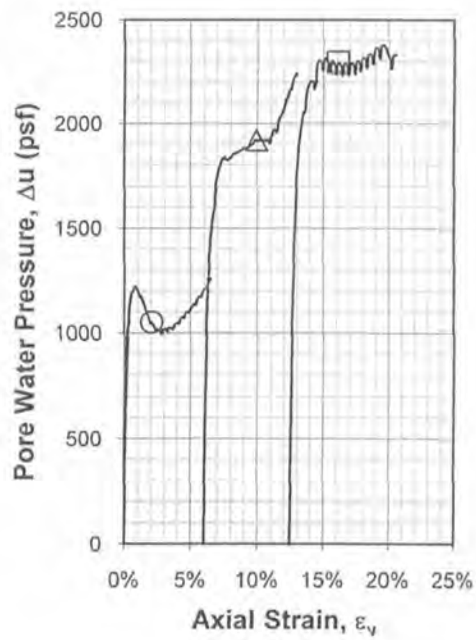
MULTI-STAGE CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Project	Mountain View Corridor		
Project No.	200901-200	**Boring No**	09-W5-2
Location	Segment 5	**Depth / Elev. (ft)**	5-5.8'
Date	12/2/09	**Sample Type**	shelby
Tested By	J Boone	**Failure Criteria**	Max obliquity
Sample Description	Lean Clay w/ Sand CL(A-6(7)): LL = 29, PI = 13		

	Symbol		○	Δ	□	
	Stage		1	2	3	
	Vertical effective consolidation stress	σ'_c	2873	5762	8640	(psf)
Initial	**Height**	L_o	3.16	2.94	2.75	(in)
	Diameter	D_o	1.43	1.48	1.46	(in)
	Moisture	w_o	16.1%	23.5%	18.6%	
	Dry unit weight	γ_{do}	101.6	102.6	111.6	(pcf)
	Est. specific gravity	G_s	2.68	2.68	2.68	
	Void ratio	e_o	0.65	0.63	0.50	
	Saturation	S_o	67%	100%	100%	
After consolidation	**Moisture**	w	23.5%	18.6%	15.5%	
	Dry unit weight	γ_d	102.6	111.6	118.1	(pcf)
	Void ratio	e	0.630	0.498	0.416	
	Saturation	S	100%	100%	100%	
	Area	A_c	1.60	1.56	1.58	(in^2)
	Time to 50% consolidation	t_{50}	0.98	251.57	45.93	(min)
	B-value	B	0.95	-	-	
	Total back pressure		11808	11518	11520	(psf)
Results at Failure	**Deviator stress**	$\sigma_{d,f}$	5333	11011	18034	(psf)
	Major principal effective stress	σ'_1	7154	14853	24379	(psf)
	Minor principal effective stress	σ'_3	1821	3843	6345	(psf)
	Strain	ε_f	2.1%	9.9%	16.1%	
	Strain rate, /min		0.02%	0.02%	0.02%	
	Sketch at Failure					







Remarks

*Values corrected for membrane effects

**A_c calculated according to ASTM D 4767 10.3.2.1 *Method A*

H:\2009\200_MVCRedwoodRdto90thSouth\Wall Borings\Segment 5\09-W5-2 @ 5-5.8' Multistage CU report

Tested in general accordance with **ASTM D 4767**

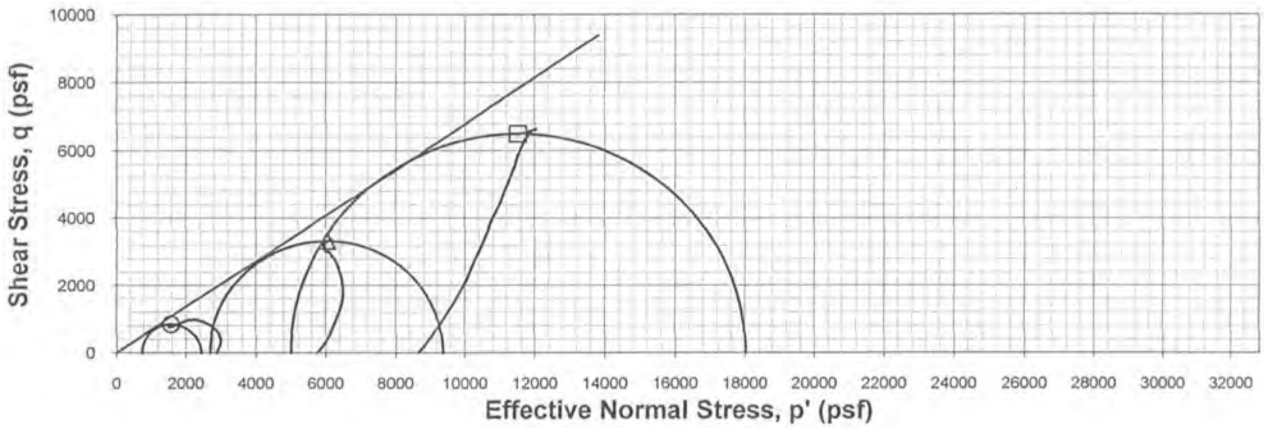
RB&G
ENGINEERING, INC.

MULTI-STAGE CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

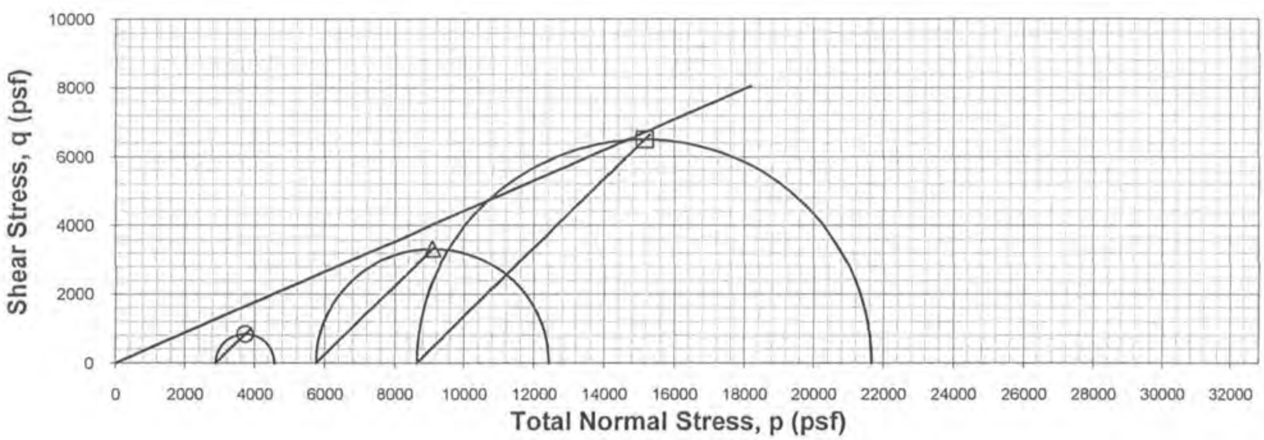
Project	Mountain View Corridor		
Project No.	200901-200	**Boring No**	09-W5-4
Location	Segment 5	**Depth / Elev. (ft)**	25-25.9'
Date	12/7/09	**Sample Type**	Remolded
Tested By	J Boone	**Failure Criteria**	Max obliquity
Sample Description	Sandy Silty Clay CL-ML (A-4(2)): LL = 23, PI = 6		

Summary of Results		σ'_{consol} psf	$\sigma_{d,f}^*$ psf	ε_f	$\sigma'^{*}_{1,f}$ psf	$\sigma'^{*}_{3,f}$ psf
Stage 1	○	2885	1686	5.9%	2429	743
Stage 2	Δ	5760	6664	11.6%	9361	2697
Stage 3	□	8640	13012	17.5%	18018	5005

Effective stress failure envelope **c'** = 0 psf ϕ' = 34.2°



Total stress failure envelope **c** = 0 psf ϕ = 23.9°



See page two for plots of deviator stress and pore water pressure versus strain.

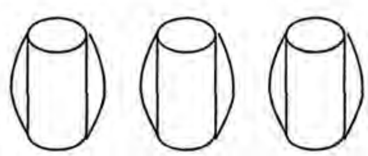
*Values corrected for membrane effects
**A_c calculated according to ASTM D 4767 10.3.2.1 *Method A*

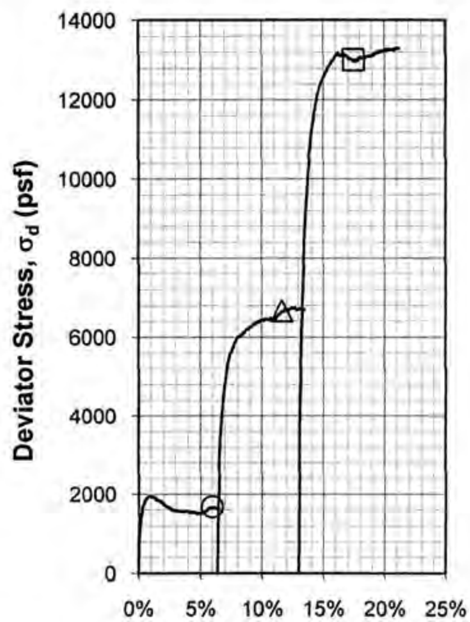
Tested in general accordance with
ASTM D 4767

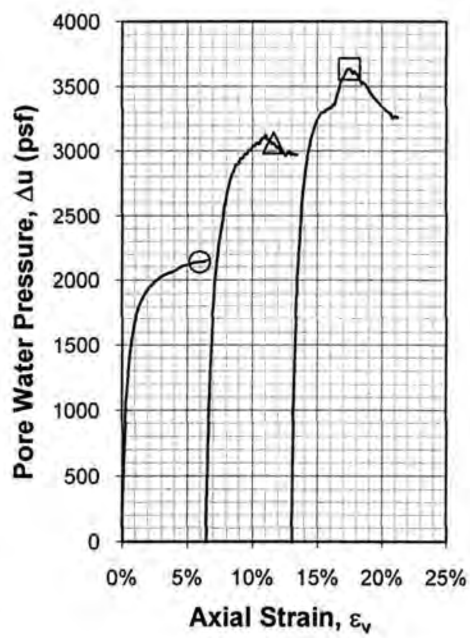
RB&G ENGINEERING, INC.

MULTI-STAGE CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Project	Mountain View Corridor
Project No.	200901-200
Location	Segment 5
Date	12/7/09
Tested By	J Boone
Sample Description	Sandy Silty Clay CL-ML (A-4(2)): LL = 23, PI = 6
Boring No	09-W5-4
Depth / Elev. (ft)	25-25.9'
Sample Type	Remolded
Failure Criteria	Max obliquity

Symbol			○	Δ	□	
Stage			1	2	3	
Vertical effective consolidation stress		σ'_c	2885	5760	8640	(psf)
Initial	**Height**	L_o	3.74	3.46	3.22	(in)
	Diameter	D_o	1.43	1.46	1.46	(in)
	Moisture	w_o	17.7%	25.1%	20.5%	
	Dry unit weight	γ_{do}	96.5	99.9	107.9	(pcf)
	Est. specific gravity	G_s	2.68	2.68	2.68	
	Void ratio	e_o	0.73	0.67	0.55	
	Saturation	S_o	65%	100%	100%	
After consolidation	**Moisture**	w	25.1%	20.5%	18.1%	
	Dry unit weight	γ_d	99.9	107.9	112.6	(pcf)
	Void ratio	e	0.674	0.550	0.485	
	Saturation	S	100%	100%	100%	
	Area	A_c	1.57	1.55	1.60	(in^2)
	Time to 50% consolidation	t_{50}	0.42	7.79	3.46	(min)
	B-value	B	0.95	-	-	
	Total back pressure		8779	11520	11520	(psf)
Results at Failure	**Deviator stress**	$\sigma_{d,f}$	1686	6664	13012	(psf)
	Major principal effective stress	σ'_1	2429	9361	18018	(psf)
	Minor principal effective stress	σ'_3	743	2697	5005	(psf)
	Strain	ε_f	5.9%	11.6%	17.5%	
	Strain rate, /min		0.01%	0.02%	0.02%	
	Sketch at Failure					





Remarks

*Values corrected for membrane effects

**A_c calculated according to ASTM D 4767 10.3.2.1 *Method A*

Tested in general accordance with **ASTM D 4767**

H:\2009\200_MVCRedwoodRdto90thSouth\Wall Borings\Segment 5\09-W5-4 @ 25-25.9' Multistage CU report

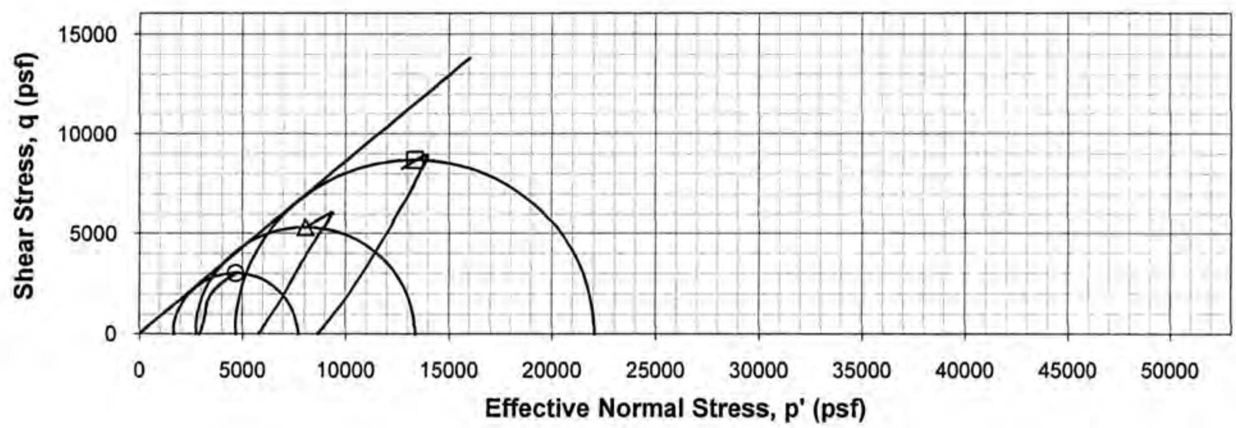
RB&G ENGINEERING, INC.

MULTI-STAGE CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

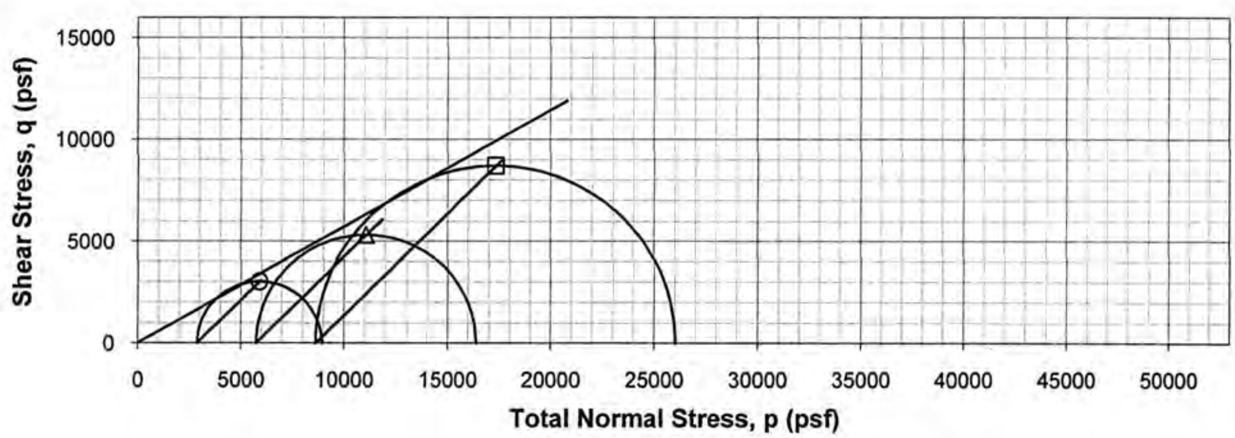
Project	Mountain View Corridor		
Project No.	200901-200	**Boring No**	09-W5-6
Location	Segment 5	**Depth / Elev. (ft)**	20-21.5'
Date	11/23/09	**Sample Type**	Remolded
Tested By	J Boone	**Failure Criteria**	Max obliquity
Sample Description	Silt w/ Sand ML (A-4(0)): Non Plastic		

Summary of Results		σ'_{consol} psf	$\sigma_{d,f}$* psf	ε_f	$\sigma'_{1,f}$* psf	$\sigma'_{3,f}$* psf
Stage 1	○	2881	6051	4.6%	7697	1646
Stage 2	Δ	5759	10632	12.8%	13365	2733
Stage 3	□	8637	17403	18.8%	22051	4648

Effective stress failure envelope c' = 12 psf ϕ' = 40.7°



Total stress failure envelope c = 0 psf ϕ = 29.8°



See page two for plots of deviator stress and pore water pressure versus strain.

*Values corrected for membrane effects

**A_c calculated according to ASTM D 4767 10.3.2.1 *Method A*

H:\2009\200_MVCRedwoodRdto90thSouth\Wall Borings\Segment 5\09-W5-6 @ 20-21.5' Multistage CU report

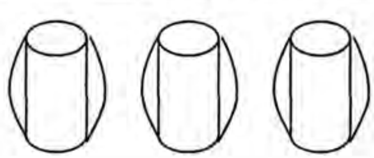
Tested in general accordance with **ASTM D 4767**

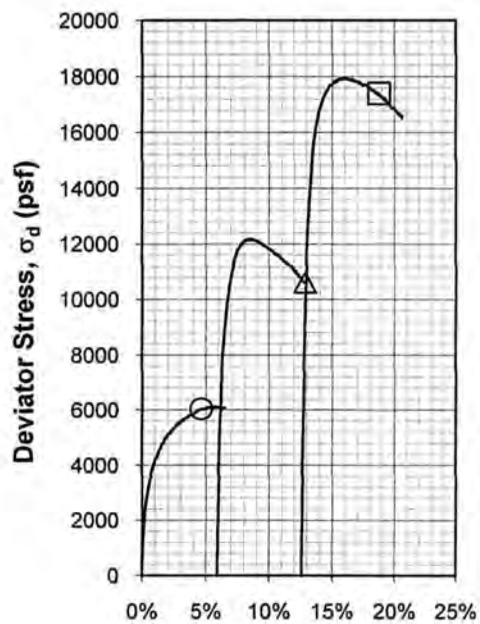
RB&G ENGINEERING, INC.

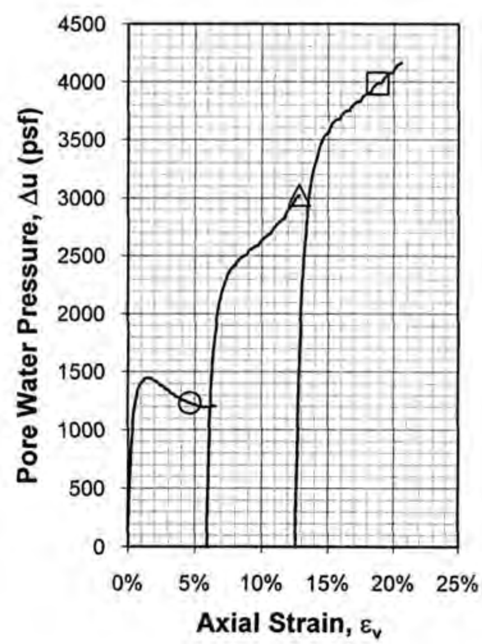
MULTI-STAGE CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Project	Mountain View Corridor		
Project No.	200901-200	**Boring No**	09-W5-6
Location	Segment 5	**Depth / Elev. (ft)**	20-21.5'
Date	11/23/09	**Sample Type**	Remolded
Tested By	J Boone	**Failure Criteria**	Max obliquity
Sample Description	Silt w/ Sand ML (A-4(0)): Non Plastic		

	Symbol		○	Δ	□	
	Stage		1	2	3	
	Vertical effective consolidation stress	σ'_c	2881	5759	8637	(psf)
Initial	**Height**	L_o	3.2	2.99	2.80	(in)
	Diameter	D_o	1.42	1.33	1.28	(in)
	Moisture	w_o	27.8%	16.9%	10.1%	
	Dry unit weight	γ_{do}	93.7	115.1	131.6	(pcf)
	Est. specific gravity	G_s	2.68	2.68	2.68	
	Void ratio	e_o	0.79	0.45	0.27	
	Saturation	S_o	95%	100%	100%	
After consolidation	**Moisture**	w	16.9%	10.1%	6.8%	
	Dry unit weight	γ_d	115.1	131.6	141.5	(pcf)
	Void ratio	e	0.453	0.270	0.182	
	Saturation	S	100%	100%	100%	
	Area	A_c	1.29	1.20	1.20	(in^2)
	Time to 50% consolidation	t_{50}	261.67	314.86	1.29	(min)
	B-value	B	1.01	-	-	
	Total back pressure		4033	8700	18598	(psf)
Results at Failure	**Deviator stress**	$\sigma_{d,f}$	6051	10632	17403	(psf)
	Major principal effective stress	σ'_1	7697	13365	22051	(psf)
	Minor principal effective stress	σ'_3	1646	2733	4648	(psf)
	Strain	ε_f	4.6%	12.8%	18.8%	
	Strain rate, /min		0.02%	0.02%	0.02%	
	Sketch at Failure					







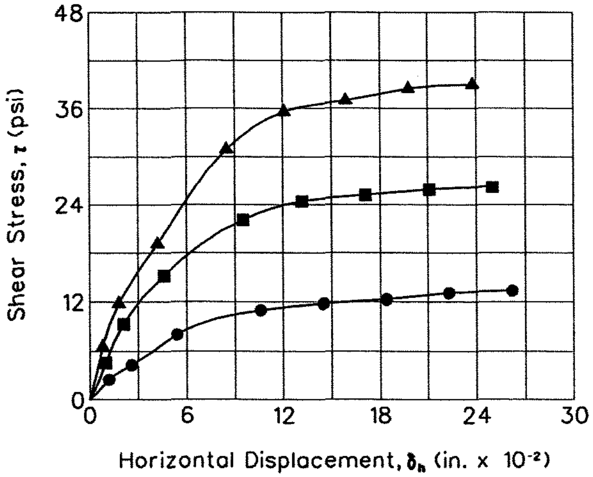
Remarks

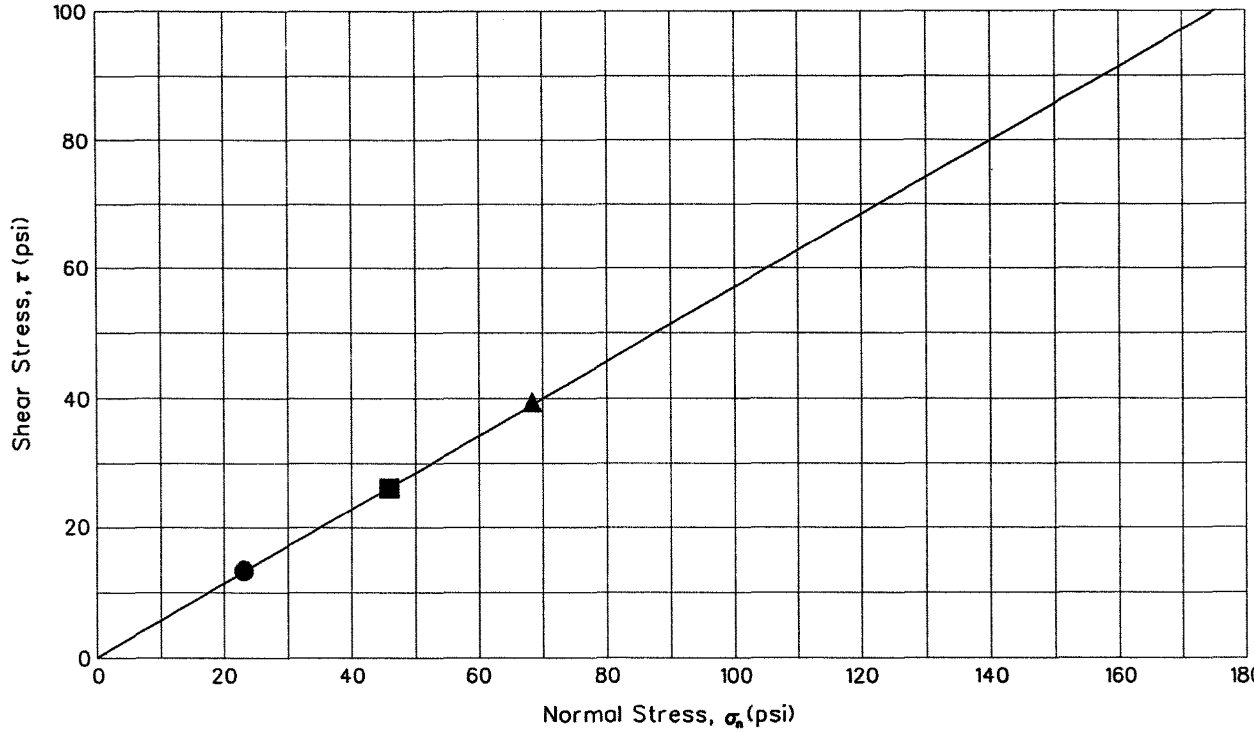
*Values corrected for membrane effects

**A_c calculated according to ASTM D 4767 10.3.2.1 *Method A*

Tested in general accordance with **ASTM D 4767**

H:\2009\200_MVCRedwoodRdto90thSouth\Wall Borings\Segment 5\09-W5-6 @ 20-21.5' Multistage CU report





Test No. or Symbol	Sample Size (inches)	Sample Data		Degree of Saturation (%)	Normal Stress δ_n (psi)	Maximum Shear Stress τ (psi)	Strain Rate (inches/minute)	Shear Strength Parameters	
		Dry Density (pcf)	Moisture Content (%)					Friction Angle φ (degrees)	Cohesion (c/psi)
●	2.375	88.2	13.1	~100	23.1	13.4	0.0014	29.7	0
■	2.375	88.4	13.0	~100	45.9	26.2	0.0014		
▲	2.375	87.8	12.9	~100	68.3	39.0	0.0014		

MATERIAL: SILTY SAND, SM (A-4(0)) (REMOLDED)

RB&G ENGINEERING INC.
Provo, Utah

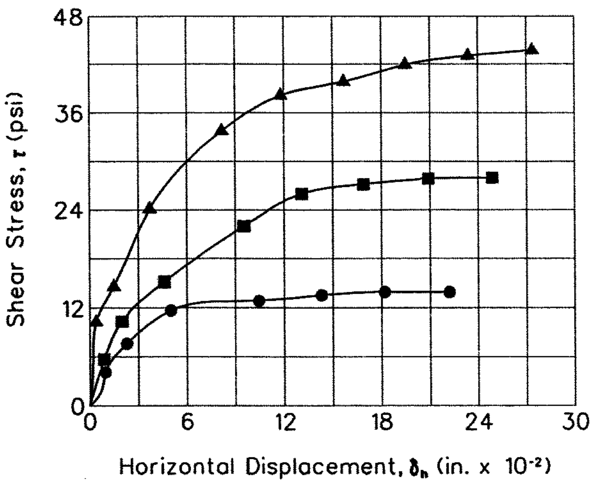
DIRECT SHEAR TEST

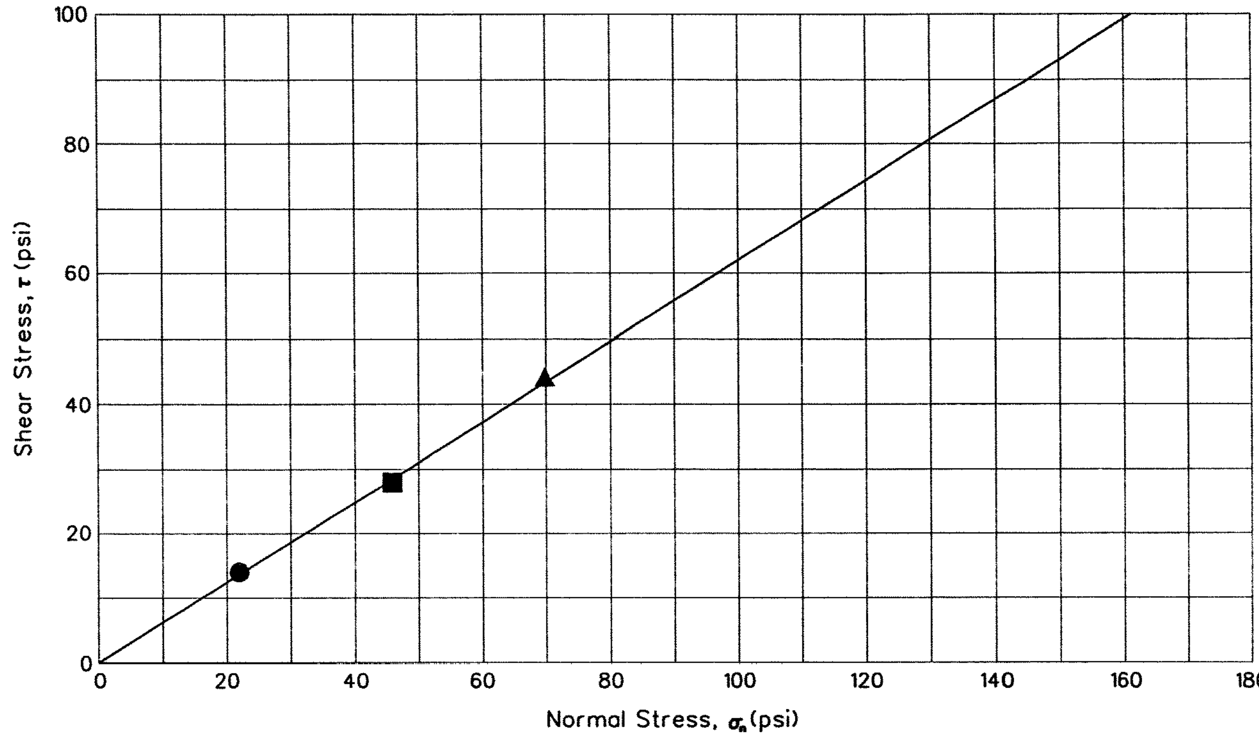
Project: *Mountain View Corridor*
Salt Lake County, Utah

HOLE NO.: 09-S5-3

DEPTH: 5'-6.5'

Figure





Test No. or Symbol	Sample Size (inches)	Sample Data		Degree of Saturation (%)	Normal Stress δ_n (psi)	Maximum Shear Stress τ (psi)	Strain Rate (inches/ minute)	Shear Strength Parameters	
		Dry Density (pcf)	Moisture Content (%)					Friction Angle φ (degrees)	Cohesion (c/psi)
●	2.375	95.5	14.3	~100	22.0	14.0	0.0014	31.8	0
■	2.375	95.4	14.1	~100	45.8	28.0	0.0014		
▲	2.375	95.6	14.0	~100	69.8	43.7	0.0014		

MATERIAL: SILTY SAND, SM (A-4(0)) (REMOLDED)

RB&G ENGINEERING INC.
Provo, Utah

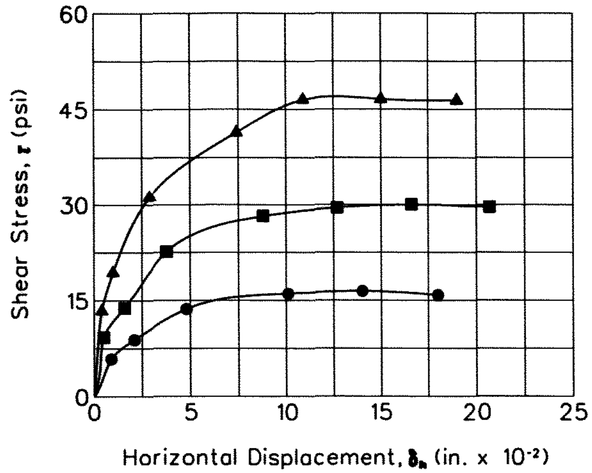
DIRECT SHEAR TEST

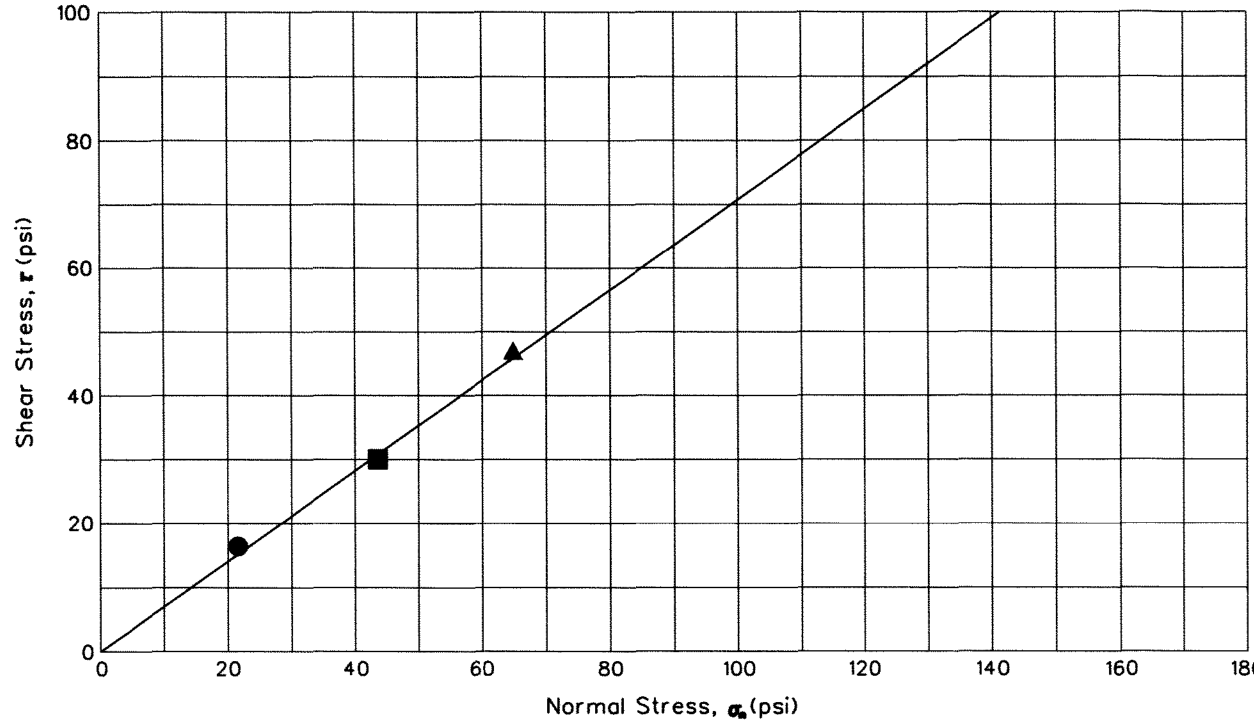
Project: *Mountain View Corridor*
Salt Lake County, Utah

HOLE NO.: 09-S5-3

DEPTH: 20'-21.5'

Figure





Test No. or Symbol	Sample Size (inches)	Sample Data: Dry Density (pcf)	Sample Data: Moisture Content (%)	Degree of Saturation (%)	Normal Stress δ_n (psi)	Maximum Shear Stress τ (psi)	Strain Rate (inches/minute)	Shear Strength Parameters: Friction Angle φ (degrees)	Shear Strength Parameters: Cohesion (c/psi)
●	2.375	95.6	16.5	~100	21.5	16.5	0.0014	35.3	0
■	2.375	95.7	16.6	~100	43.6	30.1	0.0014		
▲	2.375	95.5	16.4	~100	64.8	46.6	0.0014		

MATERIAL: SILTY SAND, SM (A-4(0)) (REMOLDED, TESTS PERFORMED ON -1/2" MATERIAL)

RB&G ENGINEERING INC.
Provo, Utah

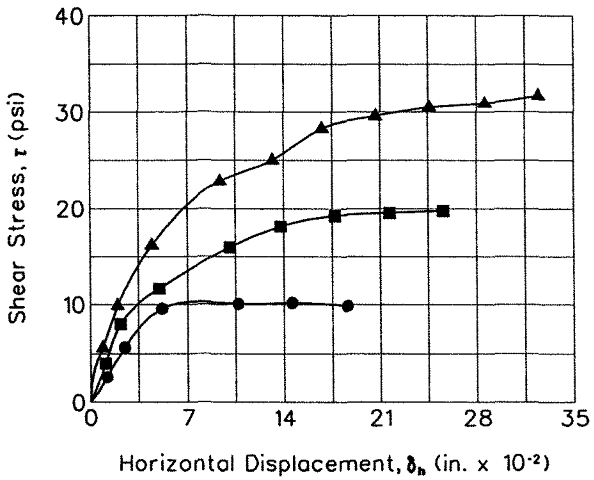
DIRECT SHEAR TEST

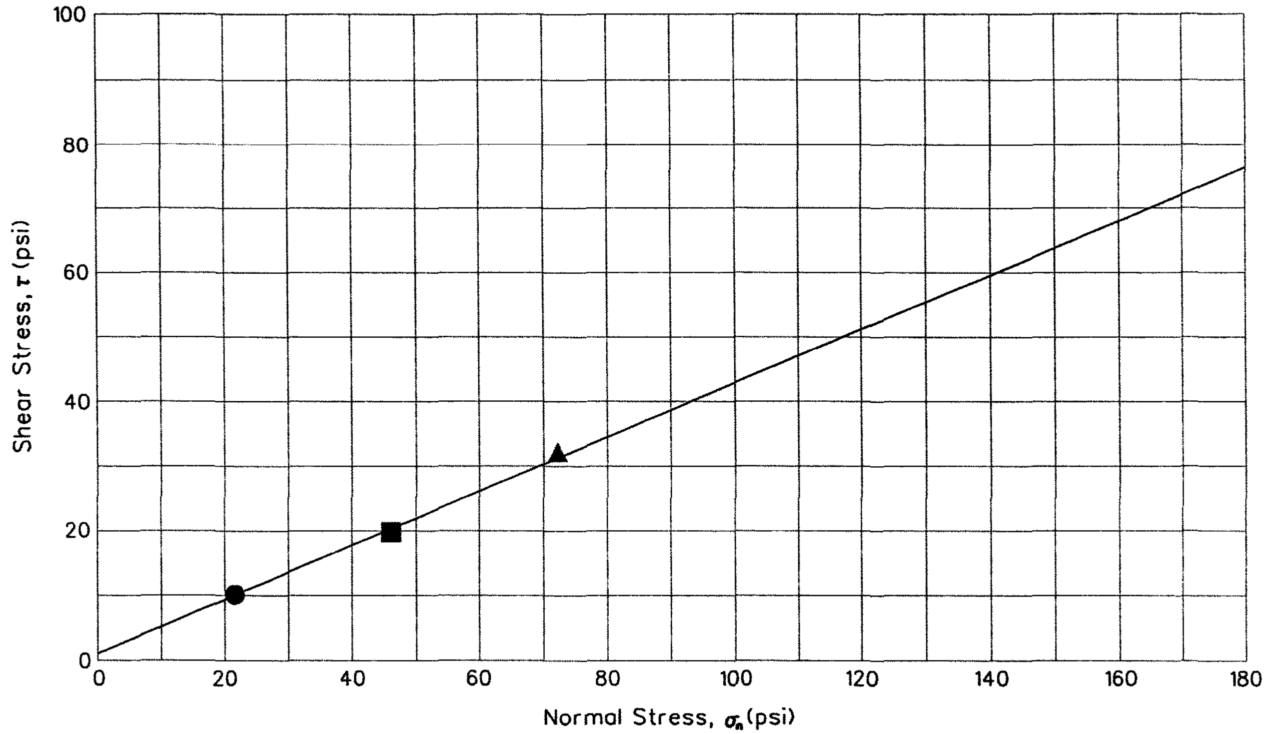
Project: *Mountain View Corridor*
Salt Lake County, Utah

HOLE NO.: 10-S5-4

DEPTH: 10'-11.5'

Figure





Test No. or Symbol	Sample Size (inches)	Sample Data: Dry Density (pcf)	Sample Data: Moisture Content (%)	Degree of Saturation (%)	Normal Stress δ_n (psi)	Maximum Shear Stress τ (psi)	Strain Rate (inches/minute)	Shear Strength Parameters: Friction Angle φ (degrees)	Shear Strength Parameters: Cohesion (c/psi)
●	2.375	87.4	28.9	~100	21.6	10.2	0.0006		
■	2.375	87.9	28.8	~100	46.1	19.8	0.0006	22.7	1
▲	2.375	87.8	29.0	~100	72.2	31.7	0.0006		

MATERIAL: SANDY SILT, ML (A-4(5)) (REMOLDED)

RB&G ENGINEERING INC.
Provo, Utah

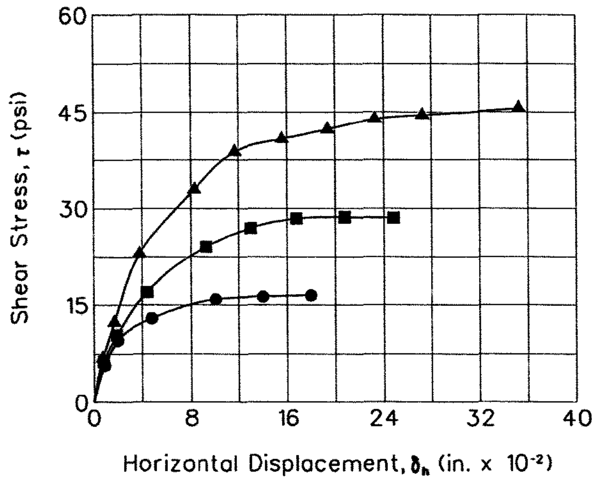
DIRECT SHEAR TEST

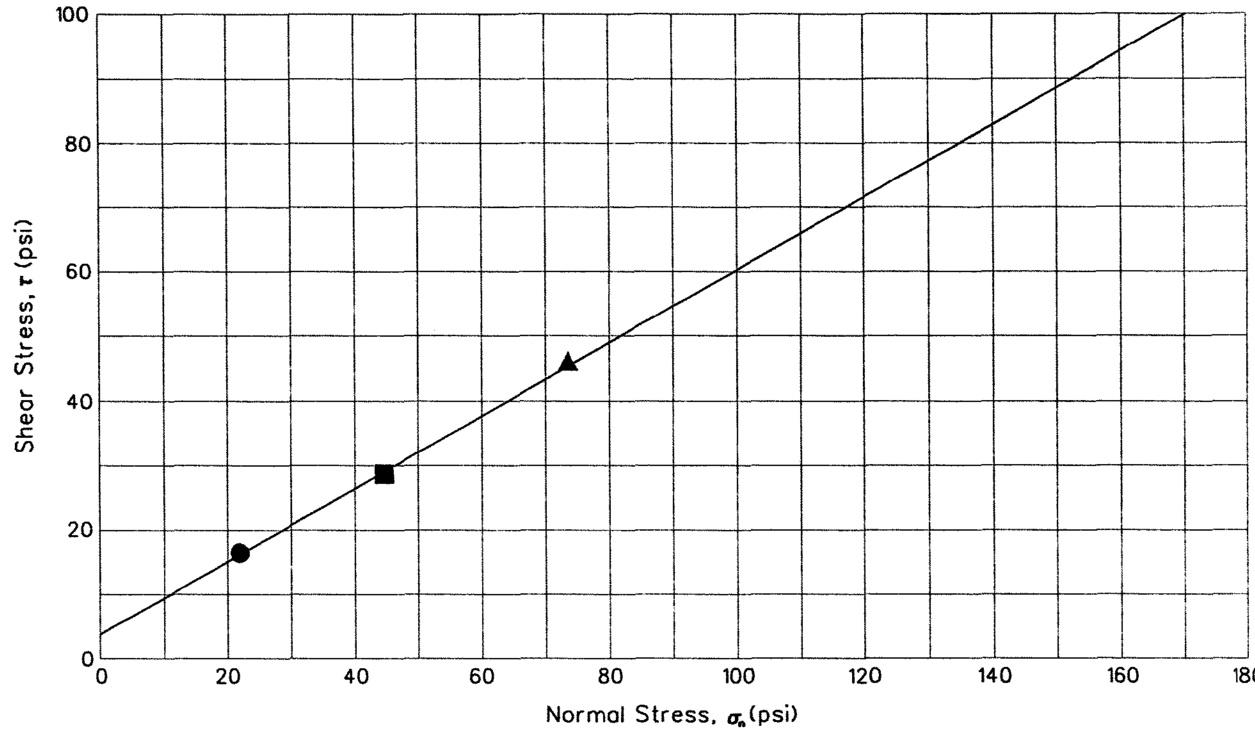
Project: *Mountain View Corridor*
Salt Lake County, Utah

HOLE NO.: 09-W5-1

DEPTH: 20'-21.5'

Figure





Test No. or Symbol	Sample Size (inches)	Sample Data		Degree of Saturation (%)	Normal Stress δ_n (psi)	Maximum Shear Stress τ (psi)	Strain Rate (inches/minute)	Shear Strength Parameters	
		Dry Density (pcf)	Moisture Content (%)					Friction Angle ϕ (degrees)	Cohesion (c/psi)
●	2.375	92.9	23.0	~100	22.0	16.5	0.0006		
■	2.375	92.6	22.9	~100	44.7	28.7	0.0006	29.5	4
▲	2.375	92.7	23.0	~100	73.5	45.6	0.0006		

MATERIAL: SILT W/SAND, ML (A-4(2))

RB&G ENGINEERING INC.
Provo, Utah

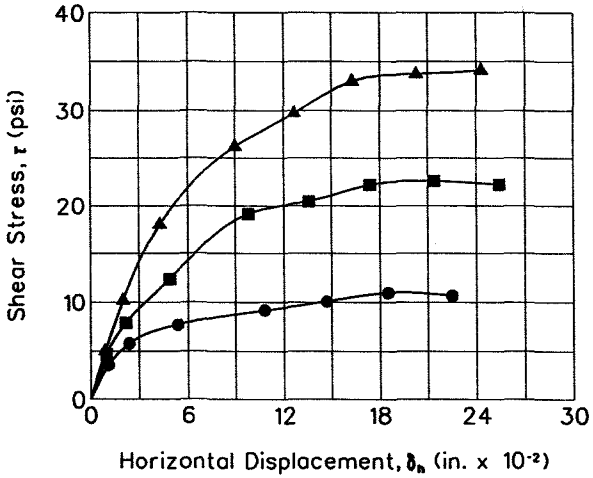
DIRECT SHEAR TEST

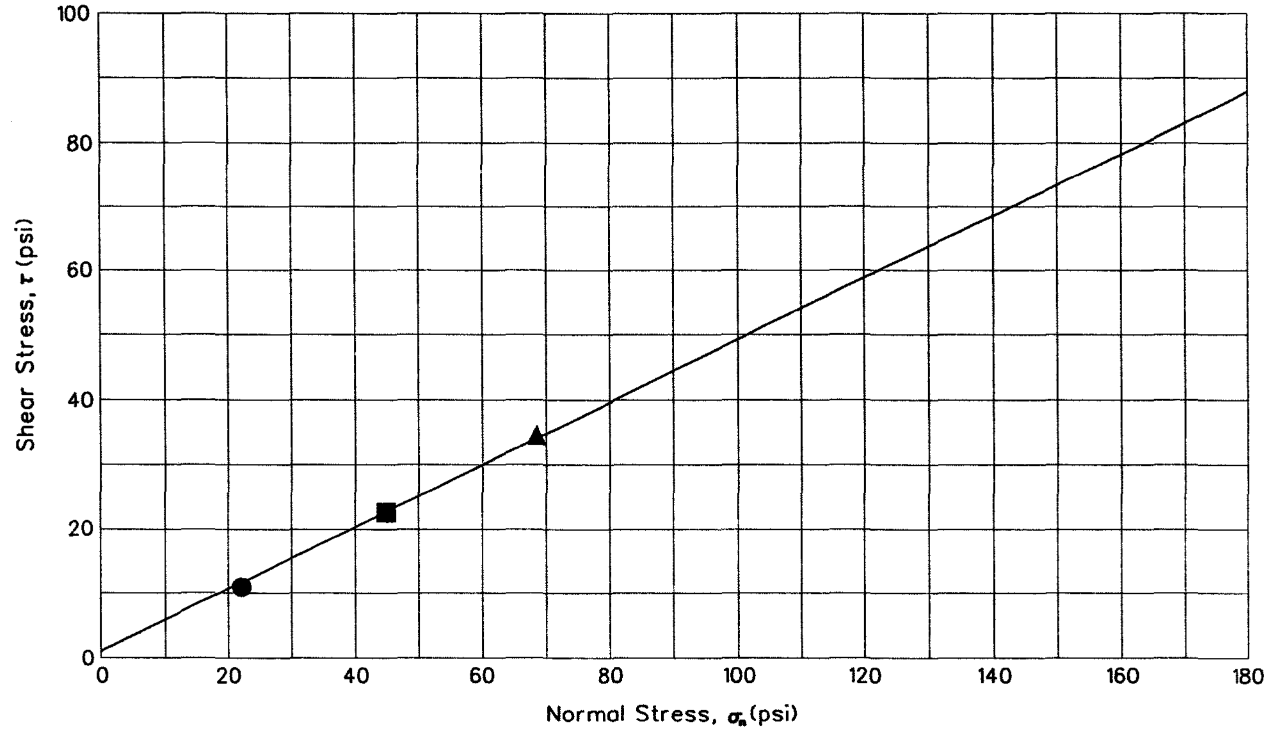
Project: *Mountain View Corridor*
Salt Lake County, Utah

HOLE NO.: 09-W5-4

DEPTH: 10'-11.1'

Figure





Test No. or Symbol	Sample Size (inches)	Sample Data: Dry Density (pcf)	Sample Data: Moisture Content (%)	Degree of Saturation (%)	Normal Stress σ_n (psi)	Maximum Shear Stress τ (psi)	Strain Rate (inches/minute)	Shear Strength Parameters: Friction Angle φ (degrees)	Shear Strength Parameters: Cohesion (c/psi)
●	2.375	91.4	27.8	~100	22.1	11.0	0.0006		
■	2.375	91.6	27.7	~100	44.9	22.6	0.0006	25.8	1
▲	2.375	91.9	28.1	~100	68.5	34.1	0.0006		

MATERIAL: LEAN CLAY W/SAND, CL (A-4(5))

RB&G ENGINEERING INC.
Provo, Utah

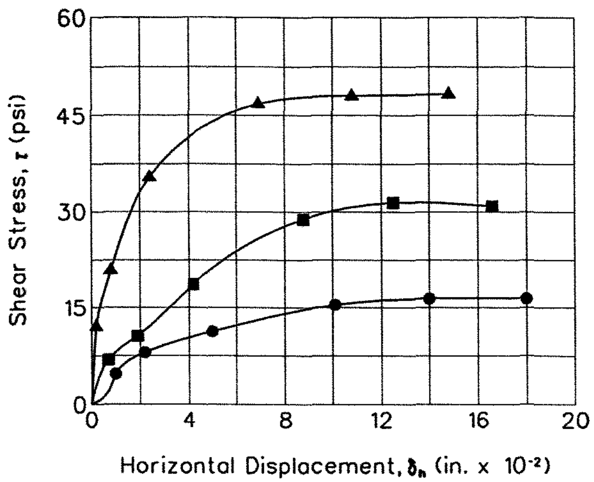
DIRECT SHEAR TEST

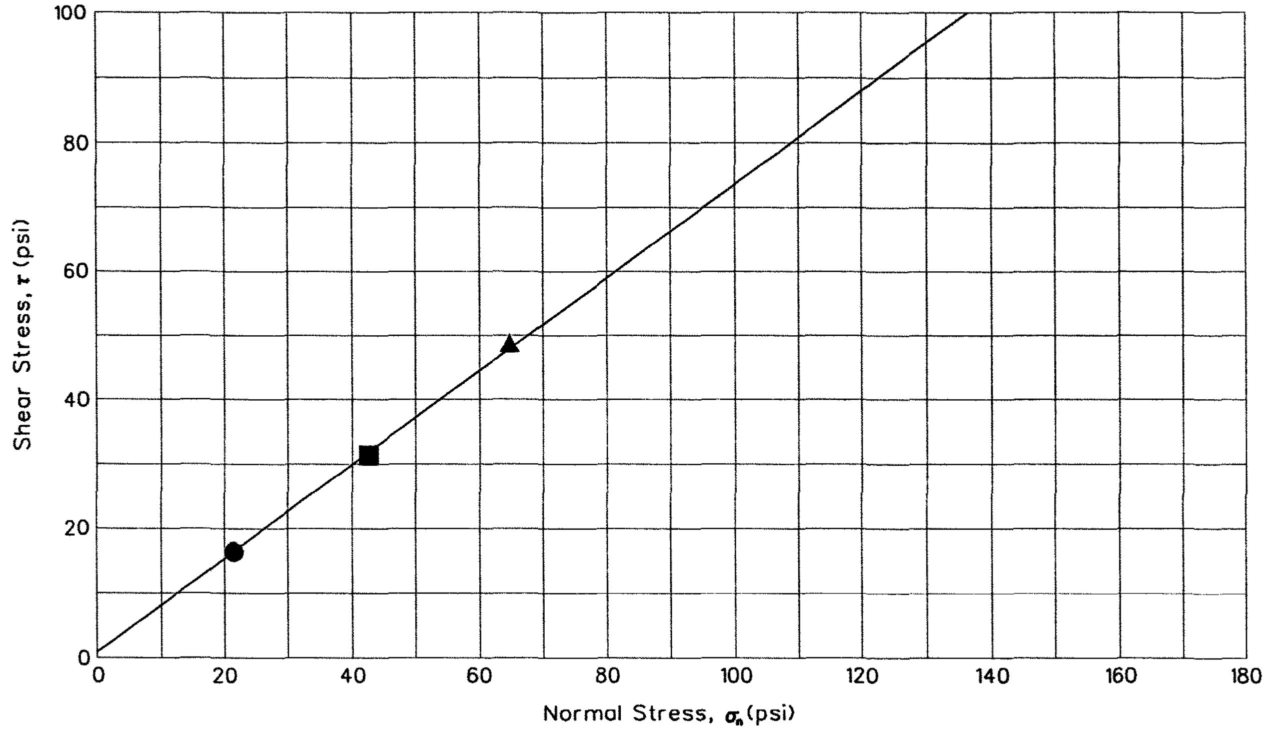
Project: *Mountain View Corridor*
Salt Lake County, Utah

HOLE NO.: 09-W5-5

DEPTH: 15'-16.5'

Figure





Test No. or Symbol	Sample Size (inches)	Sample Data		Degree of Saturation (%)	Normal Stress δ_n (psi)	Maximum Shear Stress τ (psi)	Strain Rate (inches/ minute)	Shear Strength Parameters	
		Dry Density (pcf)	Moisture Content (%)					Friction Angle ϕ (degrees)	Cohesion (c/psi)
●	2.375	94.8	16.5	~100	21.5	16.5	0.0006	36.0	1
■	2.375	95.1	16.5	~100	42.6	31.4	0.0006		
▲	2.375	95.2	16.6	~100	64.7	48.3	0.0006		

MATERIAL: SILTY CLAY W/SAND, CL-ML (A-4(3))

RB&G ENGINEERING INC.
Provo, Utah

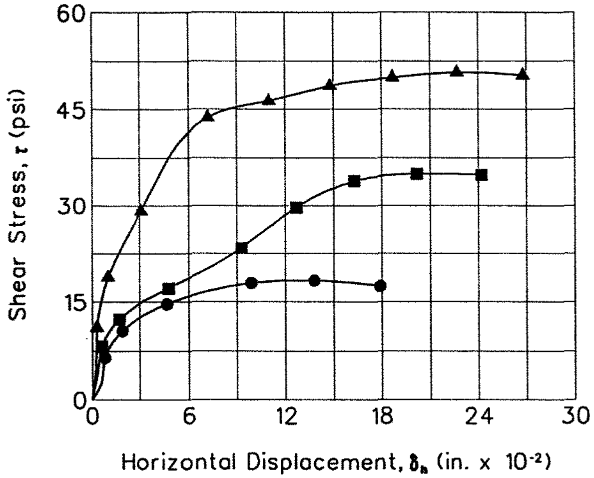
DIRECT SHEAR TEST

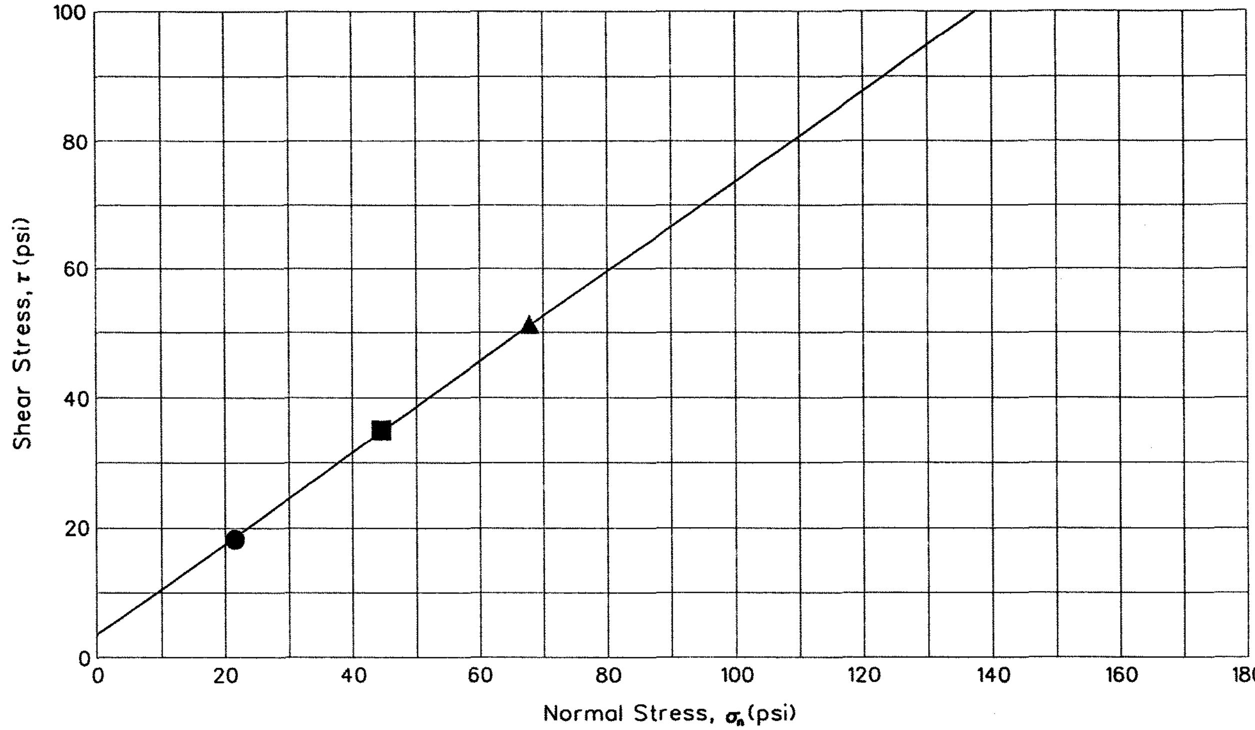
Project: *Mountain View Corridor*
Salt Lake County, Utah

HOLE NO.: 09-E5-02

DEPTH: 5'-6.5'

Figure





Test No. or Symbol	Sample Size (inches)	Sample Data: Dry Density (pcf)	Sample Data: Moisture Content (%)	Degree of Saturation (%)	Normal Stress δ_n (psi)	Maximum Shear Stress τ (psi)	Strain Rate (inches/minute)	Shear Strength Parameters: Friction Angle φ (degrees)	Shear Strength Parameters: Cohesion (c/psi)
●	2.375	82.8	33.3	~100	21.5	18.3	0.0009	35.1	3
■	2.375	82.6	33.5	~100	44.5	35.0	0.0009		
▲	2.375	82.6	33.3	~100	67.8	50.8	0.0009		

MATERIAL: SILT, ML (A-4(7))

RB&G ENGINEERING INC.
Provo, Utah

DIRECT SHEAR TEST

Project: *Mountain View Corridor*
Salt Lake County, Utah

HOLE NO.: 09-E5-02

DEPTH: 15'-16.5'

Figure

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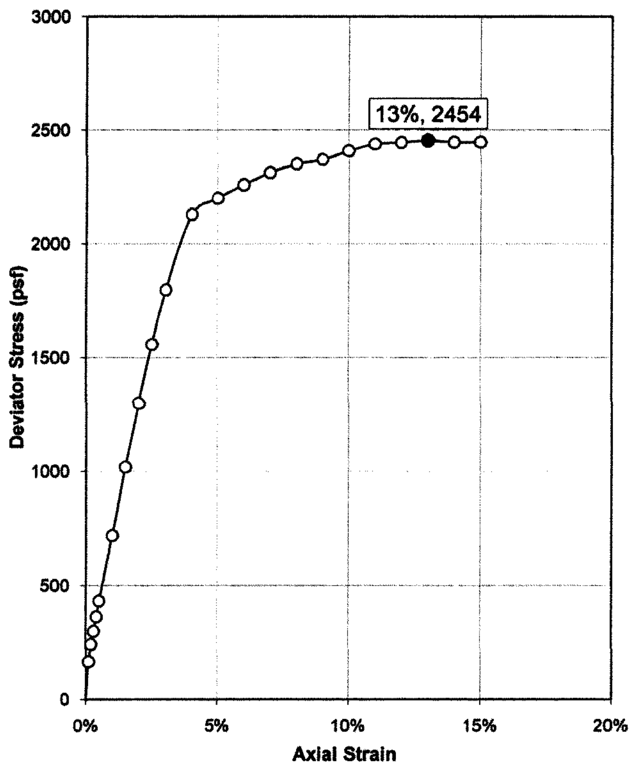
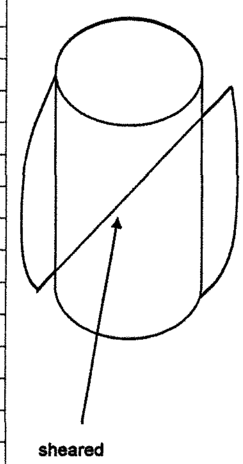
ENGINEERING, INC.

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-S5-1
Project No.	200901-200	**Sample**	
Location	Segment 5	**Depth / Elev. (ft)**	10-11.5'
Date	Tuesday, September 15, 2009	**Sample Description**	Silt w/ Sand ML (A-4(0))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	$\sigma_d / 2$ (psf)	Sketch of Specimen After Failure
0.0%	-1	-1	
0.1%	167	84	
0.2%	243	122	
0.3%	301	150	
0.4%	365	183	
0.5%	433	217	
1.0%	721	360	
1.5%	1020	510	
2.0%	1302	651	
2.5%	1559	780	
3.0%	1799	900	
4.0%	2132	1066	
5.0%	2202	1101	
6.0%	2260	1130	
7.0%	2313	1156	
8.0%	2350	1175	
9.0%	2370	1185	
10.0%	2409	1204	
11.0%	2439	1219	
12.0%	2445	1223	
13.0%	2454	1227	
14.0%	2446	1223	
15.0%	2448	1224	



Initial Sample Data

Initial height of specimen	L_o	4.31	(in)	**Moisture content***	w	30.0%	
Initial diameter of specimen	D_o	2.58	(in)	**Dry unit weight**	γ_d	86.9	(pcf)
Height-to-diameter ratio	L_o / D_o	1.67		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL			**Initial void ratio**	e_o	0.925	
Plastic index	PI	NP		**Saturation**	S	87%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	2454	(psf)	**Major principal stress at failure****	σ_1	3462	(psf)
Shear stress at failure**	c_u	1227	(psf)	**Minor principal stress at failure****	σ_3	1008	(psf)

Average strain rate to failure 1% / min

Strain at failure 13%

Remarks ______________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

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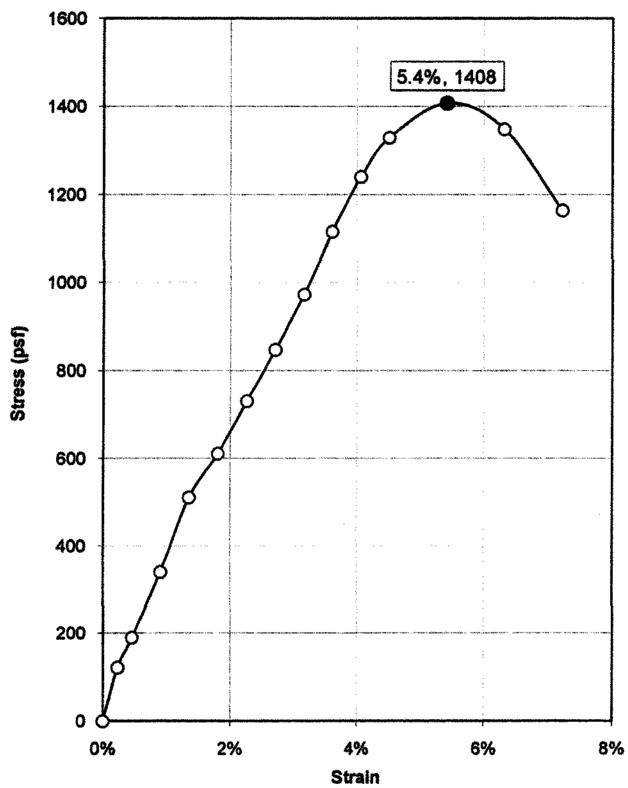
UNCONFINED COMPRESSION TEST ON COHESIVE SOILS

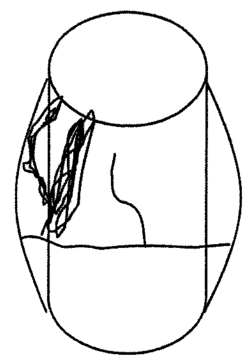
Project	Mountain View Corridor	**Boring No.**	09-S5-1
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	20-21.5'
Date	Friday, September 04, 2009	**Sample Description**	Lean Clay CL(A-4(4))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	**Proving Ring No.**	5552



Total Strain	Stress (psf)
0.0%	0
0.2%	121
0.5%	190
0.9%	341
1.4%	511
1.8%	611
2.3%	730
2.7%	847
3.2%	972
3.6%	1116
4.1%	1241
4.5%	1329
5.4%	1408
6.3%	1350
7.2%	1164

Sketch of Specimen After Failure



Initial Sample Data

Initial height of specimen	L_o	4.43	(in)	**Liquid limit**	LL	27
Initial diameter of specimen	D_o	2.58	(in)	**Plastic index**	PI	6
Height-to-diameter ratio	L_o / D_o	1.72		**Moisture content***	w	32.7%
Dry unit weight	γ_d	89.0	(pcf)			

Test Results

Unconfined compressive strength	q_u	1408	(psf)
Shear strength	τ_f	704	(psf)
Average strain rate to failure		1%	/ min
Strain at failure		5.4%	

Remarks

*Moisture content obtained from cuttings and or excess material

H:\2009\200_MVCRedwoodRdto90thSouth\Structure Borings\Railroad Bridges\MVC-S29 @ 20-21.5' UC

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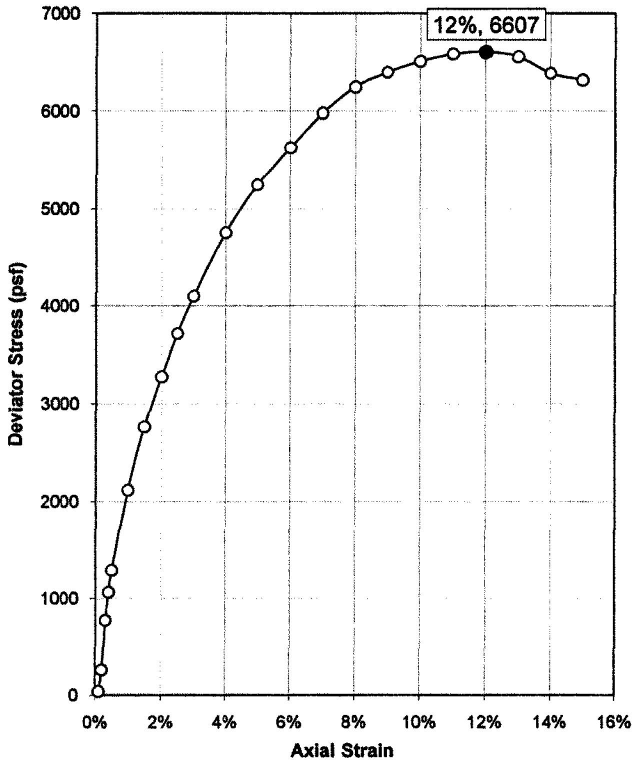
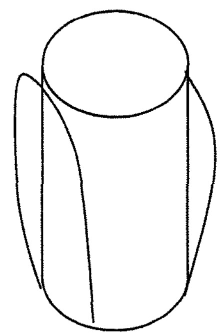
ENGINEERING, INC.

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-S5-1
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	30-31.5'
Date	Tuesday, September 15, 2009	**Sample Description**	Sandy Silt ML(A-4(0))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	σ_d / 2 (psf)	Sketch of Specimen After Failure
0.0%	-1	0	
0.1%	42	21	
0.2%	262	131	
0.3%	775	387	
0.4%	1066	533	
0.5%	1291	645	
1.0%	2119	1060	
1.5%	2769	1385	
2.0%	3276	1638	
2.5%	3717	1858	
3.0%	4103	2052	
4.0%	4757	2379	
5.0%	5247	2624	
6.0%	5625	2813	
7.0%	5980	2990	
8.0%	6245	3123	
9.0%	6397	3198	
10.0%	6510	3255	
11.0%	6586	3293	
12.0%	6607	3304	
13.0%	6559	3280	
14.0%	6387	3194	
15.0%	6318	3159	

Initial Sample Data

Initial height of specimen	L_o	5.65	(in)	**Moisture content***	w	23.3%	
Initial diameter of specimen	D_o	2.58	(in)	**Dry unit weight**	γ_d	101.1	(pcf)
Height-to-diameter ratio	L_o / D_o	2.19		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL			**Initial void ratio**	e_o	0.655	
Plastic index	PI	NP		**Saturation**	S	95%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	6607	(psf)	**Major principal stress at failure****	σ_1	9631	(psf)
Shear stress at failure**	c_u	3304	(psf)	**Minor principal stress at failure****	σ_3	3023	(psf)
Average strain rate to failure		1%	/ min				
Strain at failure		12%					

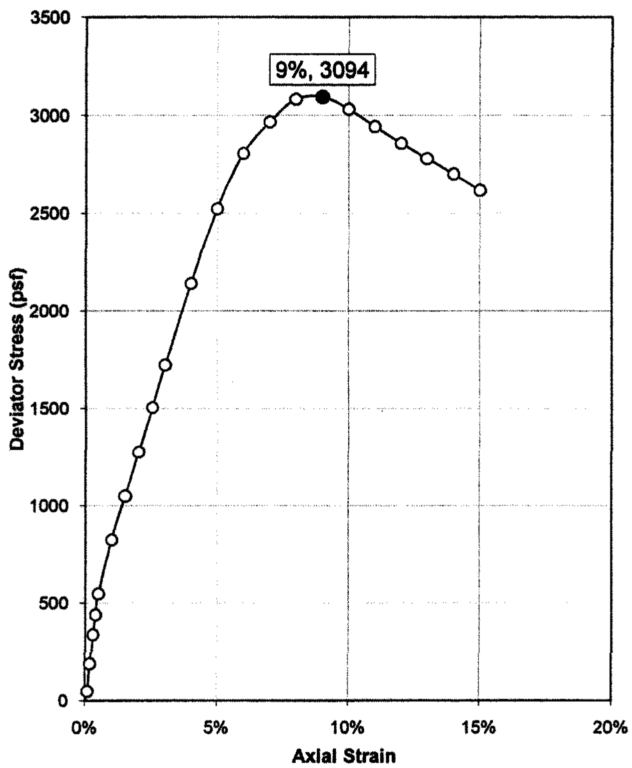
Remarks ______________________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

RB&G ENGINEERING, INC.

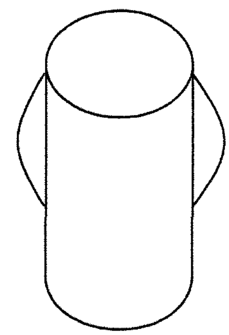
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-S5-1
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	65-66.5'
Date	Tuesday, September 15, 2009	**Sample Description**	Silty Sand SM (A-2-4(0))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	$\sigma_d / 2$ (psf)
0.0%	-1	-1
0.1%	49	25
0.2%	191	95
0.3%	339	170
0.4%	440	220
0.5%	548	274
1.0%	828	414
1.5%	1050	525
2.0%	1277	638
2.5%	1505	753
3.0%	1724	862
4.0%	2141	1070
5.0%	2524	1262
6.0%	2805	1403
7.0%	2968	1484
8.0%	3082	1541
9.0%	3094	1547
10.0%	3031	1516
11.0%	2944	1472
12.0%	2858	1429
13.0%	2779	1389
14.0%	2701	1350
15.0%	2618	1309

Sketch of Specimen After Failure



Initial Sample Data

Initial height of specimen	L_o	5.47	(in)	**Moisture content***	w	25.5%	
Initial diameter of specimen	D_o	2.58	(in)	**Dry unit weight**	γ_d	94.7	(pcf)
Height-to-diameter ratio	L_o / D_o	2.12		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL			**Initial void ratio**	e_o	0.766	
Plastic index	PI	NP		**Saturation**	S	89%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	3094	(psf)	**Major principal stress at failure****	σ_1	9718	(psf)
Shear stress at failure**	c_u	1547	(psf)	**Minor principal stress at failure****	σ_3	6624	(psf)

Average strain rate to failure 1% / min

Strain at failure 9%

Remarks ______________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

H:\2009\200_MVCRedwoodRdto90thSouth\Structure Borings\Railroad Bridges\MVC-S29 @ 65-66.5' UU report

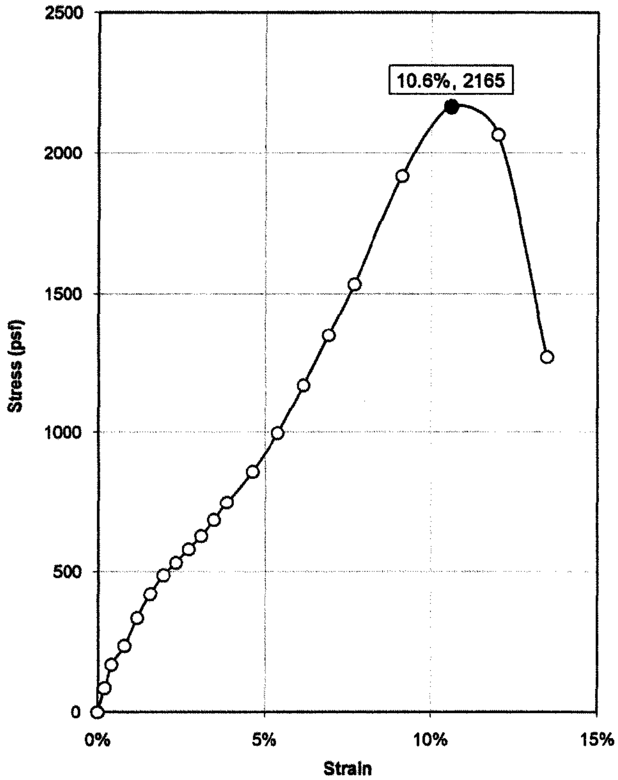
ASTM D 2850

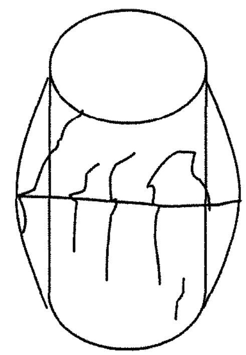
RB&G ENGINEERING, INC.

UNCONFINED COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-S5-1
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	75-76.5'
Date	Tuesday, September 08, 2009	**Sample Description**	CL (A-6(12))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	**Proving Ring No.**	5552



Total Strain	Stress (psf)	Sketch of Specimen After Failure
0.0%	0	
0.2%	86	
0.4%	172	
0.8%	238	
1.2%	338	
1.5%	421	
1.9%	487	
2.3%	532	
2.7%	581	
3.1%	629	
3.5%	687	
3.8%	749	
4.6%	859	
5.4%	997	
6.2%	1168	
6.9%	1348	
7.7%	1534	
9.1%	1918	
10.6%	2165	
12.0%	2066	
13.5%	1270	

Initial Sample Data

Initial height of specimen	L_o	5.2	(in)	**Liquid limit**	LL	35
Initial diameter of specimen	D_o	2.59	(in)	**Plastic index**	PI	16
Height-to-diameter ratio	L_o / D_o	2.01		**Moisture content***	w	31.8%
Dry unit weight	γ_d	89.3	(pcf)			

Test Results

Unconfined compressive strength	q_u	2165	(psf)
Shear strength	τ_f	1083	(psf)
Average strain rate to failure		1% / min	
Strain at failure		10.6%	

Remarks ______________________________

*Moisture content obtained from cuttings and or excess material

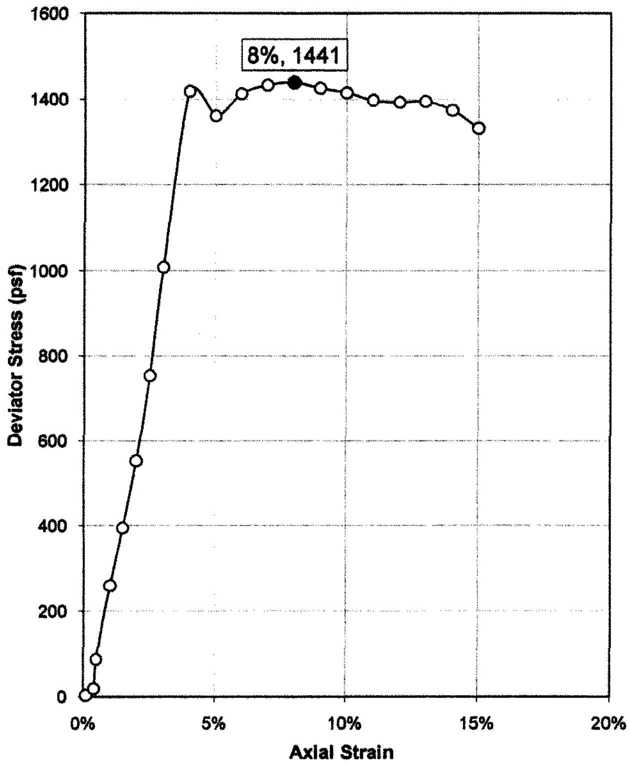
H:\2009\200_MVCRedwoodRdto90thSouth\Structure Borings\Railroad Bridges\MVC-S29 @ 75-76.5' UC

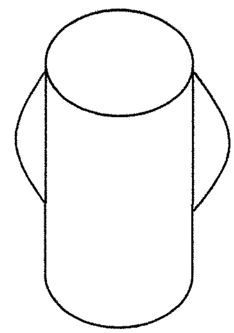
ASTM D 2166

RB&G ENGINEERING, INC.

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-S5-2
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	20-20.8'
Date	Wednesday, September 16, 2009	**Sample Description**	Lean Clay w/ Sand CL (A-4(4))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	$\sigma_d / 2$ (psf)	Sketch of Specimen After Failure
0.0%	-2	-1	
0.1%	4	2	
0.2%	-4	-2	
0.3%	-1	-1	
0.4%	20	10	
0.5%	88	44	
1.0%	261	130	
1.5%	395	198	
2.0%	554	277	
2.5%	754	377	
3.0%	1009	504	
4.0%	1419	710	
5.0%	1361	680	
6.0%	1414	707	
7.0%	1434	717	
8.0%	1441	720	
9.0%	1427	713	
10.0%	1416	708	
11.0%	1398	699	
12.0%	1393	697	
13.0%	1395	698	
14.0%	1374	687	
15.0%	1332	666	

Initial Sample Data

Initial height of specimen	L_o	4.64	(in)	**Moisture content***	w	22.2%	
Initial diameter of specimen	D_o	2.58	(in)	**Dry unit weight**	γ_d	96.8	(pcf)
Height-to-diameter ratio	L_o / D_o	1.80		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	26		**Initial void ratio**	e_o	0.727	
Plastic index	PI	8		**Saturation**	S	82%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	1441	(psf)	**Major principal stress at failure****	σ_1	3456	(psf)
Shear stress at failure**	c_u	720	(psf)	**Minor principal stress at failure****	σ_3	2016	(psf)

Average strain rate to failure 1% / min

Strain at failure 8%

Remarks ______________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

H:\2009\200_MVCRedwoodRdto90thSouth\Structure Borings\Railroad Bridges\MVC-S30 @ 20-20.8 UU report

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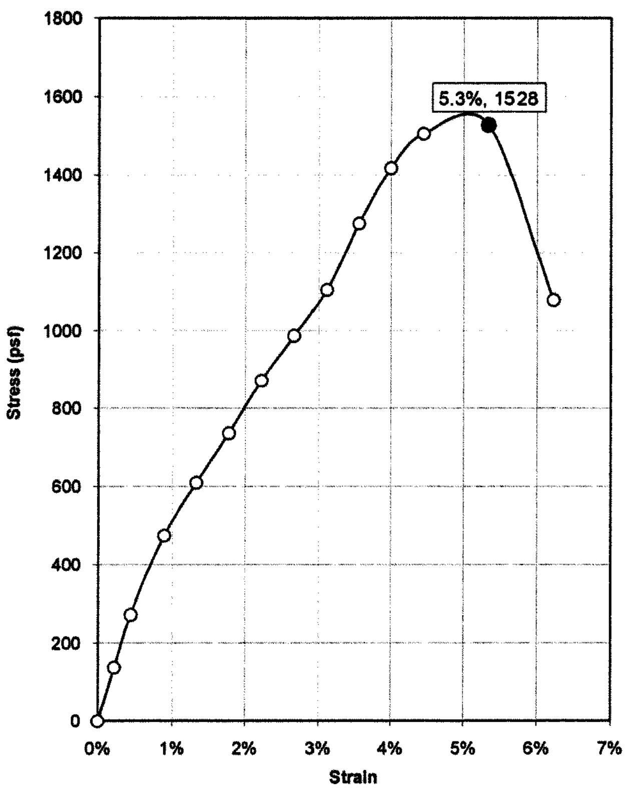
RB&G ENGINEERING, INC.

UNCONFINED COMPRESSION TEST ON COHESIVE SOILS

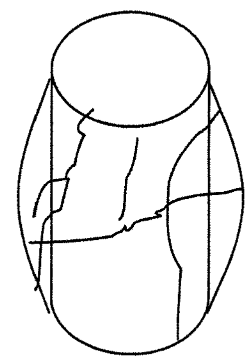
Project	Mountain View Corridor	**Boring No.**	09-S5-2
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	30-31'
Date	Tuesday, September 08, 2009	**Sample Description**	ML (A-4(0))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	**Proving Ring No.**	5552



Total Strain	Stress (psf)
0.0%	0
0.2%	137
0.4%	273
0.9%	475
1.3%	609
1.8%	737
2.2%	872
2.7%	988
3.1%	1104
3.6%	1275
4.0%	1418
4.4%	1505
5.3%	1528
6.2%	1078

Sketch of Specimen After Failure



Initial Sample Data

Initial height of specimen	L_o	4.5	(in)	**Liquid limit**	LL	
Initial diameter of specimen	D_o	2.59	(in)	**Plastic index**	PI	NP
Height-to-diameter ratio	L_o / D_o	1.74		**Moisture content***	w	18.3%
Dry unit weight	γ_d	95.4	(pcf)			

Test Results

Unconfined compressive strength	q_u	1528	(psf)
Shear strength	c_u	764	(psf)
Average strain rate to failure		1%	/ min
Strain at failure		5.3%	

Remarks ______________________________

*Moisture content obtained from cuttings and or excess material

ASTM D 2166

H:\2009\200_MVCRedwoodRdto90thSouth\Structure Borings\Railroad Bridges\MVC-S30 @ 30-31' UC

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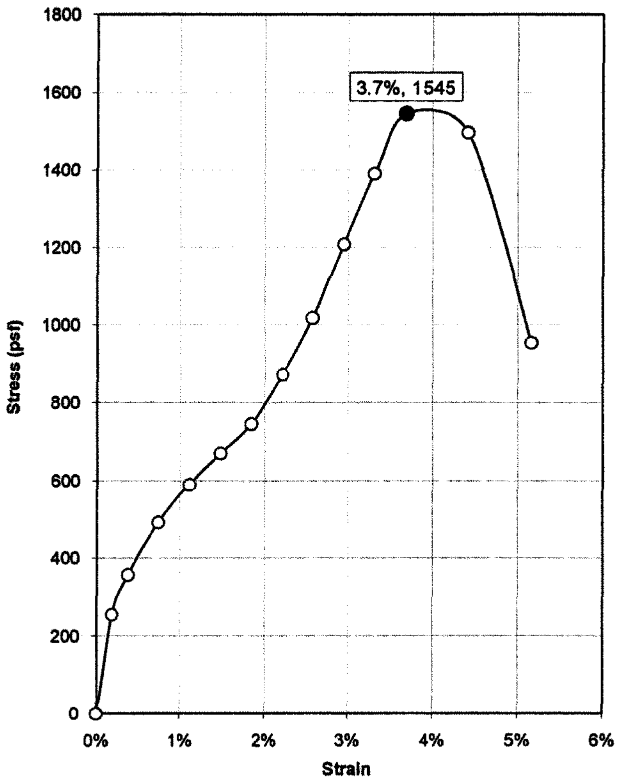
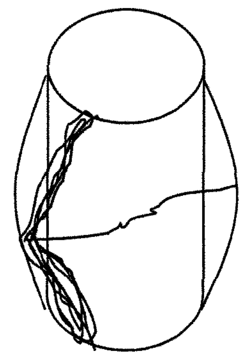
UNCONFINED COMPRESSION TEST
ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-S5-2
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	70-70.4'
Date	Tuesday, September 08, 2009	**Sample Description**	CL-ML (A-4(1))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	**Proving Ring No.**	5552



Total Strain	Stress (psf)	Sketch of Specimen After Failure
0.0%	0	
0.2%	256	
0.4%	358	
0.7%	493	
1.1%	590	
1.5%	670	
1.8%	746	
2.2%	872	
2.6%	1017	
2.9%	1208	
3.3%	1391	
3.7%	1545	
4.4%	1496	
5.2%	954	



Initial Sample Data

Initial height of specimen	L_o	5.43	(in)	**Liquid limit**	LL	24
Initial diameter of specimen	D_o	2.59	(in)	**Plastic index**	PI	5
Height-to-diameter ratio	L_o / D_o	2.10		**Moisture content***	w	18.9%
Dry unit weight	γ_d	101.1	(pcf)			

Test Results

Unconfined compressive strength	q_u	1545	(psf)
Shear strength	τ_f	773	(psf)
Average strain rate to failure		1%	/ min
Strain at failure		3.7%	

Remarks ______________________

*Moisture content obtained from cuttings and or excess material

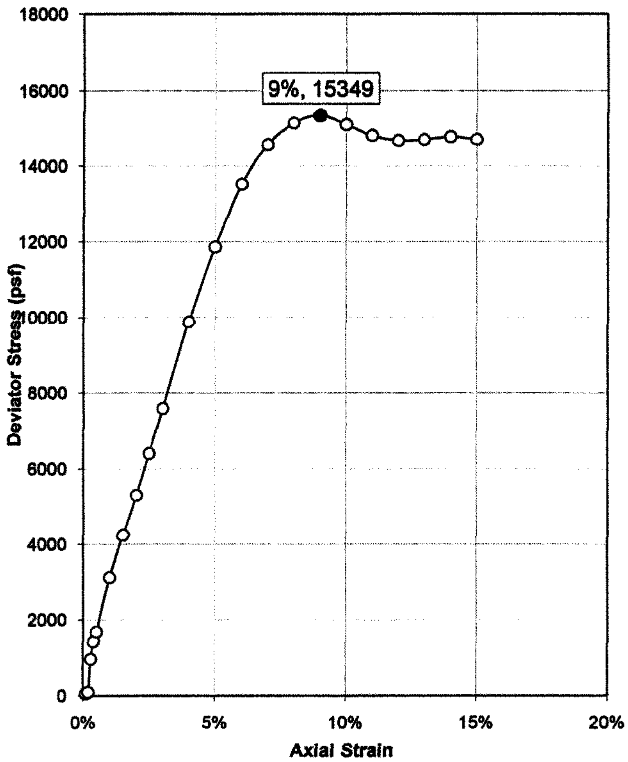
H:\2009\200_MVCRedwoodRdto90thSouth\Structure Borings\Railroad Bridges\MVC-S30 @ 70-70.4' UC

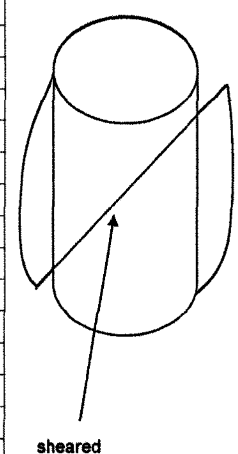
ASTM D 2166

RB&G ENGINEERING, INC.

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-S5-2
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	90-90.8'
Date	Wednesday, September 16, 2009	**Sample Description**	Sandy Silt ML (A-4(0))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	σ_d / 2 (psf)	Sketch of Specimen After Failure
0.0%	-6	-3	
0.1%	63	32	
0.2%	102	51	
0.3%	974	487	
0.4%	1439	719	
0.5%	1691	845	
1.0%	3123	1561	
1.5%	4248	2124	
2.0%	5306	2653	
2.5%	6409	3204	
3.0%	7597	3798	
4.0%	9887	4944	
5.0%	11868	5934	
6.0%	13523	6761	
7.0%	14562	7281	
8.0%	15138	7569	
9.0%	15349	7675	
10.0%	15100	7550	
11.0%	14804	7402	
12.0%	14672	7336	
13.0%	14697	7349	
14.0%	14775	7387	
15.0%	14699	7350	

Initial Sample Data

Initial height of specimen	L_o	5.01	(in)	**Moisture content***	w	22.6%	
Initial diameter of specimen	D_o	2.59	(in)	**Dry unit weight**	γ_d	93.6	(pcf)
Height-to-diameter ratio	L_o / D_o	1.93		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	NP		**Initial void ratio**	e_o	0.786	
Plastic index	PI	NP		**Saturation**	S	77%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	15349	(psf)	**Major principal stress at failure****	σ_1	24420	(psf)
Shear stress at failure**	c_u	7675	(psf)	**Minor principal stress at failure****	σ_3	9070	(psf)

Average strain rate to failure	1%	/ min
Strain at failure	9%	

Remarks ______________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

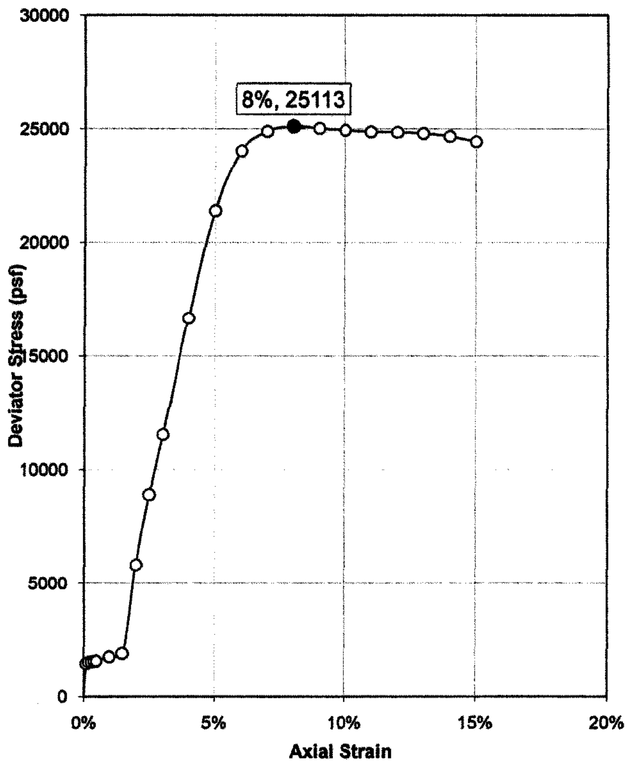
H:\2009\200_MVCRedwoodRdto90thSouth\Structure Borings\Railroad Bridges\MVC S-30 @ 90-90.8' UU report

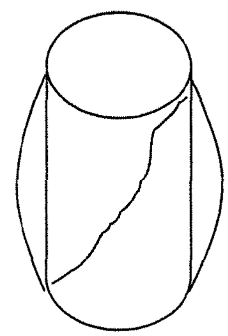
ASTM D 2850

RB&G ENGINEERING, INC.

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-S5-3
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	115-116'
Date	Monday, December 07, 2009	**Sample Description**	Sandy Lean Clay CL (A-6(7))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	$\sigma_d / 2$ (psf)	Sketch of Specimen After Failure
0.0%	-4	-2	
0.1%	1450	725	
0.2%	1517	759	
0.3%	1522	761	
0.4%	1541	770	
0.5%	1560	780	
1.0%	1749	874	
1.5%	1900	950	
2.0%	5829	2915	
2.5%	8918	4459	
3.0%	11574	5787	
4.0%	16671	8335	
5.0%	21389	10694	
6.0%	24018	12009	
7.0%	24885	12443	
8.0%	25113	12557	
9.0%	25028	12514	
10.0%	24943	12472	
11.0%	24875	12438	
12.0%	24853	12427	
13.0%	24800	12400	
14.0%	24668	12334	
15.0%	24430	12215	

Initial Sample Data

Initial height of specimen	L_o	3.7	(in)	**Moisture content***	w	29.9%	
Initial diameter of specimen	D_o	1.86	(in)	**Dry unit weight**	γ_d	85.7	(pcf)
Height-to-diameter ratio	L_o / D_o	1.99		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	34		**Initial void ratio**	e_o	0.952	
Plastic index	PI	11		**Saturation**	S	84%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	25113	(psf)	**Major principal stress at failure****	σ_1	38780	(psf)
Shear stress at failure**	c_u	12557	(psf)	**Minor principal stress at failure****	σ_3	13666	(psf)

Average strain rate to failure 1% / min

Strain at failure 8%

Remarks ______________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

H:\2009\200_MVCRedwoodRdto90thSouth\Structure Borings\Railroad Bridges\MVC-S5-3 @ 115-116' UU report

ASTM D 2850

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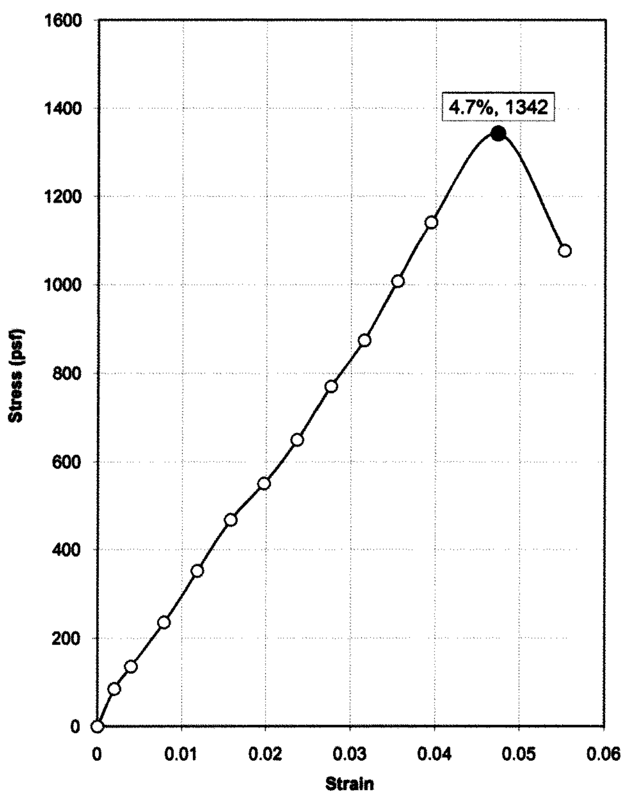
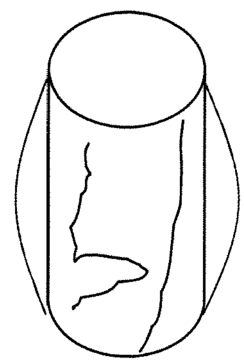
UNCONFINED COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor - 2010	**Boring No.**	10-S5-4
Project No.	200901-206	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	20-21.5'
Date	Tuesday, June 01, 2010	**Sample Description**	CL-ML (A-4(4))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	Proving Ring No.	5552



Total Strain	Stress (psf)	Sketch of Specimen After Failure
0.0%	0	
0.2%	85	
0.4%	136	
0.8%	236	
1.2%	352	
1.6%	468	
2.0%	550	
2.4%	649	
2.8%	770	
3.2%	875	
3.6%	1008	
3.9%	1141	
4.7%	1342	
5.5%	1078	

Initial Sample Data

Initial height of specimen	L_o	5.07 (in)	**Liquid limit**	LL	27
Initial diameter of specimen	D_o	2.6 (in)	**Plastic index**	PI	7
Height-to-diameter ratio	L_o / D_o	1.95	**Moisture content***	w	29.7%
Dry unit weight	γ_d	86.5 (pcf)			

Test Results

Unconfined compressive strength	q_u	1342	(psf)
Shear strength	c_u	671	(psf)
Average strain rate to failure		1%	/ min
Strain at failure		4.7%	

Remarks ______________________

*Moisture content obtained from cuttings and or excess material

ASTM D 2166

H:\2009\200_MVCRedwoodRdto90thSouth\Open-Ended Work\Work Orders\WO 003 Seg 5 RR Bridge\Testing\10-S5-4 @ 20-21.5' UC

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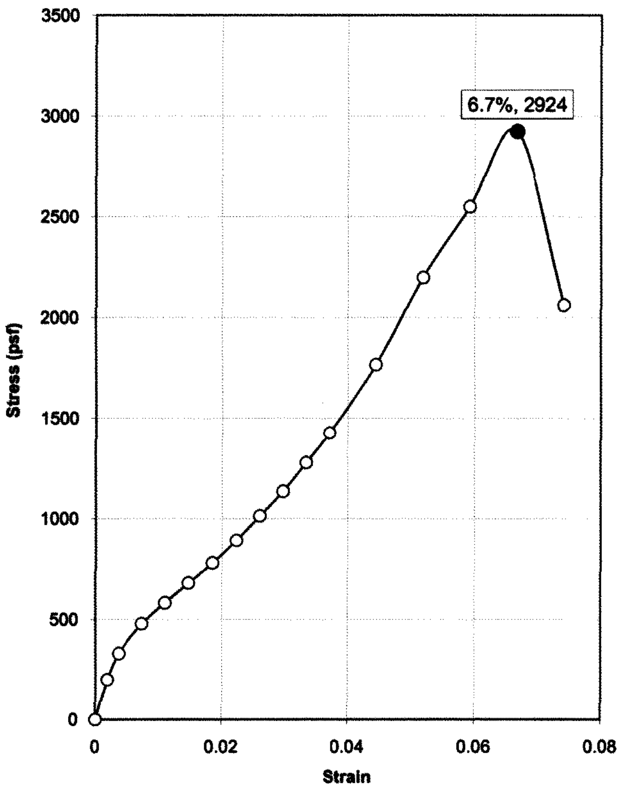
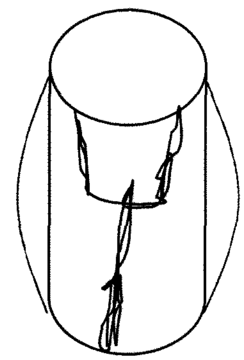
UNCONFINED COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor - 2010	**Boring No.**	10-S5-5
Project No.	200901-206	**Sample**	1
Location	Segment 5 RR Bridge	**Depth / Elev. (ft)**	60-61.5'
Date	Tuesday, June 01, 2010	**Sample Description**	CL (A-7-6(12))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	**Proving Ring No.**	5552



Total Strain	**Stress (psf)**	**Sketch of Specimen After Failure**
0.0%	0	
0.2%	199	
0.4%	330	
0.7%	478	
1.1%	582	
1.5%	679	
1.9%	778	
2.2%	890	
2.6%	1013	
3.0%	1136	
3.3%	1277	
3.7%	1425	
4.4%	1765	
5.2%	2197	
5.9%	2548	
6.7%	2924	
7.4%	2059	



Initial Sample Data

Initial height of specimen	L_o	5.4	(in)	**Liquid limit**	LL	44
Initial diameter of specimen	D_o	2.63	(in)	**Plastic index**	PI	21
Height-to-diameter ratio	L_o / D_o	2.05		**Moisture content***	w	25.7%
Dry unit weight	γ_d	92.8	(pcf)			

Test Results

Unconfined compressive strength	q_u	2924	(psf)
Shear strength	c_u	1462	(psf)
Average strain rate to failure		1%	/ min
Strain at failure		6.7%	

Remarks ______________________________

*Moisture content obtained from cuttings and or excess material

ASTM D 2166

H:\2009\200_MVCRedwoodRdto90thSouth\Open-Ended Work\Work Orders\WO 003 Seg 5 RR Bridge\Testing\10-S5-5 @ 60-61.5' UC

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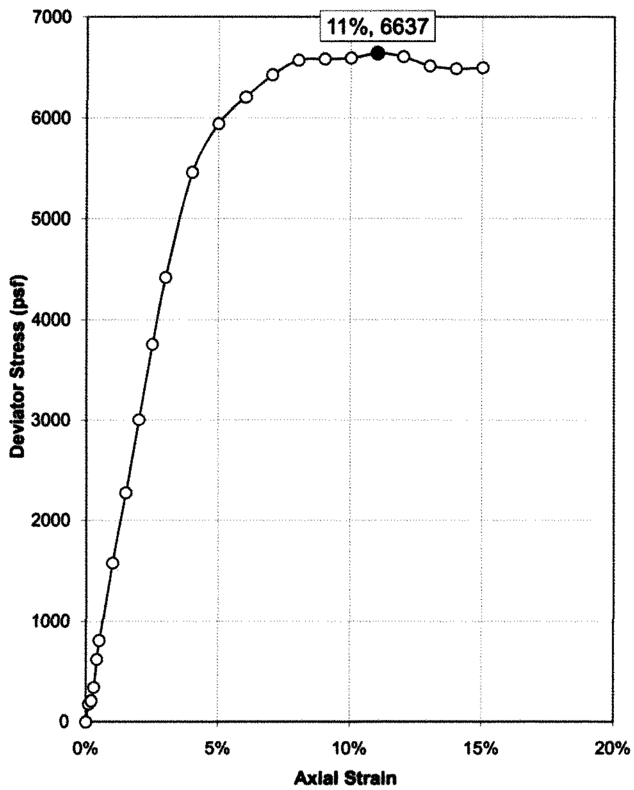
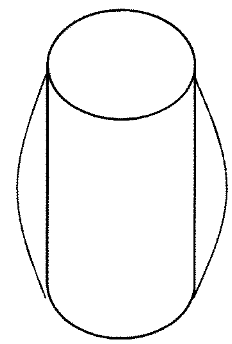
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Moutain View Corridor	**Boring No.**	10-S5-6
Project No.	200901-200	**Sample**	1
Location	Seg. 5 Ped. Bridge	**Depth / Elev. (ft)**	25-25.8'
Date	Wednesday, October 20, 2010	**Sample Description**	Silty Clay CL-ML (A-4(5))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	σ_d / 2 (psf)	Sketch of Specimen After Failure
0.0%	0	0	
0.1%	175	88	
0.2%	206	103	
0.3%	338	169	
0.4%	621	310	
0.5%	809	405	
1.0%	1575	787	
1.5%	2276	1138	
2.0%	3004	1502	
2.5%	3754	1877	
3.0%	4419	2209	
4.0%	5462	2731	
5.0%	5945	2972	
6.0%	6200	3100	
7.0%	6420	3210	
8.0%	6567	3283	
9.0%	6579	3289	
10.0%	6588	3294	
11.0%	6637	3319	
12.0%	6602	3301	
13.0%	6510	3255	
14.0%	6483	3241	
15.0%	6491	3246	



Initial Sample Data

Initial height of specimen	L_o	5.05	(in)	**Moisture content***	w	25.7%	
Initial diameter of specimen	D_o	2.60	(in)	**Dry unit weight**	γ_d	89.9	(pcf)
Height-to-diameter ratio	L_o / D_o	1.94		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	28		**Initial void ratio**	e_o	0.860	
Plastic index	PI	7		**Saturation**	S	80%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	6637	(psf)	**Major principal stress at failure****	σ_1	9226	(psf)
Shear stress at failure**	c_u	3319	(psf)	**Minor principal stress at failure****	σ_3	2589	(psf)

Average strain rate to failure 1% / min

Strain at failure 11%

Remarks ______________________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

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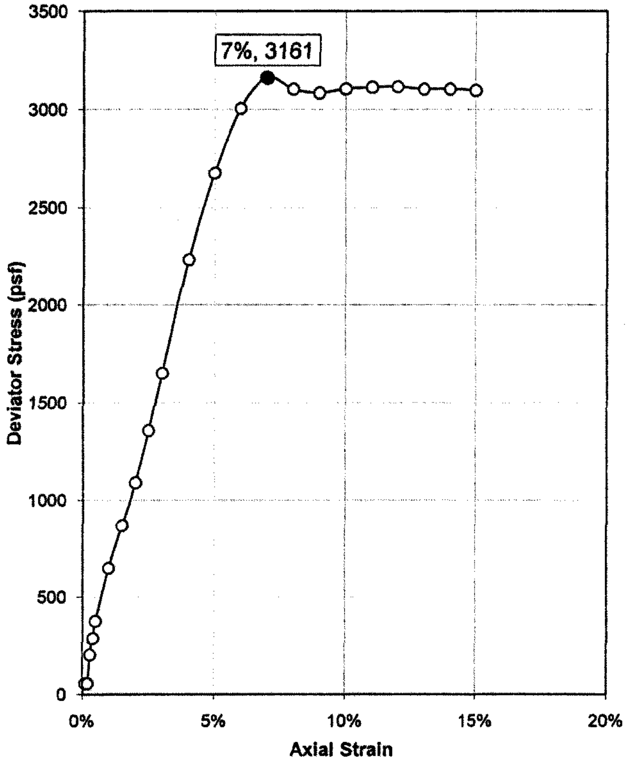
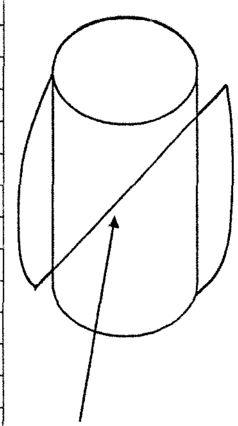
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-W5-5
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	15-16.5'
Date	Monday, November 16, 2009	**Sample Description**	Lean Clay w/ Sand CL (A-4(5))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	σ_d / 2 (psf)	Sketch of Specimen After Failure
0.0%	-3	-2	
0.1%	58	29	
0.2%	56	28	
0.3%	205	103	
0.4%	288	144	
0.5%	378	189	
1.0%	649	325	
1.5%	868	434	
2.0%	1091	545	
2.5%	1357	679	
3.0%	1654	827	
4.0%	2230	1115	
5.0%	2676	1338	
6.0%	3005	1503	
7.0%	3161	1581	
8.0%	3103	1551	
9.0%	3083	1542	
10.0%	3104	1552	
11.0%	3112	1556	
12.0%	3115	1557	
13.0%	3103	1551	
14.0%	3103	1552	
15.0%	3096	1548	



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Initial Sample Data

Initial height of specimen	L_o	5.1	(in)	**Moisture content***	w	27.8%	
Initial diameter of specimen	D_o	2.59	(in)	**Dry unit weight**	γ_d	91.0	(pcf)
Height-to-diameter ratio	L_o / D_o	1.97		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	28		**Initial void ratio**	e_o	0.837	
Plastic index	PI	8		**Saturation**	S	89%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	3161	(psf)	**Major principal stress at failure****	σ_1	4744	(psf)
Shear stress at failure**	c_u	1581	(psf)	**Minor principal stress at failure****	σ_3	1582	(psf)

Average strain rate to failure 1% / min

Strain at failure 7%

Remarks

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

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ASTM D 2850

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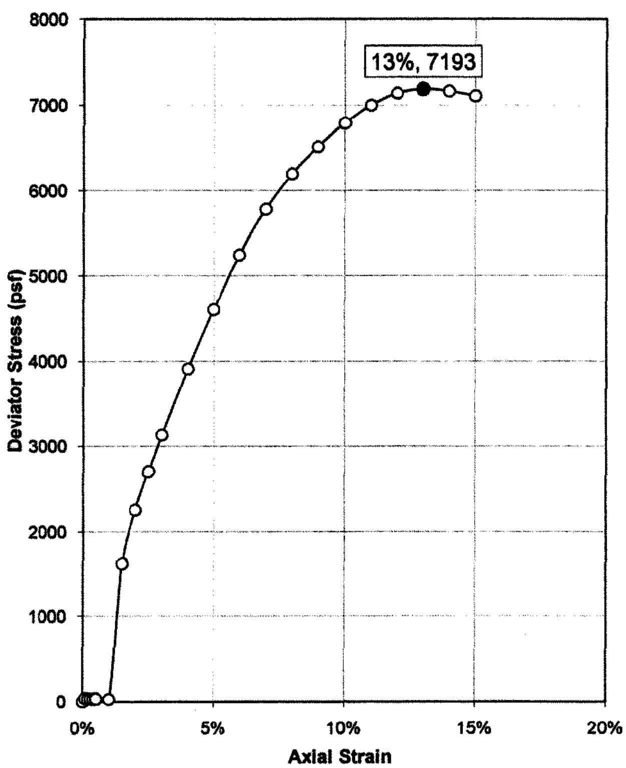
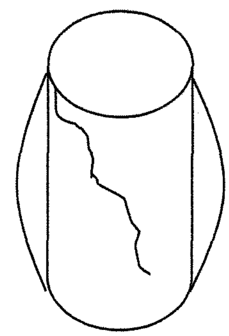
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-W5-6
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	75-76.5'
Date	Monday, November 30, 2009	**Sample Description**	Lean Clay w/ Sand CL (A-4(6))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	$\sigma_d / 2$ (psf)	Sketch of Specimen After Failure
0.0%	5	2	
0.1%	42	21	
0.2%	35	17	
0.3%	34	17	
0.4%	33	16	
0.5%	36	18	
1.0%	30	15	
1.5%	1631	815	
2.0%	2256	1128	
2.5%	2705	1352	
3.0%	3134	1567	
4.0%	3916	1958	
5.0%	4606	2303	
6.0%	5249	2624	
7.0%	5787	2893	
8.0%	6198	3099	
9.0%	6512	3256	
10.0%	6792	3396	
11.0%	7002	3501	
12.0%	7142	3571	
13.0%	7193	3597	
14.0%	7168	3584	
15.0%	7110	3555	

Initial Sample Data

Initial height of specimen	L_o	5.6	(in)	**Moisture content***	w	27.2%	
Initial diameter of specimen	D_o	2.81	(in)	**Dry unit weight**	γ_d	96.5	(pcf)
Height-to-diameter ratio	L_o / D_o	1.99		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	29		**Initial void ratio**	e_o	0.733	
Plastic index	PI	10		**Saturation**	S	99%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	7193	(psf)	**Major principal stress at failure****	σ_1	14828	(psf)
Shear stress at failure**	c_u	3597	(psf)	**Minor principal stress at failure****	σ_3	7635	(psf)

Average strain rate to failure 1% / min

Strain at failure 13%

Remarks ______________________________

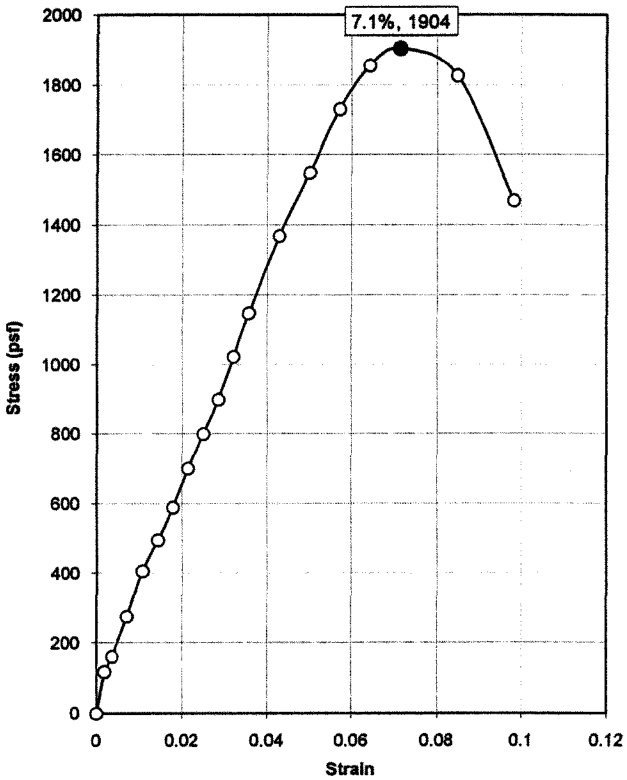
*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

RB&G ENGINEERING, INC.

UNCONFINED COMPRESSION TEST ON COHESIVE SOILS

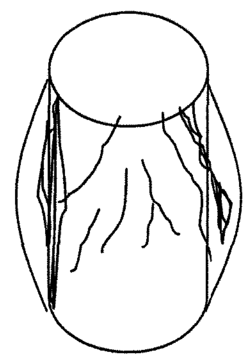
Project	Mountain View Corridor	**Boring No.**	09-W5-6
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	85-86.5'
Date	Monday, November 23, 2009	**Sample Description**	CL (A-6 (13))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	**Proving Ring No.**	5552



Total Strain	Stress (psf)
0.0%	0
0.2%	118
0.4%	161
0.7%	276
1.1%	406
1.4%	495
1.8%	589
2.1%	700
2.5%	799
2.9%	900
3.2%	1023
3.6%	1148
4.3%	1369
5.0%	1549
5.7%	1731
6.4%	1855
7.1%	1904
8.5%	1827
9.8%	1470

Sketch of Specimen After Failure



Initial Sample Data

Initial height of specimen	L_o	5.6	(in)	**Liquid limit**	LL	34
Initial diameter of specimen	D_o	2.8	(in)	**Plastic index**	PI	17
Height-to-diameter ratio	L_o / D_o	2.00		**Moisture content***	w	26.5%
Dry unit weight	γ_d	99.5	(pcf)			

Test Results

Unconfined compressive strength	q_u	1904	(psf)
Shear strength	c_u	952	(psf)
Average strain rate to failure		1%	/ min
Strain at failure		7.1%	

Remarks ______________________

*Moisture content obtained from cuttings and or excess material

ASTM D 2166

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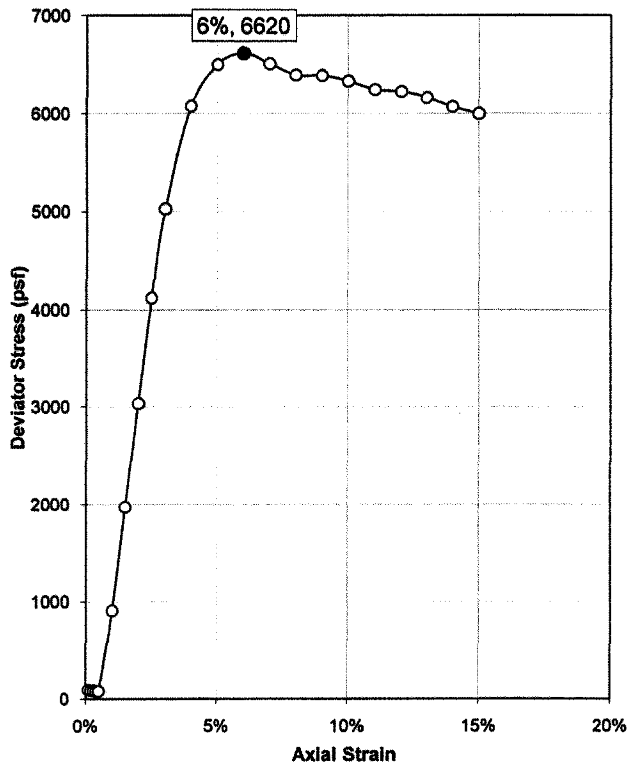
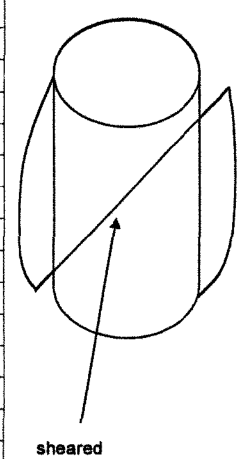
RB&G ENGINEERING, INC.

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-E5-1
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	20-21.5'
Date	Monday, November 16, 2009	**Sample Description**	Lean Clay CL (A-6(13))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	σ_d / 2 (psf)	Sketch of Specimen After Failure
0.0%	-6	-3	
0.1%	96	48	
0.2%	89	44	
0.3%	87	44	
0.4%	81	40	
0.5%	83	41	
1.0%	910	455	
1.5%	1974	987	
2.0%	3037	1519	
2.5%	4124	2062	
3.0%	5030	2515	
4.0%	6076	3038	
5.0%	6500	3250	
6.0%	6620	3310	
7.0%	6510	3255	
8.0%	6394	3197	
9.0%	6387	3194	
10.0%	6332	3166	
11.0%	6243	3122	
12.0%	6223	3111	
13.0%	6161	3081	
14.0%	6070	3035	
15.0%	6000	3000	



Initial Sample Data

Initial height of specimen	L_o	5.93	(in)	**Moisture content***	w	33.0%	
Initial diameter of specimen	D_o	2.80	(in)	**Dry unit weight**	γ_d	85.4	(pcf)
Height-to-diameter ratio	L_o / D_o	2.12		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	37		**Initial void ratio**	e_o	0.957	
Plastic index	PI	15		**Saturation**	S	92%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	6620	(psf)	**Major principal stress at failure****	σ_1	8777	(psf)
Shear stress at failure**	c_u	3310	(psf)	**Minor principal stress at failure****	σ_3	2158	(psf)
Average strain rate to failure		1%	/ min				
Strain at failure		6%					

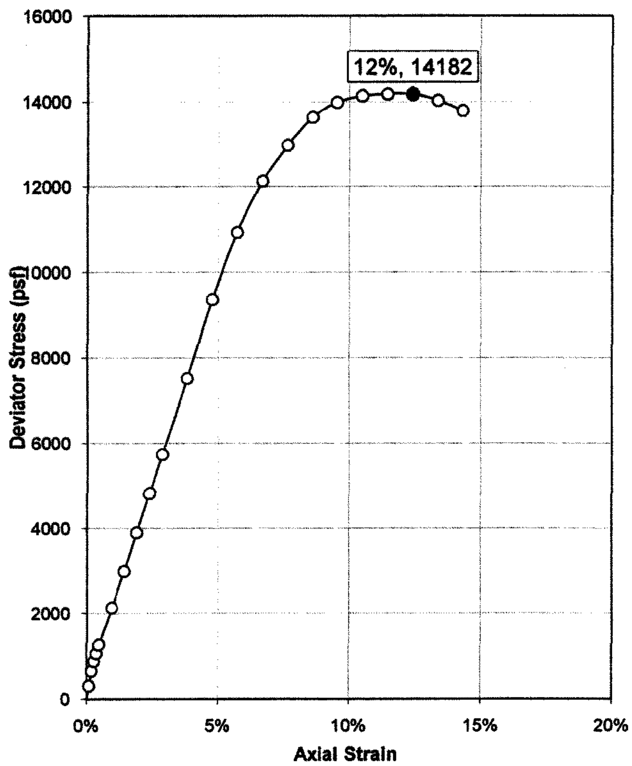
Remarks ______________________

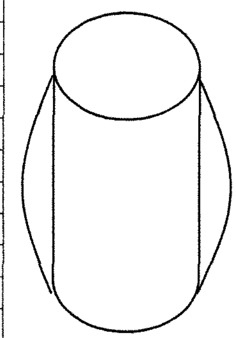
*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

RB&G ENGINEERING, INC.

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-E5-1
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	40-41'
Date	Monday, November 16, 2009	**Sample Description**	Sandy Lean Clay CL (A-7-6(16))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	$\sigma_d / 2$ (psf)	Sketch of Specimen After Failure
0.0%	-9	-4	
0.1%	314	157	
0.2%	661	330	
0.3%	883	442	
0.4%	1067	533	
0.5%	1262	631	
1.0%	2130	1065	
1.4%	2993	1496	
1.9%	3904	1952	
2.4%	4819	2409	
2.9%	5738	2869	
3.8%	7523	3762	
4.8%	9370	4685	
5.7%	10932	5466	
6.7%	12133	6067	
7.6%	12969	6485	
8.6%	13639	6820	
9.5%	13989	6994	
10.5%	14139	7069	
11.5%	14182	7091	
12.4%	14182	7091	
13.4%	14031	7016	
14.3%	13795	6898	

Initial Sample Data

Initial height of specimen	L_o	5.13	(in)	**Moisture content***	w	19.5%	
Initial diameter of specimen	D_o	2.80	(in)	**Dry unit weight**	γ_d	99.9	(pcf)
Height-to-diameter ratio	L_o / D_o	1.83		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	43		**Initial void ratio**	e_o	0.674	
Plastic index	PI	27		**Saturation**	S	78%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	14182	(psf)	**Major principal stress at failure****	σ_1	18930	(psf)
Shear stress at failure**	c_u	7091	(psf)	**Minor principal stress at failure****	σ_3	4748	(psf)

Average strain rate to failure 1% / min

Strain at failure 12%

Remarks ______________________

*Moisture content obtained from cuttings and or excess material

***Values corrected for membrane effects*

H:\2009\200_MVCRedwoodRdto90thSouth\Embankment Borings\Lab Testing\Segment 5\09-E5-1 @ 40-41.5' UU report

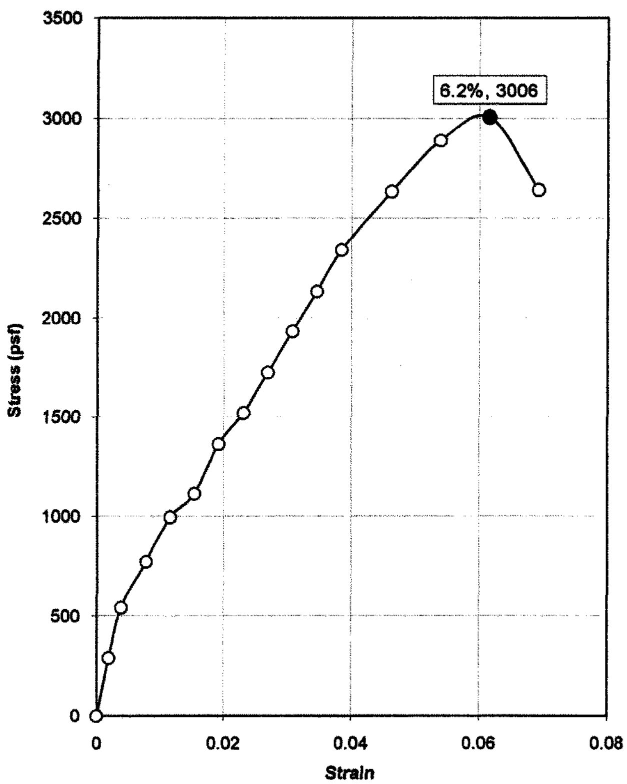
ASTM D 2850

RB&G ENGINEERING, INC.

UNCONFINED COMPRESSION TEST ON COHESIVE SOILS

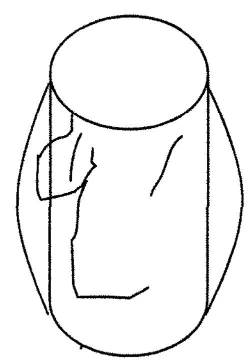
Project	Mountain View Corridor	**Boring No.**	09-E5-2
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	25-26.5'
Date	Thursday, September 03, 2009	**Sample Description**	CL (A-4 (10))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	**Proving Ring No.**	5552



Total Strain	Stress (psf)
0.0%	0
0.2%	290
0.4%	543
0.8%	773
1.2%	994
1.5%	1113
1.9%	1364
2.3%	1520
2.7%	1723
3.1%	1933
3.5%	2135
3.8%	2344
4.6%	2632
5.4%	2889
6.2%	3006
6.9%	2641

Sketch of Specimen After Failure



Initial Sample Data

Initial height of specimen	L_o	5.2	(in)	**Liquid limit**	LL	32
Initial diameter of specimen	D_o	2.59	(in)	**Plastic index**	PI	10
Height-to-diameter ratio	L_o / D_o	2.01		**Moisture content***	w	32.7%
Dry unit weight	γ_d	92.1	(pcf)			

Test Results

Unconfined compressive strength	q_u	3006	(psf)
Shear strength	c_u	1503	(psf)
Average strain rate to failure		1%	/ min
Strain at failure		6.2%	

Remarks

*Moisture content obtained from cuttings and or excess material

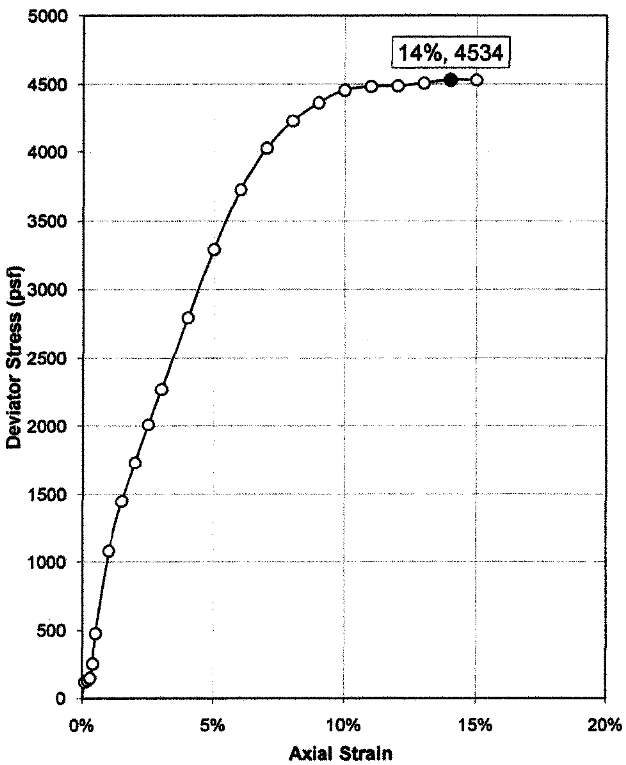
ASTM D 2166

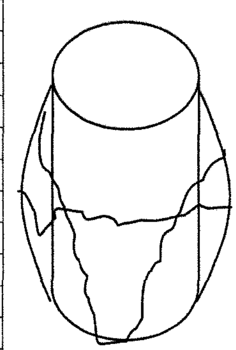
H:\2009\200_MVCRedwoodRdto90thSouth\Embankment Borings\Lab Testing\Segment 5\E45 @ 25-26.5' UC

RB&G ENGINEERING, INC.

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-E5-2
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	50-51.5'
Date	Friday, September 04, 2009	**Sample Description**	Fat Clay w/ Sand CH (A-7-6(21))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	σ_d / 2 (psf)	Sketch of Specimen After Failure
0.0%	-5	-2	
0.1%	121	61	
0.2%	135	67	
0.3%	152	76	
0.4%	256	128	
0.5%	479	240	
1.0%	1083	541	
1.5%	1451	726	
2.0%	1734	867	
2.5%	2011	1005	
3.0%	2274	1137	
4.0%	2796	1398	
5.0%	3292	1646	
6.0%	3726	1863	
7.0%	4028	2014	
8.0%	4230	2115	
9.0%	4367	2183	
10.0%	4458	2229	
11.0%	4485	2242	
12.0%	4490	2245	
13.0%	4510	2255	
14.0%	4534	2267	
15.0%	4532	2266	

Initial Sample Data

Initial height of specimen	L_o	5.25	(in)	**Moisture content***	w	39.1%	
Initial diameter of specimen	D_o	2.59	(in)	**Dry unit weight**	γ_d	80.9	(pcf)
Height-to-diameter ratio	L_o / D_o	2.03		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	50		**Initial void ratio**	e_o	1.068	
Plastic index	PI	26		**Saturation**	S	98%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	4534	(psf)	**Major principal stress at failure****	σ_1	9569	(psf)
Shear stress at failure**	c_u	2267	(psf)	**Minor principal stress at failure****	σ_3	5036	(psf)

Average strain rate to failure	1%	/ min
Strain at failure	14%	

Remarks ______________________________

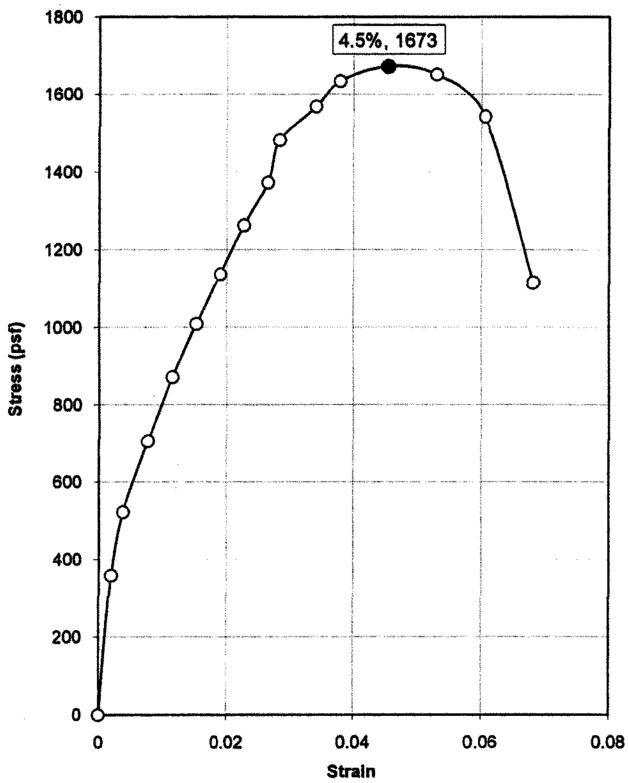
*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

RB&G ENGINEERING, INC.

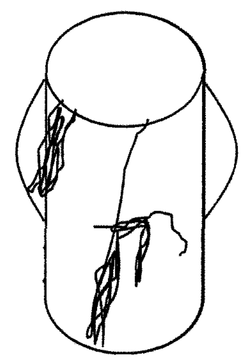
UNCONFINED COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-E5-5
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	25-26.5'
Date	Monday, September 14, 2009	**Sample Description**	CL (A-7-6(18))
Tested By	S Neil	**Sample Type**	Undisturbed (shelby)

Apparatus No.	UC - 1	Proving Ring No.	5552



Total Strain	Stress (psf)	Sketch of Specimen After Failure
0.0%	0	
0.2%	358	
0.4%	522	
0.8%	706	
1.1%	872	
1.5%	1009	
1.9%	1137	
2.3%	1263	
2.7%	1373	
2.8%	1483	
3.4%	1568	
3.8%	1635	
4.5%	1673	
5.3%	1652	
6.1%	1543	
6.8%	1116	



Initial Sample Data

Initial height of specimen	L_o	5.28	(in)	**Liquid limit**	LL	43
Initial diameter of specimen	D_o	2.59	(in)	**Plastic index**	PI	24
Height-to-diameter ratio	L_o / D_o	2.04		**Moisture content***	w	22.8%
Dry unit weight	γ_d	94.8	(pcf)			

Test Results

Unconfined compressive strength	q_u	1673	(psf)
Shear strength	c_u	837	(psf)
Average strain rate to failure		1%	/ min
Strain at failure		4.5%	

Remarks

*Moisture content obtained from cuttings and or excess material

ASTM D 2166

H:\2009\200_MVCRedwoodRdto90thSouth\Embankment Borings\Lab Testing\Segment 5\09-MVC-E46 @ 25-26.5' UC

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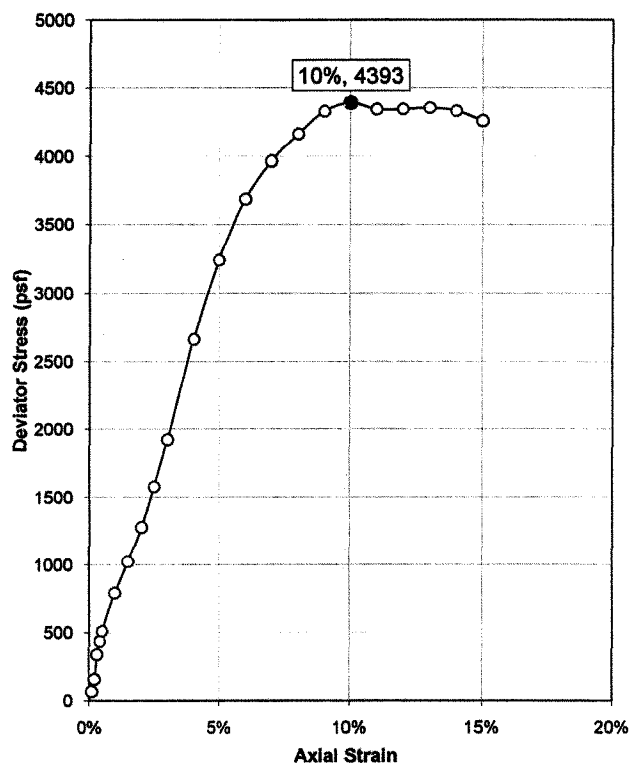
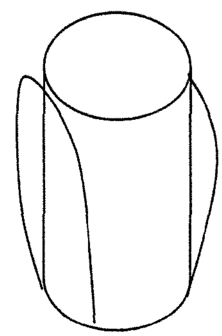
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-E5-5
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	15-16.5'
Date	Wednesday, September 16, 2009	**Sample Description**	Sandy Silty Clay CL-ML (A-4(2))
Tested By	J Boone	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	$\sigma_d / 2$ (psf)	Sketch of Specimen After Failure
0.0%	-3	-2	
0.1%	69	34	
0.2%	160	80	
0.3%	342	171	
0.4%	440	220	
0.5%	512	256	
1.0%	792	396	
1.5%	1025	513	
2.0%	1278	639	
2.5%	1579	789	
3.0%	1923	961	
4.0%	2666	1333	
5.0%	3244	1622	
6.0%	3691	1846	
7.0%	3968	1984	
8.0%	4163	2082	
9.0%	4330	2165	
10.0%	4393	2197	
11.0%	4346	2173	
12.0%	4347	2174	
13.0%	4357	2178	
14.0%	4334	2167	
15.0%	4260	2130	

Initial Sample Data

Initial height of specimen	L_o	5.2	(in)	**Moisture content***	w	21.5%	
Initial diameter of specimen	D_o	2.58	(in)	**Dry unit weight**	γ_d	106.1	(pcf)
Height-to-diameter ratio	L_o / D_o	2.02		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL	26		**Initial void ratio**	e_o	0.576	
Plastic index	PI	5		**Saturation**	S	100%	

Test Results

Deviator stress at failure**	$\sigma_{d,f}$	4393	(psf)	**Major principal stress at failure****	σ_1	5977	(psf)
Shear stress at failure**	c_u	2197	(psf)	**Minor principal stress at failure****	σ_3	1583	(psf)

Average strain rate to failure	1%	/ min
Strain at failure	10%	

Remarks ______________________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects

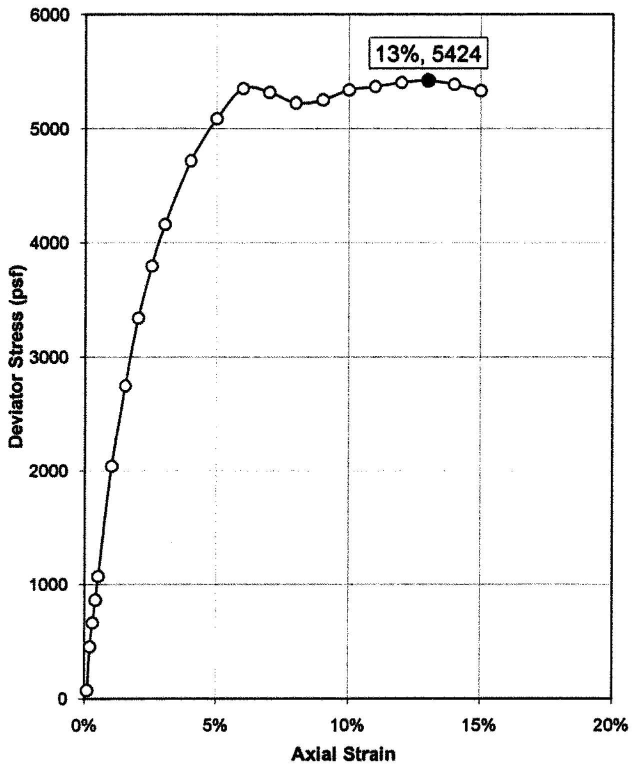
H:\2009\200_MVCRedwoodRdto90thSouth\Embankment Borings\Lab Testing\Segment 5\09-MVC-E46 @ 15-16.5' UU report

ASTM D 2850

RB&G ENGINEERING, INC.

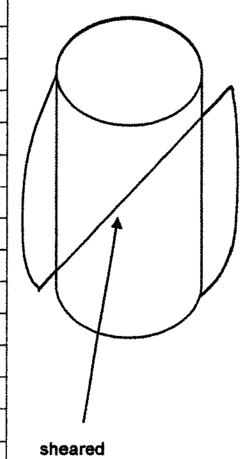
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS

Project	Mountain View Corridor	**Boring No.**	09-E5-7
Project No.	200901-200	**Sample**	1
Location	Segment 5	**Depth / Elev. (ft)**	20-21'
Date	Tuesday, December 15, 2009	**Sample Description**	Sandy Silt ML (A-4(0))
Tested By	L. Price	**Sample Type**	Undisturbed



Axial Strain	σ_d (psf)	σ_d / 2 (psf)
0.0%	-3	-1
0.1%	74	37
0.2%	454	227
0.3%	664	332
0.4%	865	432
0.5%	1073	537
1.0%	2042	1021
1.5%	2752	1376
2.0%	3343	1671
2.5%	3799	1899
3.0%	4163	2081
4.0%	4717	2358
5.0%	5090	2545
6.0%	5351	2675
7.0%	5318	2659
8.0%	5227	2613
9.0%	5254	2627
10.0%	5340	2670
11.0%	5370	2685
12.0%	5407	2703
13.0%	5424	2712
14.0%	5390	2695
15.0%	5333	2666

Sketch of Specimen After Failure



Initial Sample Data

Initial height of specimen	L_o	4.3	(in)	**Moisture content***	w	33.9%	
Initial diameter of specimen	D_o	2.80	(in)	**Dry unit weight**	γ_d	85.0	(pcf)
Height-to-diameter ratio	L_o / D_o	1.54		**Specific gravity of soil solids**	G_s	2.68	*[Estimated value]*
Liquid limit	LL			**Initial void ratio**	e_o	0.968	
Plastic index	PI	NP		**Saturation**	S	94%	

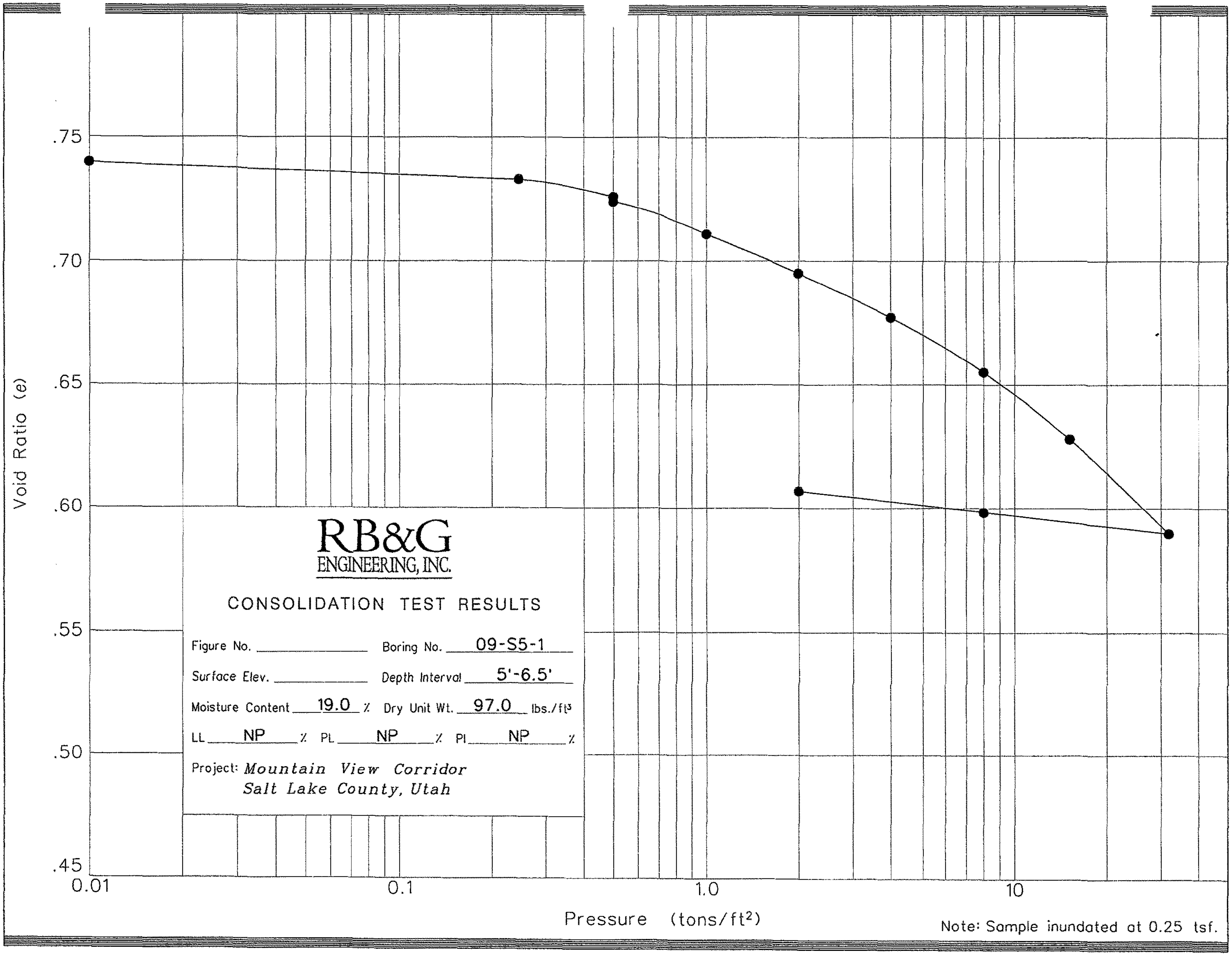
Test Results

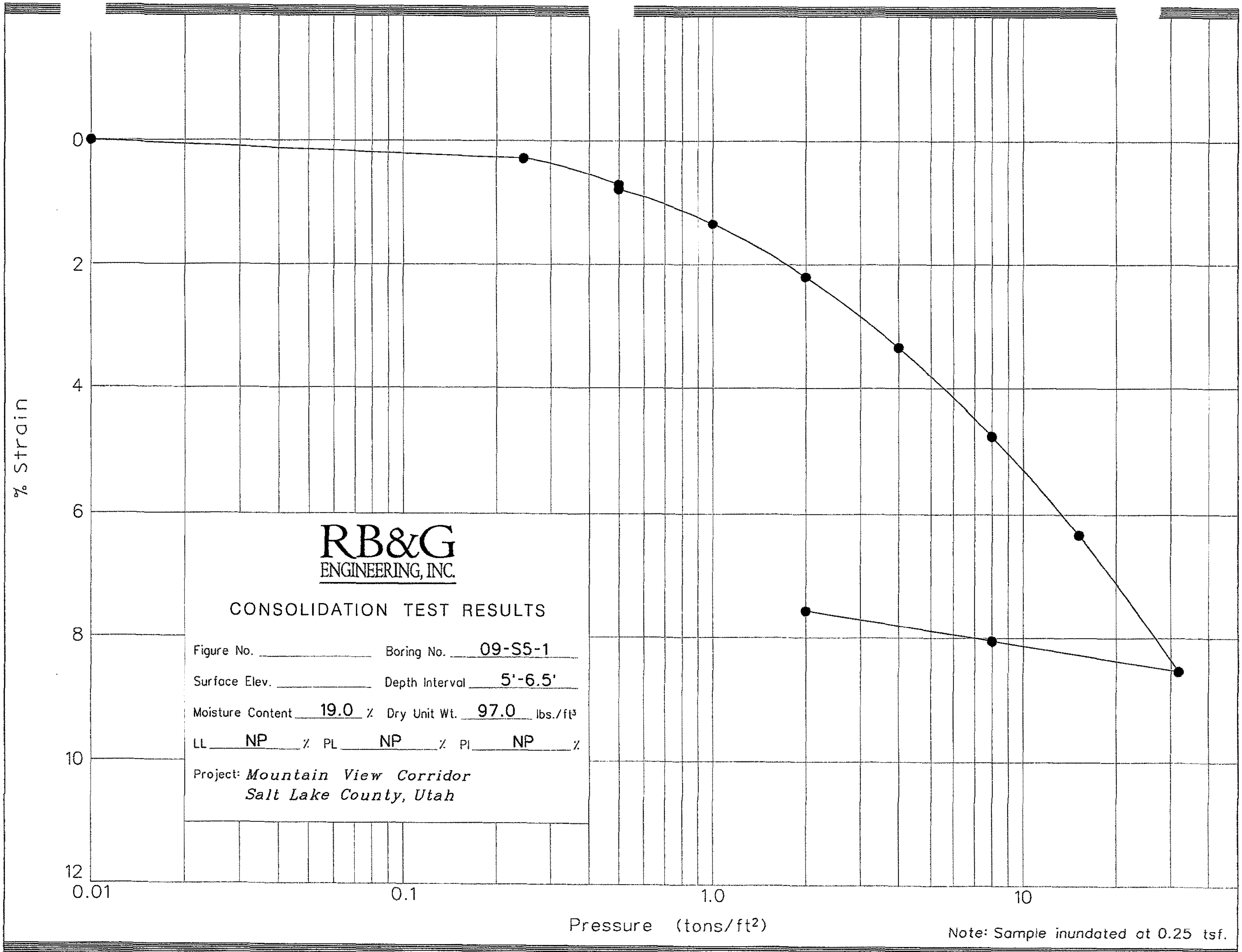
Deviator stress at failure**	$\sigma_{d,f}$	5424	(psf)	**Major principal stress at failure****	σ_1	7578	(psf)
Shear stress at failure**	c_u	2712	(psf)	**Minor principal stress at failure****	σ_3	2154	(psf)

Average strain rate to failure	1%	/ min
Strain at failure	13%	

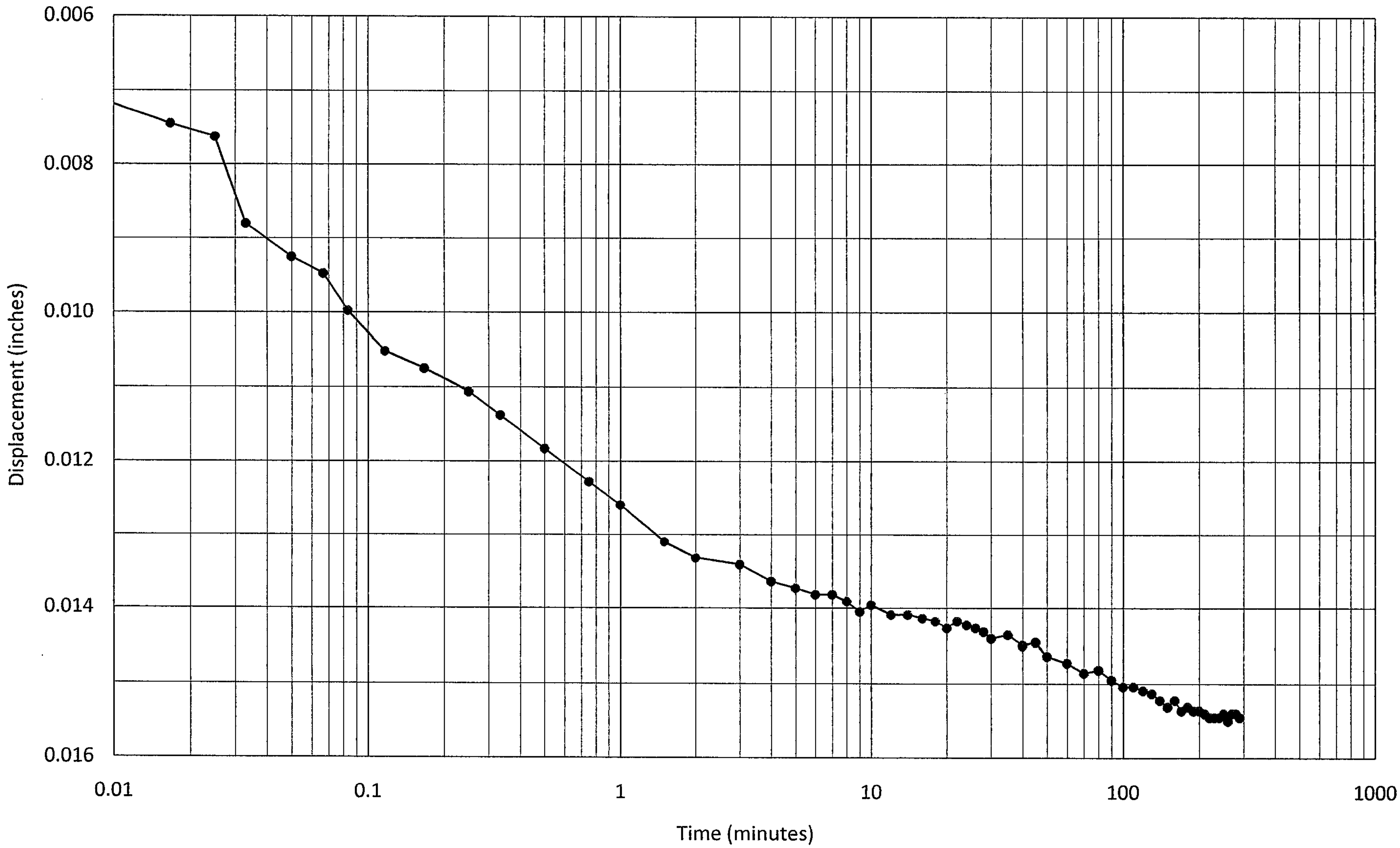
Remarks ______________________

*Moisture content obtained from cuttings and or excess material
**Values corrected for membrane effects


RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-1
Surface Elev.
Depth Interval 5'-6.5'
Moisture Content 19.0 %
Dry Unit Wt. 97.0 lbs./ft³
LL NP %
PL NP %
PI NP %
Project: Mountain View Corridor
Salt Lake County, Utah
Void Ratio (e)
.75
.70
.65
.60
.55
.50
.45
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.



0
2
4
6
8
10
12
% Strain
0.01
0.1
1.0
10
Pressure (tons/ft2)
Note: Sample inundated at 0.25 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-1
Surface Elev.
Depth Interval 5'-6.5'
Moisture Content 19.0 %
Dry Unit Wt. 97.0 lbs./ft3
LL NP %
PL NP %
PI NP %
Project: Mountain View Corridor
Salt Lake County, Utah



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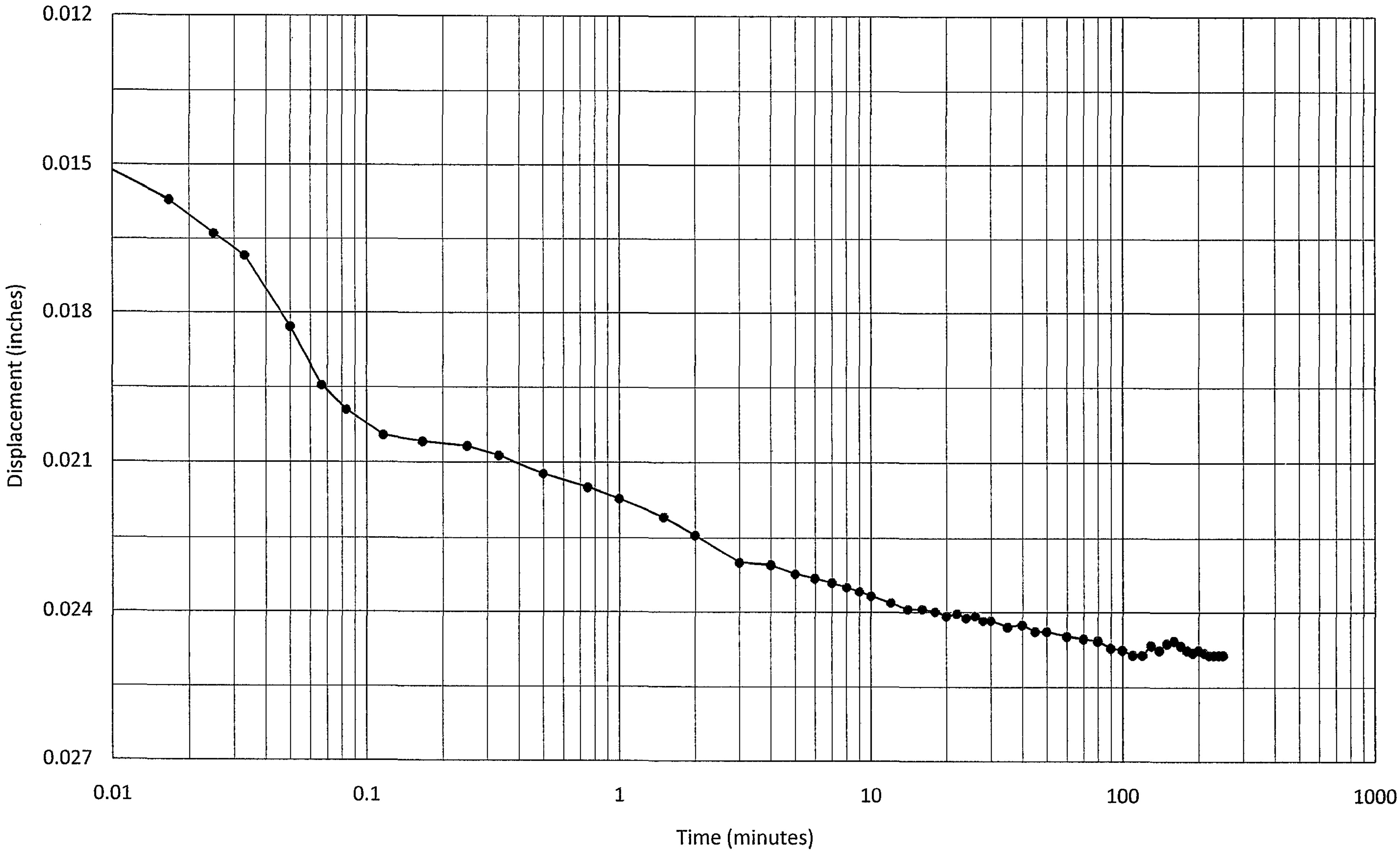
Hole no.: 09-S5-1
Depth: 5'-6.5'
Load: 0.5 to 1 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

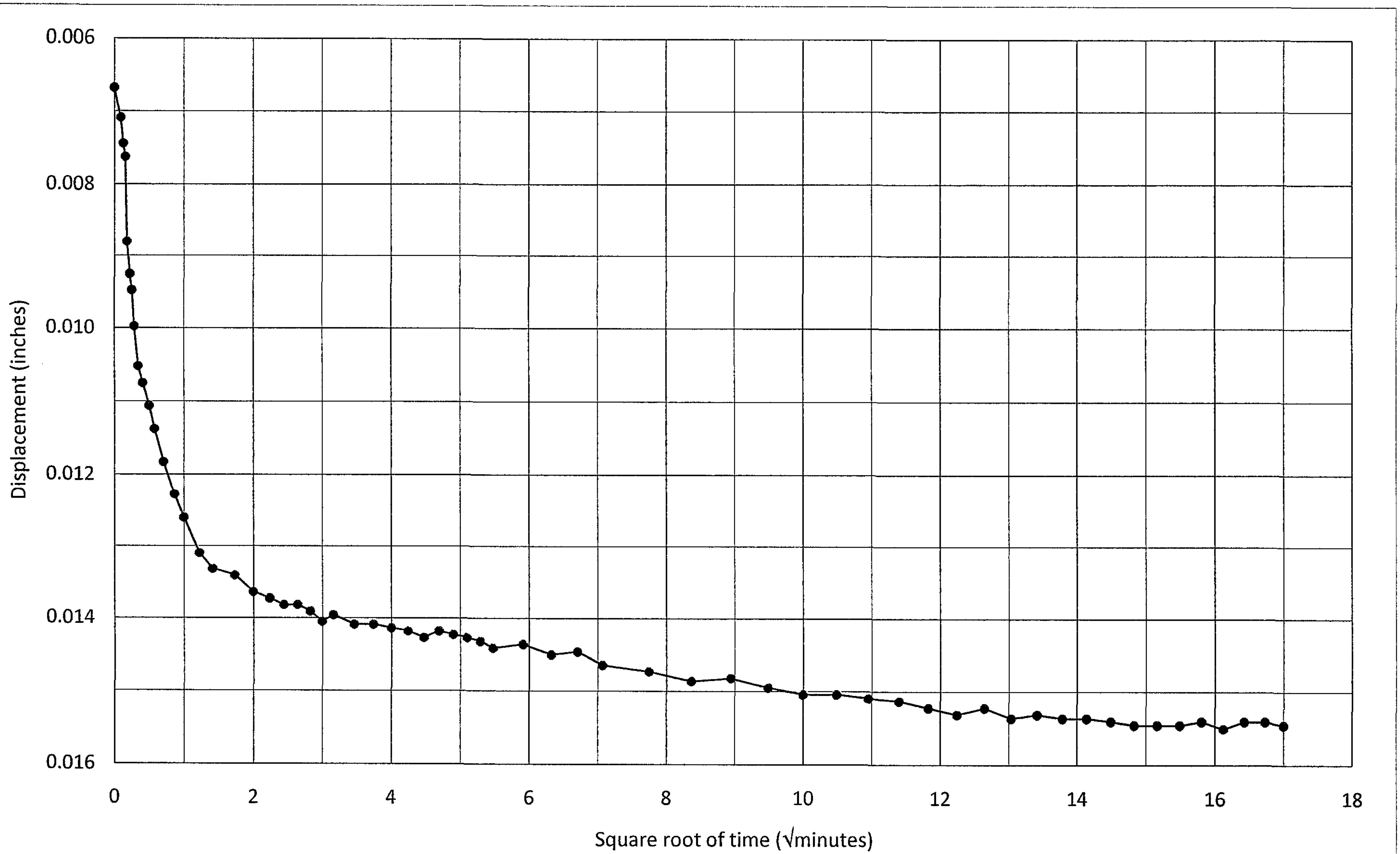


RB&G
ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 5'-6.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

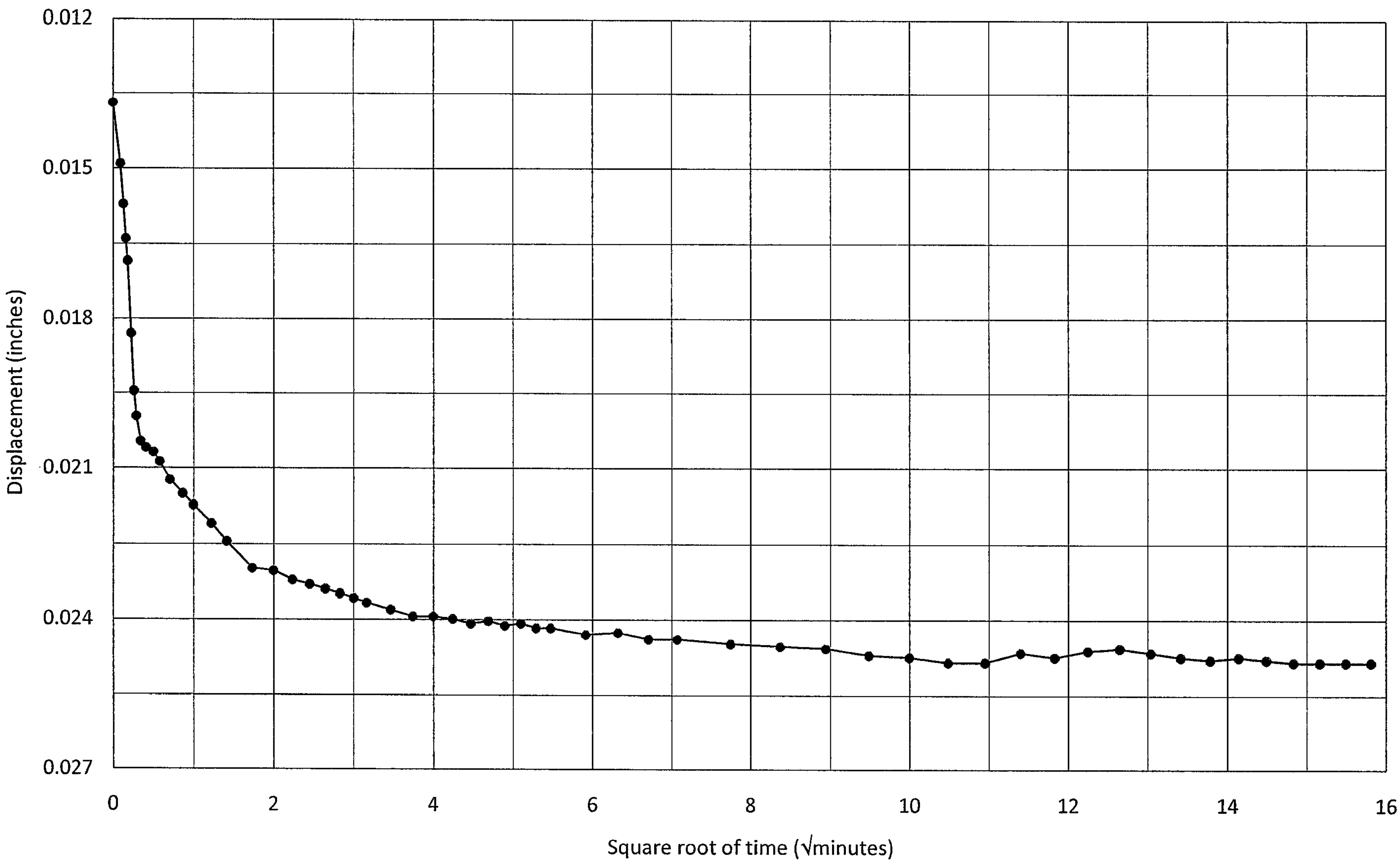


RB&G
ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 5'-6.5'
Load: 0.5 to 1 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

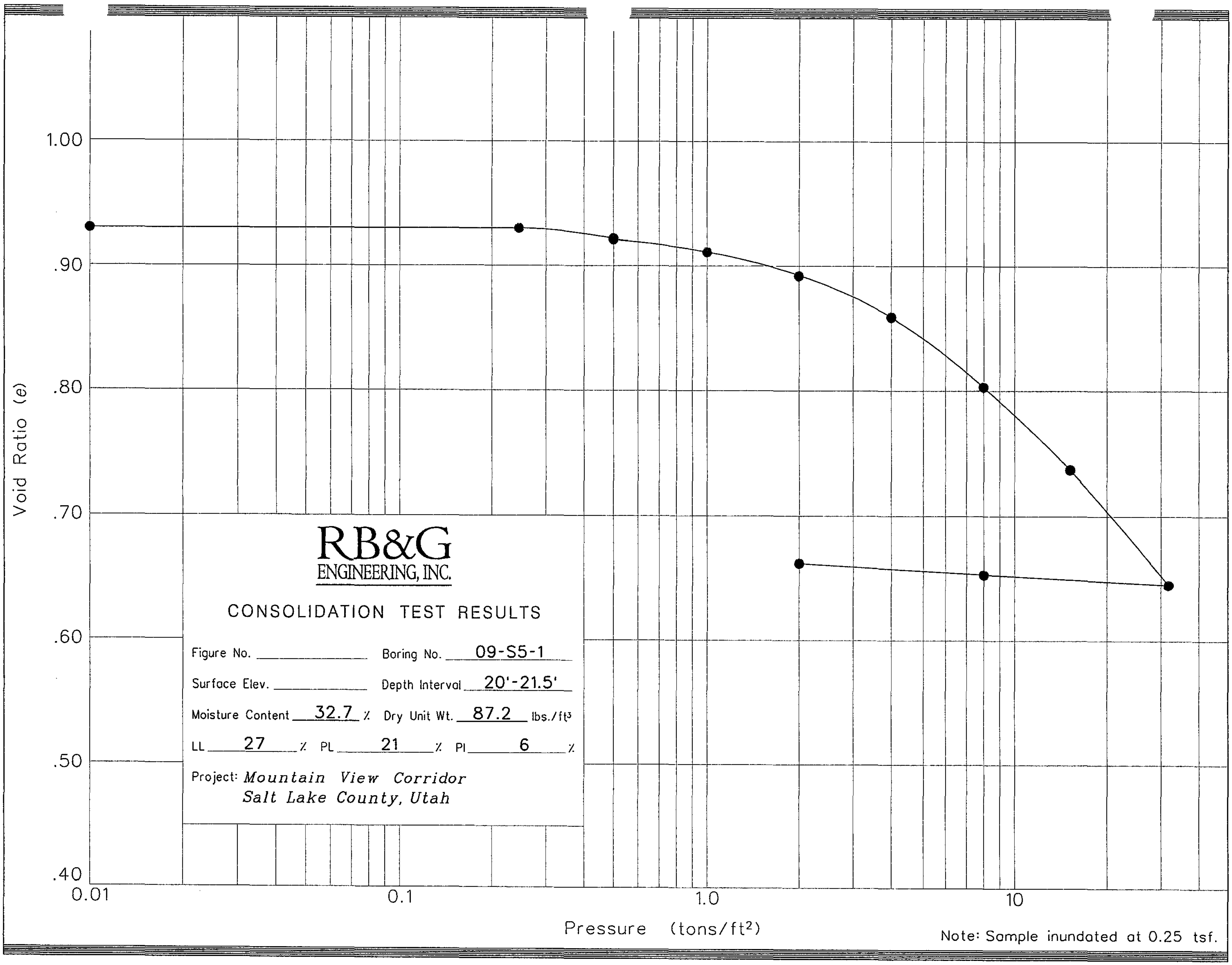


RB&G ENGINEERING, INC.

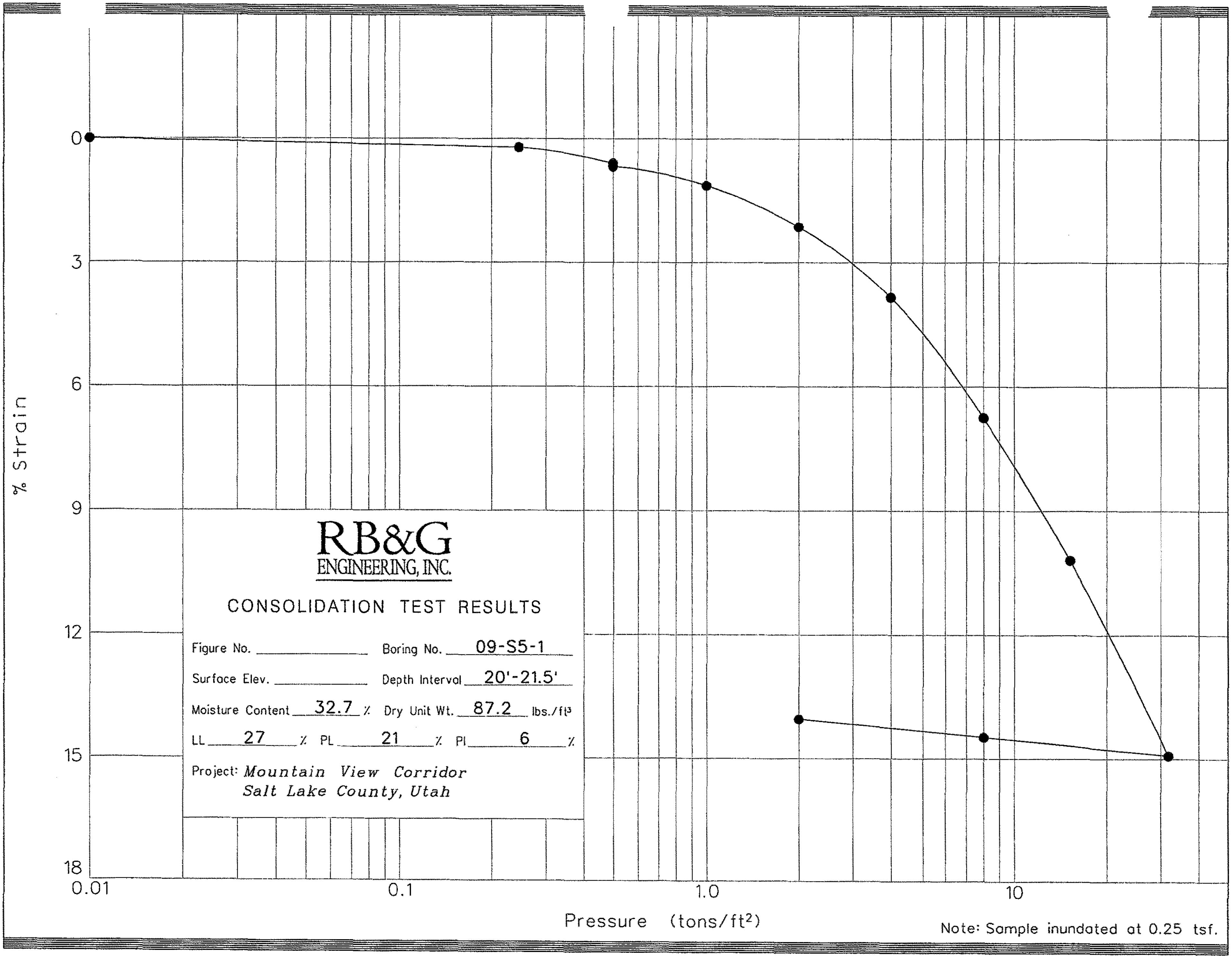
Hole no.: 09-S5-1
Depth: 5'-6.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

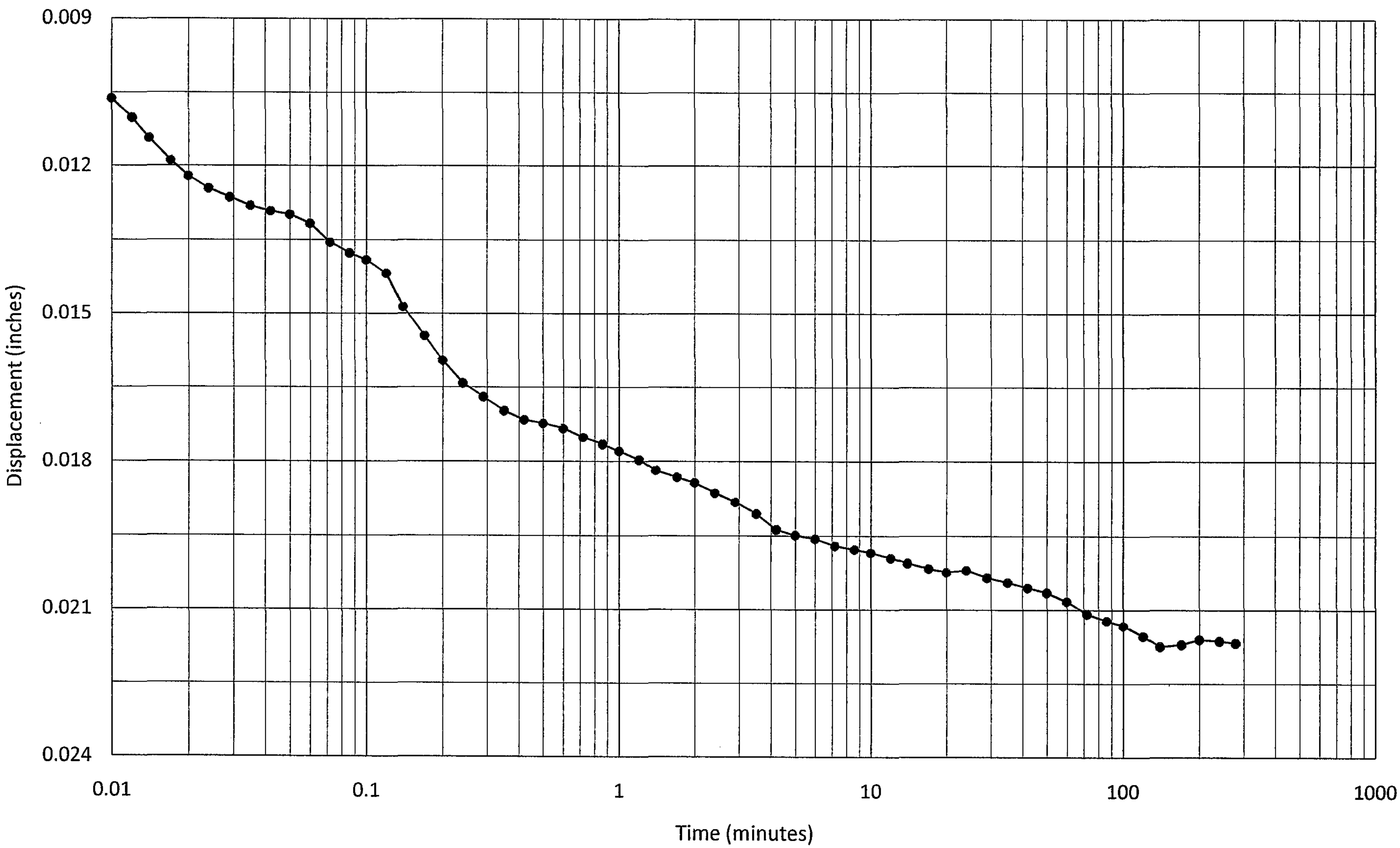
Mountain View Corridor
Segment 5
Salt Lake County, Utah



Void Ratio (e)
1.00
.90
.80
.70
.60
.50
.40
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-1
Surface Elev.
Depth Interval 20'-21.5'
Moisture Content 32.7 %
Dry Unit Wt. 87.2 lbs./ft³
LL 27 %
PL 21 %
PI 6 %
Project: Mountain View Corridor
Salt Lake County, Utah



RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-1
Surface Elev.
Depth Interval 20'-21.5'
Moisture Content 32.7 % Dry Unit Wt. 87.2 lbs./ft³
LL 27 % PL 21 % PI 6 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
3
6
9
12
15
18
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.

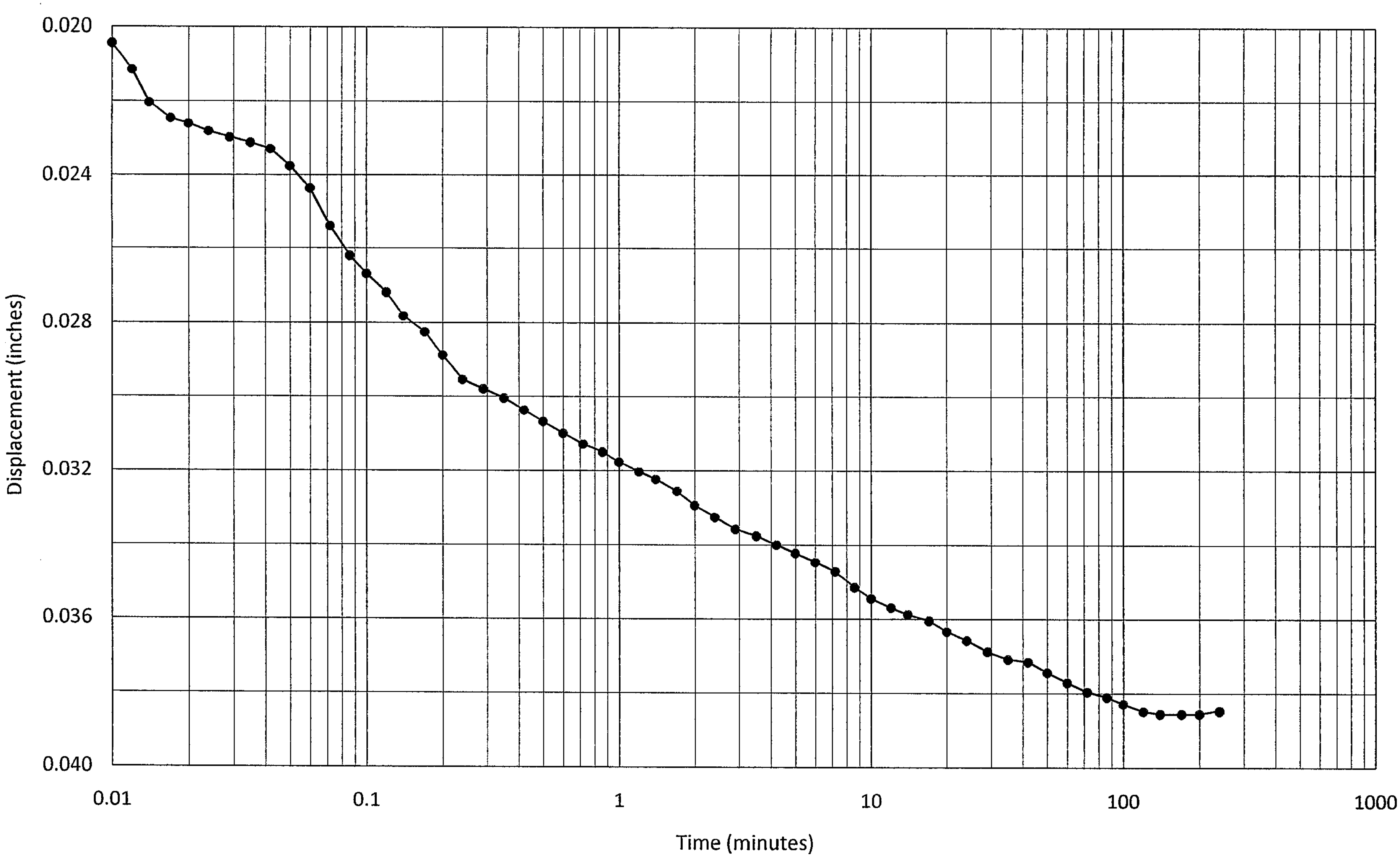


RB&G ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 20'-21.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

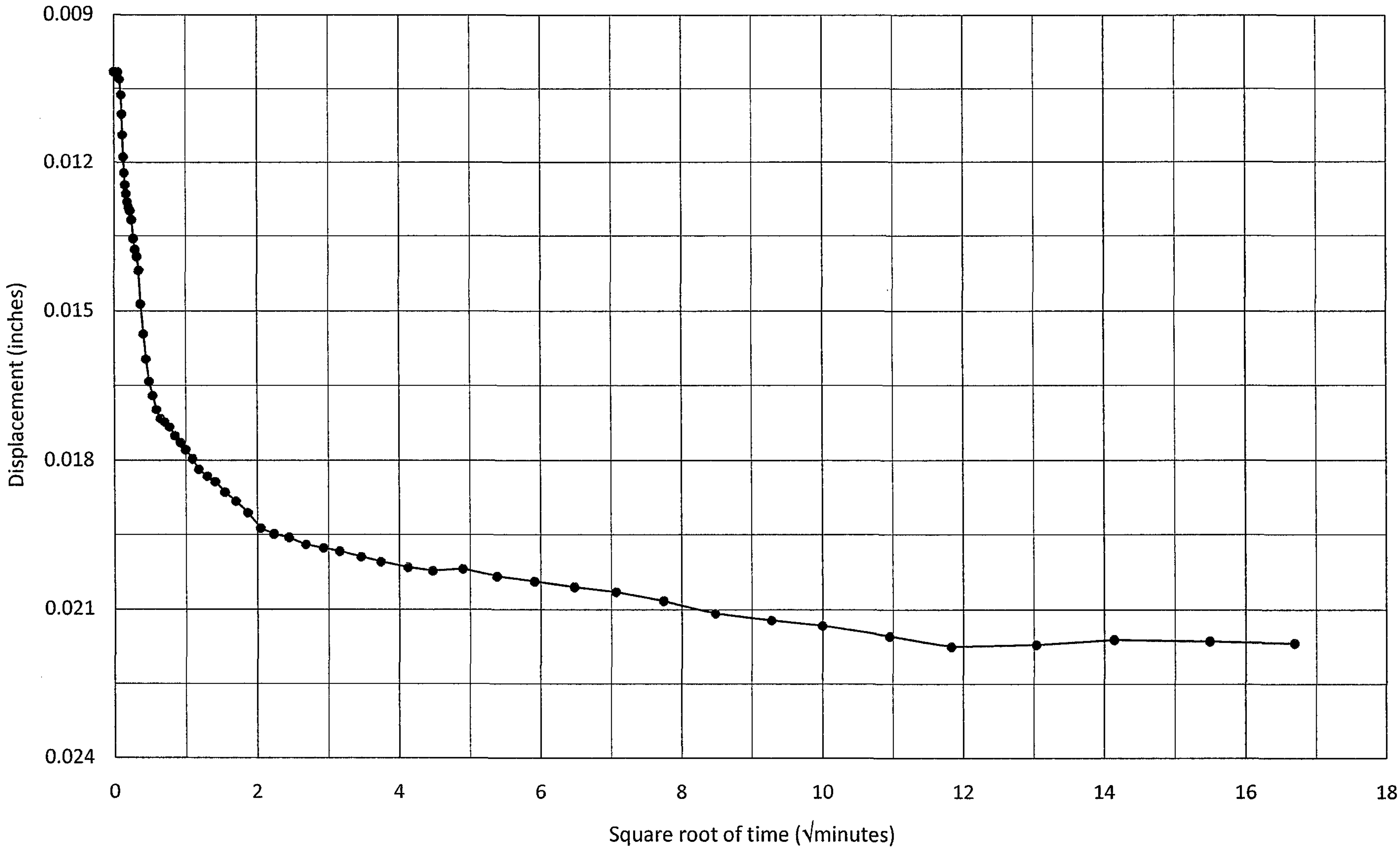


RB&G ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 20'-21.5'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

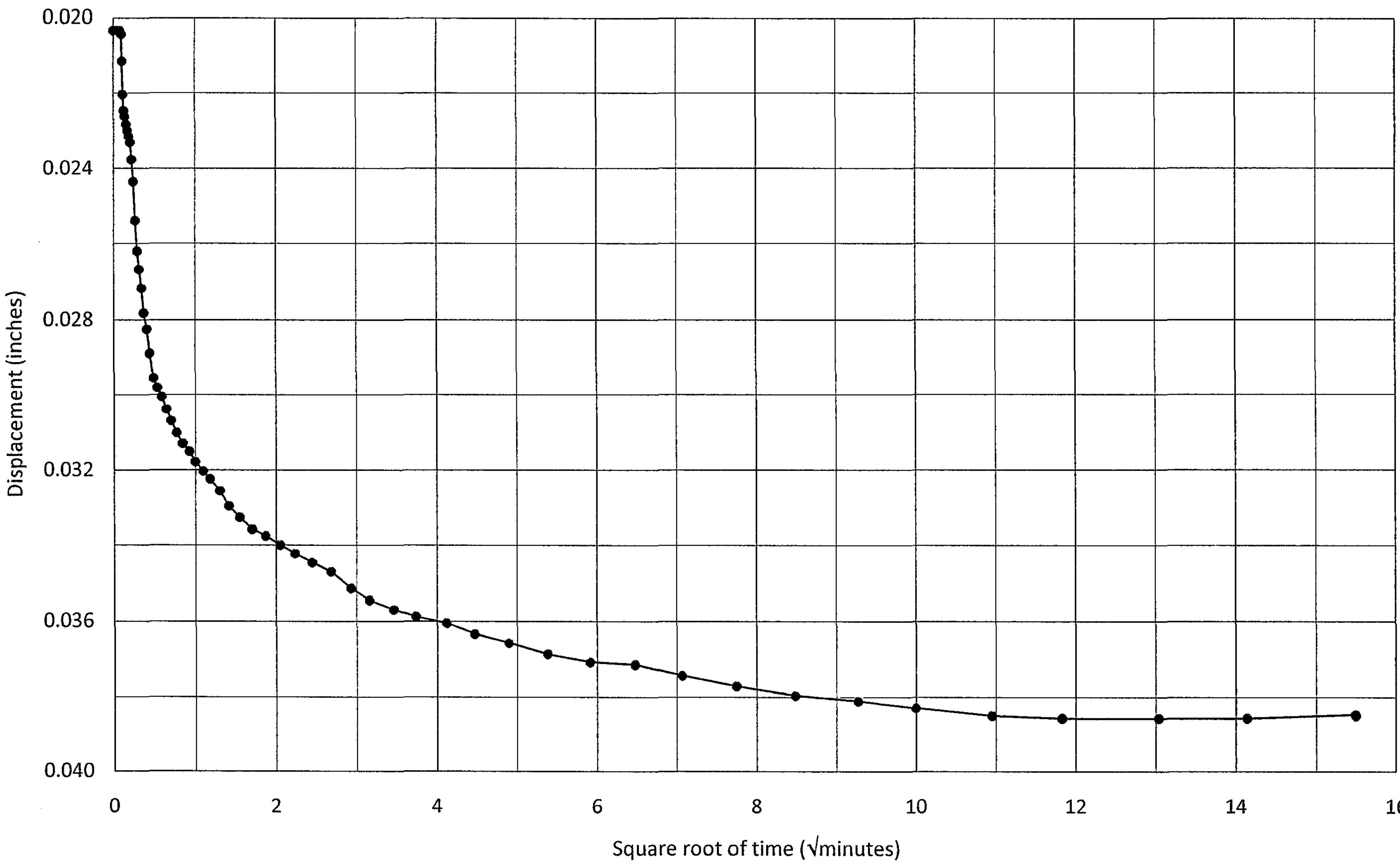


RB&G ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 20'-21.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

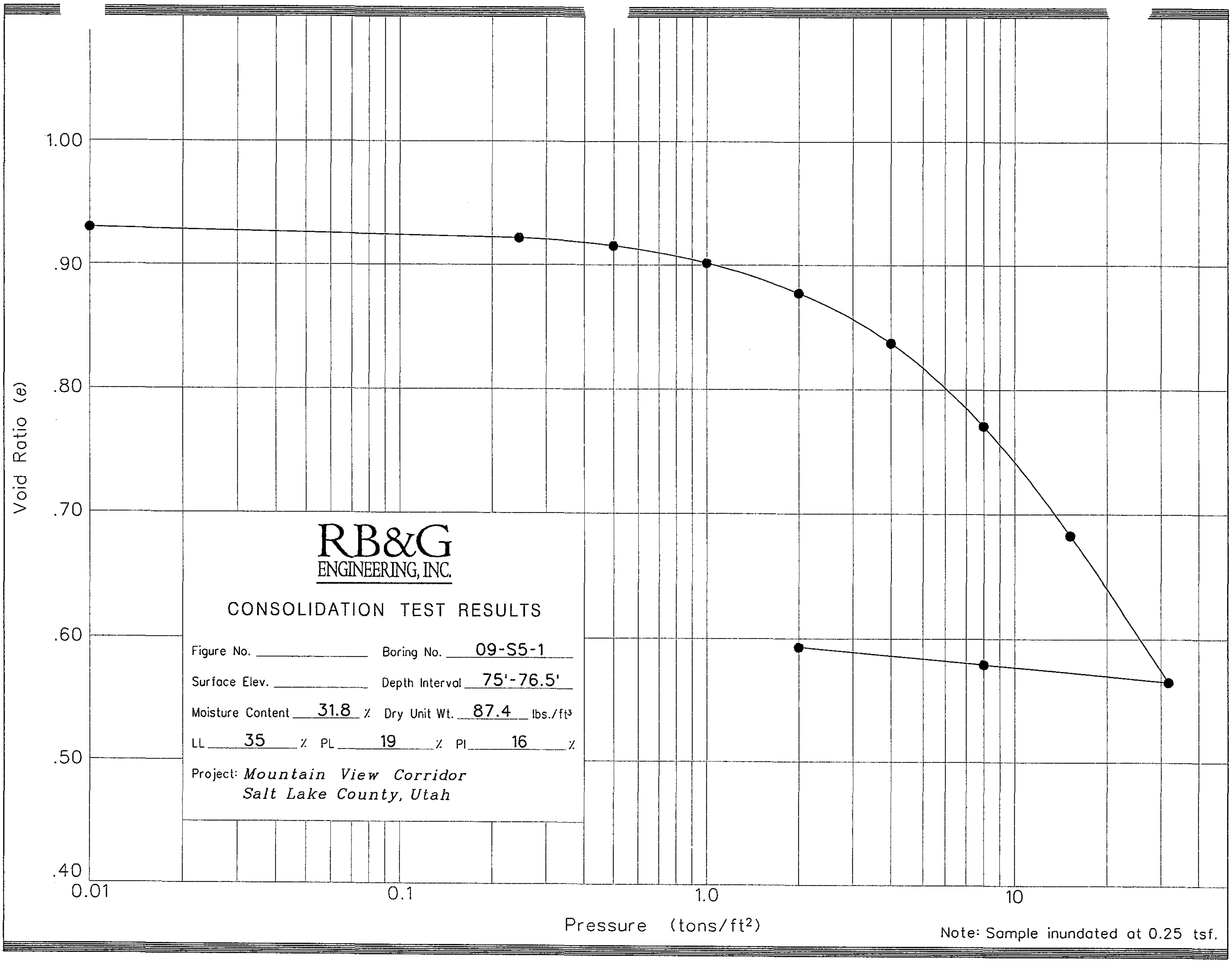


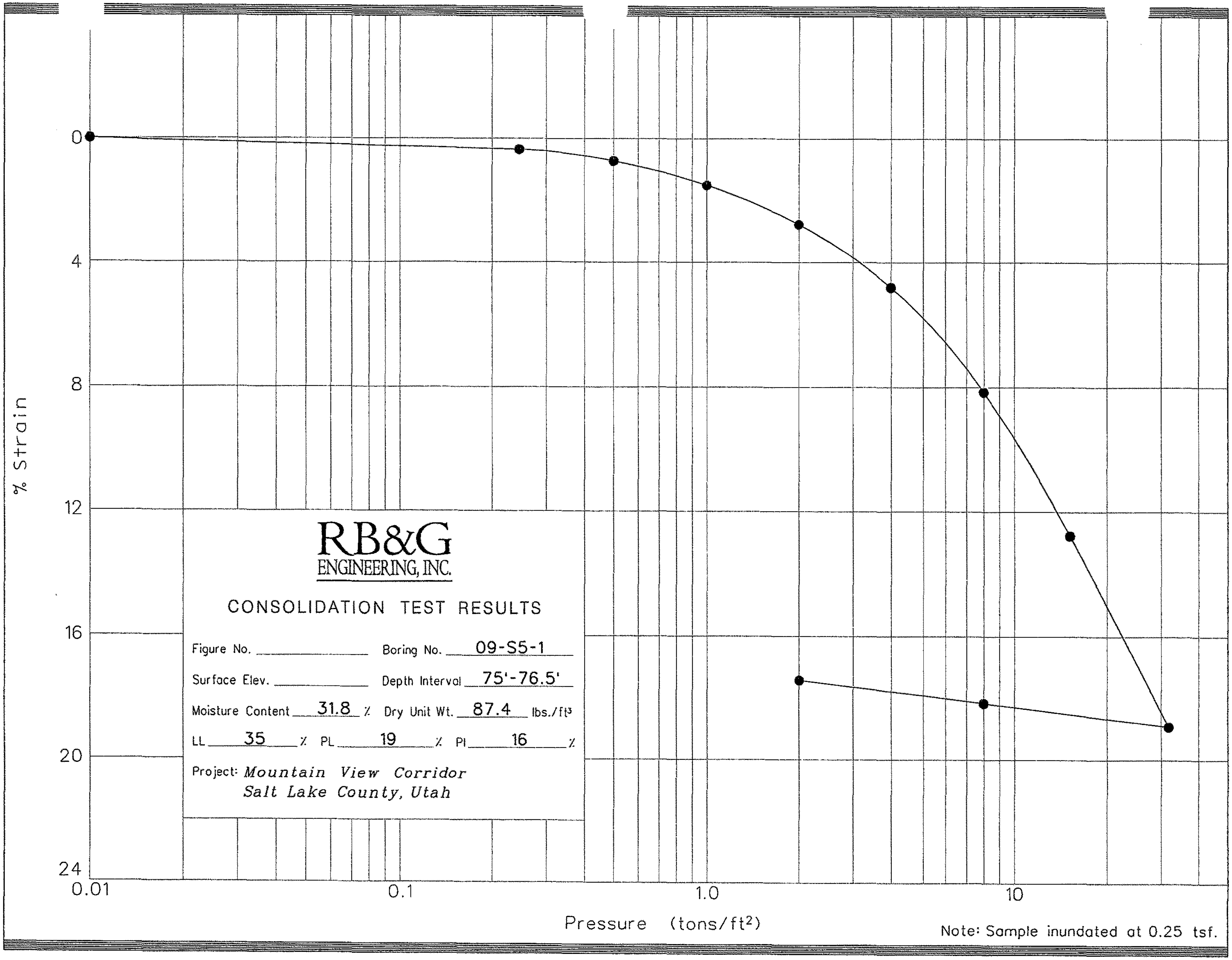
RB&G ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 20'-21.5'
Load: 2 to 4 tsf

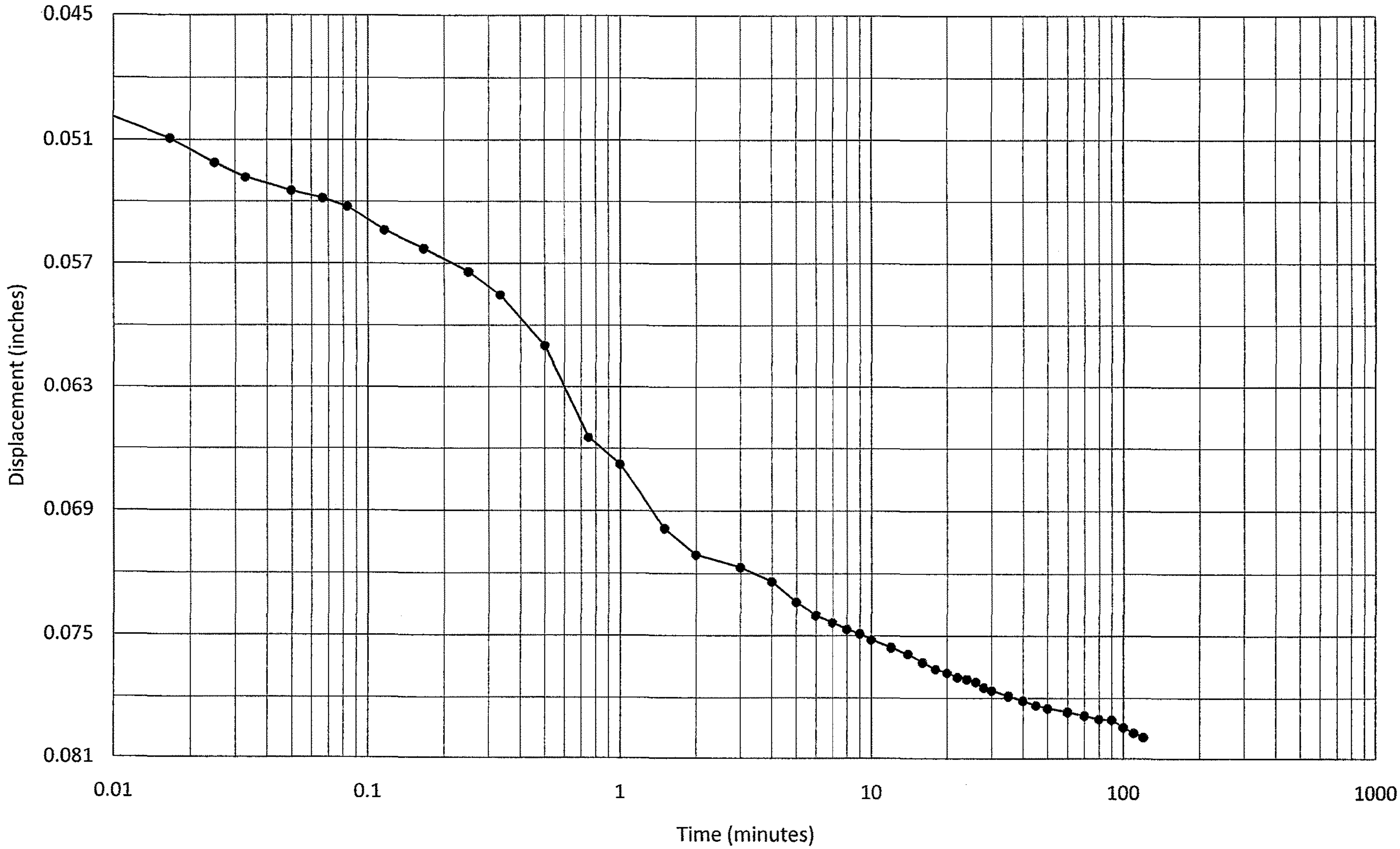
TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah


1.00
.90
.80
.70
.60
.50
.40
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-1
Surface Elev.
Depth Interval 75'-76.5'
Moisture Content 31.8 %
Dry Unit Wt. 87.4 lbs./ft³
LL 35 % PL 19 % PI 16 %
Project: Mountain View Corridor
Salt Lake County, Utah



% Strain
0
4
8
12
16
20
24
0.01
0.1
1.0
10
Pressure (tons/ft²)
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-1
Surface Elev.
Depth Interval 75'-76.5'
Moisture Content 31.8 %
Dry Unit Wt. 87.4 lbs./ft³
LL 35 %
PL 19 %
PI 16 %
Project: Mountain View Corridor
Salt Lake County, Utah
Note: Sample inundated at 0.25 tsf.

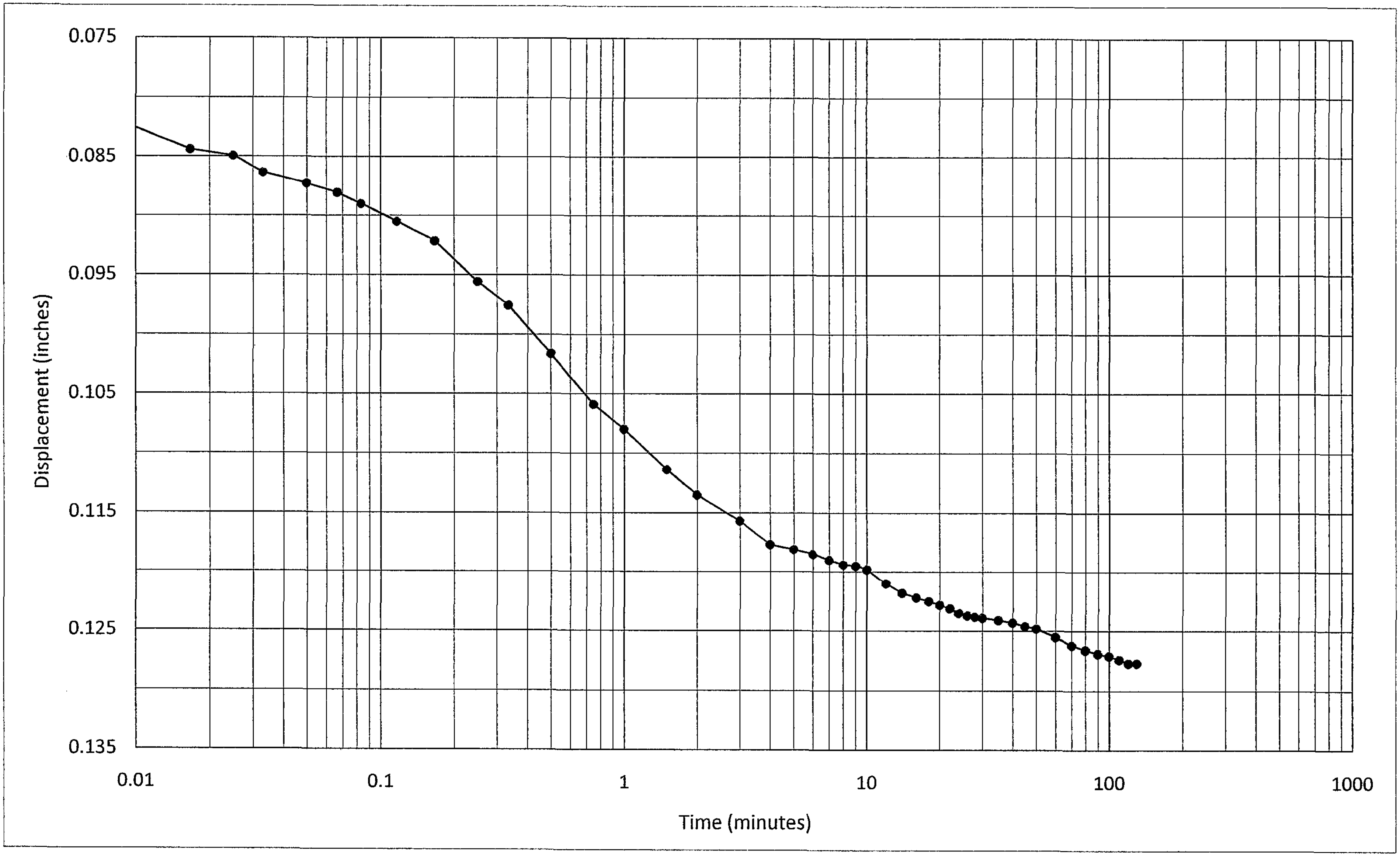


RB&G ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 75'-76.5'
Load: 4 to 8 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

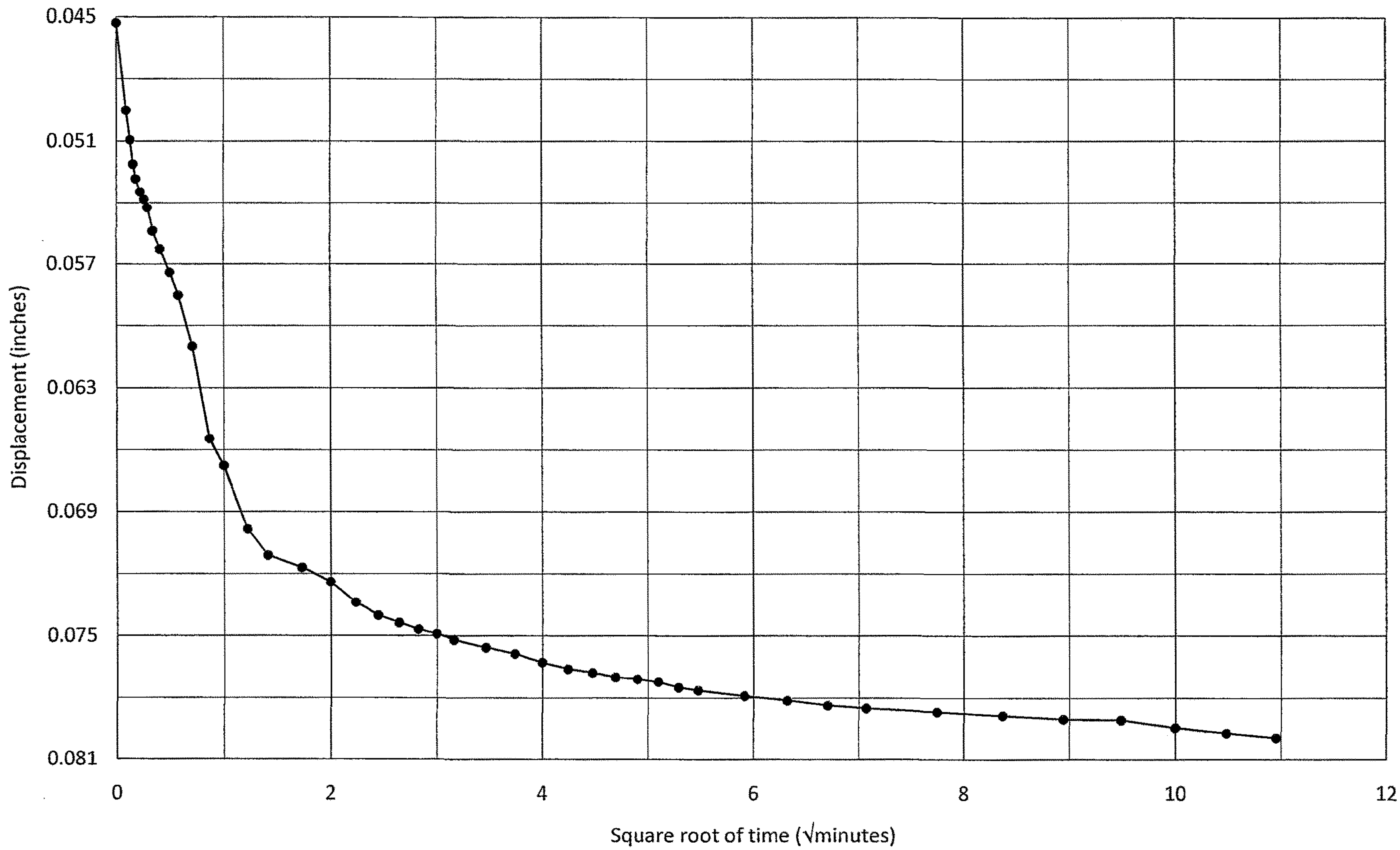


RB&G ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 75'-76.5'
Load: 8 to 16 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

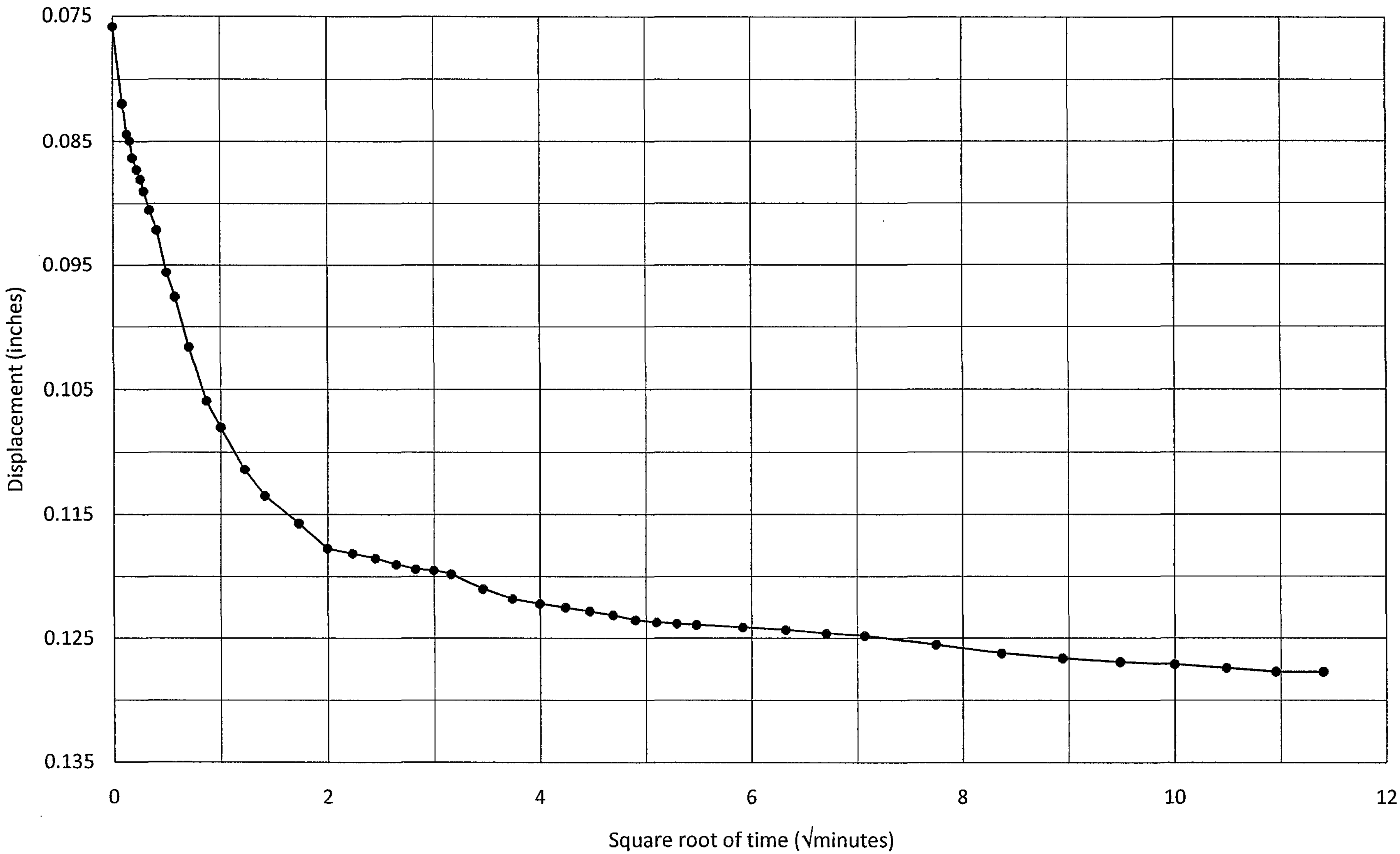


RB&G
ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 75'-76.5'
Load: 4 to 8 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

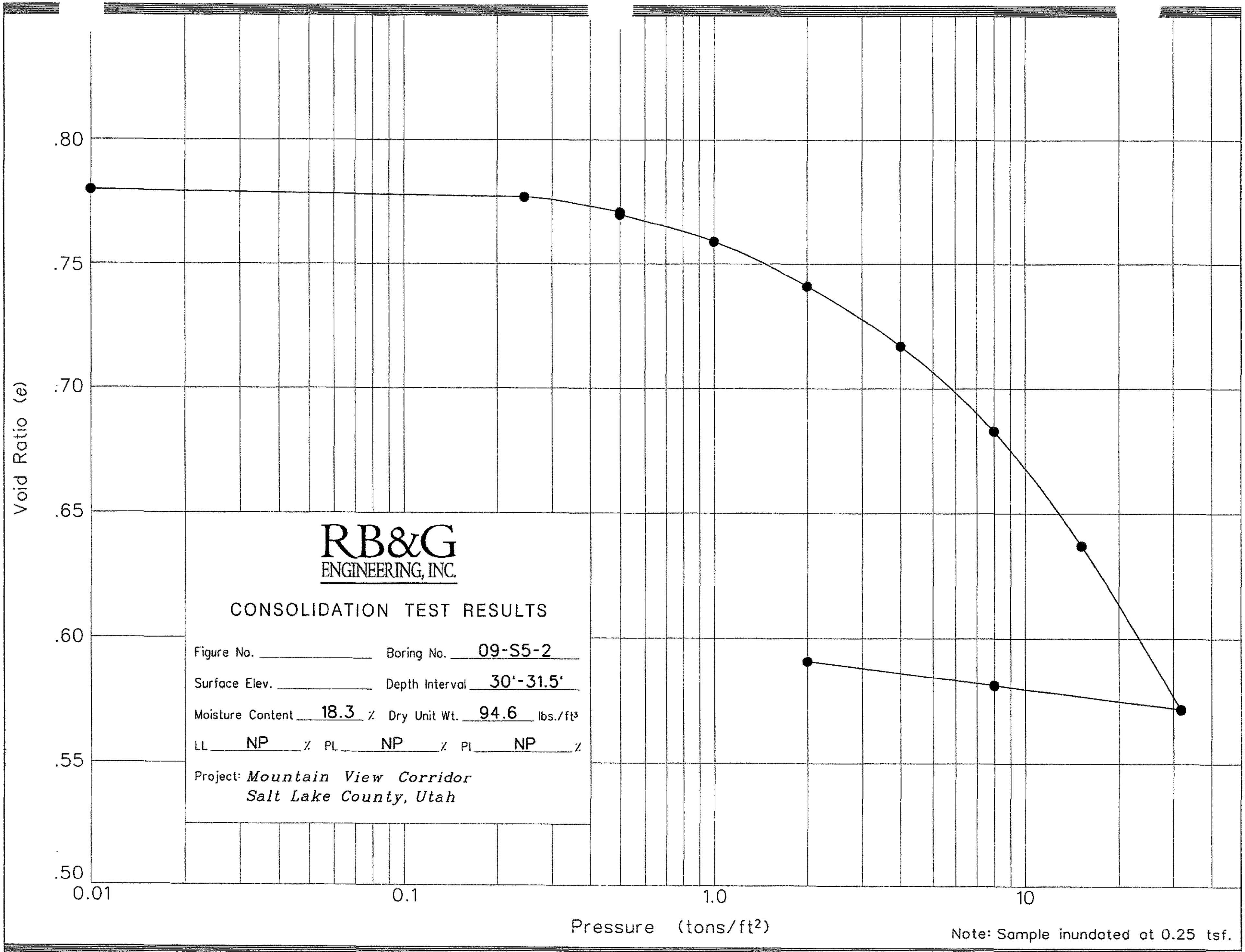


RB&G ENGINEERING, INC.

Hole no.: 09-S5-1
Depth: 75'-76.5'
Load: 8 to 16 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah



RB&G ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

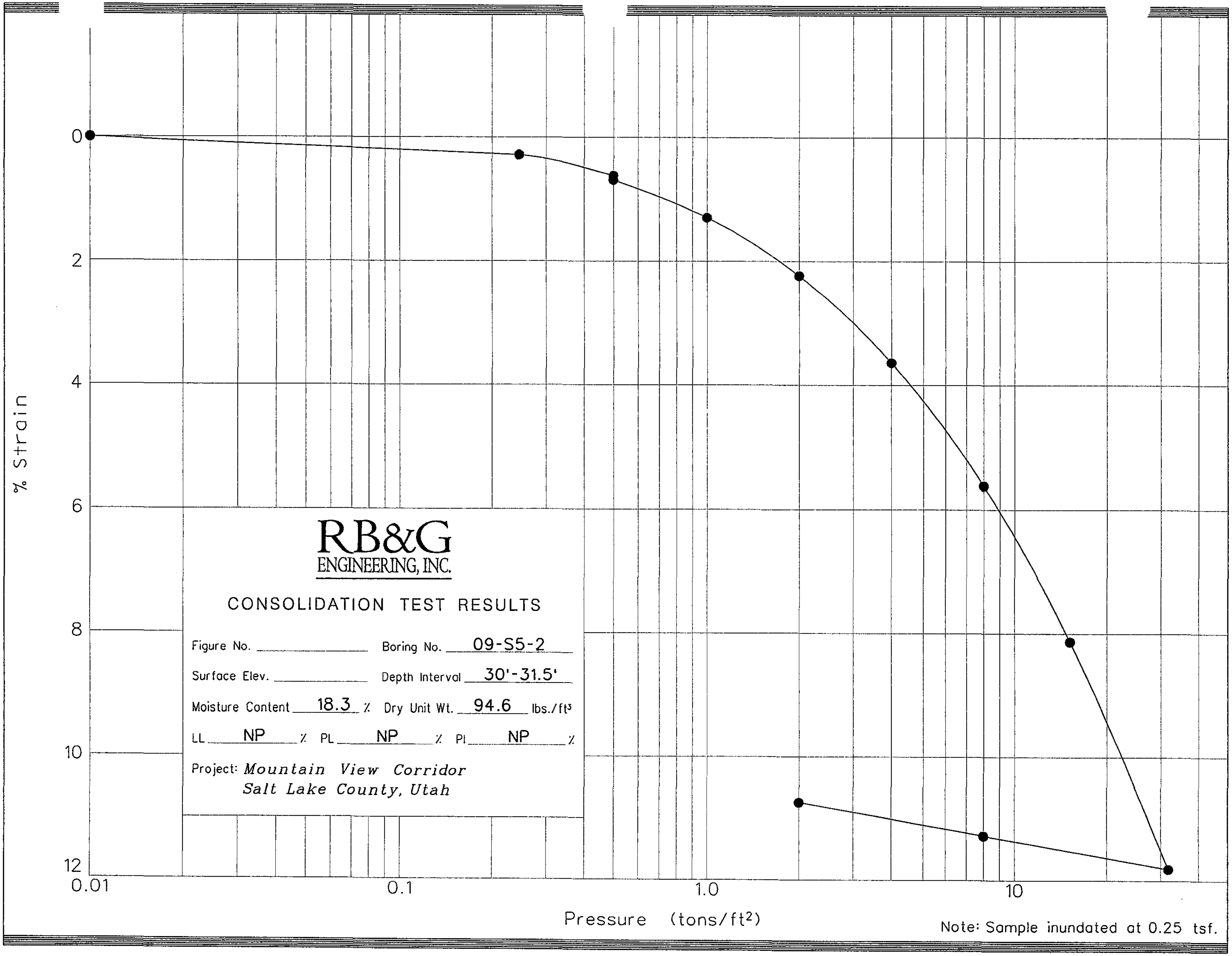
Figure No. ______ Boring No. 09-S5-2

Surface Elev. ______ Depth Interval 30'-31.5'

Moisture Content 18.3 % Dry Unit Wt. 94.6 lbs./ft³

LL NP % PL NP % PI NP %

Project: *Mountain View Corridor*
Salt Lake County, Utah



RB&G ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

Figure No. ______ Boring No. 09-S5-2

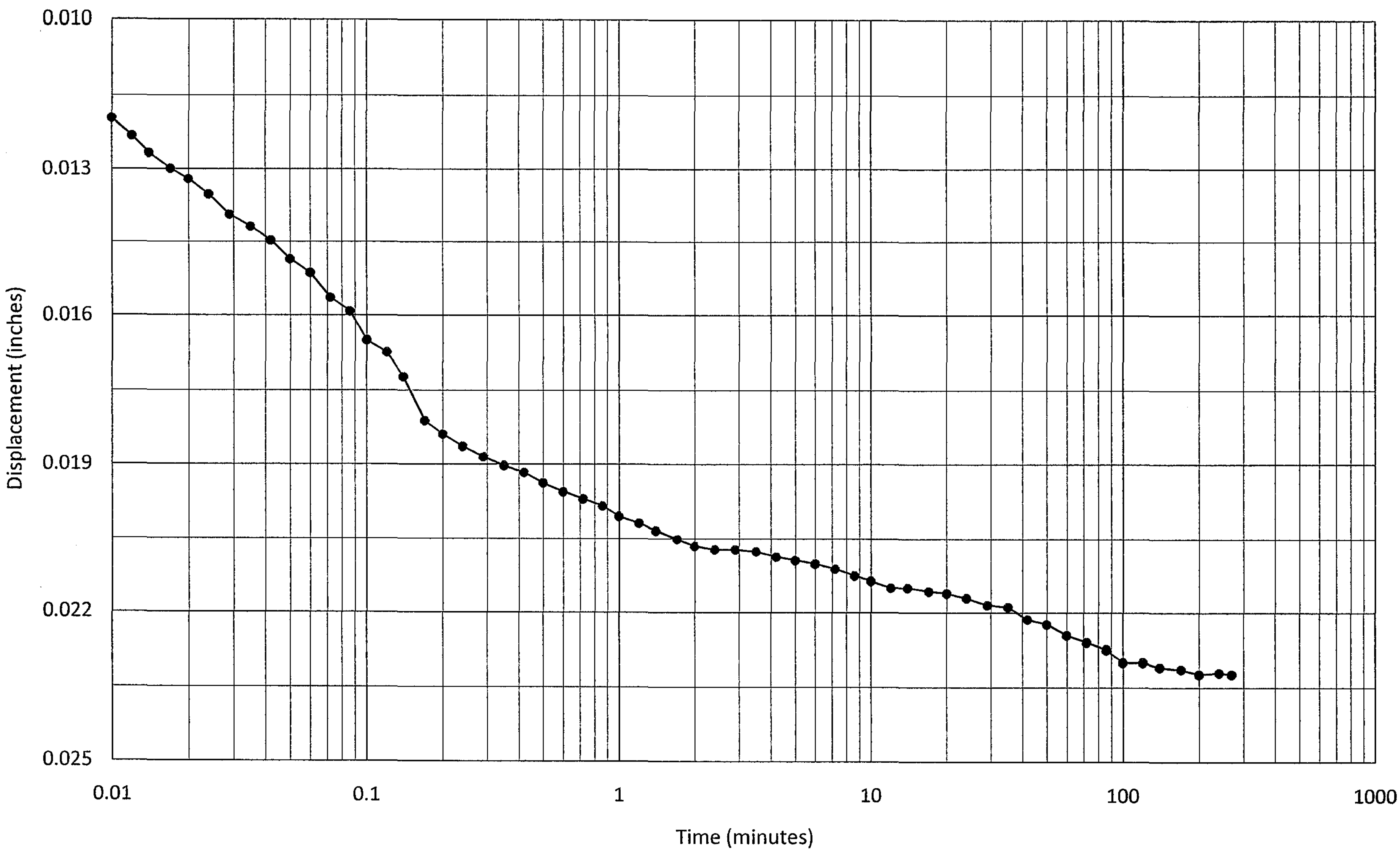
Surface Elev. ______ Depth Interval 30'-31.5'

Moisture Content 18.3 % Dry Unit Wt. 94.6 lbs./ft³

LL NP % PL NP % PI NP %

Project: *Mountain View Corridor*
Salt Lake County, Utah

Note: Sample inundated at 0.25 tsf.

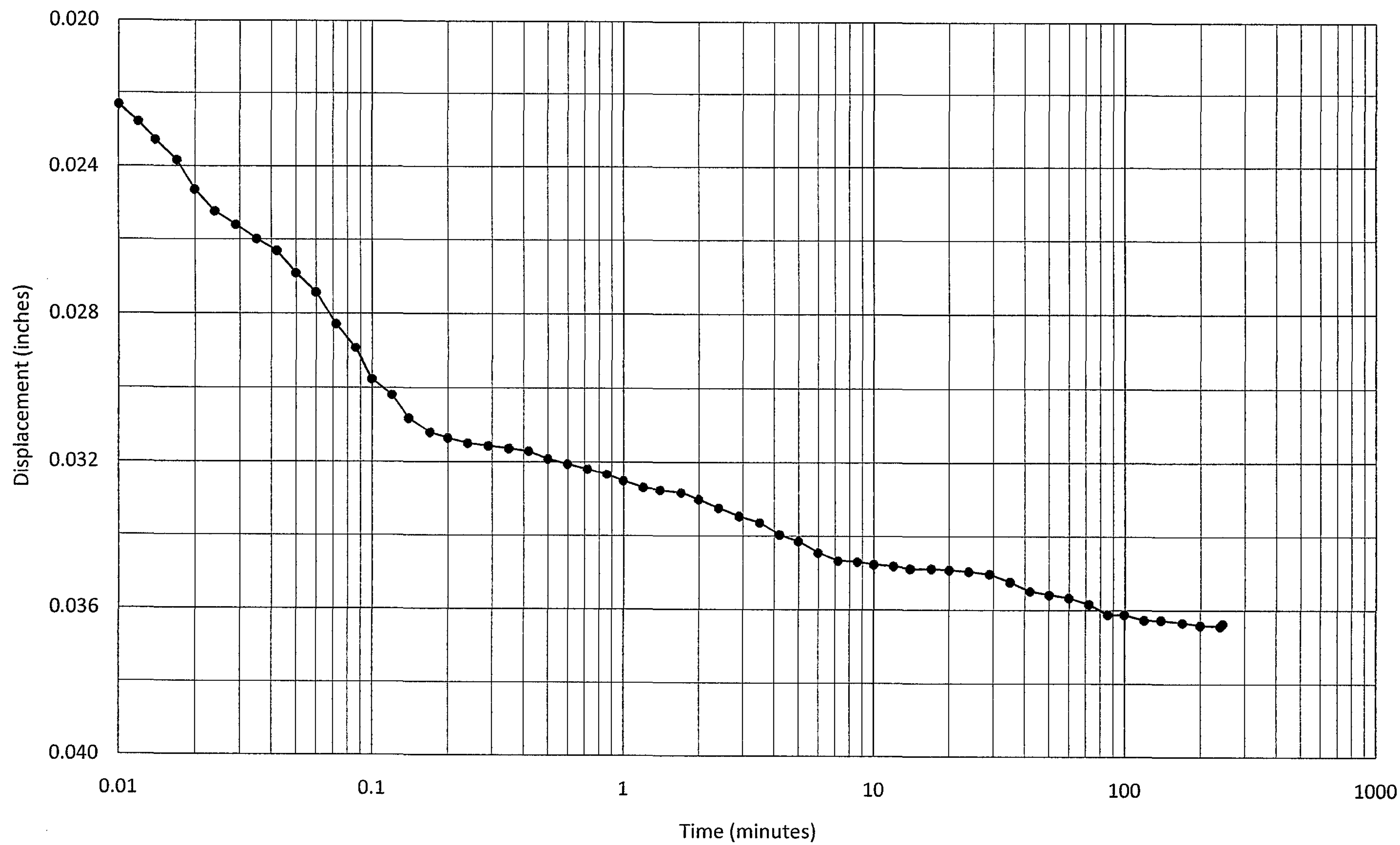


RB&G ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 30'-31.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

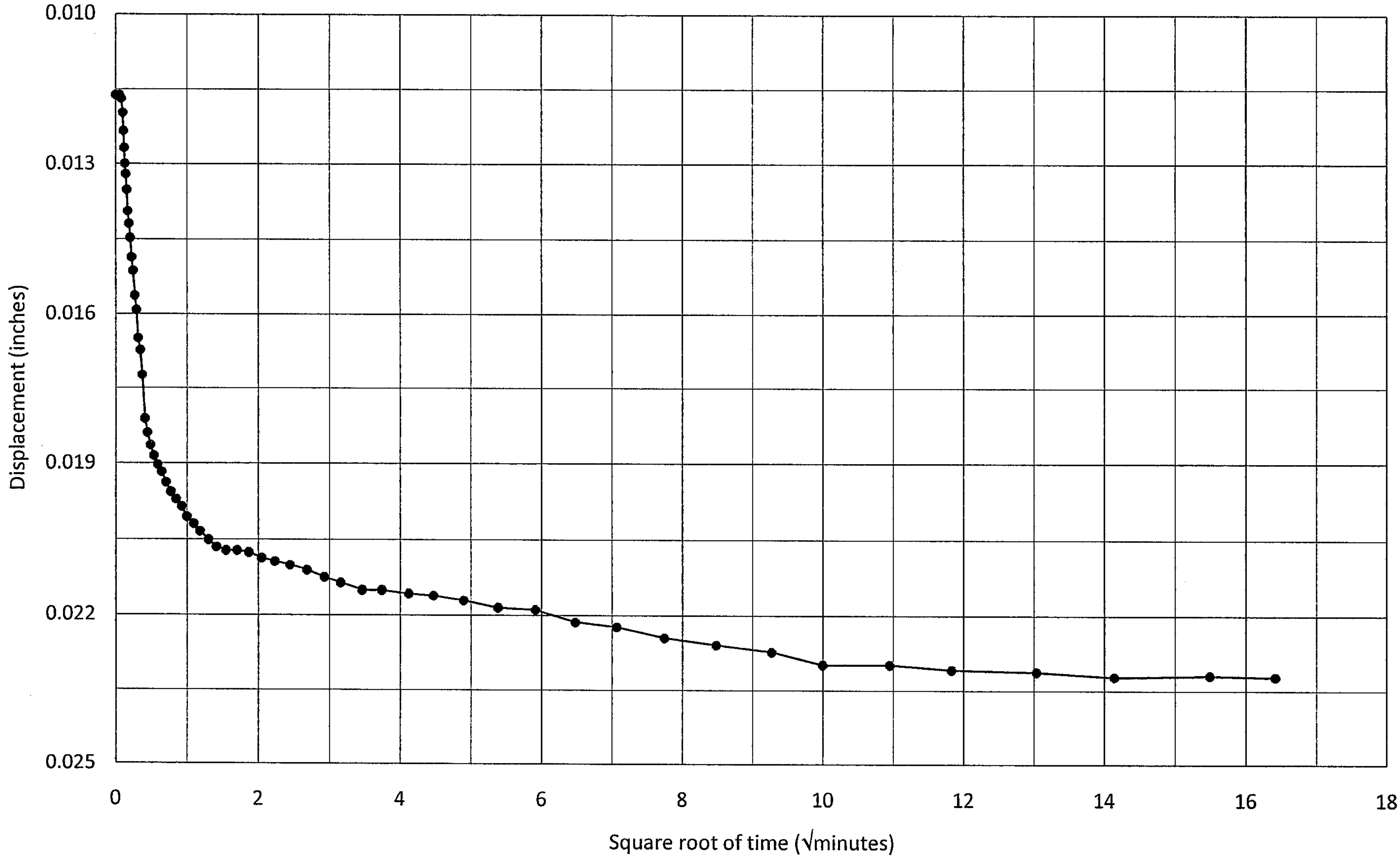


RB&G
ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 30'-31.5'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

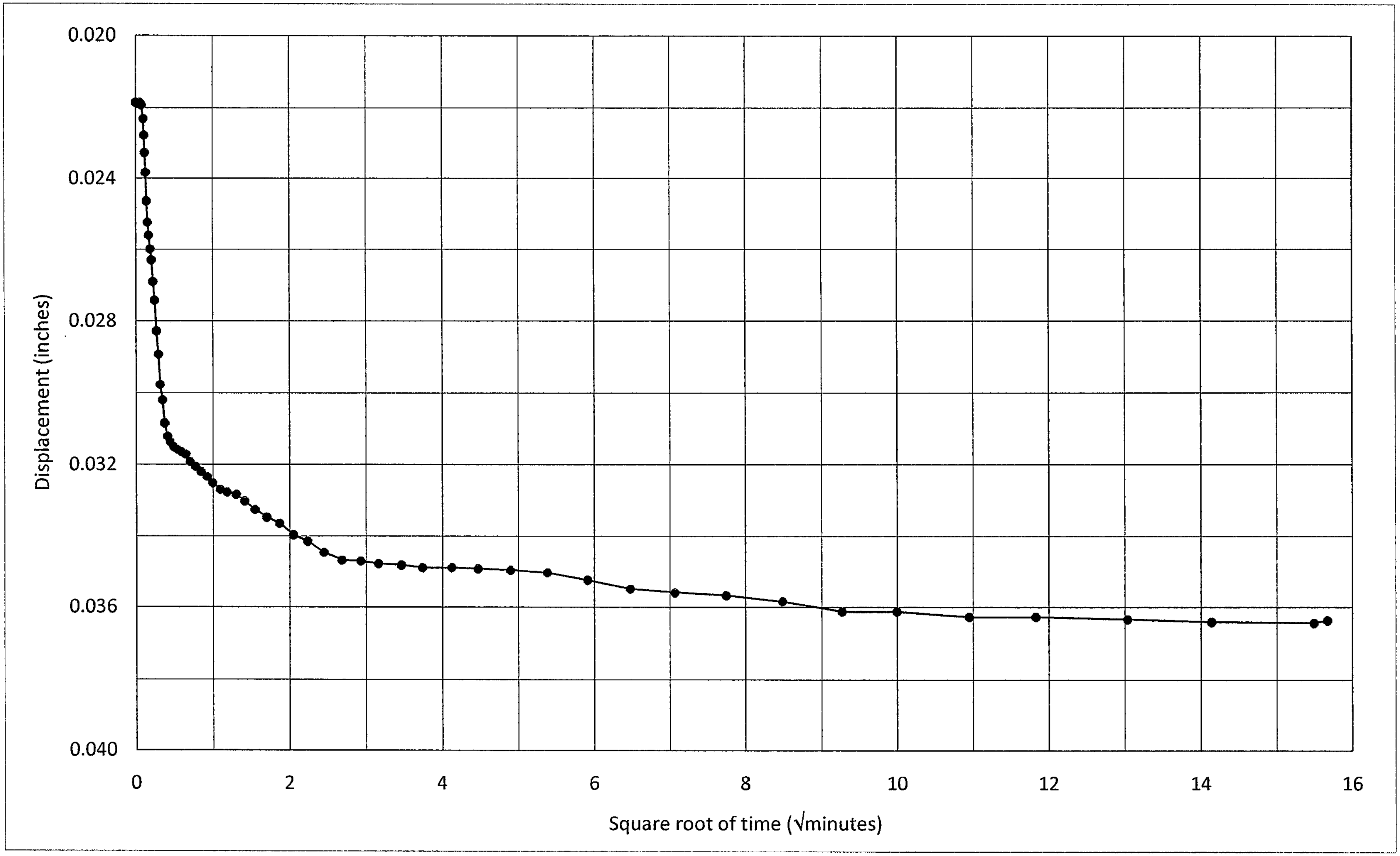


RB&G
ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 30'-31.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

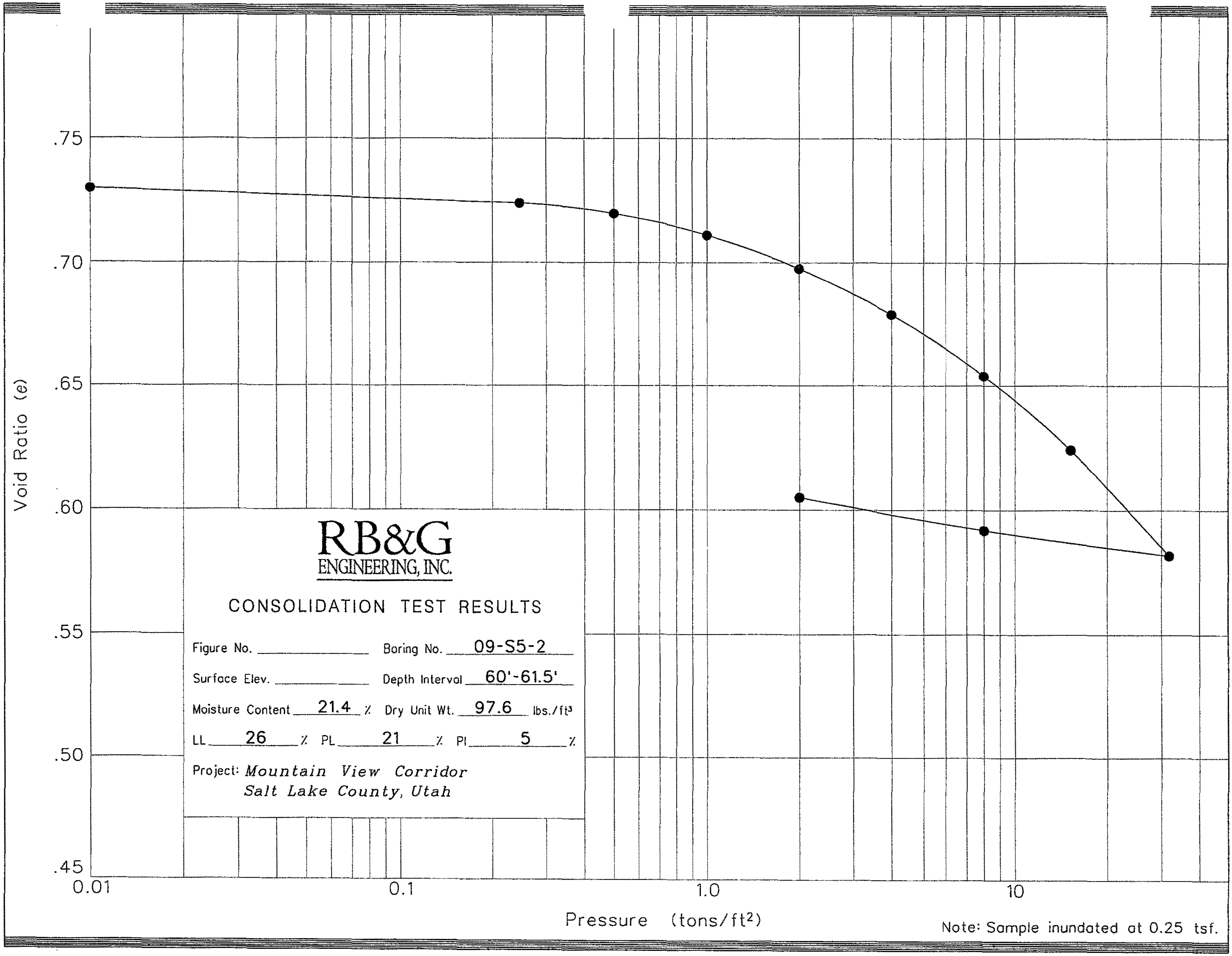


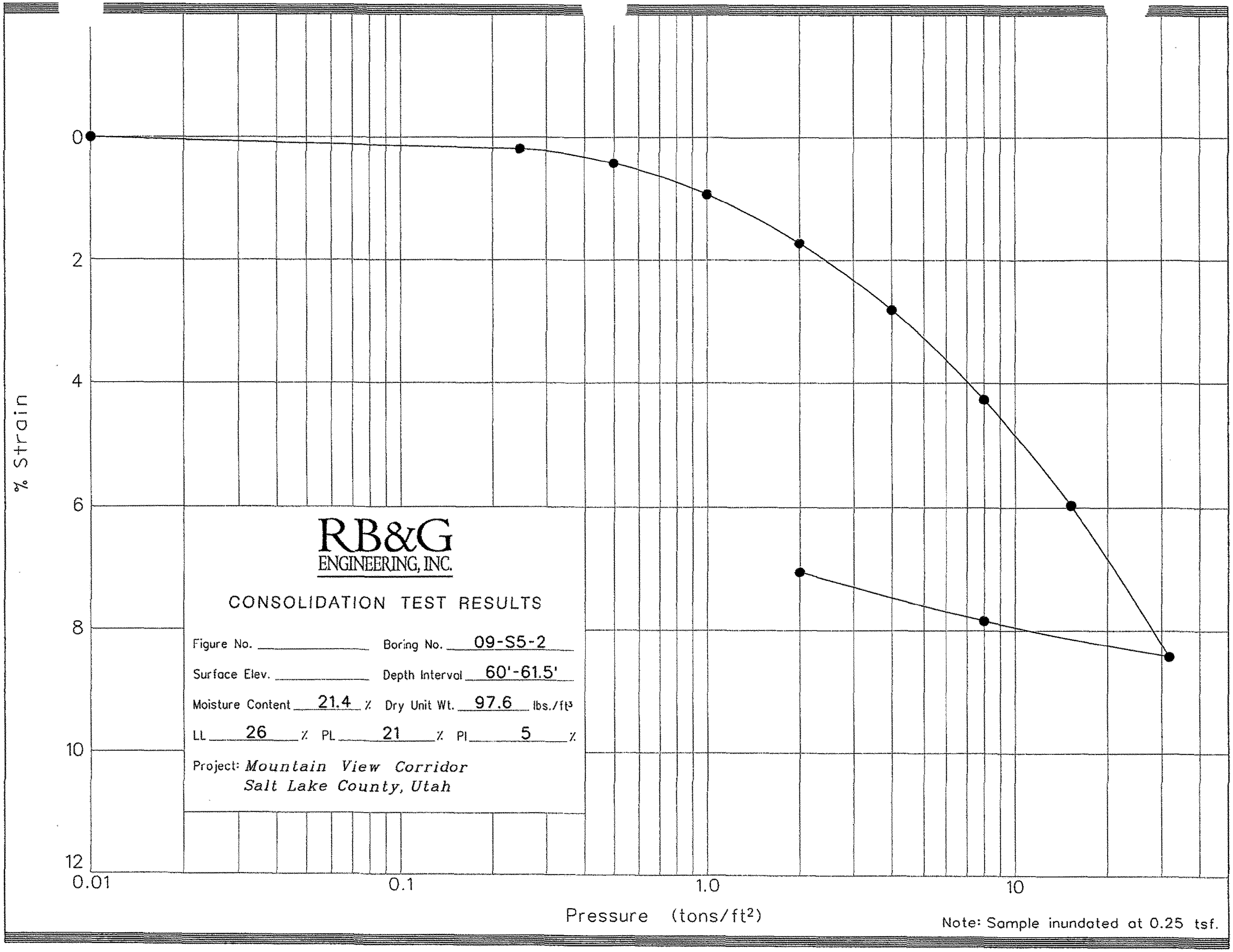
RB&G ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 30'-31.5'
Load: 2 to 4 tsf

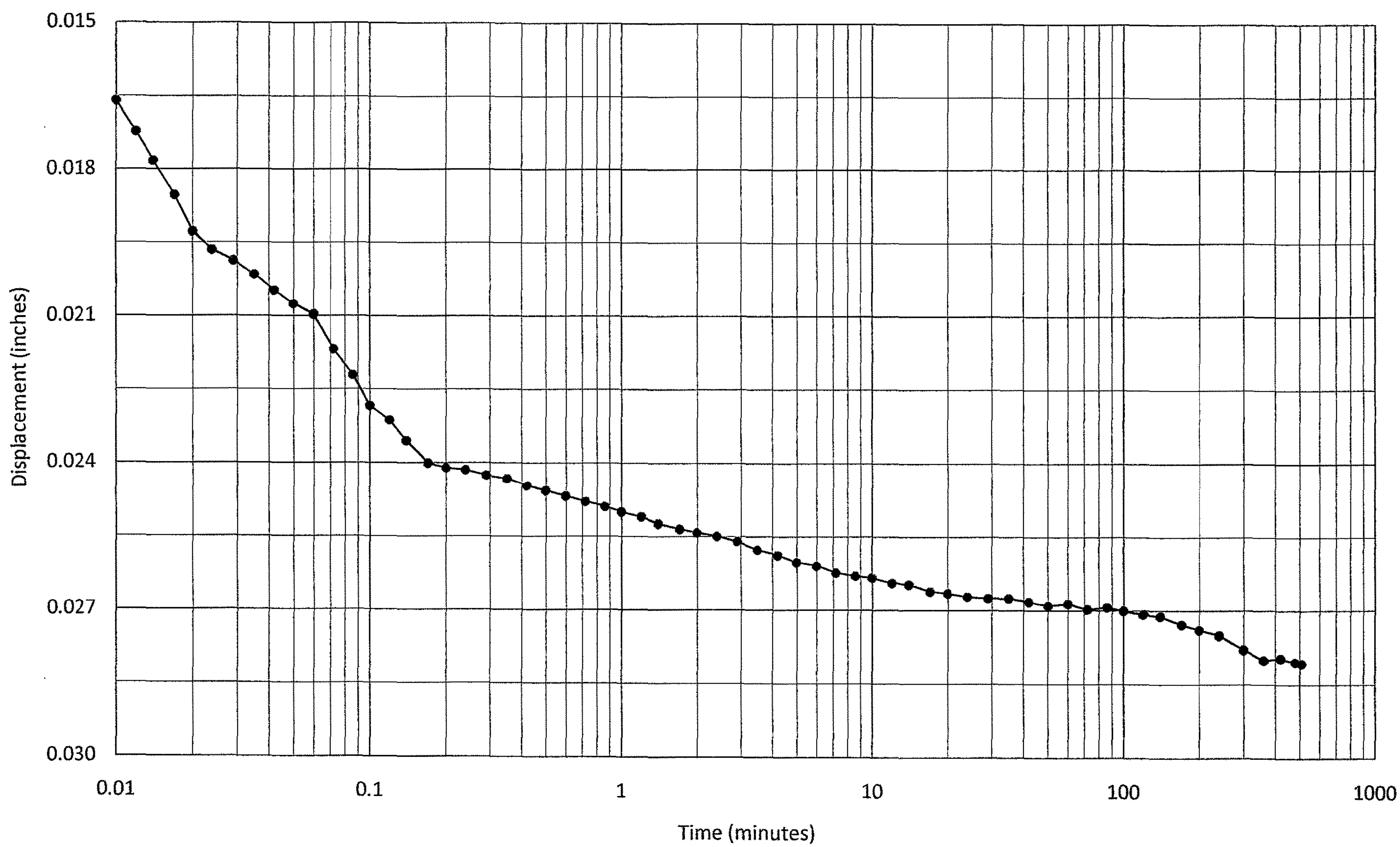
TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah


.75
.70
.65
.60
.55
.50
.45
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-2
Surface Elev.
Depth Interval 60'-61.5'
Moisture Content 21.4 %
Dry Unit Wt. 97.6 lbs./ft³
LL 26 % PL 21 % PI 5 %
Project: Mountain View Corridor
Salt Lake County, Utah



RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-2
Surface Elev.
Depth Interval 60'-61.5'
Moisture Content 21.4 %
Dry Unit Wt. 97.6 lbs./ft³
LL 26 %
PL 21 %
PI 5 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.

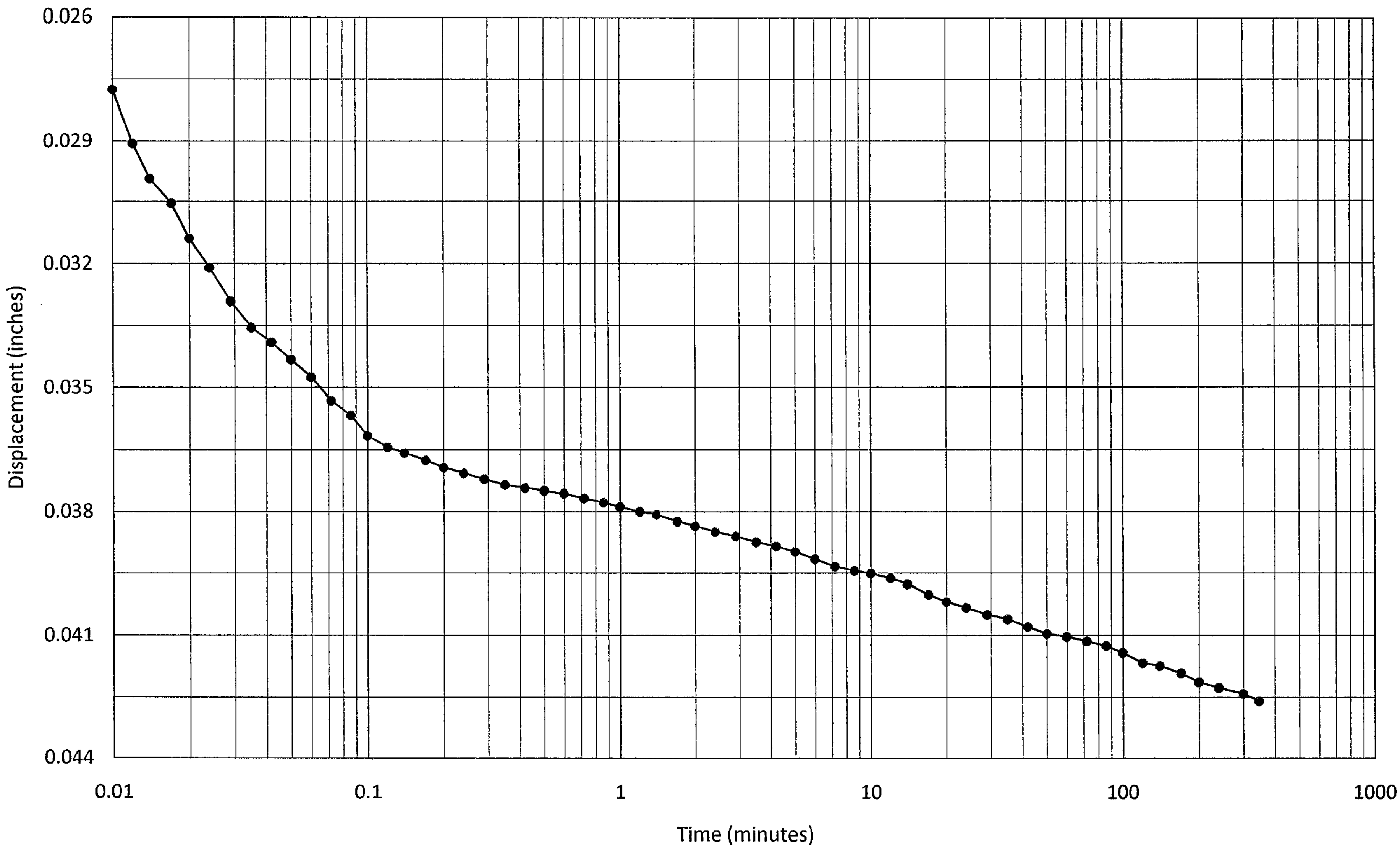


RB&G ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 60'-61.5'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

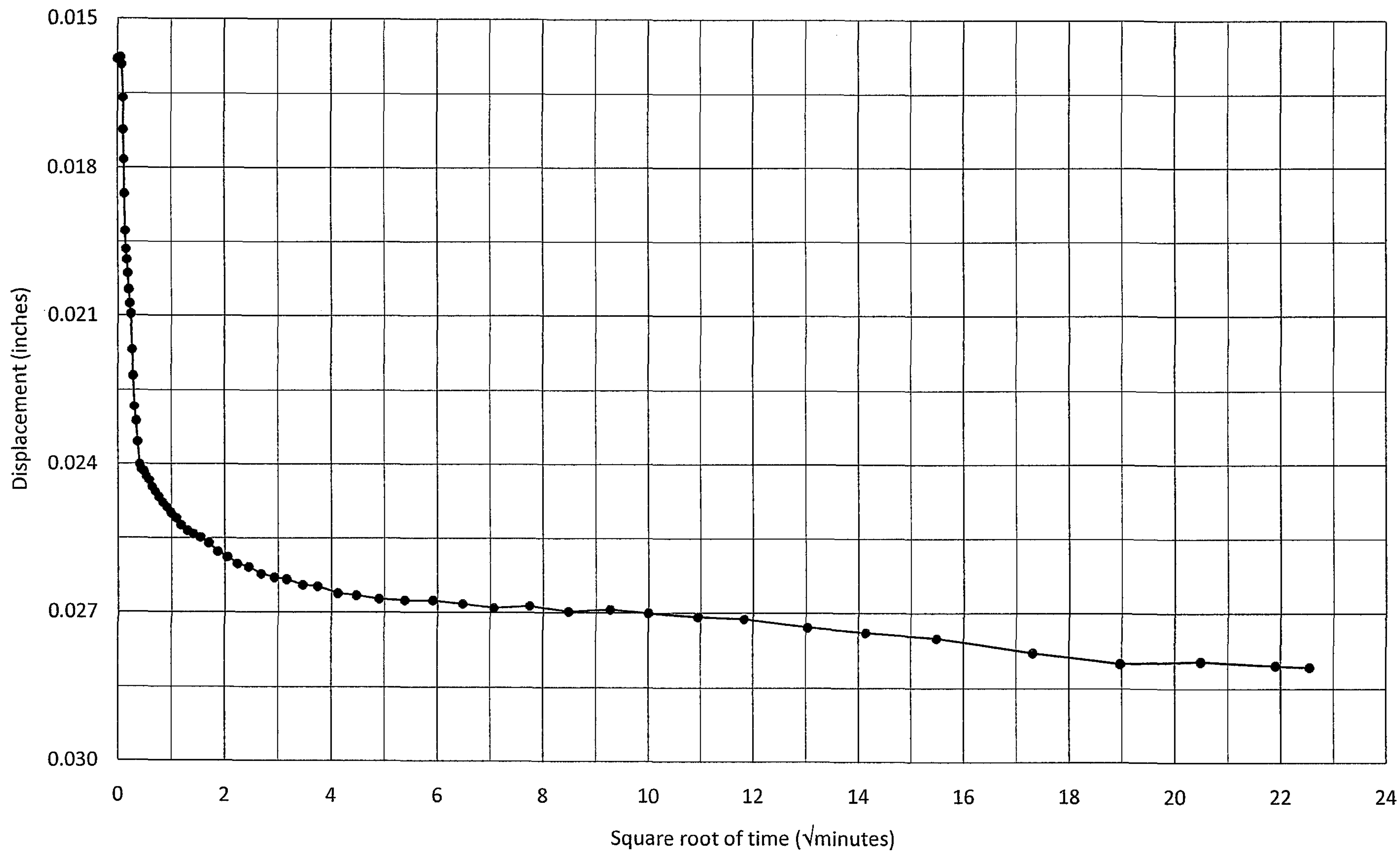


RB&G ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 60'-61.5'
Load: 4 to 8 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

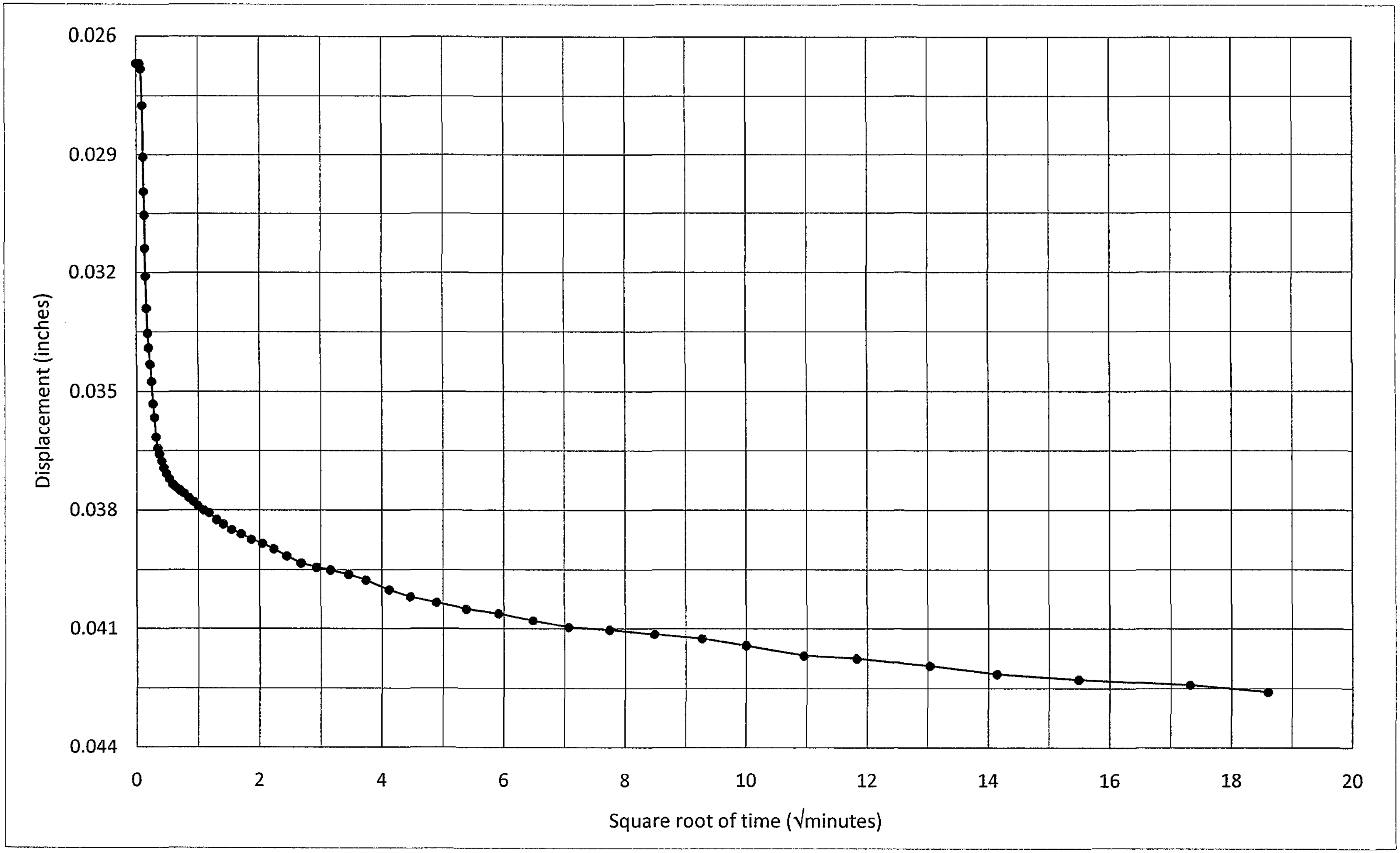


RB&G
ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 60'-61.5'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

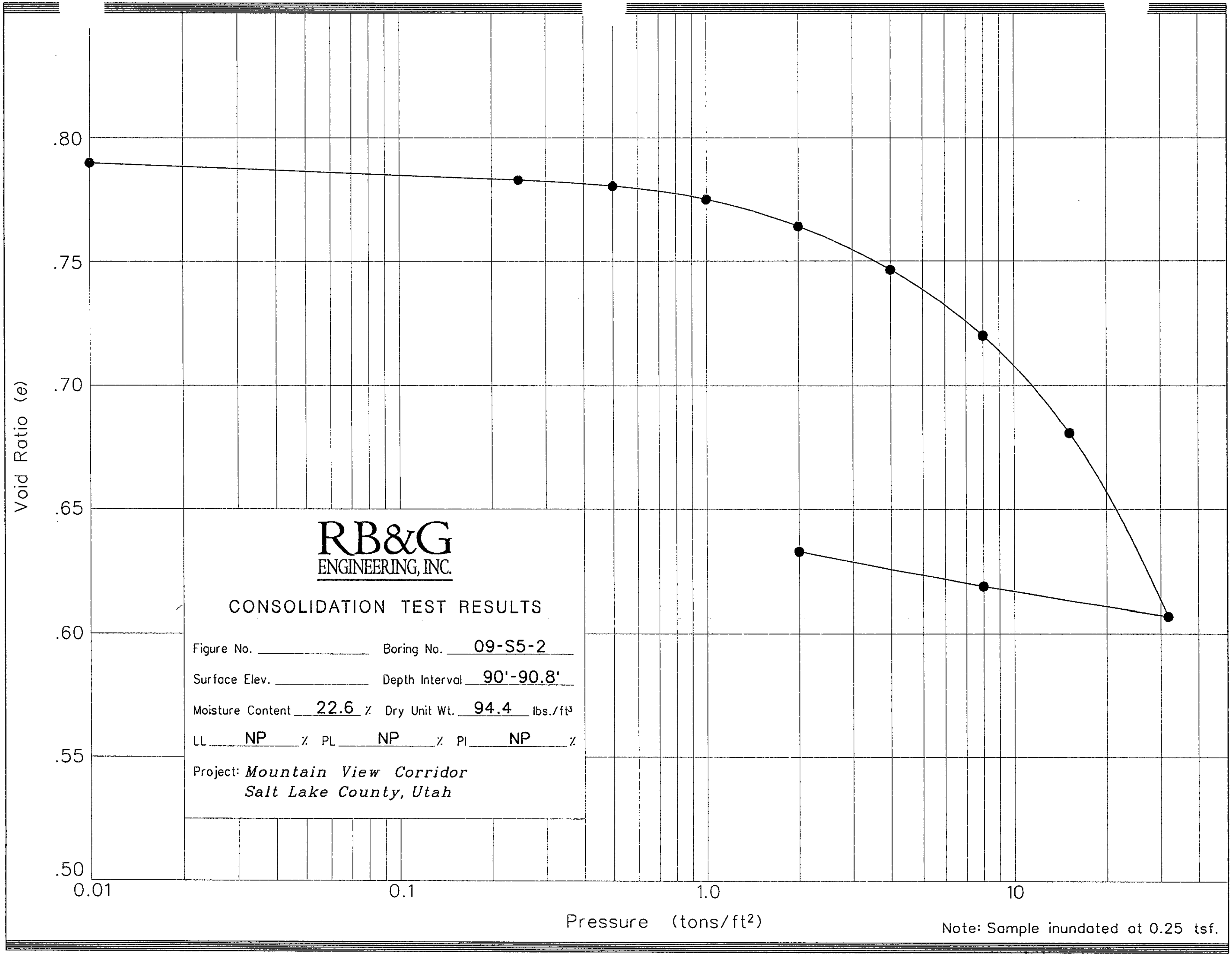


RB&G ENGINEERING, INC.

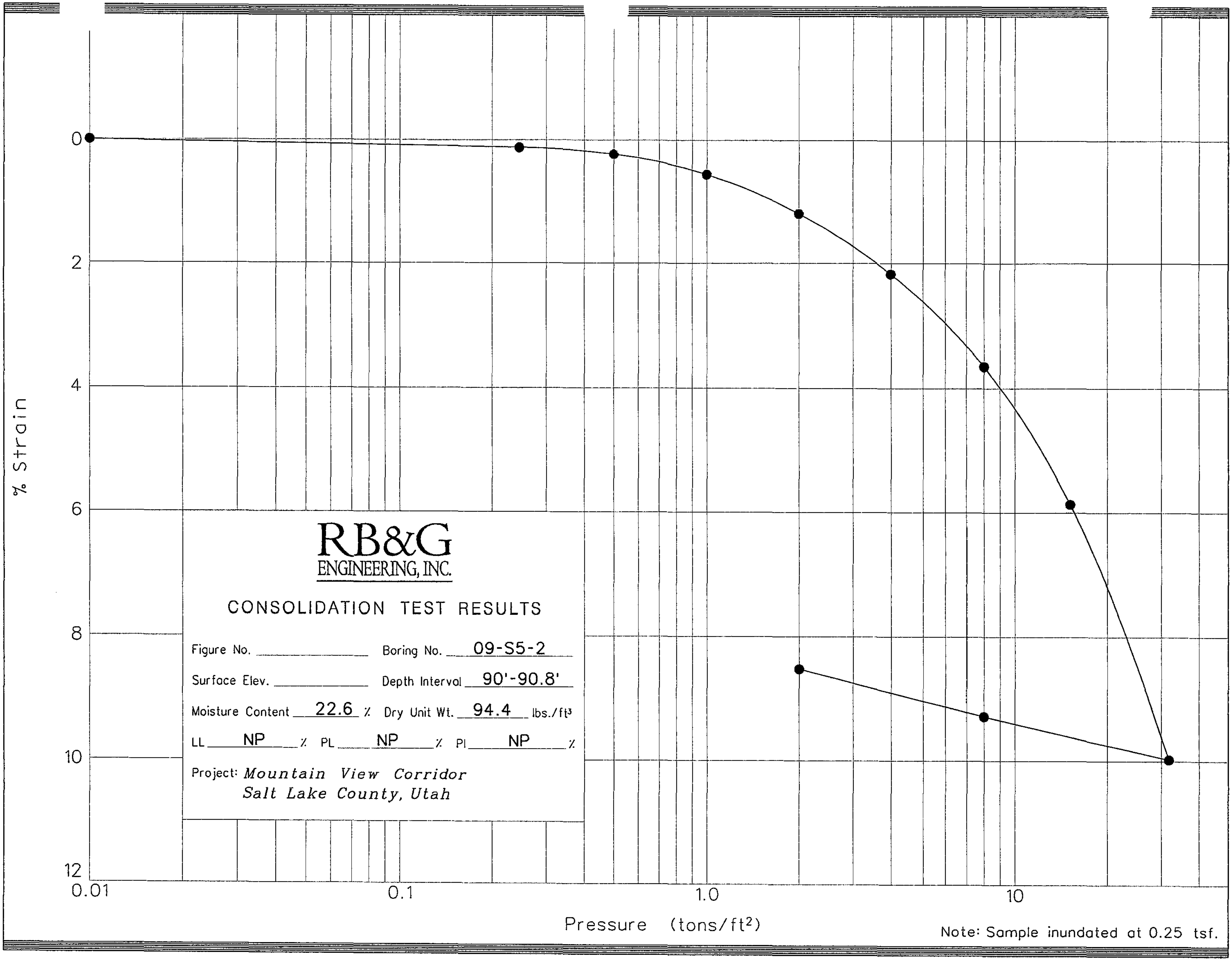
Hole no.: 09-S5-2
Depth: 60'-61.5'
Load: 4 to 8 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah



RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-S5-2
Surface Elev.
Depth Interval 90'-90.8'
Moisture Content 22.6 % Dry Unit Wt. 94.4 lbs./ft³
LL NP % PL NP % PI NP %
Project: Mountain View Corridor
Salt Lake County, Utah
Void Ratio (e)
.80
.75
.70
.65
.60
.55
.50
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.



RB&G ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

Figure No. ______ Boring No. 09-S5-2

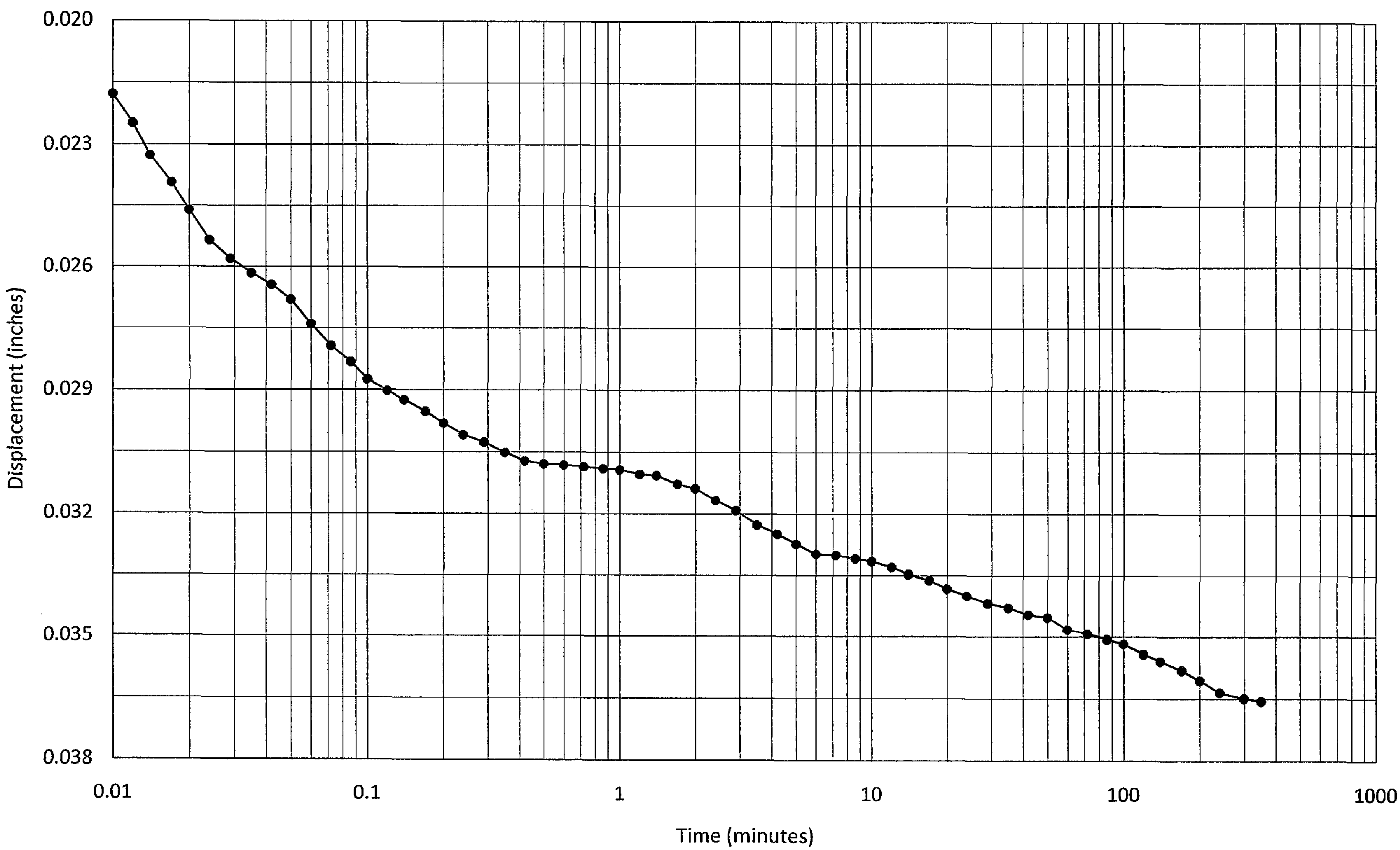
Surface Elev. ______ Depth Interval 90'-90.8'

Moisture Content 22.6 % Dry Unit Wt. 94.4 lbs./ft³

LL NP % PL NP % PI NP %

Project: *Mountain View Corridor*
Salt Lake County, Utah

Note: Sample inundated at 0.25 tsf.

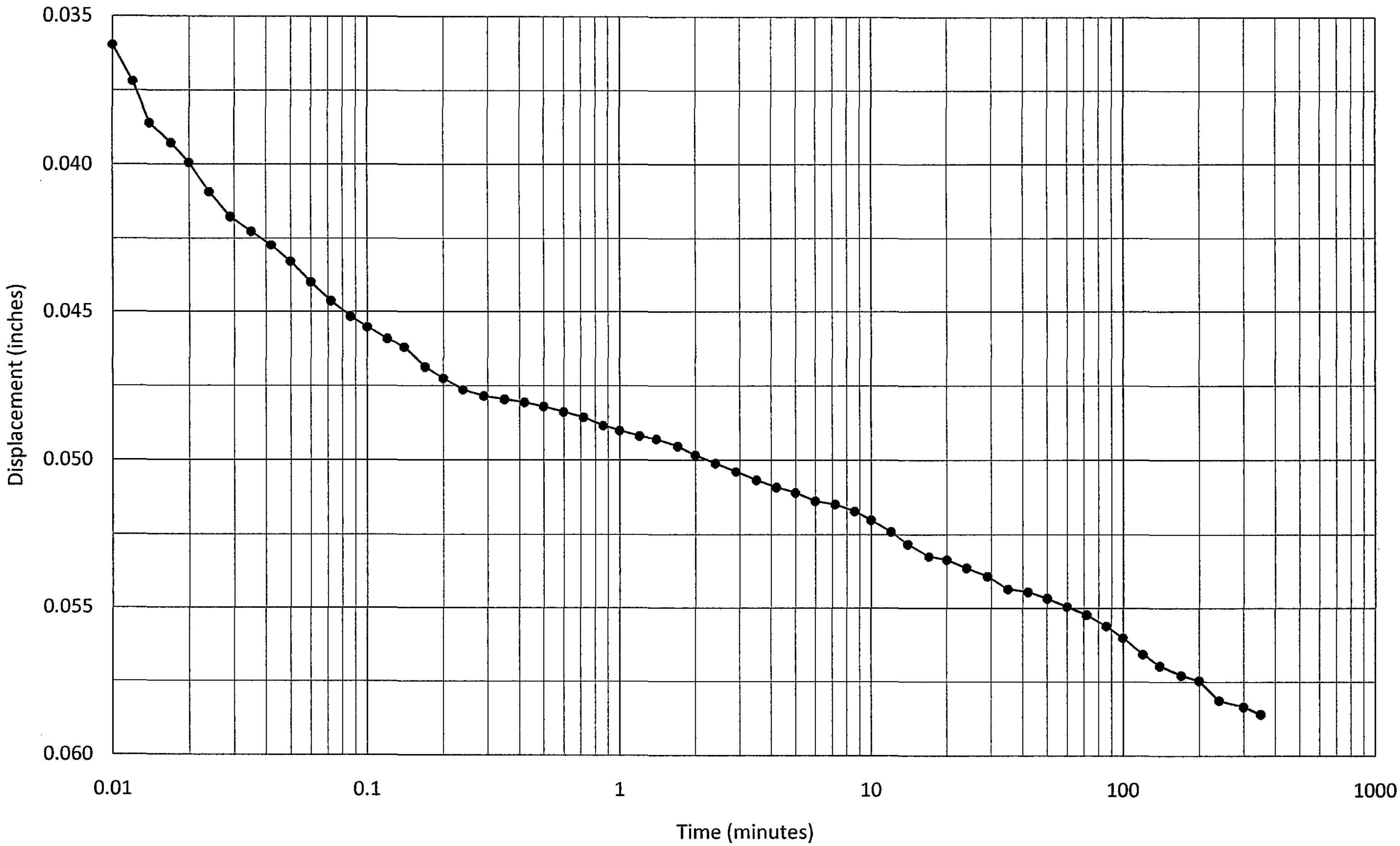


RB&G ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 90'-90.8'
Load: 4 to 8 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

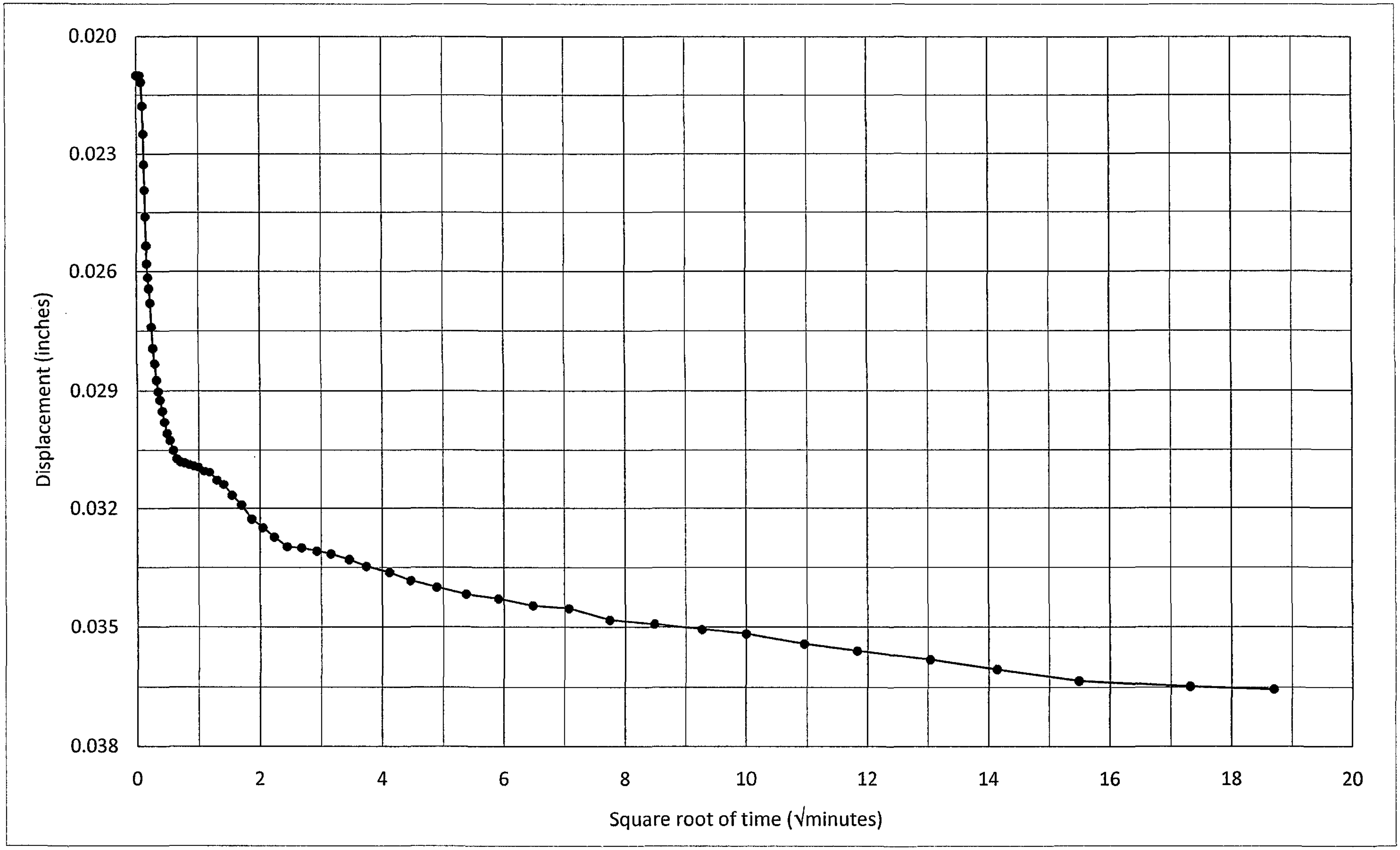


RB&G ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 90'-90.8'
Load: 8 to 16 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

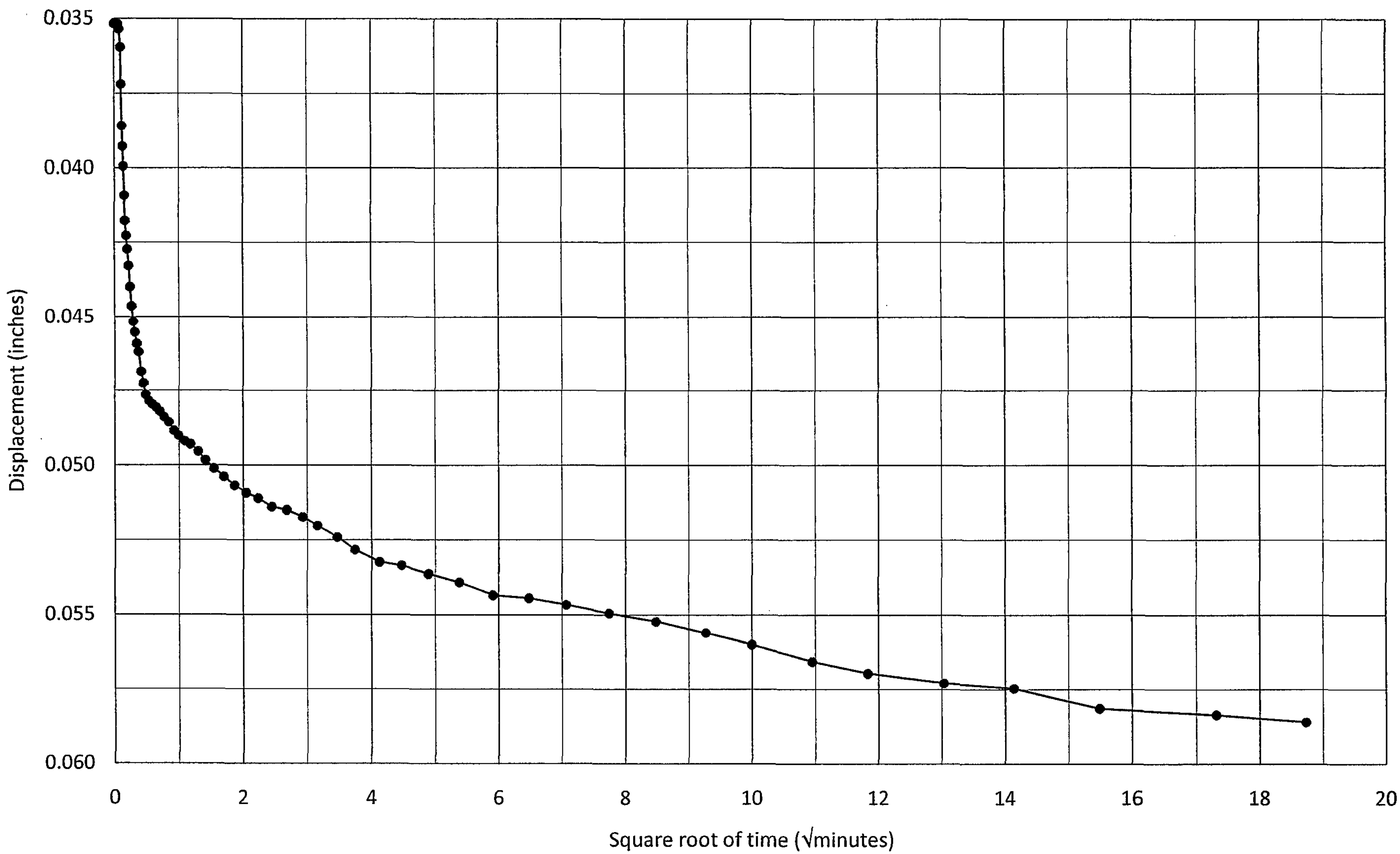


RB&G ENGINEERING, INC.

Hole no.: 09-S5-2
Depth: 90'-90.8'
Load: 4 to 8 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

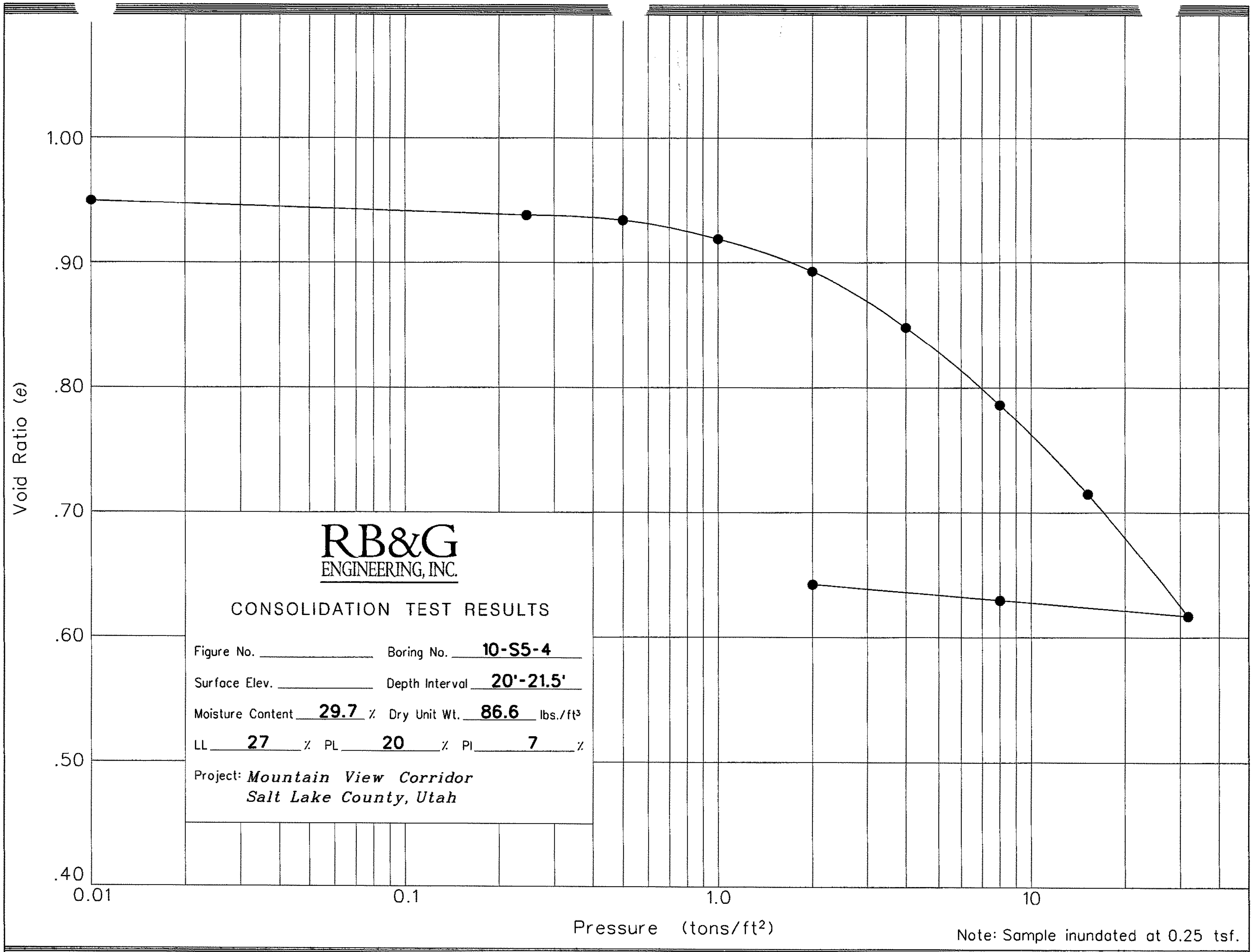


RB&G
ENGINEERING, INC.

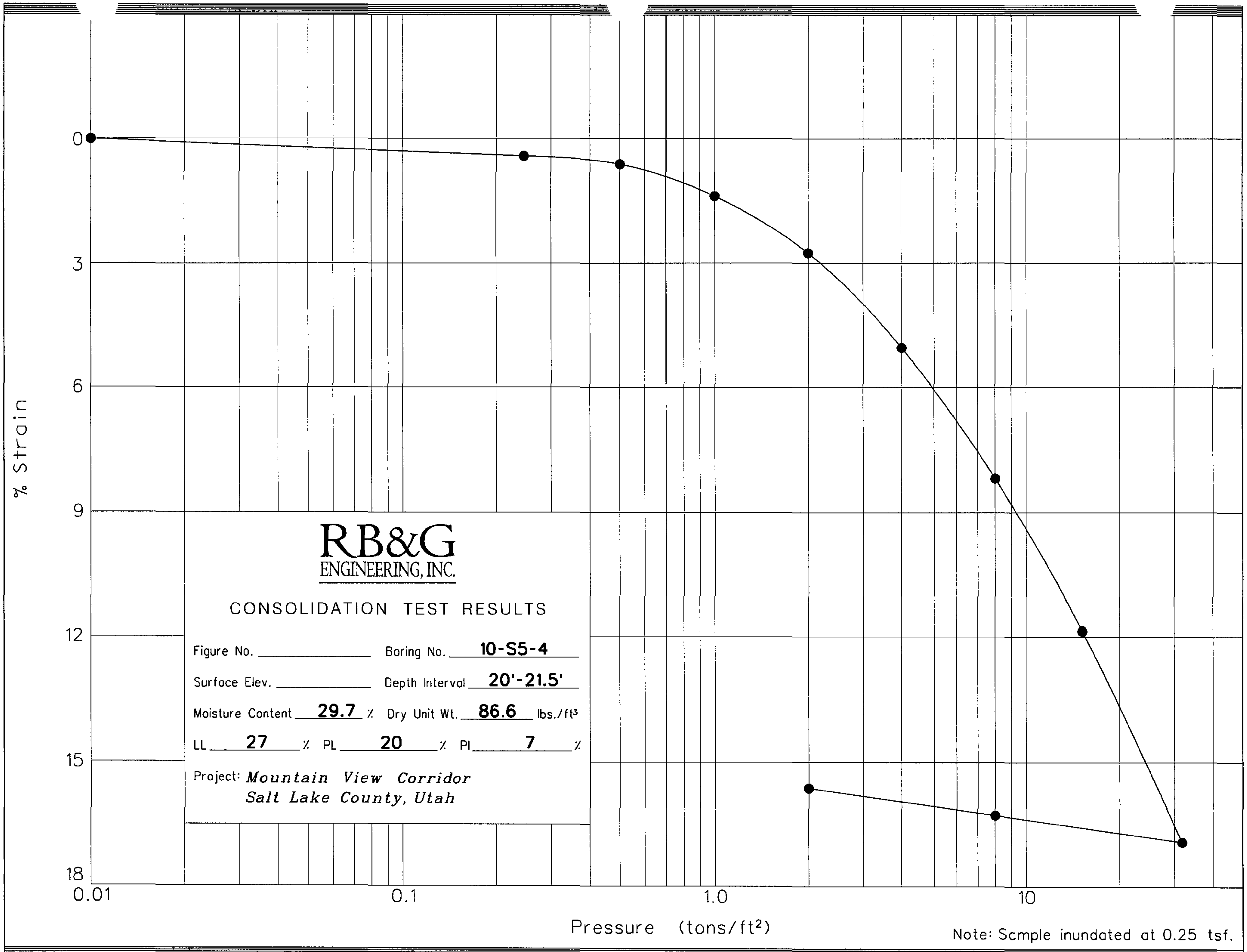
Hole no.: 09-S5-2
Depth: 90'-90.8'
Load: 8 to 16 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah



ADDENDUM 1 - OCTOBER 2010



RB&G
ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

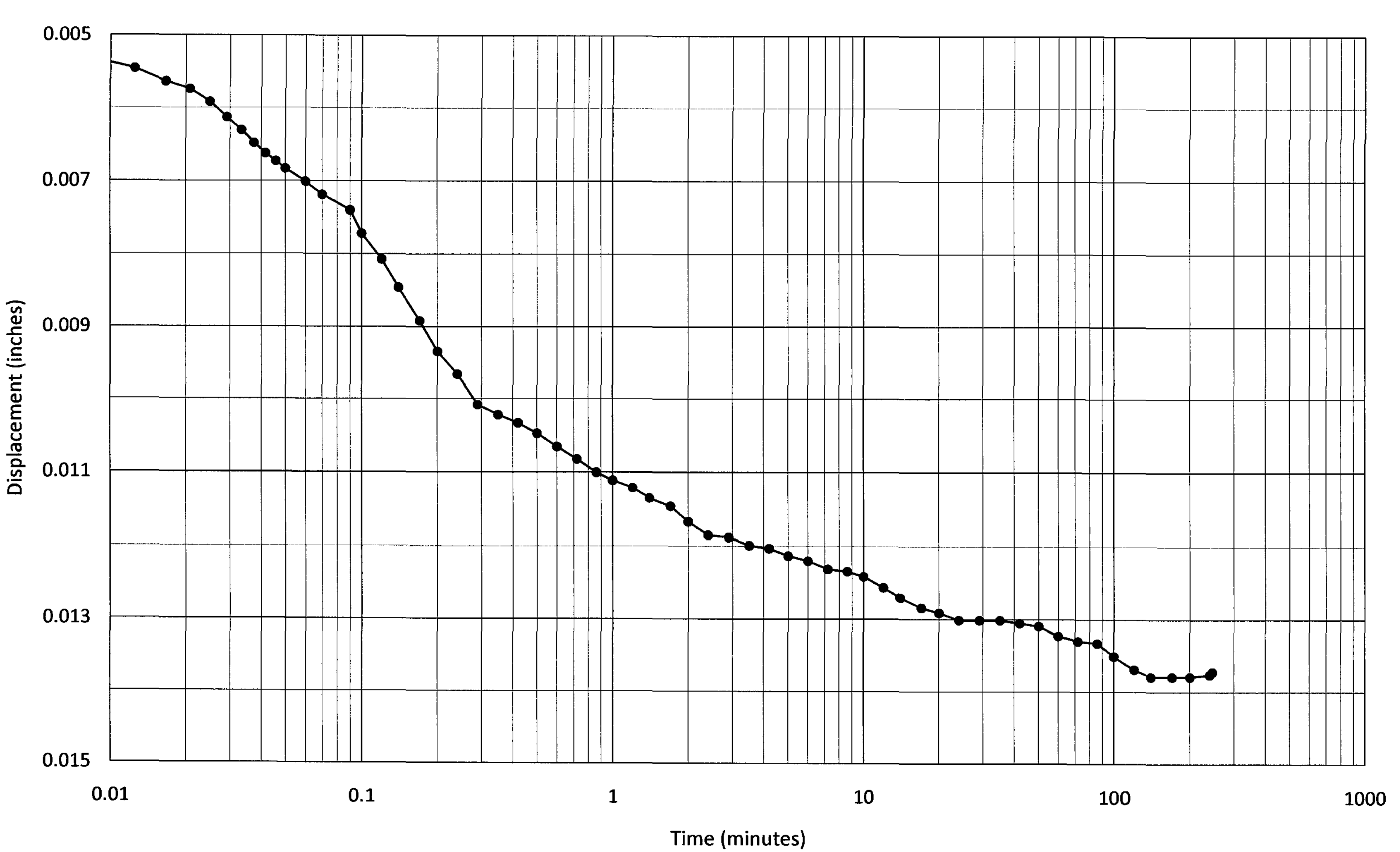
Figure No. ______ Boring No. 10-S5-4

Surface Elev. ______ Depth Interval 20'-21.5'

Moisture Content 29.7 % Dry Unit Wt. 86.6 lbs./ft³

LL 27 % PL 20 % PI 7 %

Project: *Mountain View Corridor*
Salt Lake County, Utah

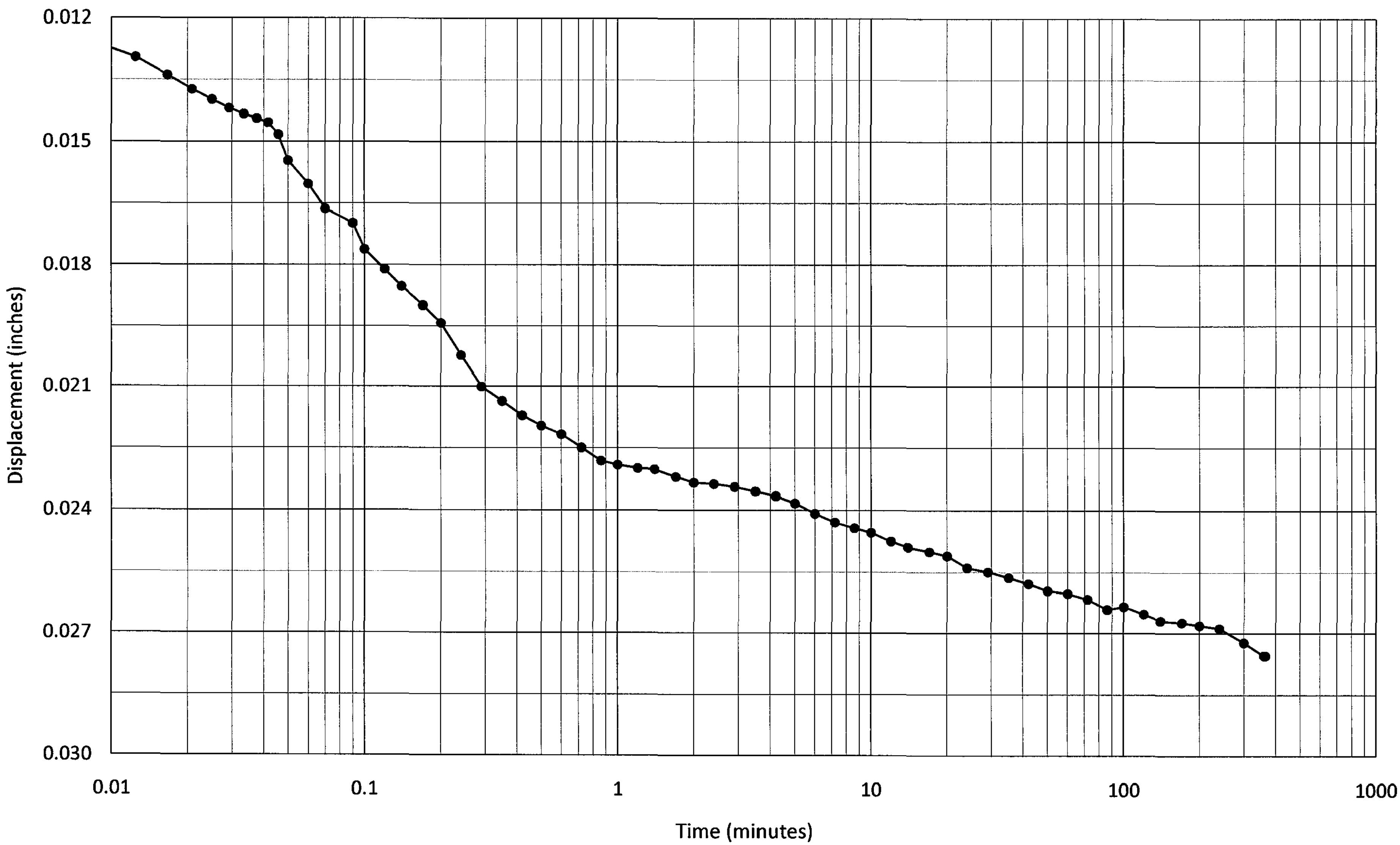


RB&G ENGINEERING, INC.

Hole no.: 10-S5-4
Depth: 20'-21.5'
Load: 0.5 to 1 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

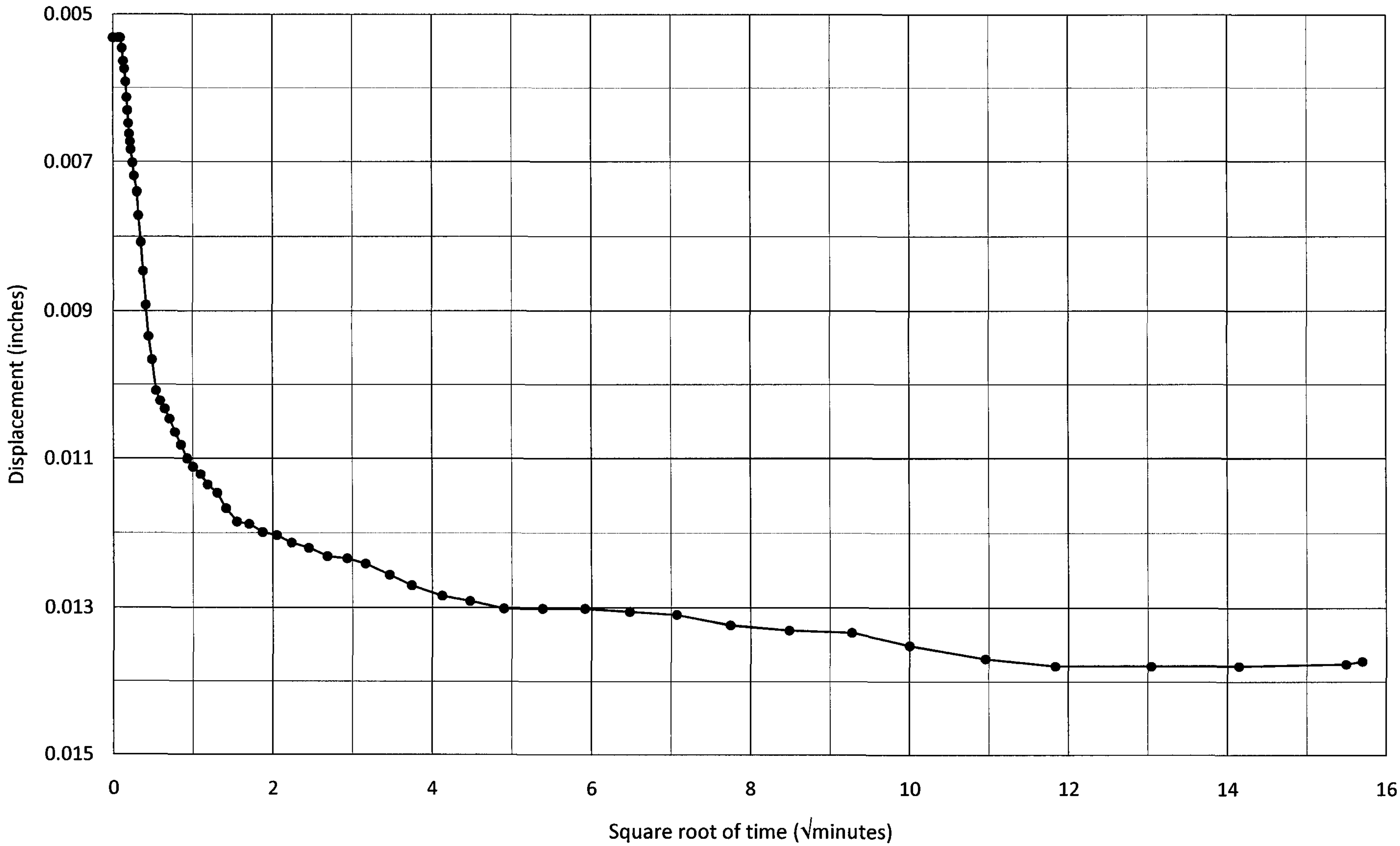


RB&G ENGINEERING, INC.

Hole no.: 10-S5-4
Depth: 20'-21.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

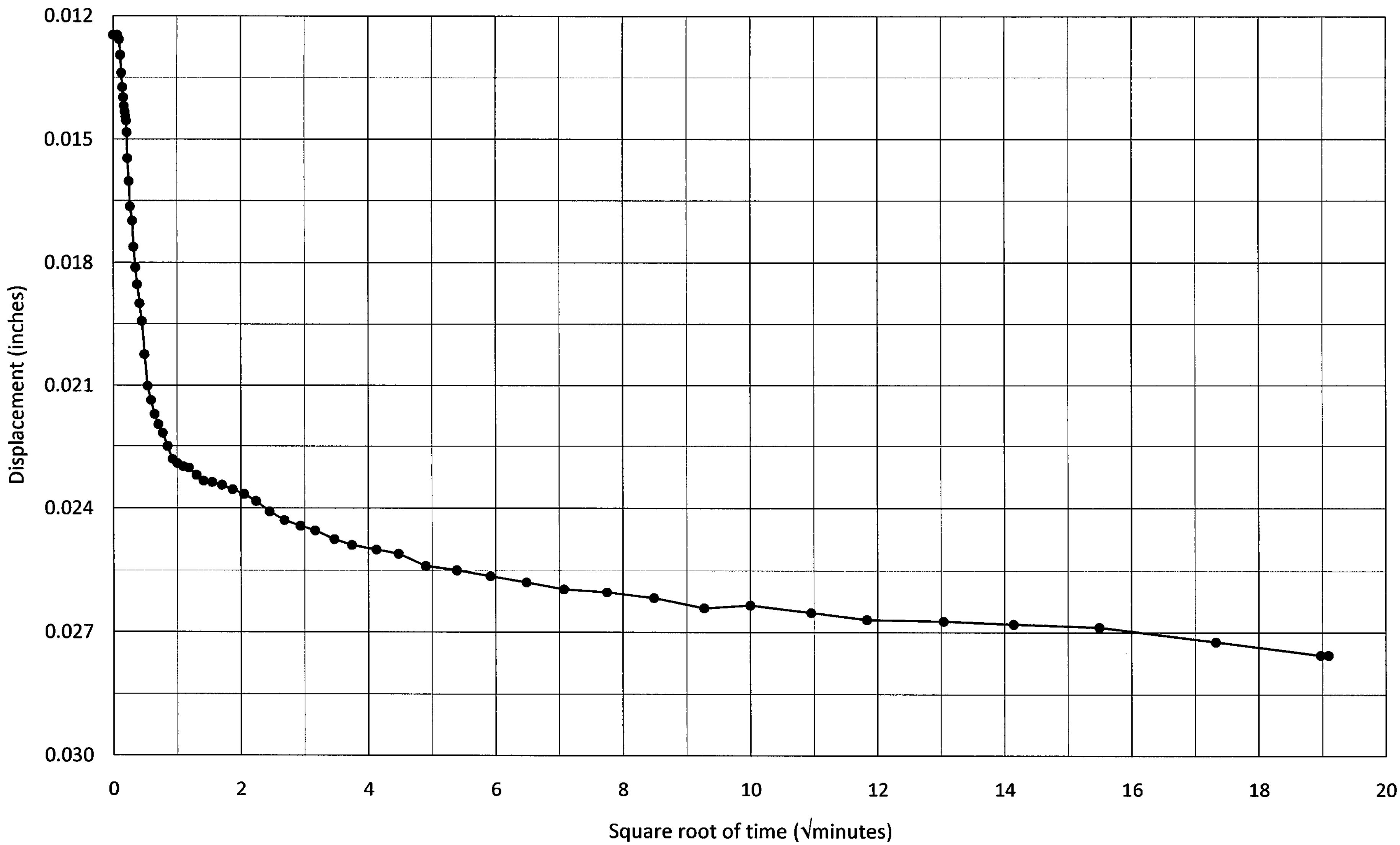


RB&G
ENGINEERING, INC.

Hole no.: 10-S5-4
Depth: 20'-21.5'
Load: 0.5 to 1 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

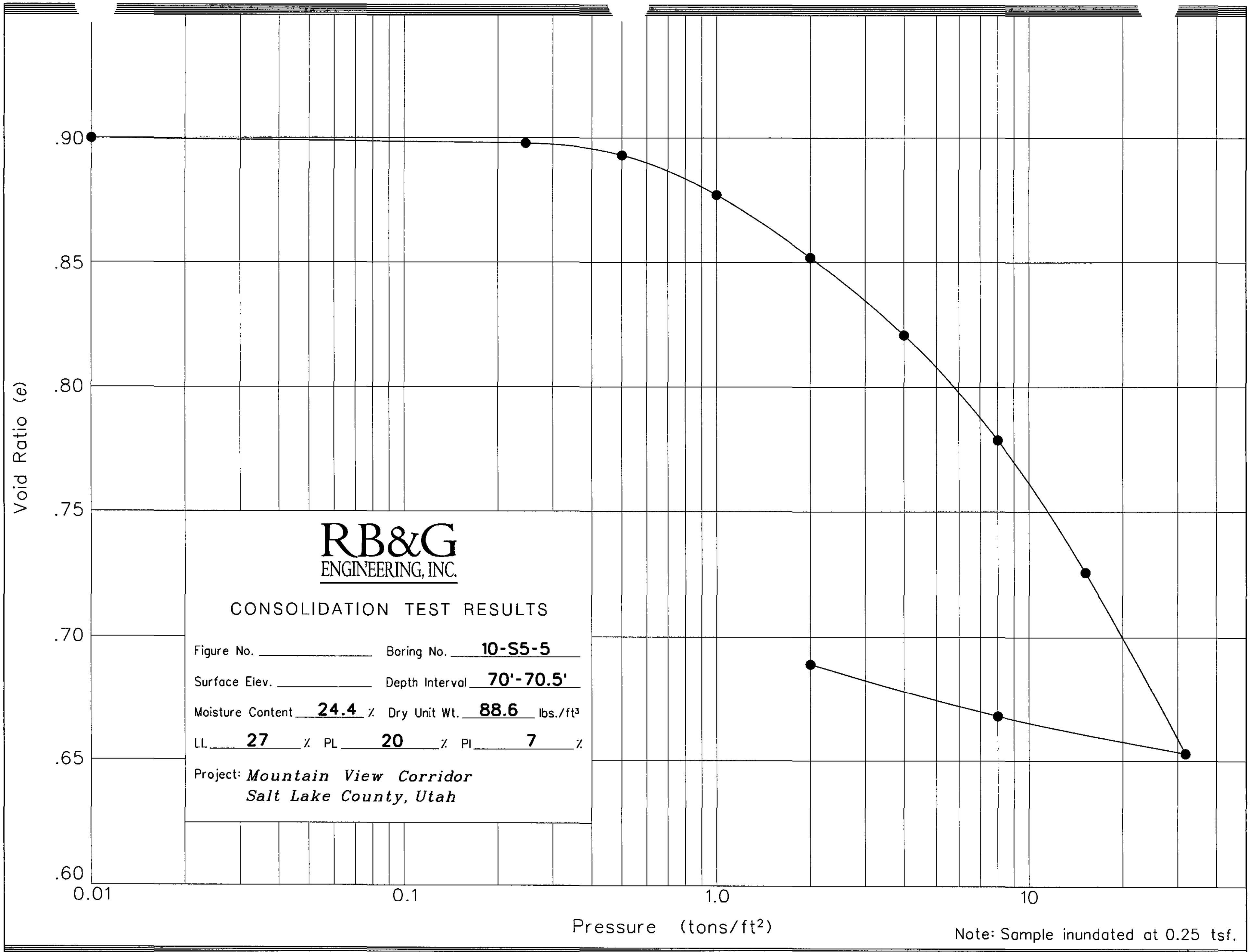


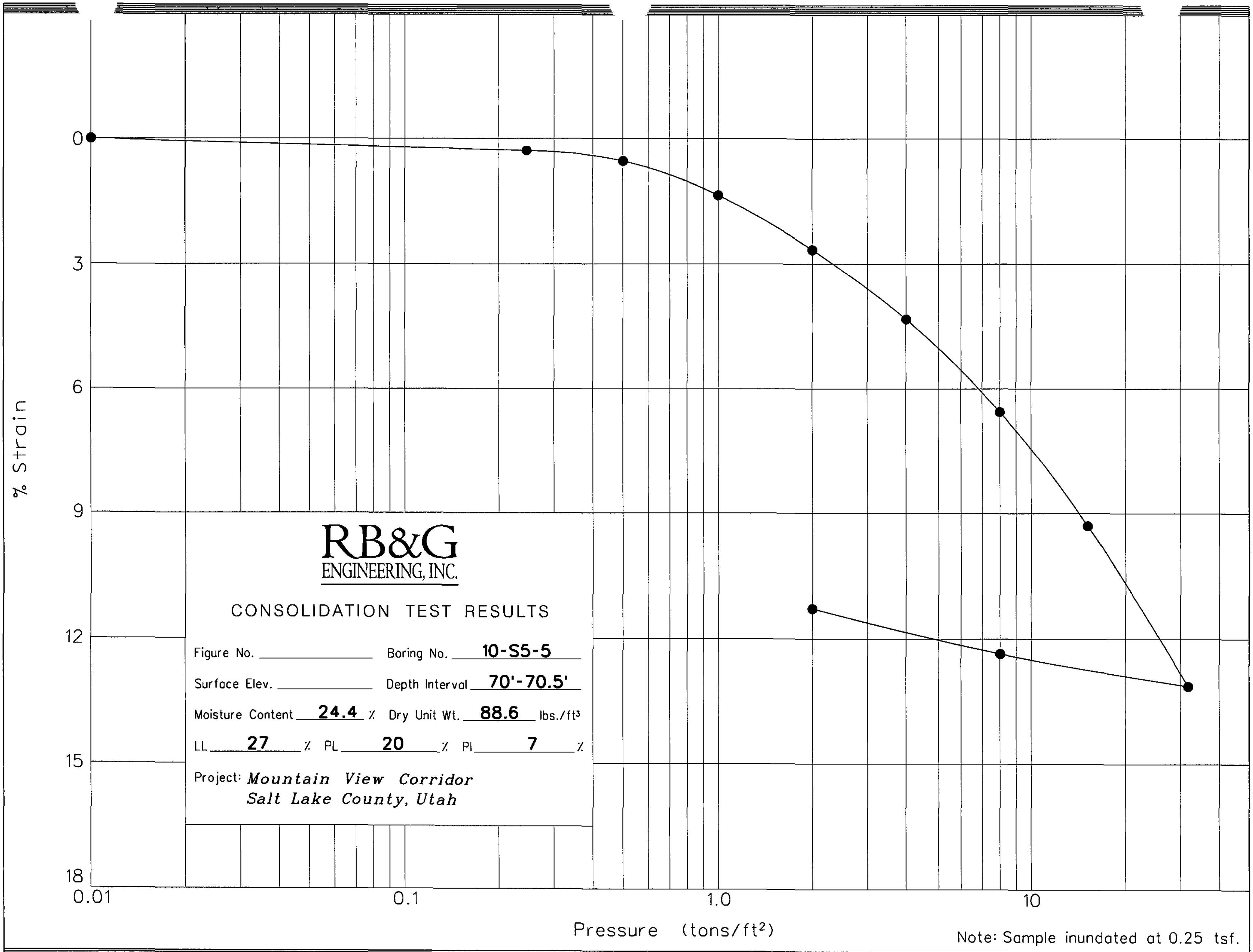
RB&G ENGINEERING, INC.

Hole no.: 10-S5-4
Depth: 20'-21.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah


Void Ratio (e)
.90
.85
.80
.75
.70
.65
.60
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 10-S5-5
Surface Elev.
Depth Interval 70'-70.5'
Moisture Content 24.4 %
Dry Unit Wt. 88.6 lbs./ft³
LL 27 %
PL 20 %
PI 7 %
Project: Mountain View Corridor
Salt Lake County, Utah



RB&G ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

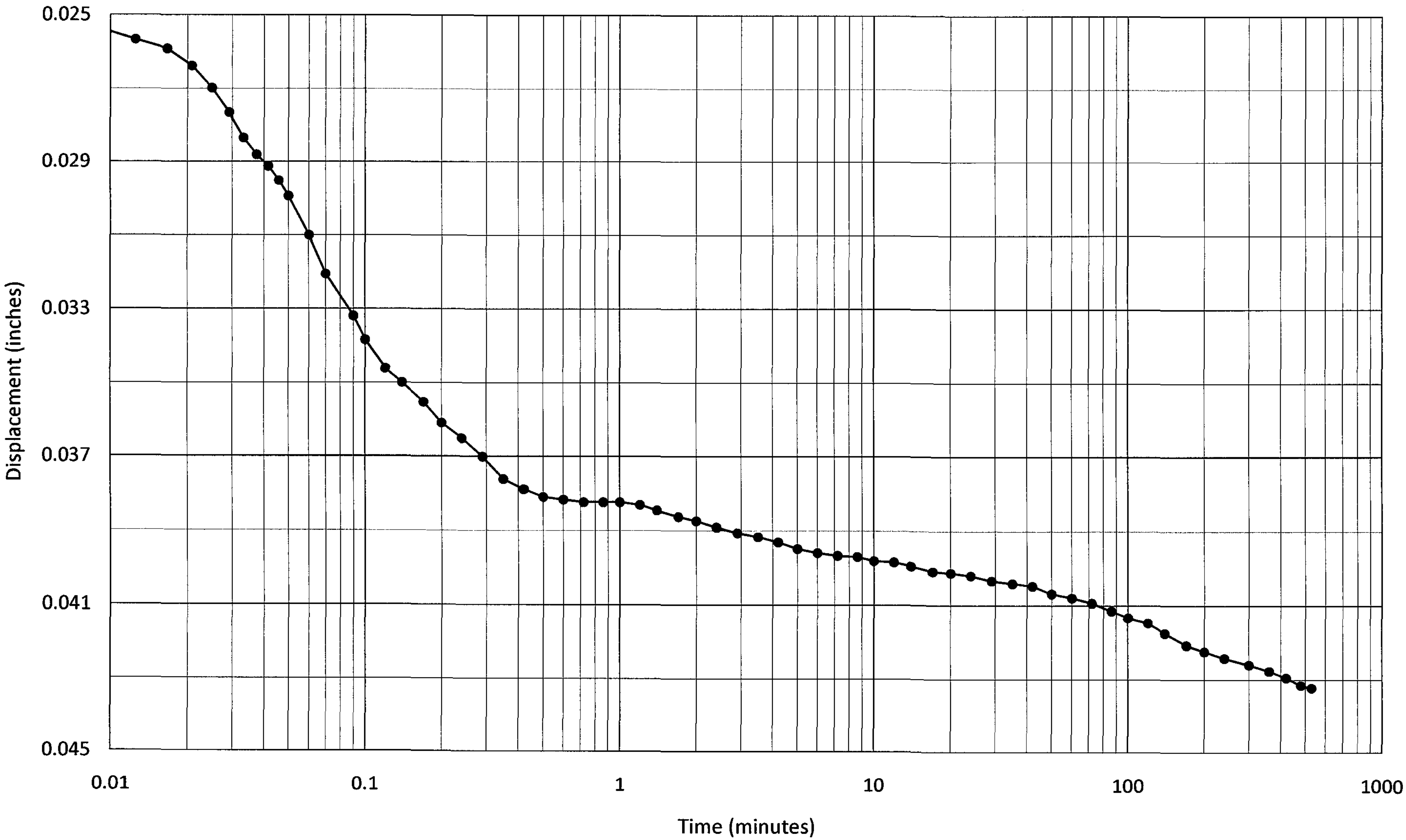
Figure No. ______ Boring No. 10-S5-5

Surface Elev. ______ Depth Interval 70'-70.5'

Moisture Content 24.4 % Dry Unit Wt. 88.6 lbs./ft³

LL 27 % PL 20 % PI 7 %

Project: *Mountain View Corridor*
Salt Lake County, Utah

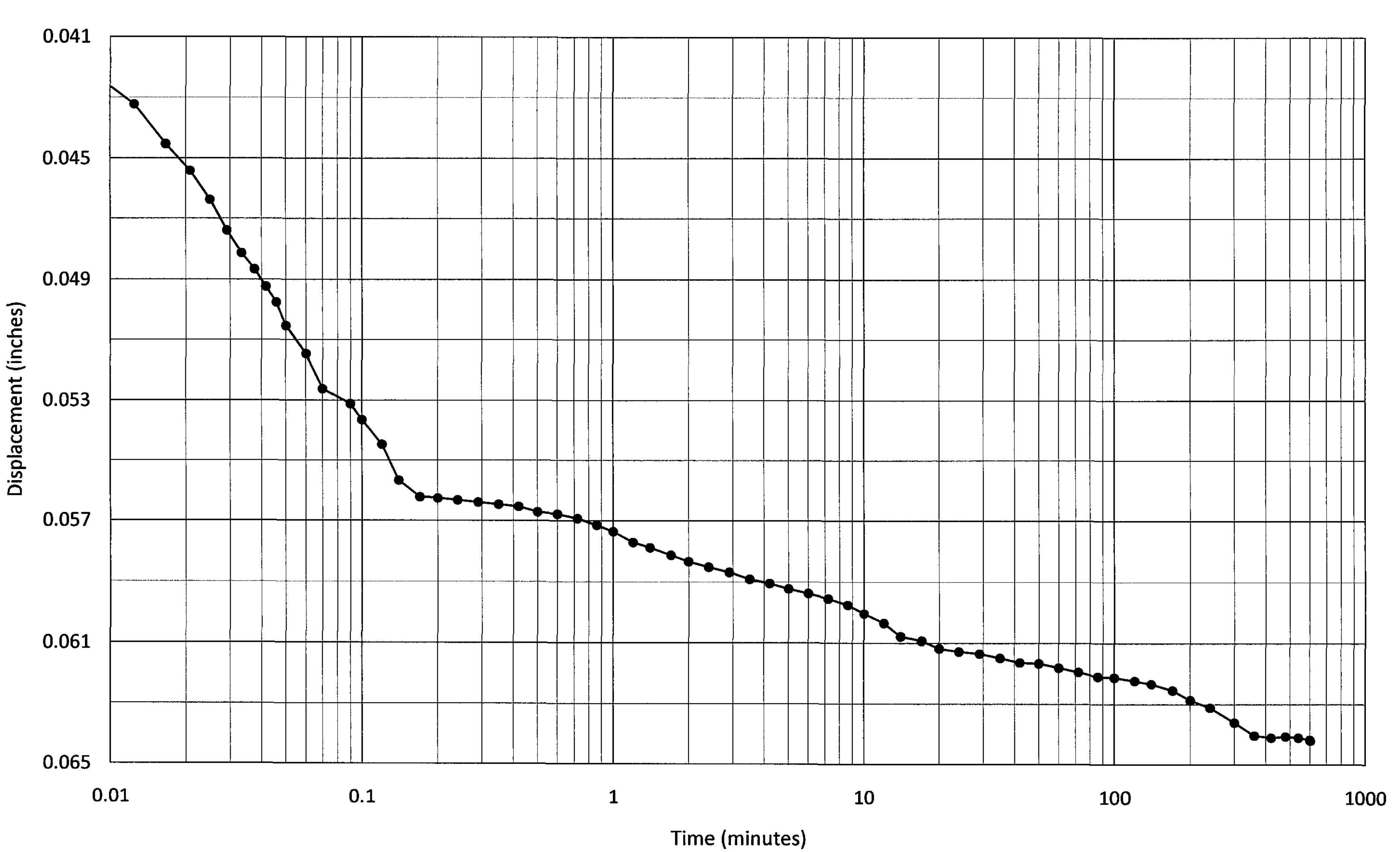


RB&G
ENGINEERING, INC.

Hole no.: 10-S5-5
Depth: 70'-70.5'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

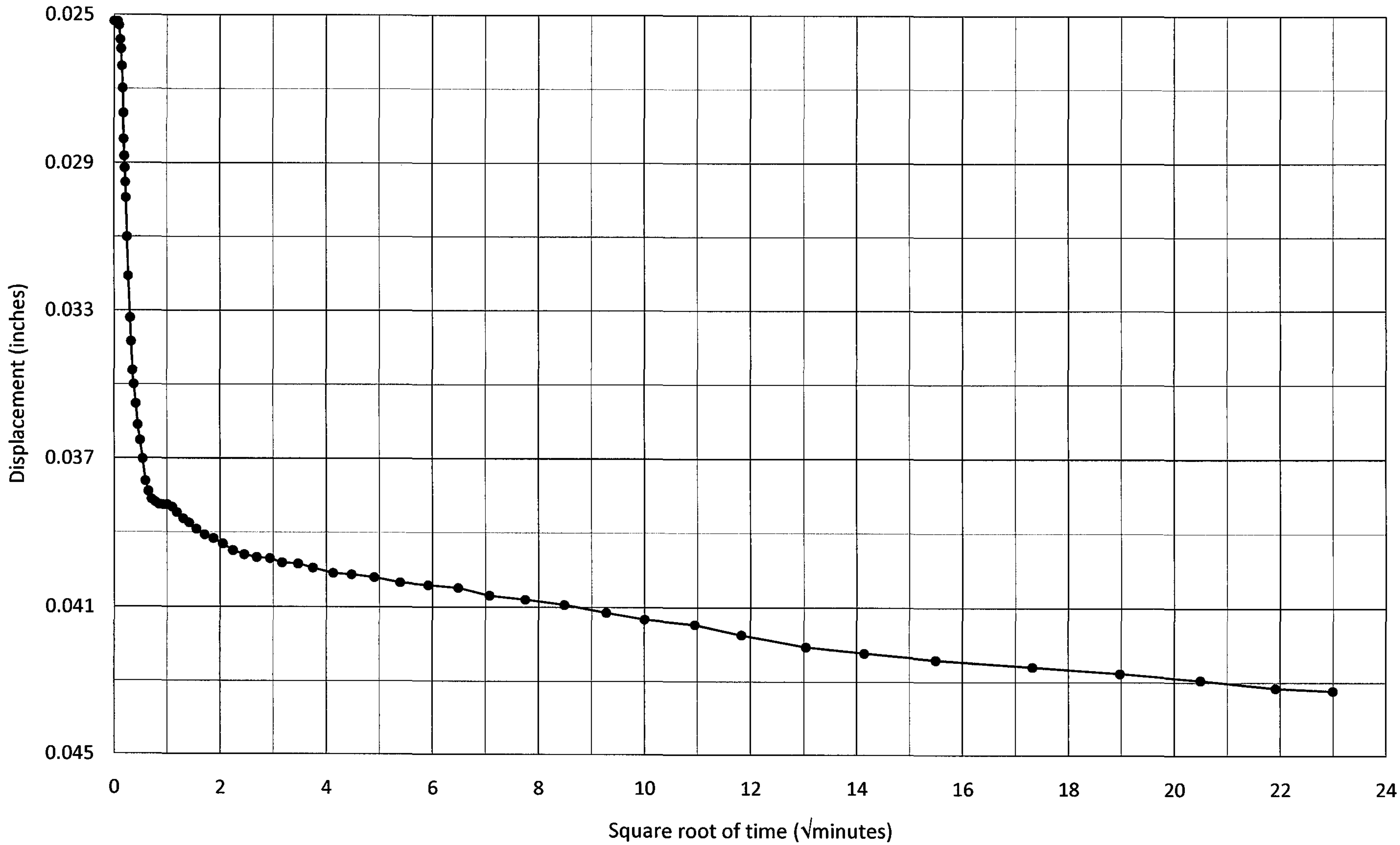


RB&G ENGINEERING, INC.

Hole no.: 10-S5-5
Depth: 70'-70.5'
Load: 4 to 8 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

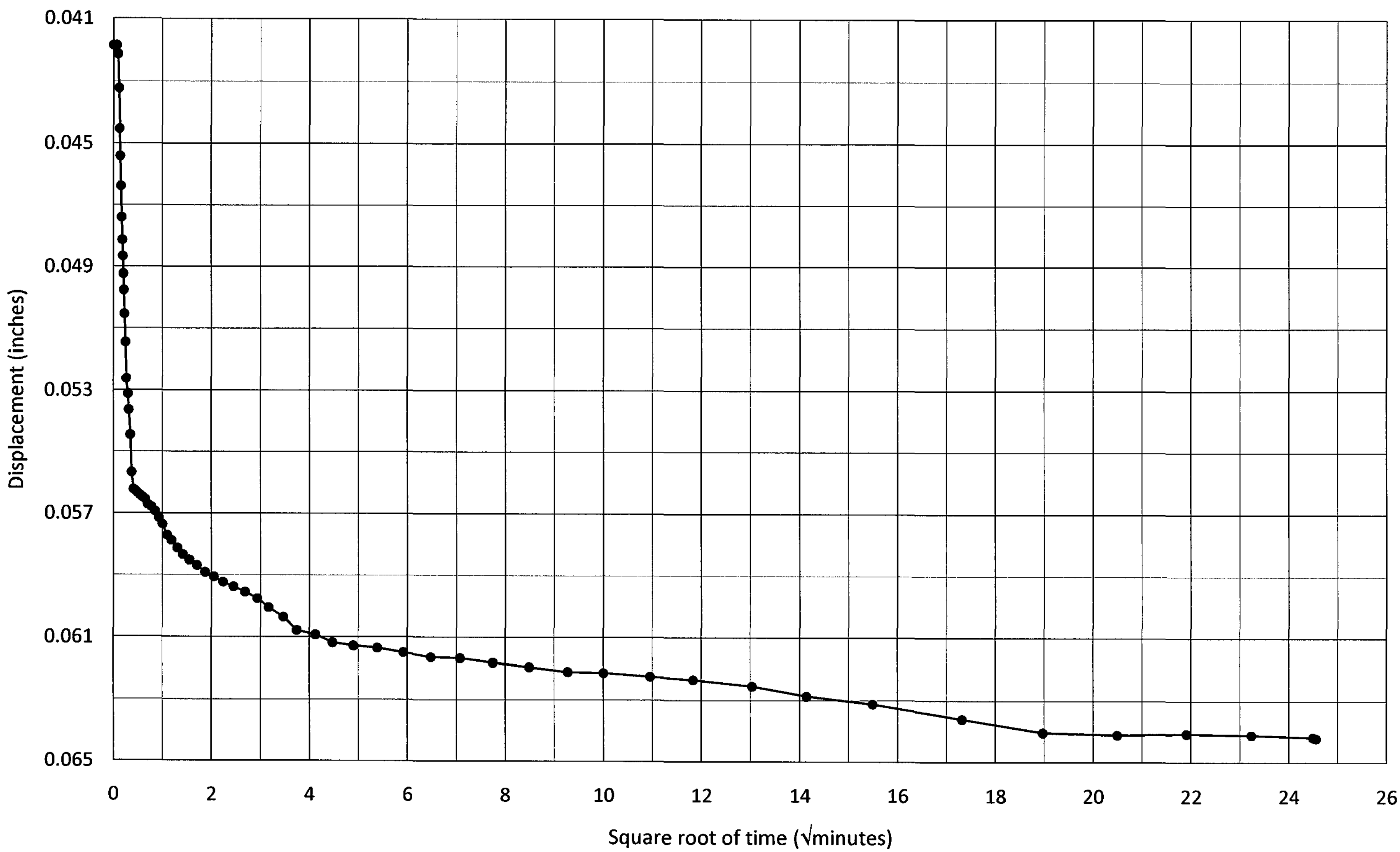


RB&G ENGINEERING, INC.

Hole no.: 10-S5-5
Depth: 70'-70.5'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah

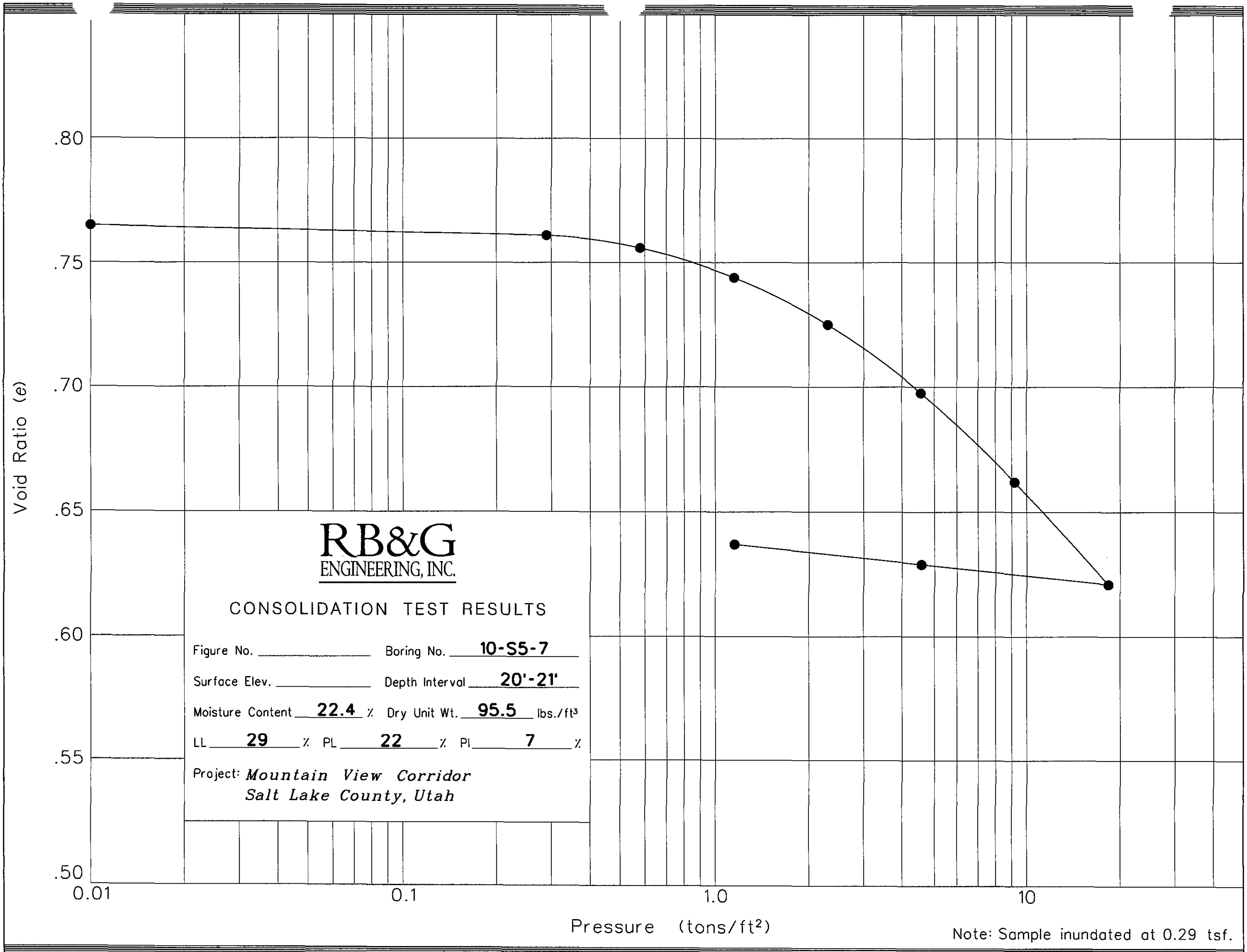


RB&G
ENGINEERING, INC.

Hole no.: 10-S5-5
Depth: 70'-70.5'
Load: 4 to 8 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 5
Salt Lake County, Utah



RB&G ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

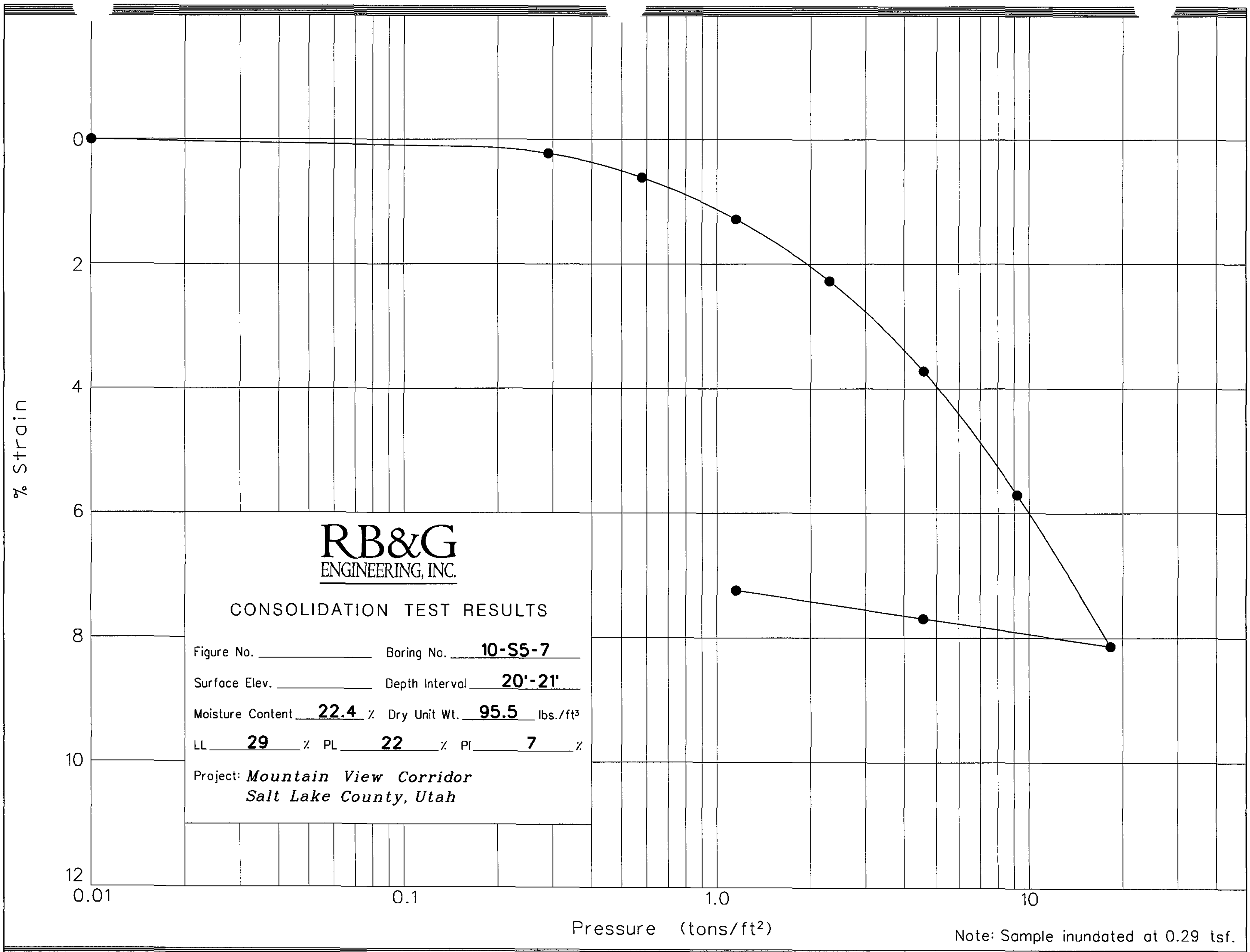
Figure No. ______ Boring No. 10-S5-7

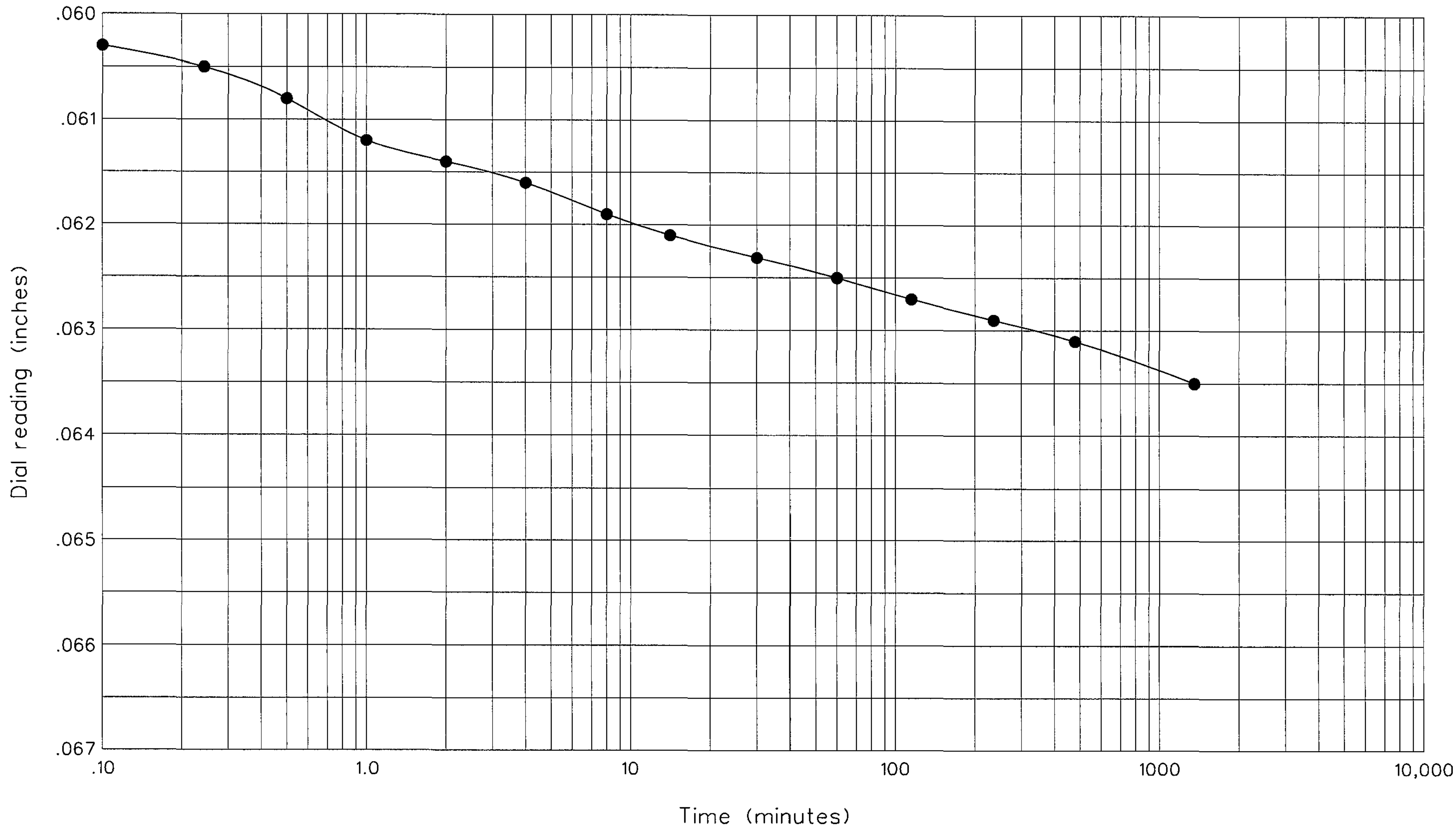
Surface Elev. ______ Depth Interval 20'-21'

Moisture Content 22.4 % Dry Unit Wt. 95.5 lbs./ft³

LL 29 % PL 22 % PI 7 %

Project: *Mountain View Corridor*
Salt Lake County, Utah


RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 10-S5-7
Surface Elev.
Depth Interval 20'-21'
Moisture Content 22.4 %
Dry Unit Wt. 95.5 lbs./ft³
LL 29 %
PL 22 %
PI 7 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



RB&G ENGINEERING, INC.

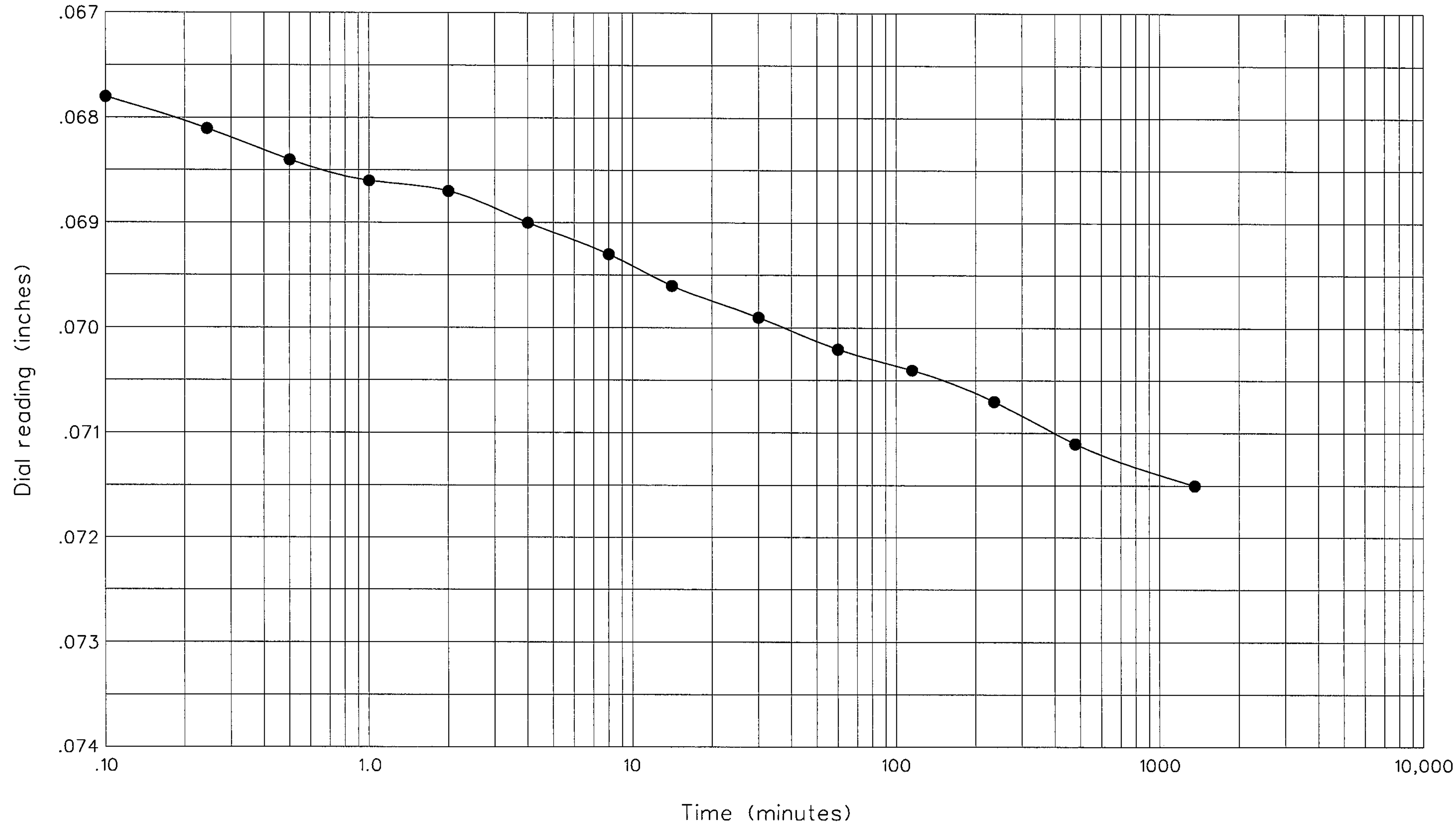
Hole no.: 10-S5-7
Depth: 20'-21'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure

ADDENDUM 1 - OCTOBER 2010



RB&G ENGINEERING, INC.

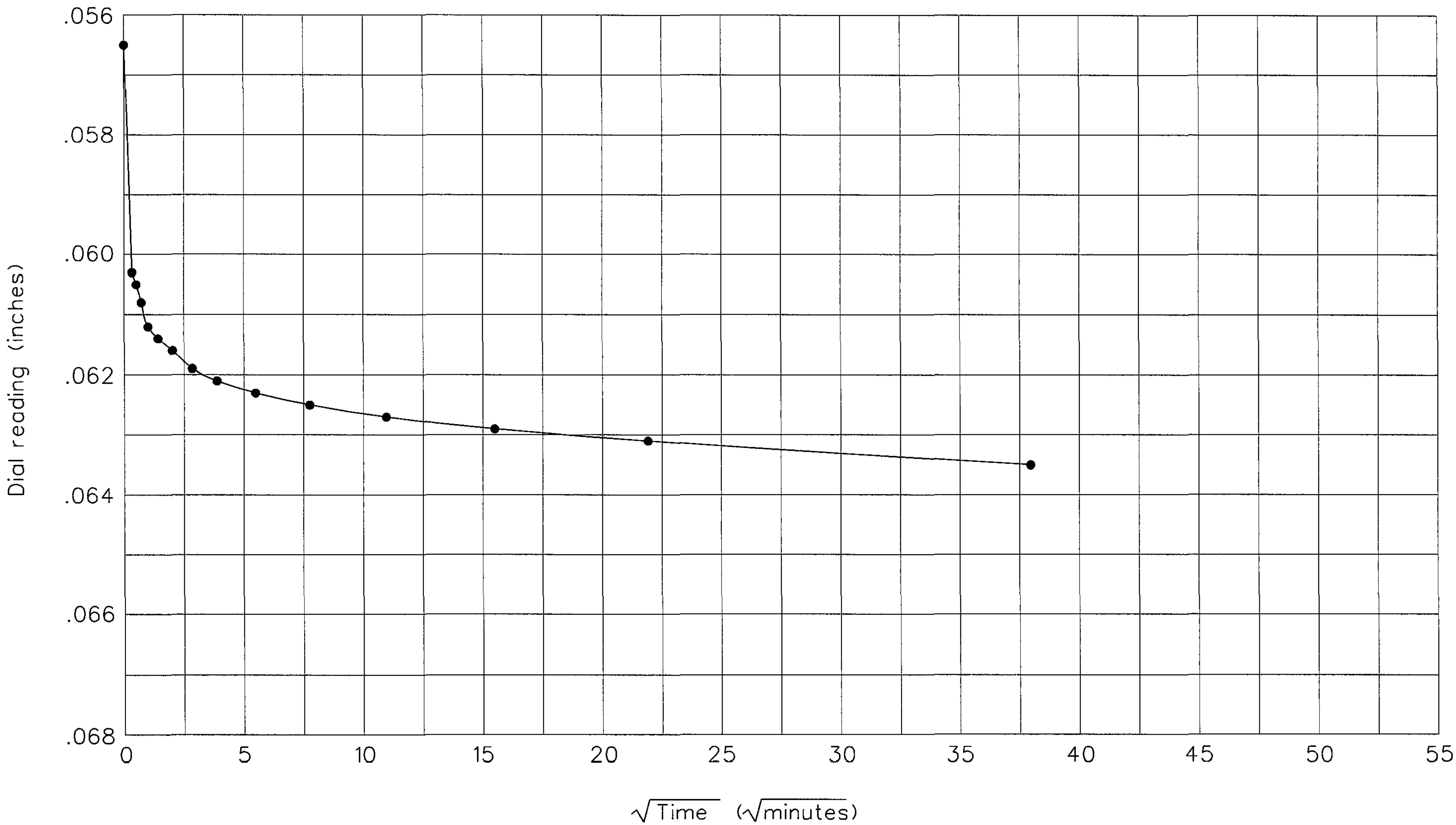
Hole no.: 10-S5-7
Depth: 20'-21'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure

ADDENDUM 1 - OCTOBER 2010



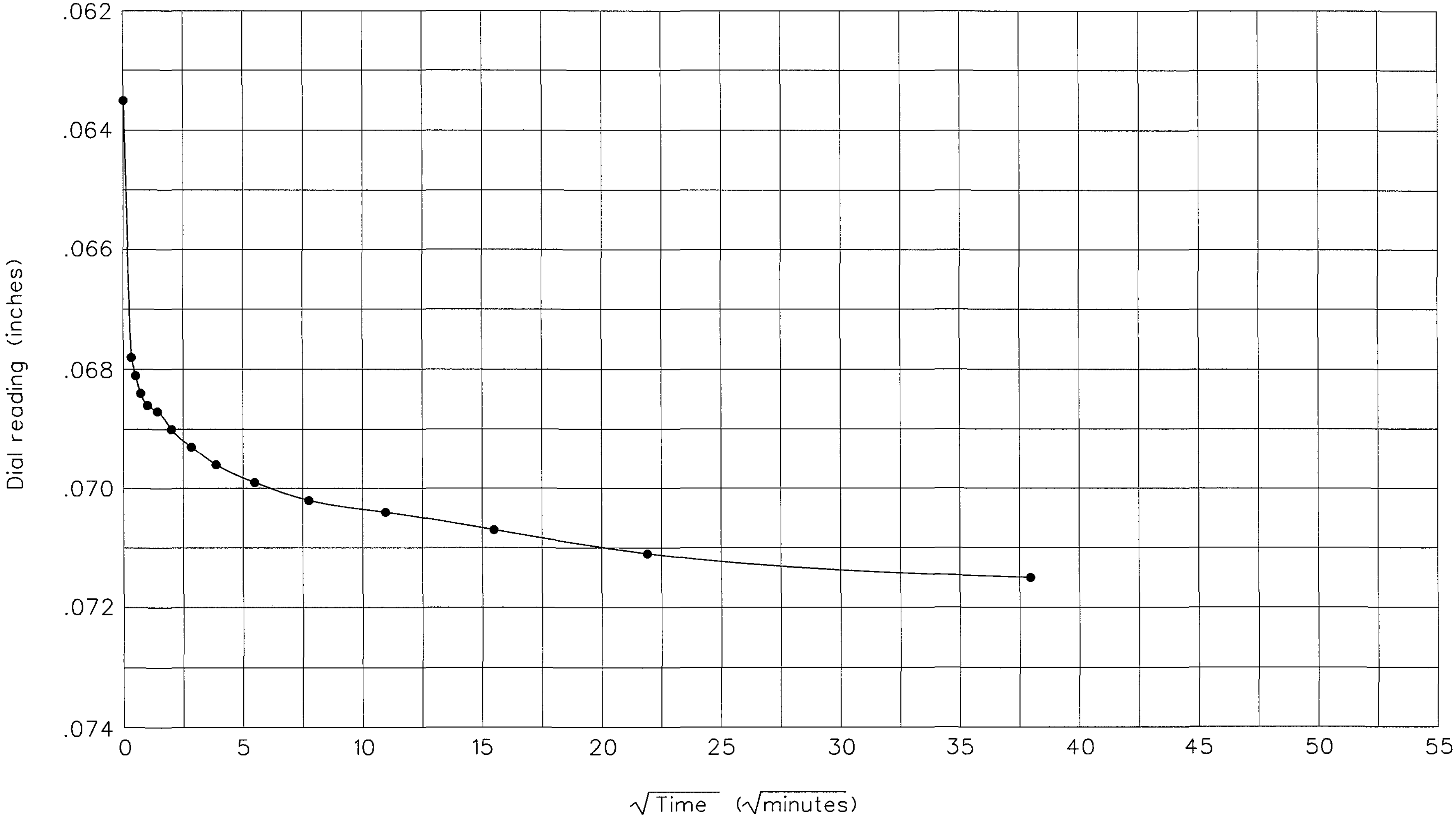
RB&G ENGINEERING, INC.

Hole no.: 10-S5-7
Depth: 20'-21'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



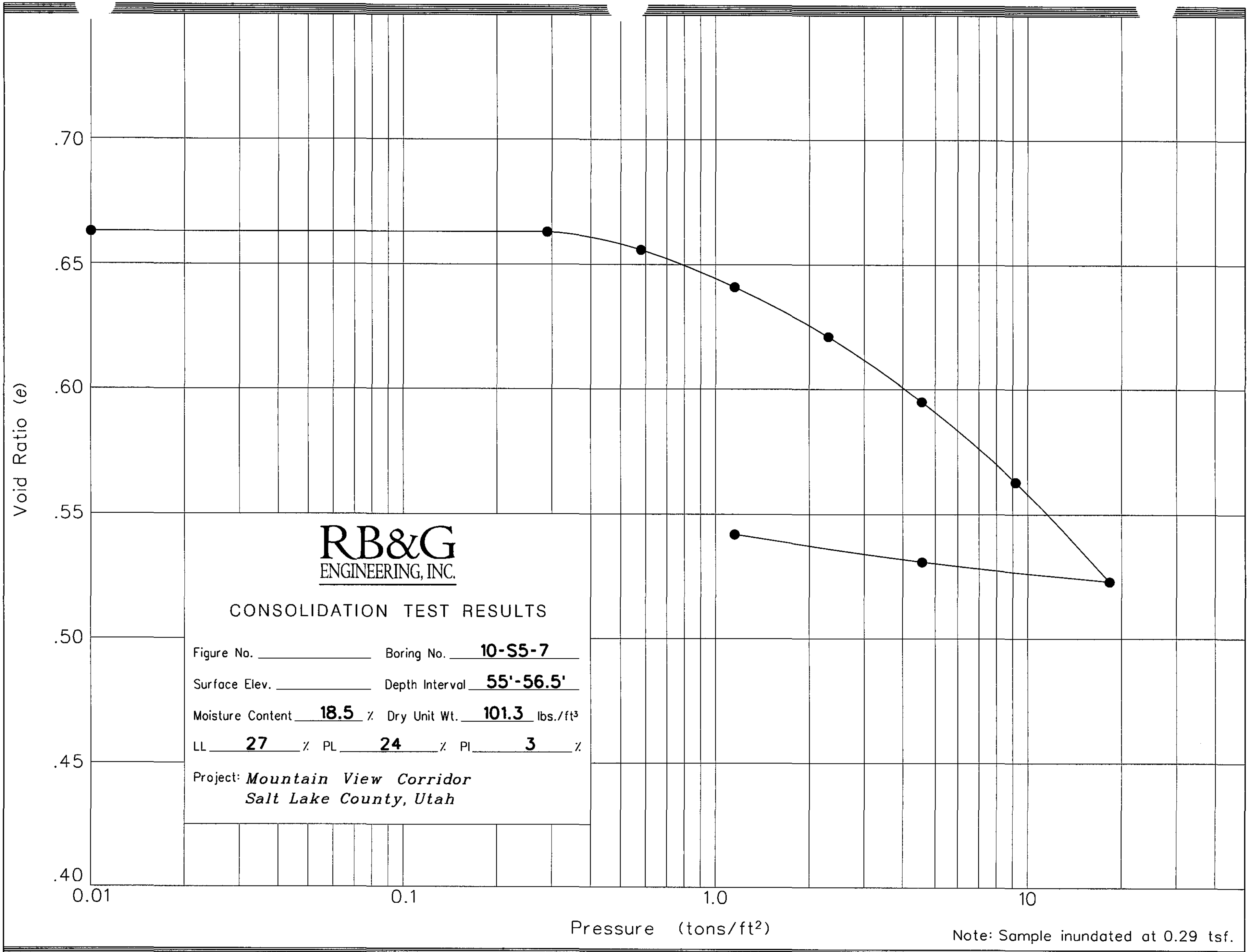
RB&G ENGINEERING, INC.

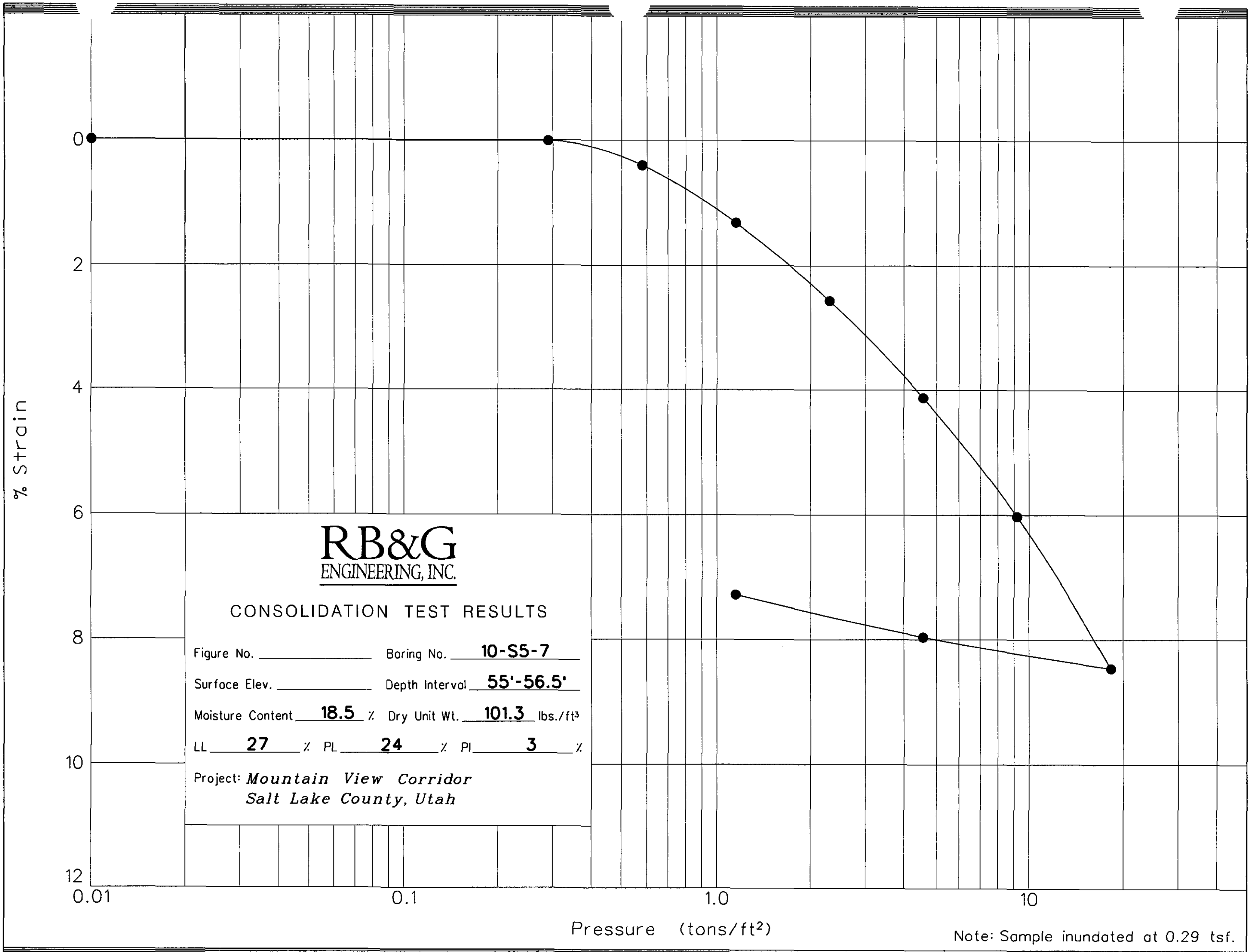
Hole no.: 10-S5-7
Depth: 20'-21'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

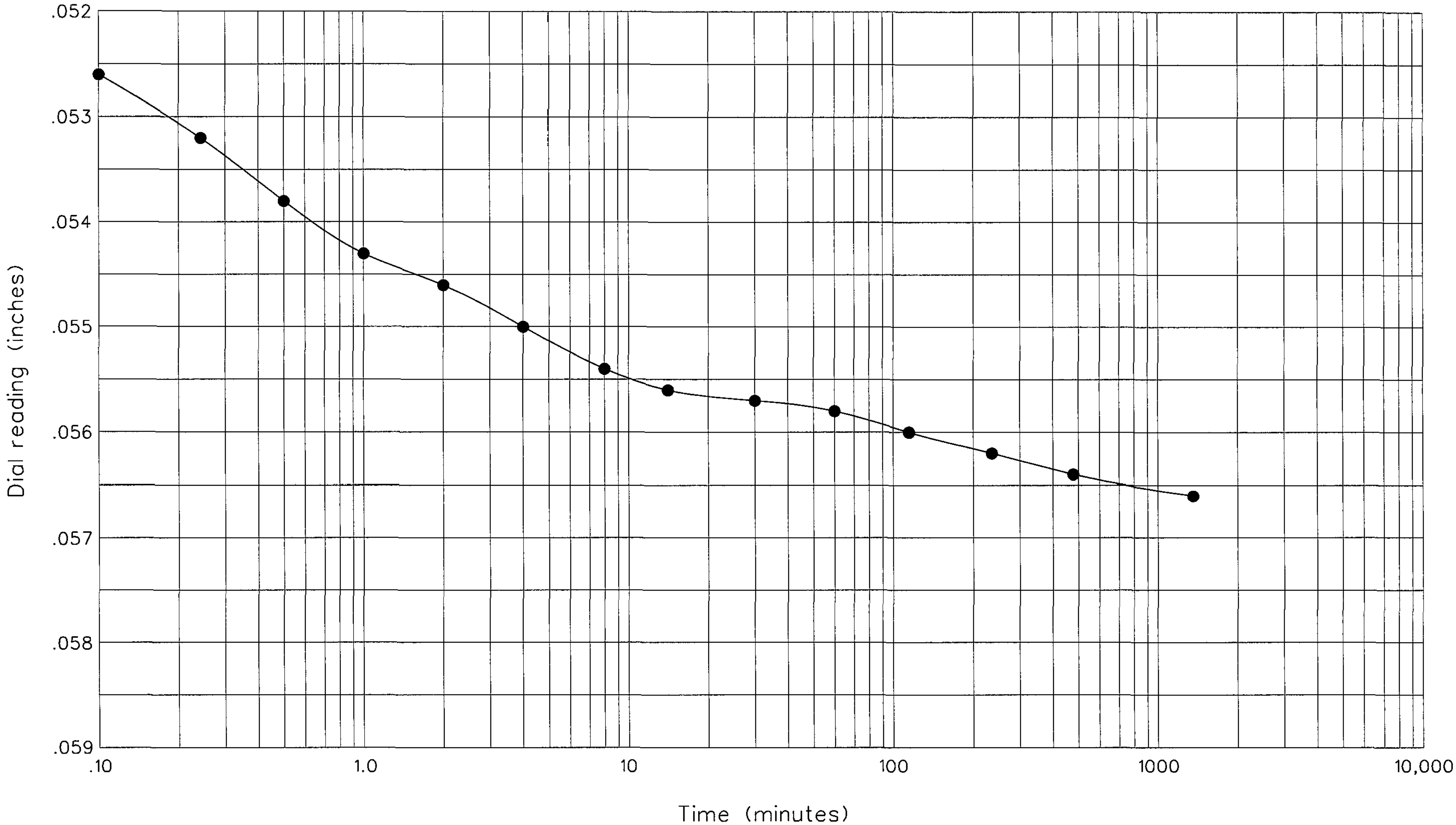
Mountain View Corridor
Salt Lake County, Utah

Figure


Void Ratio (e)
.70
.65
.60
.55
.50
.45
.40
0.01
0.1
1.0
10
Pressure (tons/ft²)
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 10-S5-7
Surface Elev.
Depth Interval 55'-56.5'
Moisture Content 18.5 %
Dry Unit Wt. 101.3 lbs./ft³
LL 27 %
PL 24 %
PI 3 %
Project: Mountain View Corridor
Salt Lake County, Utah
Note: Sample inundated at 0.29 tsf.



RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 10-S5-7
Surface Elev.
Depth Interval 55'-56.5'
Moisture Content 18.5 %
Dry Unit Wt. 101.3 lbs./ft³
LL 27 %
PL 24 %
PI 3 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



RB&G ENGINEERING, INC.

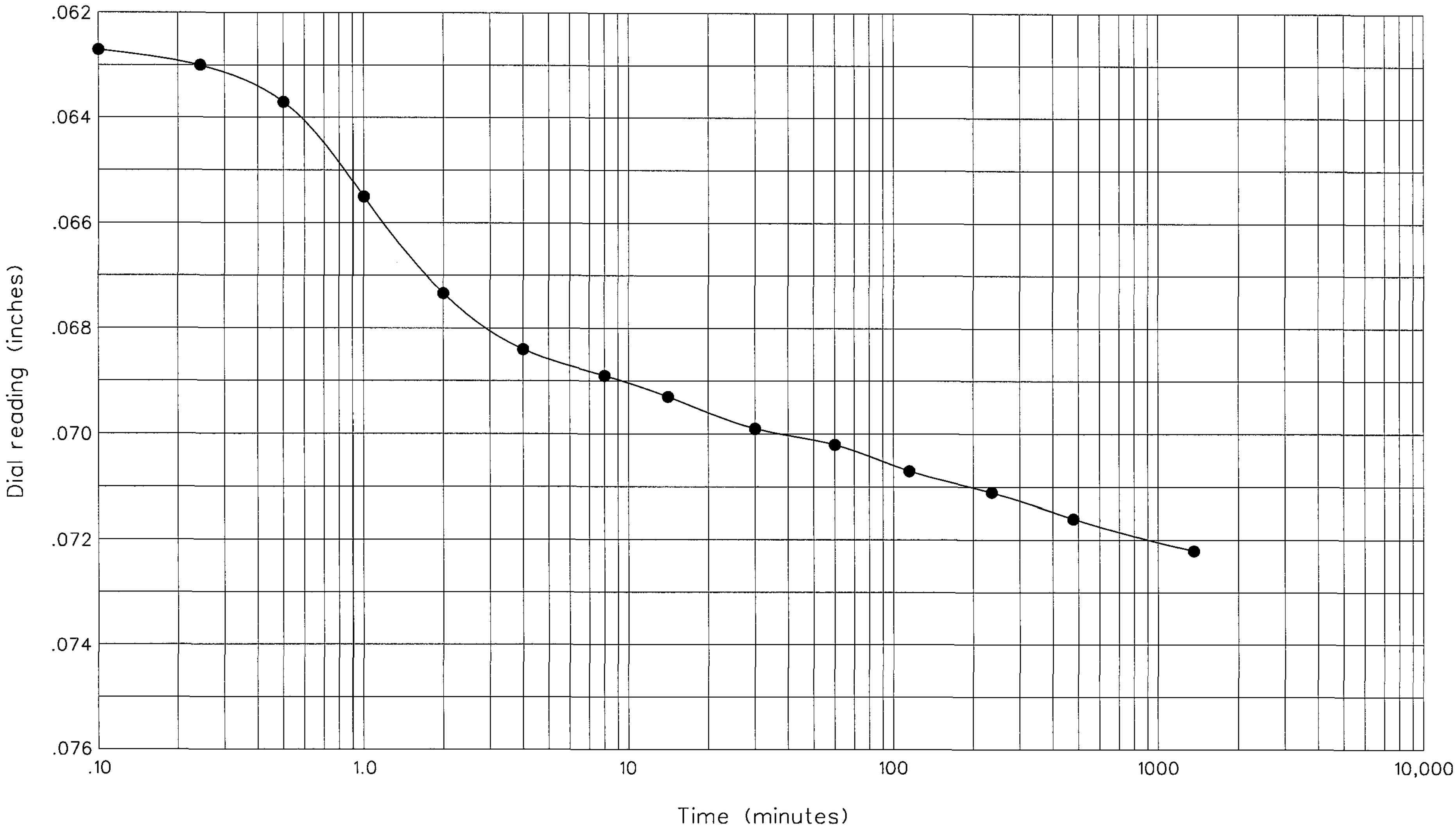
Hole no.: 10-S5-7
Depth: 55'-56.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure

ADDENDUM 1 - OCTOBER 2010



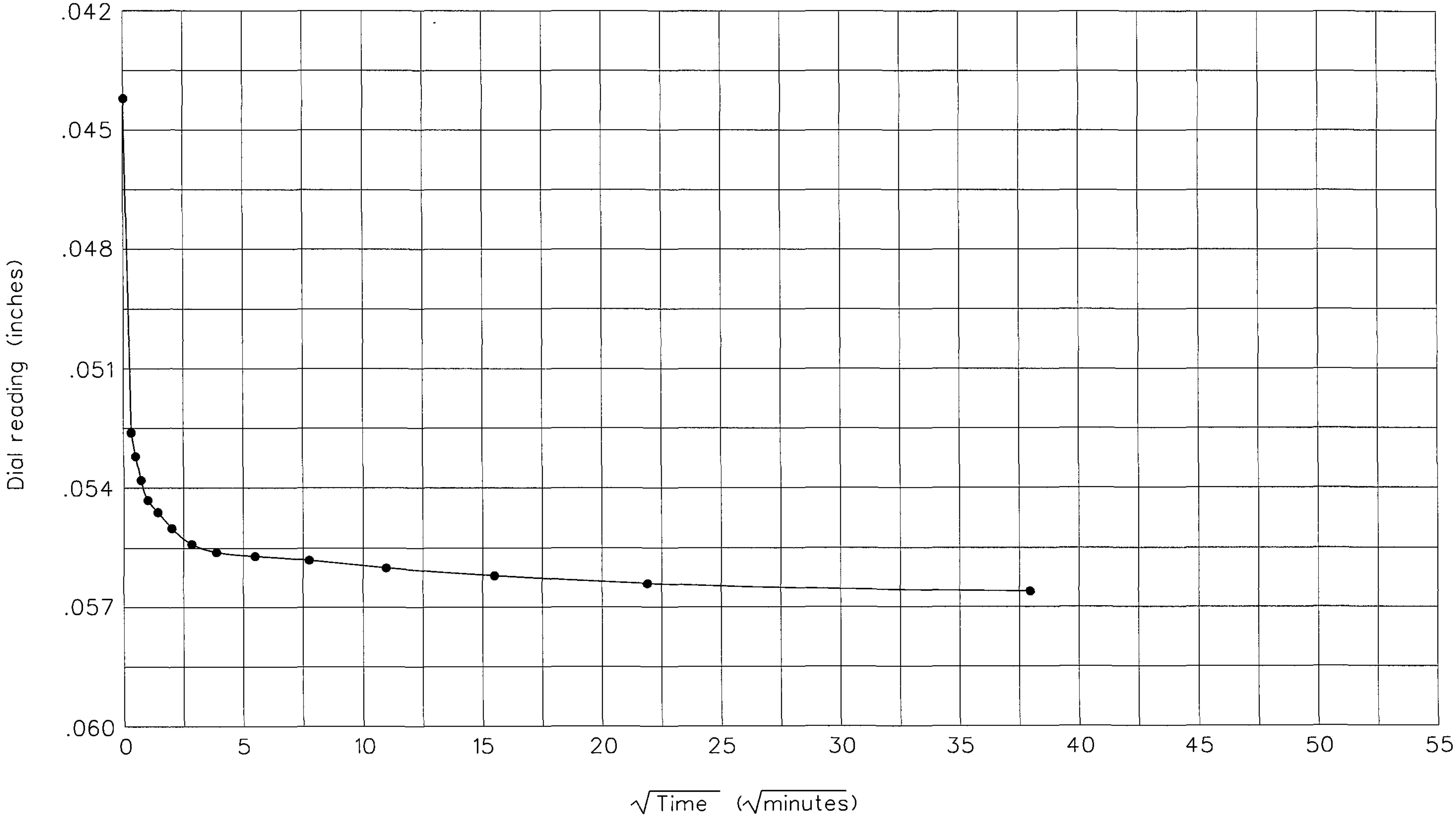
RB&G ENGINEERING, INC.

Hole no.: 10-S5-7
Depth: 55'-56.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



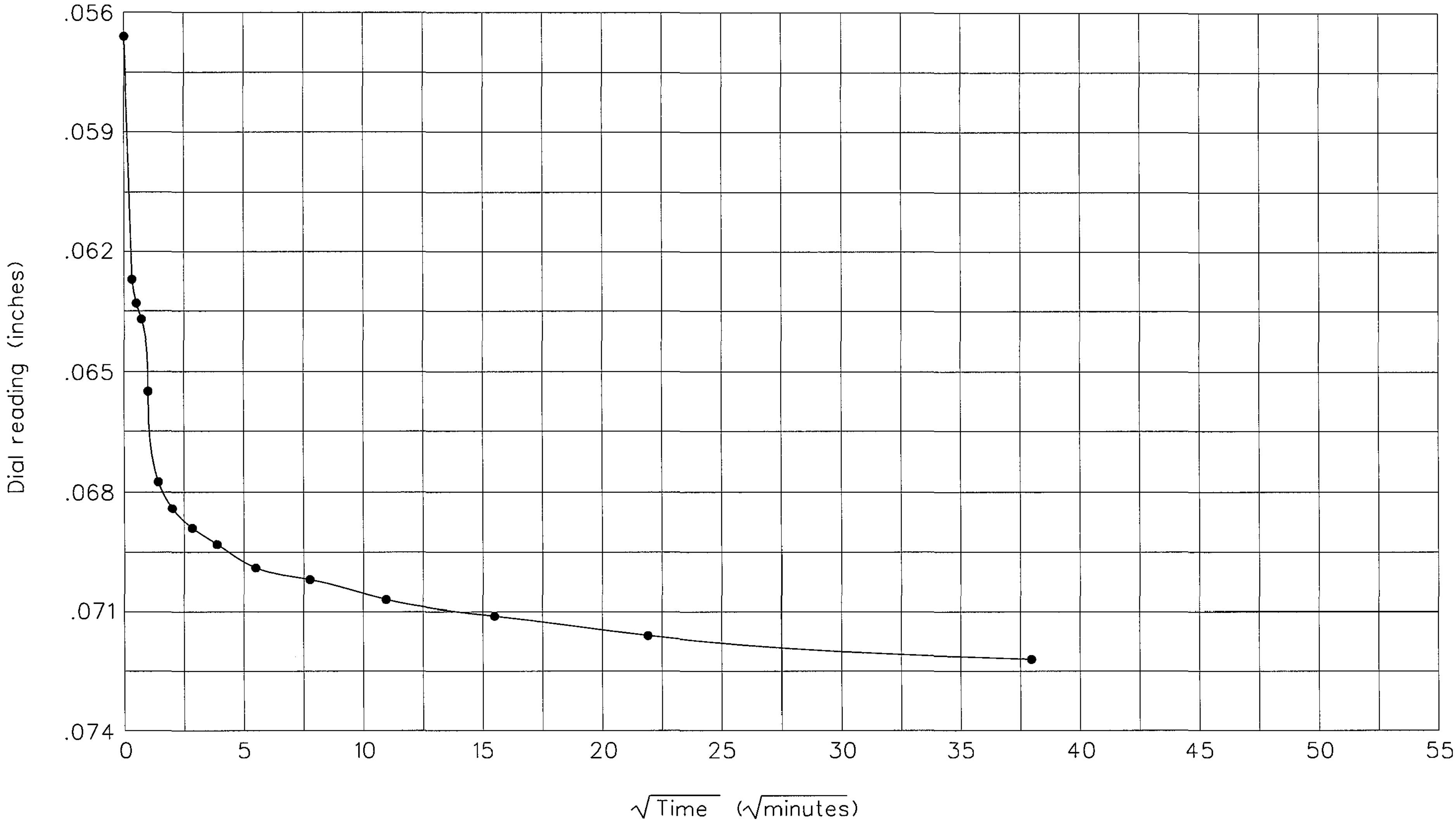
RB&G ENGINEERING, INC.

Hole no.: 10-S5-7
Depth: 55'-56.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



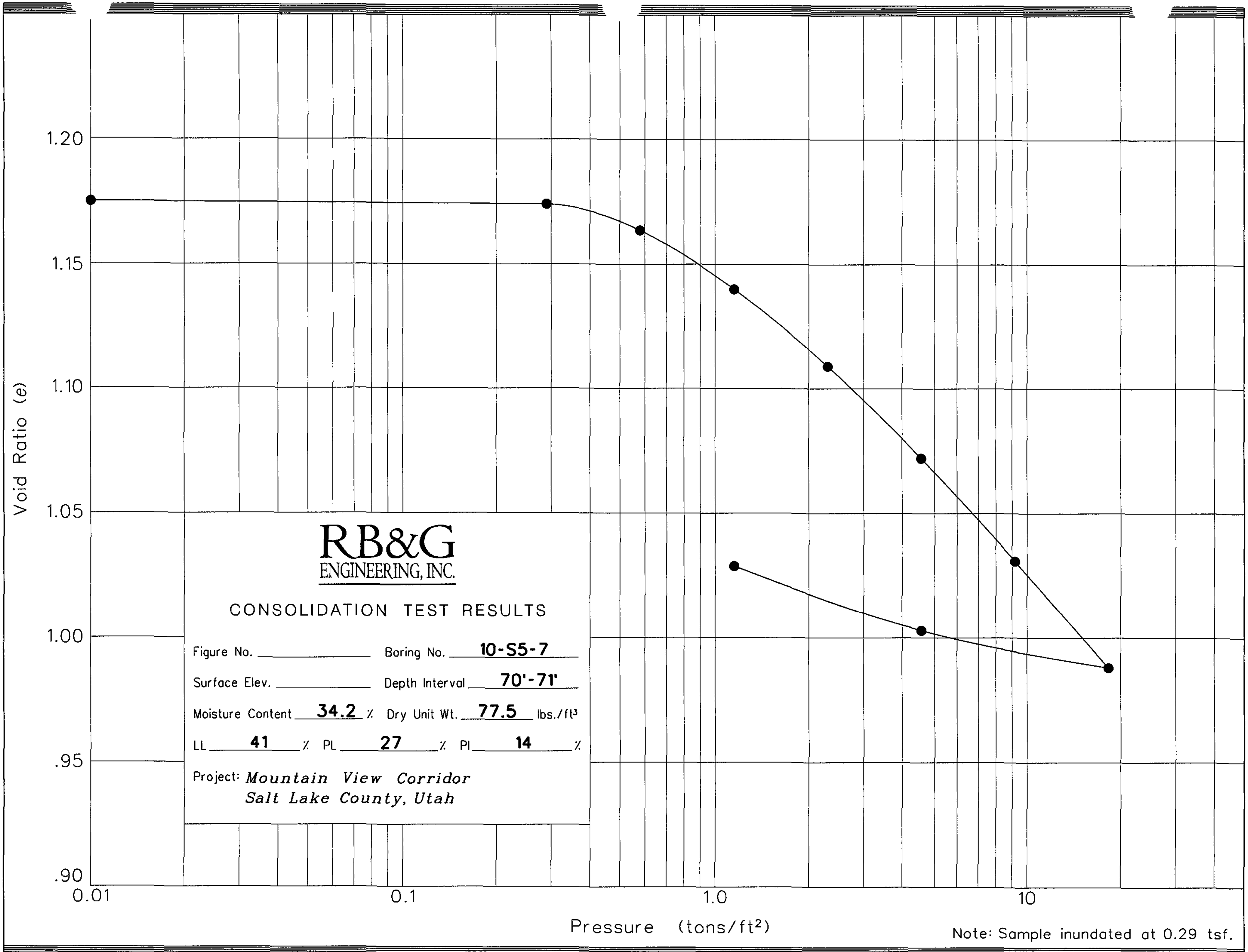
RB&G ENGINEERING, INC.

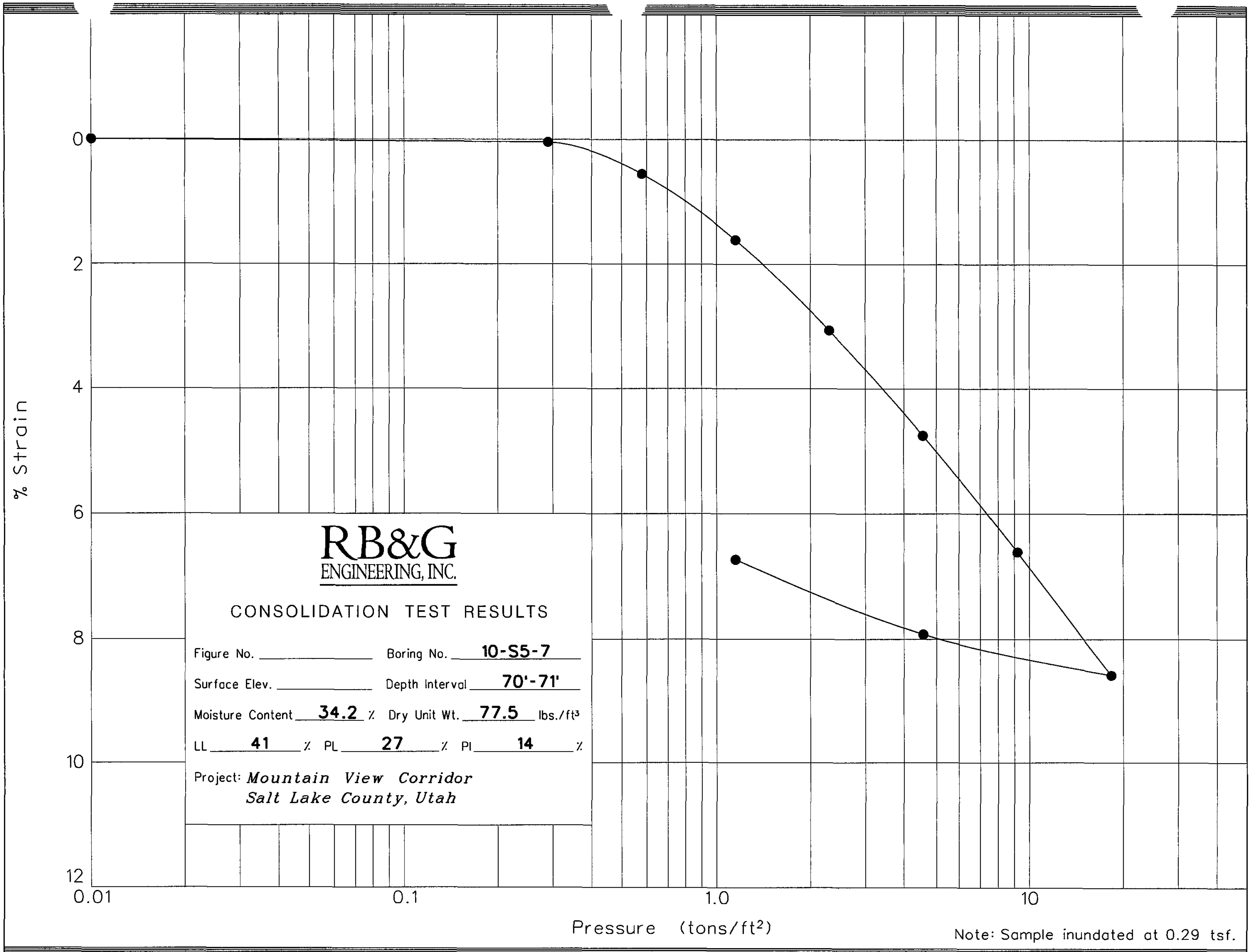
Hole no.: 10-S5-7
Depth: 55'-56.5'
Load: 2.30 to 4.60 tons

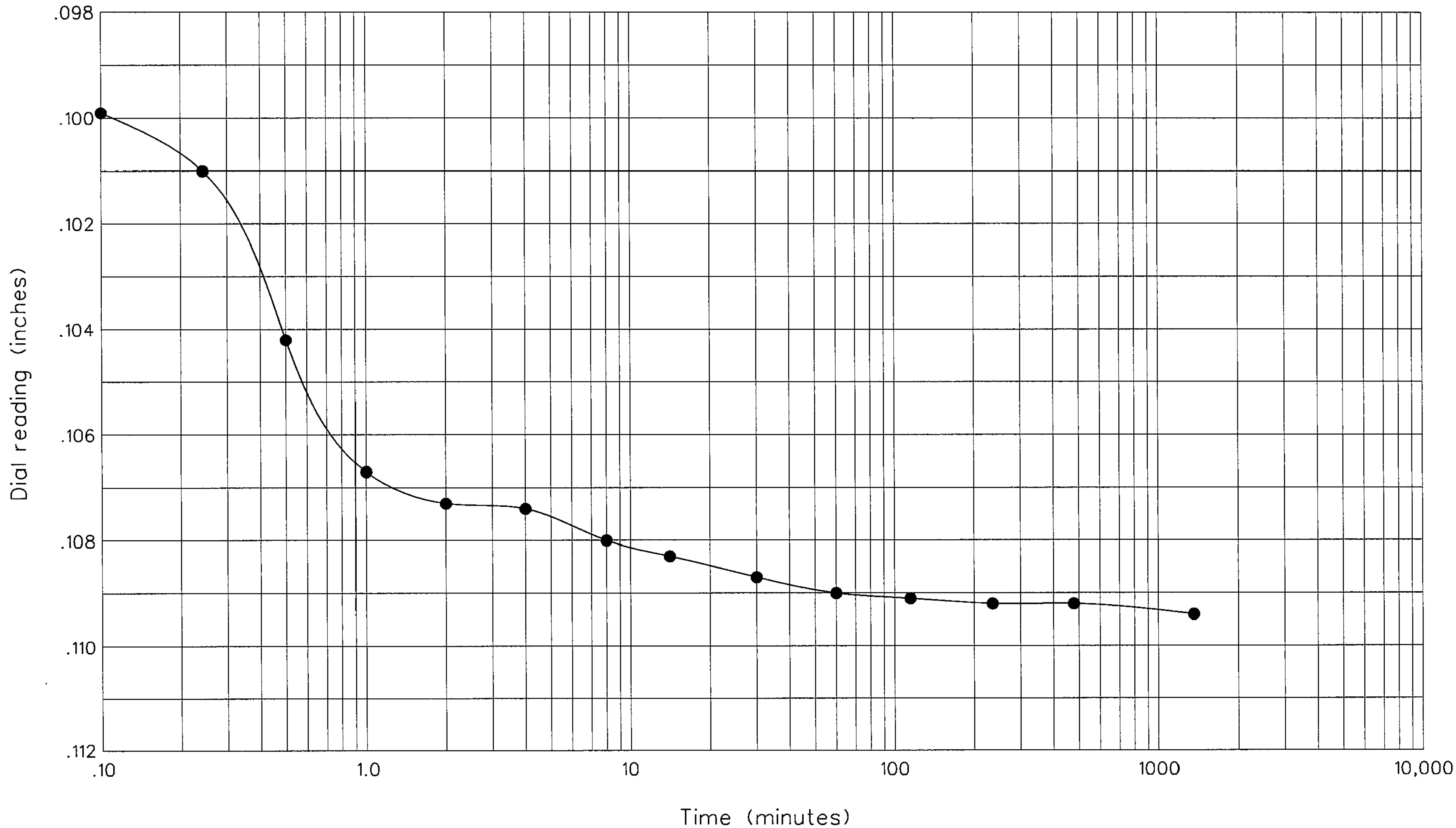
TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure


1.20
1.15
1.10
1.05
1.00
.95
.90
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 10-S5-7
Surface Elev.
Depth Interval 70'-71'
Moisture Content 34.2 %
Dry Unit Wt. 77.5 lbs./ft³
LL 41 %
PL 27 %
PI 14 %
Project: Mountain View Corridor
Salt Lake County, Utah
Note: Sample inundated at 0.29 tsf.


RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 10-S5-7
Surface Elev.
Depth Interval 70'-71'
Moisture Content 34.2 %
Dry Unit Wt. 77.5 lbs./ft³
LL 41 %
PL 27 %
PI 14 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



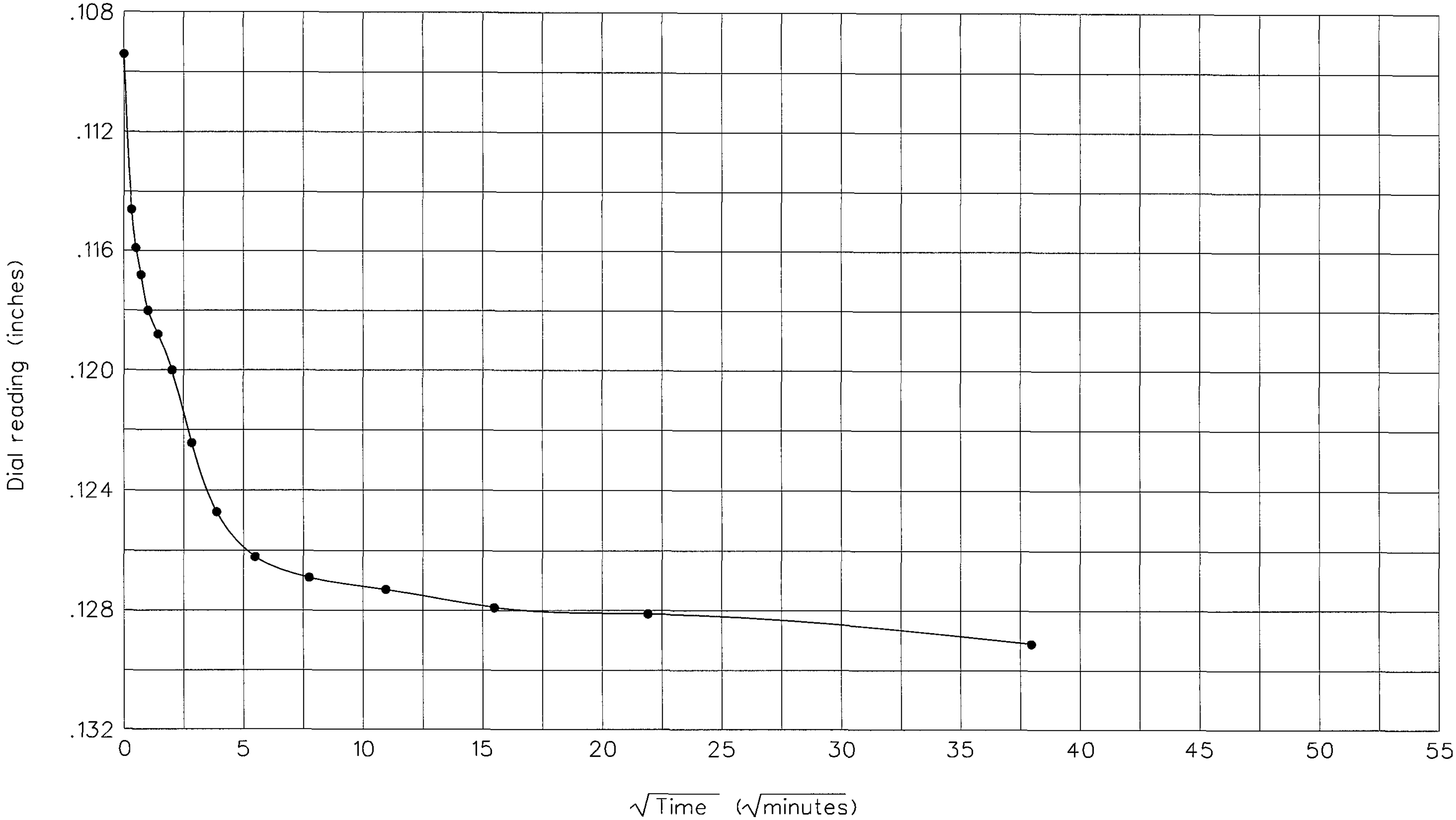
RB&G ENGINEERING, INC.

Hole no.: 10-S5-7
Depth: 70'-71'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



RB&G ENGINEERING, INC.

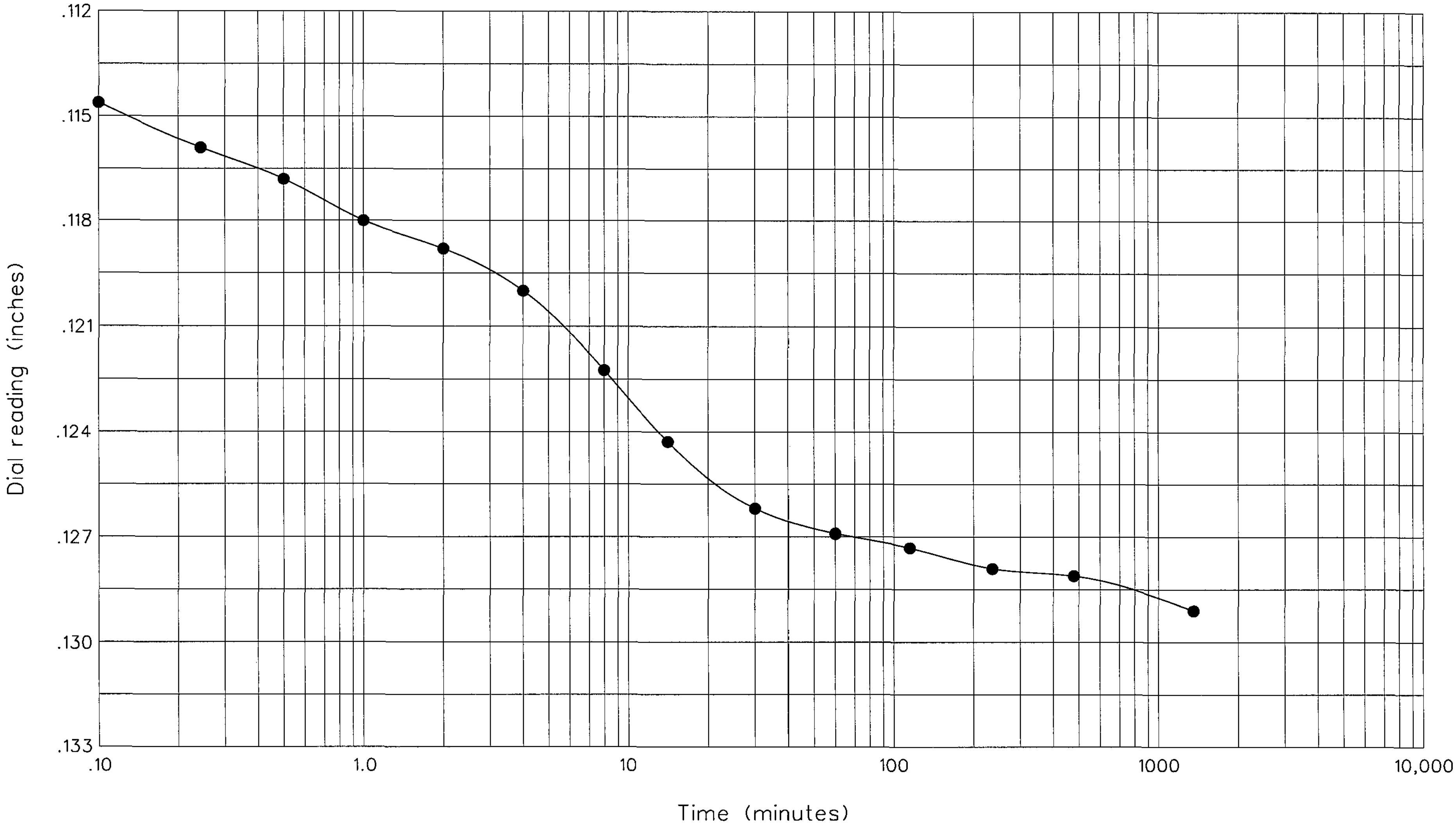
Hole no.: 10-S5-7
Depth: 70'-71'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure

ADDENDUM 1 - OCTOBER 2010



RB&G ENGINEERING, INC.

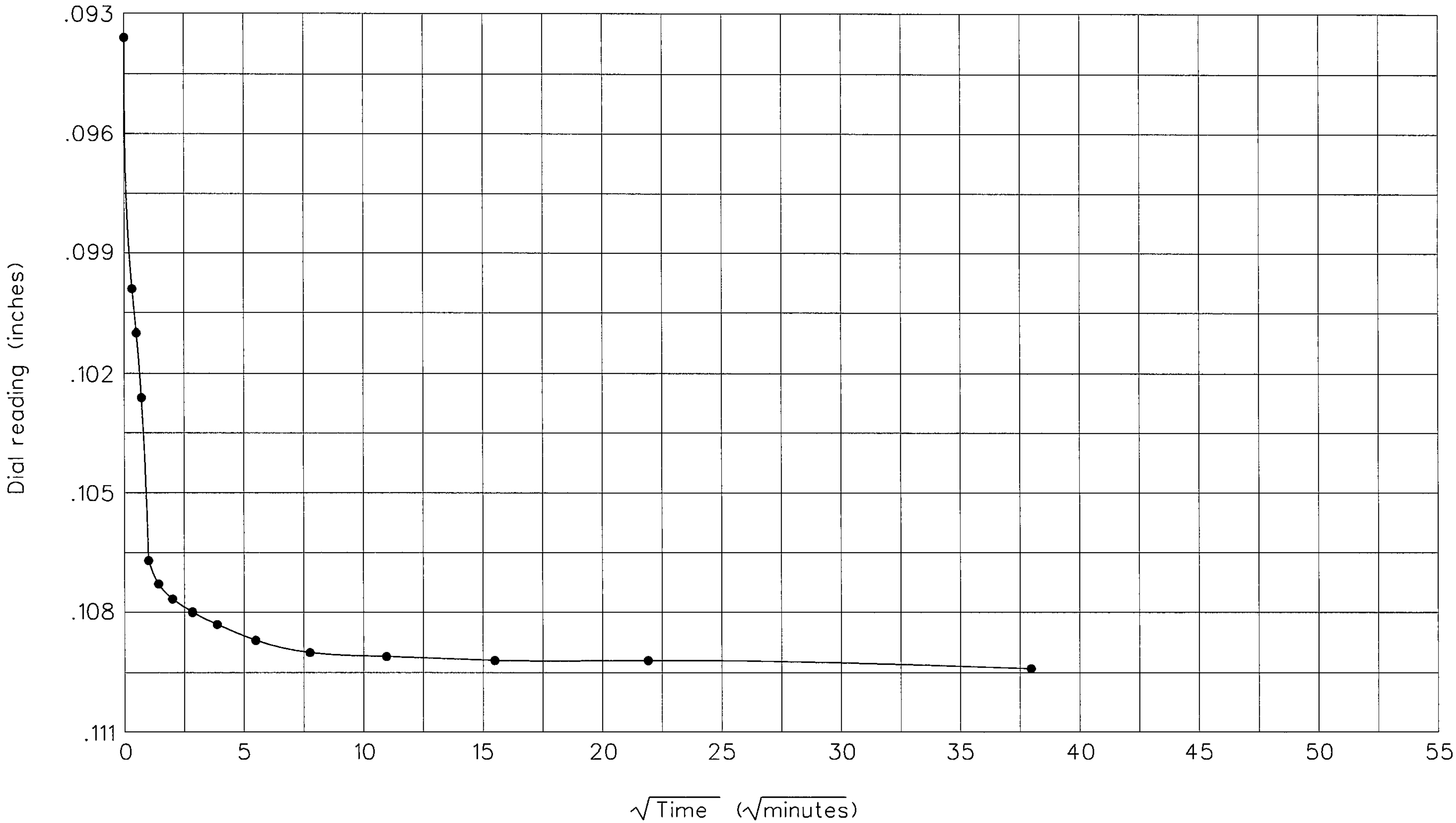
Hole no.: 10-S5-7
Depth: 70'-71'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure

ADDENDUM 1 - OCTOBER 2010



RB&G ENGINEERING, INC.

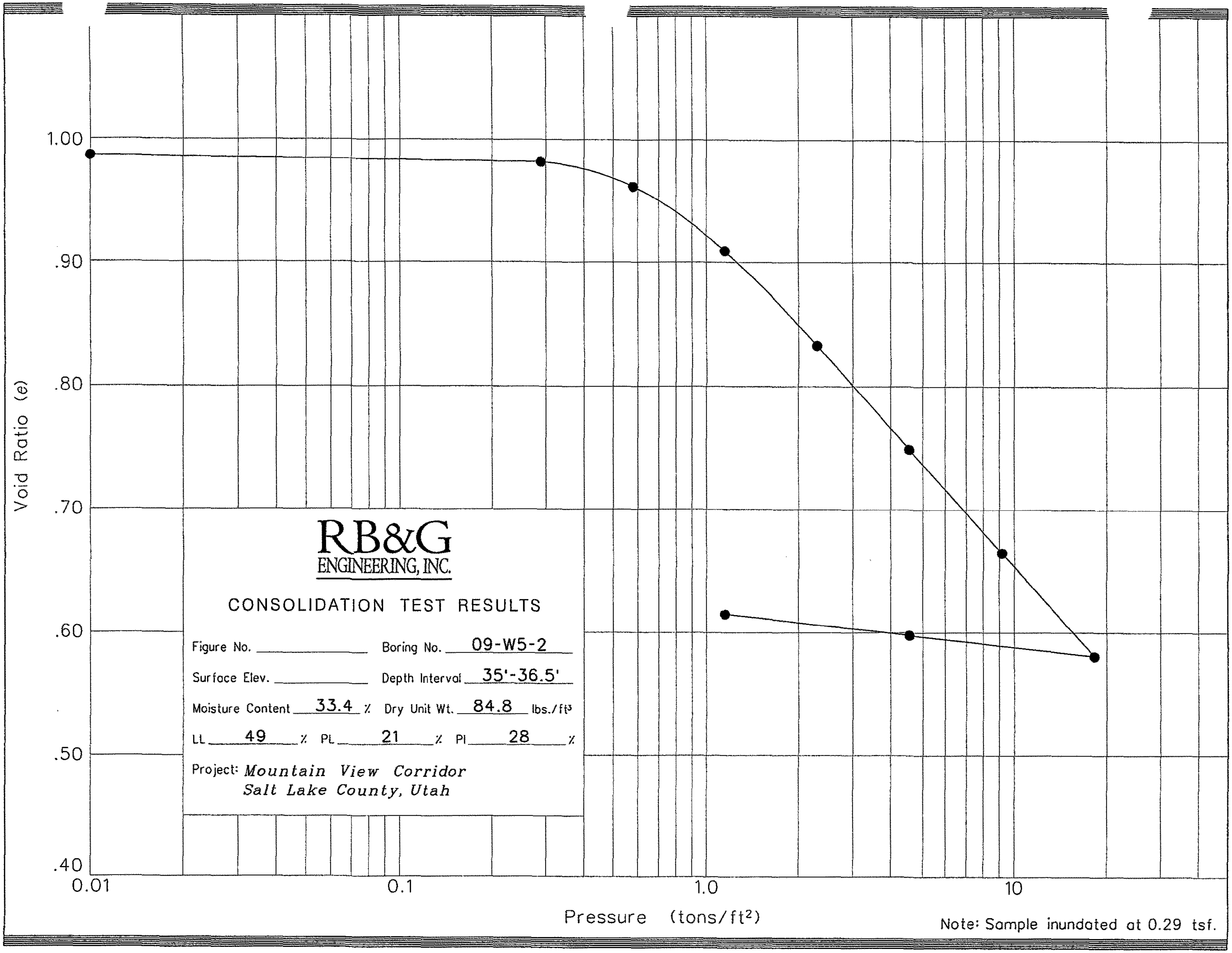
Hole no.: 10-S5-7
Depth: 70'-71'
Load: 2.30 to 4.60 tons

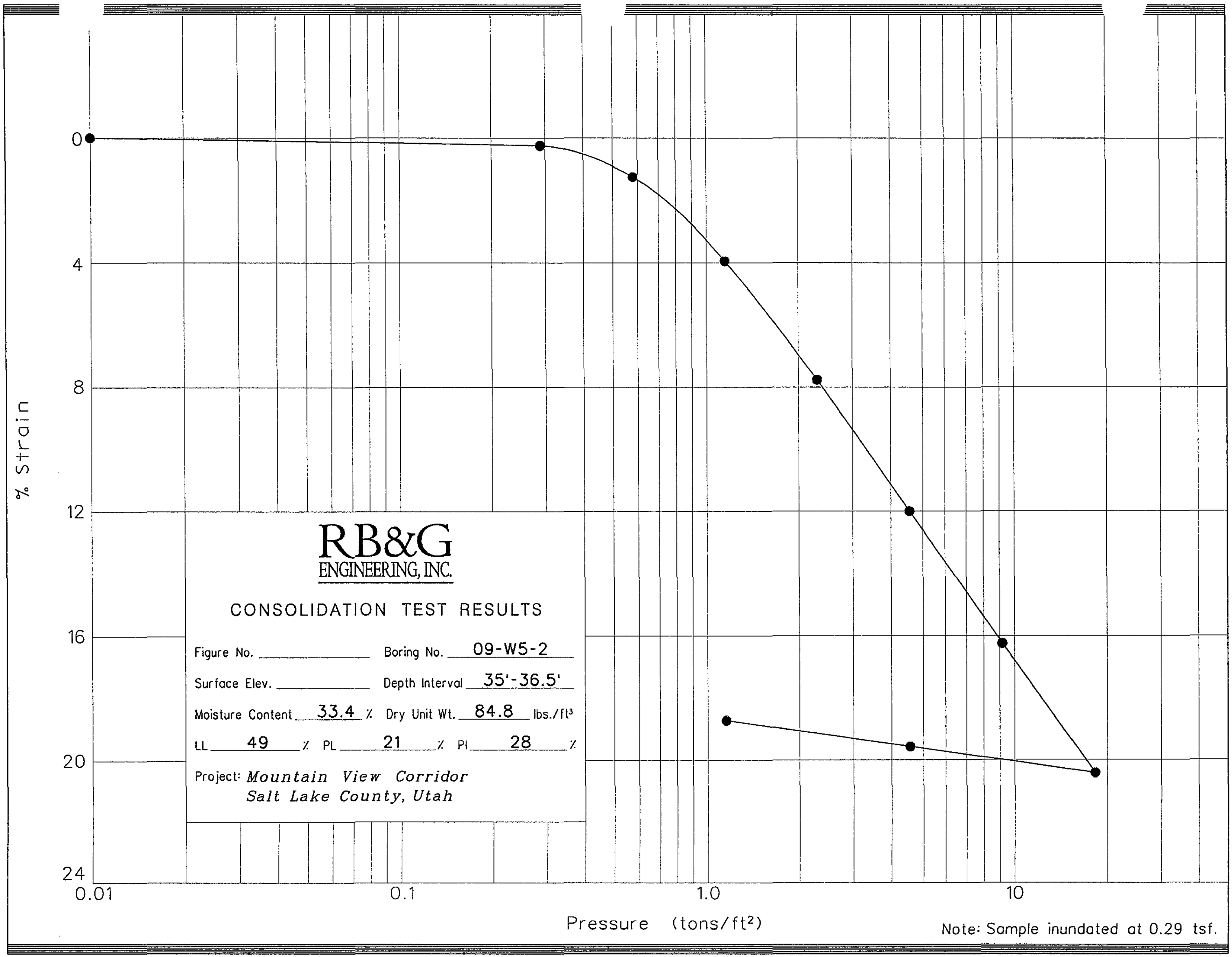
TIME CONSOLIDATION

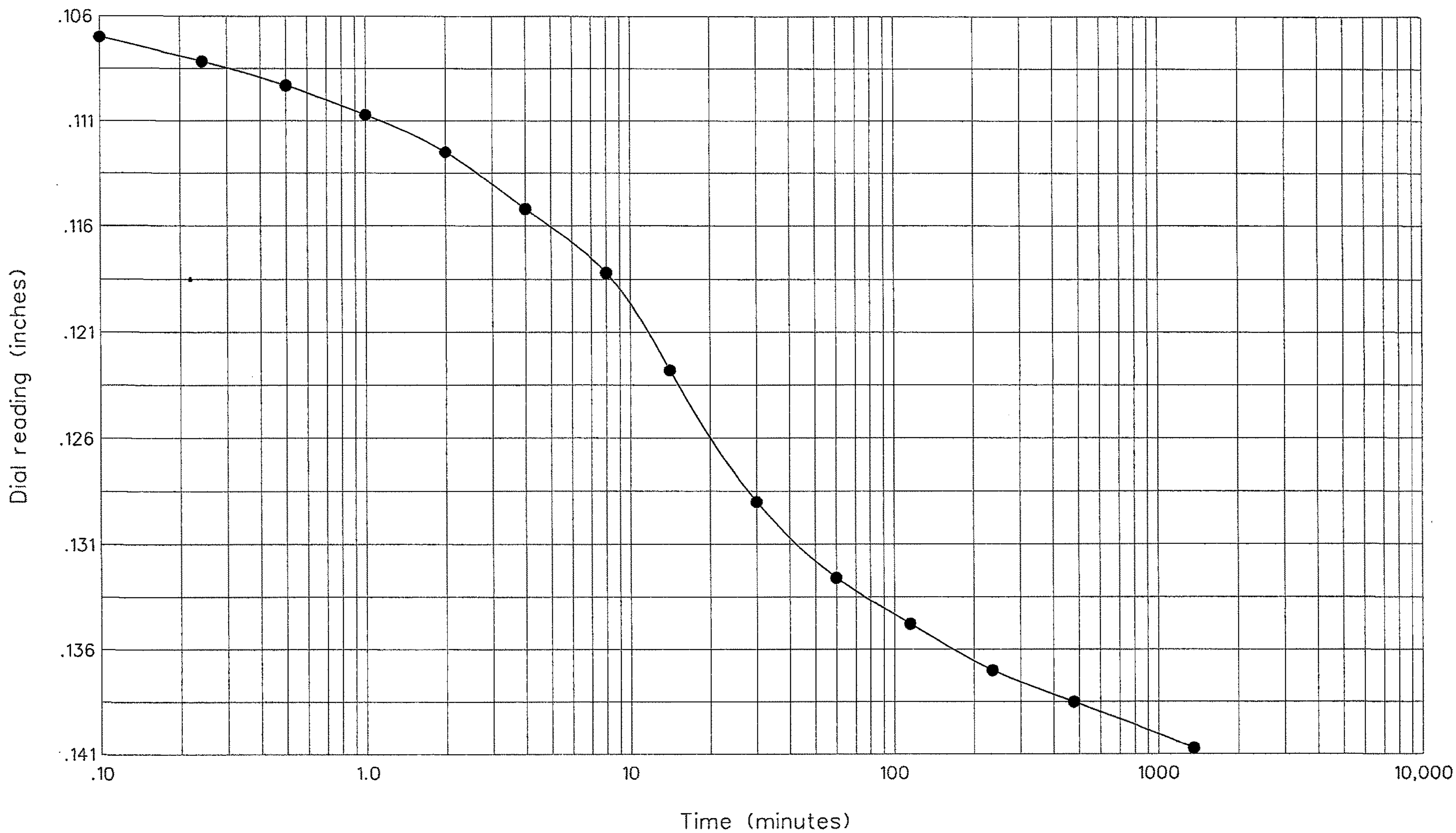
Mountain View Corridor
Salt Lake County, Utah

Figure

ADDENDUM 1 - OCTOBER 2010


1.00
.90
.80
.70
.60
.50
.40
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-W5-2
Surface Elev.
Depth Interval 35'-36.5'
Moisture Content 33.4 %
Dry Unit Wt. 84.8 lbs./ft³
LL 49 % PL 21 % PI 28 %
Project: Mountain View Corridor
Salt Lake County, Utah


RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-W5-2
Surface Elev.
Depth Interval 35'-36.5'
Moisture Content 33.4 % Dry Unit Wt. 84.8 lbs./ft³
LL 49 % PL 21 % PI 28 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
4
8
12
16
20
24
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



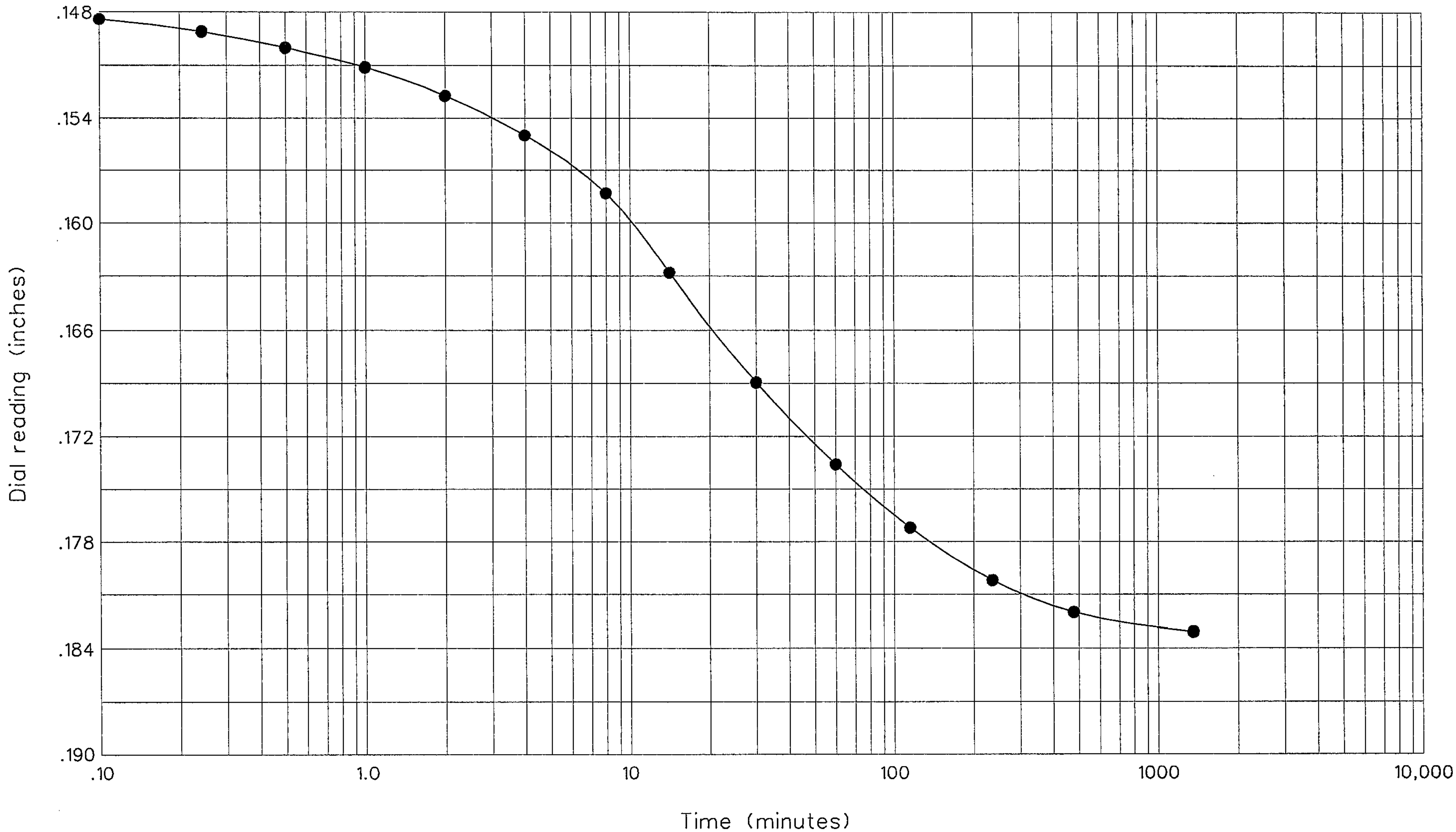
RB&G ENGINEERING, INC.

Hole no.: 09-W5-2
Depth: 35'-36.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



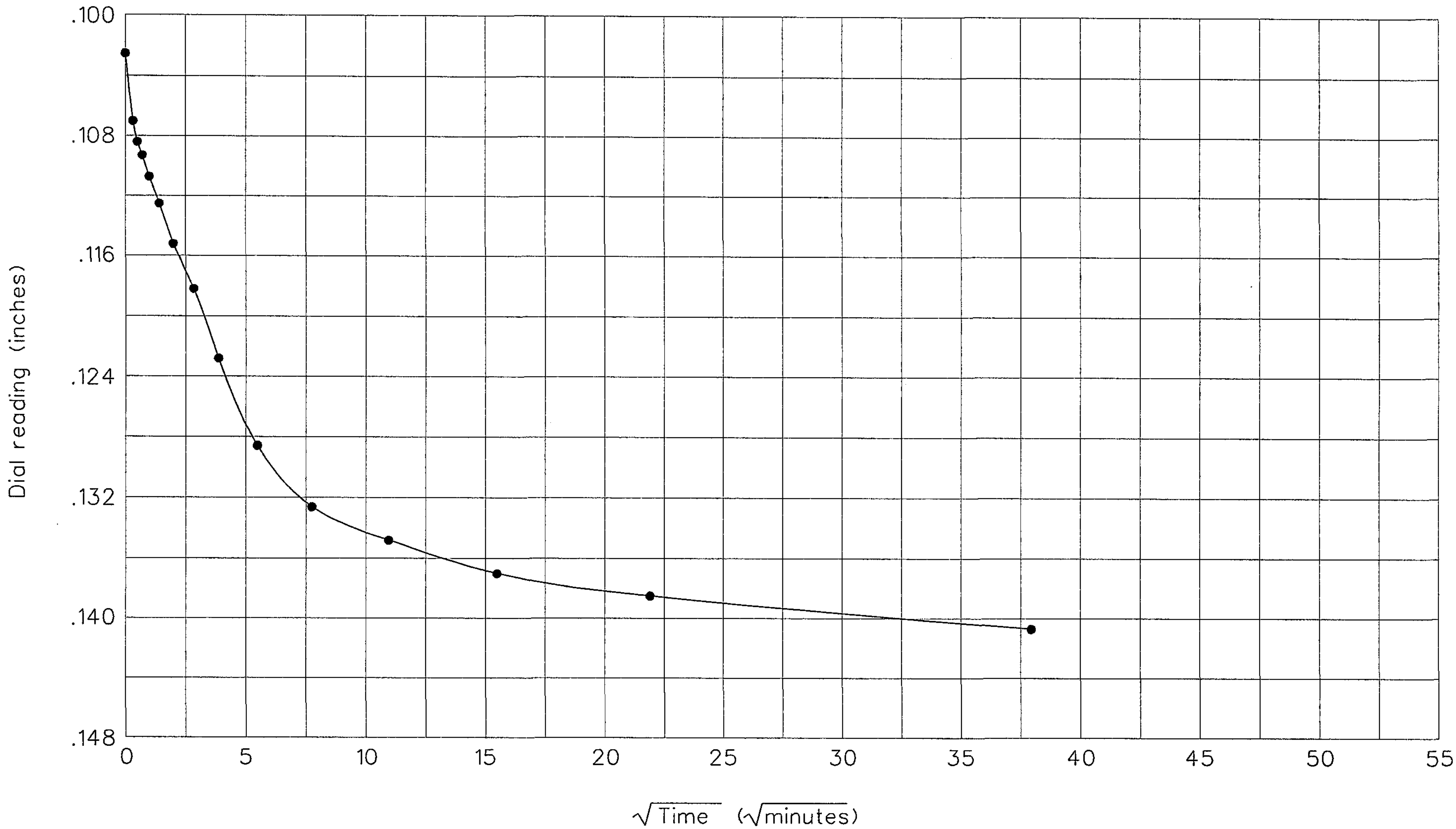
RB&G ENGINEERING, INC.

Hole no.: 09-W5-2
Depth: 35'-36.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



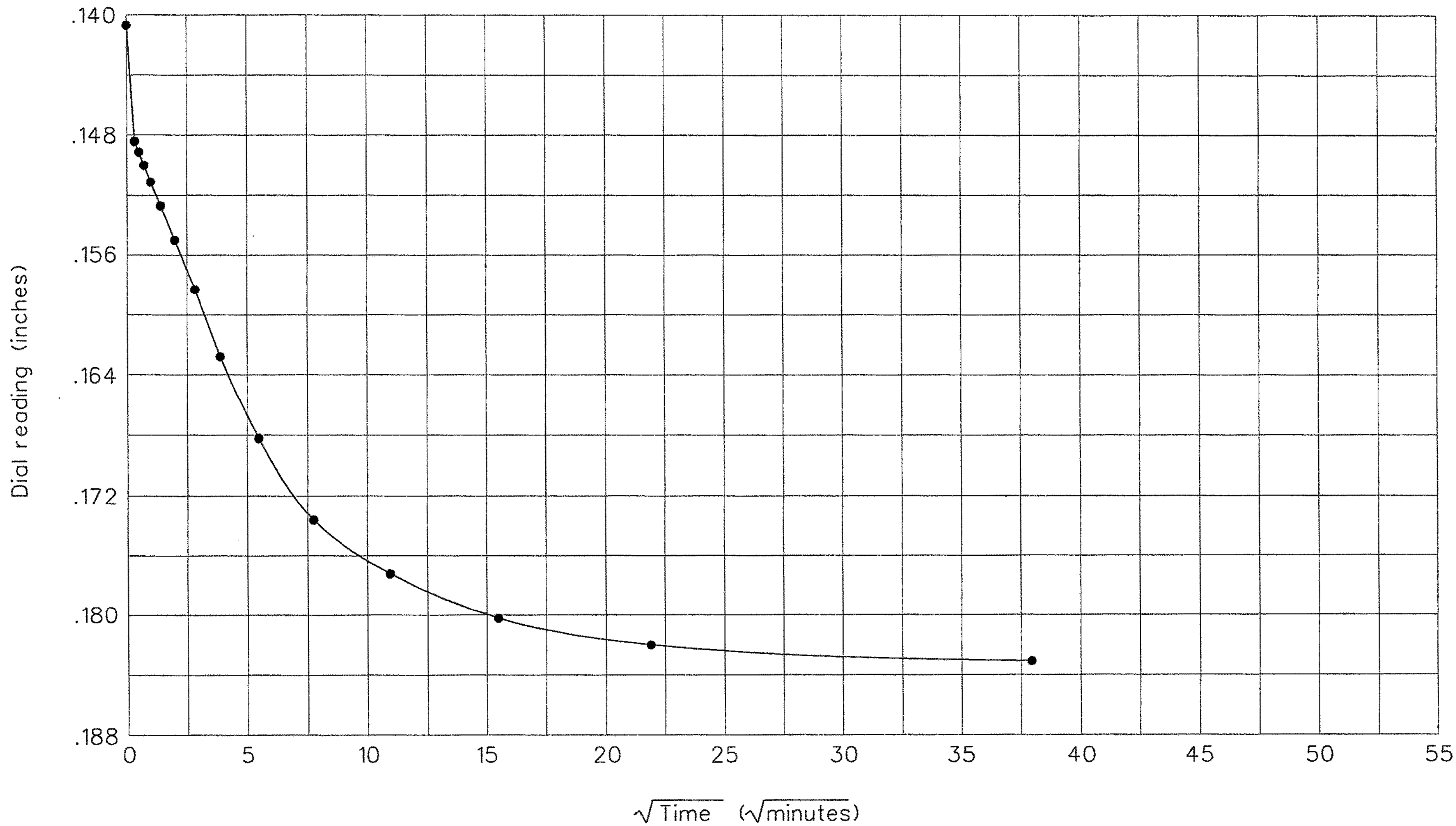
RB&G ENGINEERING, INC.

Hole no.: 09-W5-2
Depth: 35'-36.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



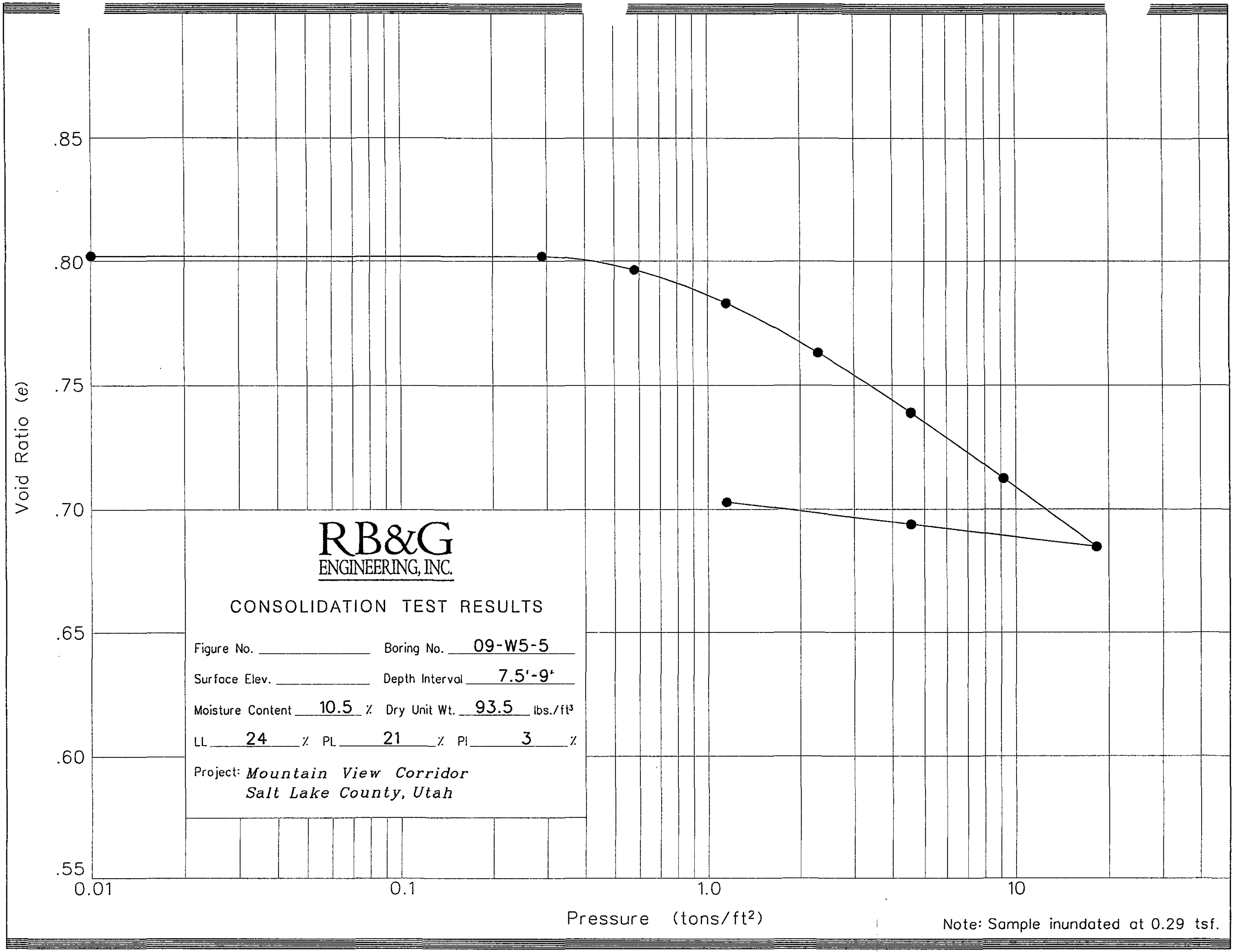
RB&G ENGINEERING, INC.

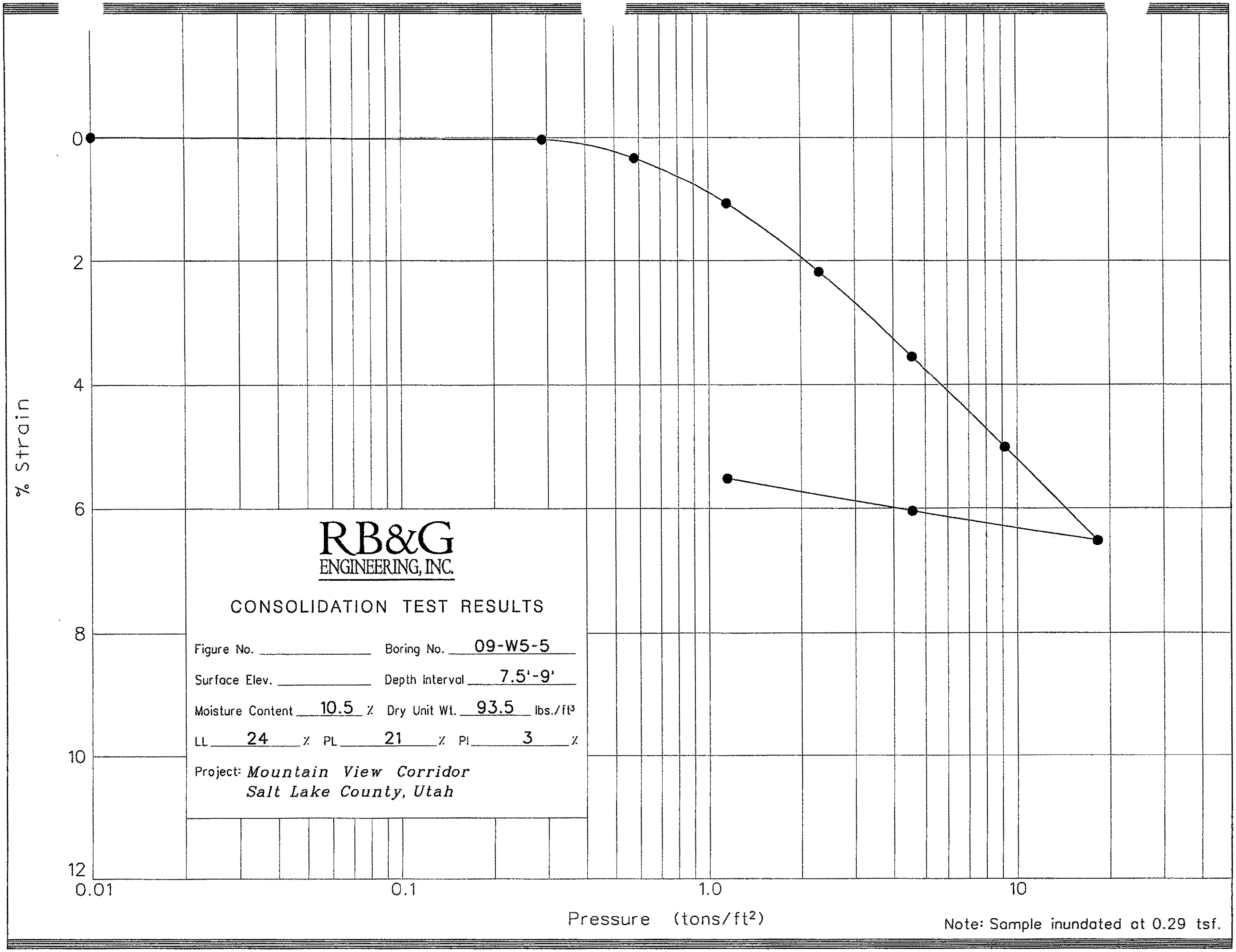
Hole no.: 09-W5-2
Depth: 35'-36.5'
Load: 2.30 to 4.60 tons

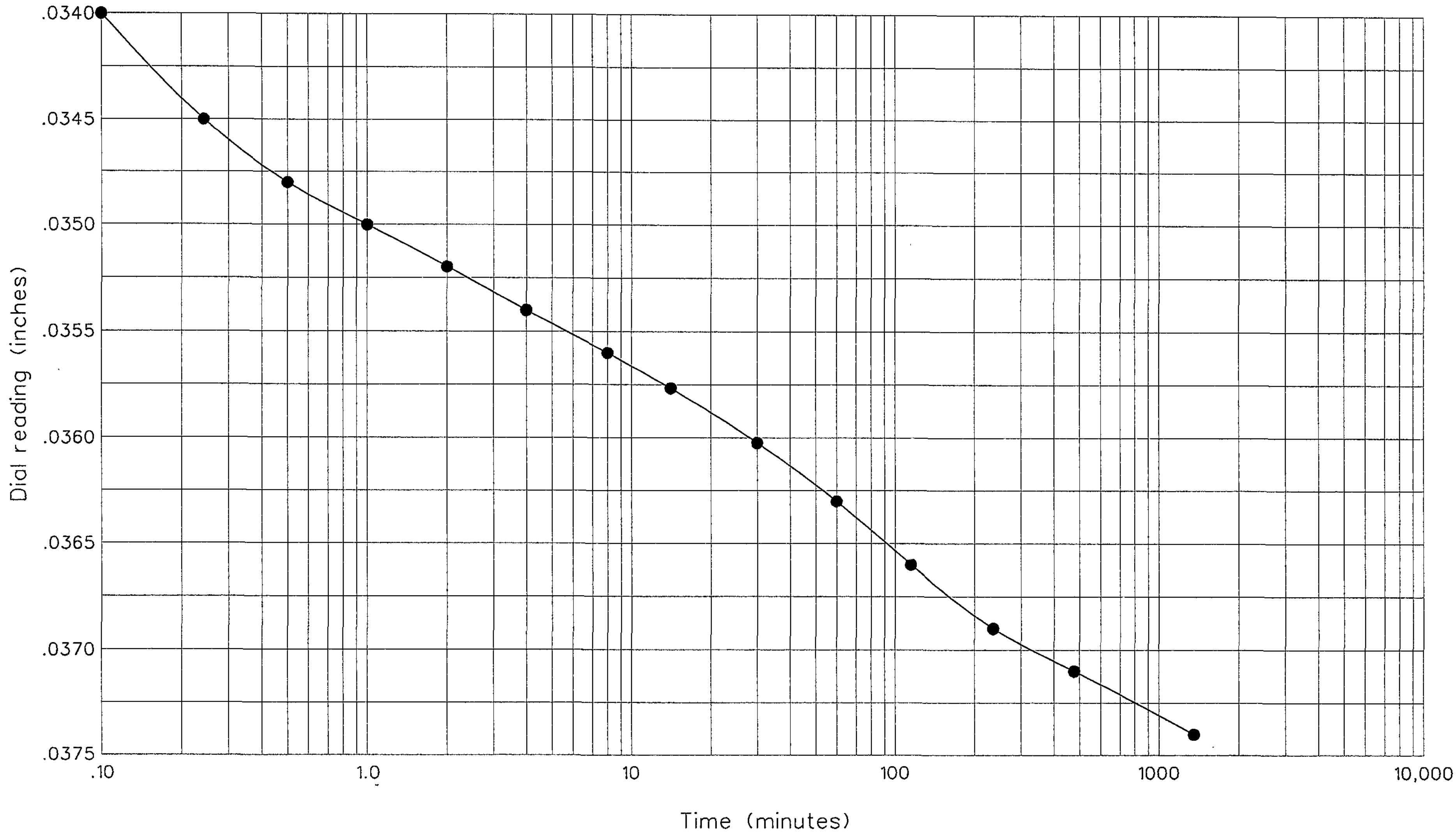
TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure


.85
.80
.75
.70
.65
.60
.55
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft2)
Note: Sample inundated at 0.29 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-W5-5
Surface Elev.
Depth Interval 7.5'-9'
Moisture Content 10.5 % Dry Unit Wt. 93.5 lbs./ft3
LL 24 % PL 21 % PI 3 %
Project: Mountain View Corridor
Salt Lake County, Utah


RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-W5-5
Surface Elev.
Depth Interval 7.5'-9'
Moisture Content 10.5 %
Dry Unit Wt. 93.5 lbs./ft³
LL 24 %
PL 21 %
PI 3 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



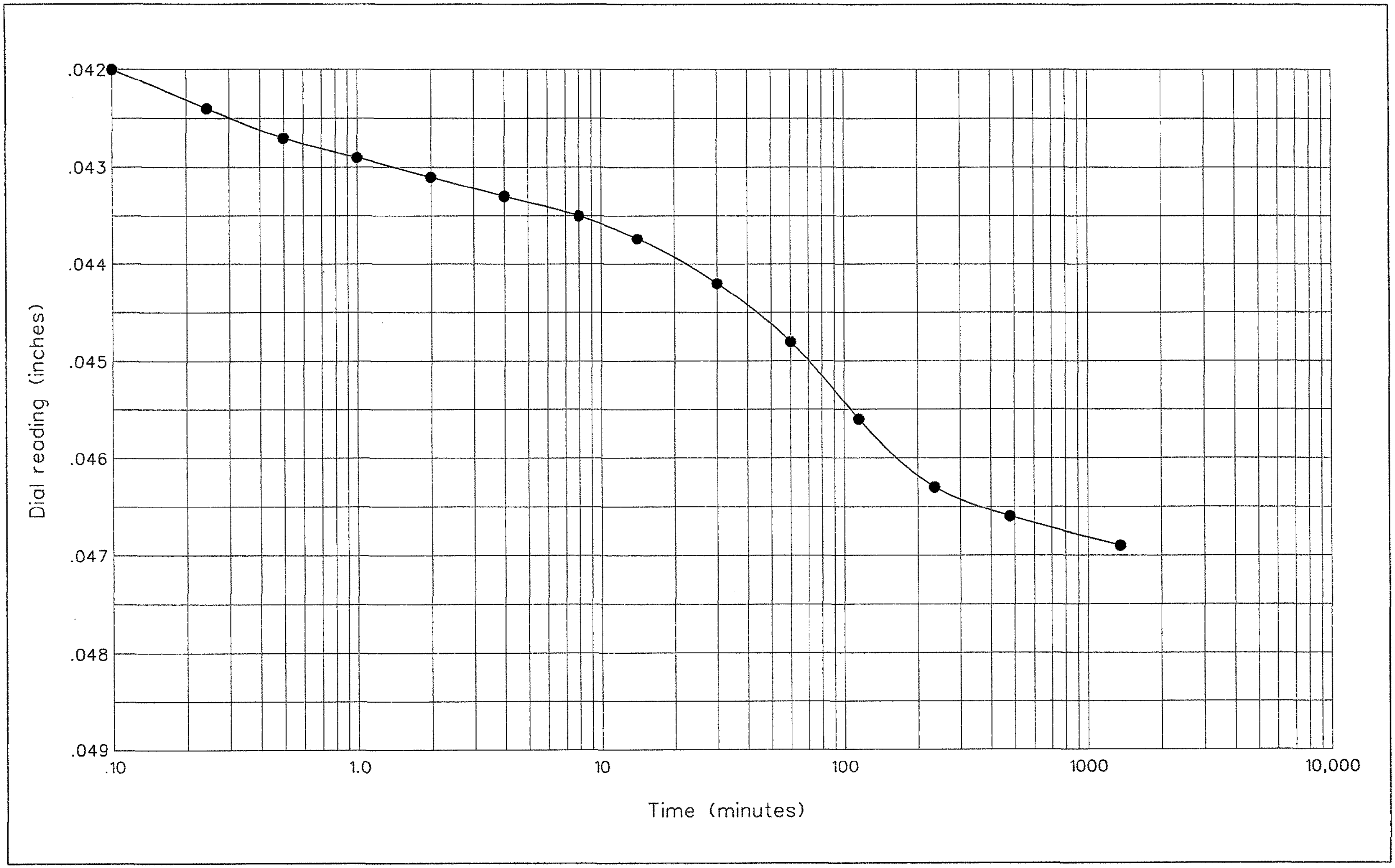
RB&G ENGINEERING, INC.

Hole no.: 09-W5-5
Depth: 7.5'-9'
Load: 0.29 to 0.58 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



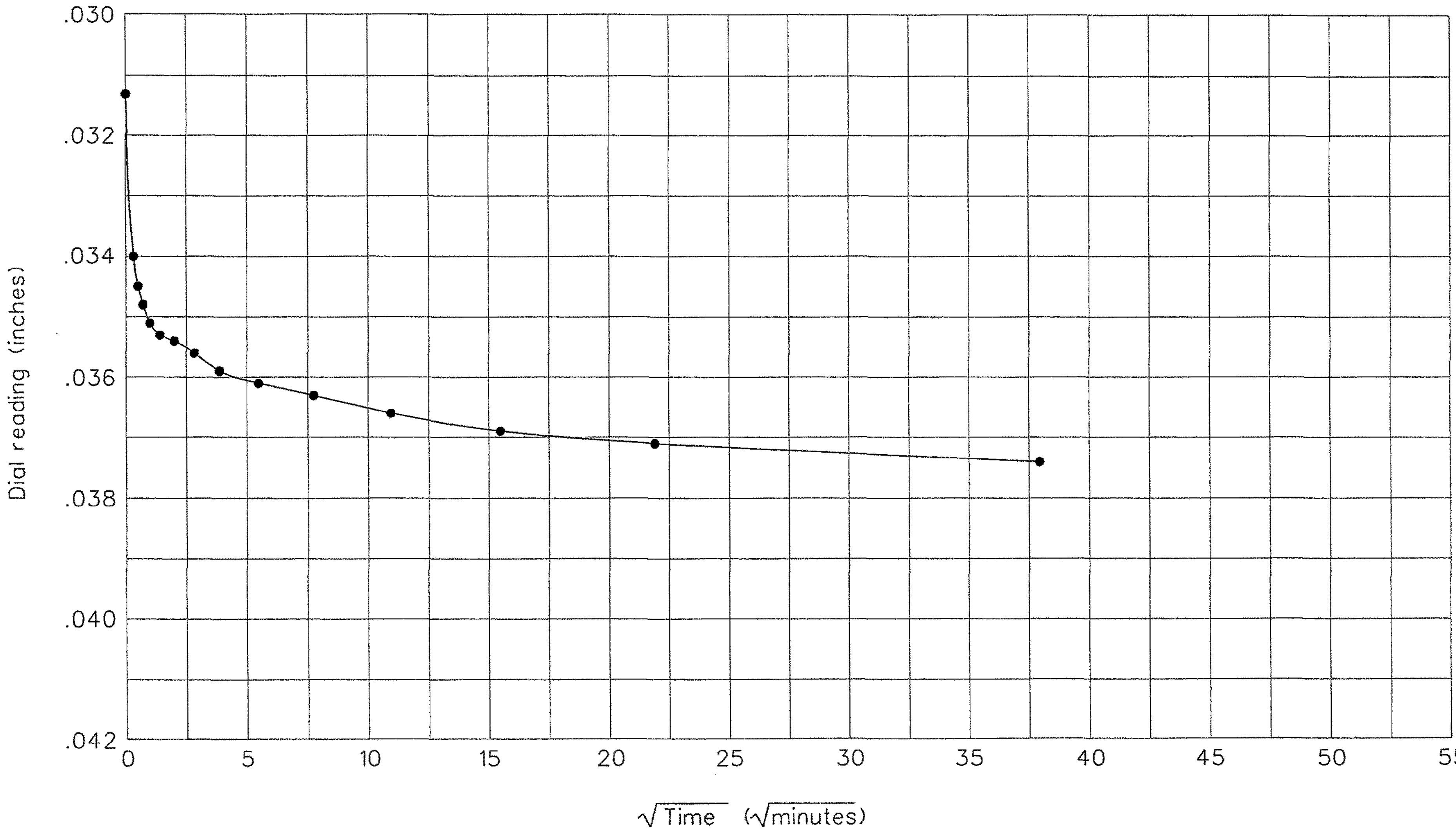
RB&G ENGINEERING, INC.

Hole no.: 09-W5-5
Depth: 7.5'-9'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



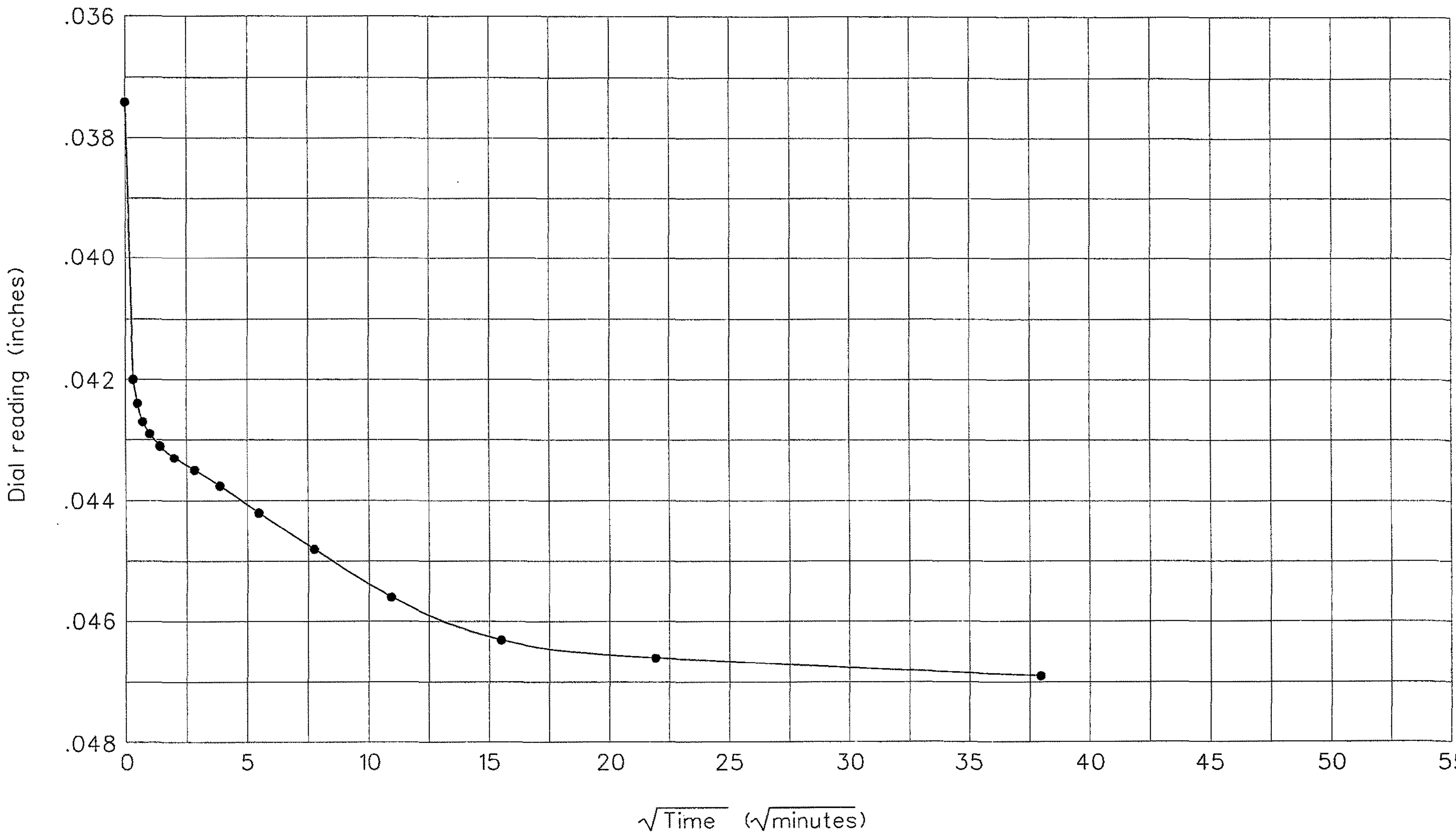
RB&G ENGINEERING, INC.

Hole no.: 09-W5-5
Depth: 7.5'-9'
Load: 0.29 to 0.58 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



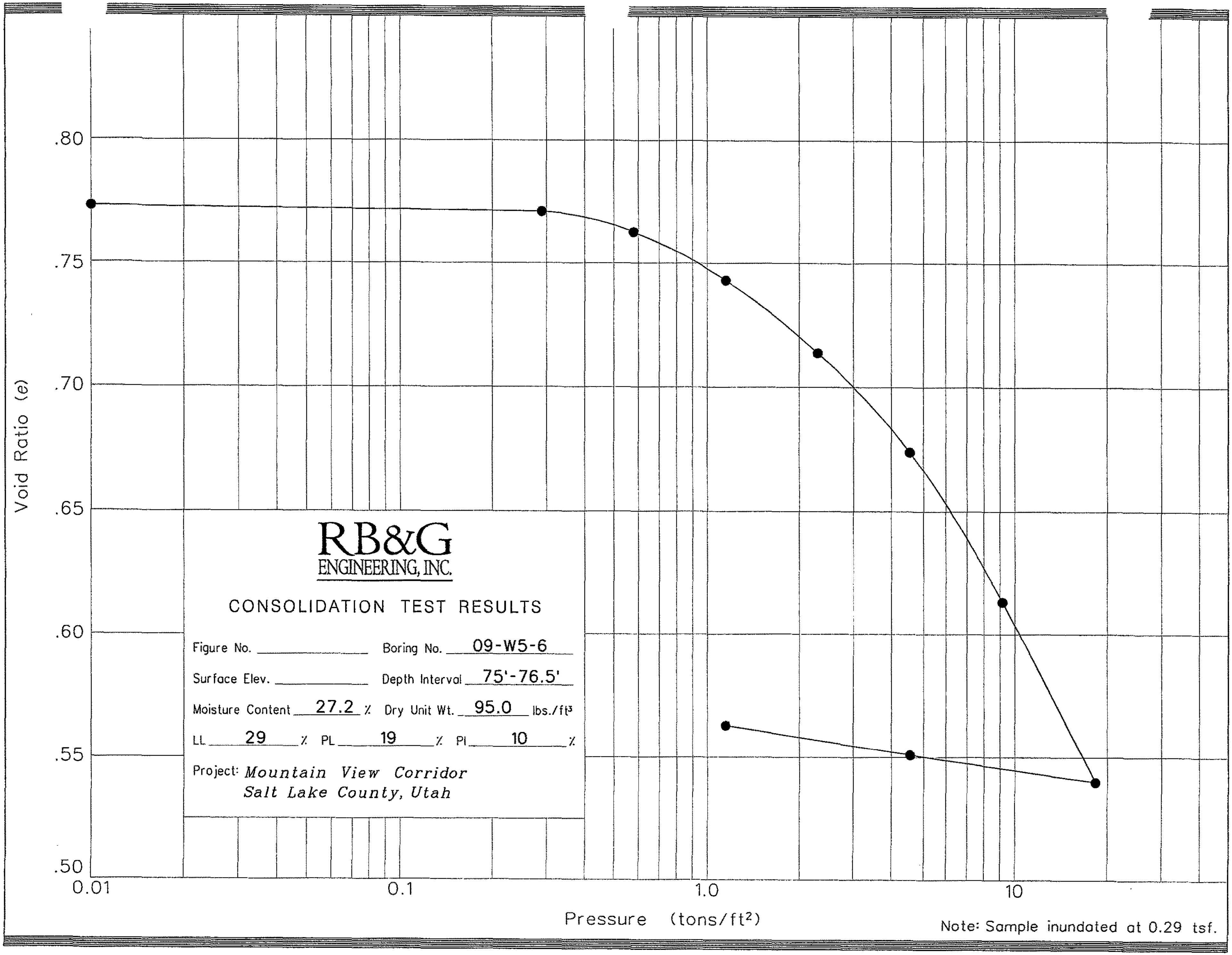
RB&G
ENGINEERING, INC.

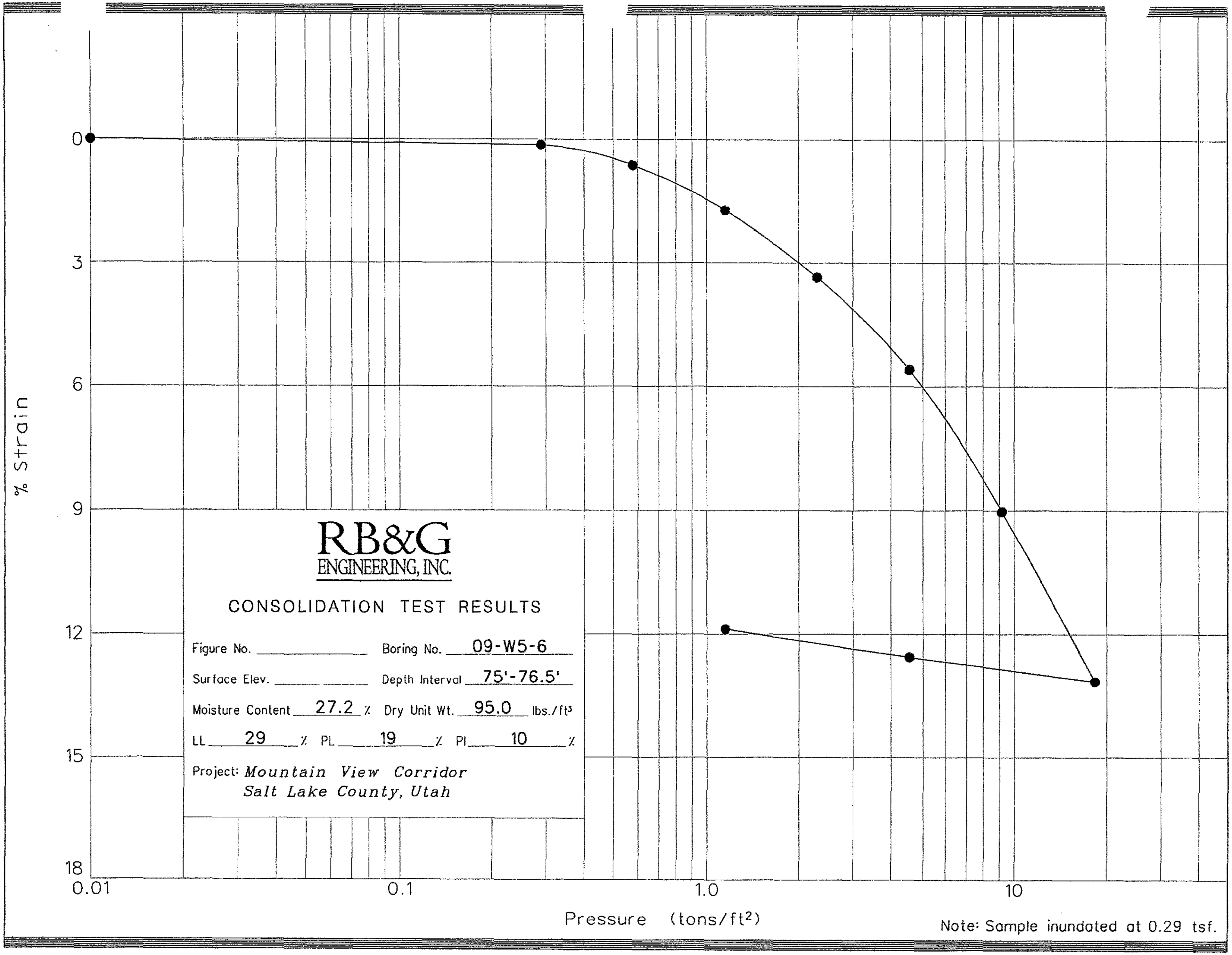
Hole no.: 09-W5-5
Depth: 7.5'-9'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

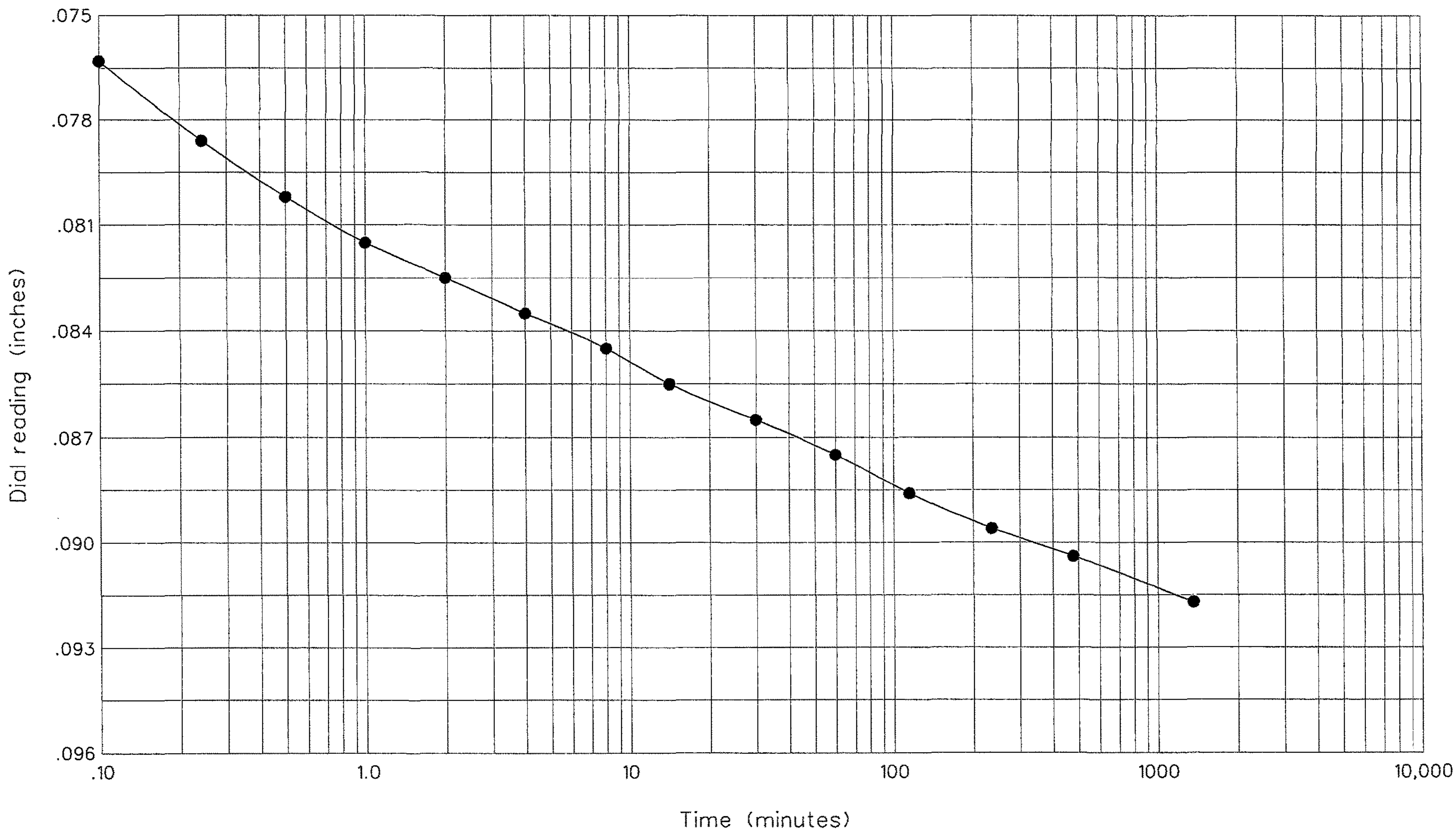
Mountain View Corridor
Salt Lake County, Utah

Figure


Void Ratio (e)
.80
.75
.70
.65
.60
.55
.50
0.01
0.1
1.0
10
Pressure (tons/ft²)
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-W5-6
Surface Elev.
Depth Interval 75'-76.5'
Moisture Content 27.2 % Dry Unit Wt. 95.0 lbs./ft³
LL 29 % PL 19 % PI 10 %
Project: Mountain View Corridor
Salt Lake County, Utah
Note: Sample inundated at 0.29 tsf.



% Strain
0
3
6
9
12
15
18
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-W5-6
Surface Elev.
Depth Interval 75'-76.5'
Moisture Content 27.2 % Dry Unit Wt. 95.0 lbs./ft³
LL 29 % PL 19 % PI 10 %
Project: Mountain View Corridor
Salt Lake County, Utah



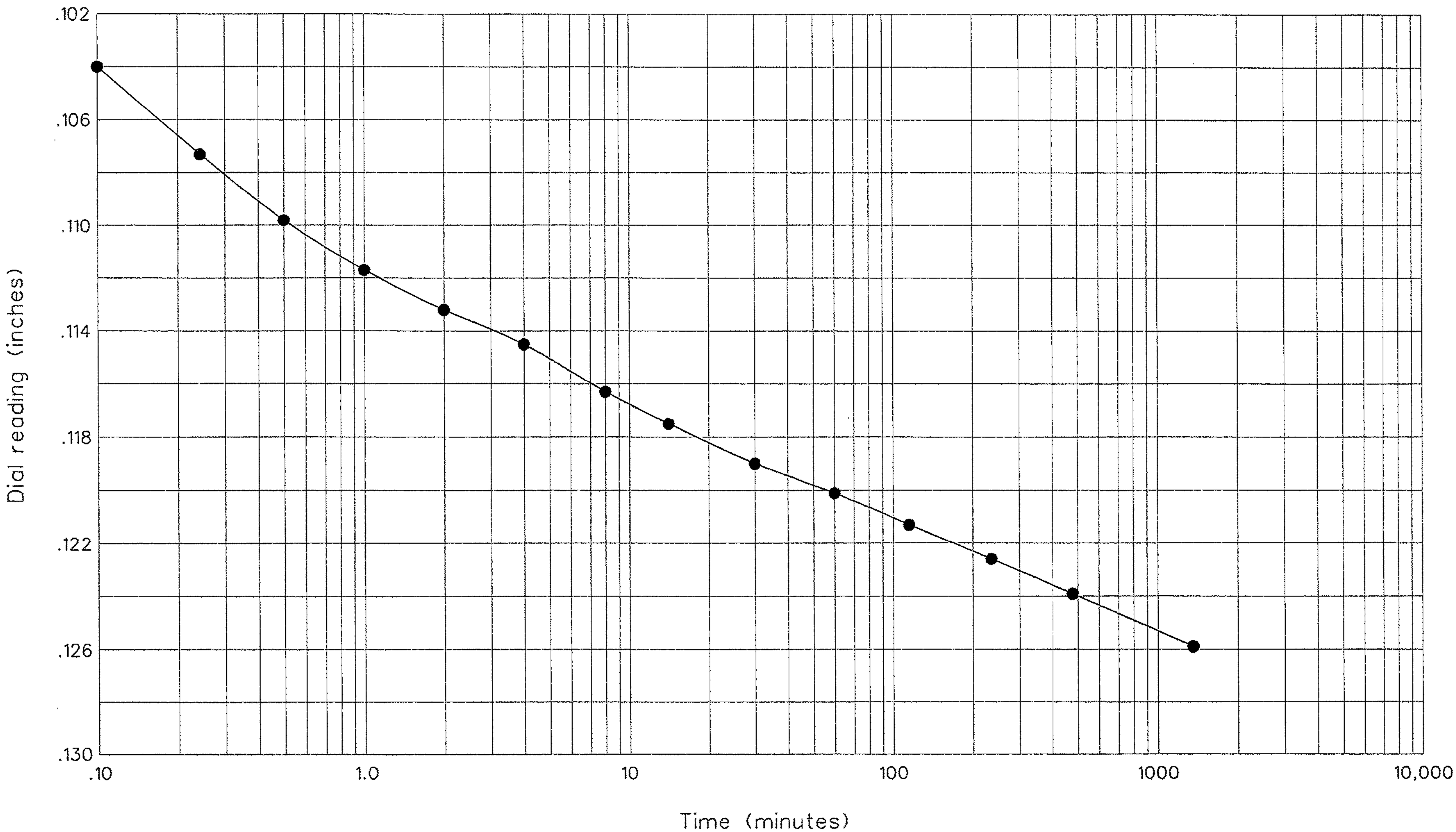
RB&G ENGINEERING, INC.

Hole no.: 09-W5-6
Depth: 75'-76.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



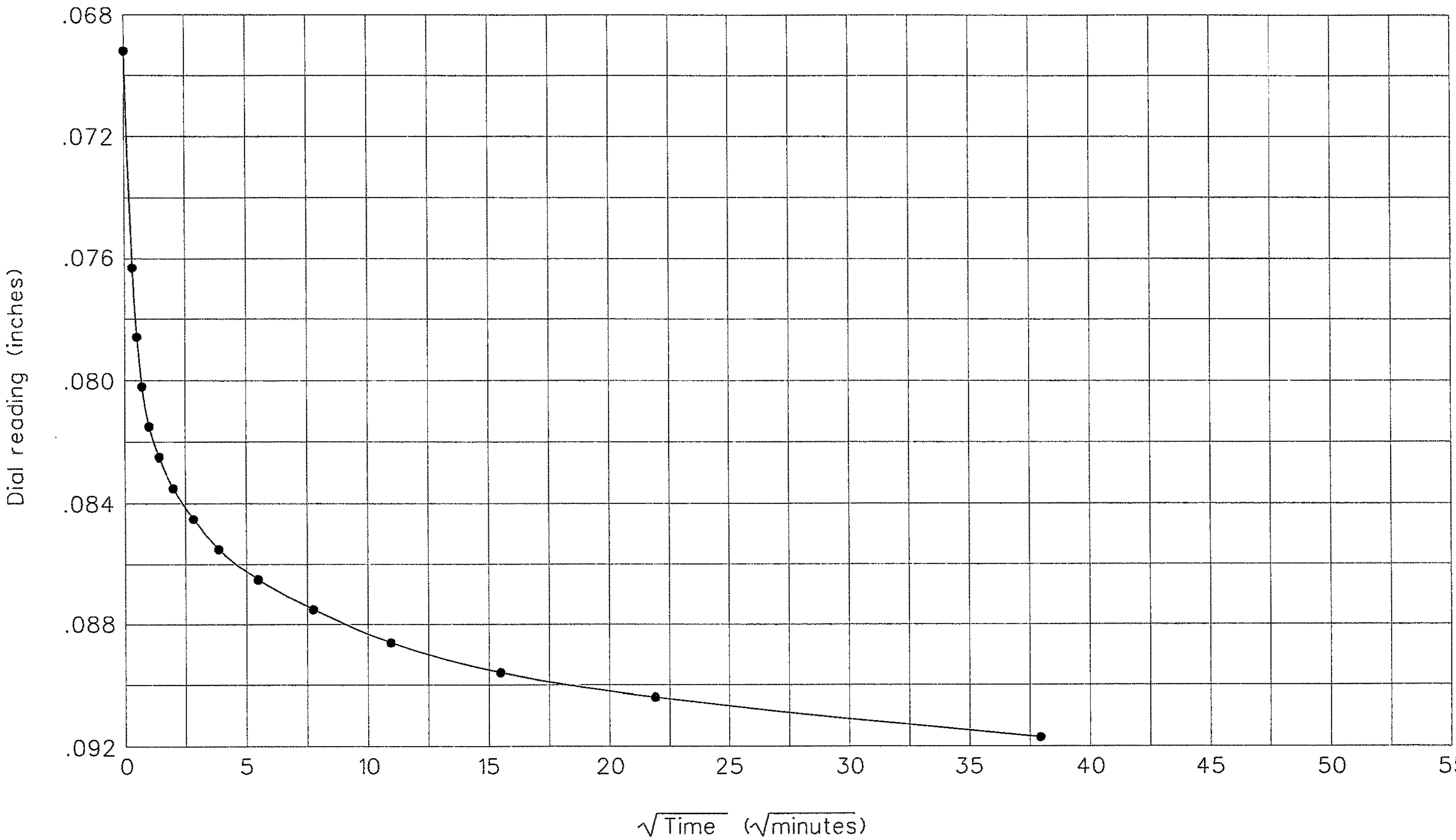
RB&G
ENGINEERING, INC.

Hole no.: 09-W5-6
Depth: 75'-76.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



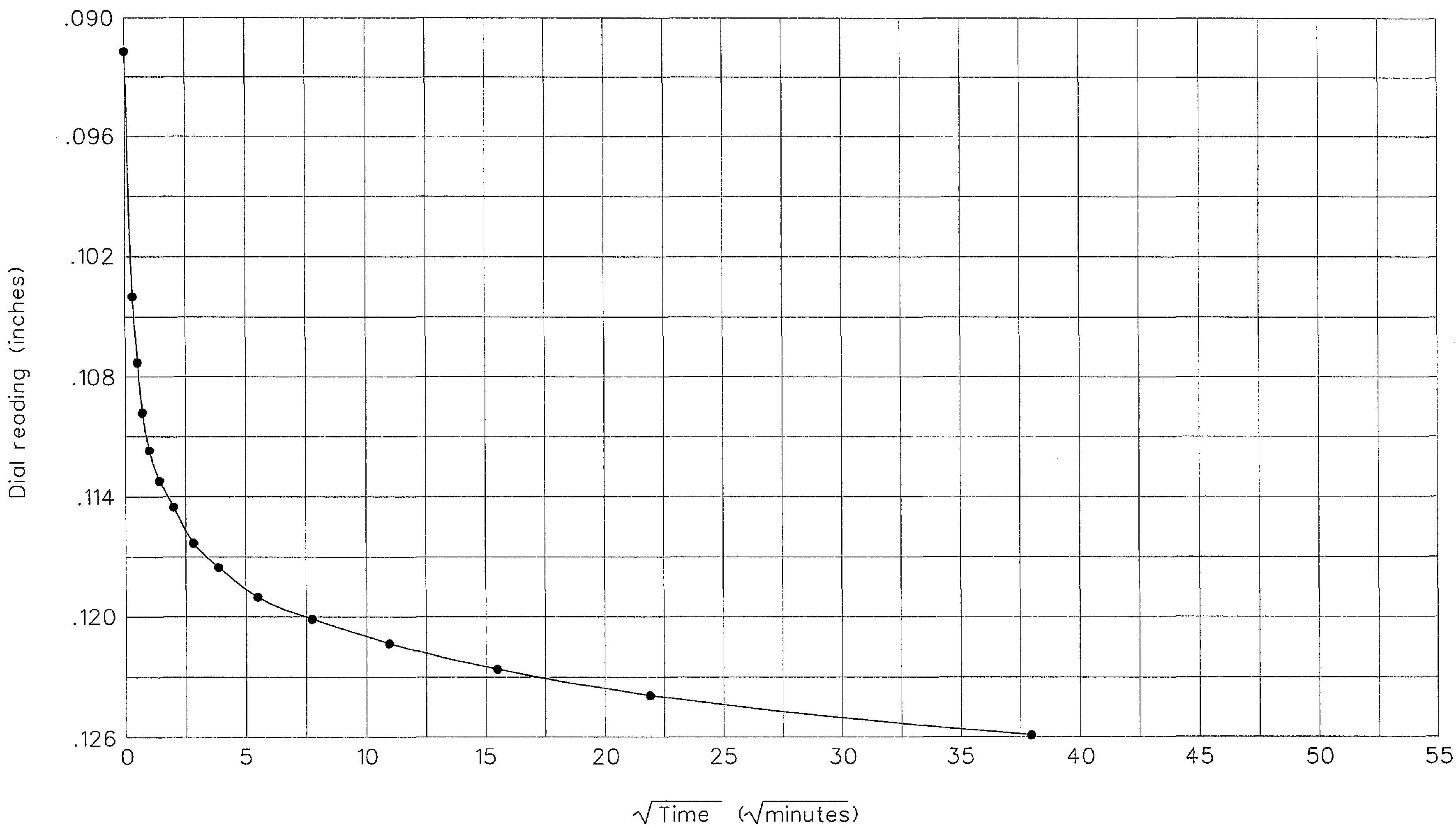
RB&G ENGINEERING, INC.

Hole no.: 09-W5-6
Depth: 75'-76.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



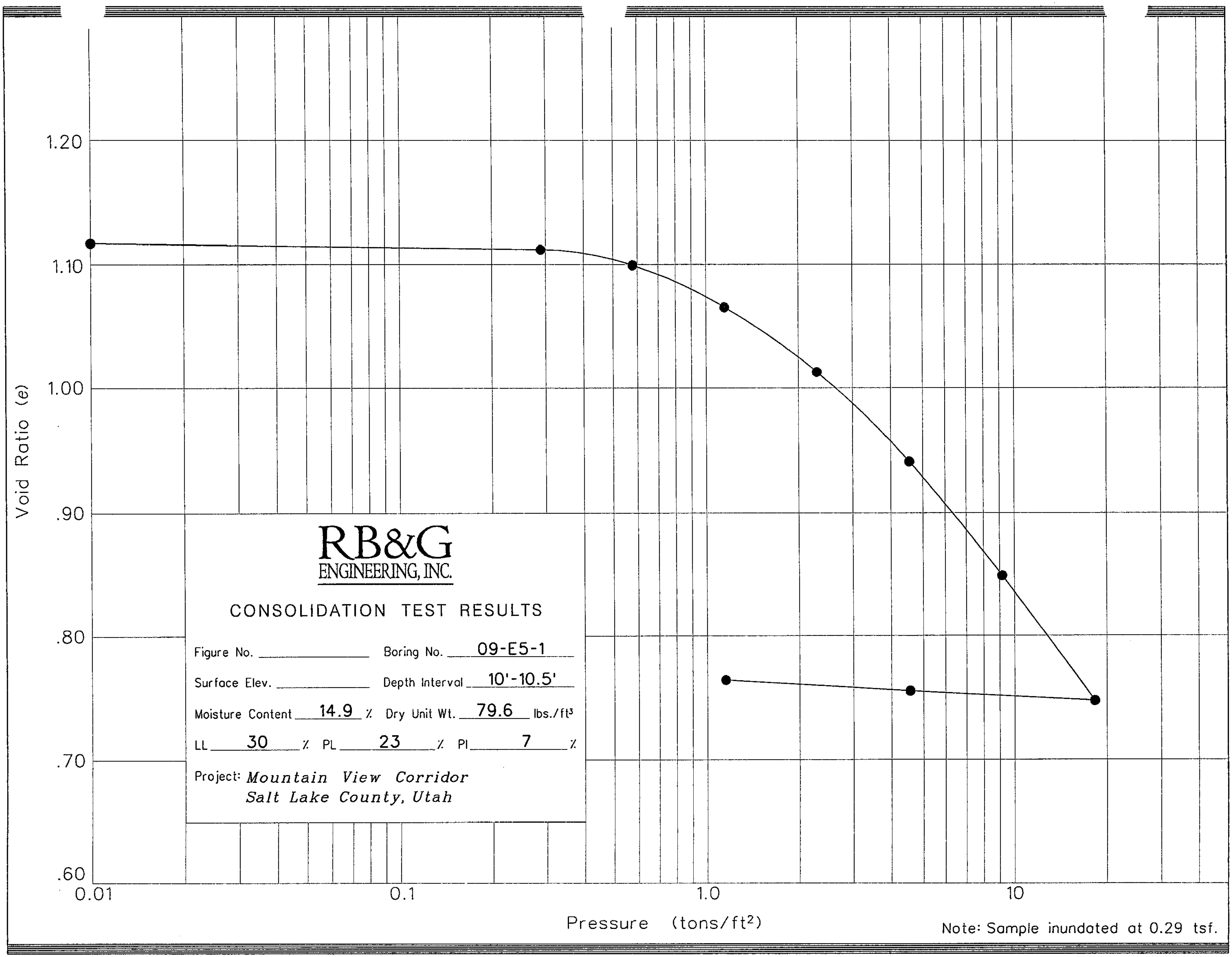
RB&G ENGINEERING, INC.

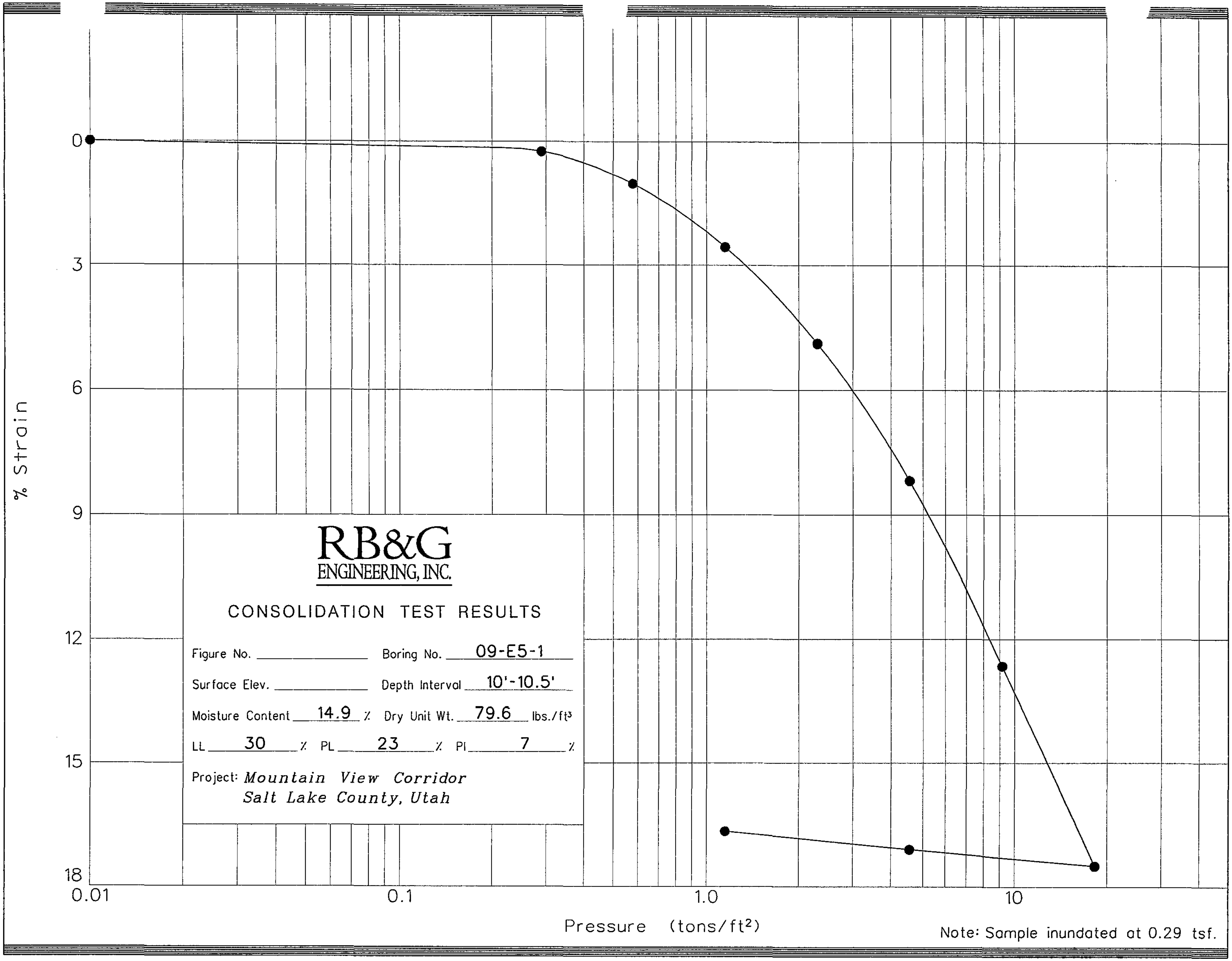
Hole no.: 09-W5-6
Depth: 75'-76.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

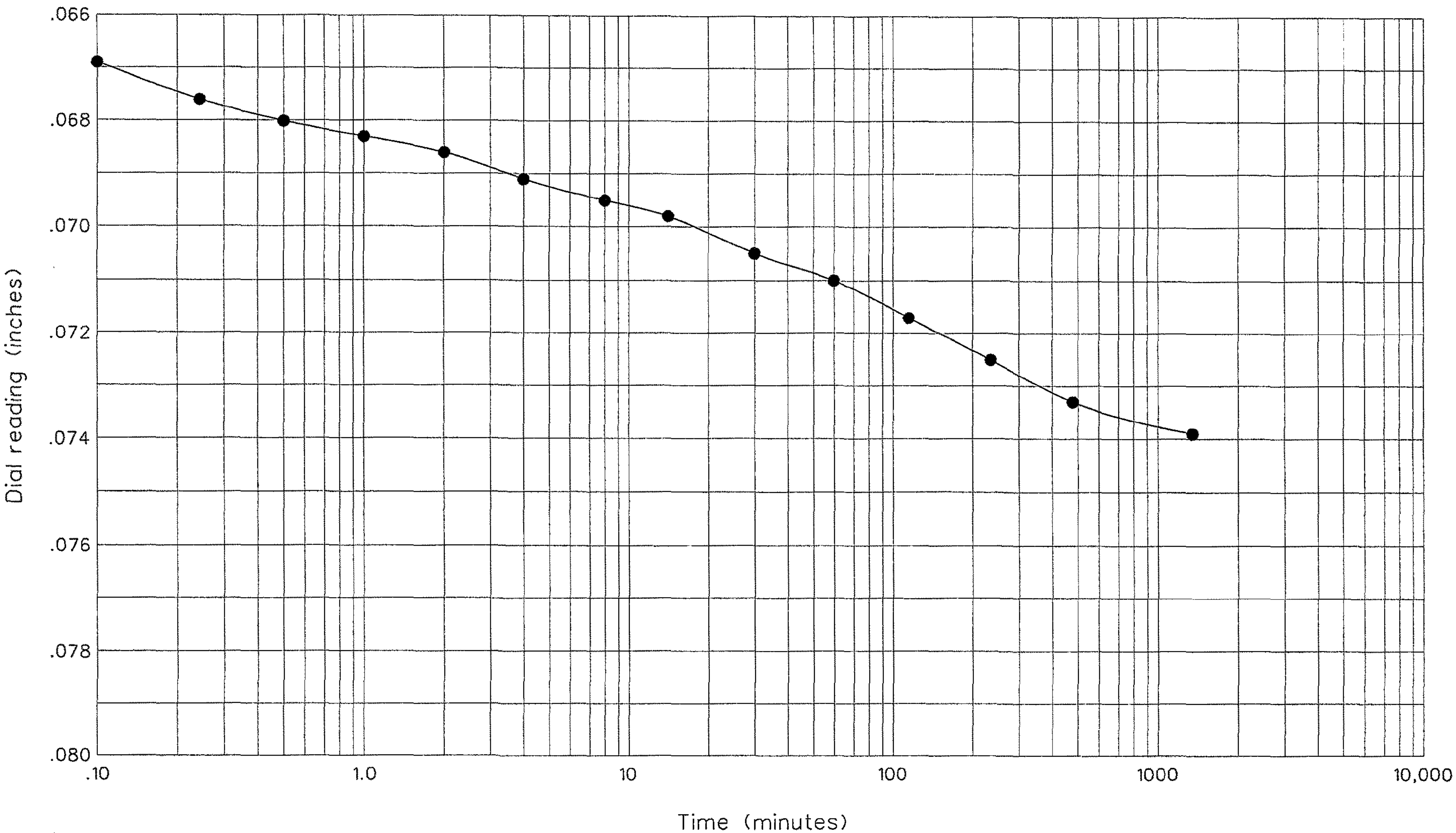
Mountain View Corridor
Salt Lake County, Utah

Figure


RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-1
Surface Elev.
Depth Interval 10'-10.5'
Moisture Content 14.9 % Dry Unit Wt. 79.6 lbs./ft³
LL 30 % PL 23 % PI 7 %
Project: Mountain View Corridor
Salt Lake County, Utah
Void Ratio (e)
1.20
1.10
1.00
.90
.80
.70
.60
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



% Strain
0
3
6
9
12
15
18
0.01
0.1
1.0
10
Pressure (tons/ft²)
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-1
Surface Elev.
Depth Interval 10'-10.5'
Moisture Content 14.9 %
Dry Unit Wt. 79.6 lbs./ft³
LL 30 %
PL 23 %
PI 7 %
Project: Mountain View Corridor
Salt Lake County, Utah
Note: Sample inundated at 0.29 tsf.



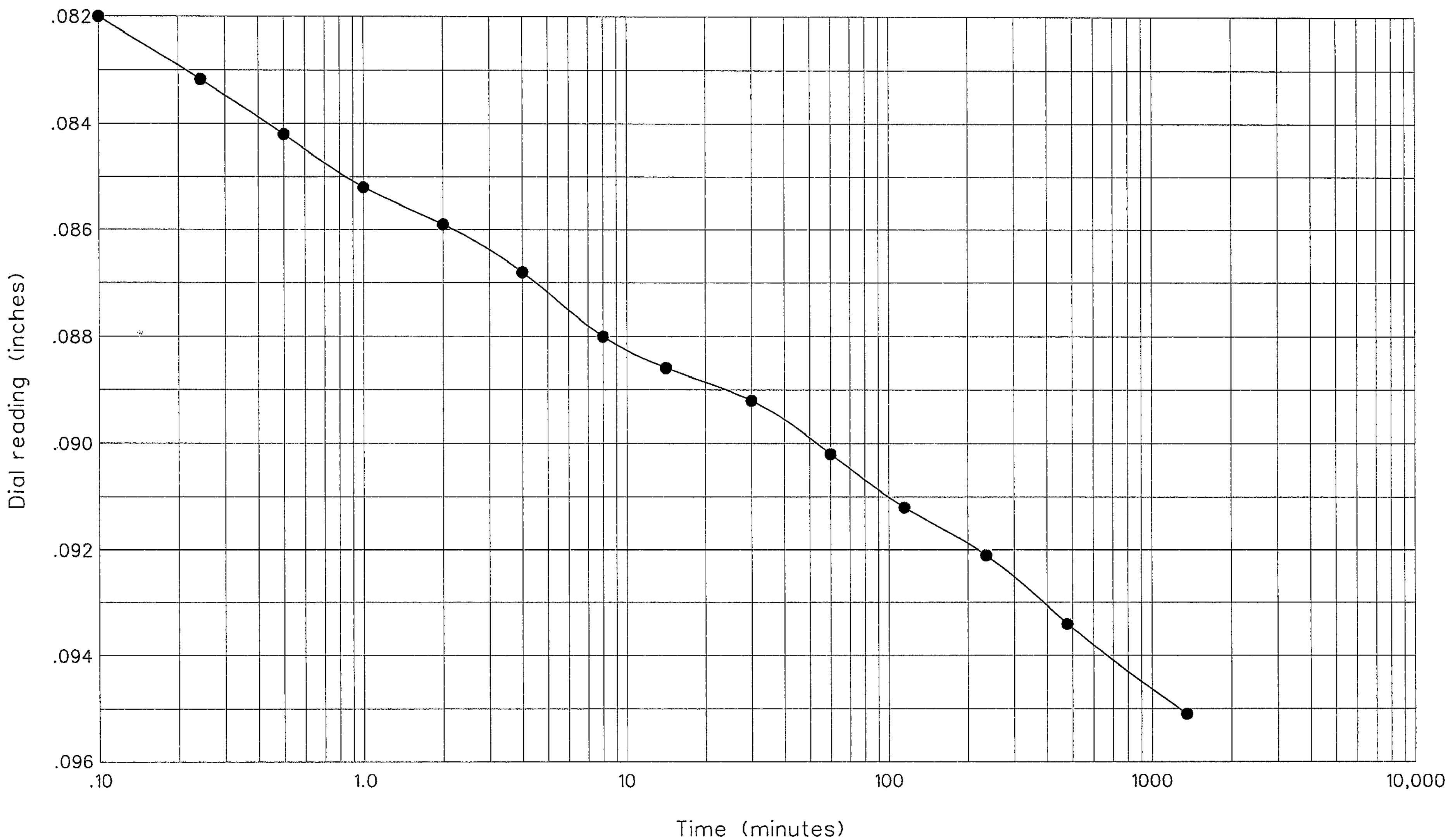
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 10'-10.5'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



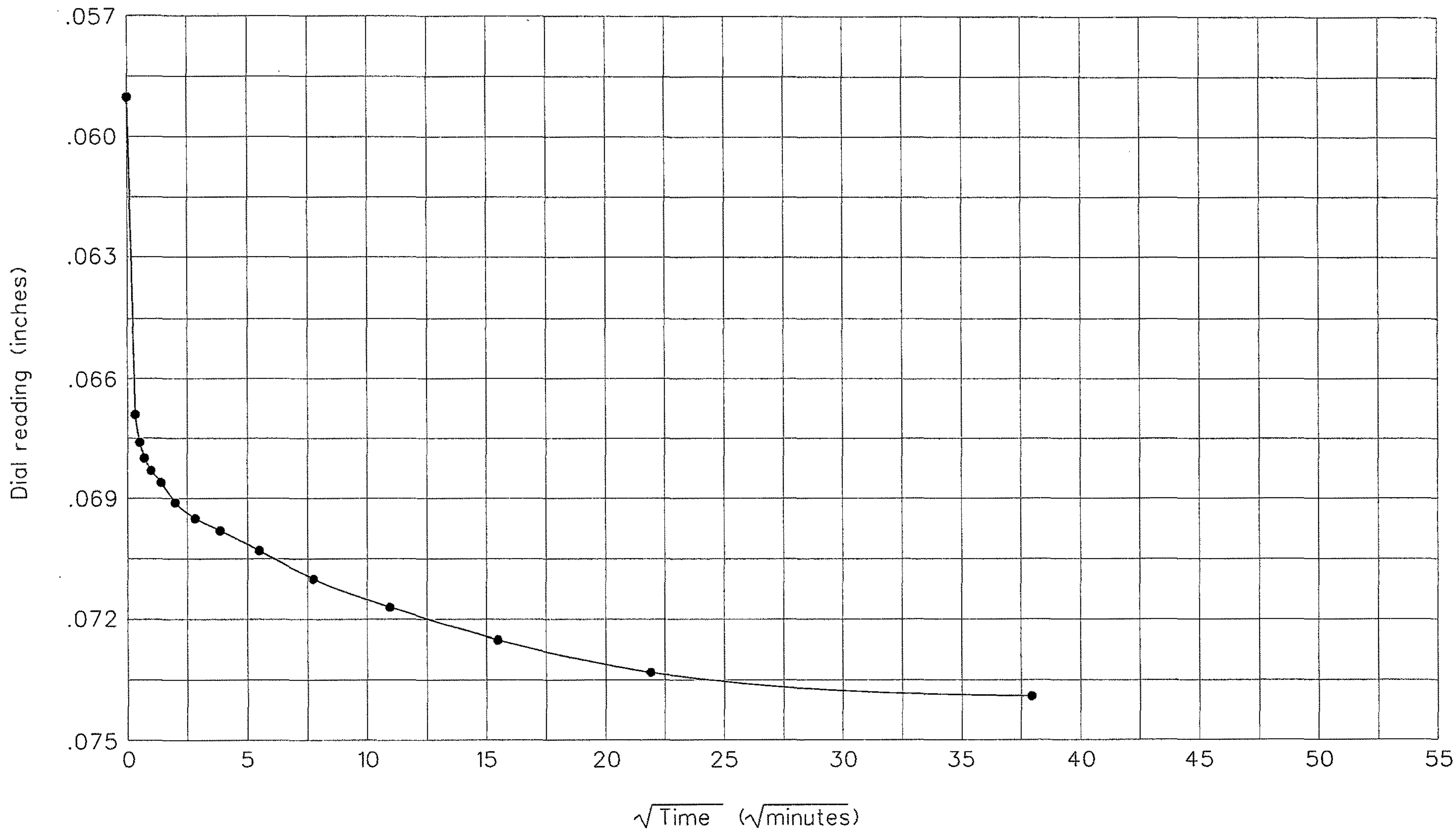
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 10'-10.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



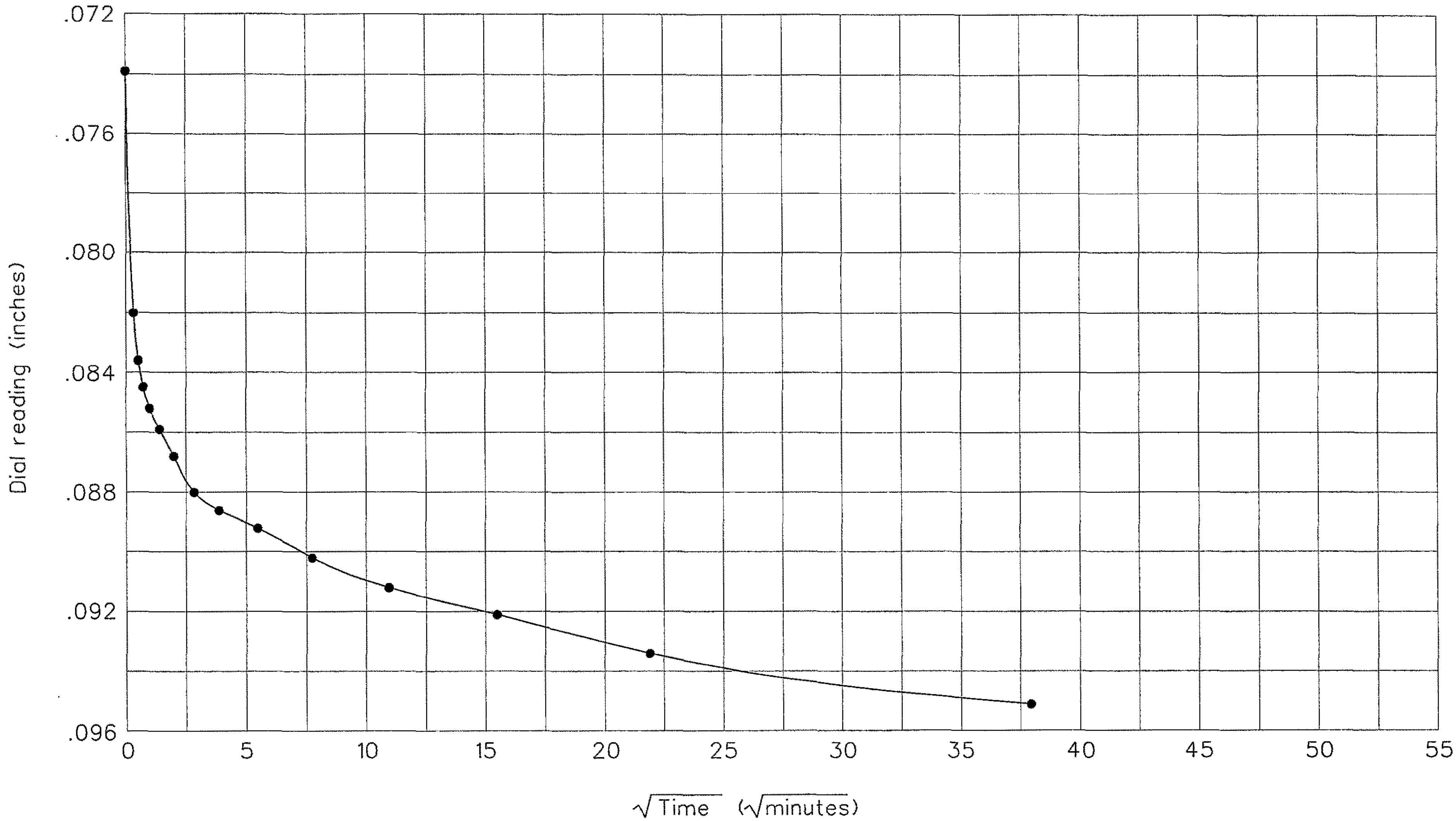
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 10'-10.5'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



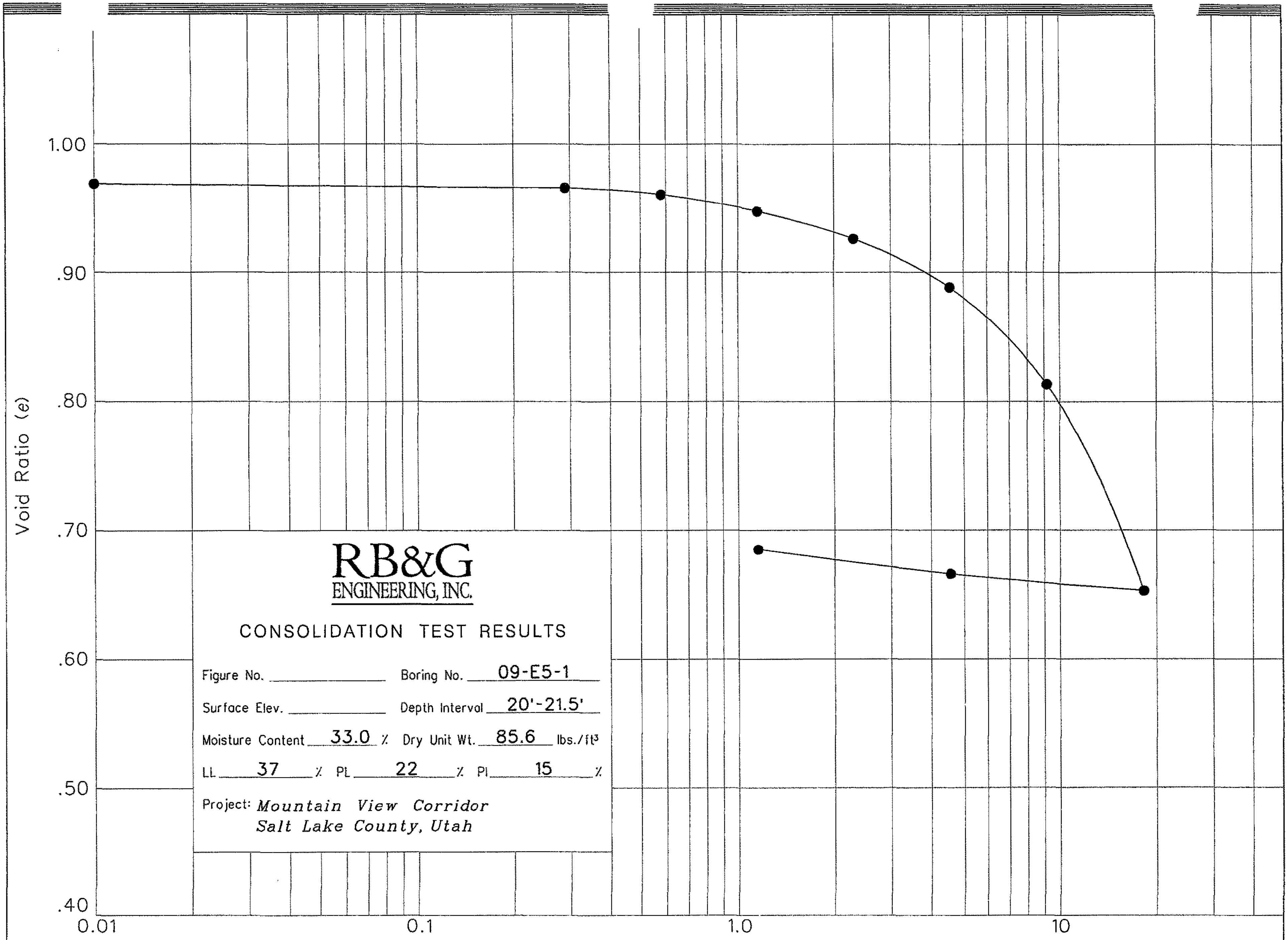
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 10'-10.5'
Load: 1.15 to 2.30 tons

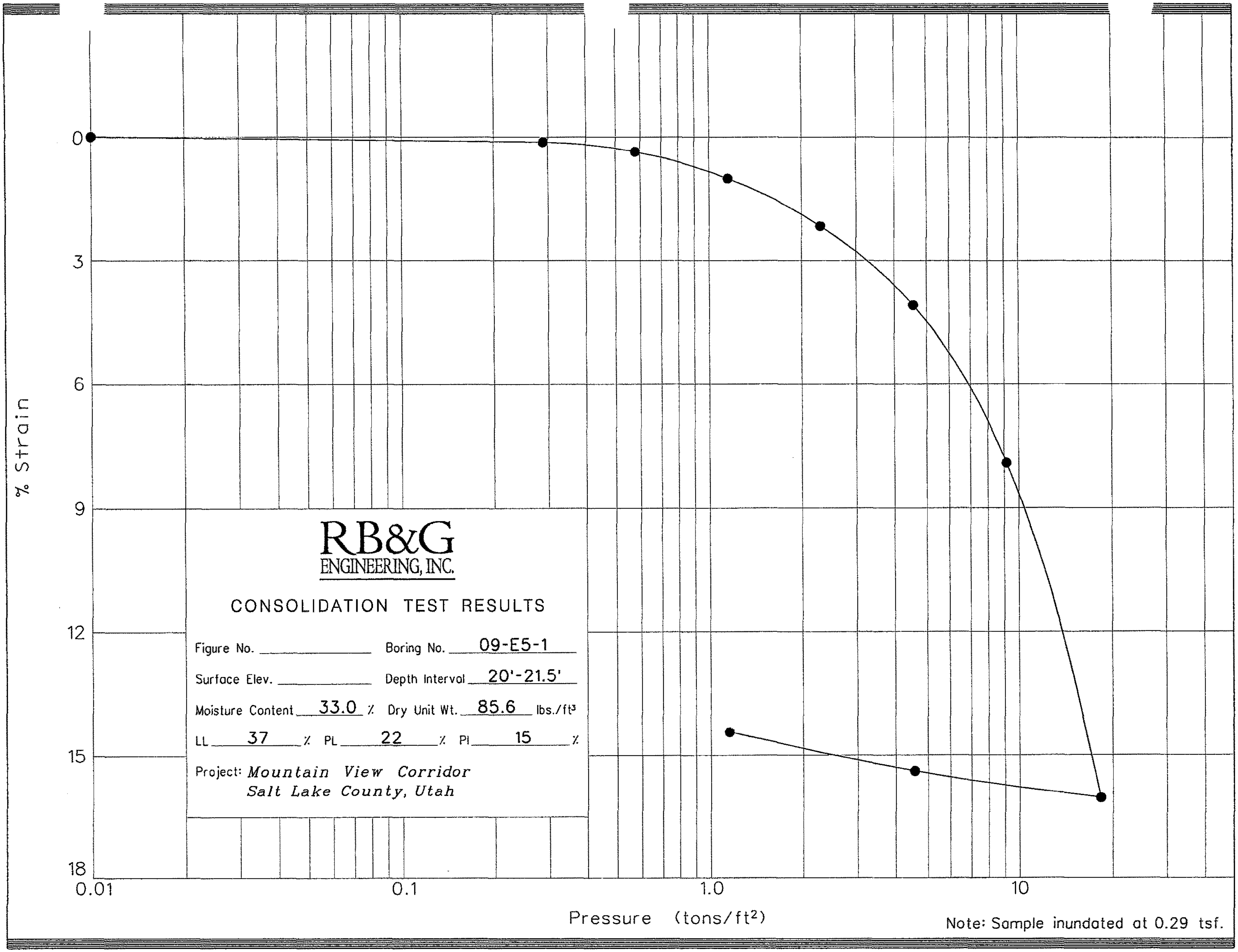
TIME CONSOLIDATION

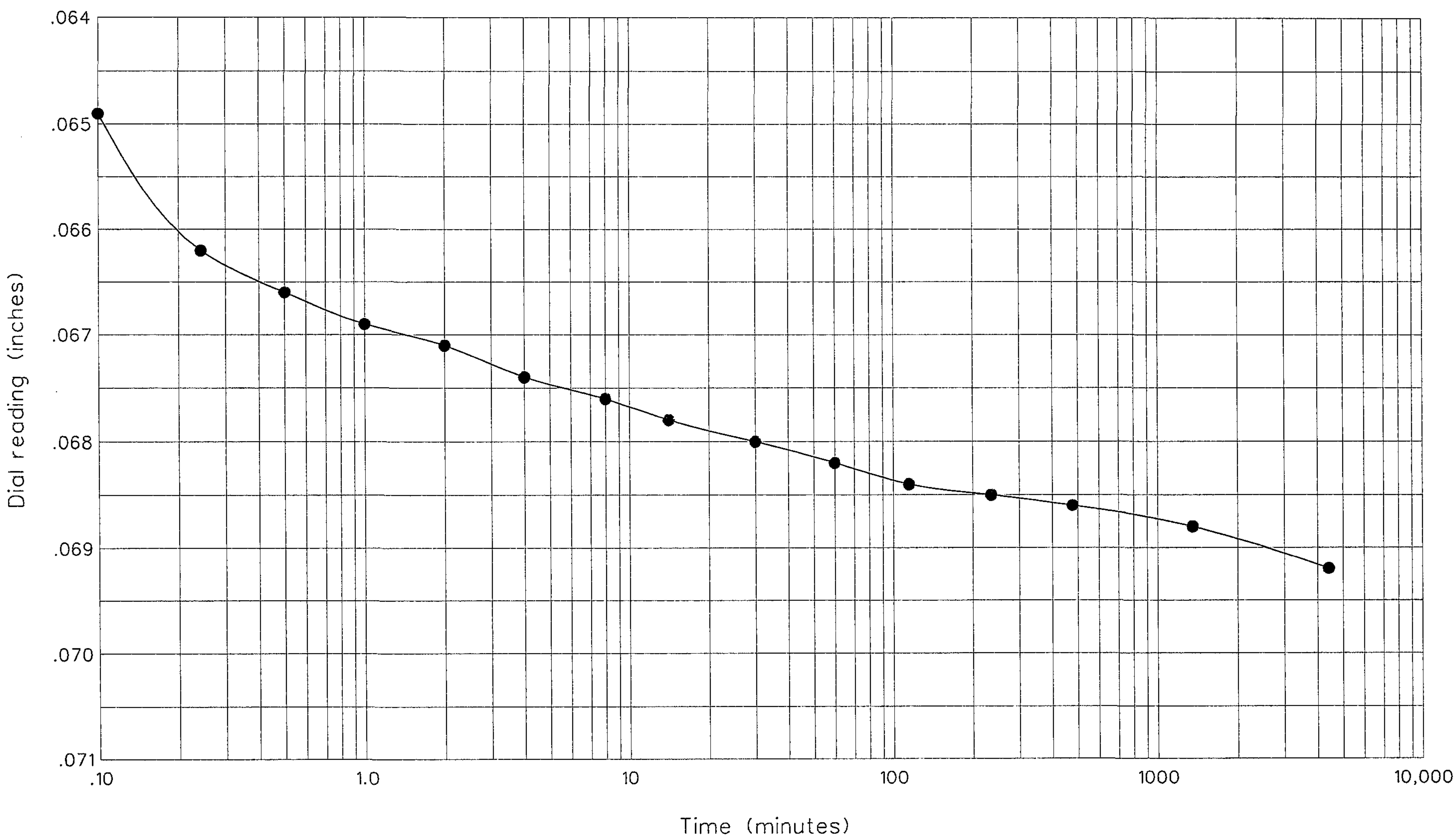
Mountain View Corridor
Salt Lake County, Utah

Figure



Note: Sample inundated at 0.29 tsf.


0
3
6
9
12
15
18
% Strain
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-1
Surface Elev.
Depth Interval 20'-21.5'
Moisture Content 33.0 %
Dry Unit Wt. 85.6 lbs./ft³
LL 37 %
PL 22 %
PI 15 %
Project: Mountain View Corridor
Salt Lake County, Utah



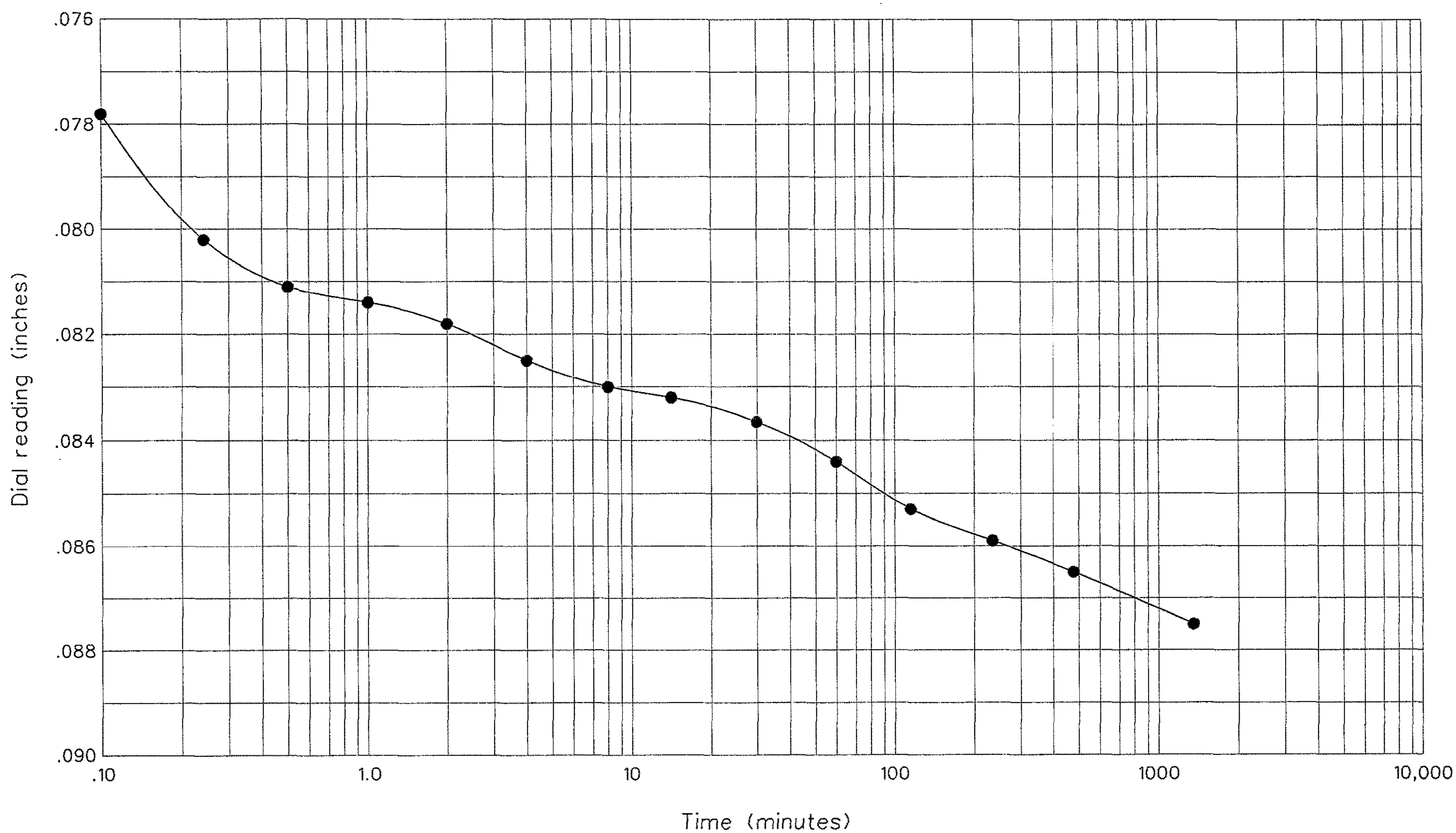
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 20'-21.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



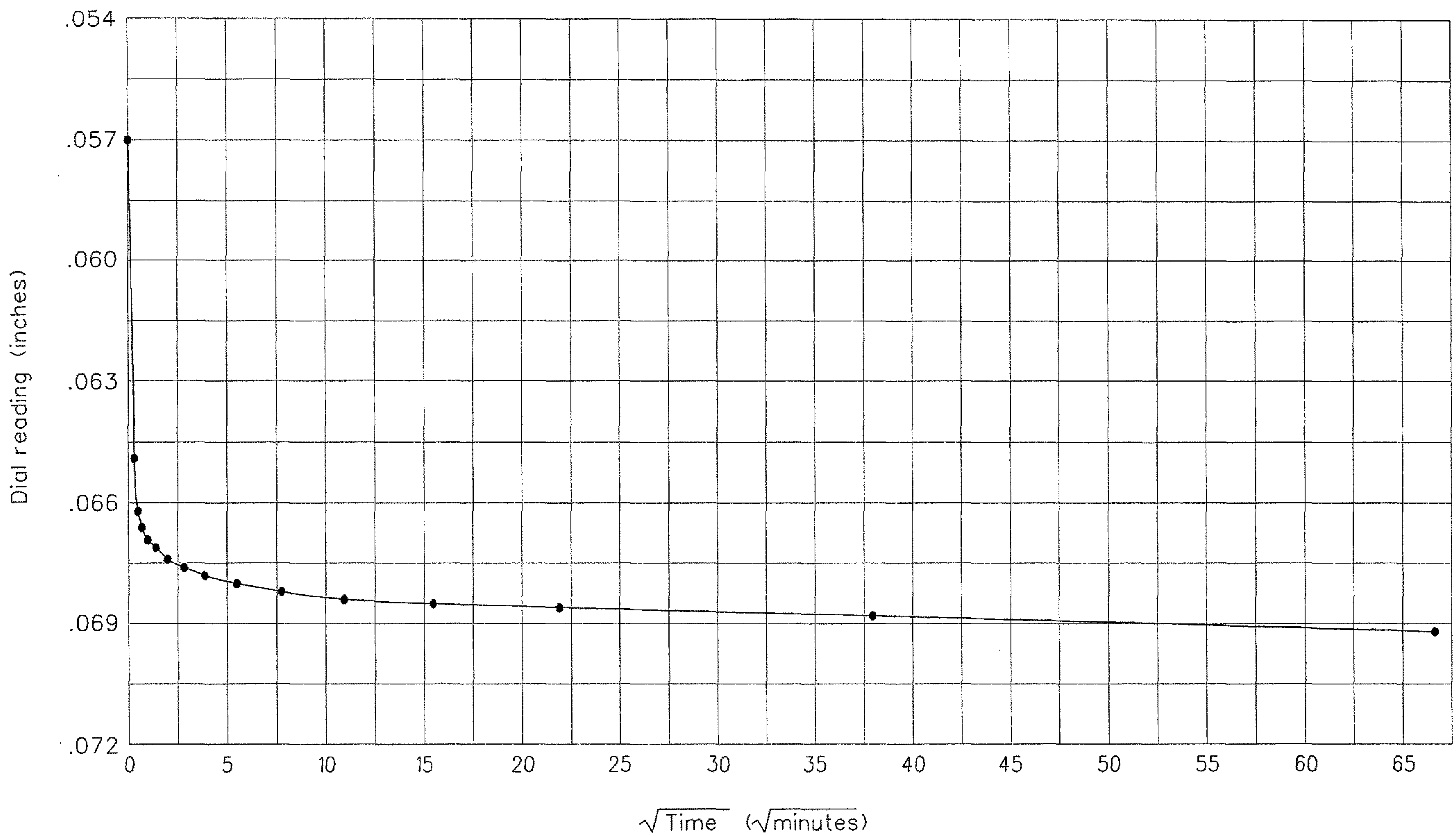
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 20'-21.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



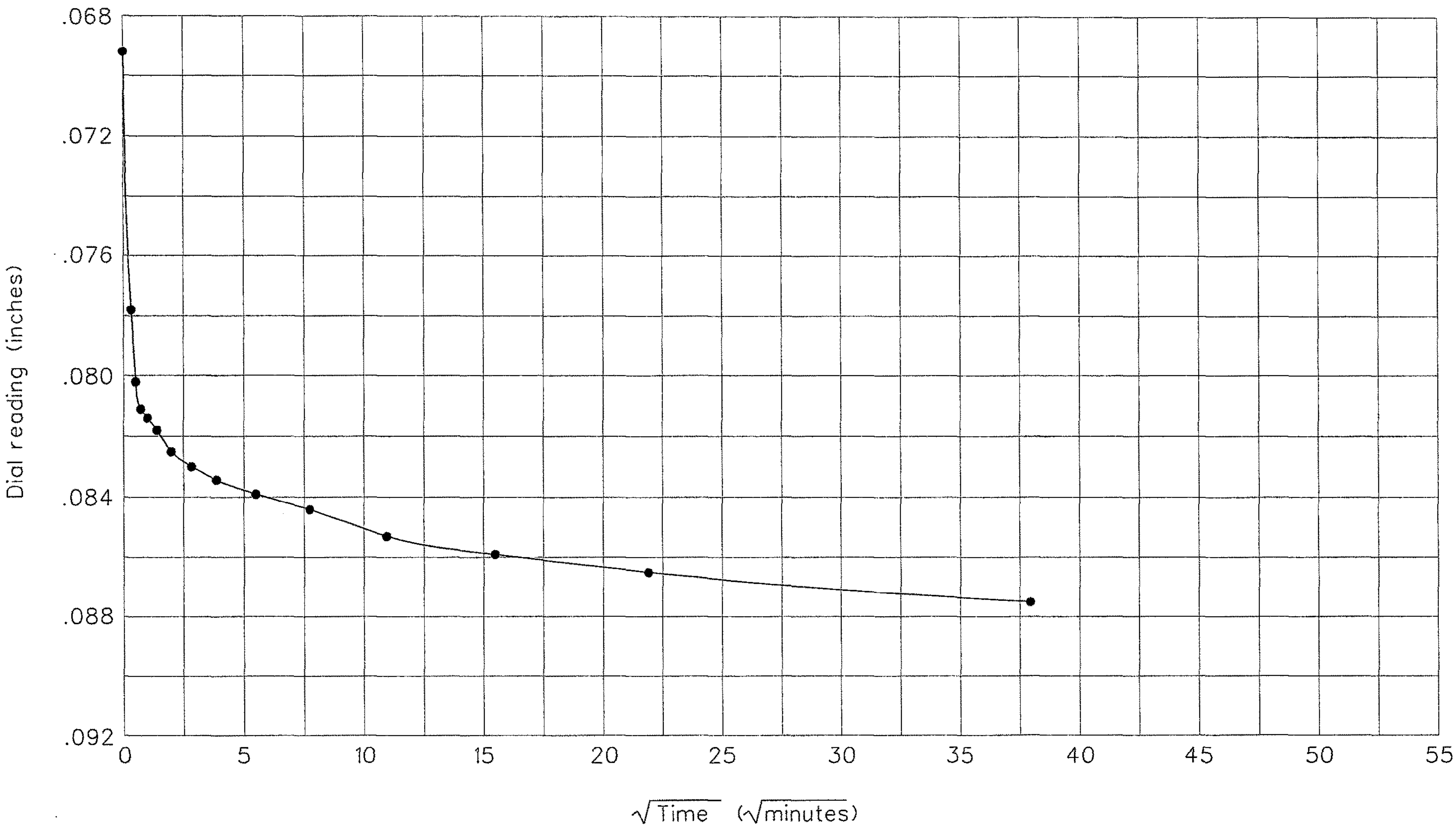
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 20'-21.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



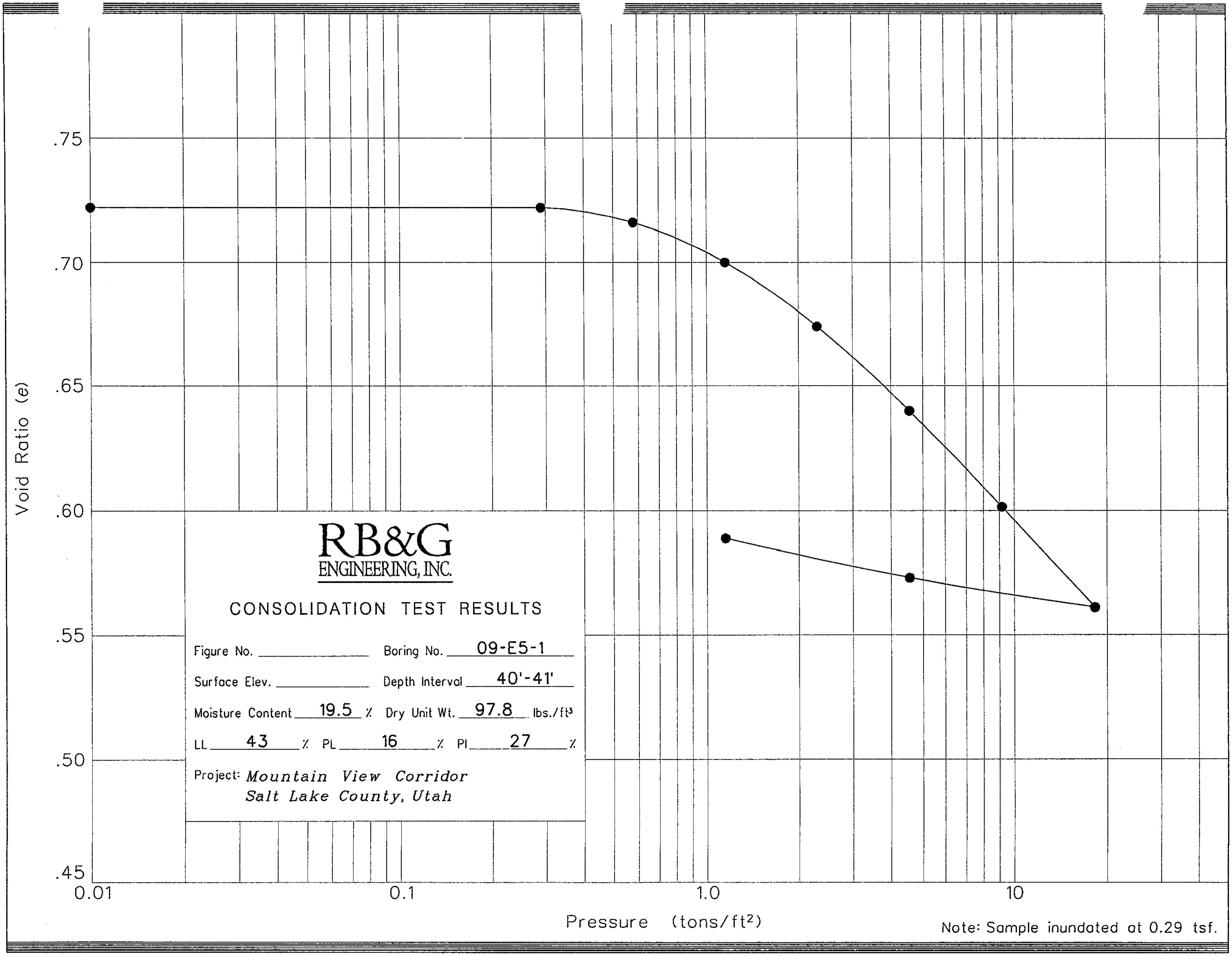
RB&G ENGINEERING, INC.

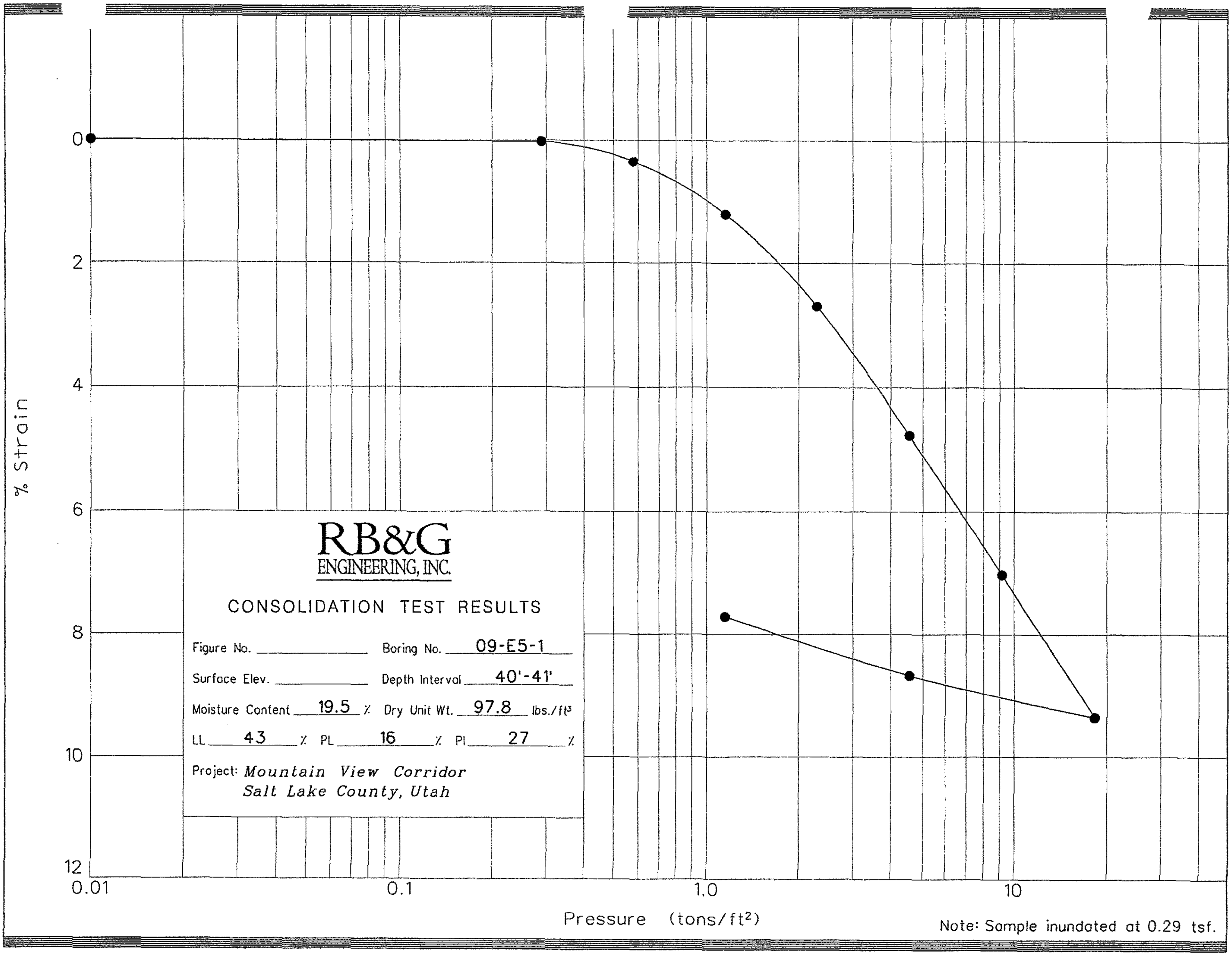
Hole no.: 09-E5-1
Depth: 20'-21.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

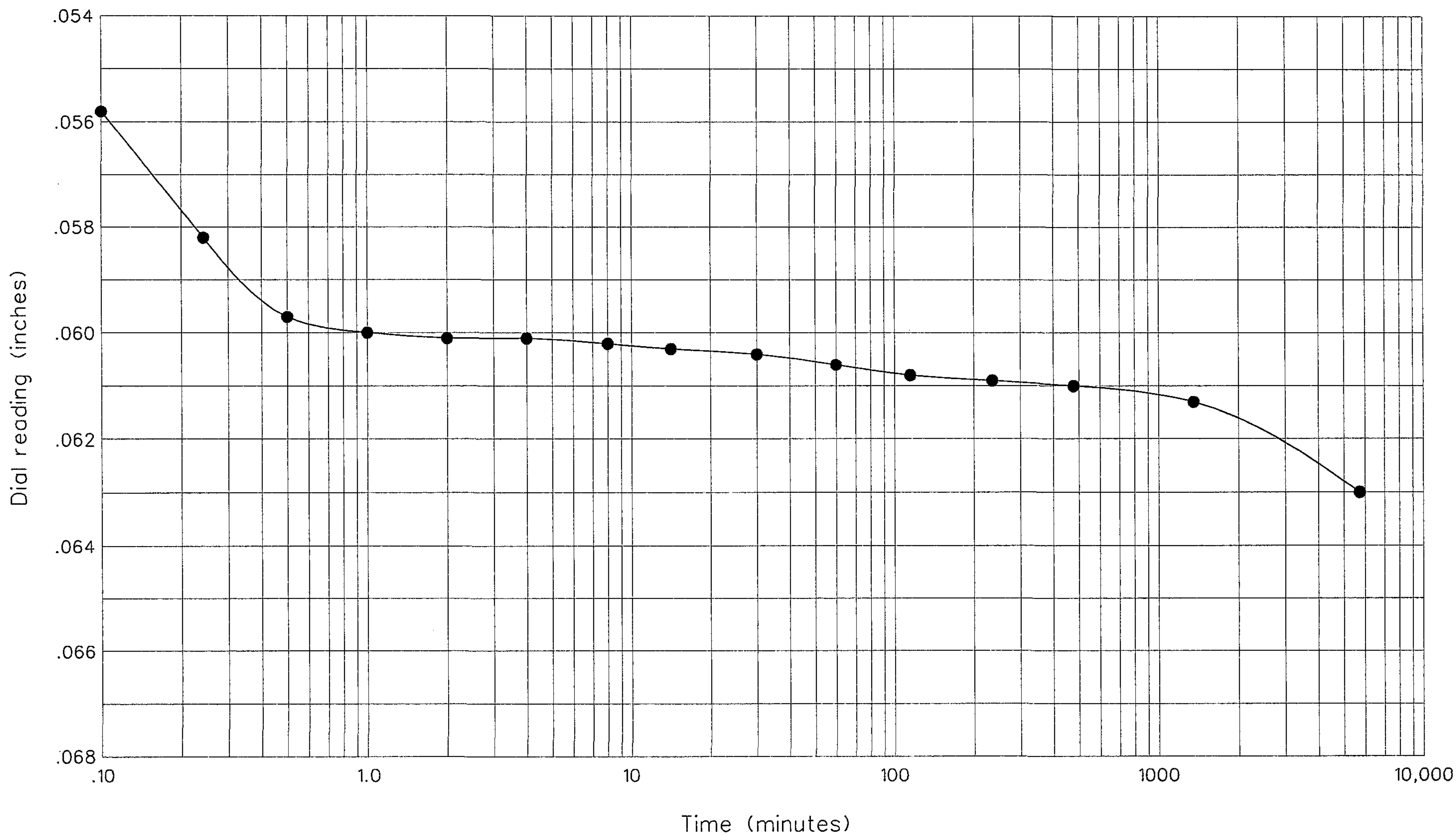
Mountain View Corridor
Salt Lake County, Utah

Figure


.75
.70
.65
.60
.55
.50
.45
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-1
Surface Elev.
Depth Interval 40'-41'
Moisture Content 19.5 %
Dry Unit Wt. 97.8 lbs./ft³
LL 43 %
PL 16 %
PI 27 %
Project: Mountain View Corridor
Salt Lake County, Utah



RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-1
Surface Elev.
Depth Interval 40'-41'
Moisture Content 19.5 %
Dry Unit Wt. 97.8 lbs./ft³
LL 43 %
PL 16 %
PI 27 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



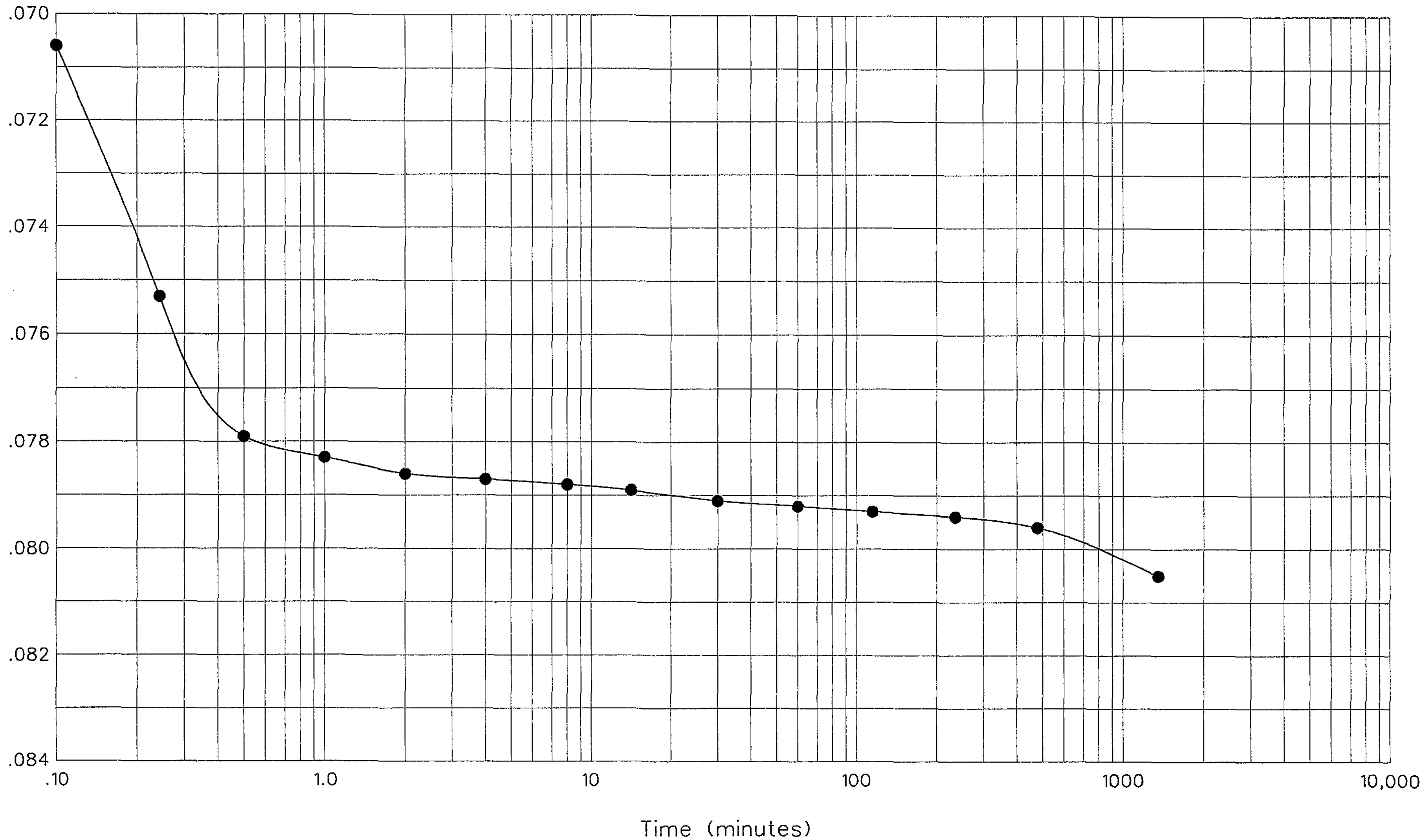
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 40'-41'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



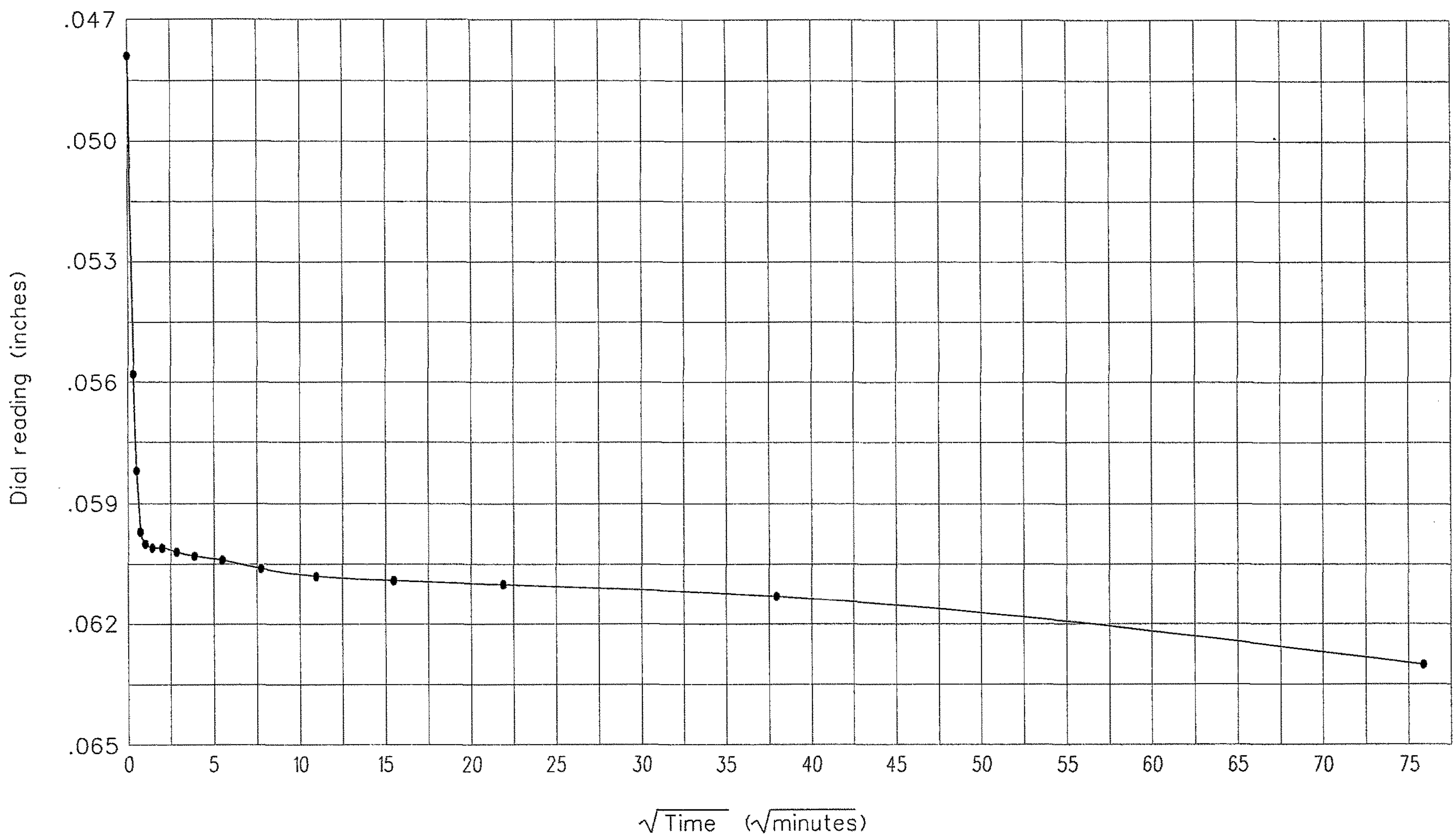
RB&G ENGINEERING, INC.

Hole no.: 09-E5-1
Depth: 40'-41'
Load: 2.30 to 4.60 tons

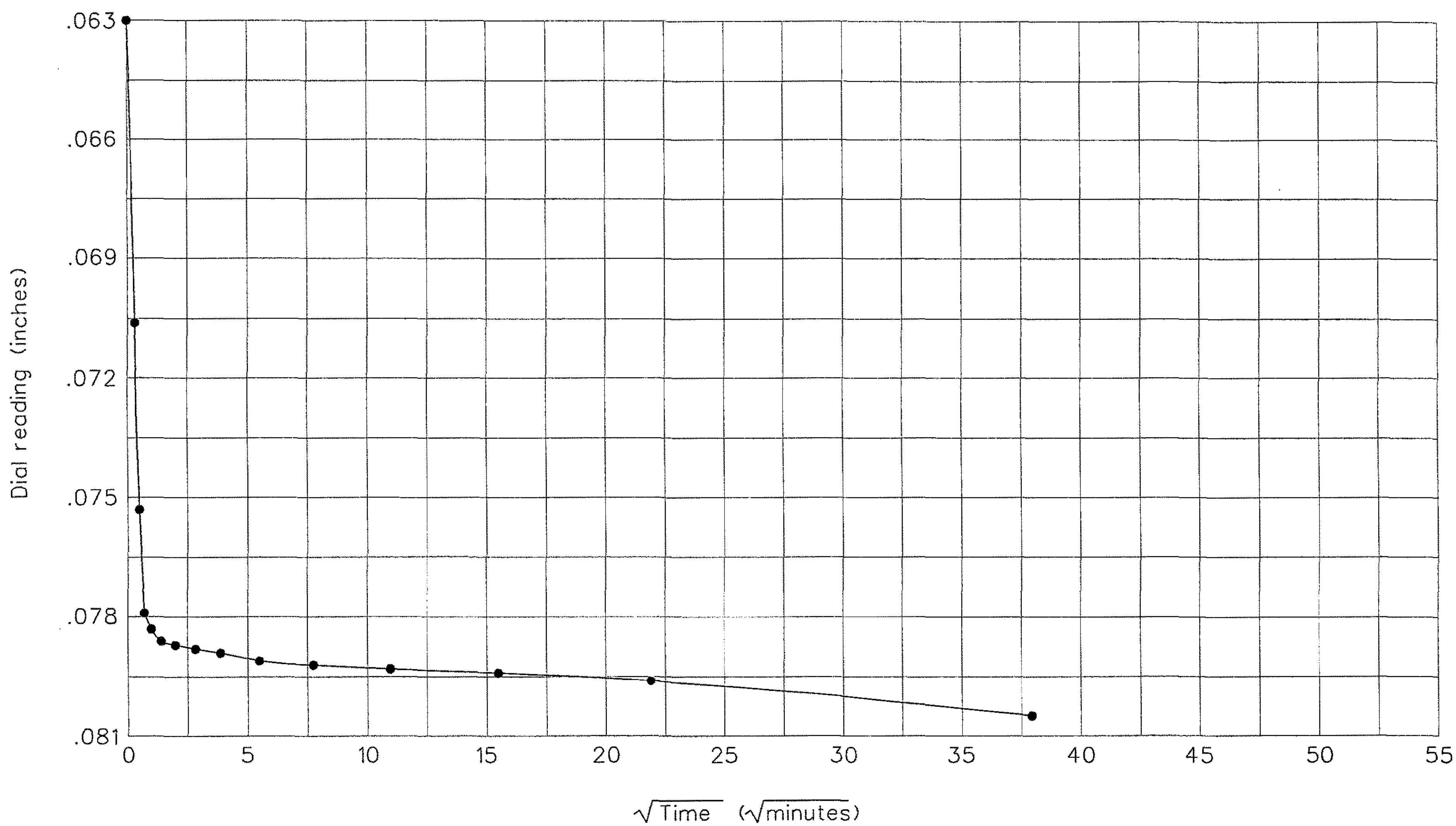
TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



RB&G ENGINEERING, INC.	Hole no.: 09-E5-1 Depth: 40'-41' Load: 1.15 to 2.30 tons	TIME CONSOLIDATION *Mountain View Corridor* *Salt Lake County, Utah*	Figure



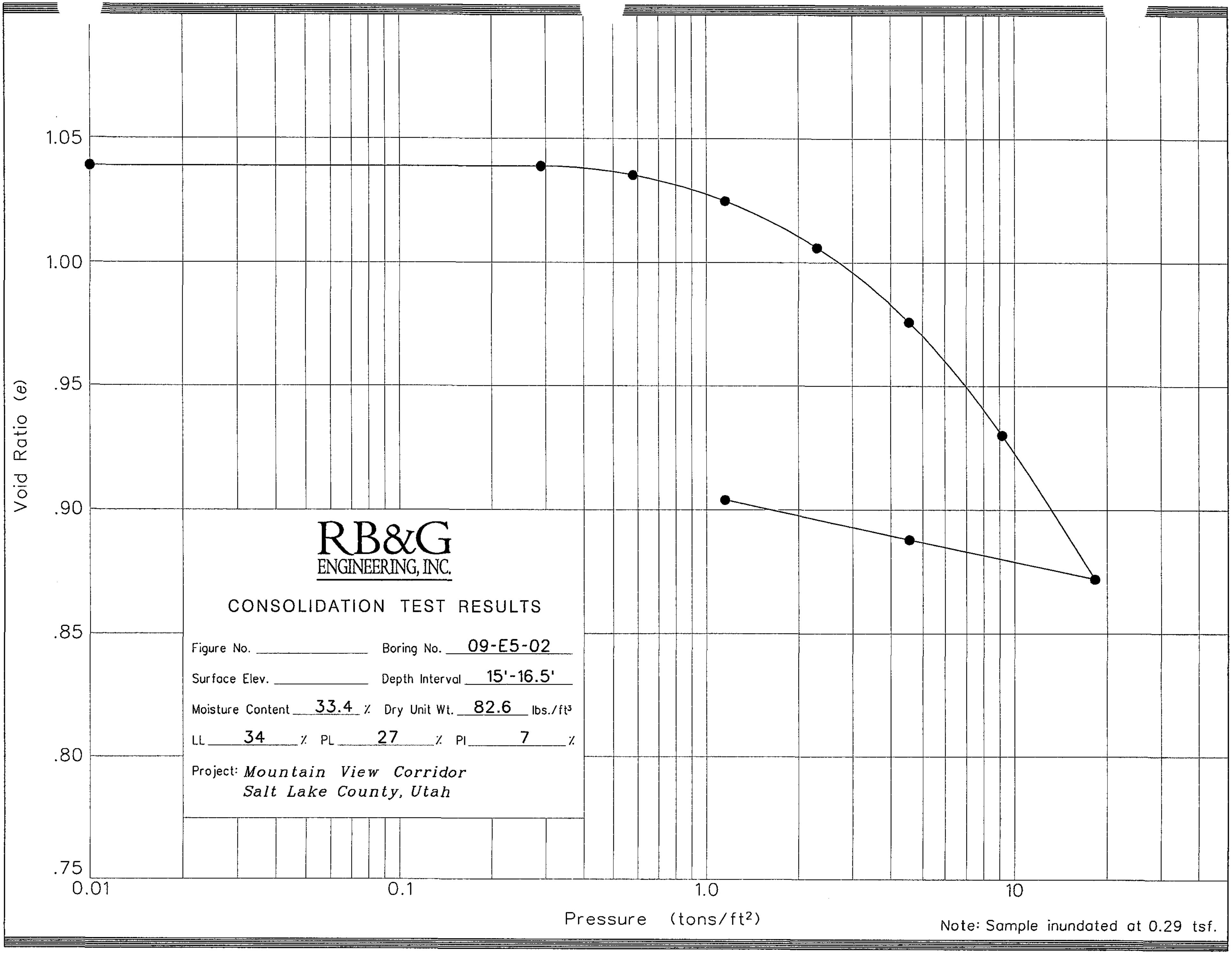
RB&G
ENGINEERING, INC.

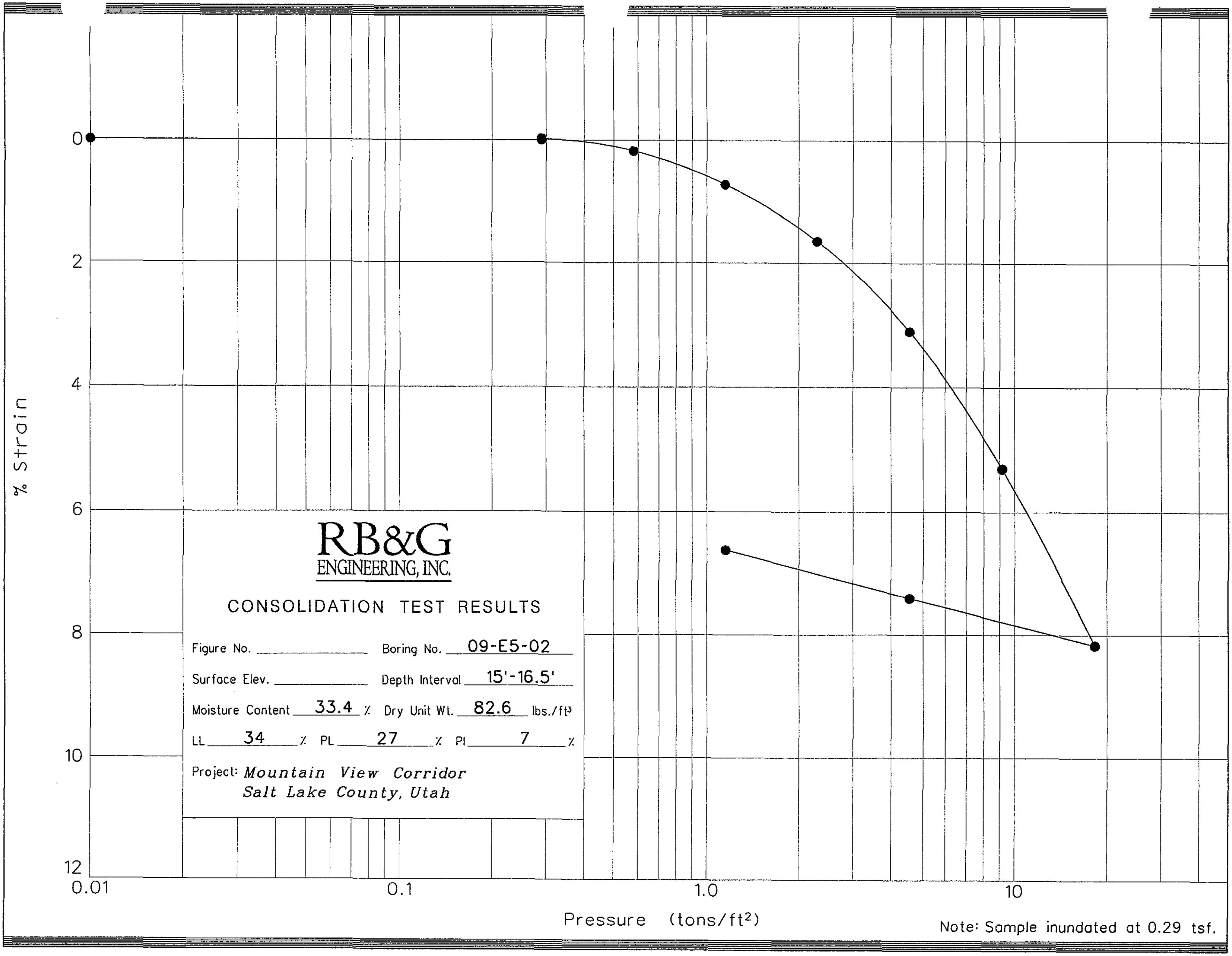
Hole no.: 09-E5-1
Depth: 40'-41'
Load: 2.30 to 4.60 tons

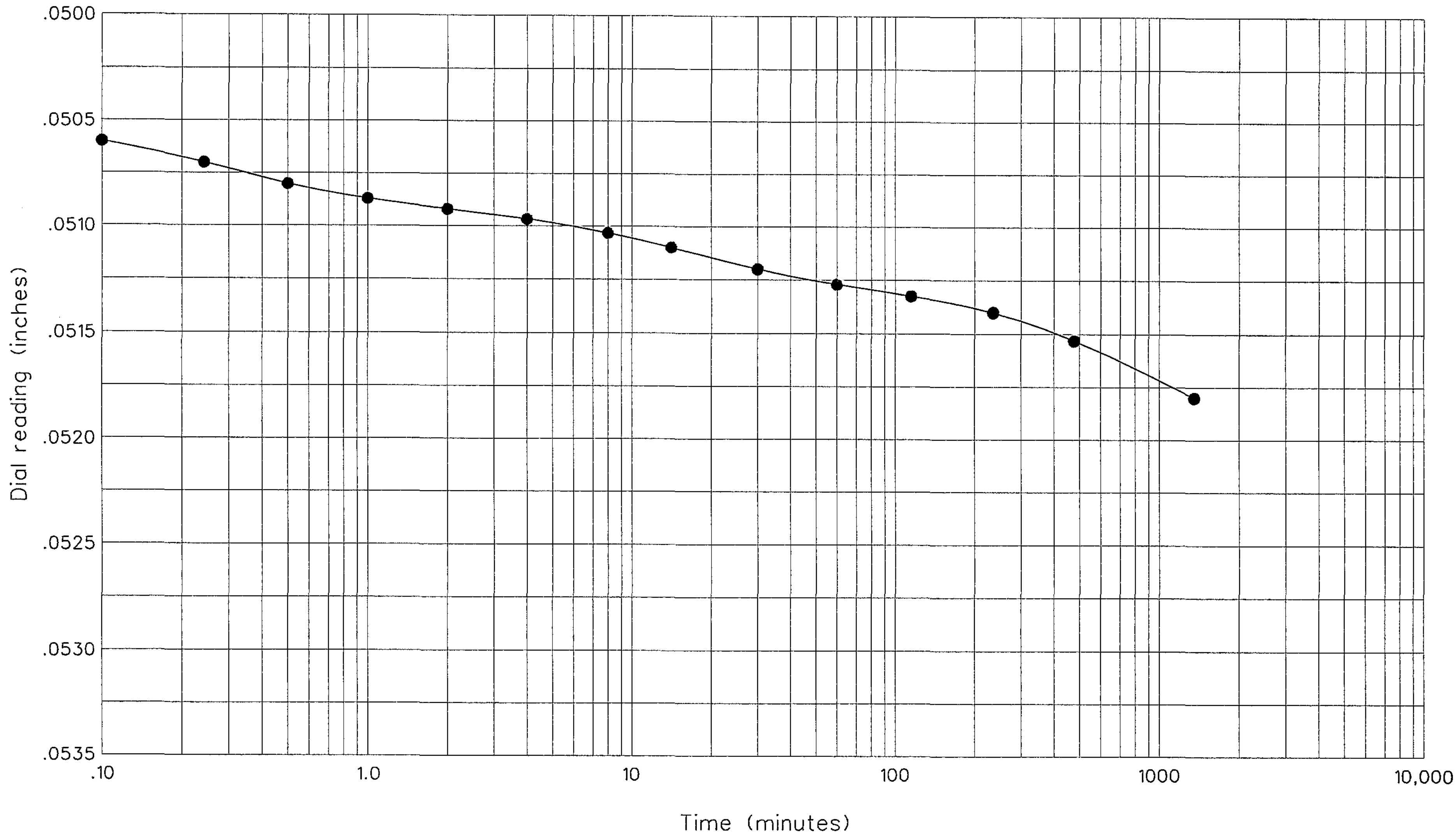
TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure


Void Ratio (e)
1.05
1.00
.95
.90
.85
.80
.75
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-02
Surface Elev.
Depth Interval 15'-16.5'
Moisture Content 33.4 % Dry Unit Wt. 82.6 lbs./ft³
LL 34 % PL 27 % PI 7 %
Project: Mountain View Corridor
Salt Lake County, Utah


% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-02
Surface Elev.
Depth Interval 15'-16.5'
Moisture Content 33.4 %
Dry Unit Wt. 82.6 lbs./ft³
LL 34 %
PL 27 %
PI 7 %
Project: Mountain View Corridor
Salt Lake County, Utah



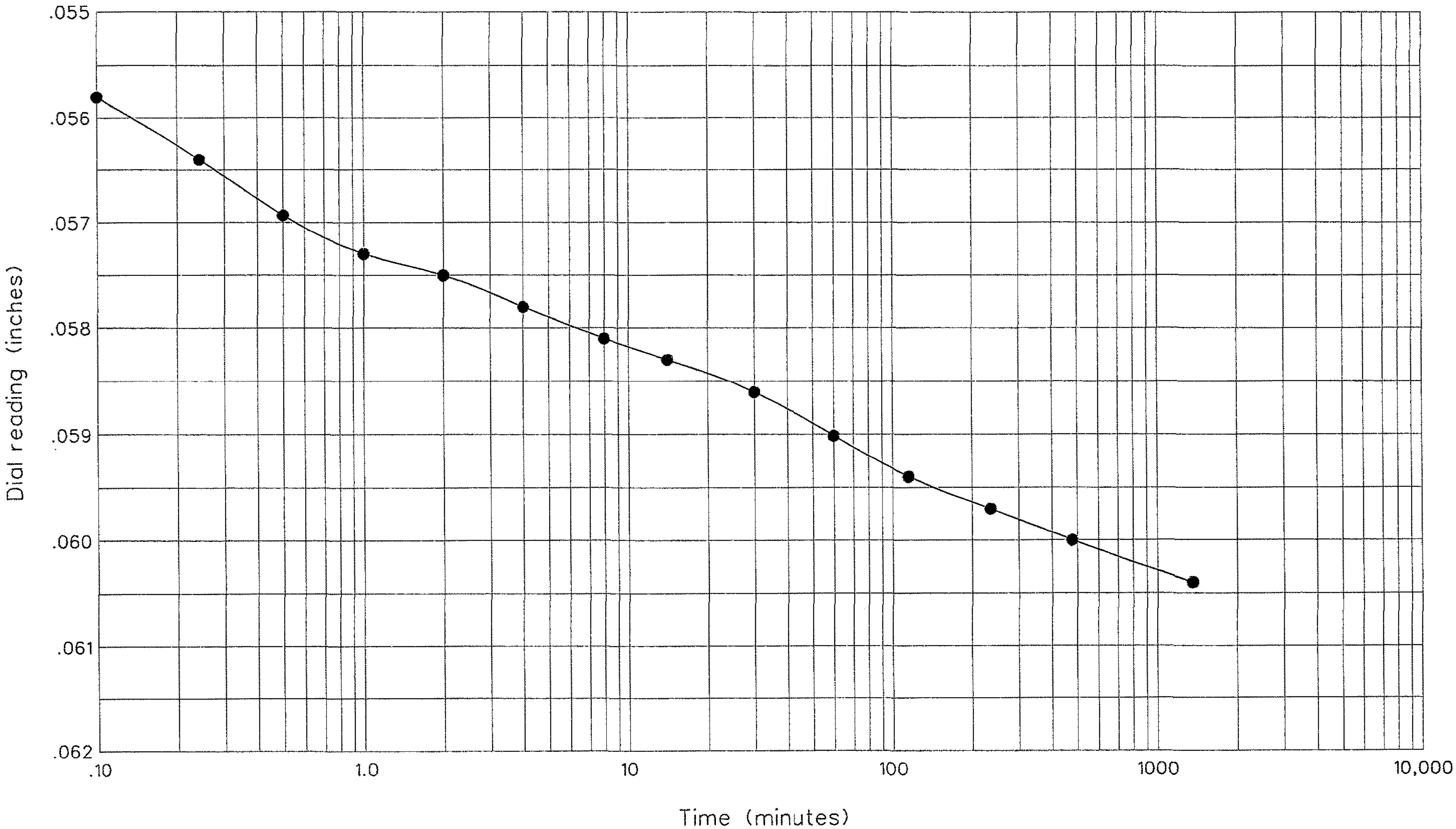
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 15'-16.5'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



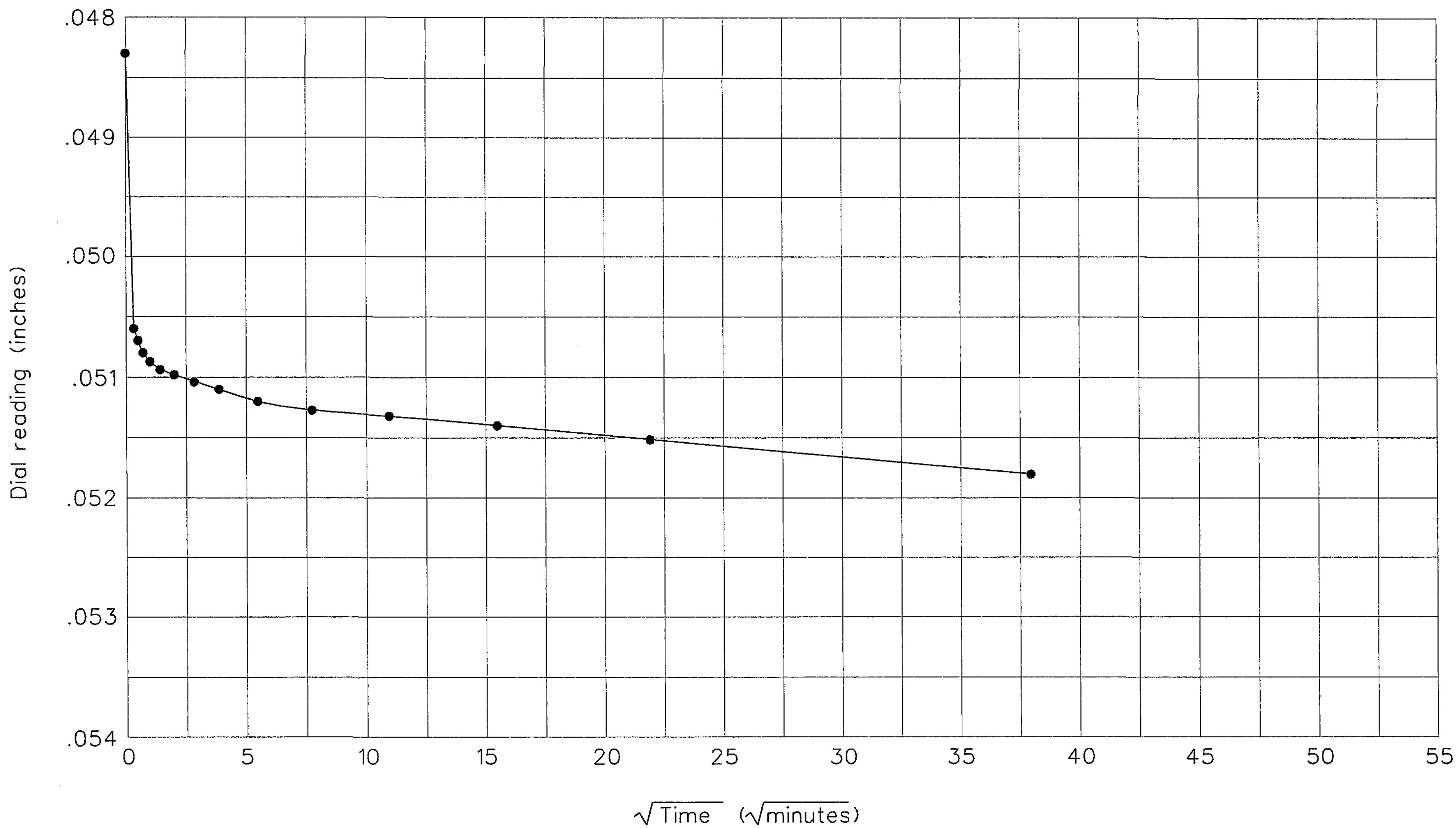
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 15'-16.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



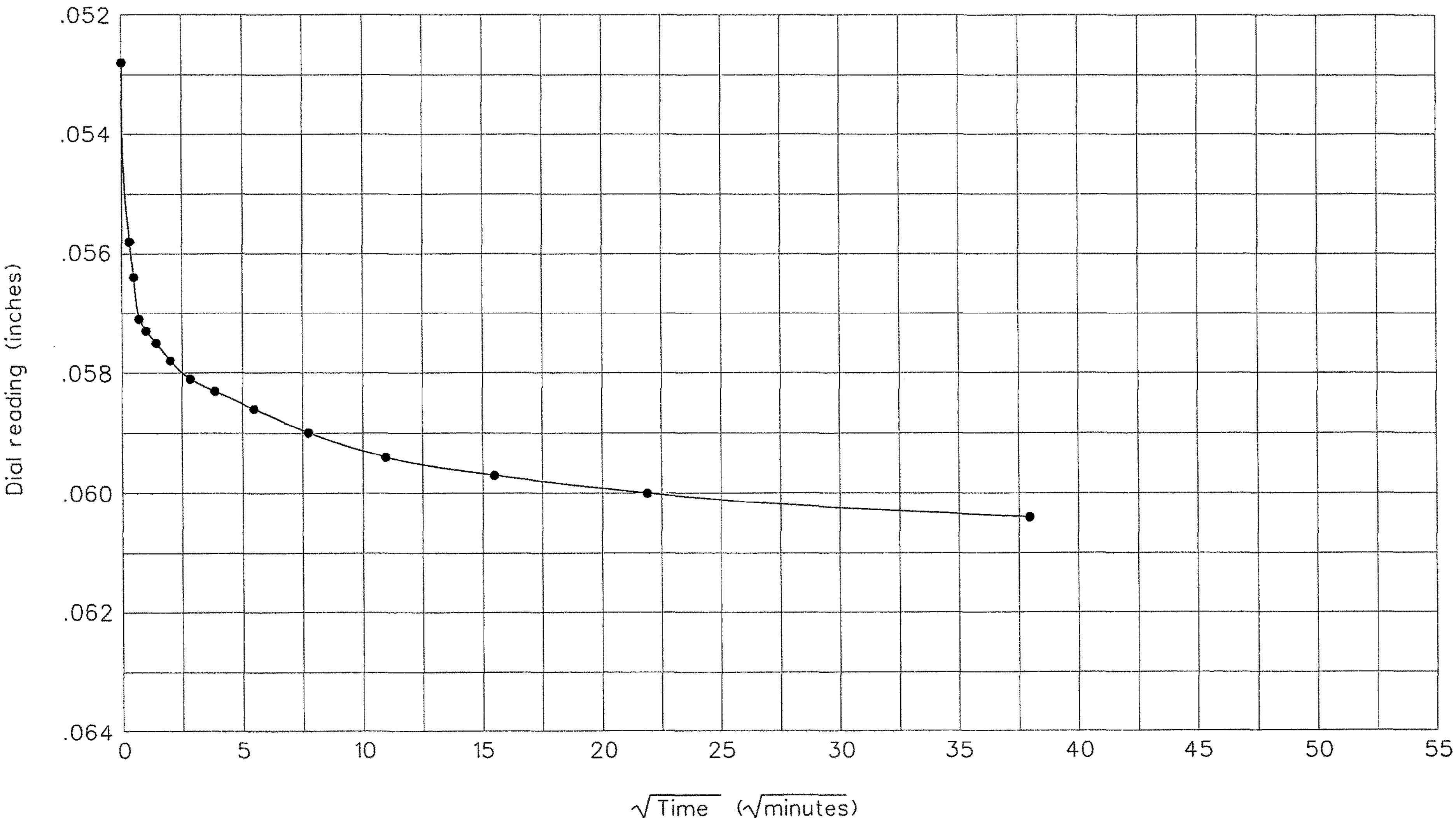
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 15'-16.5'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



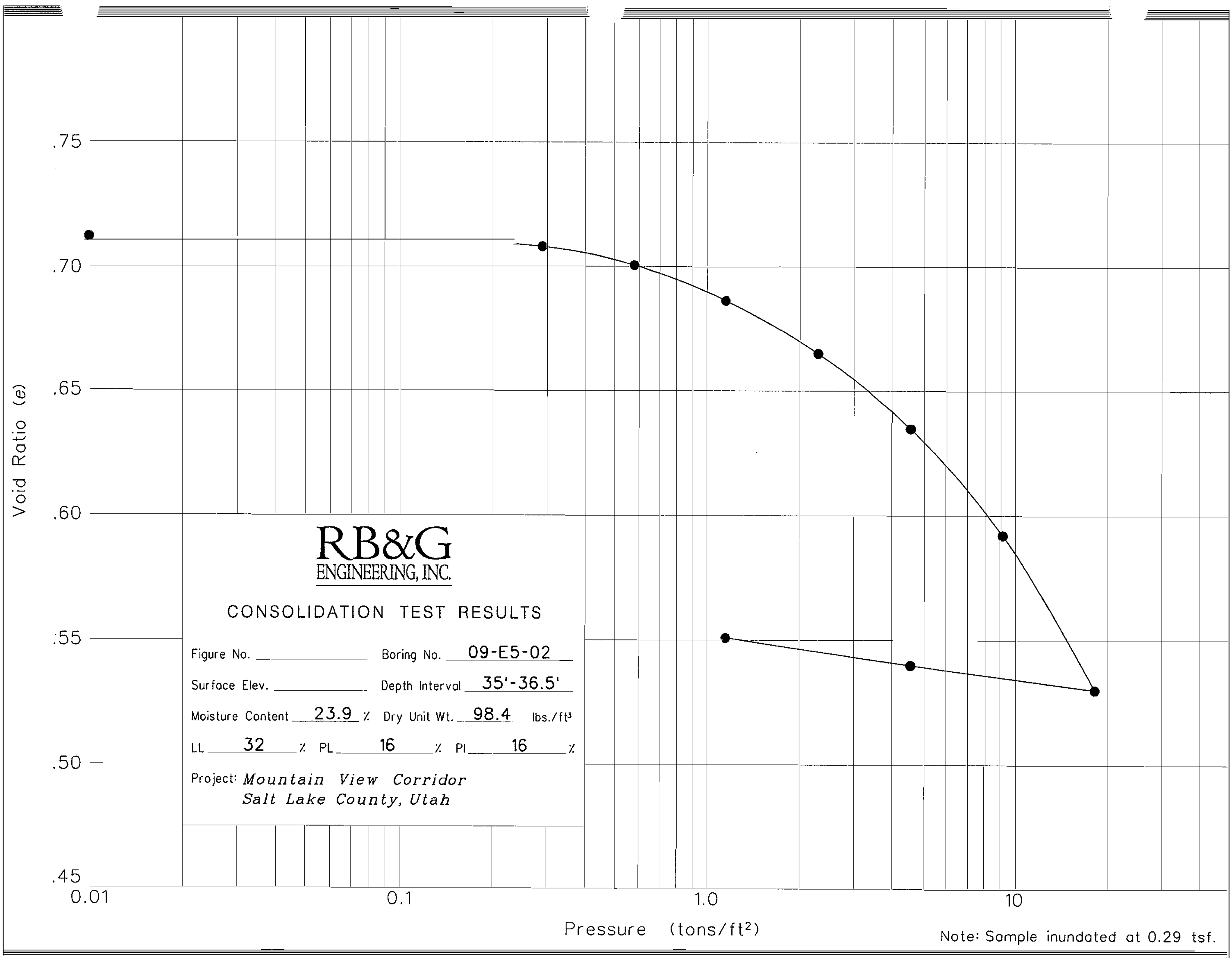
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 15'-16.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



RB&G
ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

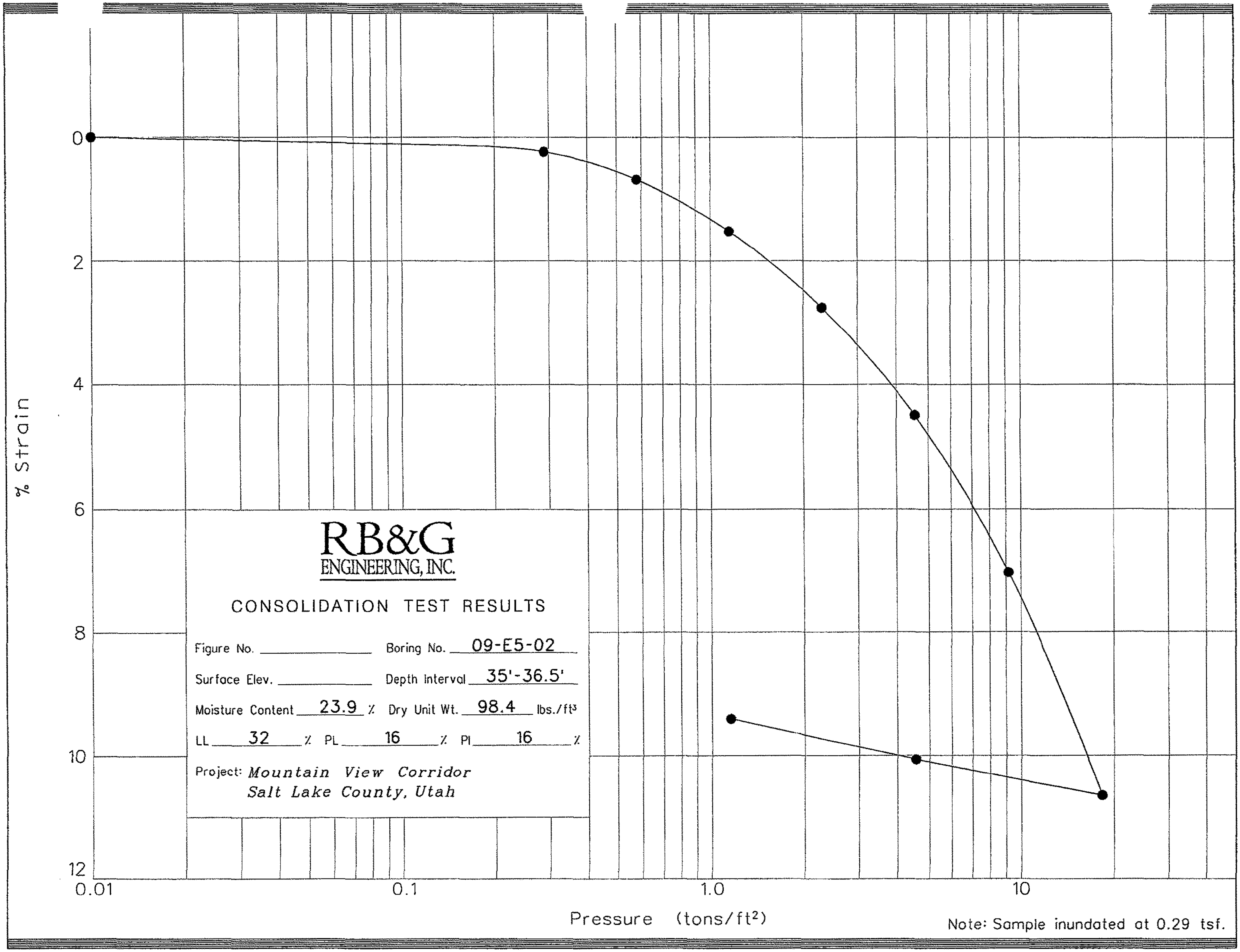
Figure No. ________ Boring No. 09-E5-02

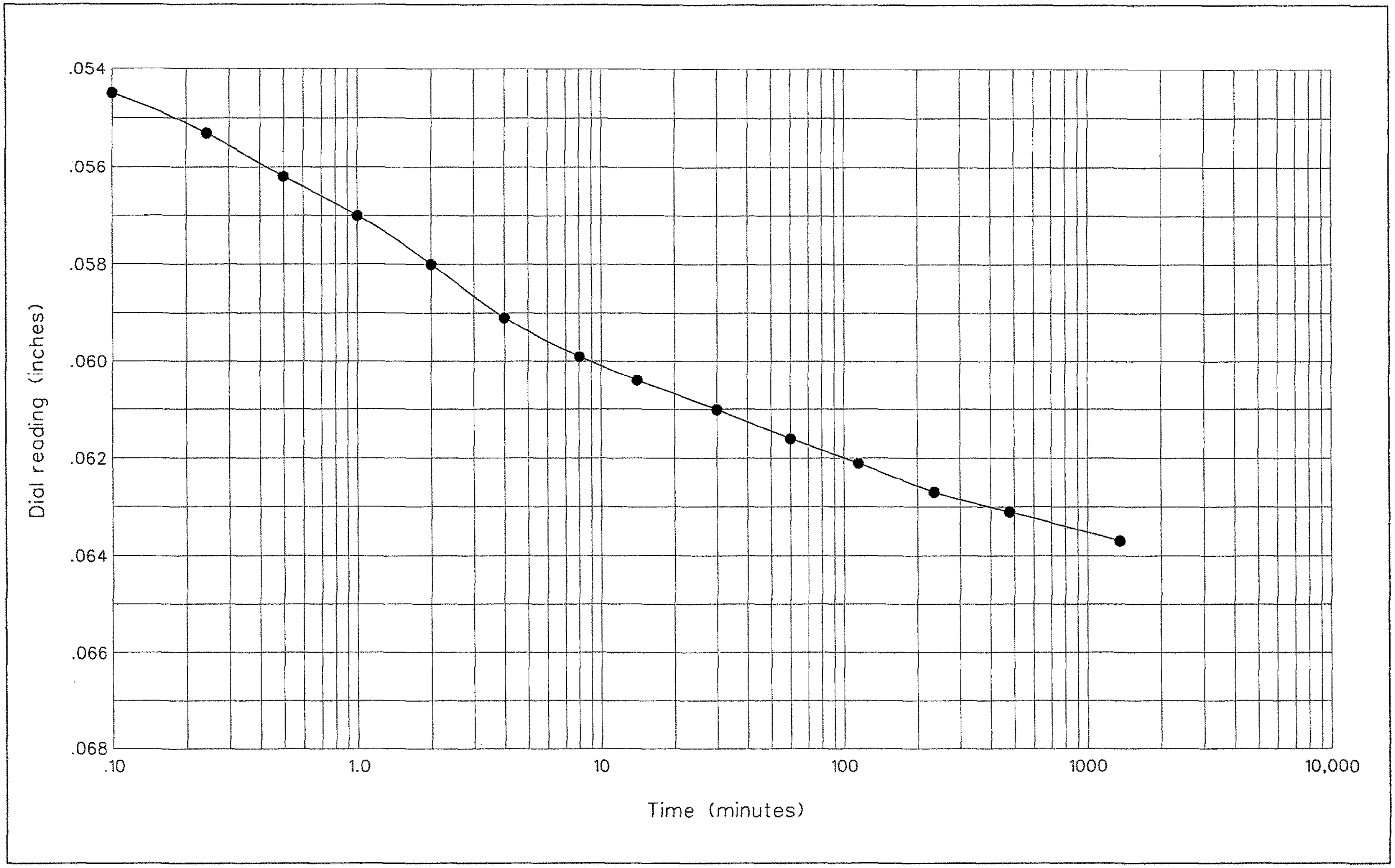
Surface Elev. ________ Depth Interval 35'-36.5'

Moisture Content 23.9 % Dry Unit Wt. 98.4 lbs./ft³

LL 32 % PL 16 % PI 16 %

Project: *Mountain View Corridor*
Salt Lake County, Utah


% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-02
Surface Elev.
Depth Interval 35'-36.5'
Moisture Content 23.9 %
Dry Unit Wt. 98.4 lbs./ft³
LL 32 %
PL 16 %
PI 16 %
Project: Mountain View Corridor
Salt Lake County, Utah



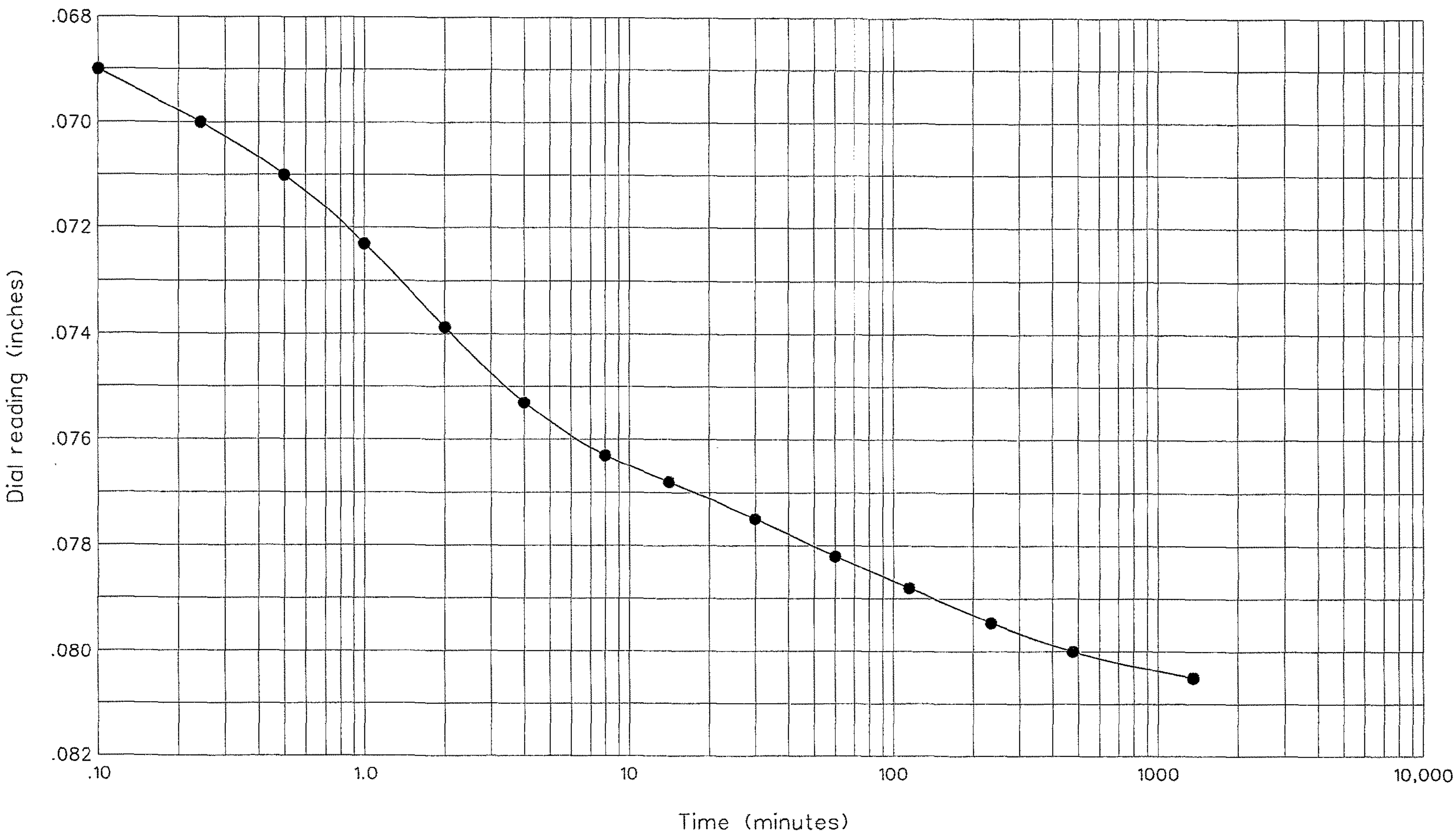
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 35'-36.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



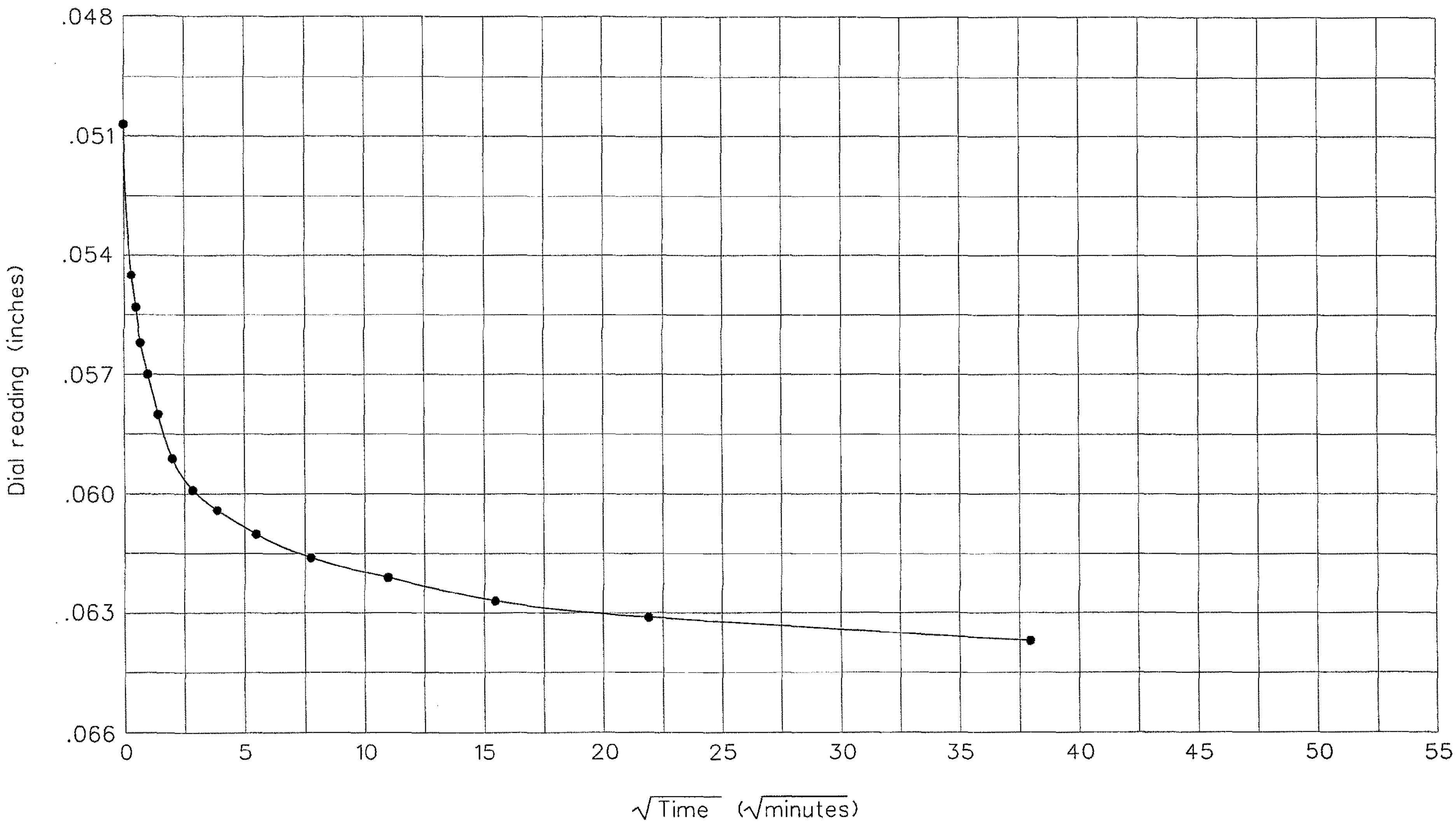
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 35'-36.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



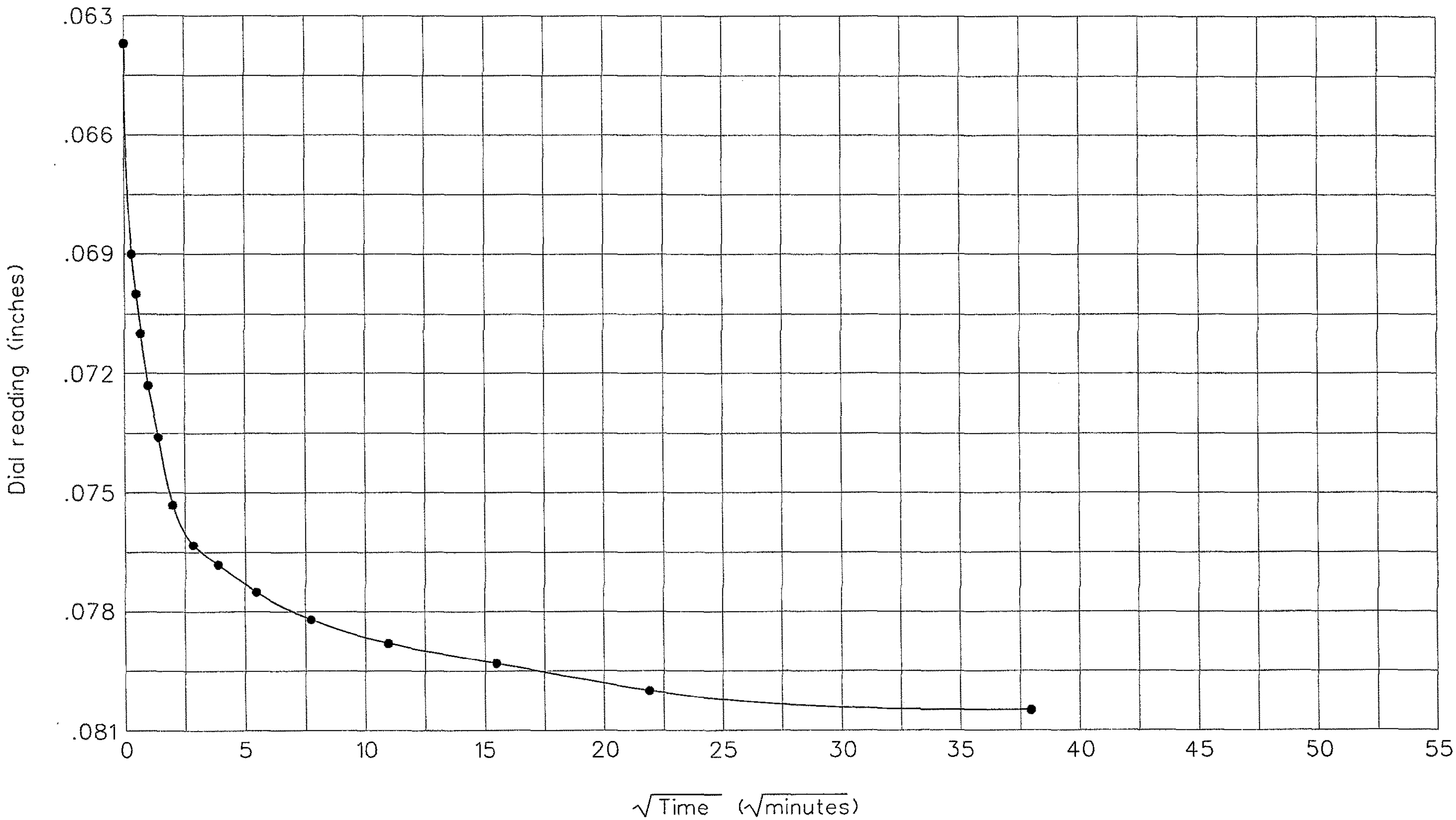
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 35'-36.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



RB&G ENGINEERING, INC.

Hole no.: 09-E5-02

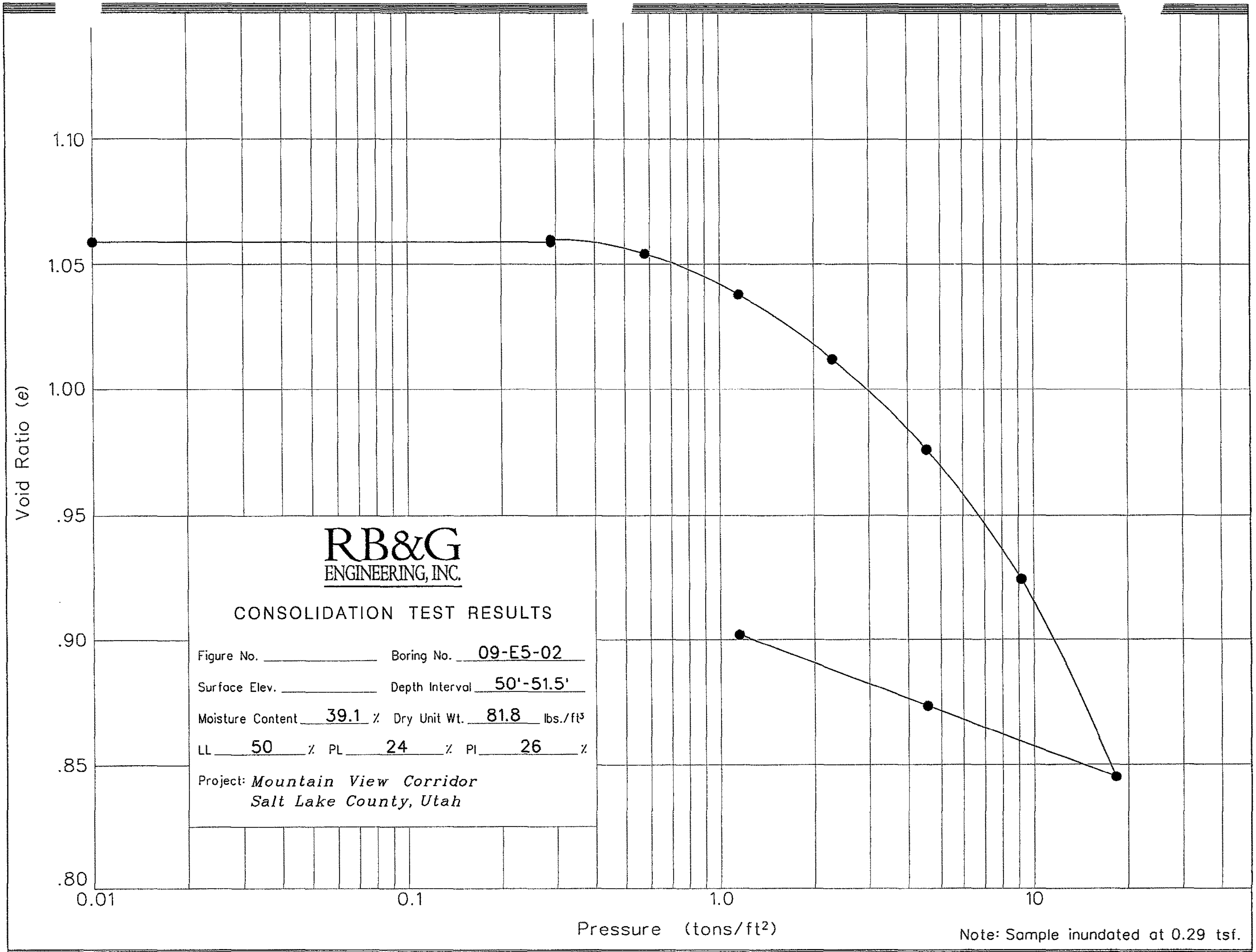
Depth: 35'-36.5'

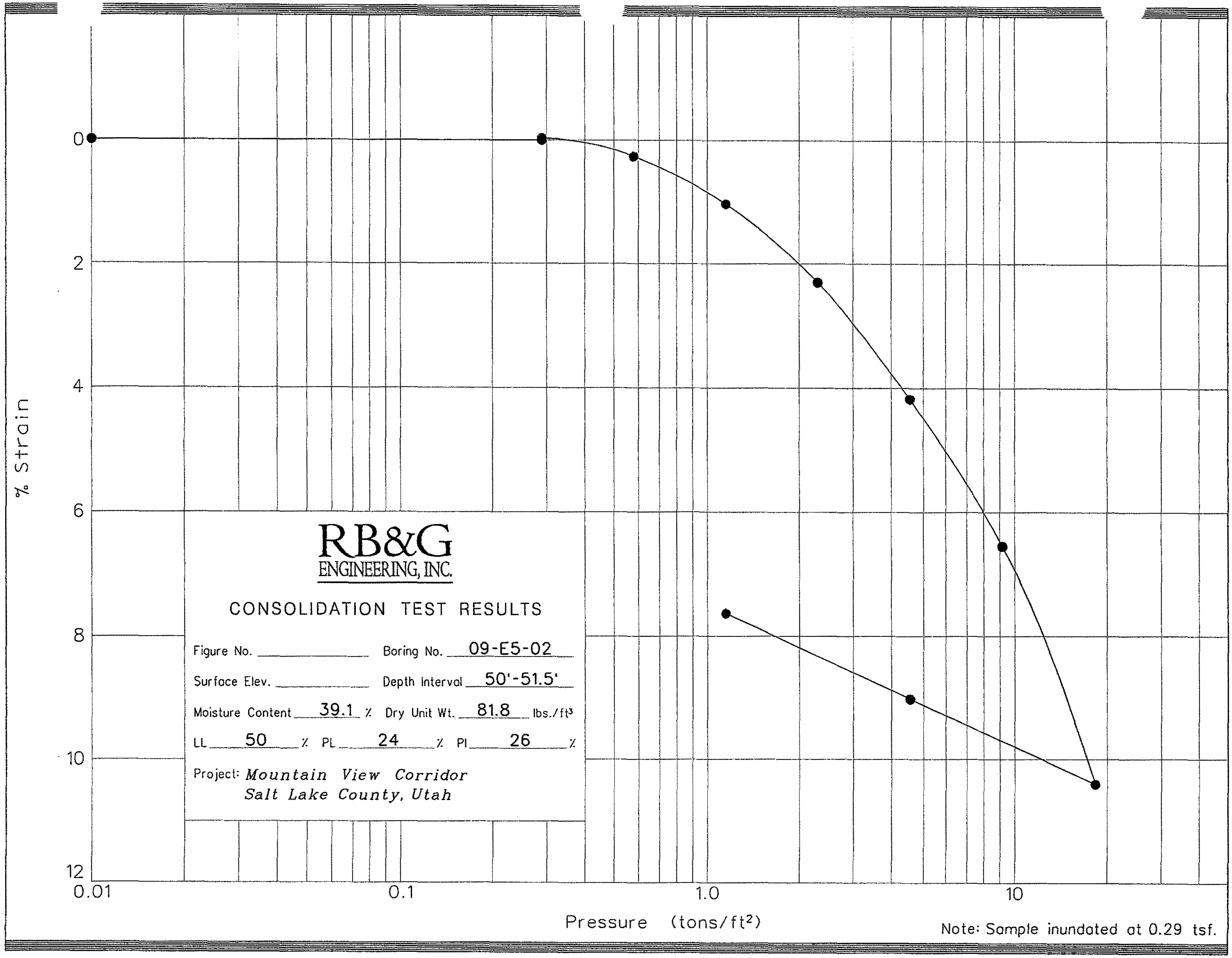
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

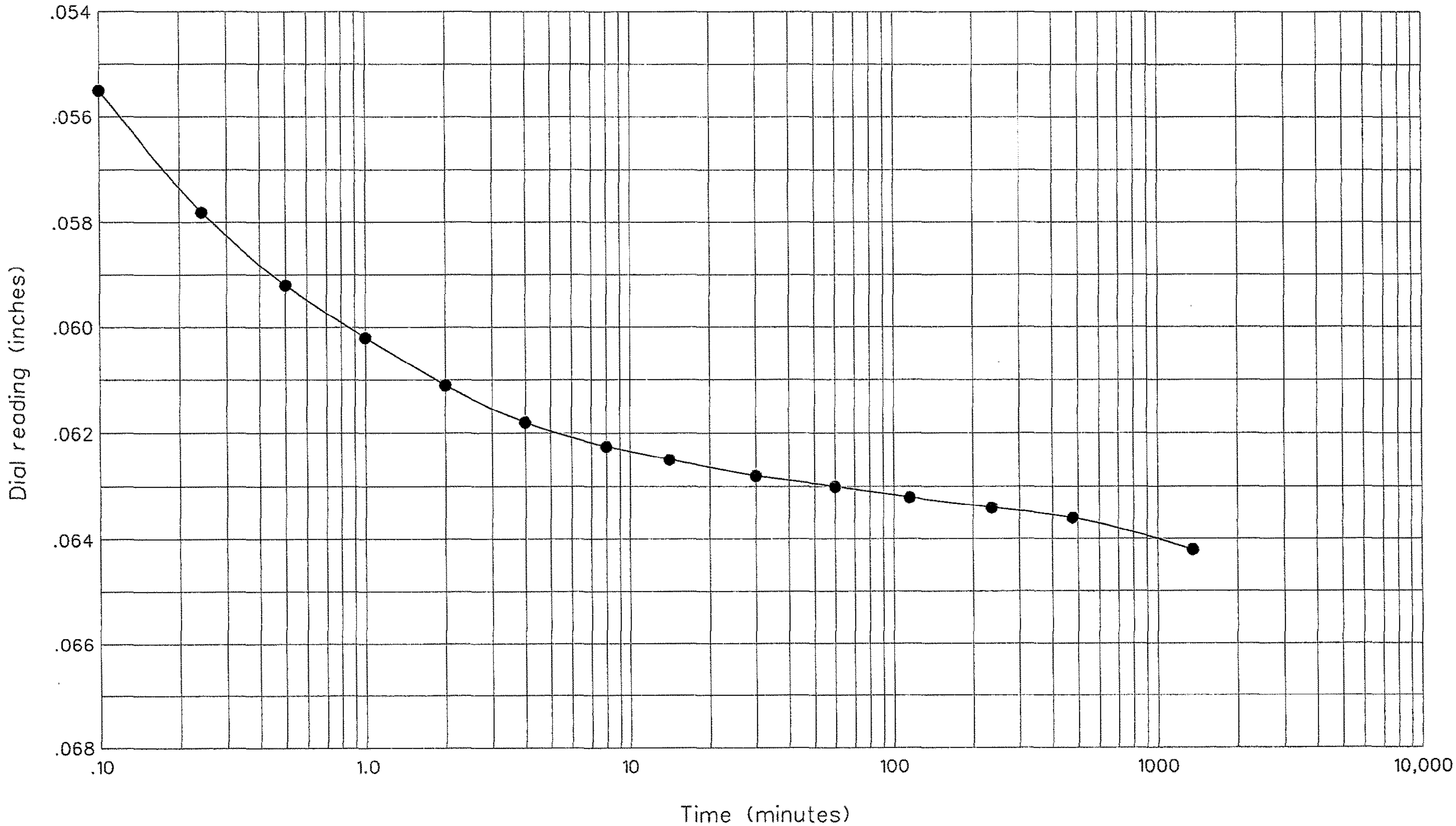
Mountain View Corridor
Salt Lake County, Utah

Figure


1.10
1.05
1.00
.95
.90
.85
.80
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-02
Surface Elev.
Depth Interval 50'-51.5'
Moisture Content 39.1 % Dry Unit Wt. 81.8 lbs./ft³
LL 50 % PL 24 % PI 26 %
Project: Mountain View Corridor
Salt Lake County, Utah



% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-02
Surface Elev.
Depth Interval 50'-51.5'
Moisture Content 39.1 % Dry Unit Wt. 81.8 lbs./ft³
LL 50 % PL 24 % PI 26 %
Project: Mountain View Corridor
Salt Lake County, Utah



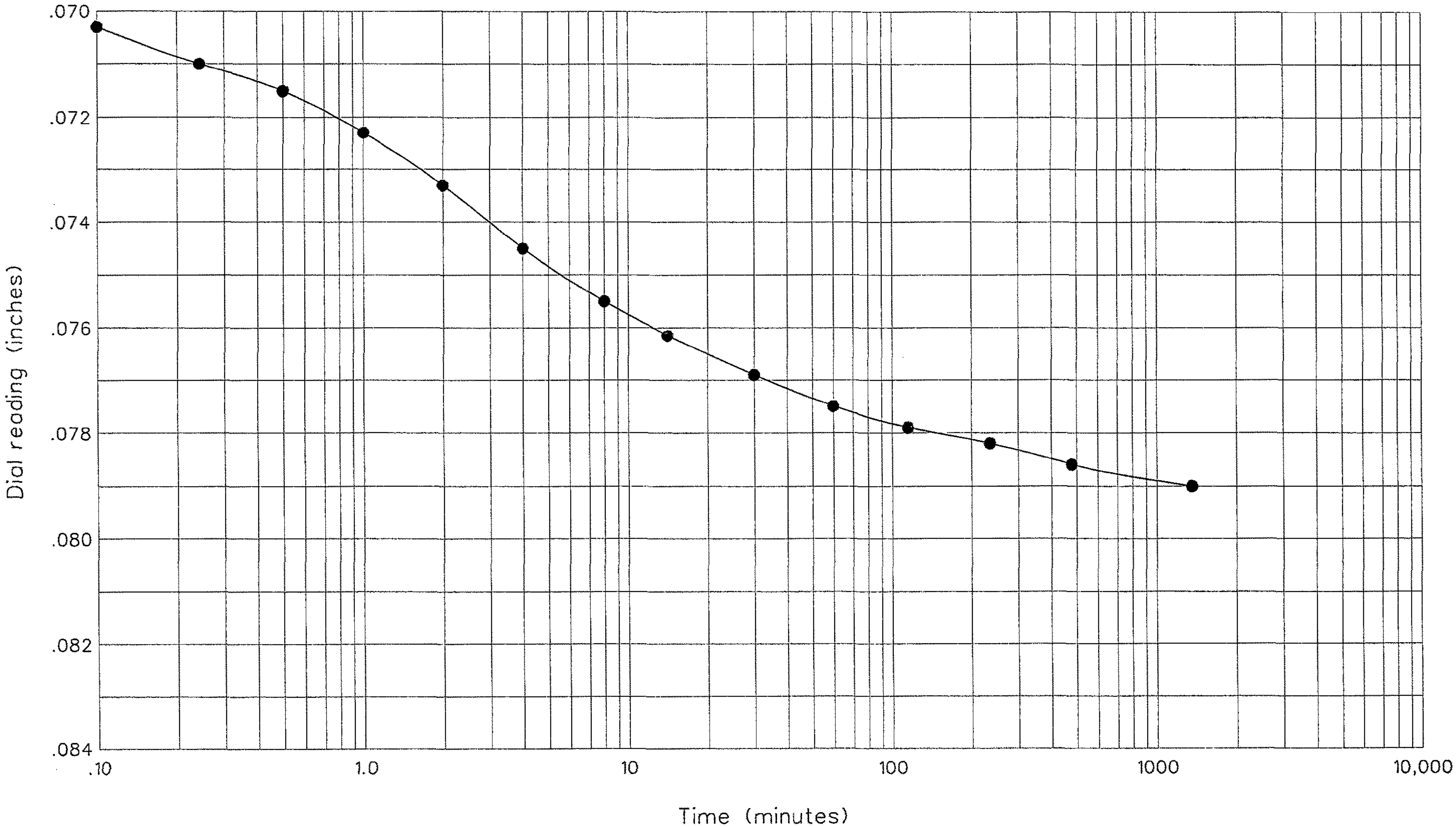
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 50'-51.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



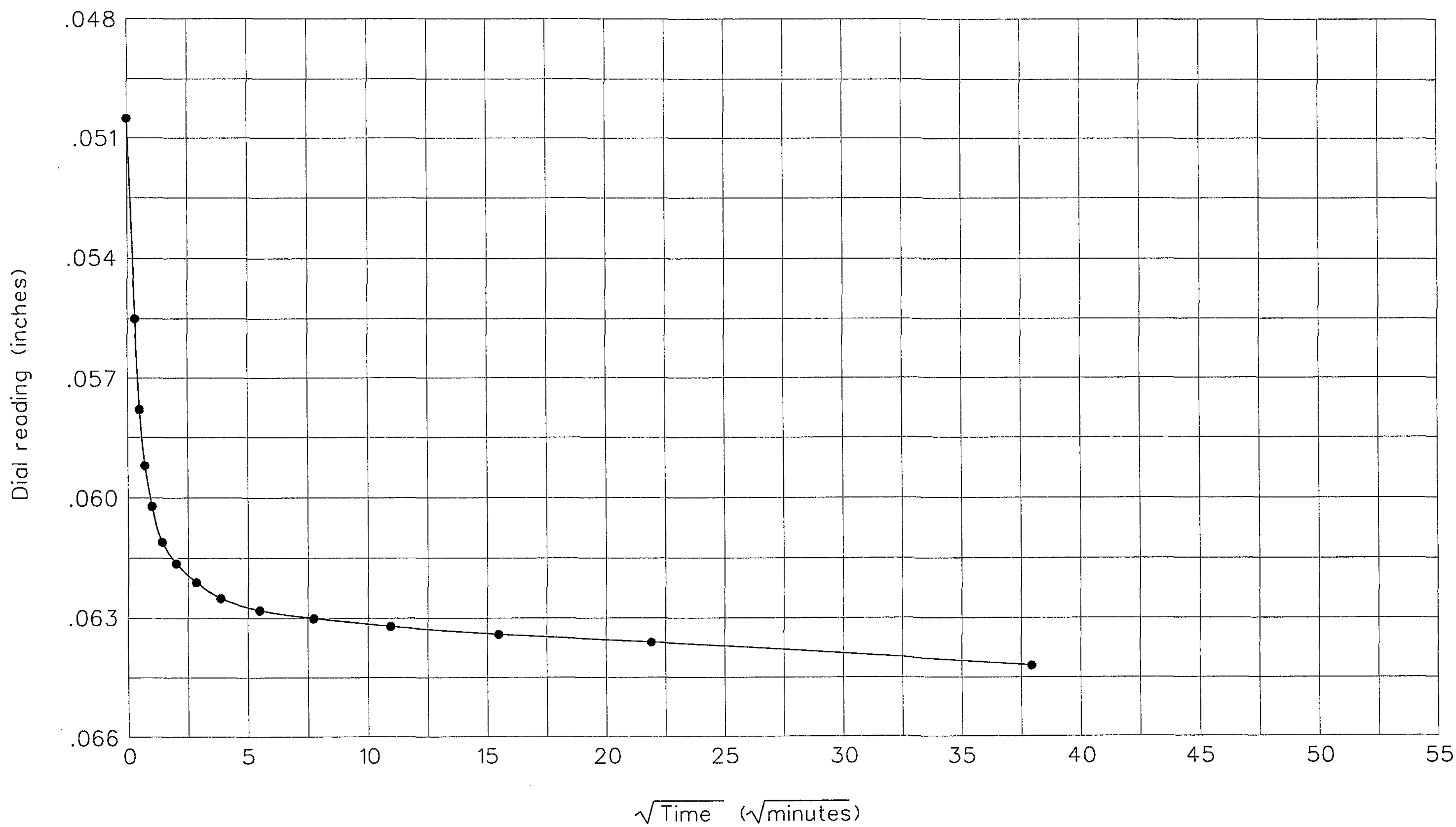
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 50'-51.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



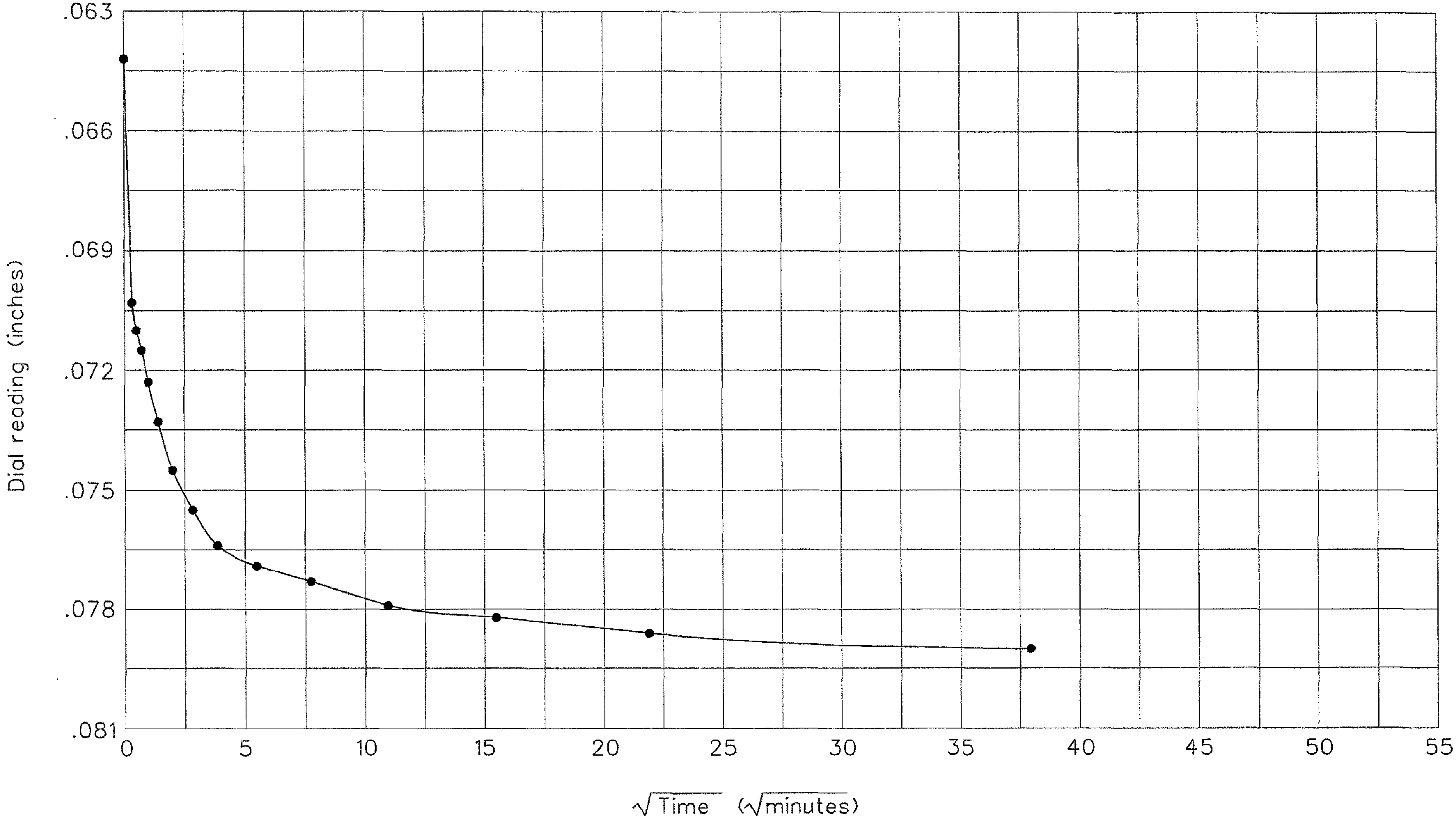
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 50'-51.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



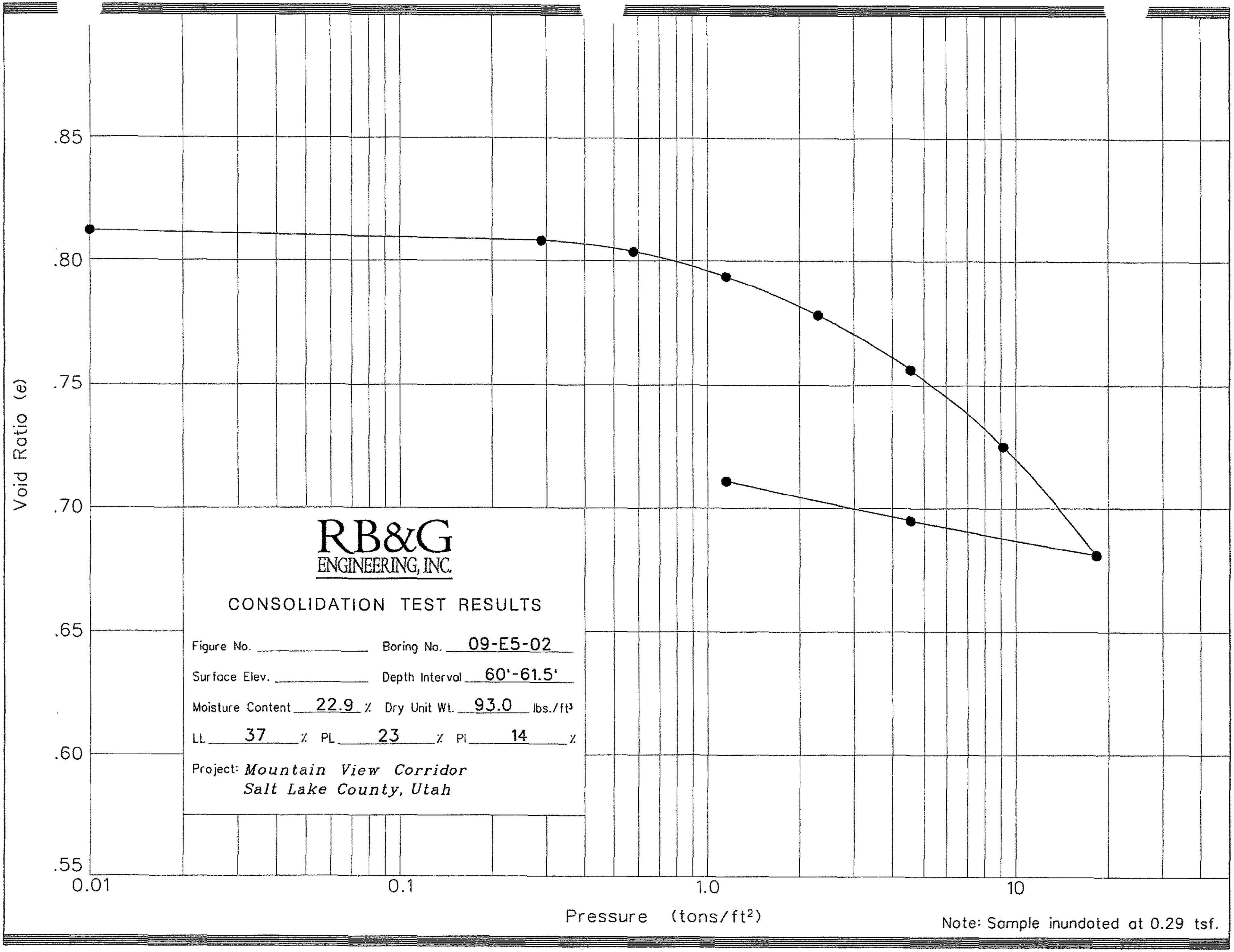
RB&G ENGINEERING, INC.

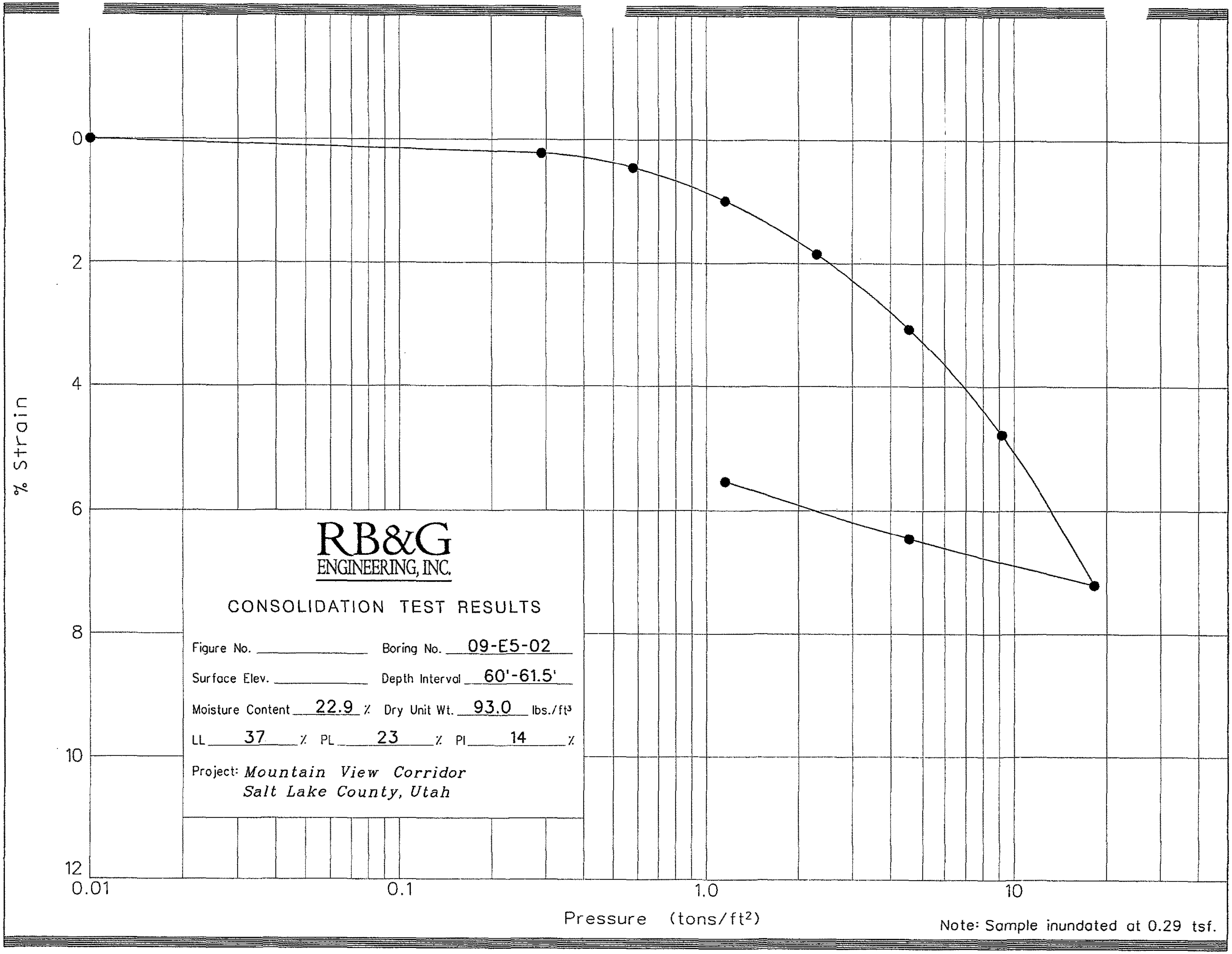
Hole no.: 09-E5-02
Depth: 50'-51.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure


RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No. ______ Boring No. 09-E5-02
Surface Elev. ______ Depth Interval 60'-61.5'
Moisture Content 22.9 % Dry Unit Wt. 93.0 lbs./ft³
LL 37 % PL 23 % PI 14 %
Project: Mountain View Corridor
Salt Lake County, Utah
Void Ratio (e)
.85
.80
.75
.70
.65
.60
.55
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



RB&G ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

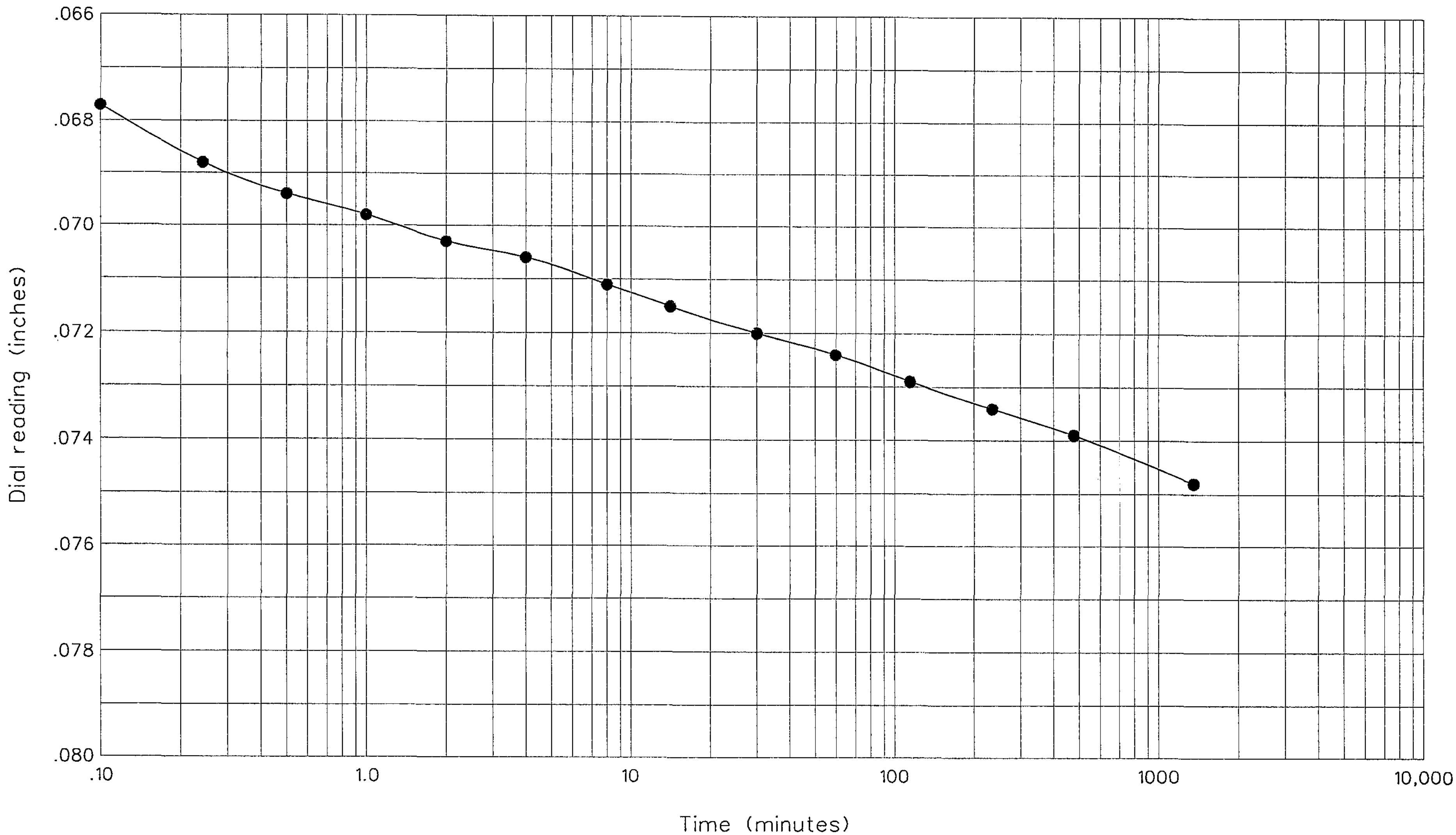
Figure No. ______ Boring No. 09-E5-02

Surface Elev. ______ Depth Interval 60'-61.5'

Moisture Content 22.9 % Dry Unit Wt. 93.0 lbs./ft³

LL 37 % PL 23 % PI 14 %

Project: *Mountain View Corridor*
Salt Lake County, Utah



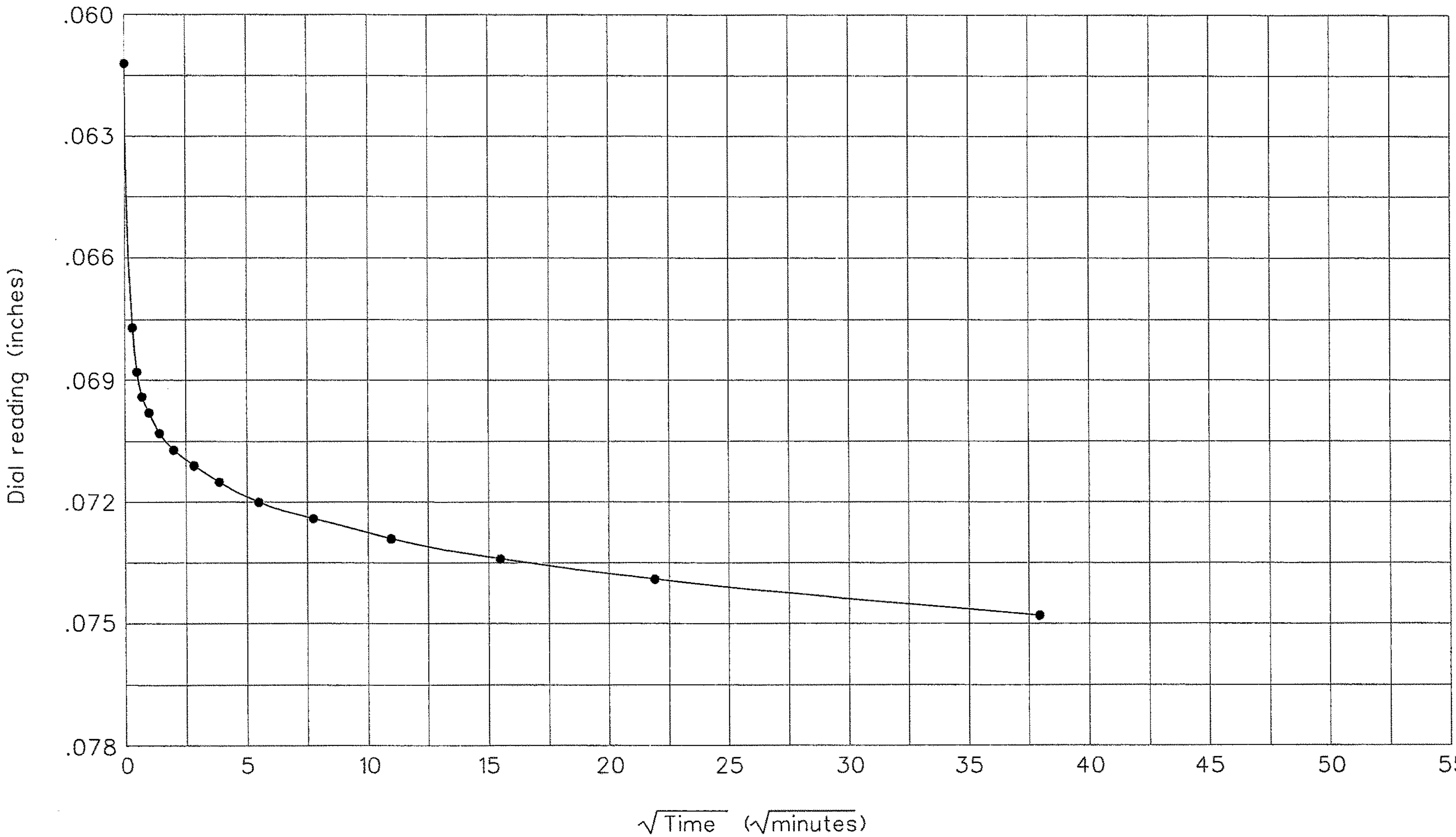
RB&G ENGINEERING, INC.

Hole no.: 09-E5-02
Depth: 60'-61.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



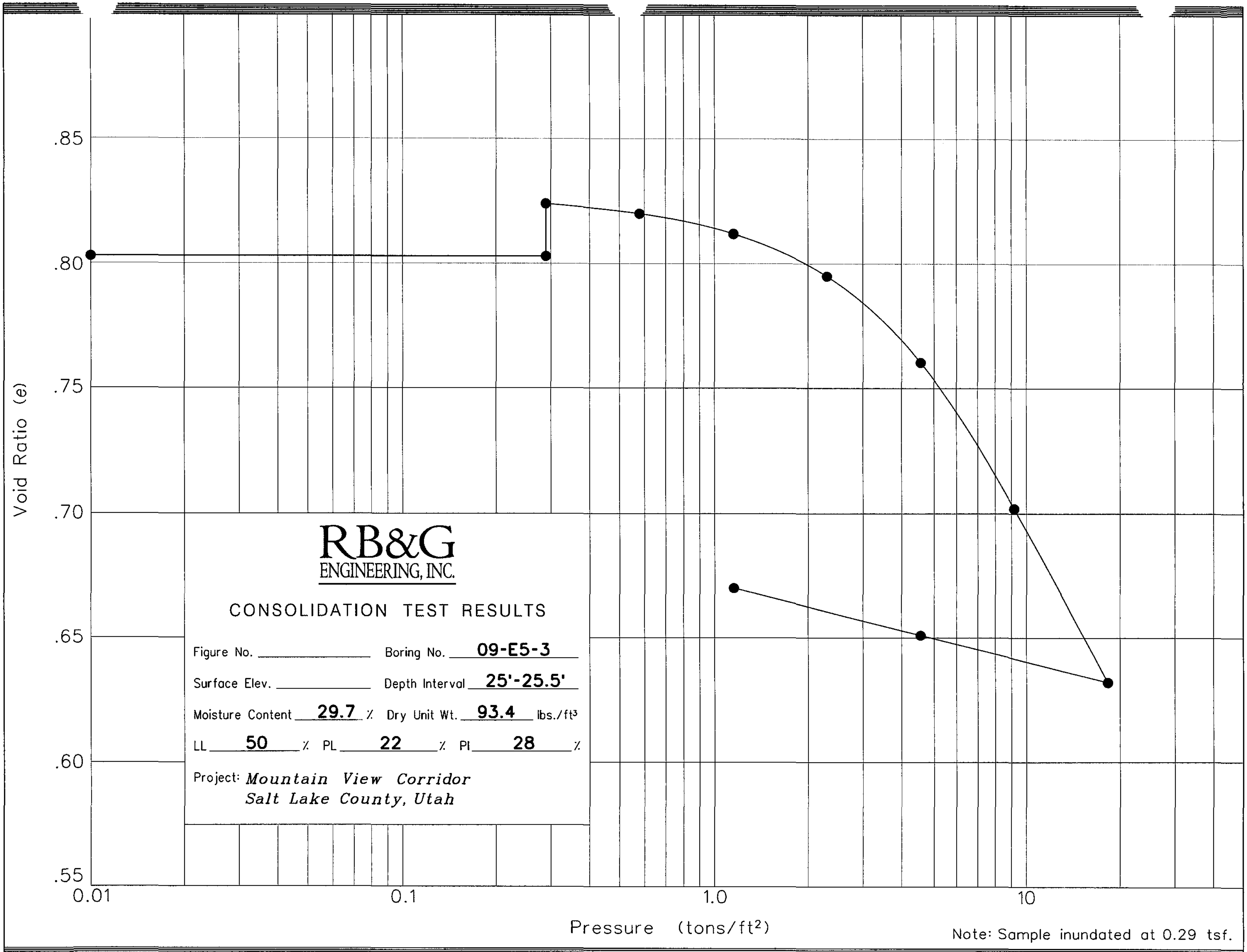
RB&G ENGINEERING, INC.

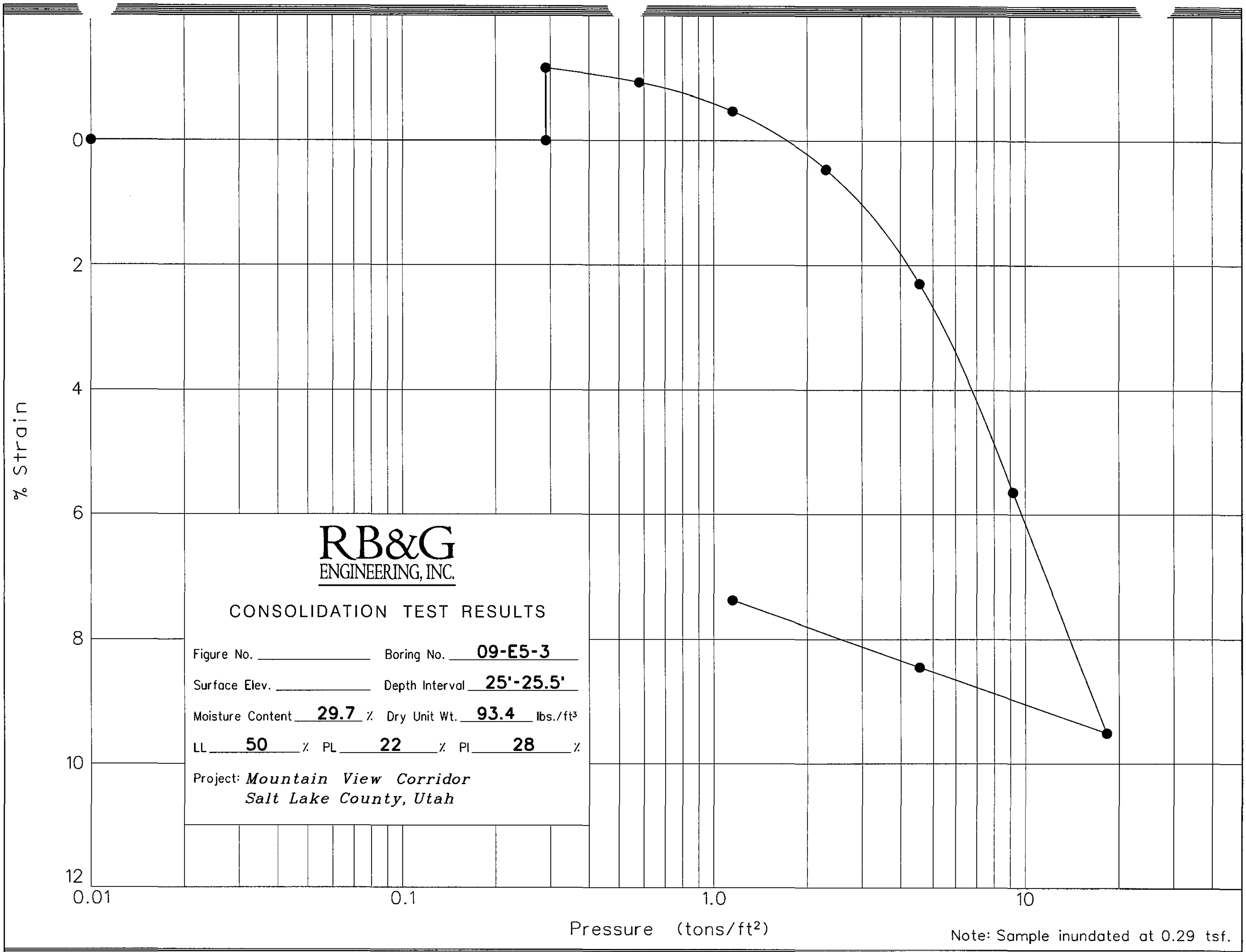
Hole no.: 09-E5-02
Depth: 60'-61.5'
Load: 4.60 to 9.20 tons

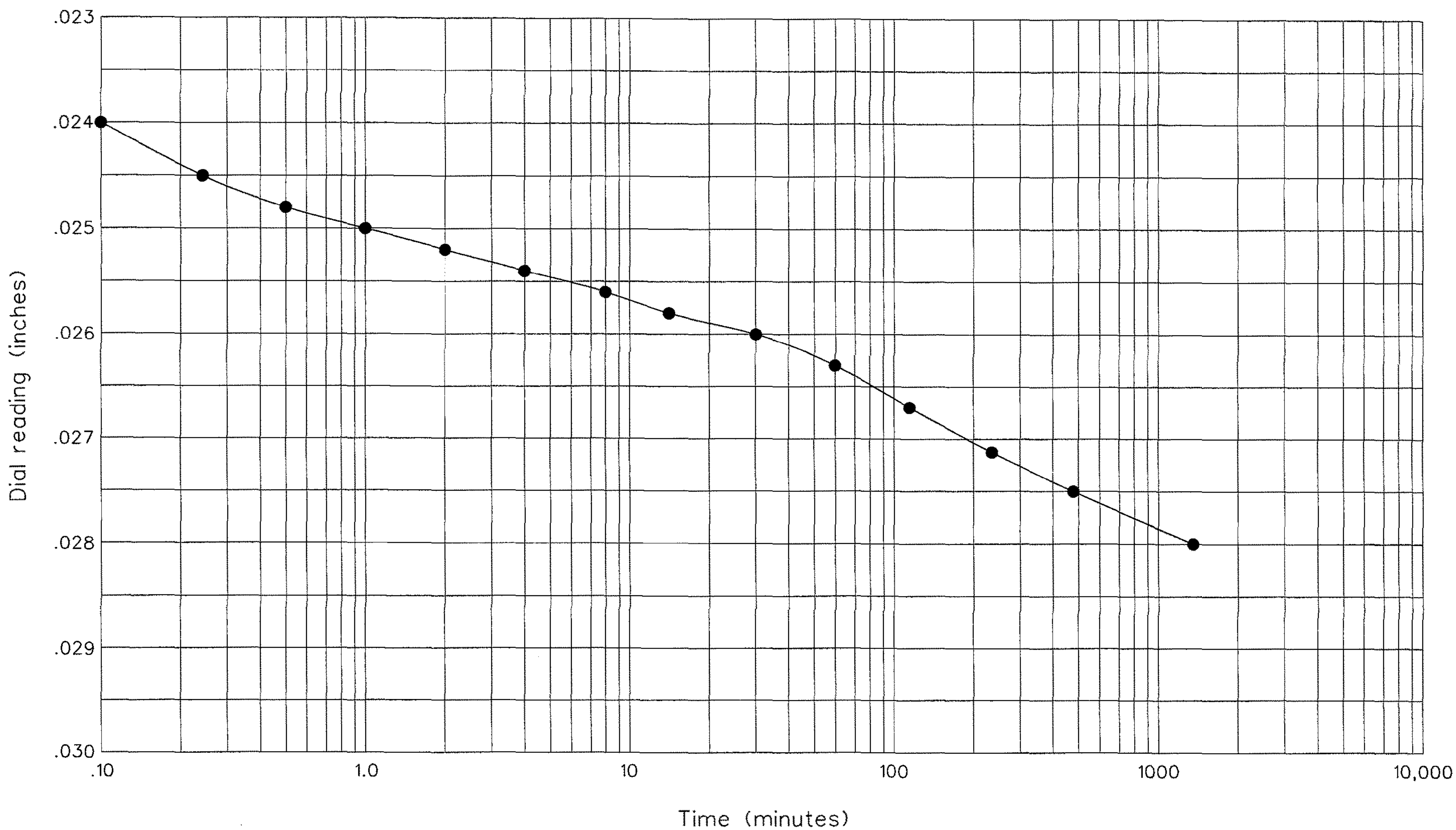
TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure


.85
.80
.75
.70
.65
.60
.55
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No. ______ Boring No. 09-E5-3
Surface Elev. ______ Depth Interval 25'-25.5'
Moisture Content 29.7 % Dry Unit Wt. 93.4 lbs./ft³
LL 50 % PL 22 % PI 28 %
Project: Mountain View Corridor
Salt Lake County, Utah
Note: Sample inundated at 0.29 tsf.


RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No. ______ Boring No. 09-E5-3
Surface Elev. ______ Depth Interval 25'-25.5'
Moisture Content 29.7 % Dry Unit Wt. 93.4 lbs./ft³
LL 50 % PL 22 % PI 28 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



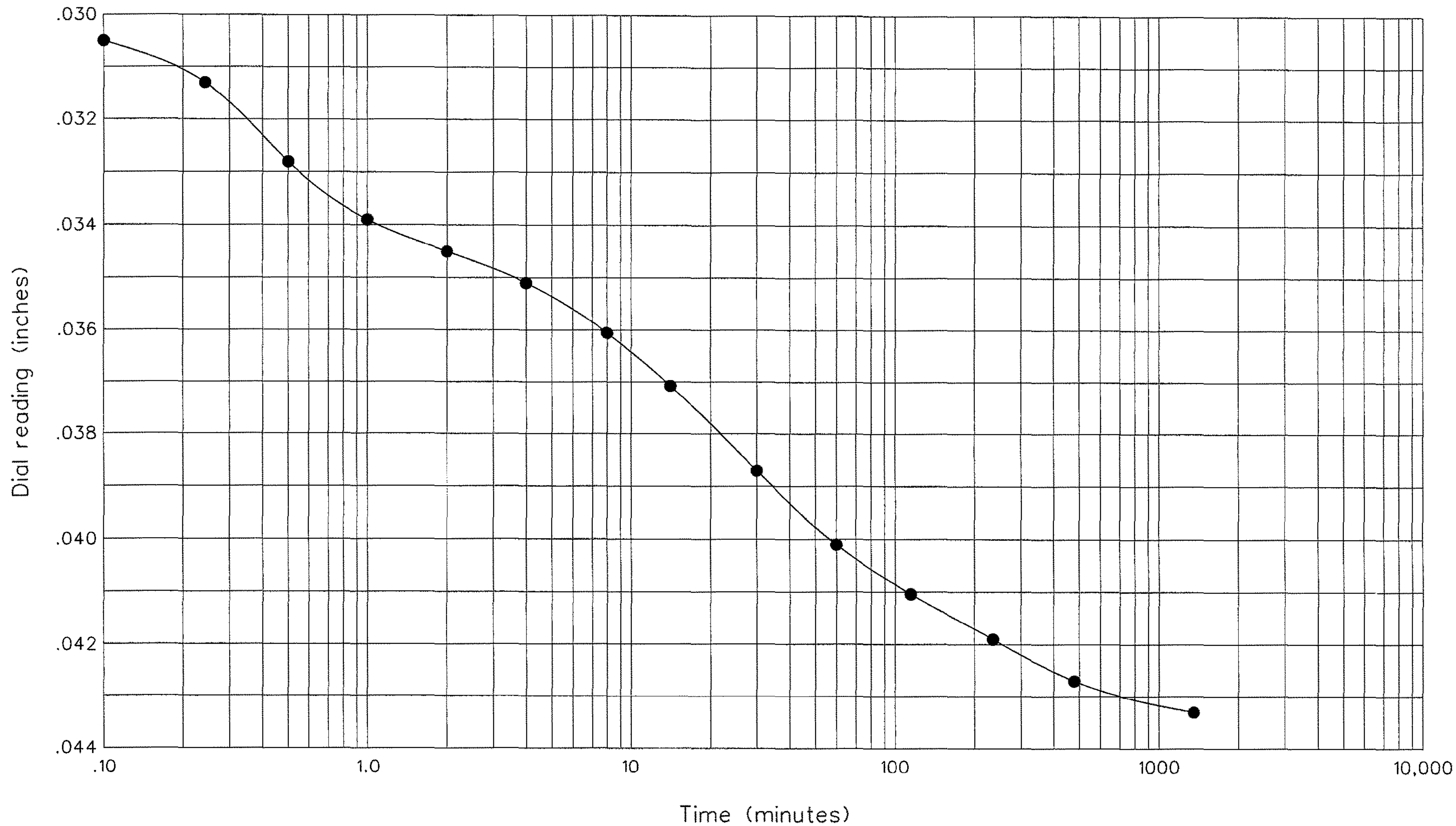
RB&G ENGINEERING, INC.

Hole no.: 09-E5-3
Depth: 25'-25.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



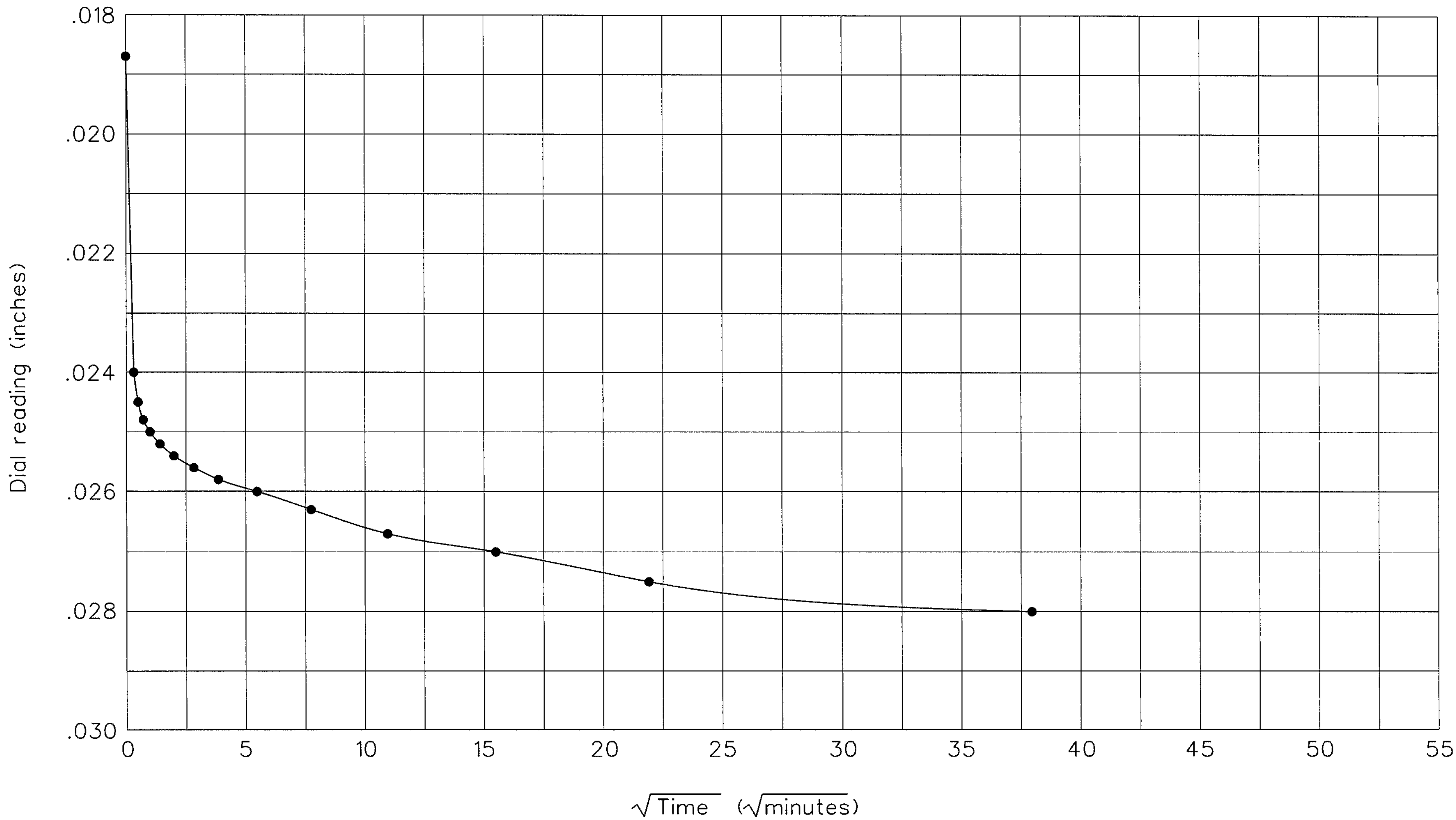
RB&G ENGINEERING, INC.

Hole no.: 09-E5-3
Depth: 25'-25.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



RB&G
ENGINEERING, INC.

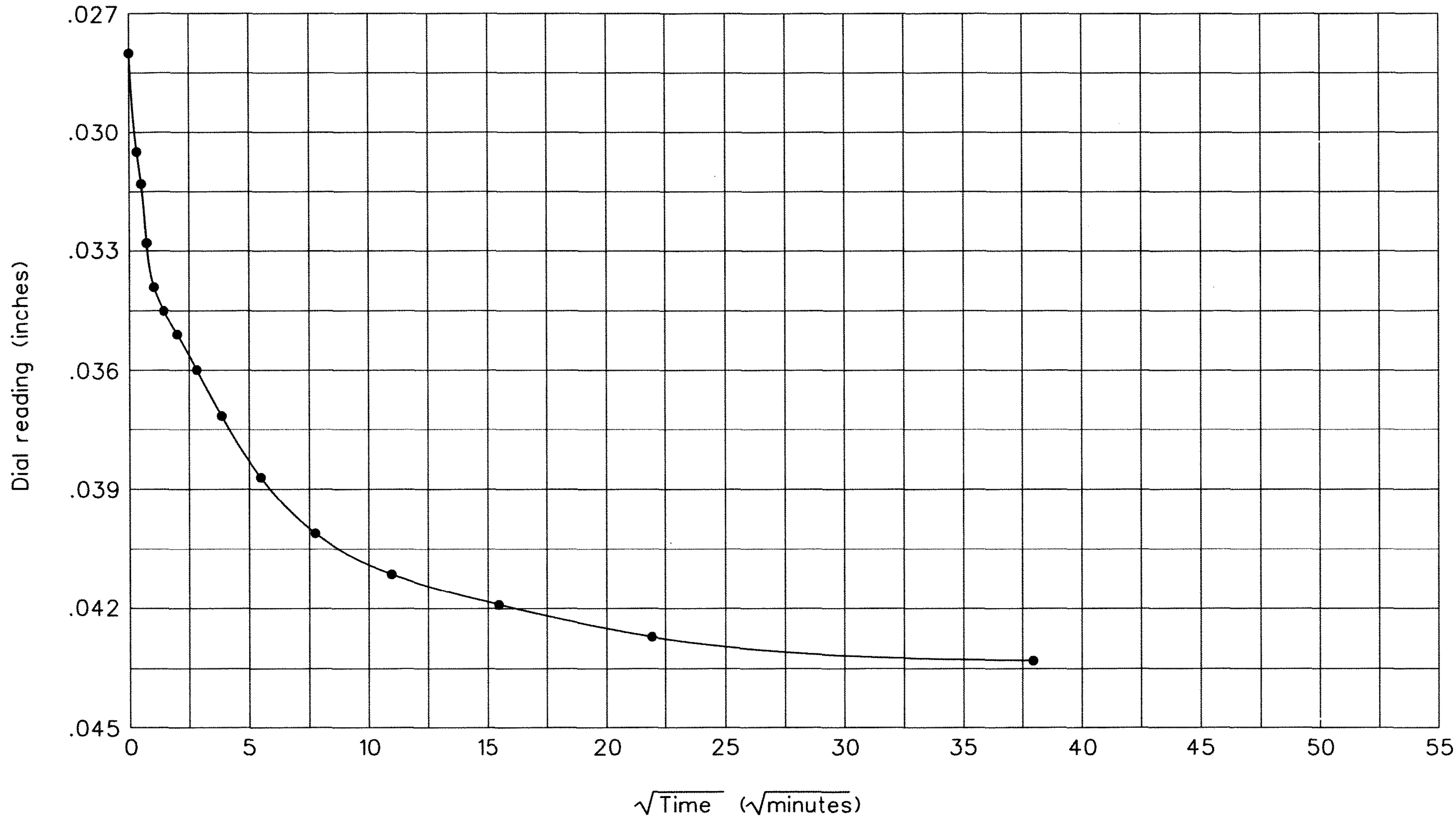
Hole no.: 09-E5-3
Depth: 25'-25.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure

ADDENDUM 1 - OCTOBER 2010



RB&G ENGINEERING, INC.

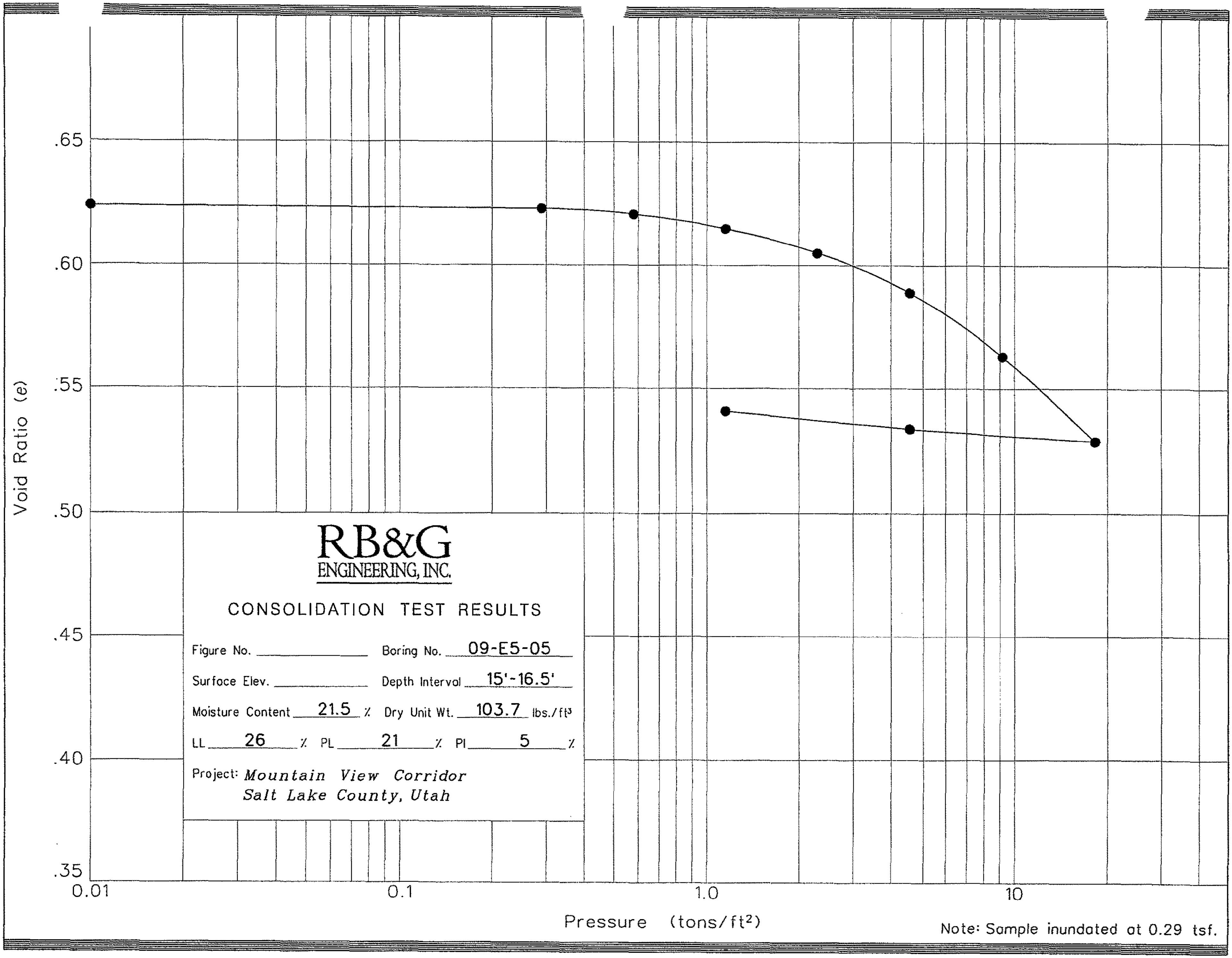
Hole no.: 09-E5-3
Depth: 25'-25.5'
Load: 2.30 to 4.60 tons

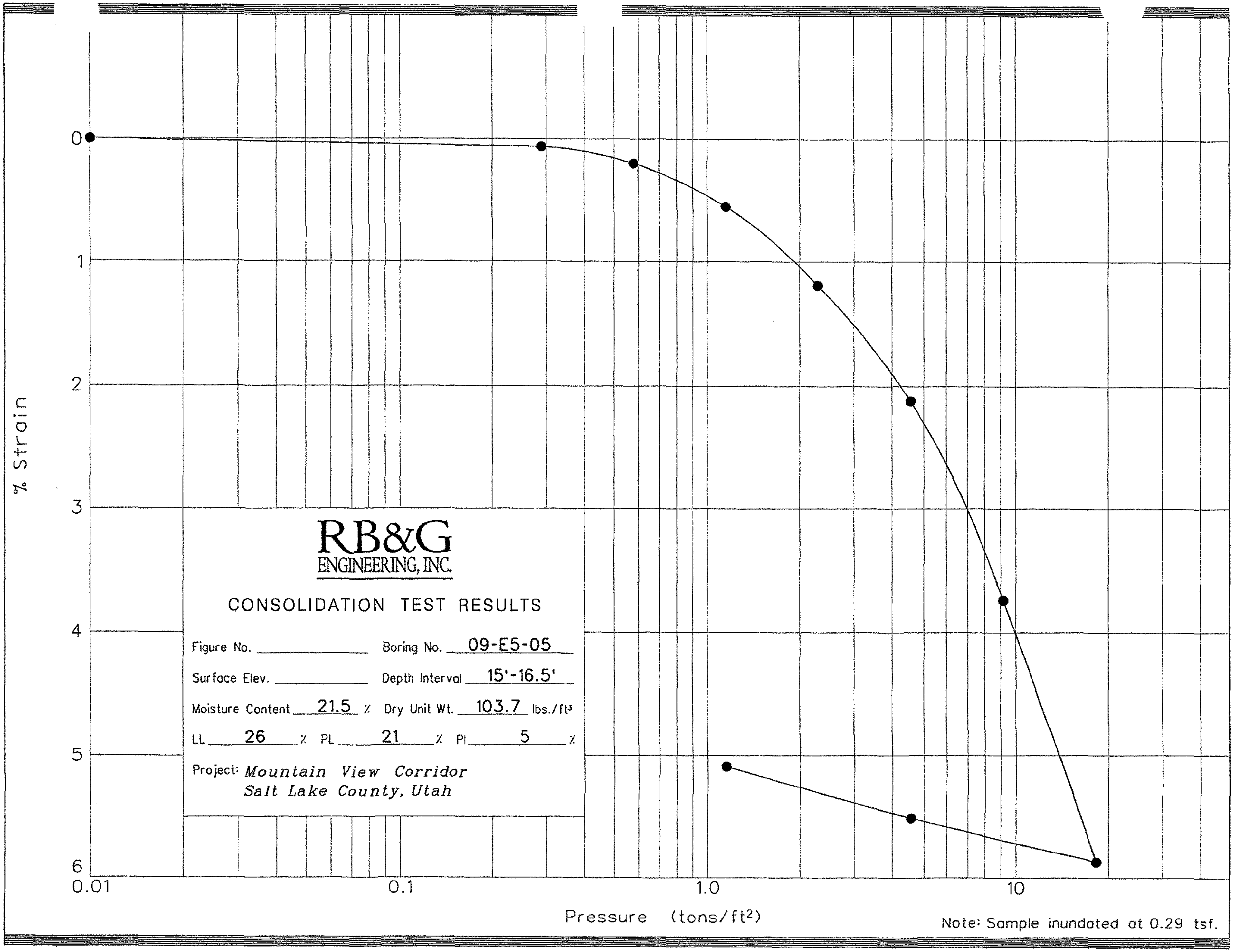
TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

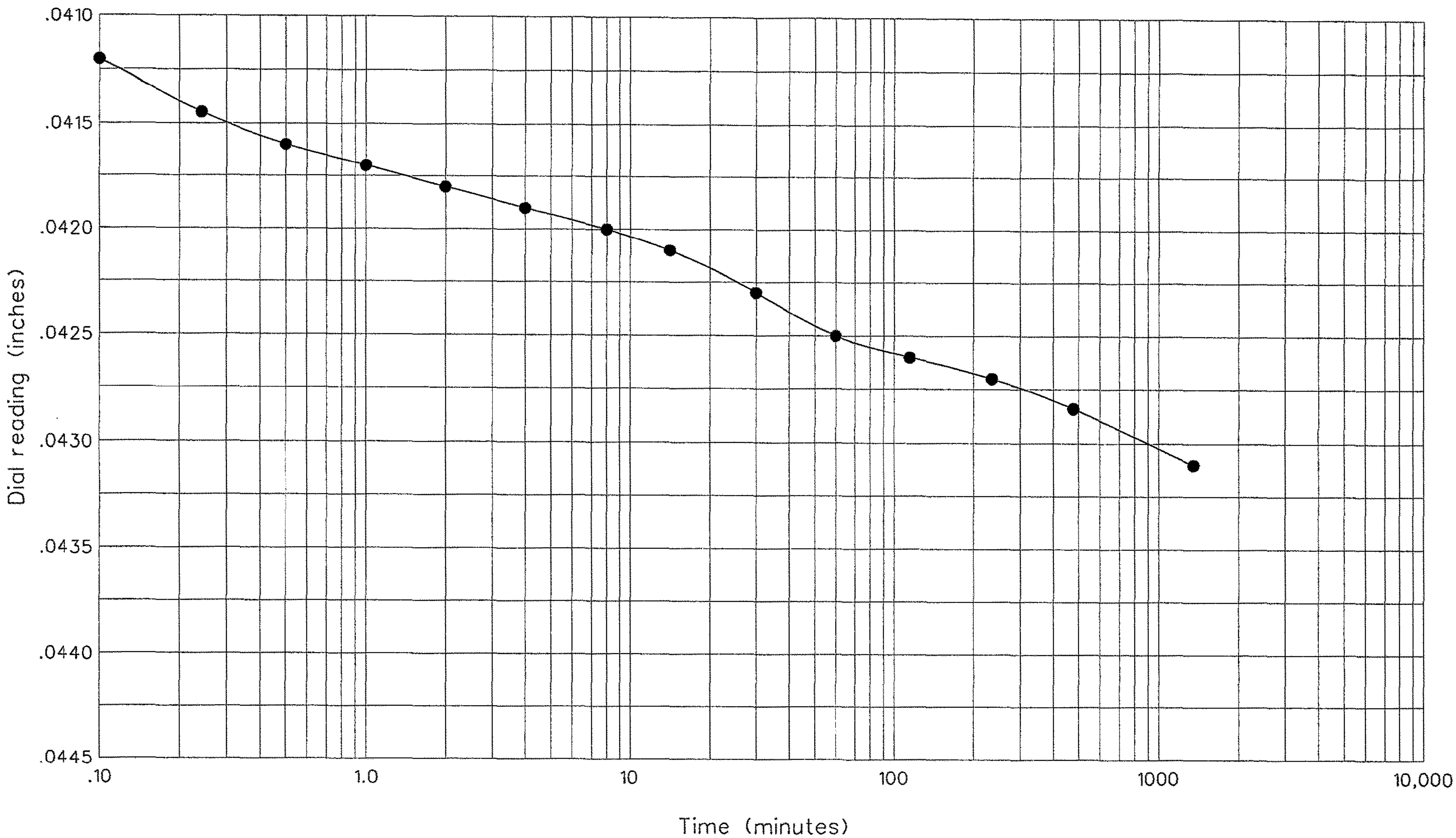
Figure

ADDENDUM 1 - OCTOBER 2010


.65
.60
.55
.50
.45
.40
.35
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-05
Surface Elev.
Depth Interval 15'-16.5'
Moisture Content 21.5 %
Dry Unit Wt. 103.7 lbs./ft³
LL 26 %
PL 21 %
PI 5 %
Project: Mountain View Corridor
Salt Lake County, Utah



0
1
2
3
4
5
6
% Strain
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-05
Surface Elev.
Depth Interval 15'-16.5'
Moisture Content 21.5 %
Dry Unit Wt. 103.7 lbs./ft³
LL 26 %
PL 21 %
PI 5 %
Project: Mountain View Corridor
Salt Lake County, Utah



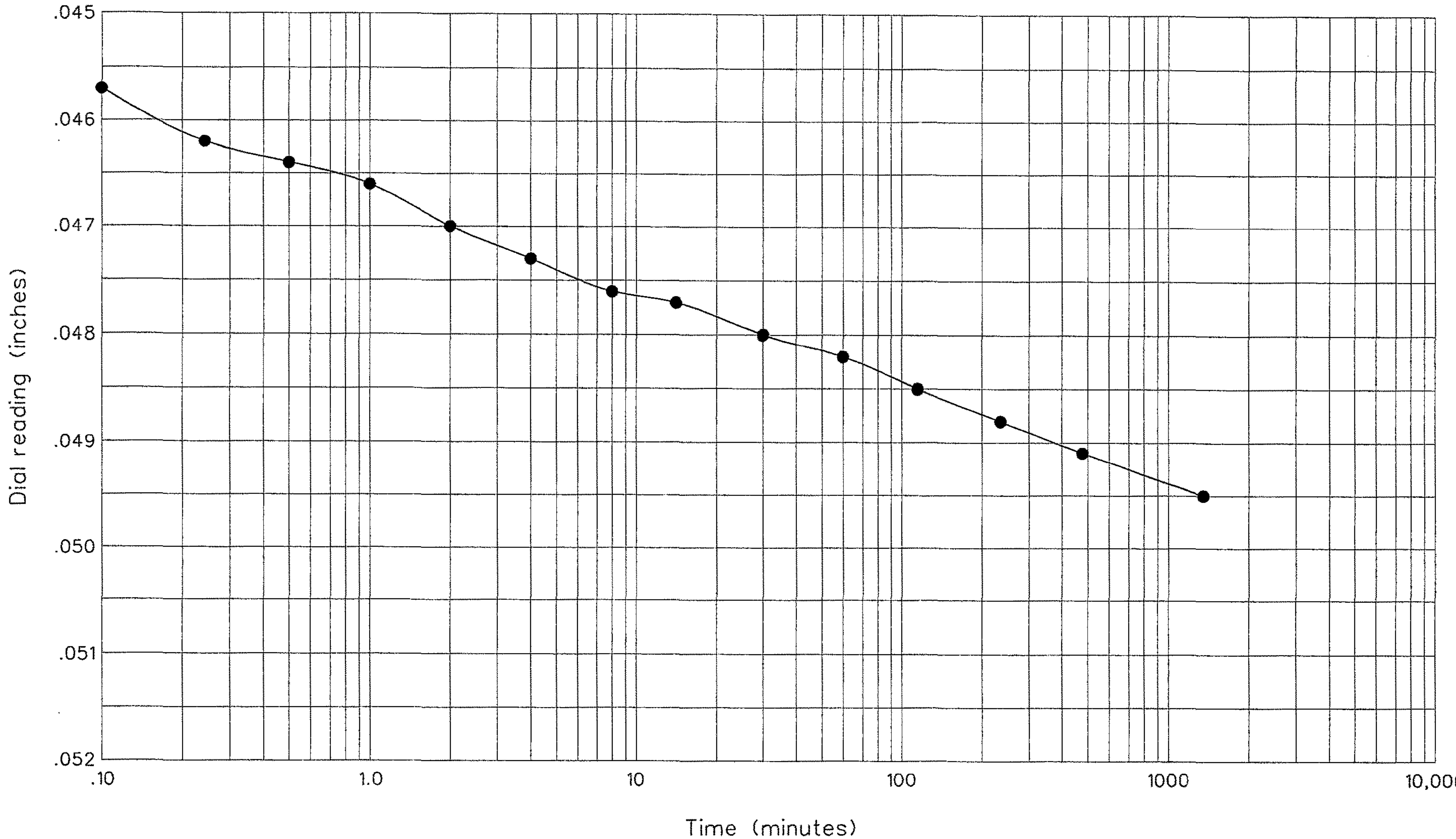
RB&G ENGINEERING, INC.

Hole no.: 09-E5-05
Depth: 15'-16.5'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



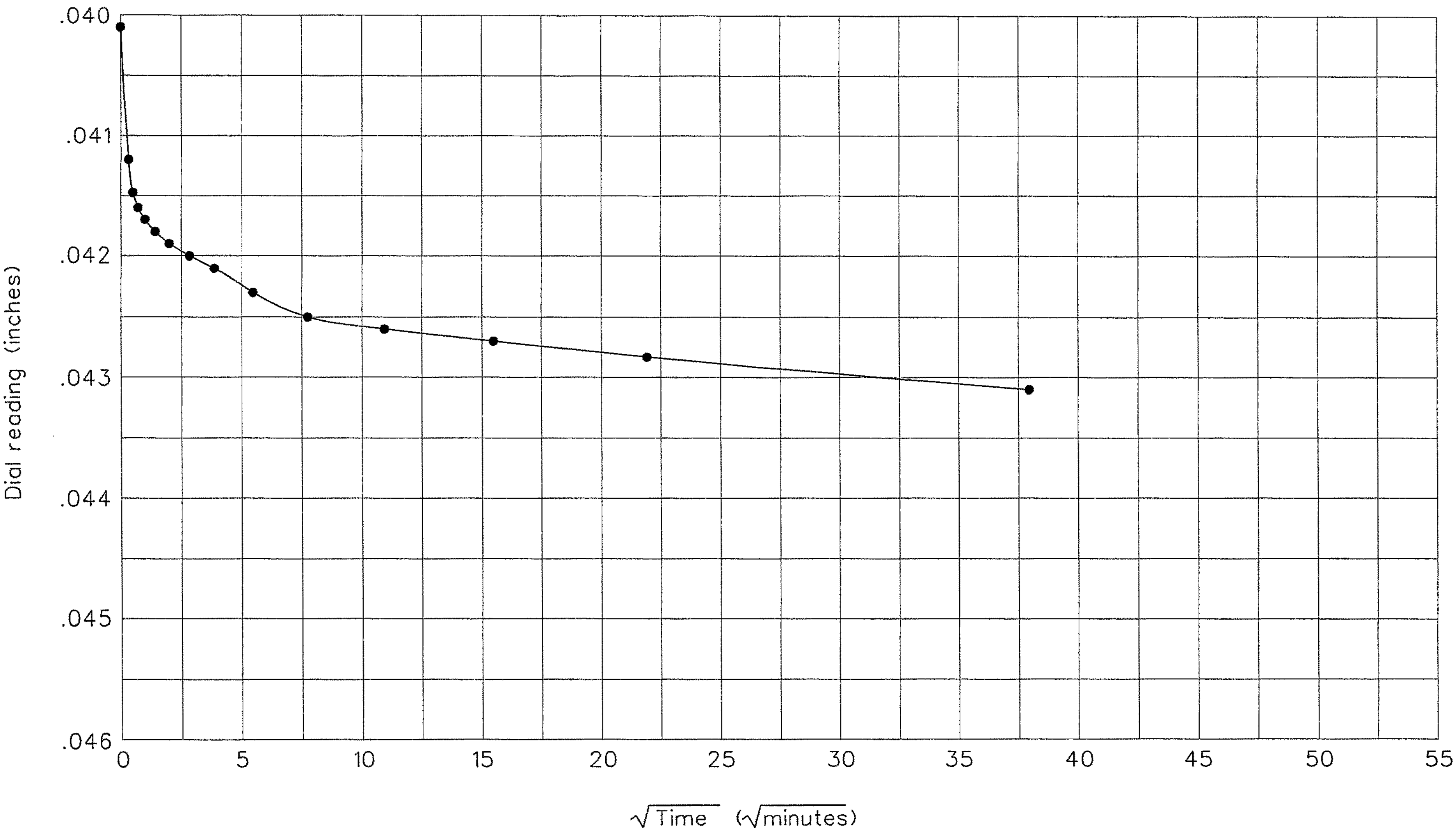
RB&G ENGINEERING, INC.

Hole no.: 09-E5-05
Depth: 15'-16.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



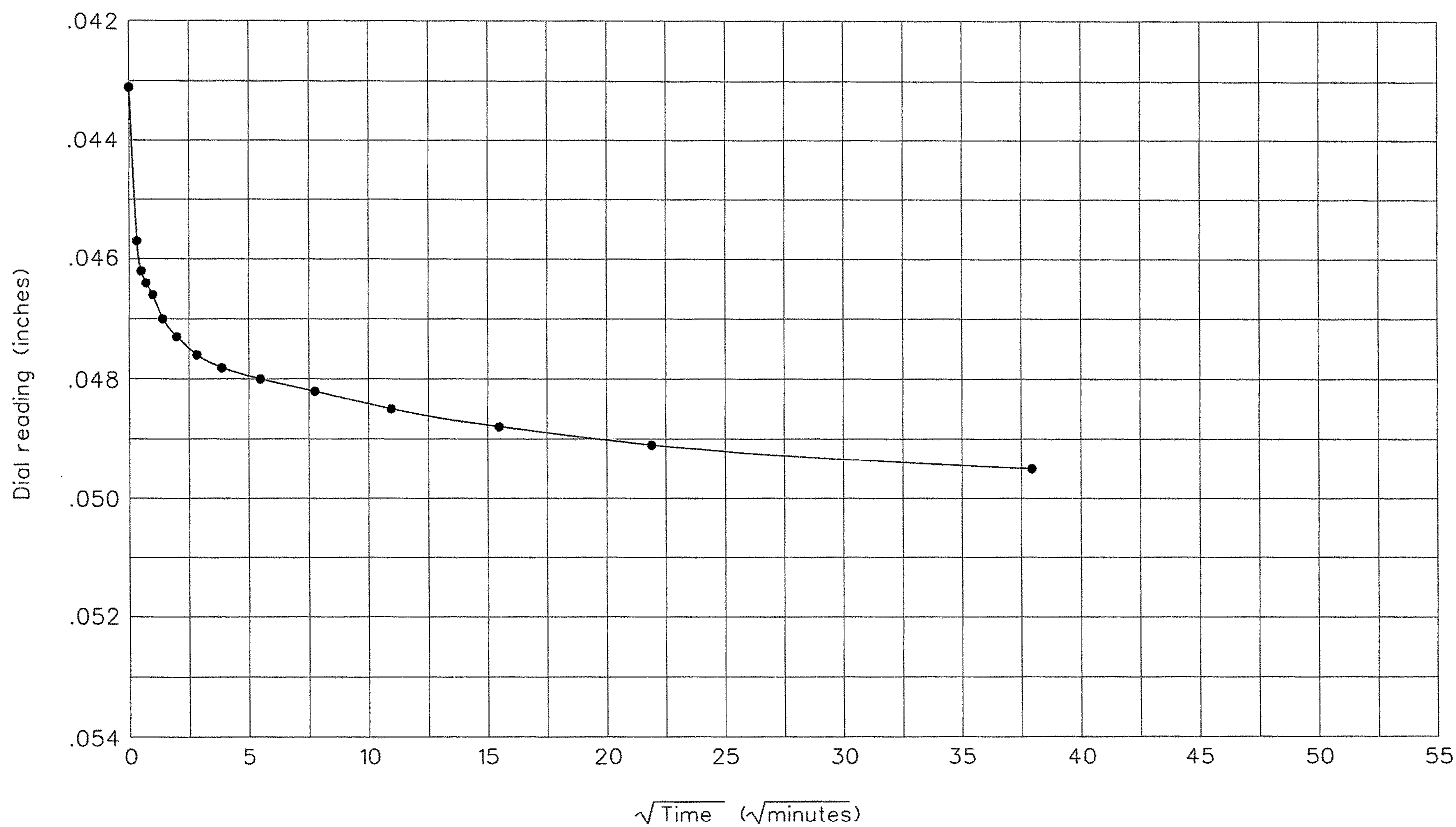
RB&G ENGINEERING, INC.

Hole no.: 09-E5-05
Depth: 15'-16.5'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



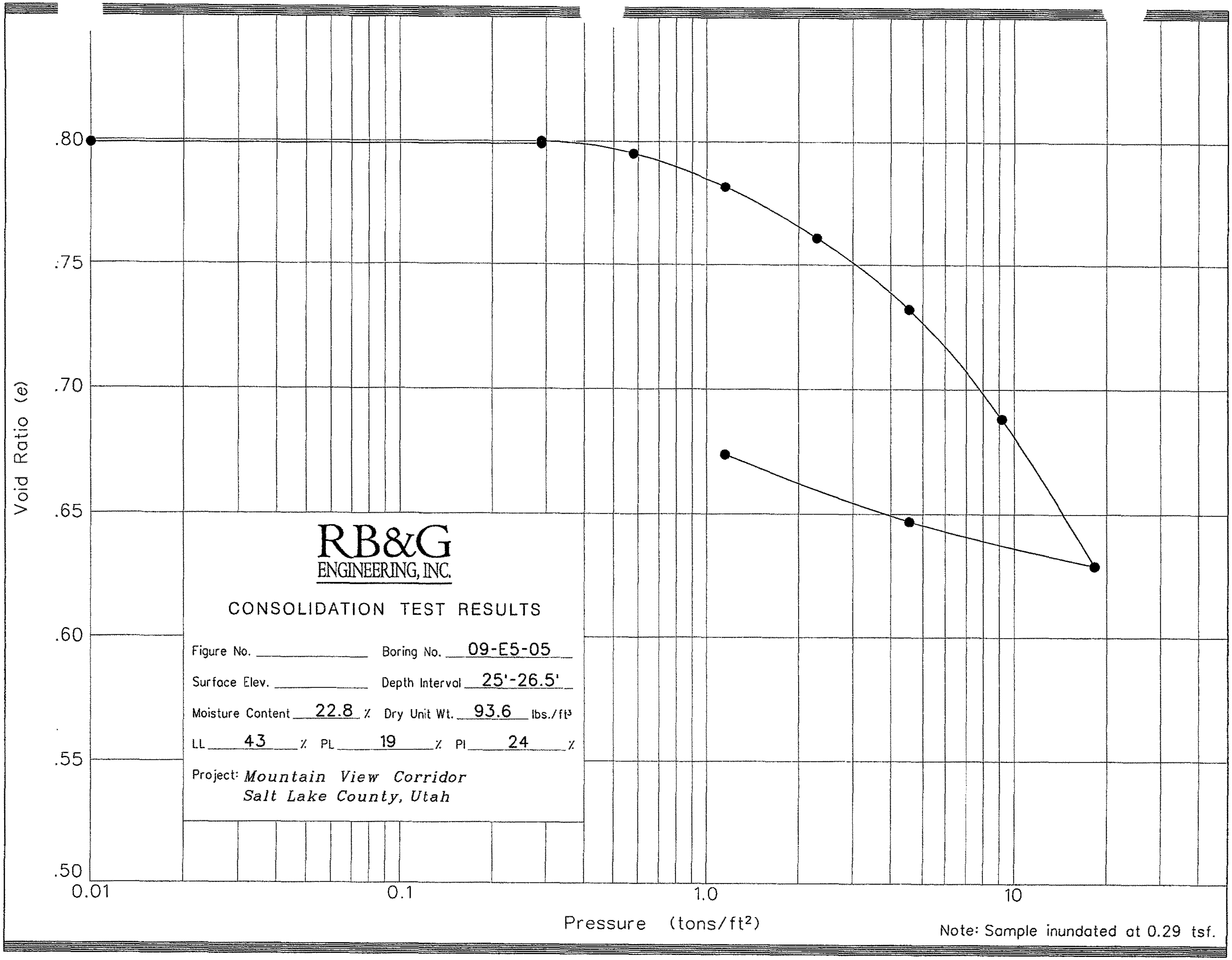
RB&G ENGINEERING, INC.

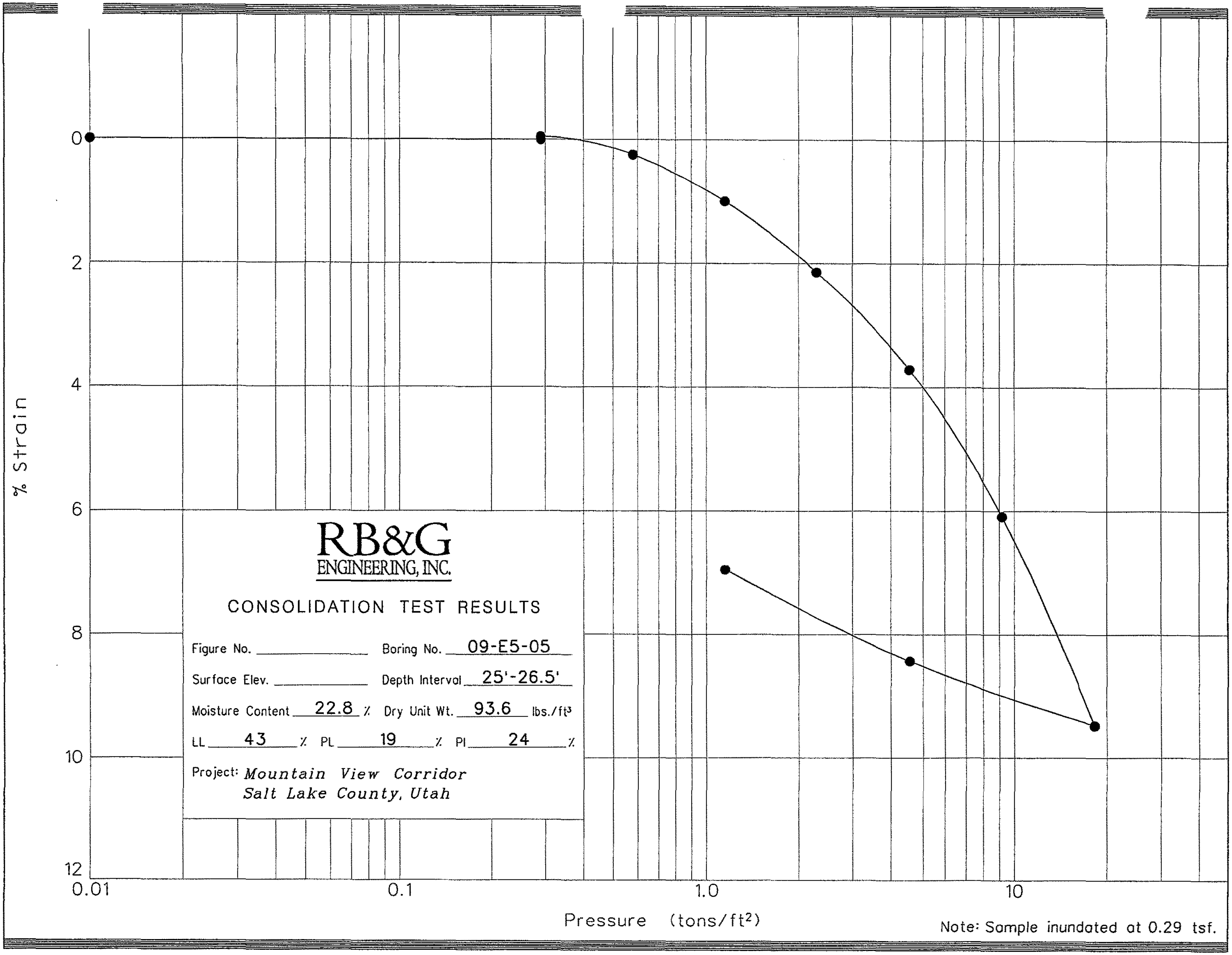
Hole no.: 09-E5-05
Depth: 15'-16.5'
Load: 1.15 to 2.30 tons

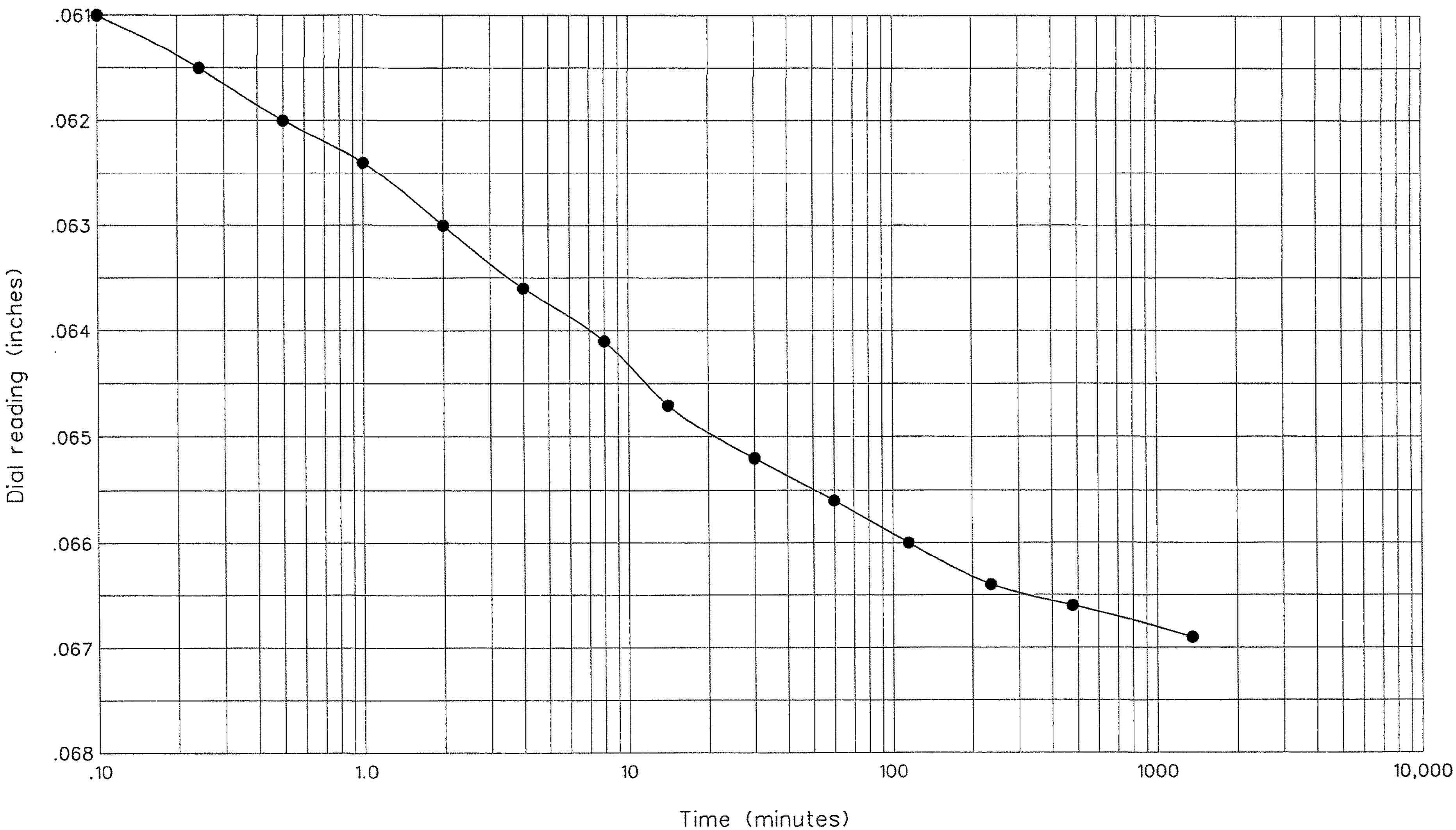
TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure


.80
.75
.70
.65
.60
.55
.50
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-05
Surface Elev.
Depth Interval 25'-26.5'
Moisture Content 22.8 %
Dry Unit Wt. 93.6 lbs./ft³
LL 43 %
PL 19 %
PI 24 %
Project: Mountain View Corridor
Salt Lake County, Utah


RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-05
Surface Elev.
Depth Interval 25'-26.5'
Moisture Content 22.8 %
Dry Unit Wt. 93.6 lbs./ft³
LL 43 %
PL 19 %
PI 24 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
2
4
6
8
10
12
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.



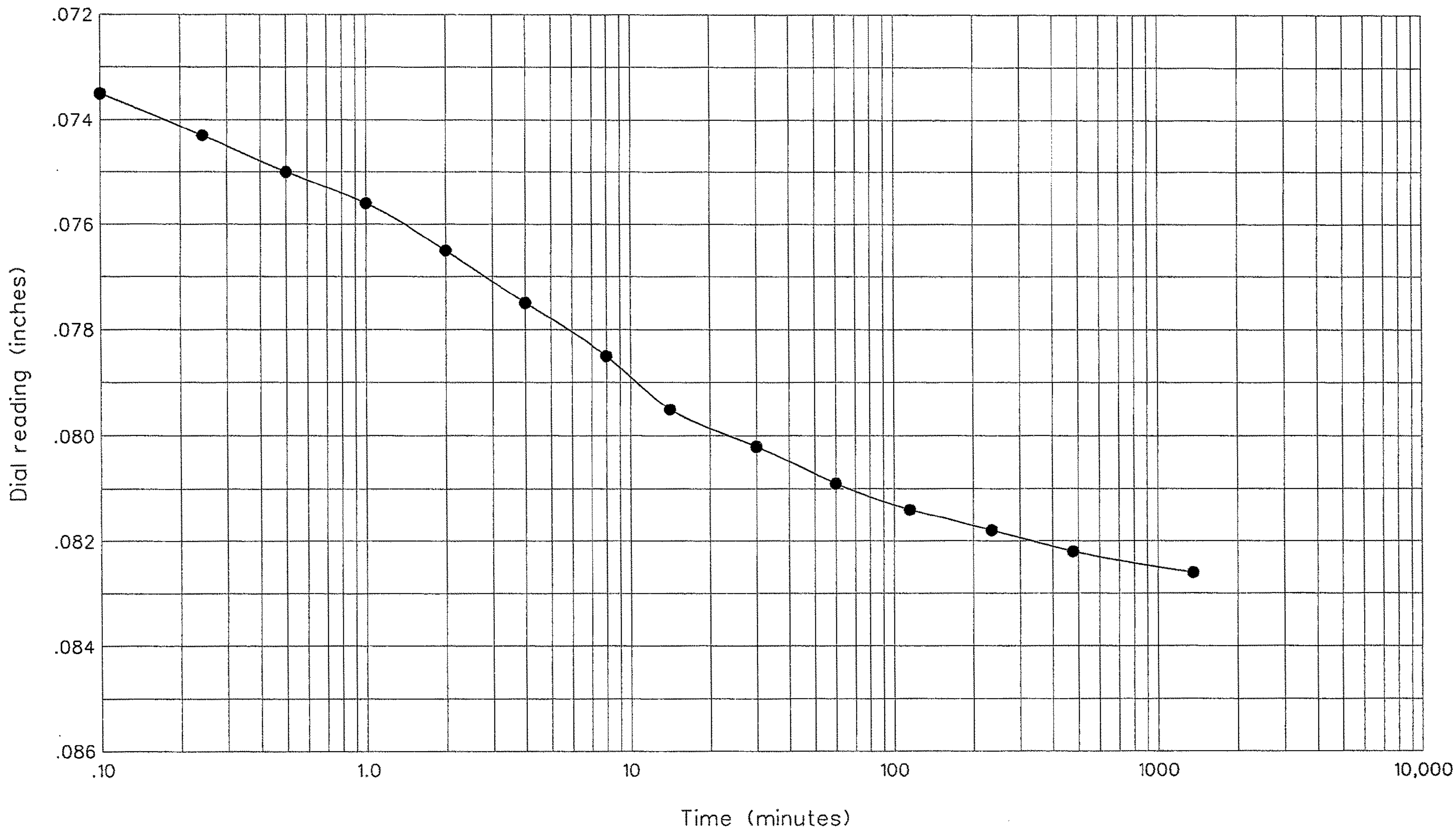
RB&G ENGINEERING, INC.

Hole no.: 09-E5-05
Depth: 25'-26.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



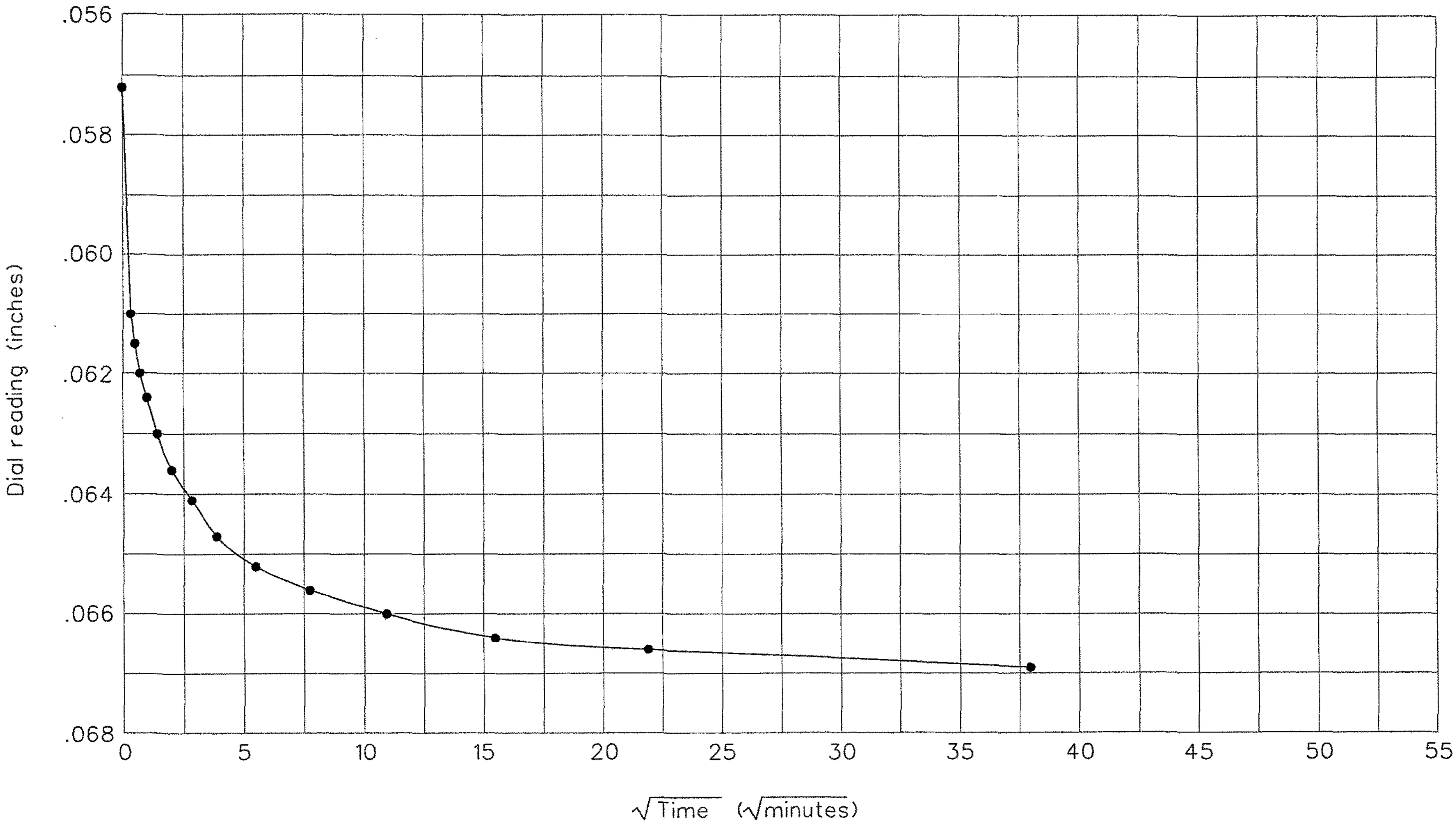
RB&G ENGINEERING, INC.

Hole no.: 09-E5-05
Depth: 25'-26.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



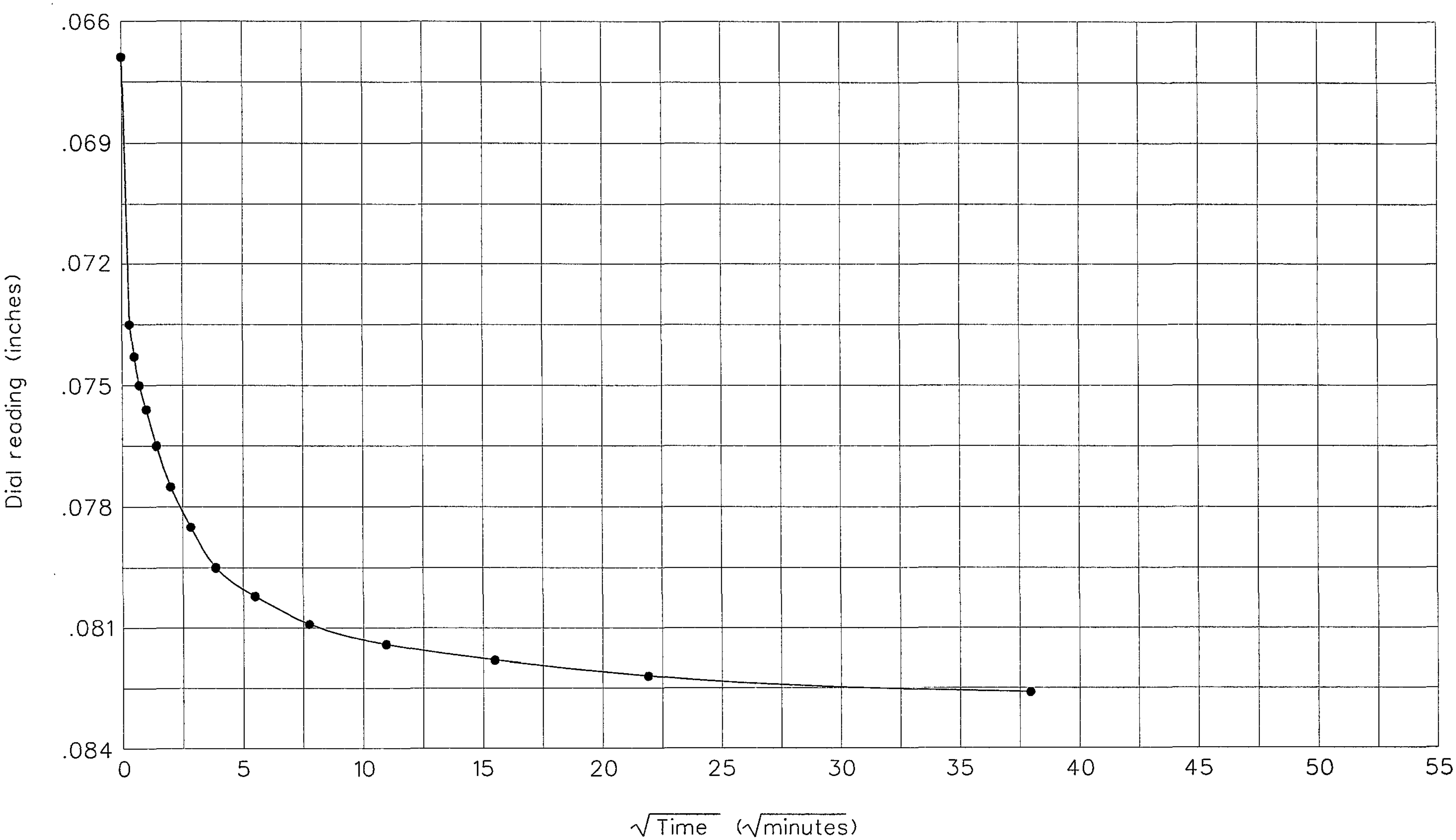
RB&G ENGINEERING, INC.

Hole no.: 09-E5-05
Depth: 25'-26.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



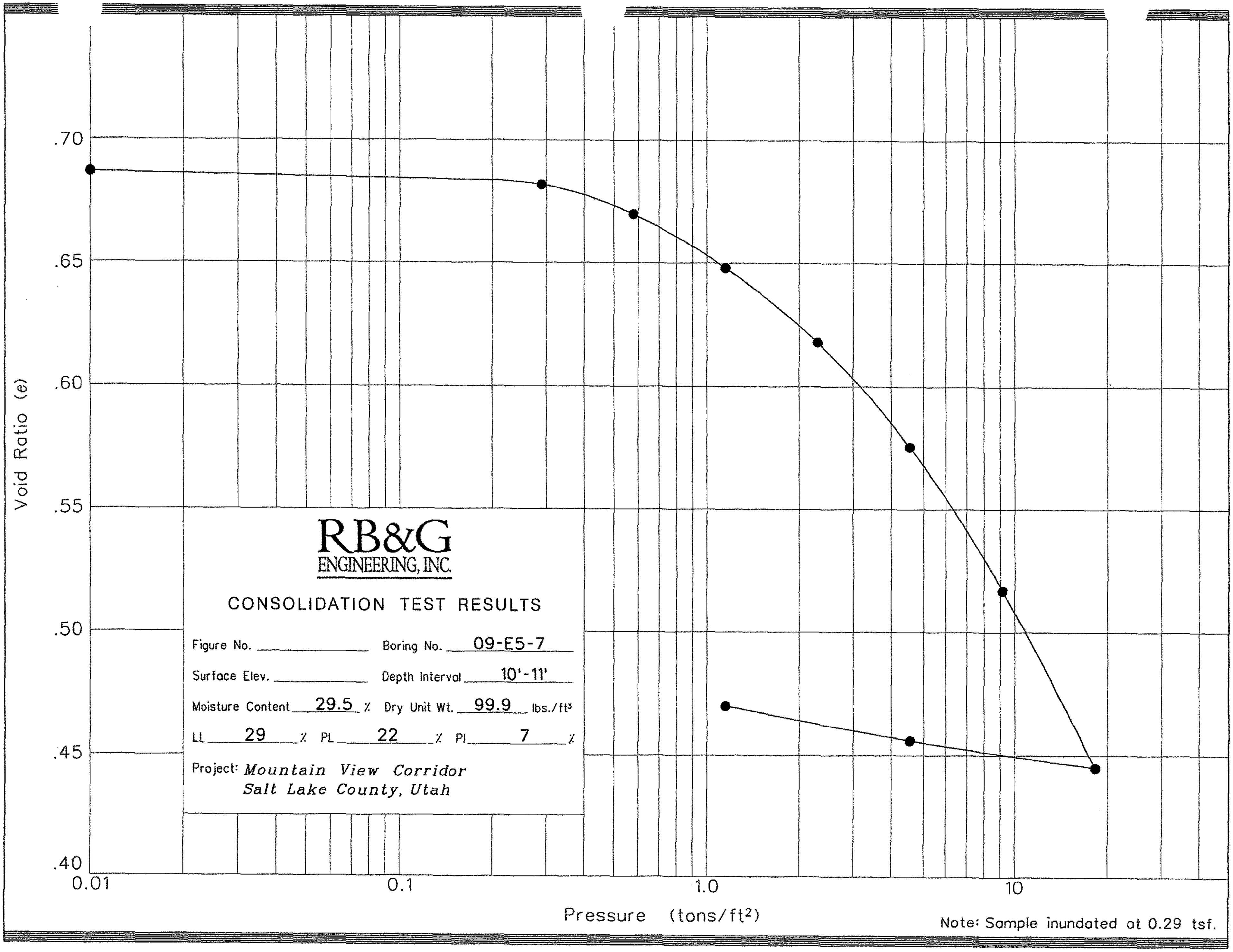
RB&G ENGINEERING, INC.

Hole no.: 09-E5-05
Depth: 25'-26.5'
Load: 2.30 to 4.60 tons

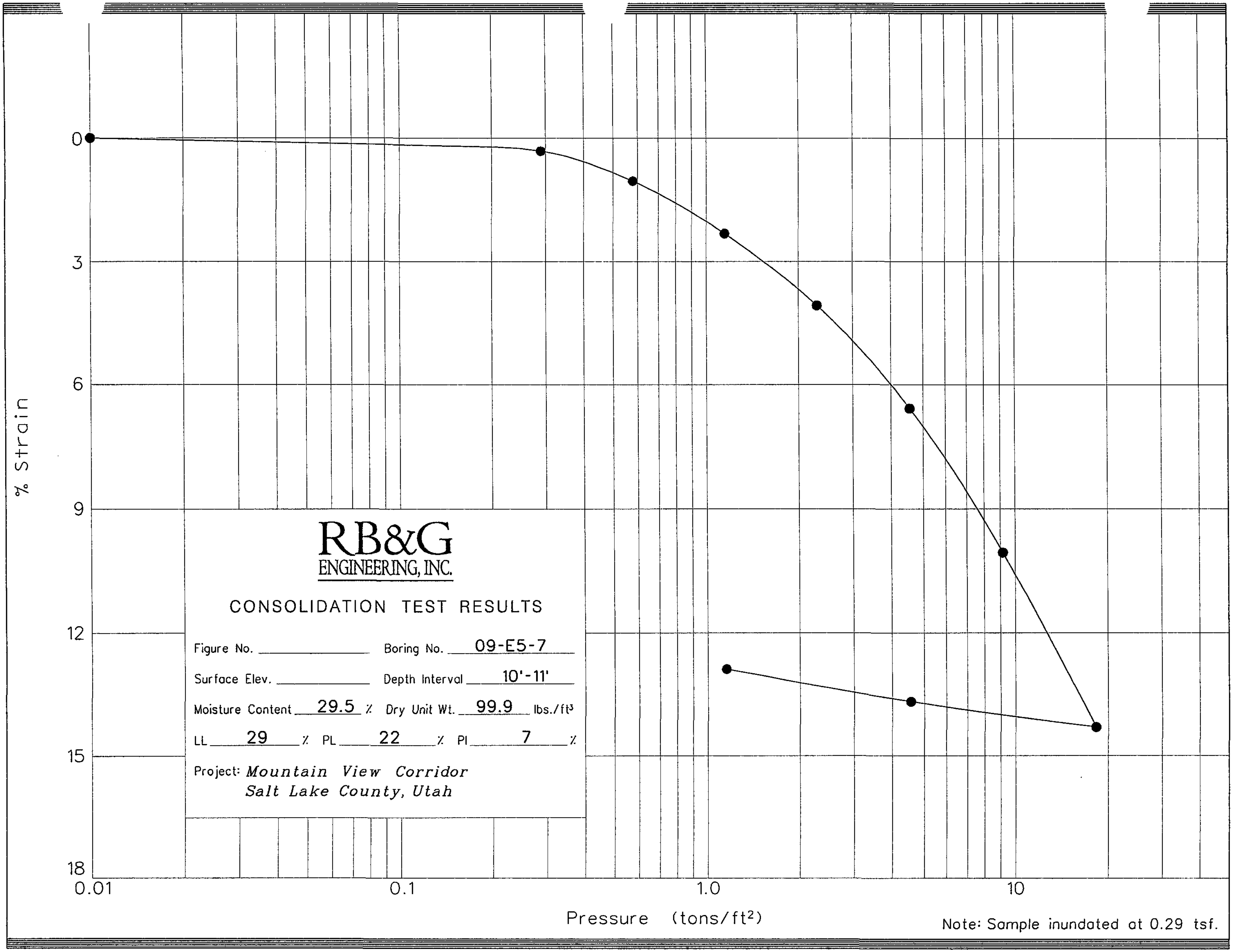
TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



.70
.65
.60
.55
.50
.45
.40
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.29 tsf.
RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-7
Surface Elev.
Depth Interval 10'-11'
Moisture Content 29.5 %
Dry Unit Wt. 99.9 lbs./ft³
LL 29 %
PL 22 %
PI 7 %
Project: Mountain View Corridor
Salt Lake County, Utah



RB&G ENGINEERING, INC.

CONSOLIDATION TEST RESULTS

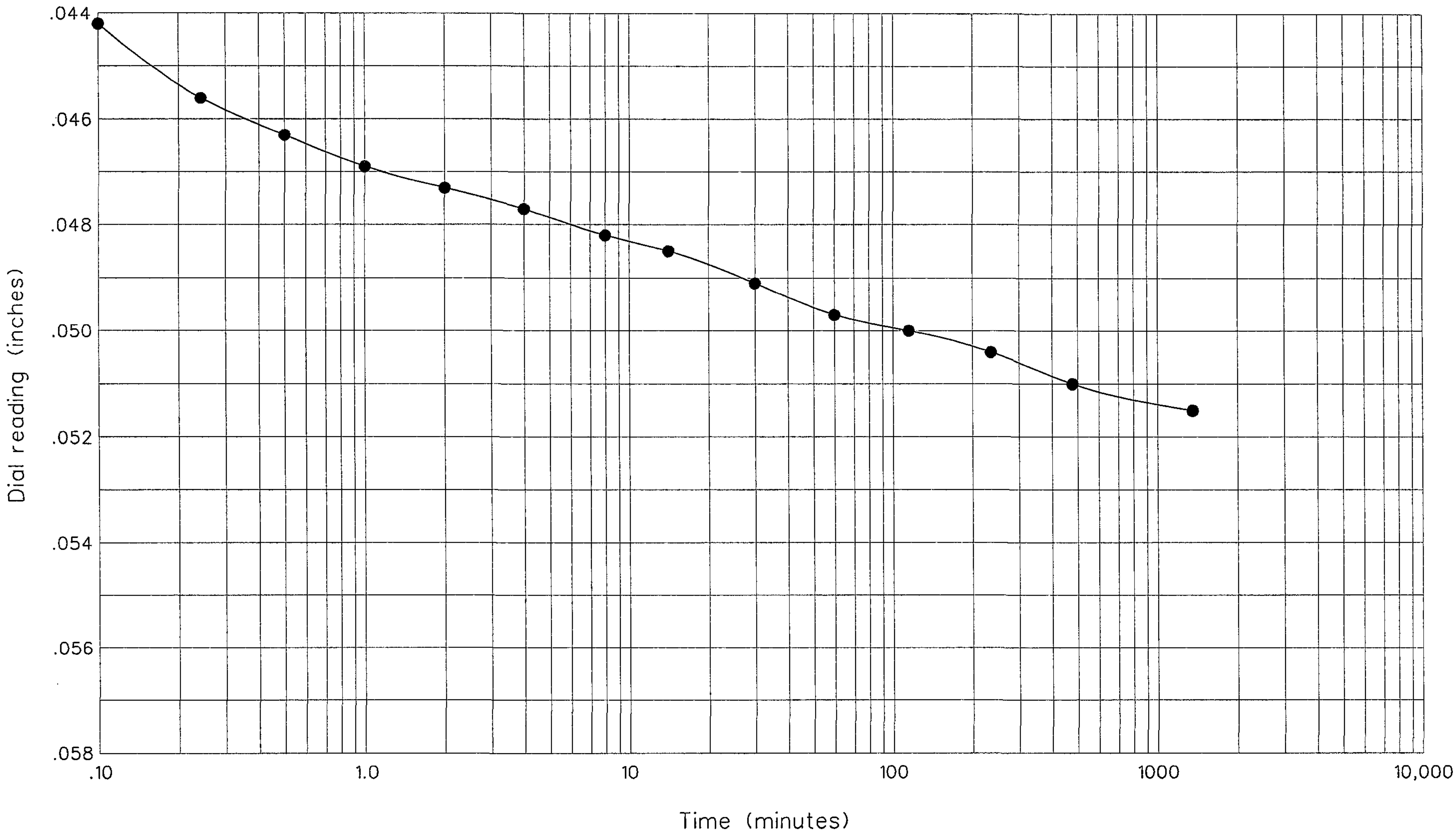
Figure No. ______ Boring No. 09-E5-7

Surface Elev. ______ Depth Interval 10'-11'

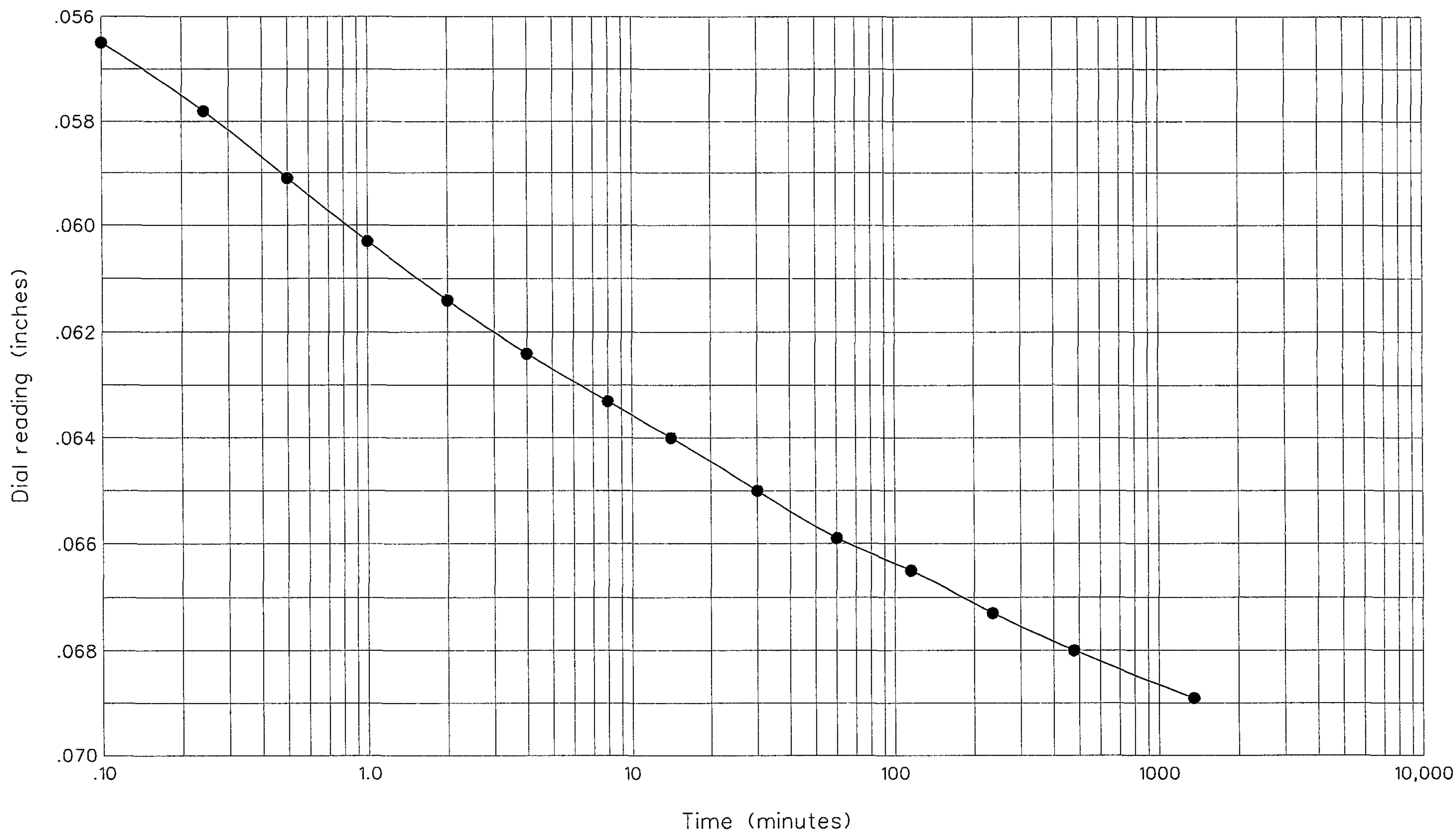
Moisture Content 29.5 % Dry Unit Wt. 99.9 lbs./ft³

LL 29 % PL 22 % PI 7 %

Project: *Mountain View Corridor*
Salt Lake County, Utah



RB&G ENGINEERING, INC.	Hole no.: 09-E5-7 Depth: 10'-11' Load: 0.58 to 1.15 tons	**TIME CONSOLIDATION** *Mountain View Corridor* *Salt Lake County, Utah*
		Figure



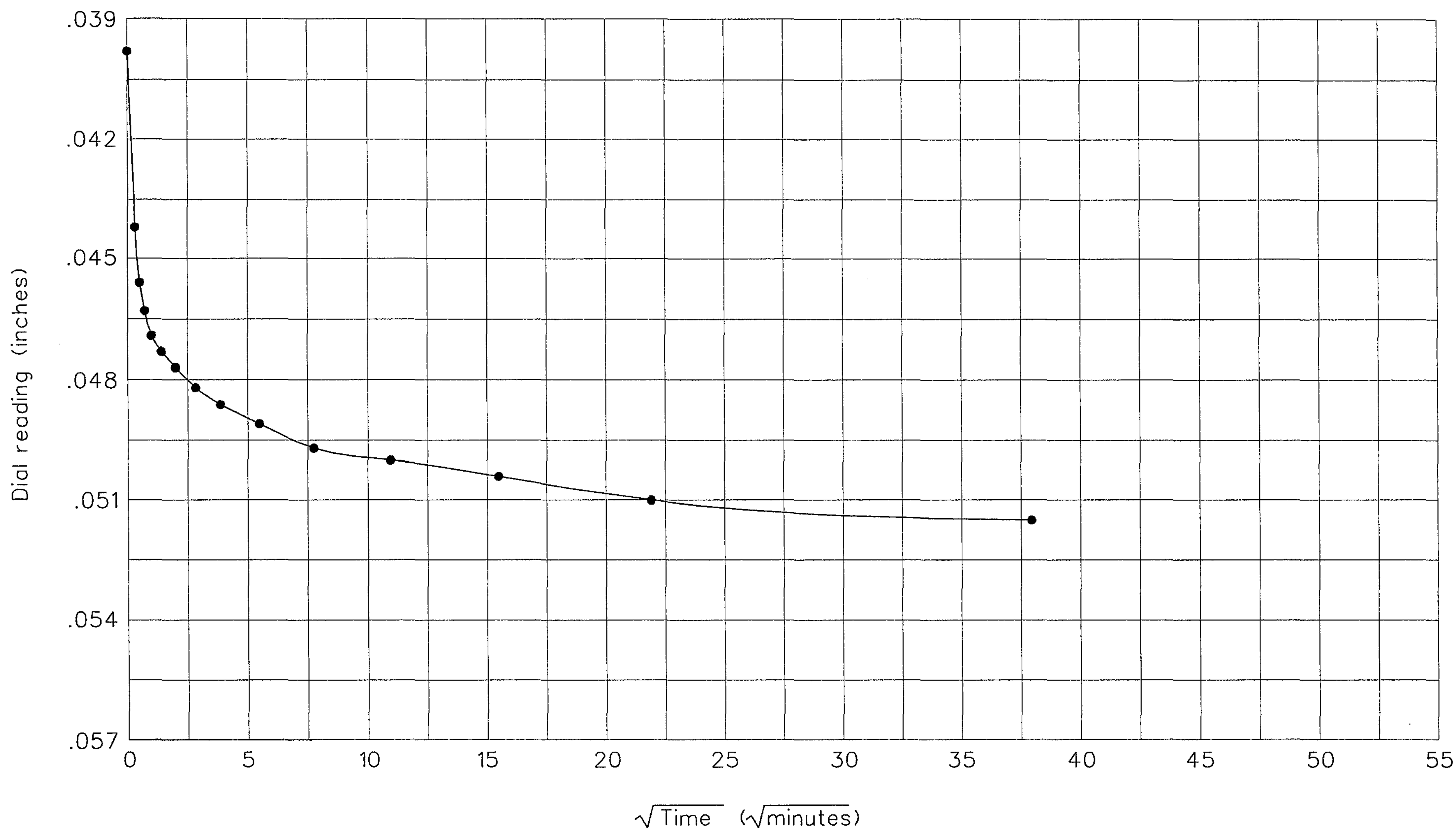
RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 10'-11'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



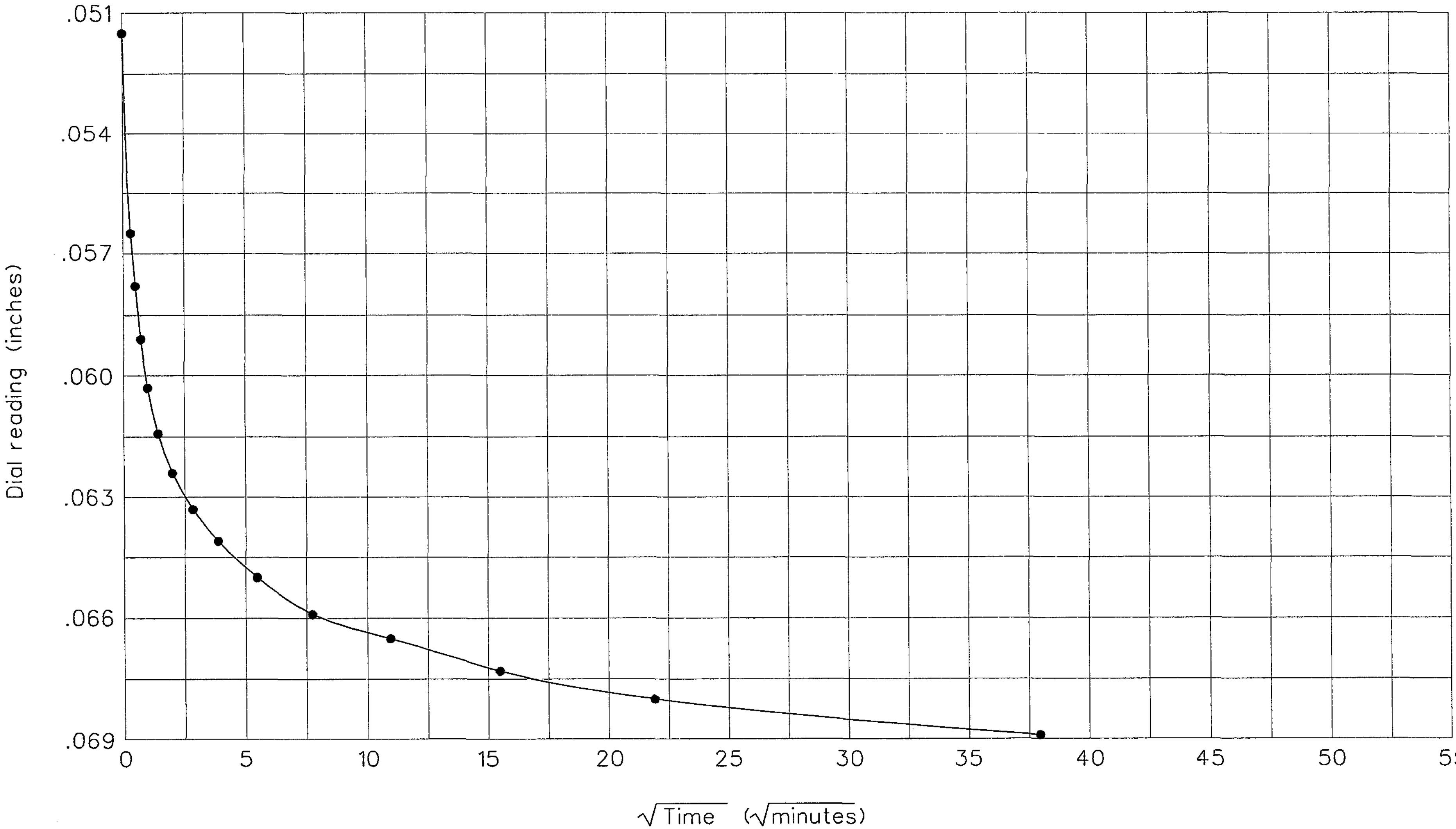
RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 10'-11'
Load: 0.58 to 1.15 tons

TIME CONSOLIDATION

Mountain View Corridor
Salt Lake County, Utah

Figure



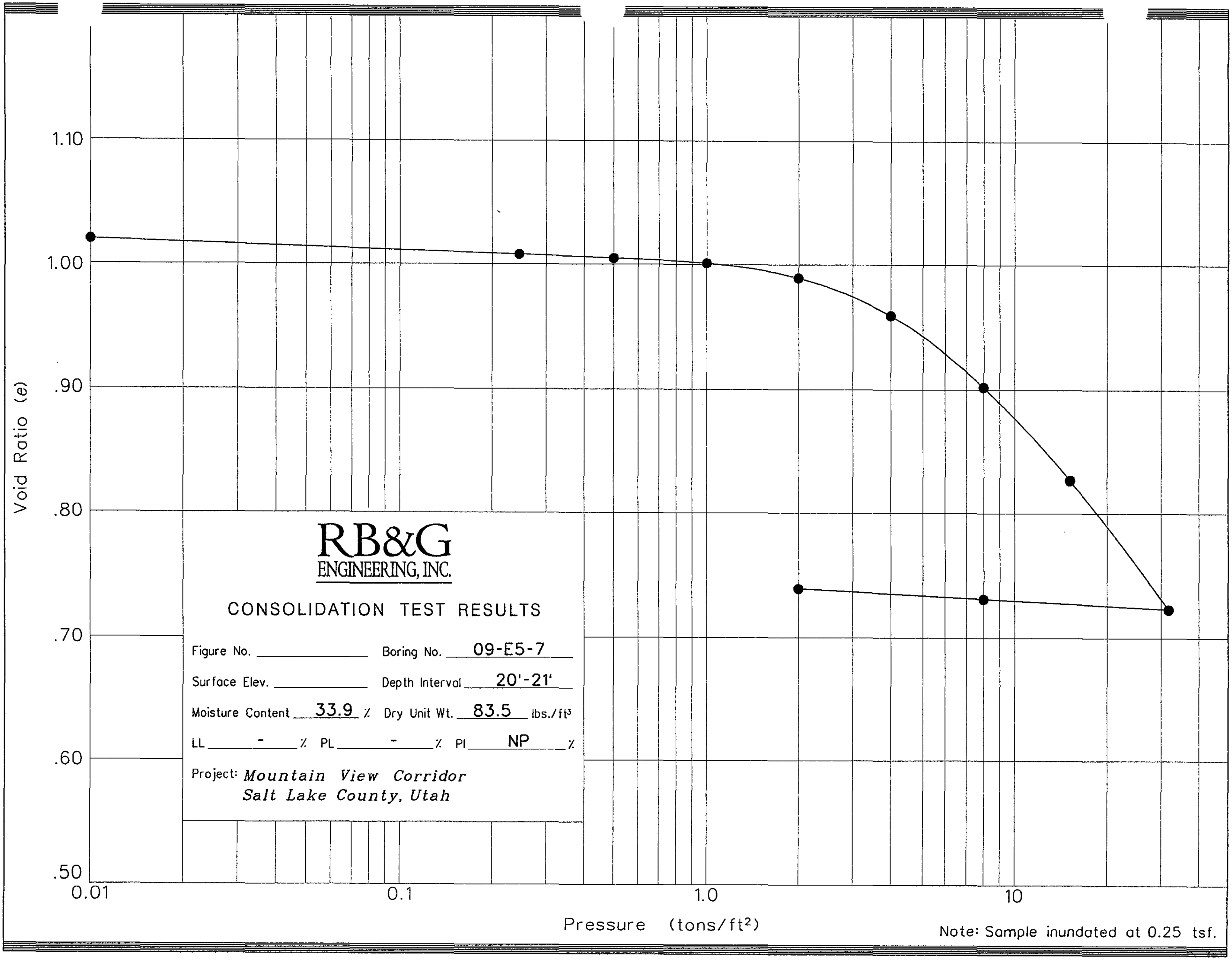
RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 10'-11'
Load: 1.15 to 2.30 tons

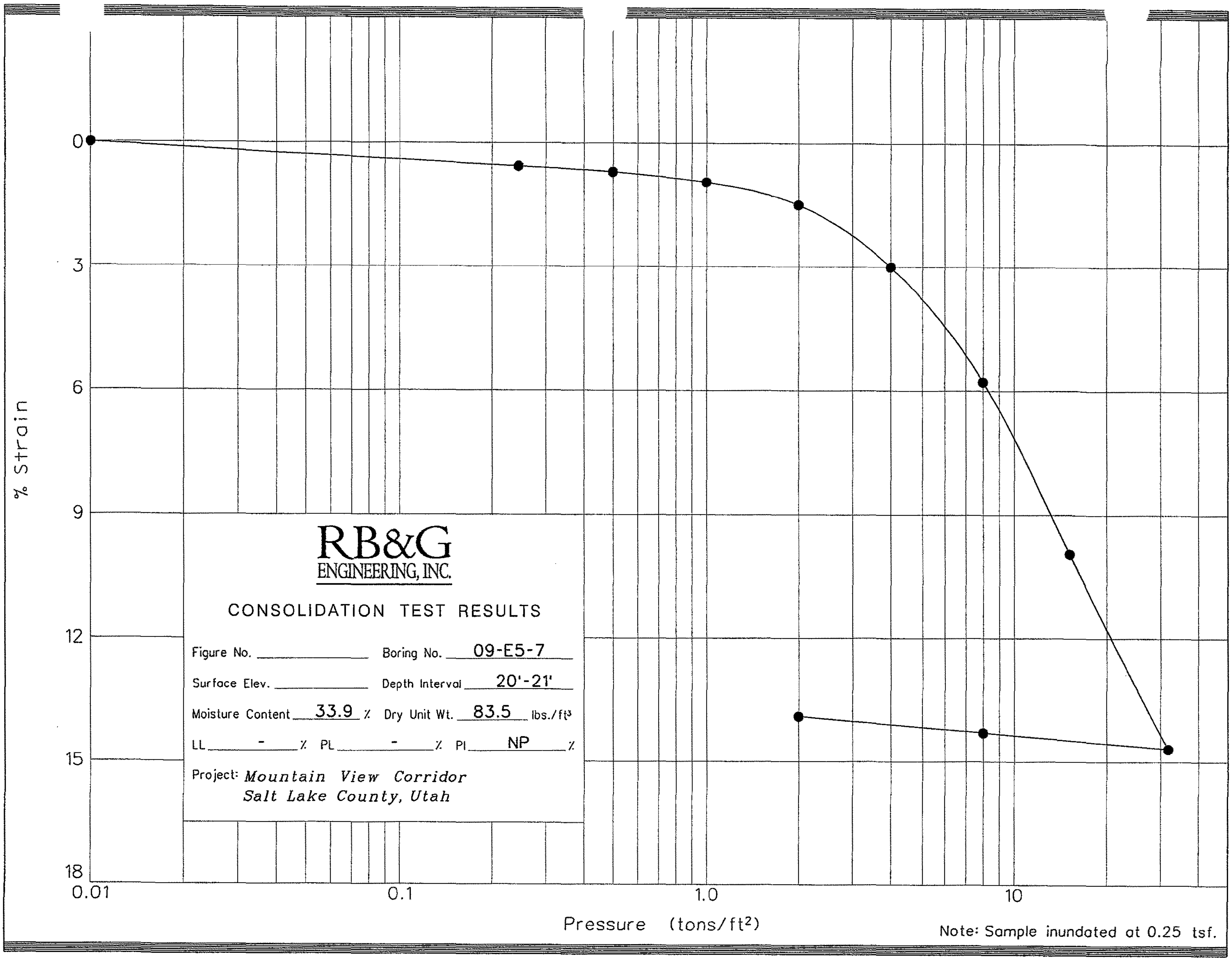
TIME CONSOLIDATION

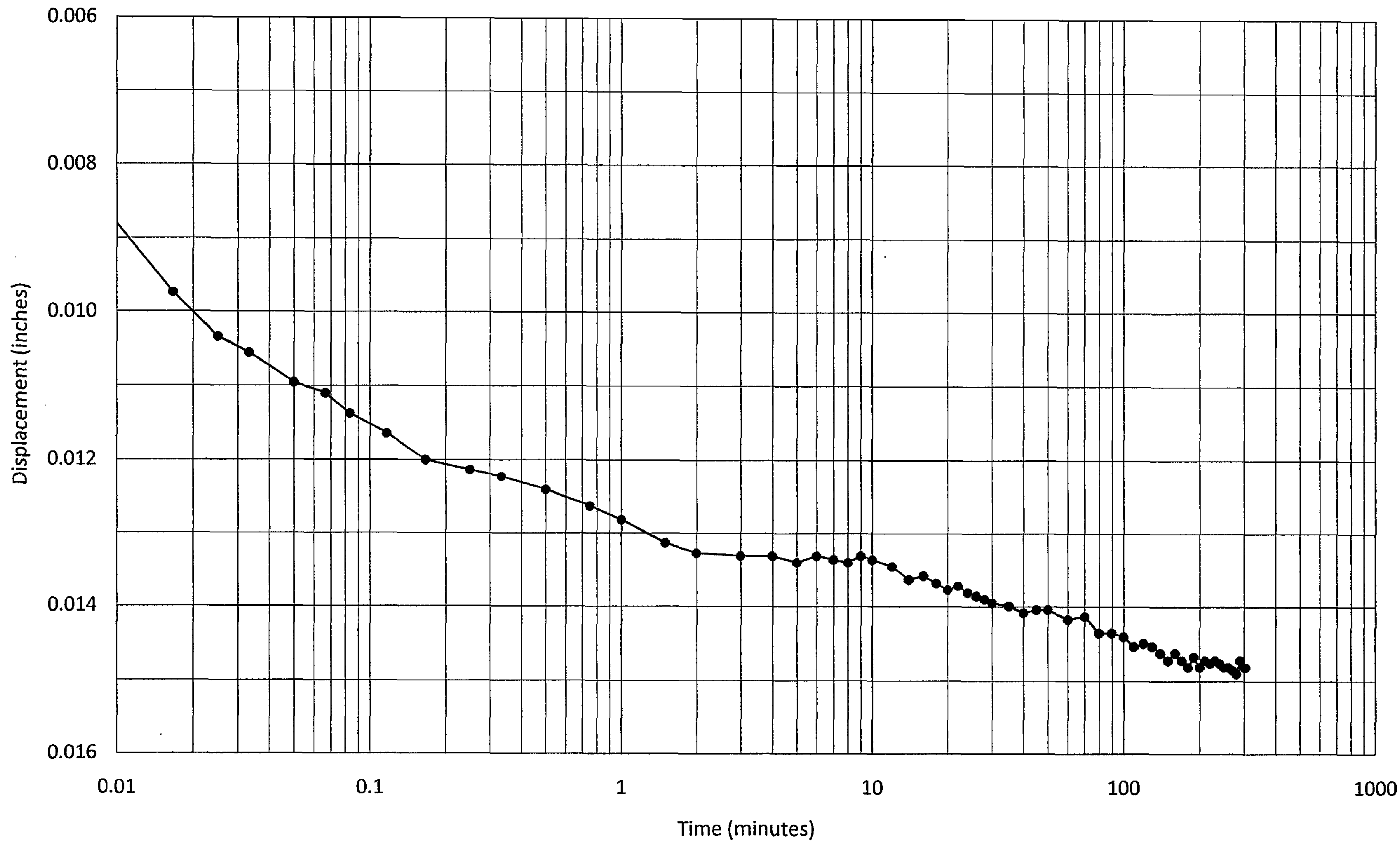
Mountain View Corridor
Salt Lake County, Utah

Figure



1.10
1.00
.90
.80
.70
.60
.50
Void Ratio (e)
0.01
0.1
1.0
10
Pressure (tons/ft²)
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-7
Surface Elev.
Depth Interval 20'-21'
Moisture Content 33.9 %
Dry Unit Wt. 83.5 lbs./ft³
LL - %
PL - %
PI NP %
Project: Mountain View Corridor
Salt Lake County, Utah
Note: Sample inundated at 0.25 tsf.


% Strain
0
3
6
9
12
15
18
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.
RB&G
ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-7
Surface Elev.
Depth Interval 20'-21'
Moisture Content 33.9 %
Dry Unit Wt. 83.5 lbs./ft³
LL - %
PL - %
PI NP %
Project: Mountain View Corridor
Salt Lake County, Utah

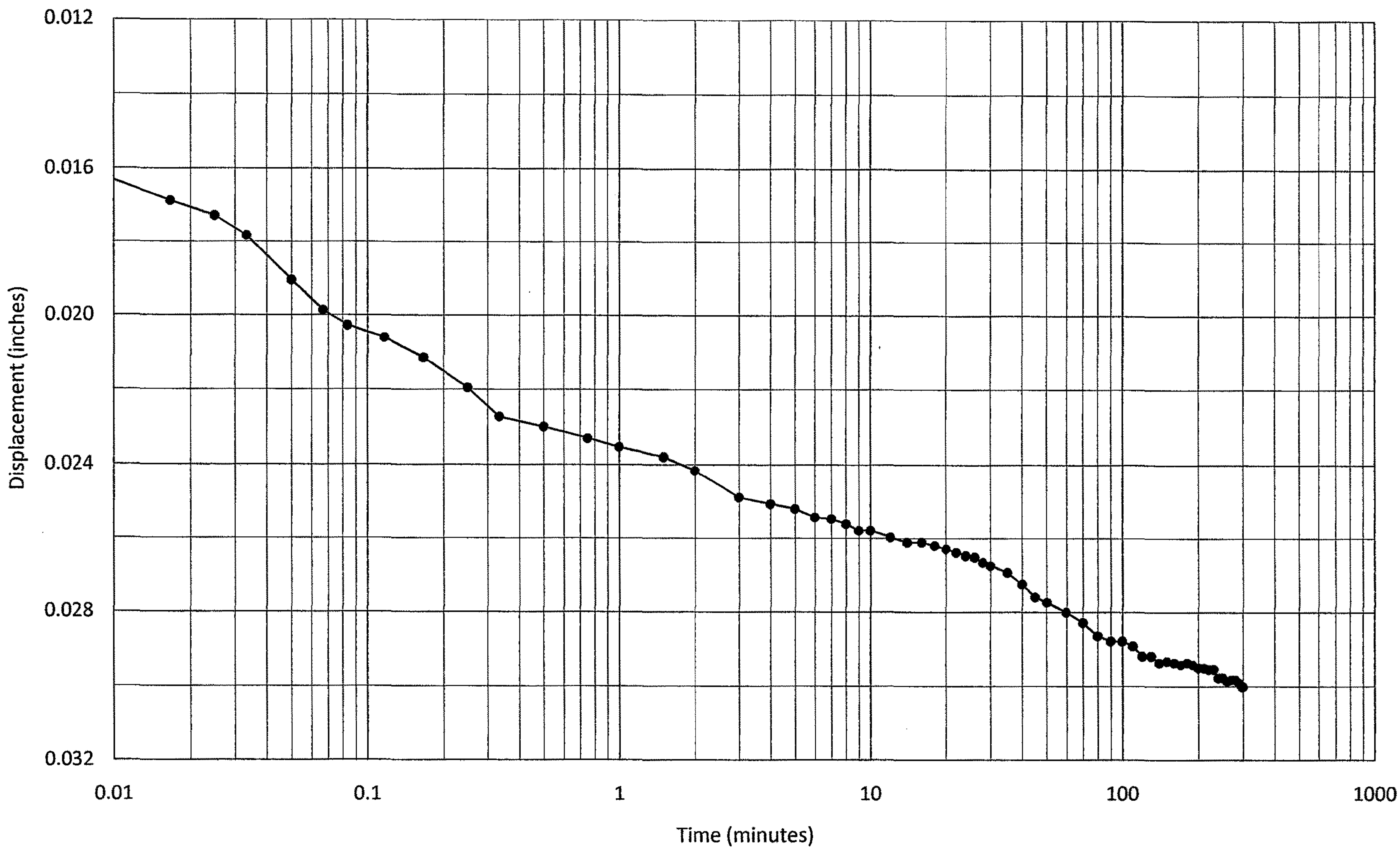


RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 20'-21'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 4
Salt Lake County, Utah

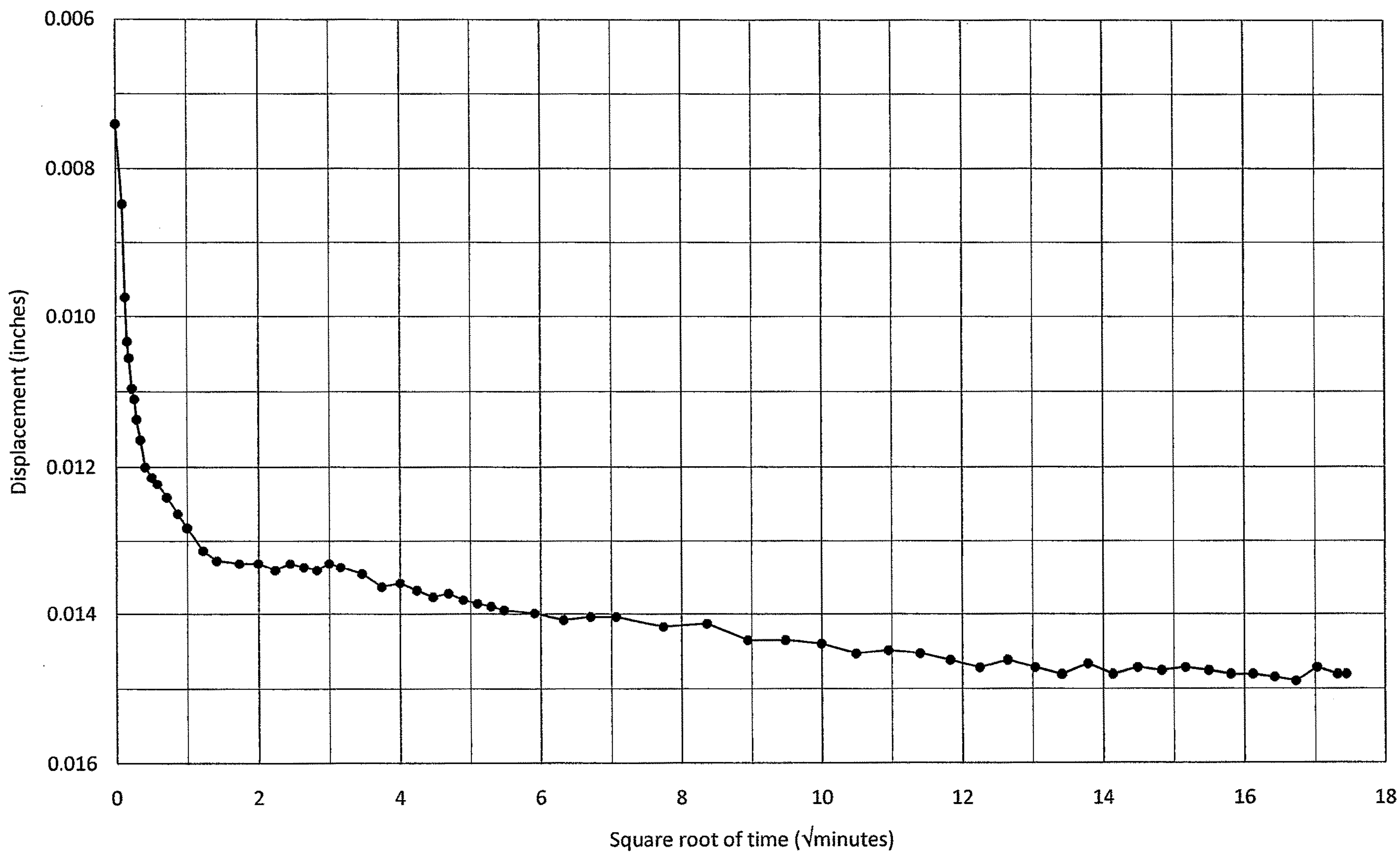


RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 20'-21'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 4
Salt Lake County, Utah

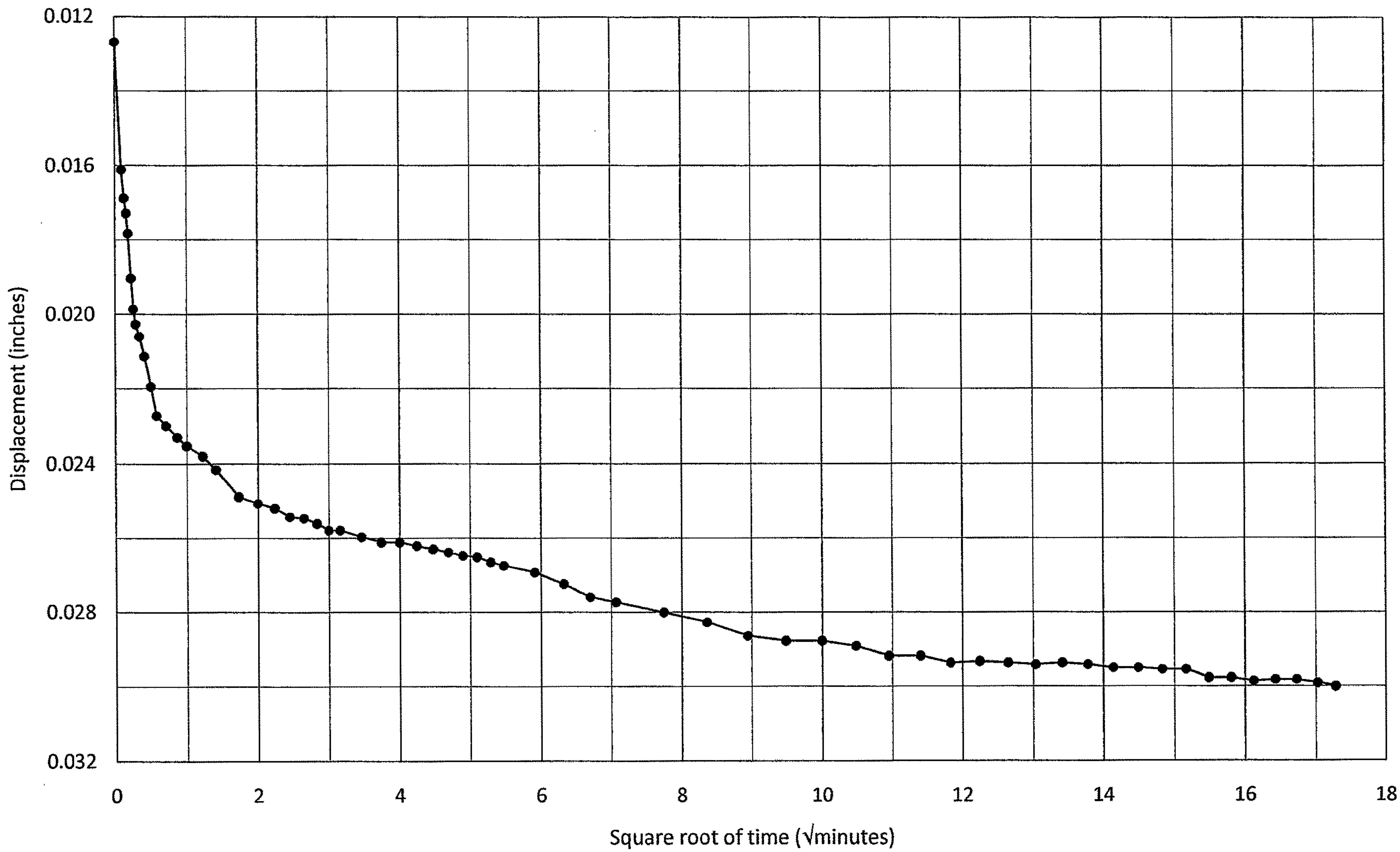


RB&G
ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 20'-21'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 4
Salt Lake County, Utah

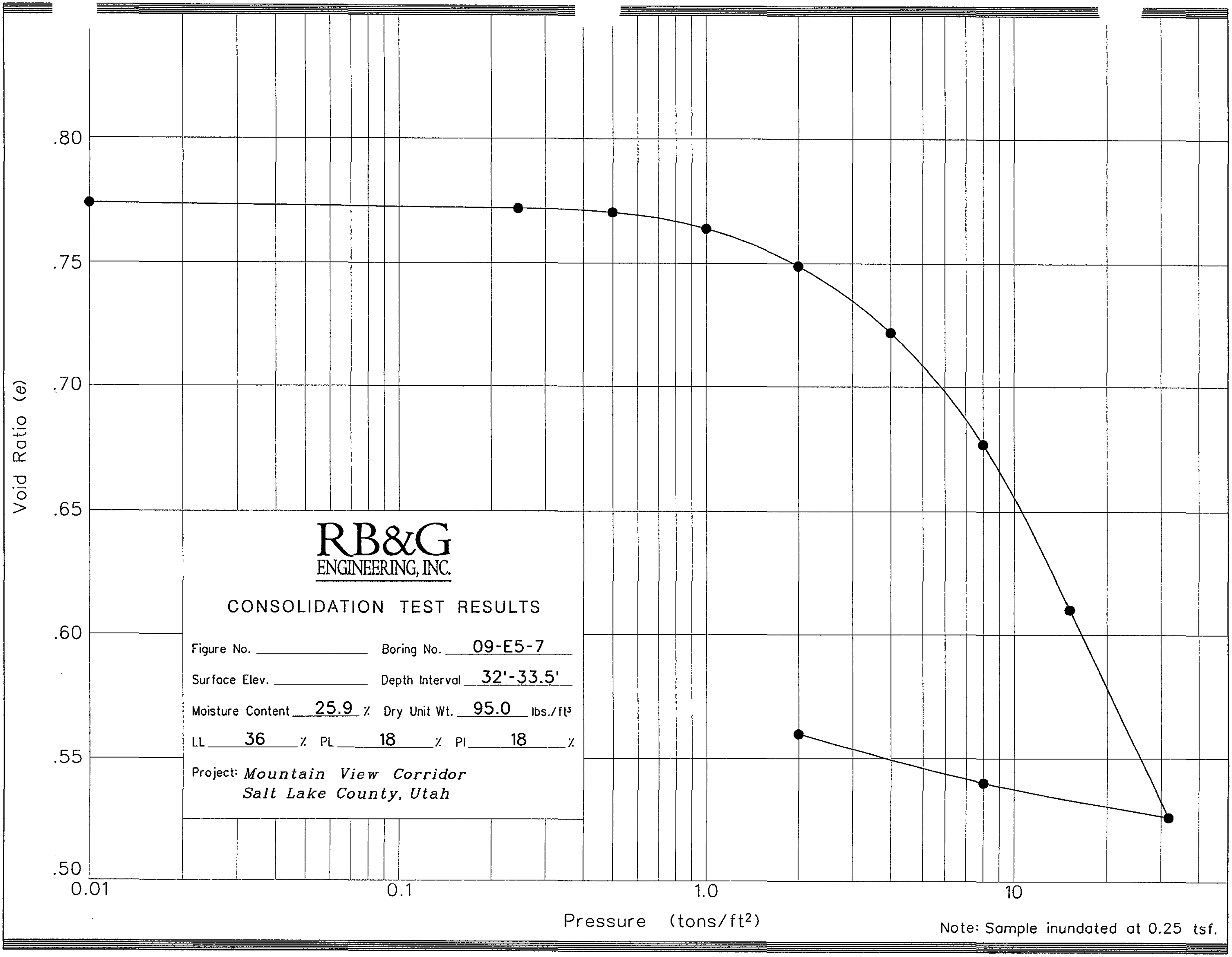


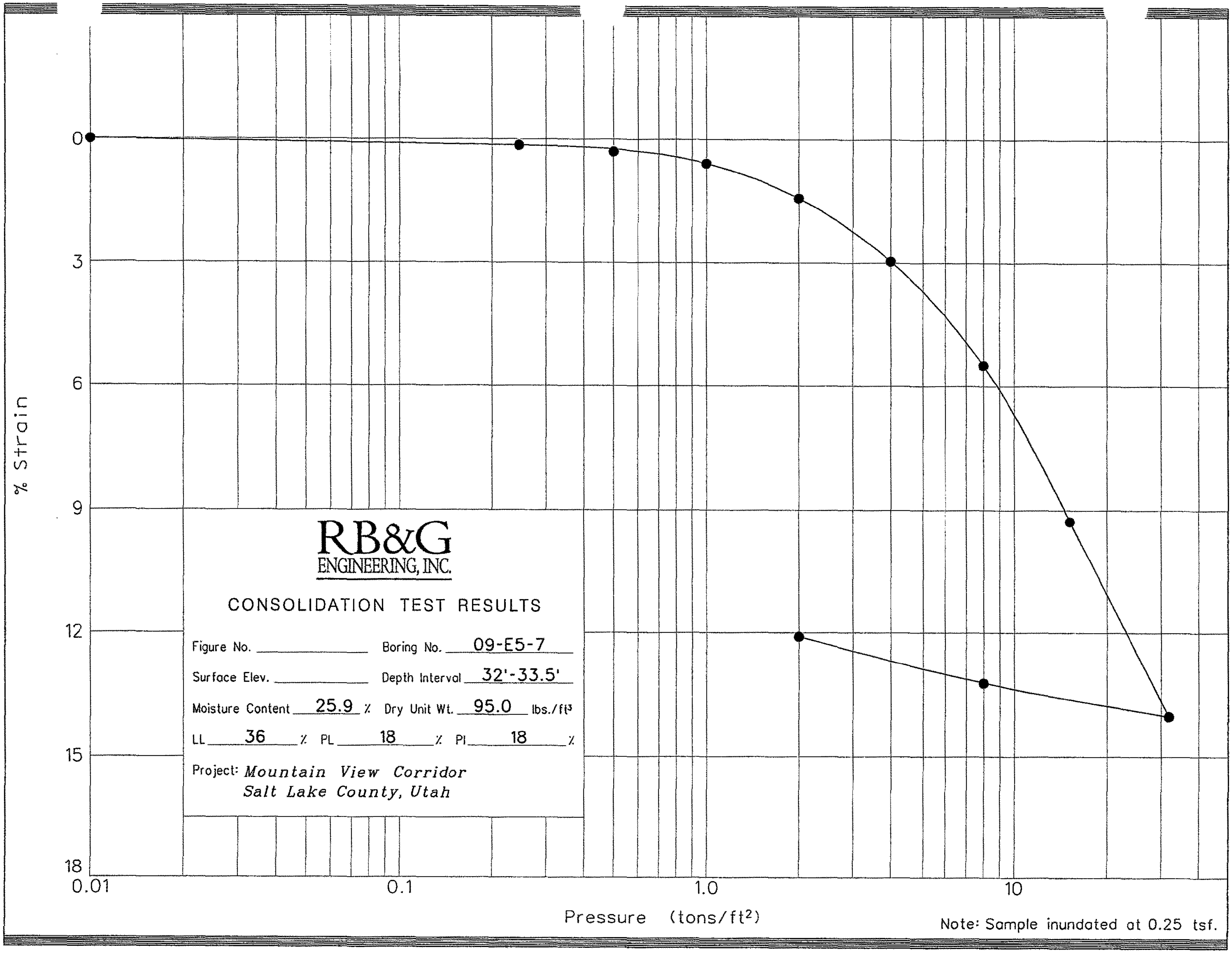
RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 20'-21'
Load: 2 to 4 tsf

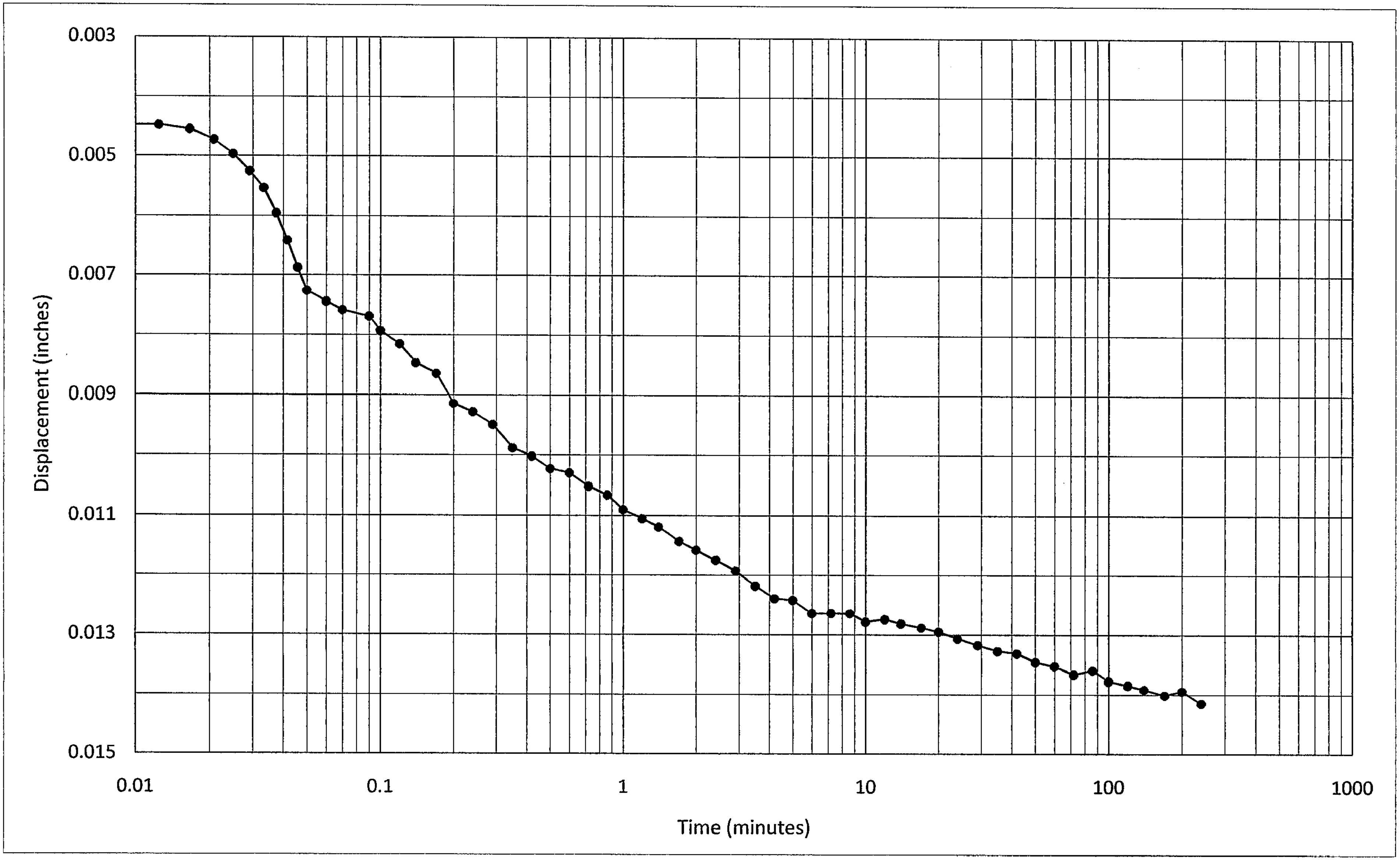
TIME CONSOLIDATION

Mountain View Corridor
Segment 4
Salt Lake County, Utah


RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-7
Surface Elev.
Depth Interval 32'-33.5'
Moisture Content 25.9 %
Dry Unit Wt. 95.0 lbs./ft³
LL 36 %
PL 18 %
PI 18 %
Project: Mountain View Corridor
Salt Lake County, Utah
Void Ratio (e)
.80
.75
.70
.65
.60
.55
.50
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.



RB&G ENGINEERING, INC.
CONSOLIDATION TEST RESULTS
Figure No.
Boring No. 09-E5-7
Surface Elev.
Depth Interval 32'-33.5'
Moisture Content 25.9 %
Dry Unit Wt. 95.0 lbs./ft³
LL 36 %
PL 18 %
PI 18 %
Project: Mountain View Corridor
Salt Lake County, Utah
% Strain
0
3
6
9
12
15
18
0.01
0.1
1.0
10
Pressure (tons/ft²)
Note: Sample inundated at 0.25 tsf.

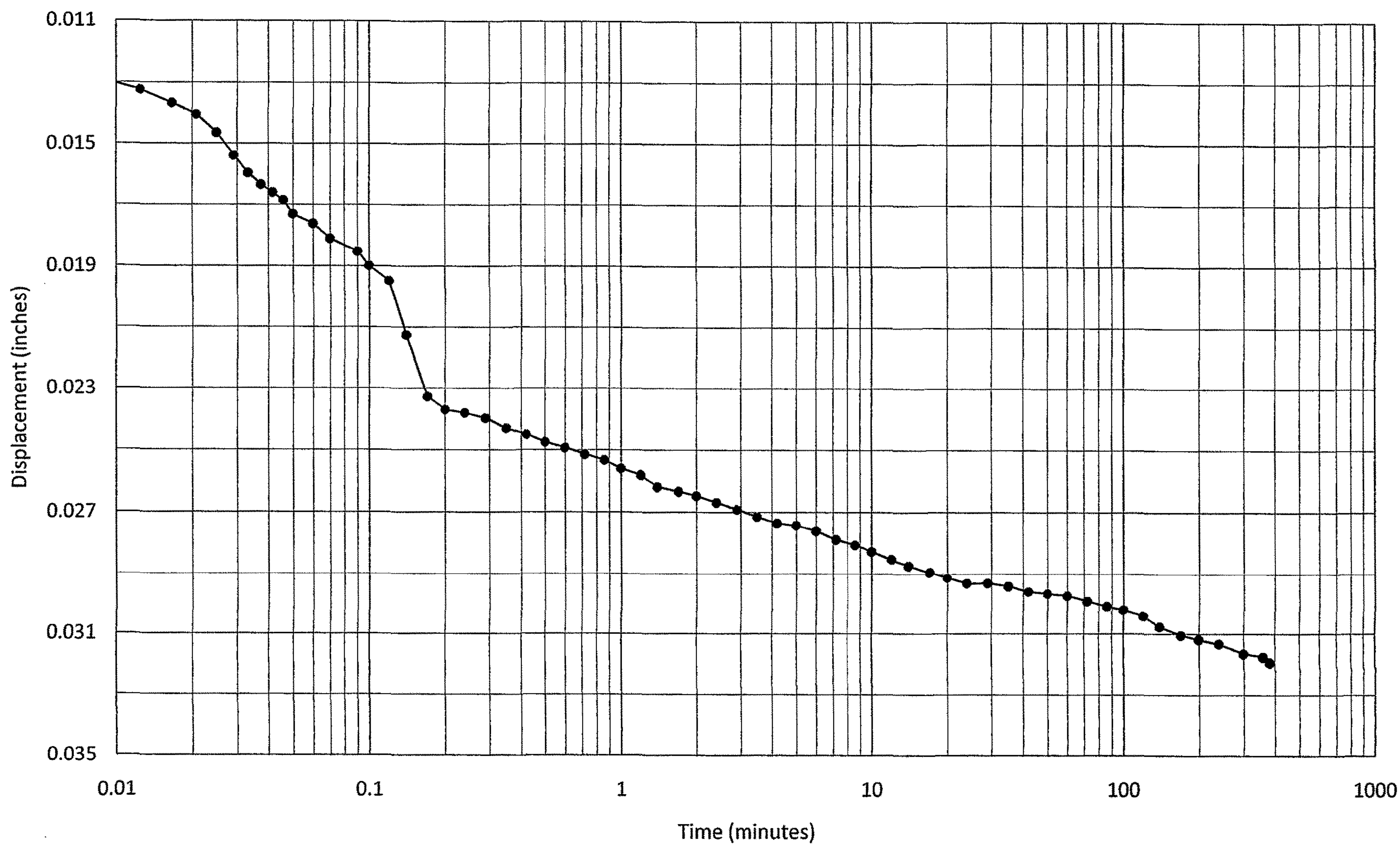


RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 32'-33.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 4
Salt Lake County, Utah

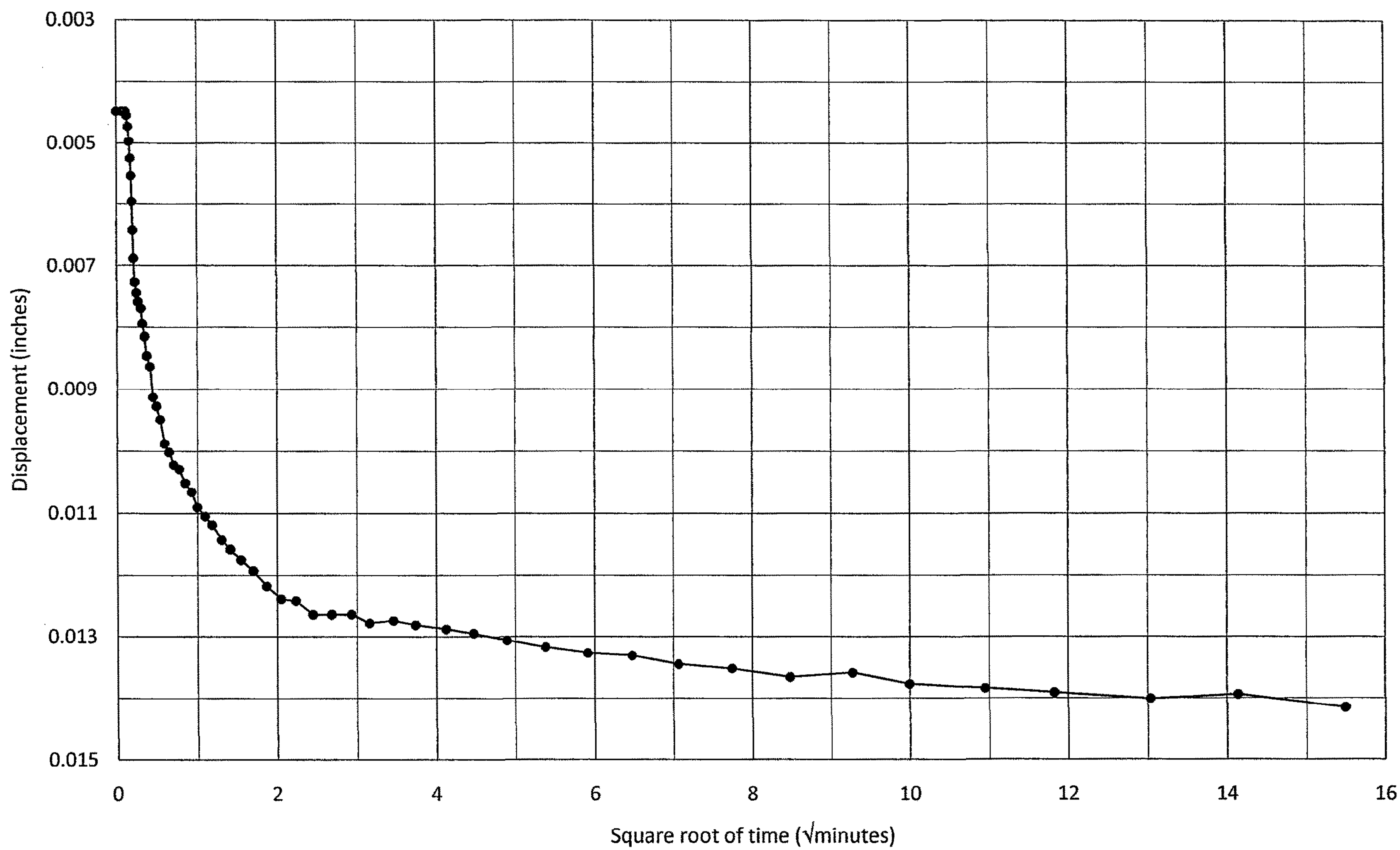


RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 32'-33.5'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 4
Salt Lake County, Utah

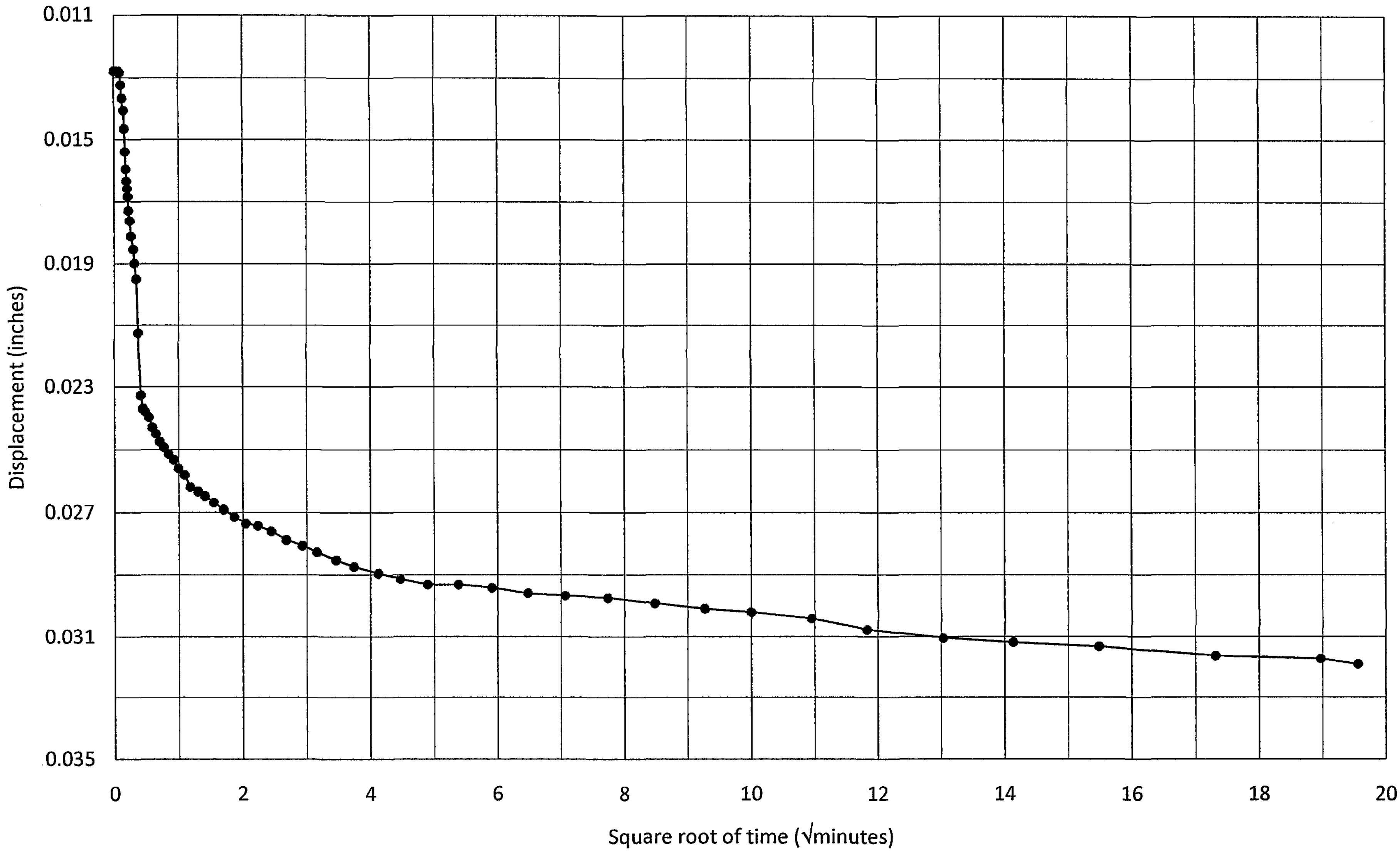


RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 32'-33.5'
Load: 1 to 2 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 4
Salt Lake County, Utah



RB&G ENGINEERING, INC.

Hole no.: 09-E5-7
Depth: 32'-33.5'
Load: 2 to 4 tsf

TIME CONSOLIDATION

Mountain View Corridor
Segment 4
Salt Lake County, Utah

RB&G ENGINEERING, INC.
1435 West 820 North, Provo, Utah 84601
801 374-5771 Provo
801 521-5771 Salt Lake City

PROJECT NO.	200901.200

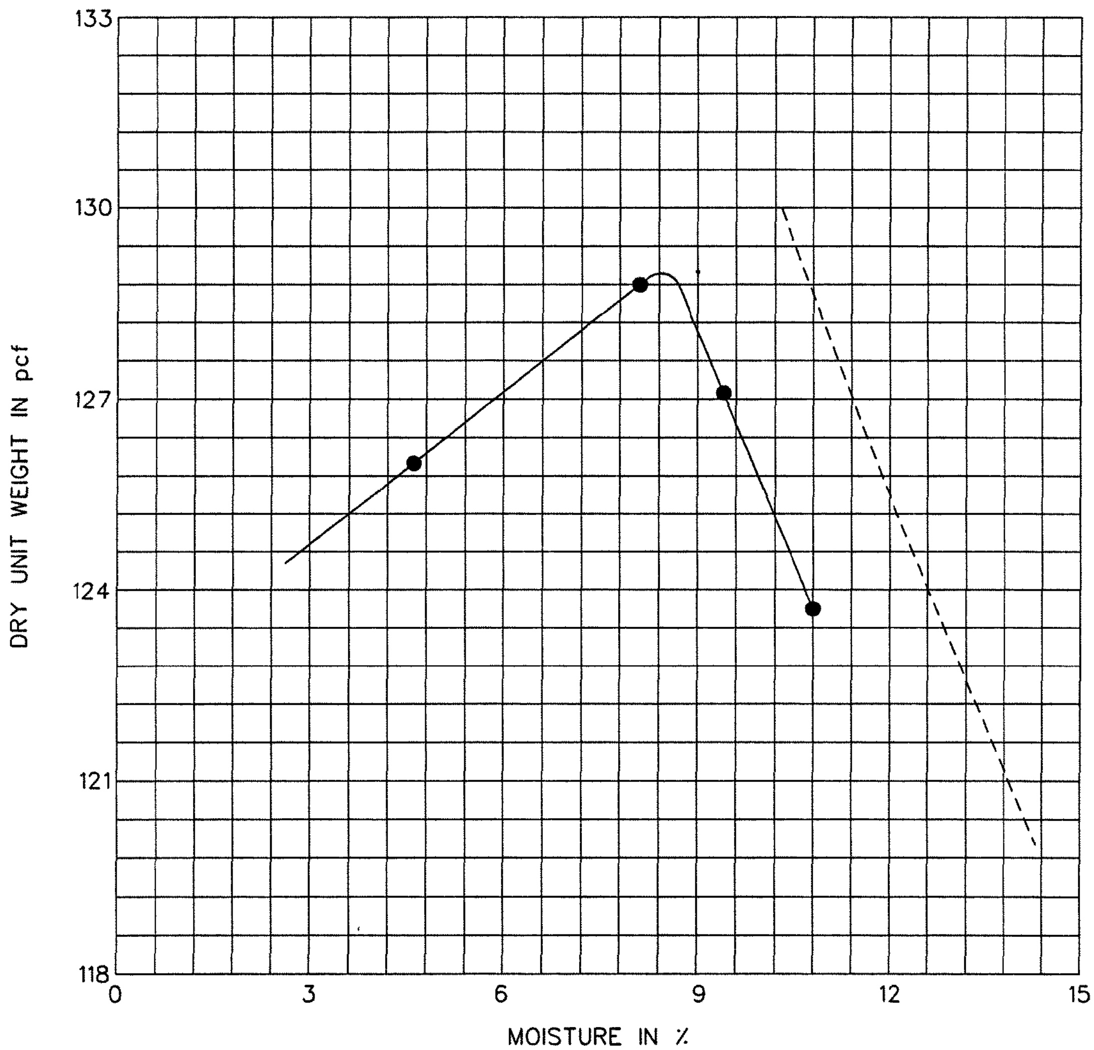
MOISTURE-DENSITY RELATION (PROCTOR)

Project	**MOUNTAIN VIEW CORRIDOR**			**Date**	**8/24/2009**
Location / No.	**NEAR BORING 09-MVC-154 AT 1'-2'**			**Technician**	**D. WALKER**
Material Description	**GRAVEL W/SILT & SAND**	**USCS**	**GP-GM (A-1-a(0))**	**Method**	**AASHTO T-180**

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	4.6



Maximum Dry Density (pcf)	129.0
Optimum Moisture Content (%)	9.0
Modified Maximum Density (pcf)	**136.0**
Modified Optimum Moisture Content (%)	**7.0**

----- 100% Saturation Curve

Specific Gravity of Soil	2.65	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.65	Est.
Percent Oversize	24.0	

Type of Specific Gravity is BULK Unless Otherwise Indicated

RB&G ENGINEERING, INC.
1435 West 820 North, Provo, Utah 84601
801 374-5771 Provo
801 521-5771 Salt Lake City

PROJECT NO.	200901.200

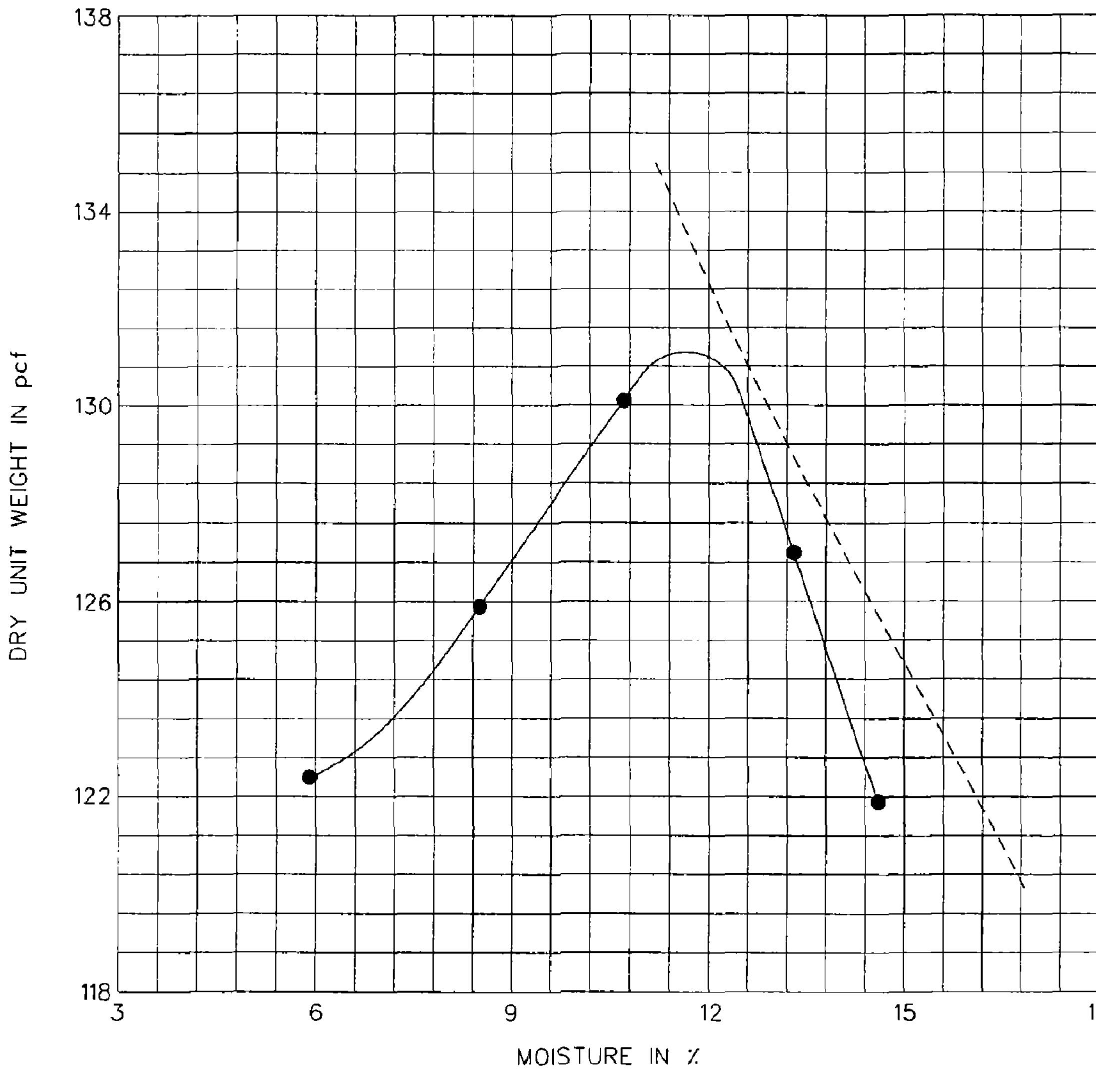
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/21/2009
Location / No.	NEAR BORING 09-MVC-154 AT 8'-9'			Technician	S. GUNNELL
Material Description	BROWN GRAVEL W/SILT & SAND	USCS	GP-GM (A-1-a(0))	Method	AASHTO T-180

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	6.0



Maximum Dry Density (pcf)	131.0
Optimum Moisture Content (%)	12.0
Modified Maximum Density (pcf)	**139.0**
Modified Optimum Moisture Content (%)	**9.0**

----- 100% Saturation Curve

Specific Gravity of Soil	2.85	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.85	Est.
Percent Oversize	30.0+	

Type of Specific Gravity is BULK Unless Otherwise Indicated

RB&G ENGINEERING, INC.
1435 West 820 North, Provo, Utah 84601
801 374-5771 Provo
801 521-5771 Salt Lake City

PROJECT NO.	200901.200

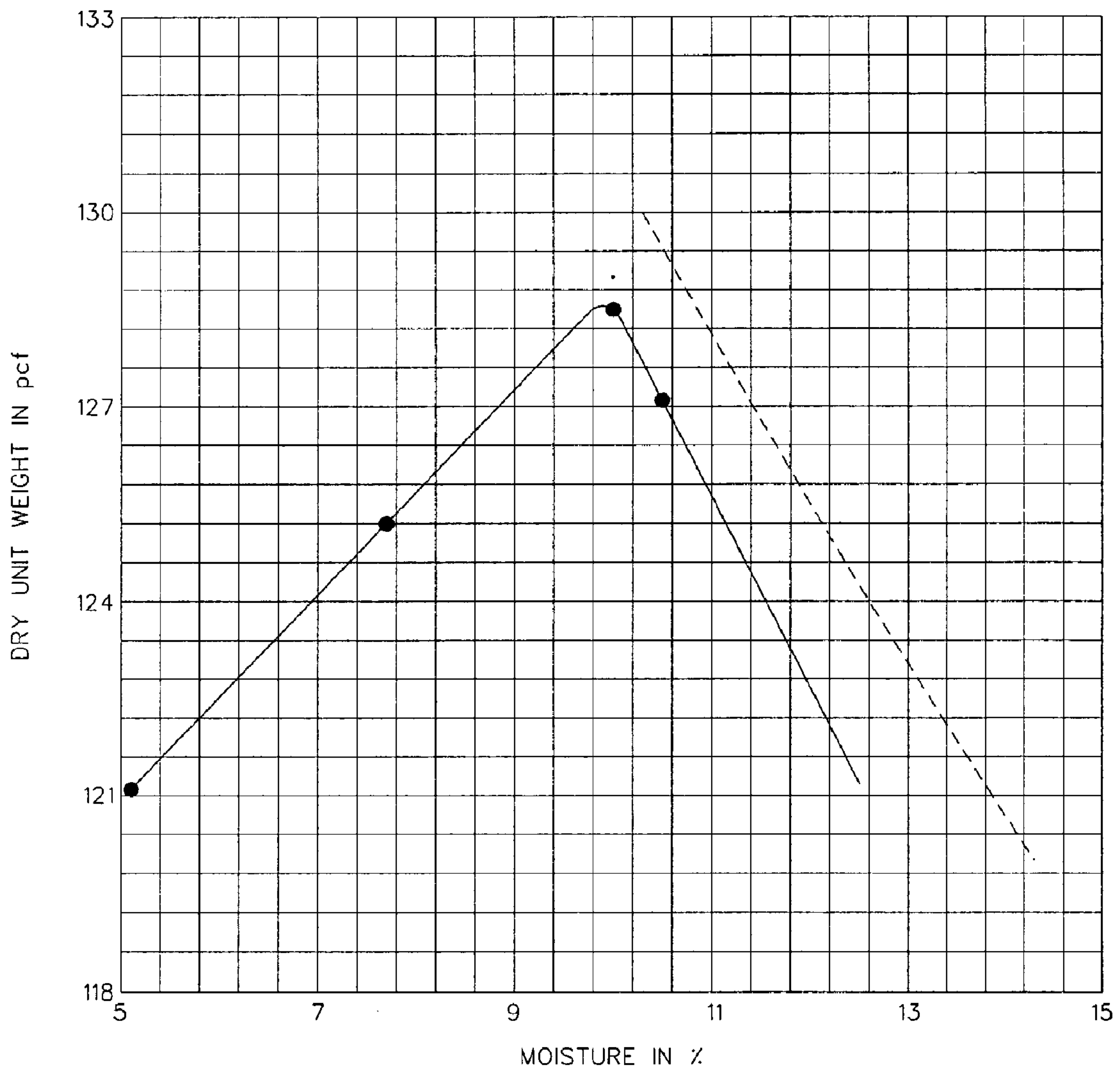
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/17/2009
Location / No.	NEAR BORING 09-MVC-154 AT 15'-16'			Technician	J. LINDO
Material Description	BROWN GRAVEL W/SILT & SAND	USCS	GP-GM (A-1-a(0))	Method	AASHTO T-180

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	5.1



Maximum Dry Density (pcf)	129.0
Optimum Moisture Content (%)	10.0
Modified Maximum Density (pcf)	**135.0**
Modified Optimum Moisture Content (%)	**8.0**

Specific Gravity of Soil	2.65	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.65	Est.
Percent Oversize	24.0	

------ 100% Saturation Curve

Type of Specific Gravity is BULK Unless Otherwise Indicated

RB&G ENGINEERING, INC. 1435 West 820 North, Provo, Utah 84601
801 374-5771 Provo
801 521-5771 Salt Lake City

PROJECT NO.	200901.200

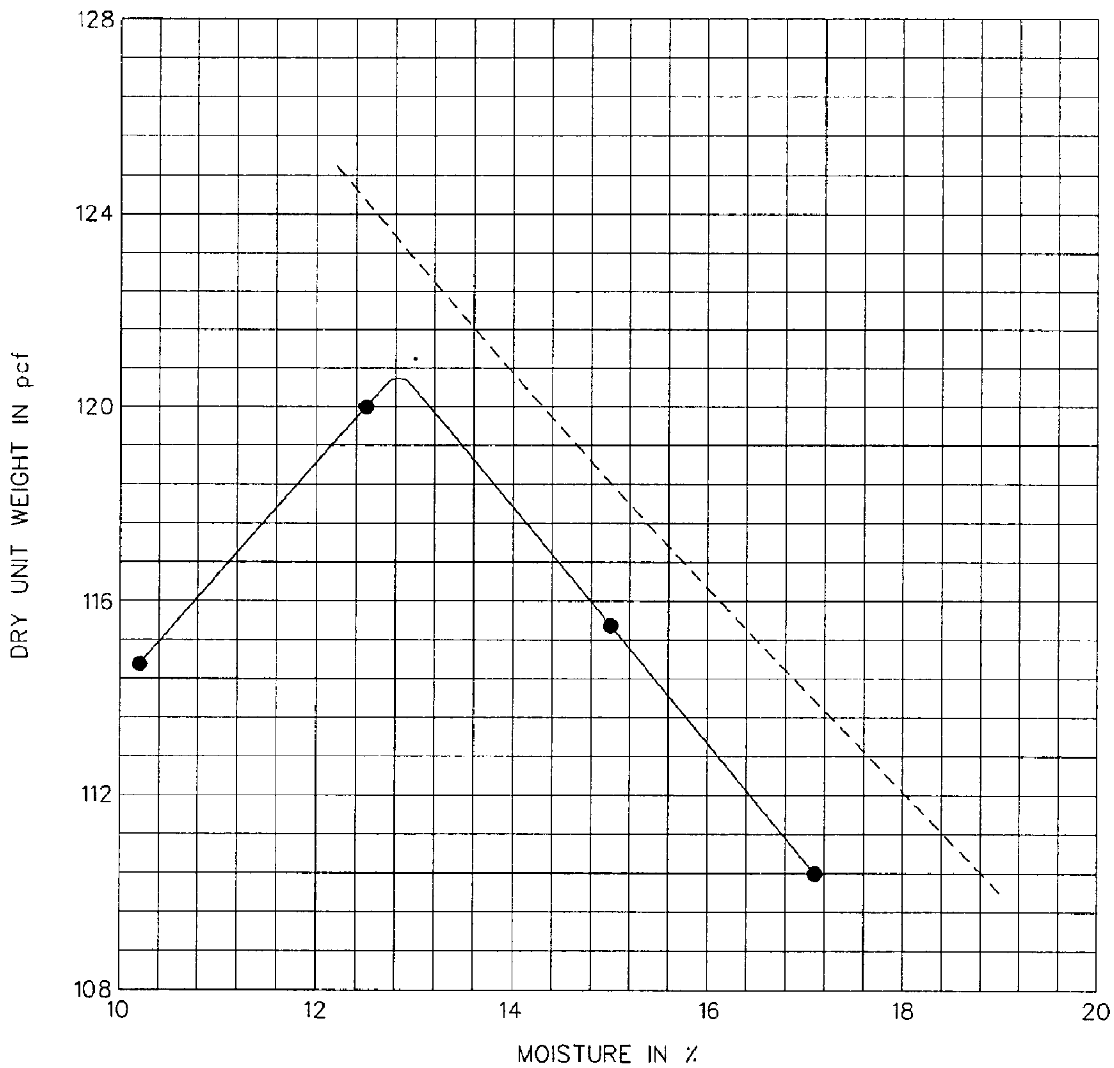
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/21/2009
Location / No.	NEAR BORING 09-MVC-157 AT 2.5'-3'			Technician	K. MARTINEZ, S. GUNNELL
Material Description	SILTY CLAYEY SAND W/GRAVEL	USCS	SC-SM (A-2-4(0))	Method	AASHTO T-99

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	10.7



Maximum Dry Density (pcf)	121.0
Optimum Moisture Content (%)	13.0
Modified Maximum Density (pcf)	**123.0**
Modified Optimum Moisture Content (%)	**12.0**

------ 100% Saturation Curve

Specific Gravity of Soil	2.65	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.65	Est.
Percent Oversize	6.0	

Type of Specific Gravity is BULK Unless Otherwise Indicated

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801 521-5771 Salt Lake City

PROJECT NO.	200901.200

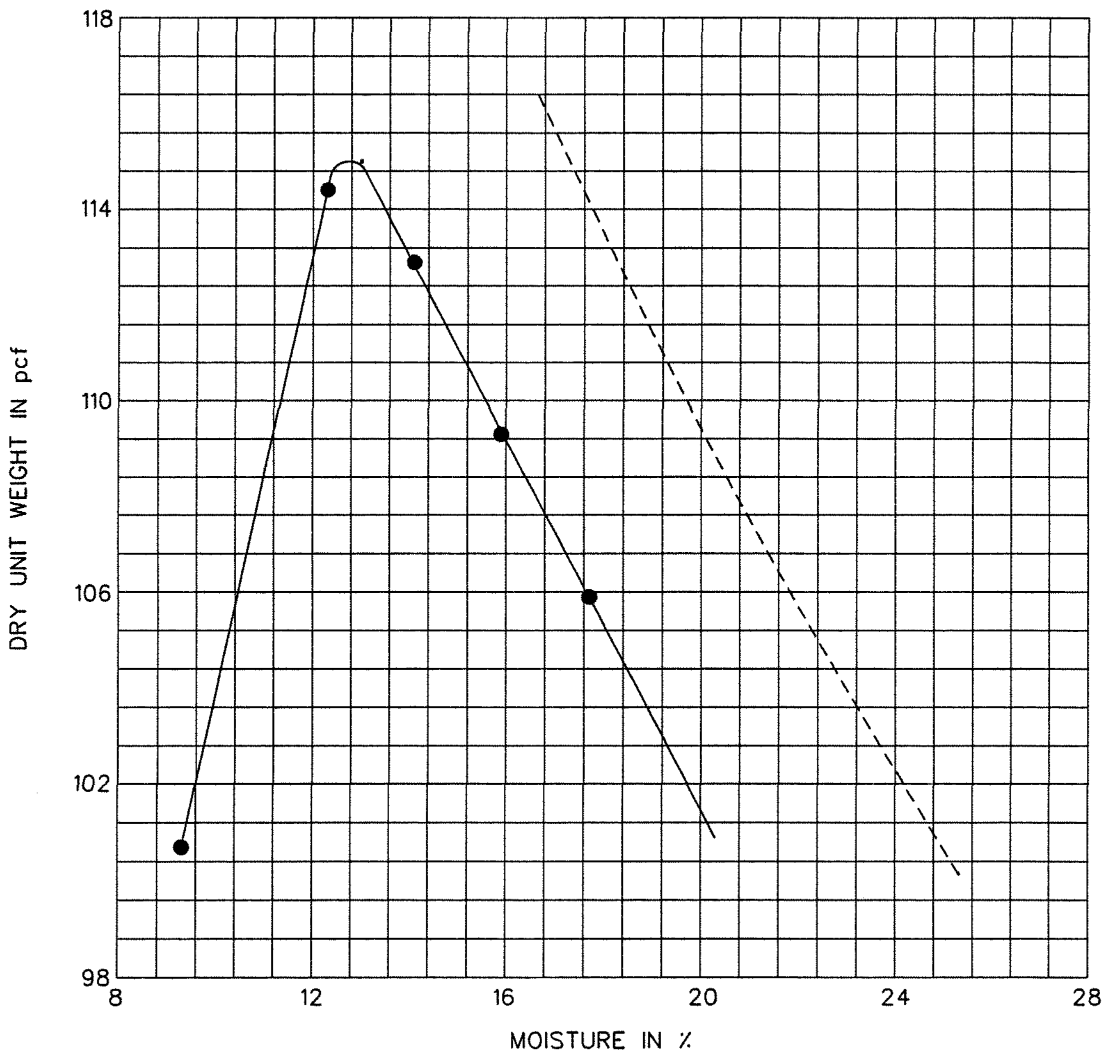
MOISTURE-DENSITY RELATION (PROCTOR)

Project	**MOUNTAIN VIEW CORRIDOR**			**Date**	**8/20/2009**
Location / No.	**NEAR BORING 09-MVC-157 AT 4'-4.5'**			**Technician**	**S. GUNNELL**
Material Description	**SANDY LEAN CLAY**	**USCS**	**CL (A-4(3))**	**Method**	**AASHTO T-99**

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	12.3



Maximum Dry Density (pcf)	115.0
Optimum Moisture Content (%)	13.0
Modified Maximum Density (pcf)	**115.0**
Modified Optimum Moisture Content (%)	**13.0**

Specific Gravity of Soil	2.70	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.70	Est.
Percent Oversize	<5.0	

----- 100% Saturation Curve

Type of Specific Gravity is BULK Unless Otherwise Indicated

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PROJECT NO.	200901.200

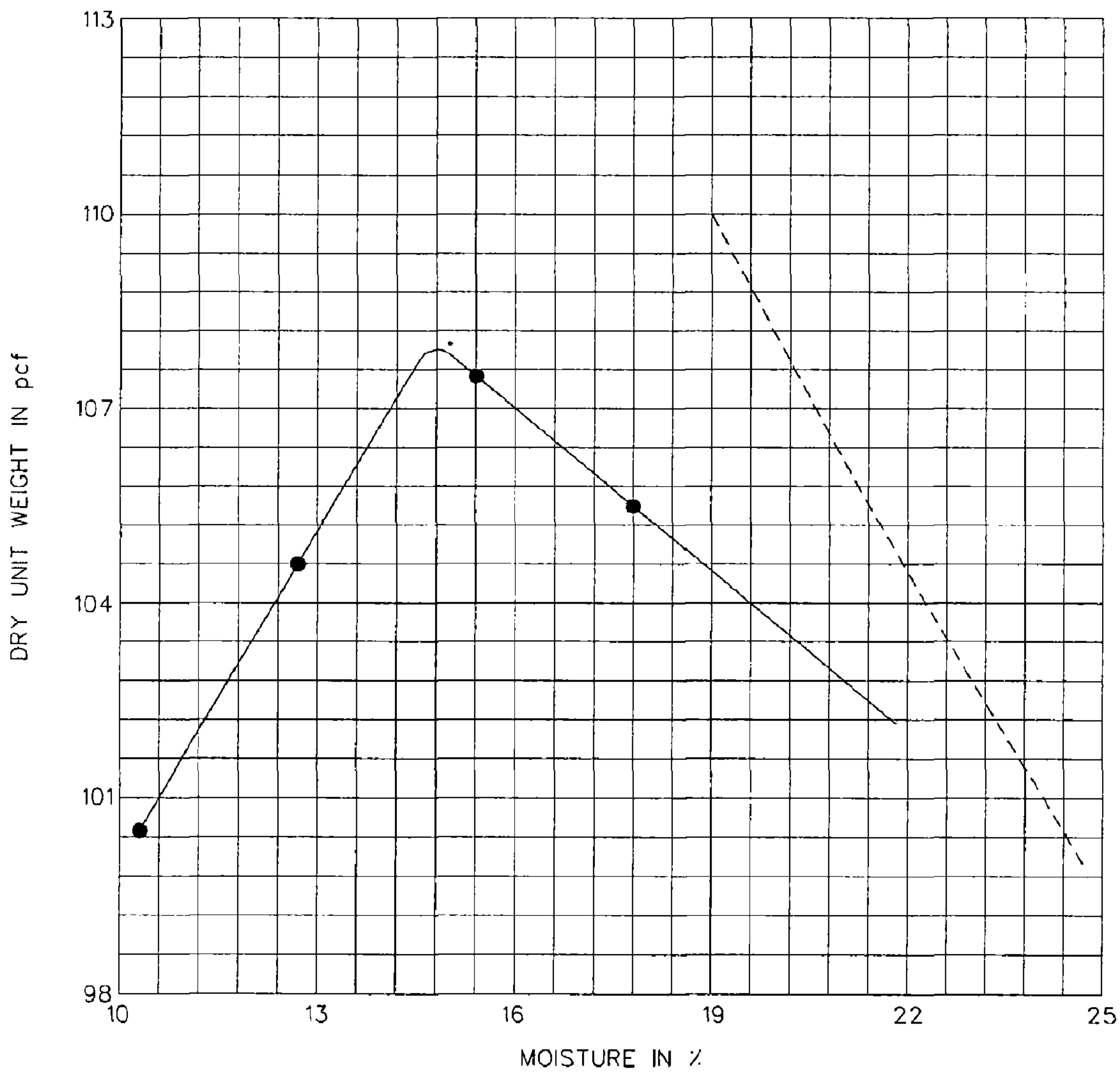
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/20/2009
Location / No.	NEAR BORING 09-MVC-160 AT 5'-6'			Technician	S. GUNNELL
Material Description	SILTY SAND	USCS	SM (A-1-b(0))	Method	AASHTO T-99

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	6.3



Maximum Dry Density (pcf)	108.0
Optimum Moisture Content (%)	15.0
Modified Maximum Density (pcf)	**108.0**
Modified Optimum Moisture Content (%)	**15.0**

----- 100% Saturation Curve

Specific Gravity of Soil	2.65	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.65	Est.
Percent Oversize	4.4	

Type of Specific Gravity is BULK Unless Otherwise Indicated

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PROJECT NO.	200901.200

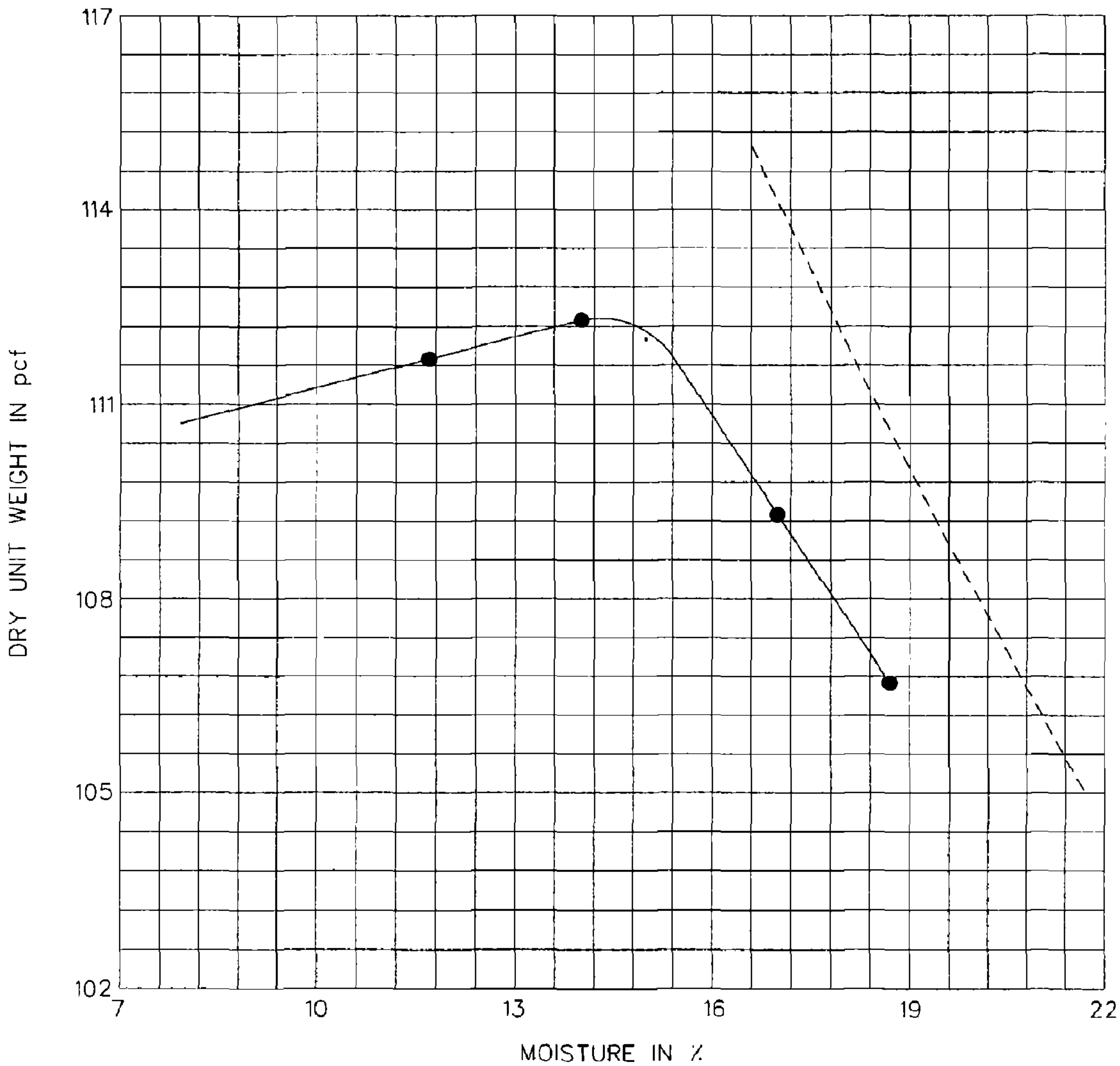
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/21/2009
Location / No.	NEAR BORING 09-MVC-160 AT 11'-12'			Technician	K. MARTINEZ
Material Description	BROWN SILTY SAND	USCS	SM (A-1-b(0))	Method	AASHTO T-180

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	11.9



Maximum Dry Density (pcf)	112.0
Optimum Moisture Content (%)	15.0
Modified Maximum Density (pcf)	**112.0**
Modified Optimum Moisture Content (%)	**15.0**

Specific Gravity of Soil	2.65	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.65	Est.
Percent Oversize	24.0	

----- 100% Saturation Curve

Type of Specific Gravity is BULK Unless Otherwise Indicated

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PROJECT NO.	200901.200

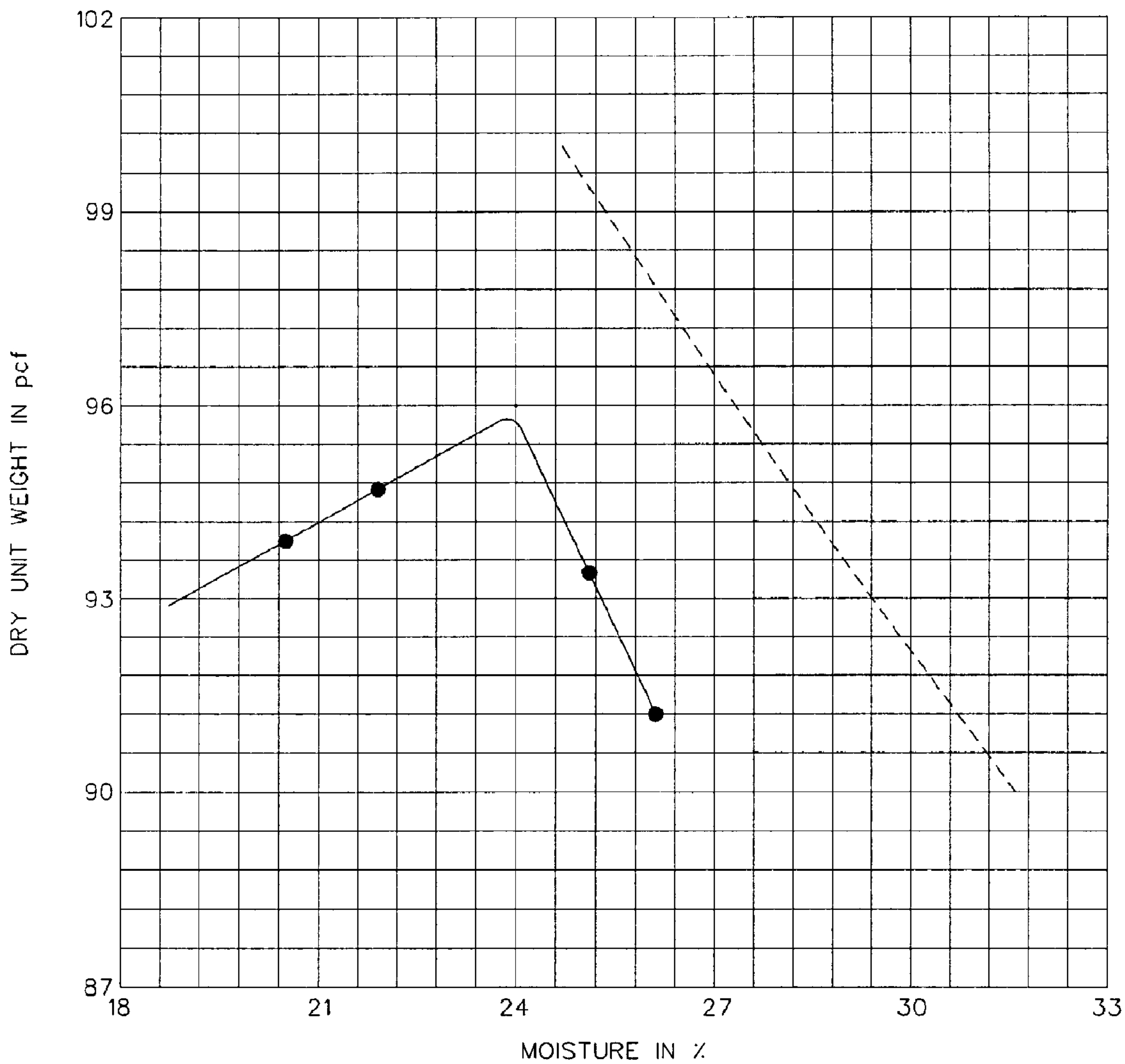
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/21/2009
Location / No.	NEAR BORING 09-MVC-164 AT 6'-7'			Technician	D. WALKER
Material Description	SILTY SAND	USCS	SM (A-4(0))	Method	AASHTO T-99

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	16.5



Maximum Dry Density (pcf)	96.0
Optimum Moisture Content (%)	24.0
Modified Maximum Density (pcf)	**96.0**
Modified Optimum Moisture Content (%)	**24.0**

Specific Gravity of Soil	2.65	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.65	Est.
Percent Oversize	0.0	

----- 100% Saturation Curve

Type of Specific Gravity is BULK Unless Otherwise Indicated

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PROJECT NO.	200901.200

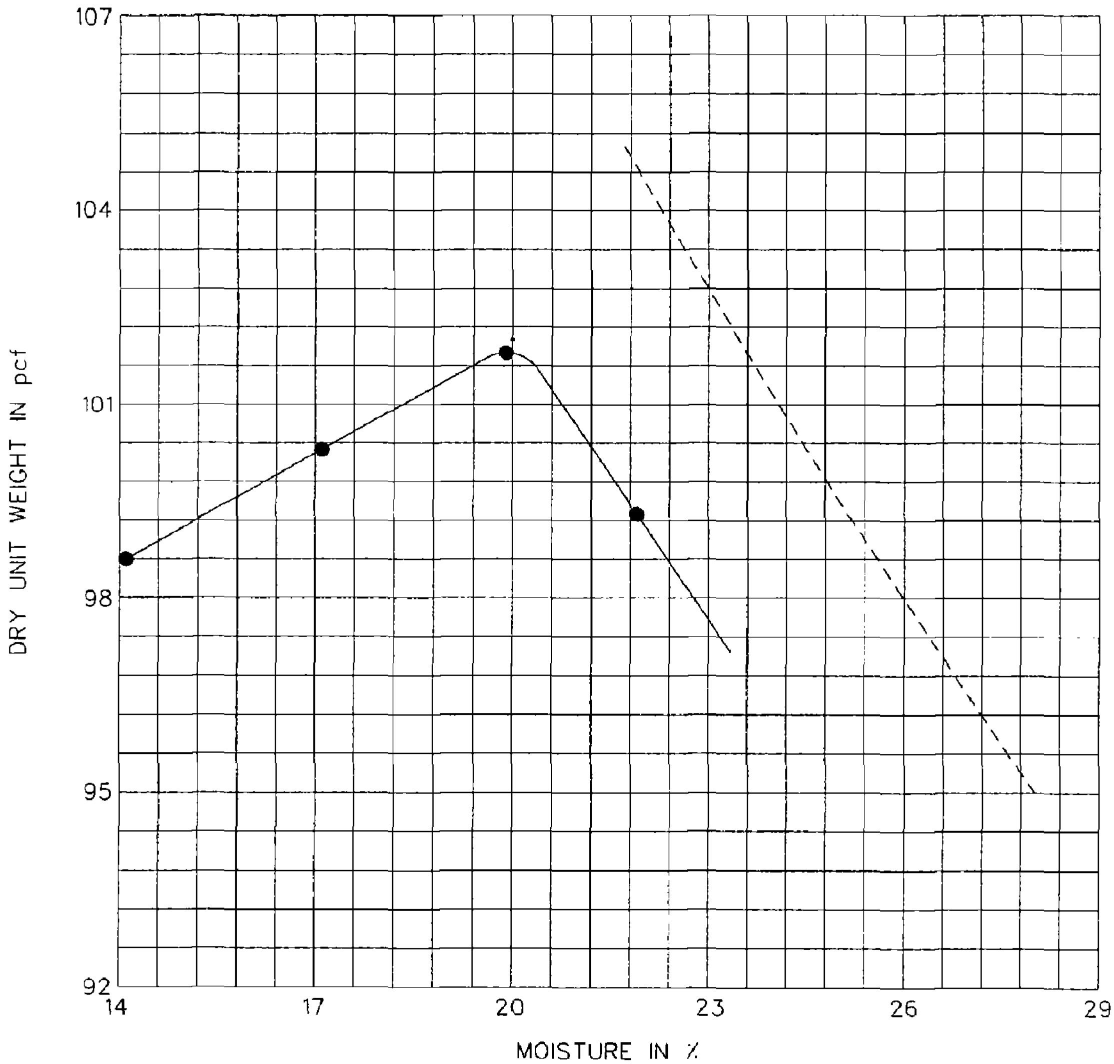
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/17/2009
Location / No.	NEAR BORING 09-MVC-164 AT 12'-13'			Technician	K. MARTINEZ
Material Description	SANDY SILT	USCS	ML (A-4(0))	Method	AASHTO T-99

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	17.6



Maximum Dry Density (pcf)	102.0
Optimum Moisture Content (%)	20.0
Modified Maximum Density (pcf)	**102.0**
Modified Optimum Moisture Content (%)	**20.0**

----- 100% Saturation Curve

Specific Gravity of Soil	2.65	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.65	Est.
Percent Oversize	0.3	

Type of Specific Gravity is BULK Unless Otherwise Indicated

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PROJECT NO.	200901.200

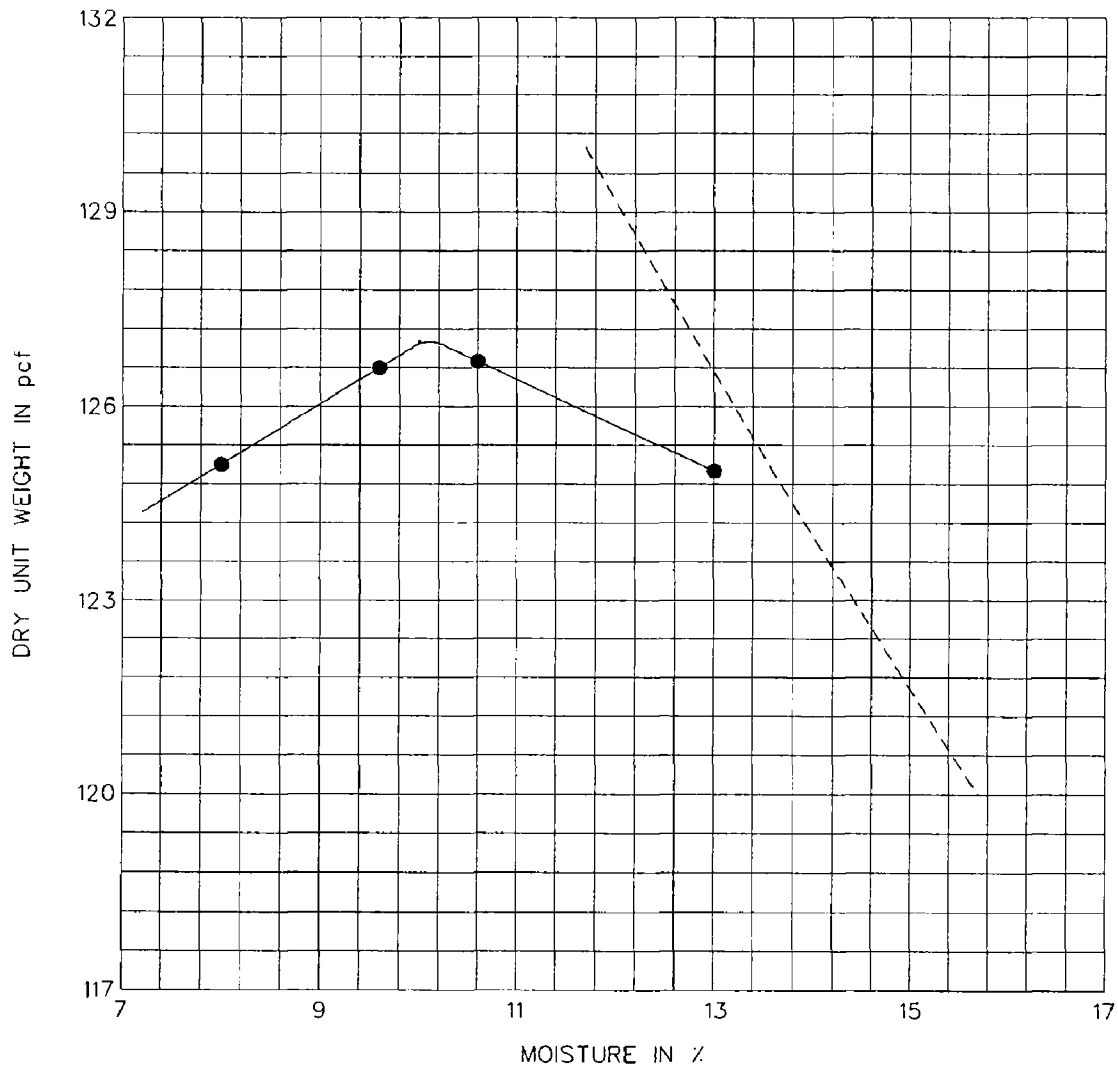
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/25/2009
Location / No.	NEAR BORING 09-MVC-167 AT 5'-6'			Technician	S. GUNNELL
Material Description	GRAVEL W/SAND	USCS	GP (A-1-a(0))	Method	AASHTO T-180

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	4.0



Maximum Dry Density (pcf)	127.0
Optimum Moisture Content (%)	10.0
Modified Maximum Density (pcf)	**136.0**
Modified Optimum Moisture Content (%)	**8.0**

----- 100% Saturation Curve

Specific Gravity of Soil	2.75	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.75	Est.
Percent Oversize	30.0+	

Type of Specific Gravity is BULK Unless Otherwise Indicated

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PROJECT NO.	200901.200

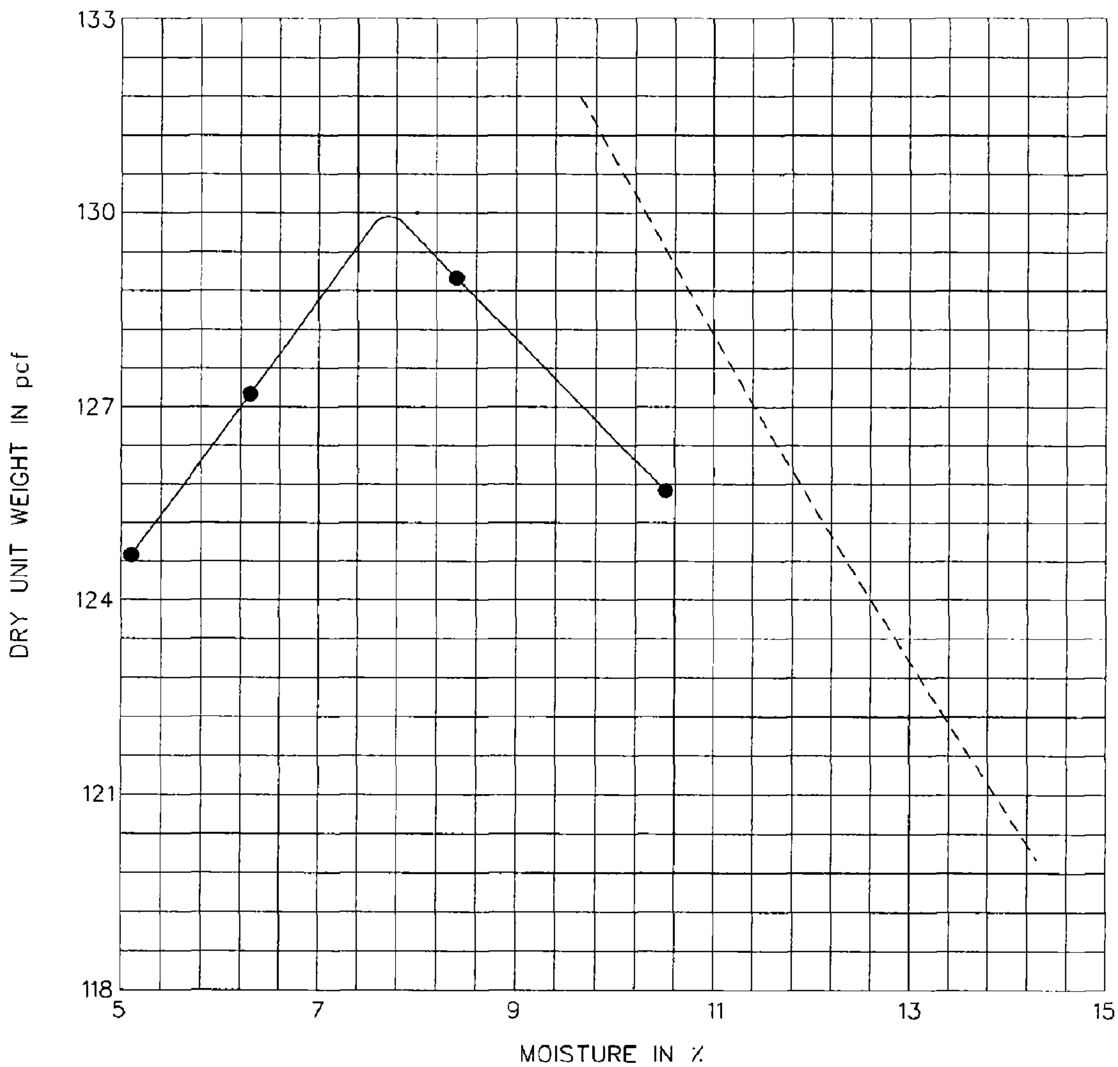
MOISTURE-DENSITY RELATION (PROCTOR)

Project	MOUNTAIN VIEW CORRIDOR			Date	8/17/2009
Location / No.	NEAR BORING 09-MVC-167 AT 10'-11'			Technician	D. WALKER
Material Description	GRAVEL W/SILT & SAND	USCS	GP-GM (A-1-a(0))	Method	AASHTO T-180

Procedure Used[1]	D
Classification Procedure[2]	Test

[1] A-No. 4 Sieve, B-3/8" Sieve, C-3/4" Sieve
[2] Visual as per ASTM D 2488, Test as per ASTM D 2487

Preparation Method	Moist
Rammer Used	Manual
As-Received Moisture Content (%)	5.1



Maximum Dry Density (pcf)	130.0
Optimum Moisture Content (%)	8.0
Modified Maximum Density (pcf)	**138.0**
Modified Optimum Moisture Content (%)	**6.0**

----- 100% Saturation Curve

Specific Gravity of Soil	2.65	Est.

OVERSIZE CORRECTION-AASHTO T-224

Specific Gravity of Soil +3/4	2.65	Est.
Percent Oversize	30.0	

Type of Specific Gravity is BULK Unless Otherwise Indicated

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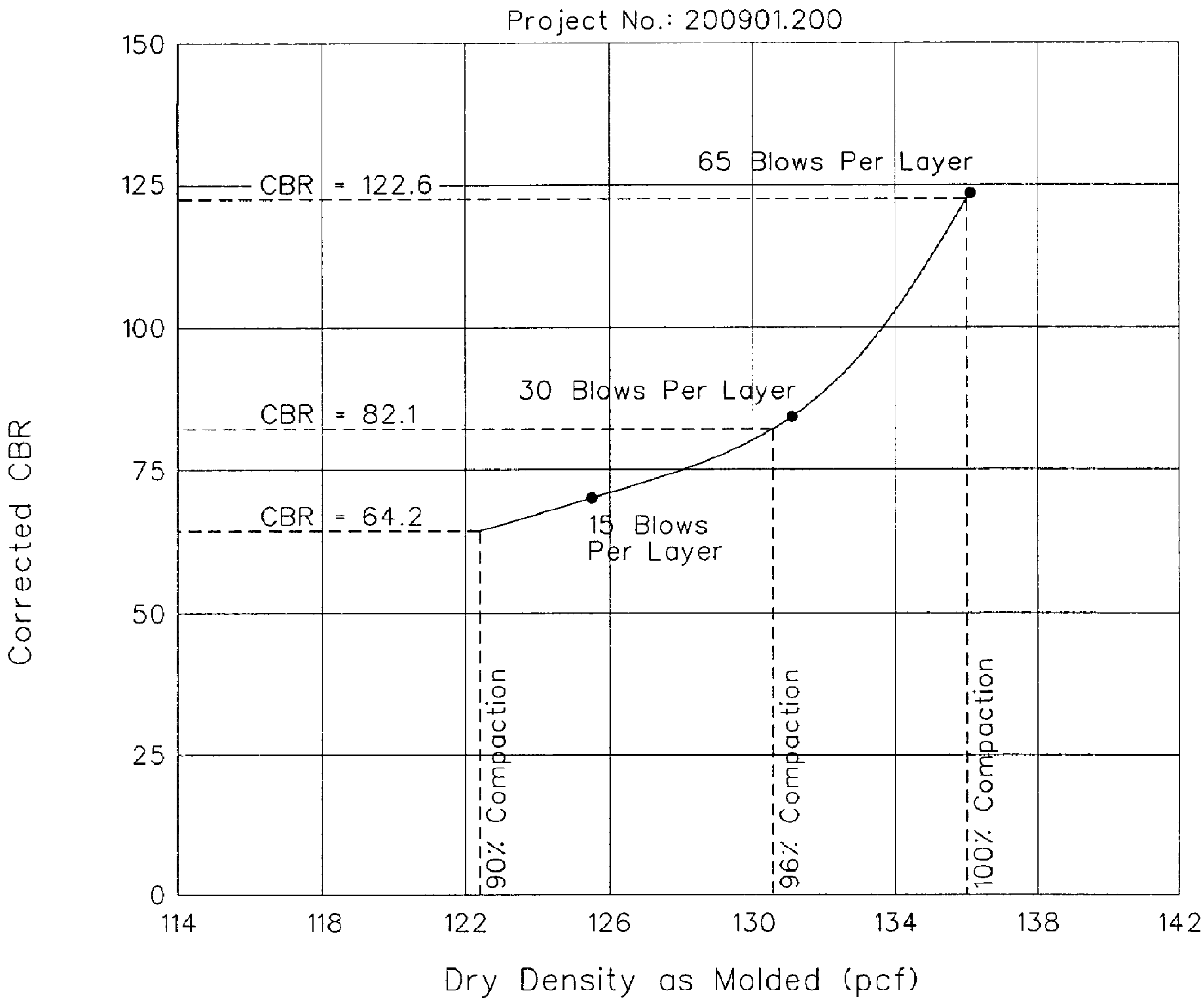
Mountain View Corridor
Redwood Road to 6200 South

Segment 5 California Bearing Ratio Test Result Summary

Boring No.	Depth Below Ground Surface (ft)	Location			Unified Soil Classification System / (AASHTO Classification)	CBR		PROCTOR		
		Line	Station	Offset		@ 96%* Compaction	@ 100% Compaction	AASHTO Method	Maximum Density (pcf)	Optimum Moisture (%)
09-MVC-154	1.0-2.0	MVC Mainline	1577+00	115 RT	GP-GM (A-1-a (0))	82.1	122.6	T-180	136.0	7.0
09-MVC-154	8.0-9.0	MVC Mainline	1577+00	115 RT	GP-GM (A-1-a (0))	83.8	108.7	T-180	139.0	9.0
09-MVC-154	15.0-16.0	MVC Mainline	1577+00	115 RT	GP-GM (A-1-a (0))	59.1	78.5	T-180	135.0	8.0
09-MVC-157	4.0-5.0	MVC Mainline	1592+06	250 LT	CL (A-4 (3))	6.4	11.5	T-99	115.0	13.0
09-MVC-160	11.0-12.0	MVC Mainline	1607+00	131 RT	SM (A-1-b (0))	20.4	28.7	T-180	112.0	15.0
09-MVC-164	12.0-13.0	MVC Mainline	1627+00	115 RT	ML (A-4 (0))	13.0	17.1	T-99	102.0	20.0
09-MVC-167	5.0-6.0	MVC Mainline	1642+00	156 LT	GP (A-1-a (0))	93.2	110.7	T-180	136.0	8.0
09-MVC-167	10.0-11.0	MVC Mainline	1642+00	156 LT	GP-GM (A-1-a (0))	59.3	77.7	T-180	138.0	6.0

* Minimum average density required in the UDOT Minimum Sampling and Testing Requirements 02056: Embankment, Base and Borrow specification 1.6 c



Location NEAR BORING 09-MVC-154 AT 1'-2'

Material GRAVEL W/SILT & SAND

GP-GM (A-1-a(0))

Soil Moisture-Density Relationship:

AASHTO T-180

Maximum Density 136.0 pcf

Optimum Moisture Content 7.0 %

Test method: AASHTO T-193

Condition ☐ unsoaked ☒ soaked

Surcharge amount 10 lbs

Swell 0.0 %

Bearing ratio @ 90% compaction 64.2 %

Bearing ratio @ 96% compaction 82.1 %

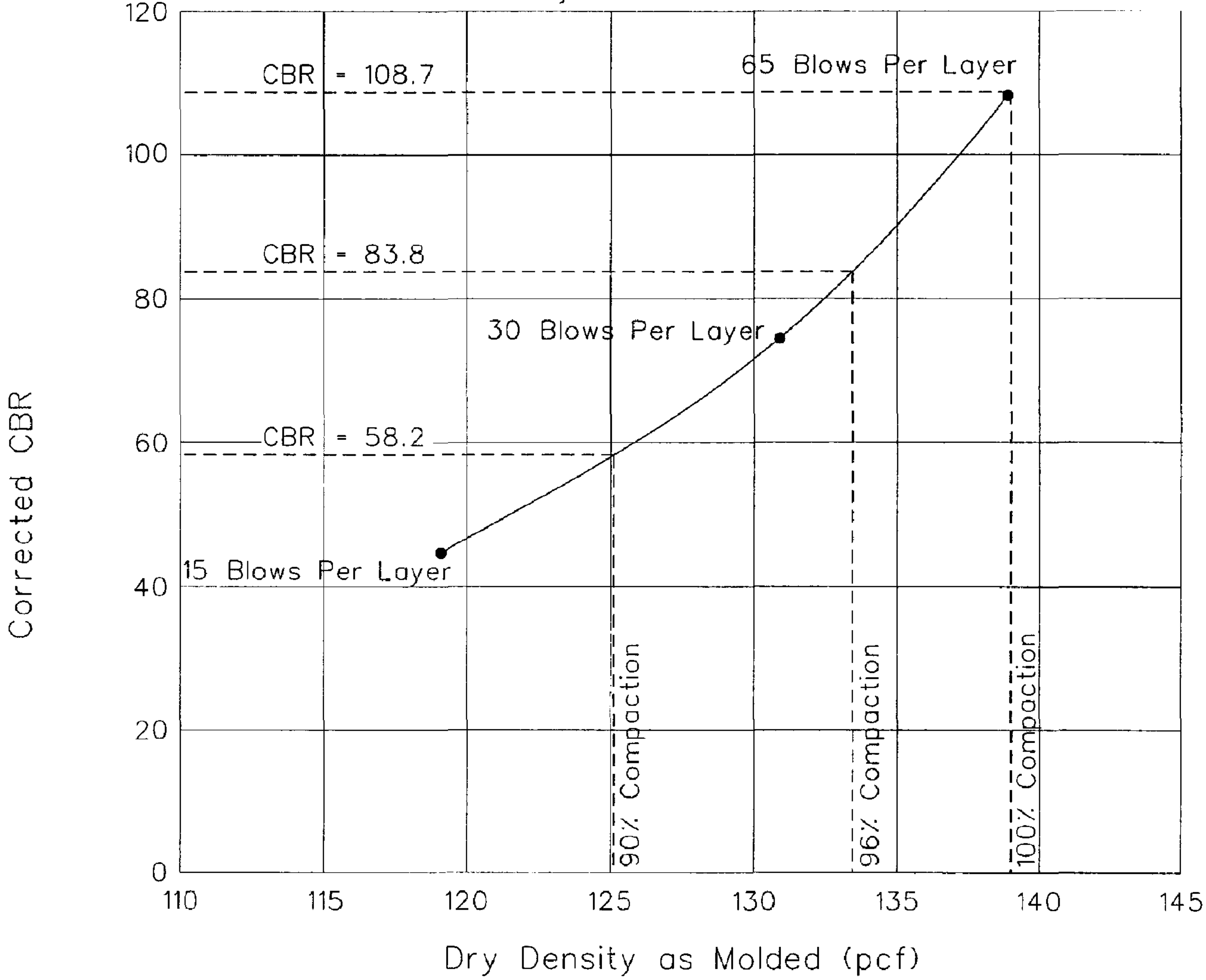
Bearing ratio @ 100% compaction 122.6 %

RB&G ENGINEERING, INC.

Figure **CALIFORNIA BEARING RATIO TEST RESULTS**

Mountain View Corridor
Salt Lake County, Utah

Project No.: 200901.200



Location NEAR BORING 09-MVC-154 AT 8'-9'

Material BROWN GRAVEL W/SILT & SAND GP-GM (A-1-a(0))

Soil Moisture-Density Relationship:

AASHTO T-180

Maximum Density 139.0 pcf

Optimum Moisture Content 9.0 %

Test method: AASHTO T-193

Condition ☐ unsoaked ☒ soaked

Surcharge amount 10 lbs

Swell 0.0 %

Bearing ratio @ 90% compaction 58.2 %

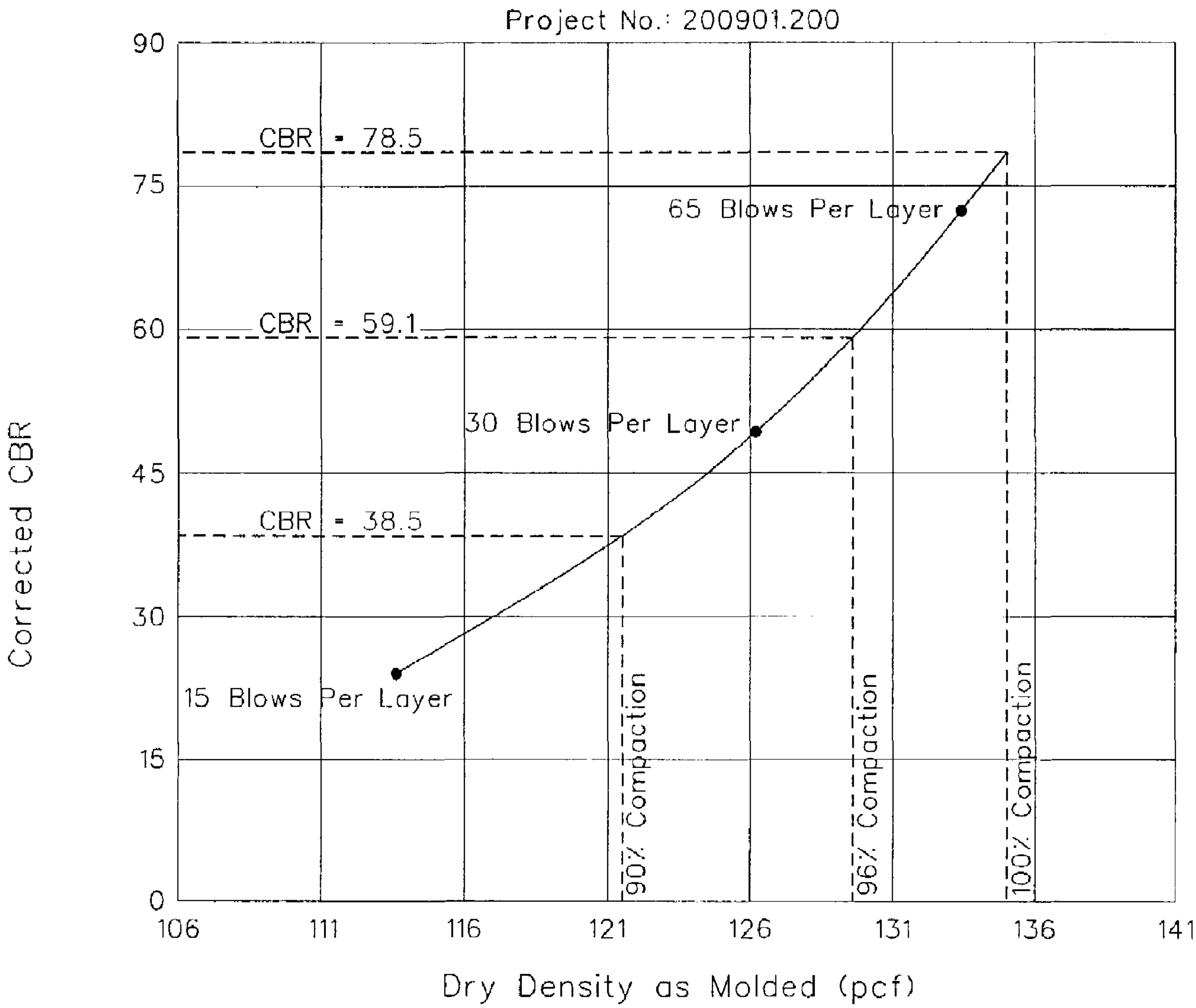
Bearing ratio @ 96% compaction 83.8 %

Bearing ratio @ 100% compaction 108.7%

RB&G ENGINEERING, INC.

Figure **CALIFORNIA BEARING RATIO TEST RESULTS**

Mountain View Corridor
Salt Lake County, Utah



Location NEAR BORING 09-MVC-154 AT 15'-16'

Material BROWN GRAVEL W/SILT & SAND

GP-GM (A-1-a(0))

Soil Moisture-Density Relationship:

AASHTO T-180

Maximum Density 135.0 pcf

Optimum Moisture Content 8.0 %

Test method: AASHTO T-193

Condition ☐ unsoaked ☒ soaked

Surcharge amount 10 lbs

Swell 0.0 %

Bearing ratio @ 90% compaction 38.5 %

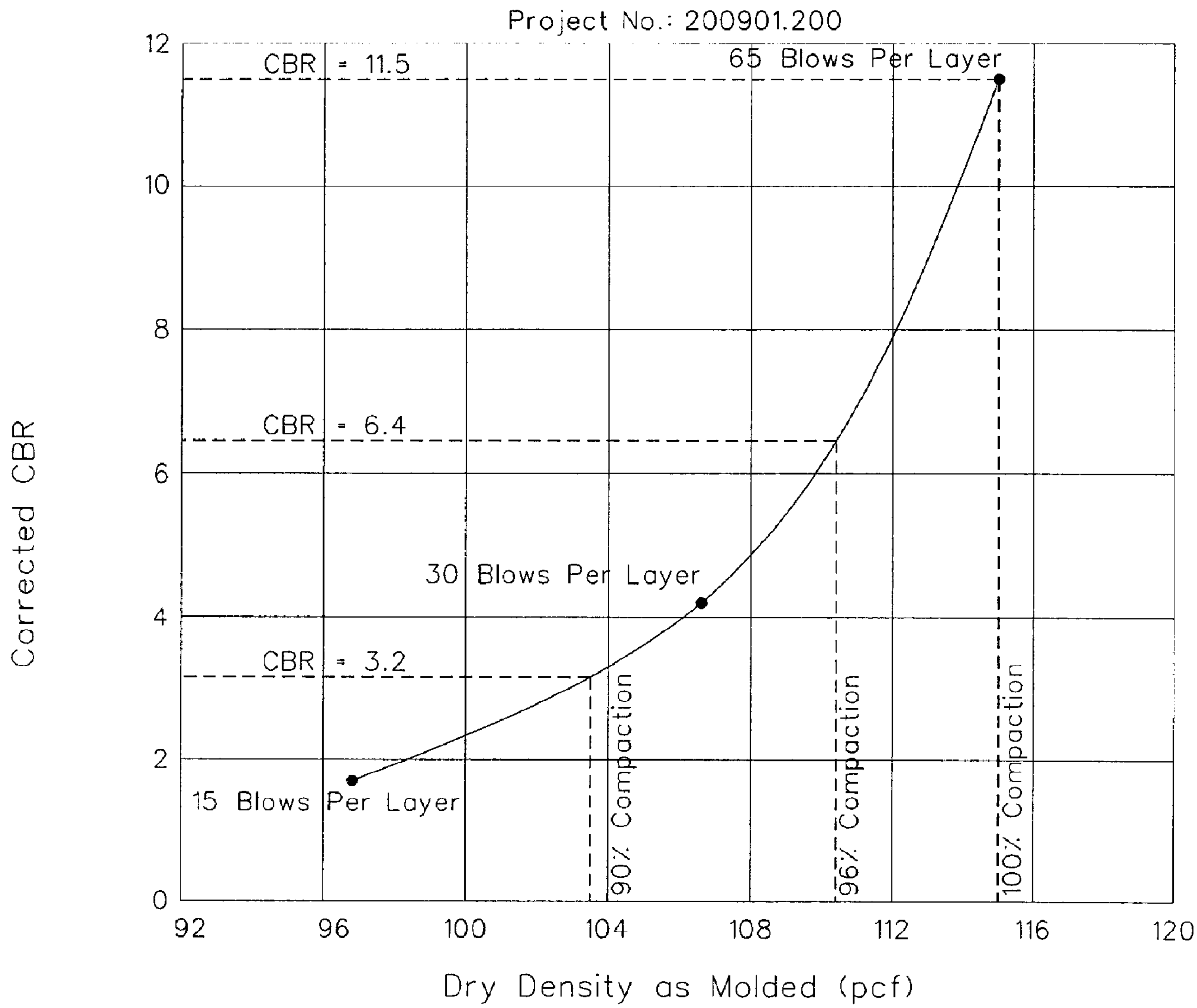
Bearing ratio @ 96% compaction 59.1 %

Bearing ratio @ 100% compaction 78.5 %

RB&G ENGINEERING, INC.

Figure **CALIFORNIA BEARING RATIO TEST RESULTS**

Mountain View Corridor
Salt Lake County, Utah



Location NEAR BORING 09-MVC-157 AT 4'-4.5'

Material SANDY LEAN CLAY

CL (A-4(3))

Soil Moisture-Density Relationship:

AASHTO T-99

Maximum Density 115.0 pcf

Optimum Moisture Content 13.0 %

Test method: AASHTO T-193

Condition ☐ unsoaked ☒ soaked

Surcharge amount 10 lbs

Swell 0.5 %

Bearing ratio @ 90% compaction 3.2 %

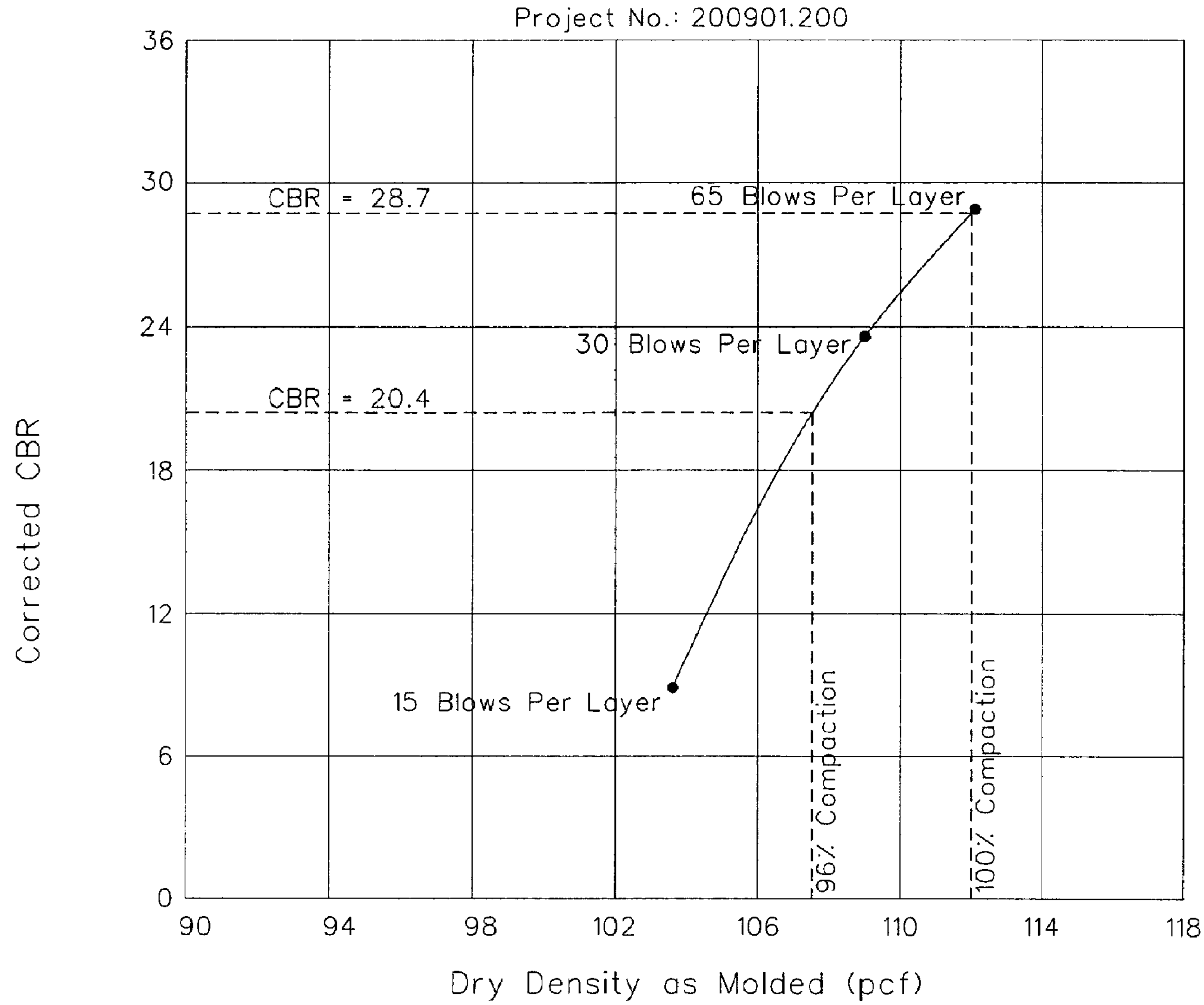
Bearing ratio @ 96% compaction 6.4 %

Bearing ratio @ 100% compaction 11.5 %

RB&G ENGINEERING, INC.

Figure **CALIFORNIA BEARING RATIO TEST RESULTS**

Mountain View Corridor
Salt Lake County, Utah



Location NEAR BORING 09-MVC-160 AT 11'-12'
Material BROWN SILTY SAND
SM (A-1-b(0))
Soil Moisture-Density Relationship:
AASHTO T-180
Maximum Density 112.0 pcf
Optimum Moisture Content 15.0 %

Test method: AASHTO T-193
Condition ☐ unsoaked ☒ soaked
Surcharge amount 10 lbs
Swell 0.0 %
Bearing ratio @ 90% compaction N/A %
Bearing ratio @ 96% compaction 20.4 %
Bearing ratio @ 100% compaction 28.7 %

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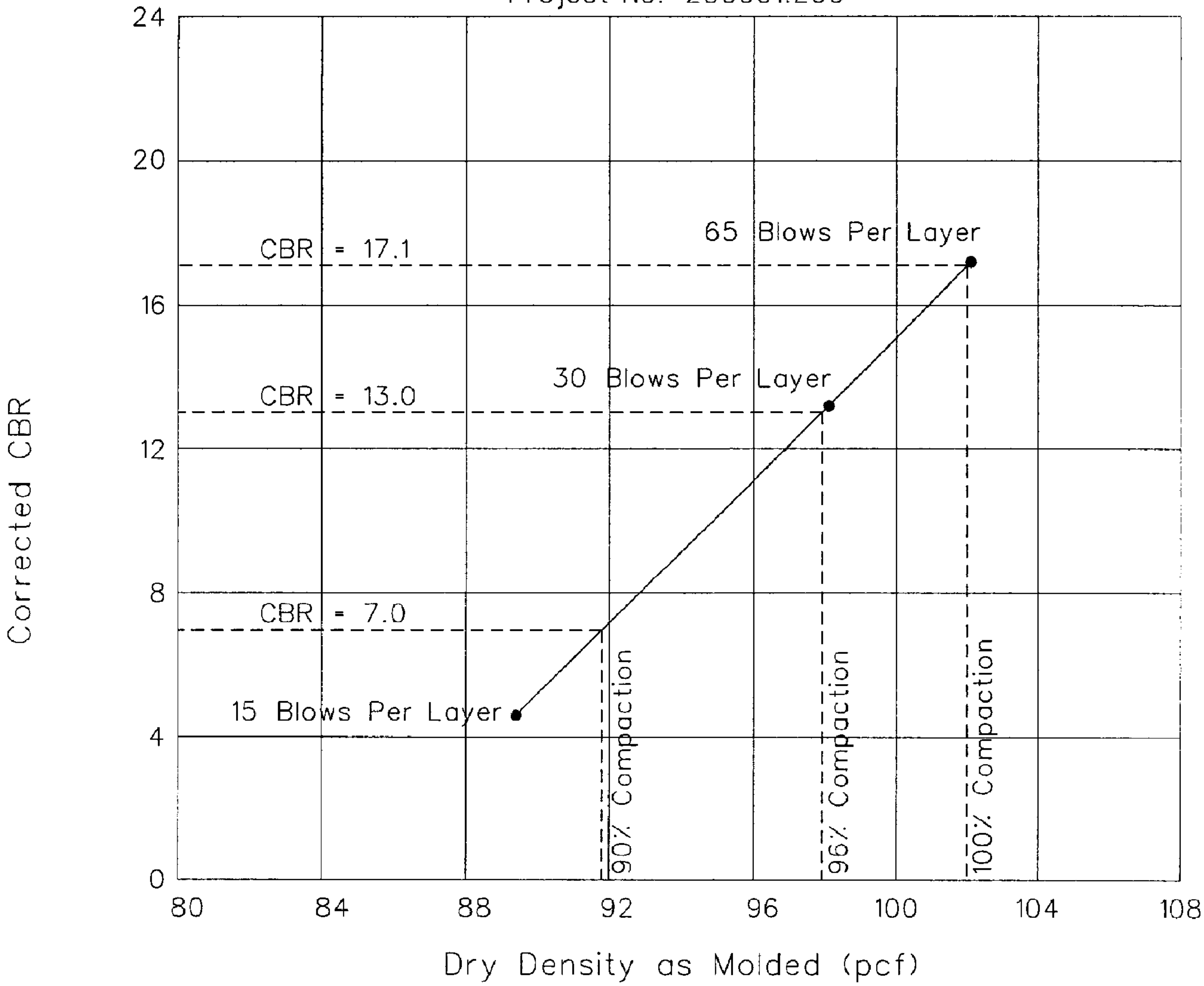
Figure **CALIFORNIA BEARING RATIO TEST RESULTS**

Mountain View Corridor
Salt Lake County, Utah

Project No.: 200901.200



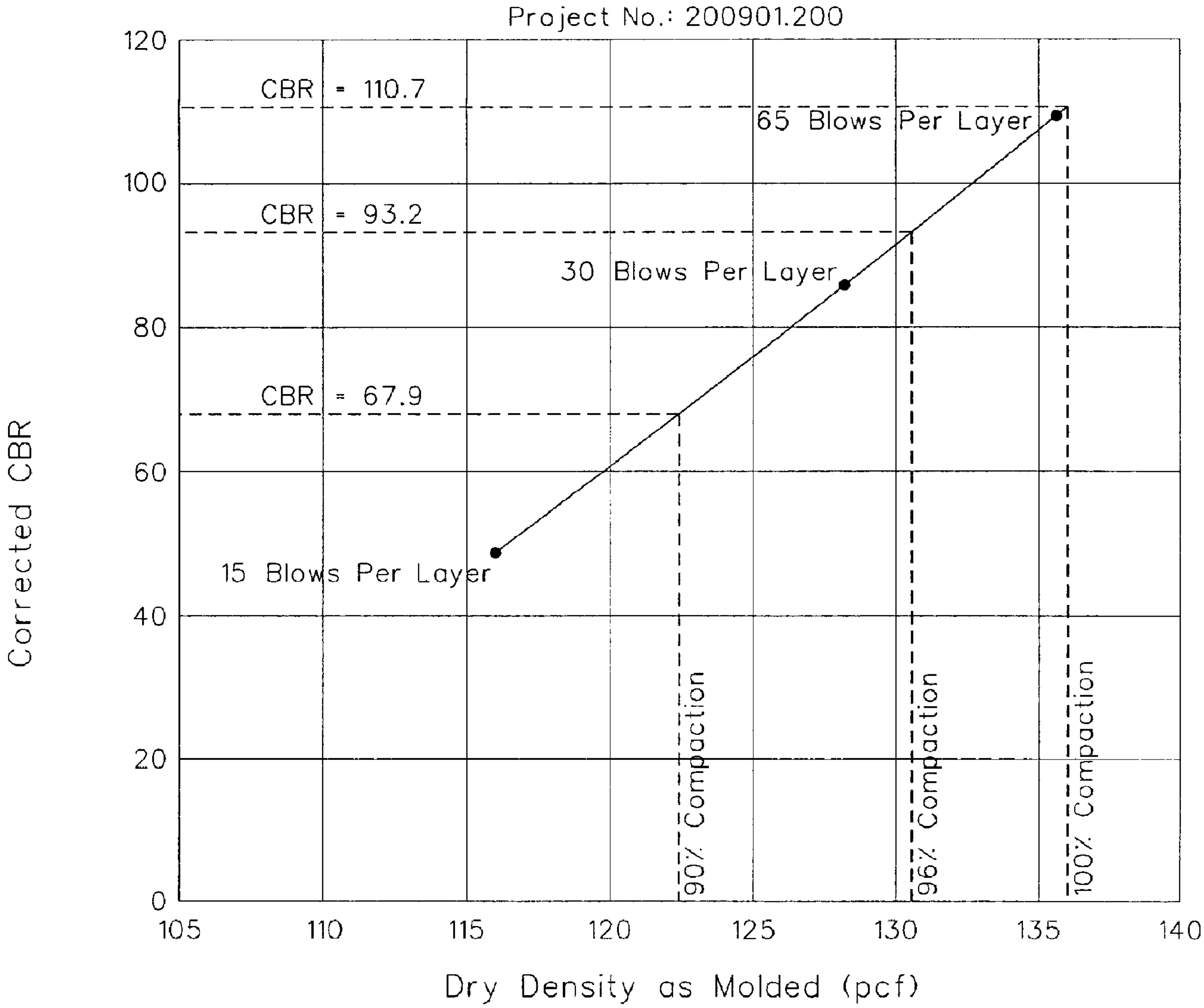
Location NEAR BORING 09-MVC-164 AT 12'-13'
Material SANDY SILT
ML (A-4(0))
Soil Moisture-Density Relationship:
AASHTO T-99
Maximum Density 102.0 pcf
Optimum Moisture Content 20.0 %

Test method: AASHTO T-193
Condition ☐ unsoaked ☒ soaked
Surcharge amount 10 lbs
Swell 0.0 %
Bearing ratio @ 90% compaction 7.0 %
Bearing ratio @ 96% compaction 13.0 %
Bearing ratio @ 100% compaction 17.1 %

RB&G ENGINEERING, INC.

Figure **CALIFORNIA BEARING RATIO TEST RESULTS**

Mountain View Corridor
Salt Lake County, Utah



Location NEAR BORING 09-MVC-167 AT 5'-6'

Material GRAVEL W/SAND

GP (A-1-a(0))

Soil Moisture-Density Relationship:

AASHTO T-180

Maximum Density 136.0 pcf

Optimum Moisture Content 8.0 %

Test method: AASHTO T-193

Condition ☐ unsoaked ☒ soaked

Surcharge amount 10 lbs

Swell 0.0 %

Bearing ratio @ 90% compaction 67.9 %

Bearing ratio @ 96% compaction 93.2 %

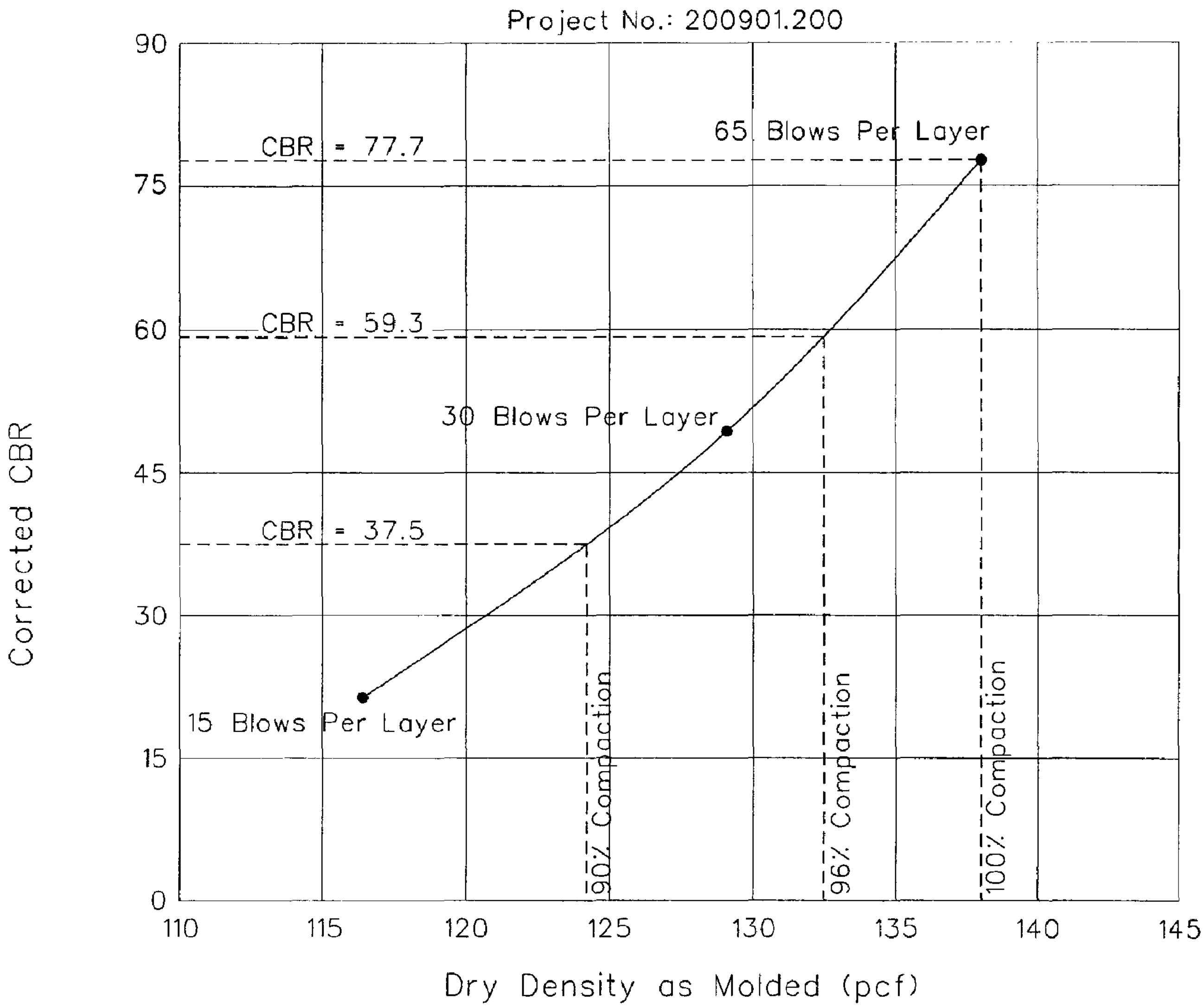
Bearing ratio @ 100% compaction 110.7 %

RB&G ENGINEERING, INC.

Figure **CALIFORNIA BEARING RATIO TEST RESULTS**

Mountain View Corridor

Salt Lake County, Utah



Location NEAR BORING 09-MVC-167 AT 10'-11'

Material GRAVEL W/SILT & SAND

GP-GM (A-1-a(0))

Soil Moisture-Density Relationship:

AASHTO T-180

Maximum Density 138.0 pcf

Optimum Moisture Content 6.0 %

Test method: AASHTO T-193

Condition ☐ unsoaked ☒ soaked

Surcharge amount 10 lbs

Swell 0.0 %

Bearing ratio @ 90% compaction 37.5 %

Bearing ratio @ 96% compaction 59.3 %

Bearing ratio @ 100% compaction 77.7 %

RB&G ENGINEERING, INC.

Figure **CALIFORNIA BEARING RATIO TEST RESULTS**

Mountain View Corridor
Salt Lake County, Utah

APPENDIX D

Seismic Acceleration Response Spectrum

AASHTO General Procedure

Site: Kennecott RR over MVC

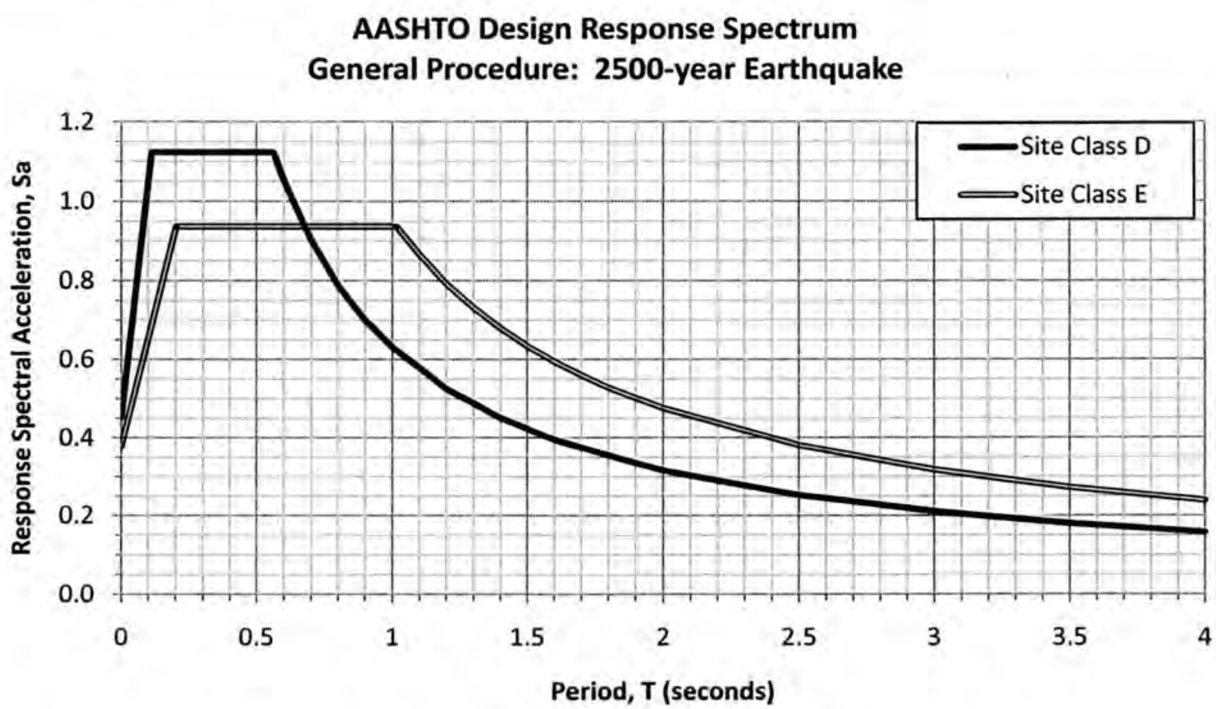
Mapped accleration values from USGS Interactive Deaggregations

Event	2475-yr	975-yr	475-yr
PGA	0.42	0.30	0.22
Ss	1.04	0.74	0.53
S1	0.39	0.26	0.18

AASHTO Site Coefficients for approx. 2500-year event

SITE CLASS D		SITE CLASS E	
Fpga 1.08	As 0.4536	Fpga 0.90	As 0.3780
Fa 1.08	Sds 1.1232	Fa 0.90	Sds 0.9360
Fv 1.62	Sd1 0.6318	Fv 2.44	Sd1 0.9516
Ts 0.5625		Ts 1.0167	
T0 0.1125		T0 0.2033	

SITE CLASS D		SITE CLASS E	
Period, T (sec)	Sa (g)	Period, T (sec)	Sa (g)
0	0.4536	0	0.3780
0.1125	1.1232	0.2033	0.9360
0.5625	1.1232	1.0167	0.9360
0.6	1.0530	1.1	0.8651
0.7	0.9026	1.2	0.7930
0.8	0.7898	1.3	0.7320
0.9	0.7020	1.4	0.6797
1.0	0.6318	1.5	0.6344
1.2	0.5265	1.6	0.5948
1.4	0.4513	1.7	0.5598
1.6	0.3949	1.8	0.5287
2.0	0.3159	2.0	0.4758
2.5	0.2527	2.5	0.3806
3.0	0.2106	3.0	0.3172
3.5	0.1805	3.5	0.2719
4.0	0.1580	4.0	0.2379



Seismic Acceleration Response Spectrum

AASHTO General Procedure

Site: Kennecott RR over MVC

Mapped accleration values from USGS Interactive Deaggregations

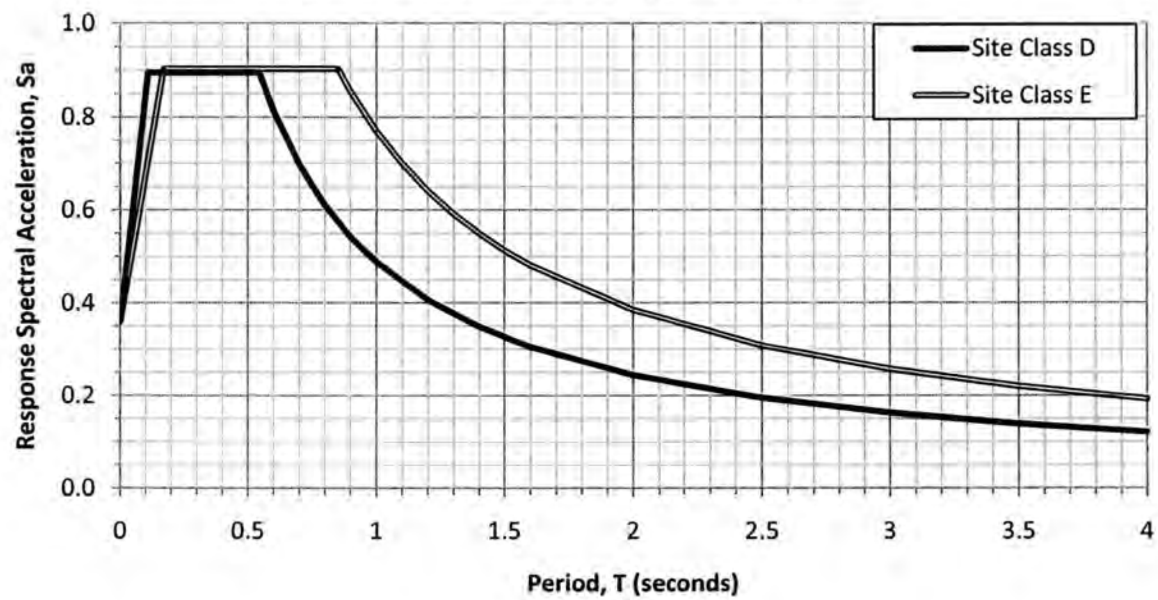
Event	2475-yr	975-yr	475-yr
PGA	0.42	0.30	0.22
Ss	1.04	0.74	0.53
S1	0.39	0.26	0.18

AASHTO Site Coefficients for approx. 1000-year event

SITE CLASS D		SITE CLASS E	
Fpga 1.20	As 0.3600	Fpga 1.20	As 0.3600
Fa 1.21	Sds 0.8954	Fa 1.22	Sds 0.9028
Fv 1.88	Sd1 0.4888	Fv 2.96	Sd1 0.7696
Ts 0.5459		Ts 0.8525	
T0 0.1092		T0 0.1705	

SITE CLASS D		SITE CLASS E	
Period, T (sec)	Sa (g)	Period, T (sec)	Sa (g)
0	0.3600	0	0.3600
0.1092	0.8954	0.1705	0.9028
0.5459	0.8954	0.8525	0.9028
0.6	0.8147	0.9	0.8551
0.7	0.6983	1.0	0.7696
0.8	0.6110	1.1	0.6996
0.9	0.5431	1.2	0.6413
1.0	0.4888	1.3	0.5920
1.2	0.4073	1.4	0.5497
1.4	0.3491	1.5	0.5131
1.6	0.3055	1.6	0.4810
2.0	0.2444	2.0	0.3848
2.5	0.1955	2.5	0.3078
3.0	0.1629	3.0	0.2565
3.5	0.1397	3.5	0.2199
4.0	0.1222	4.0	0.1924

AASHTO Design Response Spectrum
General Procedure: 1000-year Earthquake



Seismic Response Coefficients

AREMA 2010 Procedure (Chapter 9, 1.4.4.3)

Site: Kennecott RR over MVC

Mapped accleration values from USGS Interactive Deaggregations (2002)

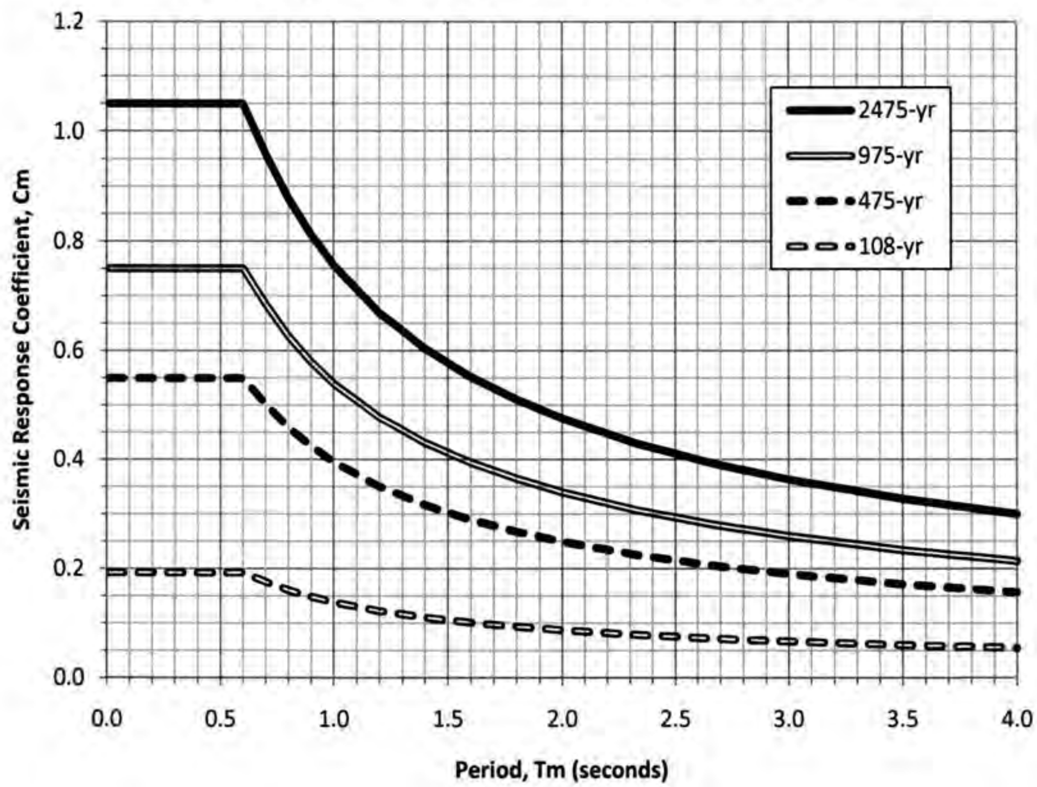
Event	2475-yr	975-yr	475-yr	108-yr
PGA	0.42	0.30	0.22	0.077
Ss	1.04	0.74	0.53	0.18
S1	0.39	0.26	0.18	0.056

Soil Type 3 - 20 to 40 feet of soft to medium-stiff clays with or without intervening layers of cohesionless soils.

Site Coefficient:	1.5	AREMA Table 9-1-6
Percent Damping:	5.0	Assumed
Damping Factor:	1.00	AREMA Chapter 9, 1.4.4.2

Tm (sec)	Cm 2475-yr	Cm 975-yr	Cm 475-yr	Cm 108-yr
0.01	1.050	0.750	0.550	0.193
0.05	1.050	0.750	0.550	0.193
0.1	1.050	0.750	0.550	0.193
0.2	1.050	0.750	0.550	0.193
0.3	1.050	0.750	0.550	0.193
0.4	1.050	0.750	0.550	0.193
0.5	1.050	0.750	0.550	0.193
0.6	1.050	0.750	0.550	0.193
0.7	0.959	0.685	0.502	0.176
0.8	0.877	0.627	0.460	0.161
0.9	0.811	0.579	0.425	0.149
1.0	0.756	0.540	0.396	0.139
1.2	0.669	0.478	0.351	0.123
1.4	0.604	0.431	0.316	0.111
1.6	0.553	0.395	0.289	0.101
1.8	0.511	0.365	0.268	0.094
2.0	0.476	0.340	0.249	0.087
2.3	0.430	0.307	0.225	0.079
2.7	0.393	0.281	0.206	0.072
3.0	0.363	0.260	0.190	0.067
3.5	0.328	0.234	0.172	0.060
4.0	0.300	0.214	0.157	0.055

AREMA Chapter 9, 1.4.4.3 - Seismic Response Coefficient



Mountain View Corridor - Segment 5 10/25/2010
Kennecott RR Bridge over MVC

Summary of Preliminary Driven Pile Resistance for Realigned Bridge

Abutment 1 (SW Abutment)

Approx. Existing Ground Elevation (ft)	5062				
Approx. Bottom of Pile Cap Elevation (ft)	5051				
Approx. MVC Roadway Elevation (ft)	5033				
Pile Length Below Existing Ground (ft)	70	81		86	
Est. Pile Length Below Btm Pile Cap (ft)	59	70		75	
Est. Pile Length Below MVC Roadway (ft)	41	52		57	
Estimated Pile Toe Elevation (ft)	4992	4981		4976	
Pile Type and Size	HP14x102	HP14x89	HP14x102	HP14x89	HP14x102
Estimated Restrike Side Resist. (kip)	637	651	690	675	714
Estimated Restrike Toe Resist. (kip)	2	2	2	2	2
Required Driving Resistance (kip)	639	653	692	677	716
Installed - Nominal Side Resist. (kip)	392	421	445	444	469
Installed - Nominal Toe Resist. (kip)	2	2	2	2	2
Installed - Total Nominal Resist. (kip)	394	423	447	446	471
Long-Term Nominal Side Resist. (kip)	388	416	440	440	464
Long-Term Nominal Toe Resist. (kip)	1	1	1	1	1
Long-Term Total Nominal Resist. (kip)	389	417	441	441	465
LRFD Strength Axial Compress. Resist. (kip)	253	271	287	287	302
LRFD Strength Axial Uplift Resistance (kip)	128	137	145	145	153
LRFD Extreme Event Compress. Resist. (kip)	389	417	441	441	465
LRFD Extreme Event Uplift Resistance (kip)	310	333	352	352	371
ASD Allowable Compression Load (kip)	173	185	196	196	207
ASD Allowable Uplift Load (kip)	129	139	147	147	155
Number of Piles Assumed for Drag Load Est.	26	26	24	24	24
Unfactored Drag Load per Pile (kip)	195	205	215	215	230
Elevation of Min. Acceptable Penetration (ft)	See Note 8 below.				

Notes:
1) Required driving resistance assumes piles driven prior to soil nail wall construction.
2) Installed nominal side resistance neglects resistance above MVC roadway excavation.
3) Assumed 1/16 inch corrosion reduces installed resistance to long-term resistance.
4) PDA testing will be required for two to three piles at this abutment due to site variability.
5) Predrilling may be necessary in the zone between elev. 5025' and 5010'. Varying soil conditions could necessitate predrilling at other elevations. In no case should predrilling extend below elevation of minimum acceptable pile penetration.
6) ASD allowable loads use factors of safety of 2.25 for compression and 3.0 for uplift.
7) Structural Engineer should check that dead load plus drag load does not exceed allowable structural capacity of pile.
8) Elevation of Minimum Acceptable Pile Penetration to be specified by bridge structural designer based on lateral and uplift loading requirements, but no shallower than elevation 5000 ft.

Mountain View Corridor - Segment 5 10/25/2010
Kennecott RR Bridge over MVC

Summary of Driven Pile Resistance for Realigned Bridge

Bent 2

Approx. Existing Ground Elevation (ft)	5060				
Approx. Finished Ground Elev. at Pile Cap (ft)	5024				
Approx. Bottom of Pile Cap Elevation (ft)	5017				
Pile Length Below Existing Ground (ft)	88		94		
Est. Pile Length Below Fin. Grd. @ Pile Cap (ft)	52		58		
Est. Pile Length Below Btm Pile Cap (ft)	45		51		
Estimated Pile Toe Elevation (ft)	4972		4966		
Pile Type	HP14x89	HP14x102	HP14x89	HP14x102	
Estimated Restrike Side Resist. (kip)	979	1043	1177	1254	For piles driven
Estimated Restrike Toe Resist. (kip)	3	3	2	3	from existing
Required Driving Resistance (kip)	982	1046	1179	1257	ground elevation.
Estimated Restrike Side Resist. (kip)	368	391	484	515	For piles driven
Estimated Restrike Toe Resist. (kip)	3	3	2	3	from approximate
Required Driving Resistance (kip)	371	394	486	518	pile cap elevation.
Installed - Nominal Side Resist. (kip)	368	391	484	515	
Installed - Nominal Toe Resist. (kip)	3	3	2	3	
Installed - Total Nominal Resist. (kip)	371	394	486	518	
Long-Term Nominal Side Resist. (kip)	365	387	480	511	
Long-Term Nominal Toe Resist. (kip)	3	3	2	2	
Long-Term Total Nominal Resist. (kip)	368	390	482	513	
Strength Axial Compress. Resist. (kip)	239	254	313	333	
Strength Axial Uplift Resistance (kip)	120	128	158	169	
Extreme Event Compress. Resist. (kip)	368	390	482	513	
Extreme Event Uplift Resistance (kip)	292	310	384	409	
ASD Allowable Compression Load (kip)	164	173	214	228	
ASD Allowable Uplift Load (kip)	122	129	160	170	
Number of Piles Assumed for Drag Load Est.	60	55	55	55	
Unfactored Drag Load per Pile (kip)	200	215	200	215	
Elevation of Min. Acceptable Penetration (ft)	See Note 7 below.				

Notes:
1) Piles must be driven after pile cap excavation to allow verification by PDA with typical driving equipment. Required driving resistance is too high to verify if piles driven from existing ground elevation.
2) Assumed 1/16 inch corrosion reduces installed resistance to long-term resistance.
3) PDA testing will be required for four to six piles at this bent due to site variability and pile quantity.
4) Predrilling may be necessary, particularly above about elevation 5006'. In no case should predrilling extend below elevation of minimum acceptable pile penetration.
5) ASD allowable loads use factors of safety of 2.25 for compression and 3.0 for uplift.
6) Structural Engineer should check that dead load plus drag load does not exceed allowable structural capacity of pile.
7) Elevation of Minimum Acceptable Pile Penetration to be specified by bridge structural designer based on lateral and uplift loading requirements, but no shallower than elevation 4985 ft.

Mountain View Corridor - Segment 5 10/25/2010
Kennecott RR Bridge over MVC

Summary of Preliminary Driven Pile Resistance for Realigned Bridge

Abutment 3 (NE Abutment)

Approx. Existing Ground Elevation (ft)	5058				
Approx. Bottom of Pile Cap Elevation (ft)	5047				
Approx. MVC Roadway Elevation (ft)	5028				
Pile Length Below Existing Ground (ft)	72	79		83	
Est. Pile Length Below Btm Pile Cap (ft)	61	68		72	
Est. Pile Length Below MVC Roadway (ft)	42	49		53	
Estimated Pile Toe Elevation (ft)	4986	4979		4975	
Pile Type and Size	HP14x102	HP14x89	HP14x102	HP14x89	HP14x102
Estimated Restrike Side Resist. (kip)	577	609	637	694	729
Estimated Restrike Toe Resist. (kip)	3	2	3	2	2
Required Driving Resistance (kip)	580	611	640	696	731
Installed - Nominal Side Resist. (kip)	387	427	443	498	519
Installed - Nominal Toe Resist. (kip)	3	2	3	2	2
Installed - Total Nominal Resist. (kip)	390	429	446	500	521
Long-Term Nominal Side Resist. (kip)	383	422	438	493	514
Long-Term Nominal Toe Resist. (kip)	2	2	2	2	2
Long-Term Total Nominal Resist. (kip)	385	424	440	495	516
LRFD Strength Axial Compress. Resist. (kip)	250	276	286	322	335
LRFD Strength Axial Uplift Resistance (kip)	126	139	145	163	170
LRFD Extreme Event Compress. Resist. (kip)	385	424	440	495	516
LRFD Extreme Event Uplift Resistance (kip)	306	338	350	394	411
ASD Allowable Compression Load (kip)	171	188	196	220	229
ASD Allowable Uplift Load (kip)	128	141	146	164	171
Number of Piles Assumed for Drag Load Est.	27	24	24	24	24
Unfactored Drag Load per Pile (kip)	195	205	225	240	255
Elevation of Min. Acceptable Penetration (ft)	See Note 8 below.				

Notes:

1) Required driving resistance assumes piles driven prior to soil nail wall construction.
2) Installed nominal side resistance neglects resistance above MVC roadway excavation.
3) Assumed 1/16 inch corrosion reduces installed resistance to long-term resistance.
4) PDA testing will be required for two to three piles at this abutment due to site variability.
5) Predrilling may be required if uplift and/or lateral loading requires piles extending below approx. elevation 4990' but in no case should predrilling extend below the elevation of minimum acceptable pile penetration. Predrilling may also be needed at shallower depths if soil conditions vary.
6) ASD allowable loads use factors of safety of 2.25 for compression and 3.0 for uplift.
7) Structural Engineer should check that dead load plus drag load does not exceed allowable structural capacity of pile.
8) Elevation of Minimum Acceptable Pile Penetration to be specified by bridge structural designer based on lateral and uplift loading requirements, but no shallower than elevation 5000 ft.

Mountain View Corridor - Segment 5
Kennecott RR Bridge over MVC

Draft - 6/26/10

Summary of Preliminary Drilled Shaft Resistance Estimates at Bent/Pier 2
Assumed MVC roadway elevation at bent is approx. 5034 ft. Side resistance neglected in upper 5 ft.

Drilled Shaft Toe Elevation	**4992 ft**	**Drilled Shaft Diameter (ft)**							
Approx. Drilled Shaft Depth	**42 ft**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Nominal Side Resistance in Axial Compression (kip)		592	789	987	1184	1382	1579	1776	1974
Nominal Toe Resistance in Axial Compression (kip)		339	603	942	1357	1847	2413	2926	3456
Total Nominal Resistance in Axial Compression (kip)		931	1393	1929	2541	3229	3992	4703	5429
Strength Side Resistance in Axial Compression (kip)		324	432	540	648	756	864	972	1080
Strength Toe Resistance in Axial Compression (kip)		170	302	471	679	924	1206	1463	1728
Total Strength Resistance in Axial Compression (kip)		494	734	1011	1327	1680	2071	2436	2808
Extreme Event Uplift Resistance (kip)		474	632	789	947	1105	1263	1421	1579
Strength Uplift Resistance (kip)		265	353	442	530	618	706	795	883
ASD Allowable Axial Compression Load (kip)		310	464	643	847	1076	1331	1568	1810
ASD Ultimate Axial Uplift Capacity (kip)		414	553	691	829	967	1105	1243	1382
ASD Allowable Axial Uplift Load (kip)		138	184	230	276	322	368	414	461

Drilled Shaft Toe Elevation	**4972 ft**	**Drilled Shaft Diameter (ft)**							
Approx. Drilled Shaft Depth	**62 ft**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Nominal Side Resistance in Axial Compression (kip)		1038	1384	1730	2076	2422	2768	3115	3461
Nominal Toe Resistance in Axial Compression (kip)		424	754	1178	1696	2309	3016	3499	4006
Total Nominal Resistance in Axial Compression (kip)		1462	2138	2908	3773	4731	5784	6613	7466
Strength Side Resistance in Axial Compression (kip)		562	750	937	1124	1312	1499	1687	1874
Strength Toe Resistance in Axial Compression (kip)		212	377	589	848	1155	1508	1749	2003
Total Strength Resistance in Axial Compression (kip)		774	1127	1526	1973	2466	3007	3436	3877
Extreme Event Uplift Resistance (kip)		831	1107	1384	1661	1938	2215	2492	2768
Strength Uplift Resistance (kip)		458	611	764	917	1070	1222	1375	1528
ASD Allowable Axial Compression Load (kip)		487	713	969	1258	1577	1928	2204	2489
ASD Ultimate Axial Uplift Capacity (kip)		727	969	1211	1453	1696	1938	2180	2422
ASD Allowable Axial Uplift Load (kip)		242	323	404	484	565	646	727	807

Notes

1) Reduce factored resistance by 20% for nonredundant shafts in accordance with AASHTO LRFD 10.5.5.2.4.
2) Due to clayey soils near elev. 4975', values should not be interpolated between those tabulated above.
3) For shafts spaced less than four diameters on centers, apply η factor from AASHTO LRFD 10.8.3.6.3.
4) Drilled shaft settlement will have to be evaluated in detail for selected shaft sizes and loading. Design resistance of large-diameter shafts may be controlled by settlement considerations.
5) ASD Ultimate Axial Uplift Capacity is 70% of nominal side resistance and does not include weight of shaft.
6) ASD Allowable Loads use a factor of safety of 3.0, which assumes no load testing.

MOUNTAIN VIEW CORRIDOR - SEGMENT 5 10/25/2010

SUMMARY OF WEAP ANALYSES

Kennecott RR Bridge - Abutment 1

Driven Pile Parameters		HP14x102 driven to 86' below existing ground surface						
Hammer Manufacturer		Delmag / APE				ICE	IHC	
Hammer Number		D19-42	D25-32	D30-32	D36-32	I-36	S-70	S-90
Hammer Rated Energy (kip-ft)		47.1	66.3	75.4	90.6	90.7	51.3	65.9
Ram Weight (kip)		4.2	5.5	6.6	7.9	7.9	7.7	9.9
Geometric Max Stroke (ft)		12.5	13.8	13.7	13.1	12.1	6.6	6.6
Maximum Compressive Stress (ksi)	600 kips resistance	22.6	28.5	29.5	31.7	35.5	39.2	39.5
	650	22.9	29.0	29.7	32.3	36.3	39.2	39.5
	700	23.2	29.4	30.1	32.9	37.1	39.2	39.5
	750	23.3	29.7	30.6	33.5	37.9	39.2	39.5
	800	23.7	29.8	31.0	34.1	38.6	39.2	39.5
Computed Blow Count (blows/ft)	600 kips resistance	70	55	44	33	37	32	22
	650	86	65	52	39	44	37	25
	700	108	79	60	45	53	42	30
	750	141	97	71	51	62	50	36
	800	180	125	84	60	74	60	43
Stroke (ft)	600 kips resistance	8.8	8.7	8.4	7.8	8.2	6.6	6.6
	650	9.0	8.9	8.4	8.0	8.5	6.6	6.6
	700	9.2	9.1	8.6	8.2	8.7	6.6	6.6
	750	9.2	9.2	8.8	8.4	8.9	6.6	6.6
	800	9.4	9.3	8.9	8.6	9.2	6.6	6.6
Transferred Energy (kip-ft)	600 kips resistance	22.8	29.5	32.4	39.2	38.1	44.7	57.6
	650	23.3	30.0	32.6	39.4	39.0	44.6	57.4
	700	23.6	30.5	33.2	41.0	40.0	44.5	57.3
	750	23.7	30.9	33.8	41.7	40.8	44.4	57.2
	800	24.3	31.0	34.4	42.6	41.8	44.3	57.1

Recommended minimum yield strength for HP14x102 driven piles:	50 ksi
Recommended maximum required driving resistance (HP14x102):	750 kips
Recommended minimum pile driving hammer energy:	60 kip-ft

Drivability Considerations

1) The WEAP analyses are only a preliminary indication of pile driving behavior at the depth and assumed resistance values listed above. The subsurface conditions at a given location and depth may provide resistance that is outside the range of assumed values.
2) Boring logs indicate the possible presence of cobbles and boulders above the assumed pile depth. Predrilling, hardened pile shoes, or other special methods or equipment may be required to achieve the assumed depth.

MOUNTAIN VIEW CORRIDOR - SEGMENT 5 10/25/2010

SUMMARY OF WEAP ANALYSES

Kennecott RR Bridge - Abutment 1

Driven Pile Parameters		HP14x89 driven to 86' below existing ground surface						
Hammer Manufacturer		Delmag / APE				ICE	IHC	
Hammer Number		D19-42	D25-32	D30-32	D36-32	I-36	S-70	S-90
Hammer Rated Energy (kip-ft)		47.1	66.3	75.4	90.6	90.7	51.3	65.9
Ram Weight (kip)		4.2	5.5	6.6	7.9	7.9	7.7	9.9
Geometric Max Stroke (ft)		12.5	13.8	13.7	13.1	12.1	6.6	6.6
Maximum Compressive Stress (ksi)	600 kips resistance	23.8	29.5	30.7	32.9	37.3	40.8	41.1
	650	24.0	30.1	31.2	33.8	38.2	40.8	41.1
	700	24.5	30.5	31.7	34.4	39.1	40.8	41.1
	750	24.8	30.7	32.1	35.1	39.8	40.8	41.1
	800	25.2	31.1	32.5	35.5	40.6	40.8	41.1
Computed Blow Count (blows/ft)	600 kips resistance	92	61	53	37	41	40	25
	650	127	77	62	43	51	48	30
	700	178	98	75	52	65	59	37
	750	258	133	94	67	85	75	47
	800	381	185	122	95	110	100	61
Stroke (ft)	600 kips resistance	9.1	8.8	8.5	7.9	8.4	6.6	6.6
	650	9.2	9.0	8.7	8.1	8.7	6.6	6.6
	700	9.4	9.2	8.9	8.3	8.9	6.6	6.6
	750	9.6	9.2	9.0	8.6	9.2	6.6	6.6
	800	9.8	9.4	9.2	8.7	9.4	6.6	6.6
Transferred Energy (kip-ft)	600 kips resistance	24.0	30.7	33.7	40.8	40.1	44.3	57.4
	650	24.3	31.3	34.6	41.9	41.1	44.2	57.2
	700	24.8	31.8	35.2	43.0	42.1	44.1	56.9
	750	25.3	32.0	35.7	43.9	43.0	44.0	56.7
	800	25.8	32.6	36.4	44.4	44.0	43.9	56.6

Recommended minimum yield strength for HP14x89 driven piles:	50 ksi
Recommended maximum required driving resistance (HP14x89):	700 kips
Recommended minimum pile driving hammer energy:	60 kip-ft

Drivability Considerations

1) The WEAP analyses are only a preliminary indication of pile driving behavior at the depth and assumed resistance values listed above. The subsurface conditions at a given location and depth may provide resistance that is outside the range of assumed values.
2) Boring logs indicate the possible presence of cobbles and boulders above the assumed pile depth. Predrilling, hardened pile shoes, or other special methods or equipment may be required to achieve the assumed depth.

Recommendations for LPILE and GROUP analyses.

Project: Mountain View Corridor
Bridge Site: Kennecott RR (realigned)

Bridge: Kennecott RR over MVC
Support: Abut 1
Boring Nos.: 09-S5-1, 09-W5-6

Approx. Exist. Ground Elev: 5062 ft
Estimated Pile Tip Elev: To Be Determined
Est. Length Below Ground: approx. 80 to 90 ft

Foundation Type: Drilled Shaft or H-Pile
Size: 14" H-pile to 120" diameter drilled shaft
Water Table: Below Investigated Depth

Soil Layers

Thickness (ft)	Top Elev (ft)	Bottom Elev (ft)	Soil Type (p-y model)	Eff. Unit Wt. (pci)	Cohesion (psi)	Strain Factor ε_{50}	Friction Angle (degrees)	p-y Modulus, k (pci)	Axial Unit Resistance Side (psi)	Axial Unit Resistance End (psi)
18	5062 ft	5044	Sand (Reese)	0.067	0	0	33	90	2.0	
16	5044	5028	Soft Clay (Matlock)	0.069	4.9	0.015	0	70	4.5	
5	5028	5023	Sand (Reese)	0.067	0	0	34	150	9.3	
14	5023	5009	Sand (Reese)	0.072	0	0	36	225	17.7	
15	5009	4994	Sand (Reese)	0.064	0	0	33	90	16.7	
20	4994	4974	Soft Clay (Matlock)	0.067	6.9	0.010	0	100	6.9	0
20	4974	4954	Soft Clay (Matlock)	0.067	6.9	0.010	0	100	6.6	0

Other Considerations

Group Effects

Use P-Multipliers for shaft groups as outlined in AASHTO LRFD Bridge Design Specifications Section 10.7.2.4

Axial Unit End Resistance

Axial pile resistance analyses assume only 1 to 3 kips toe resistance per pile due to variable soil conditions at soil toe and uncertainty regarding pile section plugging behavior.

Retaining Walls

For piles located less than 6B from retaining wall face, use P-Multiplier of 0.3 or less for the retained soil when loading is perpendicular to wall face. Wall designer must be notified if wall will be relied upon for lateral pile resistance.

Recommendations for LPILE and GROUP analyses.

Project: Mountain View Corridor
Bridge Site: Kennecott RR (realigned)

Bridge: Kennecott RR over MVC
Support: Bent 2
Boring Nos.: 10-S5-4

Approx. MVC Road Elev: 5034 ft
Estimated Pile Tip Elev: To Be Determined
Est. Length Below MVC: approx. 60 to 70 ft

Foundation Type: Drilled Shaft or H-Pile
Size: 14" H-pile to 120" diameter drilled shaft
Water Table: Below Investigated Depth

Soil Layers

Thickness (ft)	Top Elev (ft)	Bottom Elev (ft)	Soil Type (p-y model)	Eff. Unit Wt. (pci)	Cohesion (psi)	Strain Factor ε_{50}	Friction Angle (degrees)	p-y Modulus, k (pci)	Axial Unit Resistance Side (psi)	Axial Unit Resistance End (psi)
6	5034	5028	Soft Clay (Matlock)	0.065	4.2	0.019	0	35	2.1	
8	5028	5020	Sand (Reese)	0.069	0	0	34	150	6.4	
6	5020	5014	Soft Clay (Matlock)	0.064	3.5	0.020	0	30	1.9	
20	5014	4994	Sand (Reese)	0.069	0	0	34	150	16.4	
15	4994	4979	Sand (Reese)	0.072	0	0	36	225	20.6	306
7	4979	4972	Stiff Clay w/out free water	0.064	13.9	0.006	0	500	7.6	0
12	4972	4960	Sand (Reese)	0.072	0	0	36	225	21.0	354

Other Considerations

Group Effects

Use P-Multipliers for shaft groups as outlined in AASHTO LRFD Bridge Design Specifications Section 10.7.2.4

Axial Unit End Resistance

Axial pile resistance analyses assume only 1 to 3 kips toe resistance per pile due to variable soil conditions at soil toe and uncertainty regarding pile section plugging behavior.

Retaining Walls

For piles located less than 6B from retaining wall face, use P-Multiplier of 0.3 or less for the retained soil when loading is perpendicular to wall face. Wall designer must be notified if wall will be relied upon for lateral pile resistance.

Recommendations for LPILE and GROUP analyses.

Project: Mountain View Corridor
Bridge Site: Kennecott RR (realigned)

Bridge: Kennecott RR over MVC
Support: Abut 3
Boring No.: 10-S5-5

Approx. Exist. Ground Elev: 5058 ft
Estimated Pile Tip Elev: To Be Determined
Est. Length Below Ground: approx. 80 to 90 ft

Foundation Type: Drilled Shaft or H-Pile
Size: 14" H-pile to 120" diameter drilled shaft
Water Table: Below Investigated Depth

Soil Layers

Thickness (ft)	Top Elev (ft)	Bottom Elev (ft)	Soil Type (p-y model)	Eff. Unit Wt. (pci)	Cohesion (psi)	Strain Factor ε_{50}	Friction Angle (degrees)	p-y Modulus, k (pci)	Axial Unit Resistance Side (psi)	Axial Unit Resistance End (psi)
18	5058	5040	Sand (Reese)	0.067	0	0	34	150	2.2	
15	5040	5025	Sand (Reese)	0.064	0	0	30	50	4.5	
15	5025	5010	Stiff Clay w/out free water	0.067	12.5	0.009	0	200	12.5	
10	5010	5000	Sand (Reese)	0.075	0	0	36	225	21.9	
20	5000	4980	Stiff Clay w/out free water	0.065	10.4	0.008	0	150	10.3	0
18	4980	4962	Stiff Clay w/out free water	0.065	13.9	0.006	0	500	6.9	0
24	4962	4938	Sand (Reese)	0.075	0	0	36	225	10.5	0

Other Considerations

Group Effects

Use P-Multipliers for shaft groups as outlined in AASHTO LRFD Bridge Design Specifications Section 10.7.2.4

Axial Unit End Resistance

Axial pile resistance analyses assume only 1 to 3 kips toe resistance per pile due to variable soil conditions at soil toe and uncertainty regarding pile section plugging behavior.

Retaining Walls

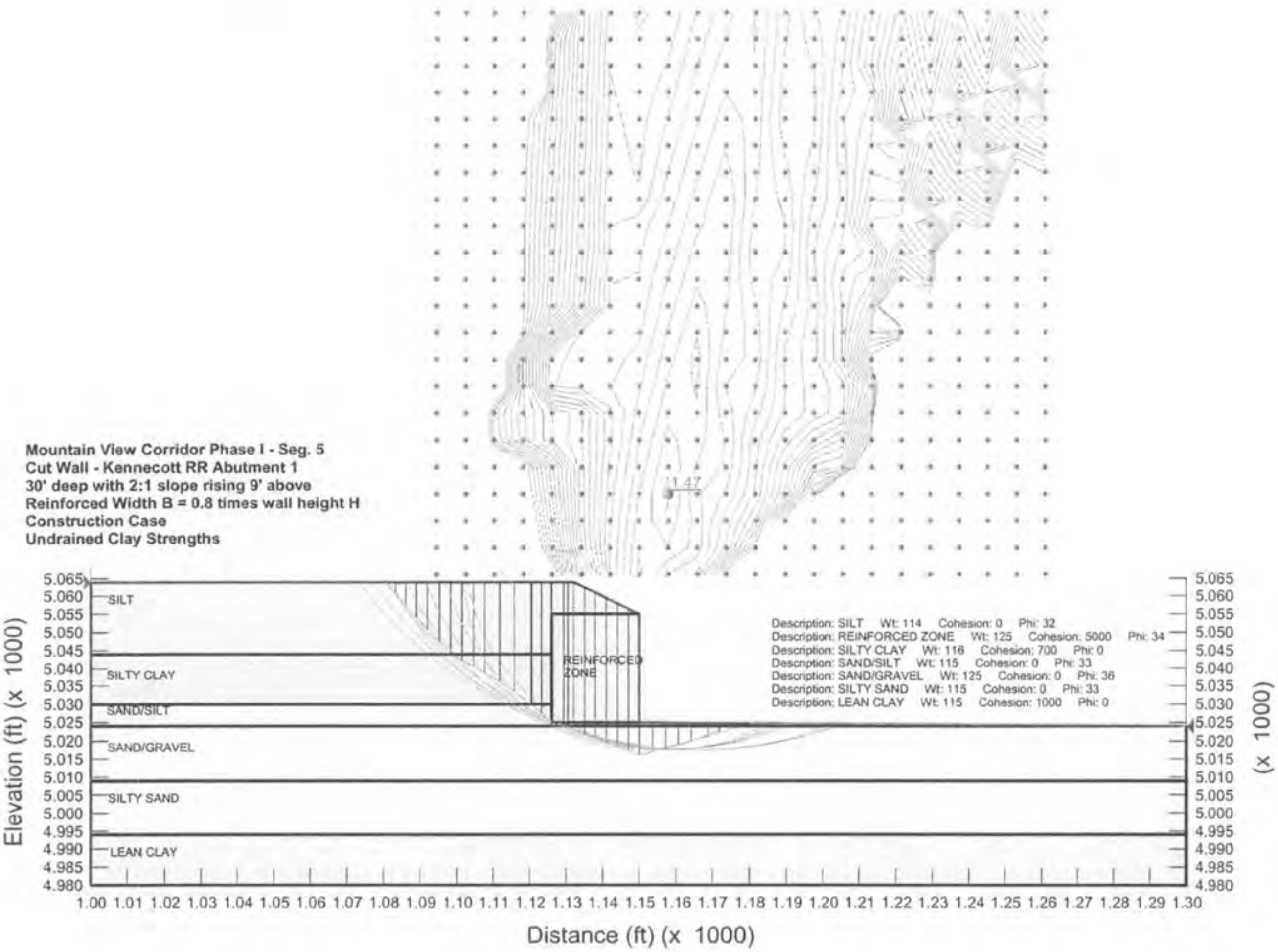
For piles located less than 6B from retaining wall face, use P-Multiplier of 0.3 or less for the retained soil when loading is perpendicular to wall face. Wall designer must be notified if wall will be relied upon for lateral pile resistance.

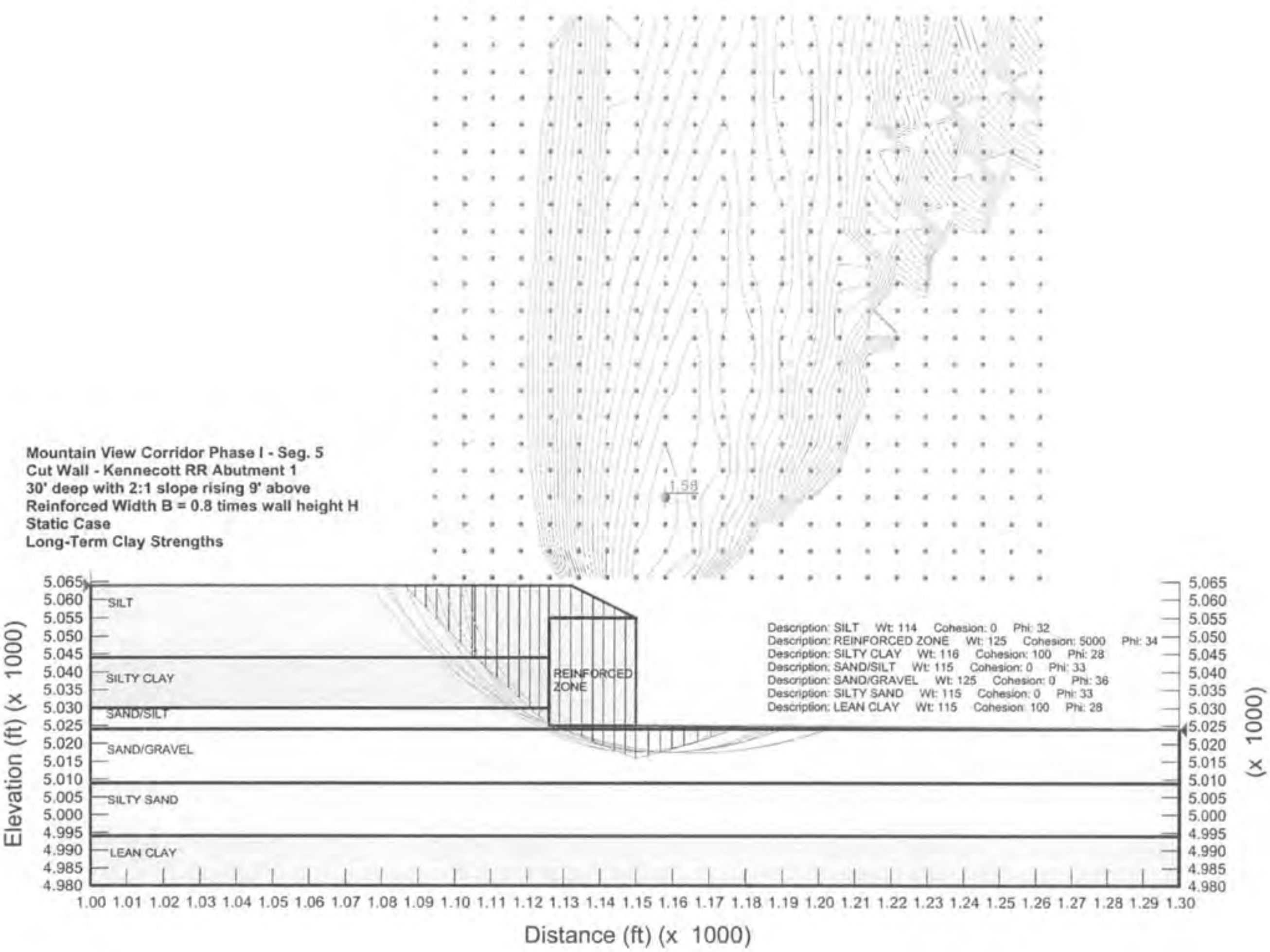
MOUNTAIN VIEW CORRIDOR - PHASE I - SEGMENT 5
SUMMARY OF ANALYSES OF GLOBAL STABILITY

Analysis location and description of embankment/cut configuration	Computed Factors of Safety*			
	Construction	Long-Term	Pseudostatic	Post-Earthquake
Kennecott RR Bridge - Abut 1 - Cut wall with H=30', B = 24', and 2:1 backslope rising 9'	1.47 (1.67)	1.58 (1.78)	1.20 (1.30)	1.54 (1.73)
Kennecott RR Bridge - Abut 2 - Cut wall with H = 22', B = 18', and 2:1 backslope rising 5'	1.43 (1.72)	1.53 (1.75)	1.07 (1.14)	1.35 (1.54)
Kennecott RR Bridge - Abut 2 - Cut wall with H = 20', B = 22', and 2:1 backslope rising 11' **	1.40 (1.57)	1.57 (1.75)	1.00 (1.14)	1.39 (1.61)
Sta. 1504+00, Cut Slope 44' deep	1.55 (1.82)	1.59 (1.63)	n/a	n/a
Sta. 1540+00, Cut Slope 43' deep	1.36 (1.41)	1.37 (1.41)	n/a	n/a
Sta. 1552+00, Cut Slope 54' deep	1.56 (1.80)	1.57 (1.61)	n/a	n/a
Sta. 1572+00, Cut Slope 30' deep	2.24 (2.39)	1.84 (1.88)	n/a	n/a
Sta. 1601+00, Cut Slope 48' deep	2.36 (2.40)	1.84 (1.84)	n/a	n/a

*Optimized factors of safety are shown first, followed by factors of safety for critical circular surface in parentheses.
**Due to relatively large backslope, wall requires B ≈ 1.1H to ensure adequate factors of safety.
n/a = Case not applicable because wall does not impact bridge.

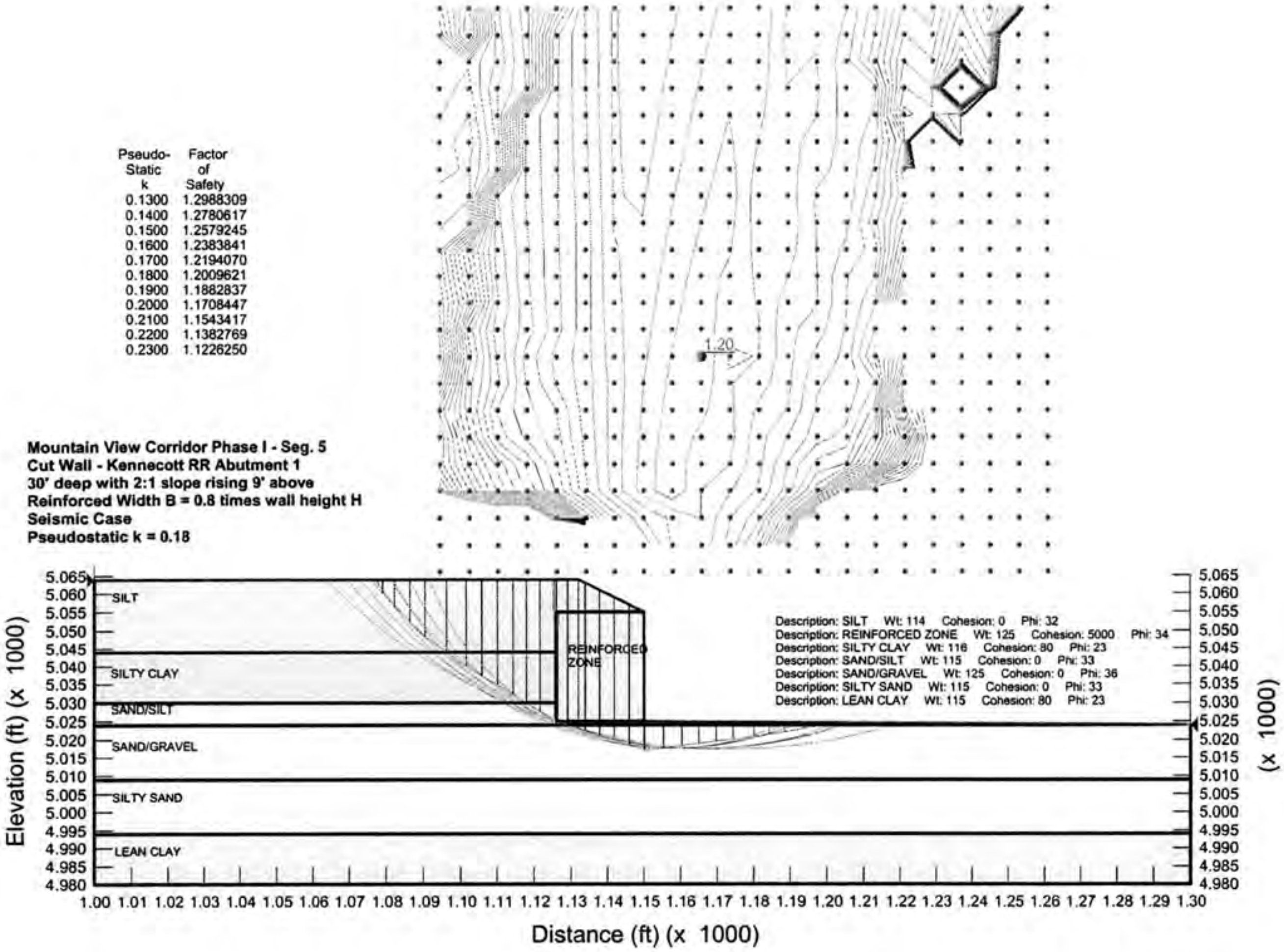
Note: These analyses are preliminary, and must be refined if the modeled wall type and/or dimensions are not representative of those selected for construction.


Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 1
30' deep with 2:1 slope rising 9' above
Reinforced Width B = 0.8 times wall height H
Construction Case
Undrained Clay Strengths
1.47
SILT
SILTY CLAY
SAND/SILT
SAND/GRAVEL
SILTY SAND
LEAN CLAY
REINFORCED ZONE
Description: SILT Wt: 114 Cohesion: 0 Phi: 32
Description: REINFORCED ZONE Wt: 125 Cohesion: 5000 Phi: 34
Description: SILTY CLAY Wt: 116 Cohesion: 700 Phi: 0
Description: SAND/SILT Wt: 115 Cohesion: 0 Phi: 33
Description: SAND/GRAVEL Wt: 125 Cohesion: 0 Phi: 36
Description: SILTY SAND Wt: 115 Cohesion: 0 Phi: 33
Description: LEAN CLAY Wt: 115 Cohesion: 1000 Phi: 0
Elevation (ft) (x 1000)
(x 1000)
5.065 5.060 5.055 5.050 5.045 5.040 5.035 5.030 5.025 5.020 5.015 5.010 5.005 5.000 4.995 4.990 4.985 4.980
1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30
Distance (ft) (x 1000)

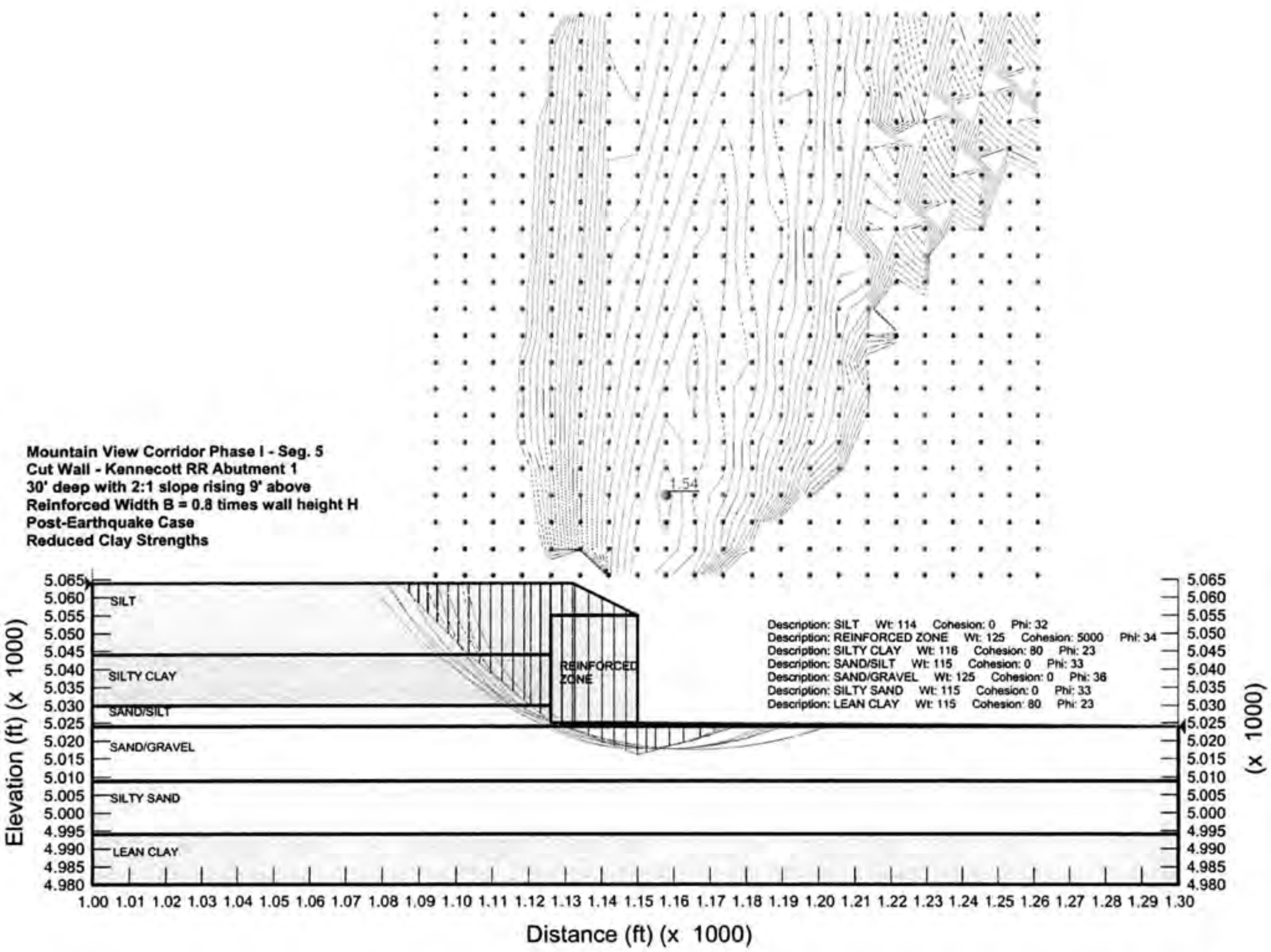

Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 1
30' deep with 2:1 slope rising 9' above
Reinforced Width B = 0.8 times wall height H
Static Case
Long-Term Clay Strengths
1.56
SILT
SILTY CLAY
SAND/SILT
SAND/GRAVEL
SILTY SAND
LEAN CLAY
REINFORCED ZONE
Description: SILT Wt: 114 Cohesion: 0 Phi: 32
Description: REINFORCED ZONE Wt: 125 Cohesion: 5000 Phi: 34
Description: SILTY CLAY Wt: 116 Cohesion: 100 Phi: 28
Description: SAND/SILT Wt: 115 Cohesion: 0 Phi: 33
Description: SAND/GRAVEL Wt: 125 Cohesion: 0 Phi: 36
Description: SILTY SAND Wt: 115 Cohesion: 0 Phi: 33
Description: LEAN CLAY Wt: 115 Cohesion: 100 Phi: 28
Elevation (ft) (x 1000)
(x 1000)
5.065 5.060 5.055 5.050 5.045 5.040 5.035 5.030 5.025 5.020 5.015 5.010 5.005 5.000 4.995 4.990 4.985 4.980
1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30
Distance (ft) (x 1000)

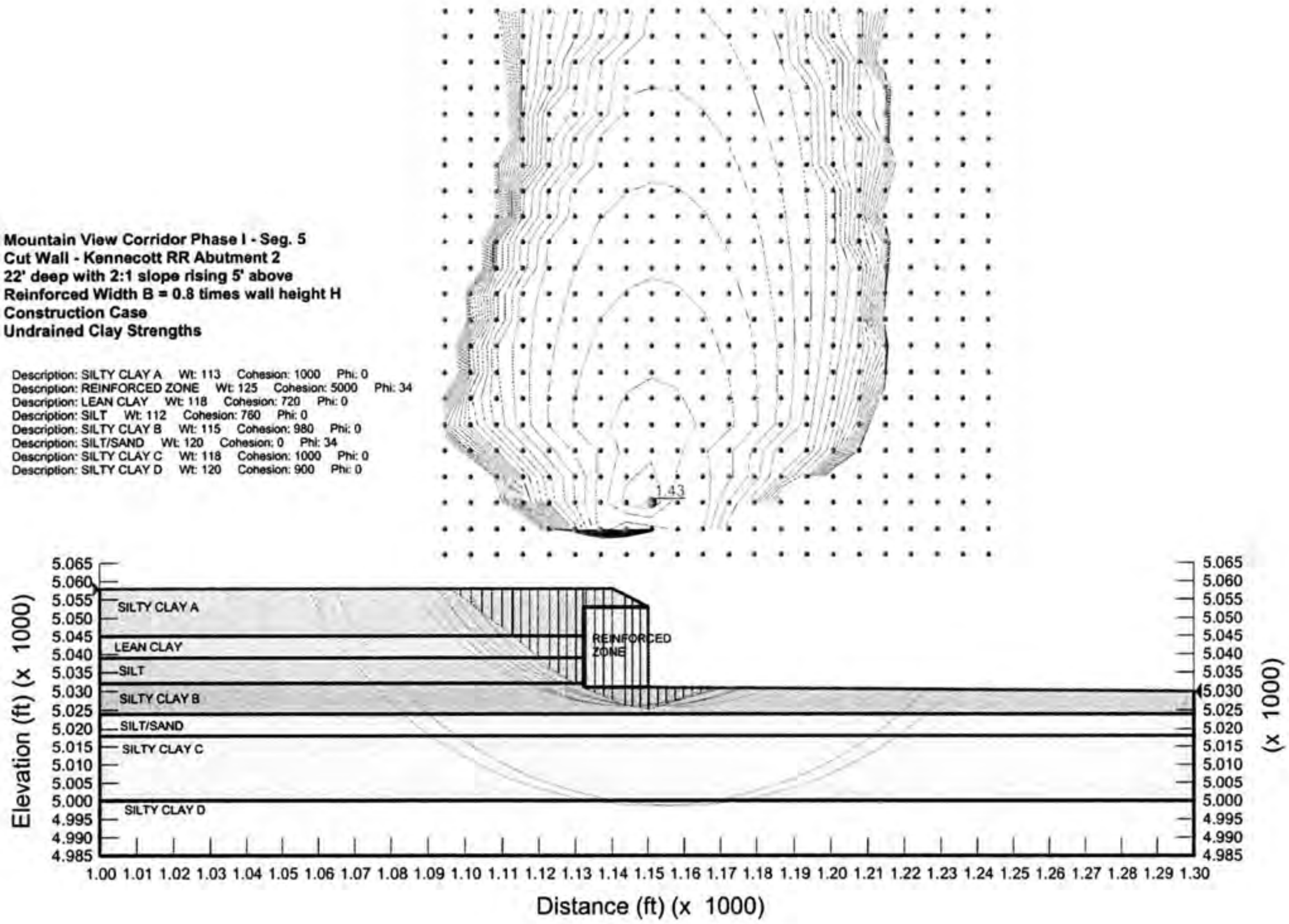
Pseudo-Static k	Factor of Safety
0.1300	1.2988309
0.1400	1.2780617
0.1500	1.2579245
0.1600	1.2383841
0.1700	1.2194070
0.1800	1.2009621
0.1900	1.1882837
0.2000	1.1708447
0.2100	1.1543417
0.2200	1.1382769
0.2300	1.1226250

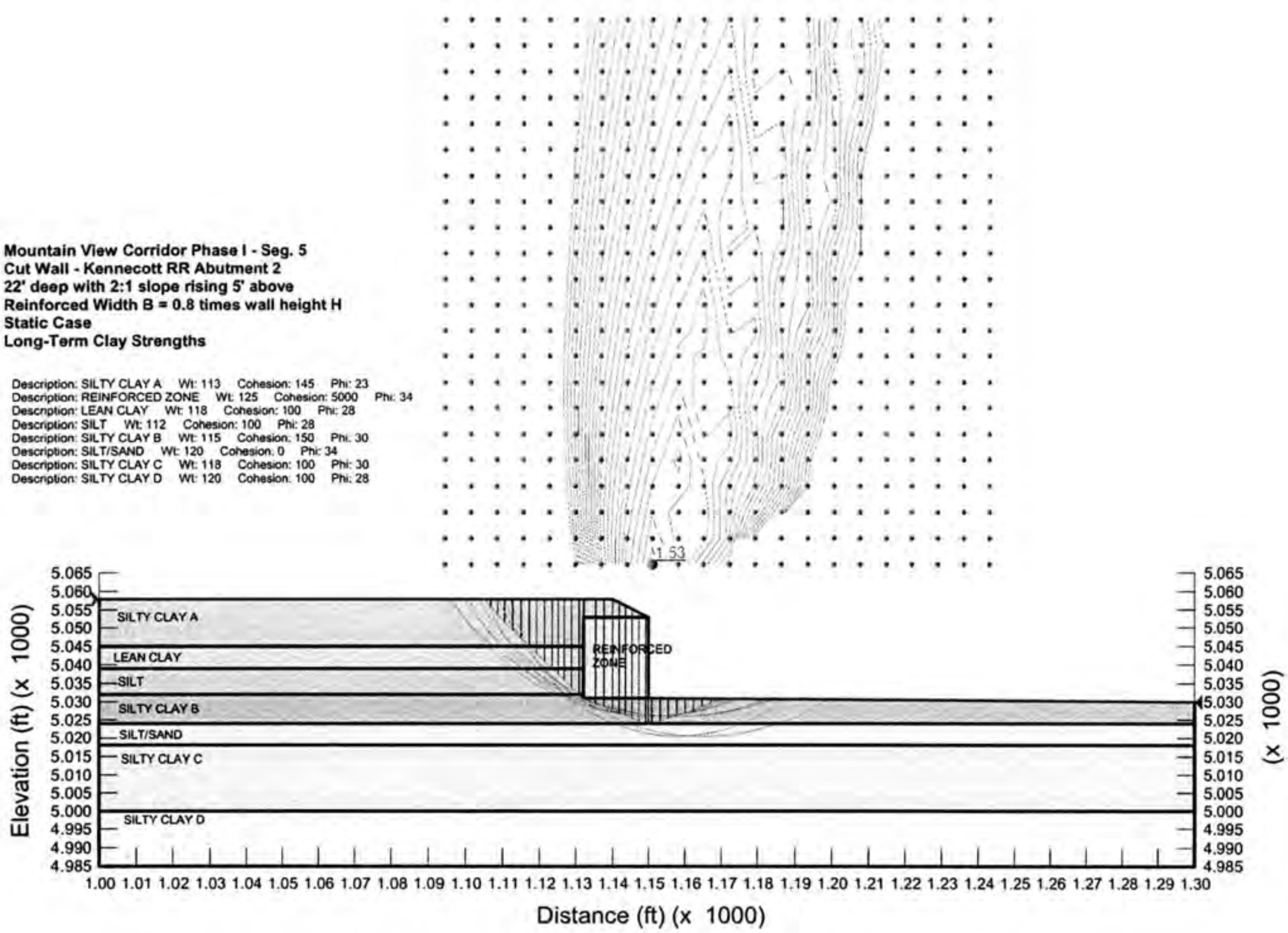
Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 1
30' deep with 2:1 slope rising 9' above
Reinforced Width B = 0.8 times wall height H
Seismic Case
Pseudostatic k = 0.18



Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 1
30' deep with 2:1 slope rising 9' above
Reinforced Width B = 0.8 times wall height H
Post-Earthquake Case
Reduced Clay Strengths



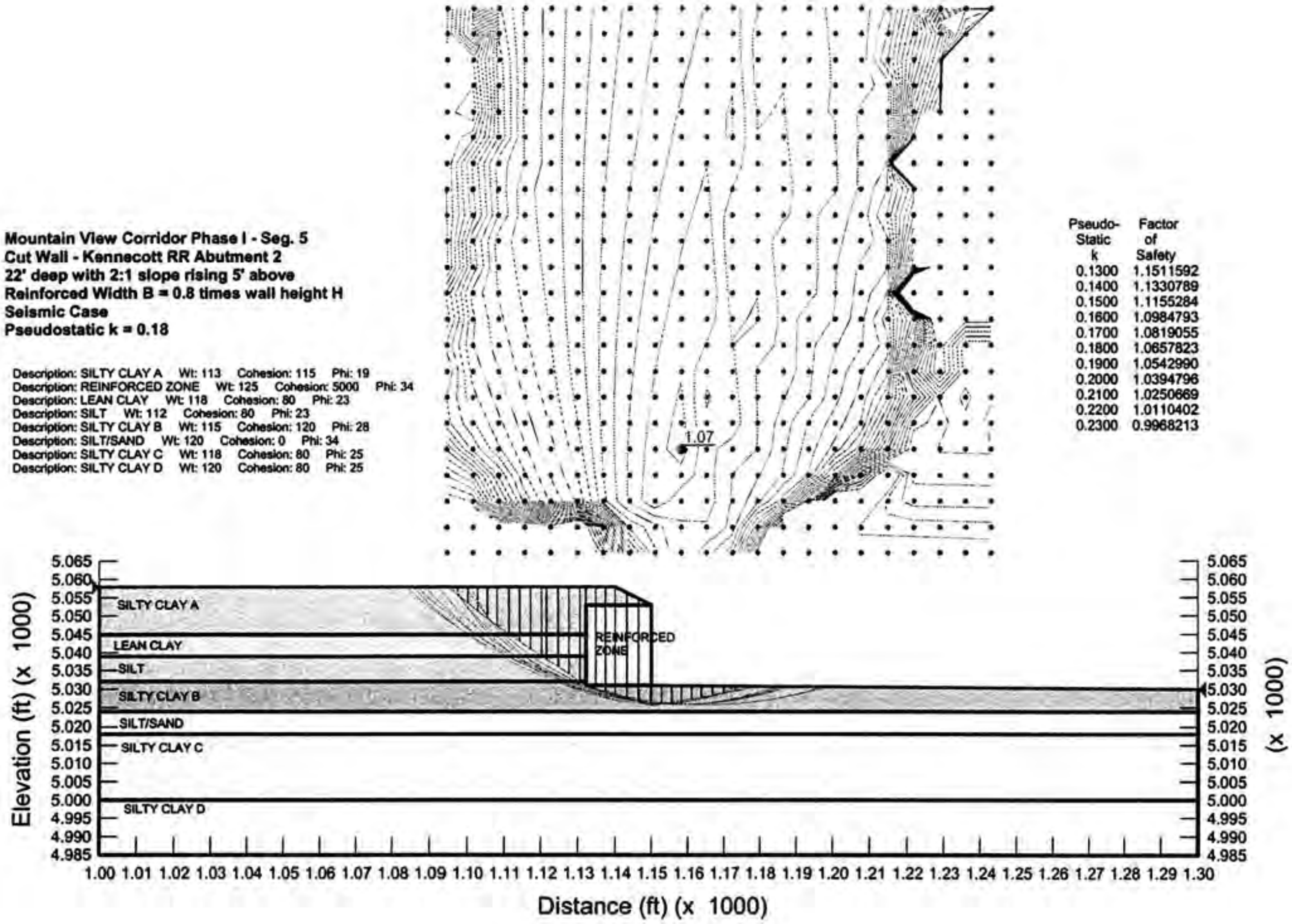

Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 2
22' deep with 2:1 slope rising 5' above
Reinforced Width B = 0.8 times wall height H
Construction Case
Undrained Clay Strengths
Description: SILTY CLAY A Wt: 113 Cohesion: 1000 Phi: 0
Description: REINFORCED ZONE Wt: 125 Cohesion: 5000 Phi: 34
Description: LEAN CLAY Wt: 118 Cohesion: 720 Phi: 0
Description: SILT Wt: 112 Cohesion: 760 Phi: 0
Description: SILTY CLAY B Wt: 115 Cohesion: 980 Phi: 0
Description: SILT/SAND Wt: 120 Cohesion: 0 Phi: 34
Description: SILTY CLAY C Wt: 118 Cohesion: 1000 Phi: 0
Description: SILTY CLAY D Wt: 120 Cohesion: 900 Phi: 0
1.43
SILTY CLAY A
LEAN CLAY
SILT
SILTY CLAY B
SILT/SAND
SILTY CLAY C
SILTY CLAY D
REINFORCED ZONE
Elevation (ft) (x 1000)
(x 1000)
Distance (ft) (x 1000)


Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 2
22' deep with 2:1 slope rising 5' above
Reinforced Width B = 0.8 times wall height H
Static Case
Long-Term Clay Strengths
Description: SILTY CLAY A Wt: 113 Cohesion: 145 Phi: 23
Description: REINFORCED ZONE Wt: 125 Cohesion: 5000 Phi: 34
Description: LEAN CLAY Wt: 118 Cohesion: 100 Phi: 28
Description: SILT Wt: 112 Cohesion: 100 Phi: 28
Description: SILTY CLAY B Wt: 115 Cohesion: 150 Phi: 30
Description: SILT/SAND Wt: 120 Cohesion: 0 Phi: 34
Description: SILTY CLAY C Wt: 118 Cohesion: 100 Phi: 30
Description: SILTY CLAY D Wt: 120 Cohesion: 100 Phi: 28
1.53
SILTY CLAY A
LEAN CLAY
SILT
SILTY CLAY B
SILT/SAND
SILTY CLAY C
SILTY CLAY D
REINFORCED ZONE
Elevation (ft) (x 1000)
(x 1000)
Distance (ft) (x 1000)

Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 2
22' deep with 2:1 slope rising 5' above
Reinforced Width B = 0.8 times wall height H
Seismic Case
Pseudostatic k = 0.18

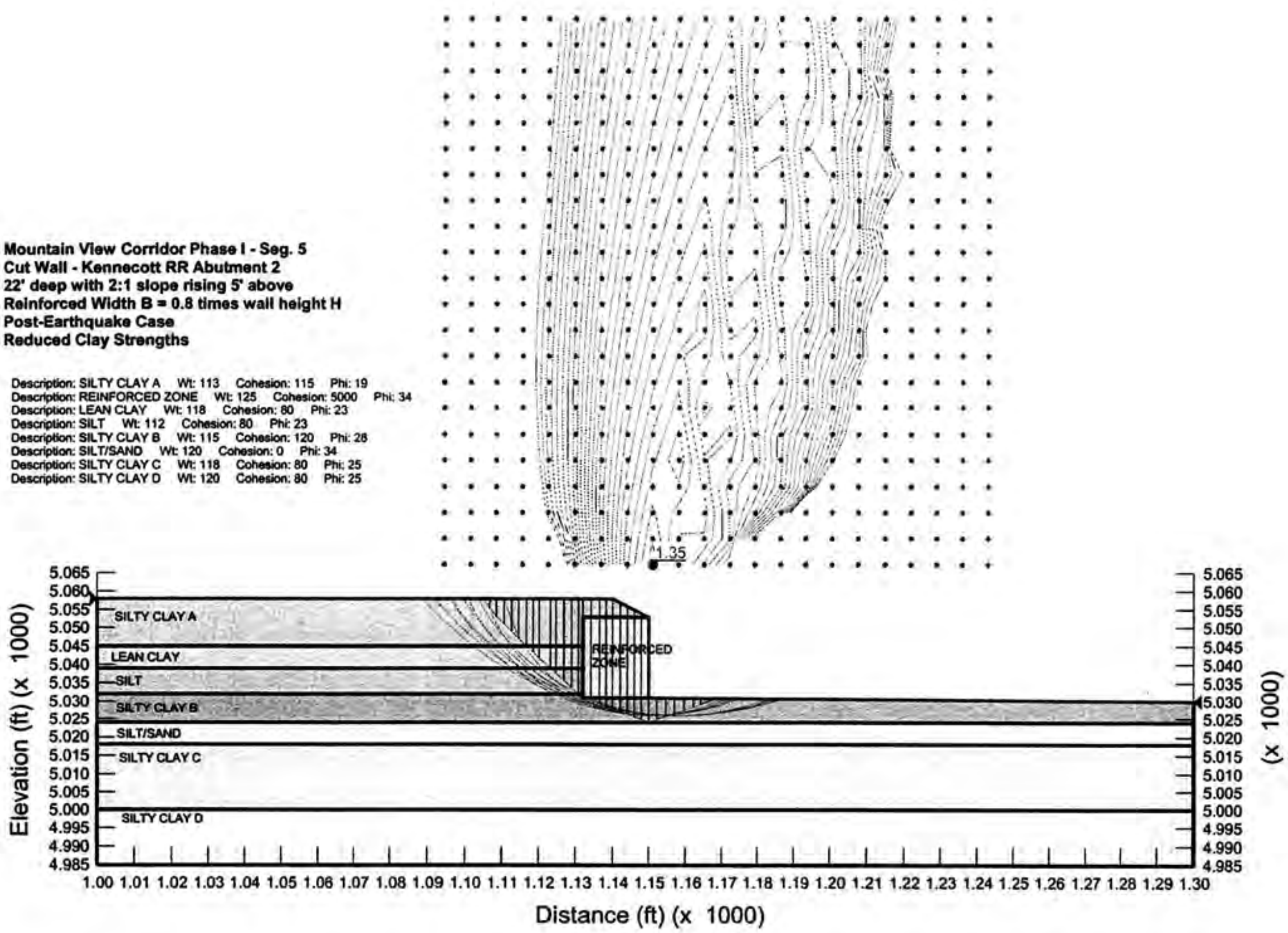
Description: SILTY CLAY A Wt: 113 Cohesion: 115 Phi: 19
Description: REINFORCED ZONE Wt: 125 Cohesion: 5000 Phi: 34
Description: LEAN CLAY Wt: 118 Cohesion: 80 Phi: 23
Description: SILT Wt: 112 Cohesion: 80 Phi: 23
Description: SILTY CLAY B Wt: 115 Cohesion: 120 Phi: 28
Description: SILT/SAND Wt: 120 Cohesion: 0 Phi: 34
Description: SILTY CLAY C Wt: 118 Cohesion: 80 Phi: 25
Description: SILTY CLAY D Wt: 120 Cohesion: 80 Phi: 25

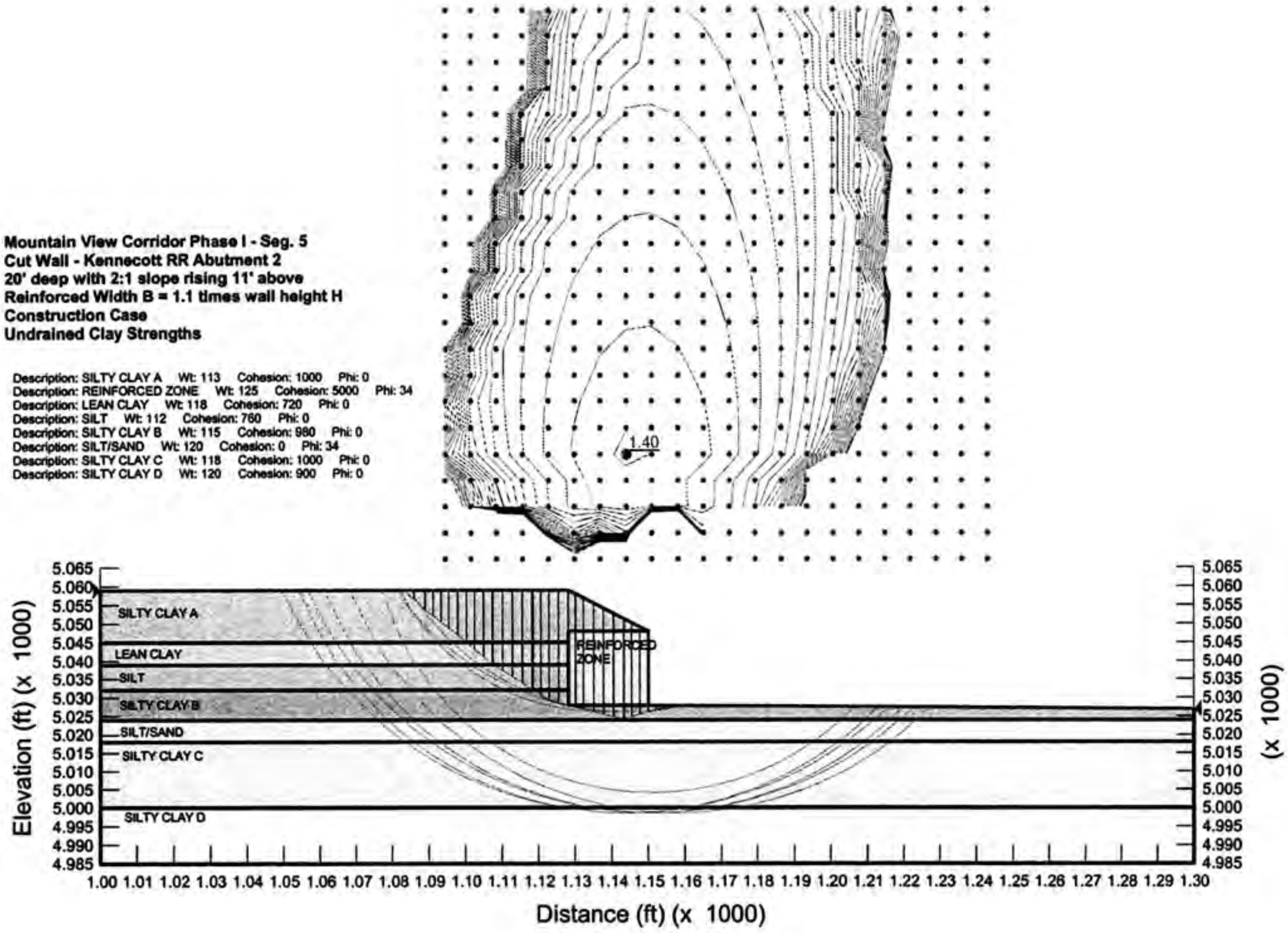
Pseudo-Static k	Factor of Safety
0.1300	1.1511592
0.1400	1.1330789
0.1500	1.1155284
0.1600	1.0984793
0.1700	1.0819055
0.1800	1.0657823
0.1900	1.0542990
0.2000	1.0394796
0.2100	1.0250669
0.2200	1.0110402
0.2300	0.9968213

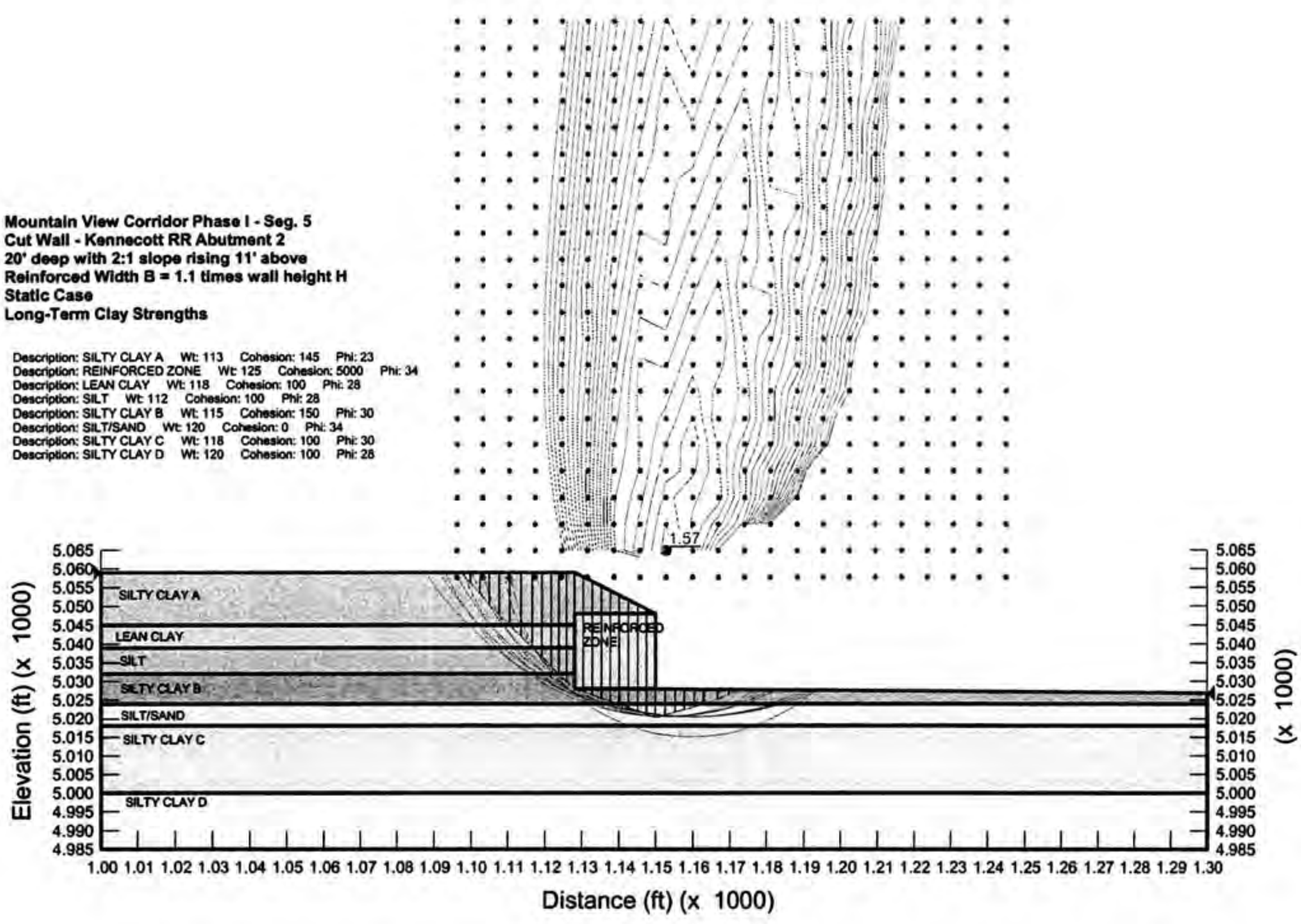


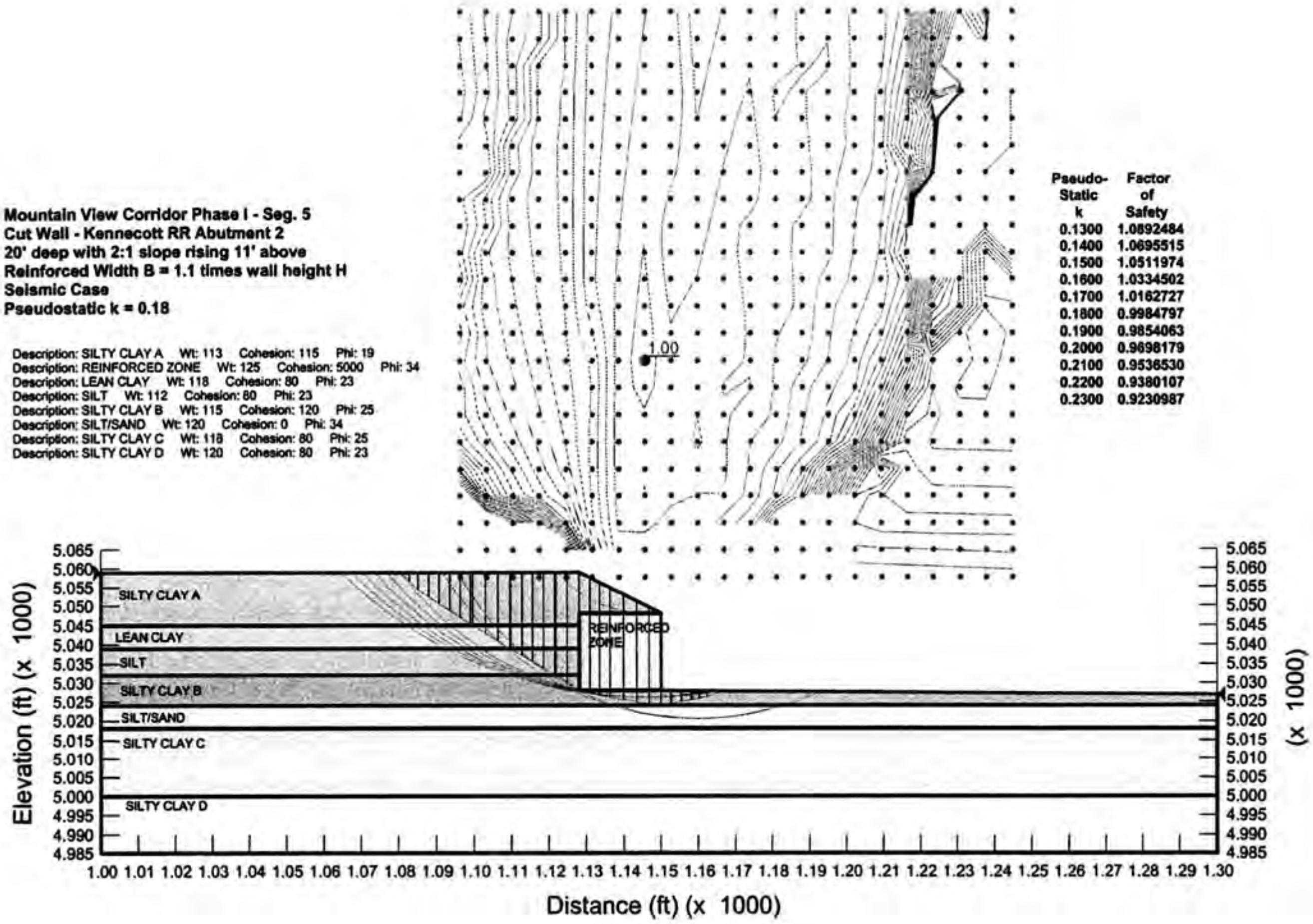
Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 2
22' deep with 2:1 slope rising 5' above
Reinforced Width B = 0.8 times wall height H
Post-Earthquake Case
Reduced Clay Strengths

Description: SILTY CLAY A Wt: 113 Cohesion: 115 Phi: 19
Description: REINFORCED ZONE Wt: 125 Cohesion: 5000 Phi: 34
Description: LEAN CLAY Wt: 118 Cohesion: 80 Phi: 23
Description: SILT Wt: 112 Cohesion: 80 Phi: 23
Description: SILTY CLAY B Wt: 115 Cohesion: 120 Phi: 28
Description: SILT/SAND Wt: 120 Cohesion: 0 Phi: 34
Description: SILTY CLAY C Wt: 118 Cohesion: 80 Phi: 25
Description: SILTY CLAY D Wt: 120 Cohesion: 80 Phi: 25

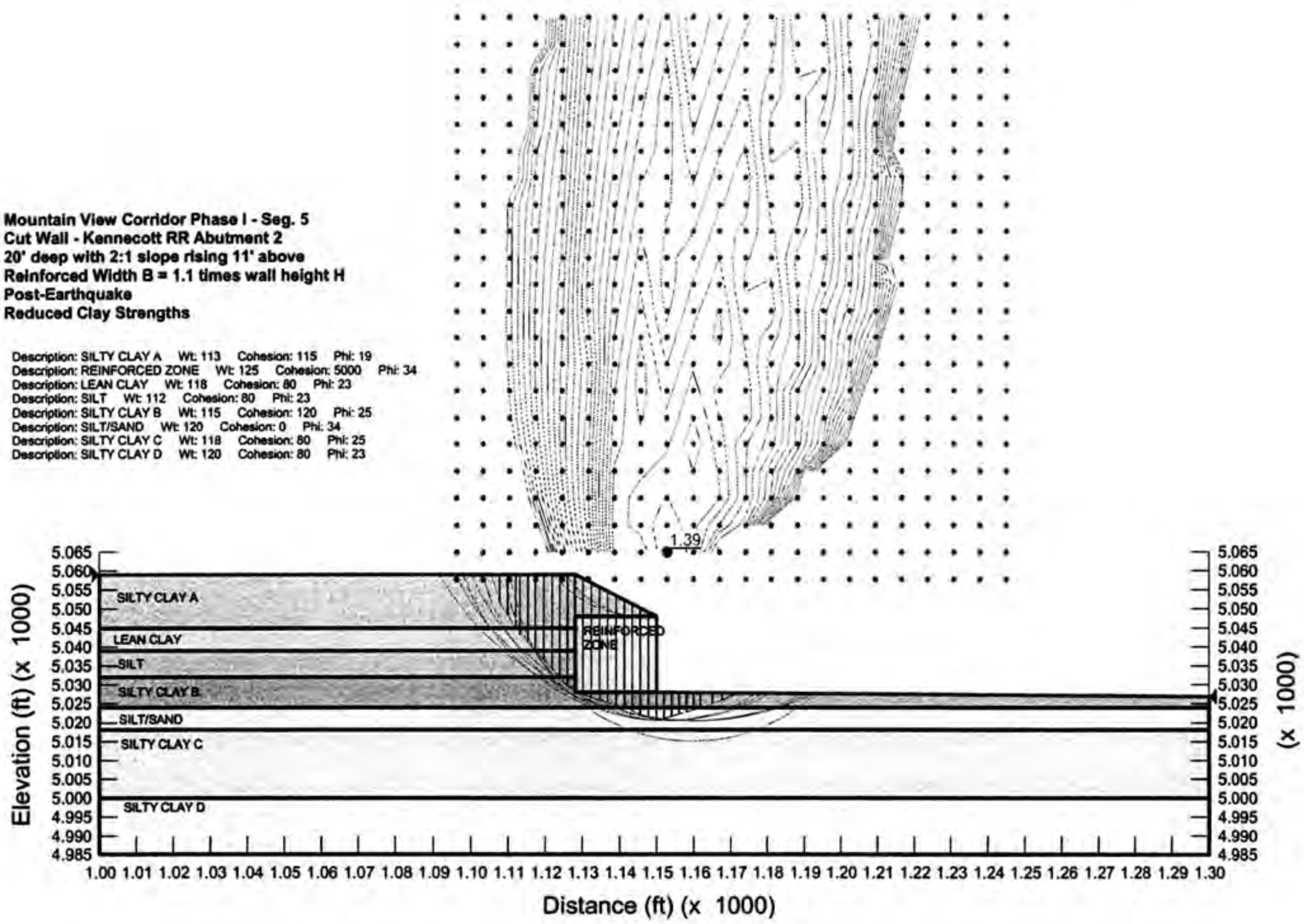


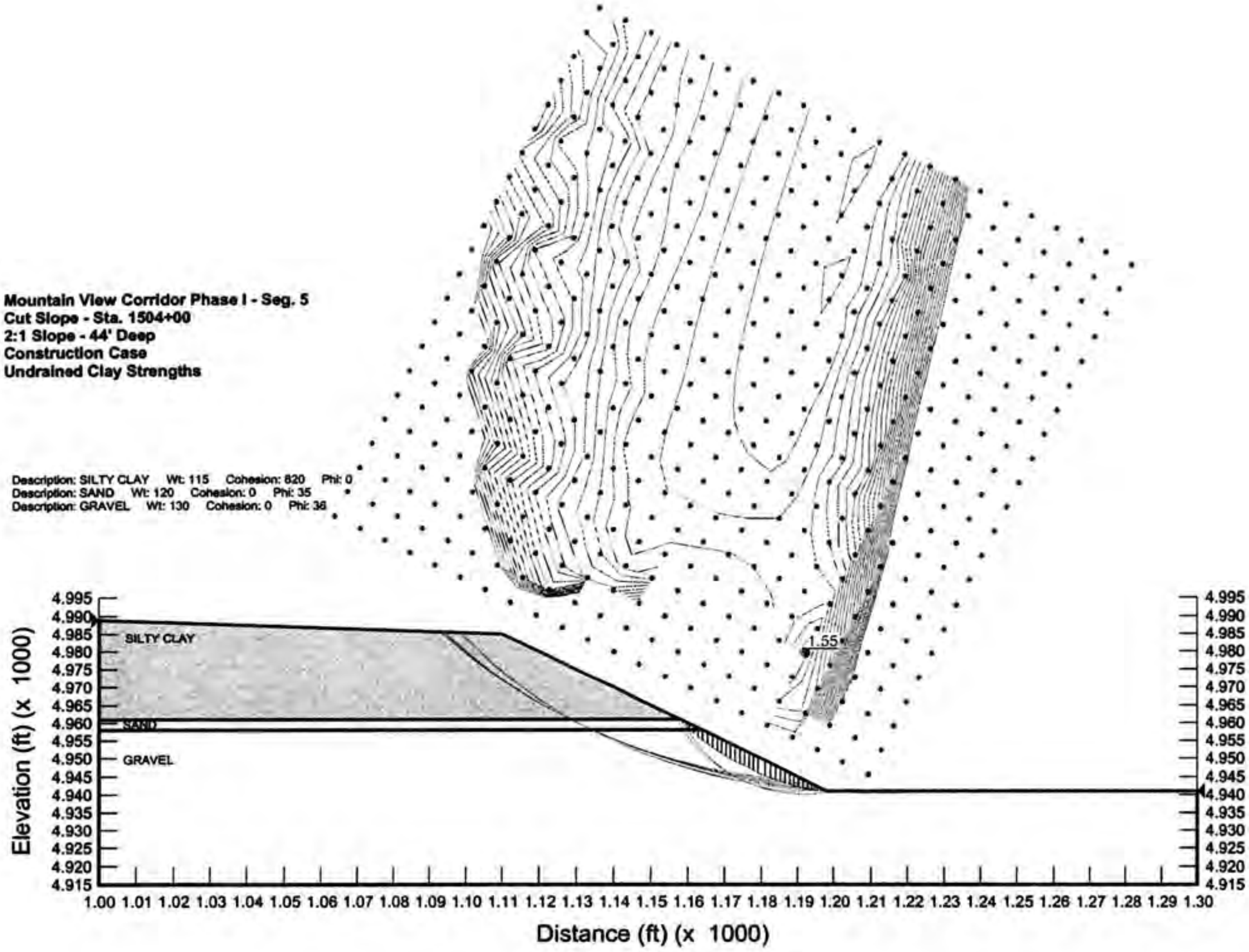

Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 2
20' deep with 2:1 slope rising 11' above
Reinforced Width B = 1.1 times wall height H
Construction Case
Undrained Clay Strengths
Description: SILTY CLAY A Wt: 113 Cohesion: 1000 Phi: 0
Description: REINFORCED ZONE Wt: 125 Cohesion: 5000 Phi: 34
Description: LEAN CLAY Wt: 118 Cohesion: 720 Phi: 0
Description: SILT Wt: 112 Cohesion: 760 Phi: 0
Description: SILTY CLAY B Wt: 115 Cohesion: 980 Phi: 0
Description: SILT/SAND Wt: 120 Cohesion: 0 Phi: 34
Description: SILTY CLAY C Wt: 118 Cohesion: 1000 Phi: 0
Description: SILTY CLAY D Wt: 120 Cohesion: 900 Phi: 0
1.40
SILTY CLAY A
LEAN CLAY
SILT
SILTY CLAY B
SILT/SAND
SILTY CLAY C
SILTY CLAY D
REINFORCED ZONE
Elevation (ft) (x 1000)
(x 1000)
Distance (ft) (x 1000)


Mountain View Corridor Phase I - Seg. 5
Cut Wall - Kennecott RR Abutment 2
20' deep with 2:1 slope rising 11' above
Reinforced Width B = 1.1 times wall height H
Static Case
Long-Term Clay Strengths
Description: SILTY CLAY A Wt: 113 Cohesion: 145 Phi: 23
Description: REINFORCED ZONE Wt: 125 Cohesion: 5000 Phi: 34
Description: LEAN CLAY Wt: 118 Cohesion: 100 Phi: 28
Description: SILT Wt: 112 Cohesion: 100 Phi: 28
Description: SILTY CLAY B Wt: 115 Cohesion: 150 Phi: 30
Description: SILT/SAND Wt: 120 Cohesion: 0 Phi: 34
Description: SILTY CLAY C Wt: 118 Cohesion: 100 Phi: 30
Description: SILTY CLAY D Wt: 120 Cohesion: 100 Phi: 28
1.57
SILTY CLAY A
LEAN CLAY
SILT
SILTY CLAY B
SILT/SAND
SILTY CLAY C
SILTY CLAY D
REINFORCED ZONE
Elevation (ft) (x 1000)
(x 1000)
Distance (ft) (x 1000)

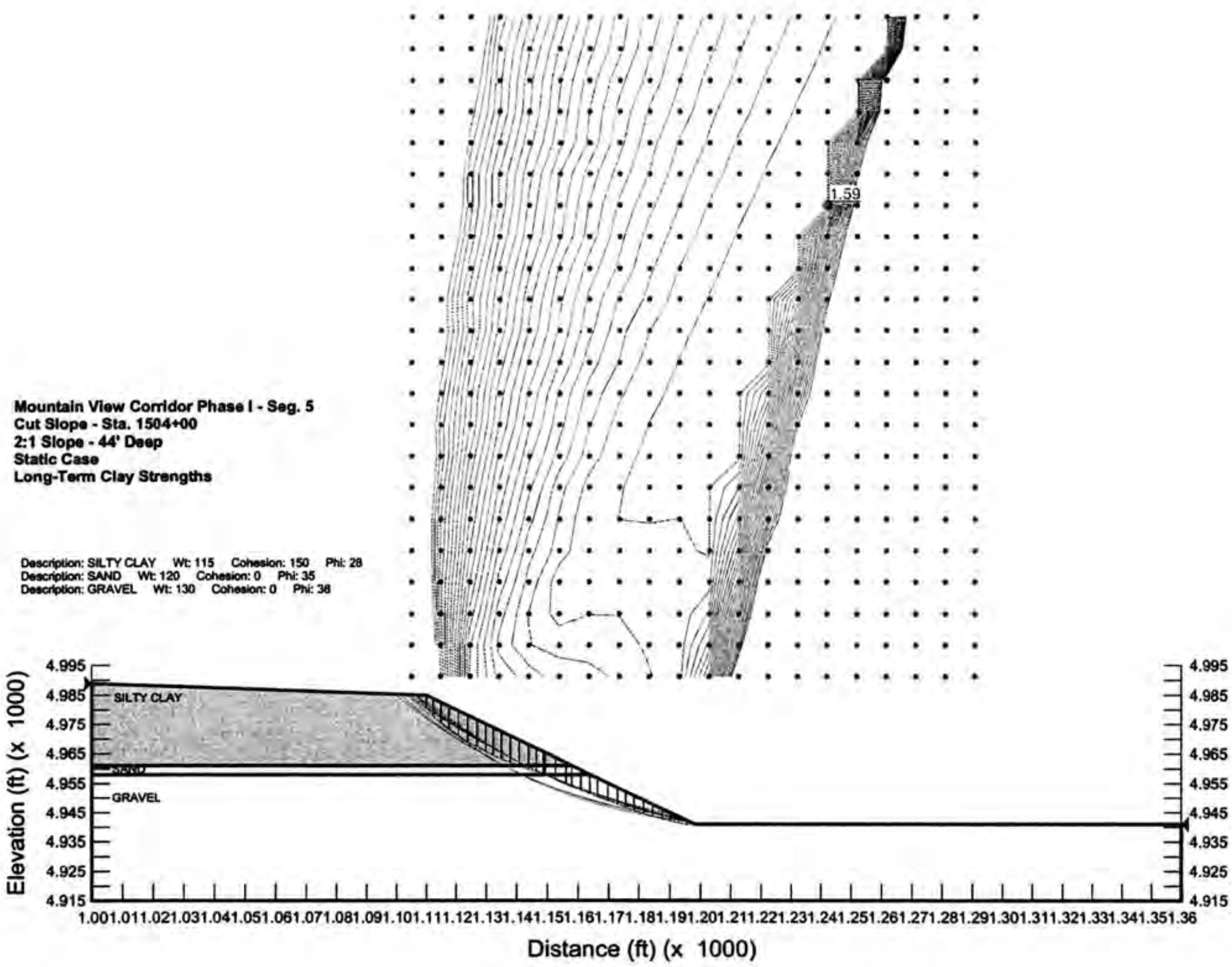


Pseudo-Static k	Factor of Safety
0.1300	1.0892484
0.1400	1.0695515
0.1500	1.0511974
0.1600	1.0334502
0.1700	1.0162727
0.1800	0.9984797
0.1900	0.9854063
0.2000	0.9698179
0.2100	0.9536530
0.2200	0.9380107
0.2300	0.9230987

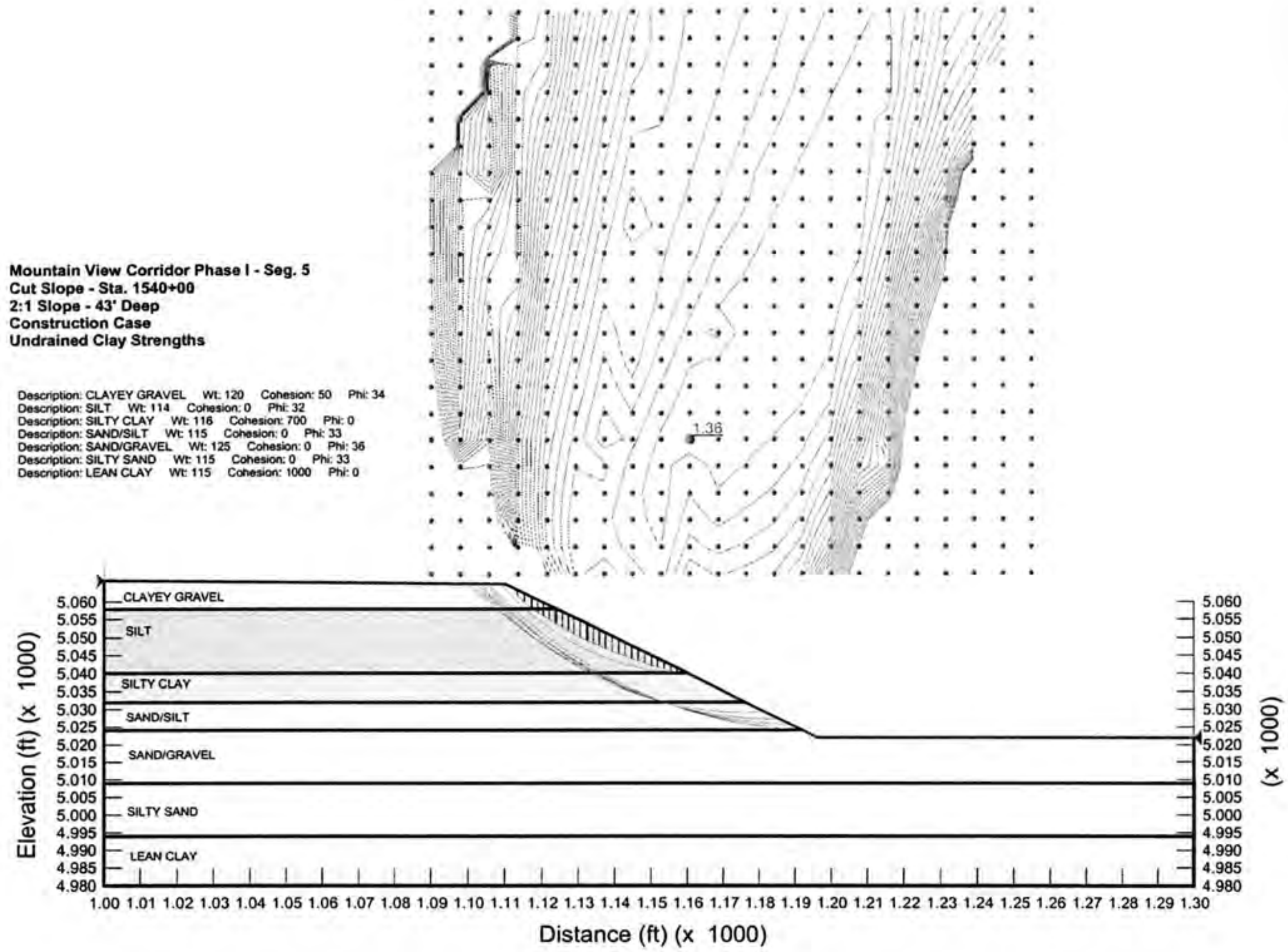




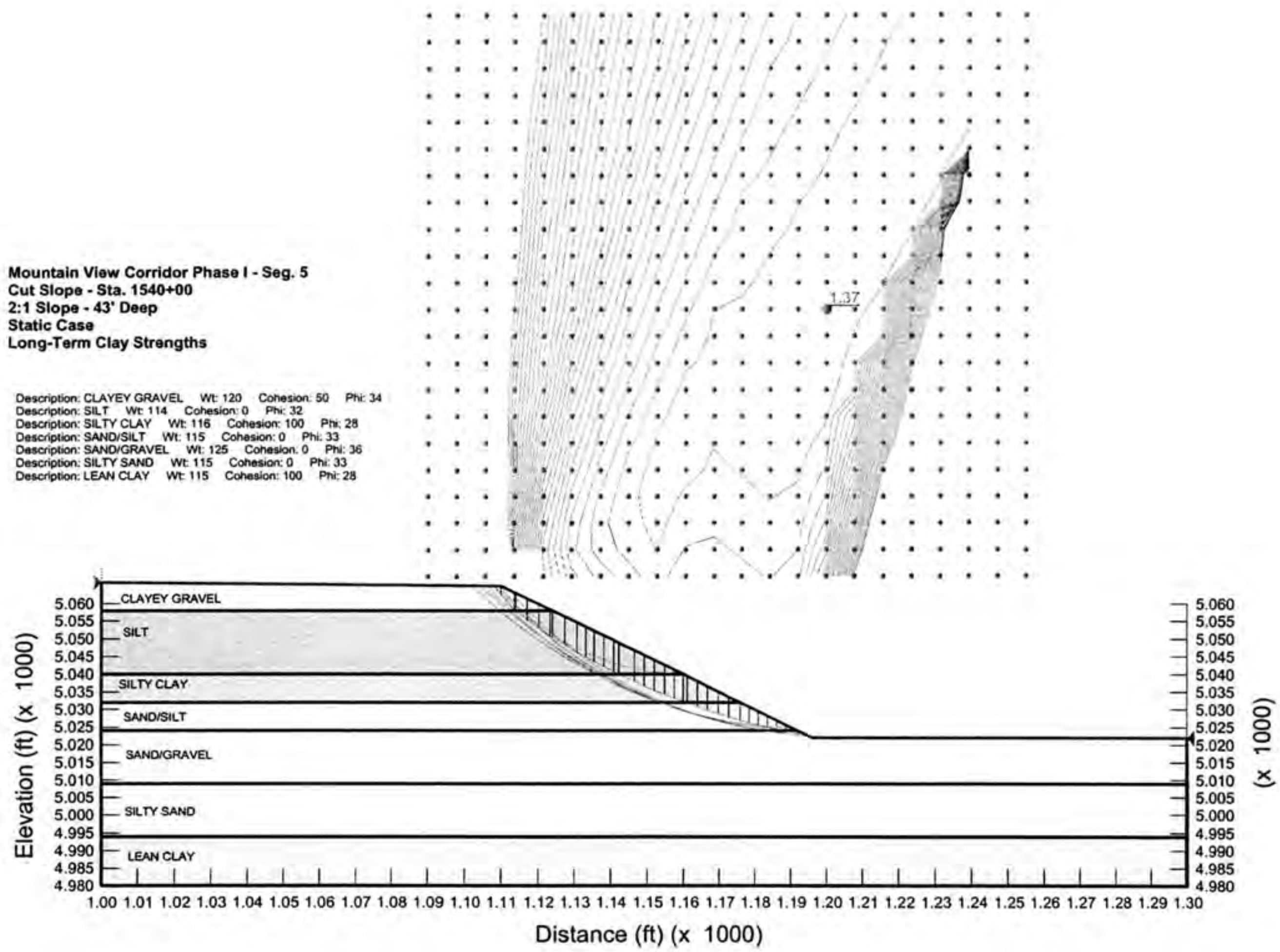
Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1504+00
2:1 Slope - 44' Deep
Construction Case
Undrained Clay Strengths
Description: SILTY CLAY Wt: 115 Cohesion: 820 Phi: 0
Description: SAND Wt: 120 Cohesion: 0 Phi: 35
Description: GRAVEL Wt: 130 Cohesion: 0 Phi: 36
1.55
SILTY CLAY
SAND
GRAVEL
Elevation (ft) (x 1000)
(x 1000)
Distance (ft) (x 1000)



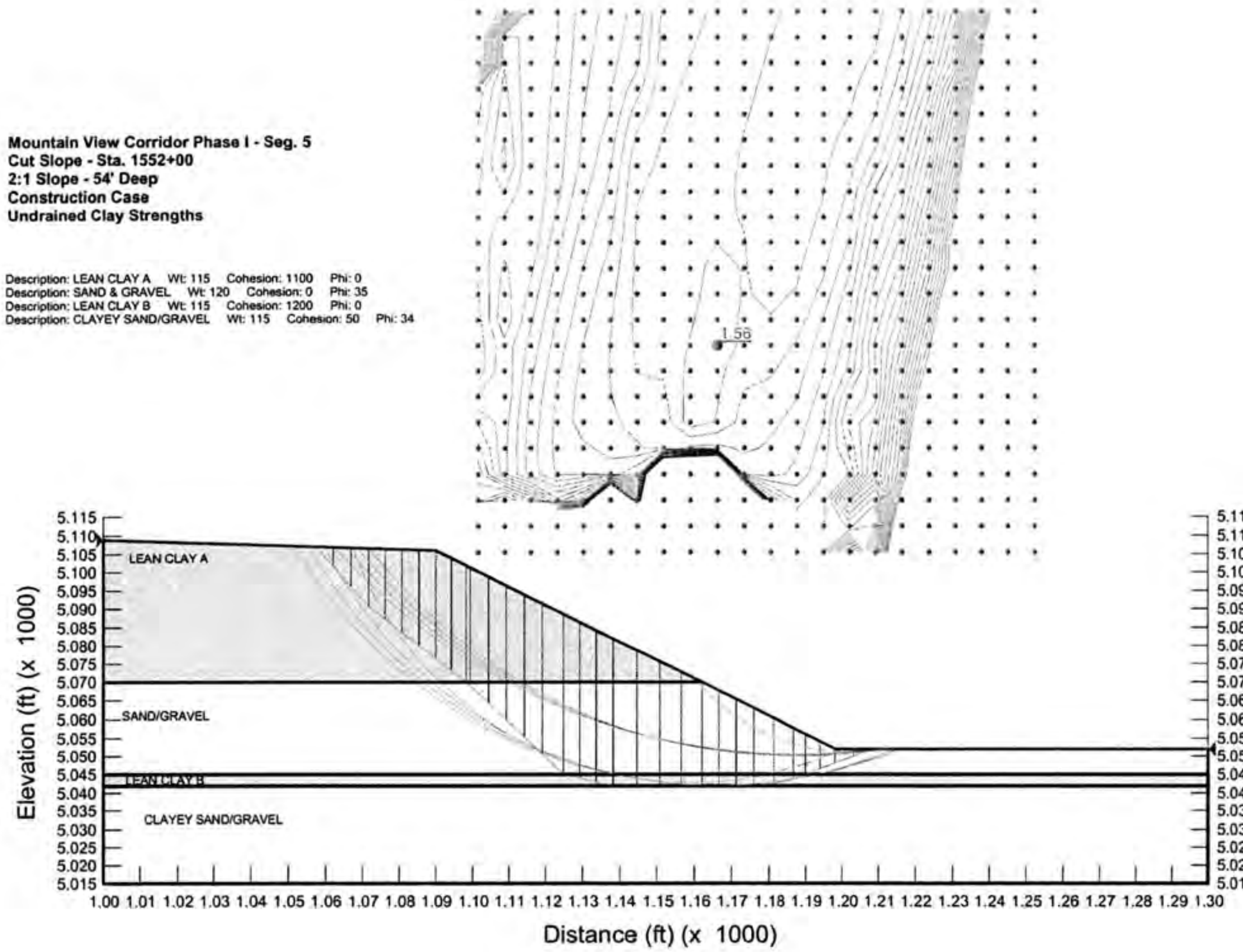
Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1504+00
2:1 Slope - 44' Deep
Static Case
Long-Term Clay Strengths
Description: SILTY CLAY Wt: 115 Cohesion: 150 Phi: 28
Description: SAND Wt: 120 Cohesion: 0 Phi: 35
Description: GRAVEL Wt: 130 Cohesion: 0 Phi: 36
1.59
SILTY CLAY
SAND
GRAVEL
Elevation (ft) (x 1000)
(x 1000)
Distance (ft) (x 1000)



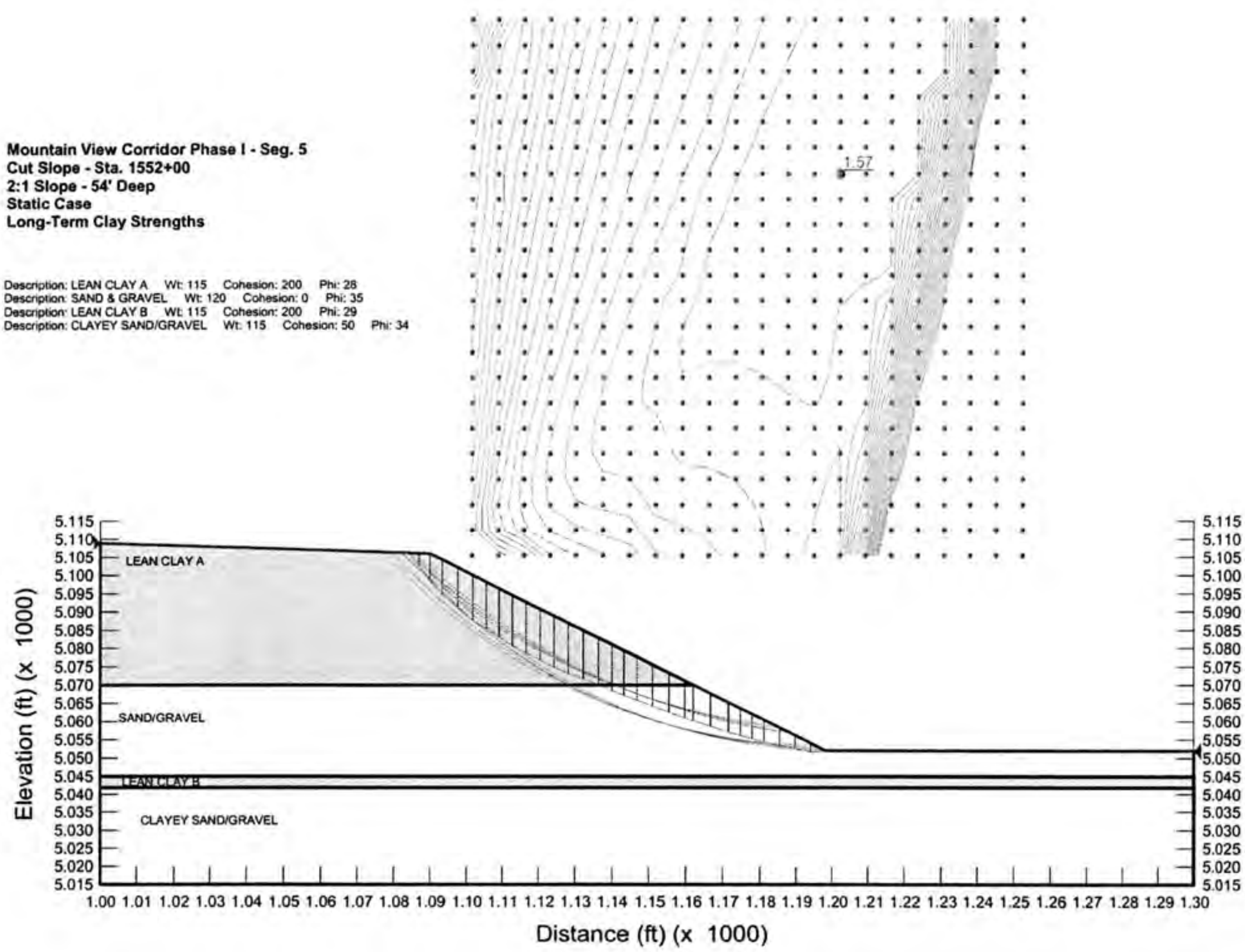
Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1540+00
2:1 Slope - 43' Deep
Construction Case
Undrained Clay Strengths
Description: CLAYEY GRAVEL Wt: 120 Cohesion: 50 Phi: 34
Description: SILT Wt: 114 Cohesion: 0 Phi: 32
Description: SILTY CLAY Wt: 116 Cohesion: 700 Phi: 0
Description: SAND/SILT Wt: 115 Cohesion: 0 Phi: 33
Description: SAND/GRAVEL Wt: 125 Cohesion: 0 Phi: 36
Description: SILTY SAND Wt: 115 Cohesion: 0 Phi: 33
Description: LEAN CLAY Wt: 115 Cohesion: 1000 Phi: 0
1.36
CLAYEY GRAVEL
SILT
SILTY CLAY
SAND/SILT
SAND/GRAVEL
SILTY SAND
LEAN CLAY
Elevation (ft) (x 1000)
5.060 5.055 5.050 5.045 5.040 5.035 5.030 5.025 5.020 5.015 5.010 5.005 5.000 4.995 4.990 4.985 4.980
(x 1000)
1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30
Distance (ft) (x 1000)



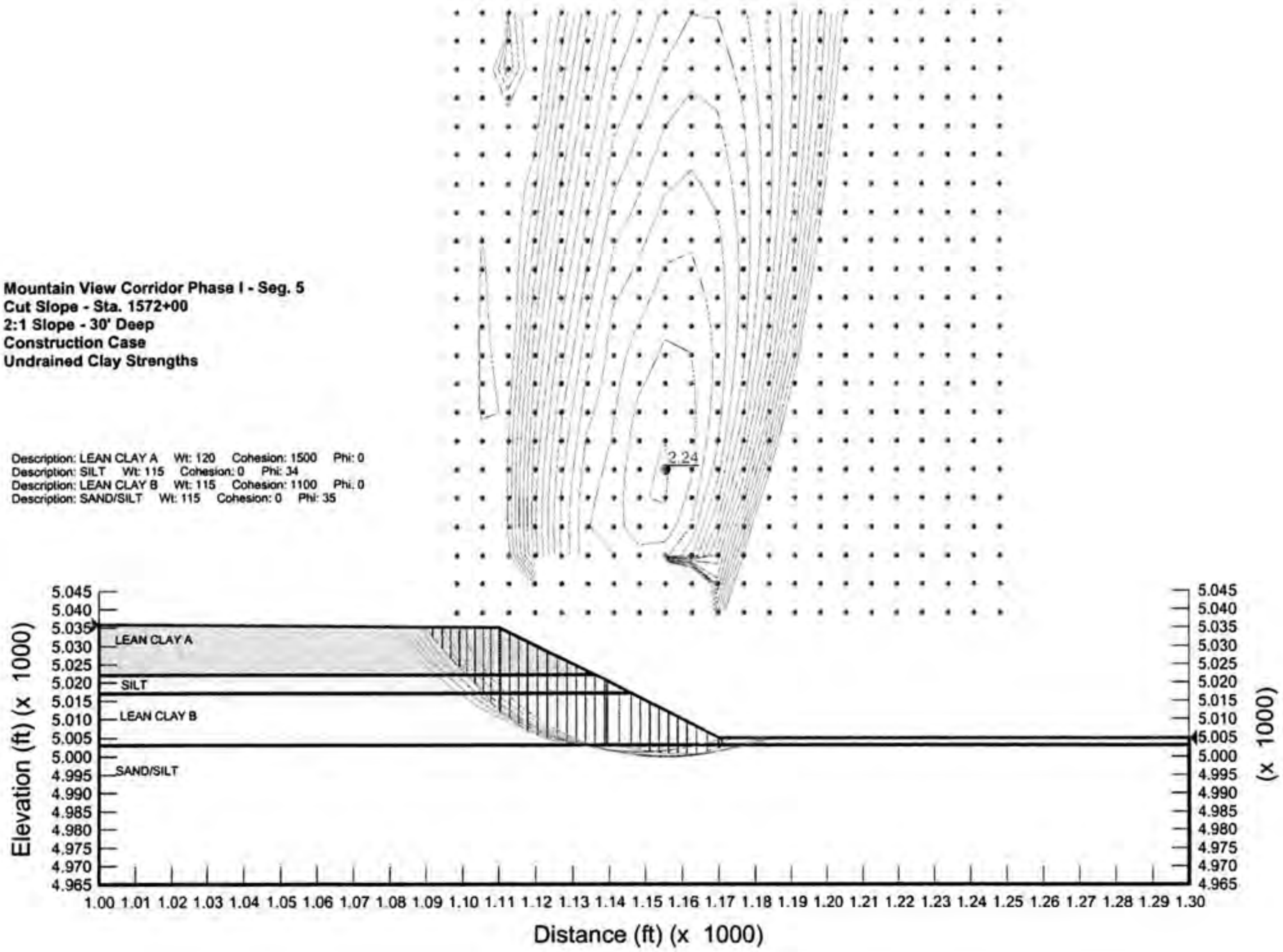
Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1540+00
2:1 Slope - 43' Deep
Static Case
Long-Term Clay Strengths
Description: CLAYEY GRAVEL Wt: 120 Cohesion: 50 Phi: 34
Description: SILT Wt: 114 Cohesion: 0 Phi: 32
Description: SILTY CLAY Wt: 116 Cohesion: 100 Phi: 28
Description: SAND/SILT Wt: 115 Cohesion: 0 Phi: 33
Description: SAND/GRAVEL Wt: 125 Cohesion: 0 Phi: 36
Description: SILTY SAND Wt: 115 Cohesion: 0 Phi: 33
Description: LEAN CLAY Wt: 115 Cohesion: 100 Phi: 28
1.37
CLAYEY GRAVEL
SILT
SILTY CLAY
SAND/SILT
SAND/GRAVEL
SILTY SAND
LEAN CLAY
Elevation (ft) (x 1000)
5.060 5.055 5.050 5.045 5.040 5.035 5.030 5.025 5.020 5.015 5.010 5.005 5.000 4.995 4.990 4.985 4.980
(x 1000)
1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30
Distance (ft) (x 1000)

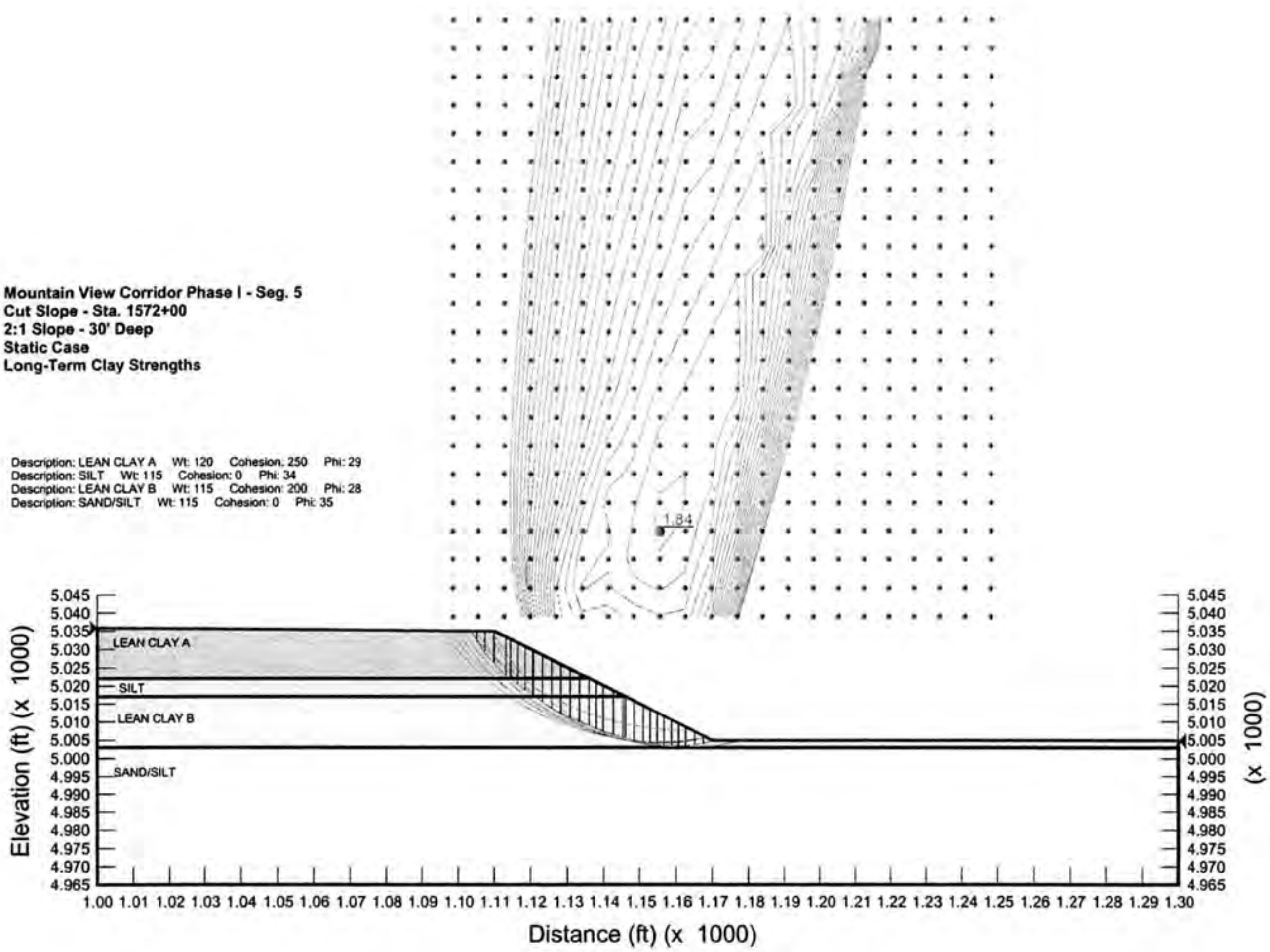


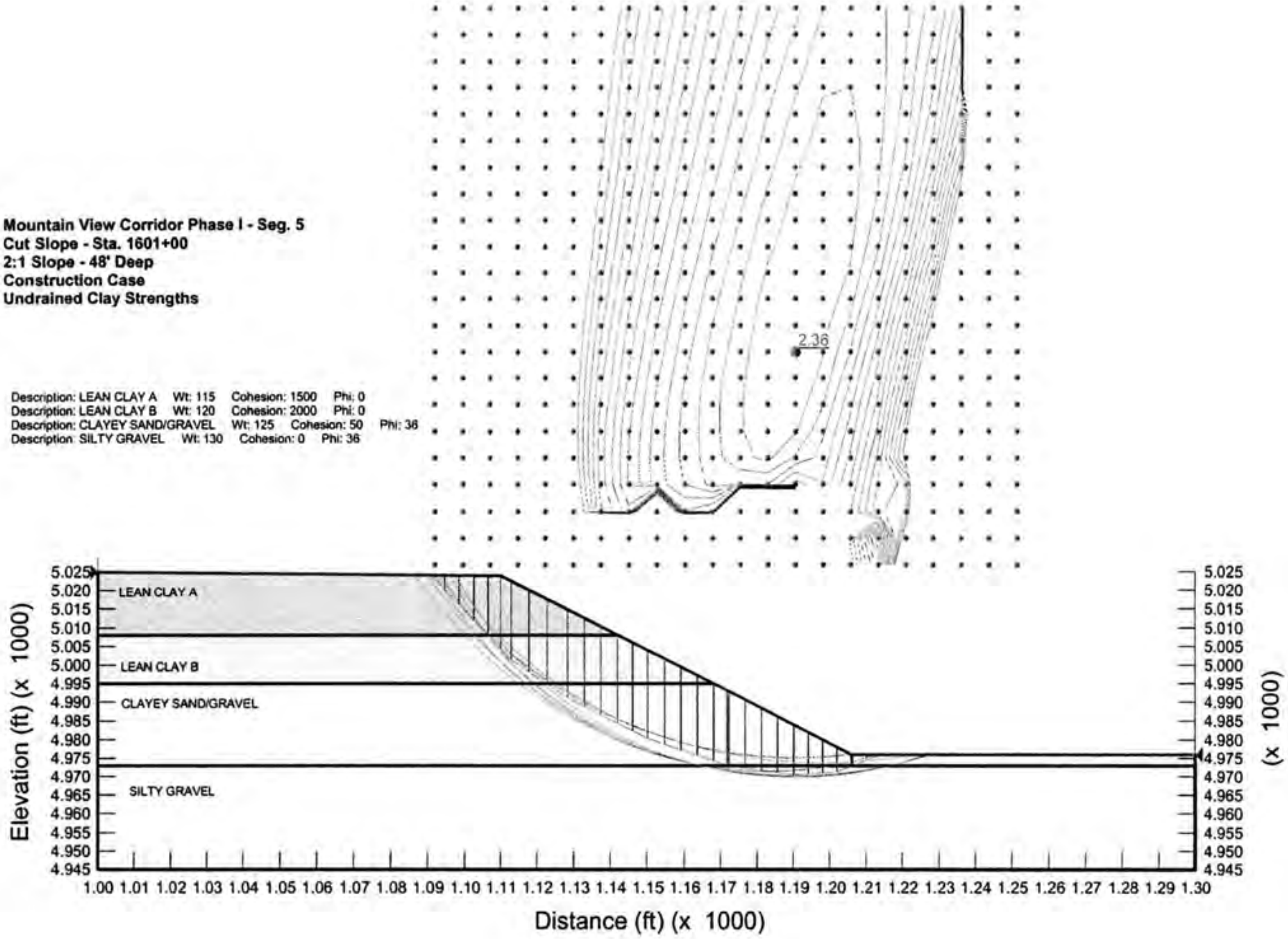
Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1552+00
2:1 Slope - 54' Deep
Construction Case
Undrained Clay Strengths
Description: LEAN CLAY A Wt: 115 Cohesion: 1100 Phi: 0
Description: SAND & GRAVEL Wt: 120 Cohesion: 0 Phi: 35
Description: LEAN CLAY B Wt: 115 Cohesion: 1200 Phi: 0
Description: CLAYEY SAND/GRAVEL Wt: 115 Cohesion: 50 Phi: 34
1.56
LEAN CLAY A
SAND/GRAVEL
LEAN CLAY B
CLAYEY SAND/GRAVEL
Elevation (ft) (x 1000)
(x 1000)
5.115 5.110 5.105 5.100 5.095 5.090 5.085 5.080 5.075 5.070 5.065 5.060 5.055 5.050 5.045 5.040 5.035 5.030 5.025 5.020 5.015
1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30
Distance (ft) (x 1000)

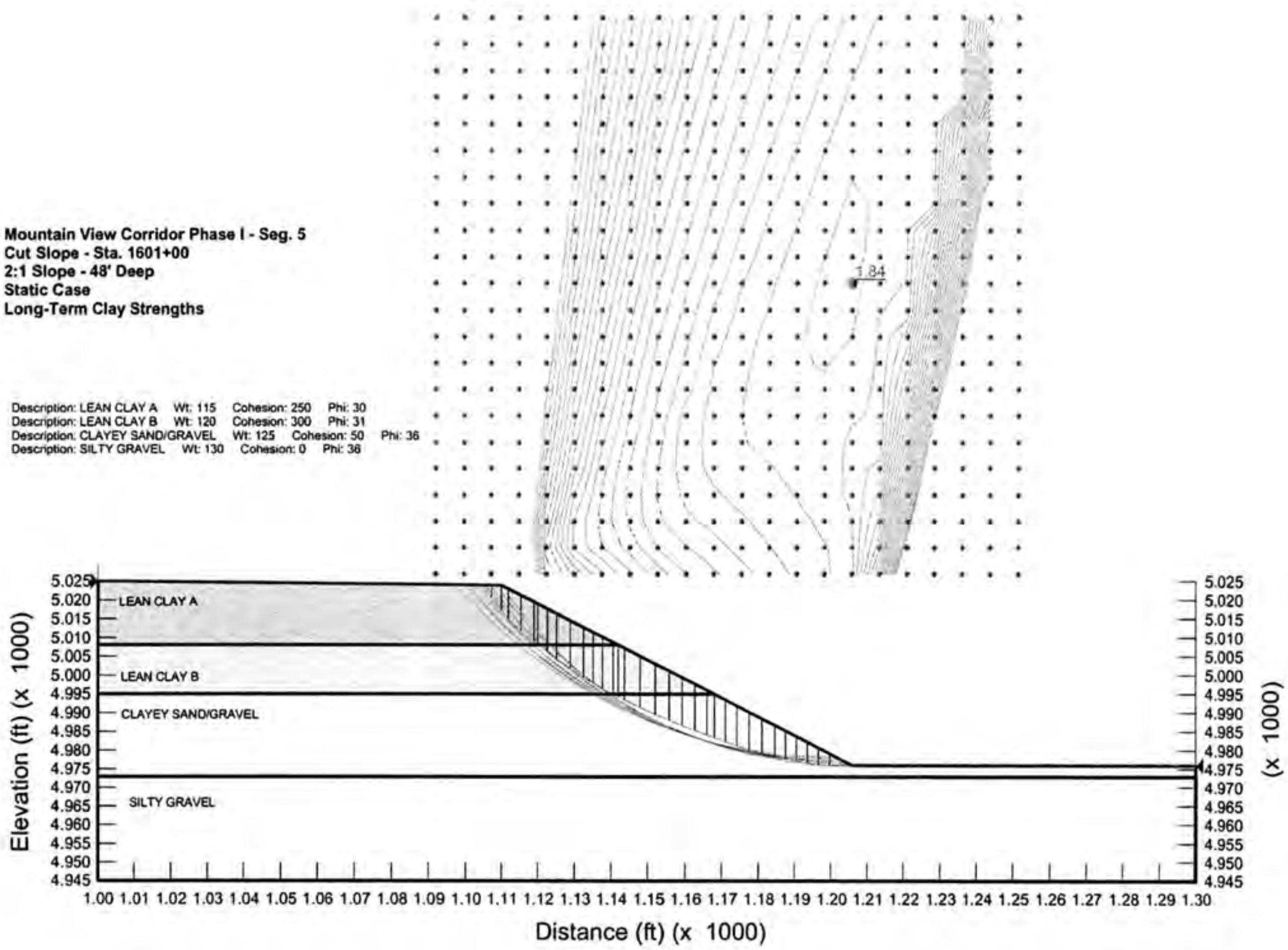


Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1552+00
2:1 Slope - 54' Deep
Static Case
Long-Term Clay Strengths
Description: LEAN CLAY A Wt: 115 Cohesion: 200 Phi: 28
Description: SAND & GRAVEL Wt: 120 Cohesion: 0 Phi: 35
Description: LEAN CLAY B Wt: 115 Cohesion: 200 Phi: 29
Description: CLAYEY SAND/GRAVEL Wt: 115 Cohesion: 50 Phi: 34
1.57
LEAN CLAY A
SAND/GRAVEL
LEAN CLAY B
CLAYEY SAND/GRAVEL
Elevation (ft) (x 1000)
(x 1000)
5.115 5.110 5.105 5.100 5.095 5.090 5.085 5.080 5.075 5.070 5.065 5.060 5.055 5.050 5.045 5.040 5.035 5.030 5.025 5.020 5.015
1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30
Distance (ft) (x 1000)


Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1572+00
2:1 Slope - 30' Deep
Construction Case
Undrained Clay Strengths
Description: LEAN CLAY A Wt: 120 Cohesion: 1500 Phi: 0
Description: SILT Wt: 115 Cohesion: 0 Phi: 34
Description: LEAN CLAY B Wt: 115 Cohesion: 1100 Phi: 0
Description: SAND/SILT Wt: 115 Cohesion: 0 Phi: 35
2.24
LEAN CLAY A
SILT
LEAN CLAY B
SAND/SILT
Elevation (ft) (x 1000)
(x 1000)
5.045
5.040
5.035
5.030
5.025
5.020
5.015
5.010
5.005
5.000
4.995
4.990
4.985
4.980
4.975
4.970
4.965
1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30
Distance (ft) (x 1000)


Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1572+00
2:1 Slope - 30' Deep
Static Case
Long-Term Clay Strengths
Description: LEAN CLAY A Wt: 120 Cohesion: 250 Phi: 29
Description: SILT Wt: 115 Cohesion: 0 Phi: 34
Description: LEAN CLAY B Wt: 115 Cohesion: 200 Phi: 28
Description: SAND/SILT Wt: 115 Cohesion: 0 Phi: 35
1.84
LEAN CLAY A
SILT
LEAN CLAY B
SAND/SILT
Elevation (ft) (x 1000)
(x 1000)
5.045
5.040
5.035
5.030
5.025
5.020
5.015
5.010
5.005
5.000
4.995
4.990
4.985
4.980
4.975
4.970
4.965
1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30
Distance (ft) (x 1000)


Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1601+00
2:1 Slope - 48' Deep
Construction Case
Undrained Clay Strengths
Description: LEAN CLAY A Wt: 115 Cohesion: 1500 Phi: 0
Description: LEAN CLAY B Wt: 120 Cohesion: 2000 Phi: 0
Description: CLAYEY SAND/GRAVEL Wt: 125 Cohesion: 50 Phi: 36
Description: SILTY GRAVEL Wt: 130 Cohesion: 0 Phi: 36
2.36
LEAN CLAY A
LEAN CLAY B
CLAYEY SAND/GRAVEL
SILTY GRAVEL
Elevation (ft) (x 1000)
(x 1000)
Distance (ft) (x 1000)


Mountain View Corridor Phase I - Seg. 5
Cut Slope - Sta. 1601+00
2:1 Slope - 48' Deep
Static Case
Long-Term Clay Strengths
Description: LEAN CLAY A Wt: 115 Cohesion: 250 Phi: 30
Description: LEAN CLAY B Wt: 120 Cohesion: 300 Phi: 31
Description: CLAYEY SAND/GRAVEL Wt: 125 Cohesion: 50 Phi: 36
Description: SILTY GRAVEL Wt: 130 Cohesion: 0 Phi: 36
1.84
LEAN CLAY A
LEAN CLAY B
CLAYEY SAND/GRAVEL
SILTY GRAVEL
Elevation (ft) (x 1000)
(x 1000)
Distance (ft) (x 1000)

Mountain View Corridor - Segment 5

Summary of Lateral Earth Pressure Recommendations

Recommended Soil Parameters

Fill Description	Total Unit Weight (pcf)	Internal Friction Angle (degrees)	Cohesion (psf)
Sandy Gravel (Import)	145	36	0
Silty Sand (Road Ex.)	125	34	0

In the equations listed herein:
γ = effective unit weight of soil
H = height of wall

(1) Active Lateral Earth Force (yielding walls)

$P_A = 0.5K_A\gamma H^2$ (triangular distribution)

$K_A = 0.26$ (imported gravel)

0.28 (silty sand)

(2) Passive Lateral Earth Force (yielding walls)

$P_P = 0.5K_P\gamma H^2$ (triangular distribution)

$K_P = 3.85$ (imported gravel)

3.54 (silty sand)

(3) At-Rest Lateral Earth Force (non-yielding walls)

$P_O = 0.5K_O\gamma H^2$ (triangular distribution)

$K_O = 0.41$ (imported gravel)

0.44 (silty sand)

(4) At-Rest Lateral Earth Force Modified for Compaction (non-yielding walls)

Use if activity of mechanical compaction equipment is anticipated within a distance equal to half the wall height.

General Equations for walls less than about 8 feet high

$P_O^* = 0.5(K_O^*)\gamma H^2$ (triangular distribution)

$K_O^* = 2.8$ for granular fill

Computed based on Sharif et al. (1984) as described in Das (1994)

Walls greater than 8 feet high should be considered on a case-by-case basis.
Pressures listed above may be reduced by limiting size of compaction equipment permitted within a distance equal to half the wall height.

(5) Seismic Lateral Earth Forces (yielding walls)

Site Peak Ground Acceleration $A_s = F_{pga} PGA$

Location	7% PE in 75 Years	3% PE in 75 Years
Kennecott RR over MVC - Site Class D	0.36	0.45
Kennecott RR over MVC - Site Class E	0.36	0.38

PGA = 0.30g for 7% PE in 75 yrs, and *PGA* = 0.42g for 3% PE in 75 yrs.

Equations by Okabe (1926) and Mononobe and Matsuo (1929), referenced in Kramer (1996)

Total Active Thrust

$P_{AE} = 0.5K_{AE}\gamma H^2$

K_{AE} = (see table below)

Dynamic Component

$\Delta P_{AE} = P_{AE} - P_A$

P_A has triangular distribution (resultant at H/3 above base of wall)

ΔP_{AE} acts at about 0.6H above base of wall (same direction as P_A)

(5) Seismic Lateral Earth Forces (continued from previous page)

Total Passive Thrust

$P_{PE} = 0.5K_{PE}\gamma H^2$

K_{PE} = (see table below)

Dynamic Component

$\Delta P_{PE} = P_P - P_{PE}$

P_P has triangular distribution (resultant at H/3 above base of wall)

ΔP_{PE} acts at about 0.6H above base of wall (opposite P_P)

Dynamic Earth Pressure Coefficients (for minimal wall displacement)*

Case	Friction Angle	Acceleration A_s		
		0.36	**0.38**	**0.45**
Active (K_{AE})	**34**	0.48	0.50	0.56
	36	0.45	0.47	0.52
Passive (K_{PE})	**34**	2.95	2.91	2.78
	36	3.24	3.20	3.07

* Assumes $k_h = 0.8A_s$.

*Dynamic Earth Pressure Coefficients (for wall displacement up to 10A inches**)*

Case	Friction Angle	Acceleration A_s		
		0.36	**0.38**	**0.45**
Active (K_{AE})	**34**	0.40	0.40	0.43
	36	0.37	0.37	0.40
Passive (K_{PE})	**34**	3.18	3.16	3.09
	36	3.48	3.46	3.38

** Assumes $k_h = 0.5A_s$. See AASHTO LRFD A11.1.1.2 "Design for Displacement"

(6) Seismic Lateral Earth Pressures (non-yielding walls)

Equations by Wood (1973), referenced in Kramer (1996)

Dynamic Thrust

$\Delta P_{eq} = a_h\gamma H^2$

a_h= Peak Ground Acceleration Coefficient (A_s)

Dynamic Overturning Moment

$\Delta M_{eq} = 0.53a_h\gamma H^3$

Point of Application of Dynamic Thrust

$h_{eq} = \Delta M_{eq}/\Delta P_{eq}$

$\approx 0.53H$

ALL COEFFICIENTS LISTED ABOVE ASSUME NEGLIGIBLE BACKSLOPE ABOVE WALL.

References

Das, B. (1994), "Principles of geotechnical engineering, 3rd edition, PWS Publishing, Boston, MA.
Kramer, S. (1996). "Geotechnical earthquake engineering," Prentice Hall, Upper Saddle River, NJ.
Mononobe, N. and Matsuo, H. (1929). "On the determination of earth pressures during earthquakes," *Proceedings, World Engineering Congress,* 9 p.
Okabe, S. (1926). "General theory of earth pressures," *Journal of the Japan Society of Civil Engineering*, Vol. 12, No. 1.

Segment 5 Detention Basin Borings - Permeability Summary

Pond 1 - Approx. Sta. 1525+00, 320' RT

Boring 09-D5-01
Ground Elev. 4976.0 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	4976.0	4971.0	182	ML
5.0	10.0	4971.0	4966.0	69	ML, CL
10.0	15.0	4966.0	4961.0	62	CL
15.0	20.0	4961.0	4956.0	296	CL

Pond 2 - Approx. Sta. 1556+00, 270' LT

Boring 09-D5-02
Ground Elev. 5023.2 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
14.0	20.0	5009.2	5003.2	31	CL-ML, SM
14.0	25.0	5009.2	4998.2	42	CL-ML, SM, ML
14.0	30.0	5009.2	4993.2	22	CL-ML, SM, ML
14.0	35.0	5009.2	4988.2	15	CL-ML, SM, ML

Boring 09-D5-03
Ground Elev. 5021.6 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
25.0	30.0	4996.6	4991.6	24	SC, SM
25.0	35.0	4996.6	4986.6	36	SM, SC
25.0	40.0	4996.6	4981.6	21	SC, CL

Boring 09-D5-04
Ground Elev. 5014.0 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
5.0	10.0	5009.0	5004.0	156	ML
10.0	15.0	5004.0	4999.0	104	ML, CL-ML
15.0	20.0	4999.0	4994.0	104	CL-ML, CH
20.0	25.0	4994.0	4989.0	69	CH, CL
25.0	30.0	4989.0	4984.0	14	CL

Pond 3 - Approx. Sta. 1578+00, 280' RT

Boring 09-D5-05
Ground Elev. 4987.2 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	4987.2	4982.2	156	GC-GM, SM
5.0	10.0	4982.2	4977.2	104	SM
10.0	15.0	4977.2	4972.2	41	SM
15.0	20.0	4972.2	4967.2	17800	SM, GC
20.0	25.0	4967.2	4962.2	13800	GC, GP-GM

Segment 5 Detention Basin Borings - Permeability Summary

Pond 4 - Approx. Sta. 1628+00, 300' RT

Boring 09-D5-06
Ground Elev. 4947.3 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	5023.2	5018.2	104	CL, GP-GM
5.0	10.0	5018.2	5013.2	27700	GP-GM, CL
10.0	15.0	5013.2	5008.2	24900	GP-GM
15.0	21.5	5008.2	5001.7	7490	CL
20.0	25.0	5003.2	4998.2	2050	CL, SC
25.0	30.0	4998.2	4993.2	9	CL, SC
30.0	35.0	4993.2	4988.2	64	SC, CL
35.0	40.0	4988.2	4983.2	277	CL

Boring 09-D5-07
Ground Elev. 4941.4 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	5021.6	5016.6	311	GC, SP-SM
5.0	10.0	5016.6	5011.6	363	SP-SM
10.0	15.0	5011.6	5006.6	5860	SP-SM
15.0	20.0	5006.6	5001.6	141	CL
20.0	25.0	5001.6	4996.6	265	CL
25.0	30.0	4996.6	4991.6	125	SM, GC-GM
30.0	35.0	4991.6	4986.6	189	GC-GM

Boring 09-D5-08
Ground Elev. 4937.9 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
25.0	30.0	4998.2	4993.2	19	CL
30.0	35.0	4993.2	4988.2	24	CL

Boring 09-D5-09
Ground Elev. 4936.4 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	5021.6	5016.6	156	CL, SM
5.0	10.0	5016.6	5011.6	225	SM
10.0	15.0	5011.6	5006.6	83	SM
15.0	20.0	5006.6	5001.6	52	SM
20.0	25.0	5001.6	4996.6	58	SM, CL
25.0	30.0	4996.6	4991.6	85	CL

Boring 09-D5-10
Ground Elev. 4935.3 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	5023.2	5018.2	91	CL, GP-GM
20.0	25.0	5003.2	4998.2	81	SM, CL
25.0	30.0	4998.2	4993.2	54	SM, CH

Boring 09-D5-11
Ground Elev. 4935.1 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	5021.6	5016.6	207	SM
5.0	10.0	5016.6	5011.6	2210	SM
10.0	15.0	5011.6	5006.6	19900	SM, SP-SM
15.0	20.0	5006.6	5001.6	17800	SP-SM
20.0	25.0	5001.6	4996.6	13800	SP-SM
25.0	30.0	4996.6	4991.6	38	SP-SM, CL

Segment 5 Detention Basin Borings - Permeability Summary

Pond near Sta. 1587+00

Boring 10-D5-12
Ground Elev. 5003.9 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
20.0	25.0	4983.9	4978.9	>16,300*	GP-GM
25.0	30.0	4978.9	4973.9	>13,400*	GP-GM, ML
30.0	35.0	4973.9	4968.9	7.6	ML

Boring 10-D5-13 and 10-D5-13 A
Ground Elev. 5000.0 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
18.0	23.0	4982.0	4977.0	>18,200*	GP-GM, CL
23.0	28.0	4977.0	4972.0	1590	SM, ML
28.0	33.0	4972.0	4967.0	3060	ML, GM
35**	40.0	4965.0	4960.0	131	CL, SM
40**	45.0	4960.0	4955.0	2.9	CL, SM
45**	50.0	4955.0	4950.0	42	CL, CL-ML

*exceeded maximum pump rate of 23 gpm
**testing from 10-D5-13 A drilled approximately 16' south of 10-D5-13 (same surface elevation)

Pond near Sta. 1558+00

Boring 10-D5-14
Ground Elev. 5016.3 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	5016.3	5011.3	311	SM
5.0	10.0	5011.3	5006.3	79	SM, CL
10.0	15.0	5006.3	5001.3	49	CL
15.0	20.0	5001.3	4996.3	21	CL
20.0	25.0	4996.3	4991.3	39	CL
25.0	30.0	4991.3	4986.3	9	CL
30.0	32.0	4986.3	4984.3	15	CL, GC

Boring 10-D5-15
Ground Elev. 5005.2 ft

Depth Interval		Elevation Interval		*k*	USCS Soil
Top (ft)	Btm (ft)	Top (ft)	Btm (ft)	(ft/yr)	Type(s)
0.0	5.0	5005.2	5000.2	1,920	SM, GP-GM
5.0	10.0	5000.2	4995.2	6,770	GP-GM
12.5	15.0	4992.7	4990.2	29	GP-GM, SM
15.0	20.0	4990.2	4985.2	7	SM, CL-ML, CL