RB&G ENGINEERING INC.

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LEGACY PARKWAY

STRUCTURE E-2572

LP OVER MILL CREEK TRAIL

STRUCTURE E-2573

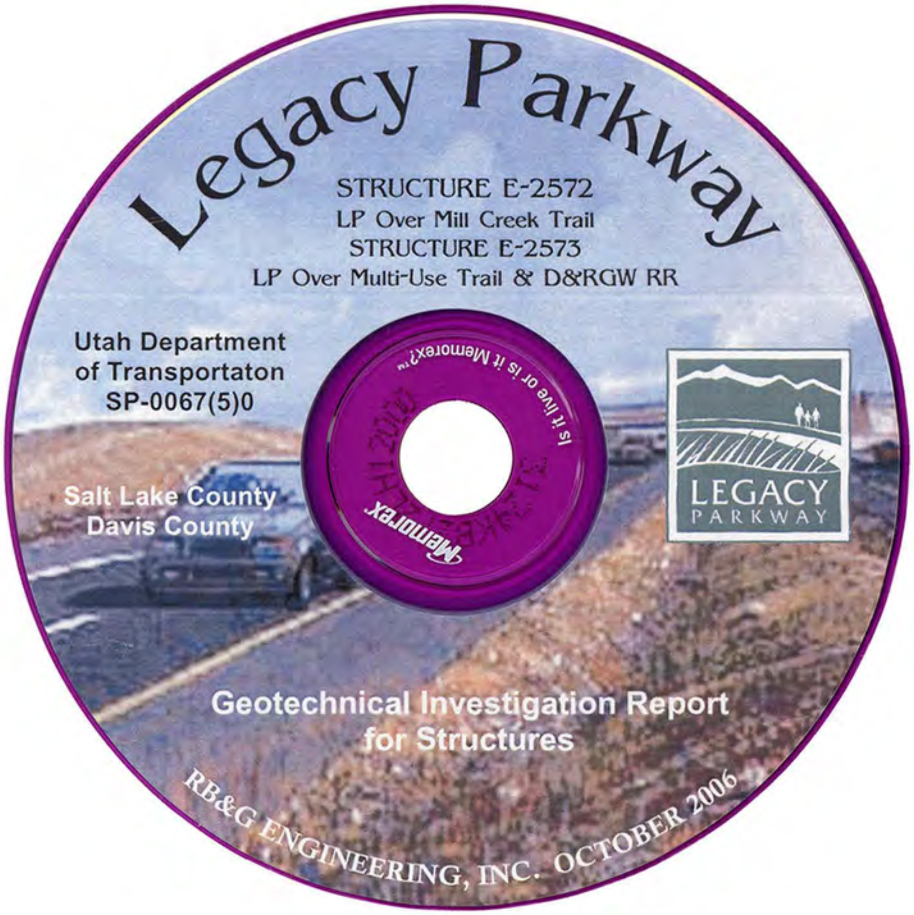
LP OVER MULTI-USE TRAIL & D&RGW RR

Salt Lake & Davis Counties, Utah

Utah Department of Transportation
SP-0067(5)0

October 2006

Geotechnical Investigation Report for Structures



Legacy Parkway

STRUCTURE E-2572
LP Over Mill Creek Trail
STRUCTURE E-2573
LP Over Multi-Use Trail & D&RGW RR

**Utah Department
of Transportaton
SP-0067(5)0**

**Salt Lake County
Davis County**

LEGACY
PARKWAY

Geotechnical Investigation Report for Structures

RB&G ENGINEERING, INC. OCTOBER 2006

RB&G
ENGINEERING
INC.

October 4, 2006

Mr. Sohail Khan
Carter & Burgess
420 East South Temple Suite 342
Salt Lake City, Utah 84111-1321

Reference: Legacy Parkway Project No. SP-0067(5)0

Gentlemen:

A Geotechnical Investigation Report for Structures has been completed for Structures E-2572, LP over Mill Creek Trail and E-2573, LP over Multi-Use Trail & D&RGW RR in Salt Lake and Davis Counties, Utah. The investigation has been conducted in accordance with a proposal submitted to your organization for the work, and the results of the study are summarized in the report transmitted herewith.

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.

Bradford E

Bradford E. Price, P.E.

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Geotechnical Investigation Report for Structures

Legacy Parkway

Structure E-2572

LP over Mill Creek Trail

Structure E-2573

LP over Multi-Use Trail & D&RGW RR

Salt Lake & Davis Counties, Utah

Utah Department of Transportation
SP-0067(5)0

October 2006

RB&G ENGINEERING, INC.

Professional Engineers

LEGACY PARKWAY

UTAH DEPARTMENT OF TRANSPORTATION
SP-0067(5)0

GEOTECHNICAL INVESTIGATION REPORT FOR STRUCTURES

Structure E-2572 – LP over Mill Creek Trail
Structure E-2573 – LP over Multi-Use Trail & D&RGW RR

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LEGACY PARKWAY

UTAH DEPARTMENT OF TRANSPORTATION
SP-0067(5)0

GEOTECHNICAL INVESTIGATION REPORT FOR STRUCTURES

Structure E-2572 – LP over Mill Creek Trail
Structure E-2573 – LP over Multi-Use Trail & D&RGW RR

1.0 GENERAL

This report presents the results of geotechnical investigations and provides foundation recommendations for the following structures located within the Legacy Parkway project:

- E-2572 – Legacy Parkway over Mill Creek Trail
- E-2573 – Legacy Parkway over Multi-Use Trail and D&RGW RR

The primary purpose of this investigation is to determine the characteristics of the subsurface material throughout the project area, and to make appropriate foundation design recommendations for the proposed structures. The report is intended to aid designers in evaluating the site and subsurface conditions for foundation design and potential construction problems.

1.1 PROJECT DESCRIPTION

The Legacy Parkway will be a four-lane, limited-access, divided highway extending approximately 14 miles from Interstate 215 at 2100 North in North Salt Lake, northward to the junction of Interstate 15 and U.S. Highway 89 near Farmington (see Figure 1) . A multiple-use pedestrian, bicycle, and horse trail will parallel the Parkway.

1.1.1 General

The Mill Creek and D&RGW RR underpass sites are both located in Davis County in Segement 2 of the Legacy Parkway project. Segment 2 begins north of 500 South in West Bountiful, and continues north to a point approximately 1800 feet south of Glover's Lane in Farmington. The Mill Creek underpass site is located at Station LP NB 2356+41 (Sta. LP SB 3356+78) on the north side of 1200 North Street at about 1600 West, in West Bountiful City. The D&RGW RR underpass site is located at about Station LP NB 2445+50 (Sta. LP SB 3447+50) near the westerly limits of Centerville City, adjacent to Sheep Road between Center Street and Parrish Lane (400 North). Structures do not presently exist at the Mill Creek and D&RGW sites.

1.1.2 Proposed Improvements

New structures will be built at locations where the Legacy Parkway roadway and trail system will cross existing streets, waterways, and other facilities. At the Mill Creek and D&RGW RR underpass sites, it is anticipated that box-type structures will be constructed to permit passage of the multi-use trail through the Legacy Parkway embankment. At the Mill Creed site, the structure will be oriented in a northwest-southeast direction. The D&RGW structure will run in an approximately north-south direction. Preliminary drawings of the proposed structures are included for reference in Appendix A.

1.1.3 Climatic Conditions

The climate in the project area is characterized by relatively warm summers and cold winters. The frost depth ranges between 20 to 30 inches. Winter snow often requires plowing, and de-icing salt is regularly deposited on major roadways during the winter months.

2.0 PREVIOUS REPORTS AND INVESTIGATIONS

The following geotechnical reports and investigations have been completed previously by others for this project.

2.1 PB/FAK GEOTECHNICAL INVESTIGATION REPORT

UDOT provided copies of the Geotechnical Reports prepared by Parsons Brinckerhoff Quade & Douglas (PB) for Fluor Ames Kraemer (FAK), LLC as a part of the Design-Build Legacy Parkway Project. The report includes the results of subsurface investigations performed by Kleinfelder, Inc. and provides geotechnical recommendations for the structures contemplated in the original project. It should be noted that the project was divided into five segments for the Design-Build Project. Segment 2 of the Design Build project was to begin about 1000 feet north of Center Street (North Salt Lake) and continue in a northwesterly direction to the vicinity of the Bountiful City landfill. Segment 3 was to begin at the north end of Segment 2 and continue north to about Lund Lane at the border between Centerville and Farmington.

It is our understanding that a structure was initially planned at the D&RGW crossing location during early phases of the Design-Build work, but was later eliminated from the Design-Build project. Before the structure was eliminated, subsurface investigations were completed at the site, and the test hole logs are contained in the PB/FAK Segement 3 Geotechnical Report. No Design-Build test holes were located within about 500 feet of the Mill Creek site.

2.2 KLEINFELDER GEOTECHNICAL INVESTIGATION

It is our understanding the Kleinfelder, Inc. conducted an investigation of the preferred Legacy Parkway alignment for UDOT and the results were submitted in a report dated June 2, 2000. Some of its findings were reproduced in the PB/FAK Design Build reports referenced in Section 2.1 above.

2.3 DAMES & MOORE PRELIMINARY GEOTECHNICAL STUDY

It is our understanding that Dames & Moore completed a geotechnical study for the proposed preliminary Legacy Parkway corridor and presented the results in a 1998 report.

3.0 EXISTING FACILITIES

No buildings presently exist at the Mill Creek underpass site. Bountiful's 1200 North Street is a minor paved roadway that runs in an east-west direction within about 100 to 250 feet south of the proposed structure location. The roadway is underlain by several feet of embankment fill in the area. The nearest buildings are a line of several homes, beginning about 650 feet west of the site along the north side of 1200 North Street. A sewage treatment plant operated by South Davis Sewer is located approximately ¼ mile west of the site. Bountiful Pond is located about 700 feet north of the Mill Creek site. Mill Creek is a small creek flowing in a generally south-to-north direction through the area.

The anticipated D&RGW structure location is presently occupied by the old railroad bed running in a north-south direction along the westerly edge of Centerville. Sheep Road is an unpaved road that parallels the D&RGW line about 60 feet west of the railroad bed. It is our understanding that this road will be realigned to accommodate Legacy Parkway in this area. A power substation is located approximately 400 feet west of the proposed underpass structure, and various overhead power lines run were observed in the area. Some commercial/industrial buildings were also observed about 300 to 400 feet west of the site at the time of the field investigations.

Various buried utility lines are known to exist in the vicinity of the proposed structures, including sewer, water, natural gas, oil/petroleum, and possibly some communications lines.

4.0 FINDINGS

4.1 EXISTING SITE CONDITIONS

The topography is relatively flat throughout Segment 2 and generally slopes down to the west toward the Great Salt Lake. The proposed Legacy Parkway corridor begins just west of the existing I-215 / Redwood Road interchange on the south and continues northward. The southerly portion of the corridor travels along the westerly limits of North Salt Lake, Woods Cross, West Bountiful, and Centerville, about 0.5 to 2 miles west of I-15. North of Parrish Lane in Centerville, the Parkway corridor will be located less than about 0.25 miles west of I-15, with the two corridors essentially parallel continuing north to the I-15 / US-89 interchange in Farmington. The south and north interchanges are already partially constructed. A few industrial and commercial facilities are located along the alignment.

The Mill Creek site is relatively flat, with the natural terrain sloping gently to the northwest. At the Mill Creek site, 1200 North Street is on embankment fill and is elevated about 5 to 7 feet above the surrounding properties. Some trees and brush line Mill Creek, and scattered trees were observed along the roadway. The Mill Creek structure will be located in an area vegetated by weeds, wild grass, and sparse brush at the time of the field investigations.

The natural topography at the D&RGW site is also flat, with a gentle slope to the northwest. The railroad bed is raised about 5 to 6 feet above the surrounding ground. At the time of the field investigations, vegetations along the sides of the railroad bed consisted of wild grass and weeds, with some low brush and occasional trees.

4.2 SURFACE DRAINAGE

Surface drainage in the area generally follows the topography to the west and northwest toward the Great Salt Lake. In addition to the Jordan River and Oil Drain at the south interchange, some creeks, streams, and canals (including Mill Creek) cross the alignment at various locations, creating the potential for flooding. At some locations within Segment 2, the existing ground is covered by water during at least part of the year, creating difficult access conditions. The location of the Mill Creek structure was particularly wet and soft at the time of drilling, as were the low-lying areas adjacent to the railroad fill at the D&RGW site.

4.3 GEOLOGY

The project is located within the Wasatch Front section of the Basin and Range physiographic region. The Wasatch Front consists of a series of down dropped valleys bounded primarily by the Wasatch Mountains on the east and the Great Salt Lake, Utah Lake and the Oquirrh Mountains on the west. The area extends from Juab County in the south up through Salt Lake, Davis, Weber and Box Elder counties to the north.

The general topography of the Wasatch Front is due, in large part, to Basin and Range extensional faulting. The Wasatch Fault is an extensional normal fault which trends northerly along the base of the Wasatch Mountains from Levan in the south, and up into Idaho to the north. Prior to extensional faulting, the region was subjected to compressional forces from the west resulting in extensive thrust faulting and mountain building. Extensional forces are still active today with various segments of the Wasatch Fault capable of generating large earthquakes with magnitudes near 7.4.

The Wasatch Mountains to the east consist predominately of Precambrian to Mesozoic, metamorphic and sedimentary bedrock. The valleys along the Wasatch Front are predominately covered with Pleistocene Lake Bonneville deposits, and younger alluvial fan and stream deposits. The Bonneville Lake Cycle began about 30,000 years ago when the climate was much cooler and wetter. The lake reached its highest elevation of about 5,100 feet, known as the Bonneville shoreline, between 16,000 to 14,500 years ago. From this shoreline, the lake eventually overtopped and breached through unconsolidated sediments near Red Rock Pass sending a catastrophic flood into the Snake River drainage system in southeastern Idaho, about 14,500 years before present. Within about a year, the lake had dropped to an elevation of about 4,740 feet, forming the Provo shoreline. Due to changing climatic conditions, the lake level gradually dropped to the historic levels of its modern day remnant, the Great Salt Lake. The last major high water shoreline of the lake was the Gilbert shoreline which reached an elevation of about 4,250 feet between 11,000 to 10,000 years ago. Historically, the Great Salt Lake has fluctuated between 4,211.9 and about 4,191 feet above sea level.

During Bonneville times thousands of feet of sediment were deposited in the valley. Deposits consist of deep-water silts and clays, shoreline sand and gravels and gravelly barrier beach and deltaic deposits. The unconsolidated to semi-consolidated valley fill deposits are thought to range from 2,000 to 5,000 feet thick (Black, and others, 2003; Currey, and others, 1984; Hintze, 1988; Stokes, 1986).

A geologic map of the Central Wasatch Front by Davis (1983) shows the surficial deposits in the proposed Parkway alignment to consist of floodplain and delta deposits (chiefly fine-grained and poorly drained sediments) in the vicinity of the south interchange, Provo Formation and younger lake bottom sediments (clays, silts, sands, and localized offshore bars) through the majority of the project, and landslide deposits near the north interchange. Newer maps of the area (Personius and Scott, 1992; Nelson and Personius, 1993), characterize the predominant surficial geologic deposits throughout the study area as Lake Bonneville lacustrine clay and silt, with Holocene to upper Pleistocene lateral spread deposits at some locations. Post-Bonneville lacustrine and marsh deposits are encountered along the easterly shores of the Great Salt Lake and encroach on the Parkway alignment from the west at some bridge sites. Localized upper Holocene stream alluvium associated with the Jordan River can be found along the shores of the river near the southerly terminus of the project. Bonneville lacustrine sand and gravel may be encountered near the northerly terminus, along with upper Holocene fan alluvium consisting of cobbles and gravel in a sandy matrix.

As shown on Figure 2a, the Mill Creek and D&RGW RR sites both lie near the border of two surficial geologic units mapped by Davis (1983). On the westerly side of the Legacy Parkway alignment in this area, the surficial materials are mapped as salt flat deposits, characterized by high silt, clay, and salt content and by poor drainage characteristics. The deposits mapped on the easterly side of the Parkway are Provo Formation and younger lake bottom sediments, which consist of clays, silts, sands, and localized offshore sand bars. It will be noted from the figure that the Mill Creek site is most likely covered by the salt flat deposits, while the lake bottom soils appear to cover the D&RGW site.

A more recent surficial geologic map by Nelson and Personius (1993) is shown on Figure 2b. On this map, the two sites also lie along the border of two difference geologic units. The deposits west of the Parkway in this area are described as young deposits of silt, clay and sand deposited in Great Salt Lake marshes, low-energy streams, oxbow lakes, and sag ponds resulting from seismic events. The young lake and marsh soils are often rich in organics and may contain localized zones of peat. East of the Parkway alignment, the surficial deposits are mapped as silt and clay with minor fine sand deposited in deep and/or quiet water of the Bonneville lake cycle. The marsh deposits shown on the westerly side of the Parkway are likely underlain by the lake bottom deposits mapped on the easterly side of the alignment.

Harty and Lowe (1992, 2003) prepared maps of several liquefaction-induced landslides along the Wasatch Front, including the North Salt Lake landslide features. The northerly limits of these landslides are located about ½ mile south of the Mill Creek site, and are identified as unit clsp on Figure 2b. The authors of the map noted that they were unable to confirm that the North Salt Lake features are landslides; however, based on surface evidence and geologic evidence provided by others, the deposits were believed to be liquefaction-induced landslides. The literature accompanying the map indicates that the possibility still exists for recurrent movement of the North Salt Lake landslides during earthquake ground shaking.

4.4 GEOLOGIC HAZARDS

Geologic hazards identified within the Legacy Parkway project area include ground shaking, liquefaction-induced lateral spreading and landslides, and subsidence during a moderate to large seismic event on the Salt Lake or Weber segments of the WFZ. Large seismic events on one of the other surrounding less studied faults such as the Great Salt Lake fault may also trigger these hazards.

Due to the proximity of the Parkway to the Great Salt Lake, tilting of the lake during tectonic subsidence will shift the lake toward the east. This subsidence will cause a rise in already high ground-water tables and cause the lake to inundate toward the east. Subsidence and tilting will be greatest nearest the fault and will taper off away from the fault toward the west. Studies by Keaton (1987), and Chang and Smith (1998) have compared the 7.5 magnitude earthquake at Hebgen Lake, Montana in 1959 to a maximum credible earthquake along the Wasatch Front. Keaton's study shows the area near the most eastern extent of Farmington Bay to have the greatest potential for flooding. It should be noted that the magnitude of this hazard is directly related to the level of the lake and the location and magnitude of the earthquake. Ground shaking from surrounding faults or rupture of the Great Salt Lake fault beneath the lake also has the potential to generate wave hazards in the form of seiche (water oscillation waves) or a lake tsunami. The actual hazard potential to the Parkway from these waves is not known. Based on a study by Lin and Wang (1978) the hazard from seiche on the lake is likely low.

Other hazards include shallow ground water and potential flooding. Further discussion of seismic hazards at the Mill Creek and D&RGW sites is provided in Section 5.0.

4.5 SOIL MATERIALS

Borings at the Mill Creek Site generally encountered firm to stiff lean and fat clay with some sand layers and lenses in the upper 60 feet. A medium-dense to dense sand layer ranging from about 4 to 7 feet thick was identified between depths of 60 and 70 feet, and was underlain primarily by clay with some sand layers. The frequency and thickness of the sandy deposits generally increased with depth. The deepest boring extended to a depth of 100 feet (approximate elevation 4113 feet).

Borings at the D&RGW RR site encountered about 3 to 6 feet of sand and gravel fill associated with the railroad bed, followed by firm to stiff lean clay with sand lenses and occasional layers to a depth of about 48 feet. The sand layers increased in frequency and thickness below 45 feet, with lean and fat clay being the other predominant soil types in the bottom half of the borings. The deepest boring completed at the D&RGW site in 2006 extended to a depth of 88 feet (approx. elev. 4134 feet). Several of the borings performed previously at the site by others extended to at least 200 feet, and the deepest of these terminated 247 feet below the ground surface (approx. elev. 3970 feet).

Soil conditions for each site are described in further detail in Section 7.1.2.

4.6 HYDROGEOLOGIC 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.

The hydraulic gradient in the Parkway area generally slopes down in a westerly direction toward the Great Salt Lake. The depth to groundwater was measured in the borings as indicated on the boring logs. At the Mill Creek site, the water level was within about 5 feet of the ground surface at the time of drilling (March 2006). At the D&RGW site, the groundwater was measured between 5.5 and 7 feet below the top of the railroad bed in February 2006. Fluctuations of a few feet can be expected due to typical seasonal variations. Artesian conditions were encountered in the lower confined aquifers at some locations, including borings at the Mill Creek and D&RGW sites, as noted on the boring logs.

4.7 POTENTIALLY HAZARDOUS MATERIALS

Potentially hazardous materials were not noted during the field investigation. All soil samples were re-examined in the laboratory and odors indicative of contamination were not noted. Potential sources of contamination include the oil drain at the southerly end of the project along with various past and present industrial sites located in the vicinity of the Parkway alignment. The apparent lack of contamination observed by field and lab personnel does not preclude the possible presence of potentially hazardous materials in the project area.

5.0 EARTHQUAKE CONSIDERATIONS

The study area is located within the seismically active Intermountain Seismic Belt, which extends from Arizona to Canada. The nearest potentially active fault is the Weber Segment of the Wasatch Fault Zone (WFZ) located about 1.7 miles west of the Mill Creek site, and 1.2 miles west of the D&RGW site. The Weber segment is capable of generating a magnitude 7.4 earthquake. The Salt Lake City Segment of the WFZ is located about 3.3 miles southeast of the Mill Creek site and 4.6 miles south of the D&RGW site and can generate a magnitude 7.2 earthquake. The West Valley Fault Zone is located about 7.5 miles south of the Mill Creek site (8.9 miles south of the D&RGW site). It is uncertain whether the West Valley Fault Zone has a true independent seismogenic source or if it functions as an antithetic fault to the WFZ.

5.1 DESIGN CRITERIA

The Mill Creek site is located at latitude 40.902° North and longitude 111.925° West. USGS-NEHRP probabilistic peak ground acceleration (PGA) values are tabulated below:

Probabilistic ground motion values in %g.

	10%PE in 50 yr	2%PE in 50 yr
PGA	26.02	62.71
0.2 sec SA	61.77	148.94
1.0 sec SA	21.15	62.19

The D&RGW RR site is located at latitude 40.919° North and longitude 111.901° West. USGS-NEHRP probabilistic peak ground acceleration (PGA) values are tabulated below:

Probabilistic ground motion values in %g.

	10%PE in 50 yr	2%PE in 50 yr
PGA	24.92	63.48
0.2 sec SA	59.38	149.42
1.0 sec SA	20.35	62.06

It should be noted that the USGS-NEHRP mapped values are calculated for "firm rock" sites having a shear wave velocity of 1500 feet per second in the upper 100 feet (MCEER Site Class B/C boundary), and that bedrock ground motions may amplify or attenuate as they propagate through overburden soils.

Borings and testing completed at the site of the proposed structures indicate that the clayey soils in the upper 100 feet at both sites have average undrained shear strengths of slightly greater than 1,000 psf. Based on this information, it is recommended that MCEER Site Class D be used for seismic design at the Mill Creek and D&RGW underpass sites..

As part of the current Legacy Parkway project, Kleinfelder, Inc. developed site specific horizontal and vertical acceleration response spectra for the 1250 West bridge site and the State Street bridge site. It is our understanding that Kleinfelder will provide a separate report with conclusions and recommendations for applying the site-specific spectra at other sites on the project.

5.2 LIQUEFACTION AND LATERAL SPREAD

Liquefaction analyses were performed using the "Simplified Procedure" developed by Seed and Idriss (1971). This procedure involves determining the seismic shear stress ratio induced by an earthquake and comparing it with the seismic shear stress ratio required to cause liquefaction. Recommended refinements for the "Simplified Procedure" for SPT data presented at the 1996 NCEER workshop (Youd et al., 1997) were applied.

An evaluation of borings and testing indicates that several soil layers may liquefy during the seismic event having a 2 percent probability of exceedance in 50 years. Soil layers showing potential for liquefaction during the design event are noted on the boring logs in Appendix B. Layer thicknesses and potential liquefaction-induced settlement corresponding to volumetric strain are summarized below.

Site	Boring No.	Thickness of Liquefiable Layers (ft)		Calculated Liquefaction Settlement (in)	
		Within Depth Investigated	Within Upper 50 Feet	Within Depth Investigated	Within Upper 50 Feet
Mill Creek	RSB-39-624	10.5	4.5	2.1	1.0
	RSB-39-625	5	1	0.8	0.3
	RSB-39-626	10	3	0.8	0.7
	RSB-39-627	13.5	2	2.1	0.5
D&RGW RR	RSB-X3-628	6	1	1.4	0.4
	RSB-X3-629	10	3	1.6	0.7

A review of the boring logs does not identify a continuous layer susceptible to lateral spread at either site. It is our opinion that the potential for lateral spread at these sites is very low, and lateral spread mitigation is not necessary for the proposed structures. The principal consequence of liquefaction at these sites is expected to be ground settlements, estimated to range in magnitude from about 0.8 to 2.1 inches as shown on the table.

6.0 FIELD AND LABORATORY TEST DATA

6.1 SUBSURFACE EXPLORATION

Subsurface investigations performed at the bridge sites include borings performed by Kleinfelder in conjunction with the Design-Build project, along with supplemental borings performed in 2006 for the current project.

Boring logs for bridge subsurface investigations performed in 2006 are included in Appendix B of this report. Test holes performed by RB&G Engineering in 2006 are labeled with the prefix "RSB" (or "RSC" for CPT holes, where applicable), followed by a number identifying the bridge site or structure, then by a hole number in the 600 series. Logs of subsurface investigations performed by Kleinfelder are also reproduced in Appendix B and are labeled with the prefix "SB" for borings and "SC" for CPT holes, followed by the Design-Build bridge number, then the boring number. It will be noted that the Mill Creek site was designated with the number "39" for subsurface exploration numbering purposes. Borings performed for the Design-Build project at the D&RGW site are labeled with the numbers "13" and "14", in reference to the numbers of the structures initially planned for the site. For the current project, the D&RGW site was numbered "X3".

For all structure borings drilled in 2006, the subsurface investigation was performed using a CME 55 rotary drill rig with a tri-cone rock bit and NW casing to advance the boring and water as the drilling fluid. Sampling was generally performed at 5-foot intervals. At some locations, sampling was performed at closer intervals to evaluate liquefaction hazard for loose cohesionless soils in the upper 30 to 40 feet. 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 drill rig used for each boring is noted on the boring log. The CME-55 No. 2 rig uses a rope and cathead hammer which was determined by UDOT to have an average energy ratio of about 55% in the spring of 2006.

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 to drive the sampling spoon through 12 inches, is defined as the standard penetration value. The 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 with a reasonable core recovery, the standard penetration value provides a good indication of the in-place density of gravelly-type material. For materials containing more than 35% gravel size particles, the density descriptions shown on the boring logs were developed based on correlations between relative density and standard penetration value for gravelly soils.

At some locations within the project it was not possible to drive the sampling spoon through the full 18 inches at some sampling depths. Where the sampling tube could not be driven through the full 18 inches, the number of blows to drive the spoon through a given depth of penetration is shown on the boring logs.

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.

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 value in tsf.

Each sample obtained in the field was classified 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. Laboratory-tested samples were also classified according to the AASHTO Classification System, and the symbols designating the soil types according to this system are also presented on the boring logs.

6.2 LABORATORY TESTING

Laboratory tests performed during this investigation to define the characteristics of the subsurface material included:

1) Mechanical Analysis

2) Density
3) Natural Moisture Content
4) Atterberg Limits
5) Unconfined Compressive Strength
6) Triaxial Shear
7) Consolidation
8) Direct Shear
9) pH, Resistivity, Sulfates, and Chlorides

Laboratory testing was performed in accordance with applicable standards published by the American Society for Testing and Materials (ASTM) 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.

7.0 STRUCTURES

7.1 DESCRIPTION

7.1.1 General

It is our understanding that Structures E-2572 and E-2573 will both be box culvert type structures which will allow portions of the multi-use trail system to pass beneath Legacy Parkway. The maximum cover over the structures is expected to be less than about five feet.

It is anticipated that the Mill Creek underpass will consist of two cast-in-place concrete boxes; each about 66 feet in length and having inside dimensions of about 20 feet wide by 10 feet high. An open trail area about 35 feet wide is expected to exist in the Legacy Parkway median area between the two box sections. The structural engineer has informed us that the maximum Strength I bearing pressure beneath the structures will be about 5.7 ksf.

The D&RGW RR trail underpass is expected to be a single cast-in-place box structure about 466 feet long, with an inside width of about 28 feet. Preliminary drawings show that the inside height of the structure will vary from about 8 to 10 feet, with a two-foot step up in grade between the equestrian trail and the pedestrian trail. It is our understanding that the maximum Strength I bearing pressure on soils beneath this structure will be approximately 5.9 ksf.

7.1.2 Subsurface Conditions

7.1.2.1 Mill Creek Site

Boring RSB-39-624 was drilled near the anticipated location of the northwest end of the underpass. This boring encountered firm to stiff lean clay with silt lenses in the upper 36 feet, followed by alternating layers of medium-dense sand and stiff lean clay up to 5 feet thick to a depth of about 50 feet. Firm fat clay was identified between about 50 and 57 feet, then stiff lean clay to about 64 feet. A zone of medium-dense silty sand with thin clay layers was encountered between 64 and 71 feet, followed by stiff lean clay with occasional sand layers to the bottom of the boring at a depth of 79.5 feet (elev. 4133 feet).

Borings RSB-39-625 and 626 were drilled near the interior ends of the two anticipated structures (in the Legacy Parkway center median area). Each boring encountered 14 feet of firm to stiff lean clay with thin sand and silt layers, followed by firm to stiff fat clay with sand and silt lenses to an average depth of 47 feet. The soil deposits below 47 feet were predominantly firm to stiff clay, with layers of medium-dense to dense sand up to about 5 feet thick. Boring RSB-39-625 terminated at a depth of 96.5 feet (elev. 4116 feet), and Boring RSB-39-626 terminated at 85 feet (about elev. 4127 feet).

Boring RSB-39-627 was located near the southeast end of the anticipated underpass. The subsurface profile in this boring consisted of about 12 feet of stiff lean clay with sand lenses, followed by firm to stiff fat clay to a depth of 38 feet. A two- foot zone of medium-dense sand was identified between 38 and 40 feet, and was underlain by stiff lean clay with some sand layers to about 62 feet. Another deposit of medium-dense sand was encountered between 62 and 67 feet, followed by firm to stiff lean clay with occasional sand layers up to about 3 feet thick to the bottom of the boring at a depth of 1000 feet (about elev. 4113 feet).

Samples of lean clay obtained from the borings were tested in the laboratory, and were found to have liquid limits ranging from 30 to 47 (average of 41), and plasticity indices between 12 and 26 (average of 20). The liquid limit of the fat clay samples was between 51 and 73 and the plasticity index ranged from 31 to 49.

7.1.2.2 D&RGW RR Site

Borings and CPT holes completed by others for the Design-Build project included several test holes near the proposed D&RGW RR underpass structure. These explorations characterized the subsurface soils as predominantly soft to stiff cohesive soils. Some relatively thick (greater than about 10 feet) deposits of medium-dense sand appear on the boring logs; however, the continuous CPT profiles suggest that the sand layers are usually less than 6 to 7 feet thick. The deepest CPT extended to about 176 feet below the ground surface, and the deepest boring reached a depth of 247 feet (elev. 3970 feet).

Boring RSB-X3-628 was drilled at the south end of the proposed structure, and encountered 3 feet of granular fill material, followed by firm to stiff lean clay to about 48 feet. A zone of firm to stiff fat clay was identified between 28 and 58 feet, followed by a deposit of silty sand about 3 feet thick. Below 61 feet, the boring encountered firm to stiff lean clay with sand layers up to 2 feet thick. The boring terminated at a depth of 83 feet (elev. 4138 feet).

Boring RSB-X3-629 was drilled about 100 feet south of the north end of the structure, and this boring encountered 6 feet of granular fill, underlain by firm to stiff lean clay with sand layers up to 3 feet thick to a depth of about 58 feet. Medium-dense to dense silty sand was the predominant soil type between 58 and 72 feet, followed by firm to stiff lean clay with sand layers up to 3 feet thick to the bottom of the boring at a depth of 88 feet (about elev. 4134 feet).

Samples of the lean clay from Borings RSB-X3-628 and 629 were tested in the laboratory, and the liquid limit was determined to range from 33 to 49, with the plasticity index between 15 and 28. One sample of fat clay was tested, and this sample had a liquid limit of 55 and a plasticity index of 32.

7.1.3 Groundwater Conditions

The shallow static groundwater level was encountered at a depth of about 5 feet (approx. elev. 4207.5 feet) at the Mill Creek site at the time of drilling (March 2006). At the D&RGW RR site, the shallow groundwater was between elevations 4215 and 4216 feet (5.6 to 6.7 feet below the top of the existing railroad bed) at the time of drilling in February 2006. It is anticipated that up to two feet of groundwater fluctuation may occur due to typical seasonal variations in precipitation and climatic cycles. Greater fluctuations are possible under unusual environmental conditions.

7.2 RECOMMENDATIONS

7.2.1 Bridge Structures

Potential foundation types at the Mill Creek and D&RGW RR underpass sites include shallow foundations, such as spread footings, and deep foundations, such as drilled shafts or driven piles. It is anticipated that the bottom of each culvert can be designed as a mat foundation. This type of shallow foundation will be significantly more cost-effective than deep foundations. Recommendations for shallow foundations are summarized below. Recommendations for deep foundations can provided for the underpass sites if needed.

7.2.1.1 Foundation Design

The bottom of the box structures are expected to be between elevations 4211 and 4212 feet at the Mill Creek site, and between elevations 4212 and 4215 feet at the D&RGW site. The soils encountered at these elevations are predominantly firm to stiff lean clays. It is anticipated that the bottom of each concrete box underpass structure will act as a mat foundation, and that the bearing pressures at the bottom of each culvert will generally be somewhat less than the pressures induced in the subgrade beneath the surrounding embankment fill.

Bearing capacity for the underpass box structures will be controlled by the firm to stiff lean clay encountered in the upper 20 to 40 feet of the subsurface profile at each site. The results of field and laboratory testing indicate that these soils have a short-term nominal bearing resistance of about 5,140 psf at the Mill Creek site, and about 5,400 psf at the D&RG RR site. The Strength I bearing resistance can be estimated by multiplying the nominal resistance by a resistance factor of 0.50. These bearing resistance values are applicable to the structure placed on existing subgrade soils prior to placement of roadway embankment fill around the structure.

It should be noted that the placement of roadway embankment fill will consolidate subgrade soils, and the clayey soils will gain strength with consolidation. If roadway embankments adjacent to the underpass are constructed in such a manner that loads from the roadway fill weight do not exceed the bearing resistance of the subgrade, bearing resistance will not be critical for the structure. Staged construction, lightweight embankment fill, or subgrade reinforcement/modification may be necessary to provide sufficient bearing resistance for the new fill, depending upon fill heights. Any subgrade modification or staged construction recommendations provided by Kleinfelder for the embankments in these areas should also be considered applicable to the structure foundation footprints.

A coefficient of subgrade reaction of 50 pci is recommended for concrete supported directly on the subgrade clay soils. This estimated coefficient of subgrade reaction is for a 12-inch square footing area and is based on typical values for the soils encountered at the sites. The coefficient of subgrade reaction can be increased to 100 pci if at least one foot of sandy gravel fill is placed beneath the concrete.

7.2.1.2 Foundation Settlement

It is anticipated that significant consolidation settlement will occur due to the placement of new roadway embankment fill adjacent to and on top of the underpass structures, and that differential and total settlement considerations may control the structural design. It is our understanding that Kleinfelder is providing settlement estimates and settlement mitigation recommendations for embankments throughout the project. If the structures cannot be designed to tolerate the anticipated settlements, it may be advisable to preload the foundation subgrade area with temporary embankment fill, allow consolidation to occur, and then excavate the temporary fill to construct the structures.

Liquefaction of loose non-plastic soil deposits due to the design event may cause settlement related to volumetric strain. Estimated ground settlements due to liquefaction are discussed in Section 5.0. Based on these estimates, it is anticipated that structures may experience up to about two inches of settlement due to liquefaction in the design seismic event.

7.2.1.3 Construction Considerations

As a minimum, the upper 6 inches should be stripped from the foundation area to remove excess organic matter. Following foundation excavation, the area should be proof rolled with light ground pressure equipment. Soft areas should be over excavated and stabilized.

Based on anticipated foundation elevations and groundwater levels encountered in the borings, some dewatering may be necessary for construction of the underpass structures. It is recommended that the groundwater be lowered to a depth of 2 feet below the bottom of the excavations. It is anticipated that dewatering can best be achieved using sumps and drain trenches where clay exists at the foundation level.

Soils at the bottom of excavations may be too soft to provide an adequate working surface. Stabilization methods will depend upon conditions encountered. 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 equal 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. As a minimum, it is recommended that a four-inch layer of granular borrow be placed at the bottom of excavations to provide a working platform.

Depending upon construction sequence and methods employed, excavation and shoring of embankment preload fill may be necessary. Maximum excavation slopes in compacted granular fill material of 1H:1V can be used for temporary cuts less than 20 feet deep. For temporary cuts between 20 and 30 feet deep, 1.5H:1V cut slopes or flatter should be used for the entire depth of the cut. The stability of cuts in uncompacted fill and/or natural subgrade soils should be evaluated on a case-by-case basis.

We recommend that preconstruction surveys and vibration monitoring be performed for any critical structures or utilities located within 500 feet of the construction areas.

7.2.2 Embankments

Analyses and recommendations for embankments are provided in a separate report by Kleinfelder.

7.2.3 Retaining Walls

Analyses and recommendations for retaining walls are provided in a separate report by Kleinfelder.

7.2.4 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, plf
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 being 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 either the wall be designed to resist hydrostatic pressure, 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 are also provided.

8.0 CORROSION INVESTIGATIONS

In order to obtain an indication of the corrosive nature of the subsurface material at these sites, resistivity, pH, sulfate, and chloride tests were performed on soil samples obtained in the test holes. The results of these tests are tabulated below:

Structure	Test Hole	Depth (ft)	Soil Type	Resistivity ohm-cm	pH	Sulfate (ppm)	Chloride (ppm)
E-2572 Mill Creek	RSB-39-624	3-4.5	Lean Clay	15,573	8.6	1,542	615
	RSB-39-626	6-7.5	Lean Clay	7,786	8.4	598	415
E-2573 D&RGW	RSB-X3-628	5-6.5	Lean Clay	11,680	9.1	366	190

The following table taken from the Bureau of Reclamation Concrete Manual indicates the amount of sulfate producing adverse effects on concrete in contact with soil containing sulfate.

Relative Degree of Sulfate Attack	Percent Water-Soluble Sulfate (as SO_4) in Soil Samples	mg/l Sulfate (as SO_4) in Water Samples
Negligible	0.00 to 0.10	0 to 150
Positive[1]	0.10 to 0.20	150 to 1,500
Severe[2]	0.20 to 2.00	1,500 to 10,000
Very Severe[3]	2.00 or more	10,000 or more

1 Use type II cement.

2 Use type V cement, or approved combination of portland cement and pozzolan which has been shown by tests to provide comparable sulfate resistance when used in concrete.

3 Use type V cement plus approved pozzolan which has been determined by tests to improve sulfate resistance when used in concrete with type V cement.

The water-soluble sulfate content in one sample at the Mill Creek site was about 0.15 percent, and a positive degree of sulfate attack should be expected. Type II cement is strongly recommended for concrete in contact with soil at the Mill Creek site. Based upon the above tests, Type I or Type II cement may be used for concrete at the D&RGW RR site; however Type II cement is preferred for its superior resistance to deterioration.

9.0 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 during construction, conditions are encountered which appear to be different than those presented in this report, it is requested that we be advised in order that appropriate action may be taken.

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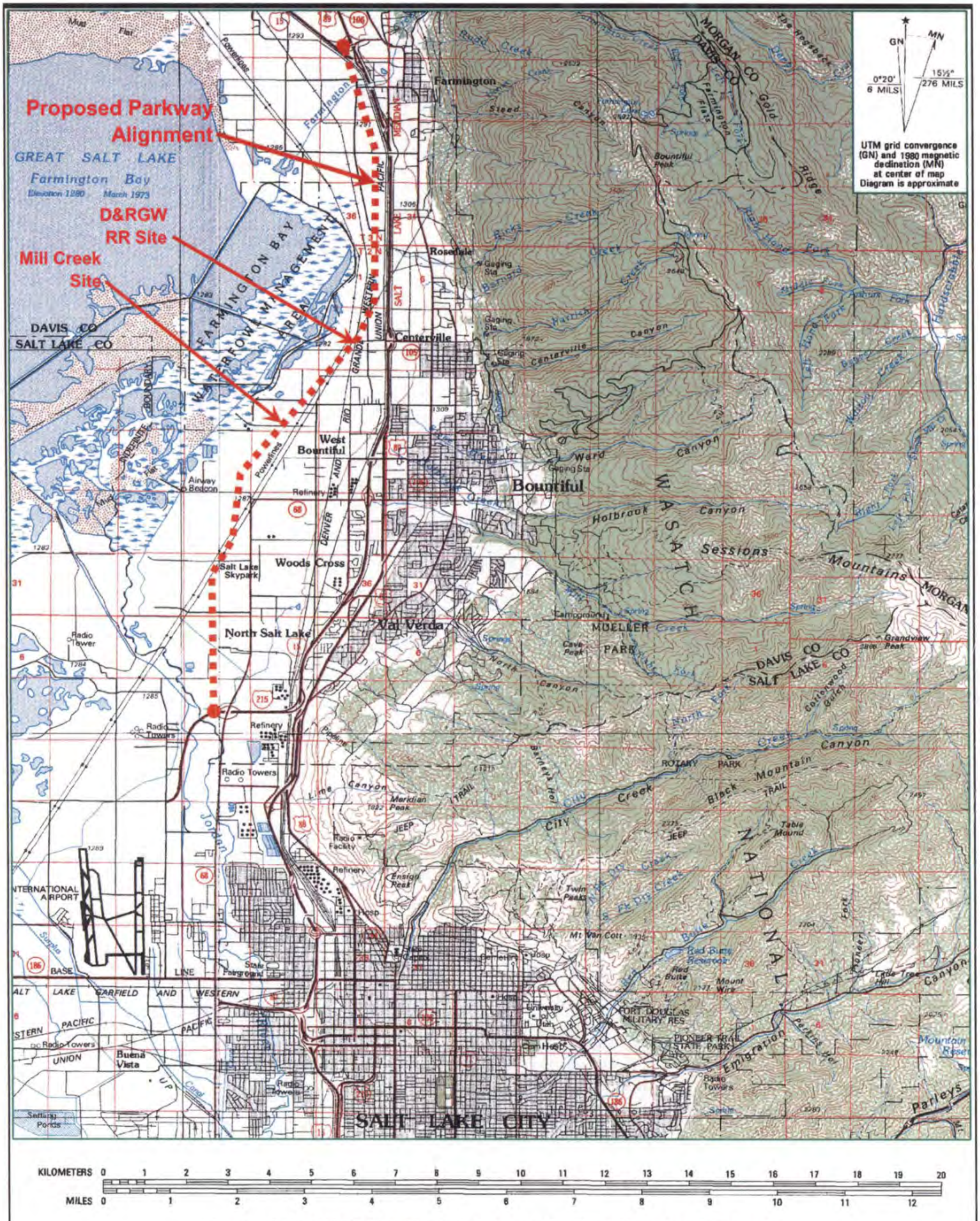
FIGURES



Portion of 1980 USGS 30 X 60 minute Salt Lake City (Utah-Wyoming) Quadrangle

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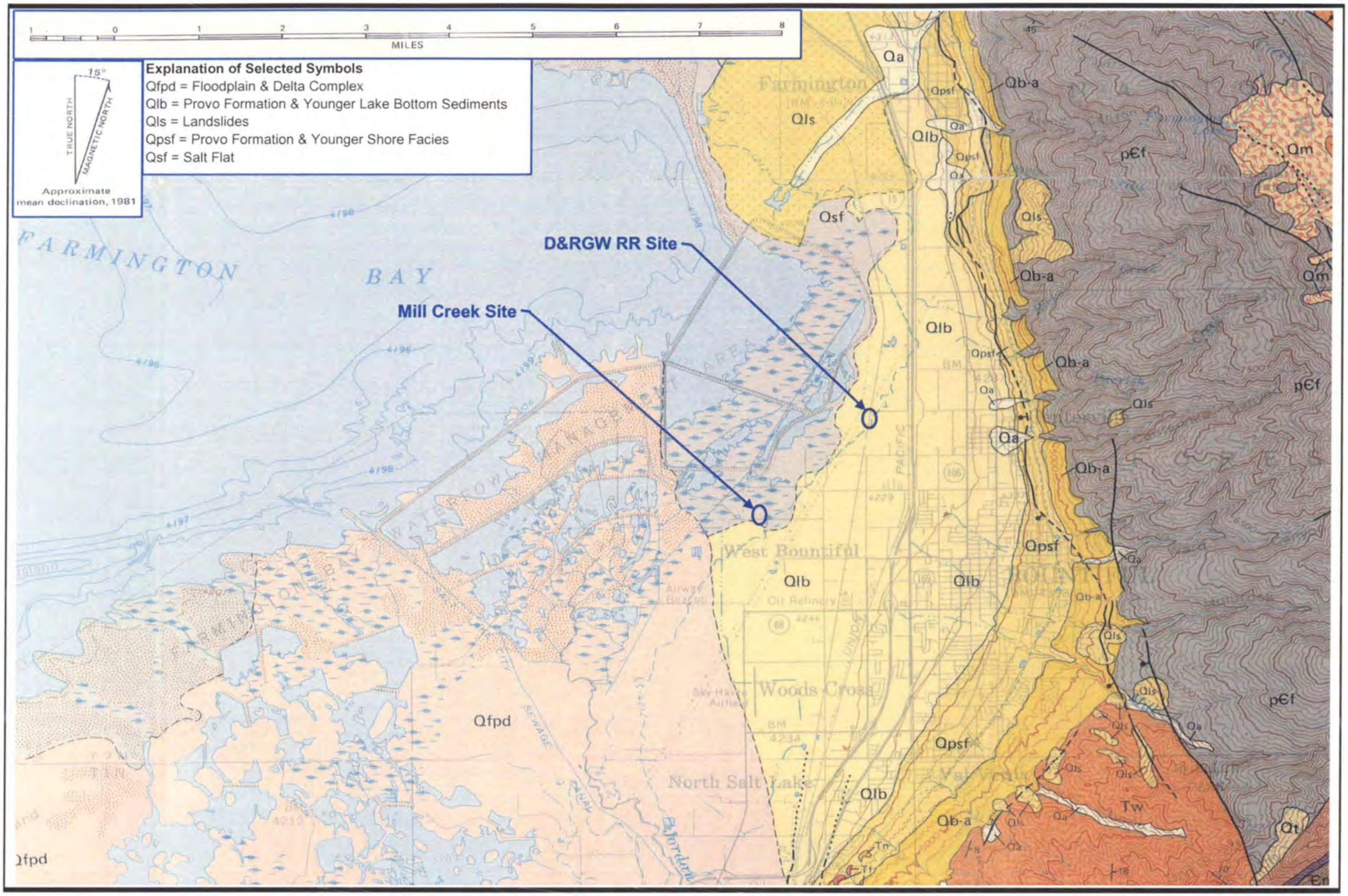
Provo, Utah

Figure 1 Vicinity Map
Proposed Legacy Parkway Alignment
Legacy Parkway
Salt Lake / Davis Counties, Utah



Explanation of Selected Symbols

Qfpd = Floodplain & Delta Complex

Qlb = Provo Formation & Younger Lake Bottom Sediments

Qls = Landslides

Qpsf = Provo Formation & Younger Shore Facies

Qsf = Salt Flat

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Figure 2a Geologic Map A
Mill Creek and D&RGW RR Sites
Legacy Parkway
Salt Lake / Davis Counties, Utah

Map modified from:
Davis, 1983
Utah Geological and Mineral Survey

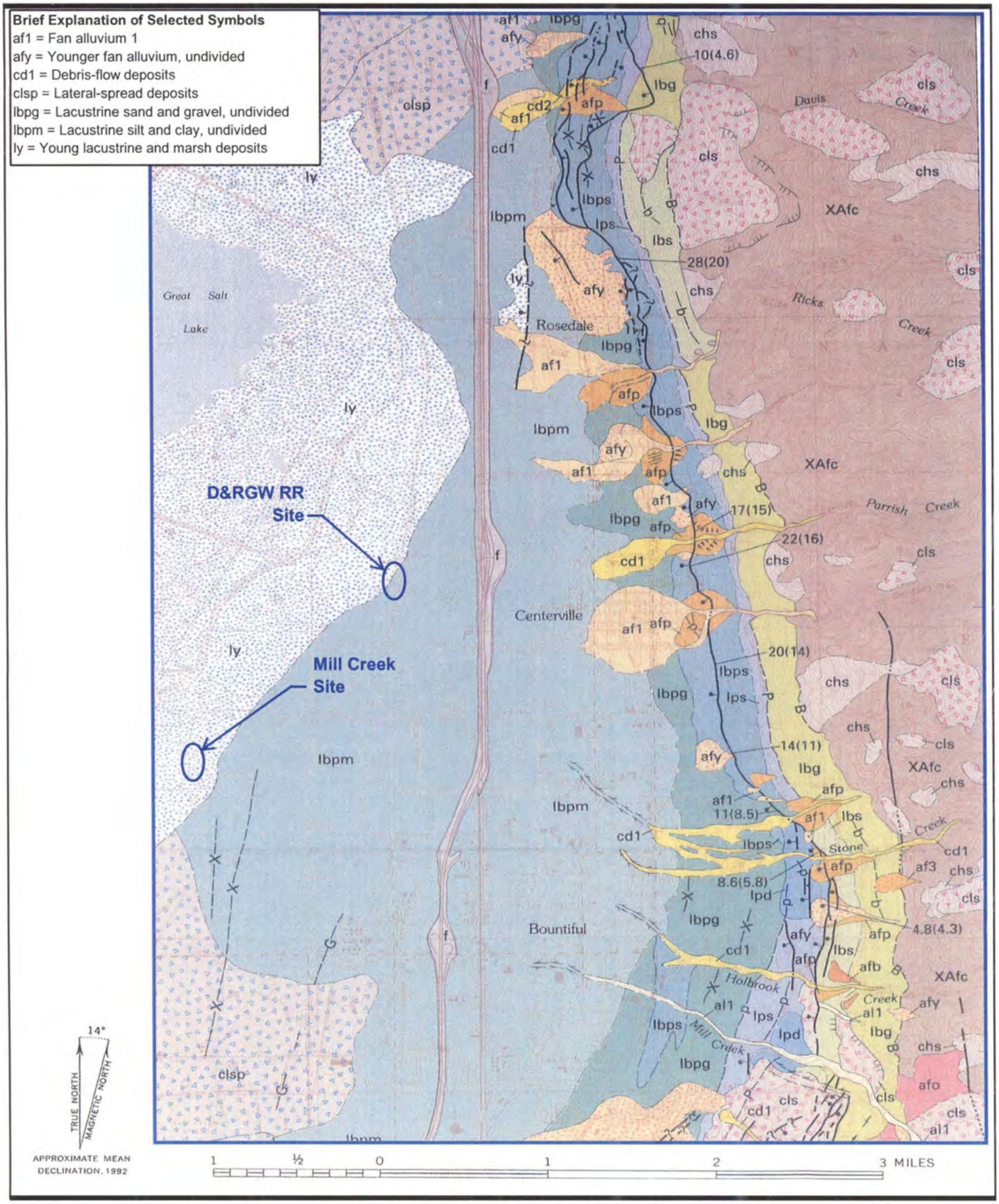

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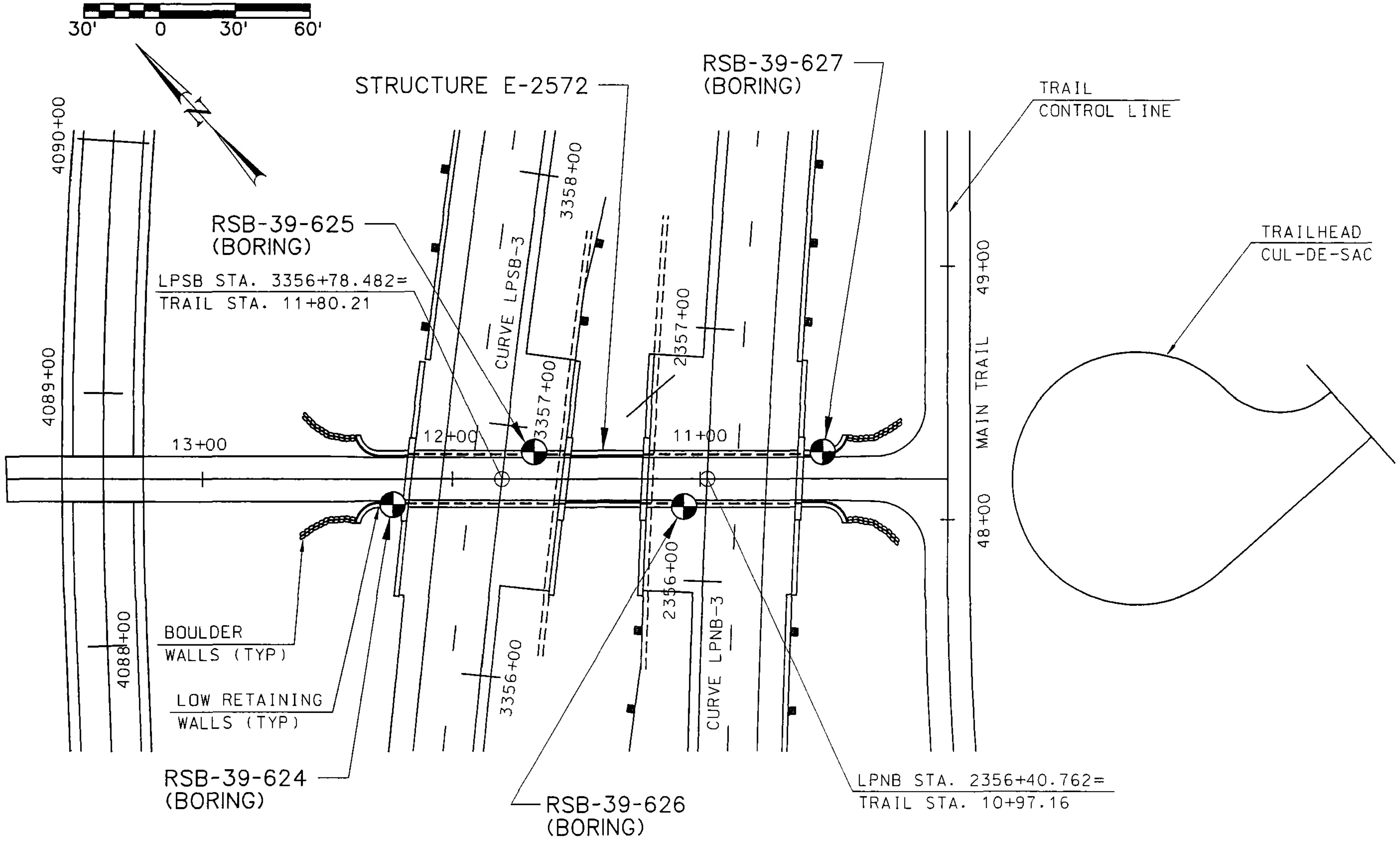
Figure 2b Geologic Map B
Mill Creek and D&RGW RR Sites
Legacy Parkway
Salt Lake / Davis Counties, Utah

Map modified from:
Nelson & Personius, 1993
Utah Geological Survey



EXPLORATION LOCATION PLAN

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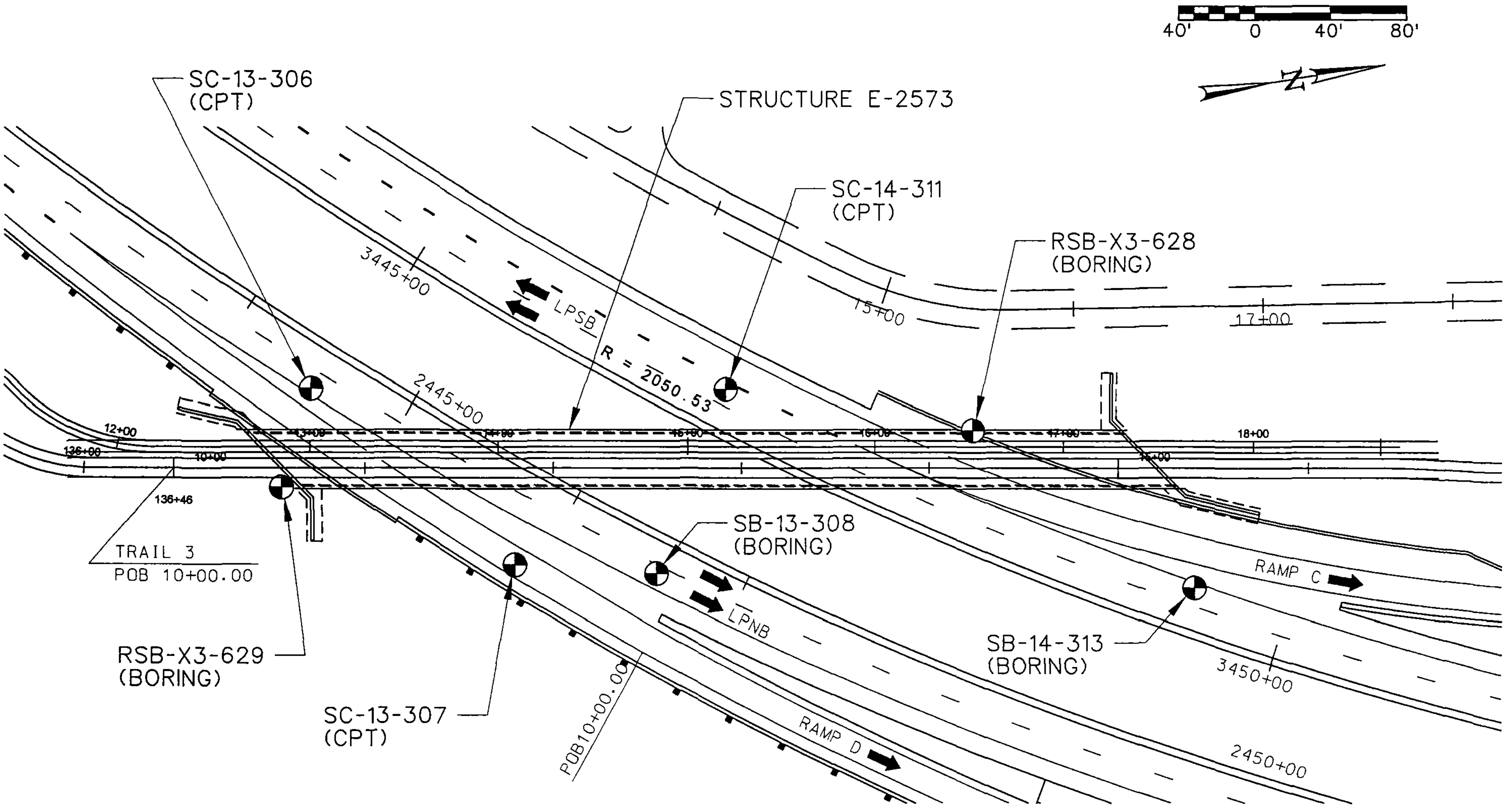
Provo, Utah

Figure 3a. SITE PLAN & TEST HOLE LOCATIONS
Legacy Parkway - Structure E-2572
(Legacy Parkway Over Mill Creek Trail)
Salt Lake/Davis County, Utah

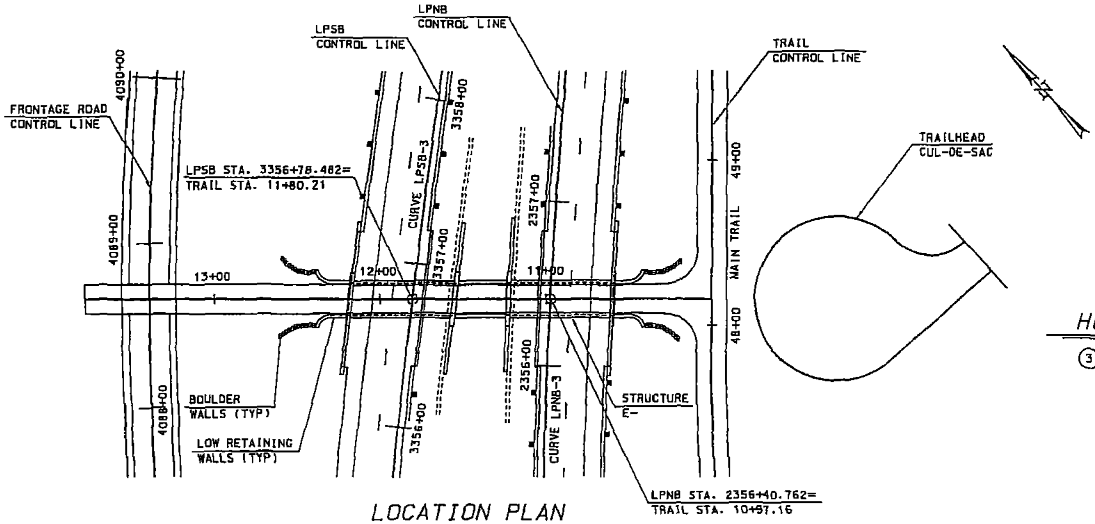


EXPLORATION LOCATION PLAN

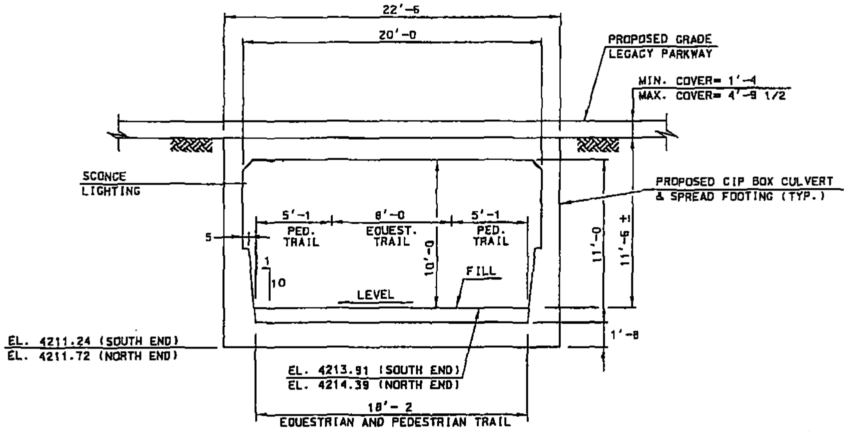
RB&G ENGINEERING INC.
Provo, Utah

Figure 3b. SITE PLAN & TEST HOLE LOCATIONS
Legacy Parkway - Structure E-2573
(Legacy Parkway Over Multi-Use Trail & D&RGW RR)
Salt Lake/Davis County, Utah

APPENDIX A
Structure Drawings



LOCATION PLAN



SECTION THRU STRUCTURE

QUANTITIES

ITEM	ESTIMATED	UNIT	AS CONST.
STRUCTURAL CONCRETE (EST. QTY. XX CY)	1	LS	
REINFORCING STEEL (COATED)	X	LB	
GRANULAR BACKFILL BORROW	X	CY	

INDEX OF SHEET

1. SITUATION & LAYOUT 1
2. SITUATION & LAYOUT 2
3. SITUATION & LAYOUT 3
4. SOIL DATA SHEET
5. FOUNDATION PLAN 1
6. FOUNDATION PLAN 2
7. CULVERT BOX DETAILS
8. ROOF PLAN
9. HEADWALL DETAILS 1
10. HEADWALL DETAILS 2
11. WINGWALL DETAILS 1
12. WINGWALL DETAILS 2
13. REINFORCING STEEL SCHEDULE 1
14. REINFORCING STEEL SCHEDULE 2
15. REINFORCING STEEL SCHEDULE 3
16. REINFORCING STEEL SCHEDULE 4

HORIZONTAL CURVE DATA

③ LPSB-3
CURVE DATA
Δ= 10°12'17"
R= 5300.00
L= 943.96
T= 473.23
PC STA. 3349+98.20
PI STA. 3354+71.43
PT STA. 3359+42.16

③ LPNB-3
CURVE DATA
Δ= 08°59'56"
R= 3948.82
L= 620.21
T= 310.74
PC STA. 2354+48.03
PI STA. 2357+58.77
PT STA. 2360+68.24

BRIDGE LOAD RATING		
	HL-93	
	RATING	LOCATION
INV.	X.XX	X.XX' F. SERV III
OPER.	X.XX	X.XX' F. STR I

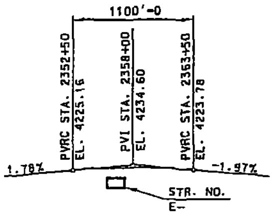
F DENOTES RATING CONTROLLED BY FLEXURE
S DENOTES RATING CONTROLLED BY SHEAR
My AT X.XX' = XXXX K-FT
Vy AT X.XX' = XXX KIPS

GENERAL NOTES

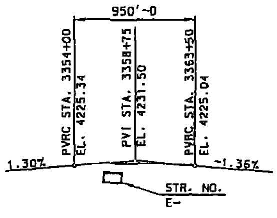
1. USE COATED DEFORMED BILLET-STEEL BARS CONFORMING TO AASHTO M 284 OR M 111 AND M 31 GRADE 60 FOR ALL REINFORCING STEEL.
2. USE STRUCTURAL STEEL CONFORMING TO AASHTO M 270 GRADE 36 EXCEPT WHERE NOTED OTHERWISE.
3. CHAMFER ALL EXPOSED CONCRETE CORNERS " EXCEPT WHERE NOTED OTHERWISE.
4. PROVIDE 2" CONCRETE COVER TO REINFORCING STEEL EXCEPT WHERE NOTED OTHERWISE.
5. USE CLASS AA (AE) CAST-IN-PLACE CONCRETE EXCEPT WHERE NOTED OTHERWISE.
6. HORIZONTAL DIMENSIONS ARE PLAN. VERTICAL DIMENSION ARE PLUMB.

DESIGN DATA

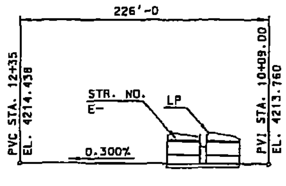
HL-93 IN ACCORDANCE WITH 3RD EDITION AASHTO LRFD AND INTERIM SPECIFICATIONS THROUGH 2006.
CAST-IN-PLACE CONCRETE: f'c = 4000 psi: fy (REINF.) = 60,000 psi: n=8
PRECAST CONCRETE: f'c = 5000 psi: fy (NONPRESTRESSED) = 60,000 psi: n=6
STRUCTURAL STEEL: fy = 36,000 psi
DESIGN SPEED: 70 mph LEGACY PARKWAY:
SEISMIC: SEISMIC DESIGN PER MCEER/ATC 49
(2475 YR RETURN PERIOD. 3% PE IN 75 YEARS)
Ss = MAX CONSIDERATION EQ GROUND MOTION AT 0.2 = 1.41 g
S1 = MAX CONSIDERATION EQ GROUND MOTION AT 1.0 = 0.59 g
SITE CLASS X
TRAFFIC DATA: 2020 ADT = 37300 LEGACY PARKWAY NORTHBOUND
2020 ADT = 37300 LEGACY PARKWAY SOUTHBOUND
DESIGN MAXIMUM COVER = 4'-9 1/2
DESIGN MINIMUM COVER = 1'-4
SOIL MOIST UNIT WEIGHT = XX #/CF
SOIL SUBMERGED UNIT WEIGHT = XX #/CF



LPNB PROFILE



LPSB PROFILE



TRAIL PROFILE

REVISIONS
NO. | DATE | BY

UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

DESIGN DG 2/06 CHECK
DRAWN KH 2/06 CHECK
QUANT. CHECK
APPROVAL RECOMM. DATE CONSULTANT DESIGN ENGR.
APPROVED DATE CONSULTANT PROJ. MANAGER

LEGACY PARKWAY
LP OVER MILL CREEK TRAIL
SITUATION & LAYOUT 1
PROJECT NUMBER SP-0067 (5) 0

SL / DAVIS
COUNTY
E-
DWG. NO.
SHT. 1 OF X

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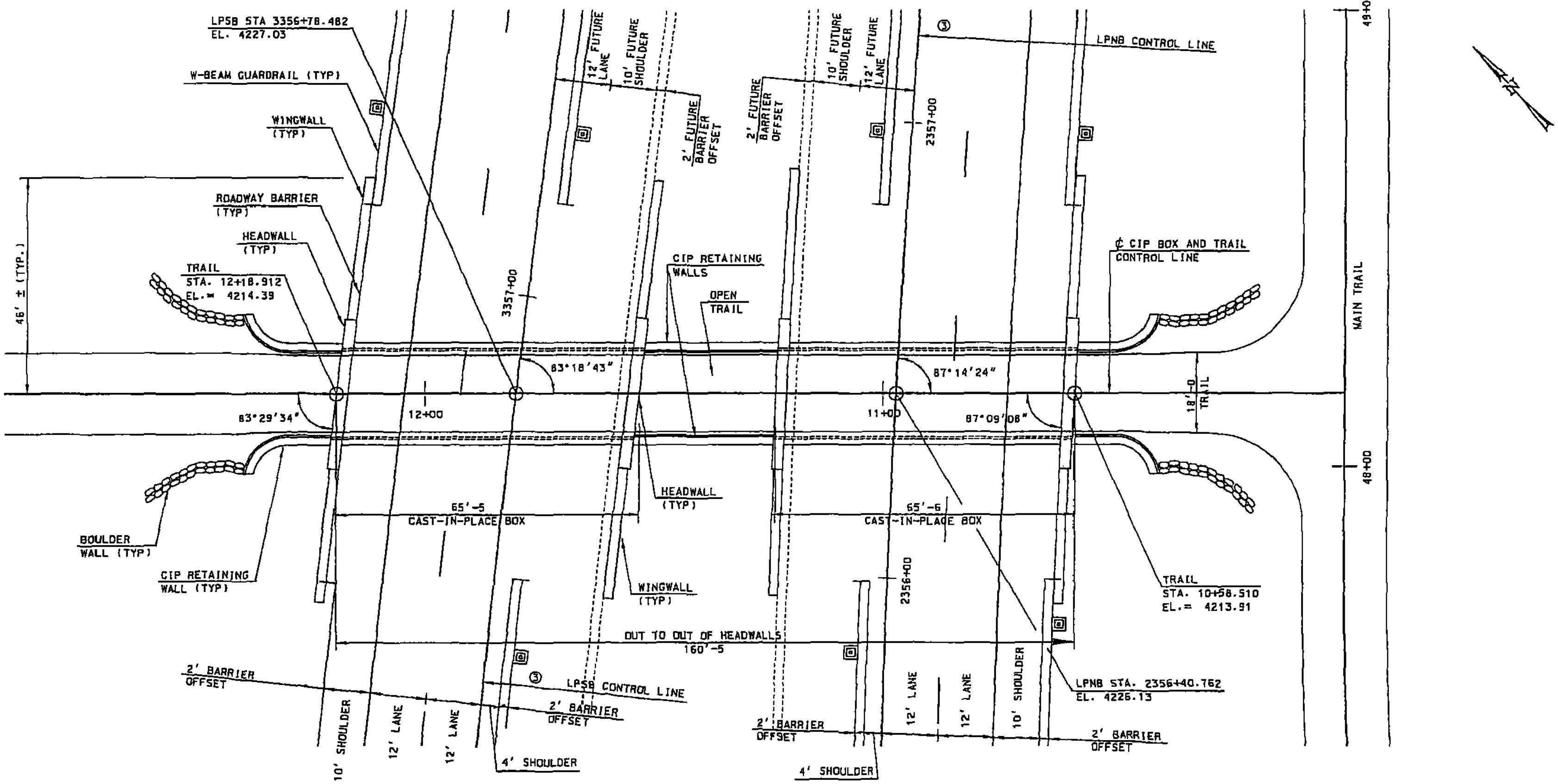
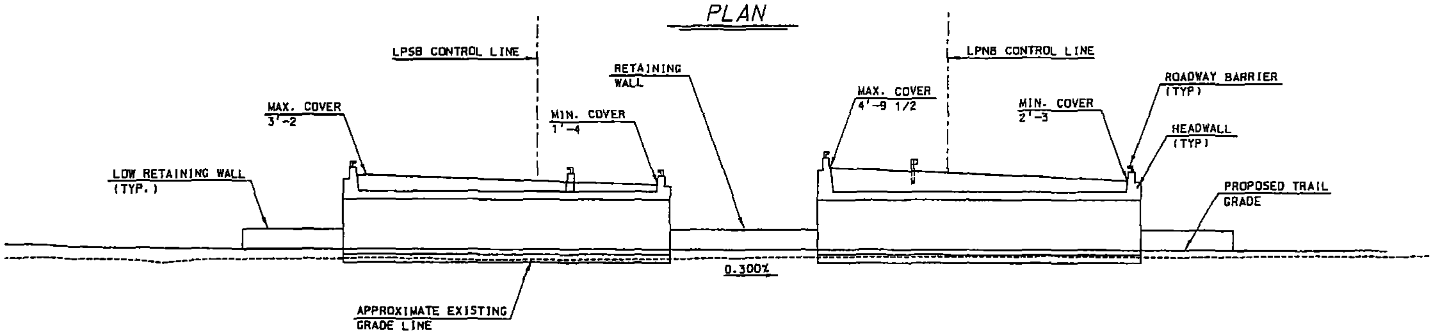


PLAN



LONGITUDINAL SECTION

REVISIONS

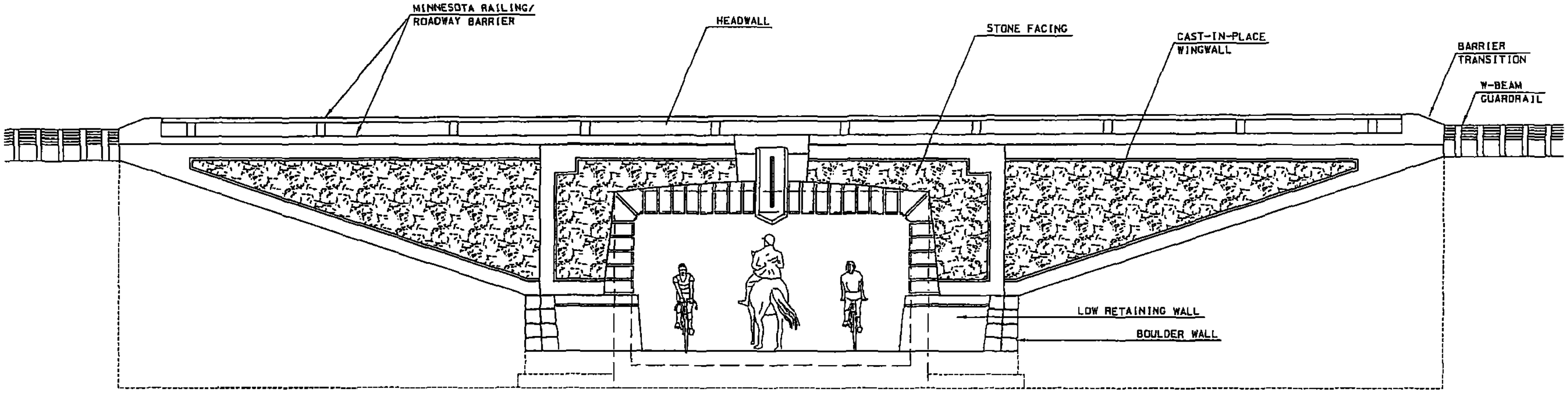
NO.	DATE	BY	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

APPROVAL RECOMM. ______ DATE ______ CONSULTANT DESIGN ENGR.
APPROVED ______ DATE ______ CONSULTANT PROJ. MANAGER
DESIGN DG 2/06 CHECK ______
DRAWN KH 2/06 CHECK ______
QUANT. ______ CHECK ______

LEGACY PARKWAY
LP OVER MILL CREEK TRAIL
SITUATION & LAYOUT 2
PROJECT NUMBER SP-0067 (5) 0

SL / DAVIS
COUNTY
E-
DWG. NO.
SHT. 2 OF X



HEADWALL ELEVATION

REVISIONS

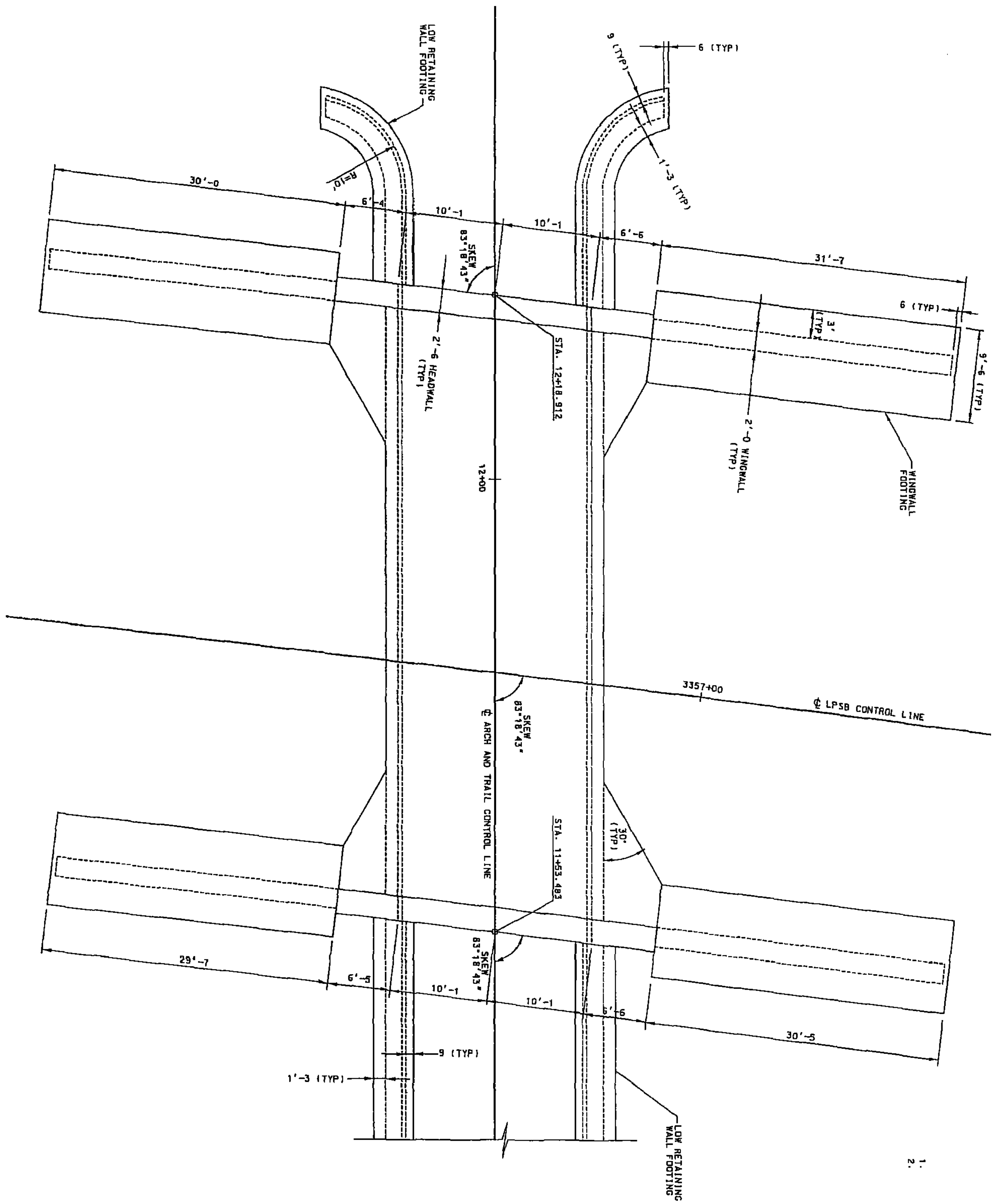
NO.	DATE	BY	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

APPROVAL RECOM. ____ DATE ____ CONSULTANT DESIGN ENGR.
APPROVED ____ DATE ____ CONSULTANT PROJ. MANAGER
DESIGN DAG 5/06 CHECK ____
DRAWN DJC 5/06 CHECK ____
QUANT. ____ CHECK ____

LEGACY PARKWAY
LP OVER MILL CREEK TRAIL
HEADWALL DETAILS
PROJECT NUMBER SP-0067 (5) 0

SL / DAVIS
COUNTY
E-
DWG. NO.
SHT. 3 OF X



NOTES

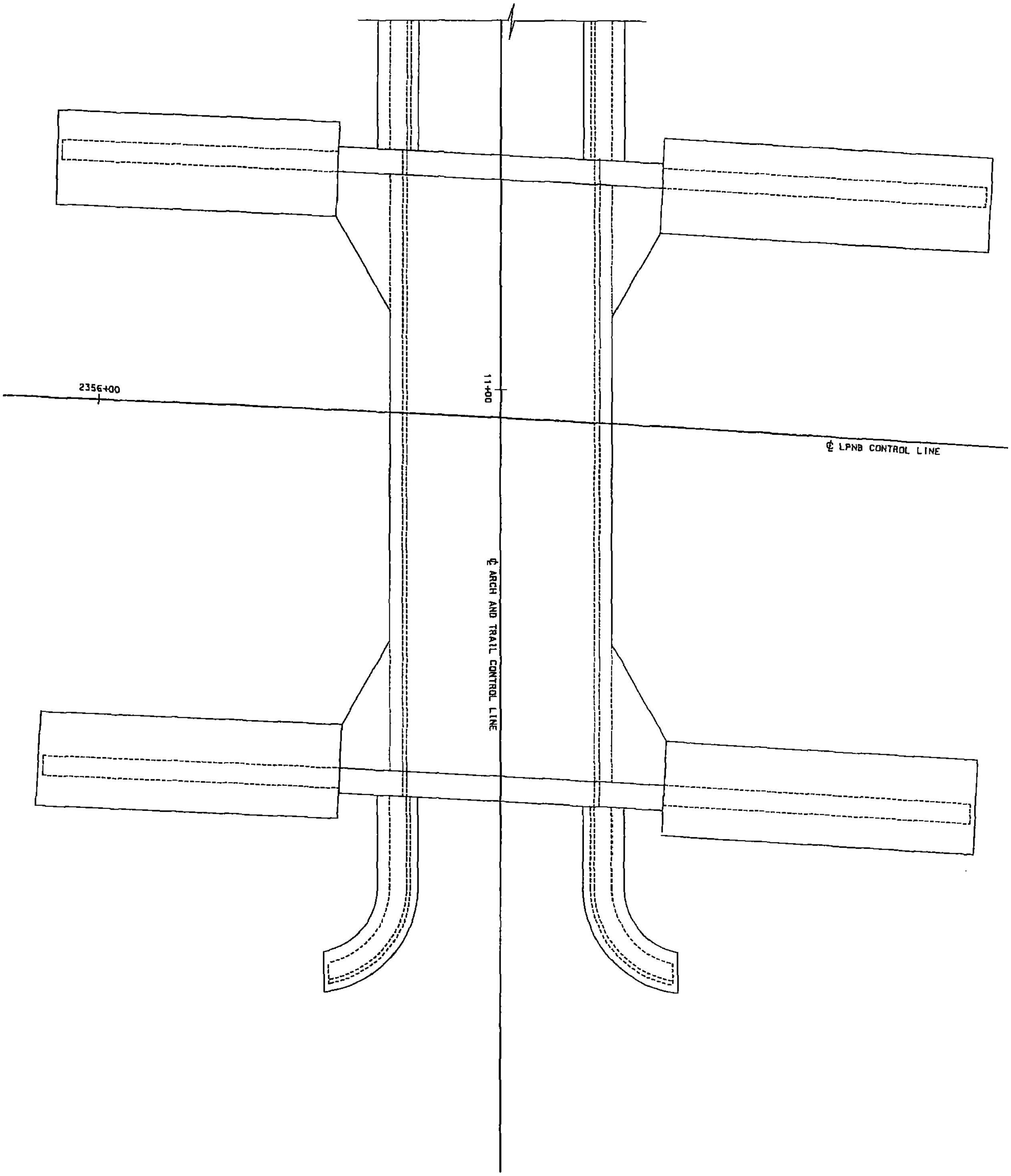
1.
2.

SHT. 5 OF X	DWG. NO. E-	COUNTY SL / DAVIS	LEGACY PARKWAY LP OVER MILL CREEK TRAIL FOUNDATION PLAN PROJECT NUMBER SP-0067 (5) 0	UTAH DEPARTMENT OF TRANSPORTATION SALT LAKE CITY, UTAH STRUCTURES DIVISION

APPROVAL RECOMM. ____ DATE ____ CONSULTANT DESIGN ENGR.	DESIGN DAG 5/06	CHECK
APPROVED ____ DATE ____ CONSULTANT PROJ. MANAGER	DRAWN DJC 5/06	CHECK
	QUANT.	CHECK

REVISIONS

NO.	DATE	BY	REMARKS



NOTES

1:
2:

SHT. 6 OF X
DWG. NO. E–
COUNTY SL / DAVIS

LEGACY PARKWAY
LP OVER MILL CREEK TRAIL
FOUNDATION PLAN
PROJECT NUMBER SP-0067 (5) 0

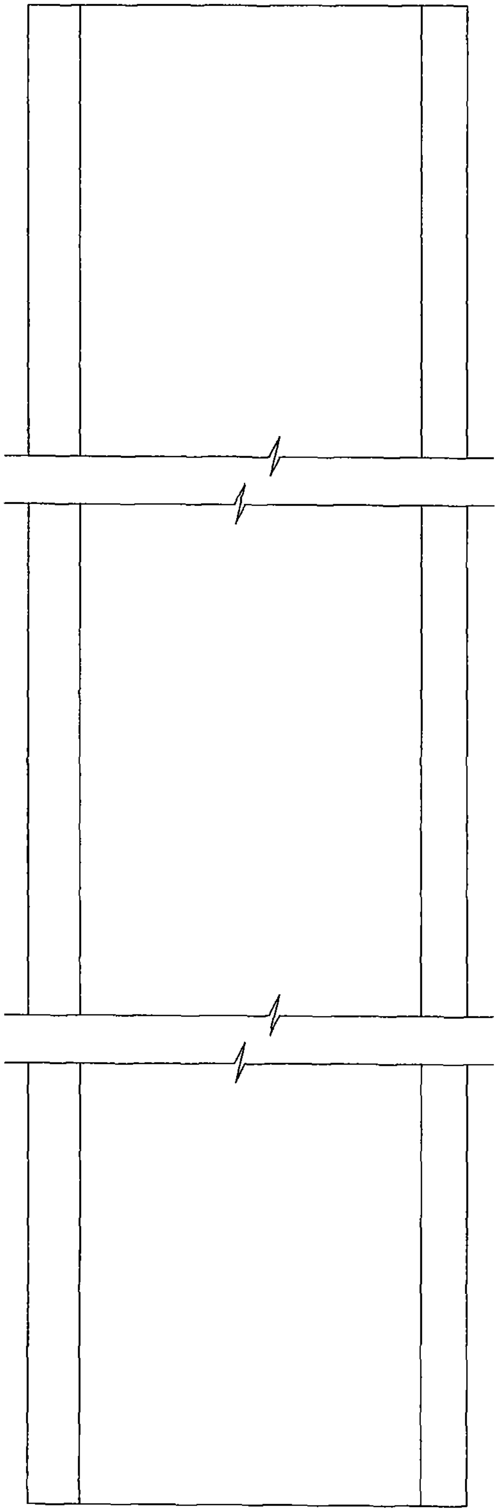
UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

APPROVAL RECOMM. ______ DATE ______ CONSULTANT DESIGN ENGR.
APPROVED ______ DATE ______ CONSULTANT PROJ. MANAGER

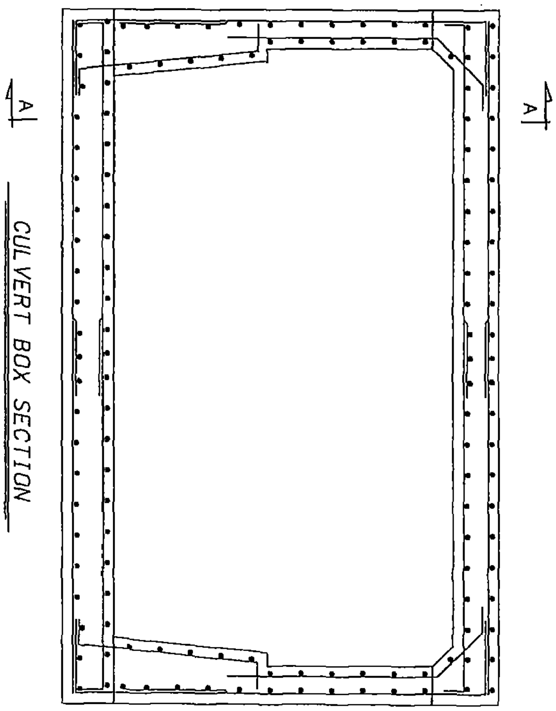
DESIGN DAG 5/06 CHECK ______
DRAWN DJC 5/06 CHECK ______
QUANT. ______ CHECK ______

NO.	DATE	BY	REMARKS

REVISIONS



SECTION A-A



CULVERT BOX SECTION

SHT. 7 OF X
DWG. NO. E-
COUNTY SL / DAVIS

LEGACY PARKWAY
LP OVER MILL CREEK TRAIL
CULVERT BOX DETAILS
PROJECT NUMBER SP-0067 (5) 0

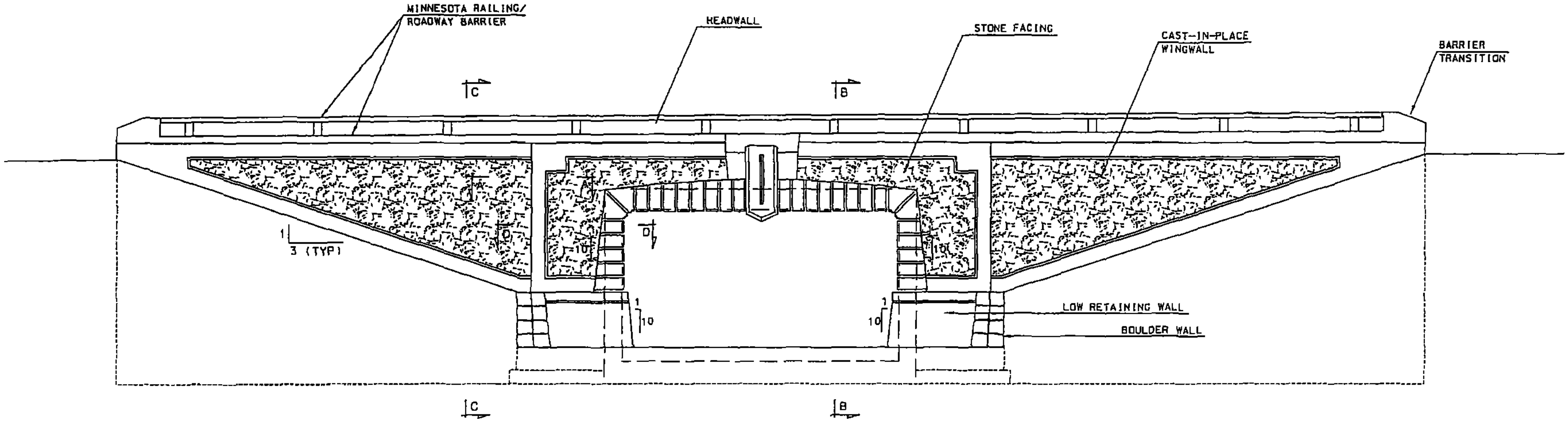
UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

APPROVAL RECOMM. ____ DATE ____ CONSULTANT DESIGN ENGR.
APPROVED ____ DATE ____ CONSULTANT PROJ. MANAGER

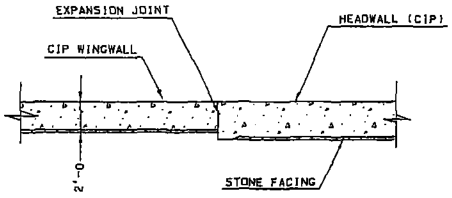
DESIGN DAG 5/06 CHECK
DRAWN DJC 5/06 CHECK
QUANT. CHECK

NO.	DATE	BY	REMARKS

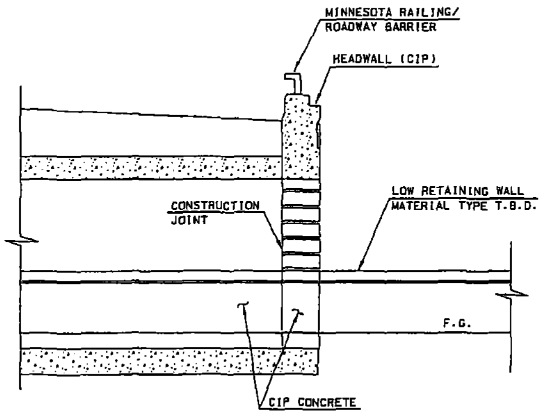
REVISIONS



HEADWALL ELEVATION



SECTION A-A



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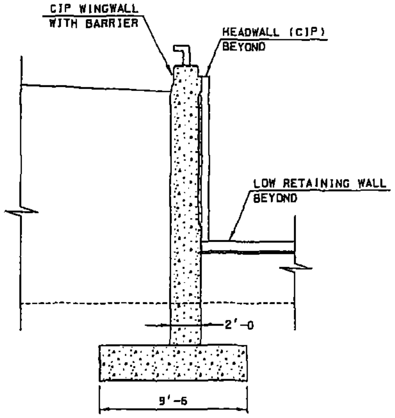

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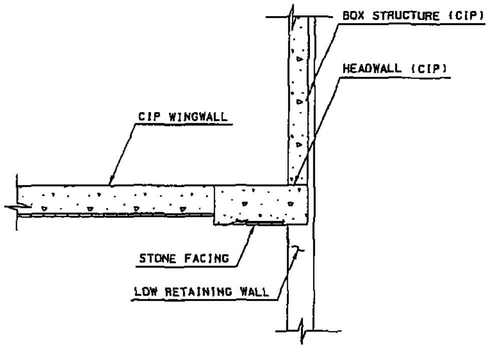

SECTION D-D

NO. DATE BY REMARKS
REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

DESIGN DAG 5/06 CHECK
DRAWN DJC 5/06 CHECK
QUANT. CHECK

APPROVAL RECOMM. DATE CONSULTANT DESIGN ENGR.
APPROVED DATE CONSULTANT PROJ. MANAGER

LEGACY PARKWAY
LP OVER MILL CREEK TRAIL
HEADWALL DETAILS

PROJECT NUMBER SP-0067 (5) 0

SL / DAVIS
COUNTY
E-
DWG. NO.
SHT. 9 OF X

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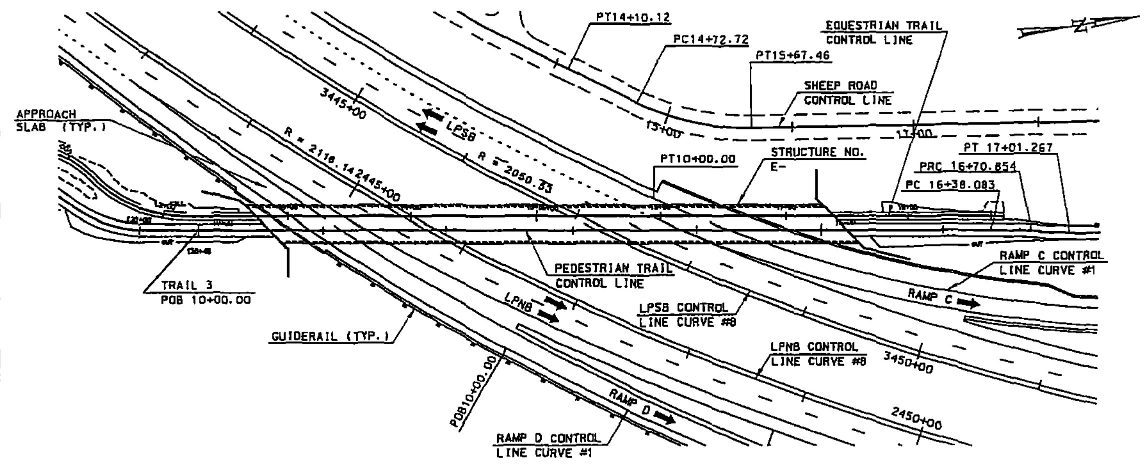
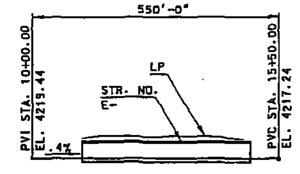
6/7/2006



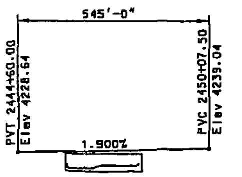
LOCATION PLAN

HORIZONTAL CURVE DATA

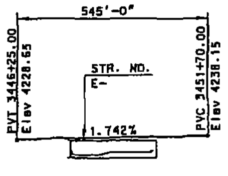
⑧ LPNB-8	⑧ LPSB-8	① RAMP C-1	① RAMP D-1
CURVE DATA	CURVE DATA	CURVE DATA	CURVE DATA
Δ= 43°54'00"	Δ= 43°29'26"	Δ= 20°00'10"	Δ= 22°03'51"
R= 2116.14'	R= 2050.52'	R= 1000.00'	R= 1800.00'
L= 1621.39'	L= 1556.46'	L= 349.11'	L= 693.16'
T= 852.83'	T= 817.88'	T= 176.35'	T= 350.93'
PC STA. 2437+92.13	PC STA. 3438+57.37	PC STA. 10+00.00	PC STA. 10+00.00
PI STA. 2446+44.97	PI STA. 3446+75.25	PI STA. 11+76.35	PI STA. 13+50.93
PT STA. 2454+13.52	PT STA. 3454+13.83	PT STA. 13+49.11	PT STA. 16+93.16



PEDESTRIAN TRAIL PROFILE



LPNB PROFILE



LPSB PROFILE

QUANTITIES

ITEM	ESTIMATED	UNIT	AS CONSTRUCTED
STRUCTURAL CONCRETE (EST. QTY. XXX CY)	1	LS	
REINFORCING STEEL (COATED)	X	LB	
GRANULAR BACKFILL BORROW	X	CY	
DRIVEN PILES	X	FT	
FURNISHING PILE DRIVING EQUIPMENT	1	LS	

INDEX OF SHEETS

GENERAL NOTES:

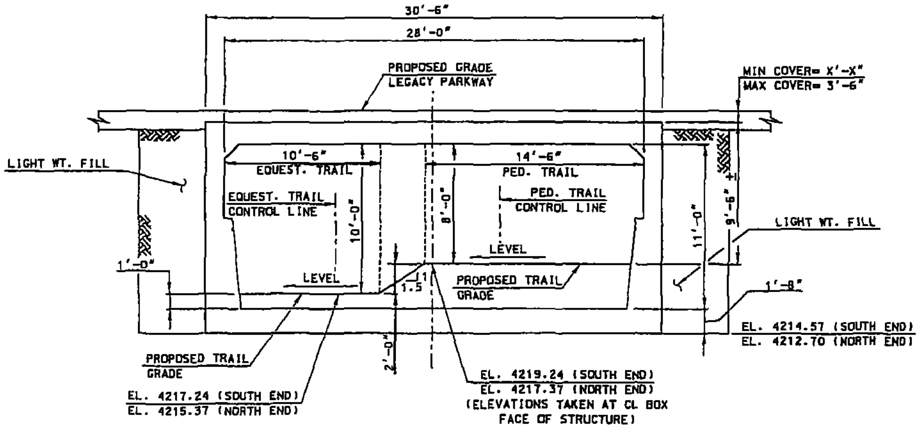
1. USE COATED DEFORMED BILLET-STEEL BARS CONFORMING TO AASHTO M 284 OR M 111 AND M 31 GRADE 60 FOR ALL REINFORCING STEEL.
2. USE STRUCTURAL STEEL CONFORMING TO AASHTO M 270 GRADE 36 EXCEPT WHERE NOTED OTHERWISE.
3. CHAMFER ALL EXPOSED CONCRETE CORNERS XXX " EXCEPT WHERE NOTED OTHERWISE.
4. PROVIDE 2" CONCRETE COVER TO REINFORCING STEEL EXCEPT WHERE NOTED OTHERWISE.
5. USE CLASS AA (AE) CAST-IN-PLACE CONCRETE EXCEPT WHERE NOTED OTHERWISE.
6. HORIZONTAL DIMENSIONS ARE PLAN. VERTICAL DIMENSION ARE PLUMB.

DESIGN DATA:

HL-93 IN ACCORDANCE WITH 3RD EDITION AASHTO LRFD AND INTERIM SPECIFICATIONS THROUGH 2006.
CAST-IN-PLACE CONCRETE: f'c = 4000 psi: fy (REINF.) = 60.000 psi: n=8
PRECAST CONCRETE: f'c = 5000 psi: fy (NONPRESTRESSED) = 60.000 psi: n=6
STRUCTURAL STEEL: fy = 36.000 psi
DESIGN SPEED: 70 mph LEGACY PARKWAY:
SEISMIC: SEISMIC DESIGN PER MCEER/ATC 49
(2475 YR RETURN PERIOD. 3% PE IN 75 YEARS)
Ss = MAX CONSIDERATION EQ GROUND MOTION AT 0.2 = 1.41 g
S1 = MAX CONSIDERATION EQ GROUND MOTION AT 1.0 = 0.59 g
SITE CLASS X
TRAFFIC DATA: 2020 ADT = 37300 LEGACY PARKWAY NORTHBOUND
2020 ADT = 37300 LEGACY PARKWAY SOUTHBOUND
DESIGN MAXIMUM COVER = 3'-6"
DESIGN MINIMUM COVER = X'-X"
SOIL MOIST UNIT WEIGHT = XX #/CF
SOIL SUBMERGED UNIT WEIGHT = XX #/CF

BRIDGE LOAD RATING		
	HL-93	
	RATING	LOCATION
INV.	X.XX	X.XX' F. SERV III
OPER.	X.XX	X.XX' F. STR I

F DENOTES RATING CONTROLLED BY FLEXURE
S DENOTES RATING CONTROLLED BY SHEAR
My AT X.XX' = XXXX K-FT
Vy AT X.XX' = XXX KIPS



SECTION THRU STRUCTURE

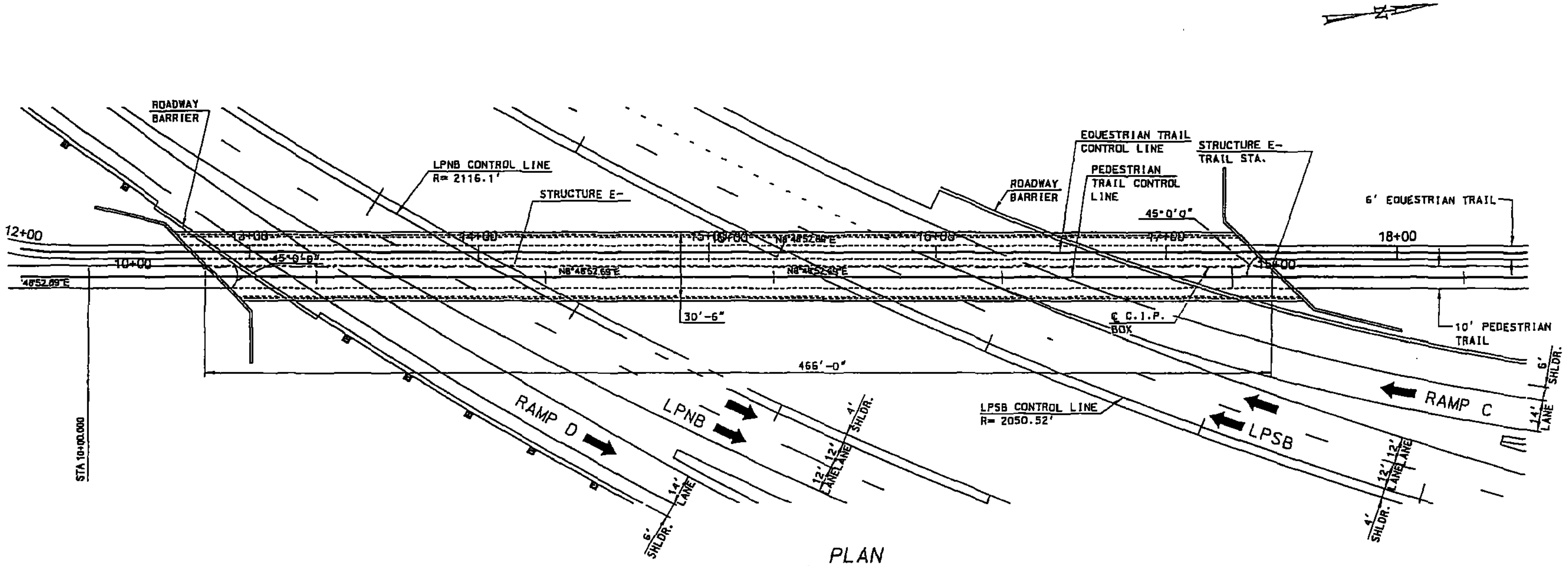
LEGACY PARKWAY
LP OVER D&RG MULTI-USE TRAIL
SITUATION & LAYOUT 1
PROJECT NUMBER SP-0067 (5) 0

UTAH DEPARTMENT OF TRANSPORTATION
REGION 1 - OGDEN, UTAH
STRUCTURES DIVISION
APPROVAL REGION. DATE CONSULTANT DESIGN ENGR.
APPROVED DATE CONSULTANT PROJ. MANAGER
DESIGN DG 2/06 CHECK
DRAWN RA 2/06 CHECK
QUANT. CHECK

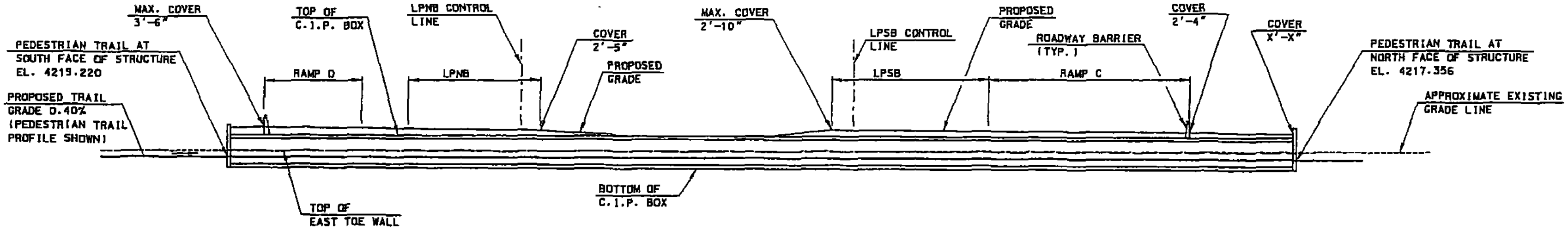
NO.	DATE	BY	REMARKS

REVISIONS

SL / DAVIS
COUNTY
E-XXX
DWG. NO.
SHT. 1 OF X



PLAN



LONGITUDINAL SECTION

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6/7/2006

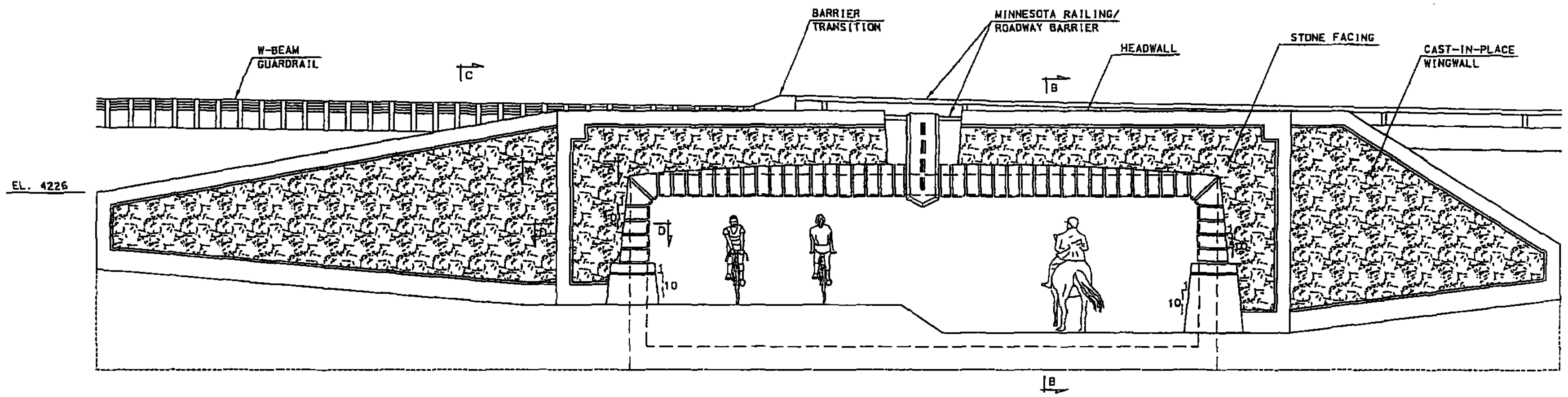
REVISIONS
NO. | DATE | BY | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
REGION 1 - OGDEN, UTAH
STRUCTURES DIVISION

DESIGN WB 2/06 CHECK
DRAWN RA 2/06 CHECK
QUANT. CHECK
APPROVAL RECOMM. DATE CONSULTANT DESIGN ENGR.
APPROVED DATE CONSULTANT PROJ. MANAGER

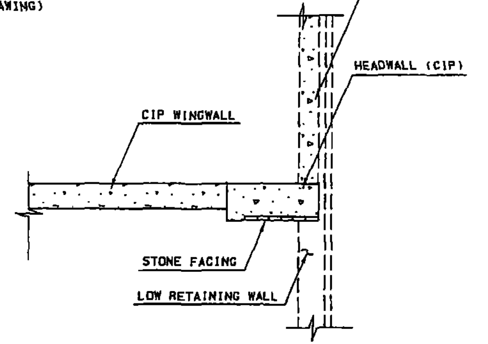
LEGACY PARKWAY
D&RG MULTI-USE TRAIL
SITUATION & LAYOUT 2
PROJECT NUMBER SP-0067 (5) 0

SL / DAVIS
COUNTY
E-XXX
DWG. NO.
SHT. 2 OF X



HEADWALL ELEVATION

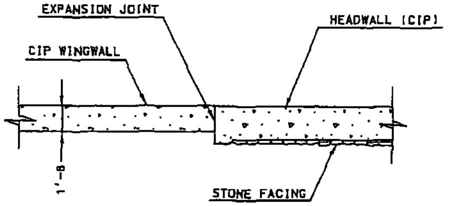
(HEADWALL SKEWED RELATIVE TO BOX - SEE PLAN DRAWING)



SECTION D-D

SECTION B-B

SECTION C-C



SECTION A-A

NO. | DATE | BY | REMARKS
REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

DESIGN | CHECK
DRAWN | CHECK
QUANT. | CHECK
APPROVAL RECOMM. | DATE | CONSULTANT DESIGN ENGR.
APPROVED | DATE | CONSULTANT PROJ. MANAGER

LEGACY PARKWAY
D&RG MULTI-USE TRAIL
SITUATION & LAYOUT 3

PROJECT NUMBER SP-0067 (5) 0

SL / DAVIS
COUNTY

E-XXX
DWG. NO.

SHT. 3 OF X

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6/7/2006

APPENDIX B
Test Hole Logs

LP OVER MILL CREEK TRAIL

E-2572

DRILL HOLE LOG

BORING NO. RSB-39-624

SHEET 1 OF 2

PROJECT: LEGACY PARKWAY - E-2572 (L.P. OVER M-USE TRAIL NEAR MILL CRK.)
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: N ~376,370, E ~56,344
DRILLING METHOD: CME-55 NO. 2 / N.W. CASING
DRILLER: D. SAMPSON
DEPTH TO WATER - INITIAL: ∇ 5.0'   AFTER 24 HOURS: ▼ ARTESIAN'

PROJECT NUMBER: 200601.139
DATE STARTED: 3/13/06
DATE COMPLETED: 3/14/06
GROUND ELEVATION: 4212.4'
LOGGED BY: N. BAILEY, G. PEASLEE

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	2,2,3,(8) *0.60*	CL	gray/gray-brown, very moist, stiff								
4210															
			☒	11	Pushed *0.55*	CL	gray, moist, stiff								
∇	5														
			■	11	4,5,6,(17) *0.70*	CL	brown, moist, stiff								
4205															
	10		☒	12	Pushed *0.62*	CL *(A-7-6(26))*	red-brown, moist, stiff	89	30.7	46	23	0	1	99	CT UC
4200			■	14	3,2,3,(8) *0.51*	CL	gray-brown, moist, stiff								
	15		☒	15	Pushed *0.50*	CL *(A-7-6(26))*	black, moist, firm	86.4	31.2	44	25	0	3	97	TS UC
4195							LEAN CLAY W/SILT LENSES 0.13" TO 6" APART								
	20		■	18	2,2,3,(6) *0.48*	CL	dk. gray, moist, firm								
4190															
	25		☒	15	Pushed *0.38*	CL *(A-7-6(20))*	dk. gray, moist, firm	89.4	32.5	41	21	0	8	92	CT UC
4185															
	30		■	12	2,1,2,(3) *0.34*	CL	gray, moist, firm								
4180															
	35		☒	16	*0.54* Pushed	CL SM	black, moist, stiff								
4175							SILTY SAND								
	40		■	18	7,9,9,(16)	SM *(A-2-4(0))*	gray, wet, med. dense		23.7		NP	0	85	15	
						ML,CL	gray, very moist, firm								
4170							INTERBEDDED LAYERS OF SANDY SILT & LEAN CLAY 2" TO 4" THICK								
	45		☒	18	*0.72* Pushed	ML,CL SP-SM	gray, moist, stiff								
4165			■	18	10,15,20,(28)	SP-SM	gray, wet, dense								
							SAND W/SILT								

RB&G ENGINEERING INC.
PROVO, UTAH

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
TS = Triaxial Shear

🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

LOGV1 COLOR 139 LOGS COLOR.GPJ US EVAL.GDT 10/2/06

DRILL HOLE LOG

BORING NO. RSB-39-624

SHEET 2 OF 2

PROJECT: LEGACY PARKWAY - E-2572 (L.P. OVER M-USE TRAIL NEAR MILL CRK.)
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: N ~376,370, E ~56,344
DRILLING METHOD: CME-55 NO. 2 / N.W. CASING
DRILLER: D. SAMPSON
DEPTH TO WATER - INITIAL: ∇ 5.0' **AFTER 24 HOURS:** ▼ ARTESIAN'
PROJECT NUMBER: 200601.139
DATE STARTED: 3/13/06
DATE COMPLETED: 3/14/06
GROUND ELEVATION: 4212.4'
LOGGED BY: N. BAILEY, G. PEASLEE

Elev. (ft)	Depth (ft)	Lithology	Sample				Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.		Gradation			Other Tests
			Type	Rec. (in)	See Legend	USCS (AASHTO)					Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	
4160								FAT CLAY								
			☒	7	Pushed *0.42*	CH (*A-7-6(55)*)	gray, moist, firm		73.1	48.3	73	49	0	2	98	CT
	55															
4155																
			■	3	8,8,10,(13) *0.59*	CL	gray, moist, stiff	LEAN CLAY W/SILTY SAND LENSES								
	60															
4150																
		🟥	☒	17	Pushed	CL SM	dk. gray, wet									
	65	🟥	■	20	7,14,9,(16) *0.36*	SM	dk. gray, wet, med. dense									
4145		🟥						SILTY SAND W/CLAY LENSES & LAYERS TO 3" THICK								
		🟥	■	14	5,8,15,(16)	SM	gray, wet, med. dense									
	70															
4140																
			☒	17	Pushed *0.65*	CL (*A-6(15)*)	brown, moist, stiff	LEAN CLAY	91.3	29.5	35	14	0	1	99	CT
	75															
4135																
		🟥				SC	brown, wet, med. dense	CLAYEY SAND								
			■	20	6,9,11,(13) *0.65*	CL	gray, moist, stiff	LEAN CLAY								
	80															
4130																
	85															
4125																
	90															
4120																
	95															
4115																

RB&G ENGINEERING INC.
PROVO, UTAH

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
TS = Triaxial Shear

🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

DRILL HOLE LOG

BORING NO. RSB-39-625

SHEET 1 OF 2

PROJECT: LEGACY PARKWAY - E-2572 (L.P. OVER M-USE TRAIL NEAR MILL CRK.)
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER: 200601.139
LOCATION: N ~376,347, E ~56,400
DATE STARTED: 3/14/06
DRILLING METHOD: CME-55 NO. 2 / N.W. CASING
DATE COMPLETED: 3/16/06
DRILLER: D. SAMPSON
GROUND ELEVATION: 4212.4'
DEPTH TO WATER - INITIAL: ∇ ~5.0' **AFTER 24 HOURS:** ▼ ARTESIAN'
LOGGED BY: G. PEASLEE

Elev. (ft)	Depth (ft)	Lithology	Sample				Material Description	Dry Density (pcf)	Moisture Content (%)	Atter.		Gradation			Other Tests
			Type	Rec. (in)	See Legend	USCS (AASHTO)				Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	
			■	16	1,2,3,(8) 0.35	CL	dk. brown to tan, moist, firm organics in top 12"								
4210															
			■	11	4,5,8,(20) 0.86	CL	lt. gray, moist, stiff LEAN CLAY								
	5														
			☒	14	Pushed 0.83	CL (A-7-6(24))	red-brown, moist, stiff	98.7	26.3	44	24	0	5	95	CT UC
4205						SM	SILTY SAND								
	10		■	16	3,3,4,(10) 0.43	CL	red-brown, moist, firm LEAN CLAY W/SAND LENSES								
4200			☒	13	Pushed 0.52	CL	brown, moist, stiff								
	15		■	17	2,2,4,(7) 0.51	CH	gray-green, moist, firm to stiff								
4195															
			☒	19	Pushed 0.56	CH (A-7-6(25))	dk. gray, moist, stiff FAT CLAY W/SAND & SAND LENSES	82.4	38.7	51	31	0	20	80	CT UC
	20														
4190															
			■	18	1,1,5,(6) 0.53	CH	dk. gray, moist, stiff								
	25														
4185															
			☒	13	Pushed 0.54	CH	gray, moist, stiff								
	30														
4180															
			■	19	4,3,3,(5) 0.40	CH	gray, moist, firm								
	35														
4175							FAT CLAY W/SILTY SAND LENSES & LAYERS TO 2" THICK & 1" TO 12" APART								
			■	16	5,5,5,(9)	CH	gray, very moist, firm								
	40														
4170															
			☒	12	Pushed 0.71	CH (A-7-6(39))	green-gray, moist, stiff		24.9	60	42	0	13	87	
	45		■	0	6,9,12,(17)	-									
4165															
			■	14	4,8,8,(12) 0.22	CL	gray, moist, soft SANDY LEAN CLAY W/SAND LENSES 0.25" TO 4" APART		22.4	30	12	0	28	72	

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
TS = Triaxial Shear

🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

RB&G
ENGINEERING
INC.
PROVO, UTAH

OGV1 COLOR 139_LOGS_COLOR.GPJ US EVAL.GDT 10/2/06

DRILL HOLE LOG

BORING NO. RSB-39-625

SHEET 2 OF 2

PROJECT: LEGACY PARKWAY - E-2572 (L.P. OVER M-USE TRAIL NEAR MILL CRK.)

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200601.139

LOCATION: N ~376,347, E ~56,400

DATE STARTED: 3/14/06

DRILLING METHOD: CME-55 NO. 2 / N.W. CASING

DATE COMPLETED: 3/16/06

DRILLER: D. SAMPSON

GROUND ELEVATION: 4212.4'

DEPTH TO WATER - INITIAL: ∇ ~5.0' **AFTER 24 HOURS:** ▼ ARTESIAN'

LOGGED BY: G. PEASLEE

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
4160																
	55		☒	14	Pushed *0.66*	CL *(A-6(8))*	gray, moist, stiff	SANDY LEAN CLAY W/SAND LENSES 0.25" TO 4" APART	101.7	22.8	32	14	0	31	79	UC
4155																
	60		■	14	7,12,16,(20) *0.60*	CL	gray, moist, stiff									
4150								LEAN CLAY								
	65	🟥	☒	14	Pushed	CL SP-SM	gray, wet									
		🟥	■	18	15,20,14,(23)	SP-SM	gray, wet, dense	SAND W/SILT								
4145																
	70		■	18	7,7,10,(11) *0.75*	CL	gray, moist, stiff									
4140																
	75		☒	15	Pushed *0.53*	CL *(A-7-6(24))*	gray, moist, stiff	LEAN CLAY W/SAND LENSES	89.7	32.3	42	23	0	1	99	CT UC
4135																
	80		■	18	6,7,11,(11) *0.56*	CL	gray, moist, stiff									
4130																
	85		■	16	10,10,13,(14) *0.62*	CL	gray, moist, stiff	SANDY LEAN CLAY W/SAND LAYERS								
4125								SILTY SAND								
	90		■	18	8,24,23,(27) *0.35*	SM,CL	gray, wet, dense	SILTY SAND W/7" LEAN CLAY LAYER								
4120																
	95		■	14	8,9,10,(11) *0.71*	SM,CL CL	gray-green, moist, stiff	LEAN CLAY								
4115																

_OGV1_COLOR 139_LOGS_COLOR.GPJ US EVAL.GDT 10/2/06

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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
TS = Triaxial Shear

🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

DRILL HOLE LOG

BORING NO. RSB-39-626

SHEET 1 OF 2

PROJECT: LEGACY PARKWAY - E-2572 (L.P. OVER M-USE TRAIL NEAR MILL CRK.)

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200601.139

LOCATION: N ~376,290, E ~56,430

DATE STARTED: 3/16/06

DRILLING METHOD: CME-55 NO. 2 / N.W. CASING

DATE COMPLETED: 3/20/06

DRILLER: D. SAMPSON

GROUND ELEVATION: 4212.4'

DEPTH TO WATER - INITIAL: ▽ ~5.0' **AFTER 24 HOURS:** ▼ ARTESIAN'

LOGGED BY: G. PEASLEE

			Sample				Material Description				Atter.		Gradation			
Elev. (ft)	Depth (ft)	Lithology	Type	Rec. (in)	See Legend	USCS (AASHTO)			Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
			■	16	1,1,3,(6) *0.45*	CL	brown, moist, firm	organics in top 12"								
4210																
			☒	15	Pushed *0.76*	CL *(A-7-6(25))*	lt. gray, moist, stiff		95.6	26	43	23	0	1	99	CT UC
	5							LEAN CLAY W/SILT LENSES & SAND LAYERS TO 1" THICK								
			■	14	3,4,6,(16) *0.50*	CL	red-brown, moist, stiff									
4205																
	10		☒	12	Pushed *0.50*	CL *(A-7-6(29))*	red-brown, moist, firm		87.6	29.4	47	26	0	1	99	CT UC
4200			■	18	1,2,3,(8) *0.65*	CL	brown, moist, stiff	LEAN CLAY W/SILT LENSES 0.13" TO 0.5" APART								
	15															
			☒	16	Pushed *0.59*	CH *(A-7-6(36))*	gray, moist, stiff			30.8	56	36	0	5	95	
4195			■	18	2,3,4,(9) *0.52*	CH	green-gray, moist, stiff	FAT CLAY W/SAND LAYERS TO 1.5" THICK & 4" TO 12" APART								
	20															
4190																
	25		☒	16	Pushed *0.53*	CH *(A-7-6(42))*	dk. gray, moist, stiff		94.8	28.9	61	36	0	0	100	CT
4185								FAT CLAY W/SILT LENSES								
	30		■	11	2,2,2,(4) *0.30*	CH	gray, moist, firm									
4180																
	35		☒	14	Pushed *0.40*	CH	gray, moist, firm									
4175																
	40		■	13	3,12,8,(17) *0.61*	CH,SM	gray, moist/wet, med. dense	FAT CLAY W/SAND LAYERS TO 4" THICK								
4170																
	45		☒	14	Pushed *0.69*	CH *(A-7-6(44))*	gray, moist, stiff	FAT CLAY W/SAND LENSES	93.8	29.6	68	47	0	13	87	CT UC
4165								SILTY SAND W/CLAY LAYERS TO 2" THICK & FROM 2" TO 4" APART								
			■	18	8,8,20,(22)	SM	green-gray, wet, med. dense									

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PROVO, UTAH

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
TS = Triaxial Shear

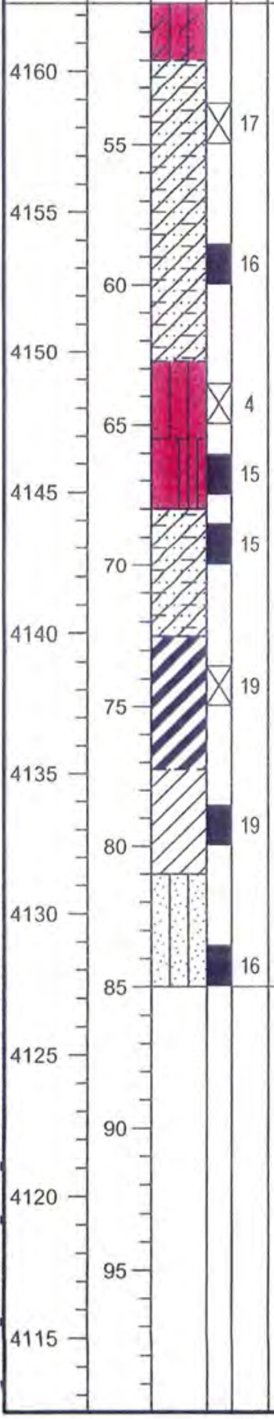
🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

DRILL HOLE LOG

BORING NO. RSB-39-626

SHEET 2 OF 2

PROJECT: LEGACY PARKWAY - E-2572 (L.P. OVER M-USE TRAIL NEAR MILL CRK.)
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER: 200601.139
LOCATION: N ~376,290, E ~56,430
DATE STARTED: 3/16/06
DRILLING METHOD: CME-55 NO. 2 / N.W. CASING
DATE COMPLETED: 3/20/06
DRILLER: D. SAMPSON
GROUND ELEVATION: 4212.4'
DEPTH TO WATER - INITIAL: ∇ ~5.0' **AFTER 24 HOURS:** ▼ ARTESIAN'
LOGGED BY: G. PEASLEE



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 SAND W/CLAY LAYERS TO 2" THICK & FROM 2" TO 4" APART								
☒	17	Pushed *0.69*	CL	gray-brown, moist, stiff	LEAN CLAY W/SAND LENSES 2" TO 8" APART								
■	16	7,9,13,(16) *0.40*	CL	brown, moist, firm									
☒	4	Pushed	SM	gray, wet	SILTY SAND								
■	15	8,15,23,(25)	SP-SM	gray, wet, dense	SAND W/SILT								
■	15	4,3,4,(5) *0.52*	CL	gray, moist, stiff	LEAN CLAY W/SILT LENSES								
☒	19	Pushed *0.85*	CH (*A-7-6(35)*)	gray-brown, moist, stiff	FAT CLAY	88.1	32.4	54	32	0	2	98	CT UC
■	19	5,7,6,(8) *0.72*	CL	brown, moist, stiff	LEAN CLAY								
■	16	8,31,45,(45)	SM (*A-2-4(0)*)	gray, wet, very dense	SILTY SAND		18		NP	0	86	14	

_LOGV1_COLOR_139_LOGS_COLOR.GPJ US EVAL.GDT 10/2/06

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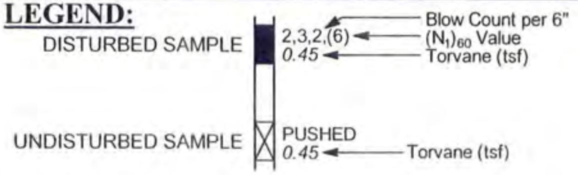
LEGEND:



OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
TS = Triaxial Shear

🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

DRILL HOLE LOG

BORING NO. RSB-39-627

SHEET 1 OF 2

PROJECT: LEGACY PARKWAY - E-2572 (L.P. OVER M-USE TRAIL NEAR MILL CRK.)
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER: 200601.139
LOCATION: N ~376,268, E ~56,486
DATE STARTED: 3/20/06
DRILLING METHOD: CME-55 NO. 2 / N.W. CASING
DATE COMPLETED: 3/22/06
DRILLER: D. SAMPSON
GROUND ELEVATION: 4212.5'
DEPTH TO WATER - INITIAL: ∇ ~SURFACE' **AFTER 24 HOURS:** ▼ ARTESIAN'
LOGGED BY: G. PEASLEE

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	2,2,5,(11) *0.51*	CL	dk. brown, moist, stiff	organics in top 12"								
☒	16	Pushed *0.70*	CL *(A-6(21))*	red-brown, moist, stiff		104.3	26.2	40	19	0	0	100	UC
■	14	3,4,5,(14) *0.32*	CL	lt. brown, moist, firm	LEAN CLAY W/SAND LENSES UP TO 12" APART								
☒	14	Pushed *0.72*	CL *(A-7-6(25))*	red-brown, moist, stiff		98.4	28	45	23	0	2	98	UC
■	18	2,2,4,(9) *0.60*	CL	brown, moist, stiff									
☒	17	Pushed *0.78*	CH *(A-7-6(32))*	gray, moist, stiff		97.7	27.5	55	33	0	11	89	UC
■	17	2,1,2,(4) *0.28*	CH	gray, moist, soft	FAT CLAY W/SAND LENSES & LAYERS TO 1" THICK & 3" TO 12" APART								
☒	14	Pushed *0.50*	CH	gray, moist, stiff									
■	5.5	2,2,2,(4) *0.25*	CH	gray, moist, soft									
					FAT CLAY								
☒	19	Pushed *0.47*	CH *(A-7-6(36))*	dk. gray, moist, firm		76	45.1	54	33	0	2	98	CT UC
■	16	6,8,6,(13)	SP-SM	gray, wet, med. dense	SAND W/SILT								
☒	14	Pushed *0.80*	CL	gray, moist, stiff	SANDY LEAN CLAY W/SAND LAYERS TO 3" THICK & UP TO 10" APART								
■	18	6,5,10,(12) *0.75*	CL	gray, moist, stiff									

Elev. (ft): 4210, 4205, 4200, 4195, 4190, 4185, 4180, 4175, 4170, 4165

Depth (ft): 5, 10, 15, 20, 25, 30, 35, 40, 45

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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
TS = Triaxial Shear

🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

DRILL HOLE LOG

BORING NO. RSB-39-627

SHEET 2 OF 2

PROJECT: LEGACY PARKWAY - E-2572 (L.P. OVER M-USE TRAIL NEAR MILL CRK.)
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: N ~376,268, E ~56,486
DRILLING METHOD: CME-55 NO. 2 / N.W. CASING
DRILLER: D. SAMPSON
DEPTH TO WATER - INITIAL: ∇ ~SURFACE' **AFTER 24 HOURS:** ▼ ARTESIAN'
PROJECT NUMBER: 200601.139
DATE STARTED: 3/20/06
DATE COMPLETED: 3/22/06
GROUND ELEVATION: 4212.5'
LOGGED BY: G. PEASLEE

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
4160																
	55		☒	18	Pushed 0.66	CL (A-7-6(21))	gray, moist, stiff	LEAN CLAY	95.2	26.8	41	20	0	3	97	UC
4155																
	60		■	16	7,13,17,(22) 0.80	CL	brown, moist, stiff									
4150		🟥	☒	8	Pushed	SP-SM	gray, wet	SAND W/SILT								
	65	🟥	■	16	9,10,11,(15)	SP-SM (A-1-b(0))	gray, wet, med. dense			23		NP	0	92	8	
4145			☒	15	0.47	CL	gray, moist, firm	LEAN CLAY								
	70	🟥			Pushed	SM	gray, wet, loose	SANDY SILT								
			■	14	6,7,9,(11) 0.42	SM CL	gray, moist, firm									
4140																
	75		■	16	7,8,12,(13) 0.70	CL	brown, moist, stiff	LEAN CLAY								
4135																
	80		☒	14	Pushed 0.40	CL (A-7-6(21))	gray, moist, firm		90.6	27.7	41	19	0	1	99	CT UC
4130																
	85		■	13	10,10,10,(12) 0.42	CL	gray, moist, firm	LEAN CLAY W/SILTY SAND LAYERS TO 1.5" THICK & FROM 2" TO 4" APART								
4125						CL	brown, moist	LEAN CLAY								
		🟥	■	16	10,13,13,(16)	SM	gray, wet, med. dense	SILTY SAND								
	90					CL	gray, moist	LEAN CLAY								
4120		🟥	☒	10	Pushed 0.35	SP-SM	gray, wet	SAND W/SILT								
	95					CL	gray, moist, firm									
4115								LEAN CLAY W/SILTY SAND LAYERS TO 3" THICK								
			■	3	39,39,39,(45) 0.75	CL	gray, moist, stiff									

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PROVO, UTAH

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
TS = Triaxial Shear

🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

LP OVER MULTI-USE TRAIL & D&RGW RR

E-2573

DRILL HOLE LOG

BORING NO. RSB-X3-628

SHEET 1 OF 2

PROJECT: LEGACY PARKWAY - STR. E-2573 (L.P. OVER M-USE TRAIL & D&RGW RR)
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: N 382,594, E 62,862
DRILLING METHOD: CME-55 NO. 2 / N.W. CASING W/TRICONE BIT
DRILLER: D. SAMPSON
DEPTH TO WATER - INITIAL: ∇ N.M. **AFTER 24 HOURS:** ▼ 5.6'
PROJECT NUMBER: 200601.143
DATE STARTED: 2/24/06
DATE COMPLETED: 2/27/06
GROUND ELEVATION: 4220.9'
LOGGED BY: G. PEASLEE

Elev. (ft)	Depth (ft)	Lithology	Sample				Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.		Gradation			Other Tests
			Type	Rec. (in)	See Legend	USCS (AASHTO)					Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	
4220			■	11	4,14,11,(39)	GP	black, moist, loose	GRAVEL								
						SP	lt. gray, moist, loose	SAND								
						GM	black, moist, loose	SILTY GRAVEL								
4215	▼ 5		■	15	4,3,4,(11) *0.43*	CL	brown to gray, moist, firm	LEAN CLAY								pH Resist. Sulfate
4210	10		☒	13	Pushed *0.62*	CL *(A-6(19))*	gray-red, moist, stiff		105.8	24.2	38	20	0	7	93	UC
4205	15		■	18	4,5,5,(12) *0.85*	CL	brown, moist, stiff									
4200	20		☒	13	Pushed *0.63*	CL *(A-7-6(25))*	green-gray, moist, stiff	LEAN CLAY W/SAND LENSES	86.8	33	43	24	0	3	97	CT
4195	25		■	20	0/10",1,1,(2) *0.36*	CL	gray, moist, firm									
4190	30		☒	14	Pushed *0.30*	CL	dk. gray, moist, firm	LEAN CLAY								
		🟥				SM	dk. gray, wet	SILTY SAND								
4185	35		■	18	2,3,4,(6) *0.52*	CL	gray, moist, stiff	LEAN CLAY W/SILTY SAND LAYERS TO 3" THICK								
4180	40		☒	16	Pushed *0.55*	CL *(A-7-6(23))*	gray, moist, stiff		101.9	23.6	45	23	0	7	93	UC
			■	20	3,3,4,(6) *0.40*	CL	gray, moist, firm	LEAN CLAY W/SILTY SAND LENSES								
4175	45		■	19	3,3,4,(5) *0.40*	CL	gray, moist, firm									
								FAT CLAY								

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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
TS = Triaxial Shear
CBR = California Bearing Ratio
🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

DRILL HOLE LOG

BORING NO. RSB-X3-628

SHEET 2 OF 2

PROJECT: LEGACY PARKWAY - STR. E-2573 (L.P. OVER M-USE TRAIL & D&RGW RR)
CLIENT: UTAH DEPARTMENT OF TRANSPORTATION
LOCATION: N 382,594, E 62,862
DRILLING METHOD: CME-55 NO. 2 / N.W. CASING W/TRICONE BIT
DRILLER: D. SAMPSON
DEPTH TO WATER - INITIAL: ▽ N.M. **AFTER 24 HOURS:** ▼ 5.6'

PROJECT NUMBER: 200601.143
DATE STARTED: 2/24/06
DATE COMPLETED: 2/27/06
GROUND ELEVATION: 4220.9'
LOGGED BY: G. PEASLEE

			Sample							Atter.		Gradation			
Elev. (ft)	Depth (ft)	Lithology	Type	Rec. (in)	See Legend	USCS (AASHTO)	Material Description	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	Other Tests
4170		▨	☒	20	Pushed 0.26	CH (A-7-6(36))	gray, moist, firm FAT CLAY	113.1	29	55	32	0	1	99	CT
4165	55	▨	■	20	4,5,7,(9) 0.65	CH	gray, wet, stiff FAT CLAY W/SILTY SAND LENSES								
4160	60	🟥	☒	12	Pushed	SM	SILTY SAND gray, wet, artesian at 61'								
		▨	■	4	10,11,26,(25) 0.75	CL	gray, moist, stiff LEAN CLAY W/SAND								
	65	🟥				SM	gray, wet, med. dense SILTY SAND								
4155		▨	■	15	8,7,14,(14) 0.50,0.30	CL	gray, moist, firm SANDY LEAN CLAY								
4150	70	▨	☒	19	Pushed 0.50	CL (A-7-6(15))	gray, moist, firm	89	33	44	24	0	31	69	CT UC
		▨				SC (A-7-6(7))	gray, moist CLAYEY SAND		21.9	43	25	0	53	47	
4145	75	▨	■	20	5,7,8,(9) 0.62	CL	gray, moist, stiff LEAN CLAY								
4140	80	▨	☒	14	Pushed 0.28	CL (A-6(14))	dk. gray, very moist, firm		28.9	33	15	0	4	96	
		▨	■	20	5,3,5,(5) 0.20	CL	dk. gray, very moist, soft								
4135	85														
4130	90														
4125	95														

RB&G ENGINEERING INC.
PROVO, UTAH

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
TS = Triaxial Shear
CBR = California Bearing Ratio
🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

DRILL HOLE LOG

BORING NO. RSB-X3-629

SHEET 1 OF 2

PROJECT: LEGACY PARKWAY - STR. E-2573 (L.P. OVER M-USE TRAIL & D&RGW RR)

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

LOCATION: N 382,234, E 62,804

DRILLING METHOD: CME-55 NO. 2 / N.W. CASING W/TRICONE BIT

DRILLER: D. SAMPSON

DEPTH TO WATER - INITIAL: ▽ 6.0' **AFTER 24 HOURS:** ▼ 6.7'

PROJECT NUMBER: 200601.143

DATE STARTED: 2/27/06

DATE COMPLETED: 2/28/06

GROUND ELEVATION: 4221.6'

LOGGED BY: C. SANBORN

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
4220			■	11	5,7,10,(26)	GP-GM (*A-1-a*)	dk. gray to tan, slightly moist, med. dense	GRAVEL W/SAND & SILT		2.3		NP	66	29	5	
4215	5		■	14	4,5,8,(20) *0.55*	GP-GM CL	black-brown, moist, loose dk. brown, slightly moist, stiff									
	▽ ▼															
4210	10		☒	11	Pushed *0.89*	CL (*A-7-6(27)*)	lt. gray & lt. brown, moist, stiff		97.8	25	47	27	0	7	93	CT UC
4205	15		☒	12	Pushed *0.73*	CL (*A-6(18)*)	lt. gray & lt. brown, moist, stiff	LEAN CLAY W/SAND LENSES 1" TO 3" APART	102.7	25	37	17	0	2	98	UC
4200	20		■	19	2,2,3,(5) *0.40*	CL	lt. gray w/some brown, moist, firm									
4195	25		☒	16	Pushed *0.38*	CL (*A-6(19)*)	lt. gray w/some brown, moist, firm		91.6	33.2	39	17	0	3	97	UC
4190	30		■	17	3,6,12,(18) *0.17*	CL,SM	clay - lt. gray, moist, soft sand - gray, wet, med. dense	INTERBEDDED LAYERS OF LEAN CLAY & SILTY SAND 1.5" TO 6" THICK								
	35															
4185		🟥	■	15	2,1,2,(3) *0.35*	SM CL	lt. gray, wet, loose lt. gray, very moist, firm	SILTY SAND								
4180	40		☒	12	Pushed *0.72*	CL (*A-7-6(31)*)	lt. gray, very moist, stiff	LEAN CLAY	85.1	31.5	49	28	0	1	99	CT UC
4175	45		■	18	3,4,5,(7) *0.45*	CL	lt. gray, moist, firm									
		🟥						SILTY SAND								

OGV1_COLOR X3_LOGS_COLOR.GPJ US EVAL.GDT 8/22/06

RB&G ENGINEERING INC.
PROVO, UTAH

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
TS = Triaxial Shear
CBR = California Bearing Ratio
🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

DRILL HOLE LOG

BORING NO. RSB-X3-629

PROJECT: LEGACY PARKWAY - STR. E-2573 (L.P. OVER M-USE TRAIL & D&RGW RR)

SHEET 2 OF 2

CLIENT: UTAH DEPARTMENT OF TRANSPORTATION

PROJECT NUMBER: 200601.143

LOCATION: N 382,234, E 62,804

DATE STARTED: 2/27/06

DRILLING METHOD: CME-55 NO. 2 / N.W. CASING W/TRICONE BIT

DATE COMPLETED: 2/28/06

DRILLER: D. SAMPSON

GROUND ELEVATION: 4221.6'

DEPTH TO WATER - INITIAL: ▽ 6.0' **AFTER 24 HOURS:** ▼ 6.7'

LOGGED BY: C. SANBORN

Elev. (ft)	Depth (ft)	Lithology	Sample				Material Description		Dry Density (pcf)	Moisture Content (%)	Atter.		Gradation			Other Tests
			Type	Rec. (in)	See Legend	USCS (AASHTO)					Liquid Limit	Plast. Index	Gravel (%)	Sand (%)	Silt/Clay (%)	
		🟥	☒	19	Pushed *0.77*	SM CL	gray, moist lt. gray, moist, stiff	LEAN CLAY								
4170																
	55		■	19	2,3,8,(8) *0.25*	CL,SM	clay - lt. gray, moist, firm sand - gray, wet, loose	INTERBEDDED LAYERS OF LEAN CLAY & SILTY SAND 0.25" TO 4" THICK								
4165																
	60	🟥	☒	0	Pushed	-										
4160		🟥	■	8	6,10,13,(16)	SM	gray, wet, med. dense	SILTY SAND								
	65		■	20	19,28,35,(42)	SM *(A-1-b)*	gray, wet, dense			14.5		NP	4	78	18	
4155																
			■	20	12,20,13,(22) *0.45*	SM	gray, wet, dense artesian at 70'	SILTY SAND W/CLAY LENSES & LAYERS TO 2" THICK								
	70															
4150																
	75		☒	14	Pushed *0.40*	CL *(A-7-6(28))*	gray, moist, firm	LEAN CLAY	87.6	34.9	48	28	0	1	99	CT UC
4145																
	80		■	19	4,6,5,(7) *0.38*	CL	gray, very moist, firm	LEAN CLAY W/SILTY SAND LAYERS 0.25" THICK & 0.5" TO 1.5" APART								
4140																
	85															
4135			■	20	12,28,40,(40) *0.61*	SP-SM CL-ML SM	gray, wet, dense gray, moist, stiff gray, wet, dense	SAND W/SILT SILTY LEAN CLAY SILTY SAND								
	90															
4130																
	95															
4125																

RB&G ENGINEERING INC.
PROVO, UTAH

LEGEND:

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

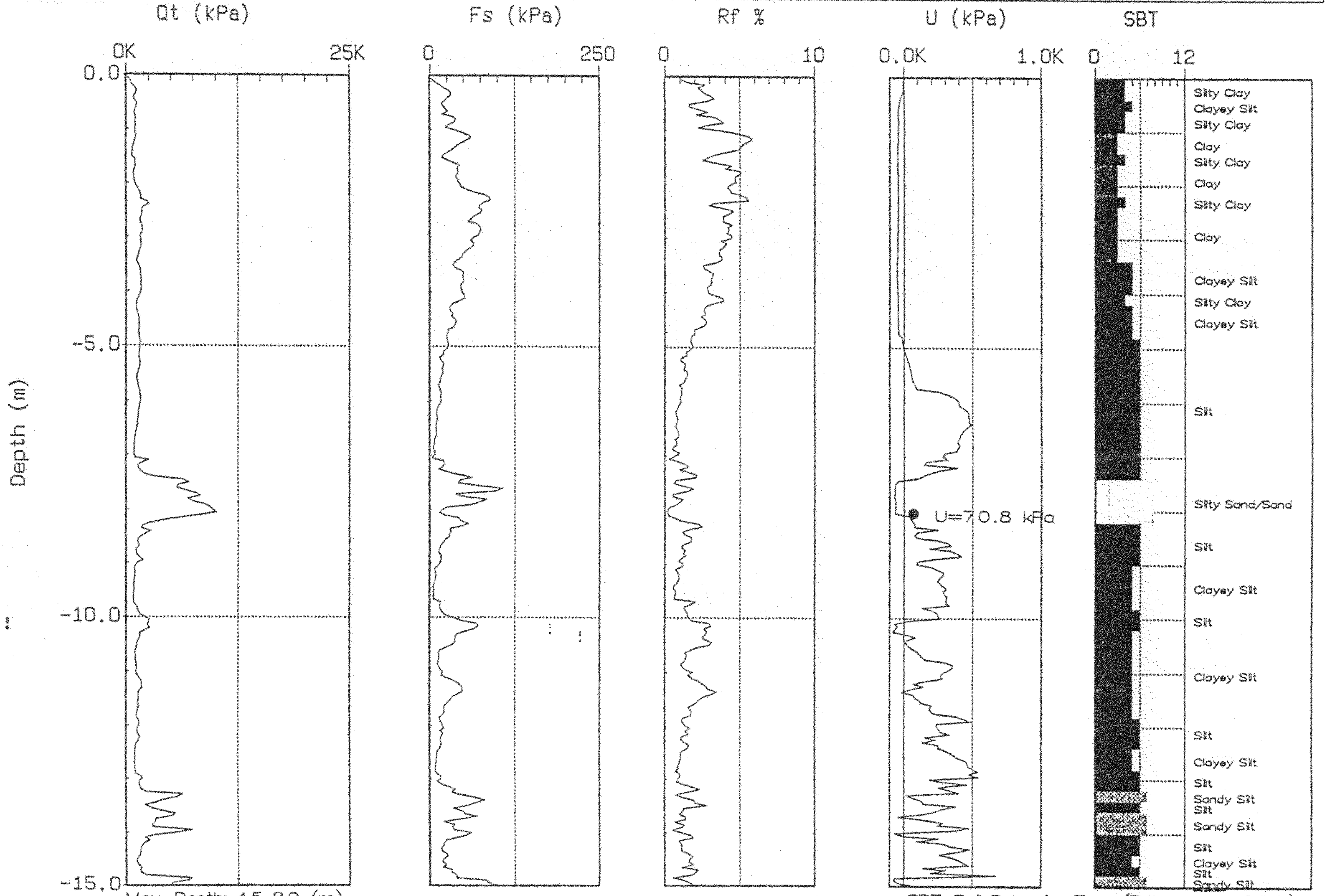
UNDISTURBED SAMPLE ☒ PUSHED *0.45* ← Torvane (tsf)

OTHER TESTS
UC = Unconfined Compression
CT = Consolidation
DS = Direct Shear
TS = Triaxial Shear
CBR = California Bearing Ratio
🟥 = Potential Liquefaction
🟦 = Potential Liquefaction & Lateral Spread

Legacy Parkway

S SC-13-306
Station: 6013+251.717 15.39 RT
Elevation: 1284.641

Cone: 20 TON A 8
Date: 01:18:00 08:43



Max. Depth: 45.80 (m)

Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

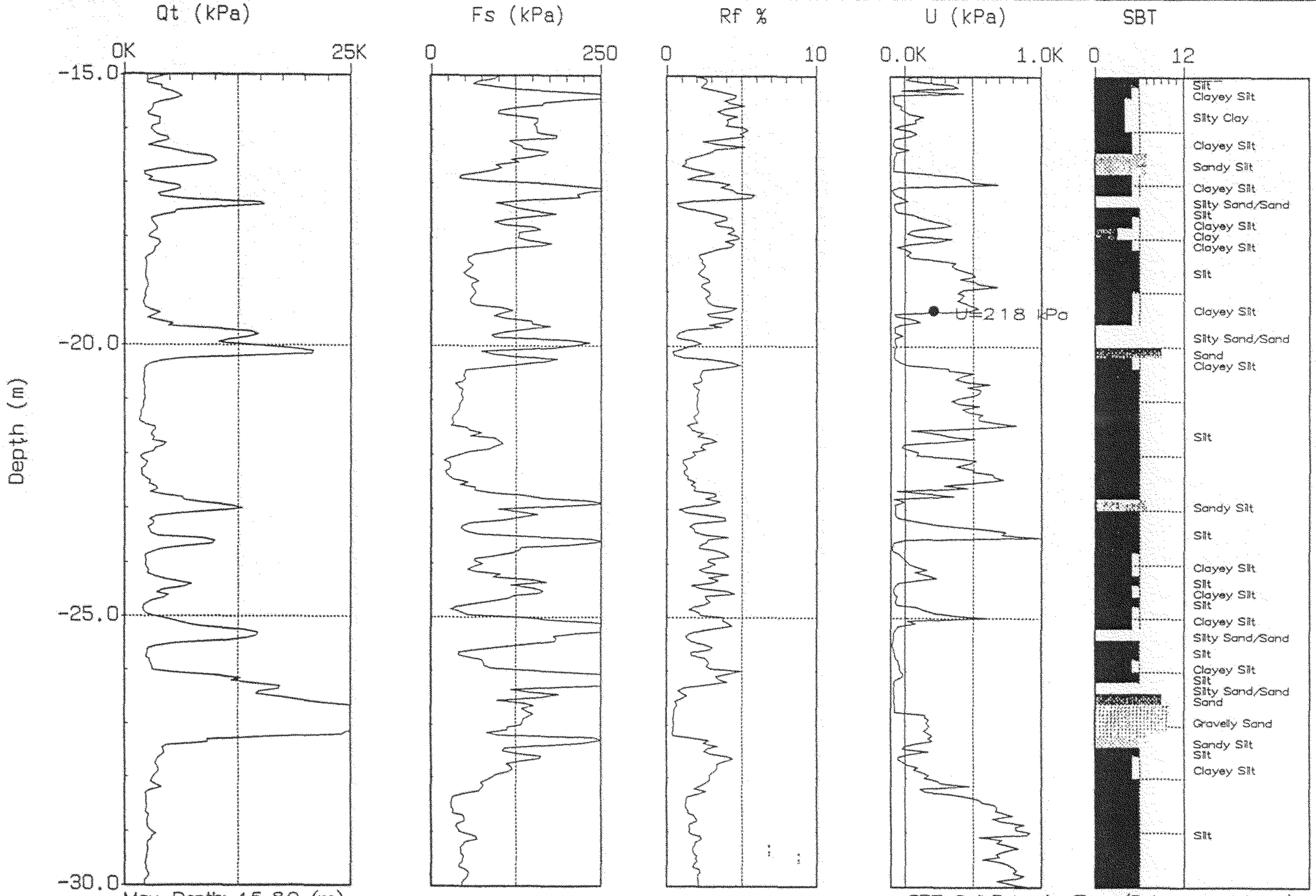
● Equilibrium (or near) Pore Pressure from Dissipation

PLATE B-126

Legacy Parkway

Site: SC-13-306
Station: 6013+251.717 15.39 RT
Elevation: 1284.641

Cone: 20 TON A 058
Date: 01:18:00 08:43



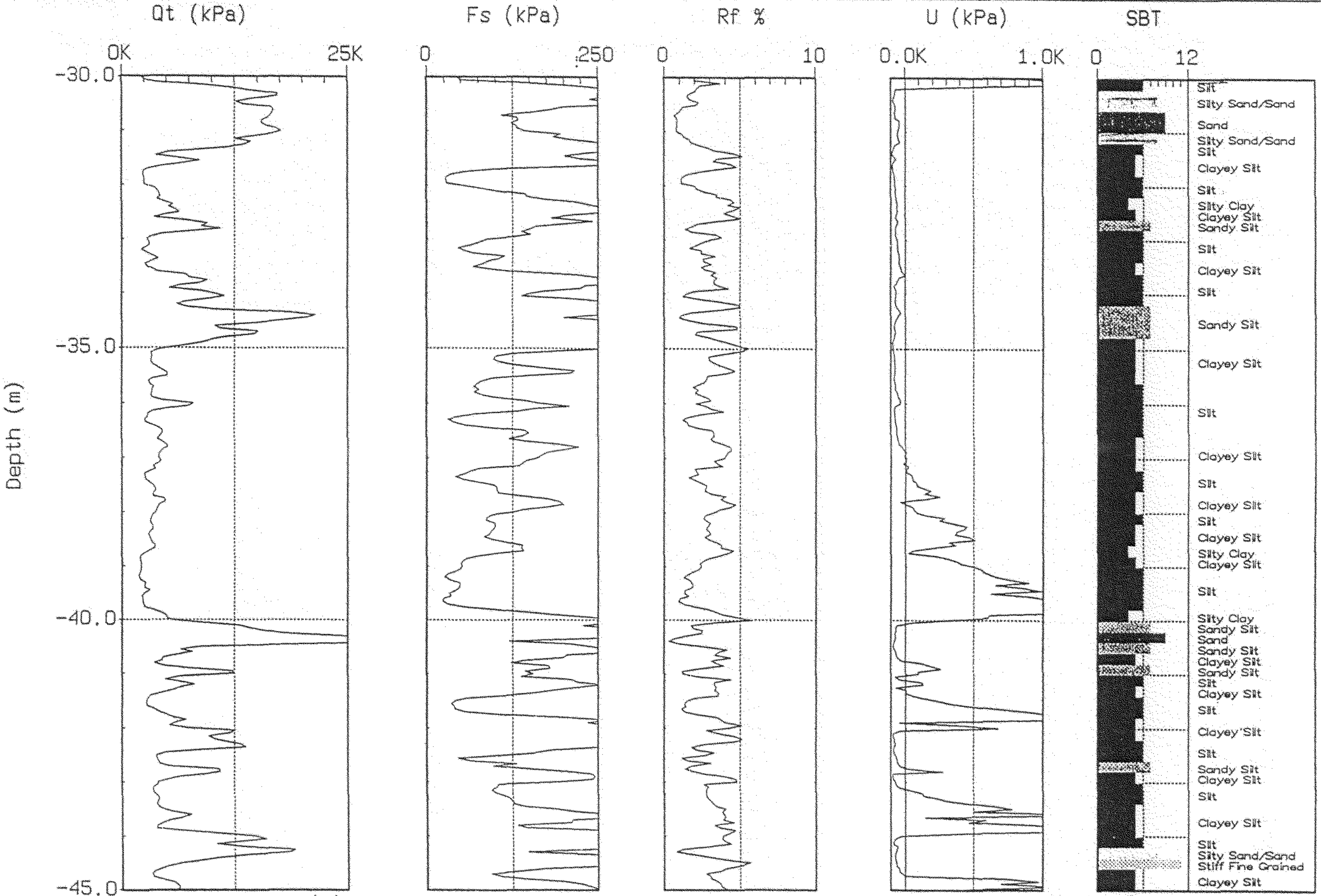
Max. Depth: 45.80 (m)
Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

● Equilibrium (or near) Pore Pressure from Dissipation

Legacy Parkway

S. . SC-13-306
Station: 6013+251.717 15.39 RT
Elevation: 1284.641
Cone: 20 TON A 038
Date: 01:18:00 08:43



Max. Depth: 45.80 (m)
Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

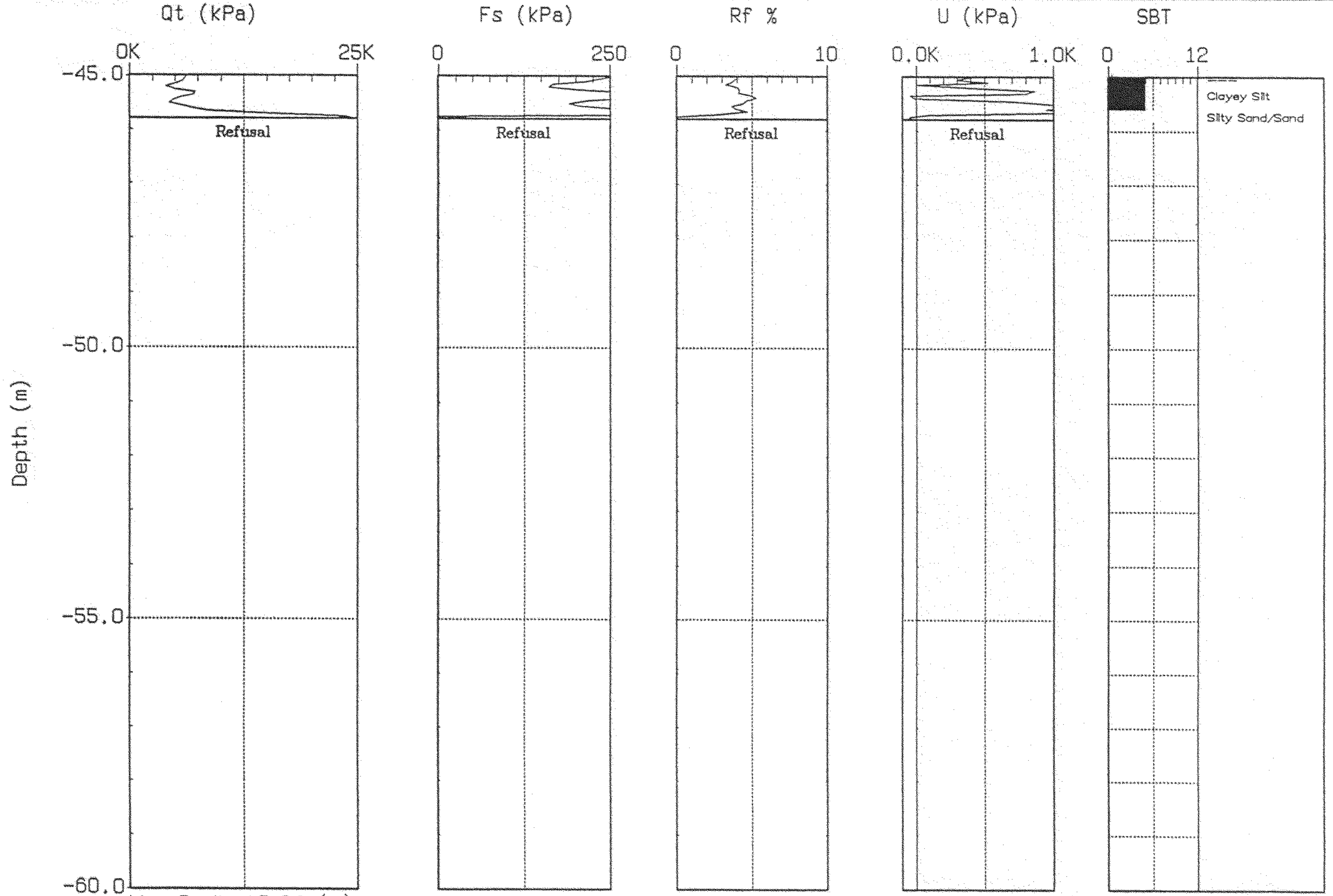
● Equilibrium (or near) Pore Pressure from Dissipation

PLATE B-128

Legacy Parkway

Site: SC–13–306
Station: 6013+251.717 15.39 RT
Elevation: 1284.641

Cone: 20 TON A 058
Date: 01:18:00 08:43



Max. Depth: 45.80 (m)
Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

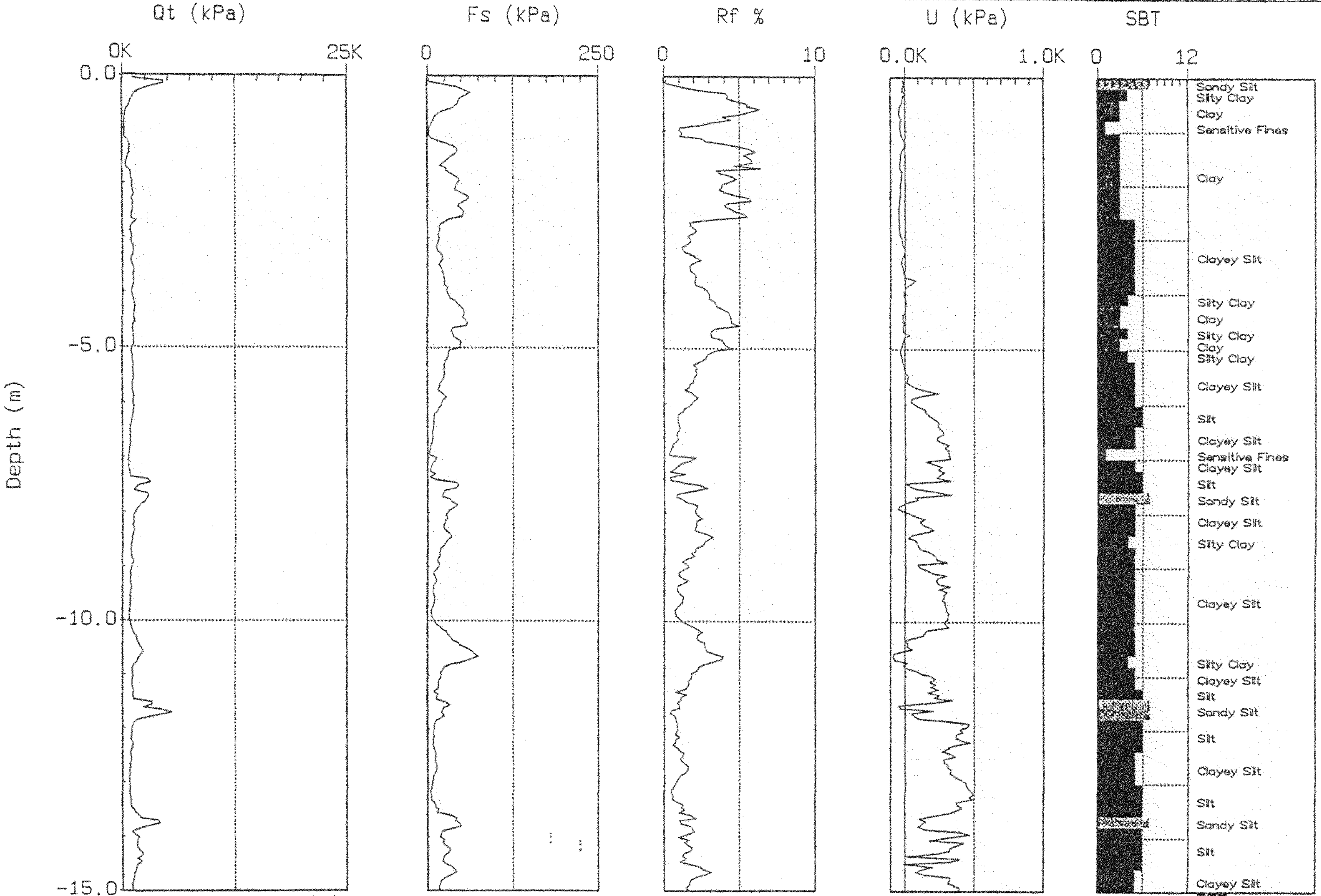
● Equilibrium (or near) Pore Pressure from Dissipation

PLATE B-129

Legacy Parkway

S. . SC-13-307
Station: 6013+292.924 23.04 RT
Elevation: 1285.026

Cone: 20 TON A [illegible]58
Date: 01:14:00 08:34



Max. Depth: 53.75 (m)

Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

● Equilibrium (or near) Pore Pressure from Dissipation

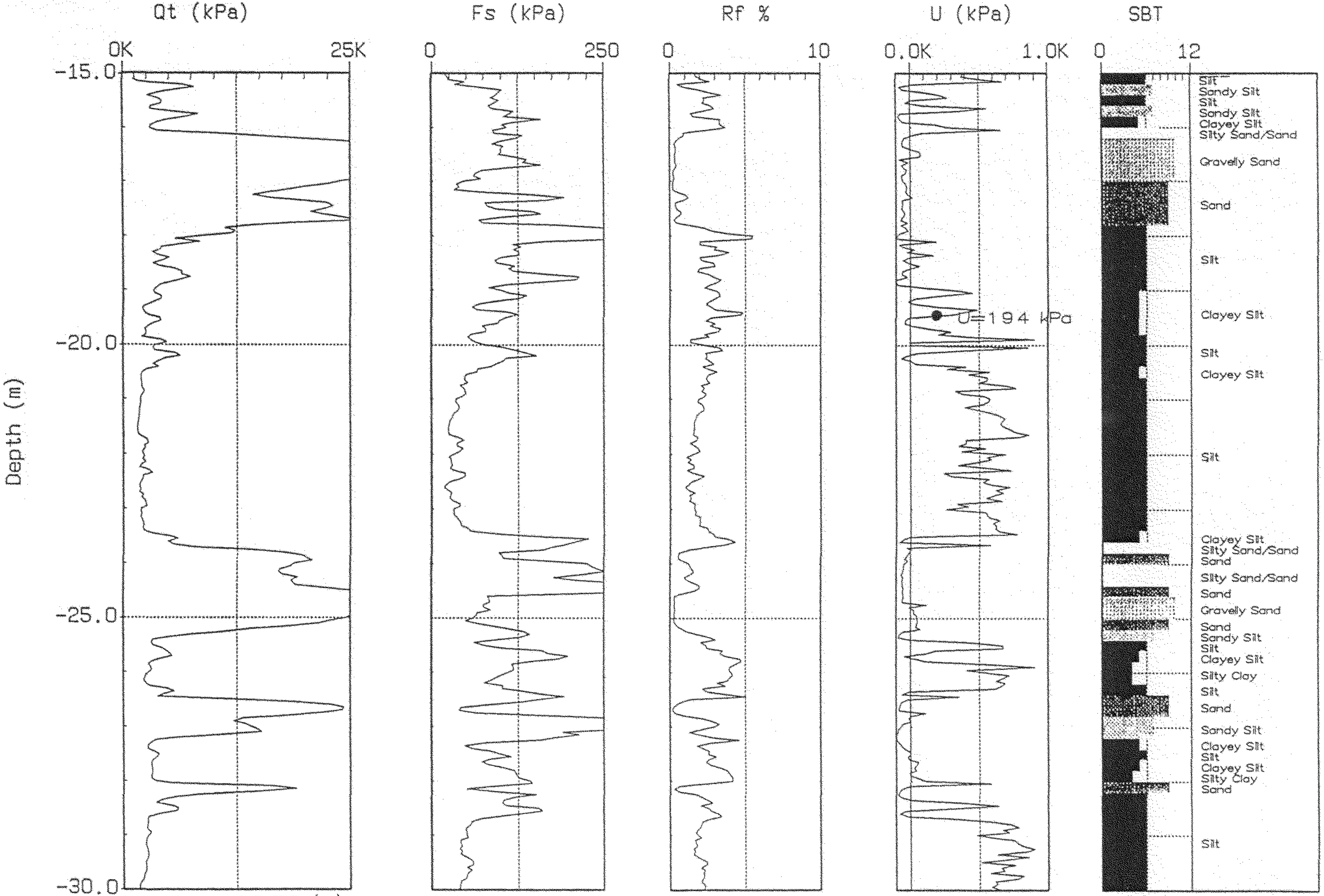
PLATE B-130

ConeTec

Legacy Parkway

Site: SC-13-307
Station: 6013+292.924 23.04 RT
Elevation: 1285.026

Cone: 20 TON A 058
Date: 01:14:00 08:34



Max. Depth: 53.75 (m)

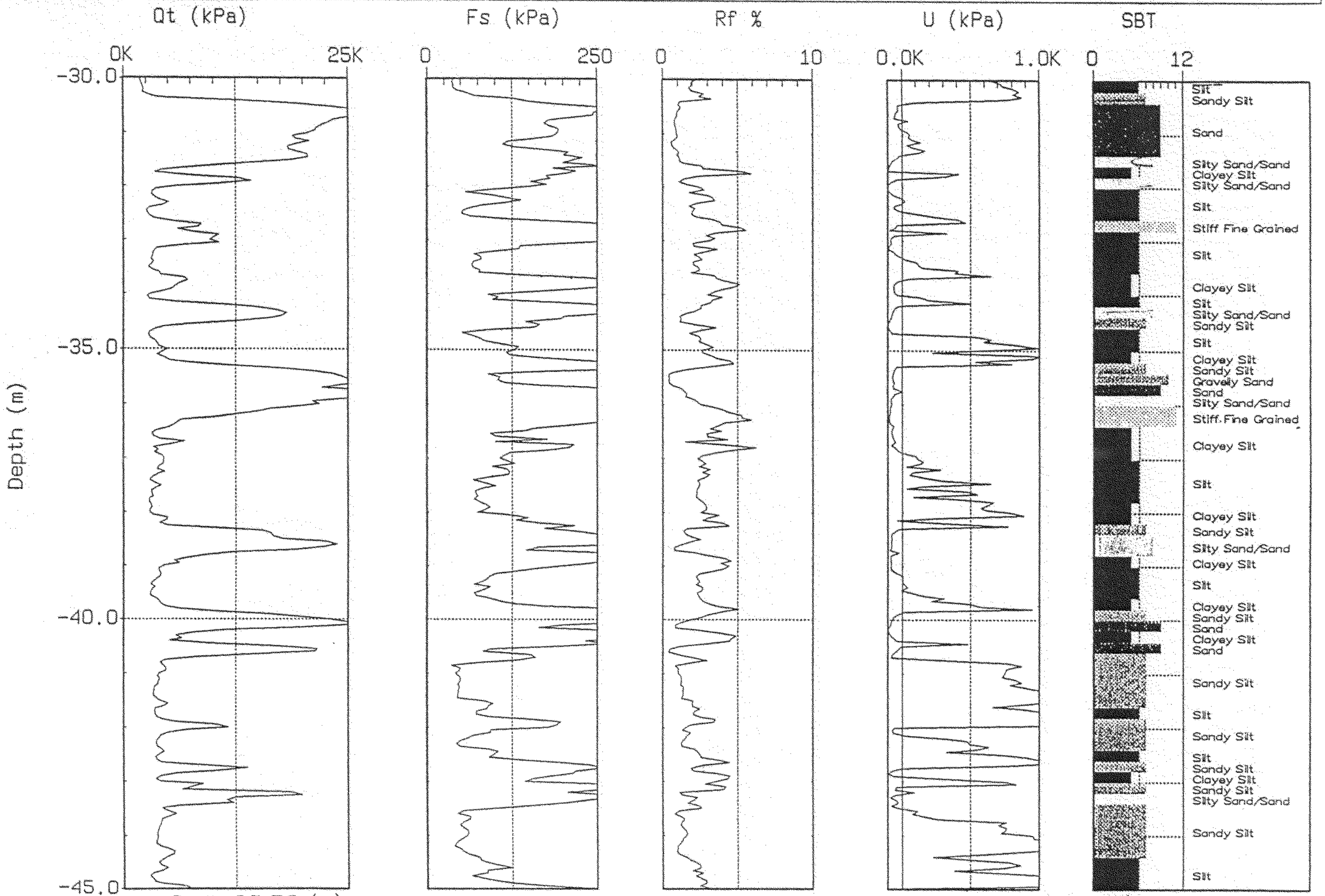
Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

● Equilibrium (or near) Pore Pressure from Dissipation

Legacy Parkway

Site: SC-13-307
Station: 6013+292.924 23.04 RT
Elevation: 1285.026
Cone: 20 TON A058
Date: 01:14:00 08:34



Max. Depth: 53.75 (m)

Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

● Equilibrium (or near) Pore Pressure from Dissipation

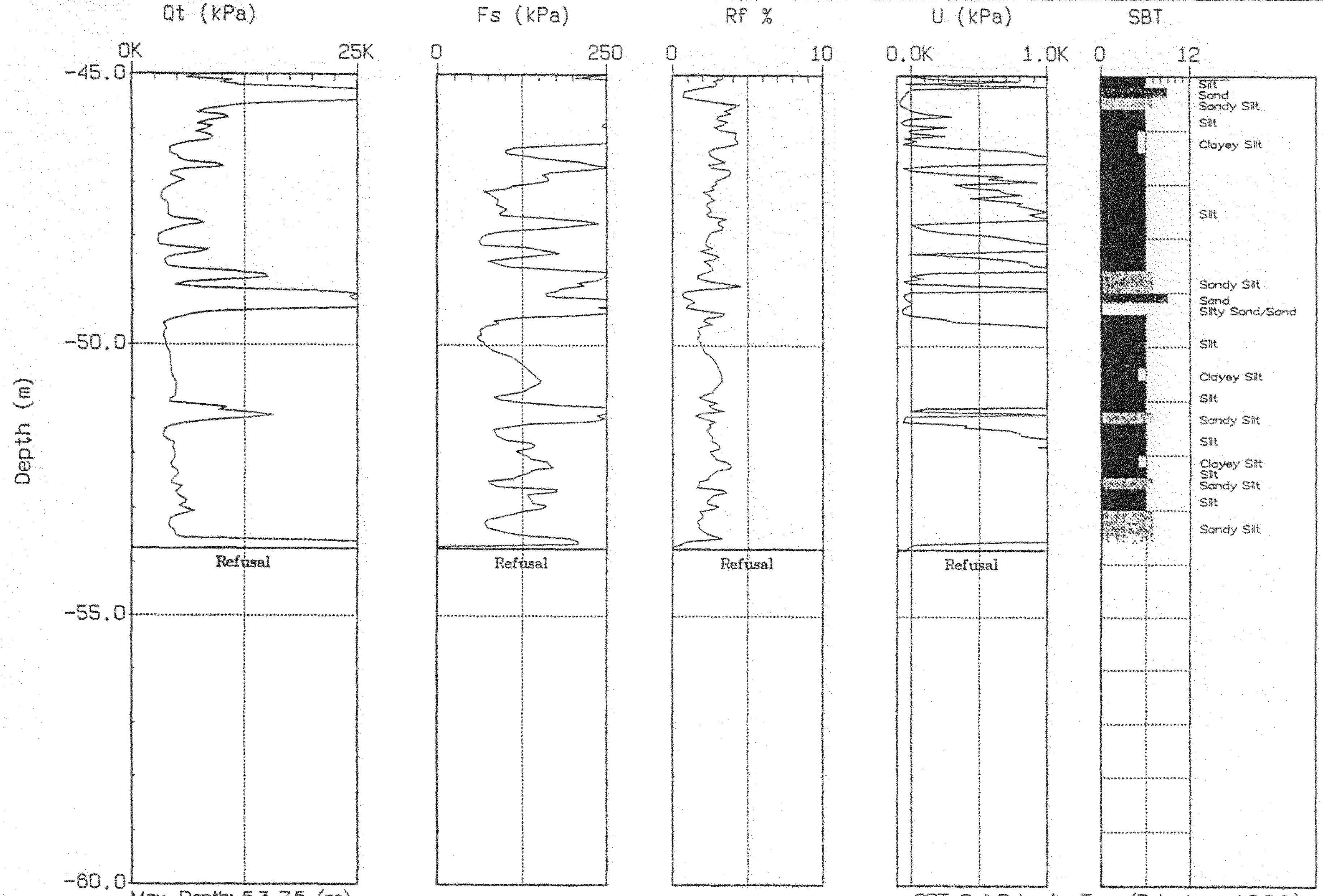
PLATE B-132

CONETEC

Legacy Parkway

Site: SC-13-307
Station: 6013+292.924 23.04 RT
Elevation: 1285.026

Cone: 20 TON A 058
Date: 01:14:00 08:34



Max. Depth: 53.75 (m)
Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

● Equilibrium (or near) Pore Pressure from Dissipation

PLATE B-133

Legacy Parkway - Preferred Alternative
I-215 to I-15/US 89 Interchange

KLEINFELDER

Project No. 35-8163-05

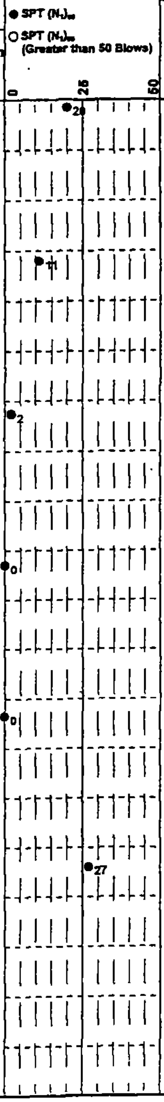
FIELD TEST BORING LOG

Boring: SB-13-308

Sheet 1 of 4

Logged by: J. Rajek
Date Start: 1/9/00
Date Finish: 1/12/00
Station: 6013+313.168 14.02 RT
Line: D MAINLINE
Coordinates (m): N 116,561.569 E 19,169.000
Elevation (m): 1285.134
Total Depth Drilled (m): 61.6
Drill Contractor: Haztech Drilling
Driller: C. Peterson
Rig Type: CME-75
Drilling Method: Mud Rotary
Hammer Type: Automatic
Rod Type: NW
Boring Diameter: 121 mm

Boring: SB-13-308
Sheet 1 of 4



Elevation (m)	SAMPLE DESCRIPTION (ASTM D 2488/D 2487)	Depth ft	Depth m	Type	Recovery (mm)	Soil Classification USCS	Soil Classification AASHTO	N, Blows per 0.15 m (or interval shown)	SPT $(N_1)_{60}$	S_u, kPa (torvane in italics)	Dry Density, kN/m³	Moisture, %	Liquid Limit	Plasticity Index	% Passing No. 200	Other Tests
1285	FILL: Silty-SAND - medium dense, moist, yellowish-brown			SPT	610			5 5 5 6	20							
		5	1	P	584						15.6	26				pH WSS R C SG
	Elastic SILT - stiff, wet, gray to reddish-yellow		2			MH	A-7-5									
		10	3	SPT	610			2 3 4 3	11							
		15	5	P	559											
1280	- very soft	20	6	SPT	610			0 0 1 2	2							
		25	8	P	0											
				P	610					9	12.8	42	56	24	97	
		30	9	SPT	610			0 0 0 0	0							
1275	- with sand lenses	35	11	P	508											
		40	12	SPT	610			0 0 0 2	0							
		45	14	P	584											
1270	Silty SAND - medium dense, wet, blackish-gray	50	15	SPT	610	SM	A-2-4	4 4 19 14	27							
		55	17													
	Sandy Lean CLAY - stiff, wet, gray, fine-grained sands	60	18	P	610	CL	A-6				16.2	23				C SG
		65	19													

Test Results *

LEGEND/NOTES

Elevations based upon North American Vertical Datum of 1988 (NAVD '88)

Coordinates are NAD '83

▽ = Observed Groundwater depth at time of drilling

Blows = Number of blows required to drive split spoon sampler 150 mm or interval shown

USCS = Unified Soil Classification System

AASHTO = American Association of State Highway and Transportation Officials

* = See Key to Soil Logs for list of abbreviations and descriptions of tests

SAMPLE TYPE

▲ SPT = Standard Penetration Test, 34.9mm ID and 50.8mm OD split spoon sampler

▮ MC = Modified California Sampler, 50.8mm ID and 63.5mm OD split spoon sampler

P P = Piston Sampler, 76.2 mm OD

▯ SH = Shelby Tube, 76.2mm OD, pushed

B BAG = Bulk Sample

Boring: SB-13-308
Sheet 2 of 4

Elevation (m)	SAMPLE DESCRIPTION (ASTM D 2488/D 2487)	Depth ft	Depth m	Graphic Log	SAMPLE Type	SAMPLE Recovery (mm)	SAMPLE Soil Classification USCS	SAMPLE Soil Classification AASHTO	SAMPLE N, Blows per 0.15 m (or interval shown)	● SPT $(N_1)_{60}$ ○ SPT $(N_1)_{60}$ (Greater than 50 Blows) 0 25 50	Test Results * S_u, kPa (torvane in italics)	Dry Density, kN/m^3	Moisture, %	Liquid Limit	Plasticity Index	% Passing No. 200	Other Tests
1265	Sandy Lean CLAY - stiff, wet, gray, fine-grained sands (continued)																
			21														
	Lean CLAY - medium stiff, wet, gray	70			SPT	610	CL	A-6	0 3 3 5	● 6							
			22														
	Silty SAND - wet, gray	75	23				SM	A-2-4									
			24														
		80			P	0											
1260			25		P	584											
		85	26														
			27														
	- medium dense	90			SPT	610			5 9 11 19	● 18							
	Lean CLAY - very stiff, wet, gray		28				CL	A-6									
		95	29														
			30														
1255																	
	- with sand	100			P	610											
			31														
		105	32														
			33														
	Silty SAND - medium dense, wet, gray, fine to coarse-grained	110			SPT	610	SM	A-2-4	7 7 8 15	● 11							
			34														
		115	35														
1250																	
			36														
	Sandy Lean CLAY - wet, gray	120			P	610	CL	A-6									
			37														
		125	38														
			39														
		130			SPT					● 10							

Legacy Parkway - Preferred Alternative
I-215 to I-15/US 89 Interchange
KLEINFELDER
Project No. 35-8163-05

FIELD TEST BORING LOG

Boring: **SB-13-308**

Sheet 2 of 4

Logged by:	J. Rajek
Date Start:	1/9/00
Date Finish:	1/12/00
Station:	6013+313.168 14.02 RT
Line:	D MAINLINE
Coordinates (m):	N 116,561.569 E 19,169.000
Elevation (m):	1285.134
Total Depth Drilled (m):	61.6
Drill Contractor:	Haztech Drilling
Driller:	C. Peterson
Rig Type:	CME-75
Drilling Method:	Mud Rotary
Hammer Type:	Automatic
Rod Type:	NW
Boring Diameter:	121 mm

LEGEND/NOTES

Elevations based upon North American Vertical Datum of 1988 (NAVD '88)

Coordinates are NAD '83

∇ = Observed Groundwater depth at time of drilling
Blows = Number of blows required to drive split spoon sampler 150 mm or interval shown
USCS = Unified Soil Classification System
AASHTO = American Association of State Highway and Transportation Officials
* = See Key to Soil Logs for list of abbreviations and descriptions of tests

SAMPLE TYPE

◩ SPT = Standard Penetration Test, 34.9mm ID and 50.8mm OD split spoon sampler
■ MC = Modified California Sampler, 50.8mm ID and 63.5mm OD split spoon sampler
P P = Piston Sampler, 76.2 mm OD
‖ SH = Shelby Tube, 76.2mm OD, pushed
B BAG = Bulk Sample

Legacy Parkway - Preferred Alternative
I-215 to I-15/US 89 Interchange

KLEINFELDER

Project No. 35-8163-05

FIELD TEST BORING LOG

Boring: **SB-13-308**

Sheet 3 of 4

Boring: SB-13-308
Sheet 3 of 4

Elevation (m)	SAMPLE DESCRIPTION (ASTM D 2488/D 2487)	Depth ft	Depth m	Type	Recovery (mm)	Soil Classification USCS	Soil Classification AASHTO	N, Blows per 0.15 m (or interval shown)	● SPT $(N_1)_{60}$ ○ SPT $(N_1)_{60}$ (Greater than 50 Blows) 0 25 50	S_U, kPa (torvane in italics)	Dry Density, kN/m³	Moisture, %	Liquid Limit	Plasticity Index	% Passing No. 200	Other Tests
1245	Sandy Lean CLAY - stiff, wet, gray (continued)				610			6 9 6 8								
	Silty SAND - wet, gray	140	43	P	610	SM	A-2-4									SV
1240		145	45													
	- medium dense	150	46	SPT	610			12 22 22 50	28							
		155	47	SPT	610			12 12 15 18	15							
1235	Lean CLAY - stiff, wet, gray	165	50	P	610	CL	A-6			44	12.0	46			93	
	Silty SAND - medium dense, wet, gray, fine-grained		51	SPT	610	SM	A-2-4	8 12 14 19	13							
	Lean CLAY - stiff, wet, gray					CL	A-6									
		175	53	SPT	610			7 8 14 21	11							
1230		180	55													
		185	56	SPT	610			12 19 22 39	20							
	Silty SAND - medium dense, wet, gray		57			SM	A-2-4									
		190	58	SPT	610			12 17 17 22	16							
	Lean CLAY - very stiff, wet, gray	195	59	SPT	610	CL	A-6	22 34 30 34	30							

Logged by: J. Rajek
Date Start: 1/9/00
Date Finish: 1/12/00
Station: 6013+313.168 14.02 RT
Line: D MAINLINE
Coordinates (m): N 116,561.569 E 19,169.000
Elevation (m): 1285.134
Total Depth Drilled (m): 61.6
Drill Contractor: Haztech Drilling
Driller: C. Peterson
Rig Type: CME-75
Drilling Method: Mud Rotary
Hammer Type: Automatic
Rod Type: NW
Boring Diameter: 121 mm

LEGEND/NOTES

Elevations based upon North American Vertical Datum of 1988 (NAVD '88)

Coordinates are NAD '83

∇ = Observed Groundwater depth at time of drilling

Blows = Number of blows required to drive split spoon sampler 150 mm or interval shown

USCS = Unified Soil Classification System

AASHTO = American Association of State Highway and Transportation Officials

* = See Key to Soil Logs for list of abbreviations and descriptions of tests

SAMPLE TYPE

▮ SPT = Standard Penetration Test, 34.9mm ID and 50.8mm OD split spoon sampler

▮ MC = Modified California Sampler, 50.8mm ID and 63.5mm OD split spoon sampler

P P = Piston Sampler, 76.2 mm OD

▯ SH = Shelby Tube, 76.2mm OD, pushed

B BAG = Bulk Sample

UTDOT Z003SB1.GPJ 5/30/00

Legacy Parkway - Preferred Alternative
I-215 to I-15/US 89 Interchange
KLEINFELDER
Project No. 35-8163-05

FIELD TEST BORING LOG

Boring: **SB-13-308**
Sheet 4 of 4

Logged by:	J. Rajek
Date Start:	1/9/00
Date Finish:	1/12/00
Station:	6013+313.168 14.02 RT
Line:	D MAINLINE
Coordinates (m):	N 116,581.569 E 19,169.000
Elevation (m):	1285.134
Total Depth Drilled (m):	61.6
Drill Contractor:	Haztech Drilling
Driller:	C. Peterson
Rig Type:	CME-75
Drilling Method:	Mud Rotary
Hammer Type:	Automatic
Rod Type:	NW
Boring Diameter:	121 mm

Boring: SB-13-308
Sheet 4 of 4

Elevation (m)	SAMPLE DESCRIPTION (ASTM D 2488/D 2487)	Depth ft	Depth m	Graphic Log	SAMPLE Type	Recovery (mm)	Soil Classification USCS	Soil Classification AASHTO	N, Blows per 0.15 m (or interval shown)	● SPT $(N_1)_{60}$ ○ SPT $(N_1)_{60}$ (Greater than 50 Blows) 0 25 50	Test Results * S_u kPa (torvane in italics)	Dry Density, kN/m³	Moisture, %	Liquid Limit	Plasticity Index	% Passing No. 200	Other Tests
1225	Lean CLAY - very stiff, wet, gray (continued)																
		200	61		SPT	610			21 22 28 38	23							
			62														
		205	63														
		210	64														
			65														
1220		215															
			66														
		220	67														
			68														
		225	69														
		230	70														
1215																	
			71														
		235	72														
		240	73														
			74														
		245	75														
1210																	
		250	76														
			77														
		255	78														
		260	79														

LEGEND/NOTES

Elevations based upon North American Vertical Datum of 1988 (NAVD '88)

Coordinates are NAD '83

⊻	= Observed Groundwater depth at time of drilling
Blows	= Number of blows required to drive split spoon sampler 150 mm or interval shown
USCS	= Unified Soil Classification System
AASHTO	= American Association of State Highway and Transportation Officials
*	= See Key to Soil Logs for list of abbreviations and descriptions of tests

SAMPLE TYPE

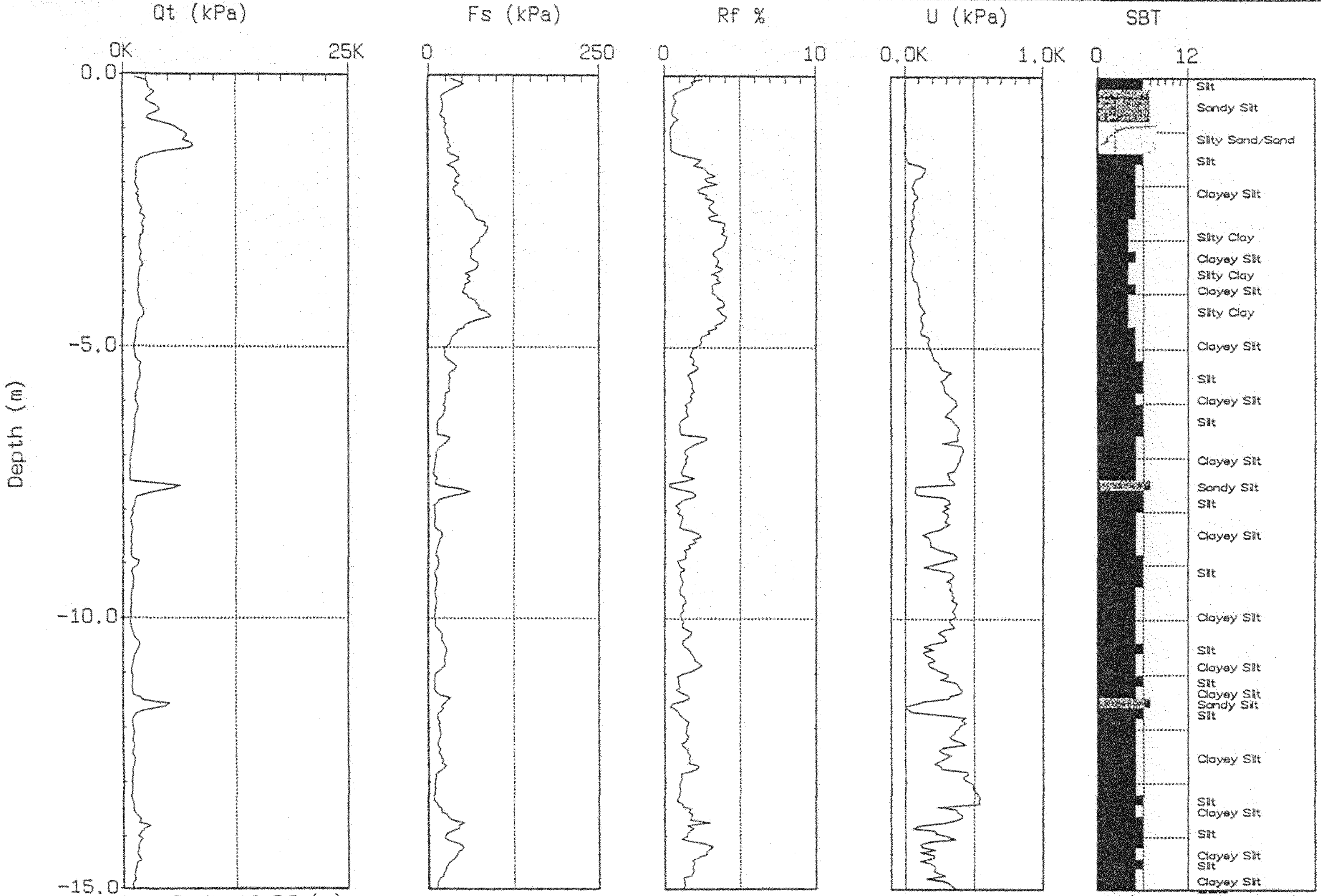
SPT	= Standard Penetration Test, 34.9mm ID and 50.8mm OD split spoon sampler
MC	= Modified California Sampler, 50.8mm ID and 63.5mm OD split spoon sampler
P	= Piston Sampler, 76.2 mm OD
SH	= Shelby Tube, 76.2mm OD, pushed
B BAG	= Bulk Sample

UTDOT Z003581.GPJ 6/30/00

Legacy Parkway

Site: SC-14-311
Station: 6013+310.311 17.20 LT
Elevation: 1284.876

Cone: 20 TON A 058
Date: 01:17:00 11:16



Max. Depth: 40.55 (m)

Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

● Equilibrium (or near) Pore Pressure from Dissipation

PLATE B-146

CONETEC

Legacy Parkway

Site: SC-14-311
Station: 6013+310.311 17.20 LT
Elevation: 1284.876

Cone: 20 TON A 058
Date: 01:17:00 11:16

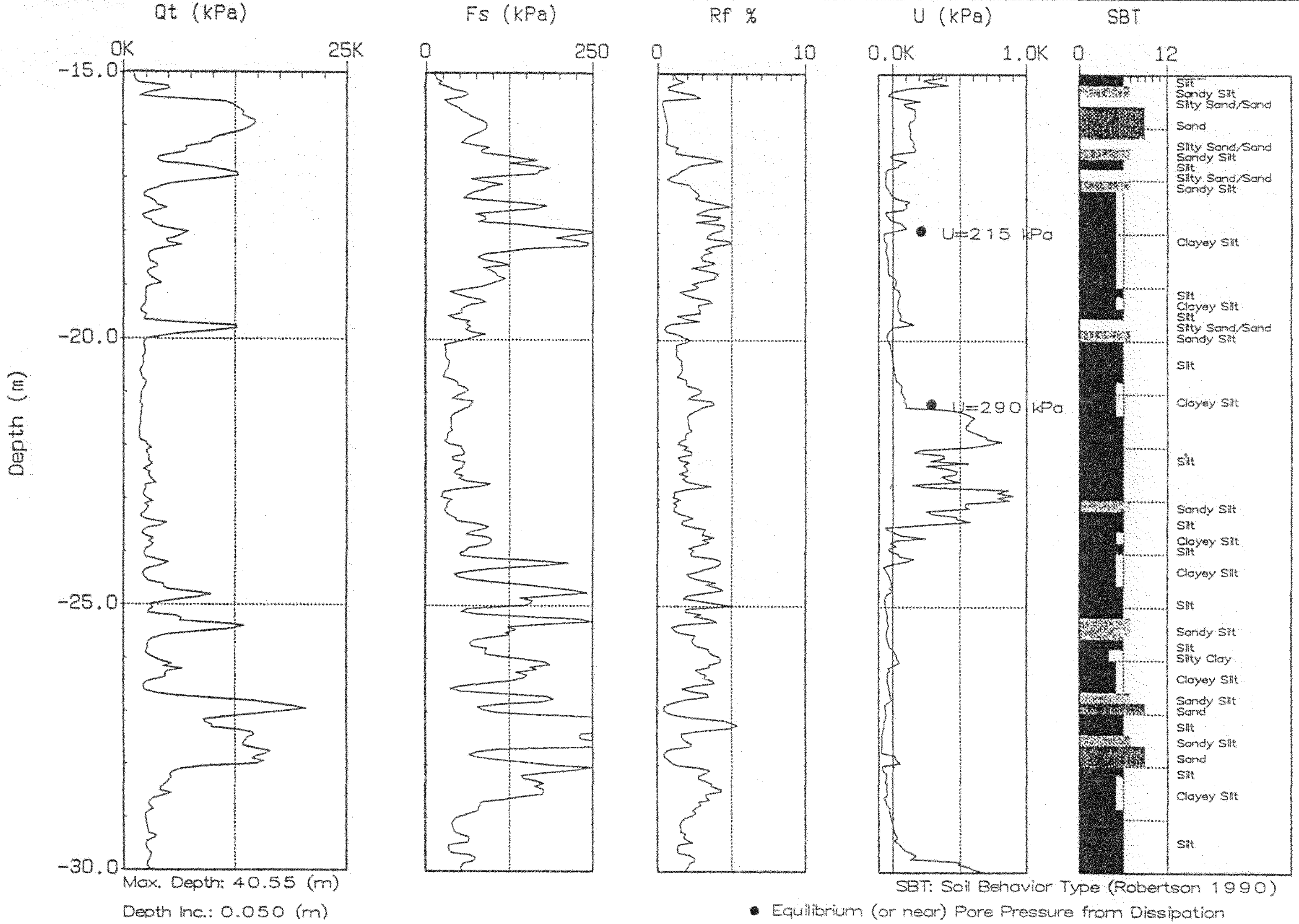


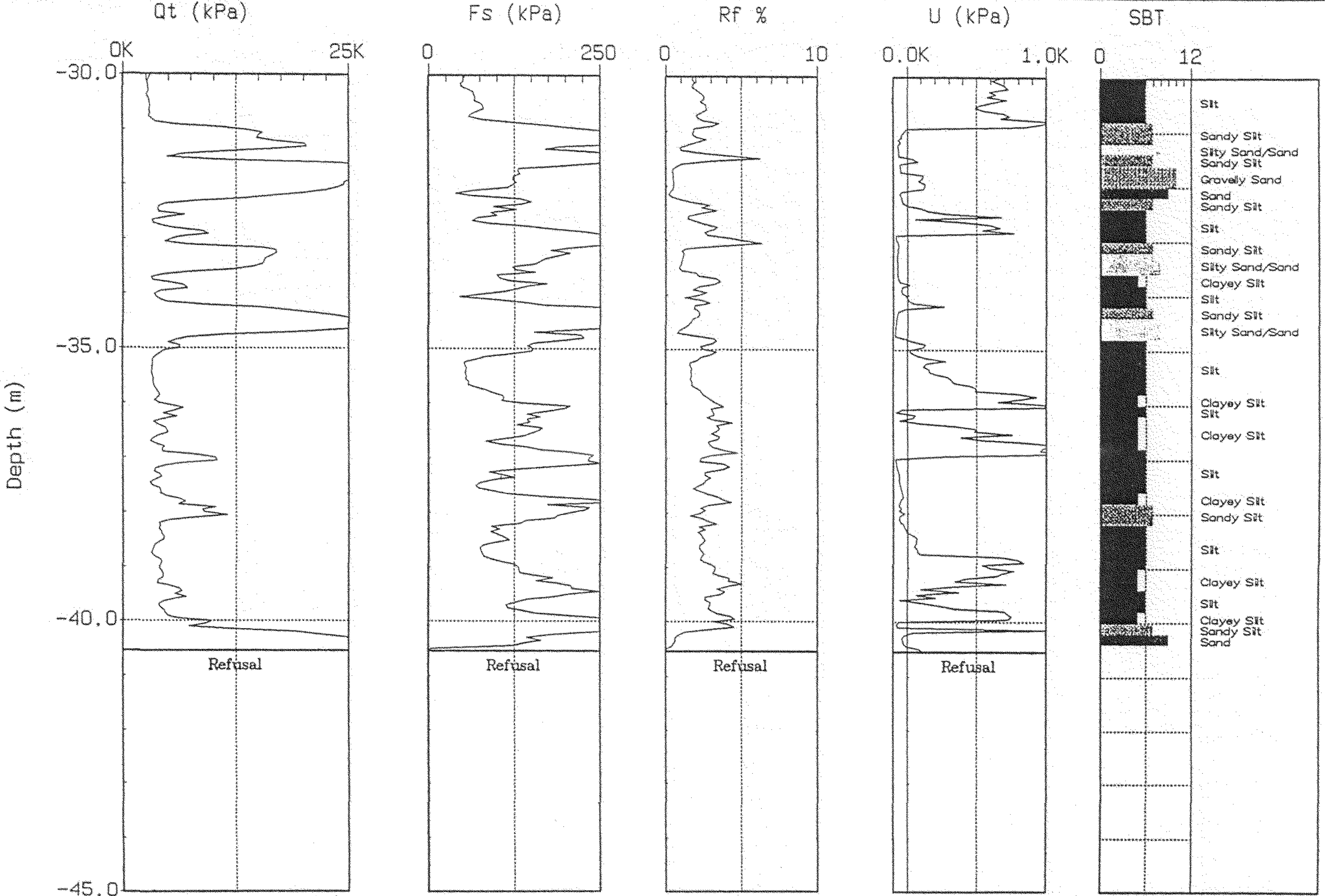
PLATE B-147

CONETEC

Legacy Parkway

S . SC–14–311
Station: 6013+310.311 17.20 LT
Elevation: 1284.876

Cone: 20 TON A 58
Date: 01:17:00 11:16



Max. Depth: 40.55 (m)
Depth Inc.: 0.050 (m)

SBT: Soil Behavior Type (Robertson 1990)

● Equilibrium (or near) Pore Pressure from Dissipation

PLATE B-148

Legacy Parkway - Preferred Alternative - I-215 to I-15/US 89 Interchange

KLEINFELDER

Project No. 35-8163-05

FIELD TEST BORING LOG

Boring: **SB-14-313**

Sheet 1 of 4

Boring: SB-14-313
Sheet 1 of 4

Elevation (m)	SAMPLE DESCRIPTION (ASTM D 2488/D 2487)	Depth ft	Depth m	SAMPLE Type	Recovery (mm)	Soil Classification USCS	Soil Classification AASHTO	N, Blows per 0.15 m (or interval shown)	● SPT $(N_1)_{60}$ ○ SPT $(N_1)_{60}$ (Greater than 50 Blows) 0 25 50	S_u kPa	Dry Density, kN/m³	Moisture, %	Liquid Limit	Plasticity Index	% Passing No. 200	Other Tests
1285	SILT - stiff, moist, dark brown, with organics and fine-grained sand			SPT	508	ML	A-4	4 4 3 5	11							
	Lean CLAY - moist, light gray		1			CL	A-6									
	- wet, with light brown mottling, trace silt	5	2	SH	610							26				pH WSS R
	- medium stiff, with sand seams	10	3	SPT	610			4 3 3 4	5							
			4													
	- light gray	15	5	SH	508											
1280		20	6	SPT	610			1 2 1 2	3							
	SILT - soft, wet, dark gray, with organics and trace of clay		7			ML	A-4									
	Elastic SILT - soft, wet, gray, with organics, trace of silt, occasional sand layers	25	8	SH	610	MH	A-7-5			33	10.4	61	69	33	100	
		30	9	SPT				5 9 6 3	15							
	SILT - stiff, wet, dark olive-gray, with a trace of sand		10			ML	A-4									
1275		35	11	SH	610											
	Silty SAND - wet, gray, with organic, fine-grained to medium-grained					SM	A-2-5									
	Lean CLAY - soft, wet, gray, sand seam	40	12	SPT	610	CL	A-6	1 2 1 2	3							
			13													
		45	14	SH	610						9.4	67				C SG
1270		50	15	SPT	610			2 2 4 8	5							
	Silty SAND - medium dense, wet, gray		16			SM	A-2-5									
	- dark gray	55	17	SPT	508			12 17 17 24	28							
		60	18	SPT	483			9 11 18 8	21							
		65	19						12							

Test Results *

Logged by:	S. Lewis
Date Start:	1/17/00
Date Finish:	1/20/00
Station:	6013+394.540 17.55 LT
Line:	D MAINLINE
Coordinates (m):	N 116,647.190 E 19,184.405
Elevation (m):	1285.358
Total Depth Drilled (m):	75.3
Drill Contractor:	Layne Christensen
Driller:	C. Davis
Rig Type:	Mobile B-59
Drilling Method:	Mud Rotary
Hammer Type:	Rope and Cathead
Rod Type:	AW
Boring Diameter	133 mm

LEGEND/NOTES

Elevations based upon North American Vertical Datum of 1988 (NAVD '88)

Coordinates are NAD '83

∇ = Observed Groundwater depth at time of drilling

Blows = Number of blows required to drive split spoon sampler 150 mm or interval shown

USCS = Unified Soil Classification System

AASHTO = American Association of State Highway and Transportation Officials

* = See Key to Soil Logs for list of abbreviations and descriptions of tests

SAMPLE TYPE

SPT = Standard Penetration Test, 34.9mm ID and 50.8mm OD split spoon sampler

MC = Modified California Sampler, 50.8mm ID and 63.5mm OD split spoon sampler

P = Piston Sampler, 76.2 mm OD

SH = Shelby Tube, 76.2mm OD, pushed

BAG = Bulk Sample

Boring: SB-14-313
Sheet 2 of 4

Elevation (m)	SAMPLE DESCRIPTION (ASTM D 2488/D 2487)	Depth ft	Depth m	SAMPLE Type	Recovery (mm)	Soil Classification USCS	Soil Classification AASHTO	N, Blows per 0.15 m (or interval shown)	● SPT $(N_1)_{60}$ ○ SPT $(N_1)_{60}$ (Greater than 50 Blows) 0 25 50	q_u, kPa (torvane in italics)	Dry Density, kN/m³	Moisture, %	Liquid Limit	Plasticity Index	% Passing No. 200	Other Tests
	Silty SAND - medium dense, wet, dark gray (continued)			SPT	508			10 9 9 9								
1265																
			21													
		70		SH	610					63	14.9	31			87	
	SILT - medium stiff, wet, olive-gray, with a trace of fine-grained sand		22			ML	A-4									
		75	23													
			24													
		80		SPT	457			3 4 4 6	●6							
			25													
1260																
		85	26													
	Lean CLAY - stiff, wet, gray		27			CL	A-6									
		90		SH	610						14.9	29				C SG
	SILT - medium stiff, wet, gray, with a trace of fine-grained sand		28			ML	A-4									
		95	29													
			30													
1255																
	Lean CLAY - medium stiff, wet, mottled light brown and light gray	100		SPT	610	CL	A-6	4 5 5 7	●8							
			31													
		105	32													
			33													
		110		SH	305											
	Silty SAND - wet, olive-gray, fine to medium-grained		34			SM	A-2-5									
		115	35													
	SILT - very stiff, wet, gray, with sand seams			SPT	559	ML	A-4	9 16 16 12	●15							
1250																
			36													
		120														
			37													
		125	38													
				SH	457											
	Silty SAND - wet, gray, fine to medium-grained					SM	A-2-5									
			39													
	SILT - medium stiff, wet, gray, with fine-grained sand	130		SPT		ML	A-4		●51							

UTDOT Z003SB1.GPJ 5/30/00

Legacy Parkway - Preferred Alternative
I-215 to I-15/US 89 Interchange
KLEINFELDER
Project No. 35-8163-05

FIELD TEST BORING LOG

Boring: **SB-14-313**
Sheet 2 of 4

Logged by:	S. Lewis
Date Start:	1/17/00
Date Finish:	1/20/00
Station:	6013+394.540 17.55 LT
Line:	D MAINLINE
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Driller:	C. Davis
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Drilling Method:	Mud Rotary
Hammer Type:	Rope and Cathead
Rod Type:	AW
Boring Diameter:	133 mm

LEGEND/NOTES

Elevations based upon North American Vertical Datum of 1988 (NAVD '88)

Coordinates are NAD '83

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Legacy Parkway - Preferred Alternative
I-215 to I-15/US 89 Interchange
KLEINFELDER
Project No. 35-8163-05

FIELD TEST BORING LOG

Boring: **SB-14-313**

Sheet 3 of 4

Logged by:	S. Lewis
Date Start:	1/17/00
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Station:	6013+394.540 17.55 LT
Line:	D MAINLINE
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Hammer Type:	Rope and Cathead
Rod Type:	AW
Boring Diameter:	133 mm

Boring: SB-14-313
Sheet 3 of 4

Elevation (m)	SAMPLE DESCRIPTION (ASTM D 2488/D 2487)	Depth ft	Depth m	Graphic Log	SAMPLE Type	Recovery (mm)	Soil Classification USCS	Soil Classification AASHTO	N, Blows per 0.15 m (or interval shown)	● SPT (N₁)₆₀ ○ SPT (N₁)₆₀ (Greater than 50 Blows) 0 25 50	Su, kPa (torvane in italics)	Dry Density, kN/m³	Moisture, %	Liquid Limit	Plasticity Index	% Passing No. 200	Other Tests
1245	Lean CLAY - medium stiff, wet, light olive-gray, with seams of gray silty sand	135	41			610	CL	A-6	7 5 7 14								
	SILT with sand - stiff, wet, olive-gray		42				ML	A-4									
		140	43		SH	610					66	17.3	20			55.	
	Silty SAND - medium dense, wet, gray, fine to medium-grained with shell fragments, mica flakes, trace of clay						SM	A-2-5									
	SILT - medium stiff, wet, gray, with sand lenses	145	44		SPT	610	ML	A-4	4 5 6 12	5							
1240		150	46														
	Silty SAND - medium dense, wet, dark gray, with shell fragments, mica flakes	155	47		SH	254	SM	A-2-5									
		160	49		SPT	533			5 7 14 17	9							
1235	- with silt lenses	165	51		SPT				10 17 15 14	13							
	SILT - wet, light gray, with occasional fine-grained sand	170	52				ML	A-4									
		175	53		SH	559						16.3	24	36	5	76	C SG
1230	Silty SAND - loose, wet, olive-gray, fine-grained, with mica flakes	180	55				SM	A-2-5									
		185	57		SPT	584			5 6 12 18	9							
	SILT - very stiff, wet, gray	190	58		SPT	610	ML	A-4	5 6 10 10	8							
		195	59														

Test Results *

LEGEND/NOTES

Elevations based upon North American Vertical Datum of 1988 (NAVD '88)

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Blows	= Number of blows required to drive split spoon sampler 150 mm or interval shown
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SPT	= Standard Penetration Test, 34.9mm ID and 50.8mm OD split spoon sampler
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P	= Piston Sampler, 76.2 mm OD
SH	= Shelby Tube, 76.2mm OD, pushed
BAG	= Bulk Sample

Boring: SB-14-313
Sheet 4 of 4

Elevation (m)	SAMPLE DESCRIPTION (ASTM D 2488/D 2487)	Depth ft	Depth m	Graphic Log	SAMPLE Type	SAMPLE Recovery (mm)	Soil Classification USCS	Soil Classification AASHTO	N, Blows per 0.15 m (or interval shown)	● SPT (N1)60 ○ SPT (N1)60 (Greater than 50 Blows) 0 25 50	Test Results * Su kPa (torvane in italics)	Dry Density, kN/m3	Moisture, %	Liquid Limit	Plasticity Index	% Passing No. 200	Other Tests
1225	SILT - very stiff, wet, gray (continued)																
	- stiff, with gravel	200	61		MC	610			17 16 15 14	12							
	- with sand		62														
		205	63														
		210	64		SPT	610			10 13 16 19	14							
			65														
1220		215	66														
	Lean CLAY - very stiff, wet, gray						CL	A-6									
		220	67		MC	610			10 17 23 20	16							
			68														
		225	69														
	SILT - very stiff, wet, dark olive-gray, with sand lenses						ML	A-4									
		230	70		SPT	584			13 15 23 50/ 125mm	2							
1215			71														
		235	72		SPT	559			15 45 24 24	37							
	- hard																
		240	73		SPT	508			4 12 40 50/ 100mm	28							
	- very stiff		74														
		245	75		SPT	610			6 12 18 24	17							
1210																	
		250	76														
			77														
		255	78														
			79														
		260															

Legacy Parkway - Preferred Alternative
I-215 to I-15/US 89 Interchange
KLEINFELDER
Project No. 35-8163-05

FIELD TEST BORING LOG

Boring: **SB-14-313**
Sheet 4 of 4

Logged by:	S. Lewis
Date Start:	1/17/00
Date Finish:	1/20/00
Station:	6013+394.540 17.55 LT
Line:	D MAINLINE
Coordinates (m):	N 116,647.190 E 19,184.405
Elevation (m):	1285.358
Total Depth Drilled (m):	75.3
Drill Contractor:	Layne Christensen
Driller:	C. Davis
Rig Type:	Mobile B-59
Drilling Method:	Mud Rotary
Hammer Type:	Rope and Cathead
Rod Type:	AW
Boring Diameter:	133 mm

LEGEND/NOTES

Elevations based upon North American Vertical Datum of 1988 (NAVD '88)

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P P = Piston Sampler, 76.2 mm OD

▯ SH = Shelby Tube, 76.2mm OD, pushed

B BAG = Bulk Sample

APPENDIX C
Laboratory Testing

LP OVER MILL CREEK TRAIL

E-2572

Table 1

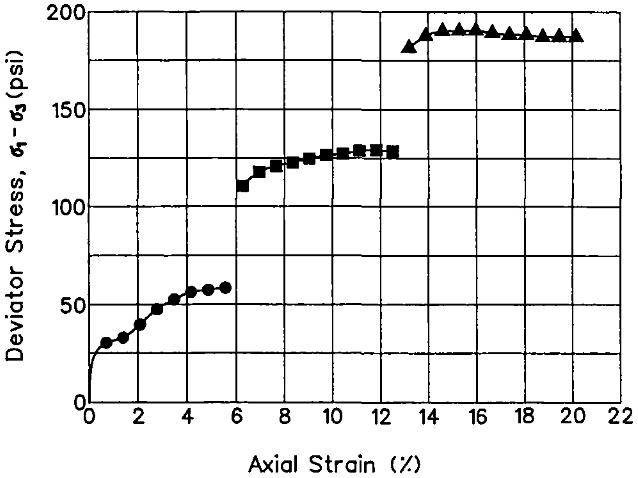
SUMMARY OF TEST DATA

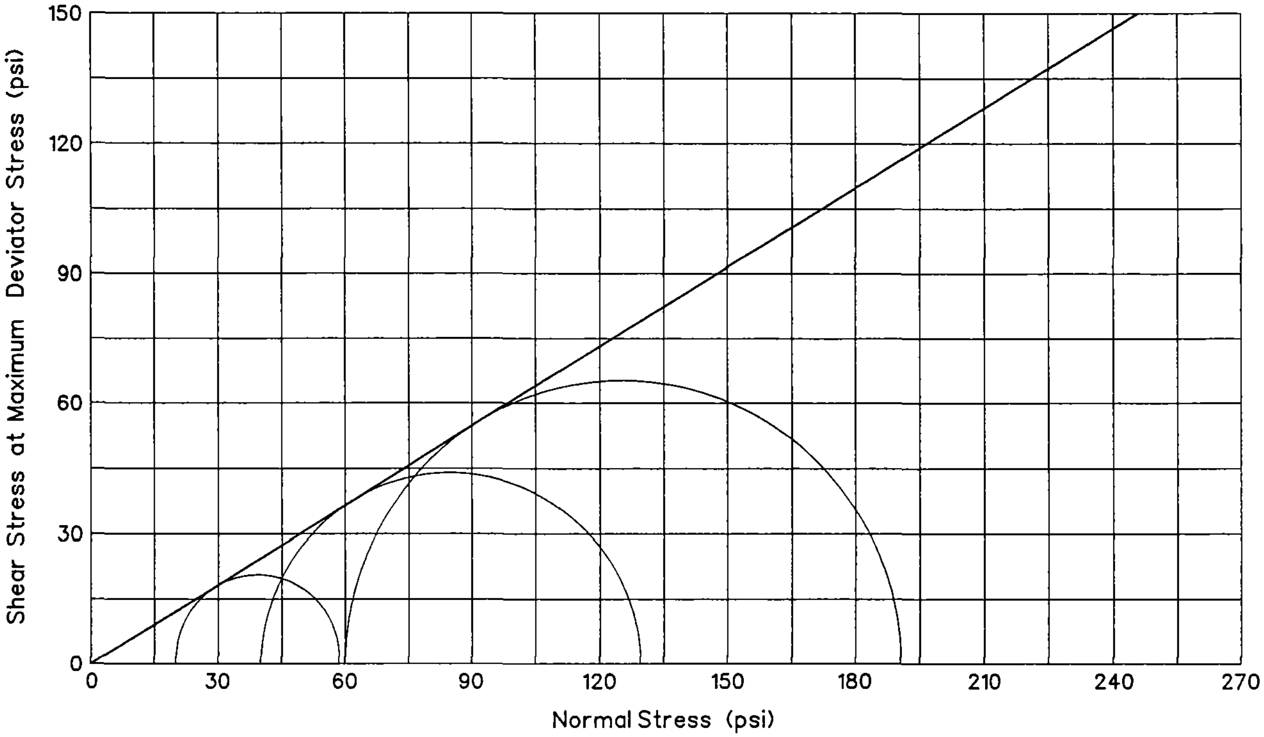
PROJECT Legacy Parkway
LOCATION Structure D-2572
(Legacy Parkway over Multi-Use Trail near Mill Creek)

PROJECT NO. 200601-139
FEATURE Foundations

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	STANDARD PENETRATION BLOWS PER FOOT	IN-PLACE		UNCONFINED COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO Classification)
			DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY	
RSB-39-624	9-10.5	Shelby	89.0	30.7	1973	46	23	23	0	1	99	CL / A-7-6(26)
	15-16.5	Shelby	86.4	31.2	954	44	19	25	0	3	97	CL / A-7-6(26)
	25-26.5	Shelby	89.4	32.5	1378	41	20	21	0	8	92	CL / A-7-6(20)
	40-41.5	18		23.7				NP	0	85	15	SM / A-2-4(0)
	53-54.5	Shelby	73.1	48.3		73	24	49	0	2	98	CH / A-7-6(55)
	73-74.5	Shelby	91.3	29.5		35	21	14	0	1	99	CL / A-6(15)
RSB-39-625	6-7.5	Shelby	98.7	26.3	3460	44	20	24	0	5	95	CL / A-7-6(24)
	18.5-20	Shelby	82.4	38.7	1856	51	20	31	0	20	80	CH / A-7-6(25)
	43.5-45	Shelby		24.9		60	18	42	0	13	87	CH / A-7-6(39)
	48.5-50	16		22.4		30	18	12	0	28	72	CL / A-6(7)
	53.5-55	Shelby	101.7	22.8	1085	32	18	14	0	31	69	CL / A-6(8)
	73.5-75	Shelby	89.7	32.3	2088	42	19	23	0	1	99	CL / A-7-6(24)
RSB-39-626	3-4.5	Shelby	95.6	26.0	2179	43	20	23	0	1	99	CL / A-7-6(25)
	9-10.5	Shelby	87.6	29.4	1982	47	21	26	0	1	99	CL / A-7-6(29)
	15-16.5	Shelby		30.8		56	20	36	0	5	95	CH / A-7-6(36)
	23.5-25	Shelby	94.8	28.9		61	25	36	0	0	100	CH / A-7-6(42)
	43.5-45	Shelby	93.8	29.6	2096	68	21	47	0	13	87	CH / A-7-6(44)
	73.5-75	Shelby	88.1	32.4	4082	54	22	32	0	2	98	CH / A-7-6(35)
	83.5-85	76		18.0				NP	0	86	14	SM / A-2-4(0)
RSB-39-627	3-4.5	Shelby	104.3	26.2	2160	40	21	19	0	0	100	CL / A-6(21)
	9-10.5	Shelby	98.4	28.0	1879	45	22	23	0	2	98	CL / A-7-6(25)
	13.5-15	Shelby	97.7	27.5	2154	55	22	33	0	11	89	CH / A-7-6(32)
	33.5-35	Shelby	76.0	45.1	1570	54	21	33	0	2	98	CH / A-7-6(36)
	53.5-55	Shelby	95.2	26.8	1950	41	21	20	0	3	97	CL / A-7-6(21)
	65-66.5	21		23.0				NP	0	92	8	SP-SM / A-1-b(0)
	78.5-80	Shelby	90.6	27.7	1662	41	22	19	0	1	99	CL / A-7-6(21)

NP=Nonplastic





MULTI-STAGE CONSOLIDATED UNDRAINED W/PORE PRESSURE MEASUREMENTS:

TOTAL STRESS FAILURE ENVELOPE

Test No. or Symbol	Sample Data		Degree of Saturation (%)	Confining Pressure (psi)	Maximum Deviator Stress (psi)	Strength Values at Failure		Sample Size, L/D (inches)	Strain Rate (inches/minute)
	Dry Density (pcf)	Moisture Content (%)				Friction Angle ϕ (degrees)	Cohesion (c/psi)		
●	86.4	31.2	~100	20	58.6	31.4	0	2.88/1.38	0.001
■	86.4	31.2	~100	40	129.5				
▲	86.4	31.2	~100	60	190.5				

RB&G ENGINEERING INC.
Provo, Utah

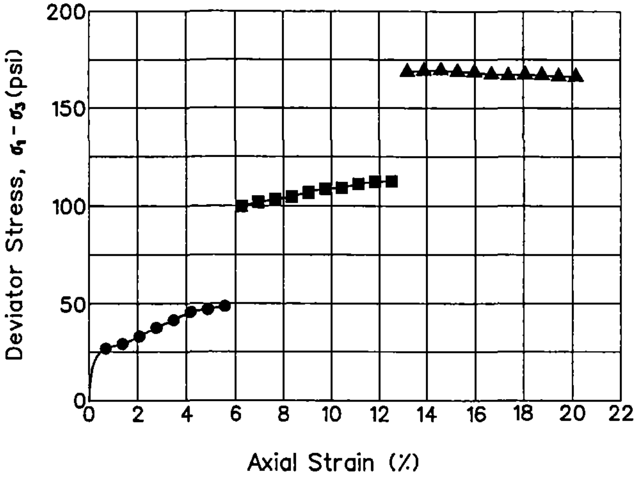
TRIAXIAL SHEAR TEST

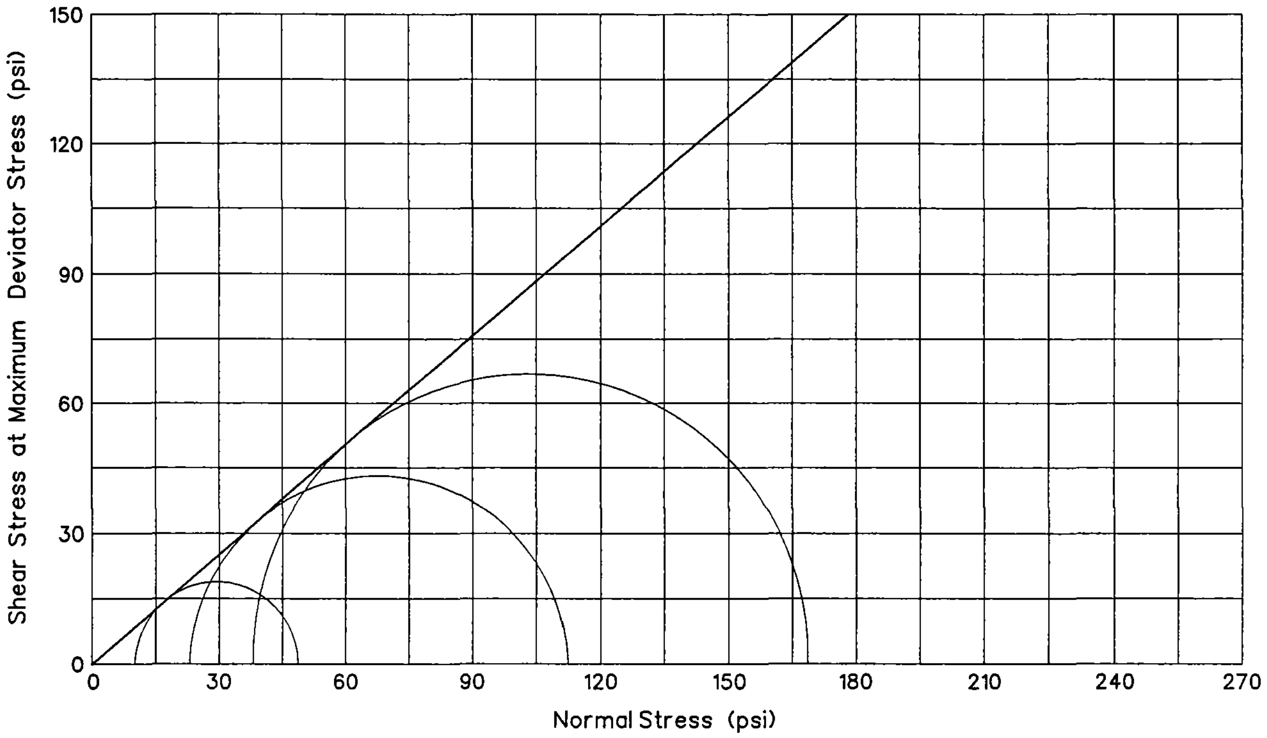
Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway Over Multi-Use Trail Near Mill Creek)
Davis County, Utah

HOLE NO.: RSB-39-624

DEPTH: 15'-16.5'

Figure





MULTI-STAGE CONSOLIDATED UNDRAINED W/PORE PRESSURE MEASUREMENTS:

EFFECTIVE STRESS FAILURE ENVELOPE

Test No. or Symbol	Sample Data		Degree of Saturation (%)	Confining Pressure (psi)	Maximum Deviator Stress (psi)	Strength Values at Failure		Sample Size, L/D (inches)	Strain Rate (inches/ minute)
	Dry Density (pcf)	Moisture Content (%)				Friction Angle ϕ (degrees)	Cohesion (c/psi)		
●	86.4	31.2	~100	10.1	48.7	40.1	0	2.88/1.38	0.001
■	86.4	31.2	~100	22.9	112.4				
▲	86.4	31.2	~100	38.0	168.5				

RB&G ENGINEERING INC.
Provo, Utah

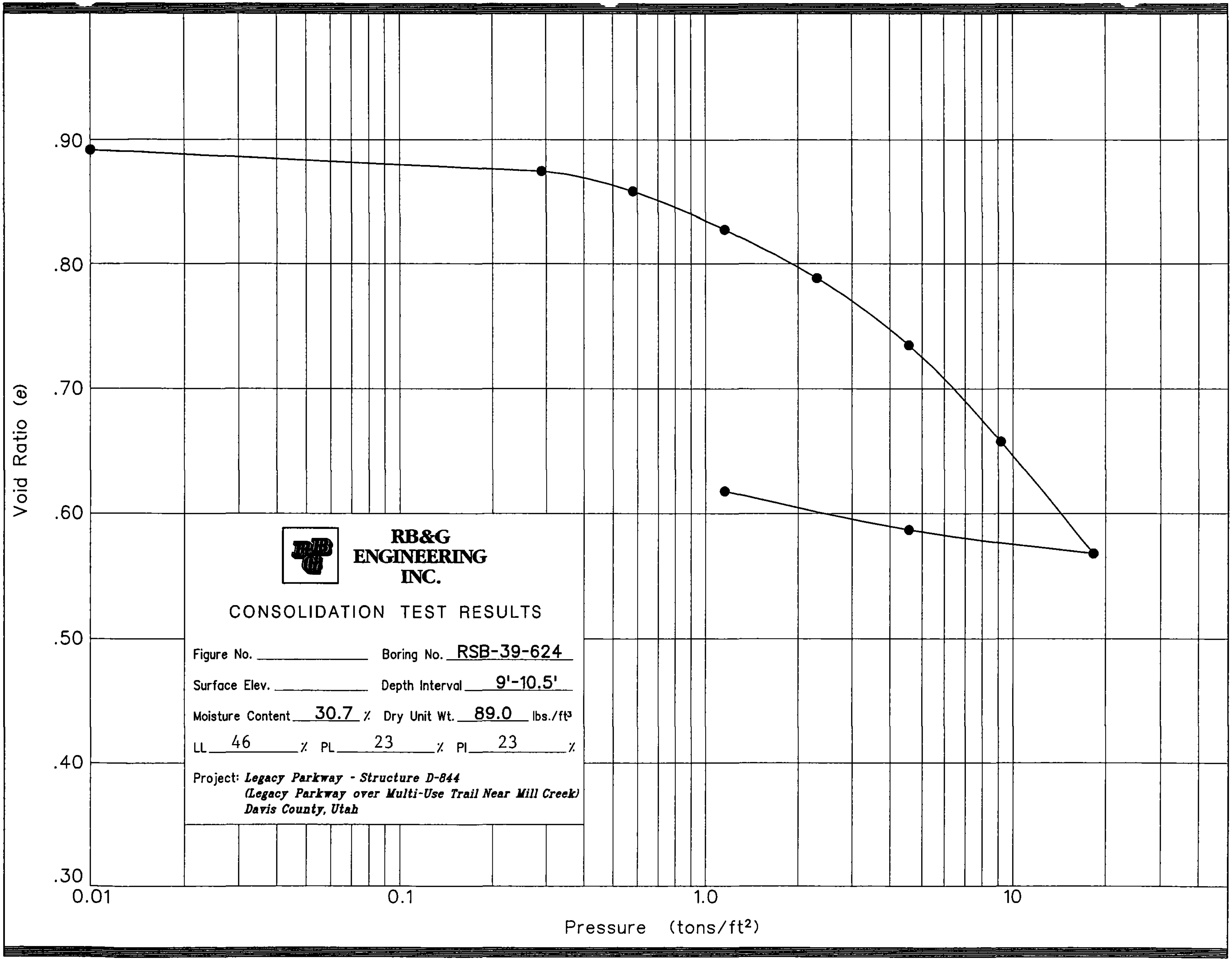
TRIAXIAL SHEAR TEST

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway Over Multi-Use Trail Near Mill Creek)
Davis County, Utah

HOLE NO.: RSB-39-624

DEPTH: 15'-16.5'

Figure



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

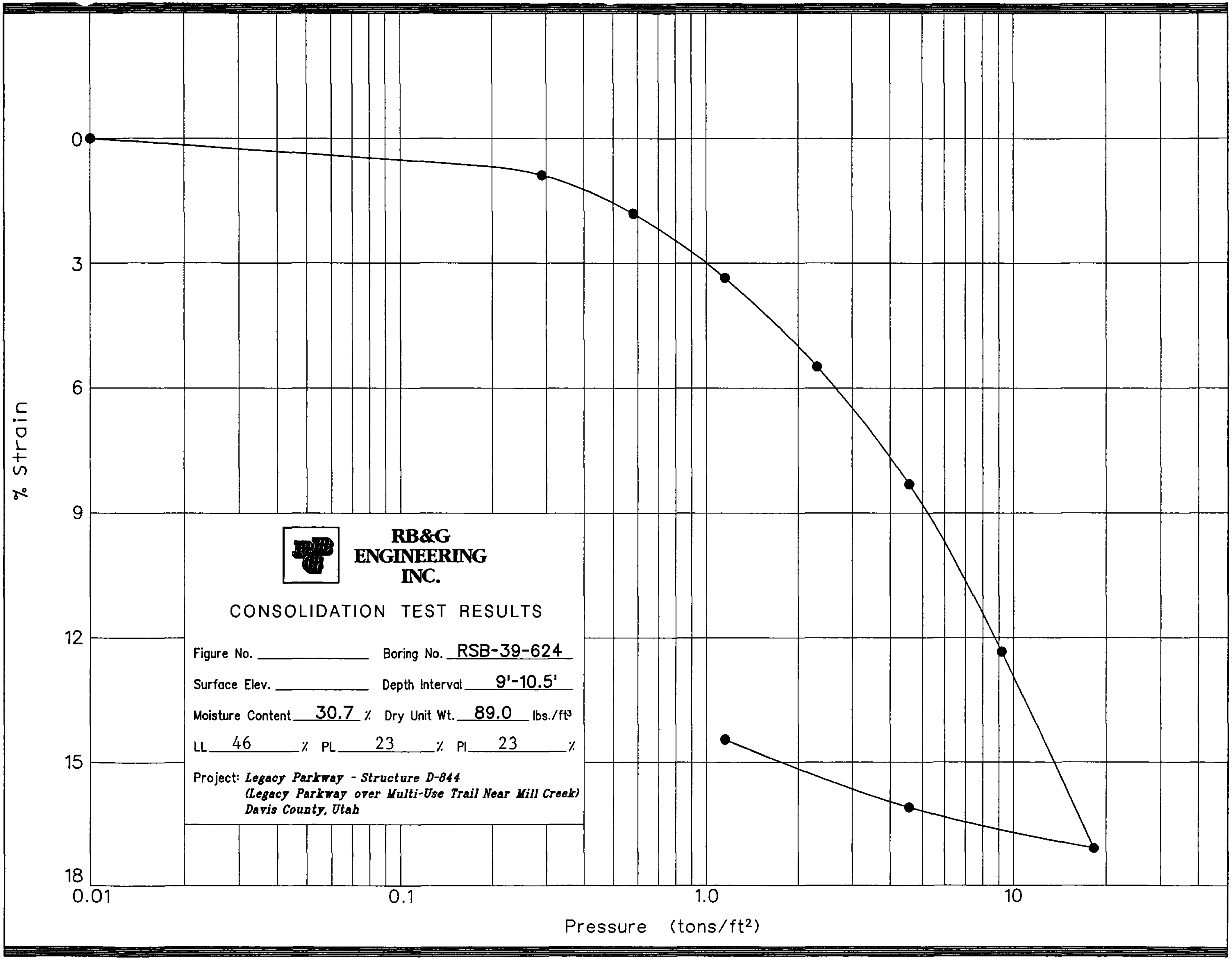
Figure No. ______ Boring No. RSB-39-624

Surface Elev. ______ Depth Interval 9'-10.5'

Moisture Content 30.7 % Dry Unit Wt. 89.0 lbs./ft³

LL 46 % PL 23 % PI 23 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

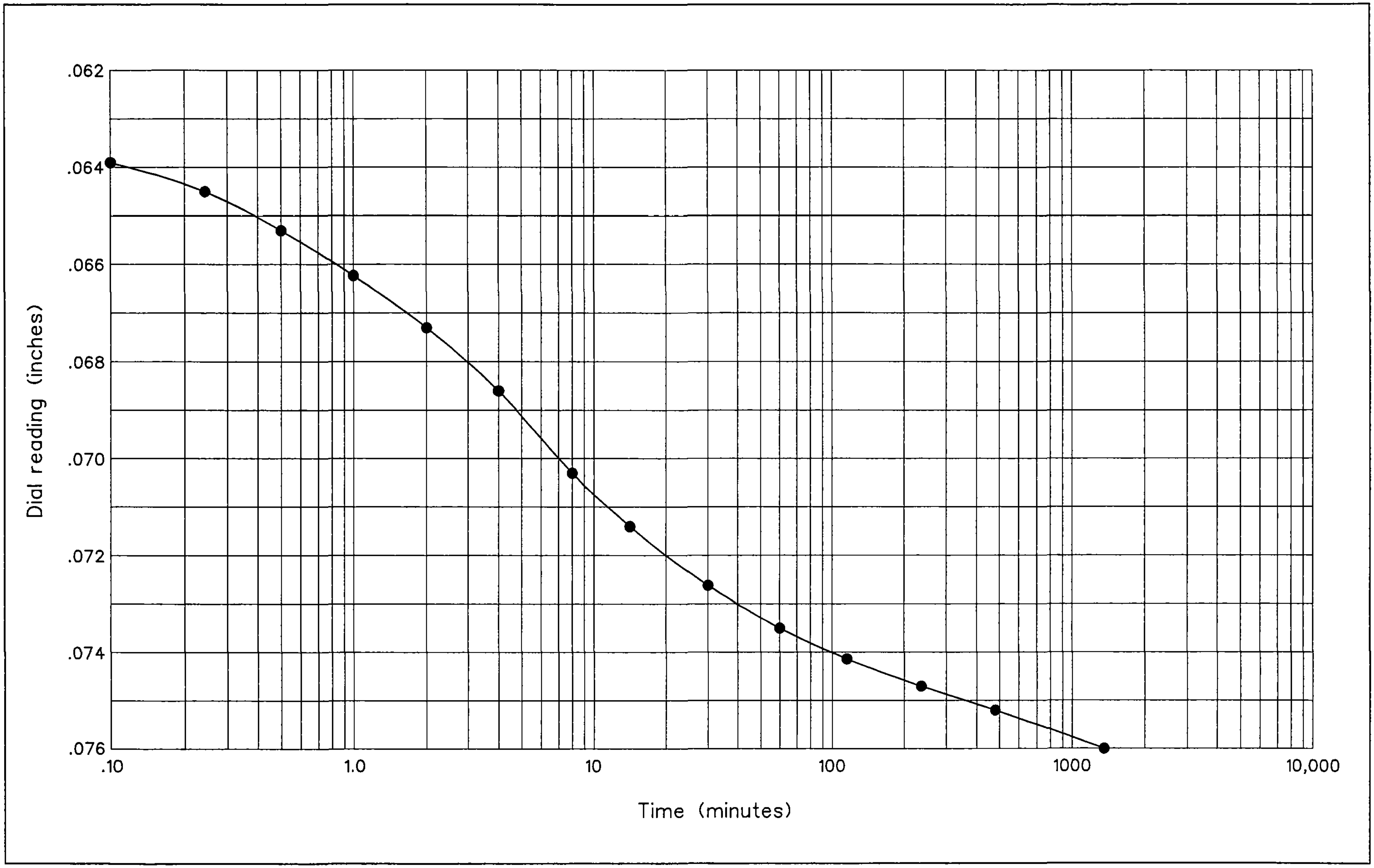
Figure No. ______ Boring No. RSB-39-624

Surface Elev. ______ Depth Interval 9'-10.5'

Moisture Content 30.7 % Dry Unit Wt. 89.0 lbs./ft³

LL 46 % PL 23 % PI 23 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



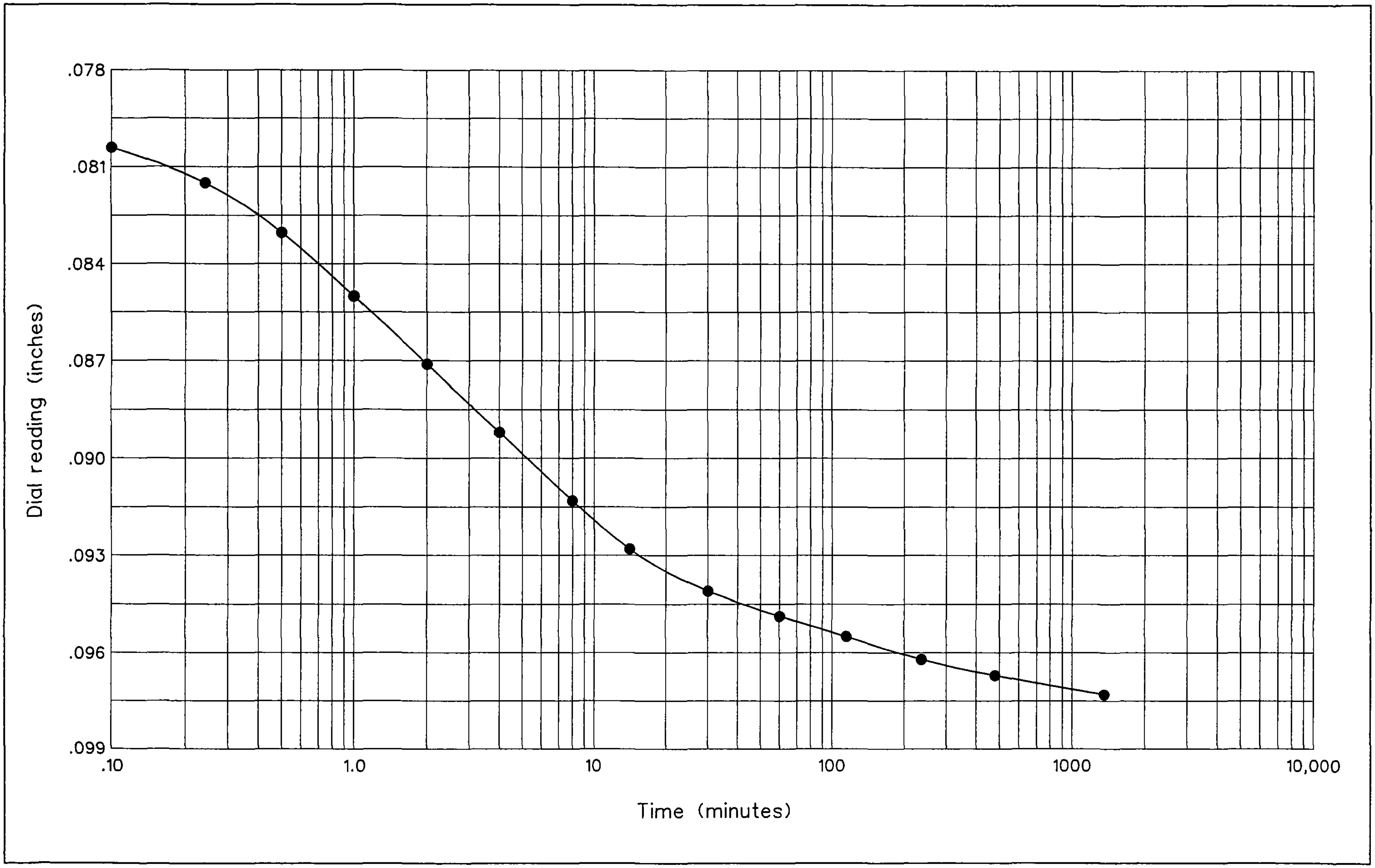
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 9'-10.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



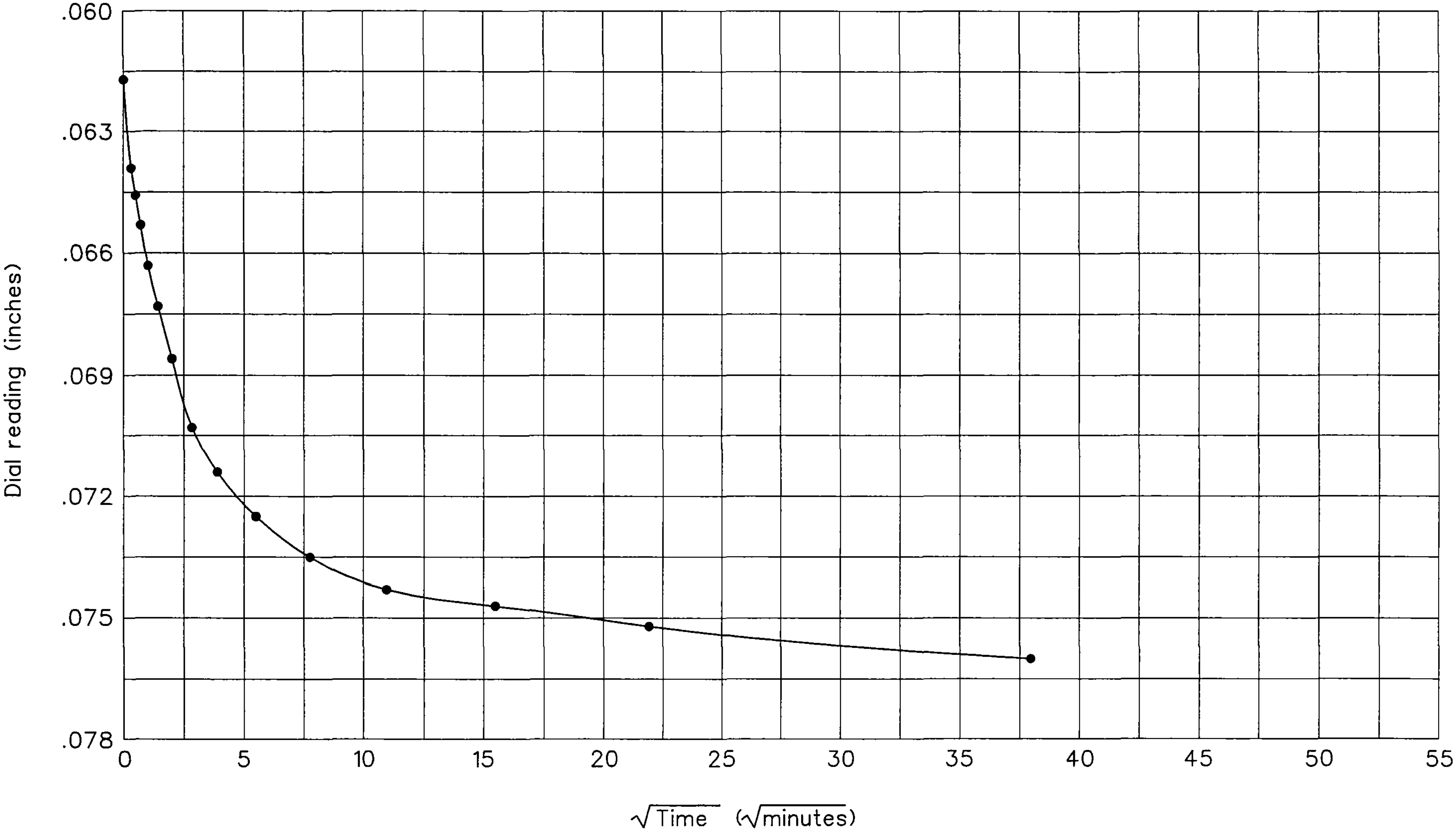
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 9'-10.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



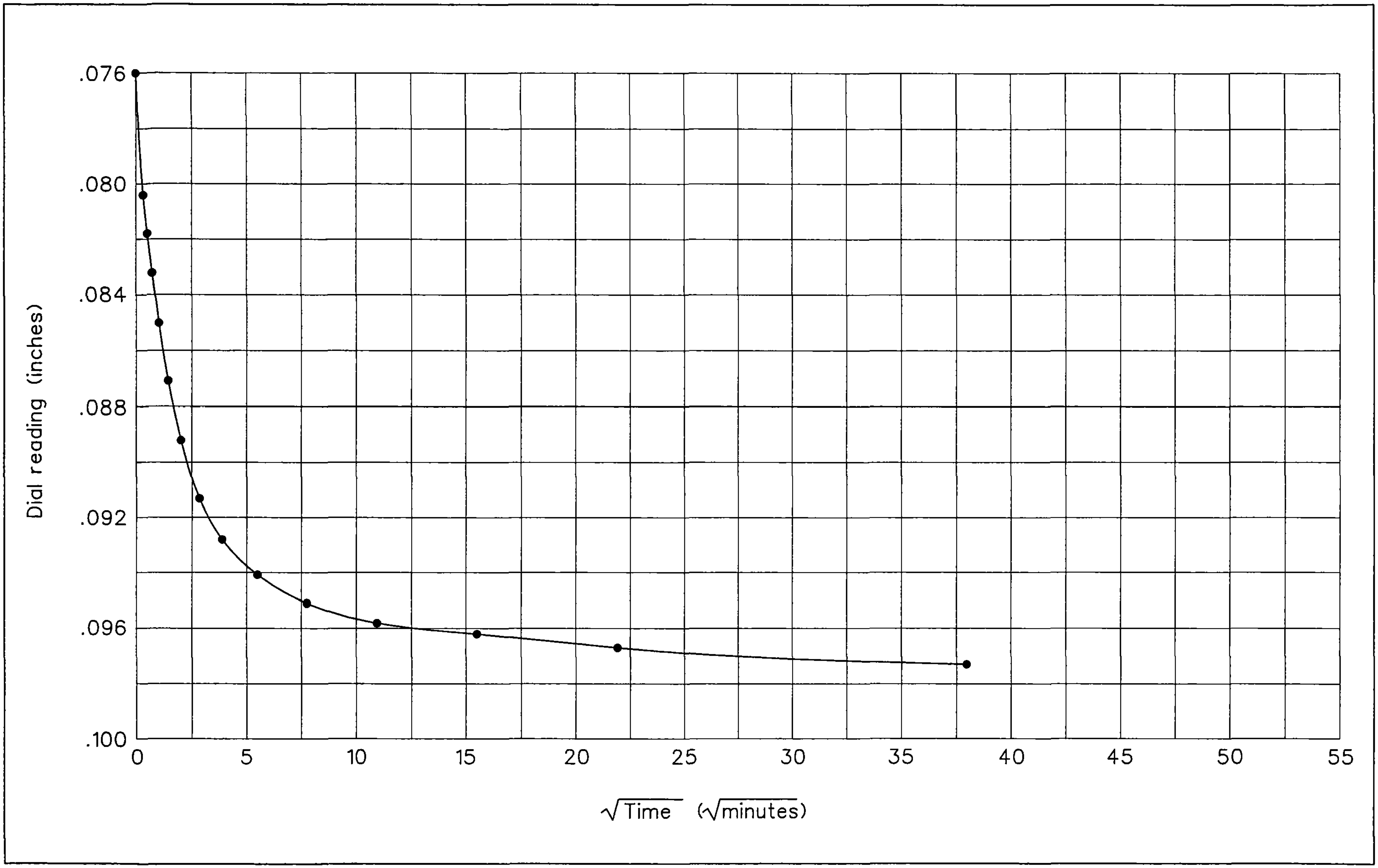
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 9'-10.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



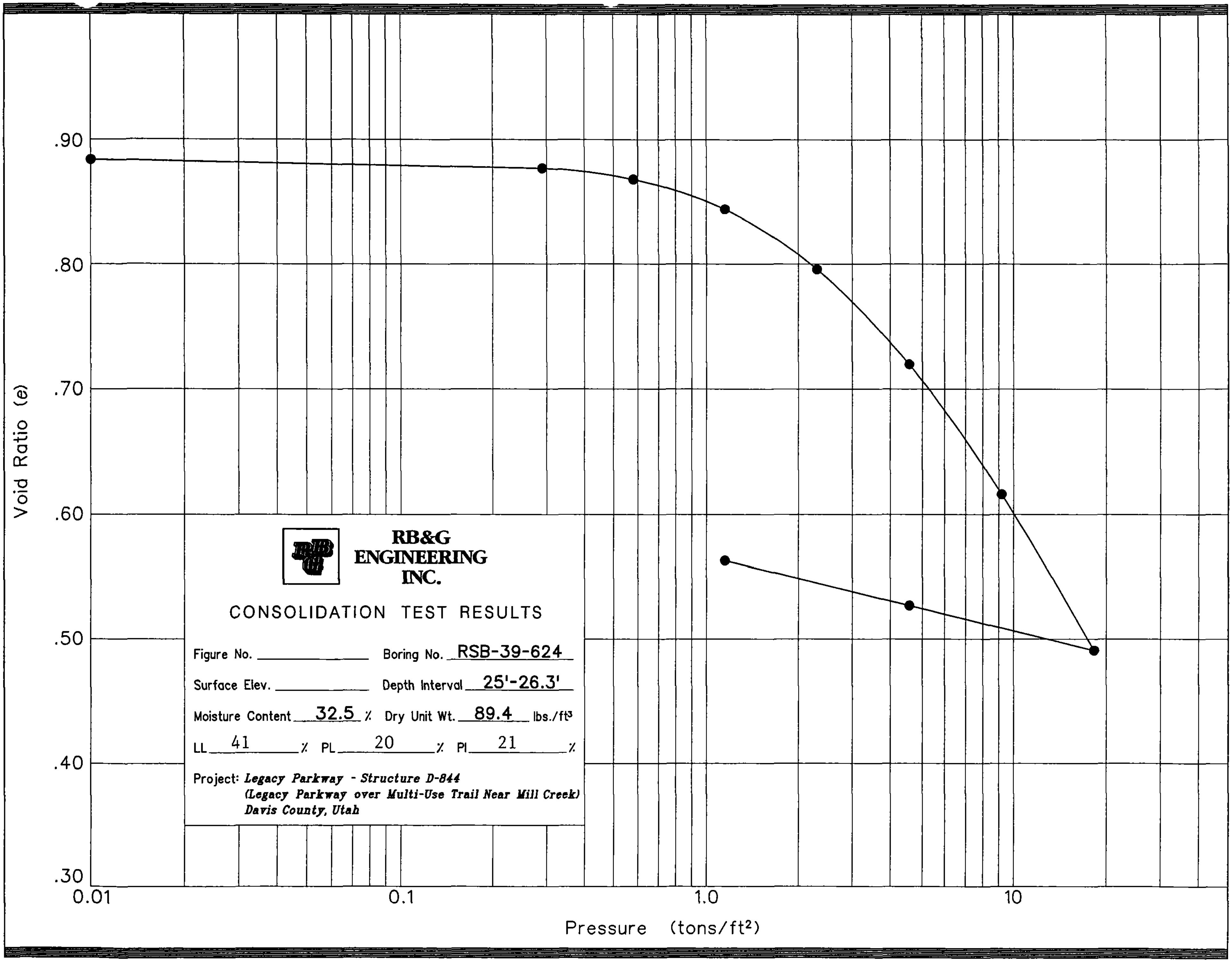
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 9'-10.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

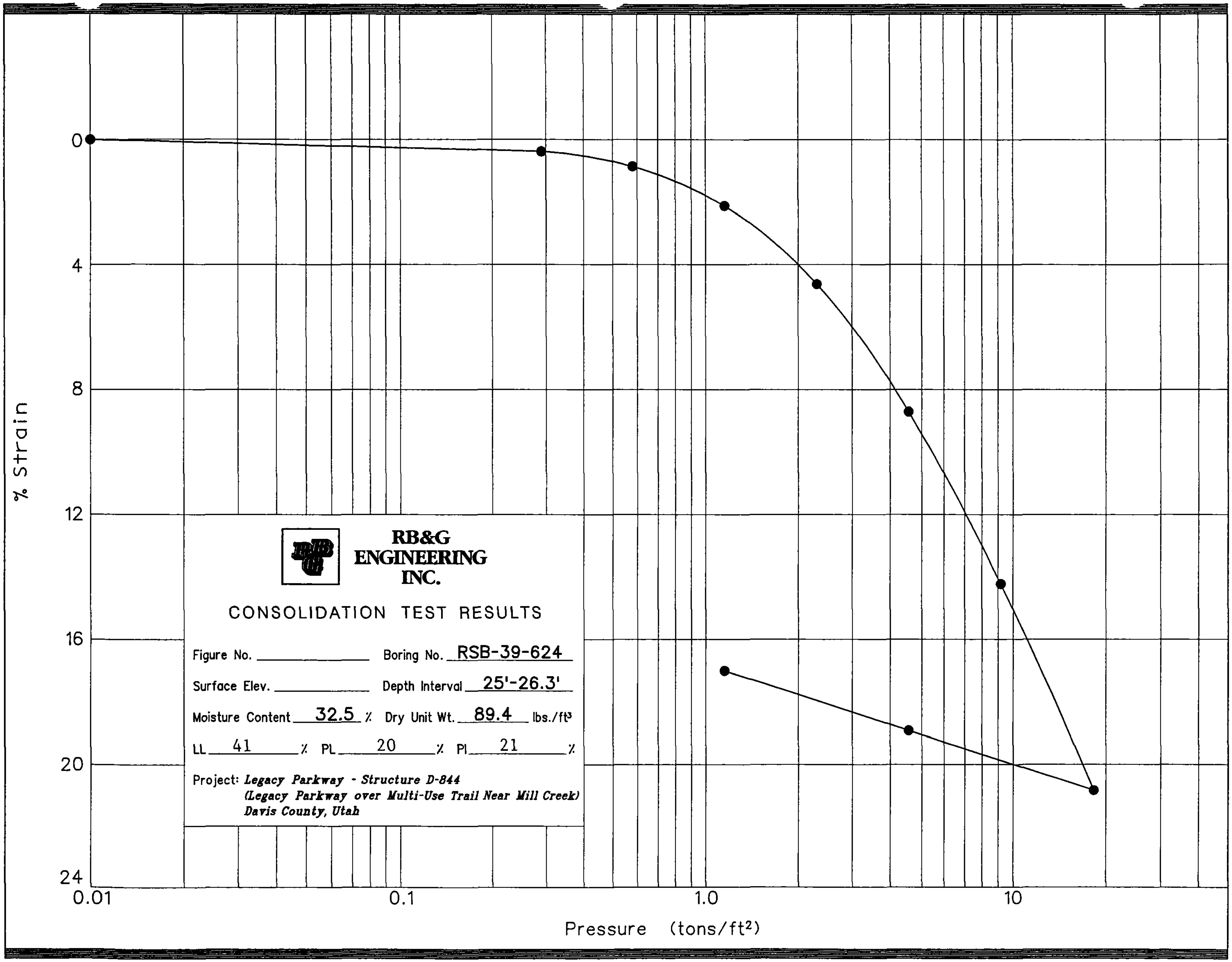
Figure No. ______ Boring No. RSB-39-624

Surface Elev. ______ Depth Interval 25'-26.3'

Moisture Content 32.5 % Dry Unit Wt. 89.4 lbs./ft³

LL 41 % PL 20 % PI 21 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

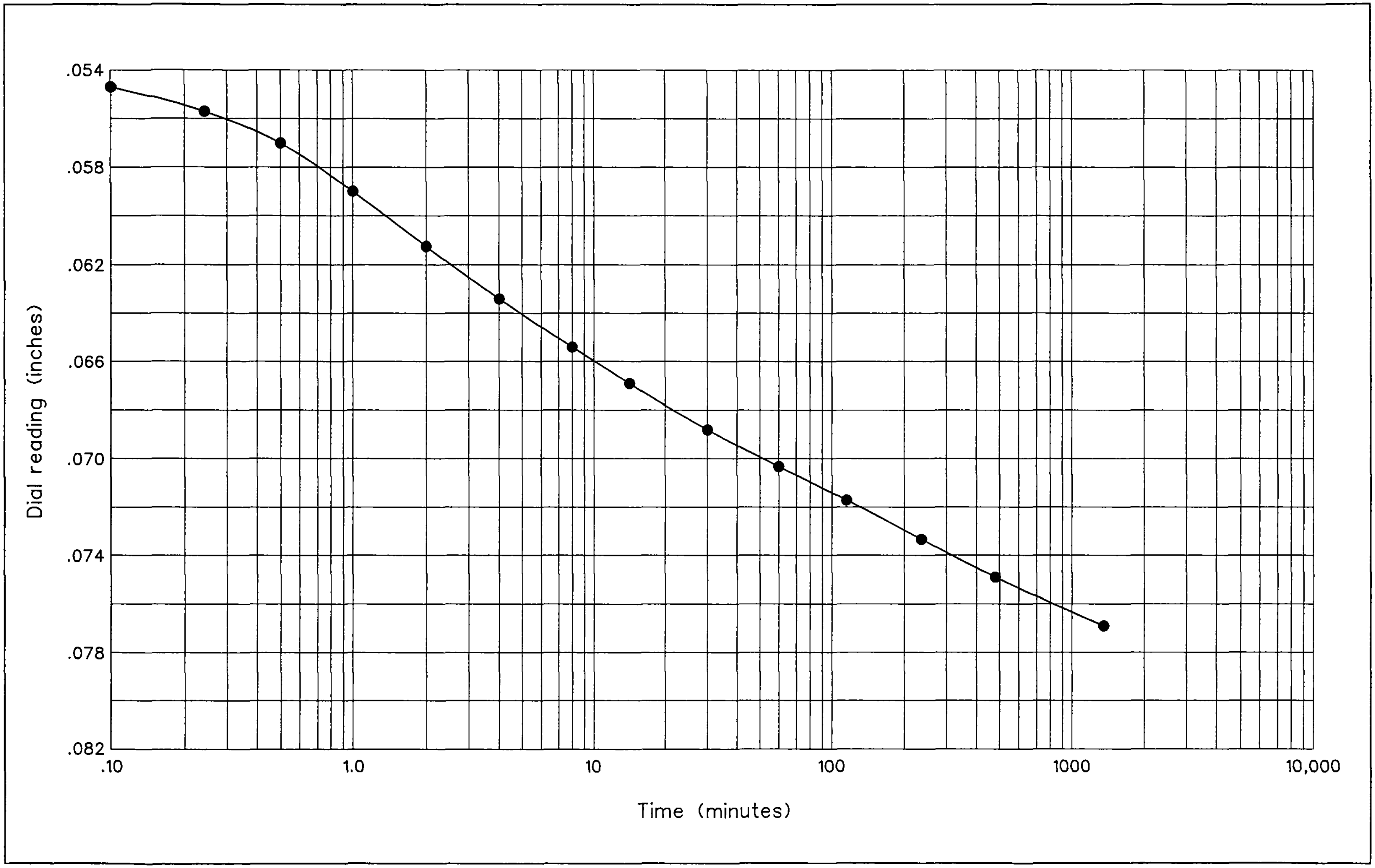
Figure No. ____ Boring No. RSB-39-624

Surface Elev. ____ Depth Interval 25'-26.3'

Moisture Content 32.5 % Dry Unit Wt. 89.4 lbs./ft³

LL 41 % PL 20 % PI 21 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



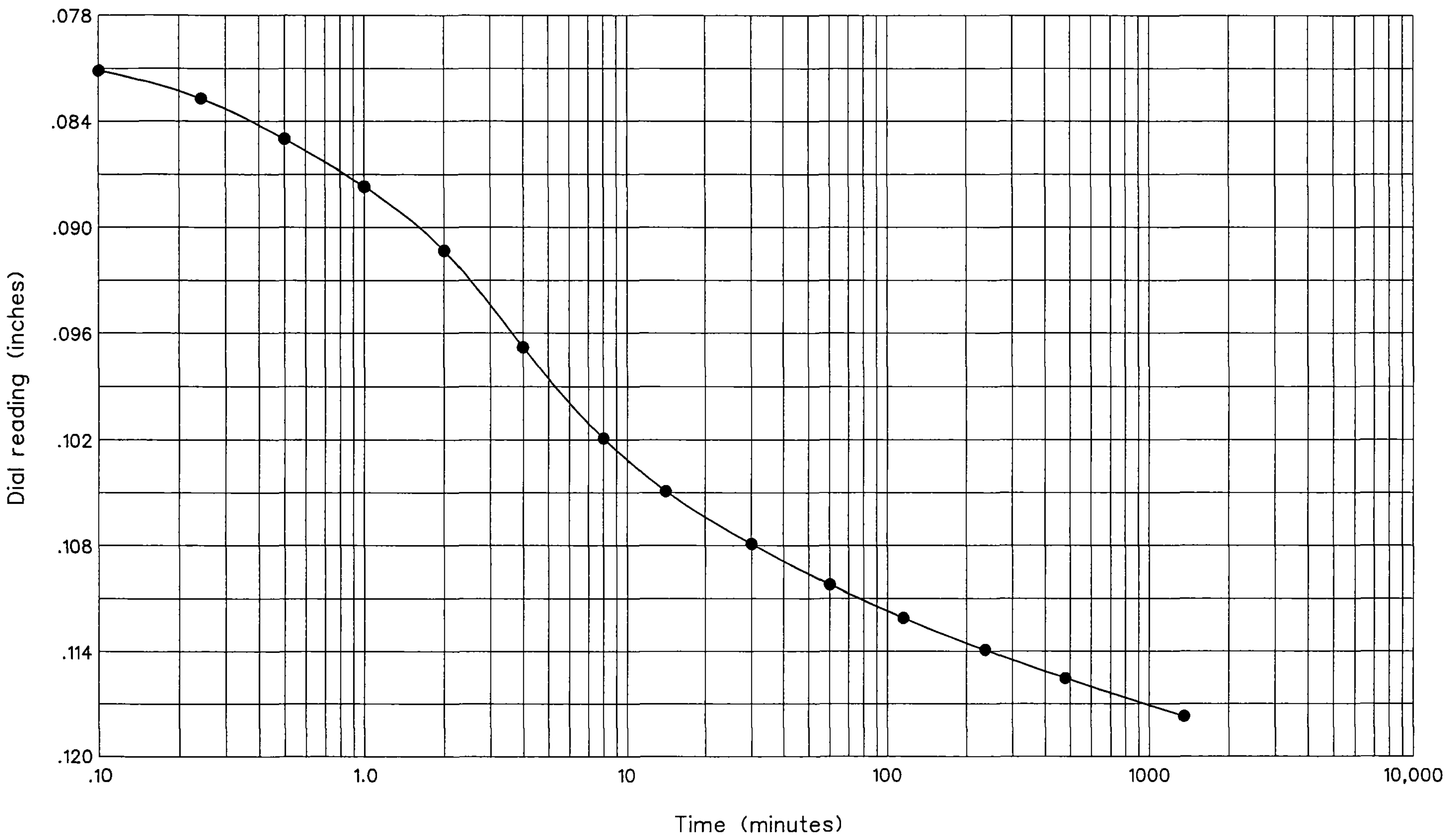
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 25'-26.3'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



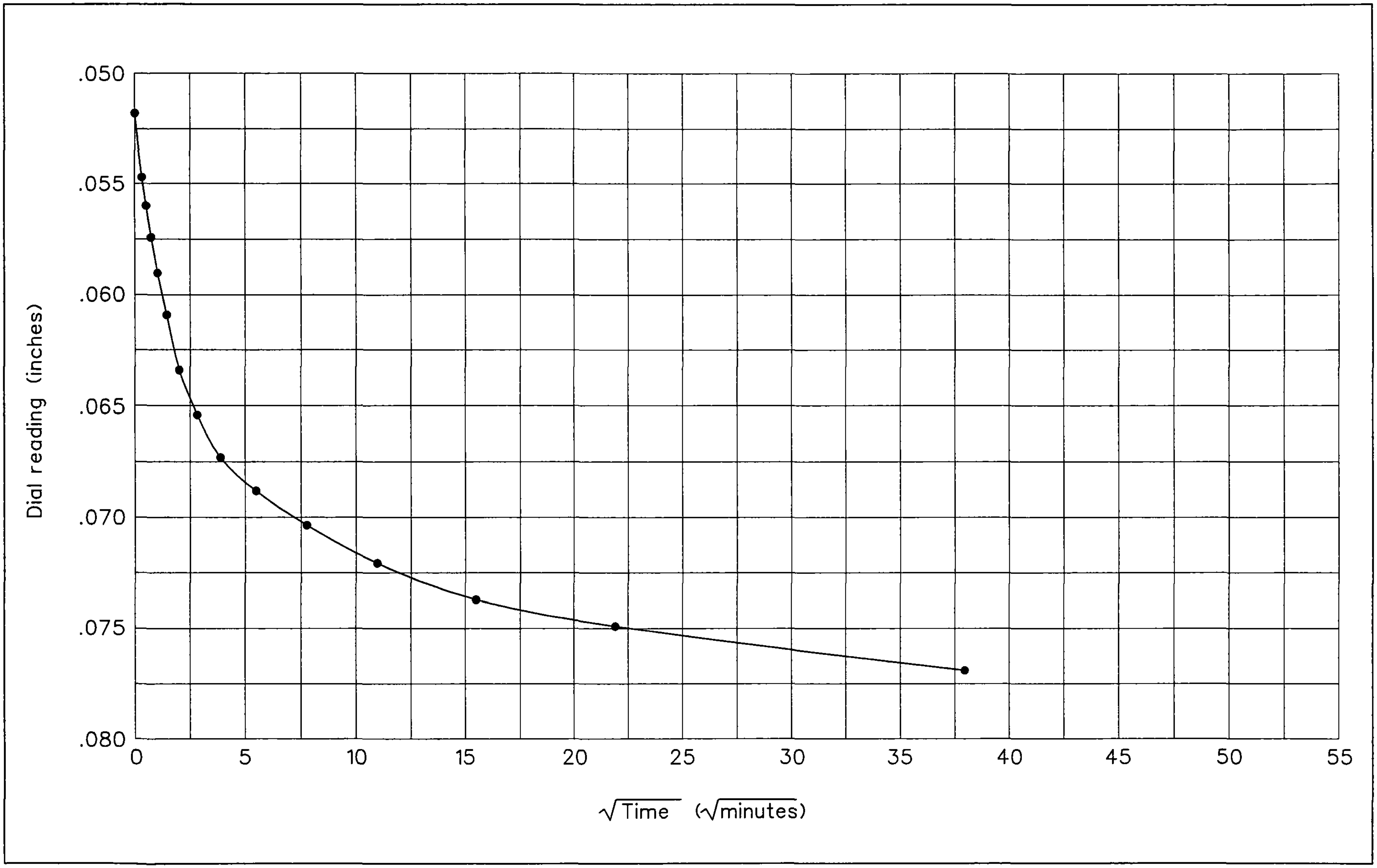
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 25'-26.3'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



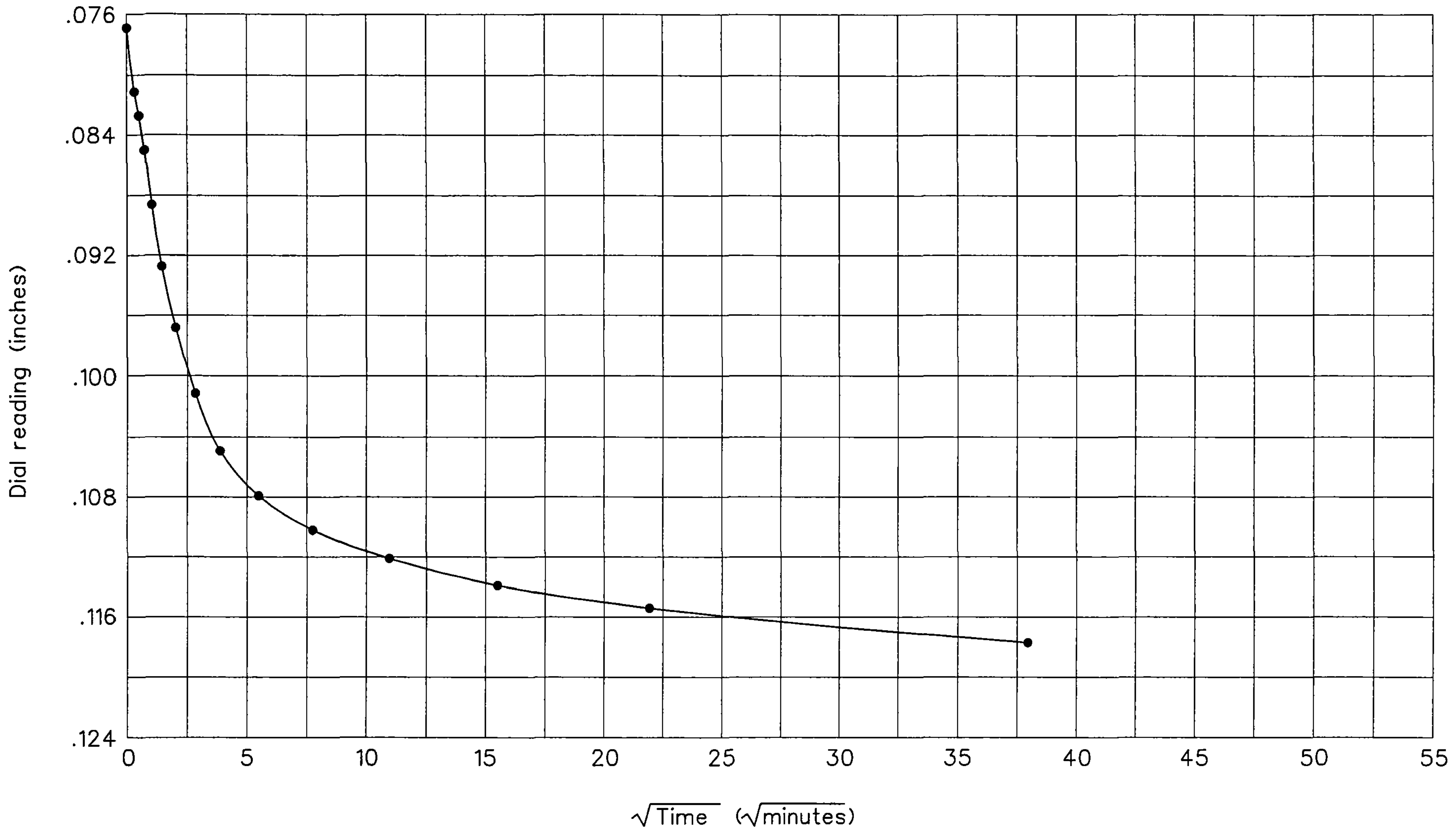
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 25'-26.3'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



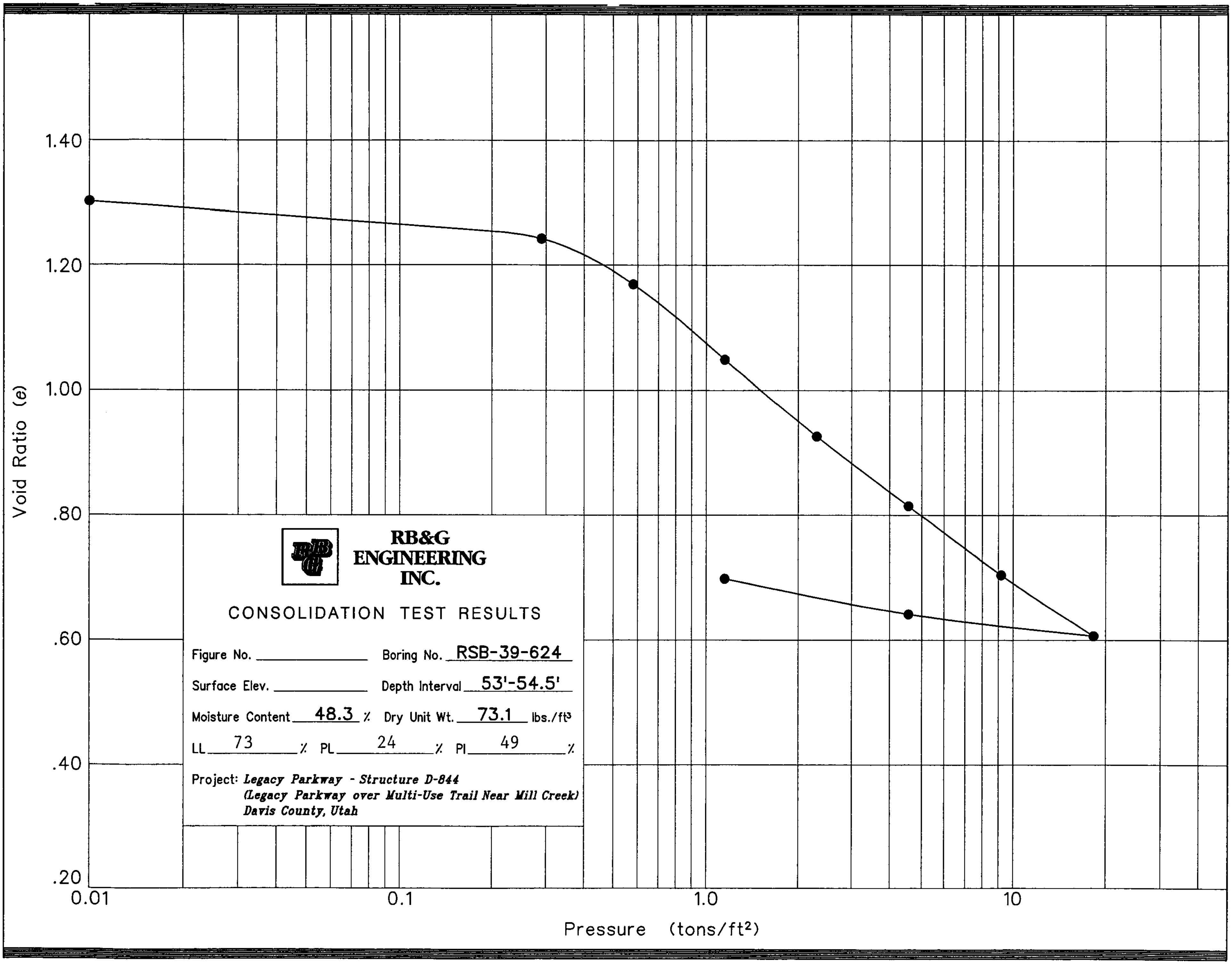
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 25'-26.3'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

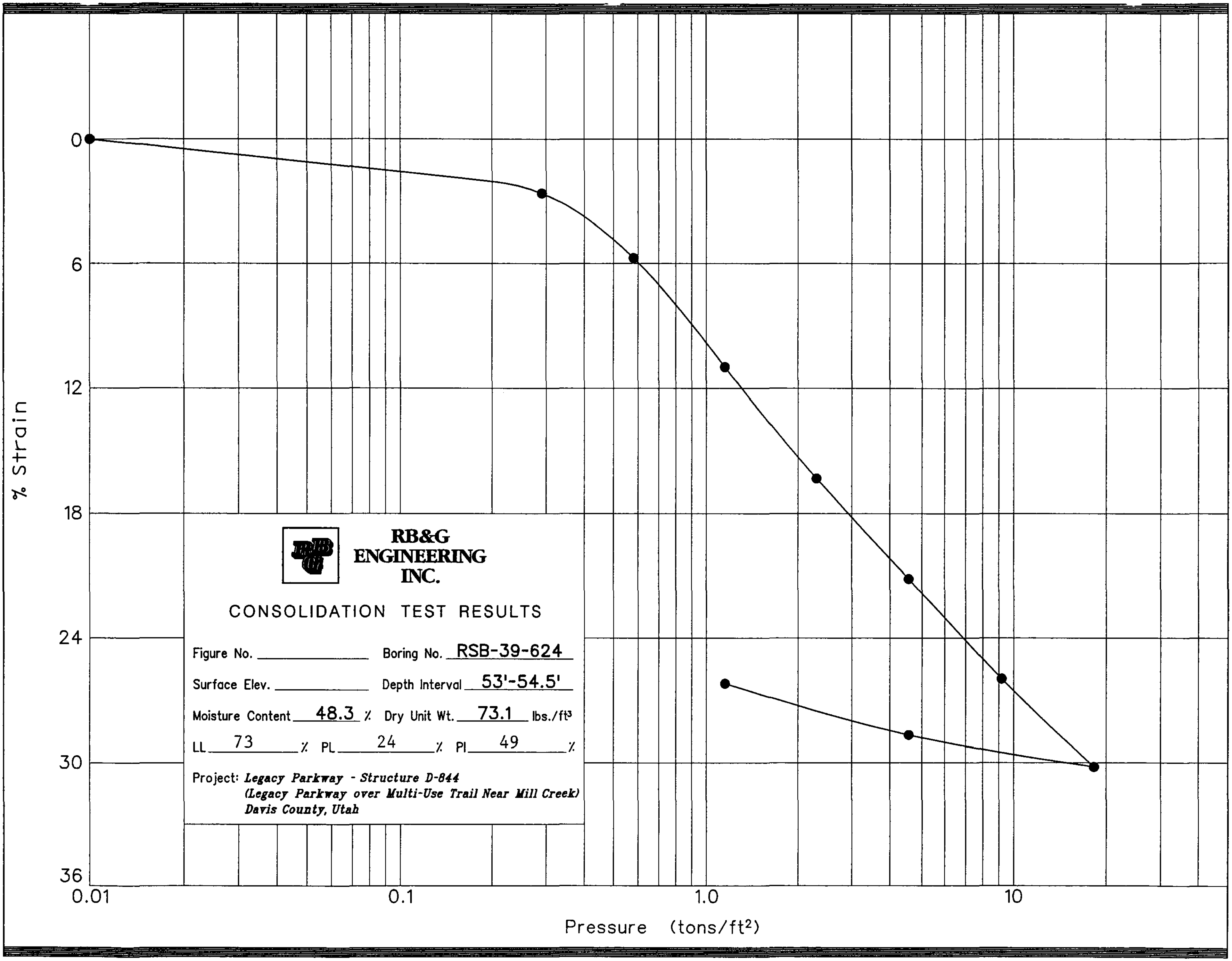
Figure No. ____________ Boring No. RSB-39-624

Surface Elev. ____________ Depth Interval 53'-54.5'

Moisture Content 48.3 % Dry Unit Wt. 73.1 lbs./ft³

LL 73 % PL 24 % PI 49 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

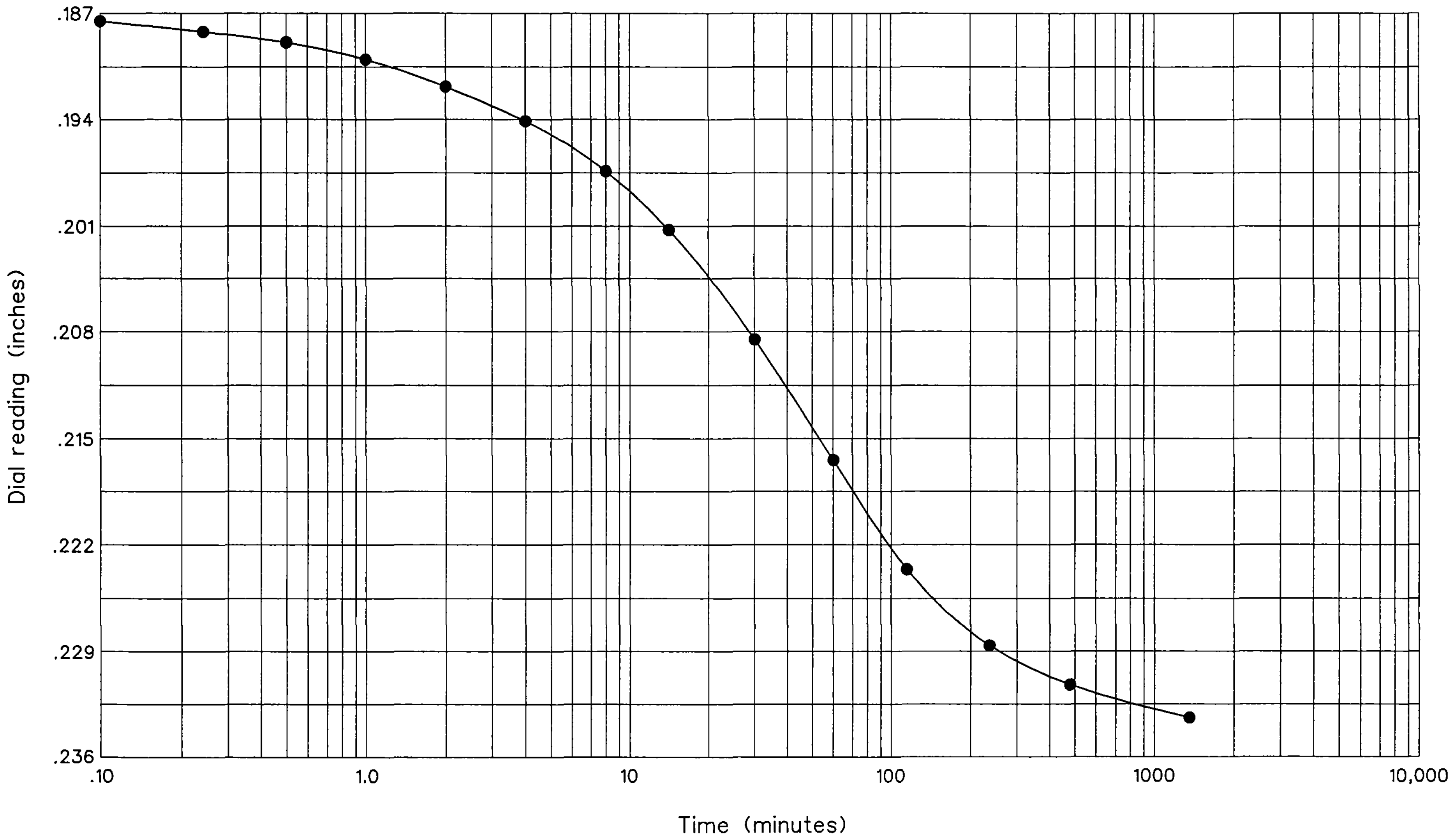
Figure No. ______ Boring No. RSB-39-624

Surface Elev. ______ Depth Interval 53'-54.5'

Moisture Content 48.3 % Dry Unit Wt. 73.1 lbs./ft³

LL 73 % PL 24 % PI 49 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



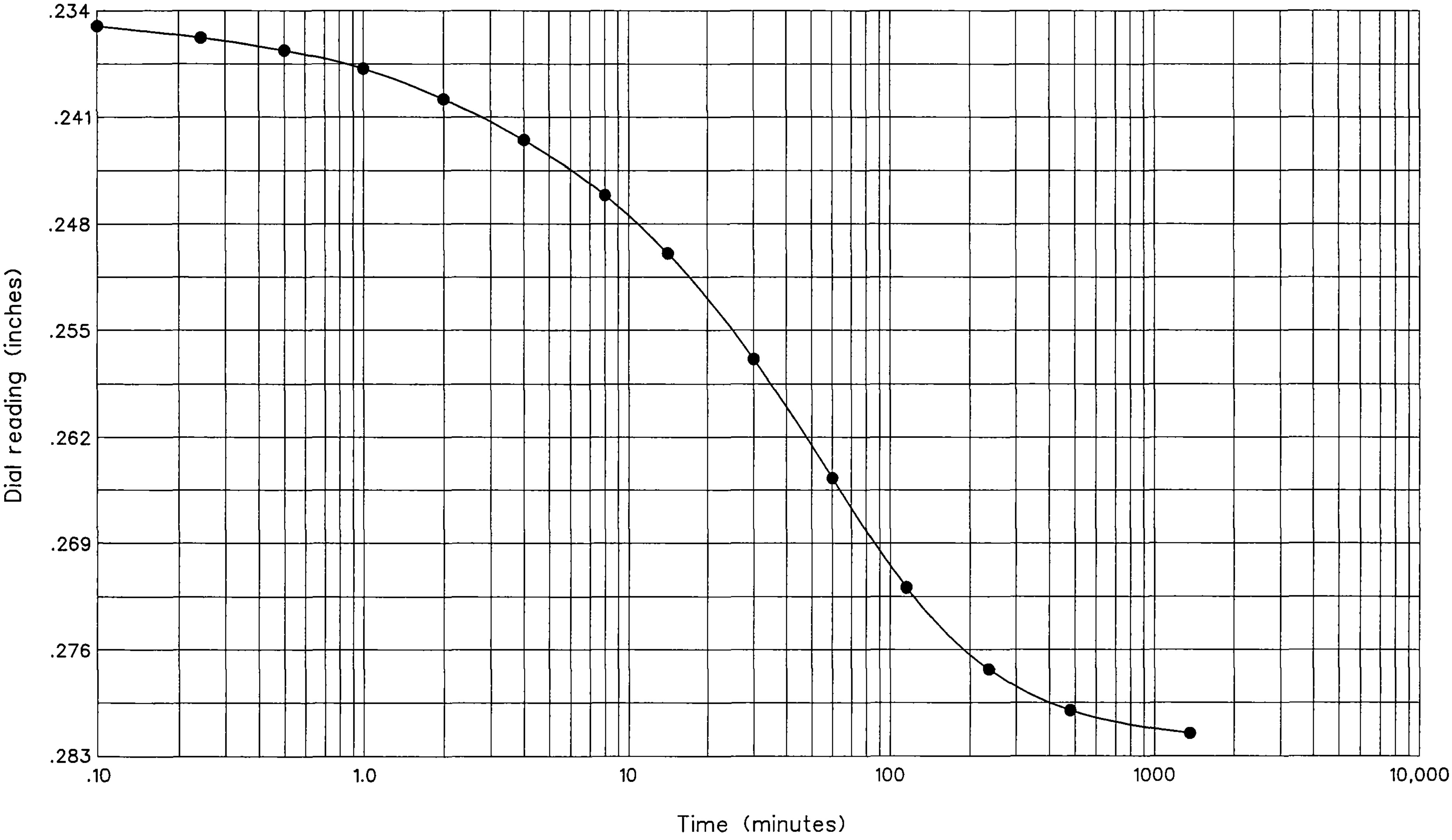
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 53'-54.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



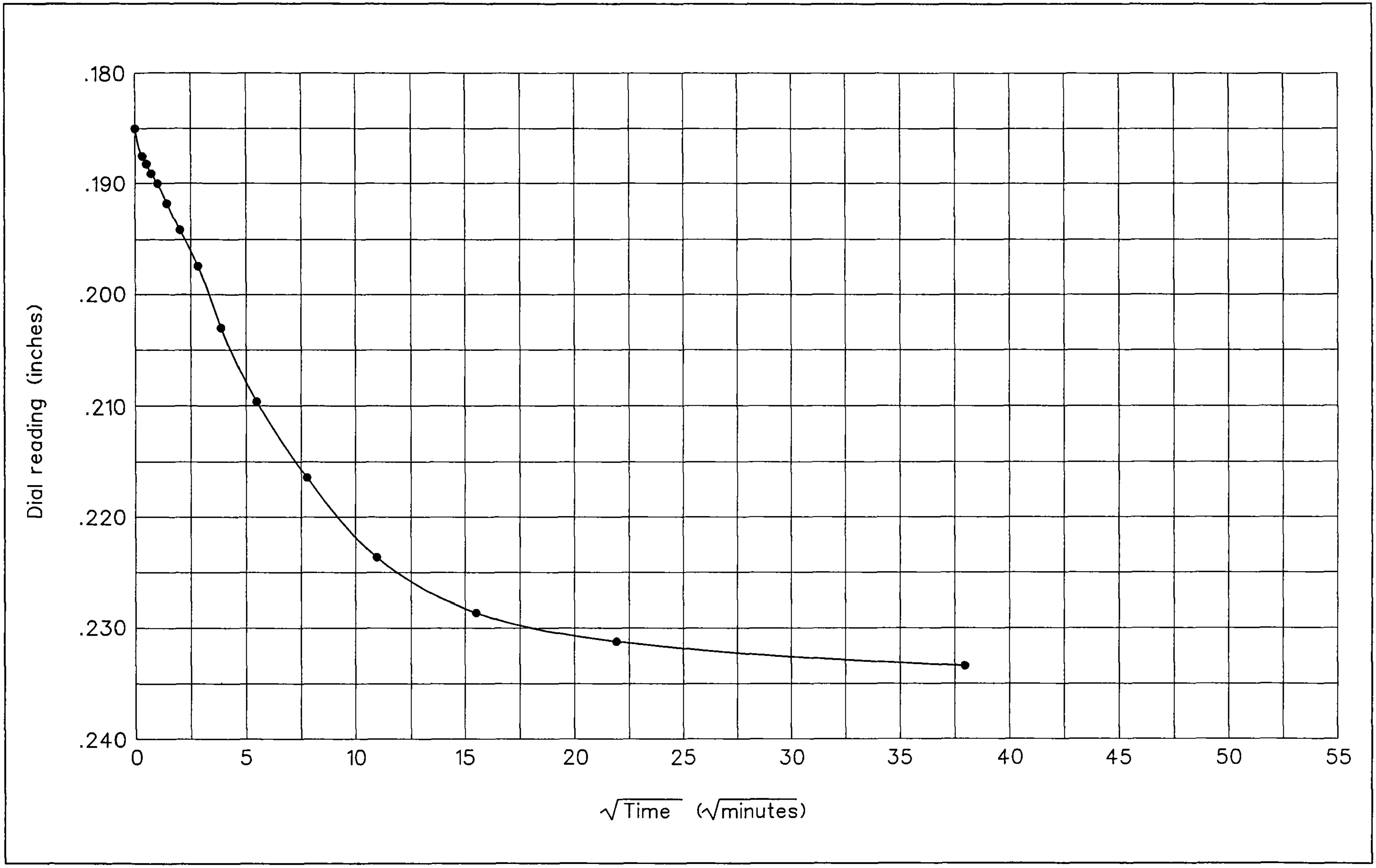
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 53'-54.5'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



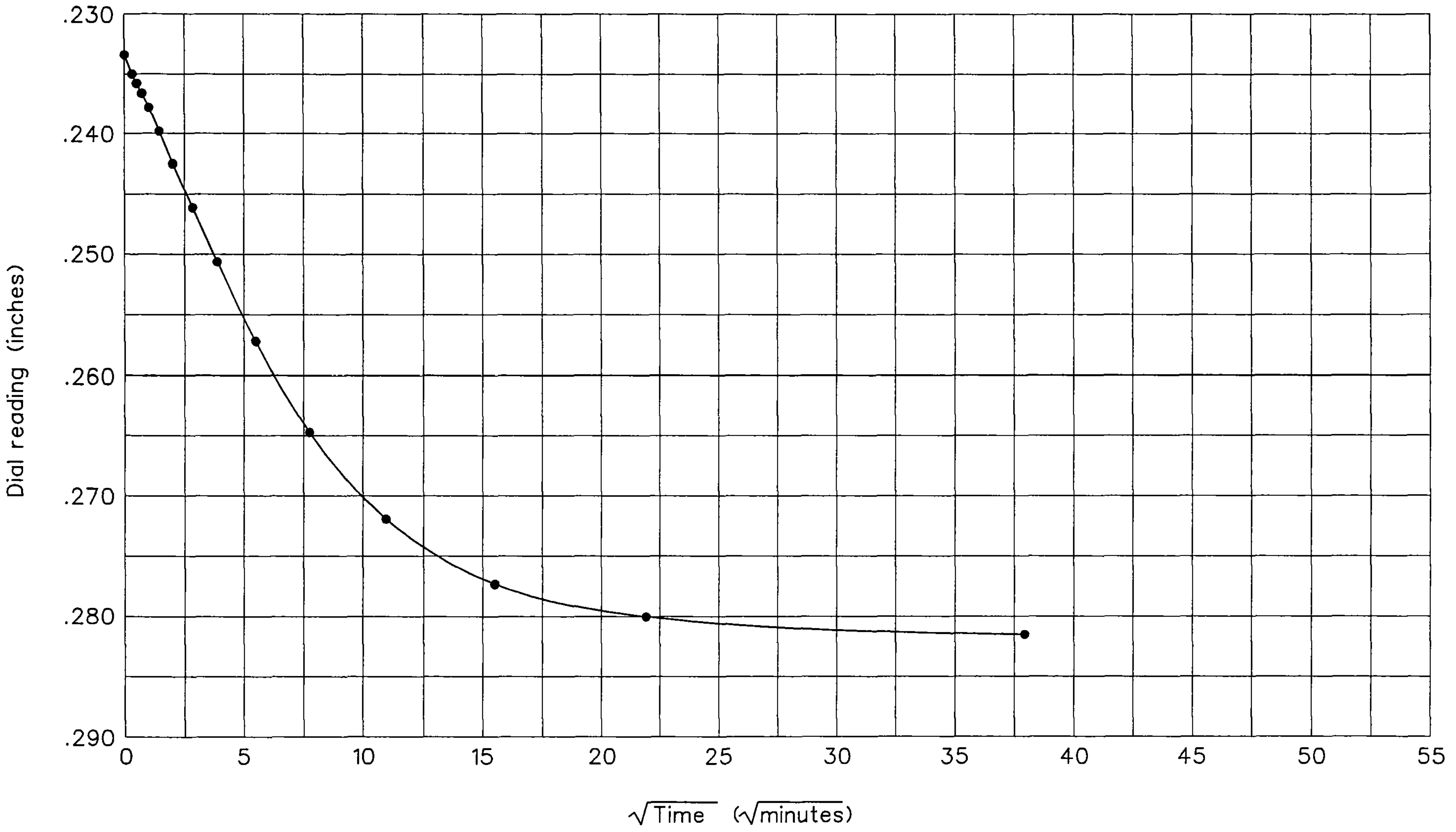
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 53'-54.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



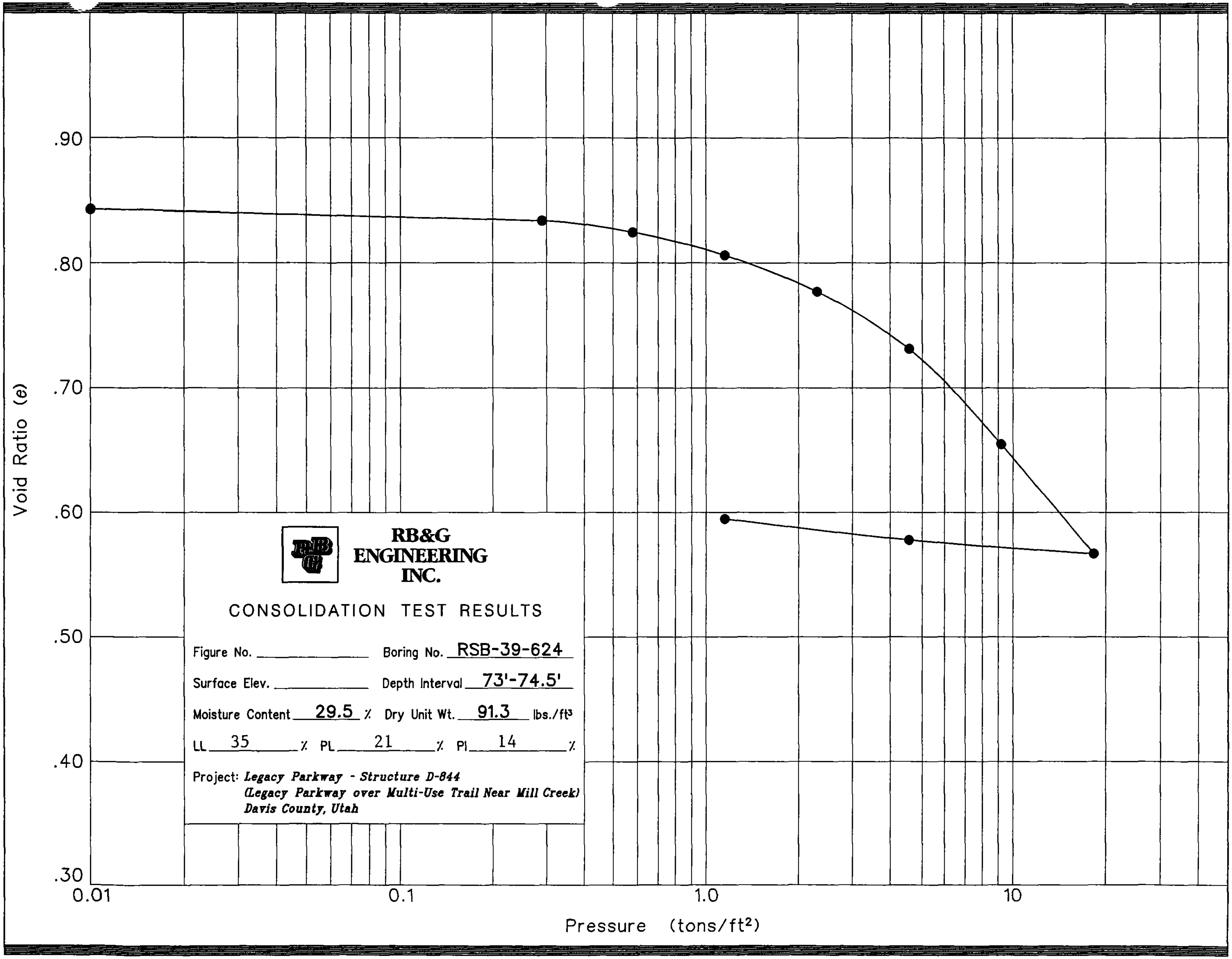
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 53'-54.5'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

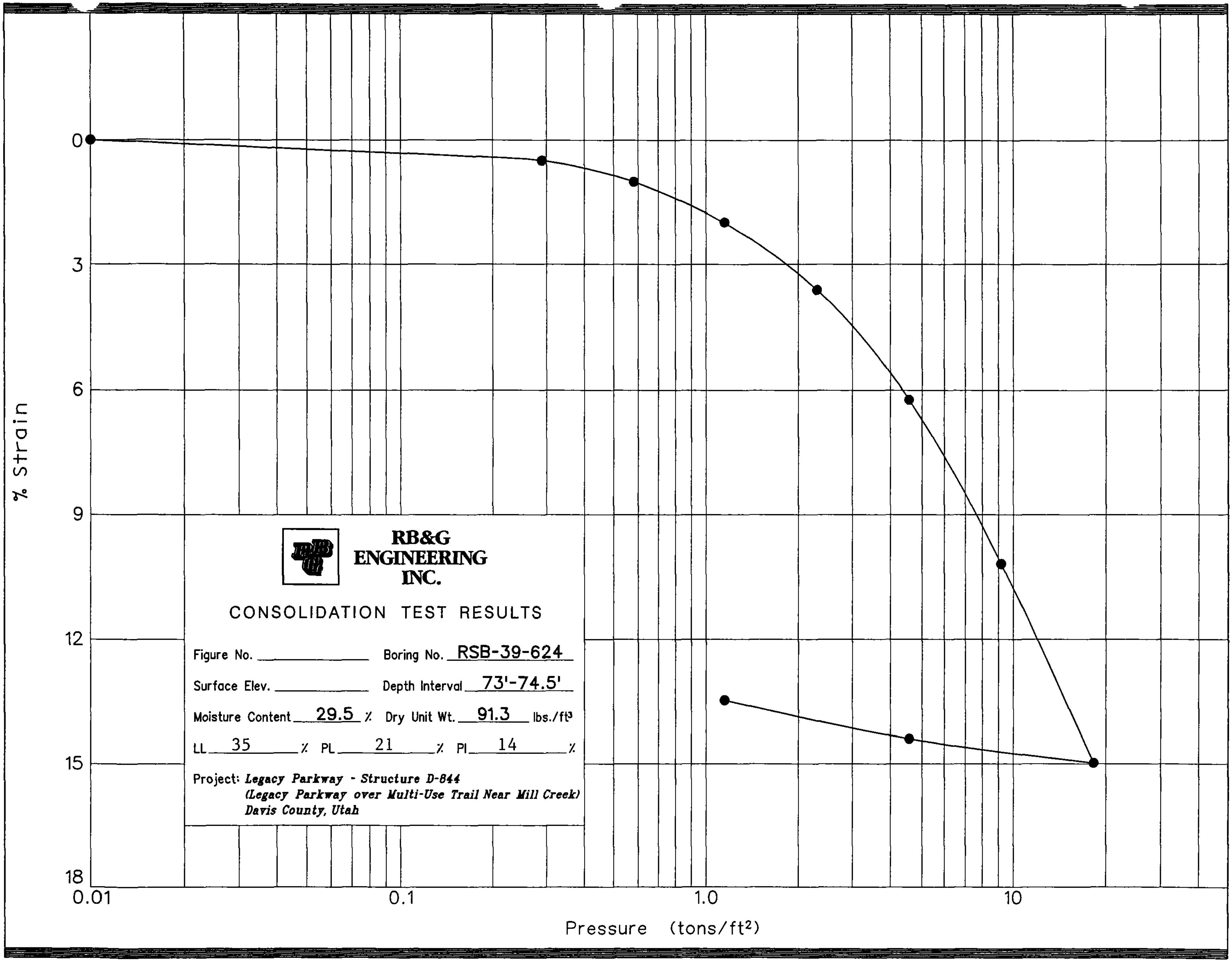
Figure No. ________ Boring No. RSB-39-624

Surface Elev. ________ Depth Interval 73'-74.5'

Moisture Content 29.5 % Dry Unit Wt. 91.3 lbs./ft³

LL 35 % PL 21 % PI 14 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

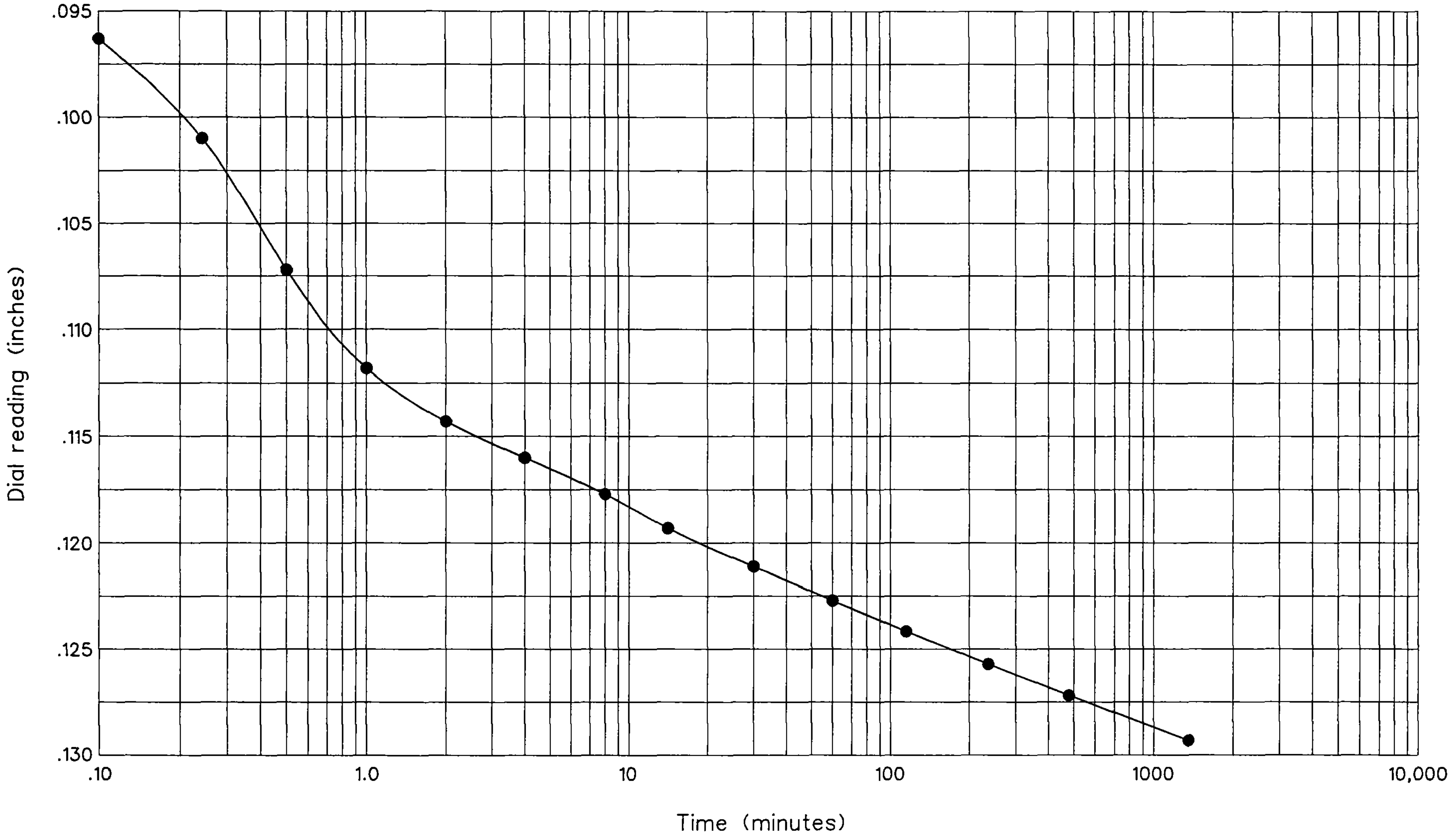
Figure No. ______ Boring No. RSB-39-624

Surface Elev. ______ Depth Interval 73'-74.5'

Moisture Content 29.5 % Dry Unit Wt. 91.3 lbs./ft³

LL 35 % PL 21 % PI 14 %

Project: ***Legacy Parkway - Structure D-844***
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



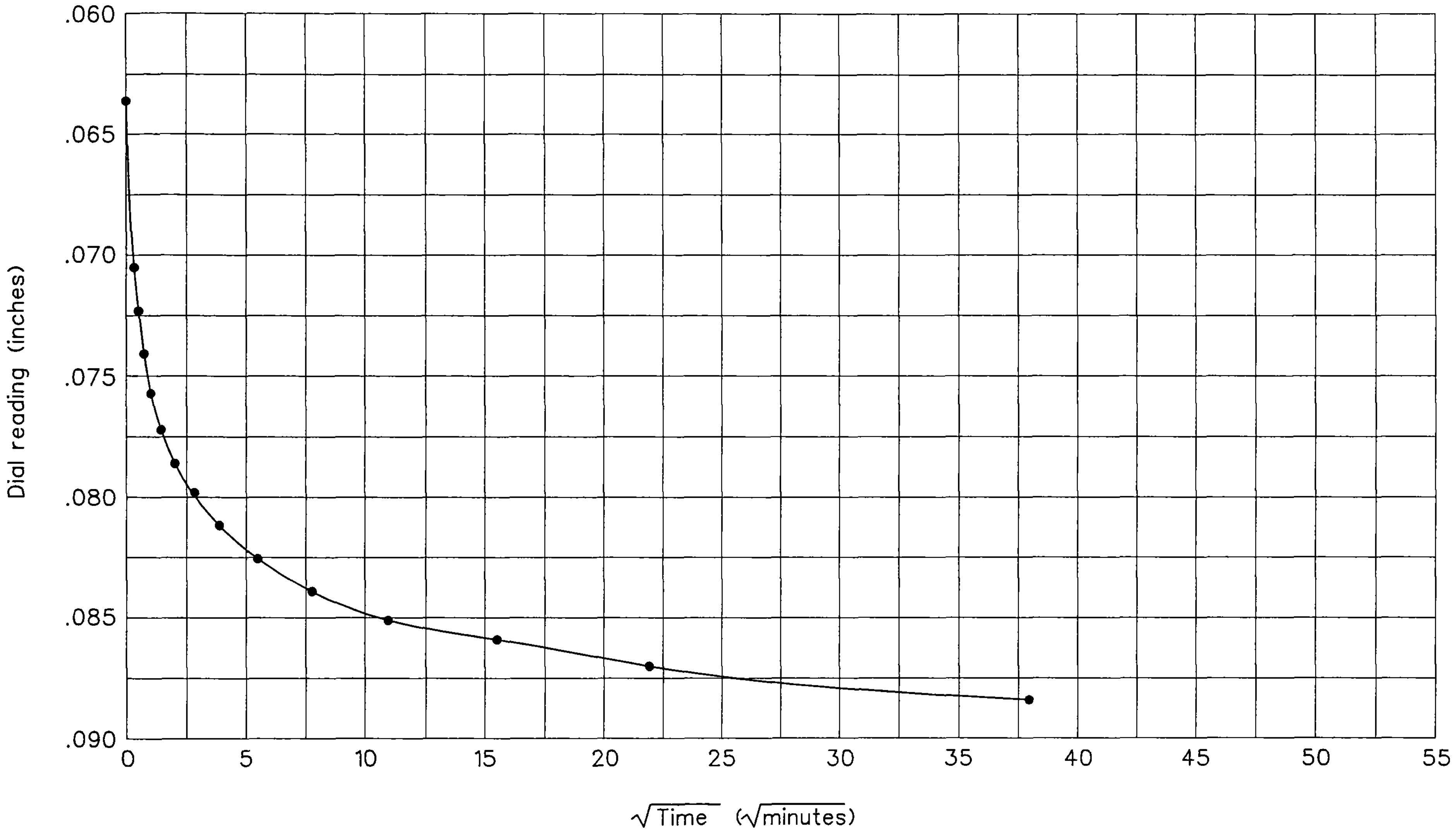
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 73'-74.5'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



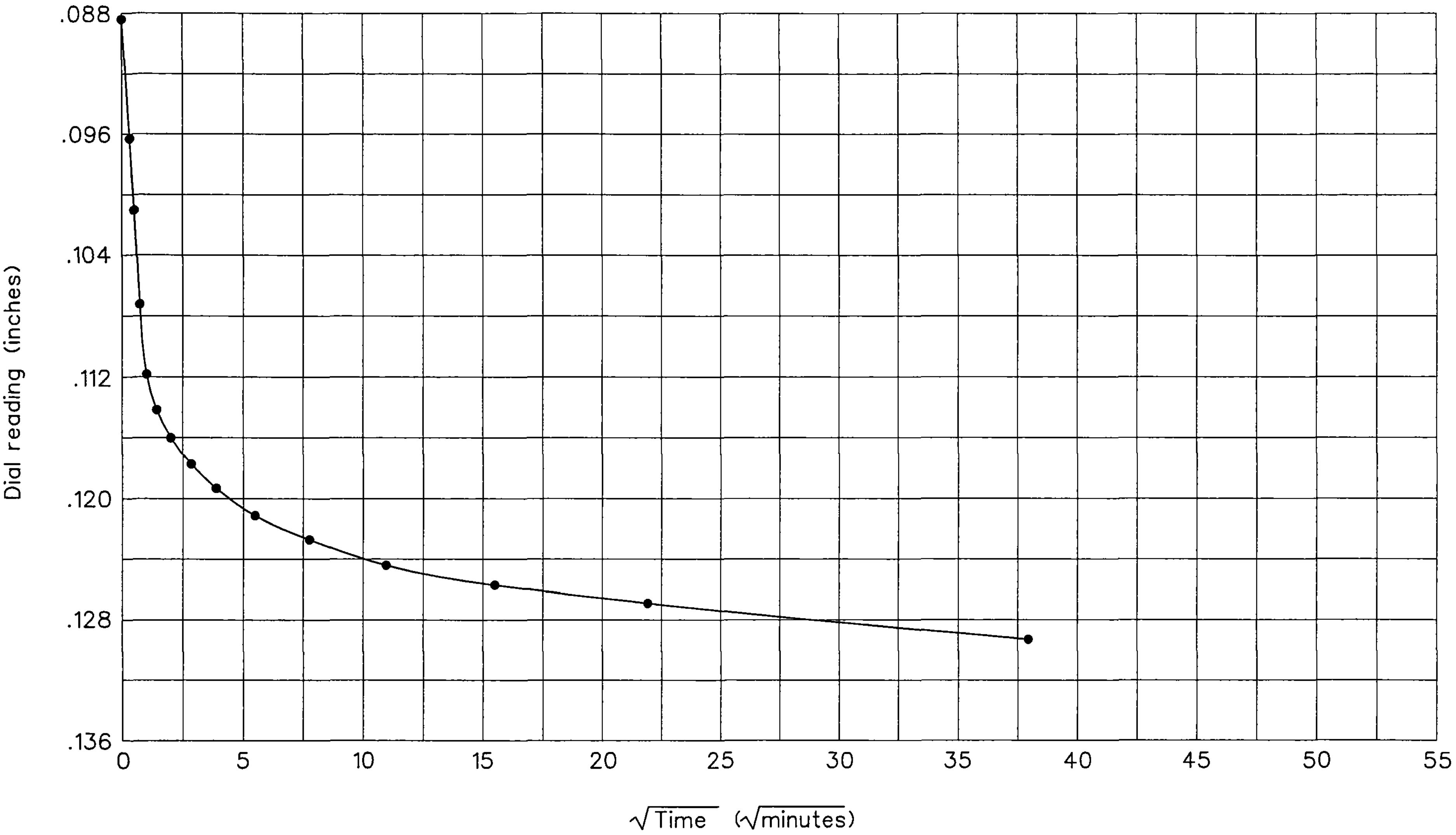
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 73'-74.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



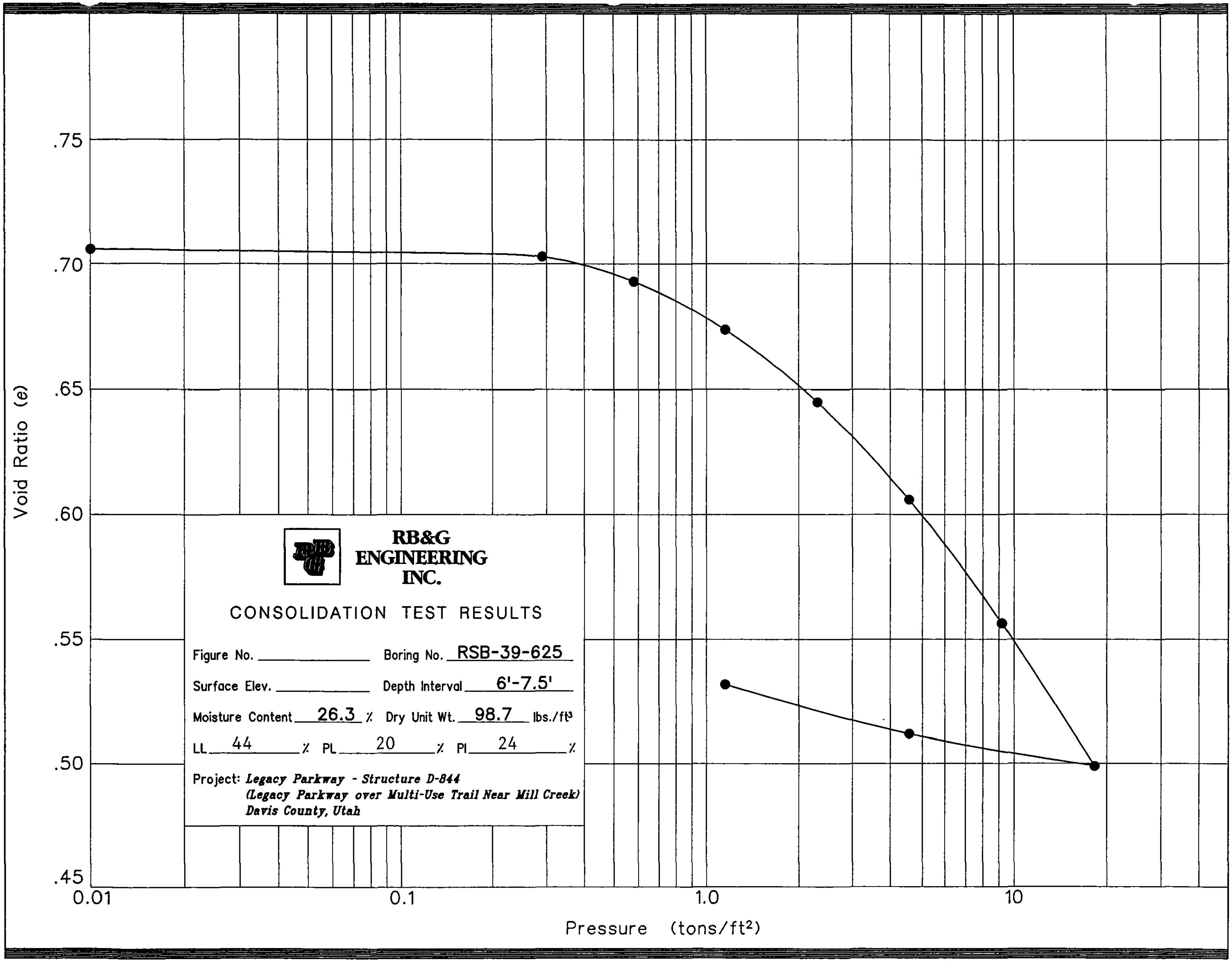
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-624
Depth: 73'-74.5'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

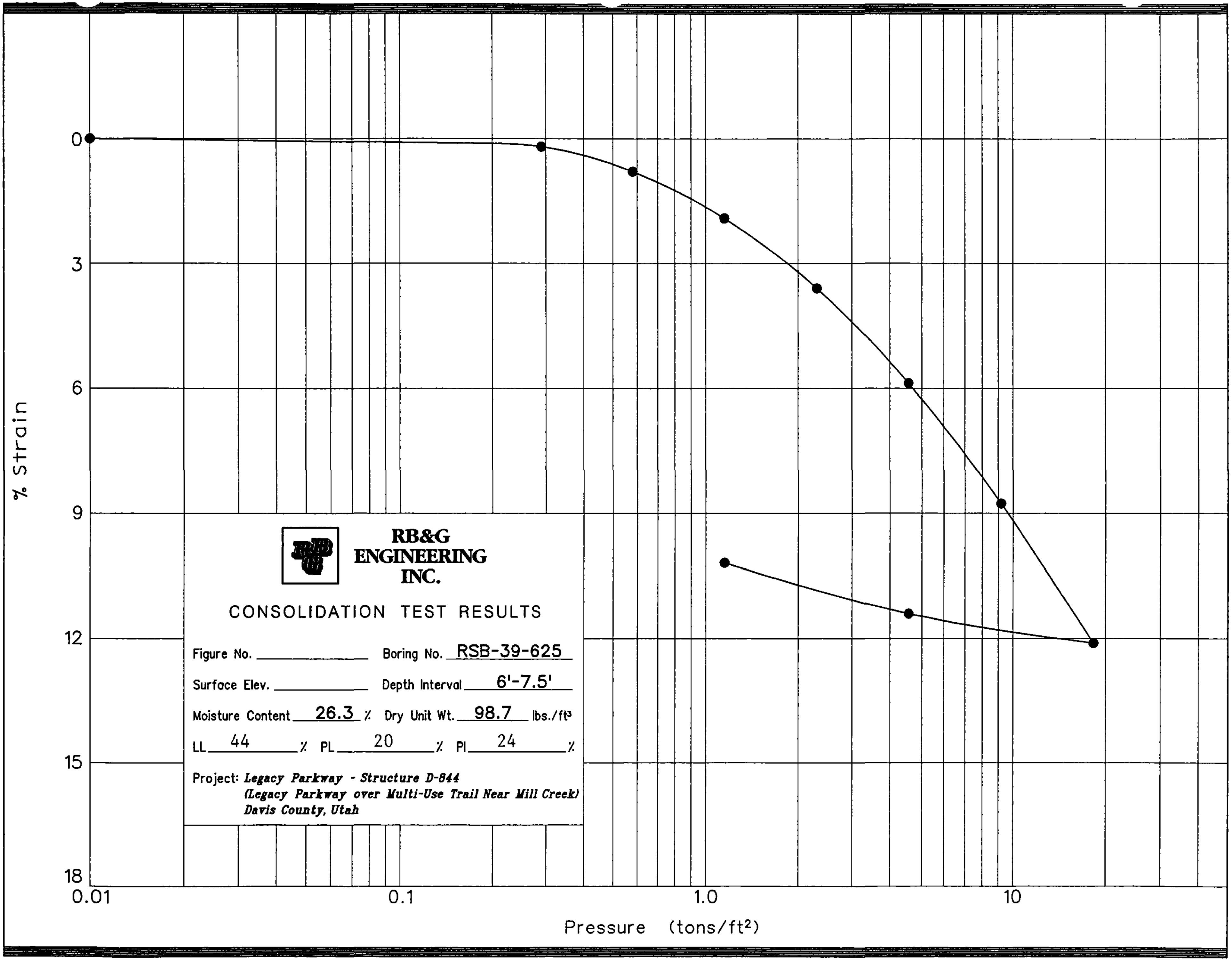
Figure No. ______ Boring No. RSB-39-625

Surface Elev. ______ Depth Interval 6'-7.5'

Moisture Content 26.3 % Dry Unit Wt. 98.7 lbs./ft³

LL 44 % PL 20 % PI 24 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

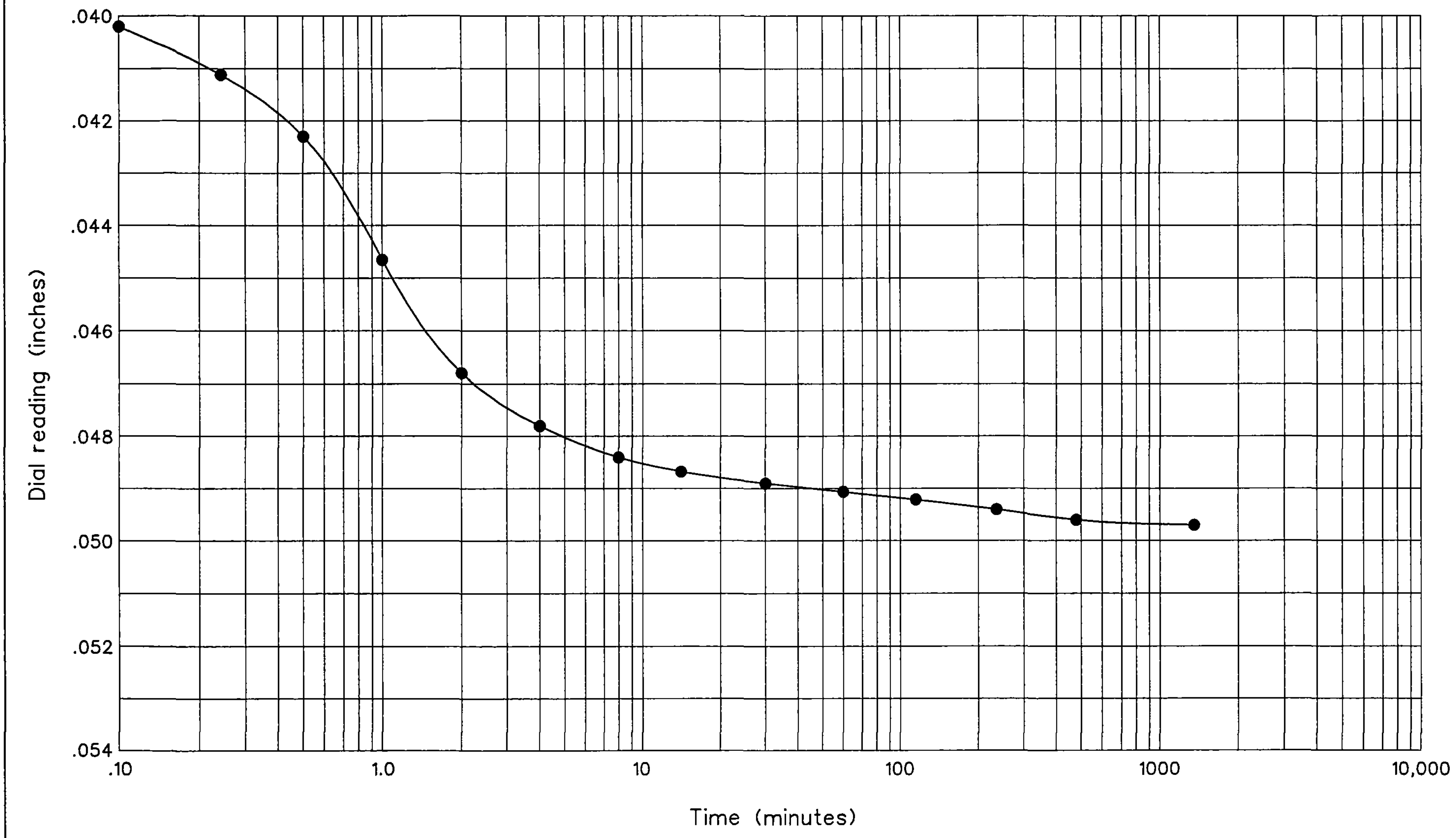
Figure No. ____________ Boring No. RSB-39-625

Surface Elev. ____________ Depth Interval 6'-7.5'

Moisture Content 26.3 % Dry Unit Wt. 98.7 lbs./ft³

LL 44 % PL 20 % PI 24 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



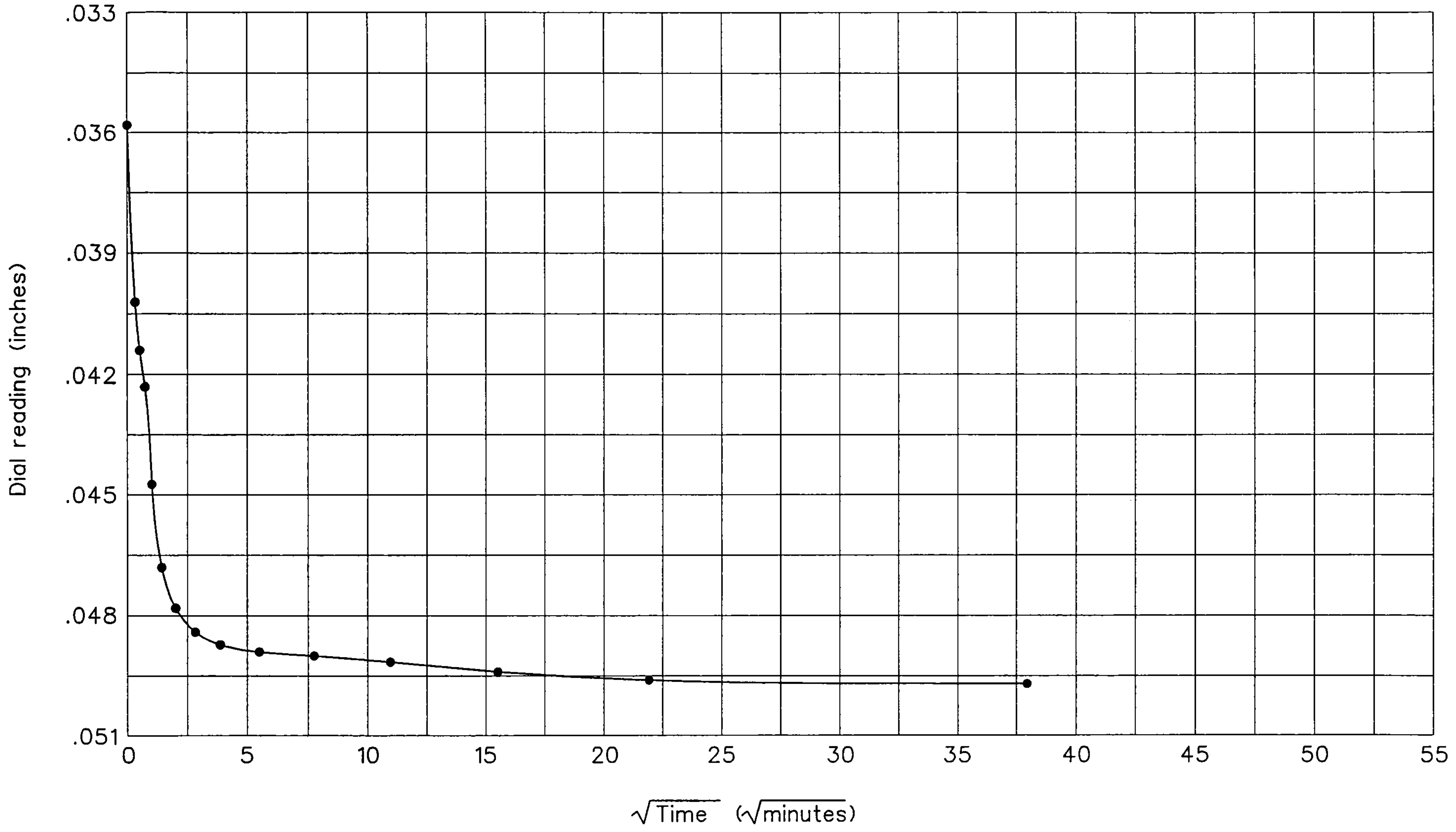
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 6'-7.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



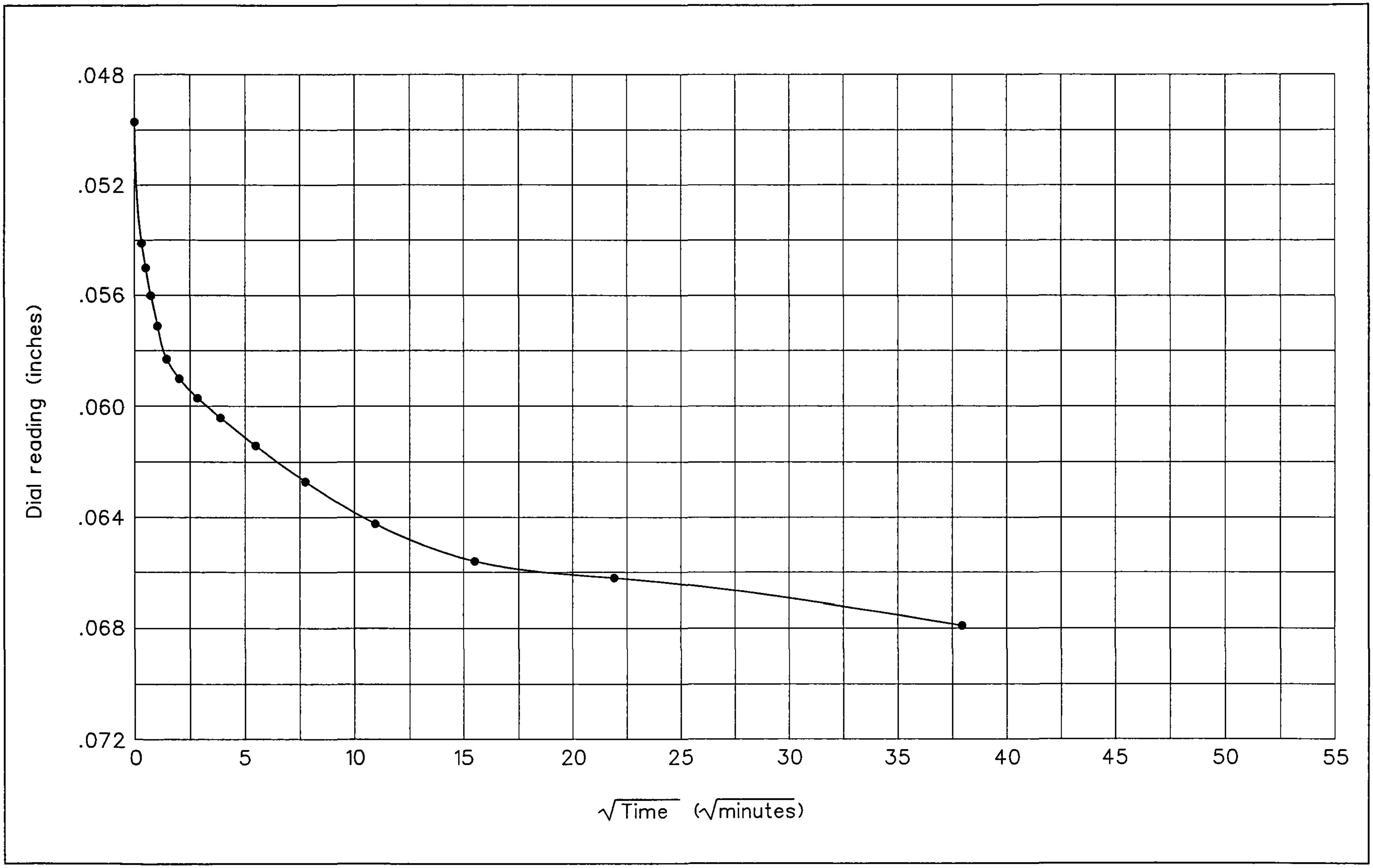
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 6'-7.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



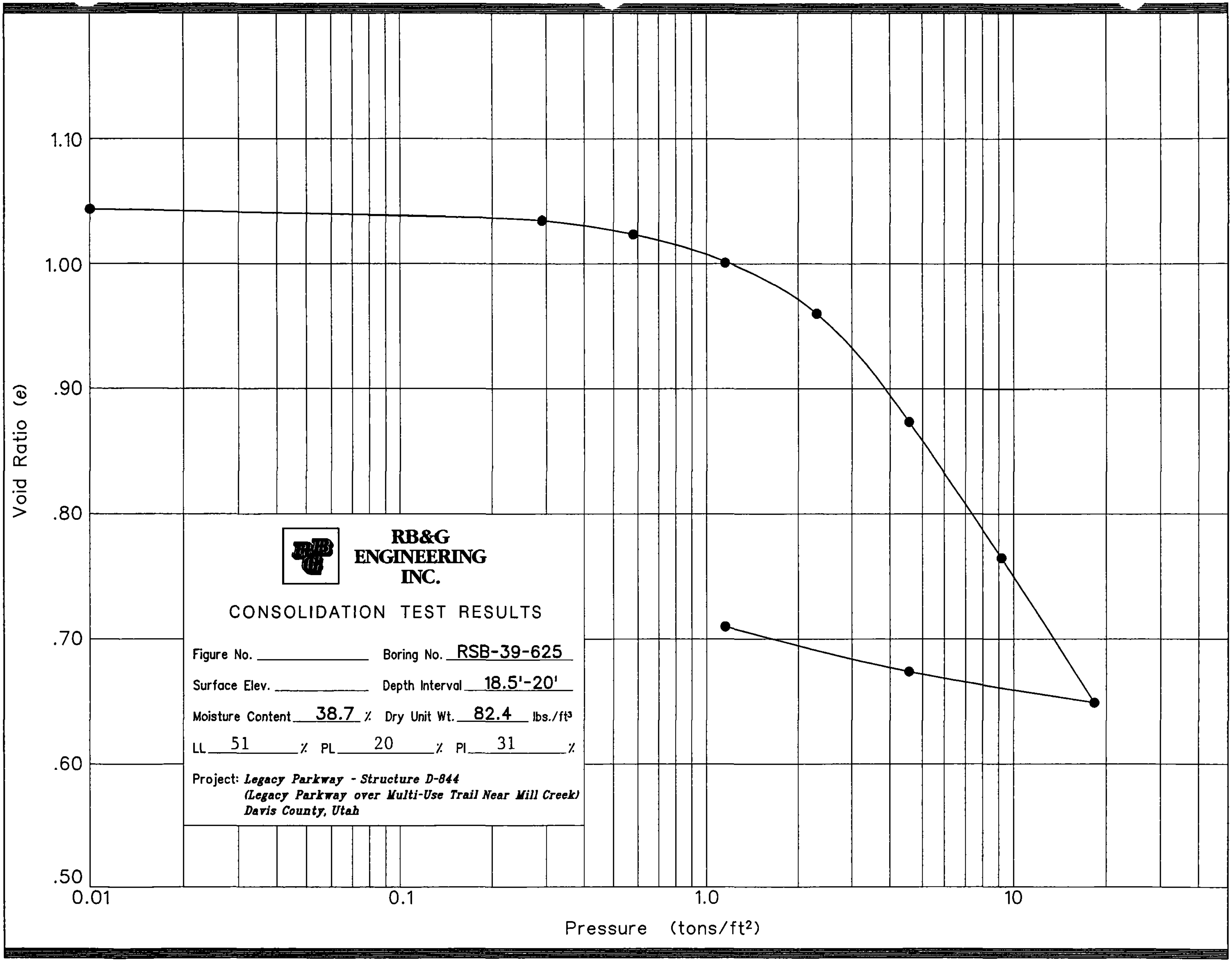
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 6'-7.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

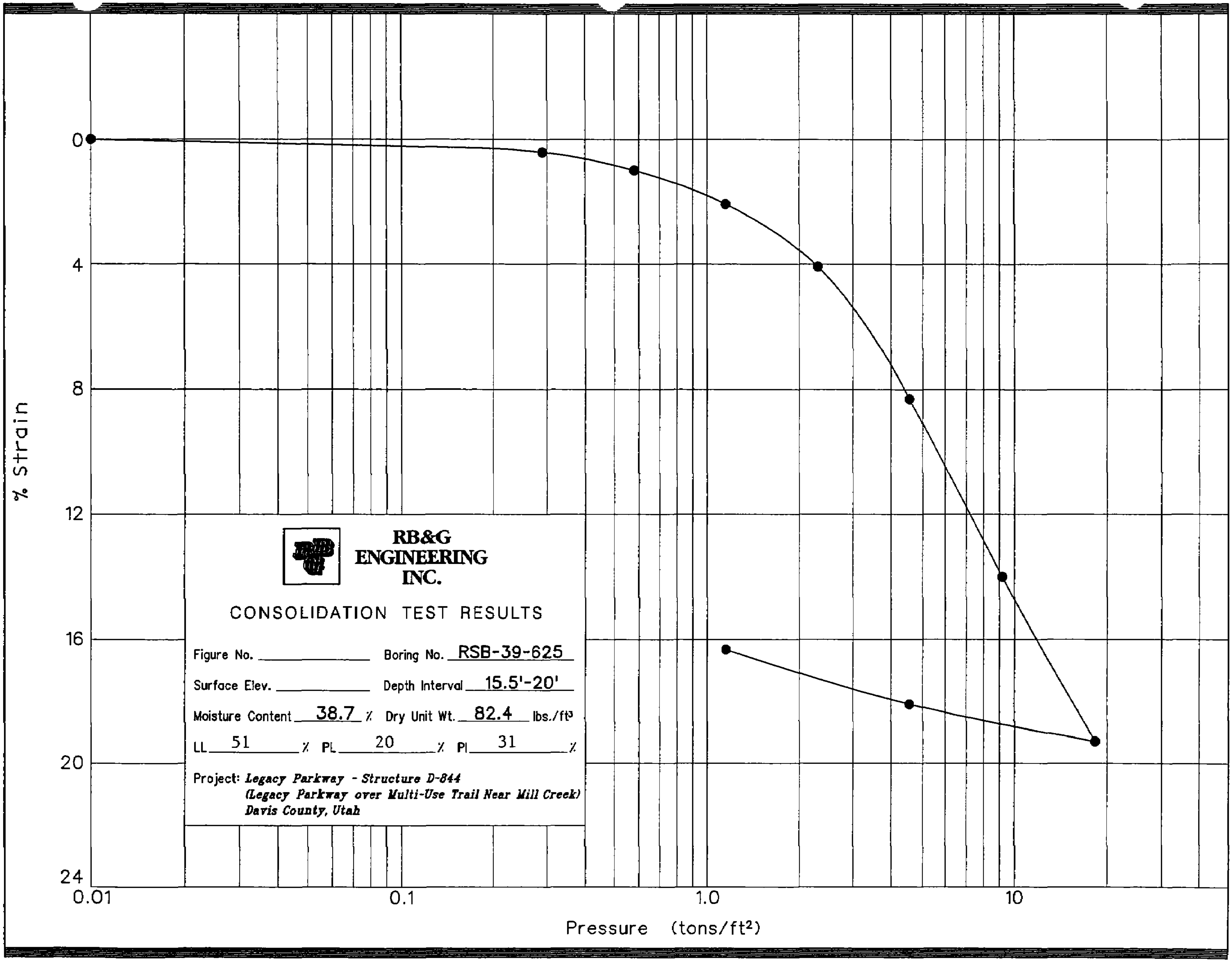
Figure No. ____________ Boring No. RSB-39-625

Surface Elev. ____________ Depth Interval 18.5'-20'

Moisture Content 38.7 % Dry Unit Wt. 82.4 lbs./ft³

LL 51 % PL 20 % PI 31 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

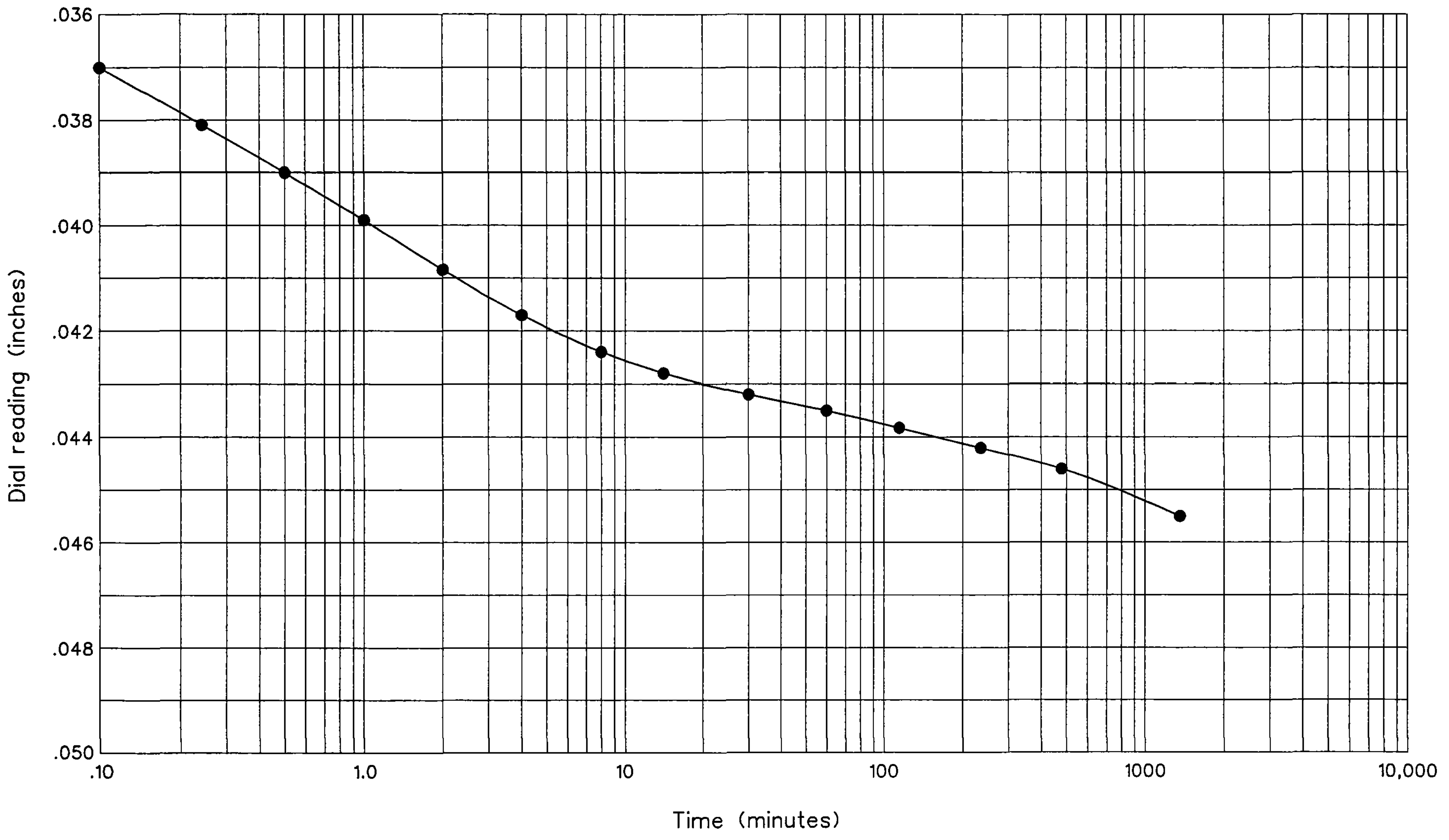
Figure No. ______ Boring No. RSB-39-625

Surface Elev. ______ Depth Interval 15.5'-20'

Moisture Content 38.7 % Dry Unit Wt. 82.4 lbs./ft³

LL 51 % PL 20 % PI 31 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



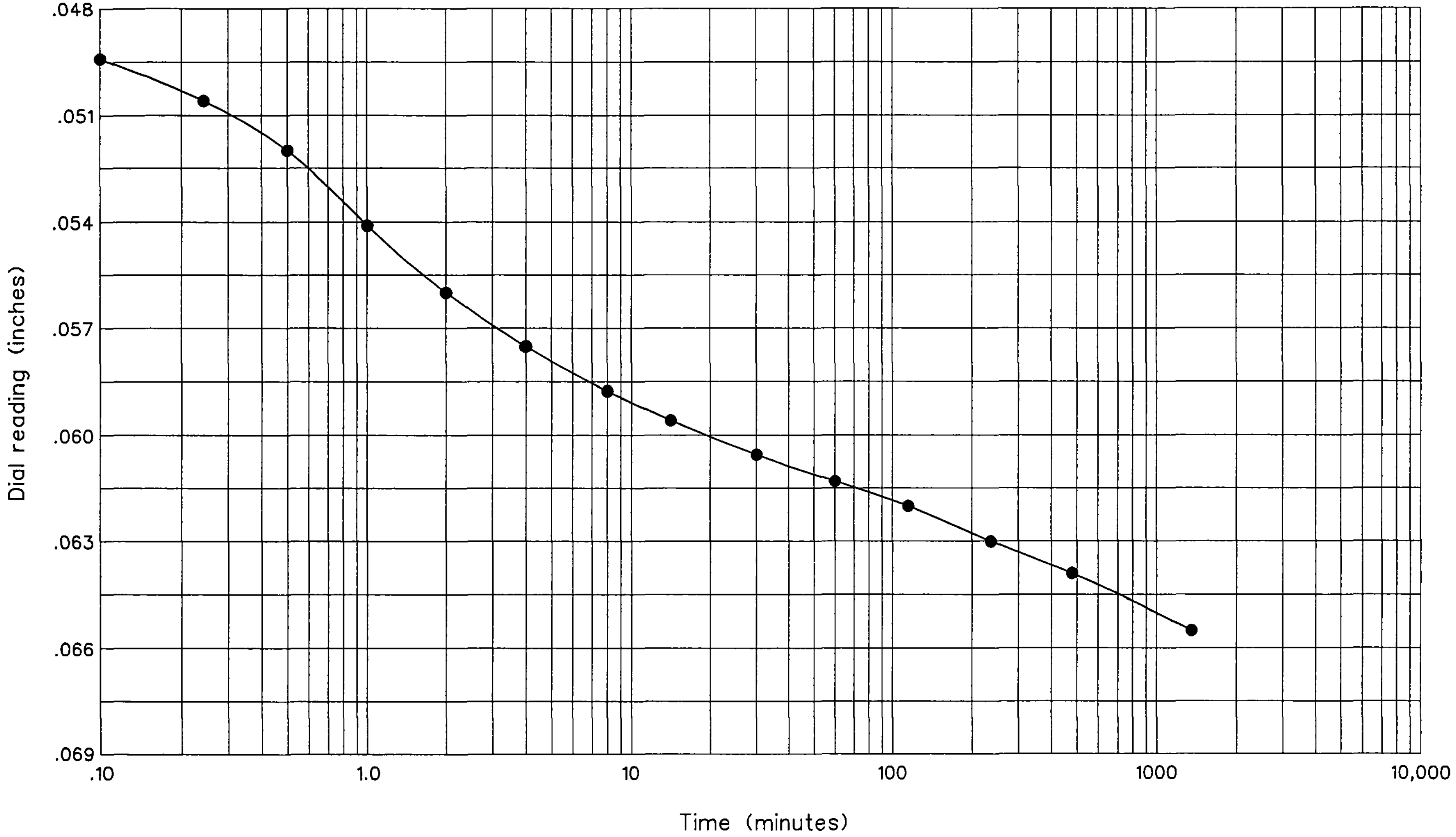
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 18.5'-20'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



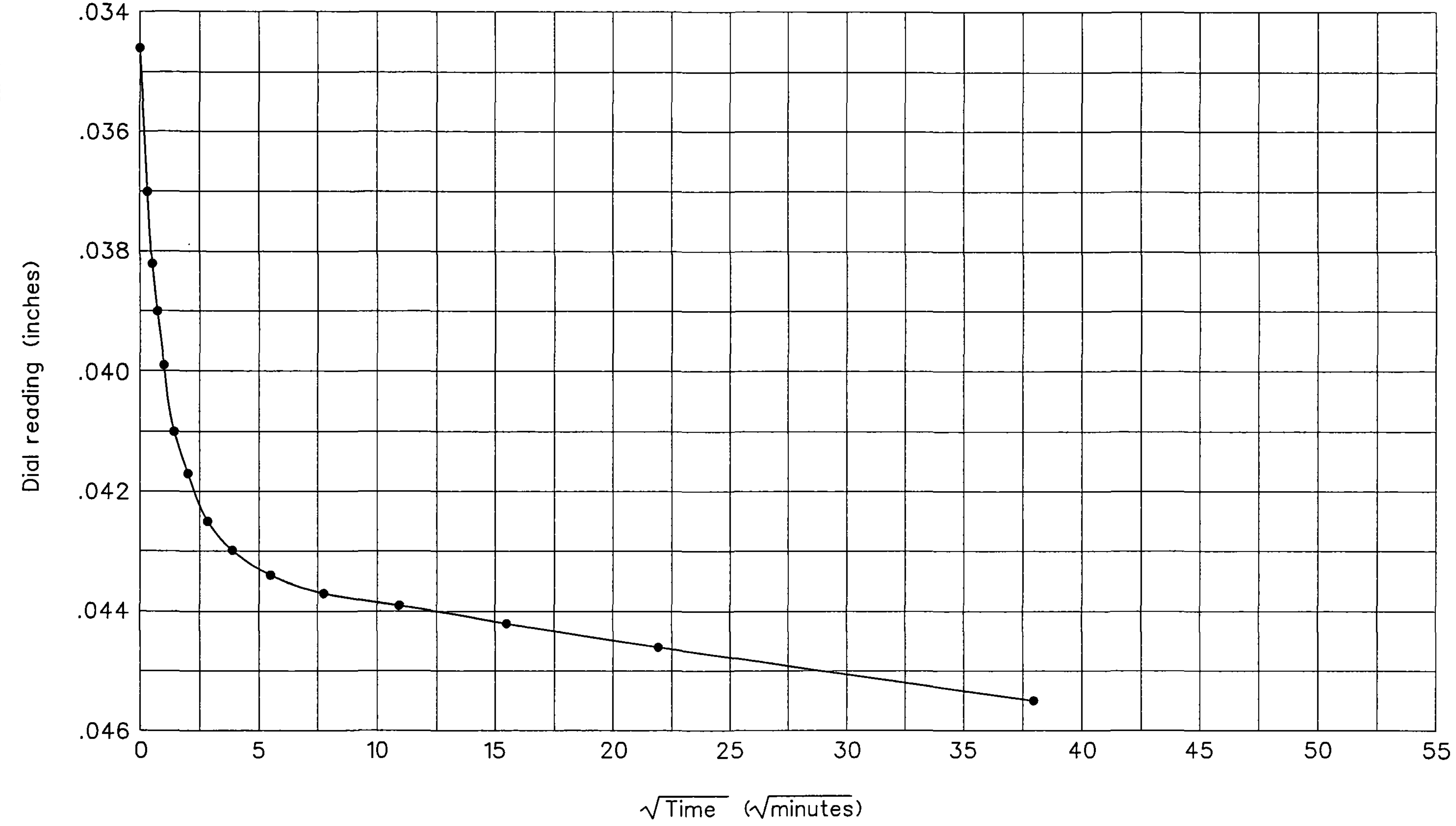
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 18.5'-20'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



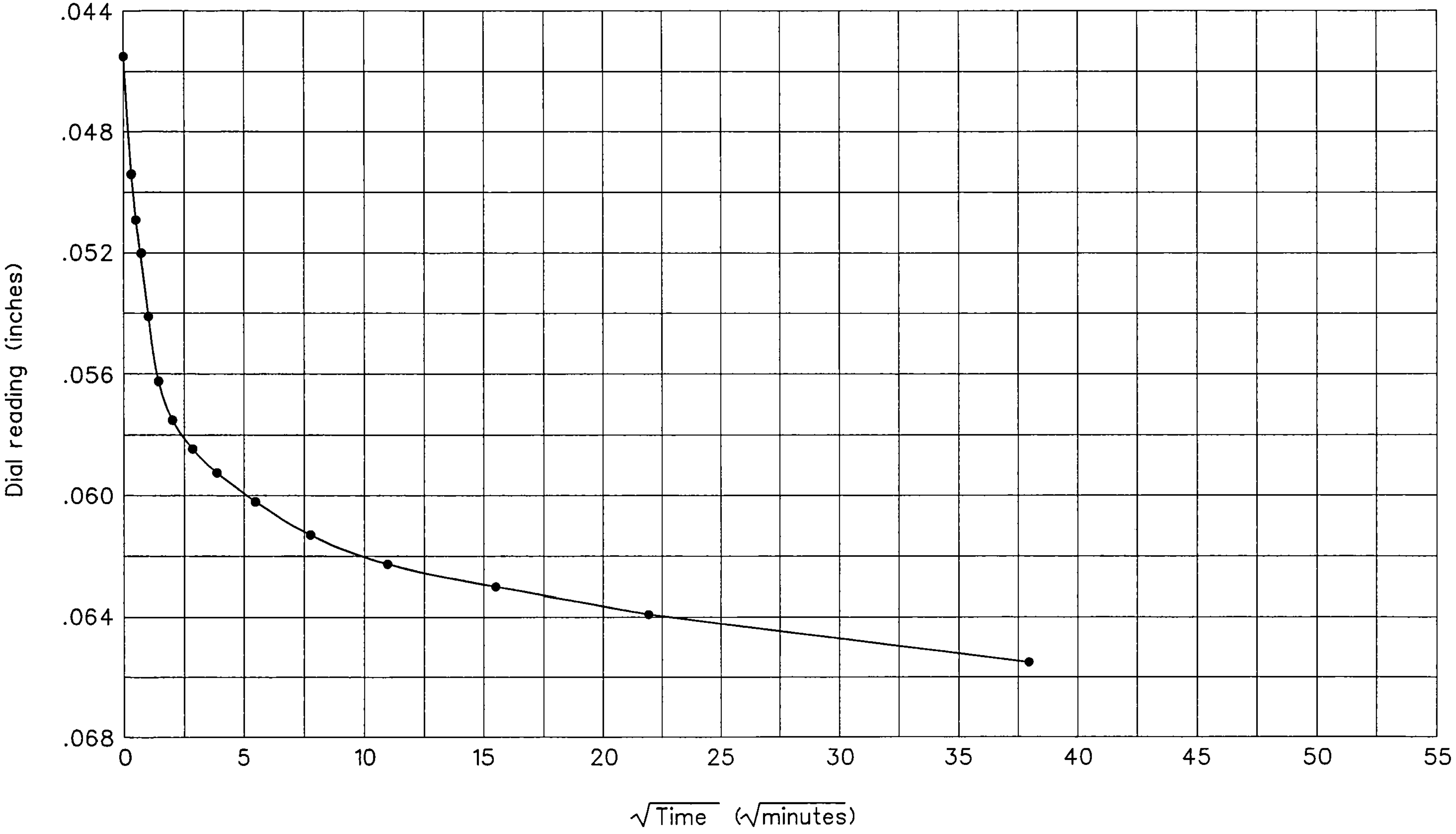
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 18.5'-20'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



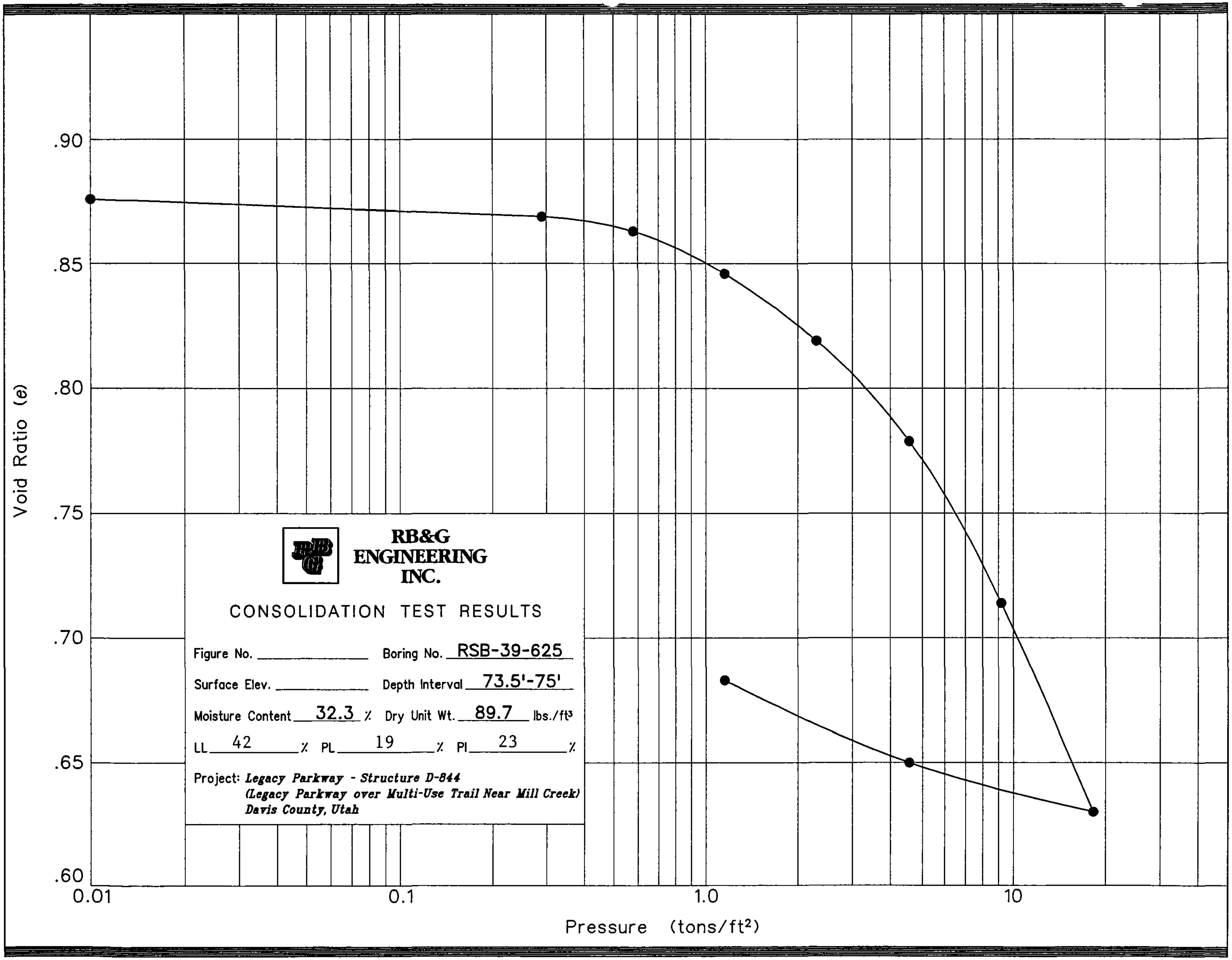
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 18.5'-20'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

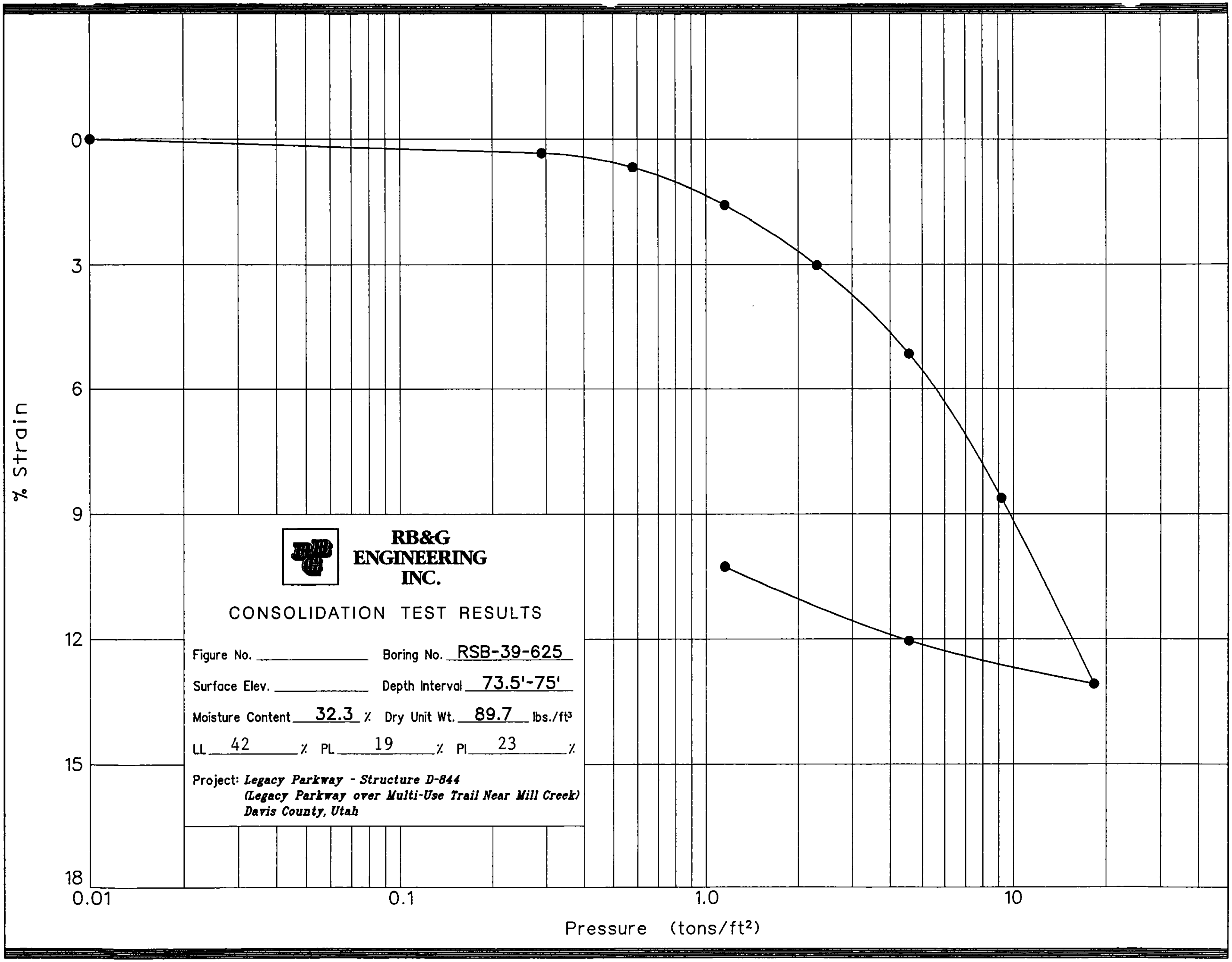
Figure No. ______ Boring No. RSB-39-625

Surface Elev. ______ Depth Interval 73.5'-75'

Moisture Content 32.3 % Dry Unit Wt. 89.7 lbs./ft³

LL 42 % PL 19 % PI 23 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

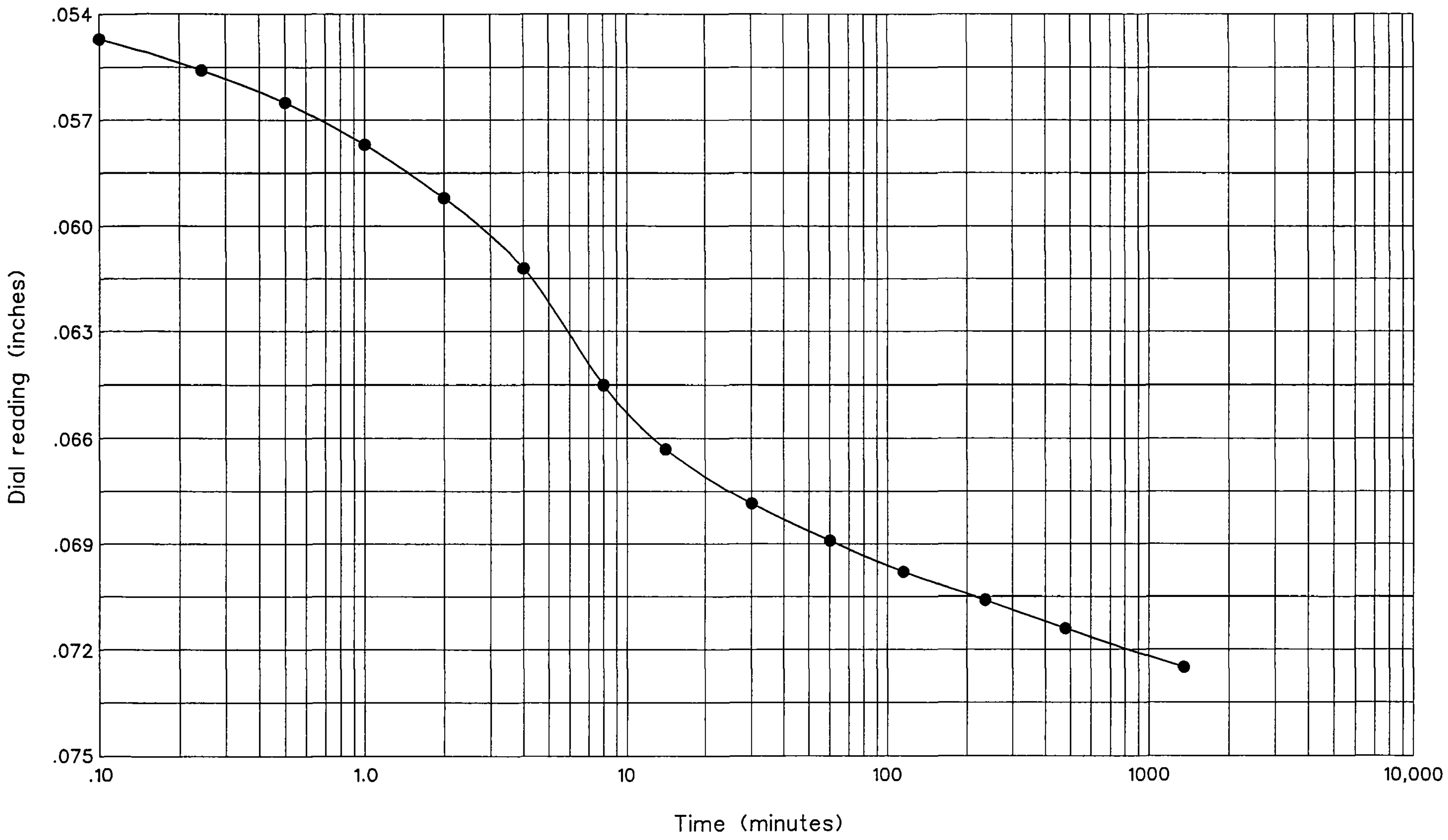
Figure No. ______ Boring No. RSB-39-625

Surface Elev. ______ Depth Interval 73.5'-75'

Moisture Content 32.3 % Dry Unit Wt. 89.7 lbs./ft^3

LL 42 % PL 19 % PI 23 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



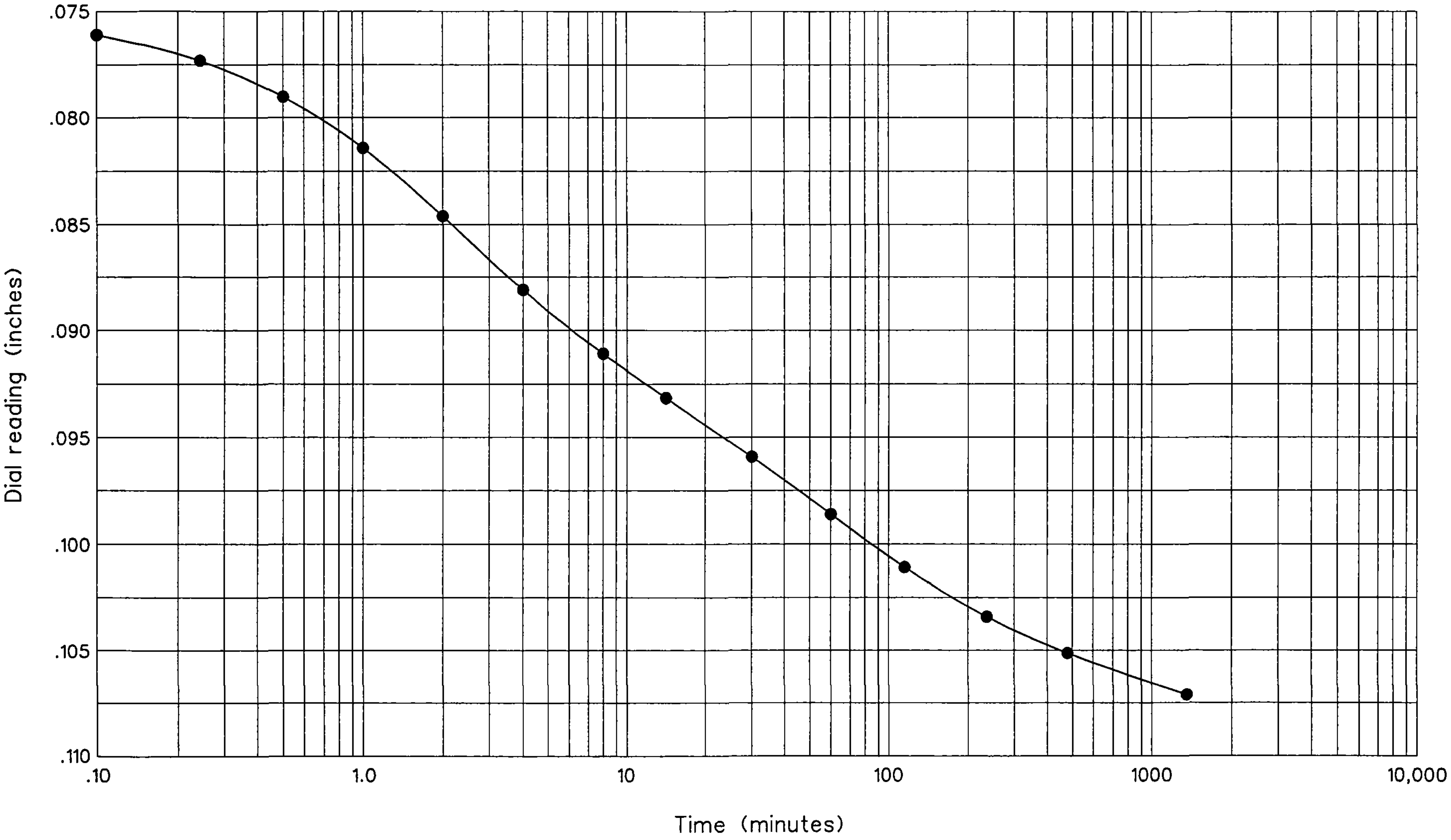
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 73.5'-75'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



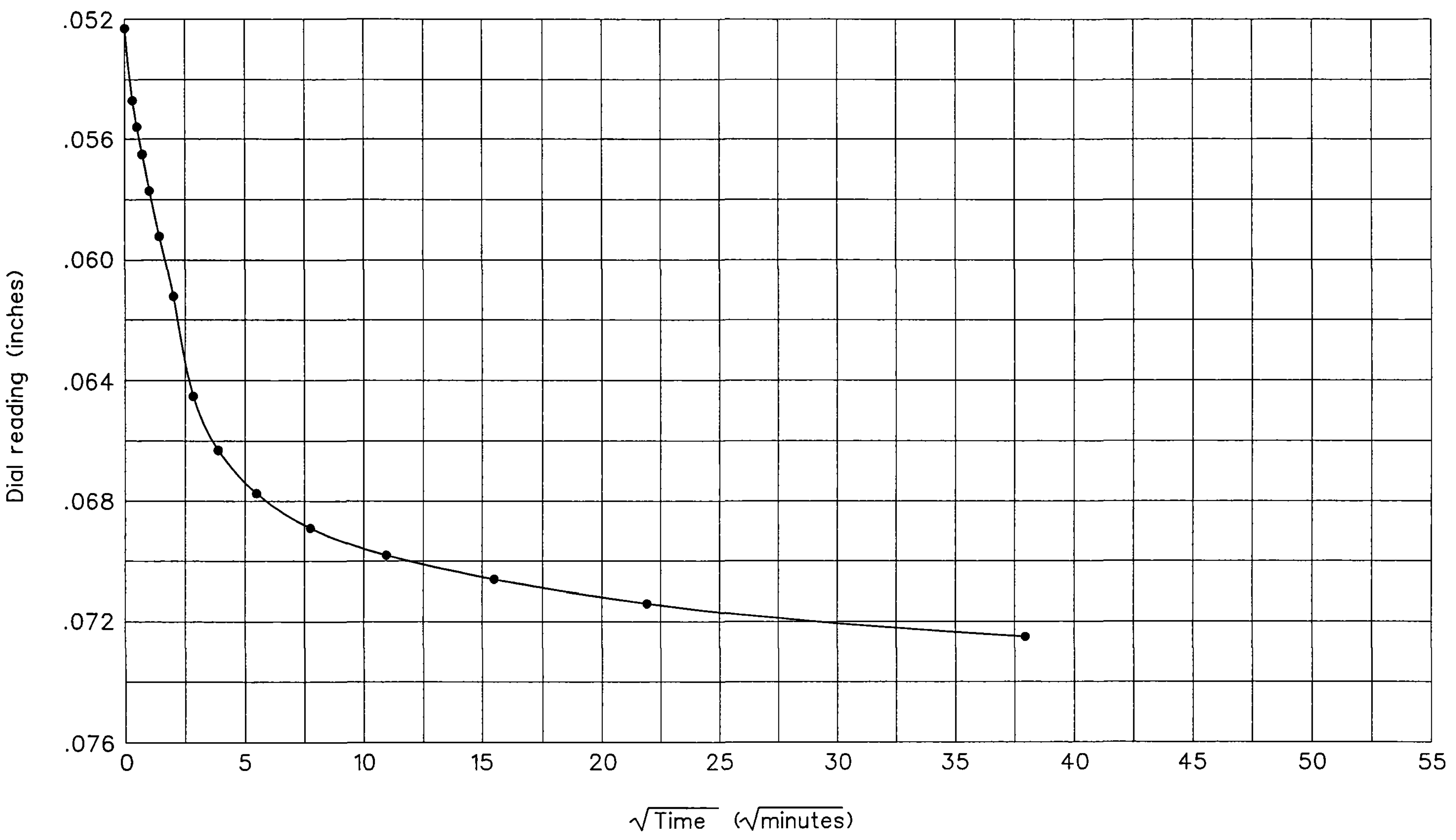
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 73.5'-75'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



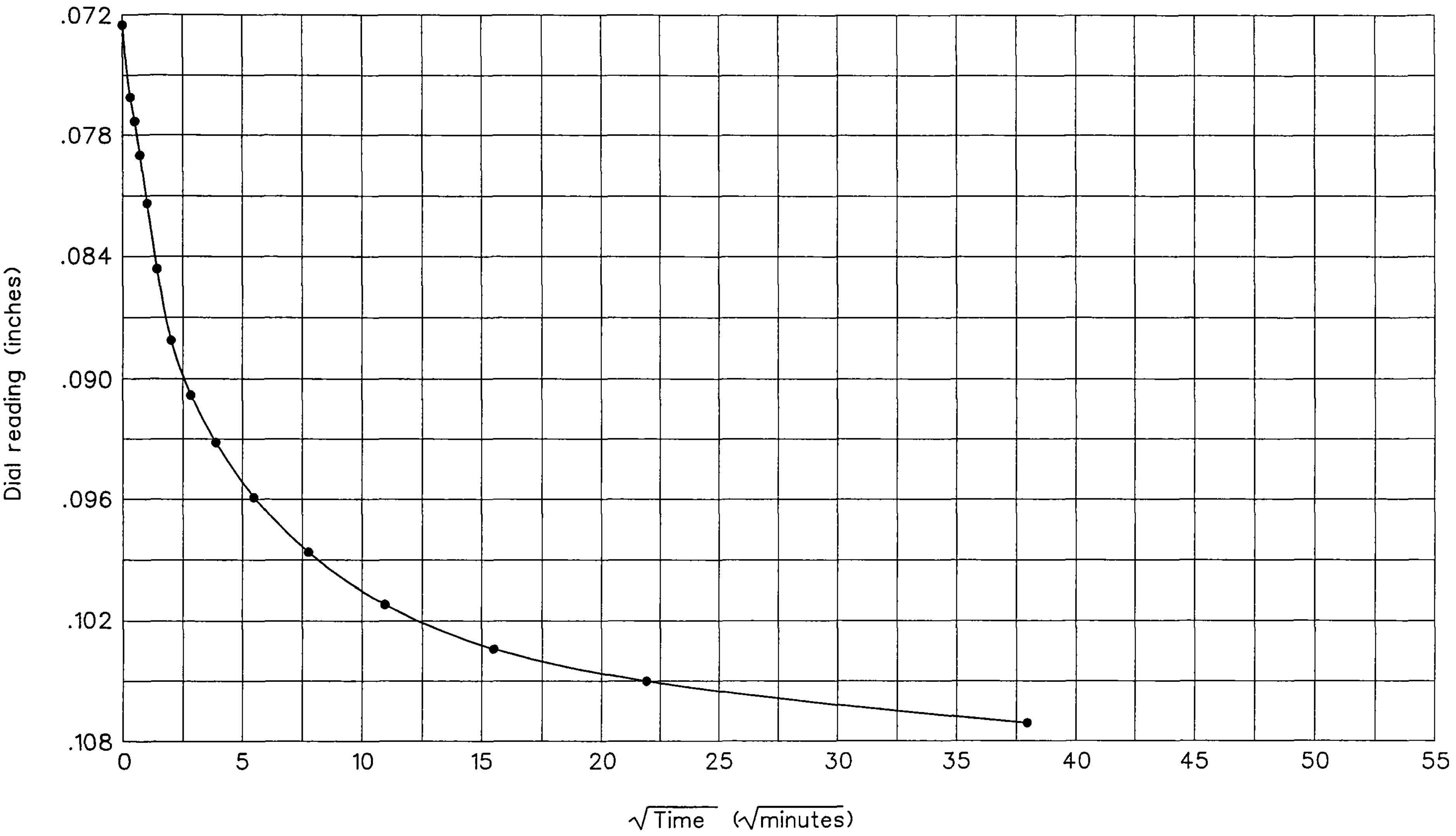
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 73.5'-75'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



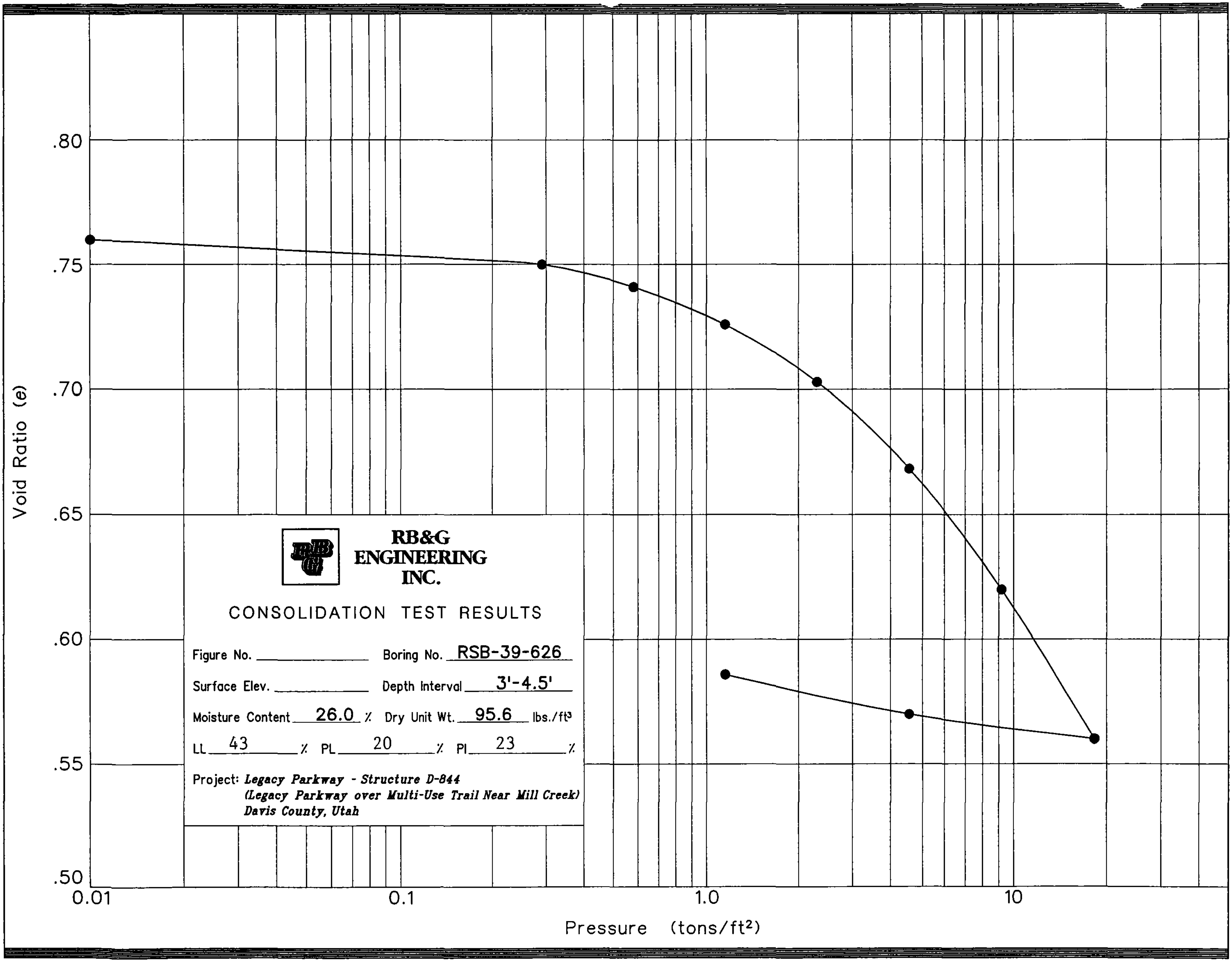
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-625
Depth: 73.5'-75'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

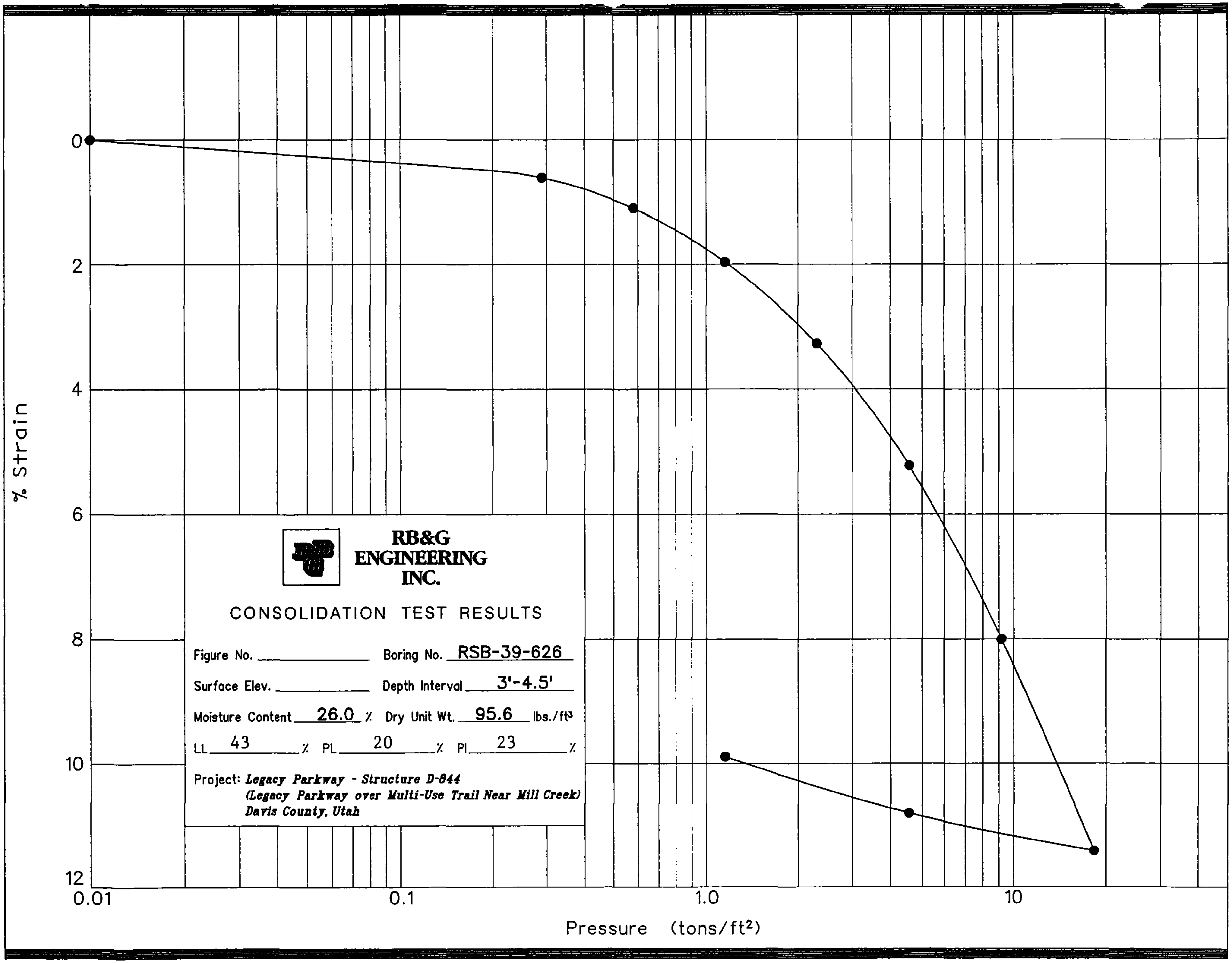
Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 3'-4.5'

Moisture Content 26.0 % Dry Unit Wt. 95.6 lbs./ft³

LL 43 % PL 20 % PI 23 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

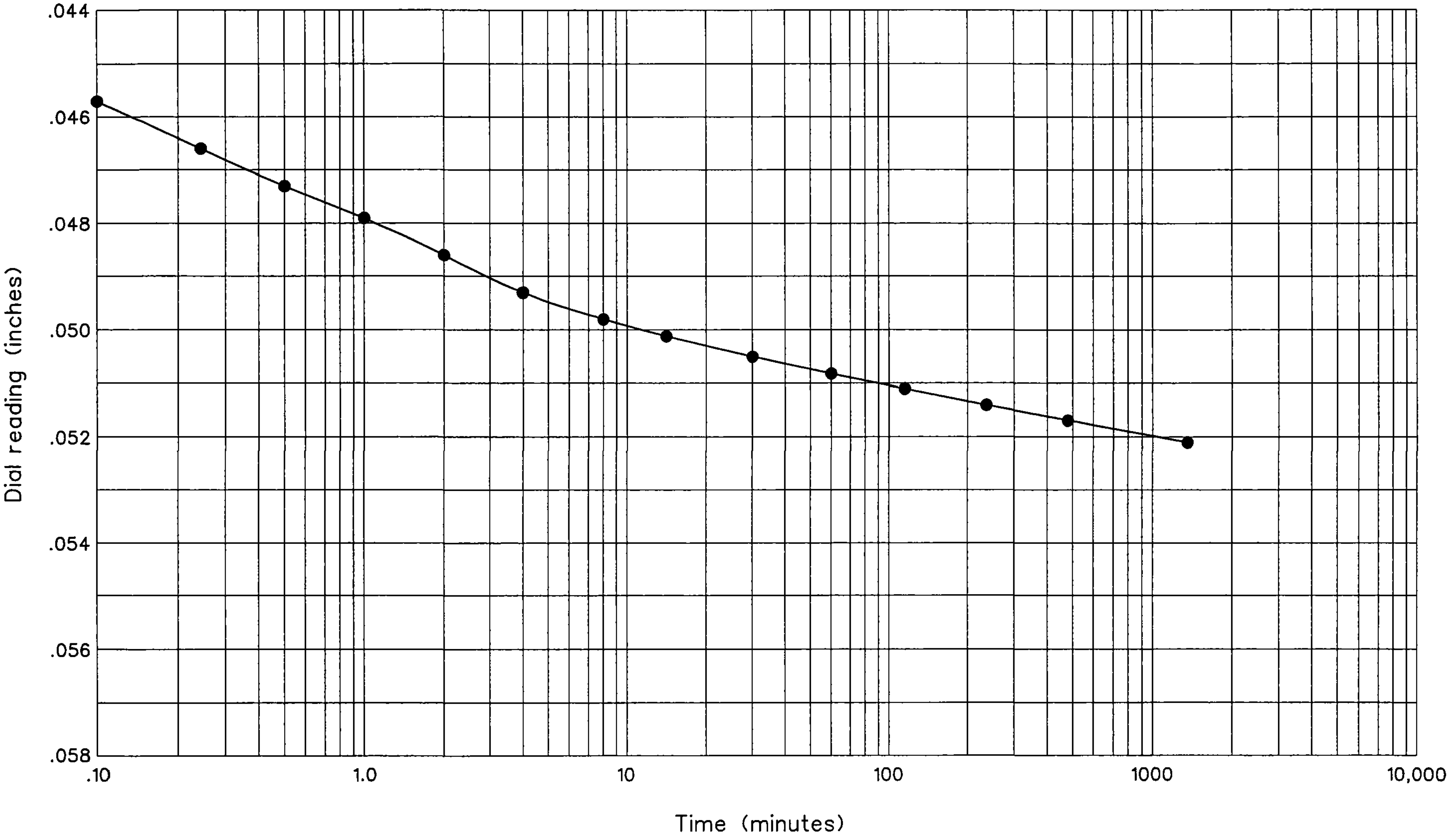
Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 3'-4.5'

Moisture Content 26.0 % Dry Unit Wt. 95.6 lbs./ft³

LL 43 % PL 20 % PI 23 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



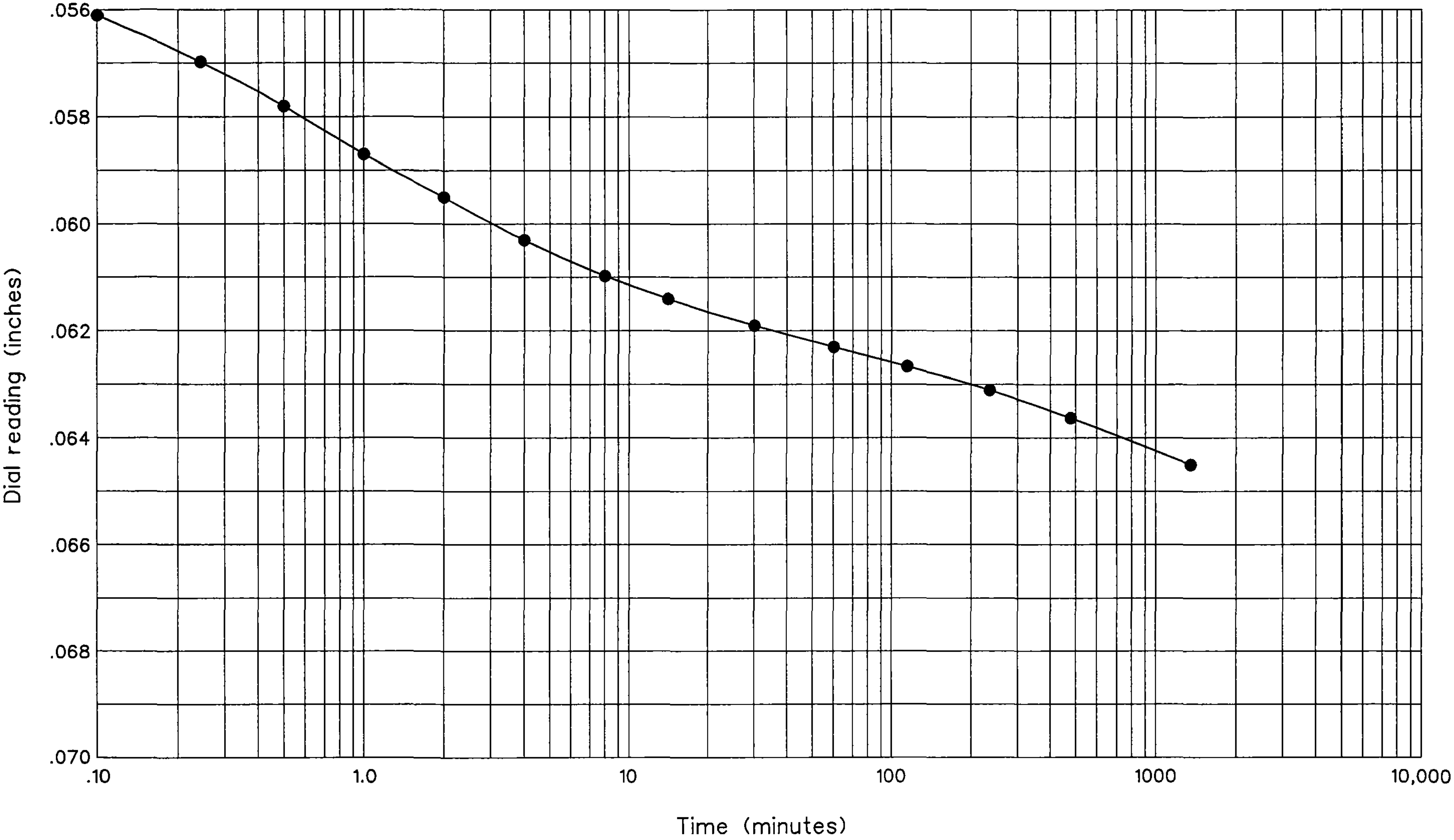
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 3'-4.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



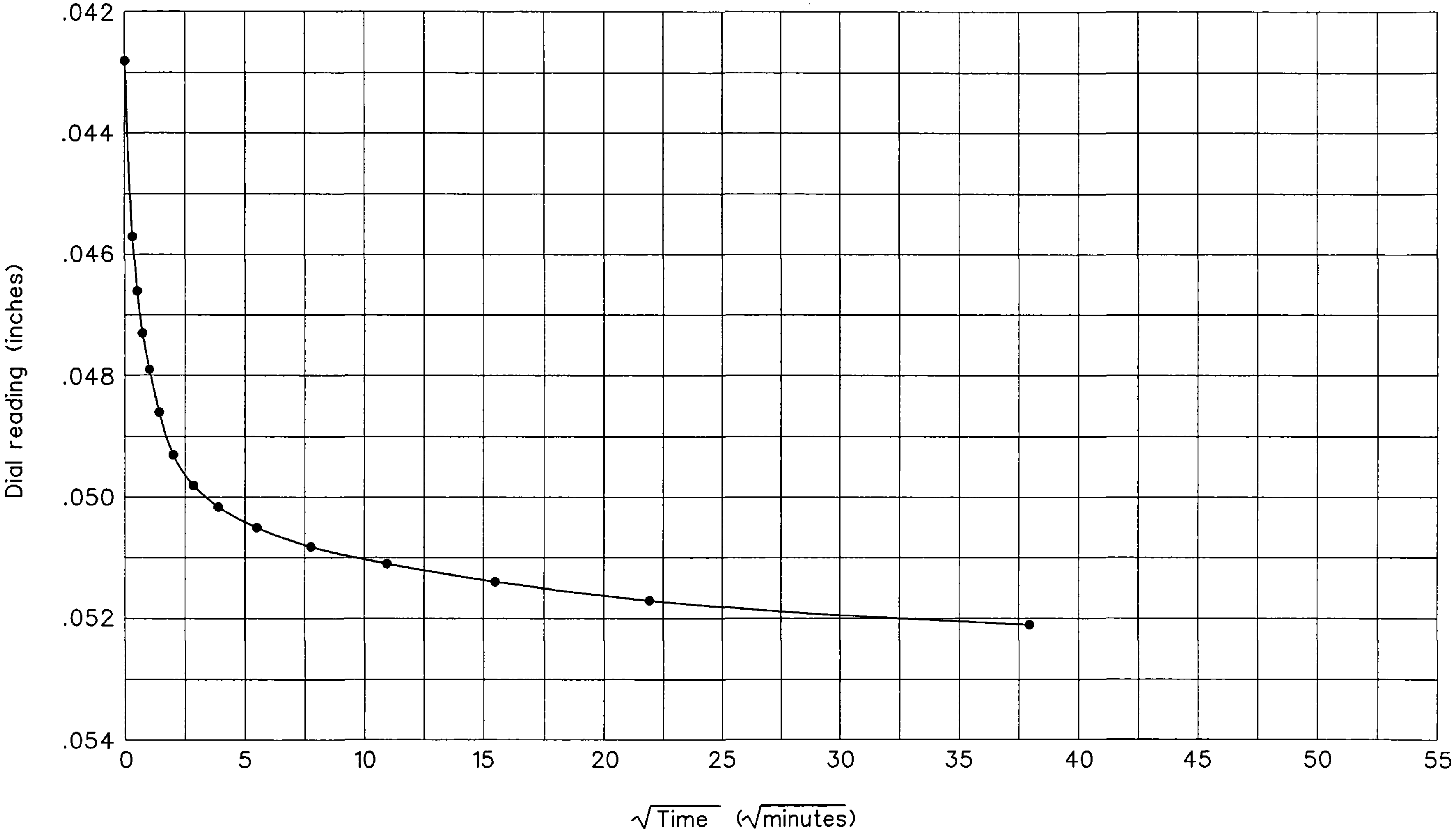
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 3'-4.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



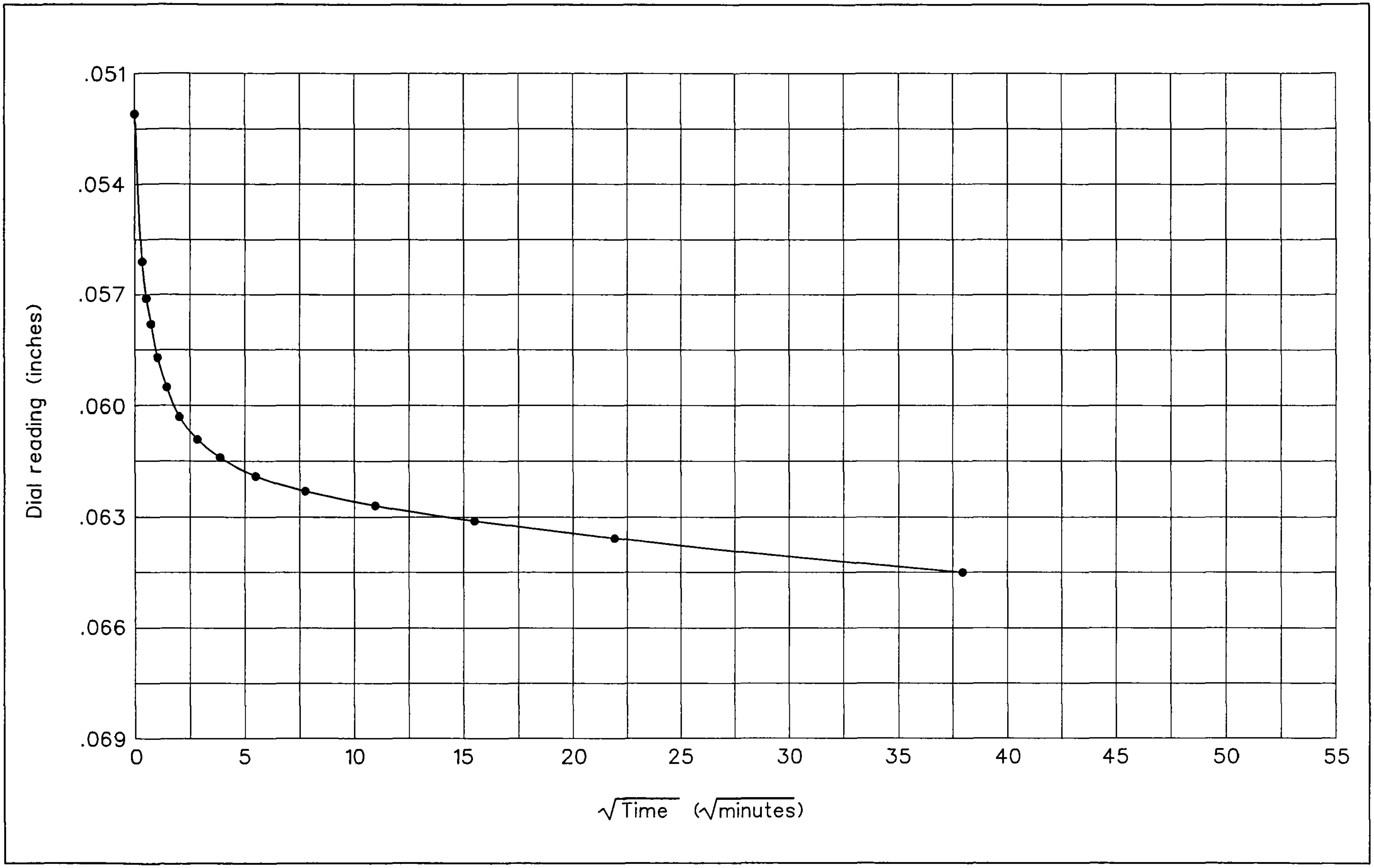
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 3'-4.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



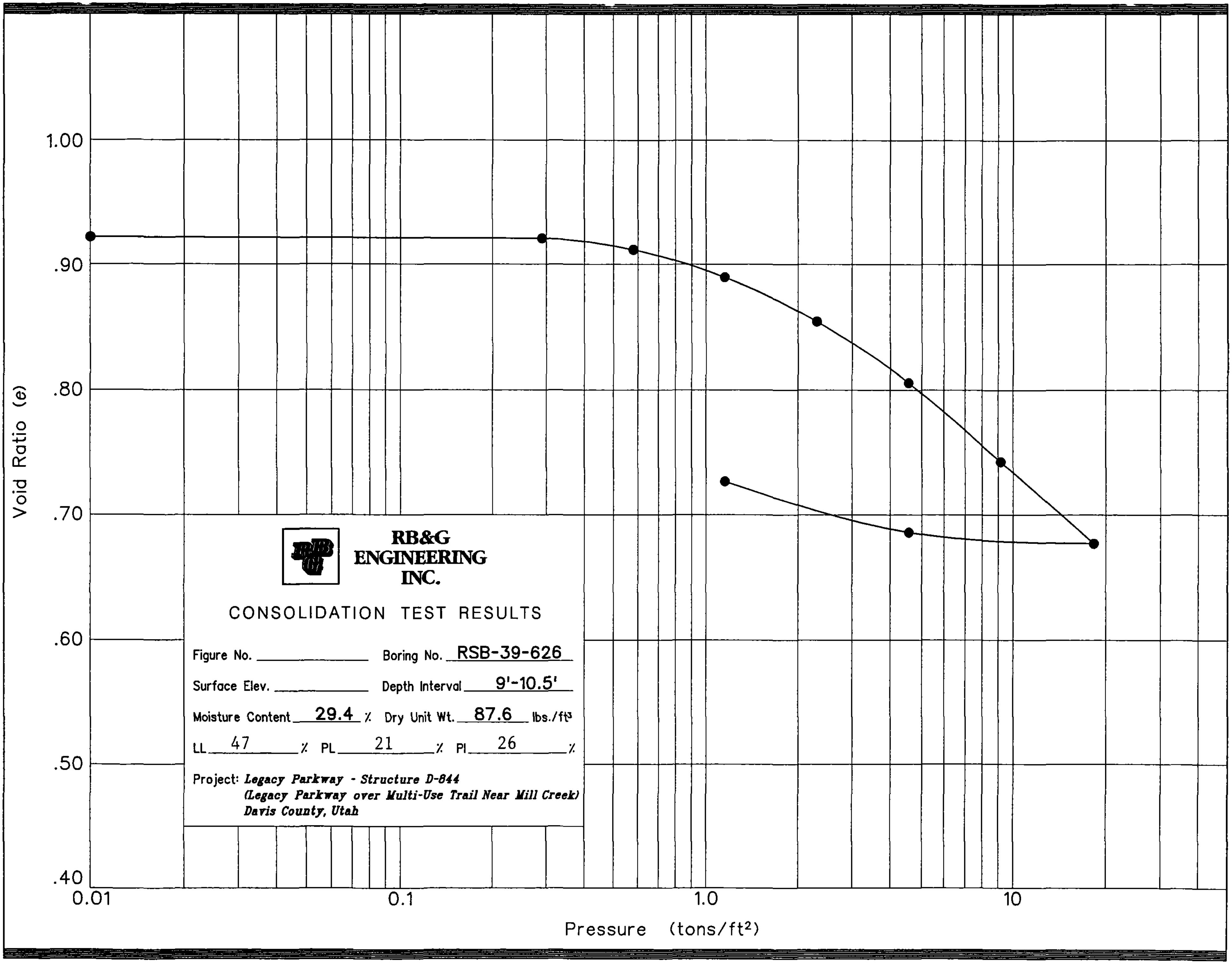
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 3'-4.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

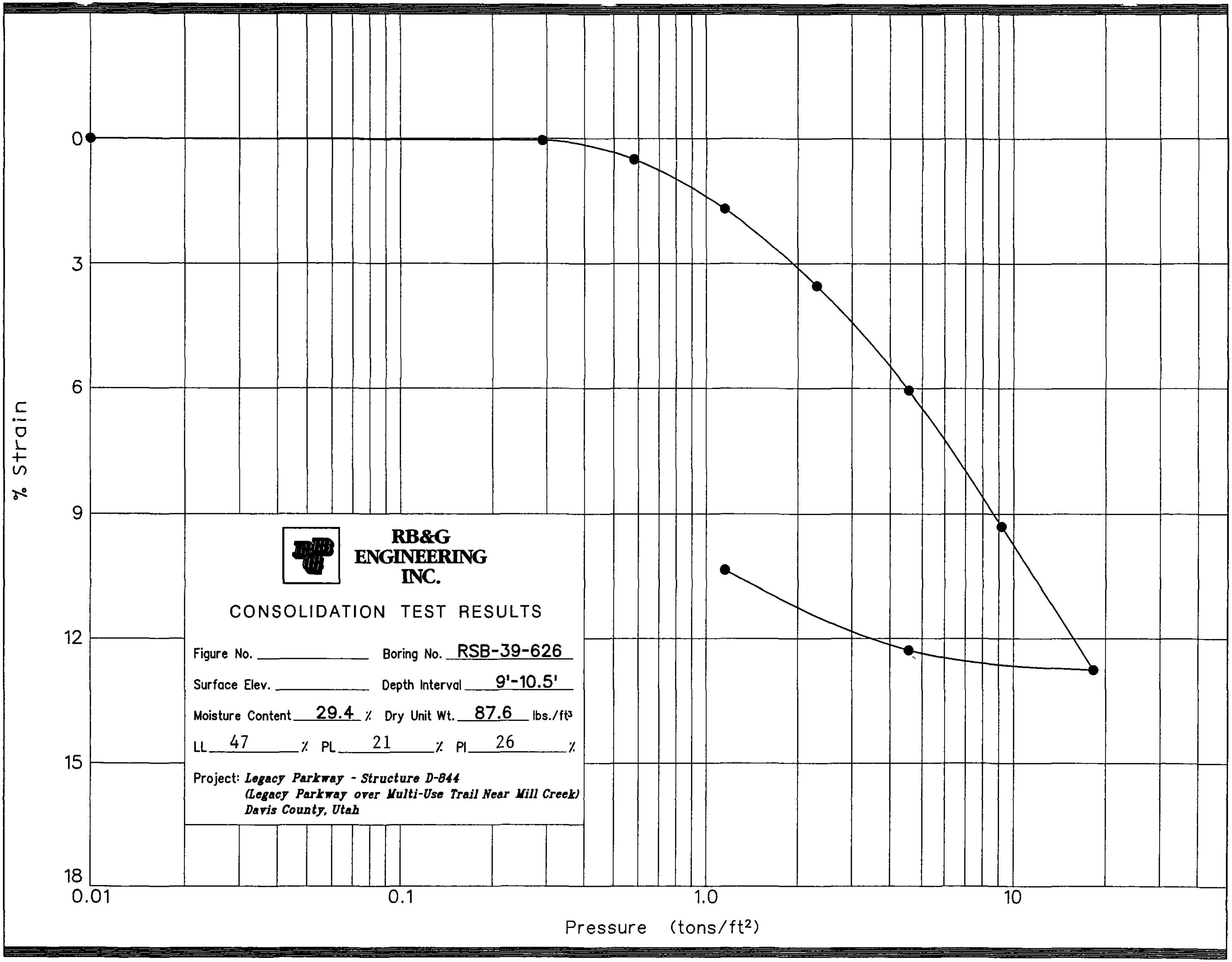
Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 9'-10.5'

Moisture Content 29.4 % Dry Unit Wt. 87.6 lbs./ft³

LL 47 % PL 21 % PI 26 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

Figure No. ______________ Boring No. RSB-39-626

Surface Elev. ______________ Depth Interval 9'-10.5'

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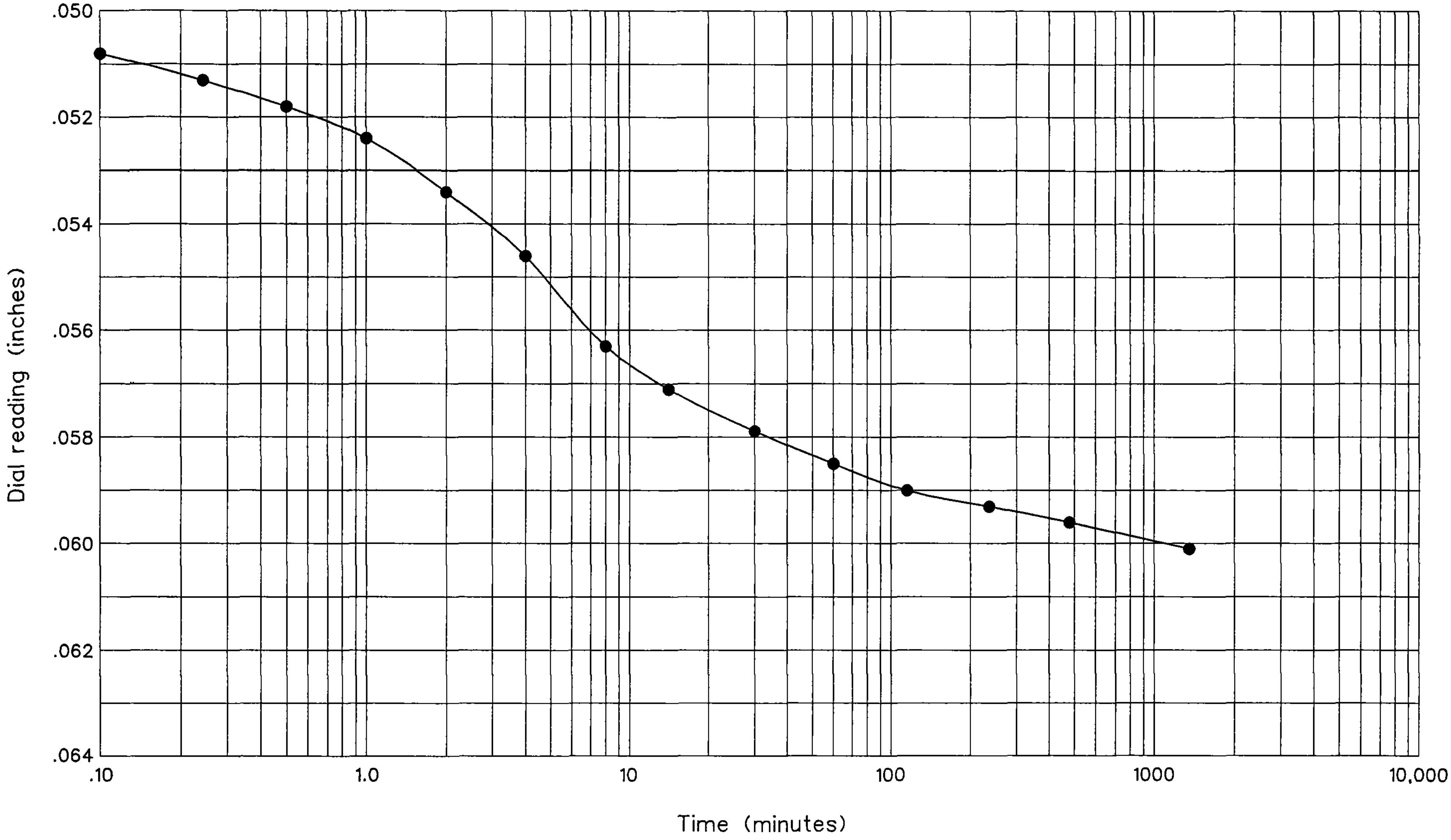
Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



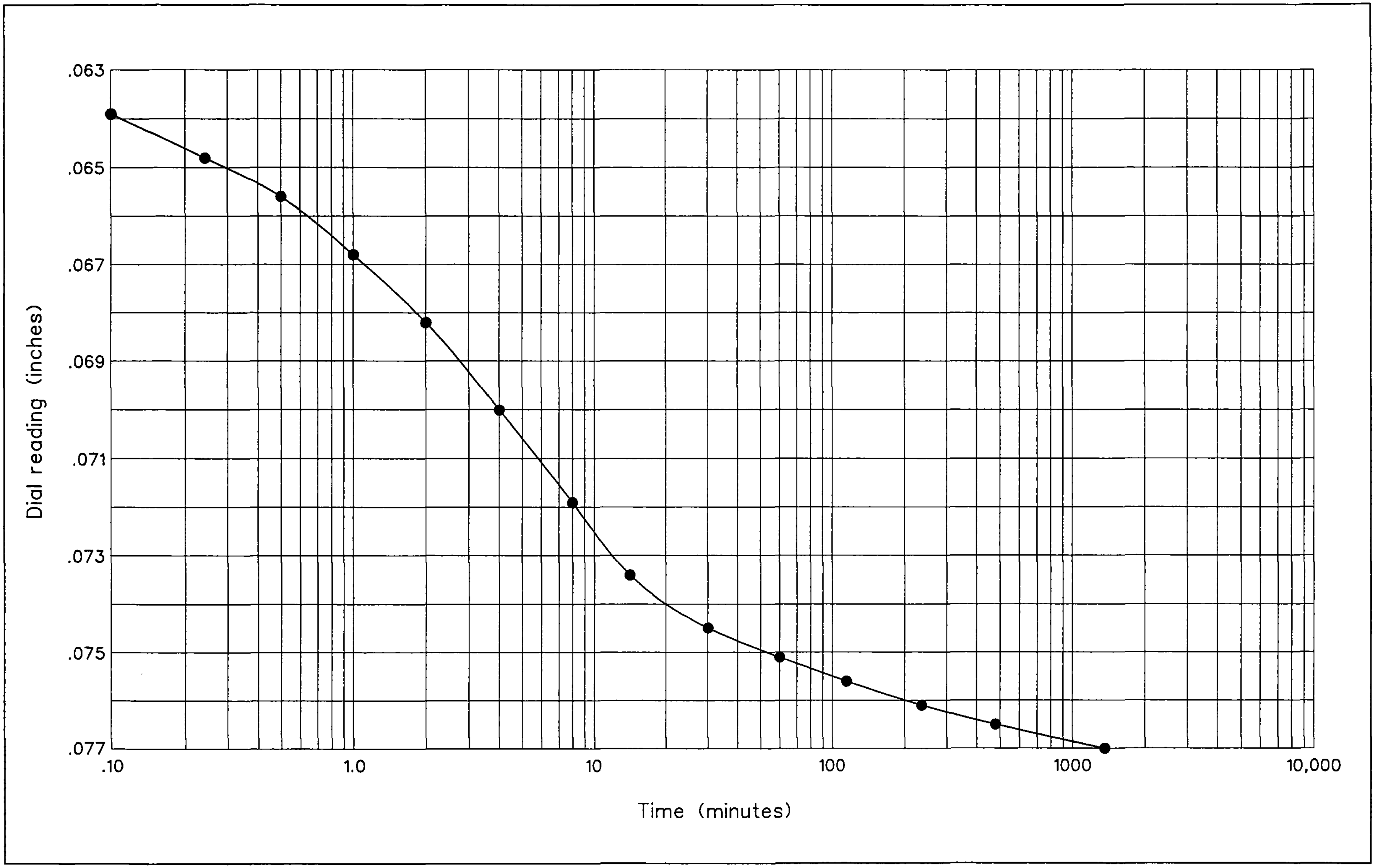
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 9'-10.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



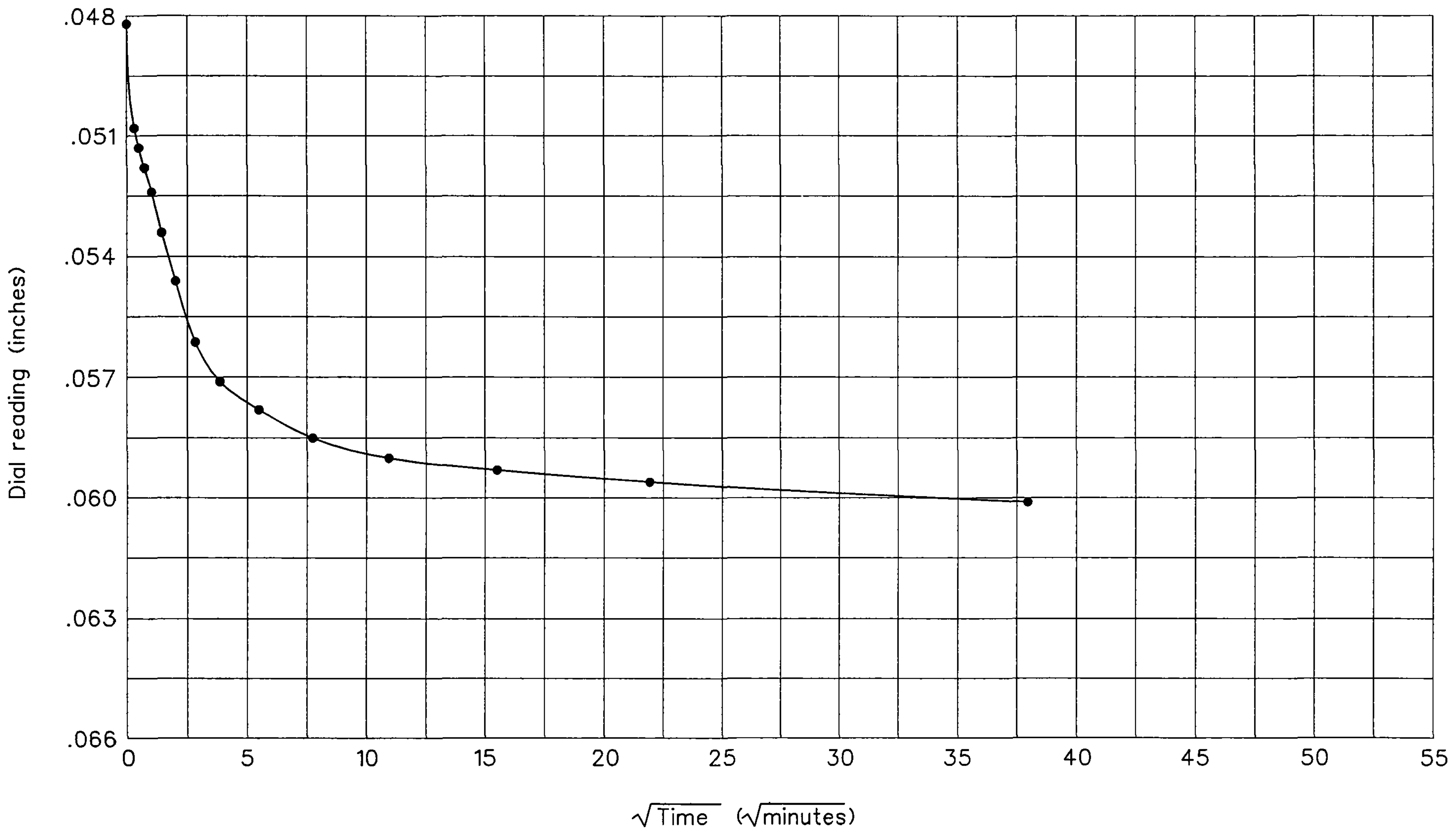
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 9'-10.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



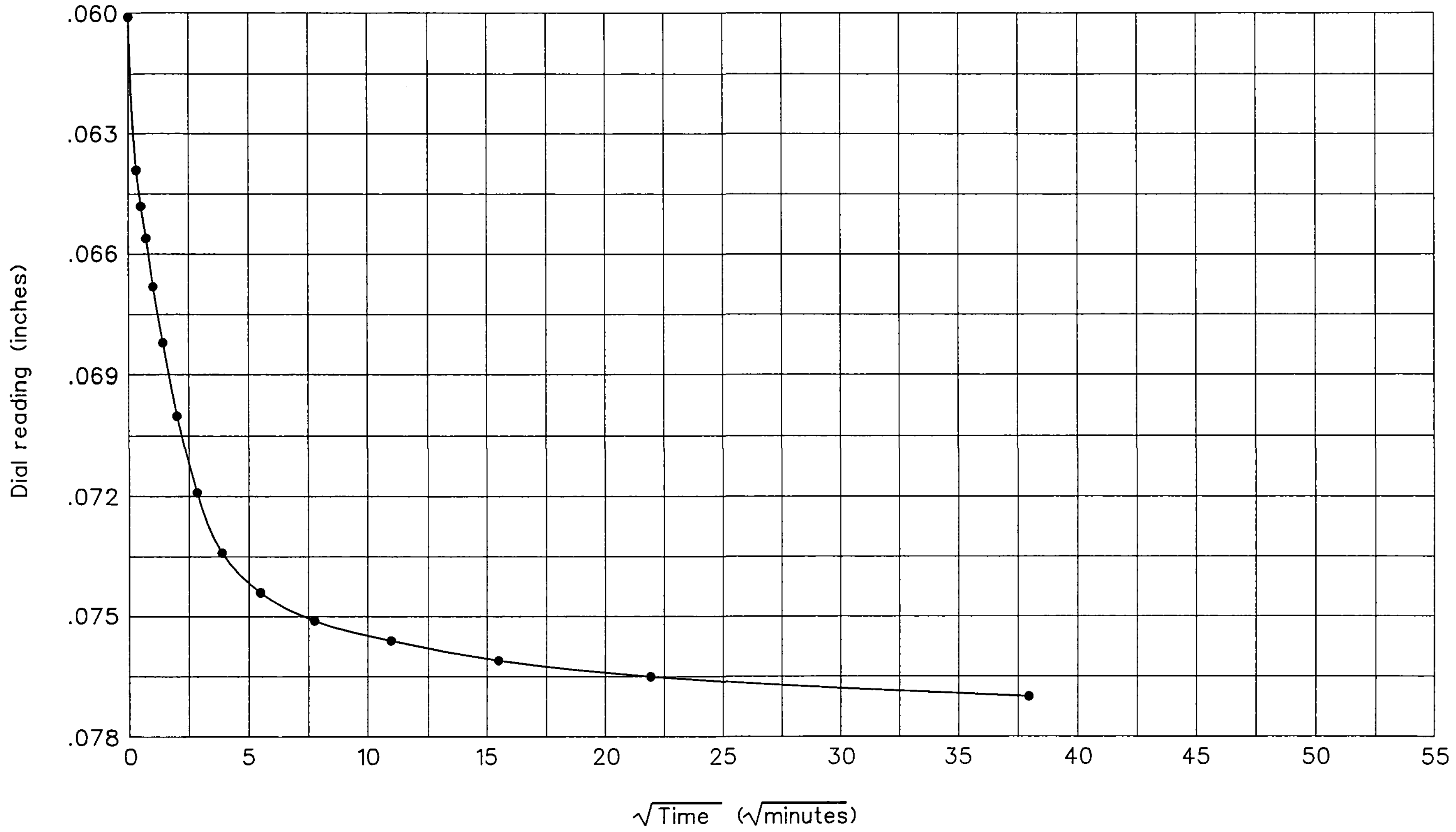
RB&G ENGINEERING INC.
Provo, Utah

Hole no.:	RSB-39-626
Depth:	9'-10.5'
Load:	1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



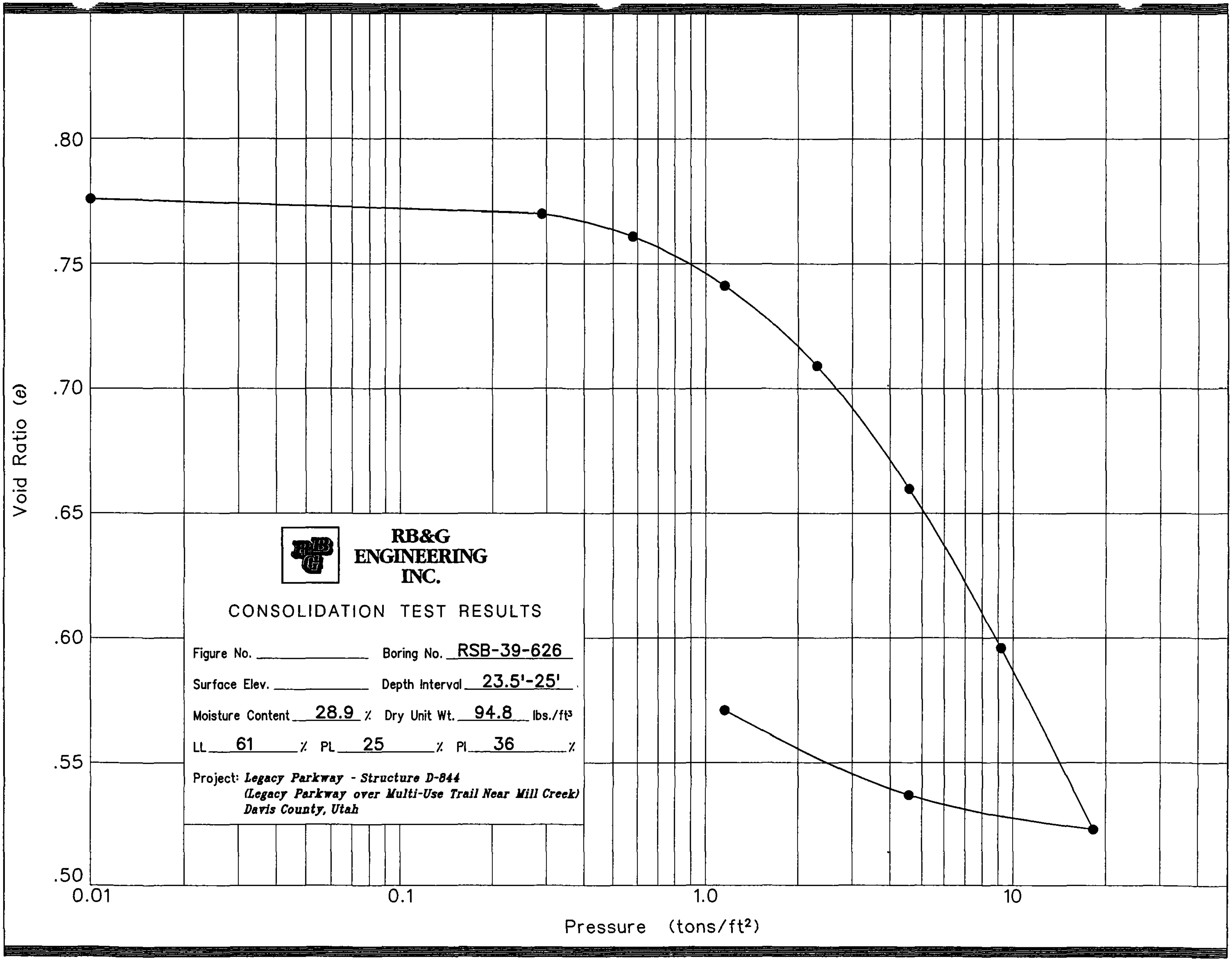
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 9'-10.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

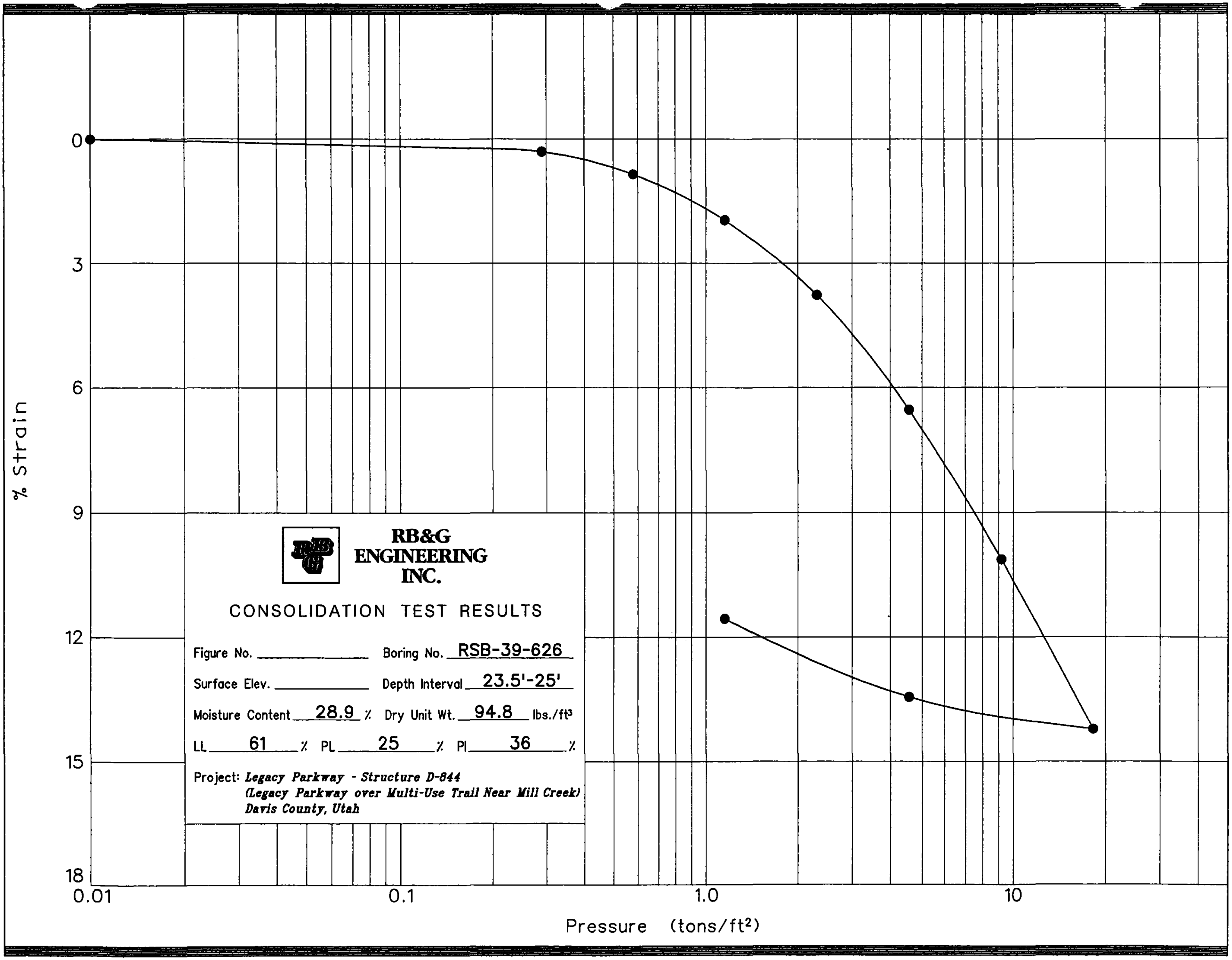
Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 23.5'-25'

Moisture Content 28.9 % Dry Unit Wt. 94.8 lbs./ft³

LL 61 % PL 25 % PI 36 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 23.5'-25'

Moisture Content 28.9 % Dry Unit Wt. 94.8 lbs./ft³

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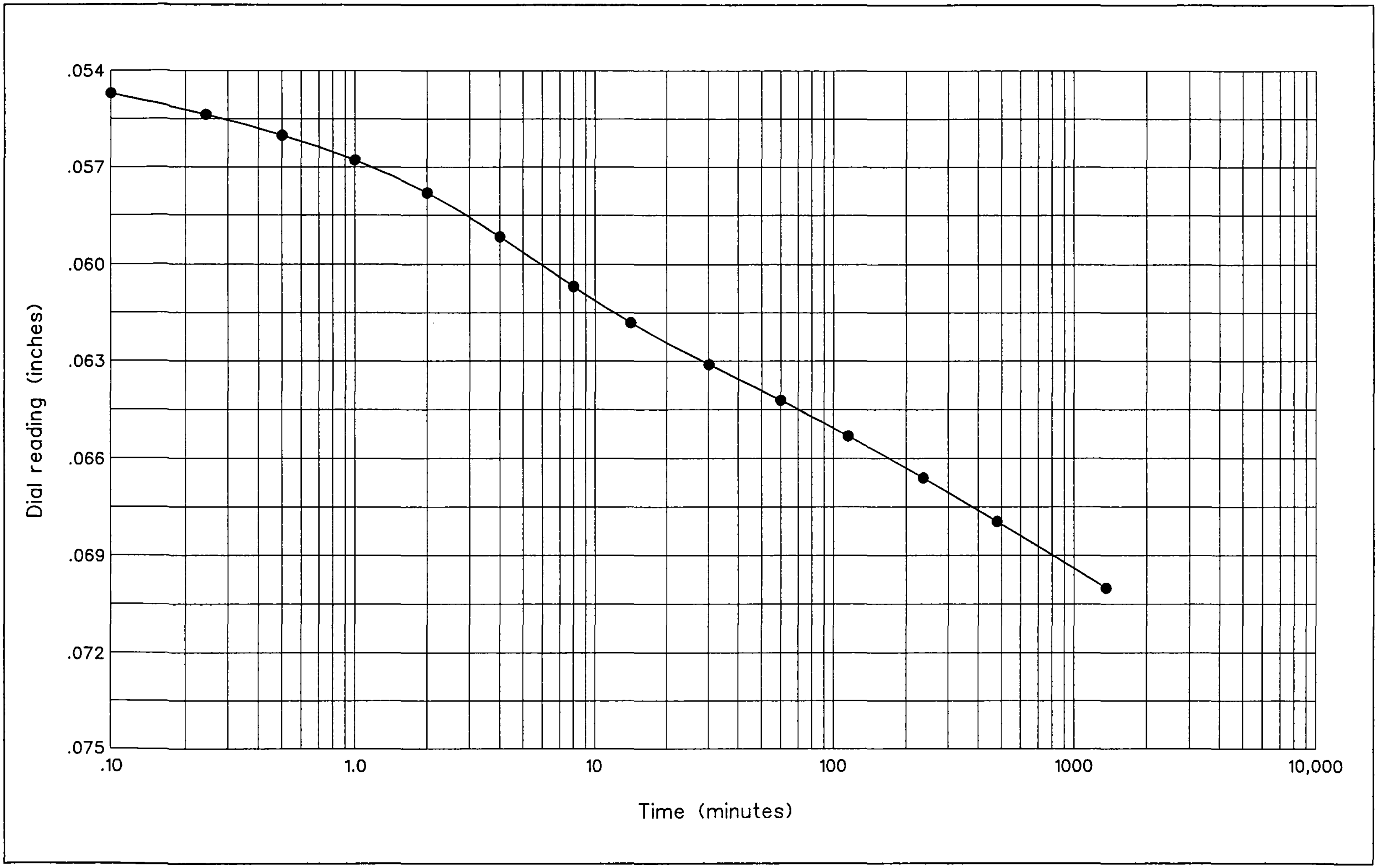
Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



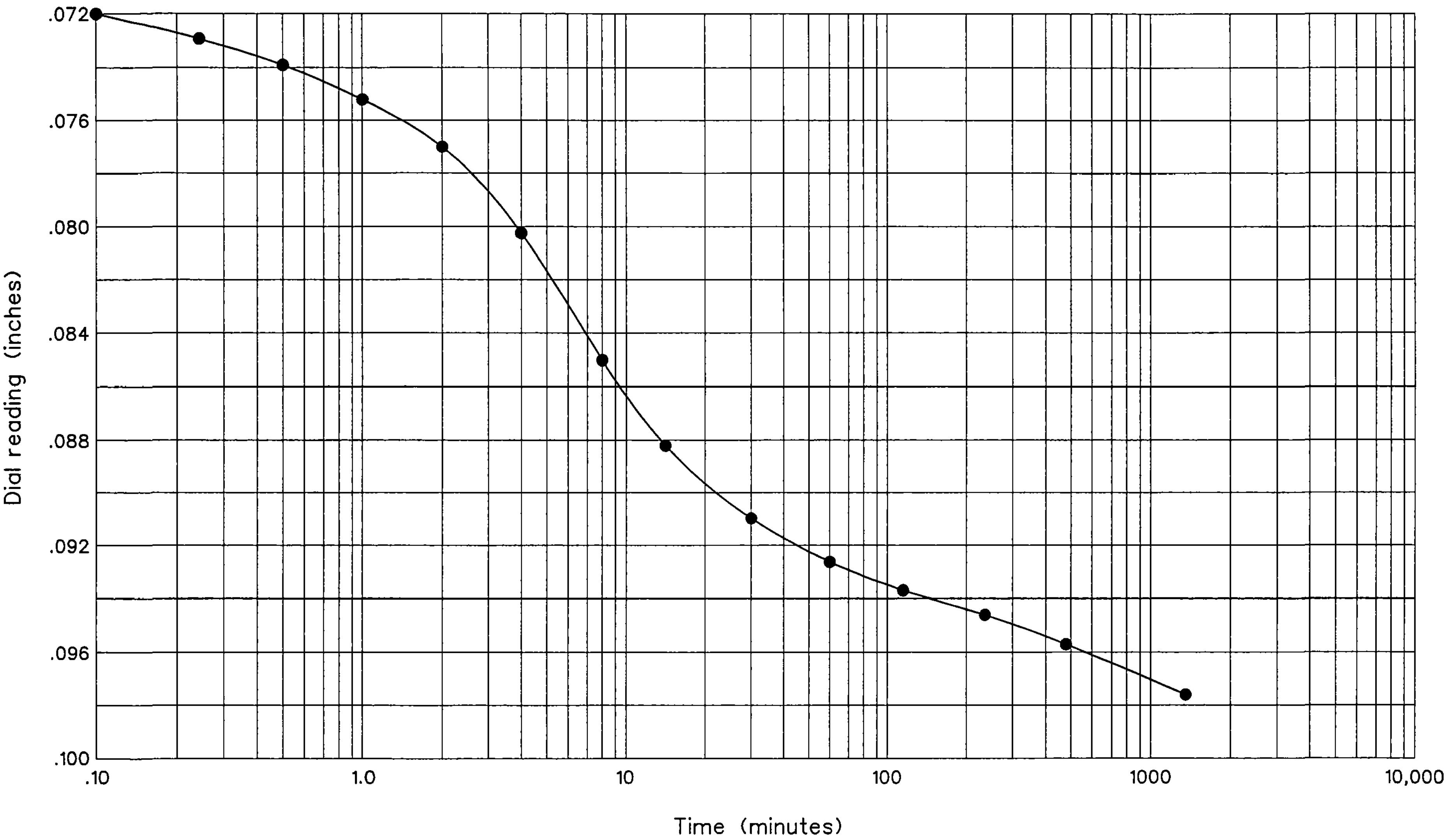
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 23.5'-25'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



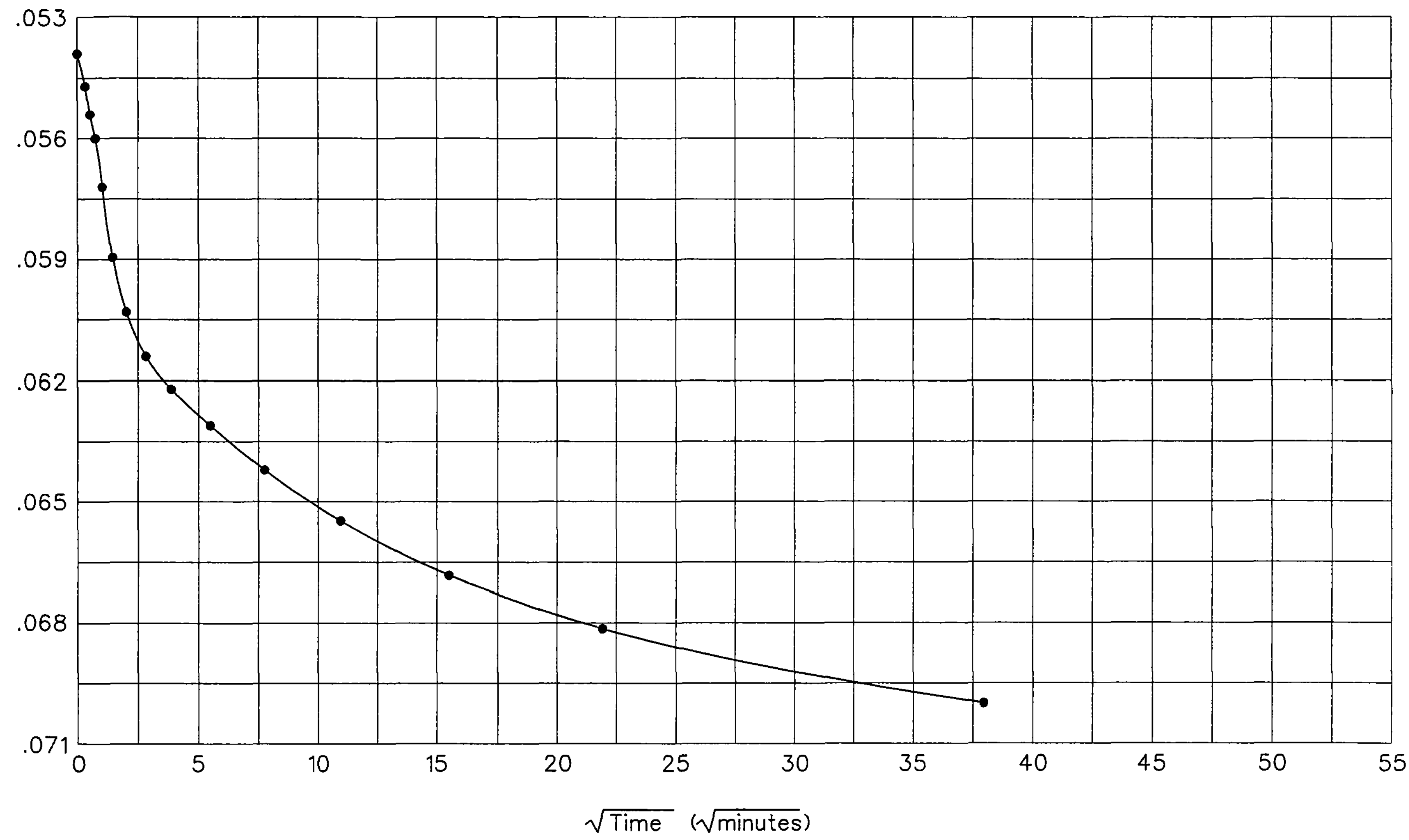
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 23.5'-25'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



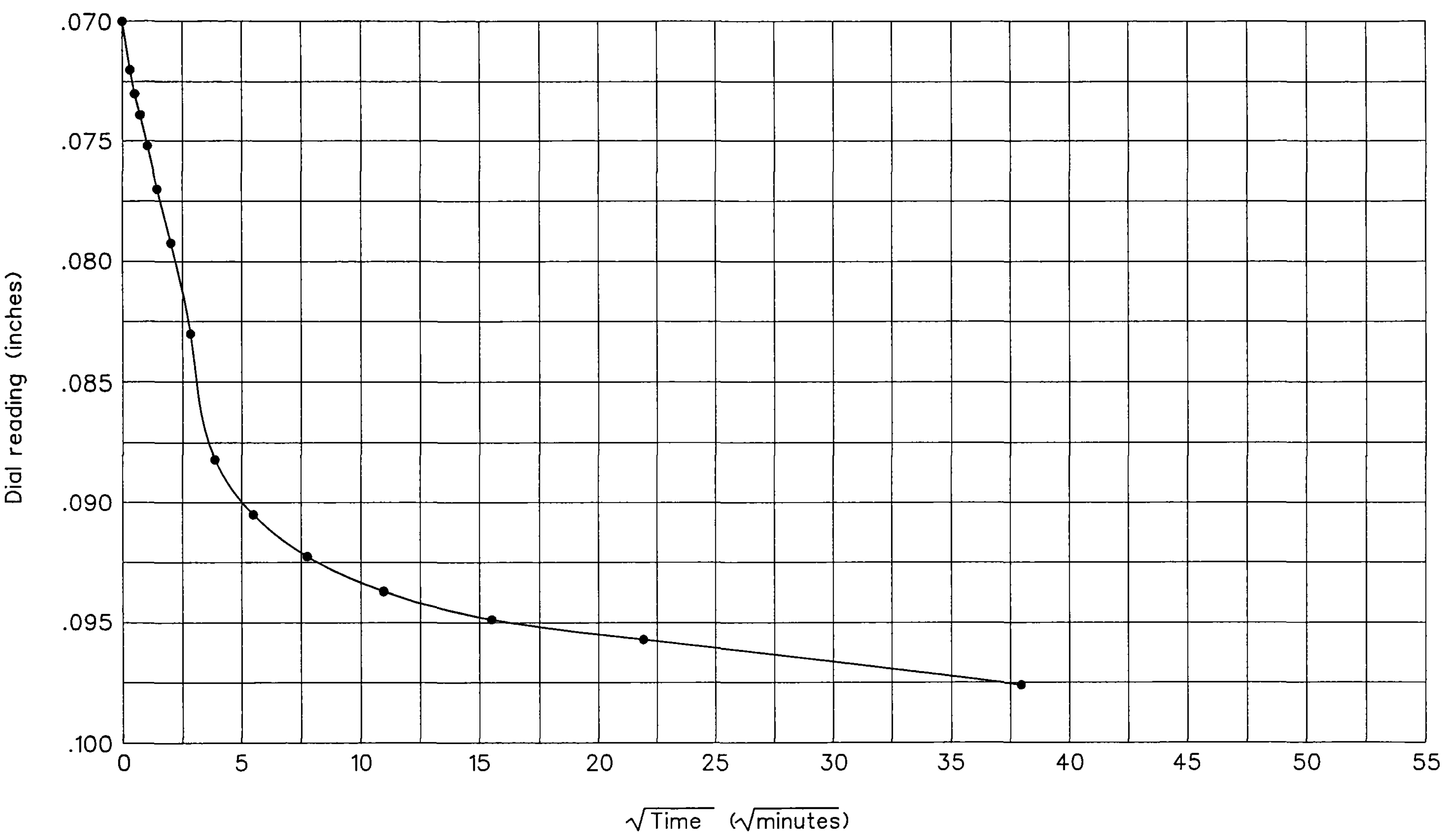
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 23.5'-25'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



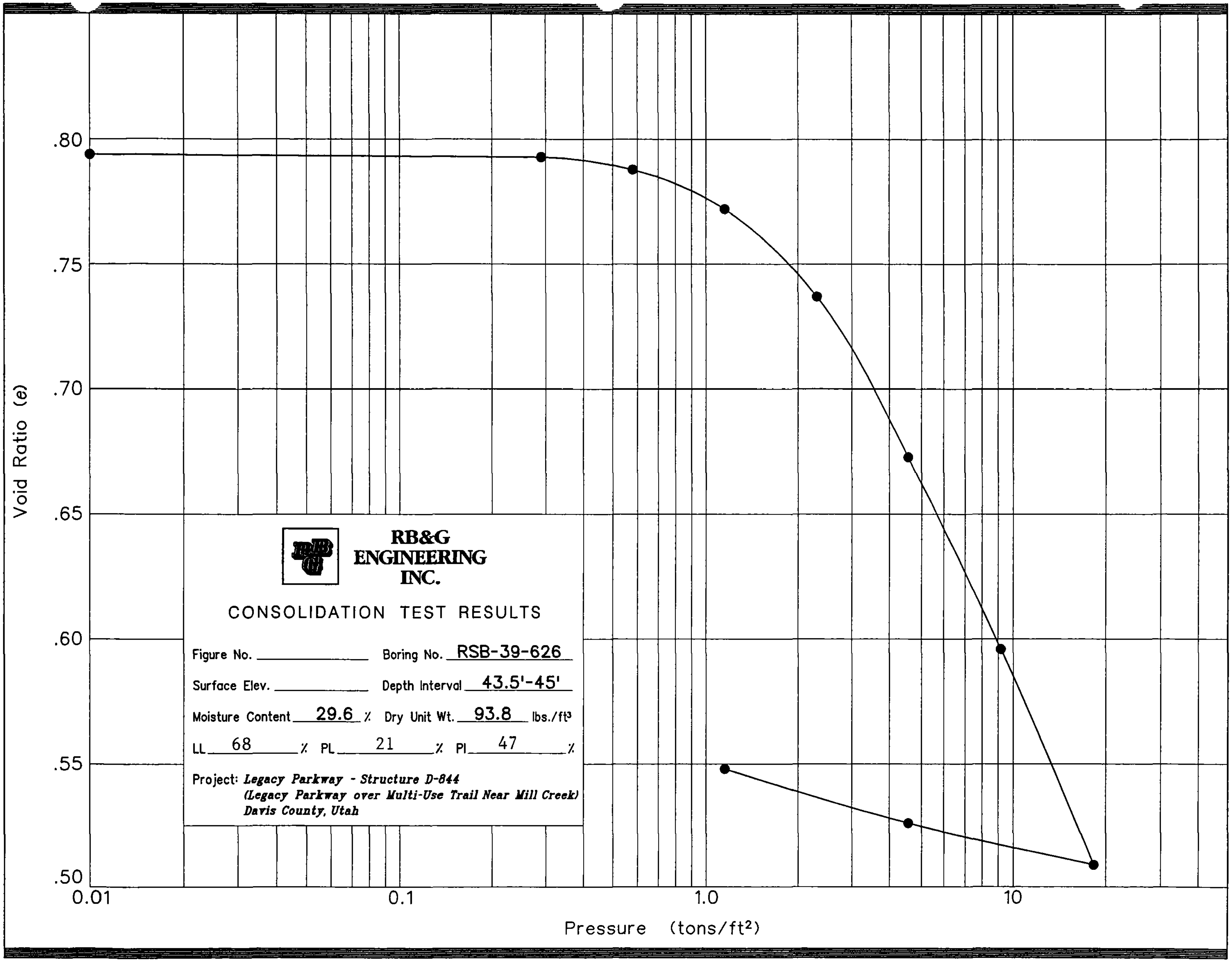
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 23.5'-25'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

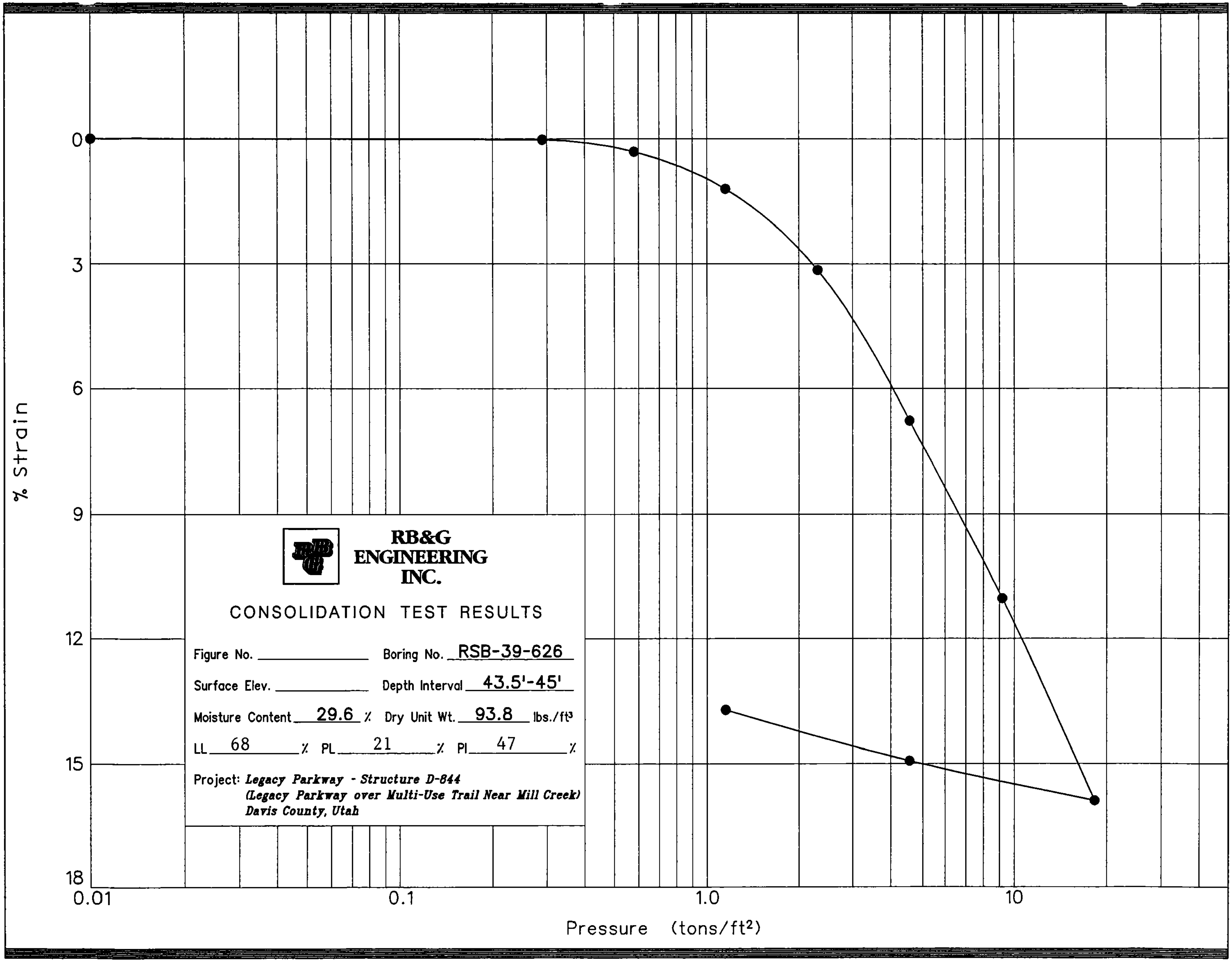
Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 43.5'-45'

Moisture Content 29.6 % Dry Unit Wt. 93.8 lbs./ft³

LL 68 % PL 21 % PI 47 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

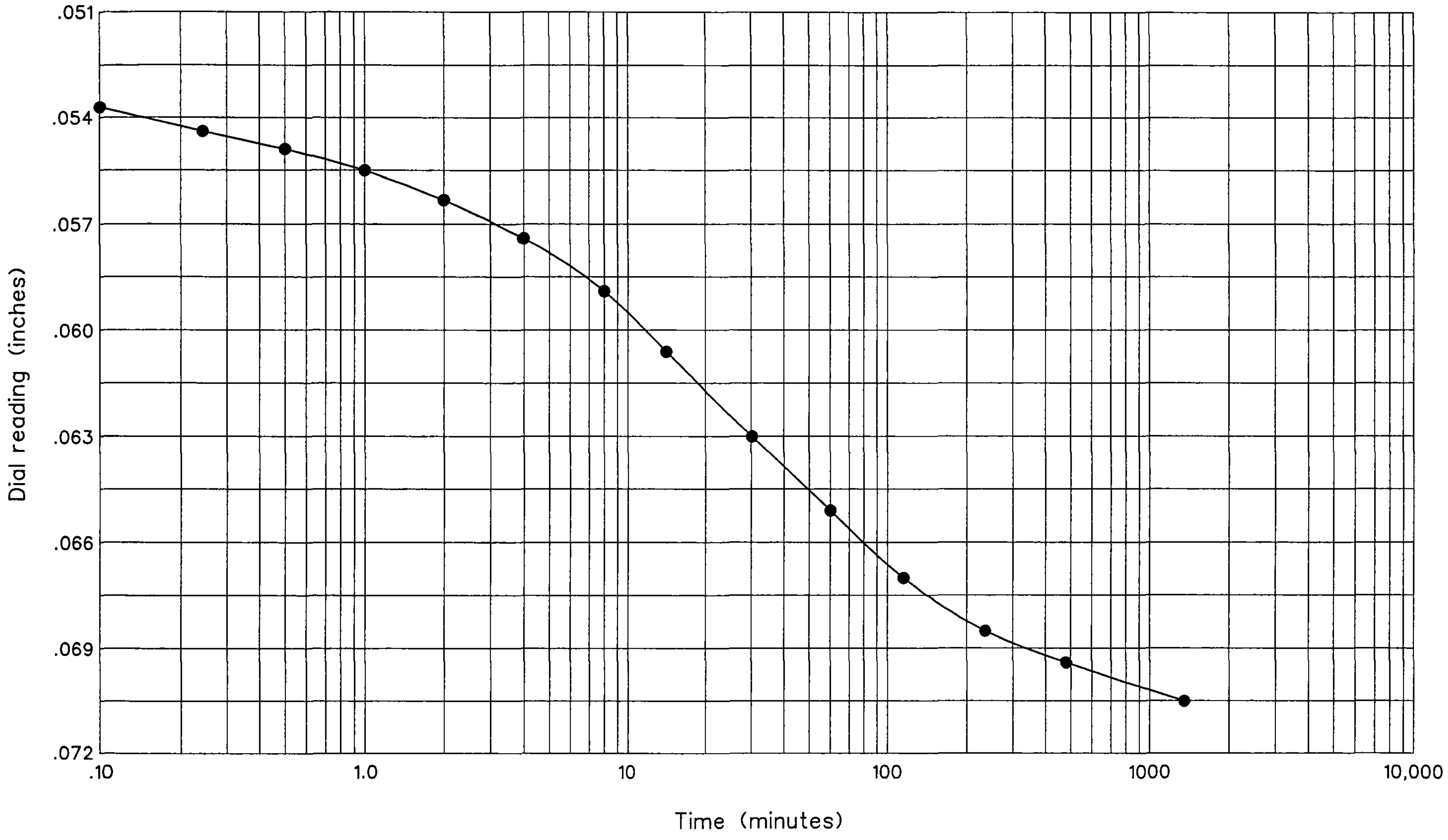
Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 43.5'-45'

Moisture Content 29.6 % Dry Unit Wt. 93.8 lbs./ft³

LL 68 % PL 21 % PI 47 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



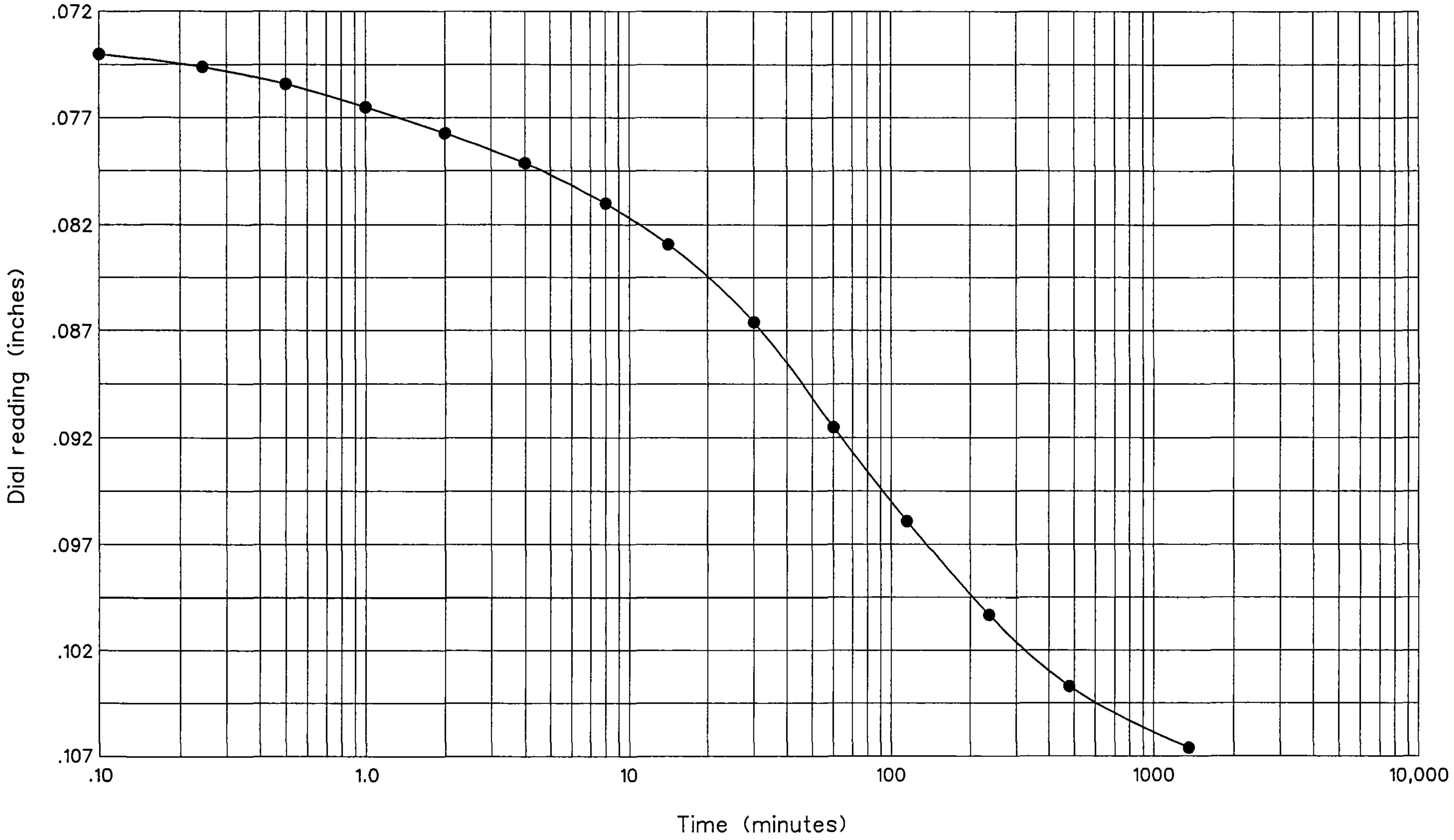
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 43.5'-45'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



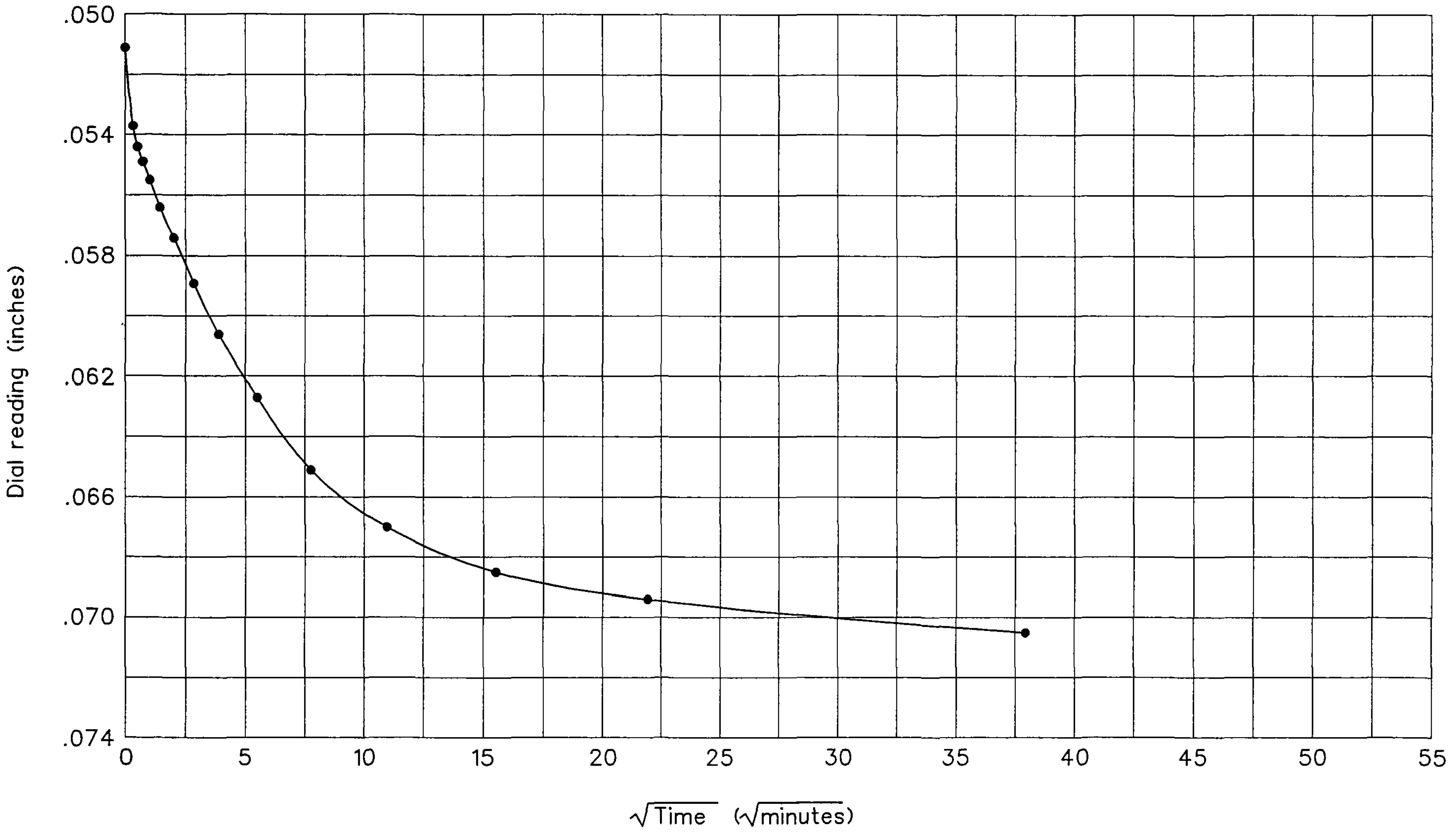
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 43.5'-45'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



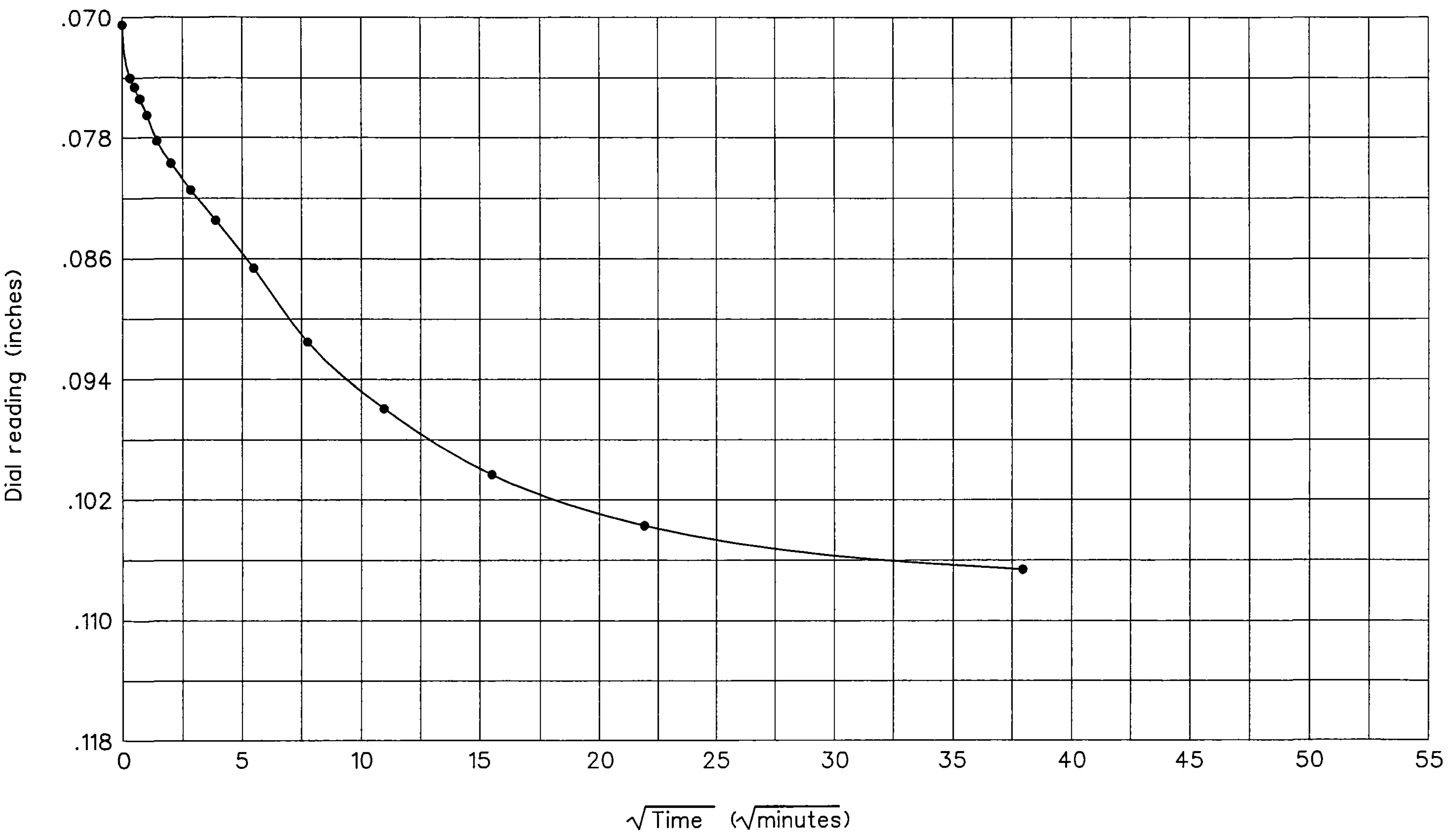
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 43.5'-45'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



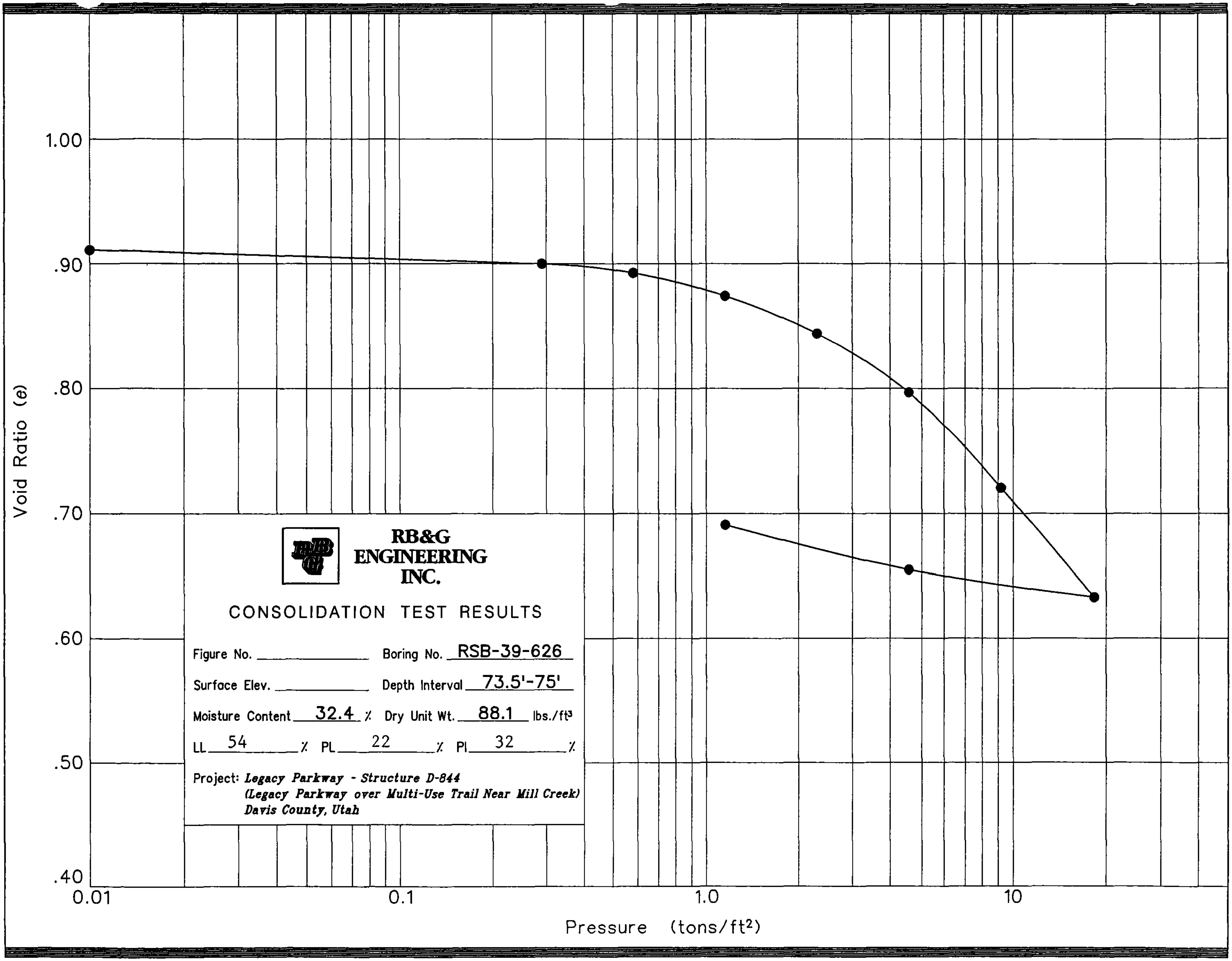
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 43.5'-45'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

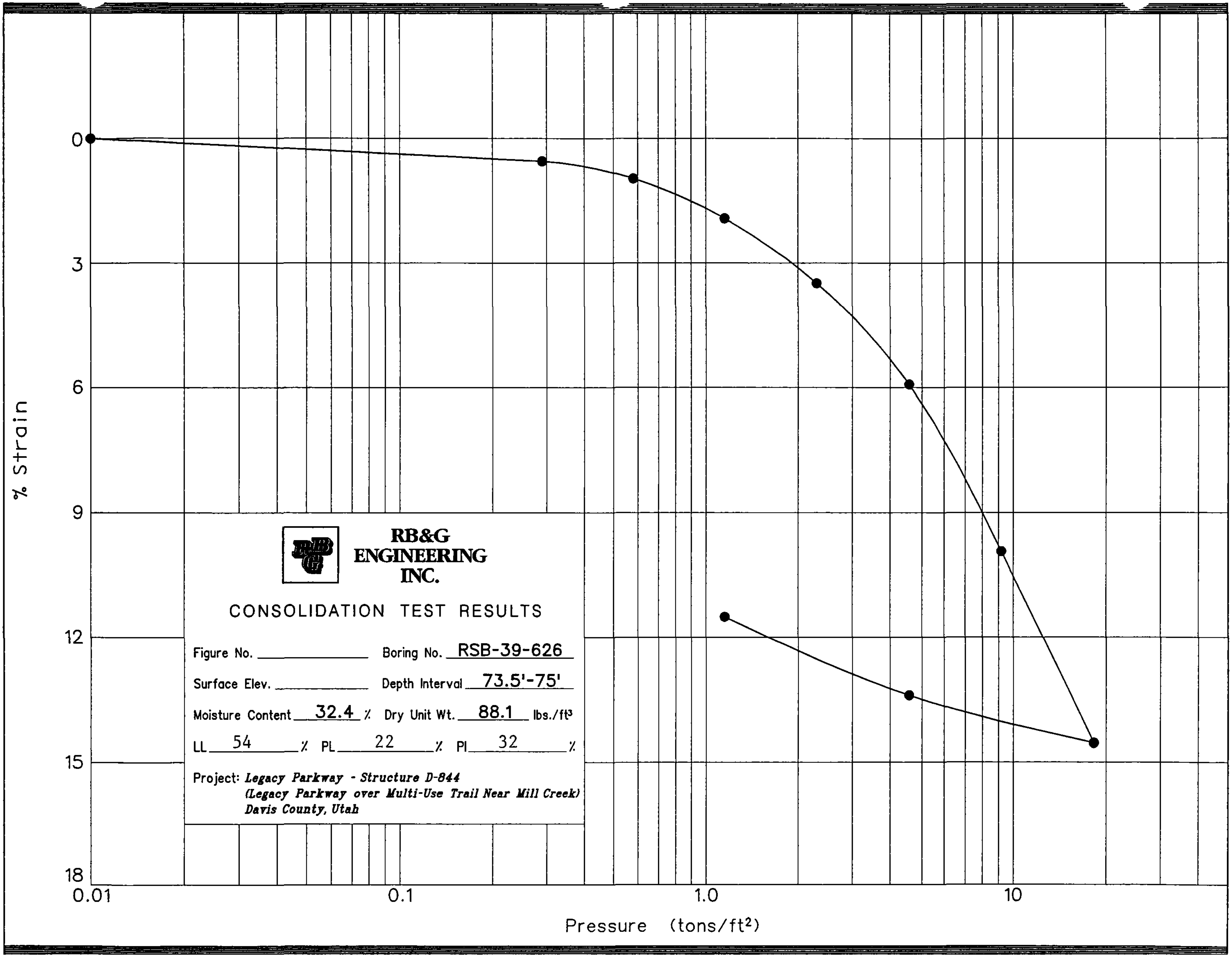
Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 73.5'-75'

Moisture Content 32.4 % Dry Unit Wt. 88.1 lbs./ft³

LL 54 % PL 22 % PI 32 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

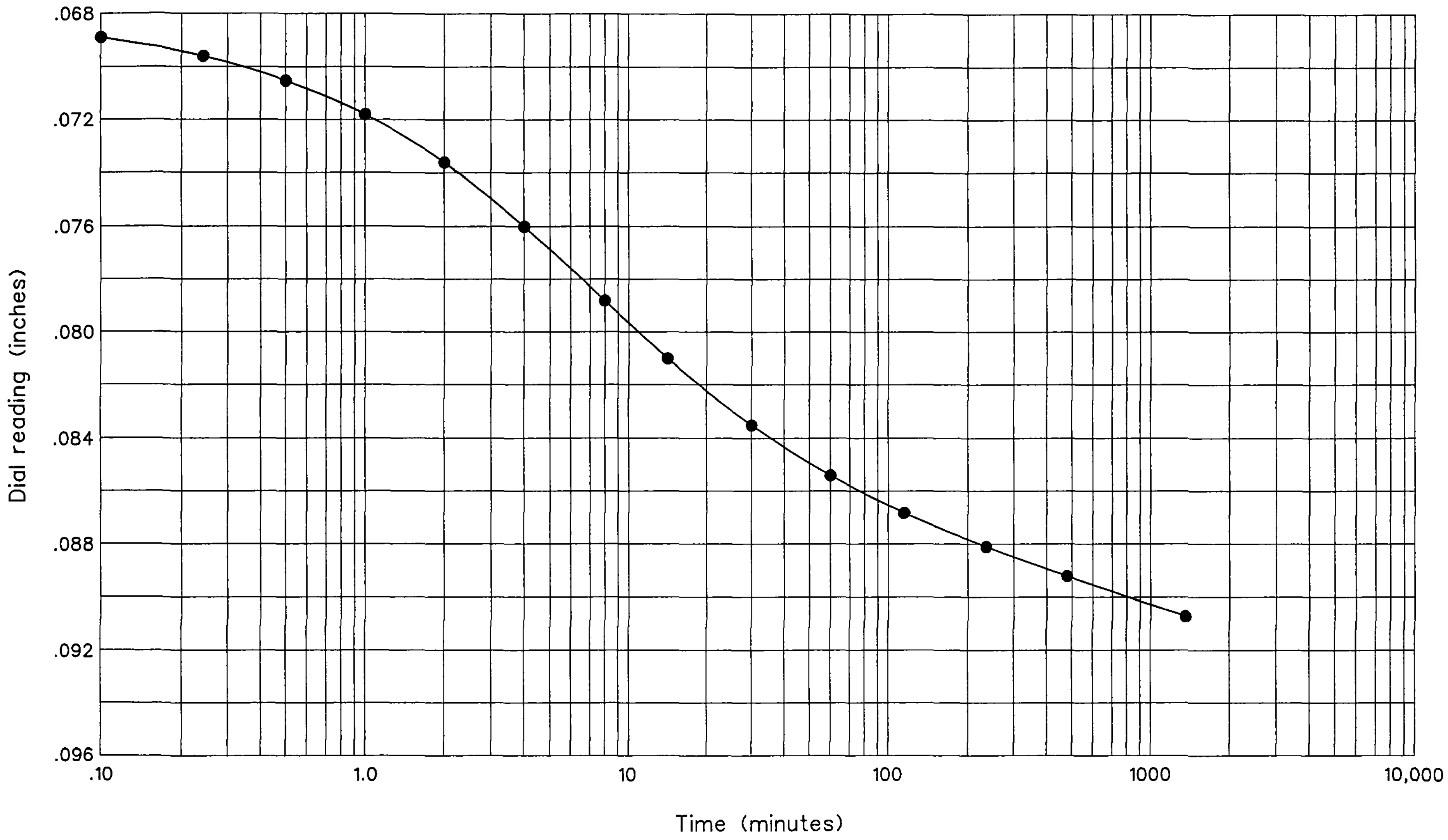
Figure No. ______ Boring No. RSB-39-626

Surface Elev. ______ Depth Interval 73.5'-75'

Moisture Content 32.4 % Dry Unit Wt. 88.1 lbs./ft³

LL 54 % PL 22 % PI 32 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



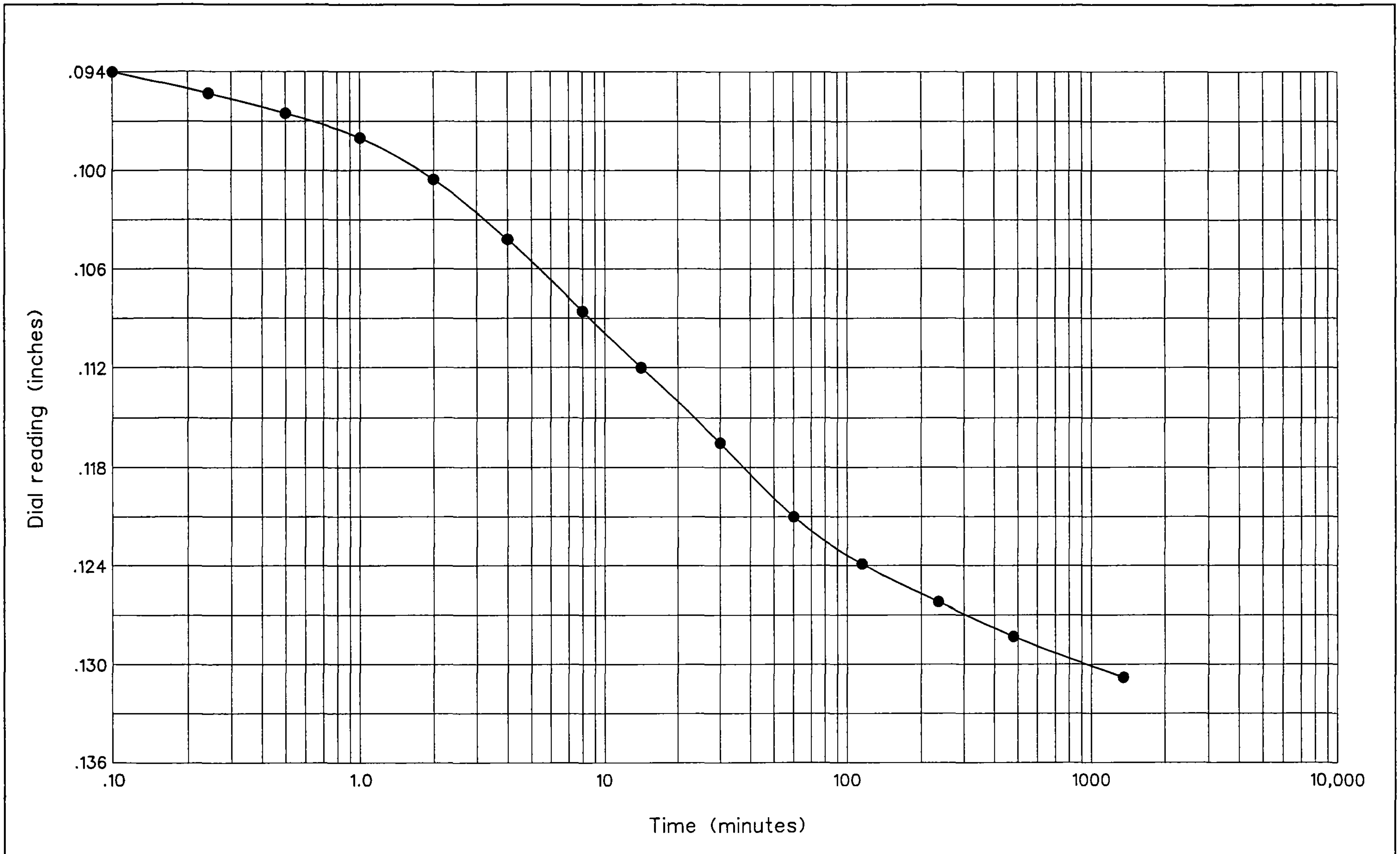
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 73.5'-75'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



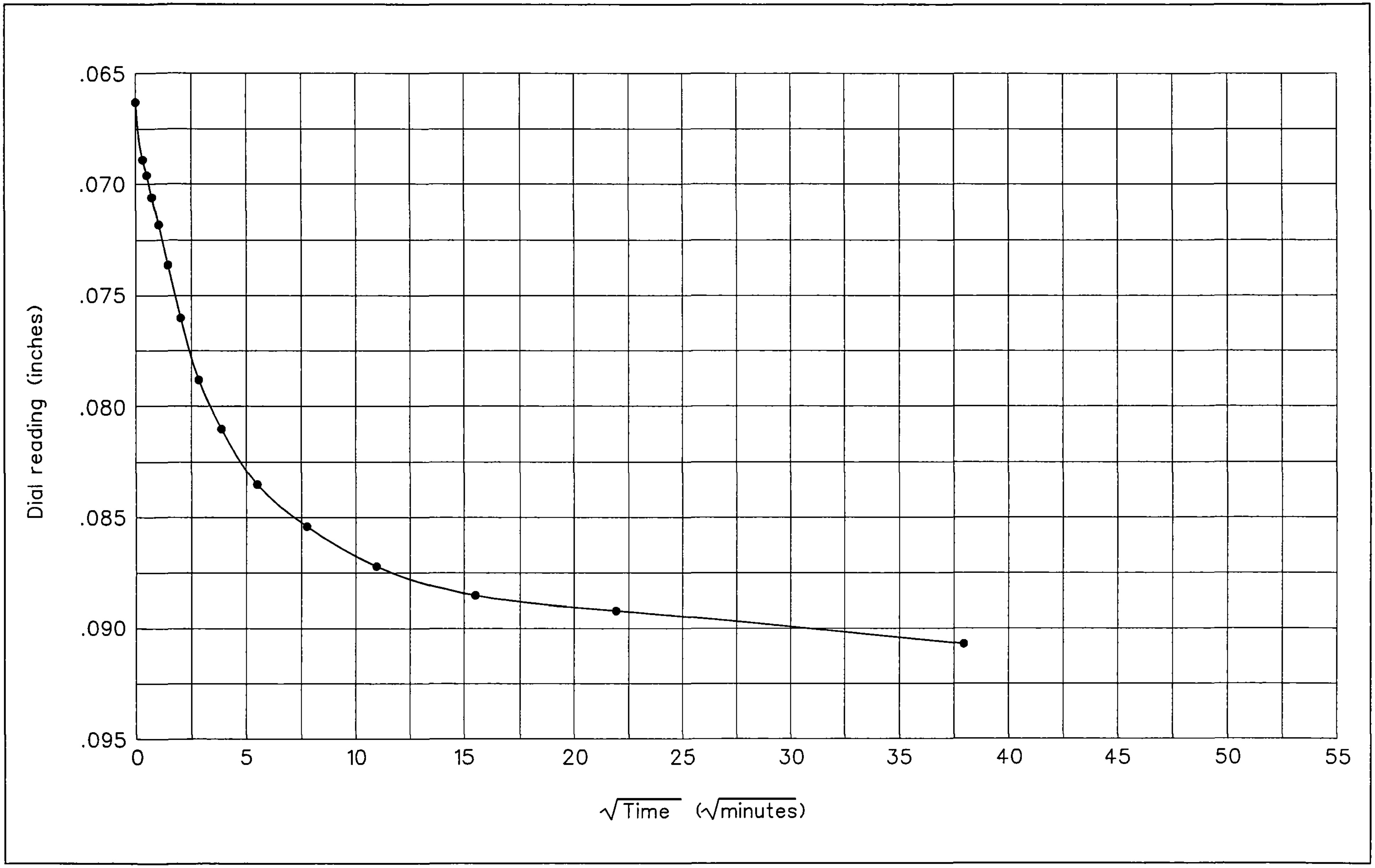
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 73.5'-75'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



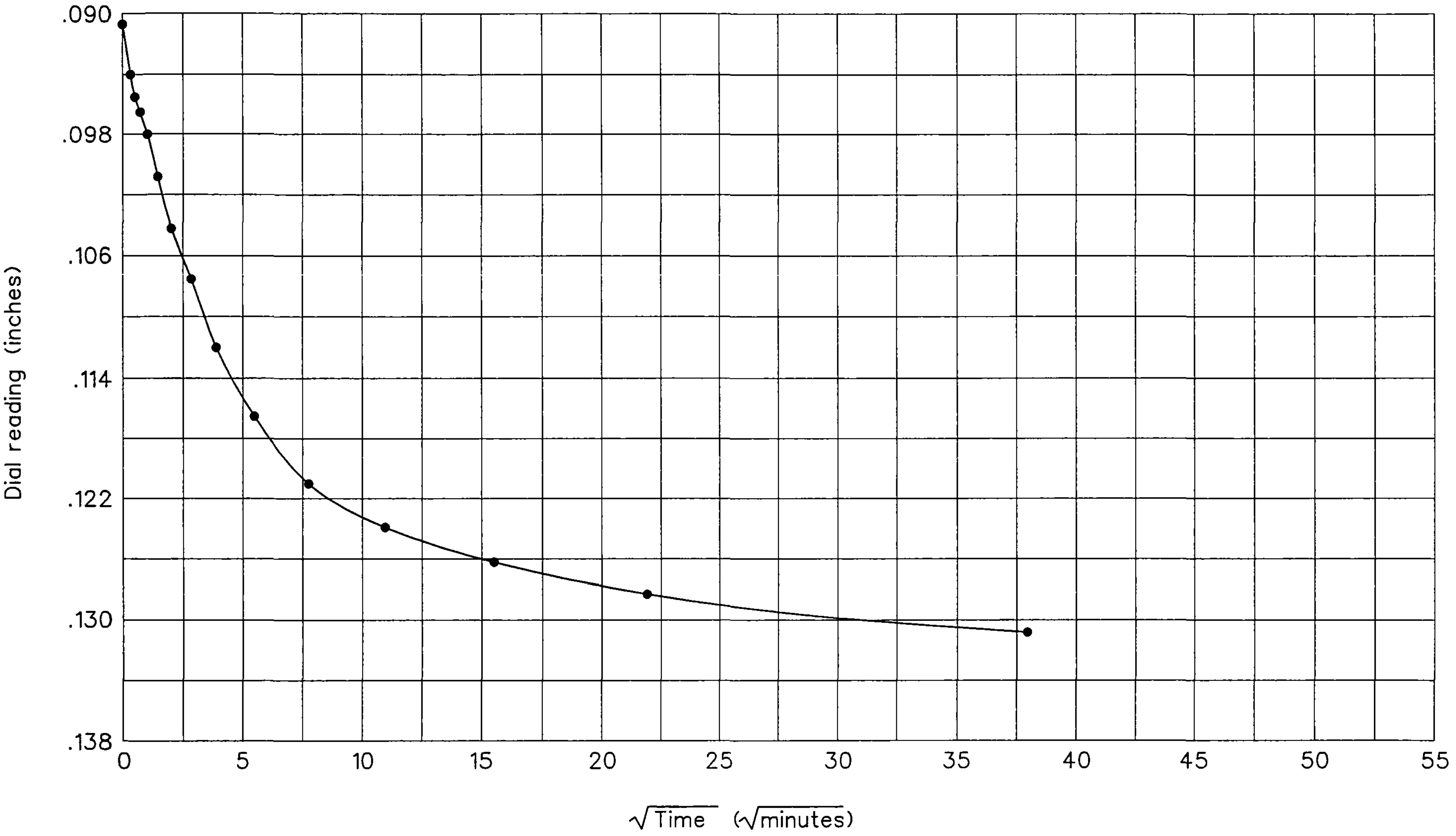
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 73.5'-75'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



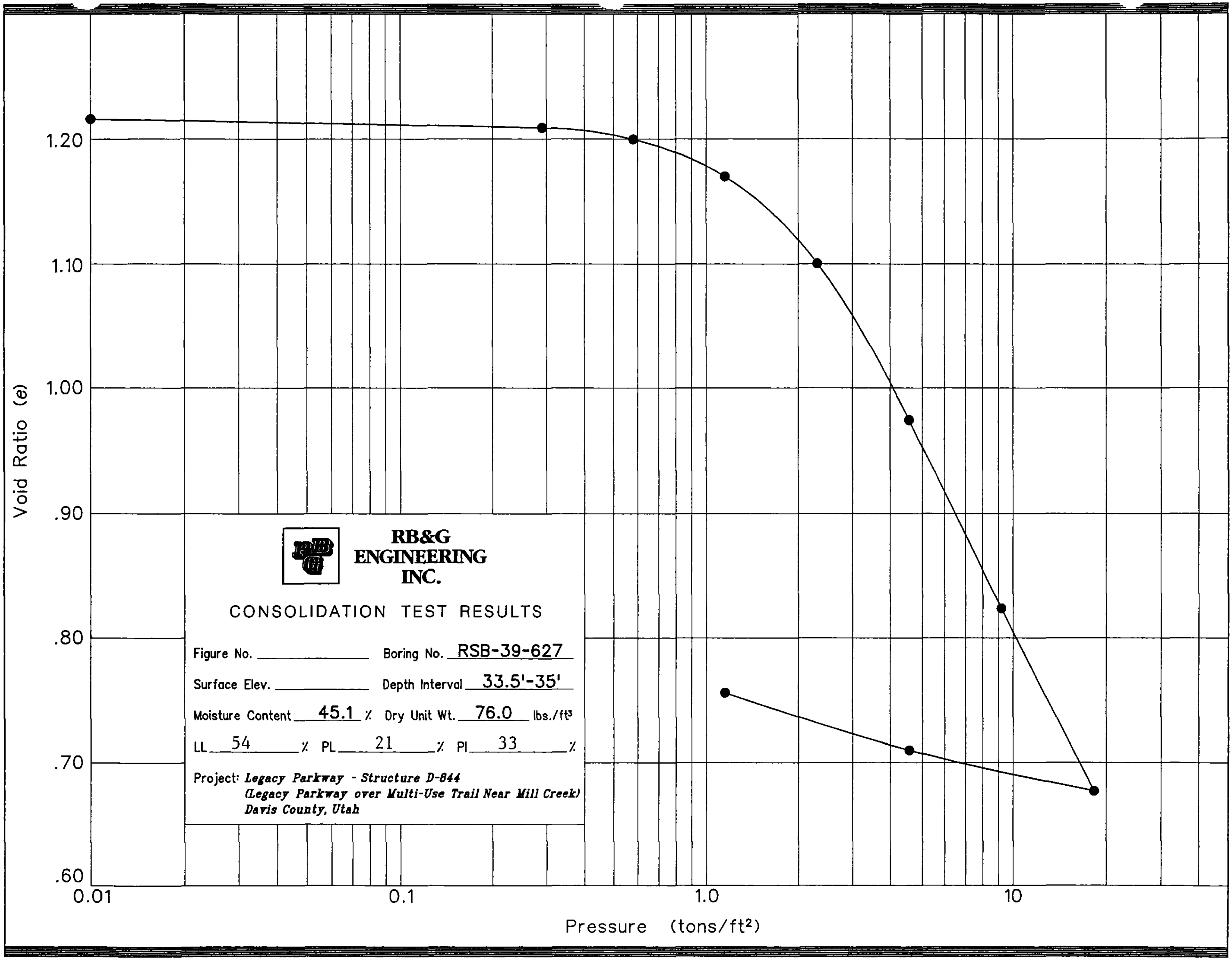
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-626
Depth: 73.5'-75'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

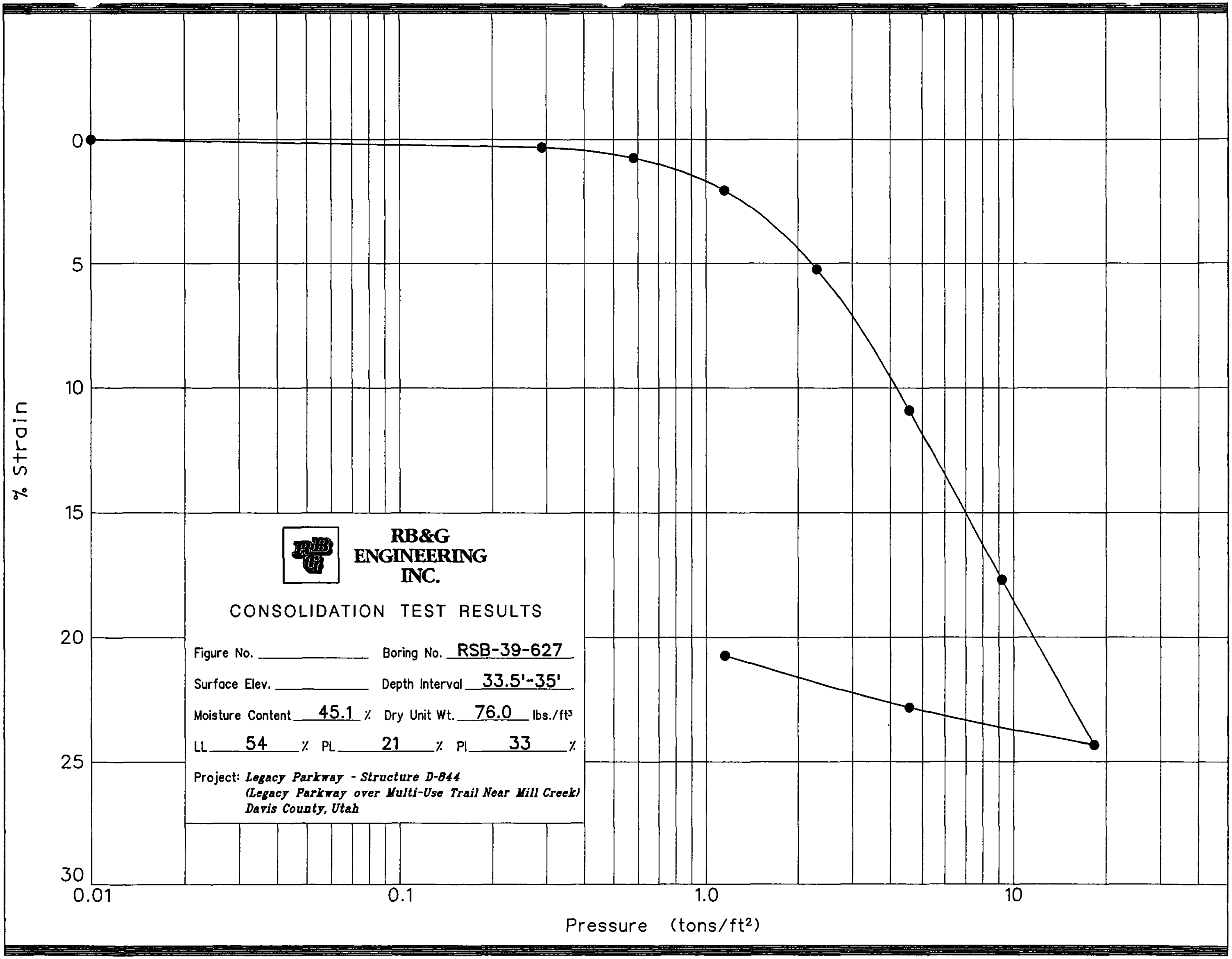
Figure No. ____ Boring No. RSB-39-627

Surface Elev. ____ Depth Interval 33.5'-35'

Moisture Content 45.1 % Dry Unit Wt. 76.0 lbs./ft³

LL 54 % PL 21 % PI 33 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

Figure No. ____________ Boring No. RSB-39-627

Surface Elev. ____________ Depth Interval 33.5'-35'

Moisture Content 45.1 % Dry Unit Wt. 76.0 lbs./ft³

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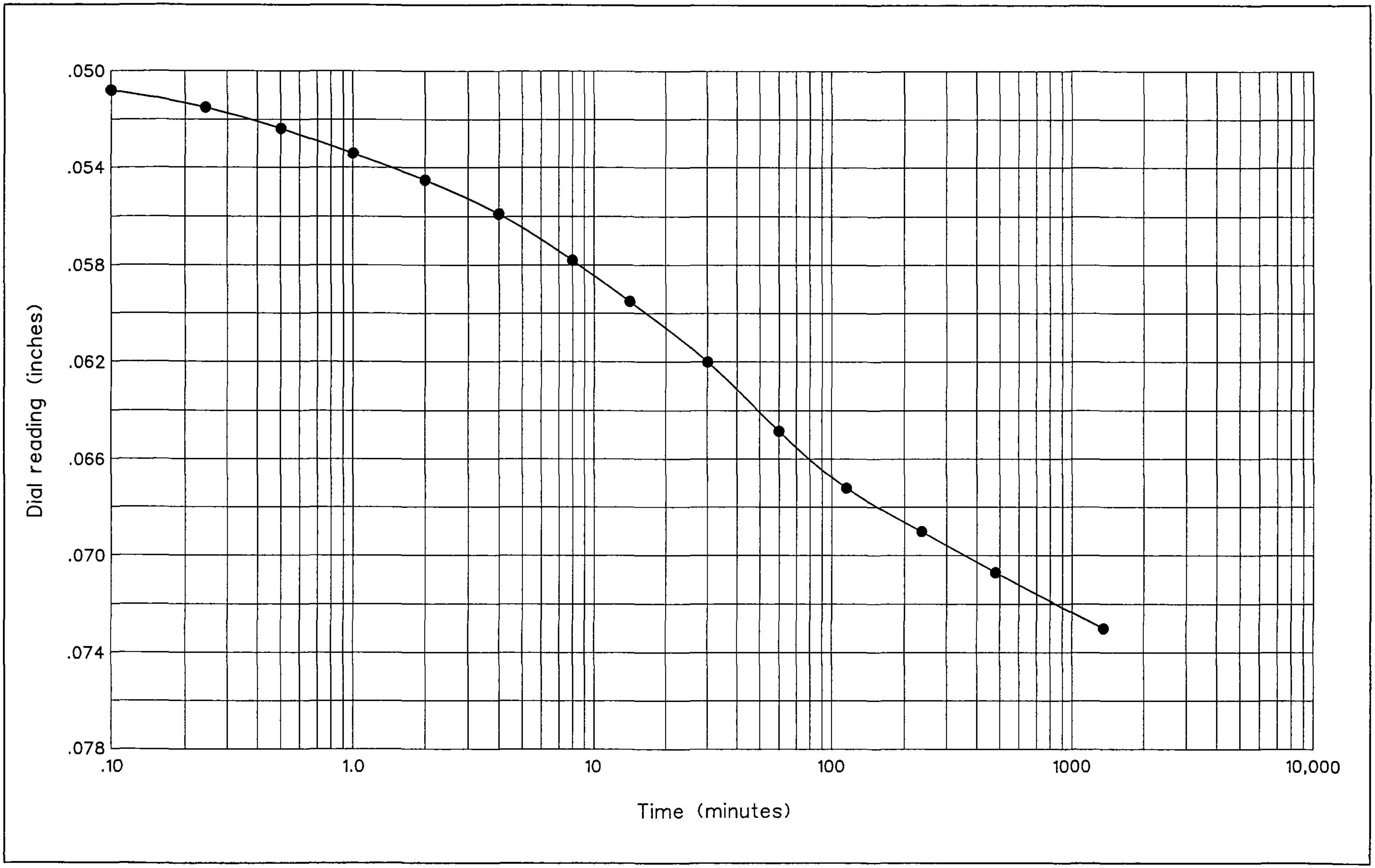
Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



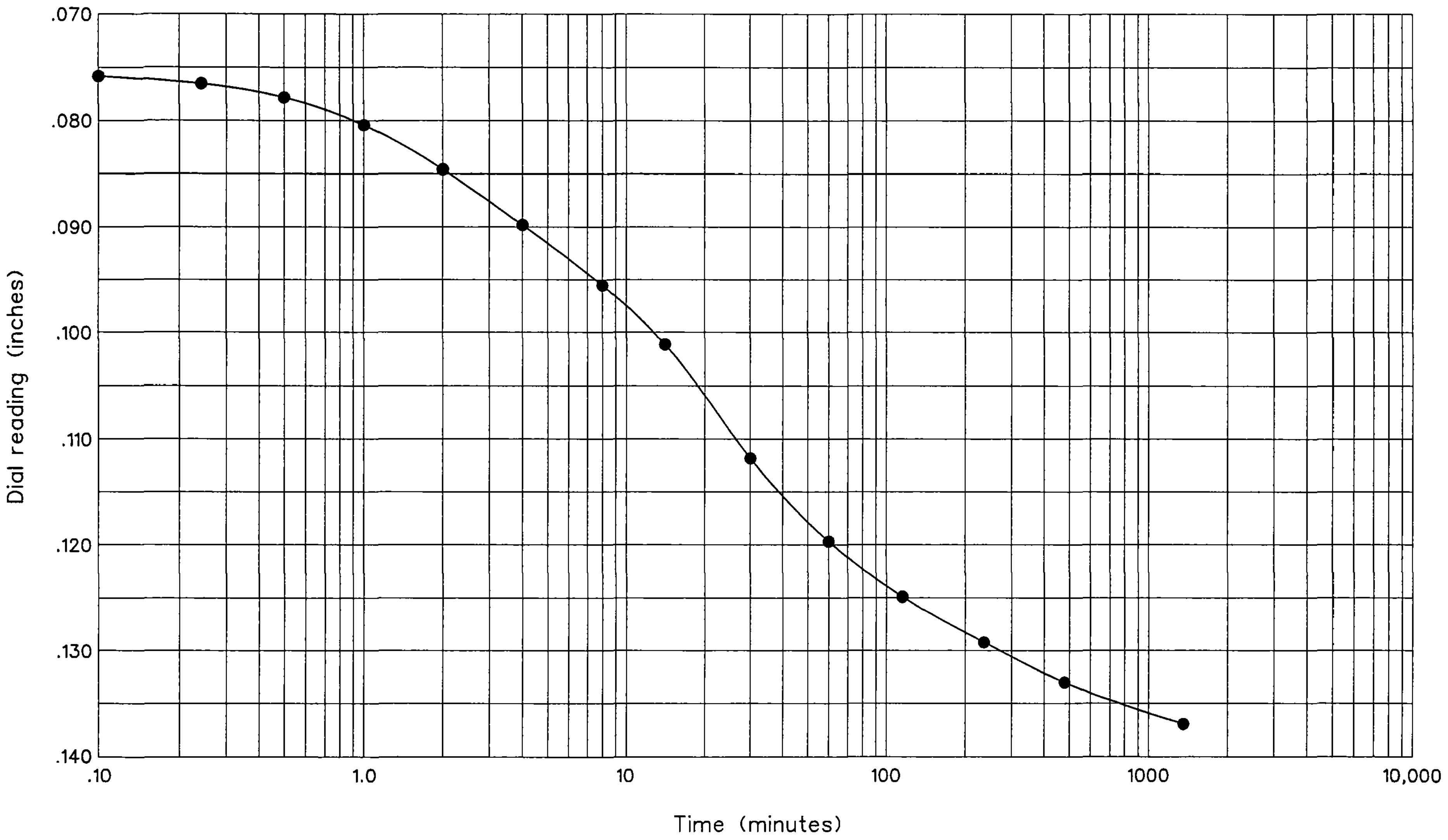
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-627
Depth: 33.5'-35'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



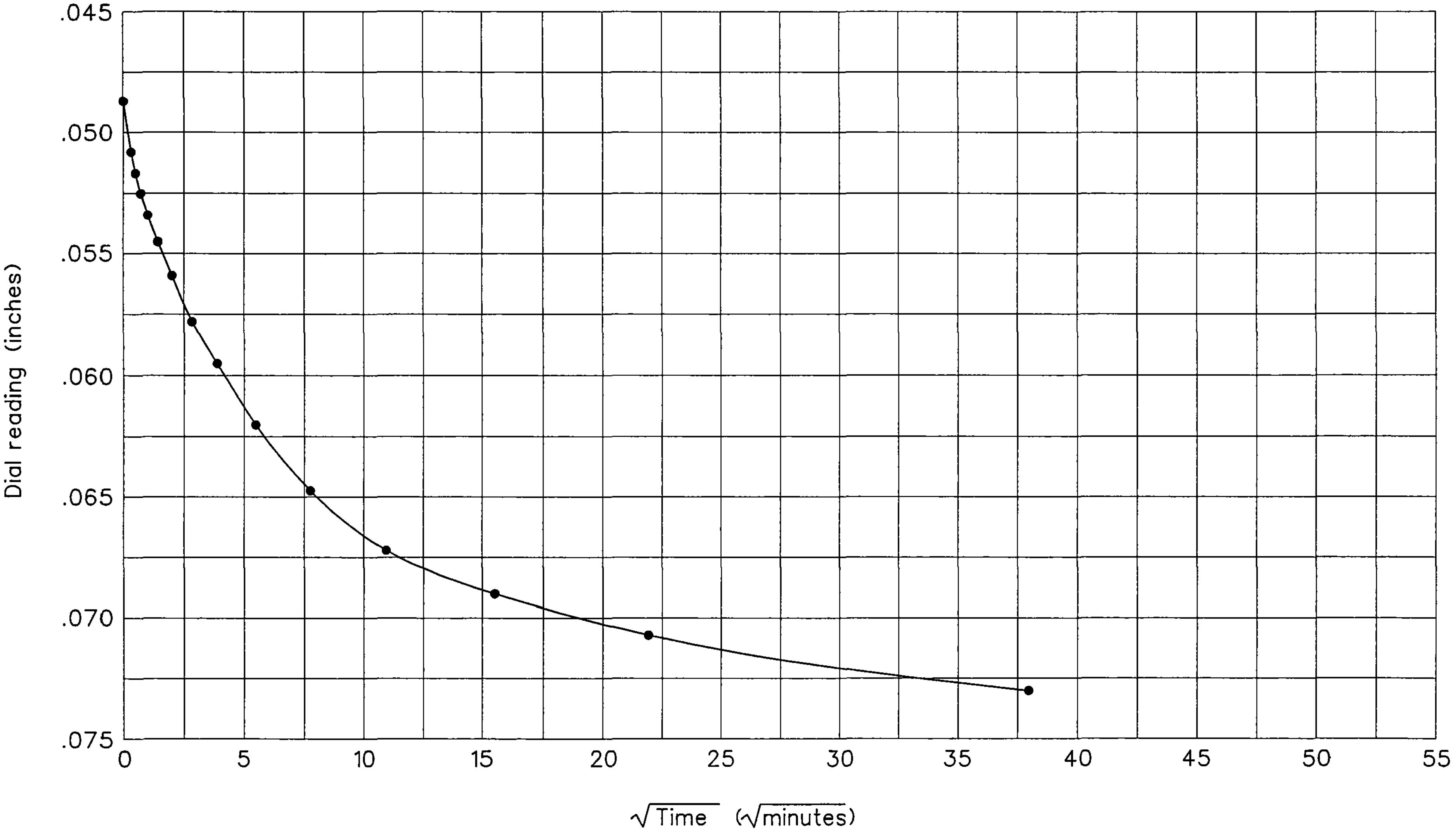
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-627
Depth: 33.5'-35'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



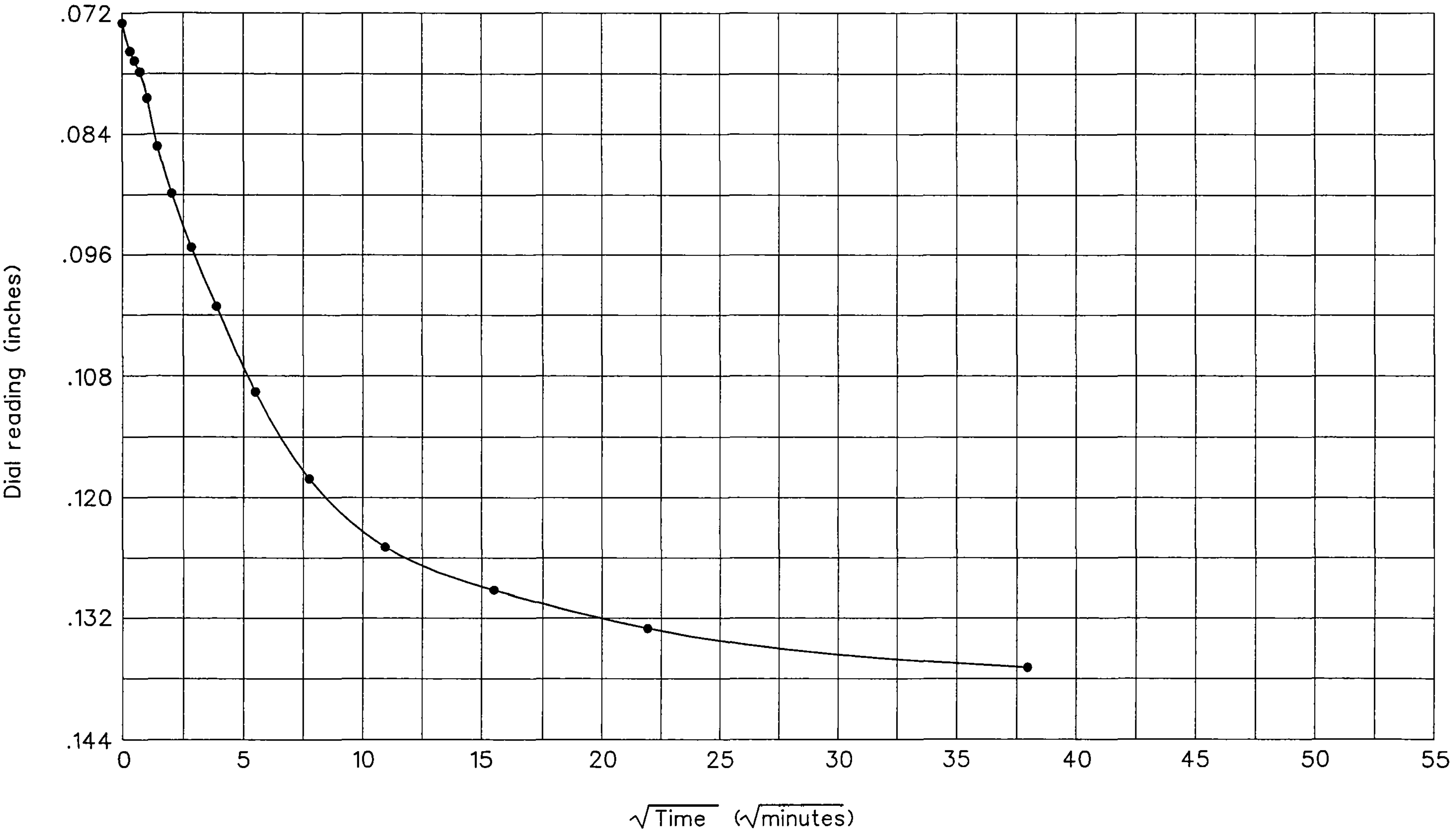
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-627
Depth: 33.5'-35'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-627
Depth: 33.5'-35'
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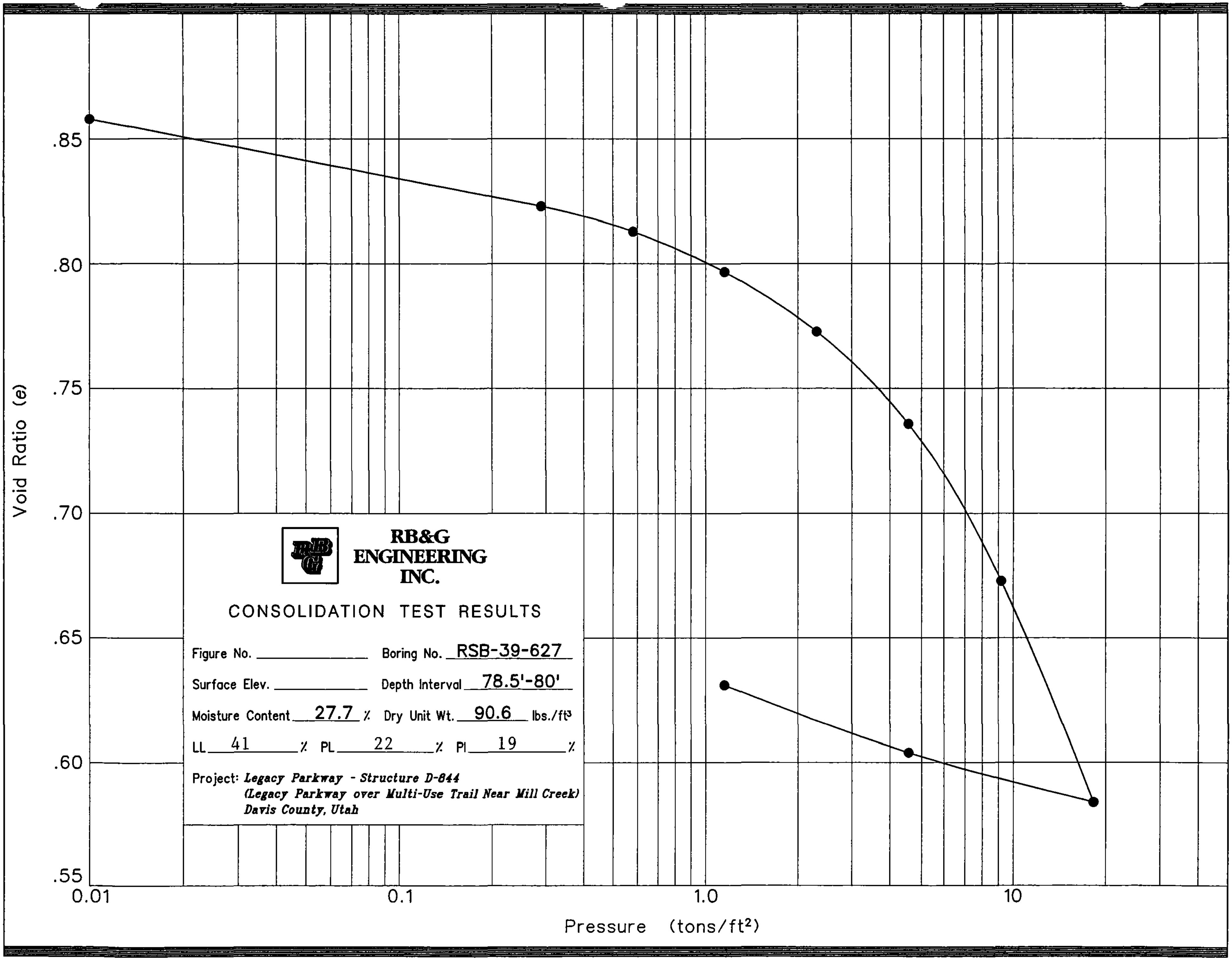
TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

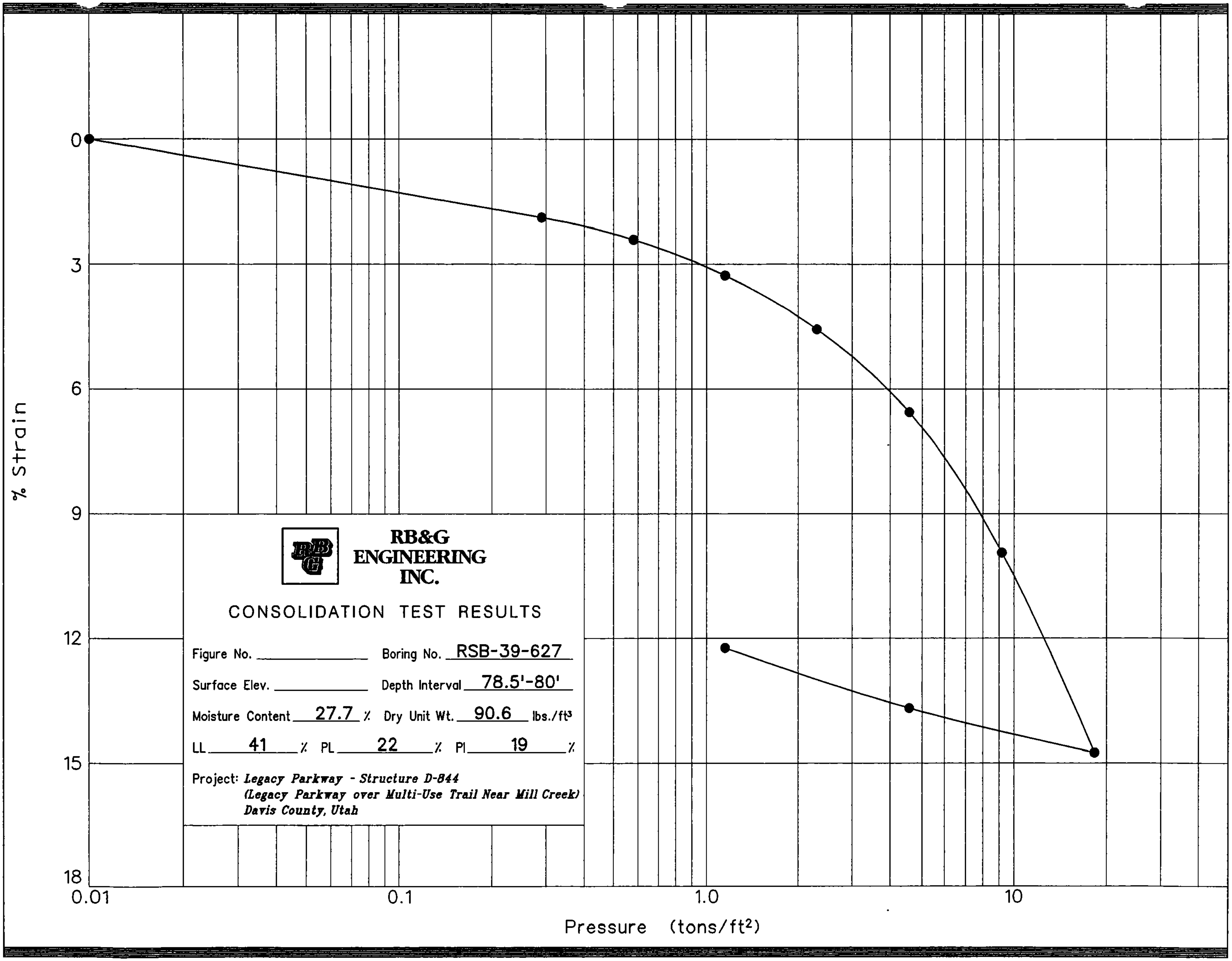
Figure No. ______ Boring No. RSB-39-627

Surface Elev. ______ Depth Interval 78.5'-80'

Moisture Content 27.7 % Dry Unit Wt. 90.6 lbs./ft³

LL 41 % PL 22 % PI 19 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

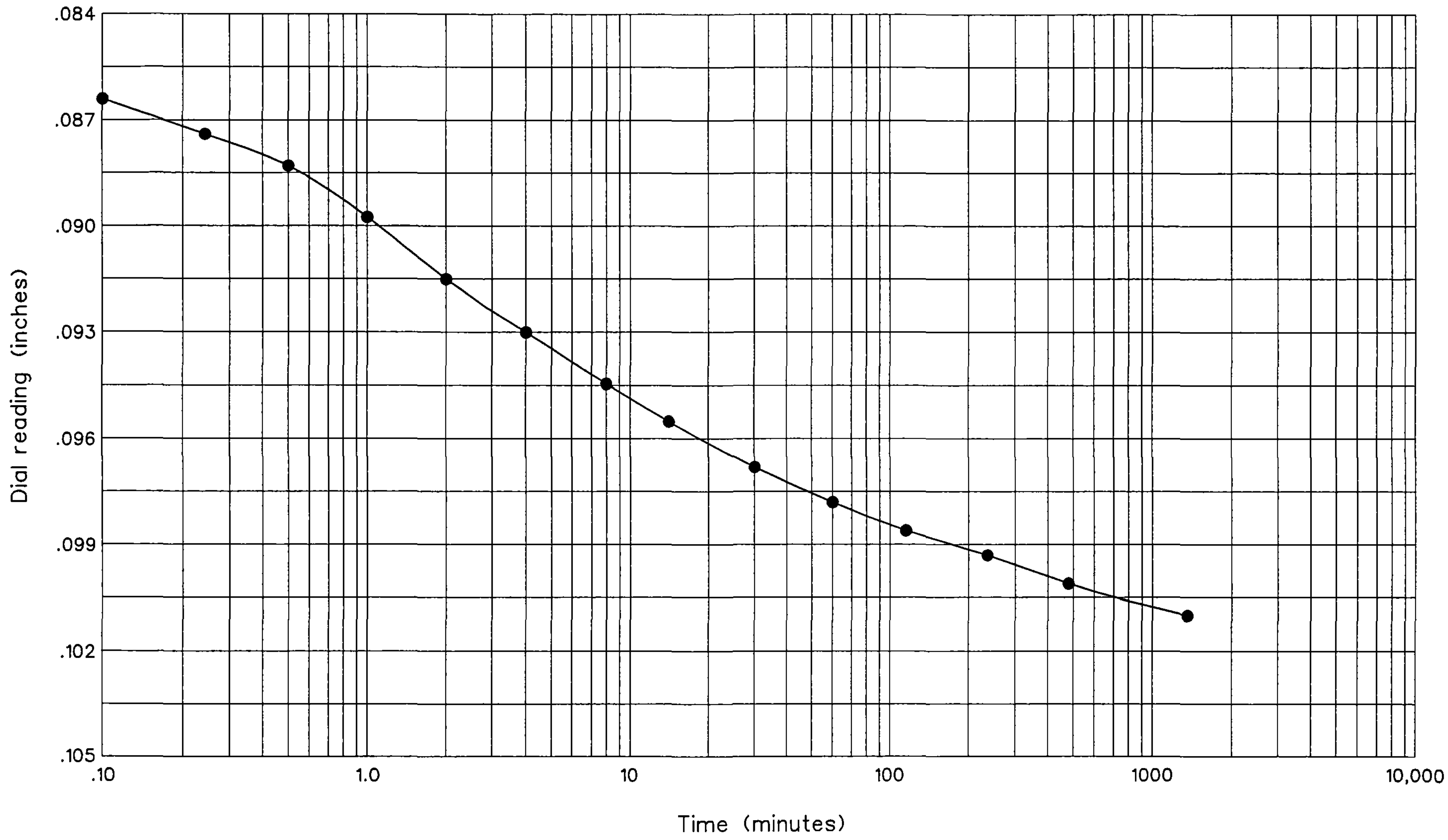
Figure No. ______________ Boring No. RSB-39-627

Surface Elev. ______________ Depth Interval 78.5'-80'

Moisture Content 27.7 % Dry Unit Wt. 90.6 lbs./ft³

LL 41 % PL 22 % PI 19 %

Project: *Legacy Parkway - Structure D-844*
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah



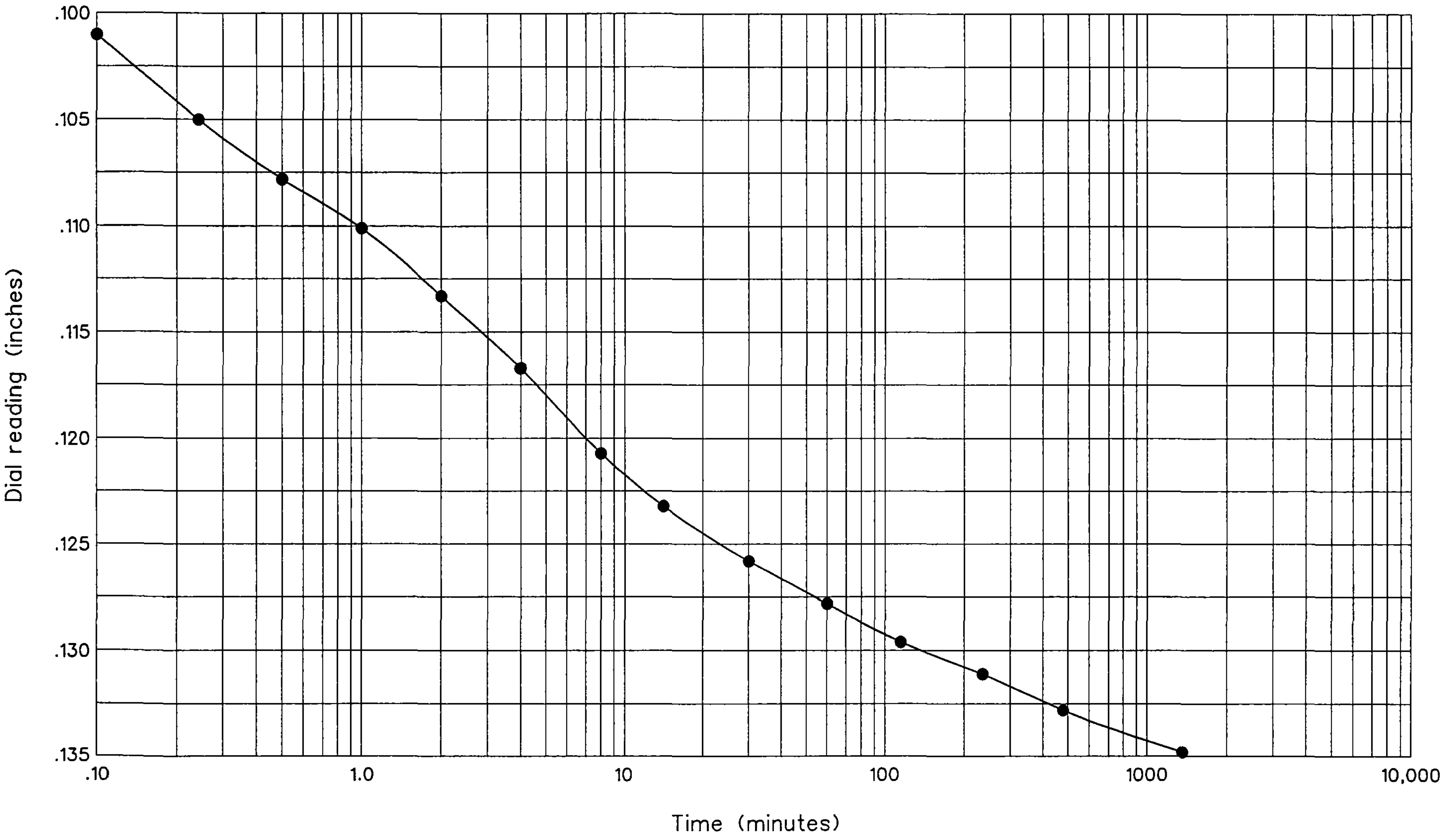
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-627
Depth: 78.5'-80'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



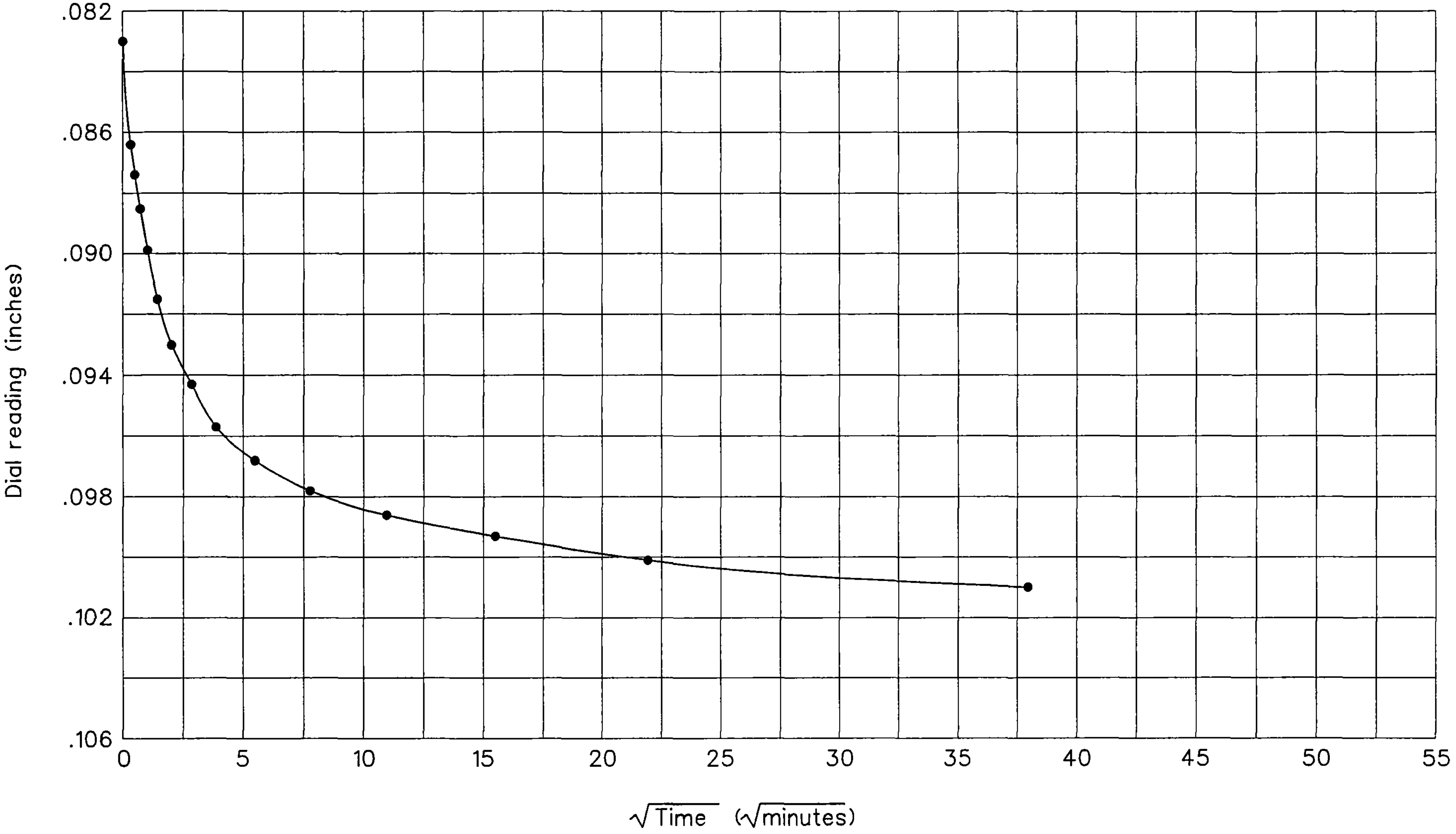
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-627
Depth: 78.5'-80'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



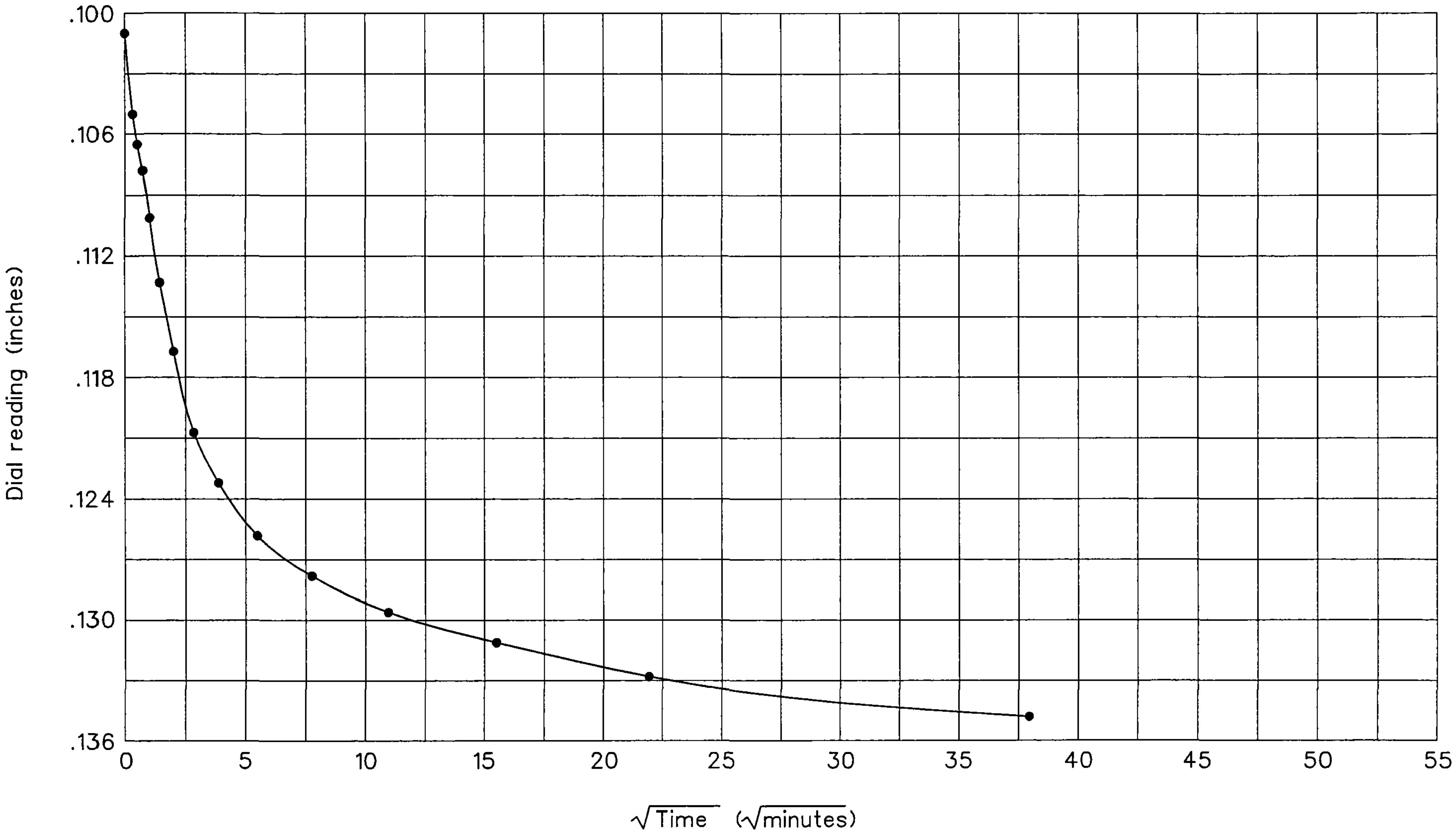
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-627
Depth: 78.5'-80'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure



RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-39-627
Depth: 78.5'-80'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-844
(Legacy Parkway over Multi-Use Trail Near Mill Creek)
Davis County, Utah

Figure

LP OVER MULTI-USE TRAIL & D&RGW RR

E-2573

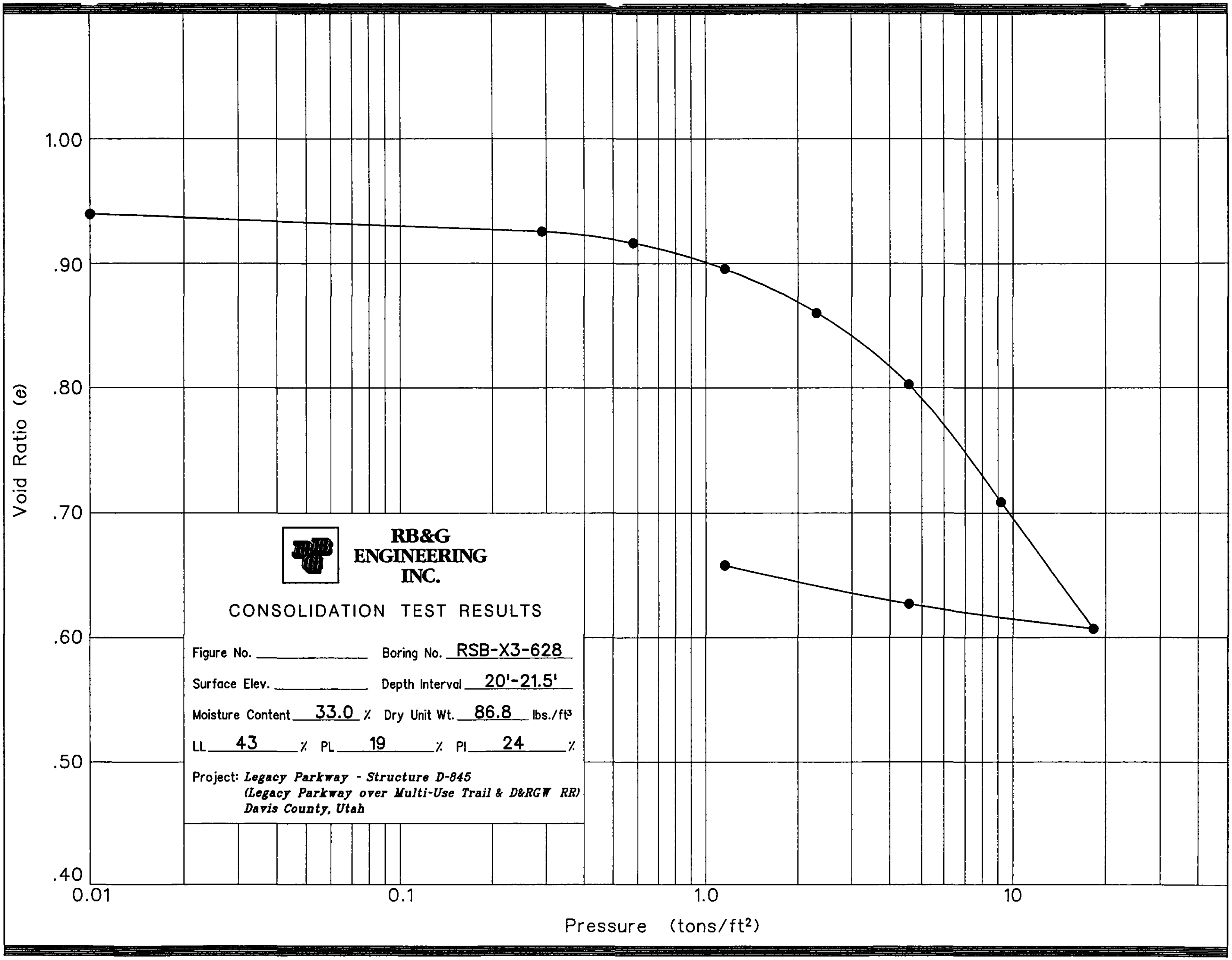
Table 1

SUMMARY OF TEST DATA

PROJECT	Legacy Parkway	PROJECT NO.	200601-143
LOCATION	Structure E-2573 (D&RG Trail Underpass)	FEATURE	Foundations

HOLE NO.	DEPTH BELOW GROUND SURFACE (ft)	STANDARD PENETRATION BLOWS PER FOOT	IN-PLACE		UNCONFINED COMPRESSIVE STRENGTH (psf)	ATTERBERG LIMITS			MECHANICAL ANALYSIS			UNIFIED SOIL CLASSIFICATION SYSTEM / (AASHTO Classification)
			DRY UNIT WEIGHT (pcf)	MOISTURE (%)		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT & CLAY	
RSB-X3-628	10-11.5	Shelby	105.8	24.2	1602	38	18	20	0	7	93	CL / A-6(19)
	20-21.5	Shelby	86.8	33.0		43	19	24	0	3	97	CL / A-7-6(25)
	40-41.5	Shelby	101.9	23.6	2653	45	22	23	0	7	93	CL / A-7-6(23)
	50-51.5	Shelby	113.1	29.0		55	23	32	0	1	99	CH / A-7-6(36)
	70-71	Shelby	89.0	33.0	1244	44	20	24	0	31	69	CL / A-7-6(15)
	71-71.5	Shelby		21.9		43	18	25	0	53	47	SC / A-7-6(7)
	80-81.5	Shelby		28.9		33	18	15	0	4	96	CL / A-6(14)
RSB-X3-629	0-1.5	17		2.3				NP	66	29	5	GP-GM / A-1-a
	10-11	Shelby	97.8	25.0	2141	47	20	27	0	7	93	CL / A-7-6(27)
	15-16	Shelby	102.7	25.0	4337	37	20	17	0	2	98	CL / A-6(18)
	25-26.3	Shelby	91.6	33.2	1998	39	20	19	0	3	97	CL / A-6(20)
	40-41.5	Shelby	85.1	31.5	1902	49	21	28	0	1	99	CL / A-7-6(31)
	65-66.5	63		14.5				NP	4	78	18	SM / A-1-b
	75-76.5	Shelby	87.6	34.9	671	48	20	28	0	1	99	CL / A-7-6(31)

NP=Nonplastic



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

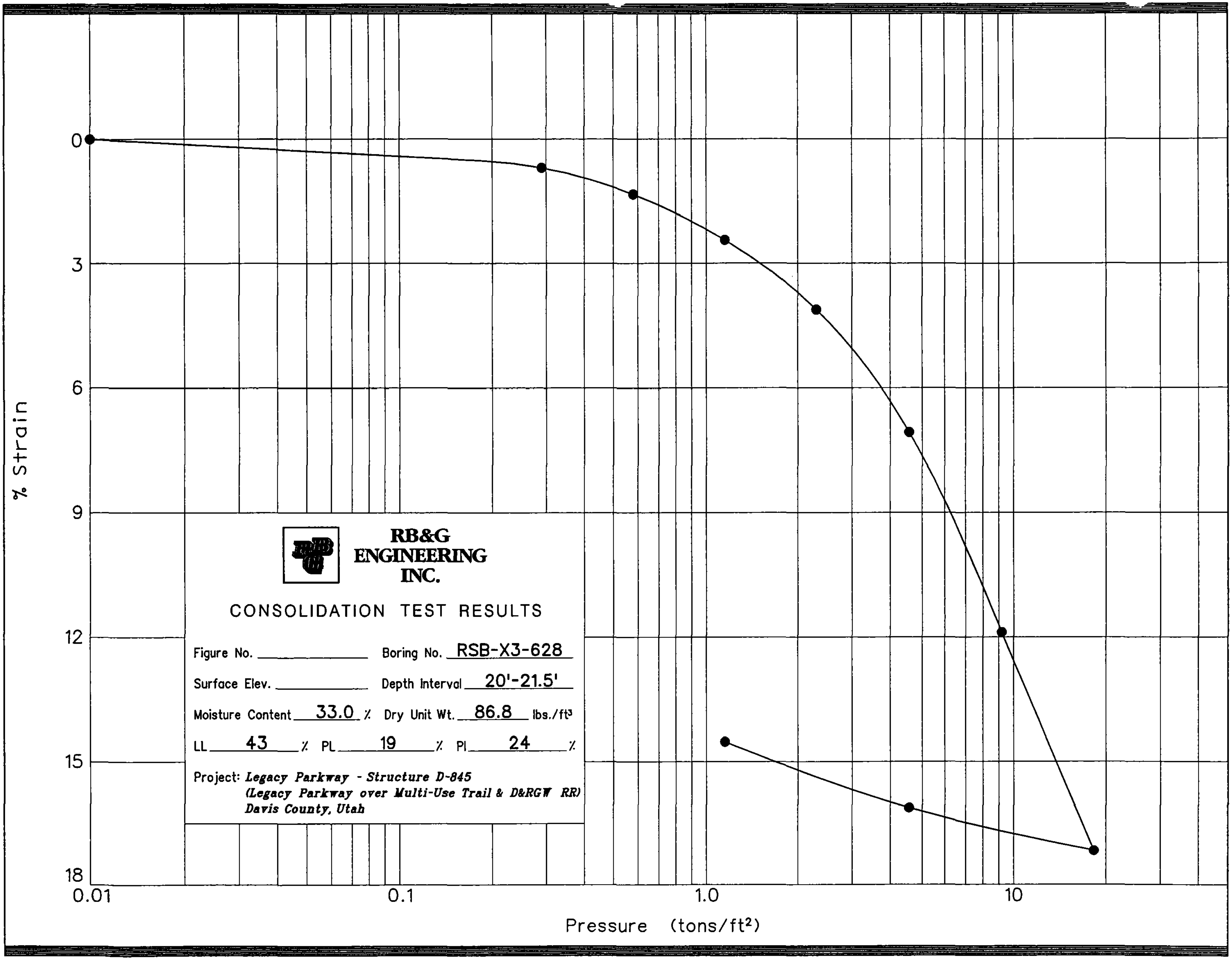
Figure No. ______________ Boring No. RSB-X3-628

Surface Elev. ______________ Depth Interval 20'-21.5'

Moisture Content 33.0 % Dry Unit Wt. 86.8 lbs./ft³

LL 43 % PL 19 % PI 24 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

Figure No. ______ Boring No. RSB-X3-628

Surface Elev. ______ Depth Interval 20'-21.5'

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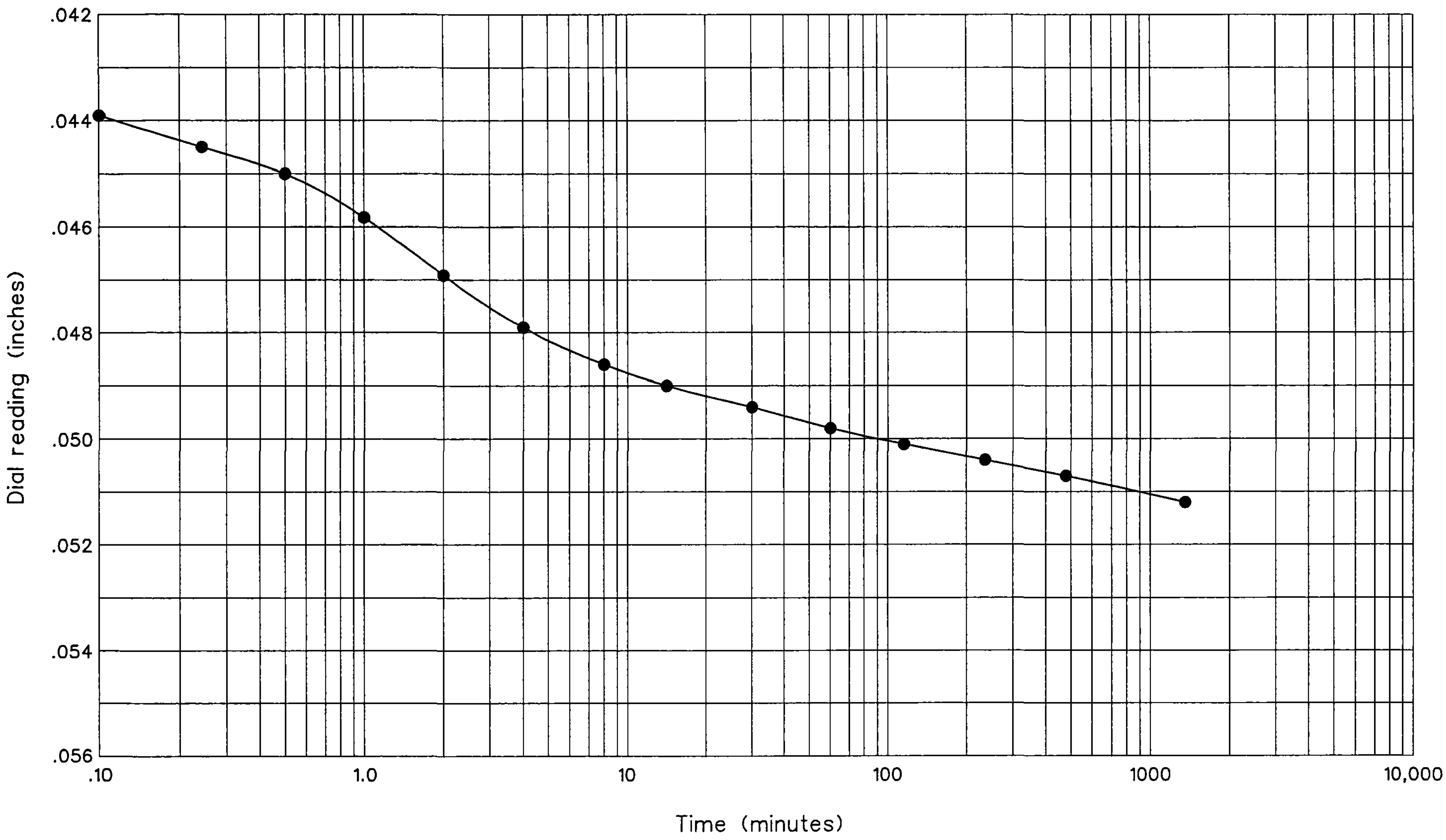
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



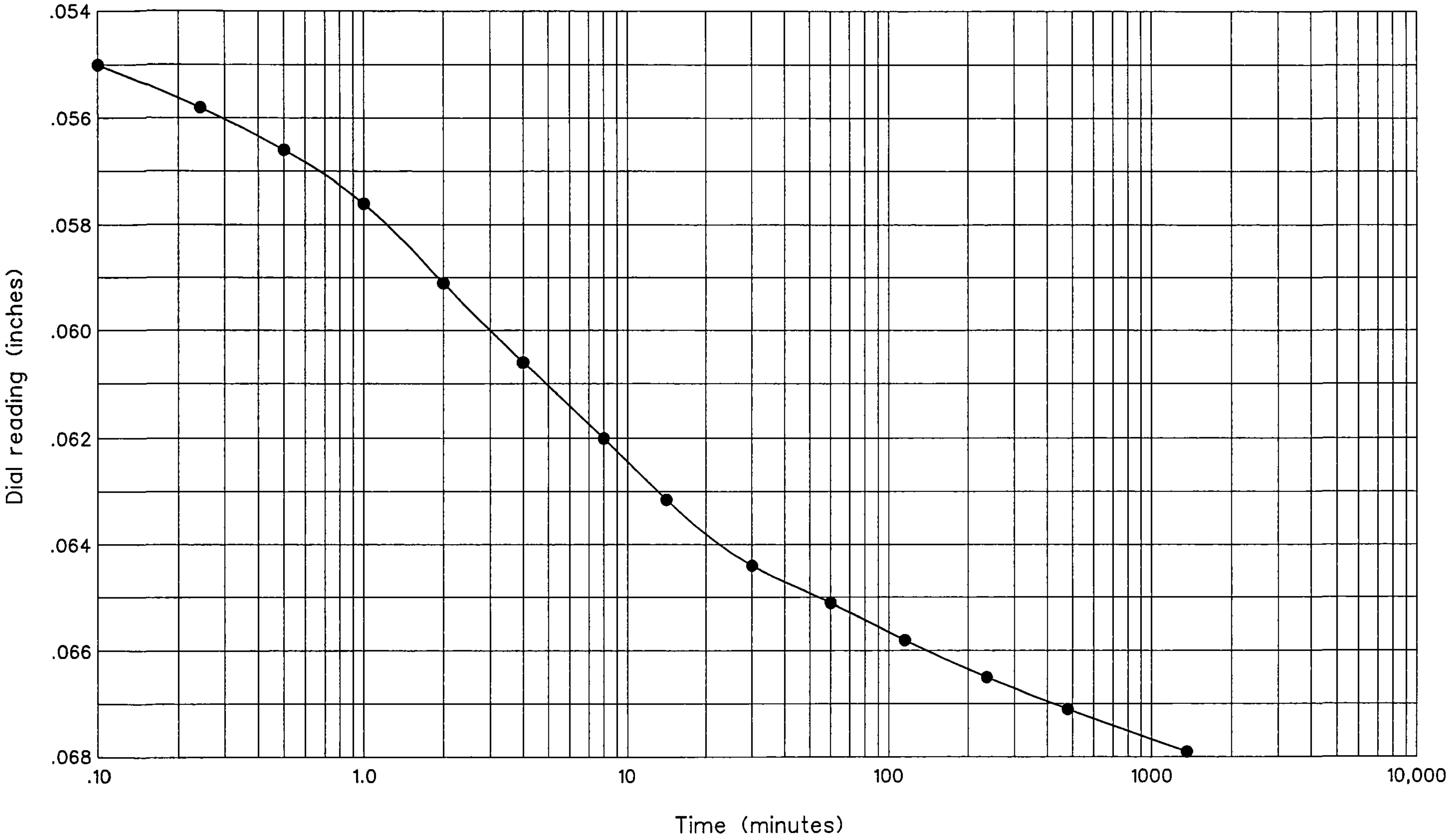
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 20'-21.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



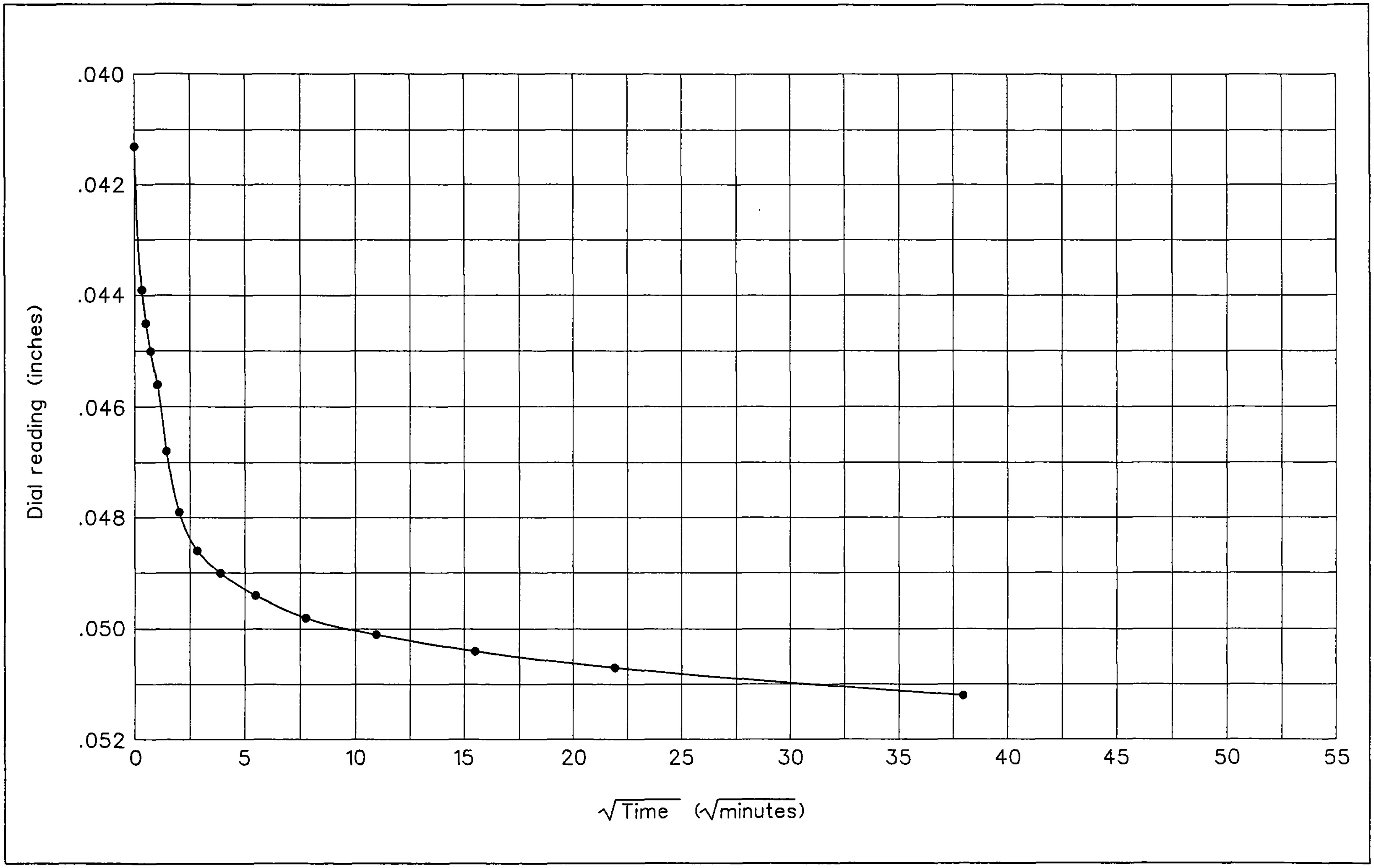
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 20'-21.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



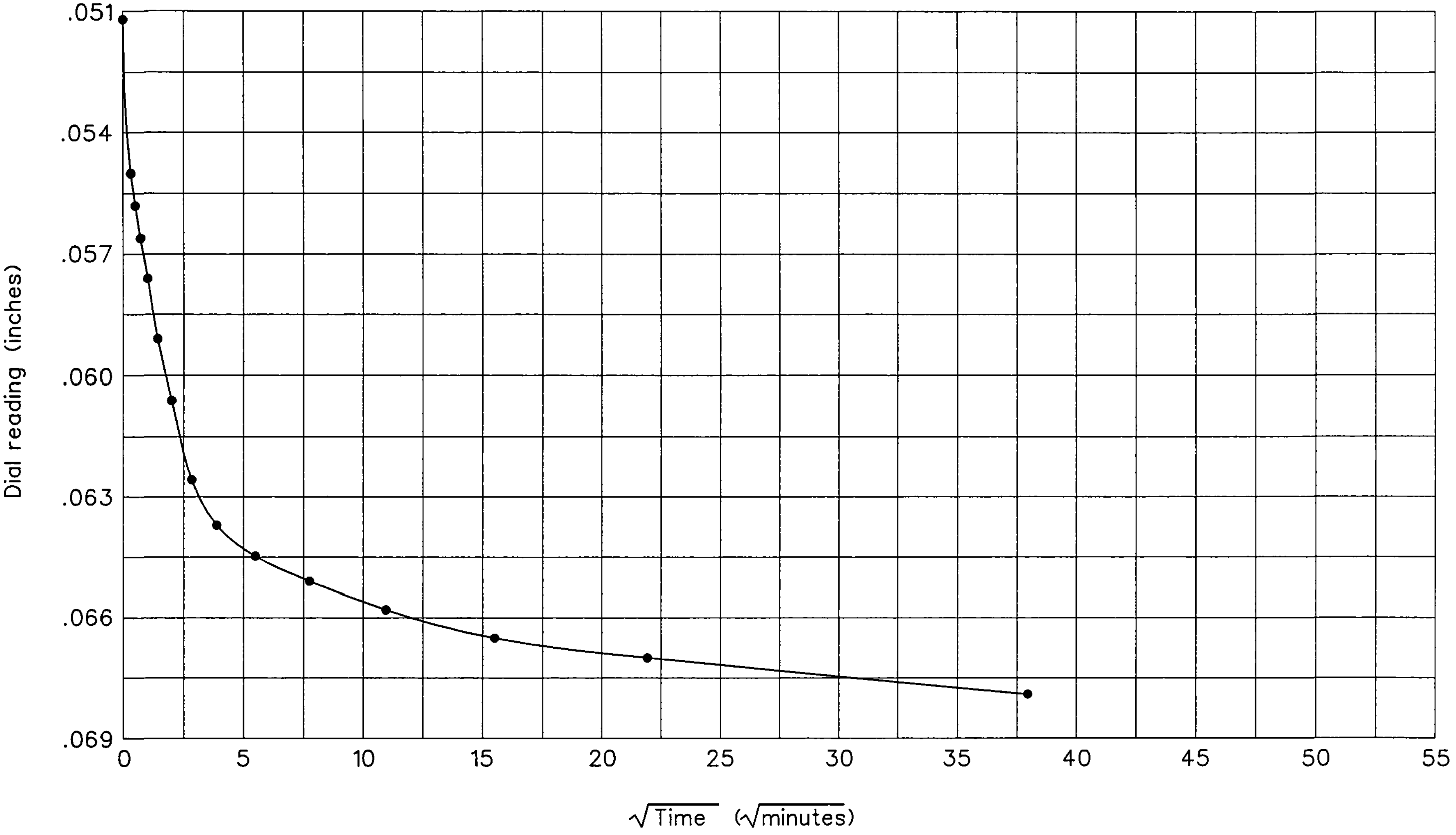
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 20'-21.5'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



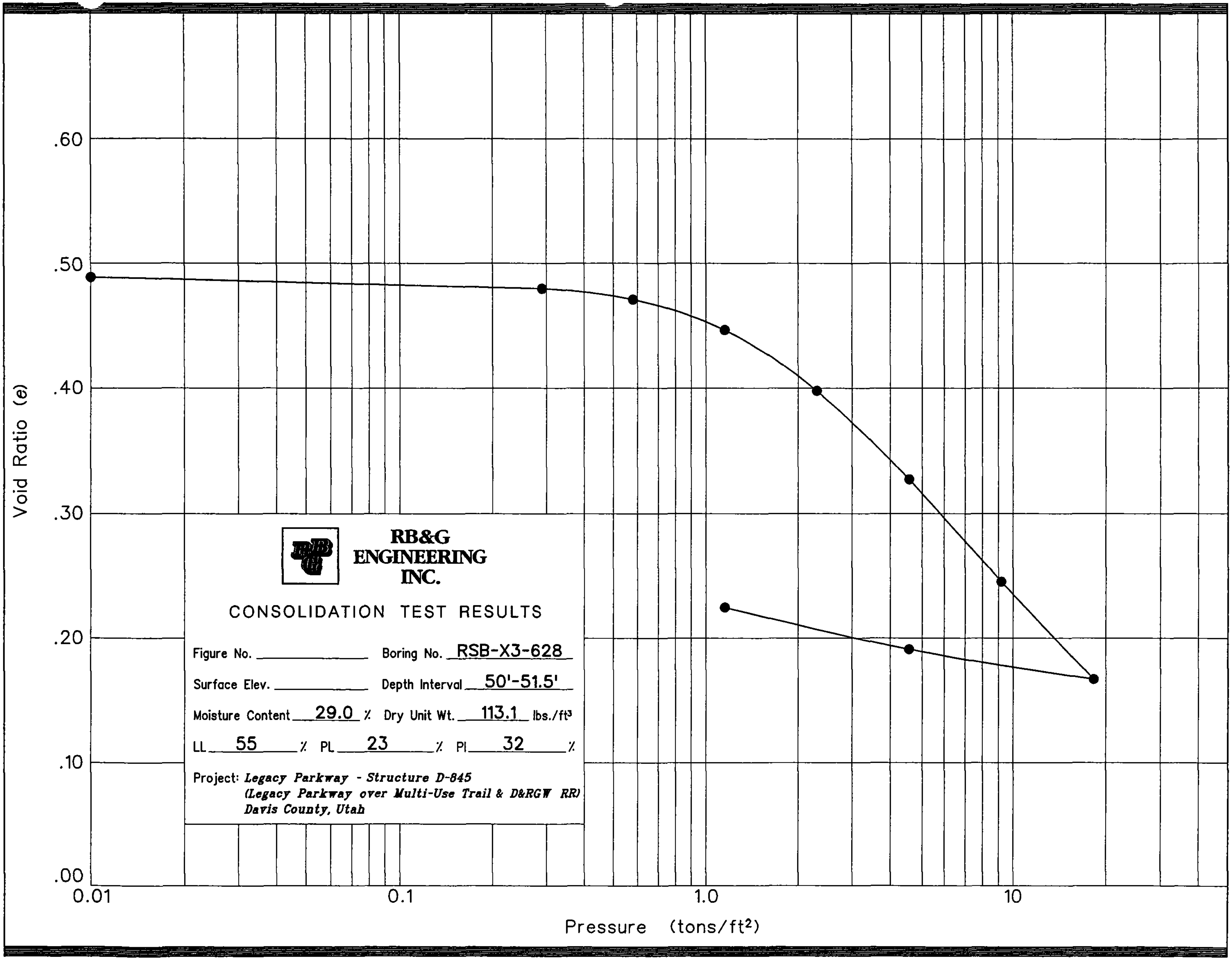
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 20'-21.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

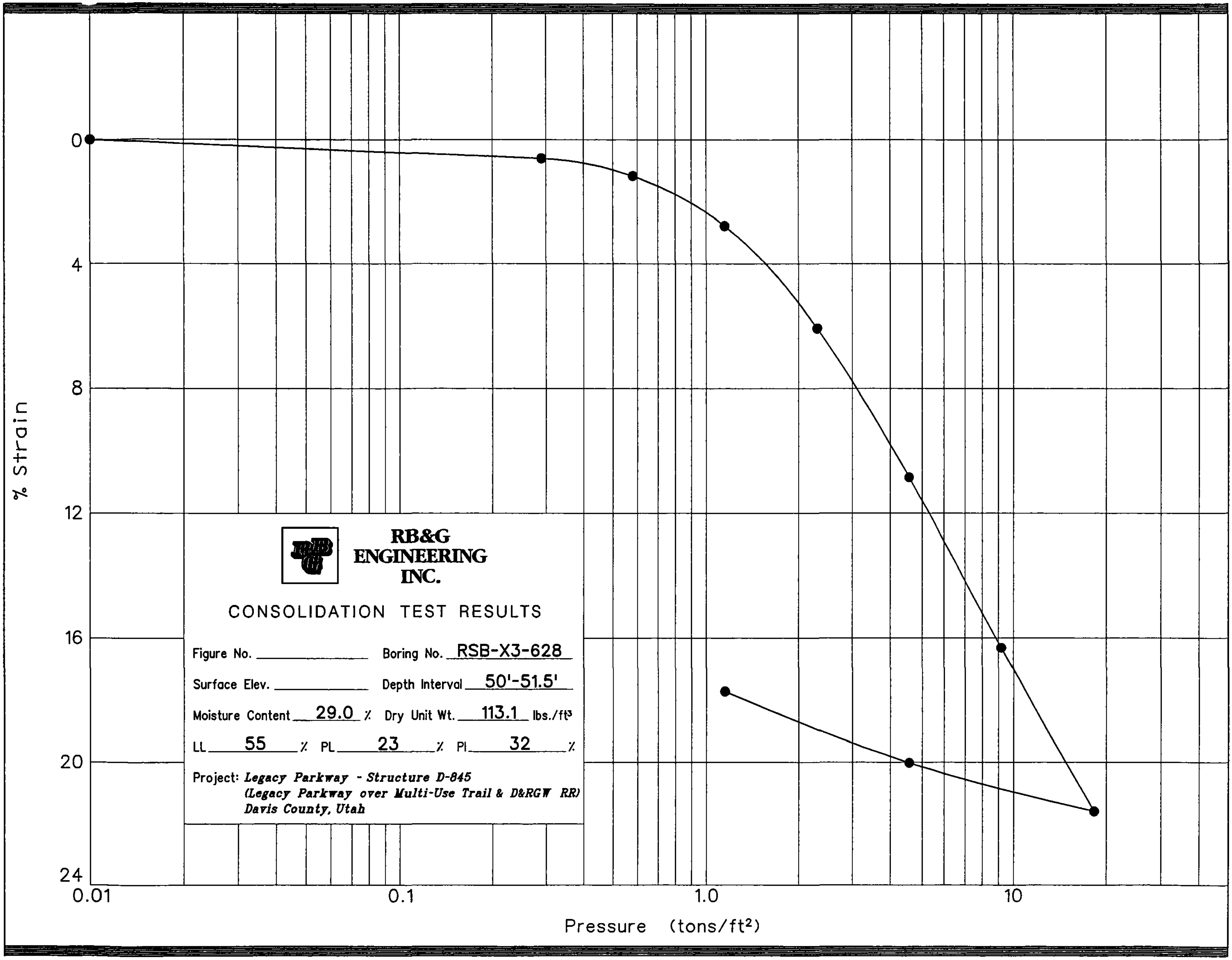
Figure No. ______ Boring No. RSB-X3-628

Surface Elev. ______ Depth Interval 50'-51.5'

Moisture Content 29.0 % Dry Unit Wt. 113.1 lbs./ft³

LL 55 % PL 23 % PI 32 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

Figure No. ______ Boring No. RSB-X3-628

Surface Elev. ______ Depth Interval 50'-51.5'

Moisture Content 29.0 % Dry Unit Wt. 113.1 lbs./ft³

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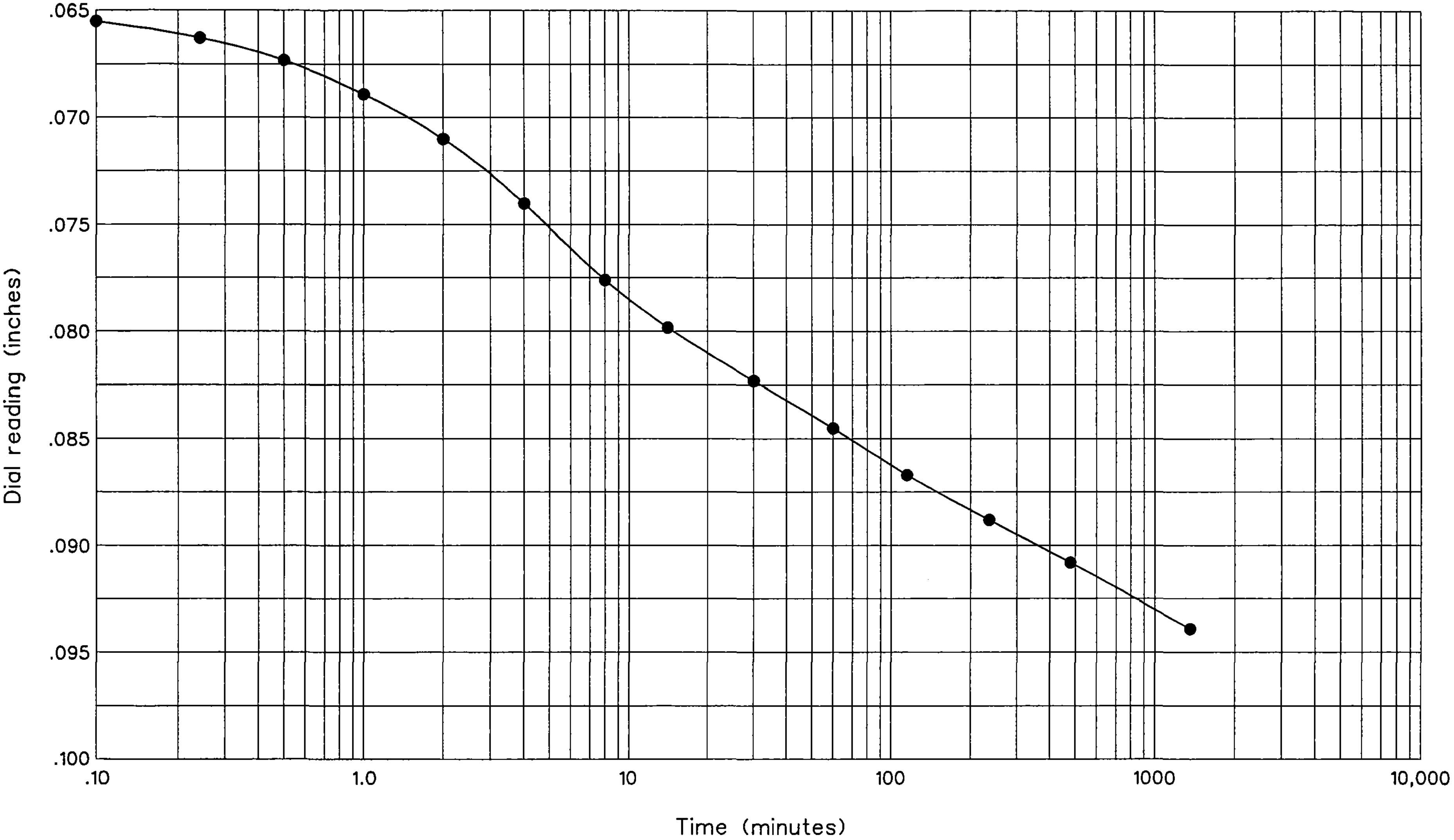
Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



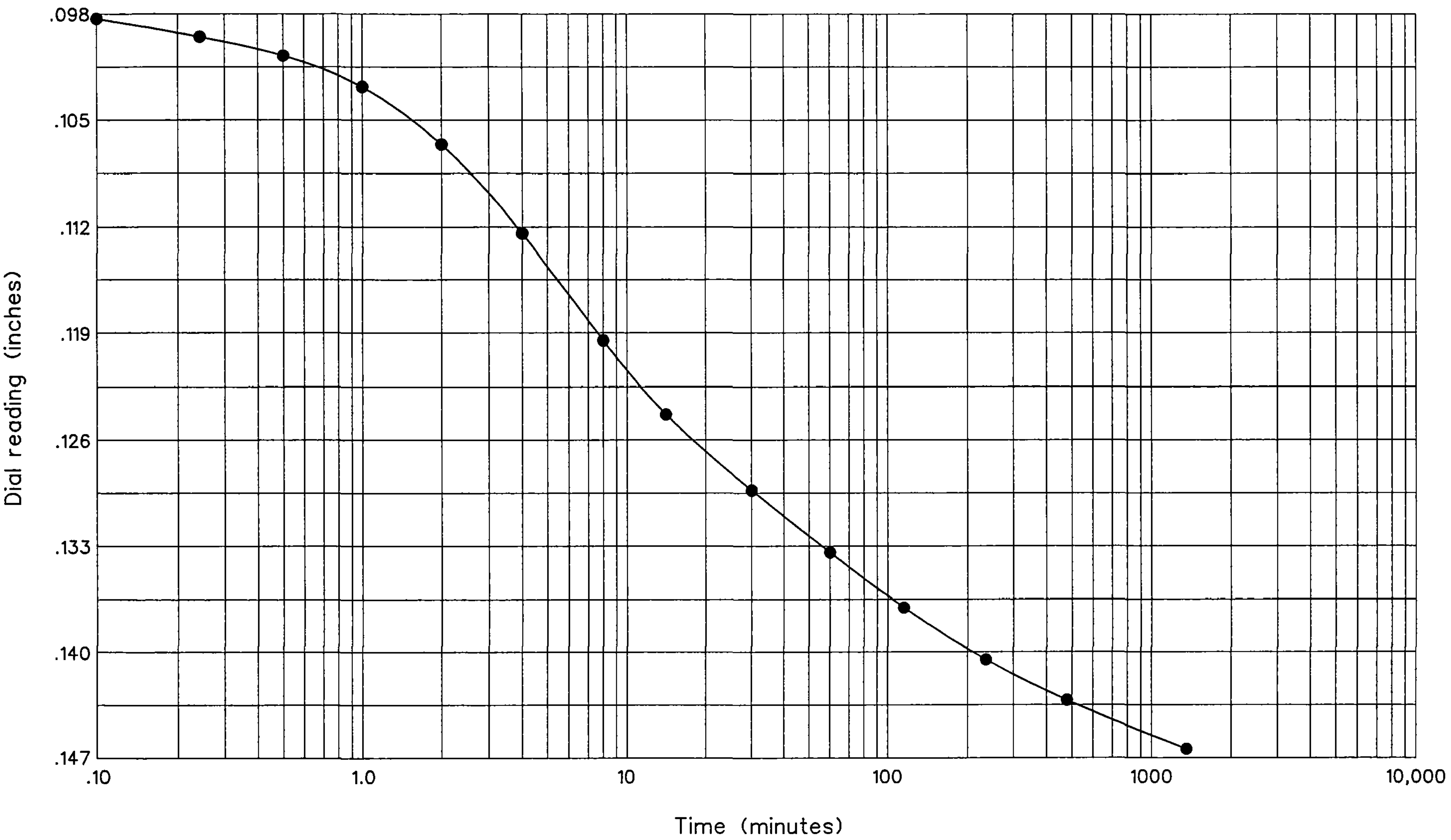
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 50'-51.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



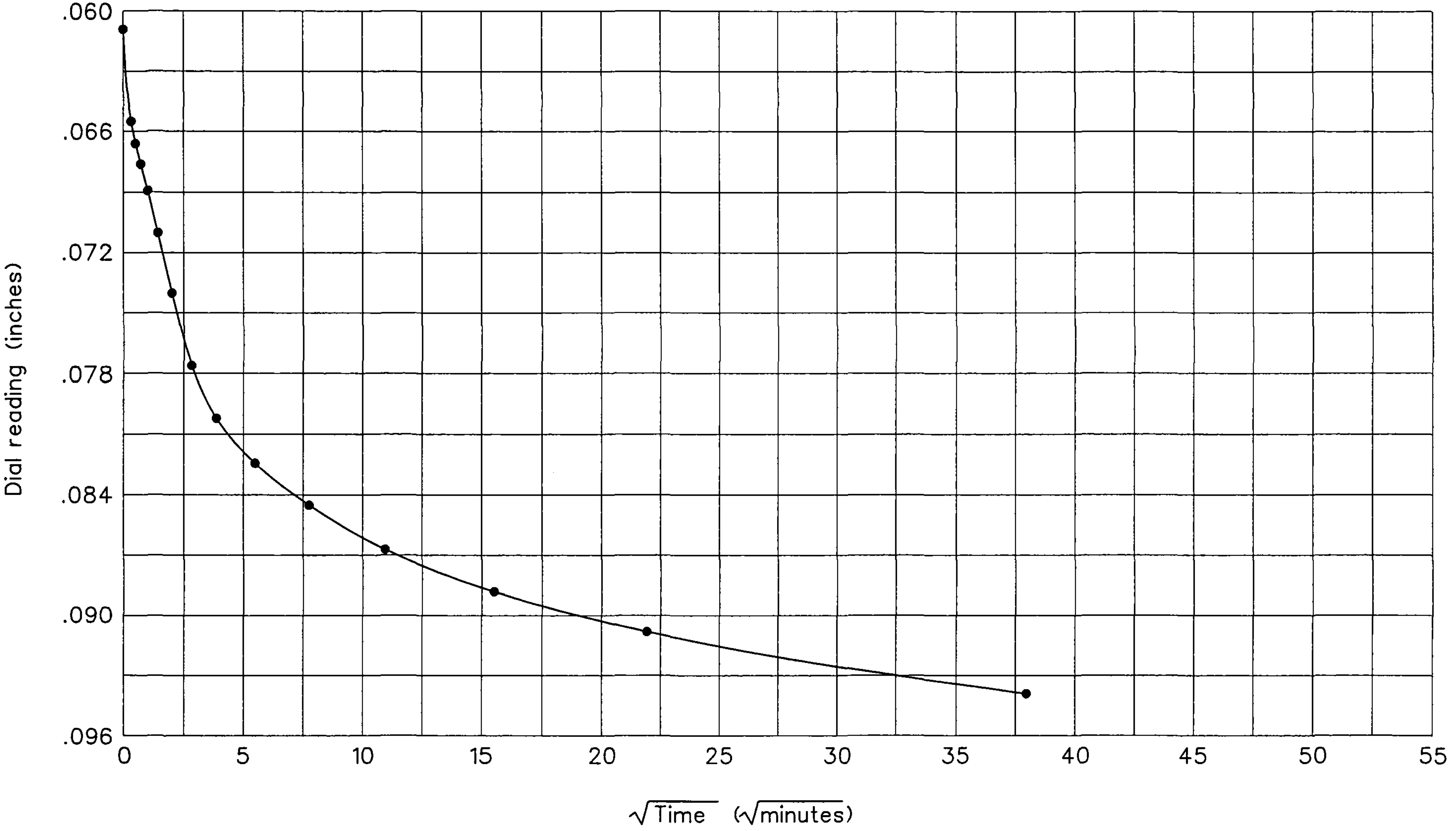
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 50'-51.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



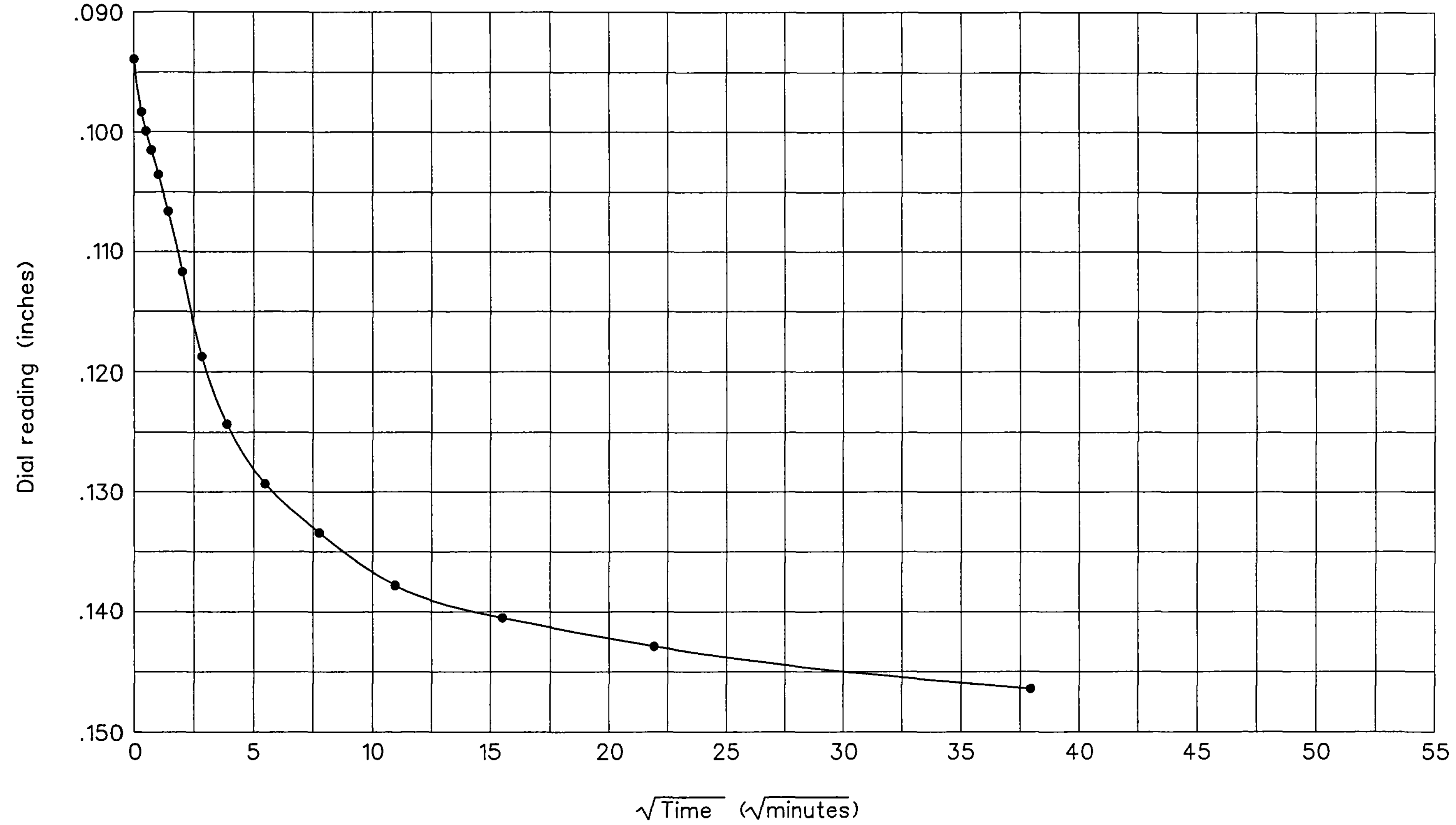
RB&G ENGINEERING INC.
Provo, Utah

Hole no.:	RSB-X3-628
Depth:	50'-51.5'
Load:	2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



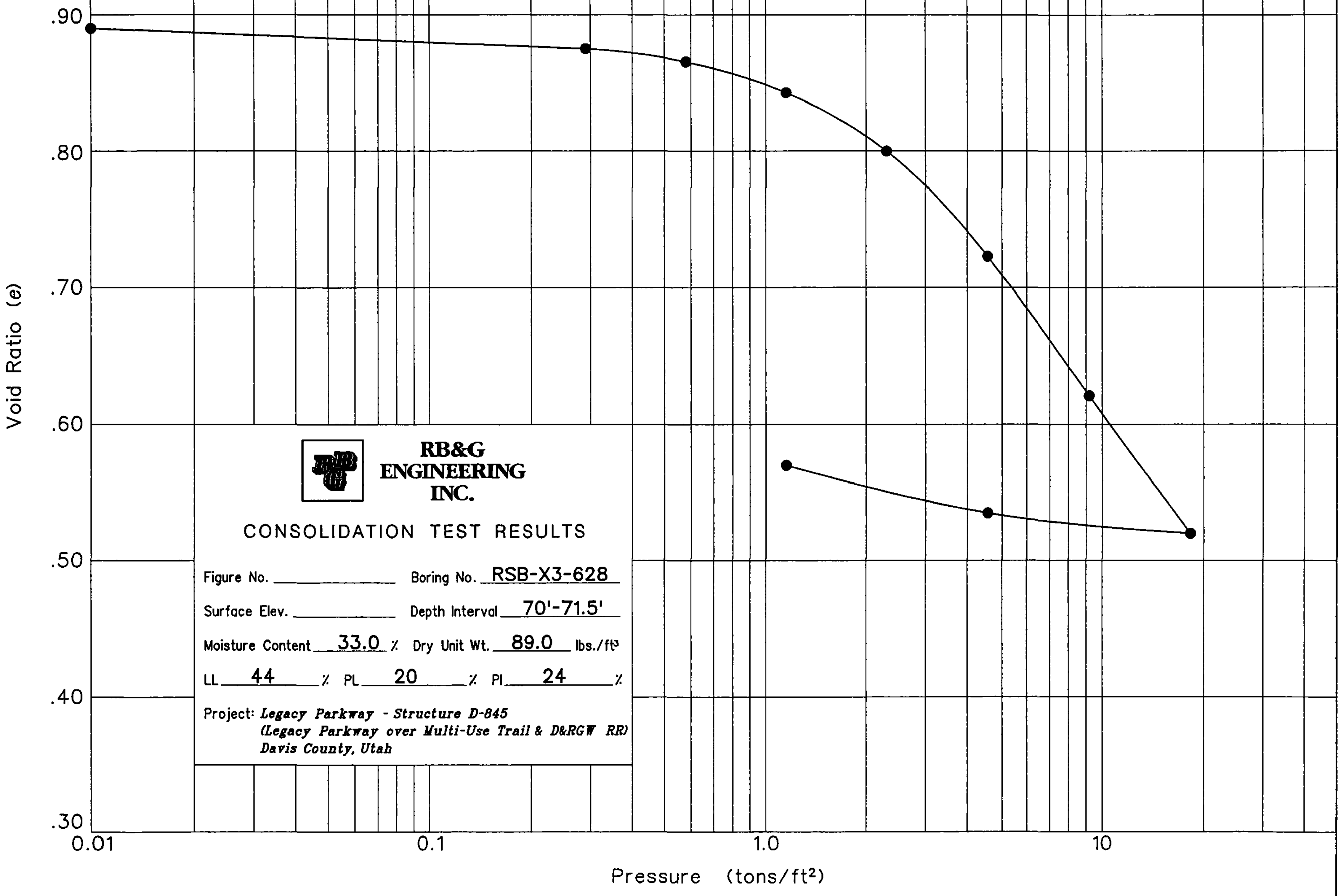
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 50'-51.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

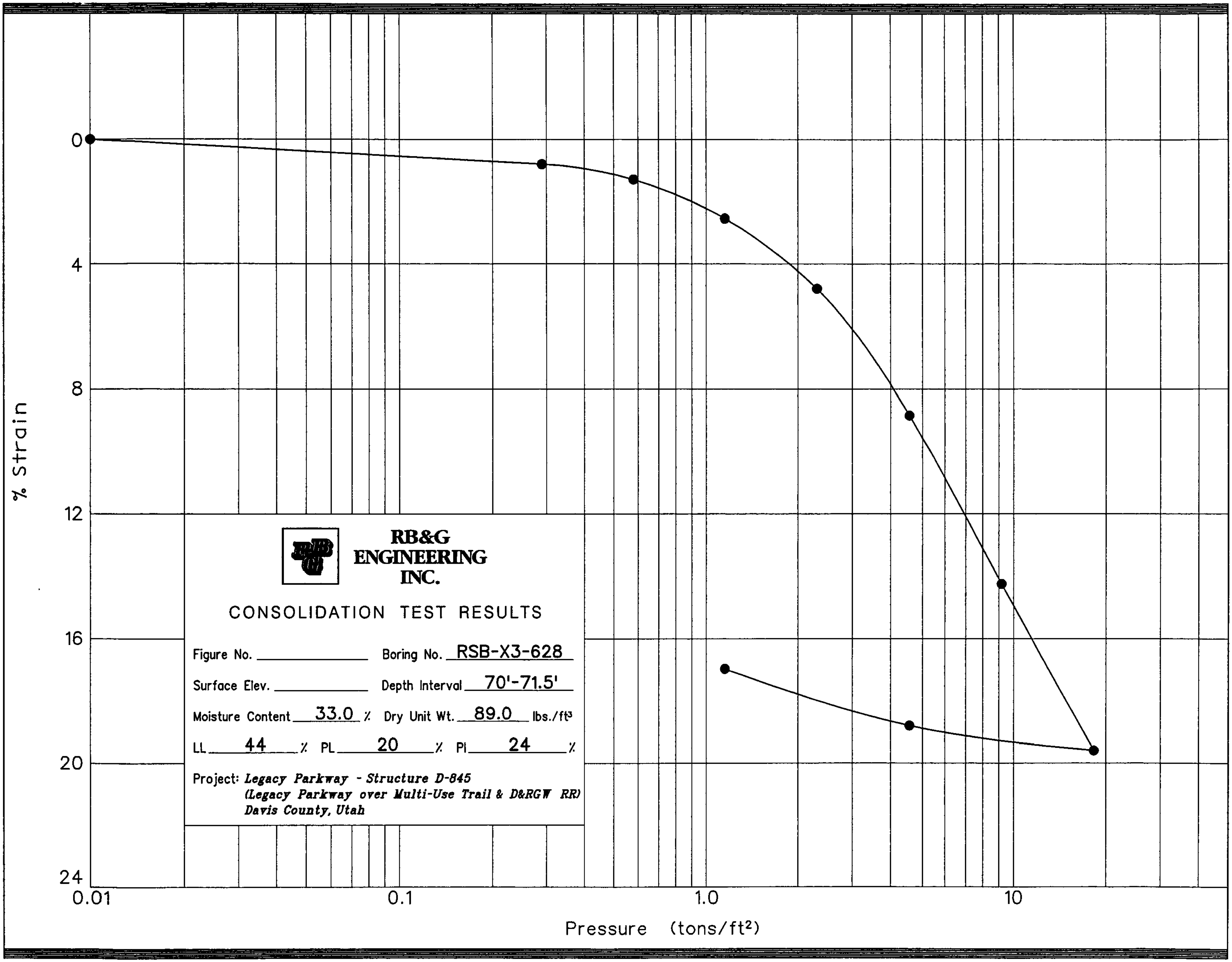
Figure No. ______ Boring No. RSB-X3-628

Surface Elev. ______ Depth Interval 70'-71.5'

Moisture Content 33.0 % Dry Unit Wt. 89.0 lbs./ft³

LL 44 % PL 20 % PI 24 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

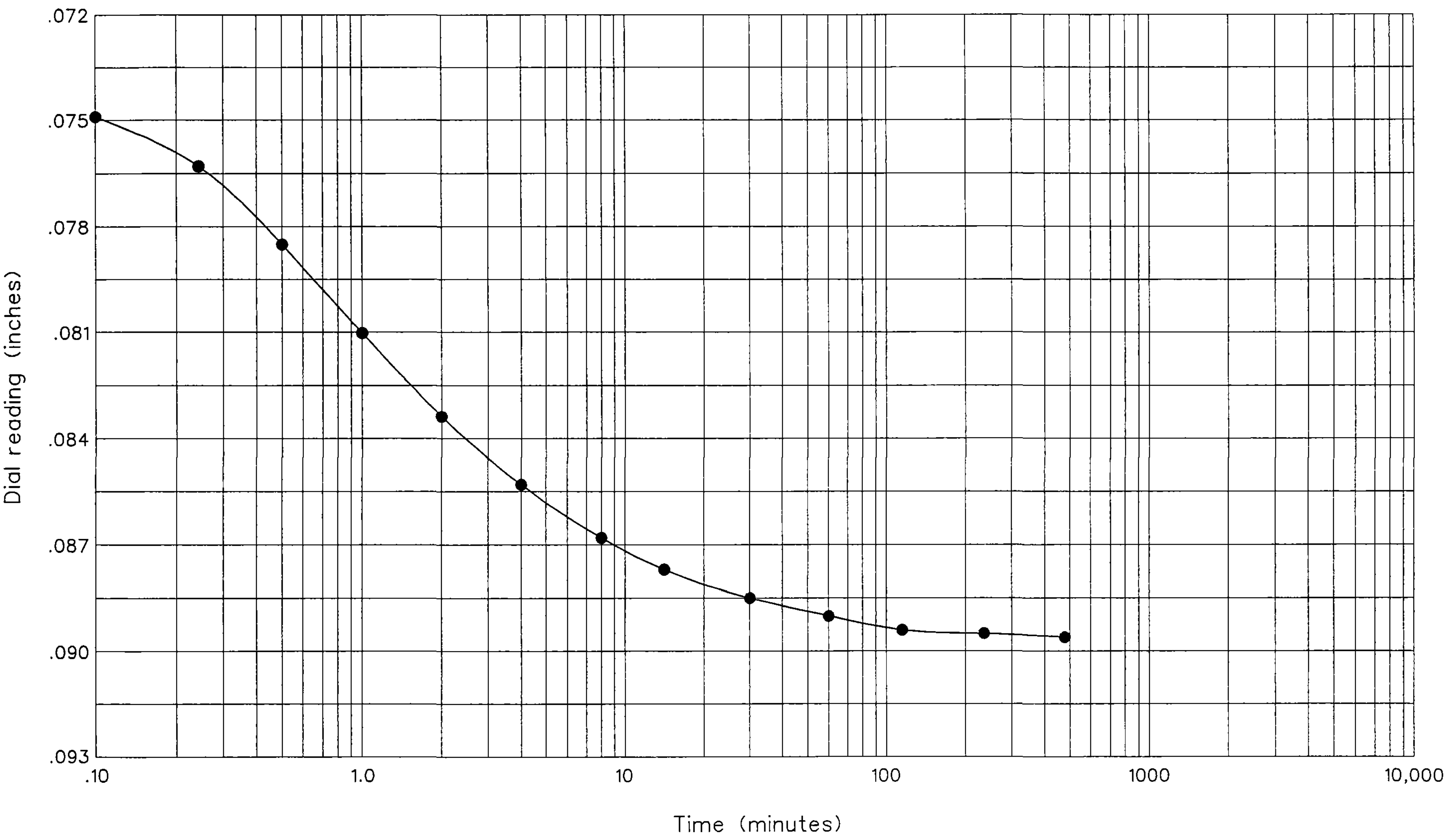
Figure No. ______ Boring No. RSB-X3-628

Surface Elev. ______ Depth Interval 70'-71.5'

Moisture Content 33.0 % Dry Unit Wt. 89.0 lbs./ft³

LL 44 % PL 20 % PI 24 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



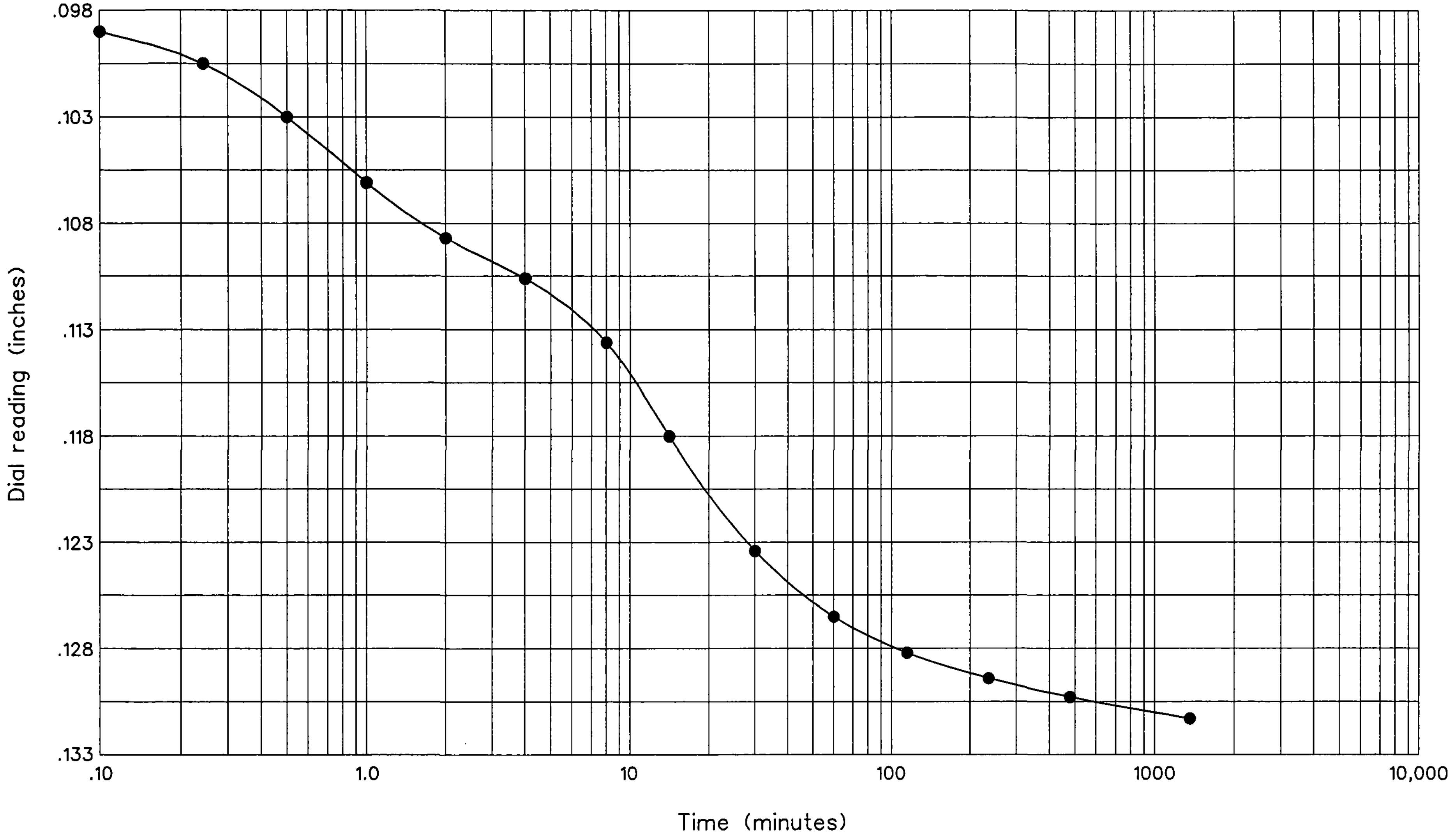
RB&G ENGINEERING INC.
Provo. Utah

Hole no.: RSB-X3-628
Depth: 70'-71.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



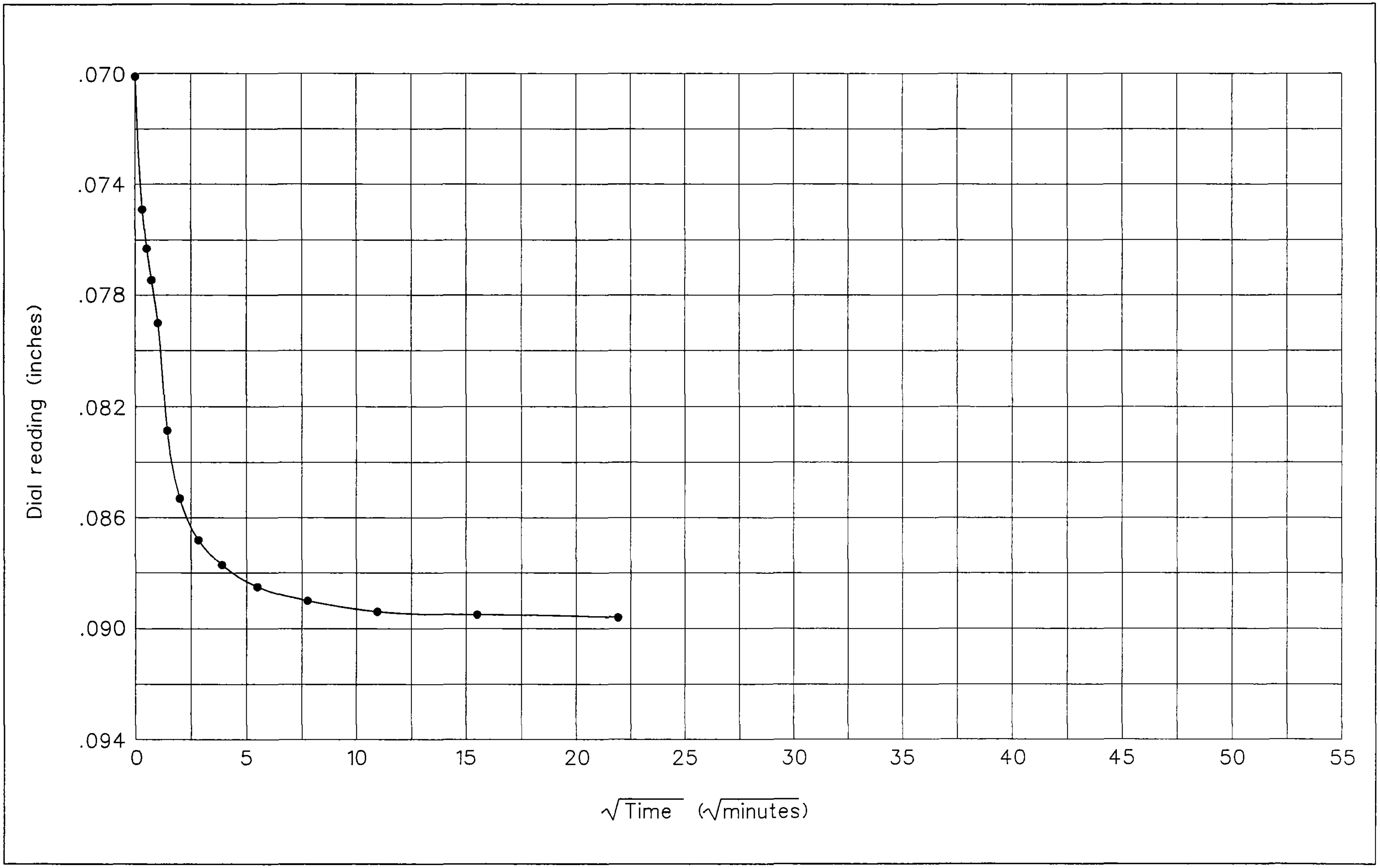
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 70'-71.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



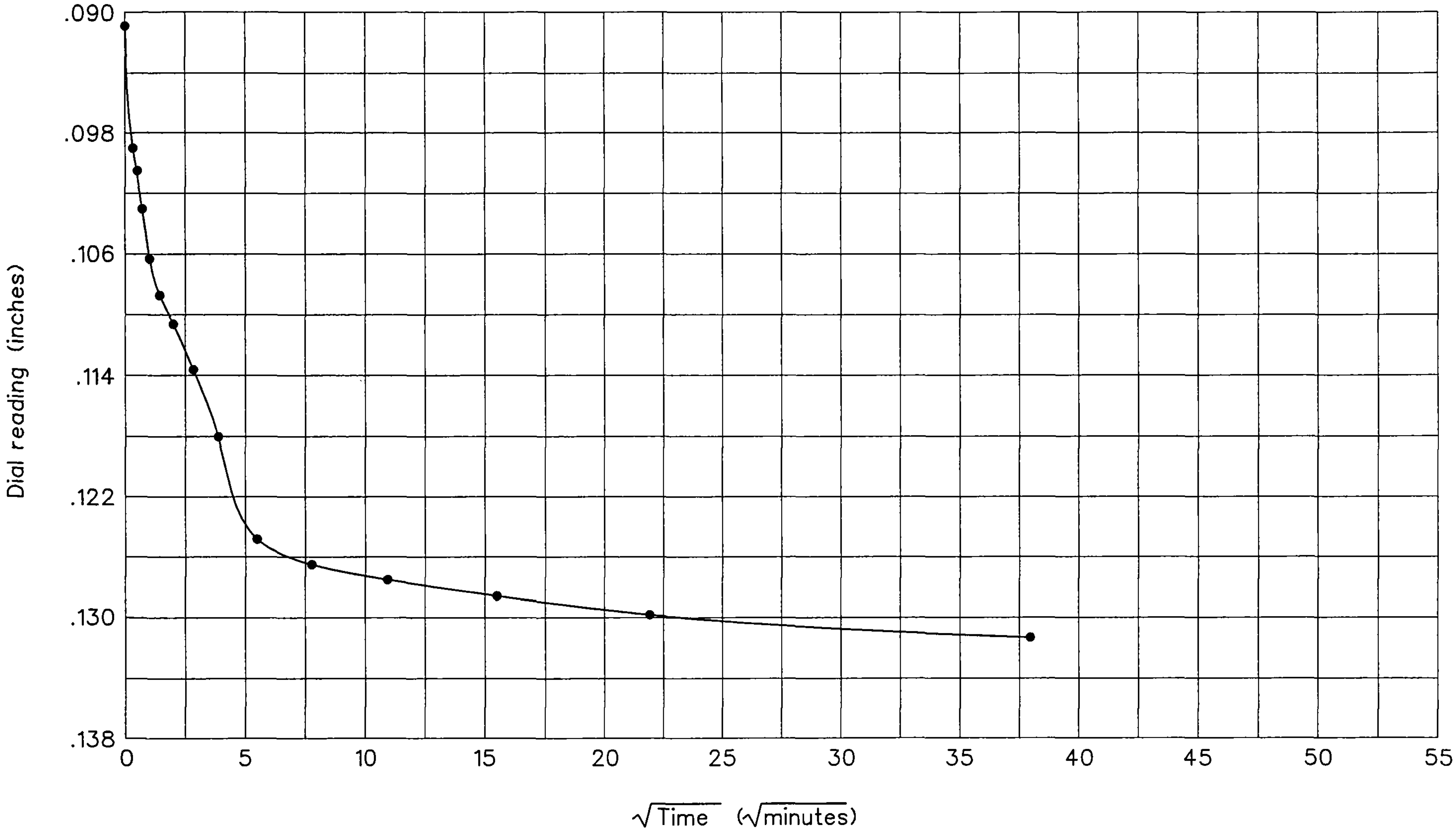
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 70'-71.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



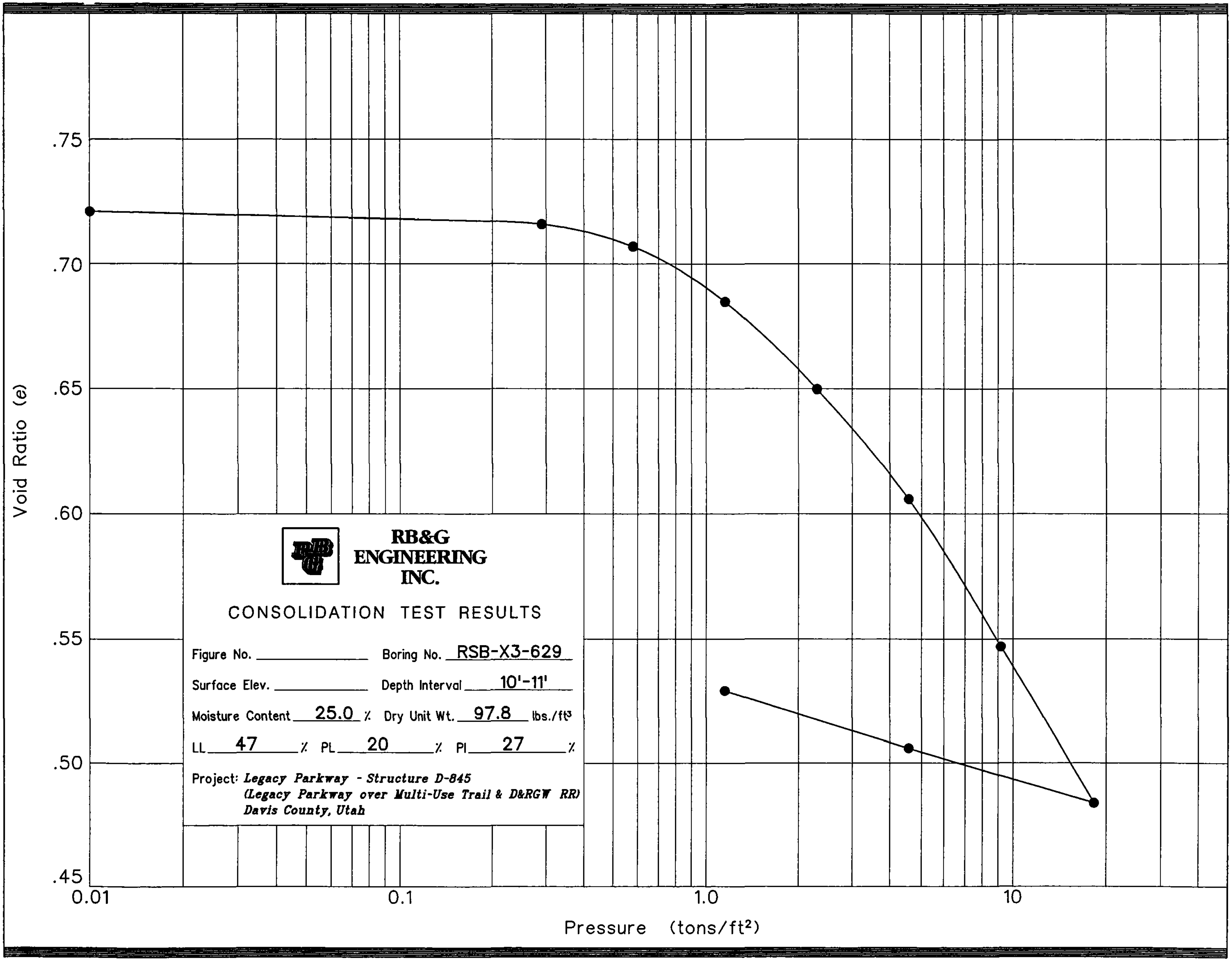
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-628
Depth: 70'-71.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

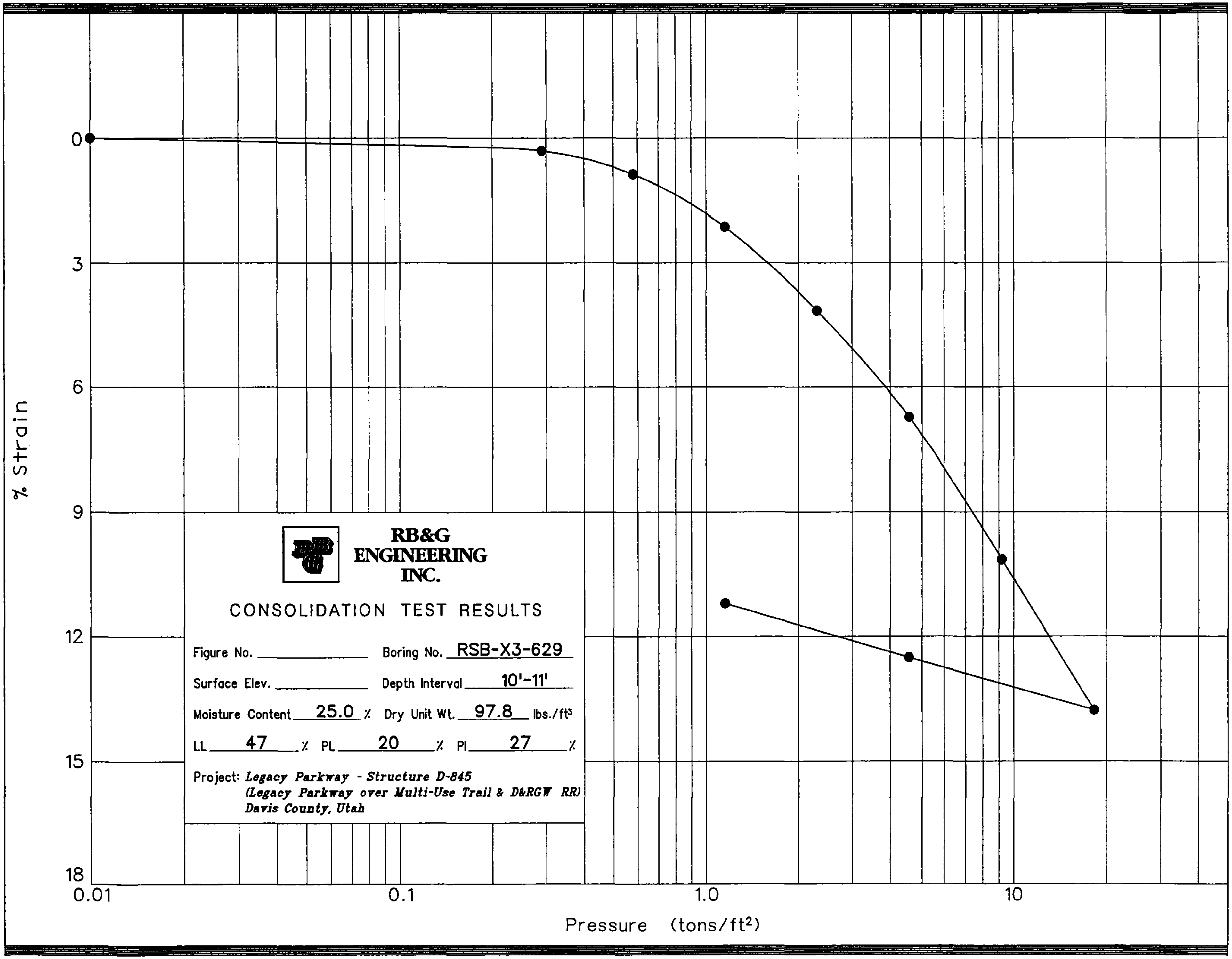
Figure No. ______ Boring No. RSB-X3-629

Surface Elev. ______ Depth Interval 10'-11'

Moisture Content 25.0 % Dry Unit Wt. 97.8 lbs./ft³

LL 47 % PL 20 % PI 27 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

Figure No. ______ Boring No. RSB-X3-629

Surface Elev. ______ Depth Interval 10'-11'

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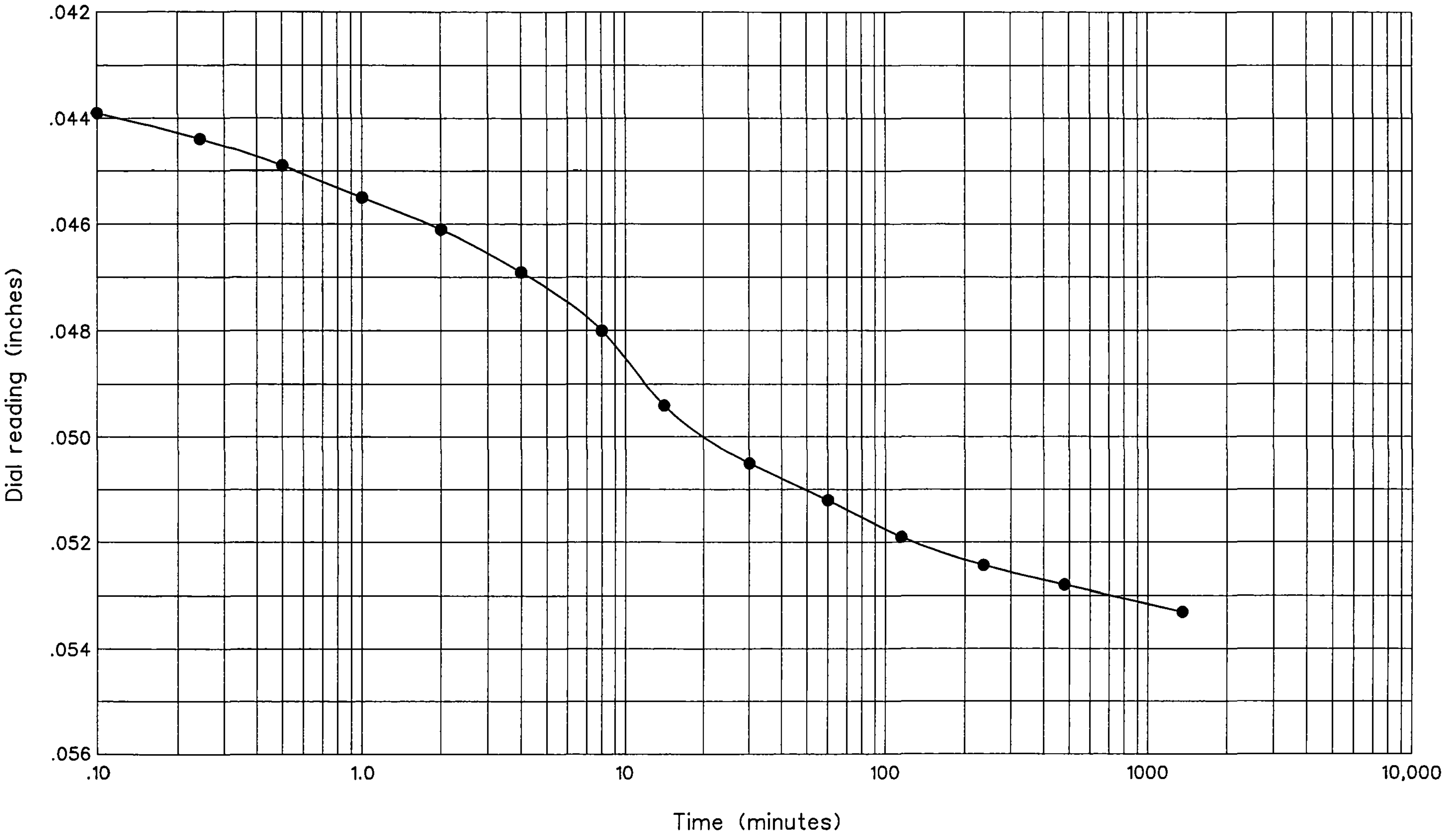
LL 47 % PL 20 % PI 27 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



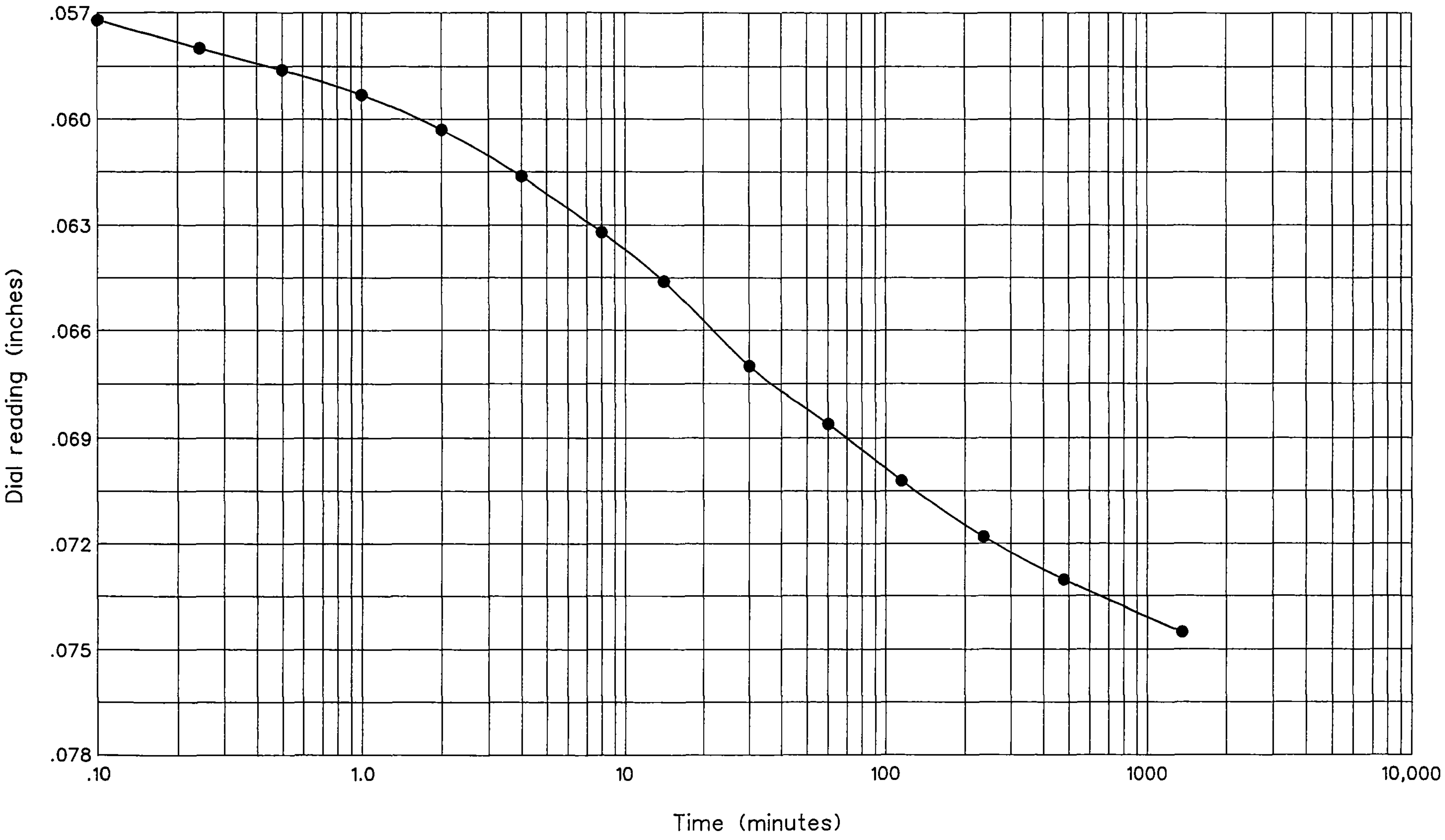
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 10'-11'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



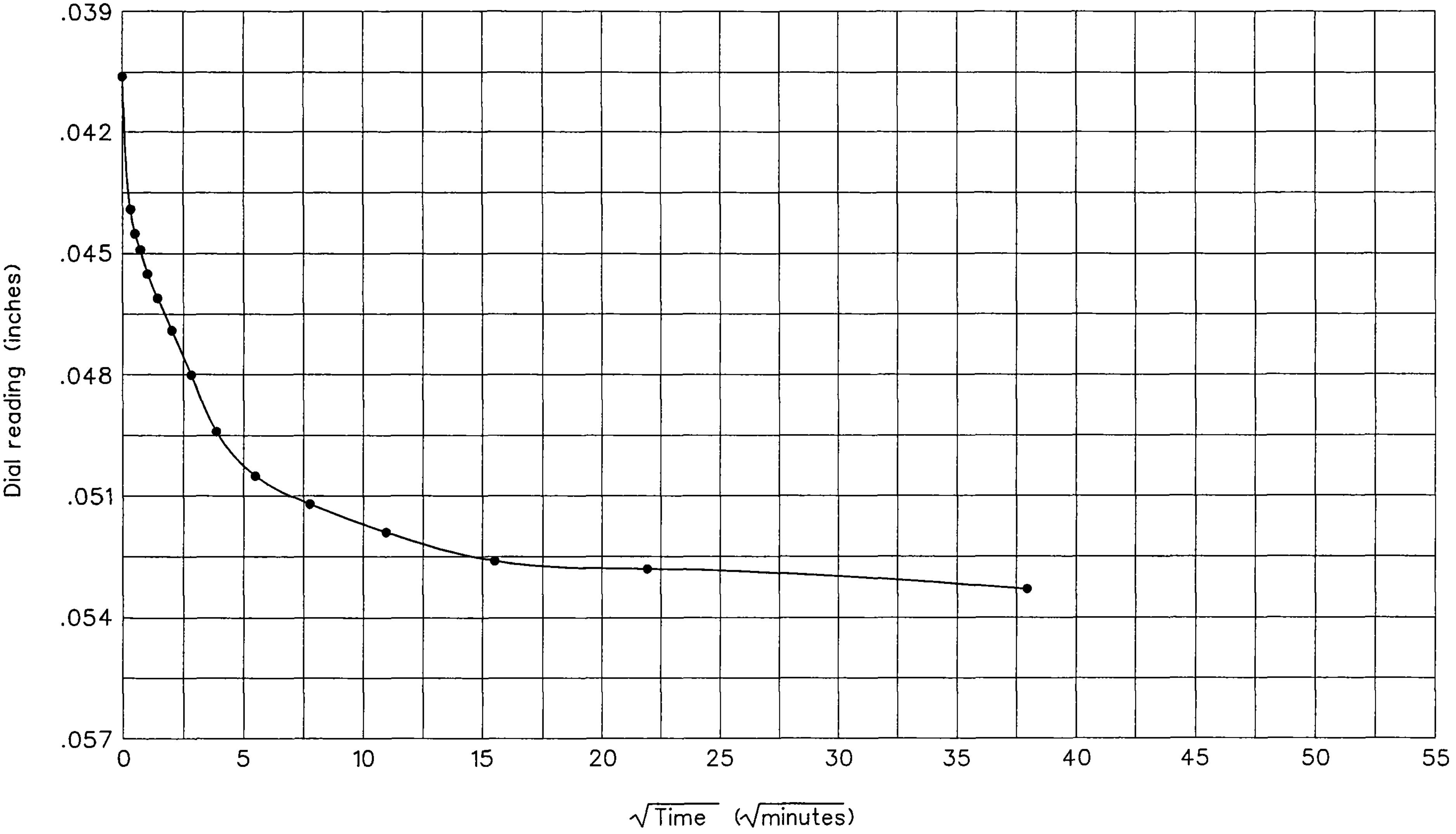
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 10'-11'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



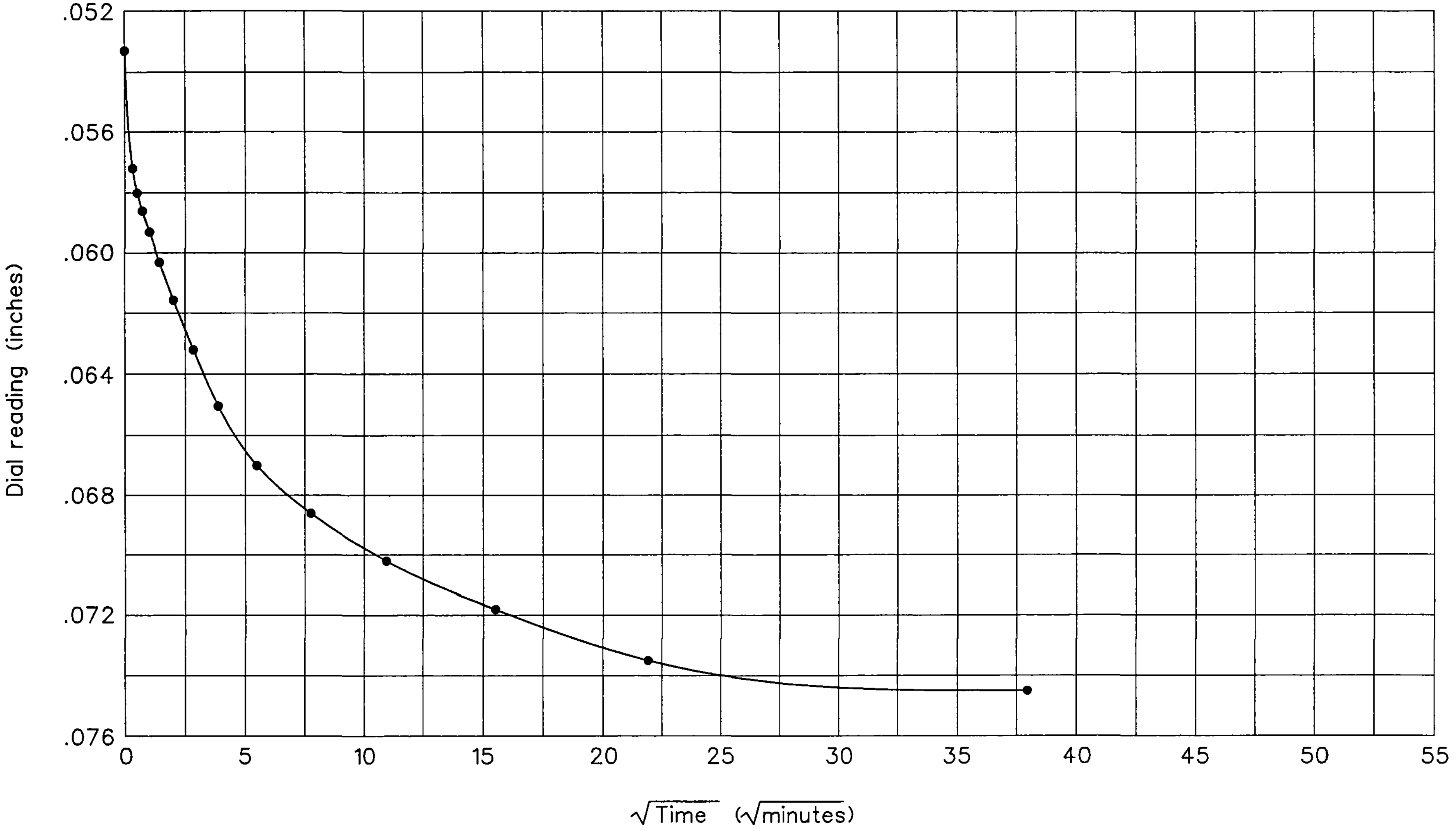
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 10'-11'
Load: 1.15 to 2.30 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



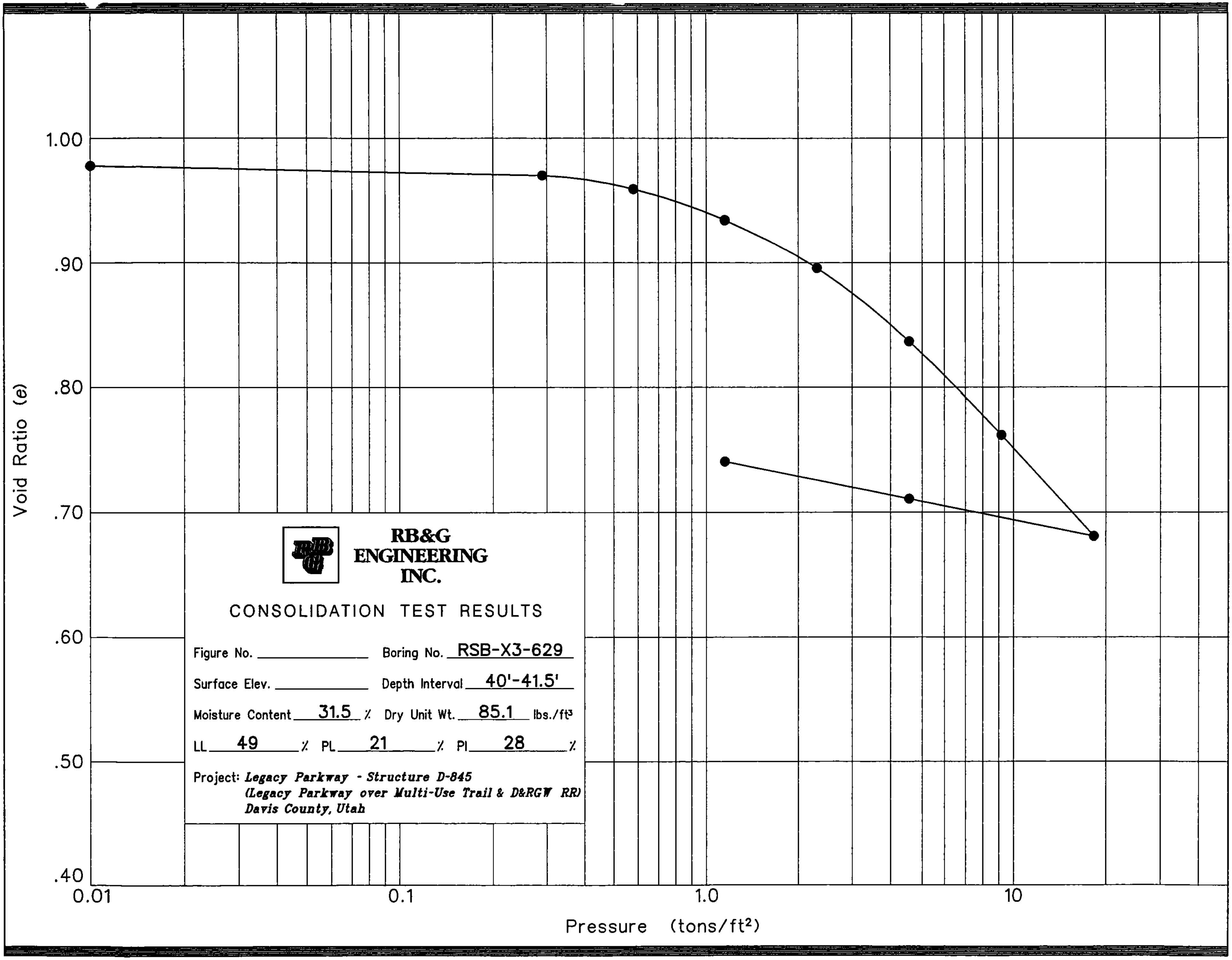
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 10'-11'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

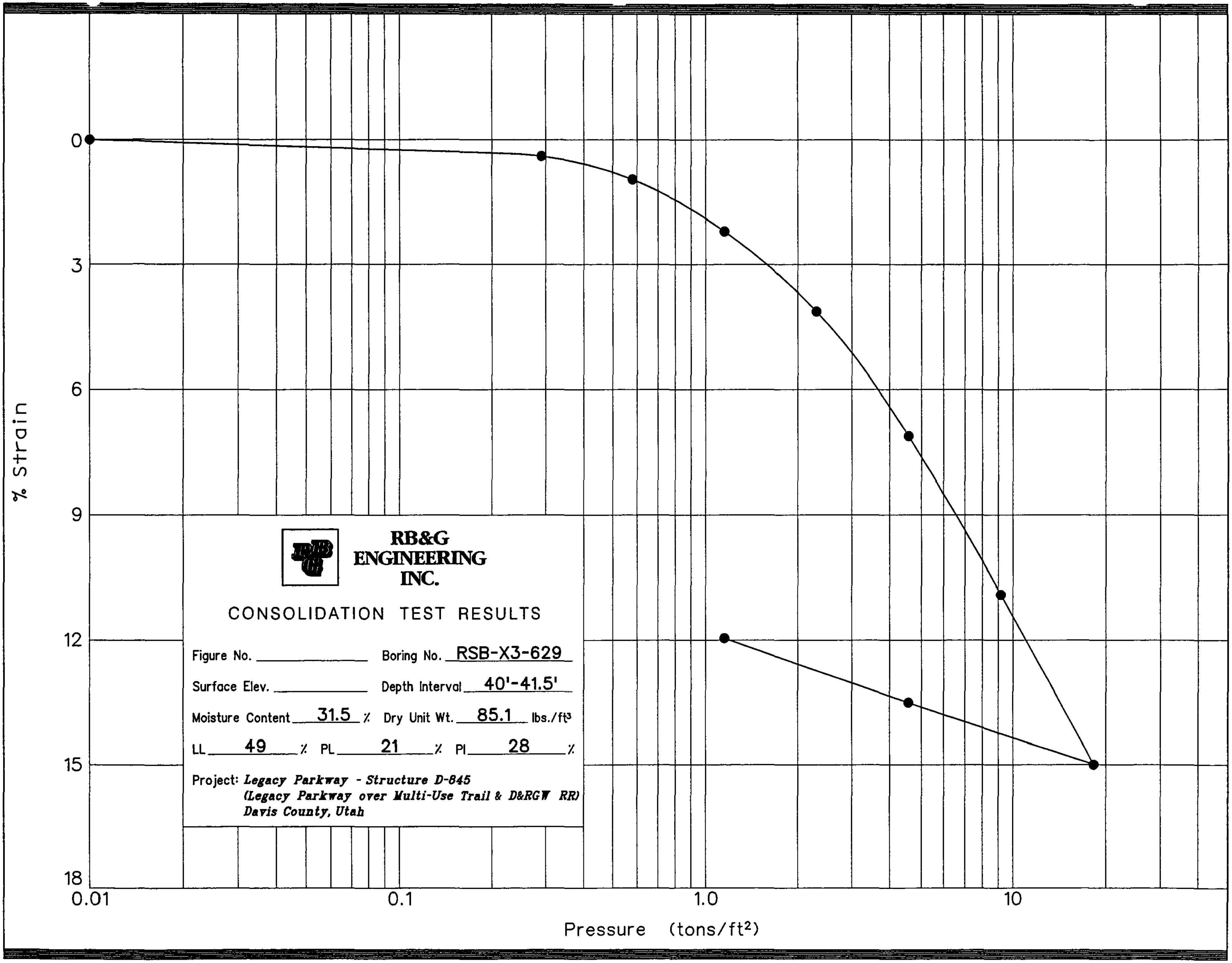
Figure No. ______ Boring No. RSB-X3-629

Surface Elev. ______ Depth Interval 40'-41.5'

Moisture Content 31.5 % Dry Unit Wt. 85.1 lbs./ft³

LL 49 % PL 21 % PI 28 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

Figure No. ______ Boring No. RSB-X3-629

Surface Elev. ______ Depth Interval 40'-41.5'

Moisture Content 31.5 % Dry Unit Wt. 85.1 lbs./ft³

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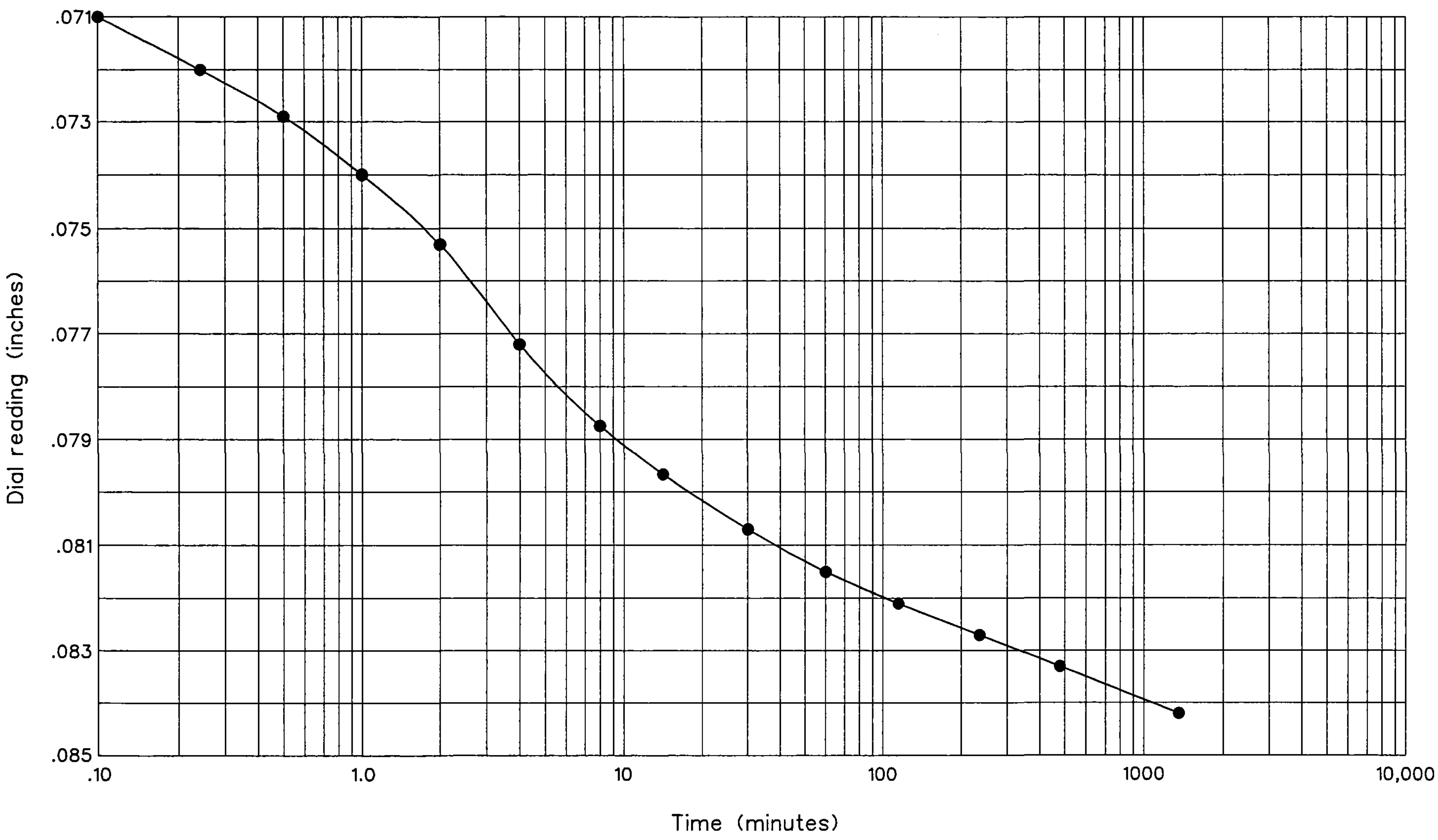
Project: ***Legacy Parkway - Structure D-845***
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



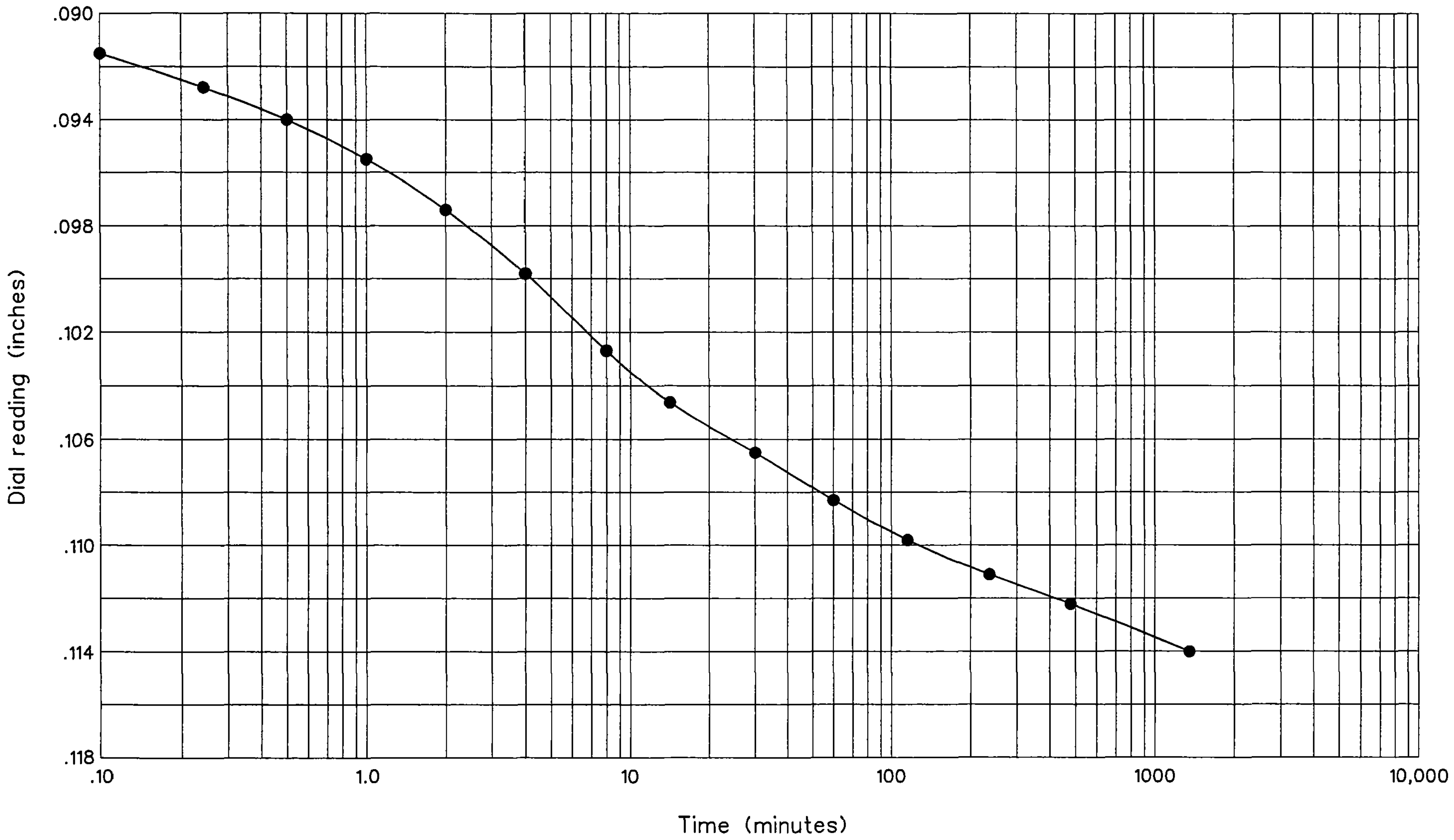
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 40'-41.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



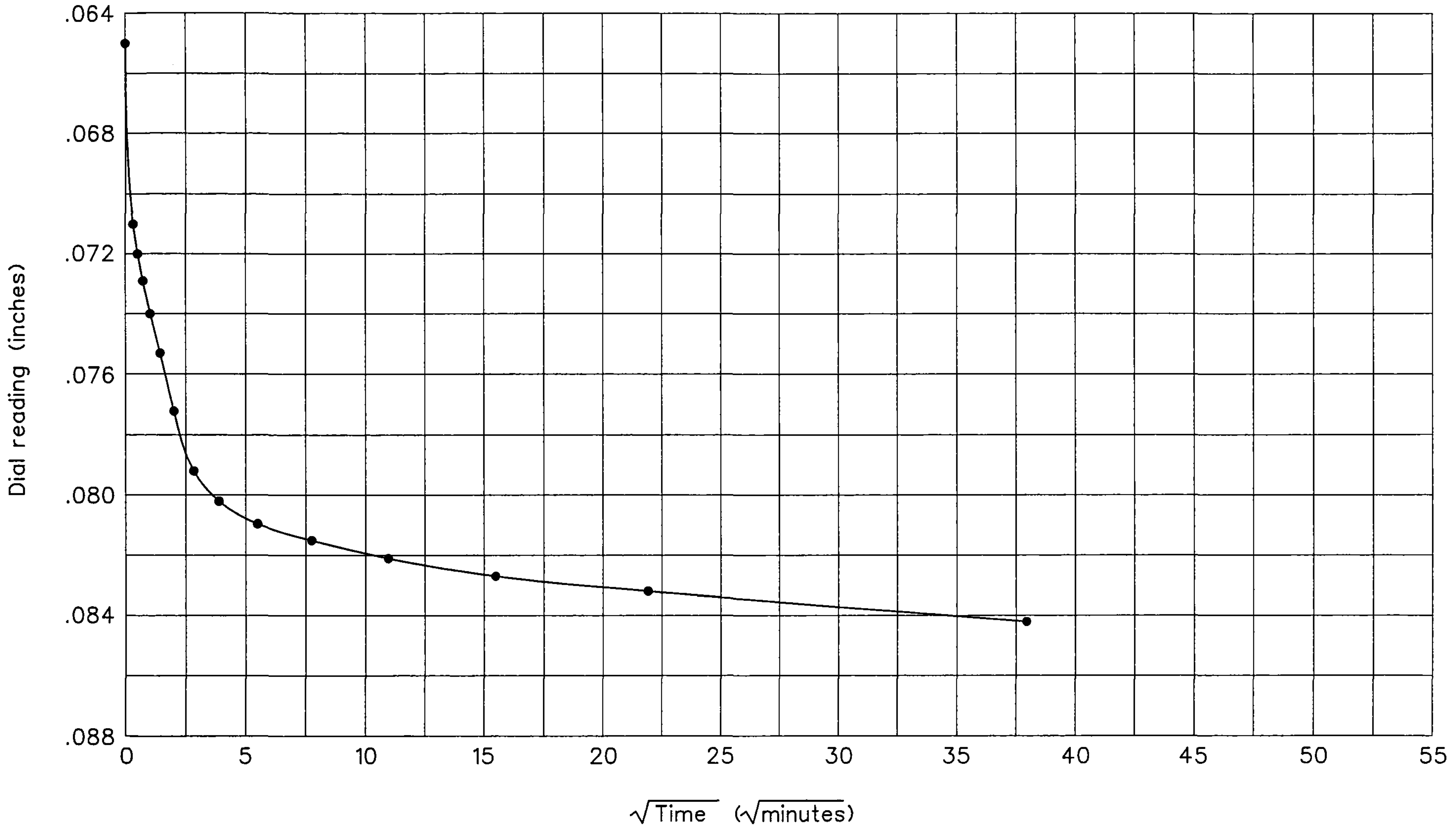
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 40'-41.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



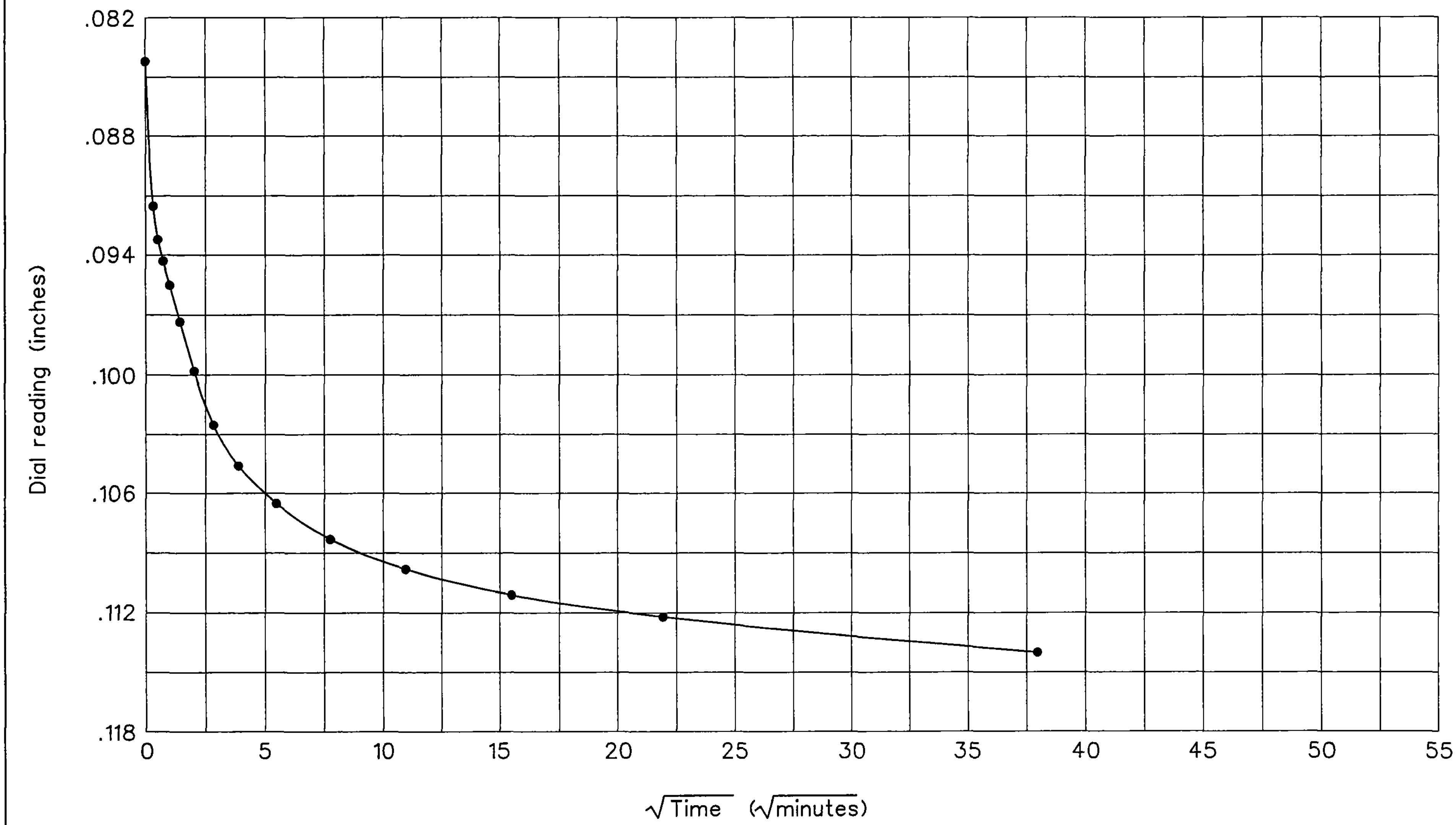
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 40'-41.5'
Load: 2.30 to 4.60 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



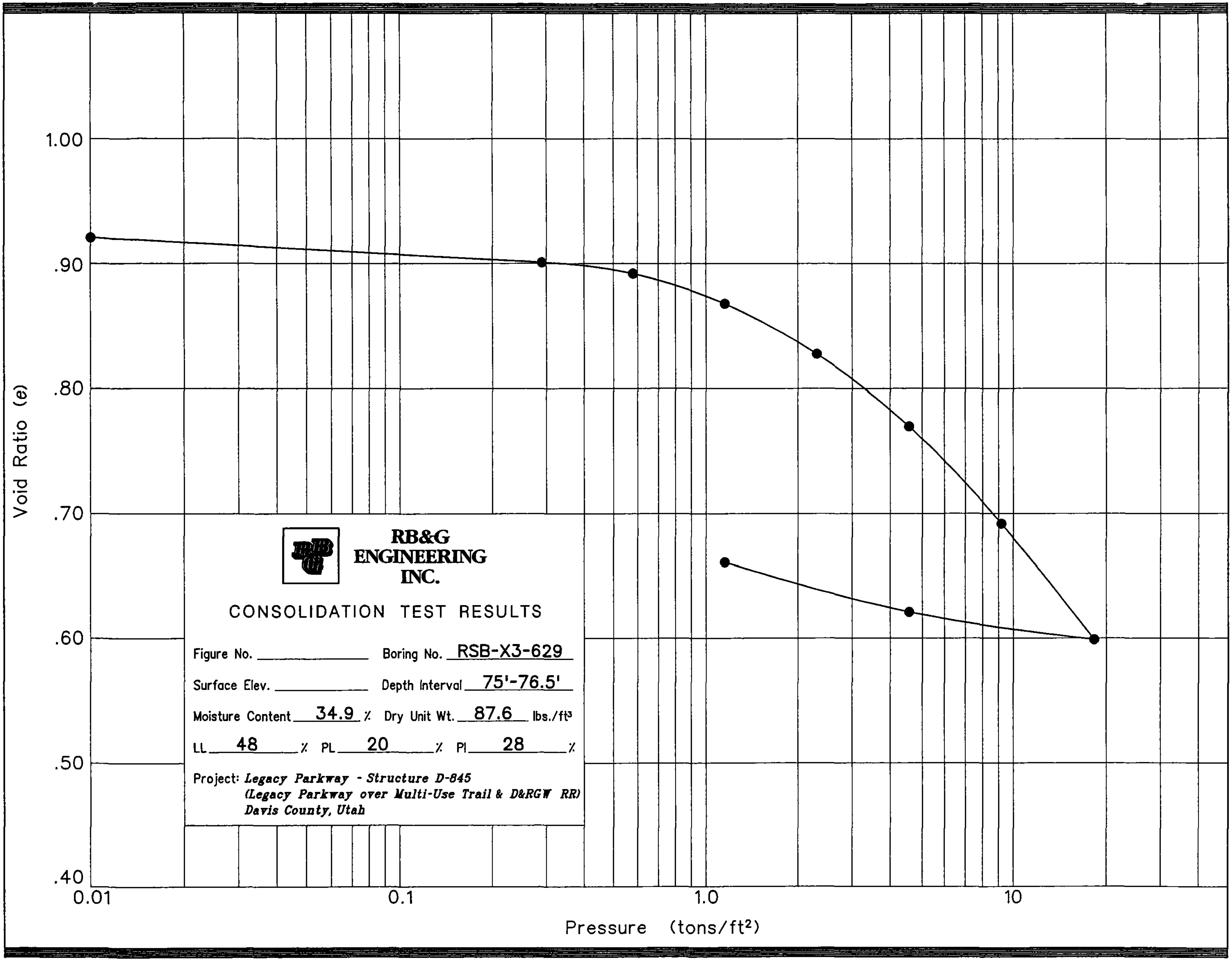
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 40'-41.5'
Load: 4.60 to 9.20 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



RB&G
ENGINEERING
INC.

CONSOLIDATION TEST RESULTS

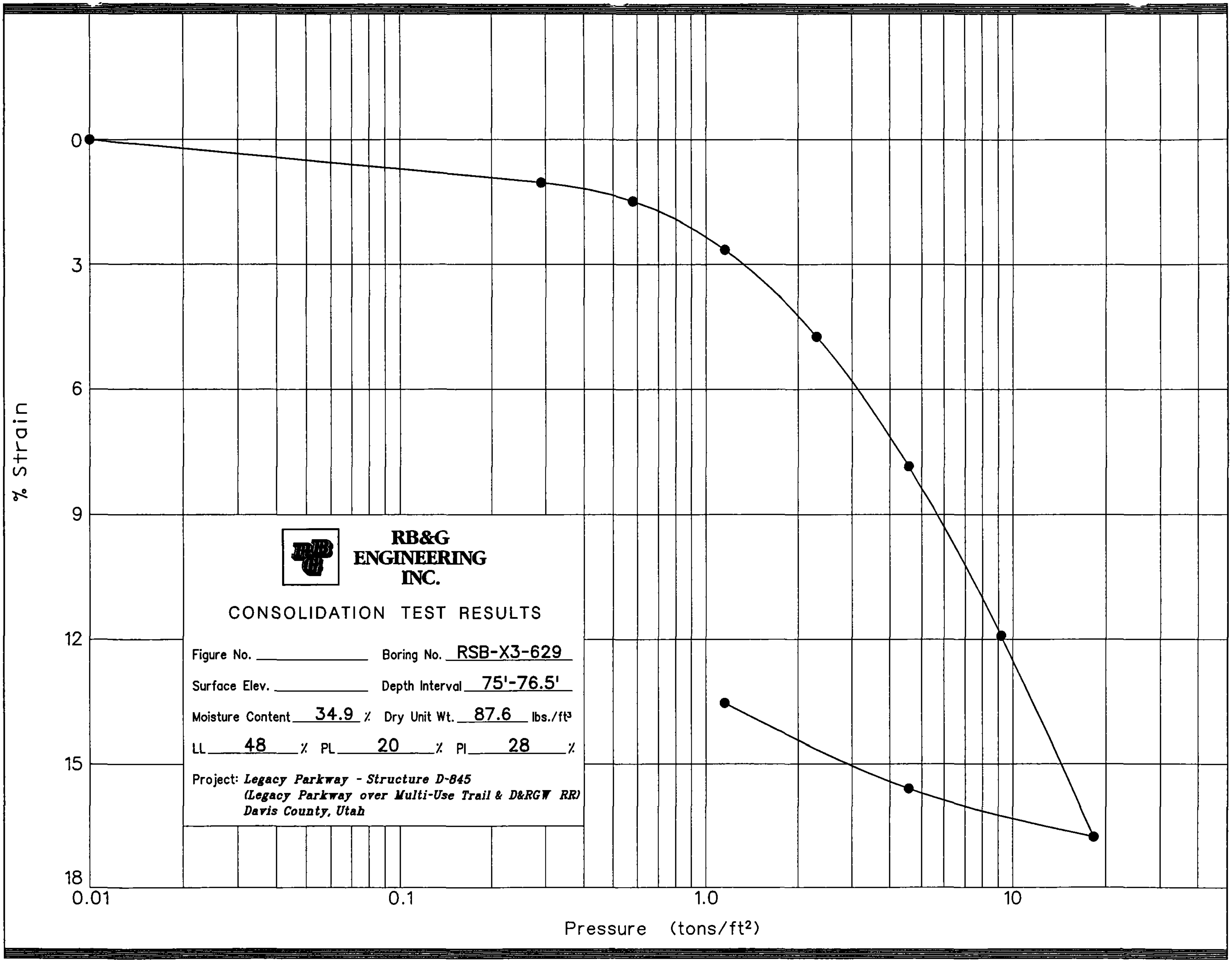
Figure No. ____________ Boring No. RSB-X3-629

Surface Elev. ____________ Depth Interval 75'-76.5'

Moisture Content 34.9 % Dry Unit Wt. 87.6 lbs./ft³

LL 48 % PL 20 % PI 28 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



RB&G ENGINEERING INC.

CONSOLIDATION TEST RESULTS

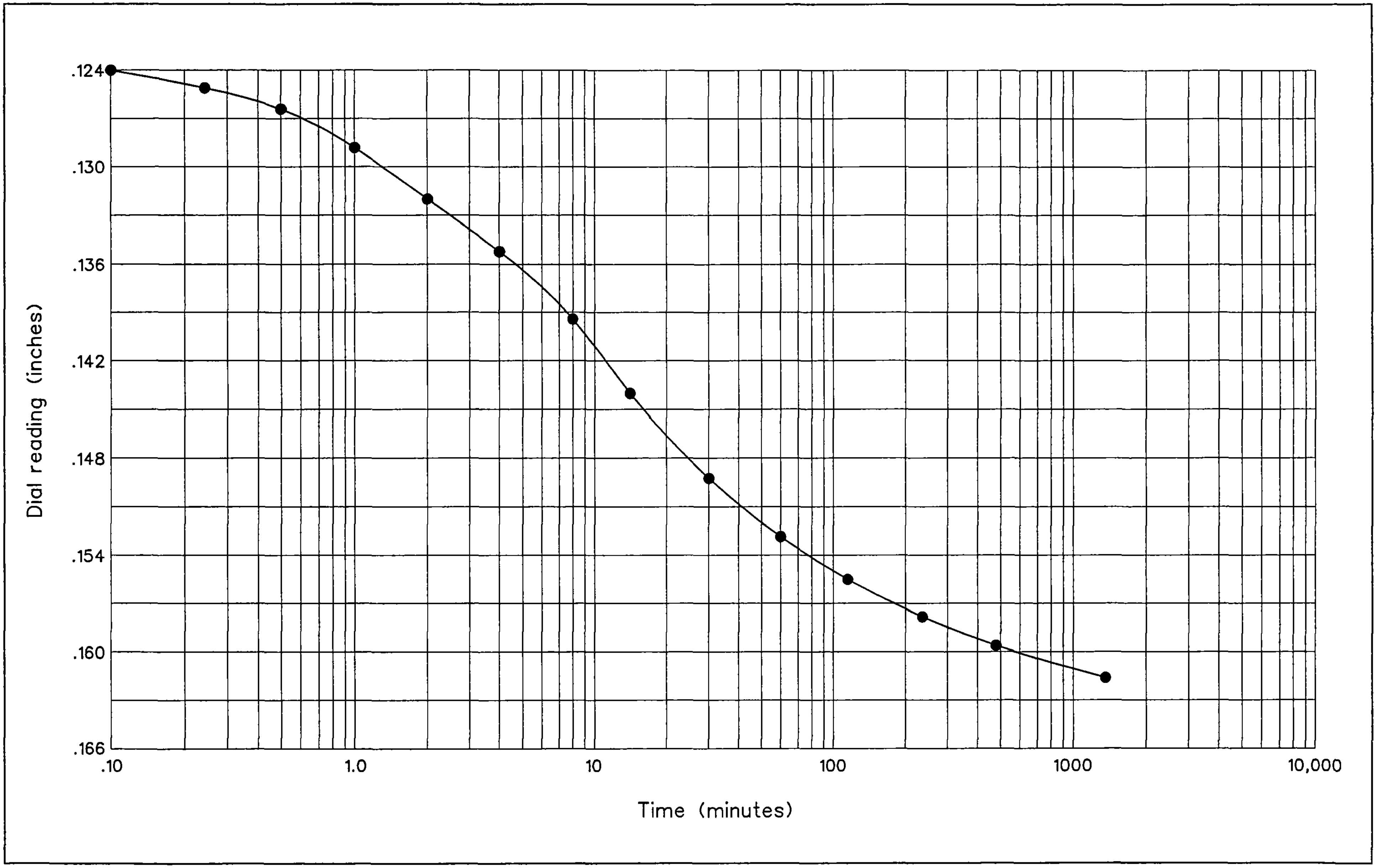
Figure No. ____________ Boring No. RSB-X3-629

Surface Elev. ____________ Depth Interval 75'-76.5'

Moisture Content 34.9 % Dry Unit Wt. 87.6 lbs./ft³

LL 48 % PL 20 % PI 28 %

Project: *Legacy Parkway - Structure D-845*
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah



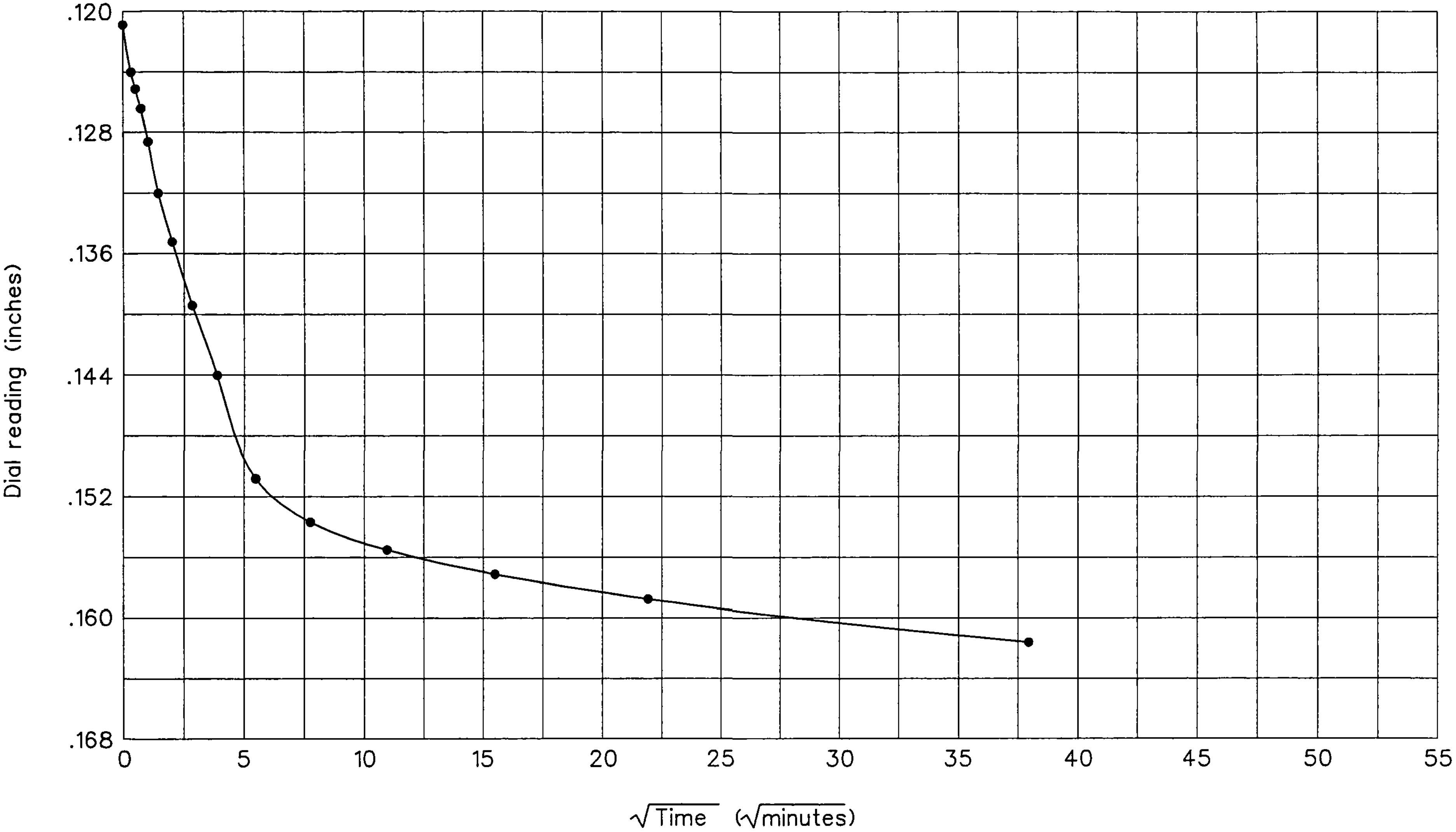
RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 75'-76.5'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure



RB&G ENGINEERING INC.
Provo, Utah

Hole no.: RSB-X3-629
Depth: 75'-76.5'
Load: 9.20 to 18.40 tons

TIME CONSOLIDATION

Legacy Parkway - Structure D-845
(Legacy Parkway over Multi-Use Trail & D&RGW RR)
Davis County, Utah

Figure

APPENDIX D
Supplemental Data

Legacy Parkway Project

Summary of Lateral Earth Pressure Recommendations

Recommended Soil Parameters

Fill Description	**Total Unit Weight (pcf)**	**Internal Friction Angle (degrees)**	**Cohesion (psf)**	**Comments**
Sandy Gravel	150	38	0	Recommend 150 pcf and 38 degrees for loads, and 125 pcf and 34 degrees for resistance.*
Silty Sand	125	34	0	
Pumice	85	38	0	Recommend 85 pcf for loads and 80 pcf for resistance.*

*Recommendations per Memo dated April 18, 2006

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 = 0.24 for Sandy Gravel and Pumice

0.28 for Silty Sand

(2) Passive Lateral Earth Force (yielding walls)

$P_P = 0.5K_P\gamma H^2$ (triangular distribution)

K_P = 4.2 for Sandy Gravel and Pumice

3.5 for Silty Sand

(3) At-Rest Lateral Earth Force (non-yielding walls)

$P_O = 0.5K_O\gamma H^2$ (triangular distribution)

K_O = 0.38 for Sandy Gravel and Pumice

0.44 for 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

$P_O^* = 0.5K_O\gamma H^2$ (triangular distribution)

K_O^* = 2.8 for Sandy Gravel and Pumice

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)

Probabilistic Peak Ground Accelerations

General Bridge Site Location	**10% PE in 50 Years**	**2% PE in 50 Years**
From Mill Creek North	0.22g - 0.26g	0.60g - 0.63g
South of Mill Creek	0.26g - 0.30g	0.65g - 0.73g

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	Peak Ground Acceleration			
		0.25	**0.30**	**0.63**	**0.73**
Active (K_{AE})	**38**	0.35	0.38	0.65	0.77
	34	0.41	0.44	0.75	0.92
Passive (K_{PE})	**38**	3.77	3.68	3.01	2.76
	34	3.14	3.05	2.39	2.11

* Assumes k_h = 0.8PGHA. See memo dated April 18, 2006

*Dynamic Earth Pressure Coefficients (for wall displacement up to 10A inches**)*

Case	Friction Angle	Peak Ground Acceleration			
		0.25	**0.30**	**0.63**	**0.73**
Active (K_{AE})	**38**	0.31	0.32	0.44	0.49
	34	0.36	0.37	0.51	0.56
Passive (K_{PE})	**38**	3.94	3.89	3.51	3.38
	34	3.29	3.24	2.89	2.77

** Assumes k_h = 0.5PGHA. See memo dated April 18, 2006

(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 (PGA/g)

Dynamic Overturning Moment

$\Delta M_{eq} = 0.53 a_h \gamma H^3$

Point of Application of Dynamic Thrust

$h_{eq} = \Delta M_{eq} / \Delta P_{eq}$

$\approx 0.53H$

References

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.

RB&G Engineering, Inc.

Memo

To: Sohail T. Khan, P.E; Larry Reasch, P.E.
From: Brad Price / Rob Johnson
CC: Steven K. Doerrer, PE; Brian Byrne, PE
Date: April 18, 2006
Re: Response to Design Criteria Questions

Responses to the questions submitted by Steven Doerrer are listed below. The email listing the questions is also attached for reference:

1) As discussed on last week's conference call (4/26/06), recommended total unit weights for fill material are as follows:

   - Regular-Weight Fill – 150 pcf for load calculations, 125 pcf for resistance calculations
   - Lightweight Fill (Pumice) – 85 pcf for load calculations, 80 pcf for resistance calculations

   It has been noted that the unit weight of regular-weight fill varies widely depending upon the source. However, it is our understanding that it is not desirable to limit the potential regular-weight borrow sources by specifying a permissible range of fill unit weight. In the interest of conservatism, we recommend using the larger unit weight to calculate soil loads, and the smaller unit weight to calculate soil resistance. The following values are recommended for fill friction angle:

   - Regular-Weight Fill – 38 degrees for load calculations, 34 degrees for resistance
   - Lightweight Fill (Pumice) – 38 degrees for load and resistance calculations

2) The Mononobe-Okabe equations are in accordance with AASHTO LRFD A11.1.1.1 and do not include inertia forces. Page 11-85 of the AASHTO LRFD states that it is not conservative to neglect inertia forces of the abutment mass. We believe it is appropriate to add seismic inertia forces of the heel backfill and concrete abutments.

3) The dynamic earth pressure coefficients provided previously, K_{AE} and K_{PE}, are for total active and passive thrust, respectively, and include both static and dynamic components. The dynamic components are ΔK_{AE} and ΔK_{PE} and are computed by subtracting the static force from the total thrust as shown on the memo. It should be noted that the equations by Wood (1973) for non-yielding walls provide only the dynamic thrust components of force and moment, and do not include static components.

4) In the memo dated 04/17/06, the horizontal acceleration coefficient k_h was assumed to be 80% of the peak horizontal ground acceleration coefficient for calculation of the Mononobe-

Okabe coefficients K_{AE} and K_{PE}. AASHTO LRFD A11.1.1.2 states that a k_h value equal to ½ the PHGA is adequate for most design purposes, provided that allowance is made for an outward displacement of the abutment of up to 10A inches (see page 11-88), where A is the maximum acceleration coefficient (PHGA). Mononobe-Okabe coefficients *for the 50% reduction* are summarized below, and may be used if allowance is made for the corresponding displacement.

Case	**Friction Angle**	**Peak Ground Acceleration Coefficient**			
		0.25	**0.30**	**0.63**	**0.73**
Active (K_{AE})	**38**	0.31	0.32	0.44	0.49
	34	0.36	0.37	0.51	0.56
Passive (K_{PE})	**38**	3.94	3.89	3.51	3.38
	34	3.29	3.24	2.89	2.77

If displacement must be minimized, we recommend that the factors shown in the initial memo (04/17/06) be used.

It should be noted that the Mononobe-Okabe factors provided to date neglect vertical acceleration. Seed and Whitman (1970) concluded that vertical accelerations can be ignored when the Mononobe-Okabe analysis is used to estimate P_{AE} for typical wall design (see Kramer, 1996). It is estimated that positive vertical accelerations, if considered, may increase the Seismic Active Thrust coefficient (K_{AE}) by as much as 30%. If desired, the coefficients on the table above can be refined to consider vertical acceleration once Peak Vertical Ground Accelerations have been determined (see Response No. 7 below).

5) We can evaluate the potential pile capacities at different depths and provide results along with uplift. It is assumed that the request of estimated pile tip elevations for compression resistance of 70, 100, and 120 tons applies only to the Pedestrian Bridge over Legacy Parkway (P-21). At any bridge we can evaluate the potential for providing a specific resistance per pile if we are provided with the desired resistance values (see also Response No. 6 below). The given extreme event capacities assume a resistance factor of 1.0, and are reduced for potential liquefaction.

6) It is possible to consider pile diameters larger than 16", although driven piles with diameters/widths greater than 16" are somewhat rare locally and local pile driving capabilities may be limited. Also, it is our understanding that a consistent pile section is preferred for the project to limit potential errors and confusion (primarily during construction). Is increased axial resistance the only reason for considering larger diameter piles? We would like to know the specific purpose for considering other diameters (such as target resistance values), as it would be inefficient to estimate capacities for an unlimited range of diameters, toe elevations, etc.

7) Kleinfelder is working on site-specific response spectra for 1250 West and State Street. It is our understanding that this data will be used to develop general response spectra (including vertical accelerations) for use at all bridge sites.

8) It was agreed at a previous meeting that the structural firms would perform the LPILE analysis using soil parameters provided by the geotechnical engineer. We recommend that p-

multipliers be used as input in LPILE or GROUP to account for group effects. As noted on the LPILE parameters sheet included with the initial recommendations for each structure, p-multipliers for laterally-loaded pile groups are outlined in AASHTO LRFD 10.7.2.4. The factors listed in the 2006 LRFD interim are in relatively good agreement with full-scale pile group lateral load tests performed at the Salt Lake City International Airport, where shallow soils are reasonably representative of the shallow soils typically encountered at the Legacy bridge sites.